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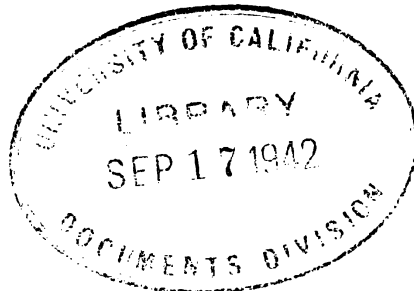
WAR DEPARTMENT

Technical Manual

TECHNICAL MANUAL

ORDNANCE MAINTENANCE
FUZE SETTER, M8

FEBRUARY 8, 1941



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TECHNICAL MANUAL
ORDNANCE MAINTENANCE



FUZE SETTER, M8

WAR DEPARTMENT,

WASHINGTON, September 6, 1941.

CHANGES }
No 1 }

TM 9-1635, February 8, 1941, is changed as follows:

2. Description.

* * * * *
e. The setting mechanism * * * adjusting and setting rings.
* * * * *

(2) For use with different types of fuzes, separate scales, setting rings, and adjusting rings are furnished. Figures 11 and 12 show the adjusting and setting rings for the 21-second aircraft time fuze Mk. IIIA1 and the 30-second mechanical time fuze, M43, respectively. For use with dummy fuze, M42, which has no engaging pawls, an adjusting ring and brake ring assembly (fig. 5½) are provided. The function of the brake ring is to impose a drag on the setting crank comparable to that caused by the engaging pawls of the service rounds. The elimination of the pawls and fuze rings for dummy practice without the addition of the braking device would allow rotation of the operating crank with relatively no resistance. Too rapid motion of the operating crank permits the stopping pawl (B135294, fig. 8, sec. D-D) to drop off the cam surface of the socket with such force that dents are made on the undercut bearing surface of the socket (C69685). Too rapid motion also results in severe wear and upsetting from pounding of the rebound pawl (A43836) on the cam stop surface. This upsetting has resulted in errors up to 1/10 second of fuze setting. Damage to the chamfered slot on the gear (C69696) results when the roller of the stopping pawl strikes the slot rapidly. From figure 5½ it can be seen that the braking mechanism consists of a brake-lined clutch plate assembly on the brake ring assembly which is held against the adjusting ring by springs giving the required friction drag.

(3) An accessory chest is provided for carrying the rings, scales, and spare electric lamps. The scale which is carried in the chest should be wrapped in soft tissue when packing.

(4) For use in darkness * * * with luminous paint.
* * * * *

[A. G. 062.11 (7-31-41).] (C 1, Sept. 6, 1941.)

6. Care and preservation.—a. Lubrication.—(1) At frequent intervals swing fuze setter open and remove the adjusting and setting rings. Clean rings thoroughly, lubricate pawls and guides with oil,

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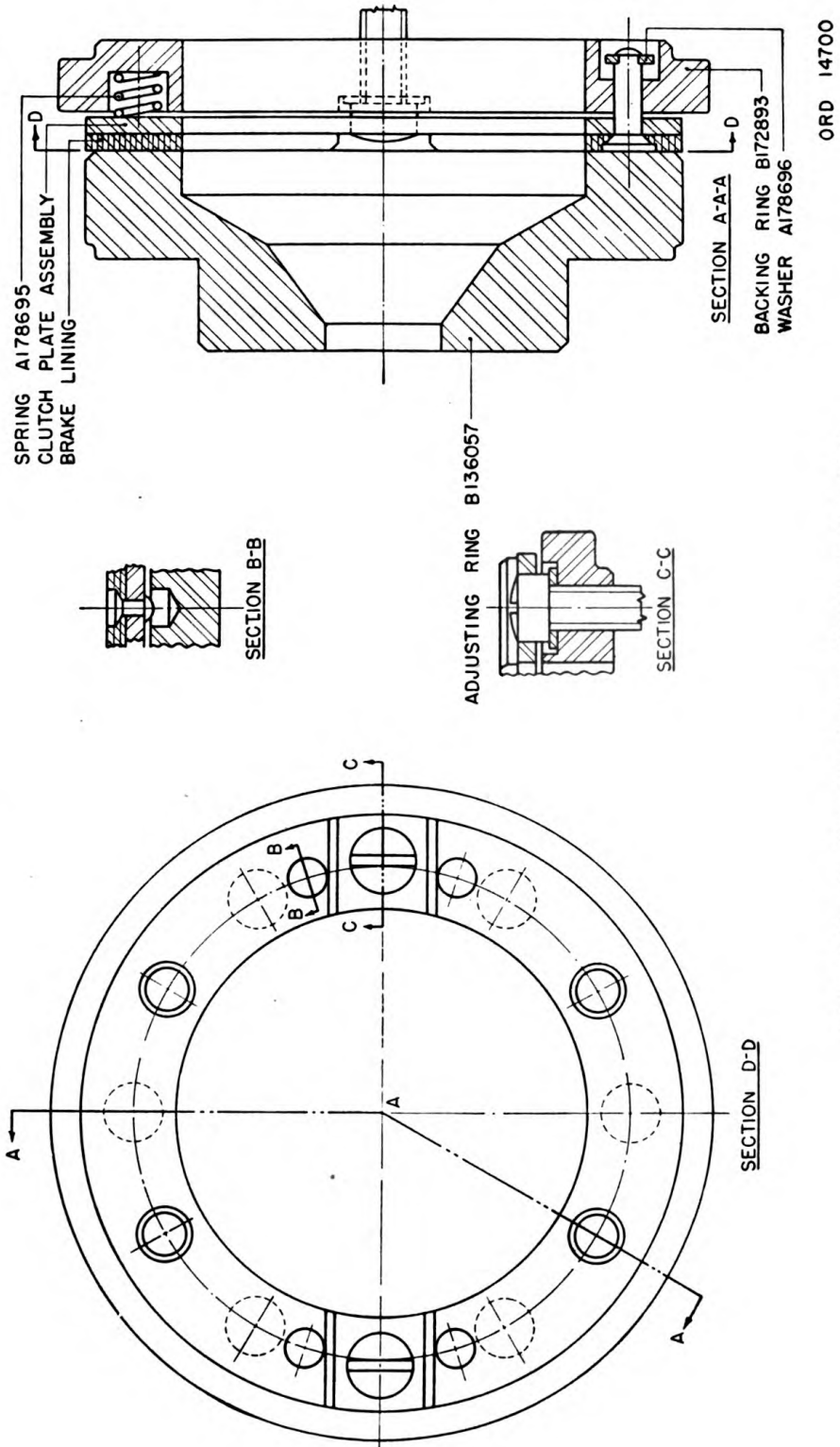


FIGURE 5 1/2.—Braking rings for use with dummy fuze, M42.

FUZE SETTER, M8

lubricating, for aircraft instruments and machine guns (U. S. A. Spec. 2-27), and coat the other surfaces with grease, special, low temperature (Royco 6A).

* * * * *

(4) At regular intervals, the entire device should be disassembled by ordnance personnel, all parts cleaned and lubricated and then reassembled. Lubricate ball bearings with grease, special, low temperature; use oil, lubricating, for aircraft instruments and machine guns, on other moving parts.

* * * * *

[A. G. 062.11 (7-31-41).] (C 1, Sept. 6, 1941.)

BY ORDER OF THE SECRETARY OF WAR:

G. C. MARSHALL,
Chief of Staff.

OFFICIAL:

E. S. ADAMS,
Major General,
The Adjutant General.

TECHNICAL MANUAL }
 No. 9-1635 }

WAR DEPARTMENT,
 WASHINGTON, February 8, 1941.

ORDNANCE MAINTENANCE

FUZE SETTER, M8

Prepared under the direction of the
 Chief of Ordnance

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1. **General.**—*a. Purpose.*—This manual is published primarily for the information and guidance of ordnance maintenance personnel.

b. Scope.—This manual supplements the technical manuals which are prepared for the using arm. It contains descriptive matter and illustrations sufficient to provide a general working knowledge of the equipment and in addition contains information of use in the maintenance and repair thereof by ordnance personnel.

c. References.—The Technical Manuals and Standard Nomenclature Lists for the equipment described herein are listed in paragraph 7.

d. Use.—The fuze setter, M8, is a mechanical device for manually setting time fuzes of 3-inch antiaircraft ammunition in accordance with data received from the director. It may be used with any 3-inch antiaircraft gun and mount firing ammunition fuzed with the 21-second antiaircraft powder-train fuze Mk. III (and modifications) or with the 30-second mechanical fuze, M43. Provision is also made for use in drill practice with 3-inch dummy ammunition.

2. **Description.**—*a.* The fuze setter (figs. 1 to 10 incl.) is mounted on the gun carriage by means of its attachment bracket. A short length of 13-conductor cable (fig. 14) is included to provide the

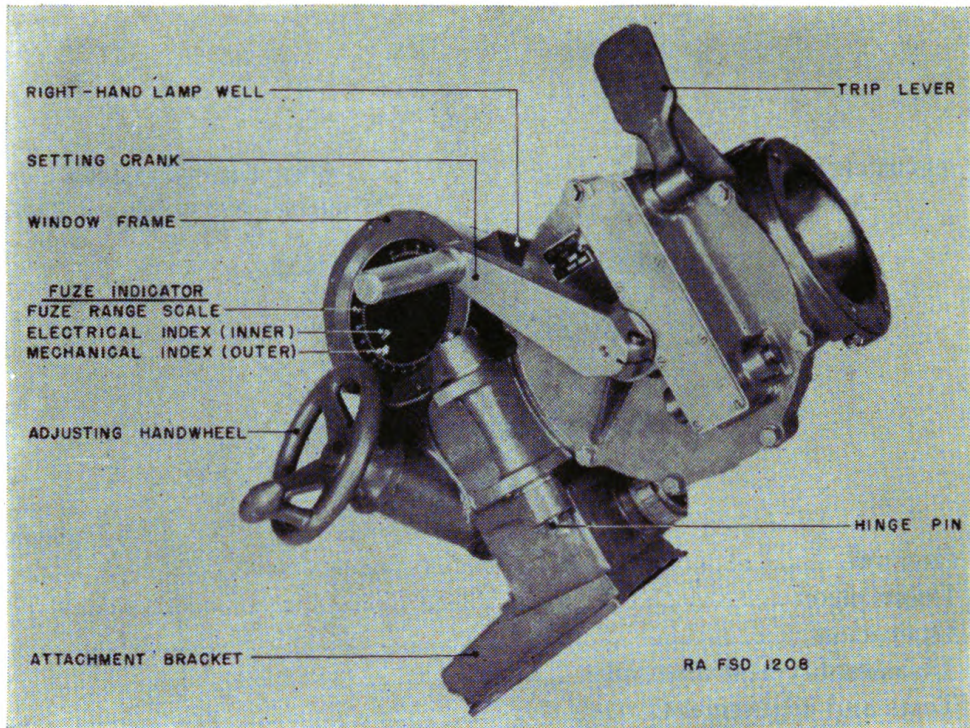


FIGURE 1.—Fuze setter, M8, left side and rear.

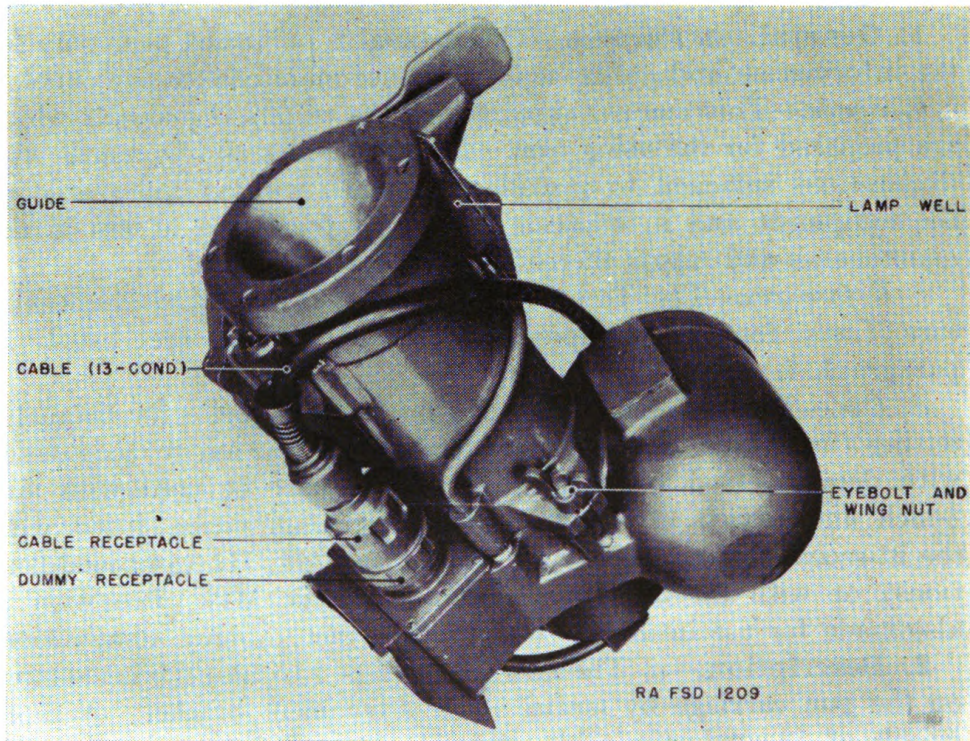


FIGURE 2.—Fuze setter, M8, right side and rear.

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electrical connection between the fuze setter and the gun junction box on the mount.

b. The fuze setter, M8, consists principally of the fuze indicator, adjusting mechanism, and setting mechanism.

c. The fuze indicator includes a standard a. c. synchronous repeater (C56701, fig. 7) mounted in the upper portion of the case.

(1) The electrical (inner) index (fig. 1) is mounted on the shaft of the a. c. synchronous repeater.

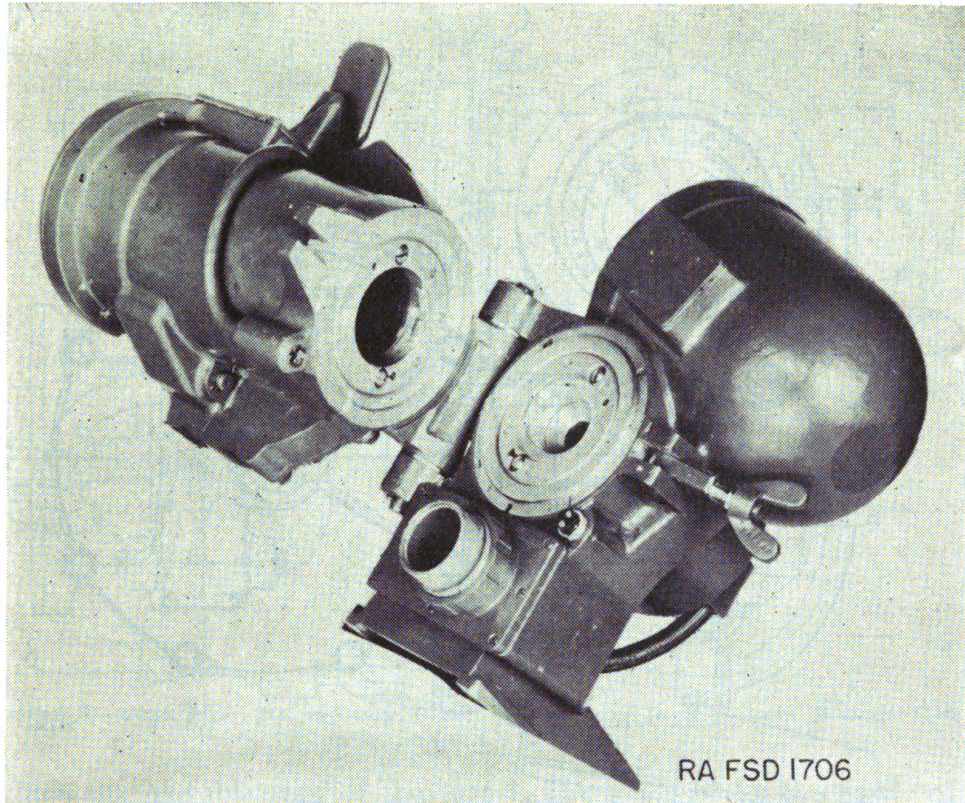


FIGURE 3.—Fuze setter, M8, open.

(2) The mechanical (outer) index, forming the other element of a follow-the-pointer drive, is geared (1:1 ratio) to the adjusting mechanism of the fuze setter. The fuze scale surrounding the mechanical index provides an indication of the fuze range.

(3) When the two indexes are matched, agreement between the adjusting mechanism and the data received from the director is indicated.

(4) The flexible cable (B137262) is provided with a standard 19-pole receptacle for making the electrical connection between the gun junction box on the mount and the fuze indicator.

d. The adjusting mechanism, housed in the fixed part of the fuze setter below the fuze indicator and geared thereto, contains the adjusting ring (fig. 6), the pawls of which engage with the movable (forward) ring of the fuze.

(1) The adjusting handwheel (B137241, fig. 9) mounted on the shaft of the worm (B137242) rotates the gear (B137240) which is attached to the adapter (C69694).

(2) On this adapter is mounted the adjusting ring assembly which has pawls to engage with the ring of the fuze.

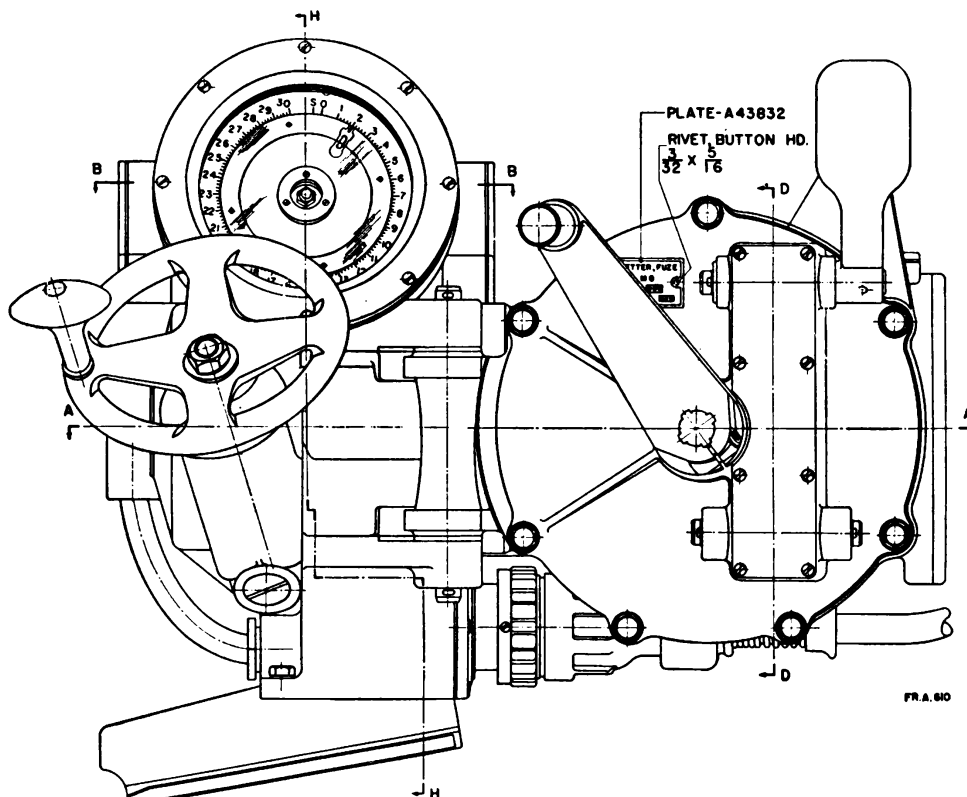


FIGURE 4.—Fuze setter, M8, side view. (Sec. A-A is shown in fig. 6; sec. B-B in fig. 7; sec. D-D in fig. 8; sec. H-H in fig. 10.)

e. The setting mechanism is located in the hinged part of the fuze setter. The entire mechanism is pivoted on a hinge pin (A48270) to permit ready separation from the fixed part of the fuze setter for cleaning and for the removal or replacement of the adjusting and setting rings.

(1) This mechanism contains the setting ring, the pawls of which engage the fixed (rear) ring of the fuze and is driven by the setting crank (C69689). By means of a ratchet-and-stop arrangement (fig. 8, secs. D-D and G-G), the setting crank is released when the trip

lever (B136855) is pressed and may then be rotated a full turn before again encountering a stop. This motion rotates the setting ring exactly two complete revolutions. During the first turn, the pawls thereof engage with the fixed ring of the fuze. Thereafter the entire round turns for the remainder of the limited travel, in the course of

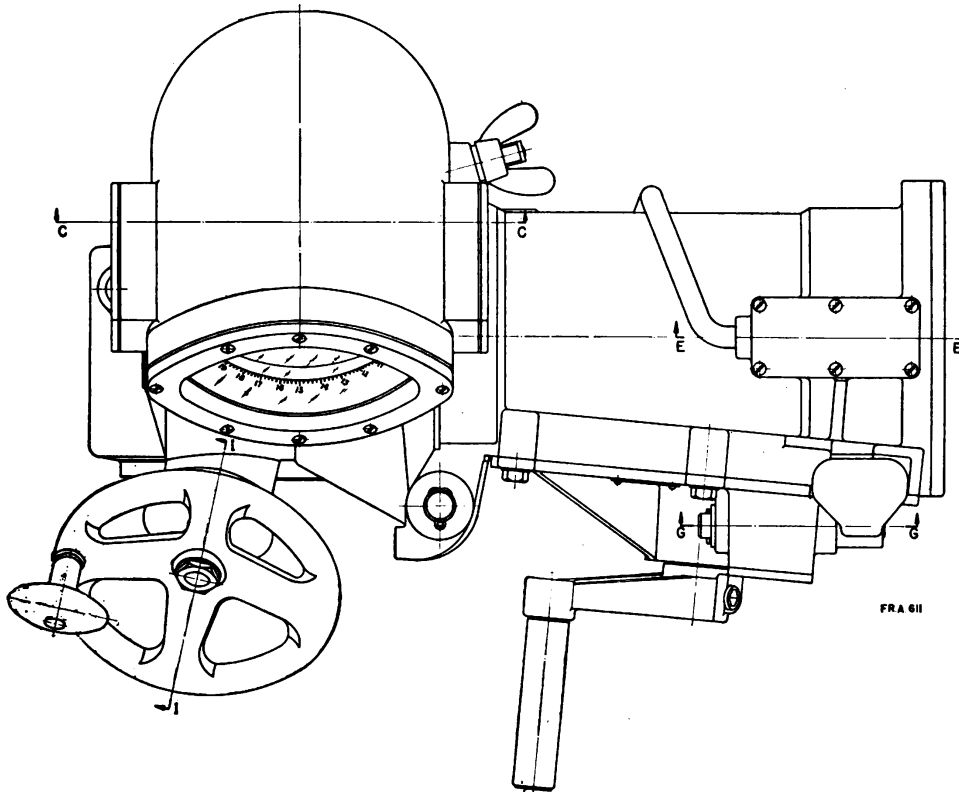


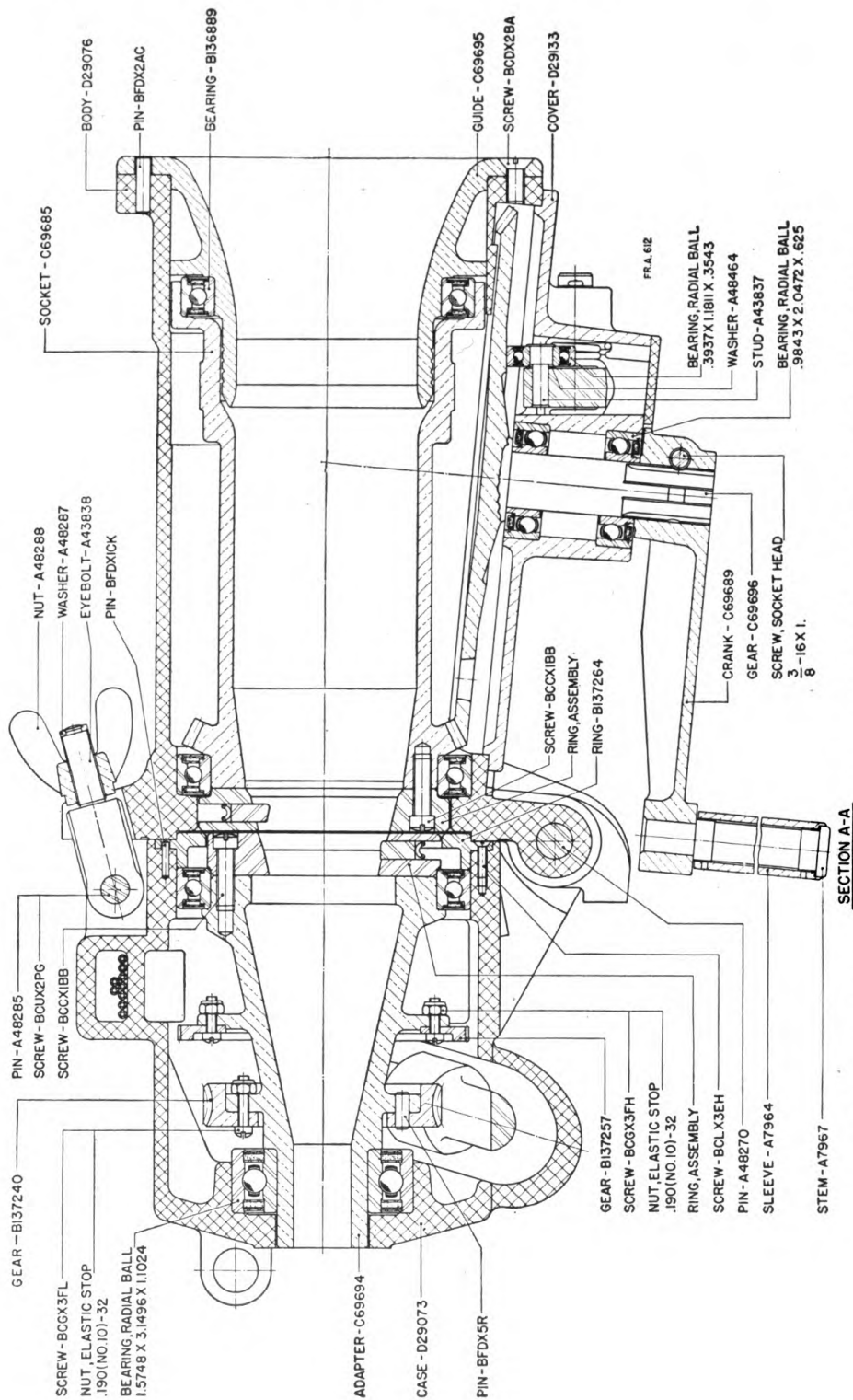
FIGURE 5.—Fuze setter, M8, top view. (Sec. C-C is shown in fig. 7; secs. E-E and G-G in fig. 8; sec. I-I in fig. 9.)

which the movable ring of the fuze is also engaged by the pawls of the adjusting ring.

(2) For use with the different types of fuzes, separate scales, setting rings, and adjusting rings are furnished. Figures 11 and 12 show these rings for two types of fuzes. An accessory chest is provided for carrying the extra parts.

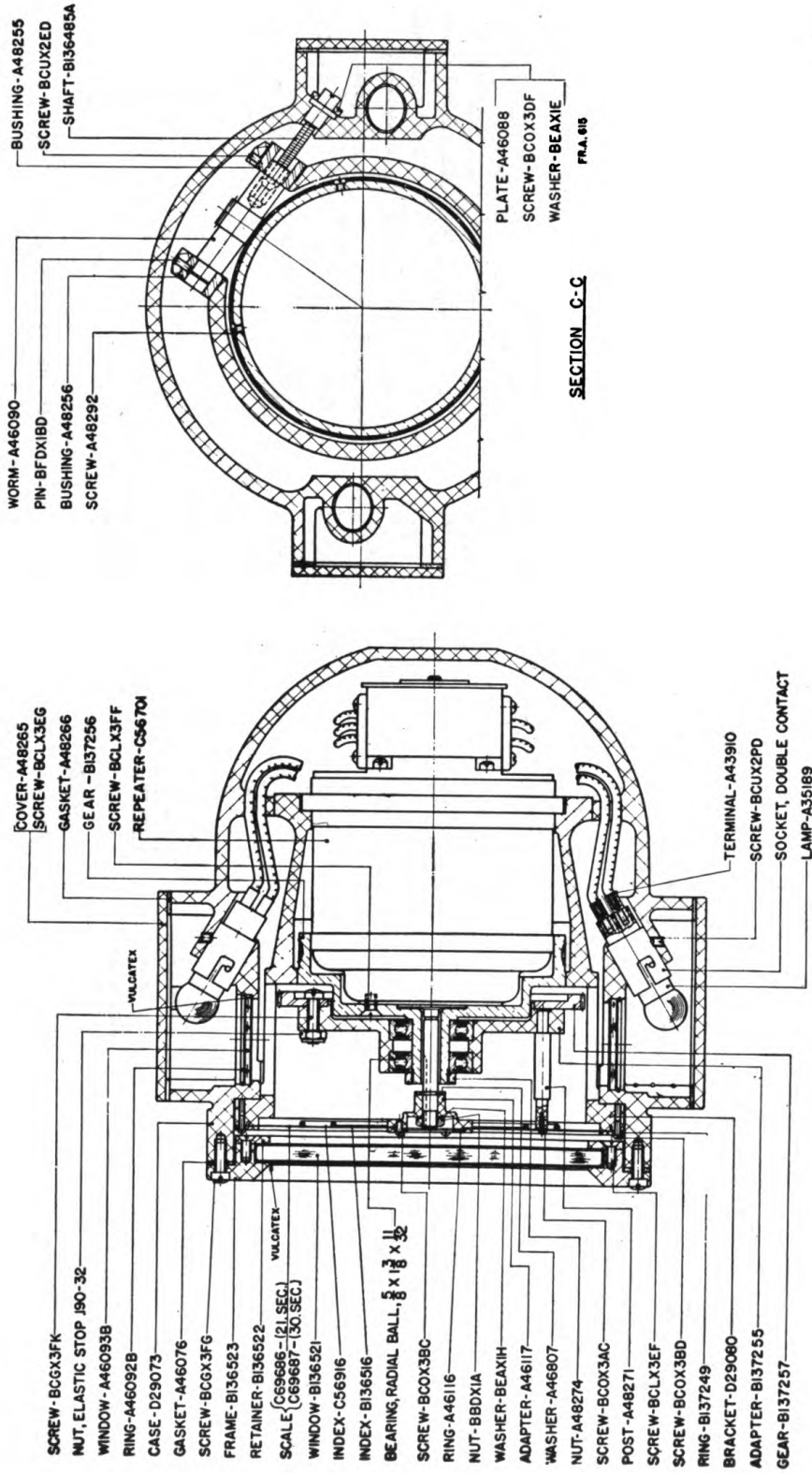
(3) For use in darkness, electric lamps, energized from a step-down transformer in the data transmission system, are provided in the lamp wells, one located above the guide (C69695, fig. 2) and one on each side of the fuze indicator. In addition, the mechanical and electrical indexes are filled with luminous paint.

f. Electrical connections.—(1) Electrical connections of the fuze setter are shown in figure 13.



SECTION A-A
 Figure 6.—Fuze setter, M8, section view. (See fig. 4 for location of section plane A-A.)

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SECTION B-B
 SECTION C-C
 FIGURE 7.—Fuze setter, M8, section views. (See fig. 4 for location of section plane B-B; fig. 5 for C-C.)

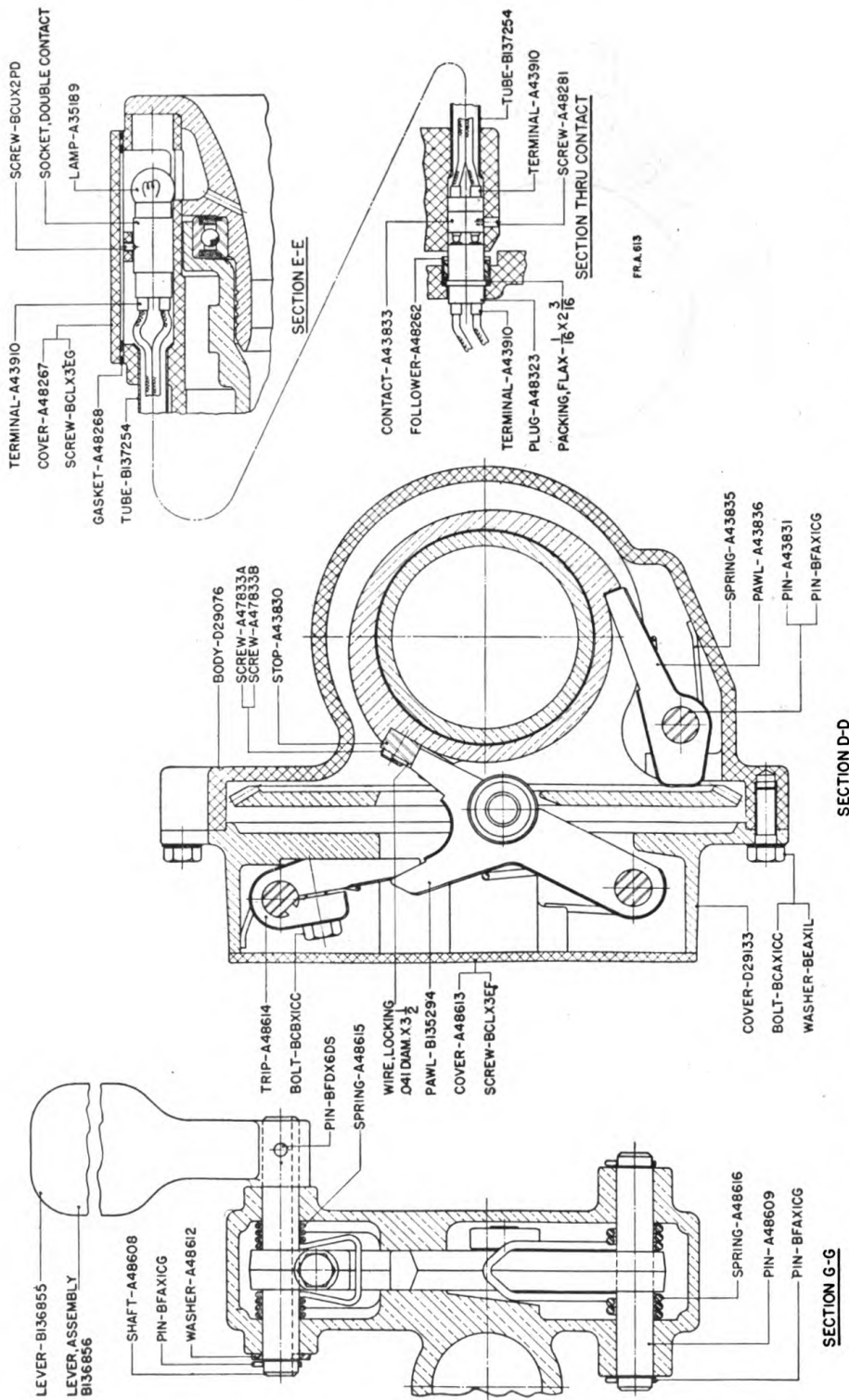
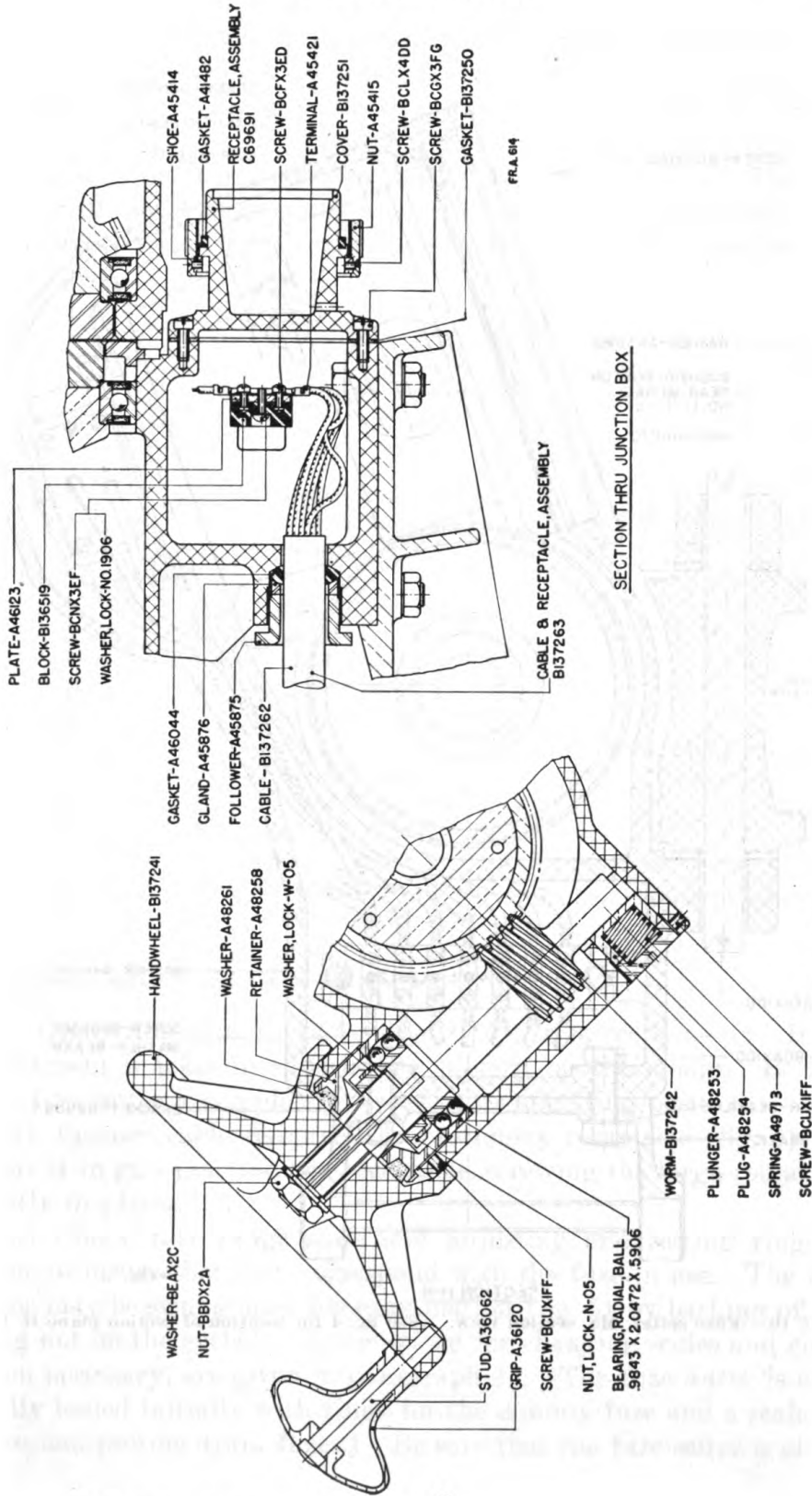


FIGURE 8.—Fuze setter, M5, section views. (See fig. 4 for location of section plane D-D; fig. 5 for E-E and G-G.)

FUZE SETTER, M8



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FIGURE 9.—Fuze setter, M8, section view. (See fig. 5 for location of section plane I-I.)

SECTION I-I

SECTION THRU JUNCTION BOX

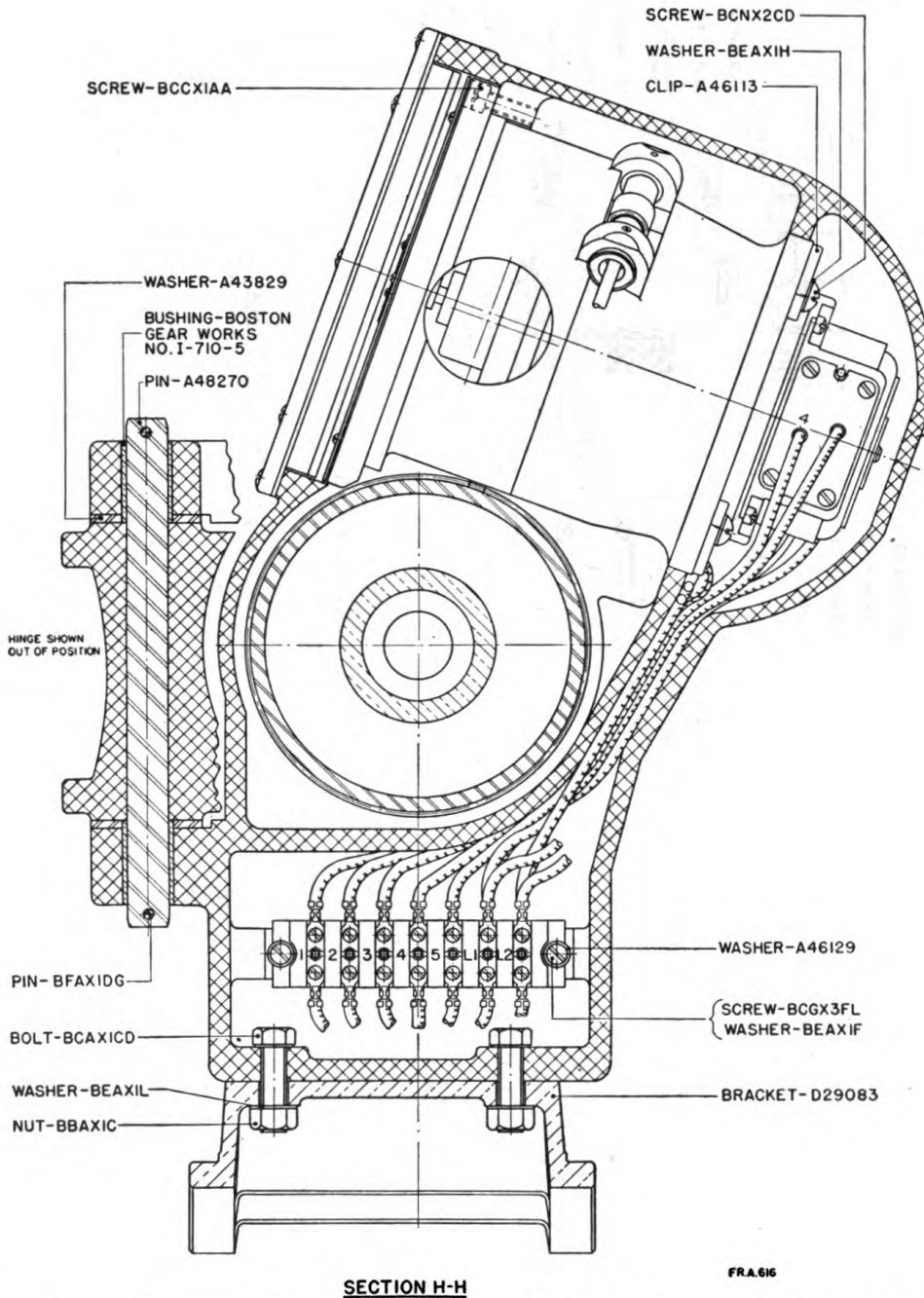


FIGURE 10.—Fuze setter, M8, section view. (See fig. 4 for location of section plane H-H.)

(2) The fuze setter is provided with a 19-pole receptacle on the end of a short section of 13-conductor flexible cable (figs. 14 and 15) for connecting to the gun junction box on the carriage. A dummy receptacle (fig. 16) is provided for storing and sealing the cable receptacle when not connected to the gun junction box. The conductors of the transmission cable (B137262) are color coded. The terminals to which each conductor is connected are shown on the table below:

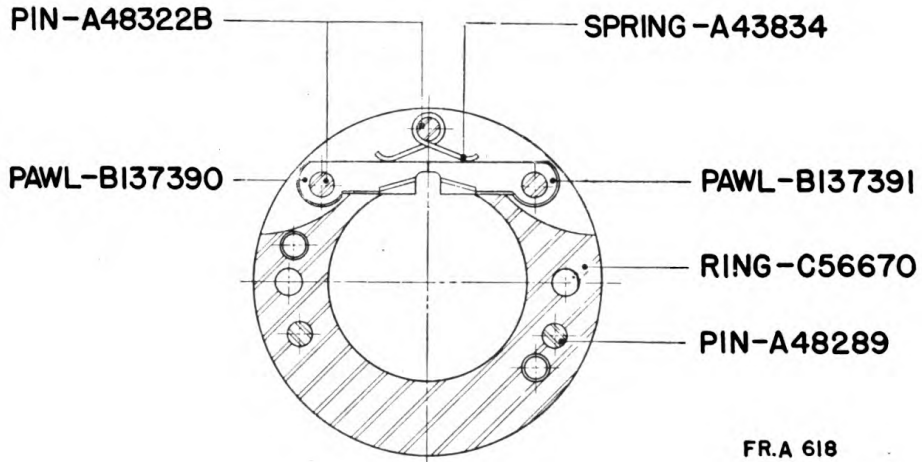
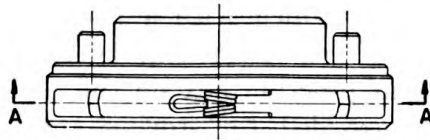
Terminals		Color coding of conductors	Connected to
Fuze setter	Cable receptacle ¹		
1 2 3	1 2 3	Orange—White tracer Orange—Black tracer Orange	Fuze range repeater armature
4 5	4 5	White Black	Power (115 volts)
1 2 3 1 2 3	6 7 8 9 10 19	Red—White tracer Red—Black tracer Red Green—White tracer Green—Black tracer Green	Fuze range repeater armature
L1 L2	17 18	White—Black tracer Black—White tracer	Power (6 volts)

¹ Receptacle terminals 11 to 16 inclusive not connected.

3. Operation.—*a. To place fuze setter in operation.*—(1) Insert attachment bracket in slots in the support on the mount. Be sure that fuze setter is completely seated in its operating position.

(2) Remove cable receptacle from dummy receptacle (fig. 2) and insert it in gun junction box receptacle, screwing the large round nut tightly in place.

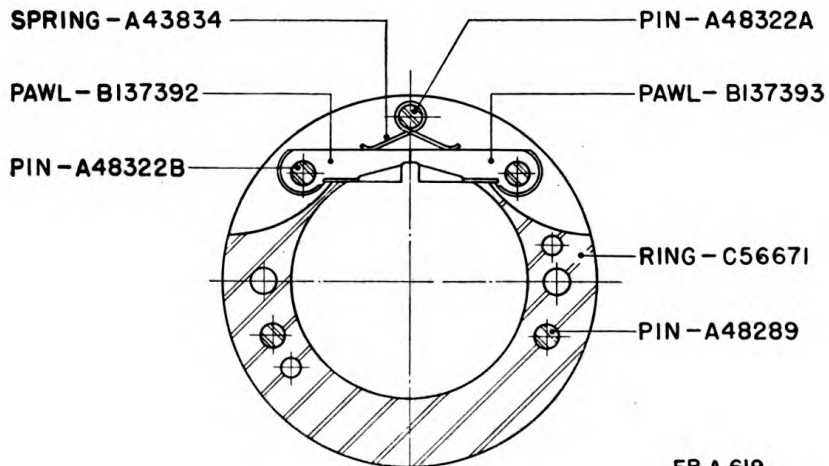
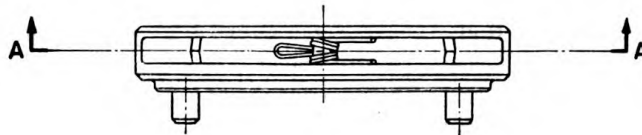
(3) Check fuze range scale and adjusting and setting rings in setter to insure that they correspond with the fuze in use. The fuze setter may be swung open for examination (fig. 3) by backing off the wing nut on the eyebolt. Instructions for changing scales and rings, when necessary, are given in paragraph 4. (The fuze setter is ordinarily issued initially with rings for the dummy fuze and a scale for 21-second powder-train fuzes.) Be sure that the fuze setter is closed



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SECTION A-A

① Adjusting ring.



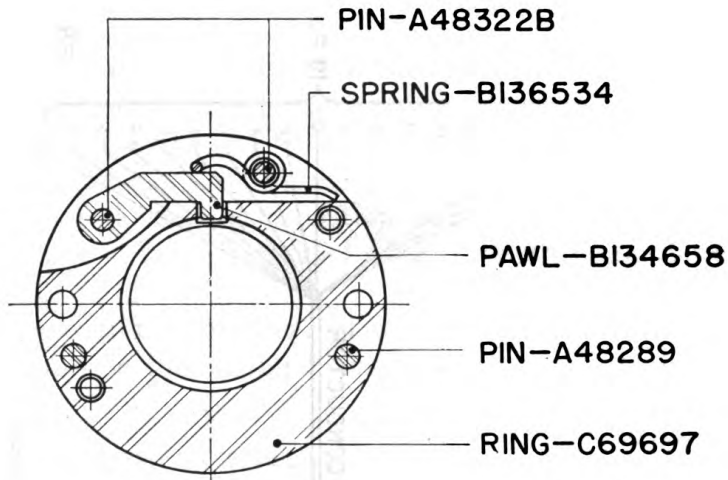
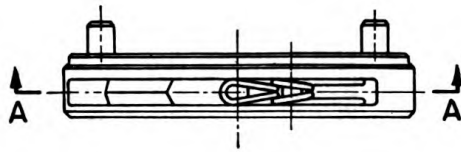
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SECTION A-A

② Setting ring.

FIGURE 11.—Rings for 21-second, antiaircraft, time fuze, Mk. IIIA1.

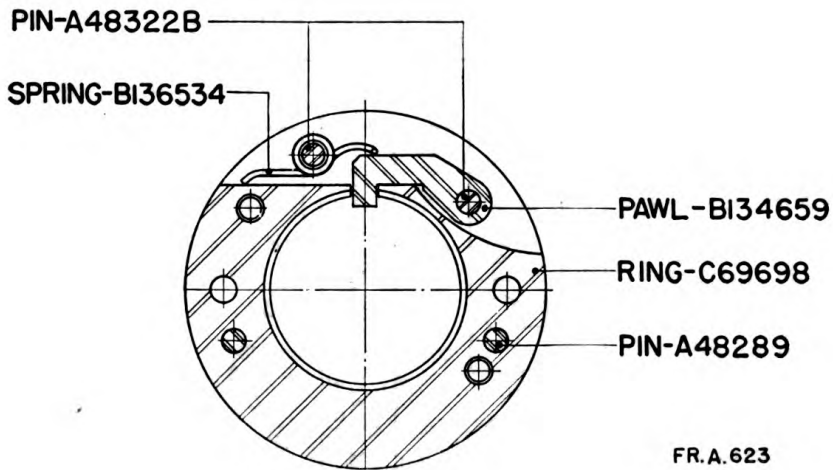
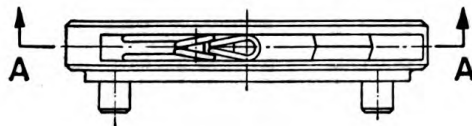
FUZE SETTER, M8



SECTION A-A

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① Adjusting ring.

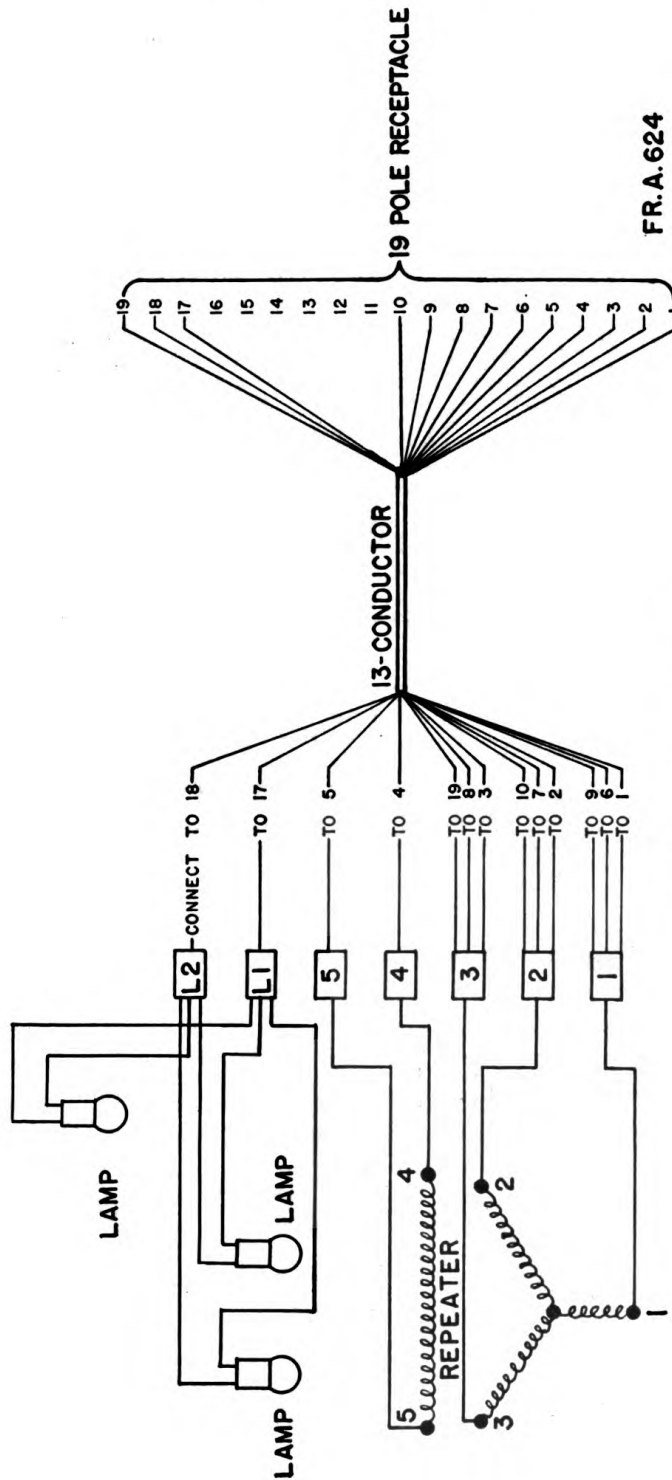


SECTION A-A

FR.A. 623

② Setting ring.

FIGURE 12.—Rings for 30-second, mechanical, time fuze, M43.



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FIGURE 13.—Wiring diagram.

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and the wing nut tightened before attempting to set fuzes or to lift the fuze setter.

b. To set fuzes.—(1) Two operators are required, one for the setting mechanism and one for the adjusting mechanism. In addition, certain operations are to be performed by personnel of the loading detail.

(2) The operator (seated) of the adjusting mechanism continuously keeps the mechanical (outer) index matched with the electrical (inner) index regardless of whether a round is in the setter or not. In lieu of matching indexes, he may instead set the mechanical (outer) index to a desired indication on the fuze range scale in the event that data is being provided other than through the electrical transmission.

(3) The operator (standing) of the setting mechanism maintains a light pressure on the setting crank in a counterclockwise direction.

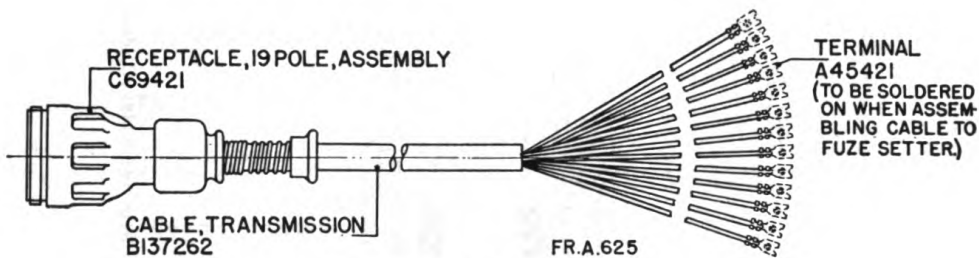


FIGURE 14.—Transmission cable.

As soon as the crank is free to move (after the trip lever has been tripped by the loading detail personnel), he turns it one full turn counterclockwise until a stop is encountered.

(4) The loading detail personnel inserts the round fully into the setter, then momentarily depresses the trip lever, permitting the setting operation to proceed; meanwhile, he exerts hand pressure downward on the base of the cartridge case as long as the round remains in the setter. When ready to use the round, he withdraws it from the setter, being careful not to turn it until entirely disengaged from the setter pawls.

c. Requirements for proper setting of fuzes.—For the accurate setting of fuzes, the following conditions must be fulfilled:

(1) That the round be placed into the fuze setter and forced downward into full insertion before pressing the trip lever, and maintained in that position by right-hand pressure on base end of case until the “cut” is completed.

(2) That the trip lever be operated with a glancing blow so it will be rearmed before the end of the crank stroke.

- (3) That the inner and outer indexes be kept matched at all times.
- (4) That the setting crank be turned at the instant of release, and

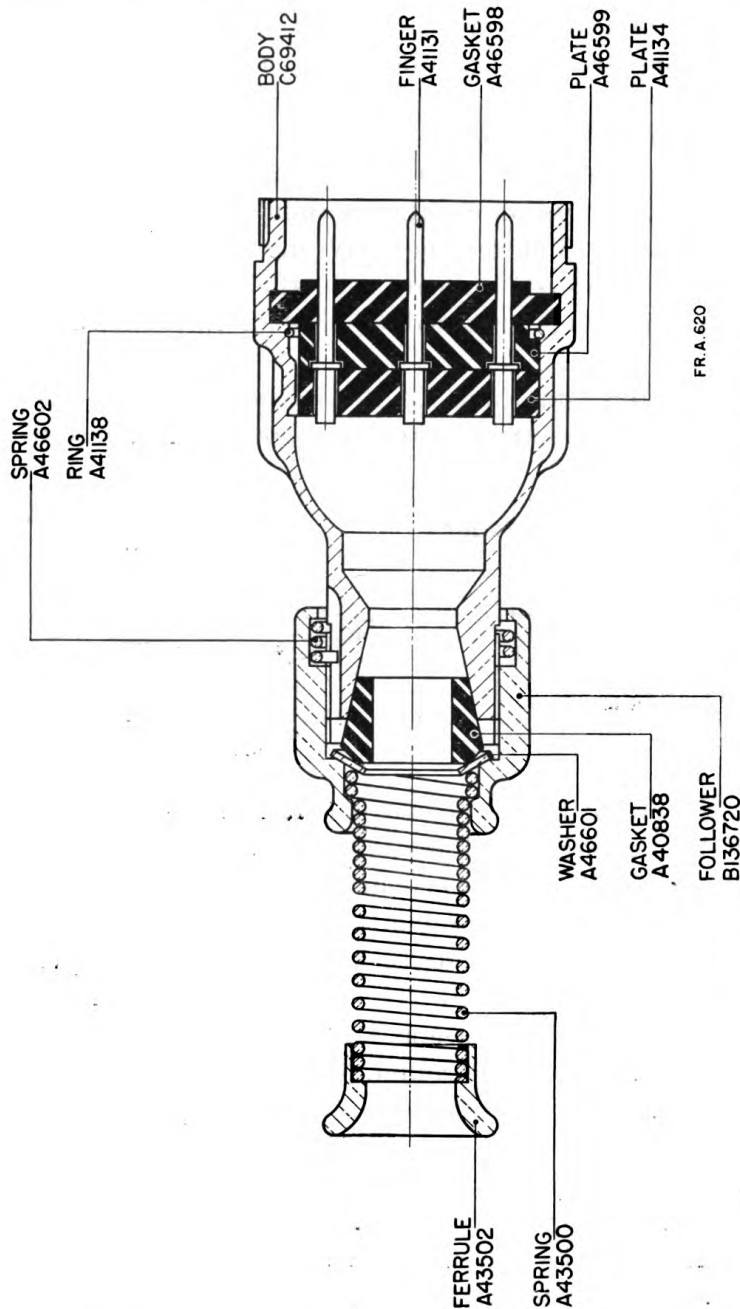


FIGURE 15.—Receptacle, 19-pole assembly (C 69421), section view.

rotation continued until it is definitely stopped by the stopping pawl at end of the one-turn setting cycle.

- (5) That the initial movement in withdrawing the round, after the

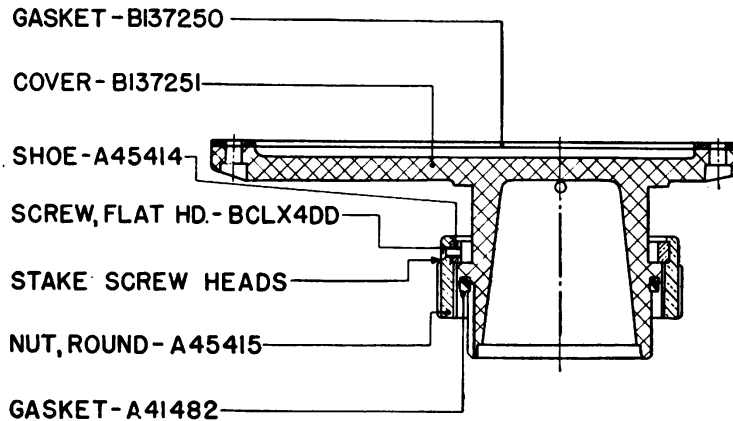
“cut” is completed, should be without rotation to avoid changing the setting during the disengagement of the fuze from the pawls.

(6) That the pawls in the adjusting and setting rings be kept lubricated and free of chips of metal, paint, or other foreign substances.

(7) That the operation and initial synchronization of the data transmission system be correct.

d. To reset a fuze previously set.—Follow the same procedure as given in *b* above for making the initial setting.

e. To place fuze setter in traveling position.—Remove cable receptacle from gun junction box and attach it to dummy receptacle (fig. 2),



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FIGURE 16.—Receptacle, dummy, assembly, section view.

wrapping cable across the face of fuze indicator. Grasp fuze setter by one of the large main castings, lift it from the bracket provided for operating, and place it in the bracket for traveling. Cover it with the canvas cover provided.

4. Disassembly and assembly.—*a. Procedure for changing fuze setter to accommodate another type of fuze.*—This operation requires changing the setting and adjusting rings, changing the fuze range scale, and synchronizing the synchronous repeater.

(1) *To change setting and adjusting rings.*—(a) Select desired rings from accessory chest. Each ring is plainly marked to indicate the corresponding fuze.

(b) Swing fuze setter open (fig. 3), remove the two screws and lockwashers in each ring and remove rings. All rings except those for use with the dummy fuze have tapped holes into which the screws may be inserted to pull the rings free if stuck.

(c) Place new rings in position, inserting locating pins in holes provided. These pins and the mounting holes are spaced so as to render the two rings noninterchangeable. Replace screws and lock-washers, tightening screws securely. Check pawls to insure that they operate freely.

(2) *To change fuze range scale.*—(a) Remove block inside lid of accessory chest to obtain the other scale.

(b) Remove fuze indicator window frame (fig. 1), taking care not to injure the gasket.

(c) Remove the six small screws exposed thereby and withdraw clamping ring which encircles the scale. Remove scale, wrap it in soft tissue paper and secure it in place behind block in accessory chest lid.

(d) Place new scale with its outer rim in the groove and replace clamping rings and screws just tightly enough to permit movement of the scale for adjustment.

(e) Place a round in fuze setter, set fuze and slide scale around to indicate the same value.

(f) To move scale, insert a blunt rod in hole above the zero graduation. Verify setting, using several different values of fuze range, tighten screws in clamping ring and check to see that both inner and outer indexes clear without rubbing throughout a complete revolution. Replace window frame.

(3) *To synchronize repeater.*—(a) The director and data transmission system are to be connected and energized for this setting. It is necessary that the director be fitted with the proper fuze range dial for the fuze in use.

(b) Make necessary settings at the director to produce an indication of fuze range near mid-scale. Set the adjusting mechanism to indicate the same value on the fuze indicator scale.

(c) If the inner and outer indexes are not matched, bring them into alinement as follows:

1. For small adjustments, remove the cover from the right-hand lamp well and, with a small screwdriver, turn the slotted shaft projecting just above the lamp until the inner index is alined with the outer index. Replace the cover and screws. This motion is limited to approximately 35° in either direction from a central position.
2. For large adjustments, remove the window frame as when changing scales, loosen the three screws (BCOX3BC) in the clamping ring (A46116) and rotate the inner index, pressing lightly with the fingers at two points 180° apart,

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until it is alined with the outer index. Tighten the screws, remove power, and check to insure that the inner index rotates freely without rubbing or binding throughout a complete revolution. Replace window frame.

(d) If the fuze range transmitter in the director has been set on "electrical zero," it is also possible to synchronize the repeater by setting it to "electrical zero" when the same value of fuze range is indicated. Refer to technical manuals covering the director and data transmission system in use for method of making this setting and for the value of fuze range at which it is to be made. A small supplementary adjustment in accordance with paragraph 4a(3)(c)1 also may be required.

b. *To replace electric lamps.*—The covers over the lamp wells may be removed and replaced, care being exercised to see that the gaskets are not injured and are properly replaced. Use only 3-cp, 6-8 volt miniature lamps with G-6 bulb and double-contact bayonet base for replacement. Spare lamps are carried in the accessory chest.

c. *To disassemble and assemble setting mechanism.*—(1) Remove the bolts (BCAX1CC, fig. 8, sec. D-D) together with the washers (BEAX1L) and lift off the cover (D29133). The setting gear (C69696), the pawl (B135294), the setting gear crank (C69689), and the trip mechanism are all assembled to the cover and can therefore be removed as a unit.

(2) Removal of the cover also gives access to the socket pawl (A43836) and gear teeth on the socket (C69685), thus permitting examination, cleaning, and lubrication of these parts.

(3) When reassembling, exercise care to have the tooth-space on the setting gear marked "2" meshed with the tooth marked "2" on the socket. Replace the cover and washers and tighten the bolts. This operation is to be performed by competent personnel under conditions which will prevent the entrance of dust into the mechanism.

d. *Other disassembly and assembly operations.*—The assembled and sectioned views and other illustrations show the location of various parts and the means by which they are held in place. These figures should be studied carefully before attempting any assembling or disassembling operation.

5. Tests and adjustments.—a. Frequently check the indications by the mechanical index on the fuze range scale against the actual value of fuze range indicated on the fuze.

(1) Lost motion in the setting mechanism may be detected by making the foregoing check first with pressure exerted on the setting

crank in one direction, then in the other, after the setting has been made.

(2) Lost motion in the adjusting mechanism may be detected by approaching the indication on the fuze range scale first in one direction, then in the other. In either case, no appreciable difference in the actual value of the fuze range indicated on the fuze for the two directions should be noted.

b. Frequently check the indications of the electrical index.

(1) With the data transmission system connected and energized, set the mechanical (outer) index to the same value of fuze range indicated on the associated director dial. Repeat the check at several values throughout the operating range if the electrical (inner) index is not in agreement therewith.

(2) Procedure for adjustment, if necessary, is given in paragraph 4a(3)(c).

(3) Further information pertaining to trouble encountered in synchronous data transmission systems and their remedies will be found in TM 9-1656.

c. Frequently swing the setter open and check the pawls to see that they operate freely and with sufficient spring pressure.

NOTE.—Pawls in the rings for M43 mechanical fuze should require a pressure of about 20 pounds to push the projecting ends in flush with the surface of the rings. Springs of a lesser capacity will be satisfactory for the powder-train fuze rings but the action of the pawls should be snappy when released from the compressed position.

6. Care and preservation.—*a. Lubrication.*—(1) At frequent intervals swing fuze setter open and remove the adjusting and setting rings. Clean rings thoroughly, lubricate pawls and guides with oil, lubricating, for aircraft instruments and machine guns (U. S. A. Spec. 2-27), and coat the other surfaces with petrolatum (U. S. A. Spec. 2-67).

(2) Occasionally lubricate hinge pin (BFAX1DG), the setting crank handle (two oil holes are provided there), the trip lever shaft (A48608), the adjusting handwheel grip (A36120), and the threads on the eyebolt (A43838) with oil, lubricating, for aircraft instruments and machine guns.

(3) Periodically remove the cover (D29133) and examine, clean, and lubricate the pawls and other moving parts thus exposed, using oil, lubricating, for aircraft instruments and machine guns. Follow the instructions given in paragraph 4c when disassembling and assembling the cover.

(4) At regular intervals, the entire device should be disassembled by ordnance personnel, all parts cleaned and lubricated and then

reassembled. Lubricate ball bearings with a mixture of petrolatum and anhydrous lanolin (U. S. A. Spec. 50-11-72); use oil, lubricating, for aircraft instruments and machine guns, on other moving parts.

(5) Keep excess lubricant that seeps from the moving parts wiped off to prevent the accumulation of dust and grit.

b. General precautions.—(1) It is essential that the screws which hold the setting and adjusting rings in place be kept tight at all times. These screws have a tendency to work loose under constant use of the fuze setter and should be examined frequently. It is necessary that the lockwashers provided be used under these screws.

(2) The metal adjacent to the pawls in the setting and adjusting rings is somewhat thin. Exercise care not to bend this metal inward and cause interference with the free movement of the pawls.

(3) Exercise care in handling the scales and indexes as they are thin and easily bent or damaged. Keep the extra scale wrapped in soft tissue paper and stored in the recess behind the block in the accessory chest lid.

(4) When not in use, keep the fuze setter in the condition indicated for traveling.

(5) Do not bump or strike any part of the fuze setter. When handling, always grasp the fuze setter by one of the large main castings; never use the handles, cable, or other smaller parts for this purpose. Before lifting, make sure that the wing nut holding the setter shut is securely tightened. Never lay the fuze setter down; separate brackets are provided on the mount for traveling and for use.

(6) Whenever the cable receptacle (C69421) is not connected to the gun junction box on the carriage, connect it to the dummy receptacle with the cable wrapped around in front of the fuze indicator as shown in figure 2.

NOTE.—When practicable, all extensive disassembly and cleaning should be performed in a closed shop room equipped with a dummy mounting bracket for clamping in a heavy vise or securing to a work bench. Always check performance by several setting operations after reassembly.

7. List of references.—*a. Standard nomenclature lists.*

Matériel, 3-inch antiaircraft gun, M3 (fixed)-----	SNL D-16
Matériel, 3-inch antiaircraft gun, M1A1 and M2A1 (mobile)-----	SNL D-17
Matériel, 3-inch antiaircraft gun, M2A2 (mobile) _	SNL D-23
Director, AA, M3 (for 3" AA guns); Director, AA, M3A1 (for 105mm AA guns); Director, AA T8E3 (for 3" A guns)-----	SNL F-158

Director, antiaircraft, M4 (for 3" and 105mm antiaircraft guns)-----	SNL F-167
Setter, fuze, M8 (for 3" AA fixed and mobile gun mounts)-----	SNL F-177
System, data transmission, M4 (for director, M4) (for mobile batteries)-----	SNL F-179
Material, cleaning and preserving, and tools and equipment used therewith-----	SNL K-1
Current Standard Nomenclature Lists are as tabulated here. An up-to-date list of SNL's is maintained as the "Ordnance Publication for Supply Index"-----	(OPSI)
<i>b. Technical manuals.</i>	
3-inch Antiaircraft Gun Matériel, Mobile-----	TM 9-360
Ordnance Maintenance, 3-Inch Antiaircraft Gun Matériel, M2A2, M2A1, M1A2, M1A1, T1A2 and T1A1-----	TM 9-1360
Cleaning and Preserving Materials----- (Now published as TR 1395-A.)	TM 9-850
Ordnance Maintenance, Antiaircraft Directors, M3, M3A1, and T8E3-----	TM 9-1650
Ordnance Maintenance, Antiaircraft Director, M4-----	TM 9-1655
Ordnance Maintenance, Data Transmission System, M4-----	TM 9-1656
<i>c. Field Manual.</i>	
Service of the Piece—3-Inch Antiaircraft Guns-----	FM 4-125
<i>d. Ordnance field service bulletins.</i>	
Maintenance of Matériel in Hands of Troops-----	OFSB 4-1
Lubrication of Fire Control Instruments-----	OFSB 6-F-1

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