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NAME: C. ... INKER
Col., Ord. Corps.
DATE: 4 APR 1952

"TD" NUMBERS

PACIFIC AREA MATERIEL

OFFICE OF THE CHIEF OF ORDNANCE
WASHINGTON, D.C.

JULY 1945

A.S.F.

OFFICE CHIEF OF ORDNANCE

WASHINGTON, D. C.

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INTRODUCTION

Among Standard Ordnance items and those either in a Limited Procurement status or under development, are many that are especially adaptable for use in the Pacific Area, and some particularly suitable for cave warfare.

It is the purpose of this report to present data on performance and chief characteristics of each item to aid in the selection of weapons for individual missions.

The various types of materiel included are divided into the following categories:

I. SELF-PROPELLED AND AMPHIBIOUS MATERIEL
- a. Tanks
- b. Gun Motor Carriages
- c. Howitzer Motor Carriages
- d. Tractors, Trucks, etc.

II. ARTILLERY
- a. Aircraft
- b. Antitank
- c. Recoilless
- d. Mortars

III. ROCKETS
- a. Launchers
- b. Ammunition

IV. AMMUNITION
- a. Shell
- b. Bombs
- c. Grenades
- d. Pyrotechnics

V. RIFLES, GRENADE LAUNCHERS, AND BULLETS

VI. BODY ARMOR

VII. PARACRATES, PARACHESTS, PARACAISSONS

Note: Terminal effect data not available at the time this copy went to press, are contained in an appendix at the end of the report.

ATTACK OF CAVES BY ARTILLERY

When once located, cave fortifications can be destroyed expeditiously by use of suitable artillery. An effective way to neutralize cave positions is to seal the entrances, and consideration of terminal ballistic effects on various soil and rock structures will assist in selecting the best weapons, ammunition, and fuzing for each mission. When an opening can be identified and attacked as a pin-point target, a few rounds of the proper ammunition will suffice to close it.

Since caves will be encountered in many kinds of soil and rock, it is not to be expected that the same weapons will be equally effective in all cases. Several typical formations will be treated separately.

HARD ROCK

This type includes the igneous rocks (granite, basalt, quartzite, etc.) and the harder limestone formations. The caves so far encountered have been constructed almost entirely by hand labor, and the enemy's work in hard material has been limited to weathered strata which exhibit frequent seams and fissures. Such rock can be successfully attacked by hits above the aperture, making use of the "edge effect" to dislodge material from the roof and seal the passage with rubble.

Effective weapons include all guns and howitzers of 155mm caliber or larger, and also the 90mm and 76mm Guns. High velocity is important inasmuch as hard rock cannot be demolished without good penetration. Therefore, where a choice of propelling charges is available, the higher will be more effective.

Proving ground tests have shown that HE ammunition with CP Fuze M78 is very effective. A percentage of low order detonations will result at short ranges, but this will not seriously reduce the performance. For the 76mm and 90mm Guns, an equally effective combination is 5 rounds of APC with BD fuze, followed by 2 rounds of HE with CP fuze. One such series will usually suffice to close an opening if accurately placed.

When it is possible to place several rounds in the same crater, tests have indicated that increased effect will be obtained in about 5 rounds, but not thereafter, as further rounds tend merely to drill deeply without producing much demolition. If the cave is not sealed after 5 hits in the same crater, raising the trajectory 2 or 3 feet will help to bring down new rubble.

SOFT ROCK

This type includes the softer grades of limestone, weathered and broken sandstone, chalk, soft coral, and shale. It is well adapted to tunneling, since it can be readily worked with hand tools, and requires little or no shoring.

All the weapons recommended for hard rock will be even more effective here, and in addition, the 105mm Howitzer will be useful. Velocity is still important, and the higher propelling charges will be more effective, both for penetration and for accuracy.

HE ammunition with CP Fuze M78 will produce good results. It is estimated that 2 or 3 well-placed rounds of 155mm or 8-inch caliber, or 4 to 6 rounds of 76mm or 90mm caliber, will close the average opening (about 3 x 5 feet) in soft rock. When considerable rubble is observed, the trajectory should be raised. Rounds fired into accumulated rubble will not be effective, and they may even assist in re-opening the passage.

FIRM SOIL

This type includes clay, soft shale, and hard-packed gravel, perhaps interspersed with broken rock. Tunnels may be shored with logs or occasionally with concrete, in which case demolition of the shoring will usually mean collapse of the tunnel. Consequently, fire directed into the cave mouth will be effective.

Any HE round set delay may be used, but preference should be given to the CP fuze, especially if there is any possibility that the target contains rock or other hard material. In all cave firings, when more than one fuze delay time is available, the shorter delay is recommended.

One 8-inch or 155mm round, if placed in the optimum position, will close an opening of normal size, unless the shoring is unusually rugged. Three to five rounds of medium caliber in or near the cave mouth may be required.

LOOSE SOIL

This type will always require shoring, and when that is demolished, the cave collapses of its own weight. Consequently, the attack depends on the nature and strength of the shoring. Demolition of log and concrete bunkers has been dealt with elsewhere, and the same methods will be effective wherever this type of construction is found.

There is some evidence that heavy weapons like the 8-inch Howitzer and 155mm Gun are too powerful to use on sloping surfaces where the cave roof is of loose material and of moderate thickness. The shell have been observed to strip off the roof completely, leaving the passages in still usable condition. Also, high velocity ammunition tends to penetrate too deeply in loose soil, and if the direction of fire is not in line with the passage, the round may be many feet from the cave when detonation occurs.

RANGE. In the case of hard rock, high velocity is essential, and the range should be as short as tactical conditions permit, (1000 yards or less is desirable for tank guns). In other cases, the weapons recommended will be effective at all ranges from which hits can be obtained.

SELF-PROPELLED AND AMPHIBIOUS MATERIEL

Self-propelled vehicles mounting high velocity guns and heavy howitzers are ideal weapons for attacking caves, bunkers and fortified positions, due to their great penetrative power, mobility, and pin-point accuracy.

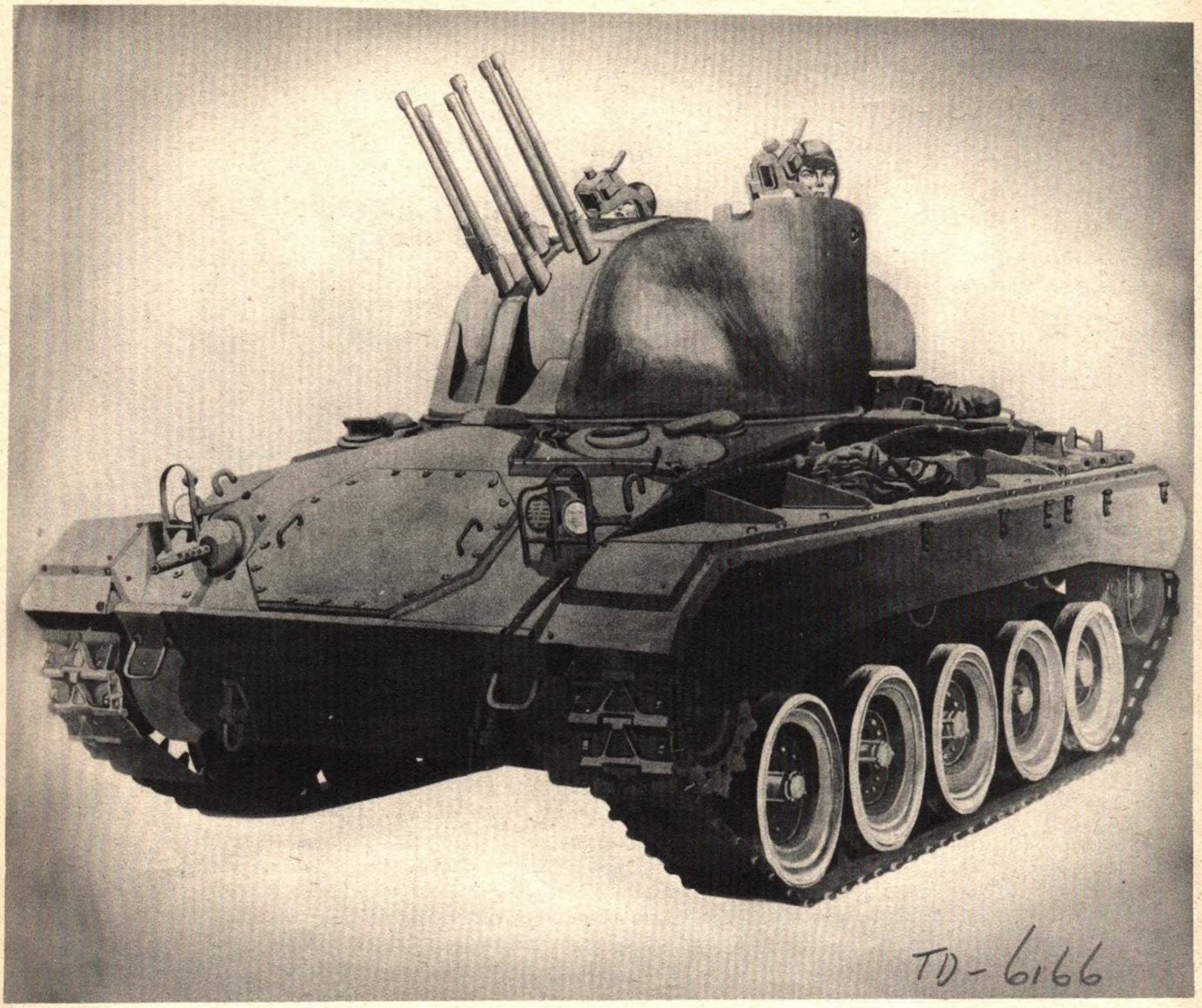
The most vulnerable points of these targets are the entrances, gun ports, doors or cave openings. Direct hits obtained in such openings may destroy personnel and materiel within, while near misses may dislodge sufficient material to close the entrance and trap the occupants. A position is not effectively neutralized until all openings are discovered and sealed. The use of smoke shells will be of assistance, for when a shell is placed in one opening, smoke may issue from other connecting passages not previously detected.

In an operation of this type best results are obtained by direct fire at close ranges. Tanks mounting high velocity, flat trajectory weapons provide great accuracy, a critical factor when small openings are under attack, and the armor protection afforded the crew permits the materiel to be brought up very near to the target.

Gun and Howitzer Motor Carriages mounting artillery or anti-tank guns also afford limited crew protection. Thus, the heaviest field pieces may be brought quickly into the most favorable firing positions.

During landing operations, after the naval and air bombardment has ceased, caves or fortified points commanding beaches can be brought under attack by use of amphibious vehicles. By means of special flotation devices, tanks and motor carriages may be brought ashore without the necessity of taking the mother vessel too close in. When approaching the beach, the vehicles can engage targets, and upon reaching the shore, jettison the flotation device and strike inland to help establish the beachhead.

CARRIAGE, MOTOR, MULTIPLE, CAL. .50 GUN, T77



This is a Light Tank M24 modified to mount a special power operated turret with 6 cal. .50 machine guns to provide a highly mobile vehicle with a large volume of fire for protection of mechanized columns against low flying aircraft.

PROCUREMENT SCHEDULE

This is an experimental vehicle—2 ordered, 1 delivered. It has not been service tested. There is no manufacturing program.

CHARACTERISTICS

Crew 4
Weight ..... 38,000 lb.
Unit ground pressure ..... 10.6 lb. per sq. in.
Armor
- **Hull—same as Lt. Tank M24**
- **Turrent—Front, sides and rear** ..... ½ in. at 25°

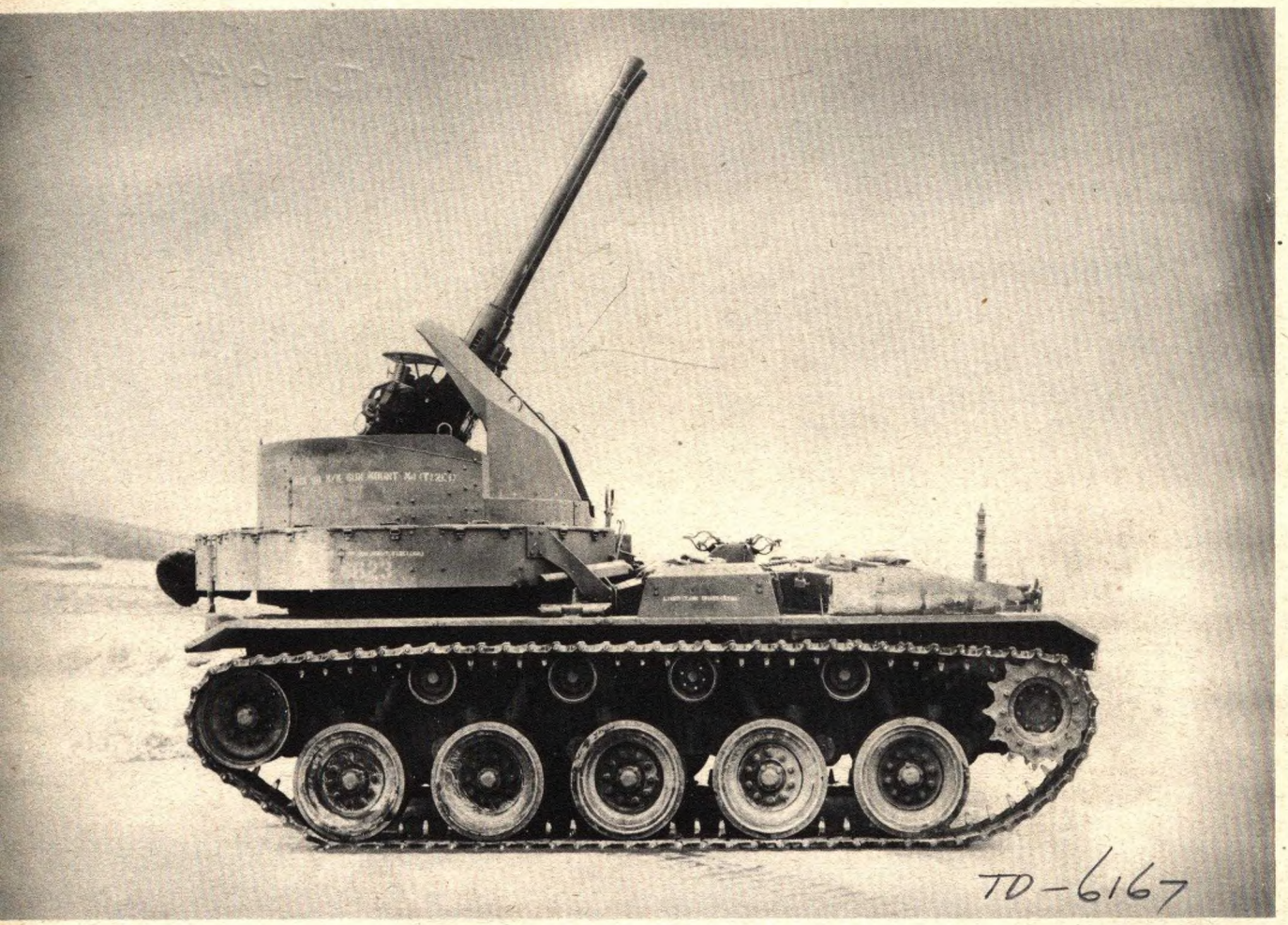
Armament—6 Cal. .50 Machine Guns, HB, M2
- **Elevation** ..... −10° to +85°
- **Traverse by power** ..... 360°
- **Cal. .30 Machine Gun in bow**

Ammunition
- **Cal. .50** ..... 6,700 rd.
- **Cal. .30** ..... 2,500 rd.

Performance—Same as Lt. Tank M24
Vision and Fire Control
- **2 Periscopes M6**
- **2 Reflex Sights Mark IX or Computing Sights T5E1**

Communications—SCR 528

CARRIAGE, MOTOR, TWIN 40mm GUN, M19



The Twin 40mm Gun Motor Carriage M19 is a highly mobile antiaircraft weapon intended for the protection of mobile armored forces. The vehicle is based on a modified Light Tank M24 chassis, with Cadillac engines, hydramatic transmissions and torsion bar suspension.

CHARACTERISTICS

Crew 6
Weight with combat load ..... 38,000 lbs.
Unit ground pressure ..... 9.6 lb./sq. in.

Armor
- Frontal ..... ½ in. @ 45° and 60°
- Sides ..... ½ in. @ 12°
- Rear ..... ½ in. @ 0°
- Gun Mount Shields ..... ½ & 5/16 in. @ 0°

Armament—Two 40mm Guns
- Elevation ..... −5° to +90°
- Traverse ..... 360° by power

Ammunition
- 352 rd.—40mm

Performance
- Maximum speed ..... 35 mph
- Grade ability 60%
- Trench crossing ability ..... 7 ft.
- Vertical obstacle ability ..... 36 in.
- Fording ability ..... 42 in.

Vision and Fire Control
- 2 Periscopes M6
- Computing Sight M13
- Local Control System M16

Communications
- Provisions for Radio SCR 528 or SCR 510 or British No. 19

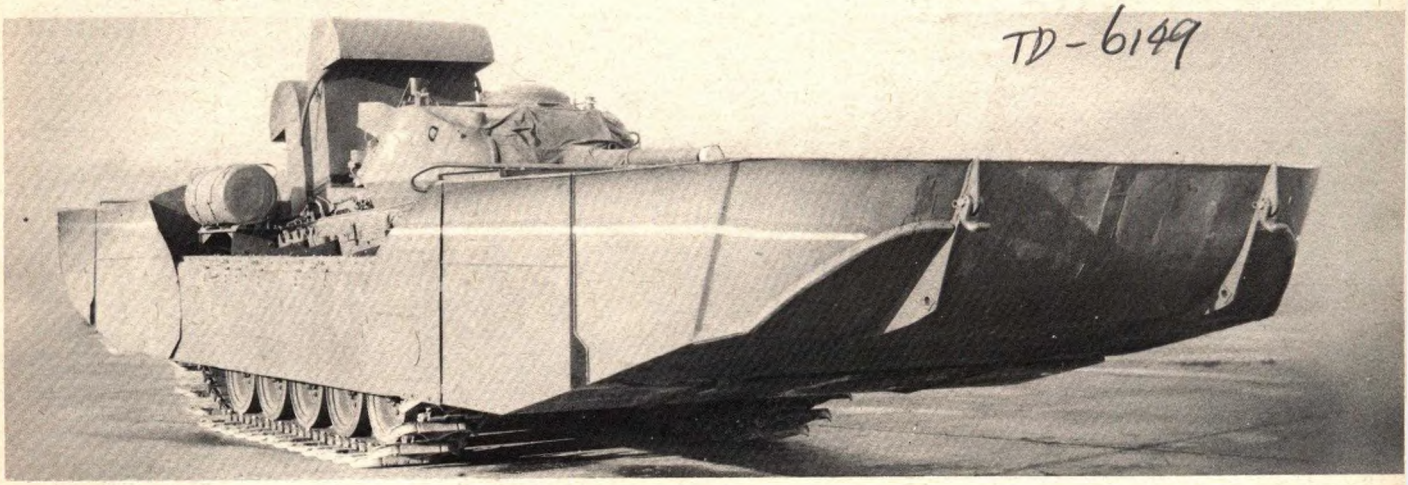
PROCUREMENT SCHEDULE*

1945						
June	July	Aug.	Sept.	Oct.	Nov.	Dec.
—	—	—	—	100	100	100

1946			
1st Q	2nd Q	3rd Q	4th Q
71	210	210	23

*Estimated as of 31 May 1945

LIGHT TANK M24, WITH SWIMMING DEVICE, ROCKET LAUNCHER AND DISASSEMBLY FOR AIR TRANSPORTATION



The equipment for water operation mounted on a standard Light Tank M24, consists of the standard fording equipment, floats front and rear, special grousers for water propulsion and jettisonable auxiliary fuel tanks. The kit can be installed in the field without any welding operations. The swimming equipment adds 13,400 pounds to the weight of the standard tank. Sufficient buoyancy is provided to float the tank where the hull is filled with water. The length over-all is 41 feet 6 inches, width, 11 foot. Speed in water is 5½ miles per hour.

The rocket launcher equipment consists of two-T95, 4.5-inch, 12 round launchers to fire the navy barrage rocket. Control in elevation and azimuth is by the normal turret and gun elevating and traversing mechanism.

The tank can be equipped with 28½ inch extended grousers. Winterization equipment, machine pistol for antipersonnel defense and arranged for disassembly and transportation in a C82 cargo airplane.

The extended grousers reduce the ground pressure to 6.4 lb. per sq. in.

The Winterization equipment provides for starting and operating the vehicles at temperatures down to –40°F.

The Machine Pistol provides protection against enemy personnel attempting to destroy the vehicle by suicide attacks.

To provide for air transportation, the tank is stripped by removal of the turret, fenders, tracks and parts of the running gear to reduce the hull weight to about 9 tons. This unit is loaded in one plane and the remaining parts are loaded into another.

PROCUREMENT SCHEDULE—L T, M24*

1945						
June	July	Aug.	Sept.	Oct.	Nov.	Dec.
219	150	130	130	130	130	130

1946			
1st Q	2nd Q	3rd Q	4th Q
600	305	150	310

*As of 31 May 1945

Fording equipment—Experimental, can be supplied on requisition
Swimming Device—Experimental and quantity production not yet authorized
28½" extended grousers — Experimental item. There is no manufacturing program
Winterization equipment—A production item supplied as required
Machine pistol—Experimental item. There is no manufacturing program

TERMINAL EFFECTS

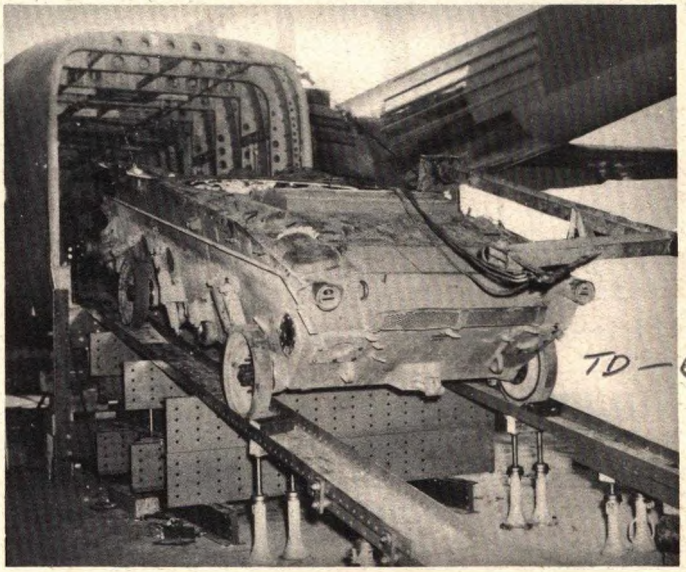
Ammunition	*Media*	*Charge*	*Range*	*Penetration*
Proj. APC-T, M61A1 (Fuze, BD, M66A1)	Homo. armor 30° obliq.	2030 f/s	2000 yd.	2.0 in.
Proj. APC-T, M61A1 (Fuze, BD, M66A1)	Massive limestone	2030 f/s	85 yd.	0.8 ft.
Proj. APC-T, M61A1 (Fuze, BD, M66A1)	Weathered limestone	2030 f/s	100 yd.	1.2 ft.
Shell, HE, M48 (Fuze, CP, M78)	Med. earth	Super	1000 yd.	12.7 ft.
Shell, HE, M48 (Fuze, CP, M78)	Palm wood	Super	1000 yd.	12.7 ft.
Shell, HE, M48 (Fuze, CP, M78)	Pine, spruce	Super	1000 yd.	9.6 ft.
Shell, HE, M48 (Fuze, CP, M78)	Oak, ebony, mahogany	Super	1000 yd.	6.3 ft.

LIGHT TANK M24, WITH SWIMMING DEVICE, ROCKET LAUNCHER AND DISASSEMBLY FOR AIR TRANSPORTATION *(Continued)*

Firing against weathered limestone (St. Louis type) the Shell, HE, M48 with Fuze, CP, M78 set delay is as effective in removing spoil as the Projectile APC-T, M61 or M61A1 with Fuze, BD, M68. In approximately ten hits in the same impact center either round will dislodge about 25 cubic feet (1.9 tons) of spoil. Against massive limestone (Warsaw type) ten hits will remove and deposit in a cave opening almost 16 cubic feet (1.2 tons) of rubble.

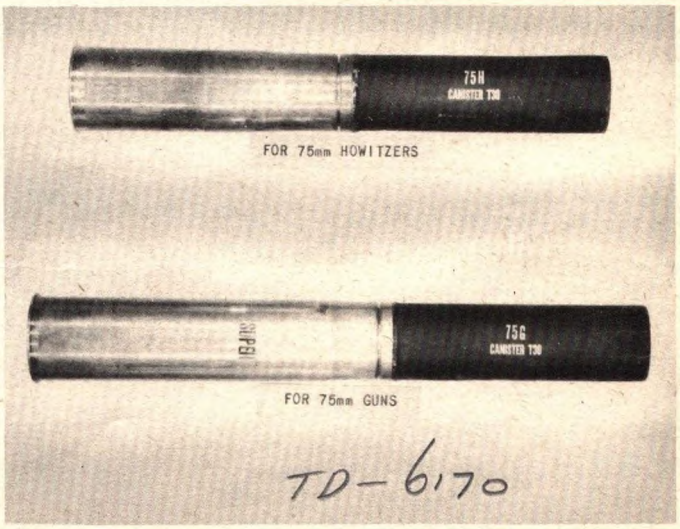
The weapon therefore can seal cave openings (3 ft. x 5 ft.) in weathered limestone or massive limestone, however, it is not as economical as other weapon-ammunition combinations. Ten rounds from this weapon may effect a temporary sealage. To permanently seal the opening the ten round group would have to be repeated several times changing the center of impact with each group.

If penetration is desired against limestone the APC Projectile is best, however, the bursting charge of the HE Shell blasts out a crater the diameter of which is greater than that obtained with the APC Projectile.



AMMUNITION
CANISTER, 75mm, T30

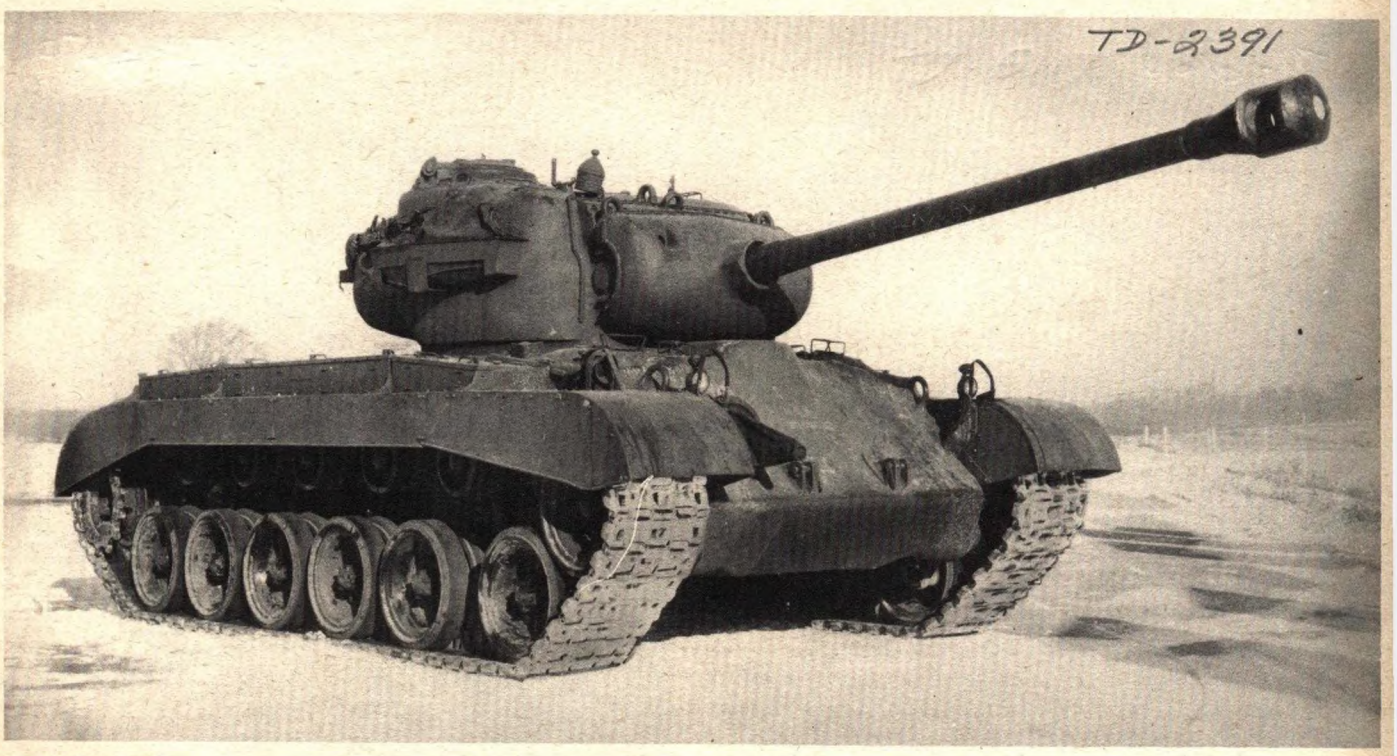
The T30 Canister was developed for use in both 75mm guns and howitzers. It is of conventional canister design being composed of a terneplate casing filled with steel balls and rosin matrix. This canister was developed primarily for use in jungle warfare and will be released for large scale procurement in the near future provided proving ground tests prove that the canister does not excessively damage the bore of the weapons.



PRODUCTION SCHEDULE (in thousands)

	1945				
	Aug.	Sept.	Oct.	Nov.	Dec.
GUN	2	0	0	0	0
HOW	5	5	5	5	5
	1946				
	1st Q	2nd Q	3rd Q	4th Q	
GUN	0	0	0	0	
HOW	18	18	18	18	

TANK, HEAVY, M26



This vehicle has been developed to provide a tank with increased armor protection, fire power and mobility.

The M26 Tank differs in many respects from the Medium Tank M4 Series. It is provided with greater armor protection and has a more powerful gun in the 90mm Gun M3. The vehicle embodies low silhouette, necessary interior space being obtained by use of wider hull. The vehicle is provided with torsion bar suspension resulting in materially improved riding characteristics over previous types of suspensions. A 23-inch wide track is provided. This vehicle employs the Ford V-8 Engine and torqmatic transmission.

CHARACTERISTICS

Crew 5
Weight with combat load ..... 92,000 lb.
Unit ground pressure—23" track—13.3 lb. per sq. in.
28" track—10.9 lb. per sq. in.

Armor
- Hull, frontal upper ..... 4 in. at 46°
- frontal, lower ..... 3 in. at 54°
- sides, forward ..... 3 in. at 0°
- sides, rear ..... 2 in. at 0°
- rear ..... 2 in.

Turret, front ..... 4 in.
- sides and rear ..... 3 in.

Gun Shield ..... 4½ in.

Armament
- 90mm Gun, M3, with 1 Cal. .30 Machine Gun in combination mount in turret
  - Elevation ..... —10° to +20°
  - Traverse ..... 360° by power or manually
- 1 Cal. .50 Machine Gun on turret for antiaircraft
- 1 Cal. .30 Machine Gun in bow

Ammunition
- 70 rd.—90mm
- 5,000 rd.—Cal. .30
- 440 rd.—Cal. .50

Performance
- Maximum speed ..... 25 mph
- Grade ability 60%
- Trench crossing ability ..... 7 ft. 11 in.
- Vertical obstacle ability ..... 36 in.
- Fording ability ..... 48 in.

Vision and Fire Control
- Vision cupola on turret
- 6 Periscopes M6
- Periscope M10F
- Telescope M71C
- Elevation Quadrant M9
- Gunners Quadrant M1
- Azimuth Indicator M20

COMMUNICATIONS

Provisions for Radios SCR 508, 506, AN/VRC-3 and British No. 19

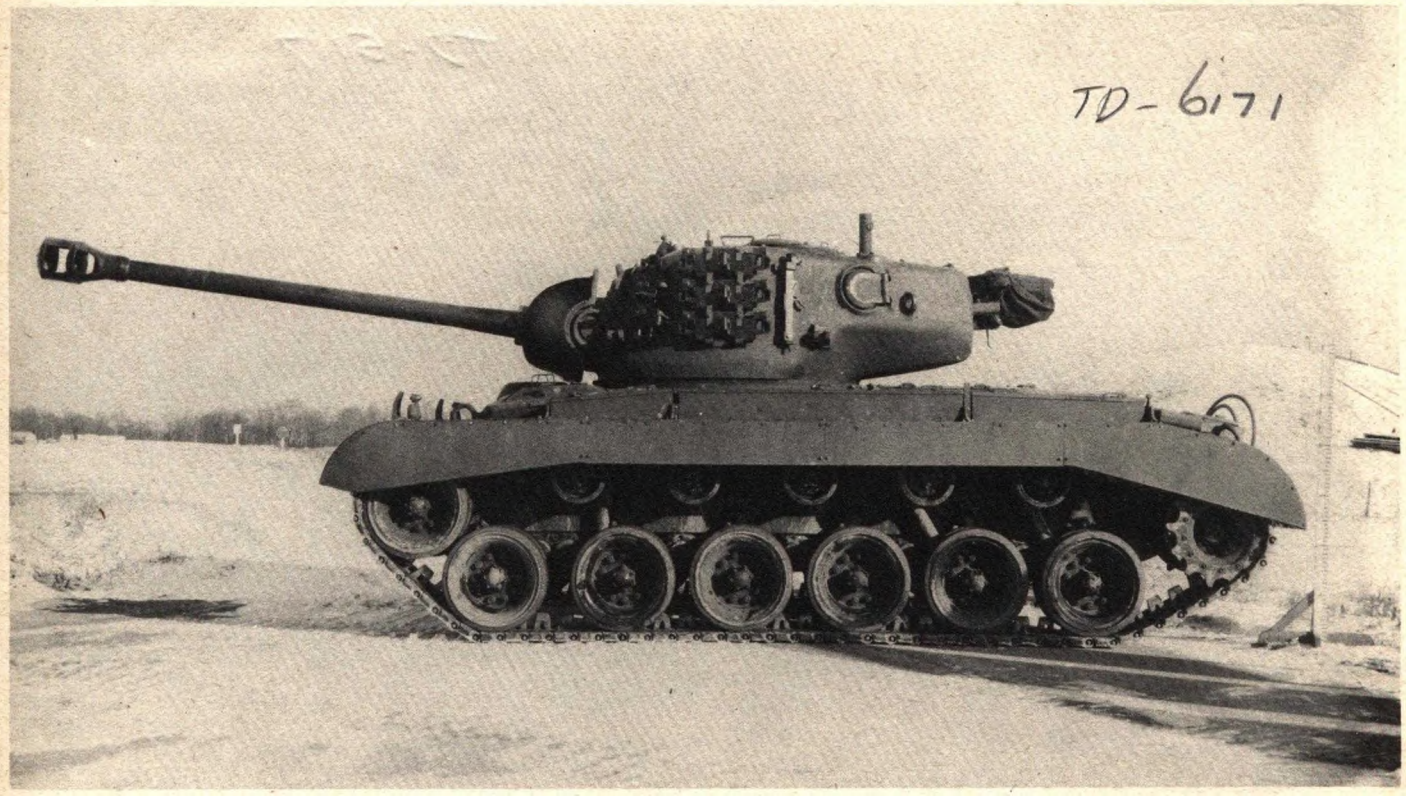
PROCUREMENT SCHEDULE*

1945						
June	July	Aug.	Sept.	Oct.	Nov.	Dec.
300	250	155	55	55	55	54

1946			
1st Q	2nd Q	3rd Q	4th Q
270	270	270	233

*As of 31 May 1945

TANK, HEAVY, T26E5



Heavy Tank, T26E5 is a modification of the M26 Tank, to provide frontal armor equivalent to the heaviest German armor encountered on the battlefield. This is a development type, 27 are being manufactured.

CHARACTERISTICS

Crew 5

Weight ..... Combat loaded—102,000 lb.

Unit Ground Pressure—with 28" track ..... 12.1 lb.

Armor:

Hull, Frontal, upper ..... 6 in. at 46½°
Frontal, lower ..... 4 in. at 54°
Sides, forward ..... 3 in. at 0
Sides, rear ..... 2 in. at 0
Rear ..... 2 in.
Turret, front ..... 7½ in. tapering to 3½ in. on the sides
rear ..... 5 in.
Gun Shield ..... 11 in.

Other Characteristics: The same as Tank, Heavy, M26 except for change in final drive and increased capacity in equilibrator to compensate the heavy gun shield.

TERMINAL EFFECTS

SEE PAGE 47

PROCUREMENT SCHEDULE

1945				
June	July	Aug.	Sept.	Oct.
27	—	—	—	—

TANK, HEAVY, T26E4

The Heavy Tank, T26E4, is a modification of the M26 tank to mount the high velocity 90mm Gun, T15E2, in place of the 90mm Gun M3. Changes in equilibrator, traversing mechanism, elevating mechanism, reworked ammunition stowage, and addition of weight to the turret rear for balance are the major changes required. Equilibrator in this vehicle is not the production type.

CHARACTERISTICS

Crew 5
Weight, combat loaded ..... 96,000 lb.
Unit ground pressure—with 23" track ..... 13.9 lb./sq. in.
—with 28" track ..... 11.4 lb./sq. in.
Armor—Same as Heavy Tank M26

Armament:
90mm Gun T15E2 with 1 Cal. .30 Machine Gun in combination mount in turret
Elevation ..... −10° to +20°
Traverse ..... 360° by power or manually
1 Cal. .50 Machine Gun on turret for antiaircraft
1 Cal. .30 Machine Gun in bow

Ammunition:
54 rd. 90mm
5,000 rd. ..... Cal. .30
440 rd. ..... Cal. .50

Performance—Same as Heavy Tank M26
Vision and Fire Control:
Same as for Heavy Tank M26 except for reticle changes required in telescopes and periscope.

Communications:
Same as Heavy Tank M26
This vehicle is a Limited Procurement Type.

PROCUREMENT SCHEDULE

1,000 of these tanks are included in production figures for Heavy Tank M26.

TANK, HEAVY, T26E2

This is a variation in the Heavy Tank, M26 to provide for mounting the 105mm Howitzer M4 and for necessary changes in details of equipment and stowage to accommodate this weapon, its fire control equipment and ammunition. Other armament is the same as the Heavy Tank, M26.

CHARACTERISTICS

Crew 5

Weight (combat loaded) ..... 93,000 lb.

Unit ground pressure—with 23" track ..... 13.4 lb. per sq. in.
—with 28" track ..... 11 lb. per sq. in.

Armor:
- Hull—Same as M26
- Turret, front ..... 5 in. tapering to 3 in. at sides
- Rear ..... 2½ in.
- Gun Shield ..... 8 in.

Armament:
- 105mm Howitzer, M4 with 1 Cal. .30 Machine Gun in combination mount in power operated turret.
- 1 Cal. .50 Machine Gun on turret for A.A.
- 1 Cal. .30 Machine Gun in bow

Elevation ..... −10° to +35°

Traverse ..... Power or Hand

Ammunition:
- 105mm ..... 74 rd.
- Cal. .50 ..... 440 rd.
- Cal. .30 ..... 5,000 rd.
- Cal. .45 ..... 900 rd.
- Grenades 12

Performance—The same as Heavy Tank, M26

Vision and Fire Control:
- Vision Cupola on turret
- 6 Periscopes M6
- Periscope M10D
- Telescope M76G
- Elbow Telescope M62
- Elevation Quadrant M9
- Gunners Quadrant M1
- Azimuth Indicator M20

Other characteristics are the same as Heavy Tank M26. This vehicle is a Limited Procurement Type.

TERMINAL EFFECTS

SEE PAGE 18

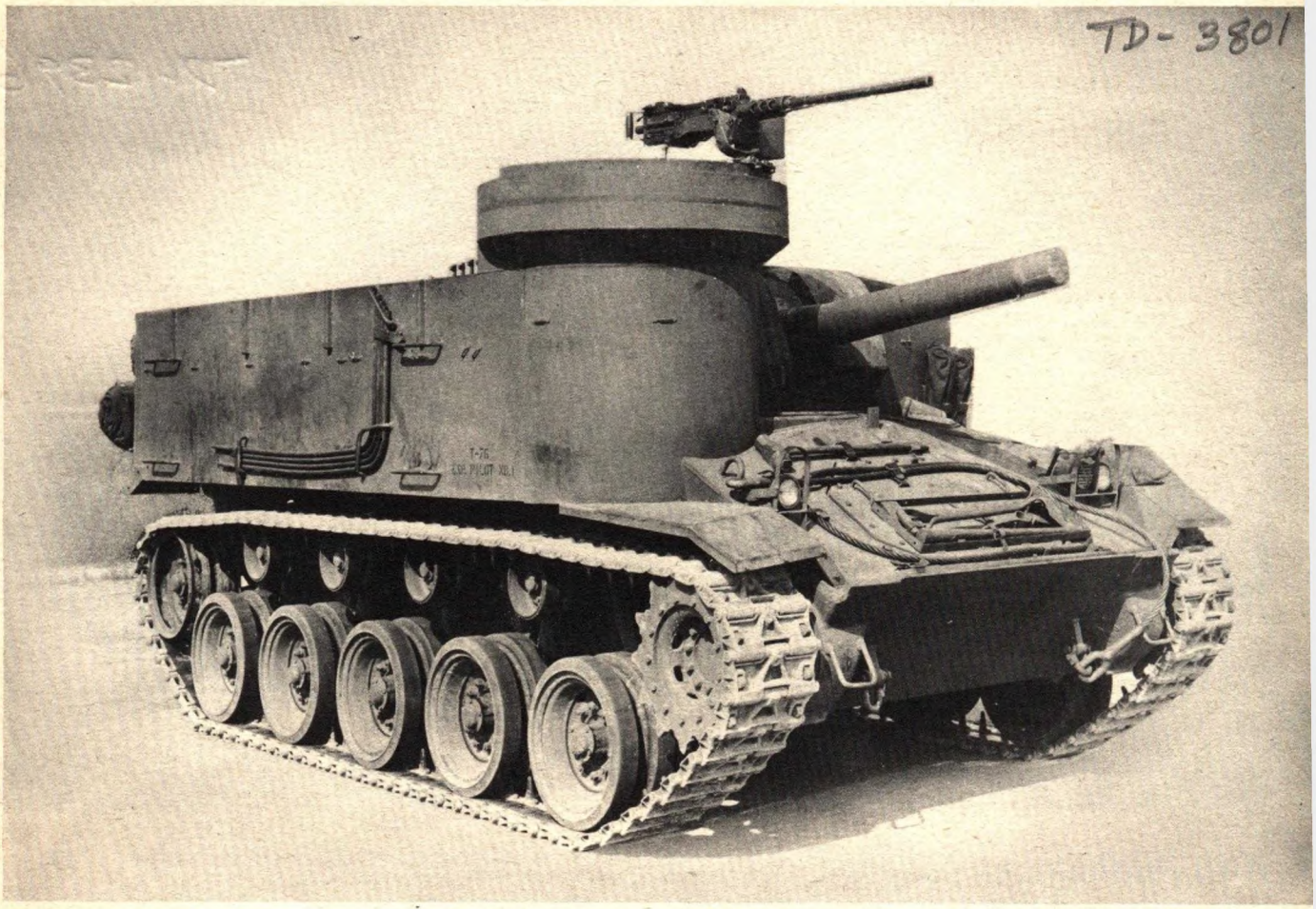
PROCUREMENT SCHEDULE*

1945					
July	Aug.	Sept.	Oct.	Nov.	Dec.
50	103	103	103	103	103

1946			
1st Q	2nd Q	3rd Q	4th Q
300	300	300	300

*As of 31 May 1945

105mm HOWITZER MOTOR CARRIAGE M37



This vehicle, which is based on a modified Light Tank M24 chassis using Cadillac engines and hydramatic transmissions with torsion bar suspension, mounts the 105mm Howitzer M4. It was developed to provide a lighter, more mobile self propelled howitzer for supporting rapidly moving armored vehicles, and as a replacement for 105mm Howitzer Motor Carriage M7 series.

CHARACTERISTICS

Crew 7
Weight (combat loaded) ..... 40,000 lb.
Unit ground pressure ..... 10.0 lb./sq. in.
Armor:
- Front, sides and rear ..... ½ in.
- Gun Shield ..... ½ in.

Armament ..... 105mm Howitzer M4
- Elevation ..... −10° to +45°
- Traverse ..... 22½° right and 22½° left
- 1 Cal. .50 Machine Gun on antiaircraft ring mount

Ammunition:
- 90 rounds 105mm
- 900 rounds ..... Cal. .50

Performance:
- Maximum speed ..... 35 m
- Grade ability 60
- Trench crossing ability 7
- Vertical obstacle ability 36
- Fording ability 42

Vision and Fire Control:
- Periscope M6
- Telescope M76G
- Panoramic Telescope M12
- Gunners Quadrant M1
- Range Quadrant M12

Communications:
- Provision for Radio Set AN/VRC-3 and Interphone Equipment RC-99

TERMINAL EFFECTS

SEE PAGE 18

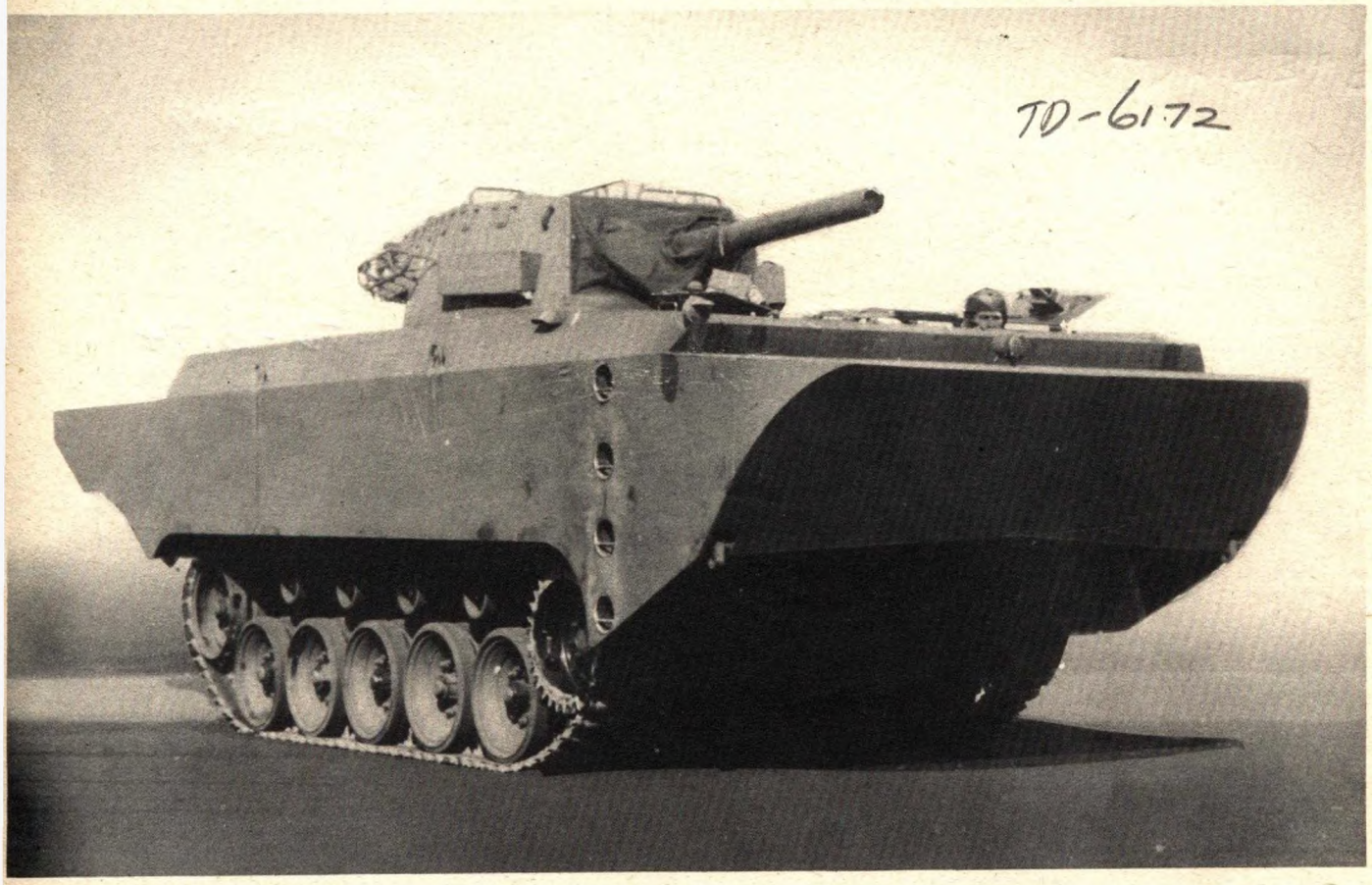
PROCUREMENT SCHEDULE*

1945				
Aug.	Sept.	Oct.	Nov.	Dec.
50	100	135	135	135

1946		
1st Q	2nd Q	3rd Q
270	270	215

*As of 31 May 1945

CARRIAGE, MOTOR, AMPHIBIAN, 105mm HOWITZER, T87



This vehicle is based on the very successful 76mm Gun Motor Carriage M18 with modifications to provide for built in float structure. This arrangement provides for satisfactory operation either on land or in water. The vehicle mounts the 105mm Howitzer M4 in a power operated 360° turret provided with gyro stabilized mount to neutralize effects of vehicle pitch.

CHARACTERISTICS

Crew 5
Weight ..... 44,500 lb.
Unit ground pressure ..... 8.4 lb. per sq. in.
Armor:
- Hull, front ..... ¼ in. at 30°
- Sides ..... ¼ in. at 0° and ½ in. at 0°
- Rear ..... ⅛ in. at 35°

Turret:
- Front ..... ¾ in. to 1 in. at 20°
- Sides ..... ½ in. at 20°
- Rear ..... ¾ in. to 1½ in. at 0°

Armament ..... 105mm Howitzer M4
- Elevation ..... −10° to +35°

Cal. .50 HB, M2 Machine Gun on Turret

Ammunition:
- 60 rounds ..... 105mm How.
- 3,000 rounds ..... Cal. .30

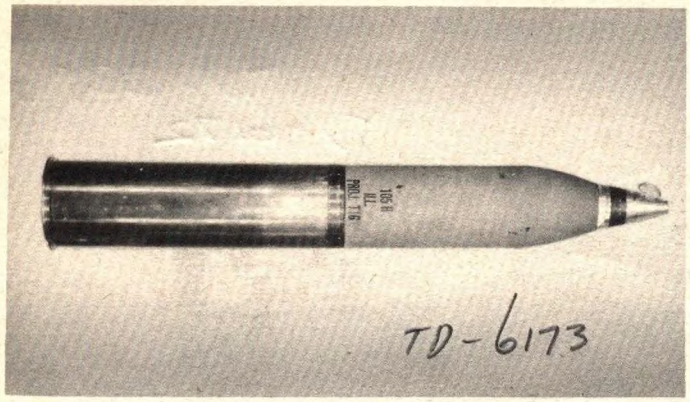
Performance:
- Maximum speed ..... 43 mph
- Grade ability 60%
- Trench crossing ability ..... 6 ft. 2 in.
- Vertical obstacle ability ..... 36 in.

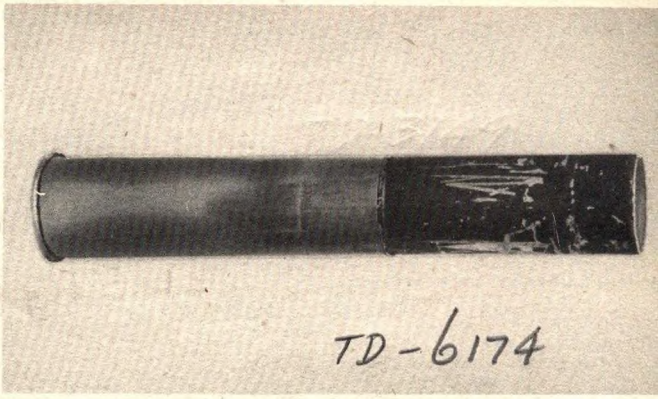
Vision and Fire Control:
- 2 Periscopes M6
- Periscope M10 Type
- Panoramic Telescope M12
- Gunners Quadrant M1

Communications—SCR 610 or British Set No. 19

PROCUREMENT SCHEDULE

This is an experimental vehicle—one pilot procured. There is no manufacturing program.





TERMINAL EFFECTS

Ammunition	*Media*	*Charge*	*Range*	*Penetration*
Shell, HE, M1	Med. earth	7	1,000 yd.	12.1 ft.
Shell, HE, M1	Palm wood	7	1,000 yd.	12.1 ft.
Shell, HE, M1	Pine, spruce	7	1,000 yd.	9.0 ft.
Shell, HE, M1	Oak, ebony, mahogany	7	1,000 yd.	6.0 ft.
Shell, HE, M1	Med. earth	3	4,000 yd.	5.7 ft.*
Shell, HE, M1	Palm wood	3	4,000 yd.	5.7 ft.*
Shell, HE, M1	Pine, spruce	3	4,000 yd.	4.2 ft.*
Shell, HE, M1	Oak, ebony, mahogany	3	4,000 yd.	2.8 ft.*
Shell, HE, M1	Med. earth	2	4,000 yd.	4.8 ft.*
Shell, HE, M1	Palm wood	2	4,000 yd.	4.8 ft.*
Shell, HE, M1	Pine, spruce	2	4,000 yd.	3.6 ft.*
Shell, HE, M1	Oak, ebony, mahogany	2	4,000 yd.	2.4 ft.*

*High angle fire against roofs.

This weapon firing Shell, HE, M1 will seal caves in massive or weathered limestone and gumbo clay mixed with low grade wet shale but a large expenditure of rounds is necessary to accomplish this end. Against caves in hard red clay with overburdens of 10 feet or less this weapon is effective, as about six rounds will effect sealage of a 4 x 4 foot cave.

The HEAT Shell is ineffective in any of these media.

AMMUNITION

Shell, Illuminating, 105mm, T16

The 105mm Illuminating Shell was designed to provide illumination at night for field artillery and also to provide off-shore illumination. The shell is fitted with M54 TSQ fuze which upon functioning displace the baseplate and ejects the parachute and illuminar assembly. The candle burns for approximately or minute with 250,000 candlepower. This shell whe properly assembled is suitable for use in the M2, M and M4 type howitzers.

PROCUREMENT SCHEDULE

1945-1946 (in thousands)

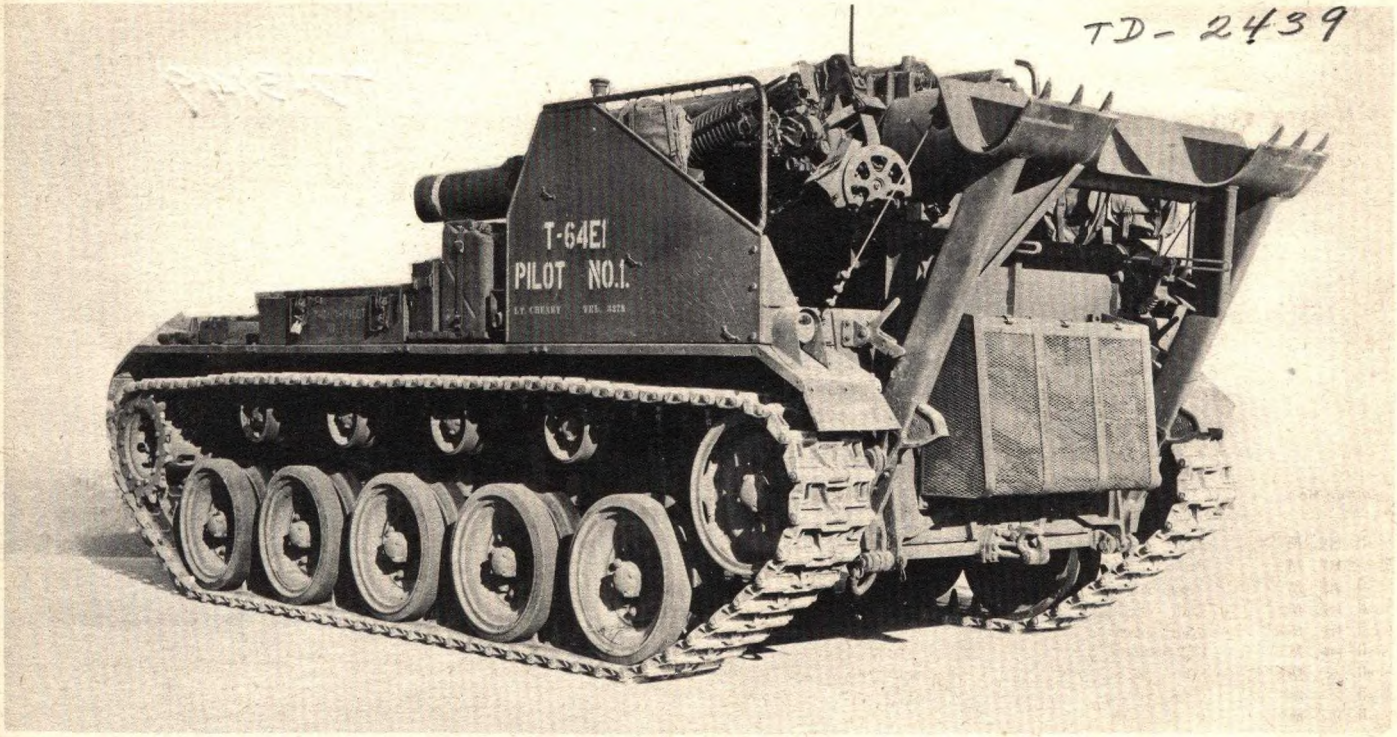
1945					
July	Aug.	Sept.	Oct.	Nov.	Dec.
5	20	25	25	25	17

1946			
1st Q	2nd Q	3rd Q	4th Q
75	75	75	68

CANISTER, 105mm, T18

The T18 canister was developed for use in bot 105mm guns and howitzers. It is of conventional ca ister design being composed of a terneplate casin filled with steel balls and rosin matrix. This caniste was developed primarily for use in jungle warfare an will be released for large scale procurement in the nea future, providing proving ground tests prove that th canister does not excessively damage the bore of th weapons. Approximately 50,000 rounds of 105m Canister have been manufactured and issued for fie use. No further production is scheduled at this tim

CARRIAGE, MOTOR, 155mm HOWITZER, M41



This vehicle was designed to provide a light weight, high speed, medium caliber, self propelled howitzer capable of being brought into action in the minimum of time, which can be used for direct or indirect fire in support of rapidly moving armored vehicles. The weapon is the standard 155mm Howitzer. The vehicle is based on a modified Light Tank M24 chassis using torsion bar suspension, cadillac engines and hydramatic transmissions.

CHARACTERISTICS

Crew 5
Weight (combat loaded) ..... 43,000 lb.
Unit ground pressure ..... 10.8 lb./sq. in.
Armor:
- **Front** ..... ½ in. @ 45° and 60°
- **Sides** ..... ½ in. @ 12°
- **Rear** ..... ¼ in. @ 0°
- **Gun Shields** ..... ⅜ in. @ 45°

Armament ..... 155mm Howitzer M1
- **Elevation** ..... −5° to +45°
- **Traverse** ..... 20° right, 17° left

Ammunition:
- 22 rounds — 155mm Howitzer — Additional rounds can be carried on accompanying vehicles.

Performance:
- **Maximum speed** ..... 30 mph
- **Grade ability** 60%
- **Trench crossing ability** ..... 7 ft.
- **Vertical obstacle ability** ..... 36 in.
- **Fording ability** ..... 40 in.

Vision and Fire Control:
- 2 Periscopes M6
- Panoramic Telescope M12A6
- Gunners Quadrant M1

Communications:
- Provisions for SCR 610, SCR 619 or British No. 19

TERMINAL EFFECTS

Ammunition	*Media*	*Charge*	*Range*	*Penetration*
Shell, HE, M107	Med. earth	7	15,000 yd.	11.9 ft.*
Shell, HE, M107	Palm wood	7	15,000 yd.	11.9 ft.*
Shell, HE, M107	Pine, spruce	7	15,000 yd.	8.9 ft.*
Shell, HE, M107	Oak, ebony, mahogany	7	15,000 yd.	5.9 ft.*
Shell, HE, M107	Med. earth	6	15,000 yd.	10.1 ft.*
Shell, HE, M107	Palm wood	6	15,000 yd.	10.1 ft.*
Shell, HE, M107	Pine, spruce	6	15,000 yd.	7.7 ft.*
Shell, HE, M107	Oak, ebony, mahogany	6	15,000 yd.	5.1 ft.*
Shell, HE, M107	Med. earth	7	2,000 ft.	17.3 ft.
Shell, HE, M107	Palm wood	7	2,000 ft.	17.3 ft.
Shell, HE, M107	Pine, spruce	7	2,000 ft.	12.9 ft.
Shell, HE, M107	Oak, ebony, mahogany	7	2,000 ft.	8.6 ft.

**High angle fire against roofs.*

The Shell, HE, M107 equipped with any PD fuze can quickly seal entrances to caves in comparatively soft material. Against limestone, concrete, hard red clay and gumbo clay mixed with low grade shale the combination of Shell, HE, M107 and Fuze, CP, M78, is extremely destructive. The CP fuzed shell is most effective when approximately 6 rounds are employed to seal a limestone cave, 2 rounds are fired against a cave dug in gumbo clay and about 3 rounds in hard red clay.

PROCUREMENT SCHEDULE**

1945							1946
June	July	Aug.	Sept.	Oct.	Nov.	Dec.	1st Q
2	18	40	40	40	40	40	80

****As of 31 May 1945**

CARRIAGE, MOTOR, 155mm GUN, M40

This gun carriage was developed to provide highly mobile heavy artillery capable of being brought into action in the minimum of time to support a rapidly moving situation.

This vehicle consists of the standard field 155mm Gun mounted on an armored chassis using current production M4 Series Tank components. The R975-C4 Engine, standard M4 Tank power train and 23-inch center guide track and horizontal volute spring suspension are used.

CHARACTERISTICS

Crew 8
Weight, combat loaded ..... 83,000 lb.
Unit ground pressure ..... 10.4 lb./sq. in.
Armor:
- Frontal, upper ..... ½ in. at 60°
- Frontal, lower ..... Same as M4 Tank (2½ in. to 4 in.)
- Sides, lower ..... 1 in.
- Sides, upper ..... ½ in.
- Rear ..... ½ in.
- Gun Shields ..... ½ in. at 45°

Armament:
- Gun 155mm, M2
- Elevation ..... −5° to +55°
- Traverse ..... 18° right and 18° left

Ammunition:
- 16 rounds .... 155mm (144 additional rounds may be carried in accompanying M4 Tractor and M23 Ammunition Trailer)

Performance:
- Maximum speed ..... 24 mph
- Gradeability 60%
- Trench crossing ability ..... 7 ft. 8 in.
- Vertical obstacle ability ..... 34 in.
- Fording ability ..... 36 in.

Vision and Fire Control:
- Vision Cupolas for driver and assistant driver
- Telescope M69E4 (M69F)
- Elbow Telescope T135 (M16A1F)
- Panoramic Telescope M12
- Gunners Quadrant M1

COMMUNICATIONS

Provisions for installation of SCR 608, 610 or 619 or British No. 19

TERMINAL EFFECTS

Ammunition	*Media*	*Charge*	*Range*	*Penetration*
Shell, HE, M101	Med. earth	Normal	15,500 yd.	12.5 ft.*
Shell, HE, M101	Palm wood	Normal	15,500 yd.	12.5 ft.*
Shell, HE, M101	Pine, spruce	Normal	15,500 yd.	9.4 ft.*
Shell, HE, M101	Oak, ebony, mahogany	Normal	15,500 yd.	6.3 ft.*
Shell, HE, M101	Med. earth	Super	20,500 yd.	13.2 ft.*
Shell, HE, M101	Palm wood	Super	20,500 yd.	13.2 ft.*
Shell, HE, M101	Pine, spruce	Super	20,500 yd.	9.9 ft.*
Shell, HE, M101	Oak, ebony, mahogany	Super	20,500 yd.	6.6 ft.*
Shell, HE, M101	Med. earth	Normal	2,000 yd.	19.4 ft.
Shell, HE, M101	Palm wood	Normal	2,000 yd.	19.4 ft.
Shell, HE, M101	Pine, spruce	Normal	2,000 yd.	14.5 ft.
Shell, HE, M101	Oak, ebony, mahogany	Normal	2,000 yd.	9.7 ft.
Shell, HE, M101	Med. earth	Super	2,000 yd.	23.5 ft.
Shell, HE, M101	Palm wood	Super	2,000 yd.	23.5 ft.
Shell, HE, M101	Pine, spruce	Super	2,000 yd.	17.5 ft.
Shell, HE, M101	Oak, ebony, mahogany	Super	2,000 yd.	11.7 ft.

**High angle fire against roofs.*

Firing the Shell, HE, M101 with Fuze, CP, M78 this weapon is extremely effective against cave dug in limestone, hard red clay or gumbo clay mixed with low grade shale. The round is most effective when approximately 5 rounds are used to seal a cave in limestone, 1 or 2 in gumbo clay and about 3 in hard red clay.

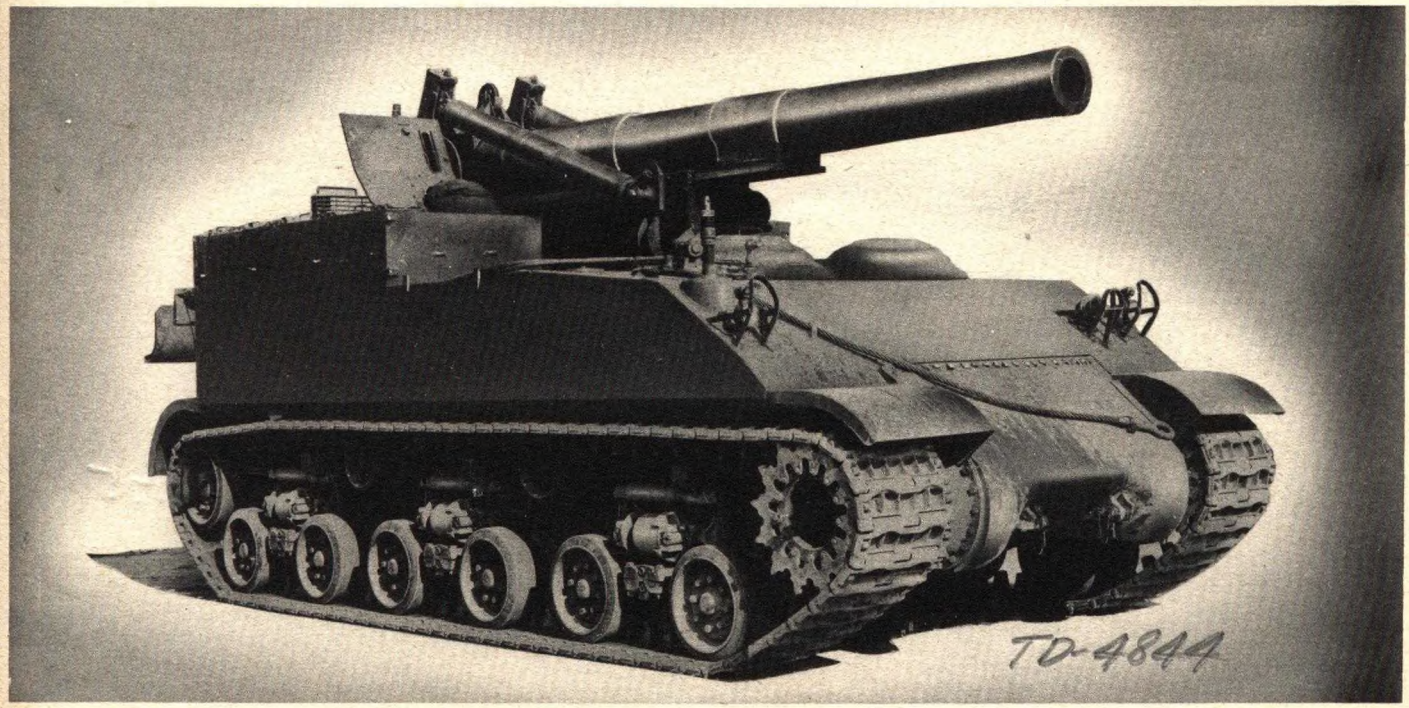
PROCUREMENT SCHEDULE**

1945						
June	July	Aug.	Sept.	Oct.	Nov.	Dec.
75	75	32	—	—	—	—

1946			
1st Q	2nd Q	3rd Q	4th Q
—	—	—	—

**As of 31 May 1945

CARRIAGE, MOTOR, 8-inch HOWITZER, T89



This carriage has also been produced to provide highly mobile heavy artillery capable of being brought into action in the minimum of time to support a rapidly moving situation.

This vehicle consists of the standard field 8-inch Howitzer mounted on the same chassis used for the 155mm Gun Motor Carriage, T83, i.e., based on Medium Tank M4 Series components.

CHARACTERISTICS

Crew 8

Weight (combat loaded) ..... 83,000 lb.

Unit ground pressure ..... 10.4 lb./sq. in.

Armor:
Same as 155mm Gun Motor Carriage, M40

Armament ..... 8 in. Howitzer M1 or M2
Elevation ..... −5° to +55°
Traverse ..... 18° right and 18° left

Ammunition:
12 rounds—8-inch (80 additional rounds will be carried in accompanying M4 Tractor and M23 Ammunition Trailer)

Performance:
Same as 155mm Gun Motor Carriage M40

Vision and Fire Control:
Same as 155mm Gun Motor Carriage T83, except for required reticle changes in telescopes

Communications:
Same as 155mm Gun Motor Carriage T83

This vehicle is a Limited Procurement type.

TERMINAL EFFECTS

Ammunition	*Media*	*Charge*	*Range*	*Penetration*
Shell, HE, M106	Med. earth	7	2,000 yd.	22.6 ft.
Shell, HE, M106	Palm wood	7	2,000 yd.	22.6 ft.
Shell, HE, M106	Pine, spruce	7	2,000 yd.	16.9 ft.
Shell, HE, M106	Oak, ebony, mahogany	7	2,000 yd.	11.3 ft.
Shell, HE, M106	Med. earth	7	15,000 yd.	17.3 ft.*
Shell, HE, M106	Palm wood	7	15,000 yd.	17.3 ft.*
Shell, HE, M106	Pine, spruce	7	15,000 yd.	12.9 ft.*
Shell, HE, M106	Oak, ebony, mahogany	7	15,000 yd.	8.6 ft.*
Shell, HE, M106	Med. earth	6	15,000 yd.	13.2 ft.*
Shell, HE, M106	Palm wood	6	15,000 yd.	13.2 ft.*
Shell, HE, M106	Pine, spruce	6	15,000 yd.	9.9 ft.*
Shell, HE, M106	Oak, ebony, mahogany	6	15,000 yd.	6.6 ft.*

About 1 hit of the Fuze, CP, M78, with Shell, HE, M106, will seal the opening to a cave (4 x 4 ft.) in limestone and from one to three the opening to caves dug into gumbo clay or hard red clay.

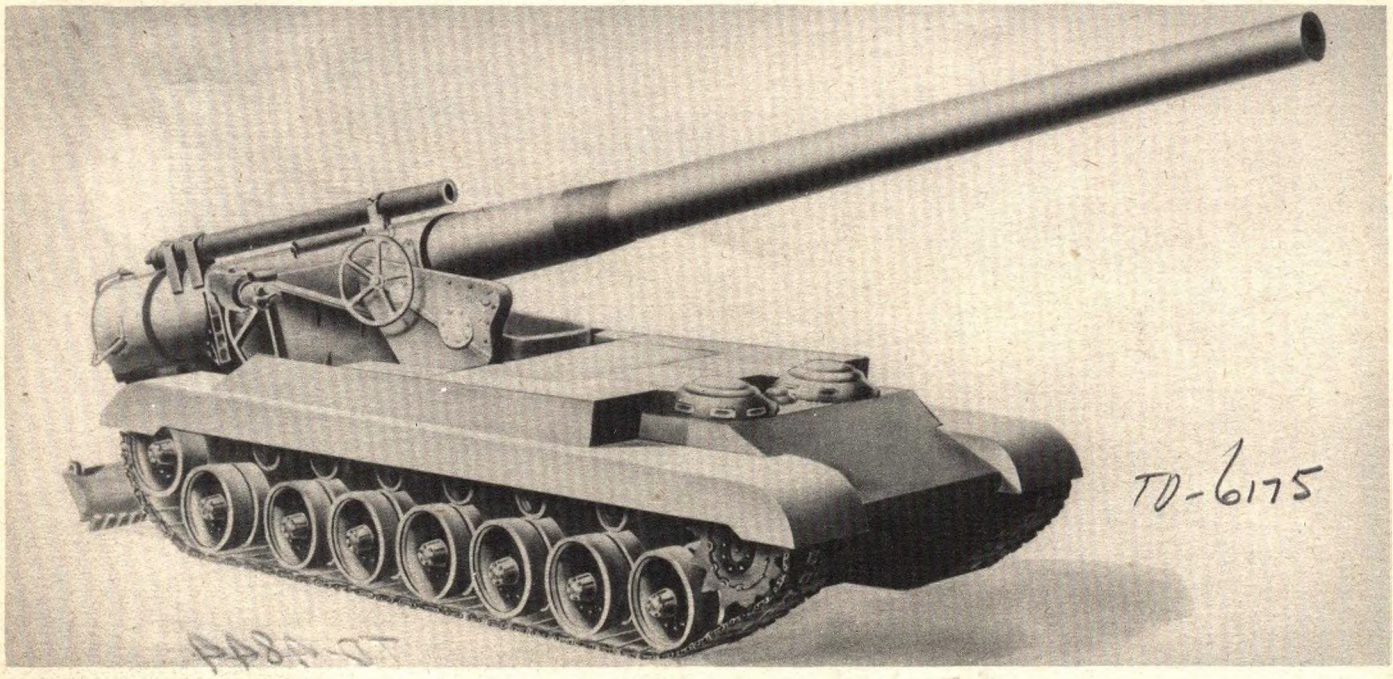
*High angle fire against roofs.

PROCUREMENT SCHEDULE*

1945					1946
Aug.	Sept.	Oct.	Nov.	Dec.	1st Q
50	75	75	75	75	226

*As of 31 May 1945

CARRIAGE, MOTOR, 8-inch GUN, T93



This heavy gun motor carriage was developed to provide highly mobile heavy caliber artillery, capable of being brought into action in a minimum of time to support a rapidly moving situation. The vehicle consists of an 8-inch gun M1 mounted on an armored chassis, using current production M26 Heavy Tank components, including Ford V-8 GAF Engine and Torqmatic Transmission. This vehicle employs a 23-inch center guided track with 5-inch extended end connectors on a torsion bar suspension system.

CHARACTERISTICS

Crew 8
Weight (combat loaded) ..... 112,000 lb.
Unit ground pressure ..... 11 lb. per sq. in.
Armor:
- Frontal, upper ..... 1 in. at 55°
- Frontal, lower ..... 1 in. at 45°
- Sides, lower ..... 1 in. at 0°
- Sides, upper ..... ½ in. at 0°
- Rear ..... ½ in. at 10°
- Top ..... ⅞ in.
- Gun Shield ..... ½ in.
- Floor ..... 1 in.

Armament ..... Gun, 8-inch, M1
Elevation ..... 0° to plus 65°
Traverse ..... 12° right and left
Ammunition:
6 rounds on the carriage. Additional ammunition will be carried in accompanying vehicles.
Performance ..... Maximum speed 15 mph
Gradeability 60%
Trench crossing ability ..... 7 ft.
Vertical obstacle ability ..... 46 in.
Cruising range ..... 80 miles
Fording ..... 55 in.
Turning radius ..... 30 ft.
Vision and Fire Control Equipment:
- Vision cupola for driver and assistant driver
- Elbow telescope M16A1E2
- 1 Panoramic Telescope M12
- Elevation Quadrant M1
- Gunners Quadrant M1

Communications:
Provision for installation of SCR 608B, SCR 610, 619 or British Set No. 19, interphone equipment with station for driver and assistant driver and two stations at the rear of the vehicle.

This vehicle is a Limited Procurement Type

TERMINAL EFFECTS

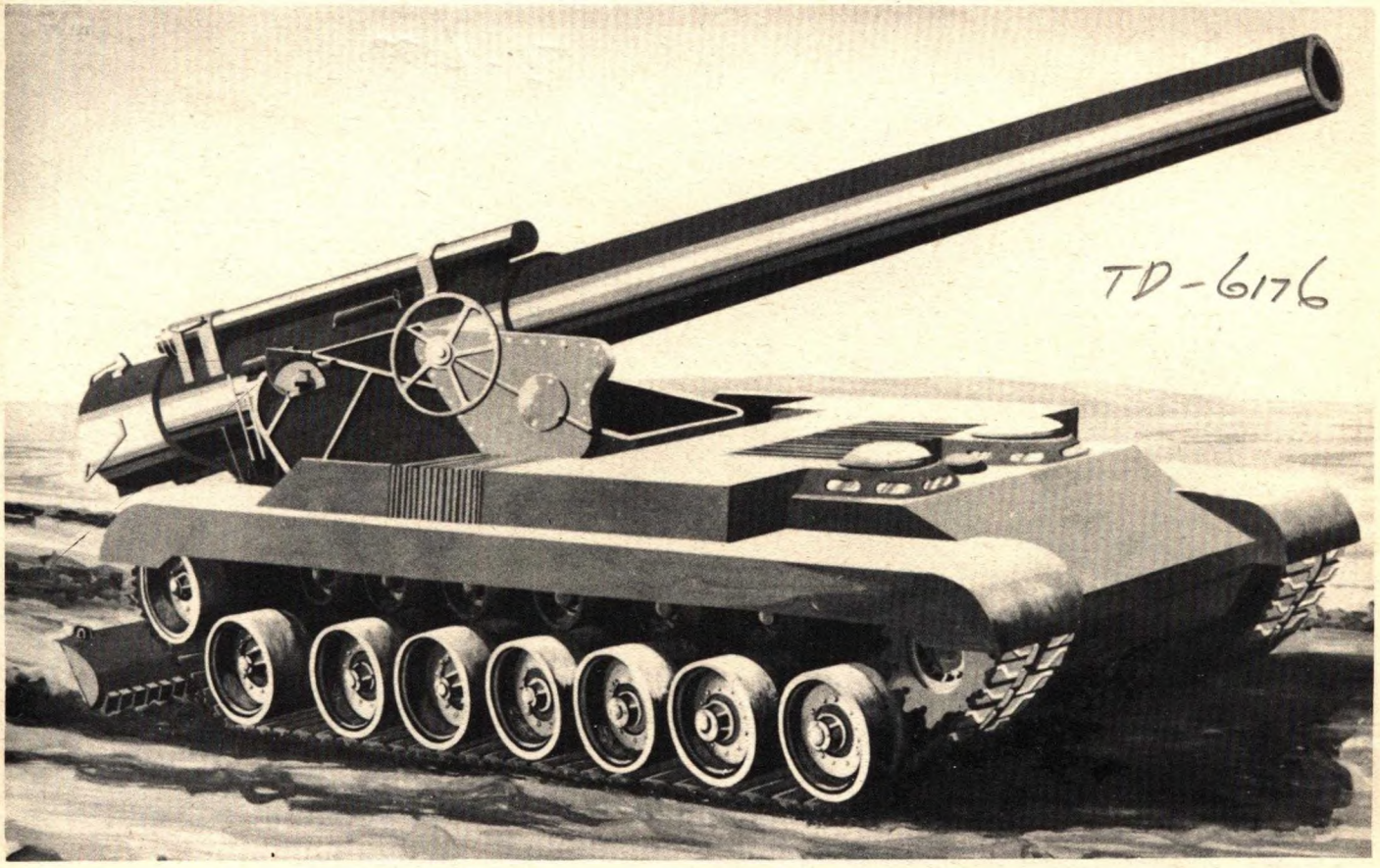
Ammunition	*Media*	*Charge*	*Range*	*Penetration*
Shell, HE, M103	Med. earth	Super	15,000 yd.	25.4 ft.
Shell, HE, M103	Palm wood	Super	15,000 yd.	25.4 ft.
Shell, HE, M103	Pine, spruce	Super	15,000 yd.	19.0 ft.
Shell, HE, M103	Oak, ebony, mahogany	Super	15,000 yd.	12.7 ft.
Shell, HE, M103	Granite	Super	15,000 yd.	1.9 ft.
Shell, HE, M103	Granite	Reduced	15,000 yd.	1.4 ft.
Shell, HE, M103	Granite	Reduced	1,000 yd.	2.5 ft.

PROCUREMENT SCHEDULE*

1946
1st Q
72

*As of 31 May 1945

CARRIAGE, MOTOR, 240mm HOWITZER, T92



This howitzer motor carriage has been developed to provide highly mobile heavy artillery capable of being brought into action in the minimum of time to support rapidly moving situations. The vehicle consists of a standard 240mm Howitzer, M1 mounted on the same chassis used for the 8-inch Gun Motor Carriage, T93.

TERMINAL EFFECTS

Ammunition	*Media*	*Charge*	*Range*	*Penetration*
Shell, HE, M114	Med. earth	4	15,000 yd.	21.5 ft.
Shell, HE, M114	Palm wood	4	15,000 yd.	21.5 ft.
Shell, HE, M114	Pine, spruce	4	15,000 yd.	16.0 ft.
Shell, HE, M114	Oak, ebony, mahogany	4	15,000 yd.	10.7 ft.
Shell, HE, M114	Granite	1	5,500 yd.	1.5 ft.

PROCUREMENT SCHEDULE*

1946
2nd Q
144

*As of 31 May 1945

CHARACTERISTICS

Crew 8

Weight (combat loaded) ..... 107,000 lb.

Unit ground pressure ..... 10.5 lb. per sq. in.

Armor:
Same as 8" Gun Motor Carriage T93

Armament ..... 240mm Howitzer M1

Elevation ..... 0° to 65°

Traverse ..... 12° right and 12° left

Ammunition:
6 rounds on the carriage. Additional ammunition will be carried in accompanying vehicles.

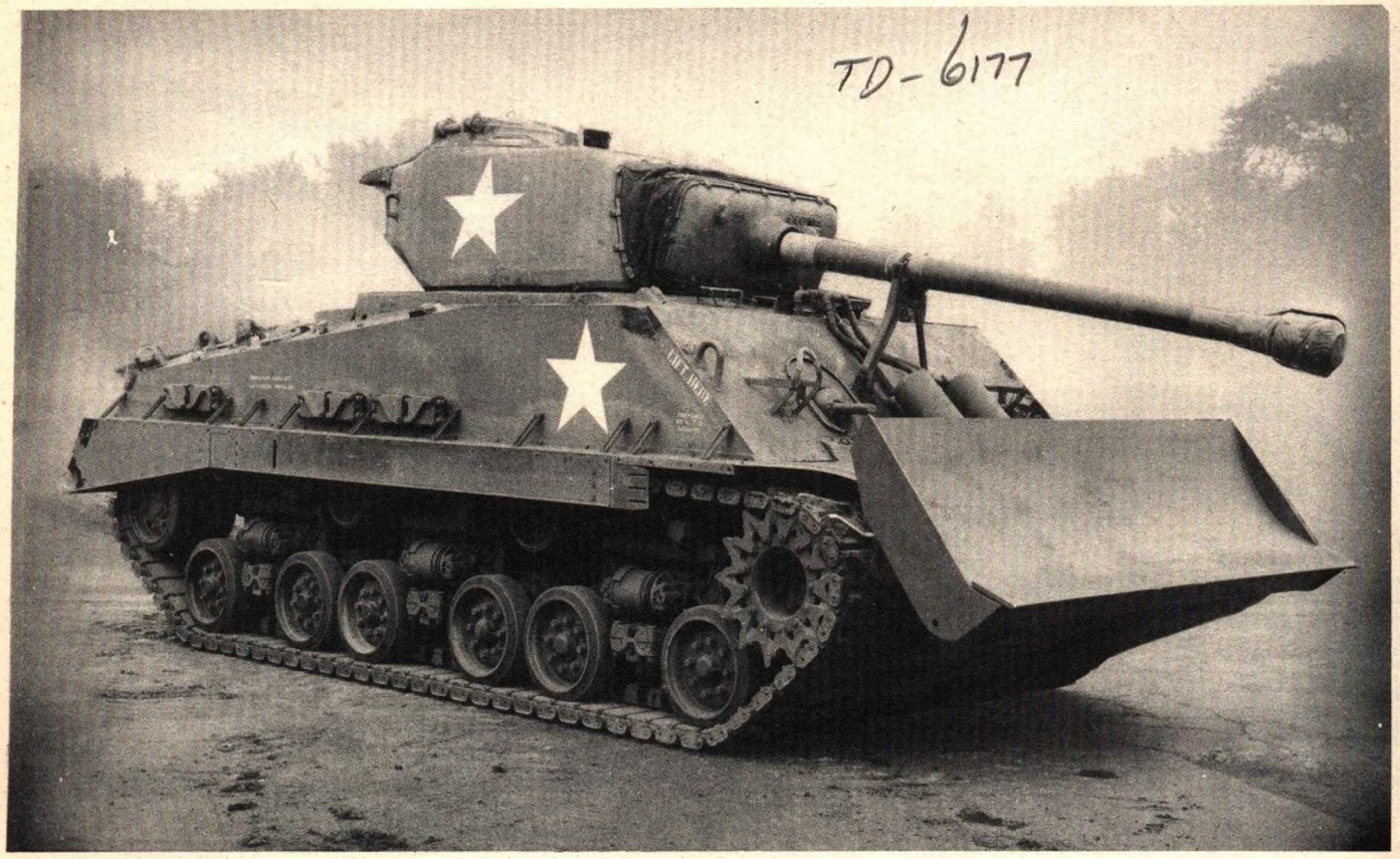
Performance:
The same as 8-inch Gun Motor Carriage T93

Vision and Fire Control:
The same as for 8-inch Gun Motor Carriage T93, except for variations in reticle in Elbow Telescope M16A1.

Communications:
The same as 8-inch Gun Motor Carriage T93

This vehicle is a Limited Procurement Type

BULLDOZER, T7 TYPE FOR TANK, MEDIUM M4 SERIES



This is an adaptation of the linkage mounted type of dozer originally developed for high speed tractors. One distinct advantage of this type is that it is independent of the type of vehicle suspension and track used and is accordingly more universal in its application. This equipment is very similar to that described for the Tractor, High Speed, M4. Blade widths are provided to suit over all width of tracks used. Unit ground pressure can be substantially reduced when necessary by the addition of extended grousers 32½ or 37 inches wide.

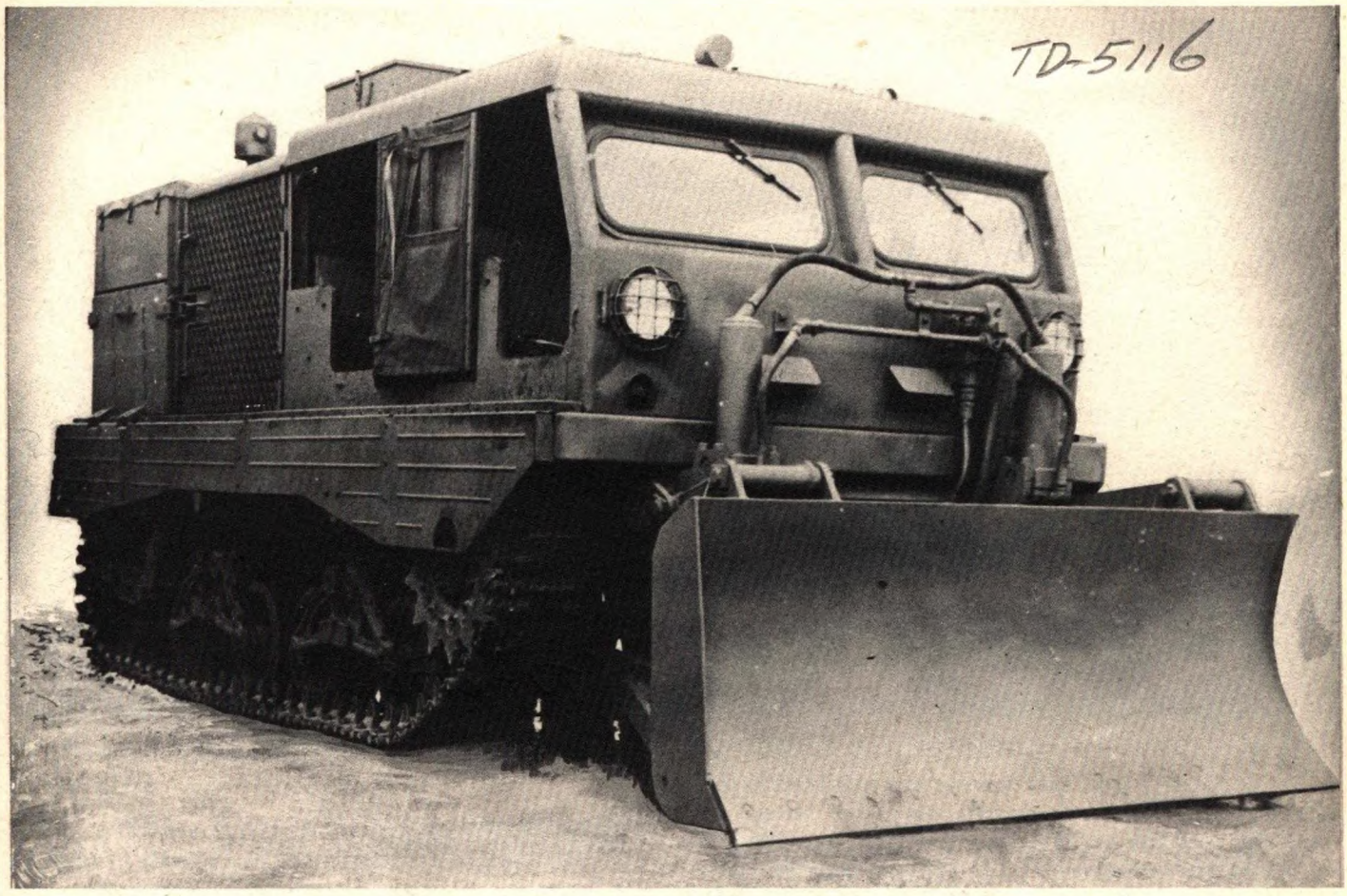
CHARACTERISTICS

Weight (excluding tank)	7,000 lb.
Width of blade	146 in.
Blade Control	Hydraulic
Performance:	
Recommended maximum operating speed with dozer attached	15 mph
Operating speed when bulldozing	1 to 4 mph
Raising speed of blade	12 in. per sec.

PROCUREMENT SCHEDULE

Experimental pilots procured. Action in progress to classify as a Limited Procurement item. There is no manufacturing program.

BULLDOZER, T1, FOR TRACTOR, HIGH SPEED, M4



This unit was developed to provide a bulldozer for attachment to the High Speed Tractor, M4, for use in emplacing guns and preparing revetments. The bulldozer blade is attached to the tractor by linkage. The jacks and upper linkage are attached to a replacement differential cover plate, provided with the kit, and to the towing eyes. The lower push beams are attached to a replacement differential cover plate, provided with the kit, and to the towing eyes. The lower push beams are attached to eyes which are welded to the belly of the tractor. The pump, connected directly to the engine crankshaft, and, with the reservoir, is located in the winch compartment. The suspension springs in the front bogies are replaced by springs used in the Heavy Tractor, M6 in order to take care of the additional weight of the blade. The complete installation may be made by 2nd echelon maintenance.

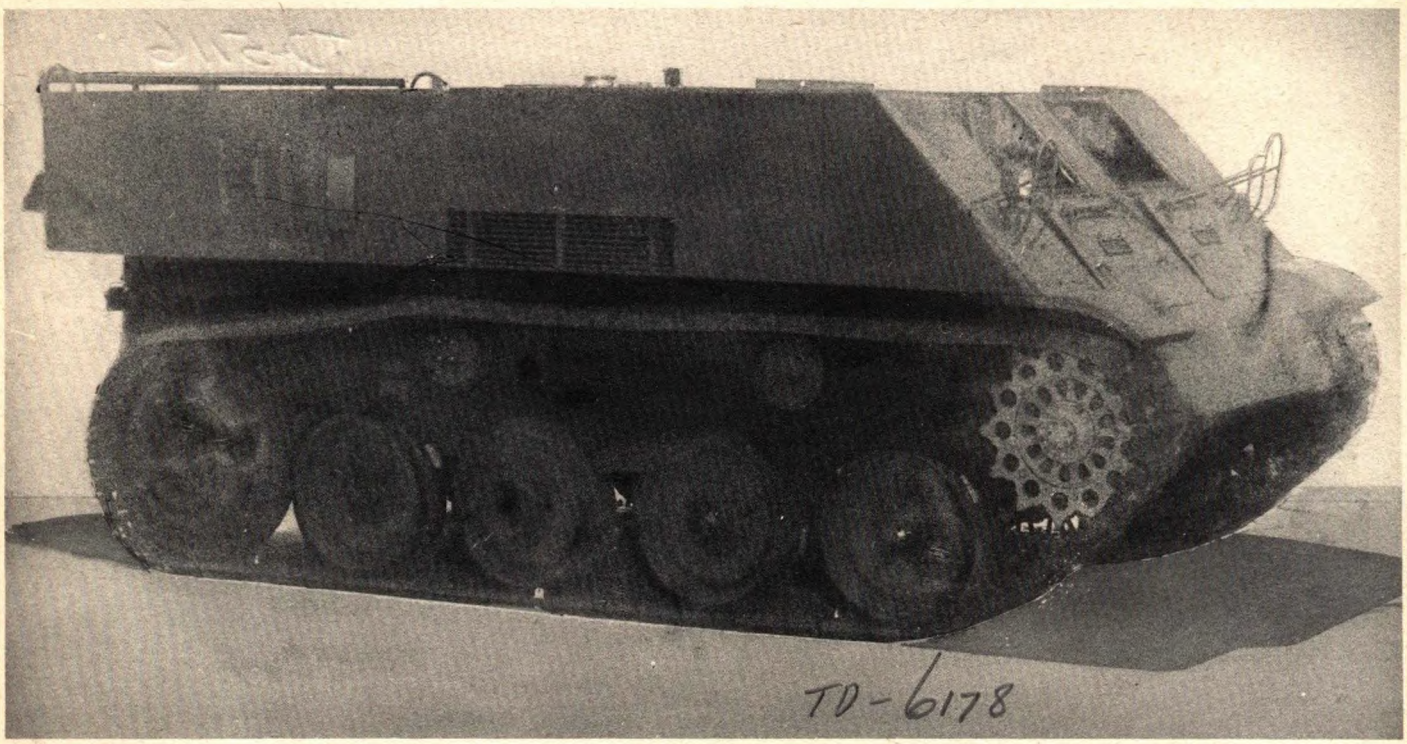
CHARACTERISTICS

Weight (excluding tractor).....4,315 lb.
Performance:
Raising speed of blade 12-inch per second. Operating speed with bulldozer—1 to 4 miles per hour in creeper gear. Maximum speed of vehicle with bulldozer in carrying position—30 miles per hour. Recommended maximum speed with bulldozer attached—15 miles per hour.

PROCUREMENT SCHEDULE

The Bulldozer, T1 is an experimental item undergoing service tests. There is no manufacturing program.

VEHICLE, ARMORED UTILITY, T9



The development of this vehicle was initiated to provide an armored cargo carrier or prime mover for light and medium artillery and antitank loads weighing up to approximately 7,500 pounds. The vehicle is of the full track, high speed type, using the Lycoming engine employed in the Light Tank M22 and equipped with torsion bar suspension and 16-inch center guided track.

CHARACTERISTICS

Crew	2 to 12
Weight (loaded)	19,000 lb.
Unit Ground Pressure	4.7 lb./sq. in.
Armor:	
Front, upper	¼ in. at 45°
Front, lower	¼ in. at 50°
Sides	¼ in. at 0°
Rear	¼ in. at 0°
Ammunition Stowage:	
Approximately 40 rounds—90mm	

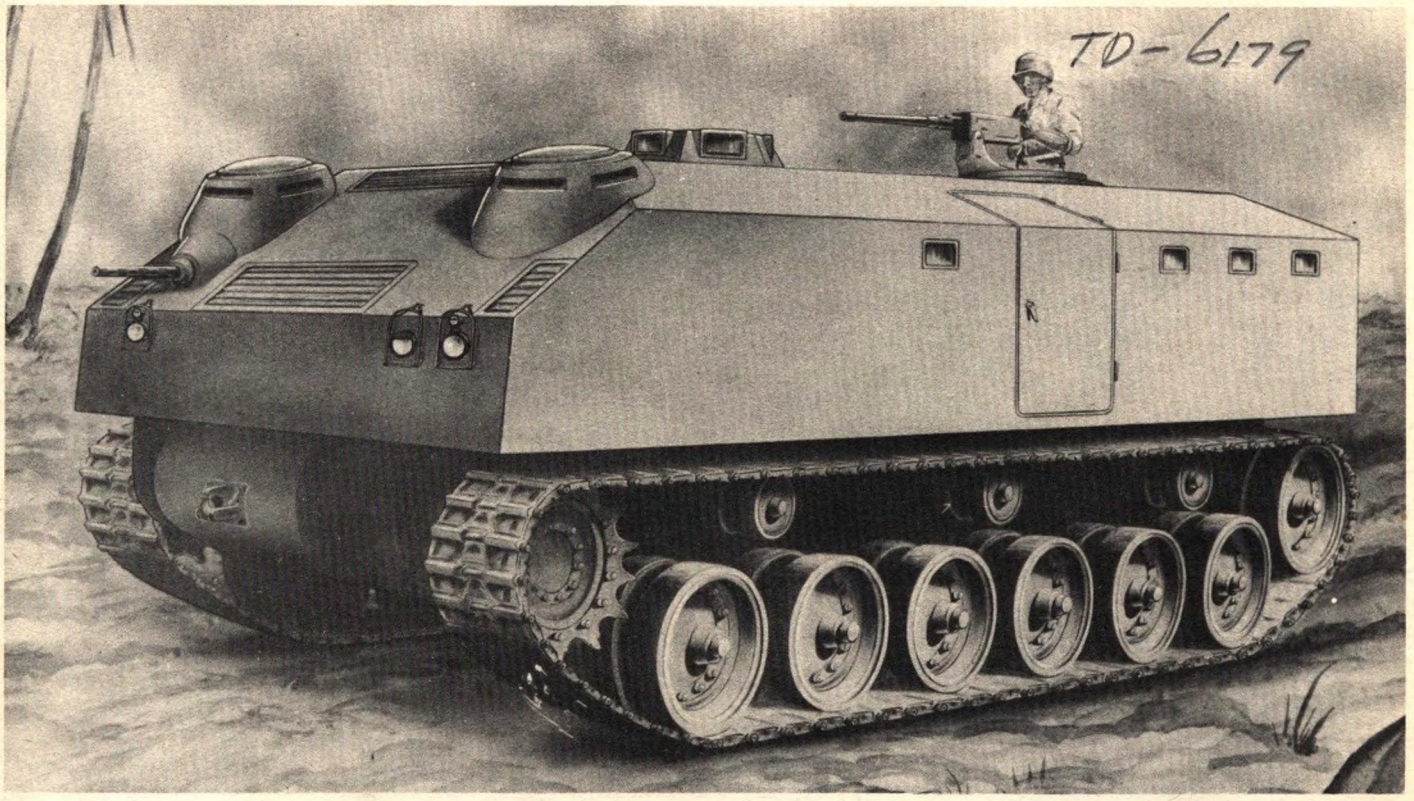
PERFORMANCE

Max. speed	30 mph
Gradeability	60%
Trench crossing ability	5 ft.
Vertical obstacle ability	24 in.
Fording ability	Floats
Communications	SCR 610

PROCUREMENT SCHEDULE

This is an exerimental vehicle—two authorized—one built. There is no manufacturing program.

VEHICLE, ARMORED UTILITY, T16



The Armored Utility Vehicle T16 was developed to provide a full track, highly, mobile armored vehicle for use as an armored personnel, cargo, reconnaissance, litter carrier, or prime mover. The vehicle is based on components of the Light Tank M24 except that the more powerful engine and power train units of the 76mm Gun Motor Carriage M18 are used to provide increased power and flexibility.

CHARACTERISTICS

Crew ..... 2 men with space for 25 additional men
Weight (loaded) ..... 45,000 lb.
Unit ground pressure ..... 7.8 lb. per sq. in.
Armor:
- Hull, upper: Front ..... 5/8 in. at 10°
- Sides and rear ..... 1/2 in. at 10°
- Hull, lower: Front ..... 5/8 in. on 10 in. radius
- Sides ..... 3/8 in. at 0°
- Rear ..... 3/8 in. at 45°

Armament:
- 1 Cal. .50 HB M2 Machine Gun on ring mount
- 1 Cal. .30 Machine Gun in bow

Ammunition:
- Cal. .50—550 rounds
- Cal. .30—1000 rounds

Electrical System ..... 24 volts

PERFORMANCE

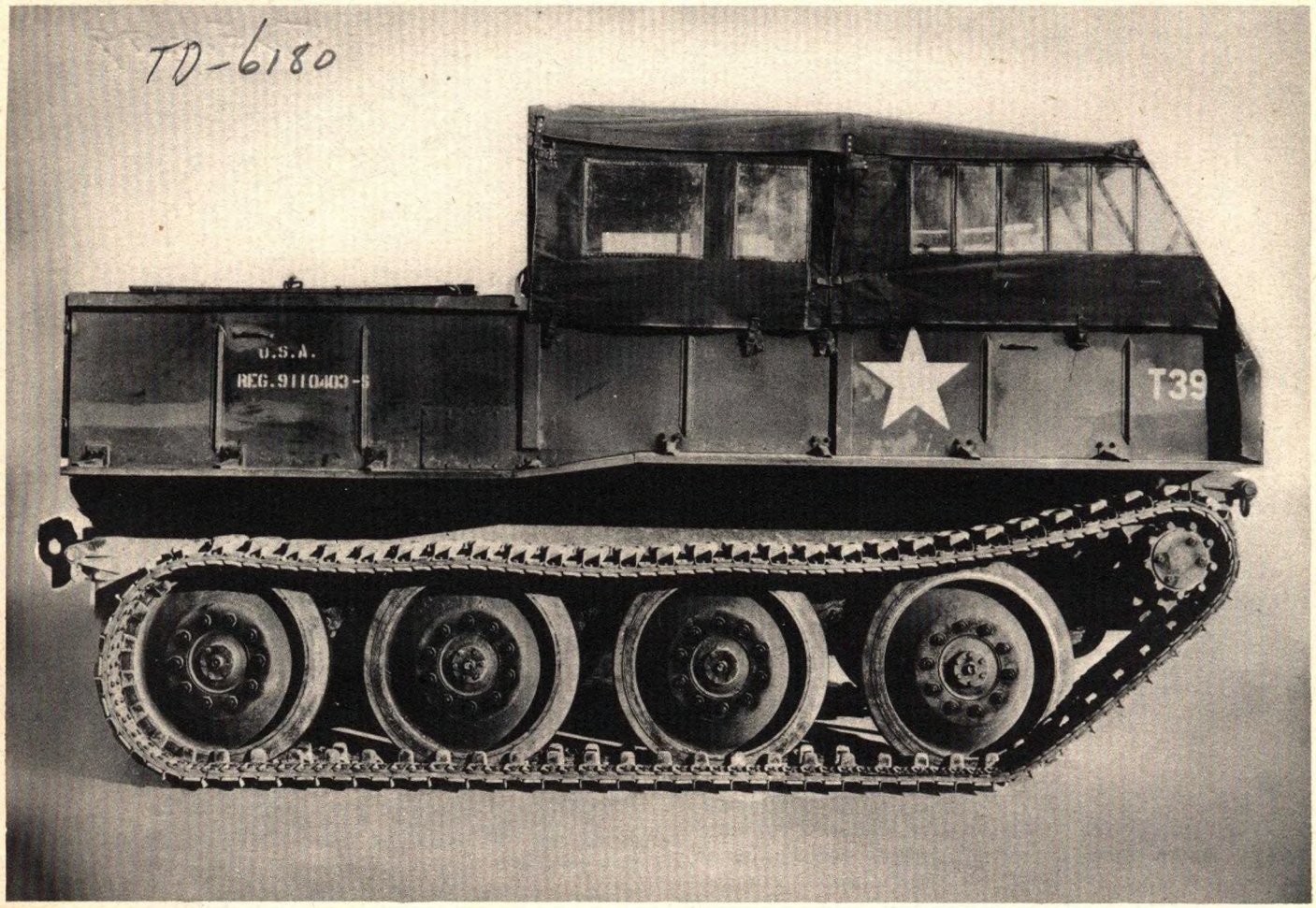
Maximum speed ..... 32 mph
Grade ability 60%
Trench crossing ability ..... 7 ft.
Vertical obstacle ability ..... 30 in.
Fording ability ..... 40 in.
Turning radius ..... 22 ft.
Vision and Fire Control
Vision Cupola for Commander
3 Periscopes T24 each for driver and bow gunner
Communications:
- SCR, 506, 508, 510, A/VRG-3, AN/URE-1. British Set No. 19

This vehicle is a limited procurement type.

PROCUREMENT SCHEDULE

1946			
1st Q	2nd Q	3rd Q	4th Q
1	399	1350	1250

TRACTOR, LIGHT, T39



This vehicle is a full track type tractor capable of transporting eight men and 2000 pounds of ammunition or cargo. It uses the Cadillac V-8 engine and hydramatic transmission. The suspension is of the torsion bar type, and the track is of the Bombardier construction 19½ inches wide, running on single solid tires. It was developed for use as a prime mover for towed artillery guns.

CHARACTERISTICS

Crew	8
Weight (loaded)	18,000 lb.
Unit ground pressure	4.4 lb. per sq. in.
Armor	None
Armament:	
Cal. .50 H.B., M2 for A.A. protection	
Ammunition:	
Approx. 30 rounds of A.T. gun Amm.	
Approx. 800 rounds for Cal. .50	

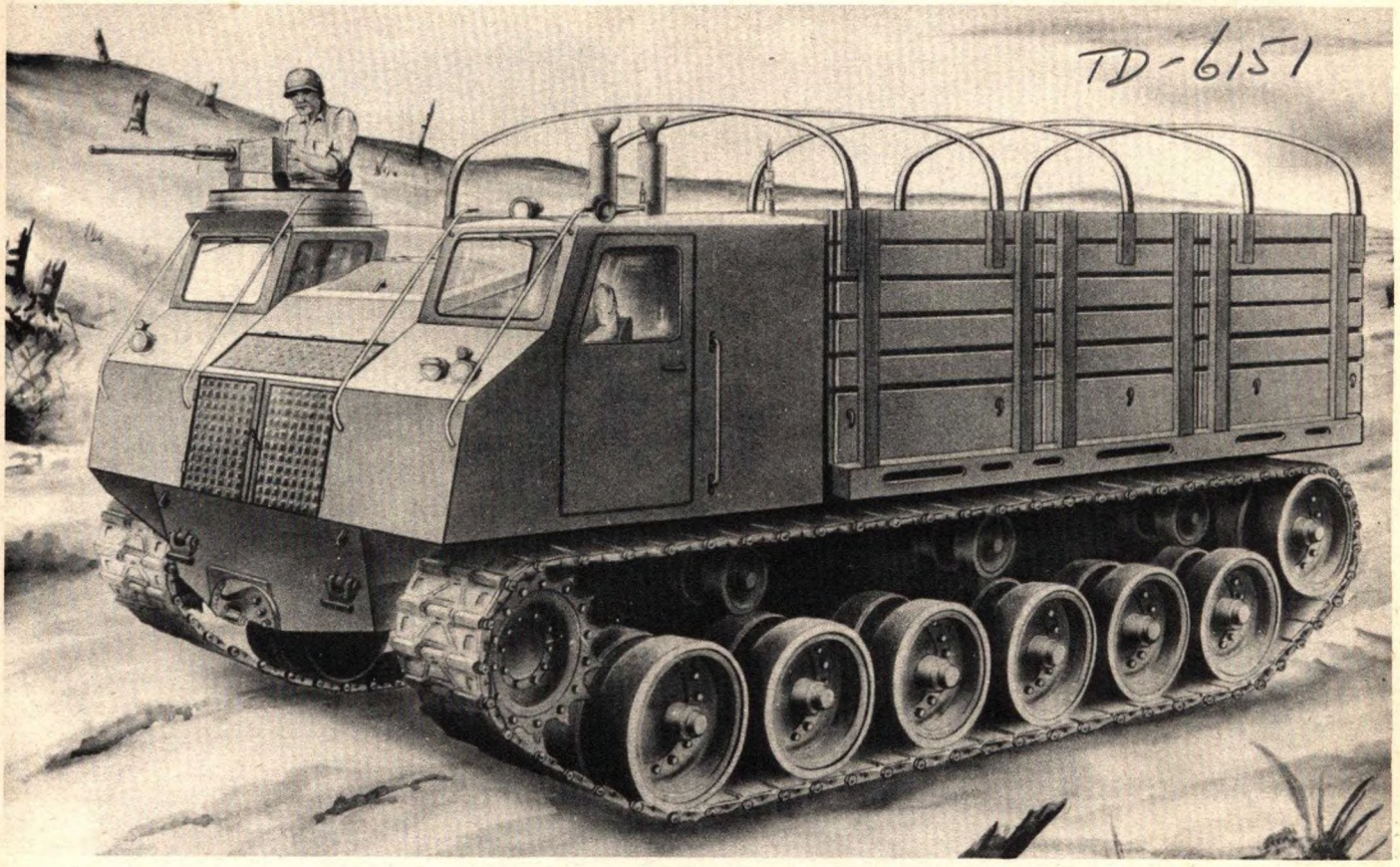
PERFORMANCE

Maximum speed	35 mph
Grade ability	60%
Trench crossing ability	4 ft.
Vertical obstacle ability	20 in.
Fording ability	48 in.
Communications	SCR, 610 or 619

PROCUREMENT SCHEDULE

An experimental vehicle—5 pilots built. There is no manufacturing program.

TRACTOR, CARGO, T42



The Cargo Tractor T42 is a high speed, full track vehicle based on components of the Light Tank M24, except for the power train which is the more powerful R975-C4 engine and torqmatic transmission as used in the 76mm Gun Motor Carriage M18. This vehicle is essentially a full track truck with large volume cargo capacity, capable of towing loads of from 18,000 to 37,000 pounds while carrying 5-ton pay load.

CHARACTERISTICS

Crew	2
Weight (loaded)	46,000 lb.
Unit ground pressure	7.3 lb. per sq. in.
Armor:	
Lower hull	⅜ in.
Upper hull	None
Bottom plate	5/16 in.

Armament:
Cal. .50 HB M2 Machine Gun on ring mount 2.36 Rocket Launcher carried.

Ammunition:
Cal. .50—550 rounds
2.36 Rocket—10 rounds

Performance:
Same as Armored Utility Vehicle, T16

Communications:
SCR 510 or British Set No. 19

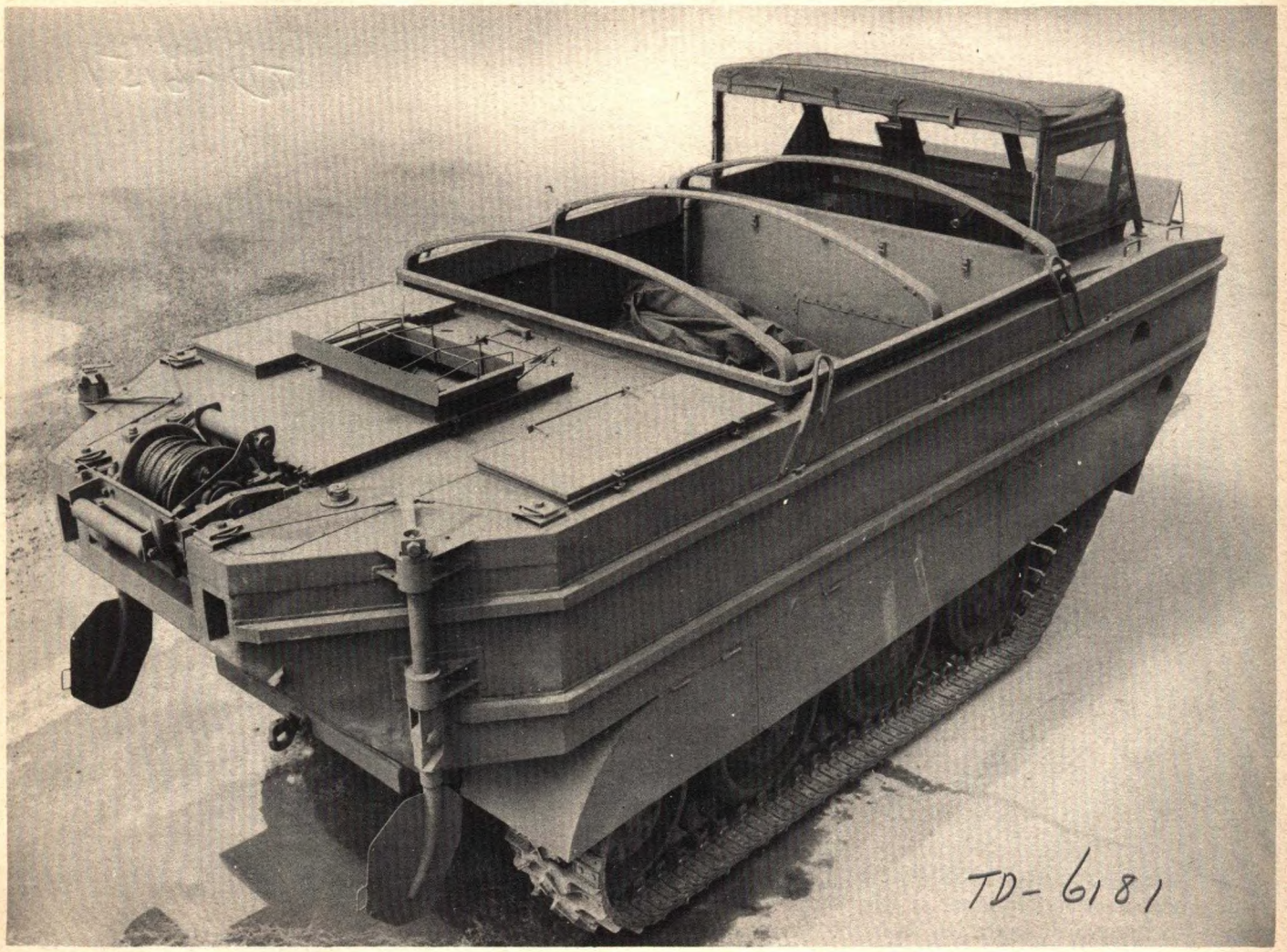
This tractor is a limited Procurement Type.

PROCUREMENT SCHEDULE*

1946			
1st Q	2nd Q	3rd Q	4th Q
1	325	900	775

*As of 31 May 1945

CARRIER, AMPHIBIAN, T34



This vehicle is intended to provide a full track amphibian cargo carrier with approximately 4.5 lb. per sq. in. ground pressure. The vehicle is based on the Light Tractor T39 modified to incorporate an amphibian type hull and uses the Cadillac V-8 engine and hydramatic transmission together with an auxiliary three speed manual-shift, transmission, torsion bar suspension and band block track, drop center type with replaceable grousers are provided. Vehicle has a capacity for three men, plus 5,000 pounds cargo.

CHARACTERISTICS

Crew	3
Weight (loaded)	21,000 lb.
Unit Ground Pressure	4.5 lb. per sq. in.
Ground Clearance	2½ in.
Cargo Space	80 in. x 90 in. x 30 in.
Maximum Speed, land	30 mph
Maximum Speed, water	5 mph approx.

PROCUREMENT SCHEDULE

This is an experimental vehicle, one pilot manufactured. There is no manufacturing program.

TRUCK, 3/4-TON, COMMAND, WEAPONS CARRIER, W/WN

This development provides a new command car to take the place of the present limited standard Command and Reconnaissance Car.

This vehicle is a converted Truck, ¾-ton, 4 x 4, Weapons Carrier. Side, front and back curtains are provided, with windows which can be camouflaged by dropping a paulin making it appear the same as the Weapons Carrier. Two bucket seats, a map table, and dome light are the only interior additions. The ambulance KD spring suspension is used to provide easier riding.

CHARACTERISTICS

Seating capacity:
6 plus driver and assistant driver
Other characteristics:
Same as Truck, ¾-ton, 4x4, Weapons Carrier

PROCUREMENT SCHEDULE*

	1945						
	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
W/WN	2000	535	535	535	535	535	441
WO/WN	3362	245	—	—	—	—	—

	1946			
	1st Q	2nd Q	3rd Q	4th Q
W/WN	1458	1458	1454	1448
WO/WN	2592	2592	2562	2562

*As of 31 May 1945

TRUCK, 3/4 TON, 4x4, UTILITY

This vehicle was developed at the request of the Air Forces to satisfy a requirement for a small powerful vehicle for transporting flyers to disposal points and for towing airplanes. It is a modification of the ¾ ton weapon carrier to incorporate lower vehicle weight, increased seating capacity and towing ability.

CHARACTERISTICS

Crew, operating	2
Passenger capacity	6
Weight (loaded)	6,965 lb.
Wheel base	105 in.
Tires	9.00 x 16, 8 ply
Ground clearance, min.	10⅝ in.
Electrical system	12 volts

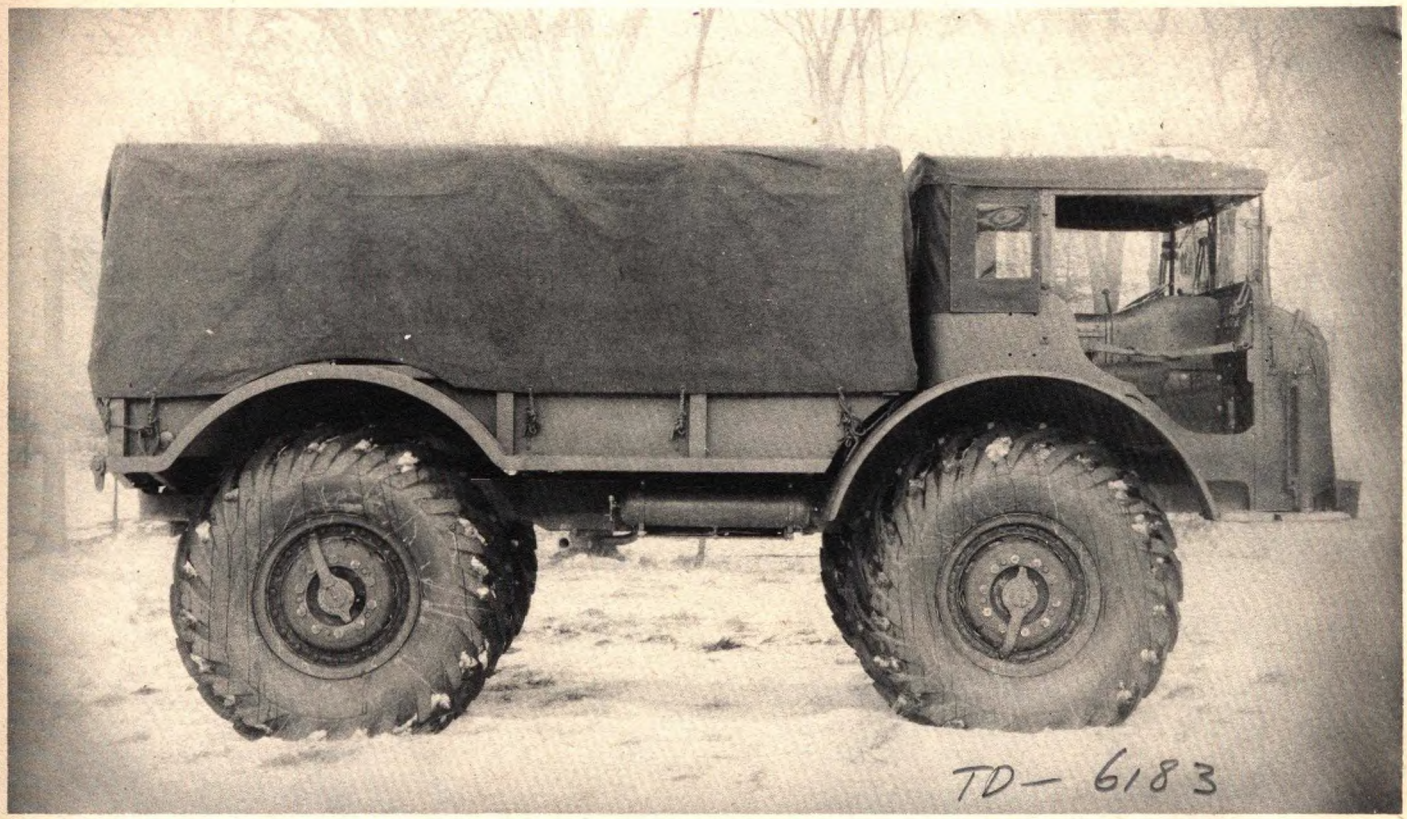
PERFORMANCE

Speed	55 mph
Grade ability	high gear 7.6%, low gear 113%
Cruising range on pavement	200 miles
Towed load	1000 lb.
Winch capacity	7,500 lb.
Fording depth	36 in.
Turning radius	23½ ft.

PROCUREMENT SCHEDULE

This is an experimental vehicle—8 procured—delivery in July. There is no manufacturing program.

TRUCK, 2-1/2 ton, 4 x 4, T23



The T23 is an entirely new type of cross country truck developed to provide high ground clearance and floatation characteristics for negotiating swampy terrain previously considered impassable to standard military wheeled vehicles. A 120 H.P. engine is used. Commercially available parts and components are used so far as suitable units can be obtained.

CHARACTERISTICS

Crew	2
Weight (loaded)	19,000 lb.
Wheelbase	124 in.
Tires—single front and rear	18.00—26
Provision made for controlling tire pressure from dash.	
Loading space	80 in. x 132 in.
Ground clearance—amidship	26 in.
Steering	Power
Electrical System	12 Volts

PERFORMANCE

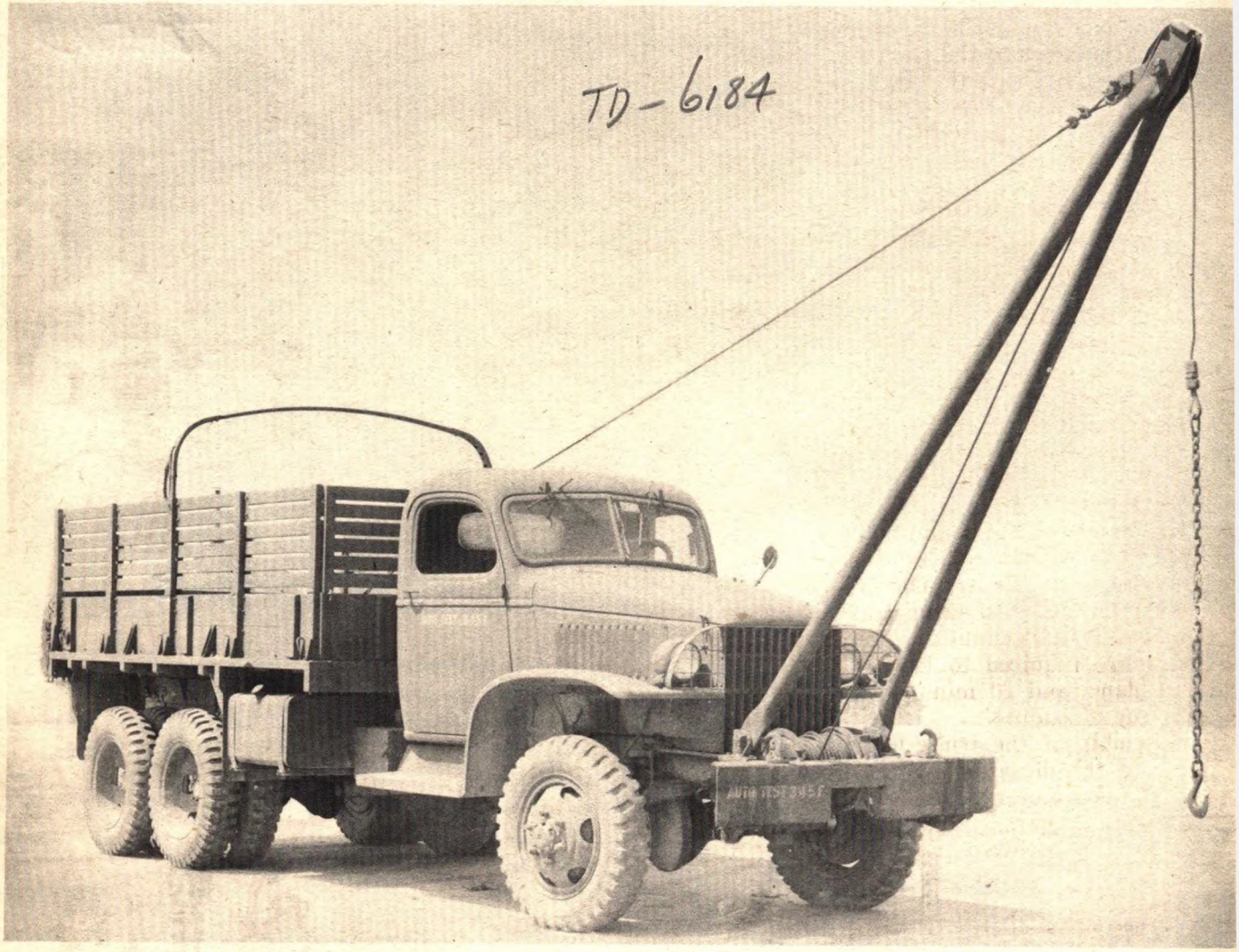
Speed	40 m.p.h.
Grade ability	4.6 in. high, 100% in low
Cruising range on pavement	200 mi.
Towed load	4,500 lb.
Winch capacity	10,000 lb.
Fording depth	65 in.
Turning radius	36½ ft.

PROCUREMENT SCHEDULE

This is an experimental vehicle—ten authorized—three built. Two additional scheduled in August—balance depends on results of tests. There is no manufacturing program.

TRUCK, 2-1/2 Ton, 6x6

WITH WATERPROOF ELECTRICAL SYSTEM, FORDING EQUIPMENT, A-FRAME, AND CROSS COUNTRY TIRE KIT



The basic truck is the standard 2½ ton, 6 x 6 military truck. The fording equipment and waterproofed electrical system provides for operation in salt or fresh water with the engine entirely submerged. The only operation required before fording is connection of air intake and exhaust extensions. The A-frame provides for lifting and moving loads up to 1,500 pounds. The standard truck winch provides the power for the A-frame lifting line. The A-frame may be disconnected and carried in the truck body when not in use. The cross country tire kit consists of 7—10.50—18—10 ply tires, air compressor and its accessories.

Characteristics are generally the same as those of the standard truck except as outlined above and the improved floatation for special operations provided by the large section tires.

PROCUREMENT SCHEDULE

Waterproofing and permanent fording equipment has been authorized to be incorporated in production and two thousand kits for field installation have been ordered. The A-frame is a standard Class IV item. The cross country tire kits are available for issue as required.

TRUCK, CARGO, 2½ TON, 6x6, W/WINCH

A 2½ ton 6 x 6 cargo truck can be transported successfully in two C-47 airplanes.

The weight and size of the truck prohibit its installation and transportation as a single load. In order to install the truck in the planes it is necessary that the body and chassis of the vehicle be divided into two parts. This is done with the aid of a specially designed frame-splicing kit. Five men require one hour to disassemble the truck.

The forward section of the chassis is driven under its own power up a ramp and into the cargo compartment of the plane. The body front section, fenders, running boards, body sills, bows, paulin, chassis, windshield and tools are loaded manually. The rear chassis section is rolled into the second plane. The body rear section, 6 wheels, the gas tank, body racks, muffler, frame splicing, and miscellaneous items are stowed behind the rear section of the chassis. The first plane can be loaded in 45 minutes, and unloaded in 30 minutes. Thirty minutes are required to load the second plane, and 20 minutes are needed for unloading.

Reassembly of the truck is the reverse of the disassembly procedure and takes a crew of 5 men approximately 2 hours.

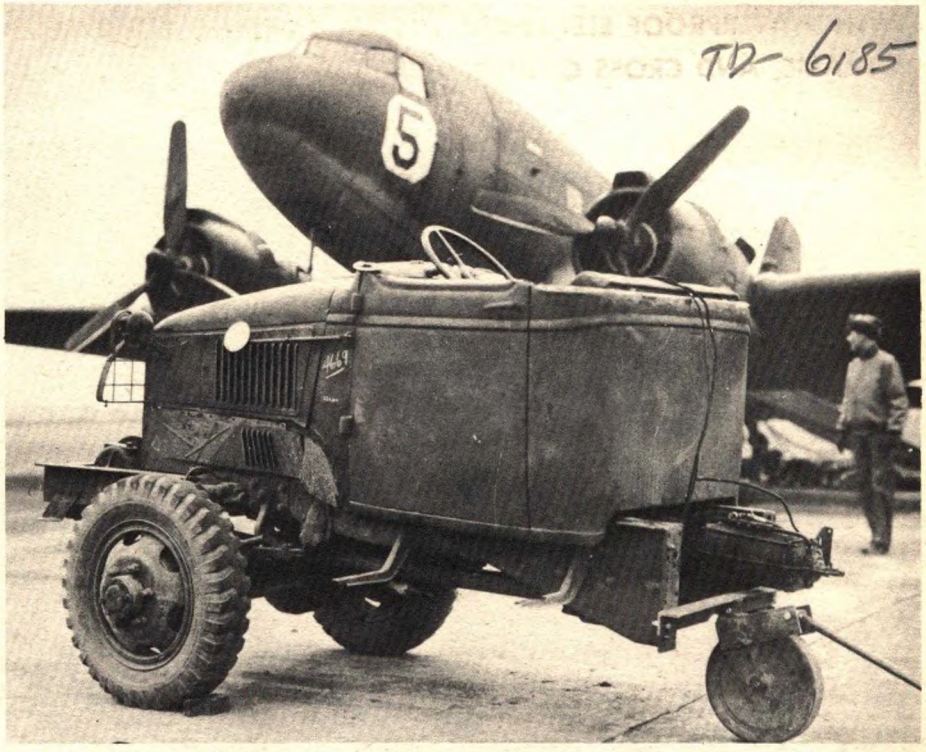
The weights involved are as follows:

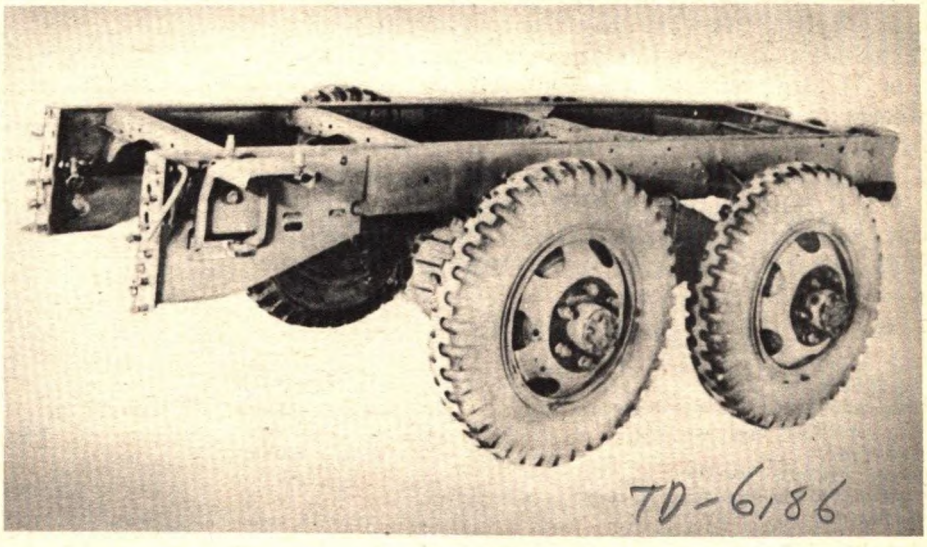
First Airplane:	
Chassis front section	4,600 lb.
Body front section	470 lb.
Fenders, running boards, bows, paulin, sills, etc.	290 lb.
Total weight	5,360 lb.
Second Airplane:	
Chassis rear section	3,120 lb.
Body rear section	615 lb.
Six wheels and tires	765 lb.
Fuel tank and spare wheel carrier	375 lb.
Body racks, windshield, muffler, frame splicing, etc.	336 lb.
Total weight	5,211 lb.
Total Weight of Truck and Accessories	10,570 lb.

PROCUREMENT SCHEDULE*

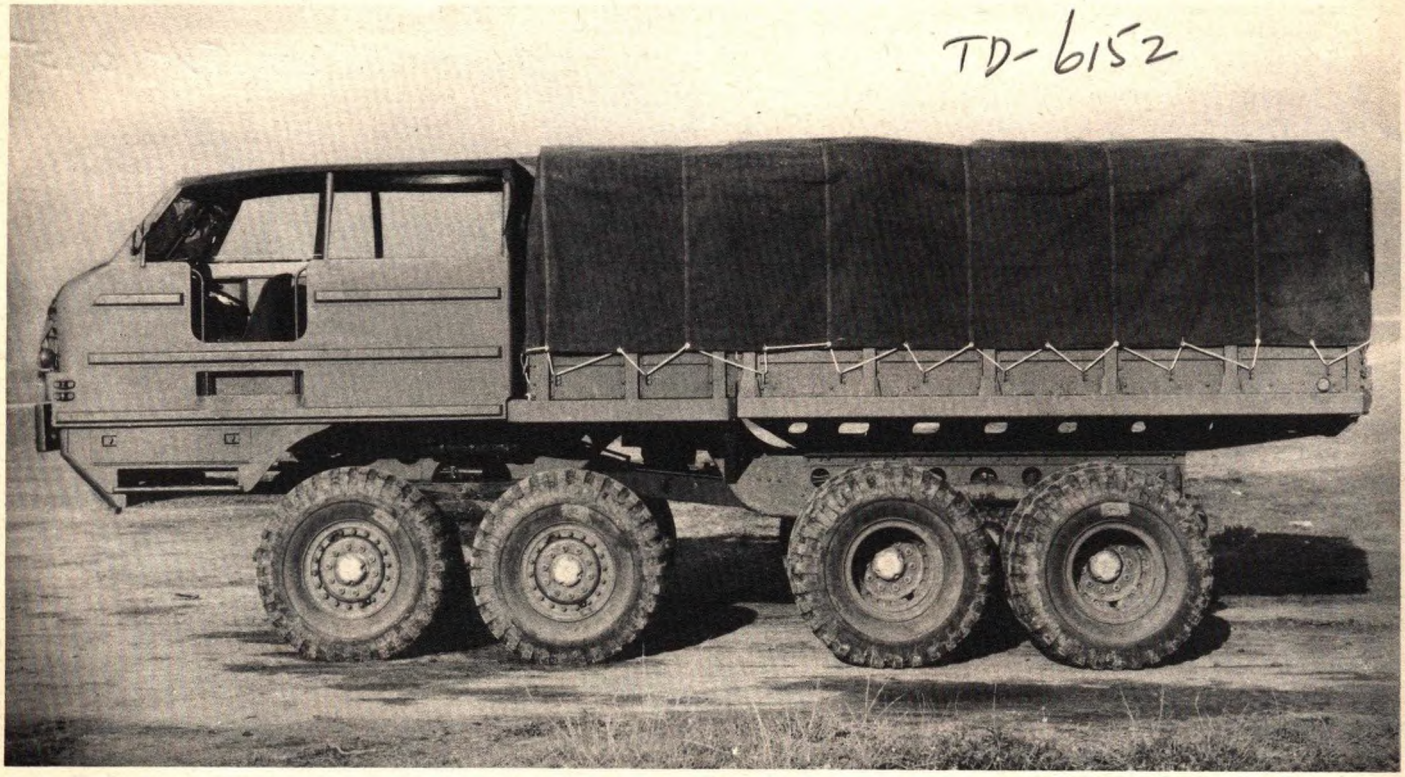
	1945 June	1945 July	
WO/WN	797	104	2,697*
W/WN	1,716	279	4,205*
Total procurement for 1945.			

*As of 31 May, 1945.





TRUCK, 8 Ton, 8 x 8, T20 Cargo



This development was inaugurated to provide a heavy duty truck with draw bar and off the road performance characteristics superior to present standard 6 or 7½ ton vehicles. The forward four single tired wheels are steered by power. The rear four have dual tires and are not steered. All wheels are chain driven. The vehicle is powered by a 602 cu. in. engine rated at 240 H.P. Standard commercial components are used to the maximum practicable extent. The basic chassis is suitable for use as a tractor or a wrecker.

CHARACTERISTICS

Crew	2
Weight (loaded)	53,000 lb.
Wheel base—center to center of bogie	130 in.
Tires, single front, dual rear	14.00 x 20
Loading space	90 in. x 200 in.
Ground clearance amidship	40 in.
Steering—platform type power operated	
Electrical system	12 volts

PERFORMANCE

Speed on pavement	40 m.p.h.
Grade ability	1.9% in high, 83.5% in low
Cruising range on pavement	400 mi.
Towed Load	32,000 lb.
Winch capacity	60,000 lb.
Fording depth	70 in.
Turning radius	36 ft.

PROCUREMENT SCHEDULE

This is an experimental vehicle—9 authorized—one delivered. There is no manufacturing program.

TRUCK, 12 Ton, 8 x 8, T26

This heavy truck is intended to ultimately supplant the 7½ ton and 10 ton types for cargo and heavy artillery prime movers, and as a prime mover for heavy transporter semi-trailers. The structure of the truck and principles of operation are generally similar to that used in the 8 ton, 8 x 8 except that dual tires are used on the front 4-wheel steering bogie. In this vehicle a V-12 engine of 275 H.P. is used. The basic chassis is suitable for use also as a truck tractor.

CHARACTERISTICS

Weight (loaded)	75,000 lb.
Wheel base, center to center of bogie	150 in.
Tires, dual front and rear	14.00 x 24
Loading Space	120 in. x 180 in.
Ground clearance amid ship	33 in.
Steering, platform type, power operated	
Electrical System	12 volts

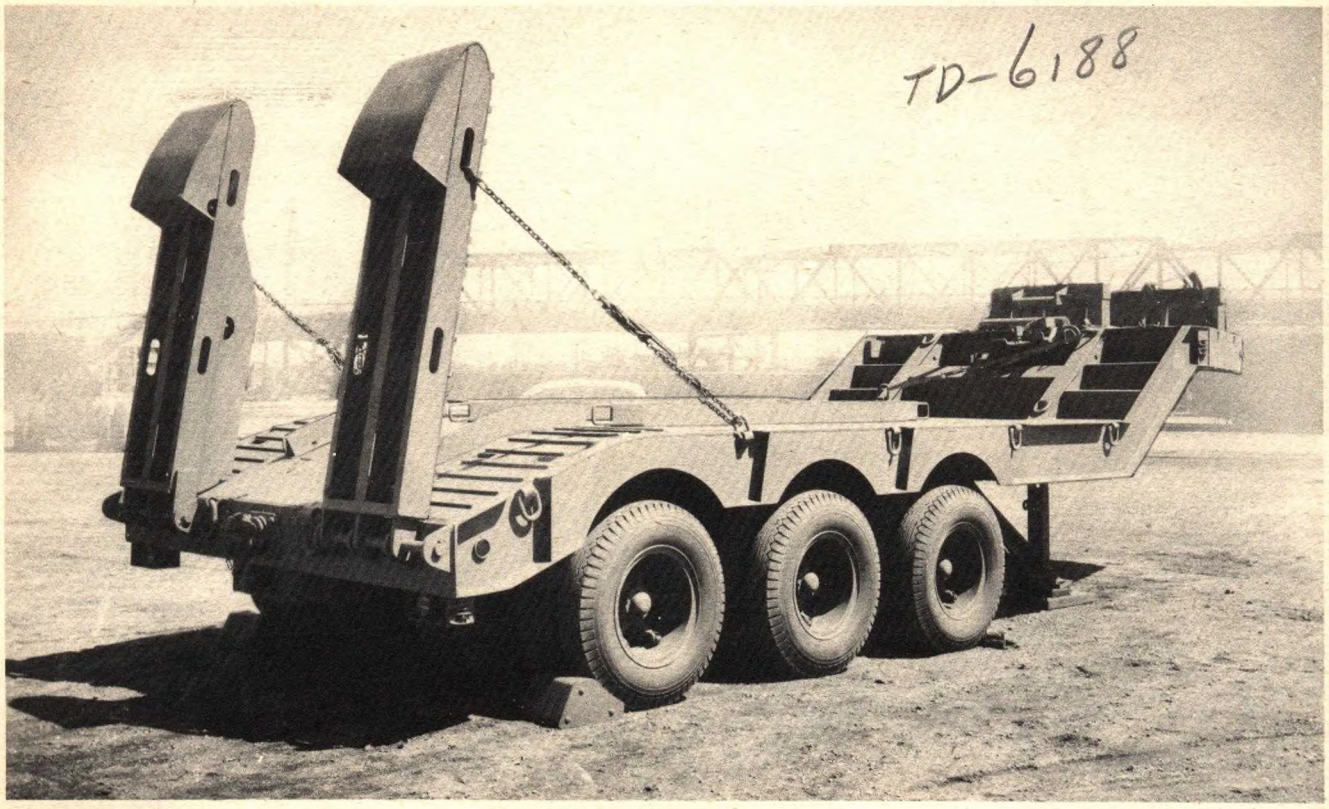
PERFORMANCE

Speed on pavement	35 m.p.h.
Grade ability	3.6% in high, 110% in low
Cruising range on pavement	400 mi.
Towed Load	50,000 lb.
Fording depth	75 in.
Turning radius	40 ft.
Winch capacity	60,000 lb.

PROCUREMENT SCHEDULE

This is an experimental vehicle. One authorized and built. There is no manufacturing program.

SEMI-TRAILER, 45-Ton, T58 and T58E1

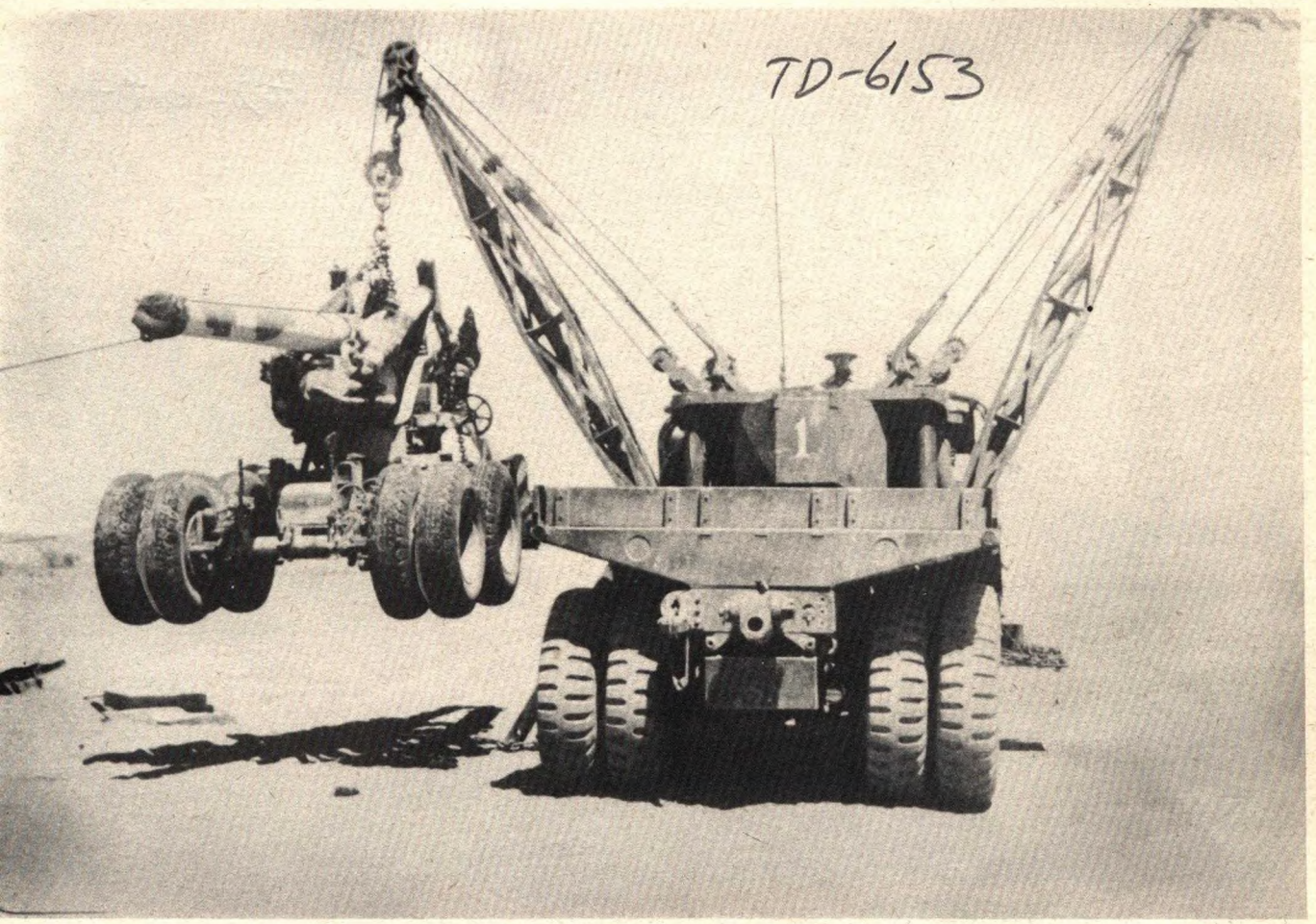


These two 12 wheel trailers are of 45 ton capacity and suitable for transportation of the Heavy Tank M26 as well as other heavy cargo loads. They are of generally similar design except for the type of wheel suspension used. The T58 uses articulating hydraulic control and the T58E1, the articulating walking beam type. Loading is accomplished by hinged ramps attached to the rear of the trailer. Stake racks are provided for use in the transportation of general cargo. These trailers weigh about 30,000 pounds without load. The tire equipment used is 9.00 x 20—10 ply dual. Air brakes are used.

PROCUREMENT SCHEDULE

These vehicles are experimental. Two pilots authorized (one of each type) and delivered. There is no manufacturing program.

TRUCK, HEAVY WRECKER



This vehicle is the result of prolonged development ork to provide 10 to 15 ton mobile crane and other recking facilities, including maximum towing ability, r Ordnance Maintenance Companies and similar es. The vehicle is based on a chassis developed for is purpose. A high over-all gear ratio and power out- s on the transfer case and the transmission for driv- g the winches are provided. Welding and flame cut- ng equipment, high capacity jacks, towing chains and her miscellaneous equipment is included in the load. r brakes are provided.

CHARACTERISTICS

w	2
ight (loaded)	57,890 lb.
ne capacity	lift 31,000 lb., lift and carry 16,000 lb., swing 25,000 lb.
eel base	200 in.
s—single front, dual rear	14.00 x 24—18 ply
ding space—box under crane	5 ton capacity
und clearance amidship	25 in.
trical System	12 volt

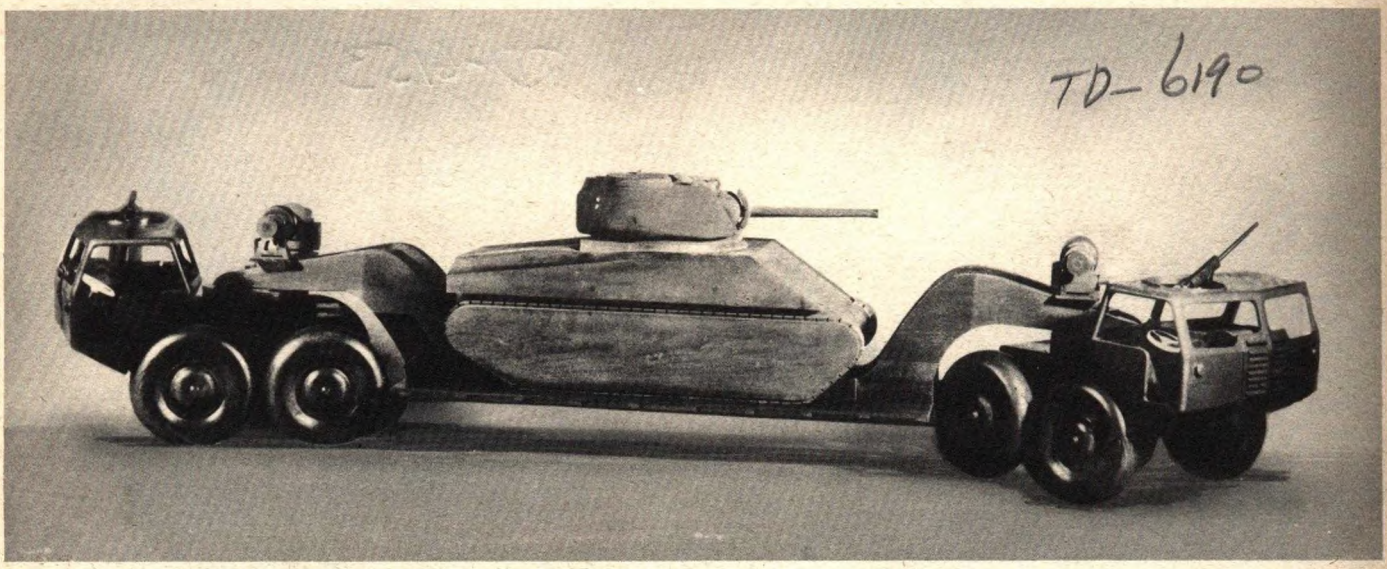
PERFORMANCE

Speed on pavement	45 m.p.h.
Grade ability	65%
Cruising Range on pavement	400 mi.
Maximum towed load	68,500 lb.
Winch capacity, direct pull	40,000 lb.
Fording depth	40 in.
Turning radius	50 ft.

PROCUREMENT SCHEDULE

This is an experimental vehicle—one manufactured. There is no manufacturing program.

HEAVY TRANSPORTER, T8



The heavy transporter T8 is an 8 wheel end loading tank and heavy cargo transporter. It consists of two four wheeled power units, each of 240 H.P. connected by a loading platform with provision for disconnecting the rear power unit for end loading. All 8 wheels are driven and steered by power. This particular unit is of 50 ton capacity. The manufacture of additional pilots suitable for transporting vehicle weighing from 70 to 100 tons is contemplated.

CHARACTERISTICS

Crew	5
Weight (loaded)	150,000 lb.
Wheel base—bogie to bogie	502 in.
Tires, single	21.00 x 28—24 ply
Drive system	Torque converter and 3 speed mechanical transmission
Armament	2—Cal. .50 Machine guns in ring mounts
Ammunition	2000 rounds—Cal. .50
Armor	None

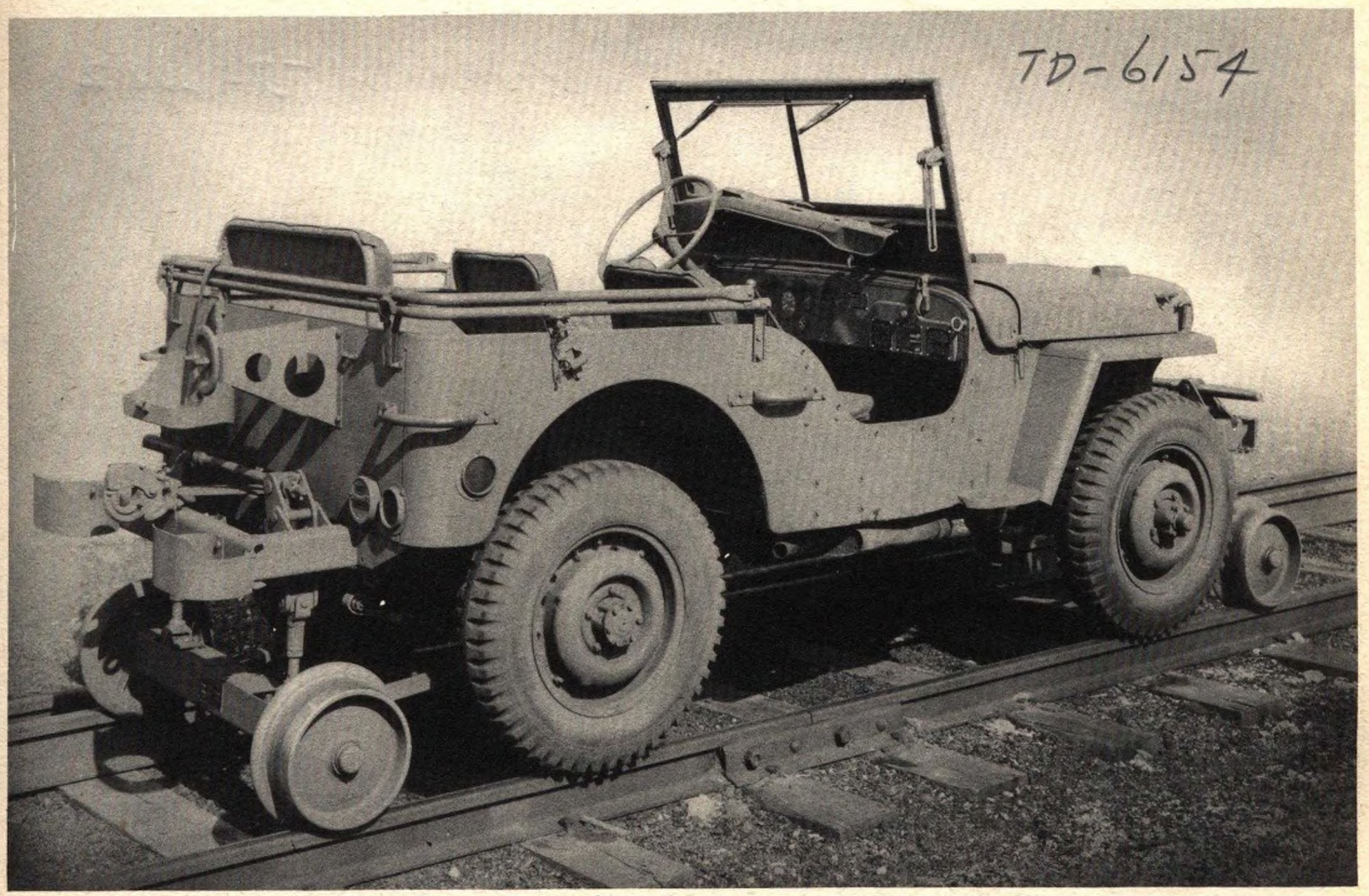
PERFORMANCE

Speed	30 m.p.h.
Cruising Range	250 mi.
Turning Radius	37 ft.
Grade ability	60%
Vertical obstacle ability	36 in.
Fording ability	42 in.

PROCUREMENT SCHEDULE

This is an experimental vehicle—four authorized—one built. There is no manufacturing program.

KIT, RAIL CONVERSION, FOR ¼-TON, 4x4 TRUCK



This kit was developed for the Transportation Corps to provide for operation of the ¼-ton, 4 x 4 truck on narrow gauge (one meter or 42 inch) railway track without destroying its ability to operate on pavement. Provision is made for raising and lowering the railway trucks. Drive on the rail is by the pneumatic tires of the truck.

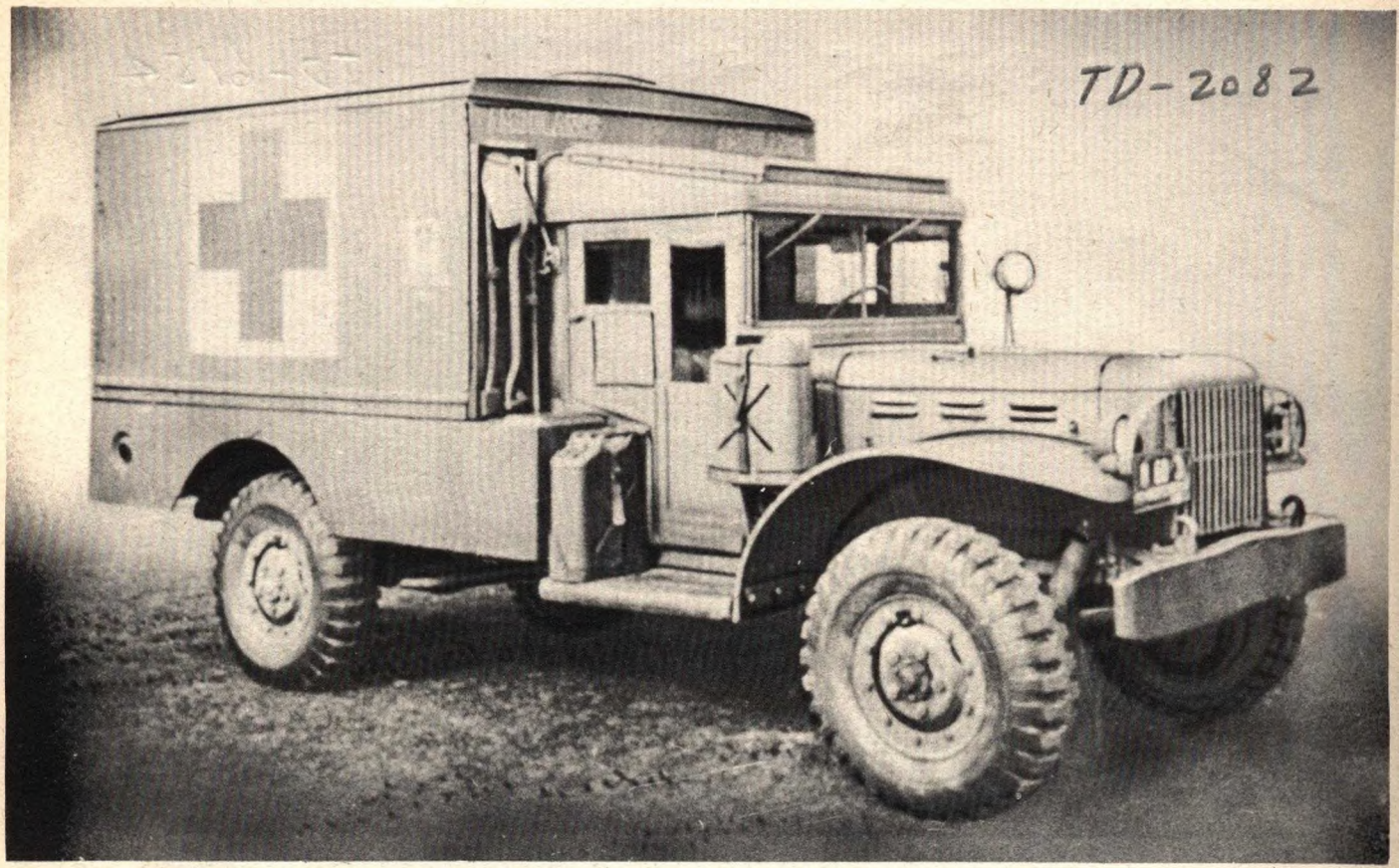
CHARACTERISTICS

Crew ..... **1 or 2 men**
Weight of auto railer equipment ..... **500 lb.**
Performance, being determined by test.

PROCUREMENT SCHEDULE

This is a development item — seven manufactured. There is no manufacturing program.

TRUCK, 3/4-Ton, 4 x 4, AMBULANCE, KD



The purpose of this vehicle is to provide a closed-body, knock-down ambulance with a roomier body and improved riding characteristics.

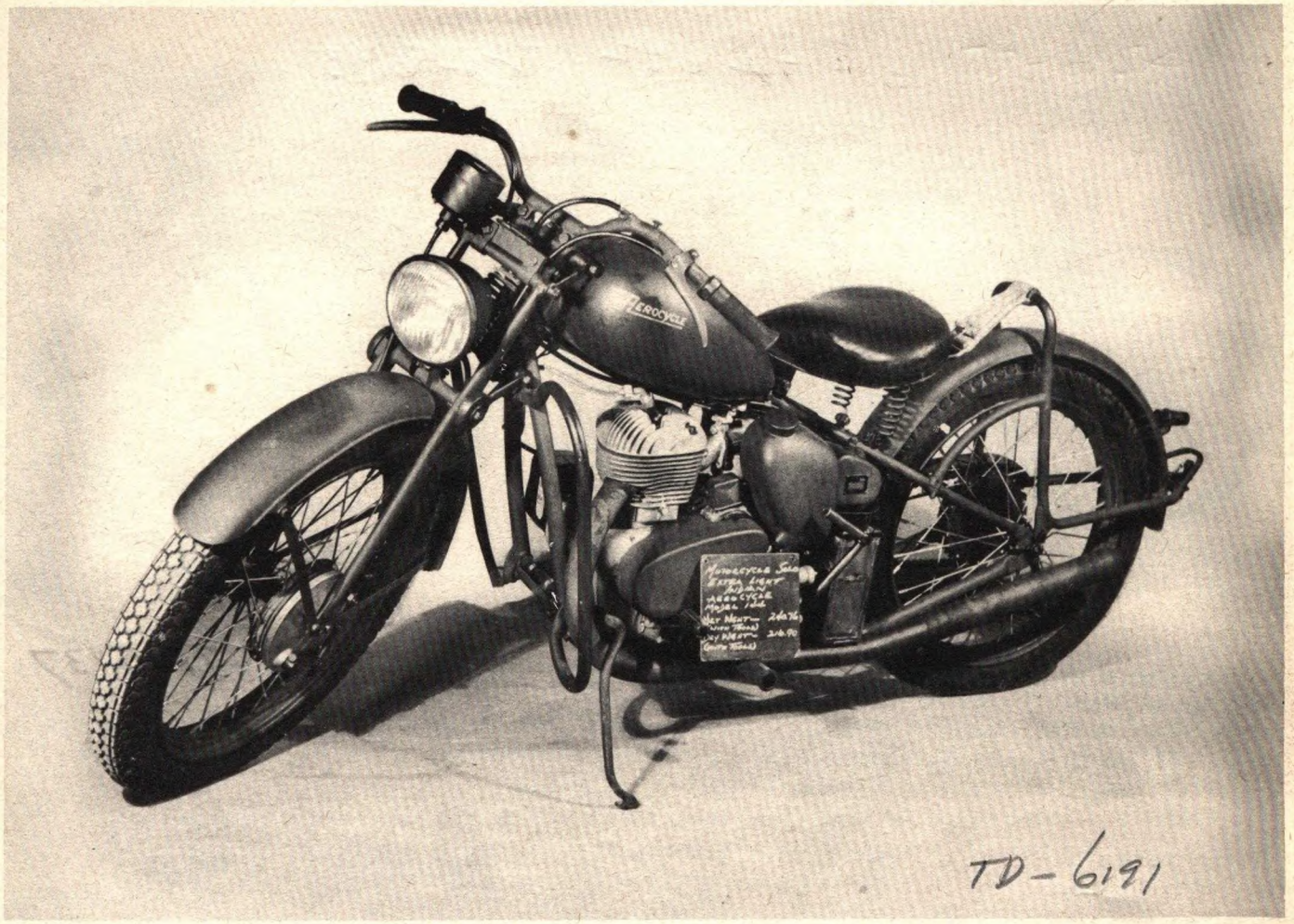
CHARACTERISTICS

The chassis is the standard ¾-ton, 4x4 truck chassis with new types of springs and shock absorbers to provide improved riding characteristics. The knock-down feature is incorporated to conserve shipping space. The body is roomier than the previous type, permitting better spacing of litters to provide the attendant free access to all litter patients. Normal provision is for four litters when attended, with space for two additional litters if unattended, or space for eight seated patients with attendant. The body is insulated, with provisions for heating and ventilating.

PROCUREMENT SCHEDULE

1945							1946			
June	July	Aug.	Sept.	Oct.	Nov.	Dec.	1st Q	2nd Q	3rd Q	4th Q
750	185	185	185	185	185	54	675	675	675	661

MOTORCYCLE, SOLO, EXTRA LIGHT



This lightweight motorcycle was developed and standardized to provide the Airborne Command and other interested services with a sturdy light motorcycle. This vehicle will replace the scooter now supplied, as soon as it can be gotten into production.

CHARACTERISTICS

Crew	1
Weight (less operator)	241 lb.
Wheel base	50 in.
Tires	3.00 x 18
Engine	displacement 13½ cu. in.—6.2 H.P.

PERFORMANCE

Speed on pavement	45 m.p.h.
Grade ability	high gear 5%, low 25%
Cruising range on pavement	250 mi.
Fording Depth	12 in.
Turning radius	10 ft. 8 in.

PROCUREMENT SCHEDULE

1945							1946			
June	July	Aug.	Sept.	Oct.	Nov.	Dec.	1st Q	2nd Q	3rd Q	4th Q
—	75	110	110	110	110	110	330	330	322	321

BICYCLE, FOLDING

This lightweight folding bicycle was developed to provide a machine with characteristics suitable for use by airborne troops. Machines originally supplied, weighed 40 pounds. Continued refinement has resulted in a satisfactory machine which weighs approximately 30 pounds.

CHARACTERISTICS

Weight	31 lb.
Drive sprockets	front 45 teeth, rear 18 teeth
Folded dimensions	34 in. x 36⅞ in. x 10¼ in.
Wheel base	40¾ in.
Tires	26 in. x 1⅜ in.—2 ply
Time to fold or unfold	40 sec.

PROCUREMENT SCHEDULE

This is an experimental item. There is no manufacturing program.

ARTILLERY

The 75mm Aircraft Cannon is excellent for use in harassing fire and as an antitank weapon. In instances where openings to a fortified position are readily visible from the air, rounds fired from this cannon will assist in sealing them.

For quick and easy transport and close support of infantry, 37mm guns have been mounted on light mounts. These weapons provide close support with the attacking troops.

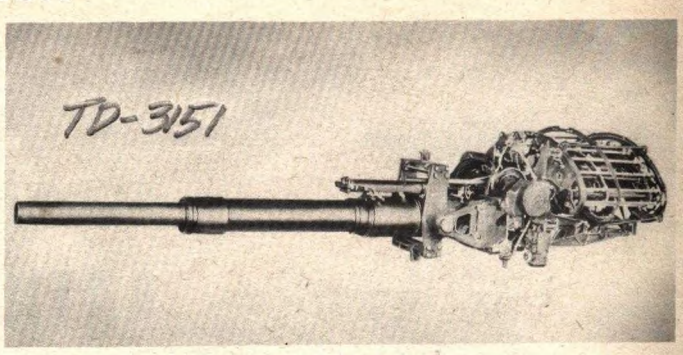
Sometimes a mission will require close artillery support but the terrain prevents bringing up self-propelled or field artillery carriages. As the need for mobile equipment of this type became apparent recoilless weapons were developed. These weapons fire regular artillery shell (HE, HEAT and Smoke) and are light enough to accompany infantry in almost every tactical operation. These weapons can also be used to pin down the enemy in their positions during the interval between the lifting of the normal artillery barrage and the attainment of the objective.

Mortars have the basic advantage of providing infantry with firepower comparable in effectiveness to artillery. Comparing weight of materiel to ammunition delivered at the target, they are very effective weapons. Mortars enable high angle fire to be employed from protected positions.

To meet the requirements of modern warfare a well integrated mortar coverage, zone by zone, and caliber by caliber has been developed. These mortars include the small 60mm mortar fired from hand-held positions at close range, larger mortars carried by manpack into frontline positions and mortars requiring prime movers and transportation vehicles. Mortars of medium caliber, both portable by hand and by wheel cart, are provided to permit blasting the enemy from strong points and machine gun bunkers. Still larger mobile mortars are included which can be emplaced in forward positions for attack of heavy fortifications.

75mm AUTOMATIC AIRCRAFT CANNON

The 75mm Feed Mechanism, M4 (T13) is an electrically powered automatic feed mechanism of 20 rounds capacity for aircraft installation with the 75mm Gun, M10, and 75mm Airplane Gun Mount, M10. These three pieces of equipment together comprise a complete automatic 75mm gun for aircraft installation. The operation is such that when the firing button is pressed, the round in the chamber is fired and the gun is automatically reloaded.



CHARACTERISTICS

Weight of Gun (M10)	407 lb.
Weight of Mount (M10)	380 lb.
Weight of Feed Mechanism (M4)	361 lb.
Weight of 20 rounds of ammunition	400 lb.
Total Weight	1,548 lb.
Rate of fire	30 rpm
Over-all length	147.0 in.
Maximum width	38.6 in.
Maximum height (with tray in downward position)	33.5 in.

AMMUNITION

Projectile, Fixed, APC-T, M61 or M61A1 w/Fuse, BD, M66A1, 75mm Gun, Shell, HE, M48, w/Fuze, PD, M57 or Fuze, TSQ, M54, 75mm Gun.

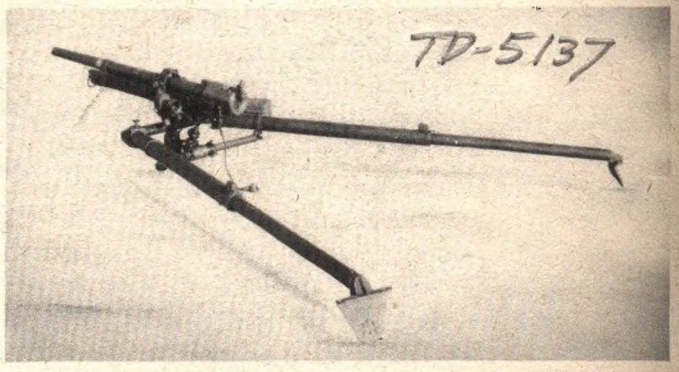
PROCUREMENT SCHEDULE

This unit was made limited procurement by OCM 19381 and 25 units were manufactured and proof accepted. Of these 25, 15 are now available at Aberdeen Proving Ground; the remaining 10 have been delivered to Army Air Forces and Ordnance installations for installation studies and preparation of standard drawings.

GUN, 37mm, T33EI; MOUNT, GUN, 37mm, TIOE3; RECOIL MECHANISM, T38E5

The ballistic characteristics of the 37mm Gun T33E1 and ammunition were developed during the jungle warfare program of a year and a half ago. At that time, a modified M4 Gun was mounted on a Cal. .50 machine gun tripod and designated 37mm Gun, T32 and Gun Mount, T9. A limited quantity of these weapons was produced and sent to the Pacific area. Because of the excessive weight of that materiel and the fact that the weapon hopped considerably during firing, a project was initiated to design a completely new weapon that was more stable, lighter and better adapted to packboard transport.

The Gun, 37mm, T33E1 and Mount, T10E3, the result of this project, is intended primarily for employment against lightly constructed emplacements and against personnel at relatively short ranges. The gun fires a 1½ pound shell, either high explosive or canister at a velocity of 1,500 f/s. The effective ranges of the HE Shell, M63 is approximately 2,400 yards. Fire control consists of a three-power direct fire Telescope, T126E1. The mount is a light weight, split trail pedestal type especially designed to be broken down into five loads weighing less than 50 pounds each, which can be readily carried on a packboard on a man's back. The total weight of the weapon is 229 pounds. Its elevation is between the limits of minus 5° to plus 18° and it can be traversed a total of 45°. To obtain greater traverse, the trails may be quickly swung to a new position. In the event the gun position is restrictive in size, the weapon can be fired with the trails telescoped.



Gun has quick removable breech unit to facilitate rapid breakdown for pack loading.

CHARACTERISTICS

Gun, 37mm, T33E1

Caliber of gun	37mm (1.45 in.)
Weight of gun complete	77.8 lb.
Weight of projectile	1.5 lb.
Muzzle velocity	1,500 f/s

Mount, Gun, 37mm, T10E3

Weight of mount complete with Gun, T33E1, Recoil Mechanism, T38E5, in firing position	229 lb.
Maximum elevation	+18°
Maximum depression	− 5°
Maximum traverse	22½° right and left
Over-all length, firing position, trails extended	115 in.
trails retracted	82 in.
Over-all width, firing, position, at spades, trails extended	94½ in.
trails retracted	66½ in.

Recoil Mechanism, T38E5

Weight of recoil mechanism	31 lb.
Type of recoil mechanism	Hydro-spring
Length of recoil	10 to 13 in.

Cylinder fabricated of extruded magnesium alloy

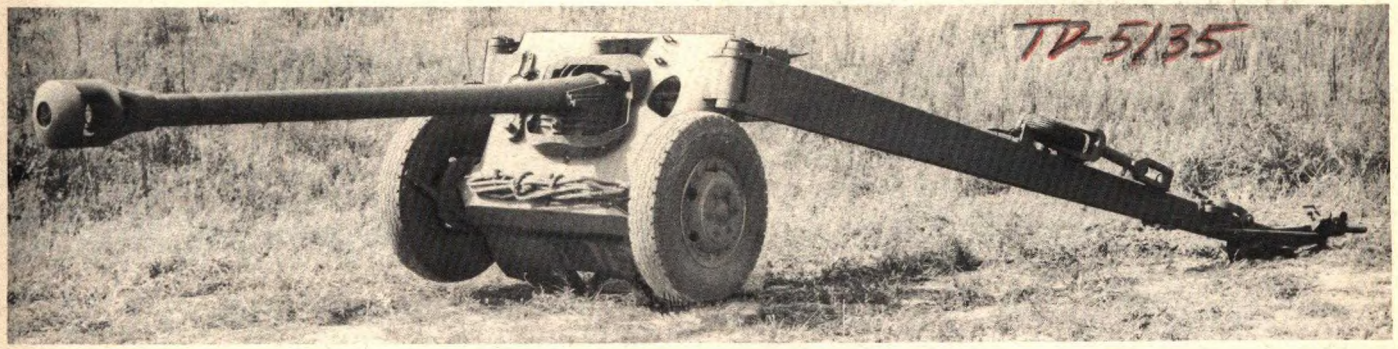
TERMINAL EFFECTS

Ammunition	Media	Charge	Range	Penetration
Shell, HE, M63	Med. earth	1,500 f/s	1,000 yd.	3.9 ft.
Shell, HE, M63	Palm wood	1,500 f/s	1,000 yd.	3.9 ft.
Shell, HE, M63	Pine, spruce	1,500 f/s	1,000 yd.	2.7 ft.
Shell, HE, M63	Oak, ebony, mahogany	1,500 f/s	1,000 yd.	1.9 ft.

PROCUREMENT SCHEDULE

Pilot models of this gun are currently undergoing tests by Infantry and Cavalry Boards. There is no manufacturing program.

GUN, 90mm, T13 with MUZZLE BRAKE, M3E1; CARRIAGE, GUN, 90mm, T9E2; RECOIL MECHANISM, T39



This weapon was developed to answer the requirement for a highly mobile antitank gun weighing less than 7,000 pounds. It incorporates a high rate of fire, excellent accuracy, capability of going into or out of firing position very quickly, and extreme ruggedness for extensive cross country maneuverability.

Fire control consists of the direct fire 3-power Telescope, T116E2; Panoramic, Telescope, M1 and Range Quadrant, M10, for indirect fire missions. The design of the carriage is novel. The armor shield acts as the main structural member for the carriage and the high anchor point of the trails permits them to swing forward and connect together near the muzzle for traveling position. The swinging of the trails to the muzzle for traveling decreases the over-all length of the weapon from 24 to 19 feet and provides an extremely rugged unit for rough, high speed, cross country operation. In firing position, the shield not only provides a ½-inch armor plate with a 40° obliquity, but the design also provides a maximum amount of space and protection for the gun crew. The extreme firing stability of the carriage, the direct fire telescope, the one-man control of both elevation and traverse, the firing of the piece by the gunner at the elevation handwheel together with automatic operation permits an unusually high rate of aimed fire (20 rpm). A trained gun crew can go from march order to the firing of the first round in 15 seconds. In firing position there is a total traverse of 60° and it may be depressed to minus 8° and elevated to plus 20°.

CHARACTERISTICS

Weight, complete ..... 6,850 lb.
Elevating limits ..... −8° to +20°
Traverse limits ..... 30° right, 30° left
Over-all width ..... 85½ in.
Over-all height ..... 58½ in.
Over-all length, traveling ..... 225 in.
Over-all length, firing ..... 292 in.
Spades, folding or rock
Handwheels, one-man control
Firing mechanism, thumb control on left hand elevating handwheel
Armor, ½ in. homogeneous plate, 40° obliquity
Air Transport—may be disassembled into 8 loads, the largest being 2,200 lb. for the gun.

BALLISTICS

Ammunition	M.V. f/s	Max. Range 45° elev. (yds.)	Max. Range Permitted by carriage (20° elev.) (yds.)
Proj, APC-T, M82	2,800	21,560	16,050
Proj, APC-T, M82	2,670	21,010	15,580
Shot, AP-T, T33	2,800	21,000 (approx.)	16,000 (approx.)
Shell, HE, M71	2,700	19,560	14,900
Shell, Chem., WP, T31E2 & T31E3	2,700	19,560	14,000

TERMINAL EFFECTS

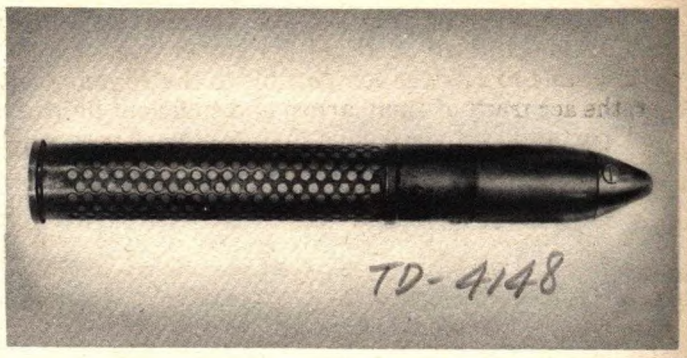
The most effective round to seal cave entrances in weathered limestone is the Shell, HE, M71 with Fuze, CP, M78. Next in order of effectiveness in the same media is the Projectile, APC-T, M82 with Fuze, BD, M68.

Ammunition	Media	Range	Penetration
Projectile, APC-T, M82	Homo Armor at 30° obliq.	2000 yd.	4.1 in.
Shot, AP-T, T33	Homo Armor at 30° obliq.	2000 yd.	4.4 in.
Shot, HVAP-T, T30E16	Homo Armor at 30° obliq.	2000 yd.	6.1 in.
Shell, HE, M71 w/Fuze, CP, M78	Medium earth	1000 yd.	17.5 ft.
Shell, HE, M71 w/Fuze, CP, M78	Shale	1000 yd.	10.0 ft.
Shell, HE, M71 w/Fuze, CP, M78	Sand	1000 yd.	15.0 ft.
Shell, HE, M71 w/Fuze, CP, M78	Clay	1000 yd.	19.0 ft.
Shell, HE, M71 w/Fuze, CP, M78	Palm wood	1000 yd.	17.5 ft.
Shell, HE, M71 w/Fuze, CP, M78	Pine, spruce	1000 yd.	13.0 ft.
Shell, HE, M71 w/Fuze, CP, M78	Oak, ebony, mahogany	1000 yd.	8.7 ft.
Shell, HE, M71 w/Fuze, CP, M78	Weathered limestone	85 yd.	1.8 ft.
Proj, APC-T, M82 w/Fuze BD, M68	Weathered limestone	85 yd.	2.3 ft.
Proj, APC-T, M82 w/Fuze BD, M68	Massive limestone	85 yd.	1.7 ft.
Shot, AP-T, T33	Weathered limestone	85 yd.	2.3 ft.
Shot, AP-T, T33	Massive limestone	85 yd.	1.7 ft.
Shot, HVAP-T, T30E16	Massive limestone	85 yd.	1.7 ft.

PROCUREMENT SCHEDULE

The weapon is currently undergoing service board tests.

RIFLE, 57mm, M18 AND T15E13



The 57mm Rifles, T15E13 and M18, operating on the recoilless principle, have been designed to provide an antipersonnel and antitank weapon of lighter weight and greater range and accuracy than other comparable light weight weapons. They have been found particularly effective when fired into cave entrances.

The rifles M18 and T15E13 differ only in the rifling of the tube. The rifling in the M18 is one turn in 25 calibers and the T15E13 is one turn in 30 calibers.

An extendable front handle and bipod are provided. The latter, when folded, becomes a shoulder rest, permitting the rifle to be fired from the shoulder in standing, sitting, or kneeling positions. The front handle may be extended and the bipod unfolded to furnish three point support for prone firing. The rifle may also be mounted on the caliber .30 machine gun tripod. Sight, Front, M26 and Mount, Sight, M74 provide attached iron sights, the rear sight leaf being similar to that of the caliber .30 M1903 rifle. Telescope, M86C, may be quickly attached to the Mount, Sight, M74.

ACCESSORIES

1. Cover, M123
2. Cover (Muzzle and Breech) M124
3. Mount, Tripod, Caliber .30, M1917A1

CHARACTERISTICS

Rifle, 57mm, M18 and T15E13

Weight (rifle complete—for mounting on tripod) ..... 40.25 lb.
Length, over-all ..... 60 in.
Recoil mechanism ..... none, recoilless
Muzzle velocity ..... 1,200 f/s
Maximum range with Shell, HE, 57mm, M306 (T22) ..... 4,300 yd.
Type of breechblock ..... interrupted thread
Firing mechanism — Spring loaded hammer, floating firing pin, trigger operated sear
Rifling—1 turn in 25 caliber (M18), 1 turn in 30 calibers (T15E13) —uniform, right hand
Mount—Bipod, forms rest for shoulder firing or bipod for prone firing used in conjunction w/extendable front handle
Alternate Mount—Mount, Tripod, Cal. .30, M1917A1
Iron Sights—Sight, Front, M26 and Mount, Sight, M74 provide iron sights when telescope is not used
Telescopic Sight ..... Telescope, M86C
Elevation (on Mount, Tripod, Cal. .30, M1917A1) ..... +65°
Depression (on Mount, Tripod, Cal. .30, M1917A1) ..... —27°
Traverse (on Mount, Tripod, Cal. .30, M1917A1) ..... 360°
Height—in firing position (on Mount, Tripod, Cal. 30, M1917A1, 0° elevation) ..... 34¼ in. to top of breechblock handle
Width—in firing position ..... 12 in. (gun and sight mounting bracket only)

PROCUREMENT SCHEDULE

1945								
Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
20	148	133	200	650	1100	1250	1250	1250

1946
1st Q
250

First thousand to be T15E13, all other M18 type.

AMMUNITION

The HE Shell, M306 (T22) was developed to provide a high explosive, anti-personnel round for the 57mm Recoilless rifle. This round is provided with a Point Detonating Fuze, M89 (T119E1).

The HEAT Shell, M307 (T20E2), was developed to provide a round for use against armored vehicles. It is provided with a Point Initiating Fuze, M90 (T123E1), and has penetrated homogeneous armor plate up to 3 inches at 20° obliquity.

The WP Shell, M308 (T23), was developed to provide a round for smoke screening, antipersonnel effect and for spotting. The M89 fuze is used with this round.

In addition to the above rounds which are in production a canister round is under development for use in this rifle. This canister round has been designated T25. It is expected the canister will be released for procurement in the near future.

All of these rounds use a perforated steel cartridge case instead of the usual solid case. The case has a paper liner which retains the propellant charge and bursts upon ignition, allowing the release of gases through Venturi tubes in the rear of the gun. All shell have pre-engraved rotating bands in order to reduce the amount of pressure required to expel the shell from the rifle.

PROCUREMENT SCHEDULE—1945-1946
(in thousands)

	1945						
	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
HE M306	100	110	140	160	180	160	160
HEAT M307	60	45	45	45	45	45	45
WP M308	40	40	40	40	40	10	—

Canister, T25 (There is no manufacturing program).

1946			
Jan.	Feb.	Mar.	Apr.
160	160	160	160
45	—	—	—
—	—	—	—

RIFLES, 75mm, T21, T25, M20

The 75mm rifles, T21, T25 and M20 have also been designed as antitank and antipersonnel weapons with a range and fire power comparable to the 75mm howitzer, the accuracy of small arms, and sufficient lightness and portability to accompany infantry. These rifles are extremely effective against personnel in caves.

The rifles, 75mm, T25 and M20 (standard nomenclature for the T25) incorporate the removable venturi tube insert and breechblock with improved orifice design which will lengthen the usable life of the weapons and simplify their maintenance. The T21 rifle weighs 105 pounds, the T25 and M20 rifles, 110 pounds.

These rifles operate on the same principles as the 57mm recoilless rifle and fire, at normal velocity of 1,000 f/s, a standard 75mm HEAT projectile with preengraved rotating band and other slight modifications. Similarly modified standard HE and WP projectiles are also fired at approximately the above velocity.

This light weight rifle may be carried short distances by 2 to 4 men. It is quickly and easily mounted on the caliber .30, M1917A1 tripod mount. Provided the range is not too great, it may be used for supporting artillery fire. Maximum range is approximately 7,000 yards.

Although the T21, T25 and M20 rifles are primarily direct fire weapons, elevation quadrants and leveling jacks are provided to bring the traverse dial into a level plane for indirect laying and rapid traverse firing.

Paracrates to allow these rifles to be dropped from airplanes are under development. It is anticipated that this weapon will become an important addition to the equipment of airborne troops.

CHARACTERISTICS

Weight (rifle w/out sights or tripod)
T21 ..... 105 lb.
T2 (M20) ..... 110 lb.
Length, over-all ..... 81.78 in.
Recoil mechanism ..... none, recoilless
Muzzle velocity ..... 1,000 f/s
Type of breechblock ..... interrupted thread
Firing mechanism—Spring loaded firing pin, trigger operated sear
Rifling—one turn in 22 calibers—uniform, right hand
Mount—Mount Tripod, Cal. .30, M1917A1
Elevation (on Mount, Tripod, Cal. .30, M1917A1) ..... +27°
Depression (on Mount, Tripod, Cal. .30, M1917A1) ..... —65°
Traverse (on Mount, Tripod, Cal. .30, M1917A1) ..... 360°

ACCESSORIES

1. **Mount, Tripod, Cal. .30, M1917A1**
2. **Jacks, Leveling, T1**
3. **Cover, T39 (Muzzle and Breech)**

OPTICAL FIRE CONTROL

1. **Telescope, M85C**
2. **Quadrant Elevation, T13E1**

TERMINAL EFFECTS

The use of this weapon close up to entrance to fortified points makes it extremely effective. Pin point targets, doors, ports, etc. can be engaged. WP Shell fired into the point through one of these openings will make the interior untenable, without suitable protective devices, for a good period of time. Against log shored positions the gun ports can be effectively closed by HE hits above the top support logs, thereby causing dirt to collapse over the entrance.

RIFLE, 75mm, M20 ON MOUNT, TRIPOD, CAL. .30, M1917A1 AND SHELL, HE, 75mm, M309.

PROCUREMENT SCHEDULE, 1945

1945									
Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.
21	73	200	300	306	200	300	300	250	0

After first 900 balance will be M20 type.

AMMUNITION

Shell similar to those for the 57mm rifle were developed for the 75mm rifles. The Shell, HE, 75mm, M309 (T38) is an antipersonnel round, and the Shell, HEAT, M310 (T39) is an antitank round with the ability to penetrate to a depth of 4 to 4.5 inches of homogeneous armor plate at all ranges and at all obliquities from 0° to 60°.

The WP Shell, M311 (T23) will be used for smoke screening, antipersonnel effect, and for spotting.

The HE Shell uses the point detonating Fuze, M48A2, the HEAT uses the base detonating Fuze, M62, and the WP Shell uses the point detonating Fuze, M57.

In addition to the above ammunition which has been developed and put into production, a canister round is also under development.

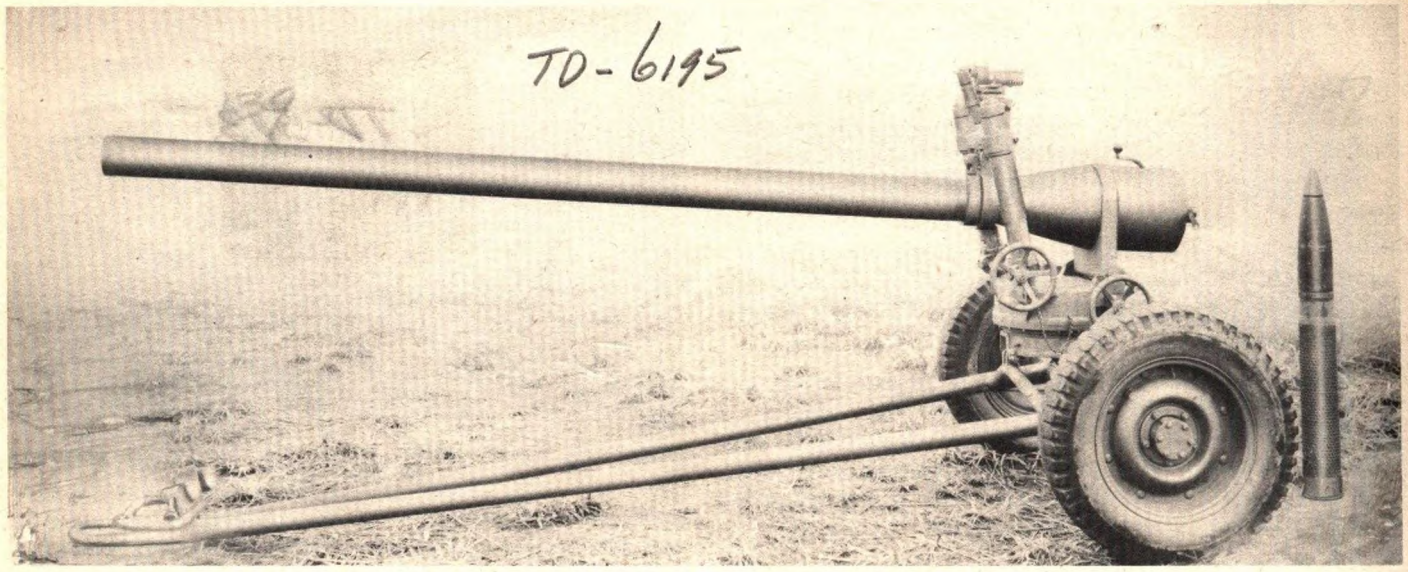
PROCUREMENT SCHEDULE—1945-1946 (in thousands)

	1945				
	June	July	Aug.	Sept.	Oct.
HE, M309	10	50	50	50	50*
HEAT, M310	92**	—	—	—	—
WP, M311	30	15	15	15	15***

Canister (There is no manufacturing program).

***240 additional to be completed by April 1946**
****225 additional to be completed by April 1946**
*****90 additional to be completed by April 1946**

RIFLE, 105mm, T19



The 105mm Rifle, T19 has been designed as an anti-tank and antipersonnel weapon with a range and fire-power comparable to a 105mm Howitzer. The T19 rifle operates on the same principles as the 57mm and 75mm recoilless rifles, firing the standard 105mm HEAT and HE projectiles with pre-engraved rotating bands at velocities of 1250 and 1140 f/s, respectively. A similarly modified WP shell is also provided and is fired at the latter velocity.

This weapon weighs 315 pounds and may be mounted on a ¼-ton, 4x4 truck, "Weasel", or on its own carriage.

The Carriage, T47 for this weapon is a two-wheeled towed mount, incorporating traverse and elevating mechanisms.

CHARACTERISTICS

Weight (rifle w/o sights or mount)	315 lb.
Length (over-all)	134 in.
Recoil mechanism	none, recoilless
Muzzle velocity	1250 f/s with HEAT; 1140 f/s with HE and WP
Type of breechblock	Interrupted thread
Firing Mechanism	Spring loaded firing pin, rotary sear
Rifling	1 turn in 20 cal., uniform, R.H.
Mount	Carriage, 105mm Rifle, T47
Elevation	−5° to +50°
Traverse	30°
Weight	485 lb.

TERMINAL EFFECTS

Ammunition	*Media*	*Range*	*Penetration*
Shell, HE, T42	Med. earth	1,000 yd.	10.5 ft.
Shell, HE, T42	Palm wood	1,000 yd.	10.5 ft.
Shell, HE, T42	Pine, spruce	1,000 yd.	7.8 ft.
Shell, HE, T42	Oak, ebony, mahogany	1,000 yd.	5.2 ft.

This weapon firing Shell, HE, M1 with CP Fuze M78 will seal caves in massive or weathered limestone and gumbo clay mixed with low grade wet shale but a large expenditure of rounds is necessary to accomplish this end. Against caves in hard red clay, with overburdens of 10 feet or less, this weapon is effective, as about six rounds will effect sealage of a 4x4 foot cave.

PROCUREMENT SCHEDULE

This item will shortly be under limited procurement. There is no manufacturing program.

AMMUNITION

The Shell, HE, T42, which is the howitzer Shell, HE, M1 fitted with a pre-engraved band can be assembled with the M48 Mod. or M51A4 PD Fuzes, the M54 or the M55 Mod. TSQ Fuzes or the M78 CP Fuze.

Shell, HEAT, T43 (pre-engraved banded HEAT Shell M67) is fuzed with the BD M62 Mod. Fuze. The shell will penetrate to a depth of 5 to 5½ inches into homogeneous armor plate at effective ranges and angles of obliquity of from 0° to 60°.

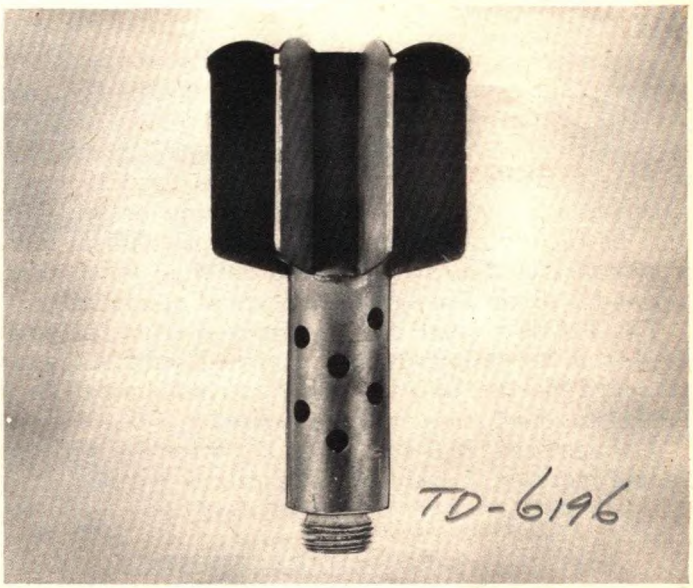
Activated by the PD Fuze M57 the WP Smoke Shell T44 is the modified (pre-engraved band) WP Smoke Shell M60.

Also under development is the Canister T49 which will be filled with approximately 200 lead balls.

PROCUREMENT SCHEDULE

The above ammunition is still in the experimental stages and it is expected that several months will elapse before it is released for production. There is no manufacturing program.

MORTAR, 60mm, M2; MOUNT, M5



This 60mm mortar is a new standard item.

The complete unit consists of the mortar, the bipod, sight, and baseplate. The firing mechanism on the mortar M2 is a fixed firing pin adaptable to drop firing only, but there is recommended for standardization and issue a kit to allow conversion of this materiel to a hand-held mortar. This kit consists of the baseplate M1, the firing mechanism from 60mm mortar, M19, and the new sight, necessary for direct fire.

The Mount, M5 for this mortar has been standardized recently. The traversing mechanism as originally furnished on the Mount M2 had an exposed screw which was susceptible to wear, especially under sandy and dusty conditions. This new mechanism has the working parts totally enclosed and is considerably more stable than the older model.

CHARACTERISTICS

Weight of complete unit.....43 lb. (tube 12.8-bipod, 16.4-baseplate 10.5)
Rate of fire.....Max. 30, normal 18 rpm
Max. range, usting Shell, HE, M49A2 w/Fuze, PD, M58B1.....2,017 yd.

PROCUREMENT SCHEDULE—1945-1946

1945						
June	July	Aug.	Sept.	Oct.	Nov.	Dec.
15041	4000	1350	600	600	600	600

1946			
1st Q	2nd Q	3rd Q	4th Q
2700	2700	2700	2068

AMMUNITION

SHELL, HE, 60mm, M49A2 with FIN, T5

The T5 Fin for use with the M49A2 shell is being developed to obviate short rounds which are now experienced with this shell. Extensive proving ground tests are being made in order to determine if the shorts are eliminated.

Due to the increase in chamber capacity it is necessary to develop a new powder charge. This charge will give the same ranges as are now obtained with the M49A2 shell.

PROCUREMENT SCHEDULE

It is expected that upon completion of proving ground tests this fin will be put into Limited Procurement for a quantity of 100,000. There is no manufacturing program.

MORTAR, 60mm, T18E6 (HAND HELD MORTAR)

This mortar was developed to provide the infantryman with a weapon that could be carried and fired with the ease of small arms, yet give him firepower enough to blast enemy gun positions and other targets which could not be reached or demolished with the hand grenade or rifle grenade. This weapon can be fired from fox hole position, shell holes, from the top of the ground or any other backing that may be readily available. The firing mechanism allows firing at low angles of elevation heretofore prohibited when using drop fire and allows for direct fire against targets of opportunity.

The T18E6 mortar can be removed from the small baseplate and fired from the standard 60mm mortar mount at the same ranges as the standard mortar, and the firing mechanism can be set for drop fire in the standard manner when desired.

A shaped charge is being developed for use with this weapon which should increase its value as an antitank weapon.

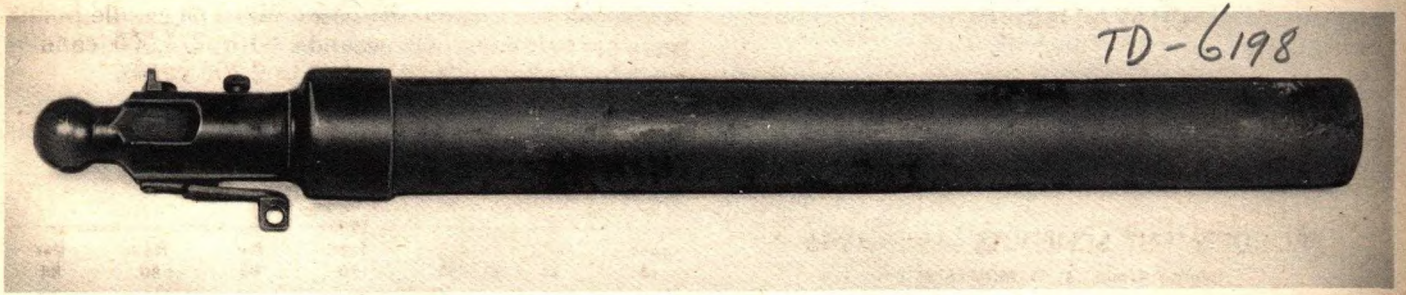
CHARACTERISTICS

Weight, complete with baseplate and sight ..... **19½ lb.**
Maximum range, using Shell, HE, M49A2, small baseplate ..... **816 yd.**
Maximum range, using Shell, HE, M49A2, std. base and mount ..... **2,017 yd.**

PROCUREMENT SCHEDULE

1945						
June	July	Aug.	Sept.	Oct.	Nov.	Dec.
153	0	0	0	0	0	0

MORTAR, 60mm, M19, with BASEPLATE, M1, SIGHT, M32 and CARRYING STRAP (IMPROVED HAND HELD MORTAR)



Although the 60mm Mortar, T18E6 has proven popular, recommendations to improve the firing mechanism to eliminate certain faults led to the development of the 60mm Mortar, M19.

The new firing mechanism provides for both the conventional drop fire and for continuous pull lever fire after loading the shell. The selector on the housing is set for either type of fire. The lever fire eliminates the need of a lanyard and insures better stability in firing.

The range characteristics and use of this mortar on the standard mount are the same as the T18E6 Mortar.

PROCUREMENT SCHEDULE

Field Service Kits to be provided for every 60mm Mortar, M2, in field. Kit consists of base cap with firing mechanism (M19 type), Baseplate, M1, Sight, M32, Carrying Strap. Initial production should be available for distribution to the field in November 1945.

MORTAR, 81mm, M1, MOUNT, M4

The 81 mm Mortar, M1 is a Limited Standard item.

The mortar as shown can be quickly broken down into three loads, the mortar, the bipod, and the baseplate of approximately 50 pounds each to form one-man pack loads for transporting over limited distances. The sight is the same as for the 60mm mortar.

The mount incorporates a new enclosed traversing mechanism. This traversing mechanism was developed to reduce wear on the exposed traversing screw as formerly furnished on the Mount, M1.

CHARACTERISTICS

Weight, complete	136 lb.
Tube	44½ lb.
Bipod	46½ lb.
Baseplate	45 lb.
Rate of fire	
Maximum	30 rpm
Normal	18 rpm

PROCUREMENT SCHEDULE—1945-1946

(Mortar 81mm, M1 W/MOUNT, M4)

Under revision due to recent adoption of mortar, 81mm, M21, Mount M15.

SHELL, ILLUMINATING, 81mm, M302

BALLISTICS

Max. Range, using Shell, HE, M43A1	3,290 yd.
Max. Range, using Shell, HE, M56 with Fuze, PD, M53B1	2,596 yd.
Max. Range, using 8 increments in emergencies only, Shell, HE, M43A1	4,000 yd.
Max. Range, using Extension Tube, T1 and 8 increments, Shell, HE, M43A1	4,400 yd.

TERMINAL EFFECTS

Ammunition	*Media*	*Ch.*	*Range*	*Penetration*
Shell, HE, M56 with Fuze PD, M53B1	Med. earth	4	500 yd.	3.0 ft.*
Shell, HE, M56 with Fuze PD, M53B1	Palm wood	4	500 yd.	3.0 ft.*
Shell, HE, M56 with Fuze PD, M53B1	Pine, spruce	4	500 yd.	2.2 ft.*
Shell, HE, M56 with Fuze PD, M53B1	Oak, ebony, mahogany	4	500 yd.	1.5 ft.*

*High angle fire against roofs

This illuminating shell has been developed for use in the 81mm mortar to provide illumination over front lines at night and to some extent for use in signaling.

It is provided with a variable time fuze (0 to 25 seconds) which upon functioning causes the tail cone of the shell to be ejected and at the same time releases the parachute and candle assembly. The candle burns for approximately 60 seconds with 275,000 candlepower. The range is from 900 to 2,200 yards.

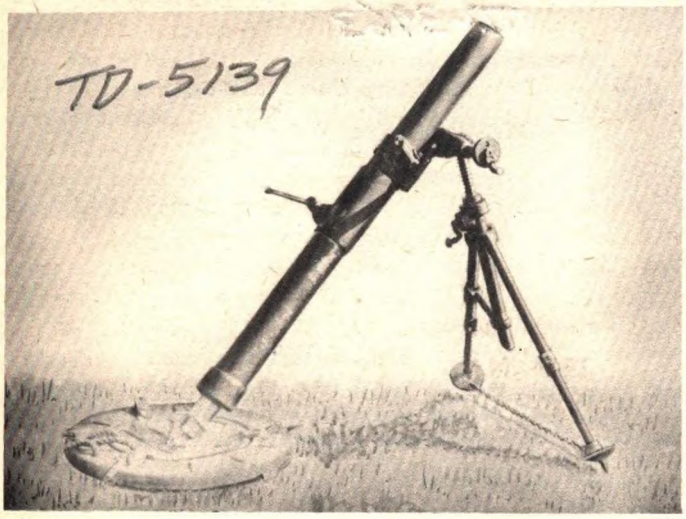
PROCUREMENT SCHEDULE—1945-1946

(in thousands)

1945						
June	July	Aug.	Sept.	Oct.	Nov.	Dec.
15	25	45	70	80	80	84

1946			
1st Q	2nd Q	3rd Q	4th Q
210	210	210	181

MORTAR, 81mm, M21; MOUNT M15



This mortar was developed to give more flexibility than the standard mortar or the short 81mm Mortar. It was designed to be easily and quickly broken down into loads of 25 pounds or less for one-man pack, to be used as either a short mortar or a standard mortar, and to provide a firing mechanism in the base cap.

For use as a short mortar, the center section of the baseplate and the base section of the tube only, are used. The legs of the mount have a telescoping feature which allows them to be shortened to mount on the lower section of the tube for this use. For this type mortar, there will be four loads.

As a long range mortar, the outer section of the baseplate is added and the top section of the tube is clamped to the base section. The legs are then extended and the bipod clamped to the top part of the tube for better stability. When used as a heavy mortar, there will be six loads.

The firing mechanism for this mortar is designed similarly to the firing mechanism used on the 60mm Mortar, M19. All the internal working parts of the 60 and 81mm firing mechanisms are interchangeable.

The tube and baseplate for this mortar are being made stronger than the present standard mortar and normal ranges of 4,000 yards will be obtained with the shell, HE, M43A1 when used as a heavy mortar and ranges of 2,000 yards can be obtained when used as a short mortar.

PROCUREMENT SCHEDULE

OCM action is being processed to standardize and obtain initial production of 1,200 items.

MORTAR, 105mm, T13; MOUNT, T12 (2,000 YARD RANGE)

This mortar was developed under the Jungle Warfare program to provide a mortar which was as portable as the 81mm Mortar, yet which would provide greater firepower. It is under limited procurement and has been shipped to the theaters.

In order to provide a mortar to meet these characteristics quickly, concession in range had to be made and the range is limited to 2,000 yards. The tube is made in two pieces to meet the weight limits and the bipod and baseplate are adaptations from the standard 81mm Mortar Mounts. The baseplate is the standard baseplate as actually used with the 81mm mortar, but the bipod has been modified by adding a clamp that will fit the larger diameter tube. The standard mortar sight is used.

CHARACTERISTICS

Weight, complete	193 lb.
Mortar	96½ lb.
Mount	51¾ lb.
Baseplate	45 lb.
Range, Shell, HE, T17E1	2,000 yd.

TERMINAL EFFECTS

Ammunition	*Media*	*Charge*	*Range*	*Penetration*
Shell, HE, T17E1	Med. earth	4	500 yd.	3.6 ft.*
Shell, HE, T17E1	Palm wood	4	500 yd.	3.6 ft.*
Shell, HE, T17E1	Pine, spruce	4	500 yd.	2.7 ft.*
Shell, HE, T17E1	Oak, ebony, mahogany	4	500 yd.	1.8 ft.*

*High angle fire against roofs

PROCUREMENT SCHEDULE

Procurement has been completed on 526 of these mortars. There is no future manufacturing program.

MORTAR, 105mm, T58; MOUNT, T41 (4,400 YARD RANGE)

This mortar was a development from the Jungle Warfare mortar and is designed to withstand firing forces necessary to give 4,400 yards range. It also combined improvements in the mount and baseplate to increase stability during firing, yet it still retains the feature of being broken down into one-man loads for packing over short distances. In order to retain this light load feature, the mount and baseplate as well as the tube are made to be broken down into two pieces each.

Some of the features of this mortar which are improvements over its predecessor are the telescoping legs which enables the mortar to retain exceptional stability even at high elevations by eliminating the necessity of a long elevating screw. The elevating screw is enclosed and is more closely fitted than would be possible with an exposed screw. All the working parts are enclosed and dust seals provided to prevent entrance of dirt and other foreign material. The shock absorbers and the baseplate are synchronized so that the mortar may fire full charge seating rounds without any preparation of the baseplate and without damage to the mount.

Another feature is that the amount of traverse has been increased from approximately 75 mils right or left to 166 mils right or left on this mount.

An adjustable sight mounting is provided which enables the gunner to sight without having to level the entire mortar for each sighting.

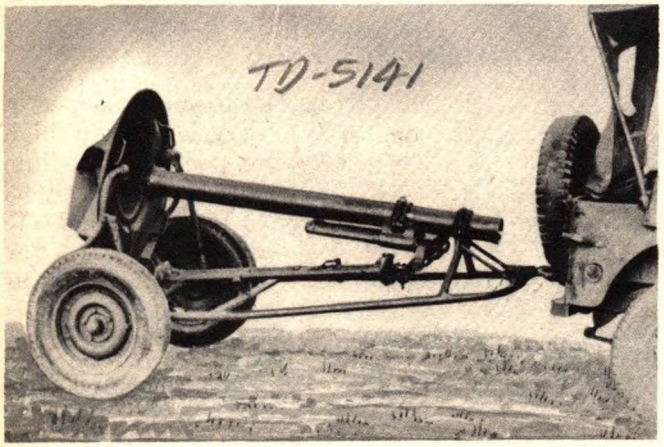
CHARACTERISTICS

Weight, complete (6 loads of approximately 50 lb. each)	300 lb.
Max. Range; Shell, HE, T17E1	4,400 yd.

PROCUREMENT SCHEDULE

Limited procurement of 300 authorized.

MORTAR, 105mm, T33E2; MOUNT, 42; WAGON, TRANSPORT, T22E1 (6,000 YARD RANGE)



This mortar was developed to give greater stability than mortars which of necessity have to be broken down into minimum load limits, and to give increased ranges. The transport wagon provided assists in emplacing the mortar and also is used for transporting the mortar mount behind a ¼ ton C & R car.

The mount and baseplate of this mortar are made heavy to withstand the shock of firing to ranges of 6,000 yards with the minimum amount of emplacing of the baseplate. Tests have shown that the baseplate can be fired from an unprepared position at the full range and that after continued firing the baseplate will settle into a well seated position. The stability of this mortar firing at full ranges under several types of terrain has been excellent in tests to date.

This firing mechanism has working parts which are similar to those provided for the 60mm M19 and the 81mm M21 Mortars, the working parts of which are interchangeable.

CHARACTERISTICS

Weight

Mortar, mount and baseplate	402 lb.
Mortar	118 lb.
Mount	124 lb.
Baseplate	160 lb.
Wagon	317 lb.
Max. range; Shell, HE, T17E1	6,000 yd.

PROCUREMENT SCHEDULE

Limited procurement of 300 authorized.

AMMUNITION

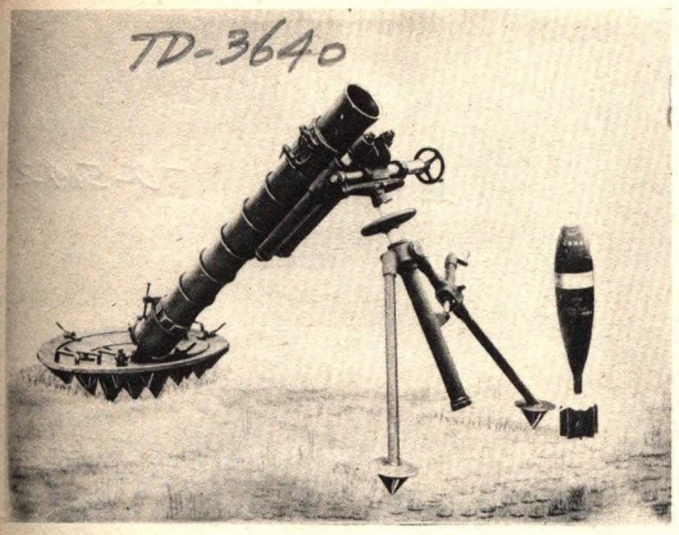
SHELL, HE, 105mm, T17E1 and SHELL, CHEMICAL, WP, 105mm, T19E1 FOR USE WITH 105mm MORTARS

Ranges of from approximately 250 to 6,000 yards are obtained with both the HE and WP shells. The HE shell is fuzed with the M4 type rocket fuze which gives superquick and 0.1 second delay functioning. The WP shell is fuzed with the M4 type rocket fuze which is superquick and 0.015 second delay. The effect of both the HE and WP shell is comparable to the corresponding 105mm howitzer rounds. The 105mm mortar and ammunition were designed to provide a medium weight mortar with greater fire power than the 60mm and 81mm mortars. The 105mm mortar may be used against enemy personnel in small areas and bunkers and it may be employed to aid in the landing of forces and substitute for artillery fire until actual artillery weapons are landed.

PROCUREMENT SCHEDULE

A quantity of ammunition for 2,000 yards range has been manufactured but it is contemplated that all future production will be for use in all ranges up to 6,000 yards. The procurement schedules for this ammunition are not available at this time.

MORTAR, 155mm, T25; MOUNT, T16E2; BASEPLATE, T2E2



This mortar is under limited procurement and the first requirements have been shipped to the theaters. It was developed under the Jungle Warfare program to give the very maximum amount of firepower that could be man-carried. It provides a short range weapon that can be transported by men or mules to areas that heretofore were considered inaccessible to a weapon of this size. This mortar can be broken down into loads of less than 100 pounds each and fires a 64 pound projectile to ranges of 2,500 yards.

Firing tests of this mortar show that it can be fired from sandy beaches with only slight preparation and that it should prove of great value in landing operations before heavy artillery can be brought up.

CHARACTERISTICS

Weight, complete	585 lb.
Tube	95 lb.
Basecap and firing mechanism	67 lb.
Collar and shock assembly	94 lb.
Traversing mechanism	45 lb.
Bipod	71 lb.
Baseplate	197 lb.
(Center section—56 lb., intermediate ring—74 lb., outer ring—67 lb.)	

TERMINAL EFFECTS

Ammunition	*Media*	*Charge*	*Range*	*Penetration*
Shell, HE, T26E1	Med. earth	3	500 yd.	4.8 ft.
Shell, HE, T26E1	Palm wood	3	500 yd.	4.8 ft.
Shell, HE, T26E1	Pine, spruce	3	500 yd.	3.6 ft.
Shell, HE, T26E1	Oak, ebony, mahogany	3	500 yd.	2.4 ft.

PROCUREMENT SCHEDULE—1945

1945						
June	July	Aug.	Sept.	Oct.	Nov.	Dec.
2	20	55	55	50	0	0

AMMUNITION

The 155mm HE Mortar Shell has been developed to provide a large caliber HE projectile with a high charge weight ratio for use against light and medium field fortifications. This shell weighs approximately 63 pounds and has a bursting charge of 19 pounds of TNT. The T28E2 WP Shell was designed for screening, for its morale effect and for such casualties as may be obtained. The total weight is approximately 65 pounds of which 15.5 pounds is the WP charge. Both shell are fitted with the M4 type rocket fuze and with mount T16E2 ranges up to 2,500 yards are obtained.

PROCUREMENT SCHEDULE—1945-1946
(in thousands)

	1945						
	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
T26E1	5	10	25	55	55	55	54
T28E2	—	—	2	5	5	5	5

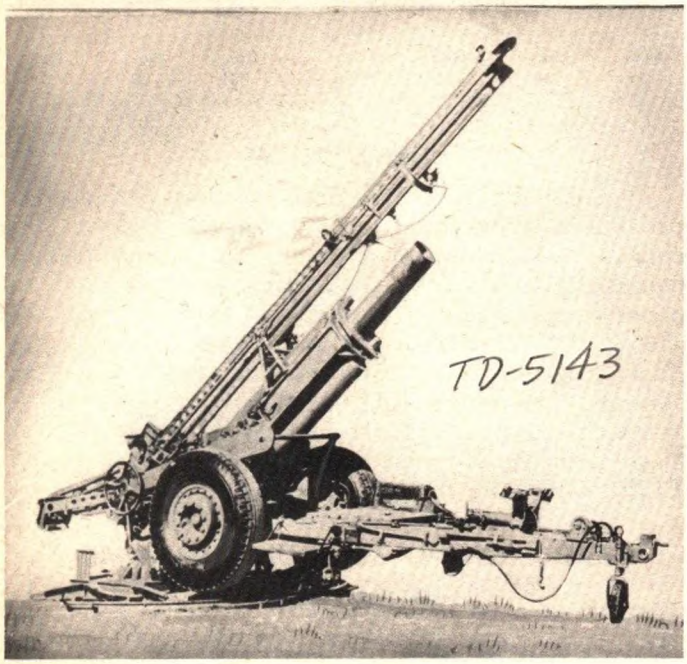
	1946			
	1st Q	2nd Q	3rd Q	4th Q
T26E1	0	0	0	0
T28E2	0	0	0	0

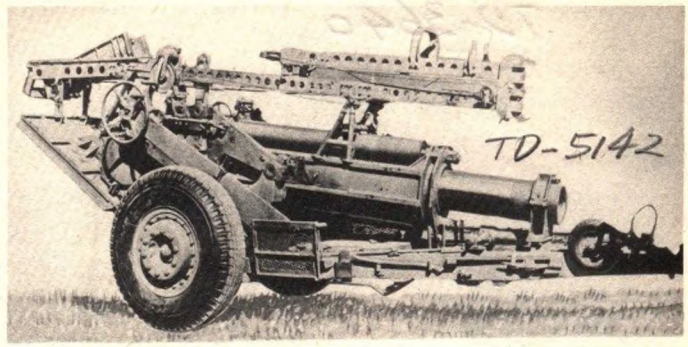
SHELL, HE, 155mm, T26E1; SHELL, CHEMICAL, 155mm, T28E2 for use in 155mm MORTARS

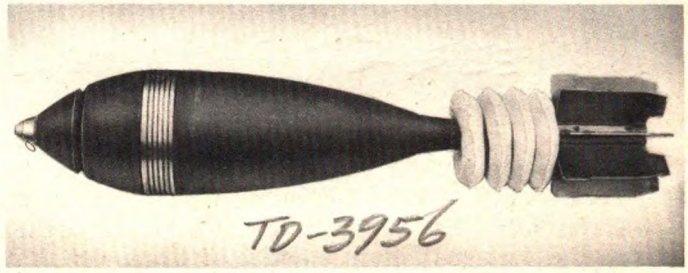
MORTAR, 155mm, T17E1, MOUNT, T10E1, BASEPLATE, T17

This item is in the development stage and consists of strengthening the tube of the T25E3 mortar and the T2E2 baseplate to be able to withstand firing stresses resulting from the increased pressure necessary to give the shell 6,000 yards range.

MORTAR, 250mm, T5E3; CARRIAGE, MORTAR, 250mm, T6E3







The development of a 250mm mortar was undertaken to provide a comparatively lightweight, highly mobile mortar for short range, high angle fire against masonry, earth, log and reinforced concrete fortifications.

The smooth bore Mortar T5E3 is muzzle loaded and will fire a 250 pound finned projectile at a muzzle velocity of approximately 940 f/s to a maximum range of approximately 7,500 yards. The recoil mechanism absorbs approximately 70% of the recoil, the remaining 30% being taken by the large baseplate spaded into the ground. The carriage provides a total traverse of 60° and an elevating range of 45° to 80°. The rail and carrier type of loading mechanism permits loading of the mortar at any angle of elevation. The rate of fire is about one round every two minutes. The weapon can be readily and quickly placed in traveling position and towed over any terrain as a single axis trail load. The total weight is 17,000 lb.

TERMINAL EFFECTS

Ammunition	*Media*	*Ch.*	*Range*	*Penetration*
Shell, HE, T3	Med. earth	4	3,000 yd.	18.8 ft.*
Shell, HE, T3	Palm wood	4	3,000 yd.	18.8 ft.*
Shell, HE, T3	Pine, spruce	4	3,000 yd.	14.1 ft.*
Shell, HE, T3	Oak, ebony, mahogany	4	3,000 yd.	9.4 ft.*
Shell, HE, T3	Med. earth	3	3,000 yd.	15.9 ft.*
Shell, HE, T3	Palm wood	3	3,000 yd.	15.9 ft.*
Shell, HE, T3	Pine, spruce	3	3,000 yd.	11.8 ft.*
Shell, HE, T3	Oak, ebony, mahogany	3	3,000 yd.	7.9 ft.*

*High angle fire against roofs

PROCUREMENT SCHEDULE

50 authorized as Limited Procurement Type.

AMMUNITION

SHELL, HE, 250mm, T3

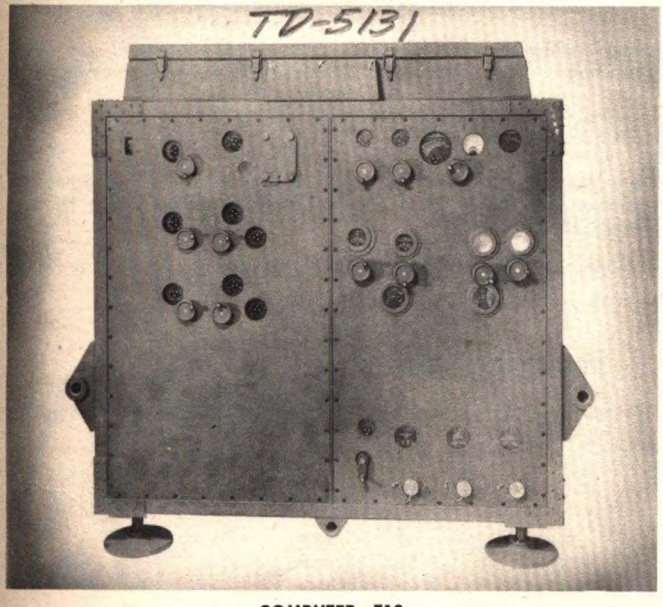
The T3 HE Shell was designed for use in the 250mm mortar to provide a comparatively light weight highly mobile short range weapon. This shell is a conventional finned type for use in a smooth bore mortar. The shell weighs approximately 250 pounds as fired and has a bursting charge of 58 pounds of TNT. This shell is fitted with the M4 type rocket fuze which can be set for superquick or 0.1 second delay functioning.

PROCUREMENT SCHEDULE

A quantity of 2,000 shells are in production for extensive proving ground tests, range firing, service board tests, etc.

DIRECTOR, T38

TRACKER, T5



COMPUTER, T18

The T38 Director continuously observes an airborne target and computes the correct firing data for the gun battery. The guns of the AA battery are positioned automatically in response to the signals received from the director.

The director consists of four components:

Tracker, T5, including the Remote Control Unit
Computer, T18
Target Selector, T1
Cable System, T6

Prior to engaging a target the T5 Tracker systematically scans the sky in search for targets—it is capable of detecting the presence of aircraft within a range of about 30 miles. This operation is performed entirely by the Remote Control Unit operator who observes the indications on a PPI scope (Plane Position Indicator Oscilliscope). Once the target to be engaged is selected the Romote Control Unit operator positions the tracker so that it points approximately at the target, and starts

TARGET SELECTOR, T1

tracking of the target. Once the tracking is started the operator's function is reduced to that of monitoring the operations. However, when IFF is provided, the Remote Control Unit operator makes the necessary challenges to assure himself that he is not engaging a friendly plane. Also, if another tracker or surveillance set is available, its presentation can be switched to the PPI scope in the Remote Control Unit thus assisting the operator in selecting the next target.

Two operators may ride the tracker while tracking a target so as to be ready to take over with manual optical or manual radar angular tracking whenever it appears that such operations will be more effective.

REMOTE CONTROL UNIT

The Remote Control Unit operator also has aided manual range tracking available in lieu of automatic tracking.

The Target Selector, T1, is provided for the purpose of quickly sighting the T5 Tracker on a target which can be observed visually.

The Computer, T18, receives the target's present position from the tracker and from such data continuously computes the correct firing data. The computer operator's functions have been reduced to:

a. Operating the smoothing circuit switch when the tracker is "on target" so as to settle the computer mechanisms quickly—a minimum settling time of six seconds is required.

b. Observing the computer outputs and informing the battery commander when firing data is such that the "commence firing" order may be given.

c. Reading the target speed meter and setting its reading on the fuze dead time corrector.

d. Observing target accelerations and switching curved flight prediction into operation when it becomes apparent that the target is not flying a straight line course.

Power for the director is obtained from generating units used with AA gun batteries.

PROCUREMENT SCHEDULE—1945-1946

Present authorized procurement is for the Marine Corps.

ROCKET MATERIEL

The modern military rocket was first developed to meet the increasing need for more fire power. Since its first use, its applications in both aerial and ground warfare have increased continually.

The principal advantage of the rocket is its complete absence of recoil. The absence of recoil permits the rocket launcher to be extremely light in design compared to artillery mounts. Hence, rocket launchers are much more mobile and easier to handle, and they can be moved into positions inaccessible to artillery of equivalent fire power.

Although rocket fire is not as accurate as artillery fire for the destruction of a point target rockets are ideal for use against an area target. Many launchers can be assembled rapidly at one point. They can be fired at a high rate, and then either reloaded or moved forward for a second salvo.

LAUNCHER, ROCKET, 2.36-inch, M18 (M9E2)

The M18 rocket launcher provides a two piece weapon which weighs approximately 1/3 less than the M9A1 launcher. This reduction in weight is accomplished by employing aluminum alloys in its fabrication. The M18 incorporates the new reflecting sight which is now standard for rocket launcher of 2.36-inch caliber. Other than weight, the military characteristics of the M18 are identical with the M9A1.

CHARACTERISTICS

Weight (of launcher)	10.5 lb.
Maximum range	600 yd.
Muzzle velocity	265 f/s
Weight (of rocket)	3.39 lb.
Weight (of rocket)	3.39 lb.
Length (assembled)	62 in.
Length (folded)	32 in.

PROCUREMENT SCHEDULE (in thousands)

1945					
Jul	Aug	Sep	Oct	Nov	Dec
2	7	7	7	6	5

LAUNCHER, ROCKET, 3.5-inch, T74

The Launcher, Rocket, 3.5-inch, T74 has been developed to provide a shoulder fired weapon with greater armor penetration than the 2.36-inch rocket launcher. This launcher, which weighs 15 pounds, is provided with a bipod and monopod to permit firing from an emplaced position against point targets as well as from the shoulder at targets of opportunity. This launcher incorporates a reflecting sight and an electrical firing mechanism.

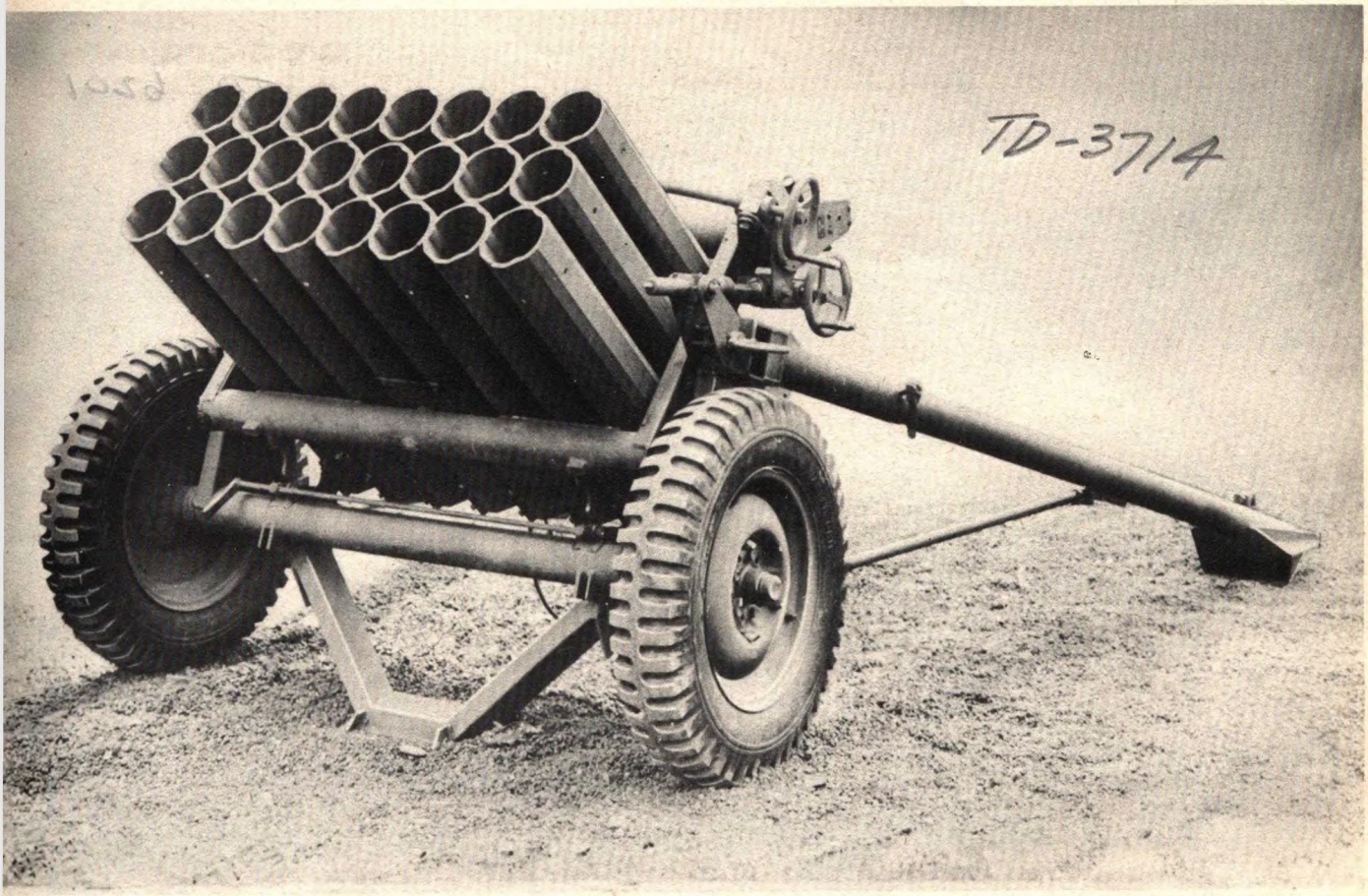
CHARACTERISTICS

Weight (of Launcher)	15 lb.
Maximum Range	1200 yd.
Muzzle Velocity	325 f/s
Weight (of rocket)	8¾ lb.
Length (assembled for firing)	62 in.
Length (assembled for carrying)	33 in.

PROCUREMENT SCHEDULE

Availability is dependent on action taken after Service Board test. There is no manufacturing program.

LAUNCHER, ROCKET, MULTIPLE, 4.5 inch, T66E2



This 24-tube launcher is mounted on a light two-wheeled carriage and can be towed by any standard military vehicle, including the ¼-ton 4x4 truck. Designed for rapid firing, this launcher can be placed in firing position quickly by two men. A front firing support and two spades at the ends of the trails give it stability.

The launcher tubes are made of aluminum and are 36 inches long. Each tube has three internal rails upon which the rocket rests. The launcher is muzzle loaded. The rear end of the rocket is inserted in the muzzle of the tube, and the rocket is pushed down as far as the backstop. In this position, two contacts on the launcher meet the contact rings on the rocket.

The firing mechanism issued with each launcher is a 10-cap blasting machine with a 50-foot firing cord. The blasting machine is connected to a firing box which contains a solenoid-operated switch. This switch fires the rockets at a rate of two each second.

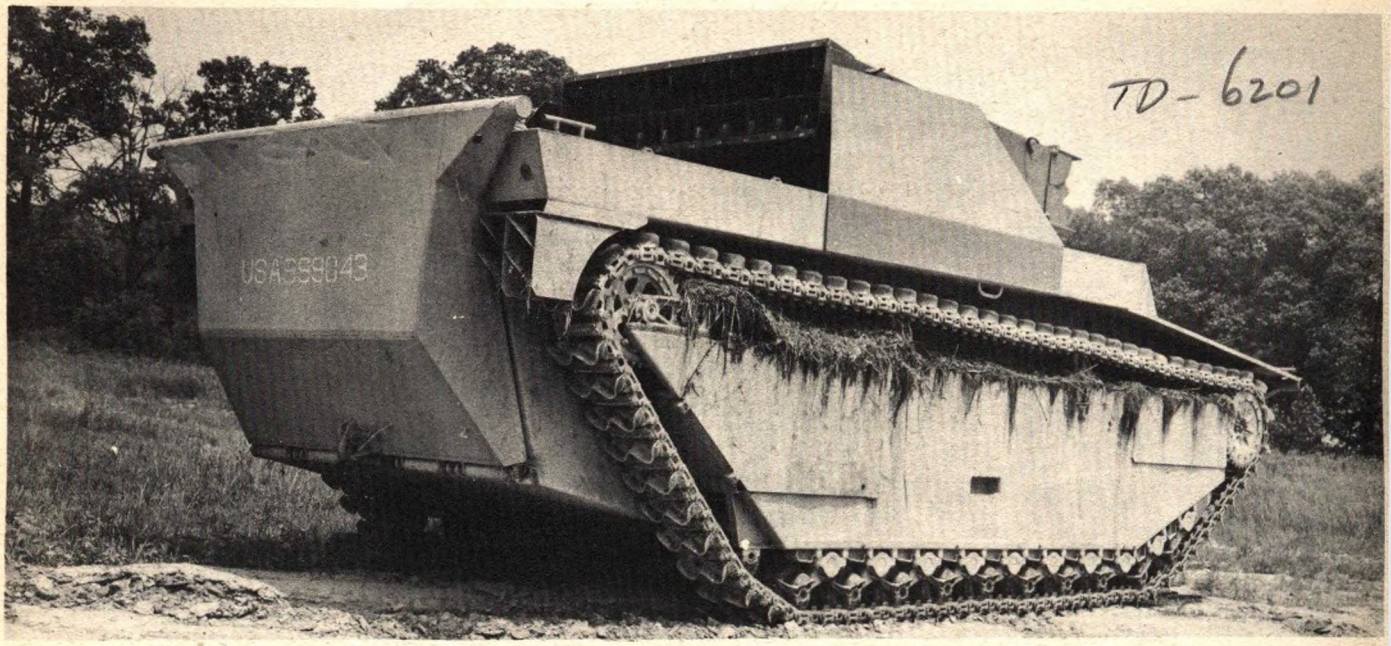
CHARACTERISTICS

Weight, of launcher	1,200 lb.
loaded with 24 rockets	2,220 lb.
Over-all length of launcher	10 ft.
Height of launcher (0° elevation)	43 in.
Number of tubes	24
Length of tubes	36 in.
Tire size	6:00 x 16
Tread	59 in.
Elevation	0° to 45°
Traverse	10° right to 10° left
Sight unit	T128E1
Instrument light	M42
Rockets fired	M16 (T38E3) and T39E3

PROCUREMENT SCHEDULE

1945							1946			
June	Jul	Aug	Sep	Oct	Nov	Dec	1st Q	2nd Q	3rd Q	4th Q
—	150	150	0	0	0	0	0	0	0	0

LAUNCHER, ROCKET, MULTIPLE, 7.2-inch, T54



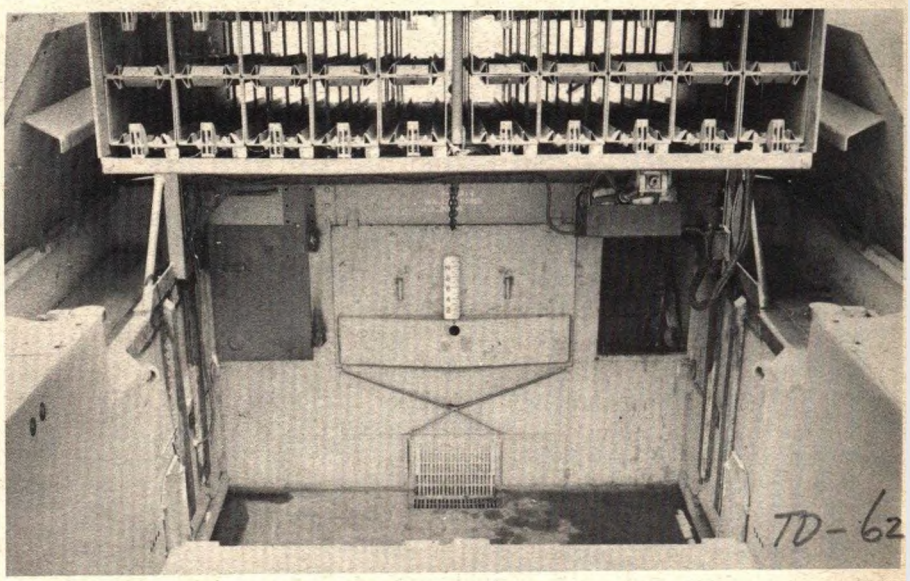
MOUNTED ON LVT (A) (4) — MAXIMUM DEPRESSION

The T54 Launcher was particularly designed for firing the Rocket, HE, 7.2-inch, T37 for demolition of beach barricades during landing operations. However, if sufficient blast protection is provided, it is also capable of launching 7.2-inch rockets with larger motors such as the T21 series. The launcher weighs approximately 6,000 pounds.

There are twenty sets of guiding rails (90 inches in length) in two banks of 10 rail sets each. They are mounted on channel iron supports welded to the inside walls of the cargo space of the LVT 4 craft.

This launcher has an elevation from —5° to 45° and traverse is effected by changing the course of the vehicle. The electrical firing mechanism allows selective single round or ripple fire (.3 sec. to 2 sec. intervals).

The switch controlling the elevation of the launcher and the quadrant provided are mounted in the cab of the vehicle. A wide range periscope is provided for sighting. This launcher provides armor plate protection against small arms fire on the bottom, sides and front end of the launcher rails. It also incorporates a rack for transporting 40 additional rounds of rocket ammunition.

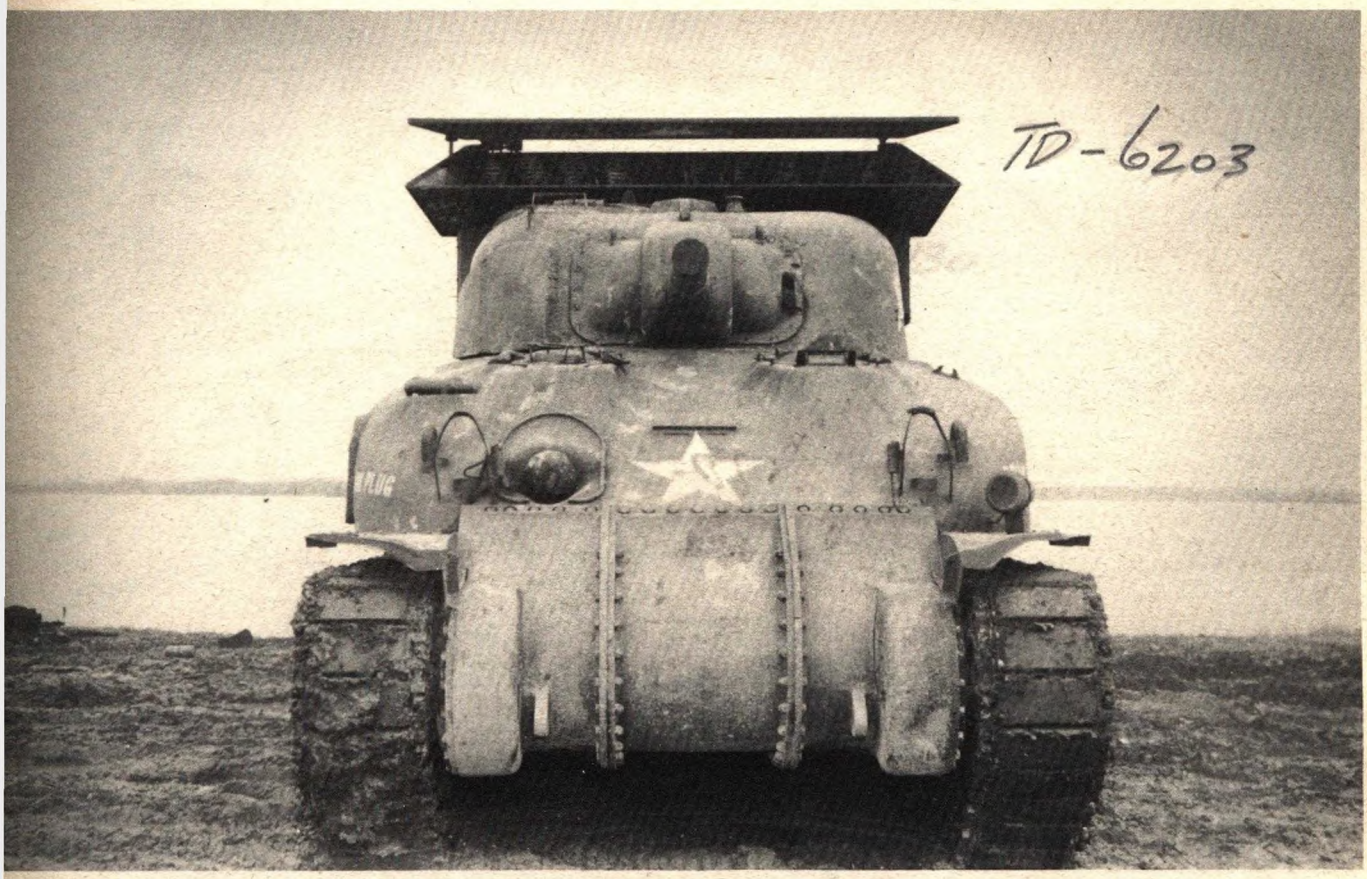


INTERIOR OF CRAFT

PROCUREMENT SCHEDULE

Pilot models have been satisfac torily tested. Procurement is de pendent upon requirements fron using arms or services. There is n manufacturing program.

AUNCHER, ROCKET, MULTIPLE, 7.2-inch, T73



LAUNCHER AT 0° ELEVATION WITH DOOR OPEN

This 10-rail, heavily armored launcher mounted on ırret of medium tank M4 series, was designed to re 7.2-inch demolition rockets with either 2.25-inch, 25-inch or 4.5-inch diameter motors. It is intended or use in demolition of walls, antitank obstacles and her fortifications. The launcher is jettisonable and perable with a minimum of interference with the nk gun. The launcher weighs approximately 4,000 ounds.

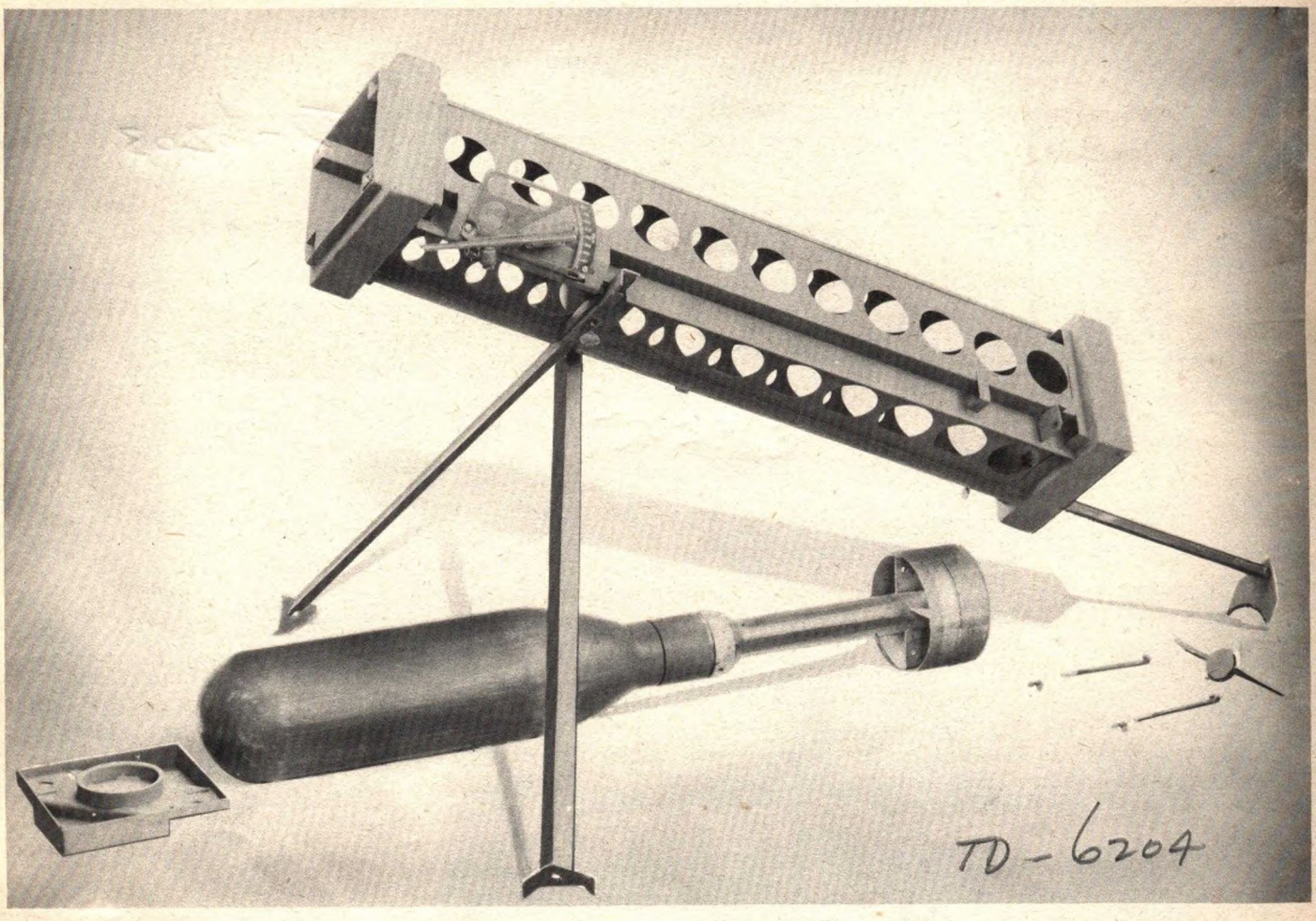
The ten sets of steel guiding rails (50 inches in ngth) are in one bank, protected with 1-inch armor n front and sides, and with ½-inch armor on top nd bottom.

The electrical firing mechanism is semi-automatic and the rate of fire controlled by the gunner, averages two rounds per minute. The launcher can be elevated from —5° to +45° and traversed 360° with the tank turret. Sighting equipment consists of the tank gun periscope or a separately mounted periscope.

PROCUREMENT SCHEDULE

Two pilot launchers have been manufactured and three additional pilots are being procured. There is no manufacturing program.

LAUNCHER, ROCKET, 7.2-inch, T91



LAUNCHER, ROCKET T91, 7.2" IN FIRING POSITION

This is a packing crate type launcher for the 7.2-inch Rocket, T69. The purpose is to provide a complete rocket and launcher assembly which can be set up close to targets such as pillboxes, walls, etc., and fired from a remote position. The rocket is a specially designed demolition charge and the launcher is expendable. The weight of the unloaded launcher is approximately 60 pounds and the rails are approximately 4 feet in length.

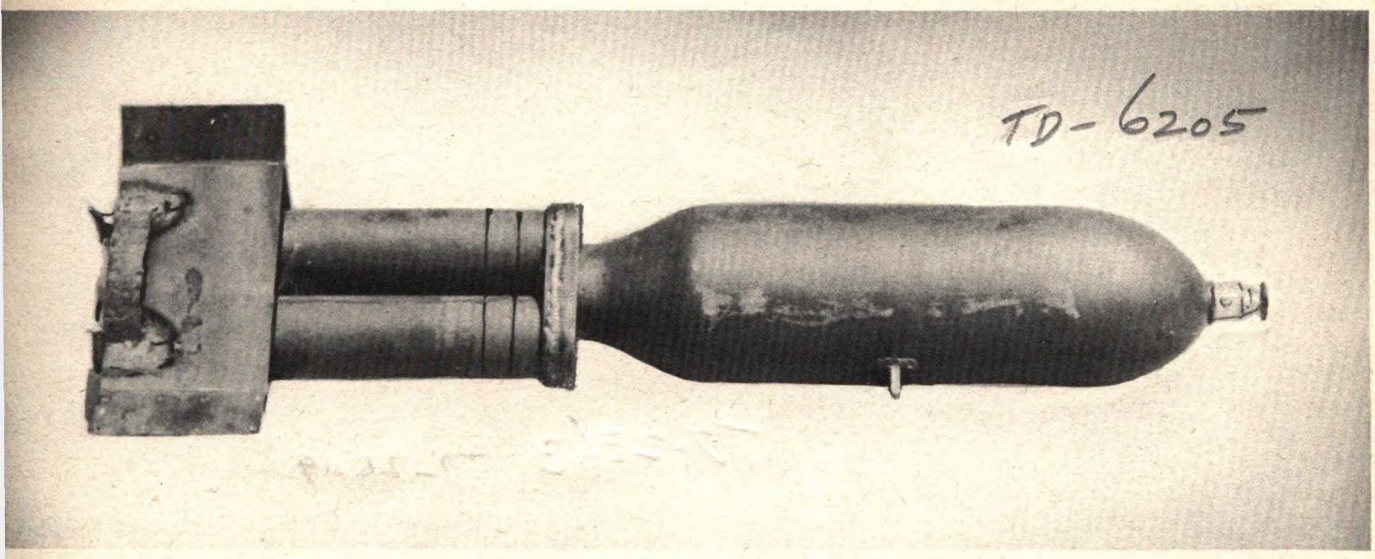
The crate is constructed of sheet metal and has angle iron internal guide rails. Two adjustable front legs and a rear stand allow elevations of 0° to 30°.

A Firing Kit consisting of a wood carrying case with 10-cap blasting machine, spool of extension wire, two stakes for staking down extension wire, and the sight and quadrant will be issued with each 10 to 15 rockets and launchers.

PROCUREMENT SCHEDULE

This item is currently undergoing proving ground tests. There is no manufacturing program.

UNIT, JET PROPULSION, T13



COMPLETE TRIMOTOR ROUND WITH M104 (MODIFIED) FUZE.

This unit was developed to equip a standard general ırpose 250 pound bomb with three 4.5 inch rocket otors for use against fortifications and caves.

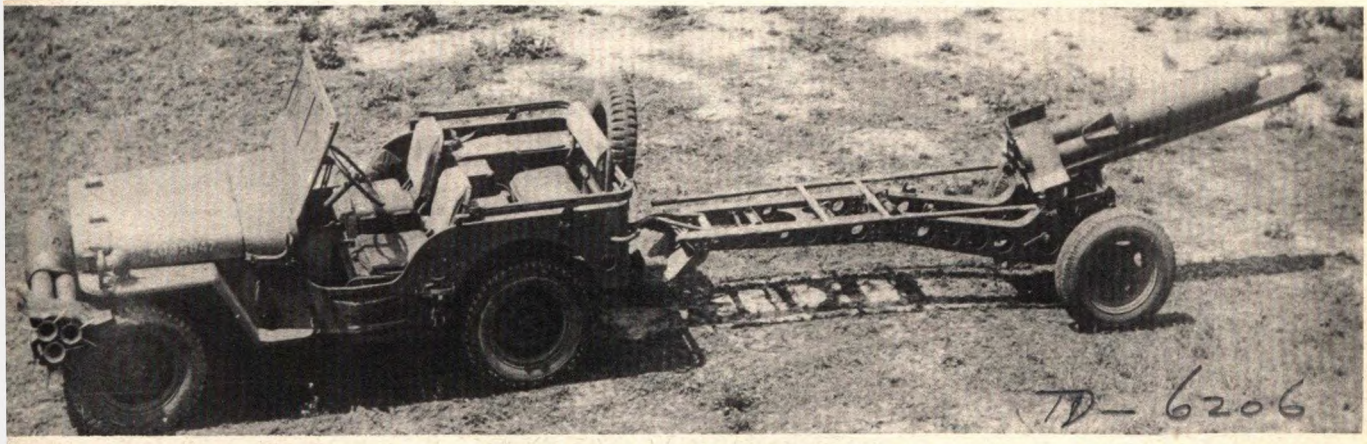
The standard 250 pound Bomb, AN-M57, is pro-lled by three 4.5 inch rocket motors, T22, mounted a common manifold. The bomb uses a point detonat-g fuze. The bomb with fuze when empty weighs 120 unds, with demolition charge it weighs 245 pounds. ıe rocket motors loaded with adapter and fin as-nbly weigh 95 pounds. The complete round weighs 0 pounds.

The bomb has a maximum range of 700 yards. At 0 yards it has a range dispersion of less than 15 rds and a lateral dispersion of approximately 5 yards. The striking velocity at maximum ranges is approximately 295 f/s. The bomb may be fired satisfactorily at temperature ranges from —20° F. to 120° F.

The launcher consists of a rail which can be attached to the 75mm Pack Howitzer Carriage. This unit has been successfully tested at the Rocket Board and Aberdeen Proving Ground.

PROCUREMENT SCHEDULE

It is expected that 5000 Units, Jet Propulsion, T13, will be procured under Limited Procurement. There is no manufacturing program.



JEEP WITH PACK HOWITZER LAUNCHER AND TWO ROUNDS OF TRIMOTOR BOMB. BOMB LITTER RIDES ON TRAIL.

ROCKET, HE, 4.5 inch, M16

The M16, formerly the T38E3 Rocket, is the basic high explosive, spin-stabilized round for use by ground troops. It is fired from multiple tube launchers such as the T66E2 against personnel and lightly fortified area targets. A point detonating fuze is employed which may be set for superquick or/.05 second delay action. With the delay setting the round will penetrate and detonate 10 to 20 feet beyond 3/8-inch armor plate or 8-inch of wood. An interesting feature of this round is the ignition of the propellant charge through the use of contact bands to which the igniter wires are attached.

CHARACTERISTICS

Weight, with fuze . . . . . 42.5 lb.
Length . . . . . 31 in.
Weight of bursting charge . . . . . 5.2 lb. (TNT)
Fuze—P.D. M48A2, with Booster M21A1 or Fuze, P.D., M81
Weight of Propelling Charge . . . . . 4.75 lb.
Service temperature limits . . . —20° to +120° F.
Maximum velocity (70° F.) . . . . . 830 f/s
Maximum range (45° elevation) . . . . 5,250 yd.

TERMINAL EFFECTS

Media	*Range*	*Penetration*
Med. earth	1000 yd.	9.3 ft.
Palm wood	1000 yd.	9.3 ft.
Pine, spruce	" "	6.9 ft.
Oak, ebony, mahogany	" "	4.6 ft.

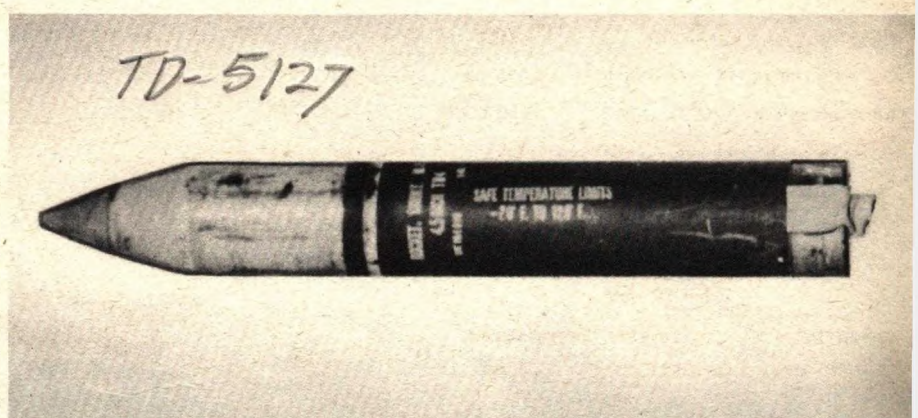
PRODUCTION SCHEDULE (in thousands)

1945						
June	Jul	Aug	Sep	Oct	Nov	Dec
165	200	210	200	200	200	210

1946			
1st Q	2nd Q	3rd Q	4th Q
330	330	330	336

ROCKET, SMOKE, (WP), 4.5 inch, T84

Designed as a companion round for the 4.5-inch spin-stabilized high explosive rocket M16, the T84 consists of the M16 rocket motor with a specially designed shell loaded with WP smoke. It is fired from multiple tube ground launchers against personnel in open areas or in lightly fortified positions. A point detonating super-quick fuze is used to give an instantaneous burst upon impact and obtain maximum dispersion of the white phosphorous.



CHARACTERISTICS

Weight, with fuze . . . . . 42.5 lb.
Length . . . . . 32 in.
Weight of filler . . . . . 6.0 lb. (WP)
Fuze . . . . . P.D. T36E1
Weight of propelling charge . . . . . 4.75 lb.
Service temperature limits . . . —20° to +120° F.
Maximum velocity (70° F.) . . . . . 830 f/s
Maximum range (45° elevation) . . . . 5,250 yd.

PROCUREMENT SCHEDULE

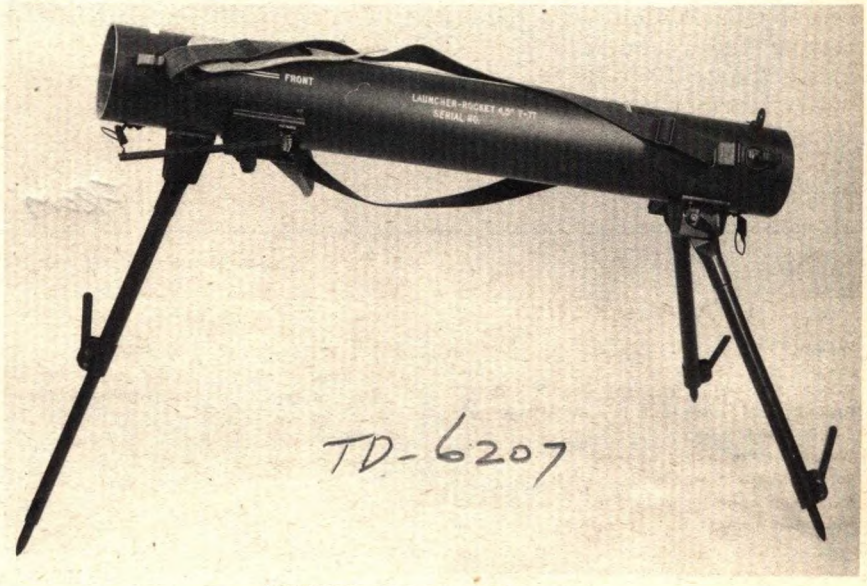
Ordnance Committee action is being taken to adopt the T84 Rocke as "Limited Procurement Type and schedule production of 25,00 rounds to fill present requirements There is no manufacturing pro gram.

ROCKET, HE, 4.5-inch, M20

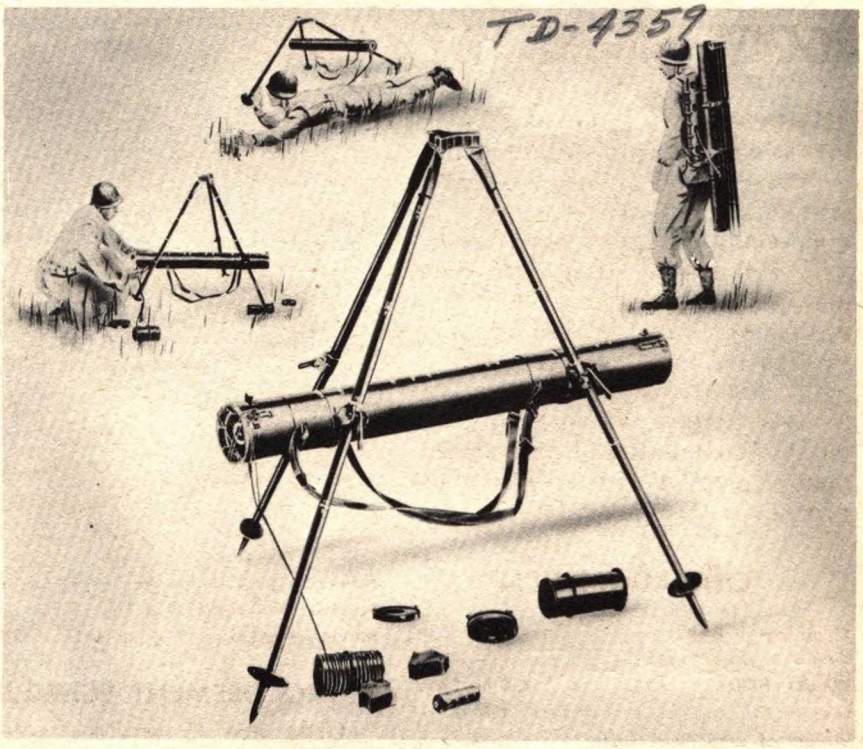
The M20 is a modification of the basic Rocket M16 to adapt it to firing from the single tube launcher M12A1 and differs from the M16 Rocket in that the igniter wires in the T38E7 are brought out through the closure disc in the nozzle plate and fastened to the one end of the firing cable. A point detonating fuze is employed which may be set for superquick or .05 second delay action. The M20 Rocket is packed, stored, and issued in the M12A1 Launcher and the entire assembly handled as one item of ammunition, the launcher being expendable after firing.

An improved launcher with a tripod mount, the T77, is currently undergoing Service Board tests.

ROCKET, HE, 4.5-INCH, M20



LAUNCHER, ROCKET, 4.5-INCH, T77



LAUNCHER, ROCKET, 4.5-INCH, M12E2

CHARACTERISTICS

Weight with fuze . . . . . 42.5 lb.

Length . . . . . 31 in.

Weight of bursting charge . . . . . 5.2 lb. (TNT)

Fuze—PD, M48A2, with Booster, M21A1 or Fuze, PD, M81

Weight of propelling charge . . . . . 4.75 lb.

Maximum (range (45° elevation) . . . . . 5,250 yd.

Maximum velocity (70°) . . . . . 830 f/s

Service temperature limits . . . . —20° to +130° F.

TERMINAL EFFECT

See page **68**

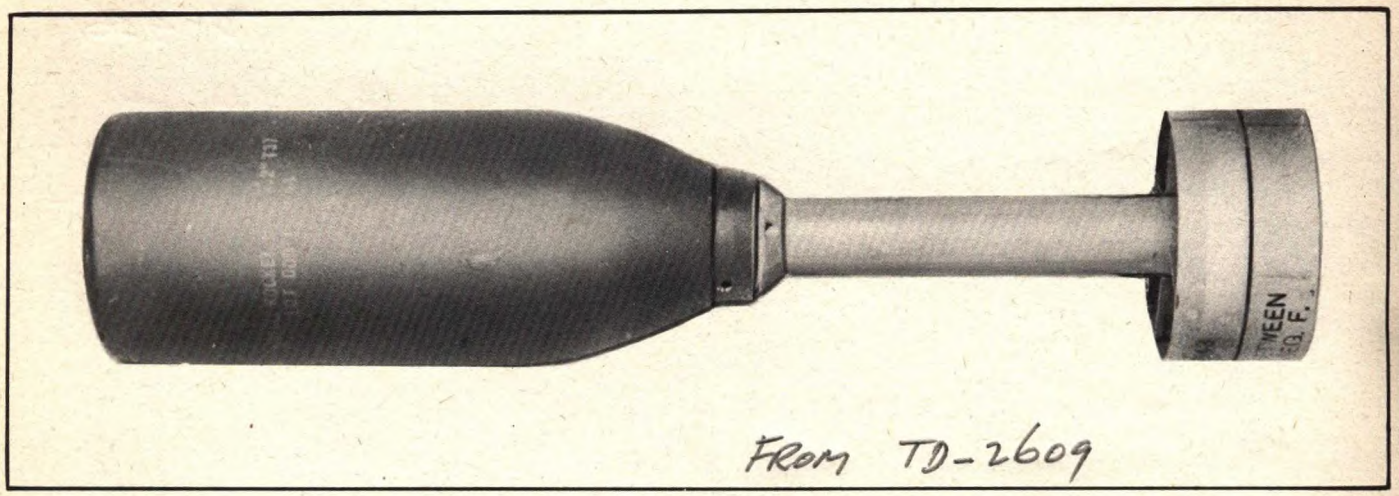
ROCKET, HE, 4.5", M20 (T38E7) W/LAUNCHER, 4.5-INCH, M12A1 (M12E2)

PROCUREMENT SCHEDULE (in thousands)

1945						
June	Jul	Aug	Sep	Oct	Nov	Dec
6	6	6	6	6	6	4

1946			
1st Q	2nd Q	3rd Q	4th Q
12	12	12	14

ROCKET, HE, 7.2 INCH, T37



7.2 INCH H.E. ROCKET, T37

The 7.2 inch HE Rocket, T37, is loaded with plastic HE and consists of the Navy 2.25 inch Mk. 3 rocket motor and Navy 7.2 inch Mk. 10 shell. It is intended for use in the demolition of fortifications.

CHARACTERISTICS

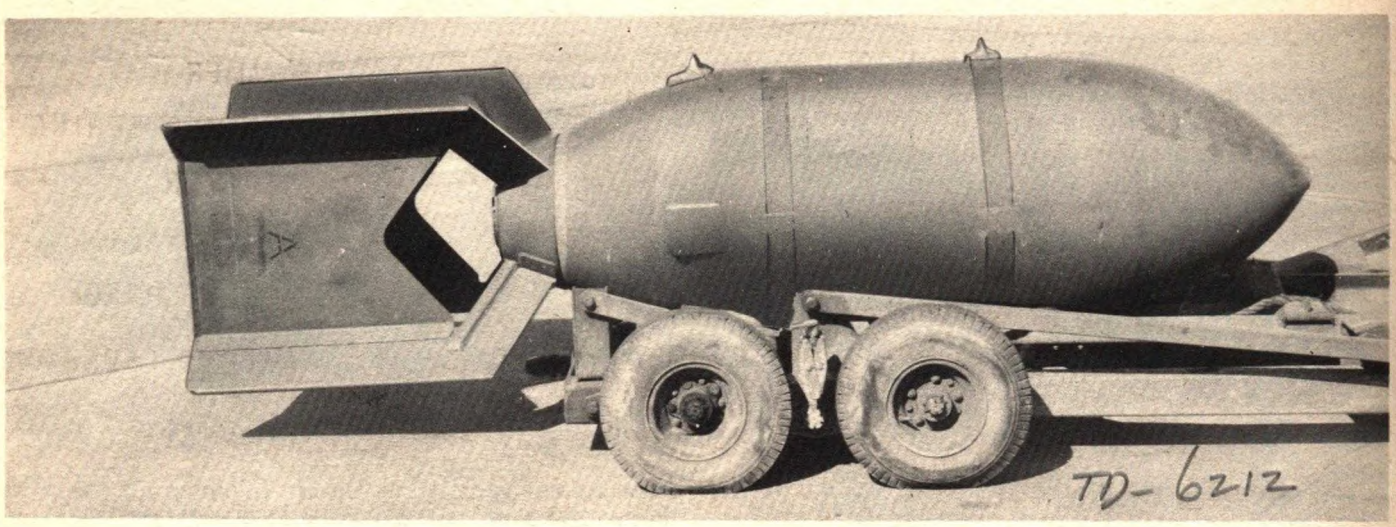
Range ..... 230 yd.
Dispersion ..... 10 mils (average) from 90 in. launcher
Velocity ..... 160 f/s
Service temperature limits ..... 10° to 120° F.
Burning time:
  At 10° F. ..... 0.6 sec.
  At 120° F. ..... 0.2 sec.
Type of stabilization ..... Fixed ring shroud fins
Length, overall ..... 35 in.
Weight of round, loaded ..... 61 lb.
Fuze ..... B.D. Mk. 146, pressure-arming type
Motor assembly:
  Diameter, outside ..... 2.25 in.
  Length ..... 15.9 in.
  Weight (less propellant) ..... 9.7 lb.
  Material ..... Navy Mk. 3 motor
Propellant:—1.5 lb. cruciform solventless powder grain, 1.7 in. O.D. by 0.44 in. I.D. by 11.3 in. long.
Type of loading ..... One stick held in place by grid
Shell assembly:
  Caliber ..... 7.2 in.
  Length ..... 19 in.
  Filler C2
  Weight, filler ..... 32 lb.
  Weight, total ..... 48.1 lb
Type of ignition:—Flat plastic case containing black powder and electric squib placed at head end of motor
Launchers M17, T40, T54, T73
Packaging:—Motor and shell packed separately. Two shells fuzed, and two motor adapters packed in wooden box. Six motors packed per wooden box

PROCUREMENT SCHEDULE

Manufacture completed. 40,000 on hand as of 26 May 1945. There is no manufacturing program.

AMMUNITION

BOMB, GP, 4000 POUND, T8



This bomb is of the conventional general-purpose design equipped with a box-type fin assembly. The bomb body is 28 inches in diameter and 85½ inches in length and contains approximately 1950 pounds of explosive. Its over-all length with fin assembly is 117½ inches.

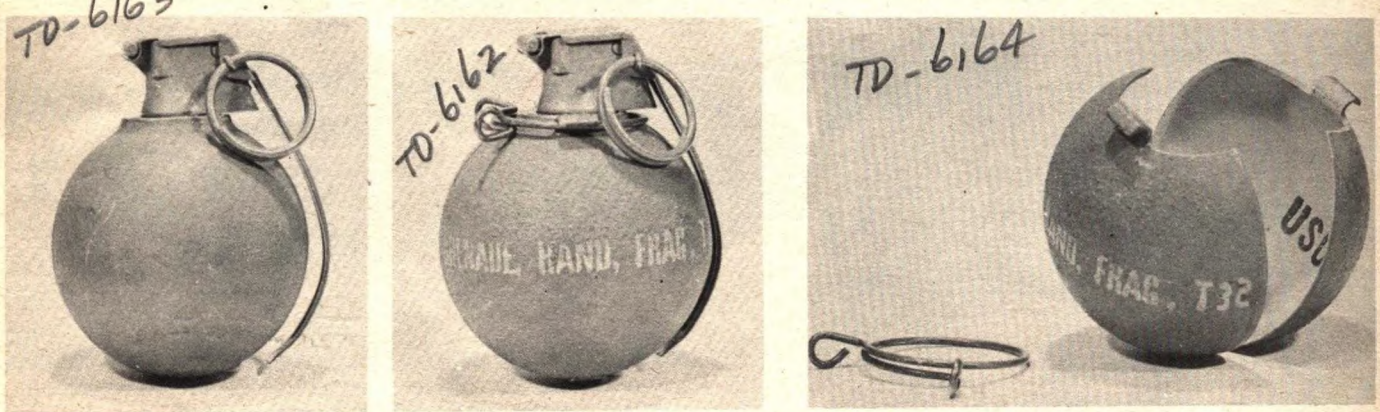
This bomb may be equipped with either instantaneous or delay nose and tail fuzes of standard design. The usual arming wire permits the bomb to be dropped safe, if desired.

This bomb was intended to be carried on the larger types of bombing aircraft and is for use against targets that would not be vulnerable to general purpose bombs of smaller size.

PROCUREMENT SCHEDULE

This bomb is now undergoing development tests. There is no manufacturing program.

GRENADE, HAND, FRAGMENTATION OR OFFENSIVE, T32 WITH FUZE, T1005



LEFT TO RIGHT, GRENADE, HAND, OFFENSIVE, T32; GRENADE, HAND, FRAGMENTATION, T32; FRAGMENTATION CASE

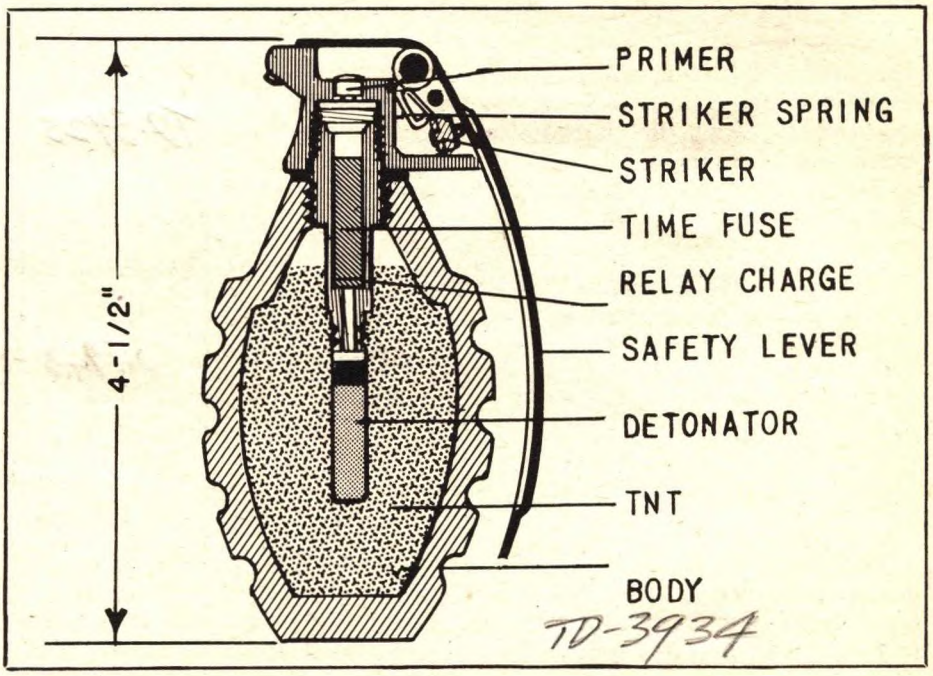
The T32 grenade is a combination fragmentation and offensive grenade, consisting of a spherically shaped magnesium alloy body loaded with high explosive and a two-piece steel fragmentation case which incloses the body. The main charge consists of approximately 7 ounces of RDX Composition "B". A complete round, loaded and fuzed, with fragmentation case weighs about 22½ ounces; without fragmentation case, about 15½ ounces. The T32 was originally developed as an offensive grenade T15 to replace the Mk III Offensive Grenade. A removable steel fragmentation case issued on each grenade makes it effective for use as either a fragmentation or an offensive grenade. The T1005 fuze for the T32 grenade is a lever type with a 4 to 5 second delay element, and operates similarly to the M204 fuze for the Mk II grenade.

PROCUREMENT SCHEDULE—1945 (in thousands)

June	July	Aug.	Sept.	Oct.	Nov.	Dec.
—	—	10	30	50	50	60

GRENADE, HAND, FRAGMENTATION, MK II WITH FUZE, M204 (T2E1)

This is a standard TNT loaded MK II grenade with an improved fuze. The improved fuze, M204, resembles the M6A4C hand grenade fuze in appearance except for the method of attaching the safety lever to the top of the fuze. This fuze is a detonating type and contains a 4 to 5 second delay element. It is issued completely assembled to the standard MK II hand grenade and is used in the same manner as the M6A4C. An important characteristic of the fuze is its smokeless, sparkless and comparatively noiseless operation.



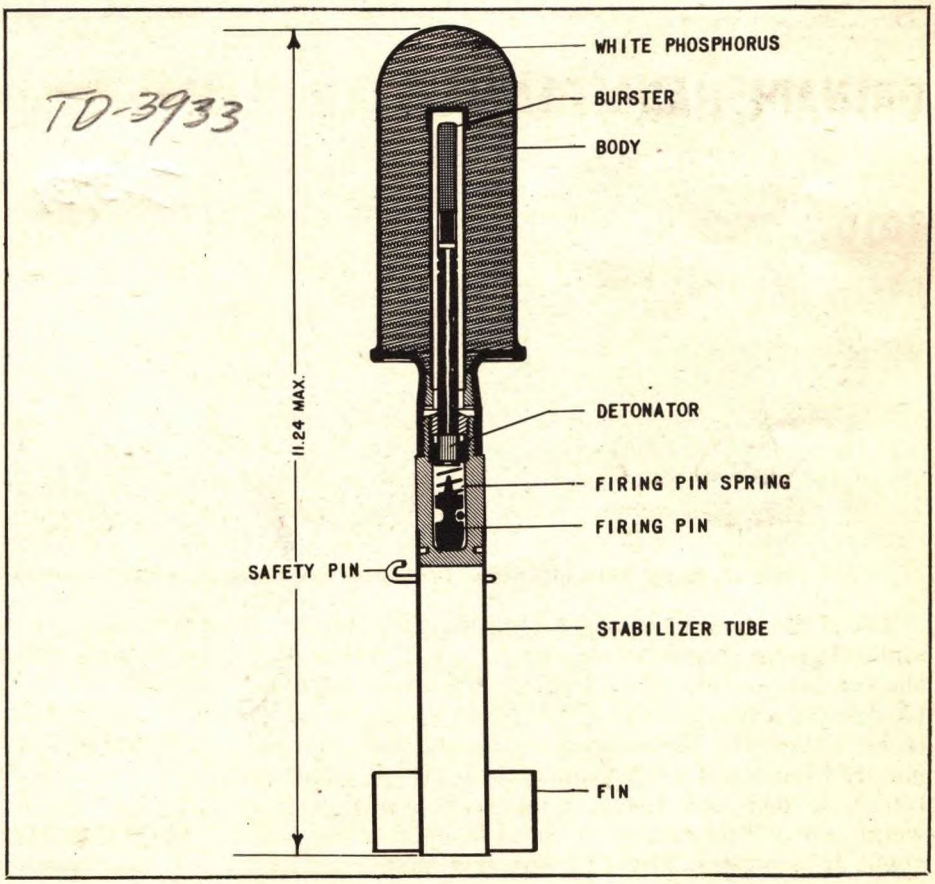
PROCUREMENT SCHEDULE (in millions)

1945						
June	July	Aug.	Sept.	Oct.	Nov.	Dec.
4	4	4	4	4	3	3

1946			
1st Q	2nd Q	3rd Q	4th Q
9	9	9	8

GRENADE, RIFLE, SMOKE, WP, M19 (T5E1)

This grenade is designed primarily for producing a smoke screen, but it is effective against personnel, particularly in foxholes, bunkers, and pillboxes. It is somewhat similar in appearance to the M9A1 AT Grenade and is filled with 8.5 ounces of White Phosphorus. The fuze functions instantaneously on impact, bursting the grenade and dispersing burning white phosphorus over an area having a radius of approximately ten yards.



PROCUREMENT SCHEDULE 1945-1946 (in thousands)

1945						
June	July	Aug.	Sept.	Oct.	Nov.	Dec.
180	50	50	50	50	50	30

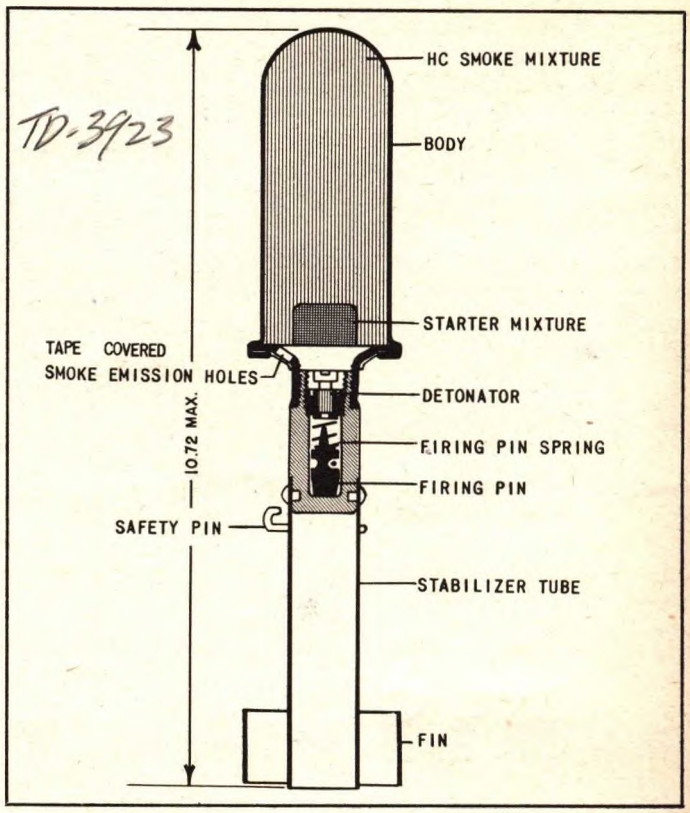
1946			
1st Q	2nd Q	3rd Q	4th Q
300	300	300	382

GRENADE, RIFLE, SMOKE, HC, M20 (T6E1)

This grenade is designed exclusively for screening purposes. It is similar in appearance to the M19 WP rifle grenade, and is filled with 10.8 ounces of HC smoke mixture. The fuze functions on impact and ignites the smoke mixture. The smoke mixture burns for approximately one minute, giving off a dense white smoke through the emission holes in the base of the grenade body.

PROCUREMENT SCHEDULE

No production scheduled—551,000 previously manufactured.



GRENADES, RIFLE, SMOKE

RED, M22 (T8E1)

YELLOW, M22

GREEN, M22

VIOLET, M22

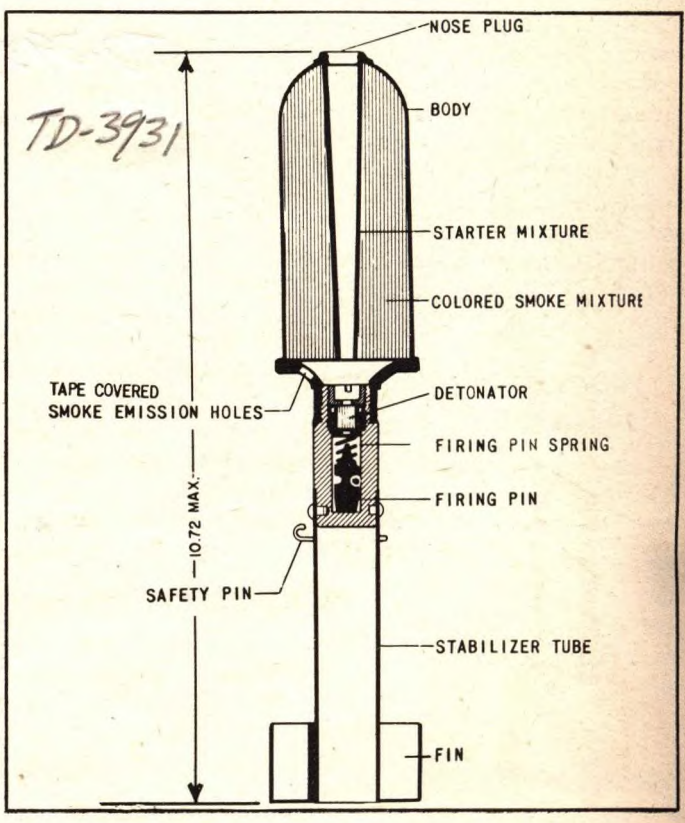
These grenades are designed exclusively for signaling. The grenade is filled with approximately 7 ounces of colored smoke mixture which is ignited on impact and burns for 45 seconds, giving off a dense colored smoke through the emission holes in the base of the grenade head.

PROCUREMENT SCHEDULE
1945-1946 (in thousands)

1945						
June	July	Aug.	Sept.	Oct.	Nov.	Dec.
20	20	25	23	10	10	1

1946			
1st Q	2nd Q	3rd Q	4th Q
120	22	0	0

The above quantities include all 4 colors.



GRENADES, RIFLE, SMOKE

RED, STREAMER, T12

GREEN, STREAMER, T12

VIOLET, STREAMER, T12

YELLOW, STREAMER, T12

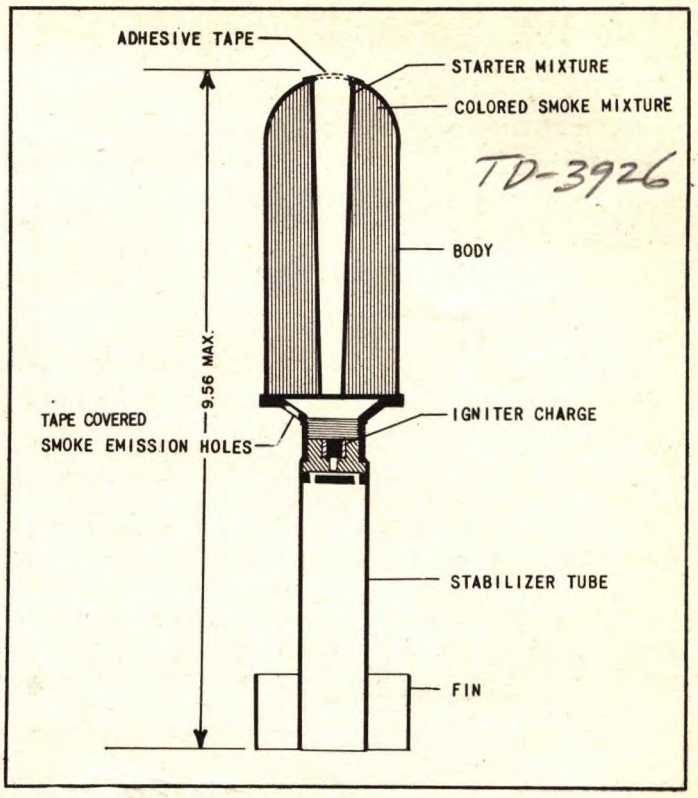
These grenades are designed exclusively for signaling. The grenade is filled with approximately 7 ounces of color smoke mixture which is immediately ignited by the grenade cartridge upon firing from a rifle or carbine and gives off a continuous colored smoke trail throughout its flight for ground-to-air and ground-to-ground signaling. This item is in limited procurement.

PROCUREMENT SCHEDULE (in thousands)

1945						
June	July	Aug.	Sept.	Oct.	Nov.	Dec.
80	95	95	90	80	80	80

1946			
1st Q	2nd Q	3rd Q	4th Q
72	0	0	0

The above quantities include all 4 colors.



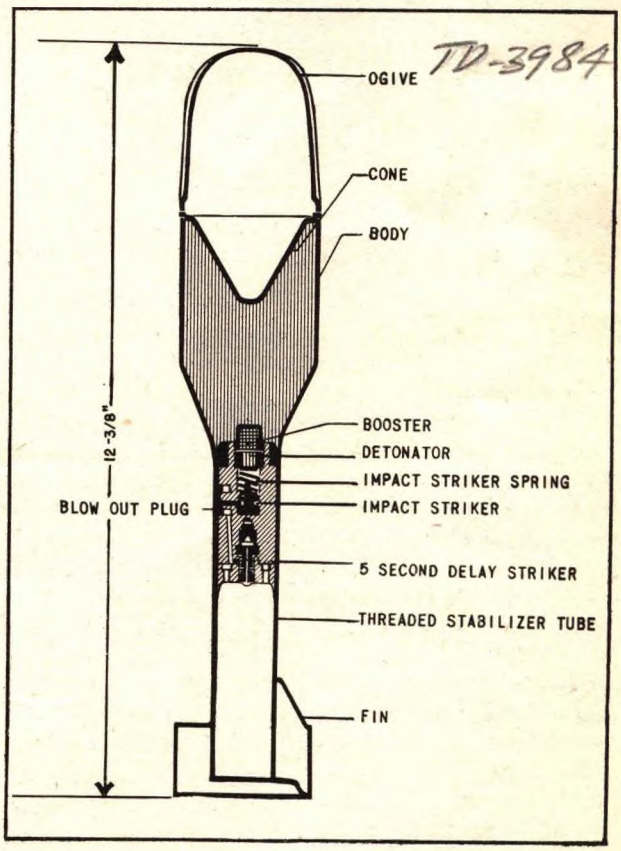
GRENADE, RIFLE OR HAND, HEAT, T16, WITH FUZE, GRENADE, T13

TD-4940

The T16 grenade is designed to be used for the same purpose as the M9A1 AT grenade and as a substitute for the MkII hand grenade. Its main explosive charge is nearly twice as large as that in the M9A1 and should result in greater armor plate penetration and better anti-personnel fragmentation. The fuze is designed to permit either hand or rifle projection of the round. For hand use, a five second delay fuze is actuated. For rifle use either a 5 second air-burst or an impact action may be selected. Whenever the grenade is used as a rifle grenade, an independent 10 second self-destroying feature is actuated. Both the 5 and 10 second delays burn without noise, sparks or smoke.

PROCUREMENT SCHEDULE

This development item is still in an experimental stage. Its availability will depend on the results of Ordnance and Service Board tests. There is no manufacturing program.

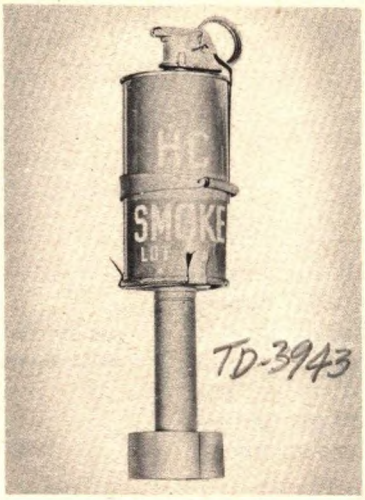


ADAPTER, GRENADE PROJECTION, CHEMICAL, M2 (T2E1)

The M2 adapter, formerly known as the T2E1, is designed for use with the chemical hand grenades listed below, permitting their projection as rifle grenades:

Grenade, Hand, Gas, Irritant (CN-DM), M6
Grenade, Hand, Gas, Irritant (CN), M7
Grenade, Hand, Smoke (HC), AN-M8
Grenade, Hand, Incendiary, AN-M14
Grenade, Hand, Smoke (Colored), M16
Grenade, Hand, Smoke (Colored), M8

The adapter consists of two primary parts, a snap-on stabilizer assembly and a metal set-back band. Any of the above listed grenades may be fitted base down into the three clips of the stabilizer assembly. The set-back band is positioned around the body of the grenade over the fuze safety lever, and serves to hold the lever in a safe position after removal of the fuze safety pin. Upon firing, the set-back band releases the safety lever and functions the fuze.

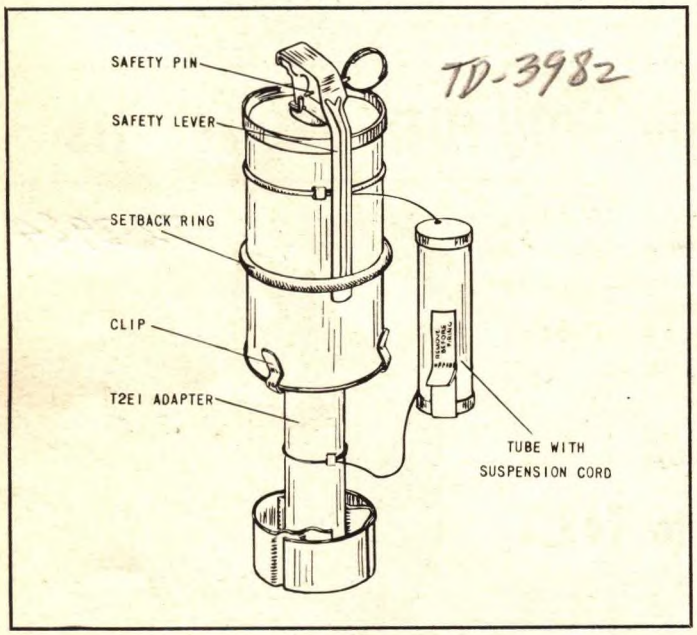


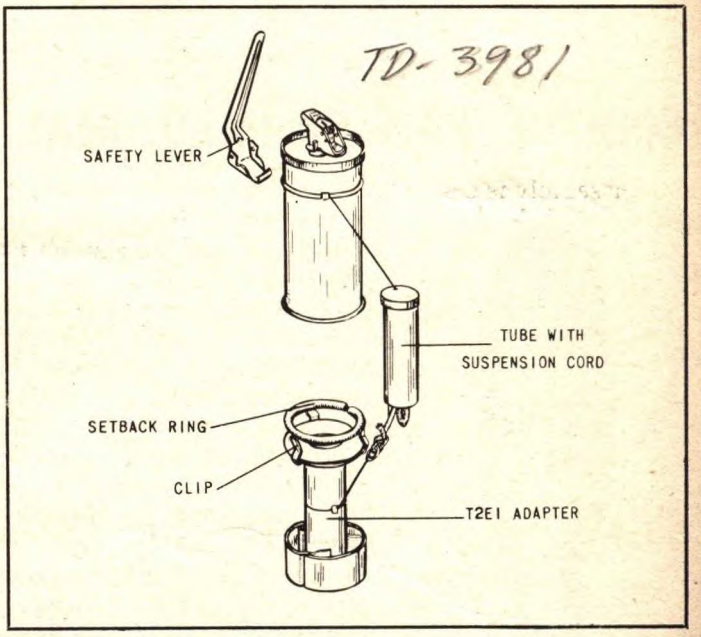
PROCUREMENT SCHEDULE
(in thousands)

1945						
June	July	Aug.	Sept.	Oct.	Nov.	Dec.
0	0	10	20	50	50	48

1946			
1st Q	2nd Q	3rd Q	4th Q
150	150	150	150

SUSPENSION DEVICE, TREE, T20, FOR SMOKE GRENADES





This device is used to suspend colored smoke grenades in tree tops and in other foliage for more effective ground-to-air signaling in heavily wooded areas. It is designed for use with the M2 adapter and an M8, M16 or M18 smoke hand grenade. The grenade, the adapter and the tree suspension device are assembled prior to use, and the entire unit is fired from the launcher in the same manner as a rifle grenade. Upon firing, the assembly is projected forward and the set-back ring strikes the clips of the adapter sharply, spreading them and thus separating the grenade from the adapter. In flight the grenade draws away from the adapter, pulling the cord out of the tube. The two travel together separated by the length of wire which easily becomes entangled in tree foliage, thus suspending the smoking grenade.

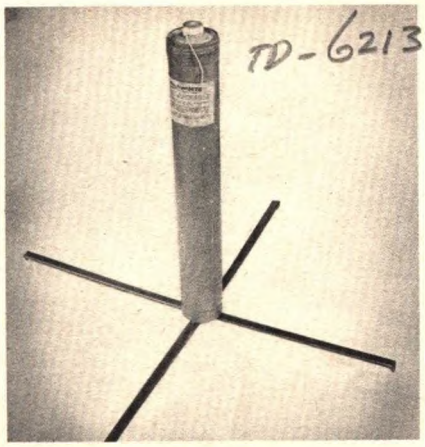
It is expected that a procurement of 25,000 will be approved and the item standardized.

TENTATIVE PROCUREMENT SCHEDULE
(in thousands)

1945						
June	July	Aug.	Sept.	Oct.	Nov.	Dec.
0	0	0	5	10	10	0

FLARE, AIRPORT, M76

This item comprises a cardboard tube 4¼ inches in diameter by 31½ inches long into which is pressed the luminant composition. At the upper end of the tube there is fastened the igniter assembly which provides for either manual or electrical ignition. The manual ignition is accomplished by pulling a firing ring and allowing a cocked firing pin to strike the primer. At the base of the flare are four recesses to accommodate leg supports which are shipped attached to the flare to give it rigidity during functioning. These leg supports are 20 inches long and extend at right angles to the axis of the flare. The flare burns for 5 to 6 minutes giving a yellow light of approximately 700,000 candlepower.



This item was designed to be used on airports when visibility is limited to indicate the ends of runways or in certain cases for complete illumination.

PROCUREMENT SCHEDULE

Approximately 16,000 available as of 1 July 1945. No further production is scheduled.

SIGNAL, DISTRESS, 2-STAR, RED, M75

This item comprises a metal cylinder approximately 5 inches long by 1⅛ inches in diameter closed at the end by a screwed cap and sealed at the other end. Inside the container is the ignition device and the pyrotechnic assembly which is very similar to a two star Roman Candle. When the store is to be used the metal cap is unscrewed and the pull wire assembly is extended and with the signal held firmly and clear of the body the pull wire assembly is sharply drawn at right angles to the signal. The removal of the pull wire allows the firing pin to strike the primer and ignite the first delay element while at the same time ejecting the igniter holder assembly. After a delay of 2 seconds the first star is ejected to an altitude of 200 feet. This star burns for six to eight seconds emitting a brilliant red light of approximately 12,000 candlepower while falling freely. Three seconds after the first star a second star is ejected which functions in the same manner. The signal is visible for about 2 to 3 miles in the daytime and for about 10 to 12 miles at night.

The signal was designed for use in emergency life rafts and in life vests.

PRODUCTION SCHEDULE

(in thousands)

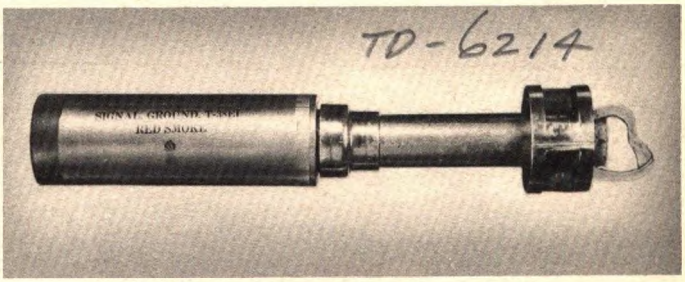
1945			
June	July	Aug.	Sept.
150	150	150	77

SIGNALS, GROUND, SMOKE, T38E1 to T42E1

This item comprises a standard ground signal case and a filling of six smoke pellets which, on burning, produce streams of colored smoke. The round is fired from a standard rifle grenade launcher attached to either the rifle or the carbine using the standard grenade launching cartridge. When fired the signal is projected to an altitude of approximately 550 feet whence the time fuze ignites the expelling charge which in turn expels and ignites the six smoke pellets. These pellets, on burning, emit a stream of colored smoke as they fall freely to the earth. The streams persist for about 35 to 40 seconds depending on wind velocities.

The item was developed to be used as a ground to ground or ground to air signal for ranges of approximately 2 to 3 miles during the daytime. The items are designated as follows:

Signal, Ground, Smoke, Red, T38E1
Signal, Ground, Smoke, Orange, T39E1



Signal, Ground, Smoke, Yellow, T40E1
Signal, Ground, Smoke, Green, T41E1
Signal, Ground, Smoke, Violet, T42E1

PRODUCTION SCHEDULE

The items have been recommended for Limited Procurement and it is expected that it will be available in limited quantities by September 1945. There is no manufacturing program.

RIFLES, LAUNCHERS AND AMMUNITION

CARBINE, CAL. .30, M2

In order to meet the requirement for increased fire power in the carbine, a redesign of the carbine was made to permit selective semi- and full-automatic fire by means of a change lever. This increase in fire power was accomplished by modifying the M1 Carbine to include seven new additional manufacturing components; two new components to replace old, and five modified components. The principle of operation in semi-automatic fire is the same as that of the M1 Carbine. Full automatic fire is accomplished by a sear trip actuated by the movement of a sear trip lever cammed downward during the free travel of the operating slide after the bolt is closed.

A new thirty round, curved, box magazine, double row type, has been developed which operates satisfactorily in the M1 or M2 Carbine. This magazine is loaded and used in the same manner as the standard magazine.

CHARACTERISTICS

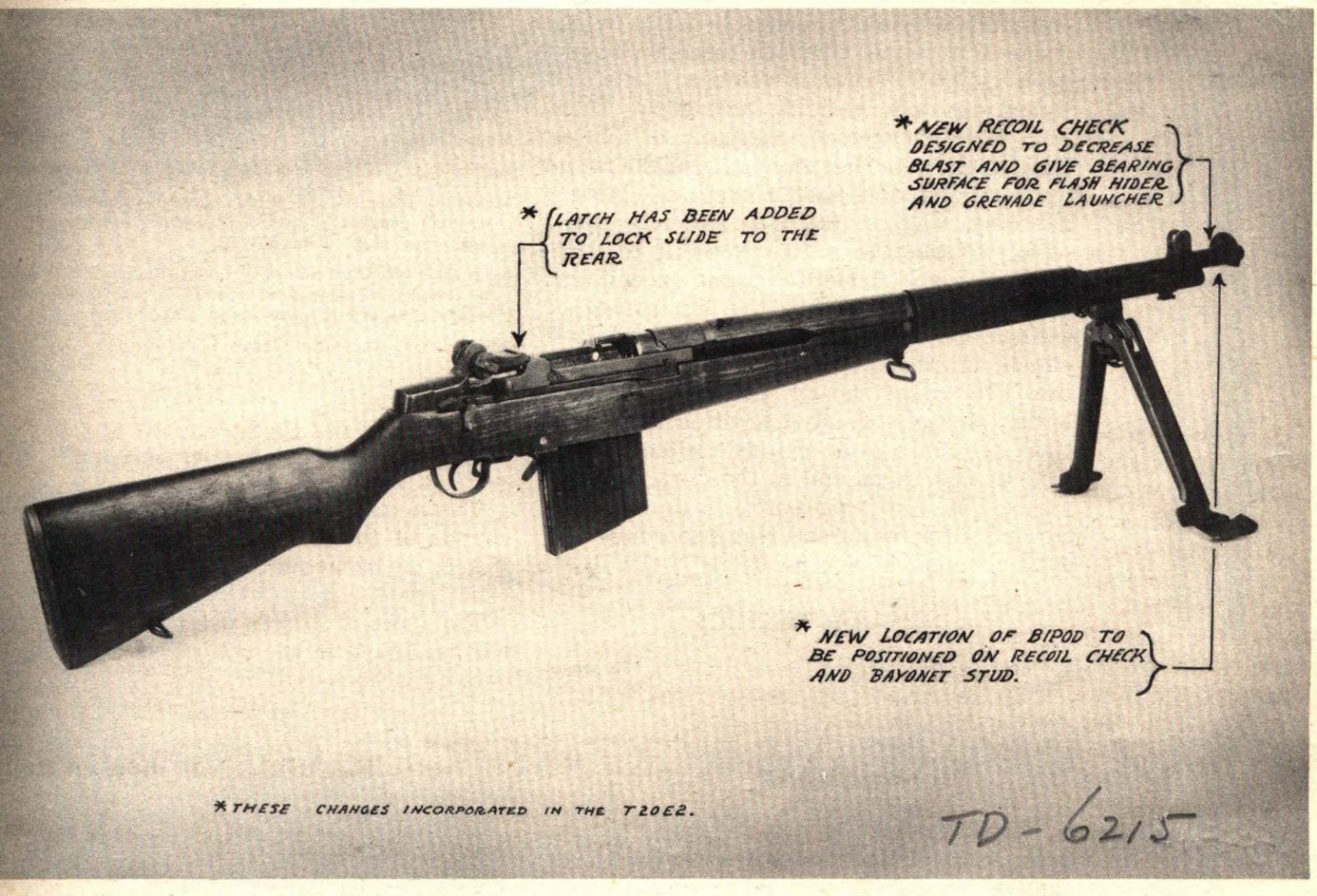
Weight	5 lb. 3.19 oz. (M1 Carbine 5 lb. 1.85 oz.)
Length, over-all	35.6 in.
Feeding Device	Magazine
Weight of magazine	30 round, empty—.17 lb.
	30 round loaded —.59 lb.
Rate of fire full automatic	750-775 rounds per minute
Sight	Adjustable

Over-all dimensions and specifications are the same as for the Carbine, M1

PROCUREMENT SCHEDULE (in thousands)

1945							1946		
June	Jul	Aug	Sep	Oct	Nov	Dec	1st Q	2nd Q	2nd Half
102	107	115	120	124	119	125	273	273	504

RIFLE, CALIBER .30, T20E2



In order to meet the requirement for increased fire-power in a shoulder rifle, the M1 Rifle was redesigned to permit selective semi- and full-automatic fire. The design is such as to utilize approximately 75% of the M1 Rifle tooling and 50% of the standard manufacturing components. The selector is located in the rear right side of the receiver and is a rotary type. Full-automatic fire is accomplished by a sear trip actuated by the movement of a sear trip lever cammed forward during the free travel of the operating slide after the bolt is closed. The rifle is equipped with a recoil check to minimize climb in automatic fire. Accessories for this weapon are the M1 Bayonet, a flash hider, a grenade launcher which functions the same as the M7A1 Launcher, and a light bipod.

MILITARY CHARACTERISTICS

Weight of Gun (less Magazine, bipod, and sling)	9 lb. 10 oz.
Weight of gun with 20 round magazine, bipod and sling	11 lb. 13 oz.
Magazine Capacity	20 rd.
Cyclic Rate	630 r.p.m.
Over-all Length	44.9 in.

PROCUREMENT SCHEDULE — 1945 — 1946
(in thousands)

1945	0	1946 Apr.	20
1946 Jan.	1	1946 May	20
1946 Feb.	5	1946 June	20
1946 Mar.	14	1946 Jul.	20

CARTRIDGE, ARMOR PIERCING-INCENDIARY, CALIBER .30, T15

TD-6216

The T15 cartridge combines armor piercing and incendiary characteristics which make the round effective against targets such as lightly armored vehicles, boats, low flying aircraft, gasoline and diesel fuels, and certain types of ammunition dumps. The penetration characteristics of the round approximate those of Cartridge, Armor Piercing, Caliber .30, M2. The incendiary effects of the T15 are comparable to those of Cartridge, Armor Piercing-Incendiary, Caliber .50, M8 within the limitations of caliber. Under conditions where the target effects ignition of the incendiary element, the T15 round is an excellent spotting bullet, since the flash at ignition is of sufficient brilliance to be plainly visible in daytime at 600 yards and in the dark at 1,000 yards. The T15 is presently in limited procurement for manufacturing procedure and establishment of specifications.

CHARACTERISTICS

Bullet
- Weight ..... 156 grains
- Jacket ..... gilding metal
- Core . . . manganese-molybdenum steel; weight, 82 grains
- Incendiary charge ..... 4 grains
- Base filler ..... lead

Complete round:
- Weight ..... 400 grains
- Case ..... brass

Muzzle velocity ..... 2800 f/s

Accuracy ..... 15 inch mean radius at 600 yards range

Incendiary efficiency: In field tests, diesel fuel, automotive and aviation gasoline in metallic containers protected by ¼ inch armor plate, were ignited.

Penetration efficiency: Averages not less than 0.42 inch depth of penetration when fired against ⅞ inch homogeneous armor plate at 100 yards range, normal impact.

Identification: Aluminum colored bullet tip.

PROCUREMENT SCHEDULE

The manufacture of a total of 10,100,000 rounds of the T15 cartridge has been initiated, to be available the last quarter of 1945.

For Ground Forces use this ammunition will be linked in the ratio four T15 rounds — one tracer round.

CARTRIDGE, ARMOR PIERCING-INCENDIARY-TRACER, CALIBER .50, M20

TD-5113

The M20 cartridge was developed to provide a round with greater destructive power than previous caliber .50 tracer ammunition, and with ballistic characteristics matching those of the Cartridge, Armor Piercing-Incendiary Caliber .50.

CHARACTERISTICS

Bullet
- Weight ..... 621 grains
- Core . . manganese-molybdenum steel; weight, 355 grains
- Jacket ..... gilding metal
- Incendiary charge ..... 18 grains
- Tracer composition } ..... 14 grains
- Igniter composition }

Complete round
- Weight ..... 1686 grains
- Case ..... brass

Muzzle Velocity . . 3050 f/s (in cal. .50 machine gun M2, HB)

Accuracy—Averages 8-inch mean radius at 600 yards range. Because of the similarity in construction between the M8 and M20 bullets, the performance in gun barrels of varying service life is identical.

Length of trace:—Averages 1700-1800 yards. The M20 round discloses gun positions to a lesser degree than other types of tracer ammunition in use by Ground Forces due to decreased brilliance of initial portion of trace, which results in reduction in muzzle flash and smoke. The smoke along the trajectory is also decreased, thus permitting more satisfactory target observation.

Ignition efficiency:—This round is equally effective as the AP-I M8 round for destruction of aircraft. In tests by the Infantry Board, the M20 cartridge was successful in igniting gasoline and kerosene filled tanks placed behind 1 inch armor plate at 400 yards range. The round will not ignite wood structures.

Penetration efficiency:—Penetration characteristics of the M20 round are approximately equivalent to those of the AP-I M8 round. In field performance tests, perforation of 1 inch armor was obtained at 400 yards range.

Identification:—Bullet tip red (No. 105 color) with aluminum colored annulus to the rear of red tip.

PROCUREMENT SCHEDULE

Production of the M20 cartridge to 1 July 1945 amounted to 18,000,000 rounds. There is a total of 150,000,000 rounds scheduled for production the remainder of 1945, the rate approximating 25 MM's per month.

The M20 round is packed in bulk in 10-round cartons and in metallic link belts in combination with other type rounds. Linkage ratio for ground use is one M20 — four M8.

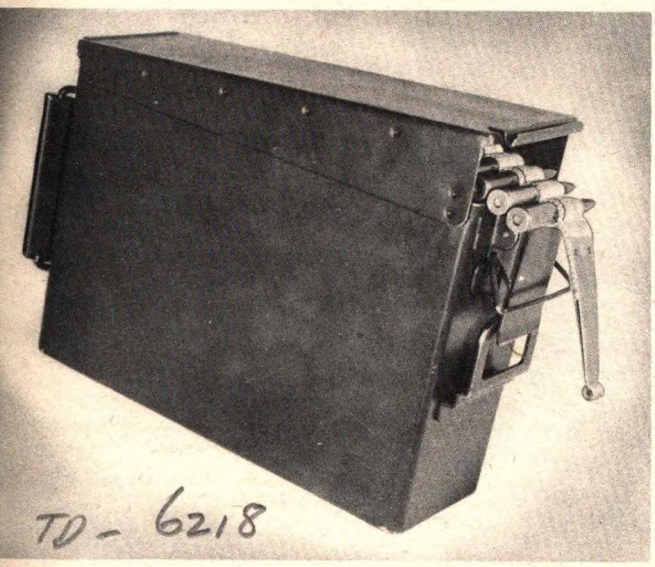
AUNCHER, GRENADE, M7A1

The M7A1 Grenade Launcher for the M1 Rifle was eveloped in order to permit the rifle to be fired semi-utomatic with the grenade launcher attached. Its appearance is similar to the M7 Grenade Launcher, but has added thereto a spring loaded plunger in the rear of the bracket to bear against the bayonet stud. The launcher can be moved fore and aft against the pressure of the spring in the valve screw assembly, and the spring in the rear of the bracket. When launching grenades, the gas pressure impinges against the face of the launcher, setting it back against the above two spring pressures and thus permits the valve to open and exhaust the excess gas. In firing ball ammunition the launcher does not set back. This item will be packaged with a valve screw assembly and a hardened gas cylinder lock to replace like components in the M1 Rifle.

PROCUREMENT SCHEDULE

It is anticipated that production will start in the latter part of 1945. There is no manufacturing program.

OX, AMMUNITION, CALIBER .30, T33E3



The T33E3 box is a metal container designed to ntain one 250-round fabric machine gun belt of liber .30 ammunition, or 275 rounds of caliber .30 metallic link belt employed for ground machine gun e. The cover of the box is constructed with extended de skirts, detents on the lower front edges of which gage on the body rim so as to retain the cover in partially opened position when desired. Thus is presented a frontal opening approximately 1 inch high which will permit the feeding of the belted ammunition from the box to the gun with the cover in such a position that the ammunition remaining in the box is protected from weather or fouling by dust or other foreign matter.

CHARACTERISTICS

Plain rectangular box body; rolled or hemmed body rim; flat bottom; seam welded type construction.
Carrying handle located on rear end of box.
A 3-segment pin and barrel type hinge to attach cover to box body. Cover is easily detachable.
A one piece hook-on type adapter for mounting the box to the cradle of the M1917A1 Tripod Mount.
The closing hasp is mounted on front end of box above, and affords protection to the adapter.
A composition rubber gasket to effect a watertight box closure. Gasket held firmly in place by a metal retainer.
Box dimensions, outside, maximum:
Width — 3 13/16 in.
Length — 11 in.
Height — 7¼ in.
Weight:
Empty ..... 3 lb., 9 oz.
Filled with 250 rounds fabric belted ammunition ..... 18 lb.
Filled with 275 rounds link belted ammunition ..... 22 lb.

PROCUREMENT SCHEDULE

The item is presently undergoing service tests to establish if all characteristics required by the using services have been included. There is no manufacturing program.

BODY ARMOR FOR GROUND TROOPS

The success of flyer's armor ("Flak Suits") in preventing and lessening the severity of casualties among air force combat personnel has been a contributing factor in the development of armor for ground troops. The continued requirement for special applications of body armor such as used in removal of antipersonnel mines and operation of special equipment (bulldozers, etc.) has led to the development of crotch and eye armor.

As a large percentage of casualties are caused by fragments the design of armor for ground troops has incorporated materials which afford a high degree of protection against fragmentation on a comparative weight basis.

HELMET M1

The Helmet M1 includes both a steel helmet and a separate liner which contains the head suspension. This liner serves the wearer as a hat when he is not in combat danger zones. The M1 is the standard helmet of the Ground Forces. The steel helmet is non-magnetic, an important consideration to those whose duties require the use of a compass or other instrument affected by magnetism.

Weight ..... **3 lb., 2 oz.**

PROCUREMENT SCHEDULE
(in thousands)

1945		1946			
May	June	1st Q	2nd Q	3rd Q	4th Q
580	580	965	899	1,080	1,080

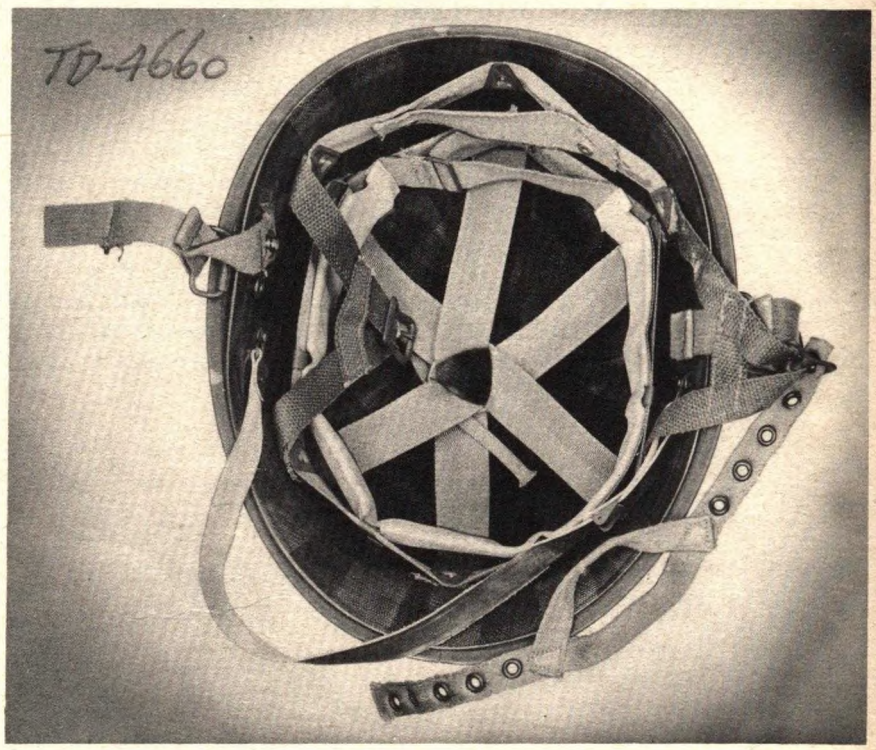
HELMET, STEEL, M1C

This helmet is used by parachutists. It is essentially the M1 helmet on which special chin straps are provided with snap buttons to secure the steel helmet to a special Helmet Liner M1C (parachutists). The purpose is to keep the helmet from being knocked off by the opening of the chute.

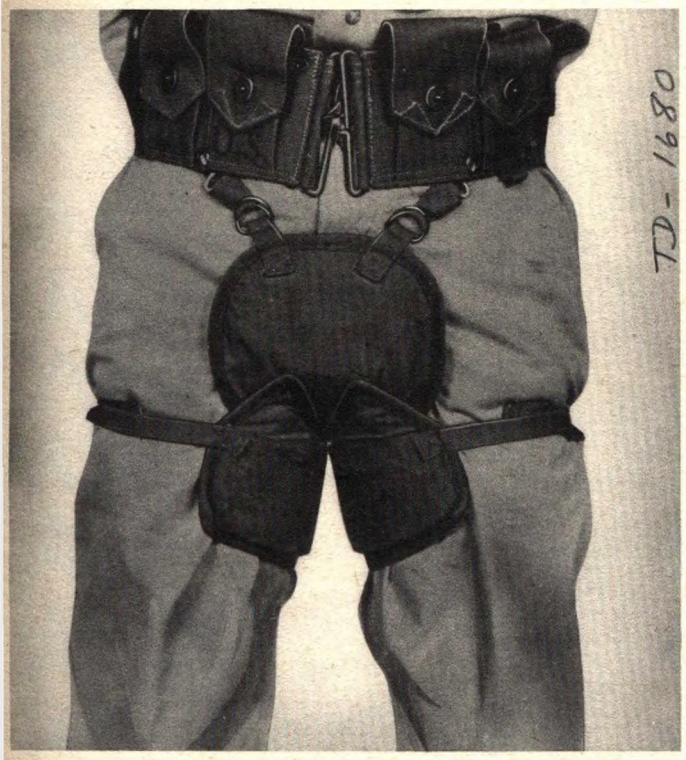
Weight ..... **3 lb., 2 oz.**

PROCUREMENT SCHEDULE

392,000 ..... **Completed April 1945**
No additional requirement.



ARMOR, CROTCH, T16E4



The Crotch Armor T16E4 is for use by engineers when removing antipersonnel mines. The center section is of hourglass shape, constructed of overlapping plates similar to standard flyer's armor. The groin flanges for thigh protection are constructed of multiple layers of nylon fabric. It is worn by attachment to the cartridge belt, and the groin flanges are held in place by a strap which is fastened around the thigh.

Weight	3 lb., 6 oz.
Area of protection	1.15 sq. ft.
Oz./sq. ft. of protection	47.0

PROCUREMENT SCHEDULE

12,220 — completed June 1945. No additional requirement.

ARMOR, EYE, T45E6

This ingenious armor was devised principally to provide eye protection for personnel engaged in clearing mine fields. A plate, of the same steel as is used in helmets and body armor, is provided with small vision slits. The steel plate is mounted in a rubber dust-goggle frame.

Weight ..... 7 oz.

PROCUREMENT SCHEDULE

4,890—Commence and complete September 1945. No additional requirement.

ARMOR, EYE, T45E4

ARMOR, VEST, T64

This item is identical in design to Armor, Vest, T62E1 except that the weight of ballistic material used (40 oz. per square foot) makes a slightly heavier item weighing 12 pounds. Its protection per unit area is substantially greater than Armor, Vest, T62E1. This item is furnished with Armor, Apron, T65, in a container bag.

Weight	12 lb.
Area of protection	3.45 sq. ft.
Oz./sq. ft. of protection	54

PROCUREMENT SCHEDULE

1945 June	4,100
Fiscal year 1946 1st Quarter	100,000

No additional requirement.

ARMOR, VEST, T62E1

This two piece armor, developed for use by ground troops, is flexible, comfortable, and light weight, supplying a completely armored front and back of overlapping plates. This item is provided with four quick release fasteners for attachment of Armor, Apron, T65. If worn with belt passed through loops (but not fastened) the Vest (with or without Apron) can be jettisoned by a single pull at the right shoulder strap. It may be worn over or under combat clothing and is so designed that it does not interfere with the wearing or use of other equipment. The item is supplied with Armor, Apron, T65, packed in a container bag to provide a package approximately 6 in. x 8 in. x 10 in. (1/3 of a cubic foot). The ballistic material is a combination of aluminum plates and nylon padding.

Weight	9 lb. 7 oz.
Area of protection	3.45 sq. ft.
Oz./sq. ft. of protection	44
Container bag	4 oz.

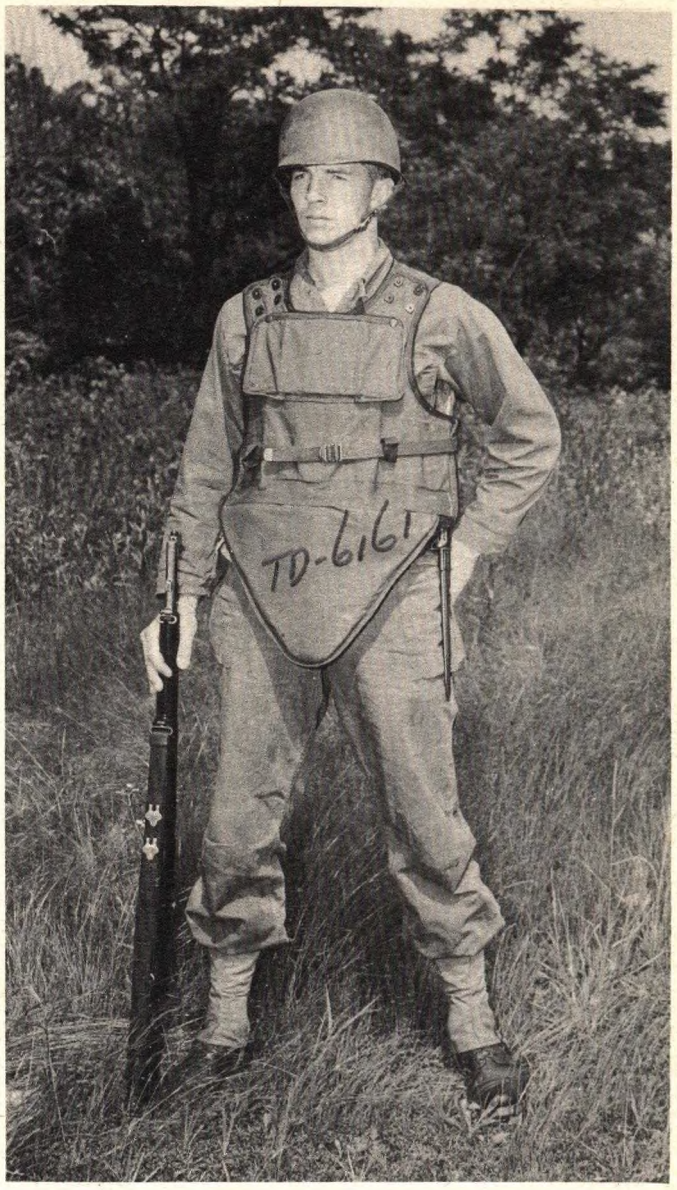
PROCUREMENT SCHEDULE

1945 June	4,100

No additional requirement.

ARMOR, APRON, T65

This item is for use with Armor, Vest, T62E1 or T64. A small flexible apron attaches to the vest with four quick release fasteners. It is attached to the outside of the vest and the ballistic material of the apron overlaps the ballistic material of the vest. By attachment in this manner, free access to the cartridge belt is assured. The coverage of the Armor, Apron, T65 supplies protection to the lower portion of the abdomen, the genitals and the femoral artery for a hand breadth below the crotch. It is furnished in the container bag with the appropriate Vest, T62E1 and T64.



ARMOR, VEST, T62E1 OR T64, WITH ARMOR, APRON, T65
(AS WORN BY 6'2" SOLDIER)

Weight	1 lb. 9 oz.
Area of protection	0.66 sq. ft.
Oz./sq. ft. of protection	38

PROCUREMENT SCHEDULE

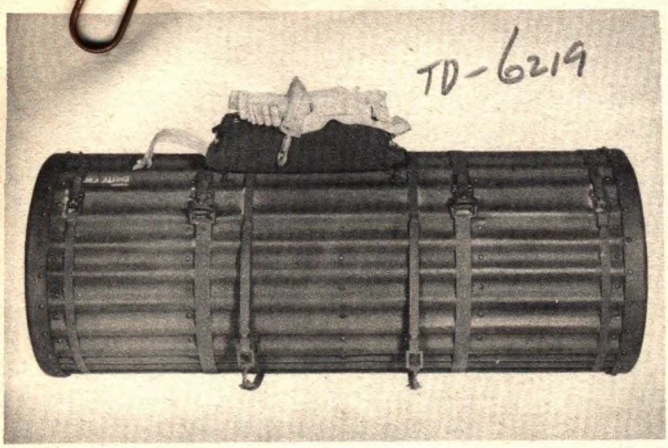
1945 June	8,060

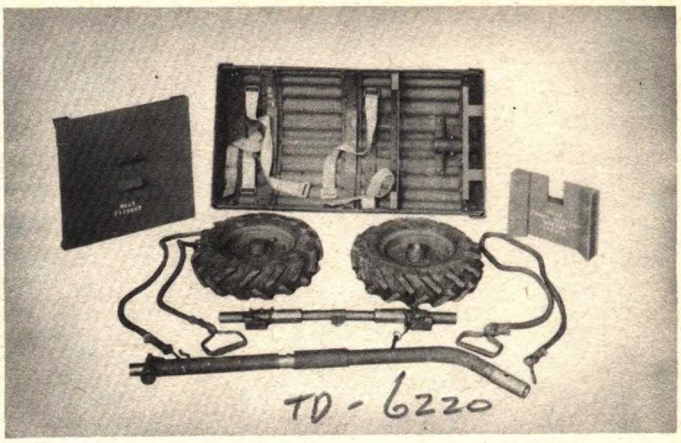
No additional requirement.

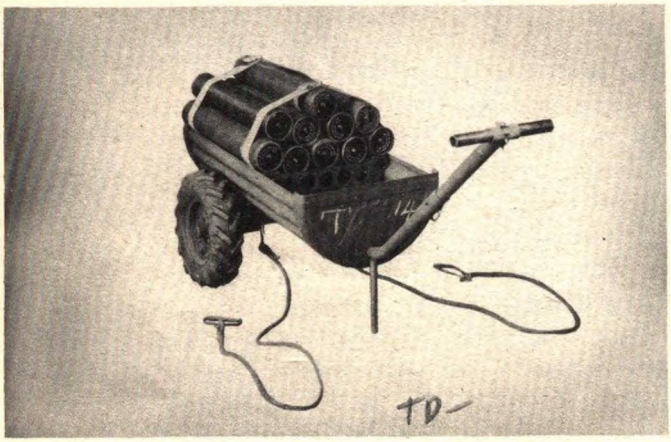
PARACRATES, PARACHESTS, PARACAISSONS

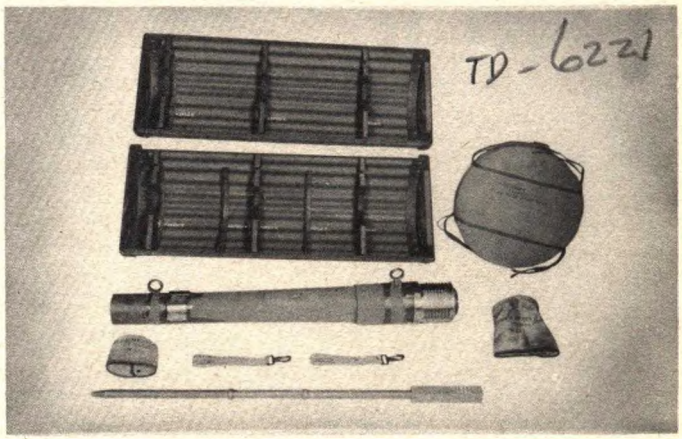
Delivery of weapons, ammunition and equipment to the usually isolated positions of air borne troops or to locations inaccessible to ground transport, is practicable when the materiel is packed in special containers dropped by parachutes from aircraft. These containers, known according to their uses as paracrates, parachests, or paracaissons, consist of a suitable container or supports and cover especially designed for the materiel it is to protect. They are provided with parachute harness and quick release fastenings. If it is to be dropped from the bomb-bay of an airplane, the paracrate is equipped with devices for attachment to the bomb shackles. Those paracrates which can be converted into hand carts by assembling wheels and a drawbar to them after landing are known as paracaissons, while parachests are solid containers, in contrast to paracrates, consisting of supports and spacers covered with heavy canvas. The latest types of this equipment are made of pressed steel and are considerably more rugged than the earlier designs.

PARACRATES FOR 75mm PACK HOWITZER, M1A1, AND CARRIAGE, M8









Paracrates, M1, M2, M3A2, M4A2, M5A2, M6A1, M7A1, comprises the seven containers required for parachute delivery of the 75mm Pack Howitzer, M1A1, and Carriage, M8. One parachest, M8A1, containing 10 rounds of ammunition and one Paracaisson, M9A2, with 8 rounds of ammunition are carried in the same plane and are dropped at the same time as the gun. The paracaisson also contains two rubber tired wheels, an axle, and a handle which can be quickly assembled to the bottom half of the paracaisson shell to form a cart suitable for hauling the 18 rounds of ammunition contained in the parachest and paracaisson.

All of these containers except the M1 and M2 were recently standardized and replaced former wooden models. With the exception of the M1, M2, and M7A1, they are of rigid corrugated steel construction and are built in standard diameters to simplify production. Since only rigid type containers are suitable for rack loading, the M1, M2, and M7A1 are used as door loads and the remaining six loads are used as the rack loads. This equipment is carried in either the C47 or the C46 Airplane.

The six corrugated containers are shipped unassembled, and require about 60% less space than assembled containers.

PROCUREMENT SCHEDULE — Paracrates (M1, M2, M3A2, M4A2, M5A2, M6A1, M7A1)

1945							1946
June	Jul	Aug	Sep	Oct	Nov	Dec	1st Q
411	0	0	29	10	40	40	120

PROCUREMENT SCHEDULE — Parachest, M8A1

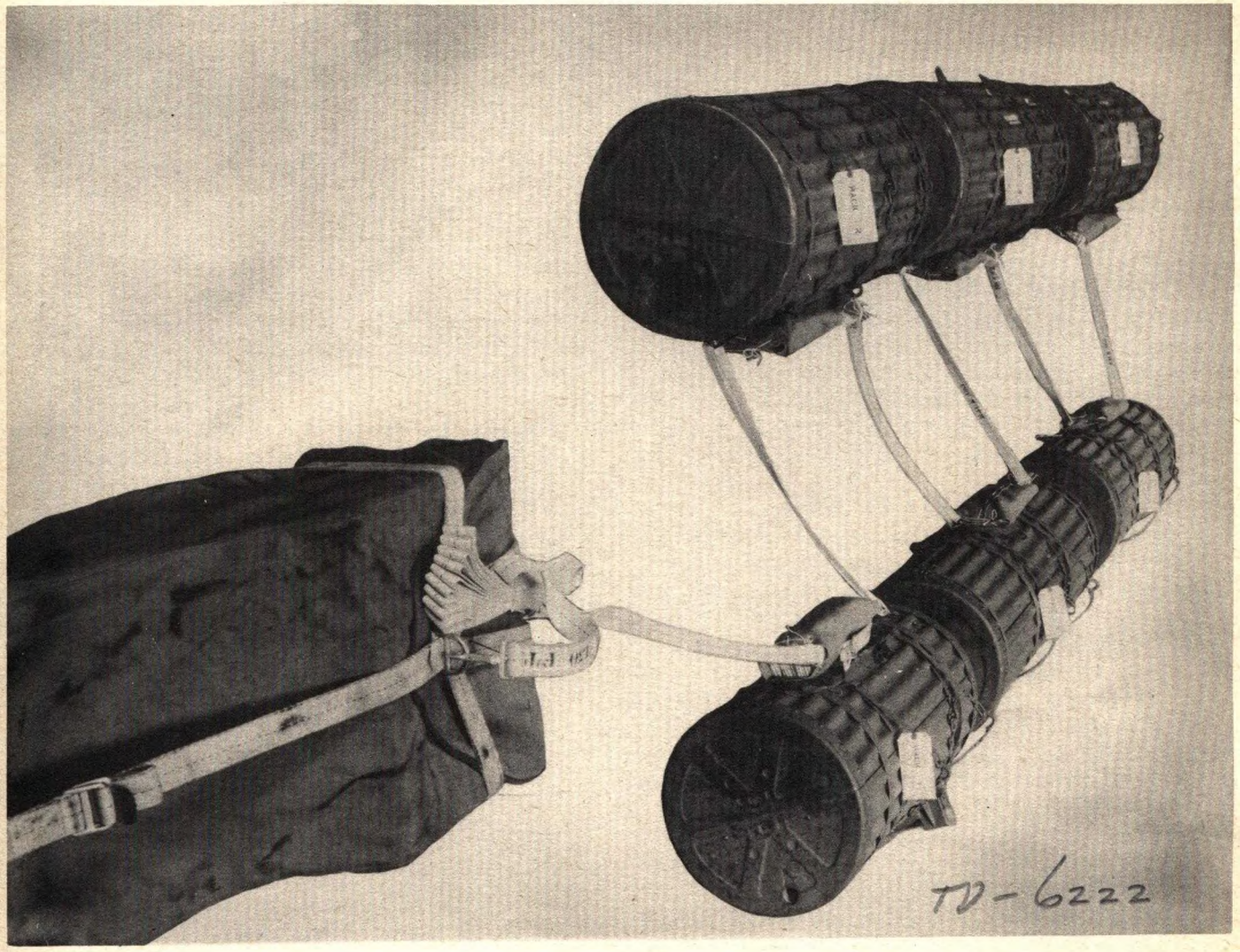
1945							1946
June	Jul	Aug	Sep	Oct	Nov	Dec	1st Q
1100	90	90	90	90	90	100	450

PROCUREMENT SCHEDULE — Paracaisson, M9A2

1945							1946
June	Jul	Aug	Sep	Oct	Nov	Dec	1st Q
1200	200	200	200	200	200	200	600

HARNESS, CONTROL PATTERN, M2

(FOR USE WITH PARACRATES FOR 75mm HOWITZER)



The Harness, Control Pattern, M2, consists of three assemblies each consisting of from one hundred and fifty to four hundred feet of 2,900 pound cotton webbing with necessary "V" rings, snap fasteners, and stow bags. This equipment ties together the nine loads for the howitzer and ammunition and insures that the loads will all fall in a small area so that there is less danger of any of the loads being lost. After one paracrate is found the ties between the loads make it a simple matter to find the remaining loads during night operations or where heavy undergrowth limits visibility.

PROCUREMENT SCHEDULE

This equipment has been recently standardized and it is expected that procurement schedules will be established shortly. There is no manufacturing program.

APPENDIX

TERMINAL BALLISTIC EFFECTS

PENETRATION AND DEMOLITION

The penetration of artillery projectiles into various kinds of rock, based on firings at Aberdeen Proving Ground and elsewhere, is shown in the appended tables. Appended tables have been compiled showing the volume of rock demolished, which may be used as a measure of effectiveness in sealing caves.

A single round, fired with normal impact at a vertical rock face, produces a shallow crater, spalling off a comparatively thin layer of material over a roughly circular area several feet in diameter.

When close range and accurate fire permit, cumulative effect may be obtained by placing additional rounds in the same spot. They deepen the crater without greatly increasing its area, until it is roughly conical in form, with depth about equal to the radius, and the total volume is four to five times that for a single round.

This is usually accomplished in about 3 rounds, after which the size of the cone is not increased by further firing. Later rounds tend to drill a deep narrow hole in the center of the crater with little external effect. Consequently, if the object is to seal caves by creating rubble, it is not desirable to fire more than 5 rounds in the same spot.

OBLIQUE IMPACT

With impact at 30° to 60°, the first round usually ricochets, producing a cup-shaped gouge in the rock face. If later rounds can be placed in this crater, they will have nearly normal impact and will bite into the rock, spalling off large quantities of material from the side of the crater farthest from the gun. The volume of rock displaced by this method is at least as great as for normal impact, and may be much greater if the line of fire happens to be nearly parallel to the cleavage planes.

EFFECT OF HIGH EXPLOSIVE

The high explosive content of shell does not greatly increase the depth of penetration, nor does it appear to have much effect in shattering rock not already damaged by the impact. It is very useful, however, in dislodging material which has already been cracked or loosened by the impact, and which might otherwise remain in place. For this reason HE ammunition with the concrete piercing fuze M78 is very effective, because it combines good penetration with a large bursting charge. Even if the shell breaks up on impact, as sometimes happens in hard rock, the resulting low order detonation is adequate to remove loosened material.

EDGE EFFECT

Like concrete, rock is less resistant to artillery fire if it has an unsupported surface to "break to". Projectiles striking closer than 15 calibers to a free edge (such as a cave mouth) penetrate more deeply and remove more material than they would from an unbroken surface. The effect is best at 8 to 10 calibers from the edge, in which case up to double the normal amount of rock may be demolished.

CHARACTER OF RUBBLE

Most of the rock shattered by artillery fire remains in sizable pieces weighing from a few pounds to half a ton or more. It is not pulverized nor scattered, but usually drops straight down from the point of impact. Hits just above a cave opening make effective use of this feature, as well as the edge effect.

ROCK CHARACTERISTICS

Penetration and demolition appear to be directly related to the compressive strength of the material. The rocks mentioned in the tables represent common types, but the compressive strength may vary widely for different formations; for example, different limestones may have strengths anywhere between 9,000 and 22,000 p.s.i. Other types also have wide limits, and the artilleryman will seldom know the exact strength of the rock he is attacking. Consequently, the tables should be considered merely as a rough guide, to show the magnitude of the effects to be expected, and the relative power of the various weapons.

Demolition is also influenced by other characteristics of the rock, such as stratification, brittleness and etc. Firings are still in progress and it is expected that revised and amplified data on terminal effects will be published in the near future.

WEATHERING

The penetrations and volumes of rubble tabulated herein apply to rock in solid beds, unbroken by seams or faults. This is the *least favorable* condition, so the values given are probably conservative. Most cave construction will be in strata near the surface, where the rock may be severely weathered, resulting in many cracks and fissures. If that condition exists, the terminal effect of artillery may be two or three times what is indicated for unweathered rock.

In the following tables, depth of penetration is in the line of the trajectory, and normal impact is assumed. All HE ammunition is forged with concrete piercing fuzes.

PENETRATIONS ALONG SHELL TRAJECTORIES INTO DIABASE (NORMAL TO TRAJECTORY)

PENETRATION — INCHES

Caliber	75mm	75mm	75mm	3 Inch	76mm	90mm	105mm	105mm	105mm	105mm	105mm	155mm	155mm
Gun*	G-M3, M6	H-M1, M3		G-M5, M7	G-M1A1, M1A1C M1A2,	G-M1, M1A1 M2, M3, T13	H-M2, M2A1, M4			H-M3		G-M1, M1A1 M2	
Shell	M48	M48		M42A1	M42A1	M71	M1			M1		M101	
Charge	Super	4	2	2800 f/s	2700 f/s	2700 f/s	7	5	3	5	3	S	N
Range Yds.													
0	10.7	6.7	4.4	12.8	12.3	16.3	10.1	6.7	6.2	6.7	6.2	25.1	18.8
500	9.9	6.2	4.2	12.0	11.5	15.5	9.6	6.5	6.0	6.5	6.0	24.3	18.1
1000	9.2	5.9	4.1	11.2	10.8	14.8	8.9	6.3	5.9	6.3	5.9	23.6	17.5
2000	8.0	5.5	3.9	9.7	9.2	13.5	7.9	6.1	5.6	6.1	5.6	22.2	16.2
3000	6.9	5.2	3.7	8.2	7.8	12.2	7.1	5.8	5.3	5.8	5.3	20.9	15.0
4000	6.1	5.0	..	6.8	6.5	10.9	6.7	5.6	5.0	5.6	5.0	19.5	13.8
5000	5.5	4.7	..	5.6	5.4	9.7	6.4	5.4	..	5.4	..	18.2	12.7
6000	..	..	..	..	4.7	8.5	6.2	..	..	..	..	16.9	11.6
7000	..	..	..	..	..	7.5	6.1	..	..	..	..	15.7	10.7
8000	..	..	..	..	..	6.6	5.9	..	..	..	..	14.5	9.9
9000	..	..	..	..	..	..	..	..	..	..	..	13.4	9.4
10000	..	..	..	..	..	..	..	..	..	..	..	12.2	9.2
12000	..	..	..	..	..	..	..	..	..	..	..	10.5	9.1
13000	..	..	..	..	..	..	..	..	..	..	..	10.0	..
14000	..	..	..	..	..	..	..	..	..	..	..	9.6	..

Caliber	155mm			8 Inch						240mm			
Gun*	H-M1			G-M1, M2			H-M1			H-M1			
Shell	M107			M103			M106			M114			
Charge	7	5	3	Super	Normal	Reduced	7	5	3	4	3	2	1
Range Yds.													
0	16.5	10.9	7.9	39.2	35.8	28.9	22.4	15.8	11.4	35.0	30.8	26.5	22.7
500	15.9	10.4	7.8	38.5	35.0	28.2	21.6	15.1	11.3	34.2	30.0	25.8	22.1
1000	15.3	10.0	7.6	37.8	34.4	27.6	20.9	14.5	11.1	33.5	29.3	25.1	21.5
2000	14.1	9.4	7.4	36.4	33.0	26.4	19.5	13.5	10.8	32.0	27.9	23.8	20.4
3000	12.9	9.1	7.2	35.0	31.8	25.2	18.1	12.8	10.5	30.6	26.5	22.5	19.3
4000	11.8	8.8	7.0	33.6	30.8	24.0	16.8	12.2	10.3	29.2	25.1	21.2	18.2
5000	10.8	8.5	6.8	32.3	29.3	22.8	15.7	11.8	10.1	27.7	23.8	20.0	17.2
6000	10.0	8.3	6.7	31.0	27.9	21.7	14.6	11.5	9.9	26.3	22.5	18.8	16.2
7000	9.4	8.2	..	29.7	26.6	20.6	13.7	11.3	9.7	24.9	21.3	18.5	15.2
8000	9.1	8.1	..	28.4	25.5	19.6	13.0	11.1	9.8	23.6	20.2	18.2	...
9000	9.0	8.0	..	27.2	24.2	18.7	12.6	10.9	..	22.4	19.1	17.1	...
10000	8.9	..	..	26.0	23.1	17.9	12.2	11.0	..	21.3	18.1	16.0	...
12000	8.8	..	..	23.9	21.1	16.3	12.0	11.2	..	19.4	16.7	16.1	...
13000	..	..	..	22.9	20.2	15.5	11.9	...	..	18.5	16.5	16.1	...
14000	..	..	..	21.9	19.3	15.3	11.8	...	..	17.8	16.3	...	...
15000	..	..	..	20.9	18.4	15.1	11.9	...	..	17.1	...	...	...
18000	..	..	..	18.6	16.6	14.9	12.4	...	..	...	...	...	...
20000	..	..	..	17.2	15.6	...	...	...	...	...	...	...	...
21000	..	..	..	16.7	15.3	...	...	...	...	...	...	...	...

*G = Gun; H = Howitzer.

PENETRATIONS ALONG SHELL TRAJECTORIES INTO GRANITE (NORMAL TO TRAJECTORY)

PENETRATION — INCHES

Caliber	75mm			3 Inch	76mm	90mm	105mm					155mm	
Gun*	G-M3, M6	H-M1, M3		G-M5, M7	G-M1A1, M1A1C M1A2,	G-M1, M1A1 M2, M3, T13	H-M2, M2A1, M4			H-M3		G-M1, M1A1 M2	
Shell	M48	M48		M42A1	M42A1	M71	M1			M1		M101	
Charge	Super	4	2	2800 f/s	2700 f/s	2700 f/s	7	5	3	5	3	S	N
Range Yds.													
0	11.5	7.2	4.7	13.8	13.3	17.6	10.9	7.2	6.7	7.2	6.7	27.0	20.2
500	10.7	6.7	4.6	12.9	12.4	16.8	10.3	7.0	6.5	7.0	6.5	26.2	19.5
1000	10.0	6.3	4.4	12.1	11.6	16.0	9.6	6.8	6.3	6.8	6.3	25.4	18.9
2000	8.6	5.9	4.2	10.4	9.9	14.5	8.5	6.6	6.0	6.6	6.0	23.9	17.5
3000	7.5	5.6	4.0	8.8	8.4	13.1	7.6	6.3	5.7	6.3	5.7	22.5	16.2
4000	6.5	5.3	..	7.3	7.0	11.7	7.2	6.0	5.4	6.0	5.4	21.0	14.9
5000	5.9	5.1	..	6.1	5.8	10.4	6.9	5.8	..	5.8	..	19.6	13.7
6000	..	..	..	..	5.0	9.2	6.7	..	..	..	..	18.2	12.5
7000	..	..	..	..	..	8.2	6.5	..	..	..	..	16.9	11.1
8000	..	..	..	..	..	7.2	6.3	..	..	..	..	15.6	10.7
9000	..	..	..	..	..	..	..	..	..	..	..	14.4	10.3
10000	..	..	..	..	..	..	..	..	..	..	..	13.2	9.9
12000	..	..	..	..	..	..	..	..	..	..	..	11.3	9.7
13000	..	..	..	..	..	..	..	..	..	..	..	10.8	..
14000	..	..	..	..	..	..	..	..	..	..	..	10.3	..

Caliber	155mm			8 Inch						240mm			
Gun*	H-M1			G-M1, M2			H-M1			H-M1			
Shell	M107			M103			M106			M114			
Charge	7	5	3	Super	Normal	Reduced	7	5	3	4	3	2	1
Range Yds.													
0	17.8	11.8	8.5	42.2	38.5	31.1	24.1	17.0	12.3	37.6	33.0	28.5	24.5
500	17.1	11.3	8.3	41.9	37.7	30.4	23.3	16.3	12.2	36.8	32.2	27.7	23.9
1000	16.5	10.8	8.2	40.6	37.0	29.7	22.5	15.6	12.0	36.0	31.5	27.0	23.2
2000	15.2	10.1	7.9	39.1	35.6	28.4	21.0	14.5	11.6	34.4	30.0	25.6	22.0
3000	13.9	9.8	7.7	37.6	34.2	27.1	19.5	13.8	11.4	32.9	28.5	24.2	20.8
4000	12.7	9.5	7.5	36.2	32.8	25.8	18.1	13.1	11.1	31.3	27.0	22.8	19.6
5000	11.8	9.2	7.3	34.8	31.4	24.5	16.9	12.7	10.9	29.8	25.6	21.6	18.5
6000	10.8	9.0	7.2	33.4	30.1	23.3	15.7	12.4	10.7	28.3	24.1	20.3	17.4
7000	10.3	8.8	..	32.0	28.7	22.2	14.8	12.2	10.6	26.8	22.9	20.0	16.4
8000	9.8	8.7	..	30.6	27.4	21.1	14.0	12.0	10.5	25.3	21.7	19.6	...
9000	9.7	8.6	..	29.3	26.1	19.5	13.5	11.7	...	24.1	20.6	18.4	...
10000	9.6	..	..	28.0	24.9	18.8	13.1	11.9	...	22.9	19.5	17.2	...
12000	9.5	..	..	25.8	22.8	17.4	13.0	12.1	...	20.8	17.9	16.0	...
13000	..	..	..	24.7	21.8	16.7	12.9	...	...	20.0	17.7	17.3	...
14000	..	..	..	23.6	20.8	16.5	12.7	...	...	19.2	17.5	...	...
15000	..	..	..	22.5	19.8	16.3	12.9	...	...	18.3	...	...	...
18000	..	..	..	20.1	18.0	16.0	13.4	...	...	...	...	...	...
20000	..	..	..	18.5	16.8	...	...	...	...	...	...	...	...
21000	..	..	..	18.0	16.5	...	...	...	...	...	...	...	...

*G = Gun; H = Howitzer.

PENETRATIONS ALONG SHELL TRAJECTORIES INTO LIMESTONE AND SANDSTONE
(NORMAL TO TRAJECTORY)

PENETRATION — INCHES

Caliber	75mm			3 Inch	76mm	90mm	105mm					155mm	
Gun*	G-M3, M6	H-M1, M2, M3		G-M5, M7	G-M1A1, M1A1C M1A2,	G-M1, M1A1 M2, M3, T13	H-M2, M2A1, M4			H-M3		G-M1, M1A1 M2	
Shell	M48	M48		M42A1	M42A1	M71	M1			M1		M101	
Charge	Super	4	2	2800 f/s	2700 f/s	2700 f/s	7	5	3	5	3	S	N
Range Yds.													
0	14.7	9.3	6.0	17.8	17.1	22.6	14.0	9.2	8.6	9.2	8.6	34.7	26.0
500	13.8	8.6	5.9	16.6	16.0	21.6	13.2	9.0	8.4	9.0	8.4	33.7	25.1
1000	12.8	8.1	5.7	15.5	14.9	20.6	12.4	8.8	8.1	8.8	8.1	32.7	24.3
2000	11.1	7.6	5.4	13.3	12.7	18.7	10.9	8.4	7.7	8.4	7.7	30.8	22.5
3000	9.6	7.2	5.1	11.3	10.7	16.8	9.8	8.0	7.3	8.0	7.3	28.9	20.8
4000	8.4	6.9	..	9.4	8.9	15.1	9.2	7.8	7.0	7.8	7.0	27.0	19.1
5000	7.6	6.6	..	7.8	7.4	13.4	8.9	7.5	..	7.5	..	25.2	17.6
6000	..	..	..	..	6.5	11.8	8.6	..	..	..	..	23.4	16.1
7000	..	..	..	..	..	10.5	8.3	..	..	..	..	21.7	15.0
8000	..	..	..	..	..	9.2	8.1	..	..	..	..	20.0	13.8
9000	..	..	..	..	..	..	..	..	..	..	..	18.5	13.2
10000	..	..	..	..	..	..	..	..	..	..	..	17.0	12.7
12000	..	..	..	..	..	..	..	..	..	..	..	14.5	12.5
13000	..	..	..	..	..	..	..	..	..	..	..	13.9	..
14000	..	..	..	..	..	..	..	..	..	..	..	13.2	..

Caliber	155mm			8 Inch						240mm			
Gun*	H-M1			G-M1, M2			H-M1			H-M1			
Shell	M107			M103			M106			M114			
Charge	7	5	3	Super	Normal	Reduced	7	5	3	4	3	2	1
Range Yds.													
0	22.9	15.1	10.9	54.3	49.5	40.0	30.9	21.9	15.9	48.4	42.5	36.6	31.6
500	22.1	14.5	10.7	53.3	48.6	39.1	29.9	21.0	15.7	47.4	41.5	35.7	30.8
1000	21.2	13.8	10.5	52.3	47.6	38.2	28.9	20.1	15.4	46.3	40.5	34.8	29.9
2000	19.5	13.0	10.2	50.3	45.8	36.5	26.9	18.6	15.0	44.3	38.6	32.9	28.2
3000	17.8	12.5	9.9	48.5	43.5	34.9	24.6	17.7	14.6	42.0	36.7	31.2	26.7
4000	16.4	12.2	9.6	46.6	42.2	33.2	23.3	16.8	14.2	40.3	34.7	29.4	25.2
5000	15.2	11.9	9.4	44.3	40.4	31.6	21.8	16.4	14.0	38.4	32.9	27.8	23.8
6000	13.9	11.5	9.2	43.0	38.7	30.0	20.2	16.0	13.7	36.4	31.0	26.1	22.4
7000	13.2	11.3	..	40.7	37.0	28.6	19.1	15.8	13.6	34.5	29.5	25.7	21.1
8000	12.6	11.2	..	39.4	35.3	27.1	18.0	15.5	13.5	32.6	27.9	25.2	...
9000	12.4	11.0	..	37.6	33.7	26.2	17.4	15.2	...	31.1	26.5	23.7	...
10000	12.3	..	..	36.0	32.0	25.3	16.8	15.3	...	29.5	25.0	22.2	...
12000	12.2	..	..	33.2	29.4	22.3	16.2	15.5	...	26.8	23.0	20.7	...
13000	..	..	..	31.8	28.1	21.4	15.6	...	...	25.7	22.8	22.3	...
14000	..	..	..	30.4	26.8	21.2	16.3	...	...	24.6	22.5	...	...
15000	..	..	..	29.0	25.5	21.0	16.8	...	...	23.6	...	...	...
18000	..	..	..	25.8	23.2	20.6	17.2	...	...	...	...	...	...
20000	..	..	..	23.8	21.6	...	...	...	...	...	...	...	...
21000	..	..	..	23.1	21.2	...	...	...	...	...	...	...	...

*G = Gun; H = Howitzer.

PENETRATIONS ALONG SHELL TRAJECTORIES INTO GRAVEL (NORMAL TO TRAJECTORY)

PENETRATIONS — FEET

Caliber	75mm			3 Inch	76mm	90mm	105mm					155mm	
Gun*	G-M3, M6	H-M1, M3		G-M5, M7	G-M1A1, M1A1C M1A2,	G-M1, M1A1 M2, M3, T13	H-M2, M2A1, M4			H-M3		G-M1, M1A1 M2	
Shell	M48	M48		M42A1	M42A1	M71	M1			M1		M101	
Charge	Super	4	2	2800 f/s	2700 f/s	2700 f/s	7	5	3	5	3	S	N
Range Yds.													
0	9.7	7.0	4.6	10.2	10.0	12.8	9.4	6.7	6.2	6.7	6.2	17.7	17.2
500	9.3	6.5	4.5	9.8	9.6	12.5	9.0	6.5	6.1	6.5	6.1	17.4	15.8
1000	8.9	6.2	4.3	9.4	9.2	12.2	8.6	6.4	5.9	6.4	5.9	17.1	14.3
2000	7.9	5.8	4.1	8.7	8.3	11.5	7.8	6.1	5.6	6.1	5.6	16.5	13.6
3000	7.1	5.5	3.8	7.7	7.5	10.8	7.1	5.8	5.3	5.8	5.3	16.0	12.8
4000	6.4	5.2	..	6.8	6.6	10.0	6.7	5.6	5.0	5.6	5.0	15.3	12.1
5000	5.8	5.0	..	5.9	5.6	9.2	6.1	5.4	..	5.4	..	14.6	11.4
6000	..	..	..	..	5.0	8.4	6.0	..	..	..	..	13.9	10.7
7000	..	..	..	..	..	7.6	5.9	..	..	..	..	13.3	10.1
8000	..	..	..	..	..	6.8	5.8	..	..	..	..	12.6	9.4
9000	..	..	..	..	..	..	..	..	..	..	..	11.9	9.0
10000	..	..	..	..	..	..	..	..	..	..	..	11.1	8.6
12000	..	..	..	..	..	..	..	..	..	..	..	9.8	8.5
13000	..	..	..	..	..	..	..	..	..	..	..	9.3	..
14000	..	..	..	..	..	..	..	..	..	..	..	8.9	..

Caliber	155mm			8 Inch						240mm			
Gun*	H-M1			G-M1, M2			H-M1			H-M1			
Shell	M107			M103			M106			M114			
Charge	7	5	3	Super	Normal	Reduced	7	5	3	4	3	2	1
Range Yds.													
0	13.8	10.0	7.4	26.3	24.9	22.0	17.4	13.6	10.2	25.0	23.0	20.7	18.9
500	13.4	9.7	7.3	26.0	24.7	21.7	16.8	13.2	10.1	24.7	22.7	20.4	18.5
1000	13.0	9.4	7.2	25.7	24.4	21.3	16.1	12.7	10.0	24.3	22.3	20.1	18.0
2000	12.2	8.9	7.0	25.3	23.8	21.0	15.7	12.0	9.8	23.6	21.7	19.4	17.1
3000	11.6	8.5	6.8	24.7	23.2	19.8	15.0	11.5	9.6	22.9	20.9	18.6	16.3
4000	10.8	8.3	6.5	24.1	22.6	19.5	14.3	10.9	9.4	22.2	20.1	17.8	15.6
5000	10.1	8.1	6.3	23.6	22.1	18.8	13.5	10.7	9.2	21.5	19.1	17.0	14.9
6000	9.4	7.9	6.2	23.0	21.5	18.0	12.7	10.4	8.9	20.8	18.1	16.2	14.2
7000	9.0	7.7	..	22.3	20.9	17.4	12.3	10.2	8.8	20.0	17.7	15.9	...
8000	8.5	7.6	..	21.6	20.3	16.8	11.8	10.0	8.8	19.2	17.2	15.6	...
9000	8.4	7.5	..	21.0	19.7	16.3	11.4	10.0	..	18.5	16.4	14.8	...
10000	8.3	..	..	20.5	19.0	15.8	10.9	10.0	..	17.8	15.6	14.0	...
12000	8.3	..	..	19.2	17.8	14.7	10.4	10.0	..	16.5	14.6	13.2	...
13000	..	..	..	18.7	17.2	14.2	10.0	...	..	16.0	14.4	14.1	...
14000	..	..	..	18.2	16.6	14.0	10.6	...	..	15.5	14.2	...	...
15000	..	..	..	17.7	16.0	13.8	10.9	...	..	14.9	...	...	...
18000	..	..	..	16.2	14.8	13.4	11.2	...	..	...	...	...	...
20000	..	..	..	15.2	13.9	...	...	...	..	...	...	...	...
21000	..	..	..	14.7	12.6	...	...	...	..	...	...	...	...

*G = Gun; H = Howitzer.

VOLUMES OF GRANITE REMOVED BY SINGLE ROUND (CUBIC FEET)

Caliber	75mm			3 Inch	76mm	90mm	105mm					155mm	
Gun*	G-M3, M6	H-M1, M3		G-M5, M7	G-M1A1, M1A1C M1A2,	G-M1, M1A1 M2, M3, T13	H-M2, M2A1, M4			H-M3		G-M1, M1A1 M2	
Shell	M48	M48		M42A1	M42A1	M71	M1			M1		M101	
Charge	Super	4	2	2800 f/s	2700 f/s	2700 f/s	7	5	3	5	3	S	N
Range Yds.													
0	3.2	0.8	0.2	5.8	5.2	12.4	3.1	0.9	0.7	0.9	0.7	51.0	21.5
500	2.6	0.6	0.2	4.7	4.2	10.9	2.6	0.8	0.6	0.8	0.6	46.9	19.5
1000	2.1	0.5	0.2	3.9	3.4	9.4	2.1	0.7	0.6	0.7	0.6	42.8	17.5
2000	1.4	0.4	0.2	2.4	2.1	6.9	1.4	0.6	0.5	0.6	0.5	35.6	14.0
3000	0.9	0.3	0.1	1.5	1.3	5.1	1.0	0.6	0.4	0.6	0.4	29.4	11.0
4000	0.6	0.3	..	0.9	0.7	3.7	0.9	0.5	0.4	0.5	0.4	24.0	8.6
5000	0.4	0.2	..	0.5	0.4	2.8	0.8	0.5	..	0.5	..	19.8	6.8
6000	..	..	..	..	0.3	1.8	0.7	..	..	..	..	15.6	5.1
7000	..	..	..	..	..	1.3	0.6	..	..	..	..	12.2	4.2
8000	..	..	..	..	..	0.8	0.6	..	..	..	..	9.9	3.2
9000	..	..	..	..	..	..	..	..	..	..	..	8.0	2.9
10000	..	..	..	..	..	..	..	..	..	..	..	6.0	2.5
12000	..	..	..	..	..	..	..	..	..	..	..	3.7	2.4
13000	..	..	..	..	..	..	..	..	..	..	..	3.3	..
14000	..	..	..	..	..	..	..	..	..	..	..	2.8	..

Caliber	155mm			8 Inch						240mm			
Gun*	H-M1			G-M1, M2			H-M1			H-M1			
Shell	M107			M103			M106			M114			
Charge	7	5	3	Super	Normal	Reduced	7	5	3	4	3	2	1
Range Yds.													
0	14.7	4.2	1.6	209.6	159.1	83.9	38.8	13.8	5.2	155.0	104.7	67.0	42.9
500	13.1	3.7	1.5	198.5	150.4	78.6	35.3	12.2	4.9	145.0	97.0	62.1	39.6
1000	11.6	3.2	1.4	187.5	141.7	73.4	31.8	10.7	4.6	135.0	90.7	57.3	36.4
2000	9.0	2.7	1.3	167.4	125.8	63.7	25.7	8.5	4.4	118.1	78.2	48.7	30.7
3000	6.9	2.4	1.2	149.9	112.0	55.8	21.1	7.4	4.1	104.0	67.6	41.7	26.3
4000	5.3	2.2	1.1	132.3	98.3	47.9	16.6	6.3	3.8	89.1	57.1	34.7	21.8
5000	4.3	2.1	1.0	117.5	87.1	41.7	13.7	5.8	3.6	77.5	48.9	29.5	18.6
6000	3.3	1.9	0.9	103.9	75.9	35.5	10.9	5.3	3.4	66.0	40.7	24.4	15.5
7000	2.9	1.8	..	92.0	66.7	30.8	9.3	5.1	3.3	56.6	35.1	23.1	12.9
8000	2.4	1.7	..	80.0	57.5	26.2	7.7	4.9	3.2	47.2	29.6	21.8	...
9000	2.4	1.6	..	70.6	50.1	23.6	7.0	4.6	..	41.2	25.5	18.3	...
10000	2.3	..	..	61.1	42.8	21.0	6.3	4.8	..	35.0	21.4	14.9	...
12000	2.2	..	..	49.3	34.3	15.5	6.0	4.9	..	26.2	16.7	15.1	...
13000	..	..	..	43.5	30.1	12.9	5.8	..	..	23.3	16.1	15.2	...
14000	..	..	..	37.7	25.9	12.6	5.6	..	..	20.6	15.5	...	...
15000	..	..	..	31.9	21.7	12.3	5.9	..	..	17.9	...	...	...
18000	..	..	..	23.4	16.6	11.5	6.7	..	..	...	...	...	...
20000	..	..	..	17.7	13.2	..	..	..	..	...	...	...	...
21000	..	..	..	16.1	12.5	..	..	..	..	...	...	...	...

*G = Gun; H = Howitzer.

VOLUMES OF LIMESTONE REMOVED BY SINGLE ROUND (CUBIC FEET)

Caliber	75mm			3 Inch	76mm	90mm	105mm					155mm	
Gun*	G-M3, M6	H-M1, M3		G-M5, M7	G-M1A1, M1A1C M1A2,	G-M1, M1A1 M2, M3, T13	H-M2, M2A1, M4			H-M3		G-M1, M1A1 M2	
Shell	M48	M48		M42A1	M42A1	M71	M1			M1		M101	
Charge	Super	4	2	2800 f/s	2700 f/s	2700 f/s	7	5	3	5	3	S	N
Range Yds.													
0	2.3	1.0	0.3	4.1	3.7	8.7	2.2	0.6	0.5	0.6	0.5	35.8	15.1
500	1.9	0.8	0.2	3.3	3.0	7.6	1.8	0.6	0.4	0.6	0.4	32.9	13.7
1000	1.5	0.7	0.2	2.7	2.4	6.6	1.5	0.5	0.4	0.5	0.4	30.1	12.3
2000	1.0	0.5	0.2	1.7	1.5	4.9	1.0	0.4	0.3	0.4	0.3	25.0	9.8
3000	0.6	0.4	0.2	1.1	0.9	3.6	0.7	0.4	0.3	0.4	0.3	20.7	7.7
4000	0.4	0.4	..	0.6	0.5	2.6	0.6	0.3	0.3	0.3	0.3	16.9	6.0
5000	0.3	0.3	..	0.3	0.3	1.9	0.5	0.3	..	..	..	13.9	4.8
6000	..	..	..	..	0.2	1.2	0.5	..	..	..	..	11.0	3.6
7000	..	..	..	..	..	0.9	0.4	..	..	..	..	9.0	2.9
8000	..	..	..	..	..	0.6	0.4	..	..	..	..	7.0	2.2
9000	..	..	..	..	..	..	..	..	..	..	..	6.1	2.0
0000	..	..	..	..	..	..	..	..	..	..	..	4.2	1.8
2000	..	..	..	..	..	..	..	..	..	..	..	2.6	1.7
3000	..	..	..	..	..	..	..	..	..	..	..	2.3	..
4000	..	..	..	..	..	..	..	..	..	..	..	2.0	..

Caliber	155mm			8 Inch						240mm			
Gun*	H-M1			G-M1, M2			H-M1			H-M1			
Shell	M107			M103			M106			M114			
Charge	7	5	3	Super	Normal	Reduced	7	5	3	4	3	2	1
Range Yds.													
0	10.3	3.0	1.1	147.0	112.0	59.0	27.3	9.7	3.7	109.0	73.6	47.1	30.1
500	9.3	2.7	1.1	139.5	105.8	55.3	24.8	8.6	3.5	102.1	68.7	43.7	27.9
1000	8.2	2.3	1.0	132.0	99.5	51.7	22.3	7.5	3.3	95.2	63.8	40.3	25.6
2000	6.4	1.9	0.9	118.0	88.4	44.7	18.1	6.0	3.1	83.0	55.0	34.3	21.6
3000	4.9	1.7	0.8	105.5	78.7	39.2	14.8	5.2	2.9	72.8	47.4	29.3	18.4
4000	3.7	1.6	0.7	93.0	69.1	33.7	11.6	4.4	2.6	62.6	40.2	24.4	15.3
5000	3.0	1.5	0.7	83.1	61.2	29.3	9.7	4.1	2.5	54.5	34.4	20.7	13.1
6000	2.3	1.3	0.6	73.1	53.4	24.9	7.7	3.7	2.4	46.4	28.6	17.1	10.9
7000	2.0	1.3	..	64.6	46.9	21.6	6.6	3.6	2.3	39.8	24.7	16.2	9.1
8000	1.7	1.2	..	56.2	40.4	18.4	5.4	3.4	2.2	33.2	20.8	15.3	...
9000	1.6	1.1	..	48.6	35.2	16.5	4.9	3.2	..	28.9	18.0	12.9	...
0000	1.6	..	..	43.0	30.1	14.6	4.4	3.3	..	24.6	15.1	10.5	...
2000	1.5	..	..	34.7	24.1	11.0	4.2	3.4	..	18.4	11.8	9.1	...
3000	..	..	..	30.6	21.1	9.1	4.1	..	..	16.5	11.3	10.7	...
4000	..	..	..	26.5	18.2	8.9	4.0	..	..	14.6	10.9	...	...
5000	...	..	..	22.4	15.3	8.7	4.2	..	..	12.6	...	...	...
8000	..	..	..	16.4	11.7	8.1	4.7	..	..	...	...	...	...
0000	..	..	..	12.4	9.3	..	..	..	..	...	...	...	...
1000	..	..	..	11.3	8.8	..	..	..	..	...	...	...	...

*G = Gun; H = Howitzer.

VOLUMES OF DIABASE REMOVED BY SINGLE ROUND (CUBIC FEET)

Caliber	75mm			3 Inch	76mm	90mm	105mm					155mm	
Gun*	G-M3, M6	H-M1, M3		G-M5, M7	G-M1A1, M1A1C M1A2,	G-M1, M1A1 M2, M3, T13	H-M2, M2A1, M4			H-M3		G-M1, M1A1 M2	
Shell	M48	M48		M42A1	M42A1	M71	M1			M1		M101	
Charge	Super	4	2	2800 f/s	2700 f/s	2700 f/s	7	5	3	5	3	S	N
Range Yds.													
0	4.0	1.0	0.3	7.2	6.4	15.4	3.8	1.1	0.9	1.1	0.9	63.4	26.8
500	3.8	0.8	0.3	5.9	5.3	13.9	3.2	1.0	0.8	1.0	0.8	58.3	24.8
1000	2.7	0.7	0.2	4.8	4.2	11.7	2.6	0.9	0.7	0.9	0.7	53.2	21.8
2000	1.7	0.5	0.2	3.1	2.8	8.6	1.8	0.8	0.6	0.8	0.6	44.3	17.4
3000	1.1	0.4	0.2	1.8	1.6	6.4	1.3	0.7	0.5	0.7	0.5	36.6	13.7
4000	0.8	0.3	. .	1.0	0.9	4.6	1.1	0.6	. .	0.6	. .	29.9	10.7
5000	0.6	. .	. .	0.6	0.5	3.2	0.9	0.6	. .	0.6	. .	24.4	8.3
6000	. .	. .	. .	. .	. .	2.2	0.8	0.6	. .	0.6	. .	19.4	6.3
7000	. .	. .	. .	. .	. .	1.5	0.7	. .	. .	. .	. .	15.5	5.1
8000	. .	. .	. .	. .	. .	1.0	0.7	. .	. .	. .	. .	12.3	4.0
9000	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	9.9	3.5
10000	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	7.5	3.1
12000	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	6.0	3.0
13000	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	4.6	3.0
14000	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	4.0	. .
15000	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	3.5	. .

Caliber	155mm			8 Inch						240mm			
Gun*	H-M1			G-M1, M2			H-M1			H-M1			
Shell	M107			M103			M106			M114			
Charge	7	5	3	Super	Normal	Reduced	7	5	3	4	3	2	1
Range Yds.													
0	18.3	5.3	1.9	260.7	198.0	104.3	48.3	17.1	6.5	192.2	130.0	83.2	53.3
500	16.4	4.7	1.8	246.9	185.2	97.7	43.3	15.1	6.2	180.3	121.4	77.2	49.1
1000	14.4	4.1	1.8	233.2	176.3	91.1	39.5	13.2	6.0	168.4	112.8	71.2	45.3
2000	11.2	3.4	1.6	208.1	156.5	79.5	31.9	10.7	5.5	147.1	97.3	60.5	38.2
3000	8.6	3.0	1.4	186.3	138.4	69.6	25.3	9.2	5.1	127.3	84.1	50.7	32.4
4000	6.7	2.7	1.3	164.6	122.3	59.7	20.6	7.8	4.7	110.9	71.0	41.4	27.1
5000	5.4	2.5	1.2	147.0	108.4	52.3	16.9	7.2	4.4	90.7	60.9	35.6	23.0
6000	4.1	2.3	1.1	129.3	94.5	44.1	13.4	6.7	4.2	81.8	50.7	30.2	19.2
7000	3.6	2.2	. .	114.4	82.8	38.3	11.5	6.4	4.1	70.3	43.7	28.6	16.0
8000	3.1	2.1	. .	99.5	71.5	32.6	9.6	6.1	4.0	58.7	36.8	27.1	. . .
9000	3.0	2.0	. .	87.3	62.4	28.5	8.6	6.0	. .	50.1	31.8	23.1	. . .
10000	2.8	. .	. .	76.0	53.3	24.6	7.7	5.9	. .	43.5	26.7	18.6	. . .
11000	2.7	. .	. .	66.8	46.8	21.7	7.5	5.9	. .	37.8	23.6	. . .	. . .
12000	2.7	. .	. .	59.9	41.4	18.9	7.3	6.1	. .	32.5	20.7	. . .	. . .
13000	. .	. .	. .	53.0	36.9	16.1	7.1	. .	. .	29.4	20.0	. . .	. . .
14000	. .	. .	. .	46.4	31.9	15.6	7.0	. .	. .	25.3	19.3	. . .	. . .
15000	. .	. .	. .	39.7	27.0	15.2	. .	. .	. .	22.2	. . .	. . .	. . .
16000	. .	. .	. .	35.7	24.8	14.9	. .	. .	. .	. . .	. . .	. . .	. . .
17000	. .	. .	. .	31.9	22.3	14.6	. .	. .	. .	. . .	. . .	. . .	. . .
18000	. .	. .	. .	28.7	20.7	14.4	. .	. .	. .	. . .	. . .	. . .	. . .
19000	. .	. .	. .	24.5	18.5	. . .	. .	. .	. .	. . .	. . .	. . .	. . .
20000	. .	. .	. .	21.2	16.4	. . .	. .	. .	. .	. . .	. . .	. . .	. . .
21000	. .	. .	. .	20.1	15.6	. . .	. .	. .	. .	. . .	. . .	. . .	. . .

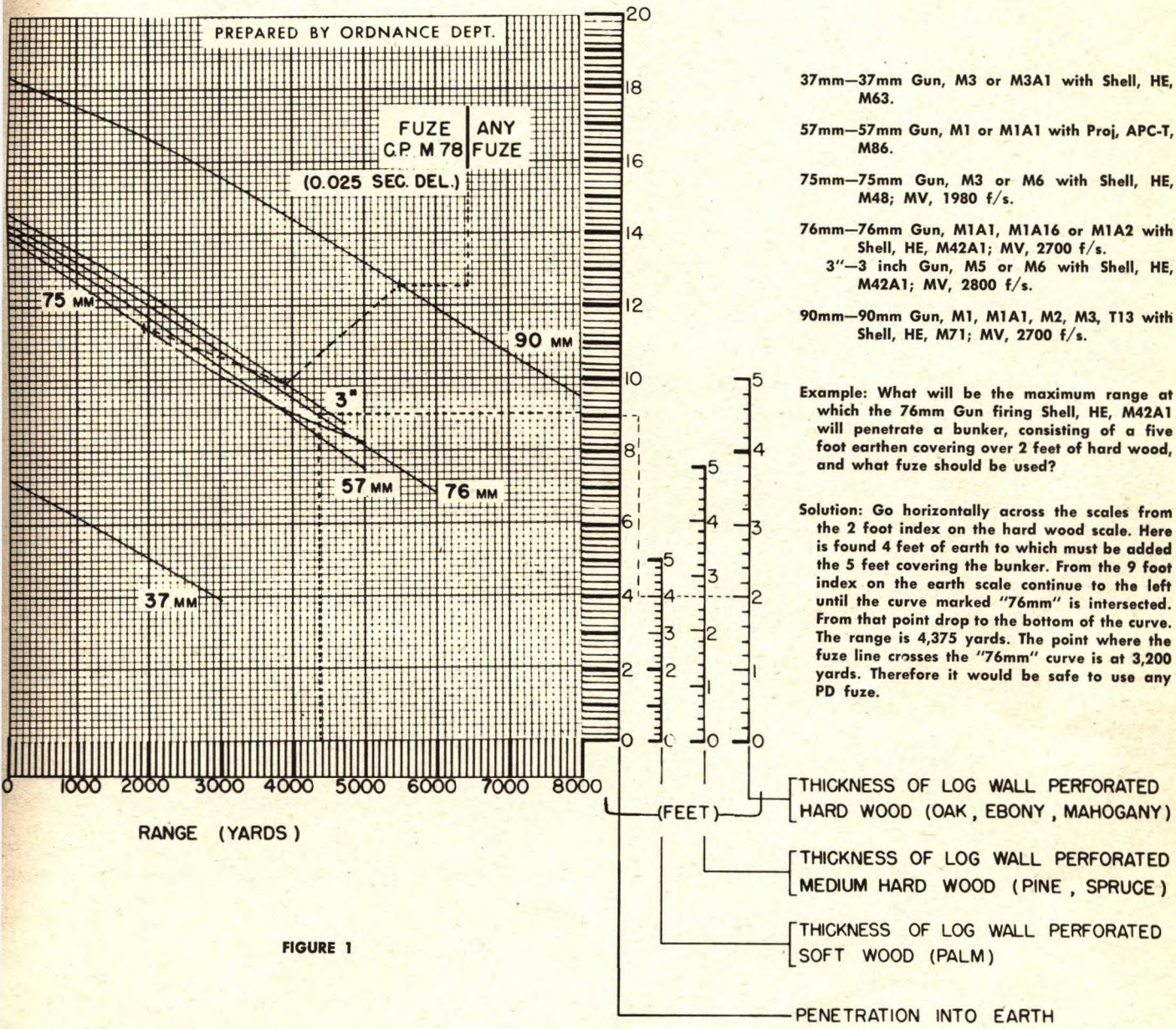
*G = Gun; H = Howitzer.

LOW - ANGLE FIRE

PENETRATION INTO MEDIUM EARTH & LOGS BY VARIOUS WEAPONS

VERTICAL LOG WALLS WITH OR WITHOUT EARTH EMBANKMENT

(EMBANKMENT INCLINATION ASSUMED GREATER THAN 25°)



37mm—37mm Gun, M3 or M3A1 with Shell, HE, M63.

57mm—57mm Gun, M1 or M1A1 with Proj, APC-T, M86.

75mm—75mm Gun, M3 or M6 with Shell, HE, M48; MV, 1980 f/s.

76mm—76mm Gun, M1A1, M1A16 or M1A2 with Shell, HE, M42A1; MV, 2700 f/s.

3"—3 inch Gun, M5 or M6 with Shell, HE, M42A1; MV, 2800 f/s.

90mm—90mm Gun, M1, M1A1, M2, M3, T13 with Shell, HE, M71; MV, 2700 f/s.

Example: What will be the maximum range at which the 76mm Gun firing Shell, HE, M42A1 will penetrate a bunker, consisting of a five foot earthen covering over 2 feet of hard wood, and what fuze should be used?

Solution: Go horizontally across the scales from the 2 foot index on the hard wood scale. Here is found 4 feet of earth to which must be added the 5 feet covering the bunker. From the 9 foot index on the earth scale continue to the left until the curve marked "76mm" is intersected. From that point drop to the bottom of the curve. The range is 4,375 yards. The point where the fuze line crosses the "76mm" curve is at 3,200 yards. Therefore it would be safe to use any PD fuze.

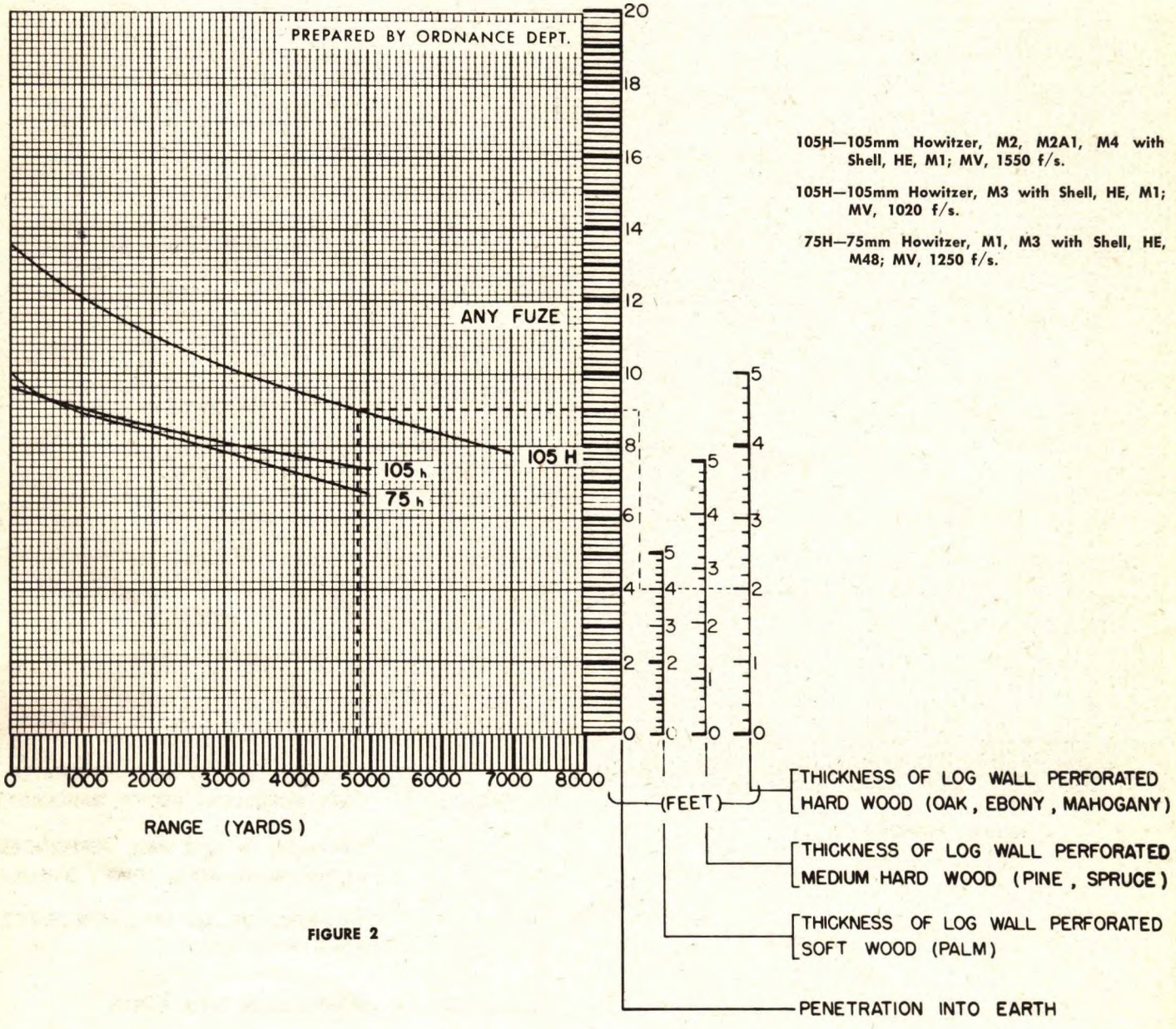
FIGURE 1

LOW - ANGLE FIRE

PENETRATION INTO MEDIUM EARTH & LOGS BY VARIOUS WEAPONS

VERTICAL LOG WALLS WITH OR WITHOUT EARTH EMBANKMENT

(EMBANKMENT INCLINATION ASSUMED GREATER THAN 25°)



105H—105mm Howitzer, M2, M2A1, M4 with Shell, HE, M1; MV, 1550 f/s.

105H—105mm Howitzer, M3 with Shell, HE, M1; MV, 1020 f/s.

75H—75mm Howitzer, M1, M3 with Shell, HE, M48; MV, 1250 f/s.

FIGURE 2

LOW - ANGLE FIRE

PENETRATION INTO MEDIUM EARTH & LOGS BY VARIOUS WEAPONS

VERTICAL LOG WALLS WITH OR WITHOUT EARTH EMBANKMENT

(EMBANKMENT INCLINATION ASSUMED GREATER THAN 25°)

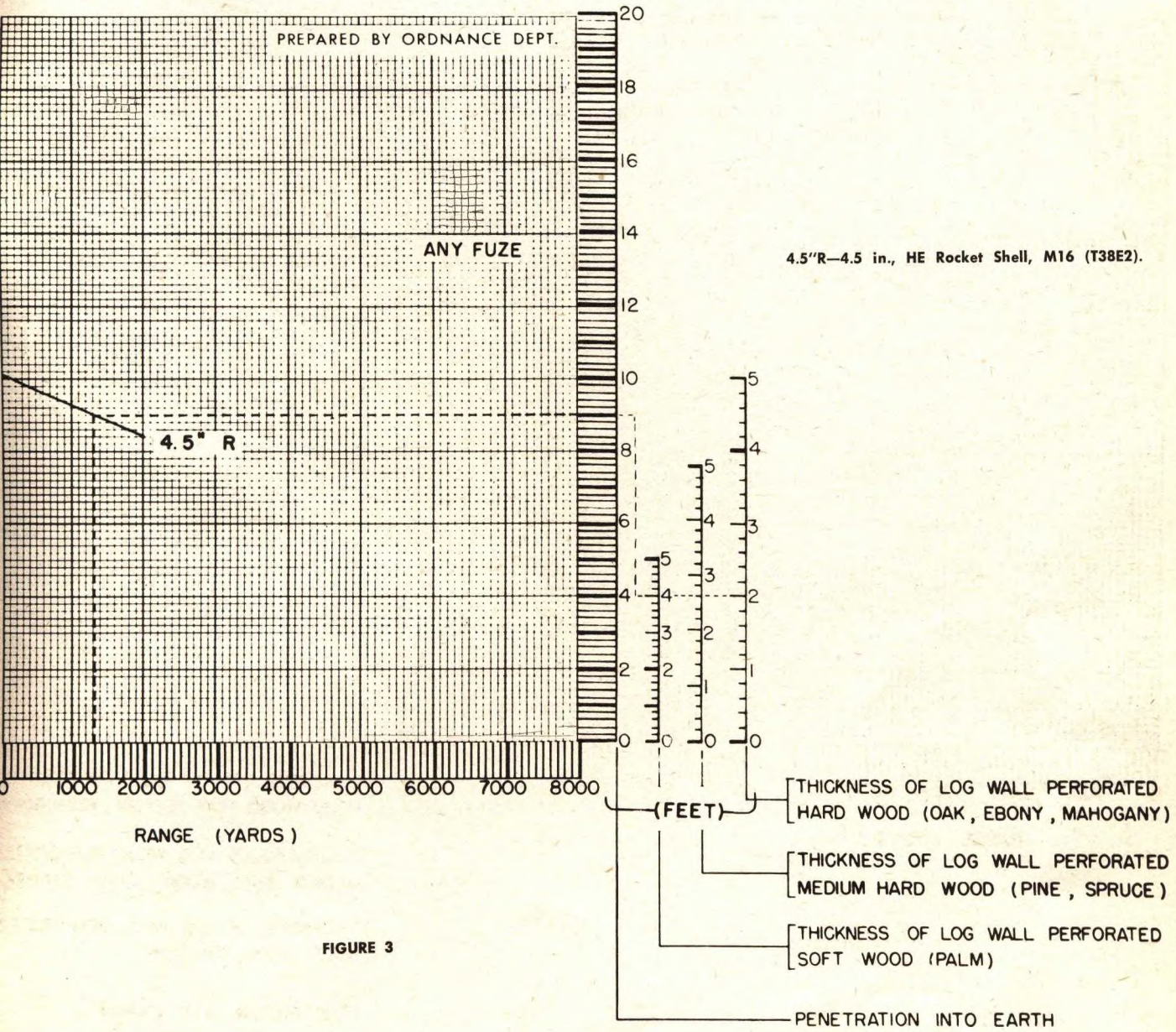


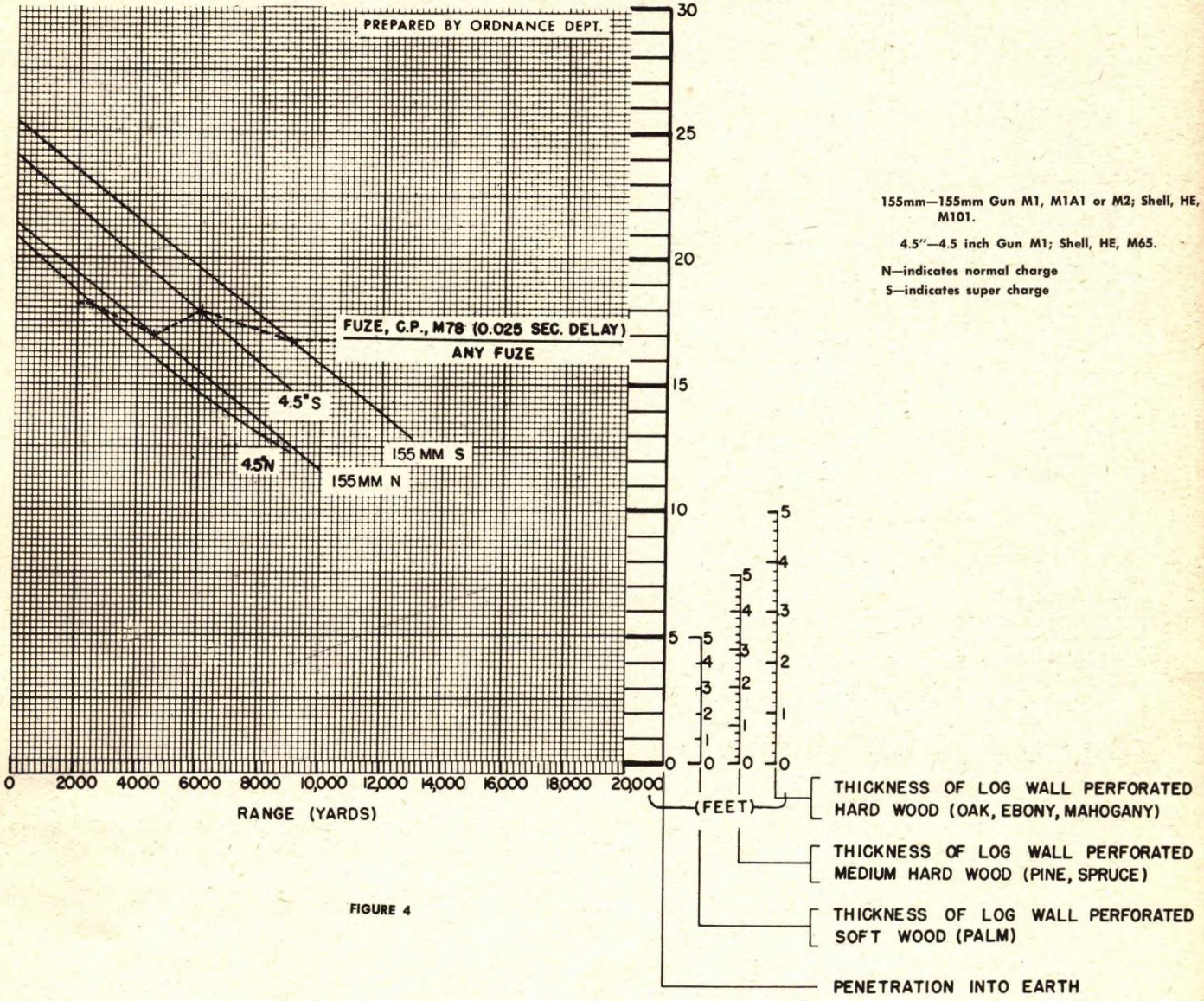
FIGURE 3

LOW - ANGLE FIRE

PENETRATION INTO MEDIUM EARTH & LOGS BY VARIOUS WEAPONS

VERTICAL LOG WALLS WITH OR WITHOUT EARTH EMBANKMENT

(EMBANKMENT INCLINATION ASSUMED GREATER THAN 25°)



155mm—155mm Gun M1, M1A1 or M2; Shell, HE, M101.

4.5"—4.5 inch Gun M1; Shell, HE, M65.

N—indicates normal charge

S—indicates super charge

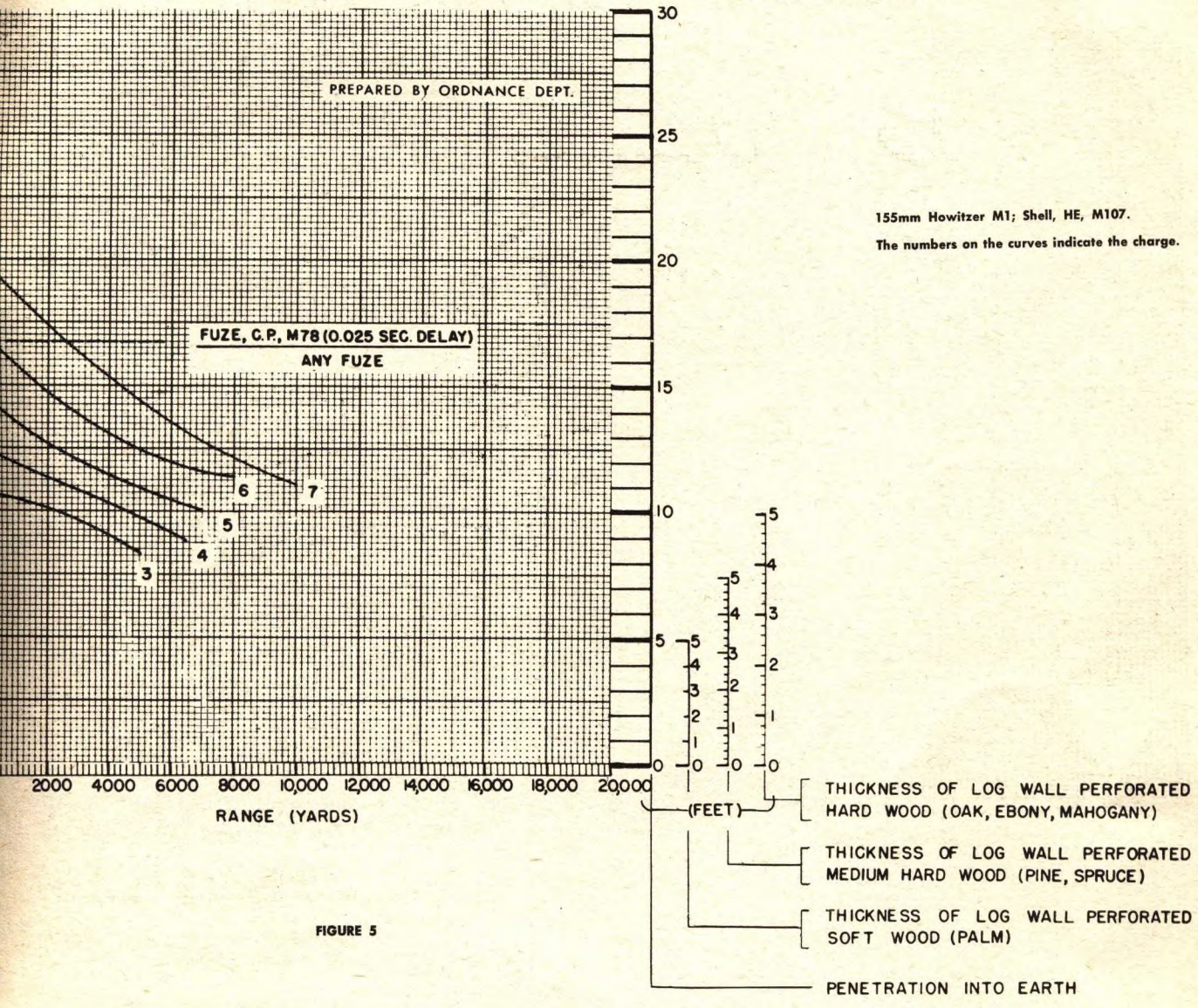
FIGURE 4

LOW - ANGLE FIRE

PENETRATION INTO MEDIUM EARTH & LOGS BY VARIOUS WEAPONS

VERTICAL LOG WALLS WITH OR WITHOUT EARTH EMBANKMENT

(EMBANKMENT INCLINATION ASSUMED GREATER THAN 25°)



155mm Howitzer M1; Shell, HE, M107.

The numbers on the curves indicate the charge.

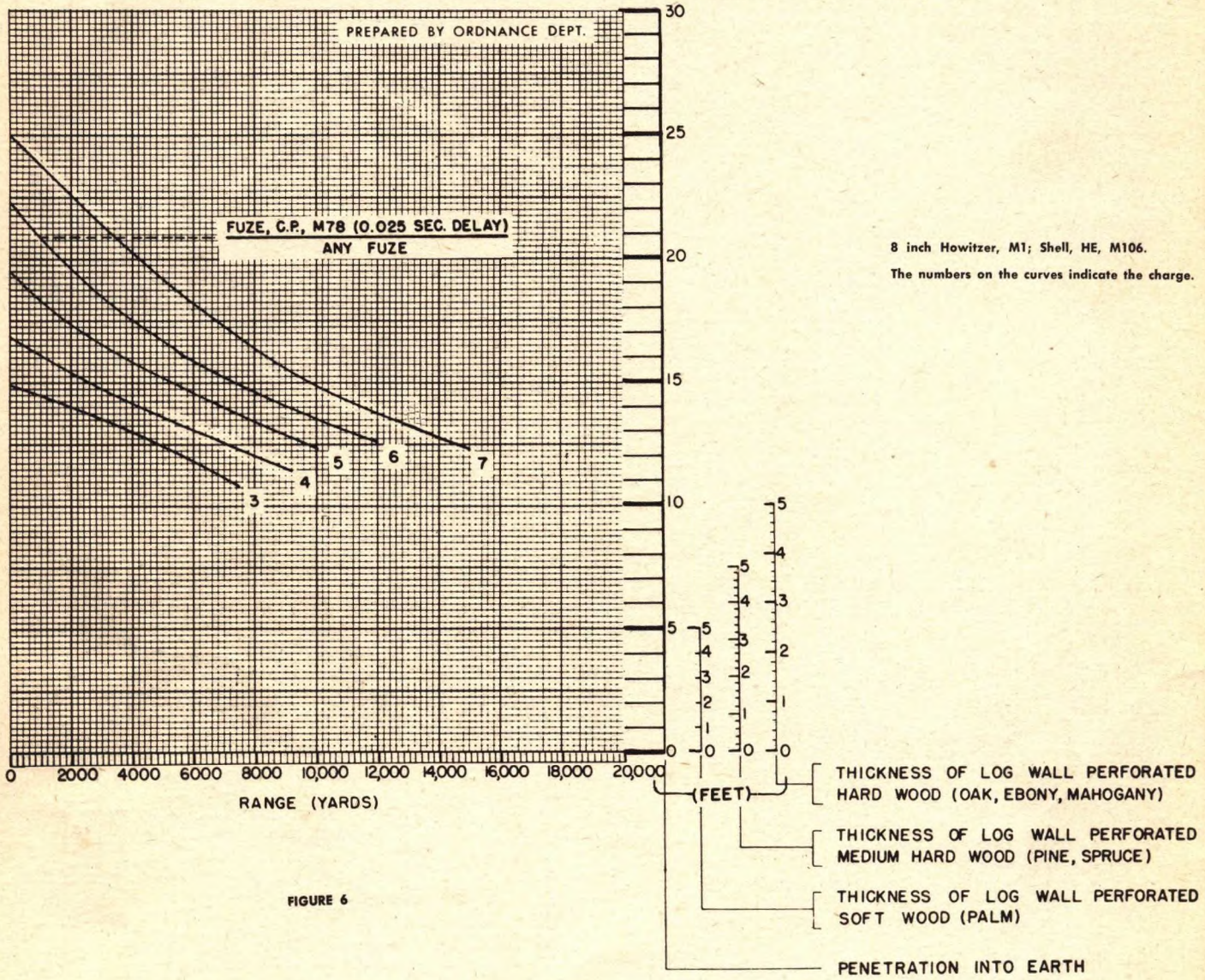
FIGURE 5

LOW-ANGLE FIRE

PENETRATION INTO MEDIUM EARTH & LOGS BY VARIOUS WEAPONS

VERTICAL LOG WALLS WITH OR WITHOUT EARTH EMBANKMENT

(EMBANKMENT INCLINATION ASSUMED GREATER THAN 25°)



8 inch Howitzer, M1; Shell, HE, M106.

The numbers on the curves indicate the charge.

FIGURE 6