U.S. ARMY WEAPONS COMMAND

XM174E2
40MM AUTOMATIC GRENADE LAUNCHER

U.S. ARMY WEAPONS COMMAND

DEVELOPED BY

AEROJET ORDNANCE AND MANUFACTURING COMPANY

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AOMC

XM174E2 40MM AUTOMATIC GRENADE LAUNCHER

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DESCRIPTION

The XM174E2 40mm Automatic Grenade Launcher is a compact, self-powered, magazine-fed weapon designed to fire standard U.S. low-velocity 40mm cartridge grenades.

Externally, the XM174E2 resembles a "sawed-off" U.S. .30 caliber Browning machine gun. However, there is nothing similar in the internal mechanism of the two weapons. Dimensions and military characteristics of the XM174E2 Launcher are shown in Figure 1.

Ammunition is fed into the launcher from a 12-round, spring-operated magazine designed for quick installation and removal. The launcher uses a direct blowback action with a spring-operated ammunition feed mechanism. Ammunition is fed into the launcher from the left side and cases are ejected through the port on the right side. Firing is from a closed-bolt position. A charging handle is located on the right side of the launcher and a "selector" push-button is located in the pistol grip to permit selection of automatic or semiautomatic (single-shot) fire.

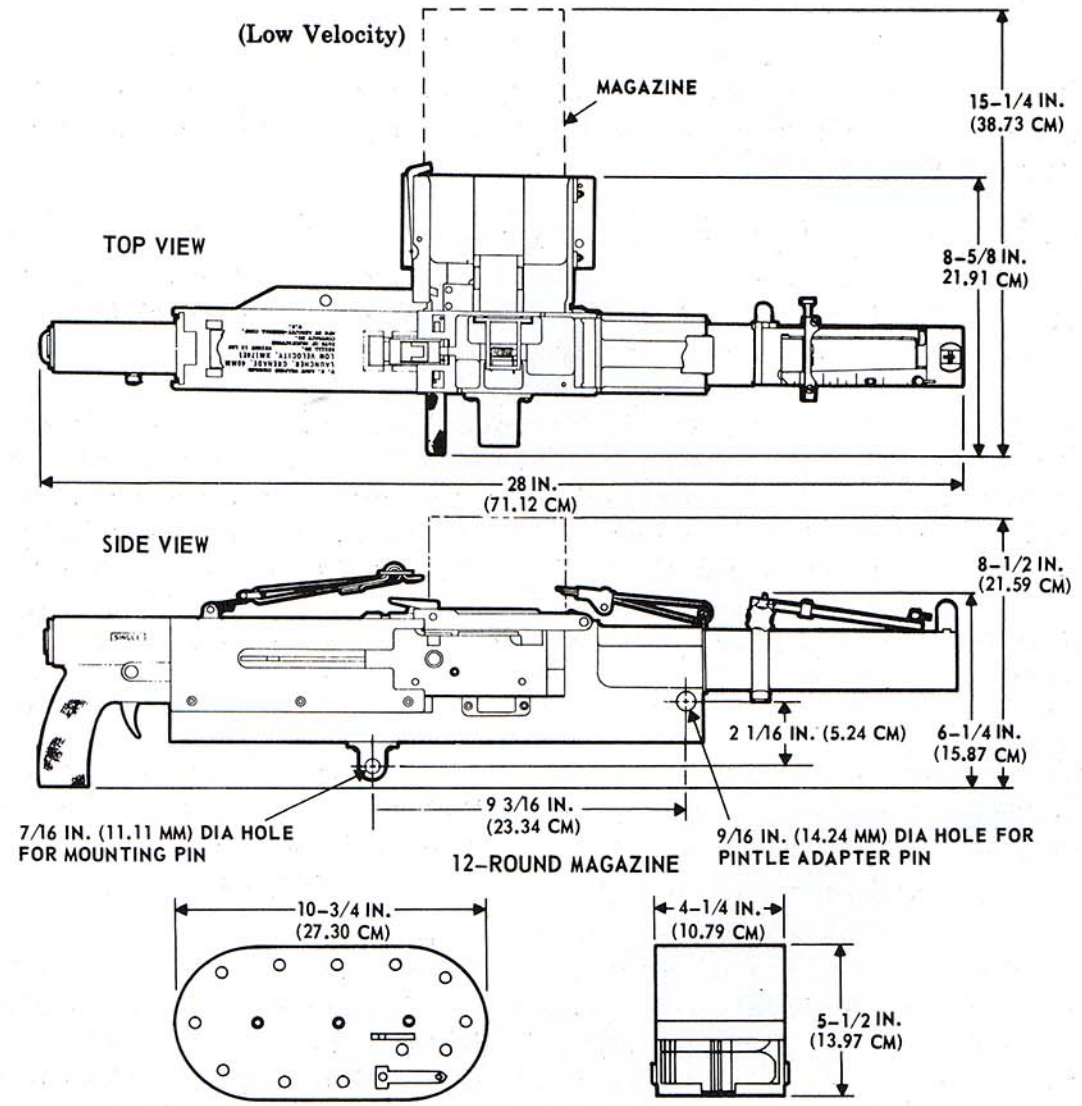
Launchers may be pintle-mounted on armored vehicles, tripod-mounted (as an infantry crew-served weapon), or fired "from the hip." When fired from the hip, recoil velocity is less than that of the single-shot shoulder-held M79 Grenade Launcher, which uses the same ammunition.

The XM174E2 40mm Automatic Grenade Launcher is capable of rapidly delivering a large volume of high-explosive (HE) fragmenting projectiles to targets within a 400-meter range. With this capability, the lethal area per minute and lethal area per pound of ammunition weight that can be delivered to a target are significantly greater than those available with any similar weapon. The high trajectory of the projectile permits effective attack of targets in defilade (targets that are invulnerable, or nearly so, to fire from flat-trajectory weapons). Consequently, the XM174E2 will add versatility and intense firepower when properly employed in a weapons mix.

The XM174 Launcher has been tested and evaluated in combat in counter-insurgency situations characterized by the following:

- Personnel as principal targets.
- Fleeting glance of targets, when seen at all.

XM174E2 40 MM AUTOMATIC GRENADE LAUNCHER



MILITARY CHARACTERISTICS

LAUNCHER WEIGHT: 16 LB (7.25 KG) (WITHOUT PINTLE ADAPTER)
WEIGHT OF LOADED 12-ROUND MAGAZINE: 10 LB (4.5 KG)
CYCLIC RATE OF FIRE: 300 SHOTS/MIN
SUSTAINED RATE OF FIRE: 100 SHOTS/MIN
OPERATION: DIRECT BLOWBACK
FUNCTION: AUTOMATIC OR SEMIAUTOMATIC
FEED: MAGAZINE (NO LINKS)
MAXIMUM RANGE: 400 METERS WITH STANDARD AMMUNITION

REF: TM 9-1010-213-14 FOR XM174E1 LAUNCHER

Figure 1. XM174E2 40mm Grenade Launcher - Dimensions and Military Characteristics.

- Targets hidden behind natural or artificial cover
- Short encounter ranges (within 400 meters) and short encounter ranges that prevent full utilization of organic area coverage weapons or tactical air superiority.
- Intense action during initial stages.
- Frequent counterambush engagements requiring a rapid response with intense firepower.

Rifle and machine gun fire would be ineffective in these general tactical situations because they require a direct hit on a practically invisible target. Firing longer bursts to increase the hit probability results in wasteful expenditures of ammunition. The fragmenting warhead fired from the XM174E2, however, need only strike near the target to be effective; indeed, the warhead can turn the enemy's cover against him. For example, a squad of men in position along a tree line (taking cover and concealment behind the trees) is vulnerable to 40mm projectiles striking brush, rocks, and trees behind them because their backs are exposed to blast and fragments from ground and air bursts.

Although the hand-held, single-shot M79 Grenade Launcher also uses the same ammunition, its rate of fire is too slow to provide the required rapid response and intense firepower. Also, the M79, or any other single-shot weapon, introduces more aiming error because it lacks the stability of a vehicle or tripod mount, as well as precluding preregistration on selected targets for night firing.

The XM174E1, a slight modification of the basic XM174, is functionally the same as the XM174 but has some minor product improvements: captivation of spring-loaded plungers, redesign of parts to prevent improper assembly/removal of the perforated barrel jacket shown in early photographs of the basic XM174, and other minor changes resulting from Tri-Service combat use in Vietnam.

The XM174E2 Launcher is the latest modification and is the version now under consideration for type classification. It can fire the new M433 HE DP cartridge, adding a capability of defeating light materiel targets with no decrease in antipersonnel capability. The antipersonnel and antimateriel capabilities of the M433 cartridge gives the XM174E2 Launcher a unique combination of capabilities for an automatic weapon of such simplicity and light weight.

WEAPON SYSTEM CHARACTERISTICS

The XM174E2 40mm Automatic Grenade Launcher has the following characteristics:

- Rapid response in a close-combat encounter
- Intense initial and sustained firepower
- Greater mobility through lightweight design
- Proved simplicity and reliability
- Capable of defeating defiladed targets through indirect fire (because of the high, curved trajectory)
- Versatility in firing modes: tripod, bipod, hand-held hip-fired, or vehicle-mounted.
- Reduced weight and volume of ammunition needed to defeat antipersonnel area targets within the weapon's range, as compared with a machine gun.
- Military characteristics

  Launcher weight:
  16 lb (7.25 kg) without pintle adapter
  17 lb (7.7 kg) with pintle adapter
  Weight of loaded 12-round magazine: 10 lb (4.5 kg)
  Maximum rate of fire: 300 rounds/min
  Operation: direct blowback
  Function: automatic or semiautomatic
  Feed: magazine (no links)
  Range: 400 meters (maximum with standard ammunition)
  Sustained rate of fire: 12-round magazine --
  90 to 100 rounds/min.

AMMUNITION CHARACTERISTICS

The XM174E2 40mm Automatic Grenade Launcher is capable of firing the following ammunition:

- M406 HE-fragmenting antipersonnel ammunition.
- M397 HE-fragmenting (airburst) antipersonnel ammunition, with increased lethal area compared to the M406.
- M433 HE DP (Dual Purpose) cartridge, which has an antipersonnel lethal area equivalent to the M406, as well as a shaped charge for defeating materiel targets.
- A wide variety of illuminating and signal cartridges in various colored smokes, colored clusters, and parachute flares. Note: These cartridges are too long to be fed automatically, but can be loaded and fired singly by raising the receiver door, pulling the bolt back, and chambering the projectile by hand.
- M407 practice round.
- M387 proof round.

A Rocket-Assisted Projectile (RAP) is under development. Should investigations of the feasibility of firing this projectile from the XM174E2 Launcher prove successful, the RAP round should more than double the maximum range of the XM174E2 Launcher.

An experimental XM651E3 CS tear gas grenade has been designed and tested. Tests have indicated that this round is compatible with the XM174E2 Launcher; however, further development will depend on more specific delineation of military characteristics for the cartridge.

TACTICAL ROLES

VEHICLE-MOUNTED, CLOSE-COMBAT SUPPORT WEAPON

Convoy protection tactics rely heavily on such flat-trajectory weapons as machine guns and rifles. Current and future tactical situations suggest that a better weapons mix, emphasizing rapid response and a distinctly increased degree of firepower, could be successfully employed. To achieve a better weapons mix, the XM174E2 should be introduced as a replacement for some of the bullet-firing weapons now in use. The XM174E2 is an ideal weapon for close-combat support (particularly during counterambush situations) of all types of vehicles - wheeled or tracked, armored or unarmored. Whether the weapon is pintle- or cupola-mounted, the point-detonating M406 HE cartridge has a much greater casualty-producing potential per pound of ammunition than any rifle or machine gun caliber ammunition ordinarily used to support such vehicles.

> The M433 HE DP cartridge gives a lightly armored vehicle equipped with the XM174E2 the capability to engage and defeat a similar vehicle.

Counterambush tactics provide an excellent example of the requirement for rapid response combined with a high level of effective firepower. In an ambush, the enemy will effectively utilize all natural cover available. The time required to locate and effectively neutralize the target is the most critical parameter of a counterambush operation. The XM174E2 is particularly adaptable to this type of operation because exact target location is not necessary for successful utilization of the weapon. The high rate of fire of the XM174E2, combined with a large lethal-area coverage projectile, allows the rapid neutralization of large areas. Furthermore, the XM174E2 reverses the role of natural cover, as explained previously.

A further advantage of the XM174E2 Launcher is that it can fire the cartridge in a high trajectory to deliver fragmenting grenades against hostile troops taking cover in foliage (Figure 2) or behind levees and dikes (Figure 3). Normally, hostile troops positioned behind these types of cover would be almost invulnerable to flat-trajectory rifle or machine gun fire.

Employment of the XM174E2 is flexible and simple in the dismounted role -- should the crew find it necessary to leave the vehicle -- because it is lightweight and self-powered and does not depend on an external power source. In the field, it can be mounted on the standard machine gun tripod used for the M60 7.62mm machine gun.

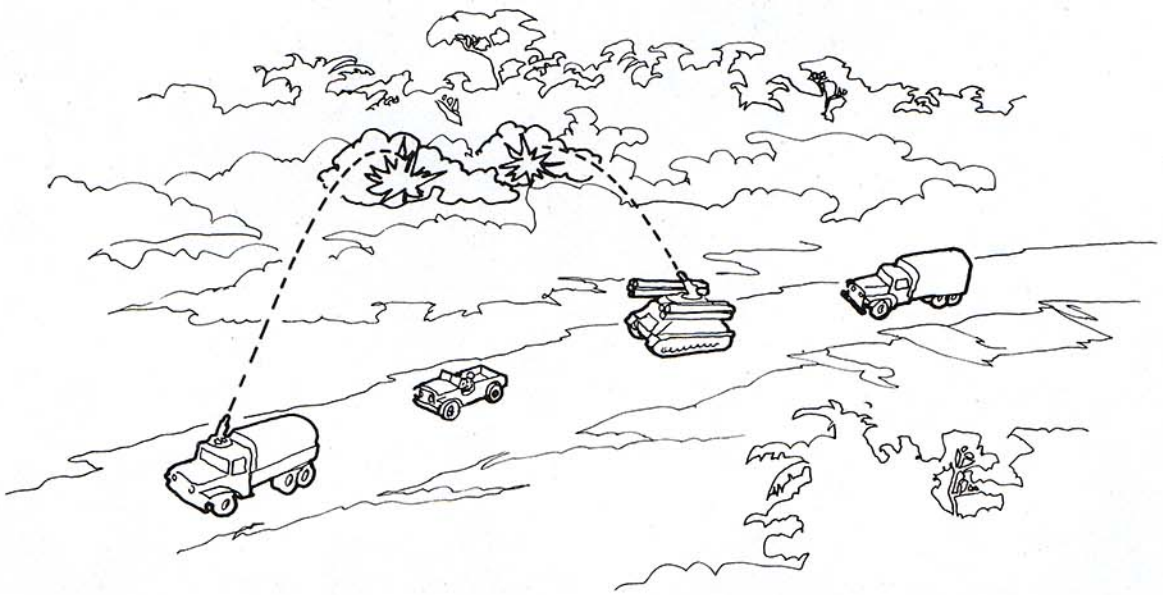


Figure 2. Defeat of Troops Hidden and Protected by Foliage.

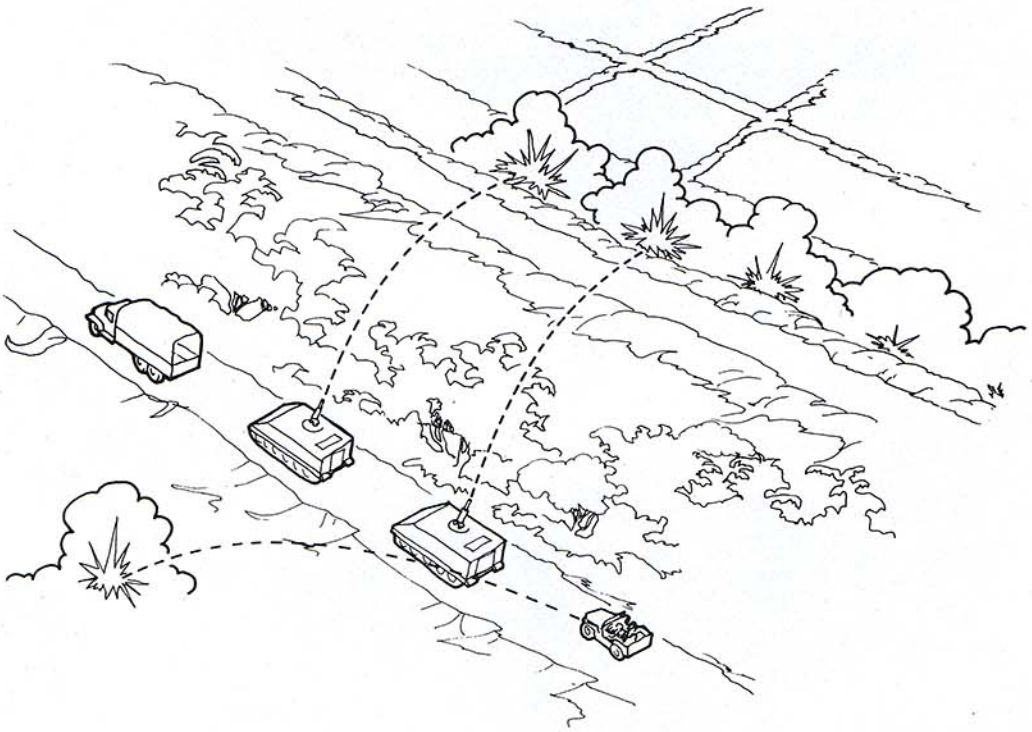


Figure 3. Defeat of Troops Protected by Earthworks.

Some vehicle applications* suitable for the XM174E2 are:

- Pintle-mounted on trucks or as a replacement for some of the caliber .50 machine guns ring-mounted on 2-1/2- and 5-ton trucks.
- Pintle- or cupola-mounted on any of the following vehicles:

  Armored personnel carriers and reconnaissance vehicles.

  Amphibious cargo and personnel carriers.

  Self-propelled antiaircraft weapons and armored or unarmored artillery.

In addition to its close-combat counterambush role, the XM174E2 is suitable for reconnaissance-by-fire from vehicles on which it is mounted. Its superiority over such weapons as the 7.62mm machine gun is demonstrated by its greater lethal area per pound of ammunition weight -- an added advantage being the reduced ammunition stowage volume requirements within the vehicles. The range limitation of the XM174E2 can be compensated for by a judicious mix of weapons mounted on the vehicles. If the RAP round under development more than doubles the weapon's range as expected, this range limitation will be largely eliminated.

Another tactical role suitable for the vehicle-mounted XM174E2 is the "clearing" of nearby friendly armored vehicles (Figure 4) which have been overrun by hostile troops. Machine guns (shooting ball ammunition) have been used in this role, but are not as effective as the XM174E2 firing the M406 or M397 cartridge for the following reasons:

- Economy -- Less ammunition is required for the XM174E2 to clear the vehicle.
- Safety -- Armored vehicles are less vulnerable to M406 or M397 cartridge fragments.

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*The XM174E2 Launcher, as developed to date, has a pintle adapter with a tapered pin that fits the standard pintle socket on M2, M122, and M3 tripods. Pintle sockets for ring and pedestal mounts are untapered. Therefore, a pintle adapter with an untapered pin will be required to mount the XM174E2 Launcher on ring and pedestal mounts. This involves a simple adapter change and not a change to the basic weapon.

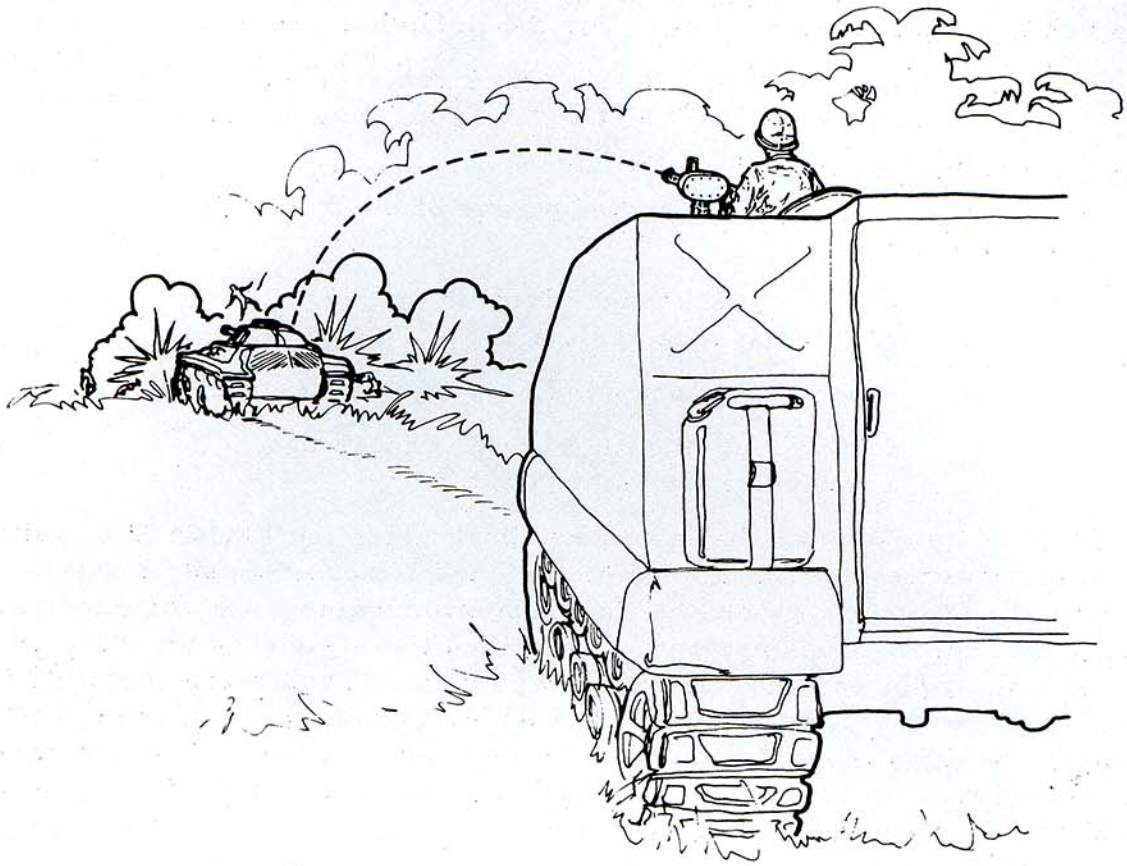

Figure 4. Defeat of Troops Attacking Friendly Armored Vehicles.

Antipersonnel cartridges have less damage-producing capability against armored vehicles than bullets because the antipersonnel-sized fragments have no effect on light armor. However, machine gun bullets fired in a burst can destroy optical components of the vehicle, penetrate lightly armored vehicles, or ricochet long distances and endanger friendly troops. The M406 or M397 cartridge can be fired at the ground around the vehicle, causing ground bursts which project a cloud of fragments around the vehicle.

An additional capability for combat in urban and other built-up areas is the use of the vehicle-mounted XM174E2 for taking under fire, and neutralizing, buildings occupied by hostile troops.

The relative superiority of the XM174E2 lies in its ability to place an area-coverage fragmenting projectile behind protective cover. One projectile

fired through a window or doorway will clear any ordinary room or hall, whereas a machine gun will require many cartridges and added time to neutralize the same area. In those situations where the building's walls are hard enough to defeat machine gun bullets, troops taking cover behind these walls are invulnerable to such fire. For those cases, the XM174 represents an "infinite" increase in effectiveness.

For those tactical situations involving vehicle-mounted automatic grenade launchers, it may at first glance appear to be advantageous to use a high-velocity 40mm grenade launcher in place of the XM174E2 to obtain more range. However, the following should be considered:

- Range "trade-off" for increased size, weight, and volume of the weapon system is unfavorable because such extra range is seldom needed. When needed, it could be more advantageous to consider use of a weapon other than a grenade launcher, which may be available in the weapons mix.

- The additional weight of a high-velocity launcher makes it more difficult to dismount the weapon and to tactically deploy it when dismounted.

- The XM174E2 uses the same 40mm ammunition as the M79 Launcher and the rifle-mounted grenade launchers already in the infantry logistic system.

- Low-velocity cartridges have a shorter minimum fuze arming distance -- 45 to 90 ft, versus 60 to 120 ft for the high velocity 40mm grenade. The shorter arming distance is needed in close-combat situations.

- Signal rounds (star clusters, parachute flares) are available only in the low-velocity family.

- Should development of the 40mm RAP cartridge prove successful in tests with the XM174E2 Launcher, it will at least double the Launcher's range, partially negating the range advantage of the high-velocity grenade launcher.

PERIMETER DEFENSE APPLICATIONS

The XM174E2 is particularly effective in perimeter defense applications where its high sustained rate-of-fire can be adequately supplied by ammunition stored at the gun position (Figure 5).

As a tripod-mounted weapon, it can be assigned a specific field-of-fire and it can be preregistered on likely avenues of approach. Range cards can be prepared, recording traverse and elevation offset to the target, for use at night or during periods of limited visibility.

The light weight and general mobility of the XM174E2 permits rapid movement of the launcher to new firing positions as required by the tactical situation. Should the firefight become sufficiently intense, with targets changing rapidly, the XM174E2 may be quickly removed from the tripod and fired from the hip.

Figure 5. Perimeter Defense Application.

Examples of likely perimeter defense applications are:

- Defense of command post or headquarters units.
- Defense of tactical units in bivouac in forward areas.
- Defense of artillery and antiaircraft positions.
- Defense of depots, air bases, and combat support groups.

The XM174E2 lends itself to a combined weapons role with 60mm and 81mm mortars. Experience has shown that both 60mm and 81mm mortars are more likely to destroy barbed wire defenses if it is necessary to direct fire onto the barbed wire. An effective tactical deployment could be to illuminate the barbed wire defenses with 60mm and 81mm illuminating shells, and use the XM174 to provide defensive fire from forward positions.

The simplicity and ruggedness of the XM174E2 makes it particularly appropriate for use in perimeter defense by support troops whose primary military skills do not involve full-time use of the weapon; for example, mechanics, clerks, truck-drivers, artillery crews, etc.

The perimeter-defense role relates particularly well to the vehicle-mounted role, in that weapons mounted on vehicles may be easily dismounted and used in perimeter defense. It is likely that weapons mounted on unarmored vehicles within the perimeter would be removed from the vehicle and emplaced on tripods in carefully selected defensive positions. Preferably, the weapon would then be preregistered on likely avenues of approach.

The weapons mounted on armored vehicles may, or may not, be dismounted. Pintle-mounted weapons that require the gunner to expose himself would probably be dismounted, while weapons installed in fully enclosed cupolas would be left in position. Superior protection, greater accuracy, and 360-degree continuous traverse afforded by the cupolas justify leaving the weapons installed. Also, preregistration of the weapon is simpler with cupolas, permitting preregistration over a full 360-degree field.

OFFENSIVE CLOSE-COMBAT APPLICATIONS

Close-combat applications of the XM174E2 are limited only by the tactical ingenuity of the men in the field. Although many defensive applications have been cited, application of the XM174E2 should not be limited to such roles. Defensive roles were described in detail because a defensive position permits storing sufficient ammunition at the gun to be compatible with its high sustained rate of fire(90-100 rounds per minute).

Many offensive situations require expenditure of ammunition in the shortest time possible; for example, an ambush mission (Figure 6) where it is necessary to "shoot and scoot." It can be seen that the XM174E2 would fulfill this role because of its capability of delivering more lethal area per pound of ammunition, per minute, than any other close-combat weapon.

The XM174E2 is appropriate for special assault missions where a small number of troops are assigned to attack a specific target and deliver a large volume of fire within a short time. This is also a "shoot and scoot" mission but, unlike the ambush, the target is sought out rather than awaited. For special airdrop delivery or submarine transport, extra ammunition may be carried because the march distance is reduced by the preliminary transport modes. Also, resupply of ammunition by air is often feasible.

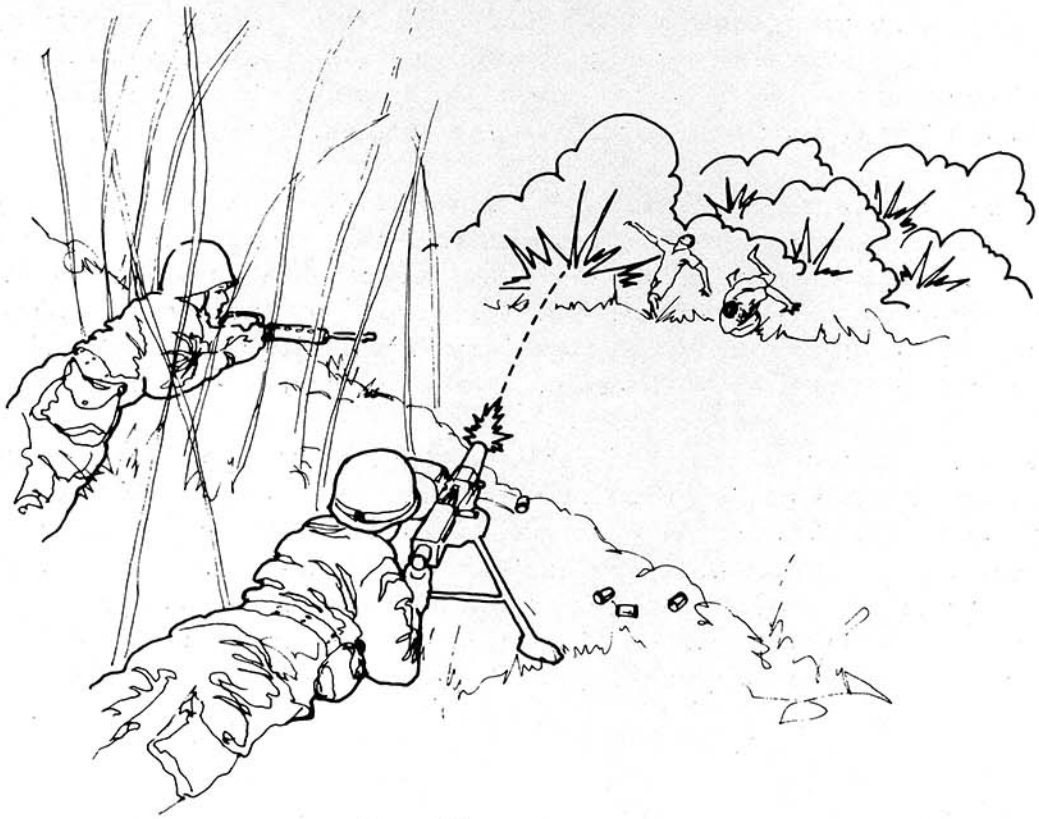

Figure 6. Offensive Ambush Situation.

SUPPORT WEAPON FOR RIVERINE WARFARE

The XM174E2 has the same major advantage for riverine warfare that it has for land-vehicle mounting -- the capability of delivering a large volume of lethal firepower on fleeting targets in a situation demanding rapid response and a flexibility of target engagement.

Dense jungle growth along river banks, which provides cover and concealment from flat-trajectory bullets, will ensure the functioning of the M406 HE cartridge above, below, in front of, and behind hidden troops (Figure 7). Air bursts provide a hail of high-velocity fragments within the space occupied by the concealed troops.

Reconnaissance-by-fire is as valid from assault/patrol craft as it is from land vehicles; actually, it is more convenient because there is more space available for ammunition stowage.

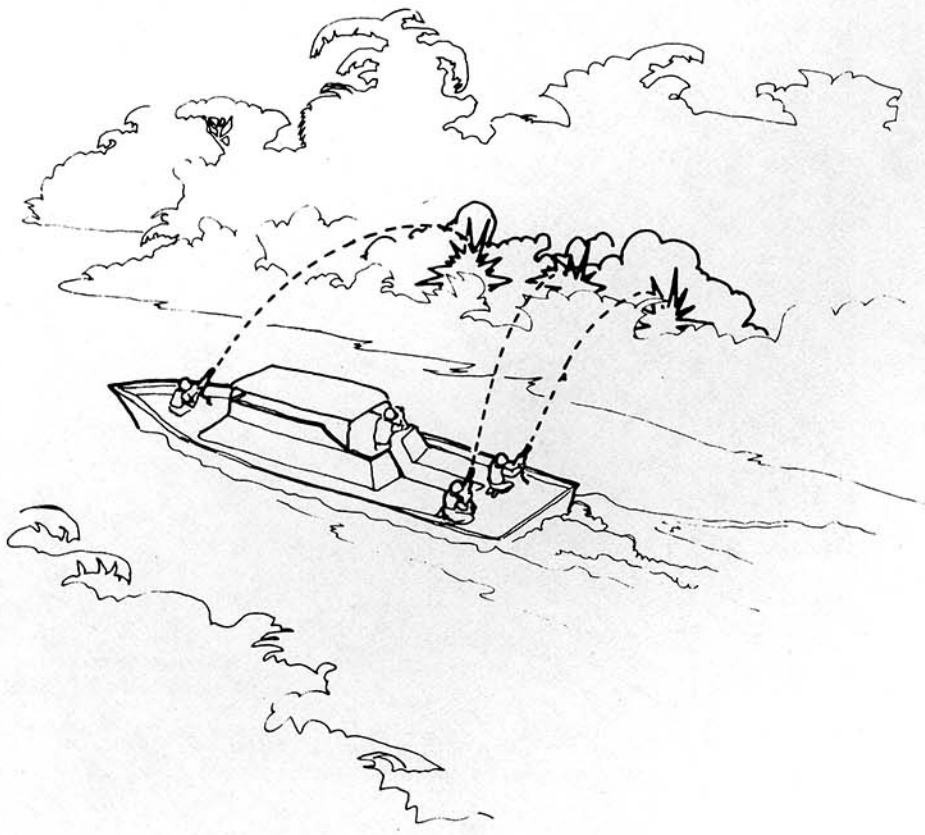

Figure 7. Riverine Warfare Application.

HELICOPTER-MOUNTED SUPPRESSIVE FIRE WEAPON

Another application that has been successfully used is pintle-mounting on helicopters (Figures 8 and 9). In this role, the weapon is used for suppressive fire during landings and takeoffs necessary to rescue downed pilots located in enemy-held areas. As such, the weapon is fired into the area around the landing zone as the helicopter is taking off or landing. The bursting of the projectiles in the area forces enemy gunners to take cover, thereby decreasing the probability of the helicopter being hit by enemy fire when it is in the vulnerable stages of takeoff or landing.

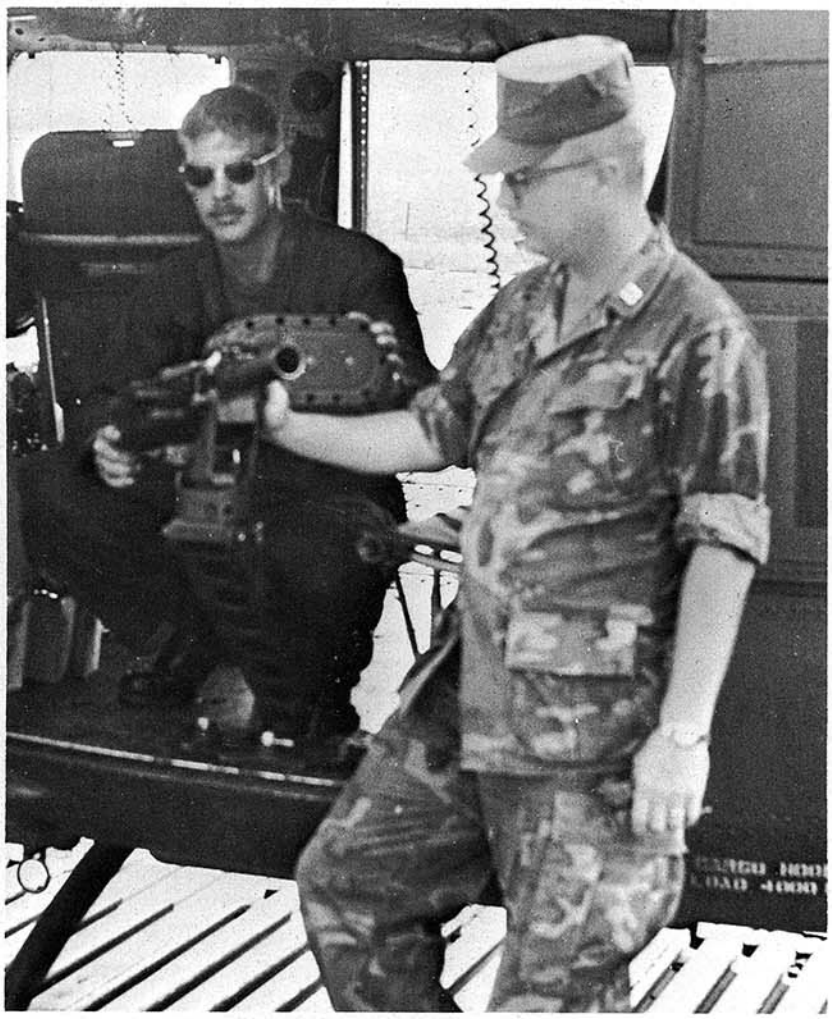

Figure 8. XM174 Launcher in UH-1 Helicopter.

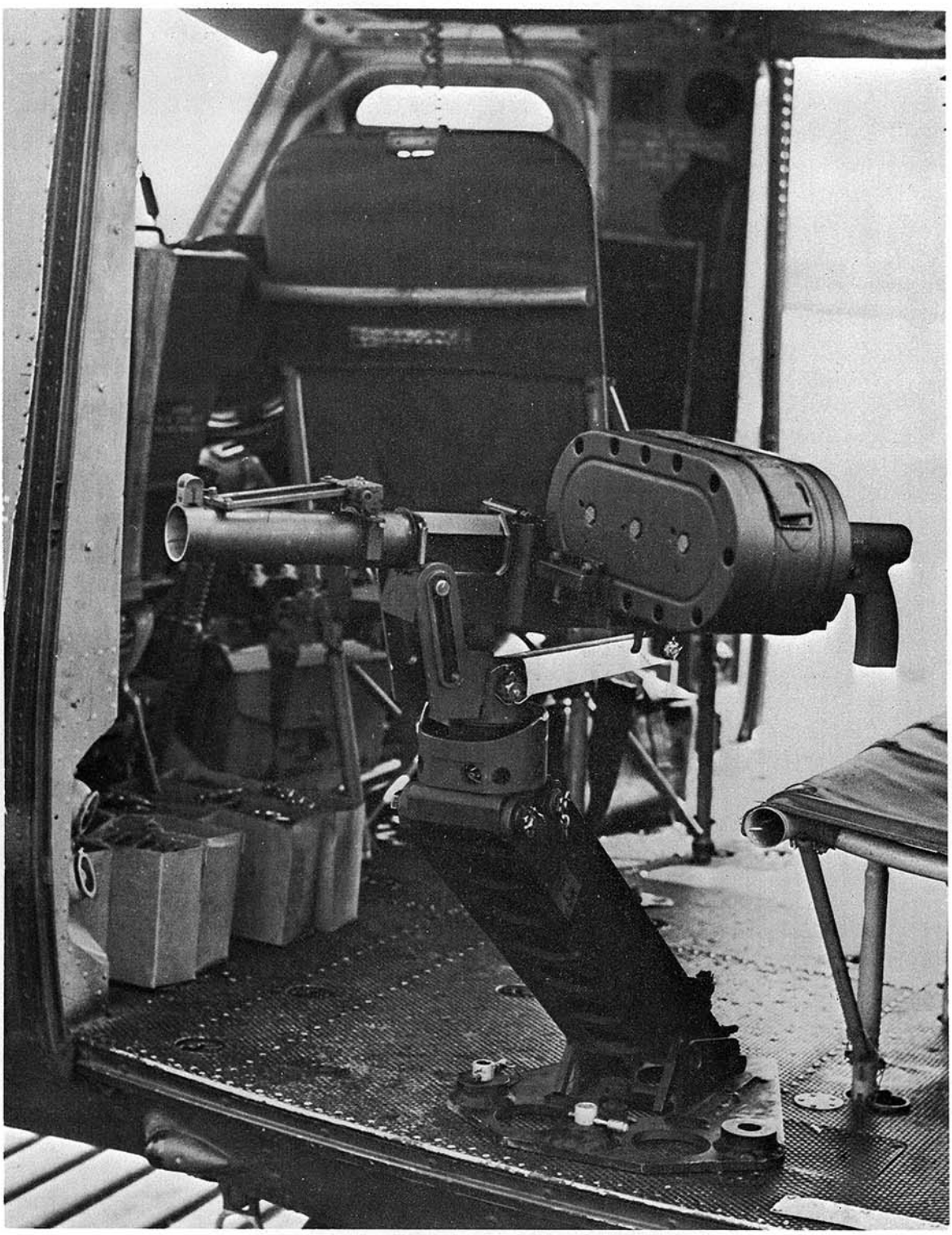

Figure 9. XM174 Launcher on Modified Gun Mount in UH-1 Helicopter.