Gunship

QUICKSTART

BEWARE: GUNSHIP is an accurate simulation of a combat helicopter. Do not attempt to jump in and fly by instinct. Helicopters are similar to other aircraft, but have important differences. Unless you've flown real helicopters, read Part I ("Operating Instructions") carefully and learn to fly using the tutorials.

- To load GUNSHIP in your computer, read the appropriate section of "Loading."
- Skim the "Cockpit & Status Panels" and "Controls" sections to familiarise yourself with the helicopter.
- Begin combat flying in Southeast Asia, just like thousands of other American helicopter pilots.
- Don't Volunteer for Western Europe. Watch the risk level as you adjust your starting options. Keep your risk low at first. Above all, avoid the 1st Line in Western Europe. The Warsaw Pact is the most formidable enemy on this planet.

LOADING

Special Instructions for the C64 Tape Cassette Version

GUNSHIP is a very large C64 program, designed for computers with the disk drives (the standard American practice). It has about 300K of code and data. In creating the tape cassette version, MicroProse has adjusted a few minor details to minimise tape loading times. No essential feature of the game has been removed. For reference the differences are described below.

C64/128

To load the tape cassette version requires either a C-64 or C-128 computer with a cassette tape drive.

- Turn off your computer, then remove all cartridges from the computer.
- Attach one joystick at port #2. Do not leave a joystick in port #1 (a joystick there can scramble your controls).
- Insert the GUNSHIP cassette into the cassette tape drive, label upward. This is SIDE 1 of the tape. Close the tape drive.
- Turn on your computer. If you have a C-128, hold down the Commodore key while turning on the computer.
- Load Tape: hold down the Commodore key and tap the RUN STOP key. Your C64/C128 will ask you to press PLAY on the tape drive. Do it. The tape will search for GUNSHIP, report finding it, and begin loading.

Note: As in most tape cassette programs, once you press PLAY, leave it down until some other instruction (such as REWIND) is given. The program cannot access the tape unless PLAY is down.

AMSTRAD

- Plug the joystick into port.
- Turn on your computer.
- Insert GUNSHIP cassette 1 side 1 in deck.
- Press CTRL and small enter and then follow on screen instructions.

SPECTRUM

Type LOAD "" and press ENTER. Press PLAY on the cassette recorder. Follow on screen prompts.

PREPARING TO FLY

AH-64A PILOT ROSTER ("SERVICE RECORD"): The tape cassette version only holds information on ONE pilot. If you point to "SAVE" and press the fire button the pilot is saved to a separate tape cassette (you cannot save it to the game tape cassette). If you point to "RELOAD" and press fire you can recall a pilot saved on a separate cassette. Remember, you cannot save a pilot unless you have a blank tape to store his service record data. NEVER attempt to save pilot data on the GUNSHIP game tape cassette.

COCKPIT & STATUS PANELS

STORES STATUS DISPLAY: This display is not available in the tape version. Use information on the main cockpit display instead.

SYSTEMS DAMAGE DISPLAY: This display is not available in the tape version. Use the "idiot lights" across the top of the cockpit instead.

AFTER THE MISSION

RETRY OPTION: Whenever you land, shut down the engines and the rotor stops turning, you have the option of either "retrying" the same mission again, or continuing. If you retry, you are able to fly the very same mission again, from the start. If you do not retry, your mission is summarised and then your after landing options are presented. Note that this is different from the disk version, where only pilots who crash while at low rank can retry.

TOP SCORES: The comparison of your score to the two all-time top scoring missions (described in fourth paragraph) is not available in the tape version.

SAVE PILOT: One of your replay options is to "Go on extended R&R (Save Pilot)." This returns you to the pilot roster, where you can save your pilot's name and record on a separate tape (see Preparing to Fly, AH-64A Pilot Roster).

PREPARING TO FLY THE AH-64A APACHE

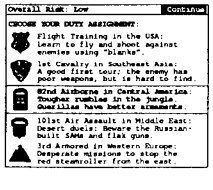
On most screens you'll see a small arrow pointer. Use your joystick to move the arrow. To make a selection, move the arrow onto the picture or box and then press the joystick fire button, or the return key on the keyboard.

VEHICLE IDENTIFICATION: Telling the good guys from the bad guys takes practice. Examine the vehicle drawing and compare it to the drawings in the "Military Equipment" section. Move the pointer to the box beside the correct name and press fire/click/return.

AH-64A PILOT ROSTER: This summarises the "service records" of pilots. To select a name, point to the name itself and press fire. This highlights the name. Point to "Continue" and press fire to return to the defaults.

To enter a new name (such as your own!), select a name you wish to replace, then point to "Erase Pilot" and press fire. Type the new name and press RETURN. This new name appears in the roster. The old name is erased, permanently.

Each pilot's service record includes a list of awards, decorations, and reprimands, followed by a number indicating the quantity of each. The letter abbreviations are: ACM – Army Commendation Medal, AM Air Medal, BSV – Bronze Star, CAC – Central America Campaign Ribbon, CMOH – Congressional Medal of Honour, DSC – Distinguished Service Cross, KIA – Killed in Action, MEC – Middle East Campaign Ribbon, MIA – Missing in Action, NDS – National Defence Service Medal, PH – Purple Heart, SEAC – Southeast Asia Campaign Ribbon, SR – Service Reprimand, SS – Silver Star, WEC – Western Europe Campaign Ribbon.



DUTY ASSIGNMENT: You can select five different areas of the world for combat flying. Point to the badge representing the area you desire and press fire. Point to "Continue" and press fire to return to the defaults.

Beginners should select Flight Training in the USA and follow the two tutorials. Combat regions are listed in order of difficulty, from Southeast Asia (the easiest) to Western Europe (the most difficult). Regions powerfully affect difficulty. Don't expect success in Western Europe until you do well in the other regions.

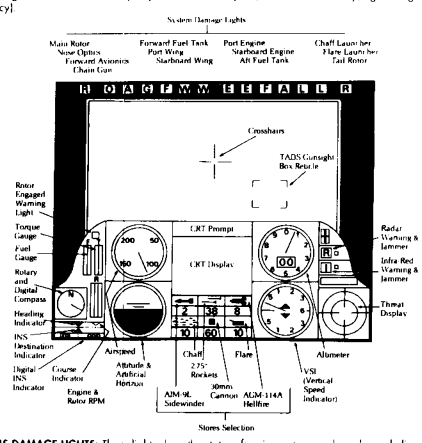
IMPORTANT!
KNOW YOUR PASSWORD & COUNTERSIGN!

The briefing and reminder screens tell you the password for this mission. YOU MUST KNOW THE COUNTERSIGN. At the end of the instructions you will see a password followed by a countersign. Find the briefing's password, and then write down the countersign that follows.

When you approach any friendly heli-base, you will get a radio message giving the password and asking for the countersign. If you do not type in the proper countersign and press "RETURN", base defences will presume you are an enemy and shoot you down!

COCKPIT & STATUS PANELS
COCKPIT INSTRUMENTATION

The cockpit is the main control panel used in flight. You "see" the landscape through the armoured gloss as you fly. A fixed crosshairs sight aids in pitch orientation and firing FFAR unguided rockets. A moving box (reticle) represents your IHADSS helmet gunsight (TADS). This box changes from dark to light colour, depending on the current accuracy of your selected weapon (dark is low accuracy, light is higher accuracy).



SYSTEMS DAMAGE LIGHTS: These lights show the status of major systems on board your helicopter. A green light means the system is functioning correctly; a coloured light means the system is malfunctioning. Reading from left to right, the systems are:

R ..... main rotor	E ..... port engine
O ..... nose optics (controls TADS)	E ..... starboard engine
A ..... forward avionics bay (gouges)	F ..... aft fuel tank
G ..... chain gun (30mm cannon)	A ..... Aft avionics bay (jammers)
F ..... forward fuel tank	L ..... chaff decoy launcher
W ..... port weapons wing	L ..... flare decoy launcher
W ..... starboard weapons wing	R ..... tail rotor (controls rotation)

STILL IN FLIGHT: You are still in flight while examining this map. Be sure to look up periodically. Otherwise you might fly into a mountain or come under attack. It's wise to hover in a safe place if you spend long periods examining this map.

INS CURSOR (INS – Inertial Navigation System): The white (Blue Arms) crosshairs on this map represents your current destination. Move the joystick to move the crosshairs. When you return to the cockpit the INS indicators will help you fly to this destination.

GRID CO-ORDINATES. The map uses a military grid co-ordinate system. To describe any position, read "right and up." That is, the first two digits are from the horizontal scale, the last two from the vertical scale. Therefore, 01-01 is the lower left corner, 01-12 is the upper left corner, 12 01 is the lower right corner, and 12 12 is the upper right corner.

ACCELERATED TIME: The accelerated time option is available only while viewing the sector map. Time passes at double the normal rate, thus halving your flying time between points.

STORES STATUS DISPLAY

This console displays the stores on your helicopter. Status lights are green if the system is functioning correctly, yellow if damaged, red if destroyed. The view of the helicopter on the left side of the console shows each system appropriately coloured.

SYSTEMS DAMAGE

This console displays the major systems on your helicopter. The indicator lights show green if the system is functioning correctly, yellow if damaged, red if destroyed. The view of the helicopter on the left side of the console shows each system appropriately coloured.

EASY vs. REALISTIC FLIGHT

When you start GUNSHIP, one of the reality options is a choice between "easy" simplified flight and "realistic" flight. MicroProse recommends realistic flight because once you learn its controls are more flexible and useful, especially at high speeds. However if realistic flying is too frustrating, try easy flight instead.

EASY FLIGHT. Here neither the pitch, roll, altitude nor airspeed of the helicopter has any effect on lift. This means that regardless of how you manoeuver the cyclic joystick, lift is unaffected. Power dives are prohibited.

The collective is the only control that affects lift in easy flight. Anytime you want to add lift (to climb, slow your descent, etc.) tap the collective up fast or slow, as appropriate. Anytime you want to reduce lift (to slow your ascent, begin or increase a descent, etc.) tap the collective down fast or slow, as appropriate.

REALISTIC FLIGHT. Here the pitch, roll, altitude, and airspeed affect lift as in a real helicopter. Ground Cushion Effect: At altitudes of 25' or less you gain a little extra lift at low speeds. The lift gained varies with altitude, and disappears entirely if you're flying too fast. Translational Lift: At speeds of 30 to 90 knots you gain considerable extra lift. The amount varies with the speed. Roll & Lift: With any significant amount of roll, the helicopter loses some lift. The lift loss increases as the helicopter rolls further left or right. Altitude: At higher altitudes you have less lift due to the thinner air. The lift loss increases as you get higher and higher. This loss is only noticeable above 1,000 feet.

Among other things, the use of realistic flight means that at high speed you can fly the helicopter not unlike an airplane. A slight pitch up slows the helicopter and causes a climb (by reducing speed into the 30-90 knot area for maximum translational lift), while a steep pitch down puts the helicopter into a fast power dive.

FLIGHT CONTROLS

This section defines how each control works.

Note: Computers sometimes misread multiple key inputs. Unless otherwise indicated, do not press two keys simultaneously. Do not push the joystick while holding a key. Pushing the joystick while holding a key may cause weird effects on C64/C128 computers.

CYCLIC JOYSTICK: Pushing forward pitches down the helicopter ("drops the nose"). Pulling back pitches up the helicopter ("raises the nose"). Pushing left or right rolls the helicopter in that direction ("tilts" the rotor and body left or right).

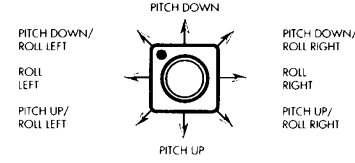
A pitch below horizontal moves the helicopter forward. A large pitch down causes a power dive. Pitch up above horizontal moves the helicopter backward. Rolling left or right at low speed causes a skid (or "sideslip") left or right. At medium and high speeds it causes a banking turn left or right.

The artificial altitude and horizon indicator shows the current pitch and roll of the helicopter.

AMSTRAD

Joystick

- Your joystick can be used in 8 different positions to control flight.
- When a target first appears, you can press the joystick button to lock on. Press again to fire a selected weapon.



COLLECTIVE: This control can be moved up fast (increases lift by large amounts) or down slowly (decreases lift by small amounts). When you raise or lower the collective, the engine torque changes appropriately. To move the collective a large amount, tap it repeatedly and quickly.

Lift keeps the helicopter airborne. If you start in level flight or hover, then increase lift, the helicopter ascends. If you start level and decrease lift, the helicopter descends.

CONTROLS SUMMARY

Category	Action	C64/C128	AMS	Spec.
Cyclic	Pitch down Pitch up Roll left Roll right	Joystick forward Joystick back Joystick left Joystick right	Joystick forward Joystick back Joystick left Joystick right	7 8 6 9
Collective	Up fast Up slow Down slow Down fast	F1 F3 F5 F7	Shift ↑ ↑ ↓ Shift ↓	Q CAPS SHIFT Q A A CAPS SHIFT
Anti-torque (tail) rotor	Rotate right Rotate left Stop Rotation	Horizontal cursor Vertical cursor RETURN	→ ← Enter/Return	X Z ENTER
View	View left View forward View right	$ CLR HOME INST DEL	Keypad 1/F1 Keypad 2/F2 Keypad 3/F3	I O P
Engines	Port on/off Starboard on/off Rotor eng./diseng.	1 2 3	Keypad 7/F7 Keypad 8/F8 Keypad 9/F9	1 2 3
Weapons	Sidewinder 2.75 FFAR Hellfire 30mm cannon	4 5 6 7	W Cycles through	W Cycles through
Fire	Fire weapon	Joystick button	Joystick	Ø
Jettison	(with weapon)	(weapon) and RESTORE	R	R
Counter-Measures	Chaff decoy Flare decoy Radar jammer IR jammer	9 - 0 +	C F J K	C F J K
Viewing Other Displays	Map Damage Stores	Z (left) shift Commodore	M D S	M D S
CRT	Chnage CRT	space bar	space bar	space bar
TADS	New TADS Target	(right) shift	N	N
Simulation	Accelerated Time Pause Reset	left arrow RUN STOP RUN STOP and RESTORE	ESC	Ex Mode Break or Y

ANSWER THE RADIO!

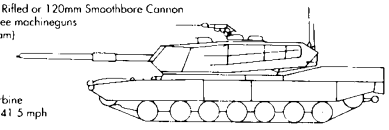
When you see the prompt "MESSAGE" above the CRT, tap the Change CRT once to read the incoming radio message. Ignoring messages can be detrimental to your health!

PASSWORD & COUNTERSIGN: As you approach your friendly base, you will get a radio message. It's VITAL that you read and answer the message! Tap Change CRT to display the message on the CRT. You will be radioed the password and asked for the countersign. You must type the proper countersign at the keyboard and press "RETURN."

Look up the countersign and type it onto the screen. Press RETURN when you are done. If you don't, your base will assume you're hostile and shoot you down!

WESTERN BLOC EQUIPMENT

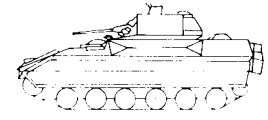
M1 and M1A1 "Abrams"
Main Battle Tank - USA



Weight: 62.9 tons
Main Weapon: 105mm Rifled or 120mm Smoothbore Cannon
Secondary Weapon: three machineguns
Armour: Heavy (Chobham)
Crew: 4
Hull Length: 7.9 meters
Hull Width: 3.7 meters
Height: 2.9 metres
Engine: 1500 hp gas turbine
Maximum Road Speed: 41.5 mph

This is the new standard tank of the U.S. Army, with the latest engine, armour, and in the A1 model, a new West German-made smoothbore gun, not to mention lots of high tech hardware. It is considerably superior to all known Russian tanks, but suffers from having a novel engine design that needs to work more reliably. Unlike the Soviet T-74, the M1 Abrams is an entirely new design that actually works. It's a curious twist that the Soviets, generally viewed as creative and innovative tank designers, have been "one upped" by the U.S. Army, who formerly lacked a reputation for "state-of-the-art" tank design.

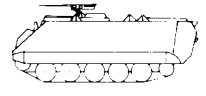
M2A1 "Bradley"
Infantry Fighting Vehicle - USA



Weight: 24.8 tons
Main Weapon: 25mm Auto-Cannon
Secondary Weapon: two TOW missiles
Armour: Light (aluminium laminate)
Crew: 3 + 7 passengers
Hull Length: 6.5 meters
Hull Width: 3.2 meters
Height: 3.0 meters
Engine: 500 hp diesel
Maximum Road Speed: 41.0 mph

This is the new armoured personnel carrier of the U.S. Army, designed to compete with the Russian BMP while keeping pace with speedy M1 tanks. It is heavily armed, lightly armoured and crowded inside. Although superior to the M113A3, it must be cautious when engaging enemy tanks. The TOW missile is no longer an invincible tank killer.

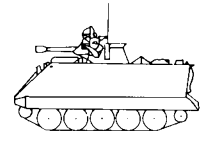
M113A3
Armoured Personnel Carrier - USA



Weight: 12.5 tons
Main Weapon: one or two machineguns
Secondary Weapon: none
Armour: Light (aluminium/steel)
Crew: 2 + 11 passengers
Hull Length: 4.9 meters
Hull Width: 2.7 meters
Height: 2.5 meters
Engine: 275 hp diesel
Maximum Road Speed: 42.0 mph

This is the latest variant of the U.S. Army's venerable "battle taxi" for infantry. It can carry and protect infantry from incidental fire, and is fairly useful against poorly armed Third World troops. Against well outfitted opponents it should stay out of the line of fire.

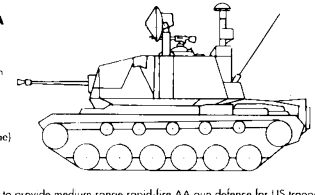
M163 Vulcan PIVADS
Self-propelled AA Gun - USA



Weight: 13.5 tons
Main Weapon: 20mm Gatling Gun
Secondary Weapon: none
Armour: Light (aluminium/steel)
Crew: 4
Hull Length: 4.9 meters
Hull Width: 2.9 meters
Height: 2.8 meters
Engine: 215 hp diesel
Maximum Road Speed: 40.5 mph

The Product Improved Vulcan Air Defence System married a six-barrel 20mm Vulcan cannon with the ubiquitous M113 chassis. The gun is aimed by a gunner, who is aided by a radar rangefinder and tracking fire-control computer. Although useful against unarmoured helicopters and slow moving planes, it is ineffective against distant or high speed targets (such as low flying jets).

M247 Sergeant York DIVAD
Self-Propelled AA Gun - USA

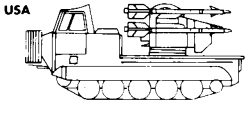


Weight: 60 tons
Main Weapon: twin 40mm Cannon
Secondary Weapon: one machinegun
Armour: Light (steel)
Crew: 3
Hull Length: 7.1 meters
Hull Width: 3.6 meters
Height: 4.6 meters (including antennae)
Engine: 750 hp diesel
Maximum Road Speed: 29.8 mph

The Sergeant York gun was designed to provide medium range rapid-fire AA gun defence for US troops. The U.S. Army has lacked a long range, effective AA gun for decades. This design was cobbled together from an old M48 tank chassis, standard 40mm AA guns, and a fighter plane's radar system.

Unfortunately, the Sgt. York repeatedly failed combat trials. Only after 146 had been produced was the U.S. Congress able to close down production of this remarkably expensive boondoggle.

M48A1 Chaparral
Surface-to-Air Missile (SAM) System - USA

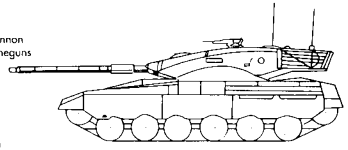


Weight: 12.7 tons
Main Weapon: four MIM-72C IR homing missiles
Secondary Weapon: none
Armour: Light (steel) for crew only
Crew: 4-5
Hull Length: 6.1 meters

Hull Width: 2.7 meters
Height: 2.7 meters (including antennae)
Engine: 202 hp diesel
Maximum Road Speed: 38.0 mph

The Chaparral combined a modified Sidewinder air-to-air missile with the U.S. Army M548 carrier. It is designed to work as a team with the Vulcan AA vehicle. The chaparral uses its IR homing missiles at targets too fast for the Vulcan. Like the Vulcan, it has no intergral search radar. Therefore it cannot engage targets until the gunner sees them.

Merkava Mk 2
Main Battle Tank - Israel

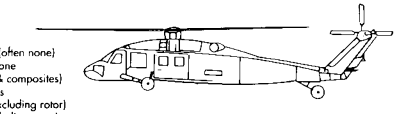


Weight: 66.0 tons
Main Weapon: 105mm Rifled Cannon
Secondary Weapon: three machineguns
Armour: Heavy (steel/composite)
Crew: 4
Hull Length: 7.5 meters
Hull Width: 3.7 meters
Height: 2.8 meters
Engine: 900 hp diesel
Maximum Road Speed: 28.6 mph

The Merkava is Israel's first "home grown" battle tank, and a very original design. It is heavily armoured, slow and carries the traditional 105mm NATO cannon designed 25 years ago. This philosophy is directly contrary to USSR design concepts, and fairly different from most western nations. However, Israel is designing from the greatest successful tank battle experience of any nation in the post WWII world. Perhaps they know something we're ignoring?

UH-60 Blackhawk
Transport Helicopter - USA

(Illustration half scale)



Weight: 8.1 tons
Main Weapon: varies (often none)
Secondary Weapon: none
Armour: Light (Kevlar & composites)
Crew: 3 + 11-14 troops
Length: 15.3 meters (excluding rotor)
Width: 5.5 meters (excluding rotor)
Height: 3.8 meters
Engine: two turboshaft jets, 2828 total shp
Maximum level Speed: 184 mph

The Blackhawk is the U.S. Army's new general-purpose helicopter and a worthy successor to the classic but aging UH-1 "Huey". The twin-engine design, light armour, and high crashworthiness make it safe, reliable machine in combat conditions. Ground attack, night flying and ECM/ESM variants exist, as well as many other special-purpose designs. However, the Blackhawk lacks sophisticated fire control systems, so even the armed versions are nowhere near as potent in combat as the AH-64 Apache.

Hughes 500MD Defender
Attack Helicopter - USA

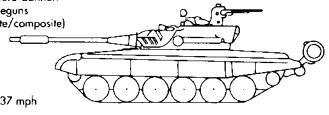
(Illustration half scale)

Weight: 1.6 tons
Main Weapon: four TOW missiles
Secondary Weapon: varies
Armour: none
Crew: 2
Length: 7.6 meters (excluding rotor)
Width: 3.2 meters (excluding rotor)
Height: 2.7 meters
Engine: one turboshaft engine, 425 total shp
Maximum level Speed: 140 mph

The Defender is not used by the U.S. Army. It is an inexpensive attack helicopter for export to smaller Western nations. It currently serves in the Isreali, Kenyan and South Korean air forces. Instead of the TOW anti-tank missiles as shown it can carry a three-barrel 7.62mm minigun (a gatling machinegun), 40mm grenade launcher, or 2.75" FFAR racket pods. Options include a mast-top sight for the TOW (instead of the nose sight shown), FLIR night vision for the pilot, air-to-air missiles, and various computerised flying and combat aids.

EASTERN BLOC EQUIPMENT

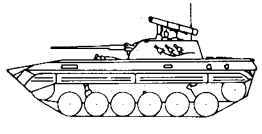
T-74
Main Battle Tank



Weight: 45.1 tons
Main Weapon: 125mm Smoothbore Cannon
Secondary Weapon: two machineguns
Armour: Medium (steel & laminate/composite)
Crew: 3
Hull Length: 7.0 meters
Hull Width: 4.8 meters
Height: 2.4 meters
Engine: 780 hp diesel
Maximum Road Speed: approx. 37 mph

This vehicle is still called the T-80 by the U.S. Defence Department even though most other nations and sources (including Jane's) indicate the Soviet designation is T-74. Like all Soviet post-WWII MBT's it is low, rounded, and fast ("drives like a sports car" according to Israeli tankers). The 125mm cannon has a mechanical loader that eliminates the need for a fourth crewman. Sights and night-fighting equipment aren't up to western standards. The armour is predominantly traditional steel plate, since the Soviets haven't discovered the secret of Chobham armour. The T-74 is an evolutionary improvement in a family that reaches back through the T-72 to T-64, T-62 and ultimately to the ancient T-55 of the 1950's.

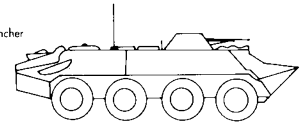
BMP-2
Infantry Combat Vehicle - USSR



Weight: 16.1 tons
Main Weapon: 30mm Rifled Cannon
Secondary Weapon: AT-5 Spandrel Missile
Armour: Light (steel)
Crew: 3 + 7 passengers
Hull Length: 6.7 meters
Hull Width: 3.1 meters
Height: 2.1 meters
Engine: 350 hp diesel
Maximum Road Speed: approx. 37 mph

The BMP-1 was a seminal concept in AFVs: an amphibious armoured vehicle with a light cannon and anti-tank missile that carried an infantry squad. The BMP-2 is an improvement on the original. It has a new 30mm high-velocity gun and better anti-tank missile, but reduced infantry space (normally only six infantrymen are carried). According to Soviet doctrine, each BMP should carry a "Grail" (SA-7, SA-7B, or SA-14 surface-to-air missile) for defence against air attack. In action one of the infantrymen opens a top hatch on the rear deck, stands up, aims the Grail from his shoulder, and fires.

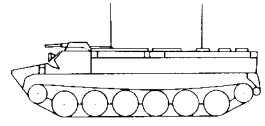
BTR-70
Armoured Personnel Carrier - USSR



Weight: 12.7 tons
Main Weapon: two machineguns
Secondary Weapon: 30mm grenade launcher
Armour: Light (steel)
Crew: 2 + 9 passengers
Hull Length: 7.8 meters
Hull Width: 2.8 meters
Height: 2.5 meters
Engine: two 115 hp gas reciprocating
Maximum Road Speed: approx. 37 mph

This 8-wheeled carrier is an upgrade of the ancient BTR-60, designed prior to the BMP. Although a useful troop carrier especially on roads or flat, firm ground, it has trivial armament, very weak armour, and an extremely poor transmission (due to the twin engines). Infantry must enter and exit the passenger compartment through two small roof hatches (most APCs use large rear doors). If the USSR had a Congress and/or a free press, ridiculous vehicles like this would be taken out of production (see the M247 Sergeant York DIVAD).

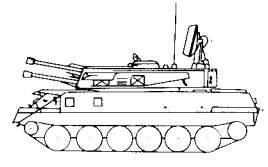
MT-LB
Armoured Carrier - USSR



Weight: 13.1 tons
Main Weapon: one machinegun
Secondary Weapon: None
Armour: Light (steel)
Crew: 2 + 11 passengers
Hull Length: 6.5 meters
Hull Width: 2.9 meters
Height: 1.9 meters
Engine: 240 hp diesel
Maximum Road Speed: 38 mph

This general-purpose carrier was based on an unarmoured tractor designed for use in swamps and arctic areas. It is an excellent cheap transporter with superior cross-country mobility. It has both roof hatches and rear doors for easy loading and unloading. Unlike the BMP, the MT-LB is not designed for fighting in the front lines.

ZSU-23-4 "Shilka"
Self-Propelled AA Gun - USSR



Weight: 20.9 tons
Main Weapon: four 23mm Auto-Cannons
Secondary Weapon: none
Armour: Light (steel)
Crew: 4
Hull Length: 6.5 meters
Hull Width: 3.0 meters
Height: 3.0 meters
Engine: 280 hp diesel
Maximum Road Speed: 27 mph

The "Zoo" is another seminal design intergrating powerful, rapid-fire AA guns with computerised radar fire control on a light tank chassis. The guns overheat quickly, and so are fired in 3 to 5 second bursts. Still, each burst puts 200 shells into the air! The original ZSU-23-4 design had mediocre radar that had trouble finding targets below 200' altitude. The newer ZSU-23-4M has a much improved radar system with better search and resolution capabilities. The guns can fire using optical sights if the radar is jammed. The ZSU-23-4 has been greatly feared by Western pilots.

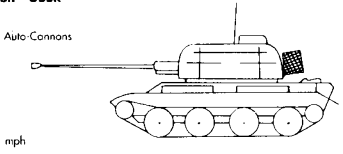
ZSU-30-2
Self-Propelled AA Gun - USSR

(No illustration available)

Weight: probably 20-30 tons
Main Weapon: two 30mm Auto-Cannons
Secondary Weapon: probably none
Armour: probably Light (steel)
Crew: probably 3-4
Hull Length: probably 6.2-6.7 meters
Hull Width: probably 3.0 meters
Height: unknown
Engine: probably a diesel
Maximum Road Speed: probably 27-37 mph

Although it has not been displayed on parade, diverse sources suggest that the Soviet Union has a new and improved AA tank with twin 30mm guns. Details are not yet available. This design replaces the ZSU-23-4, now more than 20 years old. The heavier caliber 30mm guns should be able to do more damage at longer ranges against armored helicopters such as the AH-64.

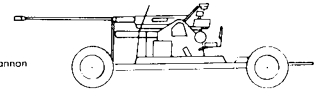
ZSU-57-2
Self-Propelled AA Gun - USSR



Weight: 30.9 tons
Main Weapon: two 57mm Auto-Cannons
Secondary Weapon: none
Armour: Light (steel)
Crew: 6
Hull Length: 6.2 meters
Hull Width: 3.0 meters
Height: 3.0 meters
Engine: 280 hp diesel
Maximum Road Speed: 31 mph

This obsolete AA weapon uses an early 1950's tank hull and two late 1950's AA guns. The guns track slowly and lack radar ranging or control (everything is done optically or manually). However, the shells are quite powerful — a direct hit can seriously damage a plane or helicopter, even the armoured A-10's and AH-64's. Large numbers were supplied to Soviet client states, who now use it primarily against ground targets.

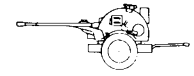
S-60
57mm AA Gun - USSR



Weight: 5.0 tons
Main Weapon: one 57mm Auto-Cannon
Secondary Weapon: none
Armour: none
Crew: 7
Length: 8.5 meters travelling
Width: 2.1 meters travelling
Height: 2.6 meters travelling
Engine: none
Maximum Road Speed: towed

This old but effective medium AA gun is still used worldwide by Soviet-equipped states. The gun can be fired using optical control. For greater accuracy a SON-9A fire control radar with PUAZO-6/60 director can be attached. One or more guns can be tied into a search radar system for long-range accuracy. During the Vietnam War this system is believed to have been the single most effective destroyer of American aircraft.

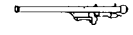
ZU-23
23mm AA Gun - USSR



Weight: 1.1 tons
Main Weapon: two 23mm Auto-Cannon
Secondary Weapon: none
Armour: none
Crew: 2-3
Length: 4.6 meters travelling
Width: 1.8 meters travelling
Height: 1.9 meters travelling
Engine: none
Maximum Road Speed: towed

This cheap, rapid-fire, short-range AA gun is used extensively by Soviet supplied armies. It is relatively light for easy transportation and sets up quickly. The gun is considerably superior to machineguns and other ad hoc AA defences, but is not designed for use with radar. Therefore its range is low and its accuracy against fast-moving targets is totally dependent on the gunner's skill.

SA-7, SA-7B or SA-14
Portable Surface-to-Air Missile - USSR

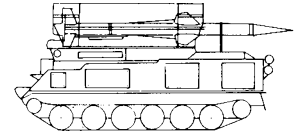


Weight: 20.3 lb missile (+tube extra)
Main Weapon: 5.5 lb fragmentation warhead
Secondary Weapon: none
Armour: none
Crew: 1
Length: 1.35 meter missile
Width: 70mm missile diameter
Height: (shoulder launched)
Engine: Mach 1.5 solid fuel
Maximum Road Speed: manpack

This IR-homing missile has been popular among Soviet-supplied armies and terrorists for years. The original SA-7 had an IR homing head that needed to fly up a jet exhaust, and was easily decayed by flares and jammers. The SA-7B has an improved seeker that is less easily jammed, but still uses a small 5.5 lb. warhead. The new SA-14 is believed to have an even better seeker and larger warhead. The maximum range and altitude of these missiles is consistently underestimated in the West. For example, although an altitude limit of 1,500' is widely quoted, an SA-7 hit an Omani jet (in 1974) at 11,500 feet!

The SA-7, -7B, or -14 is carried by infantry units, used to defend ground installations, and carried inside BMP vehicles as their aircraft defence.

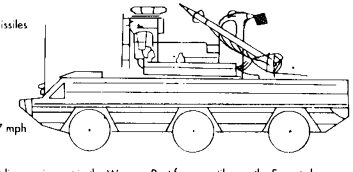
SA-6 "Gainful"
Self-Propelled Surface-to-Air Missile Launcher - USSR



Weight: 15.4 tons
Main Weapon: three SA-6 missiles
Secondary Weapon: none
Armour: Light (for crew only)
Crew: 3
Hull Length: 6.8 meters
Hull Width: 3.2 meters
Height: 3.5 meters
Engine: 280 hp diesel
Maximum Road Speed: 27 mph

This medium-range SAM system is commonly used by poorer Soviet-supplied nations against aircraft at low to medium altitude. The launcher vehicles travel and fire in co-operation with separate radar vehicles. One radar system searches for targets, then hands them off to a second fire-control radar that tracks the target, plus the missile once it is fired. The fire-control radar then sends commands to the missile that guide it to the target. If the radar control is jammed or destroyed the missile flies "blind" and is unlikely to hit anything. The SA-6 system is popular because the missiles and radar can move forward with combat troops, or be positioned where threats are greatest. However the radar and control technology are 1960's vintage and easily jammed. The missiles themselves are slow (Mach 1.5) and not very manoeuverable.

SA-8 "Gecko"
Self-Propelled Surface-to-Air Missile Launcher - USSR

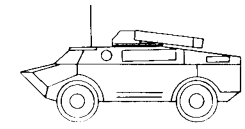


Weight: approx. 25 tons
Main Weapon: four or six SA-8 missiles
Secondary Weapon: none
Armour: Light (for crew only)
Crew: 3
Hull Length: 9.0 meters
Hull Width: 2.9 meters
Height: 4.1 + meters
Engine: no reliable data
Maximum Road Speed: approx 37 mph

This sophisticated system was front-line equipment in the Warsaw Pact forces until recently. Exports have begun to select Soviet client states (including Syria and Iraq). The vehicle mounts its own tracking radars, but can work with separate search radar systems to aquire targets beyond visual range. The target is normally tracked with radar, but optical TV tracking is available if the radar is jammed. In early flight the missile is guided toward the target by the controller. As it closes in, an IR homing warhead switches on, providing another backup in case the radar guidance system fails. The missile can reach speeds over Mach 2 and is fairly manoeuverable, but burns out rather quickly (maximum range is 12 kilometers). The vehicle can launch and control two missiles simultaneously and on different frequencies. The SA-8B system has six improved and more sensitive missiles cased in protective boxes.

SA-9 "Gaskin"
Self-Propelled Surface-to-Air Missile Launcher - USSR

Weight: approx. 8 tons
Main Weapon: four SA-9 missiles
Secondary Weapon: none
Armour: Light (steel)
Crew: 2-3
Hull Length: 5.8 meters
Hull Width: 2.4 meters
Height: 2.2 + meters
Engine: 140 hp gas reciprocating
Maximum Road Speed: approx. 60 mph



This light armoured vehicle is armed with short-range IR homing missiles. The missiles are aimed by the gunner using visual sights. The SA-9B has a simple radar to aid the gunner in locating targets. The missile itself is barely equal to the SA-7. It has an even smaller warhead, but a larger minimum range and minimum altitude. The questionable value this system was demonstrated in the 1981-82 Israeli air raids over Lebanon, where Israeli planes inflicted massive losses on entire Syrian batteries of these vehicles.

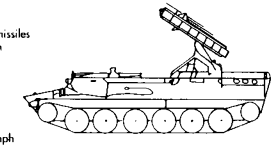
SA-11,"Gadfly"
Self-Propelled Surface-to-Air Missile Launcher - USSR

(No illustration available)

Weight: approx. 20 tons
Main Weapon: four SA-11 missiles
Secondary Weapon: none
Armour: Light
Crew: 3-4
Hull Length: 6.5 meters
Hull Width: 3.0 meters
Height: 3.0 meters
Engine: 280 hp diesel (probably)
Maximum Road Speed: approx. 27 mph

This is the latest Soviet medium-range missile, designed to replace the SA-6 system. It can use the same improved search and tracking radars. The missile homes on reflected radar signals, flies very fast (Mach 3) and is reasonably manoeuverable. Because this system is quite recent, some sources believe it has a backup TV or laser tracking system as well as IR homing for terminal guidance.

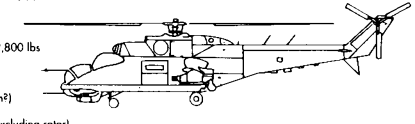
SA-13 "Gopher"
Self-Propelled Surface-to-Air Missile Launcher - USSR



Weight: 13.8 tons
Main Weapon: four SA-9 or SA-13 missiles
Secondary Weapon: one machinegun
Armour: Light (for crew only)
Crew: 3-4
Hull Length: 6.6 meters
Hull Width: 2.9 meters
Height: 2.3 meters
Engine: 240 hp diesel
Maximum Road Speed: approx. 34 mph

This is a completely redesigned successor to the SA-9 Gaskin. It has a small search radar and fires IR homing missiles from a converted MT-LB vehicle. These missiles are new, improved designs that jump between two IR frequencies to counteract jamming and flares. The homer is sensitive enough to find "hot spots" on aircraft skin caused by air friction, rather than simply chasing the exhaust. Introduced in 1980, the SA-13 missile is the USSR's best ground-launched IR homing weapon now in active service. Versions of the vehicle have been supplied to the Warsaw Pact and selected Soviet allies, but often the actual missiles are the poor SA-9's, rather than the state-of-the-art SA-13s!

MI-24 "Hind"
Attack Helicopter - USSR



Weight: 12.1 tons
Main Weapon: Varies
Secondary Weapon: 2,800 lbs of bombs, rockets etc.
Armour: Light (titanium?)
Crew: 3
Length: 33.7 meters (excluding rotor)
Width: approx. 16 meters (excluding rotor)
Height: 5.2 meters
Engine: Two Lotarev D-136 turboshaft jets, 11,400 total shp
Maximum Level Speed: 183 mph

This large, fast, heavy, armoured helicopter is literally a "flying battlecruiser". The D model has a 12.7mm gatling gun turret beneath the nose as its main weapon. The E model has four fixed 23mm cannons while the turret houses laser guidance for AT-6 "Spiral" anti-tank missiles. An F model carrying IR homing missiles for air-to-air combat may exist (the U.S. Defence Department calls it the Mi-28 Havoc). The "Hind" is faster than any western helicopter, but much less manoeuverable. Although the D model (illustrated above) has a nose turret, it lacks an equivalent to HADSS and TADS. Therefore, in swirling air-to-air combat it is limited to forward firing, like the E model. No information exists on the guns and cannons of the "F" model, much less the fire control system used.

PASSWORD	COUNTERSIGN
ACCENT	TRAMPOLINE
BILLBOARD	KICKBACK
CROMAGNON	MELODRAMA
DAKOTA	ONSTAGE
ELECTRA	VERTICAL
FOOTHOLD	INSOLENT
GRENADIER	NOCTURNE
HEDGEHOG	LOCKSMITH
IVORY	WILLOW
KNOCKOUT	PUREBRED
LOZENGE	ROMANTIC
MAZURKA	YELLOW
NEBULA	QUAKER
OVATION	UPSTAGE
PENTHOUSE	SYMPHONY
QUARTZ	ZEBRA