

VEHICLES LITE COMPANION 1

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ELECTRIC CAR

This is a generic vehicle that could represent a possible near-future all-electric vehicle (as opposed to a gas-electric hybrid, see below). Visibility is good.

Subassemblies: Body +3, 4 Wheels +1.

P&P: 40-kW improved wheeled drivetrain, 120 kWh advanced battery.

Fuel: None.

Occupancy: 1 NCS, 3 NS. **Cargo:** 10 cf.

Armor	F	RL	B	T	U
<i>All:</i>	3/5	3/5	3/5	3/5	3/5

Equipment

Body: Airbags (all seats); burglar alarm; 4-man environmental control; sound system.

Statistics

Size: 15'¥6'¥4' *Payload:* 1,000 lbs. *Lwt.:* 2.31 tons

Volume: 198 cf. *Maint.:* 102 hours. *Price:* \$38,400.

HT: 12. *HP:* 150 *Whl:* 15 each.

gSpeed: 75 *gAccel:* 3 *gDecel:* 15 *gMR:* 1 *gSR:* 5

Ground Pressure High. 1/6 Off-Road Speed

Design Notes

Body is 180 cf; wheels are 18 cf. Structure is light. It has improved brakes and improved suspension. Armor is standard composite. Mechanical controls. 1.4 cf of empty space in body. Empty weight is 3,620 lbs.

TOYOTA PRIUS

The 2001 Toyota Prius is a compact four-door sedan that uses a combination gas-electric drivetrain. Unlike a pure electric vehicle it recharges from the gas engine and does not require an external recharger. Depending on the situation the vehicle operates with just the 33-kW electric engine, the 56-kW gas engine, or both together for high-demand situations (hills and maximum speed). The gas engine is still used most of the time, with excess output routed to recharging the batteries – a LCD display next to the driver shows the battery status and power management functions. The price of efficiency is a cramped passenger space (three people can fit in the rear seats only if they are very friendly). Visibility is good. A full load of fuel costs \$17.85.

Listed performance is with the gas turbine active. At the cruising electric drive output of 15-kW gSpeed is 45 and gAccel is 2. At full output the electric drive provides gSpeed is 70 mph and gAccel is 3. With both electric drive and gas engine active (86-kW) the gSpeed is 110 mph and aAccel is 5.

There are actually two battery banks, a 2,000-kWs utility battery for the radio and environmental controls, and the remainder as the drive battery – which in standard usage is charged with 3,600 kW rather than the maximum 6,740 kW.

Subassemblies: Body +3, 4 Wheels +1.

P&P: 86-kW improved wheeled drivetrain, 53-kW improved std. gasoline engine, 8,740 kW advanced battery.

Fuel: 11.8 gallons gasoline (fire 11).

Occupancy: 1 NCS, 1 NCS, 2 CS. **Cargo:** 11.8 cf.

ArmorF RL B T U

All: 3/5 3/5 3/5 3/5 3/5

Equipment

Body: Receive-only radio; burglar alarm; airbags (NCS and NS); 5-man environmental control. *External:* Hitch.

Statistics

Size: 15'¥6'¥5' *Payload:* 1,307 lbs. *Lwt.:* 1.786 tons

Volume: 149 cf. *Maint.:* 141 hours. *Price:* \$19,890.

HT: 12. *HP:* 263 *Whl:* 30 each.

gSpeed: 85 *gAccel:* 4 *gDecel:* 15 *gMR:* 0.75 *gSR:* 4

Ground Pressure High. 1/6 Off-Road Speed

Design Notes

Body is 135 cf; wheels are 13.5 cf. Structure is medium. It has improved brakes. Armor is standard composite. Mechanical controls. 5.1 cf of empty space in body. Empty weight is 2,285 lbs.

KAWASAKI ZX-12R

Designed to compete with the Suzuki Hayabusa (see *Vehicles Lite*), the ZX-12R was introduced in 2000 as the flagship product in the Ninja line of motorcycles. It features a compact, high performance engine and a streamlined aluminum body shell. The rear passenger seat is covered when driven solo. It uses 5.36 gallons of gasoline per hour. A full load of fuel costs \$7.95. Visibility is good.

Subassemblies: Body +1, 2 Wheels -1.

P&P: 134-kW improved wheeled drivetrain, 134 kW improved HP gasoline engine, 605 kW lead acid battery.

Fuel: 5.3 gallons gasoline (fire 11).

Occupancy: 1 XCS (cycle), 1 XS (cycle) **Cargo:** 0.

Equipment

Body: None.

Statistics

Size: 6.8'x2.7'x4' *Payload:* 431.8 lbs. *Lwt.:* 0.448 tons

Volume: 17 cf *Maint.:* 148 hours. *Price:* \$18,260.

HT: 12. *HP:* 30 *Whl:* 6 each

gSpeed: 195 *gAccel:* 15 *gDecel:* 10 *gMR:* 1.75 *gSR:* 3

Ground Pressure High. 1/6 Off-Road Speed

Design Notes

Body is 15.2555 cf; wheels are 1.52555 cf. Structure is light, very expensive. It has improved suspension. Mechanical controls. Empty weight is 465 lbs. Design uses "extra detail" option for top speed.

FORD MUSTANG GT CONVERTIBLE

The 2002 Ford Mustang GT Premium Convertible is the latest in a long line of high performance 2-door sports coupes. The Mustang sits four people (two in front, two in back) and has a manual transmission, but automatic is available as an option. It burns 7.76 gallons of gasoline per hour. A full load of fuel is \$23.55. Visibility is good.

Subassemblies: Body +3, 4 Wheels +1.

P&P: 194-kW improved wheeled drivetrain, 194 kW std. gasoline engine, 2,000 kW lead acid battery.

Fuel: 15.7 gallons gasoline (fire 11).

Occupancy: 1 XNCS, 1 XNS, 2 XCS. **Cargo:** 11 cf.

ArmorF RL B T U

All: 3/5 3/5 3/5 3/5 3/5

Equipment

Body: Airbags (XNCS and XNS); burglar alarm; 4-man environmental control; sound system.

Statistics

Size: 15'¥6'¥4' *Payload:* 1,114.2 lbs. *Lwt.:* 2.247 tons

Volume: 143 cf. *Maint.:* 124 hours. *Price:* \$25,930.

HT: 12. *HP:* 262 *Whl:* 30 each.

gSpeed: 145 *gAccel:* 7 *gDecel:* 15 *gMR:* 0.75 *gSR:* 4

Ground Pressure High. 1/6 Off-Road Speed

Design Notes

Body is 130 cf with fair streamlining; wheels are 13 cf. Structure is medium, standard. It has improved brakes and a convertible ragtop. Armor is cheap metal. Mechanical controls. Empty weight is 3,380 lbs. 2.8 cf empty space in body. Design uses extra detail option for top speed.

DODGE RAM PICKUP

The 2002 Dodge Ram 1500 Quad Cab SLT is one of the larger production pickup trucks on the market. It burns 7.32 gallons of gasoline per hour. A full load of fuel is \$39. Visibility is good.

Subassemblies: Body +3, 4 Wheels +1.

P&P: 183-kW wheeled drivetrain, 183 kW std. gasoline engine, 8,400 kW lead acid battery.

Fuel: 16 gallons gasoline (fire 11).

Occupancy: 1 RCS, 1 RS, 3 NS. ***Cargo:*** 58 cf. (open)

Armor **F** **RL** **B** **T** **U**

All: 3/5 3/5 3/5 3/5 3/5

Equipment

Body: Airbags (CCS and RS); burglar alarm; 5-man environmental control; sound system. *External:* Hitch.

Statistics

Size: 19'¥7¥6' *Payload:* 3,476 lbs. *Lwt.:* 4 tons

Volume: 330 cf. *Maint.:* 112 hours. *Price:* \$31,575.

HT: 12. *HP:* 900 *Whl:* 90 each.

gSpeed: 105 *gAccel:* 5 *gDecel:* 15 *gMR:* 0.75 *gSR:* 4

Ground Pressure High. 1/6 Off-Road Speed

Design Notes

Body is 300 cf., wheels are 30 cf. Structure is heavy, standard. It has improved brakes. Armor is standard metal. Mechanical controls. Empty weight is 4,698 lbs. 14.61 cf. empty space in body.

LAMBORGHINI DIABLO VT 6.0

The Diablo 6.0 was introduced in 2000 and incorporated a number of improvements over earlier versions. It is built almost entirely of carbon composite materials, with aluminum at key points for safety. It burns 18.225 gallons of gasoline per hour. A full load of fuel is \$39.60. Visibility is good.

Subassemblies: Body +3, 4 Wheels +1.

P&P: 410-kW improved all-wheel drivetrain, 410 kW HP gasoline engine, 3,888 kW lead acid battery.

Fuel: 26.4 gallons gasoline (fire 11).

Occupancy: 1 NCS, 1 NS. ***Cargo:*** 5 cf.

ArmorF **RL** **B** **T** **U**

All: 2/4 2/4 2/4 2/4 2/4

Equipment

Body: Airbags (NCS and NS); burglar alarm; 2-man environmental control; luxury interior (NCS and NS); sound system.

Statistics

Size: 14.6'x6.7'x3.6' *Payload:* 658.4 lbs. *Lwt.:* 2.035 tons

Volume: 169 cf. *Maint.:* 62 hours. *Price:* \$101,200.

HT: 12. *HP:* 300 *Whl:* 30 each.

gSpeed: 205 *gAccel:* 12 *gDecel:* 15 *gMR:* 1.25 *gSR:* 5

Ground Pressure High. 1/4 Off-Road Speed

Design Notes

Body is 170 cf. with good streamlining; wheels are 17 cf. Structure is medium, expensive. It has improved brakes and improved suspension. Armor is standard composite. Mechanical controls. Empty weight is 3,411 lbs. Design uses extra detail option for top speed.

Lamborghini's have limited production runs and a high markup. A new Diablo will almost certainly go for 2-3 ¥ the amount listed here.

NISSAN 350Z

The 2003 Nissan 350Z is a inexpensive sports car that still maintains good performance. It burns 7.49 gallons of gasoline per hour. A full load of fuel is \$30. Visibility is good.

Subassemblies: Body +3, 4 Wheels +1.

P&P: 214-kW improved wheeled drivetrain, 214 kW improved std. gasoline engine, 3,000 kW's advanced battery.

Fuel: 20 gallons gasoline (fire 11).

Occupancy: 1 NCS, 1 NS. **Cargo:** 6.8 cf.

Armor **F** **RL** **B** **T** **U**

All: 2/5 2/5 2/5 2/5 2/5

Equipment

Body: Sound system; burglar alarm; airbags (NCS and NS); 2-man environmental control.

Statistics

Size: 14.6'¥6.7'¥3.6' *Payload:* 656 lbs. *Lwt.:* 1.816 tons

Volume: 160 cf. *Maint.:* 120 hours. *Price:* \$27,340.

HT: 12. *HP:* 263 *Whl:* 30 each.

gSpeed: 160 *gAccel:* 8 *gDecel:* 15 *gMR:* 0.75 *gSR:* 4

Ground Pressure High. 1/6 Off-Road Speed

Design Notes

Body is 145 cf. with fair streamlining; wheels are 14.5 cf. Structure is medium, standard. It has improved brakes. Armor is standard composite. Mechanical controls. Empty weight is 2,975 lbs. Design uses extra detail option for top speed.

GENERAL MOTORS HUMMER H2 SPORT UTILITY VEHICLE

The latest iteration of the Hummer is the 2002 H2, a sporty redesign with a number of improvements to comfort – and a drastically reduced sticker price. Although not as luxurious as some competitors it has superior off-road performance and is certainly more ruggedly built.

The H2 has a small cargo area, the rear seats are usually folded down to increase the available space. Alternately, another seat can be installed instead. It burns 9.44 gallons of gasoline per hour. A full load of fuel is \$48. Visibility is good.

Subassemblies: Body +3, four off-road Wheels -1.

P&P: 236-kW all-wheel-drive, 236 kW std. gasoline engine, 3,000 kW lead-acid battery.

Fuel: 32 gallons gasoline (fire 11).

Occupancy: 1 RCS, 1 RS, 3 NS. **Cargo:** 41.6 cf.

Armor	F	RL	B	T	U
<i>All:</i>	3/5	3/5	3/5	3/5	3/5

Equipment

Body: GPS; sound system; burglar alarm; airbags (RCS and RS); 6-man environmental control. *External:* Hitch.

Statistics

Size: 16'¥6'¥6' *Payload:* 2,024 lbs. *Lwt.:* 4.2 tons

Volume: 348 cf. *Maint.:* 90 hours. *Price:* \$48,545

HT: 12. *HP:* 450 *Whl:* 75 each.

gSpeed: 125 *gAccel:* 6 *gDecel:* 15 *gMR:* 0.5 *gSR:* 4

Ground Pressure High. 1/3 Off-Road Speed

Design Notes

Body is 290 cf. ; wheels are 58 cf. Structure is medium, standard. It has improved brakes. Armor is standard composite. Mechanical controls. Empty weight is 6,540 lbs. Rear seats (3 NS) are folding. A common accessory is a ST 25 winch (9,000 lb. towing). Actual curb weight (empty weight + gas) is about 6,400 lbs. but the design weight is close enough.

Variants: The 2003 H2 SUT (Sport Utility Truck) has a slightly beefier 242-kW engine and the cargo section is open-air. Decrease body volume to 270 cf. – wheels remain 58 cf. Add a 0.5-mi. range IR searchlight in a 0.2 cf. full-rotation open mount (5 HP). Empty weight of 5,840 lbs. \$49,460.

AM GENERAL M1025 HMMWV

The M1025 Armament Carrier is one the basic variants of the original M998 HMMWV that entered service in 1985. The major difference between the M1025 and M998 is the addition of a hard “clamshell” covering and an open mount for the installation of various heavy weapons. The most common configurations are a 12.7mm Machine Gun/M2HB with 2,000 rounds or a 40mm AGL/Mk 19 MOD 3 with 600 rounds. Most of the ammo will be stored as cargo.

The M1025 burns 3.92 gallons of diesel per hour. A full load of fuel is \$30. Visibility is good.

Subassemblies: Body +3, four off-road Wheels –1, full-rotation open mount +1.

P&P: 112-kW all-wheel-drive, 112 kW std. diesel engine, 3,000 kWh lead-acid battery.

Fuel: 25 gallons gasoline (fire 9).

Occupancy: 1 RCS, 1 RS, 2 RS, 1 XRS. *Cargo:* 35 cf.

Armor	F	RL	B	T	U
<i>Body:</i>	3/8	3/8	3/8	3/8	3/8

Equipment

Body: 5-man environmental control. *External:* Hitch.

Statistics

Size: 15'¥7'¥6' *Payload:* 1,850 lbs. *Lwt.:* 3.89 tons

Volume: 322 cf. *Maint.:* 86 hours. *Price:* \$54,570.

HT: 12. *HP:* 750 *Whl:* 150 each *OM:* 32.

gSpeed: 85 *gAccel:* 4 *gDecel:* 15 *gMR:* 0.5 *gSR:* 4

Ground Pressure Moderate. 1/4 Off-Road Speed

Design Notes

Body is 268 cf. ; wheels are 54 cf.; open mount is 4 cf. (3.2 usable).

Structure is heavy. It has improved brakes and puncture-resistant tires.

Armor is standard composite. Mechanical controls. Empty weight is 5,941 lbs. Rear seats (2 RS) are folding. Common additions are a medium range radio with scrambler and a ST30 (6,000 lb. towing capacity) winch (changing the designation to M1026).

Variants: Variants listed after the slash are those with the winch.

M966/M1036: Identical to the M1025 except it has a 152mm SACLOS ATGM/TOW-2 launcher on the pintle mount and six rounds stored as cargo. The TOW launcher can be removed and used by the crew.

M998/M1038: The M998 lacks the hardtop of the M1025 as well as most of the armor. When configured as a cargo carrier it has two doors and a soft ragtop over the crew compartment (seats become XRS). The cargo area can be open or covered with a ragtop. When configured as a troop carrier there are 8 XCS with an optional cloth covering. In yet another configuration there are 2 XRS added, with the remainder being a cargo area. All of these versions lack the open mount, but it can be installed on non-U.S. configurations. For the basic cargo carrier configuration body becomes 150 cf (525 HP) and cargo changes to 55 cf (open) – the wheels remain 54 cf. Armor is 3/5 cheap metal. New payload is 3,350 lbs. and empty weight is 4,733 lbs. \$41,010.

T-72S *SHILDEN* MAIN BATTLE TANK

The T-72S is the export version of the T-72B (Obiekt 184), which entered service in 1985. It differs from earlier versions in that it has improved armor protection and fire control, a larger 12-cylinder V-84 diesel engine, smoke dischargers on the turret, and a 2A46M Rapra cannon fitted with the 9M120 electronics suite that can fire and direct the 9M119 (AT-11) missile. The non-export T-72B has slightly better NBC protection, but is otherwise identical.

It uses 21.91 gallons of diesel fuel per hour. A full load of fuel and ammo is \$88,576.40. Visibility is poor. The turret rotates at 16° per turn.

Subassemblies: Body +4, full-rotation Turret +3, Tracks +2, limited-rotation Open Mount #1 +2; two Open Mounts #2 and #3 +2.

P&P: 626-kW tracked drivetrain; 626-kW std. turbocharged multi-fuel diesel; 27,200-kWs lead-acid batteries.

Fuel: 317 gallons diesel (fire 9).

Occupancy: 2 CCS (turret), 1 CCS (body). **Cargo:** 0 cf.

Armor	F	RL	B	T	U
<i>Body:</i>	6/1,400	L5/180	4/100	4/70	4/50
<i>Turret:</i>	5/1,500	L5/675	4/150	4/85	-
<i>Tracks:</i>	4/50	4/50*	4/50	4/50	4/50

* Plus DR 30L side skirts.

Weaponry

125mm smoothbore gun/2A46M [Tur:F] (39 rounds) +3.

7.62mm MG/PKT [Tur:F] (2,000 rounds) +0.

12.7mm MG/NSV [OM:F] (300 rounds) +0.

Equipment

Body: Light amp. (driver); compact fire suppression; smokescreen; 3-man NBC kit. *Turret:* Full stabilization for 125mm gun and 7.62mm machine gun; medium-range radio with scrambler; 8x telescope (gunner); 8x telescope (gunner, for ATGM); 5x telescope (commander); 6x LLTV (gunner); 4x LLTV (commander); 1-mi. IR searchlight; laser rangefinder; dedicated targeting computer w/software for 125mm gun. *Open Mount 1:* Universal mount for 12.7mm machine gun. *Open Mount 2/3:* Two smoke/decoy dischargers with 8 reloads (hot smoke). *External:* Bulldozer blade; two 500-lb hardpoints.

Statistics

Size: 21'8" x 5' *Payload:* 5,228 lbs. *Lwt.:* 51.53 tons

Volume: 1,116 cf. *Maint.:* 15 hours. *Price:* \$1,575,845.

HT: 10. *HP:* 2,400 *Tur:* 750 *Tracks:* 900 each *OM1:* 22

OM2/3: 26 each.

gSpeed:40 gAccel: 3gDecel: 20 gMR: 0.25 gSR: 5

Ground Pressure Low. 2/3 Off-Road Speed

Design Notes

Published loaded weights for the T-72B/S vary by up to 5 metric tons, design LWt. closely matches 46.5 tonne figure so it was kept. Front and side armor on the turret and body were slightly reduced from the published maximum RHA equivalents as they were averaged over the entire face and not simply the best armored location in that area. Body is 530 cf. with 60° F slope and 30° RL slope. Turret is 260 cf. with 30° slope on F and RL sides. Tracks are 318 cf. Open mount 1 is 2.5 cf. and the other two are 3 cf. each. Body and track structure is extra-heavy, turret is heavy. Structure has heavy compartmentalization. Armor is standard metal except: turret front and body front is expensive laminate, turret RL and RL is expensive metal, track skirts are standard laminate. Sealed body and turret. Mechanical controls. 9.6 cf. of empty space in the body and 6 cf. in the turret for further upgrades. Empty weight is 97,838 lbs. Typical ammo mix for 125mm gun is 12 APFSDS (5 in turret), 21 HE (15 in turret), and 6 HEAT (2 in turret). Six AT-11 missiles are carried in the body; these missiles use the statistics from *Vehicles Lite*, but see below for a more detailed treatment.

Reactive Armor: Many T-72s are fitted with first-generation explosive reactive armor (ERA). A suite of KONTACT-I protects the front and sides of the body and turret. The plates add 3.25 tons to loaded weight and cost about \$325,000.

Variants: The T-72S1 is fitted with first-generation ERA but the gun is not capable of firing the AT-11 missile.

((START BOX))

TULA KBP TKB-799 KLIVER TURRET

The Kliver turret is a privately developed upgrade that can be installed on a number of vehicles – such as the BTR-80, BMP-1 and even T-72 hulls.

The turret has also been marketed for installation on naval patrol craft.

The turret seats a gunner to the left, with the 30mm cannon in the center and ammo on the right. The four SACLOS Kornet missiles are mounted on the right and above the main turret housing.

A full load of ammo is \$282,860. Visibility is good.

Subassemblies: Turret +3, Open Mount +2.

P&P: None.

Fuel: None.

Occupancy: CCS. **Cargo:** 0 cf.

Armor	F	RL	B	T	U
<i>Turret:</i>	4/20	4/20	4/20	4/20	4/20

Weaponry

30mm autocannon/2A72 [Tur:F] (350 rounds) +3.

7.62mm MG/PKT [Tur:F] (2,000 rounds) +0.

Equipment

Turret: Full stabilization for 30mm autocannon and 7.62mm machine gun; 12x telescope [F]; 5-mi. thermograph [F]; laser rangefinder; dedicated targeting computer w/software for 30mm cannon. *External (on Open Mount):* 200-lb. dry hardpoint.

Statistics

Size: xx'x'x' *Payload:* 1,162.6 lbs. *Lwt.:* 1.59 tons

Volume: 39 cf. *Maint.:* 51 hours. *Price:* \$148,720.

HT: 12. *HP:* 225 *OM:* 32.

Design Notes

Turret is 35 cf. and open mount is 4 cf. Turret has a heavy frame with heavy compartmentalization. Armor is standard metal. Structure is sealed. 2.9 cf of empty space. Empty weight is 2,009 lbs. Four Kornet (AT-14) missiles in disposable tubes (50 lb. capacity) are fitted to the open mount hardpoint and are included in payload weight and cost.

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Extra Detail: Reactive Armor

The rules given in *Vehicles Lite*, *Vehicles, Second Edition* and *Vehicles Expansion I* are based largely on guesswork derived from early examples. There is now significantly more information available about the capabilities of reactive armor. The following rules can be used for additional realism and accuracy.

When a shaped-charge (HEAT, HEDP, HEMP) strikes an area protected by ERA, roll 2d. Subtract 1 for every prior hit by a shaped-charge warhead on that same location. If the result is 0 or less, an unprotected area has been hit and the ERA has no effect. Otherwise, the ERA protects at its stated DR, ignoring the shaped-charges armor divisor. Second and third generation ERA will also protect against high-velocity kinetic energy projectiles (APS and APFSDS), but is less effective against dense penetrators (APFSDU). Third generation ERA will protect against APFSDU, Multiply the ERA DR values by the slope modifiers of the area it is installed on. Against other attacks the ERA functions as standard metal armor.

ERA will not explode except in special circumstances (see below), even if struck by large-caliber explosive rounds or burned. However, record the damage taken by the plates that penetrates their DR. Every 100 points of damage destroys enough sections to qualify as a “previous hit.”

Generation 1 (Late TL7): Representing early developments, such as the Israeli *Blazer* and Russian *KONTACT I* systems, this armor will only explode if struck by a shaped charge and provides very little protection against kinetic-energy impacts.

ERA protects with DR 1,000 against shaped charges, but only DR 55 against other attacks. Generation 1 ERA weighs 25 lbs. and costs \$50, multiplied by the surface area of the locations being protected. It will only detonate against shaped-charge attacks. When a cassette does so, it inflicts 6dx2 concussion damage to a rough cone. A third of this damage is applied to the underlying armor.

Generation 2 (Late TL7): This includes most "mainline" ERA widely used by Russia and its customers, most notably with the *KONTACT V* system. Second-generation ERA protects with only DR 900 against shaped-charges but the heavier plates provide additional protection against tandem-charge munitions and kinetic-energy penetrator rods with DR 140. If a ERA-defeating munition strikes these plates roll 1d. Subtract 1 for every 50mm of the warhead if tandem-charge, every 25mm if triple-charge. If the result is 0 or less then the ERA explodes but the munition works as advertised anyways. Otherwise the precursor charge is defeated and the follow-on warhead is affected fully.

Generation 3 (Early TL8): Currently in development, these cassettes are designed to provide additional protection against ERA-defeating warheads and increase protection levels against kinetic-energy penetrators. Roll 2d when struck by ERA-defeating warheads instead of 1d, otherwise similar to Generation 2. Protects with DR 1,500 against shaped-charges and DR 300 against other attacks, ignoring all armor divisors.

Explosive Reactive Armor

<i>Type</i>	<i>Wt.</i>	<i>Cost</i>
Generation 1	25	\$50
Generation 2	60	\$100
Generation 3	110	\$200
Generation 1.5		

Multiply weight and cost by the surface area of the location being protected.

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Extra Design Options

Ejection Seat: This option can be added to any seat. Depending on the system the pilot can be ejected through the bottom of the aircraft, or out the top. Explosive bolts will remove intervening obstacles to enable a safe ejection and are capable of removing the individual from the vehicle even if it is inverted. Once free of the vehicle a parachute will deploy. The seat includes an emergency rescue transponder and survival kit. Some systems also have the flight recorder storage unit in the seat.

Limited Life System: Functions as an environmental control system and provides enough bottled air, water and other life-support requirements to keep a person alive. Each module supplies 1 man-day of life support, minimum module size is 0.25 man-days (6 hours), anything less then that requires negligible space. Power requirement is multiplied by the number of occupants expected to use the system.

Laser Spot Tracker: This is a sensitive electro-optical device that can detect a laser-illuminated target within line of sight. Also referred to as a laser marked target seeker.

Additional Modules

<i>Type</i>	<i>Wt.</i>	<i>Vol.</i>	<i>Cost</i>	<i>Power</i>
Ejection Seat	100	5	\$50,000	0
Limited Life System	200	4	\$1,000	0.5
Laser Spot Tracker	20	0.4	\$10,000	neg.

Retractable Landing Gear: Small wheels that can retract into the body (and thus not contribute to drag) multiplies the body volume by ¥1.075.

LBR Guidance: The guidance system for an laser-riding SACLOS missile is not the same as a laser designator. For game purposes assume the functionality is included with the extra weight and cost of a gun-launcher or any laser rangefinder. By itself, treat it as a half-price laser rangefinder. Note that an LBR guidance laser may not activate a laser detector on the target as the beam and missile is often offset from the gunners aimpoint for top attacks and to keep the missile from obscuring the target.

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KAMOV KA-50 *CHERNAYA AKULA*

The Ka-50 Chernaya Akula (“Black Shark”) is a modern close-support helicopter that has been heavily promoted by Russia for the export market. Known to NATO as the “Hokum-A”, the Ka-50 was incorrectly assumed to be an air-to-air combat helicopter when it was first reported. Initially given the marketing name “Werewolf” it was officially changed to Black Shark after a popular Russian movie by the same name popularized the term.

The Ka-50 is a single-seat design with coaxial counter-rotating rotors. Two small wings are mounted midbody, each with two hardpoints and a countermeasures pod mounted on the tips. The hardpoints are unusual in that movable mounts can be attached – rotating down up to 12°. The body has an aggressive look, with retractable landing wheels and a streamlined fuselage with large windows. One of the most unique features of the Ka-50 is the pilot ejection seat: when activated, the rotor blades and canopy are explosively separated and the seat is launched, recovering even if it was launched while inverted.

The Ka-50 is one of the most advanced Russian helicopters in existence, but has had a number of troubling problems with pilot workload, compounded by the addition of advanced electronics but relatively primitive controls. The Russians have been aggressive in forming partnerships with France and Israel to upgrade the helicopters electronics and ease these problems – the two-seat Ka-52 Alligator (“Hokum-B”) was also developed for this reason.

It burns 228.62 gallons of jet fuel per hour. A full load of fuel and cannon ammunition is \$5,935. Visibility is good.

Subassemblies: Body +4, two Multiple Main Rotors -1, two Stub Wings -2, three Retractable Wheels -1.

P&P: Two 1,600-kW MMR drivetrains; two 1,633-kW HP gas turbines; 4,800 kW advanced battery.

Fuel: 485 gallons jet fuel (fire 13).

Occupancy: 1 CCS. **Cargo:** 0 cf.

Armor	F	RL	B	T	U
<i>Body:</i>	4/15	4/15	4/15	4/15	4/15
<i>Wings:</i>	4/15	4/15	4/15	4/15	4/15
<i>Rotor:</i>	4/10	4/10	4/10	4/10	4/10

Wheels:

Pilot Compartment: -- 4/65 4/65 -- 4/65

Pilot Windshield: 4/20 -- -- -- --

Weaponry

30mm autocannon/2A42 [Bod:F] (470 rounds) +0.

Equipment

Body: Full stabilization for 30mm autocannon; three medium-range radios; long-range radio with scrambler; digital datalink with software; autopilot; military GPS; navigation instruments; IFF; inertial navigation system; HUDWAC; laser rangefinder [F]; laser spot tracker [F]; two advanced radar detectors [F/B]; laser sensor; computer terminal; small computer; flight recorder; compact fire suppression; ejection seat. *Wings:* Two advanced radar detectors; four smoke/decoy dischargers with 4 reloads (chaff or flare). *External (on wings):* Four 1,500-lb. hardpoints.

Statistics

Size: 53'¥24'¥16' *Payload:* 10,473.5 lbs. *Lwt.:* 13.871 tons

Volume: 402 cf. *Maint.:* 12 hours. *Price:* \$2,721,630.

HT: 12. *HP*: 1,800 *MMR*: 396 each *Wings*: 180 each *Wheels*: 50 each.

aSpeed: 265 *aAccel*: 4 *aDecel*: 34 *aMR*: 8.5 *aSR*: 3

Stall speed 0.

Design Notes

Body is 350 cf.; each rotor is 7 cf.; each wing is 10 cf.; wheels are 17.5 cf. Body structure is extra-heavy, rest of frame is heavy. Body has heavy compartmentalization. Entire structure is made with expensive materials. No streamlining. Armor is standard composite on body, pilot compartment, stub wings, and landing gear – expensive compartment on window and rotors. Electronic controls. Fuel tank is light, self-sealing. Empty weight is 17,270 lbs. Performance is without loaded hardpoints. With hardpoints loaded *aSpeed* drops to 260 mph. Realistic top speed is considerably lower for fuel economy reasons (about 200 mph in most cases). 9.1 cf. empty space in body. Typical ammo mix for 30mm gun is 240 AP and 230 HE. Ammo is stored in an anti-blast magazine. Actual export price will be 4-5¥ the amount listed.

((START BOX))

30mm Autocannon Rounds

<i>Type of Ammo</i>	<i>Weight</i>	<i>Cost</i>
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Armor Piercing (AP)	¥1.5	¥1.5
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High Explosive (HE)	¥1	¥1
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PZL-230F *SKORPION* SMALL AGILE BATTLEFIELD AIRCRAFT

The Skorpion was the name given to a small single-seat SABA (Small Agile Battlefield Aircraft) that would serve as a close-support aircraft for the Polish Air Force. The project was cancelled in 1994, but it had amassed considerable attention from around the world for its high-tech design and proposed capabilities. A full-scale mockup was constructed to showcase the project.

The final design, had it progressed to actual prototype stage, would have begun to enter service in 2000. It is a short, stubby aircraft dominated by the bubble canopy and weapon pylons. The design was inspired by the A-10 in certain respects – notably the engines mounted high on the rear fuselage in separate pods and the capability to mount a massive GAU-8 cannon in a special ventral hardpoint. The jet was designed to operate from unprepared landing strips and in harsh weather conditions, the wings and even part of the fuselage was modular and could be removed for quick replacement, maintenance, or to store the craft in tight spots.

It burns 375 gallons of jet fuel per hour. A full load of fuel and cannon ammunition is \$3,875. Visibility is good. A full load on the hardpoints is 7,700-lbs.

Subassemblies: Body +4, two Engine Pods -1, two STOL Wings -2, three Retractable Wheels -1.

P&P: Two 6,250-lb turbofans [Pods]; 12,000 kW advanced battery. 125-kW electrical offtake from turbofans.

Fuel: 925 gallons jet fuel (fire 13).

Occupancy: 1 CCS. ***Cargo:*** 0 cf.

ArmorF RL B T U

All: 3/5 3/5 3/5 3/5 3/5

Pilot Compartment: 4/15 4/15 4/15 -- 4/15

Weaponry

25mm 5-bar. Gatling/GAU-12/U [Bod:F] (250 rounds) +0.

Equipment

Body: Long-range radio with scrambler; digital datalink with software; autopilot; military GPS; navigation instruments; IFF; 10-mile radar [F]; HUDWAC; laser rangefinder [F]; laser spot tracker [F]; advanced radar detector [F]; laser sensor; computer terminal; small computer; flight recorder; compact fire suppression; ejection seat. *External (on wings):* Two 1,100-lb. hardpoints; four 500-lb. hardpoints. *External (on body):* One 2,500-lb. hardpoint; four 500-lb. hardpoints.

Statistics

Size: 30'¥32'¥13' *Payload:* 6,487.5 lbs. *Lwt.:* 7.222 tons

Volume: 362 cf. *Maint.:* 15 hours. *Price:* \$1,630,235.

HT: 7. *HP:* 188 *Pods:* 45 each *Wings:* 90 each *Wheels:* 10 each.

gSpeed: 250 *gAccel:* 17 *gDecel:* 15 *gMR:* 0.5 *gSR:* 2

Ground Pressure Extremely High. No Off-Road Speed

Empty Performance

aSpeed: 680 *aAccel:* 18 *aDecel:* 16 *aMR:* 4 *aSR:* 3

Stall speed 80.

Loaded Performance

aSpeed: 600 *aAccel:* 11 *aDecel:* 10 *aMR:* 2.5 *aSR:* 3

Stall speed 120.

Design Notes

Body is 240 cf.; each wing is 25 cf.; each engine pod is 20 cf.; wheels are 12 cf. Structure is light with very expensive materials. Good streamlining. Wheels have improved brakes. Wings have controlled instability. Armor is expensive composite. Computerized controls. Fuel tank is light, self-sealing. Pilot's compartment includes CS and ejection seat. Empty weight is 7,955 lbs. 7.3 cf. empty space in body. Typical ammo mix for 25mm gatling is 250 SAPHE. Ammo is stored in an anti-blast magazine. Design uses extra detail option for top ground speed. LWt is 11.072 tons with all hardpoints filled.

MCDONNELL DOUGLAS/BRITISH AEROSPACE AV-8B HARRIER II

The AV-8B Harrier II is arguably one of the most famous military jet fighters of all time. Capable of taking off and landing vertically (as long as hardpoint load was minimal) it could use even the most primitive landing sites and short runways for takeoff. Early versions were limited in tactical scope because of their lack of night operations capability and low bomb load – but the latest Harrier II Plus adds a radar system and small precision-guided weapons let it carry sufficient striking power to the target – barely.

It burns 714 gallons of jet fuel per hour. A full load of fuel, decoys and cannon ammunition is \$906,200. Visibility is good. A full load on the hardpoints is 8,260-lbs. Typical operation is to take-off using STOL techniques but it will land normally at ground facilities; on ships it will land vertically – saving fuel that otherwise would otherwise have to be reserved if a landing is missed.

Subassemblies: Body +4, two Standard Wings -2, three Retractable Wheels -1.

P&P: 23,800-lb vectored turbofan; 8,000 kW advanced battery. 238-kW electrical offtake from turbofan.

Fuel: 1,141 gallons jet fuel (fire 14).

Occupancy: 1 NCS. **Cargo:** 0 cf.

Armor **F** **RL** **B** **T** **U**

All: 3/5 3/5 3/5 3/5 3/5

Weaponry

25mm 5-bar. Gatling/GAU-12/U [Bod:F] (300 rounds) +0.

Equipment

Body: Long-range radio with scrambler; autopilot; inertial navigation system; navigation instruments; IFF; advanced bombsight; laser spot tracker [F]; two advanced radar detector [F/B]; two smoke/decoy dischargers with four reloads (chaff or flare); computer terminal; small computer; compact fire suppression; refueling probe; 0.5 man-day limited life support; ejection seat. *External (on wings):* Two 2,000-lb. hardpoints; two 1,000-lb. hardpoints; two 630-lb. dry hardpoints. *External (on body):* One 1,000-lb. dry hardpoint.

Statistics

Size: 46'¥30'¥11' *Payload:* 7,986.5 lbs. *Lwt.:* 10.579 tons

Volume: 661 cf. *Maint.:* 11 hours. *Price:* \$2,921,945.

HT: 9. *HP:* 600 *Wings:* 225 each *Wheels:* 60 each.

Empty Performance

gSpeed: 235 *gAccel:* 19 *gDecel:* 10 *gMR:* 0.5 *gSR:* 2

Ground Pressure Extremely High. No Off-Road Speed

aSpeed: 600 *aAccel:* 20 *aDecel:* 12 *aMR:* 3 *aSR:* 4

Stall speed 125 or VTOL.

Loaded Performance

gSpeed: 215 *gAccel*: 16 *gDecel*: 10 *gMR*: 0.5 *gSR*: 2

Ground Pressure Extremely High. No Off-Road Speed

aSpeed: 600 *aAccel*: 22 *aDecel*: 8 *aMR*: 2 *aSR*: 4

Stall speed 170.

Design Notes

Body is 515 cf.; each wing is 60 cf.; wheels are 25.75 cf. Structure is medium with very expensive materials. Fair streamlining. Armor is expensive metal and structure is sealed. Electronic controls. Fuel tank are light but *not* self-sealing: 416 gallons in body, 725 gallons in wings. Empty weight is 13,170 lbs. 5.3 cf. empty space in body. Typical ammo mix for 25mm gatling is 300 SAPHE. Design uses extra detail option for top ground speed. LWt is 14.709 tons with all hardpoints filled.

Variants: There are a number of major variants of the Harrier II, with each major user having its own specialized versions. Standard load includes fuel and cannon ammo. Loaded weight adds hardpoint load.

Night Attack Harrier II: The “Nightbird” is an upgrade of existing U.S. Marine Corps AV-8B’s. It adds a second small computer, HUDWAC, 5-mi. thermograph [F] and digital vehicle camera [F]. This adds 42 lbs. and \$87,000. Reduce empty space by 0.84 cf.

Harrier GR. Mk 5: In service with the British Royal Air Force. Adds two 200-lb. dry hardpoints at the end of the wings, flight recorder, military GPS, and two smoke/decoy dischargers (in wings) with one reload each (chaff or flare). Remove military GPS. Change engine to 21,750-lb. turbofan (652.5 gph), increase empty space in body to 26.69 cf. and maximum hardpoint load to 8,660 lbs. Payload without hardpoints is 7,896.5 lbs. \$905,800 for a load of fuel and decoys. Cost is \$2,906,740 and EWt is 12,938 lbs. All were updated to the Mk 7 standard by 1994.

The Mk 5 was supposed to be armed with dual Aden 25mm cannons -- one on each side of the centerline fuselage – with 100 rounds SAPHE each. The installation *never* worked out and the cannons were eventually dropped completely. A few aircraft had dummy pods fitted for carrying cameras or publicity, but there were never any operational cannons installed. Assuming they worked, these cannon pods would add 624 lbs., reduce empty space by 9.54 cf, and adds \$60,000. Ammo cost is \$880.

Harrier GR. Mk 7: Add a digital vehicle camera [F] and 5-mi. thermograph [F] to the Mk 5 loadout. Add 30 lbs. to EWt. and reduce empty space by 0.6 cf. Add \$81,000.

Harrier II Plus: All U.S. Marine Corps Harriers were converted to this standard by late 2001. It adds a 95-mi. radar [F] in an elongated nose, a second small computer, digital datalink with software, military GPS, HUDWAC, 5-mi. thermograph [F] and digital vehicle camera [F]. It also adds two 200-lb. dry hardpoints at the end of the wings in the same fashion as the RAF Mk 5/7. Length is 47' and body volume is increased to 530 cf. with wheels 26.5 cf. 7.6 cf. empty space in body. Add 542 lbs. to Ewt. and \$471,020 to cost.

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KBP 9M119 REFLEKS/SVIR/INVAR, 125MM×676MM, RUSSIA, 1986

More widely known as the AT-11 “Sniper” to the West, the 9M119 is a tank-launched guided missile almost identical to the 9M117 (AT-10 Stabber) used on the upgraded T-55AMB and T-64. In Russian parlance this is known as a TUR (*Tankovaya Upravleniya Raketa* - Tank Guided Missile).

Depending on the vehicle it is installed on it has a different designation and different operating profiles because of the targeting and control systems, but the missiles themselves are the same. The missile is packaged as the 3UBK14, which includes the missile and a gunpowder charge that drives a pusher plate together with a small solid rocket booster. It is loaded and stored just like normal cannon ammunition. The eject unit adds 15.4 lbs. but the round will be moving at its top Move on the turn it is fired. The sustainer motor burns out after 5.5 seconds and the missile coasts the rest of the way. Maximum range listed in the table assumes a launch using the eject charge.

The Svir is a laser beam rider (LBR), in which the missile uses a laser detector mounted at its rear to follow the path of a laser designator installed on the firing unit. This system of guidance is almost impossible to jam, the 9M119 family of missiles is *immune* to EOCM. A tracking lamp is located on the missile for visual spotting by the gunner but this is a tool of convenience and not how the missile is guidance. Note that in the default firing mode the missile actually travels about 2 yards above the aimpoint that the gunner is tracking; as it approaches the target the missile dives to perform a top attack. If the target is obscured or airborne the missile can be set for a direct-fire mode.

The 9K119 Refleks (“Reflex”) is the designation for the T-72 B, S and M1M mounted systems; targeting limitations restricts it to a maximum range of 4,000 yards on these platforms. The 9K120 Svir is installed on the T-80 and T-90. S53 Svir is the designation when it is fired from the 125mm Sprut-B or Sprut-D artillery pieces.

The 9M119M Invar (AT-11b Sniper) is an improved missile that has a 44mm precursor warhead (6d¥3(10)) and a slightly higher weight (37.8 lbs.) It entered Russian service in 1992. The packaged round designation is 3UBK20.

Tondar: This is the Iranian license-built copy of the 9M119M Invar.

Machine Gun, Autocannon and Grenade Launcher Installation Table

Weapon Weight	Volume	Cost	Power	WPS	VPS	CPS
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TL

Automatic Cannons

25mm 5-bar. Gatling (GAU-12/U; US)	270	5.4	\$43,000	11.5	1.1	0.0073
\$4.40(3) 7						

25mm Autocannon (Aden 25; UK)	202	4.04	\$30,000	0	1.1	0.0073
\$4.40(3) 7						

Missile Installation Table

Weapon Weight	Volume	Cost	Power	WPS	VPS	CPS
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TL

Anti-Tank Guided Missiles

125mm LBR ATGM (Svir; RU)			72.6	1.5	\$20,000	neg.
36.3	0.75	\$10,000				7

Gun Statistics Table

Weapon	Ammo	Malf.	Type	Damage	SS	Acc	1/2D	Max
RoF								

Gunner (Cannon)

25mm 5-bar. Gatling (GAU-12/U)	APFSDS	ver.	Cr.	6d¥3(2)				
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20	14	1,500	6,000	50				
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-- SAPHE	ver.	6d¥3(0.5)+1d-4[2d]	20	14	1,500	6,000		
		50						

25mm Autocannon (Aden 25)	APFSDS	ver. cr.	6d¥8(2)	20	16	2,100		
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9,000	60							
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-- SAPHE	ver. cr./exp.	6d¥4(0.5)+1d[2d]	20	14	1,400	6,000	60	
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Missile Statistics Table

Type and Designation	Warhead	Guid.	Type	Damage	Spd.	
End.	Min.	Max	SS	Acc	Skill	RoF

Anti-Tank Missiles

125mm SACLOS ATGM (Svir; RU)	HEAT	SACLOS	exp.			
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6d¥7(10)	330	16	100	5,000	n/a	n/a	OG	1/20 or NR
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