

TM 9-1675



WAR DEPARTMENT

TECHNICAL MANUAL

ORDNANCE MAINTENANCE

AZIMUTH INSTRUMENTS M1910
AND M1910A1 (DEGREES)

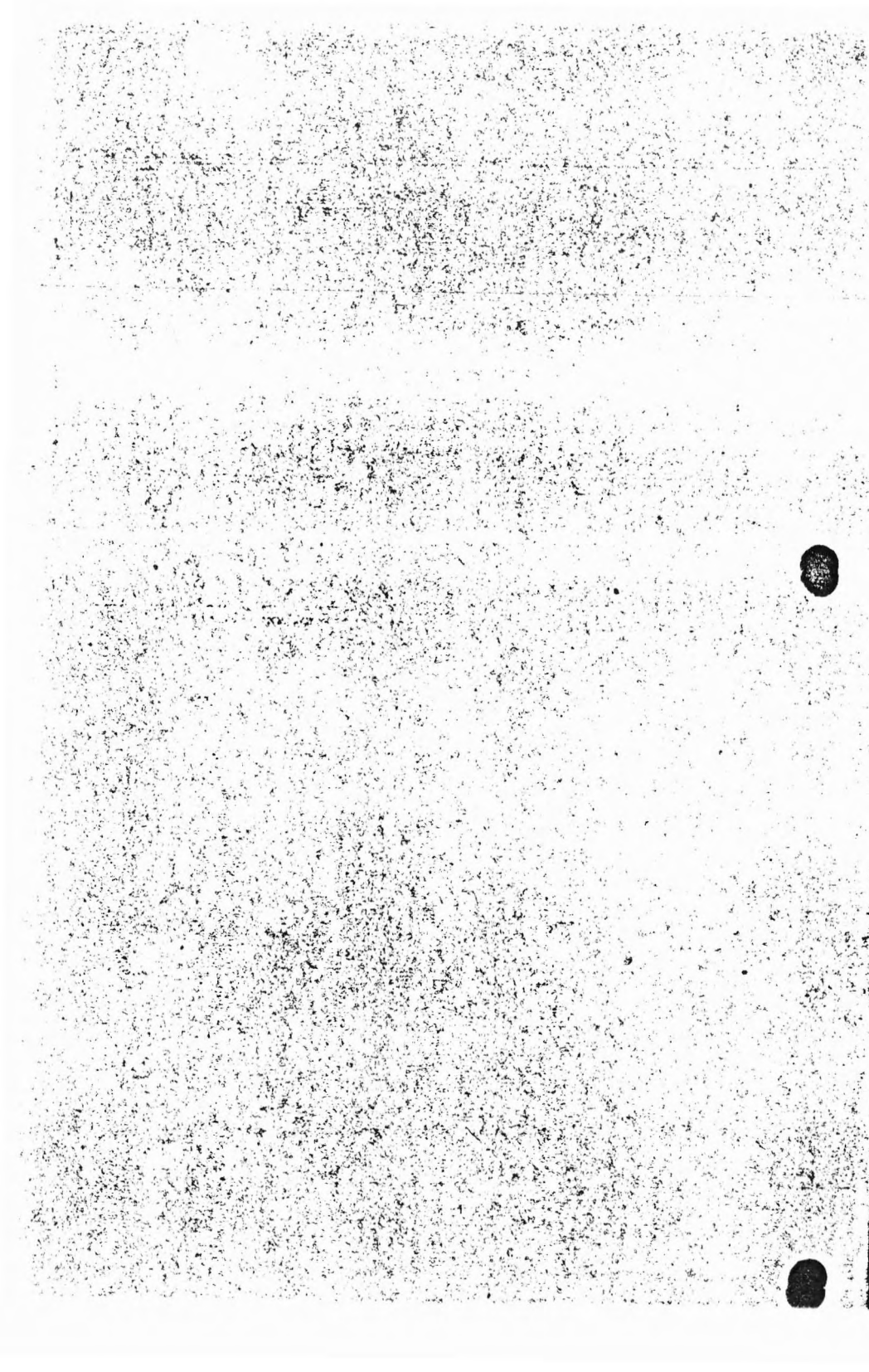
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C. E. COOK Rm. 2205

Supply Division J.C.E.

Procurement Branch



ORDNANCE MAINTENANCE

AZIMUTH INSTRUMENTS M1910 AND M1910A1 (DEGREES)

Prepared under 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 general descriptive matter and detailed instructions for the maintenance and repair of the instruments by ordnance personnel. Figures which accompany the manual show the placement and method of fastening of each of the component parts of the instruments.

c. References.—The Appendix lists all Standard Nomenclature Lists and other publications pertaining to these instruments.

2. **Description.**—*a. General.*—The azimuth instruments M1910 and M1910A1 are observing instruments used in base-end observing and spotting. The instruments measure horizontal angles from 0-360° and may be moved in elevation through approximately 40° although scales are not provided for measurement in elevation. The principal parts are the mount M1910 or M1910A1, the telescope M1910 or M1910A1, the tripod, type A, and accessories. The two instruments are similar, varying slightly in mechanical construction and in electrical equipment.

b. Telescopes M1910 and M1910A1.—(1) The telescope M1910 is shown in figures 1 to 4, inclusive; the telescope M1910A1 in figures 7 to 10, inclusive.

(2) Telescope M1910 and telescope M1910A1 have identical optical characteristics and are each supplied with two interchangeable eyepieces. The optical characteristics with the eyepieces furnished are as follows:

Power.....	10X	15X
Field of view.....	3°	3°
Diameter of exit pupil.....	0.3''	0.2''
Effective focal length of objective.....	24.25''	24.25''
Effective focal length of eyepiece.....	2.41''	1.592''
Apparent field of view.....	30°	45°

(3) The optical system includes an objective (A38374), two porro prisms (A43434), reticle (B135719), and two interchangeable eyepieces (C56454 and C56455). Each eyepiece is marked to identify its power of magnification.

(4) The telescope body (D25991, figs. 3 and 4, for telescope M1910; or D25982, figs. 9 and 10, for telescope M1910A1) positions the objective (A38374) and contains the two porro prisms (A43434). The telescope body contains trunnions (A43372 and B135431) by which the telescope is secured and positioned on the mount. The slow motion depression arm (B135528, figs. 1, 2, and 4; or B135445, figs. 7, 8, and 10) elevates or depresses the telescope. An open sight set in the top of the body permits rapid rough sighting.

(5) The shutter (B135446, figs. 2 and 4 or 8 and 10) protects the objective when the instrument is not in use, pivoting on the body when operated by the lever (A43371).

(6) The focusing nut (A43383, fig. 3 or 9) permits focusing of the objective on the reticle, removing parallax between objective and reticle at all practical object distances. A shoe (A43417A) sliding in the slotted drawtube adapter (B135534 or B135433) prevents rotation of the reticle.

(7) Etched on the glass reticle (B135719, figs. 3 and 4 or 9 and 10) is a horizontal splash scale and a centrally located vertical cross line. The splash scale, graduated at 0.02° intervals and numbered at 0.1° intervals, extends from 1.6° to 4.4° . The vertical cross line at the center is numbered 3° . Operation of the lead screw (A43380) moves the pointer (A43379) across the face of the reticle. On the telescopes M1910 and earlier M1910A1 the reticle consists of cross wires, frame (B135432), and a celluloid splash scale (A43403).

(8) The interchangeable eyepieces focus to accommodate the observer's eye. An earlier type of eyepiece assemblies for telescope M1910, which is no longer manufactured, will be supplied for replacement until the present supply is exhausted. The new eyepiece assem-

blies (C56454 or C56455) cannot be used with the old adapter (X107T) but require the new eyepiece adapter (B135449). An amber ray filter (A43393) moved by filter holder (A43396) provides protection against excessive light.

(9) The mask (B16671, figs. 1, 2, and 3 or 7, 8, and 9) is adjustable. In the proper setting the forehead is almost in contact with it when the maximum field of view is visible through the eyepiece. This condition is obtained when the eye is about 0.6 inch from the eyelens. Pressure of the observer's head against the mask should be avoided to prevent possible deflection of the instrument. The mask found on older instruments may have rubber padding. The present mask is made of black nickel-plated aluminum.

c. Mounts M1910 and M1910A1.—The mount supports the telescope and contains leveling, elevating, and azimuth mechanisms and rests on the tripod, type A, or the pier mount.

(1) The mount for the azimuth instrument M1910 is shown in figures 1, 5, and 6; for the azimuth instrument M1910A1 in figures 7, 11, and 12.

(2) The yoke (D25985, fig. 5; or D25983, fig. 11) retains the telescope trunnions with yoke caps (A43407) and clamping screws (A38882, figs. 5 and 6; or A38282, figs. 11 and 12). The yoke is secured to the spindle of the azimuth worm wheel (C56460, fig. 5) or azimuth gear (C56451, fig. 11) by a fillister head screw and a washer (A43428) and dowel pin.

(3) Two adjustable level vials, type V (A31323, figs. 1 and 6 or 7 and 12), are secured to the flange of the yoke for leveling of the instrument.

(4) The slow motion depression mechanism (figs. 1 and 6 or 7 and 12, sec. C-C) provides fine adjustment of the telescope in elevation. Thumbscrews are used for the fine adjustment and locking. Rapid motion of the telescope is obtained by loosening the clamping thumbscrew (A43675, fig. 2; or A43398, fig. 8), securing the arm to the trunnion.

(5) The azimuth crank (A43678, fig. 5; or A49714, fig. 11) operates the azimuth worm (B135531 or B135439) which turns the housing (D25992 or D25292) relative to the worm gear. Four leveling screws (A43419) are threaded in the worm gear and bear against the leveling plate (B129179).

(6) Coarse readings in azimuth are viewed through the window (A43402, fig. 6; or A49711, fig. 12) on the azimuth scale against the index (A43401). The azimuth scale is graduated at 1° intervals and numbered at 10° intervals. Fine readings are indicated on the

micrometer (A43681, fig. 5; or A43388, fig. 11) against the index (A43432, fig. 5), or against the index line engraved on the lamp bracket (C70135, fig. 11). The micrometer is graduated at 0.01° intervals and numbered at 0.1° intervals.

(7) The throw-out lever (A43404, fig. 5 or 11) meshes or unmeshes the azimuth worm with the azimuth worm wheel or gear to allow rapid traverse of the instrument in azimuth.

(8) The azimuth slow motion arm (B135436) permits rotation of the housing with respect to the yoke. Thumbscrews provide fine adjustment and locking.

(9) An azimuth worm wheel stop (A43479, fig. 5) and a stop stud (A43674 for M1910 instruments or A43433 for earlier M1910A1 instruments) may be used to limit traversing of the instrument when required.

(10) The leveling plate (B129179) supports the mount and is threaded to receive the male thread of the tripod. The leveling plate has a socket in which the leveling ball (A38249), threaded to the worm gear, rotates. The leveling screw shoes slide on the upper surface of the leveling plate while the instrument is leveled or oriented. The rim of the leveling plate is coarsely serrated, forming a hand grip to be used when screwing the plate to the tripod or pier mount.

(11) Three lamps, wired in parallel, provide illumination for the telescope reticle, the azimuth scale, and the azimuth micrometer. A shutter permits regulation of the reticle illumination. Azimuth instrument M1910 is provided with snap switch (B16805, fig. 5). Azimuth instrument M1910A1 is provided with receptacle box assembly (C70134, fig. 12) including a toggle switch (fig. 15). A fuse and resistor unit assembly, 14-0-6 (V16A for 110 volts; V16B for 220 volts) (fig. 16), reduces the voltage from the line to the lamp voltage.

d. Tripod, type A.—(1) The tripod, type A, consists essentially of a metal head and three telescoping wooden legs.

(2) The tripod head (C70128, fig. 13) has male threads to engage the leveling plate. A circular level assembly (B129517) mounted in the tripod head is used for rough leveling of the tripod before mounting the instrument.

(3) The legs are hinged to the tripod head and are secured at the desired height by clamps, brackets, and wing nuts.

(4) A carrying strap is provided.

3. Operation.—*a. Setting up and leveling.*—(1) Extend the tripod legs and clamp them so that the tripod head is approximately

level and at a convenient height above the ground. Space the legs to insure stability. Remove the plumb bob from the packing chest and suspend it from the plumb bob hook below the tripod head. Shift the position of the tripod so that the plumb bob centers over the point on the ground from which the observations are to be made. Level the tripod head with the circular level, assembly, readjusting the lengths of the legs as required.

(2) Remove the mount from its packing chest and screw the leveling plate (B129179) carefully onto the tripod head. Extreme care must be exercised at this point to insure that the threads engage properly. Approximately four turns are required to mount the leveling plate securely, which should be rotated using only the rim, not by turning other parts of the mount.

(3) Remove the telescope from its carrying case and place it on the mount, securing it in place with the clamping screws, and pull back the knob (A43483, fig. 6 or 12, sec. C-C) to allow the depression slow motion arm to fall into place.

(4) Make the necessary electrical connections—

(a) For the azimuth instrument M1910 connect the lead wire assembly (C56482, shown in fig. 14), to the binding posts at the switch (fig. 1). Two leads extend from the switch to the fuse and resistor unit (fig. 16) and thence to the main.

(b) For the azimuth instrument M1910A1 connect the cable and plug assemblies as shown in figure 7. The lead from the power receptacle extends to the fuse and resistor unit and thence to the source of power. When removing the telescope or any of the cable and plug assemblies, the power should be turned off at the source of power or at the fuse and resistor unit to avoid short circuits.

(5) Level the instrument, using the two level vials (A31323) and the four leveling screws (A43419). For best results orient the level vials so that each is parallel to a pair of diagonally opposite leveling screws. Each level is then affected only by the corresponding pair of leveling screws. Each pair of leveling screws is operated by lowering one screw and raising the other. Care should be taken that the screws are tightened only until a snug contact is made.

(6) If conditions permit, test the adjustment of the level vials as described in paragraph 5c.

b. Focusing.—To focus the telescope on a target two operations are required.

(1) Focus the eyepiece on the reticle by rotating the eyepiece until the reticle markings appear clear and distinct. The lower power eye-

piece offers a wider field of view and a brighter, steadier image than that obtained with the higher power eyepiece. However, the focusing procedure is the same with either eyepiece.

(2) Focus the eyepiece and reticle on the objective by turning the focusing nut until parallax between the reticle and image has been removed.

c. Orienting.—(1) Set the azimuth slow-motion thumbscrew (A43480, fig. 6; or A49901, fig. 12) so that the slow motion arm (B135436) is approximately in midposition. This thumbscrew is clamped or unclamped by the clamping thumbscrew (A38260).

(2) If necessary, loosen the arm clamping screw (A38251) and rotate the yoke relative to the azimuth housing so that the telescope is in the position shown in figure 1 or 7. This places the azimuth worm crank convenient to the right hand of the observer.

(3) Select a datum point of known azimuth and, by means of the azimuth worm crank, set the azimuth scale and micrometer to indicate the exact number of degrees and hundredths of degrees of this azimuth. This setting should not be disturbed during the remaining orienting operations.

(4) In the case of the model 1910A1, release the four leveling screws and rotate the entire upper part of the mount relative to the leveling plate, taking care not to unscrew the leveling plate from the tripod head, until the datum point appears approximately in the center of the field of view of the telescope. In the 1910 model, one of the level shoes is fitted to the leveling plate.

(5) Level the instrument again (par. 5c), loosening the clamping screw (A38251), and rotating the yoke relative to the azimuth housing, if necessary, to align the level vials properly. After leveling, return the yoke to its previous position and tighten the clamping screw. The vertical line of the reticle should appear approximately on the datum point.

(6) By means of the azimuth slow motion thumbscrew, released by the clamping thumbscrew (A38260), bring the vertical line of the reticle to appear exactly on the datum point. If additional travel is required, the clamping screw (A38251), may be loosened temporarily to permit moving the azimuth slow motion arm (B135436) a small distance. It should be noted, however, that a large amount of motion at this point will place the azimuth worm crank in a position inconvenient to the right hand of the observer. Except for this difficulty, this motion alone could be used for orientation purposes instead of loosening the leveling screws.

(7) See that the clamping screw (A38251), clamping thumbscrew (A38260), and leveling screws (A43419), are properly tightened. Once the instrument is properly oriented, these screws must not be disturbed. Verify the azimuth indication and the center of the datum point on the reticle.

d. Observing.—(1) Motion of the telescope in azimuth is obtained by means of the azimuth work crank, and the azimuth indications are indicated on the azimuth scale (coarse, 1° divisions) and azimuth micrometer (fine, 0.01° divisions). The azimuth worm crank may be disengaged, if desired, by means of the azimuth worm throw-out cam lever (A43404), so as to permit rapid traversing of the instrument, but the final setting and reading should be made with the worm in mesh.

(2) The pointer (A43379) is moved across the face of the reticle by rotating the knurled handle of the lead screw (A43380). The pointer indicates lateral deviations of fire by marking the point of splash, which can then be referred to the graduated scale on the reticle.

(3) To move the telescope quickly in elevation, first loosen the clamping screw (A43675, fig. 2; or A43398, fig. 8). The depression slow motion mechanism (fig. 6 or 12, sec. C-C) is used for fine adjustment.

4. Inspection.—Inspection is made for the purpose of determining the condition of the azimuth instrument, whether repairs or adjustments are required, and the remedies necessary to insure serviceability and proper functioning.

a. Telescopes M1910 and M1910A1.

Parts to be inspected

- (1) Exposed mechanical parts.
- (2) Open sight.
- (3) Optical system.

Points to be observed

- (1) Observe general appearance and check for bent or missing parts.
- (2) The line of sight should intersect the optical line of sight within approximately 5 mils.
- (3) Note if checks or frost patterns appear in the field of view. Such defects are evidence of loosening of the balsam used in cementing lenses and, if severe, require the return of the instrument to an arsenal for overhaul. Note presence of objectionable scratches on lenses.

Parts to be inspected

- (4) Reticle.
- (5) Eyepiece assemblies.
- b. Mounts M1910 and M1910A1.*

Points to be observed

- (4) Test for verticality of the cross line of the reticle by sighting on a plumb line with the instrument level.
- (5) Using the collimating telescope (No. 98, optical repair kit), focus the eyepiece for sharpness and clarity of definition.
- (1) Exposed mechanical parts. (1) Observe general appearance, smoothness of operation of knobs, etc. and check for any bent or missing parts. Graduations should be clearly legible.
- (2) Worm mechanism. (2) Operate the azimuth worm crank (A43678 or A49714) throughout entire range and check for backlash or tightness. The azimuth throw-out lever (A43404), should function properly.
- (3) Azimuth micrometer. (3) Turn the crank until a graduation on the azimuth scale is alined exactly with its index. The zero graduation on the micrometer should then be exactly alined with its index.
- (4) Level vials. (4) See that the two level vials (A31323) are secure in their housings and unbroken. Level the instrument and observe whether the bubbles remain central when the yoke is slowly rotated through 360°.
- (5) Illumination. (5) Check the lamps, switch, and the fuse and resistor unit.
- (6) Worm wheel felt strip. (6) When the yoke and housing have been separated, examine the felt strip. If not in good condition it should be replaced.

c. Tripod, type A.

Parts to be inspected

Points to be observed

- | | |
|-------------------------------|--|
| (1) Exposed mechanical parts. | (1) Observe general appearance smooth working of legs, wing nuts, clamps, etc. |
| (2) Circular level. | (2) The circular level should be secure and unbroken. |

5. Maintenance and repair.—a. *Tools*.—(1) *Optical repair kit for harbor defense*.—An optical repair kit containing the necessary tools, fixtures, cements, oils, etc., for use with this instrument is furnished to seacoast shops. A complete list of the items comprising the kit is contained in a blueprint which is fastened in the cover of the chest. Every item in the kit is designated by a number equivalent to the compartment number. Most of the items as screw drivers, etc. require no description as their uses are self-explanatory. The collimating telescope, No. 98, which is furnished with the kit is an ordinary, nonerecting type. It is adjusted for parallax by focusing the eyepiece on the cross wires and then removing parallax by turning the focusing nut to focus the objective. The magnifying power of the collimating telescope is 8.13X; the field of view is 3°.

(2) *Other tools*.—Other tools required for this instrument are described in paragraph 7.

b. *Disassembly and assembly*.—Disassembling of the instrument may be required for cleaning or repair. Repairs which necessitate disassembly and reassembly are limited to those which do not affect the optical alinement of the instrument. Repairs involving realignment, removal, or replacement of optical parts, or repairs which cannot be made with the facilities available, will require that the instrument be turned in to the base shop or arsenal. Assembly may be made by reversing steps taken in disassembly except where indicated. Reference to the figures will indicate relationship of parts.

(1) *Telescopes M1910 and M1910A1*.—(a) *Body*.—The cover (B135535 or B135430) may be removed to dust or clean the porro prisms in position.

(b) *Reticle lamp assembly*.

1. *Telescope M1910 and early M1910A1*.—To remove lamp socket assembly, press the knurled collar in and turn it to the left.

2. *Telescope M1910A1, present manufacture*.—To remove lamp socket assembly, unscrew from the lamp holder (B13805 fig. 10), using the knurled collar (A34886).

3. Pull out the shutter (B135434, figs. 4 and 10), after removing the stud (A43376).
4. To replace either of the two windows (A43374), remove the retainer (A43375) and its locking screw.
5. To replace the reflectors (A43384 or A43385), remove the securing fillister head screws.

(c) *Reticle pointer*.—To take up longitudinal play, tighten the split round nut (A43381, fig. 4 or 10). To remove the pointer mechanism, withdraw the two fillister head screws (fig. 3 or 9) and pull the mechanism out. Care should be taken to avoid bending the pointer or scratching the reticle.

(d) *Eyepiece assemblies*.—The eyepiece assemblies may be interchanged by unscrewing one eyepiece assembly from the adapter, and screwing the other eyepiece assembly into the adapter. One eyepiece assembly should always be left in the telescope to avoid accumulation of dust or moisture.

(e) *Slow motion depression arm*.—Remove the washer (A43373, fig. 4 or 10) and its three retaining screws. Unclamp the arm and slip it off the trunnion.

(f) *Mask*.—To remove the mask assembly (C44262) loosen the thumbscrew (A39576, fig. 4; or A43508, fig. 10).

(g) *Shutter*.—Remove the lever (A43371, fig. 4 or 10) secured to the shaft (A43476) by a taper pin and withdraw the shaft. Remove the plunger (A43477) and the compression spring (A43415). If the plunger is jammed or corroded in its seat it may be pushed or tapped out with a pin through the access hole shown in figure 4 or 10.

(2) *Mounts M1910 and M1910A1*.—(a) *Yoke and housing*.—Remove the fillister head screw (BCCX1BA) and washer (A43428, fig. 5 or 11). For mount M1910 and early mount M1910A1, remove the stop (A43479). Throw the azimuth worm out of mesh with the azimuth gear and lift both yoke and housing off the spindle of the azimuth gear. To separate the yoke and housing remove the four screws and washer (A43424).

(b) *Azimuth index*.—The azimuth index (A43401), the window (A43402), and their two retaining screws (fig. 6 or 12) may be removed after the yoke and housing have been disassembled.

(c) *Leveling plate*.—Remove the flat head locking screw (BCLX3DD, fig. 5 or 11) and unscrew the leveling ball (A38249).

(d) *Azimuth worm mechanism*.

1. Unscrew the special fillister head screw (A43679, fig. 5; or A43387, fig. 11).

2. Remove the crank (A43678 or A49714), the micrometer (A43681 or A38388), and washer (A49902, fig. 11).
3. Remove the lamp bracket (B135529 or C70135), and its locking screw.
4. Remove the cover (B135435) secured by five screws.
5. Remove the worm bearing support (A43389, fig. 6 or 12) secured by two fillister head screws.
6. Remove the special screw (A43399) on which the worm housing (B135530, fig. 5: or B135442, fig. 11) pivots.
7. Push worm inside to clear azimuth housing and remove with washer (A49903, fig. 11).
8. Remove the special headless screw (A43680, fig. 5) or screw (A43409, fig. 11) and slide out the bushing (B135533 or B135440).
9. Pull the worm out of the worm housing.
10. Disassemble the throw-out lever (A43404) driving out the taper pin securing it to the cam (A43422).

(e) *Clamping screws.*—To remove the clamping screws (A38882, fig. 6, sec. C-C; or A38282, fig. 12, sec. H-H), remove the securing round nut in the counterbored recess on the under side of each yoke cap. When reassembling make sure that the nut has been run up snugly against the shoulder of the thumbscrew.

(f) *Level vials.*—To remove the level vials (A31323, fig. 6 or 12), disassemble the holder (B135444) from the yoke. Unscrew the plugs (A43478) and remove all broken glass and old packing from the cavity. Place new vial in position. center graduations in opening, and pack level vial lightly in position with paper strips. Secure with calcined gypsum (plaster of paris) which has been mixed to medium consistency. Replace plugs. Remove excess plaster from surfaces after plaster has set. For adjustment after reassembly to yoke see *c* below.

(g) *Slow motion depression mechanism.*—To remove the plunger (A43423, fig. 6 or 12), unscrew the plug (A43429).

(h) *Slow motion azimuth mechanism.*—To remove the plunger (A38252, fig. 6 or 12), unscrew the plug (A38982 or A38283).

(i) *Binding posts* (mount M1910 and early M1910A1 only).

1. To remove binding post (A43510, fig. 6, sec. F-F), unscrew the special fillister head screw (A43511). In reassembly make sure that the binding post is insulated from the housing.
2. Binding post (A43673) should be disassembled only when the yoke and housing have been disassembled from the

azimuth gear. Unscrew the hexagon nut (A43426, fig. 6, sec. G-G), and withdraw the binding post and insulating washer and bushing.

(j) *Receptacle box assembly* (M1910A1, present manufacture only).—To remove the receptacle box assembly (C70134, fig. 12), withdraw the two long fillister head screws securing it to the housing after the box has been disconnected from the source of power.

c. *Adjustment*.—(1) *Levels*.—Level the instrument and observe the level bubbles as the instrument is rotated slowly in azimuth. If they remain central, the levels are in correct adjustment. If one or both bubbles move, the following adjustment is to be made:

(a) Set the level to be adjusted parallel to a pair of diagonally opposite leveling screws and adjust the pair until the bubble is central.

(b) Turn the instrument 180° in azimuth.

(c) By means of the level adjusting screws (BCGX3DG, fig. 6 or 12) return the level bubble *halfway* to its original central position.

(d) Relevel the instrument, rotate it 180° , and again note the position of the bubbles. Repeat the operation, if necessary, until the best possible adjustment is obtained.

(2) *Azimuth micrometer*.—If the azimuth micrometer requires adjustment, turn the azimuth crank until a graduation on the azimuth scale alines exactly with its index. Loosen the three fillister head screws in the end of the micrometer (fig. 5 or 11) and turn the crank until the micrometer zero graduation is alined with its index. Tighten the three screws.

(3) *Azimuth worm and gear*.—To vary pressure between the azimuth worm and gear, move aside the spring cover (Q2A, fig. 5) and turn the headless flat-point screw (A43680) then exposed, or remove the special fillister head screw (A43485, fig. 11), and turn the headless flat-point screw (BCU1FK) with a screw driver until the desired pressure is obtained.

6. *Care and preservation*.—a. *Care in handling*.—(1) The instrument contains delicate and highly accurate mechanism and the telescope contains precise optical parts. Careful handling is imperative to avoid damage caused by unnecessary shocks, straining, etc.

(2) An eyepiece assembly should always be left in the eyepiece adapter even when the instrument is not in use.

(3) Leveling and clamping screws must not be tightened beyond a snug contact. Excessive wear of threads and other damage are thereby avoided.

(4) The azimuth throw-out lever must not be snapped into mesh. When disengaging the worm and worm gear, move the lever suffi-

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ciently to allow the teeth to clear. With this procedure, excessive wear and burring of the teeth can be avoided.

(5) When the instrument is not in use it should be protected by the cover provided or should be placed in its carrying case and chest. Cover the objective with the shutter when the instrument is not in use.

b. Lubrication.—The mount should be lubricated occasionally with lubricants furnished by the Ordnance Department for fire-control instruments.

(1) The prescribed lubricants are—

(a) Oil, lubricating, for aircraft instruments and machine guns.

(b) Grease, special, low temperature. This lubricant is used where a soft or medium grease is required.

(2) Only a few drops of oil at long intervals are required in the oil cups provided.

(3) External contact surfaces should be sparingly greased or oiled. The telescope trunnions should be lightly oiled or greased before assembly to mount. The plunger mechanisms should be sparingly lubricated.

(4) The azimuth worm and gear should be lightly greased with grease, special, low temperature, at long intervals. Application of new grease should be preceded by thorough cleaning of old grease and dirt from the parts with solvent, dry-cleaning.

(5) Excess oil or grease should be wiped off.

c. Optical parts.—(1) To obtain satisfactory vision, it is necessary to keep the exposed surfaces of the lenses and other parts clean and dry. Corrosion and etching of the glass surfaces can thus be prevented or retarded.

(2) Moisture due to condensation may collect on the optical parts of the instrument when the temperature of the instrument is below that of the surrounding air. This may be removed by placing the instrument in a warm place. Heat from strongly concentrated sources should never be applied directly as it may cause unequal expansion of parts with resulting inaccuracies in observation.

(3) For dusting optical parts use only a clean camel's-hair brush. For wiping, use only the paper specially intended for cleaning optical glass—paper, tissue, lens.

(4) To remove oil or grease from optical surfaces, apply ethyl alcohol very sparingly with a clean camel's-hair brush and rub gently with clean lens paper. If alcohol is not available, breathe on the glass and wipe off with clean lens paper; repeat this operation several times until clean. The porro prisms may be swabbed if required through the access hole covered by the open sight.

(5) To remove dust, brush the glass lightly with a clean camel's-hair brush and rap the brush against a hard body in order to knock out dust particles clinging to the hairs. Repeat until dust is removed.

(6) Do not wipe lenses or windows with the fingers.

(7) Polishing liquids or pastes are not to be used for polishing lenses or windows.

7. Accessories.—*a.* The electrical equipment furnished with this instrument includes a fuse and resistor block for 110 volts or 220 volts only. Four inclosed cartridge fuses, 250-volt, 3-amp, and five special short candelabra-base lamps, rated at 2 cp, 34 to 38 volts, 0.2 to 0.24 amp, and a unit resistor are included.

b. A carrying case furnished with each telescope provides seats for the telescope and the second eyepiece.

c. A packing chest furnished with each mount provides holders for the following items: plumb bob, camel's-hair brush, sash tool brush, adjusting pins, screw driver.

(1) The plumb bob furnished with a 60-inch plumb line is used for locating the instrument over a point on the ground.

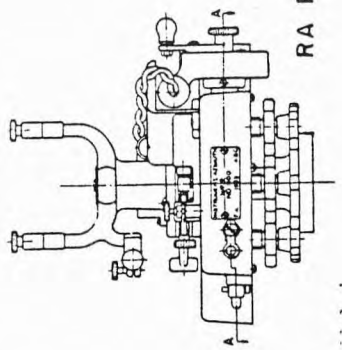
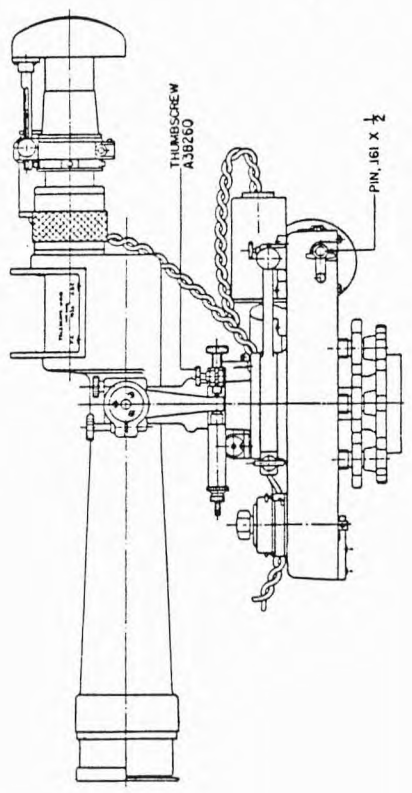
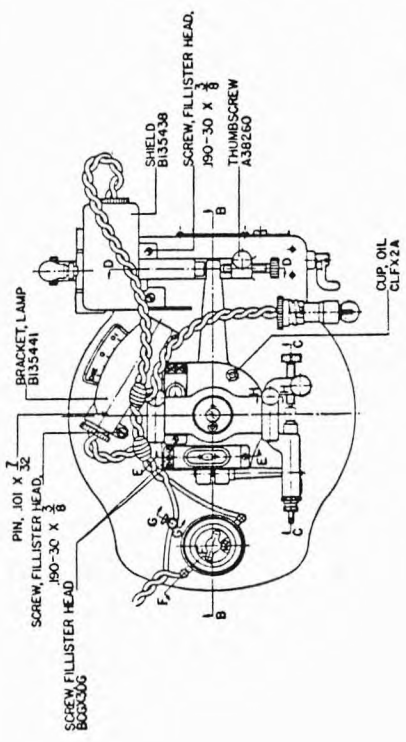
(2) The camel's-hair brush is used for removing dust from the telescope lenses. It should be kept clean and dry and should not come into contact with grease or oil.

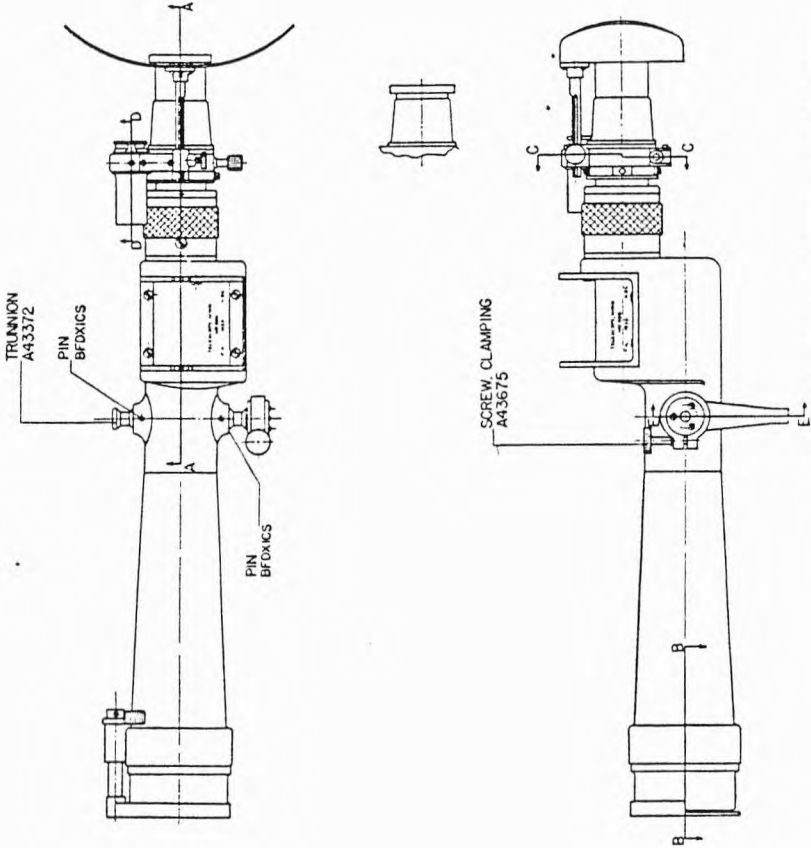
(3) The sash tool brush is oval-shaped and has the bristles laid to a chisel edge. It is used for removing dust from the dry metal surfaces of the instrument and is not to be used on optical parts.

d. The canvas cover provided with the instrument is used for protection when the instrument is left mounted on the tripod or pier mount.

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Figure 2.—Telescope M1910—-assembled views.

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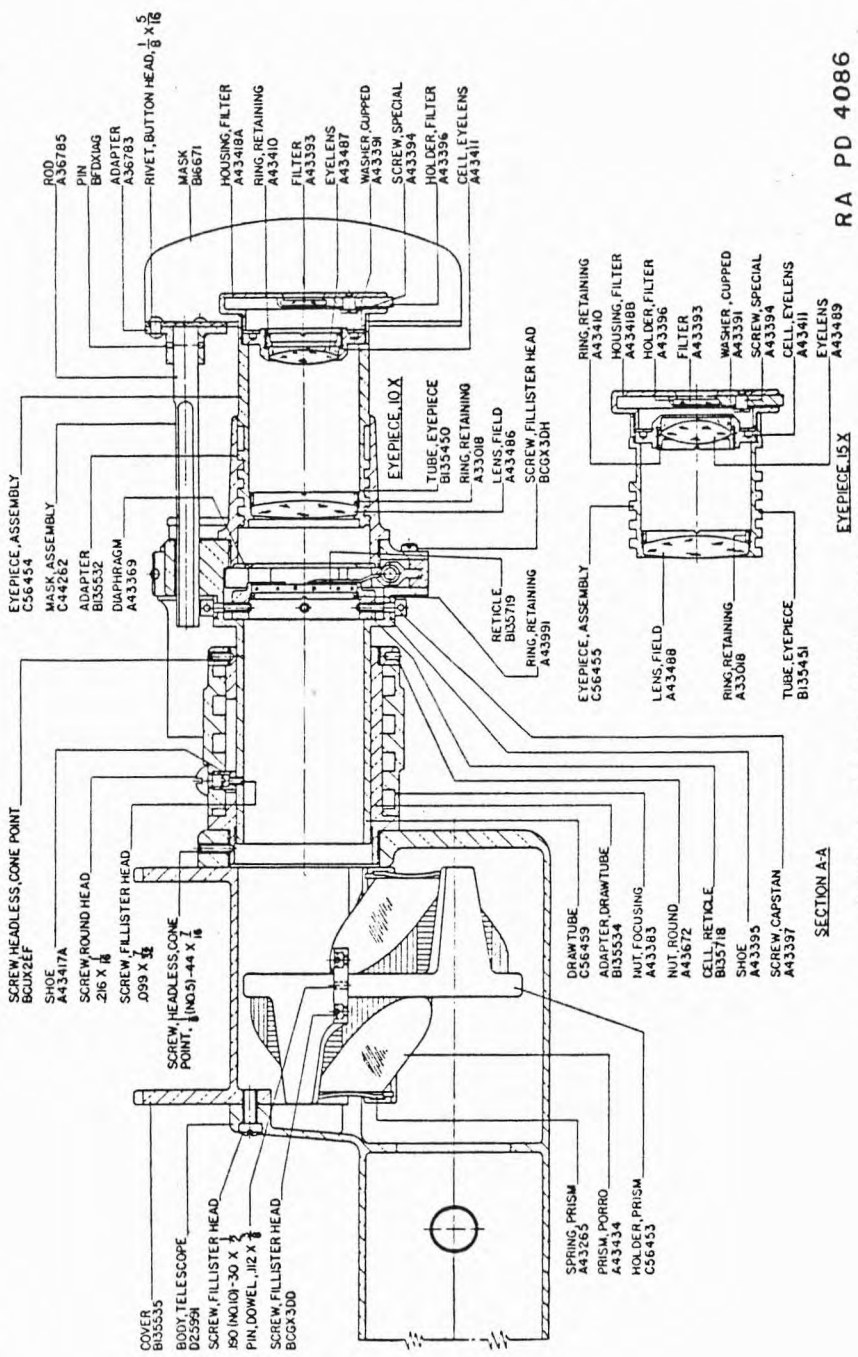
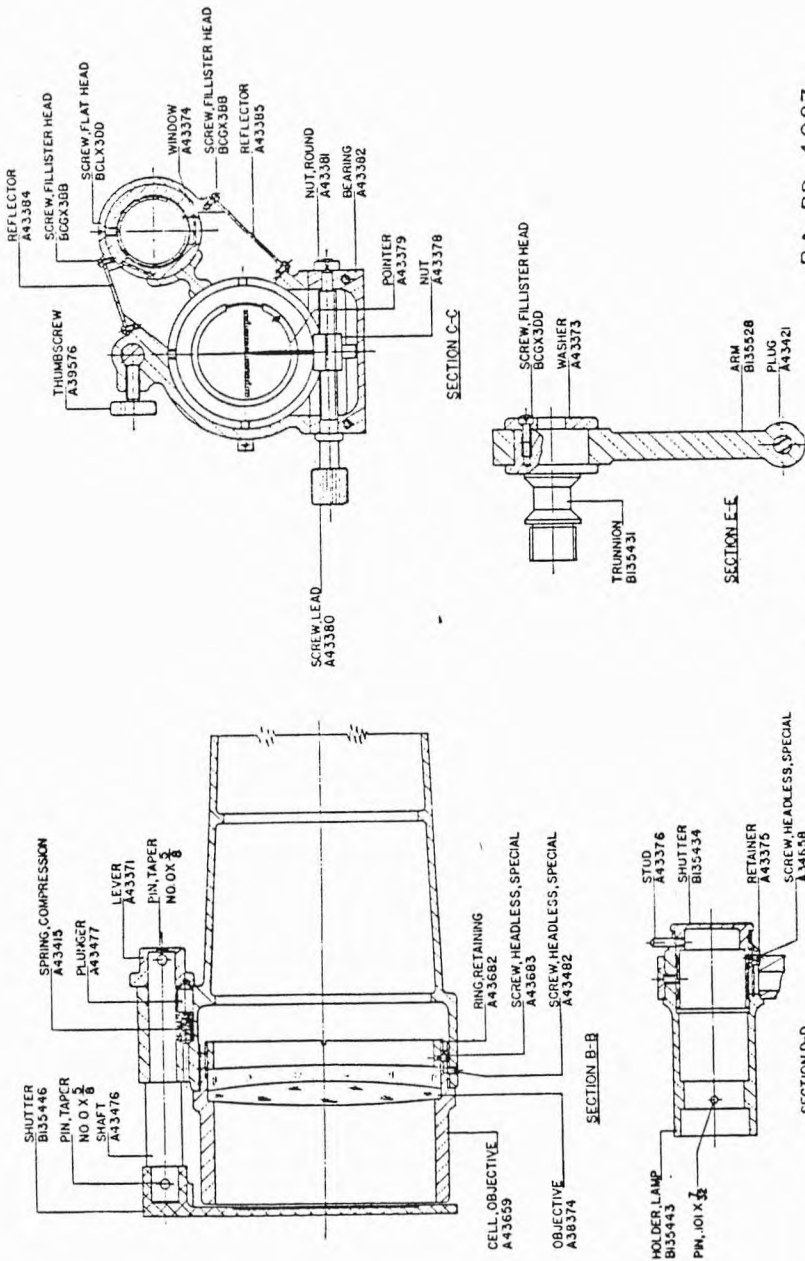


FIGURE 3.—Telescope M1910—sectioned views.

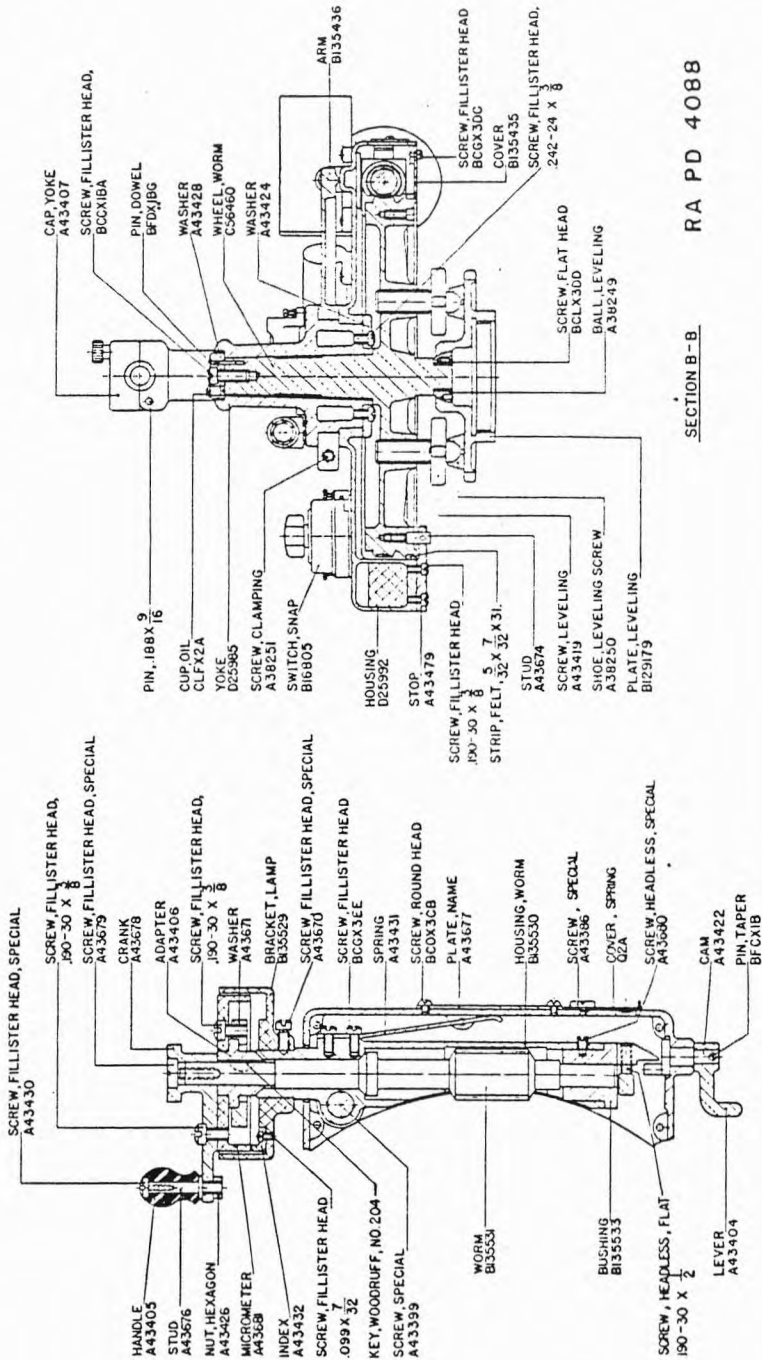
RA PD 4086



RA PD 4087

FIGURE 4.—Telescope M1910—sectioned views.

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FIGURE 5.—Mount for azimuth instrument M1910—sectioned views.

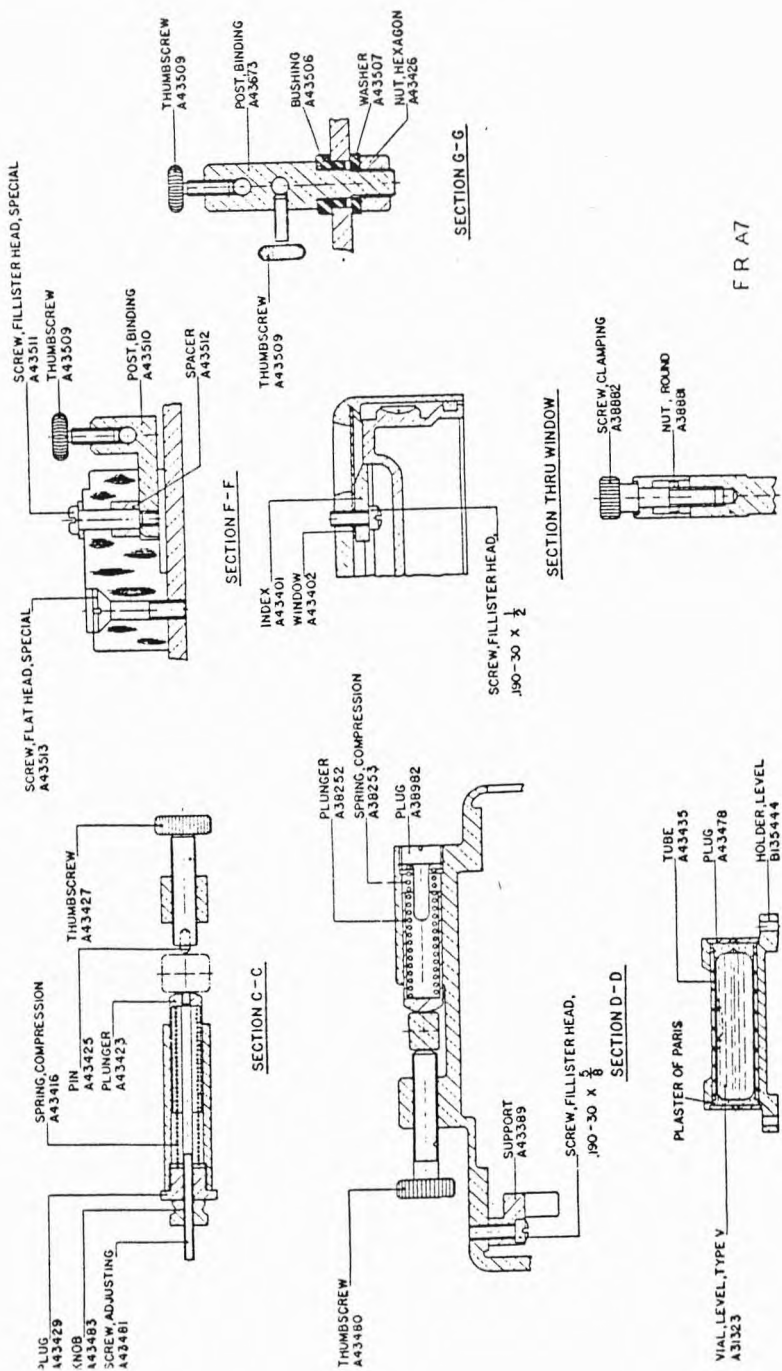


FIGURE 6.—Mount for azimuth instrument M1910—sectioned views.

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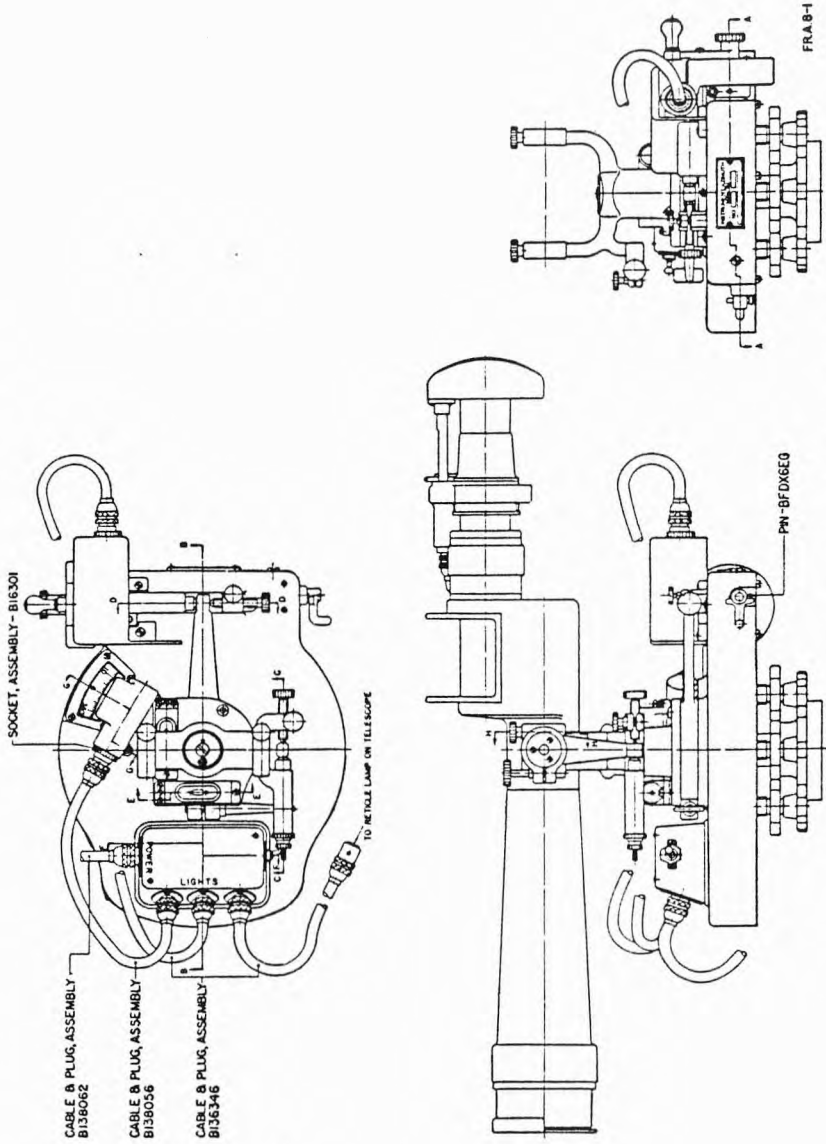


FIGURE 7.—Azimuth instrument M1910A1—assembled views.

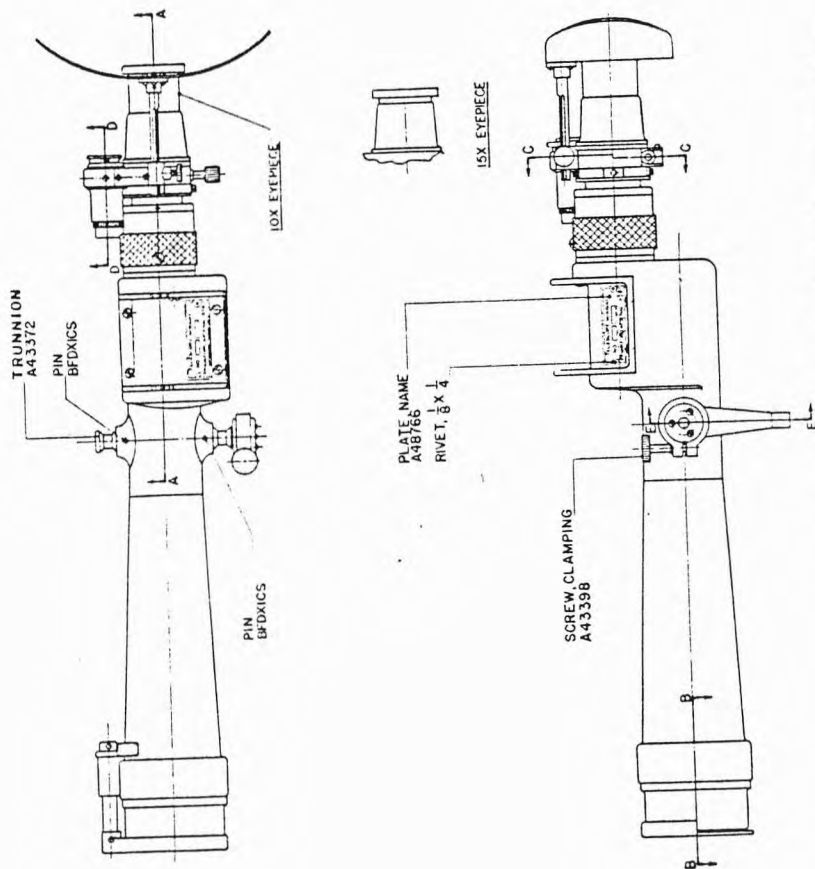


Figure 8.—Telescope M1910A1—-assembled views.

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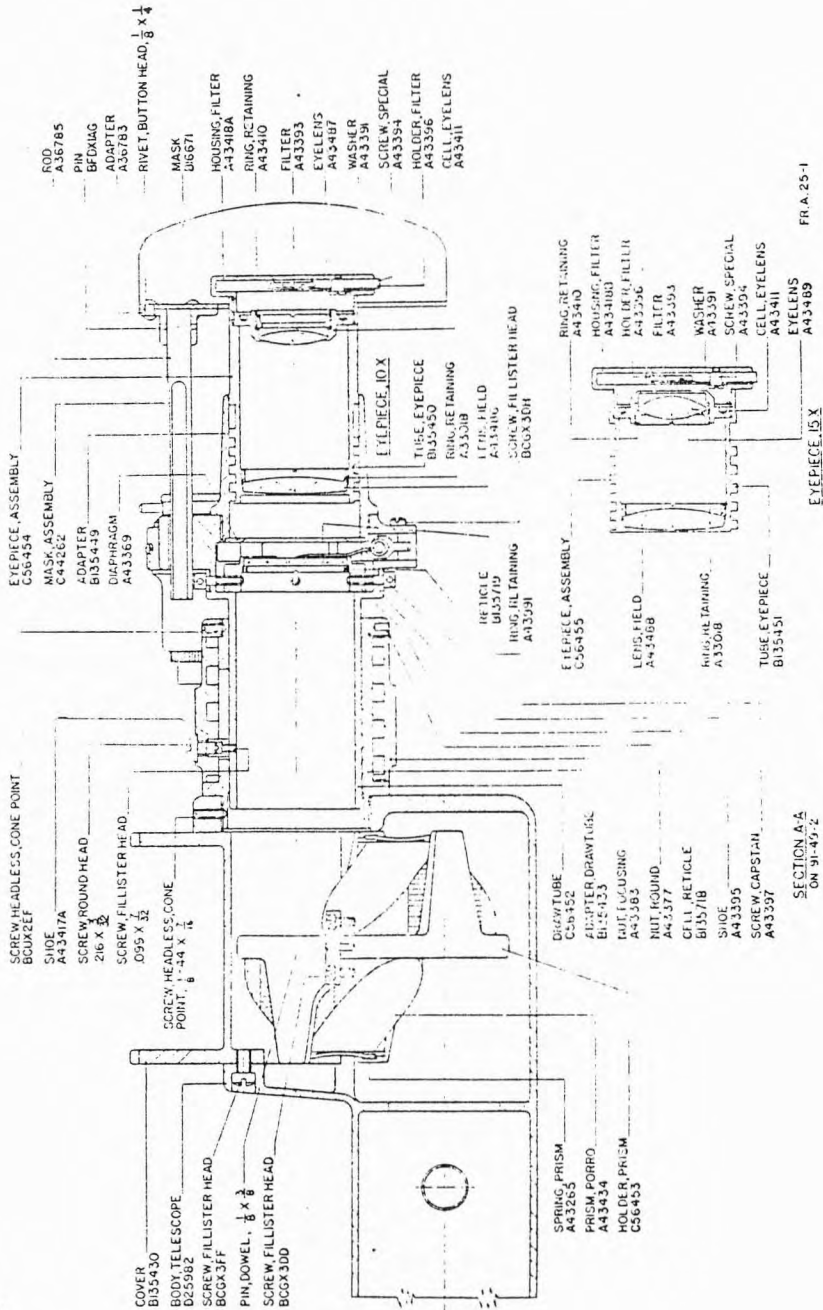


FIGURE 9. Telescope M1910A1 sectioned views.

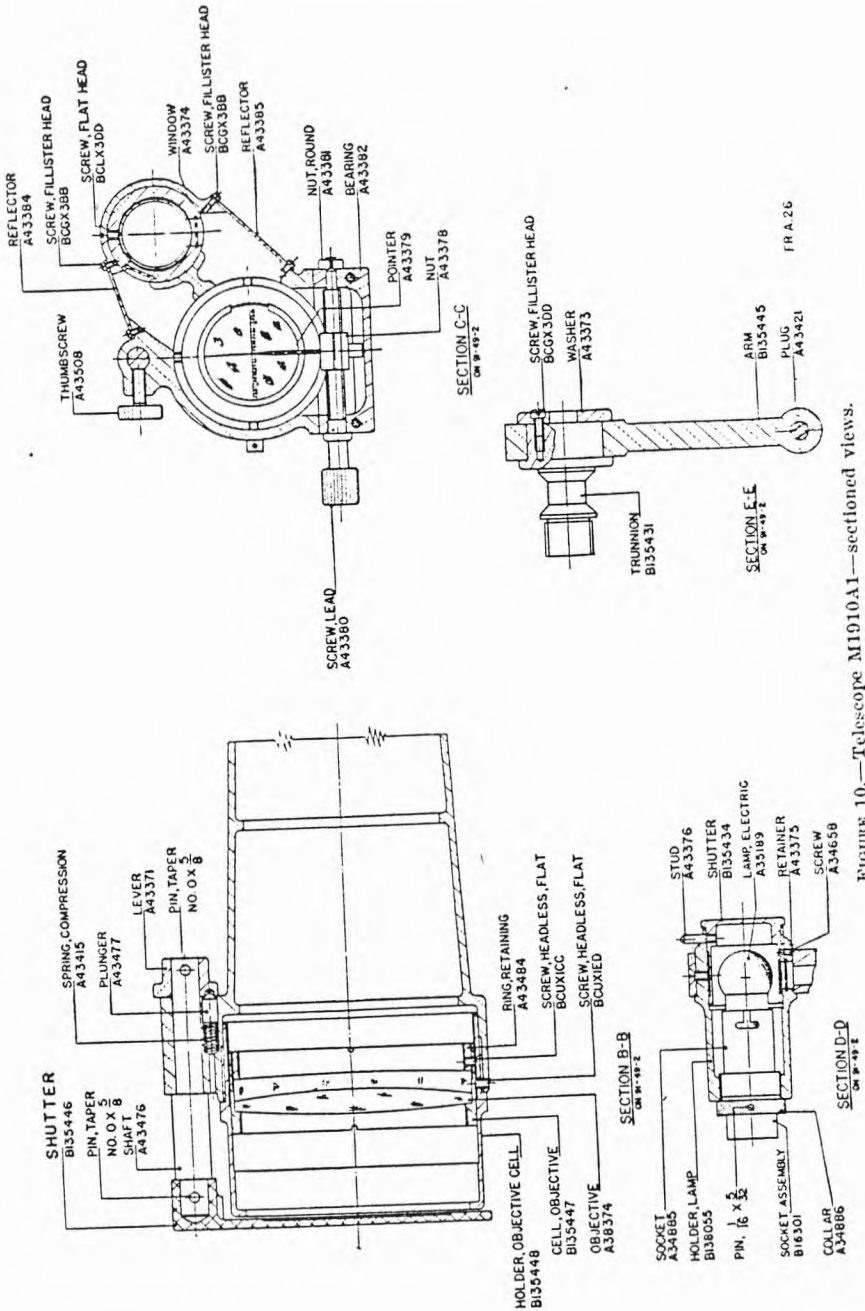


FIGURE 10.—Telescope M1010A1—sectioned views.

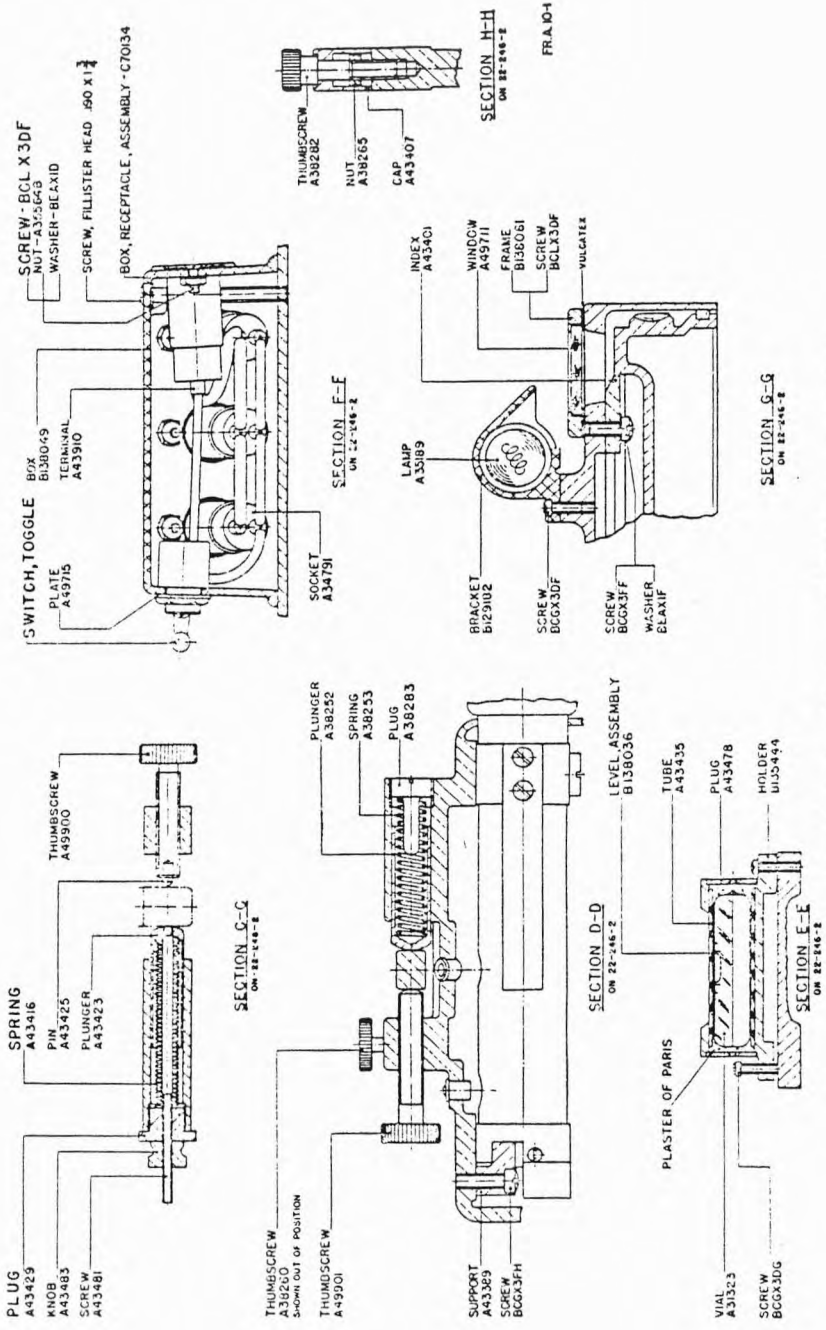


FIGURE 12.—Mount for azimuth instrument M1910A1—sectioned views.

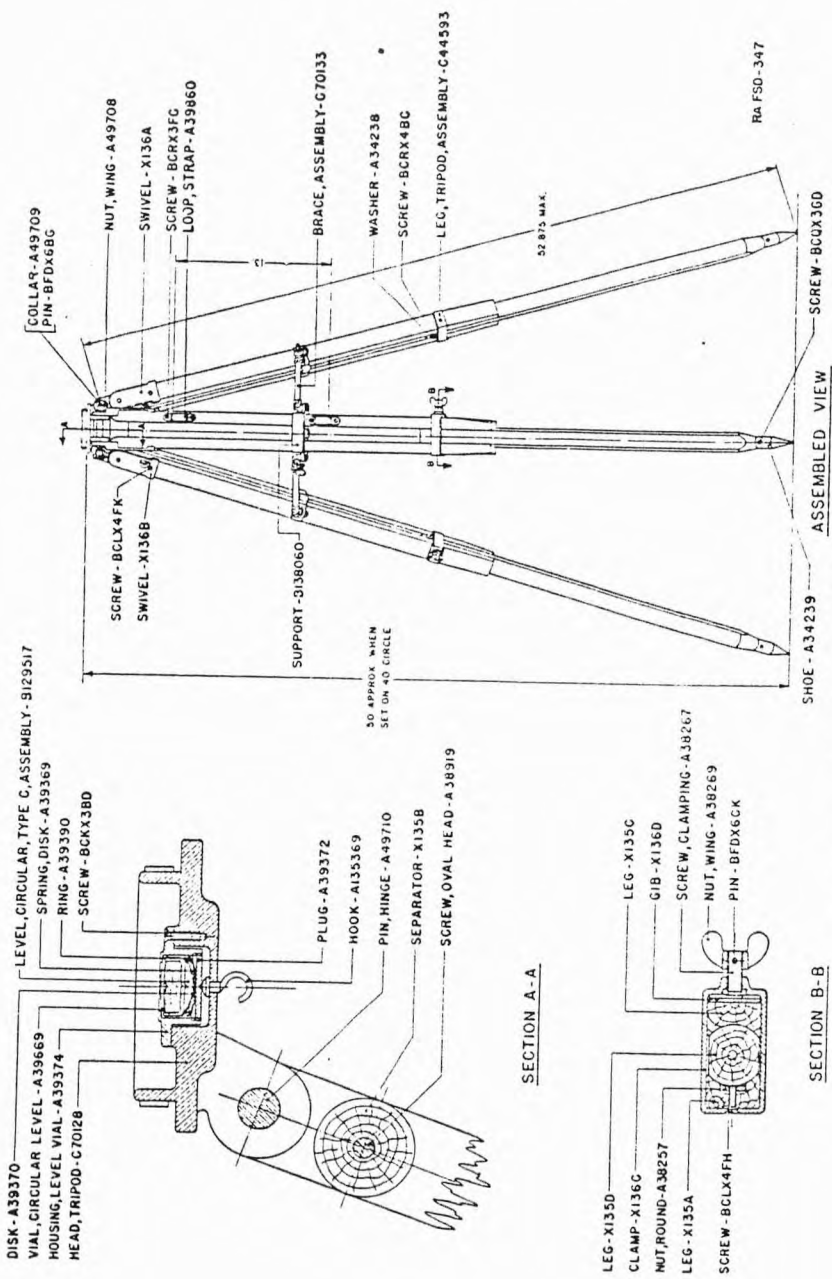
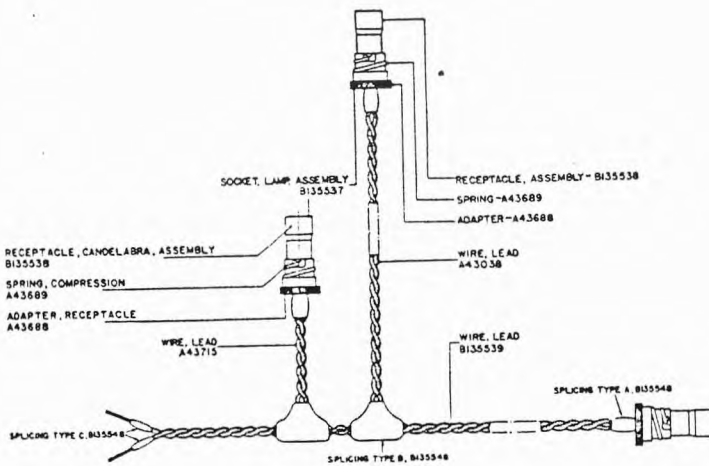


Figure 13.—Tripod, type A—-assembled and sectioned views.

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FIGURE 14.—Lead wire assembly.

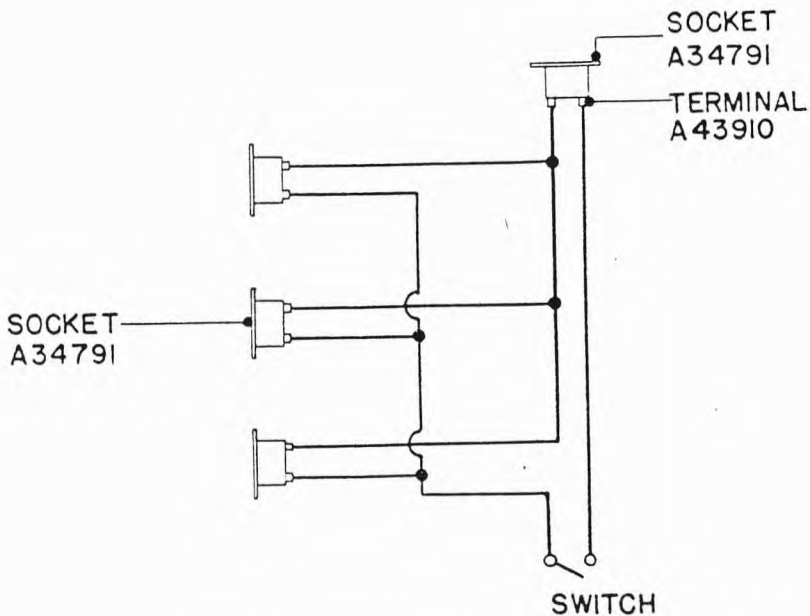
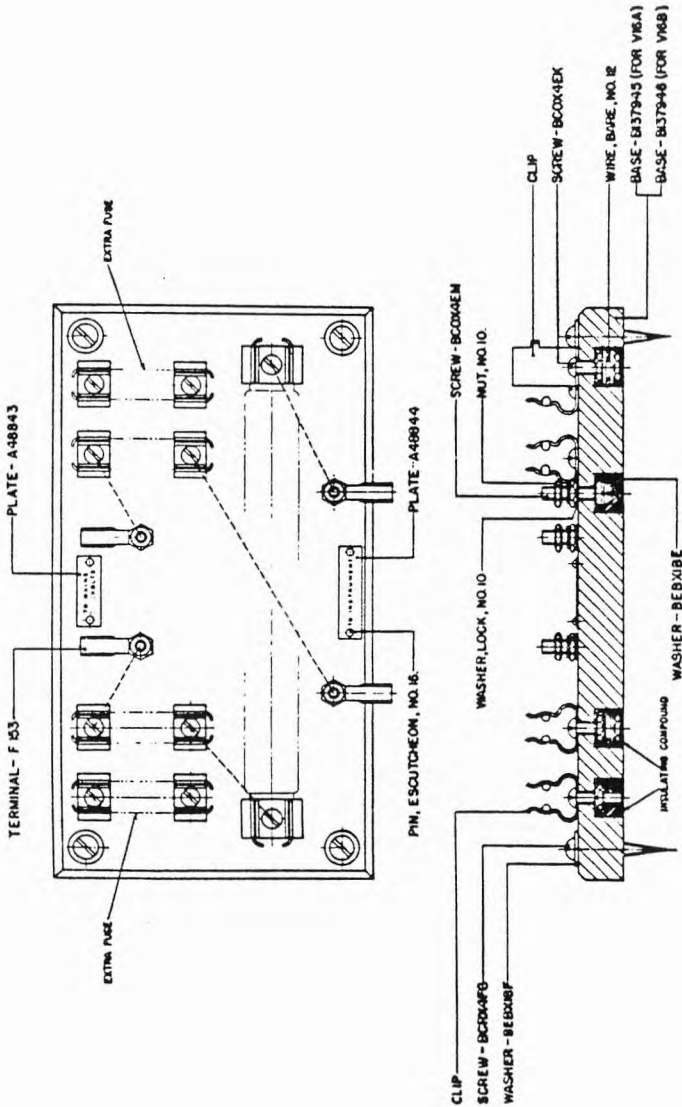


FIGURE 15.—Wiring diagram for receptacle box.

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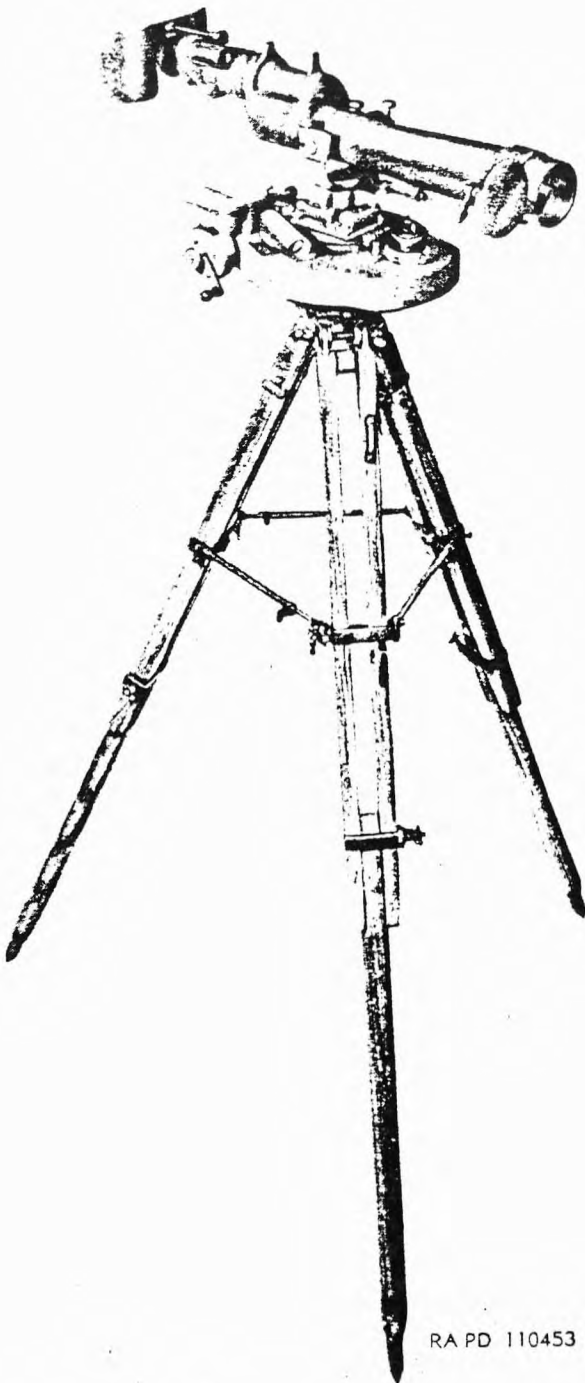
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BLOCK, FUSE AND RESISTOR UNIT ASSEMBLY
 FOR 100 WATT RESISTORS (VMSA)
 FOR 200 WATT RESISTORS (VMSB)

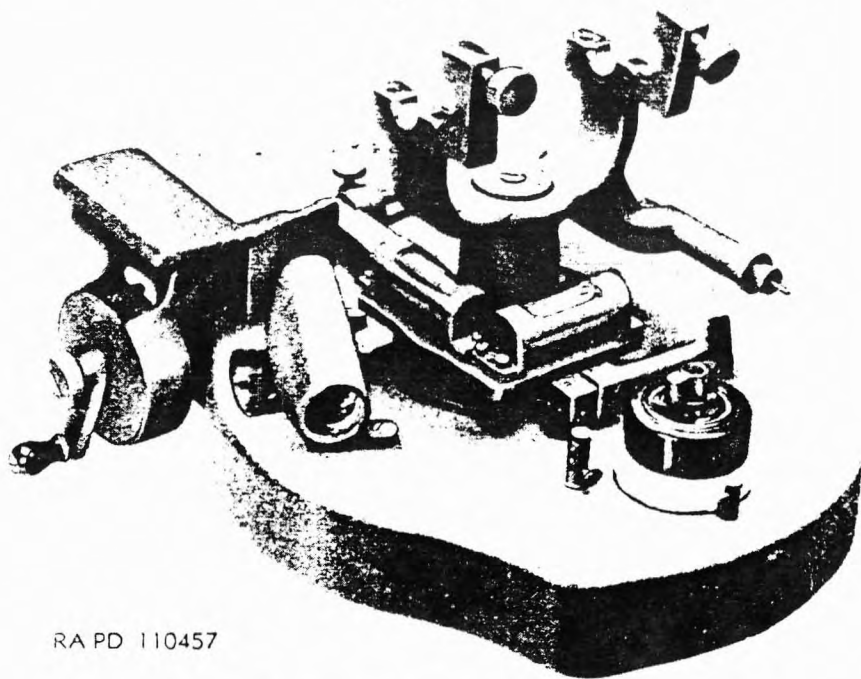
RA PD 4089

Figure 16.—Fuse and resistor unit block assembly.



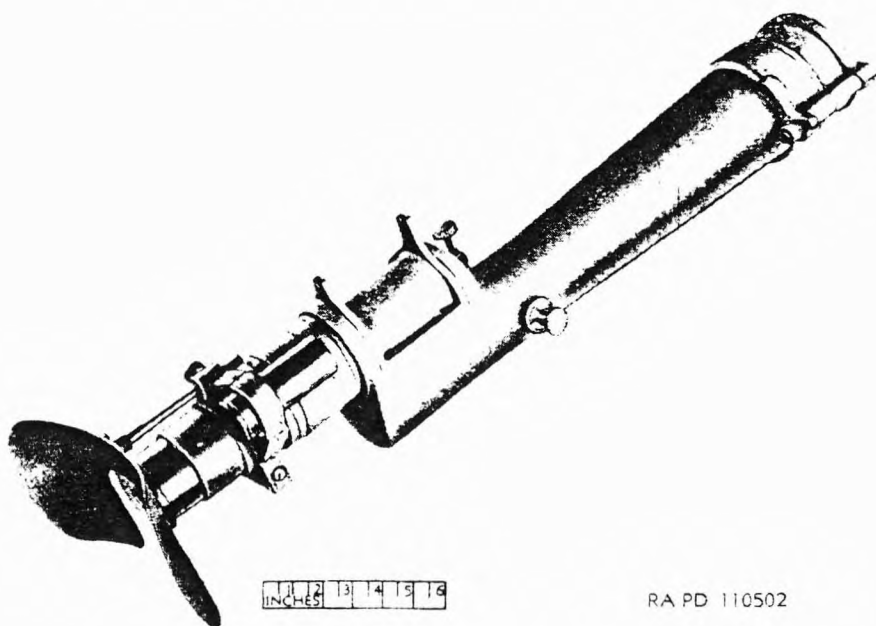
RA PD 110453

Figure 88. Instrument, azimuth, M1910, w/e.



RA PD 110457

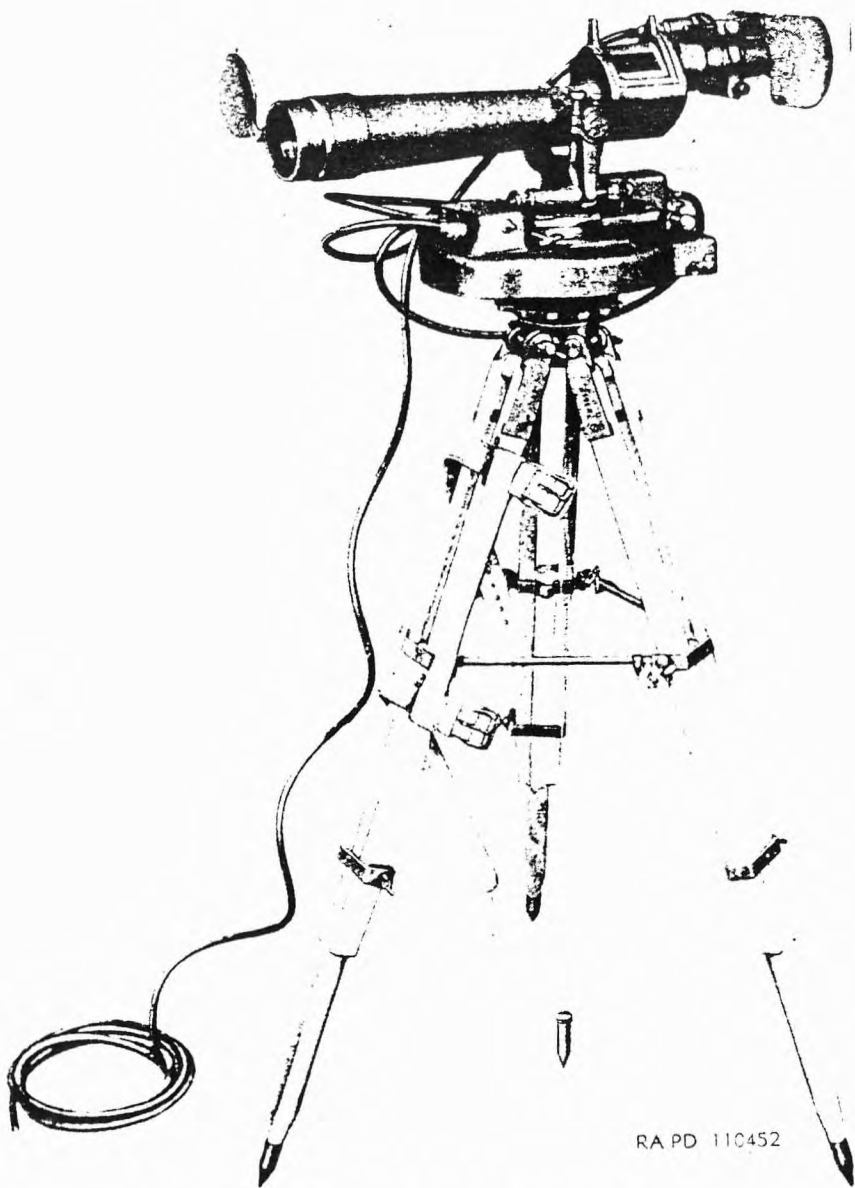
Figure 89. Mount, for instrument, azimuth, M1910.



1 2 3 4 5 6
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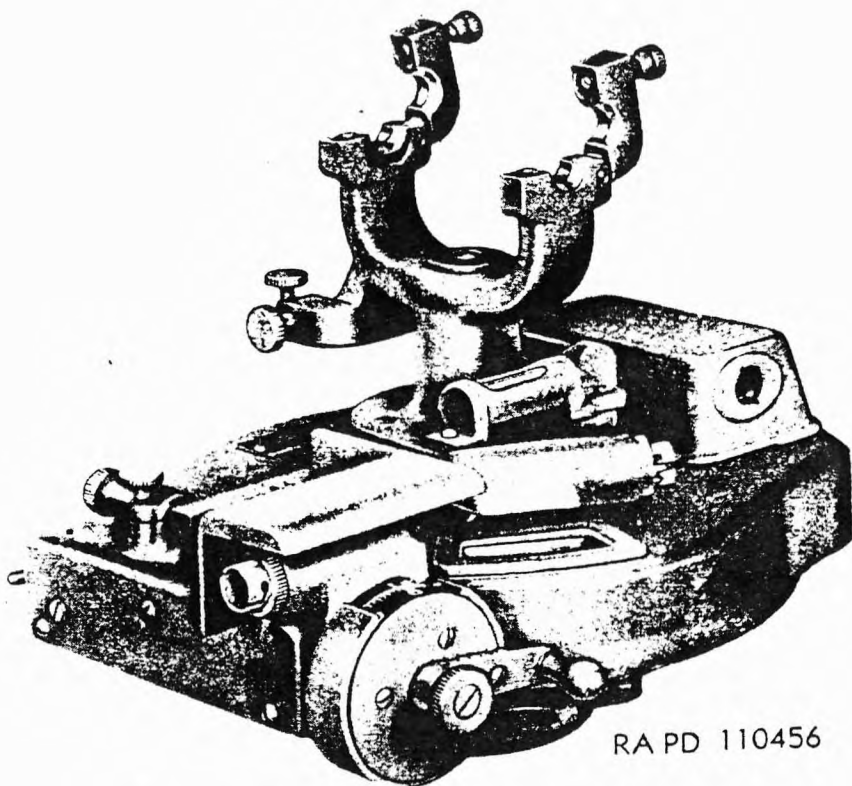
RA PD 110502

Figure 90. Telescope, M1910.



RA PD 110452

Figure 91. Instrument, azimuth, M1910A1, w/e.



RA PD 110456

Figure 92. Mount, for instrument, azimuth, M1910A1.

APPENDIX

LIST OF REFERENCES

1. Standard Nomenclature Lists.
 Instrument, azimuth, M1910 and M1910A1
 (degrees) ----- SNL F-84.
 Optical repair kit for harbor defense ----- SNL F-93.
2. Technical Manuals.
 Cleaning and preserving materials ----- TM 9-850.
 Matériel inspection and repair ----- TM 9-1100.
3. Field Manual.
 Fire-control and position finding, seacoast
 artillery ----- FM 4-15.
 [A. G. 062.11 (9-15-41).]

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B 4 (2); IR 4 (2); Bn 9 (2); IC 9 (4).
 (For explanation of symbols see FM 21-6.)

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