Dec
2015

Worldwide Equipment Guide

Volume 1: Ground Systems



TRADOC G-2 ACE–Threats Integration
Ft. Leavenworth, KS

Distribution Statement: Approved for public release; distribution is unlimited.

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REPLY TO
ATTENTION OF:

ATIN-ZAL 16 March 2016

MEMORANDUM FOR: Distribution unlimited

SUBJECT: Worldwide Equipment Guide (WEG) Update 2015

1. In today's complicated and uncertain world, it is impossible to predict the exact nature of the next conflict that may involve U.S. joint forces. We must be ready to meet the challenges of any type of conflict, in all kinds of places, and against all types of threats in all Complex Operational Environments. As a training tool, the opposing force (OPFOR) must be a challenging, uncooperative sparring partner capable of stressing any or all warfighting functions and mission-essential tasks of the U.S. force.

2. The Army Training Circular 7-100 series describes the doctrine, organizations, TTP, and equipment of such an OPFOR and how to combine it with other operational variables to portray the qualities of a full range of conditions appropriate to Army training environments.

3. The WEG was developed to support the TC 7- 100 series and all OPFOR portrayal in training simulations (live, virtual, constructive, and gaming). The equipment portrayed in the WEG represents military systems, variants, and upgrades that US forces may encounter now and in the foreseeable future. The authors continually analyze real- world developments, capabilities, and trends to guarantee the OPFOR remains relevant.

4. Published in three volumes, (Ground; Airspace & Air Defense Systems; and Naval & Littoral Systems) the WEG is the approved document for OPFOR equipment data used in U.S. Army training. Annual updates are posted on the ATN website. Therefore it is available for downloading and local distribution. Distribution restriction is unlimited. This issue replaces all previous issues.

5. For comments or questions regarding this document, contact Mr. Cantin DSN 552- 7952, (913) 684-7952, john.m.cantin.ctr@mail.mil. If he is not available (or for specific issues), contact the POCs noted in the chapter introductions.

Gary E. Phillips
Assistant TRADOC G-2

Preface

The WEG was developed to support the TC 7-100 series and all OPFOR portrayal in training simulations (constructive, virtual, live, and gaming). The equipment portrayed in this WEG represents military systems, variants, and upgrades that U.S. forces may encounter now and in the foreseeable future. The authors continually analyze real-world developments, capabilities, and trends to guarantee that the OPFOR remains relevant.

This series of TC/FM and guides outline an OPFOR capable of portraying the entire spectrum of military and paramilitary capabilities against which the U.S. Military must train to ensure success in any future conflict.

Applications for this series of handbooks include field training, training simulations, and classroom instruction throughout the U.S. Military. All U.S. Military training venues should use an OPFOR based on these handbooks, except when mission rehearsal or contingency training requires maximum fidelity to a specific country-based threat. Even in the latter case, trainers should use appropriate parts of the OPFOR handbooks to fill information gaps in a manner consistent with what they do know about a specific threat.

Unless this publication states otherwise, masculine nouns or pronouns do not refer exclusively to men.

Introduction

This Worldwide Equipment Guide (WEG) describes the spectrum of worldwide equipment and system trends in the Complex Operational Environment (COE). Tier Tables provide baseline examples of systems with counterparts in other capability tiers. Other systems are added to offer flexibility for tailoring the force systems mix. Substitution Tables offer other system choices versus baseline examples.

The OPFOR in the COE should also include options for portraying "hybrid threat". Hybrid threat is defined as:

…the diverse and dynamic combination of regular forces, irregular forces, terrorist forces, and/or criminal elements, all unified to achieve mutually benefitting effects.

The OPFOR may use conventional weapons; however regular and irregular forces may also employ improvised systems, as described throughout this guide. Upgrade tables are included to capture WEG systems changes reflecting contemporary upgrade trends. Systems and technologies in Chapter 10, Countermeasures, Upgrades, and Emerging Technology, can be used in simulations for Near-Term and Mid-Term scenarios.

The pages in this WEG are designed for use in electronic form or for insertion into loose-leaf notebooks. This guide will be updated as often as necessary, in order to include additional systems, variants, and upgrades that are appropriate for OPFOR use.

The 2015 version of the WEG has changes in the format and presentation of information. We have attempted to make the information available more user friendly, easily accessible, and concise. Therefore, much of the narrative on some systems has been updated and edited. If you have questions on the presentation of information or anything else included in this guide, contact Mr. John Cantin at DSN 552-7952, commercial (913) 684-7952, email: john.m.cantin.ctr@mail.mil.

HOW TO USE THIS GUIDE

The WEG is organized by categories of equipment, in chapters. The format of the equipment pages is basically a listing of parametric data. This permits updating on a standardized basis as data becomes available. For meanings of acronyms and terms, see the Glossary. Please note that, although most terms are the same as in U.S. terminology, some reflect non-U.S. concepts and are not comparable or measurable against U.S. standards. For example, if an OPFOR armor penetration figure does not say RHA (rolled homogeneous armor) do not assume that is the standard for the figure. If there are questions, consult the Glossary, or contact us.

System names reflect intelligence community changes in naming methods. Alternative designations include the manufacturer's name, as well as U.S./NATO designators. Note also that the WEG focuses on the complete weapon system (e.g., AT-4/5/5B antitank guided missile launcher complex or 9P148 ATGM launcher vehicle), versus a component or munition (9P135 launcher or AT-4/5 ATGM).

Many common technical notes and parameters are used in chapters 3 through 6, since the systems contained in those chapters have similar weapon and automotive technologies. Chapters 2 (Infantry Weapons), 7 (Engineer and CBRN) and 8 (Logistics), offer systems with many unique parameters and therefore may not be consistent with those in other chapters.

The authors solicit the assistance of WEG users in finding unclassified information that is not copyright-restricted, and that can be certified for use. Questions and comments should be addressed to the POC below. If he is not available, contact the designated chapter POC.

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AKO PATH TO OPFOR COE PRODUCTS

To access WEG and other COE training products at our site, use either of these two methods.
The AKO direct link is https://www.us.army.mil/suite/files/21872221.

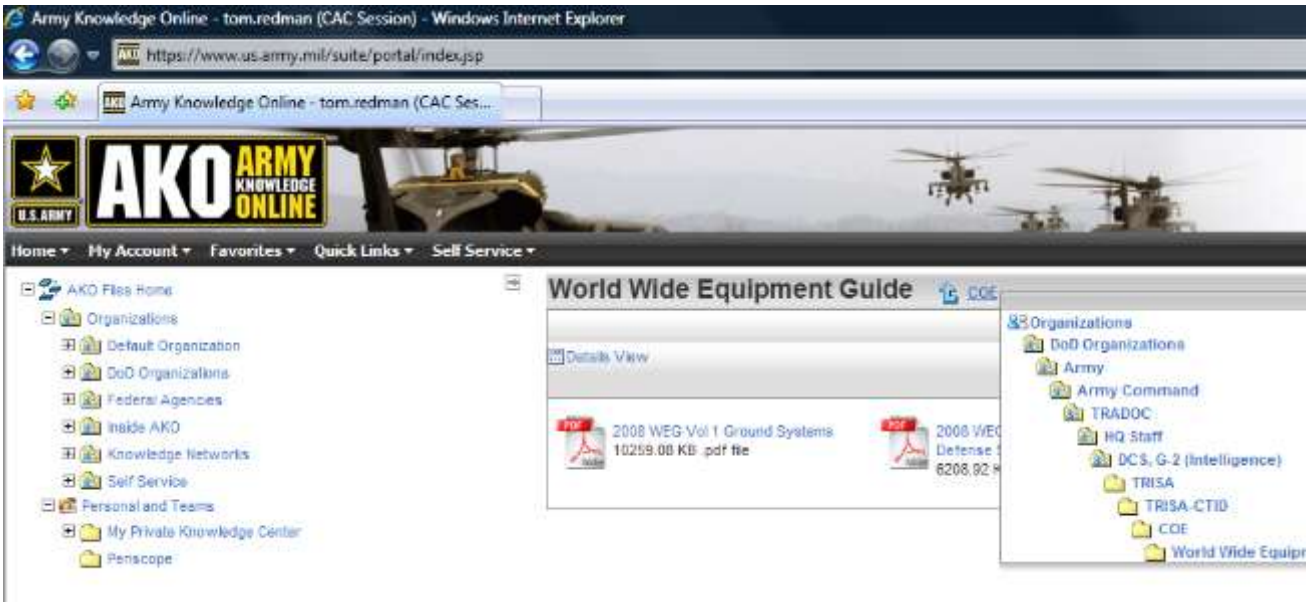
Direct link to each volume is as follows:

Volume 1 Ground Forces	https://www.us.army.mil/suite/doc/25963538
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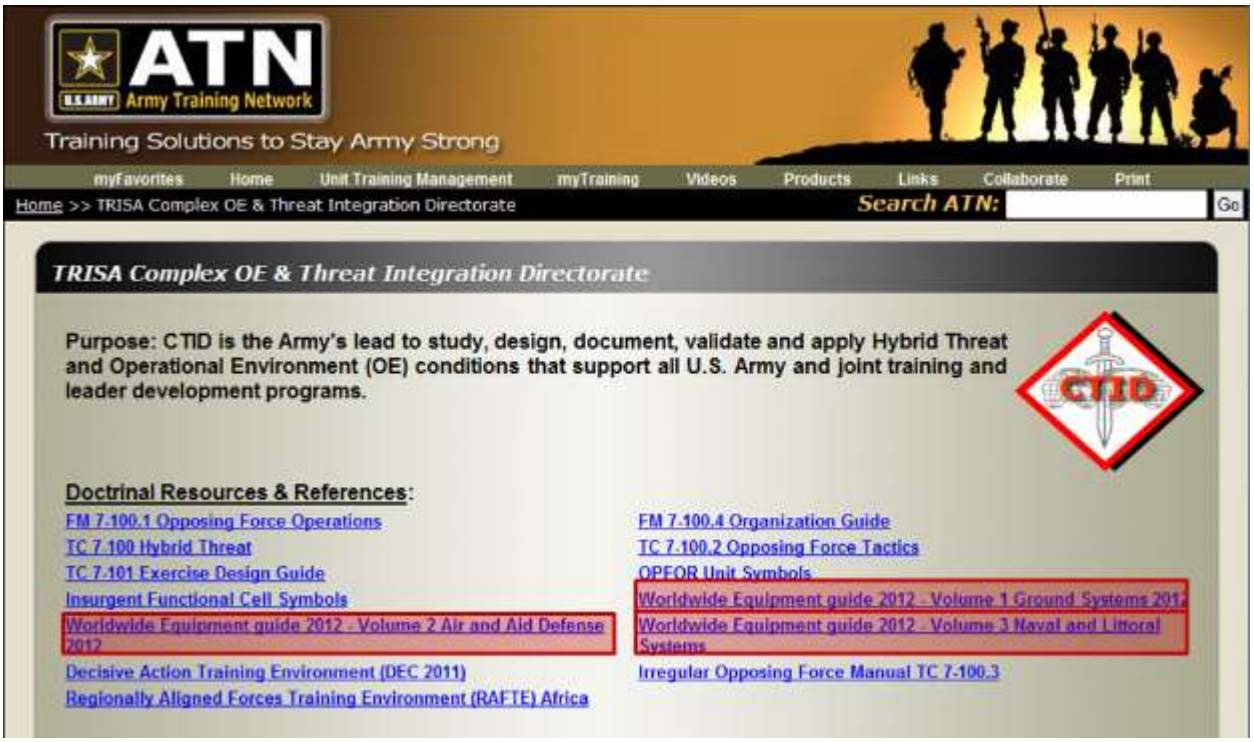
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ATN PATH TO OPFOR COE PRODUCTS

To access WEG and other COE training products at our ATN go to the TRISA CTID page at the following link https://atn.army.mil/dsp_template.aspx?dpID=311.



Navigate to the appropriate WEG Volume and download the PDF.

Opposing Force:
Worldwide Equipment Guide
Chapters Volume I

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Volume 1	TOC and Introduction
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Chapter 3	Infantry Vehicles
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Chapter 10	Countermeasures, Upgrades, and Emerging Technology
Chapter 11	Insurgent and Guerilla Forces
Chapter 12	Chemical Systems

Changes to the 2015 Worldwide Equipment Guide

Many chapters have significant changes. Changes include specific changes in format, text and data, photos, equipment name changes, as well as added or deleted pages. For clarity, functional classifications of aircraft and some designators and names for specific models have been adjusted.

In these times of reduced economic resources for military force improvements, most forces are focusing more on upgrading existing systems, with reduced numbers of new fielded systems. Thus, many older systems are being upgraded to be more effective against even the most modern forces. Therefore, the number of variants for systems described in the WEG continues to expand. Some system names have been changed to add key upgrade variants which are featured on the data sheets. A red ink edition is available for users who want to know detailed changes to text and data. Major changes can be found on the following pages:

Units of Measure

The following example symbols and abbreviations are used in this guide.

Unit of Measure	Parameter
(°)	degrees (of slope/gradient, elevation, traverse, etc.)
GHz	gigahertz—frequency (GHz = 1 billion hertz)
hp	horsepower (kWx1.341 = hp)
Hz	hertz—unit of frequency
kg	kilogram(s) (2.2 lb.)
kg/cm^2	kg per square centimeter—pressure
km	kilometer(s)
km/h	km per hour
kt	knot—speed. 1 kt = 1 nautical mile (nm) per hr.
kW	kilowatt(s) (1 kW = 1,000 watts)
liters	liters—liquid measurement (1 gal. = 3.785 liters)
m	meter(s)—if over 1 meter use meters; if under use mm
m^3	cubic meter(s)
m^3/hr	cubic meters per hour—earth moving capacity
m/hr	meters per hour—operating speed (earth moving)
MHz	megahertz—frequency (MHz = 1 million hertz)
mach	mach + *(factor)* —aircraft velocity (average 1062 km/h)
mil	milliradian, radial measure (360° = 6400 mils, 6000 Russian)
min	minute(s)
mm	millimeter(s)
m/s	meters per second—velocity
mt	metric ton(s) (mt = 1,000 kg)
nm	nautical mile = 6076 ft (1.152 miles or 1.86 km)
rd/min	rounds per minute—rate of fire
RHAe	rolled homogeneous armor (equivalent)
shp	shaft horsepower—helicopter engines (kWx1.341 = shp)
μm	micron/micrometer—wavelength for lasers, etc.

OPFOR Ground Systems – Tier Tables

The OPFOR organization and equipment must support the entire spectrum of Contemporary Operational Environment in U.S. forces training. The COE OPFOR includes "hybrid threats", and represents rational and adaptive adversaries for use in training applications and scenarios. The COE time period reflects current training as well as training extending through the Near Term. This chapter deals with current time frame systems. Lists of equipment on these tables offer convenient baseline examples arranged in capability tiers for use in composing OPFOR equipment arrays for training scenarios. For guidance on systems technology capabilities and trends after 2014, the user might look to Chapter 10, Countermeasures, Upgrades, and Emerging Technology. Those tables offer capabilities tiers for Near and Mid-Term.

OPFOR equipment is broken into four "tiers" in order to portray systems for adversaries with differing levels of force capabilities for use as representative examples of a rational force developer's systems mix. Equipment is listed in convenient tier tables for use as a tool for trainers to reflect different levels of modernity. Each tier provides an equivalent level of capability for systems across different functional areas. The tier tables are also another tool to identify systems in simulations to reflect different levels of modernity. The key to using the tables is to know the tier capability of the initial organizations to be provided. Tier 2 (default OPFOR level) reflects modern competitive systems fielded in significant numbers for the last 10 to 20 years.

Systems reflect specific capability mixes, which require specific systems data for portrayal in U.S. training simulations (live, virtual, and constructive). The OPFOR force contains a mix of systems in each tier and functional area which realistically vary in fielded age and generation. The tiers are less about age of the system than realistically reflecting capabilities to be mirrored in training. Systems and functional areas are not modernized equally and simultaneously. Forces have systems and material varying 10 to 30 years in age in a functional area. Often military forces emphasize upgrades in one functional area while neglecting upgrades in other functional areas. Force designers may also draw systems from higher or lower echelons with different tiers to supplement organizational assets. Our functional area analysts have tempered depiction of new and expensive systems to a fraction of the OPFOR force. The more common modernization approach for higher tier systems is to upgrade existing systems.

Some systems are used in both lower and higher tiers. Older 4x4 tactical utility vehicles which are 30 to 40 years old still offer effective support capability, and may extend across three tiers. Common use of some OPFOR systems also reduces database maintenance requirements.

Tier 1 systems are new or upgraded robust state-of-the-art systems marketed for sale, with at least limited fielding, and with capabilities and vulnerabilities representative of trends to be addressed in training. But a major military force with state-of-the-art technology may still have a mix of systems across different functional areas at Tier 1 and lower tiers in 2013.

Tier 2 reflects modern competitive systems fielded in significant numbers for the last 10 to 20 years, with limitations or vulnerabilities being diminished by available upgrades. Although forces are equipped for operations in all terrains and can fight day and night, their capability in range and speed for several key systems may be somewhat inferior to U.S. capability.

Tier 3 systems date back generally 30 to 40 years. They have limitations in all three subsystems categories: mobility, survivability and lethality. Systems and force integration are inferior. However,

guns, missiles, and munitions can still challenge vulnerabilities of U.S. forces. Niche upgrades can provide synergistic and adaptive increases in force effectiveness.

Tier 4 systems reflect 40 to 50 year-old systems, some of which have been upgraded numerous times. These represent Third World or smaller developed countries' forces and irregular forces. Use of effective strategy, adaptive tactics, niche technologies, and terrain limitations can enable a Tier 4 OPFOR to challenge U.S. force effectiveness in achieving its goals. The tier includes militia, guerrillas, special police, and other forces.

Please note: ***No force in the world has all systems at the most modern tier.*** Even the best force in the world has a mix of state-of-the-art (Tier 1) systems, as well as mature (Tier 2), and somewhat dated (Tier 3) legacy systems. Many of the latter systems have been upgraded to some degree, but may exhibit limitations from their original state of technology. Even modern systems recently purchased may be considerably less than state-of-the-art, due to budget constraints and limited user training and maintenance capabilities. Thus, even new systems may not exhibit Tier 1 or Tier 2 capabilities. As later forces field systems with emerging technologies, legacy systems may be employed to be more suitable, may be upgraded, and continue to be competitive. ***Adversaries with lower tier systems can use adaptive technologies and tactics, or obtain niche technology systems to challenge advantages of a modern force.***

A major emphasis in an OPFOR is flexibility in use of forces and in doctrine. This also means OPFOR having flexibility, given rational and justifiable force development methodology, to adapt the systems mix to support doctrine and plans. The tiers provide the baseline list for determining the force mix, based on scenario criteria. The OPFOR compensates for capability limitations by using innovative and adaptive tactics, techniques, and procedures (TTP). Some of these limitations may be caused by the lack of sophisticated equipment or integration capability, or by insufficient numbers. Forces can be tailored in accordance with OPFOR guidance to form tactical groups.

An OPFOR force developer has the option to make selective adjustments such as use of niche technology upgrades such as in tanks, cruise missiles, or rotary-wing aircraft, to offset U.S. advantages (see WEG Chapter 15, Equipment Upgrades). Forces may include systems from outside of the overall force capability level. A Tier 3 force might have a few systems from Tier 1 or 2. The authors will always be ready to assist a developer in selecting niche systems and upgrades for use in OPFOR portrayal. Scenario developers should be able to justify changes and systems selected. With savvy use of TTP and systems, all tiers may offer challenging OPFOR capabilities for training. The Equipment Substitution Matrices can help force designers find weapons to substitute, to reflect those best suited for specific training scenarios.

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	Tier 1	Tier 2	Tier 3	Tier 4
Dismounted Infantry				
Infantry Flame Launcher	(Shmel) RPO-M	RPO-A	RPO	LPO-50
Lt AT Disposable Launcher	Armbrust	Armbrust	Armbrust	RPG-18; M72 LAW
AT Disposable Launcher	RPG-30/32/28	RPG-27	RPG-26	RPG-22
AT Grenade Lcher (ATGL)	Panzerfaust 3-IT600	Panzerfaust 3 T-600; RPG-29	Carl Gustaf M3	RPG-7V
Long-Range ATGL	PF-98 Mounted/Tripod (@ Bn)	RPG-29/Mounted/Tripod	SPG-9M (Imp)	SPG-9
Heavy ATGM Man-Portable	Eryx SR-ATGM	Eryx SR-ATGM	M79/Type 65-1 Recoilless	M67 Recoilless Rifle
Light Auto Grenade Launcher	QLZ-87 (Light Configuration); QLZ-87B	W-87	W-87	W-87
Auto Grenade Launcher	CIS-40 w/Air-Burst Munitions/ AGS-30; QLZ-87 (Heavy Configuration)	AGS-17	AGS-17	AGS-17
Heavy Machine Gun	KORD	NSV	NSV	DShk; M2 Browning
General Purpose MG	PKM Pechneg	PKM	PKM	PKM
Anti-Materiel Rifle	M107A1(.50 Cal); 6S8 and 6S8-1 (12.7mm)	M82A1(.50 Cal); OSV-96 (12.7mm)	M82A1(.50 Cal)	M82A1(.50 Cal)
Sniper Rifle	SVD	SVD	SVD	Mosin-Nagant
Assault Rifle	AK-74M	AK-74M	AKM	AKM
Carbine	AKS-74U	AKS-74U	AK-47 Krinkov	AK-47 Krinkov
Company-Dismount ATGM	Spike-LR ATGM Launcher	Spike-MR ATGM Launcher	AT-13	AT-7
Battalion-Dismount ATGMs	Kornet-E Launcher (1 team) Starstreak-SL AD/AT (1 team)	Kornet-E ATGM Lchr	AT-5B	AT-5
Combat Vehicles				
Infantry Fighting Vehicle	BMP-2M Berezhok	BMP-2M	AMX-10P	BMP-1PG
Infantry IFSV for IFV	BMP-2M Berezhok	BMP-2M w/Kornet/SA-18	AMX-10 w/AT-5B/SA-16	BMP-1PG w/ AT-5/SA-16
Amphibious IFV	BMP-3UAE/AT-10B	BMP-3UAE/AT-10B	BMD-2/AT-5B	BMP-1PG/AT-5
Amphibious IFV IFSV	BMP-3UAE/AT-10B	BMP-3UAE/AT-10B	BMD-2/AT-5B	BMD-1PG w/AT-5/SA-16
Armored Personnel Carrier	BTR-3E1/AT-5B	BTR-80A	BTR-80	M113A1
Amphibious APC	BTR-90	BTR-80A	WZ-551	VTT-323
Amphibious APC IFSV	BTR-90/AT-5B/SA-24	BTR-80A w/Kornet-E/SA-18	WZ-551 w/AT-5B/SA-16	VTT-323 w/AT-3C/SA-14

	Tier 1	Tier 2	Tier 3	Tier 4
Airborne IFV	BMD-3	BMD-3	BMD-2	BMD-1P
Airborne APC	BTR-D	BTR-D	BTR-D	BTR-D
Airborne APC IFSV	BTR-D w/Kornet-E, SA-24	BTR-D w/Kornet-E/SA-18	BTR-D w/AT-5B/SA-16	BTR-D w/AT-5, SA-14
Heavy IFV/Heavy IFSV	BMP-3M/w Kornet-E, SA-24	BMP-3UAE/Kornet-E, SA-18	Marder 1A1/MILAN 2, SA-16	BMP-1PG/w SA-14
Combat Recon Vehicle	BRM-3K/Kredo M1	BRM-3K	BRM-1K	EE-9
Abn/Amphib Recon CRV	BMD-3/Kredo M1	BMD-3K	BMD-1PK	BMD-1K
Armored Scout Car	BRDM-2M-98/Zbik-A	BRDM-2 M-97/Zbik-B	Fox	BRDM-2
Sensor Recon Vehicle	HJ-62C	HJ-62C	BRM-1K	BRM-1K
AT Recon Vehicle	PRP-4MU (w/Kredo-M1)	PRP-4M (w/PSNR-5M)	PRP-4 (w/PSNR-5K)	PRP-3 (w/SMALL FRED)
Armored Command Vehicle	BMP-1KshM	BMP-1KShM	BMP-1KSh	BMP-1KSh
Abn/Amphib ACV	BMD-1KShM	BMD-1KShM	BMD-1KShM	1KShM
Wheeled ACV	BTR-80/Kushetka-B	BTR-80/Kushetka-B	BTR-60PU/BTR-145BM	BTR-60PU/BTR-145BM
Combat Support Vehicles				
Motorcycle	Gear-Up (2-man)	Gear-Up (2-man)	Motorcycle (2-man)	Motorcycle (2-man)
Tactical Utility Vehicle	VBL MK2	VBL	UAZ-469	UAZ-469
Armored Multi-purpose	MT-LB6MB	MT-LB6MA	MT-LBu	MT-LB
All Terrain-Vehicle	Supacat	Supacat	LUAZ-967M	LUAZ-967M
Tanks and AT Vehicles				
Main Battle Tank	T-90A/AT-11 Refleks 5km	T-72BM / AT-11 Svir 4km	Type 59-11 105mm/AT-10	T-55AMV
Amphibious Tank	Type 63A 105mm/AT-10	Type 63A 105mm	M1985 85mm/AT-3	PT-76B
Tracked Heavy Armored CV	2S25	AMX-10 PAC 90	AMX-13	M41A3
Wheeled Heavy Armored CV	Carousel 120	AMX-10RC Desert Storm	AMX 10RC	EE-9
Div ATGM Launcher Vehicle	9P157-2/Krizantema-S	9P149 w/AT-9 Ataka	9P149 w/AT-6	9P148/AT-5
Bde ATGM Veh Tracked	9P162 w/Kornet	AMX-10 HOT 3	AMX-10 HOT 2	Type 85/Red Arrow-8A
Bde ATGM Veh Wheeled	BMD-3	VBL w/Kvartet, Kornet	9P148/AT-5B	Jeep/Red Arrow-8A
Abn ATGM Launcher Veh	VBL MK2 w/Kvartet, Kornet	VBL w/Kvartet, Kornet	BMD-2 with AT-5B	BMD-1P with AT-5

	Tier 1	Tier 2	Tier 3	Tier 4
Hvy ATGM Launcher Veh	9P157/Mokopa	9P149 w/Ataka	9P149 w/AT-6	9P148/AT-5
NLOS ATGM Launcher Veh	AMX-13Nimrod-3	Type 92B/Nimrod	--	--
Div Towed AT Gun	2A45MR	2A45M	MT-12	MT-12
Bde Towed AT Gun	2A45MR	MT-12R	MT-12	M40A1
Artillery				
Mortar/Combo Gun Tracked	2S9-1	2S9-1	2S9-1	M106A2
Mortar/Combo Gun Wheeled	2S23	2S23	2S12	M-1943
Towed Mortar or Combo Gun	Type 86 or 2B16	Type 86 or 2B16	M75 or MO-120-RT	M-1943
82-mm Mortar	Type 84	Type 84	Type 69	M-1937

82-mm Auto Mortar	2B9	2B9	2B9	2B14-1
60-mm Mortar	Type 90	Type 90	Type 63-1	Type 63-1
Towed Light Howitzer	D-30	D-30	D-30	D-30
Towed Medium How/Gun	G5	2A65	2A36	D-20
Self-Propelled Howitzer	2S19M1-155, G6, AU-F1T	G6, 2S19M1	2S3M1	2S3M
Multiple Rocket Launcher	9A51/Prima	9A51/Prima	BM-21-1	BM-21
Light MRL/Vehicle Mount	Type 63-1	Type 63-1	Type 63-1	Type 63
Heavy MRL	9A52-2 and 9P140	9A52-2 and 9P140	9P140	Fadjr-3
1-Round Rocket Launcher	9P132	9P132	9P132	9P132
Amphibious SP How	2S1M	2S1M	2S1	2S1
Artillery Cmd Recon Veh	1V13M w/1D15, 1V119	1V13M w/1D15, 1V119	1V13, 1V119	1V18/19, 1V110
ACRV, Wheeled	1V152, 1V110	1V152, 1V119, 1V110	1V119, 1V110	1V18/19, 1V110
Mobile Recon Vehicle	PRP-4MU (w/Kredo-M1)	PRP-4M (w/PSNR-5M)	PRP-4 (w/PSNR-5K)	PRP-3 (w/SMALL FRED)
Arty Locating Radar	1L-259U, 1L-219	1L-220U, 1L-219	ARK-1M	Cymbeline
Sound Ranging System	SORAS 6	SORAS 6	AZK-7	AZK-5
Flame Weapon	TOS-1	TOS-1	Type 762 MRL	OT-55 Flame Tank

	Tier 1	Tier 2	Tier 3	Tier 4
Reconnaissance				
Ground Surveillance Radar	Kredo-1E	Kredo-M1	PSNR-5M/Kredo-M	PSNR-5/TALL MIKE/Kredo
Man-portable Radar	FARA-1E	FARA-1E	N/A	N/A
Unattended Ground Sensors	BSA Digital Net	BSA Digital Net	N/A	N/A
Remote TV/IR Monitor	Sirene IR	Sosna	N/A	N/A
Thermal Night Viewer	Sophie LR	Sophie/NVG 2 Gen II	NVG 2 Gen II	NVG 1Gen II
Laser Target Designator	DHY-307	DHY-307	1D15	--
Laser Rangefinder/Gonio-meter Fire Control System	Vector/SG12 with Sophie-LR	Vector/SG12 with Sophie	PAB-2M	PAB-2
Communications				
Radio VHF, Hand-Held	Panther-P	TRC5102	ACH42	R31K
Radio, SPF	Scimitar-H	PRC138	PVS5300	PRC104
Radio VHF, Veh Medium Pwr	Panther	Jaguar-V	R163-50U	R173M
Radio HF/VHF, Veh Med Pwr	M3TR	RF5000	XK2000	R123M
Satellite Systems	Syracuse-III	Feng Huo-1	Mayak	Molinya 1
Global Navigation Sattellite	NAVSTAR	GLONASS	Beidou	Galileo
Operational Comms	RL402A	R423-1	KSR8	R161-5
Tac Wide Area Network	EriTac	RITA	N/A	N/A
IBMS Network	Pakistani IBMS	Pakistani IBMS	N/A	N/A

Electronic Warfare				
Ground-Based ESM	**Meerkat-S**	**Weasel 2000**	**MCS90 Tamara**	**R-703/709**
Ground-Based EA	**CICADA-C**	**TRC 274**	**Pelena-6**	**R-330 T/B**
TACSAT EA	**CICADA-R**	**GSY 1800**	**Liman P2**	**R-934B**
Radar EA	**BOQ-X300**	**CBJ-40 Bome**	**Pelena-1**	**SPN-2/4**
GPS EA	**Aviaconversia TDS**	**Optima III**	**Aviaconversia**	**--**
UAV-Based EA	**Fox TX/Barrage**	**ASN-207/JN-1102**	**Yastreb-2MB/AJ-045A**	**Muecke/Hummel**
Engineer Systems				
Wheeled Minelaying Systems	**PMZ-4**	**PMR-3**	**Istrice VS-MTLU-1**	**--**
Tracked Minelaying Systems	**GMZ-3**	**GMZ-2**	**GMZ**	**--**
Scatterable Mine Systems	**PKM Man-Portable Minelayer**	**UMZ**	**Istrice VS-MTLU-1**	**--**
Route Recon Systems	**IPR**	**IRM**	**--**	**--**
Route Clearing Systems	**IMR-2M**	**IMR-2**	**BAT-2**	**BAT-M**
Bridging Systems	**TMM**	**PMP Pontoon Bridge**	**MT-55A**	**--**

SYSTEMS SUBSTITUTION MATRIX VOLUME 1

This table provides a list of Vol 1 systems for users to substitute other systems versus OPFOR systems listed in guidance documents. Systems in italics are Tier 2 baseline systems used in the OPFOR Organization Guide. Systems are listed by type in tier order, and can substitute to fit a scenario. Some systems span between the tiers (e.g., 3-4). Also, systems can be used at more than one tier (e.g., 3-4).

	Tier
1. RECONNAISSANCE	
Reconnaissance Vehicles	
BRM-3K Kredo-1E Combat Recon Veh	1
BRDM-2M-98, -97Armored Scout Cars	1-2
HJ-62C Sensor Recon Vehicle	1-2
VBL and VBL Mk2 Armored Scout Cars	1-2
BRM-3K Combat Recon Veh	2
BRM-1K Combat Recon Cmd Vehicle	3-4
Fox Armored Scout Car	3-4
BRDM-2 Armored Scout Car	4
Reconnaissance Systems	
Kredo-1E Grd Surveillance Radar	1-2
Fara-1E Man-portable GSR	1-2
PRP-4M Mobile Recon Vehicle	1-2
France RASIT GSR	2
Kredo-M1 Grd Surveillance Radar	2
Kredo-M Grd Surveillance Radar	3
Kredo/PSNR-5, -5K/TALL MIKE GSR	4
Sophie MF Forward Observer Sys	1
Sophie LR Thermal Binoculars/FO Sys	1
Sophie Thermal Binoculars/FO System	2
2. INFANTRY WEAPONS	
Small Arms	
6S8 and 6S8-1 (12.7mm) AM Rifle	1
M107-A1 Barrett AM Rifle	1
Pecheneg 7.62-mm GP MG	1
KORD Heavy MG	1
OSV-96 (12.7mm) AM Rifle	2
M82-A1 Barrett AM Rifle	2-4
SVD Sniper/Marksman Rifle	1-3
AK-74M Assault Rifle	1-2
RPK-74 Light Machinegun	2
NSV Heavy MG	1-3
PKM General Purpose MG	1-3
Lee-Enfield Rifle	3-4

	Tier
Mosin-Nagant Sniper Rifle	4
RPK Light Machinegun	3-4
SKS Rifle	4
AK-47/AKM Assault Rifle	3-4
RPD Light Machinegun	4
DShK 38/46 Heavy MG	4
M2 BROWNING Heavy MG	4
Grenade Launchers	
QLZ-87B Auto Grenade Launcher	1
AGS-30 Auto Grenade Launcher	1
GM-94 43-mm Magazine Grenade Lchr	1
QLZ-87 Auto Grenade Launcher	1
QLB-06 Auto Grenade Launcher	1
CIS-40 AGL w/Air Burst Munition	1
CIS-40 Auto Grenade Launcher	1-2
W-87 Auto Grenade Launcher	2-4
GP-30 Under-Barrel Grenade Lchr	3
AGS-17 Auto Grenade Launcher	3
Multi-purpose and Flame Launchers	
Shmel-RPO-M Flame Weapon	1
RPO-A Flame Weapons	2
RPO Flame Weapon	3
Antitank Weapons	
Panzerfaust 3-IT600 AT Grenade Lchr	1
PF-98and PF-98BN ATGL	1
RPG-32/Hashim ATGL	1
RPG-27 ATDL	1-3
RPG-29 ATGL	2
Panzerfaust-3T600 ATGL	2
Carl Gustaf M2 Recoilless Rifle	3
M67 Recoilless Gun	3-4
RPG-7V ATGL	4
RPG-28 AT Disposable Launcher	1
Armbrust ATDL	1-3
AT-4 ATDL	2-3
RPG-22 ATDL	4
RPG-30 ATGL	1
Obscurants and Flame	
Shmel-M Flame Weapon	1
BMO-1 Flamethrower Operator Vehicle	1-2
TOS-1 Flamethrower Weapon	1-2
RPO-A Flame Weapons	2
AF-79 Smoke Generator Vehicle	2

	Tier
3. INFANTRY VEHICLES	
Armored Personnel Carriers	
BTR-3E1	1-2
BTR-80A	2
BTR-80	3
Pandur	3
WZ 551A/Type 92	3
VTT-323	3-4
BTR-60PB	4
M113A1	3-4
YW 531H/Type 85	3-4
BOV-M	4
BTR-60PA	4
BTR-152 Armored Transporter	4
YW 531A/531C/Type 63-II	4
Infantry Fighting Vehicles	
BMP-2M Berezhok	1
BMP-2M	2
Marder 1IFV	2-3
Warrior IFV	2-3
AMX-10P IFV	3
BMP-2 IFV	3
BMP-1P IFV	4
BMP-1 IFV	4
Specialized Carriers/Infantry Fire Spt Vehicles	
BMP-3M Heavy IFV/Amp IFV	1
Kliver IFV Turret on BMP/BTR	1
BMP-3 UAE Amphibious IFV	1-2
BTR-90 Amphibious APC	1
BMD-3 Airborne IFV	1-2
BTR-D Airborne APC	1-4
BMD-1/BMD-1P Airborne	4
BTR-T Heavy APC	1-2
Combat Support Vehicles	
Spider Light Strike Vehicle	1
Cobra Light Armored Vehicle	1-2
Supacat All-Terrain Vehicle	1-2
VBL and VBR Armored Carrier	1-3
UAZ-469 Tactical Utility Vehicle	2-4
Gear-up Motorcycle	2-4
V-150 Armored Vehicle	3-4
MT-LB Armored Tracked Carrier Series	1-4
S55 4 Personnel Carrier	1-4

	Tier
4. TANKS	
Challenger 2	1
Leopard 2A5, 2A6	1
T-90A	1
Type 99 and Type 99A2	1
Al Khalid	1-2
T-80U	1-2
Leopard 2A4	1-2
T-90S	2
T-72BM	2-3
Type 96G	2
Chieftain Mk 12	2 -3
T-64B	2-3
T-80B	2-3
Chieftain Mk 5	3
T-72A/T-72M1	3
T-72B and Other T-72 Upgrade Tanks	3
AMX-30	3-4
Leopard 1A1	3-4
M60A1/M60A3	3-4
T-55AMV	3-4
T-62M	3-4
Type 59-II	4
T-34	4
5. ANTITANK AND ANTI-ARMOR	
Dismounted Infantry Crew-served Weapons	
RPG-29 Mounted 105-mm ATGL	1-2
Eryx Man-portable ATGM Launcher	1-2
Starstreak Air Def/Anti-armor Missile	1-2
Spike BLOS ATGM Launcher	1-2
Milan/Milan 3/Milan ADT ATGM Lchr	1-3
AT-13 Man-portable ATGM Launcher	3
AT-7 Man-portable ATGM Launcher	4
AT-3/Malyutka-2 ATGM Launcher	4
Portable Mounted Crew-served Weapons	
Kornet-E ATGM Launcher	1-2
9P135 Launcher and AT-4B/5B ATGMs	3-4
Red Arrow-8 ATGM Launcher	3-4
SPG-9/-9M 73-mm Recoilless Gun	3-4
M79 82-mm Recoilless Gun	3-4
Towed or Vehicle-Mounted Recoilless Guns	
B-10 82-mm Recoilless Gun	4
M60 82-mm Recoilless Gun	4
B-11 107-mm Recoilless Gun	4

	Tier
Towed Antitank Guns	
2A45MR/2A45M 125-mm Towed AT Gun	1-2
MT-12R/MT-12 100-mm Towed AT Gun	2-3
D-44/SD-44 85-mm Towed Gun	4
ZIS-3 76-mm Towed Antitank Gun	4
Heavy Armored Combat Vehicles	
M40 Upgrade 106-mm Recoilless Rifle	2-4
2S25 Self-Propelled AT Gun	1-2
Type 63A Mod Amphibious Tank	1-2
AMX-10RC Armored Recon Veh	2-3
AMX-10 PAC 90 Fire Support Veh	3
EE-9 Armored Recon Veh	3-4
M1985/PT-85 Light Tank	3
AMX-13 Light Tank	3-4
Scorpion Trkd Combat Recon Veh	3-4
M36 SP AT Gun	4
M41A3 Walker Light Tank	4
PT-76B Amphibious Tank	4
ATGM Launcher Vehicles	
Mokopa NLOS ATGM launcher System	1
9P157-2/Khrizantema-S ATGM Lchr Veh	1
VBL/Kvartet (Kornet) ATGM Lchr Veh	1
9P162/Kornet-LR ATGM Lchr Veh	1-2
Type 92B/RA-9 ATGM Lchr Vehicle	1-2
BRDM-2HOT-3 ATGM Lchr Veh	1-2
AMX-10 HOT ATGM Lchr Veh	2
9P149 (AT-6/9 Ataka) ATGM Lchr Veh	2-3
M901/ITOW ATGM Lchr Veh	2-3
9P148 (AT-4/5/4B/5B) ATGM Lchr Veh	3-4
6. ARTILLERY	
Artillery Command and Recon Vehicles	
1V13 Tracked	2-3
1V14/15 Tracked	2-3
1V16 Tracked	2-3
1V18/19 Wheeled	3
1V119 Airborne	3
1V110 Van	4
1V111 Van	4
Artillery Reconnaissance	
PRP-4MU Artillery Mobile Recon Veh	1
PRP-4M Artillery Mobile Recon Vehicle	2
PRP-3/4Artillery Mobile Recon Vehicles	3-4
IL-219 Artillery Locating Radar	1-3

	Tier
IL-220U Artillery Locating Radar	1-2
SORAS 6 Sound Ranging System	1-2
SNAR 10 Battlefield Surveillance Radar	3-4
ARK-1M Artillery Locating Radar	3
BL-904 Artillery Locating Radar	2-3
Cymbeline Artillery Locating Radar	3-4
Towed Cannon	
G-5 155-mm Towed Howitzer	1-2
GH N-45 155-mm Towed Gun-How	1-2
2A36 152-mm Towed Gun	3
D-30A 122-mm Towed Howitzer	3-4
M-46 130-mm Towed Gun	3-4
D-20 152-mm Towed Gun-Howitzer	3-4
Self-Propelled Cannon	
2S19M1 152-mm SP Howitzer	1
AU-F1T 155-mm SP Howitzer	1
CAESAR 155-mm Truck Mtd Howitzer	1
G-6 155-mm SP Howitzer	1-2
2S1 122-mm SP Howitzer	1-3
AU-F1155-mm SP Howitzer	2
2S19 152-mm SP Howitzer	2
Type 83 152-mm SP Gun-Howitzer	3
2S3M1 152-mm SP Howitzer	3
2S5M 152-mm SP Gun	3
M1978/M1989 170-mm Koksan SP Gun	4
Multiple Rocket Launcher	
Lynx MRL & Extra/Delilah Missile TEL	1-2
9A51/Prima 122-mm MRL	1-2
9A52-2 300-mm MRL	1-2
Astros-II 127/180/300-mm MRL	1-2
WM-80 273-mm MRL	1-2
BM-21 122-mm MRL	2-3
M77 128-mm MRL	2-3
9P140 220-mm MRL	2-3
Fadjr-3 240-mm MRL	2-3
9P132 122-mm Rocket Launcher	2-4
Type 63107-mm MRL	2-4
Mortars/Gun-Mortar Systems	
2B16 120-mm Towed Combination Gun	1-2
2S9-1 120-mm SP Combination Gun	1-2
2S23 120-mm SP Combination Gun	1-2
MO-120-RT 120-mm Towed Mortar	2-3
2S12 120-mm SP Mortar	3-4

	Tier
7. ENGINEER and CBRN	
Mine/Countermine	
Helkir Antihelicopter mine	1-2
PMZ-4 Towed Mechanical Minelayer	1-2
UMZ Scatterable Minelaying System	1-2
PKM Man-portable Minelaying System	1-2
TM-83 Side-attack mine	1-3 8-24
MTK-2 Tracked Mineclearing Vehicle	1-3
TM-62 Land mine	1-4
GMZ-3 Tracked Minelaying Vehicle	2-3
DIM Vehicle-Mounted Mine Detector	2-3
KMT-5 Tank-Mounted Roller-Plow Set	2-3
Istrice VS-MTLU-1Minelaying System	3
PMR-3 Towed Mechanical Minelayer	3-4
General Engineer	
IMR-2M Obstacle-Clearing Vehicle	1-3
BAT-2 Armored Route-Clearing Vehicle	2-3
MTU-72 Armored Veh-Launch Bridge	2-3
PMM-2 Self-Propelled Amphib Ferry	2-3
PMP Heavy Folding Pontoon Bridge	2-3
IRM Engineer Reconnaissance Vehicle	2-4
TMM Truck-Mounted Scissors Bridge	2-4
MT-55A Armored Veh-Launch Bridge	3-4
BAT-M Tracked Route-Clearing Vehicle	4
CBRN	
Decontamination and Smoke Vehicles	
TZ-74 Decon/Smoke Generator Vehicle	1-2
TMS-65M Decon/Smoke Generator Veh	3
8. LOGISTICS	
Transportation	
GAZ-66 2 mt Cargo Truck	2-4
Maintenance	
BREM-1 Armored Recovery Vehicle	1-3
T-54-T Armored Recovery Vehicle	4
General Utility	
KRAZ-255B 7.5 mt Cargo Truck	1-4
KamAZ 4310 6x6 General Utility Truck	1-2
Ural-375D 4.5 mt Cargo Truck	1-4
9. C2 and INFORMATION WARFARE	
Eritac Tactical Comms System	1
Kushetka-B Command and Staff Vehicle	1-2
IBMS (Pk) Integrated Battle Mgmt Sys	2

	Tier
BMP-1KSh Command and Staff Vehicle	2-3
142 NSA Command and Control Vehicle	1
Optima-3 GNSS Jamming Transmitter	1
ASN-207EW/ECM UAV	1
Cicada ES/EA Jamming Transmitter	1
1L245 Mobile Abn Rdr ECM Jammer	1-2
Weasel 2000 Mobile ESM/ELINT Sys	1-2
Aviaconversia Portable GNSS Jammer	1-2
Avtobaza Ground ELINT System	1-2
SPN-2/3/4 High-Power Radar Jammer	1-3
Infauna Airborne EA Jammer	1
Tigr-M REI PP Leer-2 EW System	1
German EULe ES/SIGINT System	1
Swedish SAB BOQ X-300 ECM/ECW Pod	1
Finish Elektrobit COMINT Sensor	1

11. COUNTERMEASURES, UPGRADES< AND EMERGING TECHNOLOGY
No Substitution Platforms

11. INSURGENT AND GUERILLA FORCES
No Substitution Platforms

12. CHEMICAL SYSTEMS
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2015

Worldwide Equipment Guide

Chapter 1: Reconnaissance



TRADOC G-2 ACE–Threats Integration
Ft. Leavenworth, KS

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Chapter 1: Reconnaissance

Reconnaissance represents all measures associated with organizing, collecting, and studying information on the enemy, terrain, and weather in the area of operation. Aggressive, continuous reconnaissance allows the timely accomplishment of combat missions with minimum losses. Poor reconnaissance can lead directly to failure.

The OPFOR term that addresses the totality of reconnaissance activities is RISTA (reconnaissance, intelligence, surveillance, and target acquisition). Therefore, RISTA **DOES NOT** equal the US term, C4ISR (command, control, communications, intelligence, surveillance, and reconnaissance). For information on OPFOR command and control (C2), see Chapter 9.

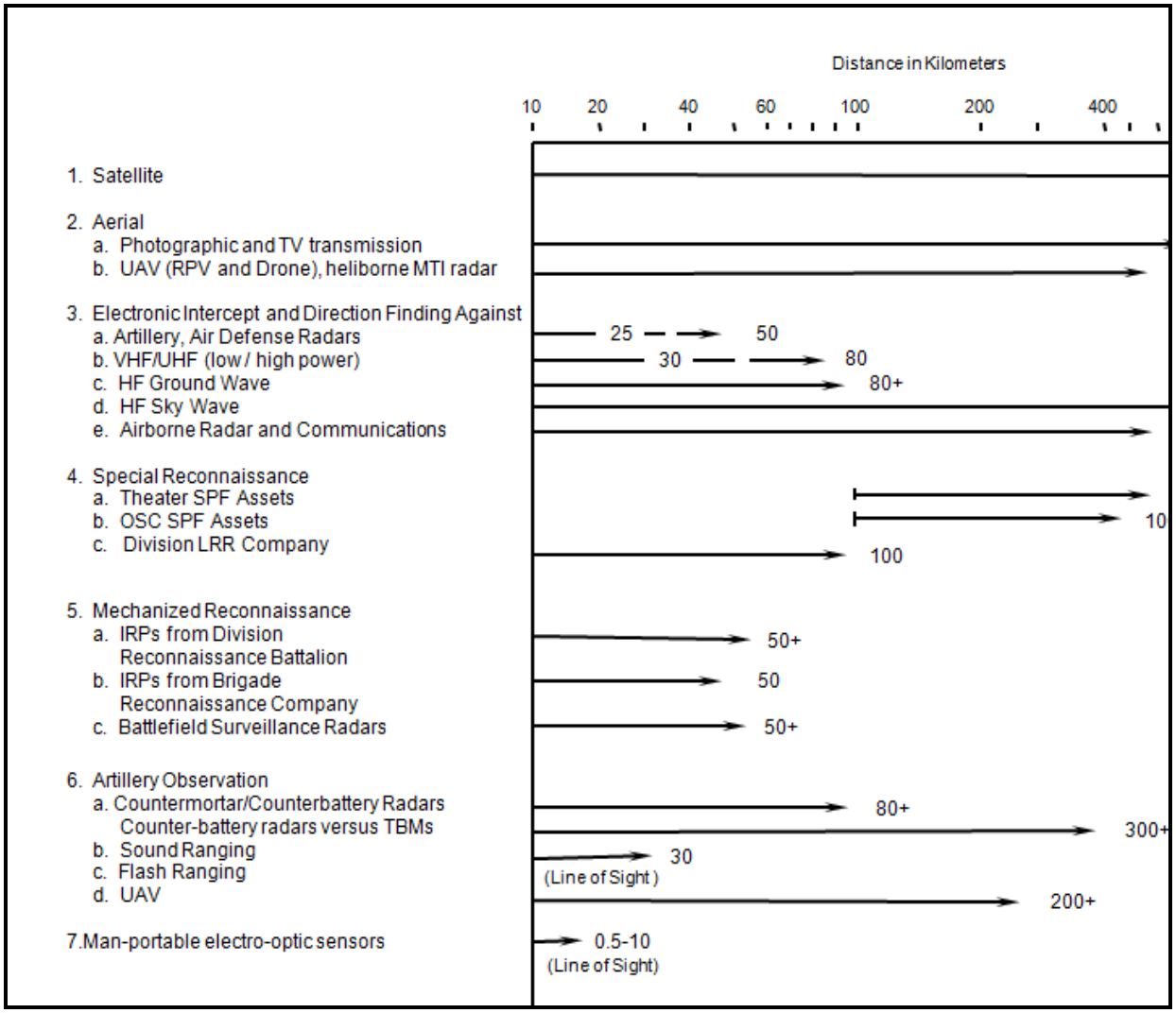
The OPFOR commits significant resources to reconnaissance. Prior to hostilities, the OPFOR will already have developed an intelligence picture and expected military courses of actions. While the OPFOR practices similar intelligence and reconnaissance disciplines (HUMINT, SIGNINT, IMINT, etc.) as the US, the OPFOR conducts RISTA with different assets, focuses, and methodologies. Reconnaissance platforms must be able to operate in all spheres: ground, surface, below surface, air, space, naval, and littoral areas. The OPFOR fields reconnaissance assets at all echelons and products derived from those assets are used for actions on the battlefield.

This chapter describes ground maneuver forces and specialized ground troops (special purpose forces-SPF) reconnaissance assets. The most basic sensors are lasers/optics/electro-optics used by infantry units (see Chapter 2). When linked with a radio, these basic sensors can be used for unit reporting and other HUMINT reports. There are also dedicated reconnaissance assets with data sheets in other chapters.

- Aerial reconnaissance (Rotary-Wing and Fixed Wing aviation chapters in Volume 2)
- Air defense reconnaissance, early warning, and target acquisition (Air Defense chapter in Volume 2)
- Artillery target acquisition (Artillery chapter)
- Engineer reconnaissance (Engineer chapter)
- NBC reconnaissance (Chemical chapter)
- Signals reconnaissance (Information Warfare chapter)
- Unmanned aerial vehicles (UAV chapter in Volume 2)

The reconnaissance effort depends upon sensor technologies for location, surveillance, and acquisition. Most units will employ a mix of older and newer systems, with recon vehicles, portable sensors, and man-portable sensors. The most prolific sensor on the battlefield is the human eye. Range is a critical factor. The table below gives general range capabilities.

Effective Ranges of Selected Reconnaissance Assets



The most prolific reconnaissance discipline is HUMINT reports generated by ground units. Much of this reconnaissance effort consists of tactical recon missions executed by maneuver units in their operational area. Any unit can generate reconnaissance. The OPFOR will exploit civilian information and acquisition assets for reconnaissance purposes. While OPFOR units may operate reconnaissance vehicles, most will have possess the ability to operate dismounted observation posts (OP). These dismounted OPs may possess similar capabilities as vehicle mounted patrol vehicles. The OPFOR will used many types of vehicles for reconnaissance including motorcycles, all-terrain vehicles, or civilian vehicles. The OPFOR will use equipment such as multi-spectral concealment materials, navigation equipment, light-weight laptop computers, and long-range communications/digital transmission systems while conducing reconnaissance.

Questions and comments on reconnaissance for specific equipment should be addressed to the respective chapter POC. Questions concerning this chapter should be addressed to:

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RISTA Key Technology Trends

Military forces continue to field new RISTA systems and upgrade old legacy systems. These systems can be found in both reconnaissance, tactical, and fir support units.

System Category	Technology Trend	Vol/ Page	System Example	Ref Page
Ubiquitous Handheld RISTA System	Remote electronic optics (EO)/3d generation thermal sight, 30x zoom precise location, video link, & graphic net	V1/1-17	Sophie MF	V1/1-32
	EO bionics with forward looking infrared (FLIR) camera, laser rangefinder (LRF), and goniometer for precise target location	V1/1-19	ADAD	V1/1-23
	LADAR optical augmentation scans & detects enemy weapon sights	V1/1-21	Mirage 1200	V1/1-21
	Robotic hand-thrown camera with PDA display, & robot/ball mount	V1/1-25	Macroswiss	V1/1-18
	Camera grenade (rifle, RPG, AGL) remotes in-flight image to display	V1/1-25	SPARCS	V2/4-8
RISTA Dismount Team Assets	Man-portable II camera net to display monitor & alert system	V1/1-17	Nighthawk	V1/1-18
	Site spy cameras with remote-display images on monitor	V1/1-18	NG-30	V1/1-17
	EO Laser target designator guides laser homing round to 10+ km	V1/1-20	DHY-307	V1/1-20
	Man-portable radar with 24 km range and LPI frequency	V1/1-22	Squire	V1/1-22
	Multi-sensor unattended ground sensors with remote monitor display	V1/1-24	CLASSIC 2000	V1/1-24
	Hand-launch UAVs/micro-UAVS for infantry, SPF, RISTA, AT, etc.	V1/1-26	Zala 421-08	V2/4-6
	Masted 50+x EO, 3d generation thermal sights & other sensors for real-time nets	V1/1-6	ATM	V1/4-9

RISTA Vehicles	Integrated weapons with sensor pods for combat reconnaissance vehicles	V1/1/6	BRM-3K	V1/1-11
	Mast-mounted motorized LPI radars & real-time digital transmission	V1/1-7	HJ-62C	V1/1/13
	Remote add-on turrets & radar modules for vehicle conversion	V1/1-7	Stalker	V1/1-7
Aerial RISTA Systems	Powered airship or aerostat with video camera or other sensor arrays	V1/1-23	TAOS/Sky Media Pro	V2/7-2
	Helicopter/weapon-launch UAV munitions for real time intel/targeting	V1/1-26	R-90	V2/1-8
	Helicopters & FW with real-time MTI; synthetic aperture radar	V2/2-21	Horizon	V2/2-21
Other RISTA Assets	INFOWAR, UAV, aerial & HUMINT assets tactically linked & fused	V1/1-7	HJ-62C	V1/1-13
	Handheld & embedded GNSS receivers for in-view displays	V1/1-14	Magellan GPS	V1/1-14
	EO laser RF weapon sights with 3d generation day & night capability	V1/1-14	IS-2000	V1/2-30
	Acoustic sensors quickly detect vehicles, weapons & aircraft	V1/1-21	HALO	V1/1-21
	Trip-wire charges, mines, or sensor-fused grenade launchers	V1/1-23	AJAX	V1/1-23
	Artillery/aerial-delivered & hand-emplaced UGS display in intelligence net	V1/1-24	BSA	V1/1-24
	Weapon launched sensor munitions for aircraft & artillery	V1/1-26	R-90	V2/1-7
	Laptop display data transmission systems, encryption, and satellite communication (SATCOM)	V1/1-30	Kredo-M1	V1/1-30

Reconnaissance Vehicles

The OPFOR conducts continuous and pervasive reconnaissance activity in all phases of military operations. To accomplish their reconnaissance, the OPFOR uses a variety of vehicles based on the enemy threat and the mobility desired. The spectrum of reconnaissance vehicles range from old systems ill-suited for modern requirements to mobile, lethal, and survivable systems equipped with complex sensor arrays and communication equipment. Some vehicles may work alone or as part of a patrol.

The vehicle most used for reconnaissance is an unarmored 4 X 4 wheeled rive *tactical utility vehicle* or TUV (see the Infantry chapter for examples). The US M151 or Jeep was originally designed as a reconnaissance vehicle and many countries still favor a similar system due to their small size, speed, and maneuverability in a variety of terrain. Some countries have upgraded their reconnaissance vehicles to something similar to the US HMMWV or British Land Rover.

Reconnaissance vehicles are designed or other vehicles are modified to fit the role desired, force requirements, and the terrain in which the vehicle needs to operate. The vehicles may be unarmed except for small arms carried by the personnel in the vehicle or other larger weapons such as a machine gun or automatic grenade launcher (AGL) may be mounted on the vehicle. Many TUV chassis are poorly suited to adding additional armor for protection of the crew. The additional weight compromises the other positive aspects of the vehicle.

The *armored scout car* is sometimes better suited for reconnaissance than the TUV. These wheeled vehicles offer good road mobility, and better all-terrain off-road mobility than other vehicle types. The vehicle can be based on a truck, armored personnel carrier, or indigenous chassis to handle the added armor requirements while maintaining good mobility. Many of these vehicles may resemble a TUV, but are designed from the ground up for reconnaissance missions. The armor is often light and the wheels are vulnerable to nearly all weapons. Other improvements may be amphibious capability such as with the French VBL and VBR and larger caliber weapons. Examples of these vehicles include the British Fox, Hungarian FUG-66, and Russian BRDM-2.

In heavy combat or when a larger number of soldiers is needed, the OPFOR will often use modified Infantry Fighting Vehicles (IFV) or Armored Personnel Carriers (APC) as a reconnaissance vehicle. Other countries have produced specialized combat reconnaissance vehicles (CRV) designed to operate ahead of the forward line of troops (FLOT), not to initiate combat, but survived if attacked. These CRVs often sacrifice space for soldiers to gain increased mobility, additional sensors, or increased C2 capacity. Many CRVs use tracks instead of wheels, but the wheeled vehicles have amphibious capabilities the tracked vehicles do not. Examples of CRVs include the Russian BRM-3K, the British Scimitar, and the Austrian Pandur RECCE vehicle.

A newer generation came about with the addition of mast mounts and multi-sensor suites to create a *sensor reconnaissance vehicle*. These vehicles are not designed to operate forward of the FLOT, but behind the lines using cover while providing continuous data to ground forces. These vehicles feature powerful multi-sensor arrays using masts from five to 10 meters high provide longer-range surveillance with less vulnerability to enemy fires. Most of these sensor vehicles are built on an IFV or APC chassis provides the space for three to five work stations. These vehicles can also serve as an intelligence coordination and analysis center. These vehicles are likely to move less often than a CRV. Examples of these sensor reconnaissance vehicles include the Czech Snezka and Chinese Type 85 with HJ-62C radar. There are also sensor vehicles available for specific branches such as the Russian PRP-3//PRP-4M for artillery units and the Russian Sborka for air defense units.

Many countries are not using their limited defense dollars not on producing new reconnaissance vehicles, but on improving the sensor suites and mounted them on other vehicles such as the Israeli Rafael Stalker or the French VBL. Some countries are going as far as putting sensors on motorcycles or all-terrain vehicles. See the Infantry chapter for various types of these vehicles are available.

Since reconnaissance forces often operate far away from other friendly units, they need to defend themselves. Some countries have developed vehicles for such purpose with enough firepower, but still can complete the reconnaissance requirements. Examples include the British Saladin Armored Car and the Austrian Pandur Fire Support Vehicle. The main guns on thse vehicles can range from 57 mm to 105 mm on the South African Rooikat. These vehicles are often modified versions of a basic IFV, APC, or other armored vehicle modified to make the vehicle most suitable for reconnaissance vehicles. Some of the more common reconnaissance vehicles are on the following data sheets.

RUSSIAN ARMORED SCOUT CAR BRDM-1



BRDM-1 converted to an ATGM platform

SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative designations:	BTR-4OP (4 X 4)	Name:	DShKM
Date of introduction:	1959	Caliber/length:	12.7-mm
Proliferation:	1943+/17 countries	Type:	Machine Gun
Description:	Light fully amphibious 4 X 4 wheel drive armor scout car with 2 firing ports on each side of the hull & 2 large hatches in the forward part of the roof; 2 belly wheels can be lowered to improve cross-country performance & cross ditches with space for 3 other soldiers besides the crew; personnel must enter & exit the vehicle from the hatches on top of the vehicle	Ammo:	1250 Rounds (250 in box, 1000 Ready): Light Ball, Ball-T, API
Crew:	2 (driver, commander)	Maximum Effective Range:	2000 m (Day); INA (Night); 1500 m (Anti-aircraft-estimate)
Combat weight (mt):	6.2	Armor penetration:	8 at 500 m (Est)
Chassis length overall (m):	5.70	Muzzle velocity (m/s):	800 (Est)
Height overall (m):	1.91	Name:	SGMB (Rear roof)
Width overall (m):	2.25	Caliber/length:	7.62-mm
Ground pressure (kg/cm^2):	INA	Type:	Medium Machine Gun

Automotive performance:	GAZ 40P	Ammo:	1250 Rounds (250 in box, 1000 Ready): Light Ball, Ball-T, API
Engine type:	Water-cooled, in-line, 6-cylinder gasoline	Maximum Effective Range:	1000 m (Day); INA (Night); 1000 m (Anti-Aircraft)
Cruising range (km):	500	Armor penetration:	8 at 500 m
Speed (km/h):	Max road: 80 Max off-road: INA Average cross-country: INA Max Swim: 6	Muzzle velocity (m/s):	800
Fording depths (m):	Amphibious	VARIANTS	SPECIFICATIONS
Radio:	INA	BRDM-1 Model 1957	Open-topped crew compartment
Protection:		BRDM-1 Model 1958	Closed-top crew compartment
Armor, turret front (mm):	10	BRDM-1 Model 1959	1 7.62-mm MG at front roof
Applique armor (mm):	No	BRDM-1 Model 1960	3 7.62-mm MGs at front & sides
Explosive reactive armor(mm):	No	BRDM-1U	Command vehicle with 4 antennas
Active Protection System:	INA	BRDM1-RKh	NBC reconnaissance vehicle with lane-marking equipment
Self-entrenching blade:	No	2P27 Tank Destroyer	2K16 launcher for 3 AT-1 Snapper ATGM missiles
NBC protection system:	Available	2P32 Tank Destroyer	2K8 launcher for 4 AT-2 Swatter ATGM missiles
Smoke equipment:	INA	2P110 Tank Destroyer	9K14M launcher for 6 AT-3 Sagger ATGM missiles
Survivability equipment:	INA	SPW-4OP (East Germany)	Unarmed BRDM-1
		SPW-40PA (East Germany)	Armed BRDM-1
		9P111 (East Germany)	9P110 Tank Destroyer
		FUG (Hungary)	Hungarian designation for BRDM-1
NOTES SOURCES: 2014 WEG, MILITARY PERISCOPE, & MILITARY FACTORY. SOME MODELS SUBSTITUTE AN SGMB MACHINE GUN FOR THE DSHKM MACHINE GUN. MANY COUNTRIES OPERATE A COMBINATION OF BRDM-1S & BRDM-2S AND THEIR TOTAL INVENTORY IS BOTH TYPES TOGETHER.			

RUSSIAN ARMORED SCOUT CAR BRDM-2



BRDM-2 used by the Polish Army

SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative designations:	GAZ 41-08	Name:	KPVT
Date of introduction:	1966	Caliber/length:	14.5-mm
Proliferation:	4694+/49 countries	Type:	Heavy Machine Gun
Description:	4 X 4 improved BRDM-1, but only space for a total of 4 personnel; personnel must still load & unload from the top of the vehicle	Ammo:	500 Rounds: API, API-T, I-T: 160 HE-T: 340
Crew:	4 (driver, commander, gunner, loader)	Maximum Effective Range:	2000 m (Day); INA (Night)
Combat weight (mt):	7.0	Armor penetration:	20 mm (CE) at 1000 m; 30 mm (CE) AT 500 m
Chassis length overall (m):	5.75	Muzzle velocity (m/s):	1005
Height overall (m):	2.31	Name:	Coaxial
Width overall (m):	2.35	Caliber/length:	7.62-mm
Ground pressure (kg/cm^2):	INA	Type:	PKT machine gun
Automotive performance:	GAZ-41	Ammo:	Heavy ball, I-T, Light ball, Ball-T, API-T: 2000
Engine type:	Water-cooled, V-8 gasoline	Maximum Effective Range:	1000 m (Day); INA (Night); 400-500 m (on the move)
Cruising range (km):	750	Armor penetration:	INA
Speed (km/h):	Max road: 95 Max off-road: INA	Muzzle velocity (m/s):	825

	Average cross-country: INA Max Swim: 10		
Fording depths (m):	Amphibious		
Radio:	R-123	VARIANTS	SPECIFICATIONS
Protection:		BRDM-2K Command Vehicle	Telescopic antenna on right side & whip antenna on right side
Armor, turret front (mm):	10	BRDM-2U Command Vehicle	2 Antennas on each side
Applique armor (mm):	No	R-1A/R-5 Command Vehicles (Poland)	AT Command vehicle with 2 R-123Z radios & 1 R-107 radio
Explosive reactive armor(mm):	No	BRDM-2RKhA NBC Reconnaissance Vehicle	Carries lane markers & 14.5-mm KPVT heavy machine gun
Active Protection System:	INA	BRDM-2RKhB NBC Reconnaissance Vehicle	Carries lane markers & two 7.62-mm machine guns & better sensors
Self-entrenching blade:	No	9P122 Malyutka	Retractable launcher with 6 AT-3 Sagger ATGMS & 8 missiles in hull
NBC protection system:	Collective	9P124	Similar to the 9P122, but 4-launcher AT-2 ATGMS with 4 missiles in hull
Smoke equipment:	No	9P133	Retractable 6-rail AT-3C ATGM launcher
Survivability equipment:	Integrated winch system	9P137	Retractable 5-rail AT-5 ATGM launcher
		9P148	Retractable 5-rail launcher with AT-4 or AT-5 ATGM launcher
		BRDM-2 Konkurs with Spandrel ATGMs	Turretless with 5 AT-5 missiles ready to fire with 9 more missiles in hull
		BRDM-2 Strela 1	SA-9 Gaskin SAM system on a turretless hull with 4 missiles
		BRDM-2ZS	PSYOP vehicle with external speaker
		BRDM-2 Model 96i (Poland)	Auxiliary wheels removed, additional hull door, crew increased to 5, & larger storage capacity
		Russian Upgrades	BPU-1 turret & electronic upgrades
NOTES SOURCES: 2014 WEG, MILITARY PERISCOPE, & MILITARY FACTORY. THE BRDM-2 HAS BEEN USED AS THE BASE CHASSIS FOR A VARIETY OF VEHICLES. MANY COUNTRIES OPERATE A COMBINATION OF BRDM-1S & BRDM-2S AND THEIR TOTAL INVENTORY IS BOTH TYPES TOGETHER.			

POLISH ARMORED SCOUT CAR BRDM-2M-98 & BRDM-2M-97



BRDM-2M-97 Zbik-B

SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative designations:	BRDM-2A, BRDM-2B M97, Zbik-A, Zbik-B	Name:	NSV-5
Date of introduction:	2004	Caliber/length:	12.7-mm
Proliferation:	1+ country/offered for export	Type:	Heavy Machine Gun
Description:	Improved BRDM-2 with auxiliary wheels removed; other weapons available; 2 soldiers can dismount for OP for short periods of time	Ammo:	1000 Rounds (Est): API (B-32), API-T (BZT-44), HEI
Crew:	4 (driver, commander, gunner, loader)	Maximum Effective Range:	2000 (Day); INA (Night); 1500 (Anti-aircraft)
Combat weight (mt):	8.0	Armor penetration:	INA
Chassis length overall (m):	5.78	Muzzle velocity (m/s):	845
Height overall (m):	2.57	Name:	HOT-3
Width overall (m):	2.78	Caliber/length:	150 mm
Ground pressure (kg/cm²):	INA	Type:	ATGM
Automotive performance:		Ammo:	Tandem charge HEAT: 4 (Est)
Engine type:	Diesel	Maximum Effective Range:	4,300 m (Minimum-75 m)
Cruising range (km):	500	Armor penetration:	1250 mm
Speed (km/h):	Max road: 100	Muzzle velocity (m/s):	240

	Max off-road: INA Average cross-country: INA Max Swim: 9-10		
Fording depths (m):	Amphibious		
Radio:	INA	VARIANTS	SPECIFICATIONS
Protection:		BRDM-2-M98/Zbik-A/BRDM-2A	Upgraded turret, 12.7-mm machine gun, & battlefield surveillance system
Armor, turret front (mm):	14	BRDM-2-M97/Zbik-B/BRDM-2B	20 upgrades including larger turret, 12.7-mm MG, ATGM, night sensors, radar, & improved space design
Applique armor (mm):	INA	BRDM-2A (Russia)	Better engine & other upgrades
Explosive reactive armor(mm):	INA	BRDM-2SMD/BRDM-2D (Russia)	145-hp engine & other improvements
Active Protection System:	INA	BRDM-B (Czech Republic)	Overhead turret, 12.7-mm MG, TV/thermal sight, new engine, & space for 6 soldiers
Self-entrenching blade:	No		
NBC protection system:	Collective		
Smoke equipment:	INA		
Survivability equipment:	Internal fire suppression system		

NOTES

SOURCES: 2014 WEG & ARMY RECOGNITION. VARIANTS INCLUDE VERSIONS WITH OR WITHOUT RADAR. GUNS CAN RANGE FROM 7.62-MM MACHINE GUNS TO 20-MM CANNONS. TURRETS ARE AVAILABLE THAT CAN CONTAIN 30-MM AUTO-CANNONS OR AUTOMATIC GRENADE LAUNCHERS (AGL). THE ATM MASTED TURRET CAN BE FITTED TO A BRDM-2 SENSOR VEHICLE. BRDM-2M-97/98 CAN BE MODIFIED TO ACCEPT A VARIETY OF ATGM SYSTEMS.

BRITISH ARMORED SCOUT CAR FOX



FV721 Fox Armored Scout Car

SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative designations:	FV721; FV722 (Vixen)	Name:	L21 Rarden
Date of introduction:	1973	Caliber/length:	30-mm
Proliferation:	70+/at least 3 countries	Type:	Automatic Cannon
Description:	4 X 4 replacement for the FV701 Ferret armored car series used for recon purposes or route protection	Ammo:	99 Rounds: HEI-T: 66 (Est) APDS-T, APSE-T: (33 Est)
Crew:	3 (driver, commander, gunner)	Maximum Effective Range:	1100 m (Day)
Combat weight (mt):	6.12	Armor penetration:	INA
Chassis length overall (m):	4.17	Muzzle velocity (m/s):	INA
Height overall (m):	2.20 (with turret)	Name:	L37A2
Width overall (m):	2.13	Caliber/length:	7.62-mm
Ground pressure (kg/cm²):	INA	Type:	Machine Gun
Automotive performance:	Jaguar XK	Ammo:	2600 Rounds: Ball; Ball-T; API; API-T (Est)

Engine type:	4.2 liter, liquid-cooled, in-line, 6-cylinder gasoline	Maximum Effective Range:	800 m (Day); INA (Night)
Cruising range (km):	434	Armor penetration:	INA
Speed (km/h):	Max road: 104 Max off-road: INA Average cross-country: INA Max Swim: 5.23	Muzzle velocity (m/s):	840
Fording depths (m):	1.0 (Unprepared)		
Radio:	INA	VARIANTS	SPECIFICATIONS
Protection:		FV722 (Vixen)	Turretless FV721; only prototypes built
Armor, turret front (mm):	Resistant to heavy MG (NFI)	Panga	FV721 with a Helio FVT 800 turret with a 12.7-mm heavy barreled MG & 1 L37A2 MG; never entered production
Applique armor (mm):	No	Fox with 25-mm Chain Gun	Variant with a 25-mm McDonnell Douglas chain gun & 1 7.62-mm MG; never produced
Explosive reactive armor(mm):	No	Fox/MILAN	Twin MILAN ATGM launcher & 1 7.62-mm McDonnell Douglas chain gun; no production models
Active Protection System:	No	Saber Armored Reconnaissance Vehicle (ARV)	All turrets from deactivated FV721s were combined with the hulls from Scorpions with a 76-mm gun to create a Scorpion ARV variant
Self-entrenching blade:	No		
NBC protection system:	No		
Smoke equipment:	8 smoke grenade launchers		
Survivability equipment:	INA		
NOTES SOURCES: 2014 WEG & MILITARY PERISCOPE. THIS VEHICLE HAS BEEN PHASED OUT OF THE BRITISH ARMY & IS ON THE WAY OUT IN MOST MILITARIES. THERE ARE SOME OF THESE VEHICLES FOUND IN SOME AFRICAN COUNTRIES.			

BRAZILIAN ARMORED SCOUT CAR EE-9 CASCAVEL



EE-9 Cascavel (Rattlesnake) Armored Car

SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative designations:	None	Name:	EC-90
Date of introduction:	1973	Caliber/length:	90-mm
Proliferation:	1432+/23 countries	Type:	Rifled Gun
Description:	6 X 6 ARV developed in conjunction with the EE-11 Urutu APC as both share many of the same components; vehicle is for recon & route protection as no dismounted soldiers are available	Ammo:	44 Rounds (12 in turret & remainder in the hull): APDS, HE Frag,
Crew:	3 (driver, commander, gunner)	Maximum Effective Range:	APDS: 1200 m (Est) HE: 2000 m (Est)
Combat weight (mt):	13.7	Armor penetration:	INA

Chassis length overall (m):	5.20	Muzzle velocity (m/s):	APDS: 1250 (Est) HE: 1050 (Est)
Height overall (m):	2.60 (cupola top)	Name:	INA
Width overall (m):	2.64	Caliber/length:	7.62-mm
Ground pressure (kg/cm²):	INA	Type:	Coaxial Machine Gun
Automotive performance:	Detroit 6V-53N	Ammo:	2000 Rounds: Ball-T, Match, API, API-T (Est)
Engine type:	Liquid-cooled, 6-cylinder diesel	Maximum Effective Range:	1500 (Est-day); INA (night)
Cruising range (km):	550 (880 on roads)	Armor penetration:	INA
Speed (km/h):	Max road: 100 Max off-road: 80 Average cross-country: INA Max Swim: N/A	Muzzle velocity (m/s):	840
Fording depths (m):	1.0	Name:	M2HB
Radio:	Varies by customer	Caliber/length:	12.7-mm (.50 caliber)
Protection:		Type:	Anti-Aircraft Machine Gun
Armor, turret front (mm):	16-mm	Ammo:	800 Rounds: Ball, Tracer, AP, API, API-T, AP Hardcore, Multipurpose, SLAP, SLAPT
Applique armor (mm):	No	Maximum Effective Range:	1500 m (Against High Hard Armor-HHA)
Explosive reactive armor(mm):	No	Armor penetration:	SLAP (Saboted Light Armor Penetrator); 34 mm HHA at 500 m
Active Protection System:	INA	Muzzle velocity (m/s):	M33 Ball: 890 SLAPT (Tracer): 1215
Self-entrenching blade:	No	VARIANTS	SPECIFICATIONS
NBC protection system:	Available	Mark 2/Cascavel I/Cascavel Magro (Thin Rattlesnake)	1st model with 37-mm gun removed from obsolete M3 Stuart tanks with Mercedes diesel engine
Smoke equipment:	Available (up to 3 smoke dischargers on either side for a total of 6)	Mark 3/Cascavel II/Cascavel Gordo (Fat Rattlesnake)	1st export model with Mercedes diesel engine, turret ring widen for Giat 90-mm gun, & 2 smoke dischargers
Survivability equipment:	Welded multi-layer armor	Mark 4/Cascavel III	Engesa EC-90 90-mm gun, 7.62-mm coaxial MG, anti-aircraft MG (12.7-mm or 7.62-mm) on commanders cupola, & a Detroit diesel engine
		Mark 5/Cascavel IV	Mark 4 with central tire pressure regulation system, Mercedes OM352 diesel engine & disk brakes
		Mark 6	Mark 5 with a Mercedes OM352A engine
NOTES SOURCES: 2014 WEG, MILITARY PERISCOPE, ENEMY FORCES, & NAVY WEAPONS.			

SPANISH HIGH-MOBILITY TACTICAL VEHICLE VAMTAC



VAMTAC as an ATGM Platform



VAMTAC with Machine Gun Mounted

SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative designations:	*Vehiculo de Alta Movilidad Tactico (VAMTAC)*	Name:	AA-52
Date of introduction:	1998	Caliber/length:	7.62-mm
Proliferation:	3567+/10 countries	Type:	Machine Gun
Description:	4 X 4 HMMWV like vehicle with 2-door or 4-door modesl available; used in a variety of configurations including recon; normal passenger capacity is 3	Ammo:	1250 Rounds (Est): Ball, Tracer; Other: INA
Crew:	1 (driver)	Maximum Effective Range:	3000 m
Combat weight (mt):	7.7	Armor penetration:	INA
Chassis length overall (m):	4.85 (some variants to 5.55)	Muzzle velocity (m/s):	830
Height overall (m):	1.90 (roof top)	VARIANTS	SPECIFICATIONS
Width overall (m):	2.18	VAMTAC I3	166-hp Steyr diesel engine
Ground pressure (kg/cm²):	INA	VAMTAC S3	188-hp Steyr diesel engine, reinforced suspension with greater payload capacity
Automotive performance:	Steyr	FAMTAC BN3	Up-armored version with 220-hp Steyer M16TCA-3 6-cylinder engine with a top speed of 135 k/hr
Engine type:	Turbo-charged 4-cylinder or – cylinder diesel	Ambulance	2 stretcher or 4 seated patients in rear compartment
Cruising range (km):	> 600	ATGM Carrier	For GBM-71 TOW or MILAN ATGM systems
Speed (km/h):	Max road: 126 (135: 6cylinder) Max off-road: INA Average cross-country: INA Max Swim: N/A	Anti-Aircraft Vehicle	Mistral Surface-to-air missiles
Fording depths (m):	0.75 (without preparation); 1.50 (with preparation)	Command & Control Vehicle	Separate rear compartment for communications gear

Radio:	**Customer dependent**	**PYSOP Vehicle**	**Equipped with loudspeaker**
Protection:			
Armor, turret front (mm):	**STANAG 4569 Level 2 mine protection, Level 3 against bullets, & Level 4 against 155-mm artillery fragments (BN3 variant)**		
Applique armor (mm):	**No**		
Explosive reactive armor(mm):			
Active Protection System:	**INA**		
Self-entrenching blade:	**No**		
NBC protection system:	**Available**		
Smoke equipment:	**INA**		
Survivability equipment:	**Net armor to protect against RPG-7 rockets is available; fire-suppression system; remotely operated weapons station available**		
NOTES			
SOURCES: 2014 WEG & MILITARY TODAY. VEHICLE CAN BE ARMED WITH A WIDE VARIETY OF WEAPONS INCLUDING MACHINE GUNS, AUTOMATIC GRENADE LAUNCHERS (AGL), ANTI-TANK MISSILES, ANTI-AIRCRAFT MISSILES, OR 81-MM MORTARS.			

RUSSIAN COMBAT RECONNAISSANCE VEHICLE BRM-1K



BRM-1K

SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative designations:	BMP M1976/2	Name:	2A28 /Grom
Date of introduction:	1976	Caliber/length:	73-mm
Proliferation:	At least 3 countries (BMP-1/2/3s are in at least 44 countries)	Type:	Smoothbore Gun with automatic loader
Description:	BMP-1 modified for recon with space for 2 passengers (see Chapter 3)	Ammo:	20 Rounds: HEAT-FS: 10 (Est) HE: 10 (Est)
Crew:	4 (driver, commander, gunner, navigator)	Maximum Effective Range:	HEAT-FS: 1300 m (600 on the move & 800-1000 m at night) HE: 1300 m (600 m on the move & 800-1000 m at night)
Combat weight (mt):	13.3	Armor penetration:	HEAT-FS (PG-15VNT): 550-700 HEAT-FS (PG-15): 335 HE (OGBG1): INA (damage or defeat an APC) HE (OG-15VM) INA (damage or defeat an APC)
Chassis length overall (m):	6.74	Muzzle velocity (m/s):	700
Height overall (m):	2.15	Name:	Coaxial
Width overall (m):	2.94	Caliber/length:	7.62-mm
Ground pressure (kg/cm^2):	0.57	Type:	PKT machine gun

Automotive performance:	**UTD20**	**Ammo:**	**Ball, Tracer; 2000**
Engine type:	**300-hp, Water-cooled, V-6 diesel**	**Maximum Effective Range:**	**1300 m (Day); 400-500 (on the move); 800 (Night)**
Cruising range (km):	**600**	**Armor penetration:**	**INA**
Speed (km/h):	**Max road: 65 Max off-road: 40-45 Average cross-country: INA Max Swim: 7**	**Muzzle velocity (m/s):**	**825**
Fording depths (m):	**Amphibious**		
Radio:	**R-173, R-130, 2x R-148 man-portable, R-014D telegraph**	**VARIANTS**	**SPECIFICATIONS**
Protection:		**BRM-1**	**Baseline ARV (BMP M1976/1)**
Armor, turret front (mm):	**19-23**	**BRM-1K**	**Smoke grenade launchers, additional communications (R-130, R-014D telegraph), PSNR-K Radar**
Applique armor (mm):	**Available**		
Explosive reactive armor(mm):	**Available**		
Active Protection System:	**No**		
Self-entrenching blade:	**No**		
NBC protection system:	**Automatic overpressure system**		
Smoke equipment:	**VEESS; Smoke grenade launchers available**		
Survivability equipment:	**INA**		

NOTES

SOURCES: 2014 WEG, MILITARY PERISCOPE. 1G25 GYROCOMPASS; 1G13 GYRO COURSE INDICATOR; 1PN22M2 FIRE SIGHT; 1D8 LASER RANGEFINDER; PSNR-5M BATTLEFIELD SURVEILLANCE RADAR. PASSENGERS MAY DISMOUNT & FORM AN ALTERNATE RECONNAISSANCE POST. ALMOST ALL BRM-1S WERE UPGRADED TO THE BRM-1K STANDARD WITH PSNR-5M RADAR.

RUSSIAN COMBAT RECONNAISSANCE VEHICLE BRM-3K



BRM-3K

SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative designations:	Rys (Lynx), Model 501	Name:	2A72
Date of introduction:	1990	Caliber/length:	30-mm
Proliferation:	At least 1 Country (BMP-1/2/3s are in at least 44 countries)	Type:	Automatic Gun
Description:	BMP-1 modified for recon with space for 3 passengers (see Chapter 3)	Ammo:	500 rounds HEI-T, Frag-HE: 340 APDS, APFSDS-T: 160
Crew:	3 (driver, commander, gunner)	Maximum Effective Range:	Frag-HE: 4000 (Day); 1200-1500 (Night-passive sight); 3000+ (Night-active sight); 4000 (anti-aircraft)

			APDS: 2500 (Day); 1200-1500 (Night-passive sight); 2500 (Night-active sight); 4000 (anti-aircraft) APFSDS-T M929: 2500+ (Day); 1200-1500 (Night-passive sight); 2500+ (Night-active sight); 4000 (anti-aircraft)
Combat weight (mt):	19.6	Armor penetration:	Frag-HE: INA APDS: 25 (RHA) at 1500 m at 60° APFSDS-T M929: 55 (RHA) at 1000m; 45 (RHA) at 2000 m
Chassis length overall (m):	6.10	Muzzle velocity (m/s):	960 (Est)
Height overall (m):	2.65	Name:	Coaxial
Width overall (m):	3.15	Caliber/length:	7.62-mm
Ground pressure (kg/cm^2):	0.62	Type:	PKT machine gun
Automotive performance:	UTD29M	Ammo:	Ball, Tracer; 2000
Engine type:	450-HOP, 10-cylinder, V-shaped, water-cooled diesel	Maximum Effective Range:	2000 m (Day); 1200-1500 (Night-passive sight); 2000 m (Night-active sight)
Cruising range (km):	600 (highway)	Armor penetration:	INA
Speed (km/h):	Max road: 70 Max off-road: 45 Average cross-country: 35 Max Swim: 10	Muzzle velocity (m/s):	825
Fording depths (m):	Amphibious		
Radio:	R-163-50U UHF, R-163-50K HF, R-163-10U (dismounts)	VARIANTS	SPECIFICATIONS
Protection:		BRM-3K	Base version is a BMP-3 variant with a steel hull
Armor, turret front (mm):	30-355 (front glacis)	BRM-3K/Kredo 1	BRM-3K CRV with a 2-3 m mast with a Kredo-1 radar system. Catherine 2d generation thermal sight extends night range to 5-7 km. 1D22 laster target designator ranges to 7 km.
Applique armor (mm):	Yes (on turret)		
Explosive reactive armor(mm):	Available		
Active Protection System:	No		
Self-entrenching blade:	No		
NBC protection system:	Automatic overpressure system		
Smoke equipment:	6 Smoke grenade launchers, VEESS		
Survivability equipment:	INA		

NOTES

SOURCES: 2014 WEG, MILITARY PERISCOPE & DEAGEL. RADIO TRANSMISSION RANGE IS 100 KM MOVING & 350 KM STATIONARY. 1D14 LASER RANGEFINDER CAN DETECT OBJECTS AT 10 KM. ACQUISITION FOR GUN SIGHTS IS ESTIMATED AT 4000 METERS. NIGHT SIGHT RECOGNITION IS AT 5000 METERS.

BRITISH COMBAT RECONAISSANCE VEHICLE SCORPION



FV101 Scorpion

SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative designations:	FV101 (See variants)	Name:	L23
Date of introduction:	1972	Caliber/length:	76-mm
Proliferation:	1173+ vehicles/18 countries	Type:	Semi-automatic rifled gun
Description:	Initially a light tank, it took on another of roles; passengers depends on the variant; specifications are for the Scorpion	Ammo:	40 Rounds:
Crew:	3 (driver, commander, gunner)	Maximum Effective Range:	INA
Combat weight (mt):	8.07	Armor penetration:	INA
Chassis length overall (m):	4.79	Muzzle velocity (m/s):	INA
Height overall (m):	2.10	Name:	L43A1 (or L8A1)
Width overall (m):	1.71	Caliber/length:	7.62-mm
Ground pressure (kg/cm²):	0.36	Type:	Coaxial Ranging Machine Gun
Automotive performance:	Jaguar J60	Ammo:	3000 Rounds:

			- `Ball; Ball-T; API; API-T
Engine type:	No 1 Mk 100B 190-hp liquid-cooled, in-line, 6-cylinder gasoline	Maximum Effective Range:	800 m (Est-Day); INA (Night)
Cruising range (km):	644	Armor penetration:	INA
Speed (km/h):	Max road: 80 Max off-road: INA Average cross-country: INA Max Swim: 9.7	Muzzle velocity (m/s):	838 (Est)
Fording depths (m):	Amphibious		
Radio:	INA	VARIANTS	SPECIFICATIONS
Protection:		Scorpion (FV101)	Original variant with 3-man crew
Armor, turret front (mm):	Against 14.5-mm rounds (remainder of the vehicle against 7.62-mm rounds)	Spartan (FV103)	Artillery & engineer vehicle with 3-man crew & 4 dismountable troops; 80 k/hr; 483 km range; 1 7.62-mm MG
Applique armor (mm):	INA	Striker (FV102)	AT vehicle with 5 Swingfire CLOS ATGMS (5 reloads) & 1 7.62-mm L37A1 MG
Explosive reactive armor(mm):	INA	Scorpion 90	3-man crew; 73 k/hr; Cockerill Mk IIIK 90-mm gun & 1 7.62-mm MG
Active Protection System:	INA	Samaritan (FV104)	Ambulance for 4 litter patients, 5 seated patients, or 2 litter/3 seated patients; 2-man crew; 483 km range
Self-entrenching blade:	No	Sultan (FV105)	Command vehicle with at least 2 radios; total 5-6 personnel; 483 km range
NBC protection system:	Yes	Samson (FV106)	483 km range, ARV with internal main winch, tow bars, & tow cables
Smoke equipment:	8 Smoke dischargers	Scimitar (FV107)	Scorpion with 1 30-mm Rarden L21 rifled gun (165 rounds) & 1 7.62-mm coax MG; 80 k/hr; 644 km range;
Survivability equipment:	Enhanced mine protection available	Scorpion 2	Description of late production Scorpions with Perkins engine & other upgrades with 2-man turret with 30-mm, 76-mm, or 90-mm main armament options
		Saber	Reconditioned recon vehicle with 30-mm Rarden cannon & Hughes 7.62-mm co-axial chain gun
VARIANTS	SPECIFICATIONS	Scorpion (Jordan)	Upgraded original Scorpion with Perkins engine & other upgrades
Scorpion 90 (Venzeula)	Scorpion 90 with Belgain CMI Defence 90-mm Mk II gun & Perkins engine	Spartan with MILAN ATGM	2-round turret must be reloaded from outside the vehicle (11 reloads)

Sturgeon	OPFOR vehicle used in Suffield, Canada based on the Spartan	Omani Scorpion	Increased protection package & some received a Cummins diesel engine
Salamander	OPFOR vehicle used in Suffield, Canada based on the 76-mm Scorpion	Scorpion vehicle-mounted automatic mortar FCS	Fires Denel's 60-mm or BAE Systems' 81-mm L16 mortars
Scorpion (Malaysia)	Scorpion 90 with 76-mm AGL & Perkins engine	CVR(T) Life-Extension Program (LEP)	LEP with diesel engine, better optics & communication
NOTES SOURCES: MILITARY PERISCOPE. ALL BRITISH SCORPION FAMILY VEHICLES RECEIVED ENHANCED MINE PROTECTION AS RESULT OF OPERATIONS IN THE BALKANS & IRAQ.			

CHINESE SENSOR RECONNAISSANCE VEHICLE HJ-62C



HJ-62C with Mast in Raised Position

SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative designations:	Type 89 Reconnaissance Vehicle	Name:	Type 54 (DShKM copy) available
Date of introduction:	1990	Caliber/length:	12.7-mm
Proliferation:	At least 1 country (Can represent Czech Snezka, Canadian LAV-RECCE, Russian Credo-S, & other reconnissance vehicles with elevated senior pods	Type:	Machine Gun
Description:	Sensor vehicle with 4-man crew (estimated) based on a Chinese Type 89 APC (Data based on this vehicle)	Ammo:	1120 Rounds: APDS, API, API-T: 500 HE-T, HEI: 620
Crew:	4 (driver, commander, & 2 others)	Maximum Effective Range:	APDS (Tungsten Core): 1500 m (Day); INA (Night); 1600 (Anti-Aircraft)
Combat weight (mt):	13.60	Armor penetration:	API: 21 at 500 m & 13 at 1000 m (RHA)
Chassis length overall (m):	6.13	Muzzle velocity (m/s):	850
Height overall (m):	2.59 (not counting sensor)	Sensors	Represent capabilities of state-of-the-art specialized elevated sensor pod systems
Width overall (m):	3.06		
Ground pressure (kg/cm^2):	INA	Radar	Qcquisiton & tracking radar similar to current Western radars (such as the Dutch Signal GB-Scout or the Israeli EL/M-2140) with an 8-12 km

			for personnel, 17-25 km for LAVs, or 25-30 for tanks/helicopters
Automotive performance:		EO Sensors	2-32 X with optical & digital zoom (estimated) with TV range of 5 km or 12 km detection with digital zoom (Day) or 5 km recognition range/7 km detection range (estimated) for 1st generation FLIR
Engine type:	320-hp diesel	Other ISR	7 km LTD designation range; 15-20 km LRF range; digital data transmission with multi-color graphic displays (includes GPS) on digital terrain map overlay. Links available to UAVs, UGS, & other remote sensors for integration & common picture transmission
Cruising range (km):	500		
Speed (km/h):	Max road: 66 Max off-road: 40 Average cross-country: INA Max Swim: 6.0		
Fording depths (m):	Amphibious		
Radio:	HF/VHF, digital, SATCOM, encryption (estimated)		
Protection:			
Armor, turret front (mm):	14 (front glacis)		
Applique armor (mm):	INA		
Explosive reactive armor(mm):	INA		
Active Protection System:	INA		
Self-entrenching blade:	No		
NBC protection system:	Yes		
Smoke equipment:	Available (2 X 4 tubes)		
Survivability equipment:	INA		
NOTES SOURCES: 2014 WEG. AN UPGRADE CAPABILITY CURRENTLY AVAILABLE FOR SELECTED RECONNAISSANCE VEHICLES IS AN AUTO-TRACKER FOR THE EO SYSTEM. EXAMPLES OF AUTO-TRACKERS ARE IN THE CROTALE, RUSSIAN SOSNA, STALKER, & BMP-3M IFV, JAPANESE TYPE 90 TANK, & THE ISRAELI MERKAVA 4 TANK. (PHOTO FROM 2014 WEG)			

Sensor Technologies for Tactical Ground Forces

Reconnaissance units use a mixture of high and low technologies. As noted in TC 7-100.2, Opposing Force Tactics, forces may perform tactical reconnaissance using designated reconnaissance units/soldiers or maneuver unit soldiers. Sensors span an increasing wider segments of the electromagnetic spectrum while integration C2, navigation systems, data processing, and fusing technologies. Developers offer more compact packages, platforms, sensor integration, and mobility systems for greater situational awareness, better operational security, and shorter response time than ever before.

Reconnaissance starts with *location* and *navigation*. Instruments include survey instruments (i.e, Bulgarian PAB-2A theodolite), aiming circles or goniometers, GPS receivers, maps, compasses, terrain data, and inertial guidance systems. Commercial equipment such as the Magellan handheld GPS units are sufficient for most forces. Other more advance equipment such as navigation data for laser rangefinders (LRF) and improved communications with digital interface ensure precise navigation.



Magellan Blazer 12 Commercial Handheld GPS Device

The primary battlefield sensor is still the human eye, but human vision receives much help. Weapons sights are often used. See the Infantry chapter for day and night weapon sights. Almost all reconnaissance forces use optics such as sights, binoculars, or telescopes to increase viewing capacity. Most of these sights operate in the visual light (0.4-0.75 µm) electro-magnetic (EM) spectrum. Binoculars can vary in features and magnifications and usually zoom from 7-12 (x) power. For longer-range day acquisition, the OPFOR uses spotting telescopes (Celestron and Swarovski models) with 60 x zoom capability. Other features could include anti-fogging lens coatings, camouflage netting, tripods for better stability or binocular periscopes (German RWDL) for covert viewing.

Night-time observation systems which operate in the visual band spectrum are all daylight observation systems similar to the human eye and therefore require visual light illumination to see. The Infantry chapter discusses the capability of using starlight, moonlight, or street lights to enable the average soldier to see greater distances. Illumination support equipment includes spotlights, flashlights, or pyrotechnics (grenades, illumination rounds) to bring light to dark spaces. Specialized devices are available, such as the Universal Tactical Light, which can be mounted on weapons and is located near the weapon's trigger. Fires or other improvised lighting offer illumination support. To ensure operational security, the OPFOR will usually not use artificial illumination until the fire fight is underway.



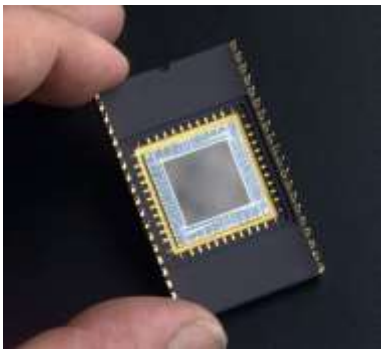
Universal Tactical Light mounted on a pistol

Reconnaissance personnel on today's battlefields have increased their use electro-optical (EO) systems to convert an image into a digital electronic signal that is sent to a display circuit (i.e., photocathode tube or micro-channel plate) for viewing. While optical zoom lens are still critical, EO cameras require almost no focal length or mirrors reducing their size and bulk. Polymers and composite material produce ergonomic devices that are easier to hold with image processing/transmission capabilities for rapid exploitation and dissemination. Zoom capacity can reach 84 x or more allows rapid detection at 10 km or more in distance for selected targets. Day and night EO technologies include TV cameras can convert video imagery into an RF signal to transmit it to a receiver/display unit. Tripod-mounted or aircraft sensor pods can acquire targets at 10-30+ km in distance. Larger systems allows vehicles and aircraft to mount sensors with even longer ranges, better resolutions, and longer transmission ranges.

ELECTRO-MAGNETIC SPECTRUM AND SENSOR TECHNOLOGIES			
Light Band	**Alternate Name**	**Microns**	**Technologies**
Ultraviolet	UV/Black Light	0.01 – 0.40	Mercury Arc

Visible Light	Daylight	0.40 – 0.75	Eye, Optics, TV, Charged-Coupled Device (CCD)
Near Infrared	NIR	0.75 – 1.30	CCD, Image Intensifiers (II), Active IR
	Shore-Wavelength IR	1.30 – 3.00	Active IR
Mid-Infrared	Mid-Wavelength IR	3.00 – 6.00	Thermal
Far Infrared	Long-Wavelength IR	6.00 – 15.00	Thermal/Forward Looking Infrared (FLIR)

All night-time observation systems that operate outside of the visual spectrum are EO systems. CCD offers some capability during dawn and dusk and periods of adverse weather that create low light levels. Sub-component improvements offer night vision devices that are clearer, more compact, more resistant to glare, require less power, more time between service, with new features including laser pointers, better zoom, greater magnification, or electronic zoom capability. Commercial grade viewers offer affordable alternatives to military systems. *Electronic zoom* (EZ) can expand images to multiply the optical zoom by a factor of 3-8 x resulting in magnification of 60-100+ x in affordable systems. This doubles or triples the acquisition range, but could reduce image clarity in the highest EZ modes.



Charged-Coupled Device (CCD)

One inexpensive digital technology is the charged-coupled device (CCD) used in many video camcorders and some cameras operate in the near IR (0.75 – 1.3 µm) band. These CCDs generally lack ability to see in absolute darkness, but most (Bushnell Night-Hawk) offer superior day vision, video capability, and can be used in "low-light-level" (LLL) conditions. There are some 20-80 x CCD binoculars claim a day acquisition range of 10 km (8 km for man-sized targets).

The following table notes the evolution and variety of viewing sensors meld EO with other technologies used by reconnaissance as well as other ground force units.

EVOLUTION OF OPTICS AND EO SENSORS: GROUND FORCES APPLICATIONS		
Surveillance and Observation	**Added Technology**	**Weapons Target Acquisition**
Binoculars Theodolites Telescopes	Optics (Lenses and Reticles)	Day Sights (Telescopes & Collimators)
Day/Night Viewers Digital Cameras Video Recorders	Electro-Optics	Day Sights Night Sights
Laser Rangefinders (LRF)	Laser Technology	Laser Aiming Sights & Pointers

Laser Illuminators "Radars"		FCS Optical Augmentation
Digital Survey Sets	Navigation/Unit Location (GPS, Computer, LRF, Goniometer)	LRF Fire Control Systems
UAV Drone Remotely Piloted Vehicle (RPV)	Rocket Motor/Airframe	Fiber-Optic Guided Missiles Attack UAVs Laser-Homing Missiles
Micro-UAV; Canister Launch UAV Artillery/Rocket Launch UAV TV Recon Grenades, Projectiles, or Rounds	Artillery/Grenade/Canister Launcher	Attack UAVs Laser-Homing Munitions, Rockets Laser Target Designators
Unattended Ground Sensors (Cameras) Multi-Sensor Pods (Vehicles/UGS) Passive IR (Autotracker) Alerters	Remote Cameras/Acoustics (Motor Drive Actuator/Controls)	Side-Attack Mine Sensor Units Unattended Anti-Tank Grenade Launchers (ATGL) Sensors
Unmanned Ground Vehicles (UGVs)	Robotic Cameras (Robotic Chassis)	UGVs with guns, ATGLs, or ATGMs Robotic Mines

Night *Infrared Viewers* operate in the 0.75 – 2.00 µm band employ active light sources such as IR spotlights and this technology is easily detectible by adversaries with night vision systems. Therefore, the use of this technology has declined as the passive mode range is limited creating limited practical value. Passive night technology such as II can be found in the Infantry chapter. This technology is now in its 3rd generation, but some companies are claiming a 4th generation technology. This technology continues to expand due to requirements from hunters, police, and the military. Night vision goggles (NVGs), such as the Malaysian NG-30, allows for hands-free operations such as for driving with many affordable ($200+) for the Nighthawk. The cheaper NVGs, however, may not offer as many features as those designed specifically for the military. Some cameras fuse II and CCD together for effective and affordable day/night use. Many night scopes, night views, and NVGs are not weapon's sights, but can be used to improve accurate firing. These devices can be used to detect targets or queue new targets for weapons. An assistant with an NVG could use a visual light pointer to designate targets for the weapons operator to engage.



Night Vision Goggles

A newer night vision technology called *thermal imagery* (TI) is now challenging II in popularity as it surpasses the former in range and resolution. TI can "see" any object with temperature different than the background objects so TI can operate in absolute darkness. TI, however, does possess some limitations.

- Shapes are sometimes converted into images not readily recognized based on the human's visual frame of reference.
- At certain times of the day, the temperature changes may alter shapes or render objects invisible.
- Lack of heat from selected targets means the TI may not see objects in the foreground or background, which helps to provide contrast and context to the observer.
- Generally TI are bulkier than II and require bulky and noisy coolant bottles or power supplies.
- TI sensors are usually more expensive than II sensors.



Handheld Thermal Imager

TI does offer several significant advantages as TI is particularly sensitive to temperatures of warm-blooded animals, vehicle engines, solar-heated metal surfaces, and running gear from moving vehicles. Even after a vehicle stops, the residual engine heat renders a clear TI image for an hour or more. Second, TI usually provides faster and easier detection than II. Many TI systems use cameras operating in the mid-IR band (3.00 – 6.00 µm) with ranges up to 2 to 3 km. FLIR, operating in the far-IR (6.00 – 15.00 µm) band, offers superior clarity and range (3-4 km) for most applications making it the preferred technology. Due to increased production and competition, the cost has declined so TI is affordable for priority weapons such as ATGM launchers, tanks, and IFV. In Tier 1 and Tier 2 forces, TI is commonly used in reconnaissance vehicles.

Over the years, TI has improved so it can be categorized by generation like II. The current proliferation of mercury-cadmium-telluride and SPRITE detector staring arrays increased ranges to 5+ km while improving the discrimination of the images. A recent development is the uncooled TI that eliminates the bulky coolant bottle. An even more recent 3rd generation system combines II and FLIR to fuse them into one clear image. Reduction in the size of parts including microcircuits and imagers have produced portable TI viewing systems. In Tier 1 and 2 reconnaissance units and selected other units, key sensors and dismounted personnel will possess Sophie thermal binoculars with the II/FLIR upgrade. Some reconnaissance units may employ ATGM thermal sights for battlefield surveillance. The larger the system, the longer range and better clarity of most IR systems.



Shakhin Thermal Imaging Scope

The miniaturization of camera technologies through CMOS (complementary metal-oxide semi-conductor) transistors and the spread of commercial products offer fertile ground for new military reconnaissance applications. EO systems, such as the Bushnell Nighthawk CCD Viewer and Digital Imaging System 22 x 60 spotter scope offers video output could be transmitted to computers or goniometer systems. These cameras allow remote viewing options. "Nanny-cams" such as the XCam2 or British Spy Vision can monitor close-in areas such as urban streets and then transmit the images. Tactical applications could include hand-thrown cameras such as the Macroswiss. Other off-the-shelf technology such as digital cameras, camera cell phones, and binocular CCD imagers possess military applications.

Lasers are important for measurement, location, and target acquisition. The most important of these is the *laser rangefinder* or LRF. The LRF is used to measure distances to targets, surveying, or self-location—all important in firing both direct and indirect fire weapons. Many fire control systems on crew-served weapons or on combat vehicles include an in-viewer LRF that provides data into the FCS computer for target acquisition. Dismounted

soldiers can used a hand-held LRF as as the Leica Vector or Aselan LH-7800 binoculars can precisely measure ranges out to 10 km. Some binocular LRFs, such as the Eloptro LH-40C and Russian 1D18, can range targets to 20 km limited only by line-of-sight and the subject's size. Some of these hand-held systems such as the Bushnell Lytespeed with a 1 km range cost less than $300.



Leica Vector Laser Rangefinder (LRF)

One of the biggest benefits of lasers integrated into EO systems is increased responsiveness as the optics, EO, acoustics, radars, and other sensors can provide accurate location without the need for a second azimuth to solve an intersection problem. The time required to obtain the second azimuth could allow the target to escape if they are moving. Targets can be precisely located and engaged with only one azimuth, a laser snap, and a simple ballistic computer.

The *goniometer* uses LRF technology and is similar to the old aiming circles used in artillery and mortar units to fire indirect fire. The goniometer surveys itself into position on a tripod base with an azimuth viewer. Most goniometers are illuminated for night-time use, carry a GPS mount, and a simple computer (or programmable calculator) to determine self-location, directions, and elevations/deflections. Some goniometers are linked to a digital transmission system or have one built right into the system. A binocular LRF could be mounted on top to sight and range objects, targets, and registration points. Night sights can be added for 24-hour operations. The system can be referred to as a goniometer system, a fire control system (Vetronix Mortar FCS-MORFIRE), a forward observer system or FOS (OIP Delft), an observation station (Leica Digital), a targeting system (Sure Strike), or other names. The modern goniometer-based LRF FOS for the OPFOR is the SG12 with GPS, Leica 21 LRF with 12 km range, thermal night sight, computer interface, and digital data transfer. The entire time to emplace the system is under two minutes.

An *aiming circle* can be used for similar purposes with the same accuracy, but only when all of the separate components (LRF, GPS, computer, digital transmission system) are present. Often, a goniometer-based system can be more responsive, move more quickly, and produce greater accuracy than an aiming circle. Any OPFOR aiming circle should be regarded as the base for an observation system. Most dismounted forces worldwide will use an aiming circle or goniometer-based system. Due to its size and ability to be broken down, the goniometer system is portable and easily carried almost anywhere on the battlefield. In the past, 100 meters was considered accurate. With the new systems, accuracy is now one to five meters creating the ability to call in precise fire against a target.



Aiming Circle

Multi-sensor suites fuse together a variety of recent technologies to create sensors that integrate day/night detection, location, and target acquisition. Most suites are found on vehicles, but suites can be created by dismounted personnel in observation posts (OP) linking the various systems together. The Eloptro LH-40C LRF can link GPS with a computer link for the viewer image to determine range, bearing, and elevation before sending the data through a digital transmission. The LH-40C does not need a goniometer base for precise target location.

The *laser target designator* (LTD) is the next step in laser evolution. The LTD can guide semi-active homing bombs, artillery, naval gun rounds, mortar projectiles, rockets, and ATGMs directly onto their target. The seeker on the munitions directs the round onto the "laser splash" aimed on the target. Some LTDs, such as the Russian 1D26, can be carried by a single operator. Most LTDs include a tripod mount with other sub-assemblies such as a built-in LRF or night sight, for easy carrying by a team of two to three soldiers. It is likely that as technology increases, lighter materials will be used to create LTDs making them lighter weight and more easily carried for use by dismounted units. There have even been laser-homing grenades developed for squad ATGLs for well over a decade.



French DHY-307 Laser Target Designator (LTD)

In some LTD-based FCS such as the French DHY-307, the LTD replaces the goniometer for an OP. The LTD FCS may contain such features as an encoded beam to ensure only one hit per target, counter-measures against the enemy looking for lasers, GPS, night sights, and the other sub-components found in a goniometer-based FCS. Most laser munitions can be used with most LTDs. Tier 1 and 2 OPFOR observers will operate the DHY-307 with a designation range of 10 km instead of goniometer-based system. OPFOR recon and AT observers possess the ability to call in laser rounds through man-portable LTDs with a night range out to 5 km with an accuracy of 1 m.

The *laser aimer* as discussed in the Infantry chapter or *laser pointer* are used by ground units to shoot direct fire weapons or point out targets to other personnel. The pointers, however, emit light and offer a risk of exposure to a prepared adversary. Thus, the pointers are only used when the fire fight begins when the using unit possesses fire superiority.



PEQ-15 Laser Aimer

A recent laser technology is the laser locator (also known as the "laser radar" or LADAR or when linked into a weapons fire control system as "optical augmentation) that uses light detection and ranging (LIDAR) to detect and measure ranges. LIDAR can operate in the active or passive mode. In the active mode, it employs a laser to scan in the observed sector, scanning in a band pattern similar to radar. The aligned IR viewer then looks for IR light generated by laser light reflected by optics and sights. Although the LADAR operating in an active mode creates a narrow laser beam, it limits the beam spread beyond the scanned target. Passive use of LADAR is more difficult because it depends on the use of light close to or behind the viewer in the right frequency with sufficient brightness and the right angularity for the viewer to detect down-range reflections. An example



Leica HDS-3000 LIDAR



Ground Vehicular Laser Locator Designator



of LADAR is the Mirage 1200 hand-held "lens detector" with a range up to 1200 m. Laser filters on optics can reduce the effectiveness of detection by LADAR. Reconnaissance vehicles and aircraft employ LADARs for day and night imagery.

For many years, reconnaissance units have detected the enemy through the process of "triangulation." When 2 or more azimuths are obtained from known locations of a particular target, the target's location can be determined by drawing the lines on the map to determine where the lines intersect. This intersection is the target's location. The system previously had some limitations as the time delay from receiving the two locations with azimuths could provide faulty information, especially if the target was on the move. Recent technology can exploit this old methodology. Precise self-location with GPS, computers, digital map displays, and digital data links from different sensors can provide the two locations with the azimuths in a matter of seconds, providing both sensors are aimed at the same target.

Acoustic sensors are also found on the battlefield including multi-directional microphones, directional microphones, sound-ranging arrays, vehicle arrays, which intersect azimuths to locate sound sources including guns, helicopters, and combat vehicles. Artillery sound-ranging systems include the Russian AZK-5 and AZK-7, Swedish Soras 6, and the British HALO all use microphones digitally linked to automated processors for rapid calculation of enemy firing locations. Sensitive microphones on various Israeli Helispot systems, including autonomous acoustic vehicles, enable them to detect and locate enemy helicopters in flight. Man-portable Air Defense Systems (MANPADS) units also use acoustic sensors to determine target locations.

The military continues to find new applications for *radar* systems, whether they are battlefield surveillance systems mounted on tripods, carriages, weapons, vehicles, aerial platforms, or even trees. New technologies such as miniaturization, millimeter-wave (MMW), improved power supplies, links to laptop computers offer other new applications. Compact radars such as the Fara-1 offer man-portable carrying capability and attachment to weapons, such as automatic grenade launchers (AGL) for fire direction. Slightly larger systems include the Thales Squire two-man radar system with a 24 km operating range that is portable in packs. Tripod-mounted radars such as the Credo-1E can link to digital nets with the ability for easy emplacement or displacement.

The major disadvantage of radar is the system actively emits a signal the enemy can locate through Electronic Warfare (EW) or other systems making the radar vulnerable to attack. Squire is a low probability of intercept (LPI) radar due to its extremely low peak power. Other LIP features include phased array with lower power levels for detectors, reduced side lobes, and operating frequencies outside of most radar intercept system bandwidths. The most common frequency bands for land radar systems have been the I and J bands. In recent years, new radar technologies have been field to add LIP features to reduce intercept vulnerability. Airborne radar such as Horizon use moving target indicator (MTI) and synthetic aperture radar (SAR), and Doppler processing with secure stand-off for missions. MMW radars (30+ GHz) offer precise acquisition and fire control, compact size antennas, and lower signal detectability.

Two other technology trends are on the rise—*remote sensors* and *robotic sensors*. Remote sensors are generally immobile, although they may be able to change their field of view in order to see as required. A simple remote sensor is a side-attack mine, such as an anti-tank disposable grenade launcher placed along an expected advance for vehicles and linked to an autonomous acoustic sensor unit, such as AJAC. As the enemy approaches, usually along a road, the device will launch a grenade, thus audibly signaling the vehicle's approach. Robotic sensors can relocate to perform their mission. Civilian applications have led to a wide variety of remote cameras, remote actuators on robotic systems, and the use with unattended ground sensors including acoustic, IR, seismic, tripwire-



electronic, and magnetic. Key technology constraints include detectability shortfalls, power supply and battery limitations, and signal transmission inadequacies, but the issues are in the process of being resolved. Use of fused sensors means more accurate, timely, and complete reports. Rechargeable batteries, acoustic.IR wake-up, miniaturization, and increased sensor sensitivity all make the use of remote sensors and sensor suites practical as well as marketable.

The British Radamec 1000L system is an example of a *remote camera* with limited operator presence to detect targets. Other applications include cameras tethered from concealed vehicles and operated through the vehicle power system. New technologies include passive IR scanning cameras with auto-track and alert algorithms such as the French Sirene or British ADAD IR units emplaced on the battlefield to link into sensor nets and monitor sensitive avenues of approach and unit flanks. Early systems include air defense sensors such as ADA, Sirene, or the hand-held Swedish IRS-700. A tethered *aerostat balloon* can hold a remote camera platform to increase surveillance beyond the line-of-sight. The Israeli TAOS system uses a gimbaled, stabilized, multi-sensor platform with a CCD and thermal camera for day or night use. Radar and laser illuminator applications are optional with the ground station mounted on a trailer. Ground forces are also adapting commercial camera network technologies to create a *surveillance camera network* that can monitor wide areas on the battlefield. These systems include the CELTICS, TACS, and Gamma 2000—all produced by Israel.

The use of an *unattended ground sensor* (UGS) by the US dates back to the Vietnam War where the UGS units were placed to detect enemy presence and movement. Some of these sensors were “break-wire” that generated a signal when broken. While the most common UGS is acoustic, other UGS units can monitor seismic, magnetic, infrared, or RF activity. Some UGS units can sleep to save energy and the size can vary from a few centimeters to a few inches in size. Relay systems may be required to forward the signal to the monitoring station. By analyzing the location and pattern of signals, the operator is cued to initiate additional battlefield surveillance activities in selected areas. Examples of UGS units include the Thales Miniature Intrusion Sensor (MIS) and Rafael. Current technology reduces false alarms such as from animals wandering in the area. Emplacement is important as if placed in too open of an area, the UGS can be seen. If placed in an urban or defilade position, the signal may not reach the monitoring station. Larger UGS units may be placed at road junctions, river crossing sites, and other important locations. Examples of the larger UGS units include the ATE UGS, Steel Eagle, Gateway, and Boden-Sensor-Ausstattung (BSA). The Thales CLASSIC 200 has been sold t over 39 countries for military, border control, police, and commercial purposes with a complete network with monitor, acoustic, cameras, and other sensors. Possible roles for the UGS include perimeter protection, route monitoring, and point surveillance. Emerging UGS technologies include linking to other sensors, mine activation, remote weapons system operation, and autonomous cueing to conduct precision targeting. A subset of the UGS is the *remotely-delivered sensor* that delivers reconnaissance rounds through a weapons system such as artillery or mortars. These rounds, once fired and activated, can provide target location, acquisition, and post-mission battle damage assessment. Cameras provide a low-cost method to obtain immediate view beyond the line-of-sight, over the hill, or behind the foliage, with a reduced risk of being seen. The Israeli IMI recently debuted a Refaim rifle grenade containing a camera that can transmit pictures back to the launching unit as the round descended on its target. A 40-mm under-barrel rifle grenade launcher can fire the Israeli Firefly that transmits video and sound back to a digital radio and laptop computer. In addition to their anti-tank role, fiber-optic ATGMs can use their camera to provide video footage for analysis by reconnaissance units.

Robotic sensors consist of single or multiple sensors mounted on robots or unmanned ground vehicle (UGV) chassis. Previous applications include the exploration of the ocean floor, other planets, and inaccessible areas

such as caves or volcanoes. The police often uses a robotic sensor for surveillance in hostile situations as well as examining contamination areas such as the Chernobyl nuclear plant. A military version is the tracked Matilda with a day TV camera used in Afghan caves, clearing minefields, and checking for potential IEDs. The OPFOR can use robotic sensors for surveillance and patrols in urban or open terrain to reduce troop vulnerability. A simple application is to use robots controlled from reconnaissance vehicles or nearby personnel. A robotic chassis features EO viewers for guidance and surveillance, such as a TV camera with an RF or cable link; GPS in-view readouts; a thermal or II night channel; and LRF. A robot can carry other sensors including acoustic microphones, NBC samples, radar, or weapons. Other robotic examples include the British tracked Wheelbarrow mine detection system or the Giant Viper wheeled line charge launcher vehicle that tows its own charge trailer. The German company, Telerob, produces tracked robots for industrial, police, and military applications. The Russian SPC robot can employ a number of sensors.



Robot with Camera

The earliest robotic sensors on the modern battlefield were unmanned aerial vehicles (UAV). See Volume 2 for additional information on UAVs. UAVs can perform pre-programmed (drone) or operator control (remotely piloted vehicle—RPV) missions. The on-board TV camera and its ability to transmit the images to a ground station are the core of the UAV mission. In the last few years, unmanned combat aerial vehicles (UCAV) have appeared to attack located targets. A UAV ground station can consist of only a notebook computer or PDA as a terminal. Due to the high cost of airplanes and the training required to become a proficient pilot, UAVs are an excellent way to work through budget constraints and lack of an efficient manned air force. Recent or expanded technology for UAVs include the following:

- *Man-portable UAVs* are light weight and can be carried in a backpack and launched by hand such as the German Carolo, Russian Pustelga, or French K100.
- *Micro-aerial Vehicles* (MAV) use radio-control (RC) model plane technology where some of these are not larger than a man's hand.
- *Improvised UAVs* using RC aircraft.
- *Vehicle/robotic launch UAVs* including canister launchers such as the Israeli Skylite UAV or the UAV the French are looking for their next LeClerc tank upgrade.
- *Weapons-launched UAVs* such as the Russian R-90 300-mm launched by the 9A152-2 MRL can loiter for 30 minutes while transmitting imagery to an artillery command and reconnaissance vehicle (ACRV).
- LTD UAV where the UAV substitutes as the laser designated in lieu of a soldier or vehicle.



American RQ-11 Man-Portable UAV

Battlefield monitoring systems require the use of cable links or RF data transmission equipment, and display arrays such as those found in vehicles modified into ground stations. These systems can fuse various technologies, including commercial equipment, together to obtain the best situational awareness possible for the user.

Technology limitations will continue to challenge reconnaissance operations, but solutions will be found. Commercial applications will continue to cross over into the military as forces with limited budgets will continue to use off-the-shelf technology for military purposes. The OPFOR will supplement new technology with low technology to conduct their reconnaissance operations. Innovative military forces can use niche technologies and aggressive manned reconnaissance units to conduct battlefield surveillance operations. The battlefield surveillance networks will consist of personnel, organic sensors, vehicles, UGS, remote sensors, UAVs and any other reconnaissance assets available. Effective equipment, sound organization and planning, commitment to the OE variables, and effective reconnaissance tactics can enable the OFPRO to gain greater situational awareness within their operational area, and to challenge enemy capabilities to achieve tactical surprise.

FRENCH GROUND SURVEILLANCE RADAR RASIT/RASIT-E



RASIT Ground Surveillance Radar (GSR) Mounted on Vehicle

SYSTEM	SPECIFICATIONS	EQUIPMENT	SPECIFICATIONS
Alternative designations:	RASIT 3190B; RACIT E; DRPT-5; Basir 110D (Iran)	Name:	Radar Acquisition de Surveillance Intermediare (RASIT)
Date of introduction:	1970s; 1990s (RASIT-E)	Console:	Digitally operated including display
Proliferation:	22+ countries	Radar:	Motor-driven for azimuth adjustment with remote control
Description:	Ground Surveillance Radar (GSR) can be operated by a crew of 1 or 2; entire system breaks down to 3 90-kg	Azimuth coverage (°):	Operator section: 10 to 240 (200 to 4300 mils)

	sections; vehicle or tripod-mounted		
Crew:	2 (operator & assistant operator); more for vehicle	Antenna type:	Flat array type; slotted waveguide antenna; cable link
Combat weight (kg):	90.0	Performance:	
Chassis length overall (m):	Varies by vehicle	Surveillance range (km):	20-23 (Personnel); 32-40 (Vehicles); 20-40 (Aircraft)
Height overall (m):	Varies by vehicle	Tracking speed:	00 – 103 km/hr
Width overall (m):	Varies by vehicle	Resolution:	+/- 10 m range; +/- 0.6° in azimuth
Ground pressure (kg/cm²):	Varies by vehicle	Countermeasure resistance:	ECCM & LPI capable
Automotive performance:	Varies by vehicle	Transceiver specifications:	
Engine type:	Varies by vehicle	Signal:	I-Band (8.00 – 10.00 GHz)
Cruising range (km):	Varies by vehicle	Power (W):	3000 (consumption); 150 (Output)
Speed (km/h):	Varies by vehicle	Width of radiation pattern lobe (°):	-11 to 240
Fording depths (m):	Varies by vehicle		
Radio:	INA	Accuracy:	90% probability of detection
Protection:	N/A	Polarization:	Linear & circular
Armor, turret front (mm):	N/A	Compatibility:	With IFF systems & ECCM capabilities
Applique armor (mm):	N/A	Remote Operation:	Console 300 m from dish
Explosive reactive armor(mm):	N/A	Target acquisition:	Automatically detects, tracks, & identifies all targets
Active Protection System:	N/A	TV Monitor:	Polar & Universal Transverse Mercator (UTM) coordinates
Self-entrenching blade:	N/A	Display:	Plotting table or mapping computer
NBC protection system:	N/A	Tone Signal:	Available
Smoke equipment:	N/A	Remote user transmission:	Standard interface; RASIT E can be integrated with battle management system using TCP/IP interface
Survivability equipment:	N/A	Alternative modes of operation:	
		Magnified mode:	2.5 km x up to 40 km; widths in 10° intervals up to 240°; registers only movement within designated zone
		FDC mode:	Weapon aiming radar to correct artillery fire; GSR still operational
		Air Defense (AD) mode:	RASIT E only; used to locate nap-of-the-earth flying helicopters up to 30 km; low flying aircraft to 40 km; sends coordinates to AD units
		Early Warning mode:	Vehicle mounted version with antenna not in stowed position
		GPS mode:	Compatible with GPS navigation systems to transmit relative coordinates using digital interface to battlefield management systems
NOTES SOURCES: 2014 WEG.			

RUSSIAN GROUND SURVEILLANCE RADAR KREDO-1E



Kredo-1E Ground Mount



Kredo-1S Ground Surveillance Vehicle



SNAR-10M Artillery Reconnaissance Vehicle

SYSTEM	SPECIFICATIONS	EQUIPMENT	SPECIFICATIONS
Alternative designations:	RP-200, IRL-133-3, Kredo-1, Credo-1, Credo-1E, & PSNR-8	Name:	Kredo-1E
Date of introduction:	1990s	Console:	INA
Proliferation:	At least 1 country	Radar:	Motor-driven for azimuth adjustment
Description:	Ground Surveillance Radar (GSR) can be operated by a crew of 2 or 3; vehicle pintle or mast-mounted or tripod-mounted	Azimuth coverage (°):	360; 180 in scan sector; 18 in elevation
Crew:	2/3 (operator; assistants); more for vehicle	Antenna type:	Slotted wave guide
Combat weight (kg):	48 (up to 97 with battery & display)	Performance:	
Chassis length overall (m):	Varies by vehicle	Surveillance range (km):	40 (detection); 30 (tracking); 40 (tanks); 20-40 (light vehicles & trucks); 35 (helicopters); 30 (large aircraft); 12 (ships); 15 (personnel); 15 (shell burst-155-mm); 0.2 (minimum)
Height overall (m):	Varies by vehicle	Tracking speed:	3-72 km/h4
Width overall (m):	Varies by vehicle	Resolution:	50 m range; 1.8° in azimuth
Ground pressure (kg/cm^2):	Varies by vehicle	Countermeasure resistance:	INA
Automotive performance:		Transceiver specifications:	Multi-mode master oscillator & klystron
Engine type:	Varies by vehicle	Signal:	Coherent pulse Doppler J-band (10.00 -19.00 GHz, US Ku band)
Cruising range (km):	Varies by vehicle	Power (W):	250 (Consumption)
Speed (km/h):	Varies by vehicle	Mode:	Mono-pulse digital processing

Fording depths (m):	Varies by vehicle	Width of radiation pattern lobe (°):	INA
Radio:	INA	Accuracy:	10 m in range); 0.12° in azimuth)
Protection:	N/A	Emplacement time:	5 minutes
Armor, turret front (mm):	N/A	Polarization:	INA
Applique armor (mm):	N/A	Compatibility:	Can be used as the base for an integrated digital sensor suite or fused to process data from other sensors
Explosive reactive armor(mm):	N/A	Remote Operation:	25-200 m away from dish
Active Protection System:	N/A	Target acquisition:	Automatically detects, tracks, & identifies targets & reads coordinates
Self-entrenching blade:	N/A	TV Monitor:	INA
NBC protection system:	N/A	Display:	Displays acquisitions on digital map display with various display colors
Smoke equipment:	N/A	Tone Signal:	INA
Survivability equipment:	INA	Remote user transmission:	Transmit data digitally over network via standard interface
		VARIANTS	SPECIFICATIONS
		Kredo-1S	Ground recon vehicle with Kredo-1E radar/EO sensor pod on telescoping arm on amphibious BAZ-5921 chassis
		TBD	Same telescoping arm as the Kredo-1S, but on the BTR-based UNSh/K1Sh1 chassis
		SNAR-10M	Russian upgrade for the SNAR-10 artillery battlefield surveillance radar vehicle (replaces BIG FRED radar with the Kredo-1E)
NOTES SOURCES: 2014 WEG. WITH THE PINTLE MOUNT, THIS RADAR CAN BE MOUNTED ON ALMOST ANY VEHICLE TO MODIFY IT INTO A RECONNAISSANCE VEHICLE. (PHOTOS FROM 2014 WEG)			

RUSSIAN/BULGARIAN GSR PSNR-5/5M & KREDO-M1



PSNR-5 Ground Surveillance Radar (GSR) Portable Dish



PSNR-5 GSR Portable Viewer

SYSTEM	SPECIFICATIONS	EQUIPMENT	SPECIFICATIONS
Alternative designations:	TALL MIKE (NATO); PSNR-5/IRL133 (Ground); PSNR-5K/1RL133-1 (Vehicle); IRL 133M (Kredo M-1 ground); 1RL 133M1 (PSNR-8 vehicle)	Name:	PSNR-1 Kredo-M1 (both C & K used in translations);
Date of introduction:	1974 (PSNR-5)	Console:	INA
Proliferation:	11+ countries	Radar:	Motor-driven for azimuth adjustment with remote control
Description:	Ground Surveillance Radar (GSR) can be operated by 1 or 2 soldiers; 3 soldiers required for dismounted carry	Azimuth coverage (°):	360; 180 in surveillance sector; +/- 18 (Tripod can be adjusted for more vertical coverage)
Crew:	1 (Vehicle); 2 (Dismounted)	Antenna type:	Parabolic dish with cable link
Combat weight (kg):	56.0; 50 (including 2 batteries for Kredo-M1)	Performance:	
Chassis length overall (m):	Varies by vehicle	Surveillance range (km):	PSNR-5/5M: 3-5 (personnel); 10-15 (vehicles); range reduced 50% at wind speeds > 5 m/second; 0.2 (minimum)
Height overall (m):	Varies by vehicle	Tracking speed:	2-60 km/hr (more for some targets)
Width overall (m):	Varies by vehicle	Resolution:	100 m in range; 50 mils in azimuth; 25 m for range & 50 mils for azimuth for Kredo-M1
Ground pressure (kg/cm^2):	Varies by vehicle	Countermeasure resistance:	INA
Automotive performance:	Varies by vehicle	Transceiver specifications:	Coherent pulse Doppler with magnetron (With klystron for Kredo-M1)
Engine type:	Varies by vehicle	Signal:	I-band (9.00 GHz); J-band (10.00-19.00 GHz or US Ku band for Kredo-M1)
Cruising range (km):	Varies by vehicle	Power (W):	90 (Consumption); 12 (Output); 110 (consumption for Kredo-M1)
Speed (km/h):	Varies by vehicle	Width of radiation pattern lobe (°):	INA
Fording depths (m):	Varies by vehicle	Emplacement time:	5 minutes (vehicle mast mounted)

Radio:	INA	Accuracy:	INA
Protection:	N/A	Polarization:	INA
Armor, turret front (mm):	N/A	Compatibility:	Operate using analog or digital processing match user interface.
Applique armor (mm):	N/A	Remote Operation:	25 m away for concealed operators
Explosive reactive armor(mm):	N/A	Target acquisition:	INA
Active Protection System:	N/A	TV Monitor:	INA
Self-entrenching blade:	N/A	Display:	Monochrome digital readouts; color on Baget-14 notebook computer for Kredo-M1
NBC protection system:	N/A	Tone Signal:	INA
Smoke equipment:	N/A	Remote user transmission:	INA
Survivability equipment:	N/A	VARIANTS	SPECIFICATIONS
		PSNR-5	Tripod mounted
		PSNR-5K	Mount mast for vehicles (i.e. Russian BRM-1K)
		PSNR-5M/Kredo-M	Updated PSNR-5K on vehicles with a notebook computer to display, process, transmit; with GPS
		Monitor-M	Links up to 4 PSNR-5M radars to provide 360°
		Kredo-M1/PSNR-5M Modernized	PSNR-5M with additional upgrades with range of 5 – 8.5 km (personnel); 20 km (tanks); 32 km (trucks); with 12 km (tracking)
		Strazh-ST	Vehicle sensor pod with Kredo-M1 & EO cameras (PRP-4M uses the PSNR-5M system; the PRP-4MU has an option for the Kredo-M1)
NOTES SOURCES: 2014 WEG.			

RUSSIAN/BULGARIAN MAN-PORTABLE GSR FARA-1E



Fara-1E GSR Set Up in the Field



Fara-1E GSR Components

SYSTEM	SPECIFICATIONS	EQUIPMENT	SPECIFICATIONS
Alternative designations:	Fara; Fara-3; RP-100; 1RL-136; SBR-3 (Russia); SSBR-3 (Bulgaria)	Name:	Fara-1E
Date of introduction:	1990s	Console:	INA
Proliferation:	2+ countries	Radar:	Motor-driven for azimuth adjustment with remote control
Description:	Man-portable Ground Surveillance Radar (GSR) can be mounted on a vehicle	Azimuth coverage (°):	360; 180 in surveillance sector;
Crew:	1 or 2 (system can be carried by 1 soldier)	Antenna type:	Flat array type slotted waveguide antenna with cable link
Combat weight (kg):	14 (total system); 18.3 (with tripod); 6 (patrol version)	Performance:	
Chassis length overall (m):	Varies by vehicle	Surveillance range (km):	5 (vehicles); 2.5 (personnel)
Height overall (m):	Varies by vehicle	Tracking speed:	2 – 50 km/hr
Width overall (m):	Varies by vehicle	Resolution:	20 m (range); 0.9° (azimuth)
Ground pressure (kg/cm²):	Varies by vehicle	Countermeasure resistance:	God jam resistance with phase-coded modulation
Automotive performance:	Varies by vehicle	Transceiver specifications:	Coherent pulse Doppler with continuous-wave kylstron
Engine type:	Varies by vehicle	Signal:	J-band (10.00 -19.00 GHz, US Ku band)
Cruising range (km):	Varies by vehicle	Power (W):	7 (consumption); 0.50 (output)
Speed (km/h):	Varies by vehicle	Width of radiation pattern lobe (°):	4 (azimuth); 10.5 (elevation)
Fording depths (m):	Varies by vehicle	Gain (dB):	27
Radio:	INA	Sideload in azimuth (dB):	16
Protection:	N/A	Emplacement time:	INA
Armor, turret front (mm):	N/A	Accuracy:	INA
Applique armor (mm):	N/A	Polarization:	INA

Explosive reactive armor(mm):	N/A	Compatibility:	Can be fused with data from other sensor systems for target location by azimuth intersction
Active Protection System:	N/A	Remote Operation:	Console can be set up 15 m away from dish
Self-entrenching blade:	N/A	Target acquisition:	Automatically detects, tracks, & identifies all targets
NBC protection system:	N/A	TV Monitor:	
Smoke equipment:	N/A	Display:	
Survivability equipment:	N/A	Tone Signal:	Earphones & sound signal alert the user & classifies targets.
		Remote user transmission:	Data can be transmitted to remote users via standard interface.
		Alternative modes of operation:	
		Individual Weapons Target Acquisition:	Mounted on the NNP-23 infrared night sight for fusing data to that device
		Crew-served Weapons Target Acquisition:	Elbow flange to mount on machine guns, AGS-17 AGL (Fara-2) to deliver precision fires up to 4 km (day/night) while still serving as a GSR
		Hand-held LRF & GPS:	Fuse azimuth directional data, current location, & range data for precise day/night target location.
		Fara-1:	Used by AD units to locate nap-of-the-earth flying helicopters & use flange elbow mount to direct machine guns or send data through link to AD units.
		Vehicle Mount Version:	Early warning of enemy personnel when mounted on motorcycles or TUVs.
		Remote Surveillance:	Link with unattended ground sensors to conduct wide area battlefield surveillance.
NOTES SOURCES: 2014 WEG; SYRACUSE RESEARCH CORPORATION TECHNICAL REPORT-GROUND SURVEILLANCE RADARS AND MILITARY INTELLIGENCE, 30 DECEMBER 2002. USE OF A LAPTOP COMPUTER INSTEAD OF THE BACKPACK UNIT DECREASES SYSTEM'S WEIGHT. COMPACT MODULAR SYSTEM IS IDEAL FOR USE ON SMALL VESSELS. (PHOTOS FROM 2014 WEG)			

FRENCH THERMAL BINOCULARS/FORWARD OBSERVER SYSTEM
SOPHIE LR



Sophie Binoculars Using the Daytime CCD Camera Mode

SYSTEM	SPECIFICATIONS	PERFORMANCE	SPECIFICATIONS
Alternative designations:	See variants	Field of View (FOV) (°):	12.4 x 6.2 (wide view); 6.2 x 3.1 (narrow view); Other versions have different FOVs
Date of introduction:	1996 (original)	Night Range (km):	Standard (without EZ)
Proliferation:	45+ countries (Sophie & Sophie LR)	Fixed-wing Aircraft:	Detection: 22 (15) Recognition: 10 (6.4)
Description:	Binoculars with additional features	Helicopters:	Detection: 16 (11) Recognition: 7 (4.5)
Crew:	1	Vehicles:	Detection: 13 (8.7) Recognition (3.3)
Combat weight (kg):	3.3 (Sophie LR with 2 X electronic zoom (EZ)); 2.4 (original)	Personnel:	Detection: 9 (4.4) Recognition: 3 (1.6)
Components:		Day Range:	Similar to night ranges

Configuration:	Hand-held binocular device	VARIANTS	SPECIFICATIONS
Power Supply:	Internal rechargeable lithium battery & DC adaptor	Original Sophie	Day/night binoculars that can be fitted to a goniometer to serve as a base sight for dismounted forward observation (FO) & fire control system
Detector:	SOFRADIR 288 X 4 element CdHgTe (Mercury Cadmium Telluride) detector	Sophie LR (Long Range):	Improved version with increased range, 2 x EZ, & image stabilization
Frequency:	8 – 12 microns	Sophie UF2:	Compact redesigned hand-held viewer that weighs 2.4 kg, but meets the Sophie LR upgraded standards
Thermal Technology:	Second generation	Sophie MF (Multi-function):	Integrated goniometer FO System (FOS) with all LR features, laser rangefinder 9LRF), laser pointing system, internal GPS, & internal color camera. FOs can adjust indirect fires 13 km, 6 km with recognition; direct fire precision ranges are 6 km+ dependent upon targets & ammunition; range against helicopters is 7 km with EZ
Optional additions:	Tripod mount; RS 422 remote control box for remote viewing (see variants for other applications)	Sophie XR (Extended Range):	All Sophie MF features as well as the new SOFRADIR Scorpio detector with increased ranges.
Operation:			
Battery Time (hrs):	Thermal: 4+; Day use: 6+ (Lithium batteries) Thermal: 4+; Day/night use: <12 (rechargeable batteries)		
Cooling Bottle:	None (uncooled FLIR)		
Detectability while surveilling:	None (passive both day & night)		
Data transmission:	CCIR or RS-170 link for digital downlink to computer/net for TV display		

NOTES

SOURCES: 2014 WEG. THE SOPHIE-LR IS USED AS LIGHTWEIGHT CAMERAS WITHIN SURVEILLANCE SYSTEMS AND INDIRECT WEAPON FIRE CONTROL SYSTEMS. SOPHIE-LR IS CONFIGURED AS A REMOTE SENSOR POD FOR VEHICLE OR SITEMOUNTED, WITH DIGITAL FEED TO A REMOTE DISPLAY. A CURRENT SOPHIE-BASED RISTA SYSTEM IS DEPICED AT THE THALES WEBSITE FOR USE BY THE F2000 UAV & IS MOUNTED ON ATGM LAUNCHERS, HELICOPTERS, & A VARIETY OF OTHER VEHICLES. THE SOPHIE-LR CAN BE MOUNTED ON A TELESCOPING MAST WITH AN RS 422 REMOTE CONTROL BOX FOR AZIMUTH ROTATION, & A VERTICALLY SWIVELING PINTLE FOR PRECISION ELEVATION. THE SENSOR POD USES A DC POWER SUPPLY & A DIGITAL DATE CABLE LINKED TO A REMOTE VIEWER OR RF VIDEO TRANSMISSION SYSTEM (UAV).

Dec
2015

Worldwide Equipment Guide

Chapter 2: Infantry Weapons



TRADOC G-2 ACE–Threats Integration
Ft. Leavenworth, KS

Distribution Statement: Approved for public release; distribution is unlimited.

Chapter 2: Infantry Weapons

Chapter 2 provides the basic characteristics of selected infantry weapons either in use or readily available to the OPFOR and therefore likely to be encountered by US forces in varying levels of conflict.

The chapter is divided into two categories—***small arms*** and ***recoilless weapons***. ***Small arms*** covers, in order, assault and battle rifles, sniper/anti-material rifles, automatic grenade launchers, under-barrel and hand held grenade launchers, light machineguns, general-purpose machineguns, and heavy machineguns. The second category, ***recoilless weapons***, contains the most proliferated disposable launcher rocket propelled grenades and reloadable launcher RPGs and recoilless rifles. While originally limited to shoulder-fired unguided antitank weapons such as the Russian 40-mm Antitank Grenade Launcher RPG-7V, the utility of shoulder-fired weapons has expanded to include multi-purpose systems such as the Swedish 84-mm Recoilless Rifle Carl Gustaf M2, and many other systems. This field of weapons is often labeled "antitank" and also includes "bunker-buster" warheads, and weapons which can be fired from within confined spaces such as the German 67-mm Disposable Antitank Grenade Launcher (Armbrust) due to no or minimal back blasts. New, disposable launcher Tier 1 anti-armor systems such as the RPG-28, 32 and 30 have also been added. The RPG-30, in particular, is designed to defeat both Explosive Reactive Armor (ERA) and Active Protective Systems (APS) via a sub-caliber device that upon firing reaches the target milli-seconds before the main 105mm HEAT tandem warhead rocket. The RPG 28 is a heavy, 125mm tandem warhead weapon that will penetrate in excess of 1000mm of rolled, homogenous armor (RHG), after defeating ERA. Both are formidable anti-armor systems, which can be easily employed by the individual Soldier or insurgent.

An enduring battle-tested, lethal, shoulder-fired weapon is the Russian Infantry Rocket Flame Weapon RPO-A Series (RPO-A/D/Z) capable of firing either a smoke, incendiary, or a thermobaric warhead to 600 meters. At 200 meters it is accurate to 0.5 m^2. The thermobaric warhead has a blast effect corresponding to a round of 122-mm HE artillery. Due to the relative low cost, availability, versatility, transportability, trainability, and lethality of this category of infantry weapons, trainers should expect to encounter these systems in larger numbers with increasing levels of lethality, penetration, and utility.

Updates and changes also include the following: the SMLE and Moisan-Nagant bolt action rifles have been deleted from the WEG. The Heckler and Koch G3 and Fabrique Nationale FN battle rifles have been added due to their proliferation throughout parts of Africa, South America, and the Indian sub-continent. Additionally, the Chinese bull pup assault rifle QBZ-95 has been added along with the Russian Federation's SV-98 sniper rifle.

Crew-served infantry weapons which require a vehicle, or which limit mobility, have been moved to the Antitank and Anti-Armor chapter (6). Questions and comments on data listed in this chapter should be addressed to:

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Belgian Fabrique Nationale 7.62x51mm NATO Main Battle Rifle, FAL



SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative Designation: None. Date of Introduction: 1954 Proliferation: Widespread; like the Hk G3, it has been used by 70+ nations, worldwide, at some time or another, and is still found in many Third World militaries/security services.	Weight: FAL 50.00: 4.3 kg (9.48 lb) FAL 50.61: 3.90 kg (8.6 lb) FAL 50.63: 3.79 kg (8.4 lb) FAL 50.41: 5.95 kg (13.1 lb) Length: FAL 50.00 (fixed stock): 1,090 mm (43 in) FAL 50.61 (stock extended): 1,095 mm (43.1 in) FAL 50.61 (stock folded): 845 mm (33.3 in) FAL 50.63 (stock extended): 998 mm (39.3 in) FAL 50.63 (stock folded): 748 mm (29.4 in) FAL 50.41 (fixed stock): 1,125 mm (44.3 in) Barrel length: FAL 50.00: 533 mm (21.0 in) FAL 50.61: 533 mm (21.0 in) FAL 50.63: 436 mm (17.2 in) FAL 50.41: 533 mm (21.0 in)	7.62x51mm NATO; ball, tracer, armor piercing. All known variants.	Action: Gas-operated, tilting breechblock Rate of fire: 650–700 rds/min Muzzle velocity: FAL 50.00: 840 m/s (2,756 ft/s) FAL 50.61: 840 m/s (2,755.9 ft/s) FAL 50.63: 810 m/s (2,657.5 ft/s) FAL 50.41: 840 m/s (2,755.9 ft/s) Effective firing range: 400–600 m sight adjustments Feed system: 20 or 30 round detachable box magazine. 50-round drum magazines are also available. Sights : Aperture rear sight, post front sight; Sight radius: FAL 50.00, FAL 50.41: 553 mm (21.8 in) FAL 50.61, FAL 50.63: 549 mm (21.6 in)

			Various telescopic and night visions sights are available for mounting on the FN FAL series of rifles.
		VARIANTS	
		Numerous, particularly among those manufactured under license from FN in other nations. Most common variants are the standard FN infantry weapon with a fixed stock. Also the para models with a 17.2 inch barrel and folding stocks.	

NOTES
LIKE THE HK G3, ONE OF THE MOST PROLIFIC MAIN BATTLE RIFLES EVER PRODUCED; CAN BE FOUND VIRTUALLY AROUND THE WORLD, STILL IN SERVICE WITH SOME THIRD WORLD MILITARIES AND SECURITY ORGANIZATIONS.

German Heckler and Koch 7.62x51mm NATO Main Battle Rifle, G3



SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative Designation: None Date of Introduction: 1959 Proliferation: Widespread; 70+ nations worldwide, with many variants produced under license within the using nation.	Weight 4.1 kg (9.04 lb) (G3A3) 4.7 kg (10 lb) (G3A4) 5.54 kg (12.2 lb) with optic (G3SG/1) 4.1 kg (9.0 lb) (G3K) Length 1,025 mm (40.4 in) (G3A3) 1,025 mm (40.4 in) stock extended / 840 mm (33.1 in) stock collapsed (G3A4) 1,025 mm (40.4 in) (G3SG/1) 895 mm (35.2 in) stock extended / 711 mm (28.0 in) stock collapsed (G3K) Barrel length 450 mm (17.7 in) 315 mm (12.4 in) (G3K)	7.62×51mm NATO; the G3 will fire all known types of 7.62x51mm NATO ammunition from standard ball to tracer, AP or other types.	Action: Roller-delayed blowback Rate of fire: 500–600 rds/min Muzzle velocity: 800 m/s (2,625 ft/s) Effective firing range: 400 m (440 yd), 100–400 m sight adjustments Feed system: 20 rd detachable box and 50 rd drum magazine Sights: Rear, rotary diopter; front, hooded post There are numerous telescopic and night sights that have been manufactured for use on the G3, by various user nations.
		VARIANTS	
		Many variants made around the world; most common are those with telescoping stocks (G3A4) or with short barrels (G3K). The original G3, introduced in 1959, had a	

		wooden stock and handguards.	

NOTES
UNQUESTIONABLY ONE OF THE MOST PROLIFICALLY DISTRIBUTED MAIN BATTLE RIFLES IN THE WORLD, AND ONE OF THE BEST, MOST RELIABLE DESIGNS.

Russian 7.62x39mm Semiautomatic Rifle, SKS



SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative Designation: Simonov Semiautomatic Carbine Date of Introduction: 1946 Proliferation: Widespread	Weight (kg): Empty: 3.85 Length (mm): Overall: 1,020 Barrel: 520 Rate of Fire (rd/min): 35-40 Operation: Gas Magazine: Integral box magazine Magazine capacity: 10 rounds Fire Mode: Semiautomatic	Name: M1943 (57N231S) Caliber/length: 7.62x39 mm Type: Ball, steel core Range (m): Effective: 350 Maximum: 800 Armor Penetration: 6 mm mild steel plate at 300 m Steel helmet at 1,000 m Flak vest at 60 m Muzzle Velocity (m/s): 718 Name: M1943 (T-45 or 57N231P) Caliber/length: 7.62x39 mm Type: Ball-Tracer Range Effective: 350 Maximum: 800 Trace (m): 800 Muzzle Velocity (m/s): 718	SIGHTS: Tangent leaf, graduated from 100 to 1,000 meters Night sights are available for the SKS
		VARIANTS	
		Karabiner-S: East German Manufacture Chinese Type 56: copy North Korea Type 63: copy Yugoslavian M59/66: copy, w/permanent grenade launcher	

NOTES
THE SKS IS THE PREDECESSOR TO THE RUSSIAN AK-47. THIS RELIABLE RIFLE IS STILL FOUND IN LARGE NUMBERS THROUGHOUT THE WORLD. IT IS THE MAINSTAY OF THE PRC “PEOPLES MILITIA”.

Russian 7.62x39mm Assault Rifle, AK-47/AKM



SYSTEM	SPECIFICATIONS	AMMUNITION	VARIANTS
Alternative Designations: AK, Kalashnikov Date of Introduction: 1949 (AK) 1961(AKM) Proliferation: Widespread (over 50 million) Feed: 30-round curved box magazine Fire Mode: Selective, automatic or semi-automatic Operation: Gas SIGHTS: Type: Fore, pillar; Rear, U-notch Magnification: None Night Sights Available: Yes	Description: Weight (kg): Loaded (with magazine): 3.8 Empty (w/o magazine): 4.3/3.14 Length (mm): 870/880 Rate of Fire (rd/min): Cyclic: 600 Practical: Automatic: 100 Semiautomatic: 40	M1943 (57N231S) Caliber/length: 7.62x39-mm Type: Ball, steel core Range (m): Effective: 300 Maximum: 800 Armor Penetration: 6 mm mild steel plate at 300 m Steel helmet at 1,000 m Flak vest at 60 m Muzzle Velocity (m/s): 718 M1943 (T-45 or 57N231P) Caliber/length: 7.62x39-mm Type: Ball-Tracer Range Effective: 300 Maximum: 800 Trace (m): 800	Numerous. Many countries manufacture clones of the AK-47 or weapons using the basic AK action. Some of these are made in different calibers. AKS: Folding stock AK-47. AKM: Improved AK-47, sights, magazine, and stock. AKMS: Folding stock variant of AKM.

		Muzzle Velocity (m/s): 718	

NOTES

PHOTO IS OF AN AKM. ALL 7.62X39 MM KALASHNIKOV ASSAULT RIFLES ARE VERY DEPENDABLE WEAPONS. THEY PRODUCE A HIGH VOLUME OF FIRE AND ARE SIMPLE TO MAINTAIN AND PRODUCE. THE PRIMARY DIFFERENCE BETWEEN THE AK-47 AND THE IMPROVED AKM IS THE RECEIVER. THE RECEIVER OF THE AK-47 IS FORGED AND MACHINED WHILE THE RECEIVER OF THE AKM IS STAMPED METAL FACILITATING EASIER AND LESS COSTLY MANUFACTURING. BOTH THE AK-47 AND THE AKM CAN MOUNT A 40-MM UNDER-BARREL GRENADE LAUNCHER. THE AK-47 AND AKM HAVE BEEN REPLACED IN MANY ARMIES BY THE NEWER AK-74. THE AK-74 IS BASICALLY AN AKM RE-CHAMBERED TO FIRE A 5.45X39 MM CARTRIDGE. THE 7.62X39 MM RPK LIGHT MACHINEGUN IS BASED ON THE AK/AKM DESIGN WHILE THE RPK-74 IS A LIGHT MACHINEGUN VERSION OF THE AK-74. BOTH ARE INFANTRY SQUAD LEVEL SUPPORT WEAPONS.

Russian 5.45x39mm Assault Rifle, AK-74/AK-74M



SYSTEM	SPECIFICATIONS	AMMUNITION	VARIANTS
Alternative Designation: AK, Kalashnikov Date of Introduction: 1974/91 Proliferation: In approximately 21 different nations, primarily in Eastern Europe, and in Asia. Fire Mode: Selective, automatic or semi-automatic Feed: 30-rd detachable box magazine (40-rd used by RPK-74 LMG is interchangeable) SIGHTS: Name: INA Type: Fore, pillar; rear, U-notch Magnification: None Night Sights Available: Yes. AK-74M N3 mounts an NSPU-3	Description: Weight (kg): Loaded (with magazine): 3.95 Empty (w/o magazine): 3.4 Length (mm): Overall: 880 (937 including muzzle brake) Barrel: 415 Rate of Fire (rd/min): Cyclic: 600 Practical: Automatic: 100 Semiautomatic: 40 Operation: Gas	Name: 7N6 Caliber/length: 5.45x39-mm Type: Ball Range (m): Effective: 500 Maximum: 800 Armor Penetration: 6 mm mild steel at 300 m, flak vest at 80 m Muzzle Velocity (m/s): 880 Name: 7N10 (Enhanced Penetration) Caliber/length: 5.45x39-mm Type: Armor piercing Range (m): Effective: 500 Maximum: 800 Armor Penetration (mm): 16 mild steel at 300 m 5 armor plate at 150 m Flak vest 200 m Muzzle Velocity (m/s): 880 Name: 7T3M Caliber/length: 5.45x39-mm Type: Tracer Range (m):	AKS-74: Folding-stock version with a Y-shaped, tubular stock. AK-74M: Improves the basic AK-74 design by adding a folding plastic stock, an improved mount for night vision or other sights. AKS-74U: Submachine gun: modified version with a much shorter barrel (207-mm) and a conical flash suppressor instead of a muzzle break. Its overall length is 492 with stock folded. AK-101: 5.56x45-mm (NATO) variant of the AK-74M. AK-102: 5.56x45-mm (NATO) short-barrel (314-mm) variant of the AK-74M. AK-103: 7.62x39-mm variant of the AK-74M. AK-104: 7.62x39-mm short-barrel (314-mm) variant of the AK-74M.

		Effective: 500 Maximum: 800 Trace: 850 Armor Penetration: INA Muzzle Velocity (m/s): 880	AK-105: 5.45x39-mm short-barrel (314-mm) variant of the AK-74M.

NOTES

WEAPON PICTURED IS AN AK-74M. THE AK-74 IS BASICALLY AN AKM RECHAMBERED AND RE-BARRELED TO FIRE A 5.45X39 MM CARTRIDGE. THE AK-74 CAN MOUNT A 40-MM UNDER-BARREL GRENADE LAUNCHER AND A PASSIVE IMAGE INTENSIFIER NIGHT SIGHT. THE AK-74 IS ALSO THE BASIS FOR OTHER 5.45X39 MM INFANTRY WEAPONS INCLUDING THE RPK-74 LIGHT MACHINEGUN.

Chinese 5.8x42mm Bullpup Assault Rifle, QBZ-95



SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative Designation: Unk. Date of Introduction: 1997 Proliferation: China, and 6 other countries.	Weight: 2.9 kg (6.4 lb) (QBZ-95B Carbine) 3.25 kg (7.2 lb) (QBZ-95 Rifle) 3.35 kg (7.4 lb) (QBZ-97 Export) 3.9 kg (8.6 lb) (QBB-95 LSW) Length: 609 mm (24.0 in) (QBZ-95B Carbine) 745 mm (29.3 in) (QBZ-95 Rifle) 758 mm (29.8 in) (QBZ-97 and QBZ-97A) 840 mm (33.1 in) (QBB-95 LSW) Barrel length: 369 mm (14.5 in) (QBZ-95B Carbine) 463 mm (18.2 in) (QBZ-95 Rifle) 490 mm (19.3 in) (QBZ-97 and QBZ-97A) 600 mm (23.6 in) (QBB-95 LSW)	5.8×42mm DBP-87 5.8×42mm DBP-95 5.8×42mm DBP-88 heavy round (for use in the LSW and QBU-88 DSM rifle) 5.8×42mm DBP-10 (new all-purpose round that is designed to replace all of the previous rounds above)	Action: Gas-Operated, Rotating bolt Rate of fire: ~650 rounds/min (QBZ-95) ~800 rounds/min (QBZ-95B Carbine) Muzzle velocity: QBZ-95 – 930 m/s (3,050 ft/s), QBB-95 – 970 m/s (3181 ft/s), QBZ-95B – 790 m/s (2581 ft/s) Effective firing range: Rifle – 400m point target, 600m area target LSW – 600m point target, 800m area target Carbine – 300m point target, 500m area target Feed system: 30-round detachable box magazine 80-round detachable drum for LSW. Sights: Hooded post front sight and aperture rear sight,

			optional Y/MA 95-002 telescopic sigh
		VARIANTS	
		QBZ-95B Carbine QBZ-95 Rifle QBB-95 LSW (Light Support Weapon) QBU-88 DSM Rifle	

NOTES

CHINA'S PROPRIETARY 5.8×42MM IS INTENDED TO PROVIDE GREATER PERFORMANCE AGAINST BODY ARMOR AND HELMETS THAN RUSSIAN 5.45X39MM AND NATO 5.56X45MM AMMUNITION AT ALL RANGES. THE DIFFERENCES BETWEEN THE VARIOUS 5.8X42MM ROUNDS IS IN TYPES OF PROPELLANT, DIMENSIONS OF THE STEEL CASES, AND BULLET WEIGHTS. HOWEVER THE NEW DBP-10 ROUND WILL REPLACE ALL THREE OF THE EARLIER VARIANT ROUNDS IN ALL OF THE QBZ/QBB/QBU SYSTEMS. ADDITIONALLY, THE WEAPON IS ALSO BEING PRODUCED FOR EXPORT, CHAMBERED IN 5.56X45MM NATO, AND HAS BEEN PURCHASED BY SEVERAL OTHER SE ASIAN AND SOUTH CENTRAL ASIAN NATIONS, PRIMARILY FOR USE BY PRESIDENTIAL GUARD AND SPECIAL FORCES UNITS.

Russian 7.62x54Rmm Sniper/Marksman Rifle, SVD



SYSTEM	SPECIFICATIONS	AMMUNITION	VARIANTS
Alternative Designation: SVD, Dragunov Date of Introduction: 1963 Proliferation: Widespread Fire Mode: Semi-automatic only SIGHTS: Name: PSO-1 Type: Infrared detection capability for night firing Magnification: 4x Field of View (°): 6 Sighting Range (m): 1,300 Night Sights Available: Yes. NSPU-3. The NSPU-3 increases accuracy to 1,000 m at night or during poor visibility.	Description: Weight (kg): Loaded (with magazine): 4.5 Empty (w/o magazine): 4.3 Length (mm): Overall: 1,230 With Bayonet: 1,370 Barrel: 620 Rate of Fire (rd/min): 30 Operation: Gas Feed: 10-rd detachable box magazine (15-rd available for the SVD-S)	Name: 57-N-323S Caliber and Length: 7.62x54-mm rimmed Type: Ball, standard steel-core Range (m): Effective: 600 Effective Night: 300 sight INA Armor Penetration (mm): Steel plate: 6 @ 520 m Flak vest: Yes @ 110 m Muzzle Velocity (m/s): 828 Name: Sniper (7N1) Caliber/length: 7.62x54R-mm rimmed Type: Steel core Range (m): Effective With Scope: 1,000 Effective W/O Scope: 800 Armor Penetration: INA Muzzle Velocity (m/s): 823	SVD-S: Folding stock, 15-rd magazine. SVU: Bullpup (trigger forward of magazine). OTs-03AS: SVU w/PSO-1 sight. 6V1: SVD with PSO-1 sight. 6V1-N3: SVD with NSPU-3 night sight.

		Name: 7N13 **Caliber/length: 7.62x54R-mm rimmed** **Type: Enhanced penetration (steel core)** **Range (m):** **Effective With Scope: 1,000** **Effective W/O Scope: 800** **Armor Penetration (mm):** **Steel Plate: 6 @ 660 m** **Flak Vest: 800 m** **Muzzle Velocity (m/s): 828** **Name: 7B2-3** **Bullet: B-32** **Caliber/length: 7.62x54R-mm rimmed** **Type: AP-I** **Range (m):** **Effective With Scope: 1,000** **Effective W/O Scope: 800** **Armor Penetration: 10-mm armor plate @ 200 m** **Muzzle Velocity (m/s): 808** **Name: 7T2m** **Bullet: T-46** **Caliber/length: 7.62x54R-mm rimmed** **Type: Tracer** **Range** **Range (m):** **Effective With Scope: 1,000** **Effective W/O Scope: 800** **Trace (m): 1,200** **Time of Trace (sec): 3** **Muzzle Velocity (m/s): 798**	

NOTES

THE BOLT MECHANISM AND GAS RECOVERY SYSTEM OF THE SVD ARE SIMILAR TO THOSE OF THE AK AND AKM. THE 7.62X54-MM RIMMED CARTRIDGE OF THE SVD IS NOT INTERCHANGEABLE WITH THE 7.62X39-MM RIMLESS ROUND OF THE AK-47/AKM. THE SVD PERFORMS BEST WHEN USING TARGET GRADE AMMUNITION, HOWEVER STANDARD (PKM/PKT) 7.62X54-MM RIMMED ROUNDS MAY ALSO BE FIRED. EVERY OPFOR INFANTRY SQUAD HAS AN SVD EQUIPPED DESIGNATED MARKSMAN (DM).

Russian 7.62x54mmR/7.62x51mm NATO Sniper Rifle, SV-98



SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative Designation: Date of Introduction: 2003 Proliferation: Russian and Armenia (current information)	Weight: 5.8 kg (12.8 lb) w/o optical sight and suppressor 7.8 kg (17.2 lb) with optical sight and suppressor Length: 1,200 mm (47.24 in) 1,375 mm (54.13 in) with suppressor Barrel length: 650 mm (25.59 in) (4 grooves, right-hand twist) Cartridge/Caliber: 7.62×54mmR or 7.62×51mm NATO Action: Bolt Muzzle velocity: 820 m/s (2,690 ft/s) Effective range: 600 m (656 yd) iron sights 1,000 m (1,094 yd) optical sight	7.62x54mmR: 7.62x54R 7N1 standard sniper; 7N14 enhanced penetration sniper; "Extra" match grade sports cartridges. 7.62x51mm NATO and .338 Lapua Magnum This rifle is capable of firing standard issue ball ammo in either caliber, but the trained DSMs or Snipers that the rifle will be issued to will also have access to target quality ammunition in order to take advantage of the superb, intrinsic accuracy offered by this sniper system.	Feed system: 10-round detachable magazine Sights: Telescopic sight and iron sights Trigger is fully adjustable for weight of pull.

		VARIANTS	
		A newer variant with a modular, fully adjustable (for length of pull and comb height) aluminum alloy stock has been produced. SV-98s chambered for the .338 Lapua Magnum cartridge, have heavier actions and barrels to handle the stresses associated with that particular cartridge.	

NOTES

THE SV-98 IS USED BY RUSSIAN POLICE SNIPERS ASSIGNED TO SPECIAL PURPOSE UNITS/TEAMS, AND SOME COUNTER-TERRORIST FORCES ORGANIC TO THE FSB, MOI AND OTHER INTERNAL SECURITY AGENCIES, AND BY SPECIAL PURPOSE AND CONVENTIONAL SNIPER UNITS OF THE RUSSIAN ARMED FORCES. IT IS REPORTED TO BE THE ISSUE SNIPER RIFLE OF THE RUSSIAN AIRBORNE TROOPS (VDV). IT HAS BEEN SPECIFICALLY DESIGNED AND BUILT TO ALLOW SUCCESSFUL SNIPER ENGAGEMENTS OUT TO 1000M, WITH OPTICAL SIGHTS.

Russian 12.7mm Anti-Material Rifle, 6S8-1



SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative Designation: KSKV Date of Introduction: 2013 Proliferation: Russian Army	Weight (kg): Empty (w/o magazine or optical sight): 12.5 Length (mm): Overall: 1,420 Barrel: 1,000 Rate of Fire (rd/min): 10 Operation: Bolt action, bull pup design Feed: 5-rd detachable box magazine Max Eff Range (m): 1,500 w/optical sight; 1,000 w/iron sights. Muzzle velocity (m/s): 770-860	7N34 Sniper BZ (API) BZT (API-T Typical Combat Load: 30 est.	SIGHTS Type: Optical: Orsis T-5000 or night vision scope mounted on integral Picatinny rail. Magnification: specifics unknown, but a variable power scope Night Sights Available: yes
		VARIANTS	
		None.	

NOTES

THE LATEST IN BULL PUP DESIGN FOR A HEAVY CALIBER, ANTI-MATERIAL RIFLE.

Russian 12.7mm Anti-Material Rifle, OSV-96



SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative Designation: KSVK Date of Introduction: 2013 Proliferation: Russia, Belarus, India, Syria (SA and various FSA factions, and it would be reasonable to assume, ISIL as well). Note that in Russia, this system is primarily used by Federal Security Service (FSB) and Ministry of Internal Affairs SPETSNAZ units.	Weight (kg): Empty (w/o magazine or optical sight): 12.9 Length (mm): Overall: 1,746 Barrel: 1,000 Rate of Fire (rd/min): limited to shooter's ability to acquire and engage targets and reload. 20 SPM would be a practical maximum. Operation: Semi-automatic, gas operated, rotating bolt. Feed: 5-rd detachable box magazine Muzzle velocity (m/s): 770-860 Max Eff Range (m): 2,000	7N34 Sniper BZ (API) BZT (API-T) Typical Combat Load: 30 est.	SIGHTS Type: Optical: POS 13x60 or night vision scope mounted on integral Picatinny rail. Magnification: 13x Night Sights Available: yes

NOTES

THE OSV-96 IS SOMEWHAT UNIQUE IN THAT IT CAN BE BROKEN DOWN AND FOLDED IN HALF AT THE POINT WHERE THE BARREL JOINS THE RECEIVER. THIS FACILITATES TRANSPORT OF AN OTHERWISE VERY UNWIELDY WEAPONS SYSTEM.

United States .50-cal Anti-Materiel Rifle, M82A1A



SYSTEM	SPECIFICATIONS	AMMUNITION	AMMUNITION
Alternative Designation: None Date of Introduction: 1984 Proliferation: Widespread (45+ nations) SIGHTS Name: Unertl Type: Optical (matches trajectory of .50-cal Raufoss Grade A) Magnification: 10x Name: Swarovski Type: Optical (with ranging reticle) Magnification: 10x42 Night Sights Available: yes Magnification: 10x42	Weight (kg): Empty (w/o magazine): 14.75 Length (mm): Overall: 1,448 Barrel: 736 Rate of Fire (rd/min): 20 Operation: Recoil Feed: 10-rd detachable box magazine Fire Mode: Semi-automatic only Typical Combat Load: 30 rounds Ammunition Types: (.50-cal cartridge) Raufoss Grade A Ball (M2/M33) AP (M2) AP-I (M8) API-T (M20)	Name: Raufoss Grade A (match)(DODIC A606) (USMC) Caliber/length: .50-cal BMG/12.7-mm x 99-m (NATO) Type: Standard operating round Range (m) (equipment-size targets): Maximum (w/scope): 1,800 Muzzle Velocity (m/s): 854 Name: MP NM140 (Nammo) MK211 Mod 0 Caliber/length: .50-cal BMG/12.7-mm x 99-m (NATO) Range (m) (equipment-size targets): Maximum (w/scope): 1,800 Armor Penetration: 11 mm @45° @1,000 m	Name: AP-S NM173 (Nammo) Caliber/length: .50-cal BMG/12.7-mm x 99-m (NATO) Type: Armor piercing Range (m) (equipment-size targets): Maximum (w/scope): 1,800 Armor Penetration: 11 mm @30° @1,500 m Accuracy: <15 cm @ 550 m Muzzle Velocity (m/s): 915 Name: M903 (Olin) Caliber/length: .50 cal BMG/12.7-mm x 99-m (NATO) Type: Saboted Light Armor Penetrator (SLAP) (actual bullet is tungsten .30 inch penetrator wrapped in a .50-cal plastic sabot) Range (m) (equipment-size targets):

Name: Barrett Optical Ranging System (BORS) Type: Ballistic Computer. This add-on device couples to the telescope, in place of the rear scope ring. It can then adjust for range, air temperature, round used, and other factors. A commonly associated scope is the Leupold Mark 4; but it can also work with other scopes. Night Sights Available: yes	Tracer (M10/21) SLAP (M903) MP (MK211 Mod 0)	Fragmentation: 20 fragments after hitting 2 mm steel Incendiary Effect: Ignition of JP4 and JP8 Accuracy: <15 cm @ 550 m Muzzle Velocity (m/s): 915	Maximum (w/scope): 1,500 Armor Penetration: 19 mm (.75 in) @1,500 m Accuracy: INA Muzzle Velocity (m/s): 1,014 Name: M8 Caliber/length: .50-cal BMG/12.7-mm x 99-m (NATO) Type: Armor piercing incendiary Range (m) (equipment-size targets): Maximum (w/scope): 1,800 Armor Penetration: 20 mm @ 100 m Accuracy: <25 cm @ 550 m Muzzle Velocity (m/s): 881 Name: M20 Caliber/length: .50-cal BMG/12.7-mm x 99-m (NATO) Type: Armor piercing incendiary-Tracer Trace (m): 91 to 1,463 Armor Penetration: 20 mm @ 100 m Accuracy: <25 cm @ 550 m Muzzle Velocity (m/s): 887
		VARIANTS	
		M107-A1 is a product improvement of the M82A1A. Improvements include: reduction in weight by 5 pounds; cylindrical titanium muzzle brake; titanium barrel key/recoil buffer system in order to operate with a Barrett suppressor; functional modifications to increase durability and ease of operation. Barrett introduced this variant in 2013.	

NOTES

THE M82A1A PROVIDES MANEUVER COMMANDERS WITH THE TACTICAL OPTION OF EMPLOYING SNIPERS WITH AN ANTI-MATERIEL WEAPON TO AUGMENT PRESENT 7.62-MM ANTI-PERSONNEL SNIPER RIFLES. RECOIL EQUALS 7.62X51-MM LEVELS. THE USMC USES RAUFOSS GRADE A AMMUNITION, BUT THE RIFLE IS CAPABLE OF FIRING ANY STANDARD 12.7X99-MM BROWNING MACHINEGUN AMMUNITION.

Russian 30mm Automatic Grenade Launcher, AGS-17 and AGS-30





SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative Designation: Plamya (Flame) Date of Introduction: 1974 (AGS-17); 1995 (AGS-30) Proliferation: 25 (AGS-17); 5 (AGS-30)	Crew: 3 (gunner and two riflemen-assistant gunners). For ground transport the AGS-17 breaks down into four parts: launcher, sight, tripod, and magazine. When dismounted the gunner carries the sight and launcher, the first assistant carries the tripod and a magazine, and the second assistant carries two additional magazines. An additional ammunition bearer may be used. Weight (kg): Empty (without magazine): 30.71 Loaded (with magazine): 45.05 Launcher: 17.86 Sight: .99 Tripod: 11.86 Magazine (loaded): 14.34 Length (m): 1.28 Height (m): INA	Types: 30-mm grenade, Frag-HE Typical Combat Load: Dismounted 87 Name: VOG-17A, VOG-17M (self-destruct) Caliber/length: 30x132.8-mm Type: Frag-HE, with a steel wire coil and aluminum nose fuze Range (m): Direct Fire Range (m): 700 Effective (m): 1,200 Min Range (m): 50 Max Indirect Range (m): 1,730 Armor Penetration: Lightly armored vehicles. Accuracy @ 400 m (m): 4.3 distance, 0.2 deflection It is very accurate in the semiautomatic mode and is quite effective in area	SIGHTS: Name: PAG-17 Type: Illuminated day optical sight Sighting Range (m): 1,700 Magnification: 2.7x Location: Left rear of launcher Night Sights Available: Yes. The AGS-17 is capable of mounting night vision sights, with a range of 1,500+ m. VARIANTS: AG-17: Helicopter and vehicle mount AGL with electric trigger and remote sight. The AG-17A has a water cooled quick-change barrel and rate of fire to 420-480 rd/min, with a 300 rd belt.

	Width (m): INA **Tripod Name: SAG-17** **Mounts: Tripod, vehicle, or helicopter** **Traverse (°): 30 total** **Elevation (°): +7 to +87** **Service Life of Barrel (rds): 6,000** **Barrel Change Time: Quick disconnect** **Rate of Fire (rd/min):** **Practical: 60-100** **Cyclic: 100-400** **Adjustable with a thumb safety. May be fired single shot or in short (≤ 5 rds) or long (6-10 rds) bursts.** **Operation: Blowback** **Feed: Drum magazine containing 29 round belt.** **Fire Mode: Selective, automatic and semi-automatic** **Loader Type: Manual**	**coverage in the automatic mode. The 50-meter increments in the range table atop the receiver indicate accuracy against point targets.** **Casualty Radius (m): 15 (90% at 7 m)** **Complete Round Weight (grams): 350** **Grenade Weight (grams): 280** **Warhead Explosive Weight (grams): 36** **Muzzle Velocity (m/s): 185** **Fuze Type: Impact, activates after 25 spins.** **Self-destruct time (sec): 27** **Other Ammunition:** **Name: VOG-30 Frag-HE with grooved body for controlled fragmentation, and increased HE fill (40 g). Lethal radius is 6 m at (90%) against personnel, with increased personnel injury effects at 10m and increased anti-material effects.** **Name: VUS-17 smoke grenade with a red phosphorus fill.** **Name: GPD-30 Frag-HE grenade. It features an effects radius of 20 m.** **When used with the AGS-30, range is 2,100 m.**	**AGS-17M: Recent version for light vehicles with pintle or ring mounts. It has a ballistic LRF sight for a range of l,730 m.** **The Adunok remote operated weapon station is a light mount for use on tactical utility vehicles, trucks, etc., with the AGS-17M. It could also be secondary RWS for IFVs/APCs.** **AGS-30/TKB-722K AGL: Lighter version and follow-on to the AGS-17, fires the same ammunition as the AGS-17, with a max range of 2,100 m.** **The AGL can use the 1PN102-1 day/night sight with 3rd gen II night range of 1,500+ m (est).** **The AG-30 version can be heli/vehicle mounted for remote operation to 2,100 m.** **Arbalet: Shoulder-fired semi-auto grenade launcher. It has a 5 or 10-rd magazine, 1,000-m aimed range, and a weight of 10 kg.**

NOTES

THE AGS-17 PROVIDES INFANTRY AN AREA SUPPRESSIVE CAPABILITY. ALTHOUGH PRIMARILY FOR USE AGAINST PERSONNEL, IT HAS A LIMITED CAPABILITY AGAINST LIGHT ARMORED VEHICLES. THE AGS-17 IS NORMALLY ORGANIZED IN A PLATOON CONSISTING OF 6 LAUNCHERS, CARRIED IN PAIRS IN THREE ARMORED VEHICLES (THEY CAN ALSO BE CARRIED IN TRUCKS OR BY TEAMS ON FOOT). ONE AGL CAN CREATE A DAMAGE ZONE 15 METERS WIDE. A PLATOON WITH 6 AGS-17S CAN COVER A SECTOR 90 M ACROSS.

Singaporean 40mm Automatic Grenade Launcher, CIS-40/Air Bursting Munition System (ABM)



SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative Designation: Unk. Date of Introduction: 1991 Proliferation: 18+ nations (pre ABM model)	Crew: 3- gunner, assistant gunner, ammo bearer Weight (kg): Empty (without magazine): 33 On soft mount: 52 Magazine: Metal box Capacity (rds): CIS-32 rds, US M548-48 rds Weight (M548) (loaded) (kg): 28 Weight (CIS-32 rds) (kg): 18 Barrel Length (m): .350 Length (m): .966 Length (on soft mount) (m): 1.025	HE DP, Self-Destruct: HE-M384/CIS S412 HE Optional: Buckshot (US) Air Bursting Munitions (See next page) Typical Combat Load: 32 rds dismounted (1 CIS can) 48 rds dismounted (1 US M548 can) 400 rds in vehicle mount S411, CIS HEDP self-destruct (data based on M430) Caliber/Length (mm): 40x53 high-velocity, standard for most Western AGLs	Reflex sight is standard. Day optical sights and computerized laser rangefinder optical sights available. Night Sights Available: AN/PAS-13-type Thermal sight (higher tier units), or US AN/TVS-5-type II Night Vision Sight (6.5x, lower tier units)

	Height (on soft mount) (m): .389 Width (m): .375 Width (on soft mount) (m): .47 Tripod Name: M3 Tripod Weight M3 (kg): 20 Lightweight Tripod Avail: Yes Mounts: Tripod, vehicle, pedestal, or turret Rate of Fire (rd/min): Rapid: 60 Sustained: 40 Cyclic: 375 Operation: Air cooled, Direct blowback with advanced primer ignition Feed: Disintegrating metal link belt (M16A2), left to right Fire Mode: Selective, automatic and semi-automatic, turret mounts (CIS 40/50) can be fired remotely Loader Type: Manual	Type: HE Dual Purpose (standard round for US MK 19) Range (m): Effective: 1,500 Minimum: Arms (M430) 18 to 30 meters Maximum: 2,200 Sighting Range: 1,500 Armor Penetration (mm): 60 Kill Radius (m): 5 (M430) Casualty (wound) Radius (m): 15 Complete Round Weight (grams): 340 Muzzle Velocity (m/s): 240 Fuse Type: Point Initiating Base Detonating Self-Destruct: Yes Other Ammunition Types: HEDP-M430/CIS S411 Dual Purpose, US HE M384/CIS S412, M385/CIS S416A Practice, US Buckshot, other compatible 40mm AGL cartridges	
		VARIANTS	
		See next page.	

NOTES

ORIGINALLY DEVELOPED BY SINGAPORE CIS FOR INFANTRY SUPPORT MOUNTED ON A TRIPOD THE CIS 40AGL IS NOW AVAILABLE FOR MOUNTING ON VEHICLES AND IN TURRETS. THE CIS 40/50 IS A 40-MM AGL AND .50 CAL HMG TOGETHER IN A ONE-MAN CUPOLA AVAILABLE ON M113 SERIES OF VEHICLES. THE CIS 40AGL IS DESIGNED TO FIRE ALL US 40-MM MK 19 MOD 3 AMMUNITION. ALL CIS 40-MM AMMUNITION IS DESIGNED TO US MILITARY SPECIFICATION. WEAPONS SYSTEMS SIMILAR TO THE CIS 40AGL (LESS THE ABMS) ARE MANUFACTURED ALL OVER THE WORLD. CIS LICENSED INDONESIAN PRODUCTION AS WELL.

Singaporean Air Bursting Munition (ABM) System

AIR BURSTING MUNTION SYSTEM (ABMS)
The ABMS consists of the Air Bursting Munition, Fire Control System (FCS), and ammunition. The system is a kit (see photo below) which fit a variety of launchers which use NATO standard 40-mm AGL ammunition. Specific systems noted include: CIS40AGL, MK19 MOD 3, ST Kinetics Super Light Weight AGL (LWAGL) and other 40-mm AGLs to fire ABM.

A similar ABMS is used in the US version of the CG-40 40-mm AGL, called M47/STRIKER. This technology is comparable to that in US OICW and OCSW programs.

Fire Control System
Name: ABMS
The ballistic FCS consists of an electronic induction ammunition programmer, laser rangefinder, optical targeting module and ballistic computer. The gunner selects a target, and the FCS programs proper detonation data into the 40-mm ABM. This detonates the ABM at the intended point. ABM is extremely effective against concealed and defilade targets. The higher probability of hits requires fewer rounds.

Day Sight: 6x
Night Sight: Integrated Gen II & Gen II+
Laser Rangefinder: Yes, integrated into the computerized FCS
Weight (kg): <5 w/bat

Air-Bursting Ammunition
Name: ABM
Caliber/Length (mm): 40x112
Type: Frag-HE
Range (m)
Effective: 1,500
Maximum: 2,200
Sighting Range: 1,500
Casualty Radius (m): INA

Complete Round Weight (grams): 340
Muzzle Velocity (m/s): 240
Fuze Type: Programmable
Arming Time: Electronic & Mechanical

Other Ammunition Types: The automatic grenade launcher with ABMS can also fire conventional 40mm AGL grenades as noted on the previous page.

OTHER USING SYSTEMS:
LWAGL (lightweight Automatic Grenade Launcher): Singaporean 40-mm AGL with capability for firing all types of NATO-compatible grenades, as well as programming ABM grenades. The AGL, without mount and ammo, weighs 19.5 kg. With all attachments as shown below, it weighs about 64 kg.

An improved lighter design employs its own ABM system with a simpler sight system, lighter tripod, and the programmer stalk next to the muzzle, rather than on the muzzle. A smaller magazine can be used for lightweight carry.



Initial version of the LWAGL, with ABMS

NOTES

A NEW CLASS OF SINGAPOREAN AMMUNITION HAS BEEN DEVELOPED FOR BOTH 40X53 HIGH-VELOCITY AGLS AND LOW-VELOCITY SHOULDER/RIFLE GRENADE LAUNCHERS. THE GRENADES USE ENHANCED-BLAST EXPLOSIVE, WITH A 5-M LETHAL RADIUS, AND WIDE FIREBALL AND BLAST OVERPRESSURE EFFECTS. THESE EFFECTS CAN DISABLE PERSONNEL AND EQUIPMENT, AND CAN BE USED IN ENCLOSURES AND AROUND CORNERS WHERE OTHER EXPLOSIVES CANNOT REACH. HEDP VERSIONS ALSO PRODUCE ARMOR PENETRATION OF 63 MM AGAINST STEEL (50 RHAE).

Chinese 35mm Automatic Grenade Launcher, W-87, QLZ-87, and QLB-06



QLZ-87



QLB-06

SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative Designation: Unk. Date of Introduction: WLZ-87 prior to 1988 (limited production); QLZ-87 fielded in 2007 Proliferation: Several other countries have purchased this AGL, from SE Asia to South America (Bolivia).	Weight (kg): Empty (without magazine): 12 Tripod: 8 Mounts: Bipod (attached) or Tripod Operation: Blowback Feed: 6, 9-rd box, 12-rd drum, 15-rd drum Fire Mode: Semi or Automatic Loader Type: Manual Range (m): Effective, 600 Max Range, 1,500 Rate of Fire (rd/min): 400 Muzzle Velocity (m/s): 170	35-mm grenades: Frag-HE: Caliber/length: 35x32mm Type: Frag-HE Grenade Fill: HE and 400 3-mm steel balls Armor Penetration: Penetrates body armor Lethal Radius (m): 11 Complete Round Weight (grams): 270 Muzzle Velocity (m/s): 170 HEAT-MP: "HEAT" Caliber/length: 35x32mm Type: HEAT-multipurpose (with anti-armor HEAT warhead and anti-personnel/anti-materiel HE blast effects)	Typical Combat Load: Crew load of 36 rds., in drums of 6, 9, 12, or 15 rds.



		Armor Penetration: 80 mm @ 600 m **Lethal Radius (m): 5 for HE effects** **Complete Projectile Weight (grams): 270** **Muzzle Velocity (m/s): 170**	
		VARIANTS	
		WLZ-87: Early prototype, found in few units. **QLZ-87: Updated lighter variant of the W-87, adopted for PLA forces. It comes in standard and heavy configurations. The standard version, with a bipod and telescope, weighs 12 kg, and has an anti-armor range of 600m. Range with the Frag-HE grenade is 1,000-1,750 m. The heavy version is more suitable for vehicle pintle mount or dismounted tripod. It is scoped, weighs 20 kg, and ranges to 1,750 m.** **QLB-06/87B: Recent lightweight shoulder version (9.1 kg), which also fires HEAT-MP grenades to 600 m, Frag-HE to 1,000 m, and has a rate of fire of 500 rds/min. The launcher has a 3x day telescope, EO night sight, bipod, and uses 6 or 15 rd grenade drums.**	

.NOTES

THE W-87 IS SIGNIFICANT IN THAT IT WEIGHS A LITTLE MORE THAN A MEDIUM 7.62-MM GP MG (PKM 18.5 LBS/U.S. M60 MG 32 LBS). IT IS SMALLER AND LIGHTER THAN THE AGS-17 BUT STILL PROVIDES THE INFANTRYMAN WITH THE ABILITY TO DESTROY LIGHTLY ARMORED VEHICLES AT 2 TO 3 TIMES THE RANGE OF THE MAJORITY OF INFANTRY LIGHT AT SYSTEMS. TEN 35-MM W-87 ROUNDS WEIGH LESS THAN 100 LINKED 7.62 ROUNDS. THE 35-MM ROUNDS ARE PROBABLY MORE EFFECTIVE AGAINST POINT TARGETS AT MEDIUM TO LONG RANGES THAN BALL 7.62-MM.

OTHER UNIT MEMBERS CAN CARRY ADDITIONAL AMMUNITION AS NEEDED, AND CAN BREAK DOWN LOAD INTO SMALLER INCREMENTS FOR EASIER CARRY

Russian 43mm Grenade Launcher, GM-94





SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative Designation: Some sources state that the GM-94 is the same weapon as Infantry Flamethrower LPO-97; but KBP, the manufacturer, lists them separately. Date of Introduction: 2007 Proliferation: Russian Ministry of Internal Affairs, and Russian military Special Purpose Forces.	Weight (kg): Empty: 4.8 Length (mm): With stock folded: 540 With stock extended: 810 Width (mm): 80 Height (mm): 320 with folded stock Rate of Fire (rd/min): 12 (salvo of 4 in 8seconds, 4 reloads, est) Operation: Pump action Feed: Over-barrel magazine Fire Mode: Semi-automatic	Ammunition Types, 43-mm grenade HE Thermobaric Non Lethal: Shock effect Smoke Tear gas Name: VGM-93.100 Caliber/length: 43-mm Type: HE thermobaric, with impact fuze. The round has a plastic nose with the explosive fill. It deforms and detonates against hard and soft targets. Weight (kg): INA Range (m): Maximum: 600 Maximum Sighted: 300 Casualty Radius (m): 3 With no metal fragments, the round can be used for room-to-room clearance of buildings (3-m lethal radius), with minimum	SIGHTS: Type: Front post and rear open U-notched, 2 blades Location: Top of magazine Sighting Range (m): 300 TYPICAL COMBAT LOAD: For dismounts 16 From vehicles <48 Single Load 4 (1 in chamber, 3 in magazine)

		damage to nearby personnel (5-m safe distance). Concussive effect from the blast will debilitate or shock personnel over a wider area than with the Shock Effects grenade noted below. Armor Penetration (mm): 8. The deforming round permits armor penetration against light armor, such as that found on tactical utility vehicles, trucks, etc. The round can destroy materiel targets. Muzzle Velocity (m/s): 85+ Other Ammunition Types: Non-lethal grenades: Smoke, shock effect, and tear gas. The Shock Effect grenade is a "flash-bang" non-lethal grenade for temporarily pacifying persons in a target area, aiding discrimination of targets from neutral personnel in the area. Tear gas grenade effectiveness area is 100m^2 against personnel in the open or 300 m^2 against personnel in enclosed areas.	

NOTES

THERE ARE REPORTS OF FRAG-HE GRENADES FOR THIS WEAPON (VGM-93.900). AS MILITARY FORCES APPLICATIONS WILL CERTAINLY REQUIRE FRAG-HE GRENADES, THIS MAKES PERFECT SENSE AND IS IN NO WAY A TECHNICAL CHALLENGE TO PRODUCE FOR USE IN THIS PARTICULAR GL.

Russian 30mm Under Barrel Grenade Launcher, GP-30



SYSTEM	SPECIFICATIONS	AMMUNITION	VARIANTS
Alternative Designation: BG-15 Mukha; GP-25 Koster, GP-30 Obuvka Date of Introduction: 1980 Proliferation: Widespread SIGHTS: Type: Front post and rear open U-notched Location: Left side of mounting bracket Sighting Range (m): Graduated out to 400	Weight (kg): Loaded: 1.79 Empty: 1.5 Length (mm): Overall: 323 Barrel: 205 Rate of Fire (rd/min): 4-5 Operation: N/A Feed: Muzzle-loaded Fire Mode: Single-shot Accuracy @ 400 m: Distance: 6.7 m Deflection: 3 m Components: Barrel (w/ mounting bracket and sight), trigger assembly	40-mm caseless grenade: Frag-HE (impact) Frag-HE (bounding) Smoke Tear gas Combat Load: 10 rounds Name: VOG-25 Caliber/length: 40x102-mm Type: Frag-HE with impact fuze Weight (kg): Round: .250 Exposive: .048 Range (m): Maximum: 400 Minimum: 10–40 (arms itself) Casualty Radius (m): 6; (90% @ 10) Self-destruct Time (sec): 14–19 Muzzle Velocity (m/s): 76	BG-15, GP-25: (see NOTES)

		Name: VOG-25P **Caliber/length: 40x122-mm** **Type: Bounding Frag-HE, explodes .5 to 1.5 m from impact** **Weight (kg):** **Round: .278** **Exposive: .037** **Range (m):** **Maximum: 400** **Minimum: 10 – 40 (arms itself)** **Casualty Radius (m): 6; 90% @ 10** **Self-destruct Time (sec): 14 – 19** **Muzzle Velocity (m/s): 75** **Name: GRD-40** **Caliber/length: 40x150-mm** **Type: Smoke** **Effective Against: Visual and infrared** **Weight (g): 260** **Smoke Screening Range (m): 50, 100, 200** **Smoke Screen Dispersion (m):** **1 sec 10x10x10** **2 sec 20x20x20** **3 sec 25x25x25** **Smoke Screen Duration @ wind speed of 3-5 m/s: At least 60 sec** **Muzzle Velocity (m/s): 70-75** **Other Grenades: Gvozd ("Nail") tear gas grenade**	

NOTES

THE GP-30 OBUVKA IS A WIDELY PROLIFERATED, MUZZLE-LOADED, SINGLE-SHOT, DETACHABLE, UNDER-BARREL GRENADE LAUNCHER. THE BG-15, GP-25 AND THE GP-30 ARE ALL BASICALLY THE SAME WEAPON. VARIANTS CAN BE MOUNTED ON ALL MODELS OF KALASHNIKOV ASSAULT RIFLES. THE RIFLEMAN CAN FIRE THE LAUNCHER ONLY WHEN THE COMPLETE WEAPON IS ATTACHED TO THE ASSAULT RIFLE.

Russian Revolving 40mm Grenade Launcher, RG-6



SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative Designation: 6G30 Date of Introduction: 1994 Proliferation: Russian Army and MVD (Internal Security Forces).	Hand-held 40-mm grenade launcher with 6-shot revolver Type cylinder. The launcher is 690 mm long (520 with buttstock retracted) and weighs 6.2 kg unloaded. With swing-out cylinder for fast loading and double action trigger, it can deliver a high volume of precision fire (16 rd/min) to 350 m.	The RG-6 fires the same 40mm caseless grenades listed for the GP 30 under barrel GL.	

NOTES
AN INTERESTING GL THAT IS VERY MUCH A COPY OF VARIOUS HAND HELD CYLINDER FED GLS MADE IN OTHER COUNTRIES.

Russian 7.62-mm Light Machinegun, RPD



SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative Designations: Degtyarev Date of Introduction: 1944 Proliferation: Widespread	Weight (kg): Empty (w/o magazine) (kg): 7 Loaded (with magazine): 13 Mount: Bipod Length (mm): Overall: 1,037 Barrel: 520 Quick Change Barrel: No Rate of Fire (rd/min): Cyclic: 600 Practical: 150 Fire Mode: Automatic Operation: Gas Feed: Metallic-link belt, 100-rd drum (containing belt). The Chinese copies may use 200-rd drums.	Name: M1943 (57N231S) Caliber/length: 7.62x39-mm Type: Ball, steel core Range (m): Effective: 800 Maximum: 800 Armor Penetration: 6 mm mild steel plate at 300 m Steel helmet at 1,000 m Flak vest at 60 m Muzzle Velocity (m/s): 718 Name: M1943 (T-45 or 57N231P) Caliber/length: 7.62x39-mm Type: Ball-Tracer Range Effective: 800 Maximum: 800 Trace (m): 800 Muzzle Velocity (m/s): 718 Name: M1943 Caliber/length: 7.62x39-mm Type: API	Sights: Type: Leaf sights Sighting range (m): 900 in 100 meter increments. Magnification: None Night Sights Available: Yes



		Armor Penetration (mm @ 0° obliquity @ 500m): 8 **Muzzle Velocity (m/s): N/A**	
		VARIANTS	
		Type 56 & 56-1: Chinese **Type 62 Light MG: North Korean** **M52: Czech**	

NOTES

THE RPD CAN BE USED AS AN ASSAULT RIFLE. THE USE OF THE DRUMS FOR AMMO CAN MAKE CARRYING THE AMMUNITION EARLIER THAN CARRYING LARGE AMMUNITION BOXES. IT WAS REPLACED BY THE RPK (WHICH WAS IN-TURN REPLACED BY THE RPK-74) BY SEVERAL ARMIES. THIS RELIABLE LIGHT MACHINEGUN IS STILL FOUND IN LARGE NUMBERS THROUGHOUT THE WORLD. IT IS THE MAINSTAY OF MANY MILITIAS. THESE WEAPONS ARE NUMEROUS, EASY TO ACQUIRE, RELIABLE, LETHAL, AND CHEAP.

Russian 7.62-mm Light Machine Gun, RPK



SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative Designation: None Date of Introduction: 1964 Proliferation: Widespread	Weight (kg): Empty (w/o magazine) (kg): 4.9 Loaded (with magazine): 5.67 w/40-rd mag Mount: Bipod Length (mm): Overall: 1,035 Barrel: 591 Quick Change Barrel: No Rate of Fire (rd/min): Cyclic: 650 Practical (auto): 150 (80 sustained, see note) Practical (semi): 50 Fire Mode: Selective Operation: Gas Feed: 40 round-curved box or 75-rd drum magazine. Can also use the 30-round curved box magazine used by the AKM.	M1943 (57N231S) Caliber/length: 7.62x39-mm Type: Ball, steel core Range (m): Effective: 800 Maximum: 800 Armor Penetration: 6 mm mild steel plate at 300 m Steel helmet at 1,000 m Flak vest at 60 m Muzzle Velocity (m/s): 718 M1943 (T-45 or 57N231P) Caliber/length: 7.62x39-mm Type: Ball-Tracer Range Effective: 800 Maximum: 800 Trace (m): 800 Muzzle Velocity (m/s): 718 M1943 Caliber/length: 7.62x39-mm Type: API Armor Penetration (mm @ 0° obliquity @ 500m): 8 Muzzle Velocity (m/s): N/A	SIGHTS Name: N/A Type: Leaf sights Magnification: None Night Sights Available: yes, (luminous front/rear)
		VARIANTS	

		RPKS: Folded stock version (820 mm in length)	

NOTES

THE RPK IS THE LIGHT MACHINEGUN VARIANT OF THE AKM AND AS SUCH IS AN EXTENDED VERSION OF THE AKM. IT HAS A LONGER, HEAVER BARREL THAN THE AKM (591 MM VS 414 MM). MOST MOVING PARTS ARE INTERCHANGEABLE WITH THE AK-47 OR AKM ASSAULT RIFLES. THE SUSTAINED RATE OF FIRE CANNOT EXCEED 80 RDS PER MINUTE DUE TO "COOK OFF". IT HAS BEEN REPLACED BY THE 5.45-MM RPK-74 IN MANY ARMIES. THE RPK FILLS THE ROLE OF A SQUAD LEVEL SUPPORT WEAPON.

Russian 5.45mm Light Machine Gun, RPK-74



SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative Designation: Unk. Date of Introduction: Late 70s. Proliferation: Widespread.	Weight (kg): Loaded (with magazine): 5.0 Empty (w/o magazine): 4.6 Length (mm): Overall: 1.07 m Barrel: 590 mm (including flash suppresser) Rate of Fire (rd/min): Cyclic: 600 Practical: Automatic: 150 Semiautomatic: 50 Operation: Gas Feed: 40-rd detachable box magazine (30-rd used by AK-74 is interchangeable) Fire Mode: Selective, automatic or semi-automatic	7N6 Caliber/length: 5.45x39-mm Type: Ball Range (m): Effective: 800 Maximum: 1,000 Armor Penetration: 6 mild steel at 300 m, flak vest at 80 m Muzzle Velocity (m/s): 960 7N10 (Enhanced Penetration) Caliber/length: 5.45x39-mm Type: AP Range (m): Effective: 1,000 Maximum: 1,000 Armor Penetration (mm): 16 mild steel at 300 m 5 armor plate at 150 m Flak vest 200 m Muzzle Velocity (m/s): 960 7T3M Caliber/length: 5.45x39-mm Type: Ball-Tracer Range (m): Effective: 800 Maximum: 1,000 Trace: 850	SIGHTS Name: INA Type: Fore, cylindrical post; rear, tangent leaf with U-notch; adjustable to 1,000 m Magnification: None Night Sights Available: Yes. 1LH51 night sight

		Armor Penetration: INA Muzzle Velocity (m/s): 960	
		VARIANTS	
		RPKS-74: Folding stock	

NOTES

THE RPK-74 IS THE MACHINEGUN (SQUAD LEVEL SUPPORT) VERSION OF THE AK-74, FIRING THE SAME AMMUNITION. INSTEAD OF THE PROMINENT MUZZLE BRAKE USED ON THE AK-74, THE MACHINEGUN IS LONGER THAN THAT NORMALLY USED WITH THE AK-74, BUT THE MAGAZINES ARE INTERCHANGEABLE. THE RPK-74 HAS A BIPOD AND IS COMPATIBLE WITH THE FRONT FIRING PORTS OF BMPS.

Russian 7.62mm General Purpose Machine Gun, PKM and Pecheneg (PKP)



SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative Designation: See Variants. Date of Introduction: (PKM/PKT/PKP): 1971/1968/2001 Proliferation: Widespread (PKM/PKT) NOTE: Picture, above, is of a PKP (Pecheneg).	Crew: 2 Weight (kg): Empty (w/o magazine) (PKM/PKT) (kg): 8.4/10.66 Loaded (with magazine): Varies with magazine Ammo box (only) with 100/200-rd belt (kg): 3.9/8.0 Tripod (lightweight) (kg): 4.75 Length (mm): Overall (PKM/PKT): 1,160/1,080 On tripod (PKS): 1,267 Barrel: 658 Barrel Change: Yes Mount Type: Pintle, coaxial, bipod or tripod (Stepanov) Mounted On: (see VARIANTS) Rate of Fire (rd/min): Cyclic: 650 Practical: 250 (PKM) Up to 600 for Pecheneg/PKP Fire Mode: Automatic Operation: Gas Feed: Belt, 100-rd belt carried in a box fastened to the right	57-N-323S Caliber and Length: 7.62x54-mm rimmed Type: Ball Max Range (PKM/PKT) (m): 3,800/4,000 Practical Range (PKM/PKT) (m): Day: 1,000/2,000 Night: 300/INA Armor Penetration @ 0° obliquity, and 500 range (mm): 8 steel plate @ 520 m (mm): 6 Flak vest: 110 m Muzzle Velocity (PKM/PKT) (m/s): 825/855 7BZ-3 Caliber and Length: 7.62x54-mm rimmed Type: Armor piercing incendiary Max Range (PKM/PKT) (m): 3,800/4,000 Practical Range (PKM/PKT) (m): Day: 1,000/2,000 Night: 300/INA Armor Penetration @ 200 range (mm): 10	Type: Open iron sights Sighting range (PKM/PKT) (m): 1,500/2,000 Magnification: None Night Sights Available: Yes

	side of the receiver. 25-rd belts can be joined in several combination lengths (100/200/250)	Muzzle Velocity (PKM/PKT) (m/s): 808	
		VARIANTS	
		PKM: Squad machinegun PKT: Vehicle mounted MG with solenoid electric trigger, remote sight, and a longer heavier barrel. It lacks a stock and, bipod. Some are coaxial to a main gun and use its sights. Others operate separately. They generally do not dismount for ground use. PKS: Lightweight tripod-mounted infantry weapon PKMS: Lightweight tripod-mounted variant of the PKS PKB (PKBM): Pintle-mounted on APCs, SP guns, BRDM, BTRs, has butterfly trigger rather than solenoid, double spade grips, and front and rear sights	

NOTES

THE 7.62-MM GENERAL-PURPOSE MACHINEGUN (PKM) IS A GAS-OPERATED, BELT-FED, SUSTAINED-FIRE WEAPON. THE BASIC PKM IS BIPOD-MOUNTED BUT CAN ALSO FIT IN VEHICLE FIRING PORTS. IT IS CONSTRUCTED PARTLY OF STAMPED METAL AND PARTLY OF FORGED STEEL. THE NEWER VARIANT PKP (PECHENEG) FEATURES IMPROVED COOLING SYSTEM, AND A HEAVY, FIXED BARREL THAT DOES NOT REQUIRE CHANGING NOR CAN IT BE CHANGED BY THE CREW. IT IS DESIGNED TO FILL THE ROLE OF A TRUE, SQUAD LEVEL GPMG FOR SUPPORT IN RUSSIAN INFANTRY AND SPETSNAZ UNITS.

Russian 12.7mm Heavy Machine Gun, DShK 38/46



SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative Designation: DShKM, Degtyarev, DShK 38 Date of Introduction: 1946 Proliferation: Widespread	Weight (kg): Empty (gun only): 36.6 w/Mount: 158 Length (mm): Overall: 1,588 Quick-change Barrel: Yes Barrel Length (mm): 1,070 Mount Type: Vehicle, wheels, or tripod (M1938) Traverse (°): 90, free on tripod Elevation (°): -10 to +80, free on tripod Rate of Fire (rd/min): Cyclic: 540-600 Practical: 80-100 Fire Mode: Automatic only Operation: Gas, fires from open bolt	Ball API (B-32) API-T (BZT-44) HEI Combat load: 750 Name: B-32 Caliber and Length: 12.7x108-mm Type: Armor Piercing Incendiary Max Range (ground) (m): 7,850 Effective Range (m): AA: 1,000 Ground: 2,000 Armor: 800 Night (w/1PN52-1): 1,000 Armor Penetration @ 0° obliquity @ 500/1,000m range (mm): 20/13.2	Name: NFI Type: metallic leaf sights Sight Range (m): 2,000 Name: Model 1943 Antiaircraft Sights Type: Computing AA sight Night Sights Available: Yes

	Feed: 50 round non-disintegrating metallic belt (feed from both sides)	Muzzle Velocity (m/s): 860	
		VARIANTS	
		DShKT: Tank mounted Chinese Type 54 Heavy Machinegun Czech M54 Quad Mount	

NOTES

THE DSHK 38/46 IS A WIDELY PROLIFERATED HEAVY MACHINEGUN GENERALLY USED AS AN ANTI-AIRCRAFT OR ANTI-VEHICLE WEAPON. MANY COUNTRIES USE THE DSHK 38/46 ON VEHICULAR MOUNTS WHILE OTHERS USE IT MOSTLY ON ITS GROUND MOUNT. MANY ASIAN COUNTIES USE A 2-WHEEL MOUNT IN THE GROUND ROLE. THE M1938 TRIPOD IS USED FOR GROUND FIRE BUT CAN BE READILY CONVERTED FOR AA FIRE. M38 AND M46 AMMO BELTS ARE NOT INTERCHANGEABLE. A LARGE FLAT ARMORED SHIELD IS OCCASIONALLY USED TO PROTECT THE CREW WHEN THE GUN IS USED IN ITS GROUND ROLE. IN MANY COUNTRIES THIS WEAPON WAS REPLACED BY THE 12.7-MM NSV IN THE GROUND ROLE OR BY THE HEAVIER 14.5-MM ZPU SERIES IN THE ANTIAIRCRAFT ROLE.

Russian 12.7mm Heavy Machine Gun, NSV/NSVT/KORD



SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative Designation: NSVS (when mounted on tripod) Date of Introduction: 1974 Proliferation: Widespread. The original plant is in Kazakhstan (NSV/NSVT). After dissolution of the USSR, a Russian plant now produces the KORD HMG. NOTE: The HMG in the above picture is of a Finnish NSV.	Weight (kg): Total System (w/6T7): 43 Empty: 25 Loaded: INA Tripod (6T7 tripod): 16 Length (mm): Overall: 1,560 On 6T7 Tripod: 1,900 Width (on 6T7 tripod) (mm): 860 Height (on 6T7 tripod) (mm): 380 Barrel Life (rds): 5,000 Barrel Change Time (sec): 5 Barrel Weight (kg): 9.2 Mount Type: 6T7 (infantry) tripod or 6U6 (w/seat) universal tripod Mounted On: (see VARIANTS) Traverse (°): 360 Elevation (°): -5 to +75 Rate of Fire (rd/min): Cyclic: 680-800	12.7-mm cartridge API (B-32) API-T (BZT-44) HEI Typical Combat Load: 300 rds Name: B-32 Caliber and Length: 12.7x108-mm Type: Armor Piercing Incendiary Max Range (grd) (m): 7,850 Effective Range (m): AA: 1,000 Ground: 2,000 Armor: 800 Night (w/1PN52-1): 1,000 Armor Penetration @ 0° obliquity @ 500/1,000m range (mm): 20/13.2 Muzzle Velocity (m/s): 860	SIGHTS Name: INA Type: Metallic sights, (tangent leaf rear and folding front post) Sight Range (m): 2,000 Name: 10P50 Optical Type: Day optical sight Magnification: 3-6x Name: 1PN52-1 Type: Night sight Magnification: 5.3x Name: 10P80 (used w/ 6U6 mount) Type: AA collimating sight (aircraft speed to 300 km/h) Name: 10P81 (used w/ 6U6 mount) Type: Ground target sight Name: K10-T (on NSVT for T-72/T-80)

	Practical: 100 Fire Mode: Automatic; short bursts (four to six), long bursts (10 to 15), or continuously Operation: Gas Feed: Left or right from metal link belt from 50-rd boxes		Type: Reflex AA sight
		VARIANTS	
		NSVT: Tank-mounted version (See NOTES) A tripod-mount (6T7) version is available for infantry use in a ground role. However, the NSVT appears more commonly mounted on the turrets of tanks as an antiaircraft machinegun. Russian NSV/NSVT: The Russian version can produce the guns for either Russian 12.7x108 or NATO 12.7 x 99 (.50-cal) ammunition. Kord: A Russian modernized version of the NSV/NSVT. Improvements include reduced weight (50% for hand-carry 6P57), reduced recoil, increased barrel life, improved reliability, improved accuracy, increased burst rate capacity, and improved reliability and maintenance. Reduced weight and recoil permits use with the 6T19 light machinegun bipod. Like the above Russian MGs, the Kord can be produced in either ammunition version. Vehicle version is 6P49. Swivel mount hand-operated versions are 6P58 and 6P59.	

NOTES

ON THE T-72 AND THE T-80, IT HAS A ROTATING MOUNT AND CAN BE FIRED FROM WITHIN THE TANK. THE TANK COMMANDER EMPLOYS THE K10-T REFLEX SIGHT TO ENGAGE AIRCRAFT. ON THE T-72/T-80 MOUNT HE ENGAGES GROUND TARGETS WITH METALLIC SIGHTS ON THE GUN ITSELF. THE T-64 TANK MOUNTS A MODIFIED VERSION WITH A FIXED MOUNT ON THE COMMANDER'S CUPOLA. IT FIRES BY MEANS OF AN ELECTRICAL SOLENOID WHEN THE TANK IS BUTTONED UP AND AN OPTICAL SIGHT INSIDE THE CUPOLA IS USED. INSTEAD OF THE NORMAL 50-ROUND AMMUNITION BELT CONTAINER, THE NSVT ON THE T-64 MAY USE A LARGER BELT CONTAINER HOLDING 200 ROUNDS.

United States Browning Heavy Machine Gun, Caliber .50, M2 HB



SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative Designation: M2A1, AN/M2, M296, M213, etc. Date of Introduction: 1933 Proliferation: Widespread	Weight (kg): Empty (gun only): 38 w/tripod and T&E: 58 Length (mm): Overall: 1,654 Quick-change Barrel: Yes Barrel Length (mm): 1,143 Mount Type: Vehicle or tripod. Rate of Fire (rd/min): Cyclic: 450-550 Sustained: ~40 Fire Mode: Automatic or single shot Operation: Short recoil, closed bolt Feed: Belt fed (M2 or M9 links), 110 round belts.	Ball M33 Tracer M17 API M8 API-T M20 SLAP M903 SLAP-T M962	Caliber and Length: .50 Caliber/12.7x99-mm Max Range (ground) (m): 6,800 Effective Range (m): 1,800 Muzzle Velocity (m/s): 890 (M33 Ball) VARIANTS: M2A1: Latest version (2010); does not require head space and timing adjustments by crew. Max eff range of approx 2,000m. SIGHTS: Type: metallic leaf sight (rear) and blade front w/cover. Sight Range (yds): 2,600

NOTES

THE BROWNING M2 IS A WIDELY PROLIFERATED HEAVY MACHINEGUN GENERALLY USED AS AN ANTI-AIRCRAFT OR ANTI-VEHICLE WEAPON. MANY COUNTRIES USE THE M2 ON VEHICULAR MOUNTS OR ON THE TRIPOD WITH ISSUED T&E FOR A VERY EFFECTIVE GROUND WEAPON FOR USE AGAINST VEHICLES OR TROOPS IN THE OPEN OR IN BUILDINGS. THE M2 CAN BE EQUIPPED WITH NIGHT OR DAY SCOPES, AND CAN BE USED AS A VERY EFFECTIVE SNIPER WEAPON WHEN EQUIPPED WITH A TELESCOPIC SIGHT AND USED IN ITS SINGLE SHOT MODE WITH SPECIAL AMMUNITION.

Russian 40-mm Antitank Grenade Launcher, RPG-7V



SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative Designation: N/A Date of Introduction: 1962 Proliferation: 70+ countries	Crew: 2 RPG-7V is light enough to be carried and fired by one person if needed. With a crew of 2, an assistant grenadier normally deploys left of the gunner to protect him from small arms fire. The full set has two bags: one has two grenades, spare parts, tools and accessories. The other has three more grenades. Caliber Launcher (mm): 40 The grenade warhead is forward of tube. Thus grenade diameter can be 105 mm or more. Weight (kg): 7.9 empty, loaded varies with grenade Length (mm): 950 Rate of Fire (rd/min): 4-6 Fire From Inside Building: No	40-mm grenade PG-7V PG-7VM PG-7VS PG-7VL PG-7VR TBG-7V OG-7V OG-7VM Combat load: 5 rockets Grenade Components: Warhead, rocket motor, tail assembly Name: PG-7V (Chinese variant is the Type 69) HEAT Caliber (mm): 85 Type: HEAT (shaped-charge) Range (m): 500 effective, 300 vs moving targets Penetration: Armor (mm CE): 300 Concrete (m): .6 + Brick (m): 10 + Earth (m): 1.5 + Length (mm): INA	SIGHTS Name: PGO-7V Type: Optical illuminated Magnification: 2.7x, 13□ field of view Location: Top of launcher/sight-left side Sighting Range (m): 500 Name: PGO-7V3 (RPG-7V1 sight with longer range) Name: UP-7V For RPG-7V1, a telescopic collimating attachment fits on PGO-7V3 sight and extends sight range for larger munitions Night Sights Available: NSP-3, NSP-2 (IR), NSPU, PGN-1 (II), 1PN58 (II), 1PN51, 7V1N3

		Weight (kg): 2.2 The original (1962) PG-7 warhead had inconsistent lethality (260-330 mm) and an unreliable fuze. Many early foreign copies had the same problems. In 1965 they were corrected on the Russian standard PG-7V. The RPG-7V grenade launcher fires a variety of rocket-assisted grenades from its 40-mm smoothbore launcher tube. With grenade warheads outside of the tube, grenades can vary for different uses. AT grenade sizes have increased to match increased tank armors. Name: PG-7VM replaced PG-7V in Russian forces in 1969. Caliber (mm): 70.5 Type: HEAT (shaped-charge) Range (m): 500 effective Penetration: Armor (mm CE): 330 + Concrete (m): .7 + Brick (m): 1 + Earth (m): 1.8 + Muzzle Velocity (m/s): 140 Length (mm): 950 Weight (kg): 2 Name: PG-7VS Caliber (mm): 72 Type: HEAT (shaped-charge) Range (m): 500 effective Penetration: Armor (mm CE): 400 + Reinforced Concrete (m): 1 + Brick (m): 1.5 + Earth (m): 2.4 + Muzzle Velocity (m/s): INA Length (mm): INA Weight (kg): 2 Name: PG-7VL adopted in 1977 Caliber (mm): 93 Type: HEAT (shaped-charge)	

		Range (m): 300 effective Penetration: Armor (mm CE): 600 Reinforced concrete (m): 1.2 + Brick (m): 1.7 + Earth (m): 2.4 + Muzzle Velocity (m/s): 112 Length (mm): 980 Weight (kg): 2.6 Name: PG-7VR (uses RPG-7V1 launcher sights) Caliber (mm): 105 Type: Tandem (same basic warhead as RPG-29) Range (m): 200 effective Penetration: Armor (mm CE): 750 + behind ERA; 950 + conventional Reinforced Concrete (m): 1.5 + Brick (m): 2 + Earth (m): 3.7 + Muzzle Velocity (m/s): INA Length (mm): 1,306 Weight (kg): 4.5 Name: Type 69 or DZGI-40 (Airburst, Chinese) Caliber (mm): 75 Type: APERS (Anti-personnel), bounds 2 m prior to detonating Range (m): 1,500 effective Lethal Radius (m): 18 with 800 steel balls Name: HE/HEAT-MP (Chinese) Caliber (mm): 92 Type: HE and HEAT effects, and 1,500 steel fragments Range (m): 600 HEAT, 1,800 vs soft targets in Type 69 launcher Casualty Radius (m): 20 against soft targets Name: OG-7VM Caliber (mm): 40 Type: Frag-HE Range (m): 1,000 effective Casualty Radius (m): INA Muzzle Velocity (m/s): 145 Length (mm): 595	

		Weight (kg): 1.7 Name: OG-7V Caliber (mm): 40 Type: Frag-HE Range (m): Effective: 280 (RPG-7V) Effective: 350 (RPG-7V1) Effective: 700 (RPG-7V1 w/UP-7V) Max: 950 Casualty Radius (m): 7 m w/flak vests on. Muzzle Velocity (m/s): 152 Length (mm): 569 Weight (kg): 1.7 Name: TBG-7V (uses RPG-7V1 launcher sights) Caliber (mm): 105 Type: Thermobaric (similar to RPO-A warhead) Range (m): Effective: 200 (RPG-7V) Effective: 550 (RPG-7V1 w/UP-7V) Max Range: 700 Penetration: Armor (mm): INA Brick (m): +1.5 Reinforced concrete (m): + 1.5 Casualty Radius (m): Neutralizes personnel in trenches and bunkers at 2 m from a trench or bunker opening. Neutralizes a 300 m2 area. Muzzle Velocity (m/s): INA Length (mm): INA Weight (kg): 4.5 Other Ammunition: More than 2 dozen countries produced improved grenades. European grenade options include HEAT grenades with penetration of 600 mm or more (including the Czech PG-7M 110, with 700 mm penetration). Anti-personnel (APERS) grenades are generally Frag-	

		HE (see above). Other APERS include Czech Type 69. Several countries offer rockets to fit 60/82-mm mortar rounds for RPG-7V launch. This feature can extend ammunition availability and lethal area for this weapon. Other grenades include tear gas, illumination, incendiary, and multi-purpose. Multi-purpose grenades include dual-purpose (e.g., Chinese HE/HEAT-MP above), thermobaric multi-purpose (Romanian GTB-7G), and Incendiary-HE (Chinese 76mm). A private venture is the PG-7VYA HEAT grenade, with an optional spacer insert. Adding the insert changes it to a multi-purpose Frag-HE grenade. A modern trend is to give shoulder-launch weapons precision close to that of ATGMs. The RPG-7V achieves that with the Israeli G-LAW, a semi-active laser-homing HEAT grenade with precision to 800 m.	
		VARIANTS	
		This is the most widely proliferated infantry AT system in the world. There are dozens of copies and variants of this launcher. RPG-250: Prototype and test base for the RPG-7V. RPG-7B1N3, -7N, and -7N1: Night site variant RPG-7V1: Upgrade w/bipod and improved PGO-7V3 sight. This is the standard production ATGL version since the late 1990s. RPG-7D, RPG-7DV1, and RPG-7D2N3 (night): Folding variants used by airborne troops. RPG-7D3 is the	

		airborne counterpart to RPG-7V1. **Type 69-1, II, III: Chinese upgrades variants with lighter weight, a wide range of munitions, and 3.0 x longer range sights.**	

NOTES

RPG-7V IS THE STANDARD (TIER 4) SQUAD ANTITANK WEAPON IN USE BY THE OPFOR. IT REQUIRES A WELL-TRAINED GUNNER TO ESTIMATE RANGES AND LEAD DISTANCES FOR MOVING TARGETS. THE RPG-7V HAS BEEN USED TO SHOOT DOWN HELICOPTERS IN SEVERAL CONFLICTS.

Russian 72.5-mm Antitank Disposable Launcher, RPG-22



SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative Designation: INA Date of Introduction: 1985 Proliferation: 9 countries	Crew: 1 Caliber (mm): 72.5 Weight (kg): 2.8 Length (mm): Firing Position: 850 Travel Position: 750 Rifling: None Breech Mechanism Type: N/A Rate of Fire (rd/min): N/A (disposable) Fire From Inside Building: No, as back blast is out to 30 m behind the weapon.	Combat Load: INA Caliber (mm): 72.5 Type: HEAT Range (m): Effective: 250 Arming Range: INA Penetration: Armor (mm CE): 390 Brick (m): 1.2 Reinforced Concrete (m): 1 Muzzle Velocity (m/s): Initial: 133 Maximum: 300 Length (mm): 618 Weight (kg): 1.48	SIGHTS: Type: Iron, calibrated for 50, 150, 200 m Magnification: None Location: Top of launcher Sighting Range (m): 250 Night Sights Available: No
		VARIANTS	
		None	

NOTES

THE RPG-22 IS A LIGHTWEIGHT, SHOULDER-FIRED, PRELOADED, DISPOSABLE ANTI-ARMOR WEAPON INTENDED FOR FIRING ONE ROUND, AFTER WHICH THE TUBE IS DISCARDED. IT IS BASICALLY A SCALED-UP VERSION OF THE RPG-18 (SIMILAR TO THE US LAW) AND HAS NO DEDICATED GRENADIER; HOWEVER, ALL SOLDIERS TRAIN TO USE THE SQUAD-LEVEL DISPOSABLE WEAPON.

Russian 105-mm Disposable Antitank Grenade Launcher, RPG-27



SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative Designation: Tavolga (Meadow Grass) Date of Introduction: 1989 Proliferation: At least 15 countries	Crew: 1 Caliber (mm): 105 Weight (kg): 8 Length (mm): Firing Position: 1,155 Travel Position: 1,155 Rate of Fire (rd/min): Single-shot disposable	Caliber (mm): 105 Type: Tandem-HEAT Range (m): Effective: 200 Penetration: Armor: 750 + behind ERA, 950 + conventional Brick: 2,000 Reinforced Concrete: 1,500+ Log and Dirt (m): 3,700 Muzzle Velocity (m/s): 120	SIGHTS: Type: Raised iron peep sight Sighting Range (m): 50, 100, 150, 200 Night Sights Available: No (Can be used with NVG found in OPFOR units). Other sights can be adapted, such as the strap-on British Ring Sight, with NVG.
		VARIANTS	
		None.	

NOTES

THIS IS A DISPOSABLE LAUNCHER VERSION OF THE RPG-29. THE RPG-27 HAS A 105-MM TANDEM WARHEAD SIMILAR TO THAT OF THE PG-7VR (RPG-7V) AND THAT OF THE PG-29V (RPG-29).

Russian 125 mm Rocket Propelled Grenade, RPG-28



SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative designations: Klyukva (Cranberry) Date of introduction: 2011 Proliferation: Russian Federation	Weight (kg): 13.5 (loaded launcher) 12kg (rocket alone) Length (mm): 1200mm (carry and firing) Rate of fire (rd/min): 1 (single shot, disposable launch tube) Operation: Manually cocked, then aimed and fired. Magazine: N/A Magazine capacity: N/A Fire mode: N/A	High Explosive, Anti-Tank (HEAT) RPG 125mm, tandem warhead. Capable of penetrating ERA and up to 1000mm of RHA; up to 3000mm of brick/cinder block; 1500+mm of reinforced concrete; 3700mm of logs and dirt (bunker).	SIGHTS: Type: PGO-7 Optical or iron peep sight. Iron sights are graduated 15, 100, 150, 200, and 300 meters 300m max effective range.
		VARIANTS	
		N/A	

NOTES

THIS WEAPON IS CURRENTLY THE LARGEST RPG (125MM TANDEM WARHEAD ROCKET) FIRED FROM A DISPOSABLE, NON-EXTENDING LAUNCHER KNOWN TO BE IN CURRENT SERVICE. OPERATED BY A SINGLE SOLDIER, THE RPG-28 IS CAPABLE OF INFLICTING A MOBILITY KILL OR A CATASTROPHIC KILL ON ANY MAIN BATTLE TANK (MBT) KNOWN TO BE IN SERVICE WITH ANY NATION.

Russian 105-mm Antitank Grenade Launcher, RPG-29 and RPG-32/Hashim



SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative Designation: Vampir (RPG-29); Hashim (RPG-32) Date of Introduction: 1989 (RPG-29); 2012 (RPG-32) Proliferation: 8+ (RPG-29); 3 (RPG-32)	RPG-29: Crew: 2 Caliber (tube) (mm): 105 Weight (w/o sight) (kg): 11.5 (launch tube and canister/extension) Length (transport) (mm): 1,000 without rear section/canister Length (firing) (mm): 1,850, with grenade canister attached Life of Tube/barrel: 300 Rate of Fire (rd/min): INA Fire From Inside Building: INA Maximum Target Speed (km/h): INA Emplacement/displacement time (min): <0.25 Deployment: The pintle permits the launcher to attach to a tripod ground mount or a vehicle mount. The RPG-29 can be broken down into two parts for one soldier carry (launcher unit front section, and grenade/canister rear section). It can be made ready to fire within a few seconds with quick connect couplings. A folding bipod is provided to	RPG-29: Name: PG-29V (in canister/launch tube extension) Caliber (warhead): 105 Type: Tandem HEAT (shaped charge) TBG-29V thermobaric rounds Effective range (m): 500 in the AT role, 800 for Multi-purpose with HE Penetration (mm CE): Armor: 750 + behind ERA, 950 + conventional Other: 1,500+ concrete and brick, 2,000 brick, 3,000 earth Length (mm): INA, but it fits in the 850-mm long canister Complete Round Weight (kg): 6.7 Muzzle Velocity (m/s): 280 Other: TBG-29V multipurpose HE thermobaric grenade. Blast effects are the same as the TBG-7V (previous pg). Effective range (m): 50-2,000 RPG-27, PG-7R grenade for RPG-7V, and RPG-32/Hashim use the same tandem warhead design.	RPG-32: Russian/Jordanian 105-mm ATGL with RPG-32V variant tandem HEAT and HE thermobaric grenades. The launcher base is a short tube with optics and trigger assembly. Sight is a collimating (binocular rangefinder) day/II night sight. The canister sleeve fits inside the short launcher stub to serve as a launch tube extension, resulting in a very lightweight 1.2-m length shoulder launcher ranging 700 m. Penetration is 850+mm vs conventional armor (650+ vs ERA), with 2 per carry case. It can launch 72.5-mm MRO-A thermobaric multi-role grenade, and perhaps other 72.5-mm grenades. Jordanian KADDB offers a vehicle remote weapons station with 7.62-mm MG, Hashim launcher, and thermal sight. An upgrade is due in 2010, to add "precision" for increased range and 80% P-hit.

	assist aiming during prone firing. SIGHTS: Day sight: Name: 1P-38 Type: Optical and iron, for RPG-29 shoulder-launch Magnification: INA Location: Left side Sighting Range (m): 500 for optical sight. Effective range for the iron (post) sight would probably be less. Weight (kg): .6 Night Sight: Name: 1PN51, 1PN52 standard RPG-29 or RPG-29N Type: II sight Weight (kg): 2.1	RPG-32: Name: PG-32V tandem HEAT TBG-32V thermobaric / FAE	1200mm in length (105mm); 900mm in length (72.5mm). Weight: 10kg/105mm. 6kg/72.5mm. Range:700m (max); 300m(effective).
		VARIANTS	
		RPG-29 comes in three versions. The shoulder launch version is the base version described here (see photo above). The shoulder launch RPG-29 could become a standard squad ATGL for maneuver forces; However, the launcher, even stripped down for shoulder launch, is considered to be fairly burdensome and ungainly for use with squads attempting to move quickly in close quarters and dense cover. Thus the RPG-32/Hashim (below) was developed. RPG-29 Mounted is an improved crew-served launcher upgrade for a more limited use ground and vehicle mount (see page 6-21). For Tier 1 and Tier 2 COE OPFOR, RPG-29 Mounted is the crew weapon in Weapons Squads and other supporting tactical units. RPG-29N: Night sight only shoulder-launch variant	

		No known RPG-32 variants.	

NOTES

RPG-29 IS A MULTI-PURPOSE FIRE SUPPORT SYSTEM WITH BOTH AT, HE AND THERMOBARIC GRENADES. THUS IT SERVES AS ALL-PURPOSE SMALL UNIT ARTILLERY AGAINST THE GAMUT OF TARGETS, INCLUDING VEHICLES, PERSONNEL, BUILDINGS, AND ANY OTHER DIRECT-FIRE TARGETS WITHIN RANGE - INCLUDING HELICOPTERS.

Russian 105-mm Disposable Antitank Grenade Launcher, RPG-30

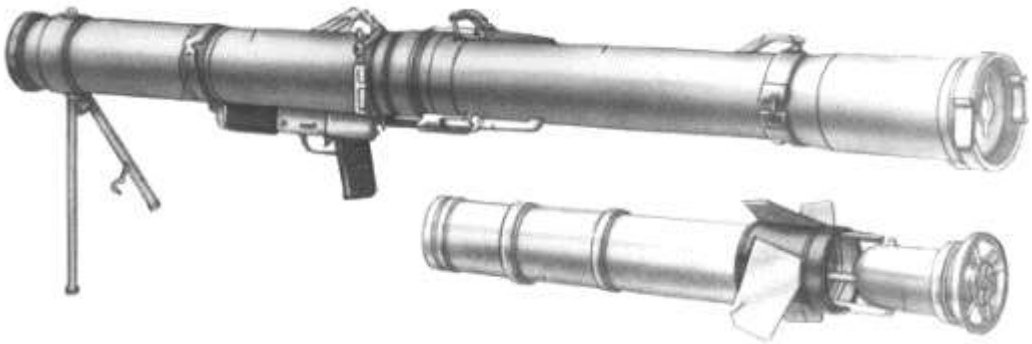


SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative Designation: Kryuk (Hook) Date of Introduction: 2011 Proliferation: Russian Federation	Crew: 1 Caliber (mm): 105 main tandem warhead HEAT rocket; Approx. 40mm sub-caliber precursor "decoy" rocket. Weight (kg): 12 (projectile) Length (mm): Firing Position: 1135 Travel Position: 1135 Rate of Fire (rd/min): Single-shot disposable	Caliber (mm): 105 (PG-30) Type: Tandem-HEAT Range (m): Effective: 300 Penetration: Armor: 900 + behind ERA, 950 + conventional Brick: 3,000 Reinforced Concrete: 1,500+ Log and Dirt (m): 3,700 Muzzle Velocity (m/s): 120	SIGHTS: Type: Raised iron peep site Sighting Range (m): 50, 100, 150, 200 Night Sights Available: No (can be used with NVG found in OPFOR units). Other sights can be adapted, such as the strap-on British Ring Sight, with NVG.
		VARIANTS	
		None.	

NOTES

THE RPG-30'S 40MM SUB-CALIBER PRECURSOR "DECOY" ROCKET, IS SPECIFICALLY DESIGNED TO DEFEAT ACTIVE PROTECTIVE SYSTEMS MOUNTED ON MBTS AND IFVS. THE DECOY ROCKET IS FIRED MERE MICRO SECONDS BEFORE THE MAIN 105MM TANDEM WARHEAD HEAT ROCKET, AND THE DECOY WILL SET OFF THE APS, THUS LEAVING A GAP IN THE PROTECTION ON THE MBT OR IFV, THUS ALLOWING THE HEAT ROUND TO STRIKE THE VEHICLE IN A NOW VULNERABLE SPOT.

Russian 122mm Infantry Rocket Flame Weapon, RPO



SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative Designation: Rys (Lynx) Date of Introduction: Late 1970s. Proliferation: Russian Federation	Crew: 1 Weight (kg): Empty: 3.5 Pack (launcher and two rounds): 22 Length (ready to fire) (m): 1.44 Rate of Fire (rockets/min): 1 Reaction Time-Travel to Fire (sec): 60 Fire From Inside Building: INA Tube Life: 100 rounds Launcher Components: Firing tube, firing mechanism, mechanical sights, collapsing bipod and sling.	Type: Incendiary napalm Warhead Incendiary Fill (liters): 4 Weight of Incendiary in Warhead (kg): 4 Type of Incendiary: Pyrogel Burn Temperature (°C): 800-1,000 Caliber (mm): 122 Casualty Radius: Fire envelope 10-40 m deep in the direction of the shot with a spray width of 3-4 m. Components: Container, warhead canister, propulsion unit .	Range (m): Effective: 190 Maximum: 400 Minimum: INA Accuracy: INA Muzzle Velocity (m/s): INA SIGHTS: Type: Open metal, front and rear Location: Left side, rear is on-line with rear of grip Magnification: None Night Sights Available: INA
		VARIANTS	
		None.	

NOTES

THE RPO IS A COMBAT-TESTED, SHOULDER-FIRED REUSABLE WEAPON THAT FIRES A ROCKET-PROPELLED ENCAPSULATED NAPALM WARHEAD. IT WAS DESIGNED TO REPLACE THE LPO-50. THE RPO IS CARRIED IN TWO PARTS THAT MUST BE CONNECTED TO FIRE. SQUEEZING THE TRIGGER IGNITES THE ROCKET WITH AN ELECTRIC SPARK. PART OF THE PROPELLANT GAS ENTERS THE CONTAINER AND PUSHES THE CANISTER, KINDLING THE IGNITER, WHICH IN TURN IGNITES THE INCENDIARY MIXTURE. THE NAPALM IN THE RPO IGNITES AT THE INITIAL STAGE OF THE FLIGHT AND UPON IMPACT BURNING PIECES ARE SCATTERED ALL OVER THE TARGET. ALTHOUGH STILL IN USE BY THE OPFOR FLAMETHROWER BN (ENCAPSULATED) AT CORPS OR ARMY LEVEL (AND OTHER ARMIES), THE RPO HAS GENERALLY BEEN REPLACED BY THE INFANTRY ROCKET FLAME WEAPON RPO-A SERIES (RPO-A/D/Z).

Russian 93mm Infantry Rocket Flame Weapon, RPO-A Series and Shmel-M



SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative Designation: Shmel (Bumblebee). Although "RPO" may be used generically to describe various infantry flame weapons, RPO-A is this specific multi-role flame weapon system. Date of Introduction: 1984 Proliferation: Russian Federation and 9 other countries	Crew: 1 Number of Weapons in a Package: 2 Weight of Package (kg): 12 Total weapon (1) weight (kg): 11 Length (mm): 920 Rate of Fire (rockets/min): 2 Reaction Time-Travel to Fire (sec): 30 Fire From Inside Building: Yes. It can be fired in enclosures of 60m3 or greater or with a barrier behind the weapon. Components: Container, ejection motor, warhead.	RPO-A: Thermobaric-flammable mixture RPO-Z: Incendiary RPO-D: Smoke Shmel-M: Thermobaric Typical Combat Load: 2 per launcher. Name: RPO-A Type: Thermobaric (enhanced blast) explosive. The RPO-A is known as the infantryman's pocket artillery because the demolition effect corresponds to 122-mm HE artillery, and 120-mm mortar projectile. It can buckle armor, penetrate rubber seals and enter openings in vehicles, injure or kill personnel, and collapse roofs and doors on bunkers and buildings. Caliber (mm): 93 Casualty Area: 50 m2 personnel in the open, 80 m3 enclosed space	PERFORMANCE: Range (m): Direct Fire: 200 with iron sight, 850 with optical sight Effective: 600 Minimum: 20 Indirect Fire: 1,000 Accuracy @ 200 m: .5 m2 Muzzle Velocity (m/s): 125 SIGHTS: Name: OPO-1 Type: Optical calibrated to 600 m Location: Left, next to grip Magnification: None Night Sights Available: INA

		Lightly armored materiel kill probability at 400 m: 0.70 **Burn Temperature (°C): 800+** **Warhead Explosive Type: Trotyl equivalent (2 kg)** **Warhead Mixture Weight (kg): 2.1** **Name: RPO-D** **Warhead Weight (kg): 2.3** **Smoke-Incendiary Type: Based on red phosphorous.** **Smokescreen:** **Time of Formation (min): 2** **Length (m): 55 to 90** **Depth and Height (m): INA** **Duration (min): 3 to 5** **Effective Against: Visual and infrared** **Name: RPO-Z** **Type: Incendiary** **Warhead Mixture Weight (kg): 2.5**	
		VARIANTS	
		Shmel-M/PDM-A Priz: This is a reusable upgrade system adopted in the Russian Army in 2003 to replace the disposable RPO-A. It Includes a reusable mini-grip-stock launcher, with a reflex sight and pistol grip. Disposable canisters (with munitions) slide on and serve as the launcher tubes. The Shmel-M is more powerful (50 % more blast = 152/155-mm cannon round) and lighter in weight than RPO-A. Range is 800m, 300m direct fire. Specifications are: caliber 90 mm, length 940 mm, weight 8.8 kg for 2. In time other canister fills (e.g., smoke and incendiary) will be available. Standard issue (2 grenades per launcher) is more compact than 2 RPO-A launchers.	

		PF-97: Chinese licensed copy of RPO-A, with optical sight mounted on some launchers.	

NOTES

DESIGNED AS A FOLLOW-ON TO THE RPO, THE RPO-A, -Z, AND -D ARE ONE-SHOT, DISPOSABLE, SHOULDER-FIRED, COMBAT TESTED (AFGHANISTAN, TAJIKISTAN, CHECHNYA), FLAME WEAPONS. THEY ARE RELIABLE. ANY SOLDIER CAN USE THIS CLOSE-COMBAT WEAPON WITH MINIMAL INSTRUCTION. THE RPO-A COMPRISES THREE BASIC COMPONENTS: CONTAINER, EJECTION MOTOR, AND CASE, WHICH IS FILLED, DEPENDING ON ITS PURPOSE, WITH THERMOBARIC (ENHANCED BLAST EXPLOSIVE), SMOKE OR INCENDIARY ROCKETS. AT ANY RANGE THE BLAST EFFECTS OF THE THERMOBARIC MUNITIONS ARE MUCH MORE SERIOUS THAN THE THERMAL EFFECTS. THE RPO SERIES OF FLAME WEAPONS ALSO SERVES AS AN EXTREMELY EFFECTIVE COUNTER-SNIPER WEAPON. THE ARMOR- AND MECHANIZED -BASED OPFOR USUALLY ISSUES ONE RPO-A PER BMP (MECHANIZED INFANTRY SQUAD). THEY ARE ALSO FOUND IN THE FLAMETHROWER BN (ENCAPSULATED) AT CORPS OR ARMY LEVEL. ONE SQUAD PER INFANTRY PLATOON HAS A RPO-A IN THE INFANTRY-BASED OPFOR. THE RPO-A SERIES OF FLAME WEAPONS ARE ISSUED MORE ALONG THE LINES OF AMMUNITION RATHER THAN A WEAPON, THEREFORE THE BOI MAY VARY.

Chinese 120-mm Antitank Grenade Launcher, PF-98



SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative Designation: "Queen Bee" Date of Introduction: 2000 Proliferation: China and 3 other countries	Crew: 2, 3 if more rounds are needed Caliber (mm): Launch Tube: 120 Warhead: 120 Weight (kg): INA Length (mm): Firing Position: INA Travel Position: INA Rifling: None Breech Mechanism Type: Rocket canister is attached to end of launcher, extending the launch tube. Launcher mount: Shoulder for company launcher, Tripod, shoulder, or pintle for battalion launcher. Rate of Fire (rd/min): 4-6	Tandem HEAT and Multipurpose Name: HEAT, with time fuze Caliber (mm): 120 Type: Tandem HEAT (shaped charge) Range (m): 800 battalion, 400-500 with company level launcher Penetration (mm CE): 800+ Weight (kg): 6.4 Time of Flight (sec): 10 Name: Multipurpose Caliber (mm): 120 Type: Frag-HE-Incendiary (120 steel balls) Range (m): 2,000 Penetration: 400 mm KE for steel balls, 25 m lethal radius Weight (kg): 7.6	SIGHTS: Name: Y/MK/PF98(Y)-120 Type: Ballistic computer laser range-finder (LRF) sight for battalion version, and optical telescope for company sight Rate of fire: 4–6 rounds per minute Maximum range: 800 m (HEAT); 1800 m (HE) Combat Load: 5 rockets.



	Fire From Inside Building: No		
		VARIANTS	
		Company and battalion versions fire the same rounds. In subsequent years, these systems will proliferate throughout battalions in weapons units and into infantry platoons and lower. Over time the battalion version will replace squad ATGLs. Battalion system could be a representative OE Tier 1 ATGL for infantry units.	

NOTES

THE PF-98 APPEARS TO HAVE EMPLOYED PROPULSION PRINCIPLES FROM THE SWEDISH BOFORS CARL GUSTAF 84-MM M2/M3 RECOILLESS GUN. THE CARL GUSTAF HAS A COMPACT ROUND WITH AN EXPULSION CHARGE TO LAUNCH ITS GRENADE, A METHOD WHICH OFFERS GREATER PRECISION THAN MORE COMMON ROCKET-PROPELLED SYSTEMS. BUT LIKE THE MORE RECENT AND LARGER GUSTAF ROUNDS, THE PF-98 ADDED ROCKET ASSIST TO EXTEND PROJECTILE RANGES. THUS THE PRODUCER REFERS TO PF-98 AS AN "ANTI-TANK ROCKET LAUNCHER". BY USING SEALED CANISTERS TO SERVE AS LAUNCHER EXTENSIONS, QUEEN BEE OFFERS A TREND-SETTING AND EFFECTIVE WAY TO INCREASE LETHALITY BY GROWING AMMUNITION TO 120-MM, WHILE RETAINING PORTABILITY AND EXTENDING RANGE CAPABILITY. BN DESIGNATION IS FOR LAUNCHER MOUNTED ON TRIPOD.

German 60-mm Antitank Grenade Launcher, Panzerfaust 3



SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative Designation: Balliste, Pzf 3-T600 Date of Introduction: 1990, 1996 for 3-T600 Proliferation: 11 countries world wide	Crew: 2 Caliber (mm): Launch Tube: 60 Warhead: 110 Weight (kg): 12 Length (mm): Firing Position: 1,200 Travel Position: 1,200 Rifling: None Breech Mechanism Type: N/A Rate of Fire (rd/min): 5 Fire From Inside Building: Yes	Tandem HEAT Multipur-FRAG (MZ-110) BASTEG Illumination Smoke/IR Smoke Tandem HEAT Multipurpose HESH Tandem HEAT SAL-H (Pzf-3LR) Name: 3-T (Tandem) Caliber (mm): 110 Type: Tandem HEAT (Pzf 3-T and 3-T600) Effective Range (m): 600 moving and stationary) Armor Penetration (mm CE): 800 behind ERA Weight (kg): 4.3 Muzzle Velocity (m/s): 152 Flight Velocity (m/s): 220 Time of Flight to 300 m (sec): INA Name: BASTEG (Barricade and Street Encounter Grenade) Caliber (mm): 110 Type: Shaped-charge w/stand-off fuze Range (m): 11 to 600 Penetration (mm): 15 armor at 45□, 920 sandbag, 256 concrete Weight (kg): 4.3 Time of Flight to 300 m (sec): INA	Typical Combat Load: 5 rockets SIGHTS: Name: DynaRange (Simrad IS2000) for Pzf 3-T600 and Pzf 3-IT600 Type: Computer laser range-finder (LRF) sight Magnification: 1x/3.5 Location: Left side Night Sights Available: Yes, KN-250 series II Day sight can be used with Simrad GN1 NVG. OFF-ROUTE MINE SYSTEM AND REMOTE LAUNCHER: The original launcher and variants can be tripod mounted, and can be used autonomously with sensor package. Name: SIRA Target Speed range (km/h): 30-60 Effective Range (m): 150 Operational Time (days): 40

		Name: 3-IT (Improved Tandem) Caliber (mm): 110 Type: Tandem HEAT/HESH (Dual-mode) on Pzf 3-IT600 With nose retracted, HESH mode has greater effects against APCs, material targets, etc. Effective Range (m): 600 moving and stationary Armor Penetration (mm CE): 900+ behind ERA, with nose extended; 1,150 conventional, with nose extended Weight (kg): 5.4 Muzzle Velocity (m/s): 152 Flight Velocity (m/s): 220 Time of Flight to 300 m (sec): INA Other Grenades: See above. The new 3LWD multipurpose grenade has a shaped charge and HE/anti-armor effects of a high-explosive squash-head (HESH) round.	Acquisition: Targets detected by acoustic sensor which activates the infrared sensors. Sensors: Acoustic: Capacitative microphone to detect and arm IR Sensor: Passive, two-color IR Optics: Double parabolic, off-axis Name: Fire Salamander Remote launcher and off-route mine system Description: 4x Pzf-3 launcher mount on a tripod with remote controlled TV camera for controlled launch, and sensors for automatic launch.
		VARIANTS	
		Panzerfaust 3 (Pzf 3): Original system with 110-mm HEAT grenade (nose probe for 700 mm penetration). Optical day sight limits range to 300 m moving, 400 stationary. Panzerfaust 3-T: Upgrade with 3-T tandem HEAT grenade and original day sight. It is effective against targets to 300m stationary, 400m moving. Night sight is optional. Panzerfaust 3-T600: Tier 2 upgrade adds the IS2000 computer laser day sight with range of out to 600 m for moving targets. It uses the Simrad KN250 series II night sight. Acquisition-to-firing time is 3-4 seconds.	

		Panzerfaust 3-IT600: Tier 1 capability upgrade adds more recent 3-IT grenade which penetrates 900+ mm armor behind ERA (equals 1,150 mm vs armor without ERA). **Panzerfaust 3LTW: Light-weight launcher weighing less than 10 kg.** **Panzerfaust 3LR: Long-range semi-active laser homing (SAL-H) system requires CO2 laser guidance unit and SAL-H grenade. Range-800 m, armor penetration-700 mm.**	

NOTES

THE PANZERFAUST 3 SERIES OF LAUNCHERS IS A COMPACT, LIGHTWEIGHT, SHOULDER-FIRED, UNGUIDED ANTITANK WEAPON SERIES. IT CONSISTS OF A DISPOSABLE CANISTER WITH A 110-MM WARHEAD AND REUSABLE FIRING AND SIGHTING DEVICE. THE PANZERFAUST 3 IS LIGHT ENOUGH TO BE CARRIED AND FIRED BY ONE PERSON. IT CAN FIRE FROM ENCLOSURES. THE GUNNER CARRIES AT LEAST TWO ROUNDS WHILE THE ASSISTANT GRENADIER CARRIES AN ADDITIONAL THREE ROUNDS.

German 67-mm Antitank Disposable Launcher, Armbrust



SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative Designation: "Crossbow" Date of Introduction: INA Proliferation: 8 countries	Crew: 1 Caliber (mm): 67 Weight (kg): 6.3 Length (mm): 850 Rifling: None Breech Mechanism Type: N/A Rate of Fire (rd/min): N/A (disposable) Fire From Inside Building: Yes (see NOTES)	67-mm grenade HEAT Range (m): Maximum: 1,500 Effective AT: 400 Flight Time (sec) @ 300 m: 1.5 Penetration: Armor (mm CE): 300 Reinforced Concrete (m): INA Muzzle Velocity (m/s): 210 Typical combat load: INA	SIGHTS: Name: N/A Type: Reflex Magnification: None Location: Left side Sighting Range (m): INA Night Sights Available: INA
		VARIANTS	
		No known variants.	

NOTES

THE ARMBRUST IS A PRELOADED, DISPOSABLE, SHOULDER-FIRED ANTITANK WEAPON. IT HAS A LOW SIGNATURE AND LOW IR DETECTABILITY AND CAN BE SAFELY FIRED FROM SMALL ENCLOSURES OR ROOMS. THE MUZZLE DOES NOT EMIT SMOKE OR BLAST AND NO FLASH CAN BE SEEN FROM THE REAR. ONLY .8 M CLEARANCE IS REQUIRED BETWEEN THE REAR OF THE WEAPON AND THE WALL. IT IS QUIETER THAN A PISTOL SHOT. THE ENTIRE WEAPON IS CONSIDERED A ROUND OF AMMUNITION AND THE LAUNCHER IS THROWN AWAY ONCE THE WEAPON IS FIRED. THE SYSTEM IS ALSO MANUFACTURED BY SINGAPORE INDUSTRIES.

Swedish Carl Gustaf 84mm Recoilless Rifle, M2/3/4



SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative Designation: Date of Introduction: 1948 Proliferation: Widespread (40+ nations)	Caliber: 84 mm rifled (24 lands, progressive twist) Crew: 2 optimal, 1 minimal Weights: 14.2 kg (M2); 8.5 kg (M3); 7.0 kg (M4) Length: 1.13m (M2); 1.07m (M3); 1.0m (M4) Breech: Hinged Rate of fire: 6 rounds per minute Sights: Iron sights, optical 3×, laser rangefinder, image intensification system for the newer M3 and M4 series	HEAT (tandem) HEDP HEAT HE Smoke Illumination Note that the following are Canadian designations (other countries use similar terminology, replacing the "FFV") Name: FFV 751 Type: HEAT (tandem) Range (m): Effective: 600+ Arming range: 20-40 Moving: INA Penetration: Armor (mm CE): 500+ behind ERA Weight (kg): 4 Name: FFV 502	System improvements have been in the areas of length, weight, sighting systems, and in the types of ammunition available.

		Type: HEDP with dual mode fuze (impact and delay) **Range (m):** **Effective (personnel in open): 1,000** **Effective (stationary): 500** **Moving: 300** **Arming Range: 15-40** **Penetration:** **Armor (mm CE): 150+ with brush safety fuze and delay fuze** **Weight (kg): 3.3 complete round** **Muzzle Velocity (m/s): 230** **Name: FFV 551** **Type: HEAT** **Range (m):** **Effective: 700** **Arming Range: 5-15** **Penetration:** **Armor (mm CE): 400** **Weight (kg): 3.2** **Muzzle Velocity (m/s): 255** **Name: FFV 441B** **Type: HE** **Range (m):** **Effective (unprotected troops, soft-skinned vehicles): 1,100** **Arming Range: 20-70** **Casualty Radius (m): INA** **Weight (kg): 3.1** **Muzzle Velocity(m/s): 240** **Name: ADM 401** **Type: Flechette (1,100 per round)** **Range (m):** **Effective: 100** **Arming Range: 0** **Casualty Pattern: 5-10 flechettes per m2 upright target at 100 m** **Name: FFV 469B/C** **Type: Smoke** **Range (m):** **Effective: Up to 1,300** **Weight (kg): 3.1** **Muzzle Velocity (m/s): 240**	

		Name: FFV 545C **Type: Illumination** **Range (m):** **Practical: 300-2,100** **Burning Time (sec): 30** **Illuminated Area, dia: 400-500** **Candle Power: 650,000 cd** **Weight (kg): 3.1 complete, 0.8 of smoke composition** **Muzzle Velocity (m/s): 260** **Other Ammunition:** **FFV 441D HE Impact/Airburst, with 800 stell pellets and time delay.** **Range is 1250 m.** **HEAT 655 CS (Confined Spaces)**	
		VARIANTS	
		M1 (1948 **M2 (1963)** **M3 (1991)** **M4 (2014)**	

NOTES

THE 84-MM CARL GUSTAF RECOILLESS RIFLE IS A ONE-MAN PORTABLE, DIRECT-FIRE, SINGLE-SHOT, BREECH-LOADING WEAPON. SEVERAL VERSIONS OF THE CARL GUSTAF ARE PRODUCED OUTSIDE SWEDEN, HOWEVER, THE AMMUNITION IS INTERCHANGEABLE AMONG THE VARIANTS. WHILE THE WEAPON CAN BE OPERATED BY ONE PERSON IT IS BETTER TO HAVE TWO—ONE TO FIRE THE GUN, AND THE OTHER TO CARRY AND LOAD THE AMMUNITION. IN ADDITION TO ITS ANTITANK ROLE, THE WEAPON CAN BE USED AS PART OF AN ILLUMINATION PLAN, TO PROVIDE SMOKE, OR FOR BUNKER BUSTING.

Swedish 84-mm Disposable Light Antitank Weapon, AT4



SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative Designation: US M136, Bofors AT 4, FFV AT4 Date of Introduction: 1987 Proliferation: 24 countries	Crew: 1 Caliber (mm): 84 Weight (kg): 6 Length (mm): Firing Position: 1,000 Travel Position: 1,000 Rate of Fire (rd/min): N/A (disposable) Fire From Inside Building: Yes (See AT4 CS)	Name: AT4 HEAT Caliber (mm): 84 Type: HEAT Range (m): Effective: 300 Arming Range: INA Penetration: Armor (mm CE): 420 Weight (kg): 6.7 Muzzle Velocity (m/s): 285 Name: LMAW (see VARIANTS) Caliber (mm): 84 Type: HEDP, modified Carl Gustaf HEPD FFV 502 (with dual mode fuze) Range (m): Effective: 300 Arming Range: INA Penetration: Armor (mm CE): 150 Concrete (m): INA Casualty Radius (m): INA Muzzle Velocity (m/s): 235 Name: AT4 CS (confined space) can fire from confined spaces as small as 22.5 m3 Caliber (mm): 84 Type: HEAT or HEDP (LMAW) warheads Range (m): Effective: INA Arming Range: INA Penetration: Armor (mm CE): 500 Weight (kg): INA Muzzle Velocity (m/s): INA	SIGHTS Name: INA Type: Popup, preset to 200 m Location: Top left Night Sights Available: Yes, INA

		Name: AT4 HP (high penetration) Caliber (mm): 84 Type: HEAT Range (m): Effective: INA Arming Range: INA Penetration: Armor (mm CE): 600 Weight (kg): Less than 7 Muzzle Velocity (m/s): 290	
		VARIANTS	
		LMAW: Light Multipurpose Assault Weapon, uses HEDP AT4 CS: Confined space AT4 HP: High penetration	

NOTES

THE AT4 IS A LIGHTWEIGHT, PRELOADED, DISPOSABLE ANTI-ARMOR WEAPON INTENDED FOR FIRING ONE ROUND, AFTER WHICH THE TUBE IS DISCARDED. ALL AT4 SYSTEMS SHARE THE SAME LAUNCHER BUT MAY CONTAIN DIFFERENT PRELOADED MUNITIONS. THE VARIANT SELECTED DEPENDS ON THE INTENDED USE. THE AT4'S AVERAGE RECOIL IS COMPARABLE TO THE M16 RIFLE.

United States 90-mm Recoilless Rifle, M67



SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative Designation: None. Date of Introduction: Type classified in 1959. Early variants had been in the Army inventory since the late 1940s. Proliferation: 10 + countries.	Crew: 3 (see Note) Caliber (mm): 90 Weight (empty) (kg): 16.4 Length (mm): 1.35 Height (ground-mounted) (mm): 432 Mount: Rear bipod and forward monopod Feed: Manual Rate of Fire (rd/min): Maximum: 1 each 6 seconds, not to exceed 5 rounds Sustained: 1 Fire From Inside Building: No	HE HEAT APERS Target Practice Name: INA Type: HE Range (m): Effective: 400 Weight (kg): INA Name: M371E1 Type: HEAT Range (m): Aimed: 800 Effective: 420 Penetration: Armor (mm CE): 350 Weight (kg): 4.2 Fuze: Point Detonating Muzzle Velocity (m/s): 213 Name: XM590E1 Type: APERS Canister (antipersonnel)	SIGHTS: Name: M103 Type: Optical, (graduated in 50 m intervals up to 400 m, every 100 m up to 800 m) Magnification: x3 Field of View (?): 10 Location: Left center

		Fill: 2,400 eight-grain flechettes Range (m): Effective: 200 Weight (kg): 3.08 Muzzle Velocity (m/s): 381 Name: XM590E1 Type: Target Practice Range (m): Ballistically identical to the HEAT M371E1 Weight (kg): 3.08 Muzzle Velocity (m/s): 381	
		VARIANTS	
		Early variants maybe found in other countries. The M67 has reportedly been reintroduced as late as 2011 for use in Iraq/Afghanistan by some units.	

NOTES

THE M67 90-MM RECOILLESS RIFLE IS A LIGHTWEIGHT, PORTABLE, DIRECT-FIRE ONLY, CREW-SERVED ANTITANK WEAPON. IT IS DESIGNED TO BE FIRED PRIMARILY FROM THE GROUND USING THE BIPOD AND MONOPOD, BUT IT MAY BE FIRED FROM THE SHOULDER. IT IS AN AIR-COOLED, BREECH-LOADED, SINGLE-SHOT RIFLE THAT FIRES FIXED AMMUNITION. ALTHOUGH INTENDED PRIMARILY FOR USE AS AN ANTITANK WEAPON, THE M67 CAN BE USED AGAINST SECONDARY TARGETS SUCH AS GUN EMPLACEMENTS AND BUNKERS. IT IS ALSO VERY EFFECTIVE IN AN ANTI-PERSONNEL ROLE. ALTHOUGH NO LONGER PRODUCED IN THE US, THE M67 IS STILL IN PRODUCTION BY SOUTH KOREA.

THE CREW CONSISTS OF A GUNNER, ASSISTANT GUNNER, AND AMMO BEARER. THE M67 CAN BE OPERATED WITH A CREW OF ONLY TWO; HOWEVER, THE THIRD CREW MEMBER (AMMO BEARER) IS CONSIDERED NECESSARY FOR EFFICIENT OPERATIONS. IN THE ABSENCE OF AN INDIVIDUAL TO PERFORM THE DUTIES ASSIGNED TO THE AMMO BEARER, THE GUNNER (CREW MEMBER 1) LAYS AND FIRES THE 90-MM RIFLE AND IS THE CREW LEADER. HE CARRIES THE M67 AND A PISTOL. THE LOADER (CREW MEMBER 2) IS RESPONSIBLE FOR LOADING THE RIFLE AND ACTS AS THE GUNNER WHEN REQUIRED. HE SECURES AMMUNITION AND CHECKS THE CLEARANCE OF THE BACK BLAST AREA PRIOR TO FIRING. HE CARRIES A PISTOL, SPARE PARTS, CLEANING MATERIEL, AND 3 ROUNDS OF 90-MM. THE AMMUNITION BEARER (CREW MEMBER 3) IS RESPONSIBLE FOR SECURING AMMUNITION AND PROVIDING SECURITY FOR THE RECOILLESS RIFLE POSITION. HE CARRIES AN ASSAULT RIFLE AND 4 ROUNDS OF 90-MM. THE M67 HAS BEEN REPLACED BY THE CARL GUSTAV M2 AND THE AT4 WEAPONS SYSTEMS.

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Worldwide Equipment Guide

Chapter 3: Infantry Vehicles



TRADOC G-2 ACE–Threats Integration
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Chapter 3: Infantry Vehicles

Infantry vehicles include all military vehicles designed for use by infantry and other tactical units. They vary from unarmored multi-role vehicles to specialized armored vehicles. Mechanized infantry units often use *light armored fighting vehicles* (LAFV) designed as infantry squad carriers. Infantry units use large numbers of vehicles, armored and unarmored, for support missions. Due to budgetary constraints, some forces also use commercial vehicles or military vehicles considered obsolete by other militaries. The US Army will likely encounter infantry forces with a mix of older, newer, and upgraded infantry vehicles in their next battle.

Vehicle Classification: The infantry can use LAFVs, multi-purpose support vehicles, specialized vehicles or commercial vehicles to transport soldiers. In wartime, the OPFOR will use all systems available to execute the mission. This chapter is divided into three sections: **armored infantry carriers**, **fire support vehicles (FSV)**, and **combat support vehicles** (CSV).

Armored infantry carriers, also known as armored fighting vehicles (AFV) are normally divided into two types: armored personnel carriers (APC) and infantry fighting vehicles (IFV). In both types, a small crew of two or three soldiers stay with the AFV while a dismount team of five or more soldiers can conduct missions on foot. Normally, most AFVs carry a total of ten soldiers, but some AFVs can carry more while others less. The difference between the APC and the IFV is the APC is a “battle taxi” that dismounts the soldiers outside of direct fire range while the IFV is designed to fight with soldiers onboard to and through the objective. To qualify as an IFV, the vehicle must be able to carry a team or squad; contain enough armor to protect the occupants from light machine guns; feature a medium cannon or automatic grenade launcher (AGL) that can defeat enemy armor vehicles; shoot on the move; possess the mobility to stay with tanks while traveling on roads or across country. Many manufacturers call their vehicles various names to make them sound like an IFV, but are not. The addition of a medium cannon to an APC does not make it an AFV unless it possesses the other characteristics. Some AFVs may be dropped from the air to be used by paratroopers on the ground. Some sources will describe a vehicle as a medium armored vehicle (MAV) or a heavy armored vehicle (HAV). The term MAV will not be used in this chapter and HAVs are often AFVs built on the same track system as a tank so they can stay up with the armor. The term heavy infantry fighting vehicle (HIFV) or heavy armored personnel carrier (HAPC) refers to the vehicles protection capability, not the vehicle’s weight. For information on HAVs mounted with some type of cannon, see Chapter 4.

AFVs normally are differentiated based on three categories: mobility, survivability, and lethality. Some AFVs travel on wheels while others travel on tracks. While not a necessity, most IFVs operate on tracks in order to travel the same terrain as tanks as the tracks more evenly distribute the vehicle’s weight. Wheeled vehicles are more likely to succumb to mobility kills than tracked vehicles as tires are susceptible to punctures. Two flat tires on the same side of the vehicle may bring the vehicle to a complete stop. Survivability is the ability of the vehicle to protect its occupants and remain operational. Survivability is based on the vehicle’s armor thickness, type (modern such as reactive armor), and style (slope). Adding armor to an AFV may reduce its mobility and creates a dilemma between survivability versus mobility. Lethality is based upon the AFV’s weapon systems and the weapons’ ability to penetrate other vehicles’ armor. Increasing the size of a main gun on a vehicle, however, often reduces its mobility. Some AFVs may feature a turret, 1-man or 2-man, but others will not. AFVs often operate auxiliary weapons such as coaxial mounted machine guns (fire in the same direction as the main gun), turret-mounted machine guns, AD machine guns, or an AGL.

Many infantry units also field FSVs featuring air defense (AD), anti-tank (AT) weapons, or mortars to guard their formations against aerial or armor threats. These vehicles may be used by chemical detection teams, field artillery forward observer teams, or Many of the AT systems are discussed in Chapter 5. The OPFOR may use civilian four-wheeled drive vehicles, sport utility vehicles, or commercial vans adapted for military roles. This chapter has been reordered to put vehicles with similar characteristics together.

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Selection Matrix for Infantry Carriers in a Military Force: Facts which impact the selection of the right vehicle for use in a military force may vary based on budget constraints, industrial base limitations, or political-military-industrial alliances. The following table offers engineering and employment considerations for use in selecting vehicles. An OPFOR squad is 9 to 10 personnel, counting the vehicle crew. Team size is 3 to 4, counting the vehicle crew. Infantry in this context includes SOF, insurgents, criminals and any other maneuver forces.

Factor	Tracked IFV	Wheeled IFV	Tracked APC	Wheeled APC	Light Wheeled APC	Armored Tactical Utility Vehicle	Light Strike Vehicle
Role	Fight with Squad onboard/ dismount; provide lethal fires	Fight with Squad onboard/ dismount; provide lethal fires	Carry Squad to dismount point; give covering fire	Carry Squad to dismount point; give covering fire	Carry Squad to dismount point; provide fire protection	Team carrier and multi-role functions; fire protection	Team carrier and multi-role functions; fire protection
Costs (1-10 with 10 being high)	9 to 10	8 to 10	3 to 5	4 to 7	1 to 3	1 to 3	1 to 3
Weight (mt)	@ 20 to 35	@ 20 to 25	@ 11 to 13	@ 10 to 15	@ 6 to 8	@ 4	@ 1.5
Time Deploy & Movement	Fast dash; slow over distance	Slow dash; fast over distance	Fast dash, slow over distance	Medium dash; fast over distance	Medium dash; fast over distance	Medium dash; fast over distance	Fast dash; fast over distance
Terrain	Good off-road; most swim	Poor off-road; some swim	Good off-road; all swim	Fair off-road; all swim	Medium off-road; most swim	Good off-road; most swim/high ford	Good off-road; most high ford

Threat to Vehicle (Frontal Protection)	Aircraft, AFV, AT weapon, mine/IED, artillery, flame, some obstacles 20 mm rd	Same as left; 5.56+mm MG to tires, obstacles 14.5 mm rd	Same as left; some obstacles 12.7 mm rd	Same as left; 5.56+ mm MG to tires; many obstacles 12.7 mm rd	Same as left, some obstacles 7.62 mm rd	Same as left; a few obstacles 7.62 mm rd	Same as left; almost no obstacles 5.56 mm rd
Targets for On-Board Weapons	All targets; 30-mm gun; ATGM; AGL; MG	All targets; 30-mm gun; ATGM; AGL; MG	Aircraft; LAV; 12.7 to 30 mm gun; MG; personnel	Aircraft; LAV; 12.7 to 30 mm gun; MG; personnel	Aircraft; LAV; 12.7 gun; MG; personnel	Aircraft; LAV; 7.62 to 12.7 gun; MG; personnel	Aircraft; LAV; 7.62 to 12.7 gun; MG; personnel
Support Required	High fuel use; load limits for aircraft	Medium fuel use; load limits for aircraft	Low fuel use; most aircraft loadable	Low fuel use; most aircraft loadable	Low fuel use; most aircraft loadable	Low fuel use; most aircraft loadable	Low fuel use; most aircraft loadable
Social Impact	Road size; noise; maneuver damage	Road size; block traffic if stuck	Road size; road noise	Road size; block traffic if stuck	No major	No major	No major
Example	BMP-2M	BTR-90M	Type 85	BTR-80A	Otokar Cobra	VBL	Spider

FRENCH INFANTRY FIGHTING VEHICLE AMX-10P



AMX-10P

SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative designations:	INA	Name:	GIAT M693 (F2) Main Gun
Date of introduction:	1973	Caliber/length:	20-mm
Proliferation:	1091+ vehicles/at least 7 countries	Type:	Automatic Cannon
Description:	IFV with exit doors in the rear with space for 8 soldiers	Ammo:	APDS-T/API-T: 260 Rounds HI/HEI-T: 500 Rounds
Crew:	3 (driver, commander, gunner)	Maximum Effective Range:	AP: 1200 m HE: 2000 m
Combat weight (mt):	14.5	Armor penetration:	INA
Chassis length overall (m):	5.8	Muzzle velocity (m/s):	APDS: 1250 HE: 1050
Height overall (m):	2.57	Name:	Coaxial
Width overall (m):	2.78	Caliber/length:	7.62-mm
Ground pressure (kg/cm²):	.53	Type:	Machine Gun
Automotive performance:	Renault HS-115 Engine	Ammo:	Tracer, AP, API, Incendiary: 2000 Rounds
Engine type:	8.2 liter liquid-cooled, turbo-charged, V-8 diesel	Maximum Effective Range:	~ 600 m

Cruising range (km):	600	Armor penetration:	INA
Speed (km/h):	Max road: 40.4 Max off-road: INA Average cross-country: INA Max swim: 7	Muzzle velocity (m/s):	~ 830
Fording depths (m):	Amphibious	Name:	Milan-2
Radio:	INA	Caliber/length:	115-mm
Protection:		Type:	ATGM
Armor, turret front (mm):	12.7-mm	Ammo:	Tandem HEAT
Applique armor (mm):	N/A	Maximum Effective Range:	< 3000 m
Explosive reactive armor(mm):	Available	Armor penetration:	INA
Active Protection System:	N/A	Muzzle velocity (m/s):	200
Self-entrenching blade:	No	VARIANTS	SPECIFICATIONS
NBC protection system:	Yes	AMX-10P	Variant profiled with Milan-2
Smoke equipment:	4 smoke grenade launchers	AMX-10P/Milan	ATGM launcher vehicle with 2 launchers
Survivability equipment:	INA	AMX/HOT	ATGM launcher vehicle with 2-man Lancelot turret with 4 HOT launchers & 14 reloads
VARIANTS	SPECIFICATIONS	AMX-10 TM	Mortar carrier with 1-man Toucan I turret towing 120-mm RT-61 mortar (60 rounds)
AMX-10 Ambulance	Unarmed variant with air condition for 3 litter or 1 litter/4 ambulatory casualties	AMX-10P w/ 120-mm mortar	Prototype w/o Toucan turret & 120-mm mortar replaces troop compartment
AMX-10 ECH	Armored repair vehicle with 6000 kg extensible jib crane & Toucan I turret	AMX-10P Marine	Improved swim variant with 12.7 machine gun, 25-mm cannon or a 90-mm gun
AMX-SAO	Battlefield observation vehicle with a 7.62-mm machine gun ILO the Toucan ** turret	AMX-10 PC	Command variant with command stations for 2 staff and 2 radio operators
AMX-10 RATAC	Artillery surveillance & fire-control radar vehicle	AMX-10 SAT	AMX-10 PC w/ specialized navigation equipment
AMX-10 RAV	Artillery resupply vehicle, but never produced	AMX-10 RAC	AMX-10 RC chassis with 105-mm gun
AMX-10 TMC-81	Prototype with a CL-81 81-mm smoothbore gun (118 rounds)	AMX-10 PAC 90	Fire support/AT variant with GIAT 90-mm gun (30 rounds)
AMX-10 VOA	Artillery observation vehicle with a low profile 2-man turret ILO of the Toucan turret	AMX-10 RC	Wheeled (6 X 6) variant fire support vehicle with 90-mm gun
NOTES SOURCES: 2014 WEG AND MILITARY PERISCOPE; FRENCH SNPE ERA KIT & OTHERS AVAILABLE FOR USE ON THE AMX-10P. DURING DISMOUNTED TROOP MOVEMENT, ERA WOULD BE A HAZARD. PASSIVE ARMOR IS MORE LIKELY			

GERMAN INFANTRY FIGHTING VEHICLE MARDER 1A3



Marder 1

SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative designations:	See variants	Name:	Mk 20 Rh202
Date of introduction:	1971	Caliber/length:	20-mm
Proliferation:	689+/at least 3 countries	Type:	Automatic Cannon
Description:	IFV with exit doors in the rear with space for 6 soldiers; 2 firing ports on both sides of the vehicle	Ammo:	1250 Rounds: API-T, APDS-T HEI, HEI-T, CAN
Crew:	3 (driver, commander, gunner, but 1 can dismount with squad)	Maximum Effective Range:	2000 m
Combat weight (mt):	35 (29.2 for earlier versions)	Armor penetration:	INA
Chassis length overall (m):	6.88	Muzzle velocity (m/s):	APDS-T: 1150 m API-T: 1100 m CAN: 1055 m HEI, HEI-T: 1045 m
Height overall (m):	3.02	Name:	Turret Coaxial
Width overall (m):	3.38	Caliber/length:	7.62-mm
Ground pressure (kg/cm²):	0.94	Type:	MG3 Machine Gun
Automotive performance:	MTU 833	Ammo:	Tracer, AP: 5000 Rounds
Engine type:	Ea-500, 22.4-liter, liquid-cooled, turbo-charged V-6 diesel	Maximum Effective Range:	1500 m
Cruising range (km):	500	Armor penetration:	INA
Speed (km/h):	Max road: 75 Max off-road: 65 Average cross-country: 35	Muzzle velocity (m/s):	~ 820

	Max Swim: N/A		
Fording depths (m):	1.5/2.0 with preparation	Name:	Milan, Milan-2, Milan-3
Radio:	INA	Caliber/length:	115-mm
Protection:		Type:	ATGM
Armor, turret front (mm):	Against 30-mm rounds	Ammo:	Tandem HEAT
Applique armor (mm):	Standard	Maximum Effective Range:	< 3000 m
Explosive reactive armor(mm):	Brenus ERA available	Armor penetration:	INA
Active Protection System:	INA	Muzzle velocity (m/s):	200
Self-entrenching blade:	Yes	VARIANTS	SPECIFICATIONS
NBC protection system:	Collective	Marder 1	Original variant with a rear 7.62 machine gun; most are upgraded or no longer in service
Smoke equipment:	6 Smoke grenade launchers	Marder A1(+)	Fully upgraded vehicle; some with thermal pointers, but others only prepared for it
Survivability equipment:	Mineclearing equipment	Marder 1A1A	No passive vision equipment
VARIANTS	SPECIFICATIONS	Marder 1A1A2	A1 turret and A2 chassis with a PERI-Z59 sight
TAM (Tanque Argentia Mediano)	Argentina built tank based on the Marder chassis	Marder 1A1A3	1A1 with SEM 80/90 radios
VCTP (Vehiculo de Combate TRansporte de Personal)	Argentina built vehicle with simplified 20-mm gun turret, 3 firing ports, 2 large roof hatches, & can carry 12 troops	Marder 1A1A4	1A1A with SEM 80/90 radios
Radarpanzer TUR	Marder chassis with a Siemens MPDR 3002S E-band air surveillance radar system	Marder 1A1A5	A1A2 with SEM 80/90 radios
Roland Air Defense Vehicle	2 Roland missiles ready to launch with 8 more in the hull	Marder 1A2	Upgrade beg in 1983 includes thermal-imaging and the removal of the rear machine gun mount
Marder 2/KUKA M12 IFV/ Schutzenpanzer 2000 IFV	35-mm cannon equipped Marder, but program was canceled	Marder 1A3	Converted 1A1s and 1A2s into the A3 configuration with passive armor and the movement of the 7.62-mm machine gun to the extreme left of the turret in a separate mount
		Marder 1A4	1A3 with SEM93 radio system
		Marder 1A5	Extra mine-protection on the underneath side
		Marder 1A5A1	AC and electronic jammers added for Afghanistan

NOTES

SOURCES: 2014 WEG AND MILITARY PERISCOPE; EARLIER VERSIONS HAD A SLIGHTLY LOWER FIGURES FOR THE PROFILE, HEIGHT, WIDTH, AND GROUND PRESSURE. ERA KITS AVAILABLE, BUT WOULD BE A HAZARD DURING DISMOUNTED OPERATIONS. MILAN-3 COUNTERMEASURES ONLY FUNCITON WITH THE MILAN-3 LAUNCHER EVEN THOUGH ALL MILAN LAUNCHERS CAN FIRE ALL MILAN ATGMS.

BRITISH INFANTRY FIGHTING VEHICLE WARRIOR



Warrior

SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative designations:	FV 511, MCV-80, Fahris ACV	Name:	L21 Rarden
Date of introduction:	1988	Caliber/length:	30-mm
Proliferation:	1040+/at least 3 countries	Type:	Automatic Cannon
Description:	IFV with exit doors in the rear with space for 7 soldiers; no firing ports	Ammo:	228 Rounds: APDS-T, APSE-T, HEI-T
Crew:	3 (driver, commander, gunner)	Maximum Effective Range:	1100 m (Day)
Combat weight (mt):	24	Armor penetration:	INA
Chassis length overall (m):	6.34	Muzzle velocity (m/s):	INA
Height overall (m):	2.79	Name:	Turret Coaxial
Width overall (m):	3.03	Caliber/length:	7.62-mm
Ground pressure (kg/cm^2):	0.65	Type:	L94A1 chain gun
Automotive performance:	Rolls Royce	Ammo:	Ball, Ball-T: 2200 rounds
Engine type:	CV8 TCA 17.41-liter air-cooled, turbo-charged V-8 diesel	Maximum Effective Range:	~1500 m
Cruising range (km):	410 (at 60 kmh on flat terrain)	Armor penetration:	INA
Speed (km/h):	Max road: 75 Max off-road: 48	Muzzle velocity (m/s):	~ 862

	Average cross-country: INA Max Swim: N/A		
Fording depths (m):	1.3 unprepared	VARIANTS	SPECIFICATIONS
Radio:	INA	Infantry Section Vehicle	Basic version with 30-mm Rarden cannon, 7.62-mm chain gun with bolt-on armor
Protection:		Desert Warrior (Fahris)	AC and 25-mm chain gun for desert warfare
Armor, turret front (mm):	Against 14.5-mm rounds	FV514 Mechanized Artillery Observation Vehicle	Dummy cannon, Battlefield Artillery Target Engagement System (BATES) computers, GPS, & laser designator
Applique armor (mm):	Available (see variants)	Desert Warrior for Kuwait	Warrior with a Delco LAV-25 2-man turret with M242 chain gun, 7.62-mm coaxial machine gun, & a single Hughes ATGM missile launcher
Explosive reactive armor(mm):	No	Reconnaissance Desert Warrior	Designed to operate in the front with a 25-mm M242 chain gun, 7.62-mm coaxial machine gun, & a single Hughes ATGM missile launcher
Active Protection System:	No	Arctic Warrior	Desert Warrior with a high-performance heater instead of air conditioning
Self-entrenching blade:	No	Command Vehicle	Battalion, Company, and Platoon versions with different radios and 30-mm Rarden cannon
Yes	Collective	Battery Command Vehicle	For British Royal Artillery commanders
Smoke equipment:	4 Smoke grenade launchers	Warrior with Milan Launcher	Milan ATGM launcher mounted on right side of the turret
Survivability equipment: All Warriors can be equipped with mine-clearing equipment	INA	Mortar Vehicle	Rear passenger compartment replace with space for an 81-mm or 120-mm mortar; turret replace with a cupola with a 7.62-mm machine gun
		Warrior Engineer Vehicle	Features a Thorn EMI Ranger mine-laying system and 7.62-mm machine gun
		TRIGAT Warrior	Fitted with hydraulic jackknife AT missile launcher with 16 missiles
		FV512 Warrior Mechanized Combat Repair Vehicle (MCRV)	Similar to the MRV(R) but w/o the winch or earth anchor; 7.62-mm chain gun in turret
		FV513 Warrior Mechanized Recovery Vehicle (Repair) (MRV))	6500 kg capacity crane, 20000 kg winch, earth anchor, air compressor, and 7.62-mm L94A1 chain gun
NOTES SOURCES: 2014 WEG AND MILITARY PERISCOPE. VARIANTS AVAILABLE BUT NOT IN PRODUCTION INCLUDE A LIGHT TANK, ATGM, ANTI-AIRCRAFT, MLRS, AND A 90-MM GUN.			

RUSSIAN AIRBORNE INFANTRY FIGHTING VEHICLE BMD-1/BMD-2



BMD-1



BMD-2

SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative designations:	See variants	Name:	2A28 /Grom
Date of introduction:	1969	Caliber/length:	73-mm
Proliferation:	1081+/at least 8 countries	Type:	Smoothbore Gun with automatic loader
Description:	Air droppable IFV with exit doors in the rear with space for 5 soldiers; 1 firing port on each side; 1 firing port in left rear door	Ammo:	40 Rounds: HEAT-FS: 16 (Est) HE: 24 (Est)
Crew:	2 (driver, commander)	Maximum Effective Range:	HEAT-FS: 1300 m (600 on the move & 800-1000 m at night)

			HE: 1300 m (600 m on the move & 800-1000 m at night)
Combat weight (mt): (BMD-2 figures in parenthesis)	7.5 for BMD-1 (8.0)	Armor penetration:	HEAT-FS (PG-15VNT): 550-700 HEAT-FS (PG-15): 335 HE (OGBG1): INA (damage or defeat an APC) HE (OG-15VM) INA (damage or defeat an APC)
Chassis length overall (m):	5.4 (5.5)	Muzzle velocity (m/s):	700
Height overall (m):	1.97 (2.18)	Name:	ATGM
Width overall (m):	2.63 (2.7)	Caliber/length:	125-mm
Ground pressure (kg/cm^2):	0.57 (0.50)	Type:	AT-3 Sagger or AT-4 Spigot
Automotive performance:	Type 5D-20	Ammo:	MCLOS: 3 rounds
Engine type:	Liquid-cooled, V-6 diesel	Maximum Effective Range:	3000 m (minimum 500 m)
Cruising range (km):	320 (500)	Armor penetration:	INA
Speed (km/h):	Max road: 70 (60) Max off-road: 40 (INA) Average cross-country: INA Max Swim: 10 (10)	Muzzle velocity (m/s):	INA
Fording depths (m):	Amphibious	Name:	Coaxial
Radio:	INA	Caliber/length:	7.62-mm
Protection:		Type:	PKT machine gun
Armor, turret front (mm):	23	Ammo:	Ball, Tracer; 2000
Applique armor (mm):	Available	Maximum Effective Range:	1300 m (Day); 400-500 (on the move); 800 (Night)
Explosive reactive armor(mm):	Available	Armor penetration:	INA
Active Protection System:	N/A	Muzzle velocity (m/s):	825
Self-entrenching blade:	N/A	Name:	Bow
NBC protection system:	Collective	Caliber/length:	7.62-mm
Smoke equipment:	VEESS	Type:	2 PKT machine guns
Survivability equipment:	INA	Ammo:	Ball, Tracer; 4000
		Maximum Effective Range:	1000 m
		Armor penetration:	INA
		Muzzle velocity (m/s):	825
		VARIANTS	SPECIFICATIONS
		BMD-1M	Improved ventilation & different road wheels
		BMD-1P Airborne Combat Vehicle	Modified for 2-man crew & 6 passengers; AT-4 Spigot instead of the AT-3 Sagger
		BMD-1 82-MM Mortar Carrier	An 82-mm mortar is mounted rearward in the troop compartment

NOTES

SOURCES: 2014 WEG AND MILITARY PERISCOPE; VEHICLE CAN BE LANDED WITH TROOPS ON BOARD. FRENCH SNPE ERA AVAILABLE, BUT HAZARD TO DISMOUNTED TROOPS IN IMMEDIATE VICINITY. OTHER OPTIONS AVAILABLE INCLUDE A B30 TURRENT (2A42 30-MM GUN, 7.62-MM COAX MG & 9P135M LAUNCHER FOR AT-5/5B ATGM), AGS-17 30-MM AUTOMATIC GRENADE LAUNCHER, SPALL LINERS, AIR CONDITIONING, & MORE POWERFUL ENGINE.

RUSSIAN AIRBORNE INFANTRY FIGHTING VEHICLE BTR-D (BMD 1979)



BTR-ZD

SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative designations:	See variants	Name:	PKT
Date of introduction:	1969	Caliber/length:	7.62-mm
Proliferation:	1081+/at least 8 countries (only some of these are BTR-D vehicles)	Type:	2 PKT machine guns
Description:	Air droppable IFV with exit doors in the rear with space for 10 soldiers; 2 firing ports on each side; 1 firing port in left rear door	Ammo:	Light Ball, Ball-T; Heavy Ball, API, API-T, Incendiary: 2000 rounds
Crew:	3 (driver, gunner, commander)	Maximum Effective Range:	1000 m (day); 400-500 on the move; INA (night)
Combat weight (mt):	6.7	Armor penetration:	8 (RHA) at 500 m
Chassis length overall (m):	5.88	Muzzle velocity (m/s):	825
Height overall (m):	1.67	VARIANTS	SPECIFICATIONS
Width overall (m):	2.63	1V119 Spektr	1V 118 Reostat without the Tall Mike radar system
Ground pressure (kg/cm²):	0.50	S0-120 (2S9 Anona) SP Howitzer/Mortar	Self-propelled howitzer/ mortar built on same chassis
Automotive performance:	Type 5D-20	BMD-KShM	Command vehicle with 30-mm AG17 AGL & folding antenna; no firing ports or smoke dischargers
Engine type:	Liquid-cooled, V-6 diesel	BRehM-D Repair & Recovery Vehicle	BTR-D chassis with recovery crane, winch, dozer blade, &

			welding system to recover BMD vehicles; 7.62-mm machine gun
Cruising range (km):	500	BTR-RD Robot (BMD-1D)	AT variant with the AT-5 Spandrel (9K113 Konkurs) ATGM launch rail, 2 bow-mounted 7.62-mm machine guns with a AT-4/AT-5 launcher available for dismount use only
Speed (km/h):	Max road: 61 Max off-road: 35 Average cross-country: INA Max Swim: 10	BTR-ZD (BMD 1979)	AD variant with with twin 23-mm ZU-23 AA gun
Fording depths (m):	Amphibious	BMD-1 with Schmel-1 RPV (Bumble Bee-1)	Second generation battlefield surveillance UAV launcher system
Radio:	INA	BMD-OBD Communications System	BTR-D chassis with an R-440 satellite commo system
Protection:		1V 118 Reostat	Observation vehicle for the 2S9 120-mm SP howitzer w/o the turret
Armor, turret front (mm):	Anti-bullet (7.62-mm)		
Applique armor (mm):	No		
Explosive reactive armor(mm):	No		
Active Protection System:	No		
Self-entrenching blade:	No		
NBC protection system:	Yes		
Smoke equipment:	V4 Forward firing smoke grenade launchers; VEESS		
Survivability equipment:	INA		

NOTES

SOURCES: 2014 WEG AND MILITARY PERISCOPE; THIS IS THE BMD-1 WITH AN ADDITIONAL ROAD WHEEL, THE TURRENT REMOVED, A RAISED HATCH AREA, AND AN EXTENDED PASSENGER COMPARTMENT TO HOLD MORE SOLDIERS. OPTIONS INCLUDE AN AGS-17 30-MM AUTOMATIC GRENADE LAUNCHER IN THE REAR OR A KILIVER TURRET (30-MM GUN, 7.62-MM COAXIAL MACHINE GUN, THERMAL SIGHTS, SUPERIOR DAY SIGHTS, AND 4 KORNET ATGM LAUNCHERS). SOME ANALYSTS CONSIDER THIS VEHICLE MORE AN APC THAN AN IFV.

RUSSIAN AIRBORNE INFANTRY FIGHTING VEHICLE BMD-3/BMD-4



BMD-3



BMD-4

SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative designations:	See variants	Name:	2A42
Date of introduction:	1990	Caliber/length:	30-mm
Proliferation:	830+/at least 7 countries	Type:	Automatic Gun
Description:	Air droppable IFV with exit doors in the rear with space for 4 soldiers; if commander dismounts, it becomes 5; 2 firing ports on each side	Ammo:	860 rounds: AP-T, APDS-T, APFSDS: 120-160 HEI-T, Frag-HE: 240-340
Crew:	3 (driver, gunner, commander)	Maximum Effective Range:	1000 m (day); 400-500 on the move; INA (night)
Combat weight (mt):	13.2	Armor penetration:	8 (RHA) at 500 m
Chassis length overall (m):	6.36	Muzzle velocity (m/s):	825
Height overall (m):	2.25	Name:	AT-5B (Konkurs-M/9P135M2)
Width overall (m):	3.13	Caliber/length:	135-mm
Ground pressure (kg/cm²):	0.54	Type:	ATGM-SACLOS

Automotive performance:	WV-60-2	Ammo:	4 (1 ready & 3 stowed)
Engine type:	Water-cooled diesel	Maximum Effective Range:	4000 m (Minimum 70 m)
Cruising range (km):	500	Armor penetration:	750-800-mm (RHA)
Speed (km/h):	Max road: 44 Max off-road: 45 Average cross-country: INA Max Swim: 10	Muzzle velocity (m/s):	200
Fording depths (m):	Amphibious	Name:	AGS-17
Radio:	INA	Caliber/length:	30-mm
Protection:		Type:	Automatic grenade launcher
Armor, turret front (mm):	Anti-bullet (7.62-mm)	Ammo:	551 rounds
Applique armor (mm):	No	Maximum Effective Range:	1700 m
Explosive reactive armor(mm):	Available	Armor penetration:	INA
Active Protection System:	No	Muzzle velocity (m/s):	185
Self-entrenching blade:	No	Name:	Turret coaxial
NBC protection system:	Collective	Caliber/length:	7.62
Smoke equipment:	6 Smoke grenade launchers; VESS	Type:	PKT machine gun
Survivability equipment:	Kmt-8 Plow or KMT-10 roller can be mounted on vehicle	Ammo:	Tracer, AP, API, Incendiary: 2000 Rounds
VARIANTS	SPECIFICATIONS	Maximum Effective Range:	2000 m (Day); 1000 (Night)
BMD-3M	100-mm 2A70 gun, 30-mm cannon, & a 7.62-mm MG	Armor penetration:	INA
2S25 SPATG	Self-propelled anti-tank gun mounted on a BMD-3 chassis	Muzzle velocity (m/s):	~ 830
RKhM-5	Chemical reconnaissance vehicle on BMD-3 chassis	Name:	RPK-74
BMD-4	100-mm 2A70 cannon, 30-mm 2A72 30-mm auto cannon, 2 7.62-mm PKT machine guns; 9M117 Arkan AT or 9K113 Konkurs ATGM; holds 5 dismount troops	Caliber/length:	5.45-mm
BMD-4M	Holds 6 dismounts to bring total in vehicle to 9 (with crew) besides improvements in BMD-3M & BMD-4	Type:	Light machine gun
		Ammo:	2325 rounds
		Maximum Effective Range:	Ball, tracer: 1700 m
		Armor penetration:	INA
		Muzzle velocity (m/s):	960

NOTES

SOURCES: 2014 WEG AND MILITARY PERISCOPE. FRENCH SNPE ERA OR OTHER KITS AVAILABLE, BUT THEIR OPERATION DURING DISMOUNTED TROOP MOVEMENT COULD BE HAZARDOUS. ADDED ERA WEIGHT AFFECTS THE VEHICLE'S SWIM CAPABILITY. PASSIVE ARMOR IS MORE LIKELY AND ONES USED FOR AMPHIBIOUS OPERATIONS WILL LIKE NOT HAVE ANY EXTRA ARMOR. OPTIONS AVAILABLE INCLUDE SPALL LINERS, AIR CONDITIONING, & A MORE POWERFUL ENGINE. OTHER TERMAL SIGHTS ARE AVAILABLE FOR THE ATGM LAUNCHER. INDIAN FLAME-V ADAPTER KITS PERMITS THE BMD-3 TO FIRE THE MILAN, MILAN-2, AND MILAN-3 ATGMS.

RUSSIAN INFANTRY FIGHTING VEHICLE BMP-1



BMP-1

SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative designations:	BMP Model 1970, Korshun	Name:	2A28 /Grom
Date of introduction:	1970	Caliber/length:	73-mm
Proliferation:	10151+/at least 44 countries	Type:	Smoothbore Gun with automatic loader
Description:	IFV with exit doors in the rear with space for 8 soldiers; 4 firing ports on each side; 1 firing port in left rear door	Ammo:	40 Rounds: HEAT-FS: 16 (Est) HE: 24 (Est)
Crew:	3 (driver, commander, gunner)	Maximum Effective Range:	HEAT-FS: 1300 m (600 on the move & 800-1000 m at night) HE: 1300 m (600 m on the move & 800-1000 m at night)
Combat weight (mt):	13.5	Armor penetration:	HEAT-FS (PG-15VNT): 550-700 HEAT-FS (PG-15): 335 HE (OGBG1): INA (damage or defeat an APC) HE (OG-15VM) INA (damage or defeat an APC)
Chassis length overall (m):	6.74	Muzzle velocity (m/s):	700
Height overall (m):	2.15	Name:	ATGM
Width overall (m):	2.94	Caliber/length:	125-mm
Ground pressure (kg/cm²):	0.60	Type:	AT-3 Sagger
Automotive performance:	UTD-20	Ammo:	MCLOS: 3 rounds
Engine type:	Water-cooled, V-6 diesel	Maximum Effective Range:	3000 m (minimum 500 m)
Cruising range (km):	600	Armor penetration:	INA
Speed (km/h):	Max road: 65 Max off-road: 40-45 Average cross-country: INA Max Swim: 7	Muzzle velocity (m/s):	INA
Fording depths (m):	Amphibious	Name:	Turret coaxial
Radio:	INA	Caliber/length:	7.62
Protection:		Type:	PKT machine gun
Armor, turret front (mm):	19-23	Ammo:	Tracer, AP, API, Incendiary: 2000 Rounds

Applique armor (mm):	Available	Maximum Effective Range:	1300 m (Day); 400-500 (on the move); 800 (Night)
Explosive reactive armor(mm):	Available	Armor penetration:	INA
Active Protection System:	No	Muzzle velocity (m/s):	~ 830
Self-entrenching blade:	No	VARIANTS	SPECIFICATIONS
NBC protection system:	Collective	BMP-1 Model 1970	Principal longer (200-mm) model with better NBC gear
Smoke equipment:	VEESS	BMP-1 Ambulance (Iraq)	Evacuate wounded
Survivability equipment:	INA	BMP-1M	Kliver turret & drop down gate
VARIANTS	SPECIFICATIONS	Type 86/WZ-501 (China)	Chinese BMP-1 IFV
BMP-1 Finnish variant	East German vehicles with autoloaders removed	BMP-1 KShM (Command Vehicle)	Communication equipment similar to BMD KShM variant
BMP-1 with Poyaud engine (Egypt)	150 with replaced 10.47-liter Poyaud 6-cylinder engine	BMP-1G ICV	AT-4/AT-5 ATGM & 30-mm AGS-17 AGL
BMP-1 with applique armor (Iraq)	Armor added to resist 12.7-mm & 14.5-mm armor-piercing shells at 200 m	BMP-1K (BMP 1974)	Command variant with additional radios, sealed right-side firing ports, & antenna
BMP-1A1 Ost	In 1990, Germany created more space (6 passengers) & removed the automatic loader	BMP-1 with Soviet modifications in Afghanistan	Applique armor, AT-4 ATGM mount; some with AGS-17 30-mm AGL
BMP-1 with CERAWA armor (Poland)	CERAWA ERA on the glacis, hull, & turret front	BMP-IRM ("Zhuk"-Beetle)	Engineer recon vehicle with front mine claws; 1 MG only
OT-90 (Czech Republic)	OT-64 1-man turret with 14.5-mm & 7.62-mm machine guns	BMP-1 with mine plow	KMT-8 or KMT-10 mine-clearing plows attached
BPzV (Czech Republic)	Recon with Tall Mike radar	MP-31	Modernized command vehicle
		BMP-R (BMP M1976)	Recon vehicle with larger rear hatches & 2-man turret
DP-90 (Czech Republic)	0T-90 maintenance variant	BRM-1/BRM-1K Reconnaissance	BMP-R with a GS-12 Tall Mike radar ILO AT-3 Sagger (see Chapter 1)
MU-90 (Czech Republic)	Turretless mine-laying OT-90	BREM-2	Light recovery vehicle w/crane
		BMP-40	Larger turret; carries 6 soldiers, prototype model only
MLI-84 (Romania)	Larger & heavier w/ 12.7-mm machine gun	PRP-3/PRP-4 (Radar)	Artillery recon vehicle with 7.62 MG ILO 73-mm cannon
Pansarbandvgn 501 (Pbv 501 (Sweden)	East German vehicles to mechanized Swedish infantry	VP-90 (Czech Republic)	Recon with OT-64 turret; 14.5-mm & 7.62-mm MGs
BREM-4 recovery vehicle	No turret & crane (Czech version is the VPV)	SVO Mineclearer (Czech Republic)	Turretless BMP-1 with 24 245-mm explosive rockets
BRM-23 (Bulgaria)	Recon with 23-mm cannon	BMP-PP0	Training variant w/o turret
82-mm SP Automatic mortar (Hungary)	Vasilyek mortar ILO troop compartment	Snezka (Czech Republic)	Battlefield surveillance vehicle
		PRAM-S (Czech Republic)	SP 120-mm mortar carrier

NOTES

SOURCES: 2014 WEG AND MILITARY PERISCOPE. ORGINAL BMP BEGAN IN 1966 BUT DID NOT PERFORM SATISFACTORIALY UNTIL 1970. FRENCH SNPE ERA KIT & OTHERS ARE AVAILABLE FOR USE, BUT IS DANGEROUS WITH SOLDIERS DISMOUNT. OTHER OPTIONS INCLUDE IMPROVED TRACKS, SPALL LINERS, AIR CONDTIONING, SMOKE GRENADE LAUNCHERS, LASER WARNING RECIVERS, & A MORE POWERFUL ENGINE.

RUSSIAN INFANTRY FIGHTING VEHICLE BMP-1P



BMP-1P

SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative designations:	BWP-1 (Poland); see notes	Name:	2A28 /Grom
Date of introduction:	1974	Caliber/length:	73-mm
Proliferation:	At least 7 countries (part of the 10151 BMP-1s)	Type:	Smoothbore Gun with automatic loader
Description:	Improved version of the BMP-1 IFV with exit doors in the rear with space for 6 soldiers; 4 firing ports on each side; 1 firing port in left rear door	Ammo:	40 Rounds: HEAT-FS: 16 (Est) HE: 24 (Est)
Crew:	3 (driver, commander, gunner)	Maximum Effective Range:	HEAT-FS: 1300 m (600 on the move & 800-1000 m at night) HE: 1300 m (600 m on the move & 800-1000 m at night)
Combat weight (mt):	13.4	Armor penetration:	HEAT-FS (PG-15VNT): 550-700 HEAT-FS (PG-15): 335 HE (OGBG1): INA (damage or defeat an APC) HE (OG-15VM) INA (damage or defeat an APC)
Chassis length overall (m):	6.74	Muzzle velocity (m/s):	700
Height overall (m):	2.15	Name:	9P135M2
Width overall (m):	2.94	Caliber/length:	135-mm
Ground pressure (kg/cm²):	0.57	Type:	AT-4 Fagot; AT-4b Faktoriya; AT-5 Konkurs; AT-5B Konkurs-M

Automotive performance:	UTD-20	Ammo:	SACLOS, 4 Rounds
Engine type:	Water-cooled, V-6 diesel	Maximum Effective Range:	2000 m; 2500 m; 4000 m; 4000 m
Cruising range (km):	600	Armor penetration:	HEAT; 480 mm (RHA); 550 mm (RHA); 650 mm (RHA); 925 mm CE (RHA)
Speed (km/h):	Max road: 65 Max off-road: 40-45 Average cross-country: INA Max Swim: 7	Muzzle velocity (m/s):	186; 186; 200; 200
Fording depths (m):	Amphibious	Name:	Turret coaxial
Radio:	R-123 or R-173	Caliber/length:	7.62
Protection:		Type:	PKT machine gun
Armor, turret front (mm):	19-23	Ammo:	Tracer, AP, API, Incendiary: 2000 Rounds
Applique armor (mm):	No	Maximum Effective Range:	1300 m (Day); 400-500 (on the move); 800 (Night)
Explosive reactive armor(mm):	Available	Armor penetration:	INA
Active Protection System:	No	Muzzle velocity (m/s):	~ 830
Self-entrenching blade:	No	VARIANTS	SPECIFICATIONS
NBC protection system:	Collective	BMP-1P	One of the most widely field & copied IFV with an AT-4/5 ATGM ILO of the AT-3 launcher. This variant is the standard vehicle when the OPFOR requires a BMP-1. For Tier 4 portrayals, the ATGM is an AT-4. For a modernized OPFOR, use an AT-5B ATGM
Smoke equipment:	6 81-mm smoke grenade launchers, VEESS	BMP-1PG	BMP-1P with an AGS-17 30-mm automatic grenade launcher & other upgrades including thermal sights
Survivability equipment:	INA	BMP-1PK	BMP-1P command variant with additional R-126 & R-107 radio equipment; right side firing ports & telescopes are blocked & features a small telescoping antenna
		WZ 501/Type 86 (China)	China has built various BMP-1 variants over the years. Many are similar to the BMP-1P
		BVP-1 (Czech Republic)	Czech built BMP-1P
		BVP-1 ARV (Czech Republic)	BMP-1P with no turret & 1500 kg crane mounted in passenger compartment
		BWP-1 (Poland)	BMP-1P built in Poland

NOTES

SOURCES: 2014 WEG AND MILITARY PERISCOPE. A VARIETY OF UPGRADES ARE AVAILABLE: IMPROVED TRACKS, SPALL LINERS, AIR CONDITIONING, SMOKE GREANDER LAUNCHERS, LASER WARNING RECEIVERS, & MORE POWERFUL ENGINES. FRENCH SNPE ERA & OTHER KITS AREAVAILABLE, BUT ARE HAZARDOUS DURING DISMOUNTED OPERATIONS. ADDITONAL ARMOR MAY JEOPARDIZE AMPHIBIOUS CAPABILITY. KORTNET ATGM LAUNCHER CAN BE MOUNTED ON OTHER BMP-1 VARIANTS. RUSSIAN AGS-17 & AG-30 30-MM AUTOMATIC GRENADE LAUNCHERS ARE ALSO AVAILABLE. KEY LIMITATION FOR BMP-1S IS THE 1-MAN TURRET, BUT BMP-1S CAN BE UPGRADED TO 2-MAN TURRETS.

RUSSIAN INFANTRY FIGHTING VEHICLE BMP-2



BMP-2

SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative designations:	Yozh (Russia); Sarath (India); BVP-2 (Czech); ZVS PRAM-S SP Mortar System	Name:	2A42
Date of introduction:	1980	Caliber/length:	30-mm
Proliferation:	10903+/at least 29 countries	Type:	Dual-feed automatic cannon
Description:	Improved version of the BMP-1 IFV with exit doors in the rear with space for 7 soldiers instead of 8 for the BMP-1; 4 firing ports on left side; 3 firing ports on right side; 1 firing port in left rear door	Ammo:	500 Rounds: HEI-T; Frag-HE: 340 AP-T, APDS-T, APFSDS-T: 160
Crew:	3 (driver, commander, gunner)	Maximum Effective Range:	AP-T: 1500 m (Day); 1300 m (Night) APDS: 2000 m (Day); 1300 m (Night) APFSDS-T M929: 2000+ (Day); 1300 (Night) Frag-HE: 4000 m (Day); 1300 m (Night)
Combat weight (mt):	14.3	Armor penetration:	AP-T: 18 (RHA, 60° at 1500 m) APDS: 25 (RHA, 60° at 1500 m) APFSDS-T M929: 55 at 1000 m or 45 at 2000 m (RHA) Frag-HE: INA
Chassis length overall (m):	6.74	Muzzle velocity (m/s):	970
Height overall (m):	2.45	Name:	9P135M1 or 9P135M3
Width overall (m):	3.15	Caliber/length:	135-mm

Ground pressure (kg/cm²):	0.64	Type:	AT-5 Konkurs; AT-5B Konkurs-M; AT-4 Fagot (less likely; AT-4b Faktoriya (less likely)
Automotive performance:	UTD-20 or UTD-23	Ammo:	SACLOS, 7 Rounds
Engine type:	Turbo-charged, water-cooled, in-line 6-cylinder diesel	Maximum Effective Range:	4000 m; 4000 m; 2000 m; 2500 m
Cruising range (km):	600	Armor penetration:	HEAT; 650 mm (RHA); 925 mm CE (RHA); 480 mm (RHA); 550 mm (RHA)
Speed (km/h):	Max road: 65 Max off-road: 45-50 Average cross-country: 35 Max Swim: 7	Muzzle velocity (m/s):	200; 200; 186; 186
Fording depths (m):	Amphibious	Name:	Turret coaxial
Radio:	R-123M or R-173	Caliber/length:	7.62
Protection:		Type:	PKT machine gun
Armor, turret front (mm):	23-33	Ammo:	Tracer, AP, API, Incendiary: 2000 Rounds
Applique armor (mm):	On BMP-2D	Maximum Effective Range:	1000 m (Day); INA (Night)
Explosive reactive armor(mm):	Available	Armor penetration:	INA
Active Protection System:	No	Muzzle velocity (m/s):	~ 830
Self-entrenching blade:	No	VARIANTS	SPECIFICATIONS
NBC protection system:	PAZ automatic overpressure system	BMP-2K	Command variant with an additional radio & antenna
Smoke equipment:	6 smoke grenade launchers, VEESS	BMP-2D	Add-on armor, but cannot swim; seen in Afghanistan; mine plow available
Survivability equipment:	KMT-8 or KMT-10 Mine Plow available; Automatic fire extinguishing system	Improved BMP-2	Better 30-mm cannon stabilization, improved communications, but is no longer amphibious
VARIANTS	SPECIFICATIONS	BMP-2ZS	Loudspeakers for PSYOP operations
BMP-2E	Improved protection with 6-mm steel plates added and track skirts	BMP-2/LAHAT	Russia is testing this variant with an Israeli ATGM system for potential sale to a South American customer
BVP-2 (Czech)	Czech designation of the BMP-2	BMP-1U (Ukraine)	1-man overhead weapon station with 30-mm gun & AT-5 launcher option
ZVS PRAM-S 120-mm SP Mortar System (Czech)	120-mm breach-loaded mortar mounted on a BMP-2 chassis with 7 road wheels	BMP-23 (Bulgaria)	MT-LB chassis with a 23-mm auto-cannon using a BMP-2 type design, but possesses inferior lethality & protection
BMP-2 with mine plow	KMT-8 or KMT-10 mine plow, but limited to surfaced-laid mines or air—delivered scatterable mines	BMP-30 (Bulgaria)	BMP-2 turret on a heavier chassis (provides protection against 20-mm ammo) is similar to the BMP-2, but operates with 7 road wheels
Sarath Indian Combat Vehicle (India)	Locally produced BMP-2 with a number of variants available		

NOTES

SOURCES: 2014 WEG AND MILITARY PERISCOPE. MANY COUNTRIES HAVE UPGRADED THEIR OLDER BMP-1S WITH 23-MM, 25-MM, & 30-MM AUTOMATIC CANNONS REPLACING THE 73-MM GUN; SOME HAVE REPLACE THE 1-MAN BMP-1 TURRET WITH A 2-MAN TURRET THAT REQUIRES EXTENSIVE BODY WORK. OPTIONS AVAILABLE INCLUDE IMPROVED TRACKS, SPALL LINERS, AIR CONDITIONING, SMOKE GRENADE LAUNCHERS, LASER WARNING RECEIVERS, OR A MORE POWERFUL ENGINE. FRENCH SNPE ERA & OTHER KITS ARE AVIALBLE, BUT WOULD BE HAZARDOUS DURING DISMOUNTED OPERATIONS. THE KBP KVARTET 4-MISSILE FOR THE KORNET ATGM CAN BE MOUNTED ON THE BMP-1 OR BMP-2 CHASSIS. INDIAN FLAME-V ADAPTOR KITS PERMITS THE BMP-2 TO LAUNCH MILAN, MILAN-2, OR MILAN-3 ATGMS.

RUSSIAN INFANTRY FIGHTING VEHICLE BMP-2M & BMP-2M Berezhok



BMP-2M

SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative designations:	BMP-2M is an early BMP2 upgrade. This is an OPFOR Tier surrogate, with options.	Name:	2A42
Date of introduction:	1995	Caliber/length:	30-mm
Proliferation:	The BMP-2M is used by at least 1 country & has been marketed since 1995. Upgrades are planned in 3 countries. The Berezhok is contracted for extport to 2 countries. It is part of the 10903+ BMP-2s in operation in at least 29 countries	Type:	Dual-feed automatic cannon
Description:	Improved version of the BMP-1 IFV with exit doors in the rear with space for 7 soldiers. 4 firing ports on left side; 3 firing ports on right side; 1 firing port in left rear door	Ammo:	500 Rounds: HEI-T; Frag-HE: 340 APFSDS-T: 160 FAPDS-T (frangible-T) can be fired Earlier 30x165 ammunition can also be fired

Crew:	3 (driver, commander, gunner)	Maximum Effective Range:	APFSDS-T M929: 2500 m (Day & Night) Frag-HE: 4000 m (Day); 2500 m (Night)
Combat weight (mt):	14.3	Armor penetration:	APFSDS-T M929: 55 at 1000 m or 45 at 2000 m (RHA) Frag-HE: INA
Chassis length overall (m):	6.74	Muzzle velocity (m/s):	970
Height overall (m):	2.45	Name:	9M133
Width overall (m):	3.15	Caliber/length:	152-mm
Ground pressure (kg/cm^2):	0.64	Type:	Kornet-LR or AT-5B (BMP-2M Improved) AT-5B/Konkurs-M (BMP-2M)
Automotive performance:	UTD-23	Ammo:	SACLOS, 6 (Kornet); 4 (AT-5B)
Engine type:	Turbo-supercharged diesel engine	Maximum Effective Range:	Kornet-LR: 5500 m (Day); 3500 m (Night); 100 m (Minimum Range)
Cruising range (km):	600	Armor penetration:	HEAT; 1100 mm (Kornet-LR); 925 mm (AT-5B) (RHA)
Speed (km/h):	Max road: 65+ Max off-road: 45+ Average cross-country: 35+ Max Swim: 7	Muzzle velocity (m/s):	550
Fording depths (m):	Amphibious	Name:	Turret coaxial (side)
Radio:	R-123M or R-173	Caliber/length:	7.62
Protection:		Type:	PKT machine gun
Armor, turret front (mm):	23-33	Ammo:	Tracer, AP, API, Incendiary: 2000 Rounds
Applique armor (mm):	23+ on BMP-2D. Add to BMP-2M Berezhok for near term OPFOR IFV.	Maximum Effective Range:	1000-2000 m (Day & Night)
Explosive reactive armor(mm):	Available	Armor penetration:	INA
Active Protection System:	No	Muzzle velocity (m/s):	~ 830
Self-entrenching blade:	No	Name:	AGS-30 or AGS-17
NBC protection system:	Collective	Caliber/length:	30-mm
Smoke equipment:	6 smoke grenade launchers, VEESS	Type:	Automatic Grenade Launcher (AGL)
Survivability equipment:	KMT-8 Mine Plow available	Ammo:	400
VARIANTS	**SPECIFICATIONS**	Maximum Effective Range:	1700 m (Day & Night)
BMP-2M	Upgraded BMP-1 to BMP-2 standards	Armor penetration:	INA
Kurganmashzavod Upgraded BMP-2	Export variant with 30-mm AGS-17 AGL, 2 ATM launchers & other equipment available	Muzzle velocity (m/s):	185
BMP-2M Berezhok	Berezhok 2-man turret. Will be exported to Algeria (Tier 1 OPFOR IFV)	**VARIANTS**	**SPECIFICATIONS**
BMP/Kliver	Kliver turret added (see separate entry for information on the Kliver turret)	"BMP-2M"	Uses BMP-3M turret, 100-mm gun, gun-launch ATGM, 30-mm coaxial gun, 7.62-mm anti-personnel coaxial gun. Limited space for dismounted soldiers to ride
NOTES SOURCES: 2014 WEG AND MILITARY PERISCOPE. SEE BMP-2 ENTRY FOR POSSIBLE UPGRADES AVAILABLE. FRENCH SNPE & OTHER ERA KITS AVAILABLE, BUT WOULD BE HAZARDOUS DURING DISMOUNTED OPERATIONS.			

RUSSIAN INFANTRY FIGHTING VEHICLE/INFANTRY FSV BMP-3M



BMP-3M

SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative designations:	None. Similar to BMP-3 (UAE). Could become a Heavy IFV if supplemental armor added	Name:	2A70
Date of introduction:	1990	Caliber/length:	100-mm
Proliferation:	1382+/at least 12 countries. Turret has also been exported to at least 2 countries	Type:	Rifled gun
Description:	Improved version of the BMP-2 IFV with exit doors in the rear with space for 7 soldiers. 4 firing ports on left side; 2 firing ports on each side & 1 firing port in the rear door	Ammo:	48 Rounds: Mix varies based on vehicle's role (i.e. 22, 22, 4 or 22, 18, 8) Frag-HE 3UOF17 Frag-HE 3UOF19 (electronic fuse) AT-10b/Arkan ATGM (see AT chapter)
Crew:	3 (driver, commander, gunner)	Maximum Effective Range:	Frag-HE 3UOF17: 4000 m (Day); 2600+ m (Night) Frag-HE 3UOF19: 7000 m (Day); 5000 (Night)

			AT-10b/Arkan ATGM: 4000-5000 m (Day & Night); 100 (minimum range)
Combat weight (mt):	18.7	Armor penetration:	Frag-HE 3UOF17: INA Frag-HE 3UOF19: INA but can defeat IFV/APC AT-10b/Arkan ATGM: 750 mm (RHA); 700 behind ERA; 800+ (conventional armor)
Chassis length overall (m):	6.8	Muzzle velocity (m/s):	250 to 355 depending on munitions type
Height overall (m):	2.30 (2.45 for some variants)	Name:	2A72
Width overall (m):	3.23	Caliber/length:	30-mm
Ground pressure (kg/cm^2):	0.62	Type:	Automatic Gun
Automotive performance:	UTD-29M	Ammo:	500 rounds HEI-T, Frag-HE: 340 APFSDS-T: 160
Engine type:	10-cylinder, 4 stroke, v-shaped, water-cooled diesel	Maximum Effective Range:	2500+ m (Day & Night)
Cruising range (km):	600 (highway)	Armor penetration:	55 mm at 1000 m & 45 mm at 2000 m (RHA)
Speed (km/h):	Max road: 70 Max off-road: 45 Average cross-country: 35 Max Swim: 10	Muzzle velocity (m/s):	INA
Fording depths (m):	Amphibious	Name:	Turret coaxial
Radio:	R-173 or R-173P	Caliber/length:	7.62
Protection:		Type:	PKT machine gun
Armor, turret front (mm):	30-100 KE/500 HEAT with ERA	Ammo:	Tracer, AP, API, Incendiary: 2000 Rounds
Applique armor (mm):	On Turret	Maximum Effective Range:	1000-2000 m (Day) INA: (Night)
Explosive reactive armor(mm):	Additional stand-off plate	Armor penetration:	INA
Active Protection System:	Available	Muzzle velocity (m/s):	~ 830
Self-entrenching blade:	Yes	Name:	Bow mounted
NBC protection system:	Automatic overpressure system	Caliber/length:	7.62
Smoke equipment:	6 81-mm smoke grenade launchers, VEESS	Type:	2 PKT machine guns
Survivability equipment:	KMT-8 Mine Plow available	Ammo:	Tracer, AP, API, Incendiary: 4000 Rounds
VARIANTS	SPECIFICATIONS	Maximum Effective Range:	1000 m (Day); 400-500 (On Move); INA (Night)
Desert BMP-3/BMP-3 (UAE)	Hydro-pneumatic suspension allows for adjustable ground clearance (see separate entry)	Armor penetration:	INA
BMP-3M with Arena-E Active Protection System	Cost will limit fielding	Muzzle velocity (m/s):	~ 830
BM-3M with ERA	Box ERA gives protection against KE rounds		
Bakcha-U/BMP-3M Unifield Fighting Compartment	Drop-in turret placed on other chassis	VARIANTS	SPECIFICATIONS
BMD-4 & BMD-4M	Amphibious IFVs with compact hulls & Bakcha-U turret	Type 97 IFV (China)	Chinese counterpart (AKA 2G) to BMP-3M with the unified fighting compartment & indigenous amphibious tracked chassis
NOTES SOURCES: 2014 WEG, MILITARY PERISCOPE. RUSSIAN AGS-17 AUTOMATIC GREANDE LAUNCHER & SHTORA IR ATGM JAMMER COUNTERMEASURE SYSTEM IS AVAILABLE. CHSSIS IS ALSO SUITED FOR MOUNTING OTHER WEAPONS: KORNET/KRIZANTEMA AT LAUNCHERS, 2S31 120-MM COMBINATION GUN; HERMES-A MISSILE LAUNCHER; PANTSIR-S1-0 AIR DEFENSE SYSTEM.			

RUSSIAN INFANTRY FIGHTING VEHICLE/INFANTRY FSV BMP-3 UAE



BMP-3 (UAE)

SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative designations:	Desert BMP-3	Name:	2A70
Date of introduction:	1990 (BMP-3); After 2000 for this variant	Caliber/length:	100-mm
Proliferation:	At least 9 countries (part of the 1382+ BMP-3s in operation globally	Type:	Rifled gun
Description:	BMP-3 with adjustable suspension system, the Namut thermal sight, improved fire control system, & air conditioning	Ammo:	48 Rounds: Mix varies based on vehicle's role (i.e. 22, 22, 4 or 22, 18, 8) Frag-HE 3UOF17 Frag-HE 3UOF19 (electronic fuse) AT-10b/Arkan ATGM (see AT chapter)
Crew:	3 (driver, commander, gunner)	Maximum Effective Range:	Frag-HE 3UOF17: 4000 m (Day); 2600+ m (Night) Frag-HE 3UOF19: 7000 m (Day); 5000 m (Night) AT-10b/Arkan ATGM: 4000-5000 m (Day & Night); 100 m (minimum range)
Combat weight (mt):	18.7	Armor penetration:	Frag-HE 3UOF17: INA Frag-HE 3UOF19: INA but can defeat IFV/APC AT-10b/Arkan ATGM: 750 mm (RHA); 700 behind ERA; 800+ (conventional armor)
Chassis length overall (m):	6.73	Muzzle velocity (m/s):	250 to 355 depending on munitions type

Height overall (m):	2.45 (adjustable)	Name:	2A72
Width overall (m):	3.15	Caliber/length:	30-mm
Ground pressure (kg/cm²):	0.62	Type:	Automatic Gun
Automotive performance:	UTD-29	Ammo:	500 rounds HEI-T, Frag-HE: 340 APFSDS-T: 160
Engine type:	10-cylinder, 4 stroke, v-shaped, water-cooled diesel	Maximum Effective Range:	2500+ m (Day & Night)
Cruising range (km):	600 (highway)	Armor penetration:	55 mm at 1000 m & 45 mm at 2000 m (RHA)
Speed (km/h):	Max road: 70 Max off-road: 45 Average cross-country: 35 Max Swim: 10	Muzzle velocity (m/s):	INA
Fording depths (m):	Amphibious	Name:	Turret coaxial
Radio:	R-173 or R-173P	Caliber/length:	7.62
Protection:		Type:	PKT machine gun
Armor, turret front (mm):	30-35 (front glacis)	Ammo:	Tracer, AP, API, Incendiary: 2000 Rounds
Applique armor (mm):	On Turret	Maximum Effective Range:	1000-2000 m (Day) INA: (Night)
Explosive reactive armor(mm):	Available	Armor penetration:	INA
Active Protection System:	No	Muzzle velocity (m/s):	~ 830
Self-entrenching blade:	Yes	Name:	Bow mounted
NBC protection system:	Collective	Caliber/length:	7.62
Smoke equipment:	6 smoke grenade launchers, VEESS	Type:	2 PKT machine guns
Survivability equipment:	KMT-8 Mine Plow available	Ammo:	Tracer, AP, API, Incendiary: 4000 Rounds
VARIANTS	SPECIFICATIONS	Maximum Effective Range:	1000 m (Day); 400-500 m (On Move); INA (Night)
BMP-3	Original IFV with 1K13-2 II night sight	Armor penetration:	INA
BMMP	Amphibious IF with the BMP-3 chassis & the BMP-2 unified fighting compartment	Muzzle velocity (m/s):	~ 830
BMP-3K	Command vehicle with HEF round for 100-mm gun, no bow MGs, & additional radios		
BMP-3F	Naval amphibious prototype; some have the Kliver turret (see separate entry)	VARIANTS	SPECIFICATIONS
9P157-2	ATGM launcher vehicle with AT-15/Krizantema ATGM	BREhM-L	Armored Recovery Vehicle (ARV)
9P162	ATGM launcher vehicle with the AT-14 Kornet ATGM	BRM-3K	Recon vehicle with 30-mm gun only & radar

NOTES

SOURCES: 2014 WEG, MILITARY PERISCOPE. CAN BE USED AS A STANDARD IFV, BUT ITS COSTS AS WELL AS OTHER CONSIDERATIONS MAY MAKE IT MORE SUITED FOR OTHER SPECIALIZED ROLES. THE BMP-3 UNIFIED FIGHTING COMMPARTMENT IS BEING FITTED TO A VARIETY OF OTHER VEHICLES. ITS SUPERIOR SWIM CAPABILITIES & FIREPOWER MAKE IT WELL SUITED FOR AMPHIBIOUS OPERATIONS. THE 100-MM CANNON, HOWEVER, IS NOT RESPONSIVE TO QUICK SLEWING (TURNING) & MAKES IT LESS EFFECTIVE IN CLOSE TERRAIN COMBAT. ITS WEAPONRY MAKES IT A SUPERIOR INFANTRY FIRE SUPPORT VEHICLE (FSV). FRENCH SNPE & OTHER ERA KITS ARE AVAILABLE. OTHER OPTIONS INCLUDE SPALL LINERS OR THE AGS-17 30-MM AGL SYSTEM.

TURKISH ARMORED INFANTRY FIGHTING VEHICLE (AIFV) FNSS



FNSS

SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative designations:	AAPC Armored Personnel Carrier (See Variants)	Name:	Giat M811 or Oerlikon Contraves cannon
Date of introduction:	1992	Caliber/length:	25-mm
Proliferation:	2738+/at least 6 countries	Type:	Dual-fed cannon
Description:	IFV from the M113 family with exit ramp (& door) in the rear with space for 10 soldiers	Ammo:	INA on Rounds carried: HEI-T; APDS-T; APFSDS-T
Crew:	3 (driver, commander, gunner)	Maximum Effective Range:	1500+ m
Combat weight (mt):	13.7 (varies for other variants)	Armor penetration:	INA
Chassis length overall (m):	5.26	Muzzle velocity (m/s):	INA
Height overall (m):	2.01	Name:	Turret coaxial
Width overall (m):	2.82	Caliber/length:	7.62-mm
Ground pressure (kg/cm²):	0.67	Type:	Machine Gun
Automotive performance:	ACV-300	Ammo:	Tracer, AP: INA Rounds
Engine type:	Detroit Diesel Model 6V-53T	Maximum Effective Range:	INA
Cruising range (km):	490	Armor penetration:	INA
Speed (km/h):	Max road: 65	Muzzle velocity (m/s):	INA

	Max off-road: INA Average cross-country: INA Max Swim: 6		
Fording depths (m):	Amphbious		
Radio:	INA	VARIANTS	SPECIFICATIONS
Protection:		AIFV	Original with 25-mm Giant M811 cannon; some may have the 25-mm Oerlkon Contraves cannon
Armor, turret front (mm):	INA	Advanced Armored Personnel Carrier (AAPC)	1-man turret with 12.7-mm & 7.62-mm machine guns
Applique armor (mm):	INA	Armored Mortar Vehicle (AMV)	6 personnel operate an 81-mm mortar & 7.62-mm machine gun
Explosive reactive armor(mm):	INA	Armored TOW Vehicle (ATV)	4-man crew operate a Norwegian ALT turret with 2 TOW missiles
Active Protection System:	No	Recovery Vehicle	AIFV with crane & winch, uprated engine with special cooling package
Self-entrenching blade:	No	ACV-S	Stretched ACV-300 with wider hull, 6 road wheels, 2-man turret, & upgraded armor for protection
NBC protection system:	INA	ACV-S with BMP-3 Turret	AIFC with 2-man BMP-3 turret (100-mm 2A70 rifled gun, coaxial 30-mm Mk 44 cannon, & coaxial 7.62-mm machine gun
Smoke equipment:	6 Smoke grenade launchers	ACV-S Tracked Load Carrier	Supply vehicle to carry 6 metric tons
Survivability equipment:	INA	ACV-300 Modular Electronic System Vehicle	Command vehicle with special communication equipment
VARIANTS	SPECIFICATIONS	ACV-300 with Hellfire Anti-Tank Missiles	4 Hellfire AT missiles on launchers with 4 additional carried internally; requireds manual reloading (8000 m range)
ACV-300 Adnan IFV (Malaysia)	10 variants with KVH TechNav navigation system & night sight	SPM-120 SP Mortar Vehicle	Swiss RUAG 120-mm Bighorn smoothbore mortar with automatic loader
ACV-S 120-mm Armored Mortar Vehicle (Malaysia)	120-mm 2R2M mounted mortar	Adnan IFV with stabilized cannon (Malaysia)	Sharpshooter turret with an ATK Bushmaster M242 25-mm chain gun
Artillery Support (UAE)	Forward Observation vehicle with laser rangefinder & radar	Adnan Anti-Tank (Malaysia)	Mounts the Pakistani Baktar Shikan ATGM system (Red Arrow 8)
NOTES SOURCES: MILITARY PERISCOPE. MOST VEHICLES ARE IN THE TURKISH ARMY, BUT OTHER ARMIES DO OPERATE THE AIFV. THE AIFV WAS BUILT BASE ON THE M113 TECHNOLOGY AND CONTINUED AFTER THE BRADLEY (M-2 & M-3) FIGHTING VEHICLE WON THE CONTRACT TO FIELD THE IFV TO THE AMERICAN ARMY			

AMERICAN INFANTRY FIGHTING VEHICLE YPR 765



YPR 765

SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative destinations:	Egyptian Infantry Fighting Vehicle (EIFV); See Variants	Name:	Oerlikon KBA-B02
Date of introduction:	1978	Caliber/length:	25-mm
Proliferation:	1497+/at least 8 countries	Type:	Cannon
Description:	IFV modified from the M113 with exit ramp in the rear with space for 7 soldiers; 2 firing ports on each side & 1 firing port in the left of the ramp	Ammo:	180 Ready rounds; 144 in reserve HEI-T; APDS-T Other types available: SAPHEI-T, TP-T, APP-T, FAPDS
Crew:	3 (driver, commander, gunner)	Maximum Effective Range:	2000 m
Combat weight (mt):	13.7	Armor penetration:	INA
Chassis length overall (m):	5.26	Muzzle velocity (m/s):	HEI-T: 1360 APDS-T: 1100
Height overall (m):	2.79 (2.01 hull top)	Name:	Turret Coaxial
Width overall (m):	2.82	Caliber/length:	7.62-mm
Ground pressure (kg/cm^2):	0.67	Type:	Machine Gun
Automotive performance:	6V-53T	Ammo:	230 Ready rounds; 1610 in reserve: AP, Tracer, Ball

Engine type:	Water-cooled, turbocharged, 2-stroke, V-6 diesel Allison	Maximum Effective Range:	1100 m
Cruising range (km):	490 (483-EIFV)	Armor penetration:	AP: 7 mm at 500 m
Speed (km/h):	Max road: 61 (66-EIFV) Max off-road: INA Average cross-country: INA Max Swim: 7	Muzzle velocity (m/s):	853
Fording depths (m):	Amphibious	Muzzle velocity (m/s):	INA
Radio:	INA		
Protection:		VARIANTS	SPECIFICATIONS
Armor, turret front (mm):	INA (sides on EIFV protected against 14.5-mm AP rounds)	EIFV	Holds only 6 soldiers that can dismount; M242 Bushmaster 25-mm gun with 900 rounds of ammo; BGM-71 TOW AT weapon with 6 rounds; M240 Machine Gun with 4400 rounds
Applique armor (mm):	Aluminum hull with spaced laminate steel on front & sides	Mortar Prime Move (Netherlands: YPR 765 PRMR)	Tows the 120-mm Thomson-Brandt mortar with crew of 7
Explosive reactive armor(mm):	INA	Cargo Carrier (Netherlands: YPR 765 PRVR-A/B)	Crew of 2 can carry cargo into the combat zone
Active Protection System:	INA	TOW Missile Carrier (Netherlands: YPR 765 PRAT)	Similar to the US M901 ITOW variant of the M113 with an Emerson TOW AT system
Self-entrenching blade:	No	Ambulance (Netherlands: YPR 765 PRGWT)	Unarmed variant with a crew of 4
NBC protection system:	Yes (Details INA)	Bn Command (Netherlands: YPR 765 PRCO-C1)	Specialized for infantry battalion commanders
Smoke equipment:	6 Smoke grenade launchers	Bn Gunnery Center (Netherlands PRCO-C2)	Specialized for use by artillery battalions
Survivability equipment:	INA	Mortar Fire-Control Vehicle (Netherlands PRCO-C3)	Specialty vehicle to control indirect mortar fire
VARIANTS	SPECIFICATIONS	Anti-Aircraft Control Vehicle (Netherlands PRCO-C4)	Specially designed for air defense command & control
Command Vehicle	Room for 9-man crew with additional communication equipment	YPR 765 PRCO-C5 (Netherlands)	Observation vehicle with only a 4-man crew
AIFV-B (Belgium)	40-caliber MG, NBC protection, & Halon fire-extinguishing system	YPR 765 PRRDR (Netherlands)	Operated the British ZB 298 battlefield surveillance radar
AIFV-B-CP (Belgium)	Pintle-mounted 12.7-mm MG, crew of 7, NBC protection, & Halon fire-extinguishing system	YPR PRRDR-C (Netherlands)	Radar/Command Vehicle
Philippine Variant	Converted to accept 50-caliber MG ILO 25-mm cannon	YPR 765 PRI/I (Netherlands)	Squad vehicle with M113 cupola, M2 HB MG, 9 soldiers, & driver
YPR-765 KMAR Military Police Vehicle	YPR-765 PRI/I modified for use by military police	YPR 806 PRBRG (Netherlands)	Recovery vehicle with HIAB crane, crew of 4, & 8 smoke grenade launchers
Turkish ACV	See separate vehicle for the FNSS IFV	YPR-2000 (Netherlands)	Upgrade included more storage containers
NOTES SOURCES: MILITARY PERISCOPE & TM 43-0001-27. VEHICLES 76-590 FEATURED ANOTHER 25-MM RIFLED CHAIN GUN ILO OF THE KBA-B02 WITH 220 ROUNDS (175 HE-I & 45 APDS-T)			

SOUTH KOREAN INFANTRY FIGHTING VEHICLE KIFV



KIFV

SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative designations:	None	Name:	M2
Date of introduction:	1985	Caliber/length:	12.7-mm
Proliferation:	1811+/at least 2 countries	Type:	Machine Gun
Description:	IFV derived from the FMC YPR 765 with exit ramp in the rear with space for 9 soldiers; firing ports	Ammo:	INA on Rounds carried: AP, API, APIT
Crew:	3 (driver, commander, gunner)	Maximum Effective Range:	1800 m
Combat weight (mt):	12.9	Armor penetration:	22.2 mm at 91 m; 19 mm at 500 m
Chassis length overall (m):	5.49	Muzzle velocity (m/s):	884
Height overall (m):	1.93 (2.52 with MG shield)	Name:	Pintle-mounted
Width overall (m):	2.85	Caliber/length:	7.62-mm
Ground pressure (kg/cm^2):	0.67	Type:	Machine Gun
Automotive performance:	D2848T	Ammo:	AP, Tracer, Ball
Engine type:	Doosan V-8 Diesel	Maximum Effective Range:	1100 m
Cruising range (km):	480	Armor penetration:	AP: 7 mm at 500 m
Speed (km/h):	Max road: 74 Max off-road: INA	Muzzle velocity (m/s):	853



	Average cross-country: INA Max Swim: 4		
Fording depths (m):	Amphibious		
Radio:	INA	VARIANTS	SPECIFICATIONS
Protection:		Vulcan Air Defense Carrier	KIFV with 20-mm Vulcan AD system & AN/PVS-2 range-only radar
Armor, turret front (mm):	INA	Mortar Carrier	81-mm (7-man) or 107-mm (5-man) fires through roof; dismount option available
Applique armor (mm):	Welded aluminum armor with applique laminated steel plates	Recovery Vehicle	3500 kg crane & 20,000 kg winch
Explosive reactive armor(mm):	INA	NBC Recon Vehicle	No firing ports, single left-opening door, 5 crew members, & NBC equipment
Active Protection System:	INA	Command Post (Malaysia)	Roof-mounted 12.7-mm MG with additional communication equipment
Self-entrenching blade:	No	Ambulance (Malaysia)	Handles wounded personnel
NBC protection system:	Yes (Details INA)	40-mm Turret	40-mm gun mounted in turret
Smoke equipment:	6 Smoke grenade launchers	Smoke Generation	Creates smoke on the battlefield
Survivability equipment:	INA	K200A1	Upgraded variant to 70 km/hr; quicker dash speed; faster amphibious speed
		Gun Carriers	Prototype vehicles with either a 30-mm or 90-mm cannon
		TOW Carrier	Proposed variant with turret with 2 TOW missiles in the ready-to-fire position
NOTES SOURCES: MILITARY PERISCOPE, MILITARY FACTORY, & TM 43-0001-27. VEHICLE SERVED AS A REPLACEMENT FOR SOUTH KOREA'S M113S. CURRENTLY ONLY OPERATED BY SOUTH KOREA & MALAYSIA. MALAYSIAN KIFVS USED DURING BOSNIAN PEACEKEEPING OPERATIONS. MECHANICAL ISSUES IN BOSNIA CAUSED MALAYSIA TO LOOK AT REPLACING THE KIFV WITH A WHEELED APC TO SUPPLEMENT THE KIFV IN FUTURE MILITARY OPERATIONS.			

SOUTH AFRICAN INFANTRY FIGHTING VEHICLE RATEL



Ratel

SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative designations:	See variants	Name:	M2
Date of introduction:	Mid-1970s	Caliber/length:	12.7-mm
Proliferation:	1667+/at least 8 countries	Type:	Machine Gun
Description:	6 X 6 wheeled IFV with rear door & 4 roof hatches for 5 soldiers to dismount; 4 firing ports on both sides of the vehicle	Ammo:	INA on Rounds carried: AP, API, APIT
Crew:	5 (commander, driver, main gunner, rear anti-aircraft gunner, section commander)	Maximum Effective Range:	1800 m
Combat weight (mt):	19	Armor penetration:	22.2 mm at 91 m; 19 mm at 500 m
Chassis length overall (m):	7.21	Muzzle velocity (m/s):	884
Height overall (m):	2.92	Name:	Turret coaxial
Width overall (m):	2.52	Caliber/length:	7.62-mm
Ground pressure (kg/cm^2):	INA	Type:	Machine Gun
Automotive performance:	D 3256 BTXF	Ammo:	6000 rounds: AP, Tracer, Ball
Engine type:	6-cyclinder, in-line turbocharged diesel	Maximum Effective Range:	1100 m
Cruising range (km):	1000	Armor penetration:	AP: 7 mm at 500 m
Speed (km/h):	Max road: 105 Max off-road: 65 Average cross-country: INA	Muzzle velocity (m/s):	853

	Max Swim: 4		
Fording depths (m):	INA	Name:	Anti-Aircraft
Radio:	INA	Caliber/length:	7.62-mm
Protection:		Type:	2 Machine Guns
Armor, turret front (mm):	20 mm	Ammo:	6000 rounds (all 3 machine guns use the same ammo: AP, Tracer, Ball
Applique armor (mm):	INA	Maximum Effective Range:	1100 m
Explosive reactive armor(mm):	INA	Armor penetration:	AP: 7 mm at 500 m
Active Protection System:	INA	Muzzle velocity (m/s):	853
Self-entrenching blade:	No	VARIANTS	SPECIFICATIONS
NBC protection system:	INA	Ratel 20	Original version with French designed turret with 20-mm F2 cannon with 1200 rounds
Smoke equipment:	4 81-mm Smoke grenade launchers	Ratel 60	Eland 60 turret with 60-mm breech-loading mortar with 3-man crew, 451 rounds (45 HE, 3 Smoke, 3 Illumination) & 7 other soldiers
Survivability equipment:	INA	Ratel 81	No turret with an 81-mm mortar installed in crew compartment for indirect fire support
VARIANTS	SPECIFICATIONS	Ratel 90	Eland 90 turret with crew of 3 & 6 other soldiers available for dismount operations
Ratel AA (Jordan)	Twin 23-mm air defense cannons from a BTR-94 mounted on the Ratel body	Ratel Command	2-seated turret with 12.7-mm, 2 7.62-mm AA MGs, & crew of 9 Soldiers
Ratel 120	Prototype 120-mm mortar carrier not yet in production	Ratel EAOS	Enhanced Artillery Observation System (EAOS) with radar capability
Ratel Logistic	8 X 8 prototype with only 2 vehicles produced	Ratel Maintenance	Mobile workshop
Lklwa	Prototype with upgraded engine that has been moved from the rear to the front	Ratel ZT3	ATGM platform with 3 ZT3 laser guided missiles on launcher with 12 additional in storage; 7.62-mm MG for self-defense
NOTES			
SOURCES: MILITARY PERISCOPE, MILITARY FACTORY, & TM 43-0001-27. WHILE THE VEHICLE HAS WHEELS (6 X 6), IT IS STILL AN IFV BECAUSE IT IS MEANT TO FIGHT THROUGH THE OBJECTIVE INSTEAD OF DISMOUNTING BEFORE THE OBJECTIVE. THE WHEEL VEHICLE MAKES IT FASTER, ESPECIALLY ON ROADS, WITH BETTER FUEL CONSUMPTION. THE DRAWBACK IS THAT WHEELED VEHICLES USUALLY CANNOT GO WHERE TRACK VEHICLES CAN NAVIGATE.			

AUSTRIAN ARMORED PERSONNEL CARRIER PANDUR



Pandur I

SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative designations:	Vlauk (Slovenia); See variants	Name:	M2HB
Date of introduction:	1996	Caliber/length:	12.7-mm (.50 caliber)
Proliferation:	336+/at least 6 countries	Type:	Machine Gun
Description:	8 X 8 wheeled APC with 2 exit doors in the rear & 2 roof hatches; 2 firing ports on both sides with a capacity for 8 dismounted soldiers	Ammo:	1000 Rounds (dependent on configuration): Ball, Tracer, AP, API, API-T, AP Hardcore, Multipurpose, SLAP, SLAPT
Crew:	2 (driver, commander)	Maximum Effective Range:	1500 m (Against High Hard Armor-HHA)
Combat weight (mt):	13.5	Armor penetration:	SLAP (Saboted Light Armor Penetrator); 34 mm HHA at 500 m
Chassis length overall (m):	5.70	Muzzle velocity (m/s):	M33 Ball: 890 SLAPT (Tracer): 1215
Height overall (m):	1.82	VARIANTS	SPECIFICATIONS
Width overall (m):	2.50	Pandur 1	Basic version as in the description
Ground pressure (kg/cm^2):	INA	Belgian Pandur	Belgian SMAS radio, NBC protection, armed with 12.7-mm & 7.62-mm machine guns
Automotive performance:	WD 612.95		

Engine type:	**6-cylinder, turbo-charged water-cooled Steyr diesel**	**Amphibious Pandur**	**Electric bilge pumps, closed air intakes-capable of 11 km/h in water**
Cruising range (km):	**700**	**Pandur Ambulance**	**3-man crew for 4 stretcher, 2 seated & 2 stretcher, or 2 seated patients**
Speed (km/h):	**Max road: 62 Max off-road: INA Average cross-country: INA Max Swim: N/A**	**Pandur Anti-Aircraft**	**Twin 20-mm cannon or SANTAL SAM in turret**
Fording depths (m):	**8.5**	**Pandur ATGM Carrier**	**HOT AT missile in a Euromissile UTM 800 launcher or a TOW AT missile in a Kvaerner-Eurkea turret; additional missiles stored in the hull**
Radio:	**INA**	**Pandur Armored Recon/Fire Support Vehicle (FSV)**	**2-man LCTS turret with a Cockerill 90-mm Mk 8 gun or a Giat TS-90 turret with a 90-mm CN90F4 gun or Cockerill CSE90 turret with an Mk III 90-mm gun**
Protection:	**INA**	**Pandur Mechanized Infantry Combat Vehicle (MICV)**	**MGTS with a choice of armaments: 12.7-mm M2 & 7.62-mm MGs; 30-mm M230 chain gun & 7.62-mm MG; or 40-mm AGL & 12.7-mm MG**
Armor, turret front (mm):	**Protects against 7.62-mm AP rounds at 30 m**	**Pandur Mortar Carrier**	**In the passenger compartment, there is an 81-mm or 120-mm mortar mounted on a turnatable**
Applique armor (mm):	**INA**	**Command & Control Vehicle**	**For C2 operations**
Explosive reactive armor(mm):	**INA**	**Armored Recovery/Repair Vehicle**	**For vehicle recovery operations**
Active Protection System:	**INA**		
Self-entrenching blade:	**No**		
NBC protection system:	**Available**		
Smoke equipment:	**6 Smoke grenade launchers**		
Survivability equipment:			
NOTES **SOURCES: 2014 WEG, MILITARY PERISCOPE, U.S. ORDNANCE, GLOBAL SECURITY, & MILITARY FACTORY. OPTIONAL WEAPONRY INCLUDES A 20-MM AUTOCANNON IN TRAVERSING TURRET, 30-MM MAUSER DUAL-FEED CANNON IN 2-MAN TURRET, 90-MM MAIN GUN IN A 2-MAN TURRET, HEAVY MORTARO, OR A HOT 4000 AT LAUNCHER.**			

CHINESE ARMORED PERSONNEL CARRIER TYPE 63



YW 531C/Type 63C

SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative designations:	YW 531A; see variants YW 531C (Data shown) VTT-323 (North Korea-see separate entry)	Name:	Type 54 (DShKM copy)
Date of introduction:	1964	Caliber/length:	12.7-mm
Proliferation:	2086+/at least 9 countries	Type:	Machine Gun
Description:	Lightly armored APC with exit door in the rear with space for 10 soldiers; 2 firing ports on left side, 1 firing port on right side, & 1 firing port in the rear door (other models vary)	Ammo:	1120 Rounds: APDS (Tungsten Core); API, API-T, Russian Duplex, Russian Duplex-T, Incendiary-T, HE-T, Type MDZ, HeI Type ZP
Crew:	2 (driver, commander)	Maximum Effective Range:	2000 m
Combat weight (mt):	12.6	Armor penetration:	API: 21 at 500 m & 13 at 1000 m (RHA)
Chassis length overall (m):	5.48	Muzzle velocity (m/s):	850
Height overall (m):	2.85	VARIANTS	SPECIFICATIONS
Width overall (m):	2.98	YW 531/Type 63/K-63	Original variant with 7.62-mm MG
Ground pressure (kg/cm²):	0.57	YW 531A/Type 63A	1968 production model with 12.7-mm MG

Automotive performance:	BF8L 413F	Type 63-1	5-road wheel variant for the YW 70-I 122-mm SP howitzer
Engine type:	4-cycle, turbocharged, air-cooled, V-8 diesel	VTT-323	North Korean Type 63-1 (see separate entry)
Cruising range (km):	500 (61-water)	Type 63-2	4 X 2 drive APC with gun shield
Speed (km/h):	Max road: 66 (42 for 531A) Max off-road: 40 (32 for 531A) Average cross-country: INA Max Swim: 6	WZ 701	Type 63-2 command vehicle with 7.62-mm MG
Fording depths (m):	Amphibious	Type 70 Rocket Launcher	Type 63-2 130-mm (19 tubes) MRL
Radio:	Type 889	Anti-Tank Missile Carrier	Red Arrow 8 AT launcher with 4-rail launcher & 4 stowed ATGMs
Protection:		YW 531C/Type 63C	4 X 2 drive APC with gun shield, better vision ports, improved German KHD diesel engine, & better ventilation
Armor, turret front (mm):	14 (front glacis)	YW 531D/Type 63D	YW 531C, but with only 1 firing port on the left side & different radio
Applique armor (mm):	No	YW 531E/Type 63E	YW 531C, but with only 1 firing port on the left side & 2 radios
Explosive reactive armor(mm):	No	Type 701	With Type 63C, better suited for high sea-state amphibious operations
Active Protection System:	No	YW 750	Ambulance for 4 stretcher or 8 seat patients
Self-entrenching blade:	No	YW 701/B	Command vehicles with Type 56 7.62-mm MG for self-defense; export model has 12.7-mm AA MG
NBC protection system:	No	YW 304	82-mm M-1937 SP mortar with 120 rounds & 12.-7-mm AA MG
Smoke equipment:	No	YW 381	120-mm SP mortar with 50 rounds
Survivability equipment:	INA	Type 54-1	122-mm mobile gun mounted in an open-topped troop compartment
		Psychological Warfare	Variant with roof-mounted speakers
		Type 85/YW 531H	Latest YW 531 variant with new suspension system, 5 road wheels, & 3 return rollers (see separate entry)

NOTES

SOURCES: 2014 WEG AND MILITARY PERISCOPE. PRIMARY INFORMATION IS ON THE YW 531C, THE MOST LIKELY VEHICLE TO ENCOUNTER ON THE BATTLEFIELD.

CHINESE ARMORED PERSONNEL CARRIER TYPE 85



Type 85

SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative designations:	YW 531H; see variants	Name:	Type 54 (DShKM copy)
Date of introduction:	1986	Caliber/length:	12.7-mm
Proliferation:	1030+/at least 4 countries	Type:	Machine Gun
Description:	Improved Type 69 APC with rear exit door& emergency roof hatches with space for 13 soldiers who can dismount; firing ports vary depending on variant	Ammo:	1120 Rounds: APDS (Tungsten Core); API, API-T, Russian Duplex, Russian Duplex-T, Incendiary-T, HE-T, Type MDZ, HeI Type ZP
Crew:	2 (driver, commander)	Maximum Effective Range:	2000 m
Combat weight (mt):	13.6 (13.8 with ATGM)	Armor penetration:	API: 21 at 500 m & 13 at 1000 m (RHA)
Chassis length overall (m):	6.13	Muzzle velocity (m/s):	850
Height overall (m):	2.59	VARIANTS	SPECIFICATIONS
Width overall (m):	3.06	Type 85/YW 531H	Domestic/export base model
Ground pressure (kg/cm^2):	0.546	YW703H	Command variant
Automotive performance:	BF8L 413F	Type 85 Armored Command Vehicle	2-man crew, 6 staff, additional communications equipment, & fewer ammunition rounds; used at regimental or division level
Engine type:	Turbocharged, air-cooled, V-8 diesel	Type 85 Recovery Vehicle	1000 KG crane with 5-man crew
Cruising range (km):	500	Type 85 Maintenance Engineering Vehicle	Similar to the WZ 751 (ambulance), but for support
Speed (km/h):	Max road: 65 Max off-road: 46 Average cross-country: 35 Max Swim: 6	Type 85 Mortar Carriers	82-mm & 120-mm variants similar to the YW 531

Fording depths (m):	Amphibious	WZ 751 Armored Ambulance	2-man crew with space for 4 litter or 8 seat patients; 12.7-mm MG
Radio:	Type 889 or VRC 83	Type 85 SP Howitzer (Type 70-1/YW 302)	Type 54-1 122-mm howitzer on Type 85 chassis
Protection:		Type 85 ATGM Launcher Vehicle	Railed hull with 4-rail Red Arrow-8 SACLOS wire-guided ATGM
Armor, turret front (mm):	14 (front glacis)	YW 307 IFV	Type 89 with a 25-mm cannon similar to the Bushmaster & the 7.62-mm coaxial MG
Applique armor (mm):	No	YW 309 Infantry Combat Vehicle (ICV)	3-man crew, 73-mm low pressure main gun, 7.62-mm coaxial MG & Red Arrow 3 ATGM
Explosive reactive armor(mm):	No	HJ-8 Anti-Tank Vehicle	AT traversable launcher with 4 HJ-8 ATGMs & 4 loads in storage in the hull
Active Protection System:	No	NVH-1	Joint Chinese/British variant with 25-mm gun
Self-entrenching blade:	No	Type 90	Updated design with reduced height, improved hull shape, & better transmission
NBC protection system:	Yes (INA for additional info)	Thai versions	Similar to the Chinese variants, but armed with a M-2HB MG
Smoke equipment:	8 Smoke grenade launchers	Artillery Command Post Vehicle	YW 531H modified with a raised rear superstructure
Survivability equipment:	INA	YW 306	130-mm MRL platform
		Type 89 (YW 534/WZ 534)	Improved power pack & night vision equipment for domestic use & export with longer & wider chassis, improved engine, & mobility
NOTES SOURCES: 2014 WEG AND MILITARY PERISCOPE.			

CHINESE ARMORED PERSONNEL CARRIER TYPE 92

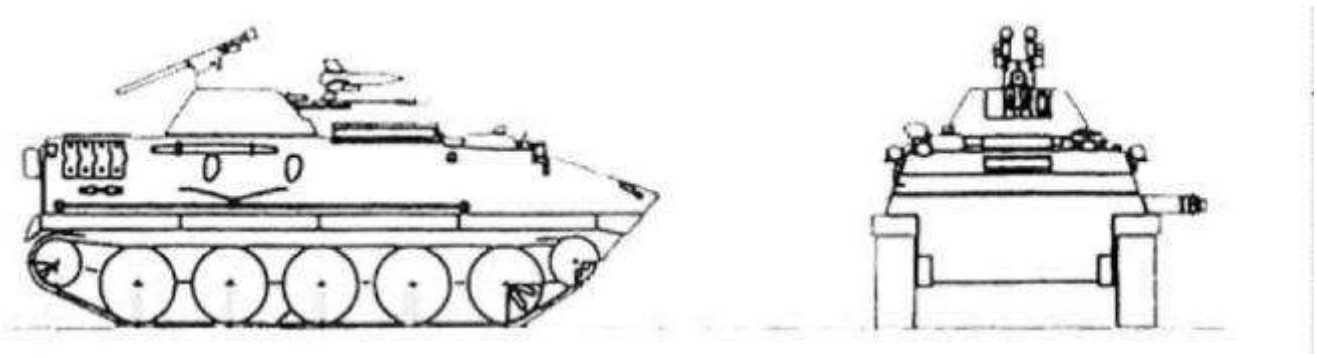


Type 92A

SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative designations:	WZ 551A; See variants	Name:	INA
Date of introduction:	1987	Caliber/length:	25-mm
Proliferation:	1347+/at least 9 countries	Type:	Automatic overhead turreted gun
Description:	6 X 6 wheeled APC, very similar to the French VAB, with single rear exit door and two roof hatches for a total of 12 soldiers (crew included); 4 firing ports on both sides	Ammo:	600 Rounds, 200 ready & 400 stowed: API: 240 (Estimated mix) HE: 360
Crew:	2 (driver, commander but some have a gunner)	Maximum Effective Range:	1500-2000 m (estimated)
Combat weight (mt):	15.00 (different for variants)	Armor penetration:	INA
Chassis length overall (m):	6.73-6.80	Muzzle velocity (m/s):	INA
Height overall (m):	2.10-2.89	Name:	PKT
Width overall (m):	2.86	Caliber/length:	7.62-mm
Ground pressure (kg/cm^2):	INA	Type:	Turret Coaxial
Automotive performance:	BF8L413FC	Ammo:	Light Ball, Ball-T; Heavy Ball, API, API-T, Incendiary: 2000 rounds
Engine type:	Deutz 4-cycle, air-cooled, V-8 diesel	Maximum Effective Range:	1000 m (day); 400-500 m on the move; 800+ (night)
Cruising range (km):	800	Armor penetration:	8 (RHA) at 500 m
Speed (km/h):	Max road: 85-100	Muzzle velocity (m/s):	825

	Max off-road: INA Average cross-country: INA Max Swim: 8		
Fording depths (m):	Amphibious	VARIANTS	SPECIFICATIONS
Radio:	Type 83, VIC-83 telephone	Type 92 (6 X 6)	Basic model with 25-mm automatic overhead turreted gun
Protection:		Type 92A/WZ 551A (6 X 6)	Basic model with 12.7-mm machine gun
Armor, turret front (mm):	10 (against 12.7-mm rounds)	WZ 901/Type 92B (4 X 4)	Riot control vehicle with 1-man turret with machine guns normally used for internal security
Applique armor (mm):	No	WZ 550 (4 X 4)	Red Arrow 9 ATGM launcher vehicle
Explosive reactive armor(mm):	No	WZ 531 Armored Recovery Vehicle	Turret removed with crane on vehicle's rear & telescopic jib
Active Protection System:	No	WZ 551/Type 86 (6 X 6)	Original model with 256-hp engine
Self-entrenching blade:	No	WZ 551 IFV (6 X 6)	3-man crew with 73-mm main gun (40 rounds), 7.62-mm coaxial MG (2000 rounds), Red Arrow 3 ATGM (4 missiles) with 8 soldiers for dismount
NBC protection system:	Collective	DK-9/WZ 551D	PL-9C missile SAM launcher missile
Smoke equipment:	8 Smoke grenade launchers	WZ 551S (6 X 6)	Cargo variant that can carry 7000 kg
Survivability equipment:	Obstacle-clearing blade available	WZ 551 Reconnaissance Vehicles (6 X 6)	Various models with sensors, laser rangefinders, & communication gear
VARIANTS	SPECIFICATIONS	WZ 554 Self-Propelled Anti-Aircraft (8 X 8)	Prototype twin 23-mm SP anti-aircraft vehicle yet to be massed produced
Armored Ambulance (6 X 6)	4 stretcher or 8 seated patients with a 12.7-mm MG for self defense	WZ 91 (4 X 4)	Red Arrow 8 ATGM launcher vehicle with 4 missiles & 8 missiles in hull
NGV-1 IFV (6 X 6)	Prototype with Nexter Systems Dragar 1-man turret with 25-mm cannon, 7.62-mm coaxial MG, & 6 smoke grenade launchers	WMA 301 Assaulter 105-mm tank destroyer (6 X 6)	105-mm low-recoil gun in a 3-man turret with 30 105-mm rounds, 7.62-mm coax MG, & 12.7-mm anti-aircraft MG
WMZ 551 (6 X 6)	Prototype 1-man turret with 12.7-mm MG, ATGM launcher, & smaller weapons	WZ 551/ZSL-92 (6 X 6)	25-mm cannon (400 rounds), coaxial 7.62-mm (1000 rounds), & improved diesel engine
BK-1990 (8 X 8)	105-mm SP AT gun	BK-1970 (6 X 6)	105-mm SP AT gun
PLL05 120-mm mortar vehicle (6 X 6)	120-mm SP combo gun version (see 2S23 elsewhere in WEG)	VL1 (4 X 4)	Shortened WMZ 551 for 8 personnel for internal security missions
PTL02/WMA 301 (6 X 6)	100-mm SP AT gun, ATGM capable	Yitian Air Defense System (6 X 6)	Yitian short-range air defense system mounted on the WZ 551 chassis
		Self-Propelled Howitzer (8 X 8)	Stretched WZ551 with 122-mm howitzer with 40 stowed rounds in hull
NOTES SOURCES: 2014 WEG, MILITARY PERISCOPE, MILITARY TODAY, AFRICA DEFENSE JOURNAL, & GLOBAL SECURITY. SOME ANALYSTS CALL THE TYPE 92 WITH THE 25-MM TURRETED GUN AN IFV, BUT IT DOES NOT MEET ALL THE CRITERIA.			

NORTH KOREAN ARMORED PERSONNEL CARRIER VTT-323



VTT-323

SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative designations:	M1973	Name:	KPVT
Date of introduction:	1973	Caliber/length:	14.5
Proliferation:	2086+/at least 9 countries (includes Chinese Type 63)	Type:	2 Heavy Machine Guns
Description:	North Korean produced Type 63 APC using PT-85 chassis with rear exit door & at least 2 firing ports on each side with space for 10 soldiers	Ammo:	1000 Rounds: API-T, API: 500 HE-T: 500 Other available: I-T, Type MDZ
Crew:	4 (driver, commander, gunner, loader)	Maximum Effective Range:	1500 m (Day) INA (Night)
Combat weight (mt):	13.5	Armor penetration:	API-T: 20 at 1000 m; 30 at 500 m
Chassis length overall (m):	6.20	Muzzle velocity (m/s):	1005
Height overall (m):	2.50	Name:	9P111 (AT Vehicles Only)
Width overall (m):	3.06	Caliber/length:	125-mm
Ground pressure (kg/cm²):	0.58	Type:	MCLOS Wire ATGM
Automotive performance:		Ammo:	4 Rounds AT-3c Imp/Polk HEAT (Slovenia) HJ Red Arrow-73A HEAT (China) HJ Red Arrow-73B/C HEAT (China)
Engine type:	Diesel	Maximum Effective Range:	3000 m (Minimum Range: 500 m)
Cruising range (km):	450	Armor penetration:	AT-3c Imp/Polk HEAT: 580 (RHA) Red Arrow-73A HEAT: 500 (RHA) Red Arrow-73B/C HEAT: 600 (RHA)
Speed (km/h):	Max road: 80 Max off-road: 70 Average cross-country: INA Max Swim: 10	Muzzle velocity (m/s):	130
Fording depths (m):	Amphibious	VARIANTS	SPECIFICATIONS
Radio:	INA	VTT-323 Anti-Tank Vehicle	AT-3C tandem HEAT ATGM or other AT system replaces the twin 14.5-mm machine guns
Protection:		Infantry Fire Support Vehicle (FSV)	AT-3 ATGM launcher and carries SA-7b, SA-14, or SA-16 MANPADS

Armor, turret front (mm):	24	120-mm Gun/Mortar	Carries a combination 120-mm Gun/ Mortar instead of infantry soldiers
Applique armor (mm):	No	Mortar Carrier	82-mm or 120-mm mortars mounted in the passenger compartment
Explosive reactive armor(mm):	No	122-mm SP Howitzer	122-mm SP howitzer mounted on VTT-323 chassis
Active Protection System:	No		
Self-entrenching blade:	No	107-mm MRL Carrier	107-mm MRL system (12, 18 or 24 tubes) mounted on rear of vehicle
NBC protection system:	No	SP Anti-Aircraft Gun	4 14.5-mm guns mounted
Smoke equipment:	No	M1985	AT-3 type anti-tank system with 4 rails
Survivability equipment:	INA	PT-85 Light Tank	Uses the same chassis
NOTES			
SOURCES: 2014 WEG, MILITARY PERISCOPE, & GLOBAL SECURITY. THERMAL SIGHTS ARE AVAILABLE. THE SLOVENIAN TS-M ATGM THERMAL NIGHT SIGHT CAN DETECT TARGETS AT 4,500 M & PROVIDE RECOGNITION AT 2,000 M. THE HE-BLAST ATGM IS USED FOR KILLING PERSONAL, DESTROYING BUNKERS, OR FIRING OTHER FORTIFICATIONS.			

FRENCH ARMORED PERSONNEL CARRIER VAB



VAB AZURE Urban Combat Vehicle



VAB APC



VAB APC



VAB Memphisto Anti-Tank APC

SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative designations:	Vehicule de l'Avant Blinde	Name:	AA-52
Date of introduction:	1976	Caliber/length:	7.62-mm
Proliferation:	5012+/12 countries	Type:	Machine Gun
Description:	4 X 4 wheeled APC with 2 rear exit doors & roof hatches for 10 soldiers; 3 firing ports on each side & a port in each rear door	Ammo:	1250 Rounds: Ball, Tracer; Other: INA
Crew:	2 (driver, commander)	Maximum Effective Range:	3000 m
Combat weight (mt):	13.0 (higher for 6 X 6 & 8 X 8 variants)	Armor penetration:	INA
Chassis length overall (m):	5.98 (longer for 6 X 6 & 8 X 8 varaints)	Muzzle velocity (m/s):	830
Height overall (m):	2.06	VARIANTS	SPECIFICATIONS
Width overall (m):	2.50	VAB RASIT	Recon vehicle with radar
Ground pressure (kg/cm²):	INA	VAB RATAC	Artillery target acquisition
Automotive performance:	VI MIDS 06.20.45 (MAN C.2356 HM 72 also available)	VAB Sanitaire Ambulance	Carries 4 litter, 10 sitting, or 2 litter/5 seated patients

Engine type:	Renault water-cooled, turbo-charged in-line, 6-cyclinder diesel	VAB VDAA Santal SAM System	6 X 6 VAB with 2-man turret with 6 MATRA Mistral SAMs with 6 extra rounds in vehicle
Cruising range (km):	1000	VAB with ESD	TA-20 turret mounted anti-aircraft system
Speed (km/h):	Max road: 92 Max off-road: INA Average cross-country: INA Max Swim: 8	VAB Echelon Repair Vehicle	4 X 4 or 6 X 6 variants for battlefield repairs with a 7.5-mm or 7.62-mm machine gun
Fording depths (m):	Amphibious	VAB PC Command Vehicle	Crew of 6 with additional radios & mapboards; FDC & FO versions also available
Radio:	INA	VAB Bromure Electronic Warfare Vehicle	Crew of 3 operate Thomson-CSF VHF tactical jammer
Protection:		VAB ATILA	Artillery fire & command
Armor, turret front (mm):	INA (Against 7.62-mm rounds)	VAB Reco	NBC reconnaissance vehicle
Applique armor (mm):	INA	VAB Genie Engineer Vehicle	Crew of 9 with roof-mounted raft
Explosive reactive armor(mm):	INA	VTM 120-mm Mortar Towing Vehicle	Tows Thompson Brandt 120-mm Mortar with 70 rounds
Active Protection System:	INA	VPM 81	81-mm mortar fires through roof opening
Self-entrenching blade:	Bulldozer blade available	VAB TOW	Basic VAB with TOW ATGM launcher with 16 reloads
NBC protection system:	Yes	VAB TOW-ALT	Thune-Eureka 2-tube TOW turret with 16 reload missiles
Smoke equipment:	4 Smoke grenade launchers	VAB with UTM 800 Anti-Tank Launcher	4 non-retractable HOT tube launchers with 8 reloads
Survivability equipment:	Vehicle chassis design helps protect vehicle from mines	VCAC HOT Mephisto Anti-Tank Vehicle	4 retractable HOT tube launchers with SACLOS missiles & 8 additional rounds
VARIANTS	**SPECIFICATIONS**	VMO	Internal Security Vehicle
VCAC Milan	Trial 4 X 4 with 2 Milan ATGMs	VMO with TOI	Standard VMO with cupola, 7.62-mm MG & AGL
VAB VDAA Albi SAM System	Prototype 4 X 4 or 6 X 6 with turret with 2 MATRA SAM launchers & 6 extra missiles	VAB AZURE	Urban warfare with bulldozer blade & panoramic periscopes
VAB New Generation/ Improved VAB	1996 Upgrade with most variants available	VAB Atlas	Improved ATILA Artillery C2
VCI	More heavily armed than the basic VAB with many variants	VAB Mark III	Latest upgrade from 2014; 6 X 6 with advanced protection & mobility
NOTES SOURCES: MILITARY PERISCOPE & GLOBAL SECURITY. ALTERNATE PRIMARY WEAPON IS A 12.7-MM MACHINE GUN WITH 1200 ROUNDS. VEHICLE COMES IN 6 X 6 OR 8 X 8 VARIANTS THAT INCREASE THE VEHICLE'S WEIGHT. VEHICLE CAN BE USED AS A PLATFORM FOR A VARIETY OF WEAPONS IS EVIDENT BY THE NUMBER AND VARIETY OF VARIANTS AVAILABLE.			

RUSSIAN ARMORED PERSONNEL CARRIER BTR-152



BTR-152

SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative designations:	BTR 150 Type 56 APC (China)	Name:	SGMB
Date of introduction:	1950	Caliber/length:	7.62-mm
Proliferation:	1880+/at least 21 countries	Type:	Medium Machine Gun
Description:	Outdated 6 X 6 wheeled APC with rear exit doors, but many variants feature an open roof & very limited armored protection; passenger space for 17 soldiers; 3 firing ports on each side with 2 in rear doors	Ammo:	1250 Rounds (250 in box, 1000 Ready): Light Ball, Ball-T, API
Crew:	2 (driver, commander)	Maximum Effective Range:	1000 m (Day); INA (Night); 1000 m (Anti-Aircraft)
Combat weight (mt):	9.0	Armor penetration:	8 at 500 m
Chassis length overall (m):	6.83	Muzzle velocity (m/s):	800
Height overall (m):	2.36	Name:	Pintle Mounted SGMB
Width overall (m):	2.32	Caliber/length:	2 7.62-mm (Optional)
Ground pressure (kg/cm²):	INA	Type:	Medium Machine Gun

Automotive performance:	**ZIL-123**	**Ammo:**	**1250 Rounds (250 in box, 1000 Ready): Light Ball, Ball-T, API**
Engine type:	**Water-cooled, in-line, 6-cylinder gasoline**	**Maximum Effective Range:**	**1000 m (Day); INA (Night); 1000 m (Anti-Aircraft)**
Cruising range (km):	**600-650**	**Armor penetration:**	**8 at 500 m**
Speed (km/h):	**Max road: 75 Max off-road: INA Average cross-country: INA Max Swim: N/A**	**Muzzle velocity (m/s):**	**800**
Fording depths (m):	**0.80**	**VARIANTS**	**SPECIFICATIONS**
Radio:	**10RT-12 or R-123**	**BTR-152**	**Basic version with open top & no winch that has been converted to other uses such as fire support vehicles, gun trucks, ambulances, or engineer vehicles**
Protection:		**BTR-152A**	**Anti-aircraft variant with twin 14.5-mm MGs mounted in a turret**
Armor, turret front (mm):	**11-15 (hull front)**	**BTR-152D/BTR-152E**	**Anti-aircraft version with 4 14.45-mm machine guns**
Applique armor (mm):	**No**	**BTR-152I**	**BTR-152V converted to use as an artillery command vehicle**
Explosive reactive armor(mm):	**No**	**BTR-152 (Model D)**	**Similar to the BTR-152V3, but with an overhead armor & 2 roof hatches**
Active Protection System:	**No**	**BTR-152V**	**Open top with central tire-pressure regulation system (CTPRS)**
Self-entrenching blade:	**No**	**BTR-152V1 (Model B)**	**BTR-152V with 5000 KG front winch**
NBC protection system:	**No**	**BTR-152V2**	**BTR-152V without the winch**
Smoke equipment:	**No**	**BTR-152V3 (Model C)**	**BTR-152V with winch, internal CTPRS air lines & infrared driving lights**
Survivability equipment:	**No**	**BTR-152U**	**Command vehicle features a high rear structure & CTPRS**
		BTR-152 with ZU-23 Mount (Lebanon)	**2 23-mm anti-aircraft machine guns mounted in troop compartment**
		BTR-152 with Czech M53 (Egypt)	**4 12.7-mm DShKM anti-aircraft MGs mounted in troop compartment**
		Type 56 (China)	**Chinese BTR-152 with a different engine**
NOTES SOURCES: 2014 WEG, ACE-THREATS BTR HANDBOOK, & MILITARY PERISCOPE. SEE THE ACE-THREATS BTR HANDBOOK PUBLISHED IN 2014 FOR DETAILED INFORMATION ON ALL BTR-152 VARIANTS.			

RUSSIAN ARMORED PERSONNEL CARRIER BTR-40



BTR-40

SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative designations:	Type 55 (China)	Name:	SGMB
Date of introduction:	1950	Caliber/length:	7.62-mm
Proliferation:	1301+/at least 12 countries	Type:	Medium Machine Gun
Description:	4 X 4 wheeled APC based on the GAZ-63 truck with an open top & a single rear exit door; passenger space for 8 soldiers; 3 firing ports on each side & 2 in the rear door	Ammo:	1250 Rounds (250 in box, 1000 Ready): Light Ball, Ball-T, API

Crew:	2 (driver, commander)	Maximum Effective Range:	1000 m (Day); INA (Night); 1000 m (Anti-Aircraft)
Combat weight (mt):	5.3	Armor penetration:	8 at 500 m
Chassis length overall (m):	5.00	Muzzle velocity (m/s):	800
Height overall (m):	1.75	Name:	Pintle Mounted SGMB
Width overall (m):	1.90	Caliber/length:	2 7.62-mm (Optional)
Ground pressure (kg/cm²):	INA	Type:	Medium Machine Gun
Automotive performance:	GAZ-40	Ammo:	1250 Rounds (250 in box, 1000 Ready): Light Ball, Ball-T, API
Engine type:	Water-cooled, in-line, 6-cylinder gasoline	Maximum Effective Range:	1000 m (Day); INA (Night); 1000 m (Anti-Aircraft)
Cruising range (km):	285	Armor penetration:	8 at 500 m
Speed (km/h):	Max road: 80 Max off-road: INA Average cross-country: INA Max Swim: N/A	Muzzle velocity (m/s):	800
Fording depths (m):	0.80	VARIANTS	SPECIFICATIONS
Radio:	INA	BTR-40A	5 person crew fires 2 14.5-mm KPV heavy MGs (2400 rounds) from a ZPTU-2 turret
Protection:		BTR-40B	Only 6 dismounted soldiers can fit into this vehicle with overhead armor with 4 roof hatches
Armor, turret front (mm):	8 mm	BTR-40Kh	NBC decontamination vehicle with poles to mark cleared lanes
Applique armor (mm):	No	BTR-40 with AT-3 Sagger	East Germany converted some BTR-40s to ATGM vehicles with a triple launcher under overhead cover
Explosive reactive armor(mm):	No	BTR-40zhd	This vehicle uses a metal wheel suspension to travel on railroad lines on scouting missions
Active Protection System:	No	Type 55 (China)	Chinese BTR-40 with different engine
Self-entrenching blade:	No	Walid (Egypt)	Variants besides the APC include a smoke rocket launcher or a minelayer vehicle
NBC protection system:	No		
Smoke equipment:	No		
Survivability equipment:	No		
NOTES SOURCES: ACE-THREATS BTR HANDBOOK, & MILITARY PERISCOPE. SEE THE ACE-THREATS BTR HANDBOOK PUBLISHED IN 2014 FOR DETAILED INFORMATION ON ALL BTR-40 VARIANTS.			

RUSSIAN ARMORED PERSONNEL CARRIER BTR-50



BTR-50

SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative designations:	See variants	Name:	SGMB
Date of introduction:	1954	Caliber/length:	7.62-mm
Proliferation:	2375+/at least 18 countries	Type:	Medium Machine Gun
Description:	The only BTR APC that uses tracks instead of wheels. There are no exit doors forcing the 18 soldiers to dismount over the sides; 2 firing ports on each side of the vehicle	Ammo:	1250 Rounds (250 in box, 1000 Ready): Light Ball, Ball-T, API
Crew:	2 (driver, commander)	Maximum Effective Range:	1000 m (Day); INA (Night); 1000 m (Anti-Aircraft)
Combat weight (mt):	14.2	Armor penetration:	8 at 500 m
Chassis length overall (m):	7.08	Muzzle velocity (m/s):	800
Height overall (m):	1.97	VARIANTS	SPECIFICATIONS
Width overall (m):	3.14	BTR-50P	Original with open troop compartment without NBC protection; 57-mm or 85-mm anti-tank (AT) gun could be mounted on the rear deck
Ground pressure (kg/cm^2):	0.51	BTR-50PA	No AT gun ramp mount; sometimes featured a 14.5-mm KPVT heavy MG
Automotive performance:	Model	BTR-50PK	Primary model with covered troop compartment, 4 firing ports & NBC protection system
Engine type:	V-6 water-cooled, in-line, 6-cylinder diesel	BTR-50PU	Command vehicle with additional radios, 4 antennae, & auxiliary power supply

Cruising range (km):	400	BTR-50PK(B)	Amphibious armored recovery vehicle designed for river crossings
Speed (km/h):	Max road: 44 Max off-road: INA Average cross-country: INA Max Swim: 7	MTP	BTR-50PK converted into a rolling workshop with 15000 crane, 8000 tow bar, & block/tackle system to raise capacity
Fording depths (m):	Amphibious	MTK (UR-67)	Mine-clearing rocket launcher system
Radio:	INA	MTR-1	BTR-50 designed for repairing equipment
Protection:		OT-62 (Slovakia & Poland)	Originally the Czech produced BTR-50
Armor, turret front (mm):	6-10 mm	Type 77 (China)	Chinese produced BTR-50P
Applique armor (mm):	No	Nimda BTR-50PK (Israel)	Improved engine, electrical system, & fuel system
Explosive reactive armor(mm):	No	Schuetzenpanzer 50PK (North Vietnam)	BTR-50PK produced by North Vietnam
Active Protection System:	Mine	Upgraded BTR-50 (Ukraine)	Improved performance vehicle with 60 km/hr speed on land, 10 km/hr in water, & with a heavier payload
Self-entrenching blade:	No	Civilian BTR-50	BTR-50P converted for civilian use such as topographic reconnaissance
NBC protection system:	Collective		
Smoke equipment:	No		
Survivability equipment:	Automatic engine fire-extinguishing system on closed vehicles; mine-clearing system available		
NOTES SOURCES: ACE-THREATS BTR HANDBOOK, & MILITARY PERISCOPE. THE SOVIET UNION PRODUCED THIS APC USING A PT-76 LIGHT TANK CHASSIS. SEE THE ACE-THREATS BTR HANDBOOK PUBLISHED IN 2014 FOR DETAILED INFORMATION ON ALL BTR-50 VARIANTS.			

RUSSIAN ARMORED PERSONNEL CARRIER BTR-60



BTR-60PB

SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative designations:	See Variants	Name:	KPVT
Date of introduction:	1960	Caliber/length:	14.5-mm
Proliferation:	9074+/at least 44 countries	Type:	Heavy Machine Gun
Description:	8 X 8 wheeled APC designed to replace the BTR-152; original design (BTR-60) had an open top & 14 soldiers had to exit over the sides; 3 firing ports on each side of vehicle	Ammo:	500 Rounds: API, API-T
Crew:	2 (driver, commander)	Maximum Effective Range:	2000 m (Day); INA (Night)
Combat weight (mt):	10.3	Armor penetration:	20 mm (CE) at 1000 m; 30 mm (CE) at 500 m
Chassis length overall (m):	7.56	Muzzle velocity (m/s):	1005
Height overall (m):	2.31	Name:	PKT
Width overall (m):	2.83	Caliber/length:	7.62-mm
Ground pressure (kg/cm^2):	INA	Type:	Turret Coaxial
Automotive performance:	GAZ-49B	Ammo:	Light Ball, Ball-T; Heavy Ball, API, API-T, Incendiary: 2000 rounds

Engine type:	2 water-cooled, in-line, 6-cylinder gasoline (1 YaMZ-236A 4-stroke diesel in BTR-60PB)	Maximum Effective Range:	1000 m (day); 400-500 m on the move; INA (night)
Cruising range (km):	500	Armor penetration:	8 (RHA) at 500 m
Speed (km/h):	Max road: 80 Max off-road: 60 Average cross-country: INA Max Swim: 10	Muzzle velocity (m/s):	825
Fording depths (m):	Amphibious	VARIANTS	SPECIFICATIONS
Radio:	R-123	BTR-60P	Initial model with open top, pintle-mounted 7.62-mm machine gun
Protection:		BTR-60PA/BTR-60PK (12 passengers only)	Covered top, NBC protection, pintle-mounted 7.62-mm MG, still exit over top
Armor, turret front (mm):	7-9 mm	BTR-60PB (space for 8 soldiers for dismounted operations)	Most common variant with BRDM-2 MG turret with a 14.5-mm MG & coaxial 7.62-mm; troops exit over top
Applique armor (mm):	No	Modernized BTR-60PB	BM2 Turret with 30-mm 2A42 Cannon & 7.62-mm PKTM MG; 30-mm AGS-17 AGL on left side
Explosive reactive armor(mm):	No	BTR-60U	Command vehicle with additional radios
Active Protection System:	No	BTR-60 PU-12/12M	Anti-Aircraft units' command vehicle
Self-entrenching blade:	No	BTR-60 MS	Radio vehicle with High Ball antenna
NBC protection system:	Collective (closed vehicles)	BTR-60 VVS	Sans turret with additional radios
Smoke equipment:	No	BTR-60 PBK	BTR-60PB with 3 radios
Survivability equipment:	No	BTR-60 1V18	Artillery observation vehicle
VARIANTS	SPECIFICATIONS	BTR-60 1V19	BTR-60 1V18 for FDC operations
BTR-60PAU (Bulgaria)	Artillery command vehicle	BTR-60 R-145BM	Communications vehicle with 5 radios
BTR-60PB-MD (Bulgaria)	Upgraded engine, radios, & NBC equipment	BTR-60 R-975	Forward air-control vehicle with turret
BTR-60P Maintenance Assistance (MTR-2)	Maintenance vehicle with tarp over troop compartment	BTR-60-Z-351BR	Power production vehicle with generator
BTR-60 SPAAG (Cuba)	Twin 30-mm anti-aircraft cannons	BTR-60-P-238BT	Switchboard vehicle for communications
BTR-60 Djibouti (Djibouti)	AML-90 turret on BTR-60	BTR-60-P-240BT	Integrates radio & wire communications-R-123M radio & R-241 switchboard
BTR-60BD	Speed increased to 100 km/h & range to 800 km	BTR-60-P241BT	Equipped with P-241 telephone system
MTP-2	Armored Recovery Vehicle	BTR-60-R-137B	Communications vehicle with turret
BTR-60PZ	Final production model with 1PZ-2 roof-mounted periscope	BTR-60 ACRV	Artillery Battery C2 & recon vehicle
BTR-60-R-140BM	C2 vehicle with turret	BTR-60-R-145	Additional radio, but no turret
MEP	Infantry command post	BTR-60-R-156BTR	C2 vehicle with additional radios
BTR-60PB FAC	Turreted FAC vehicle without the gun	BTR-60-R-409BM	Relay vehicle-R-409 & R-123M radios
NOTES SOURCES: ACE-THREATS BTR HANDBOOK, MILITARY PERISCOPE & MILITARY FACTORY. SEE THE ACE-THREATS BTR HANDBOOK PUBLISHED IN 2014 FOR DETAILED INFORMATION ON ALL BTR-60 VARIANTS.			

RUSSIAN ARMORED PERSONNEL CARRIER BTR-70



BTR-70

SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative designations:	See Variants	Name:	KPVT
Date of introduction:	1979	Caliber/length:	14.5-mm
Proliferation:	6524+/at least 19 countries	Type:	Heavy Machine Gun
Description:	8 X 8 wheeled APC as an upgrade to the BTR-60; 9 soldiers had to exit through 2 roof hatches; 3 firing ports on each side of vehicle	Ammo:	500 Rounds: API, API-T
Crew:	2 (driver, commander)	Maximum Effective Range:	2000 m (Day); INA (Night)
Combat weight (mt):	11.5	Armor penetration:	20 AT 1000 m; 30 AT 500 m
Chassis length overall (m):	7.53	Muzzle velocity (m/s):	1005
Height overall (m):	2.24	Name:	PKT
Width overall (m):	2.80	Caliber/length:	7.62-mm
Ground pressure (kg/cm^2):	INA	Type:	Turret Coaxial
Automotive performance:	ZMZ-4905	Ammo:	Light Ball, Ball-T; Heavy Ball, API, API-T, Incendiary: 2000 rounds

Engine type:	Liquid-cooled, in-line, 6-cylinder gasoline	Maximum Effective Range:	1000 m (day); 400-500 m on the move; INA (night)
Cruising range (km):	600	Armor penetration:	8 (RHA) at 500 m
Speed (km/h):	Max road: 80 Max off-road: INA Average cross-country: INA Max Swim: 10	Muzzle velocity (m/s):	825
Fording depths (m):	Amphibious	VARIANTS	SPECIFICATIONS
Radio:	INA	BTR-70 MS	Communications vehicle sans turret
Protection:		BTR-70 BMP	Artillery command vehicle
Armor, turret front (mm):	Greater than the BTR-60	BTR-70KShM	Command vehicle with improved communications & navigation equipment
Applique armor (mm):	No	BREM	Armored recovery vehicle sans turret with front-mounted jib crane
Explosive reactive armor(mm):	No	BTR-70 with AGL	30-mm AGS-17 automatic grenade launcher (AGL) mounted to the roof of the vehicle
Active Protection System:	No	BTR-70 with modified turret	BTR-70 retrofitted with BTR-80 turret, additional firing ports, & a bow-mounted wave deflector for amphibious operations
Self-entrenching blade:	No	BTR-Kh	Chemical reconnaissance vehicle
NBC protection system:	Collective	SPR-2	Turretless & replaced with a large telescopic mast for radar-jamming
Smoke equipment:	No	TAB-77 (Romania)	BTR-70s made under license in Romania
Survivability equipment:	No	Ukrainian upgrade	1-man weapon station with a 2A72 30-mm cannon or Ukrainian KBA-2 30-mm cannon & a 7.62-mm coaxial machine gun with a TKN-42 day/night weapon sight; 2 SMD-21 four-stroke diesel engines increase fuel efficiency increases range to 560 km
		BTR-70 Zhalo-s (Sting)	Prototype 85-mm long barreled gun mounted on a BTR-70 chassis for use as a tank destroyer

NOTES

SOURCES: ACE-THREATS BTR HANDBOOK, MILITARY PERISCOPE & MILITARY FACTORY. STORAGE SPACE FOR RPG-7 ROCKET LAUNCHERS & 2 30-MM AGS-17 AGLS. MANY OF THE BTR-70 APCS DID NOT PERFORM TO EXPECTATIONS DURING THE RUSSIAN ARMY'S CAMPAIGN IN CHECHNYA. SEE THE ACE-THREATS BTR HANDBOOK PUBLISHED IN 2014 FOR DETAILED INFORMATION ON ALL BTR-60 VARIANTS.

RUSSIAN ARMORED PERSONNEL CARRIER BTR-80



BTR-80



BTR-80A

SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative designations:	GAZ-5903; See Variants	Name:	KPVT
Date of introduction:	1984	Caliber/length:	14.5-mm
Proliferation:	2252+/at least 28 countries	Type:	Heavy Machine Gun
Description:	8 X 8 wheeled APC as an upgrade to the BTR-70; 7 soldiers exit through 2 side	Ammo:	500 Rounds: API, API-T

	doors; 4 firing ports on the right & 3 firing ports on the left		
Crew:	3 (driver, commander, gunner)	Maximum Effective Range:	2000 m (Day); INA (Night)
Combat weight (mt):	13.6 (14.6 for BTR-80A)	Armor penetration:	20 AT 1000 m; 30 AT 500 m
Chassis length overall (m):	7.55 (7.65)	Muzzle velocity (m/s):	1005
Height overall (m):	2.41 (2.80)	Name:	PKT
Width overall (m):	2.95 (2.80)	Caliber/length:	7.62-mm
Ground pressure (kg/cm^2):	INA	Type:	Turret Coaxial
Automotive performance:	260 hp	Ammo:	Light Ball, Ball-T; Heavy Ball, API, API-T, Incendiary: 2000 rounds
Engine type:	Water-cooled, V-8 diesel	Maximum Effective Range:	1000 m (day); 400-500 m on the move; INA (night)
Cruising range (km):	600 (800)	Armor penetration:	8 (RHA) at 500 m
Speed (km/h):	Max road: 80 (90) Max off-road: 60 (INA) Average cross-country: 40 (INA) Max Swim: 10	Muzzle velocity (m/s):	825
Fording depths (m):	Amphibious	Name:	2A72 (On BTR-80A ILO of 14.5-mm MG)
Radio:	R-173 (R-163-50U VHF, R-163-UP receiver, R-174 intercom)	Caliber/length:	30-mm
Protection:		Type:	Automatic Gun
Armor, turret front (mm):	Defeat 12.7-mm rounds	Ammo:	300 rounds HEI-T, Frag-HE-T, APT-, APDS-T, APFSDS-T
Applique armor (mm):	No	Maximum Effective Range:	2500+ m (Day & Night)
Explosive reactive armor(mm):	No	Armor penetration:	55 mm at 1000 m & 45 mm at 2000 m (RHA)
Active Protection System:	NoZS	Muzzle velocity (m/s):	INA
Self-entrenching blade:	No	VARIANTS	SPECIFICATIONS
NBC protection system:	Collective	BTR-80 (GAZ-5903)	Original with 3 firing ports on each side & smoke grenade launchers
Smoke equipment:	6 81-mm smoke grenade launchers	BTR-80A (GAZ-59034)	Upgraded model with stabilized turret with 2A72 gun, 7.62-mm coaxial machine gun, & additional firing port on the right side
Survivability equipment:	No	BTR-80AK	BTR-80A CP variant with 1 firing port on right side & 2 whip antennas at rear corners
VARIANTS	SPECIFICATIONS	BTR-80K (GAZ-59031)	Command Post with crew of 6; different turret with 14.5-mm & 7.62-mm guns & 3 radios (R-173, R-173P & R-159)
BTR-80 1V152	Artillery C2 & forward observation vehicle with navigation, range finding, & improved optics	BTR-80 Kushetka-B (M1989/1)	Command vehicle with additional communications gear & gun removed
BTR-80 R-975	Forward air control vehicle	BTR-80 PBKM (KM-80)	Command vehicle with increased radio communications equipment
2S23 (Nona-SVK) SP Gun-Mortar System (Fire Support Vehicle)	Breach-loaded 2A60 120-mm rifled mortar/gun system similar to the 2S9	BTR-80S	Modernization turret with modular armaments system (14.5-mm KPVT MG), better fire control system & improved sights
BMM	Medical series with BMM-1 (ambulance), BMM-2 (Battalion Aid Station), & BMM-3 (Brigade Medical Aid Station)	BTR-80 with Cummins Diesel	Test model with the Western Cummins 6CTA 8.3-C250 diesel engine; road speed to 100 km/h with a range of up to 600 km

BMM-1	Battlefield ambulance for immediate first aid & MEDVAC operations	BTR-82/BTR-82A (Russia & Kazakhistan)	Modernization of existing vehicles with the 2A72 30-mm automatic cannon; air conditioning, digital GPS navigation, & better fire control; 300-hp engine, likely near-term Russian APC
BMM-2	Battlefield ambulance for use at the battalion level for field treatment	BTR-80UP (Ukraine)	BTR-80 with 300-hp engine, improved armor protection & air conditioning
BMM-3	Battlefield ambulance used as a mobile field hospital	BTR-80UP-KB (Ukraine)	Battalion level command vehicle
BMM-80 (GAZ-59039 or Simfoniya)	Battlefield ambulance for 9 sitting or 2 litter patients	BTR-80UP-KR (Ukraine)	Company level command vehicle
BREM-K (GAZ-59033) ARV	Armored recovery vehicle with A-frame, tow bars, & stabilizers	BTR-80UP-S (Ukraine)	Staff vehicle
E-351BrM	Mobile power station with diesel/electric generator	BTR-80UP-M (Ukraine)	Battlefield ambulance
K1Sh1 (GAZ-59032) (UNSH)	Command Post variant with an enlarged hull without any armament in turret	BTR-80UP BREM (Ukraine)	ARV
P-240BTZ	Switchboard platform	BTR-80UP-R (Ukraine)	Dedicated reconnaissance vehicle
PU-12M6 (9S482M6)	Field Artillery (FA) battery command vehicle	BTR-80UP-T (Ukraine)	Dedicated cargo transport variant
PU-12M7 (9S482MU)	Improved PU-12M6 FA battery command vehicle	KShM Kushetka-B (Ukraine)	Command vehicle based on the K1Sh1
R-149BMR	Signal/Communications vehicle	BTR-94 (Ukraine)	Amphibious armored car with twin 23-mm 2A7M guns (same guns as the ZSU-23-4)
R-149BM4A	Command and Signal Vehicle	BTR-3U/Okhotnik (Guardian) (Ukraine)	2001 BTR-94 upgrade with a Shkval 1-man turret with 30-mm gun, twin AT-5 ATGM launchers, 30-mm AGL, & a 7.62-mm MG. Jordanian version uses a twin 23-mm gun & donated to the new Iraqi armed forces
R-165B	Short-wave signal/ communications vehicle	BTR-3E1 (Ukraine)	Export version of the BTR-3U with the Shturm turret; 30-mm ZTM cannon, a 40-mm AGL, & a 7.62-mm MG & a twin-launcher for the Barrier AT missile system.
R-439-BK (Legenda 2BK)	Satellite communications vehicle	BTR-4 (Ukraine)	Soldiers enter & leave the vehicle through rear doors; Grom overhead weapons station with 30-mm automatic cannon, 7.62-mm coaxial machine gun, & up to 4 9P135M Konkurs or Baryer AT missiles, & one 30-mm AGL on the left side of the turrret
R-439-BK1	Improved R-439-BK satellite communications vehicle	BTR-80 GKKO (Hungary)	Proposed vehicle with additional observation equipment, but no turret
R-439-MD2	Satellite communications vehicle	BTR-80M (Hungary)	1993 Improvement with 240-hp DMZ-238M2 series engine
RPM-2 (NKR)	Radiological Reconnaissance Vehicle that first appeared in 2000	BTR-80 MPAEJ (Hungary	Battlefield engineer variant without turret
RKhM-4 NBC Reconnaissance Vehicle	Outfitted with NBC equipment	BTR-80 MPFJ (Hungary)	Obstacle clearance vehicle without armament

RKhM-4-01	Improved/modernized RKhM-4 NBC vehicle	BTR-80 MVJ (Hungary)	ARV
RKhM-4-02	Upgraded RKhM-4 NBC reconnaissance vehicle	BTR-80 SKJ (Hungary)	Battlefield ambulance variant with enlarged passenger compartment
SPR-2 Wide Band Jamming System	Turretless vehicle with large telescopic antenna designed to neutralize artillery shells with proximity fuses	BTR-80 VSF (Hungary)	NBC reconnaissance vehicle
UNSh	Standardized name for expanded chassis for some current variants such as the Kusheta-B, ACRV, & BMM	TAB Zimbru (B33) (Romania)	BTR-80 with 268-hp Model 1240 V8-DTS series engine, Romanian radios, & additional 12.7-mm ammunition storage
"Tajfun"	Prototype proposed for base security forces with a 7.62-mm MG & the Kredo-1 radar	Zimbru 2000 (Romania)	Proposed improved TAB Zimbru with enlarged hull & 285-hp engine
ZS-88	With loudspeakers for PSYOP operations and riot control	Saur 1 (Romania)	2006 prototype with 275-hp Cummins engine, rear entry/exit doors & new turret
ZS-96	Another PSYOP variant with loudspeakers	Saur 2 (Romania)	Improved Saur 1 prototype
Kliver Turret System	Prototype with the Kliver turret mounted on the BTR-80 (see separate entry)	BTR-80 "Caribe" (Columbia)	Columbian designation for BTR-80 with 12.7-mm machine gun
NOTES			
SOURCES: ACE-THREATS BTR HANDBOOK, MILITARY PERISCOPE, MILITARY FACTORY, ARMY RECOGNITION. SOME ANALYSTS AND DOCUMENTS LIST THE BTR-80A AS AN IFV, BUT IT LACKS SUFFICIENT PROTECTION TO WARRANT THAT CLASSIFICAITON. THE MODULAR WEAPON SYSTEM IS OFFERED FOR EXPORT TO UPGRADE A WIDE VARIETY OF VEHICLES TO A BTR-80A STANDARD. THE BTR-80A CAN MOUNT K1-126 BULLET-RESISTANT TIRES. SEE SEPARATE ENTRY FOR INFORMATION ON THE KLIVER TURRET. SEE THE ACE-THREATS BTR HANDBOOK PUBLISHED IN 2014 FOR DETAILED INFORMATION ON ALL BTR-60 VARIANTS.			

RUSSIAN ARMORED PERSONNEL CARRIER BTR-90



BTR-90

SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative designations:	See Variants	Name:	2A42
Date of introduction:	1994	Caliber/length:	30-mm
Proliferation:	INA on quantity/at least 1 country	Type:	Automatic Gun
Description:	8 X 8 wheeled APC as an upgrade to the BTR-80 with side exit doors; 4 firing ports on the right side & 3 firing ports on the left	Ammo:	500 rounds: HEI-T, Frag-HE-T: 340 APFSDS-T, FAPDS: 160
Crew:	3 (driver, commander, gunner)	Maximum Effective Range:	Frag-HE: 4000 m (day), 2500 m (night), 4000 (anti-aircraft) APFSDS-T (M929): 2500 m (day), 2500 (night), 2500 (anti-aircraft)

Combat weight (mt):	20.92	Armor penetration:	INA
Chassis length overall (m):	7.64	Muzzle velocity (m/s):	825
Height overall (m):	2.975	Name:	PKT
Width overall (m):	3.20	Caliber/length:	7.62-mm
Ground pressure (kg/cm^2):	INA	Type:	Turret Coaxial
Automotive performance:		Ammo:	Light Ball, Ball-T; Heavy Ball, API, API-T, Incendiary: 2000 rounds
Engine type:	Turbo-charged diesel (multi-fuel)	Maximum Effective Range:	1000 m (day); 400-500 m on the move; 800+ (night)
Cruising range (km):	800	Armor penetration:	8 (RHA) at 500 m
Speed (km/h):	Max road: 100 (50+ average) Max off-road: INA Average cross-country: Claimed to be equal to tracked vehicles Max Swim: 9	Muzzle velocity (m/s):	825
Fording depths (m):	Amphibious	Name:	9P135M1 or 9P135M3
Radio:	R-163-50U VHF, R-163-UP receiver, R-174 intercom	Caliber/length:	135-mm
Protection:		Type:	AT-5 Konkurs; AT-5B Konkurs-M; AT-4 Fagot (less likely; AT-4b Faktoriya (less likely)
Armor, turret front (mm):	INA (defeat 12.7 to 20-mm rounds with applique armor)	Ammo:	SACLOS, INA on rounds carried
Applique armor (mm):	Available	Maximum Effective Range:	4000 m; 4000 m; 2000 m; 2500 m
Explosive reactive armor(mm):	Available	Armor penetration:	HEAT; 650 mm (RHA); 925 mm CE (RHA); 480 mm (RHA); 550 mm (RHA)
Active Protection System:	Available	Muzzle velocity (m/s):	200; 200; 186; 186
Self-entrenching blade:	No	VARIANTS	SPECIFICATIONS
NBC protection system:	Collective	BTR-90M/BTR-90 Rostock	BMP-3 turret with 100-mm 2A70 gun, 30-mm 2A72 cannon, & 7.6-2mm PKT machine gun
Smoke equipment:	6 81-mm smoke grenade launchers	Arzamas Upgrade	30-mm automatic gun, 7.-62-mm coaxial MG, 30-mm AGL, & ATGM range to 4000 m
Survivability equipment:	Mine protected hull	Krymsk Hybrid-Electric APC	Prototype operates on a battery-driven electric motor & can be controlled remotely with a top speed of 97 km/h

NOTES

SOURCES: ACE-THREATS BTR HANDBOOK, MILITARY PERISCOPE & MILITARY FACTORY. SOME EARLY VERSIONS LACK THE ATGM. BECAUSE THE BTR-90 HAS A MEDIUM CANNON & CAN MOUNT AN ATGM LAUNCHER, IT CAN BE CLASSED AS AN IFV. WHEN AN ATGM IS USED, CHANGE THE ORGANIZATION STRUCTURE TO IFV. DESIGNATED COMPANY/BATTALION FSVS HAVE RACKS FOR 2 MISSILE LAUNCHERS & 12-14 MISSILES IN STORAGE. OTHER MUNITIONS ARE AVAILABLE SUCH AS FAPDS, HEI-T ROUNDS, OR MILAN-ER ATGMS.

AMERICAN ARMORED PERSONNEL CARRIER M113A1



M113A1



M113A1 Armored Artillery Observation Vehicle

SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative designations:	See variants	Name:	M2HB
Date of introduction:	1964	Caliber/length:	12.7-mm (.50 caliber)
Proliferation:	34176+/at least 50 countries	Type:	Machine Gun
Description:	Tracked APC with rear ramp (door also) for 11 soldiers to dismount. Soldiers must expose themselves through the roof of the vehicle to fire their weapons. No firing ports.	Ammo:	2000 Rounds: Ball, Tracer, AP, API, API-T, AP Hardcore, Multipurpose, SLAP, SLAPT
Crew:	2 (driver, commander)	Maximum Effective Range:	2000 m (day), INA (night)
Combat weight (mt):	11.2 (changes on variant)	Armor penetration:	AP: 11 mm at 30° at 1500 m Ball: 20 mm at 100 m
Chassis length overall (m):	4.90	Muzzle velocity (m/s):	M33 Ball: 890 SLAPT (Tracer): 1215
Height overall (m):	1.80	VARIANTS	SPECIFICATIONS
Width overall (m):	2.70	M113	Original gasoline version
Ground pressure (kg/cm²):	0.55	M113A1	Diesel production model
Automotive performance:	6V53 (M13A2)	M113A1 Armored Cavalry Assault Vehicle (ACAV)	Armor around the commander's position & 2 extra M-60 MGs
Engine type:	Detroit Diesel water-cooled, 2-stroke, V-6	M113A2	Improved engine cooling, better rear fuel cells, & new suspension system
Cruising range (km):	483	M113A2 ARV	Armored Recovery Vehicle with a 1361 kg auxiliary crane
Speed (km/h):	Max road: 64 Max off-road: 35 Average cross-country: INA Max Swim: 5.8	Stretched M113A2	Prototype with an extra road wheel
Fording depths (m):	Amphibious	M113A3	Bigger engine, yoke steering, Kevlar spall liner, applique liner, external fuel cells

Radio:	Varies depending on model	M113A3 M/R	Maintenance/Recovery vehicle with 9000 kg winch & 1360 kg crane
Protection:		M58 Wolf Smoker Generator Carrier	Vehicle dedicated to produce smoke
Armor, turret front (mm):	Turretless, but defeats 7.72 x 39-mm round	M106	M113 with M30 (107-mm) mortar in back with 88-93 rounds
Applique armor (mm):	Yes	M125	M113 with M29 (81-mm) mortar in back with 114 rounds
Explosive reactive armor(mm):	Available	M163	M113A1 with turret with M61A1 Vulcan 20-mm 6-barrel Gatling cannon
Active Protection System:	No	M548	Unarmored cargo carrier
Self-entrenching blade:	Available	M577	Command post carrier with built-up rear area & telescopic antenna
NBC protection system:	No	M577A3	M113A3 engine with extended hull & 6 road wheels
Smoke equipment:	No	M901	Improved TOW Vehicle with an Emerson ITV turret with 2 TOW tubes with an additional 10 missiles
Survivability equipment:	Anti-mine armor on bottom	M981	Fire Support Vehicle (FSV) with laser designator & improved commo gear
M113 Ambulance	Various versions available	M1059 Lynx	M113A2 with M157 smoke generator system
M113 with Dozer Blade	M113s with trim vane removed to be fitted with a bulldozer kit	M1064A3	M113A3 with Soltan (120-mm) mortar with 60 rounds
M113 HAZMAT	Stretched M113A3 for spills	M1068A3	Modified M113 into the Standard Integrated Command Post (SICP)
NOTES SOURCES: 2014 WEG, MILITARY FACTORY, TM 43-0001-27, AND MILITARY PERISCOPE. OVER 100 DIFFERENT VARIANTS HAVE BEEN PRODUCED. THESE INCLUDE RECOILESS RIFLE CARRIERS, MILAN ATGM CARRIERS, ENGINEER VARIANTS, RECONAISSANCE VEHICLES, AIR DEFENSE VEHICLES WITH AA MACHINE GUNS, & THOSE ADAPTED TO MOUNT THE COUNTRY'S MACHINE GUNS AND/OR ANTI-TANK WEAPONS.			

SLOVENIAN ARMORED PERSONNEL CARRIER BOV-M



BOV-M10



BOV-M10



BOV-86M (Serbia)



BOV-M86 Anti-Tank Variant (Serbia)

SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative designations:	See variants	Name:	M86
Date of introduction:	1971	Caliber/length:	7.62-mm
Proliferation:	139+/at least 4 countries	Type:	Machine Gun
Description:	4 X 4 APC built originally by Yugoslavia with space for 8 soldiers to exit through side doors: 3 firing ports on each side & an additional one to the right of the commander's vision block	Ammo:	2000 Rounds (Estimated): Ball-T, API, API-T Other available: Light Ball, Ball-T, Heavy Ball, Incendiary
Crew:	2 (driver, commander)	Maximum Effective Range:	1000 m (day); 400-500 m on the move; 200-800 (night); 1000 (tactical anti-aircraft)
Combat weight (mt):	7.0 to 9.0 (depends on variant)	Armor penetration:	8 (RHA) at 500 m
Chassis length overall (m):	6.0	Muzzle velocity (m/s):	825
Height overall (m):	2.34 (top of the cabin)	VARIANTS	SPECIFICATIONS
Width overall (m):	2.53	BOV-M (Slovenia)	Some built with 12.7-mm MGs

Ground pressure (kg/cm²):	INA	BOV-VP	Security version with swing out gates to direct crowds
Automotive performance:	F6l413F	BOV-1/Polo M-83	Sans troop compartment with 2 ATGM launcher pods with 3 AT-3 launchers each with machine gun mounted before the two AT-3s
Engine type:	German Deutz 6-cyclinder diesel	BOV-3	3 turret-mounted 20-mm cannons for air defense
Cruising range (km):	500	BOV-30	2 turret-mounted 30-mm cannons for air defense
Speed (km/h):	Max road: 95 Max off-road: INA Average cross-country: 40 Max Swim: N/A	BOV-SN	Ambulance
Fording depths (m):	1.10	LOV (Croatia)	No raised compartment, increased hull protection, but with a 12.7-mm machine gun
Radio:	INA	Yugo import BOV variants	Serbia has a variants that include SP AA vehicles with the Igla or Stinger missiles or the ZU-23; AT vehicles with the AT-5 Spandrel; or an armored reconnaissance vehicle with a 20-mm M55 cannon, 7.62-mm PKT machine gun with twin AT-3 Sagger AT launchers or a single Spandrel system
Protection:			
Armor, turret front (mm):	6-10-mm (defeats 7.l62-mm AP at 300 m)		
Applique armor (mm):	Available on sides for variants		
Explosive reactive armor(mm):	No		
Active Protection System:	No		
Self-entrenching blade:	No		
NBC protection system:	Available		
Smoke equipment:	6 Smoke grenade launchers		
Survivability equipment:	Grill armor over windows		
NOTES SOURCES: 2014 WEG AND MILITARY PERISCOPE. THE MG86 MACHINE GUN IS A LICENSE-BUILT COPY OF THE RUSSIAN PKT. THE BOV-M HAS A CENTRAL TIRE INFLATION SYSTEM. MANY OF THE BOV-MS VEHICLES HAVE STEEL MESH SCRENS MOUNTED OVER THE VEHICLE'S WINDOWS			

FRENCH ARMORED CARRIER/TACTICAL UTILITY VEHICLE VBL



VBL with open rear



VBL with 7.62-mm machine gun (MG)



VBL with Milan Anti-Tank Weapon



VBL with M2HB MG behind protective plates

SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative designations:	Vehicule Blinde Leger, Ultrav, M11	Name:	M2HB
Date of introduction:	1984	Caliber/length:	12.7-mm (.50 caliber)
Proliferation:	1948+/at least 17 countries	Type:	Machine Gun
Description:	4 X 4 armored vehicle carrier serves in a variety of roles. Some variants can carry more than the crew.	Ammo:	1200 Rounds: Ball, Tracer, AP, API, API-T, AP Hardcore, Multipurpose, SLAP, SLAPT
Crew:	3 (driver, commander, gunner)	Maximum Effective Range:	2000 m (day), INA (night)
Combat weight (mt):	3.55	Armor penetration:	AP: 11 mm at 30° at 1500 m Ball: 20 mm at 100 m
Chassis length overall (m):	3.70	Muzzle velocity (m/s):	M33 Ball: 890 SLAPT (Tracer): 1215
Height overall (m):	1.70 (2.14 to top of MG)	Name:	Milan (on some variants)
Width overall (m):	2.02	Caliber/length:	115 mm
Ground pressure (kg/cm²):	INA	Type:	Anti-Tank Missile

Automotive performance:	XD 3T	Ammo:	Tandem Heat-SACLOS (6 Rounds on some variants)
Engine type:	Peugeot liquid-cooled, turbo-charged, in-line, 4-cylinder diesel	Maximum Effective Range:	Milan: 2000 m (minimum 25 m) Milan ER: 3000
Cruising range (km):	600 (max fuel variant to 800, 1000 with external tanks)	Armor penetration:	Milan 3: 1000 mm of ERA or 3 m of reinforced concrete
Speed (km/h):	Max road: 95 Max off-road: INA Average cross-country: INA Max Swim: 5.4	Muzzle velocity (m/s):	200
Fording depths (m):	Amphibious		
Radio:	INA	VARIANTS	SPECIFICATIONS
Protection:		VBL Samantha	Griffon surveillance radar to designate SAM missile & AA artillery targets
Armor, turret front (mm):	5-11.5	VBL Anti-Tank	Equipped with the HOT or TOW turret, but also can be integrated with Kornet or Ingwe missile systems
Applique armor (mm):	No	VBL Albi	Fires Mistral/Mistral 2 SAMs
Explosive reactive armor(mm):	No	VBL with PL127 Turret	12.7-mm MG or 40-mm AGL
Active Protection System:	No	VBL SOURCE	Upgraded optics
Self-entrenching blade:	No	VBL Information	Improved target designation
NBC protection system:	Collective	VAP Deep Penetration Vehicle	Long wheel-base for deep reconnaissance missions
Smoke equipment:	Available	ULTRAV M11	Stretched for NBC detection
Survivability equipment:	Increased mine protection; Kevlar blankets	Wasp Milan ER	Remote weapon station with a 1-tube ATGM launcher & 7.62-mm machine gun
VARIANTS	SPECIFICATIONS	VBL Canon	20-mm remote turret
VBL AT4CS	A54CS 84-mm ATGM carrier with range only to 250 m with ring-mounted 7.62-mm machine gun	VBL Ingwe (South Africa)	Armed Long Range Reconnaissance Turret with 4 Ingwe ATGM launchers
VBL Eryx	Short-range (600 m) AT carrier with secondary 7.62-mm machine gun	MPCV (Multi-purpose Combat Vehicle)	VBR chassis with 4 rail missile launcher turret with 8 missiles & 12.7-mm machine gun
VB2L Poste de Commandement	Command version with extra radios, map board, & 7.62-mm MG for self-protection	VBL Tourelle Fermee	Remote turret that can fire a 12.7-mm MG, 7.62-mm MG, or 40-mm AGL
VBL TOW (Greece)	Single tube with 4 rounds with range to 3,750 m	VBR	Stretch variant can carry 5 soldiers; remote weapon station with M2HB MG & smoke grenade launchers
VBL Milan	1 Milan firing unit with 6 missiles with range to 2 km		
NOTES SOURCES: 2014 WEG, ARMY RECOGNITION, AND MILITARY PERISCOPE. SOME VBLS WILL CARRY A 7.62-MM MACHINE GUN AS A SECONDARY WEAPON. THIS COULD BE COAXIAL MOUNTED ON AN ATGM PLATFORM SYSTEM OR ON A RING MOUNT. LRAC ANTI-TANK LAUNCHERS ARE ALSO AVAILABLE AS AN OPTION			

TURKISH LIGHT ARMORED VEHICLE COBRA



Cobra

SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative designations:	None	Name: (For APC Variant)	M2HB
Date of introduction:	1998	Caliber/length:	12.7-mm (.50 caliber)
Proliferation:	13+/at least 12 countries	Type:	Machine Gun
Description:	4 X 4 light armored personnel carrier can carry up to 10 troops besides the crew; 4 side doors, rear door, & 2 roof hatches; 3 firing ports on each side of vehicle & 1 in rear door	Ammo:	1000 Rounds: Ball, Tracer, AP, API, API-T, AP Hardcore, Multipurpose, SLAP, SLAPT
Crew:	2 (driver, commander	Maximum Effective Range:	AP: 1500 m (day-estimate); 1200 night-estimate)

			Ball: 1500 m (day-estimate); 1200 night-estimate)
Combat weight (mt):	6.2	Armor penetration:	AP: 11 mm at 30° at 1500 m Ball: 20 mm at 100 m
Chassis length overall (m):	5.0 (5.23 with winch)	Muzzle velocity (m/s):	M33 Ball: 890 SLAPT (Tracer): 1215
Height overall (m):	2.10 (cabin top)	VARIANTS	SPECIFICATIONS
Width overall (m):	2.20	APC	Basic variant to carry 8-12 troops with 12.7-mm machine gun. The APC can be fitted with a open or turret-mounted 40-mm AGL, 25-mm cannon, or 30-mm cannon.
Ground pressure (kg/cm^2):	INA	Armored Reconnaissance Vehicle	Crew of 4 in vehicle with a 25-mm cannon & FLIR
Automotive performance:		Armored C2 Vehicle	Command & control vehicle with crew of 6 armed with 7.62-mm MG
Engine type:	General Motors V-8, water-cooled, turbo-charged diesel	Armored Ambulance	Evacuates 4 litter or 6 seated patients, plus medical gear
Cruising range (km):	725	TOW Missile Carrier	Crew of 5 with a TOW ATGM with range to 3750 m or Rafael overhead weapons system with Spike AT missiles
Speed (km/h):	Max road: 115 Max off-road: INA Average cross-country: INA Max Swim: 8	Cobra EOD Vehicle	Designed for explosive ordnance disposal with controlled blade on front of vehicle operated by driver
Fording depths (m):	Amphibious	Cobra Reconnaissance/ Surveillance Vehicle	Target acquisition for higher unit commands
Radio:	Varies depending on the customer's needs	Cobra Twin-Turret	Rotating turret with 40-mm AGL & 12.7-mm machine gun
Protection:		Cobra Amphibious Vehicle	Allows vehicle to enter water without any preparation
Armor, turret front (mm):	INA (against 7.62-mm rounds)	NBC Reconnaissance Vehicle	Equipped with NBC sensors
Applique armor (mm):	Available		
Explosive reactive armor(mm):	Available		
Active Protection System:	No		
Self-entrenching blade:	No		
NBC protection system:	Available		
Smoke equipment:	Smoke grenade launchers		
Survivability equipment:	Electrical self-recovery winch; fire suppression system		
NOTES SOURCES: 2014 WEG AND MILITARY PERISCOPE. THE NUMBER OF COBRAS OPERATIONAL WORLDWIDE IS MORE NUMEROUS THAN LISTED AS MOST COUNTRIES THAT HAVE THEM HAVE NOT RELEASED THEIR ON-HAND FIGURES.			

AMERICAN LIGHT ARMORED VEHICLE V-150



USMC V-150 Commando



Portuguese V-150 Commando

SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative designations:	LAV-150 Commando	Name:	FN MAG
Date of introduction:	1971	Caliber/length:	7.62-mm
Proliferation:	4205+/at least 30 countries	Type:	Cupola Machine Gun
Description:	4 X 4 light armored vehicle with an exit door on both sides of the vehicle for 2 soldiers with no firing ports	Ammo:	3200 Rounds: Ball-T, Match, API, API-T
Crew:	3 (driver, commander, gunner)	Maximum Effective Range:	1500 (day); INA (night)
Combat weight (mt):	9.89 (V-150)	Armor penetration:	INA
Chassis length overall (m):	5.69 (longer for V-150S & M1117)	Muzzle velocity (m/s):	840
Height overall (m):	1.98 (2.59 for M1117)	VARIANTS	SPECIFICATIONS
Width overall (m):	2.26 (2.56 for M1117)	LAV-150 Commando V-100	Original model with gasoline engine with top speed of 100 km/h. Variants included APCs, 81-mm mortar carriers, command vehicles, Dragon missile carrier, TOW missile carrier, police & fire variants, & turreted versions with various weapons
Ground pressure (kg/cm^2):	INA	LAV-150 Command V-150	Diesel engine with top speed of 89 km/h
Automotive performance:	V-504 (V-150)	LAV-150 Command V-150S	Stretched by an additional 0.46 m, improved cross-country performance, & higher payload capacity
Engine type:	Cummins liquid cooled, V-8 diesel (other models have different engines)	LAV-150 Command V-150ST	Stretched variant with a turbo-charged engine with bottom of side hatch forming a step to dismount
Cruising range (km):	800 (718 for M1117)	LAV-150 Commando V-200 (Singapore)	Chrysler gasoline engine with different variants (20-mm turret, 90-mm turret, RBS-70 SAM system for

			air defense, recovery vehicle, & 120-mm mortar carrier)
Speed (km/h):	Max road: 89 (100 for M1117) Max off-road: INA Average cross-country: INA Max Swim: 5	LAV-150 V-300	6 X 6 variant with 9-10 troops, 3 crew, 105 km/h speed, & amphibious
Fording depths (m):	M1117: 1.5 (all others amphibious)	DN-III/V Caballo (Mexico)	DN-88 has 7.62-mm MG in turret; DN-V has 12.7-mm MG; both have mount for RM-12 light MG in rear
Radio:	INA	Malaysian Upgraded V-150	Proposed version to covert Malaysian army V-150s from gasoline to diesel engines
Protection:		M1117 ASV/ASV-150	Bridges the gap between the HMMWV & APC with a turret featuring a MK-19 40-mm AGL & a 14.7 (.50 caliber) machine gun
Armor, turret front (mm):	Against 7.62-mm ball	M707 Armored Knight	Artillery support vehicle
Applique armor (mm):	No	Mobile Strike Force Vehicle (MSFV) (Afghanistan)	3 variants (APC with gunner protective kit, APC with turret, & ambulance) additional protection using off-the-shelf parts
Explosive reactive armor(mm):	No	Tactical Armored Patrol Vehicle (Canada)	When fielded, it will use the Kongsberg Protector remotely operation weapons station
Active Protection System:	No	Commando Advanced APC	Extended vehicle to increase troop capacity with V-shaped hull to deflect mine blasts
Self-entrenching blade:	No		
NBC protection system:	No		
Smoke equipment:	Available		
Survivability equipment:	V-shaped hull available		
NOTES SOURCES: 2014 WEG, TM 43-0001-27 TM 43-0001-27 AND MILITARY PERISCOPE. MANY LAVS HAVE ADDED A 40-MM MK-19 AGL TO ITS WEAPONRY.			

AMERICAN MINE-RESISTANT VEHICLE COUGAR



Cougar Mine-Resistant Vehicle

SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative designations:	Cougar H Series	Name:	None on basic version
Date of introduction:	2004	Caliber/length:	N/A
Proliferation:	3993+/at least 9 countries	Type:	N/A
Description:	4 X 4 medium mine-protected vehicle can carry 4 soldiers plus crew that come in a number of variations	Ammo:	N/A
Crew:	2 (driver, commander)	Maximum Effective Range:	N/A
Combat weight (mt):	19.5 (4 X 4); 29.3 (6 X6)	Armor penetration:	IN/A
Chassis length overall (m):	5.64 (4 X 4) 6.81 (6 X 6)	Muzzle velocity (m/s):	N/A

Height overall (m):	2.62	VARIANTS	SPECIFICATIONS
Width overall (m):	2.59	Marder 1	Original variant with a rear 7.62 machine gun; most are upgraded or no longer in service
Ground pressure (kg/cm²):	INA	Cougar 6 X 6	Identical performance to 4 X 4, but with room for 12 soldiers in rear
Automotive performance:		Mastiff Protected Patrol Vehicle (PPV) (UK)	UK version of the 6 X 6 Cougar
Engine type:	Caterpillar C7 diesel	Mastiff 2 PPV (UK)	Upgraded UK 6 X 6 Cougar
Cruising range (km):	5966	Ridgeback (UK)	British 4 X 4 Cougar with Bowman communication system, ECM, night-vision & camera; variants include protected weapons station, remote weapons station, command post, & ambulance
Speed (km/h):	Max road: 105 Max off-road: INA Average cross-country: INA Max Swim: N/A	Wolfhound Tactical Support Variant (UK)	British 4 X 4 for logistics support with a cargo capacity of 4.5 tons
Fording depths (m):	1.0	Joint Explosive Rapid Response Vehicle (JERRV)	Cougar modified for EOD duties
Radio:	INA	Iraqi/International Light Armored Vehicle (ILAV)	Also known as the Badger, supports the transition efforts of the Iraqi forces
Protection:		Timberwolf	Similar to the Wolfhound with a driver, 5 Soldiers, & a remote controlled weapons station with a 7.62-mm MG, 12.7-mm MG, or a 40-mm AGL
Armor, turret front (mm):	Against 7.62 X 51-mm/54-mm AP rounds		
Applique armor (mm):	Standard		
Explosive reactive armor(mm):	No		
Active Protection System:	Available (Electronic countermeasures-ECM)		
Self-entrenching blade:	No		
NBC protection system:	MDH Overpressure with M998 filters		
Smoke equipment:	No		
Survivability equipment:	Internal Modular Side Plates, External Roof Plates, Stand-Off Armor, Flexible Lower Side-Skirt Armor, prevents blast attacks up to 13.6 kg TNT equivalent under wheel & 6.8 kg under hull/engine		
NOTES SOURCES: MILITARY PERISCOPE. ALSO USED BY PRIVATE SECURITY COMPANIES IN IRAQ SUCH AS BLACKWATER USA. MORE THAN 200 COUGARS TOOK 100 HITS FROM EXPLOSIVE DEVICES WITHOUT LOSS OF LIFE DURING ONE PERIOD OF TIME.			

SOUTH AFRICAN MINE-RESISTANT VEHICLE RG-31



RG-31 Mine-Proteced Vehicle

SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative designations:	RG-31 Nyala (South Africa) RG-31 Charger (US)	Name:	None on basic version
Date of introduction:	1971	Caliber/length:	N/A
Proliferation:	3296+/7 countries	Type:	N/A
Description:	4 X 4 armored vehicle can carry up to 8 troops that protects the occupants from	Ammo:	N/A

	small-arms fire & mines/explosives		
Crew:	2 (driver, commander)	Maximum Effective Range:	N/A
Combat weight (mt):	8.4 (RG-31 Mk 3) 14.2 (RG-31 Mk 5) 18.6 (RG-31 Mk 5EHM)	Armor penetration:	INA
Chassis length overall (m):	5.74 (RG-31 Mk 3) 6.6 (RG-31 Mk 5) 7.0 (RG-31 Mk 5EHM)	Muzzle velocity (m/s):	N/A
Height overall (m):	2.57 (RG-31 Mk 3) 2.72 (RG-31 Mk 5) 2.80 (RG-31 Mk 5EHM)	**VARIANTS**	**SPECIFICATIONS**
Width overall (m):	2.20 (RG-31 Mk 3) 2.48 (RG-31 Mk 5) 2.50 (RG-31 Mk 5EHM)	RG-31 Mk 3	Speed up to 120 k/hr
Ground pressure (kg/cm^2):	INA	RG-31 Quick Intervention Vehicle (Scorpion)	Weapons platform for a variety of weapons (crew of 4)
Automotive performance:	RG-31 Mk 3	RG-31 Mk 3 Ambulance	Crew of 4 can accommodate 4 stretcher patients
Engine type:	HR 694 Hi3, water-cooled, 6-cylinder, in-line diesel	RG-31 Mk 5EHM	Speed up to 100 k/hr
Cruising range (km):	805 (RG-31 Mk 5)	RG-31 Mk 5	2-man crew with only 6 soldiers armed with 5.65-mm, 7.62-mm, or 12.7-mm MGs; or Mk 19 AGL; Speed up to 113 k/hr
Speed (km/h):	Max road: 120 (RG-31 Mk 3) Max off-road: INA Average cross-country: INA Max Swim: N/A	RG-31 Mk 6	Longer wheelbase, greater payload capacity, improved ballistic protection with applique passive armor & spall liners; Australian Platt protected weapons station
Fording depths (m):	0.91 (RG-31 Mk 5) w/o prep		
Radio:	INA		
Protection:			
Armor, turret front (mm):	Against 5.56-mm rounds		
Applique armor (mm):	Available (RG-31 Mk 6)		
Explosive reactive armor(mm):	No		
Active Protection System:	Available (EMS)		
Self-entrenching blade:	No		
NBC protection system:	No		
Smoke equipment:	No		
Survivability equipment:	Hull can withstand a double TM57 level mine explosion (14 kg of TNT) under any wheel or a single detonation (7 kg of TNT) under the central vehicle		

NOTES

SOURCES: MILITARY PERISCOPE. ONE OF THE EARLY MINE-PROTECTED VEHICLES USED IN IRAQ. WHILE BASIC MODEL IS UNARMED & USED TO TRANSPORT SUPPLIES, OTHER VERSIONS CAN BE ARMED WITH A VARIETY OF WEAPONS INCLUDING THE PLATT WEAPONS STATION WITH 5.56-MM, 7.62-MM, OR 12.7-MM MGS OR MK-17 AGS

GERMAN ALL-PROTECTED VEHICLE DINGO



Dingo

SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative designations:	Multi-Purpose Protected Vehicle (MPPV) (Belgium)	Name:	Rheinmetall
Date of introduction:	2004	Caliber/length:	7.62-mm
Proliferation:	604+/at least 7 countries	Type:	Machine Gun
Description:	Modular design 4 X 4 APC with space for 6 soldiers; 4 sides doors with rear storage area; no firing ports	Ammo:	INA
Crew:	2 (driver, commander)	Maximum Effective Range:	1500 m (Day); INA (Night)
Combat weight (mt):	12.5 + payload	Armor penetration:	INA
Chassis length overall (m):	5.50 (Short) 6.10 (Long & Large Volume)	Muzzle velocity (m/s):	M59 Ball; M61 AP; M62 Tracer; M80 Lead Free; M992 AP; L2A1 Ball; L5A1 Tracer; L44A1 Ball; Patrone AB22 DM 111 *Weichkern* Ball; Patrone DM111A1 Ball; DM18A1B1 *Übung*
Height overall (m):	2.60 (Short & Long) 2.60-2.80 (Large Volume)	VARIANTS	SPECIFICATIONS
Width overall (m):	2.40	Dingo 2 Short	Upgraded variant with crew of 2 & 3 passengers

Ground pressure (kg/cm²):	INA	Dingo 2 Long	Upgraded version with crew of 2 & 6 passengers
Automotive performance:		Dingo 2 Large Volume	Upgraded variant with crew of 2 & 8 soldiers or larger payload
Engine type:	215 horsepower with EPS/EAS transmission	Dingo HD	Heavy duty with payload up to 3 tons with an increased vehicle weight to 14.5 mt
Cruising range (km):	1000 (700-Large volume)	Dingo 2 NBC	NBC recon & surveillance vehicle
Speed (km/h):	Max road: 100 Max off-road: INA Average cross-country: INA Max Swim: N/A	Dingo 2 GSR	Ground surveillance radar vehicle
Fording depths (m):	1.0	Dingo 2 Patrol	Remote turret with either a 7.62-mm or 12.7-mm machine gun
Radio:	INA (As needed by customer)	Dingo 2 Ambulance	Medical transport vehicle
Protection:		Dingo 2 Pick Up	Cargo carrier ILO of passenger compartment in back
Armor, turret front (mm):	Against hand-hand weapons & artillery fragments to 155-mm	Dingo 2 GSI	Armored recovery & repair vehicle
Applique armor (mm):	INA	Dingo 2 ARV	Armored recovery vehicle with dismounted crane
Explosive reactive armor(mm):	INA		
Active Protection System:	INA		
Self-entrenching blade:	No		
NBC protection system:	Yes (Info INA)		
Smoke equipment:	INA		
Survivability equipment:	Double hull against fragments & internal belly pan against mines		
NOTES SOURCES: 2014 WEG AND MILITARY PERISCOPE. OTHER VARIANTS CAN MOUNT A 12.7-MM MACHINE GUN OR THE 40-MM AUTOMATIC GRENADE LAUNCHER			

RUSSIAN IMPROVED LIGHT TACTICAL VEHICLE TIGR-M



Tigr-M

SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative designations:	Gaz-2330 SPM-1/SPM-2	Name:	Pecheneg
Date of introduction:	2004	Caliber/length:	7.62-mm
Proliferation:	Unknown/at least 8 countries	Type:	Machine Gun
Description:	4 X 4 utility vehicle similar to the HWWMV based on the GAZ-2330 chassis; can carry 5 to 10 total personnel based on variant; firing ports in police version only	Ammo:	Ball; AP; Trace; API; Sniper
Crew:	2 (driver, commander)	Maximum Effective Range:	1500 m (Day); 1200 (Night-estimate)
Combat weight (mt):	7.80	Armor penetration:	57-N-323S Ball; 6 mm at 520 m & body armor at 110 m 7N13 AP: 6 mm at 660 m & body armor at 800 m
Chassis length overall (m):	5.70	Muzzle velocity (m/s):	825
Height overall (m):	2.40	VARIANTS	SPECIFICATIONS

Width overall (m):	2.40	2330	Standard with 5 doors, closed cargo compartment & 4 seats
Ground pressure (kg/cm²):	INA	2975	Police
Automotive performance:	B215		
Engine type:	Diesel (or Cummins B-180 or YaMZ-536)	SPM-1 (233034)	Police with 2 crew members & 7 passengers
Cruising range (km):	900		
Speed (km/h):	Max road: 140 Max off-road: INA Average cross-country: INA Max Swim: N/A	SPM-2 (233036)	SPM-1 with window firing ports
Fording depths (m):	1.30	SPM-2 Tigr Alpha BB	Level 5 ballistic protection
Radio:	INA (As needed by customer)	233301 & 233011	Unarmored pickup truck with 4 doors, 4 seats & closed rear
Protection:		233002 & 233012	2-door pickup model
Armor, turret front (mm):	5.0 with spall liner; 7.62-mm protection (armor versions)	233003 & 233013	3-door SUV with sedan body
Applique armor (mm):	INA	233014-000186 & 233014-000184	Armored variants
Explosive reactive armor(mm):	INA	233114	Upgraded engine & armor
Active Protection System:	INA	Tigr-AR Assault Ramp Vehicle	Scales vertical obstacles to 8 m in height & special cutting tools
Self-entrenching blade:	No	R-145MBA	C2 vehicle with commo equipment
NBC protection system:	No	Kornet-D/EM	Tigr with 2 launches for 8 missiles
Smoke equipment:	No	MKTK REI PP	Mobile electronic warfare vehicle
Survivability equipment:	Spall liner	Scout Vehicle	With telescopic antenna
		Tigr-M	YaMZ-534 diesel engine with seats for 9 passengers instead of 8
		MK-BLA-01	UAV carrier vehicle
		SP46	2-Door parade vehicle with cabriolet body (folding roof)
NOTES SOURCES: 2014 WEG AND MILITARY PERISCOPE. OTHER VARIANTS CAN MOUNT A 12.7-MM MACHING UN; 30-MM AGL; OR THE KORNET-EM MULTI-PURPOSE MISSILE SYSTEM.			

RUSSIAN TACTICAL UTILITY VEHICLE UAZ-469



UAZ-469 Tactical Utility Vehicle



UAZ-469 with top and windows down

SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative designations:	UAZ-3151 Upgrade *Kozlik* (Goat)	Name:	None on basic model
Date of introduction:	1971 (Upgrade-1985)	Caliber/length:	N/A
Proliferation:	Widespread, especially among former WARSAW Pact countries & old Soviet allies	Type:	N/A
Description:	4 X 4 off-road vehicle can carry up to 6 passengers plus the driver	Ammo:	N/A
Crew:	1 (driver)	Maximum Effective Range:	N/A
Combat weight (mt):	2.35	Armor penetration:	N/A
Chassis length overall (m):	4.025	Muzzle velocity (m/s):	N/A
Height overall (m):	1.99	VARIANTS	SPECIFICATIONS
Width overall (m):	1.785	UAZ-469	Initial model fielded in 1973 with 70 horsepower UMZ 451 MI engine with inferior road performance & crew features
Ground pressure (kg/cm²):	INA	UAZ-469B	Export version with lower off-road performance capabilities
Automotive performance:		UAZ-3151 Upgrade	Improved vehicle first produced in 1985
Engine type:	92 horsepower gasoline	Ambulance	Space for driver, one medic, & 1 stretcher patient
Cruising range (km):	482	BJ-212	Chinese UAZ-469 variant
Speed (km/h): Max road: 110 Max off-road: INA Average cross-country: INA Max Swim: N/A			

Fording depths (m):	0.8		
Radio:	INA		
Protection:			
Armor, turret front (mm):	INA		
Applique armor (mm):	No		
Explosive reactive armor(mm):	No		
Active Protection System:	No		
Self-entrenching blade:	No		
NBC protection system:	No		
Smoke equipment:	No		
Survivability equipment:	Optional winch		

NOTES

SOURCES: 2014 WEG. 600 KG PAYLOAD CAPACITY. CARGO SPACE IS 1.6 SQUARE METERS, 1400 MM X 1000 M X 400 MM. OFTEN UNARMED, BUT SOME FEATURE A PINTLE-MOUNTED 7.62-MM OR 12.7-MM MACHINE GUN OR A W-87 AUTOMATIC GRENADE LAUNCHER. AIR DEFENSE OR ANTI-TANK UNITS MAY HVE OTHER ROLE-SPECIFIC WEAPON SYSTEMS.

BRITISH ALL-TERRAIN VEHICLE SUPACAT



Supacat

SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative designations:	All-Terrain Mobile Platform (ATMP)	Name:	PKT
Date of introduction:	By 1982	Caliber/length:	7.62-mm
Proliferation:	Unknown/at least 43 countries	Type:	PKT machine gun
Description:	6 X 6 rough terrain vehicle can carry 2 to personnel with gear or 4 personnel with less gear; vehicle is open & provides no protection to its occupants	Ammo:	Light Ball, Ball-T; Heavy Ball, API, API-T, Incendiary: 800 rounds (estimated): At Gun: 200 Ready Boxes: 600
Crew:	N/A	Maximum Effective Range:	1000 m (day); 400-500 on the move; INA (night)
Combat weight (mt):	2.70 (3.50-Mk III)	Armor penetration:	8 (RHA) at 500 m

Chassis length overall (m):	3.44 (with winch)	Muzzle velocity (m/s):	825
Height overall (m):	1.90	VARIANTS	SPECIFICATIONS
Width overall (m):	2.00	ATMP	Basic Model
Ground pressure (kg/cm²):	INA	FLPT	Fork Lift Pallet Trailer can handle pallets up to 1.6 mt
Automotive performance:	VW ADE	SLLPT	Self-Loading Lightweight Pallet Trailer
Engine type:	Turbo-charged diesel	Fuel Cat	Carries & pumps up to 1000 liters of aviation fuel & carries an engine start system. It can also carry an Air Portable Fuel Container (APFC)
Cruising range (km):	INA	Mounted Crane	Crane used for light maintenance operations
Speed (km/h):	Max road: 64 Max off-road: INA Average cross-country: INA Max Swim: < 5	Aircraft Crash Recovery Vehicle	Designed to get to difficult crash sites to recover bodies & investigate the crash
Fording depths (m):	Amphibious	Radio Rebroadcast Stations	Can be used to relay radio signals
Radio:	Vehicle/Man pack (to meet customer's need)	Casualty Evacuation	Used to get patients from difficult terrain to aid stations/hospitals
Protection:		AGTM Launcher	Fitted with Milan
Armor, turret front (mm):	Against 76.2-mm rounds, but most of vehicle is open	Mortar Carrier	Can carry an 81-mm mortar
Applique armor (mm):	No	Howitzer Tow Vehicle	Can tow a 105-mm howitzer & ammunition trailers in artillery units
Explosive reactive armor(mm):	No	Engineer Vehicle	Used by engineers to conduct operations
Active Protection System:	No		
Self-entrenching blade:	No		
NBC protection system:	No		
Smoke equipment:	INA		
Survivability equipment:	INA		

NOTES

SOURCES: 2014 WEG. THE 7.62 MACHINE GUN IS THE MOST COMMON WEAPON, BUT OTHER OPTIONS INCLUDE A 12.78-MM MACHING GUN, A 30/35/40-MM AUTOMATIC GRENADE LAUNCHER, OR AN ATGM LAUNCHER. PINTLE MOUNTS ON ROLL BAR ALLOW FOR OTHER WEAPONS. THE PINTLE MOUNT CAN EVEN HOLD A FARA-1 GROUND SURVEILLANCE RADAR WHEN THE SUPACAT IS STATIONARY

RUSSIAN BATTLEFIELD SUPPORT VEHICLE LUAZ-967



LuAz-967M Battlefield Support Vehicle

SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative designations:	See Variants	Name:	AGS-17 (Weapons carrier only)
Date of introduction:	1961	Caliber/length:	30-mm
Proliferation:	20,000 vehicles produced/ Russia has some in storage/in service with some countries	Type:	Automatic Grenade Launcher (AGL)
Description:	4 X 4 off-road vehicle similar to the American Jeep	Ammo:	HE; HEDP 116 rounds (estimated)
Crew:	1 (Driver) with space up to 4 additional soldiers	Maximum Effective Range:	1700
Combat weight (mt):	0.93	Armor penetration:	INA
Chassis length overall (m):	3.68	Muzzle velocity (m/s):	185
Height overall (m):	1.63	VARIANTS	SPECIFICATIONS
Width overall (m):	1.74	LuAZ-967A	37-hp engine with top speed of 75 km/h that can tow trailers & light artillery up to 300 kg
Ground pressure (kg/cm²):	INA	LuAZ-967M	Final production model until 1991 with same engine as the LuAZ-967A
Automotive performance:	MeMZ-965	Geolog	6 X 6 version never produced
Engine type:	27-hp gasoline	Evacuation Role	2 stretcher & 2 seated
Cruising range (km):	285		
Speed (km/h):	Max road: 65		

	Max off-road: INA Average cross-country: INA Max Swim: 3		
Fording depths (m):	Amphibious		
Radio:	INA		
Protection:			
Armor, turret front (mm):	INA		
Applique armor (mm):	No		
Explosive reactive armor(mm):	No		
Active Protection System:	No		
Self-entrenching blade:	No		
NBC protection system:	No		
Smoke equipment:	No		
Survivability equipment:	200 kg winch available for self-recovery		
NOTES SOURCES: 2014 WEG, MILITARY TODAY, MILITARY FACTORY, MINOTOR-SERVICE & PAUL MULCAHY'S PAGES. THIS VEHICLE CAN ALSO BE FITTED WITH A FATO ATGM OR 82-MM RECOILLSS RIFLE. THE SEAT CAN BE ADJUSTED SO THE DRIVER'S SEAT CAN BE FOLDED DOWN SO THE DRIVER CAN OPERATE THE VEHICLE WHILE LAYING FLAT. THE VEHICLE CAN CARRY UP TO 320 KG OF SUPPLIES, BUT MAXIMUM PAYLOAD CAPACITY IS 420 KG.			

SINGAPORE LIGHT STRIKE VEHICLE SPIDER



Spider Light Strike Vehicle

SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative designations:	None	Name:	CIS-50
Date of introduction:	2008	Caliber/length:	12.7-mm
Proliferation:	Unknown/at least 1 country. Similar to vehicles in 9 or more countries.	Type:	Machine Gun
Description:	4 X 4 dune buggy type vehicle with rollover frame can hold	Ammo:	1200 Rounds (Estimated) API, API-T, Incendiary, I-T



	up to 6 passengers in addition to the crew.		
Crew:	3 (driver, commander)	Maximum Effective Range:	AP & Ball: 1500 (Day-Estimated); 1200 (Night-Estimated)
Combat weight (mt):	1.60	Armor penetration:	AP: 11 mm at 30° at 1500 m Ball: 20 mm at 100 m
Chassis length overall (m):	4.50	Muzzle velocity (m/s):	APDS-T: 1150 API-T: 1100 CAN: 1055 HEI, HEI-T: 1045
Height overall (m):	1.90	VARIANTS	SPECIFICATIONS
Width overall (m):	2.0	SRAMS	120-mm Super Rapid Advanced Mortar System (SRAMS) with an auto-loader & 6 rounds on vehicle
Ground pressure (kg/cm^2):	INA	Ammo Carrier	Accompanies the SRAMS with additional crew member
Automotive performance:	Peugeot	Spider with Spike ATGM	Anti-tank weapons carrier
Engine type:	In-line 4, turbo-charged diesel		
Cruising range (km):	700		
Speed (km/h):	Max road: 120 Max off-road: 80 Average cross-country: INA Max Swim: N/A		
Fording depths (m):	0.60		
Radio:	INA; man-portable/vehicle as needed by the customer		
Protection:			
Armor, turret front (mm):	None, relies on speed		
Applique armor (mm):	No		
Explosive reactive armor(mm):	No		
Active Protection System:	No		
Self-entrenching blade:	No		
NBC protection system:	No		
Smoke equipment:	INA		
Survivability equipment:	Off-road mobility, speed, 360°crew fire, & quick dismount for protection		

NOTES

SOURCES: 2014 WEG AND MILITARY PERISCOPE. OTHER WEAPON OPTIONS INCLUDE A 5.56-MM MACHINE GUN, 7.62-MM MACHINE GUN WITH 3000 ROUNDS, AN AUTOMATIC GRENADE LAUNCHER WITH 300 ROUNDS, OR A SPIKE-LR AGTM WITH 6 ROUNDS. VARIOUS USES INCLUDE AS A WEAPONS TEAM VEHICLE, FIRE SUPPORT VEHICLE, ANTI-TANK WEAPONS CARRIER, MAN-PORTABLE SAM VIHICLE, OR AS A RISTA/SECURITY TEAM VEHICLE.

RUSSIAN HEAVY APC/HEAVY CSV BTR-T



BTR-T Heavy Armored Personnel Carrier/Heavy Combat Support Vehicle

SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative designations:	None	Name:	2A42
Date of introduction:	1997	Caliber/length:	30-mm
Proliferation:	Developed, marketed for export-no purchasers yet	Type:	Automatic Gun
Description:	Tracked T-55 tank hull with overhead weapons system with 4 dismounted soldiers. Limited troop capacity & no firing ports makes it more of a CSV than an APC	Ammo:	200 rounds: HEI-T, Frag-HE: 100 APFSDS-T: 100
Crew:	3 (driver, commander, gunner)	Maximum Effective Range:	Frag-HE: 4000 (day); 800-1300 (night) APFSDS-T M929; 2500 m (day); 800-1300 (night)
Combat weight (mt):	38.5	Armor penetration:	APFSDS-T M929: 55 mm KE at 1000 m; 45 mm KE at 2000 m
Chassis length overall (m):	6.20	Muzzle velocity (m/s):	825
Height overall (m):	2.40	Name:	9P135M2 (options: Trigan & MILAN)

Width overall (m):	3.27	Caliber/length:	135-mm
Ground pressure (kg/cm^2):	INA	Type:	SACLOS AT-5B/Konkurs-M ATGM
Automotive performance:		Ammo:	HEAT: 3 Rounds
Engine type:	Diesel	Maximum Effective Range:	AT-5B: 4000 m (day); 2500 m (night) Triagan (with Flame-G): 2500 (day & night) MILAN 3 (with Flame-G): 1290 (day & night)
Cruising range (km):	500	Armor penetration:	AT-5B: 925 mm CE (RHA) Trigan: 1300 mm CE (RHA) MILAN 3: 880 mm CE (RHA)
Speed (km/h):	Max road: 50 Max off-road: INA Average cross-country: INA Max Swim: N/A	Muzzle velocity (m/s):	~ 820
Fording depths (m):	1.4 (5.0 with snorkel)		
Radio:	R-173; R-173P	VARIANTS	SPECIFICATIONS
Protection:		Machine Gun Overhead Weapons Station	12.7-mm machine gun, with AGL or ATGM launchers
Armor, turret front (mm):	No turret; hull: 200 (KE/600 (CE)	30-mm Gun Overhead Weapons Station	Twin 30-mm automatic gun, or 30-mm with ATGM, or 30-mm with AGL
Applique armor (mm):	No	Scout-Patrol Vehicle (DPM)	Recon vehicle with 12.7-mm MG
Explosive reactive armor(mm):	Yes		
Active Protection System:	No		
Self-entrenching blade:	KMT-8 Mine plow available		
NBC protection system:	Collective		
Smoke equipment:	12 Smoke grenade launchers, VEESS		
Survivability equipment:	Grill armor in hull		

NOTES

SOURCES: 2014 WEG. VEHICLE MAY HAVE BEEN RESPONSE TO THE RUSSIAN EXPERIENCE IN CHECHNYA AS A SPECIAL ROLE APC FOR ACCOMPANY TANKS & INFANTRY IN URBAN CONFLICTS. SEVERAL LIMITATIONS FOR THIS VEHICLE AS AN APC: (1) DISMOUNT CAPACITY IS LESS THAN A FULL SQUAD; (2) SOLDIERS OTHER THAN THE CREW MUST EXIT VROM 2 HATCHES ON THE TOP AT THE REAR AND EXPOSES THEM TO DIRECT FIRE; (3) INTIIAL CONFIGURATIONS LACK ANTI-PERSONNEL WEAPONS & REMOTE WEAPONS FOR 360° PROTECTION; & (4) MOBILITY IS INFERIOR TO MOST MODERN TANKS. VEHICLE DOES FIT WELL INTO TIGHTLY CONGESTED AREAS SUCH AS FOREST TRAILS. A VARIETY OF ATGM SYSTEMS CAN BE MOUNTED ON THE VEHICLE SUCHT AS THE AT-4 FAGOT (9P135), AT-5 KONKURS, TRIGAN, & MILAN. THE MOST LETHAL OF THESE OPTIONS IS THE TRIGAN THAT MOUNTS ONTO A MILAN LAUNCHER ADAPTER.

RUSSIAN ARMORED PERSONNEL CARRIER MT-LB



Medic MT-LB



MT-LB Air Defense Vehicle



MT-LB Anti-Tank Vehicle

SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative designations:	MT-LB-T (Prime mover	Name:	PKT
Date of introduction:	1970	Caliber/length:	7.62-mm
Proliferation:	7170+/at least 16 countries	Type:	2 PKT machine guns
Description:	General-purpose carrier & prime mover developed from an unarmored civilian tractor. Some versions are used as an APC with a maximum capacity of 11 dismounted soldiers	Ammo:	Light Ball, Ball-T; Heavy Ball, API, API-T, Incendiary: 2000 rounds
Crew:	2 (driver, commander)	Maximum Effective Range:	1000 m (day); 400-500 on the move; INA (night)
Combat weight (mt):	11.90	Armor penetration:	8 (RHA) at 500 m
Chassis length overall (m):	6.35	Muzzle velocity (m/s):	825
Height overall (m):	1.87 (without weapons)	VARIANTS	SPECIFICATIONS
Width overall (m):	2.85	MT-LB “Blade”	Dozer version

Ground pressure (kg/cm²):	0.46 (standard track); 0.28 (wide track)	MT-LBu	Raised hull area for improved carrying capacity in 50+ of 60+ MT-LB variants
Automotive performance:	YaMZ 238V	2S1	122-mm SP howitizer
Engine type:	Liquid-cooled, V-8 diesel	BMP-23 (Bulgaria)	IFV on MT-LB chassis with 23-mm BMP-2 auto cannon
Cruising range (km):	500	BTP-LB	Technical support vehicle
Speed (km/h):	Max road: 61.5 (modernized-70) Max off-road: 30 (modernized-45) Average cross-country: INA Max Swim: 5-6	MT-SON	Ground surveillance radar (GSR) with the Pork Trough/SNAR-2 radar system
Fording depths (m):	Amphibious	RKhM	Chemical recon vehicle
Radio:	R-123 or R-123M or R-173	SA-13	SAM launcher vehicle at the regimental level
Protection:		SNAR-10	GSR with Big Fred radar
Armor, turret front (mm):	7-14	9P149/Shturm-S	ATGM launcher vehicle with AT-60 autoloader
Applique armor (mm):	No	MT-LBV (Ukraine)	MT-LB or MT-LBu upgrades
Explosive reactive armor(mm):	No	MT-LBVM	Modern 12.7-mm MG
Active Protection System:	INA	MT-LB Upgrade (Ukraine)	30-mm auto cannon, night sights, & other improvements
Self-entrenching blade:	Yes	MT-LB6MA (Russia)	Upgrade with 14.5-mm, twin 14.5-mm MGs with 7.62-mm machine gun
NBC protection system:	Collective	MT-LB6MB (Russia)	Upgraded APC with Modular Weapon Station includes the 30-mm cannon, 30-mmAGL, & 7.62-mm MG
Smoke equipment:	No	MT-LB6MB3 (Russia)	FSV/APC upgrade with anti-aircraft 23-mm GSh-23L twin cannons, 30-mm AGL & 7.62-mm machine gun
Survivability equipment:		MT-LB6MB5 (Russia)	APC/IFSV with Gsh-30K twin 30-mm anti-aircraft guns, 12.7-mm MG, 30-mm AGL & space for a single squad

NOTES

SOURCES: 2014 WEG AND MILITARY PERISCOPE. THE WIDE TRACK MAKES IT ONE OF THE WORLD'S BEST LAVS FOR ICE, SNOW, MARSHES, & SAND. BASIC MODEL CARRIES ONE 7.62-MM MACHINE GUN. OTHER WEAPONS SYSTEMS CAN BE MOUNTED ON THE VEHICLE FOR A VARIETY OF PURPOSES. MT-LB HAS BEEN CONVERTED BY THEIR USERS INTO A NUMBER OF SUPPORT ROLES INCLUDING BEING USED AS AN AMBULANCE TO EVACUATE THE WOUNDED FROM THE BATTLEFIELD.

RUSSIAN IFV/APC/INFANTRY FIRE SUPPORT VEHICLE TURRET KLIVER



Kliver Turret with 2A72 Automatic Gun and 4-RAIL ATGM system. COAC machine gun hidden to the 2A72's right.

SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative designations:	TKB-799	Name:	2A72
Date of introduction:	First displayed in 1996	Caliber/length:	30-mm
Proliferation:	Prototypes on the BTR-80, BMP-1, BMP-3 & BMP version fielded by at least 1 country. This is the upper cost end of a turret upgrade.	Type:	Automatic Gun
Description:	1-man turret with a variety of weapons.	Ammo:	300 rounds HEI-T, Frag-HE, Frangible, APFSDS-T
Crew:	1 (gunner); the vehicle will also need a driver & commander	Maximum Effective Range:	Frag-HE: 4000 (Day); 3500 (Night) APFSDS-T M929: 2500+ m (Day & Night)
Combat weight (mt):	1.50-2.50	Armor penetration:	Frag-HE: INA

			APBSDS-T M929: 55 mm at 1000 m & 45 mm at 2000 m (RHA)
Chassis length overall (m):	Depends on chassis	Muzzle velocity (m/s):	INA
Height overall (m):	Depends on vehicle	Name:	Turret coaxial
Width overall (m):	Depends on vehicle	Caliber/length:	7.62
Ground pressure (kg/cm^2):	Depends on vehicle	Type:	PKT machine gun
Automotive performance:	Depends on vehicle	Ammo:	Tracer, AP, API, Incendiary: 2000 Rounds
Engine type:	Depends on vehicle	Maximum Effective Range:	1500 m (Day); 1000 (Night-estimated)
Cruising range (km):	Depends on vehicle	Armor penetration:	INA
Speed (km/h):	Max road: N/A Max off-road: N/A Average cross-country: N/A Max Swim: N/A	Muzzle velocity (m/s):	~ 830
Fording depths (m):	Amphibious vehicle capability is retained with new turret	Name:	9M133 (NATO-AT-14 Spriggan)
Radio:	Depends on vehicle	Caliber/length:	152-mm
Protection:		Type:	SACLOS Kornet LR
Armor, turret front (mm):	Depends on vehicle	Ammo:	Kornet-E: HEAT; 2-8 Rounds depending on variant LR-HE (Thermobaric, 9M113F)
Applique armor (mm):	Depends on vehicle	Maximum Effective Range:	Kornet-E: 5500 m (Day); 3500 m (Night); (minimum range: 100 m) Kornet-LR HE: 10,000 m (Day)
Explosive reactive armor(mm):	Depends on vehicle	Armor penetration:	Kornet-E: 1000 mm (CE)
Active Protection System:	Depends on vehicle	Muzzle velocity (m/s):	INA
Self-entrenching blade:	Depends on vehicle	VARIANTS	SPECIFICATIONS
NBC protection system:	Depends on vehicle	BTR Chassis	Turret can be mounted on any vehicle with a capacity for a 1.5-2.5 ton turret. Some hull rework may be required
Smoke equipment:	Not on prototypes, but could be added	BMP-1M	IFV with Kliver upgrade. See BMP-1 for additional information. Name in OPFOR organizations is BMP/Kliver
Survivability equipment:	Depends on vehicle	Other Kliver-based IFVs	Once the Kliver turret is added to an APC or IFV, the vehicle is considered an APC for simulations
		BMP-3F	IFV exported to at least 1 country
		BMD-3	A1 turret and A2 chassis with a PERI-Z59 sight
		Infantry Fire Support Vehicle (FSV); Air Defense/Anti-Tank (AD/AT)	Carries AGTMs & MANPADS with 2 dismount teams. Combination will be dependent on vehicle's primary role
NOTES SOURCES: 2014 WEG AND MILITARY PERISCOPE. VEHICLE DATA SHEETS DO NOT CHANGE WITH THE ADDITION OF THE KLIVER TURRET. FAIRLY EXPENSIVE UPGRADE, BUT LESS THAN REPLACING ENTIRE VEHICLE. INFANTRY FORCE COULD DO A PARTIAL UPGRADE WITH 1 PER PLATOON OR 3-4 PER COMPANY.			

RUSSIAN MOTORCYLE GEAR UP



Gear Up Motorcycle with PKT Machine Gun & Side Car



Gear Up Motorcycle with Anti-Tank Weapon

SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative designations:	IMZ-8.107, IMZ-8.103	Name:	PKT
Date of introduction:	By 1999	Caliber/length:	7.62
Proliferation:	At least 3 countries, but countries have similar models	Type:	Machine Gun
Description:	Motorcycle with optional sidecar.	Ammo:	Tracer, AP, API, Incendiary: INA on number of rounds
Crew:	2 (with sidecar); room for 1 more on motorcycle	Maximum Effective Range:	1500 m (Day); 1000 (Night-estimated)
Combat weight (kg:	315	Armor penetration:	INA
Chassis length overall (m):	2.56	Muzzle velocity (m/s):	~ 830
Height overall (m):	1.10	Name:	DShK (Degtyaryov-Shpagin Large-Caliber)
Width overall (m):	1.70	Caliber/length:	12.7-mm
Ground pressure (kg/cm^2):	INA	Type:	DShK Machine Gun
Automotive performance:		Ammo:	INA
Engine type:	2-cylinder, 4-cycle, 45 horsepower gasoline	Maximum Effective Range:	2000 m
Cruising range (km):	240 (365 with additional tank)	Armor penetration:	INA
Speed (km/h):	Max road: 105 Max off-road: INA Average cross-country: INA Max Swim: N/A	Muzzle velocity (m/s):	850
Fording depths (m):	INA, float capable with air pump available for pontoon inflation or wood float attachments	Name:	AGS-17
Radio:	INA	Caliber/length:	30-mm
Protection:	INA	Type:	Automatic grenade launcher
Armor, turret front (mm):	N/A	Ammo:	INA
Applique armor (mm):	No	Maximum Effective Range:	1700 m
Explosive reactive armor(mm):	No	Armor penetration:	INA
Active Protection System:	No	Muzzle velocity (m/s):	185

Self-entrenching blade:	No	Muzzle velocity (m/s):	200
NBC protection system:	No	Name:	AT-5B (Konkurs-M/9P135M2)
Smoke equipment:	No	Caliber/length:	135-mm
Survivability equipment:	INA	Type:	ATGM-SACLOS
VARIANTS	SPECIFICATIONS	Ammo:	INA
NM3-8.107	Earlier version	Maximum Effective Range:	4000 m (Minimum 70 m)
Chang Jiang 750	Chinese version with sidecar capability	Armor penetration:	750-800-mm (RHA)
		Muzzle velocity (m/s):	200
		Name:	Varies (such as SA-18 Grouse or SA-16 Gimlet)
		Caliber/length:	Varies depending on type
		Type:	Surface-to-Air (SAM) missile
		Ammo:	Varies depending on type
		Maximum Effective Range:	Varies depending on type
		Armor penetration:	Varies depending on type
		Muzzle velocity (m/s):	2 Varies depending on type

NOTES

SOURCES: 2014 WEG. THIS MOTORCYCLE IS DERVIED FROM THE GERMAN BMW MOTORCYCLE DESIGN FROM WORLD WAR II. THERE ARE CIVILIAN VERSIONS OF THIS MOTORCYCLE SUCH AS THE SOLO AND TOURIST, BOTH WITHOUT A SIDE CAR, AND THE SPORTSMAN WITH A SIDECAR. MOTORCYLES CAN BE USED BY AIRBORNE UNITS, ESPECIALLY INFANTRY; SNIPERS; SECURITY PERSONNEL; RECONAISSANCE ELEMENTS, ANTI-TANK TEAMS, LIASION OFFICERS, SIGNAL UNITS, AND OTHER UNITS. THE SIDECAR CAN BE REMOVED. (PICTURES FROM 2014 WEG)

BRITISH LIGHT ARMORED CAR S55



British S55 Mk1 Light Armored Car

SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative designations:	FV18061; S5 Shorland	Name:	L7A2
Date of introduction:	1963 (original); 1990s (Mk 5)	Caliber/length:	7.62-mm
Proliferation:	237+/21 countries	Type:	Machine Gun
Description:	4 X 4 light armored car with 2 side exit doors & rear door on some models; 3 firing ports on each side & 2 in the rear doors; capacity for 8 soldiers in raised roof personnel carrier model; run-flat tires	Ammo:	1500 Rounds: Ball; Ball-T; API; API-T

Crew:	3 (driver, commander, gunner)	Maximum Effective Range:	800 m (Day); INA (Night)
Combat weight (mt):	3.6	Armor penetration:	INA
Chassis length overall (m):	4.51	Muzzle velocity (m/s):	838
Height overall (m):	1.85 (2.29 with turret)	VARIANTS	SPECIFICATIONS
Width overall (m):	1.80	Mk 1	Initial vehicle with 7.25-mm armor & 67-hp engine
Ground pressure (kg/cm²):	INA	Mk 2	Upgraded variant with 8.25-mm armor & 77-hp engine
Automotive performance:		Mk 3	Upgraded engine to 91-hp
Engine type:	114-hp gasoline	Mk 4	Upgraded version with 11-mm armor & 114-hp engine
Cruising range (km):	514	Mk 5	Latest upgrade with improved suspension & wider wheelbase
Speed (km/h):	Max road: 105 (Mk 5) Max off-road: INA Average cross-country: 48 Max Swim: N/A	S53 Mobile Air Defense Vehicle	Anti-aircraft missile carrier vehicle with 3 missiles ready to fire & 6 more stowed for reload
Fording depths (m):	0.5	S54 Anti-Hijack Vehicle	Special-Purpose Vehicle with special rifle marksman turret
Radio:	INA		
Protection:			
Armor, turret front (mm):	11 (7.62-mm ball at 26 m)		
Applique armor (mm):	INA		
Explosive reactive armor(mm):	INA		
Active Protection System:	INA		
Self-entrenching blade:	No		
NBC protection system:	No		
Smoke equipment:	8 Smoke grenade launchers		
Survivability equipment:	Grass-reinforced plastic flooring; air conditioning available		
NOTES SOURCES: 2014 WEG. VEHICLE USES A LAND ROVER CHASSIS. PRIMARY USE IS BY THE MILITARY FOR SITE SECURITY & AS AN INTERNAL SECURITY VEHICLE FOR POLICE & BORDER FORCES.			

Dec
2016

Worldwide Equipment Guide

Chapter 4: Main Battle Tanks



TRADOC G-2 ACE–Threats Integration
Ft. Leavenworth, KS

Distribution Statement: Approved for public release; distribution is unlimited.

Chapter 4: Main Battle Tanks

This chapter contains a representative open source sample of main battle tanks (MBTs) in regions covered by US combatant commands. This MBT selection is not comprehensive; however, the capabilities of vintage and modern tanks are significant indicators of organizational capabilities that adversaries can array against the United States.

A unit commander, scenario developer, curriculum developer, and/or other leader can use the WEG to configure a required level of Threat capability in an opposing force (OPFOR) as described in US Amy Regulation 350-2, *Operational Environment and Opposing Force Program* (2015). Practical application includes U.S. Army training, professional education, and leader development. The spectrum of WEG characteristics is descriptive—not prescriptive—and facilitates creating robust, realistic, and relevant Threat conditions in U.S. Army learning and capabilities development (CD) initiatives.

Many modern MBTs have a four-person crew of tank commander, gunner, loader, and driver. When an autoloader is part of the main gun system, the MBT has a three-person crew of tank commander, gunner-loader, and driver. Most modern MBTs mount a 105-mm to 125-mm main smoothbore gun, although limited types of MBT mount a rifled gun rather than smoothbore gun. Some MBT also have the capability to launch antitank guided missiles from their gun. Most tanks can typically stow at least 40 main gun rounds in the tank. Those tanks with an autoloader allow for immediate automatic loading of about half of the on-board ammunition.

As an integrated system of systems, evaluation of a main battle tank [some professional descriptions compare and contrast tanks as medium tank or main battle tank based on tonnage] analyzes efficiency and effectiveness from a holistic perspective. Capability and vulnerability can be evaluated in several ways depending on context and intended purpose. The WEG descriptions employ three functional categories of major subsystems to gauge overall MBT effectiveness:

- Mobility.
- Survivability.
- Lethality.

Mobility considers the relationship between improved automotive performance efficiency and the combat-load weight of a MBT. Vehicle fuel cell capacity and the type of terrain traversed affect expected norms for cruising range. MBT with on-board fuel cells can typically run for distances between 450 and 600 kilometers (km). Diesel is the norm for engine fuel among modern MBT; however; some tanks have a multi-fuel engine which can run on kerosene, diesel, and/or specific types of benzene. Vehicles with an auxiliary power unit (APU) improve MBT fuel economy during temporary halts or operating in stationary positions. Improved diagnostic upgrades alert the crew for corrective actions needed to sustain availability of an MBT subsystems.

Vehicle weight for an MBT can range from 40 to 70 tons. Several tanks described at times as medium tanks are included in this sample as main battle tanks. For example, the T90A is approximately 47 tons, the Leopard 2A6 is approximately 55 tons, and the Challenger 2 approaches 70 tons. Improvements to suspension systems, transmissions, and tracks complement automotive performance. Upgrading systems with modular components reduces inoperative time for repair and maintenance.



Survivability combines functional improvements to composite or spaced tank hull armor that include mine-protection appliqué, active-reactive and/or passive appliqué armor for the turret, glacis, flanks, and rear, and various forms of stand-off caging or mesh screens that degrade the effect of antitank weapon hits and armor penetration. Appliqué armor and explosive reactive armor (ERA), now a norm for improving protection, substantially increases vehicle weight.

Camouflage systems include methods for reducing detection by optical, infrared, and radar technologies. On-board sensors can include mine detection and laser or radar acquisition warning receivers that automatically activate MBT defense and/or interception systems. Some MBTs mount television cameras for crew 360-degree visual awareness of near surroundings and enhance local security.

A pressurized nuclear-chemical-biological (NBC) system provides crew protection in upgraded tanks for the modern NBC-contaminated battlefield. Air conditioning in some MBTs enhance systems readiness and sustainment of crew readiness in heat-extreme climates.

Other survivability enhancements can include entrenching blades for MBT self-emplacement in defensive positions, mine-clearing plows and rollers, vehicle smoke emission systems, and aerosol or smoke-obscurant grenade launcher systems. Tank survivability considers the context of operating as a *combined arms* team. Some upgrade suites include an external intercommunication telephone on the MBT's exterior for coordinating with infantry operating alongside the MBT. Armor and infantry typically operate as a team to optimize the tactical advantages that each element provides the other team member.

Lethality considers more than the main gun and auxiliary weapons systems. In addition to weapon efficiency, lethality is related to the MBT's ability to acquire and track a target, its weapon system effective engagement range, and crew situational awareness of multiple concurrent targets available for engagement. Improved command and fire control systems can include integrated thermal viewfinders for tank commander and gunner, laser rangefinders, and digital communications. Integrated command and control interconnects a network of sensors, imagery, navigation, and information systems that facilitate situational awareness and tactical understanding of an operational environment (OE).

Upgrades to lethality can include main gun and/or gun-missile capabilities, improved stabilization and fire control systems, and improved ammunition effects. Critical considerations to these upgrades include linking fire-on-the-move capability to MBT stabilization systems, rate of fire, integrated sights, target acquisition ranges, and weapons ranges to include maximum effective and maximum ranges. Lethality incorporates factors relevant to gun sights, gun precision, type of gun mount, and specific round caliber ballistics as components of maximum aimed range and maximum effective range.

Improved main gun munitions addressed in the *WEG* incorporate ongoing research and development of kinetic energy (KE) rounds with a dart-like penetrator (armor-piercing, fin-stabilized, discarding sabot (APFSDS) and/or high-explosive antitank (HEAT) multi-purpose rounds that use a shaped-charge for armor penetration. The *WEG* reflects a variety of ammunition capabilities, such as electronically-fuzed rounds for use against helicopters, or canister rounds for use in close combat. HEAT-multipurpose (MP) rounds can also be used against anti-materiel and antipersonnel (AP) targets. In comparing tank-on-tank main gun ammunition lethality, kinetic energy rounds are more lethal against composite or spaced armor than high-explosive antitank rounds gauged at the same penetration value. Ammunition upgrades are trending toward more efficient propellants with improved effects and armor penetration.



In terminology, *ready rounds* are stored for easy retrieval either inside the turret or in bustle compartments, to sustain a consistent rate of main gun fire. In listing available ready-rounds in the tank turret, the number of rounds does not typically include the ability to add an additional round in the breach. *Stowed rounds* are rounds that are either outside the tank's autoloader, or in compartments that preclude immediate retrieval during a main gun engagement. For an OPFOR MBT, the typical mix of main gun rounds on board a tank is 50% antitank and 50% for use against other targets. The OPFOR ammunition unit basic load and ammunition combat load will vary based on tactical and operational considerations of a particular training, education, or leader development condition.

A heavy machinegun auxiliary weapon in or on the tank turret trends toward a remote-controlled weapon station (RCWS) configuration to provide the ability to fire the weapon while the crewman remains protected inside the turret. Auxiliary weapon mounts often allow high-angle fire for air defense and use in built-up urban areas and/or highly inclined slopes in rural terrain. Armor shielding for the loader's machinegun, when mounted on the turret, improves protection when the machinegunner is exposed outside a turret hatch.

Summary. Improvements in MBT capabilities are typically upgrade packages rather than new tank models for production. Current evidence underscores increasing fiscal costs for research and development, testing, and production of MBT systems. Visual identification of MBT capabilities is often difficult due to the variance in upgrades to internal systems of an MBT. However, a significant decision in obvious MBT development is the ongoing field trials of the Russian Federation *Armata* family of armored chassis vehicles. The T-14 MBT within this modernization initiative provides major improvements to MBT capabilities that were constrained previously due to the vintage T-72 series hull, turret, automotive, and weapon system configurations. Professional observers in the near future will witness if the Russian Federation fields a T-14 fleet as a significant main battle tank adversary. The principle states with major indigenous tank production industry are analyzing how a fielded T-14 fleet affects their future research and development for MBT upgrade programs to counter such a threat.

The MBT WEG tier tables present examples of state-of-the art to vintage MBTs with capabilities and vulnerabilities based on upgrades to basic tank model functions of mobility, survivability, and lethality. For example, selective main gun capabilities in some models can be augmented with an anti-tank guided missile (ATGM) capability to achieve extended range and effects beyond the main gun effective range.

Leaders adapt data in the WEG to tailor an OPFOR with robust, realistic, and relevant Threat conditions for a challenging environment to U.S. Army learning and capabilities development (CD) initiatives. Address questions and comments on data listed in this chapter to:

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RUSSIAN FEDERATION MAIN BATTLE TANK T-90A T-90S



"Clamshell-type" armor applique, front applique armor, turret top and side skirt armor plates

SYSTEM	SPECIFICATIONS	SYSTEM	SPECIFICATIONS
Alternative designations:	See notes.	Armament-Main Gun:	Smoothbore gun
Date of introduction:	circa 2002	Caliber, type, name:	125mm 2A46M-4
Proliferation: [at least]	2	Rate of Fire (rd/min):	7
Crew:	3	Loader Type:	Autoloader
Combat weight (mt):	47	Ready main gun rounds:	22 in autoloader carousel
Chassis length overall (m):	6.85	Stowed rounds:	15/6 stowed
Height overall (m):	2.25	Elevation (°):	-6 to +14
Width overall (m):	3.8	Fire on Move:	Yes
Ground pressure (kg/cm2):	0.94	**Armament-Aux Weapon:**	Turret-coax to main gun
Automotive:		Caliber, type, name:	7.62-mm (7.62x 54R) PKT
Engine type (hp):	Diesel 840 V-84 (multifuel)	Max eff range-day (m):	1,500-2,000
Engine type (hp): Upgrade	Diesel 1100 V-96	Max eff range-night (m):	1,500-2,000
Cruising range (km):	550 km/650 km w/aux fuel	Fire on move:	Yes
Max road speed (kph):	65	Rate of fire (rd/min):	250 practical /650 cyclic

Max off-road speed (kph):	45	**Armament-Aux Weapon:**	Turret-TC cupola
Average cross-country (kph):	35	Caliber, type, name:	12.7-mm (12.7x108) NSVT
Max swim:	N/A	Max aimed range-day (m):	2,000
Fording depth (m):	1.7 unprep, 5.0 w/snorkel	Max eff range-night (m):	2,000
Communications		Fire on move:	Yes w/reduced accuracy
Radio:	R-173	Rate of fire (rd/min):	210 practical/800 air targets
External Intercom device	INA	**ATGM Launcher:**	
		Missile name-nomenclature:	AT-11 Sniper
Protection:		Launch method:	2A46M-4 gun-launcher
Applique armor:	Turret roof; track skirt	Missile guidance:	SACLOS laser
Explosive reactive armor:	Kontakt-5 2d gen ERA	Launch rate (msl/min):	2-3
Active prot system:	Shtora TshU1-7.	**FIRE CONTROL**	
Mine clearing:	Roller or plow (options)	FCS name:	1A45T
Self-Entrenching blade:	Yes	Thermal: TC-gunner	1A43
NBC protection system:	Yes	Main gun stabilization	2E42-4
Smoke equipment:	Grenlaunch 2x6; VESS	Infrared	Yes
		Sights w/magnific: day (m)	5000
		Sights w/magnific: nt (m)	INA

NOTES

Weapons & Ammunition Types and Typical Combat Load

125-mm smoothbore gun (mix est)	43
APFSDS-T	14
HEAT-MP/HEAT	3
FRAG-HE	12
Focused Frag Ainet (available)	8
ATGM	6
7.62-mm coax MG	2000
12.7-mm NSVT AA MG	500

VARIANTS

T-90: SUCCESSOR TO T-72BM, ORIGINALLY CALLED T-72BU, WITH FIRE CONTROL AND ARMOR UPGRADES SIMILAR TO THOSE ON THE T-80U. DESPITE USING THE LOWER COST T-72 CHASSIS, THIS TANK INCORPORATED MORE RECENT COMPONENTS THAN THE T-80U AND IS IN SOME WAYS SUPERIOR. THE ORIGINAL TANK HAD AN II NIGHT SIGHT, NOT THE THERMAL SIGHT UPGRADE, AND THE UNDER-POWERED 840-HP ENGINE. UPGRADES HAVE BEEN ADDED.

T-90A: ORIGINALLY KNOWN AS T-90SM OR T-90M, IT IS NOW ACCEPTED FOR RUSSIAN SERVICE AS THE STANDARD TANK.

T-90MS: EXPORT VARIANT: IMPROVED ARMOR PROTECTION AND ERA; REMOTE CONTROL WEAPON STATION ON TURRET ROOK WITH 12.7 MM MG; TRAVERSE FORWARD 316 DEGREES; ELEVATE -10 TO +45 DEGREE. IMPROVED FIRE CONTROL SYSTEM FOR ENGAGEMENT OF STATIONARY AND MOVING TARGETS WHILE TANK IS MOVING. TC PANORAMIC SIGHT FOR TC-GUNNER DISPLAY LINKED TO LASER RANGEFINDER; THERMAL AND 4 TELEVISION CAMERA-EACH 95 DEGREE WIDE/45 DEGREE ELEV. IMPROVED BATTLE MANAGEMENT AND LAND NAVIGATION TRACKING SYSTEM. EXTERNAL AUXILLARY DIESEL POWER UNIT FOR FUEL CONSERVATION. SOME RESERVE MAIN GUN AMMO IN BUSTLE WITH BLOWOUT PANELS. TURRET AND HULL REAR WITH BAR (LOURVE) ARMOR; ANTI-LASER WARNING AND PROTECTION. 125 MM MAIN GUN IMPROVED ACCURACY WITH 2A46M-5

RATHER THAN PRVEIOUS 2A46M IN T90S.
T-90S: EXPORT VARIANT WITH OPTION FOR UPGRADES. SEVERAL SUBSYSTEM CHANGES, SUCH AS UPGRADE FCS, NEW ENGINE, REMOVAL OF SHTORA-1, ETC., HAVE BEEN ADDED BASED ON CUSTOMER PREFERENCES, AND ARE INCLUDED IN EXPORT VERSIONS OF THE TANK. SOME EARLY T-90S HAVE BEEN UPGRADED TO THIS STANDARD. MOST OF THESE ARE BEING SOLD TO INDIA, WITH THE 1,000 HP ENGINE UPGRADE, AND WITH ADDITION OF AIR CONDITIONING.
T-90SK: T-90S COMMAND VARIANT
BHISHMA: INDIAN VARIANT PRODUCED FROM T-90A KNOCKDOWN KITS. IT DOES NOT USE THE SHTORA-1 IRCM SYSTEM. ENGINE IS T-90A UPGRADE. THE TANK IS SOMETIMES ERRONEOUSLY CALLED T-90S. VARIOUS STAGES OF UPGRADES WILL BE EMPLOYED IN INDIAN FORCES. RUSSIA HAS PROVIDED T-90S TANKS WITH INDIAN INTENT TO UPGRADE ALMOST ALL OF ITS T-90 AND T-90S REMAINING VERSIONS IN KNOCK-DOWN KITS WITH UPGRADES TO MEET THE BHISHMA STANDARD. AN ISSUE REMAINS OF NO AIR CONDITIONING SYSTEM IN SOME EXPORT MBT TO INDIA CAUSE OVERHEATING OF SYSTEM COMPONENTS AND DEBILITATING ENVIRONMENT FOR TANK CREW IN SOME ENVIRONMENTS.
PROJECT RHINO: MOST T-90 AND T-90S TANKS IMPORTED BY INDIA TO BE UPGRADED AS BHISHMA UNDER THIS PROGRAM AND AGREEMENT WITH RUSSIA.
OTHER UPGRADE VERSIONS OF THE T-72 INCLUDE FEATURES OF THE T-90A SUCH AS THE IMPROVED GUN STABILIZATION, IMPROVED FIRE CONTROL SYSTEM, IMPROVED ENGINE, AND IMPROVED AMMUNITION SUCH AS THE AINET AND THE INVAR. OTHER TANKS WHICH PROVIDE SIMILAR CAPABILITIES ARE THE UKRAINIAN T-72AG AND T-72MP. THE CZECH T-72CZM4 ALSO HAS A 2ND GEN THERMAL SIGHT. RECENT RUSSIAN TANK UPGRADE PACKAGES FOR THE T-72 ARE THE T-72M1, AND THE T-72M1M. THE ABOVE RUSSIAN UPGRADES ARE FOR MODERNIZING OLDER TANKS, VERSUS T-90/T-90A, WHICH ARE NEWLY PRODUCED TANKS. UPGRADED T-80U, T-80UK, AND T-84 TANKS ALSO HAVE SIMILAR CAPABILITIES.

MAIN ARMAMENT AMMUNITION
CALIBER, TYPE, NAME:
125-MM APFSDS-T, BM-42M
MAXIMUM AIMED RANGE (M): 3,000-4,000
MAX EFFECTIVE RANGE (M):
DAY: 3,000-4000
NIGHT: 2,600
ARMOR PENETRATION (MM KE): 590-630 AT 2,000 METERS

125-MM HEAT-MP, BK-29M
MAXIMUM AIMED RANGE (M): 4,000
MAX EFFECTIVE RANGE (M):
DAY: 4,000
NIGHT: 2,600
ARMOR PENETRATION (MM CE): 650-750 IT HAS SOME HE EFFECTS SIMILAR TO FRAG-HE ROUNDS AGAINST PERSONNEL AND MATERIEL TARGETS.

125-MM HEAT, BK-27
MAXIMUM AIMED RANGE (M): 4,000
MAX EFFECTIVE RANGE (M):
DAY: 3,000+
NIGHT: 2,600
ARMOR PENETRATION (MM CE): 700-800

125-MM HE-SHRAPNEL FOCUSED-FRAGMENTATION, AINET
MAXIMUM AIMED RANGE (M): 5,200
MAX EFFECTIVE RANGE (M):
DAY: 5,000
NIGHT: 2,600
TACTICAL AA RANGE: 4,000-5,000
ARMOR PENETRATION (MM): CAN DEFEAT IFV AND APC

125-MM FRAG-HE-T, OF-26
MAXIMUM AIMED RANGE (M): 5,000
MAX EFFECTIVE RANGE (M):
DAY: 5,000
NIGHT: 2,600
ARMOR PENETRATION (MM): CAN DEFEAT IFV AND APC. A NEAR MISS WILL SERIOUSLY DAMAGE OR DESTROY MOST IFVS AND APCS.

OTHER AMMUNITION TYPES: FRENCH GIAT 125G1 APFSDS-T, RUSSIAN BM-42 AND BM-32 APFSDS-T. NOTE: THE RUSSIANS MAY HAVE A VERSION OF THE BM-42M WITH A DU PENETRATOR. RUSSIAN BM-48 APFSDS-T PENETRATES 650-700 MM
SOKOL-1 GUIDED ANTITANK ROUND

ANTITANK GUIDED MISSILES:
AT-11B/INVAR
WARHEAD TYPE: TANDEM SHAPED CHARGE (HEAT)
ARMOR PENETRATION (MM CE): 900, 850 BEHIND ERA
RANGE (M): 5,000 DAY, 2,600 NIGHT
AT-11/REFLEKS: MISSILE WITH FRAG-HE WARHEAD TO 5,000 M

NOTES
T-90AM: THE RUSSIAN MILITARY DECIDED AGAINST T90A FOR ITS FORCES. IN SEP 2011, THEY DISPLAYED **T-90AM** AS A DEEP MODERNIZATION OF T-90A. THEY INCLUDE A LOW-PROFILE TURRET WITH A BUSTLE AUTOLOADER AND BLOW-OUT PANELS. THE NEW 2A82 GUN FIRES A LONGER (700+ MM EST) AND HEAVIER APFSDS-T ROUND TO 3,500+ M
THE ORIGINAL VERSION OF THE TANK HAS AN 840-HP DIESEL ENGINE. THE ENGINE IN SUBSEQUENT MODELS IS UPGRADED. ENGINE OPTIONS INCLUDE 950, 1,000 AND 1,100 HP.
THE ORIGINAL TANK HAD AN II SIGHT FROM THE T-80 SERIES (BURAN-PA, 800-1300 METERS RANGE). HOWEVER, MARKETING MATERIALS FEATURE THE AGAVA-2 THERMAL SIGHT. RECENT GEN^3 SIGHTS ARE AVAILABLE. THESE NIGHT SIGHTS PERMIT NIGHT LAUNCH OF ATGMS.
RELIKT 3d GEN ERA IS OFFERED TO REPLACE KONTAKT-5 IN SEVERAL UPGRADE PACKAGES, OR AS A SEPARATE UPGRADE. THE ERA ADDS UP TO 600 MM CE PROTECTION AND 300 MM KE TO TURRET BASE ARMOR PROTECTION, OR ABOUT 150 MM MORE THAN KONTAKT-5.
ARENA APS IS AVAILABLE. ACTIVE PROTECTION SYSTEMS. DEFENSIVE AIDES SUITE IS **SHTORA-1** (LASER WARNING RECEIVER WITH GUN AUTO-SLEW, LWR-DIRECTED SMOKE GRENADE LAUNCHERS, AND EO-IR JAMMER), OR PARTIAL PACKAGE EXCLUDING IR JAMMERS. NONE IS ON BHISHMA. THE SHTORA-1 IR ATGM COUNTERMEASURE ILLUMINATORS CAN BE DETECTED WITH NIGHT SIGHTS. SHTORA-1 HAS NO EFFECT AGAINST MOST MODERN ATGM SYSTEMS, WITH ENCODED TRACKER BEACONS. EXCLUSION OF SHTORA-1 OFFERS MORE ERA ON THE TURRET FRONT AND REDUCES COSTS. PROTECTION PROBABLY INCLUDES RADAR-ABSORBENT MATERIALS AND IR-RESISTANT PAINT
THE T-90 MAY BE FIELDED WITH FULL **SHTORA-1** PACKAGE (LASER WARNING RECEIVER WITH AUTO-SLEW GUN CAPABILITY, LWR-DIRECTED SMOKE GRENADE LAUNCHERS, AND EO-IR JAMMER), WITH A PARTIAL PACKAGE, OR WITHOUT SHTORA-1. SHTORA-1 ILLUMINATORS CAN BE USED FOR NIGHT ILLUMINATION.
AN IMPROVED GUN, 2A46M-4, WITH IMPROVED ACCURACY AND USE LIFE IS AVAILABLE FOR FITTING TO THE T-90.
THE BK-29 ROUND, WITH A HARD PENETRATOR IN THE NOSE IS DESIGNED FOR USE AGAINST REACTIVE ARMOR, AND AS AN MP ROUND HAS FRAGMENTATION EFFECTS. THE BK-27 HEAT ROUND OFFERS A TRIPLE-SHAPED CHARGE WARHEAD AND 50 MM MORE PENETRATION.THE 12.7-MM MG NSVT HAS BOTH REMOTE ELECTRONICALLY OPERATED SIGHT PZU-5 WITH VERTICAL STABILIZATION, NIGHT ACQUISITION, AND A GUN-MOUNTED K10-T REFLEX SIGHT.

RUSSIAN FEDERATION MAIN BATTLE TANK T-80B T-80U



"Clamshell-type" turret armor applique and skirts, front applique armor, turret top plates, and side armor skirts

SYSTEM	SPECIFICATIONS	SYSTEM	SPECIFICATIONS
Alternative designations:	-	**Armament-Main Gun:**	Smoothbore gun
Date of introduction:	1976/1987	Caliber, type, name:	125mm 2A46-2
Proliferation: [at least]	1 and 3	Rate of Fire (rd/min):	6-8
Crew:	3	Loader Type:	Autoloader; manual
Combat weight (mt):	44.5/46.0	Ready main gun rounds:	28 carousel
Chassis length overall (m):	6.98/7.01	Stowed rounds:	17
Height overall (m):	2.20/2.22	Elevation (°):	-7 to +14
Width overall (m):	3.60	Fire on Move:	Yes
Ground pressure (kg/cm2):	0.87/.0.92	**Armament-Aux Weapon:**	Turret-coax to main gun
Automotive:		Caliber, type, name:	7.62mm PKT
Engine type (hp):	Gas turbine diesel (multifuel)	Max eff range-day (m):	1000
Engine type (hp): Upgrade	1000/1250	Max eff range-night (m):	850
Cruising range (km):	370/550 w extra fuel tanks	Fire on move:	Yes
Max road speed (kph):	70	Rate of fire (rd/min):	210
Max off-road speed (kph):	45	**Armament-Aux Weapon:**	Turret-TC cupola
Average cross-country (kph):	40	Caliber, type, name:	12.7mm
Max swim:	NA	Max aimed range-day (m):	1500

Fording depth (m):	1.8 unprep; 5.0 snorkel	Max eff range-night (m):	800
Communications		Fire on move:	Yes
Radio:	R-173; R-174	Rate of fire (rd/min):	210
External Intercom device	No	**ATGM Launcher:**	
		Missile name-nomenclature:	AT-11 Refleks
Protection:		Launch method:	Gun
Applique armor:	NA/Hull side; track skirts	Missile guidance:	laser
Explosive reactive armor:	Kontakt-5	Launch rate (msl/min):	2-3
Active system:	Arena available	**FIRE CONTROL**	
Mine clearing:	Roller-plow available	FCS name:	1A332A/1A42
Self-Entrenching blade:	Yes	Thermal: TC-gunner	yes
NBC protection system:	Yes	Main gun stabilization	2E26M/2E42; 2-plane
Smoke equipment:	grenlaunch 4x2; VESS	Infrared	Yes
		Sights w/magnific: day (m)	5000
		Sights w/magnific: nt (m)	1000/2600

NOTES

WEAPONS & AMMUNITION TYPES AND TYPICAL COMBAT LOAD

125-MM SMOOTHBORE GUN (MIX EST)	45	T-80U
APFSDS-T	15	
HEAT-MP/HEAT	3	
FRAG-HE	21	
ATGM	6	
7.62-MM COAX MG	1250	
12.7-MM NSVT AA MG	500	

VARIANTS

T-80A: 1982 VARIANT WITH A DIFFERENT TURRET AND FCS TO FIRE THE SVIR ATGM USED BY THE T-72B.

T-80B: VARIANT HAS PARTIAL ERA MOUNTED; THE FEW ORIGINAL T-80S RETAINED WERE UPGRADED TO THIS STANDARD.

T-80UK: COMMAND VERSION WITH R-163-50K AND R-163-U RADIOS, TNA-4 LAND NAVIGATION SYSTEM, AND AN ELECTRONIC FUZE-SETTING DEVICE THAT PERMITS USE OF AINET SHRAPNEL ROUND. THE AGAVA THERMAL SIGHT PROVIDES A 2600-METER NIGHT ACQUISITION RANGE.

T-80UM1/BARS: UPGRADE VARIANT DEVELOPED FOR RUSSIAN TANK COMPETITION. IT FEATURES AN IMPROVED 1A45 HUNTER-KILLER FCS, 2A46M-4 MAIN GUN, SHTORA-1ATGM IR COUNTERMEASURE SYSTEM, OPTIONAL ARENA ACTIVE PROTECTION SYSTEM (**T-80UM2**), AND OTHER UPGRADE OPTIONS. IT IS OFFERED; BUT THERE IS NO RECORD OF PRODUCTION.

T-80UD: UKRAINIAN VERSION WITH A 1000-HP DIESEL ENGINE VERSUS THE TURBINE ENGINE, NEW FCS WITH 1A45 SIGHT, AND 1ST GENERATION ERA.

T-84: UKRAINIAN UPGRADE OF T-80UD, WITH A WELDED TURRET, 6TD-2 1200-HP DIESEL ENGINE, KBA-3 125-MM MAIN GUN, AND NEW FCS
WITH A SAGEM THERMAL SIGHT. IT FIRES A COMBAT GUN-LAUNCH ATGM TO 5 KM. IT ENTERED SERVICE IN THE UKRAINE IN 1999, WITH 320 EXPORTED TO PAKISTAN. A T-72 UPGRADE PACKAGE TO THIS STANDARD IS **T-72AG**.

T-84U ADDS WIDER TRACK, SHTORA-1 ACTIVE IR ATGM JAMMER SYSTEM, IMPROVED ARMOR, AND OTHER UPGRADES.

OPLOT: UKRAINIAN **T-84 UPGRADE** WITH A WELDED COMPARTMENTED TURRET, BUSTLE AUTOLOADER, CDR'S INDEPENDENT SIGHT, FRENCH ALIS 2ND GEN THERMAL SIGHT, 1200-HP DIESEL ENGINE, NEW CONFORMAL 3RD GEN ERA, OPTIONAL USE OF

ARENA ACTIVE PROTECTION SYSTEM (APS) AND SHTORA-1. THE TANK IS ADOPTED BY UKRAINIAN FORCES FOR FIELDING AND AVAILABLE FOR EXPORT. THE NEW ARTEMIS GUN-LAUNCH ATGM IS AVAILABLE.

YATAGAN/KERN2-120/T-84-120: UKRAINIAN OPLOT VARIANT WITH A 120-MM SMOOTHBORE CANNON, BUSTLE AUTOLOADER, AND ABILITY TO FIRE NATO-COMPATIBLE AMMUNITION, INCLUDING AN APFSDS-T ROUND SIMILAR TO THE FRENCH GIAT 125G1. THE GUN-LAUNCHES A UKRAINIAN LASER-GUIDED ATGM WITH A TANDEM WARHEAD.

MAIN ARMAMENT AMMUNITION

CALIBER, TYPE, NAME:

125-MM APFSDS-T, BM-42M
- MAXIMUM AIMED RANGE (M): 3000-4000
- MAX EFFECTIVE RANGE (M):
  - DAY: 2500-3000
  - NIGHT: 800-1300
- ARMOR PENETRATION (MM KE): 590-630 AT 2000 METERS

125-MM FRAG-HE-T, OF-26
- MAXIMUM AIMED RANGE (M): 5000
- MAX EFFECTIVE RANGE (M):
  - DAY: 5000
  - NIGHT: 800-1300
  - ARMOR PENETRATION (MM): CAN DEFEAT IFV AND APC.

125-MM HEAT-MP, BK-29M
- MAXIMUM AIMED RANGE (M): 4000
- MAX EFFECTIVE RANGE (M):
  - DAY: 3000
  - NIGHT: 800-1300
- ARMOR PENETRATION (MM CE): 650-750. IT HAS SOME HE EFFECTS.

125-MM HEAT, BK-27
- MAXIMUM AIMED RANGE (M): 3000
- MAX EFFECTIVE RANGE (M):
  - DAY: 2000-3000
  - NIGHT: 800-1300
- ARMOR PENETRATION (MM CE): 700-800

OTHER AMMUNITION TYPES: GIAT 125G1 APFSDS-T, RUSSIAN BM-42 AND BM-32 APFSDS-T. THE RUSSIANS MAY HAVE A VERSION OF THE BM-42M WITH A DU PENETRATOR.

ANTITANK GUIDED MISSILE:

NAME: AT-8/SONGSTER/KOBRA
WARHEAD TYPE: SHAPED CHARGE (HEAT)
ARMOR PENETRATION (MM CE): 700 (RHA), 200 BEHIND ERA
RANGE (M): 4000 DAY ONLY

NAME: AT-11B/INVAR/9M119M
WARHEAD TYPE: TANDEM SHAPED CHARGE (HEAT)
ARMOR PENETRATION (MM CE): 900, 850 BEHIND ERA
RANGE (M): 5000 DAY; 2600 NIGHT

NAME: AT-11C/INVAR-M/9M119M1
WARHEAD TYPE: TANDEM SHAPED CHARGE (HEAT)
ARMOR PENETRATION (MM CE): 900, 850 BEHIND ERA

RANGE (M): 5000 DAY; 2600 NIGHT

NOTES

FORDING DEPTHS (M): 12.0 WITH BROD-M SYSTEM

THE NIGHT SIGHT CANNOT BE USED TO LAUNCH THE ATGM. THE DAY SIGHT CAN BE USED AT NIGHT FOR LAUNCHING ATGMS IF THE TARGET IS ILLUMINATED.

A VARIETY OF THERMAL SIGHTS ARE AVAILABLE. THEY INCLUDE THE RUSSIAN AGAVA-2, FRENCH SAGEM-PRODUCED ALIS AND NAMUT SIGHT FROM PELENG. THERE ARE THERMAL SIGHTS AVAILABLE FOR INSTALLATION, WHICH PERMIT NIGHT LAUNCH OF ATGMS.

THE 12.7-MM MG NSVT HAS BOTH REMOTE ELECTRONICALLY OPERATED SIGHT PZU-5 AND GUN-MOUNTED K10-T REFLEX SIGHT.

THE MORE RECENT BK-27 HEAT ROUND OFFERS A TRIPLE-SHAPED CHARGE WARHEAD AND INCREASED PENETRATION AGAINST CONVENTIONAL ARMORS AND ERA. THE BK-29 ROUND, WITH A HARD PENETRATOR IN THE NOSE IS DESIGNED FOR USE AGAINST REACTIVE ARMOR, AND AS AN MP ROUND HAS FRAGMENTATION EFFECTS. IF THE BK-29 HEAT-MP IS USED, IT MAY SUBSTITUTE FOR FRAG-HE (AS WITH NATO COUNTRIES) OR COMPLEMENT FRAG-HE. WITH THREE ROUND NATURES (APFSDS-T, HEAT-MP, ATGMS) IN THE AUTOLOADER VERSUS FOUR, MORE ANTITANK ROUNDS WOULD AVAILABLE FOR THE HIGHER RATE OF FIRE.

THE ATGM MAY BE LAUNCHED WHILE MOVING SLOWLY (NFI). THE AT-8 CAN BE AUTO-LOADED WITH THE TWO HALVES MATED DURING RAMMING; BUT THE STUB CHARGE IS MANUALLY LOADED.

GTA-18A AUXILIARY POWER UNIT IS USED WHEN THE ENGINE IS OFF.

FORDING DEPTHS (M): 12.0 WITH BROD-M SYSTEM

ORIGINAL NIGHT SIGHT IS THE II BURAN-PA (800-1300 METERS RANGE). THE BURAN-PA CANNOT BE USED TO LAUNCH THE ATGM. THE 1G46 DAY SIGHT CAN BE USED AT NIGHT FOR LAUNCHING ATGMS IF THE TARGET IS ILLUMINATED. A VARIETY OF THERMAL SIGHTS ARE AVAILABLE. THEY INCLUDE THE RUSSIAN SANOET, FRENCH SAGEM-PRODUCED ALIS AND NAMUT SIGHT FROM BELORUSSIAN PELENG.

RUSSIAN FEDERATION MAIN BATTLE TANK T-72BM



Explosive reactive armor (ERA) tiles applique



"Bra"-type armor applique on turret front-plates on top

SYST M	SPECIFICATIONS	SYSTEM	SPECIFICATIONS
Alternative designations:	Object 187	**Armament-Main Gun:**	Smoothbore gun
Date of introduction:	1973/1992	Caliber, type, name:	125mm 2A46M/D-81TM
Proliferation: [at least]	3	Rate of Fire (rd/min):	8
Crew:	3	Loader Type:	Autoloader; manual
Combat weight (mt):	46	Ready main gun rounds:	22
Chassis length overall (m):	6.95	Stowed rounds:	23
Height overall (m):	2.25	Elevation (°):	-6 to +14
Width overall (m):	3.6	Fire on Move:	Yes-main gun
Ground pressure (kg/cm2):	0.90	**Armament-Aux Weapon:**	Turret-coax to main gun
Automotive:		Caliber, type, name:	7.62mm PKT
Engine type (hp):	Diesel SV-84	Max eff range-day (m):	1000
Engine type (hp): Upgrade	840	Max eff range-night (m):	800
Cruising range (km):	480; 550 w extra fuel tanks	Fire on move:	Yes
Max road speed (kph):	60	Rate of fire (rd/min):	250
Max off-road speed (kph):	45	**Armament-Aux Weapon:**	Turret-TC cupola
Average cross-country (kph):	35	Caliber, type, name:	12.7mm
Max swim:	NA	Max aimed range-day (m):	1500
Fording depth (m):	1.8 unprep; 5.0 snorkel	Max eff range-night (m):	INA
Communications		Fire on move:	Yes
Radio:	Digital	Rate of fire (rd/min):	200

External Intercom device	NA	**ATGM Launcher:**	
		Missile name-nomenclature:	AT-11 Svir
Protection:		Launch method:	Gun
Applique armor:	Turret top; track skirts	Missile guidance:	SACLOS, laser
Explosive reactive armor:	Kontakt-5	Launch rate (msl/min):	2-3
Active system:	Arena available	**FIRE CONTROL**	
Mine clearing:	Roller-plow available	FCS name:	1A40-1
Self-Entrenching blade:	Yes	Thermal: TC-gunner	1K13-49
NBC protection system:	Yes	Main gun stabilization	2Eh42-2, 2-plane
Smoke equipment:	Grenlaunch 8x; VESS	Infrared	Yes
		Sights w/magnific: day (m)	5000
		Sights w/magnific: nt (m)	1000

NOTES

WEAPONS & AMMUNITION TYPES AND TYPICAL COMBAT LOAD

125-MM SMOOTHBORE GUN (MIX EST)	45
APFSDS-T	14
HEAT-MP/HEAT	4
FRAG-HE	21
ATGM	6
7.62-MM COAX MG	2000
12.7-MM NSVT AA MG	300

VARIANTS

T-72B: SECOND RUSSIAN MAIN VARIANT OF THE T-72 AFTER T-72A.

T-72B1, IN 1986 A LIMITED PRODUCTION VARIANT WAS WITHOUT ATGM LAUNCH CAPABILITY; SOME DO NOT HAVE ERA.

T-72BK IS THE COMMANDER'S VARIANT WITH ADDITIONAL RADIOS.

T-72BM: RUSSIAN T-72B UPGRADE WITH 2ND GEN ERA. THE SYSTEM IS FIELDED, AVAILABLE FOR EXPORT, AND UPGRADED. TIER 2 AND SOME TIER 3 TANKS CAN CHALLENGE US FORCES UNDER FAVORABLE CONDITIONS WHEN USING MODERN AMMUNITION AND EMPLOYED BY WELL-TRAINED UNITS WITH SOUND TACTICS. A VARIETY OF UPGRADES ARE AVAILABLE FOR THE T-72B. THEY INCLUDE PROTECTION UPGRADES, SUCH AS IMPROVED ERA, APS, DEFENSIVE AIDS SUITES WITH IR JAMMERS, PLATE ARMOR, WELDED TURRET, AND GRILL ARMOR AROUND TRACKS AND GRILL.

MOBILITY UPGRADES INCLUDE A NEW POWER TRAIN, IMPROVED STEERING, IMPROVED MINE PLOWS AND ROLLERS, AND ELECTRONIC MINE SPOOFING SYSTEM. FIRE CONTROL SYSTEM UPGRADES INCLUDE NEW SIGHTS, GUN, AMMUNITION, AND IMPROVED STABILIZATION. WITH THE EXPANDING NUMBER OF UPGRADES OFFERED BY FORMER WARSAW PACT, ASIAN, ISRAELI, AND OTHER FIRMS, MOST T-72-TYPE TANKS HAVE SOME LEVEL OF UPGRADE FROM THE BASIC T-72 MBT.

THE MORE AFFORDABLE UPGRADE APPROACH FOR MOST COUNTRIES IS TO EXECUTE SPECIFIC UPGRADES DURING MAINTENANCE WORK. BUT THIS APPROACH MAY RESULT IN ONLY PARTIALLY MODERNIZED TANKS AT ANY ONE POINT IN THE LIFE OF THE VEHICLE, AND WHICH ARE NOT AS MODERN AS MORE RECENT COMPETITORS. AN ALTERNATIVE IS TO PRODUCE MODERNIZED TANKS IN SMALL NUMBERS, RESULTING IN HIGH PER-UNIT PRODUCTION COSTS.

T-72BU: UPGRADE VARIANT WITH THE FIRE CONTROL SYSTEM FROM THE T-80U, AS WELL AS A VARIETY OF OTHER CHANGES. T-72BU **RENAMED T-90**.

WITH THE LIMITED MARKET FOR NEW TANKS, THE WORLD TANK INDUSTRY HAS DEVELOPED UPGRADES AND WHOLE VEHICLE UPGRADE PACKAGES TO TAP INTO THE MARKET. OLDER T-72 TANKS CAN BE BROUGHT UP TO THE T-72B STANDARD. SOME APPROACH THE T-90 STANDARD. MOST T-72-TYPE TANKS FIELDED REFLECT SOME LEVEL OF UPGRADE. UPGRADE OPTIONS ARE EXPANDING FROM FORMER WARSAW PACT, ASIAN, ISRAELI, AND OTHER INTERNATIONAL FIRMS.

THE FOLLOWING SHOW OTHER COUNTRIES' COMPARABLE UPGRADE TANKS.
T-72S/SHILDEN: RUSSIAN EXPORT T-72A UPGRADED TO THE T-72B STANDARD. ALTHOUGH VISUALLY SIMILAR TO T-72B, IT HAS SLIGHTLY LESS CHASSIS AND TURRET PROTECTION. FORMER WP COUNTRIES SUCH AS SLOVAKIA HAVE UPGRADED THEIR TANKS TO THE T-72S STANDARD.
M-84AB1: YUGOSLAV UPGRADE TO THE M-84, BRINGING IT CLOSE TO T-90, AND THE LATEST T-72B IMPROVED TANKS.
M-95 DEGMAN: CROATIAN M-84 UPGRADE WITH BOX COMPOSITE ARMOR, ERA, 1,200 HP, AND THERMAL FCS. AN EXPORT UPGRADE CONVERSION, AKA **M-84D,** IS OFFERED FOR KUWAITI M-84A TANKS.
PT-91: POLISH UPGRADE TANKS WITH ERA, DRAWA IMPROVED FCS, SAVAN-5 THERMAL SIGHT, IMPROVED GUN STABILIZATION, AND COUNTERMEASURES.
PT-91M HAS A 1,000-HP ENGINE, NEW GUNS AND FCS, ARMOR CHANGES, AND OTHER IMPROVEMENTS. PT-91M EXPORTED TO SINGAPORE. PT-91P IS DESIGNED FOR EXPORT TO PERU.
T-72M1 DEMONSTRATOR WITH 2ND GEN ERA AND OTHER UPGRADES WERE DISPLAYED AT MILITARY SHOWS.
T-72M1M INCLUDES 3RD GEN RELIKT ERA AND OPTIONAL ARENA ACTIVE PROTECTION SYSTEM (APS).
ALTERNATIVE DESIGNATIONS: ROGATKA AND SMT M1988. IT IS ALMOST THE SAME AS T-72S (EXPORT), EXCEPT MORE ERA ON THE SIDE SKIRTS.
AJEYA MK 2. INDIA IS UPGRADING T-72A TANKS CLOSE TO A BHISHMA (T-90S) STANDARD.

MAIN ARMAMENT AMMUNITION
CALIBER, TYPE, NAME:
125-MM APFSDS-T, BM-42M
MAXIMUM AIMED RANGE (M): 3000
MAX EFFECTIVE RANGE (M):
DAY: 3000
NIGHT: 2600
ARMOR PENETRATION (MM KE): 590-630 AT 2000 METERS

125-MM FRAG-HE-T, OF-26
MAXIMUM AIMED RANGE (M): 5000
MAX EFFECTIVE RANGE (M):
DAY: 5000
NIGHT: 2600
ARMOR PENETRATION (MM): CAN DEFEAT IFV AND APC. A NEAR MISS WILL SERIOUSLY DAMAGE OR DESTROY MOST IFVS AND APCS.

125-MM HEAT-MP, BK-29M
MAXIMUM AIMED RANGE (M): 4000
MAX EFFECTIVE RANGE (M):
DAY: 3000-4000
NIGHT: 2600
ARMOR PENETRATION (MM CE): 650-750. IT HAS SOME HE EFFECTS.

125-MM HEAT, BK-27
MAXIMUM AIMED RANGE (M): 3000
MAX EFFECTIVE RANGE (M):
DAY: 3000
NIGHT: 2600
ARMOR PENETRATION (MM CE): 700-800

THE MORE RECENT BK-27 HEAT ROUND OFFERS A TRIPLE-SHAPED CHARGE WARHEAD AND INCREASED PENETRATION AGAINST CONVENTIONAL ARMORS AND ERA. THE BK-29 ROUND, WITH A HARD PENETRATOR IN THE NOSE IS DESIGNED FOR USE AGAINST REACTIVE ARMOR, AND AS AN MP ROUND HAS FRAGMENTATION EFFECTS. IF THE BK-29 HEAT-MP IS USED, IT MAY SUBSTITUTE FOR FRAG-HE OR COMPLEMENT FRAG-HE. THE BENEFIT OF HEAT-MP IS THAT THREE ROUND NATURES (APFSDS-T, HEAT-MP, ATGMS) IN THE AUTOLOADER VERSUS FOUR, MEANS MORE ANTITANK ROUNDS AVAILABLE. HOWEVER, A

CAPABILITY LOSS IS HEAT-MP LETHAL RADIUS AGAINST SOFT TARGETS IS MUCH LESS. OTHER AMMUNITION TYPES: GIAT 125G1 APFSDS-T, RUSSIAN BM-42 AND BM-32 APFSDS-T. THE RUSSIANS MAY HAVE A VERSION OF THE BM-42M WITH A DU PENETRATOR. RUSSIAN BM-48 APFSDS-T ROUND PENETRATES 650-700 MM.

ANTITANK GUIDED MISSILES:
NAME: AT-11B/INVAR
WARHEAD TYPE: TANDEM SHAPED CHARGE (HEAT)
ARMOR PENETRATION (MM CE): 900, 850 BEHIND ERA
RANGE (M): 5000

ANTITANK GUIDED MISSILES:
NAME: AT-11/SVIR (ORIGINAL ROUND)
WARHEAD TYPE: SHAPED CHARGE (HEAT)
ARMOR PENETRATION (MM): 770, 270 BEHIND ERA
RANGE (M): 4000

NOTES
A VARIETY OF THERMAL SIGHTS IS AVAILABLE. THEY INCLUDE THE RUSSIAN AGAVA-2, NAMUT SIGHT FROM PELENG, AND FRENCH SAGEM-PRODUCED ALIS. SOME THERMAL NIGHT SIGHTS PERMIT NIGHT LAUNCH OF ATGMS. UNIFIED FIRE CONTROL SYSTEM ADAPTS TO T-72B. THE 12X STABILIZED TV DAY SIGHT WITH AN IR AUTO-TRACKER IS MATCHED TO A STABILIZED 2ND GEN FLIR NIGHT SIGHT WITH ACQUISITION RANGE UP TO 7,000 M. ATGM FCS ACQUISITION RANGE TO 6,000 M.
OTHER POSSIBLE UPGRADES INCLUDE IMPROVED ARMOR, MORE POWERFUL ENGINE, AND IMPROVED AMMUNITIONS, SUCH AS THE AINET (HE-SHRAPNEL) ELECTRONICALLY FUZED ROUND. RELIKT 3RD GEN ERA IS OFFERED TO REPLACE KONTAKT-5 IN SEVERAL UPGRADE PACKAGES, OR AS A SEPARATE UPGRADE. THE ERA ADDS UP TO 600 MM CE PROTECTION AND 300 MM KE TO TURRET BASE ARMOR PROTECTION, ABOUT 150 MM MORE THAN KONTAKT-5.

RUSSIAN FEDERATION MAIN BATTLE TANK T-64B



SYSTEM	SPECIFICATIONS	SYSTEM	SPECIFICATIONS
Alternative designations:	INA	**Armament-Main Gun:**	Smoothbore gun
Date of introduction:	1966/1979	Caliber, type, name:	125mm 2A26M2
Proliferation: [at least]	2	Rate of Fire (rd/min):	6-8
Crew:	3	Loader Type:	Autoloader; ATGM manual
Combat weight (mt):	40.3	Ready main gun rounds:	24 carousel
Chassis length overall (m):	6.45	Stowed rounds:	7/6 ATGM
Height overall (m):	2.17	Elevation (°):	-6 to +14
Width overall (m):	3.41	Fire on Move:	Yes-main gun
Ground pressure (kg/cm2):	0.86	**Armament-Aux Weapon:**	Turret-coax to main gun
Automotive:		Caliber, type, name:	7.62mm PKT
Engine type (hp):	Diesel(multifuel) 5DTF	Max eff range-day (m):	1000
Engine type (hp): Upgrade	720	Max eff range-night (m):	850
Cruising range (km):	500 w extra fuel tanks	Fire on move:	Yes
Max road speed (kph):	60	Rate of fire (rd/min):	250
Max off-road speed (kph):	INA	**Armament-Aux Weapon:**	Turret-TC cupola

Average cross-country (kph):	INA	Caliber, type, name:	12.7mm
Max swim:	NA	Max aimed range-day (m):	1500
Fording depth (m):	1.8 unprep; 5.0 snorkel	Max eff range-night (m):	800
Communications		Fire on move:	Yes
Radio:	R-123M/R-124	Rate of fire (rd/min):	210
External Intercom device	NA	**ATGM Launcher:**	
		Missile name-nomenclature:	AT-8 Songster
Protection:		Launch method:	gun
Applique armor:	NA	Missile guidance:	radio freq
Explosive reactive armor:	Kontakt-5	Launch rate (msl/min):	2-3
Active system:	Available	**FIRE CONTROL**	
Mine clearing:	Roller-plow available	FCS name:	INA
Self-Entrenching blade:	Yes	Thermal: TC-gunner	No
NBC protection system:	Yes	Main gun stabilization	2-plane
Smoke equipment:	Grenlaunch 4x2; VESS	Infrared	Yes
		Sights w/magnific: day (m)	4000
		Sights w/magnific: nt (m)	800

NOTES

WEAPONS & AMMUNITION TYPES AND TYPICAL COMBAT LOAD

125-MM SMOOTHBORE GUN (MIX EST)	36
APFSDS-T	12
HEAT-MP/HEAT	2
FRAG-HE	16
ATGM	6
7.62-MM COAX MG	1250
12.7-MM NSVT AA MG	300

VARIANTS

T-64A: PRODUCTION VERSION OF BASE TANK. TANK HAS A HISTORY OF RELIABILITY PROBLEMS, AND LACKS THE HIGH ARMOR PROTECTION, TRACK SKIRTS, A FCS AND ATGM LAUNCH CAPABILITY FOR T-64B.

T-64BK: COMMAND TANK VERSION, WITH 10-M WHIP ANTENNA.

T-64B1: VERSION OF -B TANK WITHOUT ATGM LAUNCH CAPABILITY.

T-64BV: VARIANT HAS KONTAKT ERA MOUNTED. COMBAT WEIGHT (MT): 42.5 FOR T-64BV WITH EXPLOSIVE REACTIVE ARMOR (MM): STANDARD ON T-64BV

T-64U/T-64BM2: UPGRADE SERIES MARKETED BY UKRAINIAN MALYSHEV IN 2001. T-64U PROTOTYPE FEATURED 2ND GEN ERA, COMPOSITE ARMOR, AND FIRE SUPPRESSION EQUIPMENT. VARIANT ADDED T-80U FIRE CONTROL (1A42 GUNNER DAY SIGHT) AND THERMAL NIGHT SIGHT-PERMITS IT TO REPLACE RF-GUIDED AT-8/KOBRA ATGM WITH BETTER REFLEKS SERIES (SVIR/INVAR) LASER-BEAM RIDER ATGMS. UKRAINIAN-DEVELOPED LBR-GUIDED ATGM KOMBAT SIMILAR TO REFLEKS. A LATER VARIANT CHANGED THE FCS TO T-80UD/T-90 TYPE, WITH 1A45 DAY SIGHT, AND AGAT THERMAL NIGHT SIGHT.

BM BULAT: THIS 45 MT UPGRADE VARIANT IS CURRENTLY BEING ADVERTISED. IT INCLUDES AN 850-HP ENGINE, FCS WITH 1G46M LRF-BASED SIGHT AND CATHERINE-BASED THERMAL NIGHT SIGHT. REMOTE FIRED 12.7-MM MG AND 5,000 M ATGM ARE INCLUDED. PROTECTION INCLUDES 2ND GEN ERA.

MAIN ARMAMENT AMMUNITION

CALIBER, TYPE, NAME:

125-MM APFSDS-T, BM-42M
- MAXIMUM AIMED RANGE (M): 3,000-4,000
- MAX EFFECTIVE RANGE (M):
  - DAY: 2000-3000
  - NIGHT: 800-1300
- ARMOR PENETRATION (MM KE): 590-630 AT 2000 METERS

125-MM FRAG-HE-T, OF-26
- MAXIMUM AIMED RANGE (M): 5,000
- MAX EFFECTIVE RANGE (M):
  - DAY: 5000
  - NIGHT: 800-1300
  - ARMOR PENETRATION (MM): CAN DEFEAT IFV AND APC.

125-MM HEAT-MP, BK-29M
- MAXIMUM AIMED RANGE (M): 4,000
- MAX EFFECTIVE RANGE (M):
  - DAY: 3000
  - NIGHT: 800-1300
- ARMOR PENETRATION (MM CE): 650-750 IT HAS SOME HE EFFECTS.

125-MM HEAT, BK-27
- MAXIMUM AIMED RANGE (M): 4,000
- MAX EFFECTIVE RANGE (M):
  - DAY: 2,000-3000
  - NIGHT: 800-1300
- ARMOR PENETRATION (MM CE): 700-800

OTHER AMMUNITION TYPES: GIAT 125G1 APFSDS-T, RUSSIAN
BM-42 AND BM-32 APFSDS-T. THE RUSSIANS MAY HAVE A VERSION OF THE BM-42M WITH A DU PENETRATOR.

ANTITANK GUIDED MISSILE:
NAME: AT-8/SONGSTER/KOBRA
WARHEAD TYPE: SHAPED CHARGE (HEAT)
ARMOR PENETRATION (MM CE): 700 (RHA), 200 BEHIND ERA
RANGE (M): 4000

NOTES

THE NIGHT SIGHT CANNOT BE USED TO LAUNCH THE ATGM. THE DAY SIGHT CAN BE USED AT NIGHT FOR LAUNCHING ATGMS IF THE TARGET IS ILLUMINATED. A VARIETY OF THERMAL SIGHTS ARE AVAILABLE. THEY INCLUDE THE RUSSIAN AGAVA-2, FRENCH SAGEM-PRODUCED ALIS AND NAMUT SIGHT FROM PELENG. THERE ARE THERMAL SIGHTS AVAILABLE FOR INSTALLATION, WHICH PERMITS NIGHT LAUNCH OF ATGMS.

THE MORE RECENT BK-27 HEAT ROUND OFFERS A TRIPLE-SHAPED CHARGE WARHEAD AND INCREASED PENETRATION AGAINST CONVENTIONAL ARMORS AND ERA. THE BK-29 ROUND, WITH A HARD PENETRATOR IN THE NOSE IS DESIGNED FOR USE AGAINST REACTIVE ARMOR, AND AS AN MP ROUND HAS FRAGMENTATION EFFECTS. IF THE BK-29 HEAT-MP IS USED, IT MAY SUBSTITUTE FOR FRAG-HE (AS WITH NATO COUNTRIES) OR COMPLEMENT FRAG-HE. WITH THREE ROUND NATURES (APFSDS-T, HEAT-MP, ATGMS) IN THE AUTOLOADER VERSUS FOUR, MORE ANTITANK ROUNDS WOULD AVAILABLE FOR THE HIGHER RATE OF FIRE.

RUSSIAN FEDERATION MAIN BATTLE TANK T-62AM




"Bra-type" armor applique to turret front

SYSTEM	SPECIFICATIONS	SYSTEM	SPECIFICATIONS
Alternative designations:	INA	**Armament-Main Gun:**	
Date of introduction:	1965/1983	Caliber, type, name:	115mm, 2A20
Proliferation: [at least]	1	Rate of Fire (rd/min):	3-5
Crew:	4	Loader Type:	Manual
Combat weight (mt):	41.5	Ready main gun rounds:	INA
Chassis length overall (m):	6.5	Stowed rounds:	INA
Height overall (m):	2.4	Elevation (°):	-6 to +16
Width overall (m):	3.4	Fire on Move:	Yes-main gun only
Ground pressure (kg/cm2):	.77	**Armament-Aux Weapon:**	Turret-coax to main gun
Automotive:		Caliber, type, name:	7.62mm PKT
Engine type (hp):	Diesel V-55U	Max eff range-day (m):	800
Engine type (hp): Upgrade	620	Max eff range-night (m):	800
Cruising range (km):	450; 650 w extra fuel tanks	Fire on move:	Yes
Max road speed (kph):	45	Rate of fire (rd/min):	250
Max off-road speed (kph):	INA	**Armament-Aux Weapon:**	Turret-TC cupola
Average cross-country (kph):	INA	Caliber, type, name:	12.7mm DskKM
Max swim:	NA	Max aimed range-day (m):	1500
Fording depth (m):	1.4 unprep; 5.5 snorkel	Max eff range-night (m):	INA
Communications		Fire on move:	Yes
Radio:	R-173/R-173P/R-124	Rate of fire (rd/min):	250

External Intercom device	INA	**ATGM Launcher:**	
		Missile name-nomenclature:	AT-10 Skeksna
Protection:		Launch method:	gun
Applique armor:	Bra applique; track skirts	Missile guidance:	SACLOS, laser
Explosive reactive armor:	Available	Launch rate (msl/min):	2
Active system:	Drozd APS available	**FIRE CONTROL**	
Mine clearing:	Roller-plow available	FCS name:	Volna
Self-Entrenching blade:	No	Thermal: TC-gunner	INA
NBC protection system:	Radiation only	Main gun stabilization	M1 Tsklon, 2plane
Smoke equipment:	grenlaunch 2x4; VESS	Infrared	Yes
		Sights w/magnific: day (m)	4000
		Sights w/magnific: nt (m)	800-1300

NOTES

WEAPONS & AMMUNITION TYPES AND TYPICAL COMBAT LOAD

115-MM RIFLED GUN (MIX EST)	40
APFSDS-T	12
HEAT	3
FRAG-HE	20
ATGM	5
7.62-MM COAX MG	2500
12.7-MM	500

VARIANTS

T-62 VARIANTS WITH A V-46 T-72-TYPE ENGINE ADD -1 TO THEIR DESIGNATION.
T-62A: ADDED A 12.7-MM MG.
T-62M ADDS BDD BRA PROTECTION, FCS AND ATGM CAPABILITY.
T-62M1: VARIANT WITH VOLNA FCS BUT NO MISSILE-LAUNCH CAPABILITY.
T-62MK: COMMAND VARIANT.
T-62MV: VERSION WITH ERA IN PLACE OF THE BDD ARMOR. THE ERA INCLUDES KONTAKT ERA AND KONTAKT-5 2D-GENERATION ERA.
T-62D: VARIANT OF T-62M WITH THE DROZD APS VS ERA.
T-55AGM: UKRAINIAN UPGRADE CAN USE T-62 CHASSIS.

MAIN ARMAMENT AMMUNITION

CALIBER, TYPE, NAME:
115-MM APFSDS-T, BD/36-2
MAXIMUM AIMED RANGE (M): 3,000
MAX EFFECTIVE RANGE (M):
DAY: 1,800
NIGHT: 850-1,300
ARMOR PENETRATION (MM KE): 520 (RHA, 71° ANGLE) AT 1,000 M

115-MM APFSDS-T, BM-6 RUSSIAN
MAXIMUM AIMED RANGE (M): 3,000
MAX EFFECTIVE RANGE (M):

DAY: 1,800
NIGHT: 850-1,300
ARMOR PENETRATION (MM KE): 237 (RHA) AT 1,000 M

115-MM HEAT, BK-4
MAXIMUM AIMED RANGE (M): 1,500 (EST)
MAX EFFECTIVE RANGE (M):
DAY: 1,500
NIGHT: 850-1,200
ARMOR PENETRATION (MM CE): 495 (RHA)

115-MM FRAG-HE-T, OF-27
MAXIMUM AIMED RANGE (M): 4,000
MAX EFFECTIVE RANGE (M):
DAY: 4,000 ADJUST USING 1K13-1 FOR ADJUSTMENT
NIGHT: 850-1,300
ARMOR PENETRATION (MM): CAN DEFEAT IFV AND APC.

OTHER AMMUNITION TYPES: BM-3 APFSDS, BM-4 APFSDS, BK-4M HEAT, BK-15 HEAT, OF-11 FRAG-HE, OF-18 FRAG-HE

ANTITANK GUIDED MISSILES

NAME: AT-10/SHEKSNA
WARHEAD TYPE: SHAPED CHARGE (HEAT)
ARMOR PENETRATION (MM CE): 750, 250 BEHIND ERA
RANGE (M): 4,000 DAY ONLY

NAME: AT-10B/9M117M2
WARHEAD TYPE: TANDEM SHAPED CHARGE
ARMOR PENETRATION (MM CE): 800, 750 BEHIND ERA
RANGE (M): 4,000 DAY ONLY

NOTES

THE 1K13 SIGHT IS BOTH NIGHT SIGHT AND ATGM LAUNCHER SIGHT; HOWEVER, IT CANNOT BE USED FOR BOTH FUNCTIONS SIMULTANEOUSLY. WITH A SIMPLE UPGRADE, THE SIGHT CAN ACCOMMODATE A RANGE INCREASE TO THE MISSILE RANGE. FOR MOST TIER 3 AND TIER 4 OPFOR PORTRAYALS, THE UPGRADE IS NOT LIKELY, BUT THE OPTION IS A COST-EFFECTIVE ONE.
OPTIONAL SIGHTS AND FIRE CONTROL SYSTEMS INCLUDE THE ISRAELI EL-OP RED TIGER AND MATADOR FCS, SWEDISH NOBELTECH T-SERIES SIGHT, AND GERMAN ATLAS MOLF. THE BRITISH MARCONI DIGITAL FCS, SOUTH AFRICAN TIGER, AND BELGIAN SABCA TITAN OFFER UPGRADED FUNCTION. ONE OF THE BEST IS THE SLOVENIAN EFCS-3 INTEGRATED FCS.
A VARIETY OF THERMAL SIGHTS IS AVAILABLE. THEY INCLUDE THE RUSSIAN AGAVA, FRENCH SAGEM-PRODUCED ALIS AND NAMUT SIGHT FROM PELENG. THERE ARE THERMAL SIGHTS AVAILABLE FOR INSTALLATION, WHICH PERMITS NIGHT LAUNCH OF ATGMS.
OTHER IMPROVEMENTS AVAILABLE INCLUDE A HULL BOTTOM REINFORCED AGAINST MINES, RUBBER TRACK PADS, AND A THERMAL SLEEVE FOR THE GUN.

RUSSIAN FEDERATION MAIN BATTLE TANK T-55AMV





Explosive reactive armor (ERA) applique to tank front glacis, turret, and sides

SYSTEM	SPECIFICATIONS	SYSTEM	SPECIFICATIONS
Alternative designations:	INA	Armament-Main Gun:	Rifled gun
Date of introduction:	1970/1983	Caliber, type, name:	100mm, D-10T2S
Proliferation: [at least]	3	Rate of Fire (rd/min):	5
Crew:	4	Loader Type:	Manual
Combat weight (mt):	40.5	Ready main gun rounds:	43 total
Chassis length overall (m):	6.2	Stowed rounds:	INA
Height overall (m):	2.4	Elevation (°):	-5 to +18
Width overall (m):	3.30	Fire on Move:	Yes main gun
Ground pressure (kg/cm2):	0.85	**Armament-Aux Weapon:**	Turret-coax to main gun
Automotive:		Caliber, type, name:	7.62mm, PKT-T
Engine type (hp):	Diesel V-46-5M	Max eff range-day (m):	800
Engine type (hp): Upgrade	690	Max eff range-night (m):	INA
Cruising range (km):	450/650 w extra fuel tanks	Fire on move:	Yes
Max road speed (kph):	50	Rate of fire (rd/min):	250
Max off-road speed (kph):	35	**Armament-Aux Weapon:**	Turret-TC cupola
Average cross-country (kph):	25	Caliber, type, name:	12.7mm DshKM
Max swim:	1.4 unprep; 5.5 snorkel	Max aimed range-day (m):	1500
Fording depth (m):		Max eff range-night (m):	INA
Communications		Fire on move:	Yes

Radio:	R-173	Rate of fire (rd/min):	100
External Intercom device	NA	**ATGM Launcher:**	
		Missile name-nomenclature:	AT-10 Bastion
Protection:		Launch method:	gun
Applique armor:	Box armor/rubber screens	Missile guidance:	SACLOS, laser
Explosive reactive armor:	See notes	Launch rate (msl/min):	2-3
Active system:	Drozd APS available	**FIRE CONTROL**	
Mine clearing:	Roller-plow available	FCS name:	Volna
Self-Entrenching blade:	No	Thermal: TC-gunner	No
NBC protection system:	Yes	Main gun stabilization	M1 Tsiklon, 2 plane
Smoke equipment:	grenlaunch/eng smk sys	Infrared	L-4
		Sights w/magnific: day (m)	4000
		Sights w magnific: night (m)	800-1300

NOTES

WEAPONS & AMMUNITION TYPES AND TYPICAL COMBAT LOAD

100-MM RIFLED GUN (MIX EST)	43
APFSDS-T	14
HEAT-MP/HEAT	3
FRAG-HE	12
FOCUSED FRAG AINET	8
ATGM (WHEN CONFIGURED)	5
7.62-MM COAX MG	3500
12.7-MM NSVT AA MG	500

VARIANTS

T-55AMV IS DERIVED FROM A LINE OF VARIANTS OF T-55 MBT. THE -AMV UPGRADE MEANS SUBSTITUTION OF ERA FOR BDD (AKA EYEBROW OR BRA) ARMOR. VARIANTS ENDING WITH -1 DENOTE THE ENGINE REPLACED W/V-46 FROM T-72 MBT.
T-55A ADDED AN NBC PROTECTION SYSTEM.
T-55M ADDED THE VOLNA FIRE CONTROL SYSTEM (WITH ATGM LAUNCHER), IMPROVED GUN STABILIZATION AND SIGHTS, IMPROVED ENGINE, NEW RADIO, AND INCREASED PROTECTION THAT INCLUDED SIDE SKIRTS, SMOKE GRENADE LAUNCHERS, APPLIQUE ARMOR, AND FIRE PROTECTION.
T-55AM ADDED BDD (AKA EYEBROW OR BRA) ARMOR, AN ARMOR BAND AROUND THE TURRET FOR 180° COVERAGE**.**
T-55AM2: CZECH OR EAST GERMAN, OR POLISH VERSION OF T-55AM WITHOUT ATGM
T-55AM2B: CZECH OR EAST GERMAN VERSION OF T-55AM WITH KLADIVO FIRE CONTROL
T-55AM2P: POLISH T-55AM WITH MERIDA FCS AND ATGM
T-55AMD: VARIANT WITH THE DROZD APS INSTEAD OF ERA.
T-55AD DROZD: VARIANT WITH DROZD BUT NOT VOLNA FCS AND ERA.
OTHER T-54/T-55 UPGRADES:
SEVERAL FORMER WARSAW PACT COUNTRIES PRODUCED TANKS WHICH ARE SIMILAR TO THE T-55AMV. OTHER COUNTRIES HAVE INDIGENOUS VARIANTS. MANY COUNTRIES HAVE UPGRADED TO A LARGER MM MAIN GUN.
MORE THAN A DOZEN COUNTRIES HAVE PRODUCED UPGRADED T-54 AND T-55 VARIANTS WITH SIMILAR CAPABILITIES IN PROTECTION AND LETHALITY UPGRADE PROGRAMS WHICH HAVE RESULTED IN DIFFERENT BUT CAPABLE CONFIGURATIONS. HERE ARE A FEW OF THESE CONFIGURATIONS.
AL ZARRAR: PAKISTANI MODERNIZED TYPE 59 CHINESE COPY OF T-55. THE TANK HAS A **125 SMOOTH-BORE GUN**, IMAGE-STABILIZED FIRE CONTROL SYSTEM (ISFCS), THERMAL SIGHT, 730-HP ENGINE, ERA, INCLUDING ON THE SKIRTS AND IMPROVED

APFSDS-T (SABOT) ROUND.
TYPE 59-II TANK: IT HAS **105-MM RIFLED GUN** AND OTHER IMPROVEMENTS. OTHER TANKS BASED ON THE TYPE 59 INCLUDE: **TYPE 69** AND **TYPE 79** DESIGNS. A NORINCO **TYPE 59 RETROFIT PACKAGE** IS COMPATIBLE WITH T-55 AND TYPE 59 UPGRADES.
M-55 SI: SLOVENIAN T-54/55 UPGRADE WITH ASSISTANCE FROM ISRAELI ELBIT CORPORATION. IT FEATURES AN L7 **105-MM** RIFLED GUN, COMPUTER FCS WITH LRF, STABILIZED DAY/NIGHT II SIGHT, AND HUNTER-KILLER FIRE CONTROL. A THERMAL SIGHT IS AVAILABLE. SURVIVABILITY IMPROVEMENTS ARE ERA PLATES, TRACK SKIRTS, LWR-TRIGGERED SMOKE GRENADES, AND HALON FIRE SUPPRESSION. NEW ENGINE, TRACKS, AND COMMS WERE ADDED.
T-72Z/SAFIR 74: IRANIAN UPGRADE VARIANT OF T-54/55 AND TYPE 59. THIS CONSTITUTES STATE-OF-THE-ART FOR UPGRADED 50S-GENERATION FORMER WARSAW PACT TANKS. THIS TANK HAS A 780-HP DIESEL ENGINE, TRACK SKIRTS, AND SMOKE GRENADE LAUNCHERS. AN IRANIAN ERA PACKAGE IS FITTED. ARMAMENT INCLUDES AN M68 **105-MM RIFLED GUN**, 7.62-MM TYPE 59T (PKT) MG, AND A 12.7-MM TYPE 59 (DSHKM) MG. THE CANNON CAN LAUNCH AT-10/ BASTION ATGMS TO 4,000 METERS, AND FIRE A BROAD RANGE OF NATO 105-MM AMMUNITION. FIRE CONTROL INCLUDES THE ROBUST SLOVENIAN EFCS-3-55 FIRE CONTROL SYSTEM WITH A BALLISTIC COMPUTER, STABILIZATION, AND A LASER RANGEFINDER. THE FCS INCLUDES A COMMANDER'S INDEPENDENT VIEWER AND TARGET DESIGNATION SYSTEM, AND GUNNER NIGHT SIGHTS. UNDER THE ZULFIQAR PROGRAM, SUBSYSTEM UPGRADES FROM THIS VEHICLE PACKAGE COULD BE ADDED.
CZECH UPGRADE: A PROTOTYPE WAS DISPLAYED WITH 2ND GEN ERA, AND A NEW LRF FIRE CONTROL SYSTEM.
T-55M: RUSSIAN UPGRADE, WITH 2ND GEN ERA, T-80U SIDE SKIRTS, NEW FCS, 125-MM SMOOTHBORE GUN, 22-RD BUSTLE AUTO-LOADER, AND IMPROVED ENGINE AND SUSPENSION. THERE IS ALSO FIRE SUPPRESSION, SMOKE GRENADES, IR-ABSORBING PAINT AND SCREENS, AND COMMS.
T-55AGM: UKRAINIAN 48MT MODERNIZED TANK (BASED ON T-54/55/62 OR TYPE 59 SERIES). IMPROVEMENTS INCLUDE **120-MM** OR **125-MM GUN**, NEW HUNTER-KILLER FCS, THERMAL SIGHT, REMOTE AD MG, AND AUTO-LOADER. THERE IS ALSO IMPROVED ERA, NEW ENGINE, IMPROVED RUNNING GEAR, COUNTERMEASURES, AND NEW FIRE SUPPRESSION. CBT WT: APPROX 46 MT.

MAIN ARMAMENT AMMUNITION
CALIBER, TYPE, NAME:
100-MM APFSDS-T, BM-412M
MAXIMUM AIMED RANGE (M): 2,500
MAX EFFECTIVE RANGE (M):
DAY: 2,000-2,500
NIGHT: 800-1,300
ARMOR PENETRATION (MM KE): 418 AT 2,000 M, 380 AT 3,000 M

100-MM APFSDS-T, M1000, BELGIAN
MAXIMUM AIMED RANGE (M): 2,500
MAX EFFECTIVE RANGE (M):
DAY: 2,500 (EST)
NIGHT: 800-1,300
ARMOR PENETRATION (MM): NATO TRIPLE HEAVY TARGET, 4,500 M

100-MM HEAT, BK-17
MAXIMUM AIMED RANGE (M): 2,500
MAX EFFECTIVE RANGE (M):
DAY: 1,000 (EST)
NIGHT: 800-1,000 (EST)
ARMOR PENETRATION (MM CE): 380

100-MM FRAG-HE, OF-32
MAXIMUM AIMED RANGE (M): 4,000
MAX EFFECTIVE RANGE (M):
DAY: 2,500-4,000
NIGHT: 800-1,300
ARMOR PENETRATION (MM): CAN DEFEAT IFV AND APC

OTHER AMMUNITION TYPES: ORIGINAL TANK BM-8 SABOT ROUND WITH EFFECTIVE RANGE OF 1,500 M CAN ONLY PENETRATE 200M AT 1000M. THE LATER BM-25 APFSDS-T ROUND HAS AN EFFECTIVE RANGE OF 2000-2500M WITH PENETRATION INA. A VARIETY OF OTHER ROUNDS WITHIN THE RANGE NOTED ABOVE ARE AVAILABLE. THEY INCLUDE THE GIAT NR 322/NR 352 APFSDS-T AND SLOVAK JPRSV AP-T WITH RANGES BEYOND 2000 M.

ANTITANK GUIDED MISSILES:
NAME: AT-10/BASTION
WARHEAD TYPE: SHAPED CHARGE (HEAT)
ARMOR PENETRATION (MM CE): 650 (RHA), 150 BEHIND ERA
RANGE (M): 4,000 (DAY ONLY, SEE NOTES)

NAME: AT-10B/BASTION-M
WARHEAD TYPE: TANDEM SHAPED CHARGE
ARMOR PENETRATION (MM CE): 750 (RHA), 700 BEHIND ERA
RANGE (M): 4,000 (DAY ONLY, SEE NOTES)

PROTECTION:
ARMOR, TURRET FRONT (MM): 200 (BASE T-55 ARMOR)
APPLIQUE ARMOR (MM): RUBBER SCREENS AND BOX ARMOR
EXPLOSIVE REACTIVE ARMOR (MM): 1ST GEN RAISES CE ONLY TO 700-800 AGAINST HEAT; 2ND GEN RAISES TO 350-480 KE/700-900 HEAT.
ACTIVE PROTECTIVE SYSTEM: RUSSIAN DROZD APS AVAILABLE
THE BRITISH L7 105-MM RIFLED GUN HAS BEEN USED IN SEVERAL T-54/55/TYPE 59 TANK UPGRADE PROGRAMS. SEVERAL MORE RECENT 105-MM ROUNDS AND TANK FIRE CONTROL SYSTEMS HAVE BEEN DEVELOPED, TO INCREASE EFFECTIVENESS OF 105-MM TANK GUNS. THERE ARE ALSO NOW 120-MM LOW-RECOIL SMOOTHBORE TANK GUNS, SUCH AS THE COMPACT TANK GUN (CTG), WHICH FIRE STANDARD UNITARY ROUNDS, FOR T-54/55/TYPE 59 UPGRADE PROGRAMS.
OPTIONAL SIGHTS AND FIRE CONTROL SYSTEMS INCLUDE THE ISRAELI EL-OP RED TIGER AND MATADOR FCS, SWEDISH NOBELTECH T-SERIES SIGHT, AND GERMAN ATLAS MOLF. THE SERBIAN SUV-T55A FCS, BRITISH MARCONI DIGITAL FCS, SOUTH AFRICAN TIGER, AND BELGIAN SABCA TITAN OFFER UPGRADED FUNCTION. ONE OF THE BEST IS THE SLOVENIAN EFCS-3 INTEGRATED FCS. A ROMANIAN/FRENCH FCS UPGRADE PACKAGE FROM TR-85M1 TANK CAN BE USED ON T-55 TYPE TANKS. IT HAS HUNTER-KILLER FC, AND THERMAL GUNNER SIGHT. A VARIETY OF THERMAL SIGHTS ARE AVAILABLE, INCLUDING THE RUSSIAN/FRENCH ALIS AND NAMUT-TYPE SIGHT FROM PELENG. THERE ARE ALSO THERMAL SIGHTS WHICH PERMIT NIGHT LAUNCH OF ATGMS.
T-55 WITH BDD OR "BRA ARMOR" (SEMI-CIRCULAR ADD-ON ARMOR) HAVE TURRET PROTECTION INCREASED TO 330 MM (KE) AND 400-450 MM (CE). OTHER IMPROVEMENTS AVAILABLE INCLUDE A HULL BOTTOM REINFORCED AGAINST MINES, BETTER ENGINES, RUBBER TRACK PADS, AND A THERMAL SLEEVE FOR THE GUN. SOME FORCES HAVE ADDED ERA, APPLIQUE, OR BOX ARMOR TO T-55 TANKS. THESE PROTECTION IMPROVEMENTS MAY GIVE MARGINAL IMPROVEMENT AGAINST OLDER ROUNDS UP TO 105 MM, BUT DO NOT PROTECT SUFFICIENTLY TO DEFEAT MOST 120-125 MM APFSDS-T ROUNDS AT 2000 M. THEY OFFER SOME DEGREE OF PROTECTION AGAINST SOME TIER 4 AND A FEW TIER 3 ATGL WARHEADS AND ATGMS, BUT NOT AGAINST MORE MODERN AT WEAPONS.

PRC MAIN BATTLE TANK TYPE 98 AND TYPE 99A2



SYSTEM	SPECIFICATIONS	SYSTEM	SPECIFICATIONS
Alternative designations:	ZTZ-99; Type 98Gai; 98G	**Armament-Main Gun:**	Smoothbore gun
Date of introduction:	2001; 2003	Caliber, type, name:	125mm
Proliferation: [at least]	1	Rate of Fire (rd/min):	8
Crew:	3	Loader Type:	Autoloader; manual
Combat weight (mt):	53	Ready main gun rounds:	22
Chassis length overall (m):	7.7	Stowed rounds:	20
Height overall (m):	2.5	Elevation (°):	INA
Width overall (m):	3.5	Fire on Move:	Yes
Ground pressure (kg/cm2):	INA	**Armament-Aux Weapon:**	Turret-coax to main gun
Automotive:		Caliber, type, name:	7.62mm Type 59
Engine type (hp):	Diesel	Max eff range-day (m):	1000
Engine type (hp): Upgrade	1200; upgrade 1500	Max eff range-night (m):	800
Cruising range (km):	500/650w extra fuel tanks	Fire on move:	Yes
Max road speed (kph):	80	Rate of fire (rd/min):	250
Max off-road speed (kph):	60	**Armament-Aux Weapon:**	Turret-TC cupola
Average cross-country (kph):	INA	Caliber, type, name:	12.7mm W85/Type 88
Max swim:	NA	Max aimed range-day (m):	2000
Fording depth (m):	INA	Max eff range-night (m):	INA
Communications		Fire on move:	Yes

Radio:	INA	Rate of fire (rd/min):	100
External Intercom device	INA	**ATGM Launcher:**	
		Missile name-nomenclature:	AT-11/Svir/Invar
Protection:		Launch method:	Gun
Applique armor:	Track skirts	Missile guidance:	SACLOS
Explosive reactive armor:	2d or 3d gen ERA	Launch rate (msl/min):	2-3
Active system:	No	**FIRE CONTROL**	
Mine clearing:	Roller-plow available	FCS name:	ISFCS-212
Self-Entrenching blade:	No	Thermal: TC-gunner	Yes
NBC protection system:	Yes	Main gun stabilization	2-plane
Smoke equipment:	grenlaunch 12x; VESS	Infrared	Yes
		Sights w/magnific: day (m)	5000
		Sights w/magnific: nt (m)	INA

NOTES

WEAPONS & AMMUNITION TYPES AND TYPICAL COMBAT LOAD

125-MM SMOOTHBORE GUN (MIX EST)	42
APFSDS-T	14
HEAT-MP/HEAT	2
FRAG-HE	20
ATGM	6
7.62-MM COAX MG	2500
12.7-MM NSVT AA MG	500

VARIANTS

TYPE 98: EARLY VERSION CAME WITH OR WITHOUT 1ST GEN ERA.

TYPE 99: TYPE 98 UPGRADE WITH ADVANCED CONFORMAL ERA, 2ND GEN THERMAL SIGHT, COUNTERMEASURE LASER DAZZLER, AND A MORE POWERFUL ENGINE. THIS IS THE LATEST FIELDED CHINESE TANK BASED ON THE THIRD GENERATION TANK TYPE 90-II/P-90 CHASSIS.

TYPE 99A2: IMPROVED VERSION WITH 3 GEN RELIKT TYPE 3RD GEN ERA, AND A MORE EFFECTIVE GUN. THE ERA AND COMPOSITE ARMOR WILL DEFEAT VIRTUALLY ALL MODERN VEHICLE FIRED KE ROUNDS AND MISSILES. THE ATGM IS A TANDEM-WARHEAD TYPE SIMILAR TO INVAR. AN ACTIVE PROTECTION SYSTEM IS EMPLOYED ON IT. IT IS LIKELY THAT THE STANDARD FIELDED VERSION OF TYPE 99 IS TYPE 99A2 WITH PREVIOUSLY PRODUCED TYPE 99S UPDATED TO THIS STANDARD.

MAIN ARMAMENT AMMUNITION

CALIBER, TYPE, NAME:

125-MM APFSDS-T, INA
MAXIMUM AIMED RANGE (M): 3000
MAX EFFECTIVE RANGE (M):
DAY: 2500
NIGHT: 2500
ARMOR PENETRATION (MM KE): 960 AT 1,000 METERS, 800+ AT 2000

125-MM APFSDS-T, TYPE II
MAXIMUM AIMED RANGE (M): 3000
MAX EFFECTIVE RANGE (M):

DAY: 2500
NIGHT: 2500
ARMOR PENETRATION (MM KE): 600 AT 2000 METERS

125-MM FRAG-HE-T, OF-19
MAXIMUM AIMED RANGE (M): 3000
MAX EFFECTIVE RANGE (M):
DAY: 1500
NIGHT: 1500
ARMOR PENETRATION (MM): CAN DEFEAT IFV AND APC

125-MM HEAT, BK-27 ESTIMATED, BASED ON SIMILAR ROUNDS
MAXIMUM AIMED RANGE (M): 3000
MAX EFFECTIVE RANGE (M):
DAY: 1500
NIGHT: 1500
ARMOR PENETRATION (MM CE): 500

OTHER AMMUNITION TYPES: TANK CAN USE RUSSIAN AND OTHER FORMER WARSAW PACT AMMUNITION, AS WELL AS THE FRENCH GIAT 125G1. RUSSIAN ROUNDS INCLUDE THE BM-42M AND BM-32 APFSDS-T. THE RUSSIANS MAY HAVE A VERSION OF THE BM-42M WITH A DU PENETRATOR.

OTHER RUSSIAN ROUNDS INCLUDE HEAT AND HEAT-MULTIPURPOSE ROUNDS. THE MORE RECENT BK-27 HEAT ROUND OFFERS A TRIPLE-SHAPED CHARGE WARHEAD AND INCREASED PENETRATION AGAINST CONVENTIONAL ARMORS AND ERA. THE BK-29 ROUND, WITH A HARD PENETRATOR IN THE NOSE IS DESIGNED FOR USE AGAINST REACTIVE ARMOR, AND AS AN MP ROUND
HAS FRAGMENTATION EFFECTS. IF THE BK-29 HEAT-MP IS USED, IT MAY SUBSTITUTE FOR FRAG-HE (AS WITH NATO COUNTRIES) OR COMPLEMENTFRAG-HE. THERUSSIAN OF-26 ROUND IS EFFECTIVE OUT TO 5000 M WITH AREA EFFECTS.

ANTITANK GUIDED MISSILES:
NAME: INA (SIMILAR TO AT-11 SVIR)
WARHEAD TYPE: SHAPED CHARGE (HEAT)
ARMOR PENETRATION (MM CE): 770, 270 BEHIND ERA
RANGE (M): 5,000 DAY, 4,000 NIGHT

NAME: INA (SIMILAR TO AT-11B INVAR)
WARHEAD TYPE: TANDEM SHAPED CHARGE (HEAT)
ARMOR PENETRATION (MM CE): 900, 850 BEHIND ERA
RANGE (M): 5,000 DAY, 4,000 NIGHT

NOTES
OTHER SURVIVABILITY EQUIPMENT: LASER DAZZLER COUNTERMEASURE
SYSTEM CAN TEMPORARILY BLIND ENEMY GUNNERS AT 5 KM.
LASER WARNING RECEIVER
THE TANK ALSO USES AN INERTIAL/GNSS NAVIGATION SYSTEM AND BATTLE MANAGEMENT SYSTEM.

PRC MAIN BATTLE TANK TYPE 96 AND TYPE 96G



SYSTEM	SPECIFICATIONS	SYSTEM	SPECIFICATIONS
Alternative designations:	Type 88C; ZTZ 96	**Armament-Main Gun:**	Smoothbore gun
Date of introduction:	1997; 2006 for Type 99G	Caliber, type, name:	125mm 2A46M/D-81TM
Proliferation: [at least]	3	Rate of Fire (rd/min):	6+
Crew:	3	Loader Type:	Autoloader; manual
Combat weight (mt):	43; 46 for Type 96G	Ready main gun rounds:	22 carousel
Chassis length overall (m):	6.33	Stowed rounds:	20
Height overall (m):	2.30	Elevation (°):	-6 to +14
Width overall (m):	3.45	Fire on Move:	Yes-main gun
Ground pressure (kg/cm2):	0.77	**Armament-Aux Weapon:**	Turret-coax to main gun
Automotive:		Caliber, type, name:	7.62mm Type 59
Engine type (hp):	Diesel	Max eff range-day (m):	1000
Engine type (hp): Upgrade	1000	Max eff range-night (m):	INA
Cruising range (km):	400/600 w extra fuel tanks	Fire on move:	Yes
Max road speed (kph):	65	Rate of fire (rd/min):	250
Max off-road speed (kph):	45	**Armament-Aux Weapon:**	Turret-TC cupola
Average cross-country (kph):	35	Caliber, type, name:	12.7mm Type 54
Max swim:	NA	Max aimed range-day (m):	1500
Fording depth (m):	1.4 unprep; 5.0 snorkel	Max eff range-night (m):	INA

Communications		Fire on move:	Yes
Radio:	INA	Rate of fire (rd/min):	100
External Intercom device	No	**ATGM Launcher:**	
		Missile name-nomenclature:	Svir/Invar
Protection:		Launch method:	gun
Applique armor:	Track skirts	Missile guidance:	SACLOS; laser
Explosive reactive armor:	2d gen ERA	Launch rate (msl/min):	2-3
Active system:	NA	**FIRE CONTROL**	
Mine clearing:	Roller-plow available	FCS name:	ISFCS-212
Self-Entrenching blade:	NA	Thermal: TC-gunner	yes
NBC protection system:	Yes	Main gun stabilization	2-plane
Smoke equipment:	grenlaunch 12x; VESS	Infrared	Yes
		Sights w/magnific: day (m)	5000
		Sights w/magnific: nt (m)	1200; 2500 Type (6G

NOTES

WEAPONS & AMMUNITION TYPES AND TYPICAL COMBAT LOAD

125-MM SMOOTHBORE GUN (MIX EST)	42
APFSDS-T	15
HEAT	6
FRAG-HE	21
ATGM	6

(MISSILES REPLACE LIKE NUMBER MAIN GUN ROUNDS)

7.62-MM COAX MG	2250
12.7-MM NSVT AA MG	500

VARIANTS

THESE TANKS HAVE SEEN MANY MINOR IMPROVEMENTS IN MANUFACTURE AND OPERATIONS. CHASSIS WAS UPGRADED CONSIDERABLY FROM THE ORIGINAL TYPE 80/88 CHASSIS. HEAVIER TURRET/CHASSIS UPDATES TYPE 85. WEIGHT VARIES FROM 41 TO 42 TONS, DEPENDING ON VARIANT AND IMPROVEMENTS.

TYPE 85-IIAP: FIRST SIGNIFICANTLY FIELDED TANK OF THIS CLASS WITH 125-MM GUN, AUTOLOADER, AND A MODERN FCS. EARLY VERSIONS WERE ASSEMBLED USING PARTS FROM TYPE 59S, TYPE 69-IIS AND UPGRADE KITS FOR EXPORT, OR PRODUCED IN PAKISTAN UNDER LICENSE. THOSE TANKS DISPLAYED POOR CRAFTSMANSHIP AND RELIABILITY PROBLEMS. FABRICATION IMPROVEMENTS CORRECTED MOST OF THE PROBLEMS. PAKISTAN IS CONSIDERING INDIGENOUS, CHINESE, AND OTHER FOREIGN UPGRADE PROGRAMS TO MODERNIZE THOSE TANKS. PAKISTAN NOW PRODUCES 125-MM AMMO FOR THESE TANKS, THE MORE MODERN AL KHALID, AND FOR EXPORT.

TYPE 85-III: UPGRADE PROGRAM WAS DEVELOPED FOR EXPORT UPGRADES, E.G., TYPE 85-IIAP. IT INCLUDES A 1000-HP ENGINE AND COMPOSITE ARMOR PANELS, ERA, IMPROVED FCS WITH THERMAL SIGHT, AND A GUN-LAUNCH ATGM OPTION. WT 42 MT 6.3M X 3.5M. IT WAS APPLIED TO TYPE 88 SERIES AND TYPE 96.

TYPE 96: THE ORIGINAL VERSION (TYPE 88C) HAD A 730-HP ENGINE. MANY TYPE 85-III UPGRADES ARE NOW INCORPORATED. HOWEVER, WITH TRANSITION TO **TYPE 96G**, ADDITIONAL UPGRADES HAVE BEEN ADDED.

TYPE 96G: THE LATEST TANK HAS CONFORMAL 2ND GEN ERA OF THE SAME DESIGN AS ON THE TYPE 99 TANK. OTHER UPGRADES FROM THE TYPE 99 INCLUDE THE GUN, AMMUNITION, AND FCS. EXPORT VERSION ALSO HAS A SHTORA-TYPE EO JAMMER SYSTEM MOUNTED ON THE TURRET SIDES.

MAIN ARMAMENT AMMUNITION
CALIBER, TYPE, NAME:
125-MM APFSDS-T, BM-42M ESTIMATED, BASED ON SIMILAR ROUNDS
MAXIMUM AIMED RANGE (M): 3000
MAX EFFECTIVE RANGE (M):
DAY: 2000-3000
NIGHT: 850-1300
ARMOR PENETRATION (MM KE): 590-630 AT 2,000 METERS

125-MM FRAG-HE-T, OF-26 ESTIMATED, BASED ON SIMILAR ROUNDS
MAXIMUM AIMED RANGE (M): 5000
MAX EFFECTIVE RANGE (M):
DAY: INA
NIGHT: 850-1300
ARMOR PENETRATION (MM): CAN DEFEAT IFV AND APC

125-MM HEAT, BK-27 ESTIMATED, BASED ON SIMILAR ROUNDS
MAXIMUM AIMED RANGE (M): 3,000
MAX EFFECTIVE RANGE (M):
DAY: 2000-3000
NIGHT: 850-1300
ARMOR PENETRATION (MM CE): 700-800

125-MM HEAT-MP, BK-29M ESTIMATED, BASED ON SIMILAR ROUNDS
MAXIMUM AIMED RANGE (M): 3000
MAX EFFECTIVE RANGE (M):
DAY: 2000-3000
NIGHT: 850-1300
ARMOR PENETRATION (MM CE): 650-750

OTHER AMMUNITION TYPES: GIAT 125G1 APFSDS-T, RUSSIAN BM-42 AND BM-32 APFSDS-T. NOTE: THE RUSSIANS MAY HAVE A VERSION OF THE BM-42M WITH A DU PENETRATOR.

ANTITANK GUIDED MISSILES: FOR TYPE 96G
NAME: INA
WARHEAD TYPE: SHAPED CHARGE (HEAT)
ARMOR PENETRATION (MM CE): 700+
RANGE (M): 5000 DAY, 4000 NIGHT

THE MORE RECENT BK-27 HEAT ROUND OFFERS A TRIPLE-SHAPED CHARGE WARHEAD AND INCREASED PENETRATION AGAINST CONVENTIONAL ARMORS AND ERA. THE BK-29 ROUND, WITH A HARD PENETRATOR IN THE NOSE IS DESIGNED FOR USE AGAINST REACTIVE ARMOR, AND AS AN MP ROUND HAS FRAGMENTATION EFFECTS. IF THE BK-29 HEAT-MP IS USED, IT MAY SUBSTITUTE FOR FRAG-HE (AS WITH NATO COUNTRIES) OR COMPLEMENT FRAG-HE.

GEC-MARCONI CENTAUR FIRE CONTROL SYSTEM IS AVAILABLE. BRITISH BARR AND STROUD THERMAL BASED FCS CAN BE FITTED.

PRC MAIN BATTLE TANK TYPE 59D



Explosive reactive armor (ERA) and side armor skirts

SYSTEM	SPECIFICATIONS	SYSTEM	SPECIFICATIONS
Alternative designations:	WZ 120B	**Armament-Main Gun:**	Rifled gun
Date of introduction:	1958	Caliber, type, name:	105mm L7 (est)
Proliferation: [at least]	2	Rate of Fire (rd/min):	6-10
Crew:	4	Loader Type:	manual
Combat weight (mt):	38	Ready main gun rounds:	INA
Chassis length overall (m):	6.05	Stowed rounds:	INA
Height overall (m):	2.6	Elevation (°):	-4 to +17
Width overall (m):	3.3	Fire on Move:	No
Ground pressure (kg/cm2):	0.8	**Armament-Aux Weapon:**	Turret-coax to main gun
Automotive:		Caliber, type, name:	7.62mm Type 59T
Engine type (hp):	Diesel V-12	Max eff range-day (m):	1000
Engine type (hp): Upgrade	520	Max eff range-night (m):	800
Cruising range (km):	420/600w extra fuel tanks	Fire on move:	Yes
Max road speed (kph):	50	Rate of fire (rd/min):	250

Max off-road speed (kph):	25	**Armament-Aux Weapon:**	Turret-TC cupola
Average cross-country (kph):	INA	Caliber, type, name:	12.7mm Type 54
Max swim:	NA	Max aimed range-day (m):	1500
Fording depth (m):	1.4 unprep; 5.5 snorkel	Max eff range-night (m):	INA
Communications		Fire on move:	Yes
Radio:	INA	Rate of fire (rd/min):	100
External Intercom device	No	**ATGM Launcher:**	
		Missile name-nomenclature:	INA
Protection:		Launch method:	gun
Applique armor:	Track skirts	Missile guidance:	SACLOS, laser
Explosive reactive armor:	yes	Launch rate (msl/min):	INA
Active system:	NA	**FIRE CONTROL**	
Mine clearing:	Roller-plow available	FCS name:	UI Light Spot
Self-Entrenching blade:	NA	Thermal: TC-gunner	available
NBC protection system:	Yes	Main gun stabilization	2-plane
Smoke equipment:	grenlaunch 8x; VESS	Infrared	Yes
		Sights w/magnific: day (m)	5000
		Sights w/magnific: nt (m)	1000

NOTES

WEAPONS & AMMUNITION TYPES AND TYPICAL COMBAT LOAD

105-MM RIFLED GUN (MIX EST)	34
APFSDS-T	12
HEAT M456	3
HESH L35	16
ATGM	INA
7.62-MM COAX MG	3500
12.7-MM NSVT AA MG	200

VARIANTS

TYPE 59: ORIGINAL MODEL IS A COPY OF THE FORMER SOVIET T-54 MBT AND HAS A 100-MM RIFLED MAIN GUN.

TYPE 59D: MODERNIZATION UPGRADE, AKA WZ120C. IT HAS ERA, COMPUTERIZED STABILIZED FCS, THE 105-MM RIFLED GUN, AND II NIGHT SIGHTS.

TYPE 59D1 FEATURES A NEW **105-MM** TYPE 83A LONGER BARREL. GUN RANGE IS 2,000 M. A THERMAL SIGHT IS AVAILABLE. THE GUN HAS ATGM LAUNCH CAPABILITY.

TYPE 69: FAMILY OF TANKS DERIVED FROM THE TYPE 59 CHASSIS.

TYPE 69-I HAS A SMOOTHBORE **100-MM** GUN.

TYPE 69-II HAS A STABILIZED RIFLED **100-MM** GUN AND IMPROVED FIRE CONTROL SYSTEM WITH LRF AND BALLISTIC COMPUTER. A THERMAL SLEEVE WAS ADDED TO THE GUN BARREL. LIMITED NUMBER OF TYPE 69 TANKSHAVE 105-MM GUNS.

TYPE 79-I: TYPE 69 UPGRADE HAS **105-MM** GUN, THERMAL GUN SLEEVE, AND IMPROVED FCS WITH II NIGHT SIGHT. TYPE 79-II EXPORT VERSION WITH MODERNIZED FCS, IMPROVED SIDE SKIRTS, AND A NEW ENGINE.

T-72Z/ SAFIR 74: IRANIAN VARIANT WHICH CONSTITUTES STATE-OF-THE-ART FOR UPGRADED 50S-GENERATION FORMER WARSAW PACT TANKS. THIS TANK HAS A 780-HP DIESEL ENGINE, TRACK SKIRTS, AND SMOKE GRENADE LAUNCHERS. AN

IRANIAN ERA PACKAGE FITS T-72Z. ARMAMENT INCLUDES AN M68 105-MM RIFLED GUN, 7.62-MM TYPE 59T (PKT) MG, AND A 12.7-MM TYPE 59 (DSHKM) MG. THE CANNON CAN LAUNCH AT-10/ BASTION ATGMS TO 4000 METERS, AND FIRE A BROAD RANGE OF NATO 105-MM AMMUNITION. FIRE CONTROL INCLUDES THE ROBUST SLOVENIAN EFCS-3-55 FIRE CONTROL SYSTEM WITH STABILIZATION, A LASER RANGEFINDER, AND A BALLISTIC COMPUTER. THE FCS INCLUDES A COMMANDER'S INDEPENDENT VIEWER AND TARGET DESIGNATION SYSTEM, AND II GUNNER NIGHT SIGHTS.

T- 55MII: PAKISTANI TYPE 59 MODERNIZATION CONDUCTED DURING OVERHAUL INCLUDES A 580-HP ENGINE, STABILIZED 105-MM RIFLED GUN, INTEGRATED COMPUTER FCS WITH GPS, AND THERMAL SIGHT, APU, ETC.

AL ZARRAR: PAKISTANI TYPE 59 UPGRADE, WITH NEW ENGINE AND ERA. ORIGINAL AL ZARRAR HAD 1ST GEN ERA. THE LATEST VERSION HAS A 730-HP ENGINE, **125-MM GUN**, ISFCS HUNTER-KILLER FCS WITH CATHERINE 2ND GEN THERMAL SIGHT, AND 2ND GEN ERA. SO FAR, 300 ARE IN SERVICE.

MAIN ARMAMENT AMMUNITION

CALIBER, TYPE, NAME:

105-MM APFSDS, H6/62
- MAXIMUM AIMED RANGE (M): 3,000
- MAX EFFECTIVE RANGE (M):
  - DAY: 2,000-3,000 (EST)
  - NIGHT: 1,000
- ARMOR PENETRATION (MM): INA

105-MM APFSDS, UI (NEW CHINESE)
- MAXIMUM AIMED RANGE (M): 3,000
- MAX EFFECTIVE RANGE (M):
  - DAY: 2,000-3,000 (EST)
  - NIGHT: 1,000
- ARMOR PENETRATION (MM KE): 460 AT 2,000 M

105-MM HEAT, M456 (MULTINATIONAL)
- MAXIMUM AIMED RANGE (M): 3,000
- MAX EFFECTIVE RANGE (M):
  - DAY: 1,500-2,500 (EST)
  - NIGHT: 1,000
  - ARMOR PENETRATION (MM CE): 432, NATO SINGLE HEAVY TARGET

105-MM HESH, L35 (UK)
- MAXIMUM AIMED RANGE (M): 5,000
- MAX EFFECTIVE RANGE (M):
  - DAY: 2,000-3,000 (EST)
  - NIGHT: 1,000
  - ARMOR PENETRATION (MM): NATO SINGLE HEAVY TARGET

OTHER AMMUNITION TYPES: CHINESE TYPE 83/ UK L64/ US M735 APFSDS, UK L52 APDS, MULTINATIONAL M393 HEP-T, FRENCH OE 105-F1 HE, L39 SMOKE, CANISTER

ANTITANK GUIDED MISSILES:

NAME: AT-10/BASTION, CHINESE **105-MM** VARIANT FOR TYPE 59D
- WARHEAD TYPE: 105-MM SHAPED CHARGE (HEAT)
- ARMOR PENETRATION (MM CE): 650 (RHA)
  - RANGE (M): INA (DAY ONLY)

GEC-MARCONI CENTAUR FIRE CONTROL SYSTEM AVAILABLE. BRITISH BARR AND STROUD THERMAL BASED FCS CAN BE FITTED.

BRITISH MAIN BATTLE TANK CHALLENGER 2



Challenger 2

SYSTEM	SPECIFICATIONS	SYSTEM	SPECIFICATIONS
Alternative designations:	FV 4030/4	Armament-Main Gun:	Rifled gun
Date of introduction:	1994	Caliber, type, name:	120mm L30A1
Proliferation: [at least]	2	Rate of Fire (rd/min):	INA
Crew:	4	Loader Type:	Manual
Combat weight (mt):	69.0 Chal 2/60.5 Chal 1	Ready main gun rounds:	INA
Chassis length overall (m):	8.33	Stowed rounds:	INA
Height overall (m):	2.50	Elevation (°):	-10 to +20
Width overall (m):	3.5	Fire on Move:	Yes
Ground pressure (kg/cm2):	0.97	**Armament-Aux Weapon:**	Turret-coax to main gun
Automotive:		Caliber, type, name:	7.62mm
Engine type (hp):	Diesel	Max eff range-day (m):	INA
Engine type (hp): Upgrade	1500	Max eff range-night (m):	INA
Cruising range (km):	450-500	Fire on move:	Yes
Max road speed (kph):	48	Rate of fire (rd/min):	INA
Max off-road speed (kph):	INA	**Armament-Aux Weapon:**	Turret-TC cupola L37A2
Average cross-country (kph):	30	Caliber, type, name:	7.62mm
Max swim:	NA	Max aimed range-day (m):	800

Fording depth (m):	1.1	Max eff range-night (m):	INA
Communications		Fire on move:	Yes
Radio:	C42/Lanspur VHF	Rate of fire (rd/min):	INA
External Intercom device	No	**ATGM Launcher:**	NA
		Missile name-nomenclature:	-
Protection:		Launch method:	-
Applique armor:	INA	Missile guidance:	-
Explosive reactive armor:	NA	Launch rate (msl/min):	-
Active system:	NA	**FIRE CONTROL**	
Mine clearing:	Plow variant	FCS name:	Mk5, IFCS Mk 11/12
Self-Entrenching blade:	No	Thermal: TC-gunner	TOGS-2 wSAGEM viewer
NBC protection system:	Yes	Main gun stabilization	2-plane
Smoke equipment:	grenlaunch 2x5; VESS	Rangefinder	Laser
		Infrared	Searchlight
		Sights w/magnific: day (m)	INA
		Sights w/magnific: nt (m)	INA

NOTES

WEAPONS & AMMUNITION TYPES AND TYPICAL COMBAT LOAD

120-MM RIFLED GUN	50
APFSDS-T	20
HESH	30
7.62-MM MG	4000
COAX 7.62-MM	INA
CUPOLA MG	INA

VARIANTS

CHALLENGER 1: BASE TANK FROM WHICH CHALLENGER 2 WAS DERIVED. CHALLENGER 2 INCLUDES OVER 100 IMPROVEMENTS INCLUDING MOBILITY UPGRADES, TOGS-2 FCS, GUNS, AND LAND NAVIGATION SYSTEM, AND AN APU.
CHALLENGER 2E/DESERT CHALLENGER: THE TANK HAS A 1500-HP ENGINE, LOADER .50-CAL MG (TBD), AND L30A1 GUN.
OMANI CHALLENGER 2: VARIANT WITH GPS, LOADER .50-CAL MG, AIR CONDITIONING AND ADDITIONAL RADIATORS.

MAIN ARMAMENT AMMUNITION

CALIBER, TYPE, NAME:
120-MM APFSDS-T, CHARM 3, DEPLETED URANIUM
MAXIMUM AIMED RANGE (M): 5,000-6,500
MAX EFFECTIVE RANGE (M): 3,000+ DAY AND NIGHT
ARMOR PENETRATION (MM): INA

120-MM HIGH-EXPLOSIVE SQUASH-HEAD (HESH), L31
MAXIMUM AIMED RANGE (M): 5,000
MAX EFFECTIVE RANGE (M): 3,000 DAY AND NIGHT
ARMOR PENETRATION (MM): NATO SINGLE HEAVY TARGET
ANTITANK/ARMOR/PERSONNEL-MATERIEL. OTHER AMMUNITION TYPES: L15 APDS, L34 WP SMOKE

BRITISH MAIN BATTLE TANK CHIEFTAIN MK5



Chieftain

SYSTEM	SPECIFICATIONS	SYSTEM	SPECIFICATIONS
Alternative designations:	FV 4201	Armament-Main Gun:	Rifled gun
Date of introduction:	1965	Caliber, type, name:	120mm L11A5
Proliferation: [at least]	6	Rate of Fire (rd/min):	INA
Crew:	4	Loader Type:	Manual
Combat weight (mt):	55.0	Ready main gun rounds:	INA
Chassis length overall (m):	7.48	Stowed rounds:	INA
Height overall (m):	2.90	Elevation (°):	-10 to +20
Width overall (m):	3.5	Fire on Move:	Yes
Ground pressure (kg/cm2):	0.90	**Armament-Aux Weapon:**	Turret-coax to main gun L8A1
Automotive:		Caliber, type, name:	7.62mm
Engine type (hp):	Diesel	Max eff range-day (m):	800
Engine type (hp): Upgrade	750	Max eff range-night (m):	INA
Cruising range (km):	400-500	Fire on move:	Yes
Max road speed (kph):	48	Rate of fire (rd/min):	INA
Max off-road speed (kph):	INA	**Armament-Aux Weapon:**	Turret-TC cupola L37A1
Average cross-country (kph):	30	Caliber, type, name:	7.62mm
Max swim:	NA	Max aimed range-day (m):	800
Fording depth (m):	1.1	Max eff range-night (m):	INA

Communications		Fire on move:	Yes
Radio:	C42/Lanspur VHF	Rate of fire (rd/min):	INA
External Intercom device	No	**ATGM Launcher:**	NA
		Missile name-nomenclature:	-
Protection:		Launch method:	-
Applique armor:	Side skirts	Missile guidance:	-
Explosive reactive armor:	NA	Launch rate (msl/min):	-
Active system:	NA	**FIRE CONTROL**	
Mine clearing:	Plow variant	FCS name:	Mk5, IFCS Mk 11/12
Self-Entrenching blade:	No	Thermal: TC-gunner	TOGS Mk 11/12
NBC protection system:	Yes	Main gun stabilization	2-plane
Smoke equipment:	grenlaunch 2x6ea on turret	Rangefinder	Laser
		Infrared	Searchlight
		Sights w/magnific: day (m)	INA
		Sights w/magnific: nt (m)	INA

NOTES

WEAPONS & AMMUNITION TYPES AND TYPICAL COMBAT LOAD

120-MM RIFLED GUN	64
APFSDS-T	20
HESH	44
SMOKE-WP [option within 64 rounds]	
7.62-MM MG	6200
COAX 7.62-MM	6000
CUPOLA MG	200

A VARIETY OF FIRE CONTROL SYSTEMS AND THERMAL SIGHTS ARE AVAILABLE FOR CHIEFTAIN. MARCONI, NANOQUEST, AND PILKINGTON OFFER DAY AND NIGHT SIGHTS FOR THE CHIEFTAIN. AT LEAST 324 CHIEFTAINS UPGRADED WITH THE BARR AND STROUD TOGS THERMAL SIGHT SYSTEM. THE 1R26 THERMAL CAMERA CAN BE USED WITH THE 1R18 THERMAL NIGHT SIGHT. IT HAS WIDE (13.6°) AND NARROW (4.75°) FIELDS OF VIEW, AND IS COMPATIBLE WITH TOGS FORMAT. GEC SENSORS OFFERS A LONG LIST OF SIGHTS INCLUDING: MULTI-SENSORS PLATFORM, TANK THERMAL SENSOR, AND SS100/110 THERMAL NIGHT SIGHT.

VARIANTS

MK 5: FINAL PRODUCTION VARIANT, WITH A NEW ENGINE AND NBC SYSTEM, MODIFIED AUXILIARY WEAPONS AND SIGHTS. A VARIETY OF SUPPORT VEHICLES WERE DEVELOPED FROM THE TANK. THEY INCLUDE RECOVERY VEHICLES, AVLB, DOZER, MINE CLEARER, AIR DEFENSE AND 155-MM SP ARTILLERY SYSTEMS.
MK 6-11 ARE UPGRADES OF EARLIER MODELS.
MK 9 AND AFTER HAVE IFCS FCS.
MK 11 AND MK 12 HAVE TOGS.
MK 12 ADDED ROMOR (STILLBREW) SPACED ARMOR BOXES ON TURRET FRONT. A 1R18 THERMAL SIGHT ADDED TO TOGS.
KHALID/SHIR 1: JORDANIAN VARIANT WHICH HAS CHASSIS, TURRET AND WEAPONRY OF THE CHIEFTAIN, BUT INCORPORATES ENGINE AND RUNNING GEAR UPGRADES OF CHALLENGER I. THE FIRE CONTROL HAS SEEN A NUMBER OF IMPROVEMENTS, INCLUDING A NEW BALLISTIC COMPUTER.

MAIN ARMAMENT AMMUNITION
CALIBER, TYPE, NAME:
120-MM APFSDS-T, L23A1
MAXIMUM AIMED RANGE (M): 5000
MAX EFFECTIVE RANGE (M):
DAY: 3000
NIGHT: INA MK 5
3000 MK 11/12
ARMOR PENETRATION (MM): INA

120-MM HIGH-EXPLOSIVE SQUASH-HEAD (HESH), L31
MAXIMUM AIMED RANGE (M): 5000
MAX EFFECTIVE RANGE (M):
DAY: 3000
NIGHT: INA MK 5
3000 MK 11/12

ARMOR PENETRATION (MM): NATO SINGLE HEAVY TARGET THE HESH ROUND IS USED FOR ANTITANK CHEMICAL-ENERGY (CE) ANTI-ARMOR MISSIONS, AND FOR HE EFFECTS AGAINST PERSONNEL AND MATERIEL.
OTHER AMMUNITION TYPES: L15 APDS, L34 WP SMOKE
CHARM ARMAMENT UPGRADE PROGRAM, WITH THE 120-MM L30 GUN INCORPORATED IN CHALLENGER 1, IS AVAILABLE FOR CHIEFTAIN MODIFICATION PROGRAMS.

GERMANY MAIN BATTLE TANK LEOPARD 2A4, 2A5, 2A6, 2A7+



Leopard 2A6

SYSTEM	SPECIFICATIONS	SYSTEM	SPECIFICATIONS
Alternative designations:	Swiss Pz87, Swedish Stry121	Armament-Main Gun:	Smoothbore gun
Date of introduction:	1979	Caliber, type, name:	120mm L55
Proliferation: [at least]	7	Rate of Fire (rd/min):	INA
Crew:	4	Loader Type:	Manual
Combat weight (mt):	56	Ready main gun rounds:	15
Chassis length overall (m):	7.7	Stowed rounds:	27
Height overall (m):	2.8	Elevation (°):	-9 to +20
Width overall (m):	3.7	Fire on Move:	Yes
Ground pressure (kg/cm2):	0.83	**Armament-Aux Weapon:**	Turret-coax to main gun
Automotive:		Caliber, type, name:	7.62mm, MG3A1
Engine type (hp):	Diesel	Max eff range-day (m):	INA
Engine type (hp): Upgrade	1500	Max eff range-night (m):	INA
Cruising range (km):	550	Fire on move:	Yes
Max road speed (kph):	70	Rate of fire (rd/min):	1200
Max off-road speed (kph):	50	**Armament-Aux Weapon:**	Turret-TC cupola
Average cross-country (kph):	40	Caliber, type, name:	7.62mm, MG3A1
Max swim:	NA	Max aimed range-day (m):	INA
Fording depth (m):	1.0 unprep; 4.0 snorkel	Max eff range-night (m):	INA
Communications		Fire on move:	Yes



Radio:	INA	Rate of fire (rd/min):	1200
External Intercom device	INA	**ATGM Launcher:**	NA
		Missile name-nomenclature:	-
Protection:		Launch method:	-
Applique armor:	Track skirt	Missile guidance:	-
Explosive reactive armor:	INA	Launch rate (msl/min):	-
Active system:	Galiz, Stry122	**FIRE CONTROL**	
Mine clearing:	No	FCS name:	INA
Self-Entrenching blade:	No	Thermal: TC-gunner	yes
NBC protection system:	Yes	Main gun stabilization	WNA-H22, 2-plane
Smoke equipment:	grenlaunch 8x2 at turret	Infrared	Yes
		Sights w/magnific: day (m)	INA
		Sights w/magnific: nt (m)	INA

NOTES

WEAPONS & AMMUNITION TYPES AND TYPICAL COMBAT LOAD (LEOPARD 2)

120-MM SMOOTHBORE GUN (MIX EST)	42
APFSDS-T	INA
HEAT-MP/T	INA
7.62-MM MG	4750
7.62-MM COAX MG	2000
7.62-MM TURRET	2750

VARIANTS

LEOPARD 2 SERIES:

PZ87: SWISS VARIANT WITH INDIGENOUS MGS, COMMS, FCS, AND IMPROVED NBC EQUIPMENT.

DUTCH LEOPARD 2: USES INDIGENOUS EQUIPMENT AS NOTED ABOVE.

LEOPARD 2A5/LEOPARD 2 (IMPROVED): UPGRADE WITH SUBSTANTIALLY INCREASED SPACED ARMOR ON TURRET FRONT, HULL, AND SIDES. OTHER IMPROVEMENTS INCLUDE IMPROVED STABILIZATION, SUSPENSION, NAVIGATION, 2ND GEN THERMAL FIRE CONTROL, HATCH DESIGN, AND APFSDS-T ROUNDS. THIS IS A STANDARD GERMAN TANK AND IS WIDELY EXPORTED IN NATO.

NATO COUNTRIES USE THE FOLLOWING CUSTOM VARIANTS OF THE LEO 2A5:

LEOPARD 2A5M: CANADIAN UPGRADE VARIANT.

LEOPARD 2A6: GERMAN UPGRADE WITH 55-CALIBER L55 GUN, IMPROVED AMMO, NEW APU, BATTLE MANAGEMENT SYSTEM.

LEOPARD 2 HEL: VERSION OF 2A6 EXPORTED TO GREEK FORCES.

LEOPARD 2A6 EX IS AN EXPORT VERSION WITH EVEN MORE ARMOR PROTECTION. CUSTOMERS INCLUDE SPAIN AND THE NETHERLANDS. IT IS PROBABLY THE BEST-PROTECTED TANK IN THE WORLD.

LEOPARD 2 PSO (PEACE SUPPORT OPERATIONS): EXPORT VERSION OPTIMIZED FOR MOUT OPERATIONS.

LEOPARD 2A6M CAN: EXPORT VERSION FOR CANADIAN FORCES WITH SLAT ARMOR ADDED.

STRV 122: SWEDISH-LICENSED VARIANT RESEMBLING 2A5 WITH AN INDIGENOUS TURRET AND OTHER UPGRADES. THE TANK FEATURES FRENCH GALIX ACTIVE PROTECTION SYSTEM AND IMPROVED COMMAND AND CONTROL. SWEDEN DEVELOPED AN HE-T ROUND DESIGNED TO RANGE 2,000 METERS OR MORE FOR ITS LEOPARD-2 AND STRV-122 TANKS. WITH ADDITIONAL ARMOR, STRV 122 WILL WEIGH 62 MT.

LEOPARD 2A7+

THIS EVOLUTION OF THE LEOPARD PSO WAS INTRODUCED AT THE 2010 EUROSATORY EXHIBITION. IT HAS VERY SIMILAR CAPABILITIES

TO THE PSO, AS WELL AS COMBAT ENGINEERING ATTACHMENTS FOR DOZER BLADES, MINE PLOWS AND OTHER EQUIPMENT.
IT FEATURES REDESIGNED FINAL DRIVE, TRACKS AND SUSPENSION.
THE 2A7 STANDARD PACKAGE CAN BE RETROFITTED TO EXISTING VEHICLES OR SUPPLIED AS A NEW BUILD TANK. THE UPGRADE PACKAGE IS MODULAR AND CAN BE TAILORED TO CUSTOMER REQUIREMENTS. IT IS TYPICALLY ARMED WITH THE LONGER L55 GUN. IMPROVISED EXPLOSIVE DEVICE (IED) JAMMERS AND A HARD- OR SOFT-KILL DEFENSIVE AIDS SYSTEM CAN BE FITTED.
THE DRIVER HAS A SUSPENDED AUTOFLUG SEAT AND A NEW DAY THERMAL CAMERA ON THE GLACIS PLATE WHICH FEEDS A MULTIPURPOSE SCREEN.
THE TANK COMMANDER IS EQUIPPED WITH THE CARL ZEISS RTWL-B ROOF-MOUNTED STABILIZED PANORAMIC SIGHT. THIS HAS A DIRECT OPTICAL SIGHT WITH THREE FIELDS OF VIEW PLUS A THIRD-GENERATION ATTICA THERMAL IMAGER, LASER RANGEFINDER AND DAYLIGHT CAMERA FOR HUNTER-KILLER TARGET ENGAGEMENTS. ELECTRONICS AND SYSTEMS ARE LINKED THROUGH A CAN BUS, WHICH PROVIDES INFORMATION TO ALL CREWMEMBERS ON FLAT-PANEL DISPLAYS AND CAN ALSO SHOW INFORMATION FROM A STANDARD BATTLE-MANAGEMENT SYSTEM.
AN INFANTRY TELEPHONE IS FITTED AT THE REAR, ALONG WITH A DAY/NIGHT CAMERA FEEDING A SCREEN AT THE DRIVER'S POSITION FOR DRIVING IN REVERSE. AN AIR-CONDITIONING SYSTEM IS INSTALLED IN THE TURRET BUSTLE AND SAAB'S BARRACUDA CAMOUFLAGE SYSTEM IS FITTED TO REDUCE THE THERMAL LOAD.
THE VEHICLE RETAINS THE STANDARD 1500-HP MTU MB 873 KA-501 DIESEL ENGINE COUPLED TO A RENK HSWL 354 AUTOMATIC TRANSMISSION. AN AUXILIARY POWER UNIT IS FITTED TO THE REAR RIGHT OF THE CHASSIS AND CAN SUPPORT ALL SUBSYSTEMS WITHOUT REQUIRING THE MAIN ENGINE.
A COMBAT WEIGHT OF ABOUT 67.5 TONS IN ITS URBAN OPERATIONS CONFIGURATION. THIS RESULTS IN A REDUCED POWER-TO-WEIGHT RATIO OF ABOUT 22 HP/TON. HOWEVER, THE WEIGHT INCREASE REQUIRED OTHER UPGRADES, INCLUDING MODIFIED FINAL DRIVES, NEW AND STRONGER TORSION BARS, UPGRADED BRAKES, NEW DIEHL TRACKS AND A HYDRAULIC JACK-TENSIONING SYSTEM.
IMPROVED SITUATIONAL AWARENESS IS PROVIDED THROUGH EXTRA DAY AND THERMAL CAMERAS COVERING 360-DEG AROUND THE TANK, WITH IMAGES DISPLAYED AT ALL CREWMEMBERS MONITORS.
SLAT ARMOR IS PROVIDED AROUND THE REAR OF THE TURRET AND CHASSIS TO PROTECT AGAINST ROCKET-PROPELLED GRENADES. ADDITIONAL TOP PROTECTION FOR THE FORWARD PART OF THE HULL AND TURRET IS AVAILABLE AS AN OPTION.

MAIN ARMAMENT AMMUNITION (LEOPARD 2)
CALIBER, TYPE, NAME:
120-MM APFSDS-T, DM43
MAXIMUM AIMED RANGE(M): 3500
MAX EFFECTIVE RANGE (M):
DAY: INA
NIGHT: INA
ARMOR PENETRATION (MM KE): 450 AT 2000 METERS

120-MM APFSDS-T, US OLIN GD120
MAXIMUM AIMED RANGE (M): 3500
MAX EFFECTIVE RANGE (M):
DAY: 3000
NIGHT: INA
ARMOR PENETRATION (MM KE): 520 AT 2000 METERS

120-MM HEAT-MP-T, DM-12A1/US OLIN M830
MAXIMUM AIMED RANGE (M): INA
MAX EFFECTIVE RANGE (M):
DAY: 2500
NIGHT: INA
ARMOR PENETRATION (MM): INA

OTHER AMMUNITION TYPES: US-PRODUCED M829, M829A1
APFSDS-T; US M830A1 HEAT-MP-T (MPAT), GE DM12A1 (US COPY M830) HEAT-MP-T (MPAT)

NOTES

A VARIETY OF UPGRADE PROGRAMS AND OPTIONS ARE AVAILABLE FOR THE LEOPARD 2. THESE INCLUDE THE ATLAS ELEKTRONIK VEHICLE INTEGRATED COMMAND AND INFORMATION SYSTEM (IFIS), A DIGITAL COMMAND AND INFORMATION SYSTEM. THE NEW LONGER GUN BARREL (L55 GUN BARREL, 1.30 METERS LONGER) IS AVAILABLE FOR EARLIER VEHICLES. IT PERMITS EFFECTIVE USE OF A NEW APFSDS-T ROUND, DM53 (LKE II), WITH A LONGER ROD PENETRATOR, AND WHICH IS UNDER DEVELOPMENT. THE GERMAN ARMY HAS DECIDED NOT TO BUY THE DM43 APFSDS-T ROUND (AKA LKE 1), RATHER WAIT AND UPGRADE TO THE DM53 ROUND. AN EXPECTED NEAR-TERM UPGRADE IS ADDITION OF THE SPEAR GUN-LAUNCH ATGM, WHICH WAS DERIVED FROM THE RUSSIAN AT-10B ARKAN.

LEOPARD 1 SERIES:

LEOPARD 1 WAS THE BASELINE TANK WITH ORIGINAL TRACKS, AND WITHOUT TRACK SKIRTS, STABILIZATION OR THERMAL SLEEVE FOR GUN.
LEOPARD 1A1 VERSION, CAN BE FITTED WITH APPLIQUE ARMOR.
LEOPARD 1A1A1 IS THE THIRD PRODUCTION LOT, WITH APPLIQUE, AIR FILTER INTAKES. EARLY TANKS HAVE BEEN UPGRADED TO THIS STANDARD.
LEOPARD 1A2: PRODUCTION BATCH AND -1A1 UPGRADE WITH A NEW CAST TURRET, IMPROVED NBC SYSTEM, II NIGHT SIGHTS, AND AIR CONDITIONING.
ITALIAN LEOPARD 1A2: UPGRADE WITH SIRIO THERMAL FCS, GUN STABILIZATION AND TURRET DRIVE.
LEOPARD 1A3: PRODUCTION SYSTEM WITH PREVIOUS IMPROVEMENTS, LARGER WELDED SPACED ARMOR TURRET, AND IMPROVED FCS (BY COUNTRY).
LEOPARD 1A4: FINAL PRODUCTION SYSTEM WITH AEG-TELEFUNKEN FCS.
LEOPARD 1A5: MORE THAN 1,300 –1A1/1A2 TANKS HAVE BEEN REFITTED WITH AN EMES-18 FCS AND THERMAL SIGHTS. **LEOPARD 1A5 (BE):** BELGIAN UPGRADED -1A1/1A2S, WITH NEW FCS, FN MAG 7.62-MM MGS, AND THERMAL SIGHTS.
LEOPARD 1-V: DUTCH VERSION, OF -1A1A1, WITH GERMAN EMES-12A3 FCS AND PZB II NIGHT SIGHT.
A VARIETY OF SYSTEMS USE LEOPARD 1 CHASSIS TO INCLUDE GEPARD AIR DEFENSE GUN, ENGINEER AND RECOVERY VEHICLES, AND BRIDGE LAYER.
A VARIETY OF MBT VARIANTS FROM 2A1 TO 2A4 DENOTE MINOR CHANGES, AS WELL AS FCS UPGRADES. COMBAT SUPPORT VARIANTS INCLUDE AN ARMORED RECOVERY VEHICLE.

MAIN ARMAMENT AMMUNITION (LEOPARD 1)

CALIBER, TYPE, NAME:
105-MM APFSDS-T, DM43, GERMAN RHEINMETALL
MAXIMUM AIMED RANGE (M): 2000+
MAX EFFECTIVE RANGE (M):
DAY: 1400
NIGHT: 1000 IR/1,500 WHITE LIGHT/MORE WITH THERMAL
ARMOR PENETRATION (MM): NATO TRIPLE HEAVY TARGET, 5,500 M

105-MM APFSDS-T, M413, ISRAELI MILITARY INDUSTRIES
MAXIMUM AIMED RANGE (M): 6000
MAX EFFECTIVE RANGE (M):
DAY: 1400
NIGHT: 1000 IR/1500 WHITE LIGHT/MORE WITH THERMAL
ARMOR PENETRATION (MM): NATO TRIPLE HEAVY TARGET, 6000+M
105-MM HEAT-T, OCC 105 F1, FRENCH GIAT
MAXIMUM AIMED RANGE (M): 2500
MAX EFFECTIVE RANGE (M):
DAY: 1400
NIGHT: 1000
ARMOR PENETRATION (MM CE): 360 AT 0°

105-MM HEAT-T, M456A2, BELGIAN MECAR
MAXIMUM AIMED RANGE (M): 2500-3500
MAX EFFECTIVE RANGE (M):

DAY: 1400
NIGHT: 1000
ARMOR PENETRATION (MM CE): 432 AT 0°

105-MM HESH-T, DM512, RHEINMETALL
MAXIMUM AIMED RANGE (M): 4,000
MAX EFFECTIVE RANGE (M):
DAY: 1,400
NIGHT: 1,000 IR/1,500 WHITE LIGHT/MORE WITH THERMAL
ARMOR PENETRATION (MM): NATO SINGLE HEAVY TARGET

105-MM HE, OE 105 F1, FRENCH GIAT
MAXIMUM AIMED RANGE (M): 2,500
MAX EFFECTIVE RANGE (M):
DAY: 1,400
NIGHT: 1,000
ARMOR PENETRATION (MM): CAN DEFEAT AN IFV AND APC

OTHER AMMUNITION TYPES: ANY NATO-STANDARD 105-MM AMMUNITION CAN BE USED. THEY INCLUDE: CHINESE NORINCO 105, BRITISH ROYAL ORDINANCE L64A4 AND H6/6, BELGIAN MECAR M1060, FRENCH GIAT OFL 105 F1, SPANISH SANTA BARBARA C-437, US M735 AND M833 (DEPLETED URANIUM), AND CANADIAN FP105 APFSDS-T ROUNDS. OTHER TYPES AVAILABLE ARE: HE-T, SMOKE, ILLUMINATING, HESH-T, HE PLASTIC TRACER (HEP-T), AND CANISTER OR APERS-T (FLECHETTE).
A RECENT ROUND IS THE ISRAELI MILITARY INDUSTRIES APAM ROUND, WHICH
OVER-FLIES THE TARGET AND DISPERSES FRAGMENTING SUBMUNITIONS OUTWARD AND DOWNWARD OVER A MUCH WIDER KILL ZONE.
NOTES
MORE THAN A DOZEN FIRE CONTROL SYSTEMS, MANY WITH THERMAL SIGHTS, ARE AVAILABLE FOR THIS TANK. A VERSION WITH LLLTV SIGHTS IS THE LEOPARD 1A1A2. IMPROVED STABILIZATION SYSTEMS INCLUDE US HR TEXTRON, FRENCH SAMM, AND GERMAN FWM. OTHER OPTIONS INCLUDE A FRONT MOUNTED DOZER BLADE, IMPROVED AIR CONDITIONING, A 120-MM SMOOTHBORE GUN, AND OTHER SECONDARY WEAPONS.

PAKISTAN MAIN BATTLE TANK AL KHALID TYPE-90-IIM



Al Khalid

SYSTEM	SPECIFICATIONS	SYSTEM	SPECIFICATIONS
Alternative designations:	Type-90-IIM; MBT-2000	**Armament-Main Gun:**	Smoothbore gun
Date of introduction:	2001	Caliber, type, name:	125mm 2A46M/D-81TM
Proliferation: [at least]	1	Rate of Fire (rd/min):	6-8; 2 manual
Crew:	3	Loader Type:	autoloader; manual
Combat weight (mt):	48.0	Ready main gun rounds:	22 carousel
Chassis length overall (m):	6.8	Stowed rounds:	27
Height overall (m):	2.35	Elevation (°):	-5 to +18
Width overall (m):	3.4	Fire on Move:	Yes
Ground pressure (kg/cm2):	INA	**Armament-Aux Weapon:**	Turret-coax to main gun
Automotive:		Caliber, type, name:	7.62mm
Engine type (hp):	Diesel	Max eff range-day (m):	1000
Engine type (hp): Upgrade	1200	Max eff range-night (m):	800
Cruising range (km):	450	Fire on move:	Yes
Max road speed (kph):	70	Rate of fire (rd/min):	250
Max off-road speed (kph):	INA	**Armament-Aux Weapon:**	Turret-TC cupola
Average cross-country (kph):	45	Caliber, type, name:	12.7mm
Max swim:	NA	Max aimed range-day (m):	1500
Fording depth (m):	1.4 unprep; 5.0 snorkel	Max eff range-night (m):	INA

Communications		Fire on move:	Yes
Radio:	INA	Rate of fire (rd/min):	100
External Intercom device	INA	**ATGM Launcher:**	
		Missile name-nomenclature:	AT-11/Invar
Protection:		Launch method:	2A46M/D-81TM gun
Applique armor:	Track skirts	Missile guidance:	SACLOS, laser
Explosive reactive armor:	Improved ERA	Launch rate (msl/min):	2-3
Active system:	NA	**FIRE CONTROL**	
Mine clearing:	Roller-plow available	FCS name:	ISFCS-212
Self-Entrenching blade:	Yes	Thermal: TC-gunner	Yes
NBC protection system:	Yes	Main gun stabilization	2-plane
Smoke equipment:	grenlaunch 8x; VESS	Infrared	Yes
		Sights w/magnific: day (m)	5000
		Sights w/magnific: nt (m)	4500

NOTES

WEAPONS & AMMUNITION TYPES AND TYPICAL COMBAT LOAD

125-MM SMOOTHBORE GUN (MIX EST)	49
APFSDS-T	19
HEAT	6
FRAG-HE	24
ATGM	INA
7.62-MM COAX MG	4000
12.7-MM NSVT AA MG	700

VARIANTS

THE ORIGINAL TANK WAS DERIVED FROM THE CHINESE JOINT VENTURE MBT-2000 EXPORT PROTOTYPE, MODIFIED FOR PK, THE TANK HAD 1st GEN ERA AND 1st GEN THERMAL SIGHTS

TYPE 90-IIM: THE CHINESE EXPORT TANK (AKA: TYPE 90-II) HAS 2ND GEN ERA.

A VERSION OF **AL KHALID** HAS SEVERAL KEY CHANGES, INCLUDING NEW 2ND GEN ERA, NEW FCS WITH 2ND GEN THERMAL NIGHT SIGHT, A NEW ENGINE AND TRANSMISSION, AND ADDED AMMUNITION CAPACITY. A SIGNIFICANT FEATURE OF THE UPDATED TANK IS AN INTEGRATED BATTLE MANAGEMENT SYSTEM (IBMS), A DIGITALLY LINKED SYSTEM WITH DIGITAL TEXT AND GRAPHIC DISPLAY, INLAID MAPS WITH OVERLAYS, GPS FOR SELF NAVIGATION AND TARGET LOCATION, 3-D TOPOGRAPHIC IMAGES, FORMATTED ORDER AND REPORT DISPLAYS.

MAIN ARMAMENT AMMUNITION

CALIBER, TYPE, NAME:

125-MM APFSDS-T, BM-42M ESTIMATED, BASED ON SIMILAR ROUNDS
- MAXIMUM AIMED RANGE (M): 3000
- MAX EFFECTIVE RANGE (M):
  - DAY: 2000-3000
  - NIGHT: 850-1300

ARMOR PENETRATION (MM KE): 630 AT 2000 METERS

125-MM FRAG-HE-T, OF-26 ESTIMATED, BASED ON SIMILAR ROUNDS

MAXIMUM AIMED RANGE (M): 5000
MAX EFFECTIVE RANGE (M):
DAY: 5000
NIGHT: 850-1300
ARMOR PENETRATION (MM): CAN DEFEAT IFV AND APC

125-MM HEAT, BK-27 ESTIMATED, BASED ON SIMILAR ROUNDS
MAXIMUM AIMED RANGE (M): 3000
MAX EFFECTIVE RANGE (M):
DAY: 2000-3000
NIGHT: 850-1300
ARMOR PENETRATION (MM CE): 700-800

125-MM HEAT-MP, BK-29M ESTIMATED, BASED ON SIMILAR ROUNDS
MAXIMUM AIMED RANGE (M): 3000
MAX EFFECTIVE RANGE (M):
DAY: 2000-3000
NIGHT: 850-1300
ARMOR PENETRATION (MM CE): 650-750

OTHER AMMUNITION TYPES: GIAT 125G1 APFSDS-T, RUSSIAN BM-42 AND BM-32 APFSDS-T.
THE RUSSIANS MAY HAVE A VERSION OF THE BM-42M WITH A DU PENETRATOR.
THE BK-27 HEAT ROUND OFFERS A TRIPLE-SHAPED CHARGE WARHEAD AND INCREASED PENETRATION AGAINST CONVENTIONAL ARMORS AND ERA.
THE BK-29 ROUND, WITH A PENETRATOR DESIGNED FOR USE AGAINST REACTIVE ARMOR; BK-29 AS AN MP ROUND HAS FRAGMENTATION EFFECTS. IF BK-29 HEAT-MP IS USED, IT MAY ALSO SUBSTITUTE FOR FRAG-HE OR COMPLEMENT FRAG-HE.

ANTITANK GUIDED MISSILES:
NAME: AT-11B/INVAR
WARHEAD TYPE: TANDEM SHAPED CHARGE (HEAT)
ARMOR PENETRATION (MM CE): 900, 850 BEHIND ERA
RANGE (M): 5000 DAY AND NIGHT

NAME: AT-11C/INVAR-M/9M119M1
WARHEAD TYPE: TANDEM SHAPED CHARGE (HEAT)
ARMOR PENETRATION (MM CE): 900, 850 BEHIND ERA
RANGE (M): 5000(+) DAY AND NIGHT [ESTIMATE]

NOTES
WELDED TURRET PERMITS UPGRADE FOR IMPROVED ARMOR.
BAR ARMOR STOWAGE RACKS ON TURRET SIDES AND REAR CAN PRE-DETONATE GRENADES LAUNCHED AT THOSE ASPECTS. PAINT IS IR-REFLECTING.
OTHER POSSIBLE UPGRADES INCLUDE CONFORMAL ERA SIMILAR TO THAT ON THE CHINESE 98 GAI. THE DESIGN WAS DERIVED FROM THE CHINESE P-90/MBT2000, WITH PAKISTANI MODIFICATIONS. IT IS BUILT IN PAKISTAN, WITH A UKRAINIAN DRIVE TRAIN, SERBIAN FCS, FRENCH THERMAL SIGHT, WITH RUSSIAN ATGM AND ATGM FIRE CONTROL, AND POSSIBLE USE OF UKRAINIAN KOMBAT GUN-LAUNCH ATGMS.
THE PREVIOUS THERMAL SIGHT WAS SAGEM 1ST GEN WITH 2500M ESTIMATED RANGE. PAKISTANI ARMY HAS CONTRACTED FOR UPGRADE SIGHTS. AN UPCOMING EXPORT DEAL MAY BE NEW 3RD GEN SAGEM MATIS THERMAL SIGHT WITH 11,000 M DETECTION RANGE AND 5300M RECOGNITION.

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Worldwide Equipment Guide

Chapter 5: Anti-tank and Anti-Armor Systems



TRADOC G-2 ACE–Threats Integration
Ft. Leavenworth, KS

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Chapter 5: Antitank and Anti-Armor

As armored combat vehicles added more protection and ascended in importance on the battlefield, so did systems designed to stop them gain importance. The umbrella term ***antitank*** (AT) originally denoted systems specifically designed to destroy tanks. Today it is more broadly constructed. Modern combat is combined arms combat. Mechanized forces include other armored combat vehicles, such as armored reconnaissance vehicles, infantry fighting vehicles, armored personnel carriers, etc. In order to address the whole spectrum of threats on the modern battlefield, new systems are being developed and older systems redesigned. Examples are ***heavy armament combat vehicles (HACVs)*** and ***heavy combat support vehicles***.

Tank armor protection continues to increase, but another way to defeat them is to defeat associated systems. Tanks cannot survive or achieve their tactical objectives without support from other armored systems. The more recent term ***anti-armor*** may supplant the current term because antitank weapons which cannot penetrate tank armor can still be effective threats to defeat or damage more lightly armored fighting vehicles. With upgrades and innovative tactics, even older, seemingly obsolete weapons can be used as opposing force (OPFOR) anti-armor weapons.

The OPFOR places a high priority on destroying enemy vehicles. It will use all available assets (organic and improvised) for the effort. The spectrum of AT and anti-armor weapons includes aircraft, artillery, NBC assets, sniper rifles, and air defense systems. Many OPFOR countries employ antitank weapons for roles other than antitank, including AT guns against personnel and soft targets, and ATGMs against personnel and rotary-wing aircraft.

Critical factors for destroying vehicles are abilities to slow, canalize, and stop them by engaging them with lethal fires and ambushes. Mines, explosives, IEDs, other obstacle systems, and terrain restrictions can be used in concert with AT weapons.

Antitank guns (AT guns) include towed and self-propelled AT guns (aka ***SPAT*** or tank destroyers). A number of guns were designed as field guns, with multi-role capability as both artillery and antitank guns. The modern focus on maneuver warfare has brought a slight decline in development of uniquely antitank guns. Thus, the 85-mm D-44 gun, which can be used as artillery, is effective for use in an antitank role. Although recent systems have been developed, the number fielded has not kept pace with production of armored combat vehicles. Nevertheless, their effectiveness and selected armies' continued reliance on linear positional battles and protracted defenses have kept a large number of these systems in inventories. Based on numbers fielded and likelihood of their threat to US forces, only towed antitank guns were included.

Upgrades for towed guns are available. These include night sights, such as passive image intensifier sights and thermal sights for the Russian 100-mm MT-12. This is a robust antitank weapon with a high rate of fire and rapid mobility. Note the Russian innovation in the MT-12R AT gun with a radar-directed all-weather fire control system. Improved ammunition is critical for continued effectiveness of antitank weapons. The MT-12 and its variants can fire a variety of modern ammunition, including the Russian gun-launched ***antitank guided missiles*** (ATGMs), Kastet and Arkan.

The ATGM is the singular greatest threat to tanks today. These systems are distinguished from other antitank weapons in that they are guided to the target. Most employ SACLOS guidance (see Glossary). An operator holds crosshairs on the target, and the missile tracker directs the missile to that point. There are a wide variety of countermeasures (such as smoke and counter-fire, due to long flight time and operator vulnerability) for use against ATGMs. Thus, a 90% probability of hit is a technical figure, and does not mean a 90% probability of success. On the other hand, there are a variety of counter-countermeasures which the ATGMs, launchers, and operators can use to increase the chance for success. Tactics, techniques, and procedures in the antitank arena are critical to mission success.

Armor protection for many modern tanks has outpaced some older AT weapons. However, ATGMs offer improved size, range, and warhead configurations to destroy even the heaviest tanks. Notable trends include increased proliferation and variety of man-portable and portable ATGM launchers. These include shoulder-launched, short-range systems, such as the French Eryx, and copies of former Soviet systems, such as the AT-3/Malyutka ("Suitcase" SAGGER). Some so-called portable launchers (AT-4/5, TOW, and HOT) have outgrown portability weight limits, and must be carried in vehicles and only dismounted short distances from carriers. But newer compact systems are being fielded, e.g., Spike-MR and Kornet-MR.

Although there are special-built ***ATGM launcher vehicles***, the most numerous launcher vehicles are common chassis adapted by adding a pintle mounted, manually loaded and launched ATGM. Adaptation is simple, so they are not described here. Nearly all ATGM launchers are high-level threats to vehicles and rotary-wing aircraft in the US Army. They can also be used against personnel and materiel targets. The variety of launch platforms is increasing. UAVs are being adapted to launch ATGMs for responsive attacks against NLOS/BLOS targets.

Recent trends include new ATGM technologies for increased range and lethality. The most common type of lethality upgrade is the addition of a nose precursor or tandem warhead. Recent options include missiles for wider battlefield lethality—BLOS/NLOS systems, and long-range ATGMs to attack targets previously considered invulnerable. NLOS guidance technologies include fiber optics (to see through the missile eye BLOS) and semi-active laser homing (for dismounted soldier/vehicle/aircraft/UAV-mounted laser target designators to select targets). Others have "fly-over, shoot-down" mode to fly behind a hill and fire an explosive-formed penetrator (EFP, in the shape of a cannon kinetic-energy penetrator round) downward through the relatively soft top of armored vehicles. Improvements include improved guidance, resistance to countermeasures, reduced smoke/noise signatures, and increased range. Night sights are common, including thermal sights. Many countries are looking at active protection system (APS) CM systems. Already, some ATGM have counter-countermeasures to defeat all APS.

The chapter groups systems in order of mobility and unit level, from dismounted or man-portable weapons, to ground-mounted or towed weapons, to tracked or wheeled vehicle-mounted weapons. Weapon systems in this chapter represent likely or possible threats against US Army forces. Questions and comments should be addressed to:

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Antitank and Anti-Armor Systems: Key Technology Trends

Military forces worldwide continue to field new anti-armor systems and upgrade legacy systems. Modern tanks can be fitted with increased armor protection, countermeasure systems, and survivability support systems. Thus new antitank systems and upgrades are being fielded to challenge those protection upgrades. Most weapons on the battlefield have some anti-armor capability. A variety of multi-role (MR) weapons have been fielded with lethal AT capability. Similarly, many AT weapons are used to defeat other targets.

System Category	Technology Trend	System Example
Recoilless Weapons	Electro-Optical LRF fire control system (FCS) with II/thermal sight	Simrad LP101
	Precision munitions and missiles for recoilless crewed weapons	M40 with LAHAT
	New munitions (tandem HEAT, longer range, multi-purpose use)	SPG-9M Rcllss gun
	Small light launch tubes and disposable canisters to extend length	RPG-29 Mtd ATGL
	Rapid disassembly into components for dismount team portability	M79 Rcllss gun
AT Guns	New FCS can include radar-directed fire control	MT-12R AT gun
	New munitions include homing round and gun-launched ATGMs	2S25 AT gun
	Auxiliary propulsion units for local moves	MT-12/MT-12R
	Increased protection for AT gun vehicles (see HACVs)	Type 63A light tank
	HACVs with similar weapons lethality to tanks	2S25 SPAT gun
ATGMs	EO/thermal FCS with LRF and encoded beacon to counter jammers	Konkurs-M (AT-5B)
	Missiles include thermobaric multi-use, improved tandem, top attack	AT-13
	New guidance modes extend range for missiles to BLOS and NLOS	Spike-LR
	Back-blast reduction for use in confined spaces	Eryx
	KE missiles/rounds with short time-of-flight to defeat active protection	Starstreak
	Light man-portable medium-range high-lethality ATGMs	MILAN-ADT
	Remote add-on vehicle turrets with EO optics and multi-launchers	VBL-Kornet
Multi-role Weapons	Multi-role systems and munitions in other units to defeat armor	Strix IR Mortar rd
	Multi-role (AD/AT) missiles for air defense and anti-armor use	Starstreak
	Multi-role missile vehicles for AD, AT, and infantry units	BMP/Kliver
	Multi-role gun/missile systems and heavy combat support vehicles	BMPT
Other AT Weapons	Mines and IEDs include remote controlled and scatter mine systems	RPO-A grenade
	Flame weapons for use against armor and vehicle subsystems	Molotov Cocktail
	Improvised weapons for use against vehicles and personnel	PKM machinegun
	Wide variety of weapons to defeat wheels on armored vehicles	UMZ Mine scatter



Spectrum of Weapons and Munitions Effective Against Armored Vehicles

Military forces will use a wide variety of weapons to defeat armored systems and degrade their operations. The WEG describes MR weapons in various locations. Common weapons in combat units will engage various targets, including armored vehicles. With emphasis resulting from modern urban combat; demand for improved weapons and munitions against armored vehicles is increasing.

The challenge in defeating modern tanks is extremely difficult, with their high amount of armor protection and high mobility. Antitank subunits/units are found in infantry and armor battalions, brigades, and divisions, and in other combat units as needed. AT units are specially designed to support infantry, armor, and other units in combat, and are often task organized in combined arms groups. With limited armor protection and vulnerability to ground weapons, AT systems do not separate from supported maneuver units. AT unit weapons include the following:

- Crewed recoilless guns and launchers
- Towed AT guns
- HACVs (aka SPAT, etc.)
- Man-portable and shoulder launch ATGMs
- Portable and ground mount ATGMs
- ATGM launcher vehicles, and
- NLOS ATGM launcher vehicles

The most prolific anti-armor and antitank systems are in units other than AT units. By number, most are found in infantry, mechanized infantry, tank units, and in special purpose forces units, but can also be in irregular and hybrid forces. They include the following assets.

Branch	System Type	Example	Lethality D/K if hit*	Remarks
Infantry, SOF, etc. (Also irregular or, hybrid forces)	ATGL	Pzf 3-IT600	Tk and LAV=K	Tandem HEAT, HE, Bunker-B
	ATDL	RPG-27	Tk and LAV=K	Tandem HEAT
	Shoulder ATGM	Eryx	Tk and LAV=K	Tandem HEAT, HE
	ATGL/IED remote fuze	SIRA sensor, Salamander	LAV=K, Tk=K	IR/seismic sensor, RF/wire cmd
Infantry Vehicles and other LAVs	IFV main gun and ATGM	AMX-10P/MILAN	LAV=K, Tk=K	APDS round, ATGM Tandem
	Infantry fire spt vehicle	BMP/Kliver	LAV=K, Tk=K	Gun, ATGM, MANPADS
	Heavy IFV/IFSV	BMP-3M	LAV=K, Tk=K	See also HCSV
Tanks	Main Gun and ATGM	T-90S	LAV=K, Tk=K	Rounds and ATGM



Maneuver units receive support for various combat missions and phases. ATDLs are treated as ordnance stored with other ammunition, then disseminated as needed to infantry and other users depending on mission and battle conditions. Engineer assets and units will support maneuver units in the defense and conducting ambushes (by delivering or laying mines to slow or stop enemy forces, so that they can be engaged with AT/anti-armor weapons). Infantry companies and battalions may have organic weapons platoons for AT/anti-armor fire support. Combat units can call for AT unit support, anti-armor mortar/artillery fires, and aircraft strikes.

A shift to using more light armored vehicles (LAVs) has led to production and deployment of a wide array of anti-armor and multi-role weapon systems for use against LAVs. Threats to mobility are also greater with wheeled LAVs. The table on the next pages shows some of these.

Multi-Role (MR) and Anti-Armor Weapons and Munitions to Counter Armored Vehicles

Branch	System Type	Example	Lethality D/K if hit*	Remarks
Infantry, SOF, etc. (also irregular and hybrid forces)	Rifle, Machinegun Hand grenade Grenade Launcher Anti-materiel rifle MR ATGL/ATDL Flamethrower/FAE Air-to-Surface rkt lchr Improvised explosives Multi-role missile	SVD with AP rd Molotov cocktail QLZ-89 with DP Barrett M2A1A PF-89A Shmel-M reusable lchr C-5K (S-5K hand lchr) IED, “sticky bombs” Starstreak	LAV=D, Tk=D LAV=K, Tk=K LAV=K LAV=D, Tk=D LAV=K LAV=K, Tk=D LAV=K LAV=K, Tk=D Heli, LAV=K	Vs tires, optics, engine, etc. Blind optics, secondary blast Penetrate/damage tires/wheels Calibers from .338 to 23 mm HE or thermo with penetrator RPO for napalm, RPO-A FAE Improvised and shop-made Designs and fuzing vary widely Infantry Bn, also AT, AD units
Support Vehicles	AD/AT fire spt vehicle Combat recon vehicle Flame unit spt vehicle ASR launcher vehicle	Armored Starstreak BRM-3K BMO-1 with 30 RPO-A BMD/Aviaagregat S5K	LAV=K LAV=K, Tk=K LAV=K, Tk=D LAV=K, Tk=D	Weapon priority - self-defense Also BMO-T on tank chassis RS, 12x rkts, poss SAL PGM
Artillery/Mortars	Frag/HE round/rkt Flame/FAE rocket Dual-Purpose ICM SAL-homing rd/rkt	152/155mm and others 9A152 FAE rocket 152/155 mm and others	LAV=K, Tk=K LAV=K, Tk=K LAV=K LAV=K, Tk=K	Near miss or hit can destroy More heavy MRLs have FAE. Top atk, duds vs tracks/wheels

Branch	System Type	Example	Lethality D/K if hit*	Remarks
	IR fuzed/homing rd/rkt	120-mm Kitolov-2	LAV=K	Cannon, mortars, MRLs, others
	MMW-homing rd/rkt	Motiv-3M/others	LAV=K	120 mm mrtr, 122 mm MRL
	Scatter mine rockets/rds	Universal sub/others	LAV=K, Tk=D	120 mm mrtr122/220/300 MRL
	Jammer rockets/rds	122-mm 9M28K	Effectiveness K	For BM-21 MRL
		122-mm 9M519		For BM-21 MRL
Engineers	Mines/IEDs	Controlled minefield esp.	LAV=K, Tk=K	Large IED EFP, etc.
	Side-attack mine	TM-83 fuzed plate mine	LAV=K	Also TEMP-10 top attack
	Mine scatter vehicle	UMZ vehicle or pods	LAV=K, Tk=K	PKM for dismounts, 1/7-29
	Line-charge vehicle	MTK-2, ZRP-2 dismount	LAV=K Tk=D	Cmd det, belly attack, esp whls
	Other obstacles	Concertina, trenches, etc.	Effectiveness K	To stop, slow, divert vehicles
Flame Weapons	Flame/FAE launch veh	TOS-1 with FAE rocket	LAV=K, Tk=K	Stationary targets behind cover
	Incendiary rounds	API-T, thermobarics	LAV=K, Tk=K	Ignite fuel tanks, engine, etc.
	See Artillery/Mortars			
Aircraft	Cluster bomb DPICM	RBK-250/PTAB-2.5KO	LAV=K	Also RBK-500U/PTAB
	FAE/napalm bomb	ODAB-500PM FAE	LAV=K, Tk=K	Also ZAB-500 napalm
	SAL/TV guided bomb	KAB-500L, -500Kr	LAV=K, Tk=K	195 kg explosive area charge
	SAL rocket	S-13Cor 122 mm	LAV=K, Tk=K	Also 57/68/80/240/320 mm
	IR fuzed/cluster bomb	RBK-500U/SPBE-D	LAV=K, Tk=K	EFP top attack submunitions
	Air-launched missile	Kh-25 series	LAV=K, Tk=K	Guidance TV, SAL, IR
	Aircraft guns to 30-mm	Fixed, pod, and turret	LAV=K, Tk=D	Twin and Vulcan auto-cannon
	Mine scatter pod	KMGU	LAV=K, Tk=D	Or mine ladders for TM-62
UAVs	Attack UAV	Harpy/CUTLASS	LAV=K, Tk=K	Can also be a cruise missile
	UCAV	Hermes 450S/Mikholit	LAV=K, Tk=K	Guns, grenades, and ATGMs
	UAVs for attack Spt	Camcopter S-100	LAV=K, Tk=K	LTD for gun rds, rkts, ATGMs
Theater Missiles	Theater ballistic missile	Iskander	LAV=K, Tk=K	ICM= large APAM with Frag
	Cruise missile	Harpy/CUTLASS	LAV=K, Tk=K	

Branch	System Type	Example	Lethality D/K if hit*	Remarks
				UAV camera or GPS guidance
Air Defense	AD guns and cannon AD missile Multi-role missile	57-mm S-60 Pantsir-S1-0 (SA-22) Starstreak/Starstreak II	LAV=K, Tk=D LAV=K, Tk=D LAV=K	All can target ground vehicles. 2S6, Sosna, SA-11 FO also Outfly/outshoot target, no CM
Others	Heavy multi-role missiles Naval gun rounds/rkts Coastal gun SAL-H Underwater mines	Hermes-A AK-130 130-mm guns Firn-1 130-mm round KPDM-4 anti-landing sys	LAV=K, Tk=K LAV=K, Tk=K LAV=K, Tk=K LAV=K, Tk=K	UAV designates, SAL, IR Can fire SAL-H vs shore targets Bereg, also on ships (above) Magnetic fuzed wide area mine

- FAE (fuel-air-explosive) includes thermobaric HE, with high heat and overpressure effects similar to FAE.
- ICM (improved conventional munitions are canistered submunitions. DPICM are ICM with AT shaped charge and Frag-HE effects.
- SAL= semi-active laser-homing, guided round using a laser target designator operated by a dismount, or on a vehicle, RW, or UAV.
- IR fuzed rounds hold sensor-fuzed submunitions which can disperse, each aiming at a vehicle, and firing EFPs into the vehicle tops.
- IR homing munitions can lock onto vehicle hot areas to home in for top attack with a HEAT or large HE warhead.

Threats to Vehicle Mobility

Below is an unclassified listing of example organizations, weapons, and TTP which can be used to immobilize, disable, and destroy military vehicles. They can range from older, less effective systems, to modern Tier 1 or Near Term systems noted as upper range. Additional pertinent information is contained in other locations of the WEG, Ground Systems, Volume I:

- “APC and IFV Trends”
- “Kinetic Energy Threats to Light Armored Vehicles”
- “Multi-role Weapons and Munitions Against Armored Vehicles”
- “Emerging Technology Trends”



Enemy exploitation of tactical vehicle mobility limitations

The enemy will continue to capitalize on the single greatest vulnerability of most combat vehicles. That is limitations on their ability to transit terrain other than on hard surfaces (like a parking lot or road) and on other improved surfaces. That vulnerability and its cascading effects costs lives. Technical decisions in vehicle design may dictate weapons operability (shoot on move ability and speed), off-road speed, water crossing capability, and even weather considerations in mobility. Tactical decisions in using vehicles with limited road, urban, or off-road mobility can affect success and lives. A rational innovative enemy can be sufficiently informed to combine local knowledge with understanding of tactical and technical vulnerabilities for successful and lethal TTP.

Contrary to accepted beliefs, the inability of the vehicles to protect their occupants is not the primary cause of these deaths. Any protection, including any amount of armor, can be breached, bypassed, neutralized, destroyed, or otherwise mitigated. The greatest vulnerability is the ability of an enemy to determine the exact route troops will travel, define when it will travel, how it will travel, how fast it will travel, etc. This ability to define who, what, why, and where to attack provides the enemy enormous tactical advantages which are magnified in complex terrain. It not only allows an enemy to control the tempo and all aspects of attack, it allows them to attack at their own convenience. The analytical sophistication required to achieve this massive advantage is analogous to determining which route a train will take.

The primary purpose of a vehicle, any vehicle, is to transport something from point A to point B, when and where you need to. The primary purpose should never be to only protect. That's not the reason for having a vehicle—mobility is. Previously the term "tactical" or "combat" was used only to describe vehicles designed to and capable of operating off-road and transiting cross-terrain under combat conditions. Obviously neither term is appropriate for accurately describing the current class of vehicles used by many modern forces today.

Weapons

- Machinegun (12.7 mm and up will penetrate many light armored vehicles above, and below, wheel wells, 7.624R/51 mm below wheel wells and wheels)
- Machineguns can puncture vehicle tires (even those with run-flat) to immobilize or slow them. Most armored vehicles require repair with 2 or more tire hits per vehicle side.
- Anti-materiel weapons (12.7 – 20-mm HE), ballistic computers (w/laser rangefinder), advanced thermal optics, 1-shot 1-kill capability (12.7 mm range 2,500+ m, 14.5-mm and 20-mm range 2,000+m).
- Automatic Grenade Launchers 30/-35/40-mm. Ballistic computer, electronic fuzed air-burst munitions (ABM). Precise DP/HEAT fires out to 2500+ m. 35-mm Chinese QLZ-87 can penetrate 80 mm (3.2 inch) armor. HEAT round defeats 200+ mm armor. Delivers UGS, multi-spectral smoke, comms jamming grenades, robot option. Radar guidance linked (Fara-2 radar). Perfect weapon for neutralizing dismounted troops, which are especially vulnerable when dismounting from vehicles.



- Most anti-armor weapons can disable/destroy most light armored vehicles. In use by over 25 countries, standoff 100m+, penetration 950mm+, IR sensor activation and detonation.
- Off-route mines/Side-attack mines (AT or anti-vehicle). Panzerfaust-3T tandem, (penetrates 800mm+ at 400m+), w/SIRA sensor package w/fusing (acoustic/IR), Fire Salamander has 4 x Pzf-3 series launchers on tripod with remote controlled TV camera and other sensors, also auto-launch. Others TM-83, TEMP-30 sensor-fuzed mine.
- Ubiquitous shoulder-fired antitank grenade launcher /AT systems up to 125-mm, tandem-HEAT, Dual purpose, RPG-7V/Type 69, RPG-18/22/26/27/28/29/Hashim, CH PF-89/98, (from 300-mm to 1,100mm+ penetration-ranges from 200m - 800m),
- Antitank Grenade Launcher (Long Range), 125-mm tandem HEAT 1000 m, 1,300+armor penetration, TV/thermal sights, laser designator 5 km range, GPS corrected rounds.
- ATGM. Any antitank guided missile will destroy light armored vehicles - some from 8,000 meters out (AT-14 Kornet-E 5,500 to meters with 1,200-mm) and Starstreak II (dual-role MANPADS/anti-armor system with hypervelocity, laser beam-rider guidance, auto-tracker, very high Ph, armor penetration to 120-mm + for all LAVs, out to 8,000 meters). The other end of the spectrum is the (infantry) light-weight (14 kg) shoulder-fired ATGM Eryx with a range of 600 meters and penetration of 900 mm.
- Recoilless-rifles will destroy most light armored vehicles. Carl Gustaf M2/M3 84-mm, Type 65/65-1, M67 90-mm, B-10 82-mm, B-11 107-mm, Chinese PF-98 120-mm, M40 106-mm with tandem HEAT, ballistic computer sight, range to 2,000+ m, armor penetration 700+ mm, upgrades in progress. High PH/PK. R&D to add ATGM capability.
- Antitank Disposable Grenade Launchers 67 - 80mm HEAT to 300 m and 630 mm armor, HE anti-personnel effects. Some low signature, no smoke/flash, fire from enclosed spaces (rooms, sewers, etc). To 125-mm tandem HEAT 350m range, 1000+ mm tandem HEAT.
- Multi-purpose and/or bunker buster weapons will destroy most vehicles. PF-89A, SMAW HEPD, AT8 Bunker Buster, C90-CR-BM (M3), TBG-7V, BASTEG, Carl Gustaf.
- Any anti-tank hand-grenade has the capability to immobilize or destroy light armored vehicles. It is dependent of placement and angle of attack of the grenade.
- Improvised Multi-role Man-portable Rocket Launcher (AD/Anti-armor). Improvised 57-mm air-to-surface high velocity rockets (formerly aircraft rocket pods). Range 1,500m+ 400mm armor penetration, proximity fuze, and 20m lethal radius.
- Robotic weapons platforms and tracked grenade launchers and ATGM launchers
- Fixed- and rotary-wing aircraft
- CBRN attack. Some vehicles use collective protection, whereas others require masks.
- Thermobaric systems or warheads. Any hit by one of these warheads can disable or destroy a vehicle. The thermobaric warhead on RPO-A, RShG-2, WPF-89-1 and 2, Shmel-M, or TBG warhead on RPG-7V and RPG-29 have demolition effect equal to a round of 122-mm or higher

HE artillery. The complex blast/ overpressure is particularly lethal in enclosed spaces such as building, tunnels, sewers, and even vehicles with hatch open (or other blast access), etc. The GM-94 is a smaller hand-held thermobaric launcher. Some mine-clearing systems (UR-77) use thermobarics for clearing lanes and are particularly effective in clearing streets (of enemy) in urban areas. The use of thermobaric warheads is proliferating and has expanded into rockets and artillery.

- Flame/napalm and other incendiaries. The trend is away from flame throwers to encapsulated weapons, bombs, bomblets, etc. RPO-Z, RPO. At a very minimum these weapons will disable sensors, optics etc externally mounted on the vehicle. Any flammable material, POL, packs, fuel lines, ammo on a vehicle exterior may cause it to catch fire. Field expedients are very easy to manufacture and use, such as fougasse.
- Lasers to blind/damage both vehicle (electronic optics, and sensors) and crews (eyes).
- Use of robotics and other remote-operated platforms proliferates significantly by 2015.
- Corrosive cloud or micro-fiber cloud munitions can corrupt and damage vehicle engines.

Obstacles

- The greatest obstacles remain natural and man-made terrain features. Their impact is also compounded by weather effects. Thus rain can turn a field impassible to wheeled vehicle units and mud can immobilize tracked vehicles with high ground pressure.
- Conventional mines, controlled minefields, IEDs, and other explosive devices. They include mines, EFP, and sensor fuzes, also undetectable materials (e.g., plastic/alloys).
- Multi-spectral smoke/obscurants (e.g., Russian ZD-6 grenade), dust from HE fires, etc.
- Some examples of adaptive obstacles are:
    - Communications (or other electric) wire and concertina as an expedient obstacle. Both hinder or stop wheeled and tracked vehicles by wrapping around axles and tangling up tracks and road wheels. Det cord is also very effective. Once it wraps around portions of the vehicle, it is then detonated.
    - Improvised obscurants (grass, trees, POL, buildings) smoke can screen the enemy and defeat or degrade vehicle sights.
    - Local population as civilian shields to hide infiltrators, attackers, or just to swarm U.S. units looking for water, medicine, or food, etc. and slow movement.
    - Improvised mobility obstacles. Rubble, civilians, holes, disabled vehicles.
    - Defilade and side slope restrictions as sites for front/rear vehicle attack, or to utilize non-lethal slippage measures (grease, oil residue or mud troughs), and ambush attack.
    - IED or body decoys to slow unit and conduct ambush.
    - Flooding or alter the flow of water (rivers, dams, etc.), open fire hydrants etc.

- Punji stakes (innovation--place punji stakes and/or det cord in a ditch. When the enemy arrives ambush them from the same side of the road/trail. The enemy will turn towards the fire and jump into the ditch to return fire. When they enter the ditch and land on the stakes, blow the det cord). Boulders rolled or blown into valleys.
- Abatis (fallen trees, telephone poles, wrecks, etc.).
- Debris (vehicles, rubble).
- Trenches, craters, or ditches (dug by hand or blown by demolitions).
- Blow (or cut) a hole in a frozen river. Put tree logs in the water, cover with sticks and tarp and camouflage (snow). The logs continually agitate the water to keep it from freezing.
- Armored vehicles drive across the frozen river and fall in the ice hole.
- Prepare (and camouflage) the frozen river with demolitions prior to the arrival of the enemy armored column. Detonate when the armored vehicles are in midstream. Artillery targeting with MRLs will have the same effect (or use both).
- Induce avalanches in snow covered passes.
- In extreme cold, put water on dangerous portions (or steep grades) of mountain roads.

For information on conventional or generic obstacles see FM 90-7, "Combined Arms Obstacle Integration," http://www.globalsecurity.org/military/library/policy/army/fm/90-7/index.html and FM 90-7 (Army Field Manual), Combined Arms Obstacle Integration (10 Apr 2003) (Change 1) or http://www.everyspec.com/ARMY/FM+-+Field+Manual/ FM_90-7_14502/.

RISTA (UAV/UCAV, Robotic radars and camera, UGS, Manned FOs, and SOF)

- RISTA selects ambush/obstacle sites, target tracking and selection, priority target attack.
- Target acquisition and links to Integrated Fires Command, direct/indirect fires, ATGMs.
- SOF/UAV/FOs with NAI/TAIs and sensor-shooter links to artillery, mortars, ATGMs.
- Laser designators guide artillery, naval, aerial, ATGM, mortar rounds to moving targets.
- Direct attack by attack UAV/UCAV w/ATGM or precision homing submunitions.
- The ease of operation, size, and simple design of tactical UAVs lends itself to field expedient modification. Converting this UAV into a munitions delivery system (improvised attack UAV) is not difficult and offers several tactical advantages.
- Improvised (remote control aircraft-based) attack UAVs, with IED/munition attached.
- Robotic cameras locate close to mine/IED detonation points to precisely trigger them.

Information Warfare. For additional information see Chapter 10 and TC 7-100.2

- Information Attack. Alter or deny key information, Data manipulation (navigation, tracking, weapons, sensors, timing, etc). Disinformation.



- Computer Warfare: Disrupt, deny, or degrade the enemy's computer networks and information flow. Hacking, denial of service, malicious software (including adjusting clocks), etc. Insert viruses, spurious digital data, or hacking to manipulate computer information.
- Exploit reliance on extended communications and data links. Disrupt communications and data links (LIWA). Jamming communications connectivity (input and output).
- Electronic Warfare
    - Exploit, disrupt, deny, and degrade the enemy's use of the electromagnetic spectrum, especially C2 and RISTA. Wide area radar jammers.
    - GPS jamming. A 4-25 W power portable jammer has a 200-km radius. Can be delivered by artillery and/or mounted on UAV, civilian vehicles, or virtually anywhere including people, and/or farm animals.
    - Communications and data link jamming. Artillery and mortar rounds for local jamming. Wide area comms jammers.
    - Electronics vulnerable to "smart dust" which destroys electronic circuitry (computers, C2, sensors, navigations, etc.) by airborne penetration and short-circuiting the system. Delivered by rocket, UAV, other aircraft, possibly artillery. Access through computer cooling system.
    - Graphite Munitions and "blackout bombs." 400-500 kg cluster bombs/warheads with graphite strands to short out transmission stations and power grids. Can be delivered by UAVs, aircraft, rockets, and cruise missiles.

EMP and High Power Microwave.

- Use EMP (esp. non-nuclear) and High Energy High Radio Frequency Weapons (HERT) to target *circuit boards*. Circuit boards are the most vulnerable component of modern electronics.
- *EMP/HPM.* Missile, artillery, and UAV delivered EMP. This is will destroy all intravehicular electronics and battlefield digitization functionality in vehicular weapons. The specific target is circuit board systems, the internal connections of which require little EMP to disrupt and/or destroy. Electrical power is shared among propulsion, survivability, lethality, and auxiliary systems, along with multipurpose sensors, and all fusion and integration functions of each type of system.
- *Tactical EMP.* Enhanced warhead consisting of a hybrid EMP/HEAT warhead employed on ATGM, 70-mm rockets, and MRL rockets. This hybrid warhead will knock out a tank even if it does not penetrate armor, ignition, communications, or other electronics. Power output will be measured in hundreds of megawatts for microseconds. The e-warhead would also knock out other electronic systems. Applications may extend into infantry shoulder-fired rockets that could cause an electronic "soft kill" of armored vehicles.

Enemy tactics, techniques, and procedures. To degrade vehicle mobility, the enemy will:

- Always use (appropriate) portions of several basic principles. 1. Quick concentration (dispersed to avoid detection then come together for the attack, 2. Surprise, 3. Violent attack, often only three to four minutes, 4. Quick clearing and securing, 5. Quick withdrawal/dispersion, often disappearing back into the population from which they came.
- Attack with numerous hunter-killers teams (up to 10 per vehicle), approximately 4-5 persons per team armed with 1 or more AT/Antiarmor weapons, sniper rifle, 7.62-mm GPMG, RPO-A/TBG-7V (thermobaric and/or flame weapons), AT grenades, assault rifles.
- Attack fixed sites prior and set ambushes (often complex) along the relief (quick reaction) force's likely avenues of approach.
- Attack units when they temporarily halt to refuel or conduct other activities. Attack tactical refueling operations whenever possible. The optimal attack occurs during transfer of fuel from tankers/refuelers to vehicles. This may set fire to both the tanker and the combat vehicle, also catching the combat crew outside their vehicle. Attack as units (squad and above) return to garrison, as they will be short of fuel and ammo, the troops lax, tired, and complacent after days or weeks of searching for, and not finding, the enemy.
- Use other "swarming" attacks (often involving civilians timed with complex attack).
- Halt or slow movement (obstacles, decoys, feints, remote weapon) to facilitate attacks.
- Use snipers to force crew members to operate "buttoned-up", instill tenacity, and impede mobility while dismounted.
- Whenever possible use complex attack composed of several synchronized elements. Example is anti-armor (ATGM and/or AT guns) ambush in conjunction with mines, artillery, and small arms fires.
- Converge attacks, probes; events from multiple directions, and possibly multiple dimensions, by numerous elements on a single target (and/or location or sensor) overwhelm the sensors ability to provide accurate data.
- Create conditions forcing vehicle troops to dismount prematurely, into infantry ambush.
- Attack vehicle beneath, above, or beyond weapons' platform ability to elevate or depress (high or close-in). CQ swarming effective and lethal.
- Exploit the high (elevation), low (close-in, depression), and rear "dead" spaces of the vehicle. These are areas that either cannot be observed, and/or, fired upon by the crew. Examples of the high dead space is the inability of the crew to view and/or bring fire on the higher floors of a building, or the enemy firing from the high sides of valley walls, enemy attacking from the rear of the vehicle.
- Focus light weapons attacks on most vulnerable areas of vehicle, rear, tires and very light armor below wheel wells and between tires, lightly armored top. Wheels are extremely vulnerable and



easy to damage/disable. Without the wheels (especially the front steering wheels) the vehicle is disabled. External fuel tanks, flammables, ammo are vulnerable.

- Attack logistic supplies and support elements critical to operation of the vehicle (class IX parts, Fuel delivery means, vehicle mechanics and technicians, etc.)
- Kill/attack contractors maintaining/servicing/fueling vehicles or disrupt their operations
- Target power generation systems supporting all C4I systems, forcing operations in a degraded mode, and challenging analog backup skills.
- Manufacture events, riots, or demonstrations staged to block or impede vehicles used in (medical) evacuation or redirect response forces.
- Capture vehicles to exploit situational awareness through tactical internet intrusion.
- Use night vision devices, flares, and IR screens to offset enemy night vision advantage.
- Utilize poor visibility (smoke, sand, weather) conditions to offset superior vehicle optics.
- Change the nature of the conflict. Prime example is from political to religious.
- Hug enemy forces to offset their indirect fire and precision strike advantage.
- Create shortages or overloads by continual attacks on convoys, LOCs, MEDVAC, etc. and/or planting mines. All of these must then be secured by escorting units.
- Neutralize or destroy external antennas, optics, and sensors.
- Numerous synchronized attacks designed to overwhelm or over-saturate the enemy's ability to successfully deal with the attack.
- Prioritize targeting of low density specialty vehicles such as ambulances, mine- and/or route clearing and water/gap crossing (mobility/counter-mobility), POL vehicles fire support, etc. The elimination of these impacts the entire unit capability.
- Mimic Battlefield Combat Identification Systems to find, fix, close with, and destroy vehicles. Same with "friendly markings."
- Exploit the vehicle inability to traverse obstacles, roadblocks, rubble piles, holes, ditches, wrecked vehicles, and mines.
- Exploit vehicle inability to self-extract or to reposition other U.S. vehicles off the route.
- Exploit the large turning radius of the vehicle. This facilitates successful rear and rear-oblique attacks as well as trapping two or more vehicles together.
- Use multi-spectral smoke, especially in difficult terrain with poor road, surfaces, recognizable terrain, or in target rear areas during onset of attack.

Vehicle considerations which translate directly into either tactical strengths or weakness.

- Most considerations relate to mobility subsystems, apart from other subsystems. Mobility includes many specific automotive capabilities, e.g., road speed, cruising range, and swim

capability. Stopping in high threat areas means increased P-hit, and likely troops dismount. One hit means more strikes follow; so mobility is critical, and speed is critical. Acceleration ability permits a vehicle to react to perceived threats, especially in close terrain (e.g., urban). High road speed can permit vehicles to emplace before threats appear.

- Navigation ability facilitates choice of fastest, most open, and safest route.
- Ability to operate in multiple differing physical combat environments. Turbine engine operates better in temperate-cold terrains. Diesel is better in temperate-hot. Turbine engine has problems with sand clogs, and requires more fuel. Diesel fuel is less flammable. Some engines are designed to accept varying grades and types of fuel.
- Military forces must be able to operate effectively in rivers, swamps, hilly terrain, snow, and coastal areas which fall into its area of operations. *Ground pressure* is less important on paved roads; but low ground pressure is critical for trafficability on wet, icy, or loose soil and uneven terrain. Tracks have lower ground pressure than wheels. More wheels mean less ground pressure (e.g., 10x10 vs 4x4). For tracked vehicles, six road wheels mean less than 5. Wider tracks reduce ground pressure. Some vehicles can lower auxiliary wheels (BRDM-2). Others can add rubber tracks for periods of off-road use.
- Wheeled vehicles with armor have higher ground pressure. They are limited in off-road capability and speed, and in soil composition usage. They are more subject to failure on tire loss, or in uneven terrain with ditches or bumps. They are more limited in soft soil, such as areas where vehicles have preceded them.
- Front/rear tire track too wide (wide track). While a wide tire track is efficient in desert and in other open terrain, it is not suitable in areas that are terraced for farming or have dikes, etc. For example, HUMVEEs do not work off-road in terrain such as South Korea/South East Asia/Philippines, agricultural regions, etc. The tire track is too wide causing the vehicle to slide off the side of the paddy path/road or to bottom out. These “wide “vehicles are virtually useless in some areas of the world such as some forests of Europe, jungles, and other close terrain areas.
- Factors such as side slope, gap crossing capability, etc. may seem esoteric; but those limitations cause accidents that kill and injure soldiers when moving off-road around hills and across ditches and rubble, trees, disabled vehicles, etc., and on roads as well. Limitations deny movement areas or slow movement and increase vulnerability time.
- Side-slope angle capability (reduces roll-over). This threat limits movement and may kill crew members. Factors for high slide slope capability include a low profile and low roll center (pivot point between the wheels), low center of mass (usually dictated by the height of the armor on the vehicle), wheel/track width of the vehicle, and tire characteristics. If the center of mass is much higher than the roll center, the vehicle can roll more easily if the vehicle slips to road shoulders, ditches, or holes. If the vehicle is wider, roll is less likely. Wheeled vehicles are generally higher than tracked counterparts, more limited in side-slope capability, and more subject to tipping or roll-over when off-road. Stiff, higher pressure, low profile tires offer roll



resistance. Vehicles with heavy high turrets, like many western main battle tanks, have poorer side slope capability. Older low profile tanks have superior capability.

- Tracked vehicles, especially smaller ones, are more suitable on forest trails.
- Self-extraction, with winches facilitates greater use in areas with rubble and streams.
- Lighter vehicles are more deployable, for air insertion and water transport closer to their destination, limiting surface travel distance and the associated vulnerability to threats. Vehicle height and width are critical functions for moving rapidly and safely through urban areas, forests, jungles, and through tunnels. Dimensions and weight must be considered in crossing bridges, and for air deployability. Wheeled vehicles are generally higher than comparable tracked vehicles. They may have higher ground to hull clearance for mine resistance, and higher freeboard for swim capability. Also, wheeled vehicles may be lighter, which permits operability over bridges with weight restrictions.
- Tire vulnerability, especially steering tires, to small arms, ditches, det cord, etc. Avoid overloading with too much added armor, ammunition, etc., which reduces mobility.
- For fording operations, amphibious tracked vehicles are generally better-suited in conditions of high water speed and uneven surface. Some vehicles have high-ford design for deep-fording, even underwater. Some vehicles have winches to assist in fording.
- Wheeled vehicles with central tire inflation system (CTIS) operate better off-road. Vehicles with run-flat tires plus CTIS may puncture tires from inside when hitting bumps.
- Turning radius, (high radius requires backing). Tracked vehicles can pivot on one track, for vehicle-length turning radius, even in defilade areas.
- Wheeled vehicles may be able to swim in areas where tracked vehicles cannot. But they may be challenged in entering and exiting water, due to lack of traction in low water and wet/muddy shores. Vehicles with hydro-jets swim at higher speed. A few vehicles with bowplanes and hydrajets can hydroplane at high-speed in amphibious landings.
- 360 degree 3-dimensional visual and/or electronic (rear TV, etc.) observation. Inability to see 360, especially rear view (for high speed backing/and threat) can challenge movement and limit situational awareness in. Optics must elevate declinate sufficiently close-in and distant awareness. They must also be able to operate in obscurant conditions.
- Reduced movement noise (especially engine and tracks) reduces warning time for threats. This factor is less significant in open terrain, more in closed (e.g., cities and defilade).
- Reduced visual/IR signature during movement (conformal nets, side skirts, screens, etc.), will reduce detectability and vulnerability to weapons in open terrain.
- Power/battery augmentation aids stops and moves. Solar or auxiliary power units add power for less noise and IR signature. Hybrid drive adds power and rapid acceleration.
- Weapons elevate and depress sufficiently to handle targets four stories high and very close-in enemy. If they cannot they may move behind infantry during movement.



- Communications compatibility (host country, digital vs. analog, frequency management).
- Collision and fratricide avoidance require IR marker lights and paint, and BCIS networks.
- CBRN protection system (Overpressure, vehicle mask system, or individual masks).
- Mine-clearing or neutralizing capability can cause speed reductions or stops enroute. Advance clearing requires electro-magnetic decoys, unmanned vehicles, and engineer assets.

Kinetic Energy Threats to Light Armored Vehicles

Summary: Military forces worldwide generally recognize that LAVs are increasingly being used not only as armored personnel carriers and infantry fighting vehicles, but as chassis for expensive and specialized systems critical to success of the mechanized ground force. Despite a variety of efforts to increase armor protection and adapt countermeasure systems for LAVs, most munitions considered to have anti-armor effects will continue to be able to defeat light armor. Recent developments in guns, munitions, and mounts add new weapons and upgrade capabilities of older weapons to challenge LAV protection.

LAV vulnerabilities. All armored vehicle designs, light or heavy, are compromises among competing requirements for mobility, survivability, and lethality. Designers of LAVs must accept armor protection limitations further than with heavy armored vehicles to meet additional requirements such as reduced cost, swim capability, and light weight for air deployability. From their inception, LAVs have been vulnerable to a wide array of munitions from antitank weapons to aerial munitions, artillery Frag-HE rounds, vehicle main gun/machineguns, mines, air defense munitions, and infantry munitions.

In the last decade, a variety of countries including the U.S. have redesigned LAV armor packages to resist shaped charge and high-explosive threats. But such measures exact a high cost in weight and at best only reduce the chances of penetration and vehicle system kill. These munitions (especially mines and improved shaped-charges) remain a threat to LAVs. The single munition type that is most effective against LAVs will continue to be High-Explosive (HE); because that term is generally shorthand for Fragmentation-High-Explosive (Frag-HE). Most Frag-HE and HE artillery, mortar, and heavy gun rounds have sufficient fragmentation to damage a tank or destroy most LAVs with a near miss. It is generally expected that in a Frag- HE near miss of an IFV, fragmentation effects will cause some type of kill (firepower, mobility, or catastrophic). That same near miss will usually destroy a lighter APC.

Energetic armors (such as ERA), and countermeasure systems have less effect against kinetic energy munitions. The best counter continues to be more armor, and the weight constraint limits protection. All LAVs have surfaces that can be penetrated by 12.7-mm rounds, and all have equipment vulnerable even to infantry small arms.

A general rule on the battlefield is that a stopped vehicle in close combat has a short lifespan. The greater the vehicle mobility, the better chance it has to escape a kill zone. Adversaries train to target armored vehicle engine locations. Well-aimed fires can damage the engine from side or rear, for a mobility kill, and initiate fires and secondary explosions.

A recent shift toward wheeled LAVs exposes the vulnerability of wheels. Tires of wheeled vehicles are vulnerable to all weapons, from rifles to fragmentation. Tires can be penetrated by any small arms. Rubble, abatis, and other loose materials can halt wheeled vehicles, as Russian BTR-80s



experienced in Chechnya. Trenches, scattered nails, caltrops, spike strips, etc. can initiate KE tire blow-outs. Run-flat tires and added wheels (6x6, 8x8, and 10x10) can reduce but not eliminate mobility problems. Tires on steering wheels are critical; one or two penetrations can slow or stop the most modern vehicle, especially off-road. Rounds aimed at wheels can be effective even when they miss. Wheel well areas expose crews and passengers, and are rarely protected beyond 7.62-mm rounds.

Military forces worldwide recognize the difficulty in directly engaging heavy armored vehicles, and the risk in exposing themselves to obtain a catastrophic kill. An increasing variety of weapons for dismounted infantry and vehicles use KE munitions to penetrate the armor of LAVs. New specially designed weapons are being developed to attain lesser kills (mobility, firepower, communications, and function) to degrade effectiveness of the vehicle as a "system of systems". Due to limited room, much of the crew's gear may be stowed on the outside of the vehicle, and is vulnerable to fires. A favorite tactic is to attack sensors (sights, remote sensors, radar, or links to them). Remote weapons and external boxes are vulnerable to a variety of fires. Sniper fires and even rocks can damage sights to blind weapons of the most modern LAFVs.

Another vulnerable part of the LAV system is personnel. Personnel may ride outside of the vehicle, where they are exposed and vulnerable to all weapons. Drivers and personnel operating open weapons can be targeted, especially from higher angles. Concussion from munitions impacting on vehicles may not seriously damage the vehicle; but they can cause armor pieces or mounted equipment to rebound inside and kill or injure personnel. Blasts underneath vehicles can transfer shock through floor-bolted seats and break the backs of crew and passengers. Therefore, a critical part of vehicle design is in securing seats and materiel in vehicles. Also KE hits to ammo compartments and external tanks may not penetrate hull armor, but can start catastrophic fires. Hard jolts can injure soldiers inside. Thus, concealed trenches, slides from "non-lethal" road slimes, or deliberate collisions are kinetic energy threats to personnel in LAVs.

Weapons for dismounted infantry. They include sniper rifles and machine guns (7.62 mm and 12.7 mm). Machine guns and sniper rifles can be used with obstacles to slow the vehicles and deliver sufficient fires to vulnerable areas to obtain a kill (mobility, firepower, or catastrophic), or to kill crewmen and degrade its effectiveness. A variety of general-purpose machine guns can be dismounted and can penetrate some armors, tires, and exterior materials on LAVs. Mini-guns, such as 7.62-mm man-portable type, can swarm rounds at 1,200 rounds per minute. New ammunition includes sub-caliber sabot rounds for 7.62 and 12.7-mm weapons (such as the .50-cal SLAP), and improved armor-piercing rounds such as the Chinese tungsten alloy-core round. These traditional technologies defeat all current active protection systems.

A*nti-materiel sniper rifles (12.7 mm or .50 cal).* These rifles are integral to any modern battlefield. Although often categorized as sniper rifles (and capable of being used against personnel), they are generally employed as anti-materiel rifles. The most widely proliferated of these rifles are: the U.S. Barrett M82A1/M95 .50 cal semi-automatic rifle, the Croatian MACS M2-1/M3 (12.7-mm bolt action), and the Russian V-94 (12.7-mm semi-auto). The Barrett M82A1 is employed by all U.S. military forces as well as forces of 27 other countries, including Belgium, Chile, Denmark, Finland, France, Greece, Italy, Netherlands, Norway, Philippines, Portugal, Saudi Arabia, and UK. The Saboted Light Armor Penetrator (SLAP) round fired from the M82A1 can penetrate 19 mm (.75 in) of armor @ 1,500 m. It can also fire a multi-purpose round (See M82A1 data sheet). Approximately 25 variants of 12.7-mm sniper/anti-materiel rifles are available.

Larger-caliber Anti-materiel Rifles (14.5 to 20-mm). A trend in the past ten years has been towards larger-caliber anti-materiel rifles. The Croatian RT20 20-mm “hand cannon” is the most prevalent (range 1,800 m). It can chamber either an HE or API round. The RT20 was developed primarily to penetrate the armored casing around the thermal sight head on M84 tanks (a 20-mm round was the smallest caliber that could penetrate the casing). During the war in the former Yugoslavia, M84s were frequently deployed to detect Croatian infantry moving at night, so a method of removing their night-vision capability was found with this RT20 “hand cannon”.

Other anti-materiel rifles readily available are:

- US M98 cal .338 Lapua Magnum (1,400 m and twice the penetration of 7.62-mm)
- NTW 14.5-mm (range 2,300 m)
- Hungarian Gepard M3 14.5-mm (range 1,000 m)
- Austrian Steyr IWS 2000 15.2-mm (range 1,000 m, 19 gram tungsten carbide dart)
- South African NTW 20-mm (range 1,500 m)
- Finnish Helenius APH RK20 20-mm bolt-action gun

Guns for light vehicle applications (7.62 mm to 23 mm). Several countries mount guns on light carriers, such as motorcycles, fast-attack vehicles, and light utility vehicles such as HMMWVs, UAZ-467, and Land Rover. The Russians advertise the Gear-Up motorcycle with mounts for a variety of auto grenade launchers and machineguns. Several combat support vehicles for military security patrols have weapons mounted on light mounts, such as a pick-up truck or a possible towed or ground mount. Guns ranging to 14.5 mm (such as Russian Arzamas GAZ-53971 van for use of internal and other security forces) may also be mounted.

Recently China displayed a "dune buggy" with a 23-mm chain gun mounted to the overhead roll bar, for manual aiming and operation. The gun fires standard antiaircraft ammunition and recent APDS rounds, and has a thermal night sight. This gun could also mount on remote vehicle turrets, for use against air and ground targets. Oerlikon went one step farther with an infantry application for the KBB 25-mm auto-cannon. The break-apart mount actually permits infantry pack carry. It did not catch on. However, the very low profile weapon can also be towed, carried in an all-terrain vehicle, or off-loaded for ground mount. The profile is so low that the firer should dig a pit to operate it. This is a developed potential threat to all LAVs.

LAV main guns. Armored personnel carriers and combat support vehicles (7.62-mm to 30-mm). There is an increasing variety of APCs with 7.62-mm, 12.7-mm, and 14.5-mm guns, designed for the traditional "battle taxi" role. A parallel trend is for the increased use of wheels vs tracks. But on selected APCs and on combat support variants, many countries are replacing those guns with 20, 23, 25, or 30-mm guns; and the number of drop-in turrets available has exploded. Improved Oerlikon APDS and APFSDS ammunition has extended the life of 20-mm and 23-mm gun applications. The Vulcan mini-gun and modern auto-cannons in 20-mm can overwhelm a specific area of LAV armor at a high rate of fire. Multi-barrel 23-mm cannons can do the same thing. New cannon for 30-mm rounds (in several round designs) include the Ukrainian KBA-2, Russian 2A72, and Bushmaster II. Improved 30-mm rounds offer 100+ mm penetration at 1000 m (120 mm for 8-rd burst). Recently German Mauser displayed the RMK-30 recoilless gun. The light recoil gun permits accurate high-rate aimed fire to a range of 3,000 m, with a variety of ammunition including APDS and APFSDS on very light vehicle mounts.

Infantry fighting vehicles, Tanks, and fire support vehicles (20+ mm). Most IFVs feature auto-cannons in the 20-30 mm range, with a rate of fire of 500-700 rd/min, but a practical rate of fire of 100-250 rd/min. Aimed fire is generally confined to bursts, with a substantial dispersion. As armors have increased, the current trend is a shift in gun size toward 30-50 mm. A number of 35 mm guns, including the South African EMAK auto-cannon or Swiss Oerlikon 35/1000 revolver cannon (1,000+ rd/min rate of fire) have been offered for use in IFV upgrade turrets.

A 35-mm round doubles the penetration of 30-mm rounds. Swedish Hagglunds went a step farther with the 40-mm cannon on the CV9040 IFV. Italian Otobreda offers the T60/70A 60-mm gun turret for the Dardo IFV. The cannon features precision semi-automatic fires rather than automatic, but fires as rapidly as the target can be acquired. Penetration is well over 150 mm at 2000 m. The next trend (by around 2010) is cased-telescoped ammunition (CTA), which permits a 30-mm gun to achieve KE effects comparable to that of a 35-mm or 40-mm gun.

Tanks and heavy armored combat vehicles (HACVs). Any KE round of a 57+mm gun will damage and probably destroy a LAV. Canister and APERS (anti-personnel) rounds fired from tank guns, antitank guns, or HACVs guns can damage or destroy LAVs.

Other KE threats.

Mines and Improvised Explosive Devices (IEDs). Belly attack mines can include kinetic energy penetrator mines, which defeat even mine-resistant vehicles. Side-attack sensor-fuzed mines include Russian plate mines with aimed directional fragmentation. Other mines and IEDs have warheads which produce an explosively formed penetrator (EFP, shaped like a sabot penetrator), to defeat light to heavy armor, depending on design. Such mines include the Russian TM-83 and TEMP-30 sensor-fuzed mine. Other mines and IEDs (e.g., PD Mi-Pk) can produce multiple EFPs. Even blast effects from mines and IEDs can cause severe kinetic energy damage by flipping over vehicles, causing material to toss about inside and killing or injuring personnel.

Frangible rounds. The frangible armor-piercing discarding sabot (FAPDS) round design uses a brittle rod which can penetrate armor, then shatter after penetration, to spread varying sized fragments within the target. It flies with similar ballistics (including range and high velocity) to a KE round, but with effects of a Frag-HE round. Although most are currently designed for anti-aircraft use against thin armors, some are effective (with tailored brittleness, size, and design) for use against improved LAVs, such as IFVs.

Programmable fuze rounds. The Swiss Oerlikon 35-mm AHEAD round for use against aircraft uses an electronic fuze that is calibrated by a laser rangefinder, the fire control computer, and an electronic setter within the gun. At the pre-set time, the round fires a volley of KE sub projectiles forward (in the manner of 00 buckshot), with overall range to 5,000 m. Technology variants are being tested against ground vehicles. The AHEAD technology is available with other sizes of rounds, such as 30-mm PMC308. Russian HEF rounds for BMP-3M (100-mm) and T-80K tank (125 mm) employ the same technology, with range to more than 7,000 m. Russian rounds also permit an adjusted trajectory, in which they over-fly the vehicle and blast fragments outward and downward against the thin top armor of armored vehicles.

Artillery-delivered KE munitions. Artillery rounds include Russian 122-mm and 152-mm cannon rounds with top-attack flechettes, which can cover a wide area. They can damage and penetrate most LAVs.



Sensor-fuzed artillery rounds, e.g., Russian Motiv-M, German SMART-155, and US SADARM can fire an EFP into the vehicle top for a sure penetration and kill.

Kinetic energy missiles. Prototype KE ATGMs are in various stages of development. High-velocity missiles (HVMs) offer a heavy armor overmatch against the heaviest armors with long range (5-7 km) and short flight times (4 km in 1-2 seconds). One HVM system that is a current threat to LAVs is, in fact, Starstreak (MANPADS and multi-role missile, page 5-52 below). Starstreak uses laser-beam rider (LBR) guidance and shoulder, vehicle, or helicopter launch. Lethal mechanism is 3 darts - each a LBR Mach 4 HVM with high-penetration (125 mm) and HE blast. These can slam a helicopter target out to 7 km in 2-7 seconds, and have been successfully tested against light armored vehicle targets. A vehicle launcher version, Armored Starstreak, uses the Alvis Stormer LAV chassis and 8 launchers. Any Starstreak launcher is a threat to LAVs. The missile defeats almost all known countermeasures, including APS.

Future Developments in KE Attack. For the 40-mm CTA gun on the aborted US FSCS/ British TRACER programs, there was a proposal to modify the Starstreak dart into a KE missile round to fit in the autoloader, as an ATGM for use against LAVs and aircraft. The gun is fitted on the recently displayed Lancer proposed for reconnaissance vehicle and IFV and designs.

ATGMs exist with fly-over top-attack mode and EFP for target kill. The US Javelin is a successful fielded example. Other fly-over (Swedish Bill, Bill-2) ATGMs and top-attack (Israeli Spike/Gill) ATGMs with shaped-charge warheads have been fielded. The British fly-over sensor fuzed MBT-LAW ATGL employs a HEAT warhead. These designs are steps toward future soldier systems with fly-over EFP warheads for KE attack.

Attack UAVs and Micro-UAVs are being developed. A French proposal for Leclerc 2015 includes tank-launched attack micro-UAVs. The UAV kill mechanism is a top-attack EFP, which would easily penetrate LAV top armor.

Conclusions. Fighting vehicle developers have found a variety of upgrades to improve light armored vehicles. However, they are more useful in protecting the vehicle during travel to the combat zone. All of these innovations offer marginal increase in protection against modern anti-armor weapons in close combat. Even expensive high-technology approaches, such as active protection systems, will not protect against many KE munitions which threaten LAVs. In close terrain, high defilade and urban areas, combat vehicles (including tanks and LAVs) are very vulnerable on their flanks and rear. Many modern IFVs have lost their firing ports and have limited awareness or firepower to address those directions.

Technical Implications: The vehicles need weapons and sensors to address all threats for 360°, and at high and low angles of fire. Remote weapon stations and periscopes for the dismountable infantry can be added. Additional protection can be added, for use against selected high lethality weapons, such as antitank grenade launchers. Other assets are gun shields for crewmen which are partially out of vehicles, or remote fire control systems which can be operated from the inside. Side skirts and better mine/wheel well protection are needed.

Tactical Implications: Technical AT considerations may force changes in tactics for mechanized infantry and crews of combat support systems. Tactics must exploit firepower, integration, and protection in the combined arms force as well as adaptive use of cover, concealment, and deception. Assaults across open areas against light forces can lead to disaster. Movement must employ speed, cover/concealment, and mutually supporting fires. Once a squad dismounts, it may have to precede the vehicle to protect it from



anti-armor weapons, not follow and use it for protection. Although some tacticians differentiate IFVs from APCs, claiming that IFV squads can fight from the vehicle, that distinction is insignificant in close terrain, and in the face of modern AT weapons. These are only some of the responses to the spectrum of threats to light armored vehicles today. See Chapter 15, Upgrades, for additional responses.

Recoilless Weapons for Modern Warfare

In past decades, recoilless weapons were considered lethal and formidable antitank assets. Recoilless antitank grenade launchers (ATGLs) for squads have seen tremendous improvements (see Chapter 1). But, as tank armor has improved, most of the crewed systems for use by AT teams operating above squad level have seen fewer upgrades. Today, many of those crewed AT weapons are considered obsolescent. However, upgrades are available; and new weapons are now fielded. With more changes, crewed recoilless weapons can be effective.

One advantage of recoilless systems is their utility. They offer a variety of munitions, including HEAT, HE, flechette, and others, to service most battlefield targets. Some recoilless launchers (aka, recoilless guns or rifles, or mounted grenade launchers) are light enough for easy transport in light vehicles, with ability against infantry while outranging most infantry weapons. A well-proliferated example is the SPG-9/9M, with HE range beyond 4,000 m.

Recoilless weapons are limited by certain design and operational considerations. The bore size limits size of rounds and their ability to penetrate modern tank armor. However, many offer sufficient penetration to defeat other armored and unarmored vehicles (which outnumber tanks on the battlefield). Those systems are best used to augment other forces in a fight.

A key value is in their general lethality. With a higher rate of fire than most antitank guided missile (ATGM) launchers at 5 or more rounds per minute, they are useful as a fire support asset that can augment fires of other weapons against various targets. Most lack the range of ATGMs. All lack the precision. But these multi-role systems can digest various rounds to defeat vehicles, then kill exiting personnel with large HE blast munitions. In a close fight or ambush, many of these weapons can kill any vehicle other than a main battle tank (MBT) from any aspect. Some can also damage or kill MBTs from the side or rear. As we have noted for infantry antitank grenade launchers (ATDLs), crewed weapons include new ones, and upgraded munitions with tandem HEAT warheads which can kill all tanks from the side or rear (see table).

A number of features have improved precision of these weapons. A variety of electro-optical sights can be mounted on these weapons. SPG-9M and SPG-29 Mounted can use the Russian 2Ts35 laser-rangefinder sight or a widely marketed lightweight ballistic computer sight such as the Simrad IS2000. Adaptable night sights include II sights like Simrad KN250F, and various compact thermal sights. A challenge to all grenades is their relatively slow velocity, which reduces hit probability (Ph) against moving vehicles. Some have high velocity (600 m/s for Italian Folgore, 700 for SPG-9) and flat trajectories to increase Ph vs movers.

A few manufacturers are looking for improved accuracy munitions. The ultimate solution is to add ATGM launch capability to recoilless launchers. Israeli IAI has offered to produce a version of the LAHAT for use in the 90 mm M40 recoilless rifle. Even the best recoilless round cannot kill a modern tank from the frontal aspect. Any ATGM exiting a bore of <150 mm has a low probability to defeat MBT front armor. But a top-attack tandem warhead missile, e.g., a 90 mm version of LAHAT for the M40 launcher offers probable

major damage (or catastrophic kill) against an MBT turret or hull. Other vehicles would expect a catastrophic kill. Israeli IAI has offered development of the ATGM variant. In a beyond line-of-sight (BLOS) environment, ATGM capability dramatically increases effectiveness of this type of weapon.

Another limitation for recoilless weapons is their detectability. Most have high smoke and noise signatures in the backblast. Most are fairly tall and must be hand-loaded from a standing or kneeling position, which exposes the team to counter-fires. Older weapons are heavy enough to require breaking down and loading into vehicles for moves, limiting their ability to shoot and move quickly. One example of poor mobility is the old Russian B-10 (at 85 kg towed carriage, 72 without). With an anti-armor range of 400-1,000 m, the first shot had better be accurate and lethal, or the crew is in serious trouble. Thus many users only employ these older weapons in combined arms defenses and ambushes, to augment other fires.

Some old launchers have been modified to reduce weight, plus break down into components for dismounted moves. The Chinese Type 65 is a lighter weight version of B-10, at 28 kg, and uses improved ammunition. The Serbian M79 variant also weighs less than 30 kg. With improved sights, it has an anti-armor range of 670-1,000 m. Better range aids survivability.

Several newer recoilless weapons have been designed for reduced weight, lower operating profile, and reduced move and setup times. Examples include RPG-29 Mounted (next page) and the Serbian M90. The best of the modern lightweight crewed launchers may be the Chinese 120-mm PF-98. Although it operationally resembles RPG-29, it is actually an amalgam of features from a variety of modern systems. Like the RPG-29, it comes in shoulder-launch version or tripod-mount crewed version. The launcher appears to be directly derived from the Montenegro/Serbian 120-mm M90. However, they followed the Russian design by adding a lightweight tripod, and a canistered grenade which attaches to the launcher to extend its length. The ammunition is another amalgam, with warheads which could be derived from recent Carl Gustaf rounds, and a rocket motor that resembles a scaled up RPG-29 motor. The sight is a modern EO/LRF ballistic computer sight. The result is a state-of-the-art launcher with 800/2,000 m range, 800+ mm penetration, light weight (<18 kg loaded), and competitive precision.

Rapid mobility, as noted earlier, is a critical factor for survivability and utility of these weapons. Since most legacy systems cannot be easily adapted for mobility, an alternative use is to mount them on vehicles. They offer good lethality to protect vehicles; and the vehicles facilitate launch-and-move operations, without downtime for disassembly. Examples include fire support versions of BTR-50 and Czech OT-21 APCs, and various weapons on the BTR-152 armored transporter. They have also been fitted on a motorcycle and on boats.

A good weapon for ground and vehicle mounts is the Russian SPG-9, which has been seen pintle-mounted on a UAZ-469 TUV. The launcher is well proliferated, and seen several upgrades. On the SPG-9M upgrade, 2Ts35 or other more modern LRF ballistic sights are available. AT ranges are 1,300 m for improved HEAT, and 1,000 for tandem HEAT. The best of these weapons for vehicle mount is the US M40 106 mm recoilless rifle. The Bofors Retrofit Kit updates it into a modern and effective fire support weapon. Sights include the CLASS laser sight, and others. Munitions include flechette, HEP-T, and tandem HEAT. Addition of the LAHAT ATGM (above) would greatly expand its lethality. With these and other expected upgrades, and with new designs in production, we can expect to see recoilless weapons employed against U.S. forces for many more years.

RUSSIAN SELF-PROPELLED ANTITANK GUN 2S25



Photo Source www.military-today.com

SYSTEM	SPECIFICATIONS	ARMAMENT	SPECIFICATIONS
Alternative Designations	Sprut-SD	Caliber(mm), Type, Name	125mm, Smoothbore, 2A75
Date, Country of Origin	1993, RUS	Rate of Fire (prac, cyclic)	6, 8
Proliferation	Russian Ground Forces	Fire on Move	Yes
Crew	3	Elevation (deg min, max)	-5, +15
Combat Weight (mt)	18	Caliber(mm), Type, Name	7.63, Coax MG, PKT
Length (m)	6.98	Rate of Fire (prac, cyclic)	250, 650
Height (m)	2.45	Fire on Move	Yes
Width (m)	3.13	Caliber(mm), Type, Name	0, ATGM, 2A75
Ground Pressure (kg/cm^2)	0.53	Rate of Fire (prac, cyclic)	2, 3
Drive Formula	BMD-3 with 7 road wheels	Fire on Move	Yes
AUTOMOTIVE	**SPECIFICATIONS**	**AMMUNITION**	**SPECIFICATIONS**
Engine Type	500hp UTD-29 Diesel	Caliber(mm), Type, Name	125, ATGM, BM-42M APFSDST
Cruising Range (km)	500	Max Aimed Range (m)	4000
Max On-Road (km/h)	71	Max Eff Range, Day (m)	3000
Max Off-Road (km/h)	45	Max Eff Range, Night (m)	2600
Max Swim (km/h)	10	Penetration (mm)	630, K
Fording Depth (m), note	Amphibious	Combat Load (ready, stow)	15
PROTECTION	**SPECIFICATIONS**	Caliber(mm), Type, Name	125, Frag- HE-T, OF-26
Radio	R-173	Max Aimed Range (m)	5000
Armor, Turret Front (mm):	12.7	Max Eff Range, Day (m)	5000
Applique Armor (mm)	Number	Max Eff Range, Night (m)	2600
Reactive Armor (mm):	French SNPE	Penetration (mm KE)	
Mobility (mine clearing, self-entrenching)		Combat Load (ready, stow)	16
		Caliber(mm), Type, Name	125, HEAT-MP, BK-29M
NBC Protection System	Collective	Max Aimed Range (m)	4000
Smoke Equipment	6 grenade launchers	Max Eff Range, Day (m)	4000
FIRE CONTROL	**SPECIFICATIONS**	Max Eff Range, Night (m)	2600
FCS Name	Text	Penetration (mm)	650, C
Main Gun Stabilization	Yes	Caliber(mm), Type, Name	125, HEAT, BK-27
Rangefinder	TPD-KIM	Max Aimed Range (m)	4000
Infrared Searchlight	Yes	Max Eff Range, Day (m)	3000
Day Sight	LRF	Max Eff Range, Night (m)	2600
Field of View (deg)	Number	Penetration (mm)	700, C
Acquisition Range (m)	3000	Caliber(mm), Type, Name	0, ATGM, AT11C Invar-M
Night Sight	Thermal Sanoet 2	Max Aimed Range (m)	7000
Field of View (deg)	Number	Penetration (mm KE)	900
Acquisition Range (m)	2600	Combat Load (ready, stowed)	6

NOTES

HYDRO-PNEUMATIC SUSPENSION IS USED TO VARY HEIGHT IMMEDIATELY, LOWERING PROFILE TO REDUCE SIGNATURE, IMPROVE CROSS-COUNTRY MOBILITY, REDUCE SWIMMING PROFILE AND INCREASE STABILITY DURING FIRING. SINCE THE VEHICLE CAN ALSO FIT ABOARD AIRCRAFT, A LOWERED PROFILE FACILITIES LOADING.

AVAILABLE OPTIONS ARE IMPROVED AMMUNITION AND FCS, SPALL LINERS, AIR CONDITIONING AND A MORE POWERFUL ENGINE. THESE CAN INCLUDE STABILIZED FCS SIMILAR TO A T90A, WITH AUTOLOADER AND IMPROVED THERMAL NIGHT SIGHT. IMPROVED FCS COULD PERMIT USE IF THE AINET HE-SHRAPNEL FOCUSED FRAGMENTATION ROUND. FOR AIRBORNE AND AMPHIBIOUS FORCE THE ROUND WOULD SUPPLEMENT LIMITED AIR DEFENSE CAPABILITIES.

RUSSIAN ATGM LAUNCHER VEHICLE 9P149/SHTURM-S



SYSTEM	SPECIFICATIONS
Alternative Designations	AT-6 ground launcher AT-9
Date, Country of Origin	1990, RUS
Proliferation	At least 9 countries
Crew	2
Combat Weight (mt)	12.3
Length (m)	6.35
Height (m)	1.8
Width (m)	2.85
Platform	MT-LB
AUTOMOTIVE	**SPECIFICATIONS**
Engine Type	290-hp Diesel
Cruising Range (km)	500
Max On-Road (km/h)	65
Max Off-Road (km/h)	INA
Max Cross-Country (km/h)	INA
Max Swim (km/h)	4
Fording Depth (m), note	Amphibious
PROTECTION	**SPECIFICATIONS**
Radio	R-123M or R-173
Armor, Turret Front (mm):	14
Applique Armor (mm)	N/A
Reactive Armor (mm):	N/A
Mobility (mine clearing, self-entrenching)	Entrenching blade
NBC Protection System	Collective
Smoke Equipment	N/A
FIRE CONTROL	**SPECIFICATIONS**
FCS Name	INA
Beacon or Tracker Type	IR
Rangefinder	Laser
IR Searchlight	INA
Day Sight	KPS-53AV
Acquisition Range (m)	6000
Night Sight	Sanoet-1
Acquisition Range (m)	2600
ATGM Guidance	SACLOS
ATGM Command Link	Radio frequency

ARMAMENT	SPECIFICATIONS
Caliber(mm), Type, Name	ATGM, 9P149A
Rate of Fire (prac, cyclic)	2,3
Fire on Move	No
Loader Type	Automated
AMMUNITION	**SPECIFICATIONS**
Missile Type, Name	ATGM, AT-9/ Ataka
Max Range(m)	6000
Minimum Range (m)	400
Penetration (mm), KE/CE	1100, CE
Warhead Type	Shaped Charge (HEAT)
Missile Weight (kg)	48.3

VARIANTS

A variety of night sights are available, such as the Kornet-T sight with 3,500 m range (4,000 for detecting helicopters). In OPFOR Tier 1, the 9P149 night sight is 1PN79M3 2nd gen, and ranges to 5,500 m.

A modular AT-6 ATGM launcher system with launcher / autoloader is available for installation on vehicles, fixed sites and boats.

AT-9 (9M120F) and AT-6 (9M114F) thermobaric HE multi-purpose missiles range to 6,000 m

9A2200 (Ataka) anti-helicopter missile. It has a proximity fuze and an HE/frangible rod warhead which assures a kill with hit or near miss. It can also be used against light armored vehicles

Other Missile Types: A version of Ataka, 9M120-1 now has RF plus laser beam rider guidance. It can be used on 9P149 and P-157, and some RW aircraft.

NOTES
UPGRADES AT-6B AND AT-6C/KOKON-M (9M114M1, 2) CAN BE LAUNCHED FROM HELICOPTERS; BUT THEIR LENGTH EXCEEDS THE 1832-MM LIMIT FOR THE SHTURM-S AUTOLOADER, PREVENTING GROUND USE.

RUSSIAN ATGM LAUNCHER VEHICLE 9P157-2/KHRIZANTEMA-S



SYSTEM	SPECIFICATIONS
Alternative Designations	Khrizantema AT-15
Date, Country of Origin	1996, RUS
Proliferation	Fielded in 1 country, contracted for imminent export. Initial fielding is at division/echelon/above division, with Kornet at brigade and below.
Crew	2
Combat Weight (mt)	14.1
Length (m)	6.73
Height (m)	1.77
Width (m)	3.15
Platform	BMP-3 hull with no turret
AUTOMOTIVE	**SPECIFICATIONS**
Engine Type	500-hp Diesel
Cruising Range (km)	600
Max On-Road (km/h)	70
Max Off-Road (km/h)	45
Max Cross-Country (km/h)	35
Max Swim (km/h)	10
Fording Depth (m), note	Amphibious
PROTECTION	**SPECIFICATIONS**
Radio	R-173, R-173P
Armor, Turret Front (mm):	INA
Applique Armor (mm)	INA
Reactive Armor (mm):	INA
Mobility (mine clearing, self-entrenching)	Entrenching blade
NBC Protection System	Collective
Smoke Equipment	N/A
FIRE CONTROL	**SPECIFICATIONS**
FCS Name	9K123
Rangefinder	Laser
IR Searchlight	None
Day Sight	EO
Acquisition Range (m)	5500
Night Sight	1PN80/Kornet-TP therma

ARMAMENT	SPECIFICATIONS
Caliber(mm), Type, Name	ATGM, 9K123
Rate of Fire (prac, cyclic)	6,8
Fire on Move	No
Loader Type	Automated
AMMUNITION	**SPECIFICATIONS**
Missile Type, Name	ATGM, 9M123-2, Khrizantema
Max Range(m)	6000
Minimum Range (m)	400
Penetration (mm), KE/CE	1500, CE
Warhead Type	Tandem Shaped Charge (HEAT)
Missile Weight (kg)	45.0
Missile Type, Name	ATGM, 9M123F-2 / AT-15B
Max Range(m)	6000
Minimum Range (m)	400
Penetration (mm), KE/CE	INA
Warhead Type	High Explosive - Thermobaric
Missile Weight (kg)	INA

VARIANTS

Krizantema-S launcher assembly can mount on ships and vehicles.

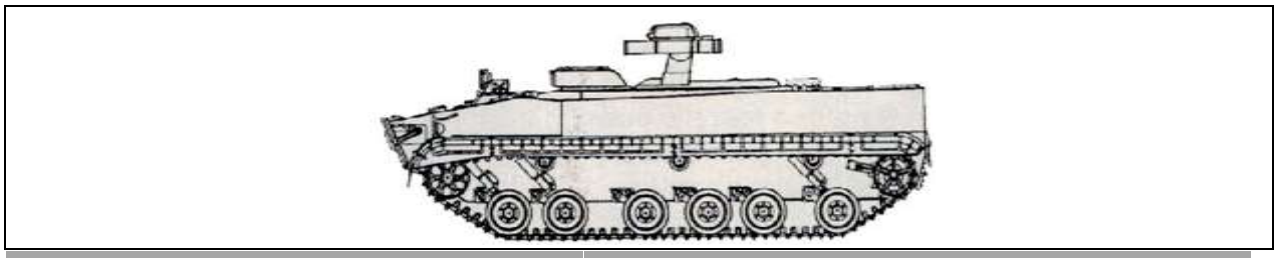
Another Upgrade package for Mi-28N/HAVOC helicopter includes the Khrizantema. The Tor gyro-stabilized EO pod can be mounted on aircraft for guiding the Krizantema-V air-launch variant.

Acquisition Range (m)	4000
RADAR	MMW guidance
Acquisition Range (m)	10,000
ATGM Guidance	Dual-mode with separate MMW radar and EO sights Radar permits automatic command line-of-sight (ACLOS) lock-on before launch. Another missile is aimed at a second target with EO.
ATGM Command Link	Radar, SACLOS laser beam rider for EO. System can operate passively with EO.

NOTES

ADDITION OF AN EO AUTO-TRACKER WOULD PERMIT AN INCREASE IN THE RATE OF LAUNCH, BECAUSE THE GUNNER COULD SWITCH MORE RAPIDLY BETWEEN TARGETS. A VERSION OF AT-9/ATAKA, 9M120-1 NOW HAS RF AND LASER BEAM RIDER GUIDANCE. THUS IT CAN SUPPLEMENT KRIZANTEMA MISSILES IN THE LAUNCHER.

RUSSIAN ATGM LAUNCHER VEHICLE 9P162/KORNET-LR



SYSTEM	SPECIFICATIONS
Alternative Designations	Kornet-T, BMP M1995
Date, Country of Origin	1996, RUS
Proliferation	2 countries
Crew	2
Combat Weight (mt)	14.1
Length (m)	6.73
Height (m)	1.77
Width (m)	3.15
Platform	BMP-3 hull with no turret
AUTOMOTIVE	**SPECIFICATIONS**
Engine Type	500-hp Diesel
Cruising Range (km)	600
Max On-Road (km/h)	70
Max Off-Road (km/h)	45
Max Cross-Country (km/h)	35
Max Swim (km/h)	10
Fording Depth (m), note	Amphibious
PROTECTION	**SPECIFICATIONS**
Radio	R-173, R-173P
Armor, Turret Front (mm):	INA
Applique Armor (mm)	INA
Reactive Armor (mm):	INA
Mobility (mine clearing, self-entrenching)	Entrenching blade
NBC Protection System	Collective
Smoke Equipment	N/A
FIRE CONTROL	**SPECIFICATIONS**
FCS Name	INA
Beacon or Tracker Type	IR
Rangefinder	Laser
IR Searchlight	None
Day Sight	1PN80/Kornet-TP
Acquisition Range (m)	5500
Field of View (deg)	5.41
Night Sight	Kornet-T/1PN80 Thermal
Acquisition Range (m)	4000
Field of View (deg)	7.8
ATGM Guidance	Laser beam rider
ATGM Command Link	Laser beam guidance unit

ARMAMENT	SPECIFICATIONS
Caliber(mm), Type, Name	ATGM, Various
Rate of Fire (prac, cyclic)	3,4
Fire on Move	No
Loader Type	Automated
AMMUNITION	**SPECIFICATIONS**
Missile Type, Name	ATGM, Kornet-LR/AT-14
Max Range(m)	5500
Minimum Range (m)	100
Penetration (mm), KE/CE	1200, CE
Warhead Type	Shaped Charge (HEAT)
Missile Weight (kg)	27.0
Missile Type, Name	ATGM, Kornet-LR HE
Max Range(m)	5500
Minimum Range (m)	100
Penetration (mm), KE/CE	INA
Warhead Type	High Explosive - Thermobaric
Missile Weight (kg)	INA

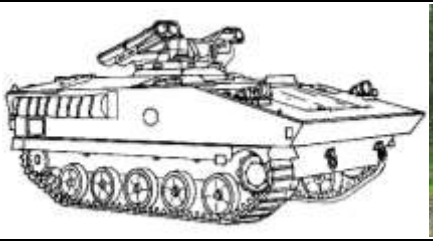
VARIANTS

KPB displayed a prototype overhead weapons module to mount on a variety of vehicles (displayed on a HMMWV). It has dual twin (4-tube) launcher, and a central module with TV/FLIR sights and MG.

Another alternative Kornet turret for ATGM launcher vehicles is ATM: A manned turret with an overhead weapon system (OWS). ATM can mount on a variety of vehicles. (see pg. 6-68) KPB offers the Kvartet/9P163-2 overhead weapons module to mount on a variety of vehicles (e.g., HMMWV and VBL, see pg 6-31). It has a dual twin (4-tube) launcher and central module with TV/FLIR sights.

NOTES
A NEW SYSTEM IS THE KORNET-EM, WITH NEW MISSILES. KORNET-EM (KORNET-D) MISSILES (TANDEM HEAT AND HE) RANGE 8 AND 10 KM. ARMOR PENETRATION IS 1,300 MM FOR HEAT. THE MISSILES FIT IN A 9P162; BUT 9P162 FIRE CONTROL IS LESS MODERN AND MAY LIMIT RANGE.

FRENCH ATGM LAUNCHER VEHICLE AMX-10 HOT





SYSTEM	SPECIFICATIONS
Alternative Designations	
Date, Country of Origin	INA, FRA
Proliferation	At least 1 country
Crew	4
Combat Weight (mt)	14.1
Length (m)	5.78
Height (m)	2.57
Width (m)	2.78
Platform	AMX-10P
AUTOMOTIVE	**SPECIFICATIONS**
Engine Type	300-hp Diesel
Cruising Range (km)	600
Max On-Road (km/h)	65
Max Off-Road (km/h)	INA
Max Cross-Country (km/h)	35
Max Swim (km/h)	7
Fording Depth (m), note	Amphibious
PROTECTION	**SPECIFICATIONS**
Radio	VHF and intercom
Armor, Turret Front (mm):	12.7
Applique Armor (mm)	INA
Reactive Armor (mm):	INA
Mobility (mine clearing, self-entrenching)	N/A
NBC Protection System	Collective
Smoke Equipment	3 smoke grenade launchers
FIRE CONTROL	**SPECIFICATIONS**
FCS Name	INA
Beacon or Tracker Type	INA
Rangefinder	INA
IR Searchlight	INA
Day Sight	M509, 3x/12x
Acquisition Range (m)	INA
Field of View (deg)	INA
Night Sight	Castor Thermal
Acquisition Range (m)	INA
Field of View (deg)	INA
ATGM Guidance	SACLOS
ATGM Command Link	Wire

ARMAMENT	SPECIFICATIONS
Caliber(mm), Type, Name	ATGM, Lancelot 3
Rate of Fire (prac, cyclic)	3,4
Fire on Move	No
Loader Type	Manual
Elevation (deg min, max)	-12, +18
AMMUNITION	**SPECIFICATIONS**
Missile Type, Name	ATGM, HOT
Max Range(m)	4000
Minimum Range (m)	80
Penetration (mm), KE/CE	800, CE
Warhead Type	Shaped Charge (HEAT)
Missile Weight (kg)	32.0
Missile Type, Name	ATGM, HOT 2
Max Range(m)	4300
Minimum Range (m)	75
Penetration (mm), KE/CE	1250, CE
Warhead Type	Tandem shaped Charge (HEAT)
Missile Weight (kg)	32.0
Missile Type, Name	ATGM, HOT 3
Max Range(m)	4300
Minimum Range (m)	75
Penetration (mm), KE/CE	1250, CE
Warhead Type	Tandem shaped Charge (HEAT)
Missile Weight (kg)	32.0

VARIANTS
THE AMX-10 HOT CONSTITUTES A HIGH-END APPLICATION ON THAT SPECTRUM, AND HAS NOT BEEN WIDELY PROLIFERATED. THE LANCELOT TURRET USED ON AMX-10 HOT CAN BE MOUNTED ON OTHER ARMORED FIGHTING VEHICLES.
THE HOT ANTITANK GUIDED MISSILE CAN BE LAUNCHED FROM A GROUND LAUNCHER. BUT THE CRUCIFORM-BASED SINGLE-TUBE GROUND LAUNCHER SYSTEM EXCEEDS THE WEIGHT LIMIT FOR THE PORTABLE CLASS OF ATGM LAUNCHERS. THUS IT WILL RARELY BE DISMOUNTED. HOWEVER, THE LAUNCHER CAN BE MOUNTED ON A VARIETY OF VEHICLES. MOST USE A SIMPLE PINTLE MOUNT. THE SINGLE-TUBE DISMOUNTABLE HOT FIRING STATION CAN BE FITTED ON LIGHT VEHICLES SUCH AS THE VBL. THUS THE OPFOR TIER 2 BATTALION ATGM LAUNCHER WAS PREVIOUSLY A HOT-3 PINTLE MOUNT VERSION ON THE VBL. IT HAS ALSO BEEN FITTED ON INFANTRY FIGHTING VEHICLES AND ATGM LAUNCHER VEHICLES, AND HELICOPTERS. ALTERNATE MOUNTS FOR THE LAUNCHER INCLUDE THE ATLAS/COMMANDO LIGHTWEIGHT LAUNCHER (140 KG) MOUNTED ON THE SPANISH SANTANA (4 X 4 LAND ROVER LIGHT TRUCK). THE TURRET CAN BE MOUNTED ON THE VBR CHASSIS, WHICH PERMITS EASIER CARRY OF THE LARGER HOT MISSILE THAN FOR ITS PREDECESSOR, THE VBL.
THE GERMAN JAGUAR 1 LAUNCHER VEHICLE IS AN UPGRADED VERSION OF THE RAKETENJAGDPANZER 2 VEHICLE WHICH LAUNCHED SS-11 ATGMS, THEN FITTED WITH A SINGLE-TUBE HOT LAUNCHER. THESE VEHICLES WERE ALL DERIVED FROM THE RELIABLE AND HIGHLY MOBILE LEOPARD 1 TANK CHASSIS.
THE FRENCH-PRODUCED VAB HOT USES A MEPHISTO RETRACTABLE TWIN-TUBE LAUNCHER, AND HAS AN ONBOARD LOAD OF 10 HOT ATGMS.
THE UTM800 TURRET HOLDS 4 X HOT MISSILES, WITH A STABILIZED SIGHT AND CASTOR THERMAL NIGHT SIGHT. THE TURRET IS USED IN TWO SYSTEMS. THE FRENCH VCR/TH EMPLOYS THE TURRET ON A PANHARD VCR/TT 6 X 6 APC CHASSIS. THE OTHER IS THE UTM TURRET ON A VAB APC CHASSIS.
AN UPDATED LAUNCHER FOR HOT-3 OFFERS A THERMAL MODULAR SYSTEM NIGHT SIGHT AND A DUAL BAND TRACKER. THE ATM LAUNCHER, SHOWN ON THE NEXT PAGE, CAN FIT A VARIETY OF VEHICLES AND LAUNCH HOT MISSILES OR MOUNT A COMBINATION OF MISSILES AND GUNS.

NOTES
FRENCH SNPE EXPLOSIVE REACTIVE ARMOR CAN BE EMPLOYED ON AMX-10 TYPE VEHICLES, BUT THEY THEN LOSE THEIR SWIM CAPABILITY.

FRENCH FIRE SUPPORT VEHICLE AMX-10 PAC 90



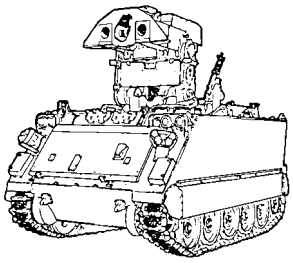
Photo Source Military.Com

SYSTEM	SPECIFICATIONS
Alternative Designations	AMX-10PAC90 Marines
Date, Country of Origin	1980, FRA
Proliferation	At least 3 countries
Crew	3
Combat Weight (mt)	16.5
Length (m)	5.9
Height (m)	
Width (m)	2.78
Ground Pressure (kg/cm²)	0.60
Drive Formula	
AUTOMOTIVE	**SPECIFICATIONS**
Engine Type	300hp Diesel
Cruising Range (km)	600
Max On-Road (km/h)	65
Max Off-Road (km/h)	
Max Cross-Country (km/h)	
Max Swim (km/h)	7
Fording Depth (m)	Amphibious
PROTECTION	**SPECIFICATIONS**
Radio	
Armor, Turret Front (mm):	12.7
Applique Armor (mm)	
Reactive Armor (mm):	
Mobility (mine clearing, self-entrenching)	No
NBC Protection System	Collective
Smoke Equipment	4 smoke grenade launchers
FIRE CONTROL	**SPECIFICATIONS**
FCS Name	Soptac
Main Gun Stabilization	No
Rangefinder	Laser
Infrared Searchlight	Yes
Day Sight	Telescopic
Field of View (deg)	
Acquisition Range (m)	3000
Night Sight	II night channel
Field of View (deg)	
Acquisition Range (m)	1500

ARMAMENT	SPECIFICATIONS
Caliber(mm), Type, Name	90, rifled gun, CN-90-F4 Super 90
Rate of Fire (prac, cyclic)	
Fire on Move	No
Elevation (deg min, max)	-8, +15
Caliber(mm), Type, Name	7.62, Coax MG, AAT 52
Rate of Fire (prac, cyclic)	700
Fire on Move	Yes
Caliber(mm), Type, Name	12.7, AA MG, M2HB
Rate of Fire (prac, cyclic)	450, 550
Fire on Move	Yes
AMMUNITION	**SPECIFICATIONS**
Caliber(mm), Type, Name	90, APFSCS
Max Aimed Range (m)	2000
Max Eff Range, Day (m)	2000
Max Eff Range, Night (m)	1650
Penetration (mm)	
Combat Load (ready, stow)	20, 30
Caliber(mm), Type, Name	90, HEAT
Max Aimed Range (m)	2000
Max Eff Range, Day (m)	1100
Max Eff Range, Night (m)	1100
Combat Load (ready, stow)	15
Caliber(mm), Type, Name	90, HE-ER
Max Aimed Range (m)	3000
Max Eff Range, Day (m)	925
Max Eff Range, Night (m)	925
Combat Load (ready, stow)	15
Caliber(mm), Type, Name	7.62
Max Aimed Range (m)	1000
Max Eff Range, Day (m)	800
Max Eff Range, Night (m)	800
Combat Load (ready, stow)	3200
Caliber(mm), Type, Name	12.7, Sabot
Max Aimed Range (m)	2000
Max Eff Range, Day (m)	2000
Max Eff Range, Night (m)	1650
Combat Load (ready, stow)	500

NOTES
ORIGINAL SYSTEM LACKS 12.7MM AA MG. ORIGINAL FCS IS M563 TELESCOPIC SIGHT. FRENCH THOMPSON CANASTA FCS WITH LLLTV IS AVAILABLE.

US ATGM LAUNCHER VEHICLE M901



SYSTEM	SPECIFICATIONS
Alternative Designations	ITV (Improved TOW Vehicle), ITOW
Date, Country of Origin	1978, USA
Proliferation	At least 8 countries
Crew	4
Platform	M113A1
Combat Weight (mt)	11.79
Length (m)	4.90
Height (m)	2.91
Width (m)	2.70
AUTOMOTIVE	**SPECIFICATIONS**
Engine Type	212-hp DieseL
Cruising Range (km)	483
Max On-Road (km/h)	64
Max Off-Road (km/h)	INA
Max Cross-Country (km/h)	INA
Max Swim (km/h)	5.8
Fording Depth (m), note	Amphibious
PROTECTION	**SPECIFICATIONS**
Radio	Various, including intercom
Armor, Turret Front (mm):	INA
NBC Protection System	None
Smoke Equipment	8 smoke grenade launchers
FIRE CONTROL	**SPECIFICATIONS**
FCS Name	ATM
Beacon or Tracker Type	Xenon (Infrared), thermal on TOW-2 and after
Rangefinder	INA
Day Sight	Day sight/tracker, 13x
Field of View (deg)	5.5
Acquisition Range (m)	INA
Night Sight	AN/TAS-4 thermal sight
Field of View (deg)	INA
Acquisition Range (m)	INA
ATGM Guidance	SACLOS
ATGM Command Link	Wire

ARMAMENT	SPECIFICATIONS
Caliber(mm), Type, Name	ATGM, M27
Rate of Fire (prac, cyclic)	2
Fire on Move	No
Elevation (deg min, max)	-30, +34
Loader Type	Manual
Caliber(mm), Type, Name	7.62, Machinegun, INA
AMMUNITION	**SPECIFICATIONS**
Missile Type, Name	ATGM, TOW (BGM-71)
Max Range(m)	3750
Minimum Range (m)	65
Penetration (mm KE)	600
Warhead Type	Shaped Charge (HEAT)
Missile Weight (kg)	25.5
Missile Type, Name	ATGM, ITOW (BGM-71C)
Max Range(m)	3750
Minimum Range (m)	65
Penetration (mm KE)	800
Warhead Type	127-mm HEAT with a short
Missile Weight (kg)	25.7
Missile Type, Name	ATGM, TOW2 (BGM-71D)
Max Range(m)	3750
Minimum Range (m)	65
Penetration (mm KE)	900
Warhead Type	152-mm HEAT with bigger probe
Missile Weight (kg)	28.0
Missile Type, Name	ATGM, TOW 2A (BGM-71E)
Max Range(m)	3750
Minimum Range (m)	65
Penetration (mm KE)	900
Warhead Type	Tandem Shaped Charge (Large HEAT, long probe)
Missile Weight (kg)	22.65
Missile Type, Name	ATGM, TOW 2B (BGM-71F)
Max Range(m)	3750
Minimum Range (m)	200
Penetration (mm KE)	900
Warhead Type	Dual explosive-formed penetrators (EFP),top-attack
Missile Weight (kg)	22.60

NOTES
THE LOADER HAS SIDE AND OVERHEAD PROTECTION DURING LOADING, WHICH REQUIRES 40 SECONDS.
THE IMPROVED TARGET ACQUISITION SYSTEM (ITAS) WAS DEVELOPED FOR TOW 2 AND LATER. IT INCLUDES A LASER RANGEFINDER, INCREASED ACQUISITION RANGE, IMPROVED NIGHT CAPABILITIES (SECOND-GENERATION THERMAL CHANNEL), AN AUTOMATIC BORE-SIGHT AND GREATER HIT PROBABILITY.

BRITISH COMBAT RECONNAISSANCE VEHICLE SCORPION



National War College Photo

SYSTEM	SPECIFICATIONS
Alternative Designations	FV101
Date, Country of Origin	1972, GBR
Proliferation	At least 18 countries
Crew	3
Troop Capacity	0
Combat Weight (mt)	8.07
Length (m)	4.79
Height (m)	2.10
Width (m)	2.24
Ground Pressure (kg/cm^2)	0.36
AUTOMOTIVE	**SPECIFICATIONS**
Engine Type	190-hp Gasoline
Cruising Range (km)	650
Max On-Road (km/h)	80
Max Cross-Country (km/h)	25
Max Swim (km/h)	6
Fording Depth (m)	1.07, Amphibious
PROTECTION	**SPECIFICATIONS**
Radio	INA
Armor, Turret Front (mm):	20
NBC protection system	Yes
Smoke Equipment	4 smoke grenade launchers
FIRE PROTECTION	**SPECIFICATIONS**
FCS Name	INA
Main Gun Stabilization	No
Rangefinder	Laser
Infrared Searchlight	Yes
Day Sight	Barr and Stroud Tank Laser Sight, 10x
Acquisition Range (m)	2200
Night Sight	GEC Sensors SS100, II, x5.8/1.6
Acquisition Range (m)	INA

ARMAMENT	SPECIFICATIONS
Caliber(mm), Type, Name	76, Rifled gun, L23A1
Rate of Fire (prac, cyclic)	6
Fire on Move	No
Elevation (deg min, max)	-10, +35
Caliber(mm), Type, Name	7.62, COAX Machinegun, L8A1
Rate of Fire (prac, cyclic)	250, 650
Fire on Move	Yes
AMMUNITION	**SPECIFICATIONS**
Caliber(mm), Type, Name	76, HESH, L29
Max Aimed Range (m)	2,200
Max Eff Range, Day (m)	
Max Eff Range, Night (m)	
Penetration (mm KE)	
Combat Load (ready, stow)	
Caliber(mm), Type, Name	76, INDIR HE, L24A1/2
Max Aimed Range (m)	
Max Eff Range, Day (m)	5000
Max Eff Range, Night (m)	
Penetration (mm KE)	
Combat Load (ready, stow)	
Caliber(mm), Type, Name	7.62
Max Aimed Range (m)	1500
Max Eff Range, Day (m)	1000
Max Eff Range, Night (m)	600

VARIANTS

Scorpion 90: Variant with a 90-mm Cockerill Mk III gun.
A number of vehicles use the same Alvis chassis. They include the Scimitar armored reconnaissance vehicle, Striker armored ATGM launcher vehicle, Spartan armored personnel carrier or Milan ATGM launcher, Stormer modernized APC, Samaritan armored ambulance, and Saber modernized reconnaissance vehicle.

NOTES
AS A REFLECTION OF THE VEHICLE'S SUITABILITY FOR A VARIETY OF ROLES, IN RECENT TIMES IT IS REFERRED TO AS AN ARMORED RECONNAISSANCE VEHICLE OR COMBAT VEHICLE RECONNAISSANCE (TRACKED)--CVR (T). A BRITISH UPGRADE PROGRAM INCLUDES A DIESEL ENGINE, THERMAL SIGHTS, AND SECURE COMMUNICATIONS. THE TANK LASER SIGHT AND AVIMO LV10 DAY/NIGHT LRF SIGHT CAN ACCEPT A THERMAL CHANNEL. THERMAL SIGHTS ARE AVAILABLE FOR USE ON THE TANK.

FRENCH LIGHT TANK AMX-13



Photo Source: www.military-today.com

SYSTEM	SPECIFICATIONS
Alternative Designations	AMX-13/90
Date, Country of Origin	1966, FRA
Proliferation	At least 15 countries
Crew	3
Combat Weight (mt)	15
Length (m)	4.88
Height (m)	2.28
Width (m)	2.51
Ground Pressure (kg/cm^2)	0.74
Drive Formula	Tracked
AUTOMOTIVE	**SPECIFICATIONS**
Engine Type	250-hp Gasoline
Cruising Range (km)	350
Max On-Road (km/h)	60
Max Off-Road (km/h)	
Max Swim (km/h)	
Fording Depth (m), note	2.1, with snorkel
PROTECTION	**SPECIFICATIONS**
Radio	TR-VP118 and intercom
Armor, Turret Front (mm):	25
Applique Armor (mm)	Number
Reactive Armor (mm):	Number
Mobility (mine clearing, self-entrenching)	Text
NBC Protection System	Text
Smoke Equipment	2 x 2 grenade launchers
FIRE CONTROL	**SPECIFICATIONS**
FCS Name	
Main Gun Stabilization	
Rangefinder	
Infrared Searchlight	Yes
Day Sight	L862 7.5x and 8x
Field of View (deg)	Number
Acquisition Range (m)	Number
Night Sight	OB-11-A 5x
Field of View (deg)	Number
Acquisition Range (m)	800

ARMAMENT	SPECIFICATIONS
Caliber(mm), Type, Name	90, Rifled Gun, CN-90-F3
Rate of Fire (prac, cyclic)	
Fire on Move	No
Elevation (deg min, max)	-5.5, +12.5
Caliber(mm), Type, Name	7.62, Coax MG, AA52
Rate of Fire (prac, cyclic)	Number, Number
Fire on Move	Yes
AMMUNITION	**SPECIFICATIONS**
Caliber(mm), Type, Name	90, APFSDS, OFL 90 F1
Max Aimed Range (m)	2000
Max Eff Range, Day (m)	1600
Max Eff Range, Night (m)	1000
Penetration (mm)	120, K
Combat Load (ready, stow)	34
Caliber(mm), Type, Name	90, HEAT,
Max Aimed Range (m)	
Max Eff Range, Day (m)	1000
Max Eff Range, Night (m)	1000
Penetration (mm)	160, C
Combat Load (ready, stow)	
Caliber(mm), Type, Name	90, HEAT, OCC 90-62
Max Aimed Range (m)	1800
Max Eff Range, Day (m)	1000
Max Eff Range, Night (m)	1000
Penetration (mm)	120, C

VARIANTS

AMX-13 Model 51 – Original tank destroyer/recon vehicle w/75mm gun. Upgraded diesel engine and a 7.62mm AA MG. 2 versions were fitted with 2 x SS-11 or 3xHOT ATGM launchers
AMX-13/105 - Variant with a GIAT 105G1 105mm gun
AMX-13 CD Model 55 - Armored vehicle recovery variant
AMX-13 DCA – Air defense variant with twin 30mm guns
AMX-13 with LAR – Multiple Rocket Launcher System
AMX 105 Mk 61 – Self Propelled howitzer variant
AMX F3 – 155mm self-propelled gun
AMX-VCI – Variant used as an APC

No notes listed

FRENCH ARMORED RECONNAISSANCE VEHICLE AMX-10RC



Photo Source: National War College

SYSTEM	SPECIFICATIONS
Alternative Designations	
Date, Country of Origin	1979, FRA
Proliferation	At least 3 countries
Crew	4
Combat Weight (mt)	15.8
Length (m)	6.35
Height (m)	2.29
Width (m)	2.95
Ground Pressure (kg/cm^2)	
Drive Formula	6 x 6 wheeled
AUTOMOTIVE	**SPECIFICATIONS**
Engine Type	260-hp Diesel
Cruising Range (km)	1000
Max On-Road (km/h)	85
Max Off-Road (km/h)	
Max Cross-Country (km/h)	
Max Swim (km/h)	4.5
Fording Depth (m), note	
PROTECTION	**SPECIFICATIONS**
Radio	
Armor, Turret Front (mm):	
Applique Armor (mm)	
Reactive Armor (mm):	
Mobility (mine clearing, self-entrenching)	
NBC Protection System	Yes
Smoke Equipment	2 x 2 grenade launchers
FIRE CONTROL	**SPECIFICATIONS**
FCS Name	COTAC M401
Main Gun Stabilization	No
Rangefinder	Cilas APX M550 laser
Infrared Searchlight	No
Day Sight	APX M504-04 10x
Field of View (deg)	
Acquisition Range (m)	
Night Sight	DIVT 13 LLLTV
Field of View (deg)	
Acquisition Range (m)	

ARMAMENT	SPECIFICATIONS
Caliber(mm), Type, Name	105, Rifled Gun, CN-105-F2
Rate of Fire (prac, cyclic)	
Fire on Move	No
Elevation (deg min, max)	-8, +20
Caliber(mm), Type, Name	7.62, COAX MG, Text
Rate of Fire (prac, cyclic)	
Fire on Move	Yes
AMMUNITION	**SPECIFICATIONS**
Caliber(mm), Type, Name	105, APFSDS-T, Giat
Max Aimed Range (m)	2000
Max Eff Range, Day (m)	1500
Max Eff Range, Night (m)	
Penetration (mm)	
Combat Load (ready, stow)	10
Caliber(mm), Type, Name	105, HEAT-T, French Giat
Max Aimed Range (m)	1130
Max Eff Range, Day (m)	1250
Max Eff Range, Night (m)	
Penetration (mm)	100, C
Combat Load (ready, stow)	9,
Caliber(mm), Type, Name	105, HE, OE 105 Mle F3
Max Aimed Range (m)	2500
Max Eff Range, Day (m)	1000
Max Eff Range, Night (m)	
Penetration (mm)	
Combat Load (ready, stow)	19

VARIANTS

Desert Storm Version – Vehicles have applique armor, an ATGM IRCM decoy device, and a DIVT 16 thermal sight, range 4000m

NOTES
THE ALIS MODULAR THERMAL SIGHT CAN BE USED ON THE AMX-10RC. A 280-HP BAUDOUIN ENGINE REPLACED THE ORIGINAL ENGINE IN SOME UPGRADES. IN 1997 THE FRENCH ARMY DEMONSTRATED A VERSION OF THE LECLERC BATTLEFIELD MANAGEMENT SYSTEM ON THE AMX-10RC.

RUSSIAN AMPHIBIOUS TANK PT-76B



National War College Photo

SYSTEM	SPECIFICATIONS
Alternative Designations	
Date, Country of Origin	1952, RUS
Proliferation	At least 21 countries
Crew	3
Troop Capacity	0
Combat Weight (mt)	14.0
Length (m)	6.91
Height (m)	2.26
Width (m)	3.14
Ground Pressure (kg/cm²)	0.46
AUTOMOTIVE	**SPECIFICATIONS**
Engine Type	240-hp Diesel
Cruising Range (km)	260
Max On-Road (km/h)	44
Max Cross-Country (km/h)	25
Max Swim (km/h)	10
Fording Depth (m)	Amphibious
PROTECTION	**SPECIFICATIONS**
Radio	R-123
Armor, Turret Front (mm):	20
Smoke Equipment	VEESS
FIRE CONTROL	**SPECIFICATIONS**
FCS Name	Text
Main Gun Stabilization	Yes
Rangefinder	
Infrared Searchlight	Yes
Day Sight	TShK-66
Acquisition Range (m)	4000
Night Sight	TVN-28 IR
Acquisition Range (m)	600

ARMAMENT	SPECIFICATIONS
Caliber(mm), Type, Name	76, Rifled gun, D-56B
Rate of Fire (prac, cyclic)	6, 8
Fire on Move	Yes
Elevation (deg min, max)	-4, + 30
Caliber(mm), Type, Name	7.62, Machinegun, PKT
Rate of Fire (prac, cyclic)	250, 650
Fire on Move	Yes
AMMUNITION	**SPECIFICATIONS**
Caliber(mm), Type, Name	76, HVAP-T, BM-354P
Max Aimed Range (m)	1,060
Max Eff Range, Day (m)	650
Max Eff Range, Night (m)	600
Penetration (mm KE)	50
Combat Load (ready, stow)	
Caliber(mm), Type, Name	76, HEAT, BK-350M
Max Aimed Range (m)	1000
Max Eff Range, Day (m)	650
Max Eff Range, Night (m)	600
Penetration (mm KE)	280
Combat Load (ready, stow)	
Caliber(mm), Type, Name	76, Frag-HE, OF-350
Max Aimed Range (m)	4000
Max Eff Range, Day (m)	
Max Eff Range, Night (m)	600
Penetration (mm KE)	
Caliber(mm), Type, Name	7.62
Max Aimed Range (m)	1500
Max Eff Range, Day (m)	1000
Max Eff Range, Night (m)	600
VARIANTS	

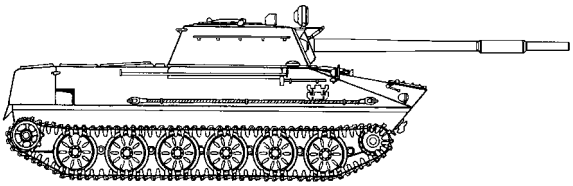
NOTES

ORIGINAL PT-76 WAS PRODUCED IN LIMITED NUMBERS WITH A NON-STABILIZED MAIN GUN. SOME PT-76S ARE AUGMENTED WITH 12.7-MM AA MGS. API ROUND CAN DEFEAT ALL LAVS, AND MOST HACVS THE CHASSIS WAS DERIVED FROM THE BTR-50 APC CHASSIS. ISRAEL OFFERS AN UPGRADE PACKAGE WITH A 90-MM GUN, LRF FIRE CONTROL AND A 300-HP ENGINE.

M1985: NORTH KOREAN VARIANT LIGHT TANK.

POLISH PT-76: VARIANT WITH A COMMANDER'S HATCH AND 12.7-MM MG.TYPE 63: CHINESE VARIANT WITH A NEW TURRET, 85-MM GUN, AND 12.7-MM AA MG. PT-76E: RECENT UPGRADE PROGRAM FEATURES A STABILIZED VERSION OF THE 57-MM S-60 AUTOMATIC AA GUN (70 RDS/MIN), WITH COMPUTER FIRE CONTROL SYSTEM AND A THERMAL SIGHT. OTHER FEATURES ARE A MORE POWERFUL ENGINE AND IMPROVED TRACKS.

NORTH KOREAN LIGHT TANK M1985/PT-85



SYSTEM	SPECIFICATIONS
Alternative Designations	
Date, Country of Origin	1985, PRK
Proliferation	At least 1 country
Crew	3
Combat Weight (mt)	19.0
Length (m)	7.0
Height (m)	2.6
Width (m)	3.2
Ground Pressure (kg/cm^2)	INA
AUTOMOTIVE	**SPECIFICATIONS**
Engine Type	320-hp Diesel
Cruising Range (km)	500
Max On-Road (km/h)	60
Max Off-Road (km/h)	INA
Max Cross-Country (km/h)	INA
Max Swim (km/h)	10
Fording Depth (m), note	Amphibious
PROTECTION	**SPECIFICATIONS**
Radio	INA
Armor, Turret Front (mm):	30
Applique Armor (mm)	N/A
Reactive Armor (mm):	N/A
Mobility (mine clearing, self-entrenching)	N/A
NBC Protection System	INA
Smoke Equipment	INA
FIRE CONTROL	**SPECIFICATIONS**
FCS Name	INA
Main Gun Stabilization	No
Rangefinder	None
Infrared Searchlight	Yes
Day Sight	INA
Field of View (deg)	INA
Acquisition Range (m)	3000
Night Sight	INA
Field of View (deg)	INA
Acquisition Range (m)	800

ARMAMENT	SPECIFICATIONS
Caliber(mm), Type, Name	85, Rifled gun, Type 62/63
Rate of Fire (prac, cyclic)	6, 8
Fire on Move	Yes
Elevation (deg min, max)	-4, + 30
Caliber(mm), Type, Name	12.7, HMG, Type 54/DShKM
Rate of Fire (prac, cyclic)	250, 650
Fire on Move	Yes
Caliber(mm), Type, Name	7.62, Machinegun, PKT
Rate of Fire (prac, cyclic)	250, 650
Fire on Move	Yes
Caliber(mm), Type, Name	ATGM, 9P111
Rate of Fire (prac, cyclic)	2
AMMUNITION	**SPECIFICATIONS**
Caliber(mm), Type, Name	85, HVAP-T, BR-365PK
Max Aimed Range (m)	1500
Max Eff Range, Day (m)	1150
Max Eff Range, Night (m)	800
Penetration (mm), KE/CE	130, KE
Caliber(mm), Type, Name	85, APC-T, Type 367
Max Aimed Range (m)	1500
Max Eff Range, Day (m)	1150
Max Eff Range, Night (m)	800
Penetration (mm), KE/CE	120, CE
Caliber(mm), Type, Name	85, HEAT-FS/BK-2M
Max Aimed Range (m)	1500
Max Eff Range, Day (m)	1150
Max Eff Range, Night (m)	800
Penetration (mm), KE/CE	100, KE
Missile Type, Name	ATGM, AT-3
Max Effective Range(m)	3000
Penetration (mm), KE/CE	410, CE
Warhead Type	Tandem HEAT
Missile Type, Name	ATGM, Red Arrow-73A (CHN)
Max Effective Range(m)	3000
Penetration (mm), KE/CE	580, CE
Warhead Type	HEAT
Missile Type, Name	ATGM, Malyutka-2
Max Effective Range(m)	3000
Penetration (mm), KE/CE	INA
Warhead Type	Frag-HE

NOTES

CHASSIS IS DERIVED FROM NORTH KOREAN STRETCHED VTT-323 APC CHASSIS. THE M1985 CHASSIS IS DERIVED FROM THE NORTH KOREAN VTT-323, AND IS SIMILAR TO THE RUSSIAN PT-76 AMPHIBIOUS TANK. THE TURRET ON THE M1985 IS AN INDIGENOUS DESIGN. MAIN GUN IS OF THE FAMILY WHICH INCLUDES CHINESE TYPE 62 AND 63 TANK GUNS, CHINESE TYPE 56/ FSU D-44 FIELD GUNS, AND THE T-34/85 TANK. THEREFORE, AMMUNITION OPTIONS INCLUDE THE VARIETY OF AMMUNITION AVAILABLE FOR THESE GUNS.

THE AT-3 TYPE ATGM CAN BE UPGRADED BY AN OPERATOR WITH A NEW WARHEAD IN MINUTES. LOW-MID LEVEL MAINTENANCE CAN UPGRADE THE MISSILE MOTOR. THE HE-BLAST ATGM IS USED FOR KILLING PERSONNEL AND DESTROYING BUNKERS AND OTHER FORTIFICATIONS.

CHINESE AMPHIBIOUS LIGHT TANK TYPE 63A (MODERNIZED)



SYSTEM	SPECIFICATIONS
Alternative Designations	Type 99, Type ZTS 63A
Date, Country of Origin	1999, CHN
Proliferation	At least 1 country
Crew	3
Combat Weight (mt)	INA
Length (m)	8.15
Height (m)	INA
Width (m)	3.20
Ground Pressure (kg/cm^2)	INA

AUTOMOTIVE	SPECIFICATIONS
Engine Type	580-hp Diesel, or 1,000
Cruising Range (km)	730
Max On-Road (km/h)	64
Max Off-Road (km/h)	28
Max Cross-Country (km/h)	28
Max Swim (km/h)	1.3
Fording Depth (m), note	Amphibious

PROTECTION	SPECIFICATIONS
Radio	A-220A
Armor, Turret Front (mm):	INA
Applique Armor (mm)	INA
Reactive Armor (mm):	INA
Mobility (mine clearing, self-entrenching)	N/A
NBC Protection System	Probable
Smoke Equipment	8 x smoke grenade launcher

FIRE CONTROL	SPECIFICATIONS
FCS Name	INA
Main Gun Stabilization	Yes
Rangefinder	Laser
Infrared Searchlight	Yes
Day Sight	INA
Field of View (deg)	INA
Acquisition Range (m)	5500
Night Sight	Thermal
Field of View (deg)	INA
Acquisition Range (m)	5000
ATGM Guidance	SACLOS, Laser
ATGM Command Link	Encoded IR laser

ARMAMENT	SPECIFICATIONS
Caliber(mm), Type, Name	105, Rifled gun, INA
Rate of Fire (prac, cyclic)	8
Fire on Move	Yes
Elevation (deg min, max)	-4, +22
Caliber(mm), Type, Name	12.7, Machine gun, W 85
Rate of Fire (prac, cyclic)	600, 100
Caliber(mm), Type, Name	7.62, COAX Machinegun, L8A1
Rate of Fire (prac, cyclic)	250, 650
Caliber(mm), Type, Name	105, ATGM, Arkan/AT-10B

AMMUNITION	SPECIFICATIONS
Caliber(mm), Type, Name	105, APFSDS-T, Chinese
Max Aimed Range (m)	3000
Max Eff Range, Day (m)	3000
Max Eff Range, Night (m)	3000
Penetration (mm KE)	460
Caliber(mm), Type, Name	105, APFSDS, H6/62
Max Aimed Range (m)	3000
Max Eff Range, Day (m)	3000
Max Eff Range, Night (m)	3000
Penetration (mm KE)	INA
Caliber(mm), Type, Name	105, HESH, L35 (UK)
Max Aimed Range (m)	5000
Max Eff Range, Day (m)	3000
Max Eff Range, Night (m)	3000
Penetration (mm KE)	INA
Caliber(mm), Type, Name	105, HEAT, M456 (multi)
Max Aimed Range (m)	3000
Max Eff Range, Day (m)	3000
Max Eff Range, Night (m)	3000
Penetration (mm KE)	432
Caliber(mm), Type, Name	7.62-mm (7.62x 54R)
Max Aimed Range (m)	2000
Max Eff Range, Day (m)	1000
Missile Type, Name	Arkan/AT-10B
Launch Method	Main-gun Tube
Max Effective Range(m)	5500
Penetration (mm KE)	750
Warhead Type	Tandem shaped charge

No notes listed

CHINESE ATGM LAUNCHER VEHICLE TYPE 92B/RED ARROW-9



SYSTEM	SPECIFICATIONS
Alternative Designations	WXLZ602B for vehicle. AKA RA-9, Hong Jian-9, and HJ-9
Date, Country of Origin	1999, CHN
Proliferation	1 country for vehicles and missile.
Crew	3
Platform	WZ-550
Combat Weight (mt)	12.5
Length (m)	6.63
Height (m)	2.8
Width (m)	2.8
Ground Pressure (kg/cm^2)	INA
Drive Formula	4x4

AUTOMOTIVE	SPECIFICATIONS
Engine Type	320-hp BF8L413F Diesel
Cruising Range (km)	800
Max On-Road (km/h)	95
Max Off-Road (km/h)	INA
Max Cross-Country (km/h)	INA
Max Swim (km/h)	8
Fording Depth (m), note	Amphibious

PROTECTION	SPECIFICATIONS
Radio	INA
Armor, Turret Front (mm):	INA
NBC Protection System	None
Smoke Equipment	INA

FIRE CONTROL	SPECIFICATIONS
FCS Name	ATM
Beacon or Tracker Type	INA
Rangefinder	Laser rangefinder 10,000m
Day Sight	Low light level TV with auto-tracker, NFI
Acquisition Range (m)	5000
Night Sight	Thermal Image System, INA
Acquisition Range (m)	4000
ATGM Guidance	SACLOS
ATGM Command Link	Laser beam rider guidance

ARMAMENT	SPECIFICATIONS
Caliber(mm), Type, Name	ATGM, Red Arrow-9
Rate of Fire (prac, cyclic)	3,4
Fire on Move	No
Elevation (deg min, max)	-10, +10
Loader Type	Auto or Manual

AMMUNITION	SPECIFICATIONS
Missile Type, Name	ATGM, Red Arrow-9
Max Range(m)	5,000
Minimum Range (m)	100
Penetration (mm KE)	1200
Warhead Type	152-mm Tandem shaped Charge (HEAT)
Missile Weight (kg)	37

VARIANTS

THE SYSTEM IS ONLY VEHICLE-MOUNTED. FIRST FIELDED VEHICLE IS TYPE 92B. A RECENTLY SHOWN 4-TUBE LAUNCHER MOUNTS MISSILES IN AN ARMORED BOX.

A SINGLE TUBE LAUNCHER WAS DEVELOPED FOR LIGHT VEHICLES. INITIAL VERSION IS ON THE NJ2046 4X4 LIGHT UTILITY VEHICLE.

HIGH EXPLOSIVE THERMOBARIC.

RED ARROW-9A: MMW-HOMING VERSION - IN DEVELOPMENT.

RED ARROW-9B: SEMI-ACTIVE LASER HOMING- IN DEVELOPMENT.

NOTES
THE MISSILE APPEARS TO HAVE BEEN DERIVED FROM THE U.S. TOW MISSILE, WITH UPGRADES IN RANGE, GUIDANCE, AND WARHEAD DESIGN.

RUSSIAN ATGM LAUNCHER VEHICLE 9P148



SYSTEM	SPECIFICATIONS
Alternative Designations	BRDM-2/AT-5
Date, Country of Origin	1977, PRK
Proliferation	At least 6 countries
Crew	2
Combat Weight (mt)	7.0
Length (m)	5.73
Height (m)	2.31
Width (m)	2.26
Drive Formula	4x4
AUTOMOTIVE	**SPECIFICATIONS**
Engine Type	140-hp Gasoline
Cruising Range (km)	750
Max On-Road (km/h)	100
Max Off-Road (km/h)	INA
Max Cross-Country (km/h)	INA
Max Swim (km/h)	10
Fording Depth (m), note	Amphibious
PROTECTION	**SPECIFICATIONS**
Radio	R-123
Armor, Turret Front (mm):	30
Applique Armor (mm)	N/A
Reactive Armor (mm):	N/A
Mobility (mine clearing, self-entrenching)	N/A /A
NBC Protection System	Collective
Smoke Equipment	N/A
FIRE CONTROL	**SPECIFICATIONS**
FCS Name	INA
Beacon or Tracker Type	Incandescent, IR, 9S451M1
Rangefinder	N/A
IR Searchlight	N/A
Day Sight	9Sh119M1
Acquisition Range (m)	4500
Night Sight	1PN65
Acquisition Range (m)	2500
ATGM Guidance	SACLOS
ATGM Command Link	Wire

ARMAMENT	SPECIFICATIONS
Caliber(mm), Type, Name	ATGM, 9P135M3
Rate of Fire (prac, cyclic)	3,4
Fire on Move	No
AMMUNITION	**SPECIFICATIONS**
Missile Type, Name	ATGM, AT-5/SPANDREL
Max Range(m)	4000
Minimum Range (m)	75
Penetration (mm), KE/CE	650, CE
Warhead Type	Shaped Charge (HEAT)
Missile Weight (kg)	25.2
Missile Type, Name	ATGM, AT-5B
Max Range(m)	4000
Minimum Range (m)	75
Penetration (mm), KE/CE	925, CE
Warhead Type	Tandem Shaped Charge (HEAT)
Missile Weight (kg)	26.5
Missile Type, Name	ATGM, AT-4/SPIGOT
Max Range(m)	4000
Minimum Range (m)	75
Penetration (mm), KE/CE	480, CE
Warhead Type	Shaped Charge (HEAT)
Missile Weight (kg)	13.0
Missile Type, Name	ATGM, AT-4B
Max Range(m)	2500
Minimum Range (m)	70
Penetration (mm), KE/CE	550, CE
Warhead Type	Shaped Charge (HEAT)
Missile Weight (kg)	13.4

VARIANTS

9P137: Original launcher vehicle with 5 AT-5 (only) launch rails

NOTES

A VARIETY OF ATGM MIXES HAVE BEEN SEEN WITH 9P148, BETWEEN AT-4 AND AT-5-TYPE ATGMS. THE PRIMARY BENEFIT OF ADAPTABILITY IS INCREASED LAUNCHER LOAD AND ADAPTABILITY TO USER COUNTRIES' INVENTORIES OF ATGMS. MOST COMMON ATGM IS AT-5. AS AT-5B IS PRODUCED, IT IS LIKELY TO REPLACE AT-5 IN BETTER-BUDGETED COUNTRY INVENTORIES. RELOAD TIME FOR THE LAUNCHER IS 25 SECONDS.

RUSSIAN FIRMS HAVE DEVELOPED COUNTERMEASURES, SUCH AS ENCODED-PULSE BEACONS FOR ATGMS AND COUNTER-DAZZLER ADJUSTMENTS TO THE 9S451M1 GUIDANCE BOX. FILTERS CAN BE MOUNTED IN FRONT OF RETICLES.

THE 1PN66 THERMAL SIGHT IS AVAILABLE FOR THE ATGM LAUNCHER. ACQUISITION RANGE IS APPROXIMATELY 2,500 METERS.

RUSSIAN KBP OFFERS A DROP-IN ONE-MAN TURRET, CALLED KLIVER, WITH A STABILIZED 2A72 30-MM GUN, A 4 KORNET ATGM LAUNCHER, THERMAL SIGHTS, AND IMPROVED FIRE CONTROL SYSTEM.

RUSSIAN/EUROPEAN ATGM LAUNCHER VEHICLE BRDM-2 HOT 3



SYSTEM	SPECIFICATIONS
Alternative Designations	ATM on BRDM-2
Date, Country of Origin	INA, RUS
Proliferation	More than 8 countries
Crew	3
Combat Weight (mt)	INA
Length (m)	5.78
Height (m)	2.57
Width (m)	2.78
Platform	BRDM-2, with an ATM upgrade turret variant

AUTOMOTIVE	SPECIFICATIONS
Engine Type	300-hp Diesel
Cruising Range (km)	600
Max On-Road (km/h)	65
Max Off-Road (km/h)	INA
Max Cross-Country (km/h)	35
Max Swim (km/h)	7
Fording Depth (m), note	Amphibious

PROTECTION	SPECIFICATIONS
Radio	VHF and intercom
Armor, Turret Front (mm):	12.7
Applique Armor (mm)	INA
Reactive Armor (mm):	INA
Mobility (mine clearing, self-entrenching)	N/A
NBC Protection System	Collective
Smoke Equipment	3 smoke grenade launchers

FIRE CONTROL	SPECIFICATIONS
FCS Name	ATM
Beacon or Tracker Type	Xenon
Rangefinder	Laser 15,000
Day Sight	TV, NFI
Acquisition Range (m)	4000
Night Sight	Thermal Image System, NFI
Acquisition Range (m)	4000
ATGM Guidance	SACLOS
ATGM Command Link	Wire

ARMAMENT	SPECIFICATIONS
Caliber(mm), Type, Name	ATGM, ATM
Rate of Fire (prac, cyclic)	3,4
Fire on Move	No
Loader Type	Manual
Elevation (deg min, max)	-12, +18

AMMUNITION	SPECIFICATIONS
Missile Type, Name	ATGM, HOT 3
Max Range(m)	4300
Minimum Range (m)	75
Penetration (mm), KE/CE	1250, CE
Warhead Type	Tandem shaped Charge (HEAT)
Missile Weight (kg)	32.0
Missile Type, Name	ATGM, HOT 2
Max Range(m)	4300
Minimum Range (m)	75
Penetration (mm), KE/CE	1250, CE
Warhead Type	Tandem shaped Charge (HEAT)
Missile Weight (kg)	32.0

VARIANTS

ATM variants include sensor only pods, and ATGMs on up to 4 weapon stations in mix with MG, 20/30-mm cannon, and Russian or Euospatiale ATGMs. Other ATM vehicle applications include BMP-3/ATM, Pandur/ATM (photo), HMMWV/ATM, Puma 4x4 ATM, Tactica/ATM, Fennek/ATM, and Wiesel/ATM HOT variants.

NOTES

THE HOT ANTITANK GUIDED MISSILE IS PRODUCED BY A EUROPEAN CONSORTIUM, WHICH INCLUDES COMPANIES IN FRANCE AND GERMANY. THE CRUCIFORM-BASED SINGLE-TUBE GROUND LAUNCHER SYSTEM EXCEEDS THE WEIGHT LIMIT FOR THE PORTABLE CLASS OF ATGM LAUNCHERS. AN UPDATED LAUNCHER FOR HOT 3 OFFERS A THERMAL MODULAR SYSTEM NIGHT SIGHT AND A DUAL BAND TRACKER. THE HOT CAN BE LAUNCHED FROM A GROUND LAUNCHER, THE SAME LAUNCHER MOUNTED ON A VARIETY OF VEHICLES, FROM INFANTRY FIGHTING VEHICLES AND ATGM LAUNCHER VEHICLES, AND FROM HELICOPTERS.

THE VEHICLE REPRESENTS VAB HOT, PANDUR HOT, SANTANA/HOT AND OTHER WHEELED HOT VEHICLES. THE AMX-10 HOT CONSTITUTES A HIGH-END APPLICATION ON THAT SPECTRUM, AND HAS NOT BEEN WIDELY PROLIFERATED. ALTERNATE MOUNTS FOR THE LAUNCHER INCLUDE THE ATLAS/COMMANDO LIGHTWEIGHT LAUNCHER (140 KG) MOUNTED ON THE SPANISH SANTANA (4 X 4 LAND ROVER LIGHT TRUCK). THE LANCELOT TURRET USED ON AMX-10 HOT CAN BE MOUNTED ON OTHER ARMORED FIGHTING VEHICLES. THE FRENCH-PRODUCED VAB HOT USES A MEPHISTO RETRACTABLE TWIN-TUBE LAUNCHER, AND HAS AN ONBOARD LOAD OF 10 HOT ATGMS. THE UTM800 TURRET HOLDS FOUR HOT MISSILES, WITH A STABILIZED SIGHT AND CASTOR THERMAL NIGHT SIGHT. THE UTM800 IS USED ON TWO APPLICATIONS. THE FRENCH VCR/TH EMPLOYS THE TURRET ON A PANHARD VCR/TT 6 X 6 APC CHASSIS. THE OTHER IS THE UTM TURRET ON A VAB APC CHASSIS. THE TURRET CAN BE MOUNTED ON THE VBR CHASSIS, WHICH PERMITS EASIER CARRY OF THE LARGER HOT MISSILE THAN DOES ITS PREDECESSOR, THE VBL.

THE SINGLE-TUBE DISMOUNTABLE HOT FIRING STATION CAN BE MOUNTED ON LIGHT VEHICLES SUCH AS THE VBL.

UNITED STATES 106MM RECOILLESS RIFLE M40



Source (text)

SYSTEM	SPECIFICATIONS
Alternative Designations	Battalion Antitank
Date, Country of Origin	1953, USA
Proliferation	At least 50 countries
Crew	4
Weight Firing (kg)	130
Length Firing (m)	3.4
Height Firing (m)	1.3
Rifling	Yes
Feed	Manual
Breech Mechanism Type	Interrupted thread
Emplacement Time (min)	>5
Fire from Inside Building	No

SIGHTS	SPECIFICATIONS
Name	.50 spoting rifle
Type	Simrad LP101 laser day sight
Night Sights	NVL-11 Mk IV II with LRF

ARMAMENT	SPECIFICATIONS
Caliber(mm)	105, Recoilless Rifle, M40
Rate of Fire (prac, cyclic)	5,
Fire on Move	No
Elevation (deg min, max)	-17, +65

AMMUNITION	SPECIFICATIONS
Caliber(mm), Type, Name	106, HEAT, M344A1
Max Aimed Range (m)	2745
Max Eff Range, Day (m)	1350
Caliber(mm), Type, Name	106, HEAT-Tracer, 3A-HEAT-T
Max Eff Range, Day (m)	2000
Penetration (mm)	700, C
Caliber(mm), Type, Name	106, HEP-T, M346A1
Max Aimed Range (m)	6,870
Caliber(mm), Type, Name	106, APERS-T, M581
Max Eff Range, Day (m)	300
Caliber(mm), Type, Name	106, HE, HEAP M-DN
Max Eff Range, Day (m)	1500

VARIANTS

M40A1: Initially fielded version of the rifle which was commonly exported, with the M-8C sporting rifle.
M40A2: Upgrade with an M79 mount.
M40A4: The latest fielded version, with the M27 tripod. Other countries have produced the rifle, under license, and mounted it on various chassis.
Bofors Retrofit Program: Upgrade program, with the Simrad sights and the 3 A-HEAT-T round. The weapon can be ported, carried on a vehicle pintle mount then transferred to a ground semi-mobile tripod mount.
M79 Mount: Tripod, ground or vehicle.
M50 Ontos: Six-barrel mount on small tracked vehicle
PAK-66: Austrian M40 on two wheeled carriage.

NOTES

THE PRODUCER OF THE LAHAT GUN-LAUNCH ATGM OFFERS TO PRODUCE A VERSION FOR USE IN THE M40 LAUNCHER. THE TANDEM ATGM IS A VIABLE THREAT TO ALL MODERN ARMORED VEHICLES. USE REQUIRES A TRIPOD MOUNTED LASER GUIDANCE UNIT, AS USED WITH MT-12 AND 2A45M AT GUNS. THE RIFLE PRODUCES A MASSIVE AMOUNT OF NOISE AND SMOKE WHICH REVEALS ITS LOCATION. THUS A FIRST ROUND HIT IS CRITICAL.

BRAZILIAN ARMORED RECONNAISSANCE VEHICLE EE-9



SYSTEM	SPECIFICATIONS
Alternative Designations	Cascavel IV
Date, Country of Origin	1977, Brazil
Proliferation	18 countries
Crew	3
Troop Capacity	0
Combat Weight (mt)	13.4
Length (m)	5.19
Height (m)	2.36
Width (m)	2.66
Ground Pressure (kg/cm^2)	INA
Drive Formula	6x6
AUTOMOTIVE	**SPECIFICATIONS**
Engine Type	212-hp Diesel
Cruising Range (km)	880
Max On-Road (km/h)	100
Max Off-Road (km/h)	INA
Max Cross-Country (km/h)	INA
Max Swim (km/h)	N/A
Fording Depth (m), note	1.0, Unprepared
PROTECTION	**SPECIFICATIONS**
Radio	INA
Armor, Turret Front (mm):	16
Applique Armor (mm)	N/A
Reactive Armor (mm):	N/A
Mobility (mine clearing, self-entrenching)	N/A
NBC Protection System	N/A
Smoke Equipment	6 smoke grenade launchers
FIRE CONTROL	**SPECIFICATIONS**
FCS Name	INA
Main Gun Stabilization	No
Rangefinder	LV3 Laser
Infrared Searchlight	No
Day Sight	SS-123, 10x
Field of View (deg)	INA
Acquisition Range (m)	INA
Night Sight	SS-122 II, 5.6x
Field of View (deg)	INA
Acquisition Range (m)	INA

ARMAMENT	SPECIFICATIONS
Caliber(mm), Type, Name	90mm, Cannon, Engesa EC 90
Rate of Fire (prac, cyclic)	INA, INA
Fire on Move	INA
Elevation (deg min, max)	-8, + 15
Caliber(mm), Type, Name	7.62mm, MG, INA
Rate of Fire (prac, cyclic)	INA, INA
Fire on Move	Yes
Elevation (deg min, max)	INA, INA
Caliber(mm), Type, Name	12.7mm, MG, M2
Rate of Fire (prac, cyclic)	INA, INA
Fire on Move	Yes
Elevation (deg min, max)	INA, INA
AMMUNITION	**SPECIFICATIONS**
Caliber(mm), Type, Name	90mm, APFSDS-T, Engequimica
Max Aimed Range (m)	INA
Max Eff Range, Day (m)	2000
Max Eff Range, Night (m)	1300
Penetration (mm KE)	INA
Caliber(mm), Type, Name	90mm, HE-T, Engequimica
Max Aimed Range (m)	INA
Max Eff Range, Day (m)	2000
Max Eff Range, Night (m)	1300
Penetration (mm KE)	INA

NOTES
VARIANTS
CASCAVEL I: ORIGINAL VEHICLE HAD A US M36 37-MM GUN TURRET.
CASCAVEL II: VARIANT WITH A FRENCH 90-MM GUN FROM AML-90.
CASCAVEL III: USES THE 90-MMCOCKERILL GUN AND NEW TRANSMISSION.
CASCAVEL IV: HAS A NEW ENGINE AND TRANSMISSION, IMPROVED DAY AND NIGHT OPTICS WITH LASER RANGEFINDER, AND .A 50 CAL ANTIAIRCRAFT MG.
OTHER AMMUNITION TYPES: HEAT-T, HESH-T, SMOKE, CANISTER
MAXIMUM EFFECTIVE RANGES ARE (M): HEAT-T - 1,500, HESH-T - 800.

RUSSIAN 73-MM RECOILLESS GUN SPG-9M



SYSTEM	SPECIFICATIONS
Alternative Designations	INA
Date, Country of Origin	1970, Russia
Proliferation	Widespread
Crew	3
Weight Firing (kg)	47.5
Weight Travel (kg)	47.5
Weight Tripod (kg)	12
Length Firing (m)	Number
Length Travel (m)	2.11
Height Firing (m)	Number
Height Travel (m)	0.80
Rifling	None
Feed	Breech load
Breech Mechanism Type	Interrupted Screw
Emplacement Time (min)	1
Fire from Inside Building	No

SIGHTS	SPECIFICATIONS
Name	2Ts35
Type	FCS
Sight Range Direct (m)	1000
Sight Range Indirect (m)	4500
Night Sights	2 gen II

AMMUNITION	SPECIFICATIONS
Caliber(mm), Type, Name	73mm, Tandem HEAT Grenade, PG-9VNT
Max Eff Range, Day (m)	1000
Max Eff Range, Night (m)	1000
Penetration (mm)	550, C
Penetration after ERA (mm)	400, C
Penetration Concrete (m)	1
Penetration Brick (m)	1
Penetration Earth (m)	1.8
Muzzle Velocity (m/s)	400
Length (mm)	INA
Weight (Kg)	INA
Caliber(mm), Type, Name	73mm, HEAT Grenade, PG-9VS
Max Eff Range, Day (m)	1300
Max Eff Range, Night (m)	1300
Penetration (mm)	400, C
Penetration after ERA (mm)	400, C
Penetration Concrete (m)	1
Penetration Brick (m)	1.5
Penetration Earth (m)	2
Muzzle Velocity (m/s)	435
Length (mm)	INA
Weight (Kg)	4.4
Caliber(mm), Type, Name	73mm, Frag HE Grenade, OG-9VM1
Max Eff Range, Day (m)	4500
Max Eff Range, Night (m)	1000
Casualty Radius (sq.m)	500
Muzzle Velocity (m/s)	INA
Length (mm)	INA
Weight (Kg)	5.3

Notes
OTHER AMMUNITION **SPG-9M CAN FIRE OLDER AMMUNITION FOR THE SPG-9. A ROCKET ASSIST CAN EXTEND FRAG-HE RANGE TO 6,000 M, BUT WITH INCREASED ERROR.** **VARIANTS** **SPG-9: OLDER VERSION, WITH EARLIER PGO-9 DAY SIGHT, 1 GEN II NIGHT SIGHT, AND OLDER AMMUNITION. THE SPG-9 CAN FIRE THE NEWER AMMUNITION WITHOUT OTHER IMPROVEMENTS.** **SPG-9D: AIRBORNE VERSION WITH DETACHABLE WHEELS** **SPG-9M IS EASILY MOUNTED ON VEHICLES SUCH AS APCS OR TACTICAL UTILITY VEHICLES USING A PINTLE MOUNT, AS AN IMPROVISED SP AT GUN.**
NOTES **THE SPG-9/9M IS A RECOILLESS, SMOOTH-BORE, SINGLE-SHOT ANTITANK WEAPON THAT FIRES BOTH ANTI-ARMOR AND ANTIPERSONNEL AMMUNITION.** **THE SPG-9M IS EQUIPPED WITH NIGHT SIGHTS. SEVERAL GENERATIONS OF NIGHT VISION EQUIPMENT (II AND IR) ARE AVAILABLE FOR THE SPG-9M AND THE OLDER SPG-9. THE GUN IS MAN-PORTABLE, BUT A TRUCK OR APC NORMALLY CARRIES IT. IT MUST BE DISMOUNTED AND PLACED ON ITS TRIPOD FOR FIRING. SEVERAL VARIANTS HAVE MOUNTED WHEELS.**

YUGOSLAV 82-MM RECOILLESS GUN M79



SYSTEM	SPECIFICATIONS
Alternative Designations	INA
Date, Country of Origin	1970, Yugoslavia
Proliferation	4 countries
Crew	4
Weight Firing (kg)	30
Length Travel (m)	1.79
Rifling	Yes
Feed	Breech load
Breech Mechanism Type	Horizontally Hinged
Emplacement Time (min)	1
Fire from Inside Building	No

SIGHTS	SPECIFICATIONS
Name	ON M72B
Type	Optical
Sight Range Direct (m)	1000
Sight Range Indirect (m)	2700
Night Sights	2 gen II

AMMUNITION	SPECIFICATIONS
Caliber(mm), Type, Name	82mm, HEAT, M79
Max Eff Range, Day (m)	670
Max Eff Range, Night (m)	670
Penetration (mm)	350, C
Penetration after ERA (mm)	INA
Penetration Concrete (m)	INA
Penetration Brick (m)	INA
Penetration Earth (m)	INA
Muzzle Velocity (m/s)	322
Length (mm)	INA
Weight (Kg)	4.87
Caliber(mm), Type, Name	82mm, HEAT, Type 65
Max Eff Range, Day (m)	670
Max Eff Range, Night (m)	670
Penetration (mm)	380, C
Penetration after ERA (mm)	INA
Penetration Concrete (m)	INA
Penetration Brick (m)	INA
Penetration Earth (m)	INA
Muzzle Velocity (m/s)	340
Length (mm)	INA
Weight (Kg)	INA
Caliber(mm), Type, Name	82mm, Frag HE, M81
Max Eff Range, Day (m)	1000
Max Eff Range, Indirect (m)	2700
Casualty Radius (sq.m)	INA
Muzzle Velocity (m/s)	320
Length (mm)	INA
Weight (Kg)	INA

NOTES
OTHER AMMUNITION OTHER AMMUNITION TYPES: O-881 HE, BK-881/BK-881M HEAT. VARIANTS B-10: RUSSIAN TOWED SYSTEM FROM WHICH THE M79 WAS DERIVED. TYPE 65: CHINESE VARIANT WEIGHS 28.2 KG (WITH TRIPOD BUT WITHOUT WHEELS). THE GUN USES THE TYPE 69 COMBINATION SIGHT AND FIRES A MIX OF AMMUNITION INCLUDING THE TYPE 65 HEAT ROUND. TYPE 65-1: CHINESE VARIANT WITH A TWO-PIECE GUN TUBE FOR LONG DISTANCE DISMOUNTED CARRY. ESTIMATED WEIGHT IS STILL 28.2 KG. BST: CROATIAN VERSION OF M79 USES THE CN-5 OPTICAL DAYSIGHT.

NOTES
THE M79 CAN BE OPERATED ON A PINTLE MOUNT.

RUSSIAN 82-MM RECOILLESS GUN B10



SYSTEM	SPECIFICATIONS
Alternative Designations	RG82
Date, Country of Origin	1950, RUC
Proliferation	At least 10 countries
Crew	4
Weight Firing (kg)	85.3
Weight Travel (kg)	85.3
Weight Tripod (kg)	6.5
Length Firing (m)	
Length Travel (m)	1.85
Width Travel (m)	
Height firing (m)	
Height Travel (m)	
Rifling	No
Feed	Breech Load
Breech Mechanism Type	Horizontally hinged
Emplacement Time (min)	0.5
Fire from Inside Building	No

SIGHTS	SPECIFICATIONS
Name	PBO-2 combination
Type	Optical, panoramic, iron
Sight Range Direct (m)	1000
Sight Range Indirect (m)	4500
Night Sights	PN 5x80 (J) II

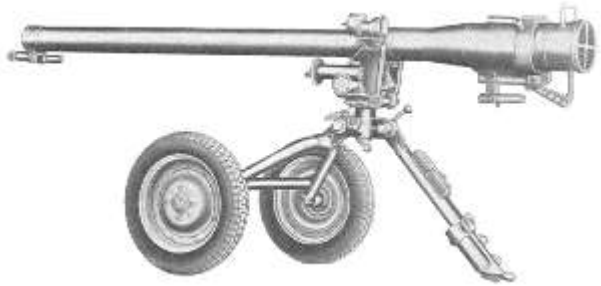
ARMAMENT	SPECIFICATIONS
Caliber(mm)	82
Rate of Fire (prac, cyclic)	7
Fire on Move	No
Elevation (deg min, max)	-20, +35
Traverse (deg)	360
AMMUNITION	**SPECIFICATIONS**
Caliber(mm), Type, Name	82, HEAT, BK881M
Max Aimed Range (m)	1000
Max Eff Range, Day (m)	400
Max Eff Range, Night (m)	
Penetration (mm)	240,C
Combat Load (ready, stow)	0, 12
Caliber(mm) Type, Name	82, HEAT, Type 65
Max Aimed Range (m)	
Max Eff Range Day(m)	450
Max Eff Range Night(m)	
Penetration (mm)	356, C
Combat Load (ready, stow)	0, 12
Caliber(mm) Type, Name	82, Frag-HE, O881A
Max Aimed Range (m)	1000
Max Eff Range Day(m)	4500
Max Eff Range Night(m)	
Penetration (mm)	
Combat Load (ready, stow)	0, 24

VARIANTS

Type 65: Chinese variant weighs only 28.2kg, includes combination sight and fires a mix of ammunition.
Tyoe 65-1: Chinese variant with a two-piece gun tube for long distance dismounted carry.
Type 78: Chinese upgrade with improved ammunition. Direct fire range for HEAT round is 500m, 445mm CE.
M79: Yugoslavian lightweight variant (WEG pg 2-45)

NOTES
THE B10 CAN BE MOUNTED ON A PINTLE, BUT IS NORMALLY TOWED ON A TWO-WHEELED CARRIAGE WITH AN UNDER SLUNG TRIPOD. THE GUN CAN BE FIRED WHILE ON TWO WHEELS OR ON THE TRIPOD.

FORMER YUGOSLAVIAN 82-MM RECOILLESS GUN M60



SYSTEM	SPECIFICATIONS
Alternative Designations	M60A
Date, Country of Origin	1965, FYR
Proliferation	At least 2 countries
Crew	7
Weight Firing (kg)	122
Weight Travel (kg)	122
Length Travel (m)	2.4
Width Travel (m)	1
Height Travel (m)	0.83
Rifling	Yes
Feed	Breech Load
Breech Mechanism Type	Vertically hinged w/ flanged rotate lock
Emplacement Time (min)	0.5
Fire from Inside Building	No

SIGHTS	SPECIFICATIONS
Type	Optical telescopic
Sight Range Direct (m)	1500

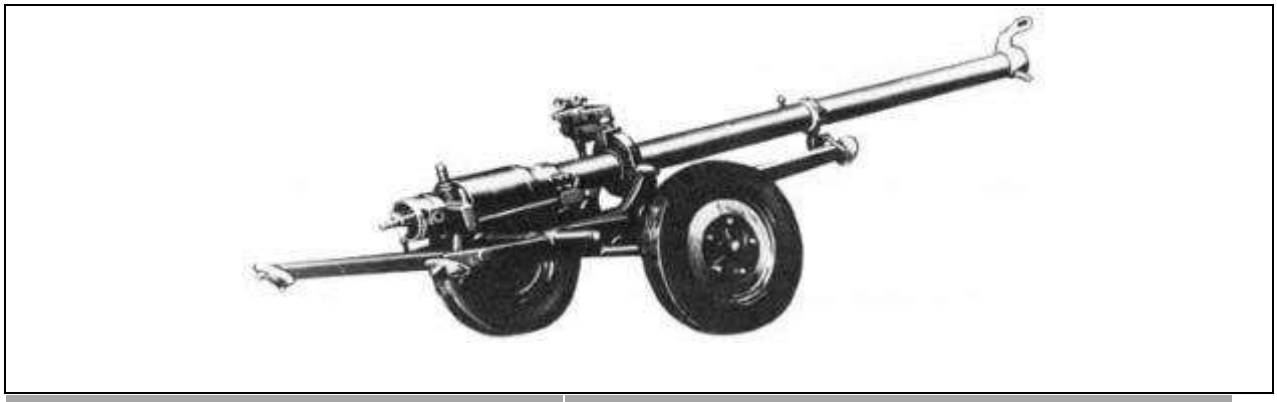
ARMAMENT	SPECIFICATIONS
Caliber(mm)	82
Rate of Fire (prac, cyclic)	4
Fire on Move	No
Elevation (deg min, max)	-20, +35
Traverse (deg)	360

AMMUNITION	SPECIFICATIONS
Caliber(mm), Type, Name	82, HEAT, M60
Max Aimed Range (m)	1500
Max Eff Range, Day (m)	500
Max Eff Range, Night (m)	
Penetration (mm)	200,C
Combat Load (ready, stow)	0, 36
Caliber(mm) Type, Name	82, Rocket Assisted HEAT, M72
Max Aimed Range (m)	1500
Max Eff Range Day(m)	1000
Max Eff Range Night(m)	
Penetration (mm)	220, C
Combat Load (ready, stow)	0, 36

NOTES

THE M60 IS MOUNTED ON A TWO-WHEELED CARRIAGE WITH A TRAILING LEG THAT IS USED AS A TRIPOD LEG FOR FIRING, AS WELL AS A TOW BAR. THE GUN CAN BE TOWED BEHIND A VARIETY OF VEHICLES AND THEN MOVED INTO POSITION BY HAND. GUN HEIGHT IS ADJUSTABLE BASED ON WHEEL AND LEG LOCK SETTINGS. THE M60 CAN ALSO BE MOUNTED ON A PINTLE, SUCH AS THE ANTITANK VERSION OF THE M60PB APC WHICH FEATURES TWO GUNS. BACK-BLAST SAFETY AREA IS 45M DEEP BY 25M WIDE.

RUSSIAN 107-MM RECOILLESS GUN B-11



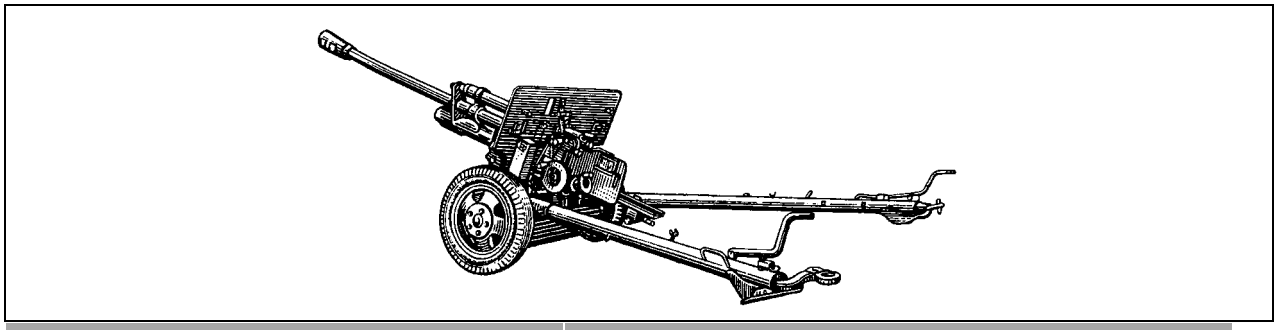
SYSTEM	SPECIFICATIONS
Alternative Designations	RG107
Date, Country of Origin	1950, RUS
Proliferation	At least 5 countries
Crew	5
Weight Firing (kg)	304.8
Weight Travel (kg)	304.8
Length Firing (m)	3.54
Length Travel (m)	3.56
Width Travel (m)	1.45
Height firing (m)	1.19
Height Travel (m)	0.9
Rifling	No
Feed	Breech Load
Breech Mechanism Type	Interrupted screw
Emplacement Time (min)	1
Fire from Inside Building	No
SIGHTS	**SPECIFICATIONS**
Name	PBO-4 combination
Type	Optical, panoramic, iron
Sight Range Direct (m)	1800
Sight Range Indirect (m)	6650
Night Sights	Available
FIRE CONTROL	**SPECIFICATIONS**
FCS Name	Text
Rangefinder	9S53 laser guidance
Infrared Searchlight	
Day Sight	OP4M-48A Direct Fire 5.5x
Field of View (deg)	11
Acquisition Range (m)	4000
Night Sight	1PN79
Field of View (deg)	
Acquisition Range (m)	3500

ARMAMENT	SPECIFICATIONS
Caliber(mm)	107
Rate of Fire (prac, cyclic)	
Fire on Move	No
Elevation (deg min, max)	-10, +45
Traverse (deg)	360
AMMUNITION	**SPECIFICATIONS**
Caliber(mm), Type, Name	107, HEAT, BK-883
Max Aimed Range (m)	1400
Max Eff Range, Day (m)	450
Max Eff Range, Night (m)	
Penetration (mm)	381,C
Combat Load (ready, stow)	0, 10
Caliber(mm) Type, Name	107, Frag HE, BK-883
Max Aimed Range (m)	1300
Max Eff Range Day(m)	
Max Eff Range Night(m)	
Penetration (mm)	
Combat Load (ready, stow)	0, 20

NOTES

THE B11 IS TOWED ON A TWO-WHEELED CARRIAGE WITH AN UNDER-SLUNG TRIPOD. THE GUN CAN BE FIRED WHILE ON TWO WHEELS, BUT DUE TO THE EFFECT OF RECOIL ON ACCURACY IT IS USUALLY FIRED FROM THE TRIPOD. IT CAN BE EASILY REPOSITIONED BY HAND.

RUSSIAN 76-MM TOWED ANTITANK GUN ZIS-3



SYSTEM	SPECIFICATIONS
Alternative Designations	M1942
Date, Country of Origin	1942, RUS
Proliferation	At least 14 countries
Crew	7
Weight Firing (kg)	1112
Weight Travel (kg)	2150
Length Travel (m)	6.10
Width Firing (m)	1.4
Height Travel (m)	1.3
Rifling	Yes
Feed	Manual
Breech Mechanism Type	
Emplacement Time (min)	
Fire from Inside Building	

SIGHTS	SPECIFICATIONS
Name	
Type	
Sight Range Direct (m)	
Sight Range Indirect (m)	
Night Sights	

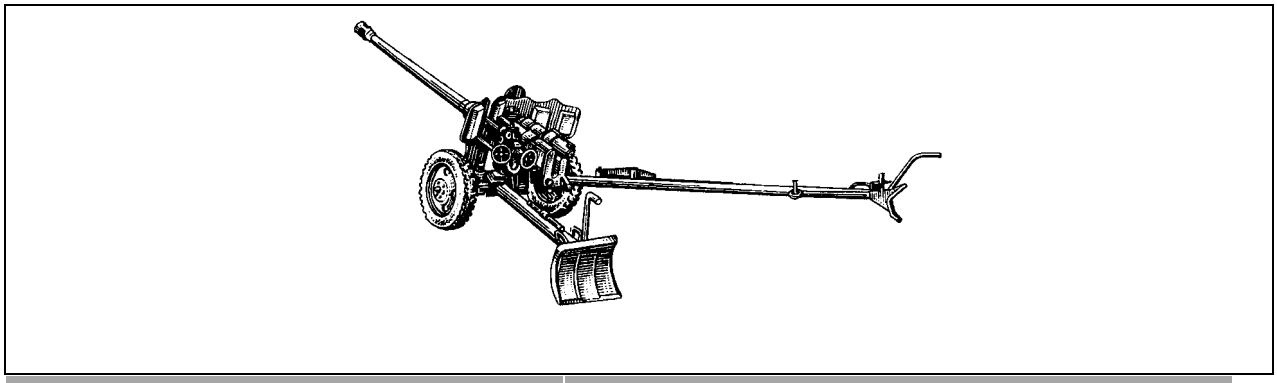
FIRE CONTROL	SPECIFICATIONS
FCS Name	
Infrared Searchlight	
Day Sight	
Field of View (deg)	
Acquisition Range (m)	
Night Sight	
Field of View (deg)	
Acquisition Range (m)	

ARMAMENT	SPECIFICATIONS
Caliber(mm)	76
Rate of Fire (prac, cyclic)	0, 25
Fire on Move	No
Elevation (deg min, max)	-5, +37
Traverse (deg)	54

AMMUNITION	SPECIFICATIONS
Caliber(mm), Type, Name	76, HVAP-T, BR-354P
Max Aimed Range (m)	
Max Eff Range, Day (m)	1000
Penetration (mm)	58, K
Caliber(mm), Type, Name	76, APC, BR-350B
Max Aimed Range (m)	
Max Eff Range, Day (m)	1000
Penetration (mm)	61, K
Caliber(mm), Type, Name	76, HEAT, BK-354M
Max Aimed Range (m)	1000
Max Eff Range, Day (m)	500
Penetration (mm)	280, C
Caliber(mm), Type, Name	76, Frag-HE, OF-350A
Max Aimed Range (m)	
Max Eff Range, Day (m)	
Max Eff Range, Night (m)	
Penetration (mm KE)	
Caliber(mm), Type, Name	76, Frag-HE
Max Aimed Range (m)	
Max Effective Range(m)	
Max Range(m)	1500

NOTES
ALTHOUGH THE ZIS-3 IS CATEGORIZED AS AN ANTITANK GUN, SOME OPFOR FORCES WILL EMPLOY IT FOR GENERAL SUPPORT, ESPECIALLY AGAINST LIGHT TARGETS. TYPICAL COMBAT LOAD IS BASED ON THE PRIME MOVER, AND A WIDE VARIETY OF SYSTEMS CAN BE USED AS PRIME MOVERS.

RUSSIAN 85-MM TOWED GUN D-44



SYSTEM	SPECIFICATIONS
Alternative Designations	M1945
Date, Country of Origin	1944, RUS
Proliferation	At least 16 counties
Crew	8
Weight Firing (kg)	1725
Length Travel (m)	8.34
Width Travel (m)	1.73
Height Travel (m)	1.42
Rifling	Yes or No
Feed	Text
Breech Mechanism Type	Text
Emplacement Time (min)	Number
Fire from Inside Building	Yes or No

SIGHTS	SPECIFICATIONS
Name	OP-2-7
Type	5.5 x magnification
Sight Range Direct (m)	1500

ARMAMENT	SPECIFICATIONS
Caliber(mm)	85
Rate of Fire (prac, cyclic)	8, 15
Fire on Move	No
Elevation (deg min, max)	-7, + 35
Traverse (deg)	54

AMMUNITION	SPECIFICATIONS
Caliber(mm), Type, Name	85, HVAP-T, BR365PK
Max Aimed Range (m)	1500
Max Eff Range, Day (m)	1150
Penetration (mm)	180, K
Combat Load (ready, stow)	0, 140
Caliber(mm) Type, Name	85, HEAT-FS, BK-2M
Max Aimed Range (m)	1500
Max Eff Range Day(m)	1500
Penetration (mm)	300, C
Caliber(mm), Type, Name	85, AP HE,
Max Aimed Range (m)	1500
Max Eff Range, Day (m)	950
Penetration (mm)	91, K
Caliber(mm), Type, Name	85, Frag-HE, O365K
Max Aimed Range (m)	1500
Max Eff Range, Day (m)	1500

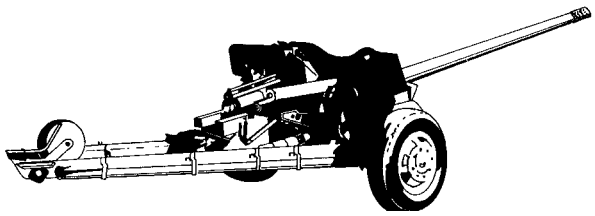
VARIANTS

D-44-N with II night sight

SD-44 Airborne version auxiliary propulsion unit which permits self-propulsion for short distances at speeds of up to 25 km/h on the road, 5.5 km/h off road.

NOTES
THE GUN IS VARIOUSLY REFERRED TO AS ARTILLERY, AS A FIELD GUN OR AS AN ANTITANK GUN. IT CAN BE USED FOR ALL ROLES OR SPECIFICALLY FOR ARTILLERY OR ANTITANK. TYPICAL COMBAT LOAD IS BASED ON THE PRIME MOVER, AND A WIDE VARIETY OF SYSTEMS CAN BE USED AS PRIME MOVERS.
SD-44 IS AN AIRBORNE VERSION WITH AUXILIARY PROPULSION UNIT WHICH PERMITS SELF PROPULSION FOR SHORT DISTANCES AT SPEEDS OF UP TO 25 KM/H ON THE ROAD.

RUSSIAN 100-MM TOWED ANTITANK GUN MT-12/MT-12R



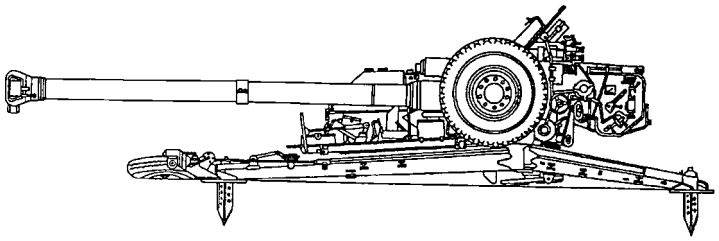
SYSTEM	SPECIFICATIONS
Alternative Designations	T-12A, 2A29/Rapira, MT12R
Date, Country of Origin	1972, RUS
Proliferation	At least 12 counties
Crew	6
Weight Firing (kg)	3050
Length Travel (m)	9.65
Width Travel (m)	2.3
Height Travel (m)	1.6
Rifling	No
Breech Mechanism Type	Semi-automatic
Emplacement Time (min)	2
Fire from Inside Building	Yes or No
SIGHTS	**SPECIFICATIONS**
Name	OP4M-40U
Sight Range Direct (m)	3000
Sight Range Indirect (m)	3000
Night Sights	APN6-40 II
FIRE CONTROL	**SPECIFICATIONS**
FCS Name	Text
Rangefinder	9S53 laser guidance
Day Sight	OP40M-40U Direct Fire 5.5x
Field of View (deg)	11
Acquisition Range (m)	3000
Night Sight	APN6-40 II
Field of View (deg)	7
Acquisition Range (m)	2000

ARMAMENT	SPECIFICATIONS
Caliber(mm)	100
Rate of Fire (prac, cyclic)	6, 15
Fire on Move	No
Elevation (deg min, max)	-7, + 20
AMMUNITION	**SPECIFICATIONS**
Caliber(mm), Type, Name	100, APFSDS-T, BM-412M
Max Aimed Range (m)	3000
Max Eff Range, Day (m)	2500
Max Eff Range, Night (m)	2500
Penetration (mm)	418, K
Combat Load (ready, stow)	0, 8
Caliber(mm) Type, Name	100, APFSDS-T, M1000
Max Aimed Range (m)	3000
Max Eff Range Day(m)	3000
Max Eff Range Night(m)	3000
Caliber(mm), Type, Name	100, HEAT, BK-17
Max Aimed Range (m)	3000
Max Eff Range, Day (m)	2500
Max Eff Range, Night (m)	2500
Penetration (mm)	380, C
Combat Load (ready, stow)	0, 4
Caliber(mm), Type, Name	100, Frag-HE, OF-15
Max Aimed Range (m)	3000
Max Eff Range, Day (m)	5500
Max Eff Range, Night (m)	3000
Combat Load 9ready, stow)	0, 4
Missile Type, Name	ATGM,AT-10 Kastet
Max Eff Range(m)	5000
Penetration (mm)	650, C
Warhead Type	Shaped Charge HEAT
Missile Type, Name	ATGM, AT-10B
Max Eff Range (m)	5500
Penetration (mm)	750, C
Warhead Type	Tandem Shaped Charge

VARIANTS
T-12: ORIGINAL VERSION, MT-12 HAS CHANGES IN CARRIAGE AND OBTURATOR, WHICH DO NOT AFFECT PERFORMANCE.
MT-12R: RUSSIAN UPGRADE WITH RADAR-DIRECTED FCS, FOR USE AT NIGHT AND ADVERSE WEATHER.
TOPAZ: FORMER YUGOSLAV VARIANT OF T-12 WITH THE 2A19M GUN MOUNTED ON A D-30 CARRIAGE.

NOTES
THE SERB ISKRA AT FCS-1 COMPUTERIZED LASER RANGEFINDER FCS IS OFFERED FOR SALE. RANGE FOR FCS-1 IS 0-3000M. RUSSIAN 2ND GEN II SIGHTS ARE ALSO AVAILABLE. THE DAY SIGHT CAN BE USED AT NIGHT IF THE TARGET IS ILLUMINATED. THERMAL SIGHTS ARE ALSO AVAILABLE UP TO 3500M.

RUSSIAN 125-MM TOWED ANTITANK GUN 2A45M



SYSTEM	SPECIFICATIONS
Alternative Designations	SPRUT-B
Date, Country of Origin	1980, RUS
Proliferation	At least 1 country
Crew	7
Weight Firing (kg)	6500
Weight Travel (kg)	Number
Weight Tripod (kg)	Number
Length Firing (m)	Number
Length Travel (m)	7.12
Width Travel (m)	2.3
Height Travel (m)	2.09
Rifling	No
Feed	Manual
Breech Mechanism Type	Text
Emplacement Time (min)	2

SIGHTS	SPECIFICATIONS
Name	PG-1M & 2Ts33
Type	Iron
Sight Range Direct (m)	2000
Sight Range Indirect (m)	

FIRE CONTROL	SPECIFICATIONS
FCS Name	Text
Rangefinder	9S53 laser guidance
Infrared Searchlight	
Day Sight	OP4M-48A Direct Fire 5.5x
Field of View (deg)	11
Acquisition Range (m)	4000
Night Sight	1PN53-1
Field of View (deg)	
Acquisition Range (m)	3500

ARMAMENT	SPECIFICATIONS
Caliber(mm)	125
Rate of Fire (prac, cyclic)	6, 8
Fire on Move	No
Elevation (deg min, max)	-6, + 25

AMMUNITION	SPECIFICATIONS
Caliber(mm), Type, Name	125, APFSDS-T, BM-42M
Max Aimed Range (m)	3000
Max Eff Range, Day (m)	3000
Max Eff Range, Night (m)	3000
Penetration (mm)	630, K
Combat Load (ready, stow)	6, 22
Caliber(mm) Type, Name	125, HEAT, BK27
Max Aimed Range (m)	4000
Max Eff Range Day(m)	4000
Max Eff Range Night(m)	3000
Penetration (mm)	800, C
Caliber(mm), Type, Name	125, HEAT-MP, BK29M
Max Aimed Range (m)	4000
Max Eff Range, Day (m)	4000
Max Eff Range, Night (m)	300
Penetration (mm)	750, C
Combat Load (ready, stow)	0, 4
Caliber(mm), Type, Name	125, Frag-HE-T, OF-26
Max Aimed Range (m)	5000
Max Eff Range, Day (m)	5000
Max Eff Range, Night (m)	3500
Combat Load 9ready, stow)	0, 20
Missile Type, Name	ATGM,AT-11B Invar
Max Eff Range(m)	5000
Penetration (mm)	900, C
Warhead Type	Tandem Shaped Charge

VARIANTS

T-12: Original version, MT-12 has changes in carriage and obturator, which do not affect performance.
MT-12R: Russian upgrade with radar-directed FCS, for use at night and adverse weather.
Topaz: Former Yugoslav variant of T-12 with the 2A19M gun mounted on a D-30 carriage.

NOTES

OTHER AMMUNITION TYPES ARE GIAT 125G1, BM42, BM32 APFSDS-T. THE RUSSIANS MAY HAVE A BM42M WITH A DU PENETRATOR. THE DAY SIGHT CAN BE USED AT NIGHT IF THE TARGET IS ILLUMINATED. THE SOKOL-1 GUIDED ANTITANK ROUND USES SEMI-ACIVE LASER-HOMING FOR A 5-KM EFFECTIVE RANGE. A LASER TARGET DESIGNATOR CAN BE POSITIONED NEXT OT THE GUN. THE DIRECT-FIRE ROUND CAN BE USED WITHOUT AN LTD UNDER SOME CIRCUMSTANCES. THE ROUND IS LESS EXPENSIVE THAN ATGMS AND OFFERS A FAST RESPONSE (1-5 SEC) TO DEFEAT TARGET VEHICLES BEFORE THEY CAN EMPLOY THEIR WEAPONS. WITH A HEAT WARHEAD AND 700MM PENETRATION, LETHALITY IS SUFFICIENT FOR A MOBILITY OR FIREPOWER KILL AGAINST TANKS AND A CATASTROPHIC KILL AGAINST OTHER TARGETS.

RUSSIAN 105-MM ANTITANK GRENADE LAUNCHER RPG-29 (MOUNTED)



RPG-29 Mounted with the 2Ts35 sight

SYSTEM	SPECIFICATIONS
Alternative Designations: Vampir. This is the pintle mount version of the launcher. When tripod-mounted version was first seen, and was known to be a replacement for SPG-9, it was incorrectly dubbed "SPG-10". For other versions, see Variants.	
Date, Country of Origin	A980s, RUS
Proliferation: At least 5 countries and several terrorist/insurgent groups. RPG-32/Hashim is currently produced for 2 countries. RPG-32 export negotiations are underway.	
Crew	2
Caliber (mm)	105, tube
Weight w/o sight (kg)	11.5 (launch tube, sight, and canister); 20 on the tripod
Length (transport) (mm)	1000 w/o rear section/canister
Length Firing (mm)	1850, with grenade canister attached
Life of Tube/barrel	300
Rate of Fire (rd/min)	4-6 est
Fire from Inside Building	INA
Max target speed (kn/h)	INA
Emplacement/displacement time (min)	<0.25

Deployment: The pintel permits the launcher to attach to a tripod ground mount or a vehicle mount. The RPG-29 Mounted breaks down into 3-4 parts for one soldier carry (launcher, grenade/ canister rear section, tripod, and perhaps, sight). It is ready to fire within a few seconds with quick connect couplings. A folding bipod on the canister can assist aiming during prone firing.

Fire means smoke and noise; but a low profile permits loading and firing while prone. Often it will be used in combined arms ambushes.

SIGHTS	SPECIFICATIONS
Name	Simrad IS2000 or similar EO sight for RPG-29 Mounted
Type	LRF-based FCS with ballistic computer
Magnification	1x/3.5x
Location	Left side
Sighting Range (m)	800
Type	3 gen II clip-on sight designed to work with day sight
Magnification	1x
Location	Left side
Sight Range (m)	600-800 for vehicle targets; 300+ man
Other sights	A variety can be used. 1st was the heavy 2Ts35 (3kg).

AMMUNITION	SPECIFICATIONS
Name	PG-29V (in canister/launch tube extension)
Caliber(mm), Type, Name	105, warhead
Effective Range (m)	800
Penetration (mm CE)	
Armor	750+ behind ERA, 950+ conventional
Other	1,500+concrete and brick, 2.000 brick, 3,000 earth
Complete Round Wt (kg)	6.7
Muzzle Velcoty (m/s)	280

VARIANTS

The RPG-29 comes in several versions.

RPG-29 Mounted: Mounted crew-served launcher variant, designed to replace SPG-9. It can fit on a vehicle with a pintle mount, or be dismounted to a tripod ground mount. The RPG-29 Mounted has a fire control system with an optical sight, laser rangefinder and ballistic data computer for increased range and precision. This increases the *effective range of the mounted system to 800 m* against a stationary target with a hit probability of 80%. The system can fire at all targets to maximum range (even moving, with reduced Ph). For Tier 1 and Tier 2 COE OPFOR, RPG-29 Mounted is the crew weapon in Weapons Squads and other supporting tactical units.

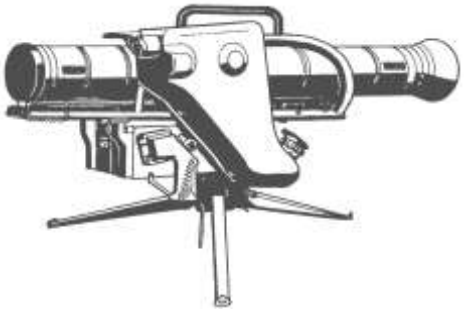
The shoulder launch version (RPG-29 - see photo and pg 2-37) has an optical sight similar to RPG-7V. The RPG-29 could become a standard squad ATGL for maneuver squads; but weight and large size are problems. The launcher, even stripped down for shoulder launch, is almost 2 m long and considered to be fairly burdensome and ungainly for use with infantry attempting to move in close quarters or dense cover, and set up quickly to fire.

RPG-32/Hashim: Russian Bazalt and Jordanian KADDB squad launcher (see RPG-29, pg 2-37). They jointly developed a lighter 105 mm shoulder

Name	KN250F or similar sight for RPG-29 Mounted	launcher, for infantry squad use. Loaded, it weighs 7 kg, with a length of 1.2 m. It can also launch a variety of smaller 72.5 mm grenades. There is also a vehicle remote weapons station with 7.62-mm MG, Hashim launcher, and thermal sight. An upgrade is due in 2010, to add "precision" for increased range and 80% P-hit

NOTES
RPG-29 MOUNTED, LIKE ITS PREDECESSOR, SPG-9, SERVES AS ALL-PURPOSE SMALL UNIT ARTILLERY - TO DELIVER SUPPORTING FIRES AGAISNT THE AMUT OF TARGETS (INCLUDING VEHICLES, PERSONNEL, BUILDINGS, AND ANY OTHER DIRECT-FIRE TARGETS WITHIN RANGE - INCLUDING HELICOPTERS).

EUROPEAN ATGM LAUNCHER MILAN/MILAN 3/MILAN ADT



MILAN 2

SYSTEM	SPECIFICATIONS
Alternative Designations	Missile d/Infantrie Leger Antichar
Date, Country of Origin	1985 MILAN 2/1996 MILAN 3 EUR
Proliferation	At least 43 countries MILAN/MILAN 2/MILAN 3
Crew	2, 3 with ammo bearer for second missile
Weight, excluding missile (kg)	16.5
Length Firing (m)	1.2 (missile canister)
Height Firing (m)	0.6
Width Firing (m)	0.42
Primary mount	Ground mount on tripod, including operator prone
Alternate Mounts	IFV, ATGM Launcher Vehicle, jeep, helicopter

FIRE CONTROL	SPECIFICATIONS
FCS Name	
Guidance	SACLOS
Command Link	Wire
Beacon Type	Pyrotechnic flare, MILAN 2/xenonbulb, MILAN 3
Tracker Type	IR, 2.2 µm/ 0.9 µm MILAN 3
Susceptible to countermeasures: Smoke, counter-fire, moving	
Counter-countermeasures: Encoded tracker, counters	
EOIRCM	
Rangefinder	INA
Sights w/ magnification	
Gunner, Day	INA, 7x
Field of View (deg)	4.3
Acquisition Range (m)	INA
Night Sight	MIRA Thermal sight available
Field of View (deg)	3 x 6

ARMAMENT	SPECIFICATIONS
Launcher	
Name	MILAN 2/MILAN 3
Launch method	Disposable launch canister
Elevation (deg min, max)	INA
Rate of launch (missiles/min)	2-3, depending n range
Reaction time (sec)	INA
Emplacement time (min)	INA
Displacement time (min)	INA
Ready/Stowed Missiles	
2-man crew (1 on launcher), 0 stowed	
3-man crew (1 on launcher), +1 ready, 0 stowed	

AMMUNITION	SPECIFICATIONS
Antitank Guided Missiles	
Name	MILAN
Max Range (m)	2000
Max Range(m)	25
Armor Penetration (mm CE)	600 (RHA)
Warhead Type	Shape Charge (HEAT)
Missile Diameter (mm)	Number
Missile Weight (kg)	6.7
Probability of hit (%)	>90
Time of flight to Max range (sec)	12.5
Average Velocity (m/s)	160
Name	MILAN 2
Max Range (m)	2000
Max Range(m)	25
Armor Penetration (mm CE)	800 (RHA)
Warhead Type	Tandem Shaped Charge
Missile Weight (kg)	6.7
Probability of hit (%)	>90
Time of flight to Max range (sec)	12.5
Average Velocity (m/s)	160
Name	MILAN 3
Max Range (m)	1920

Acquisition Range (m)	4000 detection/2000 recognition	Max Range(m)	20
		Armor Penetration (mm CE)	880 (RHA)
		Warhead Type	Tandem Shaped Charge with precursor charge
		Missile Weight (kg)	7.1
		Probability of hit (%)	>90
		Time of flight to Max range (sec)	12.5
		Average Velocity (m/s)	160
		Name	MILAN-ER (can be used on earlier launchers)
		Max Range (m)	3000
		Armor penetration (mm CE)	1100 beyond ERA 1300+ conventional armor

NOTES

ALTHOUGH THE LAUNCHER IS PORTABLE AND HAS BEEN LAELED MAN-PORTABLE, IT IS TOO HEAVY FOR ONE-MAN CARRY WITH MISSILE. A KIT IS AVAILABLE FOR RETROFIT TO EARLIER MILAN LAUNCHERS, TO PERMIT FIRING THE MILAN 3 ATGM USING EOIRCM (JAMMER COUNTERMEASURE).

FRENCH MAN-PORTABLE ATGM LAUNCHER ERYX



National War College photo

SYSTEM	SPECIFICATIONS
Alternative Designations	Anti-Char Courtee Portee (ACCP)
Date, Country of Origin	1991, FRA
Proliferation	At least 8 countries
Crew	1-3 depending on required load or vehicle available
Primary mount	Ground mount on tripod or shoulder launch
Alternate mounts	Shoulder-launch: standing, kneeling, or prone
Weight Excl. Missile (kg)	3 with II night sight
Weight Tripod (kg)	4 7.4 with tripod and Mirabel sight
Length Firing (m)	0.905
Height Firing (m)	INA
Width Firing (m)	INA tripod, 0.16 on shoulder
SIGHTS	**SPECIFICATIONS**
Name	Gunner
Type	Day, INA 3x
Field of view (deg)	3.4
Acquisition range (m)	INA
Night Sights	French Mirabel thermal sight
Field of view (deg)	INA
Acquisition range (m)	1000
FIRE CONTROL	**SPECIFICATIONS**
FCS Name	INA
Guidance	SACLOS
Command Link	Wire
Beacon Type	Infrared laser diode
Tracker Type	Charge couple device (CCD)
Susceptible to countermeasures	EO Jammers, smoke, counter-fire
Counter-countermeasures	Flight time less than 4 seconds

ARMAMENT	SPECIFICATIONS
Launcher	Eryx
Launch Method	Disposable launch canister
Rate of Launch (missiles/min)	1 est
Fire on Move	Yes or No
Elevation (deg)	INA, tripod; unlimited on shoulder launch
Reaction Time (sec)	20-30 (inc emplace time)
Emplacement time (min)	See reaction time
Displacement time (min)	<0.03
Ready/Stowed Missiles	1/0
AMMUNITION	**SPECIFICATIONS**
Missile Type, Name	Antitank Guided Missile, Eryx
Alternative Designations	ACCP
Max Range(m)	600
Minimum Range (m)	50
Probability of Hit (%)	90
Penetration (mm)	900
Warhead Type	Tandem Shaped Charge (HEAT) CE
Missile Diameter (mm)	136
Missile Weight (kg)	11 (in tube)
Average Velocity (m/s)	162

NOTES

THE DISPOSABLE CANISTER/LAUNCH TUBE IS ATTACHED TO THE REUSABLE FIRING POST (WHICH INCLUDES SIGHT SYSTEMS). ERYX EMPLOYS A RECOIL REDUCTIONS SYSTEM WITH REDUCED BACK-BLAST, WHICH PERMITS LAUNCH FROM INSIDE OF BUILDINGS. A REST SUCH AS A LEDGE OR SANDBAG IS REQUIRED FOR LAUNCHES BEYOND 350 METERS. SIGNATURE REDUCTION INCLUDES NOISE AND SMOKE REDUCTION. THE ORIGINAL SOPELEM OB50 II NIGHT SIGHT HAD A RANGE OF 600 M.

RUSSIAN ATGM LAUNCHER AT-3/MALYUTKA-2





SYSTEM	SPECIFICATIONS
Alternative Designations	Malyutka for missile and complex
Date, Country of Origin	1963, Russia
Proliferation	at least 45 countries
Crew	3
Weight Travel (kg)	30.5
Height Firing (m)	1.02
Emplacement Time (min)	1.7
Fire from Inside Building	No

FIRE CONTROL	SPECIFICATIONS
FCS Name	9S415/M/M1
Rangefinder	LRF
Infrared Searchlight	No
Day Sight	9Sh16, 8x
Field of View (deg)	22.5
Acquisition Range (m)	4000
Night Sight	Iskra TS-M Thermal
Field of View (deg)	INA
Acquisition Range (m)	3000

AMMUNITION	SPECIFICATIONS
Missile Type, Name	AT-3/3a/3b SAGGER
Max Aimed Range (m)	3000
Max Effective Range(m)	3000
Max Range(m)	3000
Minimum Range (m)	500
Penetration (mm)	400, C
Warhead Type	Shaped Charge (HEAT)
Missile Weight (kg)	10.9
Average Velocity (m/s)	115

AMMUNITION	SPECIFICATIONS
Missile Type, Name	AT-3c SAGGER
Max Aimed Range (m)	3000
Max Effective Range(m)	3000
Max Range(m)	3000
Minimum Range (m)	500
Penetration (mm)	520, C
Warhead Type	Shaped Charge (HEAT)
Missile Weight (kg)	11.4
Average Velocity (m/s)	115

AMMUNITION	SPECIFICATIONS
Missile Type, Name	Malyutka-2/AT-3e
Max Aimed Range (m)	3000
Max Effective Range(m)	3000
Max Range(m)	3000
Minimum Range (m)	500
Penetration (mm)	800, C
Warhead Type	Shaped Charge (HEAT)
Missile Weight (kg)	12.5
Average Velocity (m/s)	130

Notes

VARIANTS

COPIES INCLUDE NORTH KOREAN SUSONG-PO, TAIWANESE KUN WU, AND CHINESE RED ARROW-73/HJ-73. HJ-73B CHINESE UPGRADE WITH INDIGENOUS SACLOS GUIDANCE AND 500 MM PENETRATION.

I-RAAD: IRANIAN UPGRADE SACLOS-GUIDED WITH TANDEM WARHEAD.

MALYUTKA-2/-2M: UPGRADE MISSILES OFTEN LINKED TO OTHER UPGRADES.

9M14P1B1: SLOVENIAN MISSILE UPGRADE (NEW MOTOR AND PROPELLANT, LOWER SMOKE SIGNATURE, NOSE PROBE, AND 580 MM PENETRATION).

POLK: SLOVENIAN PORTABLE ANTI-ARMOR LAUNCHING SET INCLUDES NEW LAUNCHER, GUIDANCE PANEL WITH BINOCULAR SIGHT, AND 3 ATGMS.

MALYUTKA 2000: SWISS/BULGARIAN MISSILE DEFEATS 850 MM+ERA.

MALYUTKA M2T: ROMANIAN MISSILE WITH MILAN 2T WARHEAD. SIMILAR TO MILAN 3, IT DEFEATS IS 850 MM +ERA, TO 3,000M.

NOTES: AT-3 IS CLASSED BY WEIGHT AS PORTABLE (21+ KG WITH CREW CARRY), RATHER THAN MAN-PORTABLE (<21 KG). HOWEVER, WITH A 3-MAN CREW AND SEPARATED COMPONENTS, IT CAN BE CARRIED LIKE A MAN-PORTABLE SYSTEM. THE LAUNCHER IS ALSO A MISSILE CARRY CASE, WITH MISSILE BODY AND WARHEAD SEPARATED. THEY SNAP TOGETHER IN SECONDS. MISSILE UPGRADE TIME TO MALYUTKA 2 IS A FEW MINUTES. THE GUIDANCE PANEL CAN BE LOCATED UP TO 15 METERS FROM THE LAUNCHER, AND CAN CONTROL UP TO FOUR LAUNCHERS. IF TARGET IS <1,000 METERS FROM LAUNCHER, THE OPERATOR CAN JOYSTICK THE MISSILE TO TARGET WITHOUT USING OPTICS. BECAUSE THE MODULE IS SMALL AND CAN BE SHIFTED, ELEVATION AND FIELD OF VIEW ARE OPERATIONALLY UNLIMITED. IMPROVED VERSIONS CAN BE USED ON OLDER LAUNCHERS, BUT IN THE MCLOS MODE. ANY AT-3 CAN USE THE MALYUTKA-2M MISSILE OR BE UPGRADED TO IT WITH REPLACEMENT OF WARHEAD AND OR REPLACEMENT OF SPECIFIC WARHEAD AND MOTOR COMPONENTS.

RUSSIAN ATGM LAUNCHER 9P135 FOR AT-4/4B/5/5B



National War College Photo

SYSTEM	SPECIFICATIONS
Alternative Designations	9P135M/Fagot/Fagot-M
Date, Country of Origin	1973, Russia
Proliferation	at least 25 countries
Crew	3
Weight Travel (kg)	22.5
Length Firing (m)	1.3
Emplacement Time (min)	INA
Fire from Inside Building	No

FIRE CONTROL	SPECIFICATIONS
FCS Name	9S451M1
Guidance	SACLOS
Command Link	Wire
Day Sight	9Sh119M1, 4x
Field of View (deg)	4.5
Acquisition Range (m)	4000
Night Sight	1PN86/Mulat thermal
Field of View (deg)	INA
Acquisition Range (m)	3600

AMMUNITION	SPECIFICATIONS
Missile Type, Name	Konkurs M/AT5B SPANDREL-B
Max Aimed Range (m)	4000
Max Effective Range(m)	4000
Max Range(m)	4000
Minimum Range (m)	75
Penetration (mm)	925, C
Warhead Type	Shaped Charge (HEAT)
Time of Flight to max (sec)	19
Average Velocity (m/s)	208

AMMUNITION	SPECIFICATIONS
Missile Type, Name	Konkurs/AT5 SPANDREL –A
Max Aimed Range (m)	4000
Max Effective Range(m)	4000
Max Range(m)	4000
Minimum Range (m)	75
Penetration (mm)	650, C
Warhead Type	Shaped Charge (HEAT)
Time of Flight to max (sec)	20
Average Velocity (m/s)	200

AMMUNITION	SPECIFICATIONS
Missile Type, Name	AT4B/SPIGOT-B
Max Aimed Range (m)	2500
Max Effective Range(m)	2500
Max Range(m)	2500
Minimum Range (m)	70
Penetration (mm)	480, C
Warhead Type	Shaped Charge (HEAT)
Time of flight to max (sec)	14
Average Velocity (m/s)	180

Notes

VARIANTS
P135M3: KONKURS-M COMPLEX. LAUNCHER WITH 1PN65 THERMAL SIGHT AND AT-5B/KONKURS-M MISSILES. NIGHT RANGE IS 2,500M.
TOSAN-1: IRANIAN VARIANT OF AT-5.

NOTES
BECAUSE OF ITS WEIGHT, THE RUSSIANS CATEGORIZE THE AT-4/4B SYSTEM AS PORTABLE (21+ KG WITH CREW CARRY), RATHER THAN MAN-PORTABLE. FOR DISMOUNTED CARRY LOAD IS DIVIDED AMONG THREE PACKS. DUE TO THE GREATER WEIGHT, AT-5/-5B FITS INTO THE "HEAVY" CLASS (40+ KG), AND SHOULD ONLY BE CARRIED SHORT DISTANCES FROM VEHICLES (<500 METERS). TPVP/1PN65 THERMAL SIGHT IS AVAILABLE, WITH THE RANGE APPROXIMATELY 2,500 METERS (SEE VARIANTS, ABOVE). WEIGHT IS 13 KG. SLOVENIAN TS-F SIGHT HAS A 3,600-METER DETECTION RANGE.

RUSSIAN ATGM LAUNCHER AT-7/AT-13



Launcher with AT-7 Missile



Launcher with AT-13 missile and thermal sight

SYSTEM	SPECIFICATIONS
Alternative Designations	9P151 Firing Post
Date, Country of Origin	1978, RUS
Proliferation	At least 5 countries
Crew	2
Primary Mount	Ground mount on tripod
Weight Overall (kg)	10.2
Length Firing (m)	0.78 with AT-7/Metis 0.98 with AT-13/Metis-M
Height Firing (m)	0.72 with AT-7/Metis
Width in Overall Firing Position (m)	INA

FIRE CONTROL	SPECIFICATIONS
FCS Name	9S816 Guidance system
Guidance	SACLOS
Command Link	Wire
Beacon Type	INA
Tracker Type	IR
Susceptible to Countermeasures: EO jammers, smoke, counter-fire	
Counter-Countermeasures	AT-13 defeats EO jammers
Rangefinder	Available
Day Sight	INA
Field of View (deg)	INA
Acquisition Range (m)	INA
Night Sight: Russian 1PN86V/Mulat-115 thermal sight is available for launcher with detection at 3200 m and recognition beyond the missile's 1500 m range.	
Field of View (deg)	4.6

ARMAMENT	SPECIFICATIONS
Launcher	
Name	9P151 Firing Post
Launch Method	Disposable launch canister
Elevation (deg min, max)	-5, +10
Rate of Launch (missiles/min)	3-5 depending on range
Reaction Time (sec)	INA
Emplacement Time (min)	0.20
Displacement Time (min)	0.33

AMMUNITION	SPECIFICATIONS
Missile Type, Name	ATGM, AT-7/Saxhorn
Alternative Designation	Metis
Max Range(m)	1000
Minimum Range (m)	40
Armor Penetration (mm CE)	460
Warhead Type	Shaped Charge (HEAT)
Missile Weight (kg)	6.3 (in tube)
Probability of Hit (%)	90
Time of Flight to Max Range (sec)	6.2
Average Velocity (m/s)	180
Missile Type, Name	ATGM, AT-13
Alternative Designation	Metis-M (often mislabeled Metis-2)
Max Range(m)	1500
Minimum Range (m)	80
Penetration (mm CE)	1000/900 behind ERA
Warhead Type	Tandem Shaped Charge (HEAT)
Missile Weight (kg)	13.8 (in tube)
Probability of Hit (%)	90
Time of Flight to Max Range (sec)	8
Average Velocity (m/s)	287
Other Missiles	Metis-MHE thermobaric

Metis-MI: New Russian variant of AT-13,weighing 1 kg less, with 2000 m range

VARIANTS: Metis-M/AT-13: System with 9P151firing post adapted for and including the Metis-M missile, IOC 1992. The Mulat-115 thermal sight is likely to be used with the missile. This represents the Tier 3 OPFOR dismount ATGM system. The missile can be used on the AT-7 launcher, but cannot then defeat EO jammers.

Ready/Stowed Missiles **4/0 (1 on launcher)**

NOTES
THE RUSSIANS USED TO CHARACTERIZE THE AT-7 COMPLEX AS A MAN-PORTABLE (<21 KG), PERMITTING LONG-DISTANCE CARRY BY DISMOUNTED INFANTRY. HOWEVER, THE AT-13 MISSILE COMPLEX SLIGHTLY EXCEEDS 20 KG. WITH A 2-MAN CREW, IT IS CLOSE ENOUGH TO FIT INTO THE CATEGORY.
GUIDANCE ELEVATION HAS A 15 DEGREE SPAN. BECAUSE THE MODULE IS SMALL AND CAN BE QUICKLY CORRECTED BY SHIFTING, ELEVATION AND FIELD OF VIEW ARE OPERATIONALLY UNLIMITED, AND PERMIT USE AGAINST HOVERING OR STATIONARY HELICOPTERS.

RUSSIAN ATGM LAUNCHER KORNET-E AND KVARTET





SYSTEM	SPECIFICATIONS
Alternative Designations	AT-14, Kornet-LR/MR
Date, Country of Origin	1997, Russia
Proliferation	at least 3 countries
Crew	3
Weight Travel (kg)	30
Length Firing (m)	1.21
Emplacement Time (min)	1.0
Fire from Inside Building	No

FIRE CONTROL	SPECIFICATIONS
FCS Name	INA
Guidance	Laser Beam Rider
Command Link	N/A
Day Sight	1P45-1
Field of View (deg)	INA
Acquisition Range (m)	5000
Night Sight	1PN79/Metis-3 thermal
Field of View (deg)	INA
Acquisition Range (m)	5500

AMMUNITION	SPECIFICATIONS
Missile Type, Name	Kornet-LR
Max Aimed Range (m)	5000
Max Effective Range(m)	5000
Max Range(m)	5000
Minimum Range (m)	100
Penetration (mm)	1100, C
Warhead Type	Tandem Shaped Charge (HEAT)
Time of Flight to max (sec)	22
Average Velocity (m/s)	255

NOTES

VARIANTS

KORNET-E: EXPORT VERSION OF THE KORNET SYSTEM INCLUDES A LIGHT-WEIGHT LAUNCHER TRIPOD, THERMAL NIGHT SIGHT, AND KORNET-LR MISSILE.

A VERSION IS OFFERED FOR HOT CLIMATES.

9P163-1: PORTABLE LAUNCHER WITH KORNET -LR MISSILE. KBP SUGGESTS MOUNTING THE LAUNCHER ON TUVS AND OTHER VEHICLES. A REMOTE-OPERATED VERSION IS AVAILABLE.

KORNET-MR: MISSILE FOR A MAN-PORTABLE VERSION OF THE LAUNCHER. RANGE IS KM, WITH PENETRATION 1,000 MM. IT IS UNKNOWN IF THE MISSILE IS CURRENTLY FIELDED. SEE NOTES, BELOW.

KORNET-LR SELF-PROPELLED/9P162: ATGM LAUNCHER VEHICLE SYSTEM ON BMP-3 CHASSIS WITH TWIN LAUNCHERS (SEE PG 6-64).

KLIVER: IFV/FSV TURRET UPGRADE WITH KORNET (PG 3-47).

BMP-2M BEREZHOK: IFV UPGRADE WITH KORNET (PG 3-33).

KPB OFFERS THE KVARTET/9P163-2 OVERHEAD WEAPON STATION FOR MOUNT ON LIGHT VEHICLES (E.G., HMMWVS CURRENTLY IN UAE) AND VBL (AKA: VBL KVARTET, TIER 1 REPRESENTATIVE ATGM LAUNCHER VEHICLE). IT HAS A DUAL TWIN (4-TUBE) LAUNCHER AND CENTRAL MODULE WITH TV/FLIR SIGHTS.

OTHER MISSILES: KORNET-LR HE (THERMOBARIC, 9M133F)

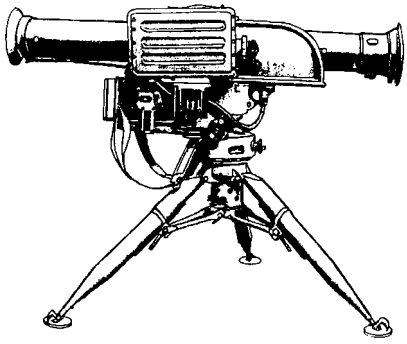
KORNET-MR TANDEM HEAT AND HE (THERMOBARIC)

KORNET-EM: NEW ATGM LAUNCHER VEHICLE IS BASED ON A RUSSIAN TIGR ARMORED 4X4 TACTICAL UTILITY VEHICLE. TWO 4-MISSILE MODULES JACK THRU THE ROOF. AN IR AUTO-TRACKER GIVES SIMULTANEOUS DUAL-LAUNCH LBR ACLOS GUIDANCE. THE NIGHT SIGHT IS 3RD GEN THERMAL, FOR A RANGE OF 5+ KM. KORNET-EM (KORNET-D) MISSILES RANGE 8 KM FOR HEAT, 10 FOR THERMOBARIC-HE. THE TANDEM HEAT DEFEATS 1,300 MM OF ARMOR. THE HE OFFERS A PROXIMITY FUZE FOR MULTI-ROLE USE (E.G., AGAINST HELICOPTERS).

NOTES

BY WEIGHT, KORNET-MR CAN BE BROKEN DOWN INTO A PORTABLE (30-50) 2-MAN SYSTEM, OR A MAN-PORTABLE SYSTEM WITH FEWER ACCESSORIES. KORNET-LR IS ONLY PORTABLE (SHORT-DISTANCE CARRY – SEE AT-3). MR AND LR KORNET MISSILES ARE INTERCHANGEABLE ON LAUNCHERS.

CHINESE ATGM LAUNCHER RED ARROW-8



Source (text)

SYSTEM	SPECIFICATIONS
Alternative Designations	Hongjian-8, RA-8, HJ-8
Date, Country of Origin	1986, CHI
Proliferation	At least 4 countries
Crew	4
Weight Firing (kg)	
Weight Travel (kg)	63
Weight Tripod (kg)	
Length Firing (m)	1.57
Length Travel (m)	
Height Firing (m)	
Height Travel (m)	
Rifling	
Feed	Disposable Launch Canister
Breech Mechanism Type	
Emplacement Time (min)	
Fire from Inside Building	

SIGHTS	SPECIFICATIONS
Name	Text
Type	Text
Sight Range Direct (m)	Number
Sight Range Indirect (m)	Number
Night Sights	Text

FIRE CONTROL	SPECIFICATIONS
FCS Name	Text
Main Gun Stabilization	Yes or No
Rangefinder	Text
Infrared Searchlight	Yes or No
Day Sight	12x Magnification
Field of View (deg)	
Acquisition Range (m)	
Night Sight	PTI-32
Field of View (deg)	Number
Acquisition Range (m)	2000

ARMAMENT	SPECIFICATIONS
Caliber(mm)	
Rate of Fire (prac, cyclic)	2, 3
Fire on Move	
Elevation (deg min, max)	-7, + 12
Traverse (deg)	

AMMUNITION	SPECIFICATIONS
Missile Type, Name	ATGM, Red Arrow-8A
Max Range(m)	3000
Minimum Range (m)	100
Penetration (mm)	800, C
Warhead Type	Shaped Charge HEAT
Missile Diameter (mm)	Number
Missile Weight (kg)	22.5
Total Weight (kg)	25.5
Average Velocity (m/s)	220
Missile Type, Name	ATGM, Red Arrow-8E
Max Range(m)	4000
Minimum Range (m)	100
Penetration (mm)	900, C
Warhead Type	Tandem Shaped Charge HEAT
Missile Diameter (mm)	
Missile Weight (kg)	22.5
Total Weight (kg)	24.5
Average Velocity (m/s)	210
Missile Type, Name	ATGM, Red Arrow-8F
Max Range(m)	4000
Minimum Range (m)	100
Penetration (mm)	1100, C
Warhead Type	Tandem Shaped Charge HEAT
Missile Diameter (mm)	
Missile Weight (kg)	
Total Weight (kg)	25
Average Velocity (m/s)	220

NOTES
THE ORIGINAL LAUNCHER IS TOO HEAVY TO BE CONSIDERED PORTABLE.
VARIANTS: RED ARROW 8L IS A COMPACT LIGHTWEIGHT (22.5 KG) LAUNCHER FOR MAN-PORTABLE USE. TRACKER SYSTEM USES AN ENCODED BEACON TO DEFEAT IR JAMMING. A PTI-32 THERMAL NIGHT SIGHT CAN BE USED. VEHICLE SINGLE TUBE LAUNCHERS ARE ON JEEPS, A MINIBUS, AND ON CHINESE APCS SUCH AS WZ-551 / TYPE 90. A 4-TUBE LAUNCHER TURRET IS USED ON MANY ATGM LAUNCHER VEHICLES, INCLUDING YW531, WZ-551, TYPE 89/ YW 534. HELICOPTER MOUNTS ARE WZ-9 AND Z-9G GUNSHIPS AND THE FRENCH ANTELOPE.
BAKTAR SHIKAN: PAKISTANI VARIANT, AKA GREEN ARROW. MISSILE DATA IS SIMILAR TO RED ARROW-8A. ONE VEHICLE MOUNT IS ON A LAND ROVER.
THERE MAY BE 8B AND 8C VERSIONS OF THE ATGM; HOWEVER, THE ABOVE ARE MORE LIKELY FOR ENCOUNTER. THE RED ARROW-8F HAS AN HE-THERMOBARIC WARHEAD OPTION. IT IS A MULTI-PURPOSE WARHEAD FOR BUNKERS, LAVS, DISMOUNTS ETC.

BRITISH AD/ANTI-ARMOR (HIGH VELOCITY) MISSILE SYSTEM STARSTREAK




Starstreak Lightweight Multiple Launcher

SYSTEM	SPECIFICATIONS
Alternative Designations	Man portable Shoulder- Launched (SL) Starstreak
Date, Country of Origin	1997, vehicle (SP HVM) 2000 man-portable (-SL)
Proliferation	2–6 countries
Crew	2 with a loader (1 possible)
Target	FW, heli, ground vehicles
ARMAMENT	**SPECIFICATIONS**
Launcher	
Name	Aiming unit
System Dimensions	See Missile
System weight (kg)	24.3 with missile
Reaction time (sec)	<6
Time between launches (sec)	<30
Reload time (sec)	<25 est
Fire on the move	Yes, in short halt
Missile	
Name	Starstreak
Range (m)	300-7000 max (guided)
Altitude (m)	0-5000
Dimensions (mm)	1400 length 127 diameter
Weight (kg)	14.0
Max missile speed (m/s)	1364, mach 4
Propulsion: Canister launch booster, bus missile, and 3 darts (sub-missiles)	
Flight time to max range (sec)	5-7
Guidance	Laser beam rider SACLOS
Warhead type	Three 25-mm darts- tungsten KE tip and case & HE fill
Penetrations (mm KE): 120+ all LAVs (equal to 3 x 40-mm APFSD-T rds) HE detonates after for frangible effects	
Fuze type	Contact with time delay
Probability of Hit (ph%)	60 FW, >95 heli (each dart 67% for heli)

FIRE CONTROL	SPECIFICATIONS
Sights w/ Magnification	
Day Sight	Avimo stabilized optical sight with lead bias system
Field of view (deg)	INA
Acquisition range (m)	7000+
Night Sight	Thales clip-on thermal sight
Acquisition Range (km)	4-5 est
Other Acquisition Aides:	
ADAD: British passive thermal IR scanners on remote tripod or vehicle mount with 240 degree FOV automatic cueing	
Missile team employs an azimuth plotting board (e.g. Russian 1L15-1) for direction of approach on aerial targets.	

VARIANTS	SPECIFICATIONS

The most common launcher used is–SL.

Starburst: Javelin SAM launcher adapted for Starstreak LBR guidance- in production

Lightweight Multiple Launcher (LML): Pedestal launcher for three missiles (above). The launcher can also mount on a light vehicle, e.g., TUV. A demonstrator is LML on a Panhard tactical truck.

Starstreak II: Improved launcher uses Starstreak or Starstreak II missile. It has an auto-tracker for hands-free guidance. It was fielded in 2010.

Starstreak Lightweight Vehicle (LWV): Land Rover truck converted into an SP SAM system with a 6-canister launcher, ADAD auto-tracker, and TV/ thermal FCS. This launcher can be mounted on other vehicles.

Armored Starstreak or (SP HVM): Vehicle is a Stormer tracked APC chassis, with an 8-missile launcher. The passive IR fire control system uses ADAD, an auto-tracker and thermal sight. The launcher can be mounted on other vehicles.

Seastreak: Single-stage missile naval variant in a 12-missile launcher, with mm-wave radar FCS.

Optional Use: As a low-cost air defense/anti-armor (multi-role) system, Starstreak can be employed against ground targets, such as light armored vehicles, and snipers in bunkers or buildings. The missile and its darts, with a unique combination of penetrator and following Frag-HE, have been successfully tested against vehicle targets. With a missile cost of 1/2 to 1/3 of competing MANPADS, the system could be used as

Self-destruct (sec) Yes, INA **Other Missiles** **Starstreak II: Improved missile has 8-km range and better precision. Fielded 2010** **Lightweight Multi-Role Missile/LMM: A multi-role missile options with a single 3-kg tandem (HEAT/HE) warhead and proximity fuze. At 13 kg, the lower-cost missile flies 8-km at 1.5 Mach. It was due in 2013 and was successfully launched by a Camcopter S-100 UCAV variant. Other projected upgrades are semi-active laser-homing and/or dual-mode (LBR/SAL-H).**	**a fire support asset to complement ATGM launchers and vehicle weapons.** **Thor: British Multi-Mission Air Defense System is a RWS, with 4 missile launchers, TV, FLIR, and an auto-tracker. Weighing .5 mt, it mounts on trucks, vans, TUVs, APCs, etc., with a remote operator. Designed for Starstreak, launchers, it can also mount other MANPADS, and ATGMs, such as Ingwe, TOW, HELLFIRE, Mokopa, Spike, etc.**

NOTES

GROUND-BASED AD SYSTEM OPTIMIZED FOR USE AGAINST ARMORED HELICOPTERS AND LOW FLYING FIXED-WING AIRCRAFT. MISSILE EMPLYS SMOKELESS PROPELLANT FOR MINIMAL DIGNATURE. FLIGHT TIME (5-8 SEC) AND LBR GUIDANCE MAKE IT ESSENTIALLY IMMUNE TO COUNTERMEASURES. BECAUSE OF THE HIGH VELOCITY, THE SYSTEM EXCEEDS THE HIT PROBABILITY OF COMETING SYSTEMS AGAISNT HIGH-SPEED AITCRAFT ON RECEDING FLIGHT PATHS.

THE STARTSTREAK'S LOWER COST AND CAPABILITIES AS A MULIT-ROLE MISSILE SYSTEM OFFERS VARIED USES. TWO CONSIDERATIONS ARE THE SEMI-AUTOMOATIC COMMAND LINE-OF-SIGHT (SACLOS) GUIDANCE AND CONTACT FUZES WHICH MAKE IT LESS EFFECTIVE AGAISNT AGILE FIXED-WING AIRCRAFT FROM SOME ASPECTS. THUS A MORE PRACTICAL COURSE WOLD BE TO REPLACE 33-50% OF THE MANPADS. WITH THE LOWER COST OF STARSTREAK AND ITS MULTI-OLE CAPABILITY, IT COULD REPLACE A PORTION OF THE EXPENSIVE SINGLE-ROLE MANPADS WITH STARSTREAKS, FOR INSTANCE, AN 18-MANPADS BATTERY COULD BE REDUCED 35%.

ISRAELI/EUROPEAN BLOS ATGM LAUNCHER SPIKE



SYSTEM	SPECIFICATIONS
Alternative Designations	To emphasize missile interchangeability using the launchers, Rafael changed missile names from Gill and Spike to Spike-MR and –LR. Later, Spike ER was fielded.
Date, Country of Origin	1997-98, Israel/Europe
Proliferation	At least 15 countries in Europe, Asia, Africa, and the Americas. It is being considered in 3 more.
Crew	2 with 2 ATGMs, 3 with 4 ATGMs
Weight Overall (kg)	13/26 with missile
Primary Mount	Tripod mount, sitting, crouching or prone
Alternate Mounts	IFV, APC, jeep, helicopter
Length Firing (m)	1.2 with missile canister
Height & Width Firing (m)	< 75 (est)
FIRE CONTROL	**SPECIFICATIONS**
FCS Name	INA
Guidance	Either for Spike-LR launcher, only IIR for Spike-MR. (1) IIR-homing Seeker (fire-and-forget, lock-on before launch)-all 3 (2) CCD/IIR fiber-optic guided (LOBL or command)-Spike-LR/ER Command Link: none for IIR-homing (1), Fiber-optic cable for (2) Susceptible To Countermeasures: Smoke and cover (IIR only)
Countermeasures:	-IIR seeker penetrates most smokes. -FOG allows varied controlled flight path. -IIR and CCD can be fuzed in dual mode to counter various CMs. -Spike-MR can launch from enclosed area and buildings -LR FOG can launch from cover, over-fly defilade/obscuration
Rangefinder	Not included but available
Sights w/ magnification	
Launcher:	Day, on Command Launch Unit (CCU)
Field of View (deg)	5 IIR, 10 CCD

ARMAMENT	SPECIFICATIONS
Launcher Name	Spike Command Launch Unit (CLU), for Spike-MR and –LR
Launch method	Disposable launch canister
Rate of launch (missiles/minute)	2-3 depending on range
Reaction time (sec)	1-2
Emplacement and Displacement Time (min)	<0.5
Reload Time (min)	<0.25
Ready/Stowed Missiles	2 for 2-man crew, 4 for 3-man crew
AMMUNITION	**SPECIFICATIONS**
Missile Name	Spike-MR (or Gill [“short Spike,” NT-G])
Max Range(m)	2500
Minimum Range (m)	200
Penetration (mm CE)	800 top-attack
Warhead Type	Tandem Chape Charge (HEAT)
Missile Weight (kg)	13; fills Spike-MR and -LR launchers
Probability of Hit (%)	95
Missile Name	Spike-LR (or Spike, NT-S)
Max Range(m)	4000
Minimum Range (m)	200
Penetration (mm CE)	800 top-attack
Warhead Type	Tandem Shape Charge (HEAT)
Missile Weight (kg)	13; will fit on all launchers
Probability of Hit (%)	95
Missile Name	Spike-ER (or Spike, Dandy, NT-D)
Max Range(m)	8000
Minimum Range (m)	200
Penetration (mm CE)	1000+top-attack
Warhead Type	Tandem Shape Charge (HEAT)
Missile Weight (kg)	32
Probability of Hit (%)	95
Other Missiles	HE version of each missile. A multi-role Penetrator Blast-

Acquisition Range (m)	2500 CCD/IIR, Spike-MR, -LR 4000 CCD/IIR FOG for -LR
Night Sight	Thermal sight, 3.5x and 10x (removable for easier carry)
Field of View (deg)	Wide and narrow
Acquisition Range (m)	3000

Frag (PBF) missile is offered for Spike-LR and otehrs

VARIANTS

Gill SF: Lightweight Gill missile/canister for Special Forces.

Spike 2.5: Variant which will be produced by Eurospike consortium, with 2.5 km max range for both modes and high CM resistance. This version has a European made missile launcher and FCS, and has been accepted for fielding in a European country.

A variety of vehicle launchers and turrets have been developed.

RCWS-30: Remote Controlled Weapon Station with a 30-mm gun, MG and twin Spike launcher. It is used on the Czech Pandur IIs.

Mangosta: Helicopter Spike missile launcher with Topaz EO sensor turret, currently marketed for sales in Latin America.

Mantis: Spike-LR 6-missile launcher currently mounted on a Marvin ATV, with thermal sight, GPS nav and LRF.

Spike ER/Spike-Extended Range/Dandy: Initially for helicopters (4-missile launcher), it can be used on other launchers. A single-tube launcher can be mounted on light vehicles. The Light Combat Vehicle (LCV) remote launcher holds 2 missiles. The missile can launch in FOG mode and switch to IIR-homing for precise impact.

NOTES

USE AN EQUAL MIX OF -MR AND -LR. FOG-M GUIDANCE FITS THE CATEGORY BEYOND-LINE-OF-SIGHT (BLOS), BECAUSE IT CAN LAUNCH FROM COVER AND HIT TARGETS BEHIND COVER. MISSILE HAS A DIVE OR TOP-ATTACK MANEUVER FOR HIGH ARMOR PENETRATION. LOFTED FLIGHT PATH PERMITS USE AGAINST HELICOPTERS.

THE WEIGHT (26 KG) FITS CATEGORIZATION PORTABLE, AND IS QUITE MAN-PORTABLE WITH A 2-3 MAN TEAM

SOUTH AFRICAN NLOS ATGM LAUNCHER SYSTEM MOKOPA





SYSTEM	SPECIFICATIONS
Alternative Designations	ZT-6, Black Mamba
Date, Country of Origin	1990, ZAF
Proliferation	Vehicle fielded in 3 countries.
Crew	3
Platform	Ratel IFV
Combat Weight (mt)	18.5
Length (m)	7.21
Height (m)	2.92
Width (m)	2.52
Ground Pressure (kg/cm^2)	INA
Drive Formula	6x6
AUTOMOTIVE	**SPECIFICATIONS**
Engine Type	282-hp Diesel
Cruising Range (km)	1000
Max On-Road (km/h)	105
Max Off-Road (km/h)	30
Max Cross-Country (km/h)	30
Max Swim (km/h)	4
Fording Depth (m), note	1.2
PROTECTION	**SPECIFICATIONS**
Radio	INA
Armor, Turret Front (mm):	20
NBC Protection System	None
Smoke Equipment	4 smoke grenade launchers
FIRE CONTROL	**SPECIFICATIONS**
FCS Name	INA
Beacon or Tracker Type	None needed w/seeker
Rangefinder	Laser
Day Sight	TV guidance
Acquisition Range (m)	10000
Night Sight	Thermal night sight
Acquisition Range (m)	5000
ATGM Guidance	SACLOS
ATGM Command Link	Semi-active laser homing (SAL), digital autopilot

ARMAMENT	SPECIFICATIONS
Caliber(mm), Type, Name	ATGM, Mokopa
Rate of Fire (prac, cyclic)	1, 2
Fire on Move	No
AMMUNITION	**SPECIFICATIONS**
Missile Type, Name	ATGM, Mokopa
Max Range(m)	10,000
Minimum Range (m)	500
Penetration (mm KE)	1400
Warhead Type	Tandem Shaped Charge (HEAT)
Missile Weight (kg)	52

VARIANTS

Swift/ZT-5 and Ingwe/ZT-35 ATGM launcher vehicles launch indigenous ATGMs with similar guidance.

Ratel Mk1, 2, and 3 variants include fire support vehicle with 90-mm gun, 81-mm mortar carrier, command vehicle, IFV with 60-mm mortar, armored maintenance vehicle, logistics vehicle.

Mokopa is a variant of the US Hellfire/Hellfire II developed initially for helicopter launch from Rooivalk. The system can also launch British Brimstone ATGMs. An upgraded Mi-24/35 HIND package includes Mokopa.

Mokopa LUV (Light Utility Vehicle) turret system: A remote weapon station to fit on vehicle flat beds, with 4 Mokopa launchers.

Thor: The light turret (pg 6-23) can launch a SAL missile, e.g., Hellfire or the Mokopa variant, and use a remote laser designator from a UAV, helicopter, vehicle or dismount to guide it to target

NOTES
THE SYSTEM REPRESENTS NIMROD, SHIN-JUMAT, HERMES, AND OTHER NLOS ATGM LAUNCHER SYSTEMS. DEVELOPERS NOTED THAT MOKOPA WILL FIT VARIOUS MODULAR LAUNCH APPLICATIONS, AND CAN BE MOUNTED ON A GROUND LAUNCHER (TRUCK, LAV OR TACTICAL UTILITY VEHICLE CHASSIS), AND ON NAVAL VESSELS. SINCE CURRENT SOUTH AFRICAN SWIFT (ZT-3) AND INGWE (ZT-35) ATGM LAUNCHER VEHICLES ARE BASED ON THE ROBUST RATEL IFV CHASSIS, WE SELECTED THAT CHASSIS AS A CANDIDATE FOR THE MOKOPA SYSTEM.

Dec
2015

Worldwide Equipment Guide

Chapter 6: Artillery Systems



TRADOC G-2 ACE–Threats Integration
Ft. Leavenworth, KS

Distribution Statement: Approved for public release; distribution is unlimited.

Chapter 6: Artillery

This chapter provides the basic characteristics of selected artillery weapon systems, artillery reconnaissance, and artillery command and control (C2) systems in use or readily available to the OPFOR. Therefore, systems discussed in this chapter are those likely to be encountered by U.S. forces in varying levels of conflict. The selection of artillery systems is not intended to be all-inclusive, rather a representative sampling of weapons and equipment supporting various military capabilities.

This update is divided into the following categories—artillery command and reconnaissance, towed cannon, self-propelled cannon, multiple-rocket launchers, mortars and combination guns, and artillery ammunition.

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Artillery Weapons: Rocket Launchers

Compared to cannon, rocket launchers (RLs) are relatively uncomplicated, easy to operate and maintain, and are highly mobile. Single-tube RLs vary from 107 mm (Type 85) to 544 mm (Luna-M/FROG-7). Single-tube RLs of 122-mm or less are man-portable for use by dismounted troops.

The majority of RLs are multiple rocket launchers (MRLs). The OPFOR categorizes MRLs as medium-caliber (100 – 220 mm), and large-caliber (220 mm and larger). The OPFOR uses MRLs to deliver heavy fire on important targets at decisive moments in a battle. They offer an economical means to deliver massive, destructive fires on an area-type target in a very short period of time. The principal disadvantage of some MRLs is that excessive dispersion does not permit direct, close support to maneuver elements. For sudden massive strikes, MRLs may execute salvo fire from the launchers. These flexible assets may fire as battery and battalion groups or as platoons or autonomous weapons. MRLs can provide the initial area coverage fires, while cannons and mortars either maintain fire at a steady volume or attack high-value point targets. MRLs are also excellent weapons for counter-battery fire, especially when the enemy uses large-area dispersion for survivability.

The MRL is an excellent area coverage weapon, and its rapid ripple fire is an excellent delivery system for high-explosive (HE), volumetric explosive (VEX), and smoke projectiles; chemical agents; and submunitions. The OPFOR often dedicates some MRLs with scatterable mines to lay on-demand mine fields. Improved munitions, e.g., guided projectiles enable MRLs to fire multiple salvos strikes from autonomous platoons or launchers, with lethal results against point targets or small target nodes.

CHINESE 107-MM MULTIPLE ROCKET LAUNCHER TYPE 63



Type 63 launcher



Improvised launcher



Iranian two launcher configuration



Type 81Chinese SP MRL. National War College Photo

SYSTEM	VARIANTS
Alternative Designations: Also called BM-1, Haseb (IR)	A variety of variants have been produced by various countries. The rockets have been used as improvised weapons, including propellant motors attached to larger munitions, to form improvised rocket assisted munitions (IRAMs), aka: "flying IEDs". Local versions of launchers and rocket models differ. Pack version for airborne troops (281kg) can be dismantled for manpack loads.
Date of Introduction: IOC 1963	
Proliferation: At least 20 countries. Iran, Turkey, and North Korea also produce launchers and rockets	
Description:	
Crew: 5 (includes ammunition bearers)	
Combat Weight (kg): 602 loaded; 376 unloaded	
Length (m): 2.9	MAIN ARMAMENT AMMUNITION
Width (m): 1.65	Caliber, Type, Name:
Height (m): 0.91	107-mm Frag-HE, Type 63 spin-stabilized rocket, original rocket
Emplacement and Displacement Times (min): 0.5	Indirect Fire Maximum Range (m): 8,000
ARMAMENT	Warhead Weight (kg): 18.8
Launcher:	Rocket Length (m): 0.84
Caliber, Type, Name: 107-mm, Towed, Type 63	Maximum Velocity (m/s): 372
Number of Tubes: 12	Fuze Type: PD
Launch Rate: 12 rockets in 7-8 sec (<1 sec per rocket) max rate	Effects: 1,600 steel balls
Loader Type: Manual	
Reload Time: 3 min	107-mm, Controlled Frag-HE, Type 63 II SS rocket (widely fielded)
Traverse (°): 32 without moving carriage, 360 for single salvo	
Left and Right: 16	Indirect Fire Maximum Range (m): 8,500

Elevation (°): +3/+57°	Warhead Weight (kg): 18.84
FIRE CONTROL	Effects: Lethal radius 18.5 m with 1,214 fragments
Indirect Fire: Optical Sight, MS-2 or similar	
	107-mm HE Incendiary, White Phosphorus, Type 63 SS rocket
	Indirect Fire Maximum Range (m): 8,500
	Warhead Weight (kg): 18.74
	Effects: Lethal radius 21 m and 1,600 fragments
	107-mm Type 81 DP, DPICM rocket (Chinese)
	Indirect Fire Maximum Range (m): 8,000
	Warhead Weight (kg): 8.4
	Effects: Submunitions with HE effects and 80-mm penetration
	Other Ammunition Types:
	Jammer round: Duration 15 min, range 7,800 m
	T-107: Turkish rocket to 11+ km. TRB-107 has steel balls, prox fuze
	Type 63 III SS: Frag-HE to 10 km with electronic fuze option

NOTES
THE MRL HAS BEEN MOUNTED ON A VARIETY OF VEHICLES. THE TYPE 81 MOUNTS THE LAUNCHER ON A SHORT BED. NORTH KOREA HAS SEVERAL VERSIONS WITH ONE, TWO, OR THREE LAUNCHERS MOUNTED AT THE REAR OF VTT TRACKED APC CHASSIS. IRAN MOUNTS THE LAUNCHER ON A 4X4 TACTICAL UTILITY VEHICLE.

RUSSIAN 122-MM MULTIPLE ROCKET LAUNCHER 9A51/PRIMA



SYSTEM	VARIANTS
Alternative Designations: 9A51	None
Date of Introduction: 1988	
Proliferation: At least 2 countries	
Description:	
Crew: 3	
Chassis/Carriage: Ural 4320 6x6 wheeled	
Combat Weight (mt): 13.9	
Chassis Length Overall (m): 7.35	MAIN ARMAMENT AMMUNITION
Width (m): 2.50	Caliber, Type, Name:
Height (m): 2.50	122-mm Frag-HE, 9M53F
	Indirect Fire Range (m):
AUTOMOTIVE PERFORMANCE	Minimum Range: 5000
Engine Type: KAMAZ-740, 210 hp, diesel engine	Maximum Range: 20,500
Cruising Range (km): 990	Warhead Weight (kg): 26
Speed (km/h):	Rocket Length (m): 3.03
Max Road: 85	Maximum Velocity (m/s): INA
Max Off-Road: 40	Fuze Type: Proximity
Cross-Country: INA	
Max Swim: N/A	Other Ammunition Types: All standard 122-mm rockets, as well as Prima rocket
Fording Depths (m): 1.5	
Emplacement Time (min): 3	
Displacement Time (min): 3	
Radio: R-173M FM-VHF	
Protection:	
Armor, Front (mm): None	
Armor Side (mm): None	
Armor Roof (mm): None	
Self-Entrenching Blade: No	
NBC Protection System: No	
Smoke Equipment: No	
ARMAMENT	
Launcher:	
Caliber, Type, Name: 122-mm, Prima	
Number of Tubes: 50	
Launch Rate:	
Full Salvo Time: 50 rounds in 30 seconds	
Single Rocket Interval: 0.6 seconds per rocket (est)	
Loader Type: Transloader, crane hoist	
Reload Time: 10 min	

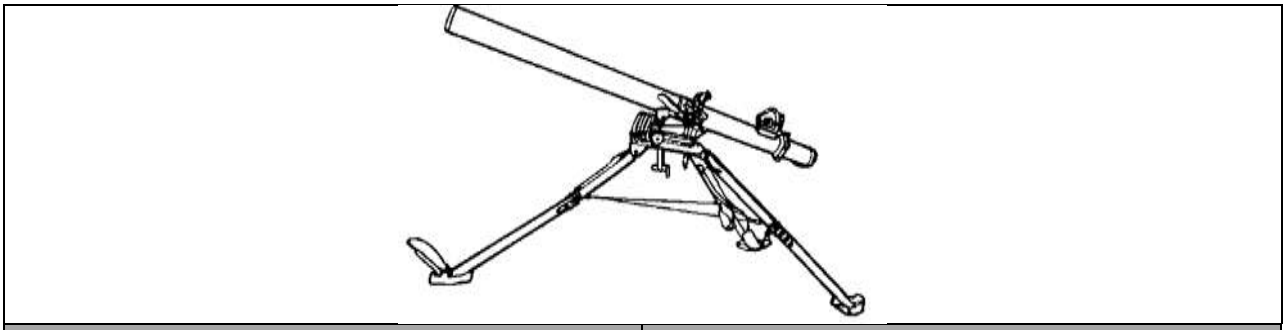
Traverse (°):	
Left: 58	
Right: 58	
Total: 116	
Elevation (°): -0/+55°	
FIRE CONTROL	
Indirect Fire: PG-1M Panoramic Telescope (PANTEL)	
Collimator: K-1	
Fire Control Computer: None	
Position Location System: None	

NOTES

THE 9A51 PRIMA LAUNCHER ASSEMBLY INCORPORATES 50 LAUNCH TUBES, A THERMAL SHROUD, AND A REMOTE ELECTRONIC FUZE SETTER. THE REMOTE FUZE SETTER INCREASES THE EASE WITH WHICH THE CREW CAN ADJUST TO CHANGING TARGET SITUATIONS. SMALL BOXES ON THE UPPER RIGHT SURFACE OF THE EXIT END OF THE LAUNCHER TUBE CONTAIN THE FUZE SETTER FOR EACH ROCKET. THE LAUNCH TUBES ARE ARRAYED FROM TOP TO BOTTOM: 11-11-11-10-7. A 51ST TUBE IN THE CENTER OF THE FOURTH ROW IS BLOCKED AND USED FOR ELECTRONICS. THE ELEVATING ARMS ARE MOUNTED IN THE CENTER OF THE BOTTOM ROW (LIKE THE 9P138) IN ORDER TO REDUCE THE HEIGHT OF THE SYSTEM. THE 9A51 PRIMA IS CAPABLE OF FIRING OLDER 122-MM ROCKETS AS WELL AS THE NEWER 122-MM ROCKETS. THE NEW ROCKETS ARE EQUIPPED WITH A SEPARATING, PARACHUTE-RETARDED WARHEAD THAT HAS MORE LETHALITY. THE LAUNCHER VEHICLE AND THE 9T232M AMMUNITION RESUPPLY VEHICLE CONSTITUTE THE 9K59 ROCKET COMPLEX.

BOTH THE 9A51 PRIMA AND THE 9T232M AMMUNITION RESUPPLY VEHICLE ARE BASED ON THE SAME URAL-4320 5-TON, 6X6 TRUCK USED FOR THE BM-21-1. THE 9A51 PRIMA IS EQUIPPED WITH MANUALLY EMPLACED HYDRAULIC FIRING JACKS TO ENHANCE FIRING STABILITY. THE 9T232M AMMUNITION RESUPPLY VEHICLE CARRIES 50 ROCKETS ARRANGED IN RACKS ON THE VEHICLE'S REAR DECK. THE CREW MANUALLY RELOADS THE LAUNCHER. THE 9A51 PRIMA IS CAPABLE (UNDER OPTIMUM CONDITIONS) OF FIRING A 50-ROCKET SALVO THAT COVERS AN AREA OF 190,000M^2.

RUSSIAN 122-MM 1- ROUND ROCKET LAUNCHER 9P132



SYSTEM	VARIANTS
Alternative Designations: DKZ-66, BM-21P, Grad-1P, 9K510	None
Date of Introduction: Mid to late 1960s	
Proliferation: At least 5 countries	MAIN ARMAMENT AMMUNITION
Description:	Caliber, Type, Name:
Crew: 4-5 (includes ammunition bearers)	122-mm Frag-HE, 9M22M
Combat Weight (kg): 101 loaded; 55 unloaded	Indirect Fire Range (m):
Length (m): 2.5	Minimum Range: 3,000
Width (m): 1.53	Maximum Range: 10,800
Height (m): 1.0	Warhead Weight (kg): 19.4
Emplacement Times (min): 2.5	Rocket Length (m): 1.90
Displacement Times (min): 2.0	Maximum Velocity (m/s): 450
Radio: R-107M	Fuze Type: PD
ARMAMENT	
Launcher:	122-mm Illuminating Rocket Projectile, 9M42
Caliber, Type, Name: 122-mm, 9P123	Indirect Fire Range (m):
Number of Tubes: 1	Minimum Range: 1,000
Launch Rate: 1 round per minute	Maximum Range: 5,000
Loader Type: Manual	Warhead Weight (kg): 27
Reload Time: .67 min (approximately 40 seconds)	Rocket Length (m): 1.90
Traverse (°):	Maximum Velocity (m/s): INA
Left, Right, and Total: 7, 7, and 14	Fuze Type: INA
Elevation (°) (-/+): B +10/+40°	
FIRE CONTROL	Other Ammunition Types: Smoke
Indirect Fire: PG-1M Panoramic Telescope (PANTEL)	
Collimator: K-1	

NOTES

THE 9P132 IS A LIGHTWEIGHT, MAN-PORTABLE ROCKET LAUNCHER USED BY GUERRILLA, SPECIAL PURPOSE FORCES, OR OTHER LIGHT FORCES. THE 9P132 IS ONLY EFFECTIVE AS A HARASSMENT OR INTERDICTION WEAPON. WHEN USED TO FIRE A NEW ILLUMINATION ROCKET (9M42) THE SYSTEM HAS BEEN REFERRED TO AS THE 9K510. THE 9P132 IS BROKEN DOWN FOR MANPACK TRANSPORT INTO TWO ONE-MAN LOADS – THE TUBE (27 KG) AND THE TRIPOD SIGHT ASSEMBLY WITH A REMOTE FIRING DEVICE (27 TO 28 KG). THE TRIPOD LEGS ALSO FOLD FOR EASE OF HANDLING. EACH 9M22M ROCKET IS BROKEN DOWN INTO TWO ONE-MAN LOADS FOR TRANSPORT. IT TAKES APPROXIMATELY 2 MINUTES FOR ASSEMBLY OF THE ROCKET. WHEN ASSEMBLED, THE LAUNCHER HAS THREE COURSE ELEVATION POSITIONS, WITH THE FINAL ELEVATION SET BY MEANS OF AN ELEVATION SCREW. THE CREW USES AN ELECTRICAL REMOTE CONTROL WITH AN ELECTRICAL IMPULSE GENERATOR AND BATTERY TO FIRE THE LAUNCHER. THE 9P132 IS INCAPABLE OF FIRING THE 9 FOOT VERSION ROCKETS OF THE BM-21 AND SIMILAR 122-MM SYSTEMS.

RUSSIAN 122-MM MULTIPLE ROCKET LAUNCHER BM-21



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SYSTEM	VARIANTS
Alternative Designations: BM-21 GRAD (Hail) MRL	BM-21-1: Upgrade on more mobile URAL-4320 chassis
Date of Introduction: 1963	BM-21V: Russian 12-tube version for airborne divisions
Proliferation: At least 50 countries	BM-21B/Grad-1: Russian 36-tube MRL on a 6x6 ZIL-131 chassis
Description:	
Crew: 5 (8 with 9K51 Complex)	Grad-P: Russian 1 round rocket launcher
Chassis/Carriage: Ural 375-D 6x6 wheeled	BM-11: North Korean 30-tube version
Combat Weight (mt): 13.7	BM-21K: Ukrainian upgrade on KrAZ-260 truck with onboard nav, FCS and thermal shield. Its (40) 40-km rockets can launch in 20 sec
Chassis Length Overall (m): 7.35	
Width (m): 2.40	
Height (m): 3.09	RM-70: Czechoslovakian 40-tube version with onboard reload
	Firos 25/30: Italian commercial MRL ranges 34 km; may fire Grad
AUTOMOTIVE PERFORMANCE	
Engine Type: URAL-375D, 180 hp water-cooled, V-8 gasoline engine	Sakr: Egyptian 40- tube MRL with 18/36/45-km rockets
Cruising Range (km): 450	Type 81: Chinese BM-21 copy. Type 85 has 40rocket auto-reload
Speed (km/h):	PHZ 89: Chinese tracked 80-rocket MRL with auto-reload
Max Road: 75	Type 90: Chinese MRL with automated FCS. Type 90A has GPS
Max Off-Road: 35	T-122 Sakarya: Turkish indigenous launcher and 40km rockets
Cross-Country: INA	GRADLAR: Israeli upgrade package with improved FCS. Converts MRLs to launch modules of 122-mm Grad or LAR rockets to 45 km. Romanian converted APR-21 MRLs are called LAROM
Max Swim: N/A	
Fording Depths (m): Unprepared: 1.5	
Emplacement Time (min): 3	
Displacement Time (min): 2	LAR: Israeli 160-mm rocket with 45-km range
Radio: R-123M	Lynx: Israeli truck chassis, with two modular launchers. Each module can launch: 20 x Grad rockets, 13 x 160-mm LAR rockets or AccuLAR (with GPS fuze kit to 40 km, 10 m CEP), or 4 x 300-mm EXTRA artillery rockets (10-m CEP to 150 km), or
Protection:	
Armor, Front (mm): None	
Armor Side (mm): None	
Armor Roof (mm): None	

Self-Entrenching Blade: No	1 x Delilah-GL 250-km cruise missile. The system is fielded and has been exported
NBC Protection System: No	**MAIN ARMAMENT AMMUNITION**
Smoke Equipment: No	Caliber, Type, Name:
ARMAMENT	122-mm Frag-HE, 9M22U
Launcher:	Indirect Fire Range (m):
Caliber, Type, Name: 122-mm, 9P132	Minimum Range: 5,000
Number of Tubes: 40	Maximum Range: 20,380
Launch Rate:	Warhead Weight (kg): 18.4 (M21OF)
Full Salvo Time: 40 rounds in 20 seconds	Rocket Length (m): 2.87
Single Rocket Interval: 0.5 seconds per rocket	Maximum Velocity (m/s): INA
Loader Type: Manual	Fuze Type: MRV-U (PD)
Reload Time: 10 min	
Launcher Drive: Electric	122-mm Frag-HE, 9M28F
Traverse (°):	Indirect Fire Range (m):
Left: 102	Minimum Range: 1,500
Right: 70	Maximum Range: 15,000
Total: 172	Warhead Weight (kg): 21.0
Elevation (°): -0/+55°	Rocket Length (m): 2.87
FIRE CONTROL	Maximum Velocity (m/s): INA
Indirect Fire: PG-1M Panoramic Telescope (PANTEL)	Fuze Type: MRV-U (PD) or AR-6 (Proximity)
Collimator: K-1	
Fire Control Computer: None. No. Some variants (right) use automated fire control. Modular GPS/notebook-based FCS for upgrading existing MRLs are likely to be available by the Near Term	122-mm Frag-HE, Type 91A (Chinese)
	Indirect Fire Range (m):
	Minimum Range: 12,700
	Maximum Range: 32,700
Position Location System: None. See variants with GPS	Warhead Weight (kg): 18.3
	Rocket Length (m): 2.75
	Maximum Velocity (m/s): INA
	Fuze Type: PD
	Other Ammunition Types: Smoke, Incendiary, Chemical, RF Jammer, Illumination, Antitank and, Antipersonnel mines

NOTES

BM-21 IS UNQUESTIONABLY THE WORLD'S MOST WIDELY USED MRL. THE LAUNCHER AND SUPPORTING EQUIPMENT ARE CALLED COMPLEX 9K51. A SPECIAL GENERATOR POWERS THE LAUNCHER. THE 9V170 FIRING DEVICE IS CAB MOUNTED. ROCKETS CAN BE FIRED WITH A REMOTE-FIRING DEVICE AND A 64-M LONG CABLE.

YUGOSLAV 128-MM MULTIPLE ROCKET LAUNCHER M77



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SYSTEM	VARIANTS
Alternative Designations: M-77 Oganj	128-mm Single Tube Launcher
Date of Introduction: Early 1970s	
Proliferation: At least 4 countries	MAIN ARMAMENT AMMUNITION
Description:	Caliber, Type, Name:
Crew: 5	128-mm Frag-HE
Chassis/Carriage: Modified FAP-2026 BDS/AV 6x6 wheeled	Indirect Fire Range (m):
Combat Weight (mt): 22	Minimum Range: 1,000
Chassis Length Overall (m): 8.40	Maximum Range: 20,600
Width (m): 2.50	Warhead Weight (kg): 20
Height (m): 3.10	Rocket Length (m): 2.60
	Maximum Velocity (m/s): INA
AUTOMOTIVE PERFORMANCE	Fuze Type: PD
Engine Type: Model 2F/002A, 200 hp water-cooled, 8-cylinder diesel engine	
	Other Ammunition Types: DPICM
Cruising Range (km): 600	
Speed (km/h):	
Max Road: 80	
Max Off-Road: 35	
Cross-Country: INA	
Max Swim: N/A	
Fording Depths (m): Unprepared: 1.2	
Emplacement Time (min): 3	
Displacement Time (min): 2	
Radio: R-123M	
Protection:	
Armor, Front (mm): None	
Armor Side (mm): None	
Armor Roof (mm): None	
Self-Entrenching Blade: No	
NBC Protection System: No	

Smoke Equipment: No	
ARMAMENT	
Launcher:	
Caliber, Type, Name: 128-mm	
Number of Tubes: 32	
Launch Rate:	
Full Salvo Time: 32 rounds in 25.6 seconds	
Single Rocket Interval: 8 seconds per rocket	
Loader Type: Hydraulic	
Reload Time: 2 min	
Launcher Drive: Electric	
Traverse (°):	
Left: 180	
Right: 180	
Total: 360	
Elevation (°): -0/+50°	
FIRE CONTROL	
Indirect Fire: PG-1M Panoramic Telescope (PANTEL)	
Collimator: K-1	
Fire Control Computer: None	
Position Location System: None	

NOTES
THE M77 IS CONFIGURED AND OPERATED IN THE SAME MANNER AS THE CZECHOSLOVAKIAN 122-MM (40 ROUND) MULTIPLE ROCKET LAUNCHER RM-70. THE LAUNCHER IS MOUNTED OVER THE REAR AXLES WITH THE RELOADER LOCATED BEHIND THE CAB. DURING RELOADING, THE LAUNCHER IS ROTATED TO THE REAR, TWO HYDRAULIC CYLINDERS RAISE THE RELOADER, AND THEN THE ROCKETS ARE PUSHED INTO THE LAUNCHER. UNLIKE THE RM-70, THE M77 USES HYDRAULIC CYLINDERS RATHER THAN A SPROCKET AND CHAIN DRIVE MECHANISM. THE MODIFIED FAP2026 TRUCK HAS FOUR HYDRAULICALLY EMPLACED FIRING JACKS TO PROVIDE FIRING STABILITY. THE ROCKETS CAN BE FIRED FROM INSIDE THE CAB OR WITH A REMOTE-FIRING DEVICE. THE M77 MRL IS CAPABLE OF MOUNTING AN ANTIAIRCRAFT MACHINEGUN FOR PROTECTION.

RUSSIAN 220-MM MULTIPLE ROCKET LAUNCHER 9P140



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SYSTEM	VARIANTS
Alternative Designations: 9P140 Uragan	None
Date of Introduction: 1977	
Proliferation: At least 7 countries	MAIN ARMAMENT AMMUNITION
Description:	Caliber, Type, Name:
Crew: 4	220-mm Frag-HE, 9M27F
Chassis/Carriage: ZIL-135LM 8x8 wheeled	Indirect Fire Range (m):
Combat Weight (mt): 20	Minimum Range: 10,000
Chassis Length Overall (m): 9.3	Maximum Range: 35,000
Width (m): 2.8	Warhead Weight (kg): 100
Height (m): 3.2	Rocket Length (m): 5.1
	Maximum Velocity (m/s): INA
AUTOMOTIVE PERFORMANCE	Fuze Type: Electronic timing (ET)
Engine Type: 2 each - 177 hp, 8 cylinder, 4-stroke gasoline engines	
	220-mm DPICM, 9M27K
Cruising Range (km): 500	Indirect Fire Range (m):
Speed (km/h):	Minimum Range: 10,000
Max Road: 65	Maximum Range: 35,000
Max Off-Road: INA	Warhead Weight (kg): 90
Cross-Country: INA	Rocket Length (m): 5.1
Max Swim: N/A	Maximum Velocity (m/s): INA
Fording Depths (m): Unprepared: 1.2	Fuze Type: Electronic timing (ET)
Emplacement Time (min): 3	
Displacement Time (min): 3	220-mm Antitank, 9M27K2
Radio: R-123M	Indirect Fire Range (m):
Protection:	Minimum Range: 10,000
Armor, Front (mm): None	Maximum Range: 35,000
Armor Side (mm): None	Warhead Weight (kg): 90
Armor Roof (mm): None	Rocket Length (m): 5.1

Self-Entrenching Blade: No	Maximum Velocity (m/s): INA
NBC Protection System: No	Fuze Type: Electronic timing (ET)
Smoke Equipment: No	
ARMAMENT	220-mm Antipersonnel, 9M27K3
Launcher:	Indirect Fire Range (m):
Caliber, Type, Name: 220-mm 9P140	Minimum Range: 10,000
Number of Tubes: 16 (2 rows of 6 tubes and 1 row of 4 tubes)	Maximum Range: 35,000
Launch Rate:	Warhead Weight (kg): 90
Full Salvo Time: 16 rounds in 20 seconds	Rocket Length (m): 5.1
Single Rocket Interval: 1.25 seconds per rocket	Maximum Velocity (m/s): INA
Loader Type: Manual	Fuze Type: Electronic timing (ET)
Reload Time: 15-20 min	
Launcher Drive: Electric	220-mm Antitank, 9M59
Traverse (°):	Indirect Fire Range (m):
Left: 30	Minimum Range: 10,000
Right: 30	Maximum Range: 35,000
Total: 36	Warhead Weight (kg): 90
Elevation (°): -0/+55°	Rocket Length (m): 5.1
FIRE CONTROL	Maximum Velocity (m/s): INA
Indirect Fire: PG-1M Panoramic Telescope (PANTEL)	Fuze Type: Electronic timing (ET)
Collimator: K-1	
Fire Control Computer: None	
Position Location System: None	Other Ammunition Types: None

NOTES

THE 9P140 URAGAN (PREVIOUSLY REFERRED TO INCORRECTLY AS BM-22 OR BM-27) IS THE WORLD'S FIRST MODERN FIN AND SPIN-STABILIZED HEAVY ROCKET SYSTEM. ESSENTIALLY A SCALED-UP VERSION OF THE BM-21, THE 9P140 USE MANY OF THE SAME DESIGN FEATURES. THE LAUNCHER, 9T452 TRANSLOADER, ROCKETS, AND SUPPORT EQUIPMENT CONSTITUTES THE 9K57 COMPLEX.

THE 9P140 AND ITS TRANSLOADER ARE BOTH BASED ON VARIANTS OF THE GASOLINE-POWERED ZIL-135LM 8-TON 8X8 CHASSIS. THE TRUCK IS UNUSUAL IN THAT IT USES TWO ENGINES, EACH DRIVING THE WHEELS ON ONE SIDE OF THE TRUCK, AND ONLY THE FRONT AND REAR AXLES STEER. THE 9P140 CAB HAS A BLAST SHIELD THAT IS RAISED DURING FIRING, AND THE VEHICLE IS STABILIZED DURING FIRING BY TWO MANUALLY EMPLACED HYDRAULIC JACKS AT THE REAR OF THE CHASSIS.

THE LAUNCHER HAS ELECTRICALLY POWERED TRAVERSING AND ELEVATING MECHANISMS. DURING TRAVEL, THE LAUNCHER ASSEMBLY IS ORIENTED REARWARD AND A LIGHT SHEET METAL COVER OVER THE MUZZLE END OF THE TUBES PREVENTS FOREIGN MATERIAL FROM ENTERING THE TUBE. THIS IS A SAFETY FEATURE THAT IS DESIGNED FOR TRAVEL WHEN LOADED. THERE IS NO SUCH COVER FOR THE MUZZLE END OF AN UNLOADED LAUNCHER.

IRANIAN 240-MM MULTIPLE ROCKET LAUNCHER FADJR-3



SYSTEM	VARIANTS
Alternative Designations: INA	None
Date of Introduction: 1996	
Proliferation: At least 1 country and Hezbollah units	MAIN ARMAMENT AMMUNITION
Description:	Caliber, Type, Name:
Crew: 5	240-mm Frag-HE, Fadjr-3
Chassis/Carriage: Mercedes Benz 6x6 wheeled	Indirect Fire Range (m):
Combat Weight (mt): 15	Minimum Range: INA
Chassis Length Overall (m): 10.45	Maximum Range: 43,000
Width (m): 2.54	Warhead Weight (kg): 90
Height (m): 3.34	Rocket Length (m): 5.2
	Maximum Velocity (m/s): INA
AUTOMOTIVE PERFORMANCE	Fuze Type: PD
Engine Type: 280 hp, V-8 liquid-cooled, diesel engine	
Cruising Range (km): INA	Other Ammunition Types: INA
Speed (km/h):	
Max Road: 60	
Max Off-Road: 25 (est)	
Cross-Country: INA	
Max Swim: N/A	
Fording Depths (m): INA	
Emplacement Time (min): INA	
Displacement Time (min): INA	
Radio: INA	
Protection:	
Armor, Front (mm): None	
Armor Side (mm): None	
Armor Roof (mm): None	
Self-Entrenching Blade: No	
NBC Protection System: No	
Smoke Equipment: No	
ARMAMENT	
Launcher:	

Caliber, Type, Name: 240-mm, Fadjr-3	
Number of Tubes: 12 (2 rows of 6 tubes)	
Launch Rate:	
Full Salvo Time: 12 rounds in 48 seconds (est)	
Single Rocket Interval: 4 seconds per rocket (est)	
Loader Type: Transloader, crane hoist	
Reload Time: 12-15 minutes (est)	
Launcher Drive: Manual	
Traverse (°):	
Left: 90	
Right: 100	
Total: 190	
Elevation (°): -0/+57°	
FIRE CONTROL	
Indirect Fire: INA	
Collimator: INA	
Fire Control Computer: None	
Position Location System: None	

NOTES
THE SYSTEM IS STABILIZED BY 2 FIRING JACKS MOUNTED ON THE REAR OF THE VEHICLE AND 2 MORE LOCATED BEHIND THE CAB. THE SYSTEM HAS A DEDICATED RESUPPLY VEHICLE WITH A CRANE TO ASSIST IN RELOADING. SHAHID BAGHERI INDUSTRIES OF IRAN DEVELOPED THE SYSTEM WITH POSSIBLE TECHNICAL ASSISTANCE FROM NORTH KOREA.

CHINESE 273-MM MULTIPLE ROCKET LAUNCHER WM-80



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SYSTEM	VARIANTS
Alternative Designations: None	None
Date of Introduction: INA	
Proliferation: At least 3 countries	MAIN ARMAMENT AMMUNITION
Description:	Caliber, Type, Name:
Crew: 5	273-mm Frag-HE, WM-80
Chassis/Carriage: TA 580 8x8 wheeled	Indirect Fire Range (m):
Combat Weight (mt): 34	Minimum Range: 34,000
Chassis Length Overall (m): 9.55	Maximum Range: 80,000
Width (m): 3.06	Warhead Weight (kg): 150
Height (m): 3.30	Rocket Length (m): 4.58
	Maximum Velocity (m/s): 1,140
AUTOMOTIVE PERFORMANCE	Fuze Type: MD-23A (Proximity)
Engine Type: 525 hp air-cooled, diesel engine	
Cruising Range (km): 400	Other Ammunition Types: None
Speed (km/h):	
Max Road: 70	
Max Off-Road: INA	
Cross-Country: INA	
Max Swim: N/A	
Fording Depths (m): INA	
Emplacement Time (min): 3 to 5	
Displacement Time (min): 3 to 5	
Radio: INA	
Protection:	
Armor, Front (mm): None	

Armor Side (mm): None	
Armor Roof (mm): None	
Self-Entrenching Blade: No	
NBC Protection System: No	
Smoke Equipment: No	
ARMAMENT	
Launcher:	
Caliber, Type, Name: 273-mm	
Number of Tubes: 8 (2 rows of 4 tubes)	
Launch Rate:	
Full Salvo Time: 8 rounds in 5 seconds	
Single Rocket Interval: .5 seconds per rocket	
Loader Type: Manual	
Reload Time: 5-8 minutes	
Launcher Drive: Electric	
Traverse (°):	
Left: 20	
Right: 20	
Total: 40	
Elevation (°): -20/+60°	
FIRE CONTROL	
Indirect Fire: INA	
Collimator: INA	
Fire Control Computer: None	
Position Location System: None	

NOTES

THE WM-80 IS CURRENTLY BEING ADVERTISED HEAVILY ON THE OPEN MARKET BY NORINCO INDUSTRIES. THE WM-80 ROCKET SYSTEM IS COMPOSED OF THE MULTIPLE ROCKET LAUNCHER, THE AMMUNITION TRANSLOADER, FIRE COMMAND AND CONTROL VEHICLES, AND THE MAINTENANCE VEHICLES. THE FIRE COMMAND AND CONTROL IS COMPOSED OF A BRIGADE/REGIMENT COMMAND VEHICLE, BATTALION COMMAND VEHICLE, SURVEILLANCE/SPOTTING RADAR, AND METEOROLOGICAL RADAR.

BRAZILIAN 127-MM, 180-MM, & 300-MM MULTIPLE ROCKET LAUNCHER ASTROS II



DoD photo by: TECH. SGT. H. H. DEFFNER [Public domain], via Wikimedia Commons

SYSTEM	VARIANTS
Alternative Designations: ASTROS II AV-LMU	None
Date of Introduction: 1983	
Proliferation: At least 6 countries	MAIN ARMAMENT AMMUNITION
Description:	Caliber, Type, Name:
Crew: 3	127-mm Frag-HE, SS-30
Chassis/Carriage: TECTRAN 10-ton 6x6 wheeled	Indirect Fire Range (m):
Combat Weight (mt): 20	Minimum Range: 9,000
Chassis Length Overall (m): 8.00	Maximum Range: 30,000
Width (m): 2.4	Warhead Weight (kg): INA
Height (m): 2.6	Rocket Length (m): 3.9
AUTOMOTIVE PERFORMANCE	Maximum Velocity (m/s): INA
Engine Type: 280 hp water-cooled, turbocharged diesel engine	Fuze Type: INA
Cruising Range (km): INA	Other Ammunition Types: None
Speed (km/h):	
Max Road: 70	Caliber, Type, Name:
Max Off-Road: 40	180-mm Frag-HE, SS-40
Cross-Country: INA	Indirect Fire Range (m):
Max Swim: N/A	Minimum Range: 15,000
Fording Depths (m): Unprepared: 1.0	Maximum Range: 35,000
Emplacement Time (min): INA	Warhead Weight (kg): INA
Displacement Time (min): INA	Rocket Length (m): 4.2
Radio: INA	Maximum Velocity (m/s): INA
Protection:	Fuze Type: INA
Armor, Front (mm): None	
Armor Side (mm): None	



Armor Roof (mm): None	Other Ammunition Types: DPICM, HE-Incendiary, Antitank mines, Antipersonnel mines, Runway Denial
Self-Entrenching Blade: No	
NBC Protection System: No	
Smoke Equipment: 6 smoke grenade launchers	Caliber, Type, Name:
ARMAMENT	300-mm Frag-HE, SS-60
Launcher:	Indirect Fire Range (m):
Caliber, Type, Name: 127-mm, 180-mm, 300-mm, ASTROS	Minimum Range: 20,000
Number of Tubes: 127-mm (32), 180-mm (16), 300-mm (4)	Maximum Range: 60,000
Launch Rate:	Warhead Weight (kg): INA
Full Salvo Time: INA	Rocket Length (m): 5.6
Single Rocket Interval: INA	Maximum Velocity (m/s): INA
Loader Type: Manual	Fuze Type: INA
Reload Time: INA	
Launcher Drive: Electric	Other Ammunition Types: DPICM, HE-Incendiary, Antitank mines, Antipersonnel mines, Runway Denial
Traverse (°):	
Left: INA	
Right: INA	Caliber, Type, Name:
Total: INA	300-mm Frag-HE, SS-80
Elevation (°): INA	Indirect Fire Range (m):
Auxiliary Weapon:	Minimum Range: 22,000
Caliber, Type, Name: .50 (12.7x99) heavy machinegun, M2HB	Maximum Range: 90,000
Mount Type: Cab AA mount	Warhead Weight (kg): INA
Direct Fire Range (m): INA	Rocket Length (m): 5.6
Max Effective Range (m):	Maximum Velocity (m/s): INA
Day: 1000	Fuze Type: INA
Night: INA	
Fire on Move: Yes	Other Ammunition Types: DPICM, HE-Incendiary, Antitank mines, Antipersonnel mines, Runway Denial
Rate of Fire (rpm): 450-550 (cyclic)	
FIRE CONTROL	
Indirect Fire: INA	
Collimator: INA	
Fire Control Computer: FIELDGUARD Radar or the FILA System	
Position Location System: None	

NOTES

THE ASTROS (ARTILLERY SATURATION ROCKET SYSTEM) II IS A MODULAR MULTIPLE ROCKET LAUNCHER CAPABLE OF FIRING THREE DIFFERENT CALIBER WRAP-AROUND FIN ROCKETS (FOR IMPROVED ACCURACY) USING SEVERAL TYPES OF WARHEADS. THE UNIVERSAL MODULES ENABLE THE SYSTEM TO ACCOMPLISH FIRE MISSIONS WITH RANGES FROM 9 TO 90 KILOMETERS.

THE ASTROS II SYSTEM CONSISTS OF THE FOLLOWING VEHICLES: UNIVERSAL MULTIPLE LAUNCHER (AV-LMU), AMMUNITION SUPPLY VEHICLE (AV-RMD), COMMAND AND CONTROL VEHICLE/FIRE CONTROL UNIT (AV-VCC), MOBILE WORKSHOPS (FOR FIELD MAINTENANCE), AND THE OPTIONAL ELECTRONIC FIRE CONTROL UNIT (AV-UCF). ALL OF THE ASTROS II VEHICLES USE THE TECTRAN ENGINHARIA 10 TON, 6X6, WHEELED VEHICLE CHASSIS.

A TYPICAL FIRING BATTERY CONSISTS OF SIX AV-LMU LAUNCHERS, SIX AV-RMD AMMUNITION SUPPLY VEHICLES, AND ONE AV-VCC FIRE CONTROL UNIT. AN AV-VCC COMMAND AND CONTROL UNIT AND TWO MOBILE WORKSHOPS ARE FOUND AT BATTALION LEVEL. THE BATTALION LEVEL AV-VCC CAN COORDINATE AND DIRECT FIRE MISSIONS FOR THREE ASTROS BATTERIES. THE AV-RMD AMMUNITION SUPPLY VEHICLE CARRIES TWO COMPLETE LOADS FOR EACH LAUNCHER.

RUSSIAN 300-MM MULTIPLE ROCKET LAUNCHER 9A52-2



SYSTEM	VARIANTS
Alternative Designations: 9A52-2 Smerch-M	9A52-2T: New Russian launcher mounted on a Tatra 816 truck chassis, and weighing 38.4 mt fully loaded
Date of Introduction: 1989	
Proliferation: At least 4 countries, with 2 more under contract	9A52-4/Tornado: Russian developmental "Smerch-Light" for export or domestic use on a Kamaz 8x8 cross-country chassis with replaceable or reloadable 6-rocket module. With a newer FC computer, (like Baget-41), response time is reduced to 3 minutes. Modules for 122 mm and 220 mm rockets are in development
Description:	
Crew: 4 (7 with 9K58 Complex)	
Chassis/Carriage: MAZ-543M 8x8 wheeled	
Combat Weight (mt): 43.7	
Chassis Length Overall (m): 12.1	9A53: Russian universal MRL on a larger MZKT-7930 8x8 chassis for rocket modules of 24x122 mm (Tornado-G), 15x220 mm (Tornado-U), or 12x300 mm (Tornado-S). It is in testing, with possible fielding in 2015 for 220 mm and 300 mm versions
Width (m): 3.05	
Height (m): 3.05	
AUTOMOTIVE PERFORMANCE	
Engine Type: 518 hp, V-12 diesel engine	
Cruising Range (km): 850	A-100: Chinese variant on indigenous chassis and 10-tube launcher, with 120 km range and 8-minute prep time. Exported to Pakistan
Speed (km/h):	
Max Road: 60	
Max Off-Road: 35	PHL03/AR-2: Recent Chinese 12-tube launcher, ranging to 150 km
Cross-Country: INA	
Max Swim: N/A	MAIN ARMAMENT AMMUNITION
Fording Depths (m): Unprepared: 1.1	Caliber, Type, Name:
Emplacement Time (min): 3	300-mm Frag-HE, 9M55F
Displacement Time (min): 3	Indirect Fire Range (m):
Radio: R-123M	Minimum Range: 20,000
Protection:	Maximum Range: 90,000
Armor, Front (mm): None	Warhead Weight (kg): 258
Armor Side (mm): None	Rocket Length (m): 7.6
Armor Roof (mm): None	Maximum Velocity (m/s): INA
Self-Entrenching Blade: No	Fuze Type: Electronic Timing (ET)
NBC Protection System: No	
Smoke Equipment: No	300-mm DPICM, 9M55K
ARMAMENT	Indirect Fire Range (m):
Launcher:	Minimum Range: 20,000
Caliber, Type, Name: 300-mm, 9A52	Maximum Range: 90,000
Number of Tubes: 12 (3 rows of 4 tubes)	Warhead Weight (kg): 233
Launch Rate:	Rocket Length (m): 7.6
Full Salvo Time: 12 rounds in 38 seconds	Maximum Velocity (m/s): INA
Single Rocket Interval: 3 seconds per rocket	Fuze Type: Electronic Timing (ET)

Loader Type: Transloader, crane hoist	
Reload Time: 36 min	300-mm Sensor-fuzed (MOTIV-3M), 9M55K1
Launcher Drive: Electric	Indirect Fire Range (m):
Traverse (°):	Minimum Range: 20,000
Left: 30	Maximum Range: 90,000
Right: 30	Warhead Weight (kg): 233
Total: 60	Rocket Length (m): 7.6
Elevation (°): -0/+55°	Maximum Velocity (m/s): INA
FIRE CONTROL	Fuze Type: Electronic Timing (ET)
Indirect Fire: PG-1M Panoramic Telescope (PANTEL)	
Collimator: K-1	Ammunition Note: All of the above warheads fit on an inertially course-corrected rocket, with time-fuze adjustment. These provide greatly improved accuracy, with error of 0.019 percent of range
Fire Control Computer: Baget-41 notebook for automated FCS	
Position Location System: GPS navigation	
	Other Ammunition Types: Smoke, Incendiary, Chemical, Leaflet, 9M55SThermobaric explosive, 9M534 with expendable R-90 UAV

NOTES

9A52-2 LAUNCHER WITH ALL SUPPORT EQUIPMENT (INCLUDING 9T234-2 TRANSLOADER, AND 1K123 VIVARY FIRE CONTROL SYSTEM) IS CALLED COMPLEX 9K58.

CURRENTLY, THE MORE COMMONLY ASSOCIATED FIRE CONTROL COMPLEX IS MP-32M1 ON A TATRA CHASSIS, WITH GLONASS/NAVSTAR GPS NAVIGATION.

ISRAELI LYNX ROCKET/MISSILE LAUNCHER WITH EXTRA AND DELILAH MISSILES




Lynx Rocket/Missile Launcher Vehicle with LAR-160 rockets



Delilah missile



LAROM

SYSTEM	VARIANTS
Alternative Designations: Lynx is both the launcher module which can fit on various mounts, and the Israeli launcher vehicle name	Lynx is both a vehicle, and a launcher to fit on vehicles. Ground launchers include tracked armored vehicles and 8x8 trucks. Israel markets the Lynx 6x6 truck (above). But the launcher fits on other user-preferred chassis. Other user countries have licenses for the conversion. Many of the customers have substantial supplies of 122-mm rockets.
Date of Introduction: By 2007. Delilah cruise missile used in combat in 2006	
Proliferation: At least 3 countries. Two others are testing versions of the system and adaptations of rockets and/or missiles. Others are looking at adopting TCS to their MRLs.	Azerbaijan Lynx: Indigenous MRL/missile TEL with Lynx launcher on 8x8 Kamaz-6350 truck. With autonomous FCS, it launches 122/ 160 mm rockets, or EXTRA ballistic missiles
Description:	
Crew: 3	Naiza: Kazakh import/production MRL with Lynx for LAR-160 on Kamaz truck
Chassis/Carriage: Mercedes 3341 6x6 wheeled	
Combat Weight (mt): INA	LAROM: Romanian 2-module MRL can launch 122-mm Grad or LAR-160 rockets
Chassis Length Overall (m): INA	
Width (m): INA	
Height (m): INA	MAIN ARMAMENT AMMUNITION
Primary Components:	Caliber, Type, Name:
Transporter-erector-launcher (TEL) and Mobile Command Post (MCP) van. Reload Modules will be transloaded at a TL point from a transloader truck with four modules, to service two launchers	LAR 160 Rocket, Composite solid-propellant
	Indirect Fire Range (km):
	Minimum Range: 10
	Maximum Range: 45
AUTOMOTIVE PERFORMANCE	Warhead Weight (kg): 110
Engine Type: INA	Rocket Length (m): 3.48
Cruising Range (km): 500 (est)	Rocket Diameter (mm): 160
Speed (km/h):	Maximum Velocity (m/s): 1,022
Max Road: INA	Warhead options: Frag-HE/PD or DPICM with time-fuze dispense
Max Off-Road: INA	
Cross-Country: INA	OTHER AMMUNITION:

Max Swim: INA	GRADLAR: Israeli upgrade package with improved FCS converts MRLs for modules of 122-mm Grad rockets and 21-45 km range. Any type of Grad 122-mm rocket can be used.
Fording Depths (m): INA	
Emplacement Time (min): 5	
Displacement Time (min): INA	
Radio: INA	LAR-160 or LAR: 160-mm rocket (13 per module) with a 45-km range. The warhead is a canister; to carry Frag-HE, sub-munitions, or any 155-mm round
Protection:	
Armor, Front (mm): None (The LAROM is armored)	
Armor Side (mm): None	
Armor Roof (mm): None	AccuLAR rocket is a GPS fuzed variant of LAR-160, with 14-40 km range and 10 m CEP). At least 4 countries use these rockets
Self-Entrenching Blade: INA	
NBC Protection System: INA	
Smoke Equipment: INA	EXTRA (Extended Range Artillery): The 300mm ballistic missile (4/launch module) ranges 150 km with a 10-m CEP. It has a 120-kg payload, and flies a ballistic trajectory, corrected with GPS. Various warheads are offered.
ARMAMENT	
Launcher:	
Caliber, Type, Name: INA	
Number of Tubes: INA	
Launch Rate:	Delilah: This cruise missile has a length of 3.2 m, weighing 230 kg. It cruises at Mach 0.3-0.7, and 8,600 m altitude. It can be launched from ships, aircraft, and the Lynx ground launcher (GL) to 250 km, with programmable guidance, and multiple waypoints. Delilah-GL has launch assist. Air, ship, and helicopter versions are offered. The missile uses GPS homing, or can loiter and use a CCD/FLIR seeker to home to target.
Full Salvo Time: INA	
Single Rocket Interval: INA	
Loader Type: INA	
Reload Time: 20 minutes	
Launcher Drive: INA	
Traverse (°):	
Left: INA	
Right: INA	
Total: INA	
Elevation (°): INA	
FIRE CONTROL	
Indirect Fire: INA	
Collimator: INA	
Fire Control Computer: INA	
Position Location System: GPS navigation	
Guided Rockets and missiles on Lynx and other MRLs/TELs can use the Trajectory Correction System (TCS). TCS can control >12 rockets/missiles equipped for Inertial/GPS guidance, vs 12 separate targets. Accuracy is 10 m. India tested TCS on the Pinaka MRL, and uses it in the recently tested Prahaar SRBM.	

NOTES

BECAUSE THE LAUNCHER CAN LAUNCH A VARIETY OF ROCKETS (122 MM OF VARIOUS, 160-MM ISRAELI LAR, WITH OR WITHOUT TCS), AND EITHER EXTRA OR DELILAH-GL MISSILES, IT IS LIKELY THAT THE PRIMARY MUNITION MIX WILL DEPEND ON ORGANIZATION LEVEL OF THE LAUNCHER. IF IT IS AT TACTICAL LEVEL, IT IS LIKELY TO BE USED PRIMARILY TO LAUNCH ROCKETS, WITH A FEW MAYBE DESIGNATED FOR EXTRA MISSILES. THOSE LAUNCHERS AT THE OPERATIONAL/STRATEGIC LEVEL ARE MORE LIKELY TO LAUNCH MISSILES, AND PERHAPS ACCULAR (LAR-160 WITH TCS) ROCKETS.

THE LAR-160 ROCKET OFFERS A LETHAL EFFECTS AREA PER ROCKET OF 31,400 M^2. WITH TCS (E.G., ACCULAR), ROCKETS PERFORM A PITCH-OVER FOR TOP ATTACK AND AN OPTIMIZED CIRCULAR PATTERN FOR FRAG-HE WARHEAD EFFECTS OR SUB-MUNITIONS. THUS, ACCULAR ROCKETS SHOULD HAVE EVEN GREATER LETHAL EFFECTS.

Artillery Weapons: Mortars and Hybrid Systems

Even in the modern era of fewer new military systems, there is much activity in development of mortars and hybrid systems. This is, in part, due to emphasis on weapons for beyond line-of-sight (BLOS) and non-line-of-sight (NLOS) engagements. It also emphasizes the need for small unit commanders to have organic deep fire capability on-hand for rapid response.

Compared to cannon systems, mortars generally sacrifice range. Their high-angle fire enhances fragmentation effects and permits attack of targets in defilade. They are ideal weapons for attacking targets on reverse slopes, in narrow gullies, in ditches, in cities, and in other areas that are difficult to reach with low-angle fire. Mortars are especially effective, with their high-angle trajectories, for smoke and illumination missions. Their light weight offers mobility to move with units and provide the small unit maneuver commander his own close and direct support. Although mortars feature high trajectories, they often are used at targets within line of sight. Thus most have sights with both direct-fire aiming and indirect-fire settings.

Most mortars in the world are man-portable or towed ground-mounted systems. In motorized infantry brigades and older Tier 3 and 4 mechanized brigades, each battalion has an organic mortar battery. In the OPFOR, motorized infantry and selected other battalions may also have 60-mm mortars at company level. Many forces around the world use man-portable 51-mm, 60-mm, 81-mm, and 82-mm mortars with dismounted conventional and special forces.

Most modern forces recognize the need for vehicle-mounted systems which can move with motorized/mechanized forces. A variety of configurations are in use. The widely fielded Russian 120-mm 2S12 (pg 7-53) is “porteed” - towable but truck-borne for rapid off-loading, emplacement/displacement, and reloading. Most vehicle systems are conventional mortars on a rotating base on the vehicle floor. Another design is the Wiesel 2 Mortar System with the light Wiesel tracked chassis, a breech-loaded motor hinged to the rear, and motorized ground spades. The semi-automated Super Rapid Advanced Mortar System (SRAMS) is light enough to mount on a light strike vehicle and fire 18 rounds per minute.

Several 120-mm mortar vehicles are turreted breech-loading systems. These include systems with semi-automated loaders (rounds delivered to loading trays), e.g., the British Armoured Mortar System modular turret, and the Patria NEMO on a wheeled 8x8 chassis. Mortar vehicle systems with autoloaders include the Czech PRAM-S on BMP chassis, and the AMOS, twin-barrel mortar system).

Hybrid Systems include combination guns that can fire fin-stabilized and rifled mortar projectiles, as well as specially designed howitzer projectiles. These are also called howitzers, gun-mortars, and cannon. They usually fire more mortar rounds than cannon rounds, due to the large inventories of mortar projectiles available, and the wider variety of mortar rounds for different roles. In the OPFOR, Tier 1 and 2 battalions have generally replaced battalion mortars with 120-mm combination guns. Russia (on following pages), China (with its PLL-05), and selected other countries have these systems. Precision mortar projectiles as well as precision cannon projectiles can be fired from these systems.

Other hybrid systems include automatic mortars, such as the 82-mm 2B9/Vasilek automatic mortar with a high rate of fire and direct-fire sights. There are also rifled mortars such as the MO-120RT (pg 7-51), which can fire lethal projectiles out to 13 km.

Traditionally, mortars have been area fire weapons due to their lack of accuracy. However, modern ammunition developments have led to the availability of precision munitions, as well as improved advanced mortar projectiles with terminal effects. These include semi-active laser-homing projectiles, IR-homing projectiles, GPS course-corrected projectiles, and projectiles with submunition fills.

FRENCH 120-MM MORTAR MO-120-RT



Photo from www.esercito.difesa.it



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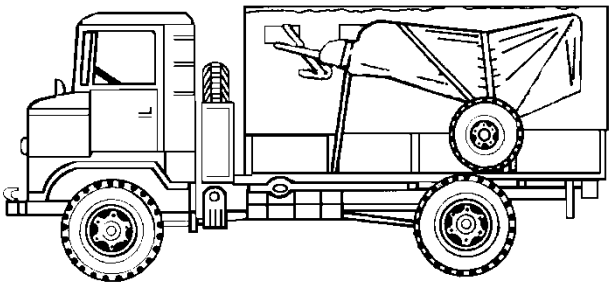
SYSTEM	VARIANTS
Alternative Designations: RT-61	120 2R2M: Mounted in light armored vehicles such as the MOWAG Piranha APC or the Turkish FMC-NUROL mortar vehicle
Date of Introduction: 1961	
Proliferation: At least 22 countries	
Description:	MAIN ARMAMENT AMMUNITION
Crew: 4-6	Caliber, Type, Name:
Prime Mover: VAB M120 4x4 wheeled	120-mm Frag-HE, PR-14
Combat Weight (mt): 13.0	Indirect Fire Range (m):
Chassis Length Overall (m): 5.98	Minimum Range: 1,100
Height Overall (m): 2.06	Maximum Range: 8,135
Width Overall (m): 2.50	Complete Projectile Weight (kg): 18.60
Combat Weight (kg): 582	Maximum Velocity: INA
Wheeled Carriage/Tube Support Mechanism (kg): 220	Fuze Type: M557 PD
Baseplate (kg): 194	
Length Overall (m): 2.70	Caliber, Type, Name:
Height Overall (m): 1.10	120-mm HE-RA, PRPA (Rocket Assist)
Width Overall (m): 1.55	Indirect Fire Range (m):
Bipod (kg): N/A	Minimum Range: 1,100
Ground Clearance (m): 0.35	Maximum Range: 13,000
AUTOMOTIVE PERFORMANCE	Complete Projectile Weight (kg): 18.60
Engine Type: Renault VI MIDS, 220 hp, diesel engine	Maximum Velocity: INA
Cruising Range (km): 1,000	Fuze Type: M557 PD
Speed (km/h):	
Max Road: 92	Other Ammunition Types: All standard 120-mm smoothbore mortar projectiles without fold-out fins (see pgs 7-59 -61 and -71)
Max Off-Road: 60 (est)	
Cross-Country: 30 (est)	
Max Swim: N/A	
Fording Depths (m): Amphibious	
Emplacement Time (min): 1.5	
Displacement Time (min): 2	
Radio: INA	
Protection:	
Armor, Front (mm): INA	
Armor Side (mm): INA	
Armor Roof (mm): INA	

Self-Entrenching Blade: No	
NBC Protection System: Yes	
Smoke Equipment: No	
ARMAMENT	
Main Armament:	
Caliber, Type, Name: 120-mm mortar, MO-ART-RT	
Rate of Fire (rpm):	
Burst: 18	
Normal: 10	
Sustained: INA	
Loader Type: Manual	
Traverse (°):	
Left: 7.5	
Right: 7.5	
Total: 15	
Elevation (°): +30/+85	
FIRE CONTROL	
Indirect Fire: INA	
Collimator: INA	
Fire Control Computer: None	
Position Location System: None	

NOTES

THE RT-61 IS A RIFLED MORTAR CAPABLE OF FIRING PRE-ENGRAVED SPIN-STABILIZED AND SMOOTHBORE 120-MM MORTAR PROJECTILES WITH OR WITHOUT ROCKET ASSIST. HOWEVER, IT IS NOT CAPABLE OF FIRING SMOOTHBORE MORTAR PROJECTILES WITH FOLD OUT FINS (SPRING-LOADED TAIL ASSEMBLIES WITH STRAIGHT FINS). THE RT-61 IS A THREE-PIECE MORTAR SYSTEM CONSISTING OF A RIFLED TUBE, A BASEPLATE, AND A WHEELED CARRIAGE. TRIGGER FIRING IS THE NORMAL METHOD OF FIRING FOR THIS MORTAR. DROP FIRING CAN BE ACCOMPLISHED ONLY WITH SMOOTHBORE MORTAR PROJECTILES.

RUSSIAN 120-MM SELF-PROPELLED MORTAR 2S12





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SYSTEM	VARIANTS
Alternative Designations: 120-mm 2S12 Sani (Sled)	None
Date of Introduction: early 1980s	
Proliferation: At least 1 countries	
Description:	MAIN ARMAMENT AMMUNITION
Crew: 5	Caliber, Type, Name:
Vehicle Platform (chassis): GAZ-66	120-mm Frag-HE (3OF843B)
Combat Weight (mt): 3.64	Indirect Fire Range (m):
Chassis Length Overall (m): 5.66	Minimum Range: 450
Height Overall (m): 2.44	Maximum Range: 7,000
Width Overall (m): 2.34	Complete Projectile Weight (kg): 16.80
2B11 Mortar	Muzzle Velocity (m/s): 325
Combat Weight (kg): 210 (firing) /297 (traveling)	Fuze Type: GVMZ-7 PD
Wheeled Carriage 2L81 (kg): 87	
Baseplate (kg): 80	120-mm Smoke
Bipod (kg): 55	Indirect Fire Range (m):
AUTOMOTIVE PERFORMANCE	Minimum Range: 1,000
Engine Type: ZMZ-66, 115 hp V-8 water cooled gasoline	Maximum Range: 6,800
Cruising Range (km): 600	Complete Projectile Weight (kg): 16.70
Speed (km/h):	Muzzle Velocity (m/s): INA
Max Road: 87	Fuze Type: PD
Max Off-Road: 35	
Cross-Country: INA	120-mm Illumination, S-843
Fording Depths (m): .80	Indirect Fire Range (m):
Emplacement Time (min): 3 (est)	Minimum Range: 1,000
Displacement Time (min): 3 (est)	Maximum Range: 5,300
Radio: R-123M	Complete Projectile Weight (kg): 16.80
Protection:	Muzzle Velocity (m/s): INA
Armor, Front (mm): none	Fuze Type: T-1 TSQ
Armor Side (mm): None	
Armor Roof (mm): None	Other Ammunition Types: All standard 120-mm mortar rounds, including Frag-HE-RA to 9,100m. See pgs 7-59-61, and -71.
Self-Entrenching Blade: No	
NBC Protection System: No	
Smoke Equipment: No	

ARMAMENT	
Main Armament:	
Caliber, Type, Name: 120-mm mortar, 2B11	
Rate of Fire (rpm):	
Burst: 15	
Normal: 10	
Sustained: 4 (est)	
Loader Type: Manual	
Traverse (°):	
Left: 5 (on bipod)/26 (moving the bipod)	
Right: 5 (on bipod)/26 (moving the bipod)	
Total: 10 (on bipod)/52 (moving the bipod)	
Elevation (°): +45/+80	
FIRE CONTROL	
Indirect Fire: INA	
Collimator: INA	
Fire Control Computer: None	
Position Location System: None	

NOTES

THE 2S12 IS A SELF-PROPELLED VERSION OF THE TOWED 120-MM MORTAR 2B11 (M-120) CARRIED ON THE BED OF GAZ-66 TRUCK. THE SP VERSION PROVIDES GREATER MOBILITY FOR THIS VERSATILE MORTAR. THE 2S12 HAS A SPECIAL SAFETY DEVICE TO PREVENT DOUBLE LOADING WHEN THE MORTAR ROUND IS NOT FIRED OR REMOVED FROM THE TUBE. WHEN A ROUND IS LOADED, IT TRIPS A TAB ON THE TUBE, PREVENTING ANOTHER ROUND FROM BEING LOADED. THE TAB SHIFTS TO THE "READY" POSITION WHEN THE ROUND FIRES, ALLOWING THE 2S12 TO BE RELOADED.

AS NOTED FOR SOME 122-MM MRLS (PG 7-50), THE 2S12 IS ON A MODIFIED GAZ-66 CHASSIS. IN MOST CASES WHEN UNDER CANVAS IT CAN ONLY BE DISTINGUISHED UNDER CLOSE EXAMINATION AS A MORTAR SYSTEM.

RUSSIAN 120-MM TOWED COMBINATION GUN 2B16



SYSTEM	VARIANTS
Alternative Designations: Nona-K	None
Date of Introduction: early 1986	
Proliferation: At least 4 countries	
Description:	MAIN ARMAMENT AMMUNITION
Crew: 5	Caliber, Type, Name:
Carriage: Split Trail, 2-wheel torsion bar suspension	120-mm Frag-HE-cannon (3VOF49)
Combat Weight (mt): 1.1	Range (m): 15 – 8,850
Chassis Length Overall (m): 5.66	Complete Projectile Weight (kg): 19.80
Travel Position: 5.9	Muzzle Velocity (m/s): INA
Firing Position: INA	Fuze Type: PD and Proximity
Height Overall (m): 1.70	
Width Overall (m): INA	120-mm HEAT (BK-19) cannon
Travel Position: 1.79	Range (m): 40 – 1,000
Firing Position: INA	Complete Projectile Weight (kg): 13.20
Towing Speed (km/h):	Muzzle Velocity (m/s): 560
Max Road: 80	Fuze Type: PD and Proximity
Max Off-Road: 35	
Max Cross-Country: INA	120-mm Frag-HE rocket assisted cannon (OF-50)
Fording Depths (m): INA	Range (m): 1,700 – 12,800
Emplacement Time (min): 2	Complete Projectile Weight (kg): 19.80
Displacement Time (min): 2	Muzzle Velocity (m/s): 367
Protection:	Fuze Type: B35 PD
Armor, Front (mm): None	
Armor Side (mm): None	120-mm Laser-Guided Projectile, cannon (Kitilov-2, see pg 7-73)
Armor Roof (mm): None	
Self-Entrenching Blade: No	Lethality mechanism: Frag-HE fill
NBC Protection System: No	Range (m): 500 - 9,000
Smoke Equipment: No	Complete Projectile Weight (kg): 25
ARMAMENT	Muzzle Velocity (m/s): INA
Main Armament:	Fuze Type: PD
Caliber, Type, Name: 120-mm gun-mortar, 2A51	
Barrel Length (cal): 24.2	120-mm Frag-HE mortar (OF-843B)
Rate of Fire (rpm):	Range (m): 450 - 7,100
Burst: 8	Complete Projectile Weight (kg): INA
Normal: 6	Muzzle Velocity (m/s): INA
Sustained: 4	Fuze Type: PD and proximity
Loader Type: Semi-automatic	
Breech Type: Vertical sliding wedge	

Muzzle Brake Type: Multi baffle	Other Ammunition Types: All standard 120-mm mortar rounds, including Frag-HE-RA to 9,100m. See pgs 7-59-61, and -71.
Traverse (°):	
Left: 30	
Right: 30	
Total: 60	
Elevation (°):	
Left: 30	
Right: 30	
Total: 60	
Elevation (°) (-/+): -10/+80°	
FIRE CONTROL	
Indirect Fire: MP46M Panoramic Telescope	
Direct Fire: DF channel in the sight	
Collimator: K-1	
Gun Display Unit: None	
Fire Control Computer: None	

NOTES

GUN AND MORTAR FRAG-HE AMMUNITION FOR THE 2B16 CAN EMPLOY PROXIMITY FUZES FOR AIR BURST. THE 2B16 IS A TOWED VERSION OF THE 2S9. IT IS TOWED IN A TUBE-OVER-TRAILS CONFIGURATION. THE 2B16 IS A COMBINATION BREECH-LOADING RIFLED-BORE INDIRECT FIRE SYSTEM CAPABLE OF FIRING BOTH CANNON AND MORTAR PROJECTILES. THUS, IT COMBINES THE PROPERTIES OF A LIGHT HOWITZER AND A MORTAR. THE SPLIT-TRAIL CARRIAGE HAS A FIRING PEDESTAL, A VARIABLE-LENGTH RECOIL SYSTEM, AND A MANUALLY ACTIVATED PROJECTILE-RAMMING SYSTEM.

ADDITIONALLY, THE TRAILS ARE AUTOMATICALLY SPREAD AND CLOSED WITH THE ASSISTANCE OF A WINCH. MORE THAN LIKELY THE RAMMING DEVICE IS USED ONLY WHEN THE 2B16 IS FIRING AT HIGH ELEVATION ANGLES (GREATER THAN 600). THE MUZZLE BREAK ABSORBS APPROXIMATELY 30% OF THE RECOIL ENERGY.

THE 2B16 WAS DESIGNED AND DEVELOPED TO SUPPORT GROUND MANEUVER UNITS BASED ON THE RUSSIAN ARMY'S EXPERIENCES IN AFGHANISTAN. SOME RUSSIAN DESIGNERS DESCRIBED THE 2B16 AS A "BAD DESIGN". THERE IS NOTHING TO INDICATE WHAT LED TO THE UNVERIFIED CLAIMS THAT THE SYSTEM WAS FLAWED. HOWEVER, PRODUCTION OF THE COMBINATION GUN CEASED AND THE SYSTEM WAS BEING WITHDRAWN FROM SERVICE IN THE RUSSIAN ARMY UNTIL THE TOWED COMBINATION GUN WAS EMPLOYED WITH UNITS FIGHTING IN CHECHNYA DURING THE 1990'S. BASED UPON ITS SUCCESSFUL EMPLOYMENT AND PERFORMANCE IN CHECHNYA, THE 2B16 HAS EARNED THE DISTINCTION AS THE SYSTEM OF CHOICE FOR FIELDING WITH MOUNTAIN ARTILLERY UNITS. THE PRIME MOVER FOR THE COMBINATION GUN IS A GAZ-66 OR IT'S EQUIVALENT. HOWEVER, THE MANUFACTURER HAS INDICATED (IN RECENT SALES BROCHURES) THAT A UAZ-469 OR ITS EQUIVALENT CAN SUCCESSFULLY TOW THE COMBINATION GUN. THE ONLY DRAWBACK TO THE UAZ-469/2B16 TOWED CONFIGURATION IS THE UAZ-469'S LACK OF ON-BOARD CARGO SPACE FOR THE TRANSPORTATION OF AMMUNITION.

RUSSIAN 120-MM SELF-PROPELLED COMBINATION GUN 2S9-1



SYSTEM	VARIANTS
Alternative Designations: Nona-S, 120-mm SP How M-1981	2S9-1 offers improved ammo storage over the original 2S9
Date of Introduction: 1981 for original 2S9	
Proliferation: At least 3 countries	
Description:	MAIN ARMAMENT AMMUNITION
Crew: 4, with 6-8 in section	Caliber, Type, Name:
Vehicle Platform (chassis): Modified BTR-D APC	120-mm Frag-HE cannon (3VOF49)
Combat Weight (mt): 8.50	Fire Range (m):
Chassis Length Overall (m): 6.02	Minimum Range: 15
Height Overall (m): 2.6. Like the BTR-D, 2S9-1 can adjust height for mobility, reduced profile, and stability during firing	Maximum Range: 8,850
	Complete Projectile Weight (kg): 19.80
Width Overall (m): 2.63	Muzzle Velocity (m/s): INA
AUTOMOTIVE PERFORMANCE	Fuze Type: PD and Proximity
Engine Type: 240-hp Diesel	
Cruising Range (km): 500	120-mm HEAT (BK-19) cannon
Speed (km/h):	Fire Range (m):
Max Road: 60	Minimum Range: 40
Max Off-Road: 35	Maximum Range: 1,000
Cross-Country: INA	Armor penetration (mm): 600
Max Swim: 9	Complete Projectile Weight (kg): 13.20
Fording Depths (m): Amphibious	Muzzle Velocity (m/s): 560
Emplacement Time (min): 1 (est)	Fuze Type: PD
Displacement Time (min): 1 (est)	
Radio: R-123	120-mm Frag-HE rocket assisted cannon (OF-50)
Protection:	Fire Range (m):
Armor, Turret Front (mm): 10	Minimum Range: 1,700
Applique Armor (mm): N/A	Maximum Range: 12,800
Explosive Reactive Armor (mm): N/A	Complete Projectile Weight (kg): 19.80
Mineclearing Equipment: N/A	Muzzle Velocity (m/s): 367
Self-Entrenching Blade: No	Fuze Type: B35 PD and proximity
Active Protection System: No	
NBC Protection System: Yes	120-mm Laser-Guided Projectile, cannon (Kitilov-2, see pg 7-71)
Smoke Equipment: No, but available	
	Lethality mechanism: Frag-HE fill
ARMAMENT	Fire Range (m):
Main Armament:	Minimum Range: 500
Caliber, Type, Name: 120-mm gun-mortar, 2A51	Maximum Range: 9,000

Barrel Length (cal): 24.2	Complete Projectile Weight (kg): 25
Rate of Fire (rpm):	Muzzle Velocity (m/s): INA
Burst: 10	Fuze Type: PD
Normal: 6	
Sustained: 4	120-mm Frag-HE mortar (OF-843B)
Loader Type: Manual	Range (m):
Breech Type: combined semi-automatic breechblock with wedge locking mechanism and powder gases plastic obturator	Minimum Range: 450
	Maximum Range: 7,100
Muzzle Brake Type: None	Complete Projectile Weight (kg): INA
Traverse (°):	Muzzle Velocity (m/s): INA
Left: 35	Fuze Type: PD and proximity
Right: 35	
Total: 70	Other Ammunition Types: All standard 120-mm mortar rds (e.g., smoke, illumination, etc.) and cannon rounds (OF-34, OF-51). See pgs 7-61 and -71.
Minimum Range: 500	
Maximum Range: 9,000	
FIRE CONTROL	
Indirect Fire: Collimator	
Direct Fire: DF telescopic sight	
Collimator: K-1	
Fire Control Computer: None	
Gun Display Unit: None	

NOTES
GUN AND MORTAR FRAG-HE AMMUNITION FOR THE 2S9-1 CAN EMPLOY PROXIMITY FUZES FOR AIR BURSTS.

RUSSIAN 120-MM SELF-PROPELLED COMBINATION GUN 2S23



SYSTEM	VARIANTS
Alternative Designations: 120-mm 2S23 Nona-SVK	PLL05: Chinese SP combo gun fits a longer variant of the 2S23 cannon on 6-wheeled WZ-551 chassis (pg 3-26). It can fire ammo for the 2S23 but Chinese rounds include longer rounds for the newer Russian 2S31 (pg 7-61). It also mounts a 12.7-mm MG.
Date of Introduction: 1990	
Proliferation: At least 3 countries	
Description:	
Crew: 4	
Vehicle Platform (chassis): Modified BTR-80 APC	MAIN ARMAMENT AMMUNITION
Combat Weight (mt): 14.50	Caliber, Type, Name:
Chassis Length Overall (m): 7.50	120-mm Frag-HE cannon (3VOF49)
Height Overall (m): 2.75	Fire Range (m):
Width Overall (m): 2.90	Minimum Range: 15
AUTOMOTIVE PERFORMANCE	Maximum Range: 8,850
Engine Type: 260 hp V-8 water cooled diesel	Complete Projectile Weight (kg): 19.80
Cruising Range (km): 600	Muzzle Velocity (m/s): INA
Speed (km/h):	Fuze Type: PD and Proximity
Max Road: 80	
Max Off-Road: 60	120-mm HEAT (BK-19) cannon
Cross-Country: 40	Fire Range (m):
Max Swim: 10	Minimum Range: 40
Fording Depths (m): Amphibious	Maximum Range: 1,000
Emplacement Time (min): 1 (est)	Armor penetration (mm): 600
Displacement Time (min): 1 (est)	Complete Projectile Weight (kg): 13.20
Radio: R-173	Muzzle Velocity (m/s): 560
Protection:	Fuze Type: PD
Armor, Turret Front (mm): Against 12.7-mm	
Armor Turret Top (mm): INA	120-mm Frag-HE rocket assisted cannon (OF-50)
Armor Hull (mm): INA	Fire Range (m):
NBC Protection System: Yes	Minimum Range: 1,700
Smoke Equipment: Six 81-mm smoke grenade launchers	Maximum Range: 12,800
ARMAMENT	Complete Projectile Weight (kg): 19.80
Main Armament:	Muzzle Velocity (m/s): 367
Caliber, Type, Name: 120-mm gun-mortar, 2A60	
Barrel Length (cal): INA	120-mm Laser-Guided Projectile, cannon (Kitilov-2, see pg 7-71)
Rate of Fire (rpm):	
Burst: 10	Lethality mechanism: Frag-HE fill
Normal: 6	Fire Range (m):
Sustained: 4	Minimum Range: 500
Loader Type: Autoloader	Maximum Range: 9,000

Breech Type: combined semi-automatic breechblock with wedge locking mechanism and powder gases plastic obturator	Complete Projectile Weight (kg): 25 Muzzle Velocity (m/s): INA
Muzzle Brake Type: None	Fuze Type: PD
Traverse (°):	120-mm Frag-HE mortar (OF-843B)
Left: 35	Range (m):
Right: 35	Minimum Range: 400
Total: 70	Maximum Range: 7,100
Elevation (°) (-/+): -4/+80°	Complete Projectile Weight (kg): INA
Auxiliary Weapon:	Muzzle Velocity (m/s): INA
Caliber, Type, Name: 7.62-mm machinegun, PKT	Fuze Type: PD and proximity
Mount Type: Coax	
Direct Fire Range (m): 1,500	Other Ammunition Types: All standard 120-mm mortar rds (e.g., smoke, illumination, etc.) and cannon rounds (OF-34, OF-51). See pgs 7-61 and -71.
Max Effective Range (m): 1,000 day, night N/A	
Fire on Move: Yes	
Rate of Fire (rpm): 650 (cyclic), 2-10 round bursts	
FIRE CONTROL	
Indirect Fire: INA	
Direct Fire: DF telescopic sight	
Collimator: K-1	
Gun Display Unit: None	
Fire Control Computer: None	

NOTES

2S23 HAS A DEVICE FOR LOADING PROJECTILES FROM THE GROUND. DURING TRAVELING THE DEVICE IS EXTERNALLY ATTACHED ON THE RIGHT SIDE NEAR THE SIDE DOOR.

GUN AND MORTAR FRAG-HE AMMUNITION FOR THE 2S23 CAN EMPLOY PROXIMITY FUZES FOR AIR BURSTS.

SWEDISH 120-MM TERMINAL-HOMING MORTAR PROJECTILE STRIX





SYSTEM	VARIANTS
Alternative Designations: N/A	None
Date of Introduction: 1994	**SUPPORT REQUIRED**
Proliferation: At least 4 countries	A critical need is target location within 75 m
Producer: Bofors	Modern (Tiers 1and 2) man-portable acquisition equipment for observation posts include GPS, LRF binoculars, LTDs (with LRF included, and precision scopes offer rapid acq within 5 m
Description:	
Weight (kg): 17.60	
Length Overall (m): 0.83	A direct link to the OP to assure timing and accuracy, and to adjust fire
Range (km):	
1-4 with special expulsion charge	If a moving target must be stopped, mines or other obstacles must be laid
1.7-8 with charge plus attachment of sustainer motor	
Guidance System:	If the mortar or combination gun, or supporting artillery can fire DPICM rounds, the dud field can halt moving vehicles
IR seeker, 12 thruster rockets	
16-bit micro- processor retains path data and target identification data	Employment Time (min): 1-5 est, depending on system
	Rate of Fire (rpm): Up to 9, although most point targets will require 1-6 rounds
Acquisition Radius (m): 150	
Lethality mechanism:	**USING SYSTEMS**
Type: Shaped-charge (HEAT)	Any 120-mm smoothbore mortar and combination gun can fire the round. The Advanced Mortar System (AMOS) can fit on a variety of vehicle chassis, boats and ships as the Patria vehicle below.
Fuze Type: PD	
Penetration: 600 (CE), top-attack. In addition, unburned thruster propellant is ignited	
Probability of Kill Given a Hit (%): 90	
Number per kill, Moving Target: 4-6 (P-hit 20% est)	
Number per kill, Stationary Target: 1-2 (P-hit 75% est)	
CM VULNERABILITY	
IR absorbing paint, camouflage material, or tenting can affect the seeker	
IR-suppressive smoke can affect the seeker	
Target can hide under dense tree canopy, building cover, etc	
Decoy targets such as heated plates may deflect the seeker	
Any challenge to location accuracy, such as smoke, dust, or target speed, may decrease the possibility that the target is within the seeker footprint	
If targets disperse when under attack, some may be able to avoid the footprint	

EMPLOYMENT	TARGET TYPES
Crew: 1 additional member in mortar crew to load seeker data	High-value target vehicles include approaching tanks, IFVs, SP artillery, scatterable mine launcher vehicles, ATGM vehicles, etc
Loading Method:	Vehicles must be hot (sun or recent move).
Hand-load or auto-load without sustainer motor	Stationary vehicle targets are preferred
Hand-load only with sustainer motor	
Equipment/Modifications Required:	
A computer (e.g., small 2-lb notebook type) is used to load target description data (from target library) into the round	
Rounds may require less target detail if other hot systems are not in the area	

NOTES
EMPLOYMENT CONSIDERATIONS AFFECT FIELDING AND USE FOR TERMINAL-HOMING MUNITIONS, IN GENERAL, AND THIS PROJECTILE IN PARTICULAR. THMP ARE FAIRLY EXPENSIVE, AND SO MUST BE METED OUT FOR USE WHEN CONDITIONS ARE OPTIMIZED, AND WHEN THE TARGETS ARE OF HIGH PRIORITY. THE HIGH PRIORITY USUALLY MEANS WHEN THE TARGETS ARE A HIGH THREAT TO INTEGRITY OF THE FORCE. WHEN MORTARS/COMBINATION GUNS HAVE LASER TARGET DESIGNATORS (LTDS) AVAILABLE WITH A FIELD OF VIEW OF THE TARGET, LGP ARE PREFERABLE FOR USE AGAINST MOST TARGETS, BECAUSE OF THE HIGHER ASSURANCE OF A HIT. HOWEVER, CONDITIONS MAY LIMIT LGP USE. THOSE CONDITIONS INCLUDE LACK OF LTDS IN THE AREA, SHORT LINES OF SIGHT, OTHER LGP COMMITMENTS, EXCESSIVE LAZING ANGLES, DUST AND FOG INTERFERENCE, ETC. THMP CAN BE LAUNCHED BY ANY MORTARS WITH ACCOMPANYING COMPUTER TO LOAD DATA, AS LONG AS AN OBSERVER IS AVAILABLE. NOTE THE DISCUSSION UNDER EMPLOYMENT, ABOVE, AND OF THMP.

RUSSIAN ARTILLERY COMMAND AND RECONNAISSANCE VEHICLE 1V18/1V19



SYSTEM	VARIANTS
Alternative Designations: M1979-2A (1V17), M1979-2B (1V18)	None
Date of Introduction: 1979	
Proliferation: At least 1 country	
Description:	
Crew: 6	
Platform (chassis): BTR-60PB	

Combat Weight (mt): 10.1	SENSORS/COMPONENTS
Chassis Length Overall (m): 7.22	Navigation: 1T121-M Navigation System
Height Overall (m): 2.06	Fire direction:
Width Overall (m): 2.82	Automated: 1V520
Automotive Performance:	Manual: PUO-7
Engine Type: 2 GAZ-49B 90 hp (180 hp total) in-line, water-cooled gasoline	Other equipment: 1D15 laser rangefinder, 1PN44 day/night sight, PAB-2AM aiming circle, DS-1 stereoscopic rangefinder
Cruising Range (km): 500 km	
Speed (km/h):	
Max Road: 80	
Max Off-Road: 60	
Cross-Country: INA	
Max Swim: 10	
Fording Depths (m): Amphibious	
Radio:	
1V18: R-123M (3 each), R-107M (1 each)	
1V19: R-123M (2 each), R-107M (1 each), R-111 (1 each), R-130M (1 each)	
Protection:	
Armor, Turret Front (mm): INA	
Armor Turret Top (mm): INA	
Armor Hull (mm): INA	
NBC Protection System: Yes	
Smoke Equipment: No	

NOTES

IN 1979, THE SOVIET UNION INTRODUCED A SIMILAR WHEELED ACRV SET FOR MULTIPLE ROCKET LAUNCHER AND TOWED CANNON UNITS. THE EIGHT-VEHICLE SET CONSISTS OF THREE 1V110 BATTERY SENIOR OFFICER'S VEHICLES, THREE 1V18 BATTERY COMMANDER'S VEHICLES, ONE 1V19 BATTALION COMMANDER'S VEHICLE, AND ONE 1V111 BATTALION CHIEF OF STAFF'S VEHICLE. EARLY VERSIONS OF THE 1V17 ACRV SET INCLUDED A 1V111 EQUIPPED WITH A MODIFIED ZIL-130-MOUNTED 9S77M INSTEAD OF THE ZIL-131. THERE HAVE BEEN NO UPGRADES TO THE 1V17 LIKE THAT OF THE 1V12 TO 1V12M.

THE ACRV 1V18 AND 1V19 ARE THE BATTERY AND BATTALION COMMANDER'S VEHICLES OF THE 1V17 ACRV COMPLEX. BOTH VEHICLES ARE EQUIPPED WITH THE 1T121 LAND NAVIGATION SYSTEM, A 1D15 LASER RANGEFINDER, AND THE 1PN44 DAY/NIGHT SIGHT. THE OBSERVER USES AN ANALOG COORDINATE CONVERTER TO TRANSLATE THE POLAR LOCATION DATA WHEN DETERMINING RECTANGULAR TARGET COORDINATES. THE 1V520 FIRE DIRECTION COMPUTER MAY BE TRANSPORTED INTERNALLY AND DISMOUNTED AT A COMMAND OBSERVATION POST.

RUSSIAN ARTILLERY COMMAND AND RECONNAISSANCE VEHICLE 1V110



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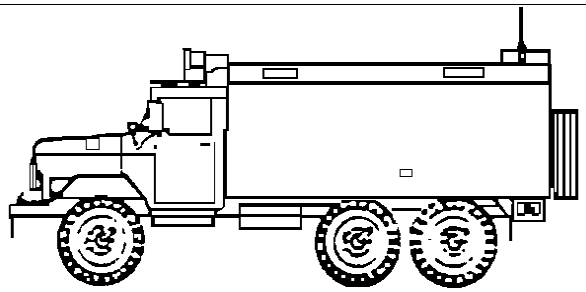
SYSTEM	VARIANTS
Alternative Designations: M1979-1	None
Date of Introduction: 1979	
Proliferation: At least 1 country	
Description:	
Crew: 5	
Platform (chassis): GAZ-66B, 4x4 wheeled, Box Body Van	
Combat Weight (mt): 3.6	
Chassis Length Overall (m): 5.66	SENSORS/COMPONENTS
Height Overall (m): 2.44	Navigation: See NOTES
Width Overall (m): 2.34	Fire direction: No computation system is installed. The vehicle is equipped with the APK automated firing data receiver
Automotive Performance:	
Engine Type: ZMZ-66, 115 hp V-8, water-cooled, gasoline	Other equipment: DSP-30 laser rangefinder, K-1 collimator
Cruising Range (km): 875 km	
Speed (km/h):	
Max Road: 87	
Max Off-Road: 35	
Cross-Country: INA	
Max Swim: .80	
Radio: R-123M radio (3 each)	

NOTES

In 1979, the Soviet Union introduced a similar wheeled ACRV set for multiple rocket launcher and towed cannon units. The eight-vehicle set consists of three 1V110 battery senior officer's vehicles, three 1V18 battery commander's vehicles, one 1V19 battalion commander's vehicle, and one 1V111 battalion chief of staff's vehicle. Early versions of the 1V17 ACRV set included a 1V111 equipped with a modified ZIL-130-mounted 9S77M instead of the ZIL-131. There have been no upgrades to the 1V17 like that of the 1V12 to 1V12M.

The ACRV 1V110 battery FDC serves the same function as the ACRV 1V13 (1V12 ACRV Complex) and is similarly equipped. However, the land navigation system is a different model.

RUSSIAN ARTILLERY COMMAND AND RECONNAISSANCE VEHICLE 1V111



SYSTEM	VARIANTS
Alternative Designations: M1979-3	None
Date of Introduction: 1979	
Proliferation: At least 1 country	
Description:	
Crew: 5	
Platform (chassis): ZIL 131 6x6 box body van	
Combat Weight (mt): 6.7	
Chassis Length Overall (m): 6.90	SENSORS/COMPONENTS
Height Overall (m): 2.48	Fire direction: 9V59 fire-control computer
Width Overall (m): 2.50	
Automotive Performance:	
Engine Type: ZIL 131 6x6 box body van	
Cruising Range (km): 850 km	
Speed (km/h):	
Max Road: 80	
Max Off-Road: 35	
Cross-Country: INA	
Max Swim: 1.4	
Radio: R-111M (I each), R-123M (2 each) radios; R-130M short-wave radio (1 each), and R-326 receiver (1 each)	

NOTES

IN 1979, THE SOVIET UNION INTRODUCED A SIMILAR WHEELED ACRV SET FOR MULTIPLE ROCKET LAUNCHER AND TOWED CANNON UNITS. THE EIGHT-VEHICLE SET CONSISTS OF THREE 1V110 BATTERY SENIOR OFFICER'S VEHICLES, THREE 1V18 BATTERY COMMANDER'S VEHICLES, ONE 1V19 BATTALION COMMANDER'S VEHICLE, AND ONE 1V111 BATTALION CHIEF OF STAFF'S VEHICLE. EARLY VERSIONS OF THE 1V17 ACRV SET INCLUDED A 1V111 EQUIPPED WITH A MODIFIED ZIL-130-MOUNTED 9S77M INSTEAD OF THE ZIL-131. THERE HAVE BEEN NO UPGRADES TO THE 1V17 LIKE THAT OF THE 1V12 TO 1V12M.

THE ACRV 1V111 BATTALION FDC/CHIEF OF STAFF'S VEHICLE SERVES THE SAME FUNCTON AS THE ACRV 1V16 (1V12 ACRV COMPLEX) AND HOUSES THE FIRE-DIRECTION COMPUTER. LIKE THE 1V16, IT IS THE SIMPLEST OF THE VEHICLES IN THE 1V17 ACRV COMPLEX AND LACKS A LAND NAVIGATION SYSTEM.

RUSSIAN ARTILLERY COMMAND AND RECONNAISSANCE VEHICLE 1V119



Front view of a Russian 1V119

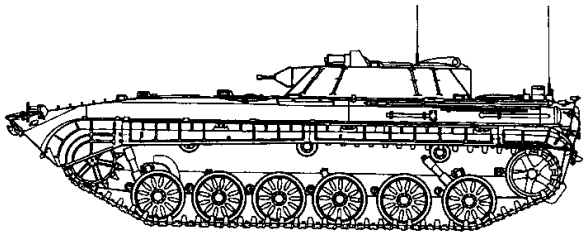
SYSTEM	VARIANTS
Alternative Designations: 1V119 Spektr	None
Date of Introduction: 1981	
Proliferation: At least 1 country	
Description:	
Crew: 6	
Platform (chassis): BMD-1	
Combat Weight (mt): 6.7	
Chassis Length Overall (m): 5.88	SENSORS/COMPONENTS
Height Overall (m): 1.97	Navigation: 1T121-M Navigation System
Width Overall (m): 2.63	
Automotive Performance:	Fire direction:
Engine Type: Type 5D20, 240 hp V-6, liquid-cooled diesel	Automated: 1V520
Cruising Range (km): 500 km	Manual: PUO-7
Speed (km/h):	
Max Road: 61	Other equipment: 1D15 laser rangefinder, DSP-30 rangefinder, 1PN44 day/night sight, PAB-2AM aiming circle, DS-1 stereoscopic rangefinder, VOP-7 vision blocks and driver's periscopes
Max Off-Road: 35	
Cross-Country: INA	
Max Swim: 10	
Fording Depths (m): Amphibious	
Radio: R-123M (3 each), R-107M (1 each)	
Protection:	

Armor, Turret Front (mm): INA	
Armor Turret Top (mm): INA	
Armor Hull (mm): 15	
NBC Protection System: Yes	
Smoke Equipment: No	

NOTES

THE ACRV 1V119 IS ASSOCIATED WITH THE DEPLOYMENT OF THE 2S9 NONA-S 120-MM COMBINATION GUN AND CAN BE PARACHUTE LANDED WITH AIRBORNE TROOPS. THE 1V119'S SENSOR AND FIRE DIRECTION PACKAGE IS SIMILAR TO THE ACRV 1V14. THE 1V118 REOSTAT IS CLASSIFIED AS A COMMAND AND RECONNAISSANCE VEHICLE AND IS NOT ASSOCIATED WITH AN ACRV COMPLEX.

RUSSIAN ARTILLERY MOBILE RECONNAISSANCE VEHICLE PRP-3 AND PRP-4M



PRP-3 with SMALL FRED radar



PRP-4MU with Kredo-M radar

SYSTEM	VARIANTS
Alternative Designations: PRP-3 aka: Val. It is also referred to as a mobile reconnaissance post (MRP)	The PRP-4 variants still use a BMP-1 chassis, but lack the rocket launchers. They differ in their upgraded sensors and components
Date of Introduction: 1975	
Proliferation: At least 1 country	SENSORS/COMPONENTS
Description:	PRP-3/Val Sensors/Components:
Crew: 5, including two scouts for dismounted operations	Navigation: 1G25 gyrocompass and 1G13 gyro course indicator
Platform (chassis): BMP-1	Fire Direction: 1V520 Ballistic Computer
Combat Weight (mt): 13.2	Right Side Sensors: Day sight, 1PN61 passive IR night sight (with a laser illuminator, aka: laser radar), and 1D11 laser rangefinder
Chassis Length Overall (m): 6.73	
Height Overall (m): 2.14	
Width Overall (m): 2.94	Left Side Sensors: None
Automotive Performance:	Other sensors: There are two periscopes for commander and operator. The PRP-3 has launcher racks on the back of the turret for illumination rockets
Engine Type: 293-hp Diesel	
Cruising Range (km): 600 km	
Speed (km/h):	
Max Road: 60	PRP-4/Nard Sensors/Components (fielded mid-1980s):
Max Off-Road: 35	Navigation: 1G25 gyrocompass and 1G13 gyro course indicator
Cross-Country: INA	Fire Direction: 1V520 Ballistic Computer
Max Swim: 7	Communications: R-173
Fording Depths (m): Amphibious	Right Side Sensors: LLLTV sight, 1PN61 and 1D11M-1 LRF. Range (km): 10 for TV and LRF, 3 1PN61
Radio: R-123M on PRP-3. For variants, see right	
Protection:	Left Side Sensors: 1PN59 Thermal sight and 1D14. Range (km): 3
Armor, Turret (mm): 23	
Armor Hull (mm): 19	Radar: 1RL133-1 PSNR-5K/TALL MIKE Radar
Self-Entrenching Blade: No	Operating Band: I
NBC Protection System: NBC filtration and overpressure system	Detection Range (vehicle): 10, 15 larger vehicles
Smoke Equipment: Vehicle engine exhaust smoke system (VEESS)	Detection Range (personnel): 3.0 km
ARMAMENT	The radar can be dismounted for tripod mount in a remote OP. A 1D13 LRF is provided for dismounts.
Main Armament:	
Caliber, Type, Name: 7.62-mm machinegun PKT	PRP-4M/Deytery Sensors/Components (1988):
Mount Type: Coaxial	Radar is PSNR-5M (see pg 4-30); and the LRF is now 1D14.
Direct Fire Range (m): 1,300	
Max Effective Range (m):	PRP-4MU Sensors/Components (1997):
Day: 1,000 / 400-500 on the move	

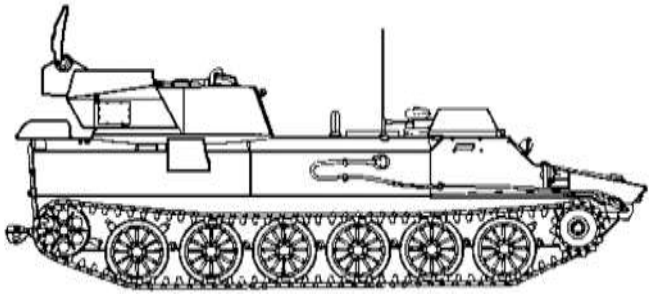
Night: 800	Communications: R-163-50, with 60-km range, and digital transmission and digital map overlay capability
Fire on Move: Yes	Radar: PSNR-5M, but Kredo-M1 is now optional (see pg 4-30)
Rate of Fire (rpm): 600 cyclic in 2-10 round bursts	

NOTES

A BRM-3K HAS THE SAME SENSORS AS THE PRP-4M, AND HAS BEEN UPGRADED SIMILARLY. IT CAN BE USED IN ITS PLACE BUT COSTS MORE.

THE LATEST AVAILABLE RADAR FOR REPLACING PSNR-5K OR PSNR-5M IS KREDO-1E. THE KREDO-1E COHERENT DOPPLER RADAR OFFERS A MAST-MOUNTED DROP-IN REPLACEMENT FOR THE PSNR-5/KREDO-M1 RADARS, WITH RANGE TO 40 KM. PROCESSING, DISPLAY, AND TRANSMISSION EQUIPMENT CHANGES REQUIRED SIMILAR TO THOSE ON THE KREDO-M1 UPGRADE. SEE PG 4-30 FOR DATA.

RUSSIAN BATTLEFIELD SURVEILLANCE RADAR SNAR 10



SNAR 10 with radar raised and the turret mounted 7.62 PKT MG pointed to the rear

SYSTEM	VARIANTS
Alternative Designations: BIG FRED, 1RL232, 1RL232-1	SNAR-10M: This updated vehicle replaces the BIG FRED radar with a Kredo-1E radar, for a ground vehicle detection range of 40 km. It also has digital display and communications. See page 4-31 for further radar data
Date of Introduction: 1975	
Proliferation: At least 12 countries	
Description:	
Crew: 5	
Platform (chassis): MT-LBu	
Combat Weight (mt): 12.6	SENSORS/COMPONENTS
Chassis Length Overall (m): 7.62	Radar
Height Overall (m): 2.72 (est)	Performance Capability
Width Overall (m): 2.85 (est)	Antenna Type: Parabolic
Automotive Performance:	Operating Band: K (34.55 to 35.25 GHz)
Engine Type: YaMZ-238, 240 hp diesel	Detection Range Against Moving Targets, Without MTI (km):
Cruising Range (km): 500 km	Vehicles: 16.0
Speed (km/h):	Ships: 30.0
Max Road: 60	Shell Impact: 10.0
Max Off-Road: 26	Detection Range Against Moving Targets, With MTI (km):
Cross-Country: INA	Vehicles: 10.0
Max Swim: N/A	Emplacement Time (minutes): 5.0
Fording Depths (m): INA	Displacement Time (minutes): 5.0
Radio: R-123M, 2 each	
Protection:	
Armor, Turret Front (mm): 20	
Armor, Turret Top (mm): INA	
Armor Hull (mm): 15	
NBC Protection System: Yes	
Smoke Equipment: No	
ARMAMENT	
Main Armament:	
Caliber, Type, Name: 7.62-mm machinegun PKT	
Mount Type: Coaxial	
Direct Fire Range (m): 1,300	
Max Effective Range (m):	
Day: 1,000 / 400-500 on the move	
Night: 800	
Fire on Move: Yes	
Rate of Fire (rpm): 600 cyclic in 2-10 round bursts	

NOTES
THE PRIMARY MISSION OF THE BIG FRED RADAR IS TO DETECT AND TRACK BOTH MOVING GROUND AND WATER SURFACE TARGETS. ADDITIONALLY, THE RADAR CAN BE USED TO PROVIDE FRIENDLY FIRE CORRECTION DATA TO ARTILLERY UNITS. THE SNAR 10 IS NOT CAPABLE OF AMPHIBIOUS OPERATIONS (UNLIKE OTHER MEMBERS OF THE MT-LBU FAMILY) DUE TO THE HEAVY TURRET. THE VEHICLES ARE ALSO EQUIPPED WITH A NBC FILTRATION AND OVERPRESSURE SYSTEM.


TRADOC
G-2

Jan

2016

Worldwide Equipment Guide

Chapter 7: Engineer Vehicles



TRADOC G-2 ACE–Threats Integration

Ft. Leavenworth, KS

Distribution Statement: Approved for public release; distribution is unlimited.

Chapter 8: Engineers

Chapter 8 of the *Worldwide Equipment Guide* (WEG) provides the basic threat characteristics for selected engineering equipment and systems. The engineer chapter discusses the following topics: landmines, minelaying systems, mine-clearing systems, route clearing systems, and "gap-crossing" systems either in use or readily available to the OPFOR and therefore likely to be encountered by US forces in varying levels of conflict in the future.

The list of engineer systems within this chapter is not meant to be encyclopedic. This chapter provides the US training community with a list of representative engineering (systems based) capabilities that allow scenario developers and the rest of the training community to create a dynamic threat to prepare today's warfighter for tomorrow's battlefield.

The chapter is divided into three major categories—***The Land Mine Primer, the Unmanned Ground Vehicle (UGV) Primer, and WEG Sheets on mobility engineering assets***. The Land Mine Primer focuses on counter-mobility and examines types of mines, minefields, emplacement or mine delivery methods. The UGV Primer discusses provides an UGV overview and of how certain systems are used for detect hazards and supporting the defeat of explosive devices such as mines. The third section consists of WEG sheets on mobility engineering assets such as but not limited to bridge crossing and mine clearing assets.

Questions and comments on data listed in this chapter should be addressed to:

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Land Mine Primer

The widespread proliferation and use of landmines on today's battlefield can be contributed to a combination of a number of factors, which include the following: the ability to easily mass produce items, the development of plastic devices, improved battlefield delivery systems, and ongoing research with regards to sophisticated fuzes. The advances in mass production techniques and the associated reduction in per-item cost along with the simplicity of manufacturing/automated production make landmines extremely easy and relatively inexpensive to produce. Technological improvements have also affected landmines in the form of the widespread use of plastic in the construction of the devices. This development has rendered metal detectors mostly ineffective for locating newer plastic-cased mines (unless the manufacture intentionally places a mass of metal in the mine). Remotely delivered mines have expanded the capability for quickly changing the tempo of battle with relation to counter mobility tactical actions and reinforcing defensive positions.

1. Types of Minefields. The following are basic types of OPFOR minefields: antitank (AT), antipersonnel (AP), mixed, decoy, and antilanding. AT minefields are the primary types of OPFOR engineer obstacle and serve to destroy or disable armored vehicles. They are primarily established in belts consisting of multiple rows on avenues that are favorable for tanks in front of the forward edge and on the flanks. Where difficult terrain is available, minefield belts will be tied into terrain obstacles to reduce the mine requirement. The OPFOR sets up conventional AP minefields on the forward edge of friendly defensive positions, in front of AT minefields, or along dismounted avenues of approach. Mixed minefields consist of both AP and AT mines. Decoy minefields are a significant form of deception to slow movement or deceive as to true unit locations. Antilanding minefields prevent landings by amphibious, airborne, or heliborne assault forces.

Minefields can also be categorized by their technical method of activation—uncontrolled, controlled, and intelligent. Controlled minefields consist of landmines with electronic switches that allow the operator (controller) control over the operational status of the minefield. The operator can change the status of the landmines either by a direct hardwire link or by radio. An entire minefield can be emplaced and turned on or off, as necessary to best support OPFOR operations. On a smaller scale, select passages in a conventional minefield can contain controllable landmines, allowing for the option of clearing safe lanes. The addition of selectable, anti-removal, and self-destruct features to controlled mines enhance flexibility and overall effectiveness.
Intelligent minefields have advanced technology that allows minefields to switch on and off and to deactivate at a certain time. When used in conjunction with unmanned ground sensors (UGS) they can communicate via and communications link and be activated remotely. Other advancements include acoustic and infrared signature activated mines. While many of these concepts are in the developmental stage, the technological means are available and have the potential to deploy as needs arise. They will be composed of "wide area coverage" mines.

2. Types of Mines. Mines may be AT/anti-vehicle, AP, antihelicopter, or area mines. They may also be defined by the manner in which they are emplaced such as scatterable (remote), or side-attack (generally AT or anti-vehicle) or their area coverage. As noted earlier for minefields, the OPFOR makes distinctions between controlled mines (command-operated by hard wire or radio linkage) and uncontrolled mines.

Side-attack mines are autonomous weapons that attack targets from the side as they pass by. These include anti-vehicle, anti-personnel, and anti-helicopter mines. They vary among manufactured side-attack mines, side-attack improvised explosive devices, and mines created by attaching manufactured or improvised sensor units to anti-tank grenade launchers (ATGLs) and anti-tank disposable launchers (ATDLs). Some side-attack mines can be used

for multiple roles. For instance, directional fragmentation mines and IEDs can be used against personnel and vehicles. Some like the MON-100 can tilt upward for anti-helicopter use.
Current developments in side-attack landmines use mature technology from other weapon programs. Since side-attack landmines have increased areas of coverage, the number required to hinder mobility of enemy forces is greatly reduced. Uses for these landmines include harassment throughout the area of operation and reinforcement of conventional minefields to make "cleared" lanes unsafe. Special Purpose Forces (SPF) and security patrols can also use these mines to economically cover multiple avenues of approach to alert on enemy encroachments. These types of mines can be used in ambush's kill zones.

Antitank. Conventional antitank mines, such as the TM-62 AT mine, are those that are emplaced either by hand or by mechanical means. These will continue to be the primary landmine threat throughout the foreseeable future. They are readily available to armies and insurgency groups worldwide and are inexpensive and effective. These mines are normally buried just below the surface of the ground but can be surface laid or buried with up to 30 cm of cover. Antitank mines can vary in size from as small as 1.4 kg for a scatterable mine (PTM-1S) to over 20 kg for a side attack mine (TM-83). The category of antitank mines includes side-attack and anti-vehicle mines.

Side-attack antitank. Commonly called "off-route mines", side-attack mines are an integral part of the adaptive battlefield and date back to the LGM trip-wire AT mines of the Vietnam War era. Today there are at least 18 different side-attack mines in use by 22 countries. Ten more side-attack mines are under development. Within the next few years these weapons will have proliferated to every combat environment. Some mines have been out fitted with acoustic and infrared signature detonation capabilities. The Polish Agawa comes in two variants, the legacy contact-fuzed MPB-ZK and the new non-contact, acoustic-activated MPB-ZN. Some mines and IEDs have warheads which produce an explosively formed penetrator (EFP), a metal sabot which penetrates light to heavy armor, depending on design. EFPs were used in the Iraqi theater against US and coalition forces. The majority of usage of such systems were by Shia Militias. Such mines include the Russian TM-83, and TEMP-30 sensor-fuzed mine. Sensor fuzed ATGL or ATDL based mines can also be effective. A shoulder-fired AT weapon placed on a tripod and fitted with an IR sensor can kill moving targets up to 100 meters away. Current warhead technology in these weapons allows penetration of up to 950 mm of rolled homogeneous armor.

Anti-vehicle. Many smaller antitank mines, or larger antipersonnel mines, have been developed (or modified) to severely damage or destroy vehicles other than tanks with a few pounds of high explosives or fragmentation. These may be either trucks, tactical utility vehicles such as UAZ-469, or light armored combat vehicles such as BTRs.

Side-attack sensor-fuzed mines such as Russian platter mines direct fragmentation to damage or destroy vehicles. Other mines and IEDs (e.g., PD Mi-Pk) initiate multiple EFPs for KE penetration. Blast effects from mines and IEDs can inflict kinetic energy damage by flipping over vehicles, bending metal, and tossing material about inside to kill or injure personnel.

Antipersonnel. Antipersonnel landmines injure by either blast or fragmentation. The small antipersonnel mine contains no more than a pound (usually only a few ounces) of high explosive. Blast injures by the force of the charge. The loss of a foot or a leg is the common result. Fragmentation mines contain hundreds to thousands of pellets. Plastic-cased landmines pepper their victims with small particles of plastic that are not detectable with x-



rays, making complete cleansing of wounds extremely difficult and increasing the risk of infection and amputation. On the battlefield, the modern AP mine is used to—

- Inflict personnel casualties.
- Hinder soldiers in clearing AT minefields.
- Establish defensive positions.
- Deny access to terrain.

Anti-helicopter. The modern attack helicopter, with increasing agility and weapons payload, is able to bring enormous firepower to bear on enemy forces. To counter this threat, a new type of mine—the antihelicopter mine—was developed. By borrowing technologies from the side-attack and wide-area landmines, antihelicopter mines may make use of acoustic fuzing to locate and target potential low-flying targets at significant distances. Their multiple-fragment warheads are more than capable of destroying light-skinned, non-armored targets at closer ranges.

A simple antihelicopter mine can be assembled from an acoustic sensor, a triggering IR sensor, and a large directional fragmentation mine. More advanced mines use a fairly sophisticated data processing system to track the helicopter, aim the ground launch platform, and guide/fire the kill mechanism toward the target. As the helicopter nears the mines, the acoustic sensor activates or cues an IR or MMW sensor. This second sensor initiates the mine when the helicopter enters the lethal zone of the mine. A typical large fragmentation warhead is sufficient to damage soft targets, such as aircraft. Alternate warhead designs include high-explosive warheads and single or multiple explosively formed penetrators.

Area Coverage. The terms “area” and “wide area” mines are often confusing and misleading. Mines classified as area mines range from antipersonnel “bouncing Betty” mines to side-attack mines, directional fragmentation mines “claymores”, and possibly antihelicopter mines. Wide area coverage mines with sophisticated fuzing and possibly a limited communications capability are weapons of the future and have not been fielded. The Polish Agawa MPB-ZN is a wide area coverage AT mine with an acoustic activated target detection range of around 150m and its EFP is described as effective against 100 mm of rolled homogenous steel armor at distances of 50 m.

3. Emplacement or Delivery Methods. In the past, landmines were generally emplaced manually one at a time. Mass mine delivery and distribution systems permit the rapid placement of large quantities of mines. Landmine emplacement vehicles are designed to automatically arm and bury a landmine every 3-10 meters. Landmines also may be placed with artillery, rockets, or aircraft at a rate of hundreds, even thousands, of mines per minutes. Emplacement means may be manual, mechanical, or remote. Manual emplacement is not possible when there is little time or during high-speed maneuver operations. Therefore, mechanical and remote means are more prevalent.

Manual. The OPFOR manually emplaces minefields when

- There is no contact with the enemy.
- Mechanical minelayers are unavailable.
- It is inadvisable to use mechanical minelayers because of terrain restrictions.

Mechanical. OPFOR engineers rely extensively on mechanized minelayers. These can bury or surface-lay AT mines. The layout of mechanically emplaced minefields is the same as those emplaced by hand. Mines can also be emplaced by helicopters or vehicles with the use of chutes (slides). Mine chutes can also be used to assist manual burial emplacement or to surface-lay mines.

Scatterable Mines. Known as "scatterable mines" in the US, other countries call them "remotely-delivered". They are landmines emplaced through a variety of means and are designed as such to be delivered by aircraft, tube artillery, multiple rocket launchers, missiles, ground vehicles, or they can be hand-thrown. Scatterable mines are not a standard item except in well-equipped armies of the world. While the number of countries possessing scatterable mines continues to increase, there will continue to be many areas of the world where scatterable mines are not a threat through the far term.

Minefield emplacement is progressing from manually and mechanically emplaced minefields to the more flexible and dynamic remotely, scatterable minefield. The ability to remotely deliver mines allows a rapid response with thousands of landmines at any point on the battlefield. Since many scatterable landmines feature self-destruct and anti-disturbance fuzing, they are well suited for operations that deny terrain for a specific period. After the allotted time has expired, the terrain can once again be used by friendly forces. Scatterable mines may be delivered by the following methods:

Artillery. Multiple rocket launchers are the primary means of remote minelaying. The principal advantage of MRL mine delivery is its ability to quickly emplace large minefields in a single volley, while minimizing exposure to enemy targeting and weapon systems. Both AP and AT mines can be delivered by artillery (which may include cannon and mortar rounds).

Ground Vehicles. Within recent years the trend has been to mount scatterable-mine dispensers on ground vehicles. Both AP and AT mines can be launched from ground vehicles. This also gives the engineers the ability to re-seed or reinforce an obstacle without entering the minefield itself.

Infantry. Lower level OPFOR infantry units may employ man-portable remote mine dispensers. These man-portable dispensers, weighing only a few pounds, are ideal for installing small, defensive, AP or AT minefields. Infantry-fired ground dispensers allow low-level units to remotely emplace minefields to protect their fighting positions, flanks, and boundaries between units, or to cover firing lines and gaps in combat formations. They can quickly close breaches in existing protective minefields and increase the density of mines on armor avenues of approach.

Aerial. Both AT and AP minefields can be laid using aerial minelaying systems. Bombers and fighter-bombers can lay remotely delivered minefields in the operational depths. Ground-attack aircraft lay these minefields in the enemy's tactical depths. Helicopter minelaying systems are used to emplace small mine belts or large barrier minefields in the execution of army or division offensive or defensive maneuver plans. This type of aerial minelaying is normally conducted over friendly territory along flanks or in rear areas.

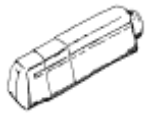
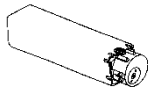
When supporting an airborne or air assault landing, helicopters may lay mines on enemy territory. Helicopter mine chutes are a tool available to even low-technology helicopter forces for installation on a variety of helicopters by low echelon maintenance units and rapidly dispensing conventional anti-tank mines in areas inaccessible to even

rapidly moving ground vehicles. Placement of a limited number of side-attack or conventional AT/AP mines along likely movement routes allows the OPFOR to harass traffic, slow movement rates, cause casualties, and affect enemy morale.

4. Fuzes. Some types of fuzes, such as pressure fuzes, are used in both AT and AP mines while other fuzes tend to be linked to more specific types of mines. For example, acoustic sensors are generally used with antihelicopter and advanced off-route mines while magnetic, tilt-rod, or seismic fuzes are used with AT mines. Most AT mines are detonated by the pressure of a vehicle driving over a buried mine or by the movement of a tilt rod attached to the mine.

Pressure and tilt-rod AT mine fuzes (contact fuzes) are being complemented and in certain cases replaced by mines with magnetic, optical, seismic, and acoustic influence mines. Some mines have a second fuze well to facilitate the installation of an antihandling fuze. Conventional antihandling devices and target-sensing fuzes have evolved into sophisticated booby traps, which virtually assure grievous injury or death to the de-miner. Some landmines may be detonated by metal detectors; others explode when their fuzes detect light when lifted from the ground. One version of the “Bouncing Betty” is activated by an array of seismic detectors. Other mines, for example the US M18A1, will accommodate a variety of fuzes, including tripwire and command detonation. Other mines, especially antihelicopter mines use a combination of sensors/fuzes to acquire the helicopter and initiate the mine when the helicopter enters the lethal zone. The following is a list of fuzes:

Pressure. The pressure fuze is the most common type of fuzes for both AT and AP mines. Also known as the contact fuze, it may require only a few ounces pressure to active the mine or as much as several hundred pounds.
Trip Wire. Also called pressure release, these fuzes may be attached to a thin wire stretched across a path or route. When the victim or vehicle passes and breaks the wire, the mine is detonated. Trip wires are used mainly with AP and side-attack mines.
Magnetic. Most armored vehicles contain a large quantity of steel and therefore create large magnetic disturbances that signal their presence to a magnetic influence fuzed landmine.
Optical. An optical fuze, using a small infrared or ultra-violet transmitting diode on a surface-placed landmine, sends a detonation signal with it senses light reflecting from the hull of a tank.
Radar. A small, micro-electronic radar can sense the underside of a tank by the magnitude and location of the radar reflection.
Seismic. Mines can be equipped with sensors that detect the vibrations caused by the weight and track movement of tanks or by the noise they make.
Acoustic. When a system approaches, antihelicopter or advanced off-route mines use an acoustic sensor to activate or cue an IR, seismic, or MMW sensor.
Infrared. IR sensors are generally used against vehicles, ground and aerial.

Proliferated land mines										
Antitank Mines										
Name	**Country of Manufacture**	**# of User Coun-tries**	**Emplacement Method Length (mm) Width (mm) Height (mm)**	**Armor Penetration (mm)/ Kill Mechanism**	**Effective Range (meter)**	**Detectability/ Composition**	**Anti-Handling**	**Fuze Type/ Self Neutralize**	**Explosive Type & Weight/Total Weight (kg)**	**Comment**
Scatterable										
PTM-1S/ PGMDM	FSU	17+	remote-surface: UMZ, MRL, aircraft, PKM portable inf L: 320 mm W: 65 H: 75	track breaker on contact/ blast	1	visual plastic	no	contact, pressure neutralize: yes- 0 to 24 hrs	PVV-12S liquid plastic: 1.4	 Anti-vehicle mine similar to German AT-1
PTM-3	FSU	12+	remote-surface: UMZ, helicopter, PKM portable inf L: 330 W: 84	70 mm: penetrates tank belly & destroys running gear	1	visual mine detectors cause detonation plastic	yes	proximity, magnetic self-destruct: yes-16 to 24 hrs	TG-40: 1.8 Total: 5	
Manual, Mechanical, and Chute Emplaced										
TM-57	FSU Bulgaria China	32+	manual mechanical chute	blast	1	easy sheet metal	yes	pressure (200/2.5/.5-6 kg) delay-armed,	TNT or TGA 60/24/16: 6.3 Total: 8.47	

	Iraq		D (max): 316 D (min): 204 H: 101					tilt rod, pull (booby trap) neutralize: no		 limited underwater
TM-62M/ P/B/D	FSU Poland Bulgaria	30+	manual mechanical chute D: 315 H: 110	27 RHAE blast	1	varies: M: metal-easy P: plastic B: caseless D: wood	Not built in	pressure (200 kg) magnetic (flux) seismic	Trotyl, RDX & aluminum/9.5 Total: 10	 limited underwater
TM-46/ TMN-46	FSU North Korea (ATM-46) Germany Bulgaria Egypt (M/71) Israel (No. 6)	28+	manual mechanical D: 306 H: 94	blast	1	easy to detect sheet metal	TMN-46 yes	pressure (180/132 kg), tilt rod neutralize: no	TNT, amatol 2.9 Total: 5.7	 The TM-46 and TMN-46 are identical except for the additional fuze well

Antitank Mines (continued)

Manual, Mechanical, and Chute Emplaced (continued)

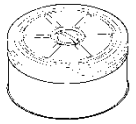
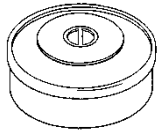
Name	Country of Manufacture	# of User Coun-tries	Emplacement Method Length (mm) Width (mm) Height (mm)	Armor Penetration (mm)/ Kill Mechanism	Effective Range (meter)	Detectability/ Composition	Anti-handling	Fuze Type/ Self Neutralize	Explosive Type & Weight/Total Weight (kg)	Comment
PMZ-40	FSU	18+	manual D: 280 H: 120	blast	contact	Easy steel	possible-no 2nd fuze well or AD features	pressure (225 AT or 68 AP) self-destruct or neutralize : no	TNT 3.6 Total: 9	 The AP/AT feature allows a single type mine to be used in a mixed minefield. Preferable in roadblocks. Replaced by the TM-41 AT mine
PT-Mi-Ba-III	Czech	17 + terrorist groups	manual mechanical chute D: 330 H: 108	blast defeats known belly armor	1	plastic /bakelite (metal in fuze only-2.9 gr)	yes with RO-4 fuze	pressure (200 kg) self-destruct or neutral: no	TNT 7.2 Total: 9.9	
Mk 7	United Kingdom	16+	manual D: 325 H: 130	blast	1	Easy detect metal	Yes	pressure (150 kg), tilt rod available	TNT 8.9 Total: 13.6	

TMD-B	FSU Namibia	16+	manual L: 315 W: 280 H: 160	blast	1	difficult with hand held detectors - wood	Possible	pressure (200-500 kg) self-destruct or neutral: no	TNT 9.0 kg Total: 9.7	
M19	US Chile Iran South Korea Turkey	13	manual L: 332 W: 332 H: 94	Blast	1	difficult with hand held detectors plastic	Yes	pressure (182 kg)	COMP B 9.5 Total: 12.6	
TMK-2	FSU	13+	manual D max: 301 D min: 75 H: 262 w/o Tilt-rod	250 RHAE belly attack plate charge	1	Easy Metal	Possible	tilt rod (8-12 kg) self-destruct or neutral: no	TG-50, TNT Total: 12.5	

Antitank Mines (continued)

Manual, Mechanical, and Chute Emplaced (continued)

Name	Country of Manu-facture	# of User Coun-tries	Emplacement Method Length (mm) Width (mm)	Armor Penetra-tion (mm)/ Kill	Effective Range (meter)	Detectability/ Composition	Anti-handling	Fuze Type/ Self Neutralize	Explosive Type & Weight/Total Weight (kg)	Comment

			Height (mm)	Mech-anism						
TMA-3	Former Yugoslavia	13	manual mechanical D: 262 H: 140 w/fuze H: 100 w/o fuze	blast	1	very difficult with hand held detectors plastic coating	Yes	pressure (180 kg) self-destruct or neutral: no	cast TNT 6.5 Total: 7.0	
PRB M3/ A	Belgium	12	manual L: 230 W: 230 H: 130	blast	1	very difficult with hand held detectors plastic	yes two secondary fuze wells	pressure (250 kg)	RDX/TNT 6.5 Total: 6.8	 aka PRB ATK-M3, waterproof
TM-41	FSU China North Korea Cambodia	10+	manual H: 145 D: 252	blast	contact	Metal	No	pressure (160 kg no)	TNT: 4 Total: 5.4	 Can be used underwater
Type 72	China S. Africa	10+	manual mechanical scatterable D: 270	blast	contact	very difficult plastic	possible	pressure (300 to 800 kg) self-destruct or neutralize : no	TNT/RDX 5.4 Total: 6.5	 Very difficult to detect with hand held detectors

			H: 100							underwater: yes
M15	US	7+	manual D: 334 H: 150	blast	0, typical with contact mine	Easy Metal	yes 3 fuze wells	pressure (159-340 kg) tilt-rod	COMP B 10.3 Total: 14.27	

Antitank Mines (continued)

Manual, Mechanical, and Chute Emplaced (continued)

Name	Country of Manu-facture	# of User Coun-tries	Emplacement Method Length (mm) Width (mm) Height (mm)	Armor Penetra-tion (mm)/ Kill Mechani sm	Effective Range (meter)	Detectability / Composi-tion	Anti-handling	Fuze Type/ Self Neutralize	Explosive Type & Weight/Total Weight (kg)	Comment

M7A2	US	7+	manual L: 178 W: 114 H: 63	blast	see note	Easy metal	Yes Two Fuze wells	pressure (159-340 kg)	Tetryl 1.62 Total: 2.19	 Designed more as anti-vehicle (trucks and LAVs) For tanks 2–5 mines used
P2 Mk 3	Pakistan	6+	manual D: 262 H: 120	blast	0, typical with contact mine	very difficult plastic	probable 2nd fuze well	pressure (204-250 kg)	TNT 6.02 Total: 7.05	 Very difficult to detect w/hand held-detectors. Can also be used as very large AP mine
PT-Mi-K	Czech	6+	manual mechanical D 300 H: 106	blast	contact	easy detect metal	possible	pressure (200-400KG)	TNT: 4.9 Total: 7.6	
P2 Mk 2	Pakistan	5+	manual D: 270x270 H: 130	blast	0, typical with contact mine	very difficult plastic, only metal is spring, striker tip, and shear wire	probable- 2nd fuze well	pressure (180-300 kg)	6 Total: 6.5	 Very difficult to detect w/hand held-detectors. Can also be used as very large AP mine

PM-60 (K-1)	Former E. Germany	5+	manual D (max): 320 D (min): 237 H: 125	blast	0, typical with contact mine	somewhat difficult (only 20 gr metal) plastic	probable 2nd fuze well	pressure (200-500 kg)	TNT 9.9 Total: 11	 waterproof

Antitank Mines (continued)

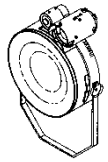
Manual, Mechanical, and Chute Emplaced (continued)

Name	**Country of Manufacture**	**# of User Coun-tries**	**Emplacement Method Length (mm) Width (mm) Height (mm)**	**Armor Penetra-tion (mm)/ Kill Mechanism**	**Effective Range (meter)**	**Detectability/ Compo-sition**	**Antihandling**	**Fuze Type/ Self Neutralize**	**Explosive Type & Weight/Total Weight (kg)**	**Comment**
PT-Mi-Ba II	Czech	4+	manual L: 397 W: 230 H: 135	blast	1	difficult plastic or metal	probable-1 or 2 fuzes. Any disturbance detonates the mine after it has been emplaced.	Pressure (200 to 450 kg)	RO-7-II: 6.44 Total: 10.2	

UKA-63	Hungary	4+	manual mechanical scatterable chute D: 300 H: 75	explosively formed fragments	Plate charge. Track-attack; side-attack effective 0 to 50 meters (see note)	easy metal	Probable	pressure, seismic, magnetic, and electrically fired command detonated, tilt-rod neutralize: no	TNT 6 Total: 9	 Can operate as a belly-attack, track-attack, or side-attack mine. The plate-charge will probably have only limited success against tank armor in side-attack mode but is successful against lightly armored vehicles.
TMM-1	Yugoslavia	2+	manual mechanical D: 326 H: 90	blast	contact	easy to detect metal	probable- 2nd fuze well	Pressure (130 w/pressure plate-70 w/o plate) self-destruct	TNT 5.6 Total: 8.7	 Commonly surface laid and use extensively in roadblocks. Limited underwater to .25 m
TM-89	FSU	15+	manual mechanical D: 320 H: 132	blast	proximity	Metal	Probable	pressure, magnetic, and electrically	TG-40 6.7 Total: 11.5	

Antitank Mines (continued)

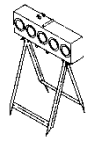
Side-Attack (Antitank and Anti-vehicle) Mines

Name	Country of Manufacture	# of User Coun-tries	Emplacement Method	Armor Penetration (mm)/ Kill Mechanism	Effective Range (meter)	Detectability/ Composition	Anti-Handling	Fuze Type/ Self Neutralize	Explosive Type & Weight/Total Weight (kg)	Comment
LMG	FSU	13+	manual	rocket propelled shaped-charge	27	visual metal	No	Tension (1 kg), tripwire neutralize: no	TNT: 3.2 Total: 10	
TM-83	FSU	13+	manual H: 440 L: 250	100 RHAE EFP (explosively formed penetrator)	50	visual case metal	possible	IR & seismic, or break wire	explosive 9.6 Total: 20.4	
Panzer-faust 3	Germany	8+	manual L: 1,200 D: warhead 110	700 rocket propelled shaped-charge	150 target speed- 30-60 kmp	visual metal	No	IR & acoustic, seismic, break wire. Targets detected by acoustic which activates IR	HEAT MP-Frag BASTEG	 SIRA sensor package

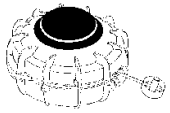
PARM 1 (DM-12)	Austria Germany UK Sweden Finland	5+	manual L: 390 D: 128	600 rocket propelled shaped-charge	40	visual metal	No	neutralize: 20, 40, 60 days	Total: 10	
MIACAH F1	France UK (L14A1) Netherlands (# 29)	4+	manual L: 260 D: 200	70 RHAE @ 40 m shaped-charge	80	visual metal	No	Break wire, command, IR influence neutralize: no	Hexolite: 7 Total: 12	

Antitank Mines (continued)

Side-Attack (Antitank and Anti-vehicle) Mines

Name	Country of Manufacture	# of User Coun-tries	Emplacement Method	Armor Penetration (mm)/ Kill Mechanism	Effective Range (meter)	Detectability/ Composition	Anti-Handling	Fuze Type/ Self Neutralize	Explosive Type & Weight/Total Weight (kg)	Comment
PD Mi-PK (Horizontal)	Czech	1+	manual L: 401 W: 125 H: 80	50 RHAE 5-EFPs	30	visual metal	possible	contact wire, command Can be linked to IR sensor	explosive: 5.5 Total: 12 (8.5 w/o stand)	

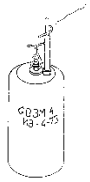
MPB-ZN/K	POL	1+	manual	EFP	50	visual metal	Yes	Acoustic and Infrared Contact (K Model)	TNT: 22(est.) Total: 45	

Anti-Personnel Mines										
Name	**Country of Manufacture**	**# of User Coun-tries**	**Emplacement Method**	**Kill Mecha-nism**	**Effective Range (m)**	**Detectability/ Composition**	**Anti-Handling**	**Fuze Type/ Self Neutralize**	**Explosive Type & Weight/Total Weight (kg)**	**Comments**
Scatterable										
VS-50	Italy Singapore (SPM-1) Egypt (T/79)	14+	manual remote-surface D: 90x90 H: 45	blast	limited	Plastic difficult	yes, the VS-50AR variant	pressure- 10 kg self neutral: no	TNT: .075 Total: .185	 Designed to be scattered from helicopters. Countermeasure blast (fuel- air-explosive line charge)-resistant. Underwater 1 meter

Anti-Personnel Mines										
Name	**Country of Manufacture**	**# of User Coun-tries**	**Emplacement Method**	**Kill Mecha-nism**	**Effective Range (m)**	**Detectability/ Composition**	**Anti-Handling**	**Fuze Type/ Self Neutralize**	**Explosive Type & Weight/Total Weight (kg)**	**Comments**
Scatterable										
PFM-1S	FSU	12+	remote-surface (UMZ, MRL, helicopter, PKM portable) H: 120 W: 61	blast	1	Visual plastic	no	pressure (5 kg) Self-destruct: 85% over 40 hr	liquid plastic-VS-6D: .040 Total: .070	 copy of US BLU-43B
POM-1S	FSU	12+	remote-surface (UMZ, helicopter, PKM portable) Ball 80x80 mm	fragmen-tation	4	Visual	yes	tripwires, S=Self-destruct	.1 Total: .750	 copy of US BLU-42B

POM-2S	FSU	12+	remote-surface (UMZ, helicopter, PKM portable) cylinder: D: 60	fragmen-tation	16	visual, readily	no	tripwires (.2 kg) Self-destruct: 4 to 100 hr	TNT: .14 Total: 1.6	
SB-33	Italy, Spain Greece (EM-20), Portugal (M412)	10+	manual scatterable D: 85 H: 30	blast	contact	Plastic difficult w/handheld detectors	yes: antihandling SB-33/AR	pressure 10 kg	RDX: .35 Total: .140	 Countermeasure blast (fuel air/explosive line charge) resistant.

Anti-Personnel Mines (continued) Manual, Mechanical, and Chute Emplaced										
Name	**Country of Manufacture**	**# of User Coun-tries**	**Emplacement Method**	**Kill Mechanism**	**Effective Range (m)**	**Detectability/ Composition**	**Anti-handling**	**Fuze Type/ Self Neutralize**	**Explosive Type & Weight/Total Weight (kg)**	**Comments**
PMN	FSU China Iraq	35+	manual chute D: 112 H: 562	blast	1	readily- plastic case metal in fuze & cover	cannot be disarmed Fuze arm delay	pressure plate-very sensitive (8-25 kg) self-neutral: no	Trotyl: 0.20 Total: 0.55	 Most common AP mine in the world. waterproof
POMZ-2M	FSU China (Type 59) North Korea Germany	33+	stake mine manual D: 107 H: 60	fragmen-tation	Max: 8 Min: 0	visual, detection cast iron	possible	tripwire (1 kg force) self-neutralize: no	TNT: 75 Total: 1.7	 Normally emplaced on stake 30 cm above ground. Fuze delay arm Underwater: no
MON 100	FSU Bulgaria	27+	manual D: 220 H: 80	directional fragmen-tation 400 pieces	100 width of kill zone @ 100 m= 6.5-9.5	metal case	possible but not likely	electric command, tension-release (2 to 5 kg)	TNT: 2 Total: 5	 Effective against lightly armored vehicles. At 100m 50% of frag will strike w/in 5 m of aim.

OZM-4	FSU	26+	manual D: 90 H: 140	bounding fragmen-tation (.6-.8 m above ground)	15	readily detectable case cast iron	possible	tripwire (2-5 kg), electrical, pressure, tension release self-neutralize: no	Total: 5	 Replaced the OZM-3
MON 200	FSU Bulgaria	25+	manual L: 431 H: 130	directional fragmen-tation 900 pieces	200 m width of kill zone @ 200 m= 10.5-14.5	visual metal case	possible but not likely	electrical, self-neutralize: no	TNT: 12 Total: 25	 Larger version of MON-100 Also effective against LAVs

Anti-Personnel Mines (continued)
Manual, Mechanical, and Chute Emplaced (continued)

Name	Country of Manufacture	# of User Coun-tries	Emplacement Method	Kill Mechanism	Effective Range (m)	Detectability/ Composition	Anti-handling	Fuze Type/ Self Neutralize	Explosive Type & Weight/Total Weight (kg)	Comments
PP-Mi-Sr II	Czech	25+	manual D: 102 H: 152	bounding fragmen-tation	max: 20 m min: 0 bound height 1 m	Easy metal case and fragmentation	possible	tripwire (4 to 8 kg), pressure (3 to 6 kg) command detonated self-neutralize: no	TNT: .36 Total: 3.2	 Fielded in 1955. Exact copy of its predecessor the PP-Mi-Sr

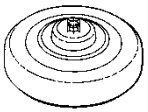
PMD-6	FSU Namibia Serbia	24+	manual L: 196 W: 87 H: 50	blast	1	detectable wood metal in fuze	possible	pressure, tripwire (1 kg) self-neutralize: no	TNT: .20 Total: .40	 Probing for low pressure threshold fuze is dangerous
MON 50	FSU	23+	manual L: 220 W: 45 H: 105	directional fragmen- tation 485 pieces.	width of kill zone @ 50 m=45	visual plastic case	possible	electric cmd, tripwire, tension, tension release self-neutralize: no	RDX: .70 Total: 20	 Copy of US M18A1 claymore Chopped wire fragments (5x5mm).
M18A1/ Claymore	US, South Korea (K440) Pakistan (P5 Mark I) Iran, Chile S. Africa (No.2) FSU (MON-50)	22+	manual L: 216 W: 35 H: 83	directional steel fragments	50	visual plastic case (fiberglass)	possible	electric command, tripwire, tension, tension release	C4: .68 Total: 1.60	
OZM-72	FSU	21+	manual D: 105 H: 172	bounding fragmen- tation	max: 25 min: 0 bound height .66 m is adjustable	Easy Metal	possible no 2nd fuze well	tripwire (2 to 5 kg) or command detonated (electrical) or pressure self-neutralize: no	TNT: .70 Total: 5.0	 Successor to the OZM-4. Same chopped wire fragments (5x5mm) as in the MON-50 Not waterproof

Anti-Personnel Mines (continued)
Manual, Mechanical, and Chute Emplaced (continued)

Name	Country of Manufacture	# of User Coun-tries	Emplacement Method	Kill Mechanism	Effective Range (m)	Detectability/ Composition	Anti-Handling	Fuze Type/ Self Neutralize	Explosive Type & Weight/Total Weight (kg)	Comments
M14	US India (M-14) Vietnam (MN-79 & MD 82B)	20+	manual D: 56 H: 40	blast	1 contact	very difficult with hand-held detector plastic body (only metal is steel striker tip)	possible	pressure (9-16 kg)	TNT: .029 Total: 1	
OZM-3	FSU	19+	manual D: 75 H: 120	bounding fragmentation	max: 25 lethal: 10 min: 0 bound height 1.5 to 2.4 m	Easy metal	possible no 2nd fuze well	tripwire (2 to 5 kg) or cmd detonated (electrical) or pressure self-neutralize no	TNT: .075 Total: 3	 not waterproof
PMN 2	FSU	16+	manual mechanical D: 125 H: 54	blast	limited	plastic easy-metal content	possible	pressure-15 kg self neutral: no	TG-40: .115 Total: .450	 Successor to PMN. Blast resistant
PPM-2	China Former E. Germany	15+	manual D: 125 H: 63	blast	0	Easy due to fuzing and detector foil plastic	possible	delay-armed (1 to 2 hr), pressure (12.5 kg) self-neutralize; no	TNT: 0.13 Total: 0.39	 Not waterproof
Type 72	China S. Africa	11+	manual D: 79 H: 39	blast	0 contact	very difficult for hand held detectors, plastic	very difficult plastic with rubber cover (see note for hand	pressure (5 to 7 kg) self-neutralize: no Types B & C detonate if moved	TNT/TNT RDX (50/50): 0.05 Total: 0.14	 Also used as booby-trap. "Look-a-likes" Type 72B=booby-trap

							held detectors)			Type 72C=both AP and booby trap, Magnetic detector detonation limited to very shallow water use
Valmara 69	Italy S. Africa (# 69 Mk 1), Singapore	10+	manual D (Top):130 D: (Bottom) 107 H:205	bounding .45m frag	27	plastic case easy to detect: fragments are steel	probable, 2nd fuze well	pressure: 6, 10 kg tripwire self neutral: no	Comp B: .4 Total: 3.2	

Anti-Personnel Mines (continued)
Manual, Mechanical, and Chute Emplaced (continued)

Name	Country of Manufacture	# of User Coun-tries	Emplacement Method	Kill Mechanism	Effective Range (meter)	Detectability/ Composition	Anti-Hand-ling	Fuze Type/ Self Neutralize	Explosive Type & Weight/Total Weight (kg)	Comments
DM-11	Germany Sweden (LI-II)	7+	manual D: 82 H: 34	blast	limited (typical for contact-fuzed blast-effect mines)	very difficult plastic	possible. no 2nd fuze well	pressure (5 kg)	TNT: 0.12 Total: 0.23	 waterproof
M16A1	US India	6+	manual D: 103 H: 203	bounding fragmen-tation	27 bound height 1	easy metal	possible no 2nd fuze well	tripwire, pressure (2, 5 kg) self-neutralize: no	TNT: 0.6 Total: 3.67	 not waterproof

M3	US Taiwan	5+	manual L: 76 W: 76 H: 134	fragmen-tation	4 increased when above ground	easy metal	probable 3 fuze wells	tripwire, (1.4 to 4.5) pressure (3.6 to 9.1)	TNT: 0.45 Total: 4	
PMP-7 ½	Former E. Germany	5+	manual Truncated cone D (top): 125 D (bottom): 60 H: 150	fragmen-tation	4	easy plastic due to metal fragments	possible	pressure (6 to 8 kg)	TNT: 0.1 Total: 1.25	 The lethality of the mine is relatively small because the mine is emplaced below the surface.
PROM-1	Former Yugoslavia	5+	manual D: 75 H: w/o fuze 178 H: w/fuze 260	bounding fragmen-tation	max: 22 min: 0 bound height .7	Easy Steel	possible	pressure (9 kg) tripwire (3 kg) self-neutralize; no	TNT: 0.43 Total: 3	 Delayed ejection and detonation by 1 to 2 seconds to ensure target is clear of the upward path.

Anti-Personnel Mines (continued)
Manual, Mechanical, and Chute Emplaced (continued)

Name	Country of Manufacture	# of User Coun-tries	Emplacement Method	Kill Mechanism	Effective Range (meter)	Detectability/ Composition	Anti-Hand-ling	Fuze Type/ Self Neutralize	Explosive Type & Weight/Total Weight (kg)	Comments
Type 69	China	5+	manual D: 60 H: w/o fuze 114 H: w/fuze 168	fragmen-tation iron body breaks into approx 240 fragments	max: 11 m min: 0 bound height 0 to 1.5 m	easy iron case	possible has detonato r well	pressure (7 to 20 kg) tripwire (1.5 to 4) command detonated self-neutralize: no	TNT: 0.105 Total: 1.35	 Closely patterned after the OZM-4., waterproof
P2 Mk2	Pakistan	4+	manual D: 70 H: 38	blast	limited	difficult Plastic	Possible no 2nd fuze well	pressure (10 kg)	TNT: 0.05 Total: 0.14	
PRB M35	Belgium	4+	manual D: 64 H: 40	blast	0	plastic	possible	pressure (5 to 15 kg)	TNT/KN03: 0.1 Total: 0.58	
MI AP DV PIQUET (Picket) PIG 63 (Model 63)	France	2+	manual D: 35 H: 270	blast	limited (typical for contact-fuzed blast-effect mines)	very difficult plastic	yes-will detonate if pulled from the ground	pressure, anti-removal	Tetryl: .030 Total: .10	 waterproof

V	Italy	2+	manual D: 38 H: 394	fragmen-tation stake mine	14 m	visually detectable	possible metal	tripwire (2 to 3 kg)	TNT: .09 Total: .91	
MI AP ID 51	France	1	manual D: 70 H: 52	blast	limited	very difficult plastic-no metal content	possible no 2nd fuze well self-neutralize: no	pressure (14 to 24 kg)	PETN: .051 Total: .09	 waterproof

Anti-helicopter Mines										
Name	**Country of Manufacture**	**# of User Countries**	**Emplacement Method**	**Armor Penetration (mm)/ Kill Mechanism**	**Effective Range (meter) Maximum /Minimum**	**Detectability/ Composition**	**Target Velocity (m/s)**	**Fuze Type/**	**Warhead Type/Total Weight (kg)**	**Status**
AHM-200	Bulgaria	1	manual	10 @ 100 m	max 200	visual		combined acoustic & Doppler SHF	Total weight: 90 kg	
HELKIR	Austria	1	manual	6 @ 50 m 2 @ 150 m		visual		dual acoustic & IR	Total weight: 43 kg	in production
TEMP-20	Russia	0	manual		detection 1,000 max 200	visual	100	dual acoustic & IR	Total weight: 12 kg	development
AHM	UK	0	manual remote		200/50	visual		dual acoustic & IR	multiple EFP	development

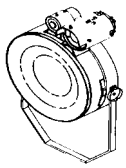
Russian Antitank Mine TM-62M/P/B/D



SYSTEM	SPECIFICATIONS	PERFORMANCE	SPECIFICATIONS
Alternative Designations:	none	Armor Penetration (mm):	27
Date of Introduction:	1960	Effect:	Blast
Proliferation:	Over 30 countries	Effective Range (m):	1
Shape:	Circular	Self-Destruct:	No
Color:	Green	Underwater Emplacement:	Yes
Length (mm):	110	Remotely detonated:	Yes
Height (mm):	101.8	Detonation Height:	N/A
Diameter (mm):	320		
Total Weight (kg):	8.5	VARIANTS	SPECIFICATIONS
Burial Depth:		TM-62M:	Metallic case
Maximum:	20	TM-62P:	Plastic case
Minimum:	None	TM-62B	Caseless
Fuze types: Pressure, seismic, magnetic.	Yes	TM-62D:	Wooden
Actuation Force (kg):	200 /150 to 550	EXPLOSIVE COMPOSITION	SPECIFICATIONS
Resistant to Explosive Neutralization:	Yes	Type:	Trotyl, RDX and aluminum power
		Weight:	7.5 to 8.3
		Booster:	Yes
		Type:	Pentryt
		Weight (gr):	0.75

NOTES
DETECTABILITY Varies. TM-62M (metal case) is readily detectable. The TM-62P (plastic) is the most difficult to detect. Limited duration capabilities when used underwater. DELIVERY PLATFORMS (examples): Tracked minelaying vehicle GMZ/GMZ-2/3; Towed mechanical minelayer PMR-3 and PMZ-4 .Helicopter (with VMP-2 minelayer)

Russian Side-attack Antitank Mine TM-83



SYSTEM	SPECIFICATIONS	PERFORMANCE	SPECIFICATIONS
Alternative Designations:	none	Armor Penetration (mm):	100
Date of Introduction:	INA	Effect:	EFP, side-attack
Proliferation:	Over 13 countries	Effective Range (m):	50
Shape:	Cylinder	Self-Destruct (days):	30
Color:	Green	Underwater Emplacement:	INA
Length (mm):	INA	Remotely detonated:	Yes
Height (mm):	400	Detonation Height:	INA
Diameter (mm):	250		
Total Weight (kg):	20.4	VARIANTS	SPECIFICATIONS
Burial Depth:		None	INA
Maximum:	INA	EXPLOSIVE COMPOSITION	SPECIFICATIONS
Minimum:	INA	Type:	TG40/60
Fuze types: 2-color IR sensor, seismic, or MVZ-7 breakwire	Yes	Weight (kg):	9.6
Actuation Force (kg):	INA	Booster:	INA
Resistant to Explosive Neutralization:	Yes	Booster:	INA
		Type:	INA
		Weight (gr):	INA

NOTES

THE TM-83 IS BASICALLY A PLATE CHARGE MOUNTED ON A STAND. THE MINE USES SEISMIC SENSORS TO IDENTIFY APPROACHING TARGETS AND TO ACTIVATE THE IR SENSOR. WHEN A TARGET PASSES INTO THE FIELD OF VIEW OF THE SENSOR, THE WARHEAD IS FIRED. THE SEISMIC SENSOR IS STORED ON THE BACK OF THE MINE AND IS CONNECTED BY AN ELECTRONIC CABLE. IT CAN ALSO BE FIRED ELECTRONICALLY. THE MINE MAY BE MOUNTED ON A TRIPOD, THE STORAGE BOX, OR TREE, ETC.

Austrian Anti-helicopter Mine HELKIR



SYSTEM	SPECIFICATIONS	PERFORMANCE	SPECIFICATIONS
Alternative Designations:	none	Armor Penetration (mm):	6 @ 50 m or 2 @ 150 m
Date of Introduction:	INA	Effect:	Directed fragmentation
Proliferation:	1	Effective Range (m):	150
Shape:	Rectangular	Self-Destruct:	INA
Color:	Green	Underwater Emplacement:	INA
Length (mm):	INA	Remotely detonated:	Yes
Height (mm):	INA	Detonation Height:	INA
Diameter (mm):	INA		
Total Weight (kg):	43	VARIANTS	SPECIFICATIONS
Burial Depth:	No	None	
Maximum:	None	EXPLOSIVE COMPOSITION	SPECIFICATIONS
Minimum:	None	Type:	INA
Fuze types: acoustic and IR.	Yes	Weight (kg):	INA
Actuation Force (kg):	INA	Booster:	INA
Resistant to Explosive Neutralization:	Yes	Type:	INA
		Weight (gr):	INA

NOTES

THE HELKIR ANTIHELICOPTER MINE IS DESIGNED TO ENGAGE NAP-OF-THE-EARTH TARGETS. THE SENSOR IS A DUAL ACOUSTIC-IR. THE ACOUSTIC SENSOR LISTENS FOR A VALID NOISE INPUT AND TURNS ON THE IR SENSOR. THE IR SENSOR IS LOCATED COAXIALLY TO THE WARHEAD. WHEN A HOT IR SIGNATURE IS DETECTED, THE WARHEAD IS FUNCTIONED.

PKM man-portable infantry mine laying system

In the late 1980s, the Soviet Army began issuing the PKM, a man-portable infantry mine laying system, to its motorized rifle battalions. The original issue was three per battalion. One Russian map was found to portray a motorized rifle platoon strongpoint incorporating PKM-laid minefields in its defense. Even though the Soviet Union dissolved its military's influence can be seen throughout many areas of operations.

Regimental assets and defending soldiers have emplaced minefields, wire obstacles and an antitank ditch to the west of the position. The regiment's UMZ detachment has also laid two remotely-delivered minefields to the west of the position. In addition, the Russians have reinforced the platoon strong point with thirteen PKM-laid minefields both outside and inside the platoon strong point.

The PKM, portable, minelaying system consists of a mounting-base assembly, blasting machine, and wire communications link. The mine dispensing canister containing an internal framework or magazine holding one or more scatterable mines depending on type is loaded onto the mounting base. The internal magazine is then launched from the canister.

Depiction of PKM Mine-Scattering System

The PKM weights 2.63 kg (5.8 lbs.) without the mine canister and consists of a single launch tube with a base mount, a blasting machine and a reel of electric ignition wire. The operator loads a propelling charge and mine canister into the launch tube, mounts the tube on the edge of a trench or firing parapet, aims the tube, connects the wire to the tube, moves off a safe distance and connects the wire to the blasting machine and then cranks the blasting machine. The PKM propels the canister some 30-100 meters (depending on the type of mine) and lays an antipersonnel mine field of 10X20, 10X40 or 20X10 meters (again depending on the type of mine used). It takes a trained operator five minutes to set up the PKM and create a minefield. The POM-1S (AP) mine canister most likely produces the 10X20 meter field while the POM-2S (AP) mine canister most likely produces the 10X40 meter field. The PFM-S mine canister (AP) most likely produces the 20X10 meter field. The PKM can also be used to launch POM-2S AT mines and PTM-1S and PTM-3 antitank mines. Numbers of mines per canister are: 64 PFM-1S, 4 POM-2S, and 1 PTM-1S or PTM-3.

The portable minelaying set is capable of remotely laying a minefield with an area of 200-400 m2 at a distance up to 100 meters from the position in any threatened sector, can be used in the course of battle to combat enemy infantry ahead of the FEBA or when it wedges into platoon flanks or gaps between squad positions.

Like the UMZ (the truck mounted mine scattering system), the Russians use the PKM to lay minefields to protect subunit positions, flanks and boundaries between subunits. PKM-laid minefields also cover firing lines and gaps in combat formations. The PKM can quickly close reaches in existing minefields and increase the density of mines on armor avenues of approach. Here are the specifications: Weight of set, kg: 2.6. Dimensions for traveling, mm: 380X150X140. Laying method: fire from cluster (remote). Types of mines laid: PFM-1S, POM-2, and PTM-3. Time required to prepare the set for laying mines: up to 5 min.

Russian Tracked Minelaying Vehicle GMZ-3



SYSTEM	SPECIFICATIONS	FEATURES (CONT.)	SPECIFICATIONS
System		Max Swim:	N/A
Alternative Designations:	INA	Fording Depths (M):	N/A
Date Of Introduction:	1963	Radios, Frequency, And Range:	
Proliferation:	Russia and Former Soviet Union	R-123	
Description:		Operating Speed (km/h):	
Crew:	3	Burying:	6
Troop Capacity:	N/A	Surface Laying:	16
Chassis:	Based on the SA-4 (GANEF) SAM	Mine Spacing (m):	5 and 10
Combat Weight (Mt):	28.5	Minelaying Pattern: (Straight line or staggered)	yes
Length Overall (M):	8.62	Mine Combat Load:	208
Height Overall (M):	2.7	Mine Weight (kg):	<12
Width Overall (M)	3.25	Time Required to Load Minelayer with One Basic Mine Load (min)	15-20
Ground Pressure (Kg/Cm2):	UNK	Main Armament:	7.62-mm PKT MG
Automotive Performance:		Max Effective Range (m):	Day: 2,000
Engine Type:	multi-fuel diesel	Rate of Fire (rd/min):	Practical: 250

HP:	513	Fire on Move:	Yes
Cruising Range (Km):	500	Loading Mines with (Crew Only) (m):	60
Speed (Km/H):		NBC Protection:	Yes
Max Road:	60	Smoke Screening System:	Yes
Max Off-Road:	30		

NOTES

MINES: TM-57 W/FUZE MVZ-57; TM-62 SERIES W/FUZES; TM-46; TMD-B; MV4-62; MVP-62 & W/PROX FUZE MVN-80. CREW: VEHICLE COMMANDER, DRIVER-MECHANIC, AND THE MINELAYER OPERATOR. COMMANDER AND DRIVER IN THE FORWARD SECTION THE OPERATOR COMPARTMENT IS LOCATED IN THE REAR PORTION OF THE VEHICLE. THE GMZ-3 HAS A DIGITAL NAVIGATION SYSTEM ALLOWING PRECISE TOPOGRAPHIC TIE-IN OF THE MINEFIELD BEING LAID. VARIANTS: GMZ; GMZ-2. SMOKE: 6 81-MM LAUNCHERS, 3 ON EACH SIDE.

Russian Towed Mechanical Minelayer PMZ-4 and PMR-3

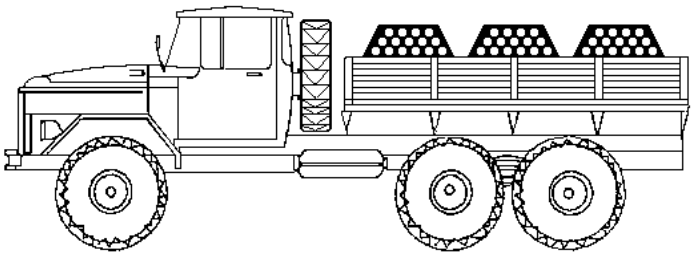


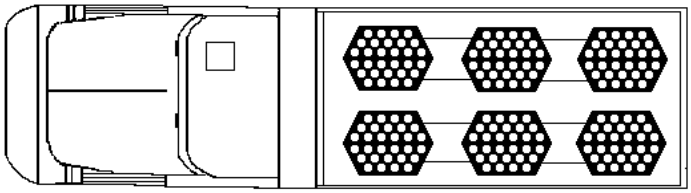


SYSTEM	SPECIFICATIONS	FEATURES (CONT.)	SPECIFICATIONS
System		Max Swim:	Not Applicable
Alternative Designations:	INA	Fording Depths (M):	Not Applicable
Date Of Introduction:	INA	Radios, Frequency, And Range:	Not Applicable
Proliferation:	At least 17 countries	None	
Description:		Operating Speed (km/h):	
Crew:	6	Burying:	2 to 3
Troop Capacity:	None	Surface Laying:	4 to 10
Chassis:	Not applicable	Mine Spacing (m):	3 to 4
Combat Weight (Mt):	1.3	Minelaying Pattern: (Straight line or staggered)	Straight line
Length Overall (M):	5.6	Mine Combat Load:	See notes
Height Overall (M):	2.7	Mine Weight (kg):	INA
Width Overall (M)	3.25	Minelaying Rate (min):	10 to 12
Ground Pressure (Kg/Cm2):	Not applicable	Main Armament:	None
Automotive Performance:		Max Effective Range (m):	None
Engine Type:	Not applicable	Rate of Fire (rd/min):	None
HP:	Not applicable	Fire on Move:	No
Cruising Range (Km):	Not applicable	Time Required to Load Minelayer with (Crew Only) (m):	
Speed (Km/H):		NBC Protection:	No
Max Road:	Not applicable	Smoke Screening System:	No
Max Off-Road:	Not applicable	Variants	Yes

NOTES
PRIME EQUIPMENT MOVER: 6X6 ZIL-131 TRUCK (200 MINES) OR 4X4 URAL-375D (350 MINES) OR BTR-152 (120 MINES). TYPES OF MINES: TM-44, TM-46, TM-57, TM-62 SERIES, TM-72, TMD-B. MAX BURIAL DEPTH (CM): 20. PMR-3, (AND THE SIMILAR PMZ-4) CONSISTS OF A SINGLE CHUTE AND A PLOW ATTACHMENT. DIFFERENCES: PMZ-4 (PIC LEFT) HAS A CABLE LAYER USED FOR LAYING CONTROLLED MINEFIELDS AND DOES NOT HAVE A CONVEYER-BELT CHAIN DRIVE ON THE WHEELS. PMZ-4 HAND LOADED ONLY. TOWED-MINELAYERS ARE USED IN SECTIONS OF THREE OR FOUR AND OPERATE 20 TO 40 METERS APART WITH EACH MINELAYER LAYING A STRAIGHT-LINE ROW. MINES IN DIFFERENT ROWS ARE STAGGERED WITH THE DISTANCE BETWEEN MINES DEPENDING ON WHETHER THE MINES ARE PRESSURE-INITIATED OR FULL-WIDTH ATTACK (INFLUENCED OR TILT-ROD FUZED).

Russian Scatterable Minelaying System UMZ





SYSTEM	SPECIFICATIONS	FEATURES (CONT.)	SPECIFICATIONS
System		Max Swim:	INA
Alternative Designations:	Multipurpose Minelayer	Fording Depths (M):	1.4
Date Of Introduction:	Designed Late 1970s	Radios, Frequency, And Range:	
Proliferation:	Russia and Former Soviet Union	R-159	Yes
Description:		Operating Speed (km/h):	10 to 40
Crew:	2	Burying:	Not applicable
Troop Capacity:	N/A	Surface Laying:	See Notes
Chassis:	ZIL-131 Truck (see VARIANTS)	Mine Spacing (m):	See Notes
Combat Weight (Mt):	10	Minelaying Pattern: (Straight line or staggered)	See Notes
Length Overall (M):	7.1	Mine Combat Load:	See Notes
Height Overall (M):	2.5	Mine Weight (kg):	See Notes
Width Overall (M)	3	Time Required to Load Minelayer with One Basic Mine Load (min)	60-90
Ground Pressure (Kg/Cm2):		Main Armament:	None
Automotive Performance:		Max Effective Range (m):	Not applicable
Engine Type:	V8, gas	Rate of Fire (rd/min):	Not applicable

HP:	150	Fire on Move:	Not applicable
Cruising Range (Km):	525	Time Required to Load Minelayer with (Crew Only) (m):	INA
Speed (Km/H):		NBC Protection:	INA
Max Road:	80	Smoke Screening System:	No
Max Off-Road:	30		

NOTES

THE UMZ HAS BEEN DISCLOSED AS THE LIKELY REPLACEMENT FOR THE GMZ-SERIES. THE UMZ CONSISTS OF THREE LAUNCHERS MOUNTED ON EACH SIDE OF THE VEHICLE FOR A TOTAL OF SIX MINE LAUNCHERS PER VEHICLE. EACH FULL TURN LAUNCHER IS HEXAGONALLY SHAPED AND CONTAINS 30 LAUNCH TUBES TOTALING 180. IT CAN FIRE THE MINES TO ONE OR BOTH SIDES, OR TO THE REAR. BOTH AP AND AT MINES ARE LAUNCHED FROM THE 140-MM LAUNCH TUBES. THE UMZ USES THE SAME MINE CANISTERS AS THE PKM SYSTEM. DEPENDING ON THE POSITION OF THE LAUNCH TUBES, ONE-, TWO-, OR THREE-LANE MINE FIELDS CAN BE LAID. MINEFIELD (M): LENGTH: 1,000 TO 1,200. DEPTH (M): 30 TO 120. MAX LENGTH OF MINEFIELD WITH ONE BASIC LOAD (M): AP, PFM-1S: 3,200. AP, POM-2: 5,000. AT, PTM-3: 600. MINE CAPACITY: FROM 180 TO 11,520 DEPENDING ON THE TYPE OF MINE NUMBER OF MINES IN ONE BASIC LOAD: AP, PFM-1S: 11,520. AP, POM-2: 720. AT, PTM-3: 180. VARIANTS: ALTHOUGH PRIMARILY MOUNTED ON THE ZIL-131, THE UMZ MINELAYING SYSTEM HAS BEEN OBSERVED MOUNTED ON SEVERAL DIFFERENT CARRIERS SUCH AS A MODIFIED MTLB-U CHASSIS OR ON A PT-S TRACKED AMPHIBIOUS PERSONNEL CARRIER.

Italian Mine Launching System Valsella Istrice-VS-MTLU-1



SYSTEM	SPECIFICATIONS	FEATURES (CONT.)	SPECIFICATIONS
System		Max Swim:	INA
Alternative Designations:	INA	Fording Depths (M):	1.4
Date Of Introduction:	1987	Radios, Frequency, And Range:	INA
Proliferation:	At least 17 countries	Vertical Step (m):	.53
Description:		Operating Speed (km/h):	10 to 40
Crew:	2	Burying:	Not applicable
Troop Capacity:	INA	Surface Laying:	See Notes
Chassis:	Iveco Fiat-90-PM	Mine Spacing (m):	See Notes
Combat Weight (Mt):	10	Minelaying Pattern: (Straight line or staggered)	See Notes
Length Overall (M):	7.1	Mine Combat Load:	See Notes
Height Overall (M):	2.5	Mine Weight (kg):	See Notes
Width Overall (M)	3	Time Required to Load Minelayer with One Basic Mine Load (min)	INA
Ground Pressure (Kg/Cm2):	INA	Main Armament:	Not applicable
Automotive Performance:		Max Effective Range (m):	Not applicable
Engine Type:	V8, gas	Rate of Fire (rd/min):	Not applicable
HP:	150 hp	Fire on Move:	Not applicable
Cruising Range (Km):	525	Time Required to Load Minelayer with (Crew Only) (m):	90-120

Speed (Km/H):		**NBC Protection:**	**INA**
Max Road:	**80**	**Smoke Screening System:**	**INA**
Max Off-Road:	**INA**		

NOTES

MINE TYPES: VS-MK2, EM-20, VS-50, TS-50, VS-1.6, VS-1.6/AR, VS-1.6/AN, VS-2.2. MINELAYING EQUIPMENT: MAGAZINE LAUNCHER SIZE: 1.15 M X 0.86M. DISTANCE MINES LAUNCHED FROM VEHICLE (M): 30-60. MINEFIELD (M): LENGTH: 3,200 TO 5,000. DEPTH: 60 TO 120. MAX LENGTH OF MINEFIELD WITH ONE BASIC LOAD (M): AP, VS-MK2: 3,200. AP, TS-50: 5,000. AT, VS-1.6, VS-2.2: 600. LENGTH OF TRIPLE-ROW MINEFIELD (M): 150 TO 1,250 (DEPENDENT). MINE CAPACITY: FROM 256 TO 6,144 (DEPENDENT). NUMBER OF MINES IN ONE BASIC LOAD (A SERIES): AP, VS-MK2: 6,144. AP, TS-50: 6,144. AT, VS-1.6: 512. AT, VS-2.2: 512. NUMBER OF MINES IN ONE BASIC LOAD (B SERIES): AP, VS-MK2: 2,560. AP, TS-50: 2,560. AT, VS-1.6: 256. AT, VS-2.2: 256. TIME FROM TRAVEL TO OPERATING POSITION (MIN): 5.

Explosive Charge Minefield Breaching Systems

Minefield breaching explosive line charge systems are in use throughout the world. These systems provide the maneuver commander a method to expeditiously breach antitank or antipersonnel minefields. Once identified on the battlefield however, these systems can become a priority target. Some systems, single or double line, are mounted on tanks while others are mounted on trailers, armored vehicles, and trucks. Some other systems are man-portable. The larger vehicle and trailer-mounted systems are designed to clear lanes through minefields/obstacles, large enough for the passage of ground combat vehicles. Man-portable (infantry) systems clear passage for at least one person to transit. The explosive filled lines are usually connected to a launcher by a cable, fired over a minefield (within which it lands) and then detonated to create a breach through the minefield. Standoff between the explosive charge and launcher varies. For instance, the Japanese CX has a standoff of 800 meters from the launcher.

Truck or Trailer Mounted Mine breaching Systems

Motorized and infantry units may have either wheeled or towed antitank mine breaching systems. While some of these systems can be dismounted, most are fired from the back of cargo trucks or from trailers. A typical "truck-mounted explosive minefield breaching system" is the FSU UR-83P (below).

Name	Country of Origin	Chassis	System (or Shell) Weight (kg) Overall: Rocket: Explosive Explosive/m	Range (m)	Length (m)	Standoff (m)	Effectiveness Lane Width (m): Lane Length (m) Lane clearing time (min)	Type Launcher/ # Line Charges	Rocket Diameter (mm)	Operators	Explosive Type /#/ Notes
UR-83P	FSU	Truck (ZIL-131) or trailer	Dimensions (m) (ready for launch) Length: 1.5 Width: 1.5 Height: 2.6 Launcher Wt (kg): Total: 230 Packaged: 360 Charge: 1,380	440	114		LL: 115 LW: 6 Assembly time by engineer squad (min): 90	Line UZP-83 charge		2	portable dismountable
Type 81	CH	EQ-240 Truck chassis	Loaded: 5,112 Unloaded: 4,082 Exp: unk Exp/m: unk	3,000	na	2,900 +	LL: 60+ LW: 10+	10 tube	2,530	3	HE, FAE ea round clears 18 m radius in AP.

The Type 81 mine clearing rocket system consists of a 10-tube launcher mounted on the rear of a modified EQ-240 chassis. Rockets are loaded manually by three persons. Although it is uncertain, warheads for this system are filled with conventional HE, FAE or a combination of both. The Chinese have stated that this system is effective against AP mines, but its effectiveness against AT mines is unknown. The range of this system is 3,000 meters, which provides the system with a maximum standoff of approximately 2,900 meters. Each round clears an 18-meter radius within an AP minefield. It is not known whether this is for the FAE or high-explosive warhead. The Type 1987 has 24 launch tubes and is mounted on a Type 59/69 tank chassis.

Mine Breaching Systems and Tracked-Vehicle-Mounted Systems

This section provides information on minefield breaching systems including system "additions" for tracked vehicles. There are a number of systems that are used to breach obstacles such as minefields. Some systems use tracked (tank) chassis as launch carriers that allow the mine breaching system to have similar mobility and maneuverability on the battlefield as mechanized units; however, the use of these systems does not allow tanks or mechanized vehicles to conduct a "Blitzkrieg" type rush across the minefield. Systems found in armor and mechanized divisions will generally be mounted on tracked vehicles due to mobility requirements. Although these minefield breaching systems may (or may not) be mounted on tanks they also may or may not belong to the maneuver commander depending on the task organization of the Threat. Many of these assets belong organically to engineer units. Further information on engineer elements can be found within TC 7-100.2, *Opposing Force Tactics* (CH12), and TC 7-100.4, Hybrid Threat Force Structure Organization Guide for the order of battle (non-task organized). The following tables provides information on OPFOR mine breaching systems:

Truck or Trailer Mounted Mine breaching Systems

Motorized and infantry units may have either wheeled or towed antitank mine breaching systems. While some of these systems can be dismounted, most are fired from the back of cargo trucks or from trailers.

Name	Country of Origin	Chassis	System (or Shell) Weight (kg) Overall: Rocket: Explosive Explosive/m	Range (m)	Length (m)	Standoff (m)	Effectiveness Lane Width (m): Lane Length (m) Lane clearing time (min)	Type Launcher/ # Line Charges	Rocket Diameter (mm)	Operators	Explosive Type /#/ Notes
UR-83P	FSU	Truck (ZIL-131) or trailer	Dimensions (m) (ready for launch) Length: 1.5 Width: 1.5 Height: 2.6 Launcher Wt (kg): Total: 230 Packaged: 360 Charge: 1,380	440	114		LL: 115 LW: 6 Assembly time by engineer squad (min): 90	Line UZP-83 charge		2	portable dismountable
Type 81	CH	EQ-240 Truck chassis	Loaded: 5,112 Unloaded: 4,082	3,000	na	2,900 +	LL: 60+ LW: 10+	10 tube	2,530	3	HE, FAE ea round clears 18 m radius in AP.

			Exp: unk Exp/m: unk								
The Type 81 mineclearing rocket system consists of a 10-tube launcher mounted on the rear of a modified EQ-240 chassis. Rockets are loaded manually by three persons. The Chinese have stated that this system is effective against AP mines, but its effectiveness against AT mines is unknown. The range of this system is 3,000 meters, which provides the system with a maximum standoff of approximately 2,900 meters. Each round clears an 18-meter radius within an AP minefield. The Type 1987 has 24 launch tubes and is mounted on a Type 59/69 tank chassis.											

Tracked-Vehicle-Mounted Systems

Systems mounted on the rear of tanks increase the survivability of the platform and therefore increase the likelihood that it may be successfully employed prior to its destruction. The use of a tracked chassis as the launch carrier gives the system the same mobility and maneuverability on the battlefield as mechanized units; however, use of these systems does not allow tanks or mechanized vehicles to conduct a "Blitzkrieg" type rush across the minefield. Systems found in armor and mechanized divisions will generally be mounted on tracked vehicles due to mobility requirements. Although these minefield breaching systems may (or may not) be mounted on tanks they do not belong to the maneuver commander. They are engineer assets and are found in rather limited numbers. Two of these systems are in the Mine clearing Platoon, Mine Warfare Company, Division Engineer Company, and Engineer Battalion of a mechanized/armored division, engineer brigade, or Corps. Further information on these elements can be found in TC 7-100.2.

Tracked-Vehicle-Mounted Systems											
Name	**Country of Origin**	**Chassis**	**System (or Shell)** **Weight (kg)** Overall: Rocket: Explosive Explosive/m	**Range (m)**	**Length (m)**	**Standoff (m)**	**Effectiveness** Lane Width (m): Lane Length (m) Lane clearing time (min)	**Type Launcher/# Line Charges**	**Rocket Diameter (mm)**	**Crew**	**Explosive Type /#/ Notes**
Type 84	CH	Tank or other armored vehicle	OA: 800 Rocket: unk Exp: 400 Exp/m: 5	300	80	200	LL: 60 LW: 5	1	unk	unk	Line charge

The Type 84 mounts in a box on the rear of a tank or other vehicle. Inside the box is a rocket in a launch rail attached to the box lid, an 80-meter-long explosive hose, and a drag chute. The rocket pulls the explosive hose over the minefield or other obstacle, arming the fuze in flight. After a short delay, the hose explodes leaving a cleared path. The box is automatically discarded after firing. With a published range of 300 meters and a length of 80 meters, the standoff of the system is estimated to be approximately 200 meters.											
Type 762	CH	Type 83, 152-mm tracked howitzer	OA: unk Rocket: 760 Exp: 400 Exp/m: 3	1,000	130	800-900	LL: 130 LW: 12-22	2	425	unk	line charge. 32 charges 12 kg ea
The Type 762 is a twin-rail rocket launcher mounted on a Type 83, 152-mm tracked howitzer chassis. It carries two 425-mm GSL 211 mineclearing rockets. The warheads on GSL 211 rockets contain an explosive line charge that is extracted during flight. The line charge is composed of 32 fixed-interval explosive charges, each weighing 12 kg. When the explosive charge is at a specific height above the minefield, specially designed detonation fuzes at the head and tail of the line charge activate and simultaneously detonate the charges. The system is equipped with an ordinary rangefinder with questionable accuracy; it is uncertain how the system will perform when deployed over a minefield.											
SVO	CZ	BMP-1	Shell size: Length (mm): 1,457 Dia (mm): 246 Weight (kg): 42				LL: 100-120 LW: 5 Time btwn rounds (sec): 2.5	24 explosive rockets			fuze initiation rod length (m): .3
The Czech Republic's SVO is an armored, tracked, mine clearing vehicle used for combat breaches of AT and mixed minefields. The breach is conducted by the launching of mine clearing shells in a specific pattern in order to detonate all the mines along a pathway through the minefield. The entire system is contained in a modified BMP-1 chassis. The turret on the chassis has been removed and exchanged for a rocket firing platform. The firing platform contains 24 launch rods angled at different elevations and deflections in order to provide full warhead coverage for a path through the minefield. The front half of the compartment is for storing and launching the warheads, the other is the operator's position. The shells fit over the 24 launch rods and are projected into the air by the initiation of explosive cartridges. Piezoelectric fuzes located at the base of the fuze extension rods detonate the shells .3 meters above the ground. The SVO reportedly has a 95% probability of initiating single impulse, nonblast resistant, pressure-fuzed mines.											

UZ-67	F S U	2S1 mod	weight (kg): 2,400		93	200 and 350	LL: 75-80 LW: 6 Time: 3-5	2	unk	2	basic load of 2 line charges
UZ-77	F S U	2S1 mod	unk		93	200 & 500 water 200	LL: 80-90 LW: 6 Time: 3-5	2	unk	2	basic load of 2 line charges

Man-Portable Rocket Propelled Line Charges

Many countries and some insurgent groups produce small (1 or 2 man-portable) explosive line charges with a wide variety of capabilities and performance. Mechanized infantry units normally do not have these since the tracked vehicles clear a way for the dismounted infantry. The basis of issue of these systems for use by dismounted (or regular) infantry units is generally three per infantry battalion; nine per brigade/regiment; 27 per division. They are used only in the primary avenue of attack (or as a deception). Battlefield employment dictates that the line is fired and detonated. The infantry then moves as quickly as possible (probably under fire) along the cleared path ensuring they do not step on any uncovered/ unexploded mines. The line charges may be carried by one or more soldiers therefore the overall weight of the charges is important. The bullet trap line charge delivery method realizes a significant weight savings by eliminating the additional weight of a rocket. The soldier simply uses his standard issue weapon to deliver the detonating cord/hose across the minefield. This places limitations on the length and weight of the delivered charge. A typical "infantry explosive minefield breaching system" is the FSU ZRP-2. It is a mine demolition charge designed to blast lanes through AP minefields. The ZRP-2 consists of a detonating cable, powder rocket engine, connecting cable, fuze, braking cord, launching table, launching device, anchor and carrying pack. The charge is launched into an AP minefield with the aid of launching device UP-60 from a position prepared on the ground surface. The charge is detonated remotely by a mechanical fuze. The charge is straightened in the minefield manually with the braking cord while the fuze retarder is burning.

ZRP-2 (FSU) Mine demolition charge	
Type	extended, single-line, made of detonating cable DKR-150A
Weight of set (kg)	50 packaged, 34 in pack
Crew, men	1 or 2
Length of charge (m)	60
Charge launching range (m)	140-160
Size of passage through AP minefield (m)	55 length x 0.4 width
Launch preparation time (min)	5

Infantry Line Charges				
Name	**Country**	**Delivery Method**	**Explosive Weight (kg/m)**	**Length (m)**
Type 73	China	Rocket	2.40	106
Type 74	China	Rocket	2.40	100
Type 81	China	Rocket	0.10	100
Type 84	China	Rocket	0.40	28
ODMIRA-60	Czech Rep	Rocket	NA	60
FATEH-1	Egypt	Rocket	0.42	120
Comet No 3001	Germany	Rocket	0.10	72
Comet No 3010	Germany	Rocket	0.57	53
Ladder 80	Germany	Rocket	NA	70
Unknown	Iraq	Bullet trap	NA	40
POMINS I	Israel	Bullet trap	0.27	50
POMINS II	Israel	Rocket	NA	50
Type 70	Japan	Rocket	1.41	136
Unknown	North Korea	Rocket	NA	180
Clap/M	Pakistan	Rocket	0.05	300
M/60	Sweden	Rocket	NA	150



Unknown	South Africa	Rocket	NA	35
Unknown	South Africa	Rocket	NA	120
RAMBS	UK	Bullet Trap	0.02	40
RAMBS 2	UK	Bullet Trap	unknown	60
ROMANS	UK	Rocket	unknown	50

UGV Primer

Unmanned Ground Vehicles or UGVs have been in service for close to forty years, detecting hazards, marking and clearing roads, and supporting the defeat of explosive devices such as mines, and explosive hazards. This mission traditionally was performed by combat engineers such a Sappers and explosive ordnance disposal (EOD), personnel and specialized police forces. The work can be extremely dangerous as it requires human contact with potentially lethal explosive devices, and hazardous materials. For this reason, UGVs have found a niche in identifying, disarming and disposing of explosives and other hazardous materials while providing combat engineers the standoff distance necessary to increase survivability. It is estimated that the global market for these types of devices will increase to $8.26 billion by the year 2020.

UGVs are credited with reducing ground troop's exposure to danger through a combination of tactics, techniques, and procedures (TTP) used to leverage this new technology. Some of the new technology that is emerging from this sector includes UGVs that are self-aware, multi-functional, energy efficient, and can operate in a variety of terrain. There are a variety of systems on the market that are designed for explosive disposal ranging in size and capability. The categories are mini, mid, and large size UGVs. Most explosive disposal UGVs fall into the Mid-sized category, as they are easy to remotely control, have a small enough profile to provide access to an emplaced explosive device, while at the same time being large enough to manipulate the devices in order to disable them. Some larger UGVs are being used in other types of combat Engineer support activities such as route clearance, and logistics support. These UGVs can look like modified tractors or forklifts with a special sensors for identifying targets, rollers and scoops to defeat mines or remove obstacles.



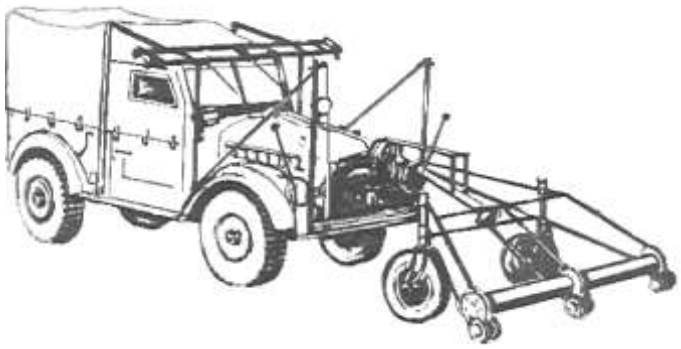
Figure 1: Inspector Mid-Sized Robot, Poland

Many UGVs have tracked belt and wheel system for driving over complex terrain in all types of weather. UGV's that perform reconnaissance functions usually move with relatively large treaded wheels for speed and maneuverability. Usually logistical UGVs are have wheels in order to keep supplies close to maneuver units on the battle field. Legged robots like Boston Dynamics Legged Squad Support System, (LS3) otherwise known as Big Dog, attempt to achieve an all-terrain capability through the employment of a quadrupedal gait. The Big Dog program has been "shelved" by the US Marines.

Challenges with UGVs are mainly with maintaining reliable command and control links between the device and the operator. This critical link, requires the operator to gaze into a computer screen while interpreting everything the UGV sees with its usually limited optical sensor. While the operator is engaged in controlling the UGV the Soldier is unable to perform other security duties and has limited situational awareness. One way to handle this

problem is to make UGVs self-aware by installing automatic target recognition (ATR), algorithms that instruct the device on how to approach and defeat obstacles. Additionally the onboard data base is loaded with the most current map data and a satellite based navigation system in order for the device to move autonomously to its target. The link between robot and operator will not be completely severed in the near future as artificial intelligence is unable to build into the device's electronics the ability to make decisions in a complex combat environment, so operators will still be needed to have a way to give commands and establish control when necessary.

Russian Vehicle-Mounted Mine Detector DIM



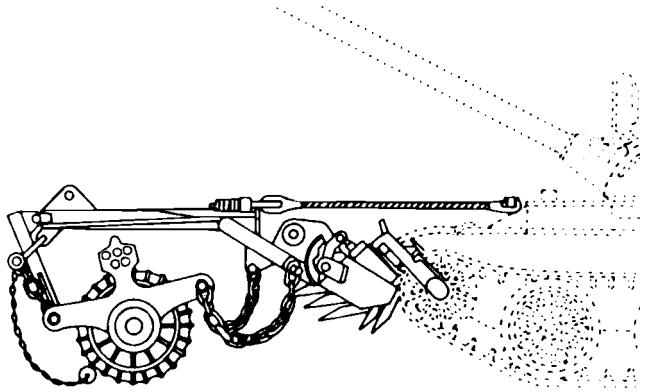
SYSTEM	SPECIFICATIONS	FEATURES (CONT.)	SPECIFICATIONS
System		Max Swim:	INA
Alternative Designations:	None	Fording Depths (M):	INA
Date Of Introduction:	Pre-1975	Radios, Frequency, And Range:	INA
Proliferation:	Widespread	Vertical Step (m):	INA
Description:		CAPABILITIES	
Crew:	2	Operating (scan) Speed (km/h):	10
Troop Capacity:	INA	Mounting/dismounting Time (min):	Up to 7
Chassis:	Used on UAZ-469/69 or other light 4x4 vehicles	Detection Ability:	Can detect metallic mines in roadways, airfields, and other flat terrain.
Combat Weight (Mt):	INA	Max Detection Depth (cm):	25
Length Overall (M):	INA	Max Detection Depth While Fording (cm):	70
Height Overall (M):	INA	VARIANTS	None
Width Overall (M)	INA		
Ground Pressure (Kg/Cm2):	INA		
Automotive Performance:	INA		
Engine Type:	INA		
HP:	INA		
Cruising Range (Km):	INA		

Speed (Km/H):			
Max Road:	**INA**		
Max Off-Road:	**INA**		

NOTES

COMPONENTS: DETECTION SYSTEM, PNEUMATIC SYSTEM, ELECTRONIC SYSTEM. THE DIM IS A LARGE PULSE-INDUCTION MINE-DETECTION DEVICE MOUNTED TO A LIGHT 4X4 TRUCK. THE DETECTION ELEMENT FASTENS TO A FRAME ON THE FRONT OF THE VEHICLE. WHEN A MINE IS DETECTED, THE VEHICLE BREAKING SYSTEM IS ENGAGED AND THE CLUTCH IS DISENGAGED. THE FULL-WIDTH DETECTION HEAD, LOCATED 2.6 METERS FROM THE VEHICLE'S FRONT WHEELS TO PROVIDE STOPPING DISTANCE, IS DIVIDED INTO SIX COMPONENTS TO PINPOINT MINE LOCATION. THE ELECTRONIC SYSTEM ALSO DISPLAYS WHICH COMPONENT OF THE MINE-DETECTOR HEAD THE MINE IS UNDER. IT ALSO HAS ATTACHED ROLLERS SO THAT THE HEAD DOES NOT COME IN CONTACT WITH GROUND OBJECTS. CROSS-COUNTRY CAPABILITY IS VERY LIMITED; THEREFORE THE DIM IS GENERALLY USED FOR CLEARING PREPARED SURFACES. THE DETECTION EQUIPMENT SWINGS UPWARD TO RIDE ON THE TOP OF THE VEHICLE CAB FOR TRAVELING. WHEN NEEDED IT IS SWUNG FORWARD TO REST ON TWO WHEELS.

Russian Tank-Mounted Mineclearing Roller-Plow KMT-5



SYSTEM	SPECIFICATIONS	FEATURES (CONT.)	SPECIFICATIONS
System		Max Swim:	None
Alternative Designations:	INA	Fording Depths (M):	None
Date Of Introduction:	1960s	Radios, Frequency, And Range:	None
Proliferation:	At least 20 countries	Vertical Step (m):	INA
Description:		CAPABILITIES	
Crew:	2	Type:	Roller and plow
Troop Capacity:	INA	Form:	3 rollers x 2
Chassis:	Mounted on T-54, T-55, T-62, other medium tanks	Number of Rollers Per Set:	2
Combat Weight (Mt):	7.5	Total Number of Rollers:	6
Length Overall (M):	3.2	Mine Removal Speed (km/h):	8-12
Height Overall (M):	INA	Cleared Lane Width, each (mm):	810 x 2
Width Overall (M)	4	Mineclearing Track Width (mm):	810
Ground Pressure (Kg/Cm2):	INA	Installation Time (min):	30 to 45
Automotive Performance:	None		
Engine Type:	None		
HP:	None		
Cruising Range (Km):	None		

Speed (Km/H):			
Max Road:	**None**		
Max Off-Road:	**INA**		

NOTES

THE KMT-5M MINE ROLLER-PLOW IS VERY FLEXIBLE, SINCE IT ALLOWS FOR EITHER THE PLOWS OR THE ROLLERS TO BE USED. THE ROLLERS FUNCTION SATISFACTORILY AGAINST MINES EQUIPPED WITH SIMPLE PRESSURE FUZES, BUT OTHER MINES WILL DEFEAT THIS EQUIPMENT. HOWEVER, THE ROLLER-PLOW COMBINATION ALSO ALLOWS THE TANK TO COUNTER MORE SOPHISTICATED FUZES WITH PLOWS DESIGNED TO UNCOVER OR PUSH MINES ASIDE. THE PLOWS AND ROLLERS CANNOT WORK SIMULTANEOUSLY. THE KMT-5M ALSO INCLUDES A LUMINOUS LANE-MARKING DEVICE FOR NIGHT OPERATIONS. BECAUSE PLOWS AND ROLLERS DO NOT CLEAR THE AREA BETWEEN THEM A "DOG BONE" OR LIGHT CHAIN WITH ROLLERS IS STRETCHED BETWEEN THE ROLLER SECTIONS TO DEFEAT TILT-ROD MINES. QUICK DISCONNECTS ALLOW THE OPERATOR TO DROP EITHER PLOWS OR ROLLERS OR BOTH; OTHERWISE, THE CREW CAN REMOVE THE SYSTEM IN 8 TO 13 MINUTES. ALL CURRENT MEDIUM TANKS HAVE FITTINGS FOR ATTACHING MINE CLEARING EQUIPMENT. THERE IS ONE PLOW PER TANK PLATOON AND ONE ROLLER PER COMPANY. FOR TANKS NEWER THAN THE T-55/62 THE PLOWS ARE NO LONGER CARRIED IN THE ENGINEER COMPANY, BUT ARE PERMANENTLY MOUNTED ON THE TANK. THEREFORE THE ENGINEERS NEED ONLY TO TRANSPORT THE ROLLERS. ONE KRAZ-255B TRUCK (WITH KM-61 CRANE) OR TWO ZIL-131 TRUCKS CAN CARRY ONE KMT-5M.

Russian Tracked Mine clearing Vehicle MTK-2

SYSTEM	SPECIFICATIONS	FEATURES (CONT.)	SPECIFICATIONS
System		Max Swim:	INA
Alternative Designations:	UR-77 mine clearing vehicle, M1979	Fording Depths (M):	INA
Date Of Introduction:	1981	Radios, Frequency, And Range:	INA
Proliferation:	FSU and former Warsaw Pact armies	Vertical Step (m):	INA
Description:		Mine clearing Equipment	
Crew:	2	Type:	Explosive line
Troop Capacity:	INA	Charges Used:	UZP-77, UZ-67
Chassis:	Based on the 2S1	Length of Charge (m):	93
Combat Weight (Mt):	15.5	Length of Charge Feed (m):	See Notes
Length Overall (M):	8.4	Size of Lane in AT Minefield (m):	See Notes
Height Overall (M):	3.1	Breaching Time (min):	3 to 5
Width Overall (M)	2.8	Variants	INA
Ground Pressure (Kg/Cm2):	INA		
Automotive Performance:			
Engine Type:	INA		
HP:	INA		
Cruising Range (Km):	500		
Speed (Km/H):			
Max Road:	60		
Max Off-Road:	30		

NOTES

THE MTK-2 CLEARS LANES IN MINEFIELDS BY USING ROCKET-PROPELLED CHARGES. THE CHARGES ARE LAUNCHED ONTO THE MINEFIELD AND THEN DETONATED BY THE VEHICLE COMMANDER-OPERATOR FROM WITHIN THE VEHICLE. THE CHARGE CAN BE FIRED ON LAND OR IN THE WATER. LENGTH OF CHARGE FEED (M): UZP-77: 200 AND 500. UZ-67: 200 AND 350 SIZE OF LANE IN AT MINEFIELD (M): WIDTH: UP TO 6 LENGTH (USP-77): 80-90 LENGTH (UZ-67): 75-80

Russian Armored Route-Clearing Vehicle BAT-2



SYSTEM	SPECIFICATIONS	FEATURES (CONT.)	SPECIFICATIONS
System		Max Swim:	INA
Alternative Designations:	None	Fording Depths (M):	1.3
Date Of Introduction:	1981	Radios, Frequency, And Range:	INA
Proliferation:	At least 2 countries.	Vertical Step (m):	.8
Description:		Trench Crossing (m): 2.7	2.7
Crew:	2+8	Automotive Performance:	
Troop Capacity:	8	Engine Type:	V-64-4 multi-fuel diesel
Chassis:	MT-T	HP:	700
Combat Weight (Mt):	39.7	Cruising Range (Km):	500
Length Overall (M):	9.64	Speed (Km/H):	
Height Overall (M):	3.69	Max Road:	INA
Width Overall (M)	4.2	Max Off-Road:	INA
Clearance (mm):	430		
Automotive Performance:			
Engine Type:	V-64-4 multi-fuel diesel		
HP:	700		
Cruising Range (Km):	500		
Speed (Km/H):			
Max Road:	INA		

Max Off-Road:	**INA**		

NOTES

BLADE WIDTH (M): VARIABLE. MOUNTED VERTICALLY IN FRONT AND OVER THE CREW CAB WHEN NOT IN USE. BULLDOZER POSITION: 4.5. ROAD CLEARING/BUILDING: 4.2. GRADING: 4.1-4.35. OPERATING DEPTH (SOLID AND FROZEN SOIL) (M): .5. OPERATING SPEED (KM/H): ROAD BUILDING: GROUND UNOBSTRUCTED: 6-8. GROUND WITH TREES < 30 CM: 2-3. SNOW: 8-15 HOURLY CAPACITY (M3/HR): DITCH DIGGING: 200-250. FILLING IN DITCHES, CRATERS, ETC: 350-450. CRANE CAPACITY (MT): 2. BOOM LENGTH (M): 7.3. WINCH CAPACITY (MT): 25 CABLE LENGTH (M): 100 THE BAT-2 IS A FOLLOW-ON TO THE BAT AND BAT-M DOZERS, BUT BETTER FITS THE CLASSIFICATION OF ARMORED ROUTE-CLEARING VEHICLE RATHER THAN THAT OF A HIGH-SPEED ARMORED DOZER. ITS CAB IS FULLY ARMORED AND IT IS DESIGNED TO OPERATE IN THE FORWARD AREAS OF THE BATTLEFIELD. THE WINDOWS IN THE FRONT, SIDES, AND REAR ARE BULLET-PROOF FURTHER ENHANCING BATTLEFIELD SURVIVABILITY.

THE ABILITY TO CARRY AN EIGHT-MAN ENGINEER SQUAD FACILITATES ITS ROLE IN THE MOVEMENT SUPPORT DETACHMENT. OTHER BAT-2 MISSIONS INCLUDE ROAD BUILDING, OBSTACLE, (STONE AND WOOD) REMOVAL, AND SNOW REMOVAL OPERATIONS. THE VEHICLE IS ALSO DESIGNED TO OPERATE IN URBAN TERRAIN AND AS AN NBC VEHICLE. STORAGE AREAS FOR ENGINEER SUPPLIES HAVE BEEN DESIGNED INTO THE VEHICLE. THE BAT-2 HAS A CRANE, A RIPPER, AND A WINCH.

Russian Tracked Route-Clearing Vehicle BAT-M

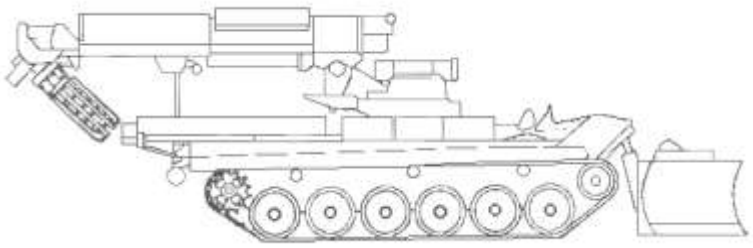


SYSTEM	SPECIFICATIONS	FEATURES (CONT.)	SPECIFICATIONS
System		Max Swim:	INA
Alternative Designations:	Dozer	Fording Depths (M):	.7
Date Of Introduction:	1967	Radios, Frequency, And Range:	INA
Proliferation:	Widespread	Vertical Step (m):	1
Description:		Trench Crossing (m): 2.7	1.57
Crew:	2	Time from Travel to Operating Position (min):	5 to 7
Troop Capacity:	INA	Variants	BAT. BAT-2: Based on MT-T artillery tractor
Chassis:	AT-T heavy tracked artillery tractor	Automotive Performance:	
Combat Weight (Mt):	26	Engine Type:	V-12 diesel
Length Overall (M):	10	HP:	
Height Overall (M):	3.5	Cruising Range (Km):	500
Width Overall (M)	4.7	Speed (Km/H):	35
Clearance (mm):	425	Max Road:	INA
		Max Off-Road:	INA

NOTES

BLADE WIDTH (M): 4.8 BLADE RATE (M3/HR): 250. OPERATING SPEED (KM/H): 10. ROTARY CRANE CAPACITY (MT): 2. THE BAT TRACTOR DOZER IS AN AT-T HEAVY TRACTOR WITH A LARGE DOZER BLADE MOUNTED AT THE FRONT OF THE HULL. IT IS DESIGNED FOR GENERAL ENGINEER USE, ROAD AND TRAIL CLEARING AND CONSTRUCTION. THE BAT-M IS AN IMPROVED MODEL (OVER THE BAT) AND IS ELECTRO-HYDRAULIC, WHEREAS THE BAT IS ELECTRO-PNEUMATIC. THE BAT-M ALSO HAS A HYDRAULIC CRANE, AND THE DOZER BLADE CAN BE SWUNG TO THE REAR IMPROVING THE VEHICLE'S LOAD DISTRIBUTION WHEN IN TRAVELING MODE.

Russian Obstacle Clearing Vehicle IMR-2M



SYSTEM	SPECIFICATIONS	FEATURES (CONT.)	SPECIFICATIONS
System		Max Swim:	INA
Alternative Designations:	INA	Fording Depths (M):	1.2
Date Of Introduction:	1982	Radios, Frequency, And Range:	R-173 radio, R-174 intercom
Proliferation:	FSU and former Warsaw Pact armies	Vertical Step (m):	INA
Description:		Trench Crossing (m): 2.7	1.57
Crew:	2	Time from Travel to Operating Position (min):	5 to 7
Troop Capacity:	INA	Variants	yes
Chassis:	T-72A	Automotive Performance:	
Combat Weight (Mt):	44.3	Engine Type:	12 cyl, diesel
Length Overall (M):	9.55	HP:	840
Height Overall (M):	3.68	Cruising Range (Km):	500
Width Overall (M)	3.73	Speed (Km/H):	60
Clearance (mm):	INA	Max Road:	INA
Gradient	25	Max Off-Road:	INA

NOTES

SYSTEM COMPONENTS: MULTIPURPOSE DOZER EQUIPMENT, BOOM, TREADWAY MINE EXPLODER. NIGHT DRIVING EQUIPMENT: YES. NBC PROTECTION SYSTEM: YES. BLADE: CAN BE USED AS A DOZER, GRADER AND V-BLADE, VERTICAL PLANE SKEW ABILITY. OPERATING SPEED (BULLDOZER) (KM/H): 8-12. EARTH DISPLACEMENT (M3/HR): 300. LANE CLEARING RATE (KM): .35. ALL-PURPOSE TOOL TRENCH DIGGING (1.1 TO 1.3M DEEP)(M3/HR): 8-10. PIT DIGGING (UP TO 2.5M DEEP) (M3/HR): 12-16. BOOM CAPACITY (MT): 2. REACH (M): 8.4. MINE SWEEPING SPEED (KM): AT PRESSURE MINES: 6-15. TILT ROD MINES: 7 VARIANTS: IMR: THE IMR IS A NBC-PROTECTED, COMBAT ENGINEER VEHICLE BASED ON THE T-54/55 TANK CHASSIS. IT IS FITTED WITH AN ARTICULATING DOZER BLADE AND A TELESCOPING CRANE THAT FITS A NUMBER OF ATTACHMENTS. IMR-2: EQUIPPED WITH MINE SWEEPERS AND MINE-CLEARING EXTENDED CHARGES. LINE DRAWING IS OF IMR-2. THE IMR-2M DIFFERS FROM THE IMR-2 IN THAT THE IMR-2M HAS NO LINE-LAUNCHED MINE CLEARING CHARGE. THE IMR-2M HAS MORE ARMOR, HYDRAULIC EQUIPMENT AND A SCRAPER-RIPPER.

Russian Engineer Reconnaissance Vehicle IRM



SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative designations:	Zhuk (Beetle)	Name:	Machinegun PKT
Date of introduction:	1976	Caliber/length:	7.62-mm (7.62x 54R)
Proliferation:	Former Soviet Union	Type:	Lt Ball, Ball-T, API, API-T
Description:	Based on the BMP-1 chassis (7 road wheels instead of 6 on BMP-1)	Ammo:	7.62-mm PKT MG (Typical Combat Load 2,000)
Crew:	6 (commander, driver, 4x dismountable engineers)	Maximum Effective Range:	Max Effective Range (m): Day: 1,000 / 400-500 on the move. Night: 800
Combat weight (mt):	17	Armor penetration:	INA
Chassis length overall (m):	8.2 (detector arms in travel mode)	Muzzle velocity (m/s):	INA
Height overall (m):	2.4	Name:	INA
Width overall (m):	3.1	Caliber/length:	INA
Ground pressure (kg/cm²):	0.69	Type:	INA
Automotive performance:	UTD20	Ammo:	INA
Engine type:	Diesel	Maximum Effective Range:	INA
Cruising range (km):	500 HP 300	Armor penetration:	INA
Speed (km/h):	Max road: 52 Max off-road: INA Average cross-country: INA Max Swim: 12	Muzzle velocity (m/s):	INA
Fording depths (m):	3		
Radio:	Onboard and 2 x R-147 (dismount)	VARIANTS	SPECIFICATIONS
Protection:	INA	IPR:	Very similar to the IRM except it has a folding snorkel on the rear deck.
Armor, turret front (mm):	INA		
Applique armor (mm):	INA		

Explosive reactive armor(mm):	**INA**		
Active Protection System:	**INA**		
Self-entrenching blade:	**No**		
NBC protection system:	**Yes, collective protection system**		
Smoke equipment:	**Vehicle engine exhaust smoke system (VEESS)**		
Survivability equipment:	**INA**		

NOTES:

THE IRM ENGINEER RECONNAISSANCE VEHICLE CONDUCTS RECONNAISSANCE OF ROUTES, FORDS, WATER BARRIERS (VELOCITY, DEPTH, UNDERWATER OBSTACLES, AND BOTTOM PROFILE AND DENSITY), ICE, MAPPING, AND OVERALL TERRAIN TRAFFICABILITY. ITS CHASSIS EMPLOYS COMPONENTS OF THE BMP-1 IFV. IT HAS TWO PROPELLERS ON THE REAR OF THE HULL FOR PROPULSION IN THE WATER. A WAVE DEFLECTOR COVERS THE FRONT OF THE HULL. THE IRM HAS AN EMERGENCY EXTRACTION/SELF-RECOVERY SYSTEM AVAILABLE WHICH ALLOWS THE VEHICLE TO QUICKLY EXTRACT ITSELF WHEN STUCK IN MUD, ETC WITHOUT HAVING THE CREW EXIT THE VEHICLE. THE SYSTEM CONSISTS OF TWO RACKS OF 12 ROCKETS EACH MOUNTED ON THE REAR DECK BETWEEN THE PROPELLERS. THIS ROCKET PROPULSION SYSTEM IS ESPECIALLY VALUABLE IF THE VEHICLE IS STUCK WHEN UNDER ENEMY FIRE. WEAPONS & AMMUNITION TYPES. GRADIENT: 36.SIDE SLOPE: 17. MINE DETECTING CAPABILITY: TWO EXTENDABLE ARMS FOR MINE DETECTING. THE MINE DETECTOR ARMS ARE HYDRAULICALLY ARTICULATED TO THEIR OPERATING POSITION IN THREE MINUTES. THE DETECTOR WILL BRING THE VEHICLE TO A HALT UPON ENCOUNTERING AN OBSTACLE OR DETECTING A METALLIC OBJECT. HANDHELD MINE DETECTORS (2) AT MINE DETECTION ZONE (M) WIDTH: 3.6 DEPTH: .3. RIVER-TYPE WIDE-SPAN MINE DETECTOR: RSHM-2 (DETECTS MINES PLANTED DEPTH OF .3M WITH CURRENT VELOCITY OF 3-5 KM/H). MECHANICAL PENETROMETER (TO ANALYZE SOIL FOR TRAFFICABILITY). SONAR (ECHO SOUNDER WITH AN AUTO RECORDER AND THREE HYDRO-ACOUSTIC TRANSDUCERS) .5 TO 20 M (FOR WATER BOTTOM PROFILES, MINE AND OBSTACLE DETECTION). GYROCOMPASS AND GYRO-STABILIZED ARTIFICIAL HORIZON: AGI-1S SURVEILLANCE AND NIGHT OBSERVATION EQUIPMENT: TNPO-160, TNP-370, TVN-2BM. NAVIGATION: INERTIAL WITH CONSTANT COORDINATE AND DIRECTION READOUT: TNA-3. IR SEARCHLIGHT IS MOUNTED TO THE RIGHT OF THE PKT MG. EQUIPMENT FOR DISMOUNTED ENGINEER: DIGITAL CAMERA PORTABLE PERISCOPE: PIR-T. THE 15X PERISCOPE IS USED PRIMARILY FOR DETAILED STUDIES OF ENEMY STRUCTURES AND OBSTACLE SOIL PENETROMETER, PORTABLE ICE DRILL LASER RANGEFINDER, THERMAL VIEWER, HANDHELD GPS RECEIVER, HANDHELD MINE DETECTORS, PORTABLE: RVM-2M AND IMP-2. RADIOS, HANDHELD: R-147 (X2)

Czechoslovak Armored Vehicle-Launched Bridge MT-55A



SYSTEM	SPECIFICATIONS	FEATURES (CONT.)	SPECIFICATIONS
System		Max Swim:	INA
Alternative Designations:	None	Fording Depths (M):	1.4
Date Of Introduction:	1970	Radios, Frequency, And Range:	R-123
Proliferation:	At least 20 countries	Vertical Step (m):	.7
Description:		BRIDGE	
Crew:	2	Type:	Scissors
Troop Capacity:	INA	Capacity (mt):	50
Chassis:	T-55A Tank (modified)	Width of Obstacle (m):	17
Combat Weight (Mt):	36	Width (m):	3.3
Length Overall (M):	9.90	Length Opened (m):	18
Height Overall (M):	3.35	Weight (kg): 6.5	6.5
Width Overall (M)	3.30	Emplacement Time (min):	2
Ground Pressure (Kg/Cm2):	INA	Displacement Time (min):	5-6
Automotive Performance:		Variants	None
Engine Type:	V-12 Diesel,		
HP:	580 hp		
Cruising Range (Km):	690		
Speed (Km/H):			
Max Road:	32-35		
Max Off-Road:	16-20		

NOTES

THE MT-55A HAS A GAP MEASURING DEVICE AND INFRARED EQUIPMENT FOR BRIDGE-LAYING AT NIGHT. IT CAN ALSO LAUNCH THE MT-72 BRIDGE. SELF-ENTRENCHING BLADE: NO. NBC PROTECTION SYSTEM: YES. SMOKE EQUIPMENT: VEHICLE ENGINE EXHAUST SMOKE SYSTEM. VERTICAL STEP (M): .7. TRENCH (M): 2.7. GROUND CLEARANCE (MM): 425. GRADIENT: 30

Russian Armored Vehicle-Launched Bridge MTU-72



SYSTEM	SPECIFICATIONS	FEATURES (CONT.)	SPECIFICATIONS
System		Max Swim:	INA
Alternative Designations:	None	Fording Depths (M):	1.2
Date Of Introduction:	1974	Radios, Frequency, And Range:	R-173 and R-134
Proliferation:	At least one country.	Vertical Step (m):	2.8
Description:		BRIDGE	
Crew:	2	Type:	Cantilever
Troop Capacity:	INA	Capacity (mt):	50
Chassis:	T-72S	Width of Obstacle (m):	18
Combat Weight (Mt):	40	Width (m):	3.55
Length Overall (M):	11.64	Length Opened (m):	20
Height Overall (M):	3.38	Weight (kg):	6,400
Width Overall (M)	3.46	Emplacement Time (min):	3
Ground Pressure (Kg/Cm2):	INA	Displacement Time (min):	8
Automotive Performance:		Variants	None
Engine Type:	Diesel		
HP:	840		
Cruising Range (Km):	500		
Speed (Km/H):			
Max Road:	60		
Max Off-Road:	45		

NOTES

SELF-ENTRENCHING BLADE: YES. NBC PROTECTION SYSTEM: YES. SMOKE EQUIPMENT: VEHICLE ENGINE EXHAUST SMOKE SYSTEM. AVERAGE CROSS-COUNTRY: 35. FORDING WIDTH (M): 1000. TRENCH (M): 2.8. GROUND CLEARANCE (MM): 49. GRADIENT: 31. SIDE SLOPE: 22

Russian Self-Propelled Amphibious Ferry PMM-2



SYSTEM	SPECIFICATIONS	FEATURES (CONT.)	SPECIFICATIONS
System		Max Swim:	INA
Alternative Designations:	None	Fording Depths (M):	1.2
Date Of Introduction:	1983	Radios, Frequency, And Range:	R-173 and R-134
Proliferation:	At least four countries.	Vertical Step (m):	2.8
Description:		BRIDGE	
Crew:	3	Type:	SP Ferry
Troop Capacity:	INA	Capacity (mt):	42.5
Chassis:	Based on amphibious version of the Kharkov T-64 (same as MT-T transporter, PTS-2 tracked amphibian)	Obstacle Gap (m):	20
Combat Weight (Mt):	36	Deck Length Opened One (m):	10
Length Overall (M):	13.5	Loading Ramps (2) width ea (m):	5
Height Overall (M):	3.85	Deck Width Opened (m):	4.2
Width Overall (M)	3.5/10.5	Emplacement Time Approx (min):	5
Ground Pressure (Kg/Cm2):	INA	Variants	Amphibious Bridging System-Wheeled (ABS-W)
Automotive Performance:	V-64-4 V-12		
Engine Type:	Diesel		
HP:	710		

Cruising Range (Km):	**500**		
Speed (Km/H):			
Max Road:	**55**		
Max Off-Road:	**INA**		

NOTES

THE PMM-2 REPLACES THE GSP AND HAS ONE MAIN ADVANTAGE AS A FERRY OVER THE GSP: WHEREAS TWO GSP HALF-FERRIES MUST BE JOINED TOGETHER TO PRODUCE ONE FERRY WITH A CAPACITY OF 50 METRIC TONS, ONE PMM-2 CAN HANDLE APPROXIMATELY THE SAME CAPACITY–EIGHT PMM-2 VEHICLES CAN FORM EIGHT SEPARATE FERRIES OR FOUR LARGE FERRIES (85-TON CAPACITY). THE PMM-2 BEARS GREAT SIMILARITY TO THE PTS-2 TRACKED AMPHIBIAN, WITH ITS CAB AND BOAT-LIKE BOW. THE CHASSIS IS SIMILAR TO THAT OF THE MT-T ARTILLERY PRIME MOVER, WITH SEVEN ROAD WHEELS AND FOUR RETURN ROLLERS. WHEN UNFOLDED THE PMM-2 CREATES A RAFT THAT CAN CARRY A MAIN BATTLE TANK WITHOUT FURTHER ASSISTANCE OR CONSTRUCTION. WHILE TWO SYSTEMS CAN BE COMBINED TO FORM AN 85-TON CAPABLE FERRY, THE PMM-2 DOES NOT FORM FLOAT BRIDGES. ON TOP OF THE HULL, THE SYSTEM HAS TWO LARGE BOX PONTOONS CARRIED ONE ATOP THE OTHER. THEY ARE HINGED TO HYDRAULICALLY UNFOLD TO EITHER SIDE OF THE HULL FOR WATER OPERATIONS. SMALL TREAD WAY RAMPS ARE FOLDED ON THE PONTOONS. THE UNFOLDED PONTOONS HAVE WAVE DEFLECTORS, AS WELL AS RAMPS TO EXPEDITE THE LOADING AND UNLOADING OF VEHICLES. AIRDROP/AIR TRANSPORTABLE: NO MINIMUM OPERATING DEPTH (M): 1.3. GROUND CLEARANCE (M): .4. APPROACH ANGLE: 25. DEPARTURE ANGLE: 25

Russian Heavy Folding Pontoon Bridge PMP



SYSTEM	SPECIFICATIONS	FEATURES (CONT.)	SPECIFICATIONS
System		Max Swim:	INA
Alternative Designations:	Ribbon bridge	Fording Depths (M):	1.2
Date Of Introduction:	1961	Radios, Frequency, And Range:	R-173 and R-134
Proliferation:	Over 20 countries.	Vertical Step (m):	2.8
Description:		BRIDGE	
Crew:	3	Type:	Pontoon
Troop Capacity:	INA	Total Length of Bridge (m):	227
Chassis:	KraZ-255B	Capacity/Load Class (mt):	60
Combat Weight (Mt):	36	Roadway Width (m):	6.5
Length Overall (M):	13.5	Working Party:	Varies - approx. 65 for full bridge set. See RAFT ASSEMBLY DATA
Height Overall (M):	3.85	Material:	SKhL-4 steel
Width Overall (M)	3.5/10.5	Bridge/center:	32
Ground Pressure (Kg/Cm2):	INA	Ramp/shore:	4
Automotive Performance:	V-64-4 V-12		
Engine Type:	Diesel		
HP:	710		
Cruising Range (Km):	500		
Speed (Km/H):			
Max Road:	55		
Max Off-Road:	INA		

NOTES

THE COMPLETE PMP RIBBON BRIDGE SET CONSISTS OF 32 CENTER PONTOONS AND 4 RAMP PONTOONS, THE NORMAL BRIDGE UNIT CONSISTS OF A HALF-SET (ONE COMPLETE BRIDGE) MADE UP OF 16 CENTER AND 2 RAMP PONTOONS. EACH 4-SECTION IS LAUNCHED FROM THE KRAZ-255B. IT AUTOMATICALLY UNFOLDS UPON ENTERING THE WATER. THE SECTIONS THEN LOCK IN PLACE TO FORM A BRIDGE UNIT 6.75 METERS LONG AND 8 METERS WIDE. NORMALLY, ALL THE UNITS ARE LAUNCHED SIMULTANEOUSLY. THEY JOIN TOGETHER PARALLEL TO THE NEAR SHORE TO FORM A CONTINUOUS ROADWAY. THE ROADWAY THEN SWINGS ACROSS THE WATER OBSTACLE; POWERBOATS (6 PER HALF-SET) HOLD IT IN PLACE ON THE DESIGNATED CENTERLINE. ENGINEERS CAN USE THE FULL 36-PONTOON SET TO CONSTRUCT 227 METERS OF BRIDGE. THEY MAY ALSO CONFIGURE IT AS 40- TO 170-TON RAFTS. A HALF-SET GIVES THE CAPABILITY TO CONSTRUCT 119 METERS OF 60-TON BRIDGE, 191 METERS OF 20-TON BRIDGE, OR RAFTS. UNDER IDEAL CONDITIONS ASSEMBLY SPEEDS OF 7 METERS OF BRIDGE PER MINUTE CAN RESULT. THIS BRIDGE CAN BE BUILT IN STREAMS WITH A VELOCITY OF UP TO 2 METERS A SECOND (APPROX. 7 KM/H). AUTOMATICALLY UNFOLDS UPON ENTERING THE WATER. THE SECTIONS THEN LOCK IN PLACE TO FORM A BRIDGE UNIT 6.75 METERS LONG AND 8 METERS WIDE. NORMALLY, ALL THE UNITS ARE LAUNCHED SIMULTANEOUSLY. THEY JOIN TOGETHER PARALLEL TO THE NEAR SHORE TO FORM A CONTINUOUS ROADWAY. THE ROADWAY THEN SWINGS ACROSS THE WATER OBSTACLE; POWERBOATS (6 PER HALF-SET) HOLD IT IN PLACE ON THE DESIGNATED CENTERLINE. ENGINEERS CAN USE THE FULL 36-PONTOON SET TO CONSTRUCT 227 METERS OF BRIDGE. THEY MAY ALSO CONFIGURE IT AS 40- TO 170-TON RAFTS. A HALF-SET GIVES THE CAPABILITY TO CONSTRUCT 119 METERS OF 60-TON BRIDGE, 191 METERS OF 20-TON BRIDGE, OR RAFTS. UNDER IDEAL CONDITIONS ASSEMBLY SPEEDS OF 7 METERS OF BRIDGE PER MINUTE CAN RESULT. THIS BRIDGE CAN BE BUILT IN STREAMS WITH A VELOCITY OF UP TO 2 METERS A SECOND (APPROX. 7 KM/H). BRIDGE PONTOONS: WEIGHT (KG): 6,790. LENGTH (M): UNFOLDED: 6.75. FOLDED: 6.75. WIDTH (M): UNFOLDED: 8. FOLDED: 5. DEPTH UNFOLDED (M): BOW SECTION: .9. CENTER SECTION: .7. FOLDED: 2. RAMP PONTOONS. WEIGHT (KG): 7,252. LENGTH (M): UNFOLDED: 5.6. FOLDED: 5.6. WIDTH UNFOLDED (M): RIVER END: 7.3. SHORE END: 7. FOLDED: 3.1. RAFT ASSEMBLY DATA. 40-TON RAFT-BRIDGE PONTOONS: 2 OVERALL DECK LENGTH (M): 13.5. ASSEMBLY TIME (MIN): 8 WORKING PARTY (EST.): 6. 60-TON RAFT-BRIDGE PONTOONS: 3 OVERALL DECK LENGTH (M): 20.3. ASSEMBLY TIME (MIN): 10. WORKING PARTY (EST.): 9. 80-TON RAFT-BRIDGE PONTOONS: 4. OVERALL DECK LENGTH (M): 27. ASSEMBLY TIME (MIN): 12. WORKING PARTY (EST): 12. 110-TON RAFT-BRIDGE RAMP PONTOON: 1 BRIDGE PONTOONS: 5 OVERALL DECK LENGTH (M): 39.3. ASSEMBLY TIME (MIN): 15. WORKING PARTY (EST.): 18. 170-TON RAFT-BRIDGE RAMP PONTOON: 1.BRIDGE PONTOONS: 8. OVERALL DECK LENGTH (M): 59.6. ASSEMBLY TIME (MIN): 15. WORKING PARTY (EST.): INA. AUXILIARY EQUIPMENT POWERBOATS OR TRACKED AMPHIBIANS: 12. LAUNCH SEQUENCE. 1. THE TRAVEL LOCKS ARE DISENGAGED, THE PONTOON CARRIER BACKS TO THE EDGE OF THE WATER, BRAKES SHARPLY, AND THEN THE PONTOON SLIDES OVER THE CARRIER ROLLER SYSTEM INTO THE WATER WHERE IT UNFOLDS ALMOST IMMEDIATELY. 2. THE PONTOON IS THEN STIFFENED BY ACTIVATING SIX LOCKING DEVICES. 3. ONCE THE PONTOONS HAVE BEEN LAUNCHED AND STIFFENED THEY ARE INTERCONNECTED PARALLEL TO THE NEAR SHORE TO FORM A CONTINUOUS STRIP OF ROADWAY. 4. THIS ROADWAY IS THEN SWUNG ACROSS THE WATER OBSTACLE AND HELD IN PLACE BY POWERBOATS. WHENEVER POSSIBLE THE LAUNCHING OPERATIONS ARE DONE ALONG A CONTINUOUS SHORELINE PERMITTING ALL PONTOONS TO BE LAUNCHED AT THE SAME TIME. IF NECESSARY, THE BRIDGE CAN BE BUILT ON A SMALL FRONTAGE USING THE SUCCESSIVE RAFT SYSTEM. THIS SLOWS CONSTRUCTION TIME. RETRIEVAL FOR RETRIEVAL THE LAUNCH OPERATION IS REVERSED. THE PONTOON CARRIER BACKS TO THE WATER'S EDGE, AN INTEGRAL JIB IS UNFOLDED FROM THE TRUCK BED, AND TWO CABLES ARE STRUNG FROM THE WINCH (LOCATED BEHIND THE DRIVER'S CAB) THROUGH THE JIB PULLEYS, AROUND THE PONTOON RETRIEVING GUIDES, AND SECURED TO THE PONTOON RETRIEVAL STUDS. THE WINCH SIMULTANEOUSLY FOLDS AND LIFTS THE PONTOON TO THE TRUCK BED. THE JIB IS THEN FOLDED BACK INTO THE TRUCK BED, AND THE PONTOON IS WINCHED OVER THE ROLLER SYSTEM AND SECURED. THE WHOLE PROCEDURE TAKES BUT A VERY FEW MINUTES.

Russian Truck-Mounted Scissors Bridge TMM

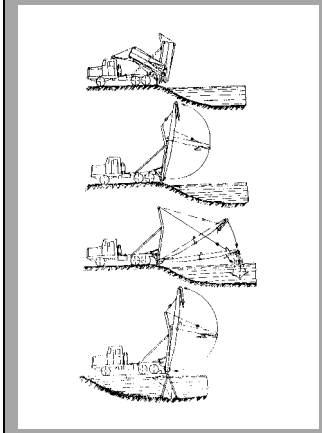


SYSTEM	SPECIFICATIONS	FEATURES (CONT.)	SPECIFICATIONS
System		Max Swim:	INA
Alternative Designations:	Mechanized Bridge, Scissors Bridge	Fording Depths (M):	1
Date Of Introduction:	1964	Radios, Frequency, And Range:	INA
Proliferation:	At least20 countries.	Vertical Step (m):	INA
Description:		BRIDGE	
Crew:	See Notes	Type:	Truck-mounted scissors
Troop Capacity:	INA	Total Length of Bridge (m):	227
Chassis:	Modified KrAZ-214 (6 × 6), 7,000 kg, or KrAZ-255B (6 × 6), 7,500 kg, and KrAZ-260 trucks.	Capacity/Load Class (mt):	60
Combat Weight (Mt):	19	Roadway Width (m):	3.2-3.8
Length Overall (M):	9.3	Working Party:	See Notes
Height Overall (M):	3.15	Material:	Low alloy steel
Width Overall (M)	3.2	Bridge/center:	INA
Ground Pressure (Kg/Cm2):	INA	Ramp/shore:	INA
Automotive Performance:	INA	Variants	TMM-3: KrAZ-255B 6 x 6 improved bridgelaying mechanism.

			TMM-6: MAZ-543 8 × 8 truck with 17 m bridge spans (unfolded).
Engine Type:	INA		
HP:	INA		
Cruising Range (Km):	INA		
Speed (Km/H):			
Max Road:	INA		
Max Off-Road:	INA		

NOTES

THE TMM IS A MULTIPLE-SPAN, TRESTLE-SUPPORTED, SCISSORS-TYPE, TREADWAY BRIDGE. ONE BRIDGE SET COMPRISES FOUR 10.5 METER, SPANS CARRIED ON, AND LAUNCHED FROM SPECIALLY MODIFIED TRUCKS. SPANS FOLD IN HALF FOR TRANSPORT. THREE OF THE SPANS HAVE INTEGRAL-MOUNTED ADJUSTED (1.7 TO 3.2 METERS) TRESTLE LEGS, WHILE THE FOURTH (FAR-SHORE) SPAN HAS NONE. DURING TRAVEL, THE TRESTLES CAN FOLD BENEATH THE SCISSORS PLAN. A LAUNCHING GIRDER MOUNTED ON THE TRUCK BED LAUNCHES THE TMM HYDRAULICALLY OVER THE TAILGATE. ASSISTED BY WINCH CABLES AND PULLEYS, THE GIRDER RAISES, UNFOLDS, AND EMPLACES THE SPAN WITH THE FOLDING TRESTLE LEGS. IF NECESSARY THE TMM CAN BE LAID UNDERWATER. THIS REQUIRES ABOUT 50% MORE EMPLACEMENT TIME. WEIGHT (KG): 4.24. PIER: (TMM ON KRAZ-255). HEIGHT (M): MIN: 1.7 MAX: 3.21. GROUND AREA (M2/PIER): 2.4. WEIGHT (M): 1.15. LOWERING METHOD: CABLE RELEASE. RAISING METHOD: HAND WINCH. LOCKING METHOD: MANUAL. ASSEMBLY DATA SPANS IN SET: 4. LENGTH OF 1 SPAN (M): UNFOLDED: 10.5. FOLDED: 5.2. TOTAL LENGTH OF BRIDGE (M): 42. OBSTACLE SPAN (M): SPAN: 9.4. DEPTH: 3. ROADWAY WIDTH (M): CLOSED: 3.2. EXTENDED: 5.2. ASSEMBLY TIME (MIN): 20-40. 1 SPAN: 8-15. 4 SPANS: 30-60. RECOVERY TIME (MIN): SAME AS ASSEMBLY. WORKING PARTY: 3 PER SPAN/12 TOTAL.



LAUNCH SEQUENCE

1. TRUCK BACKS INTO POSITION.

2. A HYDRAULIC LAUNCHING GIRDER RAISES THE FOLDED SPAN TO THE VERTICAL POSITION.

3. THE SPAN IS STRAIGHTENED BY A CABLE/WINCH SYSTEM, AND THEN IS LOWERED WITH THE INTEGRAL TRESTLE LEGS SWINGING INTO POSITION.

4. ONCE THE LOWERING OPERATION IS COMPLETED, THE CABLES ARE DISCONNECTED, THE LAUNCHING GIRDER IS BROUGHT TO TRAVEL POSITION, AND THE TRUCK MOVES OFF.

Russian Excavating Vehicle BTM-4 / MDK-3



SYSTEM	SPECIFICATIONS	FEATURES (CONT.)	SPECIFICATIONS
System		Max Swim:	N/A
Alternative Designations:		Fording Depths (M):	N/A
Date Of Introduction:	1982	Radios, Frequency, And Range:	
Proliferation:	Russia	R-124	intercom
Descrption:		R-123	
Crew:	2	Command Level:	Battalion
Troop Capacity:	N/A	Operating Equipment:	
Chassis:	MT-T	Dozer Blade (front mounted):	Yes
Combat Weight (Mt):	39.5	Ripper:	Yes
Length Overall (M):	10.2	Road harrow:	Yes
Height Overall (M):	4	Trenching machine:	Yes
Width Overall (M)	3.7	Productivity M3/hr:	< 800
Ground Pressure (Kg/Cm2):	UNK	Ditch Size:	
Automotive Performance:		Width (M):	1.1
Engine Type:	Diesel	Depth (M):	1.5
HP:	710	Excavation Rate (Km/hr):	1
Cruising Range (Km):	500	Ditch Size (frozen):	
Speed (Km/H):		Width (M):	.6

Max Road:	**70**	**Depth (M):**	**1.1**
Max Off-Road:	**UNK**	**Excavation Rate (Km/hr):**	**.3**
NBC Protection:	**Yes**	**Machine prep time (min.):**	**5**

NOTES

FITTED WITH A ROTARY BLADE ON THE REAR AND A DOZER BLADE ON THE FRONT. THE MDK-3 CAN DIG AT DITCHES, VEHICLE POSITIONS, AND FIGHTING POSITIONS.

Dec
2015

Worldwide Equipment Guide

Chapter 8: Logistics



TRADOC G-2 ACE–Threats Integration
Ft. Leavenworth, KS

Distribution Statement: Approved for public release; distribution is unlimited.

Chapter 8: Logistics

This chapter provides the basic characteristics of selected logistics vehicle and trailers. This chapter provides the basic characteristics of selected trucks, maintenance vehicles, and other logistic equipment readily available to the OPFOR. It includes a representative vehicle from the light, utility, medium, and heavy truck categories. Later updates of this guide will include data on a wider selection of trucks, trailers, vans and other logistical equipment.

Questions and comments on data listed in this chapter should be addressed to:

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RUSSIAN 2 MT 4X4 CARGO TRUCK GAZ-66



Photo courtesy of the Khabarovsk Military Museum, by Andshel

SYSTEM	SPECIFICATIONS	AUTOMOTIVE	SPECIFICATIONS
Alternative Designation		Engine	V8, 115 hp, Gasoline
Date of Introduction	1964	Cooling	Water
Proliferation	Widespread	Cruising Range (road) (km)	875
Troop Capacity	3 in cab, 18 in read	Speed (km/h)	95
Weight (mt)		Fuel capacity (liters)	
Gross Vehicle Weight	5.8	Right Tank	105
Curb	3.6	Left Tank	105
Length Overall (m)	5.65	Towing Capability (kg)	
Height Overall (m)	2.44	Off Highway	2000
Width Overall (m)	2.32	On Highway	2000
Payload on/off Highway (kg)	2000	Gradient (loaded) (°)	39
Number of Axles	2	Fording Depths (m)	8
Ground Clearance (mm)	315	CARGO SPACE	SPECIFICATIONS
Turning Radius (m)	10	Height (m)	.89
Side Slope (°)		Width (m)	2.05
Vertical Step (mm)		Length (m)	3.33
Wheels		Cargo Bed Area (m^2)	6.8
Size (in)	12X18	VARIANTS	SPECIFICATIONS
Central Tire Pressure Regulation System	Yes	GAZ-66B	Canvas-top cab for air transport or airdrop
Run Flat		GAZ-66A	Steel cab
Armament	None	Numerous other variants for various duties	

NOTES

BESIDES FUNCTIONING AS A GENERAL CARGO CARRIER, THE GAZ-66 IS USED AS A PRIME MOVER FOR 120-MM MORTARS. THE DDA-66 VARIANT IS AN NBC DECONTAMINATION TRUCK.

RUSSIAN 4.5 MT 6X6 CARGO TRUCK URAL-375D



Photo from Wikimedia Commons

SYSTEM	SPECIFICATIONS	AUTOMOTIVE	SPECIFICATIONS
Alternative Designation		Engine	V8, 180 hp, Gasoline
Date of Introduction	1965	Cooling	Liquid
Proliferation	Widespread	Cruising Range (road) (km)	650
Troop Capacity	3 in cab, 24 in read	Speed (km/h)	75
Weight (mt)		Fuel capacity (liters)	
Gross Vehicle Weight	13.2	Main Tank	300
Curb	8.4	Aux Tank	60
Length Overall (m)	7.36	Towing Capability (kg)	
Height Overall (m)	2.68	Off Highway	5,000
Width Overall (m)	2.67	On Highway	10,000
Payload on/off Highway (kg)	4,500	Gradient (loaded) (°)	65
Number of Axles	3	Fording Depths (m)	1.49
Ground Clearance (mm)	410	CARGO SPACE	SPECIFICATIONS
Turning Radius (m)	10.8	Height (m)	.872
Side Slope (°)	32	Width (m)	2.43
Vertical Step (mm)	800	Length (m)	3.9
Wheels		Cargo Bed Area (m^2)	9.5
Size (in)	14x20	VARIANTS	SPECIFICATIONS
Central Tire Pressure Regulation System	Yes	URAL-375	Observation hatch and unimproved power train
Run Flat		URAL-375E	Decontamination vehicle
Armament	None	URAL-375N	2,000 kg additional payload
		URAL-375S	Truck-tractor
		URAL-375T	Equipped with winch

NOTES

BESIDES FUNCTIONING AS A GENERAL CARGO CARRIER, THE URAL-375D IS USED AS A PRIME MOVER FOR LIGHT AND MEDIUM ARTILLERY. THE URAL-375 CHASSIS ALSO SERVES AS A BASE FOR THE BM-21 MRL, POL TANKERS, VANS, AND CRANES. THE URAL-4320 BEGAN TO REPLACE THE URAL-375D AROUND 1978.

RUSSIAN 7.5 MT 6X6 CARGO TRUCK KRAZ-255B



"790th Fighter Order of Kutuzov 3rd class Aviation Regiment, Khotilovo airbase (356-27)" by Vitaly V. Kuzmin - http://vitalykuzmin.net/?q=node/356. Licensed under CC BY-SA 3.0 via Commons - https://commons.wikimedia.org/wiki/File:790th_Fighter_Order_of_Kutuzov_3rd_class_Aviation_Regiment,_Khotilovo_airbase_(356-27).jpg#/media/File:790th_Fighter_Order_of_Kutuzov_3rd_class_Aviation_Regiment,_Khotilovo_airbase_(356-27).jpg

SYSTEM	SPECIFICATIONS	AUTOMOTIVE	SPECIFICATIONS
Alternative Designation		Engine	V8, 265 hp, Diesel
Date of Introduction	1967	Cooling	Water
Proliferation	Widespread	Cruising Range (road) (km)	850
Troop Capacity	3 in cab, 16 in rear	Speed (km/h)	70
Weight (mt)		Fuel capacity (liters)	
Gross Vehicle Weight	19.7	Right Tank	165
Curb	12	Left Tank	165
Length Overall (m)	8.64	Towing Capability (kg)	
Height Overall (m)	2.94	Off Highway	10,000
Width Overall (m)	2.75	On Highway	10,000
Payload on/off Highway (kg)	7,500	Gradient (loaded) (°)	30
Number of Axles	3	Fording Depths (m)	1
Ground Clearance (mm)	360	CARGO SPACE	SPECIFICATIONS
Turning Radius (m)	14	Height (m)	.92
Side Slope (°)		Width (m)	2.5
Vertical Step (mm)		Length (m)	4.56
Wheels		Cargo Bed Area (m^2)	
Size (in)	20X21	VARIANTS	SPECIFICATIONS
Central Tire Pressure Regulation System	Yes	KrAZ-258	Tractor-truck
Run Flat		Numerous other variants for various duties.	
Armament	None		

NOTES

PRIMARILY DESIGNED AS A CARGO TRUCK, THE KRAZ-255B IS ALSO USED AS A PRIME MOVER FOR VARIOUS EQUIPMENT INCLUDING A TANK-TRANSPORTER TRAILER AND PMP PONTOON BRIDGE.

RUSSIAN 6 MT 6X6 GENERAL UTILITY TRUCK KAMAZ 4310



Photo by: Vitaly Kuzmin

SYSTEM	SPECIFICATIONS	AUTOMOTIVE	SPECIFICATIONS
Alternative Designation		Engine	V8, 165 hp, Diesel turbocharged
Date of Introduction	1980	Cooling	Water
Proliferation	Russia, Bulgaria, Lithuania, Serbia, Poland, Hungary, Romania, Latvia, Cuba, Venezuela, Panama, Vietnam, Afghanistan, Turkey, Algeria, Kuwait, Sudan, Senegal, Burkina Faso, Botswana, Guinea, Iran, India, Pakistan	Cruising Range (road) (km)	1000
Troop Capacity	3 in cab, 18 in rear	Speed (km/h)	85
Weight (mt)		Fuel capacity (liters)	
Gross Vehicle Weight	7	Right Tank	120
Curb	3.6	Left Tank	120
Length Overall (m)	7.73	Towing Capability (kg)	
Height Overall (m)	3.375	Off Highway	2,000
Width Overall (m)	3.34	On Highway	7,000
Payload on/off Highway (kg)	6,000	Gradient (loaded) (°)	31
Number of Axles	3	Fording Depths (m)	.5
Ground Clearance (mm)	550	CARGO SPACE	SPECIFICATIONS
Turning Radius (m)	10	Height (m)	.89
Side Slope (°)		Width (m)	2.47
Vertical Step (mm)		Length (m)	4.89
Wheels		Cargo Bed Area (m^2)	~ 12
Size (in)	21X24	VARIANTS	SPECIFICATIONS
Central Tire Pressure Regulation System	Yes	KamAZ-43101	More powerful 220 hp engine
Run Flat		Numerous other variants for various duties.	
Armament	None		

NOTES

BESIDES FUNCTIONING AS A GENERAL CARGO CARRIER, THE KAMAZ-4310 IS USED AS A COMMAND AND CONTROL VEHICLE.

RUSSIAN ARMORED RECOVERY VEHICLE BREM-1



SYSTEM	SPECIFICATIONS	AUTOMOTIVE	SPECIFICATIONS
Alternative Designation	None	Engine	V12, 840 hp, Multi-fuel Diesel
Date of Introduction	1984	Cruising Range w/external tanks (km)	
Proliferation	At least 5 countries	Dirt Road w/o Towed Vehicle	650
Crew	3-TC, driver, mechanic	Dirt Road Towing Vehicle	220-430
Chassis	T-72 tank	Highway w/o Towed Vehicle	700
Weight (mt)	41	Speed (km/h)	
Length Overall (m)	7.98	Max Highway	60
Height Travel (m)	2.45	Dirt Road	45
Width Overall (m)	3.46	Highway w/o Towed Vehicle	12
Ground Clearance (mm)	457	Radio	R-123
Gradient (°)	30	RECOVERY	SPECIFICATIONS
Fording Depth (m)	1.2	Towing Capacity (mt)	50
Trench Crossing (m)	2.8	Towing Rods (m)	Two-1.68; Two-5.5
Vertical Step (m)	.85	Hydraulic Jack Capacity (mt)	30
ARMAMENT	SPECIFICATIONS	Crane Capacity (mt)	
Machine gun	12.7-mm, AD MG NSV-T	2.4 m Extension	19
Mount Type	Cupola	4.4 m Extension	3
Fire on Move	Yes	Winch Capacity (mt)	
Smoke Equipment	VEESS; Four smoke grenade launchers	Line Pull	25
NBC protection	Yes	With Blocks	100
BLADE	SPECIFICATIONS	Cable length (m)	200
Width (m	3.1	Auxiliary Winch	
		Capacity (line pull) (kg)	530
		Cable Length (m)	400
		VARIANTS	SPECIFICATIONS
		None	

NOTES

THE BREM-1 IS DESIGNED TO TOW DAMAGED TANKS FROM THE BATTLEFIELD TO DAMAGED VEHICLE COLLECTION POINTS. INSTEAD OF A TURRET IT HAS A RECTANGULAR PLATFORM ON TOP OF THE HULL FOR WORK AND LOADING.

RUSSIAN ARMORED RECOVERY VEHICLE T-54 T

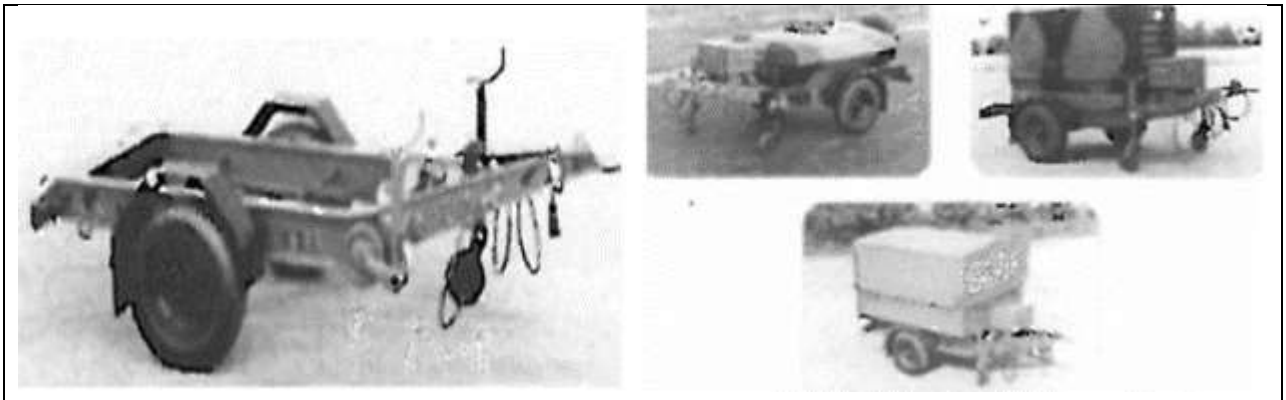


SYSTEM	SPECIFICATIONS	AUTOMOTIVE	SPECIFICATIONS
Alternative Designation	BTS-2 (Medium Tank Towing Vehicle-2)	Engine	V12, 520 hp, Diesel
Date of Introduction	1965	Cruising Range (km)	400
Proliferation	At least 50 countries	Speed (km/h)	
Crew	3 to 5	Max Highway	48
Chassis	T-54 tank	Dirt Road	
Weight (mt)	36	Highway w/o Towed Vehicle	
Length Overall (m)	7.5	Radio	
Height Travel (m)	1.9		
Width Overall (m)	3.27	RECOVERY	SPECIFICATIONS
Ground Clearance (mm)	264	Towing Capacity (mt)	40
Gradient (°)	31	Crane Capacity (mt)	1
Fording Depth (m)			
Unprepared	1.4		
With Snorkel	5.5	VARIANTS	SPECIFICATIONS
Trench Crossing (m)	2.7	There are numerous variants based on T-54 and T-55 chassis each with differing equipment modifications.	
Vertical Step (m)	.8	T-54 (A)	Former East German manufacture. Push/pull bar at front, 1 mt crane, NBC equipment, no winches or spades
ARMAMENT	SPECIFICATIONS	T-54 (B)	Former East German manufacture. Similar to T-54 (A). Tow cable brackets at hull rear, hull front protective plate, snorkel. No winch or spade.
Smoke Equipment	VEESS	T-54 (C)	Former East German manufacture. Heavy-duty crane, snorkel
NBC protection	No (See Variants)		

NOTES

THE T-54-T ARMORED RECOVERY VEHICLES ARE BASED ON MODIFIED CHASSIS OF THE T-54 MEDIUM TANK. THE RECOVERY VEHICLE VARIANTS HAVE A CRANE ABLE TO LIFT UP TO 3 MT, A LOADING PLATFORM, AND A SPADE ON THE REAR OF THE VEHICLE. THEY CAN MOUNT A SNORKEL FOR DEEP FORDING. PERFORMANCE FIGURES ARE THE SAME FOR THE T-54 (AND T-55) TANKS. THEY REPLACED OLDER TANK RECOVERY VEHICLES BASED ON THE T-34 CHASSIS.

FRENCH 2.5 T TRAILER SOFRAME RP



SYSTEM	SPECIFICATIONS	PAYLOAD WEIGHT DATA	SPECIFICATIONS
Alternative Designation	BTS-2 (Medium Tank Towing Vehicle-2)	Tanker Payload on-road (Liter)	1500
Date of Introduction	2012	Cargo payload on-road (kg)	1540
Proliferation	Widespread	Generator Payload on-road (kg)	1640
Nominal Payload (t)	2.5	Tanker Curb Weight (kg)	800
Trailer Type	Full	Cargo Curb Weight (kg)	760
Tanker Height (mm)	1500	Generator Curb Weight (kg)	660
Cargo Height (mm)	2300	Gross Vehicle Weight on-road (kg)	2300
Generator Height (mm)	2070		
Length (mm)	3880	MOBILITY	SPECIFICATIONS
Width (mm)	2050	Air Lift	Including helicopter
Ground Clearance (mm)	320	Crane Lift	
Number of axles	1	Fork Lift	
Number of tires	2		
Brake system (rear)	Drum, full air	VARIANTS	SPECIFICATIONS
		Tanker designed to carry fuel or water	
UTILITY	SPECIFICATIONS	Generator designed to carry generators	
Transport	Water, fuel, tents, generators, barbed wire, refrigerated containers, space heaters, ammunition, and field supplies	Cargo designed to carry field equipment	

NOTES

MULTIPURPOSE CROSS-COUNTRY TRAILER CAN CARRY A SERIES OF MODULAR BODIES INCLUDING STANDARD CARGO BODIES, FUEL, WATER, AND GENERATORS. DESIGNED TO BE TRANSPORTABLE BY FIXED WING OR ROTARY WING AIRCRAFT.

GREEK MULTIPURPOSE 2-WHEEL TRAILER NK P-126

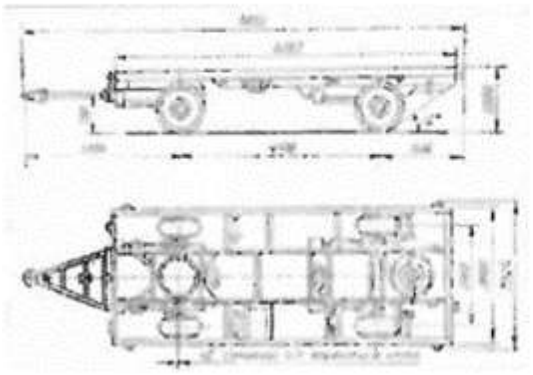


SYSTEM	SPECIFICATIONS	PAYLOAD WEIGHT DATA	SPECIFICATIONS
Alternative Designation	None	Trailer Payload on-road (kg)	2000
Date of Introduction	2009	Cargo payload on-road (kg)	
Proliferation	Europe and Africa	Generator Payload on-road (kg)	
Nominal Payload (t)	2.0	Curb Weight (kg)	1800
Trailer Type	Full	Cargo Curb Weight (kg)	
Height (mm)	2780	Generator Curb Weight (kg)	
Length (mm)	4000	Gross Vehicle Weight on-road (kg)	3800
Width (mm)	2400		
Ground Clearance (mm)		MOBILITY	SPECIFICATIONS
Number of axles	1	Towing Vehicle	MAN-Steyr or Mercedes Benz Unimog
Number of tires	2 plus spare		
Brake system (rear)	Full dual air line		
UTILITY	SPECIFICATIONS	VARIANTS	SPECIFICATIONS
Transport	Tents, generators, barbed wire, refrigerated containers, space heaters, ammunition, and field supplies	None	

NOTES

MULTIPURPOSE TRAILER SUITED FOR TWIN MOUNTED GENERATOR SETS. WELDED STEEL CARGO BODY WITH STEEL SHEET ROOF. HINGED REAR TAILGATE AND SIDE COVERS PROVIDE EASY ACCESS TO SERVICING AND COOLING AIR CIRCULATION FOR TWO LIQUID COOLED GENERATOR SETS. TRAILER IS EQUIPPED WITH NATO TOWING EYE, JOCKEY WHEEL AS THE FRONT AND RETRACTABLE LEG AT THE REAR.

RUSSIAN TRAILER MAZ-8950





SYSTEM	SPECIFICATIONS	PAYLOAD WEIGHT DATA	SPECIFICATIONS
Alternative Designation	None	Trailer Payload on-road (kg)	10,500
Date of Introduction	1996	Cargo payload on-road (kg)	
Proliferation	Eastern Europe	Curb Weight (kg)	4,500
Nominal Payload (t)	10.0	Cargo Curb Weight (kg)	
Trailer Type	Full	Gross Vehicle Weight on-road (kg)	15,000
Height (mm)	1200		
Length (mm)	8920		
Width (mm)	2820		
Ground Clearance (mm)		MOBILITY	SPECIFICATIONS
Number of axles	2	Towing Vehicle	Kraz-255B
Number of tires	4		
Brake system (rear)	Mechanical and rear wheels		
Brake system (front)	Pneumatic, all-wheel		
UTILITY	SPECIFICATIONS	VARIANTS	SPECIFICATIONS
Transport	Various types of equipment up to 10 tons	None	

NOTES

DOUBLE AXLE LOW-FRAME CHASSIS HAS SPECIFICALLY CONSTRUCTED FRAME INTENDED FOR MOUNTING VARIOUS TYPES OF EQUIPMENT. TRAILER HAS FOUR STABILIZING JACKS WHICH CAN BE SWITCHED TO TRAVELING POSITION WHEN THE VEHICLE IS IN MOTION.

Dec
2015

Worldwide Equipment Guide

Chapter 9: C2 and INFOWAR



TRADOC G-2 ACE–Threats Integration
Ft. Leavenworth, KS

Distribution Statement: Approved for public release; distribution is unlimited.

Chapter 9: C2 and INFOWAR

Command and Communications C2

This chapter provides basic characteristics of selected tactical command and control (C2) systems either in use or readily available to the OPFOR. Critical C2 equipment

Many foreign militaries are leveraging advances in automated technologies in order to use increasing amounts of data across all warfighting capabilities. Increases in processing power and broadband technologies through commercial research and development make real time situational awareness and communications on the move a tangible objective for many foreign forces. The emergence of rudimentary Integrated Battlefield Management Systems (IBMS) in tier three forces represents this global trend. Net Centric operations are viewed worldwide as a key element of modern military operations, an IBMS is a system that integrates multiple command and control formats as well as sensor data into one display that improves situational awareness through multiple sources.

There are a variety of technologies available to achieve improved situational awareness through network enabled battlefield systems. Foreign forces will incorporate various modern systems into the C2 structure and will rely on manual operators to fuse them to legacy systems.

Incorporating commercial telecommunications and internet service to meet strategic, operational and tactical objectives represents one of the most important aspects of the foreign forces information warfare (INFOWAR) campaign. In tier one and tier two forces, the level of automated interoperability can be integrated across many levels of command through domestically produced systems designed for military use. These systems are equivalent to friendly system capabilities. This selection of systems is not intended to be complete; rather, it is representative of the types and capabilities that are currently fielded or available.

Command systems in the WEG are initially limited to command vehicles, such as the listed BMP-1KSh.

While the focus of the communications equipment for this chapter is primarily tactical communications systems and the more recently fielded IBMS systems, this chapter does include limited information on satellite communication systems (SATCOMs), navigation (NAV) systems, and weather systems. Satellites have added a new dimension to the battle space in the past few decades especially in terms of SATCOM and NAV capabilities.

There are currently over a thousand operating satellites orbiting the earth, with more than half having a primary mission of supporting communication and navigation efforts both commercially and militarily world-wide. See the Tables 2-4 for specific information on examples of these satellites, their owners/operators, and users.

Questions and comments on data listed in this chapter should be addressed to:

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Table 1: Tactical Communications Systems

System	Country of Origin	Description	Frequency Range (MHz)	Digital ?	FH?	Range (km)	Power Output
Panther-V	UK	Vehicle/Manpack VHF/UHF	30-108	Yes	Yes	50	50W
Jaguar-V	UK	Vehicle/Manpack VHF	30-88	Yes	Yes	50	50W
R163-50U	Russia	Vehicle VHF	30-80	Yes	No	40	30W
R173M	Russia	Vehicle VHF	30-80	No	No	30	20W
M3TR	GE	Vehicle/Manpack	1.5-512	Yes	Yes	50	50W
RF5000	US	Vehicle HF	1.6-30	Yes	Yes	75	400W
XK2000	GE	Vehicle HF	1.5-30	Yes	No	75	150W
R123M	Russia	Vehicle HF/VHF	20-52	No	No	30	22W
Panther-P	UK	Hand-held Squad/Platoon	30-88	Yes	Yes	10	5W
TRC5102	France	Hand-held Squad/Platoon	30-88	Yes	No	7	2W
ACH42	S. Afr.	Hand-held Squad/Platoon	45-68	No	No	7	2W
R31K	Bulgaria	Hand-held Squad/Platoon	44-54	No	No	5	1W
RL402	Swe/Nor	MMW Radio Relay	225-1850	Yes	Yes	Network	N/A
R423-1	Russia	Troposcatter Relay System	4400-4700	No	N/A	Network	N/A
KSR8	Hungary	Microwave Relay System	8000	Yes	N/A	Network	N/A
R161-5	Russia	HF Radio Station	1.5-30	No	No	3000	5kW
Scimitar-H	UK	HF SPF Radio	1.6-30	Yes	Yes	500	20W
PRC138	US	HF SPF Radio	1.6-80	Yes	Yes	500	20W
PVS5300	UK	HF SPF Radio	2-30	Yes	No	500	20W
PRC104	US	HF SPF Radio	2-30	No	No	500	20W



Table 2: Communication Satellites

Name of Satellite System	Country of Operator/Owner	Users	Class of Orbit	Comments
Amos	Israel	Military/ Commercial	GEO	C-band, Ku-band, and Ka-band transponders.
Apstar	China	Commercial	GEO	C-band and Ku-band transponders.
AsiaSat	China	Commercial	GEO	C-band and Ku-band transponders.
Chuangxin	China	Government	LEO	Prototype of advanced telecommunications satellite for LEO.
Express	Russia	Commercial	GEO	C-band, Ku-band, and L-band transponders.
Gonets	Russia	Commercial/Government	LEO	UHF.
Meridian	Russia	Military	Elliptical	C-band transponders.
Raduga	Russia	Military	GEO	C-band transponders.
Rodnik	Russia	Military	LEO	UHF.
Thuraya	United Arab Emirates	Commercial	GEO	C-band and L-band transponders.
Yahsat (Y1A)	United Arab Emirates	Military/ Commercial	GEO	C-band, Ku-band, and Ka-band transponders.
Zhongxing	China (PR)	Military/Government	GEO	Ku-band transponders.

Table 3: Navigation Satellites

Name of Satellite System	Country of Operator/Owner	Users	Comments	Class of Orbit
Beidou	China	Military	Navigation/Global Positioning	GEO
Compass	China	Military	Navigation/Global Positioning	GEO
Glonass	Russia	Military/ Commercial	Navigation/Global Positioning	MEO
Parus	Russia	Military	Navigation	LEO

Table 4: Weather Satellites

Name of Satellite System	Country of Operator/Owner	Users	Comments	Class of Orbit
Electro	Russia	Government	Meteorology	GEO
Haiyang	China	Government	Meteorology	LEO
Meteor	Russia	Government	Meteorology	LEO

Note: Additional information exists for all these satellites to include perigee, apogee, eccentricity, inclination, period, mass, power, launch site, and launch vehicle and is available on request.

Norwegian Tactical Communications System Eritac



SYSTEM	SPECIFICATIONS	SYSTEM	SPECIFICATIONS
Alternative Designations:	Eritac	Components Backbone:	
Date of Introduction:	1999	Eritac Network to IP and TDM Network:	IPX600
Proliferation:	Oman, Kuwait, Egypt, Saudi Arabia, Croatia, Romania	Radio transmitter link for Eritac network:	RL532
Description:	KONGSBERG's tactical communications system	Components Tactical Local Area Network:	
Performance: Data Rates:		Tactical Gateway and Router between local and remote Combat net Radios:	TR600
Combat Net radio HF (kbps):	2	IP Based Radios:	WM600
Combat Net Radio VHF (kbps) :	16 - 64	Frequency Range (MHz):	225 - 400
Broadband IP radio UHF (Mbps):	2	Communications:	Automatic selection of link for every Data Rate and service (HF-UHF-VHF-Sat), based on required Quality of Service
Features:	Broadband and fiber optic ethernet backbone for transport to higher echelons: 100 Mbps Supported by both wireless and wired gateways	Frequency band Types:	HF/VHF/UHF/SHF
Security:	Encrypted, Frequency Hopping Spread Spectrum Transmission capable, Electro Magnetic Pulse (EMP) hardened.	Communications Transmission Platforms:	CNR/HCLOS/WLAN/SATCOM/ Fiber Optics

NOTES

ERITAC IS A HIGH-CAPACITY, AUTONOMOUS, DISTRIBUTED SWITCHING SYSTEM. VOICE AND DATA CAPABILITY INTEGRATED FROM THE STRATEGIC TO THE TACTICAL LEVEL.

Pakistani Integrated Battlefield Management System (IBMS)



SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative Designations:	Horus	Command and Control	Adds and deletes vehicles for specific tasks Associates vehicle echelon with assigned domains Provides situational alerts
Date of Introduction:	UNK	Geographical Information System:	
Proliferation:	UNK		Static and mobile management centers include routers and radio access points (RAP) to backbone
Description:	IBMS provides near real time battlefield situational awareness (SA) data through an integrated network of both mobile and fixed nodes.		Tracking devices are installed in weapons platforms (including MBTs).
VHF	Digital signal multiband interoperability	Communications:	
UHF:	Fiber optic backbone for transport to higher echelons	Frequency band Types:	HF/VHF/UHF/SHF
Features:	Displays vehicles includes real time status and decision point warnings	Communications Transmission Platforms:	CNR/HCLOS/WLAN/SATCOM/ Fiber Optics
Vehicle Management:	Records routes of registered vehicles		

NOTES
GNSS BASED UPDATES DISPLAYS ALL VEHICLES IN NETWORK. INCLUDES REAL TIME STATUS AND DECISION POINT WARNINGS.

Russian Command and Staff Vehicle BMP-1KShM

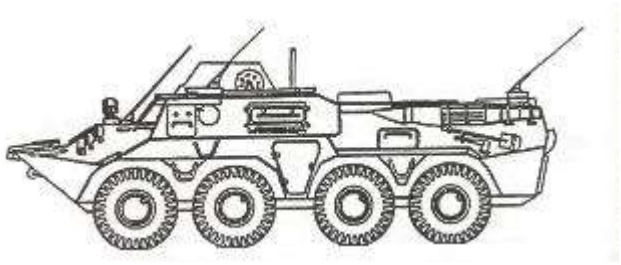


SYSTEM	SPECIFICATIONS	FEATURES (CONT.)	SPECIFICATIONS
System		Encryption:	
		Masking Devises:	R-168mve
		Transmission Equipment:	E-9u Secure
Alternative Designations:	"Potok"- 2	Digital Navigation Monitor:	
		Glonass:	Yes
		1g11n Gyrocompass:	Yeas
Date Of Introduction:	1976	Graphic Display:	Yes
Proliferation:	Bulgaria, China, Czech Republic, Poland, And Sweden	Automated Networks:	Yes
Descrption:		Emplace Time (Min):	2-3
Crew:	1 Plus Vehicle/Staff Commander (Included Below)	4 X AT-3031Telephones	
Troop Capacity:	Staff 4-6 (Total Vehicle Capacity 5-7)	Rear Mounted Onboard Generator(kw):	5
Chassis:	BMP-1	Whip Antennae For Mobile Comms:	1 HF Whip, 3 Vhfwhips
Combat Weight (Mt):	13.3	Other Antennae:	VHF Discones Masted, HF Dipoles And 11-M Mast
Length Overall (M):	6.74	Options:	Spall Liners, Air Conditioning, And A More Powerful Engine
Height Overall (M):	2.15	ARMAMENT	SPECIFICATIONS
Ground Pressure (Kg/Cm2):	0.57	Main Armament:	(Caliber, Type, Name:
		LOADER TYPE:	BELT-FEED (100-RD BELTS)
Automotive Performance:		Ready/Stowed Rounds:	Ina
Engine Type:	Diesel	Elevation (°):	Ina

Cruising Range (Km):	600	Fire On Move:	No
Speed (Km/H):		ATGM Launcher:	N/A
Max Road:	65	Firing Ports:	None
Max Off-Road:	40-45	Sights	
Average Cross-Country:	Ina	Type:	Ina
Max Swim:	7	Sighting Range (M):	1,500
Fording Depths (M):	Amphibious	Magnification:	INA
		Night Sights Available:	Yes
Command:	Normal Configuration For Rear Compartment Has 2 Officer Workstations And Two Radio Operator Consoles.	Caliber, Type, Name:	7.62-Mm API, API-T
Radios, Frequency, And Range:		Maximum Aimed Range (M):	1,500
R-168-5kve	1.5-30 Mhz (Hf), Voice/Digital, 10-300 Km	Max Effective Range (M):	
R-168-25ue	30-108 Mhz (Vhf),Voice/Digital, 20-40 Km	Day:	1,000/400-500 On The Move
R-168-100ue	30-80 Mhz (Vhf), Voice/Digital, 30-60 Km	Night:	Ina
2 X R-168-5UN(1)E	30-108 Mhz (VHF), Man Pack, 10-25 Km	Tactical AA Range:	INA
R-168-5kne	1.5-30 Mhz (Hf), Voice/Digital, 10, 40, 300 Km	Armor Penetration (Mm):	8 (Rha) At 500 M
R-438 Satellite Comms System,	Data Exchange Up To 5,000 Km	Other Ammunition Types:	Light Ball/Ball-T, Heavy Ball
Command Level:	Division, Regiment, Brigade And Battalion	VARIANTS	
Intercoms:	2	BMP-1ksh:	Tier 2 System Rradios Include R-130 HF, R-107, R-111 VHF, R-123/173 VHF.
Communications Links:	1-12	Communications Transmission Platforms:	CNR/HCLOS/WLAN/SATCOM/ Fiber Optics
Security:	Encrypted, Frequency Hopping Spread Spectrum Transmission Capable, Electro Magnetic Pulse (EMP) Hardened.		

NOTES
FOR STATIONARY LONG-RANGE TRANSMISSIONS, HAWK EYE 10-METER FOLDING DISCONES MASTED ANTENNA IS REMOVED FROM CARRYING CASE ON RIGHT SIDE OF VEHICLE AND INSERTED INTO ANTENNA BASE, WHICH EXTENDS FORWARD FROM THE TURRET.

Russian Command and Staff Vehicle Kushetka-B



SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
Alternative Designations:	R-149BMR	Explosive Reactive Armor (mm):	N/A
Date of Introduction:	1990s	Active Protective System:	N/A
Proliferation:	At least 1country	Mine clearing Equipment:	N/A
Description:		Self-Entrenching Blade:	N/A
Crew:	1 plus vehicle/staff commander (included below)	NBC Protection System:	Collective
Troop Capacity:	Staff 4-6 (total vehicle capacity 5-7)	Smoke Equipment:	VEESS, 6 x 81-mm smoke grenade launchers
Chassis:	K1Sh1 version UnSh wheeled 8 X 8 derived from BTR-80	ARMAMENT	
Combat Weight est. (mt):	13	Main Armament:	(turret mount)
Chassis Length Overall (m):	7.65	Caliber, Type, Name:	7.62-mm (7.62x 54R) MG, PKM
Height Overall (m):	2.63	Rate of Fire (rd/min):	250 practical / 650 cyclic, 2-10 round bursts
Width Overall (m):	2.9	Loader Type:	Belt-feed (100-rd belts)
		Ready/Stowed Rounds:	INA
Automotive Performance:		Elevation (°):	INA
Engine Type Diesel (hp):	260	Fire on Move:	Yes
Cruising Range (km):	600	Firing Ports:	Yes
Speed (km/h):			
Max Road:	UNK	SIGHTS	
Max Off-Road:	UNK	Type:	INA
Average Cross-Country:	UNK	Sighting range (m):	1,500
Max Swim:	UNK	Magnification:	INA



Fording Depth (m):	Amphibious	Night Sights Available:	Yes
Command:	Normal configuration for rear compartment has 2 officer workstations and two radio operator consoles.	VARIANTS	
Communications:		MAIN ARMAMENT AMMUNITION	
Radios, frequency, and range:		Caliber, Type, Name:	
R-173M 30-80 MHz (VHF), standard vehicle type(km)	20	7.62-mm API, API-T	
R-171M 30-76 MHz (VHF), duplex, voice/digital (km):	35 - 80	Maximum Aimed Range (m):	1,500
R-163-50, R-163 UP 30-80 MHz (HF), voice/digita (km):	20 - 60	Max Effective Range (m):	
R-163-10V 2-30 MHz (HF'/VHF), voice/telegraph(km):	10 - 30	Day:	1,000/400-500 on the move
HF/ VHF portable short-range units	2 x R-163-1V	Night:	INA
Protection:		Tactical AA Range:	INA
Armor, Turret Front (mm):	Against 12.7-mm rounds	Armor Penetration (mm):	8 (RHA) at 500 m
Applique Armor (mm):	N/A		

NOTES

THE VEHICLE SHARES THE SAME CONFIGURATION AS BMM MEDICAL VEHICLES AND THE 1V152/KAPUSTNIK-B ACRV. OTHER LESS SIMILAR USERS OF THE UNSH/1KSH1CHASSIS INCLUDE THE BREM-K RECOVERY VEHICLE AND SEVERAL RADIO AND IW VEHICLES.

Russian Command and Control Vehicle R-142 NSA



Photo by: Vitaly Kuzmin

SYSTEM	SPECIFICATIONS	AMMUNITION	SPECIFICATIONS
SYSTEM		Curb:	3.6
Alternative Designations:	INA	Length Overall (m):	7.73
Date of Introduction:	1980	Height Overall (m):	3.375
Proliferation:	Russia,	Width Overall (m):	3.34
		Payload on/off Highway (kg):	6,000
Communications:		Ground Clearance (mm):	550
Radios, frequency, and range:		Turning Radius (m):	10
R-173M 0-80 MHz (VHF), standard vehicle type (km):	32	Wheels:	6
R-171M 30-76 MHz (VHF), duplex, voice/digital (km):	35 - 80	Size (mm):	533 X 610
R-163-50, R-163 UP 30-80 MHz (HF), voice/digital (km):	20-60	Central Tire Pressure Regulation System:	Yes
R-163-10V 2-30 MHz (HF'/VHF), voice/telegraph (km):	10-30	AUTOMOTIVE	
R-438 satellite comms system, data exchange up to (km):	5,000		
		Engine V8, diesel turbocharged (hp):	165

Command level:	Division, brigade, and battalion	Cooling:	Water
Intercoms:	2	Cruising Range (road) (km):	1000
Communications links:	1-12	Speed (km/h):	85
Encryption E-24D:	Yes	Fuel Capacity (liters):	
Digital navigation monitor GLONASS:	Yes	Left Tank:	120
Graphic display:	Yes	Right Tank:	120
Automated networks:	Yes	Towing Capability (kg):	
Emplace Time (min):	2-3	Off Highway:	2,000
Vehicle can communicate on the move:	Yes	On Highway:	7,000
CP can operate autonomously/in network:	Yes/Yes	Gradient (loaded) (°):	31
Onboard generator:	Yes	Fording Depths (m):	0.5
Whip antennae for mobile comms:	2 HF whips, 3 VHF	CARGO SPACE	
Other antennae:	VHF discones masted, HF dipoles and 11-m mast	Height (mm):	890
Vehicle can communicate on the move:	Yes	Width (mm):	2,470
Description:		Length (mm):	4,890
Troop Capacity:	7	Cargo Bed Area (m2):	~12
Weight (mt):	7		

NOTES

BESIDES FUNCTIONING AS A COMMAND AND CONTROL VEHICLE, THE R-142 CAN PERFORM VARIOUS EW FUNCTIONS.



INFOWAR

INFOWAR is defined as specifically planned and integrated actions taken to achieve an information advantage at critical points and times. The goal is to influence an enemy's decision-making through his collected and available information, information systems, and information-based processes, while retaining the ability to employ friendly information, information-based processes, and systems to control the use of the electromagnetic spectrum at critical locations and times in the battle space or to attack the enemy.

All INFOWAR elements are mutually supporting. INFOWAR occurs through the combinations of seven elements:

- Electronic warfare (EW).
- Deception.
- Physical destruction.
- Protection and security measures.
- Perception management.
- Information attack (IA).
- Computer warfare.

EW capabilities allow foreign forces to exploit, deceive, degrade, disrupt, damage, or destroy sensors, processors, communications, and command and control (C^2) nodes. Information supremacy, delay, and denial, or distortions of the adversary's use of the electromagnetic spectrum and information infrastructure are the objectives. Electronic warfare (EW) is a perfect example of the integrated nature of foreign forces INFOWAR elements. The EW section in this chapter provides basic characteristics of selected systems either in use or readily available to the foreign forces.

Computer warfare includes capabilities that allow the foreign forces to conduct network warfare (NETWAR) to attack and exploit information systems by attacking key information technology systems within cyberspace, and to conduct network operations (NETOPS) to establish and protect C4ISR networks and information. In NETWAR the foreign forces obtains access through social engineering processes such as phishing schemes but can also employ complex technologies to intercept communications through man in the middle (MITM) attacks and hack into a system remotely. Once access is obtained, foreign forces will attempt to degrade the system or to exploit the system to collect intelligence. Some forms of attack can be launched unexpectedly through a data driven attack known as a "drive-by- download" that is embedded into a website or uploaded to a commonly used system, the victim in these cases releases malware by attempting to access what is believed to be a legitimate site or program. There are various methods used to accomplish this for the purpose of releasing viruses and other malware designed to give the attacker control over the victim's computer. The methods used to gain access involve highly developed social engineering techniques and or network attacks such as a spoofed email account or a false website.

Because these types of attacks are launched by the end user they are a concern since the attack is able to legitimately pass through various electronic defense systems such as firewalls. If access is obtained an electronic beachhead is established on the infected computer exposing the rest of the network to further attacks such as distributed denial of service attacks that overwhelm internet servers. Attacks can include vandalizing or



sabotaging a website, downloading sensitive information or degrading a key war fighting function through the release of malware.

Cyber espionage describes those INFOWAR actions that involve collecting sensitive and proprietary information such as plans, capabilities or personal data. The threat will exploit poor information technology security that exposes sensitive data to risk of exploitation or manipulation.

Information attack is a type of action that focuses on the intentional disruption or distortion of information in a manner that supports accomplishment of the mission. Unlike computer warfare attacks that target the information systems, information attacks target the information itself. Attacks on the commercial Internet by civilian hackers have demonstrated the vulnerability of cyber and information systems to innovative and flexible penetration, disruption, or distortion techniques.

Computer warfare consists of attacks that focus specifically on the computer systems, networks, and/or nodes. This includes a wide variety of activities, ranging from unauthorized access (hacking) of information systems for intelligence-collection purposes, to the insertion of malicious software (viruses, worms, logic bombs, or Trojan horses). Such attacks concentrate on the denial, disruption, or manipulation of the infrastructure's integrity. Terrorist organizations use a variety of encryption techniques such as embedding communications into innocuous computer applications in order to transmit data in a surreptitious manner. Other methods are the use of code words to conceal the meaning of topics and swapping Subscriber Identity Module (SIM) cards or cell phones to prevent electronic surveillance systems from identifying the user of a particular phone.

Evolving mobile technology has increased the portability of battlefield automated systems improving the integration and capabilities of many military functions. The proliferation of these capabilities increases the military's dependence on mobile devices and the networks that support them. Referred to as the "edge of the network," mobile systems provide improved situational awareness. However, the complexity associated with these enhancements in functionality, has introduced additional vulnerabilities. Vulnerabilities associated with wireless networking, and the need to support an expanding list of military applications, make mobile technology an important, feasible and valuable target for INFOWAR operations. Mobile devices share many of the vulnerabilities of personal computers. However, the attributes that make mobile phones easy to carry, use, and modify as well as comparatively low security standards open them to a range of attacks.

This selection of systems is not intended to be complete; rather, it is representative of the types and capabilities that are currently fielded or available. Later WEG updates will include equipment for other elements of INFOWAR operations. For more information on the INFOWAR tactics techniques and procedures see chapter 7 of TC 7-100.2 OPFOR Tactics.

Table 5: Tactical Electronic Warfare Systems

System	Country of Origin	Description	Frequency Range (MHz)	Vs. GPS?	Vs. FH?	Range (km)	Power Output
MEERKAT-S	UK	ESM/ELINT	2-40,000	No	Yes	500km	Passive
WEASEL 2000	UK	ESM/ELINT	.5-10,000	-	Yes	500km	Passive
EULe	Germany	ESM/ELINT	.9-3,000	-	Yes	450km	Passive
MCS90 TAMARA	Czech Rep	ESM/ELINT	820-3,000	-	No	450km	Passive
R-703 /709	Russia	ESM/ELINT	1.5-2,000	Yes	n/a	Unk	Unk
CICADA-C	Germany	Mounted ESM/ECM HF/VHF/UHF	.525-3,000	Yes	Yes	100km	10kw
TRC274	France	Mounted ESM/ECM HF/VHF/UHF	20-3,000	Yes	Yes	150km	4kW 1.2kW on the move
GSY1800	S. Africa	Mounted ESM/ECM HF/VHF/UHF	1-3000	Yes	Yes	100km	(ECM: 1kW)
PELENA-6	Russia	Mounted ECM HF/VHF/UHF	20-1,000	No	No	60 km	60W
R-330 ZH	Russia	Mounted ECM HF/VHF	100-2000	Yes	No	60km	1kW
CICADA-R	Germany	Mounted ESM/ECM HF/VHF/UHF	6,000-18,000	No	Yes	100km	1kW
LIMAN P2	Ukraine	Mounted ECM VHF/UHF	225-1,215*	Yes	Yes	100km	Unk
R-934B	Russia	Mounted ECM VHF/UHF	100-400	No	No	50km	500W
BOQ-X300	Sweden	Mounted ECM S/C/X/Ku/K	2-40,000	Yes	n/a	Unk	Unk
CBJ-40 BOME	France	Mounted ECM S/C/X/Ku	2-20,000	Yes	n/a	Unk	Unk
PELENA-1	Russia	Mounted ECM S/C	1,000-4,000	Yes	n/a	250 km	Unk
SPN-2/4	Russia	Mounted ECM X/K	6,000-17,500	No	No	130km	(ECM: 1kW)

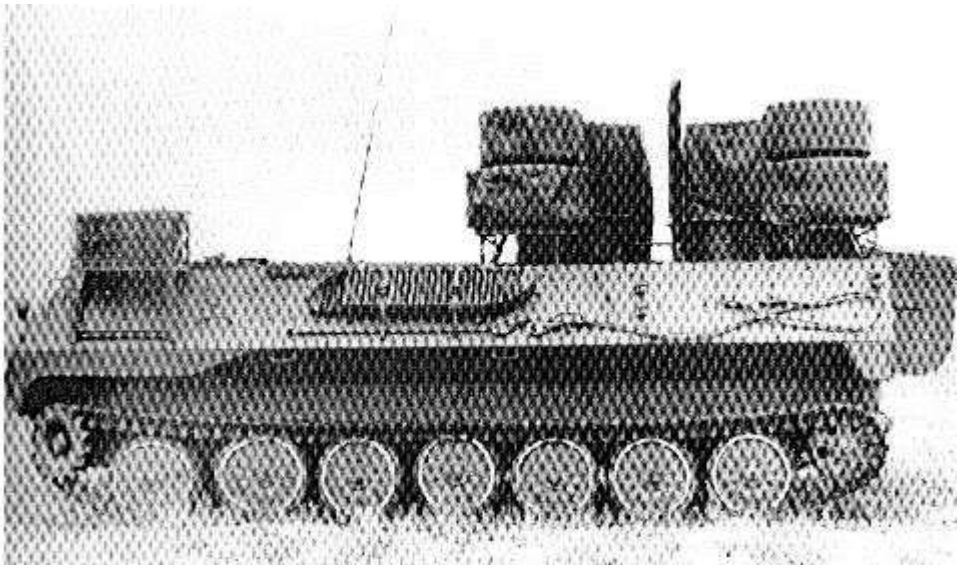


SGS2000	Germany	Mounted ESM/ECM HF/VHF/UHF	1.5-1000	No**	Yes	100km	(ECM: 1kW)
System	**Country of Origin**	**Description**	**Frequency Range (MHz)**	**Vs. GPS?**	**Vs. FH?**	**Range (km)**	**Power Output**
JN-1102	China	Mounted ECM VHF (UAV Mounted)	20-500	No	Unk	Unk	Unk
BARRAGE	France	Mounted ECM VHF (UAV Mounted)	1-3000	Yes	No	Unk	Unk
AJ-045A	Bulgaria	Mounted ECM VHF (UAV Mounted)	20-100	No	No	10km	Unk
HUMMEL	Germany	Mounted ESM/ECM VHF	20-80	No	Yes	100km	(ECM: 1kW)
STORM-H	France	Manpack ECM HF/VHF/UHF/ SHF	20-470	No	No	5km	1kW (est.)
EL/K 7029/A/B	Israel	Mounted ESM /VHF /UHF/ESM	116-400	-	Yes	100km	Passive
ORION	Russia	ELINT	200-18,000	-	No	400km	Passive
AVTOBAZA-M	Russia	ELINT	200-18,000	-	No	400km	Passive

*Liman does not DF in the 960 to 1,215 MHz range

**SGS 2000 frequency range can be extended up to 3000MHz

Russian Airborne EA Radar Jammer 1L245



SYSTEM	SPECIFICATIONS	PERFORMANCE	SPECIFICATIONS
Alternative Designations:	Vstrecha, Ground-Based Weapons Control Radar Suppression System	Fording Depths (m):	Amphibious
Date of Introduction:	1979	Communications:	Combat Net Radios Sets
Proliferation:	At least 2 countries	Protection:	Against 5.56 ball 5.56, all-around
		Transmitter:	
Description:		Frequency Range (GHz):	8 - 18
Crew:	3	Output Power (W):	1,000
Platform (chassis):	MT-LBu	Simple pulse signals received and analyzed 0.25 – 10 khz (µs):	1 - 5
Combat Weight (mt):	15.7	Pulse linear-frequency modulated signals 1 – 20 MHz (µs):	1 - 25
Chassis Length Overall (m):	7.26	Polarization of signals received:	vertical and horizontal
		Vertical:	YES
		Horizontal:	YES

Height Overall (m):	3	Sector, deg:	Combat operation (azimuth x elevation) 120 x 15 ECM with respect to the main radar 2 x 2 directional lobe of the reconnaissance strike system
Width Overall (m):	2.85	Radar detection and suppression range:	
		Reconnaissance strike system (km):	80 - 200
Automotive Performance:		Tactical aircraft (km):	30 - 100
Engine Type:	YaMZ-238, 240hp diesel	Polarization of signals transmitted:	chaotic
Cruising Range (km):	500 km	Types of jamming:	
Speed (km/h):		Noise:	Yes
Max Road:	60	Spot Programmed:	Yes
Max Off-Road:	26	Range Programmed:	Yes
Cross-Country:	INA	Interval Programmed:	Yes
Max Swim:	4.5		

NOTES

THE 1L245 IS MAINLY USED TO DEFEAT AIRBORNE RADAR SYSTEMS AND JSTARS. HOWEVER, IT HAS THE CAPABILITY TO AND JAM GROUND SYSTEMS AS WELL

Russian Airborne EA Jammer Infauna



SYSTEM	SPECIFICATIONS	PERFORMANCE	SPECIFICATIONS
Alternative Designations:	None	Engine Type:	INA
Date of Introduction:	2012	Cruising Range (km):	600
Proliferation:	Russian Airborne Forces (VDV)	Speed (km/h):	
Description:	Modified BTR 80 chassis identified as the K1Sh1.	Max Road:	85
Height (m):	2.21	Max Off-Road:	60
Weight (kg):	12,000	Average Cross-Country:	40
Length (m):	7.65	Max Swim:	10
Crew:	2	Fording Depths (m):	Amphibious
Troop Capacity:	8	EW/JAMMING SYSTEM:	
Combat Weight (mt):	14	Frequency Jamming Range (MHz):	20 - 2020
Chassis Length Overall (m):	7.55	Output Power (W):	60
Height Overall (m):	2.41	Voltage Supply (V):	12.6
Width Overall (m):	2.95	Weight of System (Separated from vehicle) (kg):	14
Ground Pressure (kg/cm2):	INA	Deployment:	Protects combat vehicles and troops against radio controlled mines and explosives (IEDs).
Drive Formula:	8 x 8	APS Capability	Softkill aerosol interference against high-precision weapons with laser and video-management systems.

NOTES

FIELDED TO: EW BATTALIONS IN AIRBORNE FORCES OF THE RUSSIAN ARMY. AS PART OF THE AIRBORNE FORCES, THIS SYSTEM WILL BE USED TO ACCOMPANY INITIAL ENTRY TROOPS AND ASSIST WITH SECURING KEY TERRAIN TO ENABLE FOLLOW-ON FORCES (MOTORIZED, MECHANIZED, AND ARMOR) TO DEPLOY INTO COMBAT AREAS.

Russia Mobile EW System LEER-2



SYSTEM	SPECIFICATIONS	PERFORMANCE	SPECIFICATIONS
Alternative Designations:	Tigr-M REI PP	Crew:	6
Date of Introduction:	2012	Engine MZ-5347-10 multi-fuel diesel engine (hp):	215
Proliferation:	Russia	Max Speed (kph):	125
Jamming Range (MHz):	20-1000	Protection:	7.62
Automotive Range (km):	400		

NOTES

E TIGR-M MKTK REI PP MOBILE TECHNICAL CONTROL, ELECTRONIC EMULATION AND ELECTRONIC COUNTERMEASURES SYSTEM IS DESIGNED FOR DEVELOPING RADIO EMITTERS, JAMMING AND SUPPRESSING RADIO-ELECTRONIC MEANS INCLUDING CELLULAR PHONE SYSTEMS.

Russian GNSS Jamming Transmitter Aviaconversia

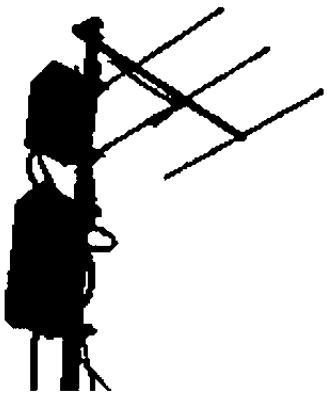


SYSTEM	SPECIFICATIONS	PERFORMANCE	SPECIFICATIONS
Alternative Designations:	GPS / GLONASS Jammer	Fixed:	Yes
Date of Introduction:	1990s	Manportable:	Yes
Proliferation:	Iran, Iraq, North Korea	Vehicle:	Yes
Description:	Aviaconversia portable GPS and GLONASS jammer	Airborne:	Yes
SPECIFICATIONS		Antenna and Transmitter:	
Jamming Range (km):	150 - 200	Antenna Type:	Omni directional or directional yagi
Power Supply DC (V):	15	Transmitter:	Continuous-wave with cable link to antenna
Configuration Weight (kg):	8 – 12	Signal:	Coherent pulse Doppler, J-band
Frequency range:		Power (kw):	
Civilian Channel (MHz):	1,577	Consumed (W):	25
Military Channel (MHz):	1,230	Emitted (W):	4
Target Systems:		Width of radiation pattern lobe (°):	360
Glonass:	Yes	Operation:	Designed to affect C2, maneuver and fire support activities. May affect high precision munitions.
GPS:	Yes		
Mount:			

NOTES

CONTINUOUSLY JAMS GPS SIGNALS. 6 MHZ FREQUENCY DEVIATION TO COUNTER EP MEASURES. ADJUSTABLE MODULATION FROM 44 TO 270 HZ TO COUNTER VARIOUS GNSS SYSTEMS.

Belarusian GNSS Distributed Jamming Complex Optima-3



SYSTEM	SPECIFICATIONS	PERFORMANCE	SPECIFICATIONS
Alternative Designations:	GPS / GLONASS Jammer	Width of radiation pattern lobe (°):	
Date of Introduction:	2003	Horizontal (°):	60 - -10
Proliferation:	Fielded in one country and marketed for sale in at least 2 others	Vertical (°):	40 - -10
Jammer Range (km):	100	Components:	The main components are the operator's automated workstation and a control unit for each transmitter. .
Power Supply AC/DC:	220/24	Number of Transmitters:	9
Weight Transmitter (kg):	10	Control System:	ASU-PP automated control system. System status and situational awareness is monitored by the operator at the remote workstation
Frequency range:		Command Links:	
Civilian (MHz):	1,575.42	Command VHF:	Yes
Military (MHz):	1,227.6	Command GSM:	Yes
Antenna and Transmitter:		Control Link Range (km):	30-50
Mount:		Response time:	
Fixed:	Yes	Command VHF (seconds):	5
Vehicle:	Yes	Command GSM (seconds):	≤ 60

Antenna Type:	**Omni directional**	**Operation:**	**Designed to affect C2, maneuver and fire support activities. May affect high precision munitions.**
Transmitter:	**Continuous-wave with cable link to antenna**		
Signal:	**Complex frequency and interval waveform degrade the GNSS code.**		
Output Power (W):	**20**		

NOTES

OPTIMA-3 GNSS JAMMING COMPLEX IS A NETWORK OF JAMMING TRANSMITTERS THAT CAN BE CONTROLLED BY A CENTRAL COMMAND STATION BY EITHER GSM CELL PHONE OR ULTRA-SHORT WAVE RADIO.

Germany Electronic Support / Attack Jamming Transmitter Cicada-C and R



SYSTEM	SPECIFICATIONS	PERFORMANCE	SPECIFICATIONS
Alternative Designations:	Hummel	FM Morse Code:	YES
Date of Introduction:	1990s	AM Telegraph	YES
Proliferation:	Holland, Spain, Australia	AM Voice:	YES
Description:	Threat multi-range jammer.	AM Morse Code:	YES
Vehicle Range (KM):	150-200	AM Facsimile:	YES
Power Supply (AC/DC):	6 / 15	Fast scan speed (MHz/s):	250 / 1000 (upgraded variant)
Weight (Mt.):	8 – 12	Passive Antennas:	
Frequency Range (MHz):	0.525 - 3,000		dipole or monopole antennas
JAMMING TRANSMITTER:			vertical or horizontal polarized omnidirectional antennas
Transmit modulation:	deception and burn through		antennas for operation on the move
FM Voice:	YES	AMPLIFIER:	
FM Telegraph / Teletype :	YES	Amplifier types:	broadband, solid-state, liquid cooled
FMFacsimile:	YES	Max output power kW into 50 Ω	10
AM Telegraph:	YES	Transmitter:	Continuous-wave with cable link to antenna

AM Voice:	YES	Amplifier Power Consumption(kW):	25.4
Jamming operation modes:		Width of radiation pattern lobe (°):	360
PRESET FREQ:	YES	OPERATION:	
BROAD JAM:	YES	Frequency Range (MHz):	1.5 - 3,000
ATTACK JAM:	YES	Automatic computer controlled jamming sequences	YES
MANUAL JAM:	YES	High power Amplifier MAX (Kw):	YES
DECEPTION:	YES	"Look Through" Capability ensures jammer is only active when target signal is on the air	YES
Broad jam bandwidth:	up to 240 MHz, in 0.1 MHz steps, simultaneous generation of up to 16 separate broadband segments	Deception jamming	YES
Jamming efficiency:	up to 16 simultaneously active radio nets	Broadband TDM (barrage) jamming against simultaneous spread spectrum transmitters	YES
ANTENNA AND TRANSMITTER:		Programming protected frequencies:	YES
Mount:	Fixed site, vehicle and airborne platforms available.	Local or remote control	YES
Antenna Type:	Omni directional or directional yagi	Environmental conditions:	
RECEIVER:		Operation (°C):	-25 - + 55
Receive modes:		Storage (°C):	-40 - +70
FM Voice:	YES	VARIANTS:	
FM Telegraph / Teletype:	YES	Cicada-R Radar Jammer	
FM Facsimile:	YES	Frequency range (GHz):	6-18

NOTES

CAN BE MOUNTED ON AN ARMORED SIX-WHEEL APC, TRACKED VEHICLE, OR IN A FIXED SITE. ABLE TO REMOTELY OPERATE WITH EITHER RADIO OR WIRED LINKS. ADDITIONAL JAMMING MODES AGAINST NEW THREATS (E.G. FREQUENCY HOPPERS, MOBILE TELEPHONES, SATELLITE NAVIGATION). COMPACT DESIGN FOR HIGHLY MOBILE APPLICATIONS.

Germany Ground Based SIGINT Light Electronic Support System (EULe)



Source: Panzerbaer

SYSTEM	SPECIFICATIONS	PERFORMANCE	SPECIFICATIONS
Alternative Designations:	Owl (English), (TMS) 210	Fast scan speed (GHz/s):	1.3
Date of Introduction:	2000's	Scan Mode:	Frequency, memory and radio frequency panorama
Proliferation:	Germany.	Target Data:	Identifies and locates LPI, LPD emissions Frequency Hop, and Spread Spectrum
Description:	Transportable Monitoring System	Frequency identification accuracy:	± 30MHz
Vehicle Range (km) est.:	150-200	Accuracy of DF, degrees:	2
Engine:	Mercedes Benz 306 hp	ANTENNAS:	
Drive:	4x4	Passive Antennas Frequency Range:	
Length (m):	6.6	ADD 195(MHz):	20-1300
Width (m):	2.39	ADD 170 UHF DF antenna for GSM (MHz):	800-2,000
Crew:	2	HE 500 (MHz):	20-3,000
Weight:	14 t	antennas for operation on the move	
Max Speed (km/h):	80	STORAGE and C2 INTERFACE:	
RECEIVER:		Storage (Tbyte):	1
Designation:	ESMB	Remote Data Rates:	

Power Supply AC/DC:	11/ 32	LAN 500 m, (copper pair) (kbps)	128
Power Supply Weight (kg):	36.8	Serial 300m, (kbps)	20
Operational Frequency Ranges (MHz):	.9 – 3,000	GSM Link, (kbps)	10
DF and Intercept (MHz):	20 - 1300	OPERATION:	
Intercept only (MHz):	≥1300		
Receive modes:		Software Defined (RAMON) Receiver	
FM Voice:	YES	Uses two or more station for DF	
FM Telegraph / Teletype:	YES	Local or remote control	
FM Facsimile:	YES	Operations Time (hours):	12
FM Morse Code:	YES	Environmental conditions:	
AM Telegraph	YES	Operation:	40 °C to +65 °C
AM Voice:	YES	Storage:	-40 °C to +65 °C
AM Morse Code:	YES	VARIANTS:	
AM Facsimile:	YES	ESMD	
GSM:	YES	Receiver Frequency Range (MHz):	.9 – 26,500

NOTES

Russian Ground Based ES, ELINT System Avtobaza



SYSTEM	SPECIFICATIONS	PERFORMANCE	SPECIFICATIONS
Alternative Designations:	1L222	Fast scan speed Targets Per Second:	15
Date of Introduction:	1980s	Frequency identification accuracy:	
Proliferation:	At least 4 countries	Accuracy of DF:	
Description:	Passive ELINT signals intercept system designed to intercept and locate pulsed airborne radars including fire control radars, terrain following radars and ground mapping radars as well as weapon (missile) data links.	Azimuth (degrees):	.3 - .5
Vehicle Range:	INA	Elevation (degrees):	3
Engine:	INA	ANTENNAS:	
Drive:	INA	Rotating Parabolic:	Yes
Length:	INA	Azimuth:	360
Width:	INA	Rotation Orbits per minute:	6 - 12
Crew:	4	Local or remote control	Yes
Weight (mt):	13.3	Range of Remote Operations (m):	100
Max Speed:	INA	LAN copper twisted pair:	INA
		Serial 300m (kbps):	INA

RECEIVER:		**Radio Link (kbps):**	**INA**
Designation:	**INA**	**OPERATION:**	
Power Supply:	**6V or 15V DC**	**Prioritization Targets:**	**Yes**
Operational Frequency Range (GHz):	**8 – 17.5**	**Number of Targets Monitored:**	**60**
DF and Intercept:	**Yes**	**Local or remote control**	**Yes**
Receive modes:		**Set Up Time (minutes):**	**25**
SLAR:	**Yes**	**Environmental conditions:**	
PGM Targeting Radar:	**Yes**	**Operation Temperature:**	**-45 - 40**
Nap of the Earth (NOE) Radar:	**Yes**	**Humidity (%):**	**98**
Early Warning Radar:	**Yes**	**VARIANTS:**	**Avtobaza-M**
SAT Phones:	**Yes**	**Receiver Range (km):**	**400**
		Frequency range (GHz):	**2 - 18**

NOTES

MAY HAVE BEEN MODIFIED TO RECEIVE AND LOCATE EMISSIONS ASSOCIATED WITH SATELLITE TELEPHONES. REPORTEDLY OPERATED IN SYRIA IN 2011 -2012.

United Kingdom Ground Based ES, ELINT System Weasel 2000



SYSTEM	SPECIFICATIONS	PERFORMANCE	SPECIFICATIONS
Alternative Designations:	None	Operation:	
Date of Introduction:	2005	Coverage sector deg.:	0 - 180
Proliferation:	At least 2 countries	Travel mode:	
Description:	Passive ELINT System	Fixed:	Yes
Crew:	2	Mobile:	No
Platform:	Mercedes Ax or 4 ton	Remote operation:	
		Number of Sensors:	≥ 1
Combat Weight (Tons):	12.6	Remote Range wired(m):	85
Antenna and Receiver:		Direction Finding::	
Mount:	Motor-driven	Library::	Yes
Antenna Type:	Omni directional	Other links:	
	Rotating Dish	PERFORMANCE	
Azimuth coverage º:	360	Surveillance range (km):	Passive system
Direction Finding assembly:	Dual 8 port switched amplitude comparison system	Variants:	
Frequency Range (GHz):	0.4 - 10		TAC Weasel
Bearing Accuracy (DF) 1 Deg. RMS (GHz):	3 - 10		Weasel II
Polarization Range (GHz):	2 - 18		Weasel III
Receiver sensitivity (dBmi):	-62		
Range (dB):	60		

NOTES
AT THE NETWORK CONTROL CENTER NCC. SENSORS OPERATE AUTOMATICALLY AFTER SETUP. SEARCH RECEIVER AUTOMATICALLY TUNES TO CORRECT FREQUENCY ONCE THE EMISSION IS IDENTIFIED. ANALYSIS AND THREAT DATA CAN BE TRANSMITTED TO REMOTE USERS. THE DATA CAN ALSO BE FUSED WITH OTHER SENSOR SYSTEMS FOR TARGET LOCATION BY AZIMUTH INTERSECTION. WEASEL SYSTEMS CAN BE USED IN CONJUNCTION WITH THE SCORPION JAMMING SYSTEM.


TRADOC
G-2

Finland ESM Wideband COMINT Sensor Elektrobit



SYSTEM	SPECIFICATIONS	PERFORMANCE	SPECIFICATIONS
Alternative Designations:	N/A	Antennas for operation on the move:	Yes
		AMPLIFIER:	
		Amplifier types:	broadband, solid-state, liquid cooled
Date of Introduction:	2010s	Output power (kW): into 50 Ω	10
Proliferation:	Finland.	frequency change time at the power output < 100 µs	
Description:	Wideband COMINT Sensor.	Transmitter:	Continuous-wave with cable link to antenna
SPECIFICATIONS:		Amplifier Power (kW):	
Range est. (km):	5 - 10	Consumption:	25
		Emitted:	4
		Width of radiation pattern lobe:	360
Power Supply (AC/DC):	6 / 15	OPERATION:	
Weight (kg):	2	Storage:	High capacity raw data recording of predetermined area
Frequency Range (MHz):	30 - 40		Reconfigurable waveforms broadband wireless signals
RECEIVER:		LPI:	Yes
Receive modes:	VHF/UHF/SHF	Remote Operations:	Yes
Fast scan speed (MHz / s):	250 - 1000 (upgrade)	Environmental conditions:	
Passive Antennas:		VARIANTS:	INA
Dipole or monopole antennas:	Yes	Frequency range (GHz):	INA

Vertical or horizontal polarized omnidirectional antennas:	**Yes**		

NOTES

China Unmanned Aerial Vehicle EW, ECM ASN-207



SYSTEM	SPECIFICATIONS	PERFORMANCE	SPECIFICATIONS
Alternative Designations:	D-4	Dimensions (m):	
Date of Introduction:	2002	Wing Span:	6
Proliferation:	At least 1 country	Length (fuselage):	3.8
		Height:	1.4 (excluding skids)
Description:		Launch Method:	Solid rocket booster on a zero length launcher.
Engines (HP):	51	Recovery Method:	Parachute (nonsteerable)
HS-700 four-cylinder, two-stroke gasoline air-cooled piston		Landing Method:	2 spring loaded skids
Propulsion:	propeller	Maximum Flights Per Aircraft:	INA
Weight (kg):			
Takeoff:	222	Survivability/Countermeasures:	INA
Fuel and Payload (combined):	50	Pre-programmable waypoints for self-correcting:	Yes
Speed (km/h):		EW/ECM	
Maximum (level):	210	Payload Type:	JN-1102 EW/ECM suite
Cruise:	150	Frequency Range (MHz):	20 -.500
Ceiling (m):		Intercept:	Yes
Maximum:	5,000 - 6,000	VARIANTS:	
Minimum:	100	ASN-206:	
Fuel (liters):	INA	Date of Introduction:	1990's
Endurance (hr.):	8 - 16		

Range (km):			
RPV Mode:	**600**		
Pre-programmed Mode:	**600**		

NOTES

THE UAV IS LAUNCHED FROM A ZERO-LENGTH LAUNCHER USING A SOLID ROCKET BOOSTER THAT IS JETTISONED AFTER TAKE-OFF.

Sweden Airborne ECM/EW Pod, Saab BOQ X-300 (on JAS39/Gripen)



SYSTEM	SPECIFICATIONS	PERFORMANCE	SPECIFICATIONS
Alternative Designations:	None	Intern Range (km):	
Date of Introduction:	1997	Combat Radius:	800
Proliferation:	Sweden (Hungary and South Africa – planned)	Ferry:	3,000
Description:		Takeoff Run/Landing Roll (m):	800/800al:
Crew:	1 (pilot) (JAS 39A/C), 2 pilots (JAS 39B/D)	External:	3,300.
Appearance:		Dimensions (m):	
Wings:	Multi-sparred delta.	Length:	14.1 (A/C), 14.8 (B/D)
Engines:	Turbofan with intake boxes on both	Wingspan (m):	8.4
sides of fuselage.		Height:	4.5
Tail:	Leading edge swept fin with upright inset rudder.	BOQ-X300 ECM/EW POD.	
Engines:	1 x 12,140 lbs thrust Volvo Aero RM12, 18,200 lbs thrust with afterburner	Alternative Designations:	None
Weight (kg):		DATE OF INTRODUCTION:	2012
Takeoff:	12,500 (A/C), 14,000 (B/D)	PROLIFERATION:	Sweden
Empty:	6.500 (A/C), 7,100 (B/D)	COUNTRY OF ORIGIN:	Sweden
Speed (km/h):		FREQ. BANDS:	S/C/X/Ku/K
Maximum (at altitude):	2,150, Mach 1.8+	FREQ. RANGE (MHz):	2-40,000
Max “G” Force (g):	+9/-3 g	RANGE:	INA
Ceiling (m):	16,000	POWER OUTPUT:	INA
Fuel (liters):		TYPE:	Airborne Electronic Countermeasures (ECM), radar jamming system.

NOTES
THE BOQ-X300 HIGH-PERFORMANCE JAMMING POD IS THE LATEST POD BEING DEVELOPED BY SAAB FOR THE GRIPEN FIGHTER. THE POD IS A MODULAR SYSTEM THAT INTEGRATES A SOPHISTICATED JAMMER, SUPPORTED BY A RWR AND ESM SYSTEM. AS AN OPTION, THE POD CAN BE CONFIGURED WITH A DUAL FIBER OPTIC TOWED DECOY TO PROVIDE EFFECTIVE COUNTERMEASURES AGAINST MONOPULSE THREAT. THE BOQ-X300 PROVIDES SELF-PROTECTION FOR HIGH VALUE ASSETS SUCH AS FIGHTER, ATTACK AND RECONNAISSANCE AIRCRAFT. THE POD IS DESIGNED TO SUPPRESS LEGACY THREATS, SURFACE BASED AS WELL AS AIRBORNE. A SECONDARY ROLE FOR THE BOQ-X300 IS TO PROVIDE JAMMING FOR TRAINING OF RADAR OPERATORS IN AIRBORNE AS WELL AS GROUND- OR SEA-BASED ENVIRONMENTS.

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Worldwide Equipment Guide

Chapter 10: Countermeasures, Upgrades, and Emerging Technology



TRADOC G-2 ACE–Threats Integration
Ft. Leavenworth, KS

Distribution Statement: Approved for public release; distribution is unlimited.

Chapter 10: Countermeasures, Upgrades, and Emerging Technology

Chapter 10 includes information on countermeasure techniques, weapon system upgrades, and emerging technology. The section on countermeasures will detail how the OPFOR can employ a variety of countermeasures in order to secure the advantage over the enemy. The section on weapon system upgrades provides an overview of the types of upgrades common OPFOR weapons systems have. The section on emerging technology highlights advancements of weapon system technology for near- and mid-term time periods.

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Countermeasures

Countermeasures (CMs) are survivability measures to preserve the integrity of assets and personnel by degrading enemy sensors and weapons effectiveness. These measures often fit within the US Army term CCD (camouflage, concealment and deception) or within the OPFOR term C3D (camouflage, cover, concealment and deception). Decoys used by tactical units within branch operations are designed to aid survivability, and are considered to be countermeasures. Countermeasures can take the form of tactical CMs (or reactive measures), or they can be technical CMs. The variety of tactical CM changes with new unit tactics techniques and procedures (TTP), to adapt to a given situation, within rules of engagement. This document focuses on technical CM. In specialized branches new technical CMs continue to appear.

Modern forces will upgrade systems with selected countermeasures. Many CMs noted are intended to protect combat vehicles from anti-armor sensors and weapons. Although the below CM can be used to counter precision weapons, many were developed for use against conventional weapons. Priorities for countermeasures are dictated by the goals of survival, mission success, and maintaining effectiveness. The first CM priority is to avoid detection until you can control the events. Among goals for using countermeasures, the highest is mission success.

Survival ("Don't Be Killed") is defined holistically, including the following requirements in order of priority: operating system or network survival, vehicle survival, vehicle avoidance of major damage, crew survival, and vehicle avoidance of minor repair. A compatible suite of countermeasures may be limited to a more modest goal, to preserve a measure of effectiveness, even at the risk of system survival. Effectiveness in this context could be defined as - ability to effectively execute the immediate and subsequent missions, until system or subsystem failure interrupts this process. Effectiveness includes: crew effectiveness, mission success, operating system effectiveness, and vehicle/soldier readiness for employment.

Several factors must be considered when selecting countermeasures:

- Countermeasures should be fielded and mounted on systems with a holistic and rational approach to assure survivability. The rational developer will focus his countermeasures with the highest priority given to assure protection against the most likely and most lethal threats. However, with changing threat capabilities over time, and conflicting priorities, the current CM mix may not be successful. Most CM are responses to specific perceived threats, and are limited by cost and weight budget concerns. With the modern reliance on precision weapons, military forces may develop complex and expensive countermeasure "suites" to degrade their effects.
- Some countermeasures can degrade a variety of sensors and weapons capabilities. They can be grouped by threat to be countered, such as artillery or ATGM CMs. Others are more adversary and technology-specific, and may not be fielded until that technology is fielded. Driven by threatening technologies, designers may launch a short-response program to produce or purchase countermeasures for rapid mounting.
- The R&D process has led to the development of counter-countermeasures, intended to negate the effects of CMs. However, at some level, these are also CMs. To avoid confusion on labeling, these will also be called countermeasures.
- When countermeasures are added to a vehicle or within close proximity, they must be mutually compatible and compatible with other subsystems. Thus issues such as electromagnetic interference and self-blinding with smokes must be considered.



- Although a variety of countermeasures are now marketed, many technical and financial factors can negate their advantages. Countermeasure development may be restricted due to resource, technology, and fabrication limitations, which vary by country and time frame. Budget limitations may limit fielding of feasible and valuable CM, or compel selection of less capable countermeasures. For instance, active protection systems can counter some weapons; but they are expensive, hazardous to soldiers, and ineffective against many weapons. Thus they may be unsuitable and unlikely for application to many systems. OPFOR users should consult the POC below for assistance in selecting CMs for a specific system.
- Countermeasures will not replace the need for armor protection and sound tactics.

Lethality Component versus Countermeasure Responses

This table is intended to assist in selection of CM and understanding the categorization for use in upgrade schemes. Many of the more widely-fielded countermeasures are designed to degrade a variety of sensors and munitions, for minimal upgrade cost. Thus, countermeasure types may be repeated under several functions. Because new technologies are emerging rapidly, and systems are finding applications which can place them in several CM types, the placement of CMs can be somewhat arbitrary. Use against artillery vs ATGMs vs ground vehicle weapons will vary. The following list of CM can be used for artillery, air defense, antitank, armor, aircraft, theater missile, and other systems, depending on the platform, gun, sensor, and munition configuration of the system.

Capability to Be Degraded	Type of Countermeasure
Detection and location	Camouflage: nets, paints, fasteners for added natural materials Cover: entrenching blades, hole-blast device, underground facilities Concealment: screens, skirts, thermal engine covers, scrim, other signature reduction Deformers, engine exhaust diversion, other signature alteration measures Aerosols: smoke and flares, water spray systems Decoys, clutter, and acoustic countermeasures Counter-location measures: GPS jammers, laser and radar warning systems
C2/sensor-shooter links	See Information Warfare (IW) Chapter
Platform or weapon	Counterfire: directional warning systems, laser radars, for rapid response Directed energy weapons (DEW), such as high-energy lasers System prioritization for hard-kill, e.g., anti-helicopter mines (See Ch 7)
Weapon sensors and fire control	CCD as noted above. Directed energy weapons, such as low-energy lasers (LEL) Electro-optical countermeasures (EOCMs)
Submunition dispensing/activation	Global positioning system (GPS) jammer Fuze (laser/IR/RF), RF barrage jammers, acoustic jammers
Precision munition and submunition sensors	CCD as noted above. False-target generator (visual, IR, RF/acoustic) Electromagnetic mine countermeasure system, to pre-detonate or confuse Fuze jammers (laser/IR/RF), RF barrage jammers, acoustic jammers
Munition/submunition in-flight, and its effects	Sensors to detect munitions: MMW radars, RF/IR/UV passive sensors Air watch and air defense/NBC warning net, to trigger alarm signal Active protection systems, for munition/submunition hard kill Cover, additional armor to reduce warhead effects
Other system effects	Miscellaneous CM (See below)

Countermeasures against sensors

Type Countermeasure	Countermeasure	Example	Application
Camouflage	Camouflage nets Camouflage paints, IR/radar/and laser-absorptive materials/paints Fasteners, belts for attaching natural materials	Russian MKS and MKT Salisbury screen rubber epoxy Chinese "grass mat" set	Variety of vehicles Variety systems Uniforms and vehicles
Cover	Natural and manmade cover, civilian buildings Entrenching blade to dig in vehicles Hole-blast devices for troop positions, spider holes Underground facilities, bunkers, firing positions	Tree cover, garages, underpasses T-80U tank, BMP-3 IFV, 2S3 arty Hardened artillery sites, bunkers	TELs, vehicles, troops IFVs, tanks, SP arty Infantry, SOF Iraqi and NK sites
Concealment	Screens, overhead cover for infantry (conceal IR/visible signature) Canvas vehicle cover, to conceal weapons Thermal covers, vehicle screens Scrim, side skirts and skirting around turret	Colebrand netting Cover on Chinese Type 90 MRL Kintex thermal blanket over engine French "Ecrim" track cover scrim	Infantry, weapon, sensor Truck-based weapons For combat vehicles Combat vehicles
Deformers/ signature modification	"Wummels" (erectable umbrellas to change/conceal shape/edges) Exhaust deformers (redirect exhaust under/behind vehicle) Engine and running gear signature modification (change sound) IR/radar deformers (in combination with RAM and RAP, etc)	Barracuda RAPCAM/TOPCAM Russian exhaust deflectors Track pads, road wheel/exhaust change Cat-eyes, Luneburg lens	Vehicles, sites, weapons Combat vehicles Tracked, other vehicles Tracked, other vehicles
Aerosols	Visual suppression measures, smokes, WP rounds Multi-spectral smokes for IR and or MMW bands, Flares, chaff, WP, to create false targets, disrupt FLIR Toxic smokes (irritants to disrupt infantry and weapons crews) Water spray systems (to reduce thermal contrast)	Smoke generators, fog oil, S-4, RPO-D ZD-6 Smoke grenades (visual/IR) WP rounds, Galix 6 flare system, Adamsite and CN in smoke mix Add-on kits for vehicles	Blinding, screening Vehicle protection Combat vehicles, arty Smoke generators Recon, C2, AD, arty
Decoys	Clutter (civilian/military vehicles, structures, burning equipment) Low to high-fidelity (multi-spectral) decoys Radar/IR decoy supplements (to add to visual/fabricated decoys) Acoustic countermeasures (to deceive reconnaissance, sensors)	Log site, truck park, tank farm, derricks IMT-72 “dummy tank”, Shape Intl Corner reflectors, KFP-1-180 IR heater Acoustic tape/speaker systems	Artillery, combat vehicles TBM, vehicle decoys Vehicle/site radar decoys Vehicles, sites
Counter-location measures	Degrade GPS by jamming to reduce precision location capability Jam radars/IR sensors Laser, IR, and radar warning systems (to trigger move/CM)	Aviaconversia GPS jammer SPN-2 truck-borne jammer set Slovenian LIRD laser warner	Infantry and others tactical/operational area Combat vehicles

Countermeasures Against Weapons And Weapon Sensors

Type Countermeasure	Countermeasure	Example	Application
Added protection (supplements to armor in reaction to specific capability)	Armor supplements (ERA, screens, bar or box armor, sand bags) Armor skirts over road wheels Mine rollers, plows and flails Vehicle belly armor, raised or redesigned belly design, skirt Vertical smoke grenade launchers (to counter PGM top attack)	Barracuda, SNPE ERA KMT-5, KMT-6	
EOCM	Use EOCMs such as IR jammer/IR searchlights to redirect ATGM	KBCM infrared CM system	Combat vehicles
False-target Generators	Acoustic jammers and directed acoustic countermeasure Laser false-target generator (against semi-active laser homing) Electromagnetic mine countermeasure system, counters fuzes	In development, can be improvised In development	To distract acoustic seekers Combat vehicles
Jammers	Altimeter jammer (counters submunition dispersion altimeter) Fuze jammers (to spoof RF proximity fuzes on munitions) Incoherent infrared jamming (to jam IR fuzes on munitions) GPS jammers to confuse navigation and course correction systems	SPR-1 armored ECM vehicle	High priority sites, CPs etc.
Active countermeasures	Active protection systems, for munition hard kill. High energy laser weapons to destroy munitions or sensors Low energy lasers to blind or dazzle. Radio-frequency weapons to burn electronics and detonate munitions Directed MGs	Arena hard-kill system ZM-87 laser weapon VEMASID counter-mine system	Tanks, recon vehicle, IFVs AT, AD systems
Counterfire/ Threat response warners	Directional warning system (locate laser/radar, to direct weapons) Employ sensors (RF/IR/UV - to detect munitions) Acoustic directional systems (to detect munitions) Laser radars (laser scanner to locate optics and direct weapons) Directed energy weapons (against optics) Anti-helicopter mines (against aircraft) Employ air watch/security, AD, NBC, nets to trigger alarm signal Dazzle grenades (temporarily blind personnel)	Pilar acoustic detection system Star-burst grenades	 Infantry
Miscellaneous CM	Optical filters to degrade effect of battlefield lasers. Pulse code/thermal CCM beacons on SACLOS ATGMs (to counter EOCM)	HOT-3 ATGM	

Countermeasures By Functional Area And Type System

Functional Area	System	Type Countermeasure	Countermeasure
Infantry, Special Forces, Reconnaissance, Military Police/Security	Dismounted soldier, Utility vehicle troops	Camouflage	Camouflage nets Fasteners, belts for attaching natural materials
		Cover	Natural and manmade cover, civilian buildings Hole-blast devices for troop positions, spider holes Underground facilities, bunkers, firing positions
		Concealment	Screens, overhead cover for infantry (conceal IR/visible signature)
		Aerosols	Visual suppression measures, smoke grenades, WP rounds Multi-spectral smokes for IR and or MMW bands, Flares, chaff, WP, to create false targets, disrupt FLIR Vertical smoke grenade launchers (to counter PGM top attack)
		CM Operational Technologies	Toxic smokes (irritants to disrupt infantry and weapons crews) Acoustic directed counterfire system Dazzle grenades (temporarily blind personnel)
Mechanized Infantry, Reconnaissance, Military Police/Security, Antitank	Armored personnel carrier Armored scout cars (Less costly LAVs) Light tanks Self-propelled AT Guns (HACVs)	Camouflage	Camouflage paints, IR/radar/and laser-absorptive materials/paints Fasteners, belts for attaching natural materials
		Cover	Natural and manmade cover, civilian buildings Underground facilities, bunkers, firing positions Armor supplements (stand-off screens, bar armor, sand bags) Thermal covers, vehicle screens
		Concealment	Scrim, side skirts and skirting around turret Exhaust deformers (redirect exhaust under/behind vehicle)
		Deformers/signature modification	Engine and running gear signature modification (change sound) IR/radar deformers (in combination with RAM and RAP, etc)
		Aerosols	Visual suppression measures, smokes, WP rounds Multi-spectral smoke grenades for IR and or MMW bands, Flares, chaff, WP, to create false targets, disrupt FLIR Toxic smokes (irritants to disrupt infantry and weapons crews) Clutter (civilian/military vehicles, structures, burning equipment) Laser, IR, and radar warning systems (to trigger move/CM)
		Counter-location measures	Beyond line-of-sight modes Remote-controlled missiles and guns Mine rollers, plows and flails
		CM Operational Technologies	Air watch/security, AD, NBC, nets to trigger alarm signal Optical filters to degrade effect of battlefield lasers. Encoded SACLOS ATGMs (to counter EOCM)

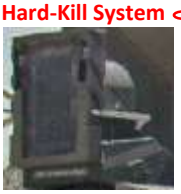
Functional Area	System	Type Countermeasure	Countermeasure
Air Defense , Artillery, Radar units, Theater Missile Units , Aviation, Headquarters,	Command and communications vehicles, Radars, missile launchers, Aircraft (High value targets)	Camouflage Cover	Camouflage paints, IR/radar/and laser-absorptive materials/paints Natural and manmade cover, civilian buildings Entrenching blade to dig in vehicles
		Concealment	Underground facilities, bunkers, firing positions Canvas vehicle cover, to conceal weapons when not in use
		Deformers/signature modification	Thermal covers, vehicle screens Scrim, side skirts and skirting around turret "Wummels" (erectable umbrellas to change/conceal shape/edges) Exhaust deformers (redirect exhaust under/behind vehicle)
		Aerosols	Engine and running gear signature modification (change sound)
		Counter-location measures	IR/radar deformers (in combination with RAM and RAP, etc) Visual suppression measures, smokes, WP rounds
		Decoys	Multi-spectral smoke grenades for IR and or MMW bands, Flares, chaff, WP, to create false targets, disrupt FLIR
		CM Operational Technologies	Degrade GPS by jamming to reduce precision location capability Jam radars/IR sensors Laser, IR, and radar warning systems (to trigger move/CM) Clutter (civilian/military vehicles, structures, burning equipment) Low to high-fidelity (multi-spectral) decoys Radar/IR decoy supplements (to add to visual/fabricated decoys) Acoustic countermeasures (to deceive reconnaissance, sensors) Anti-helicopter mines (against aircraft) Beyond line-of-sight modes Non-ballistic launch modes Anti-radiation missiles Low energy lasers to blind/dazzle optics on designators/aircraft Encoded laser target designators to foil false target generators Radio-frequency weapons - burn electronics/detonate munitions High energy laser weapons to destroy munitions or sensors Laser false-target generator (against semi-active laser homing) Altimeter jammer (counters submunition dispersion altimeter) Fuze jammers (to spoof RF proximity fuzes on munitions) Incoherent infrared jamming (to jam IR fuzes on munitions)

Functional Area	System	Type Countermeasure	Countermeasure
			GPS jammers to confuse navigation and course correction systems Optical filters to degrade effect of battlefield lasers
Information Warfare/ Deception Units	IW vehicles	Camouflage Cover Deformers/signature modification Aerosols Counter-location measures Decoys	Camouflage paints, IR/radar/and laser-absorptive materials/paints Natural and manmade cover, civilian buildings Underground facilities, bunkers, firing positions "Wummels" (erectable umbrellas to change/conceal shape/edges) IR/radar deformers (in combination with RAM and RAP, etc) Visual suppression measures, smokes, WP rounds Multi-spectral smoke grenades for IR and or MMW bands, Flares, chaff, WP, to create false targets, disrupt FLIR Degrade GPS by jamming to reduce precision location capability Jam radars/IR sensors Laser, IR, and radar warning systems (to trigger move/CM) Clutter (civilian/military vehicles, structures, burning equipment) Low to high-fidelity (multi-spectral) decoys Radar/IR decoy supplements (to add to visual/fabricated decoys) Acoustic countermeasures (to deceive reconnaissance, sensors)
All Units	Combat support vehicles (Light strike vehicles, Tactical utility vehicles, Motorcycles, ATVs, Armored CSVs, etc), Trucks	Camouflage Cover Concealment Deformers/signature modification Aerosols Decoys CM Operational Technologies	Camouflage paints, IR/radar/and laser-absorptive materials/paints Fasteners, belts for attaching natural materials Natural and manmade cover, civilian buildings Underground facilities, bunkers, firing positions Armor supplements (ERA, screens, bar or box armor, sand bags) Thermal covers, vehicle screens Engine and running gear signature modification (change sound) IR/radar deformers (in combination with RAM and RAP, etc) Multi-spectral smoke grenades for IR and or MMW bands, Flares, chaff, WP, to create false targets, disrupt FLIR Clutter (civilian/military vehicles, structures, burning equipment) Air watch/security, AD, NBC, nets to trigger alarm signal Acoustic directed counter-fire system

Trophy "Family" HV (Heavy Vehicle) Armor Countermeasure











SYSTEM	SPECIFICATIONS
Alternative Designations:	"Wind Breaker" systems ELM-2133 (WindGuard) Radar
Date of Introduction:	Declared operational by Israeli Defense Force (IDF) in 2009; Started full scale development in 2005.
Proliferation:	Fielded and successfully combat tested in one country (Israel). Tested by US in 2006. In 2013, Canada was conducting tests.
Description:	Active Protection Systems (APS)/Anti-armor countermeasures. System can engage anti-tank guided missiles (ATGM), rocket propelled grenades (RPG) and tank launched high explosive anti-tank projectiles.
Automated Hard-Kill System:	Usually 2 platforms per tank. One mounted on each side of the turret. When traveling the system normally face inwards to the turret. Each platform has Multiple Explosive Formed Penetrators (MEFP) that fire a multiple "spray" of projectiles that engages and neutralizes the warhead (at a certain point on the projectile) before detonation. System can engage on the move or at a standstill. System can engage multiple targets and auto reloads. Minimum collateral damage (estimated at less than 1 percent) to dismounted infantry and non-combatants in area of engagement.
Antenna and Transmitter:	Four (bullet/fragment resistance) flat-panel phased array antennas; pulse Doppler active electronically scanned array (AESA) radar. One (each) radar provides a 90° coverage area. Radars are located on front, rear and sides of turret providing 360^0 coverage including defense from "top down" threats.
Operation:	ELM-2133 radar actively scans for threats. If a threat is located the radar provides identification, tracks the vector of incoming threat, and delivers the point of origin to the battle management system (BMS). The computer for the BMS determines if the threat will engage the tank and if that is the case, begins the automated countermeasure process. The ballistic automated hard-kill system uncovers and aims launchers. The computer through advanced algorithms and logics continues to track the threat and determines the best intercept point. The countermeasure is then launched and neutralizes the threat. The system takes no action if the threat is going to miss the tank.
Performance:	The Trophy (HV) system is currently fielded as an APS for the Israeli Merkava Mk 4 main battle tank (MBT). Trophy has an extensive history of successful tests. The system has

	been challenged by different anti-tank platforms including: RPG-7, RPG-29, AT-3, among others. The first successful combat engagement took place on March 2011 in Gaza. An Israeli tank was on patrol near the border and an anti-tank weapon was fired at the tank but the Trophy system neutralized the threat. The system had a number of successful engagements (reporting indicates 5 or more) during the conflict between Hamas and Israeli in August 2014.	
Range (m):	10-60	
Power Supply:	UNK	VARIANTS
Weight (kg):	850	Trophy Medium Vehicle (MV)
Frequency Range (radar):	S Band	Trophy Light Vehicle (LV)

Equipment Upgrades

Armed forces worldwide employ a mix of legacy systems and selected modern systems. In the current era characterized by constrained military budgets, the single most significant modernization trend impacting armed forces worldwide is upgrades to legacy systems. Other factors impacting this trend are:

- A need for armed forces to reduce force size, yet maintain overall force readiness for flexibility and adaptability.
- Soaring costs for modern technologies, and major combat systems.
- Personnel shortages and training challenges.
- Availability of a wide variety of upgrade packages and programs for older as well as newer systems.
- New subsystem component technologies (lasers, GPS, imaging sensors, microcircuits, and propellants), which permit application to platforms, weapons, fire control systems, integrated C2, and munitions old and new.
- An explosion of consortia and local upgrade industries, which have expanded worldwide and into countries only recently introduced to capitalism.

The upgrade trend is particularly notable concerning aerial and ground vehicles, weapons, sensors, and support equipment. From prototype, to low-rate initial production (LRIP), to adoption for serial production, minor and major improvements may be incorporated. Few major combat systems retain the original model configuration five or more years after the first run. Often improvements in competing systems will force previously unplanned modifications.

Upgrades enable military forces to employ technological niches to tailor their force against a specific enemy, or to integrate niche upgrades in a comprehensive and well-planned modernization program. Because of the competitive export market and varying requirements from country to country, a vehicle may be in production simultaneously in many different configurations, as well as a dozen or more support vehicle variants fulfilling other roles. In light of this trend, OPFOR equipment selected for portrayal in simulations and training should not be limited to the original production model of a system, rather a version of the system that reflects the armed forces strategic and modernization plans and likely constraints that would apply.

The adaptive OPFOR will introduce new combat systems and employ upgrades on existing systems to attain a force structure that supports its plans and doctrine. Because the legacy force mix and equipment were selected in accordance with earlier plans and options, use of upgrades versus costly new acquisitions will always be an attractive option. A key consideration is the planned fielding date. For this document, the most widely portrayed OPFOR time frame is the current Contemporary Operational Environment. Only upgrades currently available (or marketed with production and fielding expected in the near term) are considered in COE Tiers 1-4. Also, system costs and training and fielding constraints must be considered. However, in the Emerging Technology Trends section of this chapter, we anticipate a wide variety of upgrades that could be currently applied to fielded systems.

The selection of equipment upgrades is not a simple matter. Most forces have limited budgets, competing upgrade priorities, and a substantial inventory of outdated equipment. A specific subsystem upgrade (gun, fire control system, etc.) may only slightly improve a generally obsolete system. Another option is an upgrade package, with compatible subsystem upgrades. The surest approach is to refurbish a system

into a new model with all application problems resolved. A critical factor is assurance that the modernized equipment is tested and successful. The best test remains performance in combat.

The following tables describe selected upgrades available for system modernization. The lists are not intended to be comprehensive. Rather, they are intended to highlight major trends in their respective areas. For instance, for armored combat vehicles, the focus is on upgrades in mobility, survivability, and lethality.

The category of survivability upgrades includes countermeasures (CM). The CM upgrades can apply not only to branch-specific systems (tanks, IFV, and artillery), but to general use systems subject to similar threats. An example of this is the proliferation of smoke grenade launchers on artillery and reconnaissance vehicles.

Implementation of all upgrade options for any system is generally not likely. Because of the complexity of major combat systems and need for equipment subsystem integration and maintenance, most force developers will chose a mix of selected upgrades to older systems, as well as limited purchases of new and modern systems. Please note that systems featured in this document may be the original production system or a variant of that system. On data sheets, the variants section describes other systems available for portrayal in training and simulations. Also, equipment upgrade options (such as night sights) and different munitions may be listed, which allow a user to consider superior or inferior variants. Within the document chapters, multiple systems are listed to provide other substitution options. Of course there are thousands of systems and upgrade options worldwide, which could be considered by an adaptive OPFOR.

An OPFOR trainer has the option to portray systems or upgrade packages not included in the OPFOR Worldwide Equipment Guide, to reflect an adaptive thinking OPFOR. In future WEG updates, the authors will expand on the upgrade tables with names and descriptions of upgrade options and specific systems applications which have been noted in the current document. Chapter authors are available to assist users in selecting reasonable upgrade options for system configuration in specific force portrayals.

OPFOR Antitank Weapon Upgrades

GRENADE LAUNCHER	TOWED AT GUN	GROUND ATGM LAUNCHER
Improved AT and dual-purpose rifle grenades permit riflemen to supplement shoulder-mount grenade launchers. Accurate low trajectory longer range grenades for shoulder launchers Parachute-drop overhead camera grenades for shoulder/ground launch Tripod, bipod, pintle mounts convert launchers for vehicle/ground use Take-apart AT grenade launchers or disposable launch tubes	Auxiliary propulsion unit for local movement Take-apart capability for lighter guns Improved gun and recoil system Ballistic computer/laser rangefinder sights MMW radar target auto-tracker day/night FCS Image intensifier/thermal night sights	Man-portable/ground launch and shoulder launch Take-apart launcher and sub-systems Pintle mount/dismount for variety of vehicles/platforms 1st or 2nd generation thermal night sights Extended range missiles Soft-launch for use from bunkers and buildings

GRENADE LAUNCHER	TOWED AT GUN	GROUND ATGM LAUNCHER
Larger, more lethal disposable AT grenade launchers supplement grenadier reusable launchers at critical times. Reduced noise, smoke, and flash signature grenades for AT launchers Improved reusable sights for disposable launchers, including ballistic computer/laser rangefinder sights Image intensifier/thermal night sights Counter -charge AT grenades for firing from inside of buildings Dual-purpose (HE/AT) longer range rounds HE longer range rounds Multi-purpose (HE/AT/anti-bunker) rounds Tandem shaped-charge (HEAT) warhead Thermobaric Frag-HE warhead Guided (SAL-H) grenades for shoulder/ground/vehicle launchers UPGRADE PRIORITY Computer/LRF FCS II night sights Tandem AT grenades, HE/DP grenades, thermobaric grenades	Automated battle management system with graphic flat panel display Indirect fire rounds/FCS for fire support role Increased DF range, new tank/AT gun rounds Improved, heavier , more lethal , and longer range APFSDS-T round Tandem or triple-charge HEAT round Improve Frag-HE round and DPICM submunition Canister/flechette round New type lethalities (DPICM submunition, etc.) Gun-launched ATGM (100 mm+) , including tandem HEAT UPGRADE PRIORITY APU and take-apart for lighter guns Improved gun and recoil system Improved sights, 1st gen thermal night sights Automated battle management system Improved ammunition, inc ATGM.	Launcher countermeasures (CM), such as reduced noise, smoke, flash SACLOS Guidance CCM, e.g., pulsed codes Increased ATGM velocity/reduced flight time New guidance modes: Semi-active laser beam rider and laser-homing, Fiber-optic guided missile (FOG-M) guidance, Fire and forget imaging infrared seeker, Radar homing, Multi-mode (FOG/IR homing, etc.) Helicopter stand-off launch using ground guidance High velocity MANPADS missiles used for AT Larger warhead/tandem warhead HEAT ATGM Sensor-fuzed EFP/HEAT top-attack Thermobaric HE warhead, for new applications UPGRADE PRIORITY Take-apart launcher, with pintle mount Improved 1st gen thermal night sights SACLOS CCM Reduced signature Improved ATGMs (tandem HEAT, etc.)

OPFOR Light Armored Vehicle Upgrades

COMBAT SUPPORT VEHICLE	APC/IFV, INFANTRY FIRE SUPPORT VEHICLE	ATGM LAUNCHER VEHICLE
Used/adapted for various roles, e.g., infantry (less than squad), combat support, and support vehicles. Most are light, 4x4 wheeled, van or light utility vehicle; but auxiliary wheel, 6x6 or tracked versions exist. Many of these are being converted to or replaced by mine-resistant vehicles. Included are motorcycles, ATVs, and light strike vehicles (e.g., jeep-type 4x4 vehicles or recreational dune buggies). Gun trucks, riot control vehicles, and amphibious/over-snow all terrain vehicles are used. Add encrypted voice and digital data capability. Graphic display battle management system Central tire inflation system and/or run-flat tires GPS hand-held or bracket mount Ford capability, swim capability desired Hybrid (diesel/electric) drive kits Add-on light armor, mine protection desired CM, such as multi-spectral smoke grenades Laser warning receiver desired 7.62-14.5-mm MG or 20-40-mm automatic grenade launcher main weapon Remote or overhead weapon station (RWS/OWS) Individual weapons, RPG, MANPADS, or ATGM launcher for secondary weapons Day sight and II or thermal night sight UPGRADE PRIORITY	Must be able to carry a squad Higher horsepower diesel engine GPS and inertial land navigation, graphic display battle management system, IFF Swim or deep ford (due to armor increases). Amphibious conversion with compartments for high sea state capability. Add-on armor, ERA, and improved mine protection. Fire and blast suppression CM, e.g., multi-spectral smoke grenades, LWR Firing ports (or forego due to armor increases, use periscopes or side and rear view cameras) IFV/IFSV: 20-100 mm stabilized gun, and 2-man turret. Active protection system (APS) or defensive aids suite (DAS). Upgraded FCS: Cdr's independent viewer, 2-plane stabilized TV sights, 1 - 2 gen FLIR. Upgraded secondary MG or grenade launcher with superior sights (integrated, high-angle, night). Additional remote MGs/AGLs for high-angle fires security. Improved KE, HEAT, Frag-HE rounds, ATGMs APC/IFSV: Includes truck/light vehicle conversions Remote weapon station or 1-man turret with high-angle-of fires 7.62-	Use APC/IFV wheeled/tracked chassis or tank chassis, with mobility and protection upgrades, Side and rear-view cameras Graphic display battle management system CM, e.g., multi-spectral smoke grenades, LWR Active protection system or other DAS. 1-2 man turret, or turretless design. Alternative design: 1-5 pedestal/turret or mast-elevated ATGM launchers on remote or overhead weapon station (RWS/OWS) Autoloader or manual loader under armor Multiple ATGM launch and targeting capability Improved ATGMs, as noted in above table, or RF, laser-beam rider, SAL-H/IIR ATGMs 7.62-12.7-mm MG secondary arms FCS with commander's independent viewer, 2-plane stabilized sights, TV, and target tracking. Use 1st or 2nd gen FLIR Most common ATGM vehicles are combat support vehicles with pintle-mount ATGM launcher (see above table for ground launcher). Recent development: motorcycle with sidecar and pintle-mount ATGM launcher

COMBAT SUPPORT VEHICLE	APC/IFV, INFANTRY FIRE SUPPORT VEHICLE	ATGM LAUNCHER VEHICLE
Light armor and smoke grenade launchers Remote MG or auto grenade launcher Day/night (thermal sights), RPG GPS, secure comms	23 mm MG, grenade launcher (some with 20-30-mm auto-cannon and ATGM launcher) UPGRADE PRIORITY Add-on armor, ERA, LWR, new grenades Add auto grenade launcher, upgrade ATGM, and KE round to APFSDS. FCS, stabilized sights, Imp 1st gen FLIR	UPGRADE PRIORITY RWS multiple ATGM launchers (APC/IFV/tank conversion), pintle-mount for light combat support vehicles (motorcycle, ATV, LSV, TUV, truck, etc.) Stabilized sights and 1st gen thermal sights Improved ATGMs

OPFOR Reconnaissance And Assault Vehicle Upgrades

RECONNAISSANCE VEHICLE	HEAVY ARMORED COMBAT VEHICLES	MAIN BATTLE TANK
Light recon vehicle: Combat support vehicle with light armor and TV, thermal sights, Add encrypted voice and digital data capability Combat recon vehicle: See IFV upgrades, e.g.: GPS and inertial land navigation. Digital real-time link to subscriber map overlay display, IFF, force tracker battle management system, Swim capability, winch, central tire inflation for wheeled Upgraded FCS: Cdr's independent viewer, 2-plane stabilized TV camera sights, 1 - 2 gen FLIR Elevated battlefield surveillance radar/TV/FLIR sensor suite with TV, encrypted voice, and digital data transmission capability Launch UAVs and/or robots (unmanned ground vehicles) CM, e.g., multi-spectral smoke grenades, LWR, IR/radar skirts Active protection system (APS) or other defensive aids suite (DAS). 20-100 mm gun with 2-plane stabilization, and 2-man turret. Improved secondary MG or automatic grenade launcher and sights.	Distinction among heavy recon, infantry fire support, assault gun, light tank has blurred APC/IFV chassis with increased armor and higher horsepower diesel engine. GPS and inertial land navigation, graphic display battle management system, IFF Swim or deep ford capability Add-on armor, ERA, improved mine protection, fire and blast suppression. CM, e.g., multi-spectral smoke grenades, LWR Side and rear-view cameras for security Active protection system (APS) or other defensive aides suite (DAS). 76-125 mm tank gun with 2-plane stabilization, Improved MG or auto grenade launcher, sights FCS with commander's independent viewer, 2-plane stabilized sights, TV, and target tracking. Use of 1st or 2nd generation FLIR. Side and rear-view cameras	Higher horsepower diesel engine power packs and add-on reserve fuel tanks GPS and inertial land navigation, graphic display battle management system, IFF Deep ford snorkel capability Welded turret, blow-out panels, ERA, improved mine and turret protection, fire and blast suppression. CM suite, including multi-spectral and vertical smoke grenade mix, LWR, VEESS capability Active protection system (APS) or other defensive aides suite (DAS), self-entrenching blade Side/rear-view security cameras Tank gun with 2-plane stabilization FCS with commander's independent viewer, 2-plane stabilized sights, TV, and target tracking. 2nd or 3rd generation FLIR. Auto-tracker. Hunter-tracker FCS.

RECONNAISSANCE VEHICLE	HEAVY ARMORED COMBAT VEHICLES	MAIN BATTLE TANK
Man-portable SAMs (MANPADS) for self-protection Named and targeted areas of interest link to indirect fire and missile units for real-time targeting. Laser target designator guides munitions. Sensor vehicle: APC/IFV or combat support vehicle and mast- mounted sensor pod: radar, thermal and TV Encrypted voice SATCOM/digital data systems UPGRADE PRIORITY Add higher HP diesel engine Add-on armor, ERA, LWR, new grenades Imp 1st gen FLIR, gunner and commander, Add auto grenade launcher, upgrade ATGM, and KE round to APFSDS. Elevated sensor suite and transmission capability.	Improved KE, electronic fuzed Frag-HE, and tandem HEAT rounds Gun-launched ATGMs (100+ mm) UPGRADE PRIORITY Add higher HP diesel engine Add-on armor, ERA, LWR, new grenades Imp 1st gen FLIR, gunner and commander, Larger stabilized gun, gun-launch ATGM, and KE round to APFSDS.	Heavier and longer range APFSDS-T rounds, electronic fuzed Frag-HE, and tandem HEAT rounds Gun-launched ATGMs and IR homing rounds (100+ mm). Semi-active laser homing munitions permit ATGMs to deliver indirect fire precision strikes. Improved remote-firing MG, high-angle AD sights UPGRADE PRIORITY Add higher HP diesel engine Land navigation and deep ford snorkel Add-on armor, ERA, CM suite Imp stabilization and FCS, 1st gen FLIR, Remote MG, Imp ammo (sabot, Frag-HE, and HEAT) Gun-launch ATGM.

OPFOR Artillery Upgrades

ARTILLERY RSTA/C2 SUPPORT	TOWED AND SELF-PROPELLED CANNON	MULTIPLE ROCKET LAUNCHER
Automated secure digital joint C2 network with SATCOM, linking artillery, air, EW, and reconnaissance units Integrated artillery recon vehicle with sensor mast Reconnaissance strike and fire complexes Forward air controllers linked to artillery units Artillery surveillance vehicles with ground surveillance radars, sensor suite and networked Observation teams with goniometers, thermal sights, digital comms, and laser target designators Artillery links to selected special purpose forces	Conventional munitions, e.g., controlled fragmentation, proximity and multi-option fuzes, special munitions, and propellant s (modular propellants) Artillery delivered high precision munitions e.g., SAL-H, sensor-fuzed, course corrected, terminal-homing IR Self-Propelled: Automated fire control with barrel cooling and thermal warning systems Auxiliary power unit Mobility and weight improvements, Muzzle velocity analyzer	Mobility and weight improvements, truck-based launchers which conceal the MRL signature Rapid emplace-displace and response capabilities CM, such as smoke grenade launcher and LWR On-board computer-based fire direction and land navigation systems, which permit autonomous launcher, platoon, and battery operations Tube-launched UAVs linked to the launchers and to the fire control network for real-time acquisition

ARTILLERY RSTA/C2 SUPPORT	TOWED AND SELF-PROPELLED CANNON	MULTIPLE ROCKET LAUNCHER
Acoustic vehicle detection and location Phased array counter-battery radars, networked to automated artillery net, with increased range, lower probability of error, windows-based man-machine interface Target-acquisition UAVs, networked to artillery net Automated battle management equipment use for towed and SP guns, mortars and MRLs Navigation system with GPS/inertial update, linked to automated net UPGRADE PRIORITY Integrated artillery recon vehicle, sensor mast Reconnaissance strike and fire complexes Target-acquisition UAVs, networked Observation teams, radars, acoustic sensors	CM, such as smoke grenade launcher and LWR Upgrade to 52-caliber cannon for longer range Truck-mounted high-mobility systems with long-range cannons Towed: Addition of auxiliary propulsion unit On board technical fire control computer Reduced weight and emplace/displace times Muzzle velocity analyzer Onboard or portable digital linked fire control computer Upgrade to 52-caliber cannon for longer range UPGRADE PRIORITY Mobility and weight improvements On-board navigation and fire direction systems Use of modular propellant Procurement of ADHPM Overall range and accuracy improvements	Improved lethality improved conventional munitions and special purpose (mines, jam, etc,) munitions Extended-range and course-corrected rockets, as well as addition of artillery/cruise missiles Computer-based fire control system for electronically-fuzed rockets Artillery delivered high precision munitions (ADHPM), e.g., sensor fuzed, laser-homing rockets Special munitions, such as FASCAM, chemical warhead, RF jammer rockets Mine clearer and fuel-air explosive rocket MRLs UPGRADE PRIORITY Autonomous/ semi-autonomous launcher Countermeasures Improved munitions, e.g., extended range, DPICM and thermobaric ADHPM, e.g., sensor-fuzed munitions and course corrected rounds or rockets

Emerging Technology Trends

In order to provide a realistic OPFOR for use in Army training simulations, we must describe the spectrum of contemporary and legacy OPFOR forces in the current time frame, as well as capabilities in emerging and subsequent operational environments (OEs). This chapter does not predict the future, rather notes emerging adversary capabilities which can affect training.

The OPFOR timeframes for emerging OPFOR are: 2015-2020 (Near Term) and 2021-2028 (Mid-Term). The subsequent time frame is "future" OPFOR time frame. Time lines were determined in part to assist in building OPFOR systems and simulators and for use in Army training simulations. The timeframes are arbitrary and selected for ease in focusing and linking various trends. However, they also generally match force developments for U.S. Army forces, as well as thresholds in emerging and advanced technologies which will pose new challenges to military force planners and developers.



In these time frames, the mix of forces will continue to reflect tiered capabilities. The majority of the force mix, as with all military forces, will use legacy systems. Periods 2015 and after will also see new OPFOR systems and whole new technologies. The most notable difference between the OPFOR force mix and U.S. forces is that the OPFOR will have a broader mix of older systems and a lower proportion of state-of-the-art systems. Rather, OPFOR will rely more on adaptive applications, niche technologies, and selected proven upgrades to counter perceived capabilities of their adversaries. Force developers for OPFOR will retain expensive legacy systems, with affordable upgrades and technology niches. A judicious mix of equipment, strategic advantages, and sound OPFOR principles can enable even lesser (lower-tier) forces to challenge U.S. military force capabilities.

The OPFOR systems must represent reasonable responses to U.S. force developments. A rational thinking OPFOR would study force developments of their adversaries as well as approaches of the best forces worldwide, then exploit and counter them. Thus worldwide and adversary equipment upgrades will trigger OPFOR forces to modify their equipment and tactics to deter, match, overmatch, or counter those changes.

OPFOR Technologies And Emerging Operational Environments

As noted in Chapter 1 on COE OPFOR, the adaptive OPFOR will introduce new combat systems and employ upgrades on existing systems to attain a force structure which supports its plans and doctrine. Because a legacy force mix and equipment were historically selected earlier in accordance with plans and options, upgrades versus costly new acquisitions will always be an attractive option. A key consideration is the planned fielding date. To project OPFOR capabilities in the future, we should look at the technologies in various stages of research and development today, as well as those in the concept stage for applications in the Future OPFOR time frame. Military engineering experience has demonstrated that the process of formulating military requirements, as well as technology, engineering, and budgeting factors can dramatically affect equipment modernization time lines. In addition, scientific discoveries and breakthroughs in the civilian sector have greatly contributed to the so-called "Revolution in Military Affairs", which has increased the capability for battlefield awareness, integration, timeliness, and lethality. The table below shows OPFORs in emerging and Future OEs, and some considerations.

Considerations in Determining Emerging OPFOR Technologies by Time Frame

OPFOR Consideration	Near-Term (2015-2020)	Mid-Term (2021-2025)
Challenging OPFOR	Emerging OPFOR	Objective OPFOR
Technology Source	Current marketed/fielded systems and subsystems	Recent major weapons, upgrade applications
Budget	Constricted but available for niche technologies	Improved, some major system acquisitions
Implications for OPFOR equipment	Many subsystem upgrades, BLOS weapons, remote sensors, countermeasures	More costly subsystems, recent major weapons, competitive in some areas.
Implications for OPFOR tactics and organization, Implications for U.S.	COE tactics with contingency TTP updates. Slight subunit changes add BLOS and AT systems for integrated RISTA and strikes.	Integrated RISTA with remotes. Strikes all levels. Combined arms integrated in small units for increased lethality and autonomy.

The information revolution has also decreased response time in which system developers in the military marketplace can seize a new technology and apply it in new systems or in upgrades to older systems. The following technologies and possible applications of those technologies will influence R&D as well as



fielding decisions for future force modernization and expected OPFOR capabilities to be portrayed in future operating environments.

Technologies And Applications For Use By OPFOR: Near And Mid-Term

TECHNOLOGY CATEGORY	TECHNOLOGY	TECHNOLOGY APPLICATION
Psychological Operations	Mood altering aerosols Reproductive terrorism Non-lethal technologies	Military and civilian targets, for short-term and long-term goals.
Information Operations: Sensors	Higher-resolution multispectral satellite images New sensor frequencies for acquisition New sensor frequencies operational security Use of other light bandwidths (ultraviolet, etc) Passive detection technologies and modes Auto-tracking for sensors and weapons Image processing and display integration Micro-sensors/imaging system miniaturization Unmanned surveillance, target acq/designation Multispectral integrated sensors and Multispectral integrated transmission modes Precision navigation (cm/mm three-dimension) Undersea awareness (sensors, activity) Underground awareness (sensors/mines)	High-intensity use of LITINT (internet, periodicals, forums) Increased use of information from commercial, industrial, scientific and military communities Increased use dual-use technologies
Information Operations: Computers and Comms	Low-Probability-of-Intercept communications New power sources and storage technologies: Micro-power generation Energy cells Advanced Human/Computer Interface Automatic Language Translators	New communities (Blogs, flash mobs, etc, to coordinate and safeguard comms) Secure encryption software New communications tools (internet and subscriber links)
Electronic Attack	Anti-Satellite weapons for RF, EMP, Hard kill Wide area weapons (EMP graphite bombs, etc) EMP Precision (small area) weapons Computer Network Attack Worms, viruses, trojan horses Net-centric warfare Spoofing sensors Spoofing/Intercepting data stream/ spyware	Attack electronic grid or nodes at critical times
Chem/Bio/ Radiological Attack	Dirty bombs Genetic/Genomic/DNA tagging to assassinate Genetic/Genomic/DNA targeting for Bio attack Designer Drugs/Organisms/Vectors Biologically based chem (Mycotoxins) Anti-materiel corrosive agents and organisms	Agricultural attack (animal and plant stocks and supplies) Use of tagging to incapacitate political leaders.
Physical Attack	Mini-cruise/ballistic missiles for precision, surgical strikes, and widespread use Atk UAVs (land, sea, undersea-UUV, Micro-aerial vehicles-widespread use Swarming for coordinated attack Notebook command semi-autonomous links Vehicle launch for NLOS attack/defense Multi-mode guidance: pre-programmed/ guided/homing New types of warheads	

TECHNOLOGY CATEGORY	TECHNOLOGY	TECHNOLOGY APPLICATION
	Wider area/different effects Tailorable warhead effects Precision Munitions Course-corrected/guided/homing Widespread - almost all weapons Loiter/IFF DEW Blinding/high energy lasers RF Weapons against electronics RF against people, vs structures/systems Directed acoustic weapons	
Sustainment, Protection	New battery/power cell technologies Neurological performance enhancers Better lightweight seamless body armor Personal actuators, exoskeletons, anti-RF suits Active armor and active protection systems Countermeasures to defeat rounds and sensors Counter-precision jammers, esp GPS All-spectrum low observable technologies Anti-corrosives Biometric prosthesis and cybernetics Robots assist dismounts, sensors, and logistics Robotic weapon systems	Battlefield fabrication of spare parts Airborne/ship borne refineries Potable water processing systems Transportable power generation systems

OPFOR Capabilities: Near-Term And Mid-Term

The next table provides projected system description and capabilities for analysis of the OPFOR environment facing U.S. forces in subsequent time frames. Data for the first timeframe (2013-2019) reflects generally known systems and subsystems, with their introduction to the emerging OPFOR adversary force. Timelines reflect capability tiers for systems which may be fully fielded (not Interim Operational Capability or First Unit Equipped) in brigade and division unit levels during respective time frames.

The systems projections are not comprehensive, and represent shifting forecasts. They may accordingly shift as we approach the specified time frames. Once we get beyond the turn of the decade, our current view of the future trends becomes less specific. Therefore, the second column (Mid-Term 2021-2028) focuses more on technologies—less on defined systems.

The columns can be treated as capability tiers for specified time frame OPFOR. Please note: ***No force in the world has all systems at the most modern tier.*** The OPFOR, as with all military forces worldwide, is a mix of legacy and modern systems. Thus the emerging OPFOR force comprises a mix of COE time frame Tier 1-4 systems and newer systems. One would expect that some Near- or Mid-term adversaries with lower military technology capabilities could move up one or two capability tiers from (for instance) current COE capability Tier 4, to COE Tier 2. The most likely upgrade for emerging OPFOR used in most training simulations would be to move the OPFOR from COE Tier 2 to Tier 1, with added niche emerging systems.

We have previously stated that an OPFOR force can portray a diverse force mix by separating brigades and divisions into different tiers. The OPFOR also has the option of incrementally adding higher tier systems to lower tier units, as selective upgrades. Because most of the below systems in the 2015-2020



column are currently fielded, an adversary might also incrementally upgrade COE Tier 1 or 2 units by adding fielded assets from 2015-2020 as described in that column. However, until that time frame, we cannot assure beforehand when all of those technologies will appear. Again, the tables are not predictive. The OPFOR force designer may choose a middle road between current Tier 1-4 and future systems; in many countries they are upgrading legacy and even recent systems to keep pace with state-of-the-art systems. Thus they may look to subsystem upgrades such as noted in Chapter 15.

If a specialized system for specific role is missing from the table below, continue to use the OPFOR system noted in Tiers 1-4. Please remember that these projections reflect "possible" technology applications for future systems. They incorporate current marketed systems and emerging technologies and subsystems, may be combined in innovative ways. The table below is not a product of the US intelligence community, and is not an official US Army forecast of future "threats". It is approved only for use in Army training applications and simulations.

Future OPFOR (2028 and after) is described in various portrayals. But it is generally FOUO or classified and is not included in the WEG.

OPFOR Capabilities: Near- And Mid-Term

SYSTEM	NEAR-TERM OPFOR (FY 15-20)	MID-TERM OPFOR (FY 21-28)
INFANTRY WEAPONS		
Infantry Assault Rifle	Rifle 6.8mm to 600 m day/night, w/EO LRF/pointer computer sight. Fire around corner sight EO link. Under-barrel grenades 600 m (CS gas, HEDP, EO recon, starburst, HE airburst, concussion). Rifle grenades 400m: HEAT, DP, smoke	On-bipod range 600 m. Sight on all weapons link to laptop/PDA/NVG/ helmet viewer w/real-time RF link. Multispectral smoke, TV/II recon/ atk rd, tandem HEAT grenades. Remote fire platform, 60m link.
Thermobaric grenades and Magazine grenade launcher	43-mm 4-round hand-held launcher for urban fight to 350m. Thermobaric grenades, also for hand throw, underbarrel.	Range 600 m for hand-held and under-barrel launchers, night sight. Add flechette, TV/II recon grenade.
AT/AP Hand Grenade	HEAT/Frag, 165-mm penetration, 20 m Frag radius, 20 m range, weighs 1.1 kg. Rifle grenades: HEAT 150mm to 300m	Hand grd to 40 m. Dual purpose bullet-thru rifle grd, no recoil, 150mm/Frag 20 m, 3 in belt pack.
Squad Machinegun	7.62x54 mm, frangible/sabot rds 1,300m. EO/3 gen II computer LRF sight 1,500m.	Add MMW radar, 5 km detection.
Combat Shotgun (replace one assault rifle)	12-gauge pump or semi-auto, 12 rds. Short and long change-out barrels, day/ night sights. Variable choke. Shells: HE, AP-sabot, door-buster, starburst, slug, concussion, frangible, flechette/anti-UAV	Time fuzed focused fragmentation airburst rd for use against dug in personnel, aircraft and UAVs. Multispectral smoke, CS grenades. TV/II recon rounds to 400 m.
Sniper Rifle Light	Bolt action, 7.62 mm rd, 15 lbs max weight with ammo. 10X optic w/2 gen II night channel. Range to 1000m.	Ballistic EO holographic LRF sight. Fused IR/FLIR channel 1,500m. Remote fire robot. Laser designator
Anti-Material Rifle (AMR) or Sniper Rifle (Heavy)	Semi-auto .50 cal. Weight 25 lbs. AMR/ anti-armor range 1,800 m. Armor pen 20 mm. As sniper rifle, range 1,000-1,500 m. Frangible multipurpose rd (AP 11 mm, incendiary 20 fragments). EO sight (20x) with 3 gen II night channel.	Ballistic EO holographic laser range-finder sight. Night sight fused IR/FLIR. Range 2,500+ m. Remote fire platform-60m link or weapon robot option. Laser designator.

SYSTEM	NEAR-TERM OPFOR (FY 15-20)	MID-TERM OPFOR (FY 21-28)
Automatic Grenade Launcher (AGL)-Light	35mm man portable launcher with 6/9/12-round drums. HEAT grenade range 600 m 80mm penetration. Frag-HE grenade range 1,500m. Buckshot grenade. EO day/ 3 gen II night sights. 1 per infantry squad	Air-burst munition (ABM), ballistic sights. EO and Fused IR/FLIR sight. Remote fire. Multispectral smoke grenades. Recon, HEAT/HE TV-guided atk grenades to 1,000 m
Automatic Grenade Launcher (AGL)-Heavy Weapons squads and vehicles	40 x 53 mm weight 17 kg. Range 2,200m. Ballistic fire control computer w/ EO sight. Dual-purpose grenade, HE with 60mm armor penetration. Buckshot round. Electronic fuzed HE air-burst munition (ABM). 32/48-round cans. Thermal night sight, range 2,200 m.	HEAT rd defeats 200+ mm armor. EO/ fused IR/FLIR sight. Multispectral smoke, unattended ground sensor (acoustic, seismic RF), and comms jam grenades. Robot option. Mount on all maneuver/recon vehicles. TV/IR attack grenades.
Multi-purpose Grenade Launcher (disposable)	76mm thermobaric HEAT, 250m range, 440 mm penetration. Reusable II sight.	Range to 400m. Fire from enclosed spaces. Nil smoke, little noise.
Antitank Grenade Launcher (disposable)	125mm tandem HEAT 300m range, 1000+ mm. Shoulder fired. Nil smoke.	Multipurpose DP effects, 500 m. Reduced recoil-enclosed spaces.
Antitank Grenade Launcher (ATGL - medium range) Mid-Term: Expand to AD/AT Missile Launcher	60mm launch tube, from enclosed spaces. Tandem warhead (1,150 mm to 600m), dual purpose 1700m. Ballistic LRF/3 gen II night sight to 1,500 m. Remote launch tripod. Nil smoke. High velocity 57-mm DP high vel rocket 1,000m, 300 mm pen	SAL-H, TV/IR-guided grenades to 1,000 m. Fused IR/FLIR night sight. ADAT KE dart fits converted launcher. Range 4 km. Laser designator 5 km, including artillery and mortar rounds.
Antitank Grenade Launcher (long range) Mid-Term: Expand to AD/AT Missile Launcher	125mm tandem HEAT 800+m range, 1100+ mm. HE-Thermobaric grenade to 1700 m. LRF computer sight. EO day/3 gen II Night sight. Nil smoke. Remote-fire platform option. Tripod and bipod.	SAL-H/TV/IR-guided: HEAT and HE grenades 1,200 mm. ADAT SAL/LBR KE dart to 4 km. EO and fused IR/FLIR sight, laser designator to 5 km for arty/mortar rds.
Remote-fire Platform and Weapon Robot or Laser Target Designator (LTD) Robot	Man-portable, <15 kg, 60m Laptop/PDA link. EO/3 gen II sight. MG/AGL/rifle. LTD robot TV/2nd gen FLIR, 10km range	Tracked, 24 kg, 2 hour charge, fused II/FLIR 10 km, 10 km rg RF link. LTD has 3rd gen FLIR, range 15km
Acoustic Targeting System (ATS)	Backpack/vehicle triangulates on aircraft, vehicle weapons to 6 km, MGs 2.5 km. Helmet mount to 800 m. Light display.	Increased range (10 veh weapon, 5 MG). Add auto-return fire for MG. Link to veh weapons/nets auto-slew
General Purpose and Air Defense Machinegun	12.7mm low recoil on ground tripod. Chain gun version on light vehicles, ATV, motorcycle, etc. TUV/LAV use RWS. Remote operated ground or robot version. Frangible rd 2 km, sabot 2.5 km. RAM/RAP/IR camouflage/ screens. TV/FLIR fire control. Lightweight MMW radar 5 km. Display link to AD azimuth warning net. Emplace in 10 sec. RF/radar DF set. ATS control option.	Stabilized gun and sights. Remote-operated computer FCS with PDA or laptop. Fused FLIR/ II to 5 km. Frangible, sabot rds to 3 km. Laser dazzler blinds enemy. Micro-recon/ heli atk UAVs. Robot version. Some light/AD vehicles replace w/ 30-mm recoilless gun on RWS. AHEAD round 4 km, FCS 10 km. Add-on ADAT missile launcher
Man-portable attack UAV (NLOS Backpack Munition)	2.5 kg tube launch with PDA, CCD/IR image, 10 to km and 155 m altitude, at 100-160 km/hr, with 10 min loiter, in-flight arm for HE charge, NLOS dive attack vs moving/static targets	Ranges to 20 km with 40 min loiter. Remote, air, ground, water craft, vehicle launch. 3rd gen thermal view. AT/AP remote sensor mines.
Infantry Flame Weapon	Reusable thermobaric 90-mm grenade (2/lchr) to 800 m. Effects = 152mm artillery rd. Targets personnel, bunkers, LAVs, etc. Nil smoke. EO/II night sight	Precursor (200 mm pen) DP grd. Computer LRF day/night sight. SAL-H guided. Remote fire and robot option. Use in enclosed space

SYSTEM	NEAR-TERM OPFOR (FY 15-20)	MID-TERM OPFOR (FY 21-28)
Vehicle/Man-portable Close Protection System (CPS)	Smoke grenade launchers can use multi-spectral smoke, CS smoke, Frag-HE grenades, range 3-40 meters, depending on angle. ATS control. Man-portable.	Man-portable remote control launcher. Quick load 3-6 grenades. Other Grds: CS gas, HE, AT/AP mines. 2-4 pods/vehicle.
Infantry Weapon Night Sight (Night Optical Device- NOD)	3d gen II night vision goggles/sights/ IR pointers for riflemen range 1,000. AGLs, MGs, sniper rifles/AMRs, ATGLs to 1,500m. FLIR recon sensors 3,000 m.	Uncooled 3rd gen FLIR (thermal and II combined) NVGs and weapon sights infantry 600m. Priority weapon sights 2,000+ m.
INFANTRY WEAPONS		
Armored Personnel Carrier (APC)	8x8 wheeled chassis. Add ERA. 30-mm gun (and imp rd), coax MG. FOG NLOS ATGM lchr 4 km. Thermobaric ATGM. FLIR. 2 remote 7.62-mm MGs and 40 mm ABM AGL. CPS and ATS. Attack UAV launch	10x10 wheeled hybrid drive. Box ERA. CPS. Fused FLIR/II sight 13 km. 30-mm recoilless chain gun, RWS. Air-burst rds. ADAT KE missile and NLOS ATGM to 8 km. TV/IR attack grenades.
APC Fire Support Vehicle (Weapons Squad APC or Infantry Support Vehicle [1/ pltn or company], or Company Command Vehicle in Mech APC Bn)	Wheeled 8x8 chassis with ERA. 100mm & 30mm guns, 40 mm ABM AGL, auto-tracker, hunter-killer FCS. Gun-launch ATGM NLOS (SAL) 8 km fire on move. 30 and 100-mm HE elec fuzed rd 7 km. Imp 30-mm rd. 12.7 mm AD MG, 2 remote 7.62 MG. ADAT KE msl lchr 7+ km. Laser designator 10 km. CPS, ATS.	Above chassis & drive, ERA, fused FLIR/II sight. 100mm KE/600 CE protection. Cased telescoped gun 45-mm. ADAT KE dart rd 4 km, SAL/LBR ATGM 8-12 km. CPS. Micro-UAVs recon/attack. Tunable laser designator to 15 km. Radar/ MMW radar. SATCOM. Atk grds
APC Air defense/Antitank (ADAT) Vehicle	APC Bn and Bde MANPADS btry, selected other units	See AIR DEFENSE
Infantry Fighting Vehicle	2-man turret, amphib tracked. Add ERA. 30mm gun (sabot, 110+mm pen). Frag-HE Electronic-fuzed ammo 5 km. Buckshot rd for UAVs. 40-mm ABM AGL, 4 x fiber-optic guided ATGM 8 km launch on move, 2nd gen FLIR. Auto-track, hunter-killer FCS. Remote MGs 12.7mm, 2 x 7.62. Laser designator 15 km. CPS/ATS	Hybrid drive. Box ERA 100mm KE /600 CE. 45-mm CTG. Fused FLIR /II sight 13 km. ADAT dart rd 4 km. SAL/LBR ATGM 8-12 km. MMW radar. Micro-UAVs recon/atk. Radar warner, laser radar. Tunable LTD 15 km. CPS. 2 remote MGs, 1x 12.7. TV/IR attack grenades
IFV ADAT Vehicle IFV Bn/Bde MANPADS	IFV chassis and APC ADAT weapons and upgrades	See AIR DEFENSE, APC ADAT for weapons and upgrades
Heavy Infantry Fighting Vehicle (Heavy IFV in Heavy Bn, Infantry Fire Support Vehicle, or IFV Company Command Vehicle, as Required)	2-man turret, amphib tracked, Box ERA. Auto-track, hunter-killer FCS, ATGM lch on move. 100 and 30mm guns. 100 mm HEAT, DPICM rounds. 40mm ABM AGL, NLOS (LBR/SAL) ATGM 8+km lch-on-move. 30/100-mm HE electronic fuzed rd 7 km. 30-mm buckshot rd for UAVs. AD 12.7mm MG, 2 remote 7.62 MG. Laser designator 15 km. CPS/ATS	Hybrid drive. Armor and box ERA protects 300mm KE/800 CE. 45-mm CTG, KE, HE, ADAT rds. KE missile 8 km. Micro-UAVs recon/ atk. CPS. Fused FLIR/II sight 13 km. ATGM 8-12 km. Tunable laser designator to 15 km. Radar/ MMW warners. AGL, 2 remote MGs, 1x 12.7. TV/IR atk grds
HIFV ADAT Vehicle HIFV and Amphib Bn/Bde	HIFV chassis with APC ADAT weapons and upgrades	See AIR DEFENSE, APC ADAT for weapons and upgrades

SYSTEM	NEAR-TERM OPFOR (FY 15-20)	MID-TERM OPFOR (FY 21-28)
Main battle tank	Welded turret, 3rd gen ERA, more armor. 125mm gun, bigger sabot (800+mm pen), LBR ATGM 6 km. SAL/IR-homing rd to 5 km in 1 sec, SAL-H ATGM 8 km.. Improved 2nd gen FLIR (7 km) and 50X Day/night sights. ATGM fire on move. Auto-tracker, laser radar, laser dazzler blind sights. Focused frag HE rd for heli, light AT targets. HEAT-MP, DPICM sub munitions rds. IR/MMW CM. Active suspension. CPS/ATS. Controls robot	Reduced remote turret, compartmented crew, electronic/ceramic armor, 500 mm top/mine armor. Laser/radar warners. Hybrid drive. CPS/ATS/APS. Sabot defeats 1000 mm KE. KE ATGM to 12 km. Tunable LTD to 15 km. ADAT msl 8 km. Fused 3rd gen FLIR/II sight 100 X to 13 km. MMW FC. Atk/recon micro-UAV, atk grds. Controls a robot tank.
Tank Robot (Near Term) Robotic Tank (Mid-Term)	Tracked LTD tank robot fits on platoon cmd tank when unused. Light armor, MMW/ IR screens - no signature. It designates SALH ATGMS and rds.	1/2 size MBT. Driver seat for pre-battle. Armor, weapons, mobility/ survivability (CPS/ATS/APS) same as tank. ATGM launch veh version
Tank ADAT Vehicle Tank Bn/Bde MANPADS	Tank chassis and APC ADAT weapons and upgrades	See AIR DEFENSE, APC ADAT for weapons and upgrades
Armored Tactical Utility Vehicle (TUV)	4x4 swims, 1/4 mt amphib trailer, Remote 12.7-mm MG and 40-mm AGL). Multirole (mech/recon/C4/AD/AT/security/ log). Run-flat, central tire inflation. CPS/ATS	6x6 hybrid drive, mine protection. 30-mm gun, RWS (see APC). Recon masted radar/fused FLIR/II sights. Smoke, recon/atk grenades. CPS.
Armored TUV ADAT Vehicle Infantry, SF, other units	12.7-mm MG, 2x lchr FOG/ IR-homing ATGM, EO/FLIR sight, manpack ADAT lchr. AD net azimuth warning. CPS/ATS	See above. Tunable laser designator, range 15 km. Radar warning receiver. MMW radar.
MANPADS Vehicle	Bn/Bde, insurgents. Truck, TUV, ATV. Remote launch, EO/thermal sight. Azimuth warner. Smoke/ATS	See Air Defense
Light Strike Vehicle	4x4 rear engine, 4-person, 2 m ford. 35-mm AGL, 12.7-mm MG, and 40-mm ATGL. ATS	Light armor/mine shields. Hybrid drive. Amphib (Bladders). 30-mm gun RWS (see APC). ATGM 8 km.
Light Strike Vehicle ADAT	4x4 rear engine, 4-person, 2 m ford. 35-mm AGL, 12.7-mm MG, KE LBR Msl. FOG/IR-hom ATGM 4 km. ATS	Light armor/mine shields. Hybrid drive. Amphib (Bladders). 30-mm gun RWS (see APC). ATGM 8 km.
Tactical Motorcycle Motorcycle ADAT version	Low noise diesel engine, 35-mm AGL Swim sacks. MMW/IR camouflage and screen. ATS	Continuous rubber track. FOG/ IR-homing ATGM, imp MANPADS. Track conversion in snow/swamp.
All-Terrain Vehicle (ATV) and ATV ADAT	6x6, 4-person capacity, 3.5 mt payload. Swim. Has 12.7-mm MG, 35-mm AGL. ADAT, AT, other roles. Amphib trailer. Track conversion in snow/swamp. ATS	8x8. Mine protection. Hybrid electric/diesel drive. Snap-on cab for cold weather etc. 23-mm light chain gun on pintle mount.
RECONNAISSANCE, INTELLIGENCE, SURVEILLANCE, TARGET ACQUISITION		
Binocular Laser rangefinder and Goniometer	Handheld 20km detection, 5-7km recognition, GPS. Thermal channel (below) goniometer, computer - digital transmit	See Thermal Binoculars (below). Heads-up display links to terminal. Transmit images to net.
Helmet Cam	Soldier camera link to laptop/PDA 2 km. NVG feed. Remote mast-mount.	Improved night viewer with 3 gen II or thermal. Nigh range 2 km.
Thermal Binoculars	Uncooled 2 gen FLIR. 2x electronic zoom (EZ), image stabilization. Detect 9 km (13 EZ), recognition 3.5 km (5.5 EZ)	Add LRF, laser pointer, internal GNSS. Fused FLIR/II camera. FOs call indirect fires 10-13 km, 6+ with precision, direct fire 5.5 km+. IDs heli at 7 km w EZ, detects at 13 km

SYSTEM	NEAR-TERM OPFOR (FY 15-20)	MID-TERM OPFOR (FY 21-28)
Laser Target Designator/ Rangefinder (Manportable)	Man-portable, encoded, designate SAL-H rounds, bombs, ATGMs to 10 km. 2 gen thermal sight. Mounts on sensor robot	Tunable laser designator with encoded pulse to 15 km. Mounts on sensor robot
Observer Sensor Suite For Recon, SPF, Security, Anti-tank, Air Defense, Artillery (Dismount, ATV, Motorcycle, Vehicle)	Goniometer/laser designator base. Laptop or radio link. GPS, thermal laser range-finder binoculars, manpack radar. Aircraft azimuth warner. Net with UGS, remote camera, micro-UAVs.	Mount on Sensor Robot. Increased range, encryption, SATCOM. Fused FLIR/II night sight. Tunable encoded LTD to 15 km designates for all SAL-H munitions.
Laptop Computer for Digital Sensor Network	System accesses sensor links: video cameras tactical units, UGS monitor, maps/unit status displays, azimuth and alert nets. Digital data links, microphones for discussion, ground station terminal. Access encrypted internet links, long-range cordless and SATCOM phones. Terminal to remote-detonate mines and control minefields.	Personal data assistant for dismount use or for mounting in or linking to weapon FCS. Solar rechargeable batteries, extended range on links with retransmission UAVs. Use for hand-off control of UAVs, in-flight munition retargeting. Fuse UAV, weapons, cameras, TV recon grde image, battle management data.
Surveillance radar	Man-portable low probability of intercept GS radar to detect/classify vehicles 30km, detect personnel 18km. Netted digital/graphic display.	Remotely operated, on a mast, with man-portable day/night EO sensor suite or from concealed base.
Mortar and Grenade Recon Rounds TV/IR attack grenades: Mid-Term	82 mm mortar round with a CCD TV camera to 5,700 m, aerial NLOS zoom view to laptop for 20 sec. Rifle/hand-held/AT grenades with TV cameras send video to PDA or laptop on descent.	Mortar rds (81/120), grenades with slewable fused FLIR/II and zoom. 40mm AGL grd 2,200 m. Shotgun grds. Recon, TV/IR attack grenades (HEAT/HE) from vehicle 82-mm smoke grenade launchers to 1,000m
Unattended Ground Sensor Set	Netted, acoustic, seismic, magnetic, IR. Acoustic sensor UGS array extends 12 km, for accuracy within 3m.	Robotic sensors with sleep mode, underground concealed hide position (self-relocate, dig in). Nil visual/IR/MMW signature.
Remote Cameras and Sensors	Motorized, masted, with constant-on, command-on or acoustic/seismic wakeup. 20-30km link range. CCD measures and in-ground mount. 2 gen FLIR day/night passive scan.	Robotic sensor entrenched and concealed. On wake-up, mast rises to RISTA mode. Integrated net digital display, link to sensor robots and robotic weapons.
Smart Dust	Rocket/UAV/aircraft scattered crush sensors emit for 1/2 hour.	Scatterable, attach to metal. Acoustic/crush/seismic. Emit 1 hour.
Sensor Robot	Man-portable tracked robot w/cameras in multi-sensor pods (acoustic/EO/ seismic) w/wake-up. Transmits image to monitor. Camera range 3 km. RAM. Laser designator direct munitions 10 km	Solar charge and vehicle quick charge, longer charge capability. Camera/link range 20-30 km. Self-entrench. Composition chassis and RAM is undetectable to sensors.
Acoustic sensor vehicle	Vehicle mounts microphones or dismount array, DFs/acquires aircraft, vehicles, or artillery. Rapid queuing and netted digital display. Range 10 km, accuracy 200m. Three vehicle set can locate artillery to 30 km with 1-2% accuracy in 2-45 sec. DF/ cueing rate 30 targets/min.	Range extends to 20-30 km with 10 m accuracy. Micro-UAVs with microphones to supplement the network in difficult terrain. Track and engage multiple targets. Range and accuracy SAB. Hybrid electric/diesel drive.

SYSTEM	NEAR-TERM OPFOR (FY 15-20)	MID-TERM OPFOR (FY 21-28)
Wheeled Armored Reconnaissance Vehicle (ARV)	4x4 and 4 aux wheels, low profile. 12.7-mm AD MG. NLOS FOG ATGM 8 km Multi-sensor mast, 2nd gen FLIR. GS radar classify vehicles 30 km, detect person 18km, laser designator 15 km, UGS, laser radar, MANPADS, ATGM. CPS/ ATS. Conformal MMW-IR net, MMW/IR grds. Canister UAV 10 km.	Hybrid drive. IFF. Fused FLIR/II to 24 km. Micro-UAV range 35 km. 30 mm recoilless chain gun on RWS (see APC). SAL/LBR ATGM 8-12 km. Tunable LTD 15 km. Multi-spectral smoke launcher and recon and TV/IR attack grenades to 1,000 m. Sensor robot. CPS.
Tracked Reconnaissance Vehicle	2-man turret, 30-mm gun, 12.7-mm AD MG, MANPADS, ATGM. Masted multi-sensor suite, 2 gen FLIR, laser radar, auto-tracker, laser target designator direct arty /mortar rds/bombs, ATGMs 15 km. GPS/ inertial nav, digital data. Radar detects vehicles 30 km, personnel 18. UGS net. Canister UAV. CPS/ATS	Hybrid drive. Fused FLIR/II to 24 km. IFF, Micro-UAVs to 35 km. 45 mm CT gun. ADAT KE round 4 km. SAL/LBR ATGM 8-12 km. Multi-spectral smoke launcher and recon and TV/IR atk grenades. Tunable laser designator 15 km. Sensor robot. CPS.
Long-range sensor vehicle	Tracked vehicle with elevated sensor suite on pod. Day/night TV, MMW radar detect to 45 km vehicle, 20 km personnel. 2 gen FLIR Net to UGS, UAVs, etc. Digital links to arty, AT, AD, recon, etc. 12.7-mm AD MG. Laser target designator to 15 km. CPS/ATS.	Longer range, increased target handling/transmission capacity. Manpack AD/AT LBR missile to 8 km. Fused FLIR/II to 24 km. Tunable laser designator to 15 km. Hybrid electric/diesel drive. CPS. Recon and TV/IR atk grenades.
Ground or Vehicle Launch Mini-UAV	2-backpack system. Man-portable ground launcher, and laptop terminal. Vehicle-launch from rail or canisters. TV/FLIR. Range 35 km, 3-hr endurance.	IR auto-tracker. Laser designator. Cassette launcher for vehicles. Signal retransmission terminal. Bus dispense micro-UAVs, UGS, mines
Micro-UAV	Hand-launch 4-rotor, 4 kg, 5 km/1 hr, GPS map/view on PDA/netbook. Atk grenade	< 1 kg for dismount sqd/tm, 2 km range. Add grenade for atk UAV
Heliborne MTI Radar	Range 200 km, endurance 4 hrs.	Range 400 km. Add SAR mode.
Commercial Satellite Imagery	Resolution 5 m for IR, SAR also available. <2 days for request. Terminal on tactical utility vehicle at division. Can be netted to other tactical units.	Response time reduction (to <6 hours). 1-m resolution.
ANTI-TANK		
Manpack Air Defense and Antitank (ADAT) Kinetic-Energy Missile Launcher (also listed in Air Defense)	Co/Bn substitute for ATGMs and AD. Targets helicopters and LAVs. Shoulder launch missile with 3 KE LBR submissiles 8 km, 0 m altitude. Submissiles have 25-mm sabot/HE warhead. Nil smoke. Mount on robotic launcher (below). FLIR night sight.	Fits in 45-100mm guns. Defeats all targets up to 135 mm KE. Range 8 km, time of flight 6 sec. Fused FLIR/II sight 10 km. Launch from enclosed spaces. Can mount on robotic ADAT launcher or ADAT Robot vehicle (below).
Man-portable ATGM Launcher (Also pintel/vehicle dismount)	SACLOS guided to 3 km. Tandem warhead defeats 1,200mm. Thermal sight. Jam-proof low noise/smoke. Fire from enclosed spaces. Can mount on robotic launcher (below)/vehicles.	Twin ATGM remote ground veh/ launch station with auto-tracker. Fused FLIR/II sight 5 km. NLOS /IIR homing missile to 4 km. Can use ADAT missile. Laser dazzler
Ground Turret	Ready-made hole mount turret for hoist installation, w/12.7 mm MG, 4 km ATGM launcher, thermal night sight, and radar absorbent/IR reflective paint on cover. Invisible until activated.	Add remote/unmanned pop-up turret. FOG-M top-attack or IIR-homing attack 8 km. Tandem warhead 1,300 mm. Fused FLIR/II sight to 10 km. CPS

SYSTEM	NEAR-TERM OPFOR (FY 15-20)	MID-TERM OPFOR (FY 21-28)
Ground/ Vehicle Pintle Mount ATGM Launcher	Combat support vehicle with portable robotic twin launcher (below). FOG-M top-attack or IIR-homing direct attack 4 km. Tandem warhead defeats 1,000+ mm. Thermal sight 5 km range. Low noise/smoke, countermeasure-resistant.	Range increase to 8 km and 1300 mm penetration. Thermobaric ATGM. Fused FLIR/II sight to 10 km. Launch from enclosed spaces. Laser dazzler. ADAT robot vehicle.
Robotic ADAT Launcher ADAT Robot Vehicle	Pintle mount shoulder/ground/ATV/ vehicle launch. Robotic launcher-60 m link. Twin auto-tracker. Operator in cover/spider hole. MMW/IR absorbent screen and net for operator, launcher and surrounding spall. CPS/ATS.	Masted 4-launcher, hybrid drive to self-entrench, then move to launch point. Fused FLIR/II sight to 10 km. Remote link 10 km. Most AD and AT host vehicles have 2 control stations and 2 robots. ATGM same as above. CPS.
Towed Antitank Gun	125mm gun, larger sabot (700+mm), LBR/SAL-homing ATGM 8 km. Stabilized FCS sights, auto-tracker. Auxiliary propulsion unit. TV day sight with (32x). Combined MMW radar and 2nd gen thermal night sight (5-7 km). Add SAL-H/IR HEAT rd 5 km in 1 sec, HEAT-MP, DPICM submunition round. ATS.	Remote unmanned gun with cassette, towed, dug into position, netted into AT net. Concealed position (retractable base and IR/MMW concealed). Fused FLIR/II sight to 10 km. KE ATGM (8 km), direct link to micro-UAVs and UGVs). Laser dazzler
Heavy Recoilless Gun, 106 mm and Recoilless Gun Vehicle (RGV)	TOW or RGV on TUV. Tandem HEAT round 700+mm 3 km. SAL-H, tandem ATGM (1,000+ mm), 8 km dive attack. .50-cal spotter rifle to 2,500 m. Laser designator. Computer sight, 2gen FLIR. HE, flechette rounds. RGV CPS/ATS.	HEAT rd 900+mm. Remote weapon system mount for APC, IFV, and TUV chassis. Fused FLIR/II sight to 10 km. Nil smoke/noise. Tunable laser designator for SAL munitions 15 km. Hybrid drive for RGV.
Self-Propelled Antitank Gun	Amphibious airborne tracked, 125 mm gun, larger sabot (700+ KE), SAL ATGM to 8 km. SAL-H/IR HEAT rd 5 km in 1 sec, DPICM submunition round , focus frag HE rd. Stabilized TV day sight (32x), 2 gen FLIR 5 km, auto-tracker. Laser designator 15 km. CPS/ATS.	Hybrid drive. MMW FC radar, NLOS ATGMs (8/12 km), direct link to micro-UAVs, UGVs). Fused FLIR/II sight 10 km. Micro-UAVs recon/atk. Laser dazzler. Tunable LTD 15 km. CPS, TV/IR attack grenades
Tracked ATGM Launcher Vehicle	Box ERA 300mm. NLOS/IIR ATGM launcher on IFV. 1,300 mm dive attack, 8 km. HE Thermobaric ATGM. Low noise/ smoke signature. 12.7-mm AD MG. Laser designator to 10 km. CPS/ATS. Manport ADAT KE missile launcher.	Imp ERA (300mm KE, 600 CE). Hybrid drive. NLOS/KE ATGMs LBR/SAL defeats 1,300mm at 8/12 km. EMP option. Fused FLIR/II 13 km. 2-target auto-track. Launch on move. Laser dazzler. Micro-UAV atk/ recon. 2 robots. Atk grds.
Wheeled ATGM Vehicle	4x4 Armored TUV with same launcher system as above. CPS/ATS.	Same launcher as above. Hybrid drive. Robot vehicle.
Airborne Infantry ATGM Launcher Vehicle	Airborne/amphib tracked light armored. Same launcher as above. CPS/ATS.	Same launcher as above. Hybrid drive, ERA, atk grds. Robot veh.
Heavy ATGM launcher Vehicle	Tracked, 6 lchrs, SAL-homing ATGM 1,400mm dive attack, 10 km. Warheads HEAT, Multi-purpose (HEAT/Frag-HE). 12.7-mm MG. Jam-proof auto-tracker, Laser designator 15 km. CPS/ATS.	Hybrid drive. Add IIR homing, 12 km range, EMP, and thermobaric. Warheads. Fused FLIR/II 13 km. Laser dazzler. Designator UAV 30 km range and 3-hr loiter. Atk grds

SYSTEM	NEAR-TERM OPFOR (FY 15-20)	MID-TERM OPFOR (FY 21-28)
Heavy ATGM Launcher Vehicle (and Land Attack Cruise Missile - LACM)	Tracked vehicle with 16 x SAL-homing ATGMs, Hybrid drive. RF-guided phase, 40 km. Fused FLIR/II acq to 10 km. MMW TA radar to 40 km. Warhead: 28-kg Frag-HE=1,300 mm penetration. UAV to 40 km with LTD (15 km range). FW and boat mounts. Anti-heli radar guided or SAL-homing. Atk grds.	Hybrid drive. Guidance adds radar or IIR homing. Warheads: Multi-purpose (HEAT/ Frag-HE) defeats 1,400mm), Bus for sensor-fuzed sub munitions, EMP warhead. Laser designator UAV range 100 km, 3-hr loiter time.
Attack UAV	Hit-to-kill system. Day/night 60+ km, up to 2 hours. GNSS/inertial navigation, TV/FLIR, Frag-HE warhead. They include an anti-radiation variant.	Cargo UAV 100 km dispenses IR/ MMW/SAL DP (600mm HEAT) sub munitions, EMP munitions, SAL ATGMs – UAV LTD 30 km.
Attack UAV Launcher Vehicle	Hit-to-kill UAV launch from modular launcher, 18 UAVs. GNSS/inertial nav, to 500 km. First version anti-radiation homing. Added TV guided and multi-seeker attack (hit-to-kill) UAV. Laser designator range 15 km. CPS/ATS.	Hybrid drive. Bus reusable UCAV with 4 ATGMs to 10 km, SAL-H bombs, or bus dispensing 16 terminally-homing sub munitions (with MMW/ IR seekers, or laser-homing DP sub munitions). CPS. LTD
Micro-Attack UAV	Hand or canister -launch UAV with TV and FLIR guidance to 10 km, 100-600 m altitude, with .25-.5 kg warhead.	Cassette/smoke grenade launcher launch for tactical vehicles. Recon and attack (top-attack) UAVs.
Mini-Attack UAV	Hand or vehicle canister -launch UAV with TV and FLIR guidance to 35 km, 100-600 m altitude, 1-4 kg warhead.	Cassette launcher launch for tactical vehicles. Recon and attack (DP with tandem 600 mm top-attack).
FIRE SUPPORT		
Man-portable Mortar	Conventional munitions, 82mm FRAG-HE 6.7 km, RA 13.0 km. SAL-H 6.7 km. Day/night direct/indirect fire sight. GPS. Prox fuze. Tandem ATGM 7 km.	Increased range and accuracy. Ballistic computer sight. Fused FLIR/ II 10 km.Self-lay. Dual guided (diff GNSS course correct/SAL) 13 km
Towed Mortar Upgrade	120-mm FRAG-HE – 9 km. Prox fuze. ADHPM: SAL-H and IR-homing HEAT – 9 km, Sensor-fuzed – 7 km. Night capable direct/indirect fire sight, self-lay.	Improved range/precision. Ballistic computer sight. Fused FLIR/II 10 km. Dual guided round (differential GPS corrected, SAL) to 12 km.
Towed Combination Gun	GPS gun lay/nav system. Frag-HE range 8.1 km (and prox), RAP 12.8, HEAT 1 km, SAL-H 12.8. Mortar rds SAB.	Automated fire control, Fused II/ FLIR 13 km. Autonomous lay, diff GNSS. Auxiliary propulsion unit.
Self-Propelled Combination Gun	120-mm gun/mortar system. GPS gun lay. Cannon Frag-HE (prox fuze option) 13 km, -RAP 18, HEAT 1 km. All mortar rounds. ADHPM: Mortar SAL-H and IR-homing 9 km, Sensor-Fuzed 7 km. Cannon SAL-H rd 9 km. CPS/ATS.	IFV chassis. Hybrid drive. Laser designator 15 km, diff GPS, automated FCS, autonomous lay. Fused FLIR/II 13 km. SAL-H, GPS rounds 12 km. SAL tandem HEAT ATGM to 20 km. APS
Towed Medium Gun-Howitzer	FRAG-HE - 30 km, FRAG-HE BB - 39 km, Artillery delivered high precision munitions (ADHPM): SAL-H - 25 km, Sensor-Fuzed – 27 km. GPS 40 km	Autonomous lay/fire direction. Enhanced lethality, differential GPS corrected munitions (and sensor-fuzed) 60 km.
Self-Propelled Medium Gun-Howitzer	45-cal gun. GNSS/inertial land nav, self emplace, FC. Munitions: FRAG-HE – 30 km, FRAG-HE base bleed - 39 km. ADHPM: SAL-H - 25 km, Sensor-Fuzed – 27 km, GPS-corrected 40 km.	Automated fire control. Barrel cooling, thermal warning systems. Autonomous lay/fire direction. Differential GNSS corrected rds (and sensor-fuzed) 60 km.

SYSTEM	NEAR-TERM OPFOR (FY 15-20)	MID-TERM OPFOR (FY 21-28)
Self-Propelled Medium Gun-Howitzer Tracked	Ford depth 5.5 m. 40-cal gun. GPS/ inertial land nav, self emplace and FC. FRAG-HE 23 km, FRAG-HE rocket ast 31.5 km. SAL-H rd 25 km, Sensor-Fuzed rd 27 km, GPS corrected 40 km	Automated FC. Autonomous lay/FD. Barrel cooling, thermal warning systems. Differential GNSS course corrected rds (and sensor-fuzed) 60 km.
Self-Propelled Medium Gun	Conventional munitions, FRAG-HE-BB – 30.5 km, FRAG-HE-RA–40 km. ADHPM: SAL-H - 25 km, Sensor-Fuzed – 24 km. GPS corrected 40 km.	Automated FC, barrel cooling and thermal warning, autonomous fire direction. Diff GNSS corrected rounds (and sensor-fuzed) 60 km.
Manportable Single Round Rocket Launcher	122mm FRAG-HE – 10.8 km. SAL-H, Sensor fuzed 10.8 km. On tripod	Increased range and accuracy. Enhanced lethality.
Rocket Launcher Pod (107mm) For Use on Improvised/ Modified Launch Platforms	6-tube (2x3 rockets) pod mounts on cart, vehicle (e.g., amphibious/airborne APC), or ground stand. Remote launch fire control. Cart/vehicle 1-3 pods. GNSS. Range 8.5 km. Limited lateral launcher adjustment (move vehicle). Mines and DPICM warhead option.	Improved launcher mount with servo-motors and remote computer FCS and in-view GNSS data. Munitions include: EMP, smoke, UGS, SAL-homing HE, tandem HEAT, recon, chem. Use with laser designator. Range 10 km.
SP Medium Rocket Launcher (100mm to 220mm)	122mm 50-tubes. Self-emplace (GNSS/ inertial nav). Onboard FCS. Munitions: Frag-HE 90° precision fall 40 km, GPS course-corrected DPICM and Frag-HE 36 km, RF jammer rd 18.5, SAL-H rkt 32 km, Sensor fuzed 33 km.	Extended range. Increased accuracy and lethality. Course corrected diff GPS/ inertial) in DPICM, multi-role (HEAT, HE, incendiary). Motorized spades for quick displace.
SP Heavy Rocket Launcher (220-240 mm)	Self-locating launcher, 16 tubes. GNSS/ inertial nav. Onboard fire direction. Rockets: 220mm FRAG-HE –43 km, DPICM, Chemical. Thermobaric – 43 km ADHPM: Sensor-Fuzed – 43 km	Increased accuracy. Enhanced lethality. MRL can launch cruise missiles, UAVs. Diff GNSS Course corrected munitions (DPICM, sensor fuzed, mines) to 70 km.
SP Heavy Rocket Launcher (240-300 mm and larger)	Self-emplace 300-mm 12-tube launcher. GNSS/inertial nav, onboard FCS. Inertial course-corrected rockets 100 km: mines, DPICM, Chemical, and Thermobaric. Sensor-Fuzed 90 km, UAV rocket 90 km	Range (100+ km). Differential GPS lnchr, GNSS course-corrected rkts. Enhanced lethality. Launch cruise missiles (attack UAVs) and recon UAVs to 470 km.
Weapon Locating Radar Vehicle (Counter Mortar/ Counter-Battery Radar)	Detection range with low error rate Mortar: 30 km, Cannon artillery: 20-25km, Rocket: 40km, Tactical Missile: 55km.	Faster computer processors with digital links, differential GNSS, and decreased radial error
ENGINEER		
Improvised Explosive Device (IED)	Command (RF, wire) arm/detonate. Also sensor armed/fuzed. Large shaped charge, EFP, daisy chain arty rds, large IED, mine converted to cmd/SF. Defeat RF jammers, magnetic detectors.	Fuzes and radio links which can convert explosive devices and materials into intelligent IED fields (see intelligent minefield)
Minelayer, Towed	Lays 10 to 12 mines per min. Lines 20/40 m apart. Can also lay controllable minefields.	Advanced sensors. Target discrimination. Can lay intelligent mines.
Minelayer Vehicle	Armored chassis w/7.62mm MG, lays 1,000 m AT field with 5m between mines. Lay controllable mines. CPS/ATS	Add vehicle mount mine launchers. Also lays intelligent minefields. Hybrid electric/diesel drive.
Infantry Portable Scatterable Minelaying System	Remotely lays AT/AP mixed minefield 200-400m square from a distance up to 1090m. At platoon. 6 lb, 5 min set-up. Controllable mines.	Add intelligent mines. ATGL and AGL-delivered mines.

SYSTEM	NEAR-TERM OPFOR (FY 15-20)	MID-TERM OPFOR (FY 21-28)
Scatterable Mines	Deliver by artillery, cruise missile, UAV, rotary or fixed-wing aircraft. Non-metallic case, undetectable fill, resistant to EMP and jammers, w/self-destruct.	Advanced multi-sensor mines with wake-up and target discrimination. Prox fuze mines. Controlled minefields and intelligent mines.
Artillery Scatterable Mine Rounds and Rockets	Cannon, MRL, mortar, gun/mortar. 122-mm MRLs can fire AT and/or AP mines and covers 24-81 hectares.	Extended range. Controlled minefields (RF link)
Remote Mine Launcher Pod System (Vehicle, trailer, ground)	APC w/180 x 140-mm pods, scatters mines, UGS, jammers, CS gas, and smoke grenades, 30-60m from pod. Can lay field AT/AP 1-1.2km x 30-120m. CPS/APS	Multi-sensor mines with wake-up, target discrimination. Controlled minefields, intelligent mines. Prox fuze mines (up to 540) 2 km 10 sec
Off-Route Mines (Side-Attack and Top-Attack)	Autonomous weapons that attack vehicles from the side as the vehicles pass. 125-mm Tandem HEAT (900+ mm). Target speed 30-60 km/h, range 150m acoustic and infrared sensors.	Sensor-fuzed EFP 600mm KE top attack. Remote or sensor actuated (controller turn-on/off), 360-degree multi-sensor array. Hand/ heli/ UAV/arty/ATGL mortar emplace.
Controlled Mines and Minefield	AT/AP, machine emplaceable. Armed, disarmed, detonated by RF command. Chemical fills and non-metallic cases are undetectable. With CM and shielding, negate jammers/pre-detonating systems.	Control may be autonomous, based on sensor data and programmed in decision logic, or by operators monitoring with remote nets.
Smart Mines	Wide-area munitions (WAM) smart autonomous, GPS, seismic/acoustic sensors. AT/AV top-attack, stand-off mine. Lethal radius of 100 m, 360°. Hand-emplace	Discriminate targets. Reports data to a monitor, evaluate target paths, built-in logic. Use GPS to artillery/ heli-emplace. Non-nuclear EMP or HPW options
Unexplosive Ordnance (UXO)	Artillery cannon or rocket DPICM sub munitions in impact pattern.	Unused blue remote-launch precision munition pods may be seized and used against them.
Intelligent Minefields (including Non-nuc EMP, Jam, and HP Microwave)	Developmental programs and not proliferated	Self-healing, autonomous monitoring of obstacle integrity. Advanced sensors, target discrimination, built-in logic. Non-nuclear EMP or HPW.
Engineer Reconnaissance Vehicle	Tracked IFV chassis. Amphibious- recon equip: sonar, NODs, rangefinder, soil analyzer, gyrocompass, underwater mine detection. CPS/ATS	Hand-held and vehicle-mounted ground-penetrating radars for mine detection. Hybrid electric/diesel drive. CPS
Obstacle Clearing vehicle	Tank chassis, NBC-protected, dozer (3.8m), crane (2mt), scoop/ripper, and mine detonator. CPS/ATS	Hybrid electric/diesel drive.
Vehicle or Towed Line Charge Mineclearing System	Mounted on truck, IFV, APC, TUV or tank. Rocket launch 10 tubes HE or FAE, to 3km. Breach lanes 10x60m.	
Line-Charge Mineclearing Vehicle	Clears lane 6x9 m. 2 line charges. CPS/ATS.	Hybrid electric/diesel drive.
INFORMATION WARFARE		
Lightweight Mobile ESM/DF	0.7-40 GHz, ESM/DF	SATCOM intercept capabilities
Electronic Warfare Radio Intercept/DF /Jammer System, VHF	Intercept, DF, track & jam FH; identify 3 nets in non-orthogonal FH, simultaneous jam 3 fixed freq stations (Rotary/fixed wing/UAV capable)	Integrated intercept/DF/jam for HF/VHF/UHF

SYSTEM	NEAR-TERM OPFOR (FY 15-20)	MID-TERM OPFOR (FY 21-28)
Radio Intercept/DF HF/VHF/UHF	Intercept freq range 0.1-1000 MHz. (Rotary/fixed wing/UAV capable)	Wider Freq coverage. SATCOM intercept. Fusion/cue w/other RISTA for target location/ID
Radio HF/VHF/UHF Jammer	One of three bandwidths; 1.5-30/20-90/100-400 MHz, intercept and jam. Power is 1000W. (Rotary/fixed wing/UAV capable)	Increased capability against advanced signal modulations. UAV and mini-UAV Jammers.
Portable Radar Jammer	Power 1100-2500W. Jam airborne SLAR 40-60km, nav and terrain radars 30-50km. Helicopter, manpack.	UAV and long range fixed wing jammers.
High-Power Radar Jammer	Set of four trucks with 1250-2500 watt jammers at 8,000-10,000 MHz. Jams fire control radars at 30-150 km, and detects to 150 km.	UAV jammer and airship jammer. Hybrid electric/diesel drive.
Portable GNSS jammer	4 -25 W power, 200-km radius. Man-portable, vehicle & airborne GNSS jammers, airship-mounted jammers	Man portable, vehicle & airborne (UAV) GNSS jammers-increased range and power, and improvements in antenna design
Arty-delivered and ATGL-launch Jammer	HF/VHF (1.5-120 MHz), 700m Jamming radius, est. (1-hr duration). 300 m for ATGL-launched version	Increased capability against advanced signal modulations
Missile and UAV-delivered EMP Munition	Cruise missiles and ballistic missile unitary warhead and submunition.	Increased capability against advanced signal modulations
Artillery-delivered and Manpack EMP Munition	Cannon (152/155-mm), rocket (122/220 /300-mm), and mortar (82/120-mm).	Increased power, capability, and range.
Cruise Missile Graphite Munitions and Aircraft "Blackout Bombs"	400-500 kg cluster bombs/ warheads with graphite strands to short out transmission stations and power grids.	Rocket precision and UAV-delivered munitions.
EMP Mine	Larger EMP mine. Effective radius 350 m, irregular/ disruptive 500 m.	See intelligent minefields and smart mines
COMMAND AND CONTROL		
Radio, VHF/FM, Frequency-hopping	30-88 MHz, 100 hps, channels: 2,300, Mix of analog and digital radios, tactical cellular/digital phone, all nets digitally encrypted. Burst trans. UAV Retrans	Digital radios, tactical cellular/digital phone, and satellite phones, all nets encrypted
Radio Relay Station, VHF/UHF,	60-120/390-420 MHz, range 30-40km per hop LOS	Digital communications networks. Network management station, automated battlefield management system
Command Post Vehicle, Division (wheeled and tracked versions)	4xHF/VHF high power, 1x VHF, 75-2000km. Digital comms, graphics, voice back-up. SATCOM digitally encrypted.	Completely digital comms net thru all levels, fiber-optic cables. Networked automated, secure, and integrated battle management system
DECEPTION & COUNTERMEASURE SYSTEMS		
Armored Vehicle Decoy, Mobile	Towed trailers & decoy heater units, and flares. Used in concert with obscured target vehicle for positioning near target to divert homing munitions. Radar (and motorized) corner reflectors. Inflatables, tethered, move w/air currents.	Acoustic decoys w/seismic effects. Multi-spectral (high-fidelity) decoys powered for acoustic and IR signatures. Linked to vehicle warning systems
Armored Vehicle Decoy, Stationary	Multi-spectral (high-fidelity) erectable/ inflatable vehicle mock-ups, w/heaters & motorized radar corner reflectors	Acoustic decoys w/seismic effects. Multi-spectral decoys powered acoustic/IR signatures

SYSTEM	NEAR-TERM OPFOR (FY 15-20)	MID-TERM OPFOR (FY 21-28)
Vehicle and Weapon System Camouflage and Concealment	Tactical vehicles have MMW/IR paint and conformal nets, multi-spectral grenades, side skirts, thermal blankets, Thermal screens, laser/radar warners, acoustic engine & track noise modifiers.	Add mist thermal image concealment systems.
Camouflage and Concealment for Dismounts	Thermal screens and pop-up stands conceal from overhead, front, side visual/ thermal day/night vs MMW & IR. Face masks/ gloves. Foxhole blast devices.	Ready-made spider hole covers, invisible to visual/ MMW/ IR sensors. Remote control option
Air Defense System Decoy	Manufactured and improvised decoys used with decoy emitter. Covered by AD systems in air defense ambushes.	Multispectral simulators of varied gun and missile systems mounted on robotic chassis.
Air Defense System Decoy RF Emitter	Expendable RF remote emitters with signal to match specific nearby radars, to trigger aircraft self-protection jammers.	Mounted on robotic chassis.
Non-Lethal (or Less Lethal) Weapons	Acoustic directed energy system, sticky foam, rubber bullets, acoustic disrupters	RF crowd disruption emitter. Water cannons. Laser dazzlers
ROTARY WING AIRCRAFT		
Attack Helicopter	30-mm auto-cannon, 8 NLOS FOG/IIR-homing ATGMs, range 8 km. Two pods semi-active laser homing (SAL-H) rockets 80mm (20x 8 km) or 122mm (5x 9 km). 2x LBR KE ADAT msl (warhead w/3 KE submissiles, 8 km range). Laser designator 15 km. UAVs to 30 km. 2nd gen FLIR auto-tracker. Radar and IR warners and jammers, chaff, flares	Tandem cockpit, coax rotor, 30-mm auto-cannon. 8 x RF/SAL-H ASMs to 18 km (28+kg HE=1300+mm), 2x SAL-H rocket pods (80mm or 122mm), 2 ADAT KE msl 8 km, and 2x MANPADs. 1/3 have ASM to 100 km. Fire control with fused II/ FLIR to 30 km, and MMW radar, link to ground LTD. Radar jammer. Atk and LTD UAVs to 30 km.
Multi-role Medium Helicopter and Gunship	24 troops or 5000kg internal. Medium transport helicopter. Range 460km. 30-mm auto cannon, 8 FOG-M/IIR ATGMs to 8 km, 40 x 80 mm laser-homing rockets, 4 AAMs. ATGM launchers can launch mini-UAVs and more AAMs. Mine pod option. Day/night FLIR FCS.	Fused FLIR/II to 15 km. 6x SAL-H ATGMs 18 km, 2 AAMs, 2 x 80/ 122-mm SAL-H rocket pods (20 or 5 ea). Laser designator to 15 km, and links to ground LTD. Aircraft survivability equipment (radar jammers and IR countermeasures).
Multi-role Helicopter and Gunship	12 troops (Load 400 kg internal, 1,600 external. Range 860 km. 23 mm cannon, 2 AAM, 4 SACLOS ATGMs to 13 km, TV/FLIR, day/night. Mine delivery pods	Launch 6x SAL-H ATGM to 18 km, 28+kg HE warhead. 2 x AAM Air-to-surface missile to 100 km. Pod w/7x SAL-H 90-mm rockets. Fused FLIR/II to 15 km. ASE
Light Helicopter and Gunship	3 troops (Load 750 kg internal, 700 external). Range 735 km. 20 mm cannon, 1 x 7.62mm MG, 6 SAL-H ATGMs to 13 km, 2 AAMs. FLIR night sight. Laser target designator. Mine pods	Launches 4x SAL-H ATGMs, to 18 km range. Fused FLIR/II to 15 km.
Helicopter and Fixed-Wing Aircraft Mine Delivery System	Light helicopter pod scatters 60-80 AT mines or 100-120 AP mines per sortie. Medium helicopter or FW aircraft scatters 100-140 AT mines or 200-220 AP mines per sortie.	Controllable and intelligent mines for aircraft delivery. Larger aircraft can hold multiple pods.
FIXED WING AIRCRAFT		
Intercept FW Aircraft	30-mm auto-gun, AAM, ASM, ARMs TV/laser guided bomb. 8 pylons Range 3,300 km. Max attack speed: Mach 4.	Stealth composite. ASE. Max G12+ All weather day/night. Unmanned option

SYSTEM	NEAR-TERM OPFOR (FY 15-20)	MID-TERM OPFOR (FY 21-28)
Multi-Role Aircraft	30-mm gun, AAM, ASM, ARM pods, guided, GPS, sensor fuzed bombs, 14 hard points. Thrust vectoring. FLIR	Improved weapons, munitions. Unmanned option. ASE all radars. Max G12+ All weather day/night
Ground-Attack Aircraft	Twin 30-mm gun, 8 x laser ATGMs 16 km 32 kg HE, 40 SAL-H 80mm rockets, ASMs, SAL-H and GPS sensor fuzed bombs, AA-10 and KE HVM AAM. 10 hard points. Range 500+km. FLIR	Stealth composite design. ASE. Unmanned option. Max G12+ 80-mm/122-mm rockets SAL-H, SAL-H ASM (28+kg HE=1300+ mm), to 40 km, 2 gen FLIR, radar jammer, day/night
OTHER MANNED AERIAL SYSTEMS		
High-altitude Precision Para-chute and Ram-air Parachutes	High-altitude used with oxygen tanks. Ram-air parachute includes powered parachute with prop engine.	Increased range and portability. Reduced signature. Increased payload.
Ultra-light Aircraft.	Two-seat craft with 7.62-mm MG, and radio. Folds for carry, 2 per trailer.	Rotary-winged, two-seat, MG, 1/ trailer. Auto-gyro, more payload.
UNMANNED AERIAL VEHICLES		
UAV (Brigade) It may also be employed in other units (e.g., artillery, AT missile, and naval)	Rotary wing, TV/FLIR/auto-tracker, with LRF and LTD designates targets to 15 km. Flies 180 km/6 hours, 220 km/hr, 2- 5,500 m alt, 100 kg payload. Can carry 2 AD/anti-armor missiles+MG for atk	Range extends to 250 km. Increased payload. Attack version can carry 2 SAL-H ATGMs (12 km range) or 1+ 4 70-mm SAL-H rockets (7 km, defeats 200 mm).
UAV (Divisional)	Day/night recon to 250 km. GNSS/inertial nav, digital links, retrans. SLAR, SAR, IR scanner, TV, ELINT, ECM suite, jammer/ mine dispensers. Laser designator 15 km.	Increased range, endurance. Diff GNSS. Composite materials, low signature engine. SATCOM Retrans relay links. Attack sub munitions.
UAV (Operational)	Day/night recon to 400+km. GNSS/ inertial nav with digital links. SLAR, SAR, TV, IR scanner, ELINT, ECM suite. Jammer option. Mine dispense. Laser target designator 15 km. Retrans/relay	Increased ranges, endurance. Diff GNSS. High altitude ceiling (35 km) option. Retrans/ relay/SATCOM links. UAV attack sub munitions. Laser target designators.
Unmanned Combat Aerial Vehicle (on Operational UAV platform)	Medium UAV with 4 ATGMs (fly out 10 km), laser guided bombs. Laser designator 15 km. Mine dispensers. GPS jammer, EW jammers. Range 400+ km.	Stealth composite design. ASE. Twin dispensers (pylons) with 16 terminally-homing sub munitions, MMW/IR seekers. Range 500+ km
THEATER MISSILES		
Short-Range Ballistic Missile Transporter-Erector Launcher (TEL) and Cruise Missile (CM) Launcher	Twin launch autonomous vehicle (GPS/ inertial nav, self-emplace and launch). Range 450 km. Non-ballistic launch, separating GPS corrected reentry vehicle (RV) with decoys, CCD, 10-m accuracy. ICM, cluster, nucs. EMP warhead. CM option. TEL may convert to 6 x CM TEL (500 km, 3-m accuracy, below radar). Vehicle decoys. Vehicle has visual/MMW/ IR signature of a truck.	Missile improve range (TBM 800 km, cruise 1,000), with 1-m accuracy. TBM has GNSS-corrected maneuvering RV. Warheads for both include terminal-homing sub munitions, precision cluster munitions, EMP. Cruise missiles pre-program or enroute waypoint changes. Countermeasures include penetration aid jammers.
Medium-Range Ballistic Missile	Autonomous vehicle. Separating maneuvering warhead to 1300 km. GNSS,10-m CEP. Warheads include ICM, cluster, EMP, nucs. Penaids include decoys, jammers. Visual/MMW/IR signature of a truck.	Range 2,300 km, 1-m CEP. Differential GNSS, terminal homing, separating warhead. Warheads include EMP, terminal-homing cluster munitions. Non-ballistic launch and trajectory
Land-attack SAM system (secondary role for system)	The SAM system uses its EO sight and LRF (short/med range, strat “hittiles”)	Range extends with SAM ranges. Passive operation with TV/FLIR.

SYSTEM	NEAR-TERM OPFOR (FY 15-20)	MID-TERM OPFOR (FY 21-28)
Cruise Missile Launcher Vehicle (Multi-role) Category includes specialized cruise missiles, long-range ATGMs, and SAM systems to engage targets at 12+ km.	Includes truck with 24 missile launchers. Range is 40 km. 28-kg Frag-HE warhead =1,300 mm penetration. Pre-program phase GNSS/inertial nav is used. LTD to 25 km range. Thermal night camera to 10 km. Support UAV with LTD is used. FW, RW, and sea-launch options.	Range 100 km. Penetration aids (countermeasures). IR Terminal-homing warhead or IR-homing submunitions can be used. Armored/ tracked launcher will mount 16 x 40 km missile launchers.
Cruise Missile Cassette launcher Vehicle	Off-road truck, GPS nav for autonomous ops. 16/lchr. Range 470 km; preprogram GNSS inertial guidance, with in-course correction, 10 CEP. Munitions include cluster munitions, thermobaric, chemical, DPICM/mine submunition scatter.	Launcher fire direction. Supersonic missile Diff GNSS/ inertial nav, 1-m CEP. Range 900 km. EMP warhead option. Warheads include homing cluster munitions. Penetration aids-countermeasures.
AIR DEFENSE		
General Purpose and Air Defense Machinegun	12.7mm low recoil for ground tripod. Chain gun light strike vehicle, ATV, motorcycle, etc, on pintle. TUV/LAV use RWS. Remote operated ground or robot option. Frangible rd 2 km, sabot 2.5 km. RAM/RAP/IR camouflage/ screens. TV/FLIR fire control. Lightweight MMW radar 5 km. Display link to AD azimuth warning net. Emplace 10 sec. RF/radar DF set. ATS control option.	Stabilized gun and sights. Remote-operated computer FCS with PDA/ laptop. Fused II/ FLIR 5 km. Frangible, sabot rds to 3 km. Laser dazzler blinds sights. Micro-recon/ heli atk UAVs. Robot mounts MG. Some light and AD vehicles replace gun with 30-mm recoilless chain gun on RWS, fires AHEAD round 4 km, plus Add-on ADAT missiles.
Improvised Multi-role Man-portable Rocket Launcher (AD/Anti-armor)	4-tube 57-mm launcher with high-velocity dual-purpose rockets. EO day/ night sight. Blast shield. Range 1,000 m. Penetration 300 mm, 10 m radius.	Prox fuze, 1,500 m range. Penetration 400 mm, 20 m radius.
Man-portable SAM launcher	6 km day/night range/ 0-3.5 km altitude all aircraft, velocity mach 2.6. Thermal night sight. Proximity fuze, frangible rod warhead (for 90% prob hit and kill). Approach/ azimuth link to AD warning net. Twin launcher vehicle quick mount. Nil smoke. Mount on robotic AD/AT launcher. RF/radar DF set on helmet.	Warhead/lethal radius increased air/ground targets. Improved seekers - not be decoyed by IR decoys/jammers. Fused II/ FLIR 10 km. Launch from enclosed spaces. Laser dazzler. Optional AD/AT LBR KE warhead missile – 8 km. Mount on AD/AT robot vehicle
MANPADS Vehicle Conversion Kit (Lt Stk Veh, Van, recon TUV, truck, etc)	Twin launcher and ADMG on improvised IR SAM vehicle. Day/night IR auto track FCS, MMW radar. Display link AD net. RF/radar DF set to 25 km. Camouflage	Replace launcher with 3-missile launcher: 2x ADAT KE SAMs, 1x IR SAMs. Total 6 missiles, (3+3)
Manpack Air Defense and Antitank (ADAT) Kinetic-Energy Missile Launcher (also listed in Anti-tank)	At company/Bn, can replace ATGMs and SAMs. Targets heli and LAVs. Missile has 3 KE LBR darts (submissiles) 8 km, 0 m altitude. Camo screen. Dart is 25-mm sabot with HE sleeve. Nil smoke. Fits on robotic ADAT launcher. Helmet RF/radar DF.	Larger sabot kills all targets up to 200 mm (KE) armor. Range 8 km, time of flight 5 sec. Fused II/ FLIR 10 km. Launch from enclosed spaces. Can mount on 3x remote launcher w/ IR auto-tracker, which. fits on AD/AT robot vehicle

SYSTEM	NEAR-TERM OPFOR (FY 15-20)	MID-TERM OPFOR (FY 21-28)
Towed/Portee/Vehicle Mount AA Short Range gun/missile system	2x23mm gun. MMW/IR Camou/screen. Frangible rd to 3,000 m (17mm pen). Onboard radar/TV fire control, ballistic computer, 5 km MMW radar, thermal night sight, auto-tracker, net azimuth warner. Add twin MANPADS. RF/radar DF set, 25 km. RWS on veh hull/turret. CPS/ATS.	Replace with twin 30-mm recoilless chain gun, range. Frangible, sabot, AHEAD rds to 4 km. TV/fused II/FLIR auto-tracker 10 km. MMW radar, Twin MANPADS/ADAT KE missile 8 km) lchr. APU to 15-kph self relocation. Robotic option. Laser dazzler.
Air Defense System Decoys (visual decoy, decoy emitter)	See DECEPTION & COUNTERMEASURE SYSTEMS	
Brigade gun/missile turret for mount on tracked mech IFV, wheeled mech APC, truck (motorized) chassis	Twin 30-mm gun, APFSDS/frangible rds 4 km. 30-mm buckshot rd for UAVs. Mounts 4x hyper-velocity LBR-guided SAMs to 8 km, 0 m min altitude. Passive IR auto-tracker, FLIR, MMW RADAR. 2/battalion. Track/launch on move. Targets: air, LAVs, other ground targets. RF/radar DF set with 25 km range. CPS/ATS.	Dual mode (LBR/radar guided) high velocity missile, 12 km, 0 m min altitude. Auto-tracker, to launch and fire on move. Phased array radars. Fused II/FLIR to 19 km. Twin 30-mm recoilless chain gun with AHEAD-type rds to 4 km. Micro recon/heli atk UAVs. TV/IR attack grenades.
Divisional gun/missile system on tracked mech IFV, wheeled mech APC, truck (motorized) chassis	Target tracking radar 24km. TV/FLIR. 8 x radar/EO FCS high velocity missiles to 18 km/12 at 0 m min altitude. Auto-track and IR or RF guided. 2 twin 30mm guns to 4 km. 30-mm buckshot rd for UAVs. RF/radar DF. CPS/ATS	Hybrid drive. Missile 18 km at 0 m, can kill LAVs. Fused II/FLIR auto-tracker 19 km, launch on move. Radar 80 km. Home on jam. Twin 30-mm recoilless chain gun with electronically fuzed air-burst rds to 4 km. Micro-recon/heli-atk UAVs. TV/IR attack grenades.
APC Air defense/AT Vehicle in APC Bn (Company Command Vehicle, MANPADS Vehicle in Bn/Bde)	1-man turret on 8x8 chassis. 30mm gun, 30-mm buckshot rd for UAVs. 100-X TV, 2 gen FLIR. 2x LBR ATGM lchrs 6 km, 2x veh MANPADS lchrs. Two dismount teams. 1x MANPADS lchr, 1x ADAT KE lchr. Total 18 msls. 12.7-mm MG. RF/radar DF to 25 km. CPS/ATS.	10x10 chassis, hybrid drive, box armor. Gun 30-mm recoilless gun on RWS. Ammo includes AHEAD-type to 4 km. Add 2 veh launchers for 5 HVM AD/AT (KE LBR) missiles, 8 km. Anti-helicopter surveillance/attack micro-UAVs. Fused II/FLIR 10 km. MMW radar. TV/IR attack grenades.
IFV ADAT Vehicle IFV Bn/Bde MANPADS	IFV chassis with features noted above. APC ADAT weapons and upgrades	See AIR DEFENSE, APC ADAT for weapons and upgrades
HIFV ADAT Vehicle HIFV Bn/Bde MANPADS	HIFV chassis with features noted above. APC ADAT weapons and upgrades	See AIR DEFENSE, APC ADAT for weapons and upgrades
Tank ADAT Vehicle Tank Bn/Bde MANPADS	Tank chassis with features noted above. APC ADAT weapons and upgrades	See AIR DEFENSE, APC ADAT for weapons and upgrades
Towed Medium Range AA gun/missile system	35mm revolver gun 1,000 rd/min. Gun rds: frangible, HE prox, electronic-fuzed. 4 SAMs/lchr, 45 km, 0 min altitude. Radar 45 km for 4 tgts. Resists all ECM. 2 gen FLIR auto-tracker to 20 km. RF/radar DF 25 km. SAM modes include active homing, home-on-jam. RAP/RAM/IR camo. CPS/ATS	Hybrid-drive auxiliary power units for local moves. Improved FCS, phased array radar, low probability of intercept, and acq to 80 km. Fused II/3rd gen FLIR auto-tracker to 35 km in day/night all-weather system. Ability to track and engage 8 targets per radar.
Medium-range ground SAM system	Tracked lchr. Radar to 150 km. 4 x radar-homing SAMs to 45km, 0 m min altitude (4 targets at a time). Home on jam. Use as cruise missile - priority ground tgts to 15 km, water 25 km. Fused 3rd gen FLIR auto-tracker. RF/radar DF. CPS/ATS	Hybrid drive. Improved FCS with radars and EO fused II/3rd gen FLIR day/night all-weather system to range 50 km. Radar range 200 km.

SYSTEM	NEAR-TERM OPFOR (FY 15-20)	MID-TERM OPFOR (FY 21-28)
Strategic SAM System	Cross-country truck launchers, 1 x track-via- missile SAMs 400 km, at Mach 7. 1x ATBM/high maneuver missile to 200 km. Also 8 x "hittile" SAMs to 120 km. Modes are track-via-missile and ARM (home-on-jam). All missiles 0 m to 50 km altitude vs stealth aircraft/UAVs/ ASMs. All strat/op missiles in IADS. Local IADS all AD. Battery autonomous option. Over-the-horizon TA radar veh to 400 km. Mobile radar to 350 km. Site CM, decoys.	Off-road trucks and tracked with hybrid drive. All missiles Mach 7. 1 x "big missile to 500 km. OTH radar to 600 km range with 5-min emplace-displace. Targets include all IRBMs. Increased target handling capacity (100/ battery in autonomous operations).
Operational-Strategic SAM System	Same as above on tracked chassis. Mobile FOs all batteries. AD radars on airships.	Same as above on tracked chassis.
Anti-helicopter Mines (Remote and Precision Launch)	In blind zones force helos upward or deny helo hides and landing zones. Range 150m. Acoustic and IR fuse, acoustic wake-up, or cmd detonation. Directed fragmentation. Precision-launch mines use operator remote launch, proximity fuze for detonation. RF/radar DF.	Stand-alone multi-fuse systems. Remote actuated hand-emplaced mines with 360-degree multi-sensor array, pivoting/orienting launcher, 4-km IR-homing missile. Operator monitors targets and controls (turns on or off) sections, mines or net.
Helicopter Acoustic Detection System	Early warning of helicopters. Acoustic sensors to 10km, 200m CEP. IR sensors can also be linked to air defense net.	Range 20 km, 50 m CEP. Track and engage multiple targets. Digital link to AD net, AD unit, IADS.

Military Technology Trends 2028

Year 2028 is a demarcation line for focusing on future military technologies. Even with the "Revolution in Military Affairs", most major technology developments are evolutionary, requiring one or more decades for full development. Subsystem upgrades can be added in less time. Most of the technologies noted below are in conceptual or early developmental stage or fielded at this time. Many exist in limited military or commercial applications, and can be easily extrapolated to 2028 and the near future time frame. Over this period and beyond, military forces will see some legacy systems fade to obsolescence and be replaced, or be relegated to lesser roles or lower priority units. Most will be retained and updated several times. New systems and technologies will emerge, be developed, become widely implemented, mature, and reach evanescence, requiring updates.

Infantry
• Infantry with improved weapons/sensors as primary lethal agent for combined arms • Weapon-delivered remotely-guided sub munitions and sensors for infantry weapons • Day/night sensors integrated, netted, with UAVs, robotics, and direct links to fire support • Visual/IR/MMW materials with signature management to avoid detection • Increased lethality weapons and precision for man-portable and vehicle weapons, robotic weapons • Increased range and effectiveness for use in Beyond Line-Of-Sight (BLOS) and MOUT operations • Tube launch UAVs, UCAVs, and remote overhead camera munitions for vehicles and dismounts limit collateral damage
Armor



• Tank crew in hull, with insensitive ammunition, electromagnetic armor, and active protection systems • Hybrid (diesel/electric) drive, and MMW/IR signature management • Overhead guns and missiles, electro-thermal chemical gun, and cased telescoped rounds • BLOS precision 12+km, 1,500+ mm lethality, KE missiles, and sensor/attack UAVs and robots • Infantry carrier remote weapons manned by passengers for 360° all-aspect protection • Heavy combat support vehicles/Heavy IFVs option to accompany tanks/IFVs • Micro-UAVs, attack UAVs, and UCAVs for vehicle launch
Anti-Armor
• Increased penetration (1,500+ HEAT/1,000+ KE), including lightweight capability for infantry • Infantry homing grenades with top-attack EFP or tandem • KE hypervelocity missiles/missile rounds 10+ km vehicles. KE ATGMs for infantry • Laser designators on AT grenade launchers, also used for precision artillery/air/naval rounds/ATGMs • Attack UAVs and laser target designator UAVs for precision strikes throughout the battle zone
Artillery
• Autonomous operation/rapid self-emplace/displace with integrated netted FCS • Precision munitions: laser/IR/MMW homing, EFP multi-sensor fuzed • Inertial/GPS/muzzle-velocity radar course-correction on conventional rounds/rockets • Combination guns integrate tactical unit BLOS fires and strikes
Sensors
• Multi-spectral immediate all-weather sensor transmission with real-time display • Remote unmanned sensors, weapon-launch and robotic sensors and manned sensors • Sensor nets integrated and netted from team to strategic and across functional areas • Micro-UAVs and remote overhead camera munitions for vehicles and dismount teams
Aircraft
• Continued but selective use of FW and rotary wing for stand-off weapons, sensors • Aircraft critical for transport, minelaying, jamming, other support missions • Laser designators on AT grenade launchers, also used for precision artillery/air/naval rounds/ATGMs
Other Aerial Systems
• High-altitude UAVs, long-endurance UAVs, and UCAVs seamlessly integrated with other intelligence and support systems • Recon/attack low-signature UAVs and UCAVs and stand-off munitions at all levels down to squads • Ballistic missiles with non-ballistic trajectories, improved GNSS/homing re-entry vehicles, precision sub munitions, EMP • Shift to canister launchers of tactical cruise missiles with precision homing and piloted option, cluster warheads, EMP • Laser designators on AT grenade launchers, also used for precision artillery/air/naval rounds/ATGMs • Airships and powered airships for long-duration and long-range reconnaissance, and variety of other roles • Increased use of ultra-lights and powered parachutes
Air Defense
• Integrated Air Defense System with day/night all-weather RISTA access for all AD units • Improved gun rounds (AHEAD/guided sabot) and missiles (anti-radiation homing, jam-resistant) • Autonomous operation with signature suppression, counter-SEAD radars and comms • Shoulder-launch multi-role (ADAT) hypervelocity missiles/weapons immune to helicopter decoys and jammers, • Micro-UAVs and airships for multi-role use includes air defense recon and helicopter attack • Acquisition/destruction of stealth systems and aerial munitions and ground rockets to 500+ km
Information Warfare
• Jammer rounds most weapons, electro-magnetic pulse rounds, weapons of mass effects • UAVs, missiles and robots carry or deliver jammers/EMP/against point targets and for mass effects • Multi-spectral decoys for most warfighting functions • Computer network attack and data manipulation

Access Denial
• Use of nuclear/bacteriological/chemical weapons to deny entry, access to areas or resources • Use of media and public opinion for access denial • Remotely delivered RF-controlled, smart and wide-area remote delivered sensor-fuzed and mines and IEDs defeat jamming
Non-lethal Weapons
• EMP/graphite/directed energy weapons to degrade power grid, information networks, and military systems • Space-based data manipulation to deny adversary use of satellite systems • Population control effects (acoustic devices, bio-chemical and genetic weapons, resources attack, dirty bomb) • Anti-materiel agents and organisms (microbes, chemicals, dust, and nanotech) • Countermeasures, tactical and technical, in all units to degrade enemy sensor and weapon effectiveness.

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Worldwide Equipment Guide

Chapter 11: Irregular Forces



TRADOC G-2 ACE–Threats Integration
Ft. Leavenworth, KS

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Chapter 11: Irregular Forces

The conflict spectrum in the Complex Operational Environment includes not only modernized systems in upper tier forces but also older systems in less developed forces. Forces all across the capability spectrum use older, cheaper or improvised weapons because that is what they are able to procure, afford or require to blend in with their environment. Generally, Irregular forces are lightly armed attack troops and their equipment is not based on what they want or in some cases need but what is available. The equipment of an Irregular threat actor tends to improve over time as they increase their lines of supply, which complements their usual strategy of lassitude.

Irregular forces are armed individuals or groups who are not members of the regular armed forces, police, or other internal security forces (JP 3-24). Irregular forces can be insurgent, guerrilla, or criminal organizations or any combination thereof. Any of those forces can be affiliated with mercenaries, corrupt governing authority officials, compromised commercial and public entities, active or covert supporters, and willing or coerced members of a populace.

Arms Procurement. To maintain a force that is prepared to deal with its security challenges requires an equipment program of acquisition and procurement. Irregular forces do not usually have the luxury of the acquisition methods available to states such as internal manufacture or purchase through international defense agreements. There are laws and regulations that govern the control of military equipment such as the Arms Export Control Act and International Traffic in Arms Regulations (ITAR) specifically to stop Irregular forces and large criminal organizations from obtaining military grade equipment. Despite all the obstacles Irregular forces can acquire weapons from regional military sources, through purchase on the black market or fabricate them internally.

Regional Procurement. An Irregular force has a number of ways in which it can procure weapons and explosives regionally. The most dangerous Irregular forces are those that are supplied directly from an external country. Hezbollah are a recipient of support from Iran and Syria, and what began with caution and relatively small amounts of weapons in the 1980's has become a strategic alliance that supplies short-range precision guided munitions such as the Fateh-100 or the M-600.

Areas of instability, corruption, state weakness and long running conflict can be awash with uncontrolled weapons that are easy to procure. In 2003, Iraqi forces abandoned their positions as the coalition forces advanced on Baghdad, they left military bases and storage depots unguarded. Millions of tons of weapons and explosives were left for the taking by anybody. These weapons fueled the insurgency that followed.

Weapons and explosives can be taken using force or guile from legitimate government sources in the Irregular actors AO. Much of Boko Haram's (BH) military hardware is stolen from the Nigerian Army. BH fighters have conducted raids against remote military outposts and looted ammunition bunkers. In addition BH sympathizers in the Army have been accused of leaving armory doors unlocked which has left the militants well-armed.

Illicit Arms Trade. Insurgents, Guerrillas, armed gangs, and terrorists can all multiply their force through the use of illegally acquired firepower but an alternative to seizing weapons by force is to purchase them unlawfully through the Black Market. It is important not to underestimate the magnitude of the Black Market as



it is possible to purchase top of the line tanks and radar systems with the latest technology. The illicit circulation of small arms, light weapons and their associated ammunition alone values around $1bn a year.

The arms market is a good example, for all the wrong reasons of increasing globalization. The illicit arms trade takes maximum advantage of all the open trade developments including minimized custom regulations and relaxed border controls which leads to easier movement. The faking of shipping manifests or end-use certificates, bribing officials and concealing arms as humanitarian aids are common practice. The structure of the small arms black market is complex and stretches across the globe and the activities of the black market arms dealer's stretch to other trans-national criminal organizations, like drug and human traffickers.

Sources of small arms supplies to the black market are varied but most weapons start off the legal side and then get diverted to the illegal sphere. Small arms can enter illegal circulation through theft, leakage and divergence. The management of government's stockpiles is an acute problem and a prominent source of the illegal weapons in circulation. Stockpiles consist of obsolete and surplus weapons that are often collected as part of a disarmament program and not destroyed. Much of the international focus and funding is on the destruction or containment of chemical weapons stockpiles and the destruction of post conflict and legacy mines and thus small arms stockpiles remain comparatively under the radar and uncontrolled.

Improvised Weapons. Improvised weapons can be everyday objects made from non-military materials utilized without alteration, such as machetes, pocket knives or baseball bats. These weapons are characterized as primitive but continue to be effective. Systems encountered in Vietnam such as punji stakes, Malayan Gates and blowguns are an example of using natural materiel in an innovative way for the accomplishment of a military task such as an obstacle to movement.

Some seemingly ubiquitous military systems can be missing from an Irregular threat actor's arsenal because they are not suited to the fight. In Iraq heavy mortars were absent because coalition counter battery fire could quickly and accurately destroy the large caliber hard-to move equipment. Instead the Insurgents chose to repeatedly fire Type 63 107mm rockets at coalition bases. The Type 63 was self-stabilizing and could be fired from a simple ramp, it was easy to conceal and could be set on a timer thus reducing the danger to the shooter.

Improvised weapons include also include flame and incendiary devices to ignite fuels and ammunition supplies. Fuel-air-explosive IEDs or "Molotov cocktails" have been employed in almost all conflicts, and an air droppable version of incendiary devices known as "barrel bombs" have been seen in a recent conflict. These improvised bombs include large containers filled with flammable and shrapnel producing material and are pushed from a helicopter over a variety of military and civilian targets.

Improvised weapons are most associated with less robust forces, but they can also be the most effective method of accomplishing the mission. Military or non-military materials could be used to trigger major disasters such as forest or urban fires, breached dams or levees to initiate floods. The list of improvised weapons available and there methods of employment are limited only by human imagination.

The most populous class of improvised weapons is the improvised explosive device (IED). Any explosive devices can be used to make a type of IED, they can be of various design with differing amounts of explosive fill and different detonation mechanisms. Historically, the most numerous IEDs encountered on the battlefield use hand grenades, these can be rigged by wedging them into objects to act as camouflage or by tying them to trip wires. Often grenades are hidden on bodies, weapons, or objects to be picked up by soldiers. Artillery rounds are also favored for IED construction for their larger size, they can be placed in vehicles and delivered to target with

devastating accuracy, examples of Vehicle Bourne IED's range in size from a bicycle to a dump truck. Mines have long had capability for sophisticated fuzing and remote control units seen in some IEDs. Both mines and IEDs can be converted for command-arming and detonation, and for precision sensor fuzing.

Many IEDs are not made from military munitions. Bulk explosives (such as Dynamite, TNT, C-4, etc.) are used in IEDs. Terrorists such as the shoe bomber and anti-Israeli groups used Triacetone Triperoxide (TATP), precisely because it is highly sensitive. The most common explosive in the US is ammonium-nitrate fuel oil (ANFO, an insensitive slurry mixed onsite with the bulk of the mix as common fuel oil) for mining and road construction. The slurry can then be poured or pumped deep into spaces where other explosives cannot fit. Explosives can be improvised from common materials. In 1995 domestic terrorist Timothy McVeigh created a home-made variant of ANFO in a VBIED (vehicle-borne IED, with "volumetric explosive" effects) to blow up the Murrah Building in Oklahoma City. Questions and comments on data listed in this chapter should be addressed to:

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Belgian Fabrique Nationale 7.62x51mm NATO Main Battle Rifle, FAL



SYSTEM	SPECIFICATIONS	AMMUNITION	VARIANTS
Alternative Designation: None. Date of Introduction: 1954 Proliferation: Widespread; like the Hk G3, it has been used by 70+ nations, worldwide, at some time or another, and is still found in many Third World militaries/security services.	Weight: FAL 50.00: 4.3 kg (9.48 lb) FAL 50.61: 3.90 kg (8.6 lb) FAL 50.63: 3.79 kg (8.4 lb) FAL 50.41: 5.95 kg (13.1 lb) Length: FAL 50.00 (fixed stock): 1,090 mm (43 in) FAL 50.61 (stock extended): 1,095 mm (43.1 in) FAL 50.63 (stock extended): 998 mm (39.3 in) FAL 50.41 (fixed stock): 1,125 mm (44.3 in) Barrel length: FAL 50.00: 533 mm (21.0 in) FAL 50.61: 533 mm (21.0 in) FAL 50.63: 436 mm (17.2 in) FAL 50.41: 533 mm (21.0 in) Action: Gas-operated, tilting breechblock Rate of fire: 650–700 rds/min Muzzle velocity: FAL 50.00: 840 m/s (2,756 ft/s) FAL 50.61: 840 m/s (2,755.9 ft/s) FAL 50.63: 810 m/s (2,657.5 ft/s) FAL 50.41: 840 m/s (2,755.9 ft/s) Effective firing range: 400–600 m sight adjustments Feed system: 20 or 30 round detachable & 50-round drum magazines. Sights : Aperture rear sight, post front sight; Sight radius: FAL 50.00, FAL 50.41: 553 mm (21.8 in) FAL 50.61, FAL 50.63: 549 mm (21.6 in) Various telescopic and night visions sights are available	7.62x51mm NATO; ball, tracer, armor piercing. All known variants.	Numerous, particularly among those manufactured under license from FN in other nations. Most common variants are the standard FN infantry weapon with a fixed stock. Also the para models with a 17.2 inch barrel and folding stocks.

NOTES

LIKE THE HK G3, ONE OF THE MOST PROLIFIC MAIN BATTLE RIFLES EVER PRODUCED; CAN BE FOUND VIRTUALLY AROUND THE WORLD, STILL IN SERVICE WITH SOME THIRD WORLD MILITARIES AND SECURITY ORGANIZATIONS.

Russian 7.62-mm Assault Rifle AK-47/AKM



SYSTEM	SPECIFICATIONS	AMMUNITION	VARIANTS
Alternative Designations: AK, Kalashnikov Date of Introduction: 1949 (AK) 1961(AKM) Proliferation: Widespread (over 50 million) Feed: 30-round curved box magazine Fire Mode: Selective, automatic or semi-automatic Operation: Gas SIGHTS: Type: Fore, pillar; Rear, U-notch Magnification: None Night Sights Available: Yes	Description: Weight (kg): Loaded (with magazine): 3.8 Empty (w/o magazine): 4.3/3.14 Length (mm): 870/880 Rate of Fire (rd/min): Cyclic: 600 Practical: Automatic: 100 Semiautomatic: 40	M1943 (57N231S) Caliber/length: 7.62x39-mm Type: Ball, steel core Range (m): Effective: 300 Maximum: 800 Armor Penetration: 6 mm mild steel plate at 300 Steel helmet at 1,000 m Flak vest at 60 m Muzzle Velocity (m/s): 718 M1943 (T-45 or 57N231P) Caliber/length: 7.62x39-mm Type: Ball-Tracer Range Effective: 300 Maximum: 800 Trace (m): 800 Muzzle Velocity (m/s): 718	Numerous. Many countries manufacture clones of the AK-47 or weapons using the basic AK action. Some of these are made in different calibers. AKS: Folding stock AK-47. AKM: Improved AK-47, sights, magazine, and stock. AKMS: Folding stock variant of AKM.

NOTES

PHOTO IS OF AN AKM. ALL 7.62X39 MM KALASHNIKOV ASSAULT RIFLES ARE VERY DEPENDABLE WEAPONS. THEY PRODUCE A HIGH VOLUME OF FIRE AND ARE SIMPLE TO MAINTAIN AND PRODUCE. THE PRIMARY DIFFERENCE BETWEEN THE AK-47 AND THE IMPROVED AKM IS THE RECEIVER. THE RECEIVER OF THE AK-47 IS FORGED AND MACHINED WHILE THE RECEIVER OF THE AKM IS STAMPED METAL FACILITATING EASIER AND LESS COSTLY MANUFACTURING. BOTH THE AK-47 AND THE AKM CAN MOUNT A 40-MM UNDER-BARREL GRENADE LAUNCHER. THE AK-47 AND AKM HAVE BEEN REPLACED IN MANY ARMIES BY THE NEWER AK-74. THE AK-74 IS BASICALLY AN AKM RE-CHAMBERED TO FIRE A 5.45X39 MM CARTRIDGE. THE 7.62X39 MM RPK LIGHT MACHINEGUN IS BASED ON THE AK/AKM DESIGN WHILE THE RPK-74 IS A LIGHT MACHINEGUN VERSION OF THE AK-74. BOTH ARE INFANTRY SQUAD LEVEL SUPPORT WEAPONS.

Handheld Shaped Charge Grenade RKG-3 / RGK-3M





SYSTEM	SPECIFICATIONS
Alternative Designations	M79, PR Type 3, HEAT
Date, Country of Origin	1950, RUS
Proliferation	Soviet Bloc, Vietnam, Syria, Iraq, Insurgent groups
Crew	1
Weight Firing (kg)	1.1
Length Firing (m)	0.38
Diameter (m)	0.065
Rifling	No
Emplacement Time (min)	1
Fire from Inside Building	Yes

SIGHTS	SPECIFICATIONS
Name	N/A
Type	N/A
Sight Range Direct (m)	Line Of Sight

AMMUNITION	SPECIFICATIONS
Missile Type, Name	Shaped Charge Grenade, RKG-3
Max Aimed Range (m)	20
Penetration (mm)	125
Warhead Type	Hollow Charge with Drogue Parachute
Fuze Type (mm)	Point Detonating
Explosive Quantity (g)	384
Missile Type, Name	Shaped Charge Grenade, RKG-3M
Max Aimed Range (m)	20
Penetration (mm)	165
Warhead Type	Hollow Charge with Drogue Parachute
Fuze Type (mm)	Point Detonating
Explosive Quantity (g)	560

VARIANTS

RKG-3E – Steel Liner for hollow charge and an increased 170mm armor penetration.

RKG-3EM – Copper liner for hollow charge and an increased 220mm armor penetration.

UPG-8 – Training grenade

Notes

DUE TO IMPROVEMENT IN MODERN TANK ARMOR, ANTITANK GRENADES ARE GENERALLY CONSIDERED OBSOLETE IN CONVENTIONAL WARFARE. HOWEVER, THEY CAN BE AND HAVE BEEN USED EFFECTIVELY BY GUERILLAS AND INSURGENTS AGAINST ARMORED PERSONNEL CARRIERS AND RECONNAISSANCE VEHICLES WHICH LACK THE HEAVIER MODERN ARMOR.

Russian 7.62-mm Light Machinegun RPK



SYSTEM	SPECIFICATIONS	AMMUNITION	VARIANTS
Alternative Designation: None Date of Introduction: 1964 Proliferation: Widespread	Weight (kg): Empty (w/o magazine) (kg): 4.9 Loaded (with magazine): 5.67 w/40-rd mag Mount: Bipod Length (mm): Overall: 1,035 Barrel: 591 Quick Change Barrel: No Rate of Fire (rd/min): Cyclic: 650 Practical (auto): 150 (80 sustained, see note) Practical (semi): 50 Fire Mode: Selective Operation: Gas Feed: 40 round-curved box or 75-rd drum magazine. Can also use the 30-round curved box magazine used by the AKM. Sight Type: Leaf sights Magnification: None Night Sights Available: yes, (luminous front/rear)	M1943 (57N231S) Caliber/length: 7.62x39-mm Type: Ball, steel core Range (m): Effective: 800 Maximum: 800 Armor Penetration: 6 mm mild steel plate at 300 m Steel helmet at 1,000 m Flak vest at 60 m Muzzle Velocity (m/s): 718 M1943 (T-45 or 57N231P) Caliber/length: 7.62x39-mm Type: Ball-Tracer Range Effective: 800 Maximum: 800 Trace (m): 800 Muzzle Velocity (m/s): 718 M1943 Caliber/length: 7.62x39-mm Type: API Armor Penetration (mm @ 0° obliquity @ 500m): 8 Muzzle Velocity (m/s): N/A	RPKS: Folded stock version (820 mm in length)

NOTES

THE RPK IS THE LIGHT MACHINEGUN VARIANT OF THE AKM AND AS SUCH IS AN EXTENDED VERSION OF THE AKM. IT HAS A LONGER, HEAVER BARREL THAN THE AKM (591 MM VS 414 MM). MOST MOVING PARTS ARE INTERCHANGEABLE WITH THE AK-47 OR AKM ASSAULT RIFLES. THE SUSTAINED RATE OF FIRE CANNOT EXCEED 80 RDS PER MINUTE DUE TO "COOK OFF". IT HAS BEEN REPLACED BY THE 5.45-MM RPK-74 IN MANY ARMIES. THE RPK FILLS THE ROLE OF A SQUAD LEVEL SUPPORT WEAPON.

Russian 7.62-mm General Purpose Machinegun PKM and Pecheng (PKP)



SYSTEM	SPECIFICATIONS	AMMUNITION	VARIANTS
Alternative Designation: See Variants. Date of Introduction: (PKM/PKT/PKP): 1971/1968/2001 Proliferation: Widespread (PKM/PKT) NOTE: Picture, above, is of a PKP (Pecheneg).	Crew: 2 Weight (kg): Empty (w/o magazine) (PKM/PKT) (kg): 8.4/10.66 Ammo box (only) with 100/200-rd belt (kg): 3.9/8.0 Tripod (lightweight) (kg): 4.75 Length (mm): Overall (PKM/PKT): 1,160/1,080 On tripod (PKS): 1,267 Barrel: 658. Barrel Change: Yes Mount Type: Pintle, coaxial, bipod or tripod (Stepanov) Mounted On: (see VARIANTS) Rate of Fire (rd/min): Cyclic: 650 Practical: 250 (PKM) Up to 600 for Pecheneg/PKP Fire Mode: Automatic Operation: Gas Feed: Belt, 100-rd belt carried in a box fastened to the right side of the receiver. 25-rd belts can be joined in several combination lengths (100/200/250) Type: Open iron sights Sighting range (PKM/PKT) (m): 1,500/2,000 Night Sights Available: Yes	57-N-323S Caliber: 7.62x54-mm rimmed Type: Ball Max Range (PKM/PKT) (m): 3,800/4,000 Practical Range (PKM/PKT) (m): Day: 1,000/2,000 Night: 300/INA Armor Penetration @ 0° obliquity, and 500 range (mm): 8 steel plate @ 520 m (mm): 6 Flak vest: 110 m Muzzle Velocity (PKM/PKT) (m/s): 825/855 7BZ-3 Caliber and Length: 7.62x54-mm rimmed Type: Armor piercing incendiary Max Range (PKM/PKT) (m): 3,800/4,000 Practical Range (PKM/PKT) (m): Day: 1,000/2,000 Night: 300/INA Armor Penetration @ 200 range (mm): 10 Muzzle Velocity (PKM/PKT) (m/s): 808	PKM: Squad machinegun PKT: Vehicle mounted MG with solenoid electric trigger, remote sight, and a longer heavier barrel. It lacks a stock and, bipod. Some are coaxial to a main gun and use its sights. Others operate separately. They generally do not dismount for ground use. PKS: Lightweight tripod-mounted infantry weapon PKMS: Lightweight tripod-mounted variant of the PKS PKB (PKBM): Pintle-mounted on APCs, SP guns, BRDM, BTRs, has butterfly trigger rather than solenoid, double spade grips, and front and rear sights

NOTES
THE 7.62-MM GENERAL-PURPOSE MACHINEGUN (PKM) IS A GAS-OPERATED, BELT-FED, SUSTAINED-FIRE WEAPON. THE BASIC PKM IS BIPOD-MOUNTED BUT CAN ALSO FIT IN VEHICLE FIRING PORTS. IT IS CONSTRUCTED PARTLY OF STAMPED METAL AND PARTLY OF FORGED STEEL. THE NEWER VARIANT PKP (PECHENEG) FEATURES IMPROVED COOLING SYSTEM, AND A HEAVY, FIXED BARREL THAT DOES NOT REQUIRE CHANGING NOR CAN IT BE CHANGED BY THE CREW. IT IS DESIGNED TO FILL THE ROLE OF A TRUE, SQUAD LEVEL GPMG FOR SUPPORT IN RUSSIAN INFANTRY AND SPETSNAZ UNITS.

Russian 12.7mm Heavy Machinegun NSV/NSVT/KORD



SYSTEM	SPECIFICATIONS	AMMUNITION	VARIANTS
Alternative Designation: NSVS (when mounted on tripod) Date of Introduction: 1974 Proliferation: Widespread. The original plant is in Kazakhstan (NSV/NSVT). After dissolution of the USSR, a Russian plant now produces the KORD HMG. NOTE: The HMG in the above picture is of a Finnish NSV.	Weight (kg): Total System (w/6T7): 43 Empty: 25 Loaded: INA Tripod (6T7 tripod): 16 Length (mm): Overall: 1,560 On 6T7 Tripod: 1,900 Width (on 6T7 tripod) (mm): 860 Height (on 6T7 tripod) (mm): 380 Barrel Life (rds): 5,000 Barrel Change Time (sec): 5 Barrel Weight (kg): 9.2 Mount Type: 6T7 (infantry) tripod or 6U6 (w/seat) universal tripod Mounted On: (see VARIANTS) Traverse (°): 360 Elevation (°): -5 to +75 Rate of Fire (rd/min): Cyclic: 680-800 Practical: 100 Fire Mode: Automatic; short bursts long bursts (10 to 15), or continuously Operation: Gas Feed: Left or right from metal link belt from 50-rd boxes	12.7-mm cartridge API (B-32) API-T (BZT-44) HEI Typical Combat Load: 300 rds Name: B-32 Caliber and Length: 12.7x108-mm Type: Armor Piercing Incendiary Max Range (grd) (m): 7,850 Effective Range (m): AA: 1,000 Ground: 2,000 Armor: 800 Night (w/1PN52-1): 1,000 Armor Penetration @ 0° obliquity @ 500/1,000m range (mm): 20/13.2 Muzzle Velocity (m/s): 860	NSVT: Tank-mounted version (See NOTES) A tripod-mount (6T7) version is available for infantry use in a ground role. However, the NSVT appears more commonly mounted on the turrets of tanks as an antiaircraft machinegun. Russian NSV/NSVT: The Russian version can produce the guns for either Russian 12.7x108 or NATO 12.7 x 99 (.50-cal) ammunition. Kord: A Russian modernized version of the NSV/NSVT. Improvements include reduced weight (50% for hand-carry 6P57), reduced recoil, increased barrel life, improved reliability, improved accuracy, increased burst rate capacity, and improved reliability and maintenance. Reduced weight and recoil permits use with the 6T19 light machinegun bipod. Like the above Russian MGs, the Kord can be produced in either ammunition version. Vehicle version is 6P49. Swivel mount hand-operated versions are 6P58 and 6P59.

NOTES

ON THE T-72 AND THE T-80, IT HAS A ROTATING MOUNT AND CAN BE FIRED FROM WITHIN THE TANK. THE TANK COMMANDER EMPLOYS THE K10-T REFLEX SIGHT TO ENGAGE AIRCRAFT. ON THE T-72/T-80 MOUNT HE ENGAGES GROUND TARGETS WITH METALLIC SIGHTS ON THE GUN ITSELF. THE T-64 TANK MOUNTS A MODIFIED VERSION WITH A FIXED MOUNT ON THE COMMANDER'S CUPOLA. IT FIRES BY MEANS OF AN ELECTRICAL SOLENOID WHEN THE TANK IS BUTTONED UP AND AN OPTICAL SIGHT INSIDE THE CUPOLA IS USED. INSTEAD OF THE NORMAL 50-ROUND AMMUNITION BELT CONTAINER, THE NSVT ON THE T-64 MAY USE A LARGER BELT CONTAINER HOLDING 200 ROUNDS.

Russian 7.62-mm Sniper/Marksmen Rifle SVD



SYSTEM	SPECIFICATIONS	AMMUNITION	VARIANTS
Alternative Designation: SVD, Dragunov Date of Introduction: 1963 Proliferation: Widespread Fire Mode: Semi-automatic only SIGHTS: Name: PSO-1 Type: Infrared detection capability for night firing Magnification: 4x Field of View (°): 6 Sighting Range (m): 1,300 Night Sights Available: Yes. NSPU-3. The NSPU-3 increases accuracy to 1,000 m at night or during poor visibility.	Description: Weight (kg): Loaded (with magazine): 4.5 Empty (w/o magazine): 4.3 Length (mm): Overall: 1,230 With Bayonet: 1,370 Barrel: 620 Rate of Fire (rd/min): 30 Operation: Gas Feed: 10-rd detachable box magazine (15-rd available for the SVD-S)	Name: 57-N-323S Caliber and Length: 7.62x54-mm rimmed Type: Ball, standard steel-core Range (m): Effective: 600 Effective Night: 300 sight INA Armor Penetration (mm): Steel plate: 6 @ 520 m Flak vest: Yes @ 110 m Muzzle Velocity (m/s): 828 Name: Sniper (7N1) Caliber/length: 7.62x54R-mm rimmed Type: Steel core Range (m): Effective With Scope: 1,000 Effective W/O Scope: 800 Armor Penetration: INA Muzzle Velocity (m/s): 823 Name: 7N13 Caliber/length: 7.62x54R-mm rimmed Type: Enhanced penetration (steel core) Range (m): Effective With Scope: 1,000 Effective W/O Scope: 800 Armor Penetration (mm): Steel Plate: 6 @ 660 m Flak Vest: 800 m	SVD-S: Folding stock, 15-rd magazine. SVU: Bullpup (trigger forward of magazine). OTs-03AS: SVU w/PSO-1 sight. 6V1: SVD with PSO-1 sight. 6V1-N3: SVD with NSPU-3 night sight.

		Muzzle Velocity (m/s): 828 **Name: 7B2-3** **Bullet: B-32** **Caliber/length: 7.62x54R-mm rimmed** **Type: AP-I** **Range (m):** **Effective With Scope: 1,000** **Effective W/O Scope: 800** **Armor Penetration: 10-mm armor plate @ 200 m** **Muzzle Velocity (m/s): 808** **Name: 7T2m** **Bullet: T-46** **Caliber/length: 7.62x54R-mm rimmed** **Type: Tracer** **Range** **Range (m):** **Effective With Scope: 1,000** **Effective W/O Scope: 800** **Trace (m): 1,200** **Time of Trace (sec): 3** **Muzzle Velocity (m/s): 798**	
NOTES **THE BOLT MECHANISM AND GAS RECOVERY SYSTEM OF THE SVD ARE SIMILAR TO THOSE OF THE AK AND AKM. THE 7.62X54-MM RIMMED CARTRIDGE OF THE SVD IS NOT INTERCHANGEABLE WITH THE 7.62X39-MM RIMLESS ROUND OF THE AK-47/AKM. THE SVD PERFORMS BEST WHEN USING TARGET GRADE AMMUNITION, HOWEVER STANDARD (PKM/PKT) 7.62X54-MM RIMMED ROUNDS MAY ALSO BE FIRED. EVERY OPFOR INFANTRY SQUAD HAS AN SVD EQUIPPED DESIGNATED MARKSMAN (DM).**			

United States .50-cal Anti-Materiel Rifle M82A1A



SYSTEM	SPECIFICATIONS	AMMUNITION	VARIANTS
Alternative Designation: None Date of Introduction: 1984 Proliferation: Widespread (45+ nations) SIGHTS Name: Unertl Type: Optical (matches trajectory of .50-cal Raufoss Grade A) Magnification: 10x Name: Swarovski Type: Optical (with ranging reticle) Magnification: 10x42 Night Sights Available: yes Magnification: 10x42 Name: Barrett Optical Ranging System (BORS) Type: Ballistic Computer. This add-on device couples to the telescope, in place of the rear scope ring. It can then adjust for range, air temperature, round used, and other factors.	Weight (kg): Empty (w/o magazine): 14.75 Length (mm): Overall: 1,448 Barrel: 736 Rate of Fire (rd/min): 20 Operation: Recoil Feed: 10-rd detachable box magazine Fire Mode: Semi-automatic only Typical Combat Load: 30 rounds Ammunition Types: (.50-cal cartridge) Raufoss Grade A Ball (M2/M33) AP (M2) AP-I (M8) API-T (M20) Tracer (M10/21) SLAP (M903) MP (MK211 Mod 0)	Name: Raufoss Grade A (match)(DODIC A606) (USMC) Caliber/length: .50-cal BMG/12.7-mm x 99-m (NATO) Type: Standard operating round Range (m) (equipment-size targets): Maximum (w/scope): 1,800 Muzzle Velocity (m/s): 854 Name: MP NM140 (Nammo) MK211 Mod 0 Caliber/length: .50-cal BMG/12.7-mm x 99-m (NATO) Range (m) (equipment-size targets): Maximum (w/scope): 1,800 Armor Penetration: 11 mm @45° @1,000 m Fragmentation: 20 fragments after hitting 2 mm steel Incendiary Effect: Ignition of JP4 and JP8 Accuracy: <15 cm @ 550 m Muzzle Velocity (m/s): 915 Name: AP-S NM173 (Nammo) Caliber/length: .50-cal BMG/12.7-mm x 99-m (NATO) Type: Armor piercing Range (m) (equipment-size targets): Maximum (w/scope): 1,800 Armor Penetration: 11 mm @30° @1,500 m Accuracy: <15 cm @ 550 m Muzzle Velocity (m/s): 915 Name: M903 (Olin)	M107-A1 is a product improvement of the M82A1A. Improvements include: reduction in weight by 5 pounds; cylindrical titanium muzzle brake; titanium barrel key/recoil buffer system in order to operate with a Barrett suppressor; functional modifications to increase durability and ease of operation. Barrett introduced this variant in 2013.

A commonly associated scope is the Leupold Mark 4; but it can also work with other scopes. Night Sights Available: yes		Caliber/length: .50 cal BMG/12.7-mm x 99-m (NATO) Type: Saboted Light Armor Penetrator (SLAP) (actual bullet is tungsten .30 inch penetrator wrapped in a .50-cal plastic sabot) Range (m) (equipment-size targets): Maximum (w/scope): 1,500 Armor Penetration: 19 mm (.75 in) @1,500 m Accuracy: INA Muzzle Velocity (m/s): 1,014 Name: M8 Caliber/length: .50-cal BMG/12.7-mm x 99-m (NATO) Type: Armor piercing incendiary Range (m) (equipment-size targets): Maximum (w/scope): 1,800 Armor Penetration: 20 mm @ 100 m Accuracy: <25 cm @ 550 m Muzzle Velocity (m/s): 881 Name: M20 Caliber/length: .50-cal BMG/12.7-mm x 99-m (NATO) Type: Armor piercing incendiary-Tracer Trace (m): 91 to 1,463 Armor Penetration: 20 mm @ 100 m Accuracy: <25 cm @ 550 m Muzzle Velocity (m/s): 887	
NOTES THE M82A1A PROVIDES MANEUVER COMMANDERS WITH THE TACTICAL OPTION OF EMPLOYING SNIPERS WITH AN ANTI-MATERIEL WEAPON TO AUGMENT PRESENT 7.62-MM ANTI-PERSONNEL SNIPER RIFLES. RECOIL EQUALS 7.62X51-MM LEVELS. THE USMC USES RAUFOSS GRADE A AMMUNITION, BUT THE RIFLE IS CAPABLE OF FIRING ANY STANDARD 12.7X99-MM BROWNING MACHINEGUN AMMUNITION.			

Chinese 60-mm Lightweight Long Range Mortar Type WX-90



SYSTEM	SPECIFICATIONS
Alternative Designations	W90
Date, Country of Origin	1990, CHI
Proliferation	INA
Crew	3
Weight Firing (kg)	23.6
Weight Travel (kg)	14
Weight Bipod (kg)	9
Length Barrel (cm)	1200
Height Firing (m)	1200
Rifling	No
Feed	Manual
Breech Mechanism Type	NA
Emplacement Time (min)	INA
Fire from Inside Building	No

SIGHTS	SPECIFICATIONS
Name	
Type	
Sight Range Direct (m)	
Sight Range Indirect (m)	

ARMAMENT	SPECIFICATIONS
Caliber(mm)	60.75
Rate of Fire (prac, cyclic)	30
Fire on Move	No
Elevation (deg min, max)	-0, + 80
Traverse (deg)	7

AMMUNITION	SPECIFICATIONS
Caliber(mm), Type, Name	60mm, Mortar, Western
Max Eff Range (m)	4700
Max Range, Extended (m)	5,500Number
Min Range (m)	72
Muzzle velocity (m/s)	314
Combat Load (ready, stow)	NA

VARIANTS	
Name	W89t
Barrel Length (cm)	1200
Barrel weight (kg)	9
Range (m)	Number
Name	WW90-60Lt
Barrel Length (cm)	1300
Barrel weight (kg)	11.7
Range (m)	5775
Name	WW90-60M
Barrel Length (cm)	1080
Barrel weight (kg)	9.7
Range (m)	4400

Notes

THIS MORTAR WAS PRODUCED FOR THE PEOPLES LIBERATION ARMY BUT IS ALSO AVAILABLE ON THE EXPORT MARKET. IT IS RELATIVELY CHEAP AND FIRES WESTERN 60MM AMMUNITION.

Russian ATGM Launcher for AT-4 and AT-5 9P135



SYSTEM	SPECIFICATIONS	AMMUNITION	VARIANTS
Ground mounted portable launcher for AT-4 and AT-5 family of missiles. Alt designations: AT-4B/ AT-5B, 9P135M Firing Post, Fagot/Fagot M Date of introduction: 1973 Proliferation: At least 25 countries	Crew: 3 Weight, excluding missile (kg): 22.5 Length, in firing position (m): 1.1/1.3 Launcher: 9P135 (AT-4 only), 9P135M (AT-4/AT-5) Launch method: Disposable launch canister Rate of launch (min): 2-3, range dependent Ready/Stowed – 4/0 dismounted, 4/4 veh Fire Control System: Name: 9S451M1 Guidance control box Guidance: SACLOS Command Link: Wire Beacon Type: Incandescent Infrared bulb Tracker Type: IR, 9S451M1 Susceptible to: EO Jammers, smoke, counter-fire Counter-countermeasures: Encoded pulse beacon, EO jammers Counter-dazzler adjustments to 9S451M1 Filter can be mounted on reticles Sights w/magnification: Day: 9Sh119M1, 4x Field of view (deg): 4.5 Acquisition Range (m): 4,000+ Night: 1PN86/Multi thermal sight Acquisition Range (m) 3,600+	Name: Konkurs Alt: AT-5/Spandrel-A Weight (kg) 25.2 (in tube) Type: Shaped Charge (HEAT) Penetration (mm): 650 Min/Max Range (m): 75/4000 Probability of hit(%): 90 Velocity (m/s): 200 Name: Konkurs-M Alt: AT-5b/Spandrel-B Weight (kg) 26.5 (in tube) Type: Tandem Shaped Charge (HEAT) Penetration (mm): 925 Min/Max Range (m): 75/4000 Probability of hit(%): 90 Velocity (m/s): 208 Name: Fagot Alt: AT-4/Spigot-A Weight (kg) 13 (in tube) Type: Tandem Shaped Charge (HEAT) Penetration (mm): 480 Min/Max Range (m): 70/2000 Probability of hit(%): 90 Velocity (m/s): 186 Name: Factoria (Fagot-M) Alt: AT-4b/Spigot-B Weight (kg) 12.9 (in tube) Type: Shaped Charge (HEAT) Penetration (mm): 550 Min/Max Range (m): 75/2500 Probability of hit(%): 90 Velocity (m/s): 180	P135M3: Konkurs-M Complex. Launcher with 1PN65 thermal sight and AT-5B missiles. Night range is 2,500m Tosan-1: Iranian version of AT-5 Launcher can be modified to launch other missiles such as the Indian Nag (TV/IR/SAL-homing) and the AT-3E/Malyutka-2 TPVP/1PN65 thermal sight is available with a range of 2,500. It weighs 13kg Slovienian TS-F sight has a 3,600-meter detection range

NOTES
THE RUSSIANS CATEGORIZE THE AT-4/4B SYSTEM AS PORTABLE RATHER THAN MAN PORTABLE. FOR DISMOUNT CARRY LOAD IT IS DIVIDED AMONG THREE PACKS. DUE TO ITS GREATER WEIGHT AT5/5B FITS INTO THE HEAVY CLASS AND SHOULD ONLY BE CARRIED SHORT DISTANCES FROM VEHICLE <500M.

Russian 40-mm Antitank Grenade Launcher RPG-7V



SYSTEM	SPECIFICATIONS	AMMUNITION	VARIANTS
Alternative Designation: N/A Date of Introduction: 1962 Proliferation: 70+ countries	Crew: 2 RPG-7V is light enough to be carried and fired by one person if needed. With a crew of 2, an assistant grenadier normally deploys left of the gunner to protect him from small arms fire. The full set has two bags: one has two grenades, spare parts, tools and accessories. The other has three more grenades. Caliber Launcher (mm): 40 The grenade warhead is forward of tube. Thus grenade diameter can be 105 mm or more. Weight (kg): 7.9 empty, loaded varies with grenade Length (mm): 950 Rate of Fire (rd/min): 4-6 Fire From Inside Building: No	40-mm grenade PG-7V PG-7VM PG-7VS PG-7VL PG-7VR TBG-7V OG-7V OG-7VM Combat load: 5 rockets Grenade Components: Warhead, rocket motor, tail assembly See Infantry Weapons for further details.	This is the most widely proliferated infantry AT system in the world. There are dozens of copies and variants of this launcher. RPG-250: Prototype and test base for the RPG-7V. RPG-7B1N3, -7N, and -7N1: Night site variant RPG-7V1: Upgrade w/bipod and improved PGO-7V3 sight. This is the standard production ATGL version since the late 1990s. RPG-7D, RPG-7DV1, and RPG-7D2N3 (night): Folding variants used by airborne troops. RPG-7D3 is the airborne counterpart to RPG-7V1. Type 69-1, II, III: Chinese upgrades variants with lighter weight, a wide range of munitions, and 3.0 x longer range sights.

NOTES

RPG-7V IS THE STANDARD (TIER 4) SQUAD ANTITANK WEAPON IN USE BY THE OPFOR. IT REQUIRES A WELL-TRAINED GUNNER TO ESTIMATE RANGES AND LEAD DISTANCES FOR MOVING TARGETS. THE RPG-7V HAS BEEN USED TO SHOOT DOWN HELICOPTERS IN SEVERAL CONFLICTS.

Russian 72.5-mm Antitank Disposable Launcher RPG-22



SYSTEM	SPECIFICATIONS
Alternative Designations	
Date, Country of Origin	1985, RUS
Proliferation	At least 9 countries
Crew	1
Weight Firing (kg)	2.8
Weight Travel (kg)	
Weight Tripod (kg)	
Length Firing (m)	0.85
Length Travel (m)	0.75
Rifling	Yes or No
Feed	Disposable
Breech Mechanism Type	NA
Emplacement Time (min)	1
Fire from Inside Building	No

SIGHTS	SPECIFICATIONS
Name	
Type	Iron
Sight Range Direct (m)	50, 150, 200, 250
Sight Range Indirect (m)	
Night Sights	No

ARMAMENT	SPECIFICATIONS
Caliber(mm)	**72.5**
Rate of Fire (prac, cyclic)	1, 1
Fire on Move	No
Elevation (deg min, max)	Shoulder held
Traverse (deg)	Shoulder held

AMMUNITION	SPECIFICATIONS
Missile Type, Name	**HEAT,**
Max Aimed Range (m)	250
Max Effective Range(m)	250
Penetration (mm)	390, C
Missile Diameter (mm)	72.5mm
Missile Weight (kg)	1.48
Initial Muzzle Velocity (m/s)	133
Maximum Velocity (m/s)	300

NOTES

THE RPG-22 IS A LIGHTWEIGHT, SHOULDER-FIRED, PRELOADED, DISPOSABLE ANTI-ARMOR WEAPON INTENDED FOR FIRING ONE ROUND, AFTER WHICH THE TUBE IS DISCARDED. IT IS BASICALLY A SCALED-UP VERSION OF THE RPG-18 (SIMILAR TO THE US LAW) AND HAS NO DEDICATED GRENADIER; HOWEVER, ALL SOLDIERS TRAIN TO USE THE SQUAD-LEVEL DISPOSABLE WEAPON.

Chinese 107mm Improvised Rocket Launcher Type 63



SYSTEM	SPECIFICATIONS
Alternative Designations	None
Date, Country of Origin	1960's, CHI
Proliferation	At least 20 countries
Crew	2
Weight Firing (kg)	3
Weight Travel (kg)	
Weight Tripod (kg)	10
Length Firing (m)	
Length Travel (m)	
Height Firing (m)	1.5
Width Firing (m)	1
Rifling	No
Feed	Manual
Breech Mechanism Type	Electric Battery
Emplacement Time (min)	3
Fire from Inside Building	No

SIGHTS	SPECIFICATIONS
Name	N/A
Type	Estimation
Sight Range Direct (m)	Line of Sight
Sight Range Indirect (m)	
Night Sights	

ARMAMENT	SPECIFICATIONS
Caliber(mm)	**107**
Rate of Fire (prac, cyclic)	1, 2
Fire on Move	No
Elevation (deg min, max)	-0, + est 60
Traverse (deg)	0

AMMUNITION	SPECIFICATIONS
Caliber(mm), Type, Name	**107, Rocket, Type 63**
Max Aimed Range (m)	8000
Warhead Type	Frag HE Spin stabilized
Weight (Kg)	18.8
Effect	1600 Steel Balls
Caliber(mm), Type, Name	**107, Rocket, Type 63 II**
Max Aimed Range (m)	8500
Warhead Type	Controlled Frag HE
Weight (Kg)	18.84
Effect	1214 Frag
Caliber(mm), Type, Name	**107, Rocket, Type 63 SS**
Max Aimed Range (m)	8500
Warhead Type	HE Incendiary White Phosphorous
Weight (Kg)	18.74
Effect	1600 Frag
Caliber(mm), Type, Name	**107, Rocket, Type 81 DP**
Max Aimed Range (m)	8000
Warhead Type	DPICM
Weight (Kg)	8.4
Effect	Sub munitions with HE effect 80mm penetration

NOTES

THE TYPE 63 CAN ALSO REFER TO A TOWED 12-TUBE MBRL PRODUCED IN CHINE IN THE EARLY 1960'S. IT WAS WIDELY USED BY THE PLA UNTIL THE 1980 AND IS VERY SIMILAR TO THE SOVIET BM-14. ALTHOUGH THE MBRL'S HAVE BEEN USED BY IRREGULAR ACTORS THEY ARE MORE LIKELY TO HAVE ACCESS TO THE MUNITIONS AND BE FORCED TO IMPROVISE THE LAUNCHER.

Insurgent 57-mm Improvised Rocket Launchers C-5K





SYSTEM	SPECIFICATIONS
Alternative Designations	S-5K
Date, Country of Origin	2000, INS
Proliferation	At least 2 Insurgent groups
Crew	1
Weight Firing (kg)	8
Length Firing (m)	1.42
Rifling	No
Feed	Manual
Breech Mechanism Type	Open
Emplacement Time (min)	1
Fire from Inside Building	INA
Launch control	Trigger, wire connecting to a battery in the stock

SIGHTS	SPECIFICATIONS
Name	Post, PGO-7
Type	Iron, Optical
Sight Range Direct (m)	Line of Sight
Aiming Limitation	Heat and Ash distract user
Night Sights	No

VARIANTS

Launcher tubes are extracted from UB32 Helicopter launch air to surface rocket pods. Tubes can be fabricated from pipe and some launchers have been seen with a blast shield to protect the user.

Early Chechen launchers were all welded, including grips and appeared to be sturdy.

In Tikrit a pedestal-mounted launcher with 4 unused rockets was found in the street.

ARMAMENT	SPECIFICATIONS
Caliber(mm)	57
Rate of Fire (prac, cyclic)	1, 2
Fire on Move	No
Elevation (deg min, max)	Est -10, est +65
Traverse (deg)	360
AMMUNITION	**SPECIFICATIONS**
Caliber(mm), Type, Name	57, Rocket, S5K
Free Flight Range (m)	2000
Max Eff Range, Day (m)	400
Rocket Weight (Kg)	3.65
Warhead Weight (Kg)	1.13
Rocket Length (m)	0.83
Fuze Type	Point Detonating
Penetration (mm)	150, C
Caliber(mm), Type, Name	57, Rocket, S5
Free Flight Range (m)	4000
Max Eff Range, Day (m)	400
Rocket Weight (Kg)	5.1
Warhead Weight (Kg)	1.1
Rocket Length (m)	1.42
Fuze Type	Point Detonating
Penetration (mm)	Damage light armored vehicles

NOTES

MOST LAUNCHERS USE A SINGLE TUBE BUT VARIANTS HAVE BEEN MADE WITH TWO THREE OR FOUR TUBES. VERSIONS HAVE BEEN SEEN WITH WOOD, METAL, AND PLASTIC HELD WITH A METAL STRAP, TAPE, AND WELDS THE S-5K ROCKETS FLAT TRAJECTORY OFFERS A MORE ACCURATE MUNITION FOR USE OVER DISTANCE BEYOND 200M THAN THAT OF THE HIGH BALLISTIC ARC OF AN ATGL, SUCH AS RPG-7V

Russian Surface to Air Missile Launcher SA-7 (Grail) / 9P54M



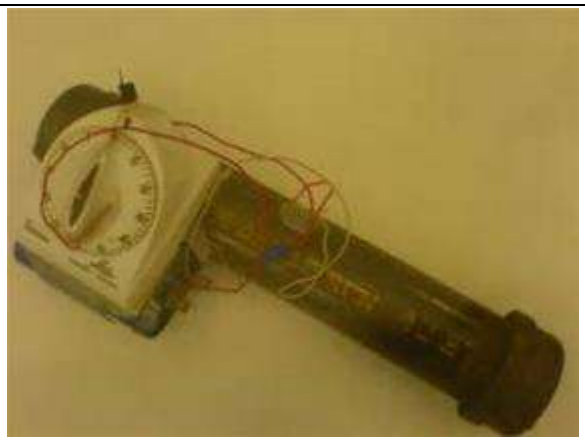


SYSTEM	SPECIFICATIONS	AMMUNITION	VARIANTS
Alt designations: 9K32M, Strela-2M Date of introduction: 1972 Proliferation: Worldwide Target: Low flying FW or Heli	Crew: 1, 2 with loader Launcher: 9P54M Length (m): 1.47 Diameter (mm): 70 Weight (kg): 4.71 Reaction time (sec): 5-10 Reload time (sec): 6-10 Fire on the move: Yes, short halt Fire Control: Sights w/magnification Target acquisition indicator Gunner visually identifies and acquires the target. IFF: Yes, can be fitted to the operator's helmet. A supplementary early warning system, passive RF antenna and headphones can be used to cue approach and direction.	Missile Name: 9M32M Range(m): 500-5,000 Max Altitude (m): 4,500 Min Altitude (m): 18 Length (m): 1.4 Diameter (mm): 70 Weight (kg): 9.97 Speed (m/s): 580 Propulsion: Solid fuel booster, and solid fuel sustainer motor Guidance: Passive 1-color IR homing (med IR range) Seeker field of view (deg): 1.9 Tracking rate (deg/sec): 6 Warhead type: HE Warhead weight (kg): 1.15 Fuze type: Contact Prob of Hit (%): 30 FW/ 40 Heli Self-destruct (Sec): 15 Countermeasures resistance: The seeker is fitted to reduce effectiveness of decoy flares and to block IR emissions.	SA-7b has improved propulsion over the older SA-7. SA-7b has better speed and range over the SA-7. SA-N-5: Naval version HN-5A: Chinese version Strela 2M/A: Yugoslavian upgrade Sakr Eye: Egyptian upgrade Strela-2M2: SA-7/7b and Strela 3/SA14 missiles converted with a Lomo upgrade 2-color IR seeker for detection/IRCM resistance similar to SA-18 SA-7b can be mounted in various vehicles, boats and vessels in four, six and eight tube launchers. It can also mount on helicopters including the Mi-8/17, Mi-24/35 and s-342 Gazelle

NOTES

THE MISSILE IS A TAIL CHASING HEAT (IR) SEEKER THAT DEPENDS ON ITS ABILITY TO LOCK ON TO HEAT SOURCES OF USUALLY LOW FLYING FIXED AND ROTARY WING AIRCRAFT. WHEN LAUNCHED TOWARDS A RECEDING AIRCRAFT, THE MANPADS CAN BE USED TO SCAN THE DIRECTION AND LOCK ON WITHOUT THE TARGET BEING VISUALLY ACQUIRED IN THE SIGHTS. A GUNNER MAY HAVE AN OPTIONAL 1L15-1 PORTABLE ELECTRONIC PLOTTING BOARD WHICH WARNS OF LOCATION AND DIRECTION OF APPROACHING TARGETS WITH A DISPLAY RANGE OF 12.5 KM. A VARIETY OF NIGHT SIGHTS ARE AVAILABLE INCLUDING 1 GEN (2-3,000M), 2 GEN (4,500M) AND THERMAL (5-6,000M).

Improvised Explosive Device Anti-Personnel Fragmentation Pipe Bomb





SYSTEM	SPECIFICATIONS
Alternative Designations	Anti-Personnel Fragmentation Device, Nail Bomb, Blast Bomb
Date, Country of Origin	NA
Proliferation	Worldwide
Crew	1
Weight Firing (kg)	Usually <2
Weight Travel (kg)	
Weight Tripod (kg)	
Length Firing (m)	Usually < 0.30
Feed	Single Use
Breech Mechanism Type	NA
Emplacement Time (min)	1
Fire from Inside Building	Yes

SIGHTS	SPECIFICATIONS
Name	
Type	Line Of Sight
Sight Range Direct (m)	50
Sight Range Indirect (m)	
Night Sights	No

ARMAMENT	SPECIFICATIONS
Caliber(mm)	NA
Rate of Fire (prac, cyclic)	1,1
Fire on Move	Yes
Elevation (deg min, max)	Hand Thrown
Traverse (deg)	360

EXPLOSIVE

Usually low grade without the need for a detonator. Black powder, fireworks or chlorate mixture are popular.

VARIANTS

Virtually any type of container that would provide confinement for an explosive material, glass jars, plastic pipe and appliances.

Some common variants are the Pressure Cooker bomb or the Letter Bomb

NOTES

A CRUDE DEVICE, OFTEN A PIPE CAPPED AT BOTH ENDS AND FILLED WITH EXPLOSIVE. CAN BE PACKED WITH NAILS OR SCREWS TO INCREASE DAMAGE. PIPE BOMBS CONCENTRATE PRESSURE AND RELEASE IT THROUGH THE FAILURE OF THE OUTER CASING. THEY ARE EASY TO MAKE IN ANY SHAPE OR SIZE BUT THE SIMPLE UNSOPHISTICATED NATURE OF THE DEVICE MAKES THEM DANGEROUS IF INCORRECTLY HANDLED.

Improvised Explosive Anti-Armor Device Explosive Formed Projectile



SYSTEM	SPECIFICATIONS
Alternative Designations	Dragon (Taliban)
Date, Country of Origin	2006, Insurgents
Proliferation	Iran, Lebanon, Hezbollah, Iraq, and Afghanistan
Crew	1
Weight Firing (kg)	Various
Length Firing (m)	>0.25
Rifling	Yes or No
Feed	Text
Breech Mechanism Type	Text
Emplacement Time (min)	Various
Fire from Inside Building	Yes

SIGHTS	SPECIFICATIONS
Name	
Type	NA
Sight Range Direct (m)	Line of Sight
Sight Range Indirect (m)	Remoted and unmanned
Night Sights	

AMMUNITION

Usually High Explosive

EFP components have been found with:

C4 Explosive / Gunpowder / TNT / HME / RDX

VARIANTS

EFPS were reportedly provided to Hezbollah proxy groups fighting in Iraq in kit form.

Machinery for forming the copper cones was discovered in Sadr City, Iraq indicating another variant.

Improvised EFP devices have been found cased in foam and painted to look like rocks

NOTES

EFP TECHNOLOGY WAS INVENTED IN THE 1930'S BY THE OIL INDUSTRY. IT HAS BEEN USED IN ANTI-ARMOR WEAPONS SINCE WW2.

EFPS WERE USED WITH DEVASTATING EFFECT IN IRAQ BY IRANIAN BACKED GROUPS AND IN AFGHANISTAN BY THE TALIBAN. A NORMAL IED WOULD CAUSE DAMAGE TO A HUMVEE AND EFP WOULD COMPLETELY DESTROY IT.

TOYOTA (DOUBLE CAB) HILUX "Technical" Multi-Role Vehicle





SYSTEM	SPECIFICATIONS
Alternative Designations	Pick-up Truck
Date, Country of Origin	1968, JPN
Proliferation	Worldwide
Crew	1
Troop Capacity	10
Combat Weight (kg)	2810
Length (m)	5.26
Height (m)	1.86
Width (m)	1.83
Ground Pressure (kg/cm²)	INA
Drive Formula	4x4

AUTOMOTIVE	SPECIFICATIONS
Engine Type	Water-cooled, in-line, 6-cylinder gasoline Text
Cruising Range (km)	436
Max On-Road (km/h)	113
Max Off-Road (km/h)	100
Max Cross-Country (km/h)	INA
Max Swim (km/h)	NA
Fording Depth (m), note	0.7t

PROTECTION	SPECIFICATIONS
Radio	
Armor, Turret Front (mm):	No
Applique Armor (mm)	No
Reactive Armor (mm):	No
Mobility (mine clearing, self-entrenching)	No
NBC Protection System	No
Smoke Equipment	No

VARIANTS

The Toyota Hiluz can be up armored however most technical will be regular civilian vehicles used by an irregular force. There are reports that drug cartels have used armored pick-ups in the past.

A Hilux can be made to accommodate rockets, air defense guns or heavy machine guns. The photos above are from Libya and Afghanistan and illustrate examples fitted with DShK heavy machineguns.

A technical can be almost any civilian truck or vehicle that can be armed with different weapon systems (rockets, air defense guns, or heavy machineguns).

NOTES

THE TOYOTA HILUX IS A GOOD EXAMPLE OF A TECHNICAL BASED ON REPORTING FROM LIBYA, SYRIA, AFGHANISTAN, AND MALI. IRREGULAR FORCES USE THESE PARTICULAR TYPE OF VEHICLE BECAUSE OF THE VEHICLE'S RELIABILITY IN HOSTILE CONDITIONS. MOST ARE 4X4 VEHICLES TO ALLOW MOBILITY IN RESTRICTIVE TERRAIN. THEY ALLOW THE THREAT ACTOR TO BE AGILE, FAST AND BLEND INTO THE CIVILIAN POPULATION. THE DOWNSIDE OF HAVING LIMITED ARMOR IS OFFSET BY HIDING IN PLAIN SIGHT.

Sudanese 4x4 Light Tactical Vehicle Karaba VTG01





SYSTEM	SPECIFICATIONS
Alternative Designations	Safir
Date, Country of Origin	2008, SUD
Proliferation	Iran, Libya, CAR
Crew	1
Troop Capacity	5
Combat Weight (mt)	1500
Length (m)	3.51
Height (m)	1.88
Width (m)	1.9
Ground Pressure (kg/cm²)	INA
Drive Formula	4 x 4

AUTOMOTIVE	SPECIFICATIONS
Engine Type	Diesel
Cruising Range (km)	500
Max On-Road (km/h)	130
Max Off-Road (km/h)	Number

PROTECTION	SPECIFICATIONS
Radio	Yes
NBC Protection System	No
Smoke Equipment	No

ARMAMENT	SPECIFICATIONS
Caliber(mm), Type, Name	73, Recoilless Gun, SPG-9 RR
Rate of Fire (prac, cyclic)	6
Fire on Move	No
Elevation (deg min, max)	-3, + 7
Caliber(mm), Type, Name	0, ATGM, AT-3 or AT-5
Rate of Fire (prac, cyclic)	2,3
Fire on Move	INA
Elevation (deg min, max)	INA

VARIANTS
Radio Station
Command Post
Ambulance

NOTES

THE KARABA VTG01 IS BASED ON THE IRANIAN-MADE SAFIR, ALTHOUGH SHOWN OPEN TOPPED IT CAN HAVE AN OPTIONAL SOFT COVER. IT IS AN EXAMPLE OF A MODERN TACTICAL UTILITY VEHICLE THAT COULD BE PROCURED BY IRREGULAR ACTORS.

Dec
2015

Worldwide Equipment Guide

Chapter 12: Chemical, Biological, Radiological, and Nuclear (CBRN) Weapons



TRADOC G-2 ACE–Threats Integration
Ft. Leavenworth, KS

Distribution Statement: Approved for public release; distribution is unlimited.

Chemical, Biological, Radiological, and Nuclear (CBRN) Weapons

This section provides a basic primer for threat characteristics for selected CBRN Weapons/agents/platforms. This portion also discusses the following topics: overview of OPFOR's rational on CBRN weapons, CBRN Threats, and WEG sheets representative of blister agents, nerve agents, choking agents, biotoxins, and decontamination platforms. These types of threats discussed in this segment are either in the real world and or readily available and therefore likely to be encountered by US forces in varying levels of conflict in the future. CBRN weapons can be used by a hybrid threat and is not limited to regular actors, but also irregular and criminal elements.

The list of CBRN systems/agents within this chapter is not meant to be encyclopedic. This chapter will be further developed with additional agents in upcoming editions. This edition of the CBRN chapter provides the US training community with a list of representative capabilities that allow scenario developers and the rest of the training community to create a dynamic threat to prepare today's warfighter for tomorrow's battlefield.

The section is divided into two major categories—***The CBRN Primer and WEG Sheets on CBRN assets/systems***. The CBRN primer provides insight into how the OPFOR composite views CBRN weapons. The second section of the primer address current CBRN threats. The WEG sheets (section) examine types of agents, and decontamination systems.

Questions and comments on data listed in this chapter should be addressed to:

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This portion of the WEG is broken into two distinct but connected narratives. The first section discusses the OPFOR's rationale with regards to usage of CBRN systems. This OPFOR segment will not go into considerable depth on OPFOR tactics due to the fact that this subject is addressed in detail in Training Circular (TC) 7-100.2 chapter 13 (CBRN and Smoke). The second piece of this narrative discusses CBRN threats and has supporting CBRN related WEG sheets.

OPFOR and CBRN Issues

This section consists of a number of significant excerpts from TC 7-100.2 in order to provide a basic context for OPFOR CBRN related topics (for additional information on the subject of OPFOR CBRN and smoke tactics see the link in the above paragraph).

Key points on the OPFOR's CBRN issues:

- The OPFOR maintains a capability to conduct chemical, nuclear, and possibly biological or radiological warfare.
- The OPFOR is most likely to use chemical weapons against even a more powerful enemy.
- The OPFOR is equipped, structured, and trained to conduct both offensive and defensive chemical warfare.
- The OPFOR is continually striving to improve its chemical warfare capabilities.
- The OPFOR views chemical defense as part of a viable offensive chemical warfare capability.
- The OPFOR use the threat of numerous methods of CBRN delivery systems as an intimidating factor.
- The OPFOR could use CBRN against a neighbor as a warning to any potential enemy.
- The OPFOR uses the fact that CBRN weapons place noncombatants at risk as a positive factor.
- The OPFOR may threaten to use CBRN weapons as a way of applying political, economic, or psychological pressure by allowing the enemy no sanctuary.
- The OPFOR might use CBRN weapons either to deter aggression or as a response to an enemy attack.
- The OPFOR will use CBRN weapons on own troops in order to reach overarching objectives.
- The use of INFOWAR at every echelon is a key component in the OPFOR's CBRN program.
- The OPFOR may develop and employ radiological weapons.
- The OPFOR has nuclear capabilities.

CBRN Delivery Systems

The OPFOR has surface-to-surface missiles (SSMs) capable of carrying nuclear, chemical, or biological warheads. Most OPFOR artillery is capable of delivering chemical munitions, and most systems 152-mm and larger are capable of firing nuclear rounds. Additionally, the OPFOR could use aircraft systems and cruise missiles to deliver a CBRN attack. The OPFOR has also trained special-purpose forces (SPF) as alternate means of delivering CBRN munitions packages.

The Effects of CBRN on the Battlefield

The use of CBRN weapons can have an enormous impact on the battlefield and in peacetime and wartime operational environments. These types of weapons are a subset of weapons of mass destruction (WMD). WMD are weapons or devices intended for or capable of causing a high order of physical destruction or mass casualties (death or serious bodily injury to a significant number of people). The casualty-producing elements of WMD can continue inflicting casualties on the enemy and exert powerful psychological effects on the enemy's morale for

some time after delivery. Conventional weapons e.g., precision weapons or volumetric explosives) can also take on the properties of WMD.

Real World Threats CBRN Primer

Classifying of chemical agents

- Lethal agents
- Nonlethal agents
- Persistent: Agent that remains able to cause casualties for more than 24 hours to several days or weeks.
- Non-Persistent: dissipates and/or loses its ability to cause casualties after 10 to 15 minutes.

Subcategories of agents as the following:

- **Nerve:** Occupational Safety & Health Administration (OSHA) defines as highly toxic chemicals called "organophosphates" that poison the nervous system and disrupt bodily functions which are vital to an individual's survival.

Types and Characteristics Chemical Agents

		PERSISTENCE	PERSISTENCE		ENTRANCE	
TYPE OF AGENT	SYMBOL	SUMMER	WINTER	RATE OF ACTION	VAPOR/AEROSOL	LIQUID
NERVE	GA, GB, GD	10 min-24 hr	2 hr-3 days	Very Quick	Eyes, Lungs	Eyes, Skin, Mouth

*ARMY FIELD MANUAL NO. 8-10-7. Health Service Support in a Nuclear, Biological, and Chemical Environment.

- **Blister agents:** OSHA defines blister agents or "vesicants" are chemicals which have severely irritating properties that produce fluid filled pockets on the skin and damage to the eyes, lungs and other mucous membranes. Symptoms of exposure may be immediate or delayed until several hours after exposure.

Types and Characteristics Chemical Agents

		PERSISTENCE	PERSISTENCE		ENTRANCE	
TYPE OF AGENT	SYMBOL	SUMMER	WINTER	RATE OF ACTION	VAPOR/AEROSOL	LIQUID
BLISTER	HD, HN	3 days-1 wk	Weeks	Slow	Eyes, Skin, Lungs	Eyes, Skin
	L, HL	1-3 days	Weeks	Quick	Eyes, Skin, Lungs	Eyes, Skin, Mouth
	CX	Days	Days	Very Quick	Eyes, Lungs, Skin	Eyes, Skin, Mouth

*ARMY FIELD MANUAL NO. 8-10-7. Health Service Support in a Nuclear, Biological, and Chemical Environment.

- **Biotoxins:** OSHA defines as biological agents include bacteria, viruses, fungi, other microorganisms and their associated toxins. They have the ability to adversely affect human health in a variety of ways, ranging from relatively mild, allergic reactions to serious medical conditions, even death.
  Properties of Selected Biological Agents

BW Agents[1]	Likely Methods of Dissemination	Transmissibility Person-to-Person	Infectivity	Lethality[2]	Stability[2]
Anthrax (Inhalation)	Spores in aerosols	None	Moderate	High	Spores are highly stable
Brucellosis	1. Aerosol 2. Sabotage (food supply)	None	High	Low	Long persistence in wet soil and food
Cholera	1. Sabotage (food/water supply) 2. Aerosol	Negligible	Low	Moderate to high	Unstable in aerosol and pure water; more so in polluted water
Glanders	Aerosol	DNA	DNA	DNA	DNA
Melioidosis	Aerosol	Negligible	High	Variable	Stable
Plague (Pneumonic)	1. Aerosol 2. Infected Vectors	High	High	Very high	Less important because of high transmissibility
Psittacosis	Aerosol	Negligible	Moderate	Very low	Stable
Shigellosis	Sabotage (Food/Water Supply)	DNA	DNA	DNA	DNA
Tularemia	Aerosol	Negligible	High	Moderate if untreated	Not very stable
Typhoid Fever	1. Sabotage (food/water supply) 2. Aerosol	Negligible	Moderate	Moderate if untreated	Unknown
Q Fever	1. Aerosol 2. Sabotage (food supply)	None	High	Very low	Stable
Rocky Mountain Spotted Fever	1. Aerosol 2. Infected Vectors	None	High	High	Not very stable
Trench Fever	1. Aerosol 2. Vector	None	DNA	Low	DNA
Typhus Fever	1. Aerosol 2. Infected vectors	None	High	High	Not very stable
Chikungunya	Aerosol	None	High	Very low	Relatively stable
Crimean-Congo Hemorrhagic Fever	Aerosol	Moderate	High	High	Relatively stable
Dengue Fever	Aerosol	None	High	Low	Relatively unstable
Eastern Equine Encephalitis	Aerosol	None	High	High	Relatively unstable
Western Equine Encephalitis	Aerosol	None	High	Low	Relatively unstable
Ebola Fever	Aerosol	Moderate	High	High	Relatively unstable
Far Eastern Tick-borne Encephalitis	1. Aerosol 2. Milk	None	High	Moderate	Relatively unstable
Hantaan Virus (Korean HFV)	Aerosol	None	High	Moderate	Relatively stable
Juinn Hemorrhagic Fever	Aerosol	DNA	DNA	DNA	DNA

- **Choking agents:** The Center for Disease Control and Prevention (CDC) defines choking agents or pulmonary agents as chemicals that cause severe irritation or swelling of the respiratory tract (lining of the nose, throat, and lungs). Chart not available.
- **Systemic/Blood Agents:** The Center for Disease Control and Prevention (CDC) defines blood agents as poisons that affect the body by being absorbed into the blood. Chart not available.

OTHER TOXIC CHEMICALS

In addition to traditional chemical warfare agents, the OPFOR may find creative and adaptive ways to cause chemical hazards using chemicals commonly present in industry or in everyday households. In the right combination, or in and of themselves, the large-scale release of such chemicals can present a health risk, whether caused by military operations, intentional use, or accidental release.

Toxic Industrial Chemicals

Toxic industrial chemicals (TICs) are chemical substances with acute toxicity that are produced in large quantities for industrial purposes. Exposure to some industrial chemicals can have a lethal or debilitating effect on humans. They are a potentially attractive option for use as weapons of opportunity or WMD because of—

- The near-universal availability of large quantities of highly toxic stored materials.
- Their proximity to urban areas.
- Their low cost.

- The low security associated with storage facilities.

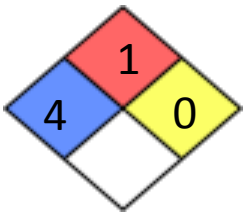
Employing a TIC against an opponent by means of a weapon delivery system, whether conventional or unconventional, is considered a chemical warfare attack, with the TIC used as a chemical agent. The target may be the enemy's military forces or a civilian population.

SULFUR MUSTARD: BLISTER AGENT



Sulfur Mustard





NFPA 704 Signal

AGENT CHARACTERISTICS	SPECIFICATIONS		ROUTES OF EXPOSURE	SPECIFICATIONS
Alternative designations:	HD (distilled sulfur mustard), Mustard, Mustard gas		Inhalation:	Yes
Military designation:	HD		Ingestion:	Yes
Chemical abstracts service number:	505-60-2		Skin/eye absorption:	Yes
UN Number	2810		METHODS OF DISSEMINATION	
Date of introduction:	1822		Indoor air:	Yes
Chemical Formula:	$C_4H_8Cl_2S$		Water:	Yes
Appearance:	Liquid	Food:	Yes	
Color:	Yellow or brown	Outdoor air:	Yes	
Description type agent:	Blister		Agricultural:	Yes
Description:	Blister agent (vesicant) that causes severe, delayed burns to the eyes, skin, and respiratory tract.		Indoor air:	Yes
Lethality:	Yes		Agricultural:	Yes
Nonpersistent:	No		Historic usage*:	Yes
Flammability*:	1			
Health*:	4			
Instability/reactivity*:	0			
Flashpoint° (F):	219.2			
Boiling Point ° (F):	422.6			

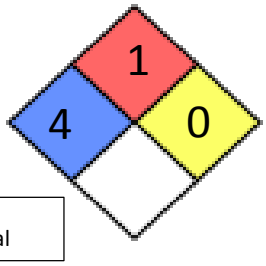
NOTES:

DESCRIPTION: MUSTARD GAS IS A VESICANT THAT WAS FIRST USED IN CHEMICAL WARFARE IN WORLD WAR I (EVEN THOUGH DISCOVERED PREVIOUSLY). IT CONSISTS OF AN OILY LIQUID OR CLEAR VAPOR. THE

UN REPORTS ‘AFTER WWI’ THE FOLLOWING USAGES OF HD : RUSSIA (1919), MOROCCO (1923-1926), ABYSSINIA (1935-1940), MANCHURIA (1937-1945), YEMEN (1963-1967), IRAQ/IRAN (1982-1988), POSSIBLE SYRIA (2014). UN #: 2810 (GUIDE 153). CDC REPORTS HD DAMAGES CELLS WITHIN MINUTES OF CONTACT; HOWEVER, PAIN AND OTHER HEALTH EFFECTS ARE DELAYED UNTIL HOURS AFTER EXPOSURE. HD IN LARGE DOSES CAN BE FATAL. HD IS 2 TO 5 TIMES MORE PERSISTENT IN WINTER THAN IN SUMMER. UN #: 2810 (GUIDE 153). THE CDC STATES THAT HD AFFECTS THE NERVOUS SYSTEM CAUSING "CHOLINERGIC TOXICITY" WITH THE FOLLOWING SYMPTOMS: EXCESSIVE SALIVA, TEARS AND URINE; GASTROINTESTINAL (GI) CRAMPING AND DIARRHEA; VOMITING (EMESIS); AND CONSTRICTED OR PINPOINT PUPILS (MIOSIS). HD HAS AN ODOR OF GARLIC, ONION, HORSERADISH, OR MUSTARD.

SARIN: CHEMICAL NERVE AGENT





NFPA 704 Signal

AGENT CHARACTERISTICS	SPECIFICATIONS	ROUTES OF EXPOSURE	SPECIFICATIONS
Alternative designations:	Trilone, Zarin	Inhalation:	Yes
Military designation:	GB	Ingestion:	Yes
Chemical abstracts service number:	107-44-8	Skin/eye absorption:	Yes
UN Number	2810	Ingestion:	Possible
Date of introduction:	1938	METHODS OF DISSEMINATION	
Chemical Formula:	$C_4H_{10}FO_2P$	Indoor air:	Yes
Appearance:	Liquid	Water:	Yes
Color:	Clear	Food:	Yes
Description type agent:	Nerve	Outdoor air:	Yes
Description:	Chemically similar to Organophospate	Agricultural:	Yes
Lethality*:	Yes	Indoor air:	Yes
Nonpersistent:	Yes	Agricultural:	Yes
Flammability*:	1	Historic usage*:	Yes
Health*:	4		
Instability/reactivity*:	0		
Flashpoint° (F):	>536		
Boiling Point ° (F):	297		

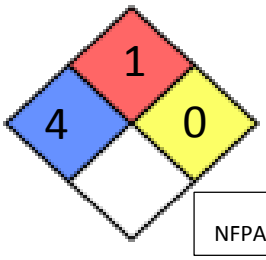
NOTES:

SARIN HAS BEEN USED BY REGULAR AND CRIMINAL ELEMENTS. MARCH 1995, AUM SHINRIKYO RELEASED SARIN GAS IN A TOKYO SUBWAY, 12 DEAD. IRAQI MILITARY USED SARIN DURING IRAN-IRAQ WAR (1980-1988) KILLING 26,000. LETHALITY: DEATH WITHIN MINUTES = 1 TO 10 MILLILITER (ML) ON SKIN ABSORPTION. INDICTORS OF ATTACK: ENEMY MOVING DECONTAMINATION UNITS FORWARD. ENEMY PUTTING ON CHEMICAL PROTECTIVE EQUIPMENT. SEVERE SIGNS OF EXPOSURE: LOSS OF CONSCIOUSNESS; SEIZURES, PARALYSIS; DEATH. SYMPTOMS: SKIN EXPOSURE: PROFUSE SWEATING, MUSCULAR TWITCHING, NAUSEA, VOMITING, DIARRHEA, AND WEAKNESS. INHALATION EXPOSURE: PINPOINT PUPILS, RUNNY NOSE, SHORTNESS OF BREATH.

VX: Nerve Agent



VX nerve agent



NFPA 704 Signal

AGENT CHARACTERISTICS	SPECIFICATIONS	ROUTES OF EXPOSURE	SPECIFICATIONS
Alternative designations:	**Methylphosphonothioic acid, O-ethyl S-(2-diisopropylaminoethyl) methylphosphonothiolate**	**Inhalation:**	**Yes**
Military designation:		**Ingestion:**	**Yes**
Chemical abstracts service number:	**50782-69-9**	**Skin/eye absorption:**	**Yes**
UN Number	**2810**	**METHODS OF DISSEMINATION**	
Date of introduction:	**Early 1950s**	**Indoor air:**	**Yes**
Chemical Formula:	**$C_{11}H_{26}NO_2PS$**	**Water:**	**Yes**
Appearance:		**Outdoor air:**	**Yes**
Color:	Clear, Amber	**Agricultural:**	**Possible**
Description type agent:	**Nerve**	**Historic usage:**	
Description:	**One of the most toxic tasteless and odorless human-made chemical warfare agents**		
Lethality:	**Yes**		
Nonpersistent:	**No**		
Flammability:	**1**		
Health:	**4**		
Instability/reactivity:	**0**		
Flashpoint° (F):	**318.2**		
Boiling Point ° (F):	**568.4**		

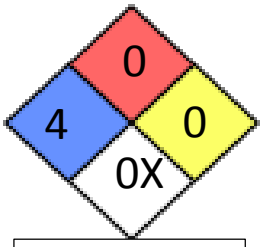
NOTES:

SYMPTOMS AND EFFECTS: BLURRED VISION, CONFUSION, DROOLING, EXCESSIVE SWEATING, COUGH, NAUSEA, DIARRHEA, SMALL PINPOINT PUPILS, CONVULSIONS, LOSS OF CONSCIOUSNESS, PARALYSIS, RESPIRATORY FAILURE POSSIBLY LEADING TO DEATH.

CHLORINE: CHOKING (LUNG DAMAGING) AGENT



WWI Chlorine Attack



NFPA 704 Signal

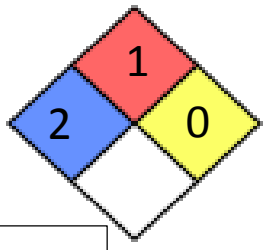
AGENT CHARACTERISTICS	SPECIFICATIONS	ROUTES OF EXPOSURE	SPECIFICATIONS
Alternative designations:	Molecular chlorine	Inhalation:	Yes
Military designation:		Ingestion:	Yes
Chemical abstracts service number:	7782-50-5	Skin/eye absorption:	Yes
UN Number	1017	METHODS OF DISSEMINATION	
Date of introduction:		Indoor air:	Yes
Chemical Formula:	Cl_2	Water:	Yes
Appearance:	Gas	Food:	Unlikely
Color:	Greenish Yellow	Outdoor air:	Yes
Description type agent:	Choking	Agricultural:	Unlikely
Description:	Toxic gas with corrosive properties.	Indoor air:	Yes
Lethality:	Yes	Historic usage*:	Yes
Nonpersistent:	Yes		
Flammability:	0		
Health*:	4		
Instability/reactivity*:	0		
Flashpoint° (F):	INA		
Boiling Point ° (F):	-30.3		

NOTES:

CHLORINE IS USED AS AN INDUSTRIAL/HOUSEHOLD CLEANER/DISINFECTANT. IT IS USES RANGE FROM WATER TREATMENT TO CHEMICAL WARFARE (DATING BACK TO WORLD WAR I). PERSISTENCE: MINUTES TO HOURS. UN NUMBER: 1017. SYMPTOMS: BLURRED VISION. BURNING SENSATION IN THE NOSE, THROAT, AND EYES, COUGHING CHEST TIGHTNESS, DIFFICULTY BREATHING OR SHORTNESS OF BREATH, NAUSEA AND VOMITING, WATERY EYES, WHEEZING, LUNG PROBLEMS AND DEATH. BBC REPORTS POSSIBLE CHLORINE ATTACKS IN SYRIA IN APRIL/MAY 2014 AND MARCH 2015. UN SUPPORTED THE ABOVE STATEMENT WITH THE FOLLOWING: “HIGH DEGREE OF CONFIDENCE, THAT CHLORINE HAD BEEN USED AS A WEAPON IN THREE VILLAGES IN NORTHERN SYRIA FROM APRIL TO AUGUST 2014.”

CHLOROACETOPHENONE: Riot Control/Tear Agent





NFPA 704 Signal

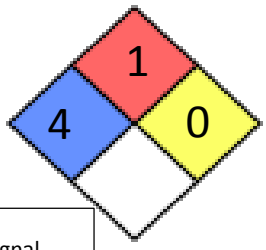
AGENT CHARACTERISTICS	SPECIFICATIONS	ROUTES OF EXPOSURE	SPECIFICATIONS
Alternative designations:	2-Chloro-1-phenylethanone, 2-Chloroacetophenone, alpha-Chloroacetophenone, Chemical mace, Chloromethyl phenyl ketone, Phenyl chloromethylketone, Tear gas	Inhalation:	Yes
Military designation:	CN	Ingestion:	Yes
Chemical abstracts service number:	532-27-4	Skin/eye absorption:	Yes
UN Number	1697	METHODS OF DISSEMINATION	
Date of introduction:		Indoor air:	Yes
Chemical Formula:	C_8H_7ClO	Water:	Yes
Appearance:	Gas	Outdoor air:	Yes
Color:	Gray, white, or colorless	Agricultural:	Possible
Description type agent:	Riot Control/Tear Agent	Indoor air:	Yes
Description:	Military and law enforcement use CN for riot control.	Historic usage:	Yes
Lethality:	Yes*		
Nonpersistent:	Yes		
Flammability:	1		
Health*:	2		
Instability/reactivity*:	0		
Flashpoint° (F):	244		
Boiling Point ° (F):	472-473		

NOTES:
EXPOSURE (MILD TO MODERATE): RUNNY NOSE, EYE IRRITATION, COUGHING, SNEEZING, DIFFICULTY BREATHING, SHORTNESS OF BREATH, CHOKING, BURNING SENSATION, NAUSEA, VOMITING. (SEVERE): FLUID IN LUNGS, NARROWING OF AIRWAYS, FAINTING, INCREASED HEART RATE, LONG TERM EXPOSURE IN CONFINED SPACE CAN IN RARE INSTANCES CAUSES DEATH.

RICIN: Biotoxin



Caster Beans



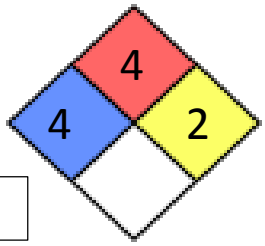
NFPA 704 Signal

AGENT CHARACTERISTICS	SPECIFICATIONS	ROUTES OF EXPOSURE	SPECIFICATIONS
Alternative designations:	Ricine, Ricins	Inhalation:	Yes
Military designation:		Ingestion:	Yes
Chemical abstracts service number:	9009-86-3	Skin/eye absorption:	Possible
UN Number	3462	METHODS OF DISSEMINATION	
Date of introduction:	INA	Indoor air:	Yes
Chemical Formula:	INA	Water:	Yes
Appearance:	Powder, Liquid, Crystalline	Outdoor air:	Yes
Color:	White	Agricultural:	Possible
Description type agent:	Biotoxin	Historic usage:	Yes
Description:	Toxic protein from Castor Bean plant		
Lethality:	Yes		
Nonpersistent:			
Flammability:	1		
Health*:	4		
Instability/reactivity*:	0		
Flashpoint° (F):	INA		
Boiling Point ° (F):	INA		

NOTES:

SYMPTOMS AND EFFECTS: RICIN INGESTION GENERALLY APPEARS WITHIN A FEW HOURS AFTER CONSUMPTION; HOWEVER, SOME PATIENTS CAN BE ASYMPTOMATIC FOR A PERIOD OF TIME. FEVER, COUGH, RESPIRATORY DISTRESS, BURING OF THE THROAT, ACCUMULATION OF FLUID IN THE LUNGS. RICIN ATTACKS THE LIVER, CENTRAL NERVOUS SYSTEM, KIDNEYS, AND ADRENAL GLANDS (2 TO 5 DAYS AFTER EXPOSURE). 3-5 DAYS AFTER CONTACT MAY LEAD TO DEATH.

HYDROGEN CYANIDE: SYSTEMIC AGENT



NFPA 704 Signal

AGENT CHARACTERISTICS	SPECIFICATIONS	ROUTES OF EXPOSURE	SPECIFICATIONS
Alternative designations:	Formonitrile, Hydrocyanic acid, Prussic acid	Inhalation:	Yes
Military designation:	AC	Ingestion:	Yes
Chemical abstracts service number:	74-90-8	Skin/eye absorption:	Yes
UN Number	1051	Historic usage*:	Yes
Date of introduction:		METHODS OF DISSEMINATION	
Chemical Formula:	HCN	Indoor air:	Yes
Appearance:		Water:	Yes
Color:	Colorless or pale blue	Food:	Yes
Description type agent:	systemic chemical asphyxiant	Outdoor air:	Yes
Description:	interferes with the normal use of oxygen by nearly every organ of the body	Agricultural:	Possible
Lethality*:	Yes	Indoor air:	Yes
Nonpersistent:	No	Historic usage:	Yes
Flammability*:	4		
Health*:	4		
Instability/reactivity*:	2		
Flashpoint° (F):	0		
Boiling Point ° (F):	78		

NOTES:

THE CDC REPORTS THAT AFTER INHALATION EXPOSURE, SYMPTOMS BEGIN WITHIN SECONDS TO MINUTES; DEATH MAY OCCUR WITHIN MINUTES. AFTER SKIN EXPOSURE, ONSET OF SYMPTOMS MAY BE IMMEDIATE OR DELAYED FOR 30 TO 60 MINUTES. INGESTION OF HYDROGEN CYANIDE (AC) SOLUTIONS OR CYANIDE SALTS CAN BE RAPIDLY FATAL.

RUSSIAN DECONTAMINATION/SMOKE GENERATOR VEHICLE TMS-65M



SYSTEM	SPECIFICATIONS	FEATURES (CONT.)	SPECIFICATIONS
System		Max Swim:	INA
Alternative Designations:	None	Fording Depths (M):	1.5
Date Of Introduction:	INA	Radios, Frequency, And Range:	INA
Proliferation:	At Least 1 Country	Nozzle Movement:	Yes
Description:		Traverse:	90
Crew:	2	Elevation	12
Troop Capacity:	INA	Depression	23
Chassis:	Ural 4320, 6x6	Operating RPM's of Turbine Engine:	INA
Combat Weight (Mt):	INA	Idle Speed (rpm):	INA
Length Overall (M):	7.3	Max Effective Speed (rpm):	INA
Height Overall (M):	2.5	Ability to Generate on the Move:	Yes
Width Overall (M)	2.8	Performance Characteristics:	
Ground Pressure (Kg/Cm2):	INA	Engine Name:	VK-1A modified gas turbine
Automotive Performance:		Fuel Type:	INA

Engine Type:	**YaMZ-238M2; V-8 liquid cooled diesel**	**Fuel Capacity (l):**	**INA**
HP:	**240**	**Operating Time (min):**	**60**
Cruising Range (Km):	**1040**	**Time to Initiate Smokescreen (min):**	**10**
Speed (Km/H):		**Generator Efficiency (%):**	**96**
Max Road:	**82**	**Smoke Screening System:**	**Yes**
Max Off-Road:	**INA**	**Emplacement Time:**	**10-12 minutes**
		Displacement Time:	**10-12 minutes**

NOTES

SMOKE GENERATOR: PHYSICAL CHARACTERISTICS: NAME: INA. LENGTH (M): INA. HEIGHT (M): INA. WIDTH (M): INA. NUMBER OF NOZZLES: 6 LOCATION OF NOZZLE: INA. NOZZLE ORIFICE SIZE (M): INASMOKE AGENT: GOST 305-73. NOMENCLATURE: GOST-305-82 PETROLEUM OBSCURANTS: MANMADE AGENTS. CLOUD COLOR: WHITE. CAPACITY OF SMOKE AGENT (L): 1500. SMOKE AGENT CONSUMPTION RATE (L/HR): 1500. ODOR: FAINT SULFUR. PROTECTION REQUIRED: NONE. THE TMS-65M IS PRIMARILY USED FOR THE DECONTAMINATION OF VEHICLES AND EQUIPMENT WHETHER STATIONARY OR ON THE MOVE. ADDITIONALLY, THE SYSTEM CAN BE USED TO DECONTAMINATE GROUND AND HARD SURFACE ROADS AS WELL AS PRODUCE PROTECTIVE SMOKESCREENS. THE VK-1 TURBINE ENGINE (A MODIFIED MIG-17 ENGINE) ALONG WITH A SEALED CONTROL CAB IS MOUNTED ON AN URAL 4320, 6X6 TRUCK CHASSIS. THE TURBINE ENGINE CAN BE MOVED VERTICALLY OR HORIZONTALLY BY CONTROLS LOCATED IN THE OPERATOR'S CONTROL CAB. THE OPERATOR'S CONTROL CAB IS FIXED TO THE LEFT SIDE OF THE TURBINE ENGINE AND IS EQUIPPED WITH FLOODLIGHTS FOR LIMITED VISIBILITY OPERATIONS. TWO 1500-LITER TANKS ARE MOUNTED ACROSS THE FRONT OF THE TRUCK BED BETWEEN THE DRIVER'S CAB AND THE TURBINE ENGINE. ONE TANK IS USED FOR OBSCURANT, DECONTAMINANTS, OR WATER AND THE OTHER TANK IS USED FOR THE FUEL TO POWER THE TURBINE ENGINE. THE OBSCURANT, DECONTAMINANT, OR WATER IS FED THROUGH PIPES INTO THE TURBINE ENGINE EXHAUST STREAM. DEPENDING UPON THE SIZE AND LEVEL OF CONTAMINATION THE TMS-65M IS CAPABLE DECONTAMINATING EQUIPMENT AT A RATE OF 30 SECONDS TO 3 MINUTES PER ITEM.

Slovakian Decontamination/Smoke Generator Vehicle TZ-74



SYSTEM	SPECIFICATIONS	FEATURES (CONT.)	SPECIFICATIONS
System		Max Swim:	
Alternative Designations:	None	Fording Depths (M):	
Date Of Introduction:	INA	Radios, Frequency, And Range:	
Proliferation:	3	Nozzle Movement:	
Description:		Traverse:	120
Crew:	2	Elevation	30
Troop Capacity:	INA	Depression	20
Chassis:	Tatra 148 PPR 15, 6x6	Operating RPM's of Turbine Engine:	13,000 rpm (equals 84%)
Combat Weight (Mt):	21.9	Idle Speed (rpm):	5400
Length Overall (M):	8.49	Max Effective Speed (rpm):	1400
Height Overall (M):	2.5	Ability to Generate on the Move:	No
Width Overall (M)	3.2	Performance Characteristics:	
Ground Pressure (Kg/Cm2):	INA	Engine Name:	Type M701 C-500
Automotive Performance:	Tatra 2-298-1	Fuel Type:	Diesel
Engine Type:	V-8 air cooled diesel	Fuel Capacity (l):	2,000
HP:	1200	Operating Time (min):	22

Cruising Range (Km):	**400**	**Time to Initiate Smokescreen (min):**	**1**
Speed (Km/H):	**INA**	**Generator Efficiency (%):**	**98**
Max Road:	**71**	**Smoke Screening System:**	**INA**
Max Off-Road:	**INA**	**Emplacement Time:**	**approximately 10-12 minutes**
		Displacement Time:	**approximately 10-12 minutes**

NOTES

THE TZ-74 IS PRIMARILY USED FOR THE DECONTAMINATION OF VEHICLES AND EQUIPMENT WHETHER STATIONARY OR ON THE MOVE. ADDITIONALLY, THE SYSTEM CAN BE USED TO DECONTAMINATE GROUND AND HARD SURFACE ROADS AS WELL AS PRODUCE PROTECTIVE SMOKESCREENS. THE TZ-74 IS BASED ON THE CHASSIS OF THE TATRA 148 PPR 15, 6X6 TRUCKS. THE SYSTEM USES A GAS TURBINE ENGINE TO GENERATE A SMOKE SCREEN OVER A LARGE AREA. THE GAS TURBINE IS MOUNTED ON THE REAR OF THE VEHICLE WITH THE OPERATOR'S CABIN ON THE LEFT-HAND SIDE, AND AN OBSCURANT TANK ON THE RIGHT-HAND SIDE. THE REMAINDER OF THE REAR OF THE VEHICLE CONSISTS OF STORAGE TANKS FOR LIQUIDS AND FUEL FOR THE TURBINE ENGINE. A SMOKESCREEN IS CREATED AS A RESULT OF THE INTRODUCTION OF OIL, DIESEL FUEL, OR A COMBINATION OF BOTH INTO THE EXHAUST NOZZLE OF THE TURBINE ENGINE. THE INTRODUCTION OF THE MIXTURE INTO THE TURBINE ENGINES EXHAUST CAUSES AN IMMEDIATE DISPERSION AND EVAPORATION OF THE MIXTURE THAT CONDENSES IN THE COOLER PART OF THE STREAM AFTER EXPULSION FROM THE MOTOR.

THE TZ-74 CAN PRODUCE SMOKE IN ABOUT A MINUTE AFTER THE TURBINE ENGINE IS TURNED ON. ALTHOUGH THE JET ENGINE HAS ENOUGH FUEL TO OPERATE FOR 3 HOURS, ITS MISSION TIME IS SEVERELY LIMITED BY THE CAPACITY OF THE INTERNAL LIQUID SOURCES AVAILABLE. HOWEVER, IF EXTERNAL SOURCES ARE USED, THE MISSION TIMES ARE DRAMATICALLY INCREASED. THE MAIN DECONTAMINANT TANK HAS A 5,000-LITER CAPACITY. THE FOG OIL TANK HAS A 200-LITER CAPACITY. THE FUEL TANK FOR THE GAS TURBINE HAS A 2,000-LITER CAPACITY.


TRADOC
G-2