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ORDNANCE PAMPHLET 1257

**GARRETT 60 mm
SHOULDER MORTAR
MARK 1 MOD 0**

Description and Instructions for Use



A BUREAU OF ORDNANCE PUBLICATION

14 SEPTEMBER 1944

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United States Navy Regulations, 1920

NAVY DEPARTMENT
BUREAU OF ORDNANCE
WASHINGTON 25, D. C.

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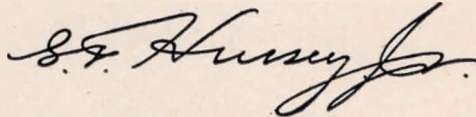
GARRETT 60-MM SHOULDER MORTAR MARK 1 MOD 0

1. Ordnance Pamphlet 1257 contains a description of and instructions for the operation and maintenance of the Garrett 60-mm Shoulder Mortar Mark 1 Mod 0.

2. Marine personnel should be governed by instructions contained herein and by such modifications as are from time to time issued by qualified supervising personnel.

3. This pamphlet does not supersede any existing publication.

4. This publication is RESTRICTED and should be handled in accordance with Article 76, U. S. Navy Regulations, 1920.



G. F. HUSSEY, JR.
Rear Admiral, U. S. Navy
Chief of the Bureau of Ordnance

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SHOULDER MORTAR

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Figure 1.—The Garrett 60 mm Shoulder Mortar Mk 1 Mod 0 in carrying position. Sight has been removed preparatory to placing it in its carrying case attached to a rear pocket of the cartridge belt.



Figure 2.—The Garrett 60 mm Shoulder Mortar Mk 1 Mod 0 in carrying position with monopod folded beneath barrel.

DESCRIPTION

1. CHARACTERISTICS

The Garrett 60 mm Shoulder Mortar Mk 1 Mod 0, is a smoothbore, muzzle-loading, hand-fired, shoulder weapon, designed to fire the 60-mm mortar shell, HE, M49A1 w/PDF M52. It is primarily an antipersonnel infantry weapon for use against machine-gun emplacements, bunkers, tanks, armored vehicles, and landing craft. The shoulder mortar is assembled in a single unit of barrel and mount, and because of its light weight can be readily carried by one man.

2. GENERAL DATA

Weight of shoulder mortar and mount, complete	25.75 lb.
Over-all length of mortar, complete	48 in.
Length of tube	25.25 in.
Diameter of bore	60 mm.
Muzzle velocity with cartridge	182 ft./sec.
Rate of fire (normal)	5 rpm.
Recoil and counterrecoil mechanism	Spring.
Length of recoil	9 in.
Maximum range (shoulder) cartridge, 45° elevation	400 yd.
Maximum range (ground) 1 increment, 45° elevation	800 yd.
Weight of 1-round, shell, HE, M49A1	2.96 lb.
Ammunition	M49A1 w/PDF M52.

3. RANGE TABLE FOR 60-MM SHELL

[Approximate]

Range (yards):	(Elevation degrees)
	Cartridge only
55	5°
105	10°
150	15°
185	20°
215	25°
240	30°

4. DESCRIPTION

a. The shoulder mortar consists of the barrel, recoil spring housing, trigger assembly, monopod and sight.

b. The barrel is bored smooth and carefully finished in interior dimensions and surfaces. Its base is recessed for the firing pin mechanism.

c. The recoil spring housing is a cylinder which contains the recoil spring, piston and separator spring. It is joined to the barrel by a draw collar which fits around the base of the barrel and screws into the head of the recoil spring housing. On the base of the recoil spring housing is a butt plate and shoulder pad.

d. The trigger assembly consists of a hand-grip, trigger, safety disconnect and sear mounted beneath the recoil spring housing.

e. The monopod is attached to a free-moving band around the recoil spring housing. It consists of a hand-grip, two legs and a locking clamp. The monopod can be folded beneath the shoulder mortar for carrying.

f. The sight is equipped with both a horizontal and cross level and is graduated in degrees from 0° to 50°.

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Figure 3.—The cocking position. With the butt held firmly to the ground, grasp the barrel with the left hand and pull it rearward until the sear engages the front of the piston with a distinct click.

FUNCTIONING

5. COCKING

To cock: Pull the barrel rearward into the recoil spring housing until the sear engages the front of the piston with a distinct click. The shoulder mortar is self-cocking. Recoil action cocks the mortar and returns safety disconnecter to SAFE after each shot.

6. ACTION OF FIRING MECHANISM

After the shoulder mortar has been cocked, the safety disconnecter is pulled toward the rear and allowed to slide forward and engage the top of the sear lip. When the trigger is pulled the safety disconnecter, acting on the lip of the sear, pushes the sear downward, disengaging it from the front of the piston. The released piston is carried forward by the

action of the partially compressed recoil spring—its head striking the base of the firing pin which in turn strikes the primer of the mortar shell cartridge. As the piston slides forward over the depressed sear and returns rearward with the recoil action, the sear spring forces the sear upward where it engages the front of the piston. The shoulder mortar is now recocked. The position of the safety disconnecter after firing is beneath the sear lip on SAFE. The safety disconnecter is a positive safety device. It must be pulled to the rear and allowed to slide forward and engage the top of the sear lip before the shoulder mortar can be fired. *The safety disconnecter should never be engaged with the top of the sear lip until ready to fire.*



Figure 4.—After the sight has been aligned on the target, cross leveling is accomplished by rotating the shoulder mortar until the bubble is centered.

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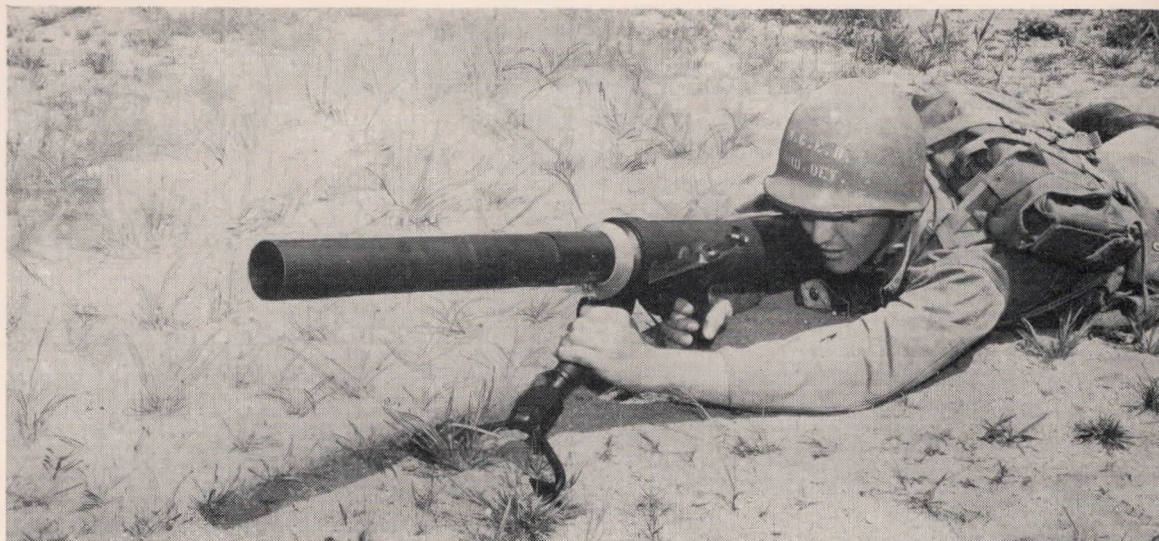


Figure 5.—Firing position with the sight aligned on the target. The gunner grasps the monopod hand grip with his left hand and moves forward until his shoulder presses firmly against the butt. The shoulder mortar must be held firmly against both recoil and counterrecoil.

7. RECOIL

When the firing pin strikes the primer of the mortar shell cartridge, the explosion of the propelling charge drives the barrel nine inches to the rear, moving the piston rearward and compressing the recoil spring. As the piston moves to the rear, compressing the air in the recoil spring housing between the base of the housing and the base of the piston, the air pressure thus built up is reduced by apertures in the head of the piston. These apertures permit a portion of the air to escape around the valve washer, thus absorbing some of the recoil. Reduction of air pressure is regulated by the amount of tension exercised by the

separator spring on the valve washer. When the recoil spring is entirely compressed, the remaining force of the recoil is absorbed through the padded butt plate by the body of the firer.

8. COUNTERRECOIL

When the recoil spring starts its forward counterrecoil movement, the separator spring is compressed against the head of the piston partially sealing the openings and creating a partial vacuum which slows down the counterrecoil force of the forward moving recoil spring. As the recoil spring moves forward, it moves the piston barrel forward with it.

9. GUNNER

a. To assume a shoulder firing position the gunner unslings the shoulder mortar and, resting the butt on the ground, swings the bipod down and clamps it in a perpendicular position beneath the barrel, extends legs and lowers the shoulder mortar to the ground. The sight is then attached to its base, using enough washers to hold it securely. Taking a kneeling position on the left of the shoulder mortar the gunner holds the rear of the mortar firmly on the ground with his right hand as he grasps the barrel with his left hand and pulls it to the rear until the sear engages the front of the piston with a distinct click. Then the gunner makes certain by inspection that the safety is *ON*. Taking a prone position directly behind the shoulder mortar, the gunner grasps the hand grip of the monopod in his left hand and raises the barrel high enough for the mortar shell, inserted by the loader, to slide down inside the barrel and become seated against the firing pin housing. For other than familiarization firing, every attempt must be made to learn to accomplish the above steps entirely in the *PRONE POSITION*.

b. Lining-up the target in the sight, the gunner makes adjustments for range and leveling. Seating the butt firmly against his shoulder and grasping the monopod hand grip in his left hand, he prepares to fire by pulling the safety disconnecter to the rear and allowing it to slide forward and engage the top of the sear lip. To fire, squeeze the trigger with the entire hand; don't pull it.

c. The shoulder mortar is prepared for high angle firing by unfastening the shoulder pad, bringing the pad up and over the end of the butt plate until it lies on top of the recoil spring housing and seating the butt plate firmly in a depression in the ground such as the gunner can make with the heel of his shoe. The monopod is then adjusted to the required elevation. Sighting, loading and firing are similar to that from shoulder position except that, when actually firing, the gunner is alongside the shoulder mortar with his right arm steadying the shoulder mortar and preventing it from becoming unseated in the ground when the counterrecoil takes place.

10. LOADER

During firing the loader takes a position on the right of the gunner. To load, he grasps the round in his left hand with one finger over the head of the safety pin and removes all propellant increments from between the blades of the tail fin. Then he snaps off the safety wire from the fuze and inserts the round, cartridge end first, into the muzzle of the shoulder mortar and, releasing the shell, listens for it to hit the bottom of the barrel. *Caution:* After releasing the shell, the hand must be immediately withdrawn from the muzzle. If the round does not slide all of the way down, he notifies the gunner who elevates the muzzle until the round is seated. After loading, the loader prepares the next round for firing. All propelling increments should be removed from all rounds before loading in the carrying bag.

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Figure 6.—Loading from prone position. The gunner elevates the barrel of the shoulder mortar as the loader inserts the shell.



Figure 7.—Shoulder mortar in high angle firing position. Note the butt is well seated in the ground.

MORTAR**11. DISASSEMBLY**

The shoulder mortar can be completely field-stripped and assembled by using only a screw driver and a pair of pliers.

a. Remove the carrying sling.

b. The sight is removed by giving the sight arm a quarter turn clockwise in raising the fore sight and depressing the rear sight.

c. Remove the barrel by unscrewing the draw collar from the rear spring housing. *Caution:* The shoulder mortar should be cocked before attempting to unscrew the draw collar. The separator spring and draw collar are next removed. The firing pin housing is removed by unscrewing it from the base of the barrel and by taking out the firing pin and firing pin spring.

d. To remove the recoil spring, press the open end of the spring housing against a clean, hard surface. The threads in the end of the housing should be carefully protected so that they do not become fouled. Release the sear from the piston by pulling the trigger.

Caution: Hold the housing firmly because

the piston is driven forward by the recoil spring with a great deal of force.) Remove the piston and take off the valve washer. Remove the recoil spring.

e. To disassemble the trigger group, remove the sear retaining pin cotter key, sear retaining pin, sear and the sear spring. The trigger is removed by taking out trigger retaining pin, trigger and trigger spring. Remove the safety disconnecter by taking out the disconnecter pin, disconnecter slide, disconnecter, disconnecter spring and disconnecter spring cover.

12. ASSEMBLY

To assemble the shoulder mortar, reverse the disassembling procedure. When the recoil spring group has been assembled, it is necessary, in order to screw the draw collar into the recoil spring, to cock the shoulder mortar. To do this, insert the muzzle end of the barrel into the recoil spring housing and push the piston to the rear until it engages and is held by the sear.



Figure 8.—The Garrett 60 mm Shoulder Mortar Mk 1, Mod 0 complete.

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Figure 19.—Step 11—Remove the trigger hinge pin, trigger and trigger spring. The safety disconnect is disassembled by removing the disconnect pin, disconnect slide, disconnect, disconnect spring and disconnect cover.

13. CARE AND CLEANING

a. The shoulder mortar is rugged and suited for the purpose for which designed. It will not, however, stand abuse or rough handling. Inaccuracy or malfunctioning will result from mistreatment. Exercise care to avoid striking or otherwise injuring the sight. Care should be taken to avoid burring or denting the barrel, recoil spring housing, and piston.

b. When not in use, keep the sight in the carrying case provided.

c. NO SUBSTITUTION OF PARTS OF OTHER WEAPONS FOR THOSE OF THE GARRETT 60 MM SHOULDER MORTAR MK 1 MOD 0 IS PERMITTED. Disassembly will not be undertaken in the field except by a gunner who is thoroughly familiar with the shoulder mortar.

d. Oil the moving parts of the shoulder mortar, as required, with a small quantity of

light oil. *Caution:* The inside of the recoil spring housing and the piston should be kept clean and dry except when in storage. Keep excess lubricant that seeps from moving parts wiped off to prevent accumulation of dust and grit.

e. The importance of keeping the bore clear of powder fouling and other foreign substances cannot be overstressed. After each period of firing, the bore should be thoroughly cleaned with a solution made by dissolving $\frac{1}{2}$ pound of soda ash, or 1 pound of sal soda in 1 gallon of water. It is permissible to use soap and water to clean the bore of this weapon if the above is not available. Wipe dry, then oil the bore with a thin coating of light, Class A lubricating oil. It will be necessary to improvise swabs of white cotton waste or other soft material for drying and applying the oil.

f. After each firing period, remove the firing pin and spring and thoroughly clean them with the solution referred to above. Wipe thoroughly dry, oil lightly, and reassemble.



Figure 20.—Step 12—Remove the recoil spring.

MOUNT AND SIGHT

14. DISASSEMBLY OF MOUNT

a. To disassemble the mount, remove the monopod hinge collar from end of the recoil spring housing and remove the monopod adjusting clamp by turning it counter clockwise. The serrated adjustment washers and monopod are released by removal of the adjusting clamp.

b. The monopod legs are removed by taking out the two leg hinge pins which release the legs, detent cam, and detent spring.

15. ASSEMBLY

To assemble the mount, reverse the disassembling procedure



Figure 21.—Step 13—Remove the monopod hinge collar from the recoil spring housing. The monopod is removed from the collar by unscrewing the adjusting clamp.

16. DESCRIPTION OF SIGHT

The sight arm is of one-piece construction with welded spirit level housings and is calibrated in degrees from 0° to 50°. The front sight is of the blade type. The rear sight has a diamond aperture for quickly engaging the target. A quarter-turn clockwise attaches the sight to its mount on the shoulder mortar. Brass shims are provided for insertion between the sight arm and its mount in order to obtain the proper amount of tightness necessary to prevent movement during firing.

17. OPERATION

Align the sight on the target and set the elevation to desired degree by moving the sight arm up or down as required. Move the mount slightly until the cross leveling bubble is centered. The shoulder mortar is then properly aimed in direction and leveled. The longitudinal bubble has been provided for use in indirect fire.

18. CARE AND PRESERVATION

Disassembly of the sight levels in the field is not permitted. When a level fails to function properly or becomes broken, the sight arm should be turned in for repair by competent ordnance personnel. Levels and shims should be kept clean and dry and should not be oiled under any conditions.

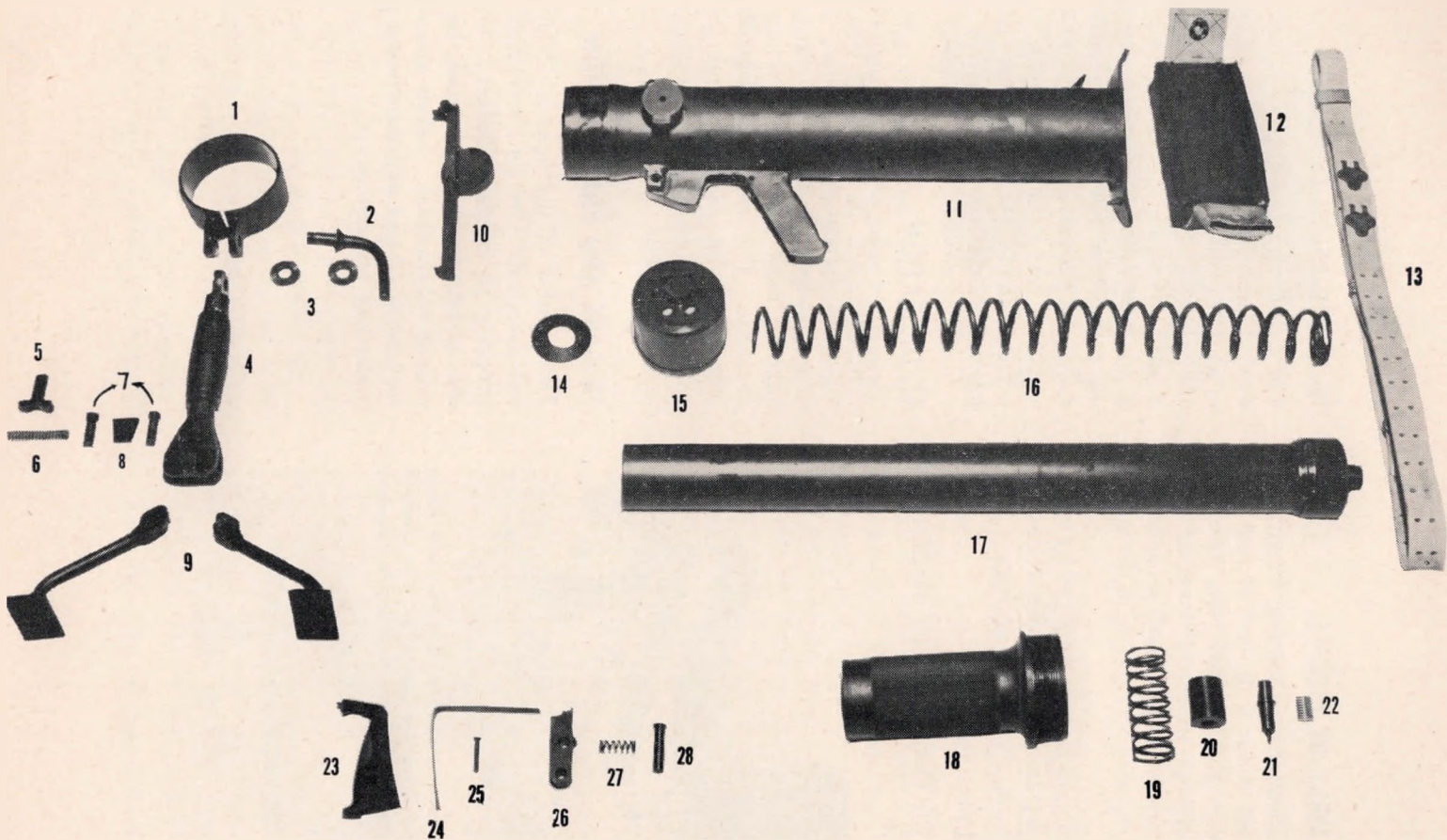


Figure 22.—Parts of the Garrett 60 mm Shoulder Mortar Mk 1 Mod 0

1. Monopod hinge ring
2. Monopod clamping handle
3. Monopod ratchets
4. Monopod hand grip
5. Monopod detent cam
6. Monopod detent spring
7. Monopod leg hinge pins
8. Monopod hinge pin lock
9. Monopod legs
10. Sight
11. Recoil spring housing
12. Shoulder pad
13. Carrying sling
14. Valve washer
15. Piston
16. Recoil spring
17. Barrel
18. Draw collar
19. Separator spring
20. Firing pin housing
21. Firing pin
22. Firing pin spring
23. Trigger
24. Trigger spring
25. Trigger hinge pin.
26. Sear
27. Sear spring
28. Sear pin

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AMMUNITION**19. CLASSIFICATION**

Based upon use, the principal classifications of ammunition for the Garrett 60-mm Shoulder Mortar Mk 1 Mod 0 are the same as for the 60-mm Mortar M2.

a. High explosive (HE), for use against personnel and light material targets. Shell, HE, M49A1, w/PDF M52.

b. Practice, for use in target practice. Shell, practice, M50A1, w/PDF M52.

20. CARE AND HANDLING

a. Complete rounds, being fuzeed, must be handled with due care at all times. The explosive elements in primers and fuzes are particularly sensitive to undue shock and high temperature.

b. Do not attempt to disassemble any fuze.

c. Protect the ammunition carefully from mud, sand, dirt, and water. The round should be free of foreign matter before firing. If it gets wet or dirty, wipe it off at once.

d. Just before loading—but at no other time—remove the safety wire from the fuze.

e. When loading, enter the round into the muzzle of the shoulder mortar, cartridge and first. When the projectile is released to slide down the bore, promptly remove the hand from the muzzle.

f. Do not handle duds. After firing, fuzes are extremely dangerous.

21. ORGANIZATIONAL SPARE PARTS

One set of organizational spare parts is included with each ten shoulder mortars. No parts from other weapons are to be used as substitutes.

1 firing pin
1 firing pin spring
1 valve washer
1 trigger pivot pin
1 trigger assembly
1 sear spring
1 sear pin
1 sear
1 trigger spring (flat)
1 shoulder pad
1 sight
1 monopod clamping handle
2 ratchets
1 buffer ring
1 monopod detent spring
1 monopod detent

22. INSPECTION

a. Note general appearance and cleanliness of bore.

b. Examine firing pin for fouling or burrs.

c. Inspect the security of the shoulder pad.

d. Note the general appearance of the monopod and see that legs and monopod clamp operate properly.

23. PRECAUTIONS BEFORE FIRING

a. Make certain the safety disconnecter is functioning properly and the shoulder mortar cocks.

b. Inspect the sight arm and make sure enough shims have been used to hold it securely.

c. The bore must be swabbed out before firing.

d. Each shell must be clean with all propelling increments removed.

24. PRECAUTIONS DURING FIRING

- a.* Make certain there are no propelling increments left in the tail of the shell.
- b.* Check the sight setting before each shot.
- c.* While sighting, keep the chin well away from the recoil spring housing and the shoulder pad firmly held against the shoulder.

25. MISFIRES

A misfire occurs when a round is loaded into the barrel of the shoulder mortar but fails to fire because the propelling charge did not function. The round, therefore, remains in the shoulder mortar until it is removed by hand.

When a misfire occurs:

- a.* The gunner must wait at least one minute before removing the round in order to avoid accident caused by possible delayed fire.
- b.* The loader then places the thumb of each hand over the muzzle, as the gunner depresses the shoulder mortar, and stops the round as the point of the fuze reaches the muzzle.
- c.* He then locates the safety pin and, holding it in place with his finger, inserts the safety wire.
- d.* Then he inspects the round to determine the cause of the misfire.
- e.* A round which has misfired should be destroyed.

PARTS LIST

DWG. NO.	PC. NO.	DESCRIPTION	NO. REQD. ONE MORTAR
SECTION THRU MONOPOD			
51340	6	Monopod ratchets.....	2
51339	4	Monopod clamping handle.....	1
51339	5	Monopod female leg.....	1
51340	7	Monopod ratchet shim.....	1
51340	1	Monopod support.....	1
51340	9	Monopod detent spring.....	1
51340	8	Monopod detent cam.....	1
51339	11	Monopod hinge pin lock.....	1
51339	6	Monopod male leg.....	1
PLAN VIEW OF SIGHT			
51336	6	Sight shim.....	1
PLAN VIEW OF SHOULDER MORTAR			
51342	5	Caution plate.....	1
51336		Sight.....	
51343	1	Carrying sling.....	1
51343	2	Shoulder pad.....	1
51341	1	Recoil spring housing.....	1
51338	1	Barrel.....	1
51339	1	Monopod hinge ring.....	1
51340	10	Monopod retaining ring pin.....	1
51340	2	Monopod grip handle retaining ring.....	2
51340	3	Monopod hand grip.....	2
51340	1	Monopod support.....	1
51339	9	Monopod leg hinge pin.....	2
SECTIONAL VIEW OF FIRING MECHANISM			
51338	7	Firing pin spring.....	1
51338	4	Firing pin housing.....	1
51338	5	Firing pin.....	1
51342	2	Separator spring.....	1
51342	3	Valve washer.....	1
51342	1	Recoil spring.....	1
51342	4	Piston.....	1
51338	3	Buffer ring.....	1
51338	2	Draw collar sleeve.....	1
51337	8	Sear pin.....	1
51337	2	Sear.....	1
51337	11	Sear spring.....	1
51337	9	Trigger hinge pin.....	1
51337		Trigger.....	
51337	7	Trigger spring.....	1

PARTS LIST

GARRETT 60MM SHOULDER MORTAR MARK-1, MOD-O.

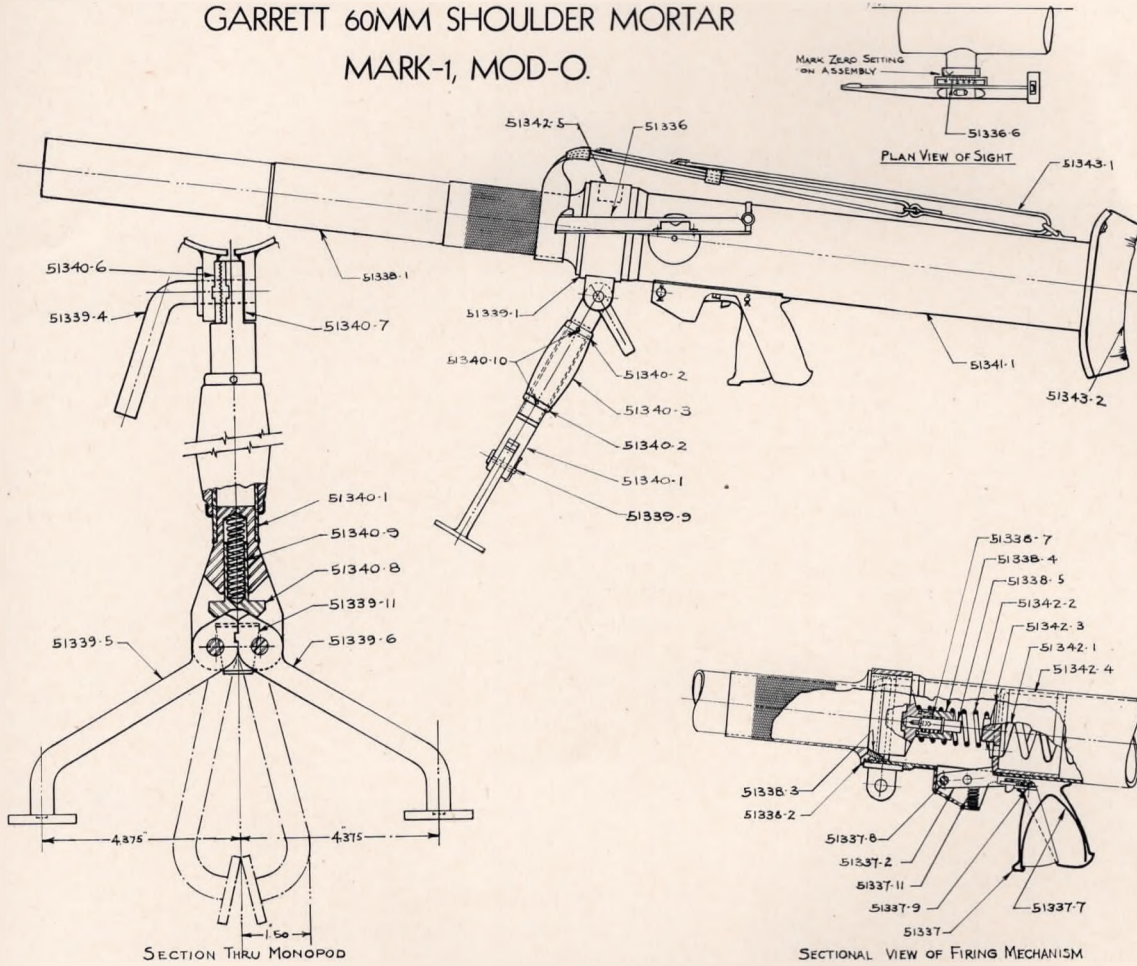


Figure 23.—General Arrangement Drawing

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