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OPFOR

WORLDWIDE EQUIPMENT GUIDE

TRADOC DCSINT Threat Support Directorate

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Introduction

This Worldwide Equipment Guide (WEG) serves as an interim guide for use in training, simulations, and modeling until the publication of FM 100-65, *Capabilities-Based Opposing Force: Worldwide Equipment Guide.* The WEG is designed for use with the FM 100-60 series of capabilities-based opposing force field manuals. It provides the basic characteristics of selected equipment and weapons systems readily available to the capabilities-based OPFOR, and generally listed in either *FM 100-61, Armor- and Mechanized-Based Opposing Force: Organization Guide* or *FM 100-63, Infantry-Based Opposing Force: Organization Guide.* Selected weapons systems and equipment are included in the categories of infantry weapons, infantry vehicles, reconnaissance vehicles, tanks/assault vehicles, antitank, artillery, air defense, engineer and logistic systems, rotary- and fixed-wing aircraft, and communications equipment.

The pages in this WEG are designed for insertion into loose-leaf notebooks. Since this guide does not include all possible OPFOR systems identified in the OPFOR field manuals, equipment sheets covering additional systems not contained in this initial issue will be published periodically. Systems selected will be keyed directly to baseline equipment contained in the 100-60 series and substitute systems in the appropriate substitution matrix. The WEG is scheduled for eventual publication on the worldwide web for use by authorized government organizations.

WORLDWIDE OPFOR EQUIPMENT

Due to the proliferation of weapons through sales and resale, wartime capture, and licensed or unlicensed production of major end items, distinctions between equipment as friendly or OPFOR have blurred. Sales of upgrade equipment and kits for application to weapon systems have further blurred distinctions between old or obsolete systems and modern systems. This WEG describes base models listed in the FMs or upgrades of those base models, which reflect current capabilities. Many less common variants and upgrades are also addressed.

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 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. Please consult the Glossary often. If questions remain, contact this office.

System names refer back to the field manuals. However, they also 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 antitank guided missile launcher or 9P148 ATGM launcher vehicle), versus a component or munition (9P135 launcher assembly or AT-4/5 ATGM).

Many common technical notes and parameters are used in chapters 2 through 7, since the systems contained in those chapters have similar weapon and automotive technologies. Chapters 1 (Infantry Weapons), 8 (Engineer and Logistics) and 9 (Rotary-wing Aircraft) offer systems that have many unique parameters and therefore may not be consistent with those in other chapters.

Please note the updated Threat Support Directorate website. The WEG and other TSD products can be downloaded at: http://leav-www.army.mil/threats/index/index.htm.

We solicit your assistance in finding unclassified information which is not copyright-restricted, and which can be certified for use. Questions and comments on systems data should be addressed to the author noted for each chapter. For general questions concerning production, content, and distribution to U.S. government organizations please contact:

Mr. Tom Redman
DSN: 552-7925 Commercial (913) 684-7925
e-mail address: redmant@leav-emh1.army.mil

Units of Measure

The following symbols and abbreviations are used in this guide.

Unit of Measure	Parameter
(°)	degrees of slope/gradient, elevation, traverse
cal	caliber–(tube length in multiples of cannon bore)
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
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 capac ity
m/hr	meters per hour–operating speed (earth moving)
MHz	megahertz–frequency (MHz = 1 million hertz)
mach	mach + *(factor)* –aircraft velocity (See Glossary)
min	minute(s)
mm	millimeter(s)
m/s	meters per second–velocity
mt	metric ton(s) (mt = 1,000 kg)
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.

DEPARTMENT OF THE ARMY
TRADOC DCSINT, Threat Support Directorate
700 Scott Avenue, Bldg 53
FORT LEAVENWORTH, KS 66027-1323

REPLY TO
ATTENTION OF

ATIN-L-T (71) 26 Jul 99

MEMORANDUM FOR: See Distribution

SUBJECT: Worldwide Equipment Guide (WEG) Update 1-99

1. This is the first quarterly supplement to the WEG, printed 21 Jan 99. This first supplement proved much larger than originally intended, because it was expanded to support —

- The Close Combat Tactical Trainer (CCTT).
- FMs 100-60 (Armor- and Mechanized-Based Opposing Force Organization Guide) and 100-63 (Infantry-Based Opposing Force Organization Guide). See systems on unit tables and equipment substitution matrices of applicable FMs (Enclosure 1).
- The current estimate of the spectrum of worldwide systems, to reflect technological and proliferation trends.
- Ongoing U.S. Army operations.

2. The WEG (Enclosure 2) is organized as a loose-leaf document to permit page changes (see page xi). An errata sheet is included, with notes which reflect minor changes to the previous WEG addition. Replacement pages will not be published at this time to reflect those minor notes.

3. Please note the updated TSD web site: **http://leav-www.army.mil/threats/index/index.htm .**

4. Due to postage costs and to ensure that customers continue receiving updates, TSD would like to verify its list of customer addresses. Therefore, TSD asks that each recipient notify us with a confirmed or corrected address. E-mail notification is preferred, which will add your organization to our E-mail list, for future OPFOR information notices. If TSD does not receive a response, we cannot ensure that your organization will continue to receive updates. Contact Mr. Tom Redman, DSN 552-7925, Commercial (913) 684-7925--e-mail address: redmant@leav-emh1.army.mil. For specific comments please contact authors noted in chapter introductions.

2 Encls
as

NICHOLAS C. COMER
GS-14, Director
Threat Support Directorate

TRADOC DCSINT TSD OPFOR BASELINE DOCUMENTATION

The following tables list TSD products currently available for use in OPFOR development and application. The TSD-produced FM 100-60 series is the most recent documentation, and is posted at the TSD web site: **http://leav-www.army.mil/threats/index/index.htm** .

TSD-PUBLISHED FIELD MANUALS

Document No.	Document Title	Published	Posted on Web Site
FM 100-60	Armor- and Mechanized-Based Opposing Force: Organization Guide	16 Jul 97	Yes PDF File
	Replaced TP 350-12		
FM 100-61	Armor- and Mechanized-Based Opposing Force: Operational Art	26 Jan 98	Yes HTML File
	Replaced TP 350-14		
FM 100-63	Infantry-Based Opposing Force: Organization Guide	18 Apr 96	Yes HTML File
	Replaced TP 350-13		

Those TRADOC OPFOR Pams not yet replaced by FMs remain in effect as the best available source on the subject matter covered in them. Print media publication of FM 100-62 is currently on hold, but final draft chapters are posted on the TSD web site home page. That draft takes precedence over TP 350-16, except for yet to be posted C^2 and Offense chapters. Until the chapters are posted, use those chapters in TP 350-16 (except when content conflicts with FMs 100-62, 60, or 61). In that instance the FM version takes precedence, as the latest TSD guidance. When all chapters of FM 100-62 are posted on the web site, users should cease using TP 350-16.

UNPUBLISHED FM'S AND OTHER TSD DOCUMENTS

Document No.	Document Title	Published	Posted on Web Site
FM 100-62	Armor- and Mechanized-Based Opposing Force: Tactics (Final Draft)	No	Yes PDF File
	Replaces TP 350-16		
TP 350-15	Light Opposing Force (OPFOR) Operational Art Handbook	15 Sep 94	Planned HTML File
TP 350-17	Light Opposing Force (OPFOR) Tactics Handbook	15 Apr 95	Planned HTML File
N/A	Worldwide Equipment Guide	21 Jan 99 w/updates	Yes PDF File
FM 100-66	Unconventional and Insurgent-Based Opposing Forces (Final Draft)	No	No
	To be Posted		

ERRATA NOTES

The following changes reflect updated information about data in preceding editions of the Worldwide Equipment Guide. We recommend that users note the changes in their copies. In a future edition, we will incorporate changes into published pages.

Page	Change
2-5	Under VARIANTS, delete: 1V118 Reostat. This vehicle is not artillery-related. See sheet for ACRV 1V119.
2-9	Under VARIANTS, after Artillery command and reconnaissance vehicles: Change to: ACRV 1V18 and 1V19 are battery and battalion command and observation vehicles, respectively.
4-13	Under line drawing, add the following entry: T-62M with Bra Armor After Applique Armor (mm): Bra armor ..., add is common
4-15	Under **VARIANTS**, add the following entry: **T-72B1**: Variant introduced in 1986 without ATGM launch capability.
4-15	Under **VARIANTS**, add the following entry: **T-72BV:** Under the Russian naming scheme, a T-72B with ERA could be expected to add V to the name.
6-17	Page change to 6-14.1, to better reflect page order.
7-12	SA-8b/GECKO, change page number to 7-12.2.
8-9	Page change to 8-10, to better reflect page order.
8-14	Under **VARIANTS**, add the following entry: **TZ 8-255B:** POL truck, capacity 8,000 liters.

Supplement Page Changes

For this supplement please make page changes as noted below:

System	Page	Change
Table of Contents	iii, iv	Replace pgs i, ii
Introduction	vii, viii*	Replace pgs iii, iv
Units of Measure, Errata	ix, x	Replace pg v, Add x
Supplement Page Changes	xi, xii	Add
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M36 Self-Propelled Antitank Gun	5-4.1,2	Replace/Add
Red Arrow 8 ATGM Launcher	5-19, 20	Add
CHAPTER 6 Introduction	6-1	Replace
1V13 ACRV	6-2.1	Add
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System	Page	Change
SA-16/GIMLET Manportable SAM System	7-10.1	Add
SA-18/GROUSE Manportable SAM System	7-11*	Replace
SA-3/GOA SAM System	7-12*	Add/Replace
SA-6/GAINFUL SAM System	7-12.1	Add
SA-8b/GECKO SAM System	7-12.2, .3	Replace for pg no.
SA-13b/GOPHER SAM System	7-13, 14*	Add/Replace
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Table: Tactical Frequency-Hopping Radios	11-7, 8	
Glossary	Glossary-1-6	Replace pgs 1-4

* Replace previously published equipment sheet because it backs up to added sheet.

DEPARTMENT OF THE ARMY
TRADOC DCSINT, Threat Support Directorate
700 Scott Avenue, Bldg 53
FORT LEAVENWORTH, KS 66027-1323

REPLY TO
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ATIN-L-T (71) 26 Jan 00

MEMORANDUM FOR: See Distribution

SUBJECT: Worldwide Equipment Guide (WEG) Semiannual Update 1-2000

1. This is our second supplement to the WEG, the first for the year 2000. We regret that budgetary and manpower limitations have compelled TSD to shift from a quarterly update schedule to semiannual updates. Therefore, coupled with the original publication in Jan 99, Update 1-99 was the only update for that year. This issue is intended to support—

- BCTP and WCOPFOR, particularly for Orangeland Scenario equipment data requirements.
- FMs 100-60 (Armor- and Mechanized-Based Opposing Force Organization Guide) and 100-63 (Infantry-Based Opposing Force Organization Guide). See systems on unit tables and equipment substitution matrices of applicable FMs (Enclosure 1).
- The current estimate of the spectrum of worldwide systems, to reflect technological and proliferation trends. The systems are also intended to reflect the expanding scope of U.S. Army training requirements.
- Ongoing U.S. Army operations.

2. The WEG (Enclosure 2) is organized as a loose-leaf document to permit page changes (see page xii). Errata sheets are included, with notes which reflect minor changes to pr e-vious WEG editions. Replacement pages will not be published at this time to reflect those minor notes.

3. Due to limited budget, TSD asks that users accept only one copy per office and either make xerox copies or download additional copies from the TSD web site.

4. The TSD web site is: **http://leav-www.army.mil/threats/index/index.htm** . Please note that our office has a new e-mail address, in which you may use the same POC E-mail name, then add @leavenworth.army.mil . For specific comments contact authors noted in chapter introductions. For general comments or questions, requests for distribution, or for address change, contact Tom Redman, DSN 552-7925, commercial (913) 684-7925, e-mail: redmant@leavenworth.army.mil.

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NICHOLAS C. COMER
GS-14, Director
Threat Support Directorate

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FM 100-60	Armor- and Mechanized-Based Opposing Force: Organization Guide	16 Jul 97	Yes PDF File
	Replaced TP 350-12		
FM 100-61	Armor- and Mechanized-Based Opposing Force: Operational Art	26 Jan 98	Yes HTML File
	Replaced TP 350-14		
FM 100-63	Infantry-Based Opposing Force: Organization Guide	18 Apr 96	Yes HTML File
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Those TRADOC OPFOR Pams not yet replaced by FMs remain in effect as the best avai l-able source on the subject matter covered in them. Print media publication of FM 100-62 is currently on hold, but final draft chapters are posted on the TSD web site home page. That draft takes precedence over TP 350-16, except for yet to be posted C^2 and Offense chapters. Until the chapters are posted, use those chapters in TP 350-16 (except when content conflicts with FMs 100-62, 60, or 61). In that instance the FM version takes precedence, as the latest TSD guidance. When all chapters of FM 100-62 are posted on the web site, users should cease using TP 350-16.

UNPUBLISHED FM'S AND OTHER TSD DOCUMENTS

Document No.	Document Title	Published	Posted on Web Site
FM 100-62	Armor- and Mechanized-Based Opposing Force: Tactics (Final Draft)	No	Yes PDF File
	Replaces TP 350-16		
TP 350-15	Light Opposing Force (OPFOR) Operational Art Handbook	15 Sep 94	Planned HTML File
TP 350-17	Light Opposing Force (OPFOR) Tactics Handbook	15 Apr 95	Planned HTML File
N/A	Worldwide Equipment Guide	21 Jan 99 w/updates	Yes PDF File
FM 100-66	Unconventional and Insurgent-Based Opposing Forces (Final Draft)	No	No
	To be Posted		

Chapter 1
Infantry Weapons

This chapter provides the basic characteristics of selected infantry weapons either in use or readily available to the OPFOR and therefore likely to be encountered by U.S. forces in varying levels of conflict. The selection of weapons is not intended to be all inclusive, rather a representative sampling of weapons and equipment supporting various military capabilities.

This chapter is divided into two categories—***small arms*** and ***recoilless weapons***. ***Small arms*** covers, in order, assault rifles, under-barrel grenade launchers, light machineguns, general purpose machineguns, heavy machineguns, and automatic grenade launchers. The second category, ***recoilless weapons***, contains the US 106-mm Recoilless Rifle M40 and the Russian 73-mm Recoilless Gun SPG-9. This category also covers a rapidly growing segment of shoulder-fired (unguided) infantry weapons. While originally limited to shoulder-fired unguided antitank weapons such as the Russian 40-mm Antitank Grenade Launcher RPG-7, the utility of shoulder-fired weapons has expanded to include multi-purpose systems such as the Swedish 84-mm Recoilless Rifle Carl Gustaf M2. This field of weapons is often labeled "antitank" and also includes "bunker-buster" warheads, and weapons fired from close spaces such as the German 67-mm Disposable Antitank Grenade Launcher Armbrust.

Another emerging 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 demolition 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. For information on guided antitank weapon systems see Chapter 5.

Questions and comments on data listed in this chapter should be addressed to:

Mr. Richard G. McCall
DSN: 552-7960 Commercial (913) 684-7960
e-mail address: mccallr@leav-emh1.army.mil

DEPARTMENT OF THE ARMY
TRADOC DCSINT, Threat Support Directorate
700 Scott Avenue, Bldg 53
FORT LEAVENWORTH, KS 66027-1323

REPLY TO
ATTENTION OF

ATIN-L-T (71) 7 Nov 00

MEMORANDUM FOR: See Distribution

SUBJECT: Worldwide Equipment Guide (WEG) Semiannual Update 2-2000

1. This is our third supplement to the WEG, the second for the year 2000. This issue is intended to support—

- FMs 100-60 (Armor- and Mechanized-Based Opposing Force Organization Guide) and 100-63 (Infantry-Based Opposing Force Organization Guide). See systems on unit tables and equipment substitution matrices of applicable FMs (Enclosure 1).
- The current estimate of the spectrum of worldwide systems, to reflect technological and proliferation trends. The systems are also intended to support the expanding scope of U.S. Army training.
- Ongoing U.S. Army operations and the operational environment.

2. The WEG (Enclosure 2) is organized as a loose-leaf document to permit page changes (see page xii). Accumulated Errata sheets for all the updates are included, with notes which reflect changes to previous WEG editions. We appreciate comments from users and the intelligence community. Replacement pages are selectively added to incorporate some of the more significant notes. *Please take the time to scan the Errata notes (pages x-xii).*

3. The Threat Support Directorate (TSD) would like to remind users that the WEG is not a product of the U.S. Army intelligence community. It was developed to support OPFOR portrayal in training simulations (constructive, virtual, and live) and activities, and is approved for that use.

4. Due to limited budget, TSD asks that users accept only one copy per office and either make xerox copies or download additional copies from the TSD web site. The TSD web site address is: **http://leav-www.army.mil/threats/index/index.htm .** We solicit your questions and comments. For specific comments contact authors noted in chapter introductions. For general comments or questions, requests for distribution, or for address change, contact Tom Redman, DSN 552-7925, commercial (913) 684-7925, e-mail: redmant@leavenworth.army.mil.

2 Encls
as

NICHOLAS C. COMER
GS-14, Director
Threat Support Directorate

TRADOC DCSINT TSD OPFOR BASELINE DOCUMENTATION

The following tables list TSD products currently available for use in OPFOR development and application. The TSD-produced FM 100-60 series is the most recent documentation, and is posted at the TSD web site: **http://leav-www.army.mil/threats/index/index.htm** .

TSD-PUBLISHED FIELD MANUALS

Document No.	Document Title	Published	Posted on Web Site
FM 100-60	Armor- and Mechanized-Based Opposing Force: Organization Guide	16 Jul 97	Yes PDF File
	Replaced TP 350-12		
FM 100-61	Armor- and Mechanized-Based Opposing Force: Operational Art	26 Jan 98	Yes HTML File
	Replaced TP 350-14		
FM 100-63	Infantry-Based Opposing Force: Organization Guide	18 Apr 96	Yes HTML File
	Replaced TP 350-13		

Those TRADOC OPFOR Pams not yet replaced by FMs remain in effect as the best available source on the subject matter covered in them. Print media publication of FM 100-62 is currently on hold, but final draft chapters are posted on the TSD web site home page. That draft takes precedence over TP 350-16, except for yet to be posted C^2 and Offense chapters. Until the chapters are posted, use those chapters in TP 350-16 (except when content conflicts with FMs 100-62, 60, or 61). In that instance the FM version takes precedence, as the latest TSD guidance. When all chapters of FM 100-62 are posted on the web site, users should cease using TP 350-16. The OPFOR Worldwide Equipment Guide is the interim guide for describing OPFOR equipment used in training simulations (constructive, virtual, and live) and modeling for the Battle Command Training Program, and for Army warfighting exe rcises.

UNPUBLISHED FM'S AND OTHER TSD DOCUMENTS

Document No.	Document Title	Published	Posted on Web Site
FM 100-62	Armor- and Mechanized-Based Opposing Force: Tactics (Final Draft)	No	Yes PDF File
	Replaces TP 350-16		
TP 350-15	Light Opposing Force (OPFOR) Operational Art Handbook	15 Sep 94	Planned HTML File
TP 350-17	Light Opposing Force (OPFOR) Tactics Handbook	15 Apr 95	Planned HTML File
N/A	Worldwide Equipment Guide	21 Jan 99 & updates	Yes PDF File
FM 100-66	Unconventional and Insurgent-Based Opposing Forces (Final Draft)	No	No
	To be Posted		

Russian 5.45-mm Assault Rifle AK-74

Ammunition Types	Typical Combat Load
5.45-mm cartridge Ball Ball-tracer Incendiary-T AP	**300**

SYSTEM

Alternative Designations: INA
Date of Introduction: 1974
Proliferation: Widespread

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
Feed: 30-rd detachable box magazine (40-rd used by RPK-74 LMG is interchangeable)
Fire Mode: Selective, automatic or semi-automatic

SIGHTS

Name: INA
Type: Fore, pillar; rear, U-notch
Magnification**:** None
Night Sights Available: Yes. AK-74M N3 mounts an NSPU-3

VARIANTS

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: Submachinegun: 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.
AK-105: 5.45x39-mm short-barrel (314-mm) variant of the AK-74M.

AMMUNITION

Name: 7N6
Caliber/length: 5.45x39-mm
Type: Ball
Range (m):
Effective: 500
Maximum: 800
Armor Penetration: INA
Muzzle Velocity (m/s): 880

Name: 7N10
Caliber/length: 5.45x39-mm
Type: Armor piercing
Range (m):
Effective: INA for AK-74 (800 for RPK-74)
Armor Penetration (mm): 16 @ 100 m 80% of time
Muzzle Velocity (m/s): INA for AK-74 (960 for RPK-74)

NOTES
The AK-74 is basically an AKM rechambered and rebored to fire a 5.45-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 5.45-mm infantry weapons including the RPK-74 light machinegun.

Russian 5.45-mm Light Machinegun RPK-74

Ammunition Types	Typical Combat Load
5.45-mm cartridge Ball Ball-tracer Incendiary-T AP	**320**

SYSTEM

Alternative Designations: INA
Date of Introduction: Late 1970s
Proliferation: Widespread

Description:
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

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

VARIANTS

RPKS-74: Folding stock

AMMUNITION

Name: 7N6
Caliber/length: 5.45x39-mm
Type: Ball
Range (m):
Effective: 800
Maximum: 1,000
Armor Penetration: INA
Muzzle Velocity (m/s): 960

Name: 7N10
Caliber/length: 5.45x39-mm
Type: AP
Range (m):
Effective: 800
Armor Penetration (mm): 16 @ 100 m 80% of time
Muzzle Velocity (m/s): 960

NOTES
The RPK-74 is the machinegun 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. The RPK-74 is the standard squad machinegun in OPFOR infantry units. It generally replaces both the RPK and PKM 7.62-mm weapons.

Russian 7.62-mm Assault Rifle AK-47/AKM

Ammunition Types	Typical Combat Load
7.62-mm cartridge Ball Tracer API Tracer Incendiary	**120**

SYSTEM

Alternative Designations: AK, Kalashnikov
Date of Introduction: 1949/1961
Proliferation: Widespread (over 50 million)
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
Operation: Gas
Feed: 30-round curved box magazine
Fire Mode: Selective, automatic or semi-automatic

SIGHTS

Name: INA
Type: Fore, pillar; rear, U-notch
Magnification: None
Night Sights Available: Yes

VARIANTS
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.
AKM: Improved AK-47, sights, magazine, and stock. Easier to manufacture with stamped receiver.
AKMS: Folding stock variant of AKM.

AMMUNITION

Name: M1943 (57N231)
Caliber/length: 7.62x39-mm
Type: Ball
Range (m):
Effective: 300
Maximum: 2,500
Armor Penetration: INA
Muzzle Velocity (m/s): 710

Name: M1943 (T-45)
Caliber/length: 7.62x39-mm
Type: Tracer
Range of Trace (m): 800
Muzzle Velocity (m/s): 718

NOTES
Photo is of an AKM. All 7.62-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 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 rechambered to fire a 5.45-mm x 39-mm cartridge. The 7.62-mm RPK light machinegun is based on the AK/AKM design while the RPK-74 is a machinegun version of the AK-74.

Sniper and Anti-materiel Rifle Threat

Summary: Sniper rifles in 7.62 mm have been used by all armies for many years. The accepted U.S. definition of sniper is a "highly skilled military marksman detailed to spot and pick off enemy troops from a concealed position." Most of these weapons have limited armor penetration ability (lightly armored vehicles). More recently sniper rifles in 12.7 mm (.50 cal) and above have proliferated to the point that any U.S. force is likely to encounter them in every combat environment. Within the past ten years another trend is to equip armies with anti-materiel rifles (a.k.a. hand cannons) generally in 14.5 to 20 mm. Some of these were designed not to destroy a vehicle but to neutralize a specific capability mounted externally on the vehicle (see Croatia' s RT-20 below).

7.62 mm (.308 cal). The representative rifle in this caliber is the widely proliferated 7.62x54R SVD (Russian and clones). It can penetrate lightly armored vehicles (10 mm @ 200 m).

12.7 mm (.50 cal) Sniper/anti-materiel rifles. These rifles are integral to any modern battlefield. Although generally categorized as sniper rifles (and capable of being used against perso n-nel), they are generally employed as anti-materiel rifles. The most widely proliferated of these rifles, whether labelled as a sniper or anti-materiel rifle, is the U.S. Barrett M82A1/M95 .50 cal semi-automatic rifle, followed by the Croatian MACS M2-1/M3 (12.7-mm bolt action), then the Russian V-94 (12.7-mm semi-auto). The Barrett M82A1 is employed by all U.S. military forces as well as 27 other countries including Belgium, Chile, Denmark, Finland, France, Greece, Italy, Netherlands, Norway, Philippines, Port u-gal, 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 avai lable.

Larger-caliber Anti-materiel Rifles (14.5 to 20-mm). A trend during the past ten years has been towards larger-caliber anti-materiel rifles. Although several are manufactured, the Cro a-tian RT20 20-mm "hand cannon" is the most prevalent (range 1,800 m). It can fire either HE or API. 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 cap ability was found with this RT20 "hand cannon".

Other anti-materiel rifles readily available are:

South African NTW 20-mm (range 1,500 m)
NTW 14.5-mm (range 2,300 m)
Hungary Gepard M3 14.5-mm (range 1,000 m)
Austria Steyr IWS 2000 15.2-mm (range 1,000 m)

Russian 7.62-mm Sniper Rifle SVD

Ammunition Types	Typical Combat Load
7.62-mm cartridge Light Ball Heavy Ball Sniper Enhanced Penetration AP-I Tracer	**40**

SYSTEM

Alternative Designations: Dragunov
Date of Introduction: 1967
Proliferation: Widespread

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)
Fire Mode: Semi-automatic only

SIGHTS

Name: PSO-1
Type: Infrared detection capability for night firing
Magnification: 4x
Field of View (°): 6

Night Sights Available: Yes. NSPU-3 . The NSPU-3 increases accuracy to 1,000 m at night or during poor visibility.
Sighting Range (m): 1,300

VARIANTS

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.

AMMUNITION

Name: Sniper (7N14)
Caliber/length: 7.62x54R-mm rimmed
Type: Steel core
Range (m):
Maximum: 3,800
With Scope: 1,300
Without Scope: 800
Armor Penetration: INA
Muzzle Velocity (m/s): 823

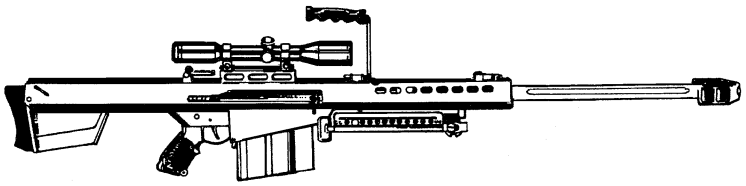
Name: 7N13
Caliber/length: 7.62x54R-mm rimmed
Type: Enhanced penetration
Range (m):
Sighting: 2,000
Armor Penetration (mm): INA. (Effective against lightly armored vehicles and crews.)
Muzzle Velocity (m/s): INA

Name: B-32
Caliber/length: 7.62x54R-mm rimmed
Type: AP-I
Range (m):
Sighting: 2,000
Armor Penetration: 10-mm @ 200 m
Muzzle Velocity (m/s): 808

Name: T-46
Caliber/length: 7.62x54R-mm rimmed
Type: Tracer
Range of Trace (m): 1,200
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. One squad in each OPFOR mechanized infantry platoon has an SVD. The platoon leader and sniper normally ride in the first squad vehicle. While the sniper has received centralized training on the SVD he also has an assault rifle (usually AKS-74U) for normal combat. His SVD is carried in the IFV/APC for those instances when he acts as a sniper.

United States M82A1A .50-cal Anti-Materiel Rifle



Ammunition Types	Typical Combat Load
.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)	30

SYSTEM

Alternative Designations: None
Date of Introduction: Early 1980s
Proliferation: Widespread (27+)

Description:
Weight (kg):
Empty (w/o magazine): 14.75
Length (mm):
Overall: 1,448
Barrel: 736
Operation: Recoil
Feed: 10-rd detachable box magazine
Fire Mode: Semi-automatic only

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

AMMUNITION

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)
Type: Multipurpose
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

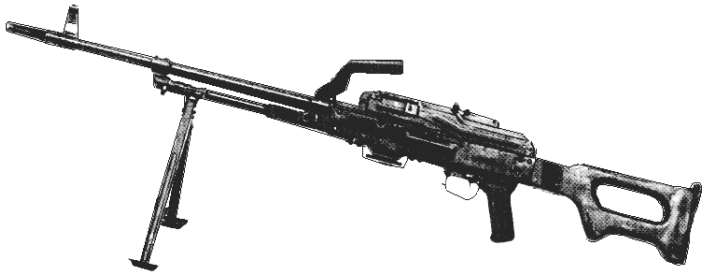
Name: M903 (Olin)
Caliber/length: .50 cal BMG/12.7-mm x 99-m (NATO)
Type: Saboted Light Armor Penetrator (SLAP) (actual bullet is tungsten .30 inch penetrator wrapped in a .50-cal plastic sabot)
Range (m) (equipment-size targets):
Maximum (w/scope): 1,500
Armor Penetration: 19 mm (.75 in) @1,500 m
Accuracy: INA
Muzzle Velocity (m/s): 1,014

VARIANTS

Model 95: Bullpup bolt action, 5-round magazine

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 7.62-mm General Purpose Machinegun PKM



Ammunition Types	Typical Combat Load
7.62-mm cartridge Ball Ball-tracer Incendiary-ranging API API-T	**INA**

SYSTEM

Alternative Designations: (see VARIANTS)
Date of Introduction (PKM/PKT): 1971/1968
Proliferation: Widespread

Description:
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

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)

SIGHTS

Name: INA
Type: Open iron sights
Sighting range (PKM/PKT) (m): 1,500/2,000
Magnification: None
Night Sights Available: Yes

VARIANTS

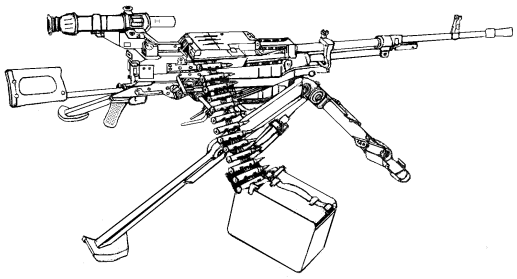
PKM: Squad machinegun
PKT: Tank-mounted coaxial, lacks stock, sights, bipod, has solenoid electric trigger, longer heavier barrel.
PKS: Lightweight tripod-mounted infantry weapon
PKMS: Lightweight tripod-mounted variant of the PKS
PKB (PKBM): Pintle-mounted on APCs, SP guns, BRDM, BTRs, has butterfly trigger rather than solenoid, double space grips, and front and rear sights

AMMUNITION

Name: INA
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^{o} obliquity @ 500 range (mm): 8
- Muzzle Velocity (PKM/PKT) (m/s): 825/855

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. Compared to the US M-60, the PK-series machineguns are easier to handle during firing, easier to care for, and lighter. The 7.62x54R is a more powerful cartridge than the US with a slightly shorter effective range.

Russian 12.7-mm Heavy Machinegun NSV/NSV-T



Ammunition Types	Typical Combat Load
12.7-mm cartridge API (B-32) API-T (BZT-44) HEI	**300**

SYSTEM

Alternative Designations: NSVS (tripod-stand mounted), Utyos
Date of Introduction: Early 1970s
Proliferation: Widespread

Description:
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 (four to six) or long bursts (10 to 15) or continuously
Operation: Gas
Feed: Left or right from metal link belt from 50-rd boxes

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)
Type: Reflex AA sight

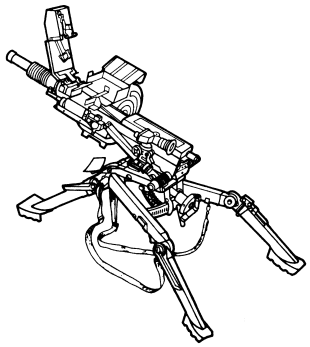
VARIANTS

NSVT: Tank-mounted, (see NOTES)

AMMUNITION
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^{o} obliquity @ 500/1,000m range (mm): 20/13.2
- Muzzle Velocity (m/s): 860

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. 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. An optic serves this purpose. 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 30-mm Automatic Grenade Launcher AGS-17



Ammunition Types	Typical Combat Load (Dismounted)
30-mm grenade Frag-HE	**87**

SYSTEM

Alternative Designations: Plamya (Flame)
Date of Introduction: 1974
Proliferation: At least 12 countries

Description:
Crew: 3 (see NOTES)
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
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

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

VARIANTS

AG-17: Vehicle mounted.
AG-17A: Helicopter mounted, electric trigger, rate of fire increased to 420-500 rd/min, 300 rd belt.
TKB-722K AGL: Lighter version and possibly the follow-on to the AGS-17, shoots the same ammunition as the AGS-17

AMMUNITION

Name: VOG-17A, VOG-17M (self-destruct)
Caliber/length: 30x132.8-mm
Type: Frag-HE
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:
- Distance: 4.3 m
- Deflection: .2 m

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.

NOTES
The AGS-17 provides the infantry with an area suppressive capability. One AGL can create a damage zone 15 meters wide. The fire from an AGL platoon covers a sector approximately 90 m across. Although primarily intended for use against personnel, it has a limited capability to engage lightly armored vehicles. The crew consists of a gunner and two riflemen-assistant gunners, and may have an additional ammunition bearer. 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. It is very accurate in the semiautomatic mode and is quite effective in area coverage in the automatic mode. The 50-meter increments in the range table atop the receiver indicate accuracy against point targets. 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 individuals). The AGS-17 is capable of mounting night vision sights.

Russian 40-mm Under-Barrel Grenade Launcher GP-30

Ammunition Types	Typical Combat Load
40-mm grenade	**10**
Frag-HE (impact)	
Frag-HE (bounding)	
Smoke	

SYSTEM

Alternative Designations: BG-15 Mukha; GP-25 Koster, GP-30 Obuvka
Date of Introduction: 1980
Proliferation: Widespread

Description:
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

SIGHTS

Name: N/A
Type: Front post and rear open U-notched
Location: Left side of mounting bracket
Sighting Range (m): Graduated out to 400

VARIANTS

BG-15, GP-25: (see NOTES)

AMMUNITION

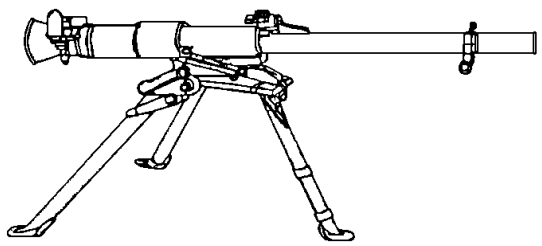
Name: VOG-25
Caliber/length: 40x102-mm
Type: Frag-HE with impact fuze
Weight (kg):
Round: .250
Exposive: .048
Range (m):
Maximum: 400
Minimum: 10–40 (arms itself)
Casualty Radius (m): 6; (90% @ 10)
Self-destruct Time (sec): 14–19
Muzzle Velocity (m/s): 76

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

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 73-mm Recoilless Gun SPG-9



Ammunition Types	Typical Combat Load
73-mm recoilless gun	**INA**
RA HEAT	
RA HE	

SYSTEM

Alternative Designations: INA
Date of Introduction: 1970
Proliferation: Widespread

Description:
Crew: 3
Caliber (mm): 73
Weight (kg):
- Firing Position: 47.5
- Travel Position: 47.5
- Tripod: 12

Length (travel) (m): 2.11
Width (travel) (m): .99
Height (travel) (m): .80
Rifling: None
Breech Mechanism Type: Interrupted screw
Feed: Breech load
Traverse (°): 30 total
Elevation (°): -3 to +7
Rate of Fire (rd/min): 6
Emplacement/displacement time (min): 1
Fire From Inside Building: No

SIGHTS

Name: PGO-9
Type: Optical and iron
Magnification: Optical 4x, 10° field of view
Location: Left side
Sighting Range (m): 1,300
Night Sights Available: IR and passive night, PGN-9

VARIANTS

SPG-9D: Airborne version with detachable wheels

AMMUNITION

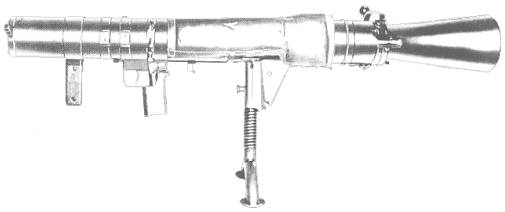
Range (m):
- Maximum Effective:
  - HEAT: 1,000
  - HE: 1,300
- Minimum: INA

Armor Penetration (mm) @ 1,000 m: 400 (HEAT any range)
Casualty Radius (m): INA
Length (mm): 1,000
Complete Round Weight (kg):
- Rocket-Assisted HEAT: 3.5
- Rocket-Assisted HE: 4

Muzzle Velocity (m/s): 435
Max Velocity w/rocket assist (m/s): 700

NOTES
The SPG-9 is a recoilless, smooth-bore, single-shot antitank weapon that fires both antiarmor and antipersonnel ammunition. Several generations of night vision equipment are available for the SPG-9. It is manportable, but a truck or APC normally carries it. It must be dismounted and placed on its tripod for firing.

Swedish 84-mm Recoilless Rifle Carl Gustaf M2



Ammunition Types	Typical Combat Load
84-mm round	**INA**
HEAT (tandem)	
HEDP	
HEAT	
HE	
Smoke	
Illumination	

SYSTEM

Alternative Designations: INA
Date of Introduction: INA
Proliferation: At least 20 countries
Description:
Crew: 1 or 2 (see NOTES)
Caliber (mm): 84
Weight (kg):
- Mount: .8
- M2: 14.2
- M3: 8.5

Length (mm): 1,065
Rifling: 24 lands/progressive twist
Breech Mechanism Type: Hinged
Rate of Fire (rd/min): 6
Fire From Inside Building: INA

SIGHTS

Name: INA
Type: Iron and telescoped
Magnification: 3x
Location: Left side
Weight (kg): 1
Used With Range Finders: Yes, laser
Night Sights Available: May be used with Generation III Image Intensification Systems.

VARIANTS
M3: Lightweight version of the M2

AMMUNITION

Name: FFV 751
Type: HEAT (tandem)
Range (m):
- Effective: 500
- Minimum: INA
- Moving: INA

Penetration:
- Armor (mm): +500

Weight (kg): 4

Name: FFV 502
Type: HEDP (with dual mode fuze)
Range (m):
- Effective (personnel in open): 1,000
- Effective (stationary): 500
- Moving: 300
- Arming Range: 15-40

Penetration:
- Armor (mm): +150

Weight (kg): 3.3
Muzzle Velocity (m/s): 230

Name: FFV 551
Type: HEAT
Range (m):
- Effective: 700
- Arming Range: 5-15

Penetration:
- Armor (mm): 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: FFV 469B
Type: Smoke
Range (m):
- Effective: Up to 1,300

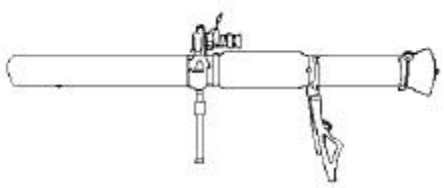
Weight (kg): 3.1
Muzzle Velocity (m/s): 240

Name: FFV 545
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
Muzzle Velocity (m/s): 260

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.

United States 90-mm Recoilless Rifle M67



Ammunition Types	Typical Combat Load
90-mm recoilless gun HE HEAT APERS Target Practice	**7**

SYSTEM

Alternative Designations: INA
Date of Introduction: Late 1940s
Proliferation: At least 11 countries
Description:
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

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

VARIANTS (INA)

AMMUNITION

Name: INA
Type: HE
Range (m):
Effective: 400
Weight (kg): INA

Name: M371E1
Type: HEAT
Range (m):
Aimed: 800
Effective: 420
Penetration:
Armor (mm): 350
Weight (kg): 4.2
Fuze: Point Detonating
Muzzle Velocity (m/s): 213

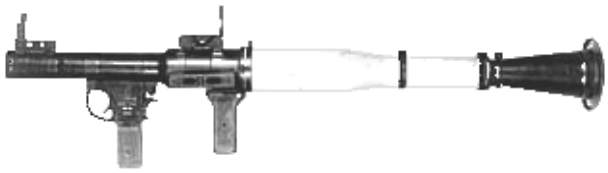
Name: XM590E1
Type: APERS Canister (antipersonnel)
Fill: 2,400 eight-grain flechettes
Range (m):
Effective: 200
Weight (kg): 3.08
Muzzle Velocity (m/s): 381

Name: XM590E1
Type: Target Practice
Range (m): Ballistically identical to the HEAT M371E1
Weight (kg): 3.08
Muzzle Velocity (m/s): 381

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 amm u-nition. 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 produ ction 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 mem-ber (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 backblast 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.

Russian 40-mm Antitank Grenade Launcher RPG-7V



Ammunition Types	Typical Combat Load
40-mm grenade	**5**
PG-7V	
PG-7VM	
PG-7VS	
PG-7VL	
PG-7VR	
TBG-7V	
OG-7V	
OG-7VM	

SYSTEM

Alternative Designations: INA
Date of Introduction: 1962
Proliferation: At least 40 countries

Description:
Crew: 2
Caliber (launcher) (mm): 40
Weight (kg):
Empty*:* 7.9
Loaded: Varies with grenade
Length (mm): 950
Rate of Fire (rd/min): 6
Fire From Inside Building: No
Grenade Components: Warhead, rocket motor, tail assembly

SIGHTS

Name: PGO-7
Type: Optical w/II
Magnification: 2.7x, 13° field of view
Location: Top of launcher/sight-left side
Sighting Range (m): 500
Night Sights Available: Yes, NSP-3, NSP-2 (IR), NSPU, PGN-1 (II), 1PN58 (II)

VARIANTS
RPG-7D, RPG-7DV1: Folding variants used by airborne troops

AMMUNITION

Name: PG-7V
Caliber (mm): 85
Type: HEAT
Range (m):
Effective: 500
Minimum: INA
Moving: 300
Penetration:
Armor (mm): 330
Length (mm): INA
Weight (kg): 2.2

Name: PG-7VM
Caliber (mm): 70.5
Type: INA
Range (m):
Effective: 500
Minimum: INA
Penetration:
Armor (mm): 330
Muzzle Velocity (m/s): 140
Length (mm): 950
Weight (kg): 2

Name: PG-7VS
Caliber (mm): 72
Type: INA
Range (m):
Effective: 500
Minimum: INA
Penetration:
Armor (mm): INA
Brick (m): + 1.5
Reinforced concrete (m): + 1
Casualty Radius (m): INA
Muzzle Velocity (m/s): INA
Length (mm): INA
Weight (kg): 2

Name: PG-7VL
Caliber (mm): 93
Type: INA
Range (m):
Effective: 300
Minimum: INA
Penetration:
Armor (mm): 600
Brick (m): 1.7
Reinforced concrete (m): + 1.1
Muzzle Velocity (m/s): 112
Length (mm): 980
Weight (kg): 2.6

NOTES
The RPG-7V is a recoilless, shoulder-fired, muzzle-loaded, reloadable, antitank grenade launcher. It fires a variety of rocket-assisted grenades from a 40-mm smoothbore launcher tube. It is the standard squad antitank weapon in use by the OPFOR. The RPG-7V is light enough to be carried and fired by one person. However, an assistant grenadier normally deploys to the left of the gunner to protect him from small arms fire. The RPG-7V requires a well-trained gunner to estimate ranges and lead distances for moving targets. Crosswinds as low as 7 miles per hour can complicate the gunner's estimate and reduce first-round hit probability to 50% at ranges beyond 180 meters.

Russian Antitank Grenade Launcher RPG-7V continued

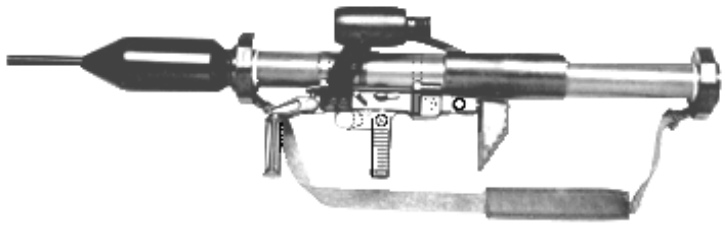
Name: PG-7VR (uses RPG-7V1 launcher sights)
Caliber (mm): 105
Type: Tandem
Range (m):
  Effective: 200
  Minimum: INA
  Sighting Range: INA
Penetration:
  Armor (mm): +750 (all armor including reactive armor)
  Brick (m): 2
  Reinforced concrete (m): +1.5
Muzzle Velocity (m/s): INA
Length (mm): 1,306
Weight (kg): 4.5

Name: TBG-7V (uses RPG-7V1 launcher sights)
Caliber (mm): 105
Type: Thermobaric (similar to RPO-A warhead)
Range (m):
  Effective: 200
  Sighting Range: 800
Penetration:
  Armor (mm): INA
  Brick (m): +1.5
  Reinforced concrete (m): + 1.5
Casualty Radius (m): INA
Muzzle Velocity (m/s): INA
Length (mm): INA
Weight (kg): 4.5

Name: OG-7V
Caliber (mm): 40
Type: Frag-HE
Range (m):
  Effective: 950
Casualty Radius (m): INA
Muzzle Velocity (m/s): 152
Length (mm): 569
Weight (kg): 1.7

Name: OG-7VM
Caliber (mm): 40
Type: Frag-HE
Range (m):
  Effective: 1,000
Casualty Radius (m): INA
Muzzle Velocity (m/s): 145
Length (mm): 595
Weight (kg): 1.7

German 60-mm Antitank Grenade Launcher Panzerfaust-3



Ammunition Types	Typical Combat Load
60-mm grenade	**INA**
HEAT	
Multipurpose-FRAG	
BASTEG	
Illumination	
Smoke	
Practice	

SYSTEM

Alternative Designations: Balliste, Pzf 3
Date of Introduction: 1990
Proliferation: At least eight countries

Description:
Crew: 1
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

SIGHTS

Name: INA
Type: Optical
Magnification: INA
Location: Left side
Used With Range Finders: Yes
Night Sights Available: Yes

VARIANTS

Panzerfaust 3-T 600: Simrad IS2000 laser gun sight with range of moving targets out to 600 m. Can be fitted with Simrad KN205F night sights.

AMMUNITION

Name: INA
Caliber (mm): 110
Type: HEAT
Range (m):
  Effective (moving): 300
  Effective (stationary): 500
Penetration:
  Armor (mm): + 700
Weight (kg): 3.8
Muzzle Velocity(m/s): 170
Flight Velocity(m/s): 250
Time of Flight to 300 m (sec): 1.3

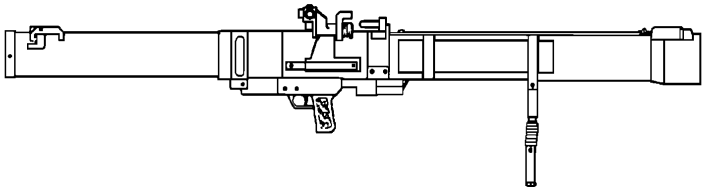
Name: BASTEG (Barricade and Street Encounter Grenade)
Caliber (mm): 110
Type: Shaped-charge w/stand-off fuze
Range (m): INA
Penetration:
  Concrete (mm): INA
Weight (kg): INA
Muzzle Velocity(m/s): INA
Flight Velocity(m/s): INA
Time of Flight to 300 m (sec): INA

OFF-ROUTE MINE SYSTEM

Target Speed range (km/h): 30-60
Effective Range (m): 150
Operational Time (days): 40
Acquisition: Targets detected by acoustic sensor which activates the infra-red sensor.
Sensors:
IR Sensor: Passive, two-color
IR Optics: Double parabolic, off-axis
Acoustic: Capacitative microphone.

NOTES
The Panzerfaust 3 is a compact, lightweight, shoulder-fired, unguided antitank weapon. It consists of a disposable cartridge with a 110-mm warhead and reusable firing and sighting device. The Panzerfaust can be adapted to serve as an off-route mine.

Russian 105-mm Antitank Grenade Launcher RPG-29



Ammunition Types	Typical Combat Load
105-mm grenade HEAT (tandem)	**INA**

SYSTEM

Alternative Designations: Vampir
Date of Introduction: Late 1980s
Proliferation: Former Soviet Union

Description:
Crew: 2
Caliber (tube) (mm): 105
Weight (kg): 11.5
Length (mm): 1,000
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): (see NOTES)

SIGHTS

Name: INA
Type: Iron, optical, and night
Magnification: INA
Location: Left side
Sighting Range (m): 450
Night Sights Available: Yes, INA

VARIANTS (see NOTES)

AMMUNITION
Name: PG-29V
Caliber (warhead): 105
Type: HEAT (tandem)
Range (m):
  Effective: 500
  Minimum: INA
Penetration (m):
  Armor: +750, (650 behind ERA)
  Concrete and brick: +1.5
Casualty Radius (m): INA
Length (mm): INA
Complete Round Weight (kg): 6.7
Muzzle Velocity (m/s): 280

NOTES
For ease of transportation the RPG-29 can be broken down into two parts which one soldier can carry. It can be made ready to fire within a few seconds. A folding bipod is provided to assist aiming during prone firing. An unnamed variant has a tripod mount and guidance and control system. The guidance and control system of the mounted variant includes an optical sight, laser rangefinder and ballistic data computer for firing on moving targets. This increases the effective range of the mounted system to 800 m against a stationary target with a hit probability of 80%.

German 67-mm Disposable Antitank Grenade Launcher Armbrust _____

Ammunition Type	Typical Combat Load
67-mm grenade HEAT	**INA**

SYSTEM

Alternative Designations: Crossbow
Date of Introduction: INA
Proliferation: At least seven countries

Description:
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)

SIGHTS

Name: N/A
Type: Reflex
Magnification: None
Location: Left side
Sighting Range (m): INA
Night Sights Available: INA

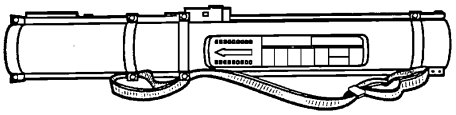
VARIANTS (INA)

AMMUNITION

Name: INA
Type: HEAT
Range (m):
Maximum: 1,500
Effective AT: 300
Flight Time (sec) @ 300 m: 1.5
Penetration:
Armor (mm): 300
Reinforced Concrete (m): INA
Muzzle Velocity(m/s): 210

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 enclosed 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. Manufactured by Singapore.

Russian 72-mm Disposable Antitank Grenade Launcher RPG-22



Ammunition Types	Typical Combat Load
72-mm grenade HEAT	**INA**

SYSTEM

Alternative Designations: INA
Date of Introduction: 1985
Proliferation: At least three countries

Description:
Crew: 1
Caliber (mm): 72
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, backblast out to 30 m behind the weapon.

SIGHTS

Name: INA
Type: Iron, calibrated for 50, 150, 200 m
Magnification: None
Location: Top of launcher
Sighting Range (m): 250
Night Sights Available: No

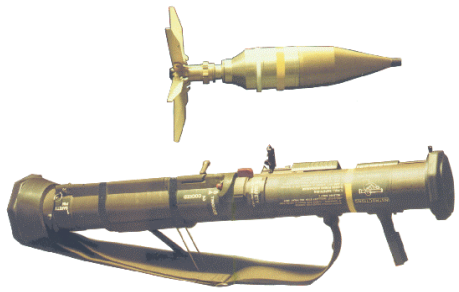
VARIANTS (None)

AMMUNITION (see NOTES)

Name: INA
Caliber (mm): 72
Type: HEAT
Range (m):
  Effective: 250
  Arming Range: INA
Penetration:
  Armor (mm): 390
  Brick (m): 1.2
  Reinforced Concrete (m): 1
Muzzle Velocity(m/s):
  Initial: 133
  Maximum: 300
Length (mm): 618
Weight (kg): 1.48

NOTES
The RPG-22 is a lightweight, shoulder-fired, preloaded, disposable antiarmor 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.

Swedish 84-mm Disposable Light Antitank Weapon AT4



Ammunition Types	Typical Combat Load
84-mm round	**INA**
HEDP	
HEAT	

SYSTEM

Alternative Designations: US M136, Bofors AT 4, FFV AT4
Date of Introduction: INA
Proliferation: At least seven countries

Description:
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: See AT4 CS

SIGHTS

Name: INA
Type: Popup, preset to 200 m
Location: Top left
Night Sights Available: Yes, INA

VARIANTS (see NOTES)

LMAW: Light Multipurpose Assault Weapon, uses HEDP
AT4 CS: Confined space
AT4 HP: High penetration

AMMUNITION

Name: AT4 HEAT
Caliber (mm): 84
Type: HEAT
Range (m):
Effective: 300
Arming Range: INA
Penetration:
Armor (mm): 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): 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 m^3
Caliber (mm): 84
Type: HEAT or HEDP (LMAW) warheads
Range (m):
Effective: INA
Arming Range: INA
Penetration:
Armor (mm): INA
Weight (kg): INA
Muzzle Velocity(m/s): INA

Name: AT4 HP (high penetration)
Caliber (mm): 84
Type: HEAT
Range (m):
Effective: INA
Arming Range: INA
Penetration:
Armor (mm): 600
Weight (kg): Less than 7
Muzzle Velocity(m/s): 290

NOTES
The AT4 is a lightweight, preloaded, disposable antiarmor 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.

Russian Infantry Rocket Flame Weapon RPO

Ammunition Types	Typical Combat Load
Rocket Rocket-propelled encapsulated napalm projectile.	**2**

SYSTEM
Alternative Designations: Rys (Lynx)
Date of Introduction: Late 1970s
Proliferation: FSU

Description:
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.

PERFORMANCE

Range (m):
Effective: 190
Maximum: 400
Minimum: INA
Accuracy: INA
Muzzle Velocity (m/s): INA

SIGHTS

Name: N/A
Type: Open metal, front and rear
Location: Left side, rear is on-line with rear of grip
Magnification: None
Night Sights Available: INA

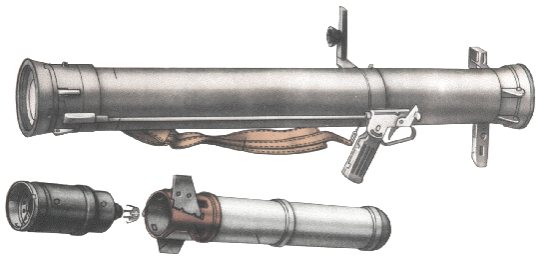
VARIANTS (None)

AMMUNITION

Name: RPO
Type: Incendiary
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

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 Infantry Rocket Flame Weapon RPO-A Series (RPO-A/Z/D) _____



Ammunition Types	Typical Combat Load
Rocket RPO-A: Thermobaric-flammable mixture RPO-Z: Incendiary RPO-D: Smoke	**2**

SYSTEM

Alternative Designations: Shmel (Bumblebee)
Date of Introduction: 1984
Proliferation: Widespread

Description:
Crew: 1
Caliber (mm): 93
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 60 m^3 or greater or with a barrier behind the weapon.
Components: Container, ejection motor, warhead.

PERFORMANCE

Range (m):
Direct Fire: 200
With Optical Sight: 850
Effective: 600
Minimum: 20
Indirect Fire: 1,000
Accuracy @ 200 m: .5 m^2
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

VARIANTS (None)

AMMUNITION

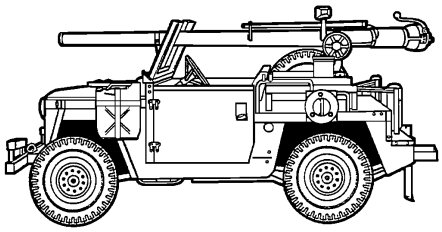
Name: RPO-A
Type: Thermobaric
Casualty Radius (m): 50 (personnel in open)
Lightly armored materiel kill probability at 400 m: 0.7
Burn Temperature (°C): 800+
Warhead Explosive Type: Trotyl equivalent (kg) -2
Warhead Mixture Weight (kg): 2.1

Name: RPO-Z
Type: Incendiary
Warhead Mixture Weight (kg): 2.5

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 (m): INA
Height (m): INA
Duration (min): 3 to 5
Effective Against: Visual and infrared

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 and can be ready to fire within 30 seconds. Any soldier, infantryman, or paratrooper 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-A is known as the infantryman's pocket artillery because the demolition effect corresponds to the 122-mm HE artillery, and 120-mm mortar projectile. 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.

United States 106-mm Recoilless Rifle M40



Ammunition Types	Typical Combat Load
106-mm recoilless gun HEAT HEAT-T HEP-T APERS-T HEAP	**INA**

SYSTEM

Alternative Designations: (see VARIANTS)
Date of Introduction: 1953
Proliferation: At least 50 countries

Description:
Crew: 2
Caliber (mm): 106
Weight (kg):
  With Spotting Rifle: 130
  Gun Only: 113
Length (m):
  Total: 3.40
  Barrel: 2.85
Width (on M79 mount) (m):
  Legs Spread: 1.524
  Legs Closed: .8
Height (on M79 mount) (m): 1.3
Bore: Rifled 36 grooves, rh
Breech Type: Interrupted thread
Recoil System: Vented breech
Feed: Manual
Traverse (°): 360
Elevation (°) (M79 Mount): -17/+65
Rate of Fire (rd/min): 5
Spotting Rifle: .50 cal M8C
Emplacement/displacement time (min): INA
Fire From Inside Building: No
Complete Round Weight (kg): 13
Muzzle Velocity (m/s): 570

SIGHTS

Name: INA
Type**:** Optical
Name: Bofors modernization package
Type: Simrad LP101 laser sight in place of the ranging gun
Magnification: INA
Location: INA
Name: Bofors modernization package
Type: Computerized LASer Sight (CLASS)
Magnification: INA
Location: INA
Night Sights Available: Yes, INA

VARIANTS

M79 Mount: Tripod, ground, or vehicle
M50 Ontos: Six-barrel mount on small tracked vehicle
PAK-66: Austrian M40 on two-wheel carriage

AMMUNITION

Name: M344A1
Type: HEAT
Range (m):
  Maximum Effective: 1,350
  Maximum Range: 2,745
Armor Penetration (mm): INA
Complete Round Weight (kg): 16.8
Muzzle Velocity (m/s): 503

Name: 3/A-HEAT-T (Bofors upgrade)
Type: HEAT-Tracer
Range (m):
  Maximum Effective: 2,000
Armor Penetration (mm): 700 +
Complete Round Weight (kg): 14.5
Muzzle Velocity (m/s): 570

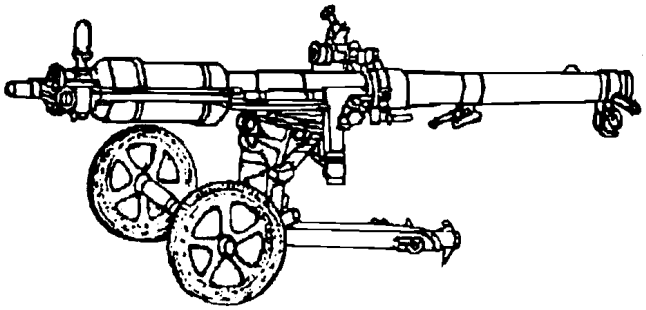
Name: M346A1
Type: HEP-T (HE plastic-tracer)
Range (m):
  Maximum: 6,870
Complete Round Weight (kg): 16.95
Muzzle Velocity (m/s): 498

Name: M581
Type: APERS-T (antipersonnel-tracer) (flechette)
Fill (.5 g ea): 10,000 flechettes
Range (m):
  Maximum Effective: 300
Complete Round Weight (kg): 18.73
Muzzle Velocity (m/s): 438

Name: HEAP M-DN
Type: HE antipersonnel (steel pellets)
Fill: 1,000 steel pellets
Range (m):
  Maximum Effective: 1,500
  Lethal Radius: 40
Complete Round Weight (kg): 16.4
Muzzle Velocity (m/s): 560

NOTES
The US M40 or M40A1 recoilless rifle is an antitank weapon. It uses a .50 cal spotting rifle mounted along the axis of the barrel to determine proper elevation for the 106-mm barrel. Upgraded systems may have the Simrad laser sight in lieu of the ranging (spotting) gun.

Russian 82-mm Recoilless Gun B-10



Ammunition Types	Typical Combat Load
82-mm recoilless gun	**36**
HEAT	12
HE/Frag-HE	24

SYSTEM

Alternative Designations: RG82
Date of Introduction: 1950s
Proliferation: At least 10 countries

Description:
Crew: 4
Caliber (mm): 82
Weight (kg):
- Firing Position: 85.3, 71.7 without wheels
- Travel Position: 85.3, 71.7 without wheels
- Tripod: 6.5

Length (travel) (m): 1.85
Width (travel) (m): INA
Height (travel) (m): INA
Rifling: None
Breech Mechanism Type: Horizontally hinged
Feed: Breech load
Traverse (°): 250 each direction, 360 total
Elevation (°): -20/+35
Rate of Fire (rd/min): 5-7
Emplacement/displacement time (min): 1/ 0.5
Fire From Inside Building: No

SIGHTS

Name: PBO-2 combination, and iron
Type: Optical, panoramic and iron
Magnification: Optical 5.5x direct/2.5x indirect
Location: Left side
Sighting Range (m): 1,000 direct
4,500 indirect

Night Sights Available: Direct and indirect (illuminated)

VARIANTS

Type 65: This Chinese variant weighs only 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.

AMMUNITION

Name: BK-881M
Type: HEAT
Range (m):
- Maximum Effective: 400
- Maximum Aimed Range: 1,000 (direct)
- Maximum Range: 4,500

Armor Penetration (mm): 240
Complete Round Weight (kg): 4.87
Muzzle Velocity (m/s): 322

Name: Type 65
Type: HEAT
Range (m):
- Maximum Effective: 450
- Maximum Aimed Range: INA
- Maximum Range: 3,750

Armor Penetration (mm): 356
Complete Round Weight (kg): 3.5
Muzzle Velocity (m/s): 240

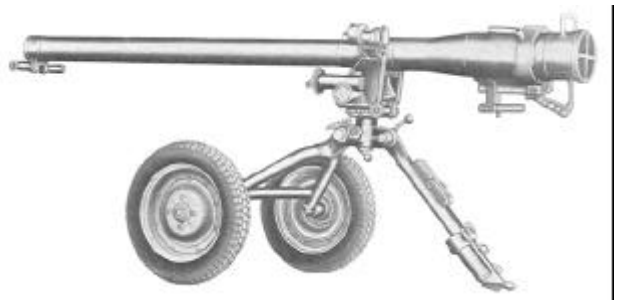
Name: O-881A
Type: Frag-HE
Range (m):
- Maximum Effective: 4,500 (indirect)
- Maximum Aimed Range: 1,000 direct/4,500 indirect
- Maximum Range: 7,300

Lethal radius (m): INA
Complete Round Weight (kg): 4.87
Muzzle Velocity (m/s): 320

NOTES
The B-10 can be mounted on a pintel, 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.

Other ammunition types include O-881 HE and BK-881 HEAT.

Former Yugoslavian 82-mm Recoilless Gun M60



Ammunition Types	Typical Combat Load
82-mm recoilless gun HEAT	**36**

SYSTEM

Alternative Designations: M60A
Date of Introduction: First sighted 1965
Proliferation: At least 2 countries

Description:
Crew: 2-5
Caliber (mm): 82
Weight (kg):
Firing Position: 122
Travel Position: 122
Tripod: INA
Length (travel) (m): 2.4 approximate
Width (travel) (m): 1.0 approximate, firing position
Height (travel) (m): 0.83 approximate, firing position
Rifling: Yes, 4 with left rotation
Breech Mechanism Type: Vertically hinged with flange rotate lock
Feed: Breech load
Traverse (°): 360
Elevation (°): -20 to +35
Rate of Fire (rd/min): 4
Emplacement/displacement time (min): 0.5/ 0.5
Fire From Inside Building: No

SIGHTS

Name: INA
Type: Optical telescopic
Magnification: INA
Location: Left side
Sighting Range (m): 1,500
Night Sights Available: INA

VARIANTS

Distinction between M60 and M60A is unknown.

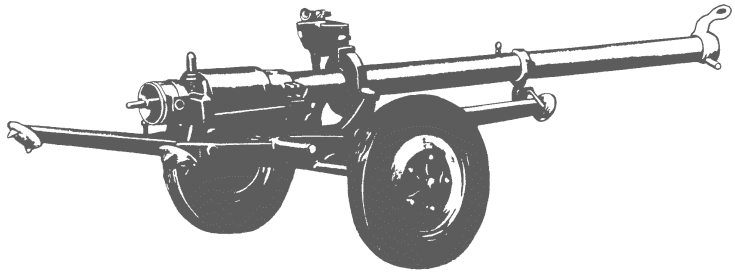
AMMUNITION

Name: M60
Type: HEAT
Range (m):
Maximum Effective: 500
Maximum Aimed Range: 1,500 stationary target
1,000 moving target
Maximum Range: 4,500
Armor Penetration (mm): 200
Complete Round Weight (kg): 7.2
Muzzle Velocity (m/s): 388

Name: M72
Type: Rocket-assisted HEAT
Range (m):
Maximum Effective: 1,000
Maximum Aimed Range: 1,500 stationary/ 1,000 moving
Maximum Range: 4,500
Armor Penetration (mm): 220
Complete Round Weight (kg): INA
Muzzle Velocity (m/s): INA

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 for towing the gun. The gun can be towed behind a variety of vehicles, 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 pintel, such as the antitank version of the M-60PB APC, which features two guns. Back-blast safety area is 45 m deep by 25 m wide.

Russian 107-mm Recoilless Gun B-11



Ammunition Types	Typical Combat Load
107-mm recoilless gun	**30**
HEAT	10
HE	20

SYSTEM

Alternative Designations: RG107
Date of Introduction: 1950s
Proliferation: At least 5 countries

Description:
Crew: 5
Caliber (mm): 107
Weight (kg):
Firing Position: 304.8
Travel Position: 304.8
Length (m):
Firing Position: 3.54
Travel Position: 3,56
Width (travel) (m): 1.45
Height (m):
Firing Position: 1.19
Travel Position: 0.9
Rifling: None
Breech Mechanism Type: Interrupted screw
Feed: Breech load
Traverse (°): 35 each direction, 360 total with slight move
Elevation (°): -10 to +45
Rate of Fire (rd/min):
Emplacement/displacement time (min): 1/1
Fire From Inside Building: No

SIGHTS

Name: PBO-4 combination (direct/indirect) and iron
Type: Optical, panoramic and iron
Magnification: Optical 5.5x direct/2.5x indirect
Location: Left side
Sighting Range (m):
Direct: 1,800
Indirect: 6,650 in

Night Sights Available: Direct and indirect (illuminated)

AMMUNITION

Name: BK-883
Type: HEAT
Range (m):
Max Effective: 450
Max Aimed Range: 1,400 (est)
Max Range: INA
Armor Penetration (mm): 381 at 0°
Complete Round Weight (kg): 12.5
Muzzle Velocity (m/s): 400

Name: O-883A
Type: Frag-HE
Range (m):
Max Effective: N/A
Max Aimed Range: 1,300 direct/ 6,650 indirect
Max Range: 6,650
Armor Penetration (mm): N/A
Complete Round Weight (kg): 13.5
Muzzle Velocity (m/s): 375

NOTES
The B-11 is towed on a two-wheeled carriage with an under-slung tripod. The gun can be fired while on two wheels; but due to recoil effect on acc u-racy, it is usually fired from the tripod.

The gun can easily be moved and repositioned by hand.

A unit of fire is 80 rounds.

Chapter 2
Infantry Vehicles

Infantry vehicles can vary from general transport assets such as trucks, to specially designed ***light armored fighting vehicles (LAFVs)***. The intensity of combat on the modern battlefield requires infantry vehicles that are mobile, survivable, and lethal. Many ground forces have programs underway to field infantry LAFVs for modern requirements. Because of budgetary constraints, many ground forces continue using infantry vehicles which we might consider obsolete, but which are well suited for their environment and military role. A number of forces have aggressive upgrade programs for older systems. The U.S. Army, in its next conflict, is likely to encounter infantry forces with a mix of older and newer infantry vehicles.

CLASSIFICATION

Infantry LAFVs are generally classed as ***armored personnel carriers*** (APCs) or ***infantry fighting vehicles*** (IFVs). The lighter, less protected and less lethal system is the APC. It is intended to carry soldiers to the close combat zone, then dismount them for their commitment to the fight. An IFV is designed to fight with soldiers onboard, to carry the soldiers forward without dismounting them if possible, and to support them with direct fires if they do dismount. The plethora of upgrade options available is permitting both APCs and IFVs to become more mobile, survivable, and lethal. Thus we see APCs with IFV survivability or IFV lethality, or with both—which transforms them into IFVs. We also see IFVs with vulnerabilities which ill-suit them for their mission requirement. This chapter highlights key infantry vehicles, with an emphasis on their capabilities in mobility, survivability and lethality. Please note that on the modern battlefield, lack of a capability (swim, night sights, etc.) is in fact a vulnerability.

TRENDS

This chapter highlights infantry LAFV features in terms of mobility, survivability, and lethality. Armies have been looking at ways to balance the need for increased protection with limitations that additional armor brings, such as the need to be amphibious. One solution is to accept a lack of swim capability for a segment of up-armored IFVs, coupled with a distribution of (less armored) amphibious vehicles within the force. Other armies are looking at limited addition of applique armor or active protection systems. Several companies have developed light explosive reactive armor (ERA), which can be used on LAFVs. However, this is a less likely upgrade, because exploding armor fragments are a hazard to dismounted soldiers.

In the past, higher combat power and cost of tanks justified the wide disparity in firepower between tanks and IFVs. However, modern IFVs, when fully manned and equipped, may have equal or higher combat power and similar cost. Therefore, lethality improvements previously afforded to tanks are being added to selected IFVs. A wide variety of lethality upgrades are available for LAFVs. These include larger main weapons and antitank guided missile (ATGM) launchers, and improved fire control systems (FCS), especially night sights. The simplest but sometimes most costly upgrade is improved ammunition.

Improved secondary armaments for aerial targets permit the main weapon to focus more on heavy targets. Thus, several countries are adding remote day sights and night sights and improved ammunition for machineguns (MGs). Others are adding automatic grenade launchers to supplement MG fires.

The aerial threat to AFVs has prompted ground forces to address that threat. One response is proliferation of air defense assets, such as shoulder-fired SAMs. A more direct response which is difficult to counter, is cost-effective, and has long-term benefits for force effectiveness, is to better equip the vehicles for counterair fires. Some infantry vehicles have been fitted with high-angle-of-fire turrets (e.g., BTR-80) and antiaircraft sights (BMP-3). Improved fire control technology has led to more exotic ammunition solutions. The BMP-3 gun-launched ATGM has a higher velocity for use against helicopters. Another new development is ballistic computer-based electronically-fuzed frag-HE rounds, including forward- and side-firing rounds, which can defeat rotary-wing aircraft and ground-based antiarmor positions at stand-off range.

Infantry vehicles offer the most economical armored vehicle chassis for development of combat support and service support vehicles, including air defense vehicles, artillery, C^4, reconnaissance, etc. Noted variants offer a link to other systems described in the WEG.

This chapter provides a representative sampling of infantry vehicles in use today. The selection is not comprehensive, rather reflects APCs and IFVs currently available to the OPFOR. Within this chapter, other types of infantry vehicles are also noted. These include airborne vehicles and multipurpose transporters. Other armored transport vehicles available to infantry units are armored trucks (e.g., former Soviet BTR-152), amphibious assault vehicles (such as U.S. LVTP7), jeep-type vehicles (e.g., HMMWV), and fast-attack vehicles (based on so-called dune buggy designs). Examples of alternative vehicles will be added in later issues of the WEG.

TECHNICAL NOTES

The following notes apply to infantry LAFVs, and to combat vehicles (in other chapters) that are used for reconnaissance, tank/assault, antitank, air defense, and artillery roles. Weapon, fire control, and munition-related narrative applies to towed and ground weapon systems.

On each equipment sheet, the top of the page provides an illustration (line drawing or photo of the system) and a summary of weapons and munitions. Note that a Typical Combat Load, when available, may be estimated. In actuality, ammunition load depends on specific country holdings, on time frame, and on scenario tactical considerations.

System and Variants sections provide basic data to assist in understanding current system status and proliferation, as well as possible upgrade options. Under Description**,** to assure comparability on vehicle dimensions, gun tube length is not included in those dimensions.

In the area, Automotive Performance, the figure *max off-road* denotes speed on dirt roads. The figure *average cross-country* is used for true off-road speed; for selected systems, it was measured on an approved course. Although some systems have specified radios, for many OPFOR countries, radios will be replaced to link with their military radio nets.

Protection figures for use in simulation applications must be measured by certifying agencies in accordance with specific Army standards. Figures on equipment sheets include published data provided for general information use, and may not coincide with vulnerability data developed by approved agencies. Protection options are available for upgrading systems. The wide variety of supplemental protection packages include active and passive armor, active protection systems and countermeasure systems. Although upgrades are being advertised and are technically possible, that does not mean that they are tactically sound, or that the application fits the OPFOR to be portrayed. Other options are generally available for installation; but, because their applicability has not been noted for specific systems, they were not included. Only a few countermeasure parameters were included. However, specific protection upgrades and systems are noted for selected OPFOR systems.

System lethality is determined by a variety of interrelated functions and considerations in the process of bringing destruction upon enemy forces and equipment. Lethality is addressed on the equipment sheets under the headings of Armament, Fire Control, Sights, and Main Armament Ammunition. Lethal fires can be delivered by ***direct fire***, in which weapon systems acquire and observe their targets, or by ***indirect fire***, in which weapons use remote acquisition assets to direct their fires. Note that direct-fire systems such as tanks can receive remote acquisition reports and engage targets by indirect fire; and indirect fire systems (such as artillery) can employ direct-fire sights to fire in the direct-fire mode. For the WEG, high-angle fires are not interpreted as indirect fires as long as the firing weapon uses its own sights to acquire and aim.

Factors affecting lethality, which are considered in the WEG, include: rates of fire, various ranges, accuracy and errors, acquisition/fire control capabilities, lethality effects, ammunition, and ability to engage targets on the move. Any of these technical factors, and other more subtle ones, may affect lethality in combat. Note also that various rates of fire are used, with adjusting factors, such as movement status and type of target. Generally automatic weapon use life dictates that, for more than a 3-4 second interval, the number of rounds expended will not exceed the ***practical*** rate of fire. However, maximum rate is critical against fast-closing targets, such as flying aircraft.

Range is not a fixed figure for most systems. It can be directly affected by four technical factors: gun/launcher configuration, mount (how it is fixed to the system), acquisition capability, and specific munition ballistics. Range is also related to less tangible factors, such as movement status (moving versus stationary, and movement speed), target type, elevation angle (such as for air defense weapons), visibility conditions, and terrain. Each weapon can have different ranges listed by ammunition type and model, where munitions are broken out. Generally, the range of direct-fire frag-HE rounds is greater than munitions designed for point targets, because the effects area is much greater than those of shaped-charge or kinetic-energy rounds. With fragmentation and blast effects, a near miss may be good enough to inflict severe damage. With these considerations, the WEG provides a figure called ***maximum aimed range***. This range indicates the farthest range for system-on-system aimed direct fire.

The maximum aimed range is based on a combination of tactics, techniques and procedures (TTPs), and on parameters of the technical factors noted above: gun/launcher, mount, acquisition system, and ammunition ballistics. This direct-fire range significantly exceeds the weapon's ***maximum effective range***. The maximum effective range/night denotes the effective range for a round, given available night acquisition capabilities. The TTPs also call for a "salvo range" for armored fighting vehicles, which exceeds other ranges and requires one or more volleys of a platoon against a single point target. These figures are less tangible, are based on TTP, and are not included in the WEG.

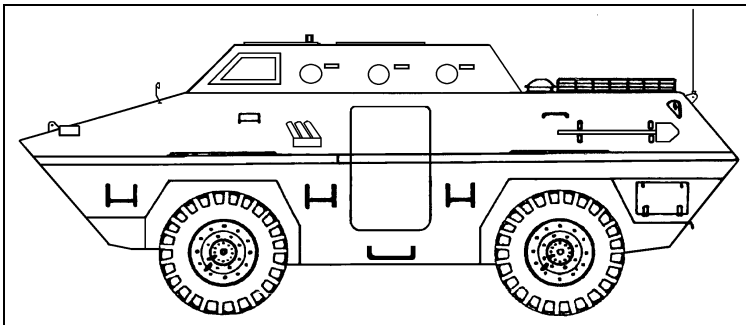
Probability of hit data is included for instructional purposes, not for use in simulations and models. Accuracy for weapons, munitions, and acquisition systems decreases with range. Antitank guided missiles are an exception; they usually have a singular probability of hit for all ranges, based on technical precision capability. Limitations, vulnerabilities, and countermeasures can affect actual performance. Several of these factors are noted on equipment pages.

Lethality performance given a hit can be measured in terms of radius of effects for fragmentation/blast effects against soft targets, and penetration distance (through steel) against hard targets. The fragmentation and blast effects of a frag-HE round mean that it is less lethal against hard targets, such as heavily armored vehicles. Another consideration is the level of destruction required. For many possible adversary forces, the critical requirement against armored vehicles is not a 100% or catastrophic kill. A mobility kill or firepower kill may be sufficient to render a system combat-ineffective, and may be counted in lethality data. The OPFOR can employ a mix of lethal and nonlethal methods. Fires of degrading (versus destructive) munitions such as smoke, mines, and radio frequency jammers can be used to suppress units and support the effort. Consult other manuals in the FM 100-60 series and other approved publications for guidance on these tactics, techniques, and procedures.

Questions and comments on data listed in this chapter should be addressed to:

Mr. Tom Redman
DSN: 552-7925 Commercial (913) 684-7925
e-mail address: redmant@leav-emh1.army.mil

Yugoslavian Armored Personnel Carrier BOV-M



Weapons & Ammunition Types	Typical Combat Load
7.62-mm MG, M86 Ball-T, API, API-T	(est) **2,000**

SYSTEM
Alternative Designations: Sometimes referred to as "BOV"
Date of Introduction: 1984
Proliferation: At least 3 countries
Description:
Crew: 2
Troop Capacity: 8
Combat Weight (mt): 7.0 -9.0, depending on the variant
Chassis Length Overall (m): 6.0
Height Overall (m): 2.34 to top of cabin
Width Overall (m): 2.53
Ground Pressure (kg/cm^2): INA
Drive Formula: 4 x 4

Automotive Performance:
Engine Type: 148-hp Diesel
Cruising Range (km): 800
Speed (km/h):
Max Road: 95
Max Off-Road: INA
Average Cross-Country: 40
Max Swim: N/A
Fording Depths (m): 1.1

Radio: INA

Protection:
Armor, Turret Front (mm): 6-10 mm, defeats 7.62 mm AP at 300 m
Applique Armor (mm): Grill armor over windows, sides on variants
Explosive Reactive Armor (mm): N/A
Active Protective System: N/A
Mineclearing Equipment: N/A
Self-Entrenching Blade: N/A
NBC Protection System: Available
Smoke Equipment: 3 smoke grenade launchers on each side

ARMAMENT
Main Armament: (See NOTES)
Caliber, Type, Name: 7.62-mm (7.62x 54R) M86 MG
Rate of Fire (rd/min): 250 practical / 650 cyclic, 2-10 round bursts
Loader Type: Belt-feed (100-rd belts)
Ready/Stowed Rounds: INA
Elevation (°): INA
Fire on Move: Yes

Auxiliary Weapon: N/A

ATGM Launcher: N/A
Firing Ports: 3 firing ports on each side, plus 1 for commander

FIRE CONTROL
FCS Name: N/A
Main Gun Stabilization: N/A
Rangefinder: N/A
Infrared Searchlight: Yes, on MG
Sights w/Magnification:
Gunner:
Day: Optical sight, INA
Field of View (°): INA
Acquisition Range (m): 1,500
Night: IR night sight on MG
Commander Fire Main Gun: No

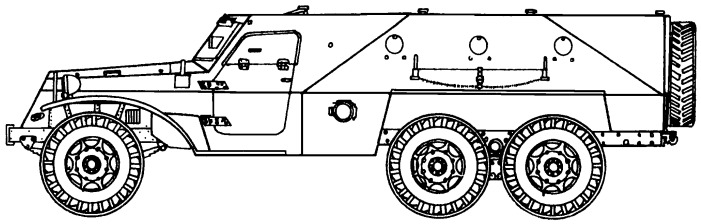
VARIANTS
BOV-M: APC was produced in the republic of Slovenia. Some APCs have a 12.7-mm MG.
BOV-VP: Security version with metal grates on the sides which can be swung out to direct crowds.
BOV-1/Polo M-83: ATGM launcher vehicle w/6 x AT-3 launc hers.
BOV-3: Air defense variant with 3 turret-mounted 20-mm cannon.
BOV-30: Air defense vehicle with 2 turret-mounted 30-mm cannon.
BOV-SN ambulance: Ambulance variant.
LOV: Croatian APC variant without the raised compartment, with a 12.7-mm MG, and optional increased hull protection. The family of LOV vehicles includes recon and NBC recon vehicles, command vehicle, rocket launcher, EW vehicle, and AA missile vehicle.

MAIN ARMAMENT AMMUNITION
Caliber, Type, Name:
7.62-mm API, API-T
Maximum Aimed Range (m): 1,500
Max Effective Range (m):
Day: 1,000/400-500 on the move
Night: INA
Tactical AA Range: INA
Armor Penetration (mm): 8 (RHA) at 500 m

Other Ammunition Types: Light Ball, Ball-T, Heavy Ball, Incend i-ary

NOTES
The M86 MG is a license-built copy of the Russian PKT. Vehicle has central tire inflation system. Many vehicles have steel mesh screen over the windows.

Russian Armored Transporter BTR-152



BTR-152V2 Variant

Weapons & Ammunition Types	Typical Combat Load
7.62-mm SGMB MG Lt ball, ball-T, API	**1,250**
or 12.7mm MG	
Optional in side mounts **2x 7.62-mm SGMB MG** Lt ball, ball-T, API	**1,250-1,750**

SYSTEM
Alternative Designations: BTR-140, Chinese Type 56
Date of Introduction: 1950
Proliferation: At least 20 countries
Description:
Crew: 2
Troop Capacity: 17
Combat Weight (mt): 9.0
Chassis Length Overall (m): 6.83
Height Overall (m): 2.04
Width Overall (m): 2.32
Ground Pressure (kg/cm^2): 3.7
Drive Formula: 6 x 6

Automotive Performance:
Engine Type: 110-hp Gasoline
Cruising Range (km): 650
Speed (km/h):
Max Road: 65
Max Off-Road: INA
Average Cross-Country: INA
Max Swim: N/A
Fording Depths (m): 0.80
Radio: 10RT-12 or R-123

Protection:
Armor, Turret Front (mm): 11-15 on hull front (no turret)
Applique Armor (mm): Available
Explosive Reactive Armor (mm): N/A
Active Protective System: N/A
Mineclearing Equipment: N/A
Self-Entrenching Blade: N/A
NBC Protection System: N/A
Smoke Equipment: N/A

ARMAMENT
Main Armament: Note: 12.7-mm MG can be used instead.
Caliber, Type, Name: 7.62-mm (7.62x 54R) machinegun, SGMB
Rate of Fire (rd/min): 250 practical
Loader Type: Belt-fed
Ready/Stowed Rounds: 250 in box, 1,000 ready/0
Elevation (°): -6 to +23.5
Fire on Move: Yes

Auxiliary Weapon: (Optional)
Caliber, Type, Name: 2x 7.62-mm (7.62x 54R) machinegun, SGMB
Mount Type: Optional MGs on side pintel mounts
Maximum Aimed Range (m): 2,000
Max Effective Range (m):
Day: 1,000/ 400-500 on the move
Night: II sights available
Fire on Move: Yes
Rate of Fire (rd/min): 250 practical each/650 cyclic, 2-10 rd bursts
ATGM Launcher: N/A
Firing Ports: 3 on each side, 2 in rear doors

FIRE CONTROL
FCS Name: N/A
Main Gun Stabilization: N/A
Rangefinder: N/A
Infrared Searchlight: No
Sights w/Magnification:
Gunner:
Day: Optical sight
Field of View (°): INA
Acquisition Range (m): 2,000
Night: II and IR sights available
Commander Fire Main Gun: No

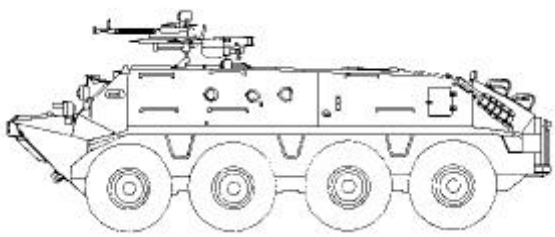
VARIANTS
BTR-152: Basic APC; many of which would later be covered and converted for other uses, such as ambulances, radio stations, and engineer vehicles. Versions for AA use include an Egyptian M53 gun (4x 12.7 mm) mount, and PLO-held ZU-23-2 gun mount.
BTR-152A: Anti-aircraft version with twin 14.5-mm MG turret
BTR-152D and E: Anti-aircraft versions with 4x 14.5-mm MGs
BTR-152I: BTR-152V version for artillery command vehicle.
BTR-152K: Version similar to **BTR-152V3** but with armored roof
BTR-152V: APC variant has central tire inflation system.
BTR-152U: Command vehicle with high rear structure
BTR-152V1: BTR-152V version with winch
BTR-152V2: BTR-152V version without winch
BTR-152V3: BTR-152V with winch and infrared driving lights

MAIN ARMAMENT AMMUNITION
Caliber, Type, Name:
7.62-mm API
Maximum Aimed Range (m): 2,000
Max Effective Range (m):
Day: 1,000
Night: INA
Tactical AA Range: 1,000
Armor Penetration (mm): 8 at 500 m

Other Ammunition Types: Light ball, ball-T, hvy ball, API-T, I-T

NOTES
Vehicles are early examples of armored transporters built from converted truck chassis (ZIL-151, and later ZIL-157)

Russian Armored Personnel Carrier BTR-60PA



Weapons & Ammunition Types	Typical Combat Load
12.7-mm DShK MG	**500**
APDS, API, API-T,	250
HE-T, HEI, I-T	250
2 x 7.62-mm PKT MG	**3,000**
Lt Ball, Ball-T	
API, API-T	

SYSTEM
Alternative Designations: BTR-60-PK
Date of Introduction: 1963
Proliferation: At least 30 countries (including variants)
Description:
Crew: 2
Troop Capacity: 12
Combat Weight (mt): 10.1
Chassis Length Overall (m): 7.22
Height Overall (m): 2.06
Width Overall (m): 2.82
Ground Pressure (kg/cm^2): INA
Drive Formula: 8 x 8

Automotive Performance:
Engine Type: 2 x 180-hp Gasoline
Cruising Range (km): 500
Speed (km/h):
- Max Road: 80
- Max Off-Road: 60
- Average Cross-Country: INA
- Max Swim: 10

Fording Depths (m): Amphibious

Radio: INA

Protection:
Armor, Turret Front (mm): 7-9mm hull front (no turret)
Applique Armor (mm): N/A
Explosive Reactive Armor (mm): N/A
Active Protective System: N/A
Mineclearing Equipment: N/A
Self-Entrenching Blade: N/A
NBC Protection System: Collective
Smoke Equipment: N/A

ARMAMENT
Main Armament:
Caliber, Type, Name: 12.7-mm (12.7 x 108) heavy MG, DShK
Rate of Fire (rd/min): 80-100 (practical)
Loader Type: Belt feed
Ready/Stowed Rounds: INA
Elevation (°): -10/+80
Fire on Move: Yes

Auxiliary Weapons:
Caliber, Type, Name: 2 x 7.62-mm machinegun PKT
Mount Type: Vehicle top
Maximum Aimed Range (m): 1,500
Max Effective Range (m):
- Day: 1,000
- Night: N/A

Fire on Move: Yes
Rate of Fire (rd/min): 250 practical / 650 cyclic, in 2-10 rd bursts

ATGM Launcher: N/A
Firing Ports: 3 on each side

FIRE CONTROL
FCS Name: N/A
Main Gun Stabilization: N/A
Rangefinder: N/A
Infrared Searchlight: N/A
Sights w/Magnification:
Gunner:
- Day: K10-T
  - Field of View (°): INA
  - Acquisition Range (m): 1,500 (est)
- Night: N/A

Commander Fire Main Gun: No

VARIANTS
A variety of armament variants for the vehicle were used, including single 7.62-mm PKT MG, or 12.7-mm MG, or no MG.

Artillery command and reconnaissance vehicles. ACRV **1V18** is a command and observation vehicle (COP). ACRV **1V19** is a fire direction center (FDC).

BTR-60PB: The most widely fielded variant has a one- man turret, a 14.5-mm KPV-T MG, a coaxial 7.62-mm MG and day/night sights.

BTR-60PBK: Company commander variant with 3 additional radios

BTR-60 PU: Armored command vehicle (ACV) variant with a 10-m mast radio antenna and front-to-rear rail antenna for mobile use

BTR-60 PU-12/ -12M: Air defense associated ACV and its upgrade

BTR-60 R-975: Forward air controller turreted variant.

MTP-2: Armored recovery vehicle

R-145BM: ACV with R-111, R-123, and R-130M radios and the distinctive Clothesline antenna

Russian Armored Personnel Carrier BTR-60PA continued

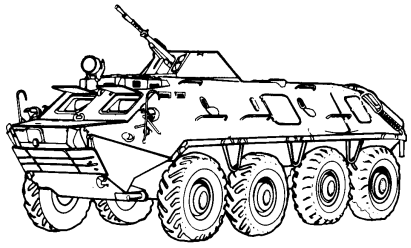
MAIN ARMAMENT AMMUNITION **Caliber, Type, Name:** 12.7-mm, APDS Chinese, Type 54 Maximum Aimed Range (m): 1,500 Max Effective Range (m): Day: 1,500 vehicles Night: N/A Tactical AA Range: 1,600 Armor Penetration (mm): INA 12.7-mm, API/API-T Type 54 Maximum Aimed Range (m): 1,500 Max Effective Range (m): Day: 1,500 unarmored ground / 800 armored Night: N/A Tactical AA Range: 1,000 Armor Penetration (mm): INA	**Other Ammunition Types:** Incendiary-T, HE-T Type MDZ, HEI Type ZP, Russian Duplex, Russian Duplex-T

NOTES

This vehicle is a roofed variant of the BTR-60P open-hatch armored carrier. It is widely fielded in original and modified form. The APC has a top-mounted 12.7-mm MG forward of rectangular gunner's hatch. Where an additional two 7.62-mm MGs are mounted, they are right and left of the hatch. Because of space restriction, no more than one or two gunners can fit in the opening.

A notable vulnerability is that passengers have to exit the vehicle through top hatches, which makes them vulnerable to fires. Also, gunners must be at least shoulder high out of the vehicle to operate the weapons.

Russian Armored Personnel Carrier BTR-60PB



Weapons & Ammunition Types	Typical Combat Load
14.5-mm turret MG API, API-T	**500**
7.62-mm coax PKT MG Light ball, Ball-T, API, API-T, I-T	**2,000**

SYSTEM
Alternative Designations: INA
Date of Introduction: 1966
Proliferation: At least 33 countries
Description:
Crew: 2
Troop Capacity: 8
Combat Weight (mt): 10.3
Chassis Length Overall (m): 7.22
Height Overall (m): 2.3
Width Overall (m): 2.82
Ground Pressure (kg/cm^2): 0.90
Drive Formula: 8 x 8

Automotive Performance:
Engine Type: 2x 90-hp Gasoline
Cruising Range (km): 500
Speed (km/h):Max Road: 80
Max Off-Road: INA
Average Cross-Country: INA
Max Swim: 10
Fording Depths (m): Amphibious
Radio: R-123

Protection:
Armor, Turret Front (mm): 7
Applique Armor (mm): Available
Explosive Reactive Armor (mm): N/A
Active Protective System: N/A
Mineclearing Equipment: N/A
Self-Entrenching Blade: N/A
NBC Protection System: Collective
Smoke Equipment: N/A

ARMAMENT
Main Armament:
Caliber, Type, Name: 14.5-mm (14.5 x 114) heavy MG, KPVT
Rate of Fire (rd/min): 150 practical
Loader Type: Belt-fed
Ready/Stowed Rounds: 50/450
Elevation (°): -5 to +30
Fire on Move: Yes

Auxiliary Weapon:
Caliber, Type, Name: 7.62-mm machinegun, PKT
Mount Type: Coax
Maximum Aimed Range (m): 2,000
Max Effective Range (m):
Day: 1,000/ 400-500 on the move
Night: N/A
Fire on Move: Yes
Rate of Fire (rd/min): 250 practical/650 cyclic, 2-10 round bursts

ATGM Launcher: N/A
Firing Ports: 3 on each side

FIRE CONTROL
FCS Name: N/A
Main Gun Stabilization: N/A
Rangefinder: N/A
Infrared Searchlight: Yes
Sights w/Magnification:
Gunner:
Day: PP-61AM, 2.6x
Field of View (°): 23
Acquisition Range (m): 2,000
Night: N/A
Commander Fire Main Gun: No

VARIANTS
BTR-60PBK: Command APC variant, with three additional radios.
BTR-60PB FAC: Turreted forward air control variant without gun.

BTR-60PZ: Final production model, with 1PZ-2 roof-mounted periscope and high angle-of-fire turret.

BTR-70: Similar design with diesel engines and added side doors.
BTR-80: Similar design with many upgrades, including greater dimensions, larger side doors, high angle-of-fire turret, new radio, single more powerful diesel engine, smoke grenade launchers, etc.

MAIN ARMAMENT AMMUNITION
Caliber, Type, Name:
14.5-mm API-T
Maximum Aimed Range (m): 2,000
Max Effective Range (m):
Day: 2,000
Night: INA
Tactical AA Range: 1,400
Armor Penetration (mm): 20 at 1,000 m/ 30 at 500 m

Other Ammunition Types: API, I-T

NOTES
The APC has self-sealing tires and a central tire inflation system. A vulnerability is that troops must dismount from the top. In Afghanistan a variety of weapons were used, such as the AGS-17 automatic grenade launcher instead of the main gun. Current options include several one-man turrets, such as the Modular Weapons Station (as on BTR-80A, with a 30-mm gun), or Kliver (with a 30-mm gun, 7.62-mm coax MG, thermal sights, superior day sights, and four Kornet ATGM launchers).

Russian Armored Personnel Carrier BTR-80

Weapons & Ammunition Types	Typical Combat Load
14.5-mm turret MG API, API-T	**500**
7.62-mm coax PKT MG Light ball, Ball-T, API, API-T, I-T	**2,000**

SYSTEM
Alternative Designations: GAZ-5903
Date of Introduction: 1984
Proliferation: At least 22 countries
Description:
Crew: 2
Troop Capacity: 8
Combat Weight (mt): 13.6
Chassis Length Overall (m): 7.55
Height Overall (m): 2.41
Width Overall (m): 2.95
Ground Pressure (kg/cm^2): INA
Drive Formula: 8 x 8

Automotive Performance:
Engine Type: 260-hp Diesel
Cruising Range (km): 600
Speed (km/h):Max Road: 85
Max Off-Road: 60
Average Cross-Country: 40
Max Swim: 10
Fording Depths (m): Amphibious

Radio: R-173

Protection:
Armor, Turret Front (mm): Against 12.7mm
Applique Armor (mm): Available
Explosive Reactive Armor (mm): N/A
Active Protective System: N/A
Mineclearing Equipment: N/A
Self-Entrenching Blade: N/A
NBC Protection System: Collective
Smoke Equipment: 6 x 81-mm smoke grenade launchers

ARMAMENT
Main Armament:
Caliber, Type, Name: 14.5-mm (14.5 x 114) heavy MG, KPVT
Rate of Fire (rd/min): 150 practical
Loader Type: Belt-fed
Ready/Stowed Rounds: 50/450
Elevation (°): -4/+60
Fire on Move: Yes

Auxiliary Weapon:
Caliber, Type, Name: 7.62-mm machinegun, PKT
Mount Type: Coax
Maximum Aimed Range (m): 1,500
Max Effective Range (m):
Day: 1,000
Night: N/A
Fire on Move: Yes
Rate of Fire (rd/min): 250 practical/650 cyclic, 2-10 round bursts
ATGM Launcher: N/A
Firing Ports: 3 on each side

FIRE CONTROL
FCS Name: N/A
Main Gun Stabilization: N/A
Rangefinder: N/A
Infrared Searchlight: OU-3GA2M
Sights w/Magnification:
Gunner:
Day: 1P3-6, 1.2x/4x
Field of View (°): 49/14
Acquisition Range (m): 2,000
Night: N/A
Commander Fire Main Gun: No

VARIANTS
BTR-80A: IFV with a stabilized turret containing a 30-mm 2A42 (BMP-2) automatic gun, coax 7.62-mm MG, and TNP-3 day/night sights. This vehicle is in prototype and offered for export. The drop-in turret package is also offered for export. A BTR-80S variant includes the turret/fire control, but with 14.5-mm versus 30-mm gun.

BTR-80K: Command variant w/ added R-173, R-173P, and R-159 (portable) radios, R-174intercom, navigation aids, and an 11-m mast

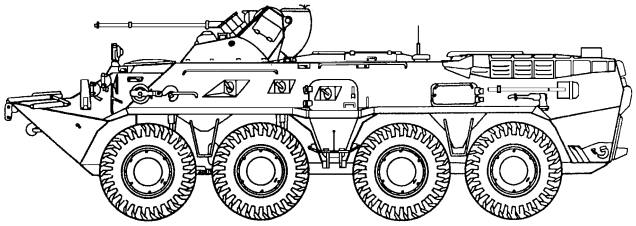
1V152: Artillery battalion command vehicle
2S23: 120-mm self-propelled combination gun (howitzer/mortar)
BREM-K: Armored recovery vehicle
RKhM-4: NBC reconnaissance vehicle
UNSh: Standardized expanded chassis for current variants, including **Kushetka-B** ACRV and BMM vehicle series.

MAIN ARMAMENT AMMUNITION
Caliber, Type, Name:
14.5-mm API-T
Maximum Aimed Range (m): 2,000
Max Effective Range (m):
Day: 2,000
Night: INA
Tactical AA Range: 1,500-2,000
Armor Penetration (mm): 20 at 1,000 m/ 30 at 500 m

Other Ammunition Types: API, I-T

NOTES
BTR-80 is superior to BTR-60/70 with a larger chassis, high-angle-of- fire turret, and single more powerful diesel engine (vs gasoline).
Options include the Kliver turret with a 30-mm gun, 7.62-mm coax MG, thermal sights, superior day sights, and (four) Kornet ATGM launchers.

Russian Armored Personnel Carrier BTR-80A



Weapons & Ammunition Types	Typical Combat Load
30-mm automatic gun HEI-T, Frag-HE-T AP-T, APDS-T, APFSDS-T	**300**
7.62-mm coax MG	**2,000**

SYSTEM
Alternative Designations: GAZ-59034
Date of Introduction: 1994
Proliferation: At least 3 countries
Description:
Crew: 2
Troop Capacity: 8
Combat Weight (mt): 14.6
Chassis Length Overall (m): 7.65
Height Overall (m): 2.80
Width Overall (m): 2.90
Ground Pressure (kg/cm^2): INA
Drive Formula: 8 x 8

Automotive Performance:
Engine Type: 260-hp Diesel
Cruising Range (km): 800
Speed (km/h):
- Max Road: 90
- Max Off-Road: INA
- Average Cross-Country: INA
- Max Swim: 10

Fording Depths (m): Amphibious

Radio: R-163-50U VHF, R-163-UP receiver, R-174 intercom

Protection:
Armor, Turret Front (mm): Can defeat 12.7-mm
Applique Armor (mm): N/A
Explosive Reactive Armor (mm): N/A
Mineclearing Equipment: No
Self-Entrenching Blade: N/A
Active Protective System: N/A
NBC Protection System: Collective
Smoke Equipment: 6 x 81-mm smoke grenade launchers

ARMAMENT
Main Armament:
Caliber, Type, Name: 30-mm automatic gun, 2A72
Rate of Fire (rd/min): 200-330 variable cyclic in bursts
Loader Type: Dual-belt feed
Ready/Stowed Rounds: 300/ 0
Elevation (°): -5 to +70
Fire on Move: Yes

Auxiliary Weapon:
Caliber, Type, Name: 7.62-mm machinegun PKT
Mount Type: Coax
Maximum Aimed Range (m): 1,500
Max Effective Range (m):
- Day: 1,000 Night: 800+

Fire on Move: Yes
Rate of Fire (rd/min): 250 practical/650 cyclic, 2-10 round bursts

ATGM Launcher: N/A
Firing Ports: 4 right side, 3 left side

FIRE CONTROL
FCS Name: N/A
Main Gun Stabilization: 2-plane
Rangefinder: INA
Infrared Searchlight: OU-5
Sights w/Magnification:
Gunner:
- Day: 1P3-9, 1.2x/4x
  - Field of View (°): 49/14 (est)
  - Acquisition Range (m): 4,000
- Night: TPN3-42 II/IR
  - Field of View (°): INA
  - Acquisition Range (m): 800

Commander Fire Main Gun: No

VARIANTS
BTR-80S: APC has the same turret with 14.5-mm vs 30-mm gun.

MAIN ARMAMENT AMMUNITION
Caliber, Type, Name:
30-mm APDS-T
- Maximum Aimed Range (m): INA
- Max Effective Range (m):
  - Day: 2,000
  - Night: INA
- Tactical AA Range: 2,500
- Armor Penetration (mm): 25 (RHA) at 1,500 m

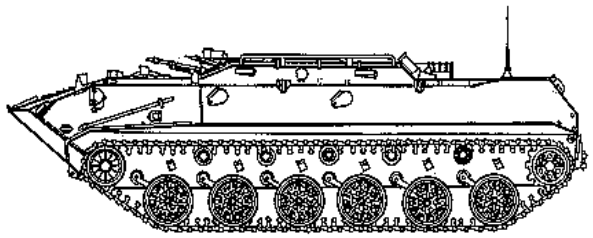
30-mm APFSDS-T, M929
- Maximum Aimed Range (m): INA
- Max Effective Range (m):
  - Day: 2,000+
  - Night: INA
- Tactical AA Range: 2,500
- Armor penetration (mm): 55 (RHA) at 1,000 m/45 at 2,000 m

30-mm Frag-HE
- Maximum Aimed Range (m): 4,000
- Max Effective Range (m):
  - Day: 4,000
  - Night: INA
- Tactical AA Range: 2,500
- Armor Penetration (mm): INA

Other Ammunition Types: 30-mm AP-T, HEI-T

NOTES
The drop-in gun/turret package (Modular Weapon System) is offered for export, to upgrade a wide variety of vehicles to BTR-80A standard.
BTR-80A can mount K1-126 bullet-resistant tires.

Russian Airborne Armored Personnel Carrier BTR-D



Weapons & Ammunition Types	Typical Combat Load
2x 7.62-mm hatch MG Lt Ball, Ball-T, API, API-T, Incendiary	**2,000**

SYSTEM
Alternative Designations: BMD M1979
Date of Introduction: 1974
Proliferation: At least 1 country
Description:
Crew: 1
Troop Capacity: 12 passengers
Combat Weight (mt): 6.7
Chassis Length Overall (m): 5.88
Height Overall (m): 1.67
Width Overall (m): 2.63
Ground Pressure (kg/cm^2): 0.5

Automotive Performance:
Engine Type: 240-hp Diesel
Cruising Range (km): 500
Speed (km/h):
- Max Road: 61
- Max Off-Road: 35
- Average Cross-Country: INA
- Max Swim: 10

Fording Depth (m): Amphibious

Radio: R-123

Protection:
Armor, Turret Front (mm): "Antibullet" (7.62-mm)
Applique Armor (mm): N/A
Explosive Reactive Armor (mm): N/A
Mineclearing Equipment: N/A
Self-Entrenching Blade: N/A
Active Protective System: No
NBC Protection System: Yes
Smoke Equipment: 2x2 forward firing smoke grenade launchers
Vehicle engine exhaust smoke system (VEESS)

ARMAMENT
Main Armament:
Caliber, Type, Name: 7.62-mm (7.62 x 54R) machinegun, PKT
Rate of Fire (rd/min): 250 practical / 650 cyclic, in 2-10 round bursts
Loader Type: Belt-fed
Ready/Stowed Rounds: INA
Elevation (°): INA
Fire on Move: Yes

Auxiliary Weapon: N/A

ATGM Launcher: N/A
Firing Ports: 2 on each side, 1 in left rear door, permit two 5.45-mm RPK-74 light machineguns to be used.

FIRE CONTROL
FCS Name: N/A
Main Gun Stabilization: N/A
Rangefinder: N/A
Infrared Searchlight: N/A
Sights w/Magnification: Open, 1x
Commander Fire Main Gun: No

VARIANTS
1V118 Reostat/1V119 Spektr: Artillery command and observation posts for amphibious and airborne forces.

2S9: 120-mm self-propelled combination gun, with a turreted breech-loaded mortar/howitzer system.

BMD-KShM: Former Soviet regiment or division command and staff variant, with large Clothes-line antenna.

BREM-D: Armored repair and recovery variant.

BTR-RD/Robot: An ATGM variant (AT-4/-5) with 2 launchers, dismounted or mounted on pintles for vehicle launch.

BTR-ZD: Air defense variant with porteed or towed ZU-23 twin 23-mm air defense gun. Vehicle also carries manpad SAM launchers.

BTR-3D: Air defense variant with a rear-mounted ZU-23 gun.

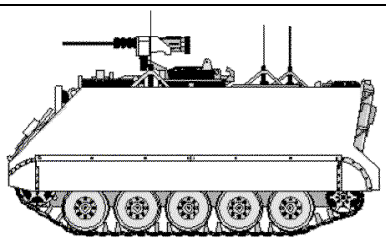
Sterkh (Malakit/Shmel): UAV transporter and launcher vehicle.

MAIN ARMAMENT AMMUNITION
Caliber, Type, Name:
7.62-mm API
- Maximum Aimed Range (m): 1,500
- Max Effective Range (m):
  - Day: 1,000 m / 400-500 on the move
  - Night: INA
- Tactical AA Range: INA
- Armor Penetration (mm): 8 (RHA) at 500 m

Other Ammunition Types: 7.62-mm Light Ball, Ball-T, Heavy Ball, API, API-T, Incendiary

NOTES
BTR-D is a variant of the BMD-1, with an additional road wheel, with the turret removed, and with a raised hatch area. The vehicle can be parachute landed with airborne troops. The BTR-Ds in grenade launcher units will carry one AGS-17 30-mm AGL in the rear.
Options include the Kliver turret with a 30-mm gun, 7.62-mm coax MG, thermal sights, superior day sights, and (four) Kornet ATGM launchers.

US Armored Personnel Carrier M113A1



Weapons & Ammunition Types	Typical Combat Load
.50 cal cupola MG Slap, API, API-T, Ball, Ball-T, Incendiary, I-T	**2,000**

SYSTEM
Alternative Designations: INA
Date of Introduction: 1964
Proliferation: At least 46 countries
Description:
Crew: 2
Troop Capacity: 11 passengers
Combat Weight (mt): 11.20
Chassis Length Overall (m): 4.90
Height Overall (m): 1.80
Width Overall (m): 2.70
Ground Pressure (kg/cm^2): .55

Automotive Performance:
Engine Type: 215-hp Diesel
Cruising Range (km): 483
Speed (km/h):
- Max Road: 64
- Max Off-Road: INA
- Average Cross-Country: INA
- Max Swim: 5.8

Fording Depths (m): Amphibious

Radio: Various, including intercom

Protection:
Armor, Turret Front (mm): N/A—No turret
Applique Armor (mm): Yes—anti-mine armor on bottom
Explosive Reactive Armor (mm): Available
Active Protective System: N/A
Mineclearing Equipment: N/A
Self-Entrenching Blade: N/A
NBC Protection System: N/A
Smoke Equipment: N/A

ARMAMENT
Main Armament:
Caliber, Type, Name: .50 cal (12.7 x 99) heavy machinegun, M2HB
Rate of Fire (rd/min): 450-550 cyclic
Loader Type: Belt feed
Ready/Stowed Rounds: 250/1750
Elevation (°): -20/+60
Fire on Move: Yes

Auxiliary Weapon: N/A
ATGM Launcher: N/A
Firing Ports: None

FIRE CONTROL
FCS Name: N/A
Main Gun Stabilization: N/A
Rangefinder: N/A
Infrared Searchlight: N/A
Sights w/Magnification:
Gunner:
- Day: Open ladder sight, 1x
  - Field of View (°): INA
  - Acquisition Range (m): 2,000
- Night: N/A

Commander Fire Main Gun: No

VARIANTS
More than 100 variants have been produced in numerous countries, with 7.62-mm MGs, 40-mm automatic grenade launchers, 90-mm recoilless rifles, and turrets with 20-to-76-mm cannons. The following are US variants. Command variants are **M577** and **M114** (C&R). Self-propelled mortars are **M125 (**81-mm) and **M106A2** (4.2-inch). The **M901/ ITV** ATGM launcher vehicle is a common variant. The **M163** SP air defense gun has a 20-mm Vulcan cannon; and **M730** is a Chapparral AD missile launcher. Other variants include ambulances, recovery and engineer vehicles.

M113A2: This multi-national variant features mobility improvements. One version is being developed with the Giat TS90 90-mm cannon.
M113A3: Changes for this multi-national variant include a new power train and increased armor protection.

AIFV: The multi-national IFV variant has M113A3 armor upgrades, a stabilized turret with 25-mm gun, and a 7.62-mm MG.

VCC-1: Italian M113 copies are supplemented by this variant

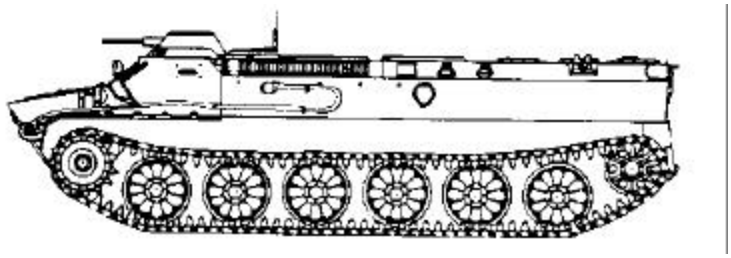
MAIN ARMAMENT AMMUNITION
Caliber, Type, Name:
.50 SLAP (sabot light armor penetrator)
- Maximum Aimed Range (m): 2,000
- Max Effective Range (m):
  - Day: 2,000
  - Night: INA
- Armor Penetration (mm): INA

.50 Cal Ball
- Maximum Aimed Range (m): 2,000
- Max Effective Range (m):
  - Day: 1,000
  - Night: N/A
- Armor Penetration (mm): INA

Other Ammunition Types: Ball-T, Incendiary, I-T, API, API-T

NOTES
The M113A1 is a variant of the gasoline-powered **M113**. Armors available include Rafael Enhanced Add-on Armor Kit (EAAK), Creusot-Marrel plate armor, and SNPE explosive reactive armor. Thermal and TV sights are also available.

Russian Light Armored Multi-purpose Vehicle MT-LB



Weapons & Ammunition Types	Typical Combat Load
7.62-mm Turret MG Lt Ball , Ball-T, API, API-T, Incendiary	**2,000**

SYSTEM
Alternative Designations: MT-LB-T
Date of Introduction: 1970, modernized in 1995
Proliferation: At least 9 countries
Description:
Crew: 2
Troop Capacity: 11 passengers
Combat Weight (mt): 11.9
Chassis Length Overall (m): 6.35
Height Overall (m): 1.87
Width Overall (m): 2.85
Ground Pressure (kg/cm^2): 0.46 standard track / 0.28 wide track

Automotive Performance:
Engine Type: 290-hp Diesel
Cruising Range (km): 500
Speed (km/h):
- Max Road: 61.5/70 modernized
- Max Off-Road: 30/45 modernized
- Average Cross-Country: INA
- Max Swim: 5-6

Fording Depth (m): Amphibious

Radio: R-123 or upgrade to -123M/-173

Protection:
Armor, Turret Front (mm): 7-14
Applique Armor (mm): N/A
Explosive Reactive Armor (mm): INA
Active Protective System: N/A
Mineclearing Equipment: N/A
Self-Entrenching Blade: Yes
NBC Protection System: Collective
Smoke Equipment: N/A

ARMAMENT
Main Armament(s):
Caliber, Type, Name: 7.62-mm (7.62x 54R) machinegun, PKT
Rate of Fire (rd/min): 250 practical / 650 cyclic, 2-10 round bursts
Loader Type: Belt-feed
Ready/Stowed Rounds: INA
Elevation (°): -5/ +35
Fire on Move: Yes

Auxiliary Weapon: N/A
ATGM Launcher: N/A

Firing Ports: 1 on each side and 1 in each rear door.

FIRE CONTROL
FCS Name: INA
Main Gun Stabilization: N/A
Rangefinder: N/A
Infrared Searchlight: N/A
Sights w/Magnification:
Gunner:
- Day: PP-61AM, 2.6x
  - Field of View (°): 23
  - Acquisition Range (m): 1,500 (est)
- Night: N/A

Commander Fire Main Gun: No

VARIANTS
MT-LB Upgrade: 1995 upgrade includes improved steering and a new engine.
2S1: 122-mm self-propelled howitzer.
9P149/Shturm-S: ATGM launcher vehicle with AT-6 autoloader.
MT-LB "blade": Dozer version with a blade attached to the vehicle.
MT-LBu: Expanded variant for artillery command and reconnaissance vehicles (ACRVs) and other uses.
MT-LBV: Arctic variant with .57m wide track for snow and improved flotation.
MTP-LB: Technical support vehicle.
MT-SON: Ground surveillance radar vehicle with Pork Trough/ SNAR-2 radar.
RKhM: Chemical reconnaissance vehicle.
SA-13: Regimental surface-to-air missile launcher vehicle.
SNAR-10: Ground surveillance radar vehicle with Big Fred radar.

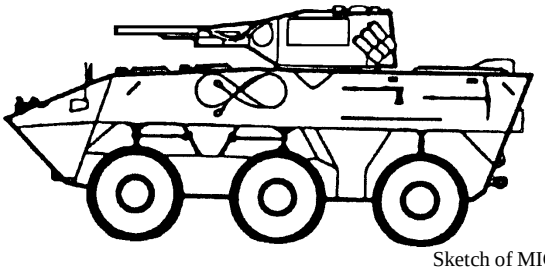
MAIN ARMAMENT AMMUNITION
Caliber, Type, Name:
7.62-mm API, API-T
- Maximum Aimed Range (m): 1,500
- Max Effective Range (m):
  - Day: 1,000/400-500 on the move
  - Night: INA
  - Tactical AA Range: INA
- Armor Penetration (mm): 8 (RHA) at 500 m

Other Ammunition Types: Light Ball, Ball-T, Heavy Ball, Incend i-ary

NOTES
Russian AG-17 30-mm automatic grenade launcher modification is available for use on MT-LB.

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.

Austrian Armored Personnel Carrier Pandur



Sketch of MICV 1/127 APC

Weapons & Ammunition Types	Typical Combat Load
12.7mm MG, M2HB SLAP, API, API-T, Ball, Ball-T, Incend, I-T	**1,000**
7.62-mm MG, FN-MAG Ball-T, API, API-T	**1,600**

SYSTEM
Alternative Designations: System featured is MICV 1/127 version
Date of Introduction: 1996
Proliferation: At least 3 countries, 2 more to follow, and the UN
Description:
Crew: 3
Troop Capacity: 8-9
Combat Weight (mt): 11.3
Chassis Length Overall (m): 5.70
Height Overall (m): 2.64 top of cupola
Width Overall (m): 2.50
Ground Pressure (kg/cm^2): INA
Drive Formula: 6 x 6

Automotive Performance:
Engine Type: 210-hp Diesel/265-hp in upgrade
Cruising Range (km): 650
Speed (km/h):
Max Road: 105
Max Off-Road: INA
Average Cross-Country: INA
Max Swim: 9/11 with Amphibious Vehicle
Fording Depths (m): 1.2

Radio: INA

Protection:
Armor, Turret Front (mm): 12.7-mm on front 30°, 7.62-mm other
Applique Armor (mm): Add-on protection to 14.5 mm available
Explosive Reactive Armor (mm): N/A
Active Protective System: N/A
Mineclearing Equipment: N/A
Self-Entrenching Blade: N/A
NBC Protection System: Yes
Smoke Equipment: 6-12 smoke grenade launchers

ARMAMENT
Main Armament: Note:
Caliber, Type, Name: .50 cal (12.7 x 99) heavy MG, M2HB
Rate of Fire (rd/min): 450-550 cyclic
Loader Type: Belt-fed
Ready/Stowed Rounds: 250 /750
Elevation (°): -15 to +50
Fire on Move: Yes

Auxiliary Weapon:
Caliber, Type, Name: 7.62-mm (7.62 x 51) machinegun, FN-MAG
Mount Type: Turret/cupola mount
Maximum Aimed Range (m): 2,000
Max Effective Range (m):
Day: 1,500
Night: II sights available
Fire on Move: Yes
Rate of Fire (rd/min): 250 practical each/650-1000 cyclic, in bursts
ATGM Launcher: N/A
Firing Ports: 2 on each side, for several APC variants.

FIRE CONTROL
FCS Name: N/A
Main Gun Stabilization: N/A
Rangefinder: N/A
Infrared Searchlight: No
Sights w/Magnification:
Gunner:
Day: Optical sight, Swarovski F-450, 2x
Field of View (°): INA
Acquisition Range (m): 2,000
Night: II and IR sights available, thermal for cannon variants
Commander Fire Main Gun: No

VARIANTS
Pandur offers a wide variety of configurations on a modern 6x6 vehicle chassis, with weights varying 9-15t. Base vehicle is the APC, with flat hull top and 2- and 3-step hull top configurations. A recent variant is **Amphibious Vehicle**, stretch flat-hull APC with slab sides and minimal preparation time for amphibious operation. Options include 1-3 cupolas and/or drop-in turrets with weapons: 7.62- and/or 12.7-mm MGs, 25-, 30-, or 35-mm autocannon, 40-mm AGL, and 90-mm cannon. Other variants include recon, fire support, TOW, Hellfire, and HOT ATGM launchers, engineer, command and control, NBC, ambulance, mortar, and logistics vehicles. A recent 8x8 fire support chassis prototype was displayed with a 105-mm gun.

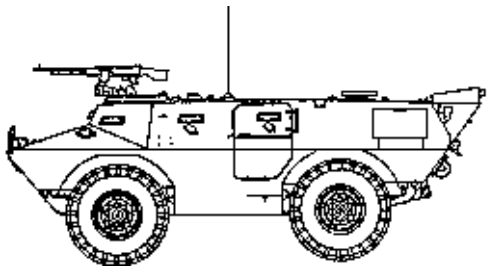
MAIN ARMAMENT AMMUNITION
Caliber, Type, Name:
.50 cal SLAP
Maximum Aimed Range (m): 2,000
Max Effective Range (m):
Day: 2,000
Night: INA
Armor Penetration (mm): INA

.50 cal Ball
Maximum Aimed Range (m): 2,000
Max Effective Range (m):
Day: 1,000
Night: INA
Armor Penetration (mm): INA

Other Ammunition Types: Ball-T, API, API-T, Incendiary, I-T

NOTES
A spall liner and mine protection carpet are included on the APC.

US Armored Personnel Carrier V-150



Weapons & Ammunition Types	Typical Combat Load
7.62-mm cupola MG Ball-T, Match API, API-T	**3,200**

SYSTEM
Alternative Designations: Commando
Date of Introduction: 1971
Proliferation: At least 20 countries
Description:
Crew: 3
Troop Capacity: 2
Combat Weight (mt): 9.89
Chassis Length Overall (m): 5.69
Height Overall (m): 1.98
Width Overall (m): 2.26
Ground Pressure (kg/cm^2): INA
Drive Formula: 4 x 4

Automotive Performance:
Engine Type: 202-hp Diesel
Cruising Range (km): 643
Speed (km/h):
- Max Road: 89
- Max Off-Road: INA
- Average Cross-Country: INA
- Max Swim: 5

Fording Depth (m): Amphibious

Radio: INA

Protection:
Armor, Turret Front (mm): Against 7.62-mm ball
Applique Armor (mm): N/A
Explosive Reactive Armor (mm): N/A
Mineclearing Equipment: N/A
Self-Entrenching Blade: N/A
Active Protective System: N/A
NBC Protection System: N/A
Smoke Equipment: Optional

ARMAMENT
Main Armament:
Caliber, Type, Name: 7.62-mm (7.62 x 51) MG, FN-MAG (exa mple)
Rate of Fire (rd/min): 650-1000 cyclic
Loader Type: Belt feed, box magazines
Ready/Stowed Rounds: INA
Elevation (°): INA
Fire on Move: Yes

Auxiliary Weapon: N/A

ATGM Launcher: N/A
Firing Ports: None

FIRE CONTROL
FCS Name: N/A
Main Gun Stabilization: N/A
Rangefinder: N/A
Infrared Searchlight: N/A
Sights w/Magnification:
Gunner:
- Day: Open ladder sight
  - Field of View (°): INA
  - Acquisition Range (m): 2,000
- Night: N/A

Commander Fire Main Gun: No

VARIANTS
Armament options vary widely and include: a turret with 7.62-mm or 12.7-mm MG or turrets with 20-mm, 25-mm, 30-mm, 76-mm, or 90-mm gun. Another turret offers a 12.7-mm MG and 40-mm grenade launcher. An 81-mm self-propelled mortar launcher variant and a TOW ATGM launcher variant are available. Variants include a cargo carrier, police and security vehicles, an air defense variant with 20-mm Vulcan cannon.

V-100: This earlier 4x4 APC has a gasoline engine.

V-150S: This slightly larger 4x4 variant has improved drive train and the above variety of turret and gun options. A Commando command variant includes a raised compartment area with external-mount 7.62-mm MG. Taiwan has versions with an open-mount 12.7-mm MG and a 107-mm (4.2 inch) mortar.

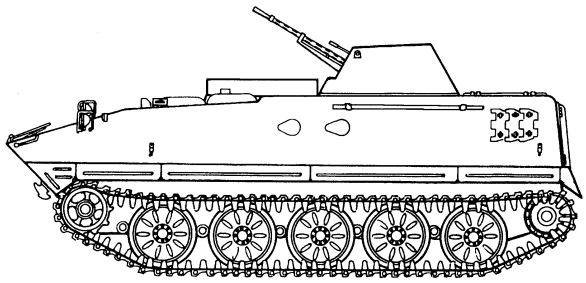
V-200: Variant sold to Singapore with 20-mm turret, 90-mm turret, air defense variant with RBS-70 surface-to-air missile and a recovery var i-ant. Another variant has a 120-mm mortar.

MAIN ARMAMENT AMMUNITION
Caliber, Type, Name: 7.62-mm Ball , NATO
- Maximum Aimed Range (m): 2,000 (est)
- Max Effective Range (m):
  - Day: 1,500
  - Night: INA
- Tactical AA Range: INA
- Armor Penetration (mm): INA

Other Ammunition Types: Ball-T, API, API-T, Match

NOTES
The baseline V-150 is equipped with a variety of pintle-mounted 7.62-mm machineguns. Many MGs are installed by user countries from their inve n-tories. The Belgian FN-MAG general purpose MG is a widely used MG that represents a common capability.

North Korean Armored Personnel Carrier VTT-323



Weapons & Ammunition Types	Typical Combat load
2 x 14.5-mm KPVT MG	**1,000**
API, API-T	500
HE-T	500
*AT Vehicle	
AT-3-Type ATGM	**4**
HEAT	
HE	
SA-7/-14/16 MANPAD	**2**

SYSTEM
Alternative Designations: M1973
Date of Introduction: 1973
Proliferation: At least one country

Description:
Crew: 3
Troop Capacity: 9 passengers
Combat Weight (mt): 13.5
Length Overall (m): 6.20
Height Overall (m): 2.50
Width Overall (m): 3.06
Ground Pressure (kg/cm^2): 0.58

Automotive Performance:
Engine Type: 260-hp Diesel
Cruising Range (km): 450
Speed (km/h):
- Max Road: 80
- Max Off-Road: 70-80
- Average Cross-Country: INA
- Max Swim: 10

Fording Depths (m): Amphibious
Radio: INA

Protection:
Armor, Turret Front (mm): 24
Applique Armor (mm): No
Explosive Reactive Armor (mm): No
Active Protective System: No
NBC Protection System: No
Smoke Equipment: No

ARMAMENT
Main Armament:
Caliber, Type, Name: 2 x 14.5-mm (14.5x114) Heavy MGs, KPVT
Rate of Fire (rd/min): 300 practical (2 x 150)
Loader Type: Belt
Ready/Stowed Rounds: INA
Elevation (°): -5 to +60
Fire on Move: Yes
Auxiliary Weapon: None
Firing Ports: 2 on each side

ATGM Launcher:
Name: 9P111-type
Launch Method: Rail-launched
Guidance: MCLOS
Command Link: Wire
Launcher Dismountable: Yes

FIRE CONTROL
FCS Name: No
Main Gun Stabilization: No (est.)
Rangefinder: No
Infrared Searchlight: No
Sights w/Magnification:
Gunner:
- Day: INA
  - Field of View (°): INA
  - Acquisition Range (m): 1,500
- Night: INA

Commander Fire Main Gun: No

VARIANTS
North Korean variant of Chinese **YW 531A/ Type 63-II** APC. An AT variant also mounts an AT-3-type ATGM launcher, and may include a SA-14 or SA-16 manportable air defense launcher.

Other vehicles using the chassis are the **PT-85** light tank, a 120-mm combination gun, a 122-mm SP howitzer, 107-mm MRLs (12/18/24 tubes), a 4-barreled 14.5-mm SP AA Gun, the M1985 (AT-3-type 4-rail) ATGM launcher vehicle, and 82- and 120-mm SP mo rtars.

MAIN ARMAMENT AMMUNITION
Caliber, Type, Name: 14.5-mm API-T
Max Aimed Range (m): 2,000 (EST)
Max Effective Range (m):
- Day: 1,500
- Night: INA

Tactical AA Range: 1,500
Armor Penetration (mm): 20 at 1,000 m/ 30 at 500 m, 38 at muzzle
Other Ammunition Types: API, I-T, HE-T Type MDZ

ANTITANK GUIDED MISSILES See AT-3 for ATGM types.
Name: AT-3c Imp/ Polk (Slovenian)
Warhead Type: Tandem HEAT
Armor Penetration (mm): 580 (RHA)
Range (m): 3,000

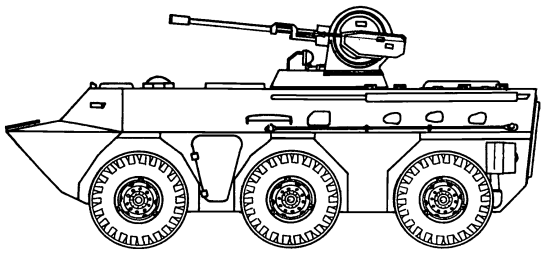
Name: Red Arrow-73A (Chinese)
Warhead Type: HEAT
Armor Penetration (mm): 500 RHA
Range (m): 3,000

Name: Red Arrow-73B/C (Chinese)
Warhead Type: HEAT
Armor Penetration (mm): 600 RHA
Range (m): 3,000

Other ATGMs: I-RAAD (Iranian), Malyutka-2 HE (Russian)

NOTES
Thermal sights are available. Slovenian TS-M ATGM thermal night sight ranges are: detection 4,500 m, recognition 2,000 m.
The HE-Blast ATGM is used for killing personnel and destroying bunkers and other fortifications.

Chinese Armored Personnel Carrier WZ 551



APC w/25-mm gun

Weapons & Ammunition Types	Typical Combat Load
25-mm automatic gun	***400**
API	200
HE	200
7.62-mm coax MG	**1,000**
	*mix estimate

SYSTEM
Alternative Designations: M1986/1, M1986/2, Type 86
Date of Introduction: 1994
Proliferation: At least 3 countries
Description:
Crew: 3
Troop Capacity: 10
Combat Weight (mt): 15.3
Chassis Length Overall (m): 6.63
Height Overall (m): 2.89
Width Overall (m): 2.80
Ground Pressure (kg/cm^2): INA
Drive Formula: 6 x 6

Automotive Performance:
Engine Type: 256-hp Diesel
Cruising Range (km): 600
Speed (km/h):
Max Road: 85
Max Off-Road: INA
Average Cross-Country: INA
Max Swim: 8
Fording Depths (m): Amphibious

Radio: INA

Protection:
Armor, Turret Front (mm): INA
Applique Armor (mm): N/A
Explosive Reactive Armor (mm): N/A
Mineclearing Equipment: No
Self-Entrenching Blade: No
Active Protective System: N/A
NBC Protection System: Collective
Smoke Equipment: 8 smoke grenade launchers

ARMAMENT
Main Armament:
Caliber, Type, Name: 25-mm automatic overhead turreted gun
Rate of Fire (rd/min): 100/300/500 in bursts, or semi-automatic
Loader Type: Drum feed
Ready/Stowed Rounds: 200/ 200
Elevation (°): -8 to +55
Fire on Move: Yes, reduced range (est.)

Auxiliary Weapon:
Caliber, Type, Name: 7.62-mm machinegun PKT
Mount Type: Coax
Max Aimed Range (m): 2,000
Max Effective Range (m):
Day: 1,000
Night: 800+
Fire on Move: Yes
Rate of Fire (rd/min): 250 practical/ 650 cyclic, 2-10 round bursts

ATGM Launcher: N/A
Firing Ports: 4
FIRE CONTROL
FCS Name: N/A
Main Gun Stabilization: INA
Rangefinder: INA
Infrared Searchlight: IR sight w/searchlight optional
Sights w/Magnification:
Gunner: Day/night sight
Day: INA
Field of View (°): INA
Acquisition Range (m): INA
Night: II
Field of View (°): INA
Acquisition Range (m): INA
Commander Fire Main Gun: No

VARIANTS
Other versions include APCs with other 25-mm guns, and with 12.7-mm machinegun. There are also IFV variants with the Dragar 1-man turret and 25-mm gun, and the BMP-1 turret with 73-mm gun. Other vehicle types include: C3 vehicle, ambulance, and an engineer vehicle. The ATGM launcher vehicle variants launch Red Arrow-8E (HJ-8E), and the new Red Arrow-9 (HJ-9) ATGM.

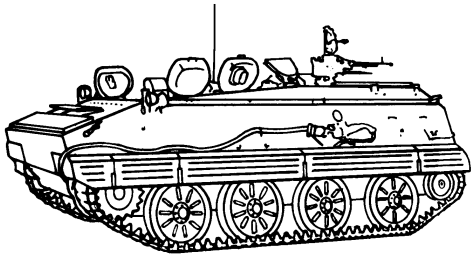
MAIN ARMAMENT AMMUNITION
Caliber, Type, Name: 25-mm API
Max Aimed Range (m): INA
Max Effective Range (m):
Day: 2,000 (est.)
Night: INA
Tactical AA Range: 2,000 (est)
Armor Penetration (mm): INA

Caliber, Type, Name: 25-mm HE
Max Aimed Range (m): INA
Max Effective Range (m):
Day: 2,000+ (est)
Night: INA
Tactical AA Range: 2,000 (est)
Armor penetration (mm): INA

Other Ammunition Types: INA

NOTES
The tires have run-flat capability.

Chinese Armored Personnel Carrier YW 531A/531C



YW 531 Baseline APC

Weapons & Ammunition Types	Typical Combat Load
12.7-mm MG	**1,120**
APDS, API, API-T,	500
HE-T, HEI	620

SYSTEM Data is for YW 531A/C where different
Alternative Designations: Type 63**,** North Korean M1967
Date of Introduction: Late 1960s
Proliferation: At least 9 countries
Description:
Crew: 4
Troop Capacity: 10 passengers
Combat Weight (mt): 12.60
Chassis Length Overall (m): 5.48
Height Overall (m): 2.85
Width Overall (m): 2.98
Ground Pressure (kg/cm^2): 0.44

Automotive Performance:
Engine Type: 260-hp Diesel/320-hp Diesel
Cruising Range (km): 500
Speed (km/h):
- Max Road: 42/66
- Max Off-Road: 32/40
- Average Cross-Country: INA
- Max Swim: 6.0

Fording Depths (m): Amphibious

Radio: Type 889

Protection:
Armor, Turret Front (mm): 14, front glacis
Applique Armor (mm): N/A
Explosive Reactive Armor (mm): N/A
Mineclearing Equipment: N/A
Self-Entrenching Blade: N/A
Active Protective System: NA
NBC Protection System: N/A
Smoke Equipment: N/A

ARMAMENT
Main Armament:
Caliber, Type, Name: 12.7-mm (12.7 x 108), heavy MG, Type 54
Rate of Fire (rd/min): 80-100 practical/600 air targets in bursts
Loader Type: Belt feed
Ready/Stowed Rounds: INA
Elevation (°): -5 to +85
Fire on Move: Yes

Auxiliary Weapon: N/A
ATGM Launcher: N/A
Firing Ports: 2 left side, 1 right, 1 in the rear/1 each side and rear

FIRE CONTROL
FCS Name: N/A
Main Gun Stabilization: N/A
Rangefinder: N/A
Infrared Searchlight: N/A
Sights w/Magnification:
Gunner:
- Day: Open ladder sight, optical sight, NFI
  - Field of View (°): INA
  - Acquisition Range (m): 3,300
- Night: N/A

Commander Fire Main Gun: No

VARIANTS
YW531A/Type 63-II: Upgrade APC with gun shield. Other vehicles with this chassis are: **YW 531B** and **Type 54-1** 122-mm SP howitzer, **Type 70** 130-mm (19-tube) MRL, and a Red Arrow-8 ATGM launcher vehicle with 4-rail launcher and 4 stowed ATGMs.

YW-531C: Variant APC with gun shield, better vision ports, and ventilation. Other vehicles use this chassis, including **YW 750** ambulance, and **YW 701A/B** and **YW 702** command post vehicles. The **C, D** and **E** variants differ in intercom sets and firing ports. Two SP mortar variants are **Type YW-304** (82-mm M-1937 type, 120 rounds, 3,040 m) and **Type YW-381** (120-mm, 50 rds, 7,700 m).

YW-531H/Type 85, Type 89, and Type 90: Expanded 5-road wheel variants. For the **-H** variant and vehicle series, see sheet.

VTT-323: North Korean variant, also known as **M1973** (See sheet).

MAIN ARMAMENT AMMUNITION
Caliber, Type, Name:
12.7-mm, APDS (Tungsten Core), Type 54
Max Aimed Range (m): 2,000 (est)
Max Effective Range (m):
- Day: 1,500 vehicles, 1,600 aircraft
- Night: INA

Tactical AA Range: 1,600
Armor Penetration (mm): INA

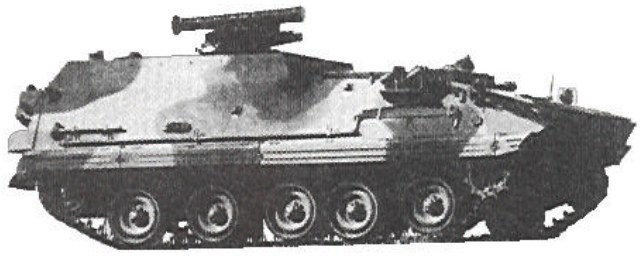
12.7-mm, API, Type 54
Max Aimed Range (m): 2,000 (est)
Max Effective Range (m):
- Day: 1,500 Unarmored ground, 800 armored vehicles
- Night: INA

Tactical AA Range: 1,600
Armor Penetration (mm): 21 (RHA) at 500 m, 13 at 1,000 m

Other Ammunition Types: API-T, Russian Duplex, Russian Duplex-T, Incendiary-T, HE-T Type MDZ, HEI Type ZP

NOTES
Type 54 MG is a Chinese copy of former Soviet 12.7-mm DShKM.

Chinese Armored Personnel Carrier YW 531H and Vehicle Series Type 85 _____



Type 85 ATGM Launcher Vehicle with Red Arrow-8 ATGM

Weapons & Ammunition Types	Typical Combat Load
12.7-mm MG	**1,120**
APDS, API, API-T,	500
HE-T, HEI	620
or	
Missile Launcher	**8**
(ATGM launcher vehicle)	
HEAT ATGM	

SYSTEM: Data is for APC / ATGM vehicle where diffe rent
Alternative Designations: Type 85 is preferred nomenclature
Date of Introduction: 1986
Proliferation: At least 4 countries
Description:
Crew: 2 / 4
Troop Capacity: 13 / 0 passengers
Combat Weight (mt): 13.6 / 13.8
Chassis Length Overall (m): 5.9
Height Overall (m): 2.85 / INA
Width Overall (m): 2.98
Ground Pressure (kg/cm^2): 0.59

Automotive Performance:
Engine Type: 320-hp Diesel
Cruising Range (km): 500
Speed (km/h):
- Max Road: 65 / 60
- Max Off-Road: 46
- Average Cross-Country: 35
- Max Swim: 6.0

Fording Depths (m): Amphibious

Radio: Type 889 / Type 889 or VRC 83

Protection:
Armor, Turret Front (mm): 14 front glacis
Applique Armor (mm): N/A
Explosive Reactive Armor (mm): N/A
Mineclearing Equipment: N/A
Self-Entrenching Blade: N/A
Active Protective System: NA
NBC Protection System: N/A
Smoke Equipment: 2 x 4 grenade launchers, some versions

ARMAMENT
Main Armament:
Caliber, Type, Name: 12.7-mm (12.7 x 108), heavy MG, Type 54
Rate of Fire (rd/min): 80-100 practical/600 air, in bursts / 2-3
Loader Type: Belt feed
Ready/Stowed Rounds: 4/4 for ATGM launcher vehicle
Elevation (°): -4 to +82 / -7 to +13
Fire on Move: Yes / No

Auxiliary Weapon: N/A
ATGM Launcher: N/A
Firing Ports: 6-7 (3 on each side, 1 in rear door, Thai version)

FIRE CONTROL
FCS Name: N/A
Main Gun Stabilization: N/A
Rangefinder: N/A
Infrared Searchlight: N/A
Sights w/Magnification:
Gunner:
- Day: Open ladder sight / day periscope
  - Field of View (°): INA
  - Acquisition Range (m): 2,000 / 4,000
- Night: INA / Thermal sight optional

Commander Fire Main Gun: No

VARIANTS
Type 85: Export vehicle series derived from the C-variant APC but expanded, and with addition of a fifth road wheel. Note: **Thai** version has .50 cal (12.7-mm) M2HB MG vs Type 54. The -H APC sired a new family of combat and support vehicles. Combat variants include: armored command APC, **YW 309** IFV (73-mm gun), **NVH-1** IFV (25- or 30-mm gun), **NVH-4** IFV (25-mm gun), **Type 70-1**/ **YW 302** 122-mm SP howitzers and **YW 306** 130-mm MRL. Support vehicles include a maintenance engineer vehicle, recovery vehicle, command post vehicle, fire fighting vehicle, and WZ 751 ambulance. Mortars are SP **Type 67** 82-mm (M1937-type, 120 rounds, 3,040 m max range), and **YW 381** 120-mm (50 rounds, 7,700 m max range). Each also has a 12.7-mm MG with 540 rounds.

Type 85 ATGM launcher vehicle: Raised hull variant with 4-rail launcher turret for Red Arrow-8 SACLOS wire-guided ATGM. The ROF is 2-3 rd/min. See launcher sheet for ATGM data.

Type 89/ YW 534: A 5-wheeled APC, combat, and support vehicle series (250 mm longer and 74 mm wider) for Chinese forces.

MAIN ARMAMENT AMMUNITION
Caliber, Type, Name:
12.7-mm, APDS (Tungsten Core), Type 54
Max Aimed Range (m): 2,000
Max Effective Range (m):
- Day: 1,500 vehicles /1,600 aircraft
- Night: INA

Tactical AA Range: 1,600
Armor Penetration (mm): INA

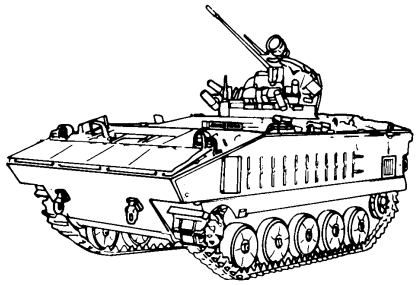
12.7-mm, API, Type 54
Max Aimed Range (m): 2,000
Max Effective Range (m):
- Day: 1,500 Unarmored ground / 800 armored
- Night: INA

Tactical AA Range: 1,000
Armor Penetration (mm): 21 (RHA) at 500 m, 13 at 1,000 m

Other Ammunition Types: API-T, Russian Duplex, Russian Duplex-T, Incendiary-T, HE-T Type MDZ, HEI Type ZP

NOTES None

French Infantry Fighting Vehicle AMX-10P



Weapons & Ammunition Types	Typical Combat Load
20-mm Cannon	**760**
APDS-T, API-T	(est) 260
HEI, HEI-T	500
7.62-mm coax MG	**2,000**
Tracer, AP, API, Incendiary	

SYSTEM
Alternative Designations: INA
Date of Introduction: 1973
Proliferation: At least 3 countries
Description:
Crew: 3
Troop Capacity: 8 passengers
Combat Weight (mt): 14.5
Length Overall (m): INA
Height Overall (m): 2.57
Width Overall (m): 2.78
Ground Pressure (kg/cm^2): 0.53

Automotive Performance:
Engine Type: 300-hp Diesel
Cruising Range (km): 600
Speed (km/h):
- Max Road: 65
- Max Off-Road: INA
- Average Cross-Country: INA
- Max Swim: 7

Fording Depths (m): Amphibious
Mineclearing Equipment: N/A
Self-Entrenching Blade: N/A

Radio: INA

Protection:
Armor, Turret Front (mm): 12.7-mm frontal
Applique Armor (mm): N/A
Explosive Reactive Armor (mm): Available
Active Protective System: N/A
NBC Protection System: Yes
Smoke Equipment: 4 smoke grenade launchers

ARMAMENT
Caliber, Type, Name: 20-mm automatic cannon M693 F1
Rate of Fire (rd/min): 740
Loader Type: Dual belt feed
Ready/Stowed Rounds: INA
Elevation (°): -8/+50
Fire on Move: INA

Auxiliary Weapon:
Caliber, Type, Name: 7.62-mm (7.62 x 51) MG, AAT 52 NF1
Mount Type: Coax
Maximum Aimed Range (m): INA
Max Effective Range:
- Day: INA
- Night: INA

Fire on Move: Yes
Rate of Fire (rd/min): INA

ATGM Launcher: N/A
Firing Ports: None

FIRE CONTROL
FCS Name: INA
Main Gun Stabilization: INA
Rangefinder: INA
Infrared Searchlight: Yes
Sights w/Magnification:
Gunner:
- Day: OB 40 Day/ night sight
  - Field of View (°): INA
  - Acquisition Range (m): INA
- Night: OB 40 Day/ night sight
  - Field of View (°): INA
  - Acquisition Range (m): INA

Commander Fire Main Gun: No

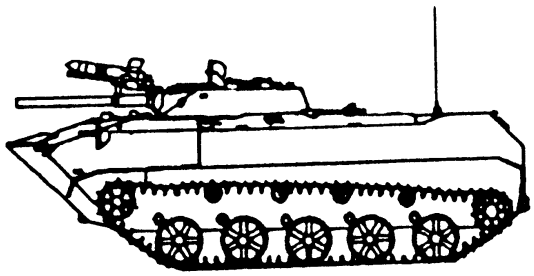
VARIANTS
AMX-10P: Variant with Milan or HOT ATGM launcher
AMX-10P/Milan: ATGM launcher vehicle, with two launchers
AMX/HOT: ATGM launcher vehicle (Toucan II turret, 4 launchers)
AMX-10 TM: Mortar carrier towing 120-mm RT-61 mortar
AMX-10 PAC 90: Fire support/AT variant with Giat 90-mm gun
AMX-10P Marine: Improved swim variant w/ 12.7/25/90-mm gun
AMX-10 PC: Command variant with varied command stations
AMX-10 RC: Wheeled (6 x 6) fire support vehicle with 90-mm gun
AMX-10 RAC: The same fire support chassis with 105-mm gun

MAIN ARMAMENT AMMUNITION
Caliber, Type, Name: 20-mm (20x139) APDS-T
- Maximum Aimed Range (m): INA
- Max Effective Range (m):
  - Day: 1,300
  - Night: INA
- Tactical AA Range: INA
- Armor Penetration (mm): INA

Other Ammunition Types: API, API-T, HEI, HEI-T

NOTES
A French SNPE explosive reactive armor (ERA) kit and others are available for use on theAMX-10P. However, during dismounted troop movement, ERA would be a hazard. Thus, passive armor is more likely; and ERA application is doubtful.

Russian Airborne Fighting Vehicle BMD-1



Weapons & Ammunition Types	Typical Combat Load
73-mm gun	**40**
HEAT	(est) 16
HE	24
AT-3/a/b/c/Imp ATGM	**4**
HEAT	3
HE	1
7.62-mm coax MG	**2,000**
2x 7.62-mm bow MG	**4,000**

SYSTEM
Alternative Designations:
Date of Introduction: 1969
Proliferation: At least 1 country
Description:
Crew: 2
Troop Capacity: 5 passengers (+1)
Combat Weight (mt): 13.3
Chassis Length Overall (m): 6.74
Height Overall (m): 2.15
Width Overall (m): 2.94
Ground Pressure (kg/cm^2): 0.57

Automotive Performance:
Engine Type: 240-hp Diesel
Cruising Range (km): 600
Speed (km/h):
- Max Road: 65
- Max Off-Road: 40-45
- Average Cross-Country: INA
- Max Swim: 7

Fording Depth (m): Amphibious

Radio: R-123M

Protection:
Armor, Turret Front (mm): 23 or Antibullet
Applique Armor (mm): See NOTES
Explosive Reactive Armor (mm): See NOTES
Active Protective System: N/A
Mineclearing Equipment: N/A
Self-Entrenching Blade: N/A
NBC Protection System: Collective
Smoke Equipment: VEESS

ARMAMENT
Main Armament:
Caliber, Type, Name: 73-mm smoothbore gun, 2A28/Grom
Rate of Fire(rd/min): 7-8
Loader Type: Autoloader
Ready/Stowed Rounds: 40 / 0
Elevation (°): -4/ +33
Fire on Move: Yes, but only 10 km/h or less (est)

Auxiliary Weapons:
Caliber, Type, Name: 7.62-mm (7.62x 54R) machinegun, PKT
Mount Type: Coax
Maximum Aimed 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 (rd/min): 250 practical / 650 cyclic, 2-10 round bursts
Caliber, Type, Name: 7.62-mm machinegun, PKT
Mount Type: Bow (ball-mounted)
Maximum Aimed Range (m): 1,000
Max Effective Range (m):
- Day: 1,000/ 400-500 on the move
- Night: N/A

Fire on Move: Yes
Rate of Fire (rd/min): 250 practical / 650 cyclic, 2-10 round bursts

ATGM Launcher:
Name: 9P111
Launch Method: Rail-launched
Guidance: MCLOS
Command Link: Wire
Launcher Dismountable: Yes

Firing Ports: 1 on each side, 1 in left rear door

FIRE CONTROL
FCS Name: INA
Main Gun Stabilization: N/A
Rangefinder: Stadiametric
Infrared Searchlight: Yes
Sights w/Magnification:
Gunner:
- Day: 1PN22M1, 8x
  - Field of View (°): 15
  - Acquisition Range (m):
- Night: 1PN22M1, 6.7x
  - Field of View (°): 6
  - Acquisition Range (m): 800-1,000, based on light

Commander Fire Main Gun: No

VARIANTS
BMD-1K: Command IFV (FSU), with added R-126 and R-107.

BMD-1M: Variant with improved ventilation and road wheels.

BMD-1P: Widely fielded IFV with AT-4/5 replacing AT-3.

BMD-1PK: Company commander variant (FSU) of BMD-1P.

BMD-2: Widely fielded variant with a 30-mm automatic gun and with AT-3 ATGM launcher replaced by AT-4/5 ATGM launcher.

BTR-D: Stretched (6-road wheel) armored multipurpose transporter variant, with two 7.62-mm MGs but no turret. This chassis has been used for a variety of other airborne vehicles.

Russian Airborne Fighting Vehicle BMD-1 continued

MAIN ARMAMENT AMMUNITION
Caliber, Type, Name:
73-mm HEAT-FS, PG-9
Maximum Aimed Range (m): 1,300
Max Effective Range (m):
Day: 800, but 600 or less on the move
Night: 800
Tactical AA Range: INA
Armor Penetration (mm): 335 (RHA)

73-mm HEAT-FS, NFI
Maximum Aimed Range (m): 1,300
Max Effective Range (m):
Day: 1,000, but 600 or less on the move
Night: 800-1,000
Tactical AA Range: INA
Armor Penetration (mm): >400 (RHA)

73-mm HE, OG-9
Maximum Aimed Range (m): 1,300, 600 or less on the move
Max Effective Range (m):
Day: 1,300, but 600 or less on the move
Night: 800-1,000
Tactical AA Range: INA
Armor penetration (mm): INA

73-mm HE, OG-9M1
Maximum Aimed Range (m): 4,500
Max Effective Range (m):
Day: 1,300, but 600 or less on the move
Night: 800-1,000
Tactical AA Range: INA
Armor Penetration (mm): INA

Other Ammunition Types: OG-9M

Antitank Guided Missiles:
Name: AT-3, -3A, -B
Warhead Type: Tandem HEAT
Armor Penetration (mm): 410 RHA
Range (m): 3,000

Name: AT-3C
Warhead Type: Tandem HEAT
Armor Penetration (mm): 520 RHA
Range (m): 3,000

Name: AT-3C Imp/ Polk (Slovenian)
Warhead Type: Precursor with HEAT
Armor Penetration (mm): 580 RHA
Range (m): 3,000

Name: Malyutka-2 (Russian)
Warhead Type: Tandem HEAT
Armor Penetration (mm): 800 RHA
Range (m): 3,000

Name: Malyutka HE (Russian)
Warhead Type: Frag-HE
Armor Penetration (mm): N/A
Range (m): 3,000

NOTES
Vehicle can be parachute landed with airborne troops onboard. Height can be lowered.

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. The Russian Volgorod Tractor Plant offers the B30 turret (a drop-in one-man turret with 2A42 30-mm gun, 7.62-mm coax MG, and a 9P135M launcher for AT-4/-5 ATGM). A Russian AG-17 30-mm automatic grenade launcher is available for BMD-1.

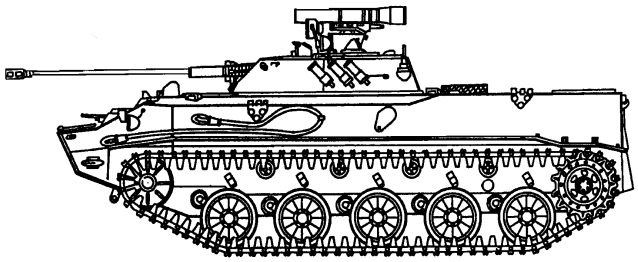
Other options are spall liners, air conditioning, and a more powerful engine. A French SNPE explosive reactive armor (ERA) kit and others are available for use on the BMD-1. However, during dismounted troop movement, ERA would be a hazard. Thus, passive armor is more likely; and ERA application is doubtful. For amphibious use, additional armor application is unlikely.

The Slovenian TS-M ATGM thermal night sight has a detection range of 4,500m and a recognition range of 2,000m.

The AT-3 HE-Blast ATGM is used for killing personnel and destroying bunkers and other fortifications.

The AT-3C Polk features a nose probe, an improved motor for increased velocity, lower smoke noise signature and a SACLOS launcher with improved sights.

Russian Airborne Fighting Vehicle BMD-3



Weapons & Ammunition Types	Typical Combat Load
30-mm automatic gun	**860**
HEI-T, Frag-HE	340/240
AP-T, APDS-T, APFSDS	160/120
ATGM launcher	**6**
7.62-mm coax MG	**2,000**
30-mm grenade launcher	**551**
5.45-mm light MG	**2,325**

SYSTEM
Alternative Designations: N/A
Date of Introduction: 1992
Proliferation: At least 1 country
Description:
Crew: 3
Troop Capacity: passengers: 4 (+3)
Combat Weight (mt): 12.9
Length Overall (m): 6.00
Height Overall (m): 2.25
Width Overall (m): 3.13
Ground Pressure (kg/cm^2): 0.32 (wide track) / .48 (standard track)

Automotive Performance:
Engine Type: 450-hp Diesel
Cruising Range (km): 500
Speed (km/h):
Max Road: 70
Max Off-Road: 45
Average Cross-Country: INA
Max Swim: 10
Fording Depth (m): Amphibious

Radio: R-173

Protection:
Armor, Turret Front (mm): "Antibullet" (7.62)
Applique Armor (mm): N/A
Explosive Reactive Armor (mm): Available
Active Protective System: N/A
Mineclearing Equipment: KMT-8 plow or -10 roller
Self-Entrenching Blade: N/A
NBC Protection System: Collective
Smoke Equipment: Smoke grenade launchers, 3 x each side of turret
Vehicle engine exhaust smoke system (VEESS)

ARMAMENT
Main Armament:
Caliber, Type, Name: 30-mm automatic gun, 2A42
Rate of Fire (rd/min): 550 cyclic in bursts/ 200-300 practical
Loader Type: Dual-belt feed
Ready/Stowed Rounds: 500/ 360
Elevation (°): -5 to +74
Fire on Move: Yes

Auxiliary Weapons:
Caliber, Type, Name: 30-mm automatic grenade launcher, AG-17
Mount Type: Bow left side
Maximum Aimed Range (m): 1,700
Max Effective Range (m):
Day: 1,200
Night: N/A
Fire on Move: Yes
Rate of Fire (rd/min): 60-100 practical in short (≤ 5 rds) or long (6-10 rd) bursts.

Caliber, Type, Name: 7.62-mm (7.62 x 54R) machinegun, PKT
Mount Type: Turret coax
Maximum Aimed Range (m): 2,000
Max Effective Range (m):
Day: 1,000
Night: 1,000
Fire on Move: Yes
Rate of Fire (rd/min): 250 practical / 650 cyclic, 2-10 round bursts

Caliber, Type, Name: 5.45-mm light machinegun, RPK-74
Mount Type: Bow right side
Maximum Aimed Range (m): 1,000
Max Effective Range (m):
Day: 800
Night: INA
Fire on Move: Yes
Rate of Fire (rd/min): 150 automatic/ 50 semiautomatic

ATGM Launcher:
Name: 9P135
Launch Method: Tube-launched
Guidance: SACLOS
Command Link: Wire
Launcher Dismountable: Yes

FIRE CONTROL
FCS Name: INA
Main Gun Stabilization: 2-plane
Rangefinder: Laser
Infrared Searchlight: Yes
Sights w/Magnification:
Gunner:
Day: BPK-2-42
Field of View (°): 8
Acquisition Range (m): INA
Night: BPK-2-42 II/IR
Field of View (°): INA
Acquisition Range (m): INA
Commander Fire Main Gun: No

VARIANTS None

Russian Airborne Fighting Vehicle BMD-3 continued

MAIN ARMAMENT AMMUNITION
Caliber, Type, Name:

30-mm AP-T
- Maximum Aimed Range (m): 2,500
- Max Effective Range (m):
  - Day: 1,500
  - Night: INA
- Tactical AA Range: 4,000
- Armor Penetration (mm): 18 (RHA) at 1,500m

30-mm APDS
- Maximum Aimed Range (m): 2,500
- Max Effective Range (m):
  - Day: 2,000
  - Night: INA
- Tactical AA Range: 4,000
- Armor Penetration (mm): 25 (RHA) at 1,500m

30-mm APFSDS-T M929
- Maximum Aimed Range (m): 2,500
- Max Effective Range (m):
  - Day: 2,000+
  - Night: INA
- Tactical AA Range: 4,000
- Armor penetration (mm): 55 (RHA) at 1,000m, 45 at 2,000m

30-mm Frag-HE
- Maximum Aimed Range (m): 4,000
- Max Effective Range (m):
  - Day: 4,000
  - Night: INA
- Tactical AA Range: 4,000
- Armor Penetration (mm): INA

Other Ammunition Types: 30-mm HEI-T

Antitank Guided Missiles:

Name: AT-5B/Konkurs-M
- Warhead Type: Tandem shaped charge (HEAT)
  - Armor Penetration (mm): 925 (RHA)
- Range (m): 4,000

Name: AT-5/Spandrel
- Warhead Type: Shaped charge (HEAT)
  - Armor Penetration (mm): 650 (RHA)
- Range (m): 4,000

NOTES

BMD-3 has variable height control.

Automatic grenade launcher has 290 ready rounds and 261 in the rack. The ATGM launcher has 3 ready rounds (one on the launcher), and two stowed.

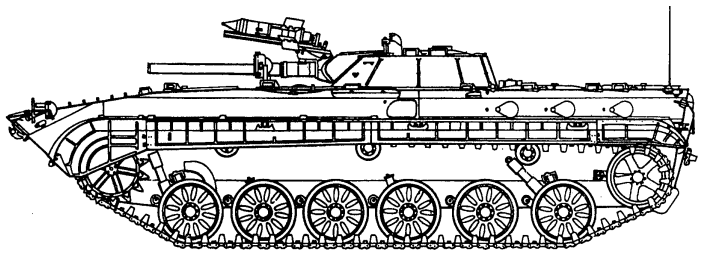
A French SNPE explosive reactive armor (ERA) kit and others are available for use on the BMD-3. However, during dismounted troop movement, ERA would be a hazard. Thus, passive armor is more likely and ERA application is doubtful. For amphibious use, additional armor application is unlikely. Other options are spall liners, air conditioning, and a more powerful engine.

The Russian SANOET-1 thermal gunner's sight is available. Thermal sights are available for the ATGM launcher. The Russian Trakt/1PN65 thermal imaging ATGM night sight is optional. Acquisition range is 2,500 m (NFI). For the ATGM launcher in dismount configuration, the Russian Mulat/1PN86 lightweight thermal ATGM night sight has 3,600 m detection range and 2,000 m identification range.

French-German Flame-V adapter kit permits the BMD-3 to launch Milan, Milan-2 and Milan-3 ATGMs.

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, a coaxial 7.62-mm MG and improved fire control system.

Russian Infantry Fighting Vehicle BMP-1



Weapons & Ammunition Types	Typical Combat load
73-mm gun	**40**
HEAT	20
HE	20
AT-3/a/b/C/Imp ATGM	**5**
HEAT	3
HE	2
7.62-mm coax MG	**2,000**

SYSTEM
Alternative Designations: BMP Model 1970**,** Korshun
Date of Introduction: 1970
Proliferation: At least 33 countries
Description:
Crew: 3
Troop Capacity: 6 passengers (+2)
Combat Weight (mt): 13.3
Length Overall (m): 6.74
Height Overall (m): 2.15
Width Overall (m): 2.94
Ground Pressure (kg/cm^2): 0.57

Automotive Performance:
Engine Type: Diesel
Cruising Range (km): 600
Speed (km/h):
- Max Road: 65
- Max Off-Road: 40-45
- Average Cross-Country: INA
- Max Swim: 7

Fording Depths (m): Amphibious
Mineclearing Equipment: KMT-8 or 10 mine plow available
Self-Entrenching Blade: No
Radio: R-123, R-M or R-173

Protection:
Armor, Turret Front (mm): 19-23
Applique Armor (mm): Available
Explosive Reactive Armor (mm): Available
Active Protective System: No
NBC Protection System: Collective protection
Smoke Equipment: Vehicle engine exhaust smoke system (VEESS)

ARMAMENT
Main Armament:
Caliber, Type, Name: 73-mm smoothbore gun 2A28/Grom
Rate of Fire: 7-8 rd/min
Loader Type: Autoloader
Ready/Stowed Rounds: 40 / 0
Elevation (°): -4 to +33
Fire on Move: Yes, but only 10 km/h or less (est.)

Auxiliary Weapon:
Caliber, Type, Name: 7.62-mm (7.62x 54R) Machinegun PKT
Mount Type: Coax
Max Aimed 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: 250 rpm (practical, in 2-10 round bursts)

Firing Ports: 4 on each side, 1 in left rear door

ATGM Launcher:
Name: 9P111
Launch Method: Rail-launched
Guidance: MCLOS
Command Link: Wire
Launcher Dismountable: Yes

FIRE CONTROL
FCS Name: INA
Main Gun Stabilization: No
Rangefinder: Laser
Infrared Searchlight: Yes
Sights w/Magnification:
Gunner:
- Day: 1PN22M1, 8x
  - Field of View (°): 15
  - Acquisition Range (m):
- Night: 1PN22M1, 6x
  - Field of View (°): 6
  - Acquisition Range (m): 800-1,000, based on light

Commander Fire Main Gun: No

VARIANTS
Earlier models, referred to as **BMP** and **BMP-A** were produced in small numbers from 1966. The standard BMP-1 (**Model 1970**) features improved fume venting, NBC protection, and swim features.
Copies include: Chinese **WZ 501/Type 86, Czech BVP-1,** and the Polish **BWP-1.** A variety of variant IFVs/APCs and support vehicles have been developed using this chassis. For instance, the Chinese **WZ 503** is a raised hull APC variant replacing the 73-mm gun with a 12.7-mm MG. The **WZ 504** is an ATGM launcher vehicle with 4-rail AT-3-type ATGM launcher. The **WZ 505** is an ambulance vehicle; and **WZ 506** is a regimental command and staff vehicle.

BMP-1K: Company command IFV, with added R-126 and R-107 transceivers. Firing ports and most periscopes are blocked.

BMP-1KSh: Former Soviet regiment or division command and staff vehicle, with turret mounted erectable 10-meter radio mast. Radios include R-130, R-111, and R-173.

BMP-1M: Iranian variant with drop rear gate vs double doors.

BMP-1P: Widely fielded FSU IFV with an AT-4/5 ATGM launcher and smoke grenade launchers (see pp. 2-21 and 2-22).

BMP-1PG: Recently offered upgrade similar to BMP-1P with an automatic grenade launcher and other options (see p. 2-21).

BMP-1PK: Command variant for BMP-1P (see p. 2-21).

Russian Infantry Fighting Vehicle BMP-1 continued _____

BPzV: Czechoslovakian reconnaissance variant with a TALL MIKE external tripod mounted radar.

BREM-2: Light recovery and repair vehicle with a light crane.

BREM-4: Armored recovery vehicle. Czech version is VPV.

BRM-1, BRM-1K: Reconnaissance command variants with improved sensors and low-profile 2-man turret (see p. 3-4).

BRM-23: Bulgarian reconnaissance variant with a 23-mm cannon, AT-3 ATGM, navigation system, NBC and artillery reconnaissance devices, and image intensifier night sights.

IMR: Armored engineer tractor, with crane and dozer blade.

IRM: Engineer underwater reconnaissance vehicle, with mine detectors and mapping capabilities .

MLI-84: Romanian APC variant with a 12.7-mm MG.

MP-31: Modernized command and staff vehicle.

OT-90: Czech APC variant with 14.5-mm and 7.62-mm MGs.

PRAM-S: Czechoslovakian self-propelled 120-mm mortar variant.

PRP-3/PRP-4: Artillery reconnaissance vehicle (see p. 6-3).

Snezka: Czech stretched version battlefield surveillance vehicle, with a sensor suite (including radar) mounted on a telescoping arm.

SVO: Czechoslovakian turretless mine clearing variant with 24 large rocket-propelled line charges.

VP90: Czech reconnaissance vehicle with 14.5 and 7.62-mm MGs

Main Armament Ammunition:
Caliber, Type, Name: 73-mm HEAT-FS, PG-9
Max Aimed Range (m): 1,300
Max Effective Range (m):
Day: 800, but 600 or less on the move in 2-4 rd bursts
Night: 800
Tactical AA Range: INA
Armor Penetration (mm): 335 (RHA)

Caliber, Type, Name: 73-mm HEAT-FS, NFI
Max Aimed Range (m): 1,300
Max Effective Range (m):
Day: 1,000/ 600 or less on the move
Night: 800-1,000
Tactical AA Range: INA
Armor Penetration (mm): >400 (RHA)

Caliber, Type, Name: 73-mm HE, OG-9M1
Max Aimed Range (m): 4,500
Max Effective Range (m):
Day: 1,300/ 600-1,000 on the move
Night: 800-1,000
Tactical AA Range: INA
Armor penetration (mm): INA

Other Ammunition Types: OG-9, OG-9M

Antitank Guided Missiles:
Name: AT-3 Malyutka/-3a, -b Malyutka-M
Warhead Type: Tandem HEAT
Armor Penetration (mm): 410 (RHA)
Range (m): 800-3,000

Name: AT-3c/ Malyutka-P
Warhead Type: Tandem HEAT
Armor Penetration (mm): 520 (RHA)
Range (m): 800-3,000

Name: AT-3c Imp/ Polk (Slovenia)
Warhead Type: Tandem HEAT
Armor Penetration (mm): 580 (RHA)
Range (m): 3,000

Name: Malyutka-2 (Russian)
Warhead Type: Tandem HEAT
Armor Penetration (mm): 800 (RHA)
Range (m): 3,000

Name: Red Arrow-73A (Chinese)
Warhead Type: HEAT
Armor Penetration (mm): 500 RHA
Range (m): 3,000

Name: Red Arrow-73B/C (Chinese)
Warhead Type: HEAT
Armor Penetration (mm): 600 RHA
Range (m): 3,000

Name: Malyutka-2 HE (Russian)
Warhead Type: Frag-HE
Armor Penetration (mm): INA
Range (m): 3,000

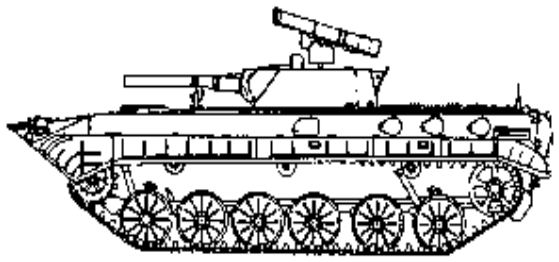
NOTES
Thermal gunner sights are available; however, most upgrades involve adding a thermal sight with an improved gun and improved fire control system. The Slovenian TS-M ATGM thermal night sight has a detection range of 4,500 m and a recognition range of 2,000 m.

Russian BMP-2 2-man turrets with gun and fire control system are being marketed for BMP-1 customers. The Volgorod Tractor Plant offers the BMP-1/B30 package with a B30 turret (a drop-in one-man turret with 2A42 30-mm gun, 7.62-mm coax MG, BMP-2-type fire control system, PZU-8 AA sight, and a 9P135M ATGM launcher for AT-4/-5 ATGM). 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. A Ukrainian turret is also available.

Russian AG-17 30-mm AGL modification is available for use on BMP-1. A French SNPE ERA kit and others are available for use on the BMP-1. Other options are improved tracks, spall liners, air conditioning, smoke grenade launchers/laser warning receivers, and a more powerful e ngine (360 hp).

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. The AT-3C Polk features a nose probe, an i m-proved motor for increased velocity, lower smoke and noise signature, and a SACLOS launcher with improved sights.

Russian Infantry Fighting Vehicle BMP-1P



Weapons & Ammunition Types	Typical Combat Load
73-mm gun	**40**
HEAT-FS	(est) 16
HE	24
ATGM	**4**
AT-4/-4B/-5/-5B	
7.62-mm coax MG	**2,000**

SYSTEM
Alternative Designations: BWP-1 (Poland), see NOTES
Date of Introduction: 1974
Proliferation: At least 7 countries
Description:
Crew: 3
Troop Capacity: 6 passengers
Combat Weight (mt): 13.3
Chassis Length Overall (m): 6.74
Height Overall (m): 2.15
Width Overall (m): 2.94
Ground Pressure (kg/cm^2): 0.57

Automotive Performance:
Engine Type: 300-hp Diesel
Cruising Range (km): 600
Speed (km/h):
- Max Road: 65
- Max Off-Road: 40-45
- Average Cross-Country: INA
- Max Swim: 7

Fording Depth (m): Amphibious

Radio: R-123, or R-173

Protection:
Armor, Turret Front (mm): 19-23
Applique Armor (mm): N/A
Explosive Reactive Armor (mm): Available
Active Protective System: N/A
Mineclearing Equipment: KMT-8 plow available
Self-Entrenching Blade: N/A
NBC Protection System: Collective
Smoke Equipment: Six 81-mm smoke grenade launchers, VEESS

ARMAMENT
Main Armament:
Caliber, Type, Name: 73-mm smoothbore gun 2A28/Grom
Rate of Fire (rd/min): 7-8
Loader Type: Autoloader
Ready/Stowed Rounds: 40 / 0
Elevation (°): -4/+33
Fire on Move: Yes, but only 10 km/h or less (est)

Auxiliary Weapon:
Caliber, Type, Name: 7.62-mm (7.62x 54R) machinegun, PKT
Mount Type: Coax
Maximum Aimed Range (m): 1,300
Max Effective Range (m):
- Day: 1,000 / 400-500 on the move
- Night: 800

Fire on Move: No
Rate of Fire (rd/min): 250 practical / 650 cyclic, 2-10 round bursts

ATGM Launcher:
Name: 9P135M2
Launch Method: Tube-launched
Guidance: SACLOS
Command Link: Wire
Launcher Dismountable: Yes

Firing Ports: 4 on each side, 1 in left rear door

FIRE CONTROL
FCS Name: 1PN22M1
Main Gun Stabilization: N/A
Rangefinder: Stadiametric
Infrared Searchlight: OU-3GK
Sights w/Magnification:
Gunner:
- Day: 1PN22M1, 8 x
  - Field of View (°): 15
  - Acquisition Range (m): 1,300
- Night: 1PN22M1, 6.7x
  - Field of View (°): 6
  - Acquisition Range (m): 800-1,000 based on light

Commander Fire Main Gun: No

VARIANTS
BMP-1PG: This recently offered Russian upgrade is similar to BMP-1P with an added AG-17 30-mm automatic grenade launcher and other options, including thermal sights.

BMP-1PK: Command variant, with addition of R-126 and R-107 transceiver. A small telescoping antenna is mounted on right rear. Firing ports and telescopes on right side are blocked off.

MAIN ARMAMENT AMMUNITION
Caliber, Type, Name:
73-mm HEAT-FS, PG-9
- Maximum Aimed Range (m): 1,300
- Max Effective Range (m):
  - Day: 800, but 600 or less on the move in 2-4 round bursts
  - Night: 800-1,000
- Tactical AA Range: INA
- Armor Penetration (mm): 335 (RHA)

73-mm HEAT-FS, NFI
- Maximum Aimed Range (m): 1,300
- Max Effective Range (m):
  - Day: 1,000/ 600 or less on the move
  - Night: 800-1,000
- Tactical AA Range: INA
- Armor Penetration (mm): >400 (RHA)

Russian Infantry Fighting Vehicle BMP-1P continued

73-mm HE, OG-9M1
Maximum Aimed Range (m): 4,500
Max Effective Range (m):
Day: 1,300/ 600-1,000 on the move
Night: 800-1,000
Tactical AA Range: INA
Armor penetration (mm): INA

Other Ammunition Types: OG-9, OG-9M

Antitank Guided Missiles:
Name: AT-5/SPANDREL
Warhead Type: Shaped charge (HEAT)
Armor Penetration (mm): 650 (RHA)
Range (m): 4,000

Name: AT-5B/Konkurs-M
Warhead Type: Tandem shaped charge (HEAT)
Armor Penetration (mm): 925 (RHA)
Range (m): 4,000

Name: AT-4/SPIGOT
Warhead Type: Shaped charge (HEAT)
Armor Penetration (mm): 480 (RHA)
Range (m): 2,000

Name: AT-4B/Factoria
Warhead Type: Tandem Shaped charge (HEAT)
Armor Penetration (mm): 550 (RHA)
Range (m): 2,500

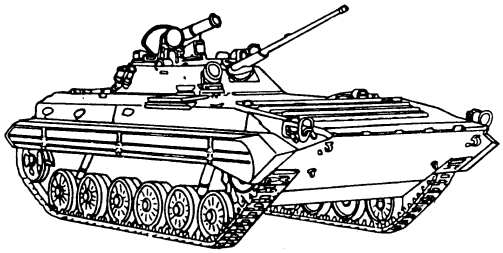
NOTES
The prototype IFV, known as BMP, was not fielded. lnitial BMP production variant, BMP-A, was halted with insignificant numbers. The baseline production IFV, BMP-1, has an AT-3/SAGGER antitank guided missile. The BMP-1P upgrade is widely fielded, with an AT-4/-5 ATGM launcher replacing the AT-3 launcher. The vehicle also added smoke grenade launchers. This variant should generally be portrayed where OPFOR calls for the BMP-1. For applications where a robust and modernized OPFOR is expected, use AT-5B ATGM. The AT-4/-4B ATGMs are less likely to be employed on this vehicle.

Other options are spall liners, air conditioning, and a more powerful engine. A French SNPE explosive reactive armor (ERA) kit and others are available for use on the BMD-1. However, during dismounted troop movement, ERA would be a hazard. Thus, passive armor is more likely; and ERA application is doubtful. Additional armor application may jeopardize amphibious capability.

Russian AG-17 30-mm automatic grenade launcher modification is available for use on BMP-1P. 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.

The Russian Alis thermal gunner's sight is available. The Slovenian TS-F ATGM thermal night sight has a detection range of 4,500 m and a recognition range of 2,000 m.

Russian Infantry Fighting Vehicle BMP-2



Weapons & Ammunition Types	Typical Combat Load
30-mm automatic gun	**500**
HEI-T, Frag-HE	340
AP-T, APDS-T, APFSDS-T	160
ATGM	**5**
AT-5/-5B/-4/-4B	
7.62-mm coax MG	**2,000**

SYSTEM
Alternative Designations: Yozh (Russia), Sarath (India)
Date of Introduction: 1980
Proliferation: At least 20 countries
Description:
Crew: 3
Troop Capacity: 7 passengers
Combat Weight (mt): 14.3
Chassis Length Overall (m): 6.72
Height Overall (m): 2.45
Width Overall (m): 3.15
Ground Pressure (kg/cm^2): 0.63

Automotive Performance:
Engine Type: 300-hp Diesel
Cruising Range (km): 600
Speed (km/h):
- Max Road: 65
- Max Off-Road: 45
- Average Cross-Country: 35
- Max Swim: 7

Fording Depth (m): Amphibious

Radio: R-123M transceiver or R-173

Protection:
Armor, Turret Front (mm): 23-33
Applique Armor (mm): On BMP-2D
Explosive Reactive Armor (mm): Available, see NOTES
Active Protective System: N/A
Mineclearing Equipment: KMT-8 mine plow available
Self-Entrenching Blade: N/A
NBC Protection System: Collective
Smoke Equipment: 6 smoke grenade launchers, VEESS

ARMAMENT
Main Armament:
Caliber, Type, Name: 30-mm automatic gun, 2A42
Rate of Fire (rd/min): 550 cyclic in bursts/ 200-300 practical
Loader Type: Dual-belt feed
Ready/Stowed Rounds: 500/0
Elevation (°): -5 to +74
Fire on Move: Yes

Auxiliary Weapon:
Caliber, Type, Name: 7.62-mm (7.62x 54R) machinegun, PKT
Mount Type: Turret coax
Maximum Aimed Range (m): 2,000
Max Effective Range (m):
- Day: 1,000
- Night: INA

Fire on Move: Yes
Rate of Fire (rd/min): 250 practical/650 cyclic, 2-10 round bursts

ATGM Launcher:
Name: 9P135M1/M3
Launch Method: Tube-launched
Guidance: SACLOS
Command Link: Wire
Launcher Dismountable: Yes

Firing Port: 4 on left side, 3 on right side
1 in left rear door

FIRE CONTROL
FCS Name: BPK-1-42 or BPK-2-42
Main Gun Stabilization: 2-plane
Rangefinder: Laser
Infrared Searchlight: Yes
Sights w/Magnification:
Gunner:
- Day: BPK-1-42 or BPK-2-42
  - Field of View (°): 8
  - Acquisition Range (m): 2,500-4,000 (est)
- Night: BPK-1-42 or BPK-2-42 II/IR
  - Field of View (°): INA
  - Acquisition Range (m): INA

Commander Fire Main Gun: No

VARIANTS
BMP-2D: Variant with add-on plate armor, but which cannot swim

BMP-2E: Variant with 6-mm steel plates added and track skirts

BMP-2K: Command variant with additional radio

MAIN ARMAMENT AMMUNITION
Caliber, Type, Name:
30-mm AP-T
- Maximum Aimed Range (m): 2,500
- Max Effective Range (m):
  - Day: 1,500
  - Night: INA
- Tactical AA Range: 4,000
- Armor Penetration (mm): 18 (RHA, 60°) at 1,500 m

Russian Infantry Fighting Vehicle BMP-2 continued

30-mm APDS
Maximum Aimed Range (m): 2,500
Max Effective Range (m):
Day: 2,000
Night: INA
Tactical AA Range: 4,000
Armor Penetration (mm): 25 (RHA) at 1,500m

30-mm APFSDS-T M929
Maximum Aimed Range (m): 2,500
Max Effective Range (m):
Day: 2,000+
Night: INA
Tactical AA Range: 4,000
Armor penetration (mm): 55 (RHA) at 1,000m/45 at 2,000m

30-mm Frag-HE
Maximum Aimed Range (m): 4,000/ 2,500 point target
Max Effective Range (m):
Day: 4,000
Night: INA
Tactical AA Range: 4,000
Armor Penetration (mm): INA

Other Ammunition Types: 30-mm HEI-T

Antitank Guided Missiles:
Name: AT-5/SPANDREL
Warhead Type: Shaped charge (HEAT)
Armor Penetration (mm): 650 (RHA)
Range (m): 4,000

Name: AT-5B/Konkurs-M
Warhead Type: Tandem shaped charge (HEAT)
Armor Penetration (mm): 925 (RHA)
Range (m): 4,000

Name: AT-4/SPIGOT
Warhead Type: Shaped charge (HEAT)
Armor Penetration (mm): 480 (RHA)
Range (m): 2,000

Name: AT-4B/Factoria
Warhead Type: Tandem shaped charge (HEAT)
Armor Penetration (mm): 550 (RHA)
Range (m): 2,500

NOTES
A French SNPE explosive reactive armor (ERA) kit and others are available for use on the BMP-2. However, during dismounted troop movement, ERA would be a hazard. Thus, passive armor is more likely and ERA application is doubtful. For amphibious use, additional armor application is unlikely. Other options are spall liners, air conditioning, and a more powerful engine.

Russian AG-17 30-mm automatic grenade launcher modification is offered for BMP-2.

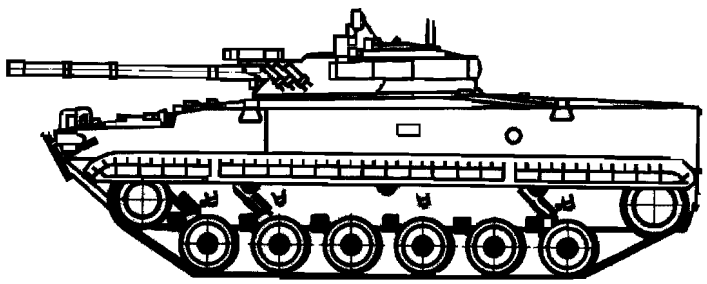
Russian KBP offers a drop-in one-man turret, called Kliver, with a stabilized 2A72 30-mm gun, a 4 Kornet ATGM launcher, thermal sights, a coaxial 7.62-mm MG and improved fire control system.

ATGM load consists of one ready on the launcher and four stowed. They are readily accessible, but require hand loading from an open hatch. The AT-5 and AT-5B are more likely than AT-4 and -4B.

French-German Flame-V adaptor kit permits the BMP-2 system to launch Milan, Milan-2, and Milan-3 ATGMs.

Thermal sights are available. The Russian SANOET-1 thermal gunner's sight is available. The Russian Trakt/1PN65 thermal imaging (TI) ATGM night sight is optional. Acquisition range is 2,500 m (NFI). For the launcher in dismount configuration, the Slovenian TS-F ATGM night sight is available and has a detection range of 4,500 m and recognition range of 2,000 m. The Russian Mulat/1PN86 lightweight TI ATGM thermal sight has 3,600 m detection range and 2,000 m identification range.

Russian Infantry Fighting Vehicle BMP-3



Weapons & Ammunition Types	Typical Combat Load
100-mm rifled gun	**40**
Frag-HE	40
AT-10/Imp ATGM	8
30-mm automatic gun	**500**
HEI-T, Frag-HE	340
AP-T, APDS-T or APFSDS-T	160
7.62-mm coax MG	**2,000**
2 x 7.62-mm bow MG	**4,000**

SYSTEM
Alternative Designations: Soviet ICV M1990/1
Date of Introduction: 1990
Proliferation: At least 7 countries
Description:
Crew: 3
Troop Capacity: 7 passengers
Combat Weight (mt): 18.70
Chassis Length Overall (m): 6.73
Height Overall (m): 2.45
Width Overall (m): 3.15
Ground Pressure (kg/cm^2): 0.62

Automotive Performance:
Engine Type: 500-hp Diesel
Cruising Range (km): 600
Speed (km/h):
- Max Road: 70
- Max Off-Road: 45
- Average Cross-Country: 35
- Max Swim: 10

Fording Depth (m): Amphibious

Radio: R-173, R-173P

Protection:
Armor, Turret Front (mm): 30-35 front glacis
Applique Armor (mm): Yes on turret
Explosive Reactive Armor (mm): Available, see NOTES
Active Protective System: N/A
Mineclearing Equipment: KMT-8 plow available
Self-Entrenching Blade: Yes
NBC Protection System: Collective
Smoke Equipment: 6 smoke grenade launchers, VEESS

ARMAMENT
Main Armaments:
Caliber, Type, Name: 100-mm rifled gun 2A70
Rate of Fire (rd/min): 8-10
Loader Type: Autoloader gun rounds; manual for gun and ATGMs
Ready/Stowed Rounds: 22/18 for rounds, 3/5 for ATGMs
Elevation (°): -5 to +60
Fire on Move: Yes

Caliber, Type, Name: 30-mm automatic gun 2A72
Rate of Fire: 350 rd/min (cyclic) in bursts
Loader Type: Dual-belt feed
Ready/Stowed Rounds: 500/ 0
Elevation (°): -5 to +60
Fire on Move: Yes

Auxiliary Weapon:
Caliber, Type, Name: 7.62-mm (7.62x 54R) machinegun, PKT
Mount Type: Turret coax
Maximum Aimed Range (m): 2,000
Max Effective Range (m):
- Day: 1,000
- Night: INA

Fire on Move: Yes
Rate of Fire (rd/min): 250 practical / 650 cyclic, in 2-10 round bursts

Caliber, Type, Name: 7.62-mm (7.62x 54R) machinegun, PKT
Mount Type: Bow left and right
Maximum Aimed Range (m): 1,000
Max Effective Range (m):
- Day: 1,000/400-500 on the move
- Night: N/A

Fire on Move: Yes
Rate of Fire (rd/min): 250 practical / 650 cyclic, in 2-10 round bursts

ATGM Launcher:
Name: 2A70 100-mm gun
Launch Method: Gun-launched
Guidance: SACLOS, laser-beam rider
Command Link: Encoded infrared laser-beam
Launcher Dismountable: No

Firing Ports: 2 on each side, 1 in left rear door

FIRE CONTROL
FCS Name: 1K13-2
Main Gun Stabilization: 2-plane
Rangefinder: Laser
Infrared Searchlight: Yes
Sights w/Magnification:
Gunner:
- Day: 1K13-2, 8x ; 1P3-10 antiaircraft, 2.6x; PPD-1 stand-by
  - Field of View (°): INA
  - Acquisition Range (m): 5,200
- Night: 1K13-2 II night channel, 5.5x
  - Field of View (°): INA
  - Acquisition Range (m): INA

Commander Fire Main Gun: Yes

Russian Infantry Fighting Vehicle BMP-3 continued

VARIANTS
BMP-3F: Amphibious Armored Combat Vehicle developed for Naval Infantry.

BMP-3 M1995: ATGM launcher vehicle, with Kornet (AT-14) launcher and autoloader, and thermal sights.

9P157: ATGM launcher vehicle, with Krizantema (AT-15) ATGM autoloader, MMW and thermal fire control system.

BMP-3K: Command variant, with electronic round fuze system for 100-mm gun. Bow MGs are removed. Added radios are R-159, R-143 and R-174.

BREhM-L: Armored recovery vehicle (ARV).

BRM-3K: Combat recon vehicle with radar and 30-mm gun.

BMP-3: UAE upgrade improvements including Namut Thermal Night sight.

MAIN ARMAMENT AMMUNITION
Caliber, Type, Name:
100-mm HE 3UOF17
Maximum Aimed Range (m): 5,000
Max Effective Range (m):
Day: 4,000
Night: INA
Tactical AA Range: 4,000
Armor Penetration (mm): 25 (RHA)

Caliber, Type, Name: 100-mm HE-Shapnel (HEF/MOD.96)
Focused-fragmentation, electronically-fuzed
Maximum Aimed Range (m): 5,200
Max Effective Range (m):
Day: 5,200
Night: INA
Tactical AA Range: 4,000
Armor Penetration (mm): INA

30-mm APFSDS-T M929
Maximum Aimed Range (m): 2,500
Max Effective Range (m):
Day: 2,000+
Night: INA
Tactical AA Range: 4,000
Armor penetration (mm): 55 (RHA) at 1,000 m, 45 at 2,000 m

30-mm Frag-HE
Maximum Aimed Range (m): 4,000
Max Effective Range (m):
Day: 4,000
Night: INA
Tactical AA Range: 4,000
Armor Penetration (mm): INA

30-mm AP-T
Maximum Aimed Range (m): 2,500
Max Effective Range (m):
Day: 1,500
Night: INA
Tactical AA Range: 4,000
Armor Penetration (mm): 18 (RHA, 60°) at 1,500 m

30-mm APDS
Maximum Aimed Range (m): 2,500
Max Effective Range (m):
Day: 2,000
Night: INA
Tactical AA Range: 4,000
Armor Penetration (mm): 25 (RHA) at 1,500 m

Other Ammunition Types: 100-mm HE-I, 30-mm HEI-T

Antitank Guided Missiles
Name: AT-10/Basnya
Warhead Type: Shaped charge
Command Link: Encoded laser-beam
Warhead Type: Shaped charge (HEAT)
Armor Penetration (mm): 650 (RHA)
Range (m): 4,000

Name: AT-10 Improved
Warhead Type: Tandem shaped charge
Armor Penetration (mm): 700 (RHA) behind ERA
Range (m): 4,000
Launcher Dismountable: No

NOTES
A French SNPE ERA kit and others are available for use on the BMP-3. However, during dismounted troop movement ERA would be a hazard. Thus, passive armor is more likely and ERA application is doubtful. Other options are spall liners and air conditioning.

Russian AG-17 30-mm automatic grenade launcher modification is available for use on BMP-3.

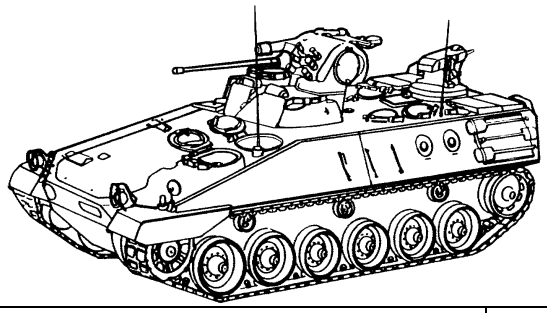
Russian KBP offers a drop-in one-man turret called Kliver, with a stabilized 2A72 30-mm gun, a 4 Kornet ATGM launcher, thermal sights, and improved fire control system.

The Namut thermal gunner's sight is available for use on BMP-3. This uses the French Athos thermal camera. Namut sight has 3x and 10x channels. Night acquisition range: 2,600 m (NFI)

Stowed rounds and ATGMs can be passed from the passenger compartment to the gunner for hand loading. This includes ATGMs.

The "HEF" (or "HE-Shrapnel") round can be employed in indirect fire mode with air burst to 7,000 m.

German Infantry Fighting Vehicle Marder 1



Weapons & Ammunition Types	Typical Combat Load
20-mm automatic cannon HEI/HEI-T API-T or APDS-T	**1,250**
7.62-mm coax MG coaxial rear/remote turret	**5,000**
Milan ATGM Launcher	**5**

SYSTEM
Alternative Designations: INA
Date of Introduction: 1971
Proliferation: At least 2 countries
Description:
Crew: 4 (3+1 squad member, who dismounts with the squad)
Troop Capacity: 5
Combat Weight (mt): 29.2/35.0* for Marder 1A3
Chassis Length Overall (m): 6.79/6.88*
Height Overall (m): 2.99/3.02*
Width Overall (m): 3.24/3.38*
Ground Pressure (kg/cm^2): 0.83/0.94*

Automotive Performance:
Engine Type: 590-600-hp Diesel
Cruising Range (km): 520
Speed (km/h):
- Max Road: 75
- Max Off-Road: 65
- Average Cross-Country: 35
- Max Swim: N/A

Fording Depth (m): 1.5/2.0 with preparation

Radio: INA

Protection:
Armor, Turret Front (mm): Against 20 mm/30 mm*
Applique Armor (mm): Available/Standard*
Explosive Reactive Armor (mm): Brenus ERA available
Active Protective System: N/A
Mineclearing Equipment: N/A
Self-Entrenching Blade: N/A
NBC Protection System: Collective
Smoke Equipment: 6 smoke grenade launchers

ARMAMENT
Main Armaments:
Caliber, Type, Name: 20-mm automatic cannon (92 Cal), Rh202
Rate of Fire (rd/min): 800-1,000
Loader Type: Dual belt feed/manual for Milan
Ready/Stowed Rounds: 345 HE and 75 AP/830 stowed
Elevation (°): -17 to +65
Fire on Move: No

Auxiliary Weapon:
Caliber, Type, Name: 7.62-mm (7.62x 51) machinegun, MG3
Mount Type: Turret coax
Maximum Aimed Range (m): 2,000
Max Effective Range (m):
- Day: INA
- Night: INA

Fire on Move: Yes
Rate of Fire (rd/min): INA

Caliber, Type, Name: 7.62-mm (7.62x 51) machinegun, MG3
Mount Type: Rear/ turret remote
Maximum Aimed Range (m): 2,000
Max Effective Range (m):
- Day: INA
- Night: INA

Fire on Move: Yes
Rate of Fire (rd/min): INA

ATGM Launcher:
Name: Milan, Milan 2, Milan 3
Launch Method: Tube (from canister)
Guidance: SACLOS
Command Link: Wire
Launcher Dismountable : Yes, with attached folded tripod.

Firing Ports: Two on each side

FIRE CONTROL
FCS Name: INA
Main Gun Stabilization: N/A
Rangefinder: Laser
Infrared Searchlight: Yes/removed in later variants
Sights w/Magnification:
Gunner:
- Day: PERI Z 11, 2x and 6x
  - Field of View (°): INA
  - Acquisition Range (m): INA
- Night: IR and white light/thermal sight*
  - Field of View (°): INA
  - Acquisition Range (m): INA

Commander Fire Main Gun: Yes

VARIANTS
Marder 1A1: Variant includes PERI Z 59 II gunner night sight, and Milan launcher. **Marder 1A1A** has original night sight.

Marder 1A3: Variant includes applique armor package, 7.62-mm MG moved to left side coaxial turret mount, three upper hull doors. In addition the suspension and turret interior were upgraded. Extra armor blocks the firing ports.

Roland: German air defense missile launcher vehicle with Marder chassis.

* Data for Marder 1A3

German Infantry Fighting Vehicle Marder 1 continued_____

VCTP: Argentine Army IFV with a Marder chassis, a 720-hp engine , a 20-mm gun on a two-man turret, and two 7.62-mm MGs.

TAM: Argentine Army tank uses the Marder chassis and a 105-mm gun.

MAIN ARMAMENT AMMUNITION
Caliber, Type, Name:
20-mm (20x139) APDS-T, DM43A1
Maximum Aimed Range (m): INA
Max Effective Range (m):
Day: 2,000
Night: INA
Tactical AA Range: INA
Armor Penetration (mm): 32 at 1,000 m

20-mm HEI, DM51A2/HEI-T, DM81
Maximum Aimed Range (m): INA
Max Effective Range (m):
Day: 2,000+
Night: INA
Tactical AA Range: INA
Armor Penetration (mm): INA

20-mm Shrapnel, DM111 (canister with forward fragment dispense)
Maximum Aimed Range (m): INA
Max Effective Range (m):
Day: INA
Night: INA
Tactical AA Range: INA
Armor Penetration (mm): INA

Other Ammunition Types: DM63 APDS-T, canister

Antitank Guided Missiles
Name: Milan
Warhead Type: Shaped charge (HEAT)
Armor Penetration (mm): 600 (RHA)
Range (m): 25-2,000

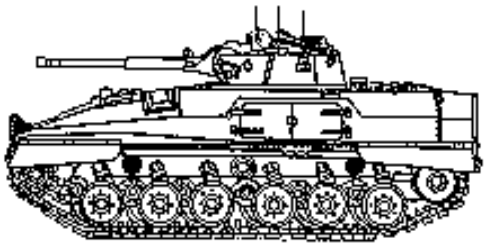
Name: Milan 2
Warhead Type: Tandem Shaped charge
Armor Penetration (mm): 800 (RHA)
Range (m): 20-2,000

Name: Milan 3
Warhead Type: Tandem Shaped charge with precursor charge
Armor Penetration (mm): 880 (RHA)
Range (m): 20-1,920

NOTES
German Brenus ERA and others are available for use on the Marder 1. However, during dismounted troop movement ERA would be a hazard. Thus, passive armor is more likely and ERA application is doubtful.

All Milan launchers will fire all ATGMs. However, Milan 3 countermeasures will only function with the Milan 3 launcher. All Milan launchers can mount (and many are fitted with) the MIRA thermal night sight.

British Infantry Fighting Vehicle Warrior



Weapons & Ammunition Types	Typical Combat Load
30-mm auto gun	**228**
HEI-T	
APDS-T, APSE-T	
7.62-mm coax MG	**2,200**
Ball, Ball-T	

SYSTEM
Alternative Designations: FV 511, MCV-80
Date of Introduction: 1988
Proliferation: At least two countries
Description:
Crew: 3
Troop Capacity: 7 passengers
Combat Weight (mt): 24.00
Chassis Length Overall (m): 6.34
Height Overall (m): 2.79
Width Overall (m): 3.03
Ground Pressure (kg/cm^2): 0.65

Automotive Performance:
Engine Type: 550-hp Diesel
Cruising Range (km): 660
Speed (km/h):
- Max Road: 75
- Max Off-Road: 60
- Cross-Country: 48
- Max Swim: N/A

Fording Depth (m): 1.3 Unprepared

Radio: INA

Protection:
Armor, Turret Front (mm): Against 14.5-mm gun
Applique Armor (mm): Available (see VARIANTS)
Explosive Reactive Armor (mm): N/A
Active Protective System: N/A
Mineclearing Equipment: N/A
Self-Entrenching Blade: N/A
NBC Protection System: Yes
Smoke Equipment: Smoke grenade launchers (4 each side of turret)

ARMAMENT
Main Armament:
Caliber, Type, Name: 30-mm automatic cannon, RARDEN L21A1
Rate of Fire (rd/min): 80-90 cyclic
Loader Type: Feed tray, clip-fed (3-round clips)
Ready/Stowed Rounds: 228/0
Elevation (°): -10/+45
Fire on Move: INA

Auxiliary Weapon:
Caliber, Type, Name: 7.62-mm chain gun, L94A1
Mount Type: Turret coax
Maximum Aimed Range (m): INA
Max Effective Range: INA
Fire on Move: Yes
Rate of Fire (rd/min): 520-570

ATGM Launcher: N/A
Firing Ports: None

FIRE CONTROL
FCS Name: INA
Main Gun Stabilization: N/A
Rangefinder: INA
Infrared Searchlight: Yes
Sights w/Magnification:
Gunner:
- Day: INA
  - Field of View (°): INA
  - Acquisition Range (m): INA
- Night: SPAV L2A1 II sight
  - Field of View (°): INA
  - Acquisition Range (m): INA

Commander Fire Main Gun: No

VARIANTS
Command variant is outfitted with radios, mapboards, other staff support equipment, and Vickers Defence Turret.

Desert Warrior: Variant with the 2-man turret from LAV-25, with a US M242 Bushmaster 25-mm automatic cannon, coaxial MG and 1-2 ATGM launchers. Other modifications are additional passive armor and three periscopes for improved vision. Sold to Kuwait.

Desert Storm Variant: Changes included passive armor added to hull sides and a pintle mount for a Milan-2 ATGM launcher.

Mechanized Artillery Observation Vehicle (MAOV): It resembles an IFV, but is fitted with a dummy cannon, improved artillery reconnaissance and automation systems, and land navigation. Options include an Osprey 8-power optical and thermal sight with Nd:YAG laser designator for the observer.

MAIN ARMAMENT AMMUNITION
Caliber, Type, Name:
30-mm APDS-T, L14
- Maximum Aimed Range (m): 4,000
- Max Effective Range (m):
  - Day: 1,100
  - Night: INA
- Armor Penetration (mm): INA

Other Ammunition Types: 30-mm APSE-T (AP Secondary Effects-T L5, HEI-T L13

NOTES
Variants available but not in production include engineer, recovery,mortar vehicles, armored fighting vehicles with 90-mm and 105-mm guns, an APC with 7.62-mm chain gun, ATGM launcher vehicles for Milan, HOT and Trigat, and a low-profile chassis for a reduced signature IFV.

Chapter 3
Reconnaissance Vehicles

The modern battlefield is becoming increasingly mobile and lethal. The challenge for reconnaissance systems is to acquire the enemy, transmit intelligence, and survive for the next mission. Therefore, ground forces use specialized reconnaissance vehicles. Most will employ a mix of systems, including tanks and infantry fighting vehicles, dismounted reconnaissance patrols, aerial reconnaissance, and reconnaissance vehicles. The spectrum of reconnaissance vehicles currently ranges from older systems ill-suited for modern requirements, to survivable, mobile, and lethal systems, equipped with complex sensor arrays and communications suites.

A number of forces fielded *combat reconnaissance vehicles* (CRVs) designed for operations at or beyond the FLOT, not to initiate combat but to survive if engaged. They may operate in combat reconnaissance patrols with heavily armed vehicles such as tanks and IFVs. Many offer sensors no better than those on other armored vehicles, and use optics for a variety of combat support missions, such as fire support. Examples of these are the British Saladin Armored Car and the Austrian Pandur armored reconnaissance Fire Support Vehicle. Main guns on these vehicles can range up to 105 mm (South African Rooikat). A growing trend is for CRVs with added sensors (such as the Russian BRM-3K). It is a versatile vehicle configured for maneuver reconnaissance with thermal sights and a 30-mm gun, but is also useful for setting up a stationary surveillance position with its Tall Mike radar. As a command (-K type) vehicle, it employs a mix of radios to transmit intelligence across several nets in a combined arms force.

A recent trend is the fielding of vehicles with sophisticated multi-sensor arrays specially designed to operate behind or near the FLOT and provide continuous data to combined arms forces. An example is the Czech Snezka, which will be featured in an update. Vehicles designed to support specific branches are included with those branches (such as PRP-3/4 for artillery).

A class of vehicles widely proliferated for light patrol duties is the armored scout car. With wheels rather than tracks, light armor, and guns generally of 7.62 - 20 mm, they offer low cost but are vulnerable to a wide variety of weapons. Examples include the British Ferret and Russian BRDM-2. A recent category of vehicle which US Army forces will encounter is lightly armored vehicles on truck or jeep-type chassis with very light armor for security, and patrol. Some are unarmed; whereas others employ sophisticated weapons stations and lethal firepower (up to 30-mm guns). Smaller 4x4 scout vehicles (such as French VBL) and ultra-light fast-attack vehicles have also been built for light patrol and rapid reconnaissance missions.

This chapter provides a representative sampling of reconnaissance vehicles in use today. The selection is not comprehensive, rather reflects systems currently available to the OPFOR.

Questions and comments on data listed in this chapter should be addressed to:

Mr. Tom Redman
DSN: 552-7925 Commercial (913) 684-7925
e-mail address: redmant@leav-emh1.army.mil

French Armored Reconnaissance Vehicle AMX-10RC _____

Weapons & Ammunition Types	Typical Combat Load
105-mm rifled gun	**38**
APFSDS-T	(est) 10
HEAT-T	9
HE-T	19
7.62-mm coax MG	**4,000**

SYSTEM
Alternative Designations: INA
Date of Introduction: 1979
Proliferation: At least 3 countries
Description:
Crew: 4
Troop Capacity: None
Combat Weight (mt): 15.8
Chassis Length Overall (m): 6.35
Height Overall (m): 2.29
Width Overall (m): 2.95
Drive Formula: 6 x 6

Automotive Performance:
Engine Type: 260-hp Diesel
Cruising Range (km): 1,000
Speed (km/h):Max Road: 85
Max Off-Road: INA
Average Cross-Country: INA
Max Swim (km/h): 4.5/7.2 with 2 hydrojets
Fording Depth (m): INA

Radio: INA

Protection:
Armor, Turret Front (mm): INA
Applique Armor (mm): Available, Desert Storm version
Explosive Reactive Armor (mm): N/A Active Protective System:
KCBM ATGM IRCM decoy device
Mineclearing Equipment: N/A
Self-Entrenching Blade: N/A
NBC Protection System: Yes
Smoke Equipment: 2x2 smoke grenade launchers (16 grenades)

ARMAMENT
Main Armament:
Caliber, Type, Name: 105-mm (48 Cal) rifled gun, CN-105-F2
Rate of Fire (rd/min): INA
Loader Type: Manual
Ready/Stowed Rounds: 12/26
Elevation (°): -8 to +20
Fire on Move: No

Auxiliary Weapons:
Caliber, Type, Name: 7.62-mm MG, INA
Mount Type: Coax
Maximum Aimed Range (m): 2,000
Max Effective Range (m):
Day: INA
Night: INA
Fire on Move: Yes
Rate of Fire (rd/min): INA
ATGM Launcher: N/A
Firing Ports: N/A

FIRE CONTROL
FCS Name: COTAC M401
Main Gun Stabilization: No
Rangefinder: Cilas APX M550 laser
Infrared Searchlight: No
Sights w/Magnification:
Gunner:
Day: APX M504-04, 10x
Field of View (°): INA
Acquisition Range (m): INA
Night: DIVT 13 LLLTV
Field of View (°): INA
Acquisition Range (m): INA
Commander Fire Main Gun: No

VARIANTS
Desert Storm version: Vehicles have applique armor, an ATGM IRCM decoy device, and a DIVT 16 thermal sight, range 4,000 m.

MAIN ARMAMENT AMMUNITION
Caliber, Type, Name:
105-mm APFSDS-T, OFL 105 Mle F3, Giat
Maximum Aimed Range (m): 2,000
Max Effective Range (m):
Day: 1,500
Night: INA
Armor Penetration (mm): Single heavy tank target at 1,000 m

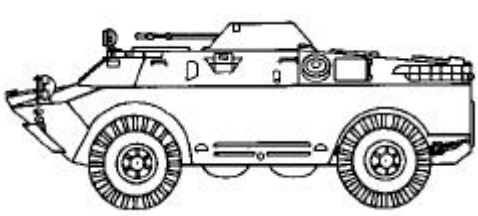
105-mm HEAT-T, OCC 105 F3, French Giat
Maximum Aimed Range (m): 1,300
Max Effective Range (m):
Day: 1,250
Night: INA
Armor Penetration (mm): 100 at 70°

105-mm HE, OE 105 Mle F3
Maximum Aimed Range (m): 2,500
Max Effective Range (m):
Day: 1,000
Night: INA
Armor Penetration (mm): INA

Other Ammunition Types: Smoke

NOTES
The Alis modular thermal sight can be used on 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 Armored Scout Car BRDM-2



Weapons & Ammunition Types	Typical Combat Load
14.5-mm machinegun	**500**
API, API-T, I-T	160
HE-T	340
7.62-mm coax MG	**2,000**
Heavy ball, I-T, Light ball, Ball-T, API-T	

SYSTEM
Alternative Designations: GAZ 41-08
Date of Introduction: 1963
Proliferation: At least 45 countries
Description:
Crew: 4
Troop Capacity: 0 (for this configuration)
Combat Weight (mt): 7.0
Chassis Length Overall (m): 5.75
Height Overall (m): 2.31
Width Overall (m): 2.75
Ground Pressure (kg/cm^2): INA
Drive Formula: 4 x 4 (+ 4 auxiliary wheels)

Automotive Performance:
Engine Type: 140-hp Gasoline
Cruising Range (km): 750
Speed (km/h):Max Road: 95
Max Off-Road: INA
Average Cross-Country: INA
Max Swim: 10
Fording Depths (m): Amphibious

Radio: R-123

Protection:
Armor, Turret Front (mm): 10
Applique Armor (mm): N/A
Explosive Reactive Armor (mm): N/A
Mineclearing Equipment: N/A
Self-Entrenching Blade: N/A
Active Protective System: N/A
NBC Protection System: Collective
Smoke Equipment: N/A

ARMAMENT
Main Armament:
Caliber, Type, Name: 14.5-mm Machinegun KPVT
Rate of Fire (rd/min): 150 practical/600 cyclic
Loader Type: Belt feed
Ready/Stowed Rounds: 500/0
Elevation (°): -5 / +30
Fire on Move: Yes

Auxiliary Weapon:
Caliber, Type, Name: 7.62-mm (7.62x 54R) Machinegun PKT
Mount Type: Coax
Maximum Aimed Range (m): 1,500
Max Effective Range (m):
Day: 1,000m / 400-500 on the move
Night: N/A
Fire on Move: Yes
Rate of Fire (rd/min): 250 practical / 650 cyclic in 2-10 round bursts

ATGM Launcher: N/A
Firing Ports: INA

FIRE CONTROL
FCS Name: N/A
Main Gun Stabilization: N/A
Rangefinder: N/A
Infrared Searchlight: INA
Sights w/Magnification:
Gunner:
Day: PP-61AM
Field of View (°): 23
Acquisition Range (m): 2,000
Night: N/A
Field of View (°): INA
Acquisition Range (m): INA
Commander Fire Main Gun: No

VARIANTS
Polish modernized variant has been offered in five versions, with upgrades such as: 12.7-mm MG, improved PKT MG mount, roof-mounted AT-4 ATGM, surveillance radar, improved fire control, etc.

Antitank guided missile launcher vehicles:
9P122 variant with 6-rail AT-3 ATGM launcher
9P124 variant with 4-rail AT-2 MCLOS ATGM launcher
9P133 variant with 6-rail AT-3C SACLOS ATGM launcher
9P137 variant with 5-rail AT-5 ATGM launcher
9P148 variant with 5-rail AT-4 or AT-5 ATGM launcher.

BRDM-2Rkh: NBC reconnaissance vehicle

BRDM-2U: Command variant without a turret

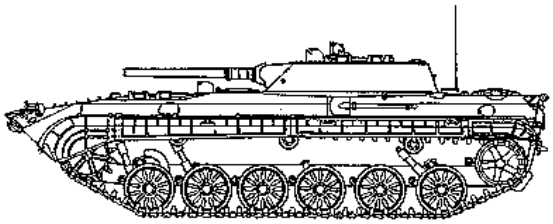
SA-9: SAM system transporter-erector-launcher vehicle

MAIN ARMAMENT AMMUNITION
Caliber, Type, Name:
14.5-mm API-T
Maximum Aimed Range (m): INA
Max Effective Range (m):
Day: 2,000
Night: INA
Tactical AA Range: 1,400
Armor Penetration (mm): 20 at 1,000 m/30 at 500 m

Other Ammunition Types: 14.5-mm API, I-T, HE-T Type MDZ

NOTES
Some BRDMs may include an AT-4 launcher and ATGMs for dismounted self-defense.

Russian Armored Reconnaissance Command Vehicle BRM-1K



Weapons & Ammunition Types	Typical Combat Load
73-mm gun	**20**
HEAT	(est) 10
HE	10
7.62-mm coax MG	**2,000**

SYSTEM
Alternative Designations: BMP M1976/2
Date of Introduction: 1976
Proliferation: At least 3 countries
Description:
Crew: 4 (with addition of a navigator)
Troop Capacity: 6 passengers
Combat Weight (mt): 13.3
Chassis Length Overall (m): 6.74
Height Overall (m): 2.15
Width Overall (m): 2.94
Ground Pressure (kg/cm^2): 0.57

Automotive Performance:
Engine Type: 300-hp diesel
Cruising Range (km): 600
Speed (km/h):
- Max Road: 65
- Max Off-Road: 40-45
- Average Cross-Country: INA
- Max Swim: 7

Fording Depth (m): Amphibious
Radio: R-173, R-130, 2x R-148 manportable, R-014D telegraph

Protection:
Armor, Turret Front (mm): 19-23
Applique Armor (mm): Available
Explosive Reactive Armor (mm): Available
Active Protective System: N/A
Mineclearing Equipment: N/A
Self-Entrenching Blade: N/A
NBC Protection System: Yes
Smoke Equipment: VEESS

ARMAMENT
Main Armament:
Caliber, Type, Name: 73-mm smoothbore gun, 2A28/Grom
Rate of Fire (rd/min): 7-8
Loader Type: Autoloader
Ready/Stowed Rounds: 20 / 0
Elevation (°) : -4/+33
Fire on Move: Yes, but only 10 km/h or less (est)

Auxiliary Weapon:
Caliber, Type, Name: 7.62-mm (7.62x 54R) machinegun PKT
Mount Type: Coaxial
Maximum Aimed 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 (rd/min): 250 practical / 650 cyclic, in 2-10 round bursts
Firing Ports: 1 on each side, 1 in left rear door

FIRE CONTROL
FCS Name: INA
Main Gun Stabilization: No
Rangefinder: Laser
Infrared Searchlight: Yes
Sights w/Magnification:
Gunner:
- Day: 1PN22M2, 8x
  - Field of View (°): 15 (est)
  - Acquisition Range (m): INA
- Night: 1PN22M2 II channel, 6x
  - Field of View (°): 6 (est)
  - Acquisition Range (m): 800-1,000, based on light

VARIANTS
BRM-1: Baseline armored reconnaissance vehicle (BMP M1976/1) without smoke grenade launchers, added comms (R-130, R-014D telegraph), and Tall Mike radar but with four more passengers.

MAIN ARMAMENT AMMUNITION
Caliber, Type, Name:
73-mm HEAT-FS, PG-9
- Maximum Aimed Range (m): 1,300
- Max Effective Range (m):
  - Day: 800, 600 on the move
  - Night: 800
- Armor Penetration (mm): 335 (RHA)

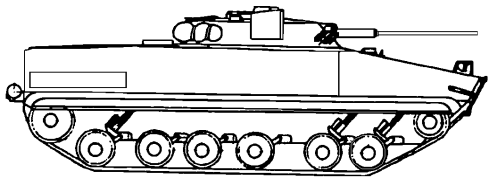
73-mm HEAT-FS, NFI
- Maximum Aimed Range (m): 1,300
- Max Effective Range (m):
  - Day: 1,000, 600 on the move
  - Night: 800-1,000
- Armor Penetration (mm): >400 (RHA)

73-mm HE, OG-9
- Maximum Aimed Range (m): 1,300
- Max Effective Range (m):
  - Day: 1,300, 1,000 on the move
  - Night: 1,000
- Armor penetration (mm): INA

Other Ammunition Types: 73-mm HE, OG-9M

NOTES
Derived from BMP-1, the vehicle has a 2-man turret and additional sensors. Two manportable SAM launchers are included. BMP-1 options fit BRM-1 and -1K. SENSORS: 1PN22M2 sight, 1D8 laser rangefinder, and Tall-Mike battlefield surveillance radar. Radar characteristics: operating band I (9.0 GHz); detection ranges 30 km personnel, 12 km vehicles. The Russian Alis or Sanoet thermal gunner's sight can be installed. Passengers may dismount from BRM-1K and will dismount from BRM-1 to form an alternate reconnaissance post.

Russian Combat Reconnaissance Vehicle BRM-3K



Weapons & Ammunition Types	Typical Combat Load
30-mm auto gun	**500**
HE-I & Frag-HE-T	340
APDS, APFSDS-T	160
7.62-mm coax MG	**2,000**

SYSTEM
Alternative Designations: Lynx, Rys
Date of Introduction: 1990
Proliferation: At least 1 country
Description:
Crew: 6
Combat Weight (mt): 19.6
Chassis Length Overall (m): 6.10
Height Overall (m): 2.65
Width Overall (m): 3.15
Ground Pressure (kg/cm^2): 0.62

Automotive Performance:
Engine Type: 500-hp Diesel
Cruising Range (km): 600
Speed (km/h):
- Max Road: 70
- Max Off-Road: 45
- Average Cross-Country: 35
- Max Swim: 10

Fording Depths (m): Amphibious

Radio: R-163-50U UHF, R-163-50K HF, R-163-10U (dismounts)

Protection:
Armor, Turret Front (mm): 30-35 mm (front glacis)
Applique Armor (mm): Yes on turret
Explosive Reactive Armor (mm): Available
Mineclearing Equipment: N/A
Self-Entrenching Blade: N/A
Active Protective System: N/A
NBC Protection System: Collective
Smoke Equipment: 6 Smoke grenade launchers, VEESS

ARMAMENT
Main Armament:
Caliber, Type, Name: 30-mm automatic gun, 2A72
Rate of Fire: 350 rd/min (cyclic) in bursts
Loader Type: Dual-belt feed
Ready/Stowed Rounds: 500/ 0
Elevation (°): -5 to + 60
Fire on Move: Yes

Auxiliary Weapon:
Caliber, Type, Name: 7.62-mm machinegun, PKT
Mount Type: Turret coax
Max Effective Range:
- Day: 2,000 m
- Night: 1,200-1,500 passive/2,000 active

Fire on Move: Yes
Rate of Fire (rd/min): 250 practical / 650 cyclic, in 2-10 round bursts

Firing Ports: 1 on each side

FIRE CONTROL
FCS Name: BPK-2-42
Main Gun Stabilization: 2-plane, 2E52-1
Rangefinder: Laser
Infrared Searchlight: Yes
Sights w/Magnification:
Gunner:
- Day: BPK-2-42
  - Field of View (°): 8
  - Acquisition Range (m): 4,000 (est)
- Night: 1PN61 II/IR sight
  - Field of View (°): INA
  - Acquisition Range (m): 1,200-1,500/3,000+ active IR

Commander Fire Main Gun: INA

VARIANTS
N/A

MAIN ARMAMENT AMMUNITION
Caliber, Type, Name:
30-mm APDS
- Maximum Aimed Range (m): 4,000 (est)
- Max Effective Range (m):
  - Day: 2,500
  - Night: 1,200-1,500 passive/ 2,500 active
- Tactical AA Range: 4,000
- Armor Penetration (mm): 25 (RHA) at 1,500 m

30-mm APFSDS-T M929
- Maximum Aimed Range (m): 4,000 (est)
- Max Effective Range (m):
  - Day: 2,500+
  - Night: 1,200-1,500 passive/2,500+ active
- Tactical AA Range: 4,000
- Armor penetration (mm): 55 (RHA) at 1,000 m, 45 at 2,000 m

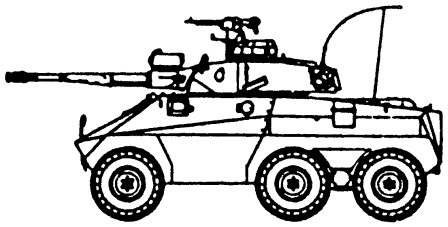
30-mm Frag-HE
- Maximum Aimed Range (m): 4,000
- Max Effective Range (m):
  - Day: 4,000
  - Night: 1,200-1,500 passive/ 3,000+ active
- Tactical AA Range: 4,000
- Armor Penetration (mm): INA

Other Ammunition Types: 30-mm HEI-T, AP-T

NOTES
BRM-3K is a variant of BMP-3 with a steel hull.

ONBOARD SENSORS: The 1PN71 thermal sight (3.7x/11.5x) has an acquisition range against tanks of 3.0 km. The 1D14 laser rangefinder (73x and 18x sights) has a day light only acquisition range of 10.0 km. The 1PN61 passive image intensifier night sight uses a laser illuminator. In the passive mode, the Generation II (7x) sight has a night acquisition range of 1.2-1.5 km. Using the active laser pulse illuminator, the acquisition range can be extended. Tall Mike Radar has an operating band I (9.0 GHz), and detection ranges: 3.0 km against personnel, 12.0 against moving vehicles.

Brazilian Armored Reconnaissance Vehicle EE-9



Weapons & Ammunition Types	Typical Combat Load
90-mm cannon	**44**
APFSDS-T	(est) 11
HEAT-T, HESH	11
HE-T	22
7.62-mm coax MG	**2,000**
.50 cal AA MG	**500**

SYSTEM
Alternative Designations: Cascavel IV
Date of Introduction: 1977
Proliferation: At least 18 countries (all variants)
Description:
Crew: 3
Troop Capacity: None
Combat Weight (mt): 13.4
Chassis Length Overall (m): 5.19
Height Overall (m): 2.36
Width Overall (m): 2.66
Drive Formula: 6 x 6

Automotive Performance:
Engine Type: 212-hp Diesel
Cruising Range (km): 880
Speed (km/h):Max Road: 100
Max Off-Road: INA
Average Cross-Country: INA
Max Swim: N/A
Fording Depth (m): 1.0 unprepared

Radio: INA

Protection:
Armor, Turret Front (mm): 16
Applique Armor (mm): N/A
Explosive Reactive Armor (mm): N/A
Active Protective System: N/A
Mineclearing Equipment: N/A
Self-Entrenching Blade: N/A
NBC Protection System: N/A
Smoke Equipment: 6 smoke grenade launchers

ARMAMENT
Main Armament:
Caliber, Type, Name: 90-mm gun, Engesa EC-90 (Cockerill-type)
Rate of Fire (rd/min): INA
Loader Type: Manual
Ready/Stowed Rounds: 24/ 20
Elevation (°): -8/+15
Fire on Move: INA

Auxiliary Weapons:
Caliber, Type, Name: 7.62-mm MG, INA
Mount Type: Coax
Maximum Aimed Range (m): 2,000
Max Effective Range (m):
Day: INA
Night: INA
Fire on Move: Yes
Rate of Fire (rd/min): INA

Caliber, Type, Name: .50 Cal M2 HB MG
Mount Type: Cupola
Maximum Aimed Range (m): 2,000
Max Effective Range (m):
Day: 2,000
Night: INA
Fire on Move: Yes
Rate of Fire (rd/min): INA

ATGM Launcher: N/A
Firing Ports: N/A

FIRE CONTROL
FCS Name: INA
Main Gun Stabilization: N/A
Rangefinder: LV3 laser rangefinder
Infrared Searchlight: N/A
Sights w/Magnification:
Gunner:
Day: SS-123, 10x
Field of View (°): INA
Acquisition Range (m): INA
Night: SS-122 II channel, 5.6x
Field of View (°): INA
Acquisition Range (m): INA
Commander Fire Main Gun: No

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.

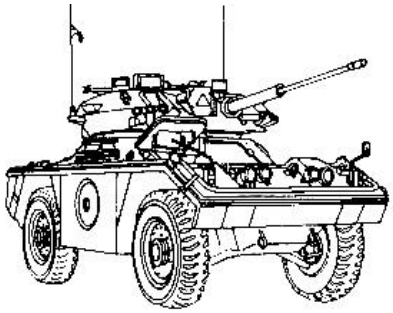
MAIN ARMAMENT AMMUNITION
Caliber, Type, Name:
90-mm APFSDS-T, Engequimica-produced
Maximum Aimed Range (m): INA
Max Effective Range (m):
Day: 2,000+
Night: INA
Armor Penetration (mm): INA

90-mm HE-T, Engequimica-produced
Maximum Aimed Range (m): INA
Max Effective Range (m):
Day: 2,200
Night: INA
Armor Penetration (mm): INA

Other Ammunition Types: HEAT-T, HESH-T, Smoke, Cannister

NOTES
Other ammunition maximum effective ranges are (m): HEAT-T - 1,500, HESH-T - 800.

British Armored Reconnaissance Vehicle Fox



Weapons & Ammunition Types	Typical Combat Load
30-mm auto-cannon	**99**
HEI-T,	(est.) 66
APDS-T,	33
APSE-T	
	2,600
7.62-mm coax MG	

SYSTEM
Alternative Designations: FV721
Date of Introduction: 1973
Proliferation: At least 3 countries

Description:
Crew: 3
Troop Capacity: 0
Combat Weight (mt): 6.12
Chassis Length Overall (m): 4.17
Height Overall (m): 2.20
Width Overall (m): 2.13
Ground Pressure (kg/cm^2): INA
Drive Formula: 4 x 4

Automotive Performance:
Engine Type: 190-hp Gasoline
Cruising Range (km): 434
Speed (km/h):
- Max Road: 104
- Max Off-Road: INA
- Average Cross-Country: INA
- Max Swim: 5.23

Fording Depth (m): 1.0 Unprepared

Radio: INA

Protection:
Armor, Turret Front (mm): Resistant to heavy MG (NFI)
Applique Armor (mm): N/A
Explosive Reactive Armor (mm): N/A
Active Protective System: N/A
Mineclearing Equipment: N/A
Self-Entrenching Blade: N/A
NBC Protection System: N/A
Smoke Equipment: 2 x 4-barrel smoke grenade launchers

ARMAMENT
Main Armament:
Caliber, Type, Name: 30-mm auto-cannon, Rarden L21
Rate of Fire (rd/min): 80-90 cyclic (1-6 round bursts)
Loader Type: Feed tray, manual clip-fed (3-round clips)
Ready/Stowed Rounds: INA
Elevation (°): -14 to +40
Fire on Move: INA

Auxiliary Weapon:
Caliber, Type, Name: 7.62-mm machinegun L7A2
Mount Type: Coax
Max Aimed Range (m): INA
Max Effective Range (m): INA
Fire on Move: Yes
Rate of Fire (rd/min): INA

ATGM Launcher: N/A
Firing Ports: None

FIRE CONTROL
FCS Name: INA
Main Gun Stabilization: N/A
Rangefinder: N/A
Infrared Searchlight: N/A
Sights w/Magnification:
Gunner:
- Day: SPAV L2A1, 5.8/1.6 x
  - Field of View (°): 8/28
  - Acquisition Range (m): INA
- Night: L2A1, II sight
  - Field of View (°): INA
  - Acquisition Range (m): INA

Commander Fire Main Gun: No

VARIANTS
None of the variants have been fielded.

MAIN ARMAMENT AMMUNITION
Caliber, Type, Name: 30-mm APDS-T, L14A2
Max Aimed Range (m): 1,500
Max Effective Range (m):
- Day: 1,000
- Night: INA
- Tactical AA Range: INA

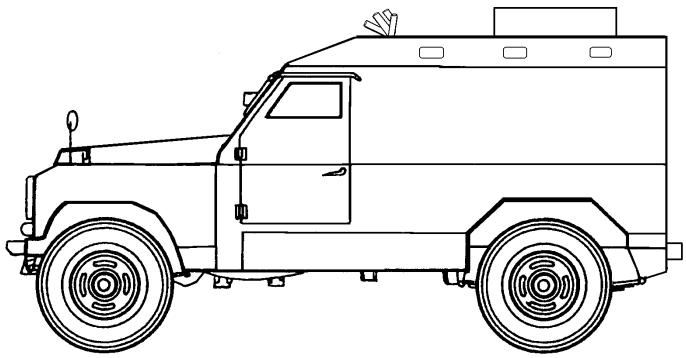
Armor Penetration (mm): 40 (RHA, 45°) at 1,500 m

Caliber, Type, Name: 30-mm HE-T, L13A1
Max Aimed Range (m): 2,000
Max Effective Range (m): INA
Tactical AA Range: INA
Armor Penetration (mm): N/A

Other Ammunition Types: APSE-T (AP Secondary Effects-T L5A2). The gun can fire the KCB (Oerlikon) family of munitions.

NOTES
These vehicles have been phased out of British service.

British Personnel Carrier S55



S55 without machinegun turret

Weapons & Ammunition Types	Typical Combat Load
7.62-mm Turret MG	**1,500**
Ball	
Ball-T	
API	
API-T	

SYSTEM Unless otherwise stated, data is for Mk 5 upgrade.
Alternative Designations: FV18061, S5 Shorland
Date of Introduction: 1963 original, 1990s for Mk 5
Proliferation: At least 21 countries

Description:
Crew: 3
Troop Capacity: 0, 8 passengers in raised roof personnel carrier
Combat Weight (mt): 3.6
Chassis Length Overall (m): 4.51
Height Overall (m): 1.85, 2.29 for turret
Width Overall (m): 1.80
Drive Formula: 4 x 4, with run-flat tires

Automotive Performance:
Engine Type: 114-hp Gasoline
Cruising Range (km): 514
Speed (km/h):
- Max Road: 105 Mk 5
- Max Off-Road: INA
- Average Cross-Country: 48
- Max Swim: N/A

Fording Depth (m): 0.5
Radio: INA

Protection:
Armor, Turret Front (mm): 11.0, can defeat 7.62-mm ball at 26 m
Applique Armor (mm): Grass-reinforced plastic flooring
NBC Protection System: No
Smoke Equipment: 2 x 4 smoke grenade launchers + roof mount

ARMAMENT
Main Armament:
Caliber, Type, Name: 7.62-mm (7.62x 51) GP Machinegun, L7A2
Mount Type: Turret
Rate of Fire: 80-100 (practical)
Loader Type: Belt feed
Ready/Stowed Rounds: INA
Elevation (°): -4 to +82
Fire on Move: Yes
Rate of Fire (rd/min): INA

ATGM: N/A
Firing Ports: 0/3 each side, 2 in the rear doors for personnel carrier

FIRE CONTROL
Infrared Searchlight: None, visual searchlight only
Sights w/Magnification:
Gunner:
- Day: Periscopic sight on turret roof
- Night: N/A

Commander Fire Main Gun: No

VARIANTS
The vehicle is produced in several versions, including armored car (with notchback cab and room for 3), personnel carrier van version.

Upgrades:
Mk 1: Initial version, with 7.25-mm armor and 67-hp engine.
Mk 2: Variant with 8.25-mm armor and 77-hp engine.
Mk 3: Upgrade with 91-hp engine.
Mk 4: Variant with 11-mm armor and 114-hp engine.
Mk 5: Upgrade with improved suspension, wider wheelbase.

Special-Purpose Vehicles:
S53 Mobile Air Defense Vehicle: Vehicle with lightweight multiple launcher (3 ready, 6 stowed).

S54 Anti-Hijack Vehicle: Version has special rifle marksman turret.

MAIN GUN AMMUNITION
Caliber, Type, Name:
Maximum Aimed Range (m): 2,000 (est)
Max Effective Range (m):
- Day: 800
- Night: INA

Armor Penetration (mm RHA):

Other Ammunition Types: Ball, Ball-T, API, API-T

NOTES
Vehicle is based on British Land Rover chassis. Primary use for the vehicle is for military site security, and internal security vehicle for police and border forces.

Air conditioning is available.

Chapter 4
Tanks/Assault Vehicles

The lethality and variety of weapons available to armored, mechanized, and infantry forces for the close fight require a continued and expanded use of heavily armored fighting vehicles (AFVs). This chapter provides a representative sampling of AFVs in use today and designed for combat assault. The selection is not comprehensive, rather reflects a mix of systems currently available for the OPFOR and likely to be encountered in varying levels of conflict. The selection is also used to highlight trends within this field of weapons.

Vehicles used for combat assault in this Guide are divided into two categories—*main battle tanks and light tanks/assault vehicles*. Tanks are tracked, heavily armored vehicles with guns of generally 75 mm or more. Among modern trends in AFVs are: increased variety of systems worldwide, and a wider application of these systems for varied roles and missions on the battlefield. As a result, technology sharing and proliferation of upgrade packages have blurred lines among vehicles used for assault, antiarmor, combat reconnaissance and fire support missions. Another trend is increased weight for all types of armored vehicles. With heavier armor protection packages, higher-output engines and larger weapons, a significant proportion of medium tanks have grown into the heavy tank weight category. Therefore, the term ***main battle tank*** is more relevant than previous weight categories.

There are still ***light tanks*** on the battlefield, although increased armor and gun size on light armored fighting vehicles such as infantry fighting vehicles and armored reconnaissance vehicles have blurred lines of distinction. A number of AFVs, such as the British Scorpion and French AMX-13 can be characterized as reconnaissance vehicles, tank destroyers, fire support vehicles, or assault vehicles; but they have tracks, armor protection, and guns of 60 mm or greater. Thus, they can also be used for light tank missions. The term ***assault vehicle*** currently represents a narrow category of older vehicles used by (former) Soviet forces - medium-armored vehicles with medium-heavy guns and no turrets. None of these vehicles were selected for this initial publication. Some representative systems will be included in the next iteration. With blurring of lines among roles and missions for heavier LAFVs and light tanks, the term *assault vehicle* will likely broaden to reflect a variety of modern programs for light - medium armored vehicles with medium to heavy guns, for use in the assault role.

Two notable trends for vehicles in this chapter are a reflection of increasing systems costs and declines or leveling of military budgets - development of variants off of established systems, and use of equipment/packages to extend the use life of systems and enhance their effectiveness. As a result, seemingly old and out-of-date tanks, some of which pre-date World War II, can be a threat to modern armored and mechanized forces. The WEG highlights a variety of upgrades as well as limitations for selected tanks. Systems-related trends can be divided among mobility, survivability, and lethality, as noted on the data sheets.

To improve mobility and compensate for weight increases, many forces have replaced older engines with more powerful diesel engines. Swim capability is limited to a few light tanks.

Within the area of survivability, the most obvious consideration is increasing armor protection levels. A prominent trend is the application of additional armor, such as plate armor or panels on turrets, side-skirts over tracks, and addition of explosive reactive armor (ERA). Additional protection measures include use of entrenching blades for self-emplacement, mine-clearing plows and rollers, nuclear, biological and chemical (NBC) protection, vehicle smoke emission systems, and smoke grenade launchers. To complement these systems are sensors such as mine detectors, laser warning receivers, and radar warning receivers. A trend receiving increasing attention is the use of active measures: electro-optical countermeasures, such as infrared jammers, and active protection systems (also known as defensive aides suites) designed to intercept incoming projectiles and destroy them prior to impact.

The area of lethality has seen a variety of upgrades, including: gun replacement, improved stabilization and fire control systems, additional weapons such as antitank guided missile systems, and improved ammunition. Critical parameters include fire on the move capability, which can be linked to stabilization, rate of fire, integrated sights, acquisition ranges, and weapon range. Note, because weapon range is really a function of sights, gun precision, the type of mount, and specific round ballistics, the WEG will incorporate those factors in the round data, as maximum aimed range. That figure conforms to the OPFOR tactics and accounts for technical capabilities (see Glossary). Maximum effective range is also included (see Glossary).

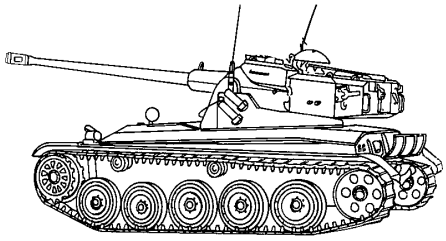
The WEG notes a variety of new ammunition natures, such as electronically fuzed tank rounds for use against helicopters, and OPFOR availability of western-style HEAT-multipurpose rounds, which can be used as both antitank and antipersonnel rounds, for greater flexibility and lethality. For some systems, the ammunition mix could be determined or estimated. For others, that data was not available. Within each category, the specific round mix will depend on tactical considerations, comparative lethality and the intended targets. A general rule for OPFOR is that tanks will have approximately 50% antitank rounds and 50% rounds for use against soft targets. Because of the relative increase in protection against HEAT rounds vs kinetic energy rounds, mix estimates reflect a bias toward KE rounds. The term *stowed rounds* does not mean rounds which are not in the tank's autoloader. Rounds in ready reach are ready rounds. Stowed rounds are those which are in compartments away from the gunner's or loader's positions, requiring a slower than normal rate of fire (see Glossary). In calculating tank rounds, the figure does not include the tactical possibility of adding an additional round in the breach.

Secondary arms continue to play an important role for OPFOR tanks, because their use permits the main gun to focus fires more on heavy and area targets. Tankers will fire main guns at hovering or slow-flying aircraft; however, the more likely weapon is the antiaircraft machinegun. Similarly, OPFOR tanks will fire main guns at personnel and other soft targets as required; but the more efficient weapon for targets at close range is the coaxial machinegun.

Questions and comments on data listed in this chapter should be addressed to:

Mr. Tom Redman
DSN: 552-7925 Commercial (913) 684-7925
e-mail address: redmant@leav-emh1.army.mil

French Light Tank AMX-13



AMX-13 Model 51/75 mm Gun

Weapons & Ammunition Types	Typical Combat Load
90-mm rifled gun	
APFSDS-T	**34**
HEAT	
HE	
Cannister	
7.62-mm coax MG	**3,600**

SYSTEM
Alternative Designations: AMX-13/90
Date of Introduction: 1966
Proliferation: At least 15 countries
Description:
Crew: 3
Combat Weight (mt): 15.0
Chassis Length Overall (m): 4.88
Height Overall (m): 2.28
Width Overall (m): 2.51
Ground Pressure (kg/cm^2): 0.74

Automotive Performance:
Engine Type: 250-hp Gasoline
Cruising Range (km): 350
Speed (km/h):
- Max Road: 60
- Max Off-Road: INA
- Average Cross-Country: INA
- Max Swim: N/A

Fording Depths (m): 0.6 unprepared, 2.1 with snorkel

Radio: TR-VP118 and intercom

Protection:
Armor, Turret Front (mm): 25 at 45° impact angle
Applique Armor (mm): N/A
Explosive Reactive Armor (mm): N/A
Active Protective System: N/A
Mineclearing Equipment: N/A
Self-Entrenching Blade: N/A
NBC Protection System: N/A
Smoke Equipment: 2 smoke grenade launchers each side of turret

ARMAMENT
Main Armaments:
Caliber, Type, Name: 90-mm rifled gun CN-90-F3
Rate of Fire (rd/min): INA
Loader Type: Autoloader and manual
Ready/Stowed Rounds: 10 in autoloader, 11/13 in hull
Elevation (°): -5.5/+12.5
Fire on Move: N/A

Auxiliary Weapon:
Caliber, Type, Name: 7.62-mm (7.62x51) MG, AA52
Mount Type: Turret coax
Maximum Aimed Range (m): INA
Max Effective Range (m):
- Day: INA
- Night: INA

Fire on Move: Yes
Rate of Fire (rd/min): INA

FIRE CONTROL
FCS Name: INA
Main Gun Stabilization: N/A
Rangefinder: N/A
Infrared Searchlight: Yes
Sights w/Magnification:
Gunner:
- Day: L862, 7.5x and 8x
  - Field of View (°): INA
  - Acquisition Range (m): INA
- Night: OB-11-A, 5x
  - Field of View (°): INA
  - Acquisition Range (m): 800-1,000

Commander Fire Main Gun: No

VARIANTS
AMX-13 Model 51: Original tank destroyer/recon vehicle, Model 51, w/75-mm gun. Many variants and upgrades have diesel engines and a 7.62-mm AA MG. Two versions were fitted with 2 x SS-11 or 3 x HOT ATGM launchers
AMX-13/90: This is the variant portrayed on this data sheet.
AMX-13/105: Variant with a GIAT 105G1 105-mm gun.
AMX-13 CD Model 55: Armored recovery variant.
AMX-13 DCA: Air defense variant with twin 30-mm guns.
AMX-13 with LAR: Multiple Rocket Launcher System.
AMX 105-mm Mk 61: Self-propelled howitzer variant.
AMX F3: 155-mm self-propelled gun.
AMX-VCI: Variant used as an APC.

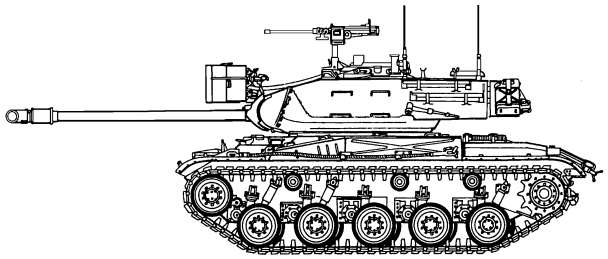
MAIN ARMAMENT AMMUNITION
Caliber, Type, Name:
90-mm APFSDS-T, NFI
- Maximum Aimed Range (m): INA
- Max Effective Range (m):
  - Day: 2,000
  - Night: 800-1,000
- Armor Penetration (mm): INA

90-mm HEAT, NFI
- Maximum Aimed Range (m): INA
- Max Effective Range (m):
  - Day: 1,000
  - Night: N/A
- Armor Penetration (mm): 160 (RHA) at 60° impact angle

Other Ammunition Types: HE, Cannister, Smoke

NOTES
Israeli EL-OP thermal sights are available for use on the tank.

US Light Tank M41A3



Weapons & Ammunition Types	Typical Combat Load
76-mm rifled gun M32	**65**
APDS-T/APFSDS-T	20
HEAT -T	20
Frag-HE	20
Cannister	5
7.62-mm coax MG	**5,000**
12.7-mm AA MG	**2,175**

SYSTEM
Alternative Designations: Walker Tank, Walker Bulldog
Date of Introduction: 1951
Proliferation: At least 18 countries
Description:
Crew: 4
Combat Weight (mt): 23.5
Chassis Length Overall (m): 5.82
Height Overall (m): 2.73
Width Overall (m): 3.20
Ground Pressure (kg/cm^2): 0.72

Automotive Performance:
Engine Type: 500-hp Gasoline
Cruising Range (km): 161
Speed (km/h):
Max Road: 72
Max Off-Road: 48
Average Cross-Country: 40
Max Swim: N/A
Fording Depths (m): 1.0 Unprepared, 2.4 prepared

Radio: INA

Protection:
Armor, Turret Front (mm): 38
Applique Armor (mm): Available
Explosive Reactive Armor (mm): N/A
Active Protective System: N/A
Mineclearing Equipment: N/A
Self-Entrenching Blade: N/A
NBC Protection System: N/A
Smoke Equipment: N/A

ARMAMENT
Main Armament:
Caliber, Type, Name: 76-mm rifled gun M32
Rate of Fire (rd/min): INA
Loader Type: Manual
Ready/Stowed Rounds: INA
Elevation (°): -9.75/ +19.75
Fire on Move: No

Auxiliary Weapon:
Caliber, Type, Name: 7.62-mm (7.62x51) MG, M9194E1
Mount Type: Turret coax
Maximum Aimed Range (m):
Max Effective Range (m):
Day: INA
Night: N/A
Fire on Move: Yes
Rate of Fire: INA

Caliber, Type, Name: .50 (12.7 x 99) AA machinegun, M2HB
Mount Type: Cupola AA mount
Maximum Aimed Range (m): INA
Max Effective Range (m):
Day: 2,000
Night: INA
Fire on Move: Yes
Rate of Fire (rd/min): 450-550

FIRE CONTROL
FCS Name: INA
Main Gun Stabilization: N/A
Rangefinder: N/A
Infrared Searchlight: Available
Sights w/Magnification:
Gunner:
Day: M97A1 and M20A1
Field of View (°): INA
Acquisition Range (m): INA
Night: Available
Commander Fire Main Gun: No

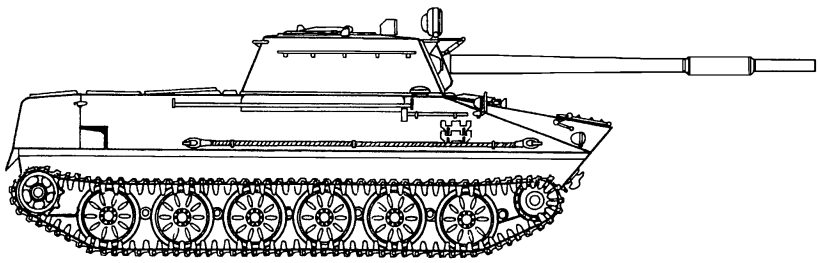
VARIANTS
M41 DK-1: Danish variant with diesel engine and LRF-based fire control. Other upgrades are side skirts, thermal sights, NBC protection, smoke grenade launchers and 7.62-mm AA MG.
Brazilian M41: Upgrades are similar to DK-1 except for AA MG and change to 90-mm gun using Cockerill Mk III ammunition.
Uruguayan M41: M41A3 fitted with Cockerill Mk III gun.
YUNG HU: Taiwanese upgrade with diesel engine.
M42/Duster: Air defense gun system with twin 40-mm AA cannon.

MAIN ARMAMENT AMMUNITION
Caliber, Type, Name:
76-mm APFSDS-T, AAI M464
Maximum Aimed Range (m): INA
Max Effective Range (m): INA
Armor Penetration (mm): NATO triple heavy (57°) at 1000 m

Other Ammunition Types: M33A1 and A2 APDS-T, M319 and M339 AP-T, M496 HEAT-T, HE, Smoke (WP), M363 cannister

NOTES
German Atlas offers the MOLF 1-plane stabilized laser rangefinder fire control system and retrofit kit The FCS includes a thermal night sight. Israeli EL-OP offers a FCS for the system. Maximum range for the canister round is 155 meters.

North Korean Light Tank M1985_____ _____



Weapons & Ammunition Types	Typical Combat load
85-mm rifled gun	**47***
APC-T/HVAP-T	
HEAT-FS	
AP HE	
Frag-HE, HE	
ATGM Launcher	**4***
AT-3-type ATGM	
12.7-mm AAMG	**500***
7.62-mm coax MG	*(est) **1,000***

SYSTEM
Alternative Designations: Often called PT-85
Date of Introduction: 1985
Proliferation: At least 1 country
Description:
Crew: 3-4
Combat Weight (mt): 19.0
Chassis Length Overall (m): 7.0
Height Overall (m): 2.6
Width Overall (m): 3.2
Ground Pressure (kg/cm^2): INA

Automotive Performance:
Engine Type: 320-hp Diesel
Cruising Range (km): 500
Speed (km/h):
- Max Road: 60
- Max Off-Road: INA
- Average Cross-Country: INA
- Max Swim: 10

Fording Depths (m): Amphibious

Radio: INA
Protection:
Armor, Turret Front (mm): 30 (est.)
Applique Armor (mm): N/A
Explosive Reactive Armor (mm): N/A
Mineclearing Equipment: N/A
Self-Entrenching Blade: N/A
Active Protective System: No
NBC Protection System: INA
Smoke Equipment: INA

ARMAMENT
Main Armament: 85-mm rifled gun, resembles CH Types 62 and 63
Rate of Fire(rd/min): 8
Loader Type: Manual
Ready/Stowed Rounds: INA
Elevation (°) : -5 to + 18
Fire on Move: No (est.)

Auxiliary Weapons:
Caliber, Type, Name: 12.7-mm (12.7 x 108), Type 54/DShKM
Mount Type: Cupola
Max Aimed Range (m): 2,000
Max Effective Range (m):
- Day: 1,600 unarmored ground / 800 armored (est.)
- Night: INA

Tactical AA Range: 1,600 (est.)
Armor Penetration (mm): 21 at 500 m, 13 at 1,000 m

Caliber, Type, Name: 7.62-mm Machine gun PKT
Mount Type: Turret coax
Max Effective Range (m):
- Day: 1,000 (400-500 on the move)
- Night: 800

Fire on Move: Yes
Rate of Fire (rd/min):
- Practical: 250
- Cyclic: 650, in 2-10 round bursts

ATGM Launcher:
Name: Similar to 9P111
Launch Method: Rail-launched
Guidance: MCLOS
Command Link: Wire
Launcher Dismountable: Yes

FIRE CONTROL
FCS Name: INA
Main Gun Stabilization: None
Rangefinder: None
Infrared Searchlight: Yes
Sights w/Magnification:
Gunner:
- Day: INA
  - Field of View (°): INA
  - Acquisition Range (m): 1,500-3,000 (est.)
- Night: IR, INA
  - Field of View (°): INA
  - Acquisition Range (m): 800 (est.)

Commander Fire Main Gun: INA

VARIANTS: N/A

MAIN ARMAMENT AMMUNITION
Caliber, Type, Name: 85-mm HVAP-T, BR-365PK
Max Aimed Range (m): 1,500 (est)
Max Effective Range (m):
- Day: 1,150 (direct fire range)
- Night: 800

Armor Penetration (mm): 130 (0°) at 1,000 m

North Korean Light Tank M1985 continued

Caliber, Type, Name: 85-mm APC-T, Type 367
Max Aimed Range (m): 1,500 (est)
Max Effective Range (m):
Day: 1,150 (est)
Night: 800
Armor Penetration (mm): 120 (0°) at 1,000 m

Caliber, Type, Name: 85-mm HEAT-FS (variant of BK-2M)
Max Aimed Range (m): 1,500 (est)
Max Effective Range (m):
Day: 1,500/970 direct fire range
Night: 800
Armor Penetration (mm): 100 at 65°, 300-400 at 0° all ranges

Caliber, Type, Name: 85-mm, AP HE,
Max Aimed Range (m): 2,000-3,000 (est.)
Max Effective Range (m):
Day: 1,500/950 direct-fire range
Night: 800
Armor Penetration (mm): 102 (0°) at 1,000 m

Caliber, Type, Name: 85-mm Frag-HE, INA (Copy of O-365K)
Max Aimed Range (m): 4,000 (est)
Max Effective Range (m):
Day: 1,500 (est)
Night: 800
Armor Penetration (mm): Can defeat most IFVs on impact

Other Ammunition Types: Chinese Smoke, AP HE. Russian BR-365P HVAP-T, BK-2M HEAT-FS

Antitank Guided Missiles:
Name: AT-3, -3A, -B
Warhead Type: Tandem HEAT
Armor Penetration (mm): 410 RHA
Range (m): 3,000

Name: AT-3C
Warhead Type: Tandem HEAT
Armor Penetration (mm): 520 RHA
Range (m): 3,000

Name: AT-3C Imp/ Polk (Slovenian)
Warhead Type: Precursor with HEAT
Armor Penetration (mm): 580 RHA
Range (m): 3,000

Name: Red Arrow-73A (Chinese)
Warhead Type: HEAT
Armor Penetration (mm): 500 RHA
Range (m): 3,000

Name: Red Arrow-73B/C (Chinese)
Warhead Type: HEAT
Armor Penetration (mm): 600 RHA
Range (m): 3,000

Name: Malyutka-2
Warhead Type: Tandem HEAT
Armor Penetration (mm): 800 RHA
Range (m): 3,000

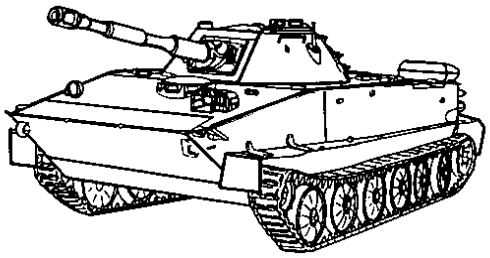
Name: Malyutka-2 HE
Warhead Type: Frag-HE
Armor Penetration (mm): N/A
Range (m): 3,000

NOTES
Chassis is derived from North Korean stretched VTT-323 APC chassis.

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 includes 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.

Russian Amphibious Tank PT-76B



Weapons & Ammunition Types	Typical Combat Load
76-mm rifled gun D-56	**40**
HVAP, AP-T/API-T	10
HEAT	10
Frag-HE	20
7.62-mm coax MG	1,**000**

SYSTEM
Alternative Designations: INA
Date of Introduction: 1952
Proliferation: At least 21 countries
Description:
Crew: 3
Combat Weight (mt): 14.0
Chassis Length Overall (m): 6.91
Height Overall (m): 2.26
Width Overall (m): 3.14
Ground Pressure (kg/cm^2): 0.46

Automotive Performance:
Engine Type: 240-hp Diesel
Cruising Range (km): 260
Speed (km/h):
- Max Road: 44
- Max Off-Road: INA
- Average Cross-Country: 25
- Max Swim: 10

Fording Depth (m): Amphibious

Radio: R-123
Protection:
Armor, Turret Front (mm): 20
Applique Armor (mm): N/A
Explosive Reactive Armor (mm): N/A
Active Protective System: N/A
Mineclearing Equipment: N/A
Self-Entrenching Blade: N/A
NBC Protection System: N/A
Smoke Equipment: VEESS

ARMAMENT
Main Armament:
Caliber, Type, Name: 76-mm rifled gun D-56B
Rate of Fire (rd/min): 6-8
Loader Type: Manual
Ready/Stowed Rounds: INA
Elevation (°): -4/+30
Fire on Move: Yes

Auxiliary Weapon:
Caliber, Type, Name: 7.62-mm (7.62x54R) machinegun PKT
Mount Type: Coax
Maximum Aimed Range (m): 1,500
Max Effective Range (m):
- Day: 1,000/400-500 on the move
- Night: 600

Fire on Move: Yes
Rate of Fire (rd/min): 250 practical / 650 cyclic, 2-10 round bursts

FIRE CONTROL
FCS Name: INA
Main Gun Stabilization: 2-plane
Rangefinder: N/A
Infrared Searchlight: Available
Sights w/Magnification:
Gunner: TShK-66
- Day:
  - Field of View (°): INA
  - Acquisition Range (m): 4,000
- Night: TVN-28 IR Available
  - Field of View (°): INA
  - Acquisition Range (m): 600

Commander Fire Main Gun: No

VARIANTS
Polish PT-76: Variant with a separate 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.

MAIN ARMAMENT AMMUNITION
Caliber, Type, Name:
76-mm HVAP-T, BM-354P
- Maximum Aimed Range (m): 1,060
- Max Effective Range (m):
  - Day: 650
  - Night: 600
- Armor Penetration (mm): 127 at muzzle, 50 at 1,000 m

76-mm HEAT, BK-350M
- Maximum Aimed Range (m): 1,000
- Max Effective Range (m):
  - Day: 650
  - Night: 600
- Armor Penetration (mm): 280 to max range

76-mm, Frag-HE, OF-350
- Maximum Aimed Range (m): 4,000
- Max Effective Range (m):
  - Day: INA
  - Night: 600
- Armor Penetration (mm): INA

Other Ammunition Types: 76-mm AP-T, BR-350 API-T

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. Israel offers an upgrade package with a 90-mm gun, LRF fire control and a 300-hp engine.

British Combat Reconnaissance Vehicle, Tracked Scorpion _____

Weapons & Ammunition Types	Typical Combat Load
76-mm rifled gun	**40**
HESH	
HE	
Cannister	
7.62-mm coax MG	**3,600**

SYSTEM
Alternative Designations: FV101
Date of Introduction: 1972
Proliferation: At least 18 countries
Description:
Crew: 3
Combat Weight (mt): 8.07
Chassis Length Overall (m): 4.79
Height Overall (m): 2.10
Width Overall (m): 2.24
Ground Pressure (kg/cm^2): 0.36

Automotive Performance:
Engine Type: 190-hp Gasoline
Cruising Range (km): 650
Speed (km/h):
- Max Road: 80
- Max Off-Road: INA
- Average Cross-Country: INA
- Max Swim: 4/6 with propeller

Fording Depth (m): 1.07, amphibious

Radio: INA

Protection:
Armor, Turret Front (mm): Against 14.5-mm projectiles
Applique Armor (mm): N/A
Explosive Reactive Armor (mm): N/A
Active Protective System: N/A
Mineclearing Equipment: N/A
Self-Entrenching Blade: N/A
NBC Protection System: Yes
Smoke Equipment: 4 smoke grenade launchers each side of turret

ARMAMENT
Main Armament:
Caliber, Type, Name: 76-mm rifled gun L23A1
Rate of Fire (rd/min): 6
Loader Type: INA
Ready/Stowed Rounds: INA
Elevation (°): -10/ +35
Fire on Move: N/A

Auxiliary Weapon:
Caliber, Type, Name: 7.62-mm (7.62x51) MG, L8A1
Mount Type: Turret coax
Maximum Aimed Range (m): INA
Max Effective Range (m): INA
Fire on Move: Yes
Rate of Fire (rd/min): INA

FIRE CONTROL
FCS Name: INA
Main Gun Stabilization: N/A
Rangefinder: Laser rangefinder
Infrared Searchlight: Yes
Sights w/Magnification:
Gunner:
- Day: Barr and Stroud Tank Laser Sight, 10x
  - Field of View (°): INA
  - Acquisition Range (m): 2,200
- Night: GEC Sensors SS100, II, x5.8/1.6
  - Field of View (°): 8/28
  - Acquisition Range (m): INA

Commander Fire Main Gun: No

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.

MAIN ARMAMENT AMMUNITION
Caliber, Type, Name:
76-mm HESH, L29
- Maximum Aimed Range (m): 2,200
- Max Effective Range (m): INA
- Armor Penetration (mm): INA

Other Ammunition Types: L24A1/2 HE (max effective range--indirect fire: 5,000 meters), L33A1 Cannister (max effective range: 100 meters), L32A5 Smoke (BE), L42 Illumination

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 Main Battle Tank AMX-30

Weapons & Ammunition Types	Typical Combat Load
105-mm rifled gun	**47**
APFSDS-T	
HEAT-T	
HE	
20-mm coaxial cannon	**1,050**
7.62-mm cupola MG	**2,050**

SYSTEM
Alternative Designations: INA
Date of Introduction: 1967
Proliferation: At least 10 countries
Description:
Crew: 4
Combat Weight (mt): 36.00
Chassis Length Overall (m): 6.59
Height Overall (m): 2.29
Width Overall (m): 3.10
Ground Pressure (kg/cm^2): 0.77/0.85 for AMX-30B2

Automotive Performance:
Engine Type: 720-hp Diesel multi-fuel
Cruising Range (km): 500-600
Speed (km/h):
- Max Road: 65
- Max Off-Road: INA
- Average Cross-Country: 35-40
- Max Swim: N/A

Fording Depths (m): 1.3, 2.2 prepared, 4.0 with snorkel

Radio: INA

Protection:
Armor, Turret Front (mm): 81 KE & CE (RHA) /120 AMX-30B2
Applique Armor (mm): N/A
Explosive Reactive Armor (mm): GIAT Brenus ERA available
Active Protective System: Galix decoys and IR jammer available
Mineclearing Equipment: No
Self-Entrenching Blade: No
NBC Protection System: Yes
Smoke Equipment: 2x2 smoke grenade launchers, VEESS

ARMAMENT
Main Armament:
Caliber, Type, Name: 105-mm (56 Cal) rifled gun CN-105-F1
Rate of Fire (rd/min): 6
Loader Type: Manual
Ready/Stowed Rounds: 19/28
Elevation (°): -8 to +20
Fire on Move: No/Yes, AMX-30B2 with COTAC FCS

Auxiliary Weapon:
Caliber, Type, Name: 20-mm (20x139) Auto-cannon M693
Mount Type: Turret Coax
Maximum Aimed Range(m): 2,000
Max Effective Range (m):
- Day: 1,300
- Night: INA

Fire on Move: No
Rate of Fire (rd/min): 1,200

Caliber, Type, Name: 7.62-mm (7.62x51) Machinegun Giat NF1
Mount Type: Turret Cupola
Maximum Aimed Range(m): 1,200
Max Effective Range (m):
- Day: 600
- Night: INA

Fire on Move: Yes
Rate of Fire (rd/min): 900

ATGM Launcher: N/A

FIRE CONTROL
FCS Name: INA
Main Gun Stabilization: None/stabilization for AMX-30B2
Rangefinder: Optical/APX-550 Laser for AMX-30B2
Infrared Searchlight: PH-8-B
Sights w/Magnification:
Gunner:
- Day: M271 telescope, 8x
  - Field of View (°): 9
  - Acquisition Range (m): INA
- Night: OB-17-A IR periscope
  - Field of View (°): INA
  - Acquisition Range (m): 1,000/1,500 white light

Commander Fire Main Gun: No

VARIANTS
AMX-30S: Export for desert use. The engine is downrated to 620 hp. The FCS is upgraded with Sopelem LRF day/night sight.

AMX-30B2: System is upgraded with improved transmission, suspe n-sion, NBC system, gun stabilization, and COTAC FCS with a thermal night sight. French Army AMX-30s were upgraded to -B2.

AMX-30EM2: Spanish upgrade program with 850-hp engine, new transmission, Hughes FCS, enlarged ammunition stowage, ERA, and C-437 APFSDS-T ammunition.

AMX-30 DCA: AD version - 2x30-mm guns on AMX-30 chassis.
GCT/AU-F1: Self-propelled 155-mm howitzer on AMX-30 chassis.
AMX-30D: Armored recovery vehicle.
AMX-30 EBG: Combat engineer tractor.
AMX-30 Bridge Layer: Scissors bridge on AMX-30 chassis.
Pluton: Theater ballistic missile launcher on AMX-30 chassis.

French Main Battle Tank AMX-30 continued

MAIN ARMAMENT AMMUNITION
Caliber, Type, Name:
105-mm APFSDS-T, OFL 105 F1, French Giat
Maximum Aime d Range (m): 3,000
Max Effective Range (m):
Day: 1,800
Night: INA
Armor Penetration (mm): NATO triple heavy target; 5,500 m

Caliber, Type, Name:
105-mm APFSDS-T, M413, Israeli Military Industries
Maximum Aimed Range (m): 6,000
Max Effective Range (m):
Day: 2,000
Night: INA
Armor Penetration (mm): NATO triple heavy target, 6,000+m

Caliber, Type, Name:
105-mm HEAT-T, OCC 105 F1, French Giat
Maximum Aimed Range (m): 2,500
Max Effective Range (m):
Day: 2,500
Night: INA
Armor Penetration (mm): 360 at 0°

105-mm HEAT-T, M456A2, Belgian Mecar
Maximum Aimed Range (m): 2,500-8,200
Max Effective Range (m):
Day: INA
Night: INA
Armor Penetration (mm): 432 at 0°

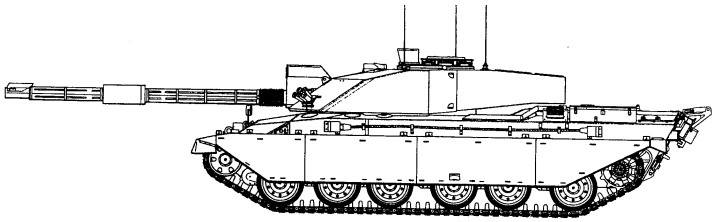
105-mm HE, OE 105 F1, French Giat
Maximum Aimed Range (m): 2,500
Max Effective Range (m):
Day: 2,500
Night: INA
Armor Penetration (mm): N/A

Other Ammunition Types: Any NATO-standard 105-mm ammun i-tion can be used. They include Belgian Mecar M1060, Chinese Norinco 105, German Rheinmetall DM43, Spanish Santa Barbara C-437, British Royal Ordinance L64A4 and H6/6, 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
AMX-32: Upgraded tank - did not enter production.
AMX-40: Later upgraded tank - did not enter production.

British Main Battle Tank Challenger 2



Weapons & Ammunition Types	Typical Combat Load
120-mm rifled gun	**52**
APFSDS-T	20
HESH	32
7.62-mm MG	**4,000**
coaxial chain gun	
cupola AA MG	

SYSTEM
Alternative Designations: INA
Date of Introduction: 1994
Proliferation: At least 2 countries
Description:
Crew: 4
Combat Weight (mt): 62.5
Chassis Length Overall (m): 8.33
Height Overall (m): 2.50
Width Overall (m): 3.52
Ground Pressure (kg/cm^2): 0.97

Automotive Performance:
Engine Type: 1,200-hp Diesel
Cruising Range (km): 450
Speed (km/h):
- Max Road: 59
- Max Off-Road: 45 est
- Average Cross-Country: 40
- Max Swim: N/A

Fording Depths (m): 1.1 Unprepared
Radio: INA

Protection:
Armor, Turret Front (mm): 500 KE RHA at 2,000 m/800 CE
Applique Armor (mm): INA
Explosive Reactive Armor (mm): N/A
Active Protective System: N/A
Mineclearing Equipment: INA
Self-Entrenching Blade: INA
NBC Protection System: Yes
Smoke Equipment: Smoke grenade launchers (2x5), VEESS

ARMAMENT
Main Armaments:
Caliber, Type, Name: 120-mm rifled gun, L30 CHARM
Rate of Fire (rd/min): INA
Loader Type: Separate-loading manual
Ready/Stowed Rounds: INA
Elevation (°): -10 to +20
Fire on Move: Yes

Auxiliary Weapon:
Caliber, Type, Name: 7.62-mm McDonnell Douglas Chain Gun
Mount Type: Turret Coax
Maximum Aimed Range (m): INA
Max Effective Range (m):
- Day: INA
- Night: INA

Fire on Move: Yes
Rate of Fire: INA

Caliber, Type, Name: 7.62-mm (7.62x 51) AA Machinegun L37A2
Mount Type: Cupola
Maximum Aimed Range (m): INA
Max Effective Range (m):
- Day: 800
- Night: INA

Fire on Move: Yes
Rate of Fire (rd/min): INA
ATGM Launcher: None

FIRE CONTROL
FCS Name: Improved Fire Control System (Marconi IFCS)
Main Gun Stabilization: 2-plane electric
Rangefinder: SAGEM Laser rangefinder
Infrared Searchlight: No
Sights w/Magnification:
Gunner: Thermal Imaging and Gun Sighting System (TOGS-2)
- Day: Gunner's Primary Sight
  - Field of View (°): INA
  - Acquisition Range (m): 5,000
- Night: Barr & Stroud TOGS-2 (with SAGEM thermal imager)
  - Field of View (°): INA
  - Acquisition Range (m): INA

Commander Fire Main Gun: INA

VARIANTS
Challenger 1: Base tank from which Challenger 2 was derived. The latter tank includes 150 improvements, including mobility upgrades, new FCS, guns, and land navigation system, and an APU.
Challenger 2E: The tank has a 1,500-hp engine and L30A1 gun.
Omani Challenger 2: Variant with GPS, 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):
  - Day: 3,000+
  - Night: INA
  - Armor Penetration (mm): INA

120-mm High-Explosive Squash-Head (HESH), L31
- Maximum Aimed Range (m): 5,000
- Max Effective Range (m):
  - Day: 3,000
  - Night: INA
- Armor Penetration (mm): INA

Other Ammunition Types: L15 APDS, L34 WP Smoke

NOTES None

British Main Battle Tank Chieftain Mk 5

Weapons & Ammunition Types	Typical Combat Load
120-mm rifled gun	**64**
APFSDS-T	20
HESH	44
7.62-mm MG	**6,200**
--Coaxial and Stowed	**6,000**
--Cupola AA MG	**200**

SYSTEM
Alternative Designations: FV 4201
Date of Introduction: 1967 Original Chieftain
Proliferation: At least 6 countries
Description:
Crew: 4
Combat Weight (mt): 55.00
Chassis Length Overall (m): 7.48
Height Overall (m): 2.90
Width Overall (m): 3.51
Ground Pressure (kg/cm^2): 0.90

Automotive Performance:
Engine Type: 750-hp Diesel
Cruising Range (km): 400-500
Speed (km/h):
- Max Road: 48
- Max Off-Road: INA
- Average Cross-Country: 30
- Max Swim: N/A

Fording Depths (m): 1.1 Unprepared

Radio: C42/Larkspur VHF

Protection:
Armor, Turret Front (mm): 300 (RHA)
Applique Armor (mm): ROMOR applique on turret, side skirts
Explosive Reactive Armor (mm): N/A
Active Protective System: N/A
Mineclearing Equipment: Plow variant, and AVLB/engineer variant
Self-Entrenching Blade: No
NBC Protection System: Yes
Smoke Equipment: Smoke grenade launchers (6 each side of turret)

ARMAMENT
Main Armaments:
Caliber, Type, Name: 120-mm rifled gun, L11A5
Rate of Fire (rd/min): 8-10 first minute/6 sustained
Loader Type: Separate-loading manual
Ready/Stowed Rounds: INA
Elevation (°): -10 to +20
Fire on Move: Yes

Auxiliary Weapon:
Caliber, Type, Name: 7.62-mm (7.62x 51) Machine gun L8A1
Mount Type: Turret Coax
Maximum Aimed Range (m): INA
Max Effective Range (m):
- Day: 800
- Night: INA

Fire on Move: Yes
Rate of Fire: INA

Caliber, Type, Name: 7.62-mm (7.62x 51) AA Machine gun L37A1
Mount Type: Cupola
Maximum Aimed Range (m): INA
Max Effective Range (m):
- Day: 800
- Night: INA

Fire on Move: Yes
Rate of Fire (rd/min): INA

ATGM Launcher: N/A

FIRE CONTROL
FCS Name: Improved Fire Control System (IFCS)
Main Gun Stabilization: 2-plane
Rangefinder: Laser, Nd-Yag
Infrared Searchlight: Yes
Sights w/Magnification:
Gunner:
- Day: Barr and Stroud Tank Laser Sight (TLS), 8x
  - Field of View (°): 10
  - Acquisition Range (m): 5,000
- Night: 1R18 Thermal sight, 3x
  - Field of View (°): INA
  - Acquisition Range (m): INA

Commander Fire Main Gun: INA

VARIANTS
Mk 5: Final production variant, with a new engine and NBC system, modified auxiliary weapons and sights. Mk 6-11 are upgrades to earlier models, with addition of IFCS. Mk 12 added ROMOR (aka: Stillbrew) spaced armor boxes. Mk 11 and Mk 12 have Thermal Observation and Gunnery Sight (TOGS).

A variety of support vehicles were developed from the tank. They include recovery vehicles, AVLB, dozer, mineclearer, air defense and 155-mm SP artillery systems.

Khalid/Shir 1: Jordanian variant which has chassis, turret and weaponry of the Chieftain, but which 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): 5,000
- Max Effective Range (m):
  - Day: 3,000
  - Night: INA
- Armor Penetration (mm): INA

British Main Battle Tank Chieftain Mk 5 continued

120-mm High-Explosive Squash-Head (HESH), L31 Maximum Aimed Range (m): 5,000 Max Effective Range (m): Day: 3,000 Night: INA Armor Penetration (mm): INA	**Other Ammunition Types:** L15 APDS, L34 WP Smoke

NOTES
Early Chieftains and some later modified tanks mount the 50. Cal M2HB machinegun over the main gun as a ranging gun. Iran and Kuwait retained the .50 Cal MG.

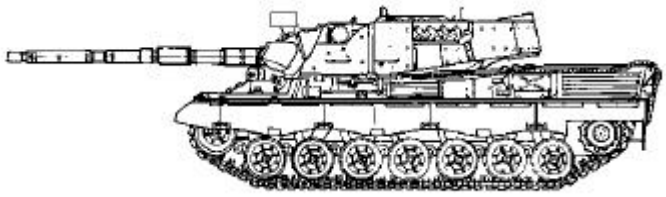
The HESH round is used for antitank chemical-energy (CE) antiarmor missions, and for HE effects against personnel and materiel.

The Iranians claim to employ a snorkel system on Chieftain, for fording to 5 meters depth.

A variety of fire control systems and thermal sights are available for Chieftain. At 324 Chieftains have been 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: Multisensors Platform, Tank Thermal Sensor, and SS100/110 thermal night sight. Marconi, Nanoquest, and Pilkington offer day and night sights for the Chieftain.

Charm Armament upgrade program, with the 120-mm L30 gun incorporated in Challenger 1, is available for Chieftain modification programs.

German Main Battle Tank Leopard 1A1



Leopard 1A1A1 with applique armor

Weapons & Ammunition Types	Typical Combat Load
105-mm rifled gun	**60/later 55**
APFSDS-T	
HESH-T	
7.62-mm MG	**5,500**
coaxial	1,250
cupola	1,250

SYSTEM
Alternative Designations: INA
Date of Introduction: 1965
Proliferation: At least 12 countries
Description:
Crew: 4
Combat Weight (mt): 40/42.4 LA1A1 and after
Chassis Length Overall (m): 7.09
Height Overall (m): 2.61
Width Overall (m): 3.37
Ground Pressure (kg/cm^2): 0.86/0.88 LA1A1 and after

Automotive Performance:
Engine Type: 830-hp Diesel multi-fuel
Cruising Range (km): 600
Speed (km/h):
- Max Road: 65
- Max Off-Road: INA
- Average Cross-Country: INA
- Max Swim: N/A

Fording Depths (m): 1.2 Unprepared, 2.25 prepared, 4.0 snorkel

Radio: INA

Protection:
Armor, Turret Front (mm): 250 RHA, KE/230 CE
Applique Armor (mm): Available, standard on L1A1A1 and after
Explosive Reactive Armor (mm): Brenus available
Active Protective System: N/A
Mineclearing Equipment: No
Self-Entrenching Blade: No
NBC Protection System: Yes
Smoke Equipment: 2x4 76-mm smoke grenade launchers

ARMAMENT
Main Armament:
Caliber, Type, Name: 105-mm (51 Cal) L7A3 rifled gun
Rate of Fire (rd/min): 10
Loader Type: Manual
Ready/Stowed Rounds: 13/47
Elevation (°): -9 to +20
Fire on Move: No/Yes (to 28 km/h) Leopard 1A1A1 and after

Auxiliary Weapons:
Caliber, Type, Name: 7.62-mm (7.62x51) Machinegun M3
Mount Type: Turret Cupola
Maximum Aimed Range(m): 1,400
Max Effective Range (m):
- Day: INA
- Night: INA

Fire on Move: Yes
Rate of Fire (rd/min): INA

Caliber, Type, Name: 7.62-mm (7.62x51) Machinegun MG3
Mount Type: Turret Cupola
Maximum Aimed Range(m): INA
Max Effective Range (m): INA
Fire on Move: Yes
Rate of Fire (rd/min): INA
ATGM Launcher: N/A

FIRE CONTROL
FCS Name: N/A
Main Gun Stabilization: None/stabilization for -1A1A1 and after
Rangefinder: TEM 2A Optical
Infrared Searchlight: XSW-30-U red/white
Sights w/Magnification:
Gunner:
- Day: TZF 1A telescope, 8x
  - Field of View (°): INA
  - Acquisition Range (m): 1,400
- Night: IR available
  - Field of View (°): INA
  - Acquisition Range (m): 1,000/1,500 white light

Commander Fire Main Gun: No

VARIANTS
Leopard 1 was the baseline tank (first production batch) with original tracks, and without track skirts, stabilization or thermal sleeve for gun. The **Leopard 1A1** version, as featured, 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 sta ndard.

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 stabiliz a-tion 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):** Bel-gian 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. These include Gepard air defense gun, engineer and recovery vehicles, and a bridgelayer.

German Main Battle Tank Leopard 1A1 continued

MAIN ARMAMENT AMMUNITION
Caliber, Type, Name:

105-mm APFSDS-T, DM43, German Rheinmetall
- Maximum Aimed Range (m): 2,000+
- Max Effective Range (m):
  - Day: 1,400/2,000 Leo 1A1 and later
  - Night: 1,000 IR/1,500 white light/more with thermal
- Armor Penetration (mm): NATO triple heavy targe t, 5,500 m

105-mm APFSDS-T, M413, Israeli Military Industries
- Maximum Aimed Range (m): 6,000
- Max Effective Range (m):
  - Day: 2,000
  - Night: 1,000 IR/1,500 white light/more with thermal
- Armor Penetration (mm): NATO triple heavy target, 6,000+m

105-mm HEAT-T, OCC 105 F1, French Giat
- Maximum Aimed Range(m): 2,500
- Max Effective Range (m):
  - Day: 2,500
  - Night: INA
- Armor Penetration (mm): 360 at 0°

105-mm HEAT-T, M456A2, Belgian Mecar
- Maximum Aimed Range (m): 2,50 0-8,200
- Max Effective Range (m):
  - Day: INA
  - Night: INA
- Armor Penetration (mm): 432 at 0°

105-mm HESH-T, DM512, Rheinmetall
- Maximum Aimed Range (m): 4,000
- Max Effective Range (m):
  - Day: 1,500
  - Night: 1,000 IR/1,500 white light/more with thermal
- Armor Penetration (mm): N/A

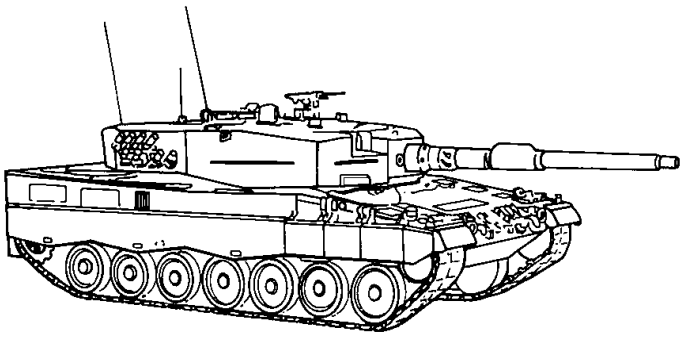
105-mm HE, OE 105 F1, French Giat
- Maximum Aimed Range (m): 2,500
- Max Effective Range (m):
  - Day: 2,500
  - Night: INA
- Armor Penetration (mm): N/A

Other Ammunition Types: Any NATO-standard 105-mm ammun i-tion 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 avai l-able 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

German Main Battle Tank Leopard 2



Weapons & Ammunition Types	Typical Combat Load
120-mm smoothbore gun	**42**
APFSDS-T	
HEAT-MP-T	
7.62-mm machineguns	**4750**
--Coaxial	**2000**
--Cupola MG/stowed	**2750**

SYSTEM
Alternative Designations: Swiss Pz 87, Swedish Strv 121
Date of Introduction: 1979
Proliferation: At least 7 countries
Description:
Crew: 4
Combat Weight (mt): 55.15
Chassis Length Overall (m): 7.69
Height Overall (m): 2.79
Width Overall (m): 3.70
Ground Pressure (kg/cm^2): 0.83

Automotive Performance:
Engine Type: 1,500-hp Diesel
Cruising Range (km): 550
Speed (km/h):
- Max Road: 72
- Max Off-Road: 45
- Average Cross-Country: 40
- Max Swim: N/A

Fording Depths (m): 1.0 Unprepared, 4.0 with snorkel

Radio: INA

Protection:
Armor, Turret Front (mm): 700 KE/1,000 against HEAT rounds
Applique Armor (mm): Track skirt
Explosive Reactive Armor (mm): N/A
Active Protective System: Galix (See note Strv 122)
Mineclearing Equipment: No
Self-Entrenching Blade: No
NBC Protection System: Yes
Smoke Equipment: Smoke grenade launchers, 8 each side of turret

ARMAMENT
Main Armaments:
Caliber, Type, Name: 120-mm smoothbore gun M256
Rate of Fire (rd/min): INA
Loader Type: Manual
Ready/Stowed Rounds: 15/27
Elevation (°): -9 to +20
Fire on Move: Yes

Auxiliary Weapon:
Caliber, Type, Name: 7.62-mm (7.62x 51) Machinegun MG3A1
Mount Type: Turret Coax
Maximum Aimed Range(m): INA
Max Effective Range (m):
- Day: INA
- Night: INA

Fire on Move: Yes
Rate of Fire (rd/min): 1,200

Caliber, Type, Name: 7.62-mm (7.62x 51) Machinegun MG3A1
Mount Type: Turret Cupola
Maximum Aimed Range(m): INA
Max Effective Range (m):
- Day: INA
- Night: INA

Fire on Move: Yes
Rate of Fire (rd/min): 1,200
ATGM Launcher: N/A

FIRE CONTROL
FCS Name: INA
Main Gun Stabilization: WNA-H22, 2-plane
Rangefinder: Laser neodymium
Infrared Searchlight: Yes
Sights w/Magnification:
Gunner:
- Day: Krupp-Atlas EMES-15, 12x / FERO Z18 secondary, 8x
  - Field of View (°): 5/10
  - Acquisition Range (m): INA
- Night: Zeiss thermal imager
  - Field of View (°): INA
  - Acquisition Range (m): INA

Commander Fire Main Gun: Yes

VARIANTS
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.

Pz87: Swiss variant with indigenous machineguns, communications and FCS, and improved NBC equipment.

Dutch Leopard 2: Uses indigenous equipment as noted above.

Leopard 2A5/Leopard 2 (Improved): Recent upgrade with spaced armor added to turret front, and increased armor on hull and side skirts. Other improvements include improved stabilization, suspension, navigation, fire control, and hatch design.

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.

German Main Battle Tank Leopard 2 continued

MAIN ARMAMENT AMMUNITION
Caliber, Type, Name:
120-mm APFSDS-T, DM43
Maximum Aimed Range(m): 3,500
Max Effective Range (m):
Day: INA
Night: INA
Armor Penetration (mm): 450 at 2,000 meters

120-mm APFSDS-T, US Olin GD120
Maximum Aimed Range(m): 3,500
Max Effective Range (m):
Day: 3,000
Night: INA
Armor Penetration (mm): 520 at 2,000 meters

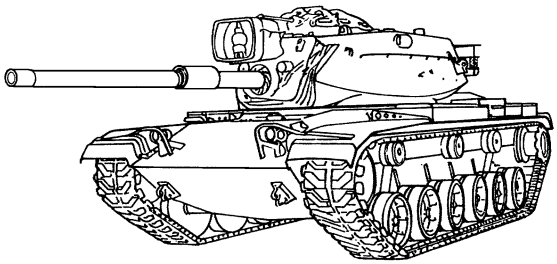
120-mm HEAT-MP-T, DM-12A1/US Olin M830
Maximum Aimed Range(m): INA
Max Effective Range (m):
Day: 2,500
Night: INA
Armor Penetration (mm): INA

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.

A new longer gun barrel (L55 gun barrel, 1.30 meters longer) is available. 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 to wait and upgrade to the DM53.

United States Main Battle Tank M60A1/M60A3



M60A1

Weapons & Ammunition Types	Typical Combat Load
105-mm rifled gun	**63**
APFSDS-T	
HEAT	
HE	
APERS-T/Canister	
.50 cal AA MG	**900**
7.62-mm coaxial MG	**5,950**

SYSTEM (M60A1 / M60A3, where their data differs)
Alternative Designations: INA
Date of Introduction: 1963/1979
Proliferation: At least 17 countries
Description:
Crew: 4
Combat Weight (mt): 52.5
Chassis Length Overall (m): 6.95
Height Overall (m): 3.27
Width Overall (m): 3.63
Ground Pressure (kg/cm^2): 0.87

Automotive Performance:
Engine Type: 750-hp Diesel
Cruising Range (km): 550
Speed (km/h):
Max Road: 48
Max Off-Road: 45
Average Cross-Country: 35
Max Swim: N/A
Fording Depths (m): 1.2, 2.4 Prepared, 4 with snorkel
Radio: AN/VRC-12, or compatible with army net radios

Protection:
Armor, Turret Front (mm): 325 KE RHA at 2,000 m/325 CE
Applique Armor (mm): Available, including modular armor
Explosive Reactive Armor (mm): BLAZER and others available
Active Protective System: N/A
Mineclearing Equipment: GDLS mine roller system available
Self-Entrenching Blade: INA
NBC Protection System: Yes
Smoke Equipment: Smoke grenade launchers (2 x 6) on M60A3
VEESS on later M60A3s

ARMAMENT
Main Armaments:
Caliber, Type, Name: 105-mm 51-cal rifled gun, M68
Rate of Fire (rd/min): 6-8
Loader Type: Manual
Ready/Stowed Rounds: 16/ 47
Elevation (°): -10 to +20
Fire on Move: No

Auxiliary Weapon:
Caliber, Type, Name: 7.62-mm (7.62x51) Machinegun, M73/M240
Mount Type: Turret coax
Max Aimed Range (m): 2,000 (est)
Max Effective Range (m):
Day: 1,800
Night: INA
Fire on Move: Yes
Rate of Fire (rd/min): 600-950

Caliber, Type, Name: .50 cal (12.7-mm) AA Machinegun, M85
Mount Type: Cupola
Max Aimed Range (m): 2,000
Max Effective Range (m):
Day: 2,000 (est)
Night: INA
Fire on Move: Yes
Rate of Fire (rd/min): 450-550 (est)

FIRE CONTROL
FCS Name: M32E1 day/night periscope / M35 or M36E1 sight
Main Gun Stabilization: Available / poor 2-plane
Rangefinder: M17C coincidence / AN/VVG-2 ruby laser
Infrared Searchlight: Number 2 IR and white light
Sights w/Magnification:
Gunner:
Day: M31, 8x / M35 or M36E1, 8x
Field of View (°): 7.5
Acquisition Range (m): 2,000 / 3,000
Night: None, IR, II available/ None, II, thermal (See NOTES)
Field of View (°): INA / See NOTES
Acquisition Range (m): INA
Commander Fire Main Gun: INA

VARIANTS
M60: Original tank was derived from M48, but with a 105-mm gun. Vehicles derived from the M60 include **M60 AVLB**, the **M9** bulldozer, and **M728** Combat Engineer Vehicle.

M60A1: Features a reshaped turret, added ammunition stowage, range-finder, improved fire control, and improved running gear.

M60A2: Unique and less successful tank version with a 152-mm gun and Shillelagh ATGM from the M-551/Sheridan.

M60A3: This version has better engine, fire control, thermal sights, ballistic computer, thermal sleeve, and improved stabilizer. A number of countries have upgraded M60A1s to comparability to the M60A3 standard. These include Israel, Austria, and Saudi Arabia.

MAGACH-7: Israeli variant with improved engine, track, fire control system, added stabilized sights, modular armor, armor track skirts, thermal sleeve, and with two 7.62-mm only cupola MGs.

MAIN ARMAMENT AMMUNITION
Caliber, Type, Name:
105-mm APFSDS, UI (New Chinese)
Max Aimed Range (m): 3,000
Max Effective Range (m):
Day: 2,000 / 3,000 (est)
Night: INA
Armor Penetration (mm): 460 at 2,000 m

United States Main Battle Tank M60A1/M60A3 continued _____

Caliber, Type, Name: 105-mm APFSDS, H6/62 (UK)
Max Aimed Range (m): 3,000
Max Effective Range (m):
Day: 2,000 / 3,000
Night: INA
Armor Penetration (mm): NATO single heavy target, 5,000 m

Caliber, Type, Name: 105-mm APFSDS, DM23 (GE)
Max Aimed Range (m): 3,000
Max Effective Range (m):
Day: 2,000 / 3,000
Night: INA
Armor Penetration (mm): 150, NATO single heavy target, 60° at 2,000 m

Caliber, Type, Name: 105-mm HEAT, M456 (multinational)
Max Aimed Range (m): 3,000
Max Effective Range (m):
Day: 1,500-2,000 / 1,500-2,500 (est.)
Night: INA
Armor Penetration (mm): 432, NATO single heavy target

Caliber, Type, Name: 105-mm HESH, L35 (UK)
Max Aimed Range (m): 3,000
Max Effective Range (m):
Day: 2,000 / 2,000-2,500 (est.)
Night: INA
Armor Penetration (mm): NATO single heavy target

Caliber, Type, Name: 105-mm HE, HE-OE (FR)
Max Aimed Range (m): 3,000
Max Effective Range (m):
Day: 2,000 / 2,500-3,000 (est.)
Night: INA
Armor Penetration (mm): INA

Caliber, Type, Name: 105-mm APERS-T, M494 (Flechette)
Max Aimed Range (m): 3,000
Max Effective Range (m):
Day: 2,000 / 3,000
Night: INA
Armor Penetration (mm): N/A

Other Ammunition Types: Chinese Type 83/ UK L64/ US M735 APFSDS, UK L52 APDS, multinational M393 HEP-T, L39 Smoke, French OBUS 105 F1 Illuminating, Australian TC800 Canister (balls)

NOTES
A variety of day and night sights (including thermal and stabilized), stabilization systems and ballistic computers are available for M60A1 and M60A3. The TTS thermal sight (5x and 10x, FOV 6x4 and 12x8°) was added to US M60A3, and has been widely fielded.

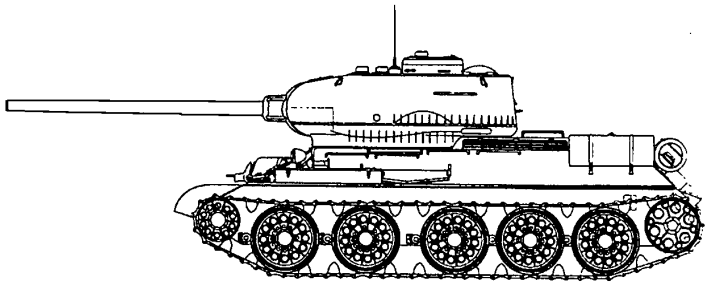
The Swiss 120-mm Compact Tank Gun is available.

Israeli IMI offers the APAM round with submunitions and a time fuze.

Israeli IAI now offers LAHAT gun-launched ATGM, with semi-active laser homing and tandem warhead; but it requires modified fire control.

Israeli IMI offers several upgrade packages, such as SABRA, for the SABRA MBT. This private venture includes extensive upgrades for mobility, lethality, and protection, including a 120-mm main gun.

Russian Main Battle Tank T-34/85



Weapons & Ammunition Types	Typical Combat load
85-mm rifled gun APC-T/HVAP-T HEAT-FS AP HE Frag-HE, HE	**55**
2 x 7.62-mm MG (7.62x54R)	**2,745**

SYSTEM
Alternative Designations: T-34-85 Model 1944
Date of Introduction: 1944
Proliferation: At least 20 countries with T-34 tanks and variants
Description:
Crew: 5
Combat Weight (mt): 32
Chassis Length Overall (m): 6.1
Height Overall (m): 2.7
Width Overall (m): 2.99
Ground Pressure (kg/cm^2): 0.88

Automotive Performance:
Engine Type: 500-hp Diesel
Cruising Range (km): 300, 500 with extra tanks
Speed (km/h):
Max Road: 56
Max Off-Road: 35
Average Cross-Country: INA
Max Swim: N/A
Fording Depths (m): 1.3, 5.5 with snorkel

Radio: R-113, R-123 in later versions

Protection:
Armor, Turret Front (mm): 75-85
Applique Armor (mm): No
Explosive Reactive Armor (mm): No
Mineclearing Equipment: Plow, roller, and dozer blade available
Self-Entrenching Blade: N/A
Active Protective System: No
NBC Protection System: No
Smoke Equipment: 2 x BDSh smoke charges

ARMAMENT
Main Armament: 85-mm rifled gun, D-5T or ZIS-S-53
Rate of Fire(rd/min): 3-4
Loader Type: Manual
Ready/Stowed Rounds: INA
Elevation (°) : -5 to + 25
Fire on Move: No

Auxiliary Weapon:
Caliber, Type, Name: 7.62-mm MG, SGMT (early upgrade)
Mount Type: Coaxial
Maximum Aimed Range (m): 2,000
Max Effective Range (m):
Day: 1,000/ 400-500 on the move
Night: N/A
Fire on Move: Yes
Rate of Fire (rd/min): 250 practical /650 cyclic, 2-10 rd bursts

Caliber, Type, Name: 7.62-mm MG, SGMB (early upgrade)
Mount Type: Bow
Maximum Aimed Range (m): 2,000
Max Effective Range (m):
Day: 1,000/ 400-500 on the move
Night: N/A
Fire on Move: Yes
Rate of Fire (rd/min): 250 practical/650 cyclic, 2-10 rd bursts

FIRE CONTROL
FCS Name: INA
Main Gun Stabilization: None
Rangefinder: Stadiametric
Infrared Searchlight: No
Sights w/Magnification:
Gunner:
Day: TSh-15 or TSh-16 articulated telescope, 4.5x
Field of View (°): 15
Acquisition Range (m): 1,500 direct fire, 5,200 indirect fire
Night: N/A
Field of View (°): N/A
Acquisition Range (m): N/A
Commander Fire Main Gun: No

VARIANTS:
T-34: The baseline tank, also referred to as **T-34/76**, has a 76-mm main gun. Many T-34s have been modified. Earlier versions use the 7.62-mm DTM MG, and later versions 7.62-mm SGMT or PKT MG. Some countries have replaced 7.62-mm AAMG with a 12.7-mm MG. Some Chinese variants have LRFs. Egyptian variants have rubber skirts and a VEESS system. Conversions include 122-mm SP guns, self-propelled AA guns, armored recovery vehicles, bridgelayers, bulldozers, and flamethrowers. Most are no longer in service.

OT-34-85: Flamethrower version is indistinguishable from the **T-34/85**, with a ZIS-S-53 gun and 60-70 m flame range.

Poland and Czechoslovakia also produced **T-34/85**.

MAIN ARMAMENT AMMUNITION
Caliber, Type, Name: 85-mm HVAP-T, BR-365PK
Max Aimed Range (m): 1,500
Max Effective Range (m):
Day: 1,150 (direct fire range)
Night: N/A
Armor Penetration (mm): 130 (0°) at 1,000 m, 167 (0°) at muzzle

Russian Main Battle Tank T-34/85 continued _____

Caliber, Type, Name: 85-mm APC-T, BR-367
Max Aimed Range (m): 1,500
Max Effective Range (m):
Day: 1,150 (est)
Night: N/A
Armor Penetration (mm): 120 (0°) at 1,000 m

Caliber, Type, Name: 85-mm HEAT-FS, BK-2M
Max Aimed Range (m): 1,500 (est)
Max Effective Range (m):
Day: 970 direct fire range
Night: N/A
Armor Penetration (mm): 100 at 65°, 300-400 at 0° all ranges

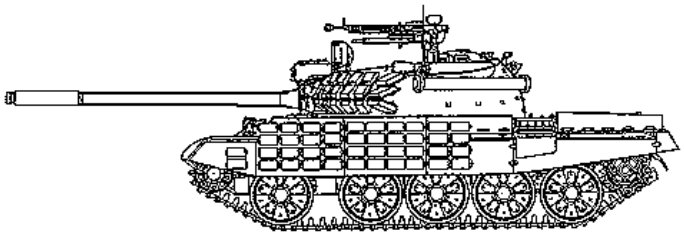
Caliber, Type, Name: 85-mm, AP HE,
Max Aimed Range (m): 1,500 (est)
Max Effective Range (m):
Day: 1,150 (est)
Night: N/A
Armor Penetration (mm): 102 (0°) at 1,000 m

Caliber, Type, Name: 85-mm Frag-HE, O-365K
Max Aimed Range (m): 5,200
Max Effective Range (m):
Day: INA
Night: N/A
Armor Penetration (mm): Can defeat most IFVs on impact

Other Ammunition Types: Chinese smoke, Russian HVAP-T BR-365P, Russian AP-T BR-365 and BR-365K, Russian Frag-HE O-365, North Korean APC-T Type 367

NOTES
Main gun is in the family which includes D-44 and SD-44 field guns, KS-12 AA Gun and ASU-85 assault gun. Ammunition options include the variety of ammunition avai lable for these guns.

Russian Main Battle Tank T-55AMV



Weapons & Ammunition Types	Typical Combat Load
100-mm rifled gun	(mix est) **43**
APFSDS-T	14
HEAT	3
Frag-HE	21
ATGM	5
7.62-mm coax PKT MG	**1,250**
12.7-mm AA MG	**500**

SYSTEM
Alternative Designations: INA
Date of Introduction: 1983
Proliferation: At least 3 countries
Description:
Crew: 4
Combat Weight (mt): 40.5
Chassis Length Overall (m): 6.20
Height Overall (m): 2.32
Width Overall (m): 3.60
Ground Pressure (kg/cm^2): 0.89

Automotive Performance:
Engine Type: 620-690 hp Diesel
Cruising Range (km): 390/600 with extra tanks
Speed (km/h):
- Max Road: 50
- Max Off-Road: 35
- Average Cross-Country: 25
- Max Swim: N/A

Fording Depths (m): 1.4 Unprepared, 5.5 with snorkel

Radio: R-173, R-173P, R-124 intercom

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 to KE/700-900 against HEAT; 2nd Gen raises to 450-480 KE/700-900 HEAT
Active Protective System: Russian Drozd APS available
Mineclearing Equipment: Roller-plow set, and plows available
Self-Entrenching Blade: No
NBC Protection System: Yes
Smoke Equipment: Smoke grenade launchers (4x 81-mm each side of turret), and 24 grenades. Vehicle engine exhaust smoke system

ARMAMENT
Main Armaments:
Caliber, Type, Name: 100-mm rifled gun, D-10T2S
Rate of Fire (rd/min): 5-7
Loader Type: Manual
Ready/Stowed Rounds: INA
Elevation (°): -5 to +18
Fire on Move: Yes (gun rounds only--ATGMs require a short halt)

Auxiliary Weapon:
Caliber, Type, Name: 7.62-mm (7.62x 54R) Machinegun PKT-T
Mount Type: Turret coax
Maximum Aimed Range (m): 2,000
Max Effective Range (m):
- Day: 800
- Night: 800

Fire on Move: Yes
Rate of Fire (rd/min): 250 rpm practical, 800 cyclic, 2-10 rd bursts

Caliber, Type, Name: 12.7-mm (12.7x108) AA MG DShKM
Mount Type: Turret top
Maximum Aimed Range (m): 2,000
Max Effective Range (m):
- Day: 1,500
- Night: N/A

Fire on Move: Yes
Rate of Fire (rd/min): 80-100 practical, 600 cyclic, 2-10 rd bursts

ATGM Launcher :
Name: D-10T2S gun
Launch Method: Gun-launched
Guidance: SACLOS, Infrared laser-beam rider
Command Link: Encoded laser-beam
Launcher Dismountable: No

FIRE CONTROL
FCS Name: Volna
Main Gun Stabilization: M1 Tsiklon 2-plane
Rangefinder: KDT-2 Laser
Infrared Searchlight: L-4
Sights w/Magnification:
Gunner:
- Day: TShSM-32PV, 3.5x and 7x
  - Field of View (°): 18 and 8
  - Acquisition Range (m): 4,000
- Night: 1K13
  - Field of View (°): INA
  - Acquisition Range (m): 800-1,300, gun rounds only

Commander Fire Main Gun: No

VARIANTS
More than a dozen countries have produced upgraded T-55 variants with similar capabilities in protection and lethality. Many countries have upgraded to a larger main gun.

T-55AMV is derived from a line of variants of T-55 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 bra armor, an armor band around the turret for 180° coverage. The -AMV upgrade means substitution of ERA for the bra armor. Variants ending with **-1** denote replacement of the engine w/V-46 engine from T-72 MBT.
The Ukraine and Syria will upgrade to the T-55AMV standard.

Russian Main Battle Tank T-55AMV continued

T-55AM2B: Czech version of T-55AMV with Kladivo fire control.
T-55AM2: Variant does not have ATGM capability or Volna FCS.
T-55AM2P: Polish version of T-55AMV but with Merida FCS.
T-55AMD: Variant with the Drozd APS instead of ERA.
T-55AD Drozd: Variant with Drozd but not Volna FCS and ERA.

MAIN ARMAMENT AMMUNITION
Caliber, Type, Name:

100-mm BM-8 Russian
- Maximum Aimed Range (m): 2,500
- Max Effective Range (m):
  - Day: 1,500
  - Night: 800-1,300
- Armor Penetration (mm): 200 at 1,000 meters

100-mm APFSDS-T, BM-25
- Maximum Aimed Range (m): 2,500
- Max Effective Range (m):
  - Day: INA
  - Night: 800-1,300
- Armor Penetration (mm): INA

100-mm APFSDS-T, BM-412M, Romanian
- Maximum Aimed Range (m): 2,500
- Max Effective Range (m):
  - Day: 2, 000+ (est)
  - Night: 800-1,300
- Armor Penetration (mm): 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): 380

100-mm Frag-HE, OF-32
- Maximum Aimed Range (m): 4,000
- Max Effective Range (m):
  - Day: <2,500
  - Night: 800-1,300
- Armor Penetration (mm): INA

Other Ammunition Types: 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 2,000 m.

Antitank Guided Missiles:

Name: AT-10/BASTION
- Warhead Type: Shaped charge (HEAT)
- Armor Penetration (mm): 650 (RHA)
- Range (m): 4,000 (day only, see NOTES)

Name: AT-10 Improved
- Warhead Type: Tandem shaped charge
- Armor Penetration (mm): 700 (RHA) behind ERA
- Range (m): 4,000 (day only, see NOTES)

NOTES

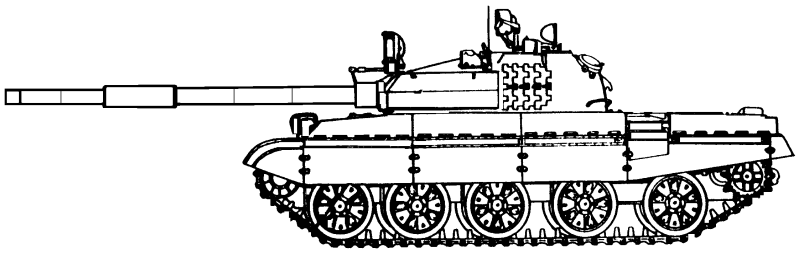
The 1K13 sight is both night sight and ATGM launcher sight; however, it cannot be used for both functions simultaneously.

T-55s with "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.

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 variety of thermal sights is available. They include the Russian/French ALIS and Namut-type sight from Peleng. There are thermal sights available for installation which permit night launch of ATGMs.

Russian Main Battle Tank T-62M



Weapons & Ammunition Types	Typical Combat Load
115-mm rifled gun	(mix est) **40**
APFSDS-T	12
HEAT	3
Frag-HE	20
ATGM	5
7.62-mm coax PKT MG	**2,500**

SYSTEM
Alternative Designations: INA
Date of Introduction: 1983
Proliferation: At least 1 country

Description:
Crew: 4
Combat Weight (mt): 41.5
Chassis Length Overall (m): 6.63
Height Overall (m): 2.4
Width Overall (m): 3.52
Ground Pressure (kg/cm^2): INA

Automotive Performance:
Engine Type: 620-hp Diesel
Cruising Range (km): 450/650 with extra tanks
Speed (km/h):
- Max Road: 45
- Max Off-Road: INA
- Average Cross-Country: INA
- Max Swim: N/A

Fording Depths (m): 1.4 Unprepared, 5.5 with snorkel

Radio: R-173, R-173P, R-124 intercom

Protection:
Armor, Turret Front (mm): 230
Applique Armor (mm): Bra armor (+100 on turret) and track skirts
Explosive Reactive Armor (mm): Available, replaces bra armor
Active Protective System: Russian Drozd APS will fit
Mineclearing Equipment: Roller-plow set, and plows
Self-Entrenching Blade: No
NBC Protection System: Nuclear radiation only
Smoke Equipment: Vehicle engine exhaust smoke system
2 x 4 Smoke grenade launchers

ARMAMENT
Main Armaments:
Caliber, Type, Name: 115-mm smoothbore gun, 2A20/Sheksna
Rate of Fire (rd/min): 3-5
Loader Type: Manual
Ready/Stowed Rounds: INA
Elevation (°): -5 to +18
Fire on Move: Yes (gun rounds only--ATGMs require a short halt)

Auxiliary Weapon:
Caliber, Type, Name: 7.62-mm (7.62x 54R) machinegun PKT
Mount Type: Turret coax
Maximum Aimed Range (m): 2,000
Max Effective Range (m):
- Day: 800
- Night: 800

Fire on Move: Yes
Rate of Fire (rd/min): 250 rpm practical, 800 cyclic, 2-10 rd bursts

ATGM Launcher:
Name: 2A20 gun
Launch Method: Gun-launched
Guidance: SACLOS, Infrared laser-beam rider
Command Link: Encoded laser-beam
Launcher Dismountable: No

FIRE CONTROL
FCS Name: Volna
Main Gun Stabilization: M1 Meteor 2-plane
Rangefinder: KTD-2 Laser
Infrared Searchlight: L-4
Sights w/Magnification:
Gunner:
- Day: TShSM-41U, 3.5x and 7x
  - Field of View (°): 18 and 8
  - Acquisition Range (m): 4,000
- Night: 1K13-1
  - Field of View (°): INA
  - Acquisition Range (m): 850-1,300, gun rounds only

Commander Fire Main Gun: No

VARIANTS
T-62M is one of a variety of T-62 variants. **T-62A:** added a 12.7-mm MG. **T-62M** adds protection, FCS and ATGM capability. T-62 variants with a V-46 T-72-type engine add **-1** to their designation.
T-62M1: Variant with Volna FCS but no missile launch capability.
T-62D: Variant with the Drozd APS vs ERA.
T-62MK: Command variant.
T-62MV: Version with ERA in place of the bra armor. The ERA includes Kontakt ERA and Kontakt-5 2nd-Generation ERA.

MAIN ARMAMENT AMMUNITION
Caliber, Type, Name:
115-mm APFSDS-T, BD/36-2
- Maximum Aimed Range (m): 3,000
- Max Effective Range (m):
  - Day: 2,000+ (est)
  - Night: 850-1,300
- Armor Penetration (mm): 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: 1,500
  - Night: 850-1,300
- Armor Penetration (mm): 237 (RHA) at 1,000 m

Russian Main Battle Tank T-62M

115-mm HEAT, BK-4 Maximum Aimed Range (m): 1,500 (est) Max Effective Range (m): Day: 1,200 Night: 850-1,200 Armor Penetration (mm): 495 (RHA) 115-mm Frag-HE-T, OF-27 Maximum Aimed Range (m): 4,000 Max Effective Range (m): Day: 1,500-2,000 Night: 850-1,300 Armor Penetration (mm): INA **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): 650 Range (m): 4,000 (day only, see NOTES) Name: AT-10 Improved Warhead Type: Tandem shaped charge Armor Penetration (mm): 700 behind ERA Range (m): 4,000 (day only, see NOTES)

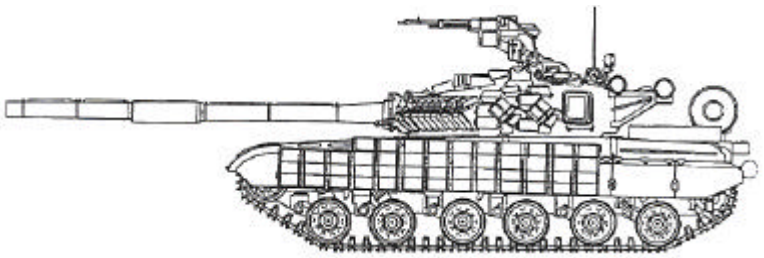
NOTES
The 1K13 sight is both night sight and ATGM launcher sight; however, it cannot be used for both functions simultaneously.

Other improvements available include a hull bottom reinforced against mines, rubber track pads, and a thermal sleeve for the gun.

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 permit night launch of ATGMs.

Russian Main Battle Tank T-64B



T-64BV

Weapons & Ammunition Types	Typical Combat Load
125-mm smoothbore gun	**37**
APFSDS-T	(mix est) 12
HEAT	2
Frag-HE	17
ATGM	6
7.62-mm coax MG	**1,250**
12.7-mm NSVT AA MG	**300**

SYSTEM
Alternative Designations: INA
Date of Introduction: 1979
Proliferation: At least 2 countries
Description:
Crew: 3
Combat Weight (mt): 40.3
Chassis Length Overall (m): 6.45
Height Overall (m): 2.17
Width Overall (m): 3.41
Ground Pressure (kg/cm^2): 0.86

Automotive Performance:
Engine Type: 720-hp Diesel
Cruising Range (km): 500 with extra tanks
Speed (km/h):
- Max Road: 60
- Max Off-Road: INA
- Average Cross-Country: INA
- Max Swim: N/A

Fording Depths (m): 1.8 Unprepared, 5.0 w/snorkel

Radio: R-123M, R-124 intercom

Protection:
Armor, Turret Front (mm): 450 KE RHA at 2,000 m/900 CE
Applique Armor (mm): N/A
Explosive Reactive Armor (mm): Standard on T-64BV
Active Protective System: Available
Mineclearing Equipment: Mine rollers and plows available
Self-Entrenching Blade: Yes
NBC Protection System: Yes
Smoke Equipment: Smoke grenade launchers (4x 81-mm each side of turret), and 24 grenades. Vehicle engine exhaust smoke system

ARMAMENT
Main Armament:
Caliber, Type, Name: 125-mm smoothbore gun 2A46-2
Rate of Fire (rd/min): 6-8 (lower in manual mode)
Loader Type: Separate-loading autoloader, ATGMs manual
Ready/Stowed Rounds: 24 in carousel, 6 ATGMs manual/7 stowed
Elevation (°): -6 to +18
Fire on Move: Yes (30 km/h rounds/low speed or stop ATGMs)

Auxiliary Weapon:
Caliber, Type, Name: 7.62-mm (7.62x 54R) Machinegun PKT
Mount Type: Turret coax
Maximum Aimed Range (m): 2,000
Max Effective Range (m):
- Day: 1,000
- Night: 850-1,300

Fire on Move: Yes
Rate of Fire (rd/min): 250 practical / 650 cyclic, 2-10 round bursts

Caliber, Type, Name: 12.7-mm (12.7x108) AA MG NSVT
Mount Type: Turret top
Maximum Aimed Range (m): 2,000
Max Effective Range (m):
- Day: 1,500 ground/1,600 for air targets (APDS)
- Night: 800-1,300

Fire on Move: Yes
Rate of Fire (rd/min): 210 practical/ 800 air targets in bursts

ATGM Launcher:
Name: 2A46-2 tank gun
Launch Method: Gun-launched
Guidance: SACLOS
Command Link: Encoded radio frequency
Launcher Dismountable: No

FIRE CONTROL
FCS Name: INA
Main Gun Stabilization: 2E26M 2-plane
Rangefinder: Laser
Infrared Searchlight: Yes
Sights w/Magnification:
Gunner:
- Day: 1G42
  - Field of View (°): INA
  - Acquisition Range (m): 5,000
- Night: TPN-1-49-23
  - Field of View (°): INA
  - Acquisition Range (m): 800-1,300 (est)

Commander Fire Main Gun: No

VARIANTS
T-64A: Production version of base tank. That tank has a history of reliability problems. It also lacks the high armor protection, track skirts, a FCS and ATGM launch capability of 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 noted in the above line drawing has Kontakt ERA mounted. This variant is more likely for encounter by US forces.

Russian Main Battle Tank T-64B continued _____

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: 2,000-3,000
Night: 850-1,300
Armor Penetration (mm): 590-630 at 2,000 meters

125-mm Frag-HE-T, OF-26
Maximum Aimed Range (m): 5,000
Max Effective Range (m):
Day: INA
Night: 850-1,300
Armor Penetration (mm): INA

125-mm HEAT-MP, BK-29M
Maximum Aimed Range (m): 4,000
Max Effective Range (m):
Day: 2,000-3,000
Night: 850-1300
Armor Penetration (mm): 650-750

125-mm HEAT, BK-27
Maximum Aimed Range (m): 4,000
Max Effective Range (m):
Day: 2,000-3,000
Night: 850-1,300
Armor Penetration (mm): 700-800

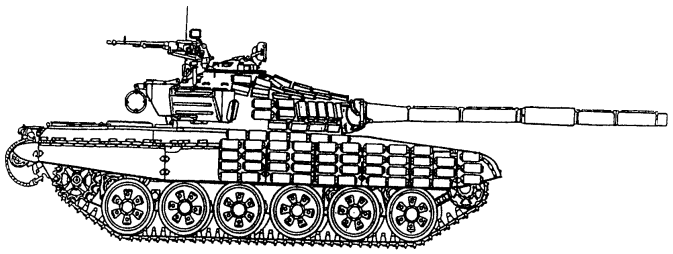
Other Ammunition Types: Giat 125G1 APFSDS-T, Russian BM-42 and BM-32 APFSDS-T. Note: The Russians may have a version of the BM-42M with a DU penetrator.

Antitank Guided Missile:
Name: AT-8/SONGSTER
Warhead Type: Shaped charge (HEAT)
Armor Penetration (mm): 700 (RHA) conventional
Range (m): 4,000

NOTES
The night sight cannot be used to launch the ATGM. The daysight can be used at night for launching ATGMs if the target is illuminated. A variety of thermal sights is 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 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 vs four, more antitank rounds would available for the higher rate of fire.

Russian Main Battle Tank T-72B



T-72B w/Kontakt ERA

Weapons & Ammunition Types	Typical Combat Load
125-mm smoothbore gun	**45**
APFSDS-T	(mix est) 15
HEAT	3
Frag-HE	21
ATGM	6
7.62-mm coax MG	**2,000**
12.7-mm AA MG	**300**

SYSTEM
Alternative Designations: T-72S (export), SMT M1988
Date of Introduction: 1985
Proliferation: At least 2 countries
Description:
Crew: 3
Combat Weight (mt): 44.5
Chassis Length Overall (m): 6.91
Height Overall (m): 2.19
Width Overall (m): 3.58
Ground Pressure (kg/cm^2): 0.90

Automotive Performance:
Engine Type: 840-hp Diesel
Cruising Range (km): 500/ 900 with external tanks
Speed (km/h):
- Max Road: 60
- Max Off-Road: 45
- Average Cross-Country: 35
- Max Swim: N/A

Fording Depths (m): 1.2 Unprepared/5.0 with snorkel
Radio: R-173 and R-134

Protection:
Armor, Turret Front (mm): 520/950 against HEAT
Applique Armor (mm): Side of hull over track skirt, turret top
Explosive Reactive Armor (mm): Kontakt or Kontakt-5 ERA
Active Protective System: Arena available
Mineclearing Equipment: Roller-plow set, and plows available
Self-Entrenching Blade: Yes
NBC Protection System: Yes
Smoke Equipment: Smoke grenade launchers (8x 81-mm left side of turret), and 32 grenades. Vehicle engine exhaust smoke system.

ARMAMENT
Main Armament:
Caliber, Type, Name: 125-mm smoothbore gun 2A46M/ D-81TM
Rate of Fire (rd/min): 4-6/2 in manual mode
Loader Type: Autoloader (separate loading) and manual
Ready/Stowed Rounds: 22/23
Elevation (°): -6 to +14
Fire on Move: Yes, up to 25 km/h. Depending on the road and distance to the target, most crews may halt before firing.

Auxiliary Weapon:
Caliber, Type, Name: 7.62-mm (7.62x 54R) Machinegun PKT
Mount Type: Turret coax
Maximum Aimed Range (m): 2,000
Max Effective Range (m):
- Day: 1,000
- Night: 800

Fire on Move: Yes
Rate of Fire (rd/min): 250 practical, 600 cyclic in 2-10 round bursts

Caliber, Type, Name: 12.7-mm (12.7x108) AA MG NSVT
Mount Type: Turret top
Maximum Aimed Range (m): 2,000
Max Effective Range (m):
- Day: 1,500/1,000 antiaircraft
- Night: N/A

Fire on Move: Yes
Rate of Fire (rd/min): 200 practical, 600 cyclic in bursts

ATGM Launcher:
Name: 2A46M
Launch Method: Gun-launched
Guidance: SACLOS, Laser beam rider
Command Link: Encoded infrared laser beam
Launcher Dismountable: No

FIRE CONTROL
FCS Name: 1A40-1
Main Gun Stabilization: 2E42-2, 2-plane
Rangefinder: TPD-K1M laser rangefinder
Infrared Searchlight: Yes
Sights w/Magnification:
Gunner:
- Day: TPD-K1, 8
  - Field of View (°): 9
  - Acquisition Range (m): 3,000 with LRF, 5,000 without
- ATGM/Night: 1K13-495 5.6x (8x ATGM)
  - Field of View (°): 6, 40 min (5 ATGM)
  - Acquisition Range (m): INA

Commander Fire Main Gun: No

VARIANTS
T-72BK: Commander's variant with additional radios

T-72BM: Version with Kontakt-5 explosive reactive armor. This system is being fielded and is available for export.

T-72S/Shilden: Russian export T-72A upgraded to be comparable to the T-72BM standard. Although similar to the T-72BM, it may have less turret front protection. The early T-72S tank has Kontakt ERA, as shown above.

T-90: Successor to T-72BM. This tank has been tentatively approved for production and adoption as a standard tank, alongside the T-80U, for the Russian army. The T-90 uses the gun and 1G46 gunner sights from T-80U, a new engine, and thermal sights. Protective measures include Kontakt-5 ERA, laser warning receivers, and the SHTORA infrared ATGM jamming system.

Russian Main Battle Tank T-72B continued

MAIN ARMAMENT AMMUNITION
Caliber, Type, Name:
125-mm APFSDS-T, BM-42M
Maximum Aimed Range (m): 3,000
Max Effective Range (m):
Day: 2,000-3,000
Night: 850-1,300
Armor Penetration (mm): 590-630 at 2,000 meters

125-mm Frag-HE-T, OF-26
Maximum Aimed Range (m): 5,000
Max Effective Range (m):
Day: INA
Night: 850-1,300
Armor Penetration (mm): INA

125-mm HEAT-MP, BK-29M
Maximum Aimed Range (m): 3,000
Max Effective Range (m):
Day: INA
Night: 850-1300
Armor Penetration (mm): 650-750

125-mm HEAT, BK-27
Maximum Aimed Range (m): 3,000
Max Effective Range (m):
Day: INA
Night: 850-1,300
Armor Penetration (mm): 700-800

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:
Name: AT-11/SVIR
Warhead Type: Shaped charge (HEAT)
Armor Penetration (mm): 700 behind ERA/800 conventional
Range (m): 4,000

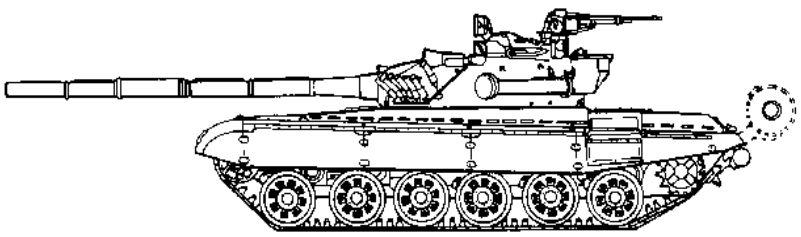
Name: AT-11B/INVAR
Warhead Type: Tandem Shaped charge (HEAT)
Armor Penetration (mm): 800 behind ERA /870 conventional
Range (m): 4,000

NOTES
The T-72B is the second main variant from the original Russian T-72 tank (after T-72A).

The 1K13-49 sight is both night sight and ATGM launch sight. However, it cannot be used for both functions simultaneously. A variety of thermal sights is available. They include the Russian Agava-2, French SAGEM-produced ALIS and Namut sight from Peleng. Thermal gunner night sights are available which permit 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 vs four, more antitank rounds would available for the higher rate of fire.

Polish/Czechoslovakian Main Battle Tank T-72M1



Weapons & Ammunition Types	Typical Combat Load
125-mm smoothbore gun	**44**
APFSDS-T	(mix est) 15
HEAT	7
Frag-HE	22
7.62-mm coax MG	**2,000**
12.7-mm AA MG	**300**

SYSTEM
Alternative Designations: Russian T-72A
Date of Introduction: 1975
Proliferation: At least 7 countries

Description:
Crew: 3
Combat Weight (mt): 41.5 (without ERA)
Chassis Length Overall (m): 6.91
Height Overall (m): 2.19
Width Overall (m): 3.59
Ground Pressure (kg/cm^2): 0.90

Automotive Performance:
Engine Type: 780-hp Diesel
Cruising Range (km): 460/700 with extra tanks
Speed (km/h):
- Max Road: 60
- Max Off-Road: 45
- Average Cross-Country: 35
- Max Swim: N/A

Fording Depths (m): 1.2 Unprepared/5.0 with snorkel

Radio: R-173M

Protection:
Armor, Turret Front (mm): 500/560 against HEAT
Applique Armor (mm): Side of hull over track skirt, turret top
Explosive Reactive Armor (mm): 1st or 2nd Gen ERA available
Active Protective System: Arena or Drozd available
Mineclearing Equipment: Roller-plow set, and plows available
Self-Entrenching Blade: Yes
NBC Protection System: Yes
Smoke Equipment: Smoke grenade launchers (6x 81-mm each side of turret), and 24 grenades. Vehicle engine exhaust smoke system.

ARMAMENT
Main Armaments:
Caliber, Type, Name: 125-mm smoothbore gun 2A46M/ D-81TM
Rate of Fire (rd/min): 4-6/2 in manual mode
Loader Type: Autoloader (separate loading) and manual
Ready/Stowed Rounds: 22/22 (22 in carousel)
Elevation (°): -6 to +14
Fire on Move: Yes, up to 25 km/h. Depending on the road and distance to the target, most crews may halt before firing.

Auxiliary Weapon:
Caliber, Type, Name: 7.62-mm (7.62x 54R) Machinegun PKT
Mount Type: Turret coax
Maximum Aimed Range (m): 1,800
Max Effective Range (m):
- Day: 1,000
- Night: 800

Fire on Move: Yes
Rate of Fire (rd/min): 250 practical, 600 cyclic in 2-10 round bursts

Caliber, Type, Name: 12.7-mm (12.7x108) AA MG NSVT
Mount Type: Turret top
Maximum Aimed Range (m): 2,000
Max Effective Range (m):
- Day: 1,500, 1,000 AA
- Night: N/A

Fire on Move: Yes
Rate of Fire (rd/min): 200 practical, 600 cyclic in bursts

ATGM Launcher: N/A

FIRE CONTROL
FCS Name: INA
Main Gun Stabilization: 2E28M, 2-plane
Rangefinder: TPD-K1 laser rangefinder
Infrared Searchlight: Yes
Sights w/Magnification:
Gunner:
- Day: TPD-K1 laser rangefinder sight, 8 x
  - Field of View (°): 9
  - Acquisition Range (m): 3,000 with LRF, 5000 without
- Night: TPN-1-49, 5.5 x
  - Field of View (°): 6
  - Acquisition Range (m): 800

Commander Fire Main Gun: No

VARIANTS
T-72: Original Russian tank from which T-72 variants were derived.

T-72M: Original Polish and former-Czechoslovakian T-72-series tank from which Polish/Czechoslovakian T-72M1 was derived. T-72M differs from T-72 in replacing the right-side coincident rangefinder with a centerline-mounted TPDK-1 LRF.

T-72A: The Russian variant differs from T-72 with the TPDK-1 LRF, added sideskirts, additional armor on the turret front and top, smoke grenade launchers, internal changes, and a slight weight increase. The Russian export version and Polish/Czechoslovakian counterparts are called **T-72M1**. Versions with Kontact ERA are known as **T-72AV /T-72 M1V**. Please note that some countries have inventories of T-72, T-72M and T-72M1, with different versions of each variant. Also, many variants were upgraded or modified. Some T-72M1s do not have smoke grenade launchers or track skirts. Some T-72s/T-72Ms have smoke grenade launchers. More reliable discriminators are armor and rangefinder/FCS.

Polish/Czechoslovakian Main Battle Tank T-72M1 continued

T-72AK/7T-2M1K: Commander's variant with additional radios

T-72AM/Banan: Ukrainian T-72A upgrade with ERA, a new engine, and additional smoke grenade launchers. The **T-72AG** upgrade has a 1200-hp engine, Shtora-1 ATGM jammer, and 1G46 (T-80U) FCS with thermal night sights.

T-72M1M: T-72M1 variant upgraded to T-72B standard.

T-72M2/Moderna. Slovakian T-72M upgrade with new engine and fire control, SFIM thermal sight, laser warning receiver, ERA, and 2 x 20-mm AA guns on turret

T-72M4CZ: Czech variant with TURMS FCS with thermal sight, new engine, increased protection ERA, and 48t weight. **T72M3CZ** ia a less radical upgrade-- for instance existing engine is modified.

T-72MP: Ukrainian upgrade with a 1,000-hp engine, added armor, Shtora-1, and SAGEM FCS and thermal sights.

T-72S/Shilden: Russian export T-72A upgraded to T-72B standard.

M-84: Former Yugoslavian tank upgraded to T-72M1 standard, but with indigenous sights. With an upgraded engine, the tank is **M-84A**. A Croatian improved version of M-84 is **M84A4/Sniper**, with improved fire control and thermal night sights. A Slovenian upgrade uses the state-of-the-art and the well-marketed EFCS-3 FCS.

PT-91/Twardy: Polish upgrade tank with ERA, laser warning receiver, smoke grenade launchers, and Tiger fire control system. Sights include a thermal gunner night sight.

MAIN ARMAMENT AMMUNITION
Caliber, Type, Name:

125-mm APFSDS-T, BM-42M
- Maximum Aimed Range (m): 3,000
- Max Effective Range (m):
  - Day: 2,000-3,000
  - Night: 850-1,300
- Armor Penetration (mm): 590-630 at 2,000 meters

125-mm Frag-HE-T, OF-26
- Maximum Aimed Range (m): 5,000
- Max Effective Range (m):
  - Day: INA
  - Night: 850-1,300
- Armor Penetration (mm): INA

125-mm HEAT-MP, BK-29M
- Maximum Aimed Range (m): 3,000
- Max Effective Range (m):
  - Day: INA
  - Night: 850-1300
- Armor Penetration (mm): 650-750

125-mm HEAT, BK-27
- Maximum Aimed Range (m): 3,000
- Max Effective Range (m):
  - Day: INA
  - Night: 850-1,300
- Armor Penetration (mm): 700-800

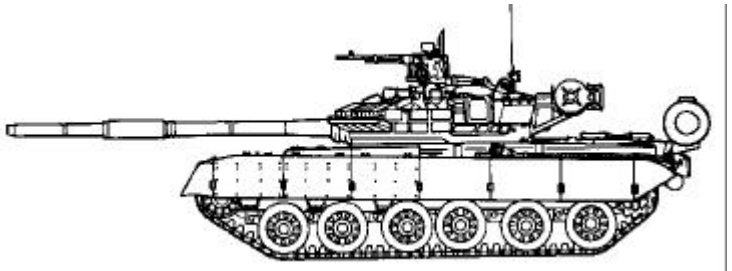
Other Ammunition Types: Giat 125G1 APFSDS-T, Russian BM-42 and BM-32 APFSDS-T. Note: The Russians may have a version of the BM-42M with a DU penetrator.

NOTES

A variety of thermal sights is available. They include the Russian Agava-2, French SAGEM-produced ALIS and Namut sight from Peleng.

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 vs four, more antitank rounds would available for the higher rate of fire.

Russian Main Battle Tank T-80B



Weapons & Ammunition Types	Typical Combat Load
125-mm smoothbore gun	**45**
APFSDS-T	(mix est) 15
HEAT	3
Frag-HE	21
ATGM	6
7.62-mm coax MG	**1,250**
12.7-mm NSVT AA MG	**500**

SYSTEM
Alternative Designations: See NOTES
Date of Introduction: 1978
Proliferation: At least 1 country
Description:
Crew: 3
Combat Weight (mt): 44.5
Chassis Length Overall (m): 6.98
Height Overall (m): 2.22
Width Overall (m): 3.58
Ground Pressure (kg/cm^2): 0.87

Automotive Performance:
Engine Type: 1,000-hp or 1,100-hpGas turbine (multifuel),
Cruising Range (km): 370/ 500 with extra tanks
Speed (km/h):
- Max Road: 70
- Max Off-Road: 48
- Average Cross-Country: 40
- Max Swim: N/A

Fording Depths (m): 1.8 Unprepared, 5.0 w/snorkel, 12.0 with BROD-M system

Radio: R-173, R-174 intercom

Protection:
Armor, Turret Front (mm): Defeat 120-mm rounds (triple layer)
Applique Armor (mm): N/A
Explosive Reactive Armor (mm): 1st Generation ERA available
Active Protective System: Available
Mineclearing Equipment: Mine rollers and plows available
Self-Entrenching Blade: Yes
NBC Protection System: Yes
Smoke Equipment: Smoke grenade launchers (4x 81-mm each side of turret), and 24 grenades. Vehicle engine exhaust smoke system

ARMAMENT
Main Armaments:
Caliber, Type, Name: 125-mm smoothbore gun 2A46-2
Rate of Fire (rd/min): 6-8 (lower in manual mode)
Loader Type: KORZINA separate-loading autoloader and manual
Ready/Stowed Rounds: 28 in carousel/17 rounds stowed but readily available for manual loading
Elevation (°): -7 to +20
Fire on Move: Yes (30 km/h gun rounds/low speed or stop ATGMs)

Auxiliary Weapon:
Caliber, Type, Name: 7.62-mm (7.62x 54R) Machinegun PKT
Mount Type: Turret coax
Maximum Aimed Range (m): 2,000
Max Effective Range (m):
- Day: 1,000
- Night: 850-1,300

Fire on Move: Yes
Rate of Fire (rd/min): 250 practical / 650 cyclic, 2-10 round bursts

Caliber, Type, Name: 12.7-mm (12.7x108) AA MG NSVT
Mount Type: Turret top
Maximum Aimed Range (m): 2,000
Max Effective Range (m):
- Day: 1,500 ground/1,600 for air targets (APDS)
- Night: 800-1,300

Fire on Move: Yes
Rate of Fire (rd/min): 210 practical/ 800 air targets in bursts

ATGM Launcher:
Name: 2A46-2 tank gun
Launch Method: Gun-launched
Guidance: SACLOS
Command Link: Encoded radio frequency
Launcher Dismountable: No

FIRE CONTROL
FCS Name: FCS 1A33
Main Gun Stabilization: 2E26M 2-plane
Rangefinder: Laser
Infrared Searchlight: Yes
Sights w/Magnification:
Gunner:
- Day: 1G42
  - Field of View (°): INA
  - Acquisition Range (m): 5,000
- Night: 1-4A
  - Field of View (°): INA
  - Acquisition Range (m): 800-1,300 (est)

Commander Fire Main Gun: No

VARIANTS
T-80BV: Variant noted in the above line drawing has ERA mounted. This variant is more likely for encounter by US forces.

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: 2,000-3,000
  - Night: 850-1,300
- Armor Penetration (mm): 590-630 at 2,000 meters

Russian Main Battle Tank T-80B continued

125-mm Frag-HE-T, OF-26
- Maximum Aimed Range (m): 5,000
- Max Effective Range (m):
  - Day: INA
  - Night: 850-1,300
- Armor Penetration (mm): INA

125-mm HEAT-MP, BK-29M
- Maximum Aimed Range (m): 4,000
- Max Effective Range (m):
  - Day: 2,000-3,000
  - Night: 850-1300
- Armor Penetration (mm): 650-750

125-mm HEAT, BK-27
- Maximum Aimed Range (m): 4,000
- Max Effective Range (m):
  - Day: 2,000-3,000
  - Night: 850-1,300
- Armor Penetration (mm): 700-800

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 Missile:
Name: AT-8/SONGSTER
Warhead Type: Shaped charge (HEAT)
Armor Penetration (mm): 700 (RHA) conventional
Range (m): 4,000

NOTES
The T-80B and -BV variants are often misidentified as T-80. They are visibly different and bear other distinctions, such as T-80B/-BV capability for launching AT-8/ Songster ATGM.

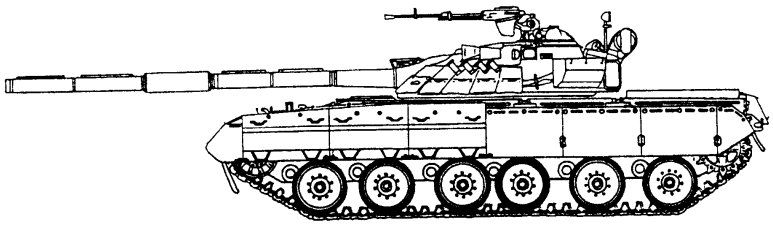
The night sight cannot be used to launch the ATGM. The daysight can be used at night for launching ATGMs if the target is illuminated.
A variety of thermal sights is available. They include the Russian Agava-2, French SAGEM-produced ALIS and Namut sight from Peleng. There are thermal sights available 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 vs 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.

Russian Main Battle Tank T-80U



Weapons & Ammunition Types	Typical Combat Load
125-mm smoothbore gun	**45**
APFSDS-T	(mix est) 15
HEAT	3
Frag-HE	21
ATGM	6
7.62-mm coax MG	**1,250**
12.7-mm NSVT AA MG	**500**

SYSTEM
Alternative Designations: SMT (Soviet Medium Tank) M1989
Date of Introduction: 1987
Proliferation: At least 3 countries
Description:
Crew: 3
Combat Weight (mt): 46.0
Chassis Length Overall (m): 7.01
Height Overall (m): 2.20
Width Overall (m): 3.60
Ground Pressure (kg/cm^2): 0.92

Automotive Performance:
Engine Type: 1250-hp Gas turbine (multi-fuel), diesel on T-80UD
Cruising Range (km): 335 km/600 km with extra tanks
Speed (km/h):
- Max Road: 70
- Max Off-Road: 48
- Average Cross-Country: 40
- Max Swim: N/A

Fording Depths (m): 1.8 Unprepared, 5.0 w/snorkel, 12.0 with BROD-M system

Radio: R-173, R-174 intercom

Protection:
Armor, Turret Front (mm): Against 120-mm ammunition
Applique Armor (mm): Side of hull , over track skirt
Explosive Reactive Armor (mm): Kontakt-5 2nd Generation ERA
Active Protective System: ARENA is available
Mineclearing Equipment: Roller-plow set and plows available
Self-Entrenching Blade: Yes
NBC Protection System: Yes
Smoke Equipment: Smoke grenade launchers (4x 81-mm each side of turret), and 24 grenades. Vehicle engine exhaust smoke system.

ARMAMENT
Main Armaments:
Caliber, Type, Name: 125-mm smoothbore gun 2A46M-1
Rate of Fire (rd/min): 7-8 (lower in manual mode)
Loader Type: KORZINA separate-loading autoloader, and manual
Ready/Stowed Rounds: 28 in carousel/17 stowed (manual loaded)
Elevation (°): -4 to +18
Fire on Move: Yes (gun rounds and ATGMs)

Auxiliary Weapon:
Caliber, Type, Name: 7.62-mm (7.62x 54R) Machinegun PKT
Mount Type: Turret coaxial
Maximum Aimed Range (m): 2,000
Max Effective Range (m):
- Day: 800
- Night: 800

Fire on Move: Yes
Rate of Fire (rd/min): 250 practical / 650 cyclic, 2-10 round bursts

Caliber, Type, Name: 12.7-mm (12.7x108) AA MG NSVT
Mount Type: Turret top
Maximum Aimed Range (m): 2,000
Max Effective Range (m):
- Day: 1,500
- Night: 800-1,300

Fire on Move: Yes
Rate of Fire (rd/min): 210 practical/ 800 air targets in bursts

ATGM Launcher:
Name: 2A46M-1 tank gun
Launch Method: Gun-launched
Guidance: SACLOS, Laser-beam rider
Command Link: Encoded infrared laser-beam
Launcher Dismountable: No

FIRE CONTROL
FCS Name: FCS 1A42
Main Gun Stabilization: 2342, 2-plane
Rangefinder: Laser
Infrared Searchlight: Yes
Sights w/Magnification:
Gunner:
- Day: 1G46/PERFECT, 3.6/12x
  - Field of View (°): INA
  - Acquisition Range (m): 5,000 (70%P-hit for ATGM)
- Night: AGAVA-2
  - Field of View (°): INA
  - Acquisition Range (m): 2,600 (gun rounds only)

Commander Fire Main Gun: Yes

VARIANTS
T-80UD: Version produced in the Ukraine with a 1000-hp diesel engine instead of the turbine engine, and 1st generation ERA.

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 2,600-meter night acquisition range.

T-84: Recent Ukrainian upgrade of T-80UD with a welded turret, a French ALIS thermal sight, a more powerful engine, optional use of ARENA active protection system (APS) and SHTORA-1 active IR ATGM jammer system. Prototypes have been demonstrated, and the tank is available for export.

Russian Main Battle Tank T-80U continued

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: 2,000-3,000
  - Night: 800-1,300
- Armor Penetration (mm): 590-630 at 2,000 meters

125-mm HE-Shapnel Focused-fragmentation, Ainet
- Maximum Aimed Range (m): 5,000
- Max Effective Range (m):
  - Day: 4,000
  - Night: 800-1,300
- Tactical AA Range: 4,000-5,000
- Armor Penetration (mm): INA

125-mm Frag-HE-T, OF-26
- Maximum Aimed Range (m): 5,000
- Max Effective Range (m):
  - Day: INA
  - Night: 800-1,300
- Armor Penetration (mm): INA

125-mm HEAT-MP, BK-29M
- Maximum Aimed Range (m): 4,000
- Max Effective Range (m):
  - Day: INA
  - Night: 800-1300
- Armor Penetration (mm): 650-750

125-mm HEAT, BK-27
- Maximum Aimed Range (m): 4,000
- Max Effective Range (m):
  - Day: INA
  - Night: 800-1,300
- Armor Penetration (mm): 700-800

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:
Name: AT-11/SVIR
Warhead Type: Shaped charge (HEAT)
Armor Penetration (mm): 700 (RHA) behind ERA/800 conventional
Range (m): 5,000

Name: AT-11B/INVAR
Warhead Type: Tandem shaped charge
Armor Penetration (mm): 800 (RHA) behind ERA /870 conventional
Range (m): 5,000

NOTES
Line drawing is a T-80UD.

GTA-18A Auxiliary Power Unit is used when the engine is off.

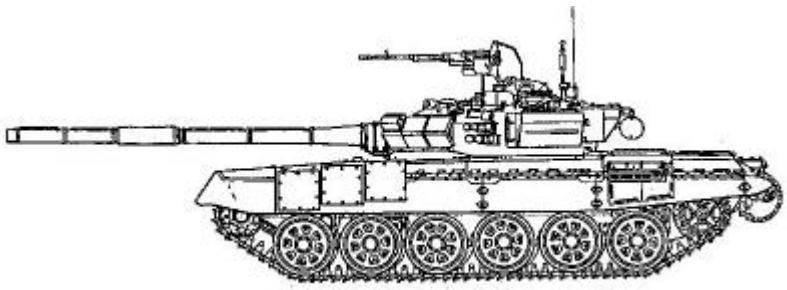
The BK-29 round, with a hard penetrator in the nose is designed for use against reactive armor, and as an MP round has fragmentation effects. The more recent BK-27 HEAT round offers a triple-shaped charge warhead and 50 mm more penetration.

The electronic round fuzing system for Ainet rounds is available for other tanks. This round uses technology similar to that for French Oerlikon's AHEAD rouns. The round is specially designed to defeat targets by firing fragmentation patterns forward and radially, based on computer calculated settings from the laser range-finder and other inputs. Targets are helicopters and dug in or defilade priority ground threats, such as ATGM positions. Rate of fire is 4 rd/min.

The 12.7-mm MG NSVT has both remote electronically operated sight PZU-5 and gun-mounted K10-T reflex sight.

The original night sight is the II Buran-PA (800-1300 meters range). The sight cannot be used to launch the ATGM. The daysight can be used at night for launching ATGMs if the target is illuminated. A variety of thermal sights is 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.

Russian Main Battle Tank T-90_____ _____



Weapons & Ammunition Types	Typical Combat Load
125-mm smoothbore gun	**43**
APFSDS-T	(mix est) 14
HEAT-MP/HEAT	3
HE-Shrapnel/Frag-HE	20
ATGM	6
7.62-mm coax MG	**2,000**
12.7-mm NSVT AA MG	**300**

SYSTEM
Alternative Designations: T-90S, T-90E
Date of Introduction: 1994
Proliferation: At least 1 country
Description:
Crew: 3
Combat Weight (mt): 46.5
Chassis Length Overall (m): 6.86
Height Overall (m): 2.23
Width Overall (m): 3.37
Ground Pressure (kg/cm^2): 0.87

Automotive Performance:
Engine Type: 1,000-hp Diesel (See NOTES)
Cruising Range (km): 500 km/650 km with extra tanks
Speed (km/h):
- Max Road: 60
- Max Off-Road: INA
- Average Cross-Country: INA
- Max Swim: N/A

Fording Depths (m): 1.2 Unprepared, 5.0 w/snorkel

Radio: R-163-504 UHF, R-163-UP receiver/R-173 for T-90S

Protection:
Armor, Turret Front (mm): 780-810 KE, 1,020-1,220 CE
Applique Armor (mm): Turret roof, front of track skirt
Explosive Reactive Armor (mm): Kontakt-5 2nd Generation ERA
Active Protective System: TshU-1-7/Shtora-1 countermeasure suite
Mineclearing Equipment: Roller-plow set and plows available
Self-Entrenching Blade: Yes
NBC Protection System: Yes
Smoke Equipment: 12 x 3D17 smoke grenade launchers, VEESS

ARMAMENT
Main Armaments:
Caliber, Type, Name: 125-mm smoothbore gun 2A46M-1 or -4
Rate of Fire (rd/min): 7-8 (lower in manual mode)
Loader Type: Separate-loading autoloader, and manual
Ready/Stowed Rounds: 22 in carousel, 15 more at hand /6 (est)
Elevation (°): INA
Fire on Move: Yes (gun rounds and ATGMs)

Auxiliary Weapon:
Caliber, Type, Name: 7.62-mm (7.62x 54R) Machinegun PKT
Mount Type: Turret coaxial
Maximum Aimed Range (m): 2,000
Max Effective Range (m):
- Day: 800
- Night: 800

Fire on Move: Yes
Rate of Fire (rd/min): 250 practical / 650 cyclic, 2-10 round bursts

Caliber, Type, Name: 12.7-mm (12.7x108) AA MG NSVT
Mount Type: Turret top
Maximum Aimed Range (m): 2,000
Max Effective Range (m):
- Day: 1,500
- Night: 800-1,300

Fire on Move: Yes
Rate of Fire (rd/min): 210 practical/ 800 air targets in bursts

ATGM Launcher:
Name: 2A46M-1 tank gun
Launch Method: Gun-launched
Guidance: SACLOS laser-beam rider, REFLEKS missile launcher
Command Link: Encoded infrared laser beam
Launcher Dismountable: No

FIRE CONTROL
FCS Name: FCS 1A45T
Main Gun Stabilization: 2E42-4, 2-plane
Rangefinder: Laser sight
Infrared Searchlight: Yes, when II sight employed (See NOTES)
Sights w/Magnification:
Gunner:
- Day: 1A43 and 1G46/PERFECT, 3.6/12x
  - Field of View (°): 20/2.5
  - Acquisition Range (m): 5,000 detection (70%P-hit for ATGM)
- Night: AGAVA-2 (See NOTES)
  - Field of View (°): INA
  - Acquisition Range (m): 2,600 (See NOTES)

Commander Fire Main Gun: Yes

VARIANTS
T-90E: INA
T-90S: Export variant
T-90SK: Export command variant

Russian Main Battle Tank T-90 continued

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: 2,000-3,000
Night: 2,000-2,600
Armor Penetration (mm): 590-630 at 2,000 meters

125-mm HE-Shapnel Focused-Fragmentation, Ainet
Maximum Aimed Range (m): 5,000
Max Effective Range (m):
Day: 4,000
Night: 2,600
Tactical AA Range: 4,000-5,000
Armor Penetration (mm): INA

125-mm Frag-HE-T, OF-26
Maximum Aimed Range (m): 5,000
Max Effective Range (m):
Day: INA
Night: 2,600
Armor Penetration (mm): INA

125-mm HEAT-MP, BK-29M
Maximum Aimed Range (m): 4,000
Max Effective Range (m):
Day: INA
Night: 2,600
Armor Penetration (mm): 650-750

125-mm HEAT, BK-27
Maximum Aimed Range (m): 4,000
Max Effective Range (m):
Day: INA
Night: 2,600
Armor Penetration (mm): 700-800

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.

Antitank Guided Missiles:
Name: AT-11/SVIR
Warhead Type: Shaped charge (HEAT)
Armor Penetration (mm): 700 (RHA) behind ERA/800 conventional
Range (m): 5,000

Name: AT-11B/INVAR
Warhead Type: Tandem shaped charge
Armor Penetration (mm): 800 (RHA) behind ERA /870 conventional
Range (m): 5,000

NOTES
The original tank 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 tank may be fielded with the original II sight from the T-80 series (Buran-PA, 800-1300 meters range). However, marketing materials feature the AGAVA-2 thermal sight. There are thermal sights available which permit night launch of ATGMs.

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.

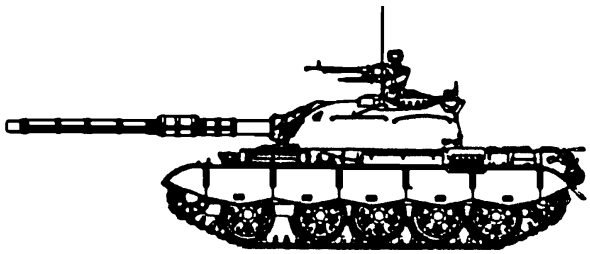
An improved gun, 2A46M-4, with improved accuracy and use life is available for fitting to the T-90.

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 more recent BK-27 HEAT round offers a triple-shaped charge warhead and 50 mm more penetration.

The electronic fuzing system for HE-Shrapnel rounds uses technology similar to that for French Oerlikon's AHEAD round. The round is specially designed to defeat targets by firing fragmentation patterns forward and radially, based on computer calculated settings from the LRF and other inputs. Targets are helicopters and dug in or defilade priority ground threats, such as ATGM positions. Rate of fire is 4 rd/min.

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.

Chinese Main Battle Tank Type 59-II



Weapons & Ammunition Types	Typical Combat Load
105-mm rifled gun L7	**34**
New CH APFSDS-T	12
M456 HEAT	6
L35 HESH	16
7.62-mm coax MG	**2,000**
7.62-mm bow MG	**1,000**
12.7-mm AA MG	**500**

SYSTEM
Alternative Designations: WZ 120B
Date of Introduction: 1951
Proliferation: At least 2 countries
Description:
Crew: 4
Combat Weight (mt): 36.5-37.0
Chassis Length Overall (m): 6.04
Height Overall (m): 2.59
Width Overall (m): 3.30
Ground Pressure (kg/cm^2): 0.8

Automotive Performance:
Engine Type: 520-hp Diesel
Cruising Range (km): 440/600 with external tanks
Speed (km/h):
Max Road: 50
Max Off-Road: 25
Average Cross-Country: INA
Max Swim: N/A
Fording Depths (m): 1.4 Unprepared, 5.5 with snorkel

Radio: INA

Protection:
Armor, Turret Front (mm): 203
Applique Armor (mm): Track skirts are fitted to some tanks
Explosive Reactive Armor (mm): N/A
Active Protective System: N/A
Mineclearing Equipment: Mine plows and roller-plows available
Self-Entrenching Blade: N/A
NBC Protection System: N/A
Smoke Equipment: 8 x 81-mm smoke grenade launchers
Vehicle engine exhaust smoke system

ARMAMENT
Main Armaments:
Caliber, Type, Name: 105-mm rifled gun, similar to L7
Rate of Fire (rd/min): 6-10
Loader Type: Manual
Ready/Stowed Rounds: INA
Elevation (°): -5/+18
Fire on Move: Yes

Auxiliary Weapon:
Caliber, Type, Name: 7.62-mm (7.62x 54R) Machine gun Type 59T
Mount Type: Turret coax
Maximum Aimed Range (m): 2,000
Max Effective Range (m):
Day: 1,000
Night: 800
Fire on Move: Yes
Rate of Fire (rd/min): 250 practical, 600 cyclic in 2-10 round bursts

Caliber, Type, Name: 7.62-mm (7.62x 54R) Machine gun Type 59T
Mount Type: Bow ball mount
Maximum Aimed Range (m): 1,000
Max Effective Range (m):
Day: 1,000
Night: N/A
Fire on Move: Yes
Rate of Fire (rd/min): 250 practical, 600 cyclic in 2-10 round bursts

Caliber, Type, Name: 12.7-mm (12.7x108) AA MG Type 54
Mount Type: Turret cupola
Maximum Aimed Range (m): 2.000
Max Effective Range (m):
Day: 1,500 ground/1,600 for air targets (APDS)
Night: N/A, II sights available
Fire on Move: Yes
Rate of Fire (rd/min): 80-100 practical, 600 air targets 2-10 rd bursts

FIRE CONTROL
FCS Name: UI light spot fire control system
Main Gun Stabilization: 2-plane
Rangefinder: LRF
Infrared Searchlight: Yes
Sights w/Magnification:
Gunner:
Day: INA
Field of View (°): INA
Acquisition Range (m): INA
Night: Type DC 1024/00 II sights, x7
Field of View (°): 6
Acquisition Range (m): 1,000
Commander Fire Main Gun: No

VARIANTS:
Type 59: Original model is a copy of the Former Soviet T-54 MBT and has a 100-mm main gun.

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 will fit 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.

Chinese Main Battle Tank Type 59-II continued

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: 800-1,300
- 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: 800-1,300
- Armor Penetration (mm): 460 at 2,000 m

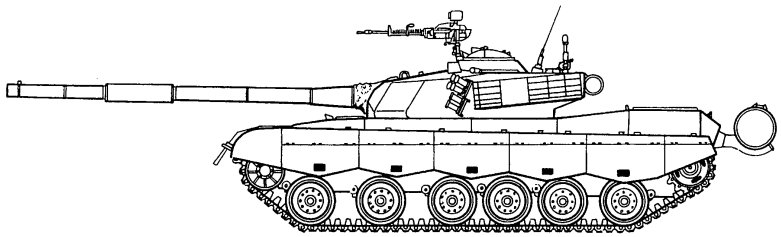
105-mm HEAT, M456 (multinational)
- Maximum Aimed Range (m): 3,000
- Max Effective Range (m):
  - Day: 1,500-2,500 (est)
  - Night: 800-1,300
- Armor Penetration (mm): 432, NATO single heavy target

105-mm HESH, L35 (UK)
- Maximum Aimed Range (m): 5,000
- Max Effective Range (m):
  - Day: 2,000-3,000 (est)
  - Night: 800-1,300
- 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, cannister

NOTES
GEC-Marconi Centaur fire control system is available. British Barr and Stroud thermal based FCS can be fitted.

Chinese Main Battle Tank Type 85-IIM



Weapons & Ammunition Types	Typical Combat Load
125-mm smoothbore gun	**42**
APFSDS-T	(mix est) 15
HEAT	6
Frag-HE	21
7.62-mm coax MG	**2,000**
12.7-mm cupola AAMG	**500**

SYSTEM
Alternative Designations: INA
Date of Introduction: 1991
Proliferation: At least 2 countries
Description:
Crew: 3
Combat Weight (mt): 41.0
Chassis Length Overall (m): 10.28
Height Overall (m): 2.30
Width Overall (m): 3.450
Ground Pressure (kg/cm^2): 0.771

Automotive Performance:
Engine Type: 730-hp Diesel
Cruising Range (km): 700/900 with external tanks
Speed (km/h):
Max Road: 57
Max Off-Road: 45
Average Cross-Country: 35
Max Swim: N/A
Fording Depths (m): 1.4 Unprepared, 2.4 with snorkel

Radio: INA

Protection:
Armor, Turret Front (mm): INA
Applique Armor (mm): Track skirts. Composite panels available.
Explosive Reactive Armor (mm): N/A
Active Protective System: N/A
Mineclearing Equipment: Mine plows and roller-plow set
Self-Entrenching Blade: N/A
NBC Protection System: Yes
Smoke Equipment: 12x 81-mm smoke grenade launchers
Vehicle engine exhaust smoke system

ARMAMENT
Main Armament:
Caliber, Type, Name: 125-mm smoothbore gun 2A46M/ D-81TM
Rate of Fire (rd/min): 4-6/2 in manual mode
Loader Type: Autoloader (separate loading) and manual
Ready/Stowed Rounds: 22/23 (22 in carousel)
Elevation (°): -6 to +14
Fire on Move: Yes, up to 25 km/h. Depending on the road and distance to the target, most crews may halt before firing.

Auxiliary Weapon:
Caliber, Type, Name: 7.62-mm (7.62x 54R) Machine gun Type 59
Mount Type: Turret coax
Maximum Aimed Range (m): 1,800
Max Effective Range (m):
Day: 1,000
Night: 800
Fire on Move: Yes
Rate of Fire (rd/min): 250 practical, 600 cyclic, 2-10 rd bursts

Caliber, Type, Name: 12.7-mm (12.7x108) AA MG Type 54
Mount Type: Cupola
Maximum Aimed Range (m): 2,000
Max Effective Range (m):
Day: 1,500 ground/1600 for air targets (APDS)
Night: N/A
Fire on Move: Yes
Rate of Fire (rd/min): 80-100 practical, 600 air targets, 2-10 rd bursts

FIRE CONTROL
FCS Name: ISFCS-212 (Image-Stabilized Fire Control System)
Main Gun Stabilization: 2-plane
Rangefinder: LRF
Infrared Searchlight: Yes
Sights w/Magnification:
Gunner:
Day: UI stabilized gunner sight
Field of View (°): INA
Acquisition Range (m): INA
Night: 2nd Generation II sights
Field of View (°): INA
Acquisition Range (m): INA
Commander Fire Main Gun: No

VARIANTS
Type 85-IIAP: Variant assembled from Type 59s and Type 69-IIs and upgrade kits, or from licensed production in Pakistan.

Type 85-III: Upgraded variant with 1,000-hp engine and composite armor panels. Variant is in prototype stage.

MAIN ARMAMENT AMMUNITION
Caliber, Type, Name:
125-mm APFSDS-T, BM-42M
Maximum Aimed Range (m): 3,000
Max Effective Range (m):
Day: 2,000-3,000
Night: 850-1,300
Armor Penetration (mm): 590-630 at 2,000 meters

125-mm Frag-HE-T, OF-26
Maximum Aimed Range (m): 5,000
Max Effective Range (m):
Day: INA
Night: 850-1,300
Armor Penetration (mm): INA

Chinese Main Battle Tank Type 85-IIM continued

125-mm HEAT-MP, BK-29M Maximum Aimed Range (m): 3,000 Max Effective Range (m): Day: INA Night: 850-1300 Armor Penetration (mm): 650-750 125-mm HEAT, BK-27 Maximum Aimed Range (m): 3,000 Max Effective Range (m): Day: INA Night: 850-1,300 Armor Penetration (mm): 700-800	**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.

NOTES
GEC-Marconi Centaur fire control system is available. British Barr and Stroud thermal based FCS can be fitted.

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 vs four, more antitank rounds would available for the higher rate of fire.

Chapter 5
Antitank

As armored combat vehicles have ascended in importance on the battlefield, so have the systems designed to stop those vehicles. The umbrella term ***antitank*** originally denoted systems specifically designed to destroy tanks. But today it is also 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. Tanks cannot survive or achieve their tactical objectives without support from other armored systems. The more recent term ***antiarmor*** may supplant the current term; because antitank weapons which cannot penetrate tank armor can still be a formidable threat if they can defeat or damage more lightly armored fighting vehicles. With upgrades and innovative tactics even older, seemingly obsolete, weapons can be used as OPFOR antiarmor weapons.

Antitank weapons can include guns of various sizes, antitank guided missile launcher systems, rocket and grenade launchers, mines and their delivery systems, and other obstacle systems. The rocket and grenade launchers are described in Chapter 1, Infantry Weapons. Mines and other obstacle systems are noted at Chapter 8, Engineer Systems. Because the OPFOR place a high priority on stopping and destroying armored combat vehicles, they will use all other available assets which can doctrinally support the effort. These include fixed and rotary-wing aircraft, artillery, NBC assets, etc. A number of recent systems have been fielded seemingly for other roles, but available for use as antitank weapons: light tanks, heavy armored reconnaissance vehicles with guns of 60 millimeters or more, assault vehicles, fire support vehicles, and artillery/mortar-type combination guns, such as Russian 120-mm 2S9, 2S23, and 2S31. Many OPFOR countries will employ antitank weapons for roles other than antitank, including AT guns against personnel and soft targets, and ATGMs against personnel and rotary-wing aircraft.

Antitank guns include towed guns and self-propelled antitank guns (also known as 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.

A number of upgrades 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, an 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 ATGM, Kastet.

The ***antitank guided missile*** (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 is a wide variety of countermeasures (such as smoke and counterfire, 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 is a variety of counter-countermeasures which the ATGMs, launchers, and operators can use to increase the chance for success. Tactics, techniques and procedures within the antitank arena are critical to mission success.

As armor protection levels and antitank weapon lethality levels continue to rise, armor protection for many modern tanks has outpaced most AT weapons. However, ATGMs have been able to increase their size, range, and warhead configurations to threaten even the heaviest tanks. Among notable trends in ATGMs is the worldwide proliferation and variety of manportable and portable ***antitank guided missile launchers***. These include shoulder-launched, short-range systems, such as the French Eryx, and a variety of copies of former Soviet systems, such as the AT-3/Malyutka ("Suitcase SAGGER). Another notable trend is in development of upgrade ATGMs, with increased lethality. The most common type of lethality upgrade is addition of a nose precursor or tandem warhead. A more recent lethality upgrade has been the use of warheads that permit the "fly-over, shoot-down" mode. These missiles can over-fly a vehicle behind a hill, and fire an explosively-formed penetrator (EFP, in the shape of a cannon kinetic-energy penetrator round) downward through the relatively soft top of armored vehicles. Other improvements include improved guidance and resistance to countermeasures, reduced smoke and noise signature, and increased range. A fairly common trend has been addition of night sights, including thermal sights for the launcher. As the missiles and launchers have been improved, weight loads have increased. Most of the so-called portable launchers (AT-4 launcher, TOW, and HOT) have outgrown the portability weight limit, and must be carried in vehicles and only dismounted short distances from the carriers.

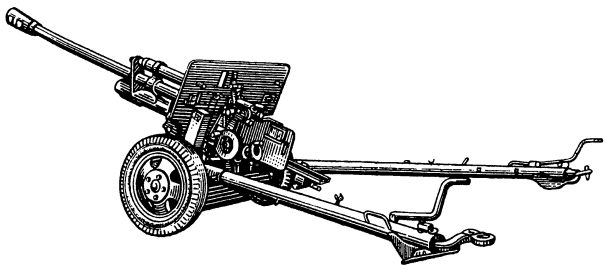
Although there are unique ***ATGM launcher vehicles*** with unique ATGMs, most numerous launcher vehicles are military and commercial vehicles adapted with pintel mounts for portable ground launchers, with ATGMs manually loaded and launched. Configurations of those vehicles consist of simply pairing of vehicle and launcher, and can be executed with equipment at hand; therefore, they were not described in this guide. The number of fielded ATGM launcher vehicles specially designed for the mission numbers no more than a few dozen systems. They constitute a high level threat to vehicles and rotary-winged aircraft in the US Army.

Systems selected for this chapter are the more common threat systems, or represent the spectrum of antitank systems which can threaten US Army forces in the world today.

Questions and comments on data listed in this chapter should be addressed to:

Mr. Tom Redman
DSN: 552-7925 Commercial (913) 684-7925
e-mail address: redmant@leav-emh1.army.mil

Russian 76-mm Towed Antitank Gun ZIS-3



Weapons & Ammunition Types	Typical Combat Load
76-mm rifled gun	**INA**
HVAP-T	
HEAT	
APC-T	
Frag-HE	

SYSTEM
Alternative Designations: M1942
Date of Introduction: INA
Proliferation: At least 14 countries

Description:
Crew: 5-7
Combat Weight (mt): 1.12
Length Overall, Travel (m): 6.10
Height Overall, Travel (m): 1.3
Width Overall, Travel (m): 1.4

Mobility:
Mount: Two-wheeled carriage with twin trails
Prime mover: AT-P tractor, light trucks
Towed Speed (km/h):
Max Road: INA
Max Off-Road: INA
Average Cross-Country: INA
Fording Depth (m): N/A
Emplace Time (min): INA
Displace Time (min): INA
Radio: N/A
Protection: Gun shield

ARMAMENT
Main Armaments:
Caliber, Type, Name: 76-mm rifled gun
Rate of Fire (rd/min): 8-10 normal / 15-20 burst indirect fire
Loader Type: Manual
Ready/Stowed Rounds: N/A
Elevation (°): -5/+37
Fire on Move: No

FIRE CONTROL
FCS Name: N/A
Main Gun Stabilization: N/A
Rangefinder: N/A
Sights w/Magnification:
Gunner:
Day: INA
Field of View (°): INA
Acquisition Range (m): INA
Night: INA
Field of View (°): INA
Acquisition Range (m): INA

VARIANTS N/A

MAIN ARMAMENT AMMUNITION
Caliber, Type, Name:
76-mm HVAP-T, BR-354P
Maximum Aimed Range (m): INA
Max Effective Range (m):
Day: 1,000
Night: INA
Armor Penetration (mm): 58 at 1,000 meters
92 at 500 meters

76-mm APC-T , BR-350B
Maximum Aimed Range (m): INA
Max Effective Range (m): INA
Day: 1,000
Night: INA
Armor Penetration (mm): 61 at 1,000 meters

76-mm HEAT, BK-354M
Maximum Aimed Range (m): 1,000
Max Effective Range (m): INA
Day: 500
Night: INA
Armor Penetration (mm): 120 (RHA)

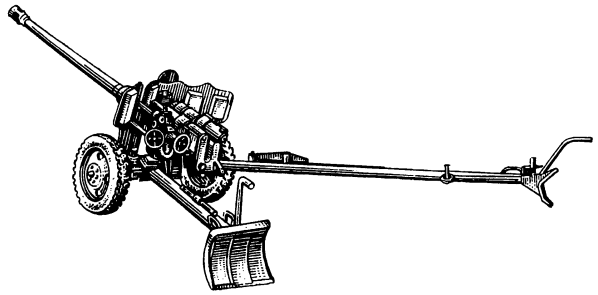
76-mm Frag-HE, OF-350A
Maximum Aimed Range (m): INA
Max Effective Range (m):
Day: INA
Night: INA
Armor Penetration (mm): INA

76-mm Frag-HE
Maximum Aimed Range (m): INA
Max Effective Range (m):
Day: 1,500
Night: INA
Armor Penetration (mm): INA

Other Ammunition Types: API-T BZR-350B, Smoke (WP)

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



Weapons & Ammunition Types	Typical Combat Load
85-mm rifled gun	**21**
HVAP-T	(est) 3
HEAT-FS	3
AP HE	3
Frag-HE	9
Smoke	3

SYSTEM
Alternative Designations: M1945
Date of Introduction: 1944
Proliferation: At least 16 countries
Description:
Crew: 8
Combat Weight (mt): 3.1
Length Overall, Travel (m): 8.34
Height Overall, Travel (m): 1.42
Width Overall, Travel (m): 1.73

Mobility:
Mount: Two-wheeled carriage with twin trails and coaster wheel
Prime mover: AT-P tractor, light trucks
Towed Speed (km/h):
Max Road: 60
Max Off-Road: 35
Average Cross-Country: INA
Fording Depth (m): INA
Emplace Time (min): 2
Displace Time (min): 2
Radio: N/A
Protection: Gun shield

ARMAMENT
Main Armaments:
Caliber, Type, Name: 85-mm rifled gun
Rate of Fire (rd/min): 8 normal / 15 burst Indirect Fire
Loader Type: Manual
Ready/Stowed Rounds: 0 / 140 on prime mover
Elevation (°): -7/+35
Fire on Move: No

FIRE CONTROL
FCS Name: N/A
Main Gun Stabilization: N/A
Rangefinder: N/A
Sights w/Magnification:
Gunner:
Day: OP-2-7 Direct Fire, 5.5x / PG-1M Indirect Fire
Field of View (°): INA
Acquisition Range (m): 1,500
Night: INA
Field of View (°): INA
Acquisition Range (m): INA

VARIANTS
D-44-N: Variant with II night sight.

SD-44: Airborne version with 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.

MAIN ARMAMENT AMMUNITION
Caliber, Type, Name:
85-mm HVAP-T, BR-365P/365PK
Maximum Aimed Range (m): 1,500
Max Effective Range (m):
Day: 1,150
Night: INA
Armor Penetration (mm): 180 (RHA) at 1,000 meters
113 (RHA, 30°) at 500 meters

85-mm HEAT-FS, BK-2M
Maximum Aimed Range (m): 1,500
Max Effective Range (m):
Day: 1,500
Night: INA
Armor Penetration (mm): 300

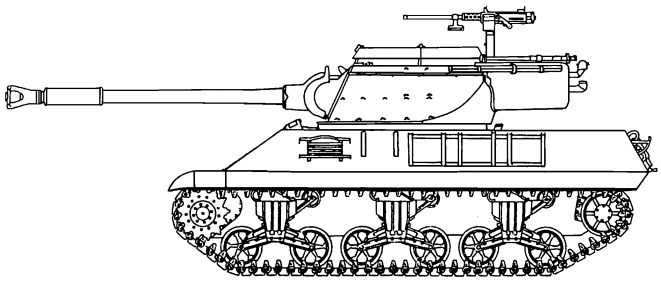
85-mm AP HE
Maximum Aimed Range (m): 1,500
Max Effective Range (m):
Day: 950
Night: INA
Armor Penetration (mm): 91 (30° angle) at 500 meters

85-mm Frag-HE, O-365K
Maximum Aimed Range (m): 1,500
Max Effective Range (m):
Day: 1,500
Night: INA
Armor Penetration (mm): INA

Other Ammunition Types: HE, BR-365 and -365K AP-T and APC-T (obsolete)

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.
PG-1M indirect fire sight characteristics are: 4x, 10° field of view. The PG-1 and -M can be used to a limited extent as direct fire sights.

U.S. Self-Propelled Antitank Gun M36



M36B2

Weapons & Ammunition Types	Typical Combat Load
90-mm gun APFSDS-T, HVAP, HEAT-T or APC HE	**47**
12.7-mm bustle MG API, API-T, APDS-T	**1,000**

SYSTEM
Alternative Designations: INA
Date of Introduction: 1944
Proliferation: At least 5 countries
Description:
Crew: 5
Combat Weight (mt): 27.7/30.8 for M36B1/29.9 for M36B2
Chassis Length Overall (m): 5.98
Height Overall (m): 3.19
Width Overall (m): 3.05
Ground Pressure (kg/cm^2): 0.95/0.86 M36B2

Automotive Performance:
Engine Type: 500-hp Gasoline/375-hp Diesel for M36B2
Chassis: M-10 tank destroyer
Cruising Range (km): 177
Speed (km/h):
- Max Road: 42/40 M36B2
- Max Off-Road: INA
- Average Cross-Country: 29
- Max Swim: N/A

Fording Depth (m): 0.91/1.07 M36B2

Radio: INA

Protection:
Armor, Turret Front (mm): 76
Applique Armor (mm): N/A
Explosive Reactive Armor (mm): N/A
Active Protective System: N/A
Mineclearing Equipment: N/A
Self-Entrenching Blade: N/A
NBC Protection System: No
Smoke Equipment: No

ARMAMENT
Main Armament:
Caliber, Type, Name: 90-mm (50 Cal) rifled gun, M3
Rate of Fire (rd/min): 8 est
Loader Type: Manual
Ready/Stowed Rounds: INA
Elevation (°): -10 to +20
Fire on Move: No

Auxiliary Weapon:
Caliber, Type, Name: 12.7-mm machinegun, M2HB
Mount Type: Turret bustle
Maximum Aimed Range (m): 2,000
Max Effective Range (m):
- Day: 2,000
- Night: N/A

Fire on Move: Yes
Rate of Fire (rd/min): 550

ATGM Launcher: None

FIRE CONTROL
FCS Name: INA
Main Gun Stabilization: No
Rangefinder: No
Infrared Searchlight: No
Sights w/Magnification:
Gunner:
- Day: INA
- Night: No

Commander Fire Main Gun: No

VARIANTS
M36B1: Variant uses an M4A3/Sherman tank chassis.
M36B2: Variant uses an M10 chassis with plate canopy protection.

MAIN ARMAMENT AMMUNITION
Caliber, Type, Name:
90-mm HVAP, INA
- Maximum Aimed Range (m): INA
- Max Effective Range (m):
  - Day: 1,000
  - Night: N/A
- Armor Penetration (mm): 195 at 1,000 m

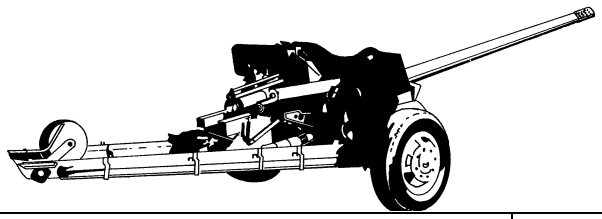
90-mm APFSDS-T, Mecar 90
- Maximum Aimed Range (m): 1,000-2,000
- Max Effective Range (m):
  - Day: 1,000+
  - Night: N/A
- Armor Penetration (mm): INA

90-mm HEAT-T, Yugoslavian M74
- Maximum Aimed Range (m): INA
- Max Effective Range (m):
  - Day: 1,000
  - Night: N/A
- Armor Penetration (mm): 150 (30° impact) at 1,000 m

Other Ammunition Types: HE M71, APC-T M82

NOTES
This type vehicle is historically referred to as a "tank destroyer". The above label is more modern. The baseline vehicle has an open-top turret.

Russian 100-mm Towed Antitank Gun MT-12



Weapons & Ammunition Types	Typical Combat Load
100-mm smoothbore gun	**20**
APFSDS-T	8
HEAT	4
Frag-HE	4
AT-10 ATGM	4

SYSTEM
Alternative Designations: T-12A, 2A29
Date of Introduction: 1972
Proliferation: At least 12 countries
Description:
Crew: 6
Combat Weight (mt): 3.1
Length Overall, Travel (m): 9.65
Height Overall, Travel (m): 1.6
Width Overall, Travel (m): 2.3

Automotive Performance:
Mount: Two-wheeled carriage with twin trails and coaster wheel
Prime mover: MT-LB-T, URAL-375D and other trucks
Towed Speed (km/h):
Max Road: 60
Max Off-Road: INA
Average Cross-Country: 25
Fording Depth (m): INA
Emplace Time (min): 2-3
Displace Time (min): 2-3
Radio: N/A
Protection: Gun shield

ARMAMENT
Main Armaments:
Caliber, Type, Name: 100-mm smoothbore gun 2A29
Rate of Fire (rd/min): 6-8/up to 15 indirect fire
Loader Type: Manual
Ready/Stowed Rounds: 0/20
Elevation (°): -7/+20
Fire on Move: No

ATGM Launcher:
Launch Method: Gun-launched, 2A29 smoothbore gun
Guidance: Laser-beam rider
Command Link: Encoded laser-beam
Launcher Dismountable: No

FIRE CONTROL
FCS Name: N/A
Main Gun Stabilization: N/A
Rangefinder: N/A
Sights w/Magnification:
Gunner:
Day: OP40M-40U direct fire, 5.5x / PG-1M indirect fire
Field of View (°): 11
Acquisition Range (m): 3,000/8,200 indirect fire
Night: APN6-40 II sight, 6.8x
Field of View (°): 7
Acquisition Range (m): 2,000

VARIANTS
T-12: Original version of Russian gun. MT-12 has changes in carriage and obturator, which do not affect lethality performance.

MT-12R: Russian upgrade with radar-directed fire control system, for use at night and adverse weather.

Topaz: Former-Yugoslav variant of T-12, with the 2A19M gun mounted on a D-30 carriage. Some have AT FCS-1 (see NOTES).

MAIN ARMAMENT AMMUNITION
Caliber, Type, Name: 100-mm APFSDS-T, BM-412M, Romanian
Maximum Aimed Range (m): 2,500, 3,000 platoon volley
Max Effective Range (m):
Day: INA
Night: INA
Armor Penetration (mm): 418 at 2,000 m/380 at 3,000 m

Caliber, Type, Name: 100-mm APFSDS-T, M1000, Belgian
Maximum Aimed Range (m): 3,000/platoon volley INA
Max Effective Range (m):
Day: INA
Night: INA
Armor Penetration(mm): Triple heavy target at 4,000 meters

Caliber, Type, Name: 100-mm HEAT, BK-17
Maximum Aimed Range (m): 2,500, 3,000 platoon volley
Max Effective Range (m):
Day: INA
Night: INA
Armor Penetration (mm): 380

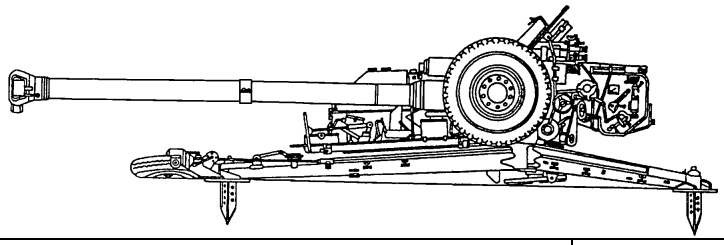
Other Ammunition Types: Russian BM-2/-20/-25 APFSDS-T; OF-15 Frag-HE; BK-5M HEAT-FS

Antitank Guided Missiles:
Name: AT-10/Kastet
Warhead Type: Shaped charge (HEAT)
Armor Penetration (mm): 650 (RHA)
Range (m): 5,000

Name: AT-10b/Kan
Warhead Type: Tandem Shaped charge (HEAT)
Armor Penetration (mm): 700 (RHA) behind ERA
Range (m): 5,000

NOTES
Russian 2nd generation II sights are available. The daysight can be used at night if the target is illuminated. Thermal sights are available. The MT-12R radar FCS can be used for surveillance, acquisition, and tracking. The Serb Iskra AT FCS-1 computerized laser rangefinder FCS is on is offered for sale. Range is 500-3,000 meters. The ATGM sight and laser guidance device has a 5,000-meter range and is a day sight only.
Ranges (m) for Frag-HE: 8,200 indirect fire/3,000 direct-fire. Rate of fire for indirect fire (Frag-HE) is up to 15 rd/min.

Russian 125-mm Towed Antitank Gun 2A45M



Weapons & Ammunition Types	Typical Combat Load
125-mm smoothbore gun	***60**
APFSDS-T	28
HEAT	4
Frag-HE	20
Invar/Svir ATGM	8
	* Mix estimate

SYSTEM
Alternative Designations: SPRUT-B (Octopus-B)
Date of Introduction: 1980s
Proliferation: At least 1 country

Description:
Crew: 7
Combat Weight (mt): 6.5
Length Overall, Travel (m): 7.12
Height Overall, Travel (m): 2.09, 2.35 with APU (0.90 firing)
Width Overall, Travel (m): 2.3

Automotive Performance:
Mount: Two-wheeled carriage with three trails and coaster wheel
Prime mover: MT-LB, URAL-4320, and other trucks
Towed Speed (km/h):
Max Road: 80
Max Off-Road: INA
Average Cross-Country: 25
Emplace Time (min): 1.5
Displace Time (min): 2.0
Radio: On the prime mover
Protection: Gun shield

ARMAMENT
Main Armaments:
Caliber, Type, Name: 125-mm smoothbore gun 2A45M
Rate of Fire (rd/min): 6-8
Loader Type: Manual, separate-loading
Ready/Stowed Rounds: 6/60 on prime mover
Elevation (°): -6 to +25
Fire on Move: No

ATGM Launcher:
Launch Method: Gun-launched
Guidance: Laser-beam rider, with 9S53 guidance device
Command Link: Encoded laser-beam
Launcher Dismountable: No

FIRE CONTROL
FCS Name: N/A
Main Gun Stabilization: N/A
Rangefinder: N/A
Sights w/Magnification:
Gunner:
Day: OP4M-48A, 5x, direct fire, 5.5x / 2Ts33 iron PG-1M, 4x, indirect fire
Field of View (°): 11 on OP4M-48A, 10 on PG-1M Acquisition Range (m): 4,000/8,200 indirect fire
Night: 1PN53-10 II sight, 6.8x; 1PN80 thermal sight available
Field of View (°): 7
Acquisition Range (m): 800-1,300

VARIANTS
None

MAIN ARMAMENT AMMUNITION
Caliber, Type, Name: 125-mm APFSDS-T, BM-42M
Max Aimed Range (m): 3,000
Max Effective Range (m):
Day: 2,000-3,000
Night: 800-1,300 II sight
Armor Penetration (mm): 590-630 at 2,000 meters

Caliber, Type, Name: 125-mm HEAT, BK-27
Max Aimed Range (m): 2,500
Max Effective Range (m):
Day: INA
Night: 800-1,300 II sight
Armor Penetration (mm): 700-800

Caliber, Type, Name: 125-mm HEAT-MP, BK-29M
Max Aimed Range (m): 2,500
Max Effective Range (m):
Day: 2,500
Night: 800-1300 II sight
Armor Penetration (mm): 650-750

Caliber, Type, Name: 125-mm Frag-HE-T, OF-26
Max Aimed Range (m): 5,000
Max Effective Range (m):
Day: 2,500
Night: 800-1,300 II sight, direct fire
Armor Penetration (mm): Can defeat IFVs on impact

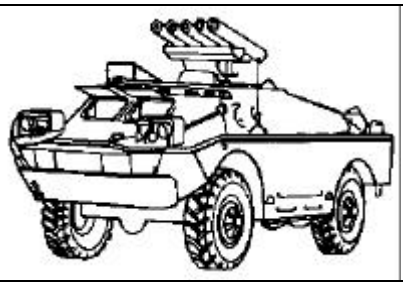
Other Ammunition Types: Giat 125G1, and BM-42 and BM-32 APFSDS-T. The Russians may have a BM-42M with DU penetrator.

Antitank Guided Missiles:
Name: AT-11/SVIR
Warhead Type: Shaped charge (HEAT)
Armor Penetration (mm): 700 (RHA) behind ERA/800 conventional
Range (m): 5,000

Name: AT-11B/INVAR
Warhead Type: Tandem shaped charge
Armor Penetration (mm): 800 (RHA) behind ERA /870 conventional
Range (m): 5,000

NOTES
The ATGM sight and laser guidance device has a 5,000-meter range, day sight only. The daysight can be used at night if the target is illum inated.

Russian ATGM Launcher Vehicle 9P148



Weapons & Ammunition Types	Typical Combat Load
Launcher	**15-20**
AT-5/AT-5B ATGM	15
Mixed (see NOTES)	
AT-4/AT-4B ATGM	10
AT-5/AT-5B ATGM	10

SYSTEM
Alternative Designations: BRDM-2/AT-5
Date of Introduction: 1977
Proliferation: At least 6 countries
Description:
Crew: 2
Platform: BRDM-2M/GAZ-41-08
Combat Weight (mt): 7.0
Chassis Length Overall (m): 5.73
Height (m):
Overall: 2.31
In Firing Position: INA
Width Overall (m): 2.26
Drive Formula: 4 x 4 (+ 4 auxiliary wheels)

Automotive Performance:
Engine Type: 140-hp Gasoline
Cruising Range (km): 750
Speed (km/h):
Max Road: 100
Max Off-Road: INA
Average Cross-Country: INA
Max Swim: 10
Fording Depth (m): Amphibious
Self-Entrenching Blade: N/A

Radio: R-123

Protection:
Armor, Turret Front (mm): 10
Applique Armor (mm): N/A
Explosive Reactive Armor (mm): N/A
Active Protective System: N/A
NBC Protection System: Collective
Smoke Equipment: N/A

ARMAMENT
Antitank Guided Missile Launcher
Name: 9P135M3 (recent upgrade)
Launch Method: tube-launched
Number of missiles on launcher: 5
Elevation (°): INA
Rate of Launch: (missiles/min): 2-3, depending on range
Reaction Time (sec): INA
Emplacement Time (min): INA
Displacement Time (min): INA
Can Launch Missiles Simultaneously : NA
Ready/Stowed Missiles: 15 (launcher + autoloader)/ 0-5 by mix
Loader Type: Automated
Launcher dismountable: No
Auxiliary Launcher: Yes
Fire on the Move: No

FIRE CONTROL
FCS Name: N/A
Guidance: SACLOS
Command Link: Wire
Beacon Type: Incandescent bulb
Tracker Type: IR, 9S451M1
Susceptible To Countermeasures: EO jammers, smoke, counterfire
Counter-countermeasures: Electro-optical jamming alarm (See note)
Rangefinder: N/A
Infrared Searchlight: N/A
Sights w/Magnification:
Gunner:
Day: 9Sh119M1
Field of View (°): INA
Acquisition Range (m): INA
Night: 1PN65
Field of View (°): INA
Acquisition Range (m): 2,500

VARIANTS
9P137: Original launcher vehicle with 5 AT-5 (only) launch rails

AMMUNITION
Antitank Guided Missiles:
Name: AT-5/SPANDREL
Alternative Designations: Konkurs
Missile Weight (kg): 25.2 (in tube)
Warhead Type: Shaped Charge (HEAT)
Armor Penetration (mm): 650
Minimum/Maximum Range (m): 75/4,000
Probability of Hit (%): 90
Average Velocity (m/s): 200
Time of Flight to Max Range (sec): 20

Name: AT-5B
Alternative Designations: Konkurs-M
Missile Weight (kg): 26.5 (in tube)
Warhead Type: Tandem Shaped Charge (HEAT)
Armor Penetration (mm): 925
Minimum/Maximum Range (m): 75/4,000
Probability of Hit (%): 90
Average Velocity (m/s): 208
Time of Flight to Max Range (sec): 19

Name: AT-4/SPIGOT
Alternative Designations: Fagot
Missile Weight (kg): 13.0 (in tube)
Warhead Type: Shaped Charge (HEAT)
Armor Penetration (mm): 480
Minimum/Maximum Range (m): 70/2,000
Probability of Hit (%): 90
Average Velocity (m/s): 186
Time of Flight to Max Range (sec): 11

Russian ATGM Launcher Vehicle 9P148 continued _____

Name: AT-4B Alternative Designations: Factoria, Konkurs M Missile Weight (kg): 13.4 (in tube) Warhead Type: Shaped Charge (HEAT) Armor Penetration (mm): 550 Minimum/Maximum Range (m): 70/2,500 Probability of Hit (%): 90 Average Velocity (m/s): 180 Time of Flight to Max Range (sec): 13.2-14.0	**Other Missile Types:** N/A

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 ATGM Launcher Vehicle 9P149

Weapons & Ammunition Types	Typical Combat Load
Launcher	**12**
AT-6 HEAT ATGM	
AT-9 HEAT ATGM	
AT-6 HE ATGM	
AT-9 HE ATGM	

SYSTEM
Alternative Designations: Shturm-S
Date of Introduction: 1990
Proliferation: At least 9 countries
Description:
Crew: 2
Platform: MT-LB
Combat Weight (mt): 12.3
Chassis Length Overall (m): 6.35
Height (m):
- Overall: 1.8
- In Firing Position: INA

Width Overall (m): 2.85

Automotive Performance:
Engine Type: 290-hp Diesel
Cruising Range (km): 500 km
Speed (km/h):
- Max Road: 65
- Max Off-Road: INA
- Average Cross-Country: INA
- Max Swim: 3-4

Fording Depths (m): Amphibious
Self-Entrenching Blade: Yes

Radio: R-123M or R-173

Protection:
Armor, Turret Front (mm): 7-14
Applique Armor (mm): N/A
Explosive Reactive Armor (mm): N/A
Active Protective System: N/A
NBC Protection System: Collective
Smoke Equipment: N/A

ARMAMENT
Antitank Guided Missile Launcher
Name: INA
Launch Method: tube-launched
Number of missiles on launcher: 1
Elevation (°): -5/+15
Rate of Launch: (missiles/min): 2-3, depending on range
Reaction Time (sec): INA
Emplacement Time (min): INA
Displacement Time (min): INA
Can Launch Missiles Simultaneously: N/A
Ready/Stowed Missiles: 12/ 0
Loader Type: Automated
Launcher dismountable: No
Auxiliary Launcher: No
Fire on the Move: No

FIRE CONTROL
FCS Name: INA
Guidance: SACLOS
Command Link: Radio frequency
Beacon Type: INA
Tracker Type: IR
Susceptible To Countermeasures: Smoke, counterfire
Counter-countermeasures: 5 encoded frequencies
Rangefinder: INA
Infrared Searchlight: INA
Sights w/Magnification:
Gunner:
- Day: INA
  - Field of View (°): INA
  - Acquisition Range (m): 5,000
- Night: Yes
  - Field of View (°): INA
  - Acquisition Range (m): INA

VARIANTS N/A

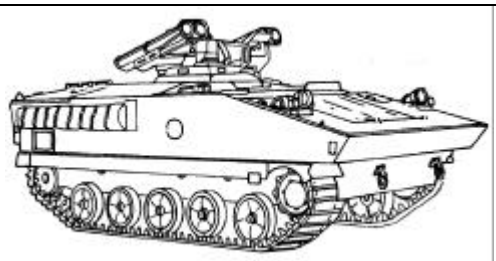
AMMUNITION
Antitank Guided Missiles
Name: AT-6a/SPIRAL
- Alternative Designations: Kokon
- Missile Weight (kg): 46.5 (in tube)
- Warhead Type: Shaped Charge (HEAT)
- Armor Penetration (mm): 750, 600 behind ERA
- Minimum/ Maximum Range (m): 400/5,000
- Probability of Hit (%): 90
- Average Velocity (m/s): 345
- Time of Flight to Max Range (sec): 14.5

Name: AT-9
- Alternative Designations: Ataka
- Missile Weight (kg): 48.3 (in tube)
- Warhead Type: Tandem Shaped Charge (HEAT)
- Armor Penetration (mm): 950, 800 behind ERA
- Minimum/Maximum Range (m): 400/6,000, 5,000 ground use
- Probability of Hit (%): 90
- Average Velocity (m/s): 400
- Time of Flight to Max Range (sec): 15.0 (12.5 in ground use)

Other Missile Types: AT-6 HE thermobaric, AT-9 HE thermobaric

NOTES
Other missiles (AT-6b and AT-6c) can be launched from helicopters; but their length exceeds the 1832-mm limit for the Shturm-S autoloader.
A modular AT-6 ATGM launcher system with launcher and autoloader is available for installation on vehicles, fixed sites and boats.

French ATGM Launcher Vehicle AMX-10 HOT



Weapons & Ammunition Types	Typical Combat load
Total HOT/ HOT 2, 2T/ HOT 3	**18**

SYSTEM
Alternative Designations: INA
Date of Introduction: INA
Proliferation: At least 1 country
Description:
Crew: 4-5
Platform: AMX-10P
Combat Weight (mt): 14.1
Chassis Length Overall (m): 5.78
Height (m):
Overall: 2.57
In Firing Position: INA
Width Overall (m): 2.78

Automotive Performance:
Engine Type: 300-hp Diesel
Cruising Range (km): 600 km
Speed (km/h):
Max Road: 65
Max Off-Road: INA
Average Cross-Country: 30-40
Max Swim: 7 (with optional water jets)
Fording Depths (m): Amphibious
Self-Entrenching Blade: N/A

Radio: VHF and intercom

Protection:
Armor, Turret Front (mm): 12.7-mm frontal (distance NFI)
Applique Armor (mm): N/A
Explosive Reactive Armor (mm): Available (see NOTES)
Active Protective System: N/A
NBC Protection System: Collective
Smoke Equipment: 3 smoke grenade launchers

ARMAMENT
Antitank Guided Missile Launcher
Name: Lancelot 3
Launch Method: tube-launched
Number of missiles on launcher: 4
Elevation (°): -12/+18
Rate of Launch: (missiles/min): INA
Reaction Time (sec): INA
Emplacement Time (min): INA
Displacement Time (min): INA
Can Launch Missiles Simultaneously : INA
Ready/Stowed Missiles: 4/14
Loader Type: Manual
Launcher dismountable: No
Auxiliary Launcher: No
Fire on the Move: No

FIRE CONTROL
FCS Name: INA
Guidance: SACLOS
Command Link: Wire
Beacon Type: INA
Tracker Type: INA
Susceptible To Countermeasures: Smoke, counterfire
Counter-countermeasures: Infrared CM hardening on later ATGMs
Rangefinder: M427 Laser rangefinder
Infrared Searchlight: INA
Sights w/Magnification:
Gunner:
Day: M509, 3x/12x
Field of View (°): INA
Acquisition Range (m): INA
Night: Castor Thermal Image System available
Field of View (°): INA
Acquisition Range (m): INA

VARIANTS N/A

Antitank Guided Missiles
Name: HOT
Alternative Designations: Euromissile
Missile Weight (kg): 32 (in tube)
Warhead Type: Shaped Charge (HEAT)
Armor Penetration (mm): 800
Minimum/ Maximum Range (m): 75/4,000
Probability of Hit (%): INA
Average Velocity (m/s): 233
Time of Flight to Max Range (sec): 17.3

Name: HOT 2
Alternative Designations: INA
Missile Weight (kg): 32 (in tube)
Warhead Type: Tandem Shaped Charge (HEAT)
Armor Penetration (mm): 900
Minimum/Maximum Range (m): 75/4,000
Probability of Hit (%): INA
Average Velocity (m/s): 233
Time of Flight to Max Range (sec): 17.3

Name: HOT 2T
Alternative Designations: INA
Missile Weight (kg): 32 (in tube)
Warhead Type: Tandem shaped Charge (HEAT)
Armor Penetration (mm): 1250
Minimum/Maximum Range (m): 75/4,000
Probability of Hit (%): INA
Average Velocity (m/s): INA
Time of Flight to Max Range (sec): INA

Other Missile Types: HOT 3--similar to HOT 2T, but with improved countermeasures

French ATGM Launcher Vehicle AMX-10 HOT continued

NOTES
The HOT Antitank guided missile is produced by a European consortium which includes France and Germany. It 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 AMX-10 HOT constitutes a high-end application on that spectrum, and has not been widely proliferated.

The cruciform-based single-tube ground launcher system exceeds the weight limit for the portable class of ATGM launchers. An updated launcher for HOT-2T offers a Thermal Modular System night sight and a dual band tracker. 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.

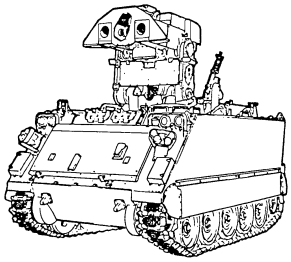
The French-produced VAB HOT uses a Mephisto retractable twin-tube launcher, and has an onboard load of 10 HOT ATGMs.

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 German Jaguar 1 Jagdpanzer is a modified Leopard 1 tank chassis with a single-tube HOT launcher.

French SNPE explosive reactive armor can be employed on AMX-10 type vehicles.

US ATGM Launcher Vehicle M901



Weapons & Ammunition Types	Typical Combat Load
ATGM Launcher TOW, ITOW, TOW 2, TOW 2A, TOW 2B	**12**
7.62-mm Cupola MG	**2,000**

SYSTEM
Alternative Designations: ITV (Improved TOW Vehicle), ITOW
Date of Introduction: 1978
Proliferation: At least 8 countries
Description:
Crew: 4-5
Platform: M113A1
Combat Weight (mt): 11.79
Chassis Length Overall (m): 4.90
Height (m):
Overall: 2.91
In Firing Position: 3.35
Width Overall (m): 2.70

Automotive Performance:
Engine Type: 212-hp Diesel
Cruising Range (km): 483
Speed (km/h):
Max Road: 64
Max Off-Road: INA
Average Cross-Country: INA
Max Swim: 5.8
Fording Depths (m): Amphibious
Self-Entrenching Blade: N/A

Radio: Various, including intercom

Protection:
Armor, Turret Front (mm): INA
Applique Armor (mm): Available. Anti-mine armor on bottom
Explosive Reactive Armor (mm): Available
Active Protective System: No
NBC Protection System: No
Smoke Equipment: 4 smoke grenade launchers on each front corner

ARMAMENT
Antitank Guided Missile Launcher
Name: M27 cupola with launcher head ("Hammerhead")
Launch Method: Tube-launched
Number of missiles on launcher: 2
Elevation (°): -30/+34
Rate of Launch: (missiles/min): 2
Reaction Time (sec): 4.25
Emplacement Time (min): 0.33
Displacement Time (min): INA
Can Launch Missiles Simultaneously : No
Ready/Stowed Missiles: 2/10
Loader Type: Manual
Launcher dismountable: No
Auxiliary Launcher: No
Fire on the Move: No

Auxiliary Weapon:
Caliber, Type, Name: 7.62-mm (7.62x51) MG
Mount Type: Cupola
Direct Fire Range (m): INA
Max Effective Range (m):
Day: INA
Night: INA
Fire on Move: Yes
Rate of Fire: INA

Firing Ports: INA

FIRE CONTROL
FCS Name: INA
Guidance: SACLOS
Command Link: Wire
Beacon Type: Xenon (Infrared), thermal on TOW-2 and after
Tracker Type: INA
Susceptible To Countermeasures: Smoke, counterfire
Counter-countermeasures:
Rangefinder: INA
Infrared Searchlight: INA
Sights w/Magnification:
Gunner:
Day: Day sight/tracker, 13x
Field of View (°): 5.5 x
Acquisition Range (m): INA
Night: AN/TAS-4 thermal sight
Field of View (°): INA
Acquisition Range (m): INA

VARIANTS
ITOW: Launcher variants have been upgraded with new turrets and launcher heads to fit the later TOW variants, such as ITOW, TOW 2, 2A and 2B. **M901A2:** Launcher vehicle fitted for TOW 2.

A variety of M113-based vehicles have incorporated TOW "hammerhead" launcher for use as ATGM launcher vehicles. These include the Italian VCC-1-based launcher vehicle, and the Dutch Armored Infantry Fighting Vehicle (AIFV) -based launcher vehicle.

AMMUNITION
Antitank Guided Missiles
Name: TOW
Alternative Designations: BGM-71
Missile Weight (kg): 25.5 (in tube)
Warhead Type: Shaped Charge (HEAT)
Armor Penetration (mm): 600
Minimum/ Maximum Range (m): 65/3,750
Probability of Hit (%): INA
Average Velocity (m/s): 179
Time of Flight to Max Range (sec): 21

US ATGM Launcher Vehicle M901 continued

Name: ITOW
Alternative Designations: BGM-71C
Missile Weight (kg): 25.7 (in tube)
Warhead Type: Tandem Shaped Charge (HEAT, short probe)
Armor Penetration (mm): 800
Minimum/ Maximum Range (m): 65/3,750
Probability of Hit (%): INA
Average Velocity (m/s): 179
Time of Flight to Max Range (sec): 21

Name: TOW 2
Alternative Designations: BGM-71D
Missile Weight (kg): 28.1 (in tube) / 21.5 (missile only)
Warhead Type: Tandem Shaped Charge (Larger HEAT, long probe)
Armor Penetration (mm): INA
Minimum/ Maximum Range (m): 65/3,750
Probability of Hit (%): 90
Average Velocity (m/s): 179
Time of Flight to Max Range (sec): 21

Name: TOW 2A
Alternative Designations: BGM-71E
Missile Weight (kg): 22.65 (missile only)
Warhead Type: Tandem Shaped Charge (Larger HEAT, long probe)
Armor Penetration (mm): INA
Minimum/ Maximum Range (m): 65/3,750
Probability of Hit (%): INA
Average Velocity (m/s): 188
Time of Flight to Max Range (sec): 20

Name: TOW 2B
Alternative Designations: BGM-71F
Missile Weight (kg): 22.60 (missile only)
Warhead Type: Dual explosive-formed penetrators (EFP), top-attack
Armor Penetration (mm): INA
Minimum/ Maximum Range (m): 200/3,750
Probability of Hit (%): INA
Average Velocity (m/s): 179
Time of Flight to Max Range (sec): 21

Other Missile Types: See NOTES, below

NOTES
The loader has side and overhead protection during loading, which requires 40 seconds.

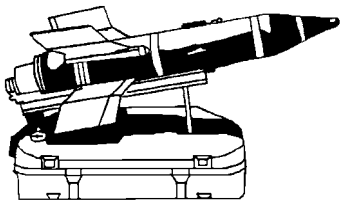
The Improved Target Acquisition System (ITAS) was developed for TOW 2 and later. It includes a laser rangefinder, increased acquisition range, improved night capabilities (second-generation thermal channel), an automatic boresight and greater hit probability.

The UK-developed Further-Improved TOW (FITOW) program is expected to be similar to TOW 2B, but with two smaller warheads.

The Israeli MAPATS is a TOW missile variant with laser-beam rider guidance and a laser guidance system.

The Israeli TAAS tandem warhead is the same diameter as the warhead on the original TOW missile, and appears to be a candidate for retrofit. The warhead is claimed to be able to penetrate 1,020 mm of armor.

Russian ATGM Launcher AT-3



Weapons & Ammunition Types	Typical Combat Load
ATGM Launcher	**4/ 3 Polk Set**
AT-3 HEAT ATGM	1 on launcher
AT-3 HE ATGM	

SYSTEM
Alternative Designations: Malyutka Complex
Date of Introduction: 1963
Proliferation: At least 45 countries
Description:
Crew: 3
Primary Mount: Ground mount on "suitcase" launcher
Alternate Mounts: Rail on BMP-1, BMD-1, BRDM, BRDM-2 etc.
Weight Overall, Excluding Missile (kg): 30.5 launcher + guidance
Length Overall in Firing Position (m): 0.86 with AT-3/a/b/c
1.02 with Malyutka-2
Height Overall In Firing Position (m): INA
Width Overall In Firing Position (m): INA

ARMAMENT
Launcher
Name: 9P111 Case launcher
Launch Method: Rail on case
Elevation (°): Fixed for launcher (see NOTES)
Rate of Launch: (missiles/min): 2
Reaction Time (sec): INA
Emplacement Time (min): 1.7 POLK set
Displacement Time (min): INA
Ready/Stowed Missiles: 4/0, 3/0 POLK set

FIRE CONTROL
FCS Name: 9S415/9S415M/9S415M1 guidance panel
Guidance: MCLOS (9S415/-M panel), SACLOS
Command Link: Wire
Beacon Type: Incandescent infrared bulb (SACLOS)
Tracker Type: N/A for MCLOS, flare tracker for SACLOS
Susceptible To Countermeasures: EO jammers, smoke, counterfire
Counter-countermeasures: Offset guidance panel, laser filters
Rangefinder: INA
Frequency: INA
Counter-countermeasures: INA
Sights w/Magnification:
Gunner:
Day: 9Sh16, 8x
Field of View (°): 22.5 (see NOTES)
Acquisition Range (m): 4000
Night: Available
Field of View (°): N/A
Acquisition Range (m): N/A

VARIANTS
Copies include North Korean Susong-Po, Taiwanese Kun Wu, and the Chinese copy, Red Arrow-73/HJ-73, with indigenous guidance.

POLK: Slovenian Portable Anti-armor Launching Set includes a new launcher, guidance panel with binocular sight, and 3 ATGMs similar to AT-3C Improved (nose probes and lower smoke signature).
With a nose probe and improved propellant, the MCLOS-guided ATGM can reach maximum range in 25 sec and penetrate 580 mm.
A Russian AT-3c/Improved (SACLOS) has similar capabilities.

AMMUNITION
Antitank Guided Missiles
Name: AT-3, -3a, -3b/SAGGER
Alternative Designations: Malyutka, Malyutka-M
Missile Weight (kg): 10.9
Warhead Type: Shaped Charge (HEAT)
Armor Penetration (mm): 400
Minimum/Maximum Range (m): 500/3,000
Probability of Hit (%): 70 against moving tanks
Average Velocity (m/s): 115
Time of Flight to Max Range (sec): 26

Name: AT-3c/SAGGER
Alternative Designations: Malyutka-P
Missile Weight (kg): 11.4
Warhead Type: Shaped Charge (HEAT)
Armor Penetration (mm): 520
Minimum/Maximum Range (m): 500/3,000
Probability of Hit (%): 90 (SACLOS)
Average Velocity (m/s): 115
Time of Flight to Max Range (sec): 26

Name: Malyutka-2
Alternative Designations: Malyutka (Modernized)
Missile Weight (kg): 12.5
Warhead Type: Tandem Shaped Charge (HEAT)
Armor Penetration (mm): 800
Minimum/Maximum Range (m): 500/3,00
Probability of Hit (%): 90 (SACLOS)
Average Velocity (m/s): 130
Time of Flight to Max Range (sec): 23

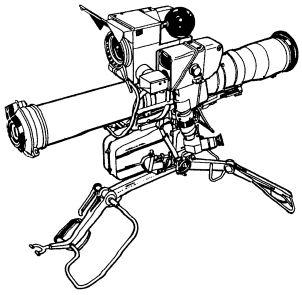
Other Missiles: Malyutka (Modernized) HE, AT-3c Imp, POLK

NOTES
AT-3 is classed by weight as portable (21-40 kg), rather than manportable (<21 kg). The launcher is also a missile carry case. 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. Guidance elevation (°) is -5/ +10. 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.

The Slovenian Iskra TS-M thermal sight is available, with detection at 3,000 meters and recognition at 1,800 meters.

Any AT-3 can be modernized to Malyutka-2 with replacement of warhead and or replacement of specific warhead and motor components.

Russian ATGM Launcher AT-4/AT-5



9P135M3 w/AT-5B and thermal sight

Weapons & Ammunition Types	Typical Combat Load
ATGM Launcher Total	**4 or 8**
AT-4/AT-4B ATGM	(see NOTES)
AT-5/AT-5B ATGM	

SYSTEM
Alternative Designations: 9P135M Firing Post, Fagot/Fagot-M
Date of Introduction: 1973
Proliferation: At least 25 countries
Description:
Crew: 3
Primary Mount: Ground mount on folding tripod
Alternate Mounts: Pintel (post) on BMP-1P, BTR-D, UAZ-469, etc.
Weight Overall, Excluding Missile (kg): 22.5
Length Overall in Firing Position (m): 1.1/1.3 AT-4/5 tube
Height Overall In Firing Position (m): INA
Width Overall In Firing Position (m): INA

ARMAMENT
Launcher
Name: 9P135 (AT-4 only), 9P135M (AT-4/AT-5), -M1, -M2, -M3
Launch Method: Tube-launched
Elevation (°) (-/+): INA
Rate of Launch: (missiles/min): 2-3, depending on range
Reaction Time (sec): INA
Emplacement Time (min): INA
Displacement Time (min): INA
Ready/Stowed Missiles: 4/0 full dismount, 4/4 on or near vehicle

FIRE CONTROL
FCS Name: 9S451M1 Guidance control box
Guidance: SACLOS
Command Link: Wire
Beacon Type: Incandescent infrared bulb
Tracker Type: IR, 9S451M1
Susceptible To Countermeasures: EO jammers, smoke, counterfire
Counter-countermeasures: EO jamming alarm (see NOTES)
Rangefinder: INA
Sights w/Magnification:
Gunner:
Day: 9Sh119M1, 4x
Field of View (°): 4.5
Acquisition Range (m): INA
Night: Available (See NOTES)

VARIANTS
P135M3: Konkurs-M Complex. Launcher with 1PN65 thermal sight and AT-5B/Konkurs-M missiles. Night range is 2,500m.

AMMUNITION
Antitank Guided Missiles
Name: AT-5B/SPANDREL-B
Alternative Designations: Konkurs-M
Missile Weight (kg): 26.5 (in tube)
Warhead Type: Tandem Shaped Charge (HEAT)
Armor Penetration (mm): 925
Minimum/Maximum Range (m): 75/4,000
Probability of Hit (%): 90
Average Velocity (m/s): 208
Time of Flight to Max Range (sec): 19

Name: AT-5/SPANDREL
Alternative Designations: Konkurs
Missile Weight (kg): 25.2 (in tube)
Warhead Type: Shaped Charge (HEAT)
Armor Penetration (mm): 650
Minimum/Maximum Range (m): 75/4,000
Probability of Hit (%): 90
Average Velocity (m/s): 200
Time of Flight to Max Range (sec): 20

Name: AT-4/SPIGOT
Alternative Designations: Fagot
Missile Weight (kg): 13.0 (in tube)
Warhead Type: Shaped Charge (HEAT)
Armor Penetration (mm): 480
Minimum/Maximum Range (m): 70/2,000
Probability of Hit (%): 90
Average Velocity (m/s): 186
Time of Flight to Max Range (sec): 11

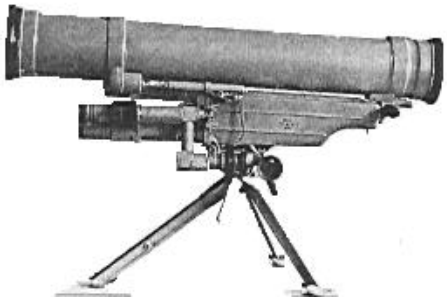
Other Missiles: AT-4B/Factoria (see NOTES)

NOTES
Because of its weight, the Russians categorize the AT-4/4B system as portable (21-40 kg) rather than manportable. 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). For crews using both ATGM classes and operating near vehicles, combat load is 8 (4 stowed in the vehicle).

The AT-4B/Factoria is an upgrade ATGM with a 2,500 meter range, 550-mm penetration, and a velocity of 180 m/s (13.2 - 14.0 sec TOF). Russian firms have developed counter-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.

TPVP/1PN65 thermal sight is available, with the range approximately 2,500 meters (see VARIANTS, above). Weight is 13 kg. Slovenian TS-F sight and Russian 1PN86-1/1PN86/Mulat have a 3,600 meter detection range.

Russian ATGM Launcher AT-7/AT-13



Weapons & Ammunition Types	Typical Combat Load
ATGM Launcher	**4**
AT-7 HEAT ATGM	
AT-13 HEAT ATGM	
AT-13 HE ATGM	

SYSTEM
Alternative Designations: 9P151Firing Post
Date of Introduction: 1978
Proliferation: At least 5 countries

Description:
Crew: 2
Primary mount: Ground mount on tripod
Alternate mounts: Shoulder for launch, UAZ-469 pintel mount
Weight Overall, Excluding Missile (kg): 10.2
Length Overall in Firing Position (m): 0.78 with AT-7/Metis
0.98 with AT-13/Metis-M
Height Overall In Firing Position (m): 0.72 with AT-7/Metis
Width Overall In Firing Position (m): INA

ARMAMENT
Launcher
Name: 9P151 Firing Post
Launch Method: Tube
Elevation (°): -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
Ready/Stowed Missiles: 4/0 (1 on launcher)

FIRE CONTROL
FCS Name: 9S816 Guidance system
Guidance: SACLOS
Command Link: Wire
Beacon Type: INA
Tracker Type: IR
Susceptible To Countermeasures: EO jammers, smoke, counterfire
Counter-countermeasures: INA

Rangefinder:
Frequency: INA
Counter-countermeasures: INA

Sights w/Magnification:
Gunner:
Day: INA
Field of View (°): INA
Acquisition Range (m): INA
Night: Available

VARIANTS
Metis-M System: 9P151firing post adapted for and including the Metis-M missile, IOC 1992.

AMMUNITION
Antitank Guided Missiles
Name: AT-7/Saxhorn
Alternative Designations: Metis
Missile Weight (kg): 6.3 (in tube)
Warhead Type: Shaped Charge (HEAT)
Armor Penetration (mm): 460
Minimum/Maximum Range (m): 40/1,000
Probability of Hit (%): 90
Average Velocity (m/s): 180
Time of Flight to Max Range (sec): 6.2

Name: AT-13
Alternative Designations: Metis-M (often mislabeled Metis-2)
Missile Weight (kg): 13.8 (in tube)
Warhead Type: Tandem Shaped Charge (HEAT)
Armor Penetration (mm): 1,000/900 behind ERA
Minimum/Maximum Range (m): 80/1500
Probability of Hit (%): 90
Average Velocity (m/s): 287
Time of Flight to Max Range (sec): 8

Other missiles: Metis-M HE thermobaric

NOTES
The Russians characterize the AT-7 ATGM complex as light or manportable (5-20 kg), permitting long-distance carry by dismounted infantry. Although the AT-13 complex slightly exceeds 20 kg, it is close enough to fit into the category.

Guidance elevation has a 15° 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.

The Russian 1PN86V/Mulat-115 thermal sight is available for use on the launcher, with detection at 3,200 meters and recognition beyond the missile's 1,500 meter range. Field of view is 4.6°.

French ATGM Launcher Eryx

Weapons & Ammunition Types	Typical Combat Load
ATGM Launcher Eryx ATGM	**1**

SYSTEM
Alternative Designations: Anti-Char Courtee Portee (ACCP)
Date of Introduction: 1991
Proliferation: At least 5 countries
Description:
Crew: 1
Primary mount: Ground mount on tripod or shoulder launch
Alternate mounts: Shoulder launch--standing, kneeling or prone
Weight Overall, Excluding Missile (kg): 3, 4 with tripod
Length Overall in Firing Position (m): 0.905
Height Overall In Firing Position (m): INA
Width Overall In Firing Position (m): INA tripod, 0.16 on shoulder

ARMAMENT
Launcher
Name: Eryx
Launch Method: Tube (disposable canister/ launch tube)
Elevation (°): INA, tripod; unlimited on shoulder launch
Rate of Launch: (missiles/min): INA
Reaction Time (sec): 20-30 (includes emplace time)
Emplacement Time (min): See Reaction Time (above)
Displacement Time (min): < 0.03
Ready/Stowed Missiles: 1/ 0

FIRE CONTROL
FCS Name: INA
Guidance: SACLOS
Command Link: Wire
Beacon Type: Infrared laser diode
Tracker Type: Charged couple device (CCD)
Susceptible To Countermeasures: EO jammers, smoke, counterfire
Counter-countermeasures: Flight time less than 4 seconds

Rangefinder: INA
Sights w/Magnification:
Gunner:
Day: INA, 3x
Field of View (°): 3.4
Acquisition Range (m): INA
Night: Sopelem OB50 II sight
Field of View (°): INA
Acquisition Range (m): INA

VARIANTS
N/A

AMMUNITION
Antitank Guided Missile
Name: Eryx
Alternative Designations: ACCP
Missile Weight (kg): 11 (in tube)
Warhead Type: Tandem Shaped Charge (HEAT)
Armor Penetration (mm): 900
Minimum/Maximum Range (m): 50/600
Probability of Hit (%): 90
Average Velocity (m/s): 162
Time of Flight to Max Range (sec): 3.7

Other missiles: N/A

NOTES
The disposable canister/launch tube is attached to the reusable firing post (which includes sight systems).

Eryx employs a recoil reduction system with reduced back-blast, which permits launch from inside of buildings. Signature reduction includes noise and smoke reduction.

A rest such as a ledge or sandbag is required for launches beyond 350 meters.

The optional French Mirabel thermal night sight is available for use on Eryx. The Mirabel offers an acquisition range of 1,000 meters, but weighs an additional 3.4 kg.

Russian ATGM Launcher Kornet-E

Kornet-E system (with Kornet-LR missile)

Weapons & Ammunition Types	Typical Combat Load
ATGM Launcher Total	**3-4**
HEAT ATGM	
HE ATGM	

SYSTEM
Alternative Designations: Kornet, AT-14
Date of Introduction: 1997-98
Proliferation: At least 3 countries
Description:
Crew: 2-3
Primary Mount: Ground mount on tripod
Alternate Mounts: IFV, APC, ATGM launcher vehicle, jeep
Weight Overall, Excluding Missile (kg): 30 with thermal sight (11)
Length Overall in Firing Position (m): 1.21 (missile canister)
Height Overall In Firing Position (m): INA
Width Overall In Firing Position (m): INA

ARMAMENT
Launcher
Name: 9P163
Launch Method: Tube-launched from carrying canister
Elevation (°): INA
Rate of Launch: (missiles/min): 2-3, depending on range
Reaction Time (sec): 1-2
Emplacement Time (min): 1.0
Displacement Time (min): 1.0
Ready/Stowed Missiles: 2 for 2-man crew, 3-4 for 3-man crew

FIRE CONTROL
FCS Name: INA
Guidance: Laser beam rider
Command Link: N/A
Beacon Type: N/A
Tracker Type: N/A
Susceptible To Countermeasures: Smoke, counterfire
Counter-countermeasures: Encoded laser beam
Rangefinder: Not included
Sights w/Magnification:
Gunner:
Day: 1P45-1 elbow sight
Field of View (°): INA
Acquisition Range (m): 5,500
Night: 1PN79 / Metis-2 thermal sight
Field of View (°): INA
Acquisition Range (m): 3,500 (ID range 2,500)

VARIANTS
Kornet-E: Export version of the Kornet system includes a light-weight launcher tripod, thermal night sight, and Kornet-LR missile. A version of the system is available for use in hot desert climates (to 60° C). Since Russian KBP began development of a medium-range (2,500 m) version, it divided domestic programs into the fo llowing:
Kornet-MR: Manportable system with E-type launcher and -MR missile. This missile is not currently fielded.
Kornet-LR.portable: System with the -LR missile.
Kornet-LR self-propelled: ATGM system on BMP-3 chassis with twin launchers, auto-loader, automated dual-track FCS with dual target trackers, Kredo surveillance radar, and improved FLIR.

Kliver: Missile-gun turret upgrade; 1-man turret with 30-mm gun, 7.62-mm MG, automated FCS and 4-tube Kornet ATGM launcher.

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.

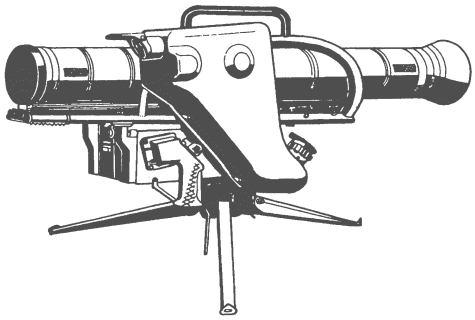
AMMUNITION
Antitank Guided Missiles
Name: Kornet-LR
Alternative Designation: 9M133
Missile Weight (kg): 27
Warhead Type: Tandem Shaped Charge (HEAT)
Armor Penetration (mm): 1,200
Min/Max Range (m): 100/5,500
Probability of Hit (%): 90
Average Velocity (m/s): 550
Time of Flight to Max Range (sec): 22

Name: Kornet-MR
Alternative Designation: INA
Missile Weight (kg): INA
Warhead Type: Tandem Shaped Charge (HEAT)
Armor Penetration (mm): 1,000
Min/Max Range (m): 100/2,500
Probability of Hit (%): 90
Average Velocity (m/s): INA
Time of Flight to Max Range (sec): INA

Other Missiles: Kornet-LR HE (thermobaric, 9M133F)
Kornet-MR HE (thermobaric).

NOTES
By weight, Kornet-MR can be broken down into a portable (marginally manportable) 2-man system, or into a clearly manportable 3-man system. Kornet-LR can be manportable with MR missiles or a larger crew, but generally is only portable (short-distance carry – See AT-3). Medium-range and long-range Kornet missiles are interchangeable among Kornet-LR, -MR, and Kornet-E launcher systems.

European ATGM Launcher MILAN 2 /MILAN 3



MILAN 2

Weapons & Ammunition Types	Typical Combat Load
ATGM Launcher Total	
HEAT ATGM	1 or 2

SYSTEM (MILAN 2 / MILAN 3, where their data differs)
Alternative Designations: Missile d/Infantrie Leger Antichar
Date of Introduction: 1985 MILAN 2/1996 MILAN 3
Proliferation: At least 39 countries MILAN/MILAN 2/1 MILAN 3
Description:
Crew: 2, 3 with ammo bearer for second missile
Primary Mount: Ground mount on tripod, including operator prone
Alternate Mounts: IFV, ATGM Launcher Vehicle, jeep, helicopter
Weight Overall, Excluding Missile (kg): 16.5
Length Overall in Firing Position (m): 1.2 (missile canister)
Height Overall In Firing Position (m): 0.6
Width Overall In Firing Position (m): 0.42

ARMAMENT
Launcher
Name: MILAN 2/MILAN 3
Launch Method: Tube-launched from carrying canister
Elevation (°): INA
Rate of Launch: (missiles/min): 2-3, depending on 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

FIRE CONTROL
FCS Name:
Guidance: SACLOS
Command Link: Wire
Beacon Type: Pyrotechnic flare, MILAN 2/ xenon bulb, MILAN 3
Tracker Type: IR, 2.2 µm/ 0.9 µm MILAN 3
Susceptible To Countermeasures: Smoke, counterfire, moving
Counter-countermeasures: Encoded tracker, counters EOIRCM
Rangefinder: INA
Sights w/Magnification:
Gunner:
Day: Name INA, 7x
Field of View (°): 4.3
Acquisition Range (m): INA
Night: MIRA Thermal sight available
Field of View (°): 3 x 6
Acquisition Range (m): 4,000 detection/ 2,000 recognition

VARIANTS
The missile launchers can be pintle-mounted for launch from vehicles, such as the Marder 1A3 IFV. A variety of reconnaissance vehicles, such as the French VBL, are fitted with MILAN launchers.

MILAN 2T: Improved ATGM with tandem warhead - not fielded

MILAN 3: Variant with a CCD tracker for the missile beacon. MILAN, MILAN 2, and MILAN 3 missiles can be fired from all three launchers; however, the EOIRCM will only work with both MILAN 3 launcher and MILAN 3 missile.

MCT: Compact turret w/two launchers for Spartan and other APCs.

AMMUNITION
Antitank Guided Missiles
Name: MILAN
Missile Weight (kg): 6.7
Warhead Type: Shaped Charge (HEAT)
Armor Penetration (mm): 600 (RHA)
Min/Max Range (m): 25/2,000
Probability of Hit (%): >90
Average Velocity (m/s): 160
Time of Flight to Max Range (sec): 12.5

Name: MILAN 2
Missile Weight (kg): 6.7
Warhead Type: Tandem Shaped Charge
Armor Penetration (mm): 800 (RHA)
Min/Max Range (m): 25/2,000
Probability of Hit (%): >90
Average Velocity (m/s): 160
Time of Flight to Max Range (sec): 12.5

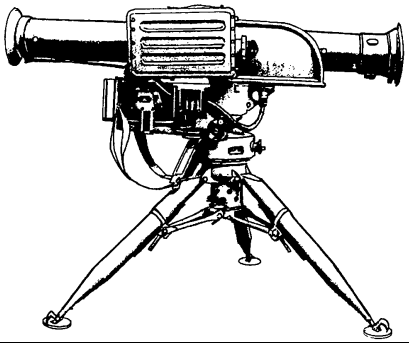
Name: MILAN 3
Missile Weight (kg): 7.1
Warhead Type: Tandem Shaped Charge with precursor charge
Armor Penetration (mm): 880 (RHA)
Min/Max Range (m): 20/1,920
Probability of Hit (%): >90
Average Velocity (m/s): 160
Time of Flight to Max Range (sec): 12.5

Other Missiles: N/A

NOTES
Although the launcher is portable and has been labeled man-portable, it is too heavy for one-man carry with missile.

A kit is available for retrofit to MILAN and MILAN 2 launchers, to permit firing MILAN 3 ATGM with EOIRCM (jammer countermeasure).

Chinese ATGM Launcher Red Arrow-8



Weapons & Ammunition Types	Typical Combat Load
ATGM Launcher Total	**Ground 1-5**
HEAT ATGM	**Vehicle 8-12**

SYSTEM
Alternative Designations: Hongjian-8, RA-8, HJ-8
Date of Introduction: 1986
Proliferation: At least 4 countries
Description:
Crew: 4
Primary Mount: Ground mount on tripod, including operator prone
Alternate Mounts: APC, ATGM Launcher Vehicle, jeep, helicopter
Weight Overall, Excluding Missile (kg): 63
Length Overall in Firing Position (m): 1.57 (missile canister)
Height Overall In Firing Position (m): INA
Width Overall In Firing Position (m): INA

ARMAMENT
Launcher
Name: Red Arrow 8
Launch Method: Tube-launched from carrying canister
Elevation (°) (-/+): -7 to +12
Rate of Launch: (missiles/min): 2-3, depending on range
Reaction Time (sec): INA
Emplacement Time (min): INA
Displacement Time (min): INA
Ready/Stowed Missiles: INA

FIRE CONTROL
FCS Name: INA
Guidance: SACLOS
Command Link: Wire
Beacon Type: Incandescent infrared bulb
Tracker Type: IR
Susceptible To Countermeasures: IR jammer, smoke, counterfire
Counter-countermeasures: Jamming CM (NFI)
Rangefinder: INA

Sights w/Magnification:
Gunner:
Day: Name INA, 12x
Field of View (°): INA
Acquisition Range (m): INA
Night: PTI-32 Thermal sight available (copy of Thorn EMI)
Field of View (°): INA
Acquisition Range (m): 4,000 detection/2,000 identification

VARIANTS
Baktar Shikan: Pakistani variant, also called **Green Arrow**. Missile data is similar to Red Arrow-8A

AMMUNITION
Antitank Guided Missiles
Name: Red Arrow-8A
Alternative Designation: HJ-8A
Missile Weight (kg): 24.5 (in tube), 22.5 ready for launch
Warhead Type: Shaped Charge (HEAT)
Armor Penetration (mm): 800
Min/Max Range (m): 100/3,000
Probability of Hit (%): 90
Average Velocity (m/s): 220
Time of Flight to Max Range (sec): 13.6

Name: Red Arrow-8E
Alternative Designation: HJ-8E
Missile We ight (kg): 24.5 (in tube), 22.5 ready for launch
Warhead Type: Tandem Shaped Charge (HEAT)
Armor Penetration (mm): 900
Min/Max Range (m): 100/4,000
Probability of Hit (%): 90
Average Velocity (m/s): 210
Time of Flight to Max Range (sec): 19

Other Missiles: There may be -8, -8B and -8C versions of the ATGM; however, the above are more likely for encounter.

NOTES
Although the launcher is portable, it too heavy for one-man carry. Vehicle mounts are jeeps, such as the Chinese BJ-212 and BJ 2023 C, and APCs such as the Chinese WZ-551 and Type 90 APC. A Chinese four launcher turret has been fitted on ATGM launcher vehicles including the Chinese YW 531, WZ-551, and YW 534, and Chilean Piranha. Helicopter mounts are the Chinese Zhi-9 (license-built SA-354N/Dauphin 2) and French Antelope.

Chapter 6
Artillery

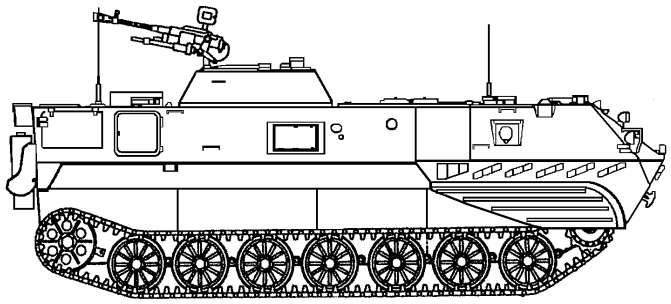
This chapter provides the basic characteristics of selected artillery weapon systems either in use or readily available to the OPFOR. Therefore, the artillery systems discussed in this chapter are those likely to be encountered by U.S. forces in varying levels of conflict . The selection of artillery systems is not intended to be all-inclusive, rather a representative sampling of weapons and equipment supporting various military capabil ities.

This update is divided into the follow ing categories—artillery reconnaissance, towed a r-tillery systems, mortar/gun-mortar systems, and multiple rocket launchers. Later updates of this guide will include data sheets addressing the aforementioned categories as well as ground mounted mortars, artillery locating radars, sound and flash systems, and surface-to-surface mi s-siles (SSMs).

Questions and comments on data listed in this chapter should be addressed to:

Mr. Walter L. Williams
DSN: 552-7923 Commercial (913) 684-7923
e-mail address: williamw@leav-emh1.army.mil

Russian Artillery Command and Reconnaissance Vehicle 1V13 _____



Weapons &Ammunition Types	Typical Combat Load
12.7-mm DShK MG	**500**

SYSTEM
Alternative Designations: M1974-1
Date of Introduction: 1974
Proliferation: At least 1 country
Description:
Crew: 6
Platform (chassis): MT-LBu
Combat Weight (mt): 15.7
Chassis Length Overall (m): 7.62
Height Overall (m): 2.72
Width Overall (m): 2.85

Automotive Performance:
Engine Type: YaMZ-238, 240 hp diesel
Cruising Range (km): 500 km
Speed (km/h):
Max Road: 60
Max Off-Road: 26
Cross-Country: INA
Max Swim: 4.5
Fording Depths (m): Amphibious

Radio: R-123M radio (3 each)

Protection:
Armor, Turret Front (mm): 20
Armor Turret Top (mm): INA
Armor Hull (mm): 15
NBC Protection System: Yes
Smoke Equipment: No

ARMAMENT
Caliber, Type, Name: 12.7-mm heavy machinegun, DShK
Mount Type: Pintle
Direct Fire Range (m): 1,500
Max Effective Range (m):
Day: 1,500
Night: N/A
Fire on Move: Yes
Rate of Fire (rpm): 80-100 (practical)

VARIANTS
1V13M: INA

SENSORS/COMPONENTS
Navigation: 1T121-M Navigation System

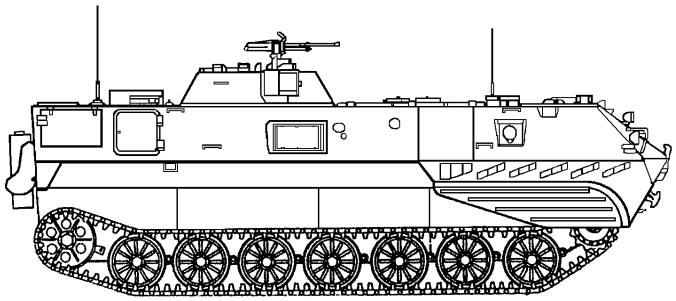
Fire direction:
Automated: APK automated firing data receiver
Manual: PUO-7

Other equipment: DSP-30 rangefinder, K-1 collimator, roof mounted periscopic aiming circle, VOP-7 vision blocks and driver's periscopes.

NOTES
The MT-LBu-based 1V12 *Maschina* ACRV set was first noted in 1974. The set provides the command and control vehicles for SP cannon battalions. The eight vehicle set consists of three 1V13 battery senior officer's vehicles, three 1V14 battery commander's vehicles, one 1V15 battalion commander's vehicle, and one 1V16 battalion FDC/chief of staff's vehicle. The 1V12M *Faltset* ACRV set is a modernized version of the system. The installation of an upgraded electronics package in the vehicles necessitated the requirement for an external-mounted power generator (the 1V12 *Machina* ACRV generator was mounted internally). In addition to freeing a small amount of space inside the vehicle, the external mounting reduces the internal noise level.

The ACRV 1V13 is the battery FDC of the 1V12 ACRV Complex. The battery senior officer, assisted by fire direction and communications personnel mans the vehicle. It has direct radio communications with the battery COP, the battalion COP, and the battalion FDC. The vehicle is equipped with a land navigation system and has a roof mounted periscopic aiming circle. The roof mounted periscopic aiming circle allows the battery senior officer the ability to lay the howitzers for direction from within his vehicle. There is no battlefield observation equipment present on the 1V13.

Russian Artillery Command and Reconnaissance Vehicle 1V14/1V15 _____



Weapons &Ammunition Types	Typical Combat Load
7.62-mm MG	**2,000**

SYSTEM
Alternative Designations: M1974-2A (1V14), M1974-2B (1V15)
Date of Introduction: 1974
Proliferation: At least 1 country
Description:
Crew: 1V14 (6)/1V15 (7)
Platform (chassis): MT-LBu
Combat Weight (mt): 15.7
Chassis Length Overall (m): 7.26
Height Overall (m): 2.72
Width Overall (m): 2.85

Automotive Performance:
Engine Type: YaMZ-238, 240hp diesel
Cruising Range (km): 500 km
Speed (km/h):
- Max Road: 60
- Max Off-Road: 26
- Cross-Country: INA
- Max Swim: 4.5

Fording Depths (m): Amphibious

Radios:
- 1V14: R-123M (3 each), R-107M (1 each)
- 1V15: R-123M (2 each), R-107M (1 each), R-111 (1 each), R-130M (1 each)

Protection:
Armor, Turret Front (mm): 20
Armor Turret Top (mm): INA
Armor Hull (mm): 15
NBC Protection System: Yes
Smoke Equipment: No

ARMAMENT
Caliber, Type, Name: 7.62-mm machinegun, PKT
Mount Type: Pintle
Direct Fire Range (m): 1,500
Max Effective Range (m):
- Day: 1,000
- Night: N/A

Fire on Move: Yes
Rate of Fire (rpm): 650 (cyclic), 2-10 round bursts

VARIANTS
1V14M/1V15M: INA

SENSORS/COMPONENTS
Navigation: 1T121-M Navigation System

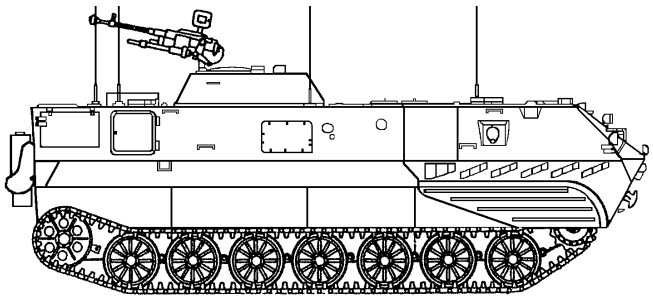
Fire direction:
- Automated: 1V520.
- Manual: PUO-7

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.

NOTES
The MT-LBu-based 1V12 *Maschina* ACRV set was first noted in 1974. The set provides the command and control vehicles for SP cannon battalions. The eight vehicle set consists of three 1V13 battery senior officer's vehicles, three 1V14 battery commander's vehicles, one 1V15 battalion commander's vehicle, and one 1V16 battalion FDC/chief of staff's vehicle. The 1V12M *Faltset* ACRV set is a modernized version of the system. The installation of an upgraded electronics package in the vehicles necessitated the requirement for an external-mounted power generator (the 1V12 *Machina* ACRV generator was mounted internally). In addition to freeing a small amount of space inside the vehicle, the external mounting reduces the internal noise level.

The ACRV 1V14 and ACRV 1V15 are the battery and battalion commander's vehicles of the 1V12 ACRV Complex. Both vehicles are equipped with the 1T121 land navigation system, a 1D15 laser rangefinder, and the 1PN44 day/night sight mounted in a basketed turret. The observer uses an analog coordinate converter to translate the polar location data when determining rectangular target coordinates. The 1V14 has an internal power generator. The 1V15 can be distinguished from the 1V14 by the external antenna bracket on the rear of the vehicle. The 1V520 fire direction computer may be transported internally and dismounted at a command observation post. The artillery commander, assisted by target acquisition, fire direction and communications personnel mans the vehicle. The artillery commander decides how to attack targets of opportunity and targets relayed to him by the supported maneuver unit.

Russian Artillery Command and Reconnaissance Vehicle 1V16 _____



Weapons &Ammunition Types	Typical Combat Load
12.7-mm DShK MG	**500**

SYSTEM
Alternative Designations: M1974-3
Date of Introduction: 1974
Proliferation: At least 1 country
Description:
Crew: 7
Platform (chassis): MT-LBu
Combat Weight (mt): 15.7
Chassis Length Overall (m): 7.26
Height Overall (m): 2.72
Width Overall (m): 2.85

Automotive Performance:
Engine Type: YaMZ-238, 240hp diesel
Cruising Range (km): 500 km
Speed (km/h):
Max Road: 60
Max Off-Road: 26
Cross-Country: INA
Max Swim: 4.5
Fording Depths (m): Amphibious

Radios:
R-123M (2 each), R-111M (1 each),
R-130M (1 each, R-326 receiver (1 each)

Protection:
Armor, Turret Front (mm): 20
Armor Turret Top (mm): INA
Armor Hull (mm): 15
NBC Protection System: Yes
Smoke Equipment: No

ARMAMENT
Caliber, Type, Name: 12.7-mm HMG, DShK
Mount Type: Pintle
Direct Fire Range (m): 1,500
Max Effective Range (m):
Day: 1,500
Night: N/A
Fire on Move: Yes
Rate of Fire (rpm): 80-100 (practical)

VARIANTS
1V16M: INA

SENSORS/COMPONENTS

Fire direction:
Automated: 9V59
Manual: PUO-7

NOTES
The MT-LBu-based 1V12 *Maschina* ACRV set was first noted in 1974. The set provides the command and control vehicles for SP cannon battalions. The eight vehicle set consists of three 1V13 battery senior officer' s vehicles, three 1V14 battery commander' s vehicles, one 1V15 battalion commander' s vehicle, and one 1V16 battalion FDC/chief of staff' s vehicle. The 1V12M *Faltset* ACRV set is a modernized version of the system. The installation of an upgraded electronics package in the vehicles necessitated the requirement for an external-mounted power generator (the 1V12 *Machina* ACRV generator was mounted internally). In addition to freeing a small amount of space inside the vehicle, the external mounting reduces the internal noise level.

The 1V16 is the simplest of the vehicles in the 1V12 ACRV Complex and serves as the battalion FDC/chief of staff' s vehicle. Normally, the battalion chief of staff, assisted by fire direction and communication personnel mans the vehicle. It has neither battlefield observation optics nor a navigation system. However, the vehicle is equipped with the standard VOP-7 vision blocks and driver' s periscopes. It is equipped with extra radios and has an extendable antenna mast mounted on the vehicle rear. The 9V59 fire-direction computer is mounted in the vehicle.

The 9V59 fire-control computer comes in several different models believed to be designated as the 9V59-1, -2, and –3. For example, the 9V59-2 is associated with 152-mm artillery units. The 9V59 fire-control computer is probably a 4-bit computer and, although quite rugged, is assessed to have a low mean time between failures because of a large number of discrete components. The 1V510 is assessed to be a replacement for the 9V59 fire-control computer. The 1V510 is capable of performing survey calculations and technical firing data. The system is assessed to be 33% faster than the 9V59.

Russian Artillery Command and Reconnaissance Vehicle 1V18/1V19 _____

Weapons &Ammunition Types	Typical Combat Load

SYSTEM
Alternative Designations: M1979-2A (1V17), M1979-2B (1V18)
Date of Introduction: 1979
Proliferation: At least 1 country
Description:
Crew: 6
Platform (chassis): BTR-60PB
Combat Weight (mt): 10.1
Chassis Length Overall (m): 7.22
Height Overall (m): 2.06
Width Overall (m): 2.82

Automotive Performance:
Engine Type: 2 GAZ-49B 90 hp(180 hp total) in-line, water-cooled gasoline
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

VARIANTS None

SENSORS/COMPONENTS
Navigation: 1T121-M Navigation System

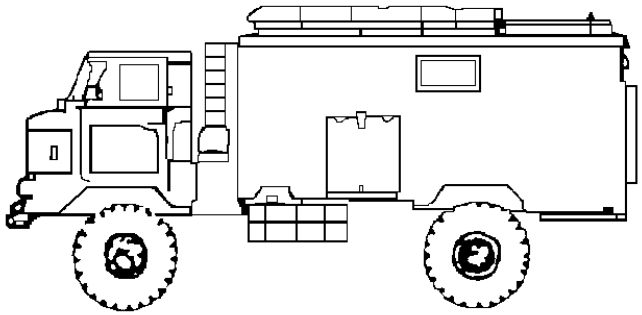
Fire direction:
Automated: 1V520
Manual: PUO-7

Other equipment: 1D15 laser rangefinder, 1PN44 day/night sight, PAB-2AM aiming circle, DS-1 stereoscopic rangefinder

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 tran s-late 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 _____



Weapons &Ammunition Types	Typical Combat Load

SYSTEM
Alternative Designations: M1979-1
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
Height Overall (m): 2.44
Width Overall (m): 2.34

Automotive Performance:
Engine Type: ZMZ-66, 115 hp V-8, water-cooled, gasoline
Cruising Range (km): 875 km
Speed (km/h):
Max Road: 87
Max Off-Road: 35
Cross-Country: INA
Fording Depths (m): .80

Radio: R-123M radio (3 each)

VARIANTS
None

SENSORS/COMPONENTS
Navigation: See NOTES.

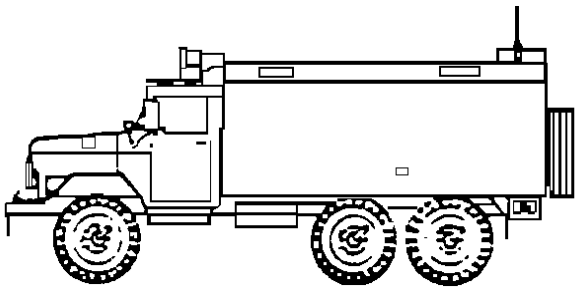
Fire direction: No computation system is installed. The vehicle is equipped with the APK automated firing data receiver.

Other equipment: DSP-30 laser rangefinder, K-1 collimator

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 _____



Weapons &Ammunition Types	Typical Combat Load

SYSTEM
Alternative Designations: M1979-3
Date of Introduction: 1979
Proliferation: At least 1 country
Description:
Crew: 7
Platform (chassis): ZIL 131 6x6 box body van
Combat Weight (mt): 6.7
Chassis Length Overall (m): 6.90
Height Overall (m): 2.48
Width Overall (m): 2.50

Automotive Performance:
Engine Type: ZIL 131 61, 150 hp V-8, water-cooled, gasoline
Cruising Range (km): 850 km
Speed (km/h):
Max Road: 80
Max Off-Road: 35
Cross-Country: INA
Fording Depths (m): 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)

VARIANTS
None

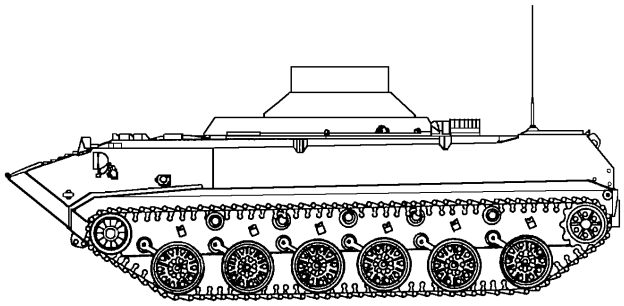
SENSORS/COMPONENTS

Fire direction: 9V59 fire-control computer

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 function 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 _____



Artist Drawing From Photo

Weapons &Ammunition Types	Typical Combat Load

SYSTEM
Alternative Designations: 1V119 Spektr
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
Height Overall (m): 1.97
Width Overall (m): 2.63

Automotive Performance:
Engine Type: Type 5D20, 240 hp V-6, liquid-cooled diesel
Cruising Range (km): 500 km
Speed (km/h):
- Max Road: 61
- 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

VARIANTS None

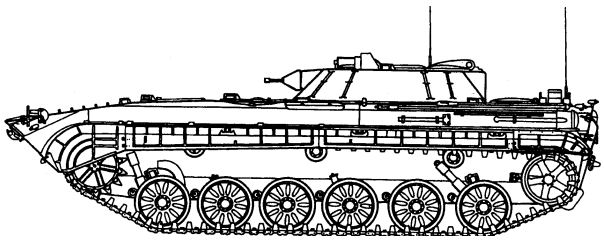
SENSORS/COMPONENTS
Navigation: 1T121-M Navigation System

Fire direction:
- Automated: 1V520.
- Manual: PUO-7

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.

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/PRP-4M _____



Weapons & Ammunition Types	Typical Combat Load
7.62 PKT MG	**2,000**

SYSTEM
Alternative Designations: None
Date of Introduction: 1975
Proliferation: At least 1 country
Description:
Crew: 5
Platform (chassis): BMP-1
Combat Weight (mt): 13.2
Chassis Length Overall (m): 6.73
Height Overall (m): 2.14
Width Overall (m): 2.94

Automotive Performance:
Engine Type: 293-hp Diesel
Cruising Range (km): 600
Speed (km/h):
- Max Road: 60
- Max Off-Road: 35
- Cross-Country: INA
- Max Swim: 7

Fording Depths (m): Amphibious

Radio: R-173

Protection:
Armor, Turret (mm): 23
Armor Hull (mm): 19
Self-Entrenching Blade: No
NBC Protection System: Yes
Smoke Equipment: Vehicle engine exhaust smoke system (VEESS)

ARMAMENT
Main Armament:
Caliber, Type, Name: 7.62-mm machinegun PKT
Mount Type: coax
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

VARIANTS
None

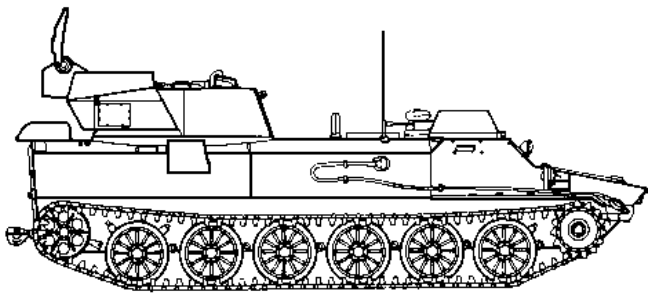
SENSORS/COMPONENTS

PRP-3 Sensors/Components:
Navigation: 1G25 gyrocompass and 1G13 gyro course indicator Fire
Direction: 1V520 Ballistic Computer
Right Side Sensors: 1PN61 Night Vision sensor and 1D11 Laser Rangefinder
Left Side Sensors: None
Radar: 1RL126 Small Fred Radar
- Operating Band: K (36.2 – 37.0 GHz)
- Detection Range: 20 km
- Tracking Range: 7–12 km

PRP-4 Sensors/Components:
Navigation: 1G25-1 gyrocompass and 1G13 gyro course indicator
Fire Direction: 1V520 Ballistic Computer
Right Side Sensors: 1PN61 Night Vision sensor and 1D11M-1 Laser Rangefinder
Left Side Sensors: 1PN59 Thermal Imaging Night Vision Device and 1D14 Laser Rangefinder
Radar: 1RL133M-1 Tall Mike Radar
- Operating Band: I (9.0 GHz)
- Detection Range (personnel): 3.0 km
- Detection Range (vehicle): 12 km

NOTES
The PRP-4M has improved 1PN71 night vision sensors. The vehicles are also equipped with a NBC filtration and overpressure system.

Russian Battlefield Surveillance Radar SNAR 10



SNAR 10 with radar raised and the turret mounted 7.62 PKT MG pointed to the rear

Weapons & Ammunition Types	Typical Combat Load
7.62 PKT MG	**2,000**

SYSTEM
Alternative Designations: BIG FRED, 1RL232, 1RL232-1
Date of Introduction: 1975
Proliferation: At least 12 countries
Description:
Crew: 5
Platform (chassis): MT-LBu
Combat Weight (mt): 12.6
Chassis Length Overall (m): 7.62
Height Overall (m): 2.72 (est.)
Width Overall (m): 2.85

Automotive Performance:
Engine Type: YaMZ-238, 240 hp diesel
Cruising Range (km): 500 km
Speed (km/h):
- Max Road: 60
- Max Off-Road: 26
- Cross-Country: INA
- Max Swim: N/A

Fording Depths (m): INA

Radio: R-123M radio, 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: Coax
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

VARIANTS
None

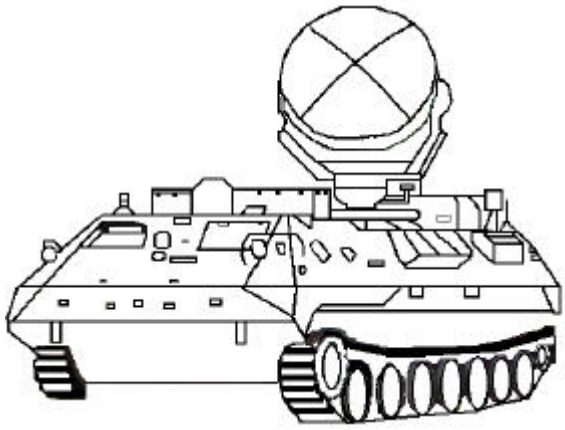
RADAR
Performance Capability
Antenna Type: Parabolic
Operating Band: K (34.55 to 35.25 GHz)
Detection Range Against Moving Targets, Without MTI (km):
- Vehicles: 16.0
- Ships: 30.0
- Shell Impact: 10.0

Detection Range Against Moving Targets, With MTI (km):
- Vehicles: 10.0

Emplacement Time (minutes): 5.0
Displacement Time (minutes): 5.0

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.

Russian Artillery Locating Radar ARK-1M Rys



SYSTEM
Alternative Designations: None
Date of Introduction: 1986
Proliferation: At least 1 country
Description:
Crew: 4
Platform (chassis): MT-LBu
Combat Weight (mt): 15.7
Chassis Length Overall (m): 7.62
Height Overall (m): 2.72
Width Overall (m): 2.85

Automotive Performance:
Engine Type: YaMZ-238, 240 hp diesel
Cruising Range (km): 500 km
Speed (km/h):
- Max Road: 60
- Max Off-Road: 26
- Cross-Country: INA
- Max Swim: 4.5

Fording Depth (m): Amphibious

Radio: R-123M radio

Protection:
Armor, Turret Front (mm): 20
Armor Turret Top (mm): INA
Armor Hull (mm): 15
NBC Protection System: Yes
Smoke Equipment: No

RADAR
Antenna:
Antenna Type: Reflector

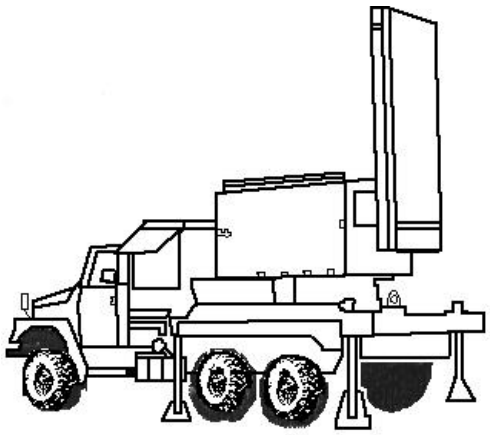
Receiver:
Noise Figure (dB): 8.0

Performance Capability
Detection Range (km):
- Mortar: 13.0
- Gun/howitzer: 8.0
- MLRS: 25.0
- Tactical Missile: 30.0

Max Number of Targets (tracks/min): 3
Emplacement Time (minutes): 5.0
Displacement Time (minutes): 5.0

NOTES
The ARK-1M power supply is located on the rear of the vehicle.

Chinese Artillery Locating Radar BL-904



SYSTEM
Alternative Designations: Type 704 and Type 704M
Date of Introduction: 1991
Proliferation: Ready for production
Description:
Crew: 4
Platform (chassis): Dong Feng EQ2100E6D, 2500 kg, 6x6
Combat Weight (mt): 11.5
Chassis Length Overall (m): 6.84 (est.)
Height Overall (m): INA
Width Overall (m): 2.40 (est.)

Automotive Performance:
Engine Type: Cummins 6BT5.9 Diesel
Cruising Range (km): INA
Speed (km/h):
- Max Road: 85
- Max Off-Road: INA
- Cross-Country: INA
- Max Swim: N/A

Fording Depths (m): 0.9

Radio: INA

RADAR
Antenna:
Antenna Type: Phased-Array
Antenna Gain (dBi): 43.3
Mode: Search
- Scan Method: Electronic
- Scan Type: Sector (azimuth)
- Scan Width (deg):
  - Narrow: 30.0
  - Wide: 90.0

Mode: Verification
- Scan Method: Electronic
- Scan Type: Nonperiodic

Mode: Track
- Scan Method: Electronic
- Scan Type: Nonperiodic

Transmitter:
Transmitter Type: Traveling Wave Tube
RF minimum (GHz): 8.0
RF maximum (GHz): 12.0
Mode: All

Receiver:
Noise Figure (dB): 8.0
Single Pulse Processing: Coherent
Multiple Pulse Processing: Doppler Filters

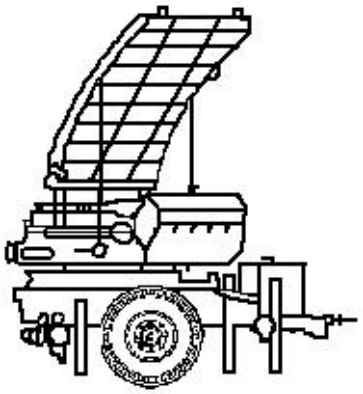
Performance Capability
Detection Range, Wide Scan Mode (km):
- 82-mm Mortar: 15.0
- 122-mm Howitzer: 16.0
- 155-mm Howitzer: 18.0

Detection Range, Narrow Scan Mode (km):
- 122-mm Howitzer: 20.0
- 155-mm Howitzer: 25.0
- 273-mm Rocket: 30.0

Max Number of Targets (tracks/min): 8
Emplacement Time: 10.0 (2 vehicle configuration)
Displacement Time: 10.0 (2 vehicle configuration)

NOTES
Versions of the BL-904 have been offered for sale by NORINCO Industries since at least 1991. While China's army is a prime candidate for the deployment of the BL-904, there is no evidence of it being fielded to operational units. Additionally, the system has not been exported. It was initially named the Type 704. Later an improved-performance version was called the Type 704M. The system is similar to the U.S. AN/TPQ-36 in both appearance and performance (as claimed by the manufacturer). The system can be used to track friendly artillery fire. The system calculates the impact error of friendly artillery rounds and provides automatic correction parameters for increased accuracy. The radar system is employed as a two-vehicle set. One vehicle carries the radar while the other vehicle carries the command cabin and the system power supply. The command cabin co n-tains the operation and control panel, data processing equipment, computer monitors/displays, etc.

British Artillery Locating Radar Cymbeline



Alternative Designations: MUFAR/PIF-518
Date of Introduction: 1973
Proliferation: At least 3 countries
Description:
Crew: 3
Platform (chassis): MK 1 version trailer
Combat Weight (kg): 980
Chassis Length Overall (m): 2.90 (transit)
Height Overall (m): 1.80 (transit)
Width Overall (m): 1.78 (transit)

Automotive Performance:
Cruising Range (km): INA
Speed (km/h):
- Max Road: INA
- Max Off-Road: INA
- Cross-Country: INA
- Max Swim: N/A

Fording Depths (m): .75

Radio: INA

RADAR
Antenna
Antenna Type: Reflector

Search Mode:
- Scan Method: Mechanical
- Scan Type: Sector
- Scan Width (°): 40

Transmitter
Transmitter Type: INA
RF Minimum (GHz): 8.0
RF Maximum (GHz): 12.0
Mode: Search

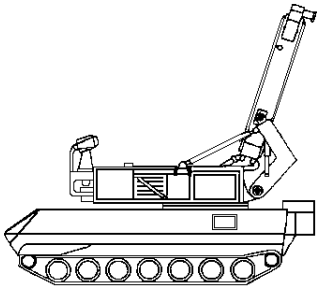
Receiver
Noise Figure (dB): INA
Multiple Pulse Processing: MTI Optional

Performance Capability
Detection Range (km):
- Min: 1.0
- Max: 20.0

Max Number of Targets (tracks/min): 3
Emplacement Time (min): 10.0
Displacement Time (min): 10.0

NOTES
The primary power source for the Cymbeline radar is a Wankel-engined driven generator delivering 1.5 kW at 28 volts d.c. The generator is capable of operating for a period of eight hours prior to refueling. Normally, the radar is transported on a two-wheeled trailer towed behind a prime mover like a Land Rover (or similar type vehicle). Four men for short distances can carry the radar. Additionally, the Cymbeline radar may be mounted on a self-propelled vehicle like the British FV432 Armored Personnel Carrier.

Russian Artillery Locating Radar IL-219



Alternative Designations: Zoopark-1
Date of Introduction:
Proliferation: At least 1 country
Description:
Crew: 3
Platform (chassis): MT-LBu
Combat Weight (mt): INA
Chassis Length Overall (m): 7.62
Height Overall (m): 2.72
Width Overall (m): 2.85

Automotive Performance:
Engine Type: YaMZ-238, 240 hp diesel
Cruising Range (km): 500
Speed (km/h):
- Max Road: 60
- Max Off-Road: 26
- Cross-Country: INA
- Max Swim: 4.5

Fording Depths (m): Amphibious

Radio: R-123M radio

RADAR
Antenna
Antenna Type: Phased-Array
Antenna Gain (dBi): 40.0
Search Mode:
- Scan Method: Electronic
- Scan Type: Sector
- Scan Width (°): 60

Verification Mode:
- Scan Method: Electronic
- Scan Type: Nonscanning
- Scan Width (°): N/A

Track Mode:
- Scan Method: Electronic
- Scan Type: Nonperiodic
- Scan Width (°): 6 (azimuth - nominal value indicated, equal to 10% of the maximum scan)
- Scan Width (°): 4 (elevation - nominal value indicated, equal to 10% of the maximum scan)

Transmitter
Transmitter Type: INA
RF Minimum (GHz): 6.0
RF Maximum (GHz): 8.0
Mode: All

Receiver
Noise Figure (dB): 5.0
Single Pulse Processing: INA
Multiple Pulse Processing: INA

Performance Capability
Detection Range (km):
- 81-mm Mortar: 12.0
- 120-mm Mortar: 15.0
- 105-mm Howitzer: 8.0
- 155-mm Howitzer: 10.0
- 122-mm Rocket: 12.0
- 220-mm Rocket: 20.0
- Tactical Missile: 35.0

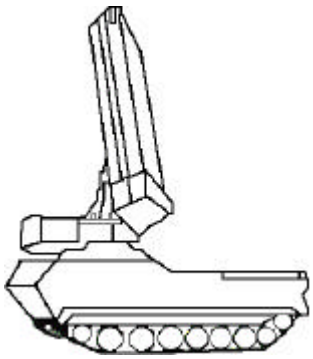
Max Number of Targets (tracks/min): 12
Emplacement Time (min): 5.0
Displacement Time (min): 5.0

NOTES
The Zoopark-1 automated multifunctional reconnaissance and control complex consists of the IL259 radar mounted on a MT-LBu chassis, IL30 maintenance van on a URAL-43203 truck, and the trailer-mounted ED30-T230P-1RPM power station. The MT-Lbu engine driven generator allows for autonomous operation. The ED30-T230P-1RPM power station provides power during vehicle and radar maintenance.

The Zoopark-1 is capable of tracking friendly artillery fire. The system calculates the impact error of friendly artillery rounds and provides automatic correction parameters for increased accuracy. Additionally, the system is also capable of controlling (simultaneously) several remote piloted vehicles (RPVs) using an automatic screen indication with a topographic mapping of calculated and real RPV flight routes. The radar is capable of conducting air traffic control around an airfield or operating area. The radar tracks and establishes the current position of aircraft in the operating area of respo n-sibility and provides real-time data transmission of data received to the air control center.

The antenna beam is electronically phase-steered in azimuth and elevation. The reflect-array is composed of 3328 phase shifters, space-fed by a monopulse horn located on the front side of the array and electronics enclosure. After coming into position, and after the array is raised from the travel position, it is rotated so that its boresight is centered in the assigned coverage sector. The search scan elevation angle is probably fixed, nominally at a low angle in the range of 30 to 50 mils. The search mode will be interrupted by verification and track mode scans during periods when targets are detected. Verification is most likely a non-scanning mode, with the beam pointed at the same elevation angle as the search scan. Also, verification may be repeated for some targets. During the track mode, the radar tracks the target by scanning in both azimuth and elevation.

Ukrainian Artillery Locating Radar IL-220U



Alternative Designations: None
Date of Introduction: Ready for production
Proliferation: At least 1 country
Description:
Crew: INA
Platform (chassis): GM-5951 ATV
Combat Weight (mt): 39.6
Chassis Length Overall (m): 9.42
Height Overall (m): 3.35
Width Overall (m): 3.25

Automotive Performance:
Engine Type: INA
Cruising Range (km): INA
Speed (km/h):
- Max Road: 60
- Max Off-Road: INA
- Cross-Country: INA
- Max Swim: INA

Fording Depths (m): INA

Radio: INA

RADAR
Antenna
Antenna Type: Phased-Array
Antenna Gain (dBi): INA
Search Mode:
- Scan Method: Electronic
- Scan Type: Sector
- Scan Width (°): 60

Verification Mode:
- Scan Method: Electronic
- Scan Type: Monopulse
- Scan Width (°): 2.3 (single beam position is assumed)

Track Mode:
- Scan Method: Electronic
- Scan Type: Monopulse
- Scan Width (°): 6 (10% of the full azimuth sector assumed for a crossing trajectory)

Transmitter
Transmitter Type: Traveling Wave Tube (TWT)
RF Minimum (GHz): 3.0
RF Maximum (GHz): 4.0
Mode: Pulsed

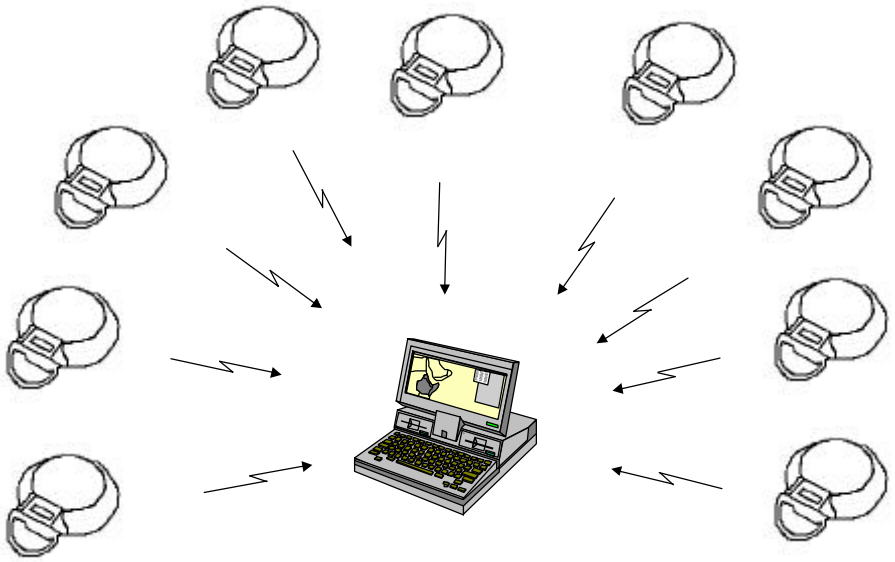
Receiver
Noise Figure (dB): 5.0
Single Pulse Processing: Coherent
Multiple Pulse Processing: MTI and Doppler Filters

Performance Capability
Detection Range (km):
- Mortar: 30.0
- Tube Artillery: 20.0
- Rocket: 40.0
- Tactical Missile: 55.0

Max Number of Targets (tracks/min):
Emplacement Time (min): 5.0
Displacement Time (min): 5.0

NOTES None

Swedish Sound Ranging System SORAS 6



For system description and operation, see NOTES

Alternative Designations: None
Date of Introduction: INA
Proliferation: At least 3 countries
Radio: INA
Calculator
Dimension:
Length (mm): 400
Width (mm): 535
Height (mm): 565
Weight (kg): 52
Memory: 200 targets
Length of microphone cable (km): 1 - 8
Data Output: Display and Paper Strip

Microphones
Total Number: 9
Dimension:
Circumference (mm): 255
Height (mm): 52
Weight (kg): 2.8
Sound Frequency (Hz): 2 to 150
Length of microphone cable (km): 1 - 8

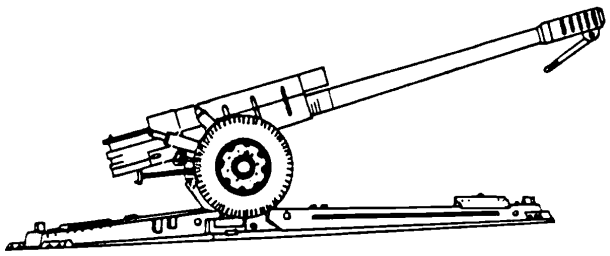
Meteorological Unit
Mast height (m): 15
Mast weight (kg): 40

Performance Capability
Detection Range (km):
Minimum: INA
Maximum: 30.0
Precision:
Under 10 km: 1% of the measured distance
Under 30 km: 2% of the measured distance
Emplacement Time (min): Varies
Displacement Time (min): Varies

NOTES
SOund RAnging System (SORAS) 6 is a fully automated, EMP-protected, completely passive sound ranging system capable of accurately locating enemy gun positions. Each microphone is surveyed into position, and acoustically designates an azimuth to each firer. The computer terminal then calculates intersection points with the azimuths, for target locations. The system operates in temperatures ranging from -40 ° to +55° C. Normally, it takes between 2 and 45 seconds for the calculator to calculate target coordinates. But, the target coordinate calculation time depends on the number of sound sources within the same interval of time. Nine microphones are deployed in an area 8 km wide and 1-2 km deep. The microphone positions are determined by conventional surveying methods or by special equipment. An alarm on the calculator is automatically triggered if contact is broken with any of the microphones. Two people can connect the meteorological unit and raise the mast in 15 to 20 mi nutes.

The above schematic is representative of the system, and does not reflect the actual Soras 6 computer terminal and associated hardware.

Russian 122-mm Towed Howitzer D-30A



Weapons & Ammunition Types	Typical Combat Load
122-mm howitzer Frag-HE Smoke Illumination	

SYSTEM
Alternative Designations: 122-mm D-30A Lyagushka
Date of Introduction: 1963
Proliferation: At least 13 countries
Description:
Crew: 5 (section of 6)
Carriage: D-30
Combat Weight (mt): 3.2
Chassis Length Overall (m):
Travel Position: 5.4
Firing Position: INA
Height Overall (m): 1.6
Width Overall (m):
Travel Position: 1.9
Firing Position: INA
Towing Speed (km/h):
Max Road: 60
Max Off-Road: 25
Max Cross-Country:
Fording Depths (m): .5
Emplacement Time (min): 1.5
Displacement Time (min): 3.5

Prime Mover: MT-LB; Ural-375, or equivalent

ARMAMENT
Main Armament:
Caliber, Type, Name: 122-mm, 2A18M canon
Barrel Length (cal): 38 (approximately)
Rate of Fire (rpm):
Burst: 8
Normal: 6
Sustained: 4
Loader Type: Semi-automatic
Breech Type: Vertical sliding wedge
Muzzle Brake Type: Multi-baffle
Traverse: (°):
Left: 360
Right: 360
Total: 360
Elevation (°) (-/+): -7/+70°

FIRE CONTROL
Indirect Fire: PG-1M Panoramic Telescope (PANTEL)
Direct Fire: OP 4M-45
Collimator: K-1
Gun Display Unit: None
Fire Control Computer: None

VARIANTS
Saddam: Iraqi produced version of the D-30
D30J: Yugoslavian produced version of the D-30
SP 122: Egyptian self-propelled howitzer (M109A2 chassis and turret with an Egyptian made D-30 howitzer).
Type 85: Chinese self-propelled howitzer (Chinese Type 85 APC chassis and a licensed produced version of the D-30 in a semi-open superstructure.)

MAIN ARMAMENT AMMUNITION
Caliber, Type, Name:
122-mm Frag-HE, OF-81
Indirect Fire Range (m):
Minimum Range: 1000
Maximum Range: 15,300
Complete Projectile Weight (kg): 21.76 (OF-56)
Muzzle Velocity: 680 m/s
Fuze Type: RGM-2 PD

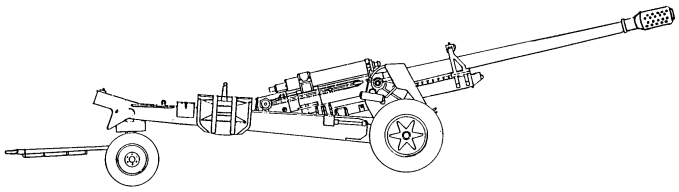
122-mm, HEAT-FS
Direct Fire Range (m):
Minimum Range: 0
Maximum Range: 1000
Armor Penetration (mm): 460 (@ 0° obliquity any range)
Complete Projectile Weight (kg): 21.58
Muzzle Velocity: 740 m/s
Fuze Type: GPV-2 PIBD

122-mm Frag-HE Rocket Assisted
Indirect Fire Range (m):
Minimum Range: INA
Maximum Range: 21,900
Complete Projectile Weight (kg): 21.76 (3OF-56)
Muzzle Velocity: INA
Fuze Type: PD

Other Ammunition Types: Incendiary, Chemical, Flechette, Semi-active laser-guided Kitolov-2M Frag-HE

NOTES
The D-30A is a midlife product improvement of the D-30. The original D-30 was fielded in 1963 and the midlife product improvements occurred in the mid to late 1970's. The original D-30 is in use with at least 50 different countries.

Russian 130-mm Towed Gun M-46



Weapons & Ammunition Types	Typical Combat Load
130-mm howitzer Frag-HE Smoke Illumination	

SYSTEM
Alternative Designations: None
Date of Introduction: 1954
Proliferation: At least 25 countries
Description:
Crew: 8
Carriage: M-46
Combat Weight (mt): 8.45
Chassis Length Overall (m):
Travel Position: 11.73
Firing Position: 11.10
Height Overall (m): 2.55
Width Overall (m):
Travel Position: 2.45
Firing Position: INA
Towing Speed (km/h):
Max Road: 50
Max Off-Road: 20
Max Cross-Country: 10
Fording Depths (m): INA
Emplacement Time (min): 6
Displacement Time (min): 7

Prime Mover: AT-S 59, KrAZ-255 or equivalent

ARMAMENT
Main Armament:
Caliber, Type, Name: 130-mm, canon
Barrel Length (cal): 52 (approximately)
Rate of Fire (rpm):
Burst: 8
Normal: 6
Sustained: 5
Loader Type: Manual
Breech Type: Horizontal sliding wedge
Muzzle Brake Type: Multiperforated (pepperpot)
Traverse: (°):
Left: 25
Right: 25
Total: 50
Elevation (°) (-/+): -2.5/+45°

FIRE CONTROL
Indirect Fire: PG-1 Panoramic Telescope (PANTEL)
Direct Fire: OP 4-35
Collimator: K-1
Gun Display Unit: None
Fire Control Computer: None

VARIANTS
None

MAIN ARMAMENT AMMUNITION
Caliber, Type, Name:
130-mm Frag-HE, OF44
Indirect Fire Range (m):
Minimum Range: INA
Maximum Range: 22,500
Complete Projectile Weight (kg): 33.40 (OF33)
Muzzle Velocity: 930 m/s
Fuze Type: V-429 PD

130-mm, APC-T
Direct Fire Range (m):
Minimum Range: 0
Maximum Range: 1140
Armor Penetration (mm): INA
Complete Projectile Weight (kg): 33.49 (BR-482B)
Muzzle Velocity: INA
Fuze Type: DBR BD

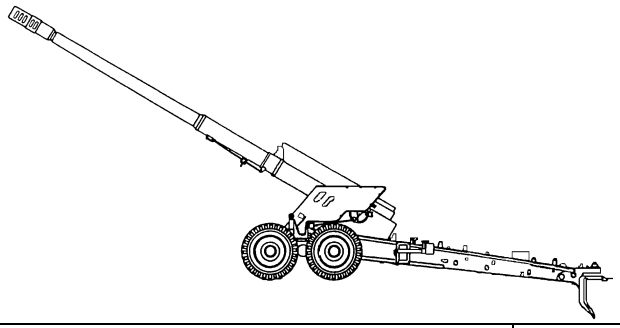
130-mm Frag-HE, OF-43
Indirect Fire Range (m):
Minimum Range: INA
Maximum Range: 27,500
Complete Projectile Weight (kg): 33.40 (OF-33)
Muzzle Velocity: 930 m/s
Fuze Type: V-429 PD

130-mm Frag-HE, ERFB-BB
Indirect Fire Range (m):
Minimum Range: INA
Maximum Range: 38,000
Complete Projectile Weight (kg): 33.40
Muzzle Velocity: 940 m/s
Fuze Type: ML-5 PD

Other Ammunition Types: Smoke, Chemical, Illumination

NOTES:
The M-46 gun crew is provided limited frontal protections by virtue of a frontal V-shaped shield (approximately 7-mm thick). Otherwise, the crew, ammunition supply, and equipment are vulnerable to casualties and damage from small arms fire, artillery fire, and bomb shrapnel. The Extended Range Full Bore-Base Bleed round was specifically designed by NORINCO Industries (China) for use with the Chinese 130-mm Type 59 Field Gun. However, this round may be fired by the M-46.

Russian 152-mm Towed Gun 2A36



Weapons &Ammunition Types	Typical Combat Load
152-mm gun Frag-HE Smoke Illumination	

SYSTEM
Alternative Designations: 2A36 Giatsint-B
Date of Introduction: 1981
Proliferation: At least 11 countries
Description:
Crew: 8
Carriage: 2A36
Combat Weight (mt): 9.80
Chassis Length Overall (m):
Travel Position: 12.9
Firing Position: 11.0
Height Overall (m): 2.7
Width Overall (m):
Travel Position: 2.7
Firing Position: 8.7
Towing Speed (km/h):
Max Road: 70
Max Off-Road: 20
Max Cross-Country: 15
Fording Depths (m): .6
Emplacement Time (min): 5
Displacement Time (min): 7

Prime Mover: KrAZ-4556, KrAZ-255B, or AT-S tractor

ARMAMENT
Main Armament:
Caliber, Type, Name: 152-mm, cannon
Barrel Length (cal): 49
Rate of Fire (rpm):
Burst: 6
Normal: 5
Sustained: 4
Loader Type: Semi-automatic
Breech Type: Horizontal sliding wedge
Muzzle Brake Type: Multi baffle
Traverse (°):
Left: 25
Right: 25
Total: 50
Elevation (°) (-/+): -2/+57°

FIRE CONTROL
Indirect Fire: PG-1M Panoramic Telescope (PANTEL)
Direct Fire: N/A
Collimator: K-1
Gun Display Unit: None
Fire Control Computer: None

VARIANTS: None

MAIN ARMAMENT AMMUNITION
Caliber, Type, Name:
152-mm Frag-HE, OF-39 (RAP)
Indirect Fire Range (m):
Minimum Range: 9,100
Maximum Range: 28,400
Complete Projectile Weight (kg): 43.51 (OF-29)
Muzzle Velocity (m/s): 945
Fuze Type: V-429 PD

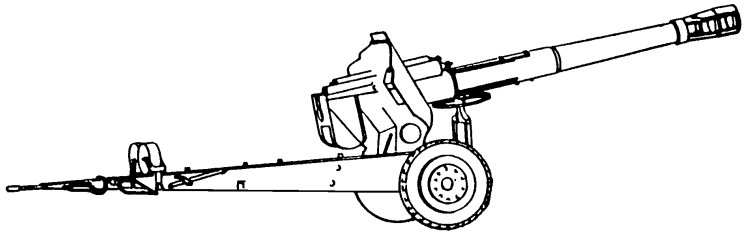
Caliber, Type, Name:
152-mm, HEAT, BP-540
Direct Fire Range (m):
Minimum Range: 0
Maximum Range: 1,000
Armor Penetration (mm): INA
Complete Projectile Weight (kg): 27.00
Muzzle Velocity (m/s): 655
Fuze Type: GPV-3 PD

Caliber, Type, Name:
152-mm Frag-HE, OF-86
Indirect Fire Range (m):
Minimum Range: 0
Maximum Range: 30,500
Complete Projectile Weight (kg): 43.8 (OF-59)
Muzzle Velocity (m/s): 945
Fuze Type: V-429 PD

Other Ammunition Types: DPICM, DPICM-BB, Incendiary, Chemical, Flechette, Semi-active laser-guided Krasnopol-M Frag-HE

NOTES
The most distinguishing feature of the 2A36 is its lower carriage. The large system weight required the use of tandem "walking-beam" axles and four wheels to provide mobility. A hydraulically powered firing pedestal is mounted on the front of the lower carriage and serves as part of the travel lock (similar to the D-20). Although the trails do not have the folding summer spades of the D-20, they do have two large spades similar to those found on the M-46/M-47. The weight of the 2A36 normally requires it to be towed by a heavy truck (like the KrAZ-255B). The KrAZ-255B is equipped with a special winch used to lift the trails in order to attach the gun' s lunette to the towing pintle.

Russian 152-mm Towed Gun-Howitzer D-20



Weapons & Ammunition Types	Typical Combat Load
152-mm howitzer Frag-HE Smoke Illumination	

SYSTEM
Alternative Designations: None
Date of Introduction: 1955
Proliferation: At least 13 countries
Description:
Crew: 8
Carriage: 122-mm gun D-74
Combat Weight (mt): 5.7
Chassis Length Overall (m):
- Travel Position: 8.10
- Firing Position: 8.69

Height Overall (m): 2.52
Width Overall (m):
- Travel Position: 2.35
- Firing Position: INA

Towing Speed (km/h):
- Max Road: 60
- Max Off-Road: 30
- Max Cross-Country: 15

Fording Depths (m): .5
Emplacement Time (min): 2.5
Displacement Time (min): 2.5

Prime Mover: AT-S Tracked vehicle; MT-LB; Ural-375; Ural-4320

ARMAMENT
Main Armament:
Caliber, Type, Name: 152-mm, canon
Barrel Length (cal): 25
Rate of Fire (rpm):
- Burst: 5-6
- Normal: INA
- Sustained: 1 (65 rounds the first hour)

Loader Type: Manual
Breech Type: Vertical sliding wedge
Muzzle Brake Type: Double flared
Traverse: (°):
- Left: 29
- Right: 29
- Total: 58

Elevation (°) (-/+):-5/+45°

FIRE CONTROL
Indirect Fire: PG-1M Panoramic Telescope (PANTEL)
Direct Fire: OP 4M
Collimator: K-1
Gun Display Unit: None
Fire Control Computer: None

VARIANTS
None

MAIN ARMAMENT AMMUNITION
Caliber, Type, Name:
152-mm Frag-HE, OF32
- Indirect Fire Range (m):
  - Minimum Range: 4600
  - Maximum Range: 17,400
- Complete Projectile Weight (kg): 43.56 (OF25)
- Muzzle Velocity: 655 m/s
- Fuze Type: V-90 PD

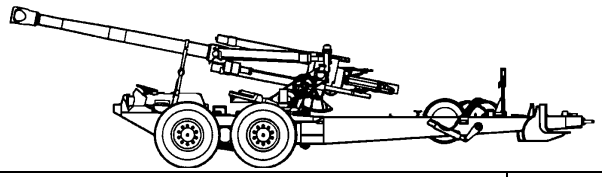
152-mm, HEAT, BP-540
- Direct Fire Range (m):
  - Minimum Range: 0
  - Maximum Range: 1000
- Armor Penetration (mm): INA
- Complete Projectile Weight (kg): 27.00
- Muzzle Velocity: 655 m/s
- Fuze Type: GPV-3 PD

152-mm Frag-HE, OF-96
- Indirect Fire Range (m):
  - Minimum Range: INA
  - Maximum Range: 24,400
- Complete Projectile Weight (kg): 43.56 (OF-64)
- Muzzle Velocity: INA
- Fuze Type: PD

Other Ammunition Types: DPICM, DPICM-BB, Incendiary, Expendable Jammer, Chemical, Flechette, Semi-active laser-guided Krasnopol-M Frag-HE

NOTES
The D-20 was the first 152-mm cannon system to incorporate a semiautomatic vertical-sliding-wedge breech block. Although the ammunition for the system was not changed, this modification allowed a slightly higher rate of fire to be achieved (6 rounds per minute rather than 4), although the sustained rate of fire was unchanged. Because the carriage is based on that of the 122-mm gun D-74, the D-20 cannot be elevated above 45°.

South African 155-mm Towed Gun-Howitzer G5



Weapons & Ammunition Types	Typical Combat Load
155-mm howitzer Frag-HE Smoke Illumination	

SYSTEM
Alternative Designations: None
Date of Introduction: 1981
Proliferation: At least 4 countries
Description:
Crew: 8
Carriage: G5
Combat Weight (mt): 13.75
Chassis Length Overall (m):
Travel Position: 12.1
Firing Position: 11.0
Height Overall (m): 2.3
Width Overall (m):
Travel Position: 3.3
Firing Position: 8.7
Towing Speed (km/h):
Max Road: 90
Max Off-Road: 50
Max Cross-Country: 15
Fording Depths (m): .6
Emplacement Time (min): 2
Displacement Time (min): 1

Auxiliary Propulsion Unit Performance:
Engine Type: 76 hp air-cooled diesel
Cruising Range (km): 100
Speed (km/h):
Max Road: 16
Max Off-Road: INA
Cross-Country: 3
Max Swim: N/A

Prime Mover: Samil 100 6x6 artillery tractor or a 10 ton equivalent

ARMAMENT
Main Armament:
Caliber, Type, Name: 155-mm, canon
Barrel Length (cal): 45
Rate of Fire (rpm):
Burst: 3
Normal: 2
Sustained: 2
Loader Type: Semi-automatic
Breech Type: Interrupted screw
Muzzle Brake Type: Single baffle
Traverse: (°):
Left: 41
Right: 41
Total: 82
Elevation (°) (-/+): -3/+75°

FIRE CONTROL
Indirect Fire: Digital Panoramic Telescope
Direct Fire: Trunnion mounted telescopic sight
Collimator: INA
Gun Display Unit: None
Fire Control Computer: None

VARIANTS
G-5 MkIII Upgrade of G-5 (see NOTES)

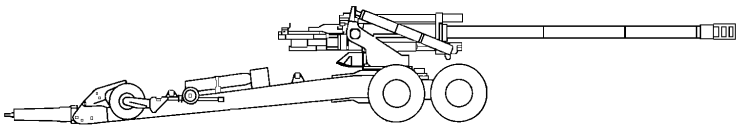
MAIN ARMAMENT AMMUNITION
Caliber, Type, Name:
155-mm Frag-HE, M1 HE
Indirect Fire Range (m):
Minimum Range: 3000
Maximum Range: 30,000
Complete Projectile Weight (kg): 8.7
Muzzle Velocity: 897 m/s
Fuze Type: PD M841

155-mm Frag-HE BB, M1 HE
Indirect Fire Range (m):
Minimum Range: INA
Maximum Range: 39,000
Complete Projectile Weight (kg): 8.7
Muzzle Velocity: 895 m/s
Fuze Type: PD M841

Other Ammunition Types: See NOTES

NOTES
The G5 is fully compatible with NATO standard 155-mm ammunition and has a direct fire range of 3000 meters (using a Frag-HE round). The APU, combined with the tandem walking-beam suspension, gives the G5 excellent self-propelled mobility over short distances. The four wheels are all powered and give the gun excellent traction over most terrain. But, the APU serves purposes other than mobility. It provides power to open and close the trails, raise and lower the trail wheels, and raise and lower the firing platform. However, there is no power traverse or elevation. Although designed for an eight-man section, the South African Defense Force normally operates the G5 with a five-man section. However, the G5 can operate with minimum of two people when all of the powered systems are working. The G-5 MkIII includes 35 reliability modifications and performance improvements. The improvements include the addition of the AS2000 Gun Monitor, an improved braking system, bigger diameter and wider trail wheels (specifically designed for sand), and incorporation of the REUTECH ACV 58 Communications System.

Austrian 155-mm Towed Gun-Howitzer GH N-45



Weapons &Ammunition Types	Typical Combat Load
155-mm howitzer Frag-HE Smoke Illumination	

SYSTEM
Alternative Designations: None
Date of Introduction: 1980
Proliferation: At least 9 countries
Description:
Crew: 6
Carriage: GH N-45
Combat Weight (mt):
GH N-45: 8.90
GH N-45 APU: 11.00
Chassis Length Overall (m):
Travel Position: 9.06
Firing Position: 11.53
Travel Position (GH N-45 APU): 9.55
Firing Position (GH N-45 APU): 11.53
Height Overall (m): (at 0º elevation)
Travel Position: 2.15
Firing Position: 2.20
Travel Position (GH N-45 APU): 2.15
Firing Position (GH N-45 APU): 2.20
Width Overall (m):
Travel Position: 2.50
Firing Position: 9.93
Travel Position (GH N-45 APU): 2.75
Firing Position (GH N-45 APU): 9.93
Towing Speed (km/h):
Max Road: 90
Max Off-Road: 50
Max Cross-Country: 15
Fording Depths (m): .6
Emplacement Time (min): 4
Displacement Time (min): 4

Auxiliary Propulsion Unit Performance:
Engine Type: 125 hp air-cooled diesel
Cruising Range (km): 150
Speed (km/h):
Max Road: 35
Max Off-Road: INA
Cross-Country: 3
Max Swim: N/A

Prime Mover: 10 ton 6x6 truck or artillery tractor

ARMAMENT
Main Armament:
Caliber, Type, Name: 155-mm, cannon
Barrel Length (cal): 45
Rate of Fire (rpm):
Burst: 7
Normal: 3
Sustained: 2
Loader Type: Semi-automatic
Breech Type: Interrupted screw
Muzzle Brake Type: Multi-baffle
Traverse (°):
Left: 30
Right: 40
Total: 70
Elevation (°) (-/+): -5/+72°

FIRE CONTROL
Indirect Fire: Digital Panoramic Telescope
Direct Fire: Trunnion mounted telescopic sight
Collimator: INA
Gun Display Unit: None
Fire Control Computer: None

VARIANTS
GH N-45 A1 Upgrade of GH N-45 (See NOTES)

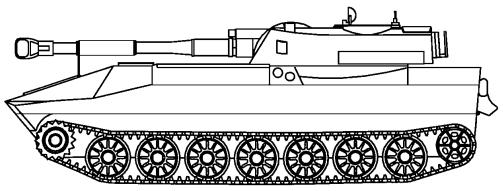
MAIN ARMAMENT AMMUNITION
Caliber, Type, Name:
155-mm Frag-HE, SN-101
Indirect Fire Range (m):
Minimum Range: INA
Maximum Range: 25,100
Complete Projectile Weight (kg): 42.3
Muzzle Velocity (m/s): 897
Fuze Type: PD

Caliber, Type, Name:
155-mm Frag-HE ERFB
Indirect Fire Range (m):
Minimum Range: INA
Maximum Range: 39,600
Complete Projectile Weight (kg): 45.4
Muzzle Velocity (m/s):: 895
Fuze Type: PD

Other Ammunition Types: See NOTES

NOTES
The GH N-45 is fully compatible with NATO standard 155-mm ammunition. The APU, combined with the tandem walking-beam suspension, gives the GH N-45 excellent self-propelled mobility over short distances. The four wheels are all powered and give the gun excellent traction over most terrain. But, the APU serves purposes other than mobility. It provides power to open and close the trails, raise and lower the trail wheels, and raise and lower the firing platform. However, there is no power traverse or elevation. The GH N-45 also includes an optional chain system (reducing the ground pressure) to improve cross-country mobility in deep, muddy, or sandy terrain. The GH N-45 A1 includes reliability modifications and pe r-formance improvements.

Russian 122-mm Self-Propelled Howitzer 2S1



Weapons & Ammunition Types	Typical Combat Load
122-mm howitzer	**45**
Frag-HE HEAT-FS Smoke Illumination	

SYSTEM
Alternative Designations: 122-mm 2S1 Gvozdika
Date of Introduction: 1974
Proliferation: At least 12 countries
Description:
Crew: 4 (section of 6 with 2 in ammo carrier)
Platform (chassis): MT-LBu
Combat Weight (mt): 15.7
Chassis Length Overall (m): 7.26
Height Overall (m): 2.72
Width Overall (m): 2.85

Automotive Performance:
Engine Type: V-8, 300 hp, Diesel
Cruising Range (km): 500 km
Speed (km/h):
- Max Road: 60
- Max Off-Road: 30
- Cross-Country: INA
- Max Swim: 4.5

Fording Depths (m): Amphibious
Emplacement Time (min): 2
Displacement Time (min): 1

Radio: R-123M

Protection:
Armor, Turret (mm): 20
Armor Turret Top (mm): 10
Armor Hull (mm): 15
Self-Entrenching Blade: No
NBC Protection System: Yes
Smoke Equipment: No

ARMAMENT
Main Armament:
Caliber, Type, Name: 122-mm, canon, 2A31
Barrel Length (cal): 36
Rate of Fire (rpm):
- Burst: 5
- Normal: 4
- Sustained: 1-2
- Fire from Ground: INA

Loader Type: Semi-automatic
Breech Type: Horizontal sliding wedge
Muzzle Brake Type: Double baffle
Traverse: (°):
- Left: 360
- Right: 360
- Total: 360

Elevation (°) (-/+): -3/+70°

FIRE CONTROL
Indirect Fire: PG-2 Panoramic Telescope (PANTEL)
Direct Fire: OP 5-37
Collimator: K-1
Gun Display Unit: None
Fire Control Computer: None

VARIANTS
None

MAIN ARMAMENT AMMUNITION
Caliber, Type, Name:
122-mm Frag-HE, OF-81
- Indirect Fire Range (m):
  - Minimum Range: 1000
  - Maximum Range: 15,300
- Complete Projectile Weight (kg): 21.76 (OF-56)
- Muzzle Velocity: 680 m/s
- Fuze Type: RGM-2 PD

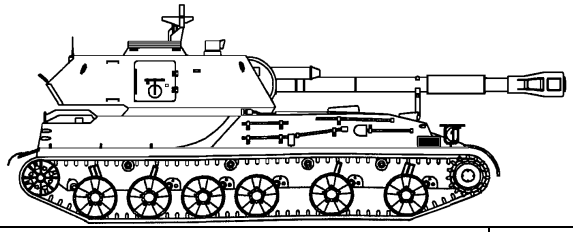
122-mm, HEAT-FS
- Direct Fire Range (m):
  - Minimum Range: 0
  - Maximum Range: 1000
- Armor Penetration (mm): 460 (@ 0° obliquity any range)
- Complete Projectile Weight (kg): 21.58
- Muzzle Velocity: 740 m/s
- Fuze Type: GPV-2 PIBD

122-mm Frag-HE Rocket Assisted
- Indirect Fire Range (m):
  - Minimum Range: INA
  - Maximum Range: 21,900
- Complete Projectile Weight (kg): 21.76 (3OF-56)
- Muzzle Velocity: INA
- Fuze Type: PD

Other Ammunition Types: Incendiary, Chemical, Flechette, Expendable Jammer, Semi-active laser-guided Kitolov-2M Frag-HE

NOTES
The 2S1's ammunition stowage rack is not mechanized. The 2S1 is manually loaded with a semiautomatic ramming capability. The four-man crew consists of the commander, driver, gunner, and loader.

Russian 152-mm Self-Propelled Gun-Howitzer 2S3M



Weapons & Ammunition Types	Typical Combat Load
152-mm howitzer	**46**
Frag-HE	
Smoke	
Illumination	
7.62 PKT MG	**1500**

SYSTEM
Alternative Designations: 152-mm 2S3M Akatsiya
Date of Introduction: 1973
Proliferation: At least 8 countries
Description:
Crew: 4
Platform (chassis): Modified SA-4 Ganef
Combat Weight (mt): 27.5
Chassis Length Overall (m): 7.75
Height Overall (m): 3.13
Width Overall (m): 3.21

Automotive Performance:
Engine Type: 520-hpV-59 V-12 multi-fuel diesel
Cruising Range (km): 450 km
Speed (km/h):
- Max Road: 60
- Max Off-Road: 25
- Cross-Country: INA
- Max Swim: N/A

Fording Depth (m): 1.00
Emplacement Time (min): 3
Displacement Time (min): 3

Radio: R-123M

Protection:
Armor, Turret (mm): 20
Armor Turret Top (mm): 15
Armor Hull (mm): INA
Self-Entrenching Blade: Yes
NBC Protection System: Yes
Smoke Equipment: No

ARMAMENT
Main Armament:
Caliber, Type, Name: 152-mm, 2A33
Barrel Length (cal): 34
Rate of Fire (rpm):
- Burst: 4
- Normal: 3
- Sustained: 1
- Fire from Ground: INA

Loader Type: Semiautomatic
Breech Type: Vertical sliding wedge
Muzzle Brake Type: Double baffle
Traverse: (°):
- Left: 360
- Right: 360
- Total: 360

Elevation (°) (-/+): -4/+60°

Auxiliary Weapon:
Caliber, Type, Name: 7.62-mm machinegun PKT
Mount Type: Bow (ball-mounted)
Direct Fire Range (m): 1000
Max Effective Range (m)`:
- Day: 1000 /400-500 on the move
- Night: 800

Fire on Move: Yes
Rate of Fire (rpm): 650 (cyclic)

FIRE CONTROL
Indirect Fire: PG-4 Panoramic Telescope (PANTEL)
Direct Fire: OP 5-38
Collimator: K-1
Gun Display Unit: None
Fire Control Computer: None

VARIANTS
2S3M1: Upgrade of 2S3M

MAIN ARMAMENT AMMUNITION
Caliber, Type, Name:
152-mm Frag-HE, OF32
- Indirect Fire Range (m):
  - Minimum Range: 4600
  - Maximum Range: 17,400
- Complete Projectile Weight (kg): 43.56 (OF25)
- Muzzle Velocity: 655 m/s
- Fuze Type: V-90 PD

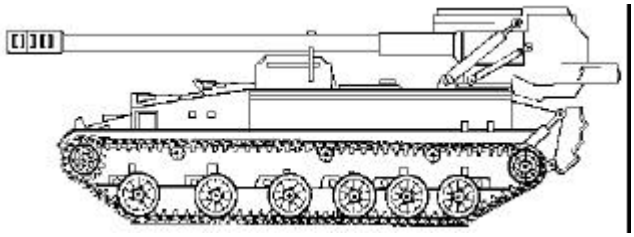
152-mm, HEAT, BP-540
- Direct Fire Range (m):
  - Minimum Range: 0
  - Maximum Range: 1000
- Armor Penetration (mm): INA
- Complete Projectile Weight (kg): 27.00
- Muzzle Velocity: 655 m/s
- Fuze Type: GPV-3 PD

152-mm Frag-HE, OF-96
- Indirect Fire Range (m):
  - Minimum Range: INA
  - Maximum Range: 24,400
- Complete Projectile Weight (kg): 43.56 (OF-64)
- Muzzle Velocity: INA
- Fuze Type: PD

Other Ammunition Types: DPICM, DPICM-BB, Incendiary, Chemical, Flechette, Semi-active laser-guided Krasnopol-M Frag-HE

NOTES
The 2S3M is an upgrade version of the 2S3. The 2S3M turret contains the 2A33 cannon, fire-control equipment, ammunition storage space, and work positions for commander, gunner, and loader. The cannon extends beyond the vehicle front and has an electrical loader/rammer attached to the cradle. Ammunition is stored in the rear of the chassis and can be replenished through a hatch in the rear panel.

Russian 152-mm Self-Propelled Gun 2S5



Weapons & Ammunition Types	Typical Combat Load
152-mm howitzer	**30**
Frag-HE	
Smoke	
Illumination	
7.62 PKT MG	**1500**

SYSTEM
Alternative Designations: 152-mm 2S5 Giatsint-S
Date of Introduction: 1981
Proliferation: At least 4 countries
Description:
Crew: 5 (section of 7 with 2 in ammo carrier)
Platform (chassis): Modified 2S3
Combat Weight (mt): 28.2
Chassis Length Overall (m): 8.33
Height Overall (m): 2.76
Width Overall (m): 3.25

Automotive Performance:
Engine Type: 520-hp V-59-V-12 multi-fuel diesel
Cruising Range (km): 500 km
Speed (km/h):
- Max Road: 63
- Max Off-Road: 25
- Cross-Country: INA
- Max Swim: 4.5

Fording Depths (m): 1.05
Emplacement Time (min): 2
Displacement Time (min): 1

Radio: R-123M

Protection:
Armor, Turret (mm): INA
Armor Turret Top (mm): 15
Armor Hull (mm): 15
Self-Entrenching Blade: Yes
NBC Protection System: Yes
Smoke Equipment: None

ARMAMENT
Main Armament:
Caliber, Type, Name: 152-mm, canon, 2A37
Barrel Length (cal): 52
Rate of Fire (rpm):
- Burst: 6
- Normal: 5
- Sustained: 1-2
- Fire from Ground: INA

Loader Type: Semi-automatic
Breech Type: Horizontal sliding wedge
Muzzle Brake Type: Multi baffle
Traverse: (°):
- Left: 15
- Right: 15
- Total: 30

Elevation (°) (-/+): -2/+57°

Auxiliary Weapon:
Caliber, Type, Name: 7.62-mm machinegun PKT
Mount Type: Bow (ball-mounted)
Direct Fire Range (m): 1000
Max Effective Range (m)`:
- Day: 1000 /400-500 on the move
- Night: 800

Fire on Move: Yes
Rate of Fire (rpm): 650 (cyclic)

FIRE CONTROL
Indirect Fire: PG-1M Panoramic Telescope (PANTEL)
Direct Fire: N/A
Collimator: K-1
Gun Display Unit: None
Fire Control Computer: None

VARIANTS
None

MAIN ARMAMENT AMMUNITION
Caliber, Type, Name:
152-mm Frag-HE, OF-39
- Indirect Fire Range (m):
  - Minimum Range: 9100
  - Maximum Range: 28,400
- Complete Projectile Weight (kg): 43.51 (OF-29)
- Muzzle Velocity: 945 m/s
- Fuze Type: V-429 PD

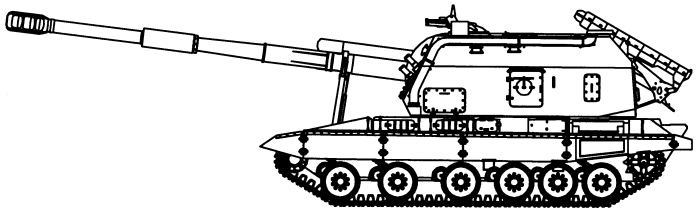
152-mm, HEAT, BP-540
- Direct Fire Range (m):
  - Minimum Range: 0
  - Maximum Range: 1000
- Armor Penetration (mm): INA
- Complete Projectile Weight (kg): 27.00
- Muzzle Velocity: 655 m/s
- Fuze Type: GPV-3 PD

152-mm Frag-HE, OF-86
- Indirect Fire Range (m):
  - Minimum Range: INA
  - Maximum Range: 30,500
- Complete Projectile Weight (kg): 43.8 (OF-59)
- Muzzle Velocity: 945 m/s
- Fuze Type: V-429 PD

Other Ammunition Types: DPICM, DPICM-BB, Incendiary, Chemical, Flechette, Semi-active laser-guided Krasnopol-M Frag-HE

NOTES
The 2S5 is more powerful, has a longer range and a higher rate of fire than the 2S3. However, the 2S5 has a limited main armament traverse and a narrower elevation range than the 2S3.

Russian 152-mm Self-Propelled Howitzer 2S19



Weapons & Ammunition Types	Typical Combat Load
152-mm howitzer	**50**
Frag-HE Smoke Illumination	
12.7-mm MG	**300**

SYSTEM
Alternative Designations: 152-mm 2S19 Msta-S
Date of Introduction: 1989
Proliferation: At least 4 countries
Description:
Crew: 5 (section of 7 with 2 in ammo carrier)
Platform (chassis): Modified T-72
Combat Weight (mt): 42
Chassis Length Overall (m): 11.91
Height Overall (m): 2.98
Width Overall (m): 3.58

Automotive Performance:
Engine Type: 840-hp V84-A diesel
Cruising Range (km): 500 km
Speed (km/h):
Max Road: 60
Max Off-Road: 25
Cross-Country: INA
Max Swim: N/A
Fording Depths (m): Unprepared: 1.5
Emplacement Time (min): 1-2
Displacement Time (min): 1-2

Radio: R-173

Protection:
Armor, Turret (mm): 15
Armor Turret Top (mm): 15
Armor Hull (mm): 15
Self-Entrenching Blade: Capable of digging a complete firing pit in 40-60 minutes
NBC Protection System: Yes
Smoke Equipment: Six Type 902 smoke grenade launchers and Vehicle engine exhaust smoke system (VEESS)

ARMAMENT
Main Armament:
Caliber, Type, Name: 152-mm, canon, 2A64
Barrel Length (cal): 48
Rate of Fire (rpm):
Burst: 8
Normal: 6
Sustained: 2
Fire from Ground: 6-7
Loader Type: autoloader
Breech Type: Vertical sliding wedge
Muzzle Brake Type: Double baffle
Traverse: (°):
Left: 360
Right: 360
Total: 360
Elevation (°) (-/+): -4/+68°

Auxiliary Weapon:
Caliber, Type, Name: 12.7-mm NSVT machinegun
Mount Type: PZU-5 AA
Direct Fire Range (m): 2000
Max Effective Range (m)`:
Day: 1500 (AA)/1500 (Ground)
Night: N/A
Fire on Move: Yes
Rate of Fire (rpm): 800 (cyclic)

FIRE CONTROL
Indirect Fire: 1P22 Panoramic Telescope (PANTEL)
Direct Fire: 1P23
Collimator: K-1
Gun Display Unit: None
Fire Control Computer: None

VARIANTS
None

MAIN ARMAMENT AMMUNITION
Caliber, Type, Name:
152-mm Frag-HE, OF-72
Indirect Fire Range (m):
Minimum Range: 6500
Maximum Range: 24,700
Complete Projectile Weight (kg): 43.56 (OF-45)
Muzzle Velocity: 864 m/s
Fuze Type: RGM-2 PD

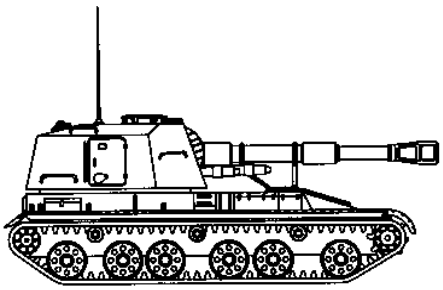
152-mm, HEAT, BP-540
Direct Fire Range (m):
Minimum Range: 0
Maximum Range: 1000
Armor Penetration (mm): INA
Complete Projectile Weight (kg): 27.00
Muzzle Velocity: 655 m/s
Fuze Type: GPV-3 PD

152-mm Frag-HE BB, OF-91
Indirect Fire Range (m):
Minimum Range: 6710
Maximum Range: 29,000
Complete Projectile Weight (kg): 42.86 (OF-61)
Muzzle Velocity: 828 m/s
Fuze Type: KZ-88 PD

Other Ammunition Types: All standard 152-mm artillery rounds

NOTES
The 2S19's gun crew can load the gun at any angle of elevation. The 2S19 can also produce a smokescreen by injecting diesel fuel into the exhaust outlet. The 21-hp gas turbine AP-18D Auxiliary Power Unit provides power for turret operations when the vehicle engine is shut down.

Chinese 152-mm Self-Propelled Gun-Howitzer Type 83



Weapons & Ammunition Types	Typical Combat Load
152-mm howitzer	**30**
Frag-HE Smoke Illumination	
12.7-mm MG	**650**
7.62-mm MG	**650**

SYSTEM
Alternative Designations: None
Date of Introduction: 1984
Proliferation: At least 1 country
Description:
Crew: 5
Platform (chassis): Type 83
Combat Weight (mt): 30.0
Chassis Length Overall (m): 7.33
Height Overall (m): 3.50
Width Overall (m): 3.24

Automotive Performance:
Engine Type: Type 12150L, V-12, 520-hp liquid-cooled diesel
Cruising Range (km): 450 km
Speed (km/h):
- Max Road: 55
- Max Off-Road: 35
- Cross-Country: INA
- Max Swim: N/A

Fording Depth (m): 1.3
Emplacement Time (min): 1
Displacement Time (min): 1

Radio: Type 889D

Protection:
Armor, Turret (mm): INA
Armor Turret Top (mm): INA
Armor Hull (mm): INA
Self-Entrenching Blade: No
NBC Protection System: No
Smoke Equipment: No

ARMAMENT
Main Armament:
Caliber, Type, Name: 152-mm, Type 66 cannon
Barrel Length (cal): 29
Rate of Fire (rpm):
- Burst: 4
- Normal: INA
- Sustained: INA
- Fire from Ground: INA

Loader Type: Semiautomatic
Breech Type: Vertical sliding wedge
Muzzle Brake Type: Double baffle
Traverse: (°):
- Left: 360
- Right: 360
- Total: 360

Elevation (°) (-/+): -5/+65°

Auxiliary Weapon:
Caliber, Type, Name: 12.7-mm (12.7x108) AA MG Type 54
Mount Type: Turret top
Direct Fire Range (m): 1500
Max Effective Range (m):
- Day: 1500 ground/1600 for air targets (APDS)
- Night: INA

Fire on Move: Yes
Rate of Fire (rpm): 80-100 practical, 600 for air targets in 2-10 round bursts

Caliber, Type, Name: 7.62 (7.62 x 54R) Machinegun Type 59
Mount Type: Turret coax
Direct Fire Range (m): 1800
Max Effective Range (m)`:
- Day: 1000
- Night: 800

Fire on Move: Yes
Rate of Fire (rpm): 250 practical, 600 cyclic in 2-10 round bursts

FIRE CONTROL
Indirect Fire: Panoramic
Direct Fire: INA
Collimator: INA
Gun Display Unit: None
Fire Control Computer: None

VARIANTS
425-mm Mineclearing Rocket Launcher Type 462: 2-round rocket launcher for use in clearing minefields.

120-mm SP Anti-Tank Gun: The AT gun is fitted with a 120-mm smoothbore mounted inside a turret on a Type 83 Gun-Howitzer chassis.

Chinese 152-mm Self-Propelled Gun-Howitzer Type 83 continued

MAIN ARMAMENT AMMUNITION
Caliber, Type, Name:

152-mm Frag-HE, Type 66
- Indirect Fire Range (m):
  - Minimum Range: 9600
  - Maximum Range: 17,230
- Complete Projectile Weight (kg): 43.6
- Muzzle Velocity: 655 m/s
- Fuze Type: Liu-4 PD and Proximity

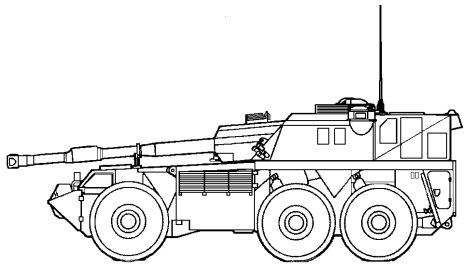
152-mm Frag-HE Rocket Assisted Projectile
- Indirect Fire Range (m):
  - Minimum Range: INA
  - Maximum Range: 21,880
- Complete Projectile Weight (kg): INA
- Muzzle Velocity: INA
- Fuze Type: PD

152-mm Frag-HE Type 83
- Indirect Fire Range (m):
  - Minimum Range: INA
  - Maximum Range: 30,370
- Complete Projectile Weight (kg): 46.95
- Muzzle Velocity: 955 m/s
- Fuze Type: Liu-4 PD and Proximity

Other Ammunition Types: HE-I, Illumination, Smoke

NOTES
The Type 83 152-mm SP Gun-Howitzer is capable of firing all standard types of 152-mm rounds. The main armament cannon is based on the Chinese 152-mm Towed Type 66 mounted on a vehicle hull similar to the Russian 152-mm SP Gun-Howitzer 2S3. The crew communicates with each other using the Type 803 intercom system. There are reports of the Type 83 being equipped with an anti-tank rocket launcher referred to as the Type 40. However, it is suspected that the rocket launcher is really the 40-mm anti-tank rocket launcher Type 69-1 (an upgraded variant of the Russian RPG-7).

South African 155-mm Self-Propelled Howitzer G6



Weapons & Ammunition Types	Typical Combat Load
155-mm howitzer	**45**
Frag-HE	
Smoke	
Illumination	
.50 Cal. M2 HB MG	**900**

SYSTEM
Alternative Designations: 155-mm G6 Rhino
Date of Introduction: 1988
Proliferation: At least 2 countries
Description:
Crew: 6
Platform (chassis): Purpose built 6x6 wheeled
Combat Weight (mt): 48
Chassis Length Overall (m): 10.4
Height Overall (m): 3.5
Width Overall (m): 3.4

Automotive Performance:
Engine Type: 525-hp air-cooled diesel
Cruising Range (km): 700 km
Speed (km/h):
- Max Road: 85
- Max Off-Road: 30
- Cross-Country: INA
- Max Swim: N/A

Fording Depth (m): 1.00
Emplacement Time (min): 1
Displacement Time (min): 0.5

Radio: INA

Protection:
Armor, Turret (mm): See NOTES
Armor Turret Top (mm): See NOTES
Armor Hull (mm): See NOTES
Self-Entrenching Blade: No
NBC Protection System: Yes
Smoke Equipment: 8 81-mm grenade launchers

ARMAMENT
Main Armament:
Caliber, Type, Name: 155-mm, canon
Barrel Length (cal): 45
Rate of Fire (rpm):
- Burst: 3
- Normal: 2
- Sustained: 1
- Fire from Ground: INA

Loader Type: Semi-automatic
Breech Type: Interrupted screw
Muzzle Brake Type: Single baffle
Traverse: (°):
- Left: 40
- Right: 40
- Total: 80

Elevation (°) (-/+): -5/+75°

Auxiliary Weapon:
Caliber, Type, Name: .50 (12.7x99) heavy machinegun, M2HB
Mount Type: Cupola AA mount
Direct Fire Range (m): INA
Max Effective Range (m):
- Day: 1000
- Night: INA

Fire on Move: Yes
Rate of Fire (rpm): 450-550 (cyclic)

FIRE CONTROL
Indirect Fire: Digital Panoramic Telescope
Direct Fire: Trunnion mounted telescopic sight
Collimator: INA
Gun Display Unit: None
Fire Control Computer: None

VARIANTS
None

MAIN ARMAMENT AMMUNITION
Caliber, Type, Name:
155-mm Frag-HE, M1 HE
- Indirect Fire Range (m):
  - Minimum Range: 3000
  - Maximum Range: 30,000
- Complete Projectile Weight (kg): 8.7
- Muzzle Velocity: 897 m/s
- Fuze Type: PD M841

155-mm Frag-HE BB, M1 HE
- Indirect Fire Range (m):
  - Minimum Range: INA
  - Maximum Range: 39,000
- Complete Projectile Weight (kg): 8.7
- Muzzle Velocity: 895 m/s
- Fuze Type: PD M841

Other Ammunition Types: See NOTES

South African 155-mm Self-Propelled Howitzer G6 continued _____

NOTES

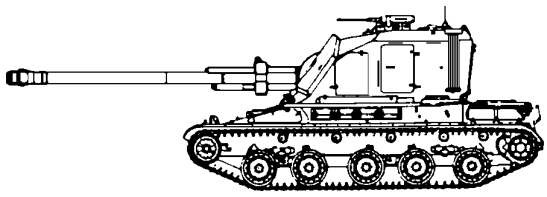
The G6 is a three-axle, six-wheeled, heavily armored system mounting a modified version of the G5 cannon. The G6 is fully compatible with NATO standard 155-mm ammunition and has a direct fire range of 3000 meters (using a Frag-HE round). The rigid chassis is actually divided into two parts, a driver's/engine compartment and a crew compartment. In order to distribute its weight and to maintain mobility over sand and soft terrain, the G6 employs large 21x25 run-flat tires. The driver controls a central tire-inflation system to vary the ground pressure. The system can also be used to maintain some degree of tire pressure in case of air leakage from small punctures. The G6 is equipped with an electronically controlled hydraulic flick rammer that provides an initial rate of fire of 3 rounds per minute.

The vehicle hull and turret provide protection against 7.62-mm small arms fire and artillery shrapnel. The frontal 60° arc provides protection against 20-mm type ammunition. Additionally, the shape and armor thickness of the chassis hull allows it to withstand at least three mine detonations (against TM46 antitank landmine or equivalent) before being immobilized. The separation of the driver/engine compartment from the crew compartment also facilitates survival against mines. The connection between the two is perforated with blowout holes to direct the force of the blast upwards, away from any personnel compartments. The separation also allows the driver to be beyond the detonation point before the mine is activated. The driver also has bullet-resistant glass windows that can be further protected by armored shutters, although it limits him to the use of a periscopic viewing port. The vehicle commander has limited steering and braking capability if the driver becomes a casualty. The crew compartment has four firing ports (two each side) so the crew can engage targets without exposing themselves to return fire.

A 45-hp (34 kw) Auxiliary Power Unit (APU) provides power for turret operations, recharging the batteries, and the driver/crew compartment air conditioning system. A wide range of optional subsystems is available to increase the efficiency of the G6 and its crew. They include the following:

- Inertial navigation and laying or back-up laying systems
- Night vision equipment
- Barrel cooling and thermal warning systems
- Fire control computer interface
- Muzzle velocity analyzer
- Explosion control for fuel tanks

French 155-mm Self-Propelled Howitzer AU-F1



Weapons & Ammunition Types	Typical Combat Load
155-mm howitzer	**42**
Frag-HE Smoke Illumination	
.50 Cal. M2 HB MG	**800**

SYSTEM
Alternative Designations: 155-mm GCT (Export Version)
Date of Introduction: 1979
Proliferation: At least 4 countries
Description:
Crew: 4
Platform (chassis): Modified AMX-30
Combat Weight (mt): 42.0
Chassis Length Overall (m): 10.25
Height Overall (m): 3.25
Width Overall (m): 3.15

Automotive Performance:
Engine Type: Hispano-Suiza HS110, 720-hp water-cooled multi-fuel
Cruising Range (km): 450 km
Speed (km/h):
- Max Road: 60
- Max Off-Road: 40
- Cross-Country: INA
- Max Swim: N/A

Fording Depth (m): 2.10
Emplacement Time (min): 1-2
Displacement Time (min): 1

Radio: TRC 559 (VHF-FM)

Protection:
Armor, Turret (mm): See NOTES
Armor Turret Top (mm): See NOTES
Armor Hull (mm): See NOTES
Self-Entrenching Blade: No
NBC Protection System: Yes
Smoke Equipment: 4 grenade launchers

ARMAMENT
Main Armament:
Caliber, Type, Name: 155-mm, canon
Barrel Length (cal): 40
Rate of Fire (rpm):
- Burst: 8
- Normal: 6
- Sustained: 2-3 (manual loading)
- Fire from Ground: INA

Loader Type: Autoloader
Breech Type: Vertical sliding wedge
Muzzle Brake Type: Double baffle
Traverse: (°):
- Left: 360
- Right: 360
- Total: 360

Elevation (°) (-/+): -4/+66°

Auxiliary Weapon:
Caliber, Type, Name: .50 (12.7x99) heavy machinegun, M2HB
Mount Type: Cupola AA mount
Direct Fire Range (m): INA
Max Effective Range (m)`:
- Day: 1000
- Night: INA

Fire on Move: Yes
Rate of Fire (rpm): 450-550 (cyclic)

FIRE CONTROL
Indirect Fire: M 589 Optical Gonimeter
Direct Fire: INA
Collimator: INA
Gun Display Unit: ATILA fire direction system
Fire Control Computer: None

VARIANTS
AU-F1T: Ugrade of AU-F1

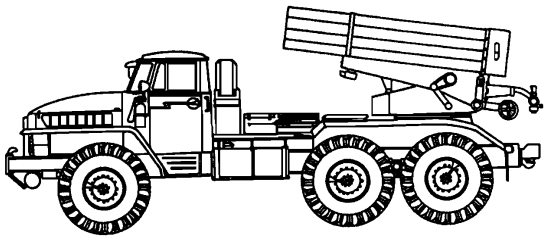
MAIN ARMAMENT AMMUNITION
Caliber, Type, Name:
155-mm Frag-HE, OE-155-56/69
- Indirect Fire Range (m):
  - Minimum Range: 9600
  - Maximum Range: 23,000
- Complete Projectile Weight (kg): 43.75
- Muzzle Velocity: 810 m/s
- Fuze Type: PD

155-mm Frag-HE Rocket Assisted H3
- Indirect Fire Range (m):
  - Minimum Range: INA
  - Maximum Range: 31,500
- Complete Projectile Weight (kg): INA
- Muzzle Velocity: 830 m/s
- Fuze Type: PD

Other Ammunition Types: DPICM, Illumination, Smoke

NOTES
The export version of the AU-F1 is known as the GCT (Grande Cadence de Tir or high rate of fire). The AU-F1T is fitted with the Sagem Cita 20 inertial navigation system as well as a 20-24 hp gas turbine auxiliary power unit (APU). A four-man gun crew can reload the AU-F1 in 15 minutes. A two-man gun crew can reload the AU-F1 in 20 minutes. The AU-F1's armor provides crew protection against artillery shrapnel and small arms fire.

Russian 122-mm Multiple Rocket Launcher BM-21



Weapons & Ammunition Types	Typical Combat Load
122-mm rocket	
Frag-HE	**40**

SYSTEM
Alternative Designations: BM-21 GRAD (Hail) MRL
Date of Introduction: 1963
Proliferation: At least 50 countries
Description:
Crew: 5 (8 with 9K51 Complex)
Chassis/Carriage: Ural 375-D 6x6 wheeled
Combat Weight (mt): 13.7
Chassis Length Overall (m): 7.35
Height Overall (m): 3.09
Width Overall (m): 2.40

Automotive Performance:
Engine Type: ZIL 375, 180 hp water-cooled, V-8 gasoline engine
Cruising Range (km): 450 km
Speed (km/h):
- Max Road: 75
- Max Off-Road: 35
- Cross-Country: INA
- Max Swim: N/A

Fording Depths (m): Unprepared: 1.5
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: 122-mm, 9P132
Number of Tubes: 40 (4 rows of 10 tubes)
Launch Rate:
- Full Salvo Time: 40 rounds in 20 seconds
- Single Rocket Interval: .5 seconds per rocket

Loader Type: Manual
Reload Time: 10 minutes
Launcher Drive: Electric
Traverse: (°):
- Left: 102
- Right: 70
- Total: 172

Elevation (°) (-/+): - 0/+55°

FIRE CONTROL
Indirect Fire: PG-1M Panoramic Telescope (PANTEL)
Collimator: K-1
Fire Control Computer: None
Position Location System: None

VARIANTS
BM-21V: Russian 12-tube version for airborne divisions
BM-21B: Russian 36-tube MRL on a 6x6 ZIL-131 chassis
Grad-P: Russian 1 round rocket launcher
BM-11: North Korean 30-tube version
Type 81: Chinese 40- rail-launched version
RM-70: Czechoslovakian 40-tube version
Sakr: Egyptian 40- tube version

MAIN ARMAMENT AMMUNITION
Caliber, Type, Name:
122-mm Frag-HE, 9M22U
Indirect Fire Range (m):
- Minimum Range: 5000
- Maximum Range: 20,380

Warhead Weight (kg): 18.4 (M21OF)
Rocket Length: (m): 2.87
Maximum Velocity: INA
Fuze Type: MRV-U (PD)

122-mm Frag-HE, 9M28F
Indirect Fire Range (m):
- Minimum Range: 1500
- Maximum Range: 15,000

Warhead Weight (kg): 21.0
Rocket Length: (m): 2.87
Maximum Velocity: INA
Fuze Type: MRV-U (PD) or AR-6 (proximity)

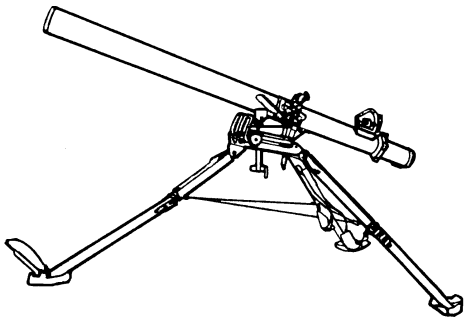
122-mm Frag-HE, Type 90A (Chinese)
Indirect Fire Range (m):
- Minimum Range: 12,700
- Maximum Range: 32,700

Warhead Weight (kg): 18.3
Rocket Length: (m): 2.75
Maximum Velocity: INA
Fuze Type: PD

Other Ammunition Types: Smoke, Incendiary, Chemical, RF Jammer, Illumination, Antitank mines, Antipersonnel mines

NOTES
The BM-21 is unquestionably the world's most widely used MRL. The launcher with supporting equipment is referred to as the complex 9K51. A special electric generator powers the launcher. The 9V170 firing device is cab mounted. But, the rockets can be fired using a remote-firing device that has a 64-meter-long cable.

Russian 122-mm 1-Round Rocket Launcher 9P132 _____



Weapons &Ammunition Types	Typical Combat Load
122-mm rocket	**1**
Frag-HE	

SYSTEM
Alternative Designations: DKZ-66, BM-21P, Grad-1P, 9K510
Date of Introduction: Mid to late 1960' s
Proliferation: At least 5 countries

Description:
Crew: 4-5 (includes ammunition bearers)
Combat Weight (kg):
Loaded: 101
Unloaded: 55
Length (m): 2.50
Width (m): 1.53
Height (m): 1.00
Emplacement Time (min): 2.5
Displacement Time (min): 2

Radio: R-107M

ARMAMENT
Launcher:
Caliber, Type, Name: 122-mm, 9P132
Number of Tubes: 1
Launch Rate: 1 round per minute
Loader Type: Manual
Reload Time: .67 minutes (approximately 40 seconds)
Traverse(°):
Left: 7
Right: 7
Total: 14
Elevation (°) (-/+): +10/+40°

FIRE CONTROL
Indirect Fire: PG-1M Panoramic Telescope (PANTEL)
Collimator: K-1

VARIANTS
None

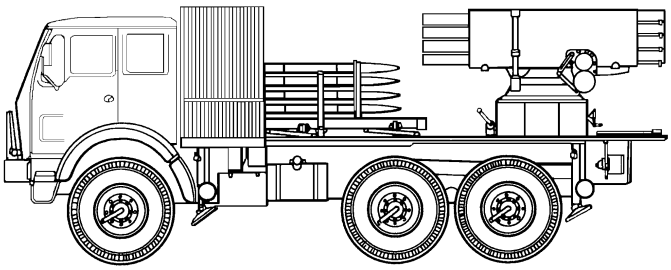
MAIN ARMAMENT AMMUNITION
Caliber, Type, Name:
122-mm Frag-HE, 9M22M
Indirect Fire Range (m):
Minimum Range: 3,000
Maximum Range: 10,800
Warhead Weight (kg): 19.4
Rocket Length: (m): 1.90
Maximum Velocity (m/s):: 450
Fuze Type: PD

Caliber, Type, Name:
122-mm Illuminating Rocket Projectile, 9M42
Indirect Fire Range (m):
Minimum Range: 1,000
Maximum Range: 5,000
Rocket Weight (kg): 27
Rocket Length: (m): 1.90

Other Ammunition Types: Smoke

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.

Yugoslav 128-mm Multiple Rocket Launcher M77 _____



Weapons &Ammunition Types	Typical Combat Load
128-mm rocket	**32**
Frag-HE	

SYSTEM
Alternative Designations: M-77 Oganj
Date of Introduction: Early 1970' s
Proliferation: At least 4 countries
Description:
Crew: 5
Chassis/Carriage: Modified FAP-2026 BDS/AV 6x6 wheeled
Combat Weight (mt): 22
Chassis Length Overall (m): 8.40
Height Overall (m): 3.10
Width Overall (m): 2.50

Automotive Performance:
Engine Type: Model 2F/002A, 200 hp water-cooled, 8-cylinder diesel engine
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 (4 rows of 8 tubes)
Launch Rate:
Full Salvo Time: 32 rounds in 25.6 seconds
Single Rocket Interval: 8 seconds per rocket
Loader Type: Hydraulic
Reload Time: 2 minutes
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

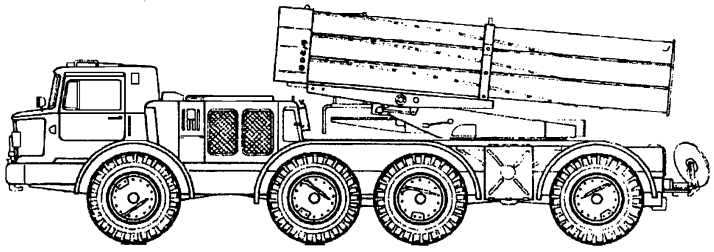
VARIANTS
128-mm Single Tube Launcher

MAIN ARMAMENT AMMUNITION
Caliber, Type, Name:
128-mm Controlled Frag-HE
- Indirect Fire Range (m):
  - Minimum Range: 1,000
  - Maximum Range: 20,600
- Warhead Weight (kg): 20
- Rocket Length: (m): 2.60
- Maximum Velocity (m/s):: INA
- Fuze Type: PD

Other Ammunition Types: DPICM

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



Weapons & Ammunition Types	Typical Combat Load
220-mm rocket	**16**
Frag-HE	

SYSTEM
Alternative Designations: 9P140 Uragan
Date of Introduction: 1977
Proliferation: At least 7 countries
Description:
Crew: 4
Chassis/Carriage: ZIL-135LM 8x8 wheeled
Combat Weight (mt): 20.0
Chassis Length Overall (m): 9.3
Height Overall (m): 3.2
Width Overall (m): 2.8

Automotive Performance:
Engine Type: 2 each - 177 hp, 8 cylinder, 4-stroke gasoline engines
Cruising Range (km): 500 km
Speed (km/h):
- Max Road: 65
- Max Off-Road: INA
- Cross-Country: INA
- Max Swim: N/A

Fording Depths (m): Unprepared: 1.2
Emplacement Time (min): 3
Displacement Time (min): 3

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: 220-mm, 9P140
Number of Tubes: 16 (2 rows of 6 tubes and 1 row of 4 tubes)
Launch Rate:
- Full Salvo Time: 16 rounds in 20 seconds
- Single Rocket Interval: 1.25 seconds per rocket

Loader Type: Manual
Reload Time: 15-20 minutes
Launcher Drive: Electric
Traverse: (°):
- Left: 30
- Right: 30
- Total: 60

Elevation (°) (-/+): -0/+55°

FIRE CONTROL
Indirect Fire: PG-1M Panoramic Telescope (PANTEL)
Collimator: K-1
Fire Control Computer: None
Position Location System: None

VARIANTS
None

MAIN ARMAMENT AMMUNITION
Caliber, Type, Name:
220-mm Frag-HE, 9M27F
- Indirect Fire Range (m):
  - Minimum Range: 10,000
  - Maximum Range: 35,000
- Warhead Weight (kg): 100
- Rocket Length: (m): 4.8
- Maximum Velocity: INA
- Fuze Type: Electronic timing (ET)

220-mm DPICM, 9M27K
- Indirect Fire Range (m):
  - Minimum Range: 10,000
  - Maximum Range: 35,000
- Warhead Weight (kg): 90
- Rocket Length: (m): 5.1
- Maximum Velocity: INA
- Fuze Type: Electronic timing (ET)

220-mm Antitank, 9M27K2
- Indirect Fire Range (m):
  - Minimum Range: 10,000
  - Maximum Range: 35,000
- Warhead Weight (kg): 90
- Rocket Length: (m): 5.1
- Maximum Velocity: INA
- Fuze Type: Electronic timing (ET)

Russian 220-mm Multiple Rocket Launcher 9P140 continued

MAIN ARMAMENT AMMUNITION (continued) **Caliber, Type, Name:** 220-mm Antipersonnel, 9M27K3 Indirect Fire Range (m): Minimum Range: 10,000 Maximum Range: 35,000 Warhead Weight (kg): 90 Rocket Length: (m): 5.1 Maximum Velocity: INA Fuze Type: Electronic timing (ET)	220-mm Antitank, 9M59 Indirect Fire Range (m): Minimum Range: 10,000 Maximum Range: 35,000 Warhead Weight (kg): 90 Rocket Length: (m): 5.1 Maximum Velocity: INA Fuze Type: Electronic timing (ET) **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

Weapons & Ammunition Types	Typical Combat Load
240-mm rocket	**12**
Frag-HE	

SYSTEM
Alternative Designations: INA
Date of Introduction: 1996
Proliferation: At least 1 country and Hezbollah Units
Description:
Crew: 5
Chassis/Carriage: Mercedes Benz 6x6 wheeled
Combat Weight (mt): 15.0
Chassis Length Overall (m): 10.45
Height Overall (m): 3.34
Width Overall (m): 2.54

Automotive Performance:
Engine Type: 280 hp, V-8 liquid-cooled, diesel engine
Cruising Range (km): 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 to 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

VARIANTS
None

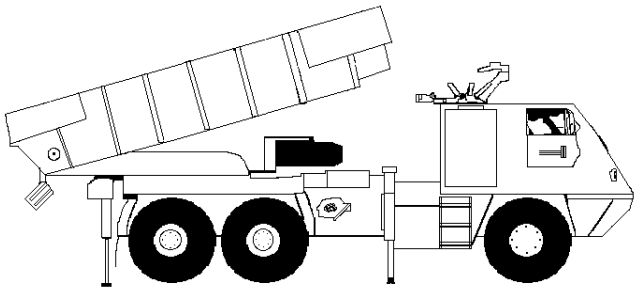
MAIN ARMAMENT AMMUNITION
Caliber, Type, Name: 240-mm Frag-HE, Fadjr-3
Indirect Fire Range (m):
- Min Range: INA
- Max Range: 43,000

Warhead Weight (kg): 90
Rocket Length: (m): 5.2
Maximum Velocity: INA
Fuze Type: PD

Other Ammunition Types: INA

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 K o-rea.

Brazilian 127-mm, 180-mm, & 300-mm Multiple Rocket Launcher ASTROS II _____



Weapons & Ammunition Types	Typical Combat Load
127-mm rocket Frag-HE	**32**
180-mm rocket Frag-HE	**16**
300-mm rocket Frag-HE	**4**
.50 Cal. M2 HB MG	**INA**

SYSTEM
Alternative Designations: ASTROS II AV-LMU
Date of Introduction: 1983
Proliferation: At least 6 countries
Description:
Crew: 3
Chassis/Carriage: TECTRAN 10-ton 6x6 wheeled
Combat Weight (mt): 20.0
Chassis Length Overall (m): 8.0
Height Overall (m): 2.6
Width Overall (m): 2.4

Automotive Performance:
Engine Type: 280 hp, water-cooled turbocharged, diesel engine
Cruising Range (km): INA
Speed (km/h):
- Max Road: 70
- Max Off-Road: 40
- Cross-Country: INA
- Max Swim: N/A

Fording Depths (m): Unprepared: 1.0
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: 6 smoke grenade launchers

ARMAMENT
Launcher:
Caliber, Type, Name: 127-mm, 180-mm, 300-mm, ASTROS
Number of Tubes: 127-mm (32), 180-mm (16), 300-mm (4)
Launch Rate:
- Full Salvo Time: INA
- Single Rocket Interval: INA

Loader Type: Manual
Reload Time: INA
Launcher Drive: Electric
Traverse: (°):
- Left: INA
- Right: INA
- Total: INA

Elevation (°) (-/+): INA

Auxiliary Weapon:
Caliber, Type, Name: .50 (12.7x99) heavy machinegun, M2HB
Mount Type: Cab AA mount
Direct Fire Range (m): INA
Max Effective Range (m):
- Day: 1000
- Night: INA

Fire on Move: Yes
Rate of Fire (rpm): 450-550 (cyclic)

FIRE CONTROL
Indirect Fire: INA
Collimator: INA
Fire Control Computer: FIELDGAURD Radar or the FILA System
Position Location System: INA

VARIANTS:
None

MAIN ARMAMENT AMMUNITION
Caliber, Type, Name:
127-mm Frag-HE, SS-30
- Indirect Fire Range (m):
  - Minimum Range: 9000
  - Maximum Range: 30,000
- Warhead Weight (kg): INA
- Rocket Length: (m): 3.9
- Maximum Velocity: INA
- Fuze Type: INA

Other Ammunition Types: None

Caliber, Type, Name:
180-mm Frag-HE, SS-40
- Indirect Fire Range (m):
  - Minimum Range: 15,000
  - Maximum Range: 35,000
- Warhead Weight (kg): INA
- Rocket Length: (m): 4.2
- Maximum Velocity: INA
- Fuze Type: INA

Other Ammunition Types: DPICM, HE-Incendiary, Antitank mines, Antipersonnel mines, Runway Denial

Brazilian 127-mm, 180-mm, & 300-mm Multiple Rocket Launcher ASTROS II continued

Caliber, Type, Name: 300-mm Frag-HE, SS-60 Indirect Fire Range (m): Minimum Range: 20,000 Maximum Range: 60,000 Warhead Weight (kg): INA Rocket Length: (m): 5.6 Maximum Velocity: INA Fuze Type: INA **Other Ammunition Types:** DPICM, HE-Incendiary, Antitank mines, Antipersonnel mines, Runway Denial	300-mm Frag-HE, SS-80 Indirect Fire Range (m): Minimum Range: 22,000 Maximum Range: 90,000 Warhead Weight (kg): INA Rocket Length: (m): 5.6 Maximum Velocity: INA Fuze Type: INA **Other Ammunition Types:** DPICM, HE-Incendiary, Antitank mines, Antipersonnel mines, Runway Denial

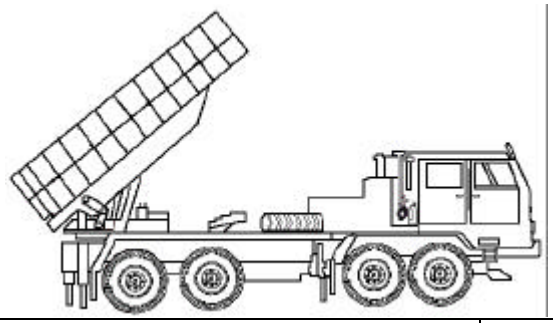
NOTES

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. A 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.

Chinese 273-mm Multiple Rocket Launcher WM-80 _____



Weapons & Ammunition Types	Typical Combat Load
273-mm rocket	**8**
Frag-HE	

SYSTEM
Alternative Designations: None
Date of Introduction: INA
Proliferation: Ready for production
Description:
Crew: 5
Chassis/Carriage: TA 580 8x8 wheeled
Combat Weight (mt): 34
Chassis Length Overall (m): 9.55
Height Overall (m): 3.30
Width Overall (m): 3.06

Automotive Performance:
Engine Type: 525 hp air-cooled, diesel engine
Cruising Range (km): 400 km
Speed (km/h):
- Max Road: 70
- Max Off-Road: INA
- Cross-Country: INA
- Max Swim: N/A

Fording Depths (m): Unprepared: 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

VARIANTS
None

MAIN ARMAMENT AMMUNITION
Caliber, Type, Name:
273-mm Frag-HE, WM-80
Indirect Fire Range (m):
- Min Range: 34,000
- Max Range: 80,000

Warhead Weight (kg): 150
Rocket Length: (m): 4.58
Maximum Velocity (m/s): 1,140
Fuze Type: WJ-6A (PD)

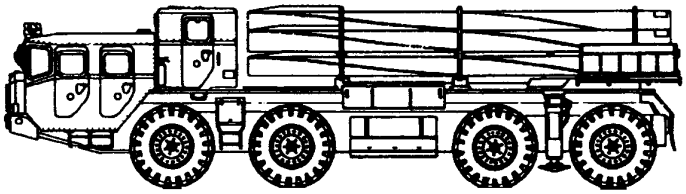
273-mm DPICM, WM-80
Indirect Fire Range (m):
- Min Range: 34,000
- Max Range: 80,000

Warhead Weight (kg): 150
Rocket Length: (m): 4.58
Maximum Velocity (m/s): 1,140
Fuze Type: MD-23A (proximity)

Other Ammunition Types: 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 mu l-tiple 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.

Russian 300-mm Multiple Rocket Launcher 9A52-2



Weapons & Ammunition Types	Typical Combat Load
300-mm rocket	**12**
Frag-HE	

SYSTEM
Alternative Designations: 9A52-2 Smerch-M
Date of Introduction: 1989
Proliferation: At least 4 countries
Description:
Crew: 4 (7 with 9K58 Complex)
Chassis/Carriage: MAZ-543M 8x8 wheeled
Combat Weight (mt): 43.7
Chassis Length Overall (m): 12.1
Height Overall (m): 3.05
Width Overall (m): 3.05

Automotive Performance:
Engine Type: 518 hp, V-12 diesel engine
Cruising Range (km): 850 km
Speed (km/h):
- Max Road: 60
- Max Off-Road: 35
- Cross-Country: INA
- Max Swim: N/A

Fording Depths (m): Unprepared: 1.1
Emplacement Time (min): 3
Displacement Time (min): 3

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: 300-mm, 9A52
Number of Tubes: 12 (3 rows of 4 tubes)
Launch Rate:
- Full Salvo Time: 12 rounds in 38 seconds
- Single Rocket Interval: 3 seconds per rocket

Loader Type: Transloader, crane hoist
Reload Time: 36 minutes
Launcher Drive: Electric
Traverse: (°):
- Left: 30
- Right: 30
- Total: 60

Elevation (°) (-/+): -0/+55°

FIRE CONTROL
Indirect Fire: PG-1M Panoramic Telescope (PANTEL)
Collimator: K-1
Fire Control Computer: None
Position Location System: None

VARIANTS
None

MAIN ARMAMENT AMMUNITION
Caliber, Type, Name: 300-mm Frag-HE, 9M55F
Indirect Fire Range (m):
- Min Range: 20,000
- Max Range: 70,000

Warhead Weight (kg): 258
Rocket Length: (m): 7.6
Maximum Velocity: INA
Fuze Type: Electronic timing (ET)

Caliber, Type, Name: 300-mm DPICM, 9M55K
Indirect Fire Range (m):
- Min Range: 20,000
- Max Range: 70,000

Warhead Weight (kg): 235
Rocket Length: (m): 7.6
Maximum Velocity: INA
Fuze Type: Electronic timing (ET)

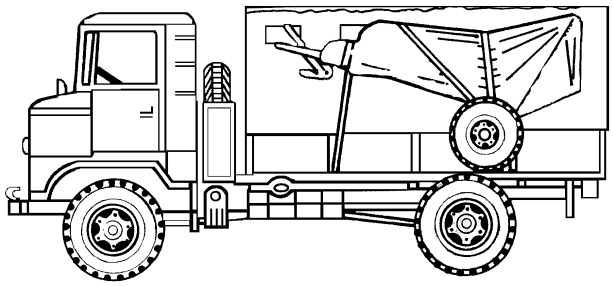
Caliber, Type, Name: 300-mm Sensor-fuzed (MOTIV-3M), 9M55K1
Indirect Fire Range (m):
- Min Range: 20,000
- Max Range: 70,000

Warhead Weight (kg): 233
Rocket Length: (m): 7.6
Maximum Velocity: INA
Fuze Type: Electronic timing (ET)

Other Ammunition Types: Smoke, Incendiary, Chemical, Leaflet, Fuel Air Explosive (FAE), R-90 expendable miniature UAV (e x-perimental)

NOTES
The 9A52-2 launcher with all supporting equipment, including the 9T234-2 Transloader, and the 1K123 Vivary Fire Control System, is referred to as the complex 9K58.

Russian 120-mm Self-Propelled Mortar 2S12



Weapons &Ammunition Types	Typical Combat Load
120-mm mortar Frag-HE Smoke Illumination	**48**

SYSTEM
Alternative Designations: 120-mm 2S12 Sani (Sled)
Date of Introduction: early 1980s
Proliferation: At least 1 countries
Description:
Crew: 5
Vehicle Platform (chassis): GAZ-66
Combat Weight (mt): 3.64
Chassis Length Overall (m): 5.66
Height Overall (m): 2.44
Width Overall (m): 2.34
2B11 Mortar
Combat Weight (kg): 210 (firing) /297 (traveling)
Wheeled Carriage 2L81 (kg): 87
Baseplate (kg): 80
Bipod (kg): 55

Automotive Performance:
Engine Type: ZMZ-66, 115 hp V-8 water cooled gasoline
Cruising Range (km): 600
Speed (km/h):
- Max Road: 87
- Max Off-Road: 35
- Cross-Country: INA

Fording Depths (m): .80
Emplacement Time (min): 3 (est)
Displacement Time (min): 3 (est)

Radio: R-123M

Protection:
Armor, Turret Front (mm): None
Armor Turret Top (mm): None
Armor Hull (mm): None
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: MPM-44M
Direct Fire: INA
Collimator: K-1
Gun Display Unit: None
Fire Control Computer: None

VARIANTS
None

MAIN ARMAMENT AMMUNITION
Caliber, Type, Name:
120-mm Frag-HE (3OF843B)
- Indirect Fire Range (m):
  - Minimum Range: 450
  - Maximum Rang e: 7,000
- Complete Projectile Weight (kg): 16.8
- Muzzle Velocity (m/s):: 325
- Fuze Type: GVMZ-7 PD

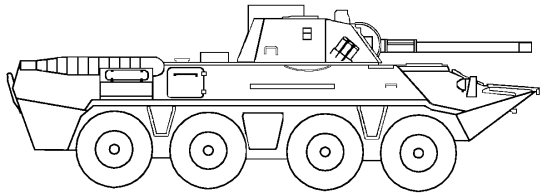
120-mm Smoke
- Indirect Fire Range (m):
  - Minimum Range: 1,000
  - Maximum Range: 6,800
- Complete Projectile Weight (kg): 16.7
- Muzzle Velocity (m/s):: I NA
- Fuze Type: PD

120-mm Illumination, S-843
- Indirect Fire Range (m):
  - Minimum Range: 1,000
  - Maximum Range: 5,300
- Complete Projectile Weight (kg): 16.8
- Muzzle Velocity (m/s):: INA
- Fuze Type: T-1 TSQ

Other Ammunition Types: All standard 120-mm mortar rounds

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 r e-moved 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.

Russian 120-mm Self-Propelled Combination Gun 2S23



Weapons &Ammunition Types	Typical Combat Load
120-mm mortar	**30**
Frag-HE	
Smoke	
Illumination	
7.62-mm MG	**2,000**

SYSTEM
Alternative Designations: 120-mm 2S23 Nona-SVK
Date of Introduction: 1990
Proliferation: At least 1 countries
Description:
Crew: 4
Platform (chassis): Modified BTR-80 APC
Combat Weight (mt): 14.5
Chassis Length Overall (m): 7.50
Height Overall (m): 2.75
Width Overall (m): 2.90

Automotive Performance:
Engine Type: 260 hp V-8 water cooled diesel
Cruising Range (km): 600
Speed (km/h):
- Max Road: 80
- Max Off-Road: 60
- Cross-Country: 40
- Max Swim: 10

Fording Depths (m): Amphibious
Emplacement Time (min): 1 (est)
Displacement Time (min): 1 (est)
Radio: R-173

Protection:
Armor, Turret Front (mm): Against 12.7-mm
Armor Turret Top (mm): INA
Armor Hull (mm): INA
NBC Protection System: Yes
Smoke Equipment: Six 81-mm smoke grenade launchers

ARMAMENT
Main Armament:
Caliber, Type, Name: 120-mm, gun-mortar, 2A60
Barrel Length (cal): INA
Rate of Fire (rpm):
- Burst: 10
- Normal: 6
- Sustained: 4

Loader Type: autoloader
Breech Type: combined semi-automatic breechblock with wedge locking mechanism and powder gases plastic obturator
Muzzle Brake Type: None
Traverse (°):
- Left: 35
- Right: 35
- Total: 70

Elevation (°) (-/+): -4/+80°

Auxiliary Weapon:
Caliber, Type, Name: 7.62-mm machinegun, PKT
Mount Type: Coax
Direct Fire Range (m): 1,500
Max Effective Range (m)`:
- Day: 1,000
- Night: N/A

Fire on Move: Yes
Rate of Fire (rpm): 650 (cyclic), 2-10 round bursts

FIRE CONTROL
Indirect Fire: INA
Direct Fire: INA
Collimator: K-1
Gun Display Unit: None
Fire Control Computer: None

VARIANTS
None

MAIN ARMAMENT AMMUNITION
Caliber, Type, Name:
120-mm Frag-HE (3VOF49)
- Indirect Fire Range (m):
  - Minimum Range: 1,000
  - Maximum Range: 8,850
- Complete Projectile Weight (kg): 19.8
- Muzzle Velocity (m/s):: 367
- Fuze Type: B35 PD

120-mm, HEAT
- Direct Fire Range (m):
  - Minimum Range: 40
  - Maximum Range: 1,000
- Armor Penetration (mm): INA
- Complete Projectile Weight (kg): 13.20
- Muzzle Velocity (m/s):: 560
- Fuze Type: PD

120-mm Frag-HE rocket assisted
- Indirect Fire Range (m):
  - Minimum Range: 6,710
  - Maximum Range: 13,000
- Complete Projectile Weight (kg): 19.8
- Muzzle Velocity (m/s):: 367
- Fuze Type: B35 PD

Other Ammunition Types: All standard 120-mm rifled mortar rds

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.

OPFOR Special Muntions Chart for Training Simulation

WEAPON	SMOKE (km)	SCATTERABLE MINES (km)	CHEMICAL (km)
122-MM: 2S1 SP, D-30 TOWED HOWITZER	15.3	N/A	15.3
152-MM: 2S3/2S3M SP, D-20 TOWED HOWITZER	17.2	N/A	17.2
152-MM: 2S19 SP, 2A65 TOWED HOWITZER	24.0	N/A	24.0
152-MM: 2S5 SP, 2A36 TOWED GUN	28.4	N/A	28.4
122-MM: BM-21 MRL	20.5	13.4	20.5

REMARKS: Currently, Russia has developed and is testing 122-mm rockets with various warheads (Frag-HE, AT/AP mines, jammers, and sensor-fuzed munitions) achieving firing ranges between 32-35 kilometers. These rockets could be deployed within the next 2-5 years.

Advanced Artillery Munitions: Laser-Guided Projectiles

NAME	COUNTRY	CALIBER	WEIGHT (kg)	LENGTH (mm)	TYPE WARHEAD	GUIDANCE SYSTEM	TARGET DESIGNATION RANGE (km) [1]	RANGE (km) MIN	RANGE (km) MAX	STATUS / PROLIFERATION
BUSSARD	Germany	120-mm mortar	17	1,050	Tandem (precursor and main charge); 800+ mm RHA penetration	IR Focal plane array (3-5µ terminal homing), semi-active laser homing (SAL-1.06µ)	3-5	.8	12	Developmental
Terminally Guided Mortar Bomb	Ukraine /Poland	120-mm mortar	18	1,200 (+)	HEAT; 550-mm RHA	SAL (1.06µ)	3-5	.5	7	Testing
Kitolov-2	Russia	120-mm mortar, combo gun	25	1,220	Frag-HE	SAL (1.06µ)	3-5	.5	9	Limited production/ 1 country
Smel' chak	Russia	240-mm mortar	134	1,635	Frag-HE	SAL (1.06µ)	3-5	3.6	9.2	Limited production/ 1 country
Kitolov-2M (KM-3)	Russia	122-mm howitzer	27	1,225	Frag-HE	SAL (1.06µ)	3-5	.8	14	Limited production/ 2 countries
Krasnopol	Russia	152-mm howitzer	51	1,300	Frag-HE, 6.5 kg AL/RDX	Inertial (middle stage of flight) SAL (final stage of flight)	3-5	5	20	Full production/ 14 countries
Krasnopol-M (KM-2)	Russia	155-mm howitzer	43.0	955	Frag-HE, 6.2 kg AL/RDX	Inertial (middle stage of flight) SAL (final stage of flight)	3-5	4	17	Full production/ 2 countries
Santimeter-1	Russia	152-mm howitzer	49.5	1,195	Frag-HE, 6.5 kg AL/RDX	SAL (1.06µ)	3-5	3	18	Limited production/ 3 countries
Aurora	Russia	152-mm howitzer	47 (+)	955	Frag-HE, 12.0 kg AL/RDX	SAL (1.06µ)	3-5	5	25	Ready for production, waiting for export customer
Ugroza [2]	Russia	122-mm rocket	65.5 (est.)	3,037 (est.)	Tandem HEAT dual main charge; 600-mm penetration	SAL (1.06µ)	3-5	1	20-32	Limited production/ 2 countries
Copperhead	United States	155-mm cannon	62	1,370	HEAT	Inertial (middle stage of flight) SAL (final stage of flight)	3-5	4	16	Production complete/1 country

NOTES:
(1) The Target Designation Range column portrays an engagement of a tank size target moving at 10-15 km/h.

(2) The Ugroza' s range is dependent upon the warhead being fitted on a rocket body containing either an older rocket motor (20 km) or new rocket motor (32 km).

Foreign Course Corrected Rocket Programs

NAME	COUNTRY	CALIBER (mm)	WEIGHT (kg)	LENGTH (mm)	WARHEAD TYPE	GUIDANCE SYSTEM	ACCURACY (CEP, m)	RANGE (km)	STATUS/ PROLIFERATION
9M55-series	Russia	300	~800	7,200	Varies - ICM, SFM, HE, thermo-baric, scatterable mines	Inertial	150 @ max range (0.21% of range)	70	Fielded 2 countries
9M5xx-series	Russia	300	~800	7,200	Varies - ICM, DPICM, SFM, HE, thermobaric, scattererable mines	Inertial	171@ maximum range (.19% of range)	90	Production/ Ex-ported, 2 countries
AccuLAR	Israel/Romania	160	120	3,700	DPICM, SFM	RF Ground Track	90-135	45	Late development IOC 2003
MLRS-TCS	Israel	227	308	3,940	DPICM SFM	RF Ground Track	70-120	32	Late development IOC 2001
Angel-100	China	300	~800	7,200	Varies - ICM, SFM, HE	Inertial	210 @ max range (0.21% of range)	100	Development IOC 2005-7
CORECT	Switzerland-Germany	227	308	3,940	DPICM, AT-4 mines	GPS+Inertial and magnetometer	50 (independent of range)	32	Late development IOC 2003-5
MARS-NAW	Germany	227	308	3,940	DPICM, SMArt-155	GPS+Inertial	50	65-70	Late development IOC 2003-2005
LT-2000 Mk45	Taiwan	227	308	3,940	DPICM	GPS+Inertial	50	75	Development IOC 2008
Diehl RM-70 Upgrade	Germany, France, Slovakia	122	77	3,220	DPICM, Multimode (HEAT, HE, Incendiary)	GPS+Inertial	50	36	Development IOC2008

Other countries with course corrected rocket development programs: Indonesia, South Africa, India, Ukraine, Brazil, Iraq.

Foreign Course Corrected Projectile Programs

NAME	COUNTRY	CALIBER (mm)	WEIGHT (kg)	LENGTH (mm)	WARHEAD TYPE	GUIDANCE SYSTEM	ACCURACY (CEP, m)	RANGE (km)	STATUS/ PROLIFERATION
TCM	Sweden	155	47	955	Varies (DPICM, SFM, HE)	Inertial+GPS	50-70	60	Development IOC 2006
Diehl GPS Geschoss	Germany	155	47	955	Varies (DPICM, SFM, HE)	Inertial+GPS	10	40	Development IOC 2003-5
Poleaxe	UK	155	54	1,650	DPICM, SFM	Inertial+GPS	50	80	Development IOC 2014
Pelican	France	155	50	1,350	DPICM, HE, SFM	Inertial+GPS	50-80	80	Development IOC 2014
BWB GPS Fin-stabilized	Germany	155	55	1,650	DPICM, SFM, HE	Inertial+GPS	20-50	100	Development IOC 2012
Ramjet Projectile	Holland-Sweden	155	55	1,500	DPICM, SFM	GPS+Inertial	20-50	80	Research IOC 2018
BROMSA	Sweden	105/155	Fuze	N/A	Any Projectile	GPS or MVV RF tracker	2-4X improvement over ballistic projectiles	25-30	Development IOC 2007
SAMPRASS	France	105/155	Fuze	N/A	Any Projectile	GPS	2-6X improvement over ballistic projectile	25-40	Development IOC 2005-7
STAR	UK	105/155	Fuze	N/A	Any Projectile	GPS	2-6X improvement over	25-40	Development

NAME	COUNTRY	CALIBER (mm)	WEIGHT (kg)	LENGTH (mm)	WARHEAD TYPE	GUIDANCE SYSTEM	ACCURACY (CEP, m)	RANGE (km)	STATUS/ PROLIFERATION
							ballistic projectile		IOC 2005-7

Other countries with course corrected projectile development programs: Israel, South Africa, Ukraine, and others.

Advanced Artillery Munitions: Sensor-Fuzed Munitions

NAME	COUNTRY	CALIBER DELIVERY SYSTEM	TARGETING SENSOR	SEARCH ALTITUDE	ARMOR PENETRATION	TYPE WARHEAD	RANGE (km)	STATUS/ PROLIFERATION
BONUS	France/ Sweden	155-mm cannon	2-color IR sensor with laser altimeter	175	120-135-mm at 150 meter slant range	Tantalum EFP	27 (39-cal. cannon) 35 (52-cal. cannon)	Full Production
SMArt	Germany	155-mm cannon	94 Ghz MMW Sensor (Active and Passive), 3-5µ IR sensor	150	135-mm RHA penetration @ 100 meters	Tantalum liner, COMP-B fill with unique waveshaper	25	Full Production
Indian Sensor Fuzed Munition	India	120-mm mortar 155-mm cannon	MMW	100 (est)	50-70-mm RHA penetration @ 100 meters	Copper penetrator	7	EIOC 2002-2003
Israeli Top-Attack Sensing Submunition	Israel	227-mm rocket	Ka-Band (Active and Passive)	100 (est)	100-mm RHA penetration @ 100 meters	Copper penetrator	32	Developmental
Meteor	Poland	122-mm rocket	2 color IR sensor with laser diode altimeter	150	80-100-mm RHA penetration @ 100 meters	Copper penetrator	30	EIOC 2003
Motiv-3M	Russia	300-mm rocket	2 color IR sensor	100 (est)	70-mm RHA penetration @ 150 meters and 30°	Copper penetrator, Ball slug	90	Full Production
Universal Submunition	Russia	120-mm mortar, 122-mm, 220-mm, and 300-mm rockets	W-band MMW Sensor (Active and Passive), 1-2µ and 8-14µ IR sensor	100 (est)	60-70-mm RHA penetration @ 100 meters and 30°	Copper penetrator, Ball slug	33 (122-mm) 35 (220-mm) 90 (300-mm)	Limited Production
MCS-E1	Russia	152-mm cannon	35 Ghz MMW (Active), 3-5µ IR sensor	100 (est)	90-mm RHA penetration	Copper penetrator, Ball slug	24	EIOC 2003-2004
MCS-E2, 152-mm	Russia	152-mm cannon	W-band MMW Sensor (Active and Passive), 1-2µ and 8-14µ IR sensor	150 (est)	80-mm RHA penetration @ 125 meters and 30°	Copper penetrator, Ball slug	20	Developmental, EIOC 2007-2008
MCS-E2, 155-mm	Russia	155-mm cannon	W-band MMW Sensor (Active and Passive), 1-2µ and 8-14µ IR sensor	150 (est)	80-mm RHA penetration @ 125 meters and 30°	Copper penetrator, Ball slug	25	Developmental, EIOC 2007-2008
SADARM	US	155-mm cannon	35 Ghz MMW Sensor (Active and Passive), 8-14µ IR sensor	130 (est) 165 (est) P3I	135-mm RHA penetration @ 100 meters	INA	24	Limited Production

Chapter 7
Air Defense

This chapter provides an overview of selected air defense systems either in use or readily available to an OPFOR. The selection of weapons is not intended to be all-inclusive, but rather a representative sampling of weapons and equipment supporting various OPFOR military capabilities.

This chapter is divided into three categories—***towed AA guns***, ***self-propelled AA guns/combination guns*** and ***surface-to-air missiles (SAMs)***. ***Towed AA guns*** covers, in order, the KS-19M2 100-mm gun, S-60 57-mm gun and the ZU-23 23-mm gun. The next category, ***self-propelled AA guns/combination guns***, contains the ZSU-23-4 23-mm gun and the 2S6 30-mm gun/missile system. The final category of ***surface-to-air missiles (SAMs)*** consists of the SA-7b, SA-8b, SA-14, SA-15b and the SA-18.

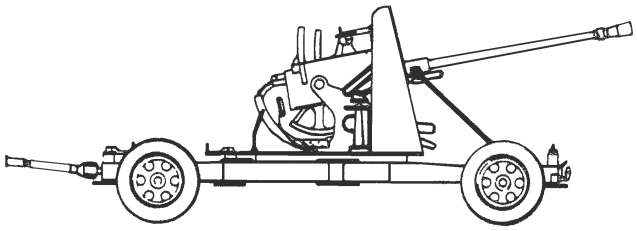
Tactical air defense is used to protect ground force units and other potential targets from attack by enemy fixed-wing aircraft and armed helicopters. Due to increases in performance and the sheer number of air defense systems, specifically manportable systems, the selected systems represent some of the most formidable threats to aircraft of all types.

Some trends in air defense development will become more widespread in the near future. These include the production of authorized and unauthorized copies of existing systems and the development of hybrid systems. The sensor package may consist of one or more radars, direct view optics, and electro-optics systems. The sensor package is the single most important aspect of air defense systems since these devices perform the surveillance and tracking functions. As the data classification permits, all attempts have been made to provide the user with as much information as possible in these areas. Radar systems have traditionally been the most popular sensor for air-defense systems, however, with the latest generation weapons they are usually supplemented with a variety of optic or electro-optic sensors such as; TV cameras, night vision sights, and laser rangefinders. As the trends become more defined and more information becomes available, updates to the systems will be produced.

Questions and comments on data listed in this chapter should be addressed to:

CPT (P) Blake Burslie
DSN: 552-7922, Commercial (913) 684-7922
e-mail address: burslieb@leavenworth.army.mil

Russian 37-mm Towed AA Gun M-1939



Weapons & Ammunition Types	Typical Combat Load
1 x 37-mm AA gun	**200**
HE	
HE-FRAG-T	
AP	
AP-T	
HVAP	
HVAP-T	
HEI-T	

SYSTEM
Alternative Designation: None
Date of Introduction: 1939
Proliferation: At least 50 countries

Description:
Crew: 8
Carriage: Four-wheels
Combat Weight (kg): 2,050
Length Overall (m): 6.04
Length of Barrel (m): 2.73
Height Overall (m): 2.11
Width Overall (m): 1.95
Prime Movers: Utility, small, medium trucks

Automotive Performance:
Max. Towed Speed (km/h): 60
Cross Country (km/h): 25
Fording Depth (m): 0.7
Emplacement Time (sec): 30
Displacement Time (sec): 30

ARMAMENT
Gun
Caliber, Type: 37-mm rifled
Number of Barrels: 1
Breech Mechanism: Rising Block
Rate of Fire (rd/min):
Cyclic: 180
Practical: 80
Clip Capacity (rds): 5
Feed: Gravity
Loader Type: Manual
Reload Time (sec): 2
Traverse (°): 360
Traverse Rate (°/sec): 61
Elevation (°) (-/+): -5/+85
Elevation Rate: (°/sec): 22

FIRE CONTROL

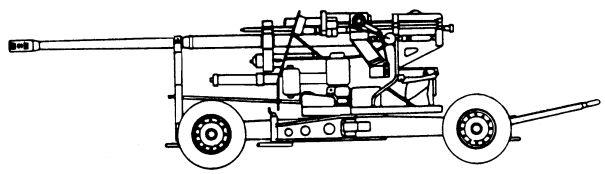
Sights w/magnification:
AZP-37 Optical sight

AMMUNITION
Type: HE, HE-FRAG-T, AP, AP-T, HVAP, HVAP-T, HEI-T
Range (m):
Max. Range (ground): 9,600
Max. Eff Range (slant): 3,000
Max. Altitude: 6,700
Armor Penetration (mm): 55 @ 500 m
Projectile Weight (kg):
HE: 0.74
AP: 0.77
HE-FRAG-T: 0.73
HVAP: 0.62
HEI-T: INA
Muzzle Velocity (m/s):
HE: 880
AP: 880
HVAP: 960
HEI-T: INA
HE-FRAG-T: 880
Self-Destruct (sec): 8 to 12
Self-Destruct Range (m): 3,700 to 4,700

VARIANTS
Type 55: Chinese designation
Type 65: Chinese twin barrel
Twin barrel exports

NOTES
The M-1939 is a towed 37-mm antiaircraft gun mounted on a four-wheeled carriage. During traveling, it can be fired from wheels at halts or fired while traveling. Normal emplacement however, requires the wheels to be removed and a jack placed under each axle for support prior to firing. The M-1939 is manually loaded with clips of five rounds each. The rounds are gravity fed into the vertically opening sliding breech with the empty cartridges automatically extracted. The M-1939 is a derivative of the BOFORS L60. Because it lacks a radar and powered gun laying motors, the M-1939 is considered to be effective only during daylight and in fair weather.

Russian 100-mm Towed AA Gun KS-19M2



Weapons & Ammunition Types	Typical Combat Load
100-mm gun	**100**
Frag-HE	
AP-T	
APC-T	

SYSTEM
Alternative Designations: None
Date of Introduction: 1949
Proliferation: At least 20 countries

Description:
Crew: 15
Carriage: Towed 2-axle, 4-wheel carriage
Combat Weight (kg): 11,000
Length Overall (m): 9.3
- Travel Position: 9.45
- Firing Position: INA

Length of Barrel (m): 5.74
Height (m):
- Overall: 2.2
- Travel Position: INA
- Firing Position: 7.62

Width Overall (m): 2.32
Prime Mover: Towing vehicle AT-S or AT-T

Automotive Performance:
Max. Towed Speed (km/h): 35
Emplacement Time (min): 7
Displacement Time (min): 6

ARMAMENT
Gun:
Caliber, Type: 100-mm gun
Number of Barrels: 1
Service Life of Barrel (rds): 2,800
Rate of Fire(rd/min):
- Maximum: INA
- Practical: 10-15

Loader Type: Manual
Reload Time (min): INA
Traverse (^{o}): 360
Traverse Rate (^{o}/sec): 20
Elevation (^{o}) (-/+): -3 to 89
Elevation Rate (^{o}/sec): 12
Reaction time (sec): 30

FIRE CONTROL
On-carriage:
PO-1M telescope
- Field of View (^{o}): 14
- Power: 5x

PG panoramic telescope:
- Field of View (^{o}): 10
- Power: 4x

Off-carriage:
Rangefinder: D-49 (off carriage)
Radar:
- Name: SON-9/SON-9A (FIRE CAN)
- Function: Fire Control
- Detection Range (km): 80
- Tracking Range (km): 35
- Frequency: 2.7-2.9 GHz
- Frequency Band: E
- Peak Power (kW): 300

PUAZO 6-19 or 6-19M fire control director

VARIANTS
Type 59: Chinese variant.

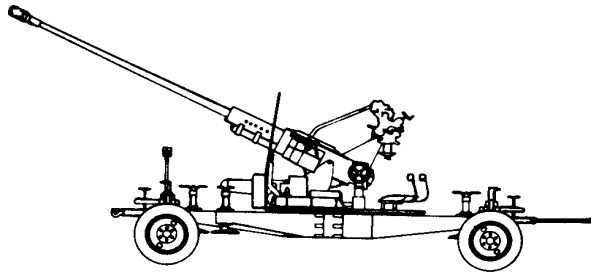
MAIN ARMAMENT AMMUNITION
Types: Frag-HE, AP-T, APC-T
Range (m):
- With on-carriage sight: 4,000
- With off-carriage radar: 12,600

Projectile Weight (kg):
- Frag-HE: 15.61
- AP-T: 15.89
- APC-T: 16

Muzzle Velocity (m/s): 900-1,000
Fuze Type: Proximity and Time
Self-Destruct (sec): 30

NOTES
The KS-19M2 may also be employed in a ground support role.

Russian 57-mm Towed AA Gun S-60



Weapons & Ammunition Types	Typical Combat Load
57-mm gun	**200**
FRAG-T	
APC-T	

SYSTEM
Alternative Designations: None
Date of Introduction: 1950
Proliferation: At least 46 countries

Description:
Crew: 7
Carriage: Four-wheel
Weight (kg): 4,500
Length Overall (m):
- Travel Position: 8.50
- Firing Position: 8.84

Length of Barrel (m): 4.39
Height (m):
- Overall:
- Travel Position: 2.37
- Firing Position: 6.02

Width Overall (m):
- Travel Position: 2.08
- Firing Position: 6.9

Prime Mover: Ural-375D

Automotive Performance:
Max. Towed Speed (km/h): 60
Emplacement Time (min): 1
Displacement Time (min): 3

ARMAMENT
Gun:
Caliber, Type: 57-mm automatic cannon
Number of Barrels: 1 each
Service Life of Barrel (rds): INA
Rate of Fire (rd/min):
- Cyclic: 105-120
- Practical: 70

Loader Type: 4 rd clip, manual
Reload Time (sec): 4-8
Traverse (^{o}): 360
Traverse Rate (^{o}/sec): 40
Elevation (^{o}) (-/+): -4 to +87
Elevation Rate (^{o}/sec): 34
Reaction time (sec): 4.5

FIRE CONTROL
On-carriage:
Optical mechanical computing sight
AZP-57:
- Target Range (m): 5,500

Direct fire telescope

Off-carriage: (see NOTES)
Rangefinder: D-49
Radar:
- Name: SON-9/SON-9A
- Function: Fire Control
- Detection Range (km): 80
- Tracking Range (km): 35
- Frequency: 2.7-2.9 GHz
- Frequency Band: E
- Peak Power (kW): 300

PUAZO 6-60 fire control director

VARIANTS
Type 59: Chinese variant
SZ-60: Hungarian license-built variant

MAIN ARMAMENT AMMUNITION
Type: FRAG-T, APC-T
Range (m):
- With on-carriage sight: 4,000
- With off-carriage radar: 6,000

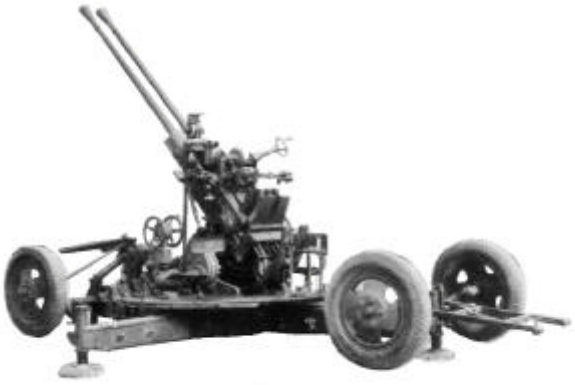
Projectile Weight (kg):
- FRAG-T: 2.81
- APC-T: 2.82

Muzzle Velocity (m/s): 1,000
Fuze Type:
- FRAG-T: Point detonating
- APC-T: Base detonating

Self-Destruct (sec): 13-17

NOTES
Some versions may have the FLAP WHEEL as the primary fire control radar. A S-60 battery will generally consist of six guns, a fire-control radar, and a fire-control director. Four-round clips feed ammunition horizontally into weapon. The S-60 also has an ammunition ready rack that can hold 4 four-round clips near ammunition feed mechanism on left side of the breech. The S-60 can also be used in a ground support role.

Chinese 37-mm Towed AA Gun Type 65



Weapons & Ammunition Types	Typical Combat Load
37-mm automatic cannons	**400**

SYSTEM
Alternative Designations: INA
Date of Introduction: Circa 1965
Proliferation: At least 7 countries

Description:
Crew: 5 to 8
Carriage: 4-wheeled/2-axle towed chassis
Combat Weight (kg): 2,700
Length Overall (m): 5.940
  Travel Position: 6.036
  Firing Position: INA
Length of Barrel (m): 2.729
Height (m): 2.080
  Overall: INA
  Travel Position: 2.105
  Firing Position: INA
Width Overall (m): 1.901
Prime Mover: INA

Automotive Performance:
Max. Towed Speed (km/h): 60
  25 cross-country
Emplacement Time (min): INA
Displacement Time (min): INA
Fording Depth (m): 0.7
Turning Radius (m): 8

ARMAMENT
Gun:
Caliber, Type: 37-mm automatic gun
Number of Barrels: 2
Operation: Recoil
Service Life of Barrel (rds): 2,500+
Barrel Change time (min): 2-3
Rate of Fire(rd/min):
  Cyclic: 320-360 (160-180/barrel)
  Practical: 80
Loader Type: 5-round clip
Reload Time (sec): 4-8
Traverse (^{o}): 360
Traverse Rate (^{o}/sec): INA
Elevation (^{o}): -5 to 85
Elevation Rate (^{o}/sec): INA
Reaction time (sec): INA

FIRE CONTROL
Sights w/magnification: Optical mechanical computing sight

VARIANTS
Russian twin-barreled variant of M-1939 export version
M1985: NKPA has mounted the 37-mm Type 65 on an open turret APC chassis.

MAIN ARMAMENT AMMUNITION
Types: AP-T, HE-T, HEI-T
Range (m):
  Max Range: 8,500
  Tactical AA range: 2,500
Altitude:
  Max Altitude: 6,000
  Effective (m): 1,768 at 45^o
  2,865 at 65^o
Self-destruct time (sec): 8-12
Self-destruct range (m): 3,700-4,700

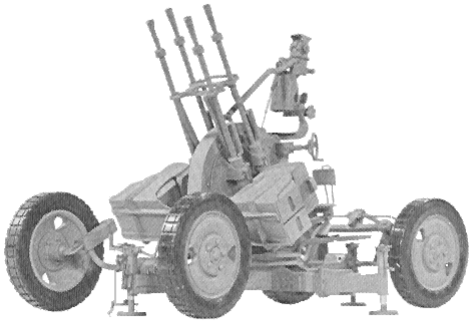
NOTES
Tire Size is 6.50 x 20. The gun can be employed on an SP tracked vehicle mount. A Chinese built direct copy of the Soviet twin barrel export version of the M-1939. The Type 65 consists of two recoil operated automatic cannons mounted on a towed, four-wheeled carriage. All tracking and loading operations are performed manually by a five to eight man gun crew. Because it lacks a radar and powered gun laying motors, the Type 65 is consi d-ered to be effective only during daylight and in fair weather.

Ammunition is interchangeable among Types 55, 65, and 74 AA guns.

Strengths: Highly reliable, rugged and simple to operate.

Weaknesses: Short range, small projectile. No organic radar.

Russian 14.5-mm Heavy Machinegun ZPU-4



Weapons & Ammunition Types	Typical Combat Load
4 barreled KPV 14.5-mm heavy machinegun AP-T API API-T HEI HEI-T	**4,800 rds** (1,200 rds/barrel)

SYSTEM

Alternative Designations: None
Date of Introduction: 1949
Proliferation: At least 45 countries

Description:
Crew: 5
Carriage: 4 wheeled/2 axle towed chassis
Combat Weight (kg): 1,810
Length Overall (m):
- Travel Position: 4.53
- Firing Position: 4.53

Length of Barrel (m): 1.348
Height (m):
- Overall: INA
- Travel Position: 2.13
- Firing Position: INA

Width Overall (m): 1.72
Prime Mover: INA

Automotive Performance:
Max. Towed Speed (km/h): 35
Emplacement Time (min): 2
Displacement Time (min): 2

ARMAMENT

Gun:
Caliber, Type: 14.5 mm machin egun
Number of Barrels: 4
Service Life of Barrel (rds): INA
Rate of Fire(rd/min):
- Max: 2,200-2,400 (600/barrel)
- Practical: 600 (150/barrel)

Loader Type: Belt of 150 rds
Reload Time (sec): 15
Traverse (^{o}): 360
Traverse Rate (^{o}/sec): 48
Elevation (^{o}): -8 to +90
Elevation Rate (^{o}/sec): 29
Reaction time (sec): 8

FIRE CONTROL

Optical mechanical computing sight
Telescope, ground targets

VARIANTS

Type 56: Chinese and NK variant.
MR-4: Romanian single axle variant

MAIN ARMAMENT AMMUNITION

Types: API, API-T, HEI, AP-T, HEI-T
Range (m):
- Max: 8,000
- Min: INA

Altitude (m):
- Max: 5,000
- Effective: 1,400

NOTES
The ZPU-4 can be fired with wheels in travel position if necessary.

The ZPU-4 may also be employed in a ground support role.

Strengths: Highly reliable, rugged and simple to operate. Quick reaction time, widely deployed, explosive round.

Weaknesses: The short-range small projectile requires a direct hit. No organic radar (except the NK Type 56 and M1983).

Russian 23-mm Towed AA Gun ZU-23

Weapons & Ammunition Types	Typical Combat Load
2 x 23-mm AA guns	**2,400**
HE-I HEI-T API-T TP	

SYSTEM
Alternative Designation: None
Date of Introduction: 1962
Proliferation: At least 50 countries

Description:
Crew: 5
Carriage: Two-wheeled
Combat Weight (kg): 950
Length Overall (m):
- Travel Position: 4.57
- Firing Position: 4.60

Length of Barrel (m): 2.01
Height (m):
- Overall:
- Travel Position: 1.87
- Firing Position: 1.28

Width Overall (m):
- Travel Position: 1.83
- Firing Position: 2.41

Prime Movers: GAZ-69 4 x 4 truck, MTLB-T, BMD-2

Automotive Performance:
Max. Towed Speed (km/h): 70
Emplacement Time (sec): 15-20
Displacement Time (sec): 35-40

ARMAMENT
Gun:
Caliber, Type: 23-mm, gas-operated gun
Number of Barrels: 2
Breech Mechanism: Vertical Sliding Wedge
Rate of Fire (rd/min):
- Cyclic: 800-1,000
- Practical: 200

Feed: 50-rd ammunition canisters fitted on either side of the upper mount assembly
Loader Type: Magazine
Reload Time (sec): 15
Traverse (^{0}): 360
Traverse Rate (^{0}/sec): INA
Elevation (^{0}) (-/+): -10°to +90°
Elevation Rate: (^{0}/sec): 54
Reaction Time (min): 8 (est.)

FIRE CONTROL

Sights w/magnification:
Optical mechanical sight for AA fire
Straight tube telescope for ground targets

VARIANTS
ZU-23M: Egyptian produced ZU-23, also referred to as the SH-23M.

MAIN ARMAMENT AMMUNITION
Type: HE-I, HEI-T, API-T, TP
Range (m):
- Max. Range: 2,500
- Min. Range: INA

Altitude (m):
- Max. Altitude: 1,500
- Min. Altitude: INA

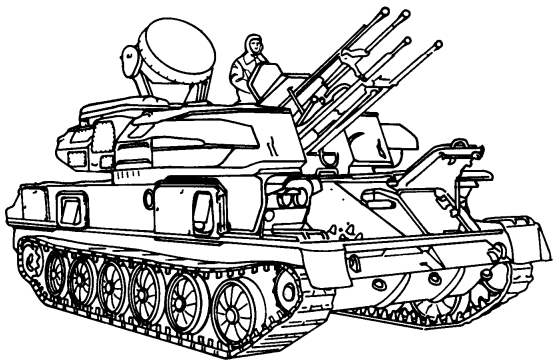
Projectile Weight (kg):
- HE-I: 0.18
- HEI-T: 0.19
- API-T: 0.189
- TP: 0.18

Muzzle Velocity (m/s): 970
Fuze Type:
- HE-I: Point detonating
- HEI-T: Point detonating
- API-T: Base detonating
- TP: Dummy

Self-Destruct (sec): 8

NOTES
Highly mobile air dropable system. Fires the same ammunition as the ZSU-23-4. The reload time will depend on the proficiency of the crew to manually reload. Can fire from the traveling position in emergencies. The ZU-23 can also be used in a ground support role.

Russian 23-mm SP AA Gun ZSU-23-4



Weapons & Ammunition Types	Typical Combat Load
4x 23-mm AA guns	**2,000**
HE-I HEI-T API-T	

SYSTEM
Alternative Designation: Shilka
Date of Introduction: 1965
Proliferation: At least 28 countries

Description:
Crew: 4
Combat Weight (mt): 20.5
Chassis: GM-575 Tracked, six road wheels, no track support rollers
Length (m): 6.5
Height (m):
Radar up: 3.75
Radar down: 2.60
Width (m): 3.1

Automotive Performance:
Engine Type: V6R-1 diesel
Cruising Range (km): 450
Speed (km/h):
Max. Road: 50

Radio: R-123

Protection:
NBC Protection System: Yes

ARMAMENT
Gun:
Caliber, Type, Name: 23-mm liquid-cooled AA 2A7/2A7M
Rate of Fire(rd/min):
Practical: INA
Cyclic: 850-1,000
Reload Time (min): 20
Elevation (^{o}): -4° to +85°
Fire on Move: Yes
Reaction Time (sec): 12-18

FIRE CONTROL
Sights w/magnification:
Day and night vision devices:
Driver periscope: BMO-190
Driver IR periscope: INA
Commander periscope: TPKU-2
Commander IR periscope: TKH-ITC
IFF: INA

Radar: 1RL33M1
Name: GUN DISH
Function: Search and Tracking
Detection Range (km): 20
Tracking Range (km): 10
Frequency: 14.8 to 15.6 GHz
Frequency Band: J

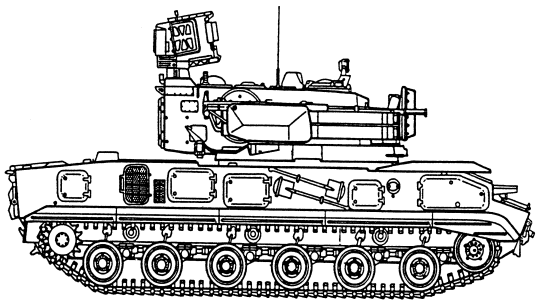
Optical-mechanical computing sight: Part of fire-control subsystem designated as RPK-2

VARIANTS
(see NOTES)

MAIN ARMAMENT AMMUNITION
Types: HE-I, HEI-T, API-T
Range (m):
Max. Effective Range: 2,500
Min. Range: INA
Altitude (m):
Max. Altitude: 5,100
3,500 if self-destruct fuze is included
Min. Altitude: INA
Projectile Weight (kg):
HE-I: 0.18
HEI-T: 0.19
API-T: 0.189
Muzzle velocity (m/s) **:** 950-1,000
Fuze Type:
HE-I: Point detonating, self-destruct option
HEI-T: Point detonating, self-destruct option
APT-T: Base detonating

NOTES
Ammunition is normally loaded with a ratio of three HE rounds to one AP round. ZSU 23-4 Shilka, is capable of acquiring, tracking and engaging low-flying aircraft (as well as mobile ground targets while either in place or on the move). Resupply vehicles carry an estimated additional 3,000 rounds for each of the four ZSUs in a typical battery. Recent (October 1997) information details ZSU-23-4 updates/modernization being offered by the Ukrainians that include: a new radar system replacing the GUN DISH radar, plus a sensor pod believed to include day/night camera, and a laser rangefinder; and mounted above radar/sensor pod is a layer of six fire-and-forget SAMs, believed to be Russian SA-18/GROUSE.

Russian 30-mm SP AA Gun/Missile System 2S6M



Weapons & Ammunition Types	Typical Combat Load
2 x 30-mm twin-barrel cannons	**1,904**
AP-T, APDS Frag-T HE-I APE	
SA-19/GRISON	**8**

SYSTEM
Alternative Designations: 2K22M, Tunguska-M
Date of Introduction: 1990
Proliferation: At least 2 countries

Description:
Crew: 4
Combat Weight (mt): 34
Chassis: GM-352M tracked vehicle
Chassis Length Overall (m): 7.93
Height (m):
- TAR up: 4.02
- TAR down: 3.36

Width Overall (m): 3.24

Automotive Performance:
Engine Type: V-12 turbo diesel
Cruising Range (km): 500
Speed (km/h):
- Max. Road: 65
- Max. Swim: INA

Fording Depths (m): INA

Radio: R-173

Protection:
NBC Protection System: Yes

ARMAMENT
Gun:
Caliber, Type, Name: 30-mm gun, 2A38M
Rate of Fire (rd/min): 4,800 (four gun total)
Reload Time (min): gun ammunition and missiles in about 16 min.
Elevation (°) (-/+): -10 to + 87°
Fire on Move: Yes

Missile: 9M311
Name: SA-19/GRISON
Range (m):
- Max. Range: 8,000-10,000 (see NOTES)
- Min. Range: 2,500

Altitude (m):
- Max. Altitude: 3,500
- Min. Altitude: 15

Dimensions:
- Length (m): 2.83

Weight (kg): 57 (in container)
Missile Speed (m/s): 600-900
Guidance: SACLOS
Seeker Field of View(°) : INA
Tracking Rate: INA
Warhead Type: Frag-HE
Warhead Weight (kg): 9
Fuze Type: Proximity
Self-Destruct (sec): INA
System Reaction Time (sec): 6-12
Fire on Move: No (must be at a halt to fire the missile)

FIRE CONTROL
Sights w/magnification:
Stabilized optical sight 1A29M
- Magnification: 8x
- Field of View(°): 8°

Commander' s position IR day/night sight
Night sight: 1TPP1 thermal available
IFF: Yes

Radars: HOT SHOT radar system
Name: 1RL144 (TAR)
- Function: Target Acquisition
- Detection Range (km): 18-20
- Tracking Range (km): INA
- Frequency: 2-3 GHz
- Frequency Band: E

Name: 1RL144M (TTR)
- Function: Target Tracking
- Detection Range (km): 16
- Tracking Range (km): INA
- Frequency: 10-20 GHz
- Frequency Band: J

VARIANTS
(see NOTES)

MAIN ARMAMENT AMMUNITION
Type: AP-T, APDS, Frag-T, HE-I, APE
Range (m):
- Max. Range: 4,000
- Min. Range: 200

Altitude (m):
- Max. Altitude: 3,000
- Min. Altitude: 0

Projectile Weight (kg): INA

NOTES
Range out to 10 km for hovering aircraft and low flying targets. In addition to the 8 mounted ready missiles two additional missiles can be carried inside. There is a 2S6M1 variant/upgrade, which has improved missile control, range and altitude capabilities of 1.5-10 km, and 0.015-6 km respe c-tively. However, as of November 1997 the 2S6M1 is not known to be fielded.

Main operating mode is radar mode, with day/night capability. The 1TPP1 thermal module is available for mounting on 2S6M. This sight has a range of 4,000-6,000 m.

Russian 57-mm Self Propelled SP AA Gun ZSU-57-2

Weapons & Ammunition Types	Typical Combat Load
Twin 57-mm automatic cannons Frag-HE AP-T APC-T	**300**

SYSTEM

Alternative Designations: None
Date of Introduction: 1955
Proliferation: At least 16 countries

Description:
Crew: 6
Carriage: 4 road wheels/T-54 modified chassis
Combat Weight (mt): 28.0
Length Overall (m): 8.4
Length of Barrel (m): INA
Height Overall (m): 2.75
Width Overall (m): 3.270
Prime Mover: A shortened T-54 chassis with thinner armor and only four road wheels.

Automotive Performance:
Emplacement Time (min): N/A
Displacement Time (min): N/A
Engine Power (hp): 520
Max Road Speed (km/h): 50
Cruising Range (km): 400
Fording Depth (m): 1.4

Armor Protection: 13 mm front hull and turret

ARMAMENT

Gun, Caliber, Type:
57-mm recoil-operated air-cooled cannons, S-68
Number of Barrels: 2
Service Life of Barrel (rds): INA
Rate of Fire (rd/min):
Cyclic: 210-240 (105-120/gun)
Practical: 140 (70/gun)
Loader Type: 5-round clip, manual
Reload Time (min): INA
Traverse (^{o}): 360
Traverse Rate (^{o}/sec): 30
Elevation (^{o}): -5 to +85
Elevation Rate (^{o}/sec): 20

FIRE CONTROL

Sights w/magnification:
Optical mechanical computing reflex sight (not radar controlled)
Later variants were fitted with a more sophisticated sighting system, identified by two small ports in forward upper portion of the turret.

VARIANTS

Type 80 Chinese variant

MAIN ARMAMENT AMMUNITION

Types: APHE, Frag-T, APC-T, HVAP-T, HE-T
Range (m):
Max Range: 12,000
Tactical AA range: 3,993
Altitude:
Max Altitude: 8,000
Effective (m): 2,835 at 45^o
4,237 at 65^o
Projectile Weight (kg):
Frag-T: 2.81
APC-T: 2.82
HE-T: 2.85
Muzzle Velocity (m/s): 1,000
Fuze Type:
Frag-T (point detonating fuze)
APC-T (base detonating fuze)
HE-T (Yugoslavian, impact [super quick] action with pyrotechnical self-destruct)
Self-Destruct time (sec): 13-17
Armor penetration (mm): 96 APC-T at 1,000 m

NOTES
The ZSU-57-2 can be employed in a ground support role.

No NBC system and no amphibious capability.

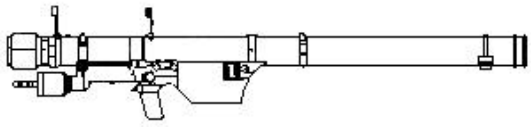
Fuel drums can be fitted on rear of hull.

Absence of a tracking radar, a night vision device, and an enclosed turret makes this a daylight, fair weather weapon system only.

Auto traverse with manual backup.

Uses same ammo as the towed single S-60.

Russian Manportable SAM System SA-7b/GRAIL



Weapons & Ammunition Types	Typical Combat Load
ready missile	**1**

SYSTEM
Alternative Designation:
9K32M Strela-2M
Date of Introduction: 1972
Proliferation: Worldwide

Description:
Crew: 1

ARMAMENT
Launcher
Name: 9P54M
Dimensions:
Length (m): 1.47
Diameter (mm): 70
Weight (kg): 4.71
Reaction Time (acquisition to fire) (sec): 5-10
Time Between Launches (sec): INA
Reload Time (sec): 6-10

Missile
Name: 9M32M
Range (m):
Max. Range: 5,500
Min. Range: 500
Altitude (m):
Max. Altitude: 4,500
Min. Altitude: 18
Dimensions:
Length (m): 1.40
Diameter (mm): 70
Weight (kg): 9.97
Missile Speed (m/s): 580
Propulsion: Solid fuel booster and solid fuel sustainer rocket motor.
Guidance: Passive IR homing device (operating in the medium IR range)
Seeker Field of View(°): 1.9°
Tracking Rate(°/sec): 6°
Warhead Type: HE
Warhead Weight (kg): 1.15
Fuze Type: Contact (flush or grazing)
Self-Destruct (sec): 15

FIRE CONTROL
Sights w/Magnification:
Launcher has sighting device and a target acquisition indicator. The gunner visually identifies and acquires the target.
Gunner:
Field of View (°): INA
Acquisition Range (m): INA

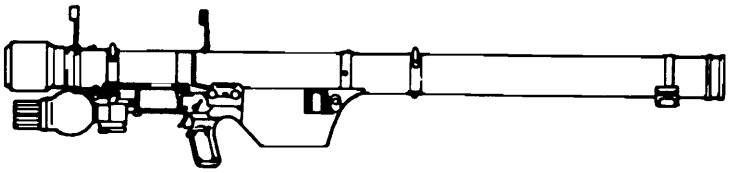
IFF: Yes (see NOTES)

VARIANTS
SA-N-5: Naval version
HN-5A: Chinese version
Strela 2M/A: Yugoslavian upgrade
Sakr Eye: Egyptian upgrade

Mounted in several types of vehicles in four, six, and eight-tube launcher varieties.
Can be mounted on several helicopters (Mi-24, S-342 Gazelle)

NOTES
The seeker is fitted with a filter to reduce the effectiveness of decoying flares and to block IR emissions. This 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. An identification friend or foe (IFF) system can be fitted to the gunner/operator's helmet. Further, a supplementary early warning system consisting of a passive RF antenna and headphones can be used to provide early cue about the approach and rough direction of an enemy aircraft. The main difference between the SA-7 and SA-7b is the improved propulsion of the SA-7b. This improvement increases the speed and range of the newer version.

Russian Manportable SAM System SA-14/GREMLIN



Weapons & Ammunition Types	Typical Combat Load
ready missiles	**1**

SYSTEM
Alternative Designation: 9K34 Strela-3
Date of Introduction: 1978
Proliferation: Worldwide

Description:
Crew: 1

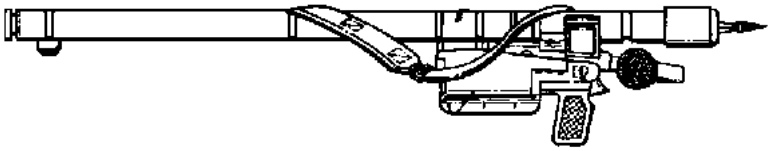
ARMAMENT
Launcher
Name: 9P59
Dimensions:
Length (m): 1.40
Diameter (mm): 75
Weight (kg): 2.95
Reaction Time (sec): 14
Time Between Launches (sec): 35-40
Reload Time (sec): 25

Missile
Name: 9M36 or 9M36-1
Range (m):
Max. Range: 6,000
Min. Range: 600
Altitude (m):
Max. Altitude: 6,000
Min. Altitude: 50
Dimensions:
Length (m): 1.4 m
Diameter (mm): 75 mm
Fin Span (mm): INA
Weight (kg): 10.3
Missile Speed (m/s): 600
Propulsion: 2-stage solid-propellant rocket
Guidance: passive IR homing
Seeker Field of View: INA
Tracking Rate: INA
Warhead Type: Frag-HE
Warhead Weight (kg): 1.0
Fuze Type: Contact/grazing
Self-Destruct (sec): 14-17

FIRE CONTROL
Sights w/Magnification:
Launch tube has simple sights
Gunner:
Field of View (°): INA
Acquisition Range (m): INA
IFF: Yes

VARIANTS
Igla 9M39 (SA-N-8): Naval version

Russian Manportable SAM System SA-16/GIMLET



Weapons & Ammunition Types	Typical Combat Load
Ground mount	**1**
SP Artillery mount	**2**
MANPAD transporter	**5**

SYSTEM
Alternative Designation: 9K310 Igla-1
Date of Introduction: 1986
Proliferation: At least 34 countries

Description:
Crew: 1

ARMAMENT
Launcher
Name: 9P322 launch tube
9P519 launcher gripstock
Dimensions (m):
Length: 1.708
Diameter: 0.08 tube, 0.33 overall
Weight (kg): 7.1
Reaction Time (sec): 5-7 seconds
Time between launches: INA
Reload time (sec): <60

Missile
Name: 9M313
Range (m):
Max. Range: 5,200 receding
4,500 approaching
Min. Range: 600
Altitude (m):
Max. Altitude: 3,500 receding slow
3,000 slow approach
2,500 receding fast
2,000 fast approach
Min. Altitude: 10
Dimensions (mm):
Length: 1,593
Diameter: 72
Weight (kg): 10.8
Missile Speed (m/s): 570
Propulsion: Solid fuel booster and dual-thrust solid fuel sustainer rocket motor.
Guidance: Passive IR homing
Seeker Field of View: 80°
Tracking Rate: INA
Warhead Type: Frag-HE
Warhead Weight (kg): 1.27
Fuze Type: Contact
Self-Destruct (sec): 14-17

FIRE CONTROL
Sights w/Magnification:
Front hooded ring, rear optical
Gunner:
Field of View (°): INA
Acquisition Range (m): INA

IFF: Yes

VARIANTS
Specialized applications include an LUAZ utility carrier designed for a manpads firing unit. The vehicle has a rack for mounting five 9P322 SA-16 launcher tubes. This rack could be used in other manportable AD unit vehicle applications.

Djigit: Russian twin launcher complex mounted on a rail frame with operator's seat and tripod. Missiles can be simultaneously launched using centrally mounted sight. A Hungarian mount with this system on a GAZ-630 4x4 truck is called **Igla-1E**.

Igla-1E: Russian export variant. Unlike the base system, fuel remnants are not fuzed with the warhead. IFF interrogator can be tailored to customer specifications.

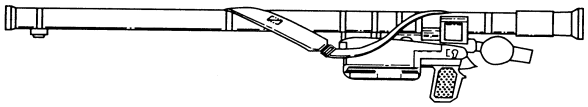
Igla-1M: Export variant similar to -1E, but lacks an IFF interrogator.

NOTES
Launcher deployment time is 5-13 seconds. Missiles are preloaded in the launch tube for quick loading to the gripstock. A tube can be used up to five times. The missile is cooled by a disposable bottle of refrigerant. The bottle and launcher battery are useable for 30 seconds after activation. The ATGM is more vulnerable to EO/IR decoy countermeasures than is the SA-18. Because the nose extends past the launcher tube, the nose is protected with an extended cap, which is removed before launching.

The unusually wide (80 °) FOV seeker permits the missile to respond more quickly to fast-maneuver targets, such as helicopters.
Maximum speed for engaged targets varies from 320 m/s rear aspect, receding targets, to 360-400 m/s head-on, approaching targets.

The gunner may have an optional portable electronic plotting board, which warns of location and direction of approaching target(s) with a display range of up to 12.5 km.

Russian Manportable SAM System SA-18/GROUSE



Weapons & Ammunition Types	Typical Combat Load
ready missiles	1

SYSTEM
Alternative Designation: 9K38 Igla
Date of Introduction: 1983
Proliferation: At least 4 countries

Description:
Crew: 1

ARMAMENT
Launcher
Name: 9P39
Dimensions (m):
Length: 1.708
Diameter: INA
Weight (kg): 1.63
Reaction Time (sec): 6-7
Time Between Launches (sec): 16
Reload Time (sec): 10

Missile
Name: 9M39
Range (m):
Max. Range: 6,000
Min. Range: 500
Altitude (m):
Max. Altitude: 3,500
Min. Altitude: 10
Dimensions (mm):
Length: 1708
Diameter: 70
Weight (kg): 10.6
Missile Speed: Mach 2
Propulsion: Solid fuel booster and dual-thrust solid fuel sustainer rocket motor.
Guidance: Passive IR homing
Seeker Field of View: INA
Tracking Rate: INA
Warhead Type: HE
Warhead Weight (kg): 1.27
Fuze Type: Contact
Self-Destruct (sec): 15

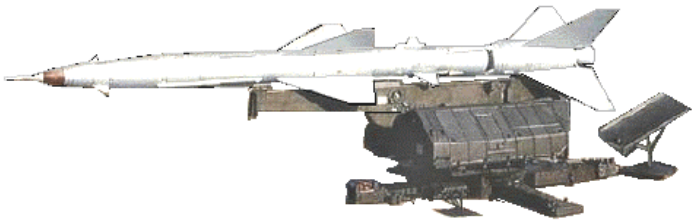
FIRE CONTROL
Sights w/Magnification:
Launcher has fore and rear sights
Gunner:
Field of View (^{o}): INA
Acquisition Range (m): INA

IFF: Yes

VARIANTS
Igla-V: Air-to-air version
Igla-D: Use in airborne forces
Igla-N: Increased lethality
Igla-S: Improved version of Igla-N

NOTES
The SAM gunner is provided information about location and direction of approaching target(s) using a portable electronic plotting board. Two variants (Igla-D and Igla-N) can be separated in two parts for easier portability, but this adds 60 seconds to the reaction time. Igla-N is heavier due primarily to the warhead mass increased to 3.5 kg.

Russian SAM System SA-2/GUIDELINE



Weapons & Ammunition Types	Typical Combat Load
Single rail ground mounted	**Six launchers per battery**

SYSTEM
Alternative Designations: V75SM, S-75 Dvina, V-75 Volkhov
Date of Introduction: 1959
Proliferation: At least 41 countries

ARMAMENT
Launcher
Description: Single-rail, ground- mounted, not mobile but transportable
Name: INA
Dimensions: INA
Weight (kg): INA
Reaction Time (sec): INA
Time Between Launches (sec): INA
Reload Time (min): 10-12
Fire on Move: No
Emplacement Time (min): < 4 hours
Displacement Time (min): < 4 hours
Normal Salvo: 3 missiles at six-second intervals

Missile: V750K
Name: INA
Range (km):
Max. Range: 35-50 Volga 55, Volga-M 67
Min. Range: 7-9
Altitude (m):
Max. Altitude: 28,000
Volga, Volga-M 30,000
Min. Altitude: 100
Dimensions:
Length (m): 10.70
Diameter (m): 0.70
Weight (kg): 2,300-2,450 at launch
Missile Speed (mach): 4.5
Propulsion:
Solid fuel booster 5 sec duration
Sustainer liquid <70 sec duration
Guidance: Command RF
Warhead Types: HE, Nuc
Bursting Radius (m): 125-135
Kill Radius (m): 65
CEP (m): 76.3
Fuze Type: Proximity or Command
Command destruction at (sec): 115
Warhead Weight (kg): 195 HE

FIRE CONTROL
Radar:
Name: FAN SONG, A-F variants
Function: Fire Control
Control Range (km): 60-120 A, B
70-145 for C, D, E
INA for F
Frequency Band: E/F for A, B G for C, D, E, INA for F
Location: Within battery formation

Radar:
Name: SPOON REST, P-12
Function: Target Acquisition, Early Warning
Detection Range (km): 275
Frequency Band:
A=A (VHF)
B=VHF below A band
Location: Outside battery formation

Radar:
Name: FLAT FACE, P-15
Function: Early warning, target acquisition
Detection Range (km): 250
Frequency Band: C
Location: At regimental HQ

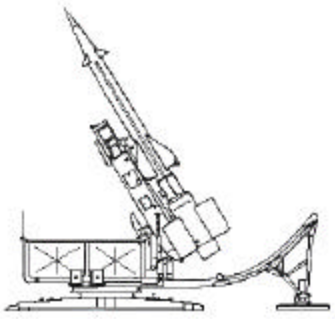
Radar:
Name: SIDE NET, PRV-11
Function: Height Finding Radar
Detection Range (km): 180
Frequency Band: E
Location: At regimental HQs in some cases

VARIANTS
SA-2a (Mod 0): FAN SONG A
SA-2b (Mod 1): FAN SONG B, longer missile
SA-2c (Mod 2): FAN SONG C, longer range, lower altitude engagement
SA-2d (Mod 3): FAN SONG E, EW enhanced
SA-2e (Mod 4): FAN SONG E nuc variant
SA-2f (Mod 5): FAN SONG F, EW enhanced Backup optical, home-in on jam-capable missile
SA-N-2: Naval test version, unsuccessful
HQ-2: Chinese variant (CSA-1)
Volga-M upgrade: Mid 90' s, digital sub- systems, 41 miles range, less maint enance
Iraqi Mod: Infrared terminal guidance/missile

NOTES
The SA-2/Guideline is a two-stage medium-to-high altitude, long-range, radar-tracking SAM. The weapon is a national-level asset usually found in the rear area with the mission of defending static assets such as supply and command installations. It is fired from a single-rail ground-mounted launcher that can be moved by a truck. The missiles are carried on a special transloader-semi-trailer towed by a Zil truck. An SA-2 regiment consists of three battalions, each having a single firing battery. Each battery has six launchers arranged in a star formation, a centrally located FAN SONG fire control radar, and a loading vehicle. The two forward batteries usually locate 40 to 50 km behind front lines; the third battery locates approx 80 km behind.

Limitations include limited effectiveness against updated ECM, restricted mobility, and limited effectiveness against low-altitude targets.

Russian SAM System SA-3/GOA



Weapons & Ammunition Types	Typical Combat Load
Launch rails	**2 or 4**

SYSTEM
Alternative Designations: S-125 Neva, S-125 Pechora (export)
Date of Introduction: Twin launcher 1961/ quadruple launcher 1973.
Proliferation: At least 39 countries

LAUNCHER
Description: Towed twin or quad-rail launcher
Name: INA
Dimensions: INA
Weight (kg): INA
Reaction Time (sec): INA
Time Between Launches (sec): INA
Reload Time (min): 50 (quad launcher)
Fire on Move: No
Emplacement Time (min): 120
Displacement Time (min): 100

ARMAMENT
Missile:
Name: 5V24, 5V27
Range (m):
Max. Range: 29,000
Min. Range: 2,400
Altitude (m):
Max. Altitude: 18,300
Min. Altitude: 4.5
Dimensions:
Length (m): 6.10
Diameter (mm): 550
Weight (kg): 946
Missile Speed (m/s): 650-1,150
Velocity (mach): 3.5
Propulsion: Solid fuel booster
Guidance: Command RF
Warhead Type: Frag-HE
Fuze Type: Proximity RF
Warhead Weight (kg): 73

FIRE CONTROL
Radar:
Name: LOW BLOW
Function: Tracking/Command guidance
Control Range (km): 85
Detection Range (km): 110
Frequency Band: I
Tracking Capability: 1 target simultaneously (1-2 missiles)

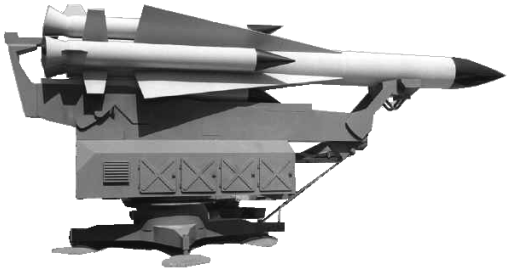
Radar:
Name: FLAT FACE/P-15
Function: Target Acquisition
Detection Range (km): 250
Frequency Band: C

Radar:
Name: SQUAT EYE/P-15M
Function: Target Acquisition (low altitude, instead of FLAT FACE)
Detection Range (km): INA
Frequency Band: C

VARIANTS
SA-3a: Two-rail launcher. Missiles without interstage fins.
SA-3b (GOA Mod 1): Two-rail launcher. Missiles have interstage fins.
SA-3c: Four-rail launcher.
S-125 Pechora: Export version
SA-N-1: Naval version

NOTES
The SA-3/GOA is a two-stage, low- to medium-altitude SAM. Two ready missiles travel in tandem on a modified truck or tracked vehicle from which the crew loads the missiles onto a ground-mounted, trainable launcher for firing. The truck-mounted FLAT FACE radar acquires the targets, while the LOW BLOW radar carries out the fire control function. It is principally a point/small area defense weapon. The SA-3 system is not mobile. It is movable, but its displacement time is considerable.

Russian SAM System SA-5/GAMMON



Weapons & Ammunition Types	Typical Combat Load
Single-rail ground mounted	**Six launchers per Battalion**

SYSTEM
Alternative Designations: S-200, Vega
Date of Introduction: 1963
Proliferation: At least 15 countries

ARMAMENT
Launcher:
Description: Single-rail, ground- mounted, not mobile but transportable
Dimensions: INA
Weight (kg): INA
Reaction Time (sec): INA
Time Between Launches (sec): INA
Reload Time (min): INA
Fire on Move: No
Emplacement Time (min): Days
Displacement Time (min): Days

Missile: (See NOTES)
Name: INA
Range (km):
Max. Slant Range: 300
Effective Range: 250
Min. Range: 17
Altitude (m):
Max. Altitude: 29,000
Effective ceiling: 30,000
Min. Altitude: INA
Dimensions:
Length (m): 10.7
Diameter (mm): 750
Weight (kg): 7,100
Wrap around Boosters:
Length (m): 4.9
Diameter (mm): 500
Missile Speed (m/s): 1,100
Propulsion: 2-stage liquid fuel, four wrap-around solid fuel rockets
Guidance: Semi-active homing
Warhead Type: Conventional (HE) or nuclear
Fuze Type: INA
Warhead Weight (kg): 60 HE
Self-Destruct (sec): INA
Booster separation at (km): 2
Reload Time (min): 5

FIRE CONTROL
Radar:
Name: SQUARE PAIR
Function: Tracking
Effective Range (km): 350
Frequency (GHz): 6.62-6.94
Frequency Band: H
Located: With firing units

Associated Radars:
Name: BACK NET initially BAR LOCK B (P-50) follow-on
Function: Surveillance/ early war ning
Range (km): 250/ 390
Frequency Band: E-band (2-2.5 GHz) / E & F bands
Location: Generally with separate early warning or Signals Reco n-naissance bns

Name: SIDE NET/PRV-11 initially, ODD PAIR, E-band follow-on
Function: Height Finding Radar
Range: INA
Frequency Band: E-band
Location: Generally with separate early warning or Signals Reco n-naissance bns

Name: TALL KING
Function: Very long-range early warning
Effective Range (km): 500-600
Frequency Band: A-band (150-180 MHz)
Location: Generally with separate early warning or Signals Reconnaissance bns

Name: BACK TRAP
Function: Very long-range early earning
Effective Range (km): INA
Frequency Band: A-band (172 MHz)
Location: Brigade Level

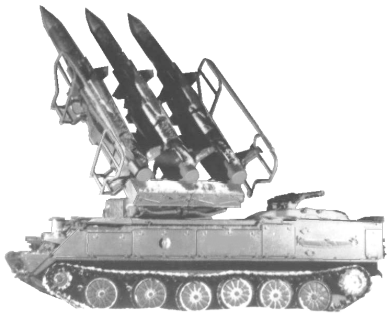
Name: BIG BACK
Function: Very long-range early warning
Effective Range (km): INA
Frequency Band: 3-d L-band
Location: Brigade Level

VARIANTS
Possibly as many as 5 missiles/variants

NOTES
The SA-5/Gammon is a long-range, strategic semi-active guided missile system for targeting medium-to-high altitude high-speed aircraft.

The missile has a long cylindrical body with a conical nose, four long chord cruciform delta wings, four small cruciform rectangular control surfaces at the extreme rear, and four jettisonable, wraparound solid-fuel boosters with canted nozzles. It uses a liquid propellant, dual thrust rocket engine, and the missile travels about 2 km before booster separation. The sustainer has four cropped delta wings and steerable rear fins. Control is assisted by ailerons.

Russian SAM System SA-6/GAINFUL



Weapons & Ammunition Types	Typical Combat Load
Launch rails	**3**

SYSTEM
Alternative Designations: Kub, Kvadral
Date of Introduction: 1966
Proliferation: At least 22 countries

Description:
Crew: 3
Combat Weight (mt): 14
TEL Chassis: Modified PT-76
Length (m): 6.09
Height (m): 4.45
Width (m): 3.04

Automotive Performance:
Engine Name, Type: V-6R, 6 cyl diesel
Cruising Range (km): 250
Speed (km/h):
Max. Road: 45
Max. Swim: N/A

Radio: INA

Protection:
NBC Protection System: Yes

ARMAMENT
Launcher:
Name: 2P25
Reaction Time (min): INA
Time Between Launches (sec): INA
Reload Time (min): 10
Fire on Move: No
Emplacement Time (min): 5 or less
Displacement Time (min): INA

Missile:
Name: 3M9, 9M9
Range (m):
Max. Range: 25,000
Min. Range: 4,000
Altitude (m):
Max. Altitude: 15,000
Min. Altitude: 50
Dimensions:
Length (m): 6.20
Diameter (mm): 335
Weight (kg): 599
Missile Speed: Mach 2.7
Propulsion: Solid fuel
Guidance: Semi-active radar ho ming
Warhead Type: Frag HE
Fuze Type: Proximity RF
Warhead Weight (kg): 50

FIRE CONTROL
Sights w/Magnification: EO sighting system on vehicle. Commander and driver have IR.

IFF: Pulse-doppler

Radar:
Name: STRAIGHT FLUSH
Function: Fire control /target acquisition
Detection Range (km): 60-90
Tracking Range (km): 28
Frequency: I-low altitude (tracking); G/H-med altitude (acquisition); H (detection)

Radar:
Name: LONG TRACK
Function: Battlefield surveillance/target acquis ition
Detection Range (km): 167
Tracking Range (km): 150
Frequency: 2.6 GHz
Frequency Band: E

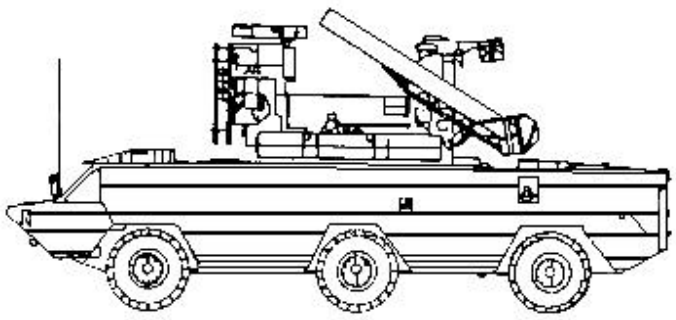
Radar:
Name: THIN SKIN
Function: Height Finding
Detection Range (km): 240
Tracking Range (km): INA
Frequency Band: H

VARIANTS
SA-6b/GAINFUL: Mounted on MT-LB, has integrated radar. The TELAR can operate independently for surveillance.

NOTES
The SA-6 is a two-stage, solid-fuel, low-altitude SAM. It has radio-command guidance with semi-active radar terminal homing. Targets are low to medium altitude fixed- and rotary-wing aircraft. Two or more missiles may be launched at a target during an engagement. The associated STRAIGHT FLUSH fire control/target acquisition radar vehicle uses the same chassis as the SA-6a TEL. The LONG TRACK target acquisition radar is also associated with the SA-6 system. The LONG TRACK surveillance radar acquires target data, the STRAIGHT FLUSH missile site r a-dars take over target acquisition and fire control.

SA-6 regiments organic to mechanized and tank divisions consist of 20 TELs in five batteries, 4 TELs to a battery. The SA-6b system includes the FIRE DOME fire control radar. When the SA-6a TEL battery is replaced with an SA-6b TELAR, the battery doubles its capability to acquire and engage targets. Each battery has four triple launchers, one STRAIGHT FLUSH vehicle, and two reload vehicles (3 missiles each). Normally, three of these batteries are deployed approximately 5 km behind the front line; the remaining two are deployed about 10 km farther back, filling the gaps b e-tween the three forward batteries.

Russian SAM System SA-8b/GECKO



Weapons & Ammunition Types	Typical Combat Load
SA-8b in canisters	**6**

SYSTEM
Alternative Designations: 9K33M3 Osa-AKM
Date of Introduction: 1980
Proliferation: At least 25 countries

Description:
Crew: 3
Combat Weight (mt): 9
TELAR: BAZ-5937 6x6 amphibious cross-country capable vehicle
Length (m): 9.14
Height (m): 4.2 (with surveillance radar folded down)
Width (m): 2.75

Automotive Performance:
Engine Type: D20K300 diesel
Cruising Range (km): 500
Speed (km/h):
Max. Road: 80
Max. Swim: 8

Radio: R-123M

Protection:
NBC Protection System: Yes

ARMAMENT
Launcher:
Name: 9P35M2
Dimensions:
Length (m): 3.2
Diameter (mm): INA
Weight (kg): 35
Reaction Time (sec): INA
Time Between Launches (sec): 4
Reload Time (min): 5
Fire on Move: No
Emplacement Time (min): 4
Displacement Time (min): Less than 4 (est.)

Missile:
Name: 9M33M3
Range (m):
Max. Range: 15,000
Min. Range: 200
Altitude (m):
Max. Altitude: 12,000
Min. Altitude: 10
Dimensions (mm):
Length: 3,158
Diameter: 209.6
Weight (kg): 170
Missile Speed (m/s): 1020
Propulsion: Solid propellant rocket motor
Guidance: RF CLOS
Warhead Type: Frag-HE
Fuze Type: Contact and proximity
Warhead Weight (kg): 16
Self-Destruct (sec): 25-28

FIRE CONTROL
Sights w/Magnification: INA
LLLTV/optical assist (for target tracking in low visibility and heavy ECM)

IFF: Yes

Radar:
Name: LAND ROLL
Function: Target Acquisition
Detection Range (km): 20-30
Tracking Range (km): 20-25
Frequency: 6-8 GHz
Frequency Band: H

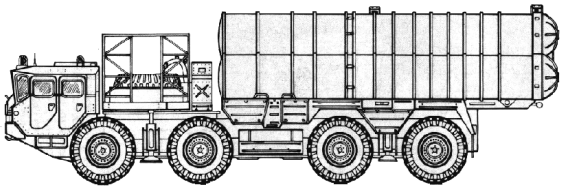
Radar:
Name: Monopulse Target Tracking Radar
Function: Target Tracking
Detection Range (km): 20-25
Tracking Range (km): INA
Frequency: 14.2-14.8 GHz
Frequency Band: J

2 Missile tracking radars:
Frequency: 10-20 GHz

VARIANTS
SA-8a: Initial production model that carries four missiles on exposed rails.
4K33 Osa-M (SA-N-4): Naval variant

NOTES
The first production version of this system was identified as SA-8a, which only had 4 launcher rails and exposed missiles. The SA-8b typically has two BAZ-5937 resupply/transloader vehicles, carrying 18 missiles each (boxed in sets of three) that supports a battery of four TELARs. A target can be brought under fire both with one missile as well as a volley of two missiles. This system is also air transportable.

Russian SAM System SA-10b/GRUMBLE



Missiles	Typical Combat Load
SA-10b in canisters on-board	**4**

SYSTEM

System Designation: S-300PMU
Alternative Designations: SA-10b GRUMBLE (NATO)
Date of Introduction: 1985
Proliferation: At least 8 countries
Primary Components:
- 1- Launch vehicle with command shelter (5P85SU)
- 2 -Launch vehicles without command shelter (5P58DU)
- 1- FLAP LID B Target engagement radar

ARMAMENT

TEL:
Name: 5P85SU or 5P58DU (see NOTES)
Time Between Launches (sec): 3
Reload Time (min): INA
Crew: 6
Fire on Move: No
Emplacement Time (min): 5
Displacement Time (min): < 5
Missiles Fired Simultaneously: 12 (2 per target)
Targets Tracked Simultaneously: 6

Automotive Performance:
Chassis: MAZ-7910 (8x8)
Engine: D12A-525 V-12 water cooled
Horsepower: 525
Cruising Range (km): 650
Speed (km/h):
- Max. Road: 60

Weight (kg): 20,000
Dimensions (m):
- Length: 9.4
- Width: 3.1
- Height: 3.7

Missile:
Name: 5V55RUD
Range (km):
- Max. Launch Range: 90
- Min. Range: 5

Altitude (m):
- Max. Altitude: 27,000
- Min. Altitude: 25

Speed (m/sec):
- Max Target: 1,200
- Max SAM: 2,100

Dimensions:
- Length (m): 7
- Diameter (mm): 450

Weight (kg):
- In Canister: 2,100

Guidance: Track-Via-Missile (TVM)
Warhead Type: HE
Fuze Type: Contact
Warhead Weight (kg): 133

VARIANTS

SA-10a: Semi-fixed version d e-ployed on trailers.
SA-10c: Improved, longer range (150 km), TOMBSTOME radar, expanded C^2.
HQ-10/HQ-15: Chinese licensed copy of SA-10.
HQ-9/FT2000: Chinese based on S-300PMU (SA-10b).
SA-N-6: Russian naval version.

ASSOCIATED RADARS

Radar:
Name: 30N6
NATO Designation: FLAP LID B
Function: Target Engagement
Unit Associated With: Firing battery
Detection Range (km): 90 km
Interception Altitude (m): 25 and higher
Target Speed (km/h): 4,200
Targets Engaged Simultaneously: 6
Missiles Guided Simultaneously : 12
Frequency (GHz): 10
Frequency Band: I/J

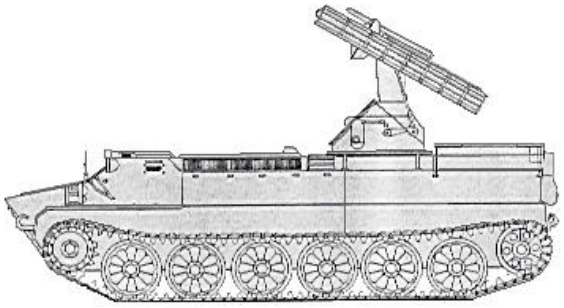
Radar:
Name: 76N6
NATO Designation**:** CLAM SHELL
Function: Low Altitude Search and Acquisition
Unit Associated With: Battalion/regiment
Detection Range (km):
- @ 1,500 feet altitude: 93
- @ 3,000 feet altitude: 120

Targets Tracked Simultaneously: 180 low level targets
Resolution of Target Radar Cross Section (RCS): .02 m^2 @ 1,400 kts
Frequency (GHz): INA
Frequency Band: I

Radar:
Name: INA
NATO Designation: BIG BIRD
Function: Target Detection/Command Guidance
Unit Associated With: Regiment
Frequency (GHz): 3.3
Frequency Band: F

NOTES
The missiles (5V55R) are in a sealed transport launch canister and do not need to be tested or adjusted during their service life of 10 years. They are launched vertically by the canister without turning the launcher toward the target. Each battery has one 5P85SU launcher vehicle with a command shelter mounted behind the cab and one or two 5P58DU launcher vehicles without the command shelter. Two missiles are normally fired at each target increasing probability of hit. The line drawing is of the 5P58DU TEL (without the command shelter).

Russian SAM System SA-13b/GOPHER



Weapons & Ammunition Types	Typical Combat Load
9M333 missiles	**8**
Ready	4
Reload	4
7.62-mm MG RPK	INA

SYSTEM
Alternative Designations: Strela-10M3, 9K35M3
Date of Introduction: 1981
Proliferation: At least 22 countries

Description:
Crew: 3
TELAR: 9A34M3 or 9A35M3 vehicle
Chassis: MT-LB
Combat Weight (mt): 12.3
Length (m):
Launch position: 6.45
Travel position: >6.45
Height (m):
TAR up: 3.8
TAR down: 2.22
Width (m): 2.85

Automotive Performance:
Engine Type: V-8 diesel
Cruising Range (km): 500
Speed (km/h):
Max. Road: 61.5
Max Swim: 6

Radio: INA

Protection:
NBC Protection System: Yes

ARMAMENT
Launcher:
Name: INA
Dimensions: INA
Length (m): INA
Diameter (mm): INA
Weight (kg): INA
Reaction Time (sec): 7-10
Time Between Launches (sec): <5
Reload Time (min): 3
Fire on Move: No, stop or short halts
Emplacement Time (min): 0.67
Displacement Time (min): <1.0

Missile:
Name: 9M333
Range (m):
Max. Range: 5,000-7,000
Min. Range: 800
Altitude (m):
Max. Altitude: 3,500
Min. Altitude: 10
Dimensions (mm):
Length: 2,223
Diameter: 120
Weight (kg): 42
Missile Speed (m/s): Up to 800/517 average
Propulsion: Single-stage solid propellant
Guidance: Photo contrast or dual IR homing
Warhead Type: HE with fragmenting rod
Fuze Type: Laser proximity/contact
Warhead Weight (kg): 5
Self-Destruct (sec): 29

Auxiliary Weapon:
Caliber, Type, Name: 7.62-mm MG, RPK
Rate of Fire (rd/min): 150 practical
600 cyclic, in bursts
Loader Type: 40/75-rd magazine
Ready/Stowed Rounds: INA
Elevation (°): INA
Fire on Move: Yes

FIRE CONTROL
Sights w/Magnification:
Electro-optical/Infrared system:
Range: INA

IFF: 1RL246-10-2/PIE RACK (RF)

Radar:
Name: 9S86/SNAP SHOT
Function: Range only
Detection Range (km): 10
Tracking Range (km): N/A
Frequency: INA
Frequency Band: INA

VARIANTS
Missile Variants: Strela-10M has uncooled lead sulphide (PbS) IR seeker. **Strela-10M2** has uncooled PbS seeker or cooled indium antimonide Mid-IR single-mode seeker.

Czech SNAP SHOT radar: Version with height adjustment capability, and improved automation and communications

SAVA: Yugloslav variant of Strela-10M/ SA-13a on a BVP M80A IFV chassis.

Strijela-10Croal: Croatian variant with a TAM 150.B 6x6 vehicle chassis, TV-based fire control and thermal night sight.

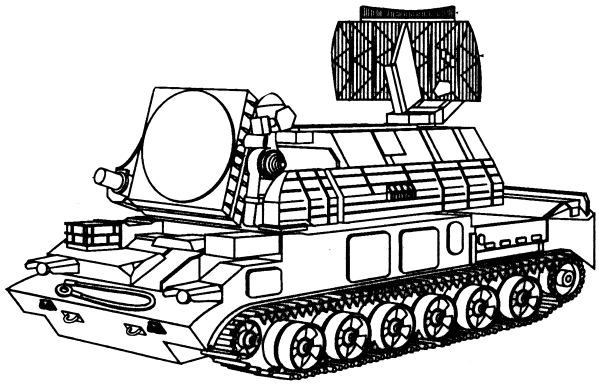
NOTES
Associated equipment includes a 9V915M maintenance vehicle, 9I11 external power supply system, and a 9V839M test vehicle. The DOG EAR battery acquisition radar has an MT-LBu tracked chassis, operates in F and G band, and provides 80 km detection and 35 km tracking.

The battery set uses centralized digital target warning net; but each launcher must individually acquire and launch against targets. One of the four launchers (9A35M/TELAR-1) has a 9S16/FLAT BOX -B passive radio DF system (range to 30 km). In a battery set, the TELAR-1 can pass data to the other launchers (9A34M/TELAR-2). The TELARs have a gasoline-powered APU.

The launcher module can be installed on other vehicles, such as BRDM-2. The launcher permits electro-mechanical aiming, and lock-on automatic slewing to track target. Launcher elevation (°) is -5 to +80 . Maximum target speed is 420 m/s.

The MT-LB hull offers only 7 mm of protection, versus twice that for the SA-9 BRDM-2. However, the SA-13 tracked chassis improves mobility, increasing capability for dispersion and survivability. The SA-13 can launch SA-9 SAMs, and can mix the SAMs.

Russian SAM System SA-15b/GAUNTLET



Weapons & Ammunition Types	Typical Combat Load
Ready missiles	**8**

SYSTEM
Alternative Designations: 9K331 Tor-M1
Date of Introduction: 1990
Proliferation: At least 5 countries

Description:
Crew: 3
TLAR: 9A331 combat vehicle
Chassis: GM-355
Combat Weight (mt): 34
Length (m): 7.5
Height (m): 5.1 (TAR up)
Width (m): 3.3

Automotive Performance:
Engine Type: V-12 diesel
Cruising Range (km): 500
Speed (km/h):
Max. Road: 65

Radio: INA

Protection:
NBC Protection System: Yes

ARMAMENT
Launcher:
Name: INA
Dimensions: INA
Length (m): INA
Diameter (mm): INA
Weight (kg): INA
Reaction Time (sec): 5-8
Time Between Launches (sec): (see NOTES)
Reload Time (min): 10
Fire on Move: Yes
Emplacement Time (min): 5
Displacement Time (min): Less than 5

Missile:
Name: 9M331
Range (m):
Max. Range: 12,000
Min. Range: 100
Altitude (m):
Max. Altitude: 6,000
Min. Altitude: 10
Dimensions (mm):
Length: 2,900
Diameter: 235
Weight (kg): 167
Missile Speed (m/s): 850
Propulsion: INA
Guidance: Command
Warhead Type: Frag-HE
Fuze Type: RF Proximity
Warhead Weight (kg): 15
Self-Destruct (sec): INA

FIRE CONTROL
Sights w/Magnification:
Electro-optical (EO) television system
Range: 20 km

IFF: Yes

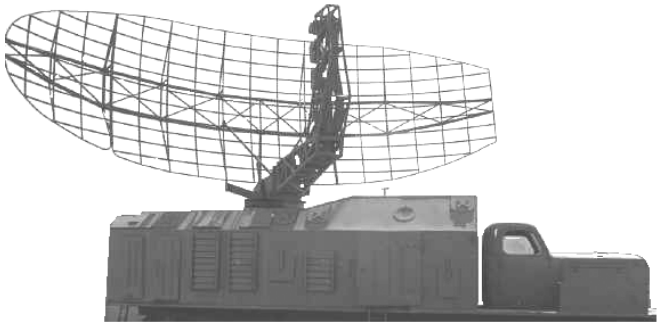
Radar:
Name: INA
Function: Target Acquisition
Detection Range (km): 25
Tracking Range (km): INA
Frequency: INA
Frequency Band: H-band Doppler

Radar:
Name: INA
Function: Target Tracking and Guidance
Detection Range (km): INA
Tracking Range (km): 25
Frequency: INA
Frequency Band: K-band Doppler, Phased Array

VARIANTS
SA-N-9: Naval version

NOTES
SA-15b is designed to be a completely autonomous air defense system (at division level), capable of surveillance, command and control, missile launch and guidance functions from a single vehicle. The basic combat formation is the firing battery consisting of four TLARs and the Rangir battery command post. The TLAR carries eight ready missiles stored in two containers holding four missiles each. The SA-15b has the capability to aut o-matically track and destroy 2 targets simultaneously in any weather and at any time of the day.

Russian SAM Radar System LONG TRACK



SYSTEM

Alternative Designations: INA

Date of Introduction: IOC 1967

Description: Twenty-five foot high single conventional parabolic mesh reflector antenna with multiple stacked feeds that is vehicle mounted.

Functions: Early warning radar, surveillance and target acquis ition

Chassis: A modified version of the AT-T heavy tracked transporter or truck mounted.

Mobility: On/off road capable mobility is very good. The LONG TRACK was the first highly mobile early warning radar. The antenna is folded for transport.

ADA Unit Level: Employed at both battalion and brigade levels

Frequency Band: E- band, 2.6 GHz

Sweep Rate (rpm): 15

Effective Range (km): >150

Effective Altitude (km): 30

Track Targets on Move: No

Emplacement Time (min): INA

Displacement Time (min): INA

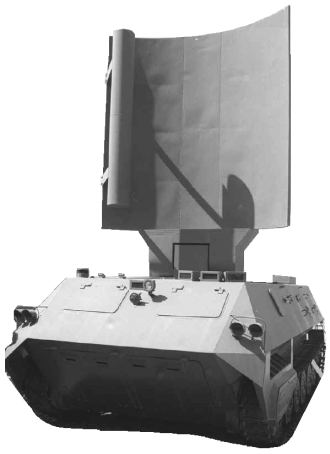
Associated SAMs: SA-4/GANEF, SA-6/GAINFUL, SA-8/GECKO

VARIANTS
Polish **Jawor** (circa 1965) and Polish **Farm Gate** (Truck mounted).

Exports: Restricted outside of former Warsaw Pact.

NOTES None

Russian SAM Radar System TUBE ARM _____ ___



SYSTEM

Alternative Designation: INA

Date of Introduction: Circa 1983

Description: Eighteen foot high cut parabolic cylindrical antenna that is track vehicle mounted.

Functions: Acquisition and surveillance

Chassis: MT-LBu tracked vehicle

Mobility: On/off road capable mobility is very good.

Associated SAMs: SA-11 GADFLY

ADA Unit Level: Employed at both battalion and brigade levels

Frequency Band: H/I bands

Sweep Rate: INA

Effective Range (km): INA

Effective Altitude (km): INA

Track Targets on Move: INA

Emplacement Time (min): INA

Displacement Time (min): INA

VARIANTS
None known

Exports: None known due to problems with entire SA-11 system.

Follow-on/Replacement systems: 9S18M1 "SNOWDRIFT"

NOTES
This radar was originally developed for the SA-11/GADFLY. As a result of problems with the TUBE ARM surveillance radar, the 9S18M1 SNOWDRIFT radar was developed to replace it.

Chapter 8
Engineer and Logistics

This chapter provides the basic characteristics of selected ***engineer equipment*** and ***logistics vehicles***. ***Engineer equipment*** covers, in order, obstacle- and route-clearing vehicles, minelaying systems, and mineclearing systems. It does not include engineer equipment designed primarily for civil engineering or construction in the rear areas. Also not included is dredging and gap crossing equipment. Data sheets addressing some of these systems will be sent with the next supplement to this guide.

The second category—***logistics vehicles***, provides the basic characteristics of selected trucks 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:

Mr. Richard G. McCall
DSN: 552-7960 Commercial (913) 684-7960
e-mail address: mccallr@leav-emh1.army.mil

Land Mine Primer

The widespread use of landmines on today's battlefields results from a combination of mass production, plastic mines, improved battlefield delivery systems, and development of sophisticated fuzing. Advances in mass-production techniques and the associated reduction in per-item cost along with its simplicity of manufacture and automated production make landmines extremely attractive for terrain denial. Another technological improvement affecting landmines is the widespread use of plastic. Metal detectors are ineffective for locating plastic-cased mines unless the manufacture intentionally places a mass of metal in the mine. Remotely delivered mines have expanded capability for changing the tempo of battle. Development of various fuze arming and triggering options have increased mine usefulness in warfare.

1. Types of Minefields. The five basic types of OPFOR minefields are antitank (AT), antipersonnel (AP), mixed, decoy, and antilanding. AT minefields are the primary type 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 minefields. Controlled minefields consist of landmines with electronic switches giving 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 friendly operations. On a smaller scale, select passages in a conventional minefield can contain controllable landmines, allowing for the option of clearing safe lanes for friendly use. The addition of selectable anti-removal and self-destruct features to controlled mines enhances flexibility and overall effectiveness.

Intelligent minefields are far-term concepts, with no foreign systems projected for fielding prior to 2008. They are still in the developmental stage and will have all the advantages of controlled landmines but also will use two-way communications. 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.

a. 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 land-mine threat throughout the foreseeable future. They are readily available to armies and insurgency groups worldwide and are cheap 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.

(1). Side-attack. 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.

Side-attack mines are autonomous weapons that attack vehicles from the side as the vehicles pass by. Current developments in side-attack landmines use mature technology from other weapon programs. For example, 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 can allow penetration of up to 950 mm of rolled homogeneous armor. 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. SOF and security patrols can also use these mines to economically cover multiple avenues of approach, alert on enemy encroachments, and trigger time-sensitive kill zones.

(2). 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 pound of high explosives or fragmentation. These may be either trucks or lightly armored combat support vehicles such as BTRs.

b. Antipersonnel. 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.

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.

c. Antihelicopter. 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—is being 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 multiplefragment warheads are more than capable of destroying light-skinned, nonarmored 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.

d. 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.

3. Emplacement or Delivery Methods. In the past landmines generally were placed 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.

a. Manual. The OPFOR manually emplaces minefields when —

- There is no contact with the enemy.
- Mechanical minelayers are unavailable.
- It is inadvisable to use mechanical minelayer because of terrain restrictions.

b. 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.

c. Scatterable Mines. The US calls them "scatterable mines", other countries call them "remotely-delivered". Whatever you chose to call them they are landmines, laid without regard to classical patterns, which are designed 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 continue 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 antidisturbance 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.

(1) 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).

(2) 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.

(3) 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.

(4) 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 harrass 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 more to 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 are being replaced or complemented by mines with magnetic, optical, seismic, and acoustic influence mines.

Some mines have a second fuze well to facilitate the installation of a anti-handling fuze. Conventional antihandling devices and target-sensing fuzes have evolved into sophisticated booby traps, which virtually assure grievous injury or death to the deminer. 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.

a. Pressure. The pressure fuze is the most common type of fuzes for both AT and AP mines. It may require only a few ounces pressure to active the mine or as much as several hundred pounds.

b. 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.

c. 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.

d. 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.

e. Radar. A small micro-electronic radar can sense the underside of a tank by the magnitude and location of the radar reflection.

f. 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.

g. 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.

h. Infrared. IR sensors are generally used against vehicles, ground and aerial.

Mines the US soldier is "most likely to encounter" on the adaptive battlefield

Anti-Tank Mines

Name	Country of Manufacture	Number of User Countries	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
Scatterable										
PTM-3	FSU	12+	remote-surface: UMZ, helicopter, PKM portable	70 mm: penetrates tank belly & destroys running gear		visual mine detectors cause detonation plastic	yes	proximity, magnetic self-destruct: yes-16 to 24 hrs	TG-40: 1.8 kg Total: 5 kg	
PTM-1S/ PGMDM	FSU	17+	remote-surface: UMZ, MRL, aircraft, PKM portable	track breaker on contact/ blast	1	visual plastic	no	contact, pressure neutralize: yes-0 to 24 hrs	PVV-12S liquid plastic: 1.4 kg	similar to German AT-1
Manual, Mechanical, and Chute Emplaced										
TM-62M/ P/B/D	FSU Poland Bulgaria	30+	manual mechanical chute	27 RHAE blast	1	varies: M: metal-easy P: plastic B: caseless D: wood	Not built in	pressure (200 kg) magnetic seismic	Trotyl, RDX & aluminum/7 kg Total: 8.5 kg	
TM-57	FSU Bulgaria China Iraq	29+	manual mechanical chute	blast	1	easy sheet metal	yes	pressure (00/2.5/.5-6 kg) delay-armed, tilt rod, pull (booby trap) neutralize: no	TNT or TGA 60/24/16: 6.0 kg Total: 8.47 kg	
TM-46/ TMN-46	FSU Germany Bulgaria Egypt (M/71) Israel (No. 6)	28+	manual mechanical	blast	1	easy sheet metal	TMN-46 yes	pressure (180/132 kg), tilt rod neutralize: no	TNT, amatol/5.7 kg Total: 2.9 kg	
PT-Mi-Ba-III	Czech	17 + terrorist groups	manual mechanical chute	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 kg Total: 9.9	
Mk 7	United Kingdom	16+	manual	blast	1	easy metal	yes	pressure (150 kg), tilt rod available	TNT/8.9 kg Total: 13.6	
TMD-B	FSU Namibia	16+	manual	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	
TMA-3	Former Yugoslavia	13	manual mechanical	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	

Anti-Tank Mines continued

Name	Country of Manufacture	Number of User Countries	Emplacement Method	Armor Penetration (mm)/ Kill Mechanism	Effective Range (m)	Detectability/ Composition	Anti-Handling	Fuze Type/ Self Neutralize	Explosive Type & Weight/Total Weight (kg)	Comment
M19	US Chile Iran South Korea Turkey	13	manual	blast	1	difficult with hand held detectors plastic	yes	pressure (182 kg)	COMP B/9.53 kg Total: 12.56	
TMK-2	FSU	13+	manual	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	
PRB M3/ A	Belgium	12	manual	blast	1	very difficult with hand held detec-tors plastic	yes	pressure (250 kg)	RDX/TNT 6.5 Total: 6.8	

Side-Attack (Antitank and Anti-vehicle) Mines

Name	Country of Manufacture	Number of User Countries	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
TM-83	FSU	13+	manual	100 RHAE EFP	50	visual case metal	possible	IR & seismic, or breakwire	explosive 9.6 Total: 20.4 kg	
LMG	FSU	13+	manual	rocket propelled shaped-charge	27	visual metal	no	Tension (1 kg), tripwire neutralize: no	TNT: 3.2 kg Total: 10 kg	
Panzer-faust	Germany	1	manual	700 rocket propelled shaped-charge	150	visual metal	no	IR & acoustic, seismic, breakwire		SIRA sen-sor package
MIACHAF F1	France UK (L14A1) Netherlands (NR 29)	4+	manual	70 RHAE @ 40 m shaped-charge	80	visual metal	no	breakwire, command, IR influence neutralize: no	Hexolite: 7 kg Total: 12 kg	
PARM 1 (DM-12)	Austria Germany UK Sweden Finland	5+	manual	600 rocket propelled shaped-charge	40	visual metal	no	neutralize: 20, 40, 60 days	Total: 10 kg	
PK Mi-PK	Czech	1+	manual	50 RHAE 5-EFPs	30	visual metal	possible	contact wire	explosive: 5.5 Total: 12	

Anti-Personnel Mines

Name	Country of Manufacture	Number of User Countries	Emplacement Method	Kill Mechanism	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, heli-copter, PKM port-able)	blast	1	visual plastic	no	pressure (5 kg) Self-destruct: 85% over 40 hr	liquid plastic-VS-6D: 40 g Total: 70 g	copy of US BLU-43B
POM-1S	FSU	12+	remote-surface (UMZ, helicopter, PKM portable)	fragmentation	4	visual	yes	tripwires, Self-destruct	100 g Total: 750 g	copy of US BLU-42B
POM-2S	FSU	12+	remote-surface (UMZ, helicopter, PKM portable)	fragmentation	16	visual, readily	no	tripwires (.2 kg) Self-destruct: 4 to 100 hr	TNT: .14 kg Total: 1.6 kg	
Manual, Mechanical, and Chute Emplaced										
PMN	FSU China Iraq	32+	manual chute	blast	1	readily-plastic case metal in fuze & cover	cannot be disarmed/	pressure plate-very sensitive (8-25 kg) self-neutralize: no	TNT: 237 g Total: .55 kg	most common AP mine
MON 100	FSU Bulgaria	27+	manual	directional fragmentation 400 pieces	100=width of kill zone @ 100 m= 6.5-9.5	metal case	possible but not likely	electric command, tension-release self-neutralize: no	TNT: 2 kg Total: 5 kg	also effective against lightly armored vehi-cles
OZM-4	FSU	26+	manual	bounding fragmentation (.6-.8 m above ground)	15	readily detect-able case cast iron	possible	tripwire (2-5 kg), electrical, pressure, tension release self-neutralize: no	Total: 5 kg	
MON 200	FSU Bulgaria	25+	manual	directional fragmentation 900 pieces	200=width of kill zone @ 200 m= 10.5-14.5	visual metal case	possible but not likely	electrical, self-neutralize: no	TNT: 12 kg Total: 25 kg	also effective against lightly armored vehi-cles
PMD-6	FSU Namibia Serbia	24+	manual	blast	1	detectable wood metal in fuze	possible	pressure, tripwire (1 kg) self-neutralize: no	TNT: 200 g Total: .4 kg	
MON 50	FSU	23+	manual	directional fragmentation 485 pieces	width of kill zone @ 50 m=45	visual plastic case	possible	electric command, tripwire, tension, tension release self-neutralize: no	RDX: 700 g Total: 2 kg	copy of US M18A1 clay-more

Antipersonnel Mines continued

Name	Country of Manufacture	Number of User Countries	Emplacement Method	Kill Mechanism	Effective Range (meter)	Detectability/ Composition	Anti-Handling	Fuze Type/ Self Neutralize	Explosive Type & Weight/Total Weight (kg)	Comments
POMZ-2M	FSU China (Type 59) North Korea Germany	22+	stake mine manual	fragmentation	4	visual, detector cast iron	possible	tripwire (1 kg force)	TNT: 75 g Total: 1.77 kg	
M18A1/ Claymore	US South Korea (K440) Pakistan (P5 Mark I) Iran Chile South Africa (Shrapnel mine No. 2) FSU (MON-50)	22+	manual	directional steel fragments	50	visual plastic case	possible	electric command, tripwire, tension, tension release	C4: 680 g Total: 1.60 kg	
M14	US India (M-14) Vietnam (MN-79 & MD 82B)	20+	manual	blast	1 contact	very difficult with hand-held de-tector plastic body (only metal is steel striker tip)	possible	pressure (9-16 kg)	TNT: 29 g Total: .099 kg	

Antihelicopter

Name	Country of Manufacture	Number 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: 35 kg	in production
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

Alternative Designations: None
Date of Introduction: 1960
Proliferation: Over 30 countries
Description:
Shape: Circular
Color: Olive Green
Case Material: (see VARIANTS)
Length (mm): 110
Height (mm): 101.8
Diameter (mm): 320
Total Weight (kg): 8.5

DETECTABILITY

Ready: Varies. The TM-62M (metal case) is readily detectable. Other variants are much more difficult. Of the TM-62 series antitank mines and fuzes, the TM-62P (plastic) is the most difficult to detect.

EXPLOSIVE COMPOSITION

Type: Trotyl, RDX and aluminum power
Weight: 7.5 to 8.3
Booster: Yes
Type: Pentryt
Weight (gr): 0.75

FUZE

Types: Pressure, seismic, magnetic
Safety Device: Delay arming, transport clip

Name: MVCh-62 (most common)
Type: Pressure
Actuation Force (kg): 200 /150 to 550
Resistant to Explosive Neutralization: Yes

Name: VM-62Z
Type: Seismic

Name: MVZ-62
Type: INA

Name: MVN-62
Type: INA

Name: MVN-80
Type: Proximity

Name: MVP-62
Type: Proximity

PERFORMANCE

Armor Penetration (mm): 27
Effect: Blast
Effective Range (m): 1
Emplacement Method: (see NOTES)
Manual
Mechanical
Chute
Burial Depth:
Maximum: 20
Minimum: None
Techniques of Employment: (see NOTES)
Controllable (remotely detonated): Yes, may use the Russian UMP-2 Controlled AT Minefield Set
Antihandling Device: Possible, however, no secondary fuze well or AD features. A special AD (MS-3) is used under AT mines.
Self-Destruct: No
Detonation Height: N/A
Underwater Emplacement: Limited duration capabilities when used underwater.

DELIVERY PLATFORMS (examples)

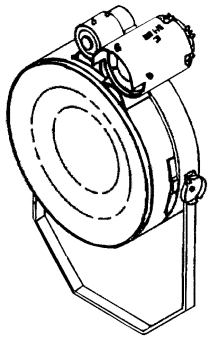
Tracked minelaying vehicle GMZ/GMZ-2/3
Towed mechanical minelayer PMR-3 and PMZ-4
Helicopter (with VMP-2 minelayer)

VARIANTS

TM-62M: Metallic case
TM-62P: Plastic case
TM-62B: Caseless
TM-62D: Wooden

NOTES
TM-62 mines can be emplaced in integrated explosive barriers or in homogeneous minefields. They may be employed singly or in groups as part of an explosive antitank barrier. TM-62 mines are placed in accordance with former Soviet doctrine, which dictates a normal density of one mine per meter of front.

Russian Side-attack Antitank Mine TM-83



SYSTEM

Alternative Designations: None
Date of Introduction: INA
Proliferation: At least 13 countries
Description:
Shape: Cylinder
Color: Olive green
Case Material: Metal
Length (mm): INA
Height (mm): 400
Diameter (mm): 250
Total Weight (kg): 20.4

DETECTABILITY

Ready: Visual

EXPLOSIVE COMPOSITION

Type: TG40/60
Weight (kg): 9.6
Booster: INA

PERFORMANCE

Armor Penetration (mm): 100
Effect: EFP, side-attack
Effective Range (m): 50
Emplacement Method: Manual
Controllable (remotely detonated): Yes, (100-m cable)
Antihandling Device: Possible
Self Destruct: 30 days

VARIANTS
None

FUZE

Types: 2-color IR sensor , seismic, or MVZ-7 breakwire
Number of Fuze Wells: 1
Actuation Force (kg): N/A
Resistant to Explosive Neutralization: Yes

NOTES
The TM-83 is a high-explosive antitank mine. It is basically a plate charge mounted on a stand. The mine uses seismic sensors to identify approac h-ing targets and to turn on the dual IR sensor. When a valid target passes into the field of view of the sensor, the warhead is fired. The plate is formed into a slug which is propelled by the explosive, destroying the target. 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 Antihelicopter Mine HELKIR

SYSTEM

Alternative Designations: None
Date of Introduction: In current production
Proliferation: At least 1
Description:
Shape: Rectangular
Color: Green
Case Material: Metal
Length (mm): INA
Height (mm): INA
Diameter (mm): INA
Total Weight (kg): 43

DETECTABILITY

Ready: Visual

EXPLOSIVE COMPOSITION

Type: INA
Weight: 20

FUZE/SENSOR

Types: Dual, acoustic, and IR
Number of Fuze Wells: INA
Resistant to Explosive Neutralization: Yes

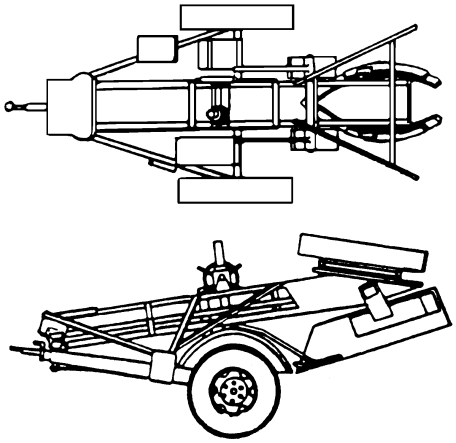
PERFORMANCE

Armor Penetration (mm): 6 @ 50 m or 2 @ 150 m
Effect: Directed fragmentation
Effective Range (m): 150
Target Speed (km/h): 250
Emplacement Method: Manual
Controllable (remotely detonated): Yes
Antihandling Device: Yes
Self-Destruct: INA

VARIANTS
None

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.

Russian Towed Mechanical Minelayer PMR-3



Mine Types	Typical Combat Load
Mines TM-44 TM-46 TM-57 TM-62 Series TM-72 TMD-B	(varies, see **Prime Mover**)

SYSTEM

Alternative Designations: INA
Date Of Introduction: INA
Proliferation: At least 17 countries

Description:
Crew: 6 (commander, driver, four operators)
Weight (mt): 1.3
Length (m): 5.6
Height (m): 2.7
Width (m): 2
Prime Mover:
6x6 ZIL-131 truck (200 mines) or
4x4 URAL-375D (350 mines) or
BTR-152 (120 mines)

MINELAYING EQUIPMENT

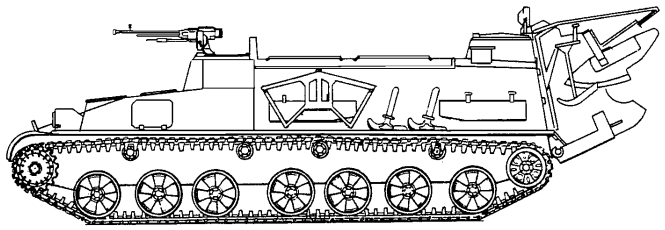
Operating Speed (km/h):
Burying: 2 to 3
Surface Laying: 4 to 10
In Snow: INA
Minelaying Rate (min): 10 to 12
Minelaying Pattern: Straight line
Mine Spacing (m): 3 to 4
Mine Capacity: Prime-mover dependent
Max Burial Depth (cm): 20

VARIANTS

PMZ-4: Lays controlled minefields; uses the same mines as the PMR-3 with the exception of the controllable minefield and cable-laying options; uses the UMP-2 Controlled AT Minefield Set

NOTES
The PMR-3, shown above, (and the similar PMZ-4) consists of a single chute and a plow attachment. Although both systems look similar at first glance, there are significant differences. Most notably, is the addition of a cable layer on the PMZ-4, used for the laying controlled minefields and the absence of the conveyer-belt chain drive on the wheels. Additionally, the PMZ-4 is more automated and must be hand loaded only. The 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. The 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 tiltrod fuzed).

Russian Tracked Minelaying Vehicle GMZ-3



Mine Types	Typical Combat Load
Mines	**208**
TM-57 w/fuze MVZ-57	
TM-62 series w/fuzes	
TM-46	
TMD-B	
MV4-62	
MVP-62 & w/prox fuze	
MVN-80	
7.62-mm PKT MG	**3,000**

SYSTEM

Alternative Designations: INA
Date of Introduction: GMZ series-1963
Proliferation: Former Soviet Union

Description:
Crew: 3 (see NOTES)
Chassis: Based on the SA-4 (GANEF) SAM
Weight (mt): 28.5
Length (m): 8.62
Height (m): 2.7
Width (m): 3.25
Ground Clearance (mm): 470
Gradient (°): 30
Fording Depth (m): 1
Vertical Step (m): .7

AUTOMOTIVE

Engine: 4 cyl, 513 hp, muli-fuel diesel
Cruising Range (km): 500
Speed (km/h):
On Road: 60
Off Road: 30
Fuel Capacity (liters): INA
Night Driving Equipment: Yes, TVNE-4B for the driver and K-3A for the vehicle commander (and PKT)
Navigation Equipment: (see NOTES)
Radio: R-123
NBC Protection System: Yes
Smoke Screening System: VEESS, plus 6 81-mm launchers, 3 on each side.

MINELAYING EQUIPMENT

Operating Speed (km/h):
Burying: 6
Surface Laying: 16
In Snow: 10
Minelaying Pattern: Straight line or staggered
Mine Spacing (m): 5 and 10
Burial Depth (mm):
Ground: 120
Snow: 500
Length of Single-row Minefield (m):
Percussion Fuzes: 1,000
Proximity Fuzes: 2,000
Mine Capacity: 208
Mine Weight (kg): up to 12
Time Required to Load Minelayer with One Basic Mine Load (min) (7 men): 15 to 20
Men required to Load Minelayer with Mines: 7 (squad)
Time Required to Load Minelayer with Crew Only (m): 60
Time from Travel to Operating Position (min):
Automatic: Up to 2
Manual: Up to 8

ARMAMENT
Some GMZ may be armed with either the 12.7 or the 14.5 machineguns.

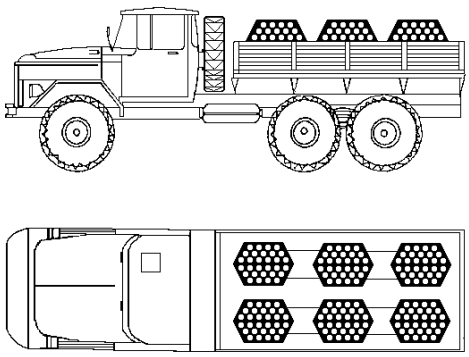
Main Armament:
Caliber, Type, Name: 7.62-mm PKT MG
Mount Type: Cupola (GMZ-3)
Max Effective Range (m):
Day: 2,000
Night: INA
Fire on Move: Yes
Rate of Fire (rd/min):
Practical: 250
Cyclic: 650

VARIANTS

GMZ: (shown above)
GMZ-2: (see NOTES)

NOTES
The crew of the GMZ-3 consists of three people—the vehicle commander, driver-mechanic, and the minelayer operator. The commander and driver are located in the forward section while the operator compartment is located in the rear portion of the vehicle. The vehicle commander operates the 7.62-mm PKT machinegun. The GMZ-3 has a digital navigation system allowing precise topographic tie-in of the minefield being laid. The previous model minelayer (GMZ-2) was not designed for the employment of mines with proximity fuzes.

Russian Scatterable Minelaying System UMZ



Mine Types	Typical Combat Load
Mines PFM-1 PFM-1/S POM-1 (S) POM-2S PTM-1S (PGMDM) PTM-3	(varies with type of mine—see below)

SYSTEM

Alternative Designations: Multipurpose Minelayer
Date of Introduction: INA
Proliferation: Former Soviet Union

Description:
Crew: 2 (driver and operator)
Chassis: ZIL-131 Truck (see VARIANTS)
Weight (mt):
Without Mine Load: 8.3
With Mine Load: 10
Length (m): 7.1
Height (m): 2.5
Width (m): 3
Ground Clearance (mm): 330

AUTOMOTIVE

Engine: V8, 150 hp, gas
Cooling: Water
Cruising Range (km): 525
Speed (km/h): 80
Gradient (°): 30
Fording Depth (m): 1.4
Vertical Step (m): .53
Night Vision Equipment: Yes, PNV-57E
Navigation Equipment: INA
Radio: R-159

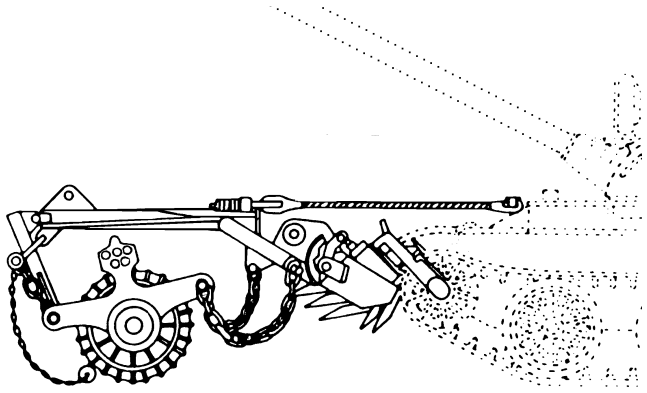
MINELAYING EQUIPMENT

Operating Speed (km/h): 10 to 40
Distance Mines Launched from Vehicle (m): 30-60
Minefield (m):
Length: 1,000 to 1,200
Depth: 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
Length of Triple-Row Minefield (m): 150 to 1,500 depending on mine type
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
Time Required to Load Minelayer (hr) (2 men): 1.5 to 2
Time from Travel to Operating Position (min): 5

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.

NOTES
While the UMZ, scatterable, mine system has been disclosed as the likely replacement for the GMZ-series, mechanical mineplanters, it probably will supplement the role formerly held by the GMZ. 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.

Russian Tank-Mounted Mineclearing Roller-Plow KMT-5



SYSTEM

Alternative Designations: INA
Date of Introduction: 1960s
Proliferation: At least 20 countries

Description:
Weight Total (kg): 7,500
Roller Section: 2,265
Plough: 420
Length (m): 3.2
Width (m): 4
Ditch Crossing (m): 2.5
System Components: Two plows (KMT-4) and two sets of three rollers

MINECLEARING EQUIPMENT

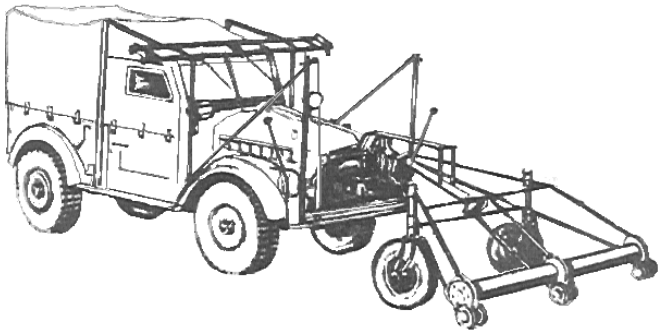
Type: Roller and plow
Platform: Mounted on T-54, T-55, T-62, other medium tanks
Form: 3 rollers x 2
Number of Rollers Per Set: 2
Total Number of Rollers: 6
Mine Removal Speed (km/h): 8-12
Cleared Lane Width, each (mm): 810 x 2
Mineclearing Track Width (mm): 810
Installation Time (min): 30 to 45

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 "dogbone" 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 mineclearing 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 Vehicle-Mounted Mine Detector DIM



SYSTEM

Alternative Designations: None
Date Of Introduction: Pre-1975
Proliferation: Widespread

Description:
Crew: 2
Prime Mover: UAZ-469/69 or other light 4x4 vehicles
Components:
- Detection system
- Pneumatic system
- Electronic system

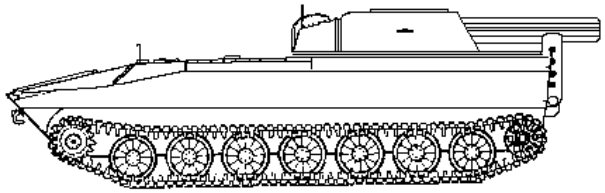
CAPABILITIES

Operating (scan) Speed (km/h): 10
Mounting/dismounting Time (min): Up to 7
Detection Ability: Can detect metallic mines in roadways, airfields, and other flat terrain.
Max Detection Depth (cm): 25
Max Detection Depth While Fording (cm): 70

VARIANTS
None

NOTES
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 Tracked Mineclearing Vehicle MTK-2



SYSTEM

Alternative Designations: UR-77 mineclearing vehicle, M1979
Date of Introduction: 1981
Proliferation: FSU and former Warsaw Pact armies

Description:
Crew: 2 (commander-operator, driver-mechanic)
Chassis: Based on the 2S1
Weight (mt): 15.5
Length (m): 8.4
Height (m): 3.1
Width (m): 2.8
System Components: Vehicle and two mineclearing charges

AUTOMOTIVE

Cruising Range (km): 500
Speed (km/h):
On Road: 60
Off Road: 30
Water: 5
NBC Protection System: Yes
Smoke Screening System: No

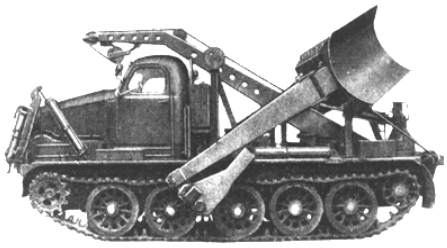
MINECLEARING EQUIPMENT

Type: Explosive line
Charges Used: UZP-77, UZ-67
Length of Charge (m): 93
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
Breaching Time (min): 3 to 5

VARIANTS (INA)

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.

Russian Tracked Route-Clearing Vehicle BAT-M



SYSTEM

Alternative Designations: Dozer
Date of Introduction: 1967
Proliferation: Widespread

Description:
Crew: 2
Chassis: AT-T heavy tracked artillery tractor
Weight (mt): 26
Length Overall (m): 10
Height Travel (m): 3.5
Width Overall (m): 4.7
Clearance (mm): 425
Gradient (°): 30
Trench Crossing (m): 1.57
Fording Depth (m): .7
Vertical Step (m): 1
Time from Travel to Operating Position (min): 5 to 7

AUTOMOTIVE

Engine: V12, 415 hp, diesel
Cruising Range (km): 500
Speed (km/h): 35
Navigation Equipment: No
NBC Protection: Yes
Radio: INA

BLADE

Width (m): 4.8
Blade Rate (m^3/hr): 250
Operating Speed (km/h): 10

ROTARY CRANE

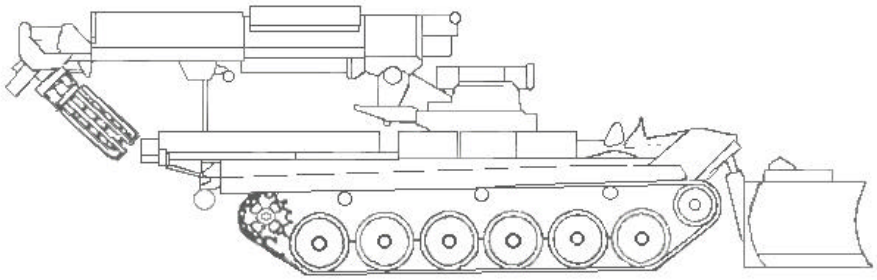
Capacity (mt): 2

VARIANTS

BAT
BAT-2: Based on MT-T artillery tractor

NOTES
The BAT tractor dozer is a 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 electrohydraulic, whereas the BAT is electropneumatic. 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 travelling mode.

Russian Obstacle Clearing Vehicle IMR-2M



SYSTEM
Alternative Designations: N/A
Date of Introduction: 1982
Proliferation: FSU and former Warsaw Pact armies

Description:
Crew: 2
Chassis: T-72A
Weight (mt): 44.3
Length (traveling) (m): 9.55
Height (traveling) (m): 3.68
Width (traveling) (m): 3.73
Gradient (°): 25
Fording Depth (m): 1.2
System Components: Multipurpose dozer equipment, boom, treadway mine exploder

AUTOMOTIVE

Engine: 12 cyl, 840 hp, diesel
Cruising Range (km): 500
Speed (km/h): 60
Night Driving Equipment: Yes
Radio: R-173 radio, R-174 intercom
NBC Protection System: Yes
Smoke Screening System: INA

BLADE
Can be used as a dozer, grader and V-blade, vertical plane skew ability.

Operating Speed (bulldozer) (km/h): 8-12
Earth Displacement (m^3/hr): 300
Lane Clearing Rate (km): .35

ALL-PURPOSE TOOL:

Trench Digging (1.1 to 1.3m deep)(m^3/hr): 8-10
Pit Digging (up to 2.5m deep) (m^3/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.

NOTES
The IMR-2M differs from the IMR-2 in that the IMR-2M has no line-launched mineclearing charge. The IMR-2M has more armor, hydraulic equipment and a scraper-ripper.

Russian Armored Route-Clearing Vehicle BAT-2

SYSTEM

Alternative Designations: None
Date of Introduction: 1981
Proliferation: At least 2 countries.
Description:
Crew: 2+8
Engineer Capacity: 8
Chassis: MT-T
Weight (mt): 39.7
Length Overall (m): 9.64
Height Travel (m): 3.69
Width Overall (m): 4.2
Clearance (mm): 430
Gradient (°): INA
Trench Crossing (m): 2.7
Fording Depth (m): 1.3
Vertical Step (m): .8

AUTOMOTIVE

Engine: V-64-4 multi-fuel diesel, 700 hp
Cruising Range (km): 500
Speed (km/h): 60
Navigation Equipment: INA
NBC Protection: Yes
Radio: INA

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 $\leq$ 30 cm: 2-3
Snow: 8-15
Hourly Capacity (m^3/hr):
Ditch Digging: 200-250
Filling in Ditches, Craters, etc: 350-450

CRANE

Capacity (mt): 2
Boom Length (m): 7.3

WINCH

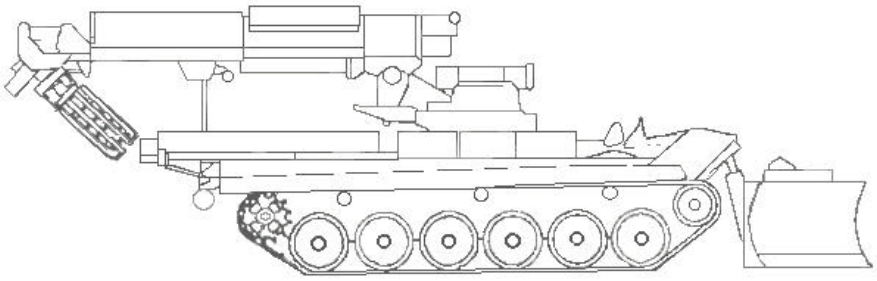
Capacity (mt): 25
Cable Length (m): 100

VARIANTS
None

NOTES
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 buil d-ing, obstacle, (stone and wood) removal, and snow removal operations. The vehicle is also designed to operate in urban terrain and as an NBC veh i-cle. Storage areas for engineer supplies have been designed into the vehicle. The BAT-2 has a crane, a ripper, and a winch.

Russian Obstacle Clearing Vehicle IMR-2M



SYSTEM

Alternative Designations: N/A
Date of Introduction: 1982
Proliferation: FSU and former Warsaw Pact armies

Description:
Crew: 2
Chassis: T-72A
Weight (mt): 44.3
Length (traveling) (m): 9.55
Height (traveling) (m): 3.68
Width (traveling) (m): 3.73
Gradient (°): 25
Fording Depth (m): 1.2
System Components: Multipurpose dozer equipment, boom, treadway mine exploder

AUTOMOTIVE

Engine: 12 cyl, 840 hp, diesel
Cruising Range (km): 500
Speed (km/h): 60
Night Driving Equipment: Yes
Radio: R-173 radio, R-174 intercom
NBC Protection System: Yes
Smoke Screening System: INA

BLADE

Can be used as a dozer, grader and V-blade, vertical plane skew ability.
Operating Speed (bulldozer) (km/h): 8-12
Earth Displacement (m^3/hr): 300
Lane Clearing Rate (km): .35

ALL-PURPOSE TOOL

Trench Digging (1.1 to 1.3m deep)(m^3/hr)**:** 8-10
Pit Digging (up to 2.5m deep) (m^3/hr)**:** 12-16

BOOM

Capacity (mt): 2
Reach (m): 8.4

MINE SWEEPING SPEED (km):

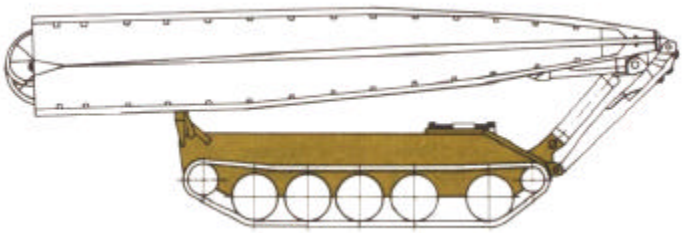
AT pressure mines: 6-15
Tilt Rod mines: 7

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.

NOTES
The IMR-2M differs from the IMR-2 in that the IMR-2M has no line-launched mineclearing charge. The IMR-2M has more armor, hydraulic equipment and a scraper-ripper.

Czechoslovak Armored Vehicle-Launched Bridge MT-55A



SYSTEM

Alternative Designations: None
Date of Introduction: 1970
Proliferation: At least 20 countries.
Description:
Crew: 2
Chassis: T-55A Tank (modified)
Weight (mt): 36
Length with Bridge (m): 9.90
Height with Bridge (m): 3.35
Width with Bridge (m): 3.30
Ground Clearance (mm): 425
Gradient (°): 30
Fording Depth (m): 1.4
Vertical Step (m): .7
Trench (m): 2.7

VARIANTS
None

AUTOMOTIVE

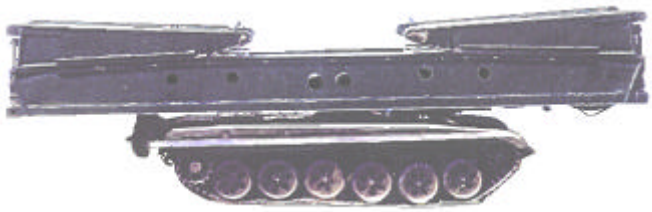
Engine: V-12 Diesel, 580 hp
Cruising Range (km): 690
Speed (km/h):
Max Road: 32-35
Average Cross-Country: 16-20
Radio: R-123
Self-Entrenching Blade: No
NBC Protection System: Yes
Smoke Equipment: Vehicle engine exhaust smoke system.

BRIDGE

Type: Scissors
Capacity (mt): 50
Width of Obstacle (m): 17
Width (m): 3.3
Length Opened (m): 18
Weight (kg): 6.5
Emplacement Time (min): 2
Displacement Time (min): 5-6

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.

Russian Armored Vehicle-Launched Bridge MTU-72



SYSTEM

Alternative Designations: None
Date of Introduction: 1974
Proliferation: At least one country.
Description:
Crew: 2, Commander and driver
Chassis: T-72S
Weight (mt): 40
Length with bridge (m): 11.64
Height with bridge (m): 3.38
Width with bridge (m): 3.46
Ground Clearance (mm): 49
Gradient (°): 31
Side Slope (°): 22
Fording Depth (m): 1.2
Vertical Step (m): .85
Trench (m): 2.8

VARIANTS
None

AUTOMOTIVE

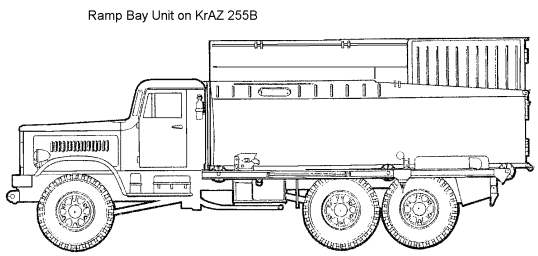
Engine: 840 hp Diesel
Cruising Range (km): 500
Speed (km/h):
Max Road: 60
Max Off-Road: 45
Average Cross-Country: 35
Radio: R-173 and R-134
Self-Entrenching Blade: Yes
NBC Protection System: Yes
Smoke Equipment: Vehicle engine exhaust smoke system.

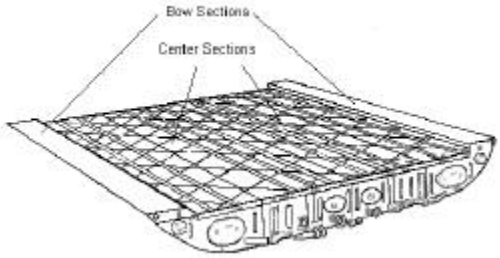
BRIDGE

Type: Cantiliver
Capacity (mt): 50
Width of Obstacle (m): 18
Width (m): 3.55
Length Opened (m): 20
Weight (kg): 6,400
Emplacement Time (min): 3
Displacement Time (min): 8

NOTES
The crew is armed with a light machine gun, a submachine gun, and hand grenades for protection.

Russian Heavy Folding Pontoon Bridge PMP





SYSTEM

Alternative Designations: Ribbon bridge
Date of Introduction: 1961
Proliferation: Over 20 countries.
Description:
Crew: See Assembly Data
Chassis: KraZ-255B

BRIDGE

Type: Pontoon
Total Length of Bridge (m): 227
Capacity/Load Class (mt): 60
Roadway Width (m): 6.5
Working Party: Varies - approx. 65 for full bridge set. See RAFT ASSEMBLY DATA
Material: SKhL-4 steel
Pontoons in Set: See NOTES
Bridge/center: 32
Ramp/shore: 4
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

NOTES
Although 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 ente r-ing 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 simult a-neously. 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 se cond (approx. 7 km/h).

Russian Heavy Folding Pontoon Bridge PMP continued_____

RAFT ASSEMBLY DATA continued

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 immed i-ately.

2. The pontoon is then stiffened by activating six locking devices.

3. Once the pontoons have been launched and stiffened they are inte r-connected parallel to the near shore to form a continuous strip of road-way.

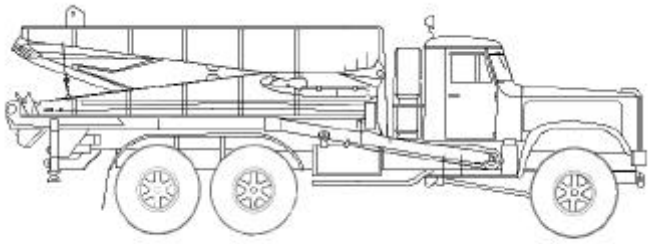
4. This roadway is then swung across the water obstacle and held in place by powerboats.

Whenever possible the launching operations are done along a contin u-ous shoreline permitting all pontoons to be launched at the same time. If necessary, the bridge can be built on a small frontage using the su c-cessive 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

Alternative Designations: Mechanized Bridge, Scissors Bridge
Date of Introduction: 1964
Proliferation: At least 20 countries
Description:
Crew: See working party
Chassis: Modified KrAZ-214 (6 × 6), 7,000 kg, or KrAZ-255B (6 × 6), 7,500 kg, and KrAZ-260 trucks.
Weight (mt): 19
Length with bridge (m): 9.3
Height with bridge (m): 3.15
Width with bridge (m): 3.2
Ground Clearance (mm): 360
Gradient (°): 0
Fording Depth (m): 1

BRIDGE

Type: Truck-mounted scissors
Capacity/Load Class (mt): 60
Material: Low alloy steel
Width (m):
Unfolded: 3.8
Folded: 3.2
Weight (kg): 4.24
Pier: (TMM on KrAZ-255)
Height (m):
Min: 1.7
Max: 3.21
Ground Area (m^2/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

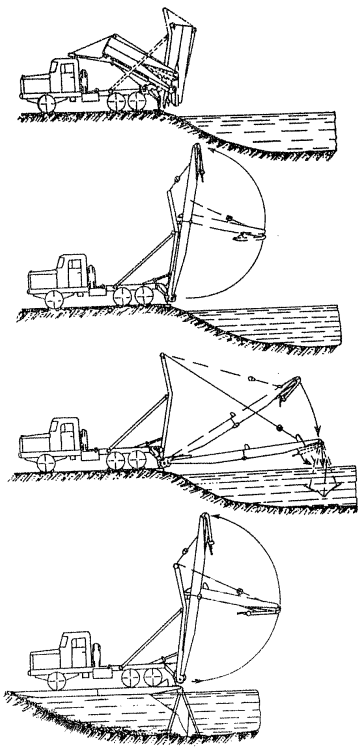
VARIANTS

TMM-3: KrAZ-255B 6 x 6 improved bridgelaying mechanism.
TMM-6: MAZ-543 8 × 8 truck with 17 m bridge spans (unfolded).

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.

Russian Truck-Mounted Scissors Bridge TMM continued _____



LAUNCH SEQUENCE

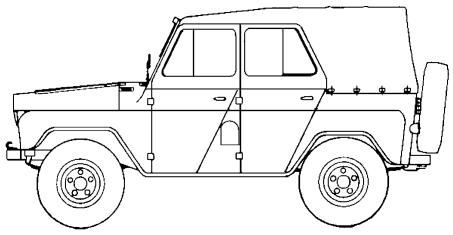
1. Truck backs into position.

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 lo w-ered with the integral trestle legs swinging into p osition.

4. Once the lowering operation is completed, the cables are disco n-nected, the launching girder is brought to travel position, and the truck moves off.

Russian 0.6 mt 4 x 4 Utility Truck UAZ-469



SYSTEM

Alternative Designations: INA
Date of Introduction: 1973
Proliferation: Widespread

Description:
Troop Capacity: 2 in front, 5 in rear
Weight (mt):
Gross Vehicle Weight: 2.4
Curb: 1.6
Length Overall (m): 4
Height Overall (m): 2
Width Overall (m): 1.8
Payload on/off Highway (kg): 600
Number of Axles: 2
Ground Clearance (mm): 300
Turning Radius (m): 6.5
Wheels:
Size (in): 8.40x15
Central Tire Pressure Regulation System: No
Run Flat: No

AUTOMOTIVE

Engine: Inline 4, 70 hp, gasoline
Cooling: Water
Cruising Range (road) (km): 730
Speed (km/h): 100
Fuel Capacity (liters):
Left Tank: 39
Right Tank: 39
Towing Capability (kg):
Off Highway: 850
On Highway: 850
Gradient (loaded) (°): 60
Fording Depths (m): .58
Trench Crossing Width (mm): INA

CARGO SPACE

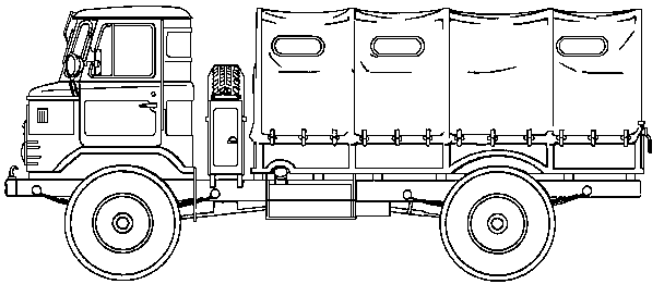
Height (mm): 400
Width (mm): 1,400
Length (mm): 1,000
Cargo Bed Area (m^2): 1.6

VARIANTS

UAZ-469B: Export; lower off-road performance
Ambulance: 1 stretcher patient and 1 attendant

NOTES
The UAZ-469 replaces the earlier UAZ-69.

Russian 2 mt 4 x 4 Cargo Truck GAZ-66



SYSTEM

Alternative Designations: INA
Date of Introduction: 1964
Proliferation: Widespread

Description:
Troop Capacity: 3 in cab, 18 in rear
Weight (mt):
Gross Vehicle Weight: 5.8
Curb: 3.6
Length Overall (m): 5.65
Height Overall (m): 2.44
Width Overall (m): 2.32
Payload on/off Highway (kg): 2,000
Number of Axles: 2
Ground Clearance (mm): 315
Turning Radius (m): 10
Wheels:
Size (in): 12x18
Central Tire Pressure Regulation System: Yes

AUTOMOTIVE

Engine: V8, 115 hp, gasoline
Cooling: Water
Cruising Range (road) (km): 875
Speed (km/h): 95
Fuel Capacity (liters):
Left Tank: 105
Right Tank: 105
Towing Capability (kg):
Off Highway: 2,000
On Highway: 2,000
Gradient (loaded) (°): 39
Fording Depths (m): .8

CARGO SPACE

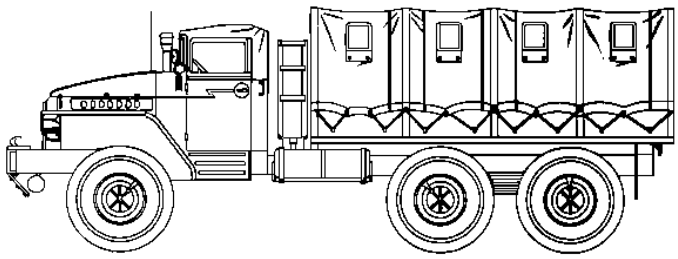
Height (mm): 890
Width (mm): 2,050
Length (mm): 3,330
Cargo Bed Area (m^2): 6.8

VARIANTS

GAZ-66B: Canvas-top cab for air transport or airdrop
GAZ-66A: Steelcab
Numerous other variants for various duties.

NOTES
Besides functioning as a general cargo carries, the GAZ-66 is used as a prime mover for 120-mm mortar. The DDA-66 variant is an NBC decontamination truck.

Russian 4.5 mt 6 x 6 Cargo Truck Ural-375D



SYSTEM
Alternative Designations: INA
Date of Introduction: 1965
Proliferation: Widespread

Description:
Troop Capacity: 3 in cab, 24 in rear
Weight (mt):
Gross Vehicle Weight: 13.2
Curb: 8.4
Length Overall (m): 7.36
Height Overall (m): 2.68
Width Overall (m): 2.67
Number of Axles: 3
Ground Clearance (mm): 410
Turning Radius (m): 10.8
Side Slope (°): 32
Vertical Step (mm): 800
Gradient (loaded) (°)**:** 65
Fording Depths (m): 1.49
Trench Crossing Width (mm): 875
Wheels:
Size (in): 14x20
Central Tire Pressure Regulation System: Yes
Run Flat: INA

AUTOMOTIVE

Engine: V8, 180 hp, gasoline
Cooling: Liquid
Cruising Range (road) (km): 650
Speed (km/h): 75
Fuel Capacity (liters):
Main Tank: 300
Aux Tank: 60
Towing Capability (kg):
Off Highway: 5,000
On Highway: 10,000

CARGO SPACE

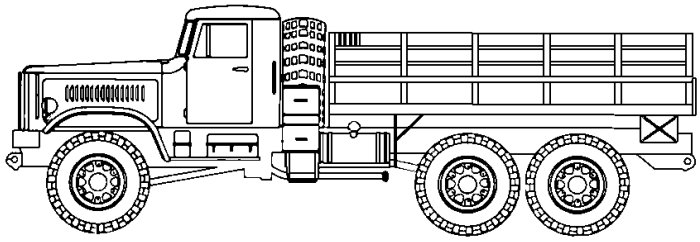
Height (mm): 872
Width (m): 2.43
Length (m): 3.9
Cargo Bed Area (m^2): 9.5

VARIANTS

URAL-375: Observation hatch and unimproved powertrain
URAL-375E: Decontamination vehicle
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 6 x 6 Cargo Truck KrAZ-255B



SYSTEM

Alternative Designations: INA
Date of Introduction: 1967
Proliferation: Widespread

Description:
Troop Capacity: 3 in cab, 16 in rear
Weight (mt):
Gross Vehicle Weight: 19.7
Curb: 12
Length Overall (m): 8.64
Height Overall (m): 2.94
Width Overall (m): 2.75
Payload (kg): 7,500
Number of Axles: 3
Ground Clearance (mm): 360
Turning Radius (m): 14
Wheels:
Size (in): 20x21
Central Tire Pressure Regulation System: Yes
Run Flat: INA

AUTOMOTIVE

Engine: V8, 265 hp, diesel
Cooling: Water
Cruising Range (road) (km): 850
Speed (km/h): 70
Fuel Capacity (liters):
Right Tank: 165
Left Tank: 165
Towing Capability (kg):
Off Highway: 10,000
On Highway: 50,000
Gradient (loaded) (°): 30
Fording Depths (m): 1

CARGO SPACE

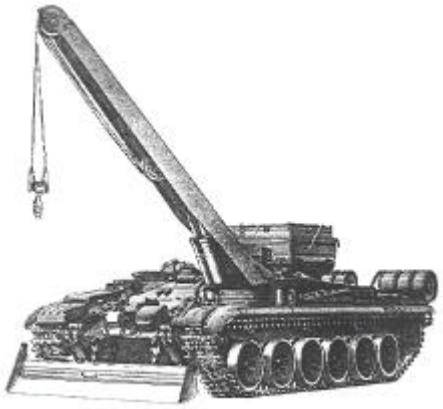
Length (m): 4.56
Width (m): 2.5
Height (m): .92
Cargo Bed Area (m^2): INA

VARIANTS

KrAZ-258: Tractor-truck
Numerous other variants for various duties.

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 Armored Recovery Vehicle BREM-1



Weapons & Ammunition Types	Typical Combat Load
12.7-mm AD MG	840

SYSTEM

Alternative Designations: None
Date of Introduction: 1984
Proliferation: At least 5 countries.
Description:
Crew: 3 (see NOTES)
Chassis: T-72 tank
Weight (mt): 41
Length Overall (m): 7.98
Height Travel (m): 2.45
Width Overall (m): 3.46
Clearance (mm): 457
Gradient (°): 30
Trench Crossing (m): 2.8
Fording Depth (m): 1.2
Vertical Step (m): .85

AUTOMOTIVE

Engine: V-12 Multi-fuel Diesel, 840 hp
Cruising Range w/external tanks (km):
Dirt Road w/o Towed Vehicle: 650
Dirt Road Towing Vehicle: 220-430
Highway w/o Towed Vehicle: 700
Speed (km/h):
Max Highway: 60
Dirt Road: 45
Towing Tank on Dirt Road: 12
Smoke Equipment: Vehicle engine exhaust smoke system (VEESS). Four smoke grenade launchers may be fitted.
NBC Protection: Yes
Radio: R-123

BLADE

Width (m): 3.1

CRANE

Capacity (mt):
2 m Extension: 19
4.4 m (max) Extension: 3
Boom Length (max) (m): 4.4

WINCH

Capacity (mt):
Line Pull: 25
With Blocks: 100
Cable Length (m): 200
Auxiliary Wench:
Capacity (line pull) (kg): 530
Cable Length (m): 400

TOWING

Capacity (mt): 50
Towing Rods:
Two 1.68 m
Two 5.5 m
Hydraulic Jack Capacity (mt): 30

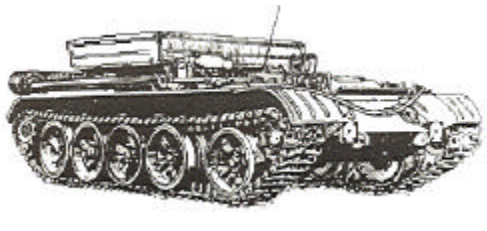
ARMAMENT

Caliber, Type, Name: 12.7-mm, AD MG NSV-T
Mount Type: Cupola
Max Effective Range (m):
AA: 1,500
Ground: 2,000
Fire on Move: Yes

VARIANTS
None

NOTES
The BREM-1 is designed to tow damaged tanks from the battlefield to damaged vehicle collection points. It has a crew of three —commander, driver, and mechanic. 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

Alternative Designations: BTS-2 (Medium Tank Towing Vehicle-2)
Date of Introduction: 1965
Proliferation: At least 50 countries
Description:
Crew: 3 to 5
Chassis: T-54
Weight (mt): 36
Length (m): 7.5
Height (m): 1.9
Width (m): 3.27
Clearance (mm) 264
Gradient (°): 31
Trench Crossing (m): 2.7
Fording Depth (m):
Unprepared: 1.4
With Snorkel: 5.5
Vertical Step (m): .8

AUTOMOTIVE

Engine: V-12 Diesel, 520 hp
Cruising Range (km): 400
Speed (km/h): 48

Smoke Equipment: Vehicle engine exhaust smoke system.
NBC Protection: No. (see VARIANTS)
Radio: INA

CRANE CAPACITY (mt): 1

TOWING CAPACITY (mt): At least 40

ARMAMENT
None

VARIANTS
There are numerous variants based on T-54 and T-55 chassis each with differing equipment modifications.
T-54 (A): Former East German manufacture. Push/pull bar at front, 1 mt crane, NBC equipment, no winches or spades.
T-54 (B): Former East German manufacture. Similar to T-54 (A). Tow cables brackets at hull rear, hull front protective plate, snorkel. No winch or spade.
T-54 (C): Former East German manufacture. Heavy-duty crane, snorkel.

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.

Chapter 9
Rotary-Wing Aircraft

This chapter provides the basic characteristics of selected rotary-wing aircraft readily available to the OPFOR. Both FM 100-60, *Armor- and Mechanized-Based Opposing Force: Organization Guide*, and FM 100-63, *Infantry-Based Opposing Force: Organization Guide*, use descriptors to indicate aircraft capabilities. In each manual, a substitution matrix enables the trainer to structure OPFOR air support requirements as required by capability rather that specific type.

Rotary-Wing Aircraft, covers systems classified as light, attack, utility, multi-role, and transport aircraft. Multi-role aircraft are able to support missions across each of the categories. This chapter encompasses many aircraft which may have a dual civil/military history. It does not include however, aircraft designed and used primarily for civil aviation.

The sampling of systems was selected because of wide proliferation across numerous countries or because of already extensive use in training scenarios. Additional data sheets addressing other widely proliferated helicopter systems will be sent with further supplements to this guide.

Because of the increasingly large numbers of variants of each aircraft, only the most common variants produced in significant numbers were addressed. If older versions of helicopters have been upgraded in significant quantities to the standards of newer variants, the older versions were not addressed.

The munitions available to each aircraft are mentioned, but not all may be employed at the same time. The weapon systems inherent to the airframe are listed under armament. The most probable weapon loading options are also given, but assigned mission dictates actual weapon configuration. Therefore, any combination of the available munitions may be encountered.

Questions and comments on data listed in this chapter should be addressed to:

CPT (P) Blake Burslie
DSN: 552-7922, Commercial (913) 684-7922
e-mail address: burslieb@leavenworth.army.mil

European Light Helicopter BO-105

Weapon & Ammunition Types Other Loading Options	Combat Load
7.62-mm or 12.7-mm MG pods	
2.75-in rocket pods (7 or 12 ea.)	**2**
68-mm SNEB rocket pods (12ea)	**2**
50-mm SNIA rockets (28 ea.)	**2**
TOW ATGM pods (4 ea.)	**2**
HOT ATGM	**6**
AS-12 ASM pods (2 ea.)	**2**
Stinger AAM pod (4 ea.)	**1**

SYSTEM

Alternative Designations: INA
Date of Introduction: 1972
Proliferation: At least 40 countries

Description: Variants in "( )"
Crew: 1 or 2 (pilots)
Blades:
- Main rotor: 4
- Tail rotor: 2

Engines: 2x 420-shp Allison 250-C20B turboshaft
Weight (kg):
- Maximum Gross: 2,500
- Normal Takeoff: 2,000
- Empty: 1,301, 1,913 (PAH1)

Speed (km/h):
- Maximum (level): 242
- Cruise: 205

Ceiling (m):
- Service: 3,050
- Hover (out of ground effect): 457
- Hover (in ground effect): 1,525

Vertical Climb Rate (m/s): 7.5
Fuel (liters):
- Internal: 570
- Internal Aux Tank: 200 ea. (max 2x)

Range (km):
- Normal Load: 555
- With Aux Fuel: 961

Dimensions (m):
- Length (rotors turning): 11.9
- Length (fuselage): 8.8
- Width: 2.5

Dimensions continued (m):
- Height: 3.0
- Main Rotor Diameter: 9.8
- Tail Rotor Diameter: 1.9

Cargo Compartment Dimensions (m):
- Floor Length: 1.9
- Width: 1.4
- Height: 1.3

Standard Payload (kg):
- Internal load: 690
- External on sling only: 1,200
- Transports 3 troops or 2 litters, or cargo.

Survivability/Countermeasures:
Main and tail rotors electrically deiced.
Infrared signature suppressors can be mounted on engine exhausts.
Rotor brake.

ARMAMENT

Most Probable Armament:
BO-105P/PAH1: Outriggers carry 6x HOT antitank missiles, or rocket pods.

CASA BO-105/ATH: The Spanish produced variant rigidly mounts 1x Rh 202 20-mm cannon under the fuselage.

AVIONICS/SENSOR/OPTICS

The BO-105P has a roof-mounted direct-view, daylight-only sight to allow firing of HOT ATGMs. Options exist to fit a thermal imaging system for night operations, and a laser designator.

Night/Weather Capabilities:
Available avionics include weather radar, Doppler and GPS navigation, and an autopilot. It is capable of operation in day, night, and instrument meteorological conditions.

VARIANTS

The BO 105 was developed initially by Messerschmitt-Bolkow-Blohm in Germany. Others are built in Chile, the Philippines, Indonesia (**NBO-105**), and Spain (**CASA BO-105/ATH**).

BO-105CB: The standard production variant.

BO-105CBS: VIP version with a slightly longer fuselage to accommodate 6 passengers, some used in a SAR role.

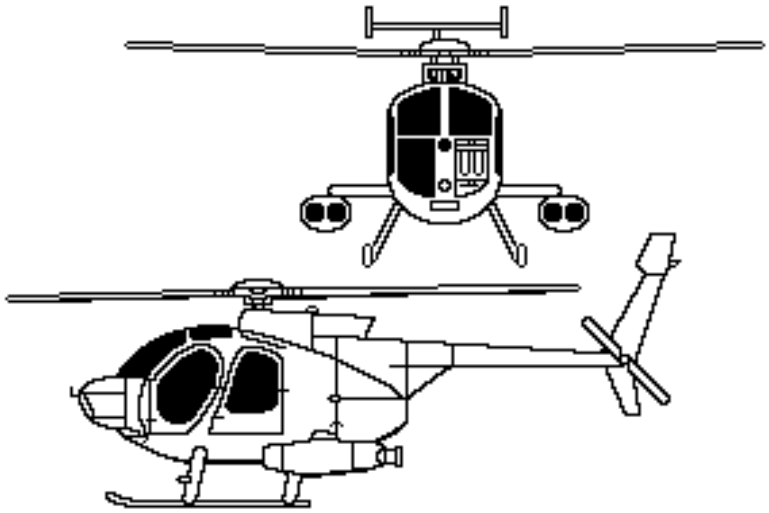
BO-105LS: Upgraded to 2x 550-shp Allison 250-C28 turboshaft engines for extended capabilities in high altitudes and temperatures. Produced only in Canada.

BO-105M/VBH: Standard reconnaissance version.

BO-105P/PAH1: Standard antitank version.

NOTES
Available munitions are shown above; not all will be employed at the same time, mission dictates weapons configuration. External stores are mounted on weapons "outriggers" or racks on each side of the fuselage. Each rack has one hardpoint. This helicopter is produced by the Eurocopter Company. It was formed as a joint venture between Aerospatiale of France, and Daimler-Benz Aerospace of Germany. Other missions include: direct air support, antitank, reconnaissance, search and rescue, and transport. Clamshell doors at rear of cabin area open to access cargo area. Cargo floor has tiedown rings throughout.

United States Light Helicopter MD-500/Defender



Weapon & Ammunition Types Other Loading Options	Combat Load
M134 7.62-mm 6x barrel, Gatling type twin MG pods	**2000**
M260 2.75-in Hydra 70 rocket pods (7 or 12 each)	**2**
.50 cal MG pods	**2**
M75 40-mm grenade launchers	**2**
MK19 40-mm grenade launcher	**2**
TOW missile pods (2 each)	**2**
Hellfire ATGM	
Stinger AAM	

SYSTEM

Alternative Designations: Hughes model 369, Cayuse, Loach
Date of Introduction: 1977 (MD-500 MD)
Proliferation: At least 22 countries

Description: Variants in "( )"
Crew: 1 or 2 (pilots)
Blades:
- Main rotor: 4 or 5 (see VARIANTS)
- Tail rotor: 2 or 4 (see VARIANTS)

Engines: (see VARIANTS)
Weight (kg):
- Maximum Gross: 1,361 (500), 1,610 (530)
- Normal Takeoff: 1,090
- Empty: 896

Speed (km/h):
- Maximum (level): 241 (500), 282 (530)
- Cruise: 221 (500), 250 (530)

Ceiling (m):
- Service: 4,635 (500), 4,875 (530)
- Hover (out of ground effect): 1,830 (500), 3,660 (530)
- Hover (in ground effect): 2,590 (500), 4,360 (530)

Vertical Climb Rate (m/s): 8.4 (500), 10.5 (530)
Fuel (liters):
- Internal: 240
- Internal Aux Tank: 80

Range (km):
- Normal Load (est.): 485 (500), 430 (530)

Dimensions (m):
- Length (rotors turning): 9.4 (500), 9.8 (530)
- Length (fuselage): 7.6 (500), 7.3 (530)
- Width: 1.9
- Height: 2.6 (500), 3.4 (530 over mast-mounted sight)

Dimensions continued (m):
- Main Rotor Diameter: 8.0 (500), 8.3 (530)
- Tail Rotor Diameter: 1.4

Cargo Compartment Dimensions (m):
- Floor Length: 2.4
- Width: 1.3
- Height: 1.5

Standard Payload (kg):
- Internal load: INA
- External load: 550
- Transports 2 or 3 troops or cargo internally, or 6 on external platforms in lieu of weapons.

Survivability/Countermeasures:
Some models have radar warning receivers.
Chaff and flare systems available.
Infrared signature suppressors can be mounted on engine exhausts.

ARMAMENT

Most Probable Armament: (MD-500D pictured)
MD-500MD/Scout Defender: Fitted with guns, rockets, grenade launchers, or a combination on 2x fuselage hardpoints.

MD-500MD/TOW Defender: Twin TOW missile pods on 2x fuselage hardpoints; mounts missile sight in lower-left front windshield.

AVIONICS/SENSOR/OPTICS

The MD-500 allows for the mounting of a stabilized, direct-view optical sight in the windshield. Options exist to fit a mast-mounted, multiple field of view optical sight, a target tracker, a laser rangefinder, thermal imager, a 16x FLIR for night navigation and targeting, and autopilot.

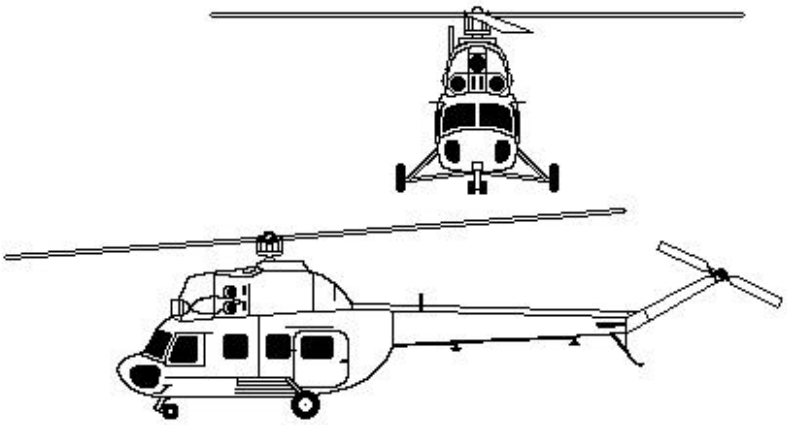
Night/Weather Capabilities:
Optional avionics include GPS, ILS and full instrument weather conditions packages.
The more advanced variants are fully capable of performing all missions under any conditions.

VARIANTS

OH-6A/Cayuse: Developed initially by the Hughes Aircraft company (later McDonnell Douglas Helicopter Company) in the mid-1960s for the US Army. Fitted with 1x 253-shp Allison T63-A-5A turboshaft, 4 bladed main rotor, and an offset "V" tail.
Hughes 500M: Military export version of OH-6 in mid-1970s with upgraded 278-shp Allison 250-C18 turboshaft engine, "V" tail.
MD-500MD/Scout and TOW Defender: Improved military version of the model 500 with 5 main rotor blades, 375-shp Allison 250-C20B turboshaft engine, and T-tail.
MD-500E/MD-500MG/Defender II: Had a more elongated nose for streamlining, and an optional 4x blade tail rotor for reduced acoustic signatures. Possible mast-mounted sight.
OH-6A/MD-530F Super Cayuse/Lifter: Upgraded engine to a 425-shp Allison 250-C30 turboshaft, and avionics in 1988 for the US Army.
MD-530MG/Defender: Has a mast-mounted sight, and incorporated upgrades of all previous variants.
AH/MH-6J: US Army Special Operations variant derived from the MD-530MG.

NOTES
Available munitions are shown above; not all will be employed at the same time, mission dictates weapons configuration. External stores are mounted on weapons racks on each side of the fuselage. Each rack has one hardpoint. Other missions include: direct air support, antitank, reconnaissance, observation, and light utility.

Russian Light Helicopter Mi-2/HOPLITE



Weapon & Ammunition Types	Combat Load
1x 23-mm automatic cannon	
1x 7.62-mm or 12.7-mm MG	
Other Loading Options:	
AT-3c/SAGGER ATGM	**4**
57-mm Rocket pods (16 each)	**2**
Twin or single fixed 7.62-mm or 12.7-mm MG	
External fuel tanks (liters)	**238**
SA-7b/GRAIL missile	**4**

SYSTEM

Alternative Designations: INA
Date of Introduction: 1965
Proliferation: Widespread

Description:
Crew: 1 (pilot)
Blades:
- Main rotor: 3
- Tail rotor: 2

Engines: 2x 400-shp PZL GTD-350 (series III and IV) turboshaft
Weight (kg):
- Maximum Gross: 3,700
- Normal Takeoff: 3,550
- Empty: 2,372

Speed (km/h):
- Maximum (level): 220
- Cruise: 194

Ceiling (m):
- Service: 4,000
- Hover (out of ground effect): 1,000
- Hover (in ground effect): 2,000

Vertical Climb Rate (m/s): 4.5
Fuel (liters):
- Internal: 600
- Internal Aux Tank: N/A
- External Fuel Tank: 238 ea.

Range (km):
- Maximum Load: 580
- Normal Load: 340
- With Aux Fuel: 790

Dimensions (m):
- Length (rotors turning): 17.4
- Length (fuselage): 11.9
- Width: 3.2
- Height: 3.7
- Main Rotor Diameter: 14.6
- Tail Rotor Diameter: 2.7

Standard Payload:
- Transports 6-8 troops or 700 kg internal cargo or 800 kg external load on 4x external hardpoints.

Survivability/Countermeasures:
Main and tail rotor blades electrically deiced.

ARMAMENT
23-mm Automatic Cannon, NS-23KM:
Range: (practical) 2,500 m
Elevation/Traverse: None (rigidly-mounted)
Ammo type: HEFI, HEI, APT, APE, CC
Rate of Fire (rpm): (practical) 550

7.62-mm or Pintle-mounted Machinegun:
(may be mounted in left-side cabin door)
Range: (practical) 1,000 m
Ammo type: HEFI, HEI, APT, APE, CC
Rate of Fire (rpm): (practical) 250

OR

12.7-mm or Pintle-mounted Machinegun:
(may be mounted in left-side cabin door)
Range: (practical) 1,500 m
Ammo type: API, API-T, IT, HEI
Rate of Fire (rpm): (practical) 100

AVIONICS/SENSOR/OPTICS

The cannon is pilot sighted, and fire is adjusted by controlling the attitude of the aircraft.

Night/Weather Capabilities:
The Mi-2 is primarily a daylight only aircraft.

VARIANTS

Mi-2R: Ambulance version that carries 4x litter patients.

Mi-2T: Transport version that carries 8 personnel.

Mi-2URN: Armed reconnaissance variant, employs 57-mm unguided rockets, and mounts a gunsight in the cockpit for aiming all weapons.

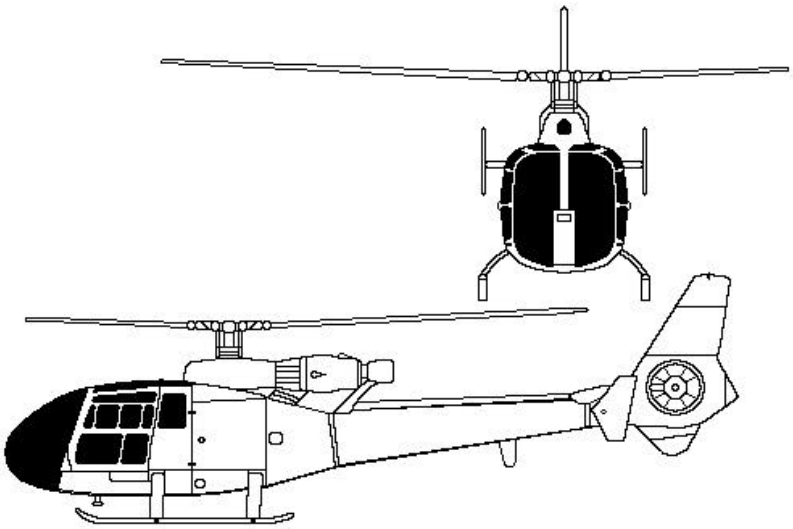
Mi-2URP: The antitank variant. Carries 4x AT-3 Sagger wire-guided missiles on external weapons racks, and 4x additional missiles in the cargo compartment.

Mi-2US: The gunship variant, employs an airframe modification that mounted a 23-mm NS-23KM cannon to the portside fuselage. Also employs 2x 7.62-mm gun pods on external racks, and 2x 7.62-mm pintle-mounted machineguns in the cabin.

PZL Swidnik: A Polish-produced variant under license from Russia. Same performance, characteristics, and missions.

NOTES
Available munitions are shown above; not all will be employed at the same time, mission dictates weapons configuration. External stores are mounted on weapons racks on each side of the fuselage. Each rack has two hardpoints for a total of four stations. Additional missions include; direct air support, antitank, armed reconnaissance, transport, medevac, airborne command post, smoke generating, minelaying, and training. The cabin door is hinged rather than sliding, which may limit operations. There is no armor protection for the cockpit or cabin. Ammo storage is in the aircraft cabin, so combat load varies by mission. Some Mi-2USs currently employ fuselage-mounted weapon racks rather than the 23-mm fuselage-mounted cannon which is removed. Some variants however, still employ the cannon.

French Light Helicopter SA-341/GAZELLE



Weapon & Armament Types	Combat Load
7.62-mm MG or	
20-mm GIAT M.621 cannon or	**100**
2x 7.62-mm AA-52 FN MG pods	**1,000**
Other Loading Options	
2.75-in rocket pods (7 ea.)	**2**
68-mm SNEB rocket pods (12 ea)	**2**
57-mm rockets (18 ea.)	**2**
HOT ATGM	**4-6**
AT-3 SAGGER ATGM	**4**
AS-11 ASM, or AS-12 ASM	**4 or 2**
SA-7 GRAIL AAM	**2**
MISTRAL AAM	**2**

SYSTEM

Alternative Designations: SA-342
Date of Introduction: 1973
Proliferation: At least 23 countries

Description: Variants in "( )"
Crew: 1 or 2 (pilots)
Blades:
- Main rotor: 3
- Tail rotor: 13 (fenestron enclosed in tail)

Engines: 1x 590-shp Turbomeca Astazou IIIB turboshaft
Weight (kg):
- Maximum Gross: 1,800 (SA 341), 1,900 (SA 342K), 2,000 (SA 342L/M)
- Normal Takeoff: 1,800
- Empty: 998

Speed (km/h):
- Maximum (level): 310
- Cruise: 270

Ceiling (m):
- Service: 4,100 (SA 341), 5,000 (SA 342)
- Hover (out of ground effect): 2,000 (SA 341), 2,370 (SA 342)
- Hover (in ground effect): 2,850 (SA 341), 3,040 (SA 342)

Vertical Climb Rate (m/s): 12.2
Fuel (liters):
- Internal: 445
- Internal Aux Tank: 90
- Additional Internal Aux Tank: 200

Range (km):
- Normal Load: 670 (SA 341), 735 (SA 342)

Dimensions (m):
- Length (rotors turning): 11.9
- Length (fuselage): 9.5
- Width: 2.0
- Height: 3.1
- Main Rotor Diameter: 10.5
- Tail Rotor Diameter: 0.7

Cargo Compartment Dimensions (m):
- Floor Length: 2.2
- Width: 1.3
- Height: 1.2

Standard Payload (kg):
- Internal load: 750
- External on sling only: 700
- Transports 3 troops or 1 litter, or cargo.

Survivability/Countermeasures:
IR signature suppressor on engine exhaust.

ARMAMENT

Most Probable Armament:
SA 341F: A GIAT M.621 20-mm cannon is installed on starboard side of some aircraft. Rate of fire is selectable at 300 or 740 rpm.
SA 341H: Can carry 4x AT-3 ATGMs, and 2x SA-7, or 128-mm or 57-mm rockets, and 7.62-mm machinegun in cabin.
SA 342K: Armed antitank version with 4-6x HOT ATGMs.
SA 342L: Either rocket pods or machineguns.
SA 342M: Armed with 4-6x HOT antitank missiles, and possibly fitted with Mistral air to air missiles.

AVIONICS/SENSOR/OPTICS

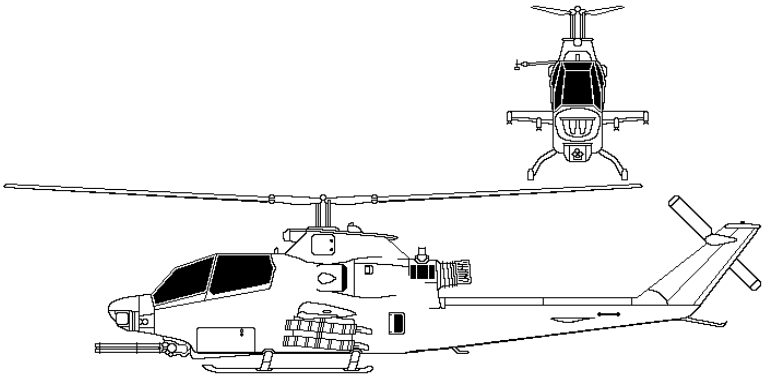
The SA 342M has a roof-mounted stabilized direct view/infrared/laser sight to allow night firing of HOT ATGMs.

Night/Weather Capabilities:
The aircraft is NVG compatible; and by its instruments, avionics, autopilot, and nav computer, is capable of flight in day, night, and instrument meteorological conditions.

VARIANTS
AS 341 Gazelle: Developed by Aerospatiale in France. Others were built in the UK by Westland, and in Yugoslavia.
SA 341B/C/D/E: Production versions for the British military. Used in training and communications roles.
SA 341F: Production version for the French Army. Upgraded engine to Astazou IIIC.
SA 341H: Export variant.
SA 342K: Armed SA 341F with upgraded 870-shp Astazou XIVH engine, mostly exported to the Middle East.
SA 342L: Export light attack variant with Astazou XIVM engine.
SA 342M: Improved ground attack variant for the French Army. Similar to SA 342L, but with improved instrument panel, engine exhaust baffles to reduce IR signature, navigational systems, Doppler radar, and other night flying equipment.

NOTES
Available munitions are shown above; not all will be employed at the same time, mission dictates weapons configuration. External stores are mounted on weapons "outriggers" or racks on each side of the fuselage. Each rack has one hardpoint. Other missions include: attack, antitank, antihelicopter, reconnaissance, utility, transport, and training. The bench seat in the cabin area can be folded down to leave a completely open cargo area. Cargo floor has tiedown rings throughout.

United States Attack Helicopter AH-1F/COBRA



Weapon & Ammunition Types	Combat Load
20-mm 3x barrel Gatling gun	**750**
Other Loading Options	
TOW missile pods (4 each)	**0-2**
2.75-in Hydra 70 rocket pods (19 each)	**2-4**
7.62-mm 6x barrel rotary MG pods	**0-2**

SYSTEM

Alternative Designations: Hueycobra, Bell 209
Date of Introduction: 1986 (AH-1S)
Proliferation: At least 11 countries

Description:
Crew: 2 (pilots in tandem seats)
Blades:
- Main rotor: 2
- Tail rotor: 2

Engines: 1x 1,800-shp AlliedSignal Engines T-53-L-703 turboshaft
Weight (kg):
- Maximum Gross: 4,535
- Normal Takeoff: 4,524
- Empty: 2,993

Speed (km/h):
- Maximum (level): 315
- Cruise: 227

Max "G" Force: INA
Ceiling (m):
- Service: 3,720
- Hover (out of ground effect): INA
- Hover (in ground effect): 3,720

Vertical Climb Rate (m/s): 8.5
Internal Fuel (liters): 991
Range (km):
- Normal Load: 610
- With Aux Fuel: N/A

Dimensions (m):
- Length (rotors turning): 16.3
- Length (fuselage): 13.6
- Width (including wing): 3.2
- Height: 4.1
- Main Rotor Diameter: 13.4
- Tail Rotor Diameter: 2.6

Cargo Compartment Dimensions: negligible
Standard Payload (kg): 1,544

Survivability/Countermeasures:
Infrared signature suppressors mounted on engine exhaust.
Radar warning receivers, IFF, Infrared jammer, chaff and flares.
Armored cockpit.

ARMAMENT
The chin-mounted turret accepts Gatling-type guns ranging from 7.62-mm to 30-mm.
Some aircraft have been modified to accept Stinger missiles (air-to-air Stinger or ATAS).

20-mm 3x barrel Gatling gun, M197:
Range: (practical) 1,500 m
Elevation: 21° up to 50° down
Traverse: 220°
Ammo Type: AP, HE
Rate of Fire: burst 16±4, continuous 730±50

Most Probable Armament:
AH-1G: Either 2x 7.62-mm miniguns with 4,000 rounds or 2x 40-mm grenade launchers with 300 rounds (one each is possible) in chin turret. Also on underwing hardpoints, 2.75-in. FFAR, minigun pods, or 20-mm automatic cannons.

AH-1S: M197, 3x barrel 20-mm Gatling gun in chin turret. Also on underwing hardpoints, 8x BMG71 TOW antitank missiles, and 2x 2.75-in FFAR rocket pods.

AVIONICS/SENSOR/OPTICS
The TOW missile targeting system uses a telescopic sight unit (traverse 110°, elevation –60°/+30°), a laser augmented tracking capability, thermal sights and a FLIR to allow for acquisition, launch, and tracking of all types of TOW missiles in all weather conditions.
The Cobra also uses a digital ballistic computer, a HUD, Doppler nav, and a low speed air data sensor on the starboard side for firing, and has in-flight boresighting.
Available Israeli-made upgrades include an integrated FLIR with laser rangefinder, GPS, automatic boresighting, and the ability to fire both TOW II and Hellfire missiles.

Night/Weather Capabilities:
The AH-1 is fully capable of performing its attack mission in all weather conditions.

VARIANTS
Most older Cobra variants still in operation have been upgraded to the AH-1F standard.
Also produced in Romania and Japan under license from Bell Textron in the U.S.

AH-1G: Initial production model in 1966

AH-1S: Upgraded 1960s produced aircraft in late 1980s to the standard TOW carrying version.

AH-1P: A set of AH-1S aircraft fitted with composite rotors, flat plate glass cockpits, and NVG capabilities.

AH-1E: A set of AH-1S aircraft upgraded with the Enhanced Cobra Armament System incorporating the universal turret, 20-mm gun, automatic compensation for off-axis gun firing, and weapon management system.

AH-1F: Current standard Cobra. Also referred to as the "Modernized Cobra". Incorporated all past upgrades.

AH-1J/-1T/-1W: See separate AH-1W entry.

NOTES
Available munitions are shown above; not all may be employed at one time. Mission dictates weapon configuration. External stores are mounted on underwing external stores points. Each wing has two hardpoints for a total of four stations. A representative mix when targeting armor formations would be eight TOW missiles, two 2.75-in rocket pods, and 750x 20-mm rounds. The gun must be centered before firing underwing stores. Additional missions include direct air support, antitank, armed escort, and air to air combat. Armored cockpit can withstand small arms fire, and composite blades and tailboom are able withstand damage from 23-mm cannon hits and small arms fire. The composite blades and tailboom are able to withstand damage from 23-mm cannon hits.

United States Attack Helicopter AH-1W/SUPERCOBRA

Weapon & Ammunition Types	Combat Load
20-mm 3x barrel Gatling gun	**750**
Other Loading Options	
Hellfire missile pods (4 each)	**0-2**
TOW missile pods (4 each)	**0-2**
2.75-in Hydra 70 rocket pods (19 each)	**2-4**
Sidewinder or Sidearm missiles	**2**
External fuel tanks (liters)	**291/378**

SYSTEM

Alternative Designations: Seacobra, Supercobra, Bell 209
Date of Introduction: 1986
Proliferation: At least 3 countries
Description:
Crew: 2 (pilots in tandem seats)
Blades:
- Main rotor: 2
- Tail rotor: 2

Engines: 2x 1,775-shp General Electric T-700-GE-401 turboshaft
Weight (kg):
- Maximum Gross: 6,700
- Normal Takeoff: 6,700
- Empty: 4,670

Speed (km/h):
- Maximum (level): 350
- Cruise: 270

Max "G" Force: +2.5 to -0.5 g
Ceiling (m):
- Service: 5,703
- Hover (out of ground effect): 915
- Hover (in ground effect): 4,270

Vertical Climb Rate (m/s): 4.0
Internal Fuel (liters): 1,150
Range (km):
- Normal Load: 590
- With Aux Fuel: N/A

Dimensions (m):
- Length (rotors turning): 17.7
- Length (fuselage): 14.7
- Width (including wing): 3.3
- Height: 4.2
- Main Rotor Diameter: 14.7
- Tail Rotor Diameter: 3.0

Standard Payload (kg): 1,740

Survivability/Countermeasures:
Infrared signature suppressors mounted on engine exhaust.
Radar and laser warning receivers, IFF, Infrared jammer, missile warning system, chaff and flares, and rotor brake.
Armored cockpit.

ARMAMENT

20-mm 3x barrel Gatling gun, M197:
Range: (practical) 1,500 m
Elevation: 21° up to 50° down
Traverse: 220°
Ammo Type: AP, HE
Rate of Fire: Burst 16±4, continuous 730±50

Most Probable Armament:
AH-1W: M197, 3x barrel 20-mm Gatling gun in chin turret. Also on underwing hardpoints, 8x TOW or Hellfire antitank missiles (or four of each), and 2x 2.75-in FFAR rocket pods. AIM-9 Sidewinder or AIM-123 Sidearm missiles provide air-to-air capability.

AVIONICS/SENSOR/OPTICS

The missile targeting system uses a telescopic sight unit (traverse 110°, elevation –60°/+30°) with two magnifications/fields of view, a laser augmented tracking capability, TV, video recorder, thermal sights, FLIR, Doppler navigation, and a digital ballistic computer for acquisition, launch, and tracking of all TOW or Hellfire missiles in all weather conditions. The helmet-mounted display integrates NVGs with missile targeting and gun turret. The system allows the aircraft to self-designate targets.

Night/Weather Capabilities:
The AH-1 is fully capable of performing its attack and armed escort missions in all weather conditions from land- or sea-based launching platforms.

VARIANTS

Most older AH-1J and AH-1T Seacobra variants still in operation have been upgraded to the AH-1W standard.

AH-1J: Initial twin engine AH-1 variant fielded in the early 1970s.

AH-1T: Upgraded engines and powertrain system for improved performance. This minimally expanded rotor system and overall dimensions of the AH-1J.

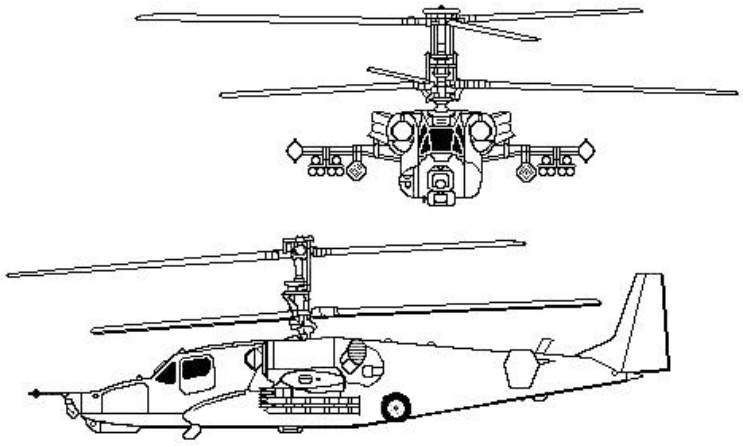
AH-1RO: Construction of a variant of the aircraft may occur in the near future in Romania. Talks are ongoing between IAR industries and Bell Textron. It may be produced under the name "Dracula".

AH-1Z/-1(4B)W: Four-bladed variant called the "King Cobra" or "Viper" that contains an integrated digital cockpit, and has better flight performance.

AH-1P/-1E/-1F: See separate AH-1F entry.

NOTES
Available munitions shown above ; not all may be employed at one time. Mission dictates weapon configuration. External stores are mounted on underwing external stores points. Each wing has two hardpoints for a total of four stations. A representative mix when targeting armor formations is eight TOW or Hellfire missiles (sometimes four of each missile is loaded), two 2.75-in rocket pods, and 750x 20-mm rounds. The gun must be centered before firing underwing stores. Additional missions include direct air support, antitank, armed escort, and air to air. Armored cockpit can withstand small arms fire , composite blades, tailboom, and fuel tanks withstand 23-mm cannon hits. This aircraft costs approximately $10.7 million which is considered inexpensive when compared to other modern attack helicopters, but it's performance is similar. Therefore many nations consider this aircraft as a possible candidate for fielding in attack helicopter squadrons.

Russian Attack Helicopter Ka-50/HOKUM



Weapon & Ammunition Types	Combat Load
1x 2A42 30-mm cannon	
HE-Frag	250
AP	250
Total	**500**
Other Loading Options	
AT-16 VIKhR ATGM (6 each)	**2**
80-mm rockets (20 each)	**2**
Twin 23-mm gun pods	**940**
500-kg bombs	**4**
AA-11/ARCHER AAM	**2**
External fuel tanks (liters)	**500**

SYSTEM

Alternative Designations: Black Shark, Werewolf
Date of Introduction: N/A
Proliferation: Preproduction. An initial fielding plan is for 2 per year for 14 years.

Description:
Crew: 1 (pilots, 2 in Ka-52)
Blades:
Main rotor: 6 (2 heads, 3 blades each)
Tail rotor: None
Engines: 2x 2,200-shp Klimov TV3-117VK turboshaft
Weight (kg):
Maximum Gross: 10,800
Normal Takeoff: 9,800
Empty: 7,692
Speed (km/h):
Maximum (level): 340 (est.)
Cruise: 270
Sideward: 100+, Rearward: 100+
Turn Rate: unlimited
Max "G" Force: +3 to +3.5 g
Ceiling (m):
Service: 5,500
Hover (out of ground effect): 4,000
Hover (in ground effect): 5,500
Vertical Climb Rate (m/s): 10
Fuel (liters):
Internal: INA
External Fuel Tank: 500 ea. (max 4x)
Range (km):
Maximum Load: INA
Normal Load: 460
With Aux Fuel: INA
Dimensions (m):
Length (rotors turning): 16
Length (fuselage): 15.0
Width (including wing): 7.34
Height (gear extended): 4.93
Height (gear retracted): 4
Main Rotor Diameter: 14.5
Cargo Compartment Dimensions: Negligible
Standard Payload:
External weapons load: 2,500 kg on 4 underwing stores points.

Survivability/Countermeasures:
Main rotors and engines electrically deiced.
Infrared signature suppressors can be mounted on engine exhausts.
Radar warning receivers, IFF, chaff and flares.
Armored cockpit and self-sealing fuel tanks.
Pilot ejection system.
(see NOTES)

ARMAMENT
30-mm Automatic Cannon, 2A42:
Range: effective 3,000 m
Elevation: -45° to +10°
Traverse: ±15°
Ammo type and rate of fire is selectable by pilot (HE or AP, 350 or 600)

Most Probable Armament: (shown above)
HOKUM A/N: Fuselage-mounted 30-mm cannon on right side, 80-mm rockets, AT-16 VIKhR ATGMs.

HOKUM B: Same as above.

ATGM, AT-16/VIKhR:
Guidance: Laser Beam Rider SACLOS
Range: 10,000 m
Warhead: HEAT
Penetration: 900 mm
Effective against ground & air targets at converging speeds to 800 km/h.
ATGM racks can depress to 12°.

AVIONICS/SENSOR/OPTICS

The HOKUM uses a low-light level TV or thermal sighting, a laser range-finder (10 km), FLIR, air data sensor, and digital data-link which interface with a fire control computer, an autopilot, a helmet sighting system and HUD for target location, acquisition, designation, and firing.

Night/Weather Capabilities:
This aircraft's avionics package ensuring a full day/night, all weather capability. If it is to be employed at night in an attack role, it must be fitted with a night targeting pod. This pod includes a FLIR, a millimeter wave radar, and an electro-optical sight takes up one of the underwing pylons.
The Ka-50N, and Ka-52 are capable of performing attack missions in day/night, and all-weather conditions.
The French companies Thomson-CSF, and Sextant Avionique offer nav/attack systems, which can be fitted to export variants.

VARIANTS

Ka-50A/HOKUM A: Standard direct air support variant.

Ka-50N/HOKUM N: Night attack variant fitted with a nose-mounted FLIR. The cockpit is fitted with an additional TV display, and is NVG compatible.

Ka-52/HOKUM B: The "Alligator" is a side-by-side, two-seat cockpit variant of the Ka-50. The gross weight of the aircraft is greater, so the performance is marginally degraded. But airframe characteristics, dimensions, and armaments are relatively similar. It includes a mast-mounted millimeter wave radar covering the front quadrant only. It is used as an attack aircraft, and as a trainer for the Ka-50.

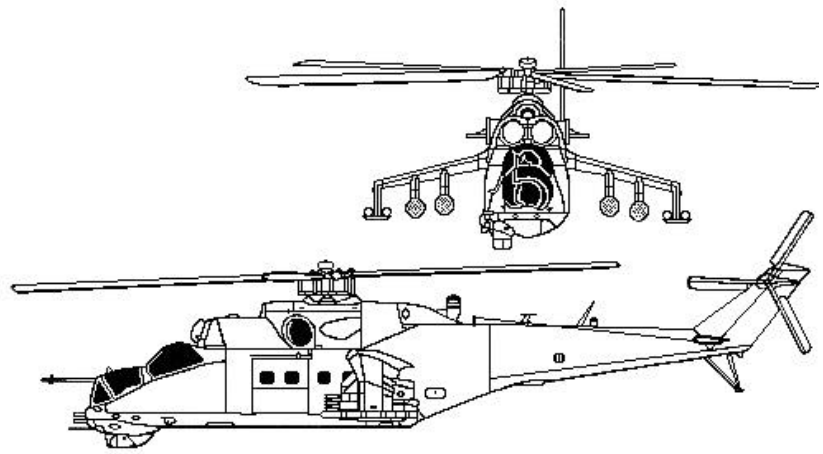
Russian Attack Helicopter Ka-50/HOKUM continued

NOTES

This aircraft is not fielded. Only a handful of prototypes exist, and it has not yet been approved for full-scale production.

The fully armored pilot's cabin can withstand 23-mm gunfire, and the cockpit glass 12.7-mm MG gunfire. The Zvezda K-37-800 pilot ejection system functions at any altitude. Available munitions are shown above; not all may be employed at one time. Mission dictates weapons configuration. External stores are mounted on underwing external hardpoints. Each wing has two hardpoints for a total of four stations. A typical mix for targeting armor formations is 12x AT-16 ATGMs, 500x 30-mm cannon rounds, and 2x 20-round pods of 80-mm folding fin unguided rockets. It was designed for remote operations, and not to need ground maintenance facilities for 2 weeks. The 30-mm cannon is the same as on the BMP-2. The firing computer will turn the aircraft to keep the gun on target. A coaxial counter-rotating rotor system negates the need for a tail rotor and its drive system. Because of this, this aircraft is unaffected by wind strength and direction, has an unlimited hovering turn rate, and gives a smaller profile and acoustic signature, while allowing a 10-15% greater power margin. The airframe is 35% composite materials with a structural central $1m^2$ keel beam of kevlar/nomex that protects critical systems and ammunition. The HOKUM is fully aerobatic. It can perform loops, roll, and "the funnel", where the aircraft will maintain a concentrated point of fire while flying circles of varying altitude, elevation, and airspeed around the target.

Russian Attack Helicopter Mi-24/HIND



Weapon & Ammunition Types	Combat Load
1x twin 30-mm gun or 12.7-mm 4 barrel turret gun	**750** **1,470**
Other Loading Options	
AT-2C or AT-6C ATGMs	**2-12**
80-mm S-8 rocket pods (20 ea.)	**2-4**
57-mm S-5 rocket pods (32 ea.)	**2-4**
GSh-23L twin 23-mm MG pods	**940**
250-kg bombs	**4**
500-kg bombs	**2**
External fuel tanks (liters)	**500**

SYSTEM

Alternative Designations: INA
Date of Introduction: 1976 (HIND D)
Proliferation: At least 34 countries

Description:
Crew: 2 (pilots in tandem cockpits)
Blades:
- Main rotor: 5
- Tail rotor: 3

Engines: 2x 2,200-shp Klimov TV3-117VMA turboshaft
Weight (kg):
- Maximum Gross: 11,500
- Normal Takeoff: 11,100
- Empty: 8,500

Speed (km/h):
- Maximum (level): 335
- Cruise: 295

Max "G" Force: 1.75 g
Ceiling (m):
- Service: 4,500
- Hover (out of ground effect): 1,500
- Hover (in ground effect): 2,200

Vertical Climb Rate (m/s): 15
Fuel (liters):
- Internal: 1,840
- Internal Aux Tank (in cabin): 1,227
- External Fuel Tank: 500 ea.

Range (km):
- Normal Load: 450
- With Aux Fuel: 950

Dimensions (m):
- Length (rotors turning): 21.6
- Length (fuselage): 17.5
- Width (including wing): 6.5
- Height (gear extended): 6.5
- Main Rotor Diameter: 17.3
- Tail Rotor Diameter: 3.9

Cargo Compartment Dimensions (m):
- Floor Length: 2.5
- Width: 1.5
- Height: 1.2

Standard Payload:
- Internal load: 8 combat troops or 4 litters
- External weapons load: 1,500 kg
- External load (no weapons): 2,500 kg

Survivability/Countermeasures:
Main and tail rotors electrically deiced.
Infrared signature suppressors can be mounted on engine exhausts.
Radar warning receivers, IFF, Infrared jammer, rotor brake, chaff and flares.
Armored cockpit.

ARMAMENT
Loaded combat troops can fire personal weapons through cabin windows.

12.7-mm 4x Barrel Machinegun, YaKB-12.7:
Range (m): (practical) 1,500
Elevation/Traverse: 20° up to 60° down/ 120°
Ammo Type: HEFI, APT, Duplex, DuplexT
Rate of Fire (rpm): up to 4,500 (pilot selectable)

OR

30-mm Twin Barrel Cannon, GSh-30K:
Range (m): (practical) 4,000
Elevation/Traverse: None (rigidly mounted)
Ammo Type: HEFI, HEI, APT, APE, CC
Rate of Fire (rpm): 300, or 2,000 to 2,600

Most Probable Armament: (HIND F pictured)
HIND D: Turret-mounted 4-barrel 12.7-mm Gatling type machinegun, 57-mm rockets, AT-2C/SWATTER ATGMs.

HIND E: Turret-mounted 4-barrel 12.7-mm Gatling type machinegun or twin barrel 23-mm turret gun, 57-mm rockets, AT-6C/ SPIRAL ATGMs.

HIND F: Fixed 30-mm twin gun on the right fuselage side, 57-mm rockets, AT-6C/ SPIRAL ATGMs.

AVIONICS/SENSOR/OPTICS
The ATGM targeting system uses a low-level light TV, a laser designator, FLIR, air data sensor, and a missile guidance transmitter.

Night/Weather Capabilities:
HIND D versions are primarily daytime aircraft only. Some HIND E and Mi-35 series export versions have upgraded night and weather capabilities, better avionics, weather radar, autopilot, HUD, GPS, NVG compatibility, more armor, and an increased weapons load provided by the French company Sextant Avionique.

VARIANTS
Nearly all of the older HIND A, B and C variants have been upgraded or modified to the HIND D or E standard.

Mi-24D/HIND D: Direct air support.

Mi-24V/HIND E: Direct air support. Most proliferated version.

Mi-24P/HIND F: Direct air support. The fixed twin gun cut the turret profile, and empty weight to 8,200 kg, while boosting maximum gross weight to 12,000 kg.

Mi-24R/HIND G-1: NBC sampling. It has mechanisms to obtain soil and air samples, filter air, and place marker flares.

Mi-24K/HIND G-2: Photo-recon, and artillery spotting. Has a camera in cabin, gun, rocket pods, but no targeting system.

Mi-25: Export version of the HIND D.

Mi-35: Export version of the HIND E. The **Mi-35M** has a twin barrel 23-mm gun.

Mi-35P: Export version of the HIND F.

NOTES
Available munitions are shown above; not all may be employed at one time. Mission dictates weapon configuration. External stores are mounted on underwing external stores points. Each wing has three hardpoints for a total of six stations. A representative mix when targeting armor formations would be eight AT-6 ATGMs, 750x 30-mm rounds, and two 57-mm rocket pods. Additional missions include direct air support, antitank, armed

Russian Attack Helicopter Mi-24/HIND continued

escort, and air to air combat. The aircraft can store an additional ammunition basic load in the cargo compartment in lieu of carrying troops. Armored cockpits and titanium rotor head able to withstand 20-mm cannon hits. Every aircraft has an overpressurization system for operation in a NBC environment.

The HIND's wings provide 22% to 28% of its lift in forward flight. In a steep banking turn at slower airspeeds, the low wing can lose lift while it is maintained on the upper wing, resulting in an excessive roll. This is countered by increasing forward airspeed to increase lift on the lower wing. Because of this characteristic, and the aircraft's size and weight, it is not easily maneuverable. Therefore they usually attack in pairs or multiple pairs, and from various directions.

Russian Attack Helicopter Mi-28/HAVOC

Most Common Armament:	Combat Load:
1x 2A42 30-mm cannon	300
4x AT-6/SPIRAL or 4x AT-9/ATAKA ATGMs	4 ea
4x 80-mm rocket pod or 4x 57-mm rocket pod	20 ea 16 ea
Other Loading Options:	
Twin 23-mm gun pods	940
500-kg bombs	4
External fuel tanks	
2x AA-16/GIMLET or 2x AA-18/ GROUSE AAM	2 ea

SYSTEM

Alternative Designations: N/A
Date of Introduction: N/A
Proliferation: Preproduction. No fielding plan due to funding constraints. Only a few prototypes of each model have been constructed.

Description:
Crew: 2 pilots in tandem cockpits
Blades:
- Main rotor: 5
- Tail rotor: 4 (in "X" configuration)

Engines: 2x 2,200-shp Klimov TV3-117VMA turboshaft
Weight (kg):
- Max Gross: 11,500
- Normal Takeoff: 10,400
- Empty: 7,000

Speed (km/h):
- Max (level): 300
- Cruise: 260
- Sideward: 100, Rearward: 100
- Turn rate: 60^0 /second

Max "G" Force: -.5 to +3.7 g
Ceiling (m):
- Service: 6,000
- Hover (out of ground effect): 3,600
- Hover (in ground effect): INA

Vertical Climb Rate (m/s): INA
Fuel: (liters)
- Internal: 1,900
- Internal Aux Tank: N/A
- External Fuel Tank: INA

Range: (km)
- Max Load: INA
- Normal Load: 475
- With Aux Fuel: 1,100

Dimensions: (m)
- Length (rotors turning): 21.2
- Length (fuselage): 16.8
- Width (including wing): 4.9
- Height: 4.7
- Main Rotor Diameter: 17.2
- Tail Rotor Diameter: 3.8

Cargo Compartment Dimensions: Negligible
Standard Payload: 3,640 kg on 4 underwing stores points.

Survivability/Countermeasures:
Main rotors and engines electrically deiced.
Infrared signature suppressors can be mounted on engine exhausts.
Radar warning receivers, pressurized cockpit, IFF, chaff, decoys and flares.
Armored cockpit and self-sealing fuel tanks.
Pilot ejection system (see NOTES).

ARMAMENT
30-mm Automatic Cannon, 2A42:
Range: Effective 3,000 m
Elevation: -40^o to $+13^o$, Traverse: ±110°
Ammo Type: HE, or AP
Rate of Fire: 300 or 800

Most Probable Armament:
HAVOC A/N: Chin-mounted 30-mm gun, 80-mm rockets, 16x ATGMs.

ATGM, AT-6/SHTURM:
Guidance: SACLOS RF
Range: 5,000-7,000 m (variant dependant)
Warhead: Tandem HEAT
Penetration: 700-950 mm (variant dependant)

ATGM, AT-9/ATAKA:
Guidance: SACLOS RF
Range: 6,000 m
Warhead: Tandem HEAT
Penetration: 1,000 mm

80-mm Folding Fin, Unguided Rocket, S-8:
Range: 2 to 3 km
Warhead: AP or HE
20 rockets per pod, 2 pods carried

SENSOR/OPTICS

The HAVOC uses optical magnification, a laser designator, HUD, a pair of FLIR sensors, and a targeting radar for target engagement.

Night/Weather Capabilities:

The Mi-28A is primarily a daylight only aircraft. The Mi-28N has avionics upgrades, and the use of night-vision goggles allows a day/night, all-weather mission capability.

VARIANTS

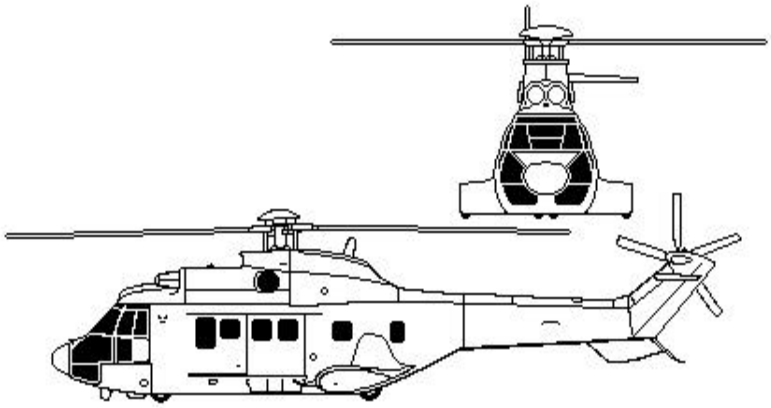
Mi-28N: Known as the "night version". This version features an integrated rotor-hub radar for both targeting and navigation, a full autopilot, an inertial navigation system, and an optical, thermal, and low-light level TV helmet targeting system for target engagement. Night vision goggles are employed. The engines are upgraded to 2x 2,500-shp Klimov TV3-117SB3 turboshaft, and the transmission and rotor blades are more efficient. This accounts for the added avionics weight, and increases the armament basic load to 500x 30-mm cannon rounds, 16x AT-9 or AT-16 VIKhR ATGMs, 2x rocket pods, and up to 4x air-to-air missiles. The aircraft's systems allow for the orchestration of group combat actions through datalinks.

Russian Attack Helicopter Mi-28/HAVOC continued _____

NOTES
This aircraft is not fielded. Only a handful of prototypes exist, and it has not yet been approved for full-scale production.

Although this aircraft is routinely compared to the U.S. AH-64 Apache, it is much larger and less maneuverable than its U.S. counterpart. The cockpit glass is bulletproof to 12.7-mm rounds, and resistant to fragmentation from 20-mm shells. The armored cockpit frame is made of titanium, steel, and ceramic. It can also withstand hits of 20-mm shells at a minimum. Rotor blade-tip pitot tubes give speed and drift information for targeting at low airspeed. The HAVOC has a high altitude ejection system that jettisons wings and cockpit doors while the crew jumps to safety with parachutes. It has a "technical compartment" which accommodates two persons. This is used to evacuate a crew from a downed aircraft. Available munitions are shown above; not all may be employed at one time. Mission dictates weapon configuration. External stores are mounted on underwing external hard-points. Each wing has two hardpoints for a total of four stations. A typical mix for targeting armor formations is 16x ATGMs, 300x 30-mm cannon rounds, and 2x 20-round pods of 80-mm rockets. The 30-mm cannon is the same as on the BMP-2. A helmet sighting system turns the cannon in the direction the pilot is looking. However, the cannon is usually fired in the stowed position only.

European Utility Helicopter AS-532/COUGAR



Weapon & Ammunition Types	Combat Load
7.65-mm MG	**2**
Other Loading Options	
20-mm twin gun pods	**2**
68-mm rocket pods (22 each)	**2**
2.75-in rocket pods (19 each)	**2**
External fuel tanks (liters)	**600**

SYSTEM

Alternative Designations: AS 332 Super Puma, SA 330 Puma
Date of Introduction: 1981
Proliferation: At least 38 countries

Description: Variants in "( )"
Crew: 2 (pilots)
Blades:
- Main rotor: 4
- Tail rotor: 5, 4 (U2/A2)

Engines: 2x 1,877-shp Turbomeca Makila 1A1 turboshaft
Weight (kg):
- Maximum Gross: 9,000 (Mk I), 9,750 (Mk II)
- Normal Takeoff: 8,600 (Mk I), 9,300 (Mk II)
- Empty: 4,330 (UC/AC), 4,460 (UL/AL), 4,760 (U2/A2)

Speed (km/h):
- Maximum (level): 275 (Mk I), 325 (Mk II)
- Cruise: 270

Ceiling (m):
- Service: 4,100
- Hover (out of ground effect): 1,650 (Mk I), 1,900 (Mk II)
- Hover (in ground effect): 2,800 (Mk I), 2,540 (Mk II)

Vertical Climb Rate (m/s): 7
Fuel (liters):
- Internal: 1,497 (UC/AC), 2,000 (UL/AL), 2,020 (U2/A2)
- Internal Aux Tank: 475 ea. (4x Mk I, 5x Mk II)

Range (km):
- Normal Load: 620 (UC/AC), 840 (UL/AL), 800 (U2/A2)
- With Aux Fuel: 1,017 (UC/AC), 1, 245 (UL/AL), 1,176 (U2/A2)

Dimensions (m):
- Length (rotors turning): 18.7-19.5 (U2/A2)

Dimensions continued (m):
- Length (fuselage): 15.5 (UC/AC), 16.3 (UL/AL), 16.8 (U2/A2)
- Width: 3.6-3.8 (U2/A2)
- Height: 4.6
- Main Rotor Diameter: 15.6-16.2 (U2/A2)
- Tail Rotor Diameter: 3.1-3.2 (U2/A2)

Cargo Compartment Dimensions (m):
- Floor Length: 6.5 (AC/UC), 6.8 (UL/AL), 7.9 (U2/A2)
- Width: 1.8
- Height: 1.5

Standard Payload (kg):
- Internal load: 3,000
- External on sling only: 4,500
- Transports 20-29 troops or 6-12 litters (variant dependant), or cargo.

Survivability/Countermeasures:
Main and tail rotor blades electrically deiced.
A radar warning receiver is standard, while a laser warning receiver, missile launch detector, missile approach detector, infrared jammer, decoy launcher, and flare/chaff dispensers are optionally available.

ARMAMENT

The Mk I variants may employ 2x 7.65-mm machine guns on pintle-mounts in the cabin doors when employed in a transport role.

Most Probable Armament
The armed versions have side-mounted 20-mm machineguns and/or axial pods fitted with 68-mm rocket launchers.

AVIONICS/SENSOR/OPTICS

Night/Weather Capabilities:
The aircraft is NVG compatible, and through its instruments, avionics, full autopilot, and nav computer, is capable of operation in day, night, and instrument meteorological conditions.

VARIANTS

SA 330 Puma: Developed in the late 1960s by Aerospatiale in France. Others were built in the UK, Indonesia, Romania.

AS 332 Super Puma: Differs from the SA 330 Puma through an improved rotor system, upgraded engines, stretched fuselage, and a modified nose shape.
The Cougar name was adopted for all military variants, and in 1990, all Super Puma designations were changed from AS 332 to AS 532 to distinguish between civil and military variants. The "5" denotes military, "A" is armed, "C" is armed-antitank, and "U" is utility. The second letter represents the level of "upgrading".

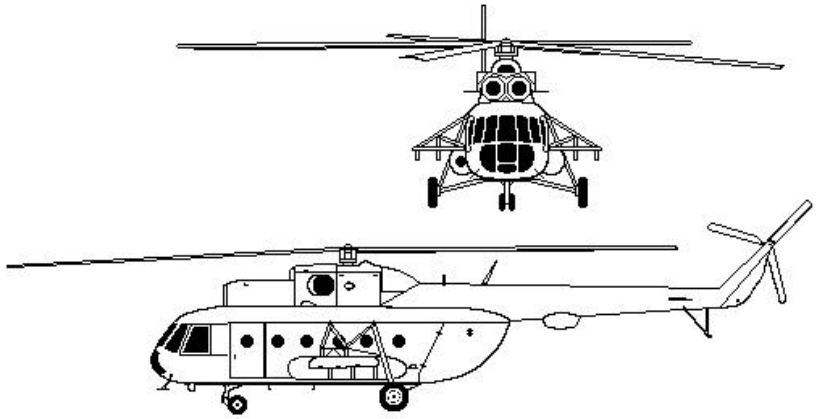
AS-532 Cougar UC/AC Mk I: The basic version with a short fuselage to carry 20 troops.

AS-532 Cougar UL/AL Mk I: This version has an extended fuselage, which allows it to carry 25 troops and more fuel. It is also capable of carrying an external load of 4,500 kg.

AS-532 Cougar U2/A2 Mk II: This 1992 version is the longest variant of the Cougar line. It has an improved Spheriflex rotor system with only 4x tail rotor blades, and 2x 2,100-shp Turbomeca Makila 1A2 turboshaft engines that allow an increased cargo carrying capability. It can transport 29 troops or 12 litters, or an external load of 5,000 kg. Primarily used for combat search and rescue, and as an armed version. It may be armed additionally with a 20-mm cannon or pintle-mounted .50 caliber machine guns.

NOTES
This helicopter is produced by the Eurocopter company. It was formed as a joint venture between Aerospatiale of France, and Daimler-Benz Aerospace of Germany. Additional missions include: VIP transport, electronic warfare, and anti-submarine warfare.

Russian Utility Helicopter Mi-8/HIP



Weapon & Ammunition Types	Combat Load
2x 7.62-mm or 1x 12.7-mm MG	
Other Loading Options	
AT-2C or AT-3 ATGMs	**4-6**
57-mm rocket pods (16 each)	**4-6**
80-mm rocket pods (20 each)	**2**
250-kg bombs	**4**
500-kg bombs	**2**
12.7-mm MG pod	**2**
Twin 23-mm gun pods	**2**
Additional fuel tanks (liters)	**1,830**

SYSTEM

Alternative Designations: INA
Date of Introduction: 1967
Proliferation: At least 54 countries

Description:
Crew: 3 (2x pilots, 1x flight engineer)
Blades:
- Main rotor: 5
- Tail rotor: 3

Engines: 2x 1,700-shp Isotov TV2-117A turboshaft
Weight (kg):
- Maximum Gross: 12,000
- Normal Takeoff: 11,100
- Empty: 6,990

Speed (km/h):
- Maximum (level): 250
- Cruise: 225

Ceiling (m):
- Service: 4,500
- Hover (out of ground effect): 800
- Hover (in ground effect): 1,900

Vertical Climb Rate (m/s): 9
Fuel (liters):
- Internal: 445
- Internal Aux Tank: 915 ea.
- External Fuel Tank: 745 in port tank, 680 in starboard tank

Range (km):
- Maximum Load: INA
- Normal Load: 460
- With Aux Fuel: 950

Dimensions (m):
- Length (rotors turning): 25.2
- Length (fuselage): 18.2
- Width: 2.5
- Height: 5.6
- Main Rotor Diameter: 21.3
- Tail Rotor Diameter: 3.9

Cargo Compartment Dimensions (m):
- Floor Length: 5.3
- Width: 2.3
- Height: 1.8

Standard Payload:
- HIP C: 24 troops, or 3,000 kg internal or external loads on 4x hardpoints.
- HIP E: 24 troops, or 4,000 kg internal or 3,000 kg external on 6x hardpoints.
- HIP J/K: antennas on aft section of fuselage.

Survivability/Countermeasures:
Main and tail rotor blades electrically deiced. Infrared jammer, chaff and flares.

ARMAMENT

Loaded combat troops can fire personal weapons through windows from inside cabin.
The HIP E mounts a flexible 12.7-mm machinegun in the nose.

AVIONICS/SENSOR/OPTICS

Night/Weather Capabilities:
The Mi-8 is equipped with instruments and avionics allowing operation in day, night, and instrument meteorological conditions.

VARIANTS

Mi-8T: The HIP C is a medium assault/ transport version. The probable armament is 57-mm rockets, bombs, or AT-2C/ SWATTER ATGMs.

Mi-8VPK: The HIP D is an airborne communications platform with rectangular communication canisters mounted on weapons racks.

Mi-8TVK: The HIP E is used as a gunship or direct air support platform. Airframe modifications add 2x external hardpoints for a total of 6, and mount a flexible 12.7-mm machinegun in the nose. The probable armament is 57-mm rockets, bombs, or AT-2/SWATTER ATGMs.

Mi-8MT/MTV/MTB/-171-17: The HIP H is an upgraded medium assault/ transport version. See separate Mi-17 entry.

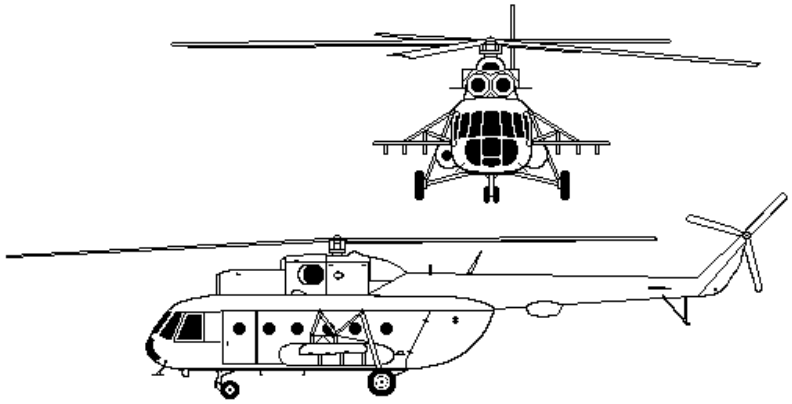
Mi-8SMV: The HIP J is an airborne jamming platform characterized by small boxes on the left side of the fuselage.

Mi-8PPA: The HIP K is an airborne jamming platform characterized by 6x "X"-shaped antennas on the aft fuselage.

Mi-9: The HIP G is an airborne command post characterized by antennas, and Doppler radar on tailboom.

NOTES
Available munitions are shown above; not all may be employed at one time, mission dictates weapon configuration. External stores are mounted on weapons racks on each side of the fuselage. The HIP C has four external hardpoints; the HIP E, HIP H, have six; other variants have none. Interior seats are removable for cargo carrying. The rear clamshell doors open, an internal winch facilitates loading of heavy freight. Floor has tiedown rings throughout. The aircraft carries a rescue hoist capable to 150 kg, and a cargo sling system capable to 3,000 kg. The Mi-8 is capable of single-engine flight in the event of loss of power by one engine (depending on aircraft mission weight) because of an engine load sharing system. If one engine fails, the other engine's output is automatically increased to allow continued flight. See also Mi-17.

Russian Utility Helicopter Mi-17/HIP



Weapon & Ammunition Types	Combat Load
2x 7.62-mm or 1x 12.7-mm MG	
Other Loading Options	
AT-2C or AT-3 ATGMs	**4-6**
57-mm rocket pods (16 each)	**4-6**
80-mm rocket pods (20 each)	**2**
250-kg bombs	**4**
500-kg bombs	**2**
12.7-mm MG pod	
Twin 23-mm gun pods	**2**
Additional fuel tanks (liters)	**1,830**

SYSTEM

Alternative Designations: Mi-8MT HIP H
Date of Introduction: 1981 (as Mi-17)
Proliferation: At least 22 countries

Description:
Crew: 3 (2x pilots, 1x flight engineer)
Blades:
- Main rotor: 5
- Tail rotor: 3

Engines: 2x 1,950-shp Isotov TV3-117MT turboshaft
Weight (kg):
- Maximum Gross: 13,000
- Normal Takeoff: 11,100
- Empty: 7,100-7,370 (variant dependant)

Speed (km/h):
- Maximum (level): 250
- Cruise: 240

Ceiling (m):
- Service: 5,000-5,700 (variant dependant)
- Hover (out of ground effect): 1,760
- Hover (in ground effect): 1,900-3,980 (variant dependant)

Vertical Climb Rate (m/s): 9
Fuel (liters):
- Internal: 445
- Internal Aux Tank: 915 ea.
- External Fuel Tank:
  - Port Tank: 745
  - Starboard Tank: 680

Range (km):
- Normal Load: 495
- With Aux Fuel: 1,065

Dimensions (m):
- Length (rotors turning): 25.4
- Length (fuselage): 18.4
- Width: 2.5
- Height: 5.7
- Main Rotor Diameter: 21.3
- Tail Rotor Diameter: 3.9

Cargo Compartment Dimensions (m):
- Floor Length: 5.3
- Width: 2.3
- Height: 1.8

Standard Payload (kg):
- Internal load: 4,000
- External on sling only: 3,000
- Transports 24 troops and cargo, or armaments on 6x external hardpoints.

Survivability/Countermeasures:
Main and tail rotor blades electrically deiced. Infrared jammer, chaff and flares.

ARMAMENT

Loaded combat troops can fire personal weapons through cabin windows from inside cabin.

Most Probable Armament:
HIP H: Fitted with 2x 7.62-mm machineguns or possibly 2x 23-mm GSh-23 gun packs in cabin, 57-mm rockets, and AT3/SAGGER ATGMs.

AVIONICS/SENSOR/OPTICS

Night/Weather Capabilities:
The Mi-17 is equipped with instruments, avionics, Doppler radar, and a fully functioning autopilot for operation in day, night, and instrument meteorological conditions.

VARIANTS

Mi-17: A mid-life upgrade of the widely proliferated Mi-8 HIP H medium assault/transport helicopter. Initially, only the export version was known as the Mi-17. The only visible differences between this variant and the older Mi-8s is that the tail rotor is on the portside rather than the starboard side, and crew armor plating.

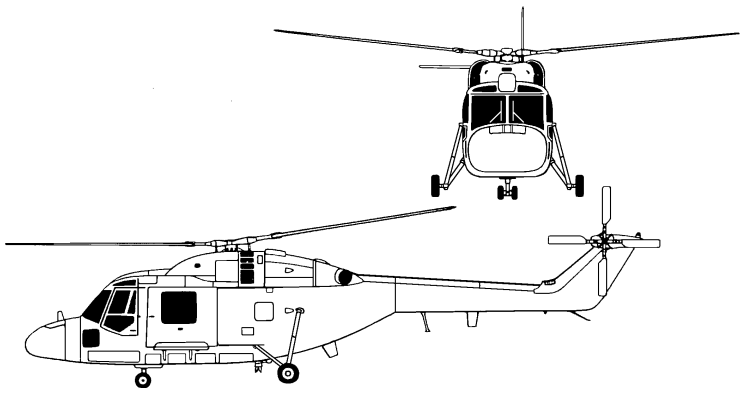
Mi-17P: A descendent of the HIP K airborne jamming platform characterized by large rectangular antennas along the aft fuselage.

Mi-171/-17M/-17V: Also known as **Mi-8MTV**, and a descendent of the HIP H. The engines are upgraded to 2x 2,070-shp Klimov TV3-117VMAs to allow greater rates of climb and hover ceilings, yet performance characteristics remain virtually unchanged from the baseline Mi-17.

Mi-8: See separate entry.

NOTES
Available munitions are shown above; not all may be employed at one time, mission dictates weapon configuration. External stores are mounted on weapons racks on each side of the fuselage. The Mi-17 has six external hardpoints. Additional missions include; attack, direct air support, electronic warfare, airborne early warning, medevac, search and rescue, and minelaying. Interior seats are removable for cargo carrying. The rear clamshell doors open, an internal winch facilitates loading of heavy freight. Floor has tie down rings throughout. The aircraft carries a rescue hoist capable to 150 kg. The Mi-17 is capable of single-engine flight in the event of loss of power by one engine (depending on aircraft mission weight) because of an engine load sharing system. If one engine fails, the other engine's output is automatically increased to allow continued flight. See also Mi-8.

United Kingdom Multi-role Helicopter LYNX



Weapon & Ammunition Types **Other Loading Options**	Combat Load
20-mm MG	**2**
2x 7.62-mm AA-52 FN MG pods	**2**
12.7-mm machinegun pod	**2**
20-mm GIAT Minigun pods	**2**
2x Antitank missile pods (4 each)	**8**
2x AAM pod	**2**
2x 68-mm or 2.75-in rocket pods (18 or 19 each)	**36 or 38**

SYSTEM

Alternative Designations: Battlefield Lynx, Super Lynx, Light Battlefield Helicopter, AH-1
Date of Introduction: 1977
Proliferation: At least 11 countries

Description: Variants in "( )"
Crew: 2 (pilots)
Blades:
- Main rotor: 4
- Tail rotor: 4

Engines: 2x 900-shp Rolls Royce Gem 42-1 turboshaft, 2x 1,260 LHTEC CTS800-4N turboshaft (Mk 9)
Weight (kg):
- Max Gross: 4,535, 5,126 (Mk 9)
- Normal Takeoff: 2,658, 3,496 (Mk 9)
- Empty: 2,578

Speed (km/h):
- Max (level): 289
- Cruise: 259, 285 (Mk 9)
- Sideward: 130, Rearward: INA

Max "G" Force: +2.3 to -0.5
Ceiling (m):
- Service: INA
- Hover (out of ground effect): 3,230, 5,126
- Hover (in ground effect): 3,660

Vertical Climb Rate (m/s): 7
Fuel (liters):
- Internal: 985
- Aux fuel : 696

Range (km):
- Normal Load: 630
- With Aux Fuel: 1,342

Dimensions (m):
- Length (rotors turning): 15.2
- Length (fuselage): 13.2
- Width: 3.8, 3.0 (Mk 9)
- Height: 3.7
- Main Rotor Diameter: 12.8
- Tail Rotor Diameter: 2.2, 2.4 (Mk 9)

Cargo Compartment Dimensions (m):
- Floor Length: 2.1
- Width: 1.8
- Height: 1.4

Standard Payload (kg):
- Internal load: 907
- External on sling only: 1,360, 2,000 (Mk 9)
- Transports 9 troops, 6 litters or cargo.

Survivability/Countermeasures:
Engine exhaust suppressors.
An infrared jammer, and flare/chaff dispensers are available.
Rotor brake and self-sealing fuel tanks.

ARMAMENT

The Lynx employed by ground forces can be equipped with two 20-mm cannons mounted externally to permit 7.62-mm machineguns to be fired from the cabin. Two fuselage pylons allow for external stores.

Most Probable Armament
The armed versions have side-mounted 20-mm machineguns and 8x HOT/Hellfire/TOW ATGMs. An additional load of 8 missiles can be carried in the cabin.

Army variants equipped for TOW missiles have a roof-mounted sight (over the left-hand pilot's seat) with IR and thermal capabilities for firing. Optional equipment allows for target magnification, LLLTV, cameras, and IR searchlight.

AVIONICS/SENSOR/OPTICS

Night/Weather Capabilities:
The aircraft is NVG compatible, and through its instruments, avionics, autopilot, and doppler navigation system, is capable of operation in day, night, and instrument meteorological conditions.

VARIANTS

Developed under a partnership between predominantly Westland of the United Kingdom, and Aerospatiale of France.
Listed below are the primary, most proliferated variants used by ground forces. Many others exist in small numbers for ground and naval forces.

Lynx AH. Mk 1: The basic army general purpose and utility version. This aircraft has skid-type landing gear. Most have been converted to **Mk 7** format.

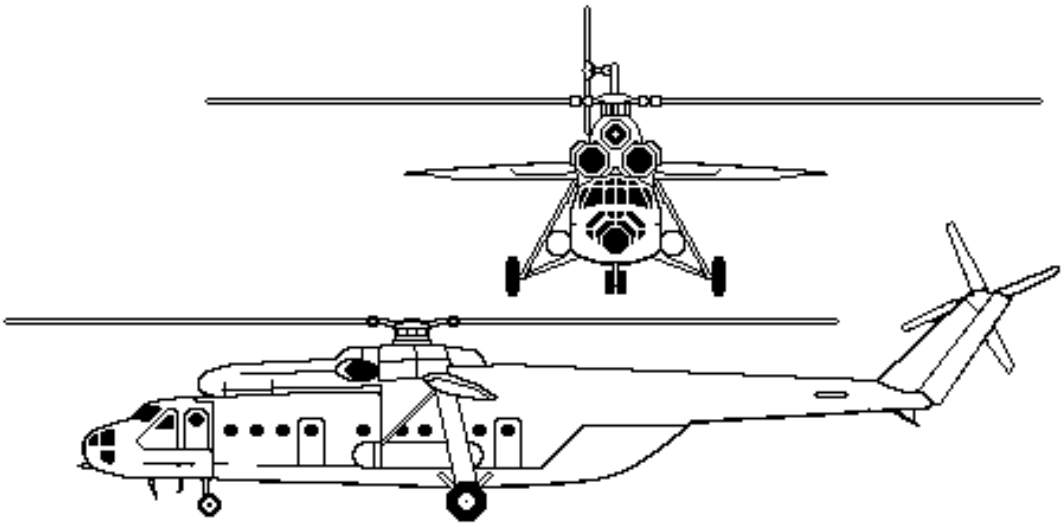
Lynx AH. Mk 7: Also known as **AH 1**. Upgraded British army version, some with improved main rotor blades. Reverse-direction tail rotor to reduce noise signatures and improve performance. This aircraft has skid-type landing gear.

Lynx AH. Mk 9: Also known as **Super Lynx** or **Light Battlefield Helicopter**. Implemented tricycle-type landing gear, improved rotor blades, and upgraded engines to increase performance. Mostly used in tactical transport role, with no ATGM launch capability.

Battlefield Lynx: Export version of Lynx AH. Mk 9 that can be armed with ATGMs.

NOTES
This aircraft was designed to be both a transport and an attack aircraft. Additional missions include: VIP transport, search and rescue, mine-laying, and anti-submarine warfare. Squadrons are aligned along aircraft models. Available munitions are shown above; not all may be employed at one time. Mission dictates weapon configuration. External stores are mounted on two points. Each fuselage side has one pylon allowing for a single gun pod or missile rack. The Lynx is capable of single-engine flight in the event of loss of power by one engine (depending on aircraft mission weight) because of an engine load sharing system. If an engine fails, the other's output is increased to allow continued flight.

Russian Transport Helicopter Mi-6/HOOK



SYSTEM

Alternative Designations: INA
Date of Introduction: 1961
Proliferation: At least 15 countries

Description:
Crew: 5 (2x pilots, 1x navigator, 1x flight engineer, 1x radio operator)
Blades:
- Main rotor: 5
- Tail rotor: 4

Engines: 2x 5,500-shp Soloviev D-25V (TV-2BM) turboshaft
Weight (kg):
- Max Gross: 42,500-46,800
- Normal Takeoff: 40,500
- Empty: 27,240

Speed (km/h):
- Max (level): 300
- Cruise: 250

Ceiling (m):
- Service: 4,500

Fuel (liters):
- Internal: 6,315
- Internal Aux Tank: INA
- External Fuel Tank: 3,490

Range (km):
- Max Load: 620
- With Aux Fuel: 1,000 km

Dimensions (m):
- Length (rotors turning): 41.7
- Length (fuselage): 33.2
- Width (including wing): 15.3
- Height: 9.9
- Main Rotor Diameter: 35.0
- Tail Rotor Diameter: 6.3

Cargo Compartment Dimensions (m):
- Floor Length: 12
- Width: 2.65
- Height: Variable from 2.0 to 2.5

Standard Payload:
- Internal: 12,000 kg with rolling takeoff
- External: 8,000 kg at hover
- Transports over 65 troops, or 41 litters, or 1x BRDM-2 scout car, or 1x BMD, or 1x GAZ truck, or 1x 7,500 liter POL truck or 12,000 liters in soft bladders.

Survivability/Countermeasures:
Main rotor blades electrically deiced.
Tail rotor blades have internal anti-icing fluid.

ARMAMENT

Some aircraft used for tactical missions have a 12.7 mm machinegun in the nose.

AVIONICS/SENSOR/OPTICS

Night/Weather Capabilities:
The avionics and navigational package, and a fully functioning autopilot allow for day/night all-weather operation.

VARIANTS

Mi-6A/-6T/HOOK A: Basic civil and military transport version.

Mi-6VKP/HOOK B: Airborne command post variant.

Mi-6VUS/HOOK C: Developed airborne command post. Also known as **Mi-22**.

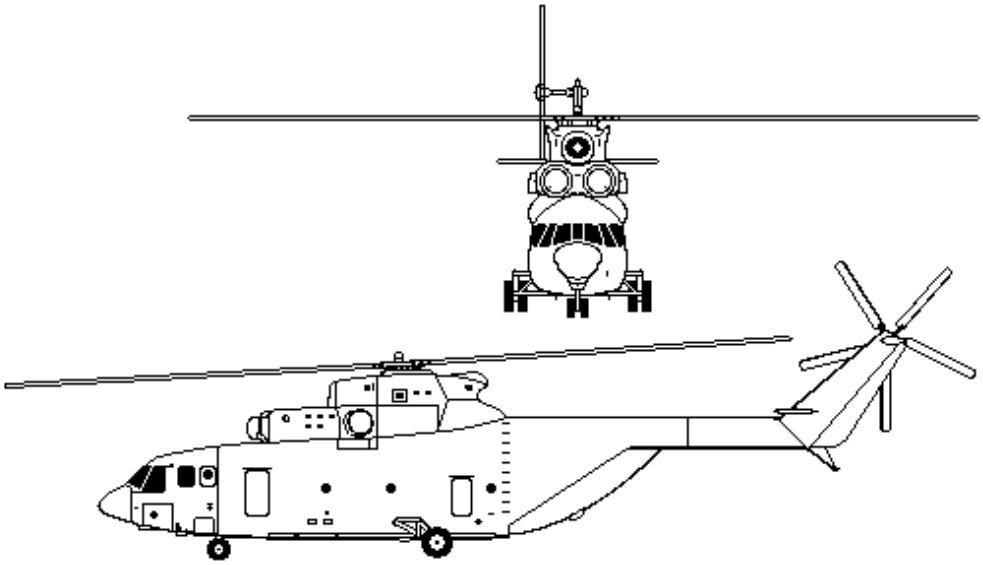
Mi-6AYaSh/HOOK D: Airborne command post with possible side-looking airborne radar fairing.

Mi-6S: Medevac variant.

Mi-6TZ: Tanker variant.

NOTES
Removable stub wings, when installed, are fixed at a 15 ^{o} incidence relative to the longitudinal axis. They provide 20% of the total lift in forward flight. Aircraft production ended in 1981. Aircraft has hydraulically actuated rear clamshell doors and ramp, provisions for internal cargo tie-down rings, an 800 kg capacity internal winch system in cargo compartment, floor capacity is 2,000 kg/m ^{2}, and a central hatch in the cabin floor for sling loads.

Russian Transport Helicopter Mi-26/HALO



SYSTEM

Alternative Designations: INA
Date of Introduction: 1983
Proliferation: At least 5 countries

Description:
Crew: 5 (2x pilots, 1x navigator, 1x flight engineer, 1x loadmaster)
Blades:
- Main rotor: 8
- Tail rotor: 5

Engines: 2x 11,400-shp Lotarev D-136 turboshaft
Weight (kg):
- Maximum Gross: 56,000
- Normal Takeoff: 49,500
- Empty: 28,240

Speed (km/h):
- Maximum (level): 295
- Cruise: 255

Ceiling (m):
- Service: 4,500
- Hover (out of ground effect): 1,800
- Hover (in ground effect): 4,500

Vertical Climb Rate: INA

Fuel (liters):
- Internal: 11,900

Range (km):
- Maximum Load: 800
- Normal Load: INA
- With Aux Fuel: 1200 km

Dimensions (m):
- Length (rotors turning): 40
- Length (fuselage): 33.5
- Width: 8.2
- Height: 8.1
- Main Rotor Diameter: 32
- Tail Rotor Diameter: 7.6

Cargo Compartment Dimensions (m):
- Floor Length: 12
- Width: 3.3
- Height: variable from 2.9 to 3.2

Standard Payload:
- Internal or external load: 20,000 kg
- Transports over 80 troops, 60 litters, or 2x BRDM-2 scout cars, or 2x BMDs, or 1x BMP or, 1x BTR-60/70/80 or, 1x MT-LB.

Survivability/Countermeasures:
Main and tail rotor blades electrically deiced.
Infrared signature suppressors on engines.
Infrared jammers and decoys; flares.
Self-sealing fuel tanks.

ARMAMENT

None

AVIONICS/SENSOR/OPTICS

Night/Weather Capabilities:
The avionics and navigational package, a Doppler weather radar, and a fully functioning autopilot allow for day/night all-weather operation.

VARIANTS

Mi-26MS: Medical evacuation version.

Mi-26T: Freight transport.

Mi-26TZ: Fuel tanker with an additional 14,040 liters of fuel in 4x internal tanks and 1,040 liters of lubricants, pumped through 4x 60-meter long refueling nozzles for refueling aircraft, and 10x 20-meter long hoses for refueling ground vehicles. Fuel transfer rate is 300 liters/minute for aviation fuel, and 75-150 liters/minute for diesel fuel. The refueling system can easily be removed to allow the aircraft to perform transport missions.

NOTES
The HALO A has no armament. The load and lift capabilities of the aircraft are comparable to the U.S. C-130 Hercules transport aircraft. The length of the landing gear struts can be hydraulically adjusted to facilitate loading through the rear doors. The tailskid is retractable to allow unrestricted approach to the rear clamshell doors and loading ramp. The cargo compartment has two electric winches (each with 2,500 kg capacity) on overhead rails can move loads along the length of the cabin. The cabin floor has rollers and tie-down rings throughout. The HALO has a closed-circuit television system to observe positioning over a sling load, and load operations. The Mi-26 is capable of single-engine flight in the event of loss of power by one engine (depending on aircraft mission weight) because of an engine load sharing system. If one engine fails, the other engine's output is automatically increased to allow continued flight.

Chapter 10
Fixed-Wing Aircraft

This chapter provides the basic characteristics of selected fixed-wing aircraft readily available to the OPFOR. Both FM 100-60, *Armor- and Mechanized-Based Opposing Force: Organization Guide*, and FM 100-63, *Infantry-Based Opposing Force: Organization Guide*, use descriptors to indicate aircraft capabilities. In each manual, a substitution matrix enables the trainer to structure OPFOR air support requirements as required by capability rather that specific type .

Fixed-Wing Aircraft, generally covers the systems that will affect the planning and actions of the tactical-level ground maneuver force, and aircraft commonly employed by the OPFOR when in close proximity to enemy ground forces. Therefore, fighters and long-range bombers are not addressed unless they are routinely employed in training scenarios. This chapter classifies aircraft as strike, ground-attack, multi-role, and transport aircraft. Multi-role aircraft are able to support missions across each of the categories. This chapter encompasses many aircraft which may have a dual civil/military application. It does not include, however, aircraft designed and used primarily for civil aviation.

This sampling of systems was selected because of wide proliferation across numerous countries or because of already extensive use in training scenarios. Additional data sheets addressing other widely proliferated aircraft will be sent with further supplements to this guide.

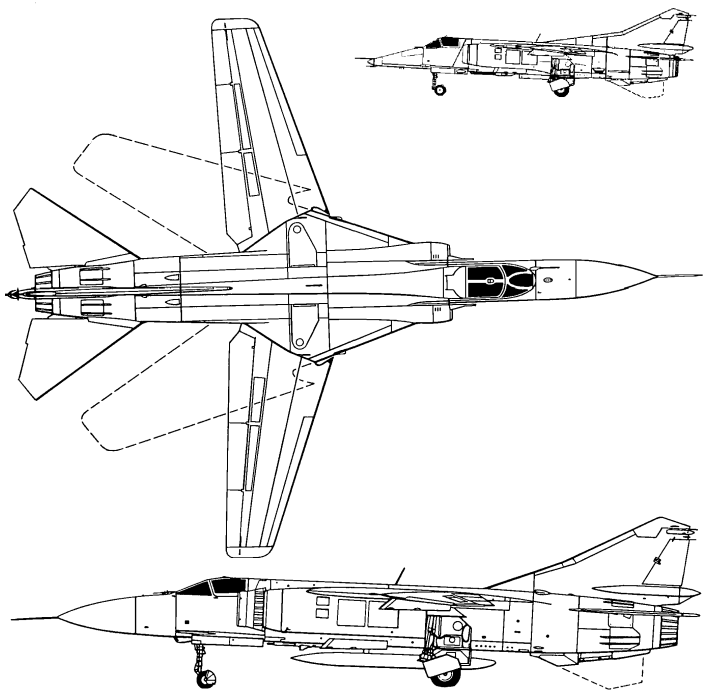
Because of the increasingly large numbers of variants of each aircraft, only the most common variants produced in significant numbers were addressed. If older versions of airplanes have been upgraded in significant quantities to the standards of newer variants, the older versions were not addressed.

The munitions available to each aircraft are mentioned, but not all may be employed at the same time. The weapon systems inherent to the airframe are listed under armament. The most probable weapon loading options are also given, but assigned mission dictates actual weapon configuration. Therefore, any combination of the available munitions may be encountered.

Questions and comments on data listed in this chapter should be addressed to:

CPT (P) Blake Burslie
DSN: 552-7922, Commercial (913) 684-7922
e-mail address: burslieb@leavenworth.army.mil

Russian Strike Aircraft MiG-23/FLOGGER



Weapon & Ammunition Types	Combat Load
23-mm Gsh-23L twin gun or 23-mm 6x barrel Gsh-6-23 gun	**200** **260**
Other Loading Options	
240-mm S-24 rockets (1 each) or 80-mm S-8 rocket pods (20 ea) or 57-mm S-5 rocket pods (32 ea)	**4**
AS-7/KERRY ASM or AS-10/KAREN ASM or AS-12/KEGLER ASM or AS-14/KEDGE ASM	**4**
2x AA-7 APEX or AA-8/APHID AAM launchers	**2**
Gun Pods	
External fuel tanks (liters)	**800**
50-kg, 100-kg, 250-kg, or 500-kg unguided and guided bombs	

SYSTEM

Alternative Designations: MiG-27, Bahadur, or Valiant (Indian variant)
Date of Introduction: 1972
Proliferation: At least 23 countries

Description: Variants in ( )
Crew: 1 (pilot)
Appearance:
- Wings: High-mount, variable, tapered
- Engines: One in fuselage
- Fuselage: Long and tubular, with box-like intakes and large, swept belly-fin
- Tail: Swept-back, tapered with angular tip, swept, tapered flats mounted on fuselage

Engines: 1x 28,660-shp Soyuz/Kachaturov R-35-300 (MiG-23)/ or 1x 25,335-shp R-29B-300 (MiG-27) turbojet with afterburner
Weight (kg):
- Max Gross: 17,800 (MiG-23)/ 20,700 (MiG-27)
- Normal Takeoff: 14,840 (MiG-23)/ 18,900 (MiG-27)
- Empty: 10,200 (MiG-23)/11,908 (MiG-27)

Speed (km/h):
- Max (at altitude): Mach 2.35 (MiG-23)/ Mach 1.7 (MiG-27)
- Max (sea level): Mach 1.2
- Takeoff/Landing Speed: 315/270

Max "G" Force (g): +8.5 g (MiG-23)/ +7.0 (MiG-27)
Ceiling (m):
- Service (clean): 18,600
- With External Stores: INA

Vertical Climb Rate (m/s): 240
Fuel (liters):
- Internal: 4,250 (MiG-23)/ 5,400 (MiG-27)
- External: Up to 5x 800 liter tanks

Range (km):
- Max Load: 1,500
- With Aux Fuel: 2,500
- Combat Radius: 1,150

Takeoff Run/Landing Roll (m):
- Prepared Surface: 500/750 (MiG-23)/ 950/1,300 (MiG-27)

Dimensions (m):
- Length: 16.8 (MiG-23/ 17.1 (MiG-27)
- Wingspan: 14.0 extended, 7.8 swept
- Height: 4.8 (MiG-23)/ 5.0 (MiG-27)

Standard Payload (kg):
- External: 3,000 (MiG-23)/ 4,000 (MiG-27)
- Hardpoints: 5 (MiG-23)/7 (MiG-27)

Survivability/Countermeasures:
Pressurized cockpit with zero/130 ejection seat, infrared and radar jammer, radar warning receiver, decoy, chaff and flares.
Armored cockpit on MiG-27

ARMAMENT
The MiG-23 has a twin gun, and the MiG-27 has a 6x barrel Gatling gun.

23-mm twin gun, Gsh-23L:
Range (m): (practical) 2,500
Elevation/Traverse: None (rigidly mounted)
Ammo Type: HEFI
Rate of Fire (rpm): 9,000

23-mm 6x barrel gun, Gsh-6-23:
Range (m): (practical) 2,500
Elevation/Traverse: None (rigidly mounted)
Ammo Type: HEFI
Rate of Fire (rpm): 9,000

AVIONICS/SENSOR/OPTICS
The MiG-23 has an acquisition and tracking radar, IR sensor, and Doppler nav system.
The MiG-23B and MiG-27 series have a flattened nose section which houses a laser rangefinder/designator, TV sighting system, and a target tracker instead of the radar to attack ground targets.

Night/Weather Capabilities:
The MiG-23 is capable of attacking air targets day or night. The MiG-27 is capable of attacking ground targets in day, night, and poor weather conditions.

VARIANTS

MiG-23M/-23MF/-23MS/FLOGGER B: Standard interceptor, and first production variant. Export version is **FLOGGER E**.

MiG-23U/-23UM/-23UB/FLOGGER C: A tandem seat combat and trainer variant.

MiG-23B/-23BN/-23BN/-23BK/FLOGGER F/and FLOGGER H: Export fighter/bomber variant with Gsh-23 twin barrel gun, and tapered nose. Evolved into MiG-27.

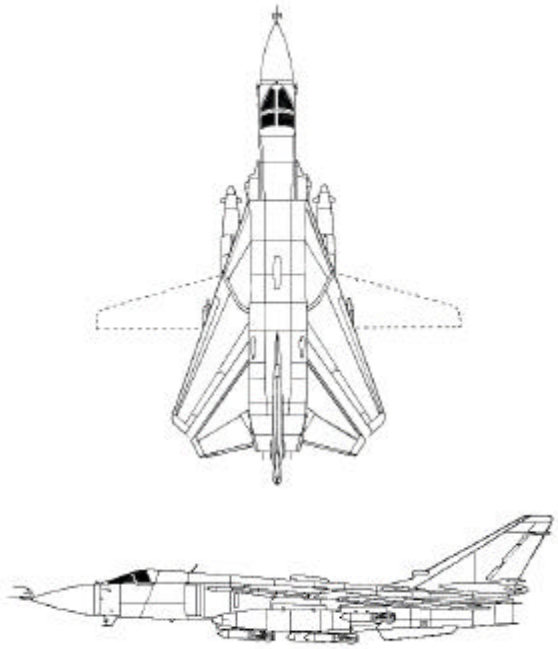
Russian Strike Aircraft MiG-23/FLOGGER continued

MiG-23ML/-23P/-23MLD/FLOGGER G and FLOGGER K: Primary production variant. Similar to FLOGGER B. **MiG-27K/FLOGGER D:** Ground-attack variant with internal 6x barrel 23-mm gun. Appearance differs by tapered nose. **MiG-27D/FLOGGER J:** Appearance differs by a long downward-sloping, pointed nose. Can be fitted with a three-camera recon pod. **MiG-27M/-27L:** Export versions built by Hindustan Aeronautics in India.		

NOTES

Inset line-drawing shows nose and intake differences of the MiG-27. This difference allows for a laser rangefinder/target designator. The sweep wing is capable of three angles: 16, 45, and 72 degrees. The ventral fin on the bottom rear of the fuselage folds for takeoff and landing. Up to five external fuel tanks can be carried on the MiG-23, and four on the MiG-27, but the MiG-27 can also be fitted for aerial refueling. Available munitions are shown above; not all may be employed at one time. Mission dictates weapons configuration. External stores are mounted on underwing and unde r-body hardpoints. Each wing has one point, two points are under the intakes along the fuselage, and the center fuselage attachment point gives five total stations. The MiG-27 then adds two more bomb racks under the wings for a total of seven stations.

Russian Strike Aircraft Su-24D/FENCER _____ ____



Weapon & Ammunition Types	Combat Load
23-mm 6x barrel Gsh-6-23 gun	**250**
Other Loading Options	
TN1000 or TN11200 nuclear weapons	
100-kg FAB-100 bombs	**38**
TV or laser-guided bombs	**4**
AS-7/KERRY ASM or AS-10/KAREN ASM or AS-11/KILTER ASM or AS-12/KEGLER ASM or AS-13/KINGBOLT ASM or AS-14/KEDGE ASM or AS-17/KRYPTON ASM	
Gun pods	**3**
AA-8/APHID AAM	**2**
External fuel tanks (liters)	**2,000 or 3,000**

SYSTEM

Alternative Designations: None
Date of Introduction: 1975
Proliferation: At least 11 countries

Description:
Crew: 2 (pilot, weapon systems operator)
Appearance:
- Wings: High-mount, variable, tapered back
- Engines: Both along body, under wings

Engines: 2x 17,200-shp Lyluka AL-21F-3A turbojet (24,700-shp with afterburner)
Weight (kg):
- Maximum Gross: 39,700
- Normal Takeoff: 35,910
- Empty: 22,320

Speed (km/h):
- Maximum (at altitude): 2,320
- Maximum (sea level): 1,530
- Maximum Attack Speed: 1,200
- Cruise: INA
- Takeoff/Landing Speed: INA

Max "G" Force (g): +6.5 g
Ceiling (m):
- Service (clean): 17,500
- With External Stores: INA
- Vertical Climb Rate (m/s): 150

Fuel (liters):
- Internal: 11,760
- External: 8,000

Range (km):
- Maximum Load: 940
- With Aux Fuel: 1,230
- Combat Radius: 950

Takeoff Run/Landing Roll (m):
- Prepared Surface: 1,100-1,200/950

Dimensions (m):
- Length: 24.6
- Wingspan: 17.6 extended, 10.4 swept
- Height (gear extended): 6.2

Standard Payload (kg):
- External: 8,000
- Hardpoints: 9 underwing

Survivability/Countermeasures:
Pressurized cockpit with zero/zero ejection seats, infrared and radar jammer, radar and missile warning receivers, chaff and flares.

ARMAMENT
23-mm 6x barrel gun, Gsh-6-23:
Range (m): (practical) 2,500
Elevation/Traverse: None (rigidly mounted)
Ammo Type: HEFI
Rate of Fire (rpm): 9,000

AVIONICS/SENSOR/OPTICS
The Su-24 has integrated navigation and fire control radars, pulse-doppler terrain following radar coupled to autopilot, laser/TV targeting and weapon guidance system, and laser rangefinder/ designator.

Night/Weather Capabilities:
The Su-24 is capable of attacking ground and surface targets in day, night, and poor weather conditions.

VARIANTS

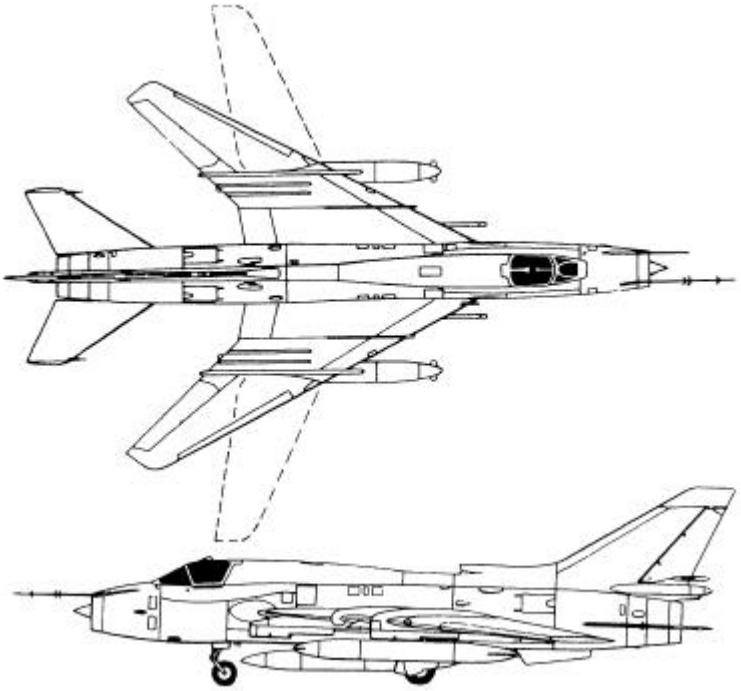
Su-24M/-24MK/FENCER D: Attack version, and export model.

Su-24MR/FENCER E: Maritime reconnaissance version with a side-looking radar, TV camera, infrared scanner, and conventional cameras, ECM suite, or ELINT pods. It has datalink to ground, and no gun.

Su-24MP/FENCER F: Another recon and electronic warfare variant.

NOTES
This aircraft was the first developed specifically as a bomber for the ground-attack role. It has a variable swept-wing, that can be set at 16, 45, or 69 degrees. Some aircraft are capable of aerial refueling, and all can carry up to three external fuel tanks for extended range. There is no internal weapons bay. Available munitions are shown above; not all may be employed at one time. Mission dictates weapons configuration. External stores are mounted on underwing hardpoints. Each wing has four points, and the center fuselage attachment point gives nine total stations.

Russian Ground-Attack Aircraft Su-17/FITTER



Weapon & Ammunition Types	Combat Load
2x 30-mm NR-30 guns	**160**
Other Loading Options	
325-mm S-25 rockets (1 each) or 80-mm S-8 rocket pods (20 each) or 57-mm S-5 rocket pods (32 each)	
AS-7/KERRY ASM or AS-9/KYLE ASM or AS-10/KAREN ASM or AS-12/KEGLER ASM or AS-14/KEDGE ASM	
AA-2 ATOLL AAM or AA-8/APHID AAM or AA-11/ARCHER AAM launchers	
23-mm SPPU-22 Gun Pods	
External fuel tanks (liters)	**800**
100-kg, 250-kg, and 500-kg unguided and guided bombs	

SYSTEM

Alternative Designations: Su-20, Su-22, Strizh or Martlet
Date of Introduction: 1970
Proliferation: At least 19 countries

Description: Variants in ( )
Crew: 1 (pilot)
Appearance:
- Wings: Low-mount, variable, swept and tapered with blunt tips
- Engines: One in fuselage, intake in nose
- Fuselage: Tubular with blunt nose
- Tail: Swept-back and tapered, flats mounted on fuselage and swept-back

Engines: 1x 28,660-shp Lyulka AL-21F-3 (Su-17/20)/ or 1x 25,335-shp Tumansky R-29BS-300 (Su-22) turbojet with afterburner
Weight (kg):
- Max Gross: 17,700 (M2)/19,500 (M4)
- Normal Takeoff: 14,000 (M2) /16,400 (M4)
- Empty: 10,000

Speed (km/h):
- Max (at altitude): Mach 2.1
- Max (sea level): Mach 1.1
- Takeoff/Landing Speed: 265
- Max "G" Force (g): +7.0

Ceiling (m):
- Service (clean): 18,000/15,200 (M4)
- With External Stores: INA

Vertical Climb Rate (m/s): 230

Fuel (liters):
- Internal: 4,550
- External: Up to 4x 800 liter tanks

Range (km):
- Max Load: 1,500
- With Aux Fuel: INA
- Combat Radius: 330 to 685

Takeoff Run/Landing Roll (m):
- Prepared Surface: 900/950

Dimensions (m):
- Length: 18.8
- Wingspan: 13.8 extended, 10.6 swept
- Height: 4.8

Standard Payload (kg):
- External: 4,000/4,250 (M4)
- Hardpoints: 8

Survivability/Countermeasures:
Radar warning receiver, decoys, chaff and flares.
Armored cockpit on M3 and M4

ARMAMENT
The Su-17 has a 30-mm machinegun with 80 rounds, mounted in each wing.

30-mm machinegun, NR-30:
Range (m): (practical) 2,500
Elevation/Traverse: None (rigidly mounted)
Ammo Type: HEFI, APT, CC
Rate of Fire (rpm): 850

AVIONICS/SENSOR/OPTICS
The early variants of the Su-17 feature relatively simple avionics and targeting packages.
Newer variants, and upgraded aircraft can have better avionics, flight controls, targeting and fire control systems, attack computers, liquid-crystal displays, HUD, pulse-Doppler radar, laser designators, GPS, and self-defense packages with FLIR or TV packages provided by several western firms, and are modified to fire western armaments.

Night/Weather Capabilities:
The earlier models of the Su-17 are primarily daytime aircraft only.
Some newer versions have upgraded night and weather capabilities based on upgraded avionics and sensor packages, and are day, night, and all weather capable.

VARIANTS
This aircraft was derived from the **Su-7 FITTER A** by incorporating variable wings.
Many variants are in use, however, the M3 and M4 are the most proliferated versions.
Domestic aircraft use the nomenclature **Su-17**, export versions use **Su-20** and **Su-22**.

Su-17/-17MK/-20/FITTER C: First production version. Export called **Su-20**.

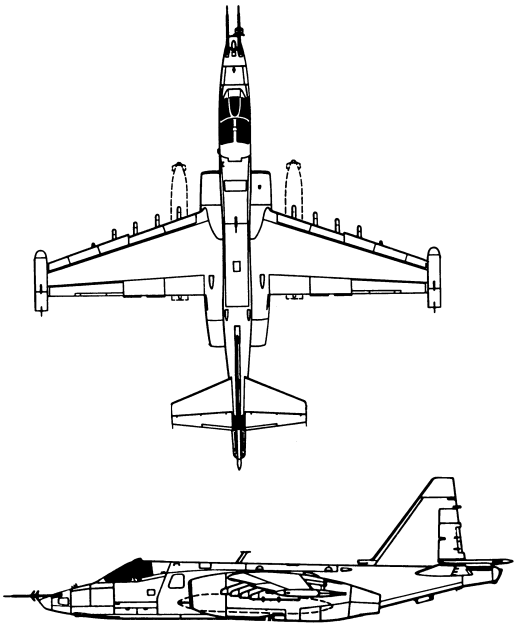
Su-17M/-17M2/-17M2D FITTER D: External Doppler-nav and internal laser rangefinder. Reconnaissance version called **Su-17R**.

Russian Ground-Attack Aircraft Su-17/FITTER continued

Su-17UM/-22U/FITTER E: Two-seat trainer with components of Su-17M. **Su-17/FITTER G:** Combat-ready two-seat trainer variant of FITTER H. Export version is **Su-22**, with Tumansky engine. **Su-17/-17M3/FITTER H:** Increased pilot visibility by drooping the aircraft nose, and incorporated an internal Doppler-nav and laser rangefinder. Reconnaissance version called **Su-17M3R**. **Su-17M4/-22M4/FITTER K:** Fighter-bomber. Essentially same as above, but with an additional air intake. Employs digital navigation and attack avionics. **Su-22/FITTER F:** Export version of FITTER D with Tumansky engine. **Su-22/-22M3/FITTER J:** Similar to FITTER H, but with increased internal fuel capacity.		

NOTES
The mid-wing pivot point of the sweep wings allows for positions of either 28, 45 or 62 degrees. Up to four external fuel tanks can be carried on wing pylons and under the fuselage. When under-fuselage tanks are carried, only the two inboard wing pylons may be used for ordnance. Available mun i-tions are shown above; not all may be employed at one time. Mission dictates weapons configuration. External stores are mounted on underwing and underbody hardpoints. Each wing has two points, and the fuselage has four attachment points for a total of eight stations. Gun pods can be mounted to fire rearward.

Georgian/Russian Ground-Attack Aircraft Su-25/FROGFOOT



Weapon & Ammunition Types	Combat Load
30-mm twin barrel Gsh-30-2 gun	**250**
Other Loading Options	
AT-16 VIKhR ATGM (8 each)	**16**
23- or 30-mm GSH gun pods	**260 ea**
57-mm S-5 rocket pod (32 ea) or 80-mm S-8 rocket pod (20 ea)	**8** **8**
AS-7/KERRY ASM or AS-10/KAREN ASM or AS-14/KEDGE ASM or AS-11/KILTER ASM or AS-17/KRYPTON ASM	**8**
AA-8/APHID or AA-10/ALAMO	**2**
50-kg to 500-kg bombs	**4,000 kg**
External fuel tanks (liters)	**800/1,150**

SYSTEM

Alternative Designations: Gratch, Rook
Date of Introduction: 1980
Proliferation: At least 15 countries

Description:
Crew: 1 (pilot)
Appearance:
- Wings: High-mount, tapered back
- Engines: Both along body, under wings

Engines: 2x 4,000-shp Ryzhov (Soyuz/Tumansky) R195 Turbojet
Weight (kg):
- Maximum Gross: 17,600
- Normal Takeoff: 14,500
- Empty: 9,525

Speed (km/h):
- Maximum (at altitude): 880
- Maximum (sea level): 950
- Maximum Attack Speed: 690
- Cruise: 700
- Takeoff/Landing Speed: 220

Max "G" Force (g): +6.5 g
Ceiling (m):
- Service (clean): 7,000
- With External Stores: 5,000

Vertical Climb Rate (m/s): 72
Fuel (liters):
- Internal: 3,660
- External: 3,762

Range (km):
- Maximum Load: 500
- With Aux Fuel (2 tanks): 640
- Combat Radius: 556

Takeoff Run/LandingRoll (m):
- Prepared Surface: 550/600
- Unprepared Surface: 650/750
- Max Load: 1,200

Dimensions (m):
- Length: 15.5
- Wingspan: 14.5
- Height (gear extended): 4.8

Standard Payload (kg):
- External: 4,400 or 6,400 (Su-25T)
- Hardpoints: 10 underwing, w/500 kg ea

Survivability/Countermeasures:
Armored cockpit and engines, zero/100 km/hr ejection seat, self-sealing fuel tanks, and strengthened flight control linkages.
IFF, infrared jammer, radar warning r e-ceiver, chaff and flares.

ARMAMENT
30-mm 2x barrel gun, Gsh-30-2:
Range (m): (practical) 4,000
Elevation/Traverse: None (rigid mount)
Ammo Type: AP, HE, CC
Rate of Fire: Burst 50

AVIONICS/SENSOR/OPTICS
The targeting system incorporates a LLLTV, int e-grated navigation and aiming system, active bomb sight, and laser rangefinder/ designator. The aircraft uses an INS, GPS, and Doppler navigation.

Night/Weather Capabilities:
The Su-25 is fully capable of performing its direct air support mission in day, night, and poor weather conditions.

VARIANTS
Early Su-25s had 2x Soyuz/ Gavrilov R95SH engines. Most now upgraded.

Su-25A/-25K: Initial variant, and export.

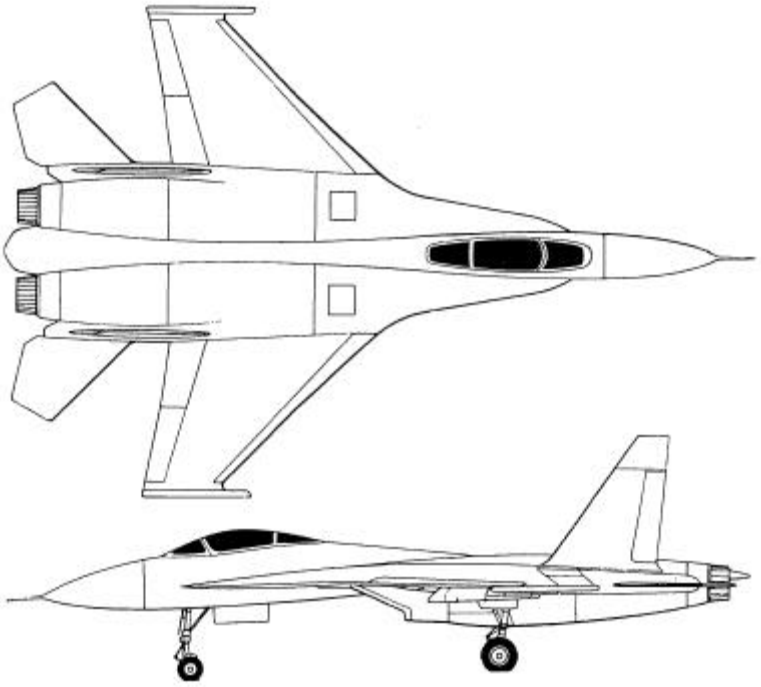
Su-25B/-25UB/-25UBK/-UBP: A two-seat combat aircraft, naval version, and trainer.

Su-25T/-25TM/-25TK: Developed from the Su-25UB. Height changed to 5.2 m to hold avionics and extra fuel. All with R195 engine for increased range, ceiling, and load. Other characteristics generally similar. Upgraded targeting, acquis i-tion, and countermeasures.

Su-39: Export variant of Su-25T.

NOTES
Available munitions are shown above; not all may be employed at one time. Mission dictates weapons configuration. External stores are mounted on underwing hardpoints. Each wing has five points for a total of ten stations. A representative mix when targeting armor formations would be 16x AT-16 ATGMs, two rocket pods, two 23-mm gun pods, 250x 30-mm rounds, and two AA-8s. The titanium cockpit is invulnerable to 20-mm cannon fire, and 30-mm fire from oblique angles. The aircraft can carry a self-contained maintenance kit in 4 underwing pods. Also the engines can operate on any type of fuel likely to be found in the forward-operating areas, including diesel and gasoline. This allows the crew to operate from unprepared airfields for extended periods of time.

Russian Multi-role Aircraft Su-27/FLANKER



Weapon & Ammunition Types	Combat Load
30-mm Gsh-30-1 cannon	**150**
Other Loading Options	
420-mm S-25 rockets (1 each) or	**4**
122-mm S-13 rocket pods (5 each) or	**4**
80-mm S-8 rocket pods (20 each)	**4**
AS-10/KAREN ASM or AS-7/KERRY ASM or AS-12/KEGLER ASM or	**8**
AS-14/KEDGE ASM or AS-17/KRYPTON ASM or	**6**
AS-18/KAZOO ASM	**2**
AA-10/ALAMO AAM or AA-8/APHID AAM or AA-9/AMOS AAM or AA-11/ARCHER AAM or AA-12 ADDER AAMs	**10**
Gun Pods	
250-kg, or 500-kg unguided and guided bombs	**4,000 kg**

SYSTEM

Alternative Designations: Su-35, J-11
Date of Introduction: 1986
Proliferation: At least 5 countries

Description: Variants in ( )
Crew: 1 (pilot)
Appearance:
- Wings: Mid-mount, swept, square tips
- Engines: Two in fuselage, with square u n-derwing intakes
- Fuselage: Pointed nose, rectangular from intakes to tail
- Tail: Twin tapered, swept fins, with mid-mount, tapered, swept flats

Engines: 2x 27,557-shp Lyluka AL-31F turbojet with afterburner
Weight (kg):
- Max Gross: 28,300/33,000 (SM)
- Normal Takeoff: 23,000/23,700 (SM)
- Empty: 17,690

Speed (km/h):
- Max (at altitude): Mach 2.35
- Max (sea level): Mach 1.1
- Takeoff/Landing Speed: 250/231

Max "G" Force (g): Control limited to +9.0 g
Ceiling (m):
- Service (clean): 18,000
- With External Stores: INA

Vertical Climb Rate (m/s): 305
Fuel (liters):
- Internal: 6,600/11,775 (SM)
- External: no provision

Range (km):
- Max Load: 3,790
- With Aux Fuel: 4,390 (SM)
- Combat Radius: 1,500

Takeoff Run/Landing Roll (m):
- Prepared Surface: 500 to 650/600 to 720 (variant dependent)/ 1,200/1,200 (Su-35)

Dimensions (m):
- Length: 21.9
- Wingspan: 14.7
- Height: 5.5

Standard Payload (kg):
- External: 6,000
- Hardpoints: 10

Survivability/Countermeasures:
Zero/zero ejection seat, infrared and radar jammer, radar and missile warning receivers, chaff and flares.

ARMAMENT
The Su-27 has a 30-mm gun mounted in the right wing, and the primary missile for air defense missions is the AA-10 ALAMO.

30-mm gun, Gsh-30-1:
Range (m): (practical) 4,000
Elevation/Traverse: None (rigidly mounted)
Ammo Type: HEFI, APT, CC
Rate of Fire (rpm): 1,500

AVIONICS/SENSOR/OPTICS
The Su-27 employs a pulse-Doppler look-down/ shoot-down radar with a search range of 240 km and a track range of 185 km. It has multi-targeting capability, but cannot guide two missiles to separate targets
It also has an IR sensor, and laser designator, HUD, helmet-mounted target-designating sight, and computerized fire control sy s-tem.

Night/Weather Capabilities:
The Su-27 is capable of attacking air targets under day, night, or all-weather conditions.
It has a beyond visual range look-down/ shoot-down capability.

VARIANTS

Su-27/-27SK/-27P/FLANKER B: Basic production version and export variant.

Su-27B/-27UB/-30/FLANKER C: Two-seat model used as command aircraft, combat trainer and interceptor. Also called **Su-30**.

Su-27K/FLANKER D: Naval variant, readily noticeable by canards forward of the wings.

Su-27IB/-34/FLANKER E: Naval variant, with side-by-side cockpit, folding wing and tail. Also called **Su-34**.

Su-27SM/-27SMK: Multi-role version. Has 12 hardpoints, greater internal fuel and payload capacity, and air refuel capability.

Su-27M/-35/FLANKER: Revised with more powerful 28,218-shp Lyluka AL-31SM engines with thrust-vectoring nozzles allowing a higher gross weight and greater range. Also fitted with better radar and targeting systems to allow multiple engagements. Dimensions increased slightly, rea d-ily noticeable by canards forward of the wings. Also called **Su-35**.

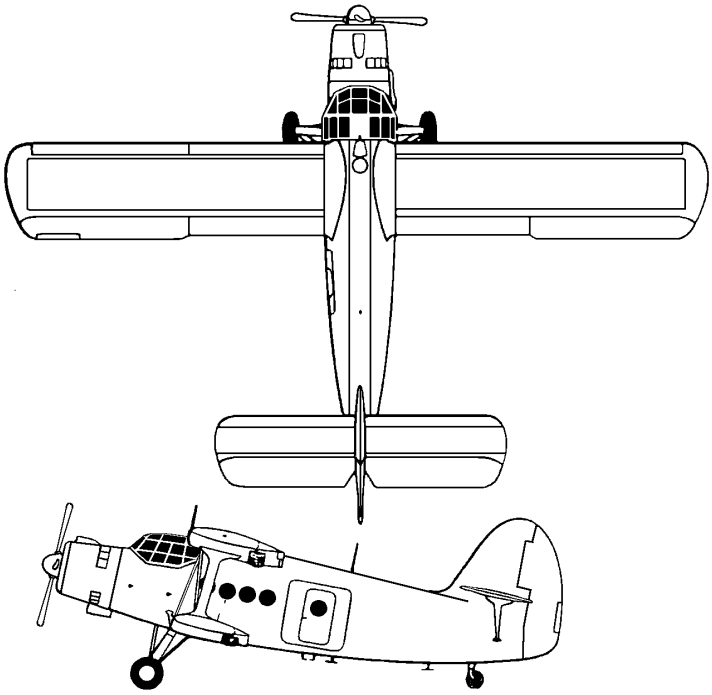
J-11: Single-seat Chinese built variant based on FLANKER B. **JJ-11:** Two-seat Chinese built variant based on FLANKER C.

Russian Multi-role Aircraft Su-27/FLANKER continued _____

NOTES

The Su-27 is primarily an all-weather interceptor/fighter aircraft used for air defense. It is also capable of performing ground attack missions. It is highly maneuverable because of a fly-by-wire control system which automatically restricts aircraft angles of attack and maximum G-loads during flight. External fuel tanks can be carried on some variants, and some are fitted for aerial refueling, but these are generally naval versions rather than air defense or strike versions. Available munitions are shown above; not all may be employed at one time. Mission dictates weapons configuration. External stores are mounted on underwing and underbody hardpoints. Each wing has two points, and an additional rail on the wingtip. Two points are under the intakes along the fuselage, and two are centrally located underneath the fuselage near the centerline and between the intakes for a total of ten stations.

Russian Transport Aircraft An-2/COLT



SYSTEM

Alternative Designations: INA
Date of Introduction: 1948
Proliferation: At least 32 countries

Description:
Crew: 2 (pilots)
Appearance:
- Wings: Biplane and rectangular-shaped with curved tips, one high-mount and one low mount (shorter), braced by struts
- Engines: One mounted in nose
- Fuselage: Short, thick, with blunt nose
- Tail: Tapered with round tip, rectangular, low-mounted flats

Engines: 1x 1,000-shp Shevetsov Ash-62 or PZL Kalisz Ash-621R 9-cylinder radial piston driving a four-bladed, variable-pitch propeller.
Weight (kg):
- Max Gross: 5,500
- Normal Takeoff: INA
- Empty: 3,450

Speed (km/h):
- Max: 258
- Min: 90
- Cruise: 185
- Takeoff/Landing Speed: 85

Max "G" Force (g): -1.0 to +3.7
Ceiling (m):
- Service (clean): 4,400

Vertical Climb Rate (m/s): 3.0

Fuel (liters):
- Internal: 1,200
- External: None

Range (km):
- Max Load: 900

Takeoff Run/Landing Roll (m):
- Prepared Surface: 150/170
- Unprepared Surface: 200/185
- Max Load: INA

Dimensions (m):
- Length: 12.7
- Wingspan: 18.2
- Height: 4.0

Cabin Dimensions (m):
- Floor Length: 4.1
- Width: 1.6
- Height: 1.8

Standard Payload (kg):
- Internal: 1,500
- Transports 12 troops or paratroops, or 6 litters.

Survivability/Countermeasures:
None

ARMAMENT
Some early prototypes experimented with single 12.7-mm or 23-mm machineguns, and u n-guided aerial rockets. None produced.

AVIONICS/SENSOR/OPTICS
Flight avionics only.

Night/Weather Capabilities:
The An-2 is capable of flight under day and instrument meteorological conditions.

VARIANTS

This aircraft was originally built in Russia. Now it is produced in China and Poland.

An-2D/-2TD: Specially modified for par a-chute training and special operations.

An-2P/-2T/-2TP: Passenger and general transport variants.

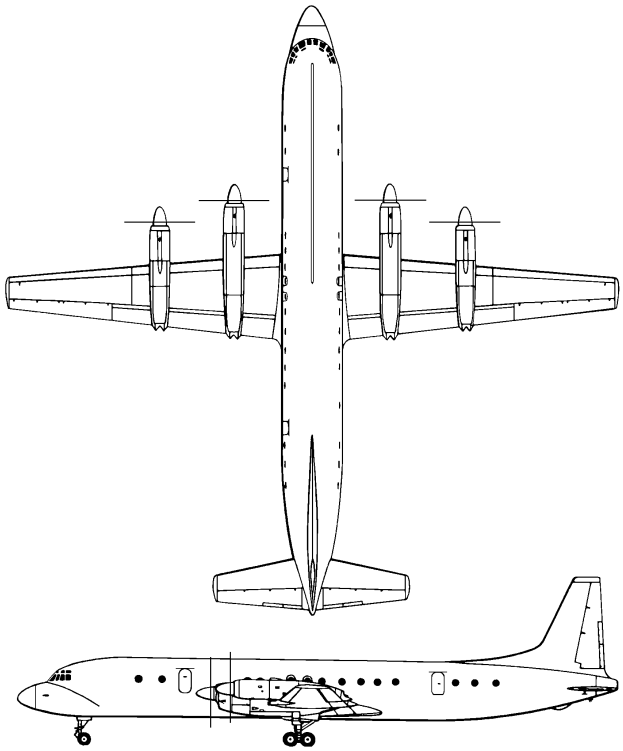
An-2V/-2M/-4: Seaplane variant with floats in place of main landing gear.

An-3: This variant employs an upgraded 1,450-shp Glushenkov TVD-20 turboprop engine, and a larger three-bladed propeller. This allows for an increased takeoff weight of 5,800 kg.

Y-5/C-5: Chinese-built version, and Chinese export nomenclature.

NOTES
The wings and elevators are fabric-covered, while the fuselage is metal. This aircraft can operate from unimproved airfields, and is noted for short takeoff and landing capabilities, and ruggedness. Its low acoustic signature and slower speeds allow for stealthy operation. Cabin contains tip-up seats which can be easily folded to allow space for cargo. Skis or pontoons can be employed on the main landing gear struts.

Russian Transport Aircraft IL-18/COOT



SYSTEM

Alternative Designations: Il-20, Il-22
Date of Introduction: 1959
Proliferation: At least 5 countries

Description:
Crew: 5 (2x pilots, 1x navigator, 1x radio operator, 1x flight engineer)
Appearance:
- Wings: Low-mounted and tapered with blunt tips
- Engines: Four mounted on wings and extending forward
- Fuselage: Round, cigar-shaped, tapered at rear with rounded nose
- Tail: Tapered with square tip, fuselage-mounted, tapered flats

Engines: 4x 4,250-shp Ivchenko AI-20M turboprop driving 4x four-bladed, reversible-pitch propellers.
Weight (kg):
- Max Gross: 64,000 (D)/61,200 (E)
- Empty: 35,000 (D)/34,610 (E)

Speed (km/h):
- Max: 675
- Min: INA
- Cruise: 625
- Takeoff/Landing Speed: INA

Max "G" Force (g): INA
Ceiling (m):
- Service (clean): 10,000
- Operating Altitude: 8,000-10,000

Vertical Climb Rate (m/s): INA

Fuel (liters):
- Internal: 30,000 (D)/23,700 (E)
- External: None

Range (km):
- Max Load: 4,000 (D)/3,200(E)
- Normal Load: 6,500 (D)/5,200 (E)

Takeoff Run/Landing Roll (m):
- Prepared Surface: 1,300 (D)/850
- Unprepared Surface: INA

Dimensions (m):
- Length: 35.9
- Wingspan: 37.4
- Height: 10.2

Cabin Dimensions (m):
- Floor Length: 24.0
- Width: 3.2
- Height: 2.0

Standard Payload (kg):
- Internal: 13,500
- Transports 122 troops or 20 ELINT operators.

Survivability/Countermeasures:
None

ARMAMENT
None

AVIONICS/SENSOR/OPTICS
Flight avionics only.

Night/Weather Capabilities:
The aircraft is capable of flight under day, and instrument meteorological conditions.

VARIANTS

This aircraft was originally designed as a civilian transport aircraft, but has been adapted for military uses.

Il-18D: Has a center fuel tank for longer flight duration and extended range.

Il-18E: Variant without center fuel tank.

Il-20/COOT A: Unarmed strategic electronic intelligence/ reconnaissance and surveillance aircraft. The airframe is essentially the same as the Il-18D, but a cylinder containing a possible side-looking airborne radar is mounted under the fuselage forward of the wing. Smaller containers on the forward sides of the fuselage house possible cameras and sensors. Many small antennas are located under the fuselage.

Il-22/COOT B: An airborne command post variant of the Il-18D airframe.

Chapter 11
Command and Communications Systems

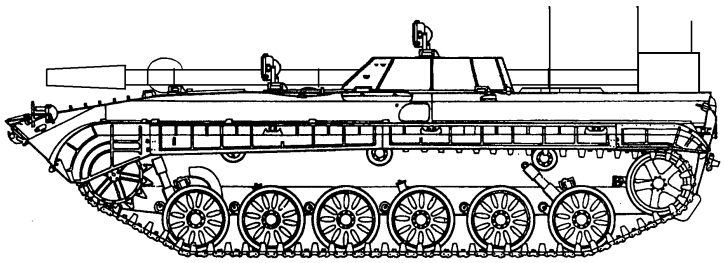
Command systems in the WEG will initially be limited to command vehicles, such as the listed BMP-1KSh.

This chapter provides basic characteristics of selected tactical communications systems either in use or readily available to the OPFOR. This selection of radios is not intended to be complete; rather, it is representative of the types and capabilities that are currently fielded or available. Radio tables are divided into two sections, single channel and frequency hopping systems. Later updates of this chapter will include information on additional categories of communications systems.

Radio data was provided by Mr. Eric L. Berry, e-mail: berrye@leav-emh1.army. mil. Questions and comments on data listed in this chapter should be addressed to:

Mr. Thomas W. Redman
DSN: 552-7925 Commercial (913) 684-7925
e-mail address: redmant@leav-emh1.army.mil

Russian Command and Staff Vehicle BMP-1KSh



Weapons & Ammunition Types	Typical Combat Load
Stowed 7.62-mm MG	**2,000**

SYSTEM
Alternative Designations: BMP M1978
Date of Introduction: 1976
Proliferation: At least 3 countries
Description:
Crew: 3
Troop Capacity: N/A
Combat Weight (mt): 13.0
Chassis Length Overall (m): 6.74
Height Overall (m): 2.07
Width Overall (m): 2.94
Ground Pressure (kg/cm^2): 0.57

Automotive Performance:
Engine Type: 300-hp Diesel
Cruising Range (km): 550
Speed (km/h):
- Max Road: 65
- Max Off-Road: 40-45
- Average Cross-Country: INA
- Max Swim: 7

Fording Depth (m): Amphibious

Radio: R-130 HF, R-107, R-111 VHF, R-123/173 VHF

Protection:
Armor, Turret Front (mm): 19-23
Applique Armor (mm): N/A
Explosive Reactive Armor (mm): Available
Active Protective System: N/A
Mineclearing Equipment: N/A
Self-Entrenching Blade: N/A
NBC Protection System: Collective
Smoke Equipment: VEESS

ARMAMENT
Main Armament:
Caliber, Type, Name: 7.62-mm (7.62x 54R) MG, PKM , stowed
Rate of Fire (rd/min): 250 practical / 650 cyclic, 2-10 round bursts
Loader Type: Belt-feed (100-rd belts)
Ready/Stowed Rounds: INA
Elevation (°): INA
Fire on Move: No

ATGM Launcher: N/A

Firing Ports: None

SIGHTS
Type: INA
Sighting range (m): 1,500
Magnification: INA
Night Sights Available: Yes

VARIANTS
BMP-1KShM: Variant has upgraded radios.

MP-31/1V31 and **9S743** use different radio configurations.

MAIN ARMAMENT AMMUNITION
Caliber, Type, Name:
7.62-mm API, API-T
- Maximum Aimed Range (m): 1,500
- Max Effective Range (m):
  - Day: 1,000/400-500 on the move
  - Night: INA
  - Tactical AA Range: INA
- Armor Penetration (mm): 8 (RHA) at 500 m

Other Ammunition Types: Light Ball/Ball-T, Heavy Ball

NOTES
For stationary long-range transmissions, HAWK EYE 10-meter folding antenna is removed from carrying case on right side of vehicle and inserted into antenna base, which extends forward from the turret. The trunnions and motor from the base vehicle (BMP-1) gun are used to operate the antenna base. The antenna can then be elevated mechanically to a vertical position.

Other Electronics: R-102 automatic calling device, 1T-219M secure speech device, TNA-1inertial navigation, 1G11N gyrocompass. On the hull rear is a generator to operate the radios.

Options are spall liners, air conditioning, and a more powerful engine. A French SNPE explosive reactive armor (ERA) kit and others are available for use. Additional armor application may jeopardize amphibious capability.

Tactical Single Channel Radios

Radio	Country of Origin	Description	Frequency Range (MHz)	Channel Spacing (KHz)	Number of Channels	Range (km)	Power Output
PRC-105/A	Iran	Man-portable VHF radio	36-76	25	1,600		0.6/2.5/5 W
PRC-110	Iran	Man-portable HF radio with 10 pre-set channels	1.6-29.999	100	284,000		5/20 W
PRC-1077	USA	Man-portable VHF radio. PRC 1077/GRC-160 (low power) and PRC 1077/VRC-46 (high power) vehicular models.	30-88	25	2,320		Man-portable: 100m/2/5 W Vehicular: 100m/2/5/50 W
PRC/ VRC-4600	Turkey	Modular family of VHF/FM radios Embedded encryption	30-76	25 or 50	920 or 1,840	40 w/30W variant	2.5 W manpack PRC-4620 2.5/10/30 W vehicular VRC-4622 2.5 W tank set VRC-4621 (w/companion 12.5/10/30 W VRC-4623)
R-107	FSU	Provides tactical, manportable FM HF/VHF voice communications	20-52	25	1,281	6 w/1.5-m whip, 15 w/2.7-m rod or 40-m wire, 25 w/raised long wire	1 W
R-123M	FSU	Vehicle-mounted tactical FM HF/VHF communications	20-51.5	25	1,261	20 w/4-m whip (moving) 50 w/10-m telescoping mast	20 W
R-130	FSU	Vehicle-mounted AM HF voice and CW communications	1.5-10.99 transmit 1.0-10.99 receive	10	950	50 w/4-m whip, 75 w/10-m whip or sloping wire, 350 w/symmetrical dipole	10-40 W
R-148	FSU	Lightweight FM VHF manportable transceiver.	37.0-51.95	50	300	5 w/1.5-m whip	1.1-2.1 W
R-171M	FSU	Vehicle-mounted FM VHF communications. Capable of 16 kbits/s data transmission.	30.0-75.999	INA		35-80 claimed	100 W
R-173	FSU	Tactical FM VHF communications	30-76	1		20 w/3-m whip	30 W

Tactical Single Channel Radios (continued)

Radio	Country of Origin	Description	Frequency Range (MHz)	Channel Spacing (KHz)	Number of Channels	Range (km)	Power Output
RU-3	FRY	Man-portable VHF radio. Digital data up to 2.4 kbit/s, digital voice up to 16 kbit/s. 40 preset channels.	30-79.975	25	2,000	7	0.3/3 W
SFH-41	Sweden	Chameleon tactical hand-held single-channel and FH radio. Receives single-or FH signals and automatically selects FH reply. 12.5,25, or 50 hps.	148-174	25 or 30	INA	INA	2/5 W
TRC350	France	Man-portable HF/SSB radio. Encryption capability. Vehicular-model TRC331, 20 W.	1.5-30	100	285,000	INA	2 W reduced power 10 W average in data mode 15 W morse, 20 W SSB voice
Type 889	China	Tactical FM VHF voice comms. Capable of 16 kbits/s data transmission in wideband mode and connected to a digital terminal set.	20.0-49.975	25 or 50	1,200 or 600	30 w/2.85-m (probable) whip, narrow band, and high-power mode	3 or 20 W
VRC-90	China	Vehicular VHF/FM radio. 16 kbit/s data capability.	30-87.975	25	2,320		0.2/3.5/50 W
XV3088	Germany	Man-portable VHF pouch radio. 9 pre-set channels. Maybe vehicular-mounted. 2.4 kbit/s data transmission.	30-87.975	25	2,320	500 meter remote.	0.2/5 W 25/50 W with power amp.

Tactical Frequency Hopping Radios

Radio	Country of Origin	Spread Spectrum Radio Description	Frequency Range (MHz)	Channel Spacing (KHz)	Number of Channels	Power Output
ACV46	South Africa	Vehicular VHF FH. 99 preset channels, embedded encryption. Remote operation by wire up to 2 km	30-87.975	25	INA	INA
ACM48	South Africa	Man-portable VHF radio. Embedded encryption, data.	30-87.975	12.5 or 25	INA	0.4/4 W
ART 2000	Iran	Man-portable or vehicular VHF FH radio with 100+ hps. May be remoted up to 3 km.	30-88	25	2,320	0.1/3 W
JAGUAR-U	United Kingdom	Tactical UHF FH radio, with man-portable, airborne, and mobile/ground station capabilities. Embedded encryption in FH mode.	225-400	25	7,000	Man-portable: 10mW/4W. Airborne: 10mW/4W/15W. Mobile: 10mW/4W/50W.
JAGUAR-V	United Kingdom	Man-portable or vehicle-mounted VHF frequency hopping combat net radio, 100 hps. Compatible w/ conventional 25/50 KHz channel-spaced radios. Operates in nine 6.4 MHz sub-bands or full-band 58 MHz. May be remote -operated by wire to 4 km. Embedded encryption	30-88	25	2,320	Man-portable: 10 mW and 5 W. Vehicle-mounted: 20 and 50 watts
Leprechaun	USA	Hand-held FH VHF radio. Embedded encryption.	30-88	INA	INA	5 W
LVP 235	India	VHF radio available in FH or fixed-frequency mo d-els. Projected 100-150 hps over full band. Embedded encryption.	30-88	INA	INA	5 W
PANTHER 2000-V	United Kingdom	VHF FH radio with man-portable, vehicular, and airborne versions. 8 pre-programmable channels. May be remoted up to 4 km. Narrow band: 9 hop bands of 6.4 MHz with 256 channels. Wideband: 58 MHz band with 2320 channels. 100 hps. Embedded encryption.	30-108	25	3,120	Man-portable 20W Vehicular 20W/50W Airborne 20W
PRC-73B	Yugo-slavia	Man-portable VHF FH radio with 100-200 hps over 5 MHz band.	30-90	INA	2,400	5 W
PRC-117A	USA	Man-portable VHF FM FH radio. Uses KY-57 VINSON encryption	30-89.975	25	2,400	0.1/1/10 W
PRC-119	USA	Man-portable VHF FM FH radio. 8 programmable single-channel and 6 frequency-hopping pre-set channels. Integrated voice and data secure comm u-nications.	30-88	INA	2,320	4.5 W

Tactical Frequency Hopping Radios (continued)

Radio	Country of Origin	Spread Spectrum Radio Description	Frequency Range (MHz)	Channel Spacing (KHz)	Number of Channels	Power Output
PRC-130	USA	Man-portable HF FH radio with 10 hps. Embedded encryption.	2.0-30	INA	280,000	5/20/100 W
PRC-710	Israel	Hand-held FH VHF radio, embedded encryption.	30-88	25	2,320	5 W adjustable
PRC 1080	USA	Hand-held FH VHF radio. Embedded encryption, 9 preset channels.	30-87.975	25	2,320	Selectable 100 mW-2W
PRC/VRC-9600	Turkey	Man-portable or vehicular-mounted VHF FH with 100-200 hps. Capable of burst-data transmission. Embedded encryption.	30-88	25	3,120	5 W man-portable 5/50 W vehicular
RAVEN 2V	United Kingdom	Man-portable, hand-held, vehicular, or base station VHF FH radio. Capable of burst-data transmission, data-rate adapter. Voice/data encryption, remote operation. Expected hop rate approx 150 hps.	30-88	25	2,320	Vehicular 50 W
RU-5	Yugo-slavia	Man-portable VHF/FM FH radio. Embedded encryption. Up to 16 kbit/s data transmission. Full-band hop set at approx. 100 hps. 10 pre-set channels.	30-87.975	25	2,320	0.5/5 W
SCIMITAR-H	United Kingdom	Vehicular-mounted HF FH radio. Burst-data transmission capability. Wire-remote up to 3 km. Embedded encryption.	1.6-30	100	284,000	20 W man-portable, 100/400 W vehicular-mounted.
SCIMITAR-V	United Kingdom	Man-portable or vehicular VHF FH radio with 150-250 hps over 58 MHz band. Embedded encryption.	30-88	25	2,320	0.1/5/50 W
SEM 173-193 CNR System	Germany	Modular series of VHF CNR radios, with the SEM 173 transceiver as the common unit. Remote operation up to 4 km. Embedded encryption. SEM 173 man-portable: SEM 173 V vehicular SEM 183 vehicular; SEM 193 vehicular SEM 183/193 dual station; SEM 193/193 dual station	30-108	12.5 or 25	3,120 or 6,240	SEM 173, 183 0.05/0.5, 5 W. SEM 193, 183/193 0.05/0.5/5/50 W.
StarCom	Sweden	Man-portable and vehicular FH VHF radio. Embedded encryption, remote operation by wire up to 6 km.	30-87.975	25	2,320	Man-portable 5 W Vehicular 5/50 W

Chapter 12
Unmanned Aerial Vehicles

This chapter provides the basic characteristics of selected unmanned aerial vehicles (UAVs) either in use or readily available to the OPFOR. Therefore, the UAVs discussed in this chapter are those likely to be encountered by U.S. forces in varying levels of conflict. The selection of UAVs is not intended to be all-inclusive, rather a representative sampling of various military capabilities.

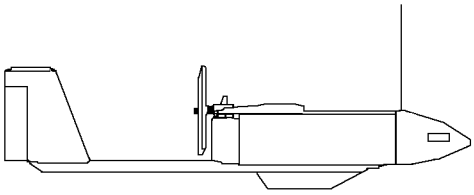
UAVs come in various types, sizes, and levels of complexity, each having their own niche over the battlefield. For example, fixed-wing, propeller-driven platforms excel in endurance and range; jet-propelled UAV's trade endurance for speed; and rotary-wing UAVs can carry relatively large payloads.

UAVs are also referred to as drones or remotely piloted vehicles (RPVs) depending on their flight control. An on-board computer with the flight plan programmed into it prior to the mission controls drones. RPVs use a data link to a ground control station where the pilot/operator controls the flight manually. Many modern UAVs are capable of operating in either manner.

Questions and comments on data listed in this chapter should be addressed to:

Mr. Walter L. Williams
DSN: 552-7923 Commercial (913) 684-7923
e-mail address: williamw@leavenworth.army.mil

French Unmanned Aerial Vehicle Fox AT1



SYSTEM
Alternative Designations: ASPIC AT
Date of Introduction: 1988
Proliferation: France, United Nations, and civilian customers

Description:
Engines: 1 x Limbach 22 hp L 275 E two-cylinder, two-stroke, air-cooled
Propulsion: 2-blade push propeller
Weight (kg):
Takeoff: 90
Fuel and Payload (combined): 30
Speed (km/h):
Maximum (level): 216
Cruise: 145
Ceiling (m):
Maximum: 3,000
Minimum: 30
Fuel (liters): INA
Endurance (hr): 1.5
Range (km):
RPV Mode: 50
Relay/Programmed Mode: 100
Dimensions (m):
Wing Span: 3.6
Length (fuselage): 2.75
Height: 0.25

Launch Method: Hydraulic or sandow ramp.
Recovery Method: Parachute
Landing Method: skid
Maximum Flights Per Aircraft: INA

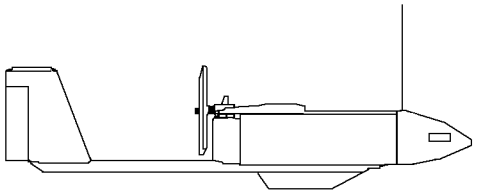
Survivability/Countermeasures: INA

SENSOR/OPTICS
Payload Type: CCD color video or infrared cameras, thermal analyzers, high definition line scanners, NBC and meteorological sensors.
Television field of view: INA
IR Linescan:
Length: INA
Resolution: INA

VARIANTS:
Fox AT2 UAV
Fox TX Electronic Warfare UAV
Fox TS1 Target Drone
Fox TS3 Target Drone
Mini-Fox Target Drone

NOTES
The Fox AT1 UAV is one of a family of low-cost UAVs designed by the French firm CAC SYSTEMES. Each UAV system is composed of a transportation and launching system, a ground control station (GCS) mounted on a 4x4 truck frame, and four UAVs. The Fox AT1 is launched from a mobile launching catapult (transportation and launching system) that is mounted on a trailer with transportation compartments for 4 UAVs. Normally two of the four UAVs are equipped with CCD cameras for daytime missions and the remaining two are FLIR equipped for nighttime missions. Upon mission completion the UAV can be reserviced and available for another mission in less than 30 minutes. The Fox AT1 is capable of carrying 15 kilograms of various payloads. Additionally, two underwing pods allow for four loads to be carried and dropped. Normally the GCS consist of a crew of three personnel: pilot, observer, and a technician. However, two people can deploy the UAV system and have it available for operation in less than 20 minutes. The guidance and control consists of an UHF data link with four proportional and eight numeric channels, of which four control the autopilot. Telemetry is through a 12-channel data link.

French Unmanned Aerial Vehicle Fox AT2



SYSTEM
Alternative Designations: None
Date of Introduction: 1988
Proliferation: France, United Nations, and civilian customers

Description:
Engines: 1 x Limbach 22 hp L 275 E two-cylinder, two-stroke, air-cooled
Propulsion: 2-blade push propeller
Weight (kg):
Takeoff: 135
Fuel and Payload (combined): 60
Speed (km/h):
Maximum (level): 216
Cruise: 145
Ceiling (m):
Maximum: 3,000
Minimum: 30
Fuel (liters): INA
Endurance (hr): 5
Range (km):
RPV Mode: 50, 100, 150 (200 as an option)
Relay/Programmed Mode: 350

Dimensions (m):
Wing Span: 4.0
Length (fuselage): 2.75
Height: 0.25
Launch Method: Hydraulic or sandow ramp.
Recovery Method: Parachute
Landing Method: Airbag
Maximum Flights Per Aircraft: INA

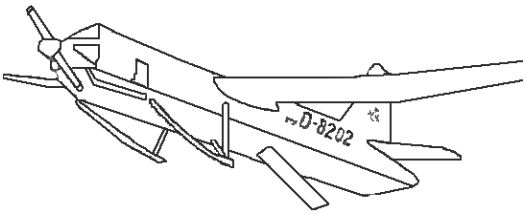
Survivability/Countermeasures: INA

SENSOR/OPTICS
Payload Type: Panoramic CCD color Camera, Low Light Television (with zoom), IR linescan CAMELIA camera, SAR camera, FLIR, multi-sensor gimball platform (IR and visible), etc.
Television field of view: INA
IR Linescan:
Length: INA
Resolution: INA

VARIANTS: None

NOTES
The Fox AT2 UAV is one of a family of low-cost UAVs designed by the French firm CAC SYSTEMES. Each UAV system is composed of a transportation and launching system, a ground control station (GCS) mounted on a 4x4 truck frame, and four UAVs. The Fox AT2 (like the Fox AT1) is launched from a mobile launching catapult (transportation and launching system) that is mounted on a trailer with transportation compartments for 4 UAVs. Normally two of the four UAVs are equipped with CCD cameras for daytime missions and the remaining two are FLIR equipped for nighttime missions. Upon mission completion the UAV can be reserviced and available for another mission in less than 30 minutes. The Fox AT2 is capable of carrying 30 kilograms of various payloads. Additionally, two underwing pods allow for two loads to be carried and dropped. Normally the GCS consist of a crew of three personnel: pilot, observer, and a technician. However, two people can deploy the UAV system and have it available for operation in less than 20 minutes. The guidance and control consists of an UHF data link with four proportional and eight numeric channels, of which four control the autopilot. Telemetry is through a 12-channel data link.

Chinese Unmanned Aerial Vehicle D-4



D-4 UAV with reusable solid rocket booster prior to jettison after take off

SYSTEM
Alternative Designations: ASN-104/105
Date of Introduction: 1985
Proliferation: At least 1 country

Description:
Engines: 1x –30 hp HS-510 four-cylinder, two-stroke gasoline air-cooled piston
Propulsion: 2-blade wooden push propeller
Weight (kg):
- Takeoff: 140
- Fuel and Payload (combined): INA

Speed (km/h):
- Maximum (level): 205
- Cruise: 150

Ceiling (m):
- Maximum: 3,200
- Minimum: 100

Fuel (liters): INA
Endurance (hr): 2
Range (km):
- RPV Mode: 60
- Relay/Programmed Mode: 100 (est.)

Dimensions (m):
- Wing Span: 4.3
- Length (fuselage): 3.3
- Height: 0.9 (excluding skids)

Launch Method: Solid rocket booster on a zero length launcher.
Recovery Method: Parachute (nonsteerable)
Landing Method: 2 spring loaded skids
Maximum Flights Per Aircraft: INA

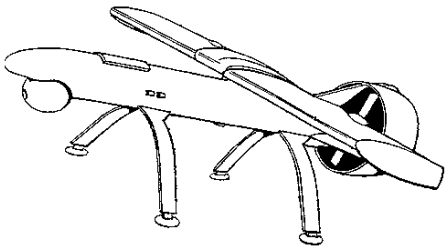
Survivability/Countermeasures: INA

SENSOR/OPTICS
Payload Type: Panoramic Camera, Low Light Television (with zoom) and IR linescan
Television field of view: INA
IR Linescan:
- Length: INA
- Resolution: INA

VARIANTS: None

NOTES
The D-4 UAV is launched from a zero-length launcher using a solid rocket booster that is jettisoned after take-off.

Russian Unmanned Aerial Vehicle Shmel-1



SYSTEM
Alternative Designations: Bumblebee
Date of Introduction: 1991
Proliferation: At least 2 countries

Description:
Engines: 1x 32-hp Samara/Trud (Kuznetsov) P-032 two-cylinder, two-stroke gasoline
Propulsion: 3-blade shrouded pusher propeller
Weight (kg):
- Takeoff: 130
- Fuel and Payload (combined): 70

Speed (km/h):
- Maximum (level): 180
- Cruise: 140

Ceiling (m):
- Maximum: 3,000
- Minimum: 50

Fuel (liters): INA
Endurance (hr): 2
Range (km):
- RPV Mode: 60
- Relay/Programmed Mode: 120 (est.)

Dimensions (m):
- Wing Span: 3.25
- Length (fuselage): 2.78
- Height: 1.10

Launch Method: Rocket-assisted catapult
Recovery Method: Parachute (nonsteerable)
Landing Method: 4 spring loaded landing legs
Maximum Flights Per Aircraft: 10 to 20

Survivability/Countermeasures:
The engine and propeller are enclosed in a shrouded ring that serves the purpose of reducing noise as well as reducing the surface reflection and heat signature.

SENSOR/OPTICS
Payload Type: Television and IR linescan
Television Field of View: 3º to 30º (zoom)
IR Linescan:
- Length: 3 to 4 times aircraft altitude
- Resolution: 3 milliradians

VARIANTS: None

LAUNCH VEHICLE
Designation: BTR-D
Alternative Designations: BMD M1979
Description:
Crew: 2
Combat Weight (mt): 6.7
Chassis Length Overall (m): 5.88
Height w/o Launch unit (m): 1.67
Width Overall (m): 2.63

Automotive Performance:
Engine Type: 240-hp Diesel
Cruising Range (km): 500
Speed (km/h):
- Max Road: 61 (est.)
- Max Off-Road: 35 (est)
- Average Cross-Country: INA
- Max Swim: 10 (est.)

Fording Depth (m): Amphibious

Radio: R-123

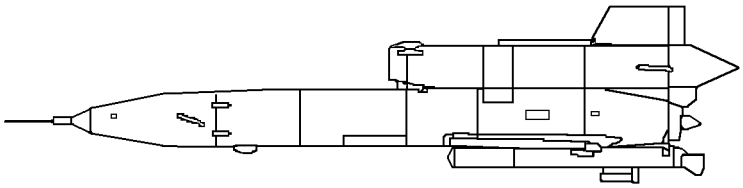
Protection:
Armor, Turret Front (mm): "Antibullet" (7.62-mm)
NBC Protection System: Yes
Smoke Equipment: None

NOTES
The Shmel-1 is part of a complex called the STERKH, which is probably an acronym of unknown expansion. The STERKH complex consists of a launcher, a support/maintenance vehicle, and at least one (probably as many as three) aircraft. The Yakolev Design Bureau designed the STERKH.

The transporter-launcher-controller (TLC) has positions for two UAV operators and is capable of controlling two Shmel-1's simultaneously. Automatic pre-launch monitoring, launch, flight control, and displaying of the received data is conducted from the TLC. The display in the TLC indicates aircraft position overlaid onto the television image. Given the system's digital downlink, the IR image could also be recorded on magnetic tape or displayed on a video monitor. However, the data is almost certainly recorded on electronic medium for playback. The description of the system may indicate a problem involving the inability of the operator to translate aircraft coordinates to those of the targets being located. A laser rangefinder or designator could easily accomplish this, but such a capability is not indicated for the Shmel-1. The current system requires coordinate conversion from map association or photographic interpretation with a laser capability to be added later.

The area coverage of the sensor payload is excellent. Analysis indicates that the camera, at an altitude of 1500 meters and a field of view of 30º, can image an area of approximately 500,000 m^2 or a circle with a radius of 400 meters. The IR linescan at the same altitude would see a strip approximately 5,100 meters long and 4.5 meters wide. Ground resolution would decrease significantly at the ends of the scan. At a nominal speed of 120 km/h and flying the maximum altitude, the aircraft could observe a maximum of 192 km^2/h with the television system or 1,200 km^2/h with the IR linescan.

Russian Unmanned Aerial Vehicle TU-143 Reys



SYSTEM
Alternative Designations: DR-3
Date of Introduction: 1973
Proliferation: At least 7 countries

Description:
Engines: 1x – TRD TR3-117 turbojet
Propulsion: Jet
Weight (kg):
  Takeoff: 1,600
  Fuel and Payload (combined): 1,540
Speed (km/h):
  Maximum (level): 940
  Cruise: 850
Ceiling (m):
  Maximum: 5,000
  Minimum: 50
Fuel (liters): 190
Endurance (minutes): 25
Range (km):
  RPV Mode: N/A
  Relay/Programmed Mode: 360
Dimensions (m):
  Wing Span: 2.24
  Length (fuselage): 8.06
  Height: 1.54 (excluding skids)

Launch Method: Solid rocket booster on a mobile transporter-erector-launcher (TEL)
Recovery Method: Parachute (nonsteerable)
Landing Method: 3 retractable skids (tricycle gear)
Maximum Flights Per Aircraft: 10

Survivability/Countermeasures: INA

SENSOR/OPTICS
Payload Type: Panoramic Camera, Low Light Television and radiation detection equipment
Television field of view: INA
IR Linescan:
  Length: INA
  Resolution: INA

VARIANTS: None

NOTES
The DR-3 normally operates at a reconnaissance depth of 150 km and is preprogrammed prior to each mission. It is launched from a mobile TEL using a solid rocket booster (that is jettisoned after take-off) in tandem with the turbojet engine. The DR-3 uses its onboard navigation and guidance control to cruise at preset altitudes (four total) between 50 to 2,000 meters. Prior to landing, a drogue chute is deployed to slow the speed of the DR-3 prior to deployment of the main recovery parachute. A braking rocket engine (located in the fuselage) is activated at an altitude of approximately 1.8 meters to soften the landing on the "tricycle landing gear". The DR-3 reconnaissance payload normally consists of two versions (besides the radiation detection version). The first version consists of an AP-402M aerial camera with Zima-M IR-reconnaissance equipment. The second payload consists of an AP-402M aerial camera with an Aist-M TV system. The camera film is removed and processed in a data processing station upon completion of the mission. However, data from both the TV and radiation detection equipment is downlinked in real-time to the ground control station.

Chapter 13
Theater Missiles

The trend among military forces for acquisition of theater missiles has expanded with the growth of regional rivalries and the strategy of using long-range strike capability to gain regional leverage. Theater missiles can be categorized among two types—theater ballistic missiles (TBMs) and cruise missiles. They are launched from ground launchers, aircraft, or naval vessels. These systems are designed for deep strike missions—beyond those of close battle assets. Because of the high cost and limited numbers of these systems compared to artillery, they will be used against high-priority targets at critical phases of a conflict, or against political targets. Selected OPFOR forces with limited numbers of missiles may hold them in a separate missile unit at echelons above the supported ground force commander. Those missiles may be used for purposes other than execution of military strike missions. Where missiles are subordinate to the ground force commander, they will be used as another strike asset to support his plan.

The OPFOR cruise missiles can be launched from ground launchers or naval platforms. Air-launched cruise missiles (ALCMs) are treated as munitions in aircraft chapters. Foreign ground and sea-launched cruise missiles are generally employed in an anti-ship role. However, applications may be developed for use against ground targets. Such systems can be addressed in future WEG updates.

The TBMs employ a high-atmosphere or exo-atmospheric ballistic trajectory to reach the target. That trajectory is easier to track than a cruise missile flight profile; however, the TBM can deliver a high-lethality payload a long distance quickly, and for most of its trajectory, it cannot be intercepted by even state-of-the-art anti-ballistic missiles (ABMs). These missiles are launched from ground launchers or naval platforms. Ground launchers include—

- Fixed ground launchers (usually associated with hardened underground sites).
- Mobile launch complexes with dozens of vehicles and significant set-up time.
- Trailer launchers.
- Highly mobile transporter-erector-launchers (TELs).

Launchers vary from older systems with simple modifications, to specialized vehicles designed for operation in all types of terrain. Newer launchers may incorporate improved mobility to reduce vulnerability to location by terrain anaysis and intelligence preparation of the battlefield.

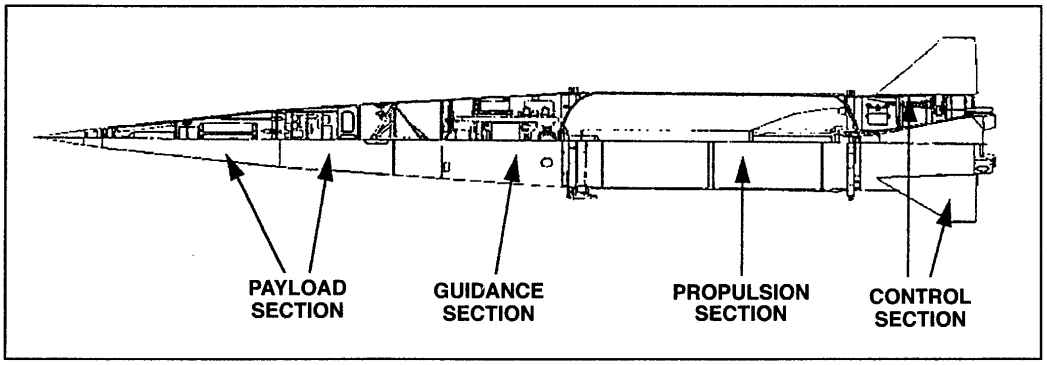
The missile system is selected for a mission based on its ability to reach the target within targeting timelines, and its ability to deliver effective lethality on the target. Improved heavy multiple- rocket launcher systems with course correction and increased-lethality warheads have replaced TBMs as preferred strike systems against selected deep targets. For instance, a Russian 9A52 MRL can deliver twelve 300-mm rockets 70-90 km with precision and minimal preparation time. However, a modern TBM can deliver twice the payload a farther distance with better precision against critical heavy targets.

Keys for timely delivery include target location, fire mission calculation and transmission, launcher and missile responsiveness, reload time, and move times. Therefore, modern missile system support equipment can include computerized fire control and location/navigation systems (such as global positioning systems), as well as dependable and secure communications.

The most critical component of a theater ballistic missile system, which differentiates system capabilities and limitations, is the missile. Missiles are generally classified according to their range—

- Short-range ballistic missile (SRBM), 0-1,000 km.
- Medium-range ballistic missile (MRBM), 1,001-3,000 km.
- Intermediate-range ballistic missile (IRBM), 3,001-5,500 km.

Various approaches are used to improve range, such as lengthening missiles for increased fuel and longer burn time, improving motors (in the propulsion section), using more efficient solid fuel motors, and employing smaller and lighter warheads. Below is an example of a modern missile (the Russian Tochka-U SRBM) and its major components.



The warhead (within the payload section) is the munition, the lethality mechanism which is selected for that strike mission and around which the system is designed. Many countries acquired ballistic missiles specifically to deliver weapons of mass destruction (WMD) against civilian targets such as urban centers. For such a mission, a less accurate system with a large payload capacity is sufficient for the mission. A substantial proportion of SRBM and some MRBM designs are copies or variants of the former-Soviet SCUD-B/SS-1c. Although these systems lack accuracy and responsiveness of some the newer systems, they can deliver large lethal payloads against fixed targets or targets whose limited mobility permits them to be stationary long enough for the TBMs' operational timelines.

A number of newer TBM designs with improved range, accuracy and operational considerations have been fielded. Modern warhead developments include separating warheads, multiple warheads, maneuvering reentry vehicles (RVs), varied lethal and electronic warhead fills, warhead buses (varied submunitions), precision navigating and homing warheads, and warheads with

countermeasures (penaids). Separating and maneuvering warheads, penaids, and other technical measures will further challenge the capability of theater missile defense assets to prevent strikes against priority targets.

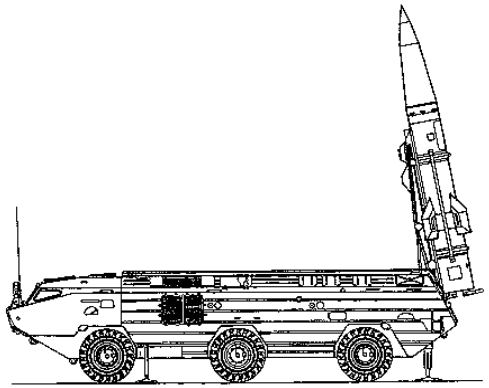
Operational timelines include launcher emplacement and survey times, mission transmission time, missile preparation time (which includes aiming), launch sequence, displacement time, move to a hide/transloading point, then move to the next launch point. Target location, command and control, and fire mission transmission times are separate. Often the launcher will be emplaced with some launch preparation steps completed and ready for a mission. These steps may sacrifice accuracy for reduced exposure time. More modern launchers will have a minimal preparation time between emplacement and execution of a fire mission.

After a launch, the launchers will displace as quickly as possible (often <5 minutes) to reduce the possibility of detection and tracking, and to avoid strikes from specially-assigned counter-missile assets and units. To assure survivability of these expensive long-range weapons, the forces will employ tactical countermeasures and, where possible, use rapid emplacement and autonomous operations to reduce losses. Some forces employ technical countermeasures to add increased survivability of the launcher and increased probability of missile/warhead success. Countermeasures include improved coatings and camouflage patterns and nets, underground hides/facilities, decoys, and secure communications. These measures are intended to degrade the enemy's detection, targeting, impact or effectiveness kill, and lethality effects.

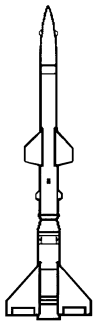
State-of-the-art TBMs can cost more than a million dollars each. If the systems are not accurate enough, or if the enemy has ABM capabilities, those TBMs may not have a high assurance of success, and may not be a factor in the OPFOR plan. The OPFOR may limit its missile requirement to systems used to gain regional political leverage by targeting civilian targets. Thus, budgetary, political, and military considerations affect TBM decisions. Given the budget limitations and systems costs which have impacted most military forces in the last decade, the OPFOR will likely have a mix of older and newer systems and selected upgrades. Systems featured in this chapter are the more common systems, or represent the spectrum of missile systems which can threaten US Army forces or interests within an operational environment.

Questions and comments on data in this specific update should be addressed to Tom Redman, DSN: 552-7925, e-mail: redmant@leavenworth.army.mil. Otherwise, TBM analyst is:

Dr. Don Madill
DSN: 552-7926 Commercial (913) 684-7926
e-mail address: madilld@leavenworth.army.mil

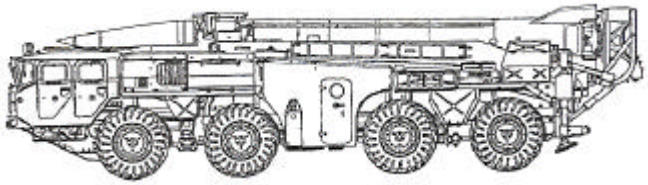


Tochka-U/SS-21

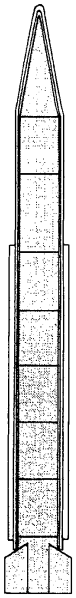


B610 / CSS-8

M-11/ CSS-7



SCUD-B / SS-1c



Nodong-1

DF-3 / CSS-2

Foreign Theater Ballistic Missiles

System Type	SRBM	SRBM	SRBM	SRBM	SRBM	SRBM	SRBM	MRBM	IRBM	**Technologies & Trends**
Name/ NATO Name Designator	Tochka-U SCARAB SS-21 Mod 2	B610 / M-7 CSS-8	SCUD-B SS-1c	SCUD-B SS-1c Mod 2	M-11/ DF-11 CSS-7	SCUD-C SS-1d	M-9/DF-15 CSS-6	Nodong-1	DF-3 CSS-2	More SCUD variants
Producing Country	Russia	China	Russia North Korea	Russia	China	Russia North Korea	China	North Korea	China	Technology Transfer
Proliferation (countries)	At least 6	At least 2	At least 20	At least 1	At least 2	At least 5	At least 1	At least 1	At least 2	Increased proliferation
Type Launcher	TEL	TEL	Fixed, TEL	Fixed, TEL	TEL	Fixed, TEL	TEL	TEL	Fixed, Mobile complex	Mobile/decoy launchers
Propulsion	Single-stage Solid	Single-stage (est) Solid	Single-stage Liquid	Single-stage Liquid	Single-stage Solid	Single stage Liquid	Single-stage Solid	Single-stage Liquid	Single-stage Liquid	Non-ballistic trajectory
Range Min-Max (km)	20-120	50-150	50-300	300	50-300	500	200-600	170-1,300	1,500-3,000+	Increased range
Guidance	Inertial	Inertial	Inertial	Inertial IR homing	Inertial	Inertial	Inertial	Inertial	Inertial	Multi-sensor Homing
Accuracy (m)	50	150	1,000	50	300	<800	600	4,000	2,000-2,500	Improved Guidance
Payload (kg)	480	190	1,000	600	800	700	500-600	770	1,500-2,150	Separating multiple RVs
Warheads	HE, Chem, Nuc, ARM, EMP, Submunitions	HE, Chem	HE, Chem, Nuc	Separating HE, Nuc	Separating HE, Nuc poss Chem	HE, Chem	Separating. HE, Nuc poss Chem Poss Fuel-Air Submuni-tions	HE, Chem poss Nuc	HE, Nuc, or 3 separating reentry vehicles (RVs)	Cluster, Volumetric, Submunitions BW warheads, ARM, EMP
Comments	TEL is amphibious	Modified SA-2 SAM Tracked TEL	Technology widely used	Requires compatible IR imagery	Possible export or technology export to other countries		SCUD-B variant Russia limited production	SCUD-B variant ND-2 IRBM variant Poss export	Variants with varied warheads and ranges Towed launcher Lengthy prep time	Autonomous operation Penaids/ Counter-measures Reduced prep/

										displace times

GLOSSARY

AA - antiaircraft

acquisition range - sensor range against a category of targets. Targets are usually categorized as infantry, armored vehicles, or aircraft. Acquisition includes four types (or levels of clarity, in ascending order of clarity): detection, classification, recognition, and identification. Where the type of acquisition is not specified, the acquisition range will be regarded as sufficient for a c-curate targeting. This range is comparable to the former Soviet term *sighting range*.

AAM - air-to-air missile

AD - antihandling device (mines)

ADHPM - artillery-delivered high-precision munition. This term can be used to describe various artillery precision munitions, including guided, terminally homing, SAL-homing, and course-corrected mortar and cannon rounds and rockets.

AGL - automatic grenade launcher

AIFV- airborne infantry fighting vehicle

aka - also known as

ALCM - air-launched cruise missile

AL/RDX - aluminized RDX (ammunition) is an enhanced blast filler with aluminum added to the RDX high explosive, often used in Russian Frag-HE munitions with increased lethality.

AM - amplitude modulated (communications)

antitank - functional area and class of weapons characterized by destruction of tanks. In the modern context used in this guide, the role has expanded to fit the term "antiarmor" (which includes systems and munitions which can be employed against light armored vehicles)

AP - antipersonnel

APAM - antipersonnel - anti-materiel (ammunition)

APE - armor-piercing explosive (ammunition)

APERS-T - antipersonnel - tracer (ammunition)

APC - armored personnel carrier

APC-T - armor-piercing capped tracer (ammunition)

AP HE - armor-piercing high explosive (ammunition)

API-T - armor-piercing incendiary tracer (ammunition)

APERS-T - antipersonnel tracer (ammunition)

APT - armor-piercing tracer (ammunition)

APU - auxiliary power unit; auxiliary propulsion unit

ARM - anti-radiation missile. The missile homes in on the radar pulse to kill a radar system.

ASM - air-to-surface missile

AT - antitank

ATGL - antitank grenade launcher

ATGM - antitank guided missile

aux - auxiliary

average cross-country (speed) - vehicle speed (km/hr) on unimproved terrain without a road

AVLB - armored vehicle-launched bridge

burst (rate of fire) - artillery term: the greatest number of rounds that can be fired in 1 minute
BW - biological warfare, including ammunition type.

cal - caliber
caliber - barrel length to gun bore ratio (for all gun systems), and used as a measure of gun barrel size or as a component of ammunition/gun size; in the case of US-made infantry weapons, diameter of ammunition/gun bore only, measured in inches, and used to describe ammunition/gun size
canister - close-range direct-fire ammunition which dispenses a fan of flechettes forward
C - centigrade
CC - cargo-carrying (ammunition)
CCD - cover, concealment, and deception; also charged-coupled device, an imaging sensor which operates in the visual and near-IR bands, with day and limited night capability.
CCM - counter-countermeasure
CE - chemical energy: the class of ammunition which employs a shaped charge for the lethal mechanism. Ammunition types which employ CE include HEAT and HESH (see below).
Chem - chemical (ammunition type)
CM - countermeasure
coax - coaxial
CRV - combat reconnaissance vehicle
CW - continuous wave (communications)
cyclic (rate of fire) - maximum rate of fire for an automatic weapon (in rd/min)

decon - decontamination
direct-fire range - maximum range of a weapon, operated in the direct-fire mode, at which the bullet's trajectory will not rise above the height of the intended point of impact on the target. At this range, the gunner is not required to adjust for range in order to aim the weapon. The comparable Russian term is *point blank range*.
DPICM - dual-purpose improved conventional munitions (ammunition)
DPICM-BB - dual-purpose improved conventional munitions, base-bleed (ammunition)
DU - depleted uranium (ammunition)
DVO - direct-view optics

ECM - electronic countermeasure
EFP - explosively-formed penetrator (ammunition); kinetic-energy penetrator which is created by a plate, shaped into a slug by an explosive charge, then propelled by it to a target
EIOC - estimated IOC
EMD - engineering, manufacture and development. Fielding phase between prototype and IOC.
EMP - electro-magnetic pulse, including ammunition type. The pulse can kill electronic microcircuits in a target area.
EO - electro-optic, electro-optical
ERA - explosive reactive armor
ERFB - extended range full-bore (ammunition)
ERFB-BB - extended range full-bore, base-bleed (ammunition)
est - estimate

ET - electronic timing (ammunition fuze type)
European - from a consortium of firms located or headquartered in several European countries
EW -electronic warfare

FCS - fire control system
FFAR - folding-fin aerial rockets
FAE - fuel-air explosive (ammunition). This munition technology is employed in aerial bombs and artillery munitions, and uses a dispersing explosive fill to produce intense heat, a long-duration high-pressure wave, and increased HE blast area
flechette – small steel darts (much like nails) used to fill artillery rounds (and some bombs). Ge n-erally thousands of these darts are fired (similar to a shotgun in an anti-personnel role) di s-pensing the flechettes forward over a wide area. Unlike **canister rounds,** FSU artillery rounds use a time fuze, permitting close-in direct fire, long-range direct fire, and indirect fire.
FH - frequency-hopper (radio, communications)
FLIR - forward-looking infrared (thermal sensor)
FLOT - forward line of own troops
FM - frequency modulated (communications)
FOV - field of view
frag-HE - fragmentation-high explosive (ammunition)
FSU - former Soviet Union

GCS - ground control station
gen - generation. Equipment such as APS and (thermal and II) night sights are often categorized in terms of 1st, 2nd or 3rd generation of development, with different capabilities for each.
GP MG - general purpose machinegun
GPS - global positioning system

HE - high explosive (ammunition)
HEAT - high-explosive antitank (also referred to as shaped-charge ammunition)
HEAT-FS - high-explosive antitank, fin-stabilized (ammunition)
HEAT-MP - high-explosive antitank, multi-purpose
HEFI - high-explosive fragmentation incendiary (ammunition)
HEI - high-explosive incendiary (ammunition)
HEP-T - high explosive plastic-tracer (ammunition)
HESH - high-explosive squash head (ammunition)
HF- high frequency (communications)
hps - hops per second (communications)
HUD - head-up display
HVAP-T - hypervelocity, armor-piercing tracer (ammunition)

ICM - improved conventional munition (ammunition, round containing submunitions/gr enades)
IFF - identification friend-or-foe
IFV - infantry fighting vehicle - improved conventional munition; frag-He bomblet submunition **II** - image intensification (night sighting system)
ILS - instrument landing system

INA - information not available
incend - incendiary
IOC - interim operational capability
IR - infrared
IRBM - intermediate-range ballistic missile (3,001-5,500 km)
I-T - incendiary - tracer (ammunition)

K-kill - catastrophic kill (simulation lethality data)
kbits - kilobites per second (communications)
KE - kinetic energy: class of ammunition which transfers energy to the target for the lethal mechanism. Ammunition types which employ KE include AP, APFSDS-T, and HVAP-T.

LAFV - light armored fighting vehicle
LLLTV - low-light-level television
LMG - light machinegun
LRF - laser rangefinder

mach - speed of sound, based on atmospheric conditions (1160 km/h at sea level)
max - maximum
maximum aimed range - maximum range of a weapon (based on firing system, mount, and sights) for a given round of ammunition, while aiming at a ground target or target set with sights in the direct-fire mode. The range is not based on single-shot hit probability on a point target, rather on tactical guidance for firing multiple rounds if necessary to achieve a desired lethality effect. One writer referred to this as *range with the direct laying sight*. Even greater ranges were cited for *salvo fire*, wherein multiple weapons (e.g., tank platoon) will fire a salvo against a point target.
max effective range - maximum range at which a weapon may be expected to achieve a high single-shot probability of hit (50%) and a required level of destruction against assigned targets. This figure may vary for each specific munition and by type of target (such as infantry, armored vehicles, or aircraft).
max off-road (speed) - vehicle speed (km/hr) on dirt roads
MCLOS - manual command-to-line-of-sight
MG - machinegun
Mk - Mark
MRBM - medium-range ballistic missile (1,001-3,000 km)
MRL - multiple rocket launcher
MMW - millimeter wave (sensor mode, band in the electromagnetic spectrum)
MVV - muzzle velocity variation (RF tracker for monitoring round-to-round variations in muzzle velocity variations due to tube wear, or for tracking artillery course-corrected rounds for command course adjustment)

N/A - not applicable
NBC - nuclear, biological, and chemical
Nd - neodymium, type of laser rangefinder
NFI - no further information
normal (rate of fire) - artillery term: rate (in rd/min) for fires over a 5-minute period

NVS - night-vision system
Nuc - nuclear (ammunition type)
NVG - night-vision goggle

PD - point-detonating (ammunition fuze type)
penaid - Penetration aid, countermeasure system in the warhead to counter air defense weapons effectiveness.
Ph - probability of hit (simulation lethality data)
PIBD - point-initiating base-detonating (ammunition fuze type)
pintel - post attached to a firing point or vehicle, used to replace the base for a weapon mount
Pk - probability of kill (simulation lethality data)
Poss - possible
practical (rate of fire) - maximum rate of fire for sustained aimed weapon fire against point ta r-gets. The rate includes reload time and reduced rate to avoid damage from overuse. Former Soviet writings also refer to this as the **technical rate of fire**.

RAP - rocket-assisted projectile (ammunition type)
ready - rapid detectability under normal mobility conditions (mines)
mirecon - reconnaissance
rd - round
ready rounds - rounds available for use on a weapon, whether in autoloader or in nearby sto w-age, which can be loaded within the weapon's stated rate of fire
RF - radio frequency
RHA - rolled homogeneous armor, often used as a standard armor hardness for measuring pen e-tration of anti-tank munitions
RHAe - RHA equivalent, a standard used for measuring penetrations against various type armors
rpm - rounds per minute (aircraft)
RV - reentry vehicle. That portion of a TBM separating (or multiple separating) warhead which reenters the atmosphere and maneuvers to the target.

SACLOS - semiautomatic command-to-line-of-sight
SAL - semi-active laser; guidance method used in precision munitions, such as ADHPM, and ATGMs.
SAM - surface-to-air missile
SHF - super high-frequency (sensors)
SFM- sensor-fuzed munition (artillery ammunition)
shp - shaft horsepower (aircraft)
SLAP - saboted light armor penetrator (ammunition). Small arms/machinegun round with a sub-caliber penetrator guided down a gun bore by sabots, designed to defeat light a rmor.
SP - self-propelled
SOF - special operations forces
SRBM - short-range ballistic missile (0-1,000 km)
SSM - surface-to-surface missile (can include IRBM, MRBM, or SRBM, or cruise missile)
stadiametric - in this guide, a method of range-finding using stadia line intervals in sights and target size within those lines to estimate target range

stowed rounds - rounds available for use on a weapon, but stowed and requiring a delay greater than that for ready rounds (and cannot be loaded within the weapon's stated rate of fire)
sustained (rate of fire) - artillery term: rate (in rd/min) for fires over the duration of an hour

tactical AA range - maximum targeting range against aerial targets, aka: **slant range**
TAR - target acquisition radar
TBM - theater ballistic missile
TEL - transporter-erector-launcher. Vehicle which carries, raises, and launches TBMs.
TELAR - transporter-erector-launcher and radar
thermobaric - HEI volumetric (blast effect) explosive technology similar to fuel-air explosive and used in shoulder-fired infantry weapons and ATGMs
TLAR - transporter-launcher and radar
TOF - time of flight (seconds)
TTP - tactics, techniques, and procedures
TTR - target tracking radar
TV - television (sensor mode)

UAV - unmanned aerial vehicle, class of unmanned aerodynamic systems which include remotely piloted vehicles and preprogrammed (drone) aircraft
UHF - ultra-high frequency (communications)
UI - unidentified

VEESS - vehicle engine exhaust smoke system
VHF - very high frequency (communications)
volumetric - class of explosive ammunition fill which produces high long-duration blast and heat (includes thermobaric and FAE)
vs - versus

w/ - with (followed by associated object)
WMD - weapons of mass destruction (ammunition type). These generelly consist of nuclear, bacteriological, and chemical munitions.
WP - white phosphorus (ammunition)