TM 9-1556

WAR DEPARTMENT TECHNICAL MANUAL

ORDNANCE MAINTENANCE

OBSERVATION TELESCOPES M48 AND M49

WAR DEPARTMENT *8 JUNE 1944*

CONTENTS

Section I

INTRODUCTION

1. SCOPE.

a. This manual is published for the information and guidance of ordnance personnel. It contains detailed instructions for inspection, disassembly, reassembly, maintenance, and repair of the Observation Telescopes M48 and M49. These instructions are supplementary to those in Field and Technical Manuals prepared for this using arms. Additional descriptive matter and illustrations are included to aid in providing a more complete working knowledge of the materiel.

2. CHARACTERISTICS.

a. The telescopes discussed herein are used for observaaton by the cavalry and infantry. Their chief purpose is to assist in observing the effectiveness of artillery fire.

b. Both Telescopes M48 and M49 are basically the same, Each is an erect-image instrument, the image being erected by means of two porro prisms and magnified by the lenses in the eyepiece Both telescopes are the "prism-offset'" type and are tubular in shape. The arrangement of the optical elements is the same in both Instruments.

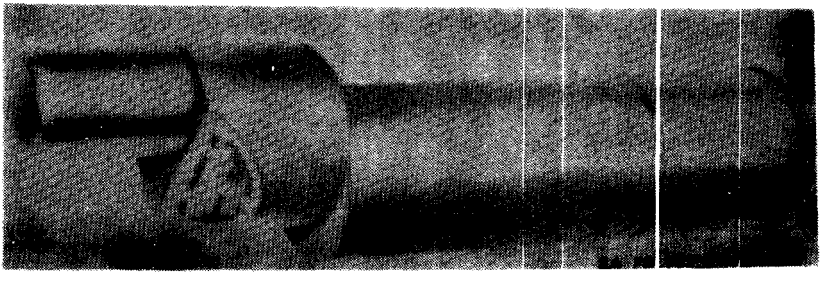

Figure 1-Observation Telescope M48

c. The equipment for each telescope includes a carrying case and a tripod with carrying case Telescope M48 uses Carrying Case M26. and Tripod M14 with Carrying Case M31. Telescope M49 uses Carrying Case M27, and Tripod M15 with Carrying Case M42.

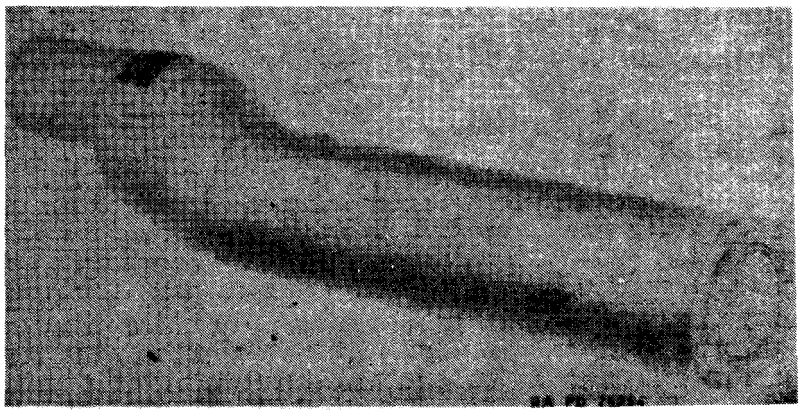

Figure 2 -Observation Telescope M49

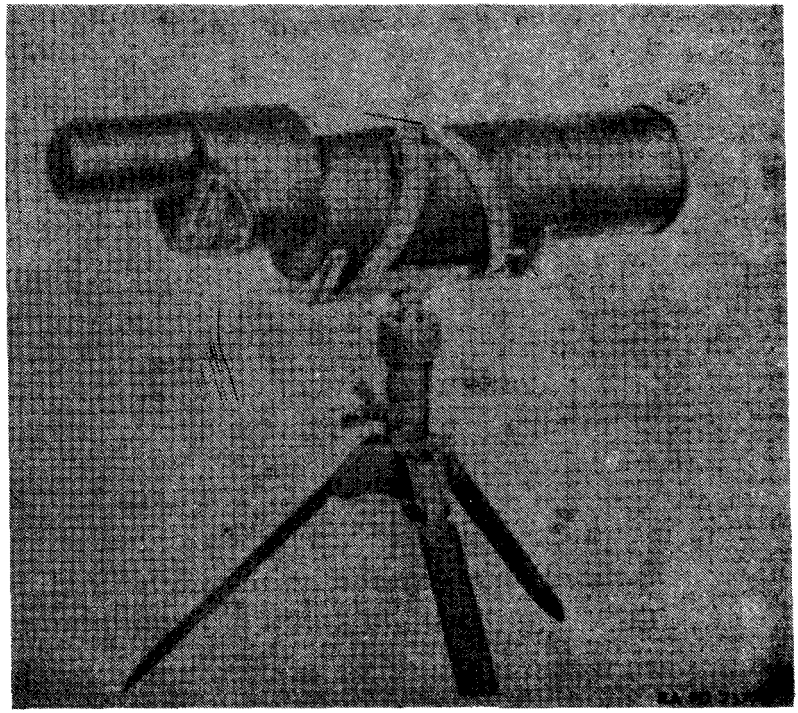

Figure 3 -Observation Telescope M48 and Tripod M14

DESCRIPTION

3. DIFFERENCES BETWEEN MODELS.

a. Despite their similarity in many respects, there are some differences between these models, as shown by the following comparative specifications:

	M48	M49
Power	19.6x	20x
Field of view	2°8'	2°12'
Diameter of exit pupil	0.100 in.	0.108 in
E. F. L. of objective	13.004 in.	14.211 in.
E. F. L. of eyepiece	0.662 in.	0.716 in.
Length	13½ in. approx.	14½ in. approx.

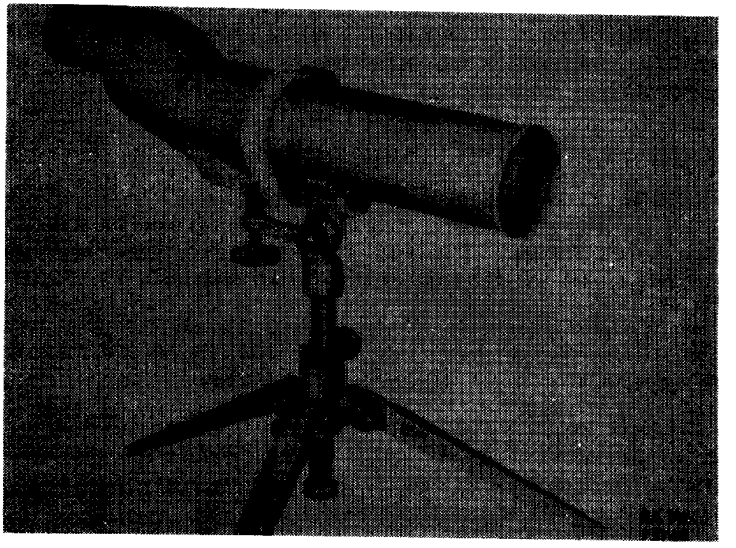

Figure 4-Observation Telescope M49 and Tripod M15

Section II

DESCRIPTION

4. OBSERVATION TELESCOPE M48.

a. Observation Telescope M48 (fig. 1) is a 19.6-power telescope having a field of view of 2 degrees 8 minutes and an exit pupil diameter of 0.100 inch. The image is erected by a porro prism system. The over-all length of the telescope with the sunshade closed is approximately 13½ inches.

b. The major units of Observation Telescope M48 are the objective assembly, body tube, prism housing assembly, and focusing mechanism with eyepiece assembly.

c. The front of the telescope has a sliding sunshade which can be extended approximately 2 inches as the need requires.

d. The telescope is furnished with an objective cover and eyepiece cap. These are screwed into place to protect the lenses when the telescope is not in use.

e. The telescope is focused by pushing or pulling the eyepiece in or out until an approximate focus is reached, and then turning the knurled focusing sleeve to obtain exact focus. This arrangement is made possible by a spring-loaded ball which either rides over the threads of the focusing nut, when the eyepiece is pushed or pulled, or engages the threads when the eyepiece is turned.

5. OBSERVATION TELESCOPE M49.

a. Observation Telescope M49 (fig. 2) is a 20-power telescope having a field of view of 2 degrees 12 minutes and an exit pupil diameter of 0.108 inch. The image is erected by a porro prism system. The over-all length of the telescope is approximately 14½ inches.

b. The major units of Observation Telescope M49 are the objective assembly, the body tube, the prism housing assembly, and the focusing mechanism with eyepiece assembly.

c. Observation Telescope M49 does not have an adjustable sunshade. Instead, the front end of the body tube extends approximately three-quarters of an inch beyond the objective, thereby providing a permanent sunshade.

d. The telescope is furnished with an objective cover and an eyepiece cap. These are screwed into place to protect the lenses when the telescope is not in use.

e. The telescope is focused by turning the knurled focusing sleeve.

6. ACCESSORIES.

a. Accessories for Observation Telescopes M48 and M49 include a carrying case for each telescope, a tripod for each telescope, and a carrying case for each tripod. These accessories are described in the paragraphs immediately following in this section.

DESCRIPTION

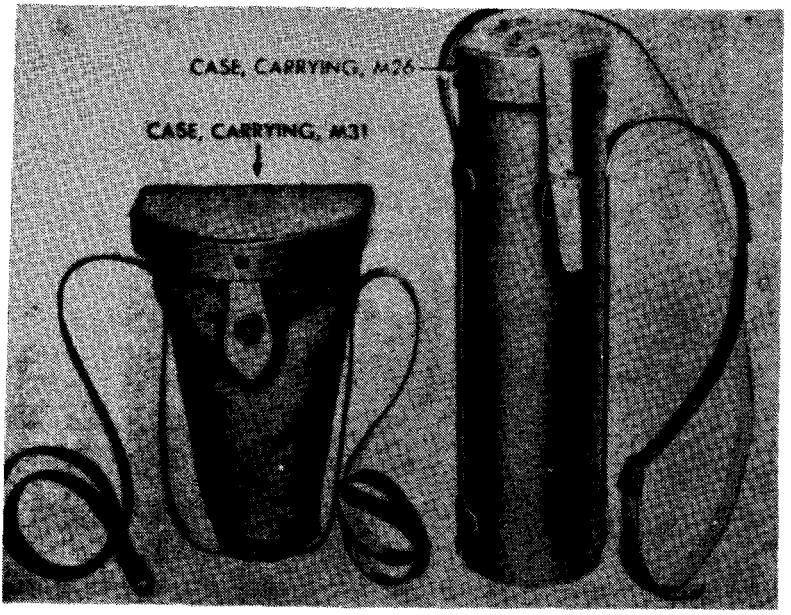

Figure 5-Carrying Case M26 for Observation Telescope M48 and Carrying Case M31 for Tripod M14

7. CARRYING CASE M26 (FOR TELESCOPE M48).

a. Carrying Case M26 (fig. 5) is used for transporting observation telescope M48, and affords protection for the telescope when the latter is not in use. It is an all-leather case, cylindrical in shape, approximately 3¾ inches in diameter and 14 inches long. The Telescope M48 fits into the case, objective end down. An elastic loop near the top of the case fits over the eyepiece cover cap and assists in holding the telescope securely in place. A leather cap fits snugly over the top of the carrying case and is secured by a leather strap and buckle. Loops are provided to receive the shoulder strap which is part of the equipment and which is used for carrying the case and its contents.

8. TRIPOD M14 (FOR TELESCOPE M48).

a. Tripod M14 (fig. 6) provides a rest for the Telescope M48 and steadies it when in use. The telescope rests in the cradle of the tripod and is secured by a webbing strap and buckle. A socket-and-ball connection between the tripod cradle and the leg assembly permits movement of the telescope. A clamping nut holds the telescope at any required angle. With the folding legs of the tripod fully ex-

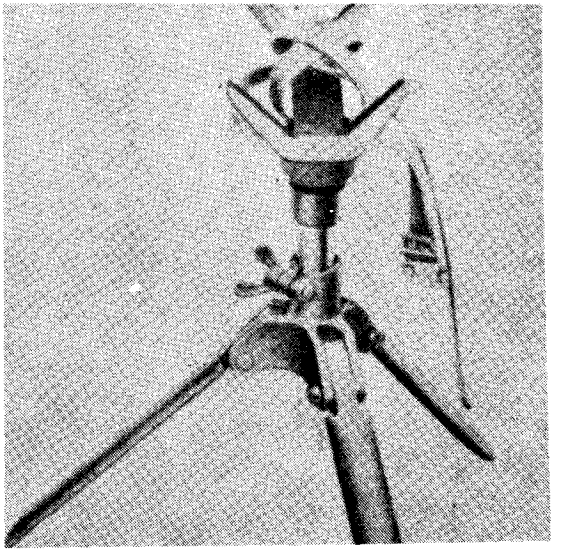

Figure 6 -Tripod M14 With Strap

tended, the eyepiece of the mounted telescope stands approximately 11 inches above the surface upon which the tripod rests. The telescope can be raised or lowered, and can be held at any position by tightening the clamping thumbscrew. The tripod folds into a compact unit which fits readily into the carrying case. The principal assemblies of the Tripod M14 are the cradle assembly and the leg assembly.

9. CARRYING CASE M31 (FOR TRIPOD M14).

a. Carrying Case M31 (fig. 5) is used for carrying Tripod M14, and for storing it when not in use. The Carrying Case M31 is of canvas construction with a stiff leather reinforcement at the back and on the bottom. The stiff leather top swings on a leather hinge and is fastened by a strap and snap fastening. Leather shoulder straps are provided for carrying the case and its contents.

10. CARRYING CASE M27 (FOR TELESCOPE M49).

a. Carrying Case M27 (fig. 7) is used for transporting Observation Telescope M49 and affords protection for the telescope when the latter is not in use. It is an all-leather case, lined with a felt-like padding. It measures approximately 4 inches across and is 15 inches long. The Telescope M49 fits into the case with the front end down, making

DESCRIPTION

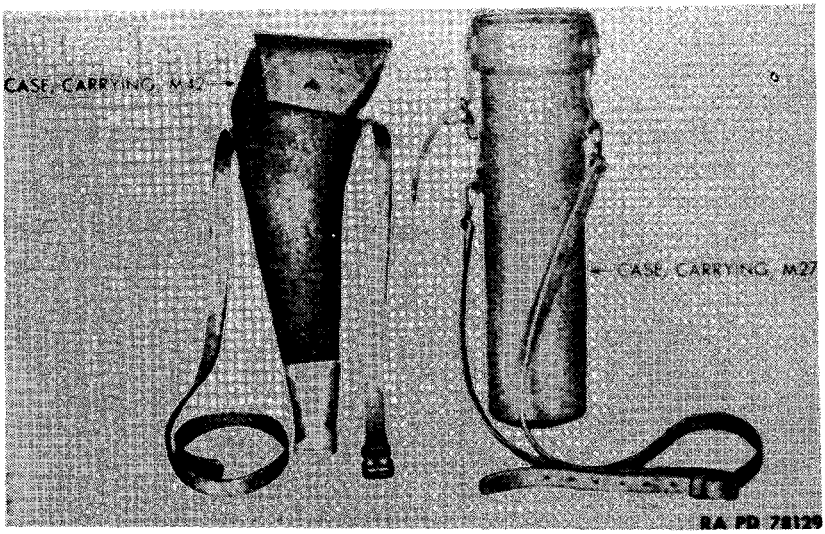

Figure 7 -Carrying Case M27 for Observation Telescope M49 and Carrying Case M42 for Tripod M15

a snug fit which requires no means other than the cover for securing the instrument in the case. A leather cover cap fits over the top of the case and is secured by a strap. Shoulder straps are also provided for carrying the case and its contents.

11. TRIPOD M15 (FOR TELESCOPE M49).

a. The Tripod M15 provides a rest for the Telescope M49 and steadies it when in use. The telescope rests in the cradle and is held in place by a leather strap (fig. 4). With the folding legs of the tripod fully extended, the eyepiece of the telescope is approximately 11 inches above the surface upon which the tripod rests. With this tripod, the telescope can be swung around to any desired position. An elevating screw is also provided for elevating or depressing the forward end of the telescope as necessity requires.

b. The main assemblies of Tripod M15 are the cradle assembly and the leg assembly. These two assemblies are joined by means of the cradle support shaft which extends through the collar in the leg assembly.

c. The Tripod M15 folds into a compact unit and fits into a carrying case for ease and convenience in transportation.

12. CARRYING CASE M42 (FOR TRIPOD M15).

a. Carrying Case M42 is provided for transporting the Tripod M15 (fig. 7) and for storing it when not in use. This carrying case is of canvas construction with leather reinforcements. Snap fasteners are used to secure the cover flaps. Leather shoulder straps provide a convenient means for carrying the case and its contents.

Section III

BASIC INSPECTION

13. PURPOSE OF INSPECTION.

a. Inspection is made for the purpose of determining the condition of the instrument, whether repairs or adjustments are required, and the action necessary to place the instrument in serviceable condition.

14. INSPECTION REQUIREMENTS.

a. Observation telescopes should be checked for:

Name plate data
Completeness
Appearance
Sealing
Condition of paint
Condition of lenses
Smoothness of operation of focusing mechanism
Parts not too loose or too tight
Tilt of image
Clarity and definition of images
Condition of carrying cases

15. BASIC INSPECTION OF OBSERVATION TELESCOPES.

a. Record the serial number from the name plate. The name plate is located on the housing (figs. 11 and 17).

b. Examine the telescope for completeness, appearance, condition of paint, and for broken parts. See that set screw openings are properly sealed.

c. Shake the telescope and listen for rattles or other sounds that would indicate loose parts.

d. Check the operation of the focusing mechanism to determine that it functions smoothly and that parts are not too tight.

e. Check the covers and the eyepiece cover caps for ease of application and removal. Examine for damaged threads and determine whether they seat properly.

f. Look into the telescope and examine the optical elements for signs of breakage, dirt, grease, moisture, and deterioration of adhesive balsam in the compound lenses. Defects of this nature can be seen by looking through the objective end of the telescope.

g. The image should appear sharp and clear, and should be upright when the telescope is in normal operating position.

h. Examine the carrying cases for open seams, broken stitches, deteriorated elastic, torn or frayed straps and strap loops, defective fasteners, broken snap rings, etc.

16. ACTION TO BE TAKEN.

a. Instruments found defective must be repaired or adjusted to make them serviceable. Defects noted and action to be taken must be entered on the inspection form (O.O.F. 7229). The action to be taken will be governed by the facilities available.

Section IV

GENERAL MAINTENANCE

17. TOOLS.

a. Tools for the accomplishment of maintenance described in this manual may be found in the instrument repair kit furnished to ordnance companies.

18. CLEANING AND PRESERVING MATERIALS.

a. **Lubricants.**

GREASE, lubricating, special (for all lubrication where grease is required)

OIL, lubricating, for aircraft instruments and machine guns (for all lubrication where oil is required)

b. **Cleaning Materials.**

ALCOHOL, ethyl, grade 1 (for cleaning optical parts)
BRUSH, artist, camel's hair (for removing dust and lint from optics)
PAPER, lens tissue (for cleaning polished glass surfaces)
SOAP, liquid, lens cleaning
SOLVENT, dry cleaning (for cleaning metal components)

19. CARE OF OPTICAL PARTS.

a. To obtain satisfactory vision with Telescopes M48 and M49 it is necessary to keep the lenses clean and dry. Care must also be exercised in handling the telescopes to prevent damage to, or disarrangement of, the optical system. The instruments should not be jarred or handled roughly, and under no condition should they be dropped.

b. Under ordinary conditions, lenses can be cleaned sufficiently with lens tissue paper. If there is dust on the lenses, remove it by brushing lightly with camel's hair artist brush, and tap the brush against a hard body to knock out small particles of dust that cling to the hairs. Repeat until all dust is removed. Do not attempt to clean or wipe the lenses with the fingers or a cleaning cloth; and under no conditions will polishing liquids, pastes, or abrasives be used for cleaning polished lenses.

c. To remove oil or grease from the lenses, apply liquid lens-cleaning soap with a piece of lens tissue paper. Wipe off and polish with another piece of tissue.

d. When liquid lens-cleaning soap is not available, ethyl alcohol may be used for cleaning the lenses. It is important to use the alcohol very sparingly, as it reacts on the cement used to hold the lenses together and will damage the lenses unless used sparingly and wiped off quickly. Apply ethyl alcohol with a camel's hair artist brush, and wipe dry with a piece of lens tissue paper.

e. When ethyl alcohol is not available, breathe heavily on the lens to moisten and wipe dry as directed above. Repeat the operation several times until all traces of oil have been removed.

20. CARE OF MECHANICAL PARTS.

a. To obtain satisfactory functioning of the mechanism in Telescopes M48 and M49, the mechanical parts should be kept clean and lubricated if necessary. When assembling the parts, apply special lubricating grease sparingly to the threads, but take care that grease does not get on the lenses. An occasional light application of grease to the threads in the focusing nut and focusing sleeve, and to the adapter in the focusing mechanism will help to keep the instruments functioning properly.

(1) OIL, lubricating, for aircraft instruments and machine guns, is to be used on ball and socket joints of Tripods M14 and M15, and for screw threads in leg, cradle, and collar assemblies of Tripods M14 and M15.

DISASSEMBLY AND ASSEMBLY

21. ROUTINE CLEANING DURING DISASSEMBLY.

a. All parts which have been removed from the instrument should be carefully cleaned before assembly.

(1) Optical elements should be cleaned with liquid lens-cleaning soap. If this is not available. use ethyl alcohol as an alternative. Care must be exercised to prevent alcohol from coming in contact with the edges of compound lenses as the lens cement is soluble in alcohol. If pencil marks have been placed on the unpolished surfaces of lenses or prisms, avoid removing them to prevent difficulty when assembling. Polish the optical element with lens tissue paper. Remove dust and dirt with an air bulb and a clean, small camel's hair artist brush.

(2) Metal components should be cleaned in dry-cleaning solvent applied with a stiff-bristled brush. NOTE: The solvent is highly inflammable. Take proper precautions when using or handling it. Also, the solvent should be changed frequently, so it will not become saturated with dirt. *CAUTION: Do not clean metal components in dry-cleaning solvent when the optical elements have not been removed.*

22. SEALING.

a. When replacing the eyepiece and objective cells in telescopes, apply a *very light* film of grease to the threaded part of the cell. The The grease film facilitates assembly and is effective in sealing the telescope. There should be just enough grease to make the joint airtight and moisturetight, but not enough to overrun onto the lenses.

b. When replacing the objective lens or the eyelens in their cells, use black Navy sealing compound to form a seal between the lens and the cell. If necessary, soften the black Navy sealing compound by warming with the hands. Then roll the sealing compound into a fine, thread-like piece and apply it around the flange in the cell upon which the lens will rest.

c. Plug the recesses above the various adjusting screws, etc., with plugging cement of the same color as the instrument. Smooth the cement to hide the openings as completely as possible.

Section V

DISASSEMBLY AND ASSEMBLY

23. GENERAL.

a. To preserve the parts of the instrument, it is necessary to exercise care and close attention during disassembly, cleaning, and adjustment. The extent of disassembly for any given repair job is determined by the repairman when he makes his inspection.

b. All optical elements and metal components should be carefully marked or tagged as they are disassembled to ensure correct positioning in the instrument on reassembly. If parts are not so marked or tagged, considerable difficulty may be encountered in the final assembly. Reference marks should be scribed when deemed advisable. An indelible pencil or diamond may be used for marking on *unpolished* surfaces of optical elements. Metal components may be scribed, marked, or tagged.

c. Defective parts should be replaced from stock. Replacement of defective optical elements must be carefully checked inasmuch as replacement of even one optical element may change the optical characteristics of the telescope and render readjustment necessary. Replacement of metal components is easily accomplished since the components are all standardized and available as replacements.

24. DISASSEMBLY OF OBSERVATION TELESCOPE M48.

a. Disassembly of focusing Mechanism.

(1) Remove the eyepiece cover cap (fig. 8). Carefully unscrew the eyepiece assembly (fig. 8) and wrap it in clean tissue paper.

(2) Unscrew the focusing nut locking screw A204670 (fig. 8). Unscrew the eyepiece focusing nut sleeve A204664 (fig. 10) from the focusing nut. Unscrew the focusing nut from the eyepiece focusing nut tube A204667. Remove the ball and spring from its recess.

(3) Unscrew the focusing tube (fig. 8) from the prism housing. Slide off the focusing sleeve.

b. Disassembly of Eyepiece Asssembly.

(1) Unscrew the retaining ring (fig. 9). See figure 8 for components of Observation Telescope M48.

(2) Hold the eyepiece assembly, with the field lens down, and gently tap around the edges of the cell to release the field lens. Repeat the procedure to free the eyelens, tapping more vigorously if necessary. NOTE: Be careful to hold the eyepiece assembly over a soft pad or piece of folded tissue when performing this operation. Do not permit the bare finger or table to come in contact with the polished surfaces of the lens. After removal, wrap the lens in lens tissue paper and store in a safe place.

c. Disassembly of Prism Housing Assembly.

(1) Remove focusing mechanism with eyepiece assembly from prism housing assembly (fig. 8).

(2) Unscrew the prism housing assembly (fig. 8) from the body tube.

DISASSEMBLY AND ASSEMBLY

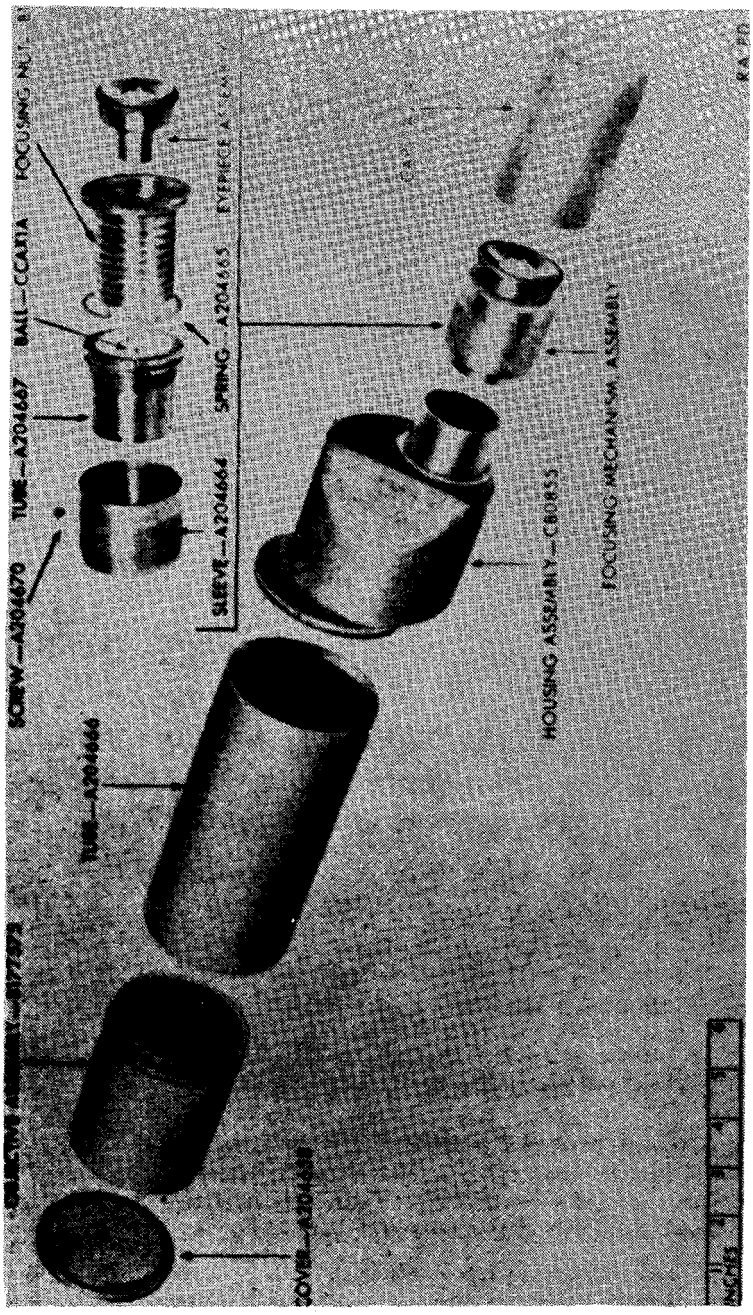

Figure 8—Observation Telescope M48—Partially Disassembled

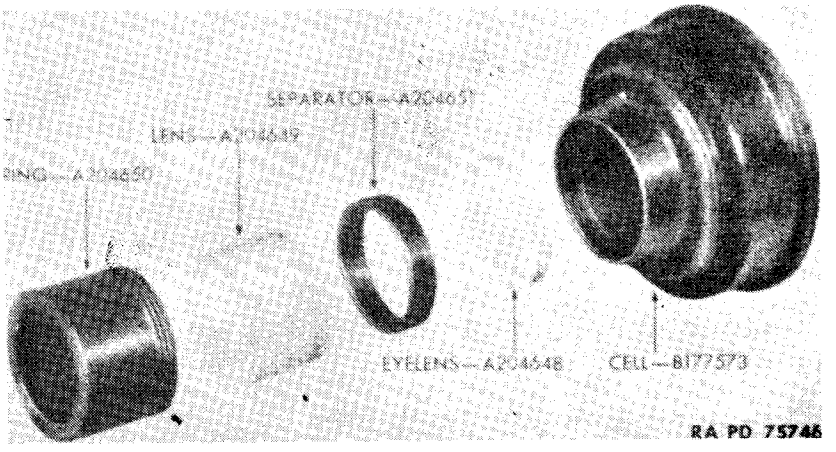

Figure 9 - Observation Telescope M48-Eyepiece Assembly Disassembled

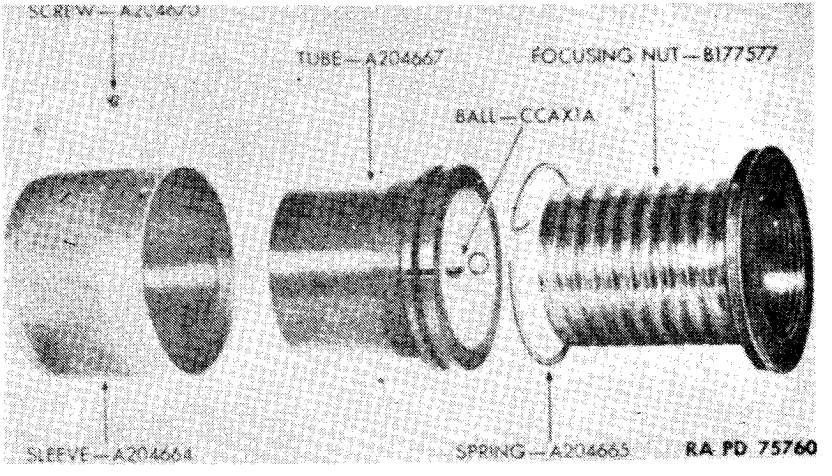

Figure 10 - Observation Telescope M48-Focusing Mechanism Assembly Partially Disassembled

(3) Loosen screws A204655 (fig. 11) that hold the diaphragm, and remove diaphragm (fig. 11).

(4) Remove screws BCGX1EE and washers that hold the prism shelf assembly and lift out the shelf assembly.

d. Disassembly of Prism Shelf Assembly. Remove the screws (fig. 12) that hold the prism clips in place and remove the clips with

the prisms. NOTE: Before this operation, mark the unpolished surface of the prisms and the adjacent shelf surfaces in such a way that the original position of each prism can easily be determined.

e. Disassembly of Objective Assembly.

(1) Unscrew the retainer (fig. 13) and remove the sunshade which slides over the objective cell.

(2) Unscrew the objective cell (fig. 13) from the body tube A204666 (fig. 8).

(3) Remove the retaining ring from the back of the objective cell and gently tap out the objective. *NOTE: Be sure to hold the cell over* a *tissue pad or other soft surface when performing this operation to prevent damage to the objective.* If the objective does not come out easily, crumple a piece of lens tissue paper into the cell and, with a piece of lens tissue paper between the thumb and the objective, gently push out the objective. Clean the lens immediately after removal, wrap carefully, and lay aside in a safe place until reassembly.

25. ASSEMBLY OF OBSERVATION TELESCOPE M48.

a. To assemble the telescope, reverse the disassembly procedure.

b. To reassemble the focusing mechanism, use the following procedure:

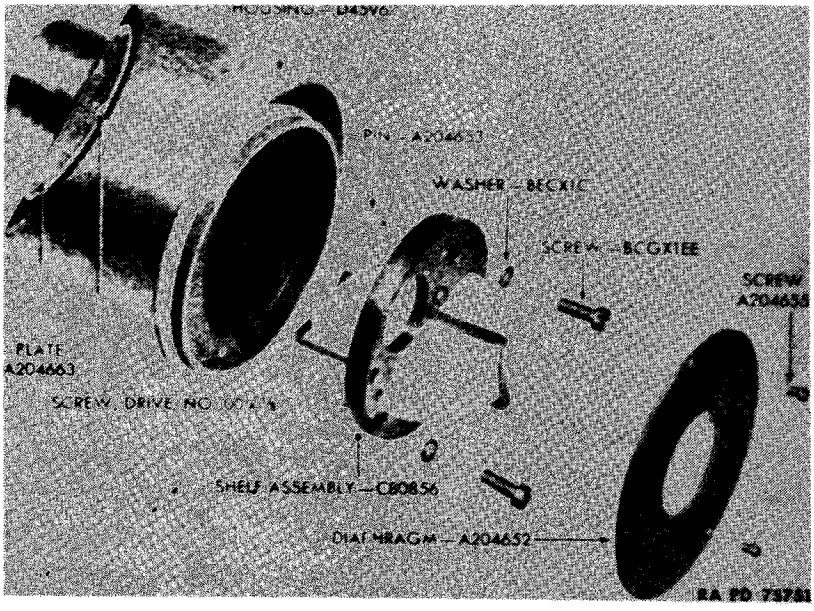

Figure 11 - Observation Telescope M48-Prism Housing Assembly C80855 Partially Disassembled

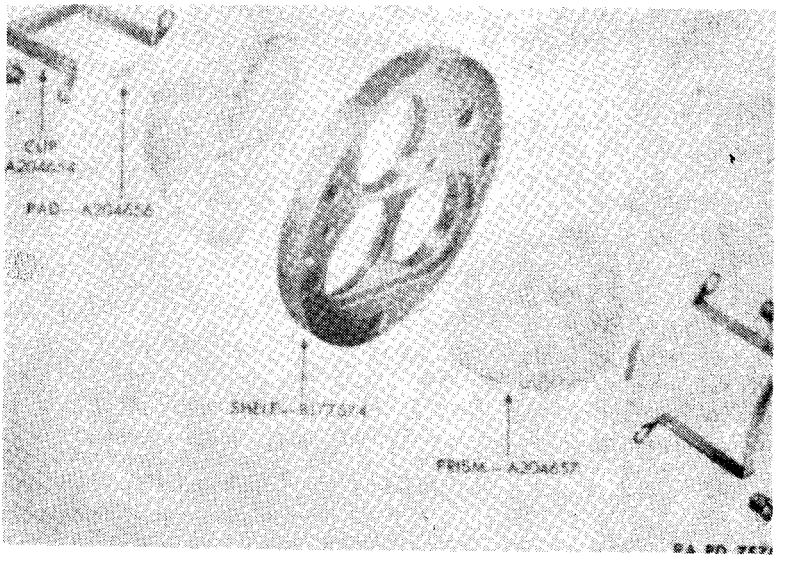

Figure 12-Observation Telescope M48-Prism Shelf Assembly C80856 Disassembled

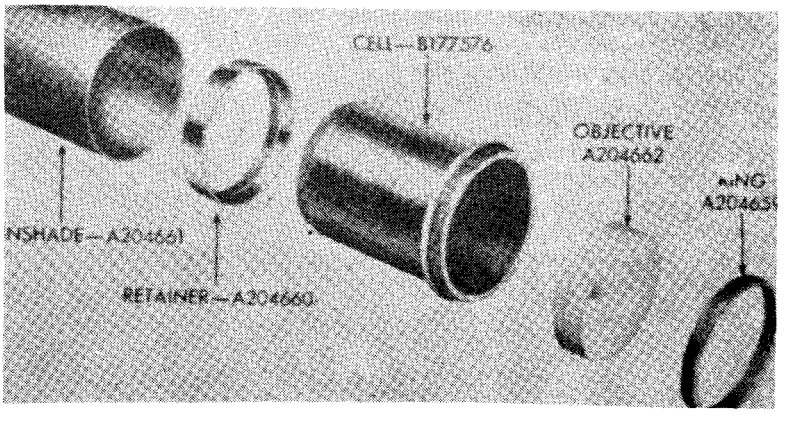

Figure 13-Observation Telescope M48-Objective Assembly Disassembled

(1) Place the focusing sleeve in position so the crimped edge is next to the shoulder of the prism housing. Screw the focusing tube into position. Replace the ball spring A204665 on the tube. Place the ball CCAX1A in its recess (fig. 8).

(2) Carefully wipe all dust and grease from the focusing nut. Place a light coat of grease on the threaded surface of the focusing nut. Carefully slide the nut into position. Screw the focusing sleeve into the focusing nut and replace the locking screw. Check the operation of the focusing nut. The lateral movement should be smooth for its entire length of travel.

c. All parts which have been removed from the instrument should be carefully cleaned before assembly (par. 21).

d. After assembly and adjustment, the various parts and mechanisms should be again inspected according to the procedure given in section III.

26. DISASSEMBLY OF OBSERVATION TELESCOPE M49.

a. Disassembly of Eyepiece Assembly.

(1) Unscrew cover cap A317039 (fig. 14).

(2) Remove eyepiece assembly C130787 from prism housing assembly by unscrewing adapter (fig. 15).

(3) Unscrew stripped eyepiece assembly B180758 (fig. 15) from focusing sleeve A317071.

(4) Loosen locking screw BCKX3AD and remove focusing sleeve from threaded sleeve A317068.

(5) Unscrew threaded sleeve from adapter A317070. NOTE: The threaded sleeve is screwed into the adapter from the front and is unscrewed by turning in a clockwise direction.

(6) Remove stop ring A317067 from front end of threaded sleeve. exercising care not to damage threads in doing so.

b. Disassembly of Stripped Eyepiece Assembly.

(1) Unscrew retaining ring A317065 (fig. 16).

(2) Hold eyelens cell slightly above a piece of soft cloth, or tissue, and tap lightly to remove field lens A317907 and separator A317066.

(3) Use same method to remove eyelens A316906, tapping more vigorously or pushing against eyelens if necessary. Care should be exercised that the bare fingers or table surface do not touch the lens. After removal, wrap the lens in a piece of lens tissue paper and store in a safe place.

c. Disassembly of Housing Assembly.

(1) Unscrew the housing assembly C130788 from the body tube A317040 and unscrew the eyepiece assembly C130787 from the housing assembly (fig. 14).

ORDNANCE MAINTENANCE-OBSERVATION TELESCOPES M48 AND M49

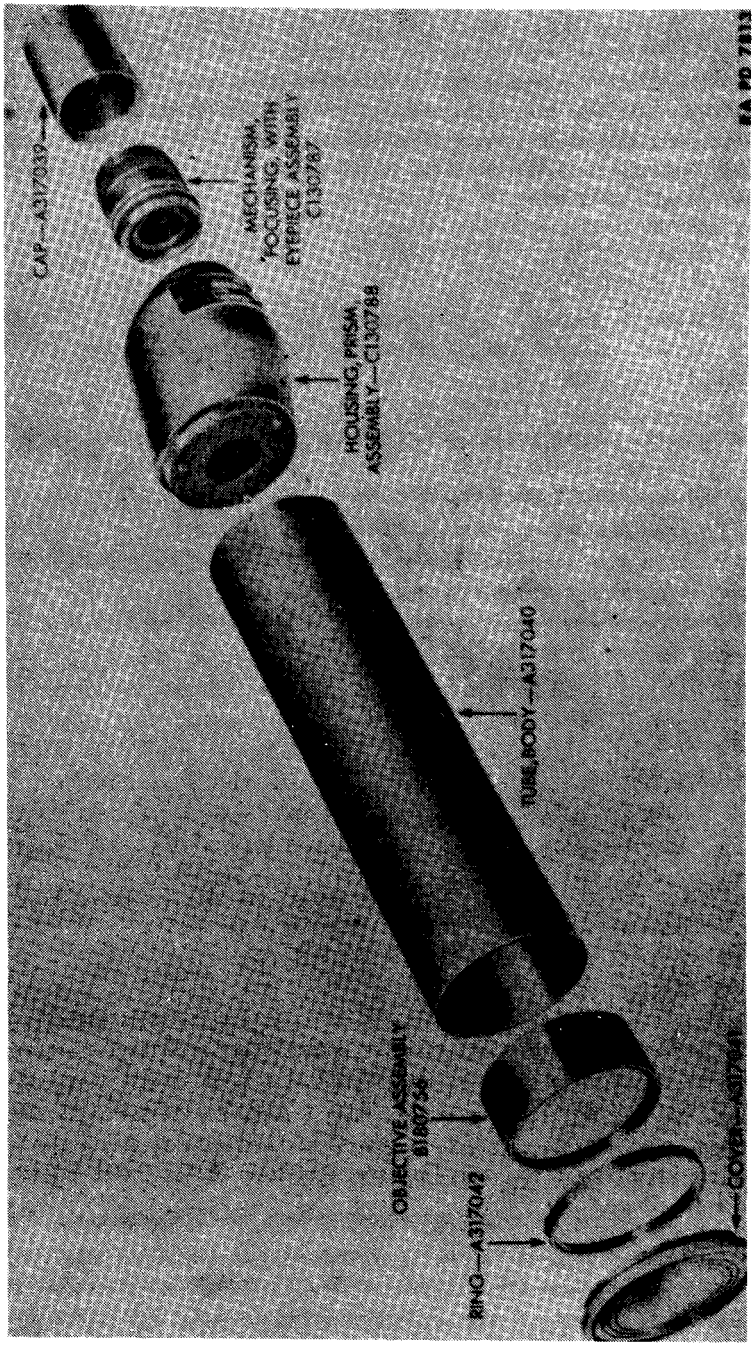

Figure 14—Observation Telescope M49—Partially Disassembled

DISASSEMBLY AND ASSEMBLY

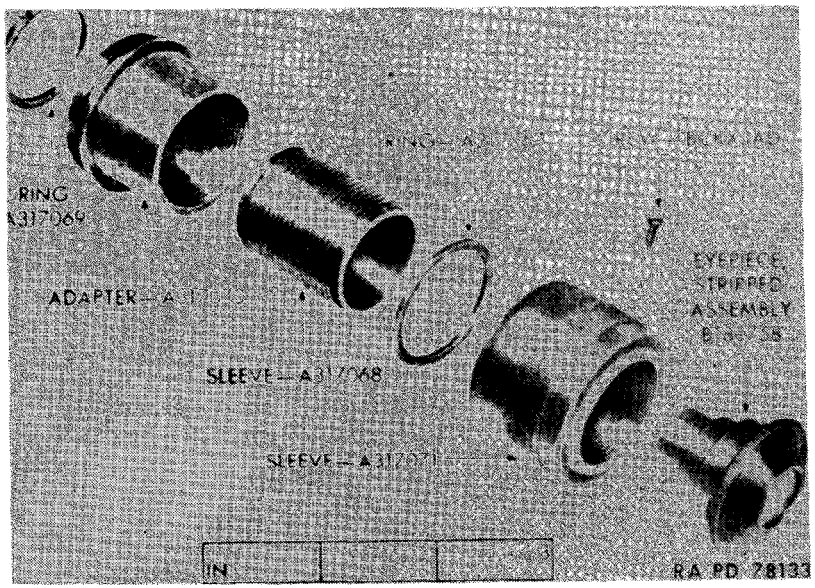

Figure 15-Observation Telescope M49-Focusing Mechanism With Eyepiece Assembly C130787 Partially Disassembled

(2) Remove the washer A317092 (fig. 17) that serves as a diaphragm, by first removing the three screws A317091 that hold it.

(3) Remove screws A317093 and BCFX4AF that hold the prism shelf assembly C130797 (fig. 17) and remove the shelf assembly.

d. Disassembly of Prism Shelf Assembly.

(1) Make a pencil mark on, or otherwise inscribe, the unpolished surfaces of the prisms B180726 (fig. 18) and the adjacent surfaces of the shelf, so that each prism can be returned to its original position on reassembly.

(2) Remove the screws BCFX3BB (fig. 18) that hold the prism clips A317094 to the shelf. Carefully remove the pads and the prisms that are held by the clips, taking care not to chip or damage the prisms.

e. Disassembly of Objective Assembly.

(1) Unscrew the ring A317042 (fig. 14) from the front end of the body tube.

(2) Unscrew the objective assembly B180756 (fig. 14) from the body tube A317040.

(3) Remove the retaining ring A317062 (fig. 19) from the objective assembly. Place a piece of lens tissue paper on both sides of

the objective and gently push the objective A316908 out of the cell A317063. Do not exert too much pressure or wedge the objective in the cell by exerting more pressure on one side than on the other. Clean the objective immediately after removal, wrap carefully and lay aside in a safe place until reassembly.

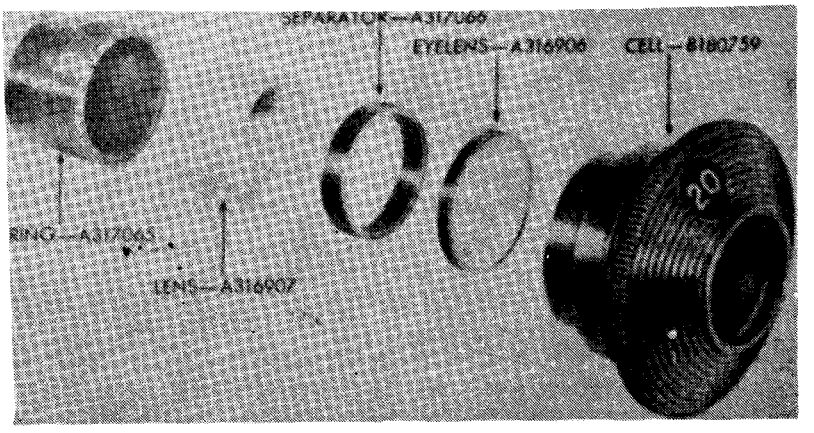

Figure 16-Observation Telescope M4-Eyepiece Assembly B180758 Disassembled

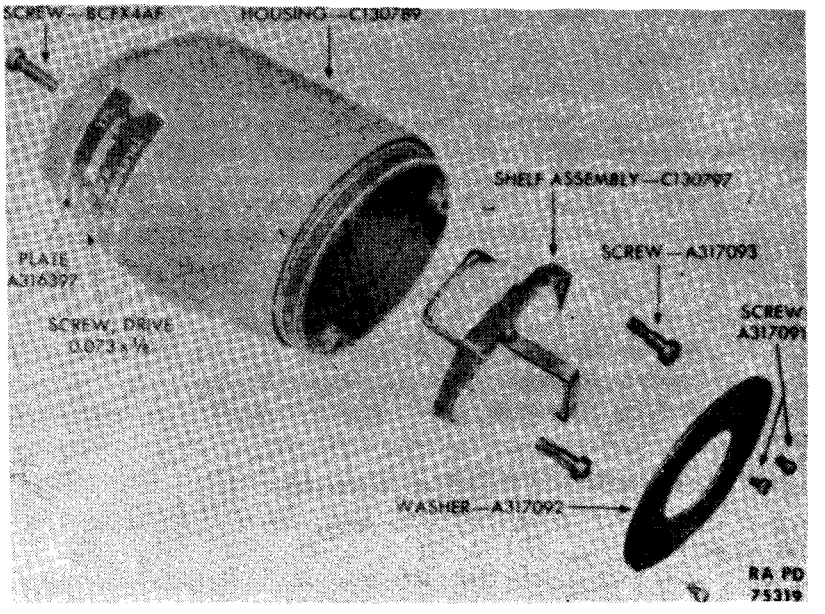

Figure 17-Observation Telescope M49-Prism Housing Assembly C130788 Partially Disassembled

DISASSEMBLY AND ASSEMBLY

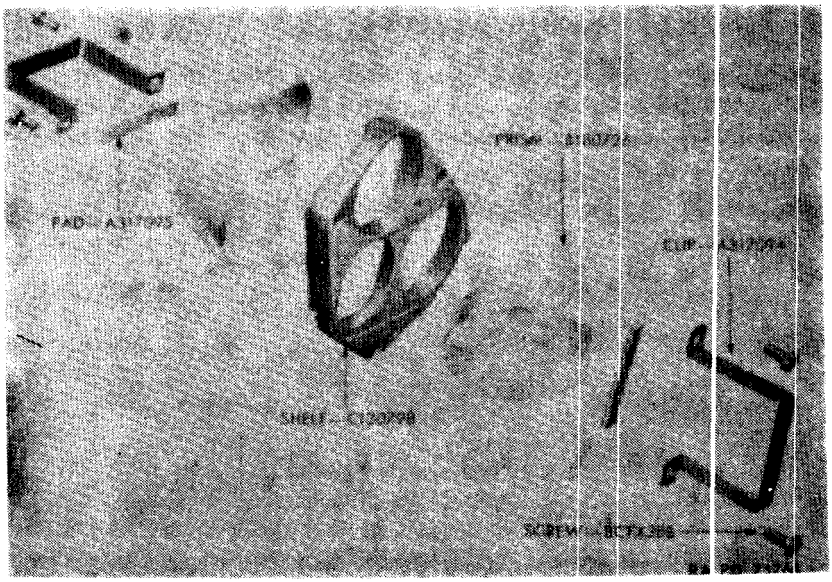

Figure 18-Observation Telescope M49-Prism Shelf Assembly C130797 Disassembled

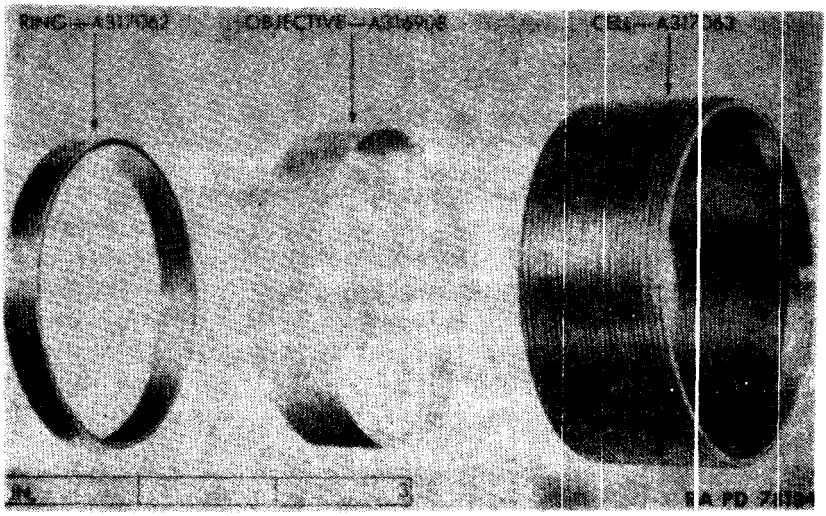

Figure 19-Observation Telescope M49-Objective Assembly B180756 Disassembled

27. ASSEMBLY OF OBSERVATION TELESCOPE M49.

a. To assemble the telescope, reverse the disassembly procedure.

b. All parts which have been removed from the instrument should be carefully cleaned before assembly (par. 21).

c. After assembly and adjustment, the various parts and mechanisms should be again inspected according to the procedure given in section III.

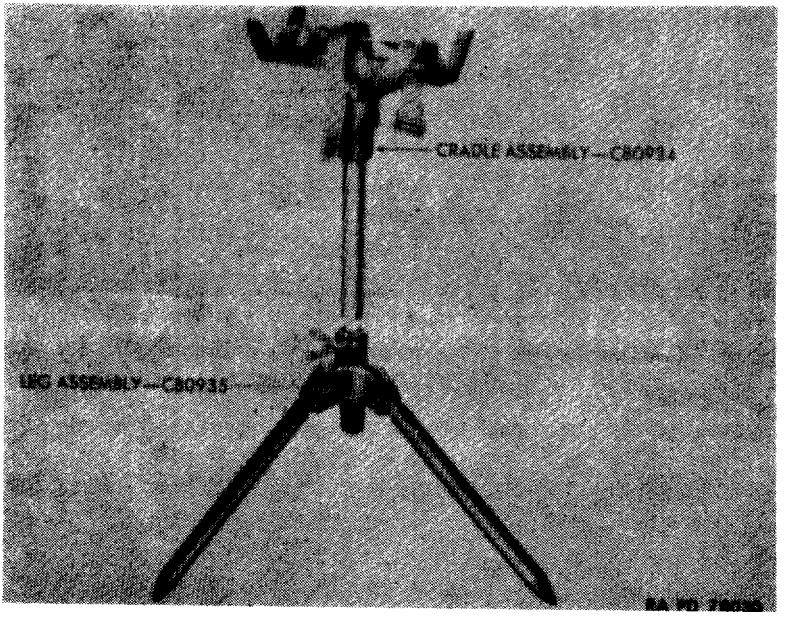

Figure 20-Tripod M14-Separated

28. DISASSEMBLY OF TRIPOD M14.

a. Disassembly of the Cradle Assembly.

(1) Loosen the clamping thumbscrew in the leg assembly and remove the cradle assembly from the leg assembly (fig. 20).

(2) Unscrew the knurled nut at the base of the cradle with ball assembly, and separate that assembly from the socket with shaft assembly (fig. 21).

(3) Should the cork disks A205066 (fig. 21) need replacing, pry them out with the blade of a small screwdriver or pocketknife. Inasmuch as the disks are likely to break into small pieces during this procedure, care should be taken to remove all small bits of cork from the socket.

DISASSEMBLY AND ASSEMBLY

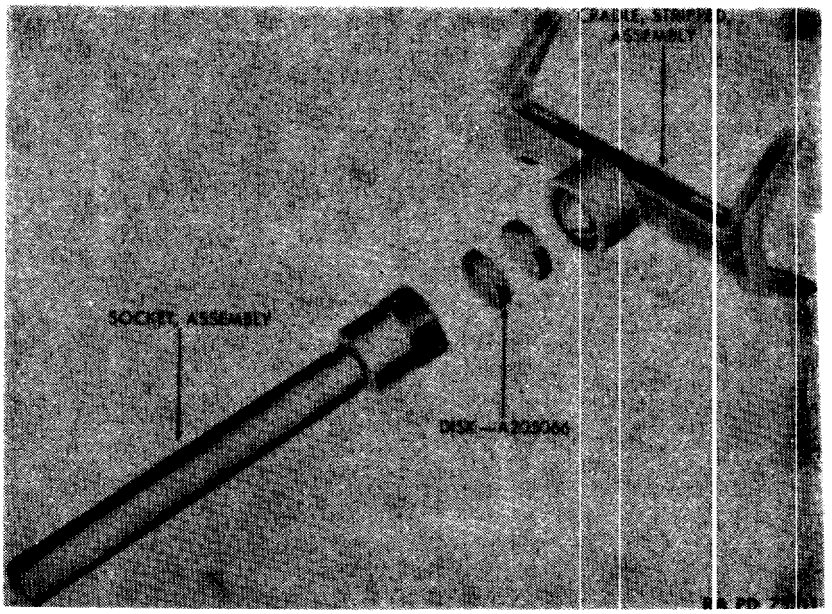

Figure 21-Tripod M14-Removal of Cradle With Ball Assembly From Socket With Shaft Assembly

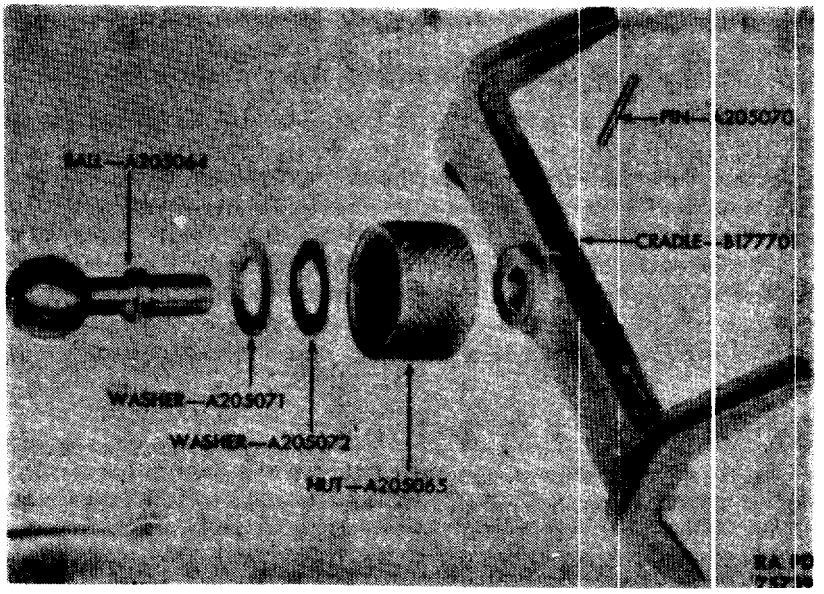

Figure 22-Tripod M14-Cradle With Ball Assembly-Disassembled

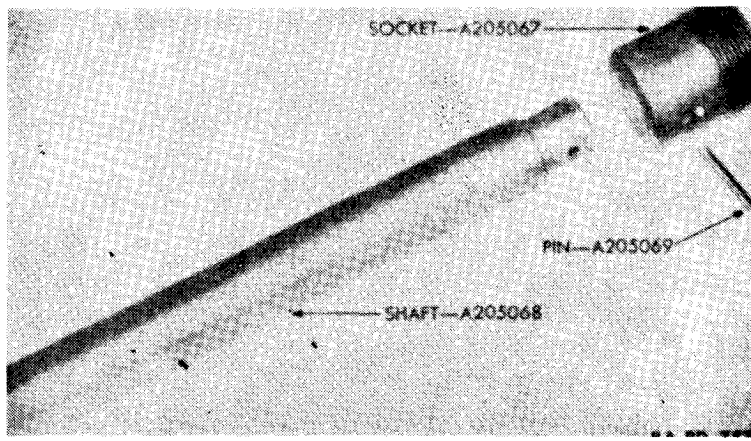

Figure 23-Tripod M14-Socket With Shaft Assembly-Disassembled

(a) Disassembly of Cradle with Ball Assembly. Drive out the ball retaining pin and remove the ball from the tripod cradle. When this is done, two washers and nut A205065 will come off at the same time (fig. 22).

(b) Disassembly of Socket with Shaft Assembly. Drive out the socket retaining pin and remove socket from shaft (fig. 23).

b. Disassembly of the Leg Assembly. Remove the screws BCNX2CH that hold the legs to the head (fig. 24). Remove the washers. Pull the legs from the head.

29. ASSEMBLY OF TRIPOD M14.

a. General. To assemble Tripod M14, reverse the disassembly procedure. However, before assembling the tripod, determine whether the parts are in serviceable condition and replace where necessary. Special attention should be given to the condition of the cork disks A205066, socket A205067, and nut A205065.

30. DISASSEMBLY OF TRIPOD M15.

a. General. Tripod M15 comprises three subassemblies: cradle assembly, collar assembly, and leg assembly. To break the tripod down into these subassemblies: Remove thumbscrew A7575962. Loosen the clamping thumbscrew in the leg assembly, and remove the cradle assembly from the leg assembly. Loosen the thumbscrew in the collar assembly and slide that assembly off the cradle assembly shaft (fig. 25).

DISASSEMBLY AND ASSEMBLY

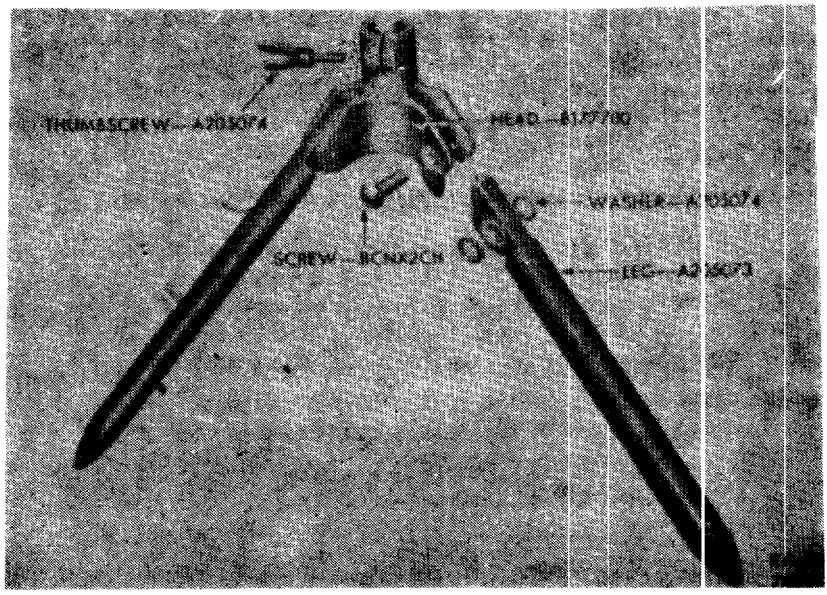

Figure 24-Tripod M14-Leg Assembly-Partially Disassembled

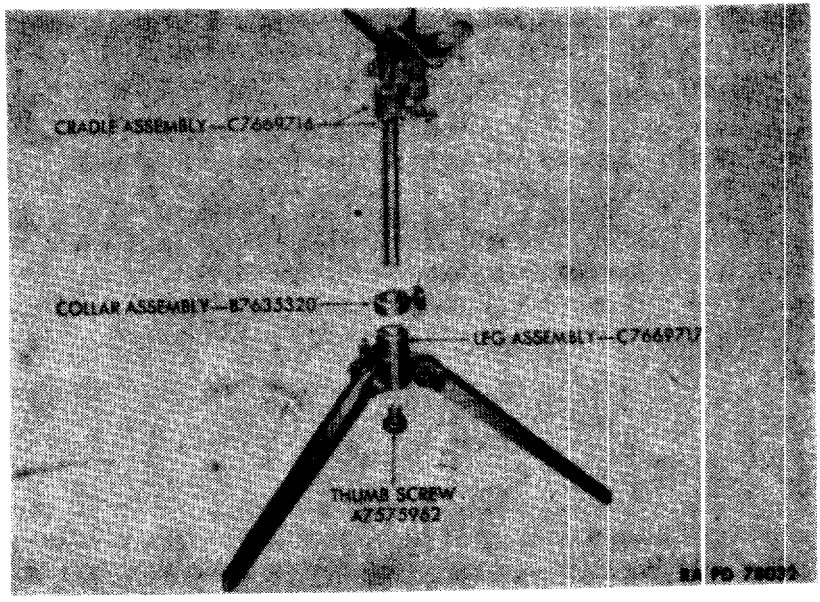

Figure 25-Tripod M15-Partially Disassembled

b. Disassembly of the Cradle Assembly. Remove nut and lock washer from end of bolt A7575950. Drive out the bolt and remove washer A7575951 (fig. 26). Take out the elevating thumbscrew A7575956. Take off the cradle, at the same time removing the compression spring from between the arm and the cradle. Take out screw BCFX2AD and remove the fork that it holds. Drive out the taper pin that secures the tube to the arm and remove the tube.

31. ASSEMBLY OF TRIPOD M15.

a. General. To assemble Tripod M15, reverse the disassembly procedure. Before assembling the tripod, determine whether the parts are in serviceable condition and replace where necessary.

DISASSEMBLY AND ASSEMBLY

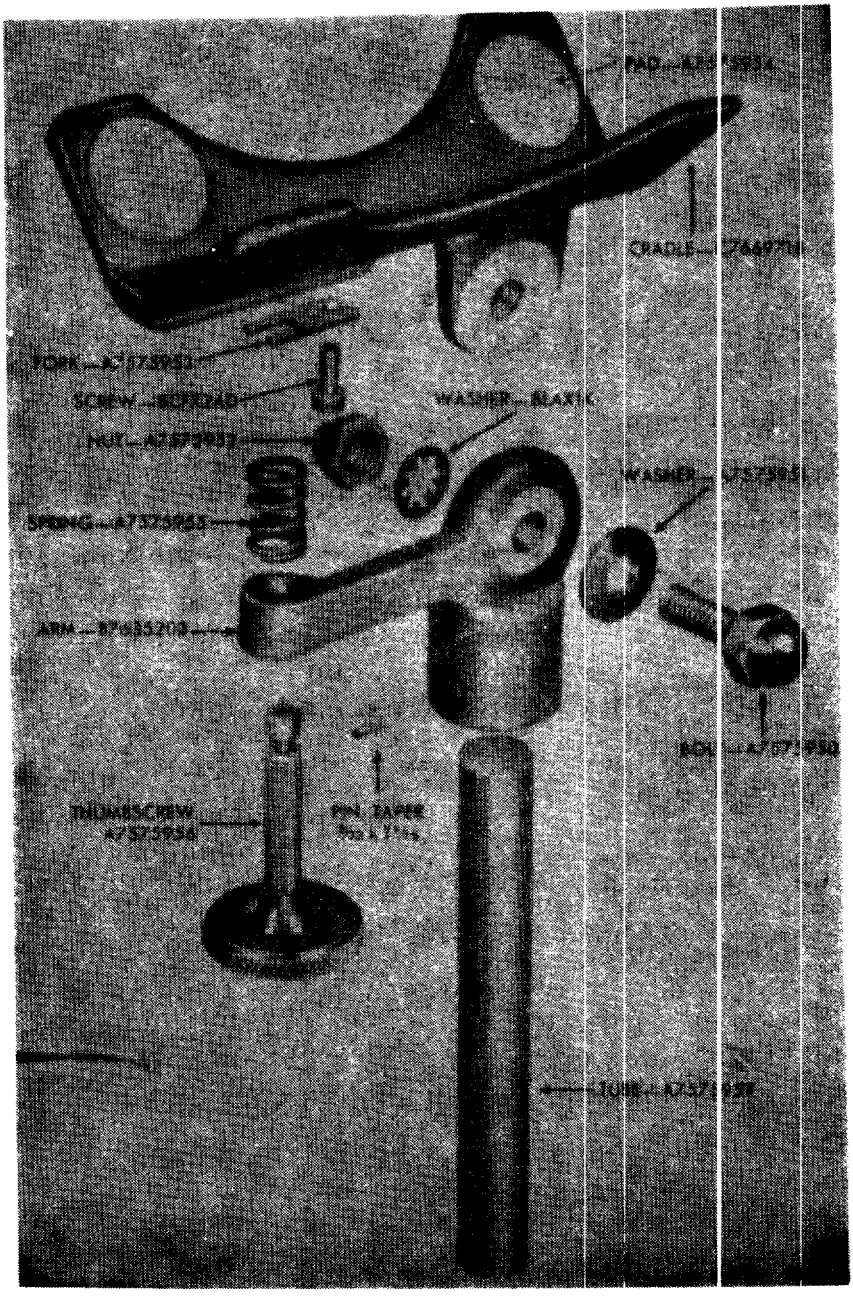

Figure 26-Tripod M15-Cradle Assembly-Disassembled

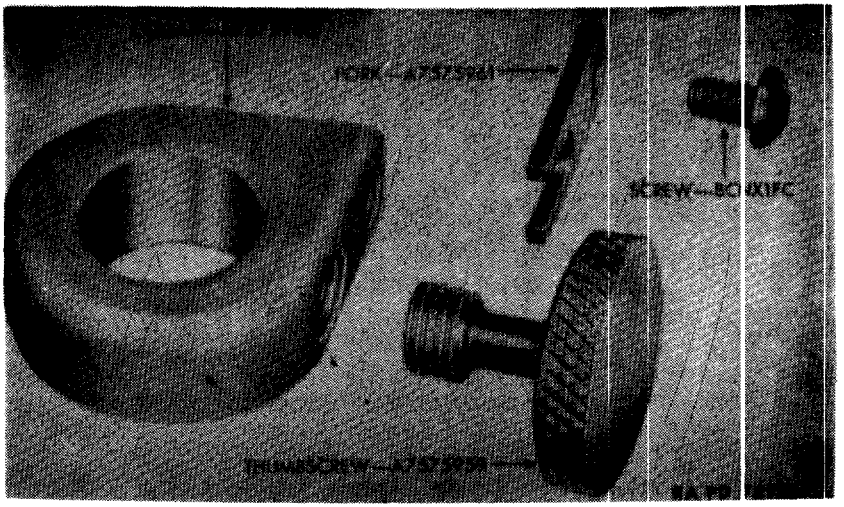

Figure 27-Tripod M15-Collar Assembly-Disassembled

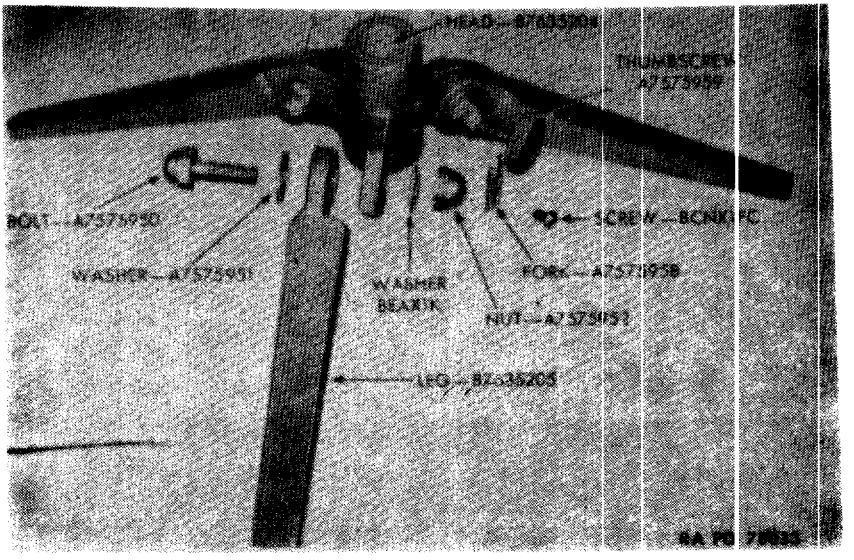

Figure 28. Tripod M15 Leg Assembly Partially Disassembled

Section VI

REFERENCES

32. PUBLICATIONS INDEXES.

The following publications indexes should be consulted frequently for latest changes or revisions of references given in this section and for new publications relating to materiel covered in this manual:

a. Introduction to Ordnance Catalog (explaining SNL system) . . . . . ASF Cat. ORD 1 IOC

b. Ordnance Publications for Supply Index (index to SNL's) . . . . . ASF Cat. ORD 2 OPSI

c. Index to Ordnance Publications (listing FM's, TM's, TC's, and TB's of interest to Ordnance personnel, OPSR, MWO'S, BSD, S of SR's, OSSC's, and OFSB's, and including alphabetical listing of Ordnance Major Items with publications pertaining thereto) . . . . . OFSB 1-1

d. List of Publications for Training (listing MR's, MTP's, T/BA's, T/A's, and FM's, TM's, and TR's concerning training) . . . . . FM 21-6

e. List of Training Films, Film Strips, and Film Bulletins (listing TF's, FS's, and FB's by serial number and subject) . . . . . FM 21-7

f. Military Training Aids (listing graphic training aids, models, devices, and displays) . . . . . FM 21-8

33. STANDARD NOMENCLATURE LISTS.

Cleaning, preserving, and lubricating materials; recoil fluids, special oils, and miscellaneous related items . . . . . ORD 5 SNL K-1
Kit, repair, instrument . . . . . SNL F-206
Telescope, observation, M48 and M49 . . . . . SNL F-173

34. EXPLANATORY PUBLICATIONS.

Auxiliary fire control instruments (field glasses, eyeglasses, telescopes, and watches) . . . . . TM 9-575
Cleaning, preserving, lubricating, and welding materials and similar items issued by the Ordnance Department . . . . . TM 9-850
Instruction guide, the instrument repairman . . . . . TM 9-2602

INDEX

INDEX

☆U.S. GOVERNMENT PRINTING OFFICE: 1990 - 262-912/30572

WAR DEPARTMENT
Washington 25, D. C., 8 June 1944

TM 9-1556, Ordnance Maintenance: Observation Telescopes 48 and M49, is published for the information and guidance of all concerned.

[A.G. 300.7 (13 May 44)
O.O. 300.7/1882]

BY ORDER OF THE SECRETARY OF WAR:

G. C. MARSHALL,
Chief of Staff.

OFFICIAL:

J. A. ULIO,
Major General,
The Adjutant General.

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IBn 9-T/O & E 9-75, 9-315.

IC 9-T/O & E 9-7, 9-8, 9-9, 9-57, 9-318, 9-377.

(For explanation of symbols, see FM 21-6.)

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The Metric System and Equivalents

Linear Measure

1 centimeter = 10 millimeters = .39 inch
1 decimeter = 10 centimeters = 3.94 inches
1 meter = 10 decimeters = 39.37 inches
1 dekameter = 10 meters = 32.8 feet
1 hectometer = 10 dekameters = 328.08 feet
1 kilometer = 10 hectometers = 3,280.8 feet

Weights

1 centigram = 10 milligrams = .15 grain
1 decigram = 10 centigrams = 1.54 grains
1 gram = 10 decigram = .035 ounce
1 dekagram = 10 grams = .35 ounce
1 hectogram = 10 dekagrams = 3.52 ounces
1 kilogram = 10 hectograms = 2.2 pounds
1 quintal = 100 kilograms = 220.46 pounds
1 metric ton = 10 quintals = 1.1 short tons

Liquid Measure

1 centiliter = 10 milliliters = .34 fl. ounce
1 deciliter = 10 centiliters = 3.38 fl. ounces
1 liter = 10 deciliters = 33.81 fl. ounces
1 dekaliter = 10 liters = 2.64 gallons
1 hectoliter = 10 dekaliters = 26.42 gallons
1 kiloliter = 10 hectoliters = 264.18 gallons

Square Measure

1 sq. centimeter = 100 sq. millimeters = .155 sq. inch
1 sq. decimeter = 100 sq. centimeters = 15.5 sq. inches
1 sq. meter (centare) = 100 sq. decimeters = 10.76 sq. feet
1 sq. dekameter (are) = 100 sq. meters = 1,076.4 sq. feet
1 sq. hectometer (hectare) = 100 sq. dekameters = 2.47 acres
1 sq. kilometer = 100 sq. hectometers = .386 sq. mile

Cubic Measure

1 cu. centimeter = 1000 cu. millimeters = .06 cu. inch
1 cu. decimeter = 1000 cu. centimeters = 61.02 cu. inches
1 cu. meter = 1000 cu. decimeters = 35.31 cu. feet

Approximate Conversion Factors

To change	*To*	*Multiply by*	*To change*	*To*	*Multiply by*
inches	centimeters	2.540	ounce-inches	newton-meters	.007062
feet	meters	.305	centimeters	inches	.394
yards	meters	.914	meters	feet	3.280
miles	kilometers	1.609	meters	yards	1.094
square inches	square centimeters	6.451	kilometers	miles	.621
square feet	square meters	.093	square centimeters	square inches	.155
square yards	square meters	.836	square meters	square feet	10.764
square miles	square kilometers	2.590	square meters	square yards	1.196
acres	square hectometers	.405	square kilometers	square miles	.386
cubic feet	cubic meters	.028	square hectometers	acres	2.471
cubic yards	cubic meters	.765	cubic meters	cubic feet	35.315
fluid ounces	milliliters	29,573	cubic meters	cubic yards	1.308
pints	liters	.473	milliliters	fluid ounces	.034
quarts	liters	.946	liters	pints	2.113
gallons	liters	3.785	liters	quarts	1.057
ounces	grams	28.349	liters	gallons	.264
pounds	kilograms	.454	grams	ounces	.035
short tons	metric tons	.907	kilograms	pounds	2.205
pound-feet	newton-meters	1.356	metric tons	short tons	1.102
pound-inches	newton-meters	.11296			

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°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

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