

Self-Propelled Guns



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MOWAG Piranha 5 10x10

Notes: Unlike most of MOWAG's Piranha range of vehicles, the Piranha 10x10 (also known as the Piranha 5) was never designed or meant to be an APC chassis. It was designed from the start as a heavy scout vehicle and tank destroyer. The Piranha 10x10 was a private company design that MOWAG hoped would interest international buyers; the first prototype was completed in 1993, with the development phase being completed in 1994, and presentation to the international arms market in 1995. Later in 1995, the Piranha 10x10 was first demonstrated to several potential Middle

Eastern buyers. However, the eventual customers were primarily European nations – Denmark, Sweden, and Romania. Later, the Spanish acquired several Piranha 5s, including an unknown number for the Spanish Marines, armed with a 120mm gun and having advanced stabilization as standard. In addition, the Piranha 5 was in contention for the fire support elements of Stryker Brigades (though it did not fare well in the air-portable tests). The US has retained 5 Piranha 5s for further testing. The New Zealanders also use the Piranha 5. The Piranha 5 has not seen combat use, except for sporadic combat in a peacekeeping role.

For the most part, each countries' Piranha 5s are the same externally, with most differences being internal. All of these vehicles sold are equipped with a NATO-compatible rifled 105mm GIAT G2 main gun, but a 120mm Rheinmetall gun has always been an available option. The TML 105 turret is equipped with advanced fire control and vision devices, but poor gun stabilization in its basic form. Each has a 40-kilowatt APU for use when the engine is off; Sweden is said to have specifically requested this feature, as their Piranha 5s are to be used for long coastal watches (and patrols), where power may be needed immediately for fire control and to power vision devices. In addition, there are two clusters of seven GALIX grenade launchers, which may be command or automatically-fired. The grenades are larger than standard NATO smoke generation grenades at 80mm.

Power is provided with a 340-horsepower Scania turbocharged diesel coupled to a 7-speed fully automatic ZF transmission. The driver has conventional controls, with power steering on the front four wheels and power/antilock brakes. The tires have central tire pressure regulation, and are puncture-resistant run-flat tires. The driver is on the front right, with his hatch cover rotating open to the left. He has three wide-angle vision blocks to his front and sides; the center one has a night vision channel. To his left is the engine; behind him is a seat for an additional passenger, with a hatch that rotates out to the right. The commander is on the turret left, and the loader's hatch is on the turret right.

The rear of the vehicle carries the fuel tank, 26 rounds of 105mm ammunition or 22 rounds of 120mm, and a small space where the crew can store their gear and which is big enough for a single cot. The rest of the ammunition is in the turret bustle.

The chassis is essentially an extended Piranha II 8x8 chassis. The hull is of all-welded steel, but has only moderate protection in the armor department.

A number of options are available for the Piranha 5, besides the 120mm Gun. The engine may be replaced with a 400 or 450 horsepower engine. Applique armor may be applied to the vehicle's hull and turret, as may lugs for ERA on the front and sides of the hull and turret. If applique armor is installed, it is welded on rather than being bolted on (and giving something else to rocket around the vehicle upon a hit). NBC overpressure or vehicular NBC systems may be installed; all five parties operating these vehicles have taken the NBC Overpressure option. A BMS is available, along with a vehicle state system and GPS. An autoloader can be added to the loading system, but this is not designed to completely replace the loader. Better stabilization is also available, as is a laser designator. A day/night CITS can give the Piranha 5 a hunter/killer capability; the Swedes and Spanish have taken this option. Air conditioning can be added.

Swedish Piranha 5s

The Swedish iteration of the Piranha 5 have an internal soft Kevlar antispalling liner. Swedish Piranha 5s do not use the RWS option; instead, they use an electrically-turning cupola with a Ksp-58 for the commander. They are equipped with NBC Overpressure, with a vehicular NBC backup. Sweden uses a domestic form of a BMS, along with a vehicle state computer, GPS, and a mapping computer. Swedish Piranha 5s have a CITS, enabling a hunter/killer capability. Swedish Piranha 5s are equipped with a 400-horsepower engine. They have a short-range radio jammer (does not jam friendly forces' radios) to keep IED from exploding; this extends under the front third of the vehicle, and the commander gets an alert if anything is found. They are equipped with a full BMS, including vehicle state computer, GPS, and mapping module.

Danish Piranha 5s

Danish Piranha 5s have Kongsberg Protector RWS above the commander's hatch. Denmark adds hard Kevlar panels to the interior molded into the walls, and also have a Kevlar antispalling liner. Danish Piranha 5s use a 400-horsepower turbocharged diesel engine. In addition, Danish Piranha 5s. Danish Piranha 5s have a short-range radio jammer (does not jam friendly forces' radios) to keep IED from exploding; this extends under the front third of the vehicle, and the commander gets an alert if anything is found. Danish Piranha 5s have a Kongsberg Protector RWS above the commander's hatch.

Spanish Piranha 5s

Spain has gone all-out with their Piranha 5s. They armed their Piranha 5s with 120mm Rheinmetall guns, and Spain has elected to equip their Piranha 5s with a mondo-powerful 577-horsepower engine. The vehicles have a full BMS and Vehicle State computer, along with GPS and a mapping module. They have a CITS, giving it a hunter/killer capability. The Spanish have installed a 40-liter chilled water tank in their cargo area. Spanish Piranha 5s also have RWR and LWR. They are equipped with air conditioning with NBC filters.

Romanian Piranha 5s

Romanian Piranha 5s also have a Kongsberg Protector RWS, but it is differently-armed than the Danish Protector. They are outfitted with the 450-horsepower engine. Romanian Piranha 5s do not have a BMS, but they do have a vehicle state computer and GPS with a mapping computer. They are equipped with air conditioning with NBC filters.

New Zealander Piranha 5s

New Zealander Piranha 5s are very similar to Danish Piranha 5s; they have a CROWS-type OHWS, they have hard molded-in Kevlar panels as well as an antispalling blanket. have a short-range radio jammer (does not jam friendly forces' radios) to keep IED from exploding; this extends under the front third of the vehicle, and the commander gets an alert if anything is found. The New Zealander Piranha 5s, however, use an uprated 450-horsepower engine. New Zealander Piranha 5s have a full BMS with Vehicle State computer and GPS with a mapping module. They have AC with NBC Filters. Their Piranha 5s have a 50-liter chilled drinking water tank, as well as a ration cooker and water heater. New Zealander Piranha 5s have RWR, LWR, and IFF; it is rumored that this is preparation for the installation of an APS in the future.

I have included versions below for Piranha 5s with all the options installed, just for the heck of it, in both 105mm and 120mm versions. Drinking water tanks, chilled or room-temperature, can be installed in the cargo space' the Spanish and New Zealanders have elected to install a 40-liter chilled tank. Spanish Piranha 5s also have Radar and Laser Warning Receivers, as do New Zealander Piranha 5s.

Vehicle	Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
Piranha 5 (Swedish)	\$982,080	D, A	838 kg	30 tons	4	23	Passive IR (D, G), Thermal Imaging (G, C), 2 nd Gen Image Intensification (G, C)	Shielded
Piranha 5 (Swedish, w/Applique)	\$1,006,904	D, A	572 kg	30.53 tons	4	23	Passive IR (D, G), Thermal Imaging (G, C), 2 nd Gen Image Intensification (G, C)	Shielded
Piranha 5 (Danish)	\$1,212,529	D, A	515 kg	30.3 tons	4	26	Passive IR (D, G), FLIR (G), 2 nd Gen Image Intensification (G, C)	Shielded
Piranha 5 (Danish, w/Applique)	\$1,237,353	D, A	505 kg	30.83 tons	4	26	Passive IR (D, G), FLIR (G), 2 nd Gen Image Intensification (G, C)	Shielded
Piranha 5 (Spanish)	\$1,322,213	D, A	517 kg	30.43 tons	4	26	Passive IR (D, G), 2 nd Gen FLIR (G, C), 2 nd Gen Image Intensification (G, C), Day/Night Backup Camera	Shielded
Piranha 5 (Spanish, w/Applique)	\$1,353,993	D, A	527 kg	30.96 tons	4	27	Passive IR (D, G), 2 nd Gen FLIR (G, C), 2 nd Gen Image Intensification (G, C), Day/Night Backup Camera	Shielded
Piranha 5 (Romanian)	\$976,319	D, A	495 kg	30.3 tons	4	27	Passive IR (D, G), 2 nd Gen Thermal Imaging	Shielded

Piranha 5 (Romanian, w/Applique)	\$985,309	D, A	479 kg	30.83 tons	4	28	(G, C), 2 nd Gen Image Intensification (G, C), Day/Night Backup Camera Passive IR (D, G), 2 nd Gen Thermal Imaging (G, C), 2 nd Gen Image Intensification (G, C), Day/Night Backup Camera	Shielded
Piranha 5 (New Zealander)	\$1,127,859	D, A	572 kg	30.5 tons	4	27	Passive IR (D, G), 2 nd Gen FLIR (G, C), 2 nd Gen Image Intensification (G, C), Day/Night Backup Camera	Shielded
Piranha 5 (New Zealander w/Applique)	\$1,475,457	D, A	567 kg	31.03 tons	3	28	Passive IR (D, G), 2 nd Gen FLIR (G, C), 2 nd Gen Image Intensification (G, C), Day/Night Backup Camera	Shielded

Vehicle	Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
Piranha 5 (Swedish)	117/58	32/16	300	148	Trtd	W(8)	TF12 TS6 TR3 HF10 HS7 HR4*
Piranha 5 (Swedish, w/Applique)	116/58	32/16	300	148	Trtd	W(8)	TF15Sp TS9Sp TR3 HF16Sp HF10Sp HR5**
Piranha 5 (Danish)	115/58	32/16	300	148	Trtd	W(8)	TF13 TS7 TS4 HF11 HS8 HR5*
Piranha 5 (Danish, w/Applique)	114/58	32/16	300	148	Trtd	W(8)	TF16Sp TS10Sp TR4 HF17Sp HS11Sp HR6**
Piranha 5 (Spanish)	152/77	42/22	300	214	Trtd	W(8)	TF13 TS7 TR4 HF11 HS8 HR5*
Piranha 5 (Spanish w/Applique)	150/75	41/21	300	214	Trtd	W(8)	TF15Sp TS9Sp TR3 HF16Sp HF10Sp HR5**
Piranha 5 (Romanian)	127/64	36/18	300	167	Trtd	W(8)	TF13 TS7 TS4 HF11 HS8 HR5*
Piranha 5 (Romanian, w/Applique)	124/63	34/18	300	167	Trtd	W(8)	TF16Sp TS10Sp TR4 HF17Sp HS11Sp HR6**
Piranha 5 (New Zealander)	125/63	34/18	300	167	Trtd	W(8)	TF15 TS9 TS6 HF13 HS10 HR6**
Piranha 5 (New Zealander w/Applique)	124/62	34/18	300	167	Trtd	W(8)	TF19Sp TS13Sp TR4 HF16Sp HS13SP HR7**

Vehicle	Fire Control	Stabilization	Armament	Ammunition
Piranha 5 (Swedish)	+2	Basic	105mm GIAT G2 Gun, Ksp-58 (C), Kso-39	48x105mm, 4000x7.62mm

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Piranha 5 (Danish)	+3	Fair	105mm GIAT G2 Gun, M2HB (RWS), MAG	48x105mm, 2400x.50, 4000x7.62mm
Piranha 5 (Spanish)	+3	Fair	120mm Rheinmetall Gun, MG3 (C), MG3	42x120mm, 4000x7.62mm
Piranha 5 (Romanian)	+2	Basic	105mm GIAT G2 Gun, Mk 19 AGL (RWS), MAG	48x105mm, 4000x7.62mm, 760x40mm Grenades
Piranha 5 (New Zealander)	+3	Fair	105mm GIAT G2 Gun, Mk 19 AGL, MAG (CROWS), MAG	48x105mm, 4000x7.62mm, 760x40mm Grenades

*Hull and Turret Roof AV for these versions is 5. Hull floor AV is 7Sp.

**Hull and Turret Roof AV for these versions is 6. Hull floor AV is 8Sp

M113A1 Recoilless Rifle Carrier

Notes: This is an Australian modification of the M113A1, used as an antiarmor vehicle and support vehicle. In this version, an M40A2 106mm recoilless rifle has been mounted on the deck on the right side of the vehicle behind the commander's cupola. There is a modified Carl Gustav M2 ammunition box mounted on the floor of the interior to hold ammunition for the recoilless rifle, but more boxes are often carried in the passenger area. The weapon is operated from the open hatch on the rear deck. The standard M2HB on the commander's hatch is retained; ammunition stowage is rearranged for quick access.

The engine is the General Motors 6V53, which develops 212 horsepower and offers much better fuel economy. This is coupled to an automatic transmission with three forward speeds and one reverse. The driver's position is in the left front of the hull; his hatch is above him, to the front and left of the commander's cupola. The driver has vision blocks that cover everything except the rear and part of the right-side arcs, and the front one can be easily removed and replaced with a passive IR periscope. The seat for the driver can be raised and lowered so that the driver may drive with his head outside the hatch or buttoned up. The controls consist of a gearshift, a gas pedal, and a pair of tillers to steer and brake the vehicle using differential steering. (Driving an M113 with the tiller system actually requires a surprising amount of upper body strength – if you don't have it, you'll develop it pretty fast.) The M113 is amphibious with a minimum of preparation (the trim vane must be lowered to its swimming configuration, which takes no more than 15 seconds) – but the M113 must already have rubber track skirts installed. These bolt onto the sides of the M113 over the top part of the tracks; when the M113 enters the water, an air bubble forms over the top of the tracks to give the M113 the extra buoyancy needed for it to float. Propulsion is by the movement of its tracks. (These rubber skirts are easily torn up in normal field operations, and they are usually left in the motor pool.) The M113 has a bilge pump that pumps water out of the engine compartment and from under the floor of the M113. The M113 used a flat torsion bar suspension, another thing that could lead to troops feeling beat-up and queasy by the time they reached the AO; I'm not the only one who has thrown up during a long off-road M113 ride!

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$239,027	D, A	843 kg	11.96 tons	4	7	Passive IR (D)	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
159/111	44/31/4	360	124	Std	T2	HF6 HS4 HR4

Fire Control	Stabilization	Armament	Ammunition
None	None	M40A2 106mm recoilless rifle, M2HB (C)	16x106mm, 2000x.50

LAV-90

Notes: This is a variant of the MOWAG Piranha II 8x8 (a version of this vehicle, armed with a 25mm turret, is known to the US as the LAV-25), is armed with a 90mm TS-90 turret. This is the same turret as found on the ERC-90. There is another version of this vehicle, using a Cockerill LCTS 90mm turret. Saudi Arabia uses the TS-90 version, and Oman and Qatar use the Cockerill turret version. This version of the LAV has an increased fuel capacity, a small hatch on the left side of the hull (primarily for passing reload ammunition), and a winch with a capacity of 6.8 tons.

As a variant of the Piranha, the LAV-90 has the wedge-shaped nose and moderately-sloped sides of the basic chassis, and an 8x8 suspension with front and rear sets of wheels with independent steering, giving the LAV-90 a surprisingly small turning radius. For standard road use, the LAV-90 normally uses only the four rear wheels as drive wheels, switching to 8-wheel drive off road. The LAV-90 is amphibious with a minimum of preparation (about 2 minutes) and is propelled in the water by propellers and steered by rudders. Power is provided by the standard LAV II engine, the Detroit Diesel 6V53T 275-horsepower turbocharged diesel. This is coupled to an automatic transmission and the driver has a conventional drive control setup. The driver is located on the front left and has three vision blocks to his front.

The turrets are to the rear of the driver, slightly forward of center; in the case of the LCTS 90, it carries a commander and gunner/loader, with the commander having a cupola with all-around vision blocks and the gunner having a hatch with vision blocks to his front, left, and rear. The sights and night vision devices are provided for the gunner, but available to the commander, and he has auxiliary controls for the autocannon and coax. The turret is armed with a cannon and coaxial machinegun. One-quarter of the main gun ammunition and one half of the coaxial machinegun ammunition is stowed in the turret, with the rest being elsewhere in the vehicle. A cluster of six smoke grenade launchers is found on each side of the turret. The TS-90 turret has only a commander and gunner/loader in the turret, and no ready rounds are carried in the turret as it is too small; 400 rounds of machinegun ammunition are stowed in the turret. The LAV-90 can take a version of the LAST applique armor kit, though the resulting vehicle is too heavy and unbalanced for amphibious operations.

Vehicle	Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
LAV-90 (TS-90 Turret)	\$235,900	D, A	559 kg	13 tons	3	9	Passive IR (D, G), Image Intensification (G, C)	Enclosed
With LAST Kit	\$241,734	D, A	554 kg	14.13 tons	3	9	Passive IR (D, G), Image Intensification (G, C)	Enclosed
LAV-90 (LCTS 90 Turret)	\$265,836	D, A	516 kg	13.4 tons	3	9	Passive IR (D, G), Image Intensification (G, C)	Enclosed
With LAST Kit	\$272,410	D, A	511 kg	14.53 tons	3	9	Passive IR (D, G), Image Intensification (G, C)	Enclosed

Vehicle	Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
LAV-90 (TS-90 Turret)	179/90	50/25/5	300	101	Trtd	W(6)	TF6 TS7 TR6 HF6 HS4 HR4
With LAST Kit	168/85	47/23	300	101	Trtd	W(6)	TF6 TS7 TR6 HF10Sp HS6Sp HR5*
LAV-90 (LCTS 90 Turret)	174/88	49/25/5	300	101	Trtd	W(6)	TF5 TS5 TR5 HF6 HS4 HR4
With LAST Kit	163/83	46/23	300	101	Trtd	W(6)	TF5 TS5 TR5 HF10Sp HS6Sp HR5*

Vehicle	Fire Control	Stabilization	Armament	Ammunition
LAV-90 (TS-90 Turret)	+3	Fair	90mm CN 90 F2 gun, MAG	43x90mm DEFA, 1620x7.62mm
LAV-90 (LCTS 90 Turret)	+3	Good	90mm Cockerill Mk 3 gun, MAG	43x90mm NATO, 1620x7.62mm

*Hull floor AV is 5; Hull roof AV is 3.

LAV-105

Notes: This is a tank destroyer version of the LAV-25, used by US Army light divisions and by the US Marines. It is a standard LAV-25 chassis with a new turret mounting a 105mm NATO-compatible cannon, and the passenger space taken up with ammunition stowage. A stronger 300-horsepower engine, transmission, and suspension have been used to cope with the increased weight. The gun is equipped with an autoloader. Much of the automotive and structural details of the LAV-90 above apply to the LAV-105;

however, the LAV-105 has rearranged ammunition stowage to accommodate the larger rounds of main gun ammunition and autoloader, though half of the M2HB's ammunition is stowed in the turret, for use by the commander/gunner. The turret is likewise different with it being similar to Stryker M1128's turret in appearance, though it mounts a heavily-buffered and low-pressure gun. A cluster of six smoke grenade launchers is found on each side of the turret. The LAV-105 can take a version of the LAST applique armor kit, though the resulting vehicle is too heavy and unbalanced for amphibious operations.

Twilight 2000 Notes: The LAV-105 was also used in the Twilight War in limited numbers by the US Army's 82nd Airborne Division, 101st Airborne Division, 173rd Airborne Brigade, and by the Canadian military.

Vehicle	Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
LAV-105	\$309,150	D, A	714 kg	14.52 tons	3	9	Passive IR (D, G, C), Image Intensification (G, C)	Enclosed
With LAST Kit	\$316,796	D, A	709 kg	15.65 tons	3	9	Passive IR (D, G, C), Image Intensification (G, C)	Enclosed

Vehicle	Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
LAV-105	175/89	49/25/5	300	111	Trtd	W(6)	TF5 TS5 TR5 HF6 HS4 HR4
With LAST Kit	164/84	46/23	300	111	Trtd	W(6)	TF5 TS5 TR5 HF10Sp HS6Sp HR5*

Vehicle	Fire Control	Stabilization	Armament	Ammunition
LAV-105	+4	Good	105mm EX35 Gun, MAG, M-2HB (C)	30x105mm, 1000x7.62mm, 500x.50

*Hull floor AV is 5; Hull roof AV is 3.

LAV III/90 Bobcat I

Notes: As the LAV III was selected for service with Canada and the US in late 1993 (known to the Canadians as the Kodiak, and the Americans as the LAV III or LAV 3rd Generation), the utility of the more robust chassis was immediately realized and other vehicles based on this chassis were drawn up. One of these was the fire support and tank destroyer vehicle known as the Bobcat I to the Canadians and the LAV III/90 FSV to the Americans who tested them. The Bobcat I is a standard Kodiak chassis topped with a turret similar to that of the LAV-90, but with increased armor protection. The Bobcat I also has a better night vision suite and a laser detection system that detects targeting lasers and automatically launches smoke grenades in the direction of the beam. The turret is that of the British Scorpion-90, but with extra armor and better fire control.

The gunner and commander have LCD screens displaying various information about the vehicle's state, and the commander and driver also have access to a GPS and tactical navigation system (TACNAV) along with a digital compass. The LCD monitors also display the view through the sights and vision devices to the gunner and commander. The commander has an independent thermal imager and image intensifier as well as a telescopic day sight, giving him a hunter/killer capability. The commander also has access to a 6-million candlepower searchlight with white light and IR channels. The driver is in his customary place in the front left, and has standard driving controls. The Bobcat I is powered by a Caterpillar 3126 turbocharged diesel developing 350 horsepower, coupled to an automatic transmission. The 8x8 suspension can be switched to 4x8 (with the rear set of wheels providing the power) to improve on-road performance; it is also beefed up to improve off-road performance. All wheels have antilock brakes and run-flat tires, as well as a traction control system. In the front of the hull is a winch with a capacity of 6804 kg and 100 meters of cable. The LAV III/90 is not amphibious. The crew is protected by an automatic fire detection and suppression system for the driver's compartment, engine compartment, turret basket, and rear compartment. The crew and passengers also have the protection of a collective NBC system, and the Bobcat I has a chemical agent detector and a radiation meter. The Bobcat I is radiologically protected. Armor is still of steel, though it is improved over that of the LAV-90. The Bobcat I has a laser/radar warning receiver to alert the crew when they are being targeted. The crew and troops have air conditioning.

The armor can be supplemented by a composite appliqué armor kit called MEXAS which provides excellent levels of protection without adding undue weight. The Bobcat I can also be fitted with bar/slat armor around its hull to further foil HE-type rounds (Including HEAT); this acts as spaced armor with an AV of 1, and from some angles, gives a sort of "double spaced" effect (the 2D6 normally added to a hit are not added on, and then the hit is reduced by a further 2D6). The hull floor is especially strengthened; though it does not have the V-shape of true MRAPs, the design does to an extent channel away blasts, and troops and equipment inside suffer 10% less damage. The bar/slat armor adds 300 kg to the weight of the vehicle and slows it by 2%, and increases fuel consumption by 2%. The Kodiak is not air-portable with the bar/slat armor in place. The ramp is not covered by the bar/slat armor though the area immediately to the right and left of the ramp are – 25% of all rear-quarter hits will hit the bar/slat armor. The Bobcat I employs thermal dampening technology which presents a -2 penalty to those trying to detect it by IR/thermal-based vision devices or when an IR-guided weapon tries to lock on.

Twilight 2000 Notes: A half a dozen were deployed to both the 82nd and 101st Airborne Divisions, but those divisions preferred the lighter weight and smaller size of the earlier generation of LAV-25 based vehicles, and those LAV IIIs were the only examples of those vehicles deployed by those divisions. More substantial use was made of the LAV III/90 by US Light Divisions and the US Marines. These vehicles were placed into service with Canadian units, primarily in scout squadrons.

Vehicle	Price	Fuel	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
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		Type							
Bobcat I	\$438,707	D, A	551 kg	16.77 tons	4	7	Passive IR (D, G, C), Image Intensification (G, C), Thermal Imaging (C), WL/IR Searchlight		Shielded
With MEXAS	\$442,601	D, A	551 kg	17.1 tons	4	7	Passive IR (D, G, C), Image Intensification (G, C), Thermal Imaging (C), WL/IR Searchlight		Shielded

Vehicle	Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor					
Bobcat I	163/82	46/23	400	147	Trtd	W(6)	TF7Sp	TS6Sp	TR7	HF9Sp	HS6Sp	HR5*
With MEXAS	162/81	46/23	400	147	Trtd	W(6)	TF7Sp	TS6Sp	TR7	HF12Cp	HS9Sp	HR5*

Fire Control	Stabilization	Armament	Ammunition
+3	Good	90mm Cockerill Mk 3 gun, MAG, MAG (C)	50x90mm, 2175x7.62mm

*Hull and Turret Roof AV is 5; Hull Floor AV is 5Sp.

LAV III/105 Bobcat II

Notes: This is basically the same thing to the LAV-105 that the Bobcat I is to the LAV-90; being a tank destroyer based on the Kodiak chassis, but armed with a 105mm gun instead of the 90mm gun of the Bobcat I. In general, the Bobcat I was meant for fire support, while the Bobcat II was more of a dedicated tank destroyer. The turret is a modified form of that used by the M8 Buford AGS; though this turret has the same blow-out panels as the M8, the modular armor cannot be fitted to this modified turret. Instead, the armor on the turret was upgraded directly.

Twilight 2000 Notes: As with the Bobcat I, these vehicles were primarily assigned to Canadian and US units, but a small number were also purchased by Australia and New Zealand. Two were assigned to the 82nd and 101st Airborne Divisions, but these vehicles were hated by riggers and loadmasters due to their large size and the extra work required to land their weight safely by parachute or LAPES.

Vehicle	Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision		Radiological
Bobcat II	\$462,629	D, A	556 kg	18.73 tons	4	9	Passive IR (D, G, C), Image Intensification (G, C), Thermal Imaging (C), WL/IR Searchlight		Shielded
With MEXAS	\$466,736	D, A	556 kg	19.06 tons	4	9	Passive IR (D, G, C), Image Intensification (G, C), Thermal Imaging (C), WL/IR Searchlight		Shielded

Vehicle	Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor					
Bobcat II	150/75	41/21	400	147	Trtd	W(6)	TF7Sp	TS7Sp	TR7	HF9Sp	HS6Sp	HR5*
With MEXAS	149/74	41/21	400	147	Trtd	W(6)	TF7Sp	TS7Sp	TR7	HF12Cp	HS9Sp	HR5*

Fire Control	Stabilization	Armament	Ammunition
+4	Good	105mm EX35 Gun, MAG, MAG (C)	34x105mm, 2175x7.62mm

Harbin Type 89 Antitank Gun

Notes: This self-propelled antitank gun was first fielded in China in small numbers in the late 1980s. The chassis is the same as that of the Type 83 152mm self-propelled gun/howitzer. The M-1989 has a driver's compartment at the front left and the engine compartment on the front right. The turret is mounted on the rear of the vehicle, with a door on the rear of the vehicle for crew entry. The 120mm gun is fitted with a thermal sleeve and fume extractor. The commander has a cupola on the right side of the turret with a machinegun mount. There are stowage baskets on either side of the turret rear. There are four smoke grenade launchers on each side of the turret, and a thick, oily smoke cloud can be laid by injecting diesel fuel into the vehicle's exhaust. At the rear of the hull is a door for crew entry and quick replenishment of ammunition. The driver is on the front left. The crew is protected by a collective NBC system as well as an automatic fire suppression system. A special rack carries a Type 69 RPG and four rounds, which are considered part of the basic weaponry of the vehicle. The Type 83-152 has inertial navigation and a mapping system with computer to give the driver instructions. Power is provided with the 520-horsepower turbodiesel WR4B-12V160LD engine coupled to an automatic transmission. Armor is of steel, but it is thin steel and provides minimal protection. The basic chassis is as similar to the Type 83 as possible in order to simplify production; however, interior appointments are very different due to the different weaponry and ammunition.

The ammunition is of Chinese make, similar to the NATO 120mm ammunition, but no APFSDSDU ammunition is made in China for this weapon. The gun can fire NATO ammunition, however, including APFSDSDU rounds. The main gun is long and accurate, though with limited fire control equipment. The gun has a semiautomatic loader which quickens the fire rate, though not as much as a 125mm gun with an autoloader. The gun is not stabilized, so shots while moving are not recommended.

Note that unlike other Chinese weapons systems, the Type 89 has never been offered for sale outside of China. It has also only seen small-scale introduction inside of China, due to its 120mm gun; the 125mm and 100mm guns are felt to be logistically superior to the 120mm gun, as well as being superior due to the 125mm gun's ability to be fed by an autoloader. Only about 100 Type 89s were built, equipping two divisions as well as a few independent brigades. Though vehicles were built which filled equivalent roles, a version with a 125mm or 100mm gun was never built.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$668,634	D, A	783 kg	31 tons	4	21	Passive IR (D, G), Image Intensification (G)	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
121/85	34/24	885	194	Trtd	T4	TF7 TS4 TR4 HF8 HS3 HR3

Fire Control	Stabilization	Armament	Ammunition
+2	Basic	120mm Type 82-2 L/50 gun, PKT, W-85 (C), Type 69-1 RPG	60x120mm, 1100x7.62mm, 650x12.7mm, 4xType 69 rounds

Henschel Jagdpanzer Kanone (Kanonenjagdpanzer)

Notes: Also known as the Jagdpanzer-90 (to distinguish it from later versions with heavier armament), this is a tank destroyer based on the chassis of the Leopard 1 tank, with a gun taken from obsolete M47 tanks. They had been largely phased out of service or converted to artillery observation post vehicles or Jaguars during the Cold War. These vehicles were used only by Germany and Belgium; the Belgians did not retire theirs until 1991. Like the Leopard 1, the armor of the Jagdpanzer is not much to write home about, but is aided by raked sloping on the front and moderate sloping on the sides.

The Jagdpanzer Kanone has a raised superstructure instead of a turret and the gun mounted in the glacis plate. These vehicles were further upgraded, with laser rangefinders, better night vision, and braces of flare and smoke grenade launchers. There is a hatch near the front of the superstructure on the right for the commander, and another on the rear right deck for the rest of the crew. Unusually, the driver does not have his own hatch. Some are equipped with searchlights above the gun. German Jagdpanzers have MG-3 machineguns, while Belgian vehicles have MAG machineguns.

The Jagdpanzer Kanone is a quick and agile vehicle, in keeping with its primary role as a tank destroyer; this is a result of the use of the Leopard 1 hull, engine, and transmission along with its light weight, which is primarily due to the rather thin armor. Power is provided by an MTU MB 837Aa 500-horsepower multifuel engine, normally fueled by diesel fuel in German and Belgian service. Traverse for the main gun is only 15 degrees for most versions, and elevation from -8 to +15 degrees.

Belgian Jagdpanzer Kanones

The Belgians took delivery of 80 essentially stock Jagdpanzer Kanones in 1975, intending to use them primarily as fire support vehicles, as the 90mm gun was not able to handle the newer crop of T-64 and T-72 tanks being deployed by the other side. However, the Belgians began modifying them almost immediately, adding in a ballistic computer, laser rangefinder, and widening the arc through which the gun could be traversed to 20 degrees to either side. In addition, the IR vision blocks were replaced with vision blocks with image intensification channels. Their smoke grenade launchers usually had a partial load of flares (usually a 3-2 mix on each side). Belgian Jagdpanzer Kanones have extra armor plating on the glacis and sides and have an Overpressure system.

Twilight 2000 Notes: While the Jagdpanzer-90 acquitted itself well during the Twilight War as an infantry support vehicle, it quickly became apparent even before hostilities started that its 90mm gun lacked the punch to allow it to be the tank destroyer it was designed to be so long ago. Therefore, shortly before the war a limited number of Jagdpanzer-90s were upgraded with more modern 105mm guns. They retained the laser rangefinders, ballistic computers, night vision, and flare and smoke generation launchers of the Jagdpanzer 90s, as well as some being equipped with the optional white light/IR searchlight. Conversions began in the mid-1980s at a slow rate, but this conversion rate quickened dramatically when the war began in earnest. Unlike the Jagdpanzer-90, the Jagdpanzer-105 (and later versions with heavier armament) were used only by Germany.

While the Twilight War was going on, some of the older Jagdpanzer 90s were upgraded by replacing their main guns with 120mm guns, and called the Jagdpanzer-120. These vehicles entered service in late 1997 and gave a good accounting of themselves in combat.

The Jagdpanzer-122 is an assault gun based on the Jagdpanzer 90 chassis. These were made during the war by replacing the 90mm gun with a 122mm D-30 Howitzer, which the Germans had from former East German stocks. These vehicles were used for fire support when assaulting fortified positions and were not generally used in the antitank role, unlike other Jagdpanzer vehicles.

These variants of the Jagdpanzer Kanone are entirely fictional: they are the idea of [Jim Lawrie](#) (known to most T2Kers as ChalkLine).

Vehicle	Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
Jagdpanzer-90	\$293,528	D, G, AvG, A	520 kg	27.5 tons	4	13	Passive IR (D, G, C), (Some) WL/IR Searchlight	Shielded
Jagdpanzer-90 (Belgian)	\$304,016	D, G, AvG, A	522 kg	27.6 tons	4	15	Passive IR (G), Image Intensification (D, G, C)	Shielded
Jagdpanzer- 105	\$336,965	D, G, AvG, A	527 kg	27.75 tons	4	13	Passive IR (D, G, C), (Some) WL/IR Searchlight	Shielded
Jagdpanzer- 120	\$363,320	D, G, AvG, A	534 kg	28 tons	4	10	Passive IR (D, G, C), (Some) WL/IR Searchlight	Shielded
Jagdpanzer- 122	\$362,504	D, G, AvG, A	533 kg	28.06 tons	4	10	Passive IR (D, G, C), (Some) WL/IR Searchlight	Shielded

Vehicle	Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
Jagdpanzer-90	132/93	37/26	470	185	Std	T6	TF27 TS14 TR10
Jagdpanzer-90 (Belgian)	132/92	37/26	470	185	Std	T6	TF30 TS17 TR10
Jagdpanzer-105	131/92	36/26	470	185	Std	T6	TF27 TS13 TR10
Jagdpanzer-120/122	130/91	36/25	470	185	Std	T6	TF27 TS13 TR10

Vehicle	Fire Control	Stabilization	Armament	Ammunition
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German SP Guns

Jagdpanzer-90	+2	Fair	90mm NATO Gun, MG-3, MG-3 (C)	51x90mm, 4000x7.62mm
Jagdpanzer-90 (Belgian)	+4	Fair	90mm NATO Gun, MAG, MAG (C)	51x90mm, 4000x7.62mm
Jagdpanzer-105	+3	Fair	105mm NATO Gun, MG-3, MG-3 (C)	44x105mm, 4000x7.62mm
Jagdpanzer-120	+3	Fair	120mm Rheinmetall Gun, MG-3, MG-3 (C)	38x120mm, 4000x7.62mm
Jagdpanzer-122	+3	Fair	122mm D-30 Howitzer, MG-3, MG-3 (C)	38x122mm, 4000x7.62mm

Komatsu Type 60

Notes: The Type 60 SP 106mm Recoilless Gun is an old tank destroyer design, dating from the mid-1950s and predating the use of missile-based tank destroyers. The Type 60 was retired in the early 1980s.

The Type 60 uses a low-profile, compact tracked mover chassis, with the recoilless rifles on the right side and the commander/gunner opposite them on the center of the vehicle to the rear and right of the driver. The driver is on the front left and has three vision blocks, to the front and to the front left and right. The loader has a seat in the hull to the left of the commander/gunner. The engine is at the rear of the vehicle.

The M40 106mm recoilless rifles elevate for firing and depress almost level with the top of the vehicle for travel; the commander/gunner's seat is connected to the guns and elevates with them when the recoilless rifles raise for firing. Most sighting is done with the M40's telescopic sights and the spotting rifle on the right recoilless rifle. The loader must stand (or at least crouch) on the rear engine deck when loading the recoilless rifles; the rounds are carried on the left running board in an armored box. A normal combat load calls for eight rounds in the ammunition box and two already loaded in the rifles. The weapons may be fired when raised or lowered; when lowered, traverse is limited to 20 degrees to each side and elevation ranges are -5 and +10 degrees. When raised, traverse is expanded to 30 degrees to each side and elevation ranges are -20 and +15 degrees. The elevation and traverse controls are manual, though the rifles and commander/gunner's seat raise to firing position under electrical power.

The original engine chosen for this vehicle was a 110-horsepower six-cylinder diesel. Later, with the Type 60C, the standard engine became the 150-horsepower Komatsu SA4D105 four-cylinder diesel, responding to complaints of lack of mobility.

Vehicle	Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
Type 60A	\$72,650	D, A	279 kg	8 tons	3	7	Headlights	Enclosed
Type 60B	\$73,418	D, A	279 kg	8 tons	3	7	Headlights	Enclosed
Type 60C	\$73,538	D, A	283 kg	8.1 tons	3	7	Headlights	Enclosed

Vehicle	Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
Type 60A	107/75	30/21	77	33	Std	T2	HF4 HS2 HR2
Type 60B	107/75	30/21	77	33	Std	T2	HF6 HS3 HR2
Type 60C	134/94	37/26	77	45	Std	T2	HF6 HS3 HR3

Vehicle	Fire Control	Stabilization	Armament	Ammunition
(All)	None	None	2xM40 106mm Recoilless Rifles	10x106mm

M113A1 Twin Recoilless Rifle Carrier

Notes: This Pakistani modification of the M113A1 uses a mount on the forward part of the hull instead of the normal commander's cupola for a twin M40A2 106mm recoilless rifle installation. The vehicle carries a small crew and a large amount of ammunition for its launchers. The mount includes a laser rangefinder for the recoilless rifles to increase accuracy. The weapons are fired by a gunner standing in the open rear hatch.

The M113A1 hull is driven by the 6V53 212-horsepower diesel engine, and an automatic transmission is installed. The engine, transmission, differential, and final drives are unified into a single power pack which may be replaced as one unit or serviced as individual components. The M113A1 chassis is controlled by differential steering and tillers. The fuel tanks are in the walls of the fighting compartment. The crew compartment of the M113A1 chassis has a very well-functioning heater. The battery compartment is also heated for cold-weather operation.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$320,349	D, A	400 kg	12.72 tons	4	6	Passive IR	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
136/95	38/26/4	360	124	Stnd	T2	HF6 HS4 HR4

Fire Control	Stabilization	Armament	Ammunition
+2	None	Twin M40A2 106mm recoilless rifles	20x106mm

1K17 Szhatie

Why is this vehicle in an SP Guns page? Simply because I don't know where else put it, and the closest the page is the closest match.

The Szhatie (Compression) is essentially a heavy-duty, but relatively low-power, laser system mounted on a 2S19 Msta-S chassis. Though first prototypes of the Szhatie appeared on Soviet proving grounds in the late 1970s and early 1980s, it was not known outside of Russia until after Soviet Union dissolved. Rumors, rough drawings, and approximate (and wildly varying) specifications were known to US, Canadian, and NATO intelligence services, there was not enough information during the cold war to fill more than a thin folder. Two prototypes were eventually built and continually modified and improved, but in the end, the Szhatie was deemed too expensive to maintain and operate, and in the late 1980s, one was put into the Army Technology Museum near Moscow and the other scrapped. The situation may have remained the same, but in 2016, the Russians appear to have to put the Szhatie into a very low LRIP. This version appears to be much more powerful than the original model. The first was delivered to the Russian Army in 2017.

When the existence of this vehicle was discovered, there were anguished, outraged cries in Geneva and The Hague, mainly that it must violate one or more Conventions. Despite continual analysis of the documents (which continues to this day), none of the diplomats and lawyers have been able to pin down which Conventions the Szhatie was violating. (I'm guessing that in the near future, new Conventions will be added to the Main Documents.) Mr Putin seems to have taken this for a tacit permission to develop an even more powerful version of the Szhatie.

At first, the purpose was to produce a vehicle which could blind thermal viewers and image intensifiers and other optics in a wide arc in front of the vehicle. It achieved this by focusing the light through 30 kilograms of artificial rubies, which produced a laser beam that could be shot through up to 12 emitters. Each emitter was composed of a mirror and prism system that focused 13 laser tubes into each emitter, producing a single output at the emitter. The Russians also know that anyone looking through optics when the beam was fired would at least temporarily, if not permanently blinded. Estimates of the laser battery's output varies with source, but most sources put a full battery discharge at 15 kilowatts. However, the gunner of the Szhatie may elect to not fire one or more lasers, with each emitter not fired increasing power output by 2 kilowatts. The divergence of the full-output beam is about 10 degrees, with less emitters having correspondingly less divergence. The effects of the emitters is hard to quantify, but a 15 kW beam will burn out or temporarily blind (50/50 chance) fire control optics, thermal, image intensifying, and CCD optics equipment. It can also (roll of 12 on d20) cause spontaneous launching of laser decoys and actuation of their sensor systems. At max output (22kW Using only one emitter), the effects include (roll 8 on d20) setting personnel on fire, blinding them, causing them to believe they are about to be set on fire and doing a stop-drop-roll. Such a beam also has a penetration of 20/10/5/3; if ERA is struck, the block is ruined and penetrated without the ERA going off. (NERA gives normal protection.) As composite armor contains materials that are ablative, they also halve the results of the beam's penetration. Spaced armor does not have its normal effect, it merely acts as more armor for the beam to penetrate. It is also possible that external fuel tanks, crew equipment or other equipment stowed on the surface of the vehicle, or items like boards or plastic may also catch on fire (Roll 12 on d20).

Using the emitters does require a roll to hit – but only a 1, 2, or 3 is actually a “miss.” Catastrophic Failure means that 1d6 emitters are blown (depending upon how many emitters were used in the attack), and a 2 or 3 means that the power generation batteries failed to transmit the required power to the emitters. The commander is also the gunner of the Szhatie.

The Szhatie is also useful against aircraft and UAVs. The emitters are also very vulnerable to ground fire, and particularly automatic rifle, machinegun, and sniper attacks. In addition, when figuring maintenance, the turret should be considered a separate component, requiring the same amount of maintenance as the vehicle itself.

The 2016 iteration of the Szhatie benefits from nearly 30 years of laser development. For the most part, this manifests itself as an increase in laser power, though Russian laser research does match Western laser research. Using all the emitters gives a beam cluster of 21 kW, which allows for a +2 in operation rolls. A full-power one-emitter beam is at 28kW, again yielding a +1 on operational rolls and a penetration of 30/15/8/4.

In either case, the absolute damaging or blinding limit, whether 12 beams or one, is 3000 meters. It does have short, medium, long, and extreme ranges, at a rate of 375/750/1500/3000 meters. At any shot, if an emitter scores catastrophic failure, the emitter (roll for each emitter that fired) is burned out and will not function until an appropriate level of maintenance is reached. On a roll of 2, 1d6 emitters failed to fire.

As noted above, the chassis of the Szhatie is a 2S19 Msta-S chassis. However, the Szhatie uses the 840-horsepower turbocharged diesel engine of a T-72A tank, and has a battery-powered system that allows the Szhatie to power up to eight full 12-emitter shots. If the engine is running, the batteries can charge off of the engine, but this takes 10 minutes for each emitter to be powered, and 1.5 hours to charge enough to allow eight further shots. The driver's position is in the center of the glacis, with the commander atop the turret, armed with a heavy machinegun or its equivalent. The gunner is in the turret. The firing and commander's stations are of high technology, and the original vehicle has only minimal night vision, while the 2016 model has somewhat better optics and electronics. The original Szhatie has inertial navigation; the 2016 version has GPS with a full mapping module with screens for the commander and driver. The 2016 version is also equipped with a better fire control system a vehicle state computer, and a full BMS.

A laser system based on the ZSU-23-4, with the guns replaced by laser emitters, has apparently been developed. I do not have enough information to stat this out right now.

Vehicle	Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
Szhatie (1980's)	\$38,908,710	D, A	874 kg	41 tons.	2	48	Image Intensification (D), Backup Day/Night Camera	Shielded

Model)								(D), Thermal Imaging (G/C)	
Szhatie	\$55,697,508	D, A	510 kg	39 tons	2	63		Image Intensification (D,	Shielded
(2016 Model)								G/C), Day/Night Backup Camera (D), FLIR (G/C)	

0

Vehicle	Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
Szhatie (1980's Model)	143/100	40/28	1200+400	307	Trtd	T6	TF10 TS36 TR10 HF70Sp HS11Sp HR12
Szhatie (2016 Model)	151/106	42/29	1200+400	292	Trtd	T6	TF12Sp TS40Sp TR10 HF70Sp HS11Sp HR12

Vehicle	Fire Control	Stabilization	Armament	Ammunition
Szhatie (1980's Model)	+1	None	20kW Laser, NSVT (C)	Laser Ammunition Special, 1000x12.7mm
Szhatie (2016 Model)	+3	Basic	28kW Laser, Kord (C)	Laser Ammunition Special, 1500x12.7mm

ASU-57

Notes: This vehicle was designed specifically for use by Russian airborne troops in the mid-1950s, and used by the Russian Airborne until the advent of the ASU-85 in 1960. Nonetheless, they stayed in ever-more-limited Soviet service until the mid-1970s. They were some of the first Russian vehicles making extensive use of aluminum armor instead of steel. They were not meant to be tank destroyers; it was recognized even then that its low-caliber gun could not destroy the tanks of even that period in most cases. Instead, the ASU-57 was meant to provide fire support and anti-fortification firepower to airborne infantry. The only country believed to still be using the ASU-57 is Yugoslavia, in small numbers, though it is possible that a few are still in service in Vietnam and with insurgents in Libya.

The powerplant of the ASU-57 was a problem; it was kept small to save weight and was, at 50 horsepower, underpowered for even the low weight of the ASU-57. (Later versions used an upgraded 55 horsepower engine, which was still underpowered.) The engines are variants of those found in the GAZ-M-20 Pobeda civilian car. The armor was designed to be useful only against small arms and shell splinters and could be defeated by even 7.62mm AP rounds. The fighting compartment was open-topped, which gave the crew good situational awareness, but deficient protection. However, what the Soviet Airborne was looking for at the time was low weight, and they got it.

Twilight 2000 Notes: Though small amounts of ASU-57s were found in Mobilization-Only units in Russia, most ASU-57s are in active service in Yugoslavia or some African and Asian Third World armies.

Vehicle	Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
ASU-57	\$50,238	G, A	277 kg	3.35 tons	3	3	Headlights	Enclosed
ASU-57M	\$50,254	G, A	279 kg	3.35 tons	3	3	Headlights	Enclosed

Vehicle	Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
ASU-57	113/79	31/22	140	22	Std	T2	HF4 HS2 HR2*
ASU-57M	122/85	34/24	140	24	Std	T2	HF4 HS2 HR2*

Fire Control	Stabilization	Armament	Ammunition
+1	Basic	57mm Ch-51 or Ch-51M Gun, DTM or DShK (C)	30x57mm, 2500x7.62mm or 1500x12.7mm

*The fighting compartment is open-topped; the commander/gunner and loader have a vehicle roof AV of 0.

ASU-85

Notes: Work on the design that would become the ASU-85 actually began shortly after the adoption of the ASU-57, and was enabled by the rapid Russian progress in heavier-lift aircraft and parachute-landing technology in the early 1960s. The ASU-85 is based on the PT-76 light tank chassis, but the amphibious capabilities are omitted and the ASU-85 has a different engine, the YaMZ-306V horizontal six-cylinder diesel developing 210 horsepower. The more powerful engine was meant to give the ASU-85 greater agility and speed, to increase its survivability. Originally, the ASU-85 was to be open-topped like the ASU-57, but shortly before production was to begin the MoD decided that the ASU-85 was to have an armored roof. The delay that was caused by this requirement meant that by the time production began in 1961, the ASU-85 was essentially obsolete. In Soviet service, the ASU-85 would equip only VDV (Airborne) units; in addition, the ASU-85 was exported only to East Germany and Poland in the Warsaw Pact.

Vietnam has 5 still in service, and one has been seen in use by the Ukrainians in the current war. Vietnam has expressed in an upgrade package proposed by the Belarusians in 2016, consisting of a new 300-horsepower engine, upgraded night vision gear, the addition of a laser rangefinder and ballistic computer, rearranged ammunition stowage, and a refurbished gun. However, no upgrading work has been done to date.

The ASU-85 consists of a large, boxy chassis with a D-70 (2A15) 85mm gun mounted in the glacis plate along with a coaxial machinegun. The gun can be traversed 15 degrees to the left and right, but most laying of the gun is done by pivoting the vehicle on its tracks. Elevation ranges are -4.5 to 15 degrees. Sighting is done with a telescopic sight in the daytime or with the WL channel of the searchlight at night and an IR-sensitive sight along with the IR channel of the searchlight at night.

Twilight 2000 Notes: This assault gun is one of the older vehicles that were still in active Russian service in 2000, being introduced in 1960. It was being quickly replaced by the 2S9, but there are still a large number of them in service with Category 2, 3, and Mobilization Only units at the time of the Twilight War. The Belarusian Upgrade Package does not exist in the Twilight 2000 timeline.

Vehicle	Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
ASU-85	\$315,093	D, A	469 kg	15.5 tons	4	9	Active IR (G, C), WL/IR Searchlight (G/C)	Enclosed
ASU-85M	\$277,496	D, A	467 kg	15.65 tons	4	9	Active IR (G, C), WL/IR Searchlight (G/C)	Enclosed
Belarusian Upgrade Package	\$306,563	D, A	473 kg	15.8 tons	4	10	Thermal Imaging (G, C), Image Intensification (D, G, C)	Enclosed

Vehicle	Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
ASU-85	106/74	29/21	250+285	62	Std	T4	HF10 HS4 HR4
ASU-85M	105/74	29/20	250+285	62	Std	T4	HF10 HS4 HR4
Belarusian Upgrade Package	137/96	38/27	250+285	89	Std	T4	HF10 HS4 HR4

Vehicle	Fire Control	Stabilization	Armament	Ammunition
ASU-85	+1	Basic	85mm D-70 Gun, PKT	45x85mm, 2500x7.62mm
ASU-85M	+1	Basic	85mm D-70 Gun, PKT, DShK (C)	39x85mm, 2500x7.62mm, 600x12.7mm
Belarusian Upgrade Package	+3	Basic	85mm D-70 Gun, PKT, DShK (C)	43x85mm, 2500x7.62mm, 600x12.7mm

SU-100

Notes: The SU-100 actually began development as the SU-85, armed with an 85mm D-5 gun, but the SU-85 idea was rendered obsolete by the advent of the 85mm D-5-armed T-34-85 tank in 1943. Work began on the SU-100, armed with the 100mm D-10S gun, as a tank able to mount the D-10S has not been invented yet. Work started in 1944 and by March of that year working prototypes were made and production quickly followed. The SU-100 was able to make quick work of the German Panther tank at a range of 1500 meters and below, but like most Soviet tank destroyers, the SU-100 suffered from thin armor from all aspects. The SU-100 could be found in frontline service in some countries over 40 years later, and continues in reserve service to this day in some Third World countries. Vietnam and North Korea continue to use them in main line service, and they have been seen in in current conflict in Yemen.

Like other Russian assault guns, the SU-100 has no turret and an enlarged fighting compartment. Hatches for the commander and driver are located on the roof; the commander's hatch is on the right side in a sponson, and has an inscribed mil ring to aid in calling for covering artillery fires. All other crewmembers use the commander's hatch. The sights use a x4 telescopic optic, with a night vision channel. Power is provided by a 500-horsepower Kharkiv V-2 12-cylinder diesel engine, coupled to a rather balky transmission; trained SU-100 drivers were valuable. The SU-100 proved to be hampered by its lack of any machinegun, and one was added after World War 2, particularly in Middle Eastern service, on the SU-100M variant (which also had modifications to suit it better for hot weather and sandy conditions, and a 530-horsepower engine).

The SU-100 is noted for the positioning of the gunner's sight, which is close to the gun mounting and this makes it difficult for the gunner to angle his head to use the sight effectively. The war-emergency quality of welding is also deficient, and seams tend to burst when hit; however, the armor itself is of better protection than earlier Soviet tank destroyers. The gun has a narrow traverse angle of 12 degrees to either side. As noted, the initial SU-100 models had no machineguns, and this made fighting off enemy infantry difficult without supporting troops.

Twilight 2000 Notes: The SU-100 is still a common sight in Middle Eastern, Southeast Asian, and Chinese service, as well as North Korean and African service. It can also be found equipping Soviet Category 3 and Mobilization-Only units.

Vehicle	Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
SU-100	\$320,511	D, A	651 kg	31.6 tons	4	19	Active IR (G, C)	Shielded

SU-100M	\$332,321	D, A	651 kg	31.7 tons	4	19	Passive IR (G, C)	Shielded
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Vehicle	Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
SU-100	119/83	33/23	812+380	148	Std	T6	HF18 HS9 HR9
SU-100M	124/87	34/24	812+380	157	Std	T6	HF18 HS6 HR6

Vehicle	Fire Control	Stabilization	Armament	Ammunition
SU-100	+1	None	100mm D-10S gun	44x100mm
SU-100M	+1	None	100mm D-10S gun, PK (C)	44x100mm, 2000x7.62mm

AI-Fahd AF-40-8-2 Fire Support Vehicle

Notes: This is a basic AI-Fahd APC mounting an M40 106mm recoilless rifle. It is intended for direct fire support of infantry and for the attacking of fortified positions. In this version, the rear ramp is deleted and the passenger space largely taken up by the recoilless rifle, ammunition, and crew. The seat to the right of the driver is retained, and may be used for a passenger (usually taken by a unit commander).

The driver and commander of the AF-40-8-2 FSV are in the front of the hull; the commander has conventional vision blocks, while the driver has a night vision block in addition to his conventional vision blocks. Their hatches may be locked partially open (so they are elevated straight out from the hull), or locked open completely. The AF-40-8-2 FSV has four roof hatches. The engine fitted is a Deutz 12-cylinder turbocharged diesel engine which is air-cooled and develops 550 horsepower; the more powerful engine is fitted to allow for more mobility and because the rear area does not need to transport troops. The transmission is automatic, and driver's controls conventional. The suspension is 8x8 and of the off-road-type, with the drive being switchable to 8x4 for road use (the four middle wheels being the drive wheels in this case). The front four wheels are independently steerable from the rear four vehicles, giving the AF-40-8-2 FSV a tight turning radius. The suspension incorporates conventional hydraulic shock absorbers along with a nitrogen gas spring system which gives the AF-40-8-1 a very smooth ride and an adjustable suspension; ground clearance may drop to as low as 15 centimeters for a hull-down position or as high as 60 centimeters to clear obstacles. The AF-40-8-2 FSV has an automatic fire detection and suppression system. Armor is of aluminum; lugs for ERA are optional, but not standard. Also fitted are multiple layers of Kevlar to form an antispall liner. Also not standard is amphibious capability; such is fitted to Pakistani vehicles, but not Saudi vehicles. The vehicle has NBC overpressure with a collective NBC backup, and air conditioning.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$222,905	D, A	652 kg	15.2 tons	3+1	5	Passive IR (D)	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
259/130	72/36/6	550	204	Std	W(6)	HF12Sp HS5Sp HR3

Fire Control	Stabilization	Armament	Ammunition
None	None	106mm M40A2 Recoilless Rifle, MAG (C)	50x106mm, 1100x7.62mm

Ikv-91/Ikv-93

Notes: This vehicle belongs to Sweden's previous generation of tank destroyers, yet was not out of service until the mid-1990s. 210 of these vehicles were produced. The Ikv-91 is armed with a 90mm gun; the Ikv-93 is armed with a 105mm gun and was produced only as an experiment. The Ikv-93 is rather rare. The commander, loader, and gunner exit through hatches in the turret deck, while the driver has a hatch on the deck on the front left side. The commander and gunner have periscopes that are the equivalent of binoculars as well as night vision devices. The Ikv-91 is designed for operations in northern Sweden, and is sure-footed on difficult terrain. The engine has a preheater to ensure that it starts in cold weather. The commander can control the gun as well as the gunner, but the commander has no access to the fire control computer, and his shots are at +2 at best. The vehicle is balanced such that the main gun or machineguns may fire while the vehicle is swimming without danger of sinking.

Power is provided by a Volvo Penta TD 120 330-horsepower diesel, coupled to an automatic transmission, and with torsion bar suspension. In addition to primary armament, the Ikv-91 and 93 have a pair of 71mm Lyran flare launching mortars on the back of the turret, which must be loaded and fired by reaching out of one of the turret hatches to the Lyran device. On each side of the turret are a cluster of six smoke grenade launchers.

Twilight 2000 Notes: A number of conversions from Ikv-91s were made to the Ikv-93 standard before the Twilight War; some more were made afterwards, and there was even a tiny amount produced as new vehicles. About 50 were available for the Twilight War.

Merc 2000 Notes: The Ikv-93 was never produced in any large numbers.

Vehicle	Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
Ikv-91	\$342,010	D, A	554 kg	16.3 tons	4	9	Active/Passive IR (D, G)	Shielded
Ikv-93	\$333,658	D, A	557 kg	16.15 tons	4	9	Active/Passive IR (D, G)	Shielded

Vehicle	Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
Ikv-91	144/100	40/28/6	400	122	Trtd	T4	TF8 TS7 TR6 HF10 HS6 HR4
Ikv-93	145/101	40/28/7	400	122	Trtd	T4	TF8 TS7 TR6 HF10 HS6 HR4

Vehicle	Fire Control	Stabilization	Armament	Ammunition
Ikv-91	+3	Basic	90mm KV90S73 gun, Ksp m/39, Ksp m/39 (C)	59x90mm, 4250x7.62mm, 10xFlares
Ikv-93	+3	Basic	105mm Rh-105-11 gun, Ksp m/39, Ksp m/39 (C)	39x105mm, 4250x7.62mm, 10xFlares

Ikv-98/99

Notes: This is a tank destroyer based on the CV90 chassis. Instead of the normal turret, the Ikv-98 mounts a GIAT TML turret armed with a NATO 105mm gun. This vehicle was produced in tandem with the Ikv-99; originally meant for export purposes, the Swedes have been aggressively marketing this vehicle and the Ikv-99. This vehicle is even more rare than the Ikv-99 listed below. The Ikv-98 was trialed against other vehicles for the program that eventually produced the US Army's M10 Booker light tank. However, Hagglunds and SAAB are still shopping the design around worldwide, so far with several evaluations but no takers.

The Ikv-99 is a tank destroyer based on the CV90 chassis. Instead of the normal turret, the Ikv-99 mounts a larger turret armed with a 120mm Rheinmetall cannon. This vehicle was meant to replace the much older Ikv-91, since that vehicle's 90mm gun lacks the penetration to defeat newer tanks.

The Ikv-98/99 hull is designed with a high level of base armor (for an IFV) made of all-welded steel, meant to offer protection for against up to 30mm rounds from the front, and an appliqué armor package was also devised from the outset. Other armor upgrade packages have been designed since then, as well as a lug system for ERA; this includes simple bolt-on steel plates, the MEXAS ceramic spaced armor package, and bar/slat/anti-RPG mesh cages. The design of the Ikv-98/99 has a low, generally rounded silhouette which reduces the radar signature, as well as dampeners for the exhaust system and engine heat in general which lower its IR signature (-2 deficit for detection by both methods). The sound signature is also relatively low; under some circumstances, the Ikv-98/99 cannot be heard by the enemy until the Ikv-98/99 is almost on top of them. The Ikv-98/99 is equipped with separate automatic fire detection and prevention systems for the turret, engine and driver's compartment, troop compartment, and fuel tanks. The crew and passengers are protected by an MBC overpressure system with a collective NBC backup system, as well as a chemical agent and radiation detector. The Ikv-98/99 is not designed to be amphibious.

In addition to a coaxial machinegun, the Ikv-98/99 is armed with two Lyran 71mm mortars on the rear of the turret behind the commander's station which can fire smoke or illumination rounds to an extended range, and four smoke grenade launchers on each side of the turret. A later addition was a pintle mount at the commander's station for a SAW-type weapon or a light machinegun. Both the Lyran mortars and the smoke grenade launchers can be fired when buttoned up from the commander's station. The turret carries the commander on the right side of the turret and the gunner on the left. The sighting system on the Ikv-98/99 incorporates a ballistic computer and laser rangefinder, and the night vision system is comprehensive.

The driver is in the front left; he has three vision blocks to the front, and can replace the middle vision block with a night vision

block. The driver has a conventional steering yoke with a gas and brake pedal. The troop compartment has a large door in the rear for entry and exit, but the Ikv-98/99 has no firing ports or vision blocks for the troops, as tactical doctrine for all countries involved so far call for troops to dismount in all cases and not fight from the vehicle. There are two overhead hatches on the rear deck for standing troops, and hatches on the turret deck for the commander and gunner. The Ikv-98/99 has heating and air conditioning systems for crew comfort, as well as an NBC overpressure system with a collective NBC backup system.

The suspension of the Ikv-98/99 is particularly noted for its smooth ride and large lack of the squeaks and creaks that tend to go along with most tracked vehicles, and this contributes greatly to its ability to move on enemy positions without being noticed until it's too late. The engine noise is also effectively dampened out by insulation and exhaust baffles that also reduces its IR signature and gives the engine good protection from burning fuel being poured into the engine compartment. The engine used is a Scania DSI-14 550-horsepower turbocharged diesel; coupled to an automatic transmission. The engine, transmission, and part of the drive train are part of an integrated power pack that can be removed from the vehicle in one piece, quickening and simplifying maintenance and allowing a complete powerpack change in as little as 15 minutes.

Upgrades started in 2001 gave the Ikv-98/99 a Scania DI-16 600-horsepower engine and matching transmission, general suspension and drive train improvements, and electrical system updates, as well as a fully-stabilized main gun and coaxial machinegun. A US-designed FLIR system was also fitted as well as an improved ballistic computer. A laser warning system was added to the defensive suite, and a commander's independent sight system was installed to give the Ikv-98/99 a hunter/killer capability. After this first set of improvements, the resulting vehicle was dubbed the Ikv-98/99B. Between 2005 and 2008, some Ikv-98/99s were equipped with a battlefield management system, though the resulting vehicle was still called the Ikv-98/99B. The Ikv-98C/99C have these improvements as well as bolt-on spaced appliqué steel armor modules for the hull and turret, bar/slat/anti-RPG mesh and improved hull floor, hull deck, and turret deck armor as well. Thickened Kevlar anti-spalling liners have been added to the interior. Every hit on a face protected by bar/slat/RPG mesh combination will destroy 5% of the bar/slat/RPG mesh. Thus, a skilled enemy gunner can exploit this damage in an attempt to hit a hole in the armor, and if hit enough, the bar/slat/RPG mesh can become useless. (This is true in general of any type of bar/slat/anti-RPG mesh appliqué).

Twilight 2000 Notes: Both of these vehicles were placed into mass production and used by Sweden in the Twilight War. As production of these vehicles began only in 1997, stocks of these vehicles were never high and they never fully replaced the Ikv-91 and 93.

Vehicle	Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
Ikv-98	\$393,430	D, A	638 kg	28 tons	4	15	Passive IR (D, G, C), Image Intensification (G, C), Thermal Imaging (G)	Shielded
Ikv-98 With Applique	\$403,173	D, A	624 kg	29.7 tons	4	15	Passive IR (D, G, C), Image Intensification (G, C), Thermal Imaging (G)	Shielded
Ikv-98B	\$527,386	D, A	640 kg	28 tons	4	16	Passive IR (D, G, C), Image Intensification (G, C), FLIR (G), Thermal Imaging (C)	Shielded
Ikv-98B w/BMS	\$730,606	D, A	640 kg	28.1 tons	4	18	Passive IR (D, G, C), Image Intensification (G, C), FLIR (G), Thermal Imaging (C)	Shielded
Ikv-98C	\$546,687	D, A	633 kg	31.1 tons	4	19	Passive IR (D, G, C), Image Intensification (G, C), FLIR (G), Thermal Imaging (C)	Shielded
Ikv-98C w/BMS	\$752,748	D, A	633 kg	31.2 tons	4	19	Passive IR (D, G, C), Image Intensification (G, C), FLIR (G), Thermal Imaging (C)	Shielded
Ikv-99	\$414,982	D, A	631 kg	28.33 tons	4	19	Passive IR (D, G, C), Image Intensification (G, C), Thermal Imaging (G)	Shielded
Ikv-99 With Applique	\$416,819	D, A	617 kg	30.03 tons	4	19	Passive IR (D, G, C), Image Intensification (G, C), Thermal Imaging (G)	Shielded
Ikv-99B	\$548,938	D, A	642 kg	28.33 tons	4	19	Passive IR (D, G, C), Image Intensification (G, C), FLIR (G), Thermal Imaging (C)	Shielded
Ikv-99B w/BMS	\$752,158	D, A	642 kg	28.43 tons	4	21	Passive IR (D, G, C), Image Intensification (G, C), FLIR (G), Thermal Imaging (C)	Shielded
Ikv-99C	\$558,777	D, A	626 kg	32.43 tons	4	20	Passive IR (D, G, C), Image Intensification (G, C), FLIR (G), Thermal	Shielded

lkv-99C w/BMS	\$761,997	D, A	626 kg	32.53 tons	4	21	Imaging (C) Passive IR (D, G, C), Image Intensification (G, C), FLIR (G), Thermal Imaging (C)	Shielded
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Vehicle	Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
lkv-98	130/91	36/25	525	249	Trtd	T4	TF14 TS8 TR6 HF18 HR7 HS4
lkv-98	125/87	34/24	525	249	Trtd	T4	TF17Sp TS10Sp TR7 HF21Sp HS9Sp HR4*
With Applique							
lkv-98B	150/105	42/29	525	300	Trtd	T4	TF14 TS8 TR6 HF18 HR7 HS4
lkv-98B w/BMS	150/105	42/29	525	300	Trtd	T4	TF14 TS8 TR6 HF18 HR7 HS4
lkv-98C	138/97	38/27	525	300	Trtd	T4	TF18Sp TS11Sp TR8 HF23Sp HS11Sp HR5**
lkv-98C w/BMS	138/97	38/27	525	300	Trtd	T4	TF18Sp TS11Sp TR8 HF23Sp HS11Sp HR5**
lkv-99	129/90	36/25	525	249	Trtd	T4	TF14 TS8 TR6 HF18 HR7 HS4
lkv-99	124/86	34/24	525	249	Trtd	T4	TF17Sp TS10Sp TR7 HF21Sp HS9Sp HR4*
With Applique							
lkv-99B	148/104	41/29	525	300	Trtd	T4	TF14 TS8 TR6 HF18 HR7 HS4
lkv-99B w/BMS	148/104	41/29	525	300	Trtd	T4	TF14 TS8 TR6 HF18 HR7 HS4
lkv-99C	137/95	38/27	525	300	Trtd	T4	TF18Sp TS11Sp TR8 HF23Sp HS11Sp HR5**
lkv-99C w/BMS	137/95	38/27	525	300	Trtd	T4	TF18Sp TS11Sp TR8 HF23Sp HS11Sp HR5**

Vehicle	Fire Control	Stabilization	Armament	Ammunition
lkv-98	+3	Good	105mm EX35 gun, Ksp m/39, Ksp m/39 (C)	55x105mm, 3000x7.62mm, 10xFlares
lkv-99	+3	Good	120mm CTG 120/L50 gun, Ksp m/39, Ksp m/39 (C)	45x120mm, 3000x7.62mm, 10xFlares

*This version has a hull and turret deck AV of 3, and a hull floor AV of 4.

**The lkv-98C and the lkv-99C have a hull and turret deck AV of 3, and a hull floor AV of 5Sp.

MOWAG Piranha II 10x10 Armored Combat Vehicle

Notes: This is a longer, 10-wheeled, more heavily armed, tank destroyer variant of the MOWAG Piranha (the base vehicle for the LAV-25 and related vehicles). The vehicle is built in Switzerland, but the only customer has been the Swedish Navy, who bought 44 of them for coastal defense roles to use against landing craft and hovercraft. Armor is heavier as well. The versions for Sweden are equipped with three secure vehicular radios each. The versions for Sweden are also upgraded, with gun stabilization, thermal imaging, and a computerized land navigation system.

The ACV is equipped with a 40kW APU for silent watches and to allow the vehicle to be used as a command center. To this end, the ACV is equipped with additional radios and with an extendible radio antenna mast. The ACV is equipped with a 350-horsepower Scania turbocharged diesel engine coupled to a ZF 7-speed automatic transmission. Steering is by the front four wheels and is power-assisted. Drive is normally by the rear three axles on the road, with the front two axles being engaged by a switch in the driver's compartment for use when driving off-road. The Piranha II 10x10 uses larger tires than the standard Piranha tires. The driver has access to a central tire pressure regulation system. He also can use a hydropneumatic suspension system, with which the driver may select one of three suspension heights. The commander controls an 8-ton-capacity winch in the rear of the vehicle and can be led out to the front or rear. It is primarily for self-recovery, but may also be used to assist other vehicles in distress. The crew is protected by an automatic fire/explosion suppression system and an NBC Overpressure system.

The main gun is, unfortunately, stabilized only in one plane and for the most part, the vehicle needs to come to a halt for accurate fire. This is considered acceptable by the Swedish Navy, as the vehicle would be primarily firing at targets in the water or beach from a hull-down position or screened by forest or rocky terrain. The gun is fitted with a semiautomatic loading system, allowing a better rate of fire than normal. The turret holds 12 rounds of main gun ammunition, with the rest being carried in the rear of the vehicle. The commander's machinegun is externally mounted and can be fired with the commander under armor and the hatch closed. The commander may aim and fire (but not reload) his weapon while protected by armor. The commander's machinegun is not stabilized. The TML 105 turret is of French design, but with increased armor protection. The ACV is equipped with a BMS and a GPS/inertial navigation system. 14 Galix smoke grenade launchers are mounted around the turret; these may also fire illumination and fragmentation grenades.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$762,186	D, A	811 kg	18 tons	4	12	Thermal Imaging (G, C), Image Intensification (D), Passive IR (G, C)	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
139/97	39/27/4	400	123	Trtd	W(8)	TF10Sp TS8Sp TR7 HF11Sp HS8Sp HR6

Fire Control	Stabilization	Armament	Ammunition
+3	Good	105mm GIAT G2 gun, Ksp-59, Ksp-59 (C)	38x105mm, 4000x7.62mm

M3 GMC

Notes: The M3 GMC (Gun Motor Carriage) is an elderly tank destroyer based on the chassis of the M3A1 half-track armored personnel carrier of World War 2. The 75mm gun is mounted in the rear compartment and has limited traverse of 19 degrees left and 21 degrees right, and elevation of 29 degrees and depression of -10 degrees, firing over the front of the vehicle. The main gun was equipped with an M2A3 gun shield (taken from an earlier carriage for the M1897A5 gun), which gave good armor protection to the front and somewhat less to the sides. Three pintle mounts are included on the rear and both side walls, as well as a heavy machinegun mount, for local and antiaircraft defense. Power is provided by the standard half-track engine, the White 160AX 6-cylinder 147-horsepower gasoline engine, a modified commercial truck engine. This is coupled to a manual transmission.

The M3A1 is similar, but uses the M5 gun shield and mount as supplies of the M2A3 gun shield and mount were insufficient to equip all M3-type GMCs built. The M1897A5 main gun of the M3A1 can traverse 21 degrees in either direction, but can only depress to -6.5 degrees.

The M3 GMC was sort of a stopgap vehicle, and was supplanted in production in 1943 by purpose-built turreted tank destroyers line the M10 and M18 Hellcat. 2203 M3s and M3A1s were built from 1941-1943. Most were retired to museums, displays, and to ranges for an ignoble fate as gunnery targets. Some were acquired by collectors and kept in running status, though these usually had weapons with plugged barrels, depending upon which licenses and permits the owner possessed and the local laws and regulations.

Twilight 2000 Notes: This vehicle was very rare in the Twilight War, but still used by a few Latin and South American countries. In addition, some were kept in running condition by museums and collectors in various parts of the world.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$135,125	G, A	1.5 tons	9.1 tons	5	8	Headlights	Open

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor*
121/84	34/23	230	65	CiH	W(3)	TF3 TS2 TR0 HF2 HS2 HR2

Fire Control	Stabilization	Armament	Ammunition
+1	None	M1897A5 75mm gun, M1919A4 (x3), M2HB ©	59x75mm, 900x.30-06, 300x.50

*Except for the hood, the M3 GMC is open-topped and has a roof AV of 0.

Chrysler M10 "Wolverine"

Notes: This is a tank destroyer based on the early-production M4A2 Sherman tank chassis. It was developed to provide, fast, lightweight antiarmor vehicles, but was used primarily for infantry support as it could not go toe to toe with German tanks due to its light armor. By 2004, most of these vehicles were found in South American countries to provide fire support to mechanized infantry units, rarely being used to combat tanks.

The M10 was armed with the M7 76.2mm high-velocity gun. This gun had a telescopic direct fire sight and a panoramic indirect fire sight. The M2HB was mounted on the rear of the turret for antiaircraft use, though it could also be used in an anti-infantry role. Normally, an M1 Thompson submachinegun was stowed in brackets in the right rear of the turret, along with ample ammunition. (This is not included in the cost of the vehicle.) Next to the assistant driver in the hull was stowed an M1903 Springfield rifle with a rifle grenade adapter and ten M9 rifle grenades (also not included in the vehicle cost) for use in close range antivehicle combat. The M10 is powered by a GM 6046 twin diesel 375-horsepower engine, coupled to a manual Synchronesh transmission. A sore spot among crews is the hand-cranked turret traverse, which could take up to two minutes for a 360-degree rotation; most crews preferred to pivot-steer the hull and then use the turret traverse for final adjustments.

The M10A1 is the same vehicle as above, but based on the M4A3 Sherman instead of the M4A2. It uses a shorter-range but higher horsepower Ford GAA 8 450-horsepower gasoline engine and is somewhat lighter. The transmission is the same. The last 300 M10A1s were armed with the M1 3-inch gun, which had a higher muzzle velocity due to a longer barrel and could fire heavier-warhead ammunition. The M1 gun, however, is lighter than the M7 despite its longer barrel, so the resulting M1-armed M10A1 is lighter than the standard M10A1.

British M10s and M10A1s were armed with the QF 17-pounder antitank gun, which had a long barrel and fired different ammunition than the M7 or M1. These were designated the 17pdr SP Achilles tank destroyer. The Mark Ic was the equivalent of the M10 and the Mark Ilc was the equivalent of the M10A1. However, the Achilles is the same weight as its M10 and M10A1 counterparts, despite its longer barrel, due to the lighter construction of its gun.

The Republican Chinese modified seventeen M10s into self-propelled howitzers, using captured Japanese Type 91 10cm (105mm) field howitzers. These conversions were all done in 1949. The M10 SPH is also fitted with a different turret which has a roof which has several vision blocks and a rear access door, used to resupply the howitzer during long bombardments. It is a less armored, but larger turret. A bow machinegun was also added, fired by the assistant gunner/radio operator.

The M35 Tracked Prime Mover was thought up after the M10 was supplanted by the M18 Hellcat. This was essentially a turretless M10 with a rearranged and re-equipped interior, to suit the M35's role as a prime mover for 8-inch howitzers. The M35 carried part of the gun crew as well as some ammunition for the howitzer it towed. The opening where the former turret ring was could be sealed with a canvas cover. The M35 was unarmed, relying on the crew's small arms.

The name "Wolverine" was often found in Chrysler advertising literature, but was not used by US troops. US troops simply referred

to the M10 (and other tank destroyers of the period) as a "TD." Other countries using the M10 may have had nicknames for it, but I have not been able to find them. Other than US use, the M10 was used by Britain, Canada, France, Belgium, Denmark, Netherlands, Israel, and Taiwan; Taiwan may still have some kept in working order in the reserve role. From those countries, M10s were sold to various Third World nations. Like the M3 GMC, some are kept in working order by collectors, but most existing examples are in museums and displays, and many have been used as range targets and blown to hell.

Vehicle	Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
M10	\$137,882	D, A	454 kg	29.6 tons	5	20	Headlights	Enclosed
M10A1	\$138,105	G, A	467 kg	29.03 tons	5	20	Headlights	Enclosed
M10A1	\$143,090	G, A	468 kg	28.64 tons	5	20	Headlights	Enclosed
w/M1 Gun								
Achilles Ic	\$145,239	D, A	454 kg	29.6 tons	5	20	Headlights	Enclosed
Achilles Ilc	\$146,182	G, A	467 kg	29.03 tons	5	20	Headlights	Enclosed
M10 SPH	\$197,816	D, A	469 kg	30.35 tons	5	20	Headlights	Enclosed
M35	\$27,156	D, A	1.38 tons	8.53 tons	2+4	12	Headlights	Enclosed

Vehicle	Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor		
M10	101/71	28/20	620	111	Trtd	T5	TF11	TS5	TR3 HF27 HS8 HR4*
M10A1	117/82	33/23	730	201	Trtd	T5	TF11	TS5	TR3 HF27 HS8 HR4*
M10A1	118/83	33/23	730	201	Trtd	T5	TF11	TS5	TR3 HF27 HS8 HR4*
w/M1 Gun									
Achilles Ic	101/71	28/20	620	111	Trtd	T5	TF11	TS5	TR3 HF27 HS8 HR4*
Achilles Ilc	117/82	33/23	730	201	Trtd	T5	TF11	TS5	TR3 HF27 HS8 HR4*
M10 SPH	100/70	28/19	620	111	Trtd	T5	TF5	TS5	TR3 HF27 HS8 HR4
M35	277/194	77/54	620	111	Stnd	T5			HF27 HS8 HR4**

Vehicle	Fire Control	Stabilization	Armament	Ammunition
M10/M10A1	+1	None	M7 76.2mm gun, M2HB (C)	54x76.2mm, 300x.50
M10A1	+1	None	M1 76.2mm gun, M2HB (C)	54x76.2mm, 300x.50
w/M1 Gun				
Achilles Ic/Ilc	+1	None	QF 17-Pounder (76.2mm) gun, M2HB (C)	54x17pdr (76.2mm), 300x.50
M10 SPH	+1	None	Type 91 105mm howitzer, M1919A4, M2HB (C)	40x105mm, 800x.30-06, 500x.50

*The turret is open-topped and has an AV of 0.

**The center of the hull roof (where the turret used to be) is open and has an AV of 0.

Buick M18 Hellcat

Notes: This old World War 2 tank destroyer is still in use by some South American and Southeast Asian countries, most notably Venezuela, who used them in fairly large numbers until recently. It was designed to be smaller, faster, and lighter than a tank, while using a more powerful gun (for the time), but it was not meant to go toe to toe with a tank, using fire and maneuver to outflank tanks and strike them in the vulnerable sides and rear. Early models used a Continental R975-C1 350-horsepower gasoline engine, while most M18s used an uprated Continental R975-C4 400-horsepower supercharged engine. Both were coupled to the innovative 900T Torqmatic automatic transmission, something which contributed to the M18's agility; however, testing discovered that the gear ratios of the Torqmatic was set wrong and luckily this was found out before its combat debut. Steven J Zaloga, a military vehicle author, attributes the M18's excellent service and kill record to the bravery and skill of its crews, calling the M18 an "ill-conceived design" due to its thin armor. The vehicle is hampered by high fuel consumption due to its high-horsepower gasoline engines.

A strange shortcoming is that the engine air cooler pulled some of its air through the turret. This, in effect, turned the turret into a refrigerator, and in the cold of Europe in 1944-45, this led to suffering among its crews. The open-topped turret did not help in this regard. The GM might want to keep this in mind for flavor during game play.

By 2004, most of these vehicles were in infantry fire support roles or static antitank defensive positions. The Yugoslavians were noted users of the M18 in the postwar period; decades later, in the Yugoslavian Civil War, they were still soldiering on. As many Yugoslavian M18s had less-than-reliable chassis by then, the turret was sometimes mounted on T-55 tank chassis which had damaged turrets (see Yugoslavian Self-Propelled Guns). The M18 is notable for being one of Harley Earl's first military vehicle designs. As, with time, the M18 revealed a number of shortcomings, only about a third of the originally envisioned amount of M18s were actually produced, being stopped at 2507 vehicles. Some were sent to the British and Russians for possible Lend-Lease sales, but they were not impressed and declined the M18. The republican Chinese received 214 M18s, and basically drove them until they wore out, after which some of the turrets in better condition were put on M42 Duster AAA chassis to produce the Type 64 light tank.

The Greeks also wore out their M18s, after which the turrets were taken from the hulls and used as fixed gun emplacements along Greece's northern border and on some Aegean islands. Venezuela operated 40; at least one was heavily modernized in the 1990s, though I have no information about this upgrade and I will therefore not cover it here. Several more are found in museums and displays, and in collectors' care.

The M39 Armored Utility Vehicle was similar to the M35 version of the M10 (above), in that it was a "stripped" version of the M18. 640 were modified from M18s after World War 2, and these were used primarily as artillery tractors, though they were often used as general cargo and personnel carriers. All were modified from M18s equipped with the 400-horsepower engine. They had a large open-topped space where the turret was; though by March 1945, it was advised by many officers that a fully-armored roof be designed, this never came to pass, and the M39 was replaced during the Korean War with the M75 APC. The opening did have a large canvas cover designed for it. As manufacture of the M18 base had concluded in 1944, spare parts for the M39 eventually became difficult to source, and they were withdrawn from service. The only other country to use the M39, West Germany, retired theirs in 1956, and the M39 left service as a military vehicle in 1957 in the US.

Vehicle	Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
M18 (350 hp Engine)	\$114,638	G, A	435 kg	17.04 tons	5	14	Headlights	Enclosed
M18 (400 hp Engine)	\$114,798	G, A	438 kg	17.04 tons	5	14	Headlights	Enclosed
M39	\$22,623	G, A	1.12 tons	15.17 tons	3	12	Headlights	Enclosed

Vehicle	Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
M18 (350 hp Engine)	145/101	40/28	620	148	Trtd	T3	TF5 TS5 TR5 HF6 HS4 HR4*
M18 (400 hp Engine)	163/114	45/32	620	172	Trtd	T3	TF5 TS5 TR5 HF6 HS4 HR4*
M39	179/125	50/35	625	172	Stnd	T3	HF6 HS4 HR4**

Vehicle	Fire Control	Stabilization	Armament	Ammunition
M18	+1	None	M1 76.2mm gun, M2HB (C)	45x76.2mm, 840x.50
M39	None	None	M2HB (C)	1000x.50

*The turret is open-topped and has an AV of 0.

**The center of the hull roof (where the turret used to be) is open and has an AV of 0.

GM M36 "Jackson"

Notes: This old warhorse is still in use by some South American and Southeast Asian countries. It combines the hull of the M10/M10A1 with a new turret mounting the M3 90mm gun. It replaced the M10 and the M18 (eventually). The M36 used the hull and engine of the M10A1, while the M36B2 used the hull and engine of the M10. These hulls were equipped with somewhat larger fuel tanks. The M36B1 used the hull and engines of the M4A3 Sherman, and is heavier than either the M36 or M36B2, as it retains the bow machinegun armament. Some M36B2s had armored covers for the turret added, but this was not a standard installation. The turret is a different shape than the M10 and has a more rounded profile. The turret bustle/counterweight stores 11 rounds for the main gun, with the rest being stored in the hull. The M3 90mm gun does not have any autoloader, but it does have an electrically-powered rammer, which somewhat increases fire rate (not enough to affect game terms). Some M36B2s have the M3A1 gun; this is an M3 with a single-baffle muzzle brake and bore evacuator (again, not applicable in game terms, except for flavoring elements, but the muzzle brake and bore evacuator do help keep gunsmoke from obscuring the line of sight for follow up shots). The M2HB is again mounted on the rear of the turret, but units often moved this mount to the front of the turret due to the difficulty of firing the M2HB at targets directly to the front of the M36, or a mount for an M1919A4 was positioned at the front of the turret. Turret appointments are much similar to the M10 series.

The M36 is similar to the M10A1, but has a 90mm gun instead of the 76mm gun. The name "Jackson" was applied after World War 2 in some publications, but was never used by the US Army or those countries it was sold to. Other than the US, users included Yugoslavia (who fought them as late as the Yugoslavian Civil Wars), France, Iraq (captured from Iran, and mostly destroyed during Desert Storm and Iraqi Freedom), Iran, Italy, Pakistan, Philippines, Taiwan (who used two of them until 2001), South Korea (some of the turrets are still being used as fixed artillery at some border firebases), and Turkey.

Vehicle	Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
M36	\$207,513	G, A	388 kg	27.67 tons	5	16	Headlights	Enclosed
M36B1	\$219,236	G, A	368 kg	30.84 tons	5	18	Headlights	Enclosed
M36B2	\$207,288	D, A	387 kg	29.94 tons	5	10	Headlights	Enclosed

Vehicle	Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
M36	121/85	34/24	727	201	Trtd	T5	TF11 TS5 TR3 HF27 HS8 HR4

M36B1	112/78	31/22	636	201	Trtd	T5	TF11 TS5 TR3 HF27 HS8 HR4
M36B2	100/70	28/20	625	111	Trtd	T5	TF11 TS5 TR3 HF27 HS8 HR4

Vehicle	Fire Control	Stabilization	Armament	Ammunition
M36/M36B2	+1	None	M3 90mm Gun, M2HB (C)	47x90mm, 1000x.50
M36B1	+1	None	M3 90mm Gun, M1919A4 (Bow), M2HB (C)	47x90mm, 2000x.30-06, 1000x.50

T-55/M18

Notes: This is a T-55 chassis with the turret replaced by that of the M18 Hellcat tank destroyer. This modification is seen with some regularity inside the borders of the former Yugoslavia, but rarely outside that area. The reason why this modification was done in the first place is not clear (the first ones were done in the early 1980s), but reasons from combining T-55s with non-functioning turrets and M18s with non-functioning hulls to the production of a cheap infantry support vehicle have been proposed. About the only modifications that have been done to the turret were slightly better stabilization, night sights, and modifications needed to mate it to the T-55 chassis.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$211,616	D, A	454 kg	29.68 tons	4	16	Active/Passive IR (D, G, C)	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
140/98	39/27	812+380	246	Trtd	T6	TF5 TS5 TR5 HF60 HS12 HR6

Fire Control	Stabilization	Armament	Ammunition
+1	Basic	M1 76.2 mm gun, M2HB (C)	45x76mm, 840x.50BMG