ARMAMENT

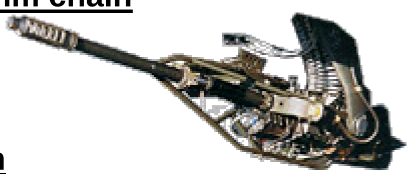
Now can Apache carry:

- Hydra 70 rocket system (Max. 76)
- Hellfire (Max. 16)
- Hellfire II (Max. 16)
- M230
- External fuel tank (871 l)

Here are some other future options.

(click on weapons)

Hughes (McDonnell Douglas) M230 30mm chain



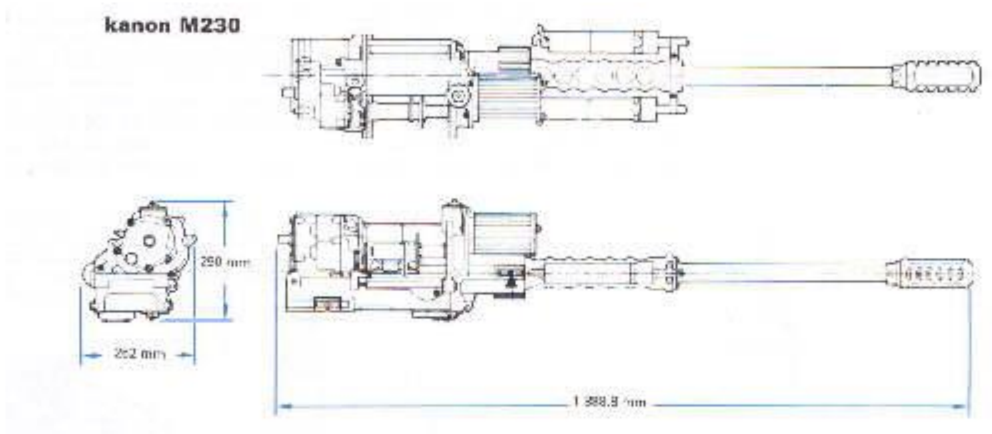
gun

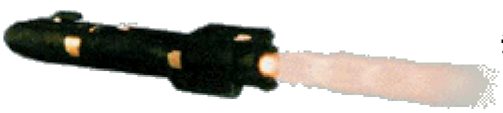
Rate-of-fire	625 / min
Ammo speed	2600ft/s (792m/s)
Ammo storage capacity	1200
Ammo handling system	linear linkless
Total weight	127 lb (57.5kg)
Max. range	19700ft (6005m)

On 20 August 1998 US Army Tank-Automotive and Armaments Command Armament and Chemical and Logistics Activity (TACOM-ACALA) and McDonnell Douglas Helicopter Systems (MDHS) signed a first-of-its kind contract for spare parts for the M230 30mm Gun and Area Weapon System (AWS) for the APACHE attack helicopter. The contract allows for parts to be ordered directly from a catalog instead of through the traditional contracting process. The Government can also order parts based on need when the Army needs them, instead of projecting quantities. This eliminates binding the Government into procuring set numbers in advance and reduces unnecessary inventory. In addition, delivery is directly to the troops in the field instead of to the storage depot, where delays are incurred in shipping to the field. This contracting effort decreases administrative and production lead times, reduces ordering time from nine months to less than a month, reduces administrative costs, and minimizes the strain on manpower resources including those of DCMC and DCAA, as well as TACOM-ACALA and MDHS, while maintaining reasonable prices for spare parts requirements.

cannon General Electric XM188E1 of YAH-63

M789 (HEDP) High Explosive Dual Purpose
M799 (HEI) High Explosive Incendiary
M788 (TP) Target Practice





AGM - 114 Hellfire

The Hellfire Air-to-Ground Missile System (AGMS) provides heavy anti-armor capability for attack helicopters. The first three generations of HELLFIRE missiles use a laser seeker. The fourth generation, Longbow HELLFIRE, uses a radar frequency seeker.

The first generation of Laser HELLFIRE presently is used as the main armament of the U.S. Army's AH-64 Apache and U.S. Marine Corps' AH-1W Super Cobra helicopters. The second generation currently is available for deployment. Laser HELLFIRE homes on a laser spot that can be projected from ground observers, other aircraft, or the launching aircraft itself. This enables the system to be employed in a variety of modes: autonomous, air or ground, direct or indirect, single shot, rapid, or ripple fire.

For antiarmor roles, the AGM-114 missile has a conical shaped charge warhead with a copper liner cone that forms the jet that provides armor penetration. This high explosive, antitank warhead is effective against various types of armor including appliqué and reactive. Actual penetration performance is classified. It can also be employed against concrete bunkers and similar fortifications.

The tactical missiles are propelled by a single stage, single thrust, solid propellant motor. When thrust exceeds 500 to 600 pounds, the missile leaves the rail. Based on a 10g acceleration parameter, arming occurs between 150 to 300 meters after launch. Maximum velocity of the missile is 950 miles per hour. Maximum standoff range is a function of missile performance, launch platform altitude versus target altitude, visibility and cloud cover. Remote designation allows the launch aircraft to stand off at greater distances from the target. This standoff range can be out to the maximum missile effective engagement range.

There are different techniques for tactical employment of the Hellfire missile on the battlefield. These techniques are ultimately driven by the two engagement methods by which the missile can be controlled to the target: autonomous and remote. An autonomous engagement requires the aircraft launching the missile to guide it all the way to the target after the missile is away. In this method, a single aircraft and its crew will locate, identify, fire, and guide the missile until destruction of the target in the same way an M2/M3 Bradley crew employs its TOW missiles. In contrast, a remote engagement requires an aircraft to serve as a launch platform, providing a missile for another aircraft or a ground observer, designating with a laser, to guide the missile to its intended target. A ground designation station such as an FO or Combat Observation Lasing Team (COLT) accomplishes this with lasing devices like the G/VLLD or MULE.

With a remote engagement, the air crew is responsible only for delivering the missile toward the general location of the target, but is no longer responsible for its guidance once it leaves the external launch rails. This allows remote engagements to provide one distinct advantage over autonomous engagements. Using this technique, the launch aircraft is often able to remain masked behind terrain, greatly reducing its visible launch signature while delivering missiles toward the target array, thereby increasing aircraft survivability - a force protection consideration. Remote engagements, however, require a great deal more coordination and plan-ning between the “shooter” and the “observer.”

In addition to the two methods of engagement, there are four modes of delivery that aircrews can utilize when firing the Hellfire missile. These delivery modes are driven by three factors: distance to the target, the weather (primarily visibility and cloud ceiling height), and terrain conditions under which the missile will be fired. When a Hellfire missile flies through obscuration (fog, clouds, smoke) or if the designator fails to lase the target properly until impact, the missile loses laser lock and will be lost for good. Only one model of Hellfire missile, the AGM-114K, has a built-in system to assist in the reacquisition of the target after laser lock-on is lost. The AGM-114L, when fielded, will provide a true fire-and-forget capability.

The first delivery mode is known as the Lock-on Before Launch (LOBL) technique. In this mode, the missile laser seeker acquires and locks-on to the coded laser energy reflected from the target prior to launch. The advantage to using this particular delivery mode is that the air crew is assured that the missile has already positively locked on to the target prior to launch from the aircraft, thereby reducing the possibility of a lost or uncontrolled missile. The disadvantages of a LOBL delivery revolve around the trajectory of the Hellfire missile. To compensate for a low cloud ceiling, an aircraft may need to expose itself to threat weapons ranges in order to ensure a successful engagement.

One method to reduce the maximum altitude of the Hellfire’s flight trajectory is to select the Lock-on After Launch -Direct (LOAL-DIR) delivery mode. This delivery mode results in the lowest of all trajectories during missile flight because it is employed using a laser designation delay. Overall, depending on the length of laser delay time, the maximum altitude reached during the flight trajectory is much lower; a distinct advantage over all other delivery modes. The downside to this method, however, is that air crew is not assured of positive lock-on prior to launch.

The last two delivery modes are unique in that they allow the launch aircraft to remain masked behind terrain to reduce its firing signature and increase aircraft survivability. These delivery modes are known as Lock-on After Launch - High (LOAL-HI) and Lock-on After Launch -Low (LOAL-LO). The first mode, LOAL-HI, allows the missile to clear a 1,000 ft. high terrain feature to front of the aircraft, provided the aircraft remains a minimum of 1500 meters away from that terrain feature. This technique is most effective in a remote engagement. The major disadvantage of employing the LOAL-HI method, however, is that the missile flies the highest trajectory of all delivery modes and is most susceptible to a break in missile lock due to penetration of low-lying clouds. Using the last delivery mode, LOAL-LO, will help to reduce the maximum altitude of the Hellfire trajectory somewhat, but will also limit the size of the terrain mask utilized by the aircraft for survivability.

The **AGM-114A** Basic HELLFIRE tactical missile is the originally designed Hellfire missile, which is no longer purchased by the Army. A total of 31,616 were produced by both Martin Marietta and Rockwell International since 1982. AGM-114As in the inventory are released for live-fire training when they are replaced with AGM-114Cs.

The **AGM-114B**, although primarily designed for Navy use, can be fired from Army aircraft. This missile has an additional electronic arm/safety device required for shipboard use.

The **AGM-114C** missile has an improved semiactive laser seeker with an improved low visibility capability.

The AGM-114C has a low smoke motor and a lower trajectory than the 114A. Army missiles should be marked with either the A or C designation just behind the seeker.

The **AGM-114F** Interim HELLFIRE missile features two warheads [adding a precursor warhead to defeat vehicles equipped with reactive armor] a seeker and an autopilot similar to the C-model missile. Final delivery of the Interim HELLFIRE missiles produced by Rockwell was completed in January 1994. Production for foreign military sales continued.

The **AGM-114K** HELLFIRE II missile features dual warheads for defeating reactive armor, electro-optical countermeasures hardening, semiactive laser seeker, and a programmable autopilot for trajectory shaping. The AGM-114K missile is capable of operating with either pulsed radar frequency or A-Code laser codes for those aircraft equipped with dual code capability. Hellfire II incorporates many improvements over the Interim Hellfire missile, including solving the laser obscurant/backscatter problem, the only shortcoming identified during Operation Desert Storm. Other improvements include electro-optical countermeasure hardening, improved target reacquisition capability, an advanced technology warhead system capable of defeating reactive armor configurations projected into the 21st century, reprogrammability to adapt to changing threats and mission requirements, and shipboard compatibility. The Initial Production Facilitation and Production Qualification Test contract was awarded to Martin Marietta in November 1992. The initial production contract was awarded in May 1993, and the second production contract was awarded in February 1994.

ROCKET WARHEADS

M151 High Explosive. The M151 HE is an antipersonnel, antimateriel warhead and is traditionally referred to as the "10 Pounder." The bursting radius is 10 meters; however, high velocity fragments can produce a lethality radius in excess of 50 meters. The nose section is constructed of malleable cast iron that is threaded to receive the fuze. The base section is constructed of steel or cast iron and is threaded so that it can be attached to the rocket motor. The base section and the nose section are welded (brazed) together. Total weight of the loaded, unfuzed, warhead is 8.7 pounds, of which 2.3 pounds is composition B4. The M151 can be used M423, M429, and M433 fuzes.

M274 Smoke Signature (Training). This training rocket provides a ballistic match for the M151 HE warhead. The casing is a modified WTU-1/B with vent holes or blowout plugs. A modified M423 fuze mechanism is integral to the warhead. A cylindrical cartridge assembly is in the forward section of the casing; it contains approximately 2 ounces of potassium perchlorate and aluminum powder that provides a "flash, bang, and smoke" signature. The M274 weighs 9.3 pounds.

M261 High-Explosive Multipurpose Submunition.

The MPSM warhead provides improved lethality against light armor, wheeled vehicles, materiel, and personnel. It has a plastic nose cone assembly, an aluminum warhead case, an integral fuze, an expulsion charge, and nine M73 submunitions. The primary warhead fuze, M439, is remotely set with the ARCS, MFD, or RMS to provide range settings (time of flight) from 500 meters to approximately 7,000 meters. On the AH-1, the RMS is programmable only from 700 meters to 6,900 meters.

Initial forward motion of the rocket fuze timing. The expulsion charge is initiated at a point before and above the target, approximately 150 meters, depending on the launch angle. The submunitions are separated by ejection, and arming occurs when the ram air declarator deploys. The RAD virtually stops forward velocity and stabilizes the descent of the submunition. An M230 omnidirectional fuze with an M55 detonator is used on each submunition and is designed to function regardless of the impact angle.

Each submunition has a steel body that has a 3.2-ounce shaped charge of composition B for armor penetration. The submunition is internally scored to optimize fragments against personnel and materiel. Upon detonation, the shaped charge penetrates in line with its axis and the submunition body explodes into high velocity fragments (approximately 195 at 10 grains each up to 5,000 feet per second) to defeat soft targets. The fuzed weight of the M261 is 13.6 pounds.

Approximate target area coverage. At shorter ranges, the RAD takes longer to overcome momentum, increasing dispersion. As range increases, the rocket loses momentum, increasing the effectiveness of the RAD. This increased effectiveness reduces submunition drift and ground dispersion. Forestation, other vegetation, and natural or man-made structures within the target area may cause the submunition to detonate or land in a dispersion pattern other than the one shown in Figure 5-6.

Probability of impact angle. Aerodynamic forces affecting submunitions during vertical descent may prevent them from landing upright (0 degrees off center). Sixty-six percent of the time a submunition will land 5 degrees off center; 33 percent of the time a submunition will land 30 degrees off center.

MPSM lethality potential. Each M73 HE submunition has a shaped charge that can penetrate in excess of 4 inches of armor. A submunition that lands 5 degrees off center has a 90-percent probability of producing casualties against prone, exposed personnel, within a 20-meter radius. A submunition landing 30 degrees off center has a 90-percent probability of producing casualties within a 5 meter radius.

M267 MPSM Smoke Signature (Training). The M267 MPSM training warhead operationally, physically, and ballistically matches the M261. Three M75 practice submunitions and six inert submunition load simulators take the place of the nine HE submunitions in the M261 warhead. Each practice submunition contains approximately 1 ounce of pyrotechnic powder. An M231 fuze with an M55 detonator is used with practice submunitions.

M257 Illumination. The M257 illumination warhead provides one million candlepower for 100 seconds or more. It can illuminate an area in excess of 1 square kilometer at optimum height. A deployed main parachute descent is approximately 15 feet per second. An M442 integral fuze provides a standoff range of approximately 3,000 meters with the MK 40 motor and approximately 3,500 meters with the MK 66 motor. The weight of the M257 is 10.8 pounds, of which 5.4 pounds is magnesium sodium nitrate.

M229 High-Explosive. The M229 HE warhead is currently in the inventory. An elongated version of the M151, it is commonly referred to as the "17 Pounder." The M229 filler consists of 4.8 pounds of composition B4 and has the same fuzes as the M151. Its unfuzed weight is 16.4 pounds.

M156 White Phosphorous (Smoke). The M156 is primarily used for target marking and incendiary purposes. It ballistically matches the M151 and is of similar construction. Filler for the M156 is 2.2 pounds of WP with a .12-pound bursting charge of composition B. The approximate weight of the fuzed warhead is 9.7 pounds. The M156 uses M423 and M429 fuzes.

M247 High-Explosive. The M247 is no longer in production; however, some of these warheads may still be found in war reserve stockage. With a shape charge for an antiarmor capability, the M247 employs a cone shaped charge like that of the M72 LAW. The point initiated detonating fuze (M438) is an integral part of the warhead. The weight of the M247 is 8.8 pounds, of which 2.0 pounds is composition B.

M255E1 Flechette. The M255E1 flechette warhead, which contains approximately 1,180 60-grain hardened steel flechettes, is in limited production. It is designed for use with the M439 fuze and has possible air-to-air as well as air-to-ground application.

Specifications: (114A)

Manufacturer: Rockwell, Martin Marietta
Missile: 99 lb (45kg)
Warhead: 20 lbs (9kg)
impact-fused Firestone shaped-charge high-explosive
Length: 5.3 ft (1,61m)
Diameter: 7 in (17,8cm)
Wingspan: 1.1 ft (33,5cm)
Guidance: semi-active laser homing
Propulsion: Thiokol TX-657 reduced-smoke solid-fuel rocket
Speed: Mach 1.1 (1313km/h)
Range: approx. 5 miles

Version: Interim HF II Longbow
Diameter: 7 in 7 in 7 in
Weight: 107 lb 100 lb 108 lb
Length: 71 in 64 in 69.2 in

BEI Hydra 70 Rocket System

The HYDRA 70 (70mm) Rocket System is a family of 2.75" unguided rockets.The 2.75 inch Folding-Fin Aerial Rocket (FFAR) was originally developed by the US Navy for use as a free-flight aerial rocket in the late 1940s. Used during both the Korean and Vietnam wars, their role has expanded to include air-to-ground, ground-to-air, and ground-to-ground. The 2.75 inch rocket system has a rich history of providing close air support to ground forces from about 20 different firing platforms, both fixed-wing and armed helicopters, by all US armed services. When the requirements of this system were changed to a new air-to-ground role for fixed and rotary wing aircraft, new fuzing and warhead performance characteristics, as well as a modified motor for low speed aircraft became necessary. The HYDRA 70 family of rockets was designed to fill this role. The Hydra 70 rocket system is used by US Army Special Operations Forces, the US Marine Corps, the US Navy, and the US Air Force. The Hydra-70 rocket is fired from all armed Army Helicopters and the armed helicopters of most sister services. The rocket is also fired from many U.S. fixed wing platforms and is a major export munition to many allied nations. The Army's Hydra-70 PM at Rock Island, IL is assigned as the single item manager responsibile for meeting the rocket needs of all users.

The war reserve unitary and cargo warheads are used for anti-materiel, anti-personnel, and suppression missions. The Hydra 70 family of Folding-Fin Aerial Rockets (FFAR) also includes smoke screening, illumination, and training warheads. These rockets are used by rotary, wing, fixed and ground platforms. The most widely used application is on helicopters for air-to-ground engagements.

In the US Army, Hydra 70 rockets are fired from the AH-64A Apache/AH-64D Apache Longbow using M261 19-tube rocket launchers, and the OH-58D Kiowa Warrior and the AH-1F "modernized" Cobra using seven-tube M260 rocket launchers. The AH-1G Cobra and the UH-1B "Huey" used M200 19-tube rocket launchers. The Navy uses the 19 round LAU-61C/A and the seven round LAU-68 D/A rocket launchers. These reusable launchers have an external thermal coating that greatly prolongs cook-off protection time. Full production of these launchers began in June 1985.

To provide some stability the four rocket nozzles are scarfed at an angle to impart a slight spin to the rocket during flight. The modified motor provides increased stand-off range and reduced ballistic dispersion. The MK 66 rocket motor was designed to provide a common 2.75-inch rocket for helicopters and high-performance aircraft. Compared to the MK 40 motor, it has a longer tube, an improved double base solid propellant, and a different nozzle and fin assembly. Increased velocity and spin provide improved trajectory stability for better accuracy. The launch signature and smoke trail have been significantly reduced. The MK 66 Mod 1 is not hazards of electromagnetic radiation to ordnance safe. It can be inadvertently ignited by electromagnetic radiation, especially by radio frequencies found aboard Navy ships. Both the Mod 2 and Mod 3 have HERO filters, and the Mod 2 filter may prevent the AH-1 rocket management system from inventorying. The Mod 1 is the standard motor for Army use as will be the Mod 3 when it is fielded.

The HYDRA-70 family of rockets can now fill a variety of roles. A multipurpose Submunition (MPSM) Warhead, when added to the new motor, provides reduced range dispersion and improved system lethality. The HYDRA-70 High Explosive Remote Set (HERS) Rocket provides an aircraft with a Remote Set (RS), multi-option capability for use against canopy or bunker penetration targets, as well as against targets in the open. An RS flechette warhead was recently fielded for the SOF. Screening smoke and both visible and infrared (IR) illumination are available for supportive missions.

The Navy's Advanced Rocket System planned in the late 1980s to "neckdown" the 2.75-Inch and 5-Inch Rocket Systems to one that mets the requirements of the Anti-Surface Warfare Master Plan. These rockets provide a high volume of air-to-ground fire from stand-off ranges against a broad target spectrum. The program was intended to maximize available RDT&E funds through the use of currently ongoing or planned Product Improvement Programs, NDI and FWE/NCT candidate components. The motor were intended to have a minimum effective range of 10,000 meters direct fire and 15,000 meters loft delivery is required. Warhead were to include Color marking; anti-personnel, material, armor, helicopter and coastal shipping; chaff; flare; smoke screening; night marking; and training.

The HYDRA XXI will be an improvement of the HYDRA-70 2.75 Inch Rocket System which is currently in production/deployment phase. The objective is to upgrade the 2.75 Inch Rocket system with and infusion of information age digital technology to fulfill its mission on the Force XXI/digitized battlefield of the 21st Century. This will be accomplished in the near term through Materiel Change upgrades of components(warheads, fuzes, rocket motor & launcher) to address emerging and changing requirements such as Insensitive Munitions, Hazards of Electromagnetic Radiation to Ordnance, environmental and other operational deficiencies that may develop as the system progresses in service. Other upgrades will include the evaluation and development of fuzes and warheads to meet new operational needs identified by the Army, Navy, Marine, Air Force, and Special Operation Forces such as employment in Military Operations in Urban Terrain. Additional applications are being pursued for the use of the system for light infantry and ground mobile forces. The improvement of the system is being managed by the Project Manager for the 2.75 inch rocket system located at the Industrial Operations Command at Rock Island IL, who has developed a Joint Service Improvement Plan which is a road map for the improvement of the rocket system.

The Army's Advanced Precision Kill Weapon System (APKWS) is intended to fill the gap between the current unguided 2.75" Hydra-70 Rocket System and the HELLFIRE anti-tank missile. It is anticipated that APKWS will be comprised of a laser sensor and guidance package coupled with the Hydra-70 rocket. While operation is expected to be much the same as with HELLFIRE (using laser designation of the target); the smaller warhead, less complex seeker, and utilization of the Hydra-70 rocket will allow precision engagement of soft to lightly-armored targets at significantly lower costs than with HELLFIRE. The APKWS study is an effort to evaluate the cost-benefit of modifying the 2.75-inch unguided rocket with a laser sensor to increase the number of "stored" kills per attack/scout helicopter. The methodology considers the type threat units likely to be encountered in various locations of the world, the number of candidate targets for the APKWS, the potential combat effectiveness of an Aviation Restructure Inititive (ARI) interim attack battalion, and the potential for cost savings to attrit the threat units to two different levels. The study also evaluates the impact of collateral damage control and logistics.

APKWS will provide Army aviation with a low cost, highly accurate weapon for engagement of light-armored and soft point targets. It offers high single shot probability of hit against medium to long range point targets (1 km to >6 kms). The weapon will enhance aviation's capability and lethality in all roles, especially MOUT, early entry, and aerial fire support missions. Current plans, funding permitting, call for fielding of APKWS in FY 02.

M261 19-tube rocket launcher

Diameter: 40,6cm
Length: 1,65m
Weight: 35,9kg
Max. range: 5,5km

M260 seven-tube rocket launchers

Diameter: 25,4cm
Length: 1,65m
Weight: 15,5kg
Max. range: 5,5km

Used combat heads with engine Mk.66 (Mk.40):

M151
M261/M439C
M247/M438
M255/M439 antiarmour
M264/M439 smoke
M262
Chaff/M439
M259 smoke
M259E1 red phosphorus
M267 training
M257

Europe: in 600 m (1800 ft) above the sea level, temperature 21C					
mission	missiles	munition	vertical lift	horizontal speed	time of flight
tank defence	16HF	1200pcs	302 m/min	148 knots	2,5 hr
attack support	8HF/38rockets	1200pcs	262 m/min	150 knots	2,5 hr
invasion support	76rockets	1200pcs	238 m/min	153 knots	2,5 hr
MIDDLE EAST: in 1200 m (3600 ft) above the sea level, temperature 35C					
tank defence	8HF	320pcs	442 m/min	154 knots	1,83 hr
tank defence	8HF	1200pcs	137 m/min	151 knots	2,87 hr
tank defence	16HF	320pcs	137 m/min	147 knots	1,9 hr
attack support	8HF	1200pcs	293 m/min	153 knots	1,83 hr
invasion support	38rockets	1200pcs			