DEPARTMENT OF THE ARMY
TECHNICAL MANUAL
DEPARTMENT OF THE AIR
FORCE TECHNICAL ORDER

TM 9-2002
TO 39A-15A-14
(Formerly TM 9–297)

3.5-INCH
ROCKET LAUNCHERS
M20 AND M20B1

DEPARTMENTS OF THE ARMY AND THE AIR FORCE
APRIL 1953

AGO 3297B—Apr

TM 9–2002/TO 39A–15A–14

This manual supersedes TM 9–297, 10 August 1950, including C 1, 13 November 1951, TB 9–297–1, 24 November 1952, and those portions of TB ORD 418, 12 September 1951, and TB ORD 425, 10 December 1951, pertaining to the material covered herein.

3.5-INCH ROCKET LAUNCHERS M20 AND M20B1

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DEPARTMENTS OF THE ARMY
AND THE AIR FORCE
WASHINGTON 25, D. C., *13 April 1953*

TM 9–2002/TO 39A–15A–14 is published for the information and guidance of all concerned.

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CONTENTS

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CHAPTER 1
INTRODUCTION

Section I. GENERAL

1. Scope

a. These instructions are published for the information and guidance of the personnel to whom this matériel (figs. 1 and 2) is issued and for field maintenance personnel. They contain information on the operation, organizational maintenance, and field maintenance of the matériel, as well as descriptions of major units and their functions in relation to other components of the matériel.

b. The appendix contains a list of current references, including supply catalogs, technical manuals, and other available publications applicable to the matériel.

c. When repair, modification, or adjustment is beyond the scope or facilities of organizational and field maintenance personnel, the responsible maintenance unit will be informed so that trained personnel, with suitable tools and equipment, may be provided or proper instructions issued.

d. This manual differs from TM 9–297, 10 August 1950, as follows:

(1) Adds information on:
- (*a*) Modifying monopod and elminating bipod.
- (*b*) Rounds used.
- (*c*) Testing electric circuit of launcher with electric output testers.

(2) Revises information on:
- (*a*) Ammunition.
- (*b*) Bore sighting procedures.
- (*c*) Maintenance instructions.
- (*d*) Reflecting sight assembly.
- (*e*) Testing electrical firing mechanisms with electric output testers.

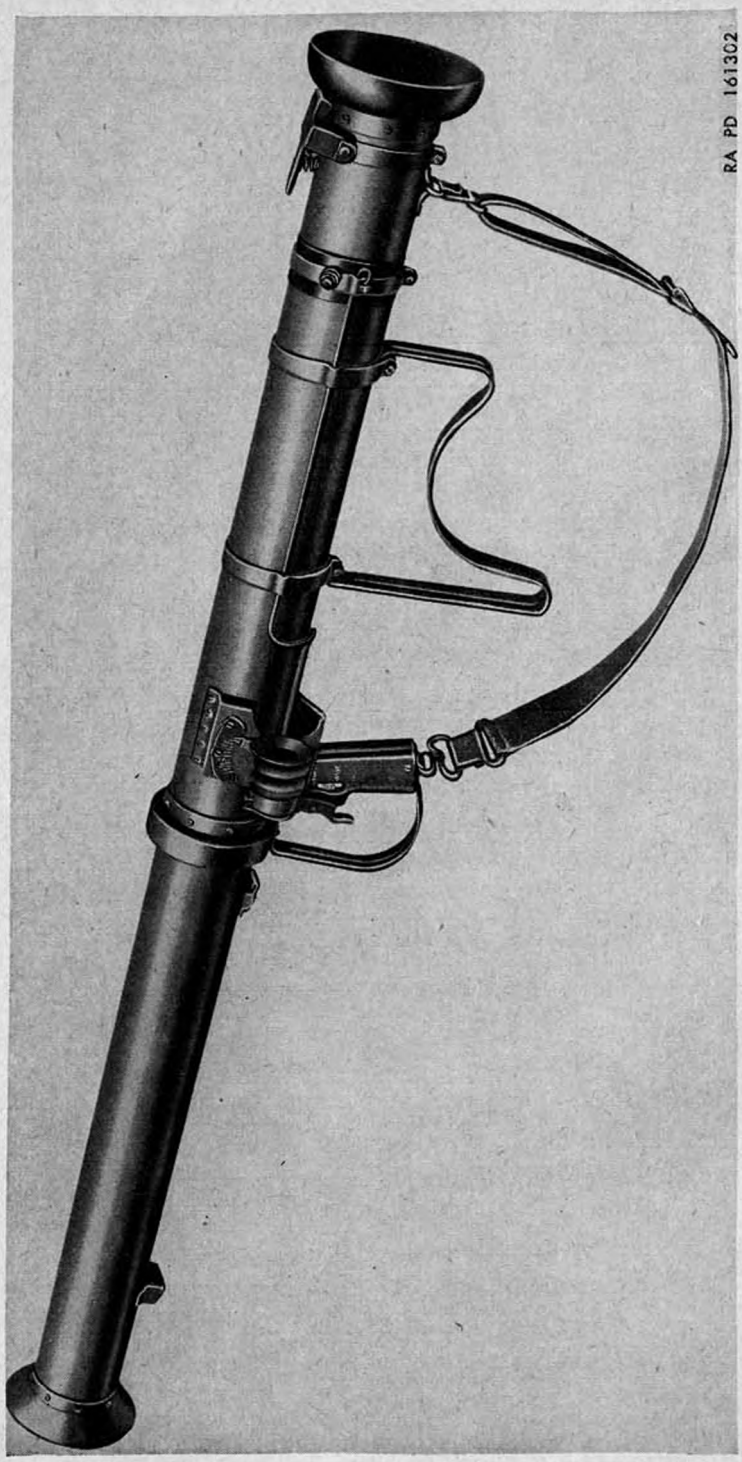


Figure 1. 3.5-inch rocket launcher M20—left-side view.

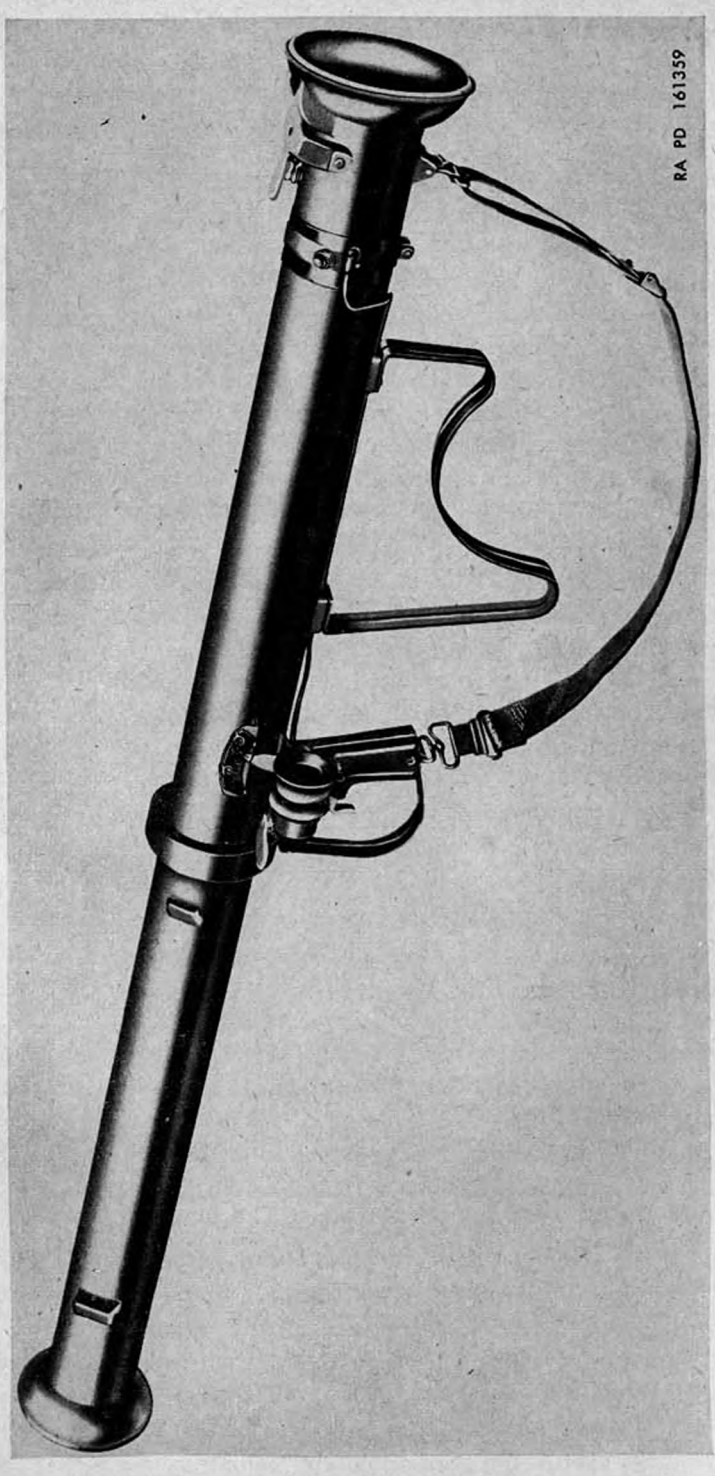


Figure 2. 3.5-inch rocket launcher M20B1—left-side view.

2. Maintenance Allocation

a. Organizational Maintenance Allocation. In general, the prescribed organizational maintenance responsibilities will apply, as reflected in the allocation of tools and supply parts, in the appropriate columns of DA Supply Catalog ORD 7 SNL B–42, and also in accordance with the extent of disassembly prescribed in this manual for the purpose of cleaning, lubricating, or replacing authorized spare parts. The publication of instructions for field maintenance is not to be construed as an authority for the performance by organizational units of those functions which have been restricted to field maintenance. In all cases, where the nature of the repair, modification, or adjustment is beyond the scope of facilities of the using organization, the supporting ordnance maintenance unit should be informed in order that trained personnel, with suitable tools and equipment, may be provided or other proper instructions issued.

b. Field Maintenance Allocation. The publication of instructions for complete disassembly is not to be construed as authority for the performance by field maintenance units of those functions which have been restricted to depot shops and arsenals. In general, the prescribed maintenance responsibilities will apply as reflected in the allocation of maintenance parts listed in the appropriate columns of DA Supply Catalog ORD 8 SNL B–42. Provisions of parts listed in the depot guide column of ORD 8 supply catalogs will be made to field maintenance, only when the emergency nature of the maintenance to be performed has been certified by a responsible officer of the requisitioning organization.

3. Forms, Records, and Reports

a. General. Responsibility for the proper execution of forms, records, and reports rests upon the officers of all units maintaining this equipment. However, the value of accurate records must be fully appreciated by all persons responsible for their compilation, maintenance, and use. Records, reports, and authorized forms are normally utilized to indicate the type, quantity, and condition of matériel to be inspected, to be repaired, or to be used in repair. Properly executed forms convey authorization and serve as records for repair or replacement of matériel in the hands of troops, and also for delivery of matériel requiring further repair to ordnance shops in arsenals, depots, etc. The forms, records, and reports establish the work required, the progress of the work within the shops, and the status of the matériel upon completion of its repair.

b. Authorized Forms. The forms generally applicable to using organizations are listed in the appendix. For a current and complete listing of all forms, see current SR 310–20–6.

c. Field Report of Accidents.

(1) *Injury to personnel or damage to matériel.* The reports, necessary to comply with the requirements of the Army safety program, are prescribed in detail in the SR 385–10–40 series of special regulations. These reports are required whenever accidents involving injury to personnel or damage to matériel occur.

(2) *Ammunition.* Whenever an accident or malfunction involving the use of ammunition occurs, firing of the lot which malfunctions will be immediately discontinued. In addition to any applicable reports required in (1) above, details of the accident or malfunction will be reported as prescribed in SR 385–310–1.

d. Reports of Unsatisfactory Equipment or Materials. Any suggestions for improvement in design and maintenance of equipment and spare parts, safety and efficiency of operation, or pertaining to the application of prescribed petroleum fuels, lubricants, and/or preserving materials, or technical inaccuracies noted in Department of the Army publications, will be reported through technical channels as prescribed in SR 700–45–5 to the Chief of Ordnance, Washington 25, D.C., ATTN: ORDFM, using DA Form 468, Unsatisfactory Equipment Report. Such suggestions are encouraged in order that the other organizations may benefit.

Note. Do not report all failures that occur. Report only REPEATED or RECURRENT failures or malfunctions which indicate unsatisfactory design or matériel. However, reports will always be made in the event that exceptionally costly equipment is involved. See also SR 700–45–5 and printed instructions on DA Form 468.

Section II. DESCRIPTION AND DATA

4. Description

a. The 3.5-inch rocket launchers M20 (fig. 1) and M20B1 (fig. 2) are two-piece smooth-bore weapons of the open-tube type and are fired by an electrical firing mechanism located in the trigger grip. The weapons are designed to be fired from the shoulder in the standing, kneeling, and sitting positions. On launchers of early manufacture, a bipod and monopod (figs. 3 and 4) were provided to permit firing from the prone position; however, launchers of present manufacture do not include these components. Launchers of early manufacture may be modified to eliminate the bipod (par.

109), in which case the monopod is also modified by removing the monopod leg (with foot attached) (par. 84) (fig. 5). To save weight, aluminum has been used in the manufacture of the barrels and many other parts. These launchers are used to launch smoke rockets and high-explosive rockets against ground targets. The high-explosive antitank rockets are capable of penetrating heavy armor at angles of impact greater than 30 degrees. The weapons are sighted on the target by means of a reflecting sight assembly (fig. 6). In firing position, the front and rear barrel assemblies (fig. 6) are joined to form a launching tube. In carrying position, the barrels (fig. 7) are fastened together in a double-tube arrangement, thereby eliminating the unwieldy length of the assembled weapon. The front barrels of all 3.5-inch rocket launchers, whether they are of the same model number or not, are interchangeable; however, the launcher must be bore sighted after the barrels are changed. A gun sling (fig. 8) is used as an accessory for carrying the launcher.

b. The primary functions of the launcher are to ignite the propellent powder of the rocket and give direction to its initial flight. The propulsion of the rocket is accomplished by the jet action of the propellent powder in the motor body of the rocket and does not depend upon gas pressure built up inside the launcher tube. The launcher tube, therefore, need be only heavy enough to prevent denting or bending during handling and to prevent excessive heating at normal rates of fire.

c. When the propellent is ignited, gases and flames are blown from the breech of the launcher. The area directly in rear of the launcher must be clear of personnel and material (par. 24). Because of the rear blast of the weapon, the gunner must take special precautions to avoid injury to himself when firing from the prone position.

5. Differences Between Models

The basic difference between the launcher M20 and the M20B1 is in fabrication of the front and rear barrels (figs. 6 and 9). The tubes of the launcher M20 are manufactured from aluminum tube stock. The component parts of the barrel assembly, such as the breech guard and the barrel coupling screw and nut, are fastened to the tube by means of screws. The tubes of the launcher M20B1 are aluminum castings and many of the component parts of the barrel assembly are cast integral with the tube, effecting a slight saving in overall weight.

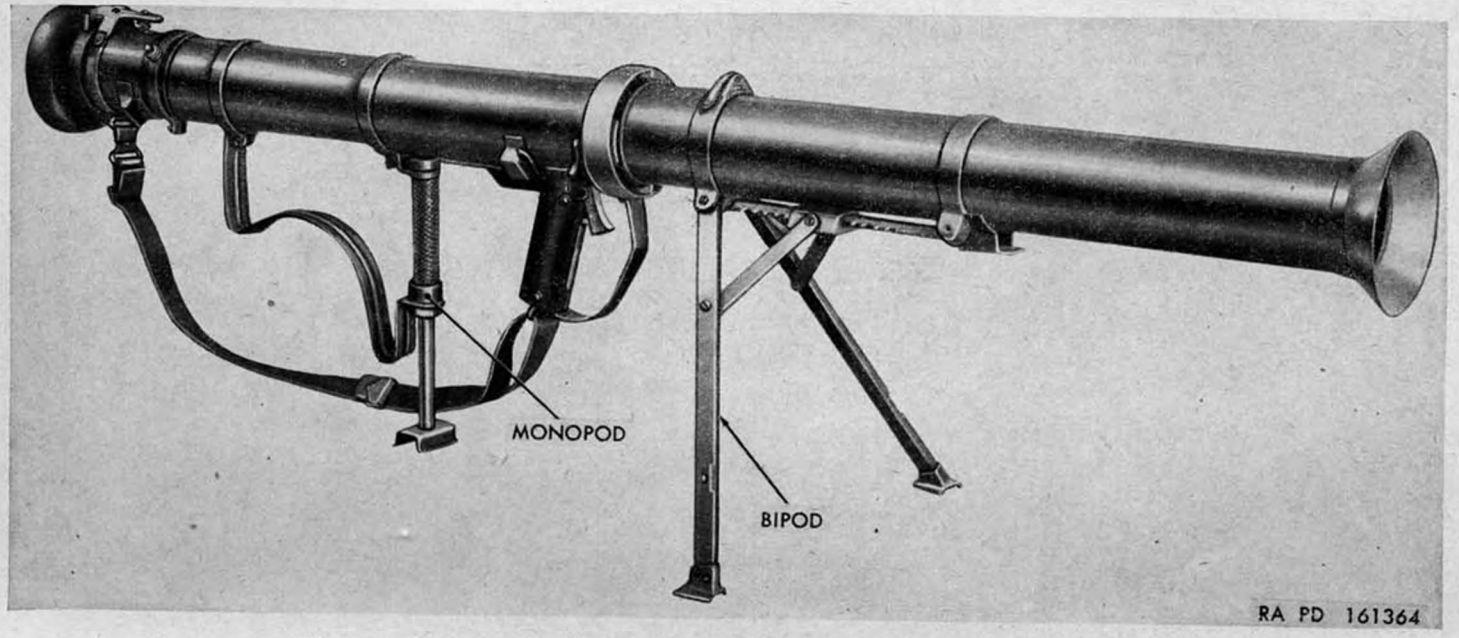


Figure 3. 3.5-inch rocket launcher M20 (bipod extended) (early manufacture).

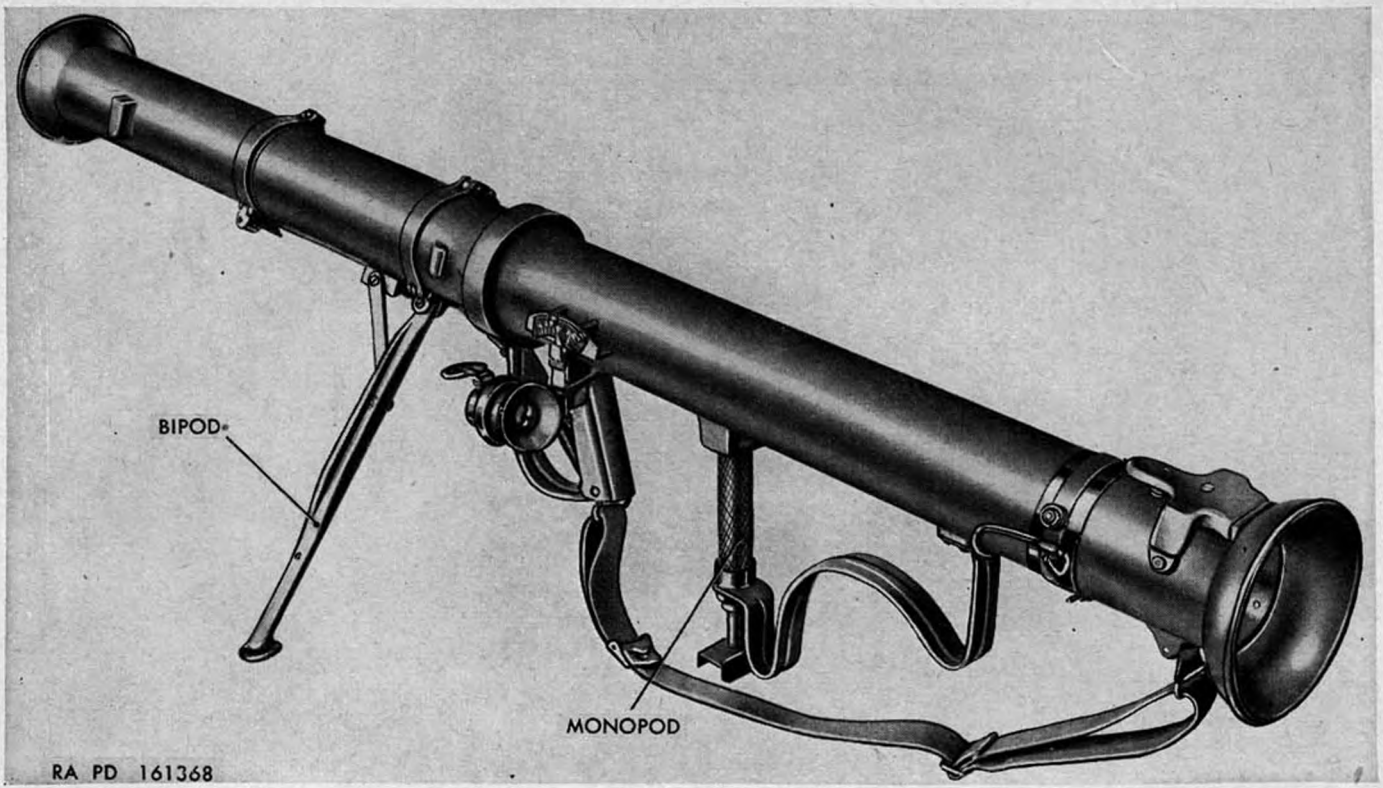


Figure 4. 3.5-inch rocket launcher M20B1 (bipod extended) (early manufacture).

Figure 5. 3.5-inch rocket launcher M20B1 (modified monopod) (early manufacture).

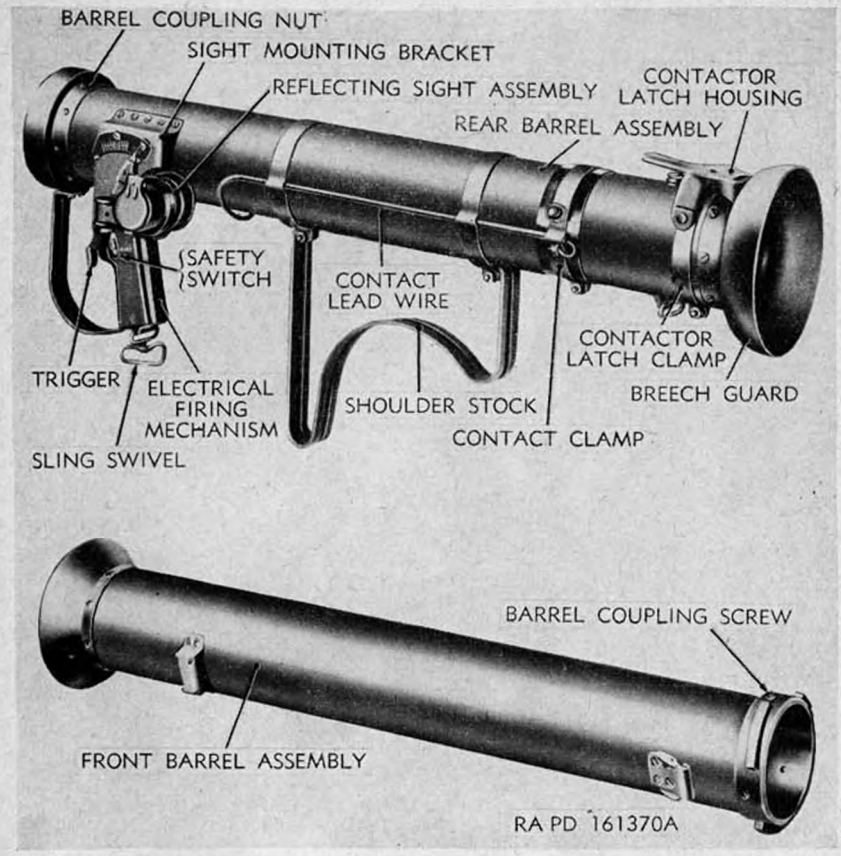


Figure 6. Front and rear barrels of launcher M20—left-side view.

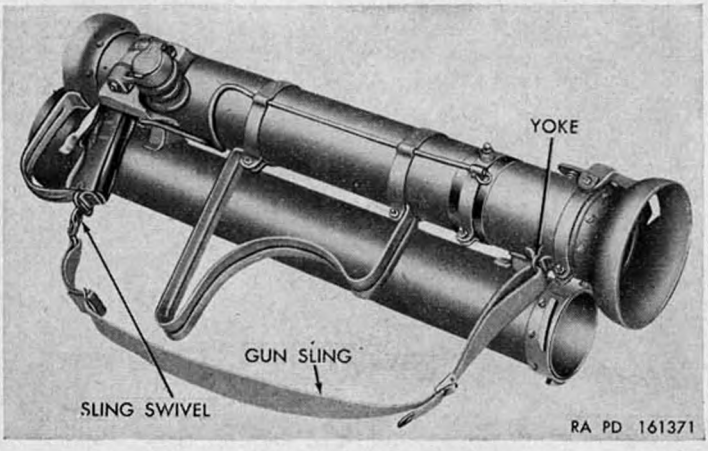


Figure 7. Barrels assembled for carrying.

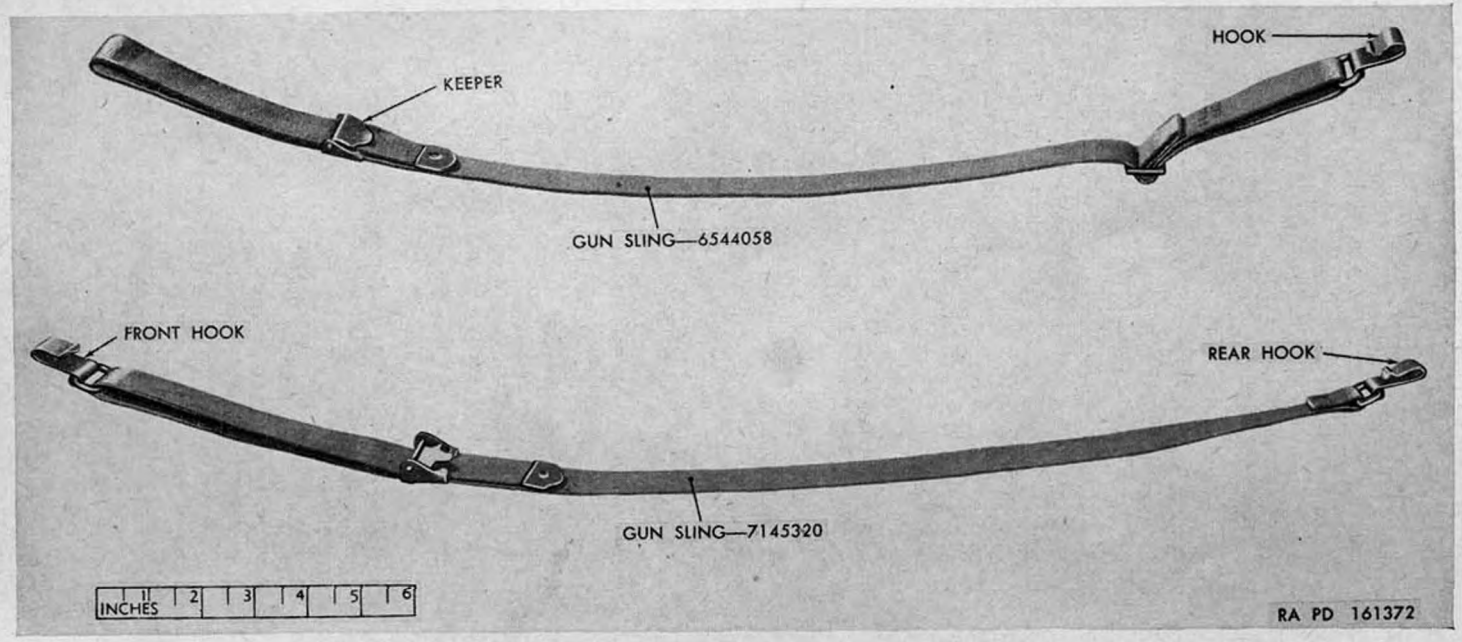


Figure 8. Gun slings 6544058 and 7145320.

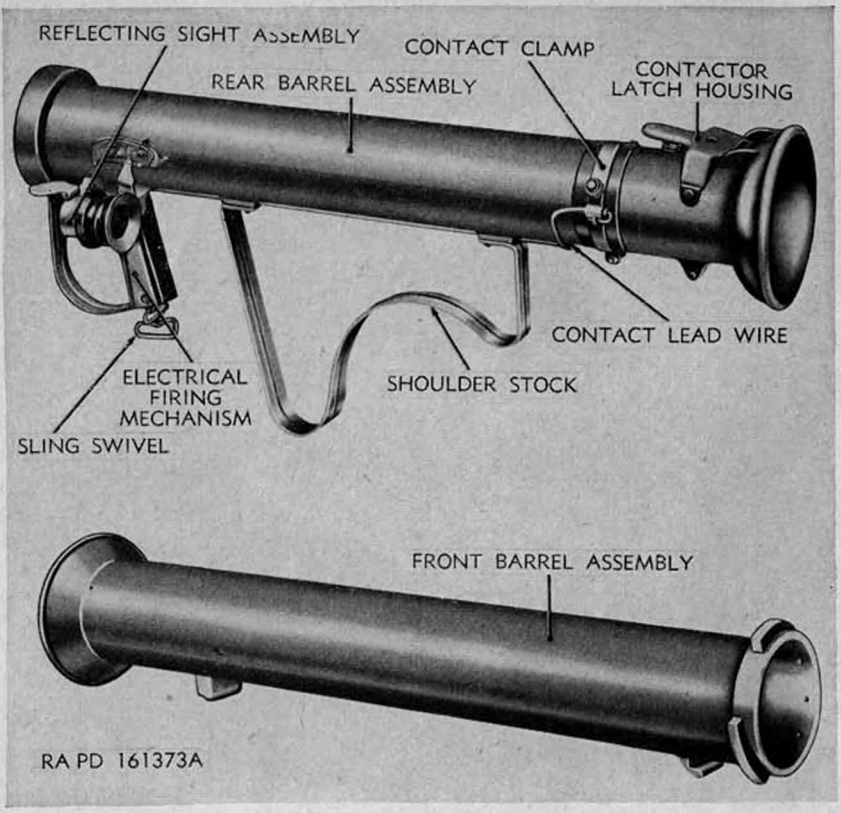


Figure 9. Front and rear barrels of launcher M20B1—left-side view.

6. Identification Information

The model and serial numbers are stamped at the rear end of the rear barrel of launcher M20 (fig. 10) and is cast on top of the rear barrel of launcher M20B1.

7. Tabulated Data

a. Launcher.

	M20	*M20B1*
Length of launcher (assembled for firing)	60.25 in	60.25 in
Weight of launcher with bipod and monopod (aprx)	15 lb	14 lb
Weight of launcher without bipod and monopod (aprx)	13 lb	12 lb
Length of front barrel (aprx)	30 in	30 in
Weight of front barrel	6.1 lb	5.75 lb
Length of rear barrel	31.25 in	31.25 in
Weight of rear barrel	8.9 lb	8.25 lb
Type of firing mechanism	electrical	electrical

b. Sling.

Weight	0.24 lb

c. Ammunition.

Types used (par 126)	HE, AT, WP, and practice
Weight of rocket (aprx)	9 lb
Range (max)	aprx 860 yd
Muzzle velocity	aprx 334 fps
Armor penetration	aprx 11 in homogeneous armor plate

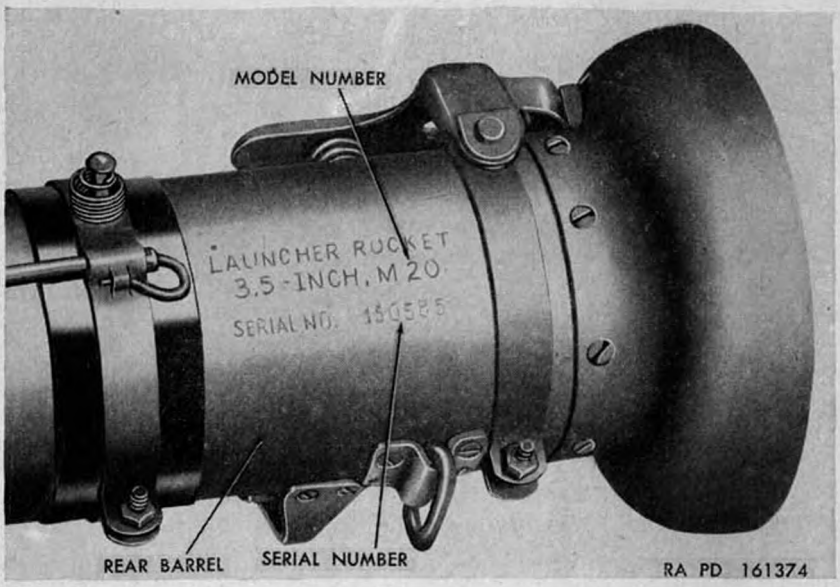


Figure 10. Location of serial and model numbers on launcher M20.

CHAPTER 2
OPERATING INSTRUCTIONS

Section I. SERVICE UPON RECEIPT OF MATÉRIEL

8. General

a. Upon receipt of new or used matériel, it is the responsibility of the officer in charge to ascertain whether it is complete and in sound operating condition. Reference to paragraphs 42 through 62 will provide information on the components of the various major groups of the rocket launcher.

b. A record should be made of any missing parts and of any malfunctions. Such conditions should be corrected as quickly as possible.

c. Attention should be given to small and minor parts, since these are the ones more likely to become lost and may seriously affect the proper functioning of the launcher.

d. The rocket launcher should be cleaned and prepared for service in accordance with instructions given in paragraph 9.

9. New Matériel

a. Remove launcher from the packing box, remove the preservative from all external surfaces with a clean cloth, then wipe with a cloth dampened with dry-cleaning solvent, volatile mineral spirits, or one part of grease-cleaning compound to four parts dry-cleaning solvent or volatile mineral spirits. Clean the bore with waste, in order to remove the preservative; then saturate a cloth in dry-cleaning solvent, volatile mineral spirits, or one part of grease-cleaning compound to four parts dry-cleaning solvent or volatile mineral spirits and remove all remaining preservative.

b. Set up the matériel and make an operational check (par. 23), giving particular attention to the following parts:

Contactor latch housing (figs. 6 and 9)
Barrel coupling lock lever (fig. 11)
Barrel latch handle (fig. 13)
Trigger and safety switch (fig. 6)
Monopod (figs. 3 and 4)
Bipod (fig. 4)

c. Front and rear barrels should assemble easily and lock positively when coupled in any of the three locked positions (par. 52*a*).

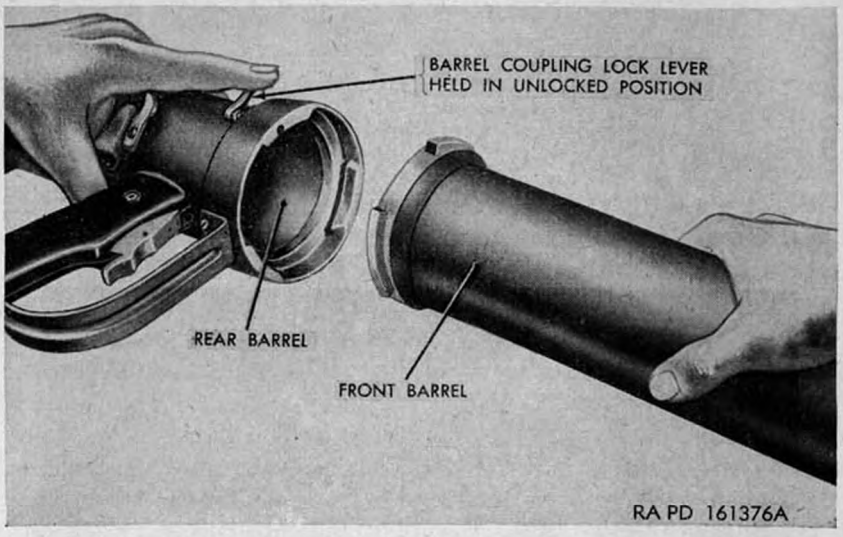


Figure 11. Method of assembling barrels for firing.

d. Lubricate the matériel (par. 35).

e. Bore sight the launcher (par. 44*c*).

f. Check equipment with Department of the Army Supply Catalog ORD 7 SNL B–42.

g. Inspect the gun sling (par. 61).

h. For weapons equipped with firing mechanism 7140325 (double action on trigger squeeze), squeeze the trigger slowly. If a double click is heard, adjust the firing mechanism (par. 79*b*).

10. Used Matériel

a. In addition to the procedures and inspections prescribed in paragraph 9, used matériel will also be inspected to determine whether modification work orders have been applied.

b. A list of modification work orders is published in SR 310–20–4. If any modification work order has not been applied, the local ordnance officer must be notified promptly.

Section II. CONTROLS AND INSTRUMENTS

11. General

This section describes, locates, and illustrates all controls and instruments provided for the operation of rocket launchers M20 and M20B1.

12. Trigger

Movement of the trigger actuates an electrical firing mechanism (fig. 12) housed in the trigger grip. Squeezing the trigger generates the electric current used to ignite the rocket, by imparting motion to the magneto armature in the electrical firing mechanism.

13. Safety Switch

The safety switch is part of the electrical firing mechanism. The switches on the two firing mechanisms are in different locations and perform their functions by different means.

a. Safety in Electrical Firing Mechanism 7313326. The safety (fig. 12) on firing mechanism 7313326 is located in the upper rear portion of the left trigger grip. In the "SAFE" position, the safety short circuits the current and prevents it from reaching the igniter of the rocket. However, the trigger is free to move. The lower position of the safety is its "FIRE" position. In this position, the safety opens the circuit permitting the current to reach the igniter of the rocket. Markings on the grips indicate the two positions of the safety (fig. 12).

b. Safety in Electrical Firing Mechanism 7140325. The safety (fig. 12) is located in the slot on the left trigger grip. The safety has two positions. The lower position is its "SAFE" position. In this position, a block on the safety mechanism is positioned behind a protruding lug of the trigger, locking the trigger. The upper position of the safety is its "FIRE" position. In this position, the block of the safety mechanism is held clear of the lug on the trigger and the trigger is free to move.

Caution: Whenever firing is not being attempted, the safety must be kept in its "SAFE" position.

14. Barrel Coupling Lock Lever

a. The barrel coupling lock lever (fig. 11) is located on the right side of the rear barrel assembly just behind the coupling nut.

b. The barrel coupling lock lever is used to release the barrel coupling lock and must be operated when assembling or disassembling the front and rear barrels (pars. 23*a* and 27). It is operated by raising and holding the lever in its unlocked position. When the lever is released, a spring returns it to its locked position.

15. Barrel Latch Handle

a. The barrel latch handle (fig. 13) is located on the right side of the rear barrel assembly, just back of the trigger grip.

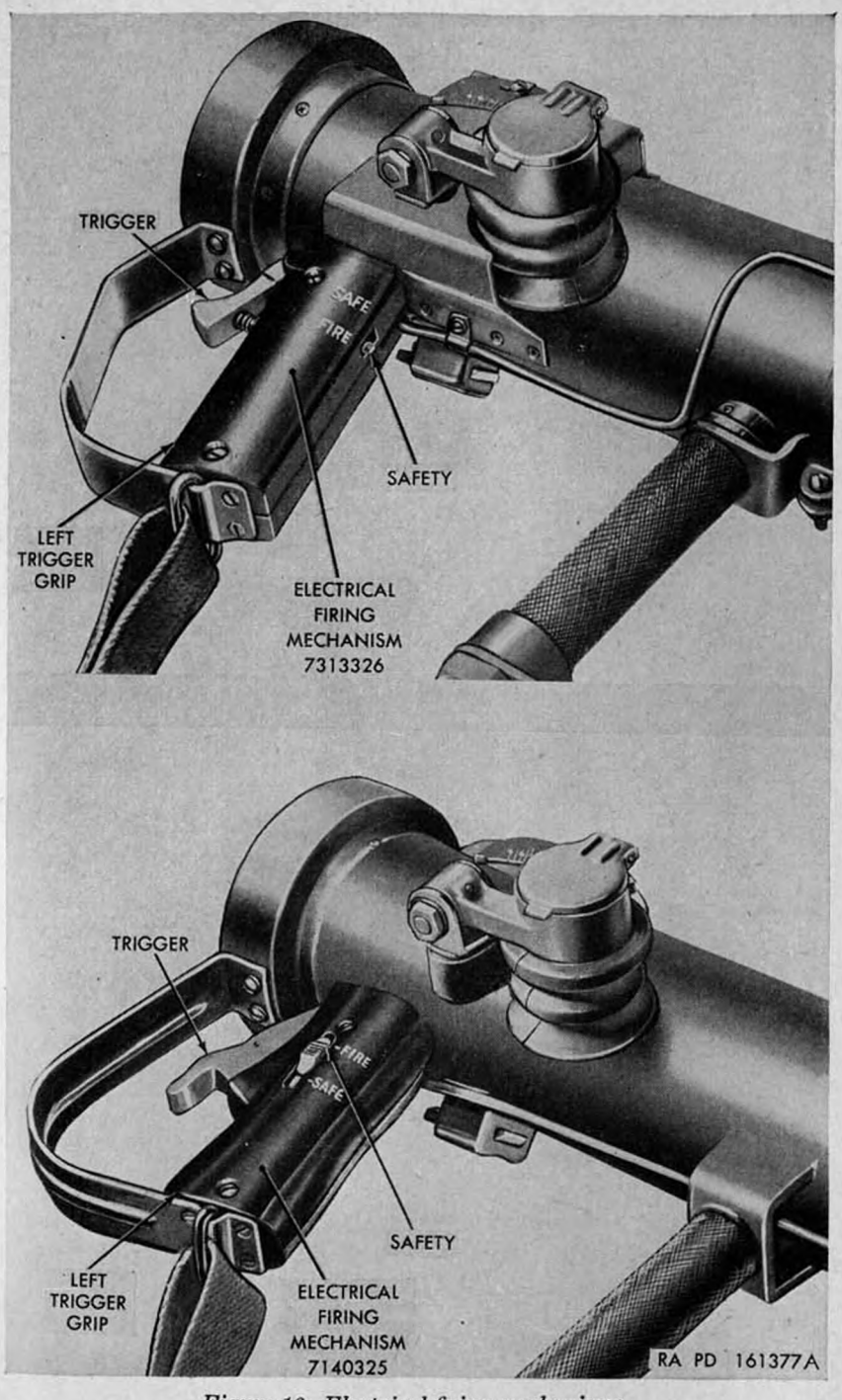


Figure 12. Electrical firing mechanisms.

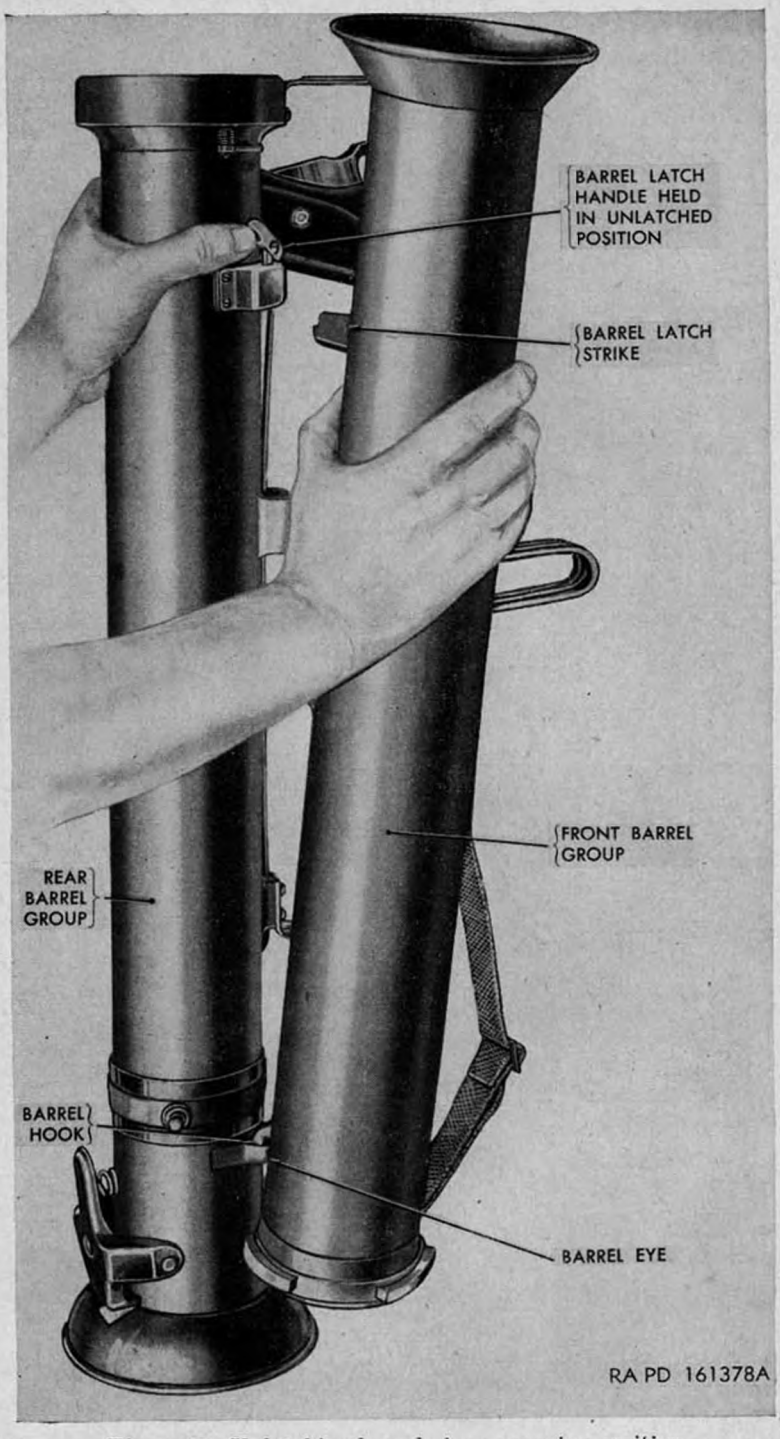


Figure 13. Unlatching barrels from carrying position.

b. The barrel latch handle is used to release the barrel latch, which locks the front and rear barrel assemblies in carrying position. Moving the handle forward retracts the barrel latch bolt, causing it to release the barrel latch strike on the front barrel assembly. Two springs on the barrel latch bolt (par. 53*b*) keep the bolt in its normal extended position.

Note. Such parts as the barrel hook and eye and the barrel latch strike occur as parts only in the launcher M20. In the launcher M20B1, these parts are cast integral with the barrel.

16. Monopod Assembly

a. The monopod assembly (fig. 14) is used in conjunction with the bipod assembly to adjust the elevation of the launcher when it is fired from the prone position. This item of equipment is used on launchers of early manufacture only.

b. To extend the monopod assembly, rotate the monopod sleeve body (figs. 14 and 44) clockwise as viewed from the bottom.

17. Bipod Trip

a. The bipod trip (fig. 49) is located at the bipod front ring. The leg lock buttons, of the bipod front ring assembly, act as stops to hold the bipod in folded position against the front barrel.

b. The bipod trip serves to pry the bipod legs free of the lock buttons for unfolding. Pulling the trip away from the barrel pries the bipod legs free. "PULL" is marked on the trip to indicate this operation (par. 23*b*(1)).

c. Two springs on the trip pin hold the trip in its normal position, flat against the barrel.

18. Bipod Catch Slide

a. The bipod slide is mounted on the front and rear rings of the bipod assembly. The slide block moves along the slide as the bipod is folded and unfolded. The bipod slide block catch is pivoted on the bipod catch pin through the bipod slide block.

b. The bipod slide block catch of some launchers M20 is released by pressing the lever end of the catch against the slide block. The catch then swings free of the ratchet teeth, or notches, on the slide. A spring on the catch pivot pin keeps the catch pressed against the slide.

c. The bipod slide block catch of some launchers M20 and M20B1 may also be released by pulling the catch down out of engagement with the ratchet, or notches, on the underside of the slide, as well

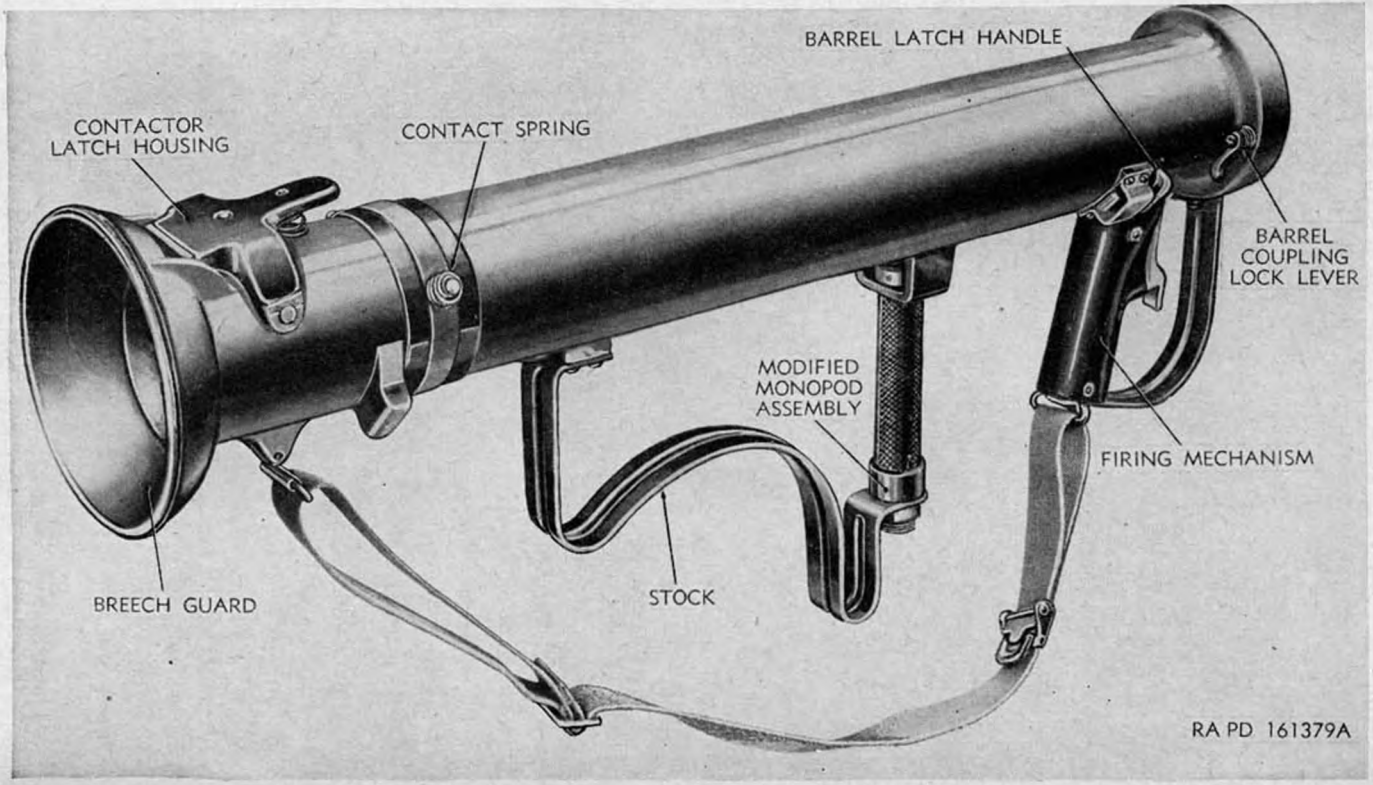


Figure 14. Rear barrel of launcher M20B1 (early manufacture)—right-side view.

as by pressing the lever end of the catch against the slide block as described in *b* above. A spring on the catch pivot pin keeps the catch pressed against the slide.

d. The bipod slide block catch must be released, in order to permit folding the bipod, but the ratchet or notches permit unfolding of the bipod without touching the catch. By engaging the ratchet or notches of the slide, the slide block catch will hold the bipod in any position to which the bipod is extended.

e. The bipod, of which the bipod slide catch is a part, is used on launchers M20 and M20B1 of early manufacture.

19. Bipod Rear Ring Lock Handle

a. The bipod rear ring lock handle (fig. 48) of the 3.5-inch rocket launchers M20 and M20B1 is operated in similar fashion, although the design has been modified. On some launchers M20, the bipod rear ring lock handle is located at the top of the bipod rear ring, directly opposite the slide. On launchers M20 and M20B1 of present manufacture, the bipod rear ring lock handle is located on the right side near the tip of the rear ring.

b. To release the bipod rear ring lock, raise the lock handle. To lock the position of the barrel in the bipod rings, press the handle down against the bipod rear ring.

c. The bipod rear ring lock handle releases the rear ring lock so that the front barrel can be rotated in the bipod rings. This permits proper sighting of the weapon if the bipod is on uneven ground. The rear ring is locked in position before sighting. Bipod ring stops on the barrel prevent longitudinal motion of the barrel, in the bipod rings, when the lock is released (par. 23*b*(2)).

20. Contactor Latch Housing

a. On the launcher M20, the contactor latch housing is mounted on the contactor latch clamp in front of the breech guard (fig. 6). On the launcher M20B1, the latch housing is mounted in front of the breech guard (fig. 14) on lugs cast integral with the barrel. The latch housing protrudes through an opening in the breech guard.

b. A steel blade, riveted to the rear of the body of the contactor latch housing, engages notches in the radial fins at the rear of the rocket and serves to hold the rocket in its proper firing position in the launcher. The contact between the blade of the contactor latch housing and the rocket fins provides grounding of the rocket to the rear barrel for the completion of the firing circuit. A spring keeps the rear end of the contactor latch housing depressed.

c. When the forward end of the contactor latch housing is pressed down against the barrel, the blade at the rear of the contactor latch housing swings clear of the breech of the launcher tube. This is done during loading or unloading of the launcher (pars. 23*c*(5) and 25*d*).

21. Sighting Equipment

a. General. The equipment used for sighting the launchers M20 and M20B1 consists of a reflecting sight assembly (figs. 6 and 9) and an elevation plate which are mounted on the front left side of the rear barrel assembly. Three different reflecting sight assemblies have been issued for use on the launchers. The only part that differs on these reflecting sight assemblies is the reticle.

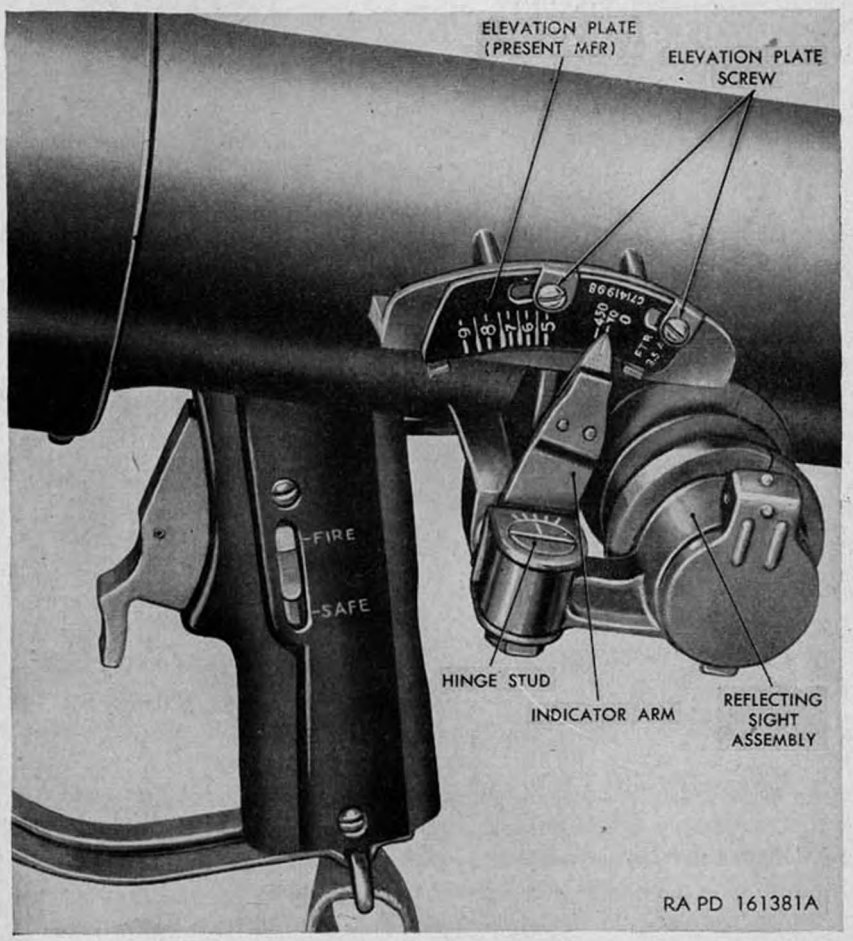


Figure 15. Reflecting sight assembly 7141999 (in folded position) with elevation plate 7141998.

Launchers of early manufacture were equipped with either reflecting sight assembly 7313440 or reflecting sight assembly 7162890 containing the concentric ring and oval type reticle patterns respectively (fig. 32) and elevation plate 7138366. MWO ORD B42–W1 authorizes the replacement of these components with reflecting sight assembly 7141999 and elevation plate 7141998 (figs. 15 and 17).

b. Reflecting Sight Assembly 7141999 (Ladder or Tree Type Reticle Pattern) (fig. 16). The reticle in reflecting sight assembly 7141999 has a dashed vertical center line, a dashed horizontal normal line, and four dashed horizontal range lines. The length of each sector of the vertical center line and the distance between the sectors represent 50 yards of range. The length of the sectors of the horizontal line and the distance between the sector represent the leads required for various estimated target speeds, progressing from right to left of the center line in 5-mph increments. The normal line is marked "0" at each end. The four range lines are each marked to represent the range in yards. The reticle is used as described in (1) and (2) below.

(1) If a target is moving from left to right and its speed is estimated at 20 mph, with an estimated range of 300 yards, position the target at the left-hand end of the second sector of the 300-yard range line, to the left of the vertical center line.

(2) If the range is estimated at 350 yards, horizontally aline the target with the bottom of the sector of the vertical center line, just below the 300-yard range line.

Note. With the ladder type reticle (fig. 16), the intersection of the horizontal reticle line (*i.e.*, normal line or range line), which has been applied to the target with the vertical line of the reticle, covers the spot on the terrain at which the rocket will explode (if the range has been estimated correctly).

c. Elevation Plate.

(1) The range scale is engraved on the elevation plate, which is used in conjunction with the reflecting sight assembly. Reflecting sight assembly 7141999 (ladder type reticle pattern) is used with elevation plate 7141998 (fig. 17).

(2) Elevation plate 7141998 (fig. 17) is calibrated from "0" to "9," but there are no calibrations between "0" and "5." These figures indicate the range in hundreds of yards. Calibrations are not needed between "0" and "5" on the elevation plate, since a range up to 450 yards is covered by the reticle pattern. There is a notch on the elevation plate for each 50 yards of range between "5" and "9" on

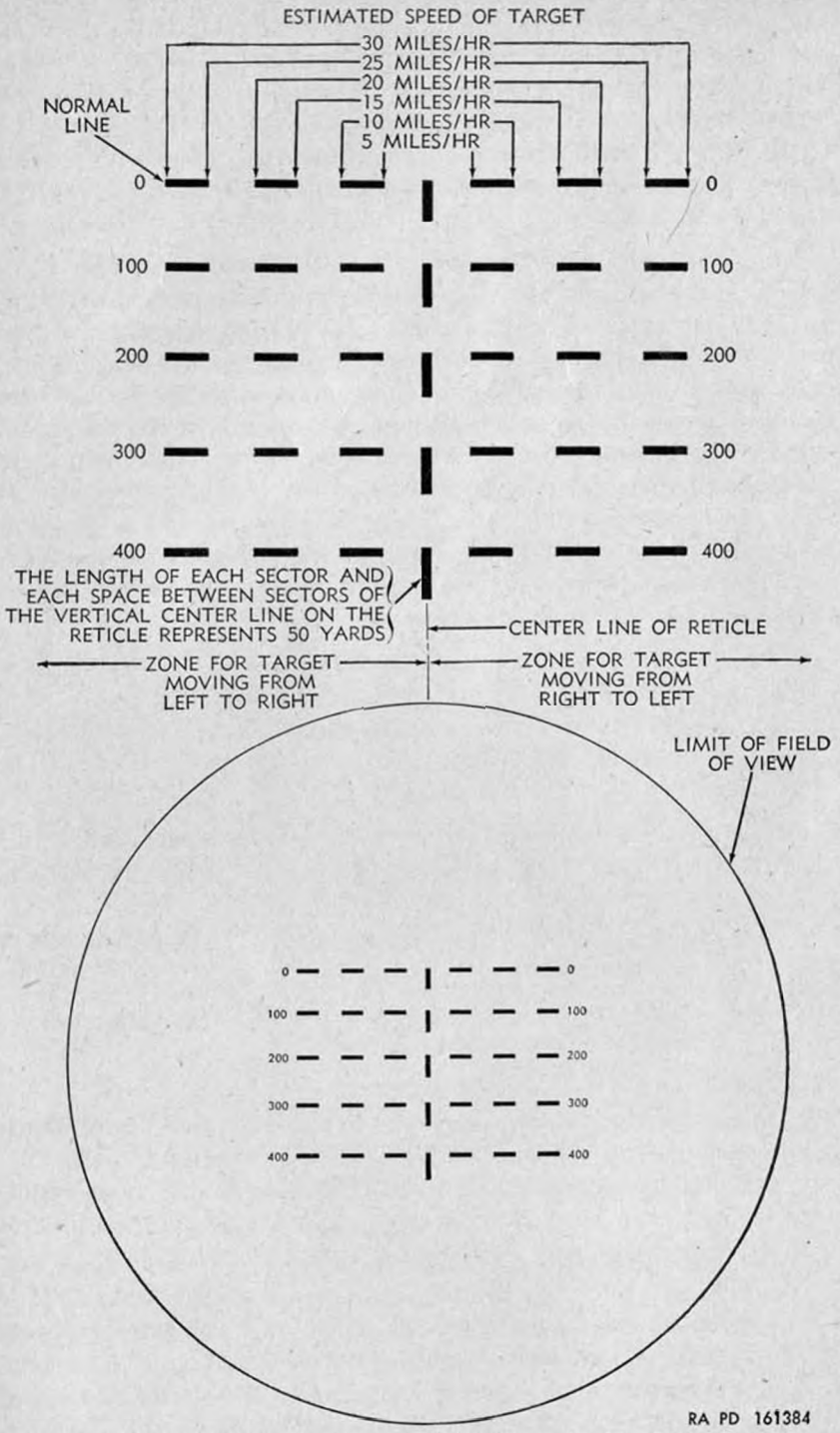
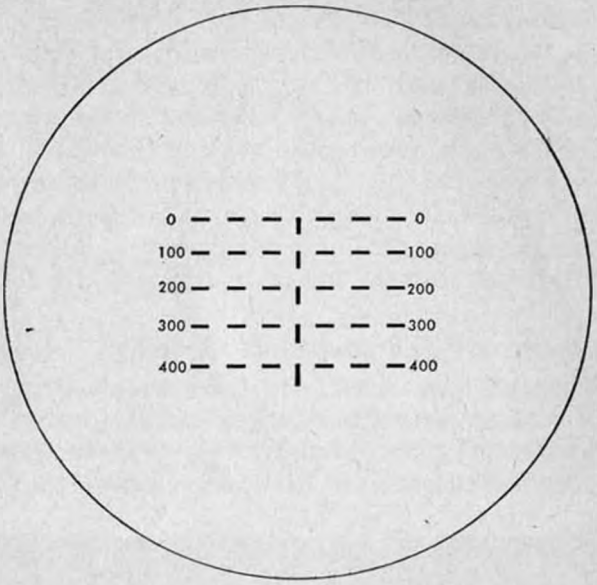


Figure 16. Ladder or tree type reticle pattern for reflecting sight assembly 7141999.



LADDER TYPE RETICLE PATTERN

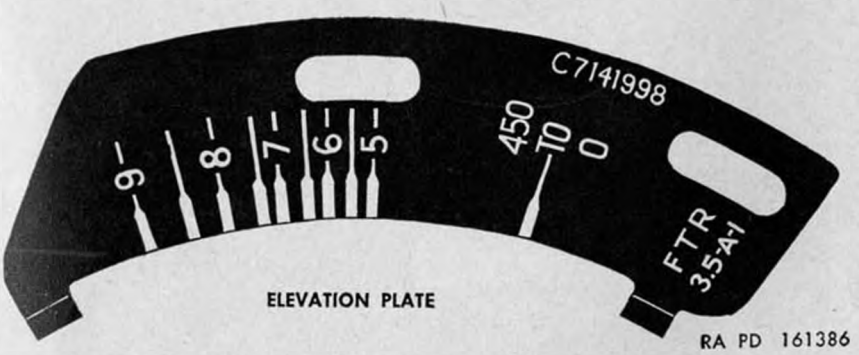


Figure 17. Ladder type reticle pattern used with elevation plate 7141998.

the range scale. These notches engage a spring-loaded projection on the indicator arm pointer and hold it by detent actions to maintain the range setting of the sight.

(3) To set the sight for a specific range, move the indicator arm to the position on the elevation plate corresponding to the desired range. For example: if the range is estimated to be 600 yards, set the indicator arm pointer at "6" on the elevation plate. When sighting on target less than 500 yards distant, the elevation should be set at "0."

d. Graduations on Indicator Arm Yoke. The reflecting sight lens frame (fig. 18) is secured to the indicator arm yoke by a hinge stud, which permits the sight to be folded back out of the way against the launcher rear barrel when not in use (fig. 15) or to be swung out into the firing position (fig. 23) for use in firing. The head of the hinge stud (fig. 15) is engraved with an index. This index is set against an adjacent scale on the indicator arm yoke when setting the sight in azimuth during bore sighting (par. 44*c*). The five graduations on the indicator arm yoke are for reference only.

e. Manipulation of Reflecting Sight Assembly.

(1) The sight is unfolded from its carrying position by pulling it out and away from the barrel. This causes it to pivot on the sight hinge stud in the yoke of the indicator arm. It is swung out until the locking ball in the sight hinge

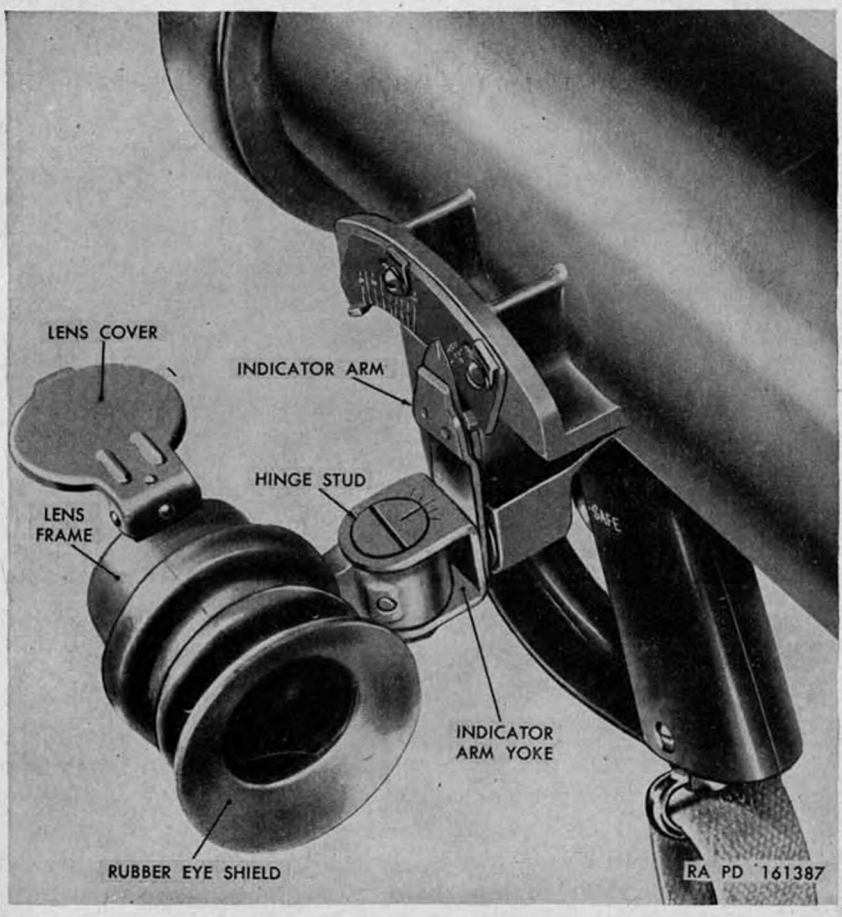


Figure 18. Reflecting sight assembly 7141999 (in firing position).

stud engages and holds the sight in its sighting position (fig. 18).

(2) After use, the sight is swung back out of the way (for carrying) by pushing it back against the barrel (par. 27*c*) until the locking ball snaps and secures the sight in carrying position (fig. 15).

Section III. OPERATION UNDER USUAL CONDITIONS

22. General

This section contains instructions for the mechanical steps necessary to operate the rocket launchers M20 and M20B1 under conditions of moderate temperatures and humidity. Instructions for operation under unusual conditions are given in paragraphs 28–31.

23. Preparing Launcher for Firing

a. Assembling.

(1) Release the barrel latch (par. 15) and disengage the barrels (fig. 13).

(2) Raise the barrel coupling lock lever and hold it in its unlocked position (par. 14). Screw the front barrel into the coupling nut of the rear barrel (fig. 11), and release the lock lever. Be sure lock lever snaps into place.

(3) When these directions have been followed, the launcher is ready for loading.

(4) Prepare the ammunition for firing as described in paragraph 127.

b. Preparing to Fire from the Prone Position. To prepare the launcher for firing from the prone position, it is first assembled as described in *a* above.

(1) *Unfold the bipod.* Pull the bipod trip (fig. 49) and lower the bipod to its unfolded position. Stand the launcher on its bipod and monopod (figs. 3 and 4).

(2) *Level the reflecting sight assembly.* The reflecting sight must be leveled when uneven ground tilts the bipod.

(*a*) Release the bipod rear ring lock (par. 19*b*).

(*b*) Swing the monopod to the vertical position as gaged by eye.

(*c*) Lock the bipod rear ring (par. 19*c*) to improve stability.

(3) *Elevating the launcher.* Adjust the required elevation of the launcher by rotating the monopod sleeve body (par. 16). This is done while sighting on the target (*d* below).

Caution: In assuming the prone position, the gunner must lie at an angle of not less than 45 degrees to the line of aim in order to avoid injury by the rear blast of the weapon. The gunner must take care that movement of the weapon in tracking the target does not inadvertently place his feet within the danger zone behind the launcher (par. 24).

c. Loading the Launcher.

(1) Prior to loading, make sure that the bore is clean.

(2) Put the safety in its "SAFE" position (par. 13).

(3) Check the rocket for a loose nozzle closure by grasping the red and green ignition wire leads, which pass through the closure, and gently pulling while observing the closure. Any movement of the closure indicates failure of the bond. A loose closure may result in the rocket falling short or "chuffing" (intermittent burning with a puffing noise) when fired. A chuffing rocket may fall to the ground a short distance from the launcher, smolder, and then resume burning and be propelled in an unpredictable direction.

Caution: Rockets with loose nozzle closures must not be fired. Special attention must be given to examining the nozzle closure during wet or freezing weather.

(4) Remove the shorting clip, from the contact ring assembly of the rocket, before loading the rocket into the launcher (par. 127*a*(1)).

(5) Grasp the rocket by the motor tube and pull the blue lead (figs. 55 and 56) out of the expansion cone at the rear of the rocket. Straighten the end of the wire and pull the insulating tube off.

(6) Remove the safety band from the rocket.

(7) Depress the front end of the contactor latch housing. Carefully push the rocket into the launcher barrel until the contactor latch blade will engage a continuous groove (fig. 56) in the support band on the radial fins of the rocket (par. 126*b*(1)), or the notches in the six radial fins of the rockets M28 (fig. 55) and M29.

(8) Engage the uninsulated portion of the (blue) contact wire between any of the coils of either contact spring (fig. 19). The launcher is now ready to be fired.

Caution: Do not jar a loaded launcher. After a rocket has been loaded into a launcher, the ejection pin of the fuze is held depressed and the rocket, therefore, is prepared for arming. Jarring the launcher might unlatch the rocket and cause it to slip out of the barrel. If a loaded launcher is dropped so that the breech guard strikes the ground first, the shock might move the setback sleeve of the rocket fuze sufficiently to lock it in its rearward position, thus enabling the ejector pin to be thrown clear. In this condition, a sharp blow might detonate the rocket.

Warning: It is very important that the contactor latch is correctly engaged. If, for example, the contactor latch engages the nozzle and fin assembly (fig. 55) at some point forward of the groove on M28A1 (fig. 55) and M29A1 rockets or on M28A2 and M29A2 rockets (fig. 56), or forward of the notch (fig. 55) in the fins on M28 or M29 rockets; the rocket may become locked to the launcher. The 3.5-inch rocket develops a powerful thrust when fired and incorrect engagement of the contactor latch may cause the weapon to be violently wrenched from the shooter's grasp or the shooter and weapon may be hurled forward with possible injuries and damage. Incorrect engagement of the contactor latch may also cause the rocket to fall from the rear of the launcher after it is loaded.

Warning: The loader must never stand directly behind the launcher.

d. Sighting. Open the lens cover (fig. 18) and rotate the sight into firing (sighting) position.

(1) *Ranges less than 500 yards.*

(*a*) If the range is less than 500 yards, set the indicator arm in its "0 to 450" position on elevation plate 7141998.

(*b*) Sight through the reflecting sight assembly and adjust the elevation of the launcher so as to bring the dashed horizontal range line of the reticle, which corresponds to the estimated range, on the target. For example: If the estimated range of a target is 300 yards, aline the launcher so as to position the target on the horizontal range line marked "300." If the range is 350 yards, horizontally aline the target with the bottom of the sector of the vertical center line on the reticle just below the "300" range line.

Figure 19. Placing contact wire to contact spring.

(*c*) Estimate the speed of the target in miles per hour to determine the lead necessary and position the target on the proper sector of the range line (par. 21*b*).

(2) *Ranges greater than 450 yards.*

(*a*) If the range is greater than 450 yards, set the indicator arm on the corresponding position on the elevation plate.

(*b*) Sight through the reflecting sight assembly and adjust the elevation of the launcher so as to bring the normal line (fig. 16) of the reticle (marked "0") on the target.

(*c*) Estimate the speed of the target in miles per hour to determine the lead necessary and position the target on proper sector of the normal line of the reticle (par. 21*b*).

24. Firing

Caution 1: Before firing the launcher, it must be determined that the area behind the launcher,within a distance of 25 yards, is clear of personnel or inflammable material. The danger zone (fig. 20) is designated as a triangle area with a base and height of 25 yards, the apex of the triangle being at the breech of the launcher and its height (which bisects the base) an extension of the launcher axis.

Caution 2: Before firing the launcher, care must be exercised in protecting the eyes. Rockets of M28 and M29 series and T127E2 smoke rockets may be expected to produce some after-burning (irregular burning after the main burning and thrust have ceased) at normal operating temperatures. Hence, goggles should be worn to prevent injuries to the eyes.

a. To fire the rocket, move the safety to the "FIRE" position (par. 13), and squeeze the trigger (par. 12). If the rocket fails to fire, make several attempts (par. 26*b*), but be sure to keep the launcher on the target while attempting to fire it.

Warning: Whenever firing is not being attempted, the safety must be kept in its "SAFE" position.

b. Care must be exercised when firing through brush and trees, since impact with a twig or branch may deflect the rocket. A heavy branch may detonate the rocket.

c. If the trigger sticks, refer to paragraph 26*c* for immediate action to maintain firing of the launcher.

25. Unloading

a. Before unloading the launcher, move the safety to the "SAFE" position (par. 13).

b. If a misfire has occurred, perform the immediate action described in paragraph 26*b*. Wait at least 15 seconds.

c. Remove the rocket contact wire (fig. 19) from the contact spring of the launcher, depress the front end of the contactor latch housing (par. 20) and carefully withdraw the rocket from the launcher. If, while removing the rocket from the launcher, the

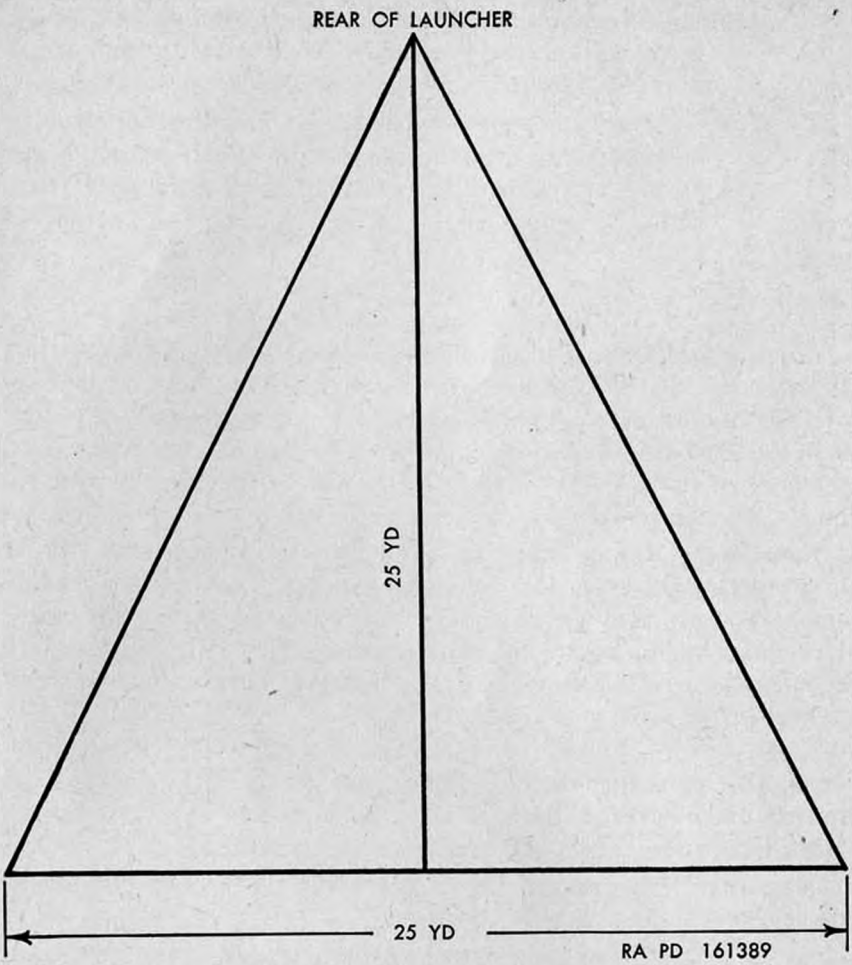


Figure 20. Danger zone diagram.

ejection pin tends to bear against the breech guard of the launcher, press the pin back and hold it. As soon as the rocket has been removed from the launcher, install the safety band over the ejection pin (par. 126*c*(1)).

d. Install the insulating tube and coil the blue contact wire and place it inside the expansion cone at the rear of the rocket. Repack the rocket in its fiber container.

Warning: Without the ejection pin in place, the rocket is armed and must be handled, nose up, with extreme care. If the ejection pin cannot be installed, the rocket must be destroyed, as soon as practicable, in accordance with TM 9–1900.

26. Correction of Malfunctions and Stoppages by Immediate Action Only

a. Definition. The procedure prescribed for clearing a rocket launcher for further use, when a misfire occurs during actual or simulated combat firing, is termed "Immediate Action."

b. Misfire. When a misfire occurs, perform the immediate action described in (1) through (4) below.

(1) If the misfiring weapon is a launcher equipped with electrical firing mechanism 7313326 (fig. 12), check to make sure that the safety switch is in the "FIRE" position. This instruction does not apply to launchers equipped with electrical firing mechanism 7140325 (fig. 12), since the trigger of this mechanism cannot be squeezed with the safety in its "SAFE" position.

(2) Attempt to fire the rocket again by squeezing the trigger while keeping the launcher sighted on the target.

(3) If the rocket still does not fire, make certain that the uninsulated end of the blue contact wire of the rocket engages the contact spring of the launcher, that the contactor latch blade is engaged in the fin notches of the rocket, and that the blade and notches are clean. Sight the launcher on the target and again squeeze the trigger.

(4) If the rocket still does not fire, remove the rocket from the launcher as outlined in paragraph 25. After the rocket is removed, repack it and put it aside for disposal by authorized personnel.

Caution: A slight noise and a small puff of smoke emitting from the rear of the launcher indicates that the igniter has functioned but failed to initiate the propellent. Wait 2 minutes before removing the rocket from the launcher (par. 25) and observe all the precautions for firing during this interval.

Warning: Be sure that the safety is in the "SAFE" position, except when actually squeezing the trigger.

c. Sticking Trigger. Malfunction of electrical firing mechanism 7140325. If the trigger of electrical firing mechanism 7140325 should stick in the grips when it is depressed, the mechanism can still be operated, until the condition can be corrected, by manually extending the trigger to its ready-to-fire position each time it is depressed.

27. Preparation of Launchers for Traveling

a. Hold the barrel coupling lock lever (fig. 11) in the unlocked position, and unscrew the front barrel from the rear barrel. Release the lock lever.

b. Engage the barrel hook (fig. 13) and eye and press the barrels together until the barrel latch bolt snaps into position in the latch strike (par. 15*b*). If necessary, release the bipod rear ring lock, rotate the bipod assembly to avoid interference, and close the bipod rear ring lock (par. 19).

c. Fold the lens cover against the sight (par. 42*c*) and rotate the sight so that the rubber eyeshield is positioned against barrel of the launcher (par. 21*e*).

Section IV. OPERATION UNDER UNUSUAL CONDITIONS

28. General

a. The mechanical steps of operation under unusual conditions are similar to those for operation under usual conditions, which are covered in paragraphs 22 through 27. The only difference in procedure exists in the servicing of the launcher, with regard to cleaning and lubrication. The instructions in paragraphs 29 through 31 must be followed closely, in order to insure proper functioning of the weapon in locations where the atmosphere is salty or where extremes in temperature and humidity of the atmosphere prevail. Special care must be exercised, with regard to cleaning and lubrication of the launcher, as explained in paragraphs 29 through 31. Such care is necessary in order to insure proper operation and functioning of the weapon and to guard against excessive wear of the moving parts. Proper care prevents deterioration of the matériel.

b. Under any condition, the bore of the barrels and the contactor latch housing must be wiped thoroughly, to remove excess oil before firing of the rockets.

29. Cold Weather Operation

a. Preparation for Cold Weather Operation. When it is anticipated that the launcher will be operated in cold climates, it will be necessary to lubricate the weapon with the lubricants prescribed for the expected temperature of operation. When it is necessary to change the grade of lubricant, it is imperative that the parts

receiving the lubrication be completely disassembled and cleaned before the new lubricant is applied.

b. Cold Weather Operating Instructions and Daily Care.

(1) Do not let snow or ice collect on moving parts or in bore of launcher. Remove snow and ice before attempting to move parts.

(2) Inspect matériel thoroughly, and provide as much protection as possible for all parts. See that covers are properly installed and securely fastened. If moisture or ice is found, the contaminated surface must be cleaned thoroughly, dried, and coated sparingly with a light oil.

c. Prevention of Condensation.

(1) Do not bring the matériel indoors unless absolutely necessary, but cover to protect it from snow and ice.

(2) If it is necessary for matériel to be brought indoors, the launcher will be cleaned immediately, dried, and lubricated. After it has reached room temperature, again clean, dry, and lubricant the launcher.

d. Firing in Temperatures Below Freezing.

(1) Special attention must be given to protect the eyes, face, and hands when firing the launcher in cold climates. Rockets of M28 and M29 series and the smoke rockets T127E2 will produce considerably more after-burning (irregular burning after the main burning and thrust have ceased) at lower operating temperatures than at normal operating temperatures. Also, at lower operating temperatures, the burning time and distance increases to such an extent that the rocket will burn beyond the length of the launcher.

Caution: Face and hand protection are mandatory when firing the launcher at below freezing temperatures. Without such protection, face and hand injuries are almost certain to result.

(2) Moisture entering the fuze cavity is injurious even in normal temperatures. It is specially injurious in freezing temperatures. The safety band, which is around the fuze as issued, depresses the ejection pin and seals the fuze against the entrance of moisture. When the band is removed preparatory to firing, the ejection pin moves to the locked position, leaving an opening around the pin and moisture, if present, can enter the fuze cavity. If considerable time elapses between removal of the safety

band and firing, moisture may enter the fuze cavity and freeze. Ice or frost, within the fuze, might prevent functioning of the fuze at the target.

Caution: In freezing temperatures, it is especially important that the safety band be removed only just before firing and that the rocket be kept dry.

(3) Prevent accumulation of ice or frost on rockets to avoid freezing of rocket to the launcher and to insure accuracy of flight. Ice or frost formation, on the rocket, may have the following effects:

(*a*) The 3.5-inch rocket develops a powerful thrust when fired. If, after loading, the rocket freezes to the launcher and then is fired, the weapon and mount might be violently wrenched from the shooter's grasp, or the shooter and weapon might be hurled forward with possible injuries and damage.

(*b*) Accumulation of ice on the rocket, particularly in such quantities as would appreciably affect its weight, balance, or flow of air through the fin, would have an adverse effect on accuracy of flight and range.

30. Tropical Climates

In tropical climates, where temperature and humidity are high or where salt air is present, the launcher will be inspected daily and cleaned thoroughly. In humid, salty atmosphere, lubricate the bore and all unpainted metal surfaces daily, as prescribed in the lubrication order (fig. 21).

31. Operation in Sandy or Dusty Conditions

In hot dry climates, where sand and dust are apt to get into the bore, all moving parts and the bore will be wiped clean daily or more often if necessary.

Note. Lubricants contaminated with sand or dust form abrasive mixtures. During sand or dust storms, the launchers will be kept covered as much of the time as operating conditions permit.

CHAPTER 3
ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

Section I. ORGANIZATIONAL SPARE PARTS, TOOLS, AND EQUIPMENT

32. General

No spare parts or tools are issued to the using organization for maintaining the matériel.

33. Equipment

Equipment supplied with the 3.5-inch rocket launchers M20 and M20B1 is listed for issue by the ORD 7 SNL B–42 catalog and by T/A and T/O&E. Gun slings 6544058 and 7145320 are the only items of equipment authorized.

Section II. LUBRICATION AND PAINTING

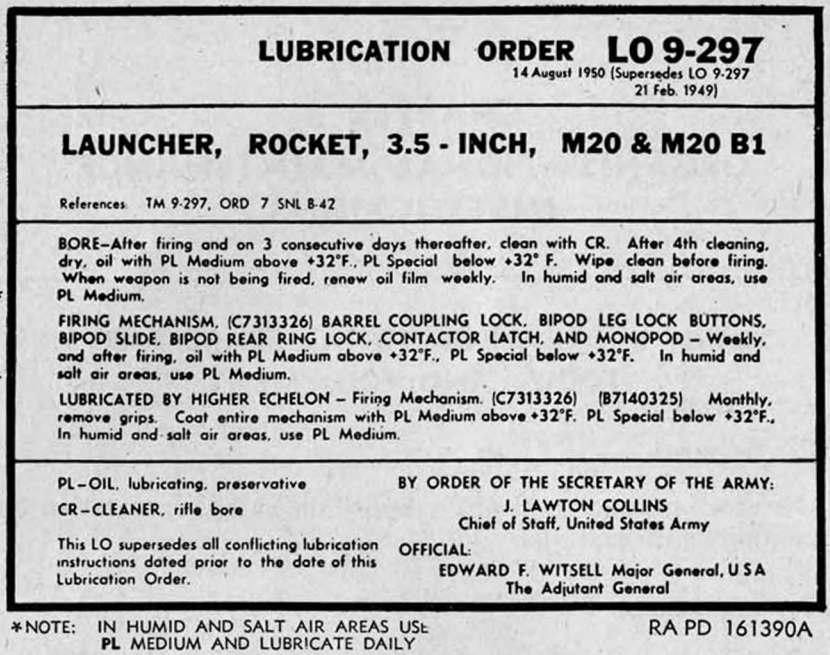
34. Lubrication Order

a. Lubrication Order 9–297 (fig. 21) prescribes organizational maintenance lubrication for this equipment. Lubrication to be performed by ordnance maintenance personnel also is covered in NOTES.

b. One lubrication order (fig. 21) is issued with each item of matériel and is to be carried with it at all times. If matériel is received without copies, the using organization immediately will requisition a replacement (see SR 310–20–4).

c. Instructions on lubrication orders are binding on all levels of maintenance and there will be no deviations.

d. Service intervals, specified on lubrication orders, are for normal operating conditions and during active service. These intervals will be reduced under extreme conditions, such as excessively high or low temperatures, prolonged periods of firing, sandy or dusty locations, immersion in water, or exposure to moisture; any



LUBRICATION ORDER LO 9-297

14 August 1950 (Supersedes LO 9-297 21 Feb. 1949)

LAUNCHER, ROCKET, 3.5 - INCH, M20 & M20 B1

References: TM 9-297, ORD 7 SNL B-42

BORE–After firing and on 3 consecutive days thereafter, clean with CR. After 4th cleaning, dry, oil with PL Medium above +32°F., PL Special below +32° F. Wipe clean before firing. When weapon is not being fired, renew oil film weekly. In humid and salt air areas, use PL Medium. *

FIRING MECHANISM, (C7313326) BARREL COUPLING LOCK, BIPOD LEG LOCK BUTTONS, BIPOD SLIDE, BIPOD REAR RING LOCK, CONTACTOR LATCH, AND MONOPOD – Weekly, and after firing, oil with PL Medium above +32°F., PL Special below +32°F. In humid and salt air areas, use PL Medium. *

LUBRICATED BY HIGHER ECHELON – Firing Mechanism. (C7313326) (B7140325) Monthly, remove grips. Coat entire mechanism with PL Medium above +32°F. PL Special below +32°F., In humid and salt air areas, use PL Medium.

PL–OIL, lubricating, preservative

CR–CLEANER, rifle bore

This LO supersedes all conflicting lubrication instructions dated prior to the date of this Lubrication Order.

BY ORDER OF THE SECRETARY OF THE ARMY:

J. LAWTON COLLINS
Chief of Staff, United States Army

OFFICIAL:

EDWARD F. WITSELL Major General, U S A
The Adjutant General

*NOTE: IN HUMID AND SALT AIR AREAS USE PL MEDIUM AND LUBRICATE DAILY

RA PD 161390A

Figure 21. Lubrication order.

one of which may quickly destroy protective qualities of lubricant. During inactive periods, intervals may be extended commensurate with adequate preservations.

e. Lubricants are prescribed in lubrication order (fig. 21) in accordance with two temperature ranges, namely, above 32° F and below 32° F. It will be necessary to change grades of lubricants only when air temperatures are consistently in next lower or higher range.

35. Special Lubrication Instructions

a. Bore. Clean and oil as prescribed in lubrication order (fig. 21).

(1) Wet a wiping cloth with rifle-bore cleaner and run it through the bore several times. Then run a clean dry wiping cloth through the bore.

(2) Repeat these operations until the bore is clean. Apply a film of rifle-bore cleaner to the bore.

(3) For three consecutive days after firing, clean and oil the bore as described in (1) and (2) above. On the fourth cleaning after firing, thoroughly dry the bore after cleaning and oil as prescribed in lubrication order (fig. 21).

b. Contactor Latch Pins. At intervals specified in table I apply one or two drops of preservative lubricating oil to the contactor latch pins.

c. Contactor Latch Housing (fig. 22). Clean at intervals specified in LO 9–297 (fig. 21). Remove any powder fouling or rust with rifle-bore cleaner, dry-cleaning solvent, or volatile mineral spirits. Crocus cloth may be used to remove deep seated corrosion. Wipe dry and protect with film of lubricant (fig. 21).

d. Electrical Firing Mechanism 7313326 (figs. 23 and 24).

(1) Weekly, lift the trigger spring and washer (fig. 24) to expose the opening in the rocker arm cover for the toggle pin. Inject a few drops of oil into this opening (fig. 24).

(2) Monthly, remove grips (par. 46*a*) and clean parts of any dirt or corrosion. Apply a film of oil to all metal parts. This operation is restricted to the organizational mechanic only.

Note. Corrosion on the armature will be disregarded.

Caution: Lubricate the trigger mechanism sparingly, as excess oil may render it inoperative.

e. Electrical Firing Mechanism 7140325 (fig. 23). The following operation is restricted to the organizational mechanic only.

(1) Monthly, remove grips (par. 46*b*) and clean.

(2) Apply the prescribed lubricant to the trigger pin and to the slot in the back of the trigger above and below the trigger latch. Operate the electrical firing mechanism several times after applying lubricant to the trigger latch.

(3) Apply prescribed lubricant to the roller on the trigger latch, to both pins in the trigger bar, and to the armature spring sleeve.

(4) Place the blade of a screwdriver against the front of the top plate of the firing mechanism, so as to stop the safety lugs of the trigger about one-eighth of an inch from the top plate, when the trigger is squeezed. Hold the trigger lugs against the screwdriver. This keeps the top of the armature in its rearward position and also exposes the slot in the armature spring sleeve (fig. 25) and a little of the armature spring. Apply the prescribed oil to the opening in the sleeve. Again squeeze the trigger a few times to work the oil into the sleeve.

(5) Wipe off excess oil and assemble the grips to the firing mechanism (par. 48).

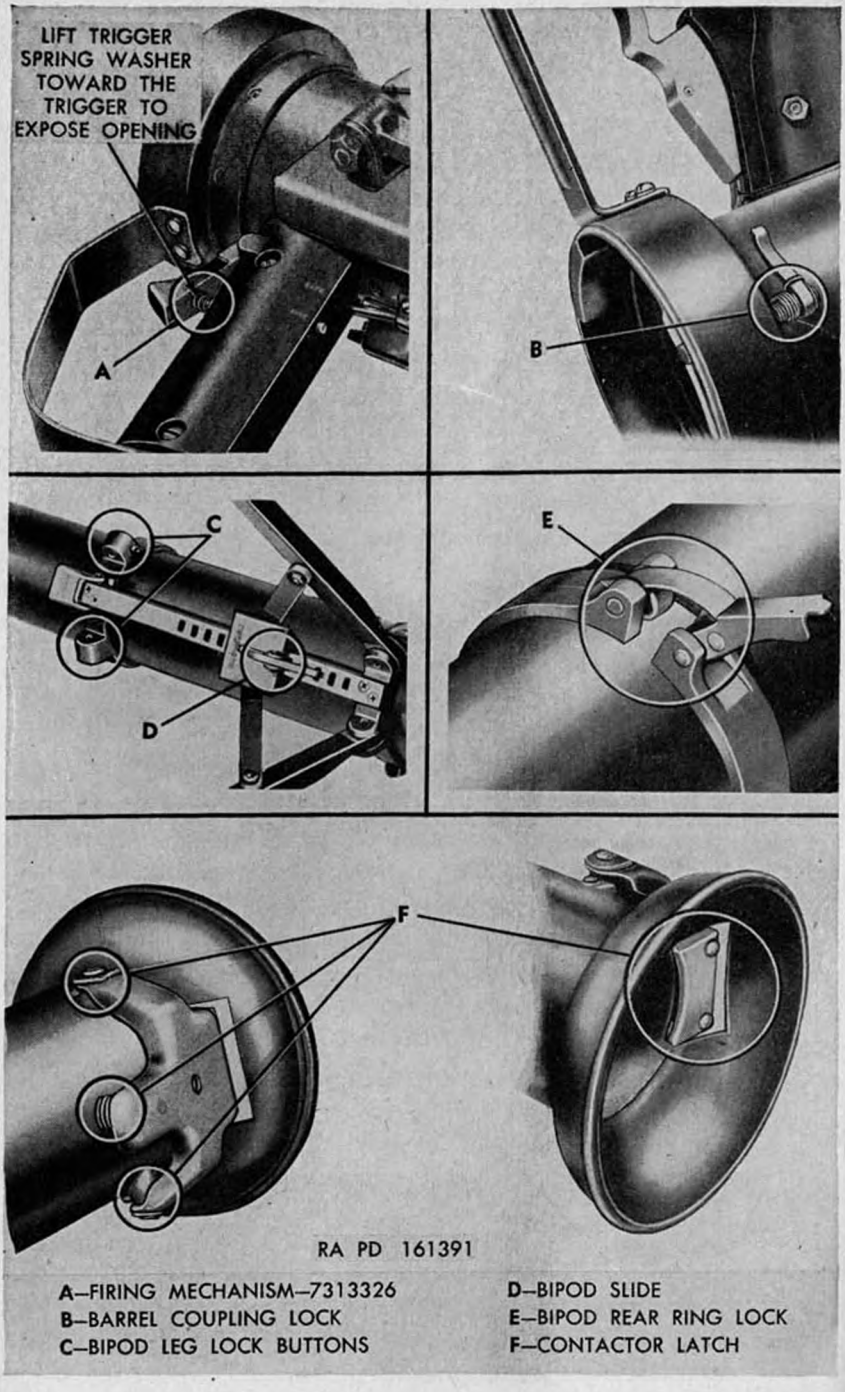


Figure 22. Localized lubrication points (A through F).

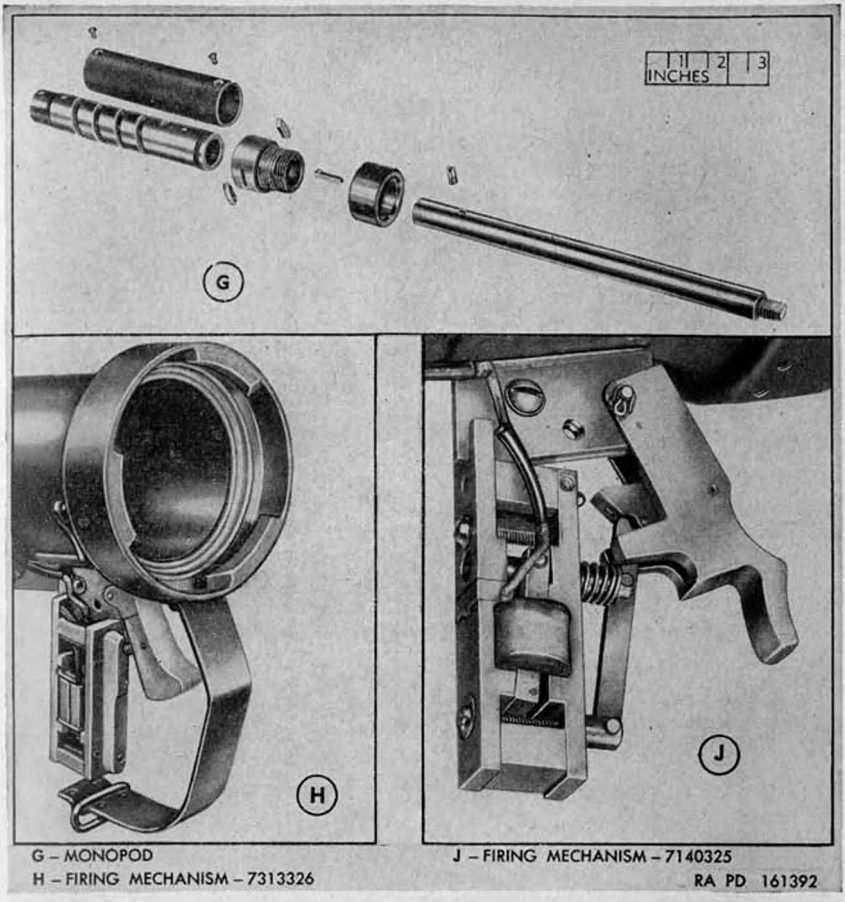


Figure 23. Localized lubrication points (G through J).

f. Bipod Slide (fig. 22). If corrosion has occurred and rifle-bore cleaner, dry-cleaning solvent, or volatile mineral spirits will not clean the slide properly, remove the rust spots with crocus cloth. Wipe thoroughly dry and apply a film of lubricant (fig. 21).

g. Barrel Latch. Remove barrel latch bolt (par. 53*b*). Clean all parts with rifle-bore cleaner, dry-cleaning solvent or volatile mineral spirits. Wipe dry, apply a light film of lubricant (fig. 21), and assemble (par. 55*b*).

h. Barrel Coupling Lock. For the monthly maintenance, it will be necessary to disassemble the barrel coupling lock (par. 53*c*). Clean all parts with rifle-bore cleaner, dry-cleaning solvent, or volatile mineral spirits. Wipe dry, apply a light film of lubricant, and assemble (par. 55*a*).

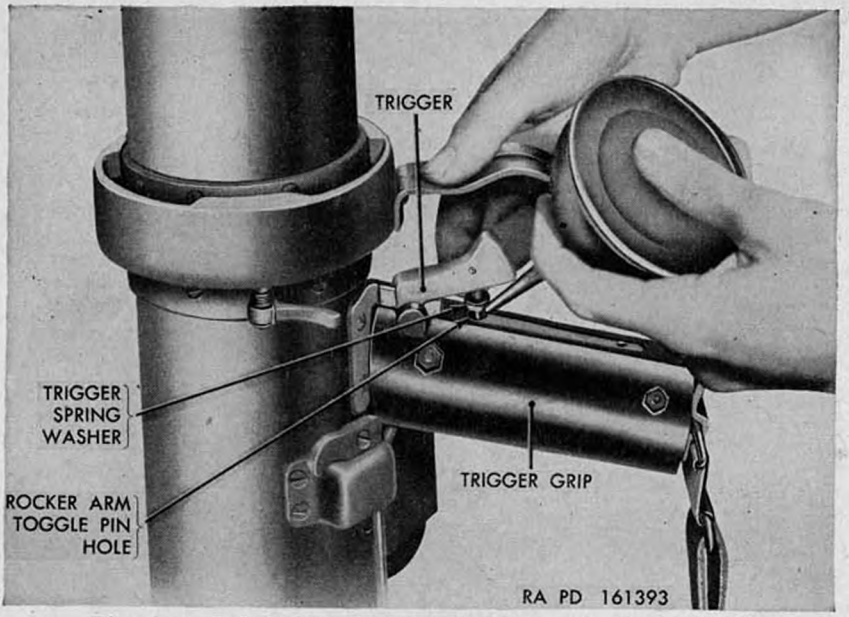


Figure 24. Lubrication of electrical firing mechanism 7313326.

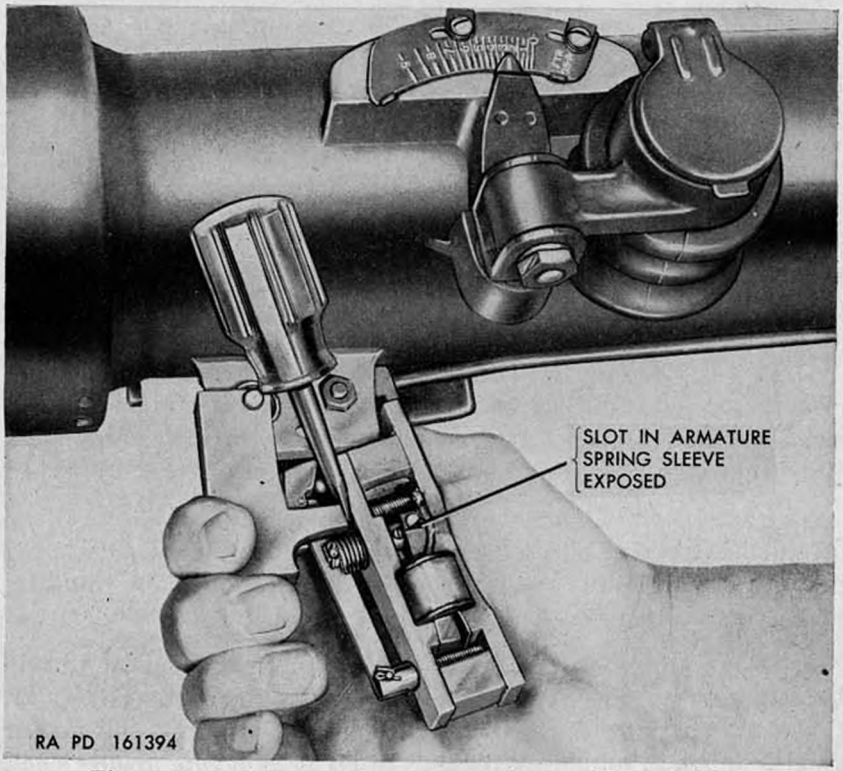


Figure 25. Lubrication of armature spring in electrical firing mechanism 7140325.

i. Bipod Rear Ring Lock. For the before firing and monthly lubrication, clean all accessible parts with rifle-bore cleaner, dry-cleaning solvent, or volatile mineral spirits. Wipe dry and apply light film of lubricant (fig. 21).

36. Painting

Instructions for the preparation of the matériel for painting, methods of painting, and materials to be used are contained in TM 9–2851.

Section III. PREVENTIVE MAINTENANCE SERVICES

37. General

Preventive maintenance services, prescribed by Army Regulations, are a function of the using organizational level of maintenance. This section contains preventive maintenance services allocated to operating personnel (crew) and to the organizational maintenance personnel (mechanic).

38. Operational Inspection

a. Inspect the launcher for general condition, loose or broken components, rust, painting defects, bends and dents, or for obstructions in the bore (par. 9).

b. Check the functioning of the barrel coupling lock. When the barrels are coupled in any of the three locked positions, the front barrel must be locked firmly in the rear barrel without play.

c. Check functioning of the monopod. The operation of the monopod, in extending and retracting the monopod leg, should be smooth. The monopod leg and foot must resist turning.

d. Check for any broken or loose wire connections.

e. Check for corroded electric contact points.

f. Examine the contact springs to see that they are secure to the clamp and that they are clean and free from rust, paint, and grease.

g. Check trigger to see that it works smoothly.

39. Common Preventive Maintenance Procedures

The general preventive maintenance, in *a* through *g* below, will be observed in addition to that referred to in table I.

a. Rust, dirt, grit, gummed oil, and water cause rapid deterioration of internal mechanisms and outer unpainted surfaces. Par-

ticular care should be taken to keep all bearing and sliding surfaces clean and properly lubricated. Wiping cloths and rifle-bore cleaner are furnished for this purpose. All traces of corrosion should be removed with crocus cloth.

b. Loose parts will be tightened.

c. Avoid getting petroleum products, such as dry-cleaning solvent, volatile mineral spirits, rifle-bore cleaner, engine fuels, or lubricants, on rubber parts or electric wires, as the petroleum products will deteriorate the rubber.

d. Use clean water or a soap solution of one-quarter pound of soap chips to 1 gallon of hot water for all rubber parts and overall general cleaning of painted surfaces.

e. Serious damage to weapons, in many cases requiring repair and replacement of component parts of sighting equipment, has resulted from the use of water, steam, or air from a high-pressure hose for cleaning purposes. For this reason, operating personnel are prohibited from using water, steam, or air under pressure for cleaning this weapon.

f. Each time a launcher is disassembled for cleaning or repair, carefully inspect all parts for cracks, excessive wear, rust, and like defects, which might cause malfunctions of the weapon. See paragraphs 40 and 41 for information on certain parts which when worn, damaged, or improperly adjusted cause definite malfunctions. Use this section as a guide during inspection. Thoroughly clean and properly lubricate all parts before assembly.

g. At least every 6 months, a check will be made to see that all modifications have been applied. A list of current modification work orders is published in SR 310–20–4. If a modification has not been applied, the local armament officer will be promptly notified. No alteration or modification will be made by organizational personnel, except as authorized by official publications.

Table I. Preventive Maintenance Schedules

Point	Preventive maintenance	Reference
	CREW	
	Daily	
Barrel	Examine for dents.	Par. 38*a*.
Contact springs	Examine springs to see that they are secure to the clamp, clean, and free from rust, paint, and grease.	Par. 38*f*.
	Before Firing	
Barrel	Wipe clean.	Par. 35*a* and LO 9–297 (fig. 21).

Point	Preventive maintenance	Reference
	CREW—Continued	
	Before Firing—Continued	
Wiring and connections.	Check for loose connections and condition of wiring.	(*)
Reflecting sight assembly.	Check for loose or broken lenses.	Par. 44.
Contactor latch housing.	Clean and wipe dry.	Par. 35*c* and LO 9–297 (fig. 21).
Barrel latch springs.	Check for corrosion, paint, grease, or dirt; clean.	Par. 54*b*.
Barrel coupling lock.	Test functioning. Check for rust and burs.	Par. 35*h*.
Bipod trip	Test functioning.	Par. 17.
Bipod slide and slide block catch.	Test functioning. Check for rust and burs.	Table IV (par. 70) and par. 18.
Bipod leg lock buttons.	Test functioning. Check for rust.	Par. 17.
	After Firing	
Barrel	Clean.	Par. 35*a* and LO 9–297 (fig. 21).
Contactor latch housing.	Clean.	Par. 35*c*.
All parts	Record any malfunctions or damages resulting from firing, and correct before next firing.	
	Weekly	
Contact springs	Clean.	Par. 38*f*.
Barrel	Clean with rifle-bore cleaner, wipe dry, and oil.	Par. 35*a*.
Barrel coupling lock.	Oil.	Par. 35*h* and LO 9–297 (fig. 21).
Contactor latch pins.	Oil.	Par. 35*b*.
Contactor latch housing.	Clean and oil.	Par. 35*c* and LO 9–297 (fig. 21).
Electrical firing mechanism.	Oil.	Par. 35*d*, *e*, and LO 9–297 (fig. 21).
Bipod leg lock buttons.	Oil.	LO 9–297 (fig. 21).
Bipod slide	Clean and oil.	Par. 35*f* and LO 9–297 (fig. 21).

Point	Preventive maintenance	Reference
	CREW—Continued	
	Weekly—Continued	
Bipod rear ring lock.	Clean and oil.	Par. 35*i* and LO 9–297 (fig. 21).
Wiring and connections.	Check for loose connections and condition of wiring.	(*)
	Monthly	
Insulating band for contact spring clamp.	Inspect for damage.	Table III, (par. 68).
Barrel coupling lock.	Clean and oil.	Par. 35*h*.
Barrel latch	Clean and oil.	Par. 35*g*.
Contactor latch shunt.	Check firmness of fastening.	(*)
All parts	Thoroughly inspect and repair if necessary.	
	MECHANIC	
	Monthly	
Electrical firing mechanism.	Remove grips, clean and lubricate.	Par. 35*d* and *e*.
Bipod rear ring lock.	Clean and oil.	Par. 35*i*.

* Notify ordnance maintenance personnel if riveted or soldered connections are found broken.

Section IV. TROUBLE SHOOTING

40. Failure to Fire

Failure to fire generally is caused either by defective ammunition or defective firing mechanism. If the contact wire on the rocket is loosely connected to the rocket, the rocket is defective and will be turned over to ordnance maintenance personnel. Defective firing mchanism may be due to spent magnets, loose connections, or broken parts.

Note. The inspection in *a* through *d* below is to be performed by the organizational maintenance mechanic only.

a. Remove the trigger grips (par. 46*a* and *b*), and check firing mechanism for loose joints or contacts and for breakage. If any part of the firing mechanism is worn or broken, notify ordnance maintenance personnel.

b. Inspect the wiring. Look especially for damaged insulation. Be sure that the contact clamp is positioned properly on the insulating band and that the insulating band is not damaged. Be

sure that the insulating sleeve, on the end of the aluminum tube of the contact lead wire, completely separates the contact clamp from the aluminum tube and that the insulating sleeve is not damaged (par. 52*d*).

c. Inspect the contactor latch housing. Be sure that both ends of the shunt of the contactor latch housing are fastened securely (par. 52*d*) to insure good grounding of the latch housing. The blade, at rear of contactor latch body, must be clean and free of oil film. Contactor latch spring must press the blade against rocket. Contact surfaces of notches in radial fins of rocket must be clean.

d. Contact springs must be clean and free of corrosion and must firmly clamp the bare end of the rocket blue contact wire.

41. Inaccurate Fire

Inaccurate fire is usually the result of inaccurate adjustment of the reflecting sight assembly. Bore sight the launcher in accordance with instructions in paragraph 44*c*.

Section V. REFLECTING SIGHT ASSEMBLY

42. General

a. Location. The reflecting sight assembly (fig. 6) is located on the left side of the rear barrel. Refer to paragraph 21 for a description of the sight and associated parts and to paragraph 23*d* for operating procedure.

b. Arrangement. The reflecting sight assembly is a folding-type sight. It can be swung back against the launcher rear barrel and is out of the way when the weapon is in carrying position. The reflecting sight assembly (fig. 15) pivots in the sight bracket assembly, which is on the left side of the rear barrel of the launcher M20 just forward of the monopod. This pivot mounting permits the lens frame and indicator arm to swing as a unit with the pointer of the indicator arm (fig. 15) sweeping the elevation plate and provides the elevation setting of the reflecting sight (par. 21*c*). The folding action of the reflecting sight assembly is provided by a hinge stud (fig. 18), which fastens the lens frame into a yoke of the indicator arm. A ball lock, built into the hinge stud, secures the sight assembly in a fixed firing (sighting) position (fig. 23) or a fixed carrying position (fig. 15). The indicator arm, pointer, yoke, the hinge stud, the lens cover, the springs, the lock balls, and the elevation plate are steel parts.

c. Lens Cover. A lens cover (fig. 18) is hinged at the front of the sight. A ball lock, built into the hinge, holds the cover open

when the sight is in use or closed to protect the lens from dust and moisture when the sight is not in use (par. 27*c*).

d. Eye Shield. A rubber eye shield (fig. 18) affords protection against injury to the gunner's eye, which may be caused by a slight motion of the weapon when it is fired.

e. Reticle. Objects in the field are seen through the optical system of the reflecting sight assembly without magnification, while the enlarged image of the reticle is seen in phantom, superimposed on the field of vision. Use of the reticle in conjunction with the proper elevation plate, for purpose of estimating lead for a target, is covered in paragraph 21.

43. Disassembly

Disassembly of the reflecting sight assembly, and its removal, is prohibited on the organizational level.

44. Maintenance

a. Care in Handling Sighting Instruments.

(1) Sighting instruments, in general, are rugged and suited for the designed purpose. However, they will not stand rough handling or abuse. Inaccuracy or malfunctioning will result from mistreatment.

(2) The lens assembly of the reflecting sight assembly is sealed with an atmosphere of nitrogen to prevent fogging. Disassembly of the lens assembly, therefore, is prohibited, since such disassembly cannot be done without injury to the sight.

(3) Any instrument which indicates incorrectly or fails to function properly, after the authorized tests and adjustments have been made, is to be turned in for repair by ordnance maintenance personnel. The authorized tests and adjustments are those for which tools and parts have been provided. Adjustments, other than those expressly authorized, are not the responsibility of the using arm personnel.

(4) Painting of sighting equipment by the using arm is prohibited.

b. Optical Parts.

(1) Keep the exposed surface of the lenses and other parts clean and dry. Erosion and etching of the surfaces of the glass, which interferes with vision, can be prevented or greatly retarded, by keeping the glass clean and dry.

Keep the lens cover closed at all times when the sight is not in use.

(2) For wiping optical parts, use only lens tissue paper specially intended for cleaning optical glass. Use of cleaning cloth is not permitted. To remove dust, brush the glass lightly with a clean artist's camel's-hair brush, and rap the brush sharply against a hard body in order to knock out the small particles of dust that cling to the hairs. Repeat this operation until all dust is removed. Under no circumstances will polishing liquids, pastes, or abrasives be used for polishing lenses.

(3) Exercise particular care to keep optical parts free from oil and grease. Do not wipe the lenses with the fingers. To remove oil and grease from optical surfaces, apply liquid lens cleaning soap with a tuft of lens cleaning tissue paper. If lens cleaning soap is not available, breathe heavily on the glass (provided the temperature of the air is above 32° F) and wipe off with clean lens tissue paper. Repeat this operation until clean.

c. Bore Sighting. The purpose of bore sighting is to test the alinement of the reflecting sight assembly with respect to the bore of the launcher. Bore sighting of the weapon, by the using arm, will be accomplished by the distant target method. Refer to paragraph 77 for bore sighting instructions for ordnance maintenance personnel.

(1) The target may be any point on distant terrain, 1,500 yards or more from the launcher.

(2) If score marks (par. 117*b*) appear on the rim of the muzzle deflector of the launcher (spaced 90 degrees apart), install two lengths of string as cross hairs across the muzzle locating them in the score marks. Remove the wooden disk, having a ⅛-inch drilled hole, from the ammunition container and insert it in the rear of the launcher as a bore sight plug. Sight through the hole in the plug and aline the launcher so that the distant target appears exactly at the intersection of the cross hairs. The launcher must be set firmly in this position.

(3) If the muzzle deflector of the launcher does not have score marks to locate the cross hair (par. 117*b*), position the eye at least 3 feet behind the launcher and in such a position that the outline of the front opening is centered in the outline of the rear opening of the launcher. At the same time, the distant target is centered in the outline

of the front opening of the launcher. The launcher must be set firmly in this position.

(4) Set the indicator arm at "0" on the elevation plate. Sight through the reflecting sight assembly. If the image of the target is not at the intersection of the horizontal and vertical line, the reflecting sight assembly is out of adjustment. To adjust vertically, loosen the elevation plate screws (fig. 15) and move the elevation plate to the desired position. To adjust laterally, loosen the hinge stud nut, and turn the hinge stud (fig. 15) with a screwdriver to the desired position. When correctly adjusted, the target should be centered in both the sight assembly and the bore.

Note. The target must be centered in both the sight assembly and the bore for all three locked positions of the front barrel in the rear barrel. It will be necessary to check all three positions after the final adjustment has been made.

Section VI. ELECTRICAL FIRING MECHANISM

45. General

a. The electrical firing mechanism (fig. 26) is located on the underside and at the forward end of the rear barrel. It is secured to the barrel by means of the grip support. Basically, it consists of the two grips, the trigger assembly, and the electrical firing mechanism. The electrical firing mechanism is composed of two magnets housing a coil of wire, which in turn houses a steel armature. When the trigger is squeezed, the armature rocks in the coil and generates sufficient current to ignite the rocket.

b. Some launchers M20, of early manufacture, are equipped with electrical firing mechanism 7313326 (fig. 12). In this firing mechanism, the rocker arm and armature spring provide a snap action to the movement of the armature. The magneto generates current when the trigger is squeezed and also when it is released. Springs return the trigger to its original position.

c. Some launchers M20 and the launchers M20B1 are equipped with electrical firing mechanism 7140325 (fig. 12). In this firing mechanism, the armature is rotated away from the pole faces and returned to the pole faces by squeezing the trigger. A snap action is imparted to the movement of the armature in both directions. When the trigger is squeezed, the latch on the trigger presses the trigger bar back against a spring on the armature spring sleeve. The armature spring inside the sleeve is also compressed

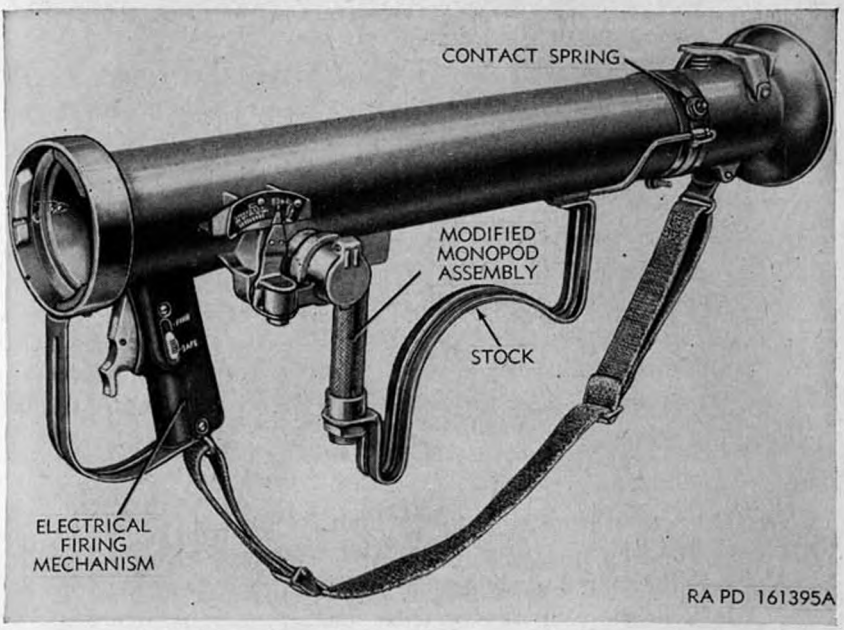


Figure 26. Rear barrel of launcher M20B1 (early manufacture)—left-side view.

as the trigger bar is pressed back. The armature is held against the pole faces by magnetic force. When the compression of the armature spring exceeds the magnetic force, the armature is rotated away from the pole faces. As soon as contact between the armature and the pole faces is broken, the magnetic force, being applied to the armature, is greatly diminished by the gap, permitting the spring to snap the armature away from the pole faces. At this point, the latch on the trigger releases the trigger bar, permitting it to spring forward propelled by the compressed spring on the armature sleeve and carry the armature spring sleeve and armature with it. The magneto of this firing mechanism only generates current while the trigger is squeezed. A spring returns the trigger to its original position.

d. Due to the superior snap action and the automatic use of the return motion, the electrical output of firing mechanism 7140325 is almost three times that of firing mechanism 7313326.

46. Disassembly (Organizational Mechanics Only)

At the organizational maintenance level, disassembly of the electrical firing mechanism is allowable only for lubrication and cleaning. For this reason it is necessary to remove the grips.

a. Electrical Firing Mechanism 7313326 (Single Action on Trigger Squeeze) (fig. 27).

(1) Unscrew the four screws which secure the trigger guard to the grips. Unscrew the two screws which secure the trigger guard to the launcher, taking care not to drop the lock washer which is on each screw.

(2) Unscrew the two screws and nuts which fasten the two grips together. The grips are now free from the firing mechanism. When the left grip is removed, the safety switch becomes a loose part in the left grip.

Caution: With the grips removed from the firing mechanism, the magnetic field tends to pick up metal particles. Work space, therefore, will be kept as clean as possible.

b. Electrical Firing Mechanism 7140325 (Double Action on Trigger Squeeze) (fig. 28).

(1) Unscrew the four screws which secure the trigger guard to the grips. Unscrew the two screws which secure the trigger guard to the launcher, taking care not to drop the lock washer which is on each screw.

(2) Unscrew the two screws and nuts which fasten the two grips together. The grips are now free from the firing mechanism. The safety is assembled as a part of the left grip and is not to be disassembled. See CAUTION in *a* above.

(3) If the slot in the trigger has become clogged with dirt, remove the cotter pin and trigger pin and slide off the trigger and latch assembly (fig. 38).

47. Maintenance

a. The electrical firing mechanism is to be lubricated as indicated in paragraph 35*d* and *e*. If the firing mechanism does not function properly, notify ordnance maintenance personnel.

b. Clean the slot in the trigger of firing mechanism 7140325, see that the latch moves freely.

48. Assembly

a. Electrical Firing Mechanism 7140325. Slip the trigger and latch assembly over the trigger spring and bushing. Aline the holes in the bushing and trigger, insert the trigger pin, and install new cotter pin (fig. 27).

b. Electrical Firing Mechanisms 7313326 and 7140325.

(1) Place the grips in position on the firing mechanism.

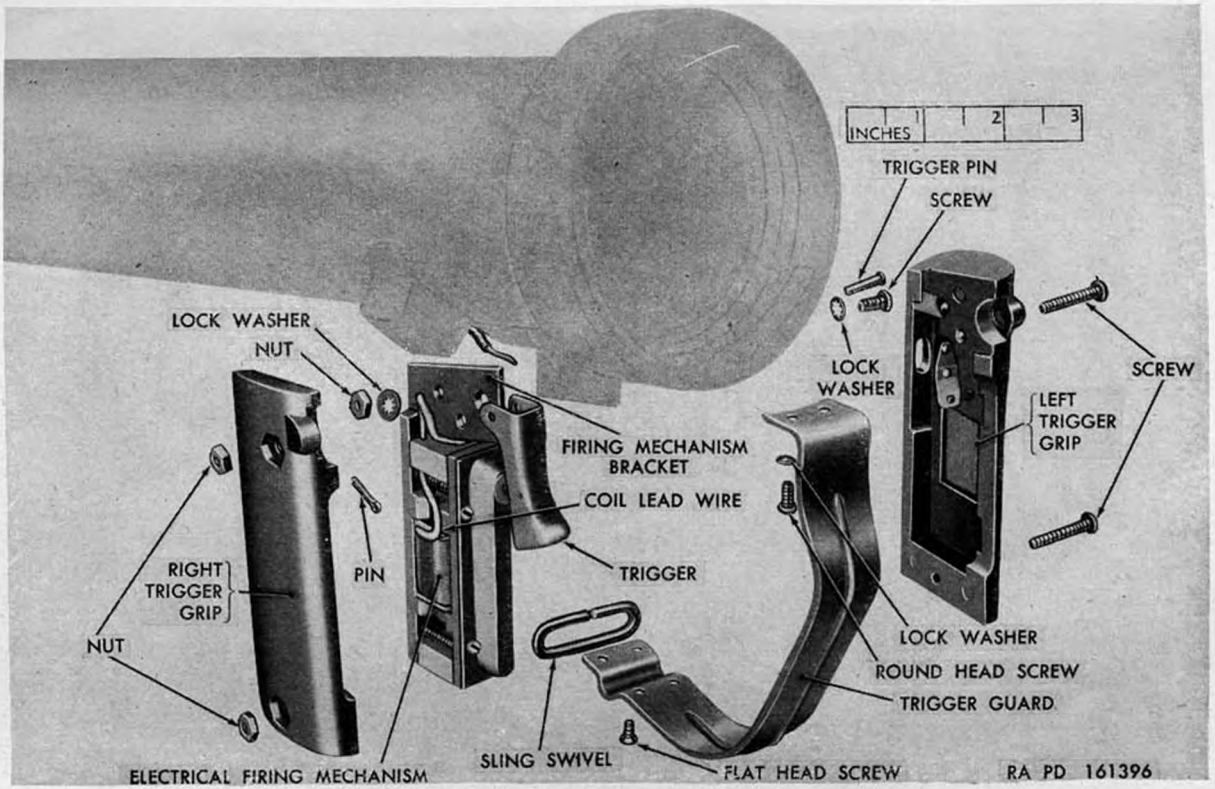


Figure 27. Grips removed from electrical firing mechanism 7313326.

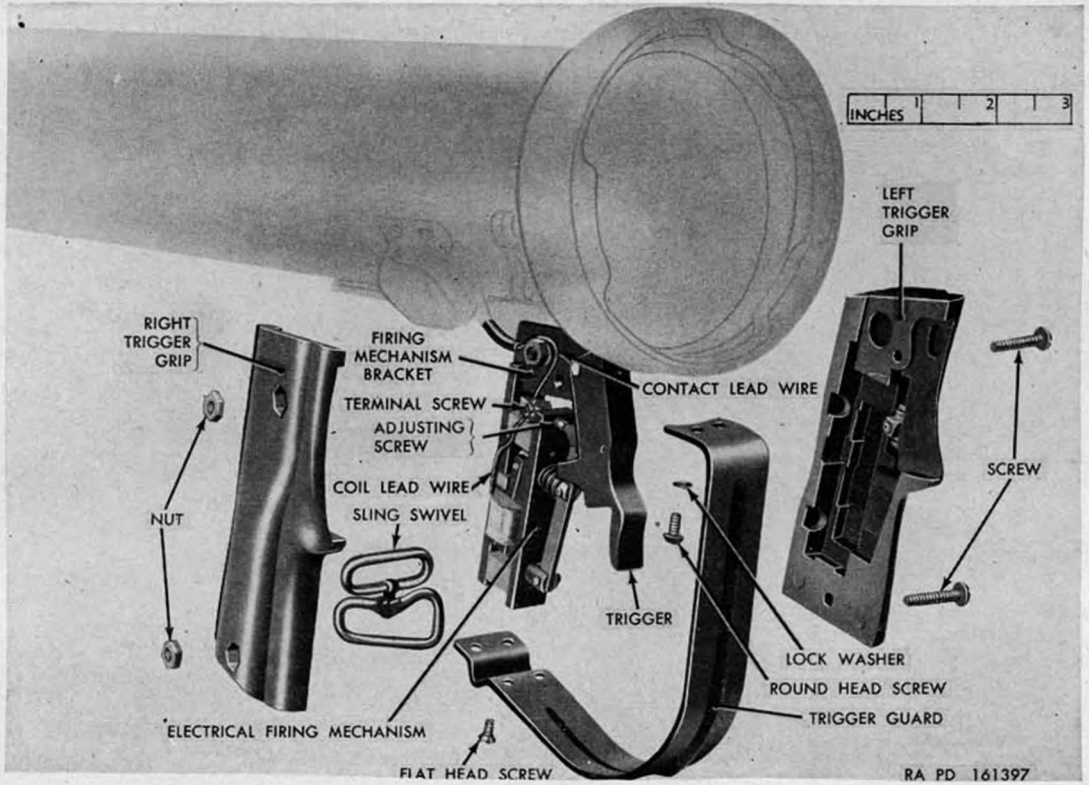


Figure 28. Grips removed from electrical firing mechanism 7140325.

Adjust the position of the firing mechanism, so as to aline the holes in the support and bracket for the upper screw, and fasten the grips together with the two screws and nuts (figs. 27 and 28).

(2) Place the sling swivel in its loop, in the trigger guard, and fasten the trigger guard to the grips by means of the four screws. Fasten the trigger guard to the launcher by means of the two screws and lock washers provided.

Section VII. MONOPOD STOCK ASSEMBLY

49. General

On launcher M20 of early manufacture, the monopod stock assembly consists of a shoulder stock and a monopod, mounted on stock clamps, around the rear barrel between the sight mounting bracket and contact clamp (fig. 29). On the launcher M20B1, the monopod stock assembly is similarly located, but it is mounted on supports cast integral with the rear barrel (fig. 26). The monopod is used in conjunction with the bipod, on the front barrel, to form a three-legged stand for the weapon (figs. 3 and 4). The launcher stands on the bipod and monopod when firing from the prone position. The height of the monopod can be adjusted by rotating the sleeve body of the monopod. Manipulation of this adjustment provides stable control of the elevation of the launcher. On some launchers M20 and M20B1 of early manufacture, the foot of the

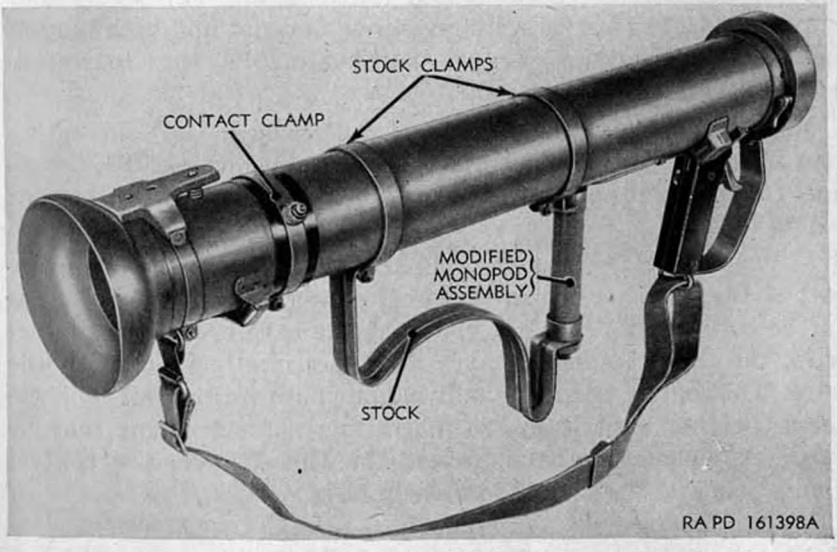


Figure 29. Rear barrel M20 (early manufacture)—right-side view.

monopod has been eliminated, and the body of the monopod has been retained to complete the stock (fig. 5). On launcher M20 and M20B1 of present manufacture, the monopod assembly has been eliminated and a new stock has been substituted.

50. Removal and Disassembly

Removal of the stock assembly and disassembly of the monopod is not within the scope of the using arm or organizational mechanic.

51. Maintenance

The monopod stock assembly is to be maintained on the field maintenance level.

Section VIII. FRONT AND REAR BARREL GROUPS

52. General

a. The front and rear barrel groups consist of the front and rear barrels (figs. 6 and 9). They are joined by means of the barrel coupling screw on the rear end of the front barrel and the barrel coupling nut of the forward end of the rear barrel (fig. 11). The barrel coupling screw and nut are segmented so that a twist of less than one-quarter turn will engage or disengage them. The front barrel can be assembled to the rear barrel in any one of three positions. If the front barrels are interchanged between weapons, the weapons must be bore sighted (par. 44*c* and 77) before they can be used. The barrel coupling screw and nut and both barrels are made of aluminum. On the launcher M20B1, these parts are cast as part of the barrels.

b. The sight mounting bracket (fig. 6) is on the left side of the rear barrel of the launcher M20. On the launcher M20B1, a support for the sight and elevation plate is cast integral with the rear barrel (fig. 26).

c. The contact springs (figs. 14 and 26) complete the firing circuit of the launcher, when the blue contact wire of the rocket is forced between the coils. In clamping the bare end of the contact wire, the contact spring makes good electrical contact with the wire. The contact clamp not only mounts both springs but connects them together electrically, so that either contact spring may be used. An insulating band around the barrel under the contact clamp insulates the clamp from the barrel.

d. The contact lead wire (fig. 6) connects the contact clamp to the firing mechanism. It is a stranded glass braid insulated wire,

which is run through an aluminum tube to protect it against damage. An insulator sleeve, on the end of the aluminum tube, separates the contact clamp from the aluminum tube. On the launcher M20, the tube is clamped in place by the front and rear stock clamps. On the launcher M20B1, the tube is held in place by the stock and monopod supports on the rear barrel. The firing mechanism is grounded to the rear barrel (pars. 45–48). The complete firing circuit is as follows: from grounded firing mechanism, through insulated wire to contact clamp, through contact between spring and the bare end of the blue rocket contact wire, through the rocket contact wire to the rocket igniter, through the contact ring on the rocket and contactor blade, through contactor latch housing to contactor latch shunt. The grounding of the shunt to the rear barrel completes the firing circuit.

e. The electrical firing mechanism (fig. 26) (pars. 45–48) is housed between the grips. On the launcher M20 of early manufacture, the stock with the monopod (pars. 49–51) is clamped rigidly to the rear barrel, between the sight mounting bracket and the contact clamp. On the launcher M20B1, the stock and monopod (fig. 26) are similarly located but are mounted on supports which are cast integral with the rear barrel. The contactor latch housing serves to engage the groove in the radial fin assembly of the rocket and hold the rocket in proper firing position in the launcher. This contact also completes the firing circuit of the rocket (*d* above). The breech guard facilitates loading.

Note. Parts such as the muzzle deflector, the breech guard, the barrel hook and eye, the barrel latch strike, the grip support (bipod) stops, the barrel coupling screw and nut, stock clamp assembly, front clamp assembly, sight and range scale bracket, and contactor latch clamp occur as parts only on the launcher M20. On the launcher M20B1, the function of these parts is performed by units cast integral with the barrels.

53. Disassembly

a. Barrels. The barrels are held in their locked position by means of the barrel coupling lock. The coupling lock is under spring tension, in order to keep it in locked position. To separate the front and rear barrels, it is necessary to raise the barrel coupling lock lever (fig. 11). This releases the barrel coupling lock. Rotate the front barrel in the rear barrel in a counterclockwise direction for about one-quarter of a turn.

b. Barrel Latch (fig. 30). The barrel latch bolt operates under spring tension and is housed in a frame (on launcher M20), or a housing (on launcher M20B1). The frame is fastened flush to the rear barrel of the M20, while on the M20B1 the housing mounts on

a pad, which has been cast integral with the rear barrel. The barrel latch should be disassembled for cleaning and lubrication only and is accomplished as follows:

(1) Unscrew the barrel latch handle screw. This frees the barrel latch handle from the barrel latch bolt.

(2) Withdraw the barrel latch bolt and springs.

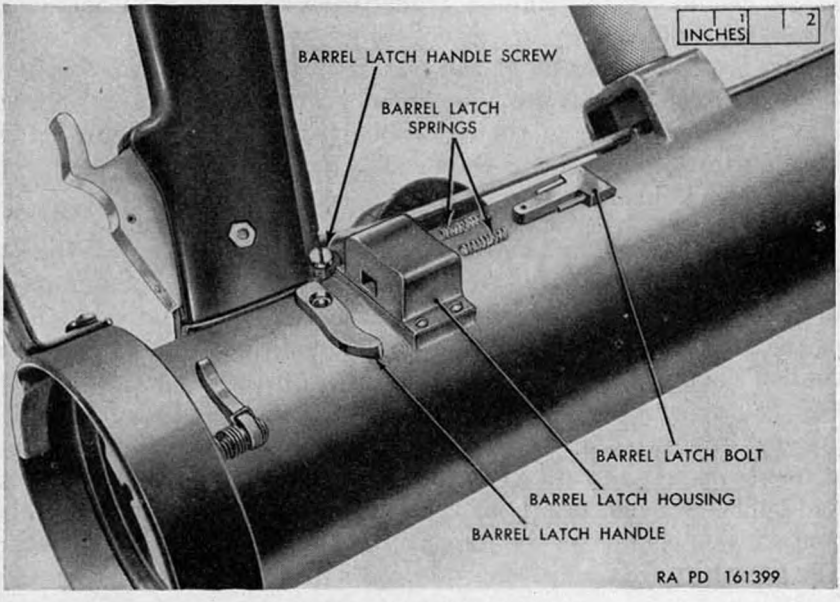


Figure 30. Barrel latch parts.

c. Barrel Coupling Lock. The barrel coupling lock (fig. 31) should be disassembled for cleaning and lubrication only.

(1) Remove the screw and lock washer. This frees the coupling lock washer, retaining the coupling lock lever.

(2) Unhook the coupling lock spring from the coupling lock lever and carefully tap the lever off the screw.

(3) Remove the spring and washer; then unscrew the coupling lock screw.

54. Maintenance

a. Barrels. Maintenance of the barrels consists chiefly of cleaning and inspecting for wear or broken parts. The barrel coupling screw and nut should be examined for burs and dirt. Dirt, on the thread, will prevent locking of the barrels.

b. Barrel Latch. Clean and lubricate in accordance with paragraphs 35 and 39. Inspect for weak or broken barrel latch springs.

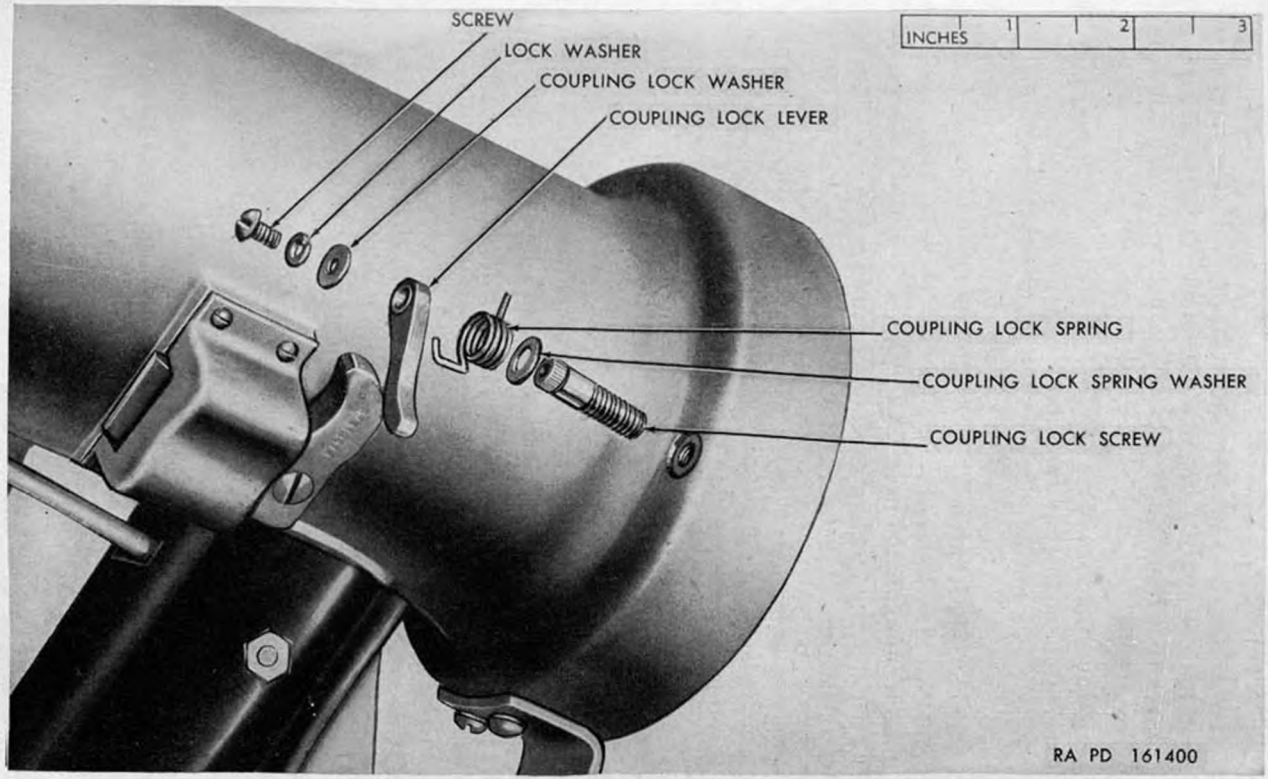


Figure 31. Barrel coupling lock parts.

If springs are unserviceable, notify ordnance maintenance personnel.

c. Barrel Coupling Lock. Clean and lubricate in accordance with paragraphs 35 and 39.

d. Steel Parts. Many parts of the front and rear barrels of launchers M20 and M20B1 are made of steel. It is these parts of the launchers that must be protected against rust. The following are some examples:

Barrel coupling lock parts
Barrel latch parts (handle is aluminum)
Bipod leg lock button
Bipod slide
Bipod slide block catch
Bipod rear ring lock part
Contactor latch housing
Electrical firing mechanism trigger bar
All pins, screws, springs, and washers

Unpainted surfaces of steel parts will be cleaned with dry-cleaning solvent or volatile mineral spirits, thoroughly dried, and lubricated at intervals prescribed in table I.

55. Assembly

a. Barrel Coupling Lock (fig. 31).

(1) Screw the front barrel into the rear barrel.
(2) Screw the coupling lock screw into its tapped hole until it prevents rotation of the front barrel.
(3) Slip the washer and then the coupling lock spring on to the coupling lock screw.
(4) Assemble the coupling lock lever on to the coupling lock screw in locked position (pointing down and faced so the curvature, at the end, is pointing away from the barrel).
(5) Hook the spring over the lever.
(6) First slip the lock washer and then the coupling lock washer on the screw so that the lock washer engages the head of the screw.
(7) Install the screw, with its two washers, in its tapped hole on the coupling lock screw. Tighten the screw so that the lever is clamped firmly.

b. Barrel Latch (fig. 30).

(1) Slip the springs on the pins of the barrel latch bolt.
(2) Insert the barrel latch bolt into the frame or housing and fasten the barrel latch handle to the bolt with its screw. Tighten the screw securely.

c. Barrels. Raise the barrel coupling lock lever and hold it in its unlocked position (par. 14). Screw the front barrel into the coupling nut of the rear barrel (fig. 11). Release the lock lever. Check to see if lock lever is holding. There should be no play in this coupling.

Section IX. BIPOD ASSEMBLY

56. General

a. The bipod assembly is used on launchers M20 and M20B1 of early manufacture. First models of launcher M20 were supplied with bipod assemblies having continuous front and rear rings (fig. 51). Later models of the launcher M20 and the launcher M20B1 were equipped with split front rings (fig. 50), held by a screw and nut to facilitate removal of the bipod assembly from the front barrel. The rear ring clamp of the bipod assemblies, of later manufacture, also was improved to provide split rear rings and more positive clamping of the barrel. This design facilitates removal of the bipod assembly from the front barrel.

b. The bipod slide block catch (fig. 52) of launcher M20 of present manufacture and of launcher M20B1 was redesigned to permit disengagement of the catch by a lifting action, instead of depressing the lever end of the catch. To a great extent, this eliminates the possibility of injury to the fingers.

c. The slide for the bipod assembly of launcher M20, of early manufacture, was manufactured from bar stock and has ratchet teeth machined on the bottom surface. These exposed ratchet teeth are a possible source of injury when handling the weapon. The slide for the bipod assembly, of present manufacture, is formed from sheet steel stock and has notches stamped into the bottom to replace the ratchet teeth. The bottom face of the bipod slide (fig. 52) is smooth.

d. The front barrel is free to rotate in the bipod, when the bipod rear ring lock is released (par. 19). This permits leveling of the sight assembly (par. 23*b*(2)). The bipod legs are held in the folded position by the spring actuated leg lock buttons of the bipod front ring assembly. Pulling the bipod trip (fig. 49) releases the legs for unfolding (par. 23*b*(1)). The bipod slide block catch holds the bipod in any position to which the bipod has been extended (par. 18). The bipod is made of aluminum, but the bipod slide is steel (par. 54*d*) and must be protected against corrosion by frequent cleaning and oiling (par. 35*f*).

57. Removal and Disassembly

Removal from the front barrel or disassembly of the bipod assembly is not within the scope of organizational maintenance personnel.

58. Maintenance

The bipod assembly should be kept clean and oiled (par. 34). Dirt in the slide will prevent proper functioning.

Section X. GUN SLING

59. General

The gun sling is used with 3.5-inch rocket launcher for the purpose of carrying the weapon. There are two models of the gun sling (fig. 8) found in connection with the launcher: gun sling M1 (webbing) 6544058 (early mfr.) and gun sling 7145320 (present mfr.).

60. Removal

Sling 6544058 (fig. 8) is removed from the launcher by releasing its hook from the yoke at end of rear barrel. The front end is removed by releasing the keeper and pulling the webbed belt through the sling swivel (fig. 7), mounted under the grips. Sling 7145320 has hooks at each end, one hook through the yoke at the rear end of the barrel and the other through the swivel. To free the sling from the barrel, release the front and rear hooks.

61. Maintenance

The hooks and keeper of the sling are steel and must be guarded against rust. These rust formations are to be removed with crocus cloth and rifle-bore cleaner. Inspect the webbed belt for fraying and for a rotting of the material at the points where it contacts the steel hooks and keeper. If this piece of equipment becomes deteriorated or unserviceable, replace with a new sling.

62. Installation

Sling 7145320 is installed by hooking the front end to the sling swivel (fig. 7), under the trigger grips, and the rear end to the yoke, attached to the rear barrel just forward of the breech guard. For sling 6544058, it is necessary to hook the rear section to the yoke, in the same manner as sling 7145320. The front end of the belt is then passed through the sling swivel and under the keeper (fig. 8). The keeper is then closed, securing the belt at the desired length.

CHAPTER 4
FIELD MAINTENANCE INSTRUCTIONS

Section I. FIELD SPARE PARTS, TOOLS, AND EQUIPMENT

63. General

Tools, equipment, and maintenance parts, over and above those available to the using organization, are supplied to ordnance field maintenance units for maintaining and repairing the matériel.

64. Parts

Field maintenance parts are listed in the appropriate column of the Department of the Army Supply Catalog ORD 8 SNL B–42, which is the authority for requisitioning replacements. Parts not listed in an ORD 8 catalog, but required by depot shops in rebuild operations, may be requisitioned from the listing in the corresponding ORD 9 catalog and will be supplied if available, when the need is substantiated. Requisitions for ORD 9 parts will contain a complete justification of requirements.

65. Common Tools and Equipment

Standard and commonly used tools and equipment, having general application to this matériel, are listed for issue by T/A and T/O&E.

66. Special Tools and Equipment

The special tools and equipment, tabulated in table II, are listed in Department of the Army Supply Catalog ORD 6 SNL J–12. This tabulation contains only those special tools and equipment necessary to perform the operations described in this manual; it is included for information only, and is not to be used as a basis for requisitions.

Note. Special tool sets in ORD 6 SNL J–12, in addition to special tools, also contain standard and commonly used tools and equipment. Specifically applicable to this matériel.

Table II. Special Tools and Equipment for Field and Depot Maintenance

Item	Identifying Number	References		Use
		fig.	par.	
TESTER, elec output, firing mechanism, rocket launcher, 0 to 50 milliwatt seconds, in case.	7162347 (17–T–5518–100)	39, 54	79*a*, 82*a*, and 119	Used to test electrical firing mechanism 7313326.
TESTER, elec output, firing mechanism, rocket launcher, 0 to 70 milliwatt seconds, in case.	7142254	54	79*a*, 82*b*, and 119	Used to test electrical firing mechanisms 7140325 or 7313326.
TESTER, elec output, firing mechanism, rocket launcher, 0 to 100 milliwatt seconds, in case.	7142554	39, 54	79*a*, 82*b*, and 119	Used to test electrical firing mechanisms 7140325 or 7313326.

Section II. INSPECTION

67. General

a. Scope. This section provides specific instructions for the technical inspection, by ordnance maintenance, of matériel either in the hands of troops or when received for repair in ordnance shops. It also briefly describes the in-process inspection of matériel during repair and the final inspection after repair has been completed. Trouble shooting information is incorporated, wherever applicable, as a normal phase of inspection.

b. Purposes of Inspections. Inspections are made for the purposes of: (1) determination of the conditions of an item as to serviceability, (2) determination of incipient failure, (3) the assurance of proper application of maintenance policies at prescribed levels, and (4) the ability of a unit to accomplish its maintenance and supply missions.

c. Categories of Technical Inspection. In general, five categories of inspection are performed by ordnance field maintenance personnel.

(1) *Overall inspection.* This is a periodic overall inspection performed by a contact party on matériel in the hands of troops and an inspection performed by maintenance company personnel when matériel is evacuated to the ordnance company. The inspection of matériel evacuated is more thorough and includes check and repair of minor points that would not be required in the inspection performed by a contact party.

(2) *Pre-embarkation inspection.* This inspection is conducted

on matériel in alerted units scheduled for oversea duty, in order to insure that such matériel will not become unserviceable or worn out in a relatively short time. It prescribes a higher percentage of remaining usable life in serviceable matériel, to meet a specific need beyond minimum serviceability.

(3) *In-process inspection.* These are inspections performed in the process of repairing (field maintenance) the matériel as prescribed further in this chapter. This is to insure that all parts conform to the prescribed standards, that the workmanship is in accordance with approved methods and procedures, and that deficiencies not disclosed by the preliminary inspection are found and corrected. Detailed instructions are contained in this chapter.

(4) *Final inspection.* This is an acceptance inspection performed by a final inspector, after repair has been completed, to insure that the matériel is acceptable for return to user according to the standards established. Detailed instructions are contained in paragraphs 120 and 121.

(5) *Spot check inspection.* This is a periodic overall inspection, performed on only a percentage of the matériel in each unit, to determine the adequacy and effectiveness of organizational maintenance.

68. Technical Inspection

Warning: Before starting a technical inspection, be sure to clear the weapon. Do not touch the trigger until the weapon has been cleared. Inspect the barrel to insure that it is empty. Avoid having live ammunition in the vicinity of the work.

a. Preparatory Procedures.

(1) Check to see that the weapon has been cleaned of all corrosion-preventive compound, grease, excessive oil, dirt, or foreign matter which might interfere with proper functioning or obscure the true condition of the parts.

(2) Make an overall inspection of the weapon for general appearance, condition, operation, and manual functioning. Use dummy rounds.

b. Inspection Guide. Table III is provided as a check list to be used as a guide for the inspection of weapons in the hands of troops. The overall inspection column lists the standards denoting minimum serviceability and the next column lists the standards for pre-embarkation inspection.

Note. The additional column is provided for comparative information only, to show the standards which are desired when the weapon is repaired in ordnance field shops.

Table III. Inspection Guide for 3.5-Inch Rocket Launchers M20 and M20B1

Points to be inspected	Overall inspection	Pre-embarkation inspection	Final inspection Field maintenance
Hinge locking spring	Holds sight in extended or folded position.	Holds sight in extended or folded position.	Holds sight in extended or folded position.
Lens cover	Is held in open and closed position by cover locking spring.	Is held in open and closed position by cover locking spring.	Is held in open and closed position by cover locking spring.
Indicator arm	Not bent or deformed.	Not bent or deformed.	Not bent or deformed.
Lens	No erosion or etching of glass.	No erosion or etching of glass.	No erosion or etching of glass.
Sight accuracy	Bore sight.	Bore sight.	Bore sight.
Barrel surfaces	No chips, cracks, or scratches causing exposed metal.	No chips, cracks, or scratches causing exposed metal. Paint should be dull, not glossy.	No chips, cracks, or scratches causing exposed metal. Paint should be dull, not glossy.
Barrel coupling	No play between front and rear tubes when coupled.	No play between front and rear tubes when coupled.	No play between front and rear tubes when coupled. Check threads of locking screw.
Tubes	Clean and free of dents and rust.	Clean and free of dents and rust.	Clean and free of dents and rust. Plug gage must pass freely through both barrels when coupled.
Barrel hook and eye	Not bent or deformed to prevent assembly.	Not bent or deformed to prevent assembly.	Not bent or deformed to prevent assembly.
Barrel latch	Holds assembled barrels securely. Will not release under normal pressure.	Holds assembled barrels securely. Will not release under normal pressure.	Holds assembled barrels securely. Will not release under normal pressure.
Contact clamp	Clean and free of rust.	Clean and free of rust.	Clean and free of rust.
Coupling screw	No burs or dirt.	No burs or dirt.	No burs or dirt.

Contact spring	Not broken. Clean and free of rust.	Not broken. Clean and free of rust.	Not broken. Clean and free of rust. Test for good electrical contact (par. 119).
Insulating band	Good general appearance. Contact clamp seated in center.	Good general appearance. Contact clamp seated in center.	Remove from barrel and inspect conditions (pars. 93 and 94).
Contactor latch housing	Free of rust and paint on contact blade. Make firm contact with notch in rocket fin. Must be able to hold rocket in tube when held in vertical position.	Free of rust and paint on contact blade. Make firm contact with notch in rocket fin. Must be able to hold rocket in tube when held in vertical position.	Free of rust and painting on contact blade. Make firm contact with notch of rocket fin. Must be able to hold rocket in tube when held in vertical position.
Contact lead wire assembly	All soldered points are in good condition.	All soldered points are in good condition.	Soldered points are in good condition. Test electrical circuit. Check insulator sleeve under contact clamp.
Electrical firing mechanism	Check connections for looseness with emphasis on soldered points. Check electrical output for 15-milliwatt seconds. Check for rust in armature and mildew on coil covering.	Check connections for looseness with emphasis on soldered points. Check electrical output for 15-milliwatt seconds. Check for rust in armature and mildew on coil covering.	Check connections for looseness with emphasis on soldered points. Check electrical output for 15-milliwatt seconds. Check for rust in armature and mildew on coil covering.
Grips	No cracks.	No cracks.	No cracks.
Trigger	Operates smoothly, well lubricated, no dirt in trigger.	Operates smoothly, well lubricated, no dirt in trigger.	Operates smoothly, well lubricated, no dirt in trigger.
Safety	When in "SAFE" position launcher will not fire.	When in "SAFE" position launcher will not fire.	When in "SAFE" position launcher will not fire. Firing mechanism 7313326 should be checked with electric output tester. (Trigger can still be squeezed with safety on).

Points to be inspected	Overall inspection	Pre-embarkation inspection	Final inspection Field maintenance
Bipod leg lock buttons	Holds bipod securely in folded position.	Holds bipod securely in folded position.	Holds bipod securely in folded position.
Bipod slide block catch	Holds bipod securely in extended position.	Holds bipod securely in extended position.	Holds bipod securely in extended position.
Bipod trip	Should return to normal position after use.	Should return to normal position after use.	Should return to normal position after use.
Rear ring lock	Locks bipod firmly to rear barrel.	Locks bipod firmly to rear barrel.	Locks bipod firmly to rear barrel.

69. Inspection of Matériel in the Hands of Troops

a. General. Refer to TM 9–1100 for responsibilities and fundamental duties of inspecting personnel, the necessary notice and preparations to be made, forms to be used, and general procedures and methods to be followed by inspectors. Matériel to be inspected includes organizational spare parts, equipment, and the stocks of cleaning and preserving matériels. In the course of this technical inspection, the inspector will accomplish the following:

(1) Determine serviceability, i.e., the degree of serviceability, completeness, and readiness for immediate use, with special reference to safe and proper functioning of the matériel. If the matériel is found serviceable, it will be continued in service. In the event it is found unserviceable or incipient failures are disclosed, the deficiencies will be corrected on the spot, or advice given as to corrective measures when applicable, or, if necessary, the matériel will be tagged for delivery to and repaired by ordnance maintenance personnel.

(2) Check for causes of mechanical and functional difficulties that troops may be experiencing and for apparent results of lack of knowledge, misinformation, neglect, improper handling and storage, security, or preservation.

(3) Check on application of all authorized modifications, to see that no unauthorized alterations have been made or that work beyond the authorized scope of the unit is being attempted. The following modification work order is considered manditory as of this printing; however, also check the index in SR 310–20–4 and the current modification work order file for any additional modification work orders promulgated subsequent to this printing.

MWO	*Title*
MWO ORD B42–W1	Replacement of sight assemblies with one containing the ladder type reticle pattern (fig. 16).

(4) Instruct the using personnel in proper preventive maintenance procedures where found inadequate.

(5) Check on completeness of the organizational maintenance allowances and procedures for obtaining replenishments.

(6) Check conditions of storage of general supplies and ammunition.

(7) Initiate a thorough report of matériel on "deadline," with reasons therefore, for further appropriate action.

(8) The inspector should report to the responsible officer any carelessness, negligence, unauthorized modifications, or tampering. This report should be accompanied by recommendations for correcting the unsatisfactory conditions.

b. Detailed Instructions. The detailed instructions used by the inspector to determine the serviceability of matériel in troop hands are given in (1) through (3) below.

(1) *Front and rear barrel assemblies.*

(*a*) All surfaces will be free from chips, scratches, and cracks. There will be no exposed metal, and painted surfaces should be dull rather than glossy.

(*b*) Barrel coupling lock should hold the barrels locked for firing. There should be no play between front and rear barrels. The coupling lock lever should be kept depressed (locked) by the coupling lock spring.

(*c*) The barrel coupling nut and screw should be free of burs and dirt. Accumulation of dirt or presence of burs will prevent the proper assembly of the two barrels.

(*d*) The tubes should be clean and free of rust. There should be no dents or deformations that would prevent the 6-inch improvised plug gage (fig. 53) from passing through the entire length of the bore when the barrels are assembled (par. 116).

(*e*) There should be no deformation of the barrel hook and eye on the barrel latch strike. If these parts are damaged or misshaped, it will prevent assembly of barrels for carrying.

(*f*) The barrel latch spring should keep the latch in locked position at all times. When the barrels are assembled for carrying, the latch should hold them securely.

(*g*) The contact clamp should be examined for rust and positioned in approximately the center of the insulating band. The insulating band should be in good condition, showing no signs of deterioration.

(*h*) Inspection of contact springs is essential. A broken spring will probably result in a failure to fire.

(*i*) The contactor latch housing should be free of rust. The blade of the contactor latch housing should be free of dirt, rust, or paint, as foreign matter will result in poor contact with the rocket fin and failure to fire. The contactor latch spring should be sufficiently strong to hold a rocket in the tube while the tube is held in a vertical position.

(*j*) All soldered joints in the electrical circuit should be substantial. The insulator sleeve should separate the contact lead wire tube from the contact clamp.

(*k*) All steel parts of the barrel which are not painted (par. 54*d*) should be free of rust and coated with light oil.

(*l*) The bipod slide block catch should be inspected for failure to properly engage the ratchet or notches on the bipod slide. They should hold the bipod in extended position.

(*m*) The bipod trip springs should be inspected to insure return of the bipod trip to its original position flat against the barrel.

(*n*) The bipod leg lock buttons should hold the bipod securely in folded position. Failure to do so indicates weak or broken springs.

(*o*) The monopod (early manufacture) should be checked for functioning and note made of any binding. The keys, screws, and washers are steel and should be checked for rust. No functional check can be made on the modified monopod; however, check to see that its steel parts are free of rust. On launchers of present manufacture, the monopod has been replaced by an aluminum stock.

(*p*) Score marks, located 90° apart, must appear on the rim of the muzzle deflector. These notches are used to locate cross hairs during bore sighting by organizational personnel. They must be positioned on the horizontal and vertical axes of the launcher (par. 117*b*).

(2) *Electrical firing mechanism.*

(*a*) Grips must not be scratched, chipped, or cracked. They should fit securely, protecting the firing mechanism from the elements.

(*b*) The soldered joints are to be checked for proper electrical contact and for strength. Observe whether there is mildew on the coil and if any excess solder dripped about the mechanism.

(*c*) The trigger should operate smoothly when actuated. A dirt clogged trigger on firing mechanism 7140325 can be cleaned in accordance with paragraph 80. Worn or broken parts, on either type firing mechanism, will result in their replacement.

(*d*) The safety on firing mechanism 7140325 should prevent actuation of the trigger when in "SAFE" position. Without actually firing the launcher, it is not possible to check the safety of firing mechanism 7313326 unless an electrical output tester is available (par. 82*a*).

(3) *Reflecting sight assembly.*

(*a*) The sight assembly should pivot on the hinge and should lock in either the folded or extended position.

(*b*) The lens cover should lock in either the open or closed position. This piece shields the lens when it is in carrying position.

(*c*) The indicator should not be bent or deformed, and the pointer should firmly engage the notches of the elevation plate.

(*d*) The lens should have no scratches on the glass surfaces, which might affect the sighter's accuracy.

(*e*) Bore sight the launcher using either the distant target method (par. 44*c*) or the bore sight target method (par. 77).

70. Inspection of Matériel Received in Field Maintenance Shops

a. Inspections. When launchers are received in field maintenance shops, they should be inspected as outlined in paragraph 69. In addition, the following inspections which are beyond the scope of ordnance maintenance should be made.

(1) Check alinement of front and rear barrels when coupled (par. 116), with the 6-inch improvised plug gage (fig. 53).

(2) Test output of electrical firing mechanism and complete electrical circuit of launcher as indicated in paragraphs 82 and 119, respectively.

b. Trouble Shooting. Malfunctions with probable causes and the necessary corrective action to be taken by the responsible ordnance personnel are tabulated in table IV. Corrective action, when completed, should meet standards prescribed in table III (par. 68).

Table IV. Trouble Shooting

Malfunction	Probable causes	Corrective action
Failure of front and rear barrel to couple properly.	Dirt on screw or in nut.	Clean both surfaces.
	Bur on barrel coupling screw.	Remove with a file or crocus cloth.
Failure to lock in coupled position.	Broken coupling lock spring.	Replace spring (pars. 53*c* and 55*a*).
	Worn or damaged coupling lock screw.	Replace screw (pars. 53*c* and 55*a*).
Barrel latch fails to hold barrels in carrying position.	Broken barrel latch spring.	Replace spring (pars. 53*b* and 55*b*).
Barrel hook and eye will not engage.	Deformed part.	Straighten if possible.
Round fails to stay in tube.	Weak or broken contactor latch spring.	Replace spring (par. 89).
Failure to fire.	Low electrical output of firing mechanism.	Replace firing mechanism (pars. 78 and 81).
	Poor contact by blade of contactor latch housing.	Clean blade.
	Broken contact spring.	Replace contact clamp (pars. 93 and 96).
	Deteriorated insulator sleeve between contactor clamp and contact lead wire tube.	Replace insulator sleeve (pars. 93 and 96).
Bipod will not stay folded.	Broken bipod leg lock button spring.	Replace spring (pars. 110 and 113).
Bipod trip fails to return to position after use.	Broken bipod trip spring.	Replace spring (pars. 110 and 113).
Bipod slide block catch fails to engage notches of slide.	Broken catch spring.	Replace spring (pars. 110 and 113).
Bipod assembly fails to rotate on front barrel.	Dirt under ring.	Remove bipod assembly and clean.

Table IV—Continued.

Malfunction	Probable causes	Corrective action
Bipod is not securely locked to barrel.	(Launcher M20-continuous rear ring)—Broken or weak rear ring lock spring.	Replace spring (pars. 110 and 113).
	(Launchers M20 and M20B1—split ring type)—Loose rear ring clamping spring.	Adjust tension of spring (par. 114*b*(3)).
Monopod does not function properly.	Binding of parts.	Disassemble and replace worn parts.
Trigger does not function smoothly.	Dirt in trigger slot (firing mechanism—7140325).	Clean slot (par. 80).
	Lubrication needed.	Lubricate (par. 35*d* and *e*).
Safety does not prevent firing.	Defective shunt in firing mechanism—7313326.	Replace firing mechanism (pars. 78 and 81).
	Broken lug on trigger in firing mechanism—7140325.	Replace firing mechanism (pars. 78 and 81).
Reflecting sight assembly fails to lock in open or folded position.	Broken locking spring.	Replace spring (pars. 73*a* and 76*d*).
Lens cover fails to stay open or closed.	Broken lens cover spring.	Replaee spring (pars. 73*b* and 76*d*).
Launcher fires inaccurately.	Sight assembly out of adjustment.	Bore sight (par. 77).

71. Pre-Embarkation Inspection of Matériel in Units Alerted for Oversea Movement

For information regarding the inspection of matériel in units alerted for oversea movement, refer to table III.

Section III. REFLECTING SIGHT ASSEMBLY

Note. MWO B42–W1 orders replacement of reflecting sight assembly 7313440 (concentric ring type) or sight assembly 7162890 (oval type) by sight assembly 7141999 (ladder type). Elevation plate 7141998 is to replace plate 7138366 used with the oval and concentric ring type reticle patterns (fig. 32).

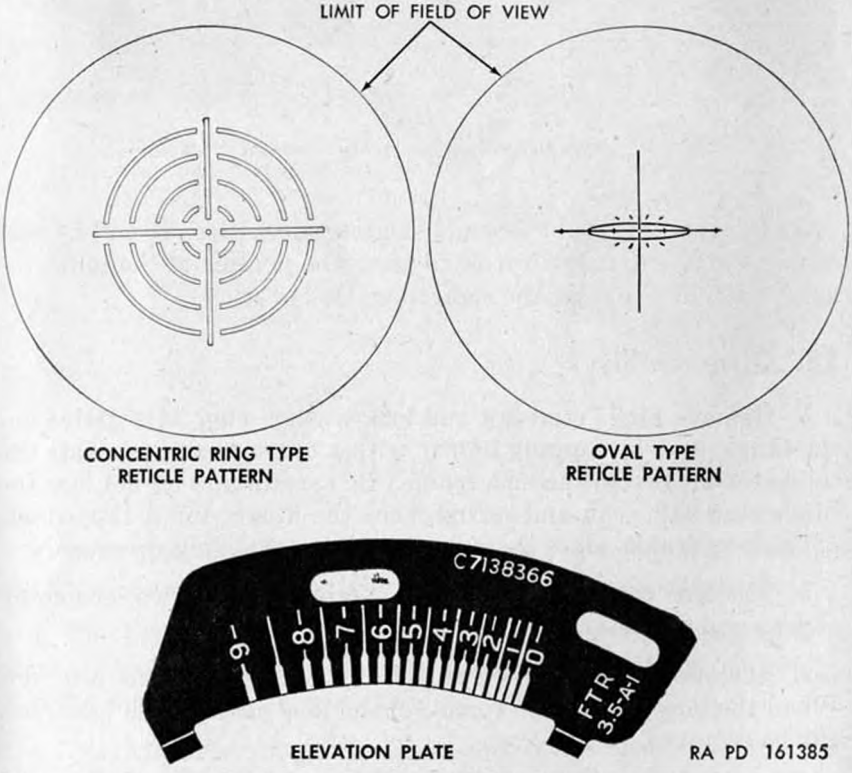


Figure 32. Concentric ring and oval type reticle patterns used with elevation plate 7138366 (these are obsolete types and must be replaced).

72. Removal

a. Unscrew the two screws in the slots of the elevation plate (fig. 15). Remove the screws, elevation plate washers and lock washers, and elevation plate.

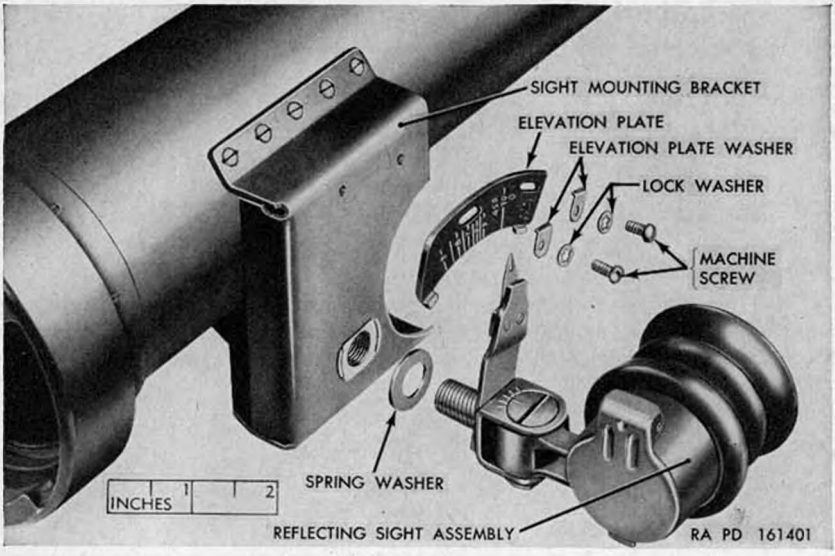


Figure 33. Reflecting sight assembly removed from barrel.

b. Unscrew the sight assembly counterclockwise. It will be necessary, for the first few turns, to press the pointer of the indicator arm up slightly to clear the sight mounting bracket.

73. Disassembly

a. Remove hinge stud nut and lock washer (fig. 34). Drive out the hinge stud, by tapping lightly with a hammer and separate the indicator arm from the lens frame. Be careful and do not lose the hinge stud ball, seat, and spring when the hinge stud is tapped out of the lens frame, since these parts are under spring pressure.

b. The lens cover is removed, by taking out the two lens cover screws and the lens cover spring and ball.

c. Remove the rubber eye shield and remove the lens retainer. When the lens retainer is removed, the lens assembly is loose and can be removed.

74. Inspection

a. The lens cover spring should show no signs of wear or be weakened to the point where it will no longer hold the lens cover locked in open or closed position.

b. Check the threads on the lens cover screws for burs or stripping, since these screws are small and quite easily stripped.

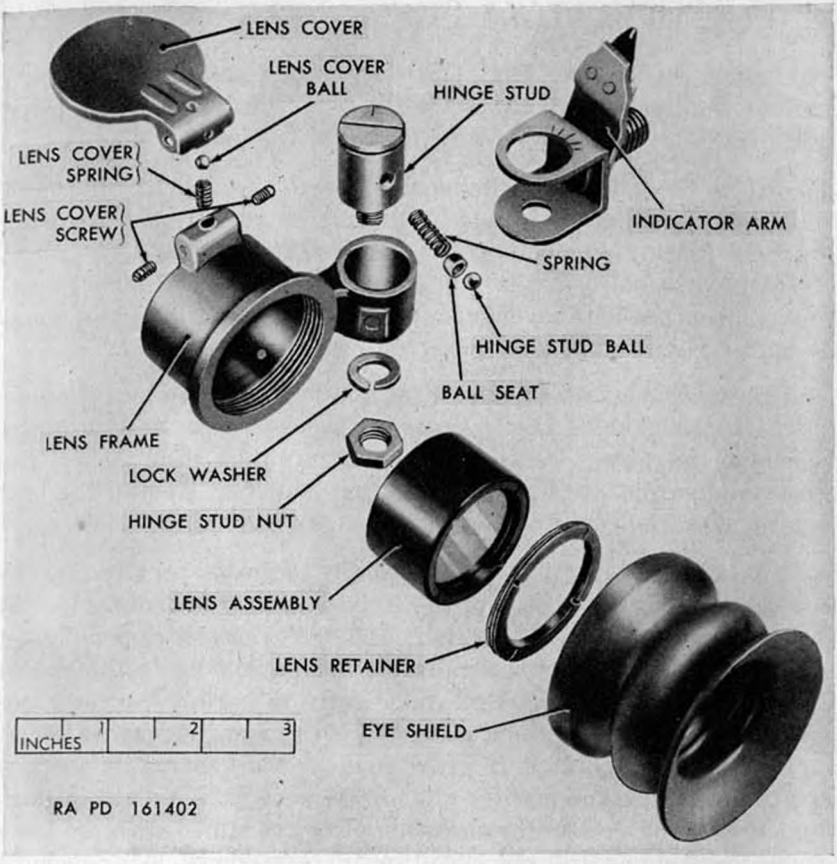


Figure 34. Reflecting sight assembly 7141999—exploded view.

c. The hinge stud spring should be strong enough to provide snap to the locking of the sight in extended or folded position.

d. The indicator arm must not be deformed and the indentation on the pointer must not be worn to the extent that it will not maintain the elevation settings on the elevation plate.

e. The lens assembly must be inspected for broken or cracked lens. If fogging is observed, the atmosphere of nitrogen has escaped and is indicative of a fracture in some part of the assembly.

75. Repair

Repair of the reflecting sight assembly consists of replacing worn or broken parts. If lens frame is unserviceable, replace sight assembly as a unit.

76. Assembly and Installation

a. Insert the lens assembly (fig. 34) in the lens frame and screw the lens retainer in, until it holds the lens tightly. A stud located in the frame insures proper positioning of the lens.

b. Place the lens cover spring and ball in the hole in the top of the hinge in the frame. Place the lens cover on top of the spring and ball, seating the ball in the small recess in the lens hinge. Aline the two holes in the lens cover with the two holes in the frame, insert the lens cover screws, and tighten until the lens cover is secure.

c. To assemble the indicator arm and lens frame, place the lens frame in the yoke of the indicator arm and aline the two holes. Assemble the spring, seat, and ball in the hinge stud. Insert the hinge stud so that its flat side faces the launcher. Install the lock washer and hinge stud nut on the threads of the hinge stud.

d. Attach the reflecting sight assembly to the barrel (fig. 33), by inserting the threaded stud of the sight assembly in the retainer of the mounting bracket of launcher M20 or in the cast appendage of launcher M20B1. Turn the indicator arm clockwise to the end of the threads and then back off sufficiently to permit the indicator arm to point to the extreme right of the bracket. It may be necessary to raise the pointer, in order to clear the housing on the last few turns. Raise the pointer and slide the elevation plate in position, so that the slots in the elevation plate are alined with the holes in the bracket. Install the elevation plate washers, lock washers, and screws.

Note. When a reflecting sight assembly is removed or installed, it is necessary to bore sight the launcher (par. 77).

77. Bore Sighting

a. General. The purpose of bore sighting is to aline the sight with the bore of the launcher. For instructions on bore sighting by the distant target method, see paragraph 44*c*.

b. Procedure. Improvised bore sighting plugs (fig. 35) and a bore sighting target (fig. 36) must be prepared by field maintenance personnel.

(1) Insert the front bore sight plug (cross hairs) into the muzzle end of the bore and the rear bore sight plug (peep hole) into the breech end of the bore. Set the launcher in an improvised bore sighting stand which holds the launcher firmly in horizontal position and the target perpendicular to the line of sight. Locate the target 100¼

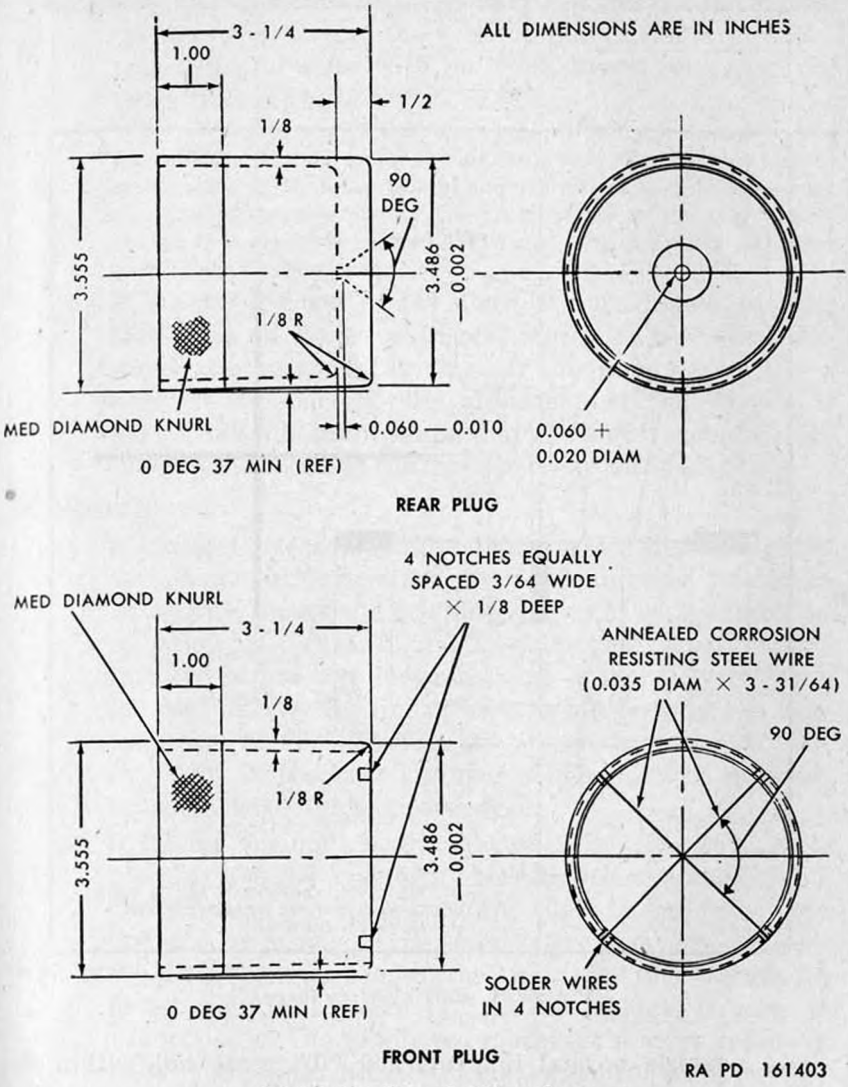


Figure 35. Bore sighting plugs.

inches forward of the front edge of the sight mounting bracket.

(2) Set the indicator arm at "0" on the elevation plate. Sight through the front and rear bore sight plugs, and line the center line of the launcher bore accurately on the intersection of the large cross on the target. Sight through the reflecting sight assembly and rotate the launcher, so as to place the vertical center line of the reticle parallel with the vertical axis of the target. The image of the

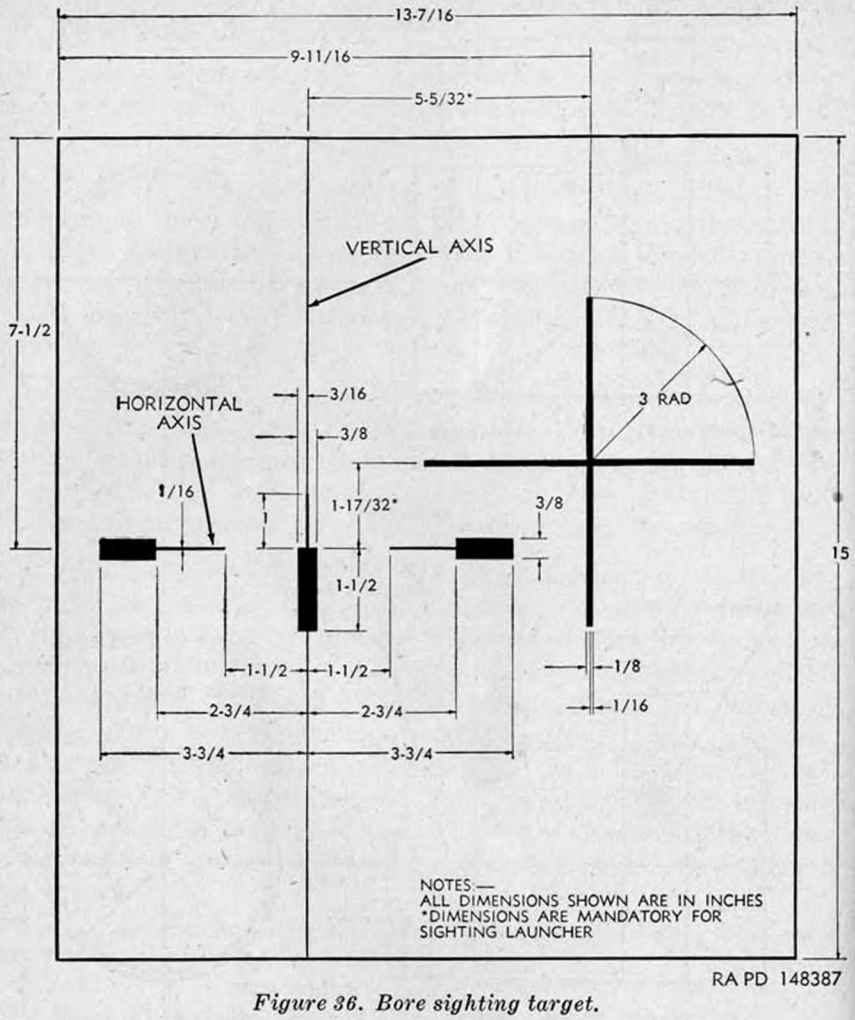


Figure 36. Bore sighting target.

reticle normal line, marked "0," must fall within the heavy portions of the horizontal axis of the target; also, the image of the vertical center line on the reticle must fall within the heavy portions of the vertical axis.

(3) If the target is not vertically centered, adjust the reflecting sight assembly in elevation as described in *c* below. This adjustment is made, as necessary, to bring the image of the horizontal normal line of the reticle on the horizontal axis.

(4) If the target is not laterally centered, adjust the reflecting sight assembly in azimuth as described in *c* below. The image of the vertical center line of the reticle must aline

with the vertical axis of the target and must fall within the heavy portion of the vertical axis of the target. Repeat this procedure with the front barrel rotated in the three locking positions.

Note. The image of the intersection of the horizontal normal line and the vertical center line of the reticle must fall within the heavy portions of the horizontal and vertical axis of the target for all three locked positions of the front barrel in the rear barrel. It will be necessary to check all three positions after the final adjustment has been made.

(5) If the requirement in (4) above is not fulfilled, test the barrels in all three locked positions with the 6-inch improvised plug gage (fig. 53). If this gage passes freely through the barrels, the alinement of the barrels is within the minimum limits and the sight should be adjusted for a mean of the three barrel positions.

c. Adjustment.

(1) If vertical (elevation) adjustment of the line of sight is necessary, as determined by bore sighting procedure (*b* above), loosen the machine screws at each end of the elevation plate (figs. 15 and 33). Shift the elevation plate forward in order to lower the line of sight or rearward in order to raise the line of sight, while keeping the indicator arm on "0." Tighten the two machine screws after the sight is positioned properly in elevation as determined by bore sighting procedure.

(2) If lateral (azimuth) adjustment of the line of sight is necessary, as determined by bore sighting procedure in *b* above, loosen the hinge stud nut (figs. 15 and 34). Turn the stud by means of the screwdriver slot. This adjusts the position of the stop in the hinge stud and adjusts the firing (sighting) position of the line of sight in azimuth (deflection). The graduated markings are for reference only. Tighten the hinge stud nut, when the sight is properly positioned in azimuth as determined by bore sighting procedure in *b* above.

Section IV. ELECTRICAL FIRING MECHANISM

78. Removal

Refer to paragraph 46 for instructions regarding disassembly of the firing mechanisms permitted by organizational maintenance. Instructions for complete removal of firing mechanisms from launcher follow:

a. Electrical Firing Mechanism 7313326 (Single Action on Trigger Squeeze) (fig. 37).

(1) At the firing mechanism, disconnect the contact lead wire leading to the contact clamp. Heat and disconnect the soldered joint between the contact lead wire and the wire lead on the firing mechanism rear plate.

(2) Remove the cotter pin from the trigger pin and withdraw the trigger pin.

(3) Unscrew the screw and nut, which secure the firing mechanism to the grip support on the rear barrel. Take care not to drop the two lock washers.

Caution: Further disassembly of the firing mechanism is prohibited, because this action decreases the magnetic output of the magneto from 30 to 40 percent.

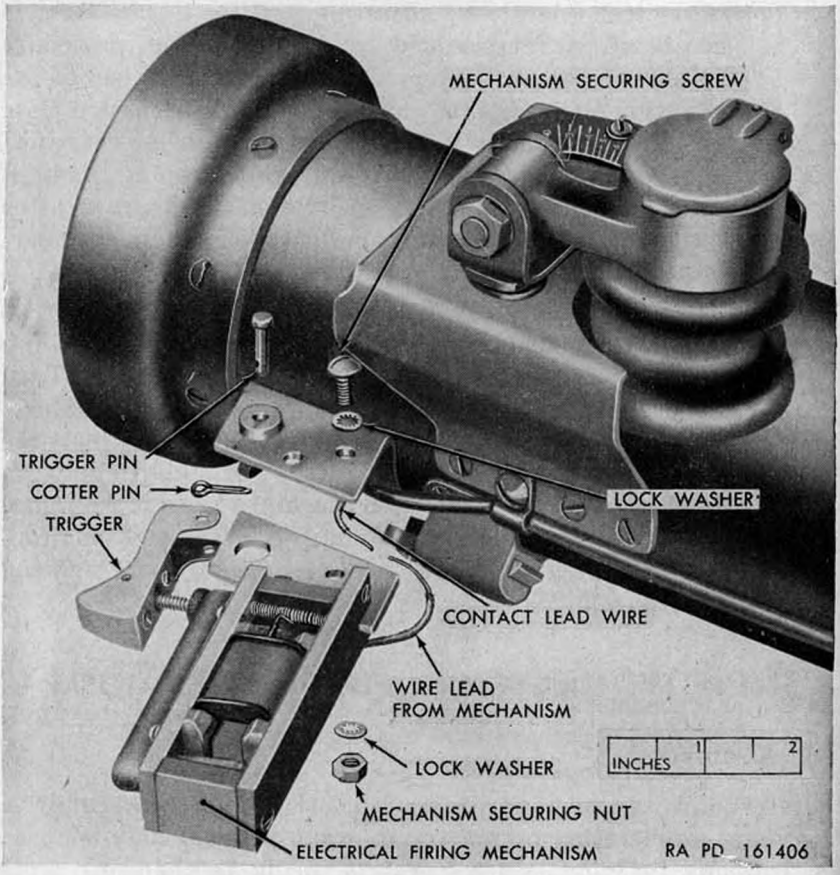


Figure 37. Electrical firing mechanism 7313326 (removed from barrel).

b. Electrical Firing Mechanism 7140325 (Double Action) (fig. 38).

(1) At the firing mechanism, disconnect the contact lead wire, by removing the soldered terminal screw that fastens the terminal on the contact lead wire and the terminal on the coil lead wire together (fig. 28).

(2) Remove the cotter pin from the trigger pin and withdraw the trigger pin (fig. 38). This frees the trigger and latch assembly. Take care not to drop the trigger spring.

(3) Unscrew the mechanism securing screw and nut which secure the firing mechanism to grip support of the rear barrel, take care not to drop the two lock washers.

Caution: Further disassembly of the firing mechanism is prohibited, because this action decreases the output of the magneto from 30 to 40 percent.

79. Inspection

The firing mechanism must be inspected for corrosion of steel parts or mildew on coil. The trigger on firing mechanism 7140325

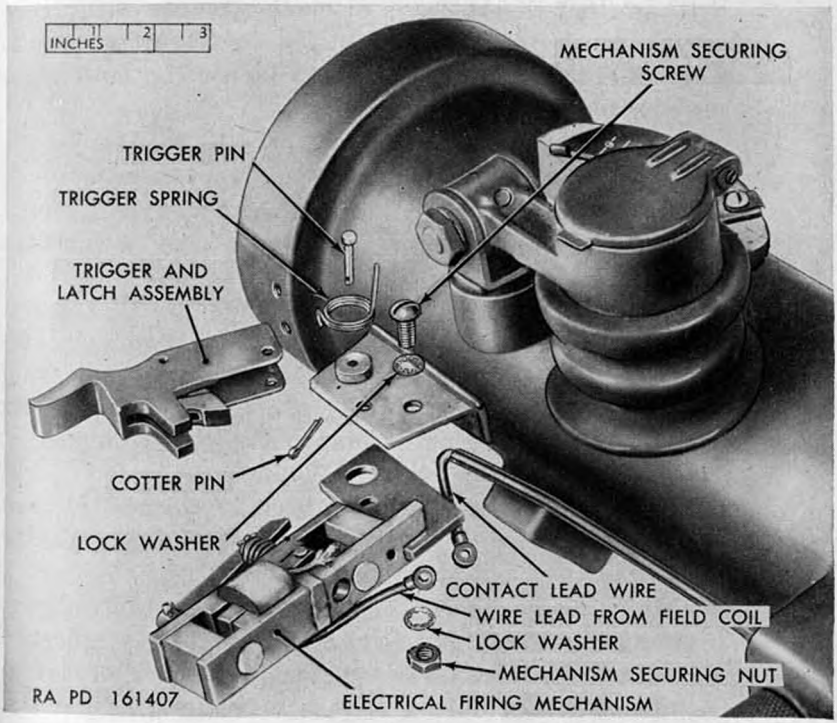


Figure 38. Electrical firing mechanism 7140325 (removed from barrel).

should be checked for accumulation of dirt in the trigger slot; check the trigger spring (fig. 38) for serviceability. Firing mechanisms which have loose components, such as magnets or other critical parts, will be removed and returned to ordnance rebuild installations if otherwise serviceable.

a. Testing Electrical Firing Mechanism (Removed From Launcher).

(1) The electrical firing mechanism must be tested to determine its serviceability. Firing mechanism 7313326 is serviceable if its output is 15 milliwatt seconds; firing mechanism 7140325 is serviceable if its output is 40 milliwatt seconds and if no electrical impulse occurs during release of trigger. Both firing mechanisms must operate smoothly when completely assembled to launchers (with grips installed).

(2) Firing mechanism electrical output testers are used to check the serviceability of the firing mechanism (table II).

(3) In an emergency, when tester 7142554 or 7142254 is not available, it is permissible to use tester 7162347 (fig. 39) on firing mechanism 7140325 (double action on trigger squeeze), but this tester is primarily for use with firing mechanism 7313326 (single action on trigger squeeze). Testers 7142554 and 7142254 may be used on both types of firing mechanism.

(4) The following procedures should be used for testing the electrical firing mechanism removed from launcher:

(*a*) Clip one wire lead (fig. 39) of tester to firing mechanism bracket. Clip remaining wire lead to the lead from field coil.

(*b*) Operate firing mechanism by squeezing the trigger. With firing mechanism 7313326 (single action on trigger squeeze), do not release the trigger until indicating needle of the tester has traveled its maximum register on scale. With firing mechanism 7140325 (double action on trigger squeeze), avoid quickly repeated operation of trigger, by pausing at least 10 seconds between trigger squeezes, in order to permit time for energy to dissipate, preventing damage to the tester.

(*c*) With firing mechanism 7140325 (double action on trigger squeeze) note that no electrical impulse is indicated on the tester during release of trigger. If an electrical impulse occurs during release of trigger, adjust the firing mechanism as described in *b* below.

(*d*) Note maximum reading on tester and if above the requirement for serviceability, the firing mechanism may be used on a launcher.

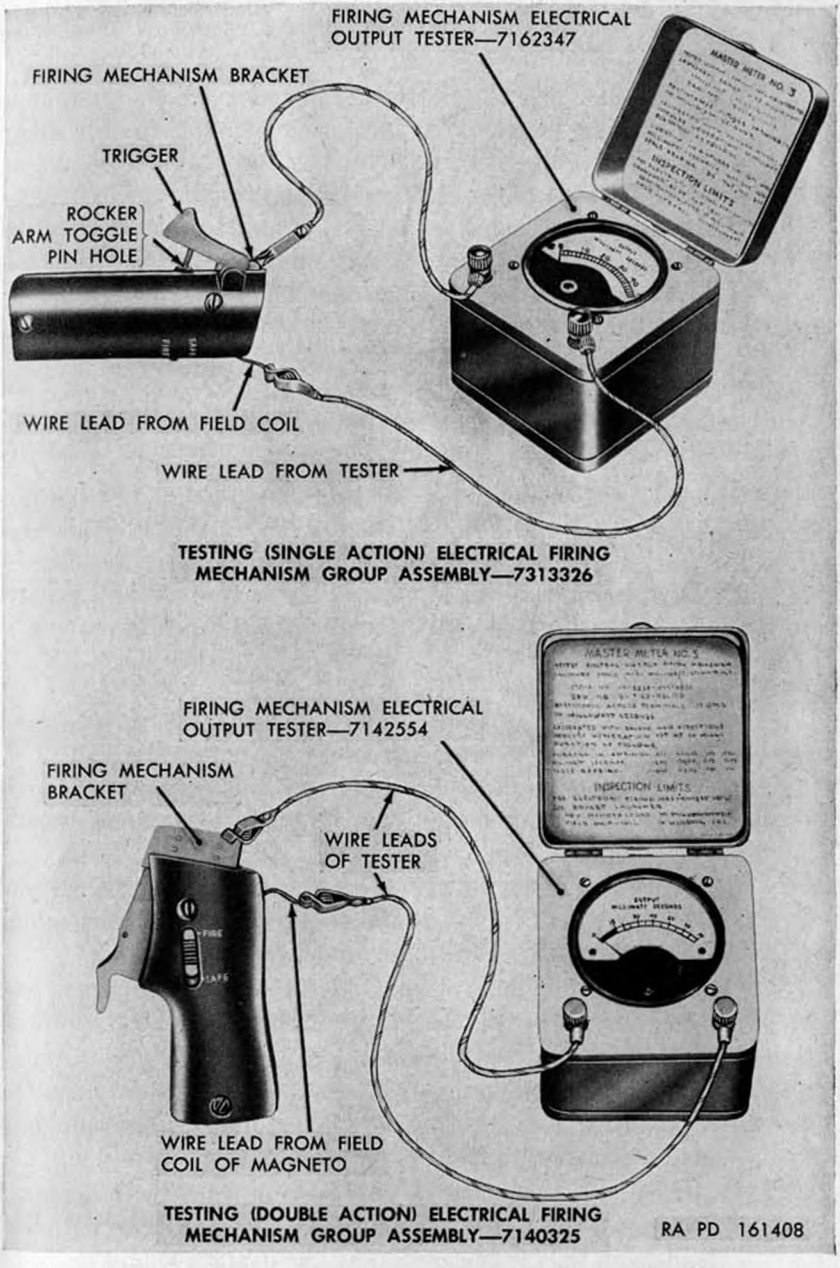


Figure 39. Testing electrical firing mechanism (removed from launcher).

b. Adjustment of Electrical Firing Mechanism 7140325 (fig. 38).

(1) Wear or loosening of the adjusting screw (fig. 28) may require its resetting. To reset the adjusting screw, loosen the set screw which locks the position of the adjusting screw. Insert a small screwdriver through the hole in the bottom plate and turn the adjusting screw clockwise (slightly) to take up wear.

(2) If a double click can be distinguished when the trigger is squeezed, the nose of the adjusting screw is too far away from the trigger latch. The best adjustment is determined by testing the electrical output of the firing mechanism (*a* above).

(3) Tighten the set screw to lock the position of the adjusting screw when the best adjustment has been determined.

80. Repair

a. If unserviceable, replace the trigger spring on firing mechanism 7140325. No parts are issued for firing mechanism 7313326.

b. If the trigger slot of firing mechanism 7140325 has become clogged with dirt, clean the slot in the trigger. Lubricate the trigger latch (par. 35*e*(2)). See that the latch moves freely. Lubricate the roller on the trigger latch and see that it rotates easily. Lubricate firing mechanism (par. 35*e*). Wipe off excess oil.

81. Assembly

a. Electrical Firing Mechanism 7313326 (*Single Action on Trigger Squeeze*) (fig. 37).

(1) Secure the firing mechanism to the grip support on the rear barrel.

(*a*) Aline the holes of the grip support on the barrel and the support bracket of the firing mechanism, slip a lock washer on the screw, and insert the screw.

(*b*) Slip another lock washer on the end of the screw and engage the nut on the screw. Tighten the screw and nut.

(2) Place the upper end of the trigger over the grip support and support bracket, so that the holes in the trigger, the support, and bracket aline. Insert the trigger pin and install new cotter pin.

(3) Connect the contact lead wire, which leads to the contact clamp, at the firing mechanism. Be sure that both the lead from the magneto coil and the contact lead wire from the contact clamp are soldered to the terminal. Use only

rosin core solder and use it sparingly. Do not permit solder to drip on other parts of the firing mechanism.

(4) Oil the firing mechanism in accordance with paragraph 35*d*.

(5) Install the safety switch in the left grip, with the tapered part of the switch contact upward.

(6) Install the grips as outlined in paragraph 48.

(7) Squeeze trigger several times to note smoothness of operation of firing mechanism. If operation is not smooth, discard and replace with a serviceable mechanism.

b. Electrical Firing Mechanism 7140325 (Double Action on Trigger Squeeze) (fig. 38).

(1) Secure the firing mechanism to the grip support on the rear barrel.

(*a*) Aline the holes of the grip support, on the rear barrel, and the support bracket of the firing mechanism. Slip a lock washer on the screw and insert the screw.

(*b*) Slip another lock washer on the screw and engage the nut on the screw. Tighten the screw and nut.

(2) Place the trigger spring around the bushing on the grip support and hook the spring around the grip support and into the "U" shaped slot of the bracket.

(3) Place the upper end of the trigger over the trigger spring, the grip support, and support bracket of the firing mechanism, so that the holes in the trigger, the grip support, and the bracket aline. Insert the trigger pin and install new cotter pin.

(4) Place the terminal of the contact lead wire and the terminal of the lead from the field coil over the hole in the firing mechanism. Solder as in *a*(3) above. Slip the screw through both terminals and secure it to the firing mechanism. Not all firing mechanisms 7140325 were equipped with lead terminals. These will have to be spliced, soldered, and wrapped with the rubber and friction tape. Tape covering must not be bulky.

(5) Lubricate firing mechanism (par. 35*e*).

(6) Install grips (par. 48*b*).

(7) Squeeze trigger several times to note smoothness of operation of firing mechanism. If operation is not smooth, discard and replace with a serviceable mechanism.

82. Functional Test

Procedure of testing is similar to that used when testing the electrical firing mechanism removed from launcher.

a. Electrical Firing Mechanism 7313326 (Assembled to Launcher).

(1) Remove left grip assembly (par. 46*a*).

(2) Clip one wire lead of tester to firing mechanism bracket (fig. 27). Clip the other wire lead of tester to the coil lead wire (fig. 27).

(3) Operate electrical firing mechanism by squeezing trigger. Do not release trigger immediately. Permit indicating needle of the tester to travel to its maximum register on scale before releasing the trigger.

(4) Note maximum reading on tester.

(5) If the electrical output of the firing mechanism measures less than 15-milliwatt seconds, do not attempt to correct the output but discard the firing mechanism and replace with a serviceable firing mechanism. Follow the instructions in paragraph 81*a* during the installation of firing mechanism.

(6) If the test shows the firing mechanism to be serviceable, lubricate the firing mechanism as prescribed in paragraph 35*d*, and install the grips on the firing mechanism (par. 48).

b. Electrical Firing Mechanism 7140325 (Assembled to Launcher).

(1) Remove the grips from the firing mechanism (par. 46*b*).

(2) Clip one wire lead of tester 7142254 or 7142554 to firing mechanism bracket (fig. 39).

(3) Remove the terminal screw that retains the terminal of the coil lead wire and the contact lead wire (fig. 28), freeing the terminal. Clip the other wire lead of the tester to the field coil lead wire (fig. 39).

(4) Operate firing mechanism 7140325 by squeezing trigger. Avoid quickly repeated operation of trigger. Pause at least 10 seconds between trigger squeezes to permit time for energy to dissipate, preventing damage to the tester.

(5) Note that no electrical impulse is indicated on tester during release of trigger. If an electrical impulse occurs during release of trigger, adjust firing mechanism as described in paragraph 79*b*. If this condition cannot be corrected by adjustment, discard the firing mechanism and replace with a serviceable mechanism.

(6) Note maximum reading on tester. If the electrical output of the firing mechanism measures less than 40-milliwatt seconds, do not correct the output. Discard the

firing mechanism and replace with a serviceable firing mechanism. Follow the instructions in paragraphs 81*b* and in (7) below during the installation of the firing mechanism.

(7) If the test shows the firing mechanism is serviceable, lubricate the firing mechanism as prescribed in paragraph 35*e*. Connect leads from field coil and contact lead wire to the firing mechanism (par. 81*b*(4)) and install the grips (par. 48).

(8) Squeeze trigger several times to note smoothness of operation of firing mechanism. If operation is not smooth, discard and replace with a serviceable mechanism.

Section V. MONOPOD STOCK ASSEMBLY

83. Removal

a. Launcher M20. Remove the clamp securing screws, nuts, and lock washers (fig. 45) which fasten the front and rear clamps to the barrels of all launchers M20. This applies to launchers equipped with the shoulder stock (present mfr) (fig. 40) and monopod stock assembly (early mfr) (fig. 41).

b. Launcher M20B1. On launcher M20B1, of present manufacture, equipped with the shoulder stock (fig. 43), remove the mounting screws and lock washers. On launchers of early manufacture, equipped with the monopod stock assembly (fig. 42), remove the mounting screws, lock washers, and the screws securing the monopod cap to the monopod.

84. Modify Monopod Assembly

If the bipod is not wanted on the weapon, remove the bipod (par. 109) and modify the monopod as follows:

a. Remove the monopod stock assembly (par. 83).

b. Using a small punch with a flat end, unstake the two mounting screws and remove them from the monopod cap. Remove the monopod from the front clamp (M20) or from the barrel (M20B1) (figs. 41 and 43 respectively).

c. Unstake the two mounting screws and remove them from the knurled monopod sleeve body (fig. 44). Slide the sleeve body off the monopod spiral-slot body.

d. Remove the leg screw (fig. 44) and slide the leg (with foot attached) from the bottom of the spiral-slot body.

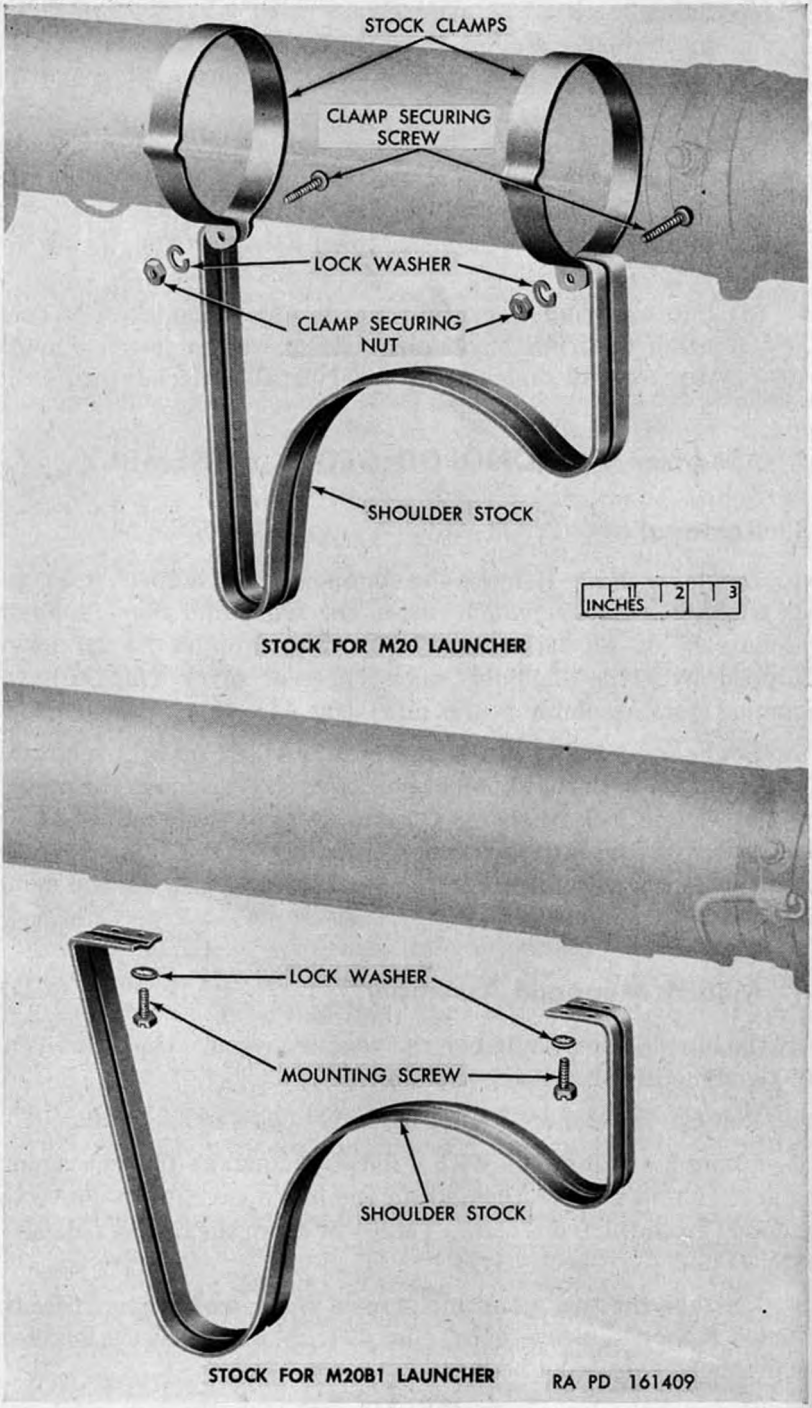


Figure 40. Stock parts of launchers M20 and M20B1 (present mfr).

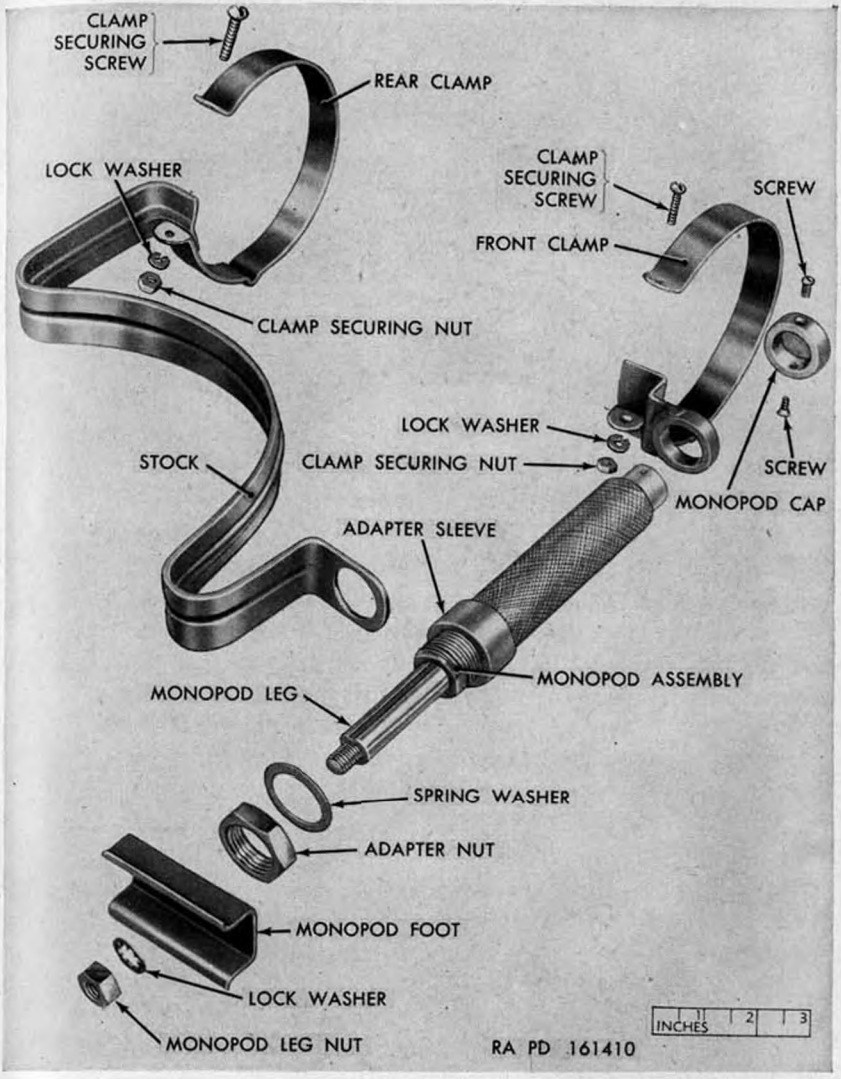


Figure 41. Monopod and stock parts of launcher M20 (early type).

e. Pry the assembly consisting of a key and pin (fig. 44) from the keyway in the adapter.

f. Discard the leg (with foot attached) (*d* above) and the key and pin (*e* above) in accordance with SR 735–150–1.

g. Slide the knurled monopod sleeve body on the spiral-slot body and secure with two No. 6 (0.138) x 0.200 machine screws. Stake the screws in place.

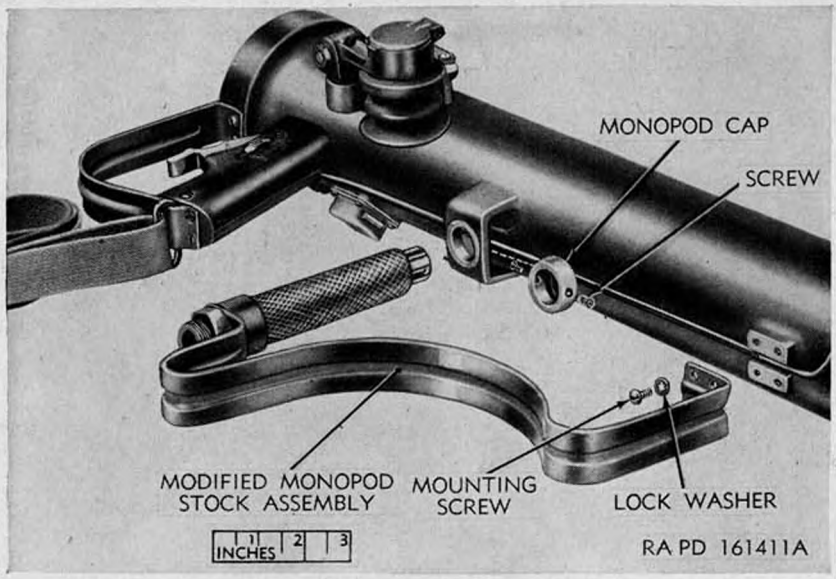


Figure 42. Modified monopod and stock assembly removed from barrel of launcher M20B1 (early mfr).

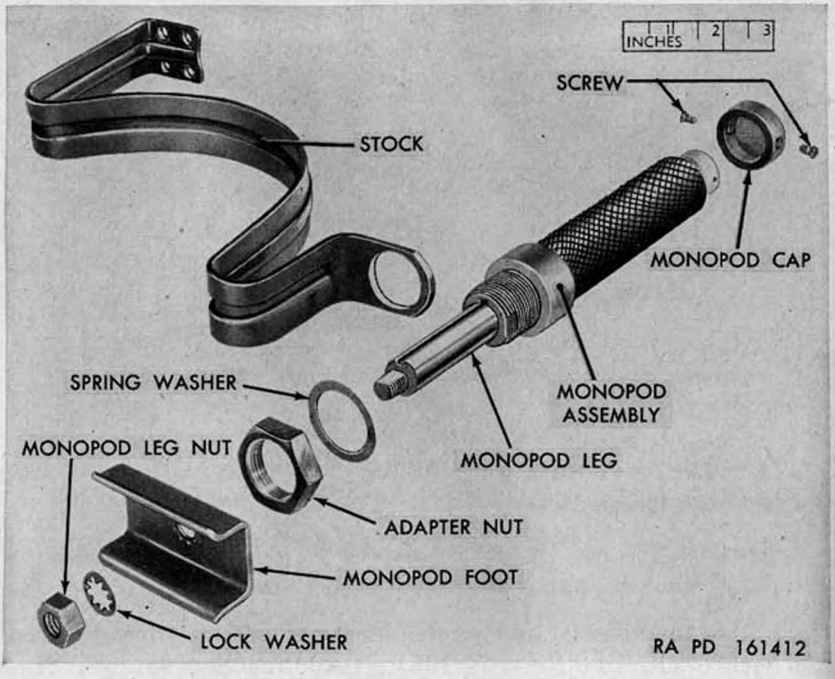


Figure 43. Monopod and stock parts of launcher M20B1—exploded view.

h. For launcher M20, insert upper end of the modified monopod assembly into the bracket of the front clamp. Place the monopod cap over upper end of the spiral-slot body and aline the two mounting screw holes in the cap with the tapped holes in the body. Secure with two No 6 (0.138) x 0.290 machine screws. Stake the screws in place. Install the monopod stock assembly (par. 88*a*).

i. Install the monopod stock assembly of launcher M20B1 as described in paragraph 88*b*(1).

85. Disassembly

a. Monopod Stock Assembly. Remove the screws that secure the monopod cap to the monopod assembly on launcher M20 (fig. 41).

(1) Unscrew the adapter nut and remove the lock washer and monopod foot (fig. 43).

(2) Remove the adapter nut, spring washer, and adapter sleeve (figs. 43 and 44).

(3) Remove the two adapter keys from the adapter, and slide the adapter off the monopod leg.

(4) The monopod leg key is held in the adapter by the leg key pin. It need not be removed unless corroded. If necessary, drive out the pin from its hole in the adapter and remove the key.

(5) Using a punch, unstake the two mounting screws and unscrew them from the monopod sleeve body, off the spiral-slot body.

(6) Unscrew the leg screw, and slide the spiral-slot body from the monopod leg.

b. Modified Monopod Assembly (fig. 45).

(1) Unscrew the adapter nut and remove the spring washer from the adapter. Then slide the stock and the adapter sleeve off the monopod.

(2) Using a small punch with a flat end, unstake the two mounting screws and remove them from the monopod cap. Remove monopod from front clamp (M20) or from the barrel (M20B1) (figs. 41 and 42 respectively).

(3) Using the same punch, unstake the two mounting screws and remove them from the knurled monopod sleeve body (fig. 44). Slide the sleeve body off the monopod spiral slot body.

Note. Further disassembly of the modified monopod is unnecessary.

86. Inspection and Repair

a. Check functioning of monopod; note any binding. Disas-

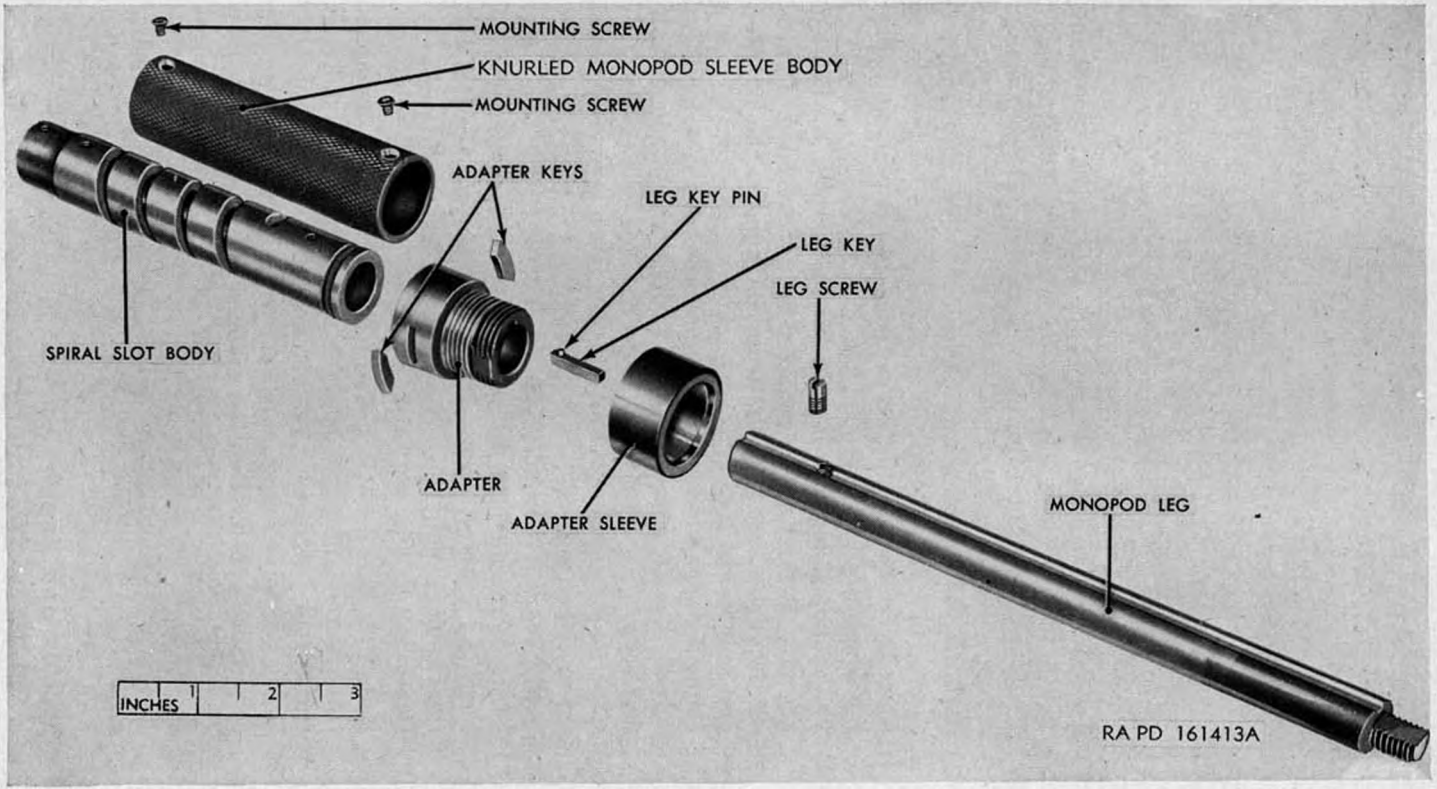


Figure 44. Monopod parts—exploded view.

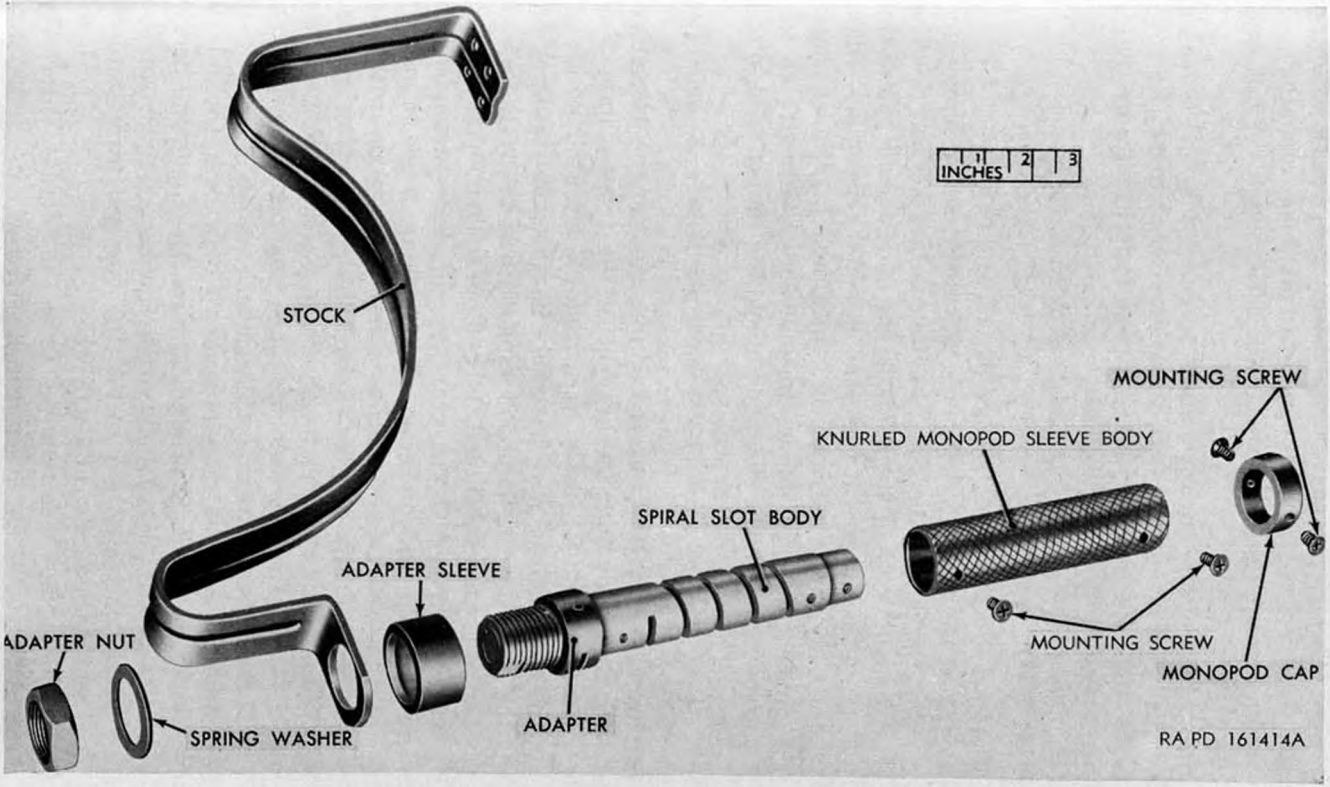


Figure 45. Modified monopod parts—exploded view.

semble the group (par. 85). Examine all parts for damage, scores, and burs. The keys, screws, and washers are steel (on launcher M20, the bracket of the front clamp assembly is steel), examine these steel parts for rust. For the modified monopod, examine only for rust and damage to the threads of the screws, adapter nut, and adapter.

b. If any part of the monopod stock assembly becomes worn or damaged, it is to be replaced with a new serviceable part. Remove rust spots with rifle-bore cleaner and crocus cloth, burs or rough spots are removed with crocus cloth.

87. Assembly

a. Monopod Stock Assembly (figs. 41, 43, and 44).

(1) Insert the monopod leg in the spiral-slot body. Make sure that the end of the body, having the arc keyway for the Woodruff keys of the adapter, the end of the leg, and the screw threads are at the same end of the assembly. Slide the body on the leg until the tapped hole for the leg screw appears directly under the spiral slot. Insert the leg screw through the slot and engage the tapped hole in the leg. Tighten the leg screw.

Note. The leg screw must not protrude beyond the spiral-slot body.

(2) For launcher M20, insert the upper end of the assembled leg and body into the bracket of the front clamp. For launcher M20B1, make sure that the aluminum tube of the contact lead wire assembly is placed in its notch on the barrel in the monopod support, and insert the upper end of the assembled leg and body in the monopod support cast integral with the rear barrel. Place monopod cap over upper end of the spiral slot body. Face it around so that the two mounting screw holes aline with the tapped holes in the body. Install the mounting screws. The mounting screws for the cap are slightly longer than the mounting screws for the monopod sleeve body. Tighten the screws and stake them.

(3) Slide the knurled monopod sleeve body over the spiral-slot body. Face it around to aline the mounting screw holes of the sleeve body with the tapped holes of the spiral-slot body, and install the two mounting screws. Tighten the screws and stake them.

(4) If the leg key was removed from the adapter, insert the key (with the leg key pin in it) (fig. 44) in the keyway of the adapter, fitting the leg key pin in its hole in the adapter.

(5) Slide the adapter over the end of the monopod leg and the spiral-slot body, engaging the leg key in the keyway on the leg. Adjust the position of the adapter, so that the key slots of the adapter aline with the keyway encircling the end of the spiral-slot body. Insert the two adapter keys and slide the adapter sleeve over the adapter.

(6) Slide the stock over the leg and adapter. Slip the spring washer over the adapter and place it against the stock. Place the spring washer so that the inner portion of the washer is raised away from the stock. Engage the adapter nut in the screw thread of the adapter, and tighten the nut sufficiently to flatten the spring washer.

Note. It is necessary to clamp the monopod cap to prevent turning while tightening the adapter nut.

(7) Place the foot at the end of the leg and turn it, until the flat of the hole in the foot alines with the flat on the end of the leg. Slip the foot on the end of the leg. The channel of the foot should face down (away from the leg). Slip the lock washer on the end of the leg and engage the monopod leg nut on the thread at the end of the leg. Tighten the leg nut securely.

Note. The foot cannot be turned on the leg when properly secured. If the adapter nut is sufficiently tight, the leg will not turn.

b. Modified Monopod Assembly (fig. 45).

(1) Slide the sleeve body on the spiral-slot body and secure with two No. 6 (0.138) x 0.200 machine screws. Stake screws in place.

(2) For launcher M20, insert the assembled modified monopod into the bracket of the front clamp. For launcher M20B1, make sure that the aluminum tube of the contact lead wire assembly is placed in its notch on the barrel in the monopod support, and insert the upper end of the spiral-slot body in the monopod support cast integral with the rear barrel. Place the monopod cap over the upper end of the spiral-slot body. Face it around, so that the two mounting screw holes aline with the tapped holes in the body. Install the mounting screws. Tighten and stake them.

(3) Slide the adapter sleeve over the adapter end of the spiral-slot body.

(4) Slide the stock over the adapter. Slip the spring washer over the adapter and place it against the stock. The

spring washer will be placed in such a manner that the inner portion of the washer is raised away from the stock. Engage the adapter nut in the screw thread of the adapter, and tighten the nut sufficiently to flatten the spring washer.

(5) The monopod stock assemblies (modified) are secured to the rear barrel in the same manner as the early manufacture monopod stock assemblies of launchers M20 and M20B1 (par. 88).

88. Installation

a. Launcher M20. For launcher M20, force both stock clamps open sufficiently to be slipped on the rear barrel. Do not damage the aluminum tube of the contact lead wire assembly while installing the stock clamps. Pull each clamp together, again, around the barrel. Be sure that the aluminum tube of the contact lead wire assembly is in the small loop of each clamp. This prevents flattening of the tube when tightening the clamp. Before tightening the clamps, aline the monopod with the trigger grip (parallel with the face of the sight mounting bracket). Insert the screws in the holes of the clamps, put the lock washer on each screw, engage the nuts, and tighten the clamp screws and nuts.

b. Launcher M20B1.

(1) For the launcher M20B1, early manufacture, make sure that the aluminum tube for the contact lead wire assembly is placed between the two pads on the bottom of the barrel and install the four screws which fasten the stock to the barrel. Make sure that the aluminum tube of the contact lead wire assembly is placed in its notch on the barrel in the monopod support and insert the upper end of the monopod spiral-slot body into the round hole of the monopod support (cast integral with the rear barrel). Place the monopod cap over the upper end of the monopod spiral-slot body and aline the two mounting screw holes in the cap with the two tapped holes in the body. Secure with two No. 6 (0.138) x 0.290 machine screws. Stake the screws in place.

(2) The stock of the launcher M20B1, present manufacture, is secured to the rear barrel by mounting screws. Aline the holes in the stock with the four holes in each of the pads under the rear barrel (fig. 40). Insert four screws in each pad, and tighten securely.

Section VI. CONTACTOR LATCH HOUSING

89. Removal

a. Remove the cotter pin (fig. 46) from each contactor latch pin and withdraw the two contactor latch pins.

b. Straighten the contactor latch shunt, slightly, by raising the contactor latch housing. This frees the contactor latch spring. Unless care is exercised, the spring will be dropped.

c. Disengage the contactor latch shunt from the barrel by removing the screw. The contactor latch stud, which carries the latch spring, also clamps the shunt to the contactor latch housing.

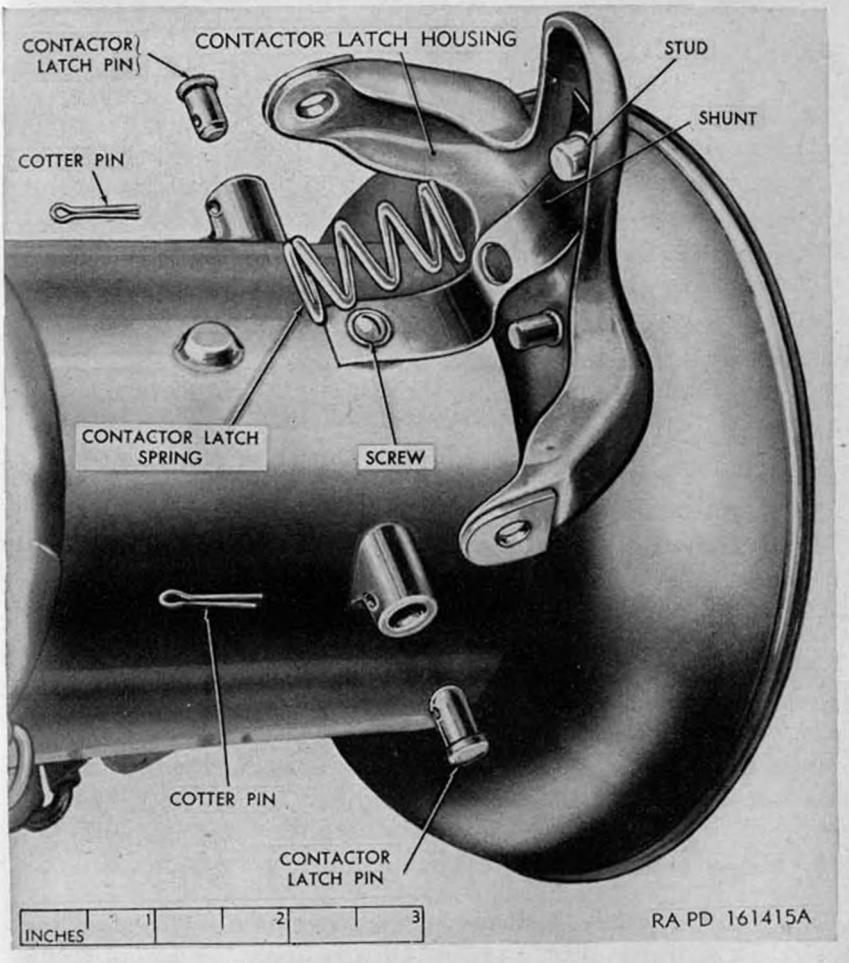


Figure 46. Contactor latch parts of launcher M20B1.

90. Inspection

Inspect the contactor latch housing to be sure that it is not corroded or deformed. Steel parts, such as the pins and spring, are to be observed for rust, paying particular attention to the contactor blade. The shunt should be checked to be sure that it is secured to the barrel. Inspect the spring for strength, a weak or broken spring will cause poor or no contact with the rocket fin.

91. Repair

If parts become corroded, they are to be cleaned with rifle-bore cleaner and crocus cloth. Remove burs from the blade and any other part with crocus cloth. Parts that have become worn, damaged, or unserviceable are to be replaced with new parts.

92. Installation

a. Firmly secure the contactor latch shunt (fig. 46) to the barrel by means of the screw.

b. Place the latch housing in its proper position, protruding through its opening in the breech guard.

c. Slip the contactor latch spring over the stud.

d. Aline the hole in the contactor latch housing with those in the bosses of the contactor latch clamp of launcher M20 or the bosses cast integral with the barrel of launcher M20B1. Install the two contactor latch pins and secure them with new cotter pins.

Section VII. CONTACT CLAMP

93. Removal

a. Removal of the contact clamp (fig. 47) requires opening the soldered connection of the contact lead wire.

b. Access to the insulating band (under the clamp) and to the insulator sleeve (on the end of the aluminum tube of the contact lead wire) can be obtained for the purpose of inspection, by removing the clamp securing screw, nut, and lock washer from the clamp, and spread the clamp to free the band.

94. Inspection

See that springs are soldered securely to clamp. Coils of springs should be tight, in order to hold the wire from the rocket firmly. Check insulating band for breaks or cracks. Check the contact

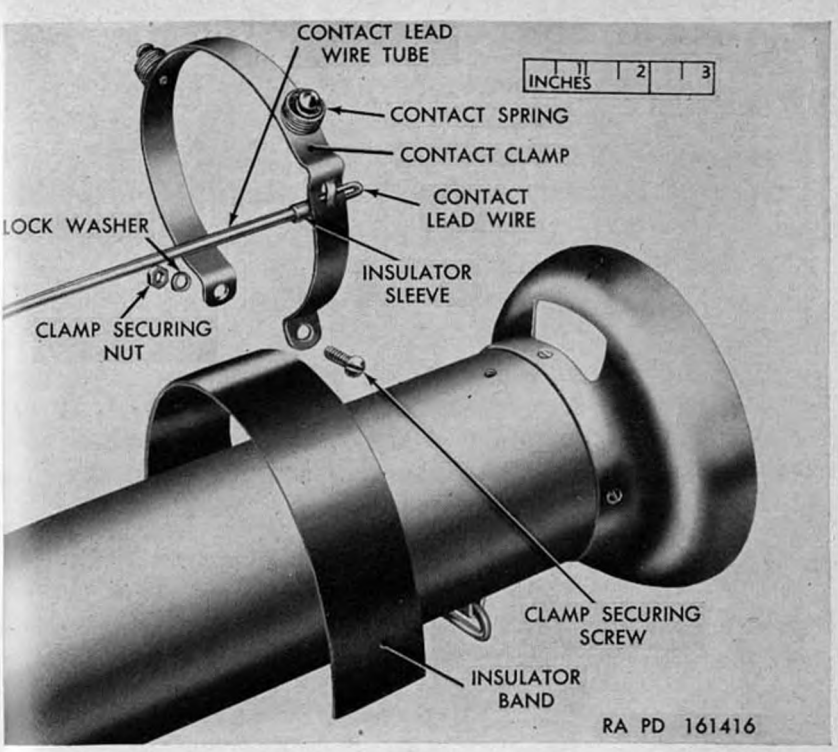


Figure 47. Contact clamp and insulating band.

springs for breaks and corrosion. The clamp should be checked for bends to insure positioning over the contact lead wire tube.

95. Repair

Remove the rust from corroded parts with rifle-bore cleaner and crocus cloth. If the contact springs are broken or if the clamp is deformed, the clamp assembly should be replaced. If springs are loose, they may be soldered. Coat the contact springs with light oil. Replace insulating band if necessary.

96. Installation

To install the contact clamp (fig. 47), wrap the insulating band around the barrel and pull the clamp over it in its proper position. See that the clamp is approximately centered on the insulating band. Make sure the clamp is faced around, so that the small loop fits over the insulator sleeve on the aluminum tube of the contact lead wire. Be sure that the insulator sleeve completely separates the clamp from the tube of the contact lead wire. Install the screw, nut, and lock washer in the clamp and tighten them.

Section VIII. CONTACT LEAD WIRE ASSEMBLY

97. Removal

a. Remove the stock assembly (par. 83).

b. Heat the soldered connection at the contact clamp until the solder becomes soft, and pull the wire away from the clamp.

c. Remove the contact clamp (par. 93).

d. Remove the grips from the electrical firing mechanism (par. 46).

e. Heat the soldered connection at the electrical firing mechanism until the solder becomes soft, and pull the wires apart. If contact lead wire is provided with a terminal, free the lead wire from the firing mechanism by unscrewing the terminal screw (fig. 28).

98. Inspection

Examine the wire for corrosion and cracks in the insulation. Check the tube to see that it is not dented.

99. Repair

If the contact lead wire is corroded or damaged, it is to be replaced as a unit.

100. Installation

a. Place the contact lead wire in position against the barrel and install stock assembly (par. 88) and contact clamp (par. 96).

b. Solder one end of the contact lead wire to contact clamp and the other end to the lead from the electrical firing mechanism. If the lead wire is provided with a terminal, secure to firing mechanism by means of the terminal screw (fig. 28).

c. Install grips on electrical firing mechanism (par. 48).

Section IX. BARREL LATCH ASSEMBLY

101. Disassembly

For disassembly see paragraph 53*b*.

102. Inspection

Refer to paragraph 54*b* for maintenance instructions.

103. Repair

If the barrel latch springs become worn or broken, replace with new parts.

104. Assembly

Refer to paragraph 55*b* for assembly procedure.

Section X. BARREL COUPLING LOCK

105. Disassembly

For disassembly, see paragraph 53*c*.

106. Inspection

Inspect the coupling lock screw for burs, deformation, or stripping. Check the coupling lock spring for weakness or fracture. Steel parts must be inspected for rusting. See that threads of tapped hole for coupling lock screw are not stripped.

107. Repair

Remove corrosion from steel parts with rifle-bore cleaner and crocus cloth. If any parts of the barrel coupling locks are worn, damaged, or defective, replace with new or serviceable parts.

108. Assembly

Refer to paragraph 55*a* for assembly procedure.

Section XI. BIPOD ASSEMBLY

109. Removal

If the bipod is not wanted on the weapon, modify the monopod (par. 84) and remove the bipod as follows:

a. Continuous Ring Type (3.5-inch Rocket Launcher M20).

(1) Remove the stop, the barrel latch strike, and muzzle deflector by removing the screws.

(2) Slip the rings off the barrel over the front end.

Note. If the bipod is not wanted on the weapon, install the stops, barrel latch strike, and muzzle flash deflector. Fasten these parts with No. 6 (0.138) x 0.173 screws and secure screws by staking. Discard the bipod assembly in accordance with SR 735–150–1. Modify the monopod (par. 84).

b. Split Ring Type (3.5-inch Rocket Launcher M20B1).

(1) File off end and drive out the rivet (fig. 48) that pins the clamping spring and adjuster to upper yoke of rear split ring.

(2) Unscrew the socket-head screw and safety nut which fasten the upper yoke and lower yoke of the front ring together and remove the bipod assembly.

Note. The weapon may be issued without installing the bipod. In this case, discard the bipod assembly in accordance with SR 735–150–1.

110. Disassembly

a. Bipod Legs. Partially extend the bipod and remove the upper and lower leg shoulder screws (fig. 48); then remove the bipod legs.

b. Bipod Leg Lock Buttons (fig. 49).

(1) Unscrew each set screw which retains each leg lock button.

(2) Withdraw the springs and leg lock buttons.

c. Bipod Trip (fig. 50).

(1) Remove one of the cotter pins and pull the trip pin toward the opposite side, far enough to free one side of the trip.

Caution: Do not let the trip spring fly out.

(2) Pull the free side away from the trip pin and remove the spring.

(3) Remove the other cotter pin and pull the trip pin in the other direction to free the trip. Be careful, again, not to let the trip spring fly out. Remove the trip spring.

(4) There is not enough clearance to withdraw the trip pin from the slide. To remove the trip pin, it is necessary to remove the two mounting screws fastening the slide to the bipod front ring. Move the front ring forward on the barrel until it is out of the way, and withdraw the trip pin from the slide.

d. Bipod Rear Ring Lock (Continuous Ring Type) (fig. 51).

(1) Release the lock (par. 19*b*) and unscrew the lock stud.

(2) Removing the lock stud frees the lock handle, and lifting the lock handle from the rear ring frees the lock spring and block so that they can be withdrawn from the rear ring.

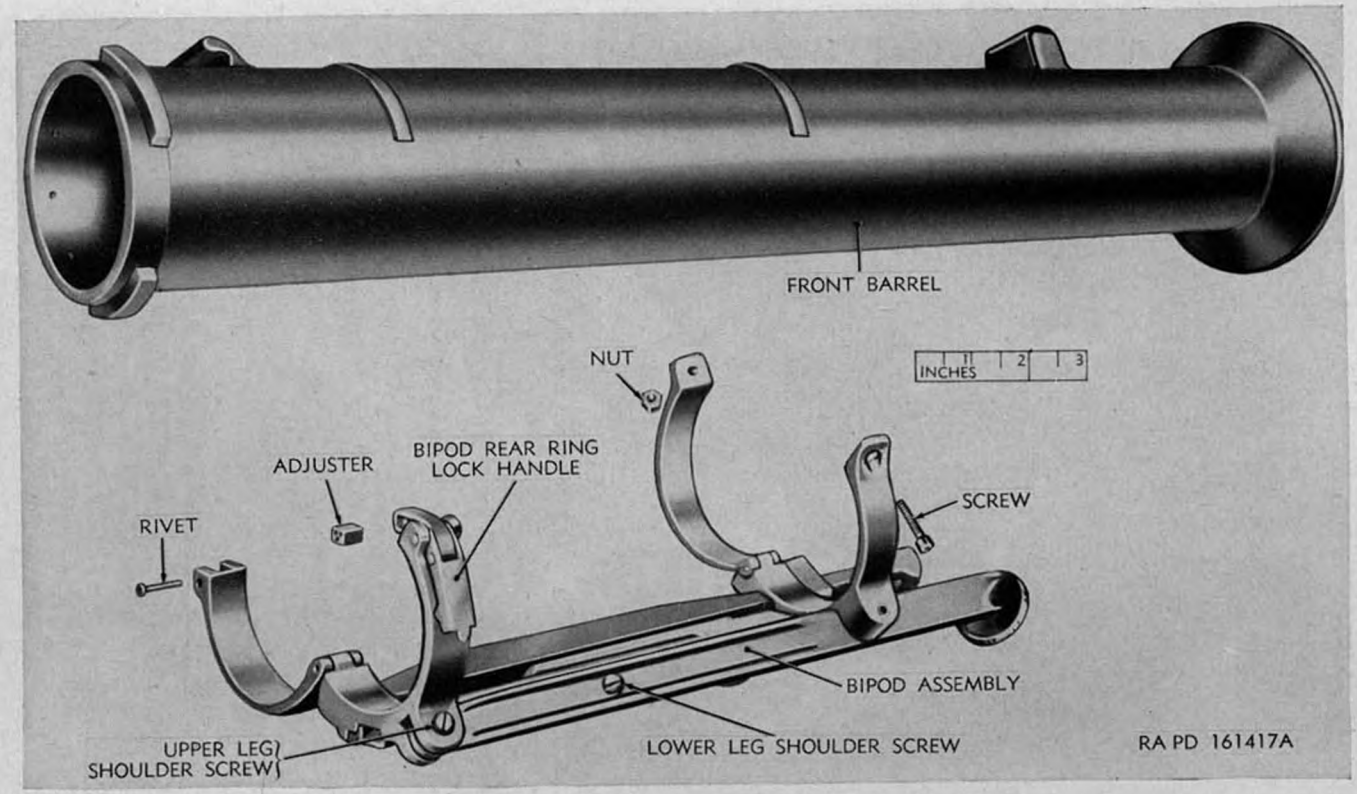


Figure 48. Bipod removed from front barrel of launcher M20B1.

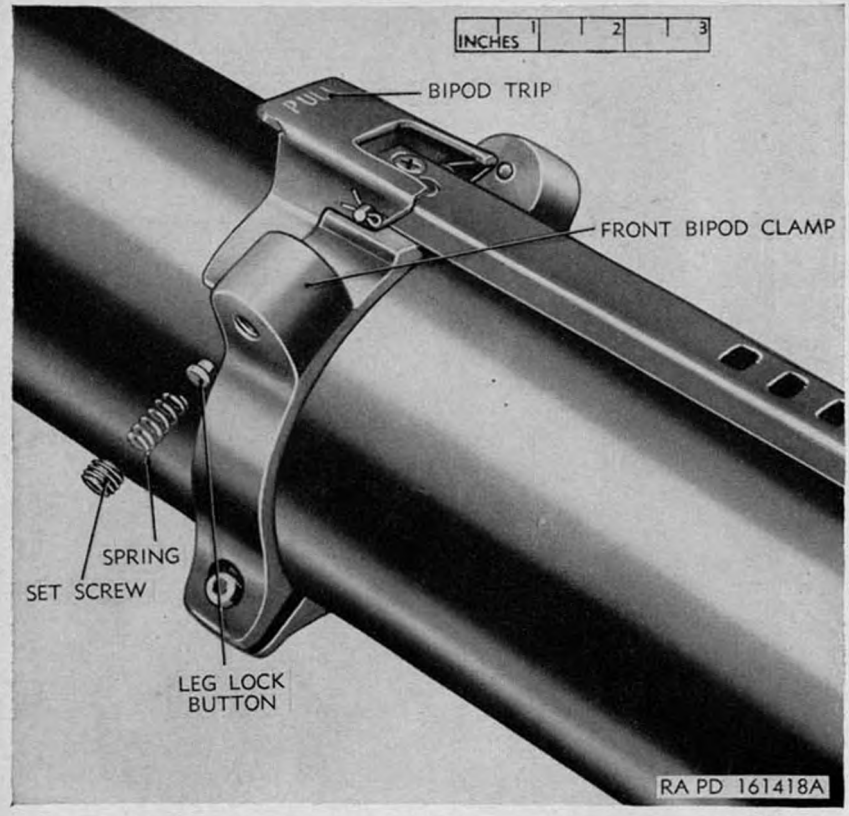


Figure 49. Leg lock button parts—exploded view.

e. Bipod Slide Block Catch (fig. 52).

(1) Release bipod slide block catch from notch in bipod slide.

(2) Remove the cotter pin and withdraw the bipod catch pin. This action will free the bipod slide block catch and spring.

111. Inspection

Inspect for weak or broken leg lock button springs and bipod trip springs. Check for wear of the bipod trip pin and cotter pins and for deformed bipod trip. The bipod rear ring lock spring must be inspected to insure that it is not cracked or misformed. Inspect the slide block catch at the point where it pivots on the catch pin, to be sure the catch is not unserviceable by being cracked. Be sure that the lip of the catch has not worn to the extent that it will not positively engage the bipod slide.

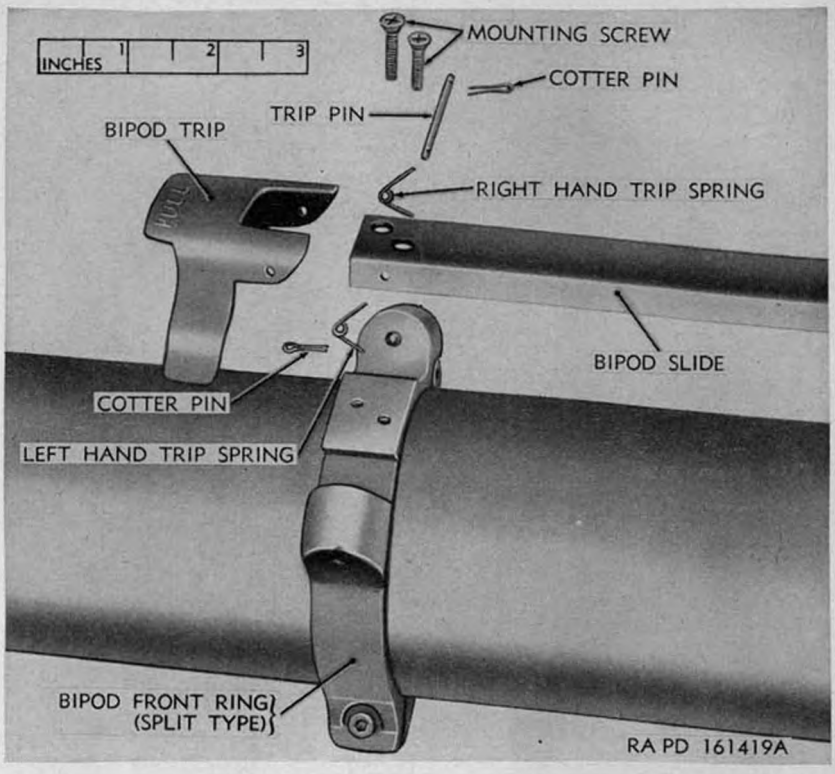


Figure 50. Bipod trip parts—exploded view.

112. Repair

If the bipod leg lock buttons fail to lock bipod in folded position, replace springs. When the bipod trip does not return to position after use, it will be necessary to replace the two bipod trip springs. If the bipod rear ring lock fails to hold the bipod on to the front barrel, replace spring. If the bipod slide block catch fails to hold the bipod in extended position, replace catch spring.

113. Assembly

a. Bipod Leg Lock Buttons (fig. 49).

(1) Install the leg lock button in its recess with spherical end first.

(2) Insert a spring behind each of the leg lock buttons.

(3) Screw the retaining set screw in place and tighten it. The end of the tapped thread provides a stop, so that tightening the screw will lock it in place.

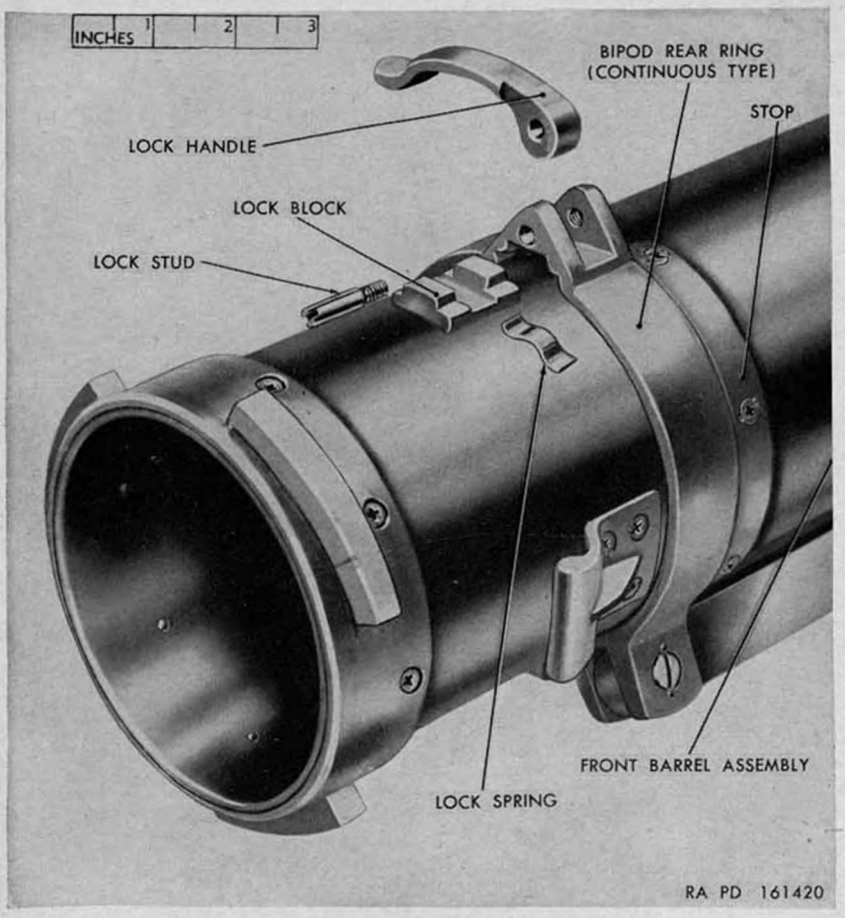


Figure 51. Rear ring lock parts—exploded view.

b. Bipod Trip (fig. 50).

(1) Insert the trip pin in its hole in the slide, return the bipod front ring to its proper position on the front barrel, and install the two mounting screws which fasten the slide to the bipod front ring.

(2) Pull the trip pin to one side until approximately one-quarter inch is left protruding from the slide. Fit the new trip spring on the pin. Be sure the proper spring is selected.

Note. The trip springs are wound right hand and left hand. Properly installed, the outer arm of each spring engages the trip, while the inner arm of each spring engages the bipod front ring.

(3) Place the trip over the end of the slide, so that one side is in position to receive the trip pin.

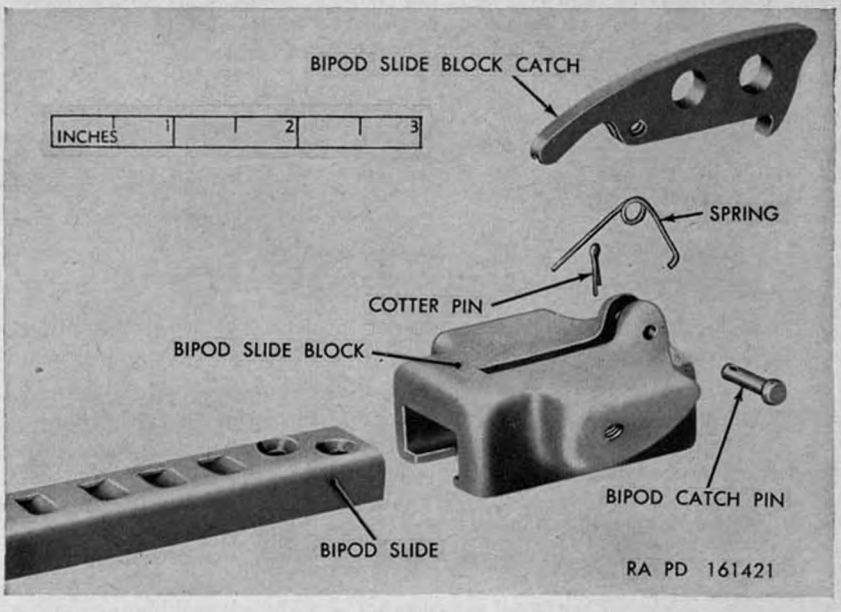


Figure 52. Bipod slide block catch—exploded view.

(4) Push the trip pin through to the other side, until only one-quarter inch of the end protrudes from the slide. Slip the other trip spring on the pin.

(5) Push the trip up in position to receive the other end of pin. Withdraw the pin, as required, to afford clearance for the trip to be pushed into place.

(6) Push the trip pin through into its proper position and install two new cotter pins.

c. Bipod Rear Ring Lock (fig. 51).

(1) Place the lock spring in its groove in the lock block. The spring should lie arch up.

(2) Face the lock block so that its groove is parallel to face of the rear ring, and slide the block (with the spring) into the rectangular opening at the top of the ring.

(3) Hold the lock handle vertically over the bipod rear ring with its hole end down, facing so that its main curvature is to the right of the front barrel. Insert the lower end of the handle between the ears, at the top of the rear ring. It may be necessary to shift the block slightly to fit the handle in its groove.

d. Bipod Slide Block Catch (fig. 52). Place the catch spring in the catch, so that the long arm of the spring fits in the slot of the catch at the lever end. Place the catch (with spring) in position

on the slide block so that the holes aline. Install the catch pin and secure with a new cotter pin.

e. Bipod Legs. Aline the bipod legs and install the upper and lower leg shoulder screws (fig. 48).

114. Installation

a. Continuous Ring Type.

(1) Slip the rings over the front barrel.

(2) Install the stops, the barrel latch strike, and the muzzle deflector by screwing them into place.

Note. In removing the staked screw 7313443 (early manufacture launchers M20), which secures the stops, barrel latch strike, and muzzle deflector, the threaded hole in the barrel may have been stripped. Before installing parts, retap stripped holes with a No. 8 (0.164)–32NC–2 tap. Use screw 7313448 for securing parts to barrel. For launcher M20 (present manufacture), screw 731-3448 may be replaced by screw 7142635 when the same stripping condition exists.

Note. When securing detachable parts to the aluminum barrel by means of steel screws, do not exert excessive pressure, since the aluminum threads are easily stripped.

b. Split Ring Type.

(1) Properly locate front barrel in the rings.

(2) Install the socket-head screw and safety nut to fasten the upper yoke to the lower yoke of the front ring. Loosen screw one-third to one-half turn from clamping position, to allow for free bipod rotation when bipod rear ring lock handle is unlatched.

(3) Place adjuster in loop at free end of clamping springs. With bipod rear ring lock handle in unlatched position, aline the hole of the upper yoke with one hole in the adjuster, and insert a new rivet. Move the bipod rear ring lock handle to latched position. If the ring fails to grip the barrel, select another hole of the adjuster which, by trial, provides a strong grasp when clamped to the barrel, but which permits easy manipulation of the handle. Upset the end of the rivet.

Section XII. FRONT AND REAR BARREL GROUPS

115. Disassembly

Disassembly of the front and rear barrels is covered in paragraph 53*a*.

116. Inspection

Barrels will be inspected for unpainted surfaces and dents. The 6-inch improvised plug gage (fig. 53) should pass freely through the tube when the front and rear barrels are assembled in the three possible positions. The 20-inch improvised plug gage should pass freely through each front and rear tube.

Note. Plug gaging and bore sighting are required whenever barrels are changed.

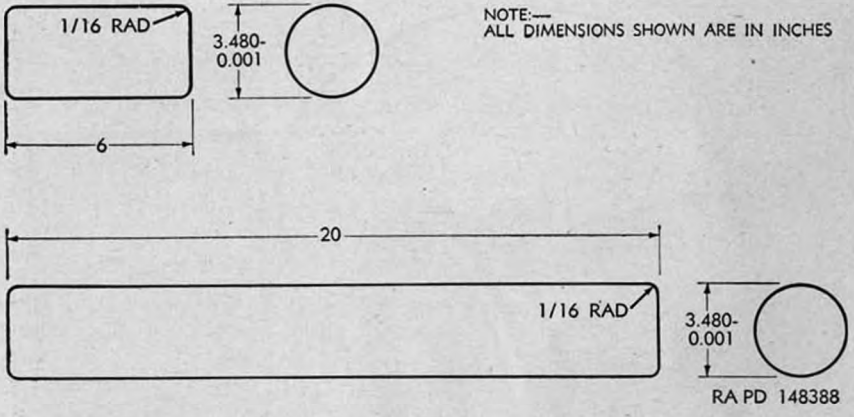


Figure 53. Improvised plug gages.

117. Repair

a. Parts of the launcher from which paint has worn off will be repainted in accordance with TM 9–2851. Purpose of such painting is to prevent light reflection from worn spots which may become shiny. The application of paint is strictly limited to the damaged area and no paint is to be applied to other parts of the launcher.

Note. Do not paint contact springs, contact surfaces of contactor latch housing, or the sight assembly. Polished parts or moving parts where wear occurs and where functioning may be effected by the application of paint will not be painted.

b. The muzzle deflectors of front barrels must have score marks on the rim spaced 90 degrees apart. These notches are used for locating cross hairs for bore sighting by organizational personnel. When these notches are missing, they must be added by ordnance maintenance personnel on the vertical and horizontal axes of the launcher.

118. Assembly

Assembly of the front and rear barrels is covered in paragraph 55*c*.

119. Testing Electrical Circuit of Completely Assembled Rocket Launcher

a. Clip one wire lead of tester to blade of contactor latch housing. Clip the other wire lead of tester to contact spring stud (fig. 54), located near the rear of tube.

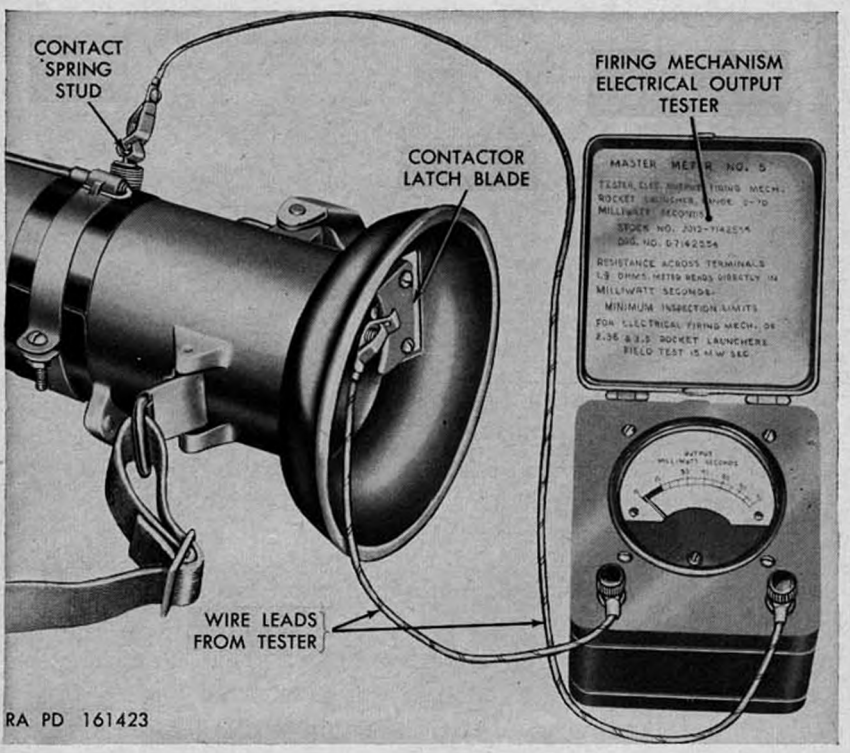


Figure 54. Testing electrical circuit of completely assembled rocket launcher.

b. Operate firing mechanism 7140325 by squeezing trigger. This firing mechanism has a power output of 45- to 65-milliwatt seconds. It is important to avoid quickly repeated operation of trigger, in order to prevent damage to the thermocouple on the tester. Pause at least 10 seconds between trigger operations.

c. Operate firing mechanism 7313326 by squeezing trigger. Do not release the trigger at once. Permit indicating needle of the tester to travel to its maximum register on the scale before releasing the trigger.

d. Note maximum reading on tester.

e. If the electrical output of the firing mechanism measures less than the requirement for serviceability, test the firing mechanism directly (excluding the electrical circuit of the launcher) (par. 79 or 82). If the test shows that the firing mechanism is unserviceable, replace the firing mechanism. Follow instructions in paragraph 81 when installing a serviceable firing mechanism.

f. If the firing mechanism proves to be serviceable, but the test of the electrical circuit of the completely assembled launcher (*a* through *c* above) shows an inadequate electrical output, some part of the electrical circuit of the launcher is defective. Perform the trouble shooting procedures in (1) through (4) below.

(1) Inspect the wiring. Look especially for damaged insulation.

(2) Determine by inspection that the contact clamp is positioned properly on the insulating band and that the insulating band is not damaged. Inspect the insulator sleeve, on the end of the aluminum tube of the contact lead wire assembly, to determine that it completely separates the contact clamp from the aluminum tube and that the insulator sleeve is not damaged.

(3) Inspect the contactor latch housing. Be sure that both ends of the shunt of the contactor latch housing are fastened securely, in order to insure good grounding of the latch housing. Inspect the blade at rear of contactor latch housing. It must be clean and free of oil film.

(4) Also, inspect the contactor latch spring and the contact springs. The contact springs must be clean and free of lubricant and corrosion. Replace the contactor latch spring, if found defective (par. 89). Replace the rear barrel contact clamp, if either contact spring is found to be defective.

Section XIII. FINAL INSPECTION

120. Final Inspection

When inspection and repair of the launcher at the depot or field maintenance station is finished, it should pass through a final inspection. At this point, the repaired portions of the launcher should be tested and a general inspection be applied as outlined in paragraph 70.

121. Field Maintenance Repair Standards

a. Bore. The bores of the launchers M20 and M20B1 are to be gaged with a plug gage. The 6-inch improvised plug gage (fig. 53) must pass freely through the tubes when they are assembled in the three possible positions. If the gage fits tightly, or if it fails to pass through the length of the tube freely, the launcher must be removed from service.

b. Electrical Firing Mechanism. The minimum requirement for firing mechanism 7313326 to be serviceable is 15-milliwatt seconds. The minimum requirement for firing mechanism 7140325 to be serviceable is 40-milliwatt seconds for a rebuilt weapon or a weapon in the field and from 50- to 65-milliwatt seconds for new manufacture. Failure to deliver this minimum output necessitates replacement of the firing mechanism. Firing mechanism 7140325 must show no impulse on the electrical output tester when the trigger is released. Both firing mechanisms must operate smoothly when completely assembled to launcher (with the grips installed).

CHAPTER 5

AMMUNITION FOR 3.5-INCH ROCKET LAUNCHERS M20 AND M20B1

122. General

Ammunition for the 3.5-inch rocket launchers M20, M20 modified, and M20B1 is issued in the form of complete rounds of fixed ammunition (figs. 55 and 56). The term "fixed," used in conjunction with ammunition, signifies that the propelling charge is fixed (not adjustable) and that the round is loaded into the launcher as a unit. The complete round consists of a rocket head, a fuze, and a rocket motor which contains the propellant and its igniter. A nozzle and fin assembly is rigidly attached to the rear of the motor. The fuze body, threaded at both ends, serves also as a coupling for the rocket head and motor.

123. Classification

Ammunition for these rocket launchers consists of the following types which are classified according to the rocket head as high-explosive antitank (HE, AT), smoke (WP), and practice. The same motor is used for all types.

a. The head of the high-explosive antitank rocket is thin-walled and contains a shaped charge of high explosive especially designed for penetration of armored targets.

b. The head of the smoke (WP) rocket is approximately of the same size, shape, and weight as the HE, AT head and contains a white phosphorus filler. The smoke rocket functions on impact to produce a spray of white phosphorus particles which ignite spontaneously on contact with air to produce a dense white smoke.

c. The head of the practice rocket, which is used for training purposes, is completely inert. It is of the same size and shape as the HE, AT head, but slightly heavier. However, the practice fuze is correspondingly lighter than the service fuze, hence the practice head and practice fuze are of the same weight as the HE, AT head and service fuze.

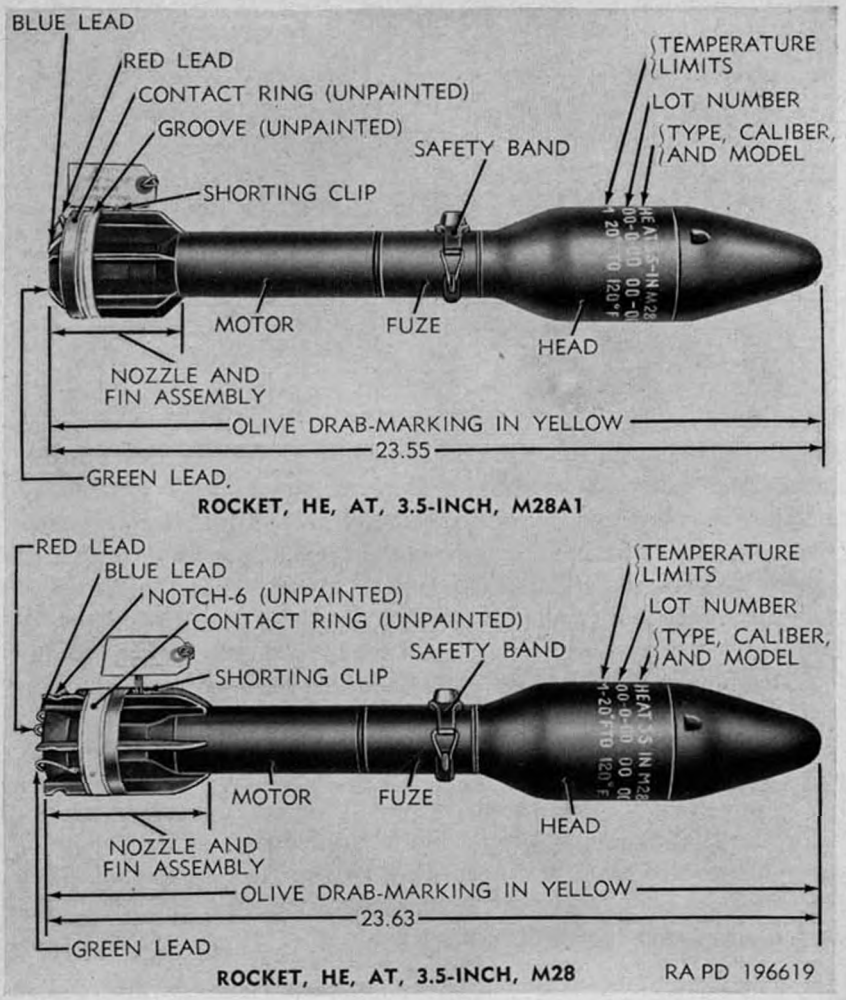


Figure 55. 3.5-Inch rockets M28 and M28A1.

124. Identification

a. General. Ammunition and ammunition components are completely identified by the painting and marking (including an ammunition lot number) on the ammunition items (fig. 56) and on all original packing containers.

b. Model. To identify a particular design, a model designation is assigned at the time the item is classified as an adopted type. This model designation becomes an essential part of the standard nomenclature and is included in the marking on the item. The present system of model designation for a standard item consists of the letter "M" followed by an Arabic numeral, for example,

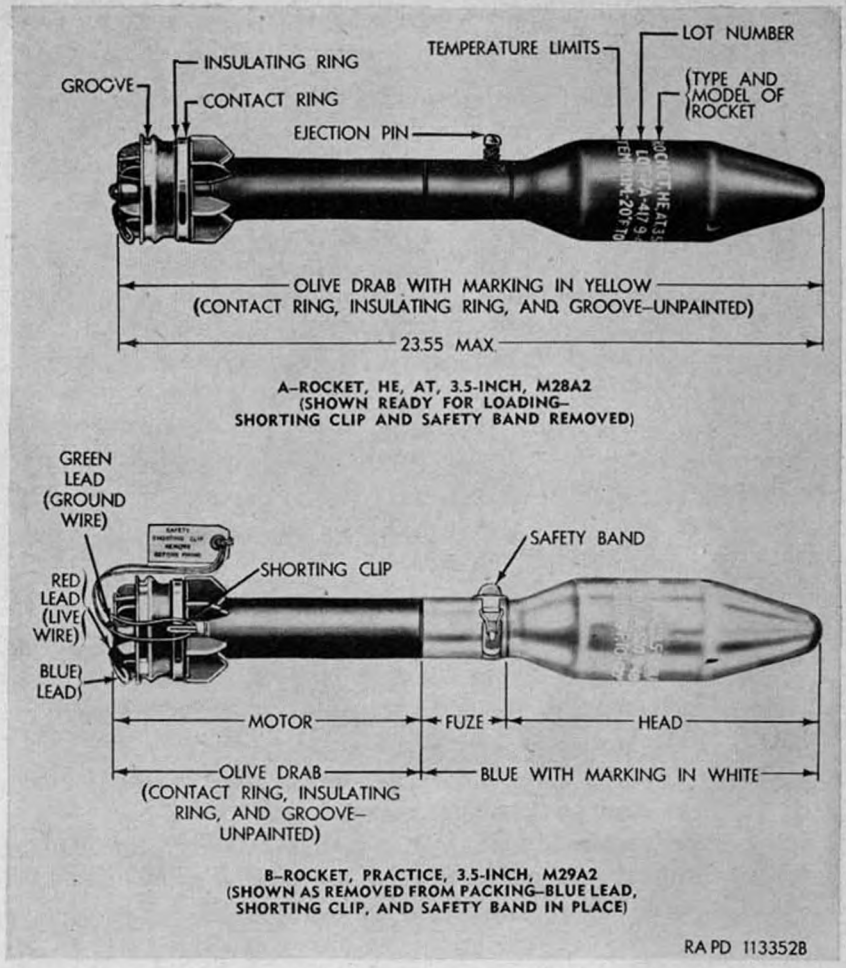


Figure 56. 3.5-Inch rockets M28A2 and M29A2.

"M1." Modifications are indicated by adding the letter "A" and the appropriate Arabic numeral. Thus, "M100A1" indicates the first modification of an item for which the original designation was "M100."

c. Ammunition Lot Number. When ammunition is manufactured, an ammunition lot number, which becomes an essential part of the marking, is assigned in accordance with pertinent specifications. This lot number is stamped or marked on every loaded complete round and on all packing containers. It is required for all purposes of record, including reports on condition, functioning, or accidents in which the ammunition may be involved. In any one lot of ammunition, the components used in the assembly are manufactured under as nearly identical conditions as practicable. To

obtain the greatest accuracy when firing, successive rounds should consist of one ammunition lot whenever practicable.

d. Painting. Rocket ammunition is painted primarily to prevent rust and to provide, by the color, a ready means of identification as to type. Lusterless paint is used to meet requirements for camouflage. The color scheme is as follows:

ROCKET HEAD:
- HE, AT——Olive drab, marking in yellow.
- Smoke (WP)——Gray, marking and 1 band all in yellow.
- Practice——Blue, marking in white.

FUZE:
- HE, AT——Olive drab.
- Smoke (WP)——Olive drab.
- Practice——Blue.

MOTOR:
- HE, AT——Olive drab.
- Smoke (WP)——Olive drab.
- Practice——Olive drab.

e. Marking. Standard markings are stenciled on the rocket (fig. 56) in the appropriate color in accordance with the color scheme described in *d* above. These markings include the following:

(1) *On the rocket head (stenciled unless otherwise indicated).*
- Type, size, and model of rocket.
- Ammunition lot number, which consists of the loader's initials or symbol and the loader's lot number and the date (month and year) of loading.
- Temperature limitations within which it is safe to fire the rocket.
- The metal parts lot number and date (month and year) of manufacture of the head assembly is stamped in the metal on the union assembly.

(2) *On the fuze (stamped in the metal).*
- Fuze nomenclature.
- Loader's lot number and date (month and year) loaded.

(3) *On the motor (stenciled).*
- Metal parts lot number.
- Date (month and year) of manufacture.

125. Care, Handling, and Preservation

Warning: Explosive ammunition or components containing explosives must be handled with appropriate care at all times. The explosive elements in igniters and fuzes are particularly sensitive

to undue shock and high temperature. Boxes containing ammunition should not be dropped, thrown, tumbled, or dragged.

a. Ammunition is packed to withstand conditions ordinarily encountered in the field. Care must be observed to keep packings from becoming broken or damaged. All broken packings must be repaired immediately and careful attention given to the transfer of all marking to the new parts.

b. When it is necessary to leave ammunition in the open, raise it on dunnage at least 6 inches from the ground and cover it with a double thickness of paulin, leaving enough space for the circulation of air. Where practicable, dunnage strips should be placed under each layer of boxes and other ammunition components. Suitable trenches should be dug to prevent water from running under the pile.

c. Since explosives are adversely affected by moisture and high temperature, due consideration should be given to the following:

(1) Do not break the moisture-resistant seals until ammunition is to be used. Ammunition removed from airtight containers, particularly in damp climates, is apt to corrode, thereby rendering the ammunition unserviceable.

(2) Protect ammunition from high temperature and direct rays of the sun. Rockets should never be stored where the temperature may exceed 120° F. More uniform firing is obtained if the rounds are at the same temperature.

(3) Do not attempt to disassemble any rocket.

(4) Rockets should be free of foreign matter, sand, mud, moisture, frost, snow, ice, or grease. If rounds become dirty or wet, they should be wiped off at once with a clean, dry, wiping cloth.

(5) In handling and storage, complete rounds should at all times be kept pointed in the direction that would result in the least damage should the propellant be accidentally ignited.

(6) Rockets prepared for firing, but not fired, will be returned to their original condition and packings and will be appropriately marked. Such ammunition will be used first in subsequent firings in order that stocks of opened packages may be kept at a minimum.

(7) Do not handle duds. Because their fuzes may be armed, duds are extremely dangerous. They will not be moved or touched but will be destroyed in place in accordance with TM 9–1900.

126. Authorized Rounds

Ammunition authorized for use in the 3.5-inch rocket launchers M20, M20 modified, and M20B1 is listed in table V. Standard nomenclature, which is used in the listing, completely identifies the ammunition except for ammunition lot number.

a. Rocket Head.

(1) The head of the HE, AT rockets M28, M28A1, and M28A2 consists of a thin gage steel body cylindrical in shape and tapered at the rear. The cylindrical portion is 3.5 inches in diameter; the rear of the tapered portion, approximately 2 inches. The body contains a shaped charge of 1.93 pounds of COMP B held in place by a thin gage metal cone. The forward end of the body is closed by a thin gage metal ogive. The weight of the complete head is approximately 4.5 pounds.

(2) The heads of the smoke (WP) rocket T127E2 and T127E3 are approximately of the same size, shape, and weight as the HE, AT head and contain a white phosphorus filler.

(3) The head of the practice rockets M29, M29A1, and M29A2 consists of a hollow cast iron body of the same external dimensions as the HE, AT head. The forward end is closed by a thin gage metal ogive similar to that fitted to the HE, AT head. The weight of the complete head is approximately 4.65 pounds; the weight of the cast iron body compensating for the absence of a filler. An alternative head consists of the metal parts of the HE, AT rocket head and an inert filler to bring the weight up to that of cast iron practice head.

Table V. Authorized Ammunition

Standard nomenclature of complete round	Complete round		Rocket head			Rocket motor			Fuze	
	Length (in)	Weight (lb)	Type of filler	Kind of filler	Weight of filler	Model of igniter	Model of propellent	Weight of propellent (lb)	Standard nomenclature	Action
ROCKET, HE, AT, 3.5-in, M28 (T80E2).	23.55	8.90	HE	COMP B	1.93	M20 (T18)	M7	0.36	FUZE, rocket, BD, M404 (T160E6).	Nondelay
ROCKET, HE, AT, 3.5-in, M28A1.	23.55	8.90	HE	COMP B	1.93	M20 (T18)	M7	0.36	FUZE, rocket, BD, M404 (T160E6).	Nondelay
ROCKET, HE, AT, 3.5-in, M28A2.	23.55	8.90	HE	COMP B	1.93	M20 (T18)	M7	0.36	FUZE, rocket, BD, M404 (T160E6).	Nondelay
ROCKET, smoke, WP, 3.5-in, T127E2 and T127E3.	23.55	8.90	Smoke	WP	------	M20 (T18)	M7	0.36	FUZE, rocket, BD, T2015E2.	Nondelay
ROCKET, practice, 3.5-in, M29 (T85E2).	23.55	8.90	None*	None*	------	M20 (T18)	M7	0.36	FUZE, rocket, dummy, M405 (T2008E2).	Inert
ROCKET, practice, 3.5-in, M29A1.	23.55	8.90	None*	None*	------	M20 (T18)	M7	0.36	FUZE, rocket, dummy, M405 (T2008E2).	Inert
ROCKET, practice, 3.5-in, M29A2.	23.55	8.90	None*	None*	------	M20 (T18)	M7	0.36	FUZE, rocket, dummy, M405 (T2008E2).	Inert

* Head consists of cast iron body with steel ogive and no filler. An alternative head consists of steel body and ogive, inert loaded to weight.

b. Motor Assembly.

(1) *Description.* The rocket motor assembly, shown in figure 56, consists of the propellant and igniter housed in a heat-treated, alloy-steel, high strength tube to which the nozzle and fin assembly is securely attached. The front end of the tube is assembled to the base of the fuze; the rear end is constricted to form a nozzle. The cylindrical motor cavity is divided into four sections by spacer plates, which support the grains of propellent powder. The rear ends of the spacer plates rest against the trap. The fin assembly consists of an aluminum-alloy expansion cone, three pairs of aluminum-alloy fins (six fins), and a contact ring assembly. The contact ring assembly, which encircles the fin, consists of three concentric rings: an aluminum-alloy support ring, a laminated plastic insulating ring, and a copper contact ring. The support ring, which is innermost, is 1.78 inches wide and has a 360-degree groove near the rear end for engagement with the detent of the launcher to complete the electrical circuit. The contact ring is mounted on the forward end of the support ring but insulated from it by the insulating ring. The same motor assembly is used with the HE, AT, smoke (WP), and practice rocket. There are differences in the motors assembled to rockets of different modifications. The principal differences are in the trap, fin, and contact ring assembly. The trap in rockets M28 and M29 is a cast steel grid, whereas in the later modifications, it is a steel disk with drilled holes. Each of the blades of the fin (M28 and M29 models) are notched to receive the contactor latch blade of the launcher to complete the electrical circuit.

(2) *Propellent.* The propelling charge consists of 12 grains of M7 propellent. Each grain is 5 inches long and approximately $\frac{3}{8}$ inch in diameter and weighs 0.03 pound. Three grains are placed in each of the four sections (a total of 12 grains of propellent weighing 0.36 lb) formed by the spacer plates. Each lot of propellent is adjusted at the time of manufacture to give standard velocity. Since the rate of burning increases with the initial temperature, it is important not to fire rockets at temperatures beyond the limits marked on each rocket. Firing at temperatures below the minimum (—20° F.) will give erratic ranges and excessive back blast of powder particles; firing at temperatures above the maximum (+120° F.) will cause dangerous pressures to build up

within the motor. The propellant is ignited by the igniter M20 ((3) below).

(3) *Igniter and leads.* The IGNITER, M20 (T18), which consists of a short, cylindrical, plastic case containing a 3-gram black powder charge and SQUIB, electric, M1, is assembled in the forward end of the motor on top of the propellent spacer plates. The leads of the electric squib, running parallel to the grains of propellant, pass from the igniter through the nozzle closure into the expansion cone. The green lead (ground wire) is connected to the support ring of the contact ring assembly. The red lead (live wire) is connected to the contact ring by a tubular rivet which passes through but is insulated from the support ring. These connections are positioned 180 degrees apart. The blue lead ("pigtail") is actually an extension of the red lead (live wire) (fig. 56) and, as such, has one end connected to the same terminal as the red lead. The free end of the blue lead is connected to one of the contact springs on the launcher contact spring clamp at the time of loading. The blue lead is coiled and placed in the expansion cone during shipment and is held in this position by a piece of adhesive tape. The free end of the pigtail is stripped and then covered with a piece of plastic tubing which insulates the stripped end during handling and shipping. This insulating tubing is removed prior to connecting the blue lead to the contact spring.

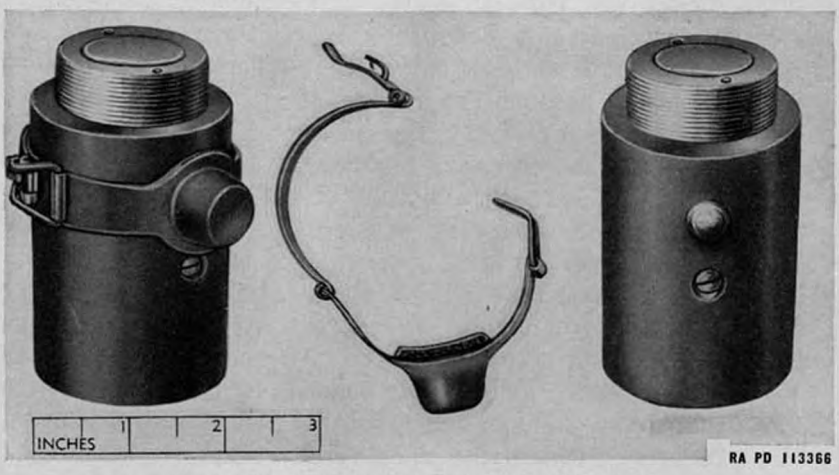


Figure 57. Fuze, rocket, BD, M404 (T160E6).

c. Fuze, Rocket, BD, M404 (T160E6).

(1) *Description.* This base detonating fuze (figs. 56 and 57) is of the simple inertia type, which functions with nondelay action upon impact. The fuze body and safety band are olive drab; the fuze nomenclature, the loader's lot number, and the month and year of loading are stamped into the metal. An ejection pin, which passes through the fuze body and prevents movement of the internal parts, is provided to preclude accidental functioning during shipping, handling, and firing. An additional safety feature is provided by the safety band, which prevents the ejection pin from moving during shipping and handling. The safety band is not removed from the fuze until the rocket is to be loaded into the launcher. The fuze mechanism consists of a plunger, an actuating sleeve, a firing pin, a setback sleeve, a creep spring, a stop pin, and a lock pin. The explosive train includes a detonator and booster.

(2) *Functioning.* When the safety band is removed, the ejection pin moves outward approximately three-eighths of an inch but still prevents all parts of the fuze mechanism from moving. When the rocket is in the firing chamber, the ejection pin is partially depressed by the chamber, thereby, freeing the setback sleeve so that it can move on setback. It should be noted that, in this condition the fuze is still safe, since the ejection pin prevents movement of the actuating sleeve and firing pin. If it becomes necessary to remove the rocket from the launcher, the ejection pin will move outward and reengage the setback sleeve, thus returning the fuze to its original safe condition. When the rocket is fired, the force of setback causes the setback sleeve to move rearward against the resistance of the creep spring, partially compressing the spring. The setback sleeve is held in its rearward position by the lock pin. When the rocket leaves the muzzle of the launcher, the ejection pin is thrown clear of the fuze and the fuze is fully armed. During flight, the firing pin lever and firing pin spring prevent the firing pin from striking the detonator and the creep spring retards forward movement of the plunger and actuating sleeve. The action of the creep spring, which is partially loaded, is strong enough to retard the plunger and actuating sleeve and to prevent the fuze from firing should the rocket strike a light object such as light brush or undergrowth. Upon impact

with a more resistant object, the plunger and actuating sleeve move forward until the sleeve hits the firing pin lever, causing the firing pin to strike the detonator and explode the rocket.

d. Fuze, Rocket, BD, T2015E2. This fuze, which is similar in appearance to the M404 fuze (*c* above), is used with ROCKET, smoke, WP, 3.5-inch, T127E2 to function the burster in the WP rocket head.

e. Fuze, Rocket, Dummy, M405 (T2008E2). This fuze, used in the practice rocket, is an inert fuze, which incorporates an ejection pin assembly simulating that used in the BD fuze M404 (T160E6) (*c* above). The body of the fuze and the safety band are painted blue. The fuze nomenclature, the loader's lot number, and the month and year of loading are stamped into the metal.

127. Preparation for Firing

a. Preparation of Rockets. After rockets are removed from their packings, they are prepared for firing as follows:

(1) Remove the shorting clips (fig. 56) from the contact ring assemblies.

(2) Pull the blue lead (figs. 55 and 56) out of the expansion cone, straighten the end of the wire, pull the insulating tube off, and remove the safety band from the fuze.

(3) Set the firing mechanism of the launcher at "SAFE" (par. 13) and insert the rocket in the launcher, being certain the rocket is fully seated so that the contactor latch blade engages the 360-degree groove in the support ring. On the rockets M28 and M29, a notch is provided in each of the six radial fins (fig. 55) to engage the latch. Refer to WARNING in paragraph 23*c*.

(4) Connect the stripped end of the wire to either one of the two contact springs (fig. 19) on the launcher, whichever is more convenient.

b. Rockets Prepared for Firing but not Fired.

(1) Set the launcher at "SAFE."

(2) Disconnect the blue lead from the contact spring.

(3) Disengage the latch from the groove in the support ring and carefully withdraw the rocket from the launcher.

(4) Replace the safety band on the fuze.

(5) Replace the shorting clip on the contact ring assembly.

(6) Replace the insulating tubing over the stripped end of the blue lead, coil the lead, and replace it in the expansion cone. Tape the blue lead to the expansion cone.

(7) Restore the rocket as it was originally packed in the container.

128. Precautions in Firing

a. The following precautions should be closely observed in order to prevent injury to personnel and damage to matériel:

(1) Rockets should be free of foreign matter, such as sand, mud, moisture, frost, snow, ice, or grease. If rockets become dirty or wet, they should be wiped off at once with a clean, dry, wiping cloth.

(2) When firing, especially from wooded areas or other areas containing objects in the line of fire, exercise caution to prevent the rocket from striking branches or other object, which might deflect the rocket or cause it to function prematurely.

(3) Do not drop the muzzle of the launcher immediately after firing, because, in so doing, the rocket may strike the foreground and cause serious injury to personnel.

(4) In firing rockets, consideration should be given to the blast of the flame to the rear. Ammunition and personnel should be kept out of the blast area unless protected by adequate shelter. If practicable, flammable material such as dry vegetation should be cleared from the area before firing. Refer to paragraph 24.

(5) Do not fire rockets at temperatures below —20° or above +120° F. These temperatures are specified as the safe limits for each round. Refer to paragraph 126*b*(2).

(6) Rockets with damaged fins should not be fired, since they are unstable in flight, hence erratic in range and deflection. Be careful when loading rounds into the launcher, in order to prevent damage to the blades of the fin assembly.

(7) Make sure that the contactor latch plate is fitted properly into the unpainted groove or notch of the rocket. Keep the grooves and notches clean to insure good contact with the latch.

(8) Misfires will be handled in accordance with paragraph 26*b*.

(9) If a rocket is in the chamber of a hot launcher and firing is interrupted, the rocket should either be fired or removed promptly from the launcher in order to prevent the possibility of a cook-off.

b. The following additional precautions will be observed in firing rockets in freezing weather:

(1) *General.* Rockets will function normally at any temperature between the temperature limits marked thereon.

However, there are certain precautions which should be observed to insure more reliable functioning when the atmospheric temperature is below 32° F., particularly during rainstorms, snowstorms, or in an atmosphere sufficiently humid to cause icing or frost. When rockets are subjected to temperature fluctuation, which may loosen the nozzle closure, moisture may enter and subsequently form ice or frost within the motor.

(2) *Protect the fuze cavity against the entrance of moisture.* The safety band (fig. 56), which is around the fuze as issued, depresses the ejection pin and seals the fuze against the entrance of moisture. When the band is removed preparatory to firing, the ejection pin moves to the locked position and moisture, if present, can then enter the fuze cavity. Under these conditions, if considerable time elapses between removal of safety band and firing, moisture may have entered the fuze cavity and frozen. This might prevent functioning of the fuze at the target, due to the formation of ice or frost within the fuze. Hence, it is important that the safety band be removed only *just before firing* and that the rocket be kept dry.

(3) *Prevent accumulation of ice or frost on rocket in order to:*

(*a*) *Avoid freezing of rocket to the launcher.* The 3.5-inch rocket develops a powerful thrust when fired. If, after loading, the rocket freezes to the launcher and then is fired, the weapon might be wrenched from the shooter's grasp or the shooter and the weapon might be hurled forward with possible injuries and damage.

(*b*) *Insure accuracy of flight.* Accumulation of ice on the rocket, particularly in such quantities as would appreciably affect its weight, balance, or flow of air through the fin, would have an adverse effect on accuracy of flight and range.

(4) *Use face protection to prevent injury from after-burning of the rocket when firing at low temperatures.* The rockets may be expected to produce some after-burning (irregular burning after the main burning and thrust have ceased) at high temperatures and considerably more at low temperatures. Hence, a face protector or at least goggles for eye protection should be worn by personnel firing these rockets, *especially* at low temperatures.

Caution: Without such protection, face injuries are almost certain to be suffered.

(5) *Check for loose nozzle closures to prevent a "short range" or a "chuffing" rocket.* Wide and frequent temperature fluctuations, especially if during the periods of freezing the temperature falls below 0° F., may cause a failure of the bond between the nozzle closure and the nozzle of the rocket. This nozzle closure is of plastic material and is cemented to the nozzle by a rubber-base adhesive. The security of the closure can be checked before firing, by grasping and gently pulling the red and green ignition wire leads which pass through the closure. A loose closure may result in the rocket's falling short or "chuffing" (intermittent burning with a puffing noise) when fired. Either a short or a chuffing rocket creates a hazard. A chuffing rocket may fall to the ground a short distance from the rocket launcher, smolder, and then resume burning and be propelled in an unpredictable direction. A loose nozzle closure would also permit the entrance of moisture into the motor where it might freeze or wet the propellant and the igniter. A substantial accumulation of ice in the chamber will cause a malfunction.

Caution: Rockets with loose nozzle closures should not be fired, especially if there is evidence of moisture, ice, or frost in the motor.

129. Packing

Rockets of this caliber are packed in individual, hermetically sealed, metal containers, which, in turn, are packed in wooden boxes (fig. 58) in quantities of three containers (three rockets) per wooden box. The box is marked to identify the contents as indicated in figure 58 and, in the case of smoke and practice rockets, stripes in accordance with the basic color scheme are painted on the box. The exterior of the metal containers are painted and marked to indicate the type of rocket contained, that is, olive drab with yellow marking for the HE, AT rockets, gray with markings and 1 band in yellow for the smoke (WP) rockets, and blue with white marking for the practice rockets. The marking on the container includes the AIC symbol, nomenclature of the packed item, and ammunition lot number. The overall dimensions (in) of the packing box are approximately 29⅝ x 14⅛ x 6⅝. The total weight is 53 pounds and its cubical displacement is 1.59 cubic feet. For more complete packing and shipping data, refer to Department of the Army Supply Catalog ORD 3 SNL S–9.

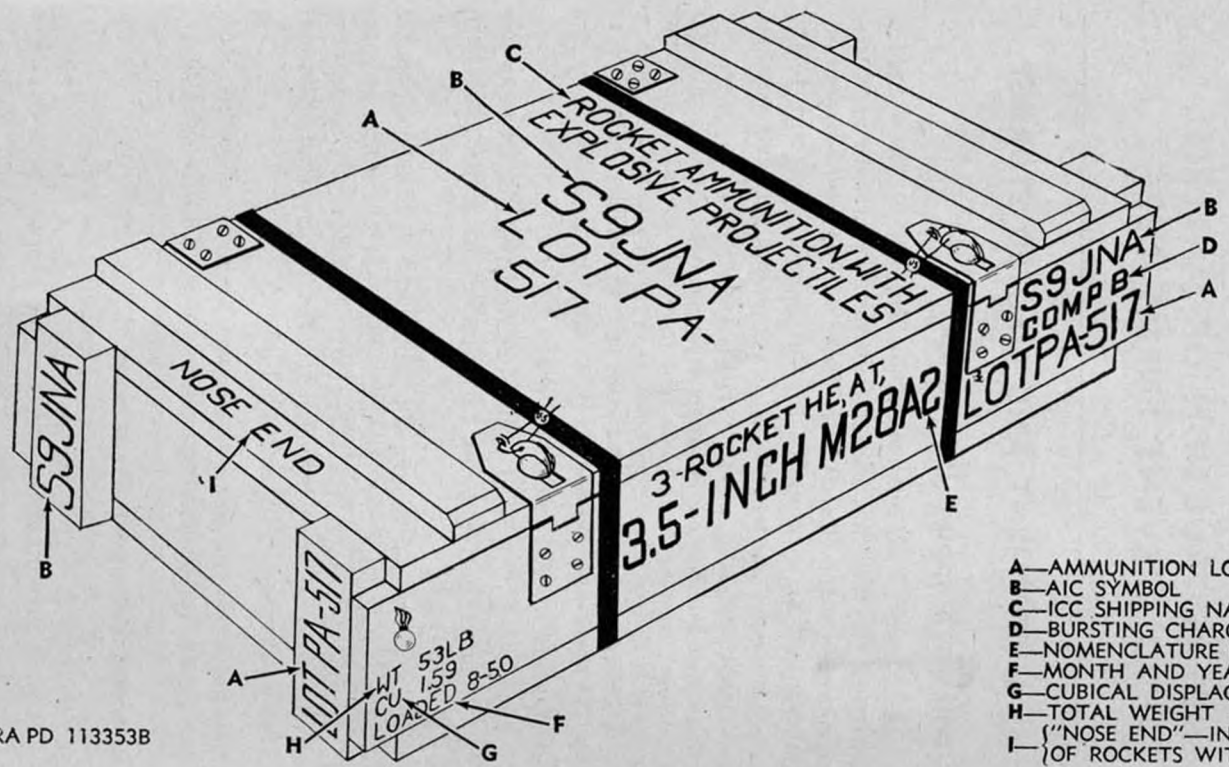


Figure 58. Packing box for 3.5-inch HE, AT rockets.

d. Removal from Limited Storage.

(1) If the units are not shipped or issued upon expiration of the 90-day limited storage period, they must be further inspected as prescribed in *b* above.

(2) If the launchers to be shipped will reach their destination within the scope of the limited storage period, they need not be processed upon removal from storage unless inspection reveals it to be necessary according to anticipated in-transit weather conditions.

Note. All launchers being reissued through the depot supply system to troops within the continental limits of the United States must meet the requirements of TB ORD 385. This is NOT required for so-called reissues, exchanges, or redistribution among troop units, where the depot supply system is not involved.

(3) Rocket launchers will be serviced in accordance with paragraphs 8 through 10, when it has been ascertained that they are to be placed into immediate service. Lubricate as prescribed in paragraphs 34 through 36.

(4) Repair and/or replace all items tagged in accordance with *a*(3) above.

132. Processing, Packaging, and Packing Instructions

a. Cleaning.

(1) Disassembly of launchers will be limited to uncoupling the front barrel from the rear barrel.

(2) The interior of the barrels, the coupling ends, and the remaining exposed *unpainted* metal surfaces will be cleaned by scrubbing with cloths soaked in dry-cleaning solvents or volatile mineral spirits followed by wiping with clean solvent-soaked cloths. When the solvent-soaked cloths used for the first scrubbing operation become too dirty for further use, discard them and use clean solvent-soaked cloths. Clean cloths must be used for the final wiping operation. Dry the parts thoroughly with dry compressed air provided with special moisture filter traps or by wiping the part with clean, lint-free dry cloths (TM 38–230).

Note. During processing of launchers, it is imperative that cloth or synthetic rubber gloves be worn while handling items. Repaint normally painted surfaces where paint has been removed or chipped, in accordance with TM 9–2851.

(3) Reconditioned launchers will have those areas which have become contaminated with burned powder residue cleaned with rifle-bore cleaner, using a bristle (not wire) brush. The remaining exposed *unpainted* metal surfaces will be cleaned as prescribed in (2) above.

b. Application of Preservatives.

(1) Apply preservatives as soon as possible after cleaning operations (*a* above). For application temperature of preservatives, refer to TM 9–850.

(2) Coat the interior of the barrels and the coupling ends of the launcher barrels with preservative lubricating oil (medium). The two contact springs and studs, the underside of the contactor latch with its stop, and all other exposed, *unpainted* surfaces will be coated with rust-preventive compound (medium).

Note. Do not dip launchers in compound. Exercise extreme care while applying compound to prevent it from contacting the firing mechanism.

c. Packaging.

(1) *Wrapping.*

(*a*) The firing mechanism, minus its guard and swivel assembly, will be inclosed in one wrapping of heavy duty, volatile corrosion inhibitor treated material. The firing mechanism will then be overwrapped with two individual thicknesses of greaseproof barrier-material. Secure barrier-material to the launcher barrel with water resistant pressure-sensitive adhesive tape.

(*b*) The reflecting sight assembly will have two separate wraps of grease-proof barrier-material applied, after which, the sight will be positioned so that the eye piece is next to the launcher barrel. Secure barrier-material to barrel with water resistant pressure-sensitive adhesive tape.

(*c*) Apply one thickness of greaseproof barrier-material of sufficient quantity to conform around the coupling ends of the launcher barrels and coupling lugs. Secure with water resistant pressure-sensitive adhesive tape.

(2) *Protective insulation.* Prior to packing the launchers, apply at least two thicknesses of greaseproof barrier-material of sufficient length and width in the notches and circular cut-outs in support 7, spacers 8 and 9, and block 10.

d. Packing. Launchers will be boxed (par. 133) and packed four launchers to a box in accordance with the following instructions:

(1) Tag the front and rear barrel assemblies so that the two parts which have been bore sighted together will be readily identified prior to assembly.

(2) Uncouple the two parts of the launchers.

(3) Locate two supports (7) in the grooves between battens (6).

(4) Position four rear barrels in the cutout notches in supports (7). All four barrels must point in the same direction (fig. 59).

(5) Locate the spacers (8) between battens (6) and on top of the rear barrel assemblies. The conduit tubes on the rear barrels must be positioned in the notches provided in the spacers. Refer to figure 59 for proper location of the spacers.

(6) Position the four front barrel assemblies on top of spacers (8) in the cut-outs provided. All barrels must face in the same direction (fig. 59).

(7) Nail one hold-down block (10) to spacer (9) as shown in figure 59. Insert these parts between battens upon the front barrels, after positioning the launcher stocks in the notches provided.

(8) Position the other hold-down block (10) in the grooves between battens (6) and on top of the rear barrels (fig. 59).

(9) Extreme care should be taken during the packing operation to see that the protective insulation applied over the cut-outs in the spacers and blocks is not dislodged. The barrel latch strike near the muzzle end of each front barrel must be placed firmly against the side of either block (10). A sufficient amount of water resistant pressure-sensitive adhesive tape of 1 inch width must then be wrapped around the circumference of each front barrel near its coupling end and adjacent to one spacer (8) and the remaining block (10) (fig. 59) to prevent horizontal movement.

(10) Close, strap, and mark container as prescribed in paragraph 133.

133. Construction of Shipping Container

a. Shipping Box Data. The data contained in table VI are for four 3.5-inch rocket launchers M20 or M20B1 packed in a style 2 nailed wood box (fig. 59).

Note. Before constructing a quantity of these boxes, a trial pack must be made and the dimensions of the box or blocking adjusted, if necessary.

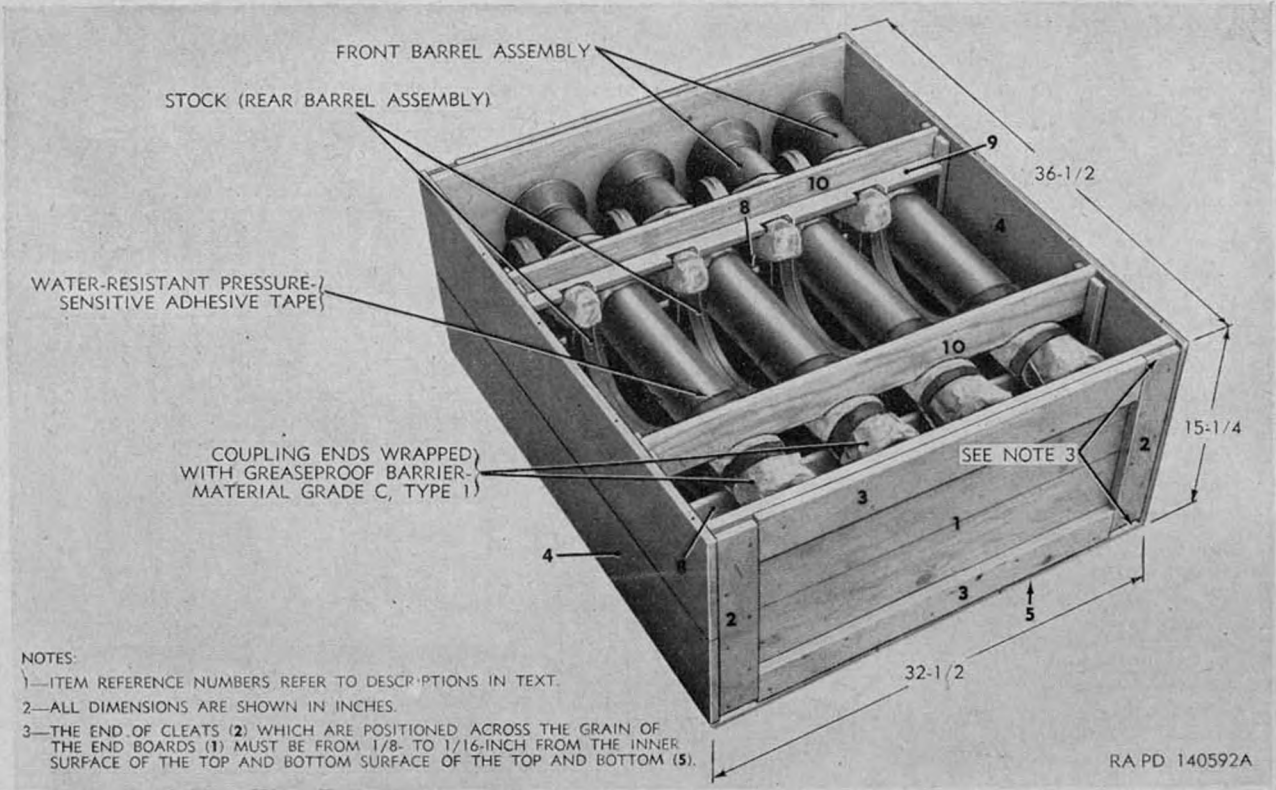


Figure 59. Packing box for four 3.5-inch rocket launchers M20 or M20B1—box fully packed.

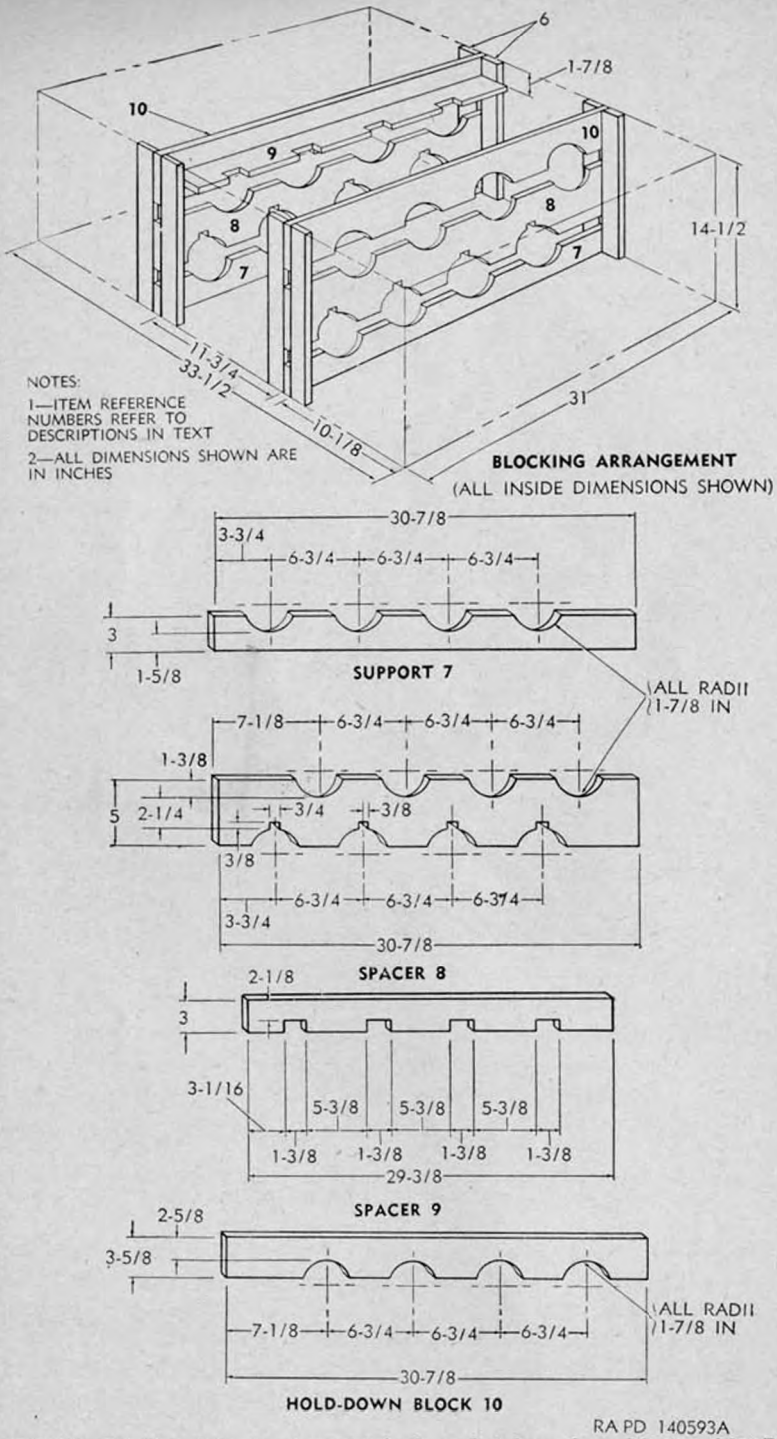


Figure 60. Packing box for four 3.5-inch rocket launchers M20 or M20B1—blocking details.

Table VI. Shipping Box Data

Shipping data	Box dimensions—inches		Volume and weight
	Inside	Outside	
Length	33½	36½	
Width	31	32½	
Height	14½	16	
Weight (net lb)			50
Weight (gross lb)			127
Bearing pressure (lb per sq ft)			15
Volume (cu ft)			10.9
Ship tons (40 cu ft)			0.27

b. Bill of Materials. Table VII lists the packaging materials and materials required to construct one style 2 nailed wood box (fig. 59) for four 3.5-inch rocket launchers M20 or M20B1. The box is designed to be constructed of group I or II lumber of standard thickness. Plywood spacers will be made from group I or II lumber, type A or B, condition I. The reference numbers are those referred to in the text and figures 59 and 60.

Table VII. Bill of Materials

Reference number	Quantity required	Part name	Actual size—inches		
			Length	Width	Thickness
1	2	Sheathing (Ends)[1]	31	14½	¾
2	4	Vertical end cleats[2]	14⅜	¾	¾
3	4	Horizontal end cleats	26⅜	2¼	¾
4	2	Sheathing (Sides)[1]	36½	14½	¾
5	1 each	Sheathing (Top and bottom)[1]	36½	32½	¾
6	8	Side battens (Guides)	14⅜	1¾	¾
7	2	Supports (Plywood, see fig 60 for detail).	30⅞	3	¾
8	2	Spacers (Plywood, see fig 60 for detail).	30⅞	5	¾
9	1	Spacer (Plywood, see fig 60 for detail).	29⅜	3	¾
10	2	Hold-down blocks (Plywood)	30⅞	3⅝	¾
	20 sq ft	Greaseproof barrier-material, grade C, type I.			
	as req'd	Flexible waterproof barrier-material (for case liner—export shipment only par. 133*c*).			
	as req'd	Fivepenny cement-coated nails			
	as req'd	Sevenpenny cement-coated nails			
	as req'd	Staples (for strapping)		⅜	

Reference number	Quantity required	Part name	Actual size—inches		
			Length	Width	Thickness
	2	Steel straps w/strap seals[3]	100	⅜	0.020
	as req'd	Water resistant pressure-sensitive adhesive tape.			
	1½ sq ft	Volatile corrosion inhibitor treated packaging material (heavy duty) (VCI).			

1 The width of ends, sides, top and bottom may be made of several pieces, but no piece must be less than 2½ inches in width.

2 The ends of these cleats which are positioned across the grain of the end boards (1) must be from ⅛ to 1/16 inch from the inner surface of the top and bottom surface of the top and bottom (5).

3 Equivalent steel wire may be substituted.

c. Fastening Schedules. Table VIII lists the fastening procedure to be used when fabricating the box illustrated in figure 59. If woods of group III or IV are used, or if the prescribed size of nail is not available, schedule must be adjusted as prescribed in TM 9–2854.

Table VIII. Fastening Schedule

Fasten		Nail size (cement-coated)	Maximum spacing (in)	Notes
Part	To part			
Cleats (2) and (3)	Ends (1)	7d	2	Stagger and clinch
Side battens (6)[1]	Sides (4)	7d	2	Stagger and clinch
Sides (4)	Ends (1) and cleats (2).	7d	2	Stagger
Bottom (5)	Ends (1) and cleats (2) (3).	7d	2	Stagger
Bottom (5)	Sides (4)	7d	6–8	
Top (5)	Ends (1) and cleats (2) (3).	7d	2	Stagger
Top (5)	Sides (4)	7d	6–8	
Block (9)	Spacer (10)	5d	2	

1 For oversea shipment, the box will contain a flexible waterproof barrier case-liner, type L–2 (except for shipment to frigid zones). Coat the surfaces of the battens in contact with the case liner with a water-resistant adhesive. Make sure that all protruding nails are clinched and splinters removed from inside of box before installing case-liner in order not to puncture barrier-material. Before sealing top of case-liner, apply a plywood or corrugated cover on top of units within case-liner for a firm sealing foundation. Properly seal all edges with adhesive waterproof sealing compound. Nail top of box on and apply the correct size and number of straps to exterior of container *just prior to shipment* as prescribed in *d* below.

d. Strapping. Locate two steel straps (⅜ x 0.020) approximately 6 inches from each end of the container around sides, top, and bottom of the box *JUST PRIOR TO SHIPMENT.* All straps

must be drawn tight so as to sink into the edges of the container. Apply strap seals and crimp seal. Staple all straps to the container with cement-coated or chemically etched staples spaced at intervals of approximately 6 inches.

e. Identification and Marking.

(1) *Domestic.*

(*a*) After the unit has been packed, the standard marking information required to identify and mark containers for domestic shipment will be printed or stenciled directly onto the shipping container with the standard nomenclature; stock number or other identifying number; quantity and size; weight (WT); cubage (CU); package number (where required); domestic address label; caution labels and markings (where required); and date packed (month and year). Adjacent to the description of the contents the letters DOM PK will be stenciled or printed in letters 1½ inches high where possible, but never less than 1 inch.

Note. When the set markings, packing lists, special and technical data markings are necessary, they will be used and applied in accordance with specific instructions from the officer in charge.

(*b*) Do not apply labels or mark containers unless the contents have been actually inspected and processed.

(2) *Oversea.*

(*a*) For shipment to ports of embarkation for oversea shipment, the containers will be labeled or stenciled as prescribed for domestic shipment ((1) above) and, in addition, will include the oversea address and service color marking (SR 746–30–5).

(*b*) Each container shipped in less than carload lot (LCL) or less than truckload lot (LTL) to a port will also bear a domestic address. Old addresses and irrelevant data will be effectively removed or obliterated prior to shipment. A label not exceeding 28 inches (yellow corners not required on label) will be used for domestic addresses. Label will be securely attached to the container and covered with waterproof transparent protective coating cement. Stenciling of domestic addresses on containers is not permitted.

134. Loading and Blocking Instructions

For general loading rules and methods and procedures for loading and blocking boxed items in boxcars refer to TM 9–2854.

Section II. DESTRUCTION OF MATÉRIEL TO PREVENT ENEMY USE

135. General

a. Destruction of the 3.5-inch rocket launchers M20 and M20B1, when subject to capture or abandonment in the combat zone, will be undertaken by the using arm only when, in the judgment of the unit commander concerned, such action is necessary in accordance with orders of, or policy established by, the army commander. When these launchers are in the possession of ordnance maintenance personnel or in storage, destruction will be in accordance with FM 9–5, and applicable portions of the information below.

b. The information which follows is for guidance only. Certain of the procedures outlined require the use of explosives and incendiary grenades, which normally may not be authorized items of issue to personnel armed with the rocket launcher. The issue of these and related materials, and the conditions under which destruction will be effected, are command decisions in each case, according to the tactical situation. Of the several means of destruction, those most generally applicable are:

Mechanical — Requires axe, pick mattock, sledge, crowbar, or similar implement.

Burning — Requires gasoline, oil, incendiary grenades, or other flammables.

Demolition — Requires suitable explosives or ammunition.

Gunfire — Includes artillery, machine guns, rifles using rifle grenades, and launchers using antitank rockets. Under some circumstances hand grenades may be used.

In general, destruction of essential parts by mechanical means will render the rocket launcher useless. However, selection of the particular method of destruction requires imagination and resourcefulness in the utilization of the facilities at hand under the existing conditions. Time is usually critical.

c. If destruction to prevent enemy use is resorted to, the matériel must be so badly damaged that they cannot be restored to a usable condition in the combat zone either by the repair or cannibalization. Adequate destruction requires that all parts essential to the operation of the matériel, including essential spare parts, be destroyed or damaged beyond repair. However, when lack of time and personnel prevents destruction of all parts, priority is given to the destruction of those parts most difficult to replace. Equally important, the same essential parts must be destroyed on

all like matériel so that the enemy cannot construct one complete unit from several damaged ones.

d. If destruction is directed, due consideration should be given to:

(1) Selection of a point of destruction that will cause greatest obstruction to enemy movement and also prevent hazard to friendly troops from fragments or ricocheting projectiles which may occur incidental to the destruction.

(2) Observance of appropriate safety precautions.

136. Destruction of the 3.5-Inch Rocket Launchers M20 and M20B1

Caution: Remove rocket, if present, from the launcher prior to destroying the launcher by any of the methods described below, to preclude possibility of ignition and projection of the rocket in unpredictable flight.

a. Method No. 1—By Mechanical Means.

(1) Remove ammunition, if present, from the launcher.

(2) Disassemble the launcher as indicated in paragraph 27*a*.

(3) Using an axe, pick mattock, sledge, or other heavy implement, smash the sights, bipod, monopod, and stock. Also smash the firing mechanism, barrels, barrel coupling lock, barrel latch, and contactor latch. Slash the gun sling. Elapsed time: about 1 minute.

b. Method No. 2—By Burning. Destruction of essential parts, such as the sights and firing mechanism followed by burning in an intense fire, will render the rocket launcher useless. Since the rocket launcher is almost entirely of metal, sufficient quantities of combustible should be used to insure a hot fire. However, if combustible is not available, the use of incendiary grenades as indicated in (1), (2), and (3) below will render the matériel useless.

(1) Remove ammunition, if present, from the launcher.

(2) Place the launcher on the ground.

(3) Holding an incendiary grenade near the muzzle of the launcher, fire the grenade. Quickly insert the grenade into the muzzle. Using a suitable stick or staff, push the incendiary grenade midway into the launcher tube. The burning grenade will burn through the coupling and the launcher tube. Elapsed time: about 2 minutes.

c. Method No. 3—By Demolition.

(1) Prepare a 1-pound charge of EXPLOSIVE, TNT (using a 1-pound block or equivalent, together with the necessary detonating cord to make up the charge).

(2) Insert the charge into the muzzle.

(3) Using a suitable stick or staff, push the charge midway into the launcher tube.

(4) Provide for dual priming to minimize the possibility of a misfire. For priming, either a nonelectric blasting cap crimped to at least 5 feet of safety fuse (safety fuse burns at the rate of 1 foot in 30 to 45 seconds; test before using) or an electric blasting cap and firing wire may be used. Safety fuse, which contains black powder, and nonelectric blasting caps must be protected from moisture at all times. The safety fuse is ignited by a fuse lighter or a match before taking cover; the electric blasting cap requires a blasting machine or equivalent source of electricity and is fired after taking cover.

Caution: Keep the blasting caps, detonating cord, and safety fuse separated from the charges until required for use.

Note. For the successful execution of methods of destruction involving the use of demolition materials, all personnel concerned will be thoroughly familiar with the pertinent provisions of FM 5–25. Training and careful planning are essential.

(5) Detonate the charge. The detonation of the charge will destroy the launcher. If primed with nonelectric blasting cap and safety fuse, ignite and take cover. If primed with electric blasting cap, take cover before firing the charge. Elapsed time: about 4 minutes.

d. Method No. 4—By Gunfire. Destroy the launcher by gunfire, using artillery, machine guns, rifles using rifle grenades, or launchers using anti-tank rockets. Fire on the launcher. Although one well-placed direct hit will destroy the launcher, several hits may be required for complete destruction. Elapsed time: about 2 minutes.

137. Destruction of Rockets

a. If destruction of rockets is directed, due consideration should be given to:

(1) Accomplishment of the destruction in such a manner as to cause the greatest obstruction to enemy movement and

also prevent hazard to friendly troops from fragments or uncontrolled flight of rockets.

(2) Observance of appropriate safety precautions.

b. Rockets are most effectively destroyed by burning. To accomplish this, stack rockets, either packed or unpacked, in piles so that the rocket heads point toward the enemy or stack in a trench or depression, head downward. Place flammable materials such as paper, rags, brush, and wood around and on the pile. Pour gasoline and oil over the pile. Sufficient flammable material must be used to insure a fire sufficiently hot to destroy the rockets. Ignite and take cover.

c. Since ignition of the propellant in the rocket motor will cause some rockets to be projected in unpredictable flight, the danger area for the destruction of rockets should be considered as having a radius equivalent to the effective range. Generally, however, the rocket will travel in the same direction in which it is pointed at the time of ignition.

APPENDIX
REFERENCES

1. Publication Indexes

The following publication indexes and lists of current issue should be consulted frequently for latest changes or revisions of references given in this appendix and for new publications relating to matériel covered in this manual:

Index of Administrative Publications	SR 310–20–5
Index of Army Motion Pictures, Kinescope Recordings and Film Strips.	SR 110–1–1
Index of Technical Manuals, Technical Regulations, Technical Bulletins, Supply Bulletins, Lubrication Orders, and Modification Work Orders.	SR 310–20–4
Index to Tables of Organization and Equipment, Reduction Tables, Tables of Organization, Tables of Equipment, Type Tables of Distribution, and Tables of Allowances.	SR 310–20–7
Index of Training Publications	SR 310–20–3
Introduction and Index (supply catalogs)	ORD 1
Military Training Aids	FM 21–8

2. Supply Catalogs

The following catalogs of the Department of the Army Supply Catalog pertain to this matériel:

a. Ammunition.

Ammunition Instruction Material for Aircraft Bombs, Grenades, Pyrotechnics, and Rockets.	ORD 3 SNL S–6
Ammunition, Land Mines and Components; Demolition Explosives and Related Items; and Ammunition for Simulated Artillery, Booby Trap, Hand Grenade, and Land Mine Fire.	ORD 3 SNL R–7
Ammunition, Rockets, All Types, and Components.	ORD 3 SNL S–9

b. Maintenance and Repair.

Cleaners, Preservatives, Lubricants, Recoil Fluids, Special Oils, and Related Maintenance Materials.	ORD 3 SNL K–1
Items of Soldering, Metallizing, Brazing, and Welding Materials; Gases and Related Items.	ORD 3 SNL K–2
Launcher, Rocket, 3.5-inch, M20 and M20B1.	ORD (*) SNL B–42
Lubricating Equipment, Accessories, and Related Dispensers.	ORD (*) SNL K–3
Special Tool-Sets for Small Arms and Automatic Weapons (SNL Groups A and B).	ORD 6 SNL J–12

3. Forms

The following forms are applicable to this matériel:

DA Form 9–3, Processing Record for Shipment and Storage of Vehicles and Boxed Engines

DA Form 468, Unsatisfactory Equipment Report

DA Form 811, Work Request and Job Order

DA Form 811–1, Work Request and Hand Receipt

WD AGO Form 867, Status of Modification Work Order

DD Form 6, Report of Damaged or Improper Shipment

4. Other Publications

The following explanatory publications contain information pertinent to this matériel and associated equipment:

a. Ammunition.

Distribution of Ammunition and Explosives for Training Purposes.	SR 710–60–50
Ammunition, General	TM 9–1900
Ammunition Inspection Guide	TM 9–1904
Qualification in Arms: Qualification and Familiarization.	AR 370–5
Regulations for Firing Ammunition for Training, Target Practice, and Combat.	SR 385–310–1
Rockets	TM 9–1950
Training Ammunition	T/A 23–100

(*) See ORD 1, Introduction and Index, for published catalogs of the ordnance section of the Department of the Army Supply Catalog.

b. Camouflage.

Camouflage, Basic Principles	FM 5–20

c. Decontamination.

Decontamination	TM 3–220
Defense Against Chemical Attack	FM 21–40

d. Destruction to Prevent Enemy Use.

Explosives and Demolitions	FM 5–25
Ordnance Service in the Field	FM 9–5

e. General.

Accounting for Lost, Damaged, and Destroyed Property.	SR 735–150–1
Basic Arctic Manual	FM 31–70
Instruction Guide: Operation and Maintenance of Ordnance Matériel in Extreme Cold (0° to —65° F.).	TM 9–2855
Mountain Operations	FM 70–10
Operations in the Arctic	FM 31–71
Safety: Reports of Accident Experience	SR 385–10–40
Supplies and Equipment: Unsatisfactory Equipment Report.	SR 700–45–5
Targets, Target Material and Training Course Layouts.	TM 9–855

f. Maintenance and Repair.

Abrasive, Cleaning, Preserving, Sealing, Adhesive, and Related Materials Issued for Ordnance Matériel.	TM 9–850
Inspection of Ordnance Matériel in the Hands of Troops.	TM 9–1100
Lubrication	TM 9–2835
Lubrication Order	LO 9–297
Maintenance Supplies and Equipment: Maintenance Responsibilities and Shop Operations.	AR 750–5
Painting Instructions for Field Use	TM 9–2851

g. Shipment and Limited Storage.

Army Shipping Document	TM 38–705
Instruction Guide: Ordnance Packaging and Shipping (Posts, Camps, and Stations).	TM 9–2854
Marking and Packing of Supplies and Equipment: Marking of Oversea Supply.	SR 746–30–5

Military Standard—Marking of Shipments	MIL–STD–129**
Ordnance Storage and Shipment Chart—Group C.	SB 9–OSSC–B
Preparation of Supplies and Equipment:	
Processing of Unboxed and Uncrated Equipment for Oversea Shipment.	AR 747–30
Preservation, Packaging, and Packing of Military Supplies and Equipment.	TM 38–230
Protection of Ordnance General Supplies in Open Storage.	TB ORD 379
Shipment of Supplies and Equipment: Report of Damaged or Improper Shipment.	SR 745–45–5
Standards for Oversea Shipment and Domestic Issue of Ordnance Matériel Other Than Ammunition and Army Aircraft.	TB ORD 385

* Copies may be obtained from Aberdeen Proving Ground, Aberdeen, Md.

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