

TM 9-1611

WAR DEPARTMENT

TECHNICAL MANUAL

ORDNANCE MAINTENANCE
FIELD GLASS, TYPE EE

September 12, 1941

ORDNANCE MAINTENANCE
FIELD GLASS, TYPE EE

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 instrument by ordnance personnel. Figures in the manual show the placement and method of fastening of each of the component parts of the instrument.

c. References.—All Standard Nomenclature Lists and other publications pertaining to this instrument are listed in the appendix.

2. **Description.**—*a. General.*—(1) The field glass is an instrument used for observation and approximate measurement of small angles. It consists of two compact prismatic telescopes pivoted about a common hinge to provide adjustment for varying interpupillary distances.

(2) Field glass, type EE, of Bausch and Lomb manufacture is the preferred type of limited standard glass for issue to the using arms. Field glass, type EE, of U. S. naval gun factory manufacture is also limited standard. The name of the manufacturer is indicated on each glass.

b. Characteristics.—(1) The field glass of Bausch and Lomb manufacture has the same optical characteristics as that of naval gun factory manufacture but is a smaller and superior glass.

(2) The optical characteristics are—

Power.....	6X
Field of view.....	8°
Diameter of exit pupil.....	0.197 in.
Effective focal length of objective.....	4.890 in.
Effective focal length of eyepiece.....	0.811 in.
Apparent field of view.....	48°

(3) Each eyepiece assembly, C44146 and C44147, can be focused independently by turning the knurled focusing nut, B16442, until a sharp image is obtained. A diopter scale, B16443, permits rapid setting once the corrections for the observer's eyes are determined.

(4) The left eyepiece assembly, C44146, contains a reticle, B16444 (figs. 1 and 2), with a horizontal mil scale which appears in the lower portion of the field. The scale is graduated in 5-mil intervals, 40 mils each side of center. Above and below the center of the scale are short horizontal lines which indicate 5-mil vertical intervals. The reticle used in glasses of older manufacture contains a vertical stadia scale with graduations corresponding to the inverted sight leaf of the service rifle. This scale is used to locate auxiliary aiming points in indirect fire.

(5) An interpupillary scale, B16451, graduated every two millimeters from 56 to 75 shows the spacing between eyepiece centers and permits the observer to set the instrument to suit the spacing of his eyes. The desired setting is obtained by pivoting the telescopes about the body hinge pin, A36203.

(6) The body hinge pin carries an adjustable hinge stop ring, A36210, which engages the hinge stop, A36202, at a predetermined setting of the interpupillary scale so that the instrument may be returned to that setting without reference to the scale. The hinge stop may be disengaged to allow full hinge motion without disturbance of the stop ring adjustment.

3. Operation.—*a. Interpupillary distance.*—To set the glass so that the eyepieces are the same distance apart as the observer's eyes, look through the glasses at some fairly distant object. Open or close the glasses at the hinge until the field of view ceases to be separate or overlapping circles and appears to be one sharply defined circle.

b. Focus.—To focus the eyepiece, look through the glass, both eyes open, at a fairly distant object. Place a hand over the front of one telescope assembly and screw the focusing nut of the other in or out until the object is sharply defined. Repeat for the other eye. Avoid touching the objective.

c. Observation.—When using the field glass hold it in both hands, lightly pressed to the eyes, to keep the proper relation with the eyes

and to avoid tremors of the body. When possible, use a rest for the glass or elbows.

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

Parts to be inspected

- a. Exposed mechanical parts.
- b. Optical system.
- c. Eyepiece assembly.
- d. Reticle.
- e. Collimation of optical axes.

Points to be observed

- a. Observe general appearance, smoothness of operation of eyepiece and hinge, condition of strap and case.
- b. 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. Extensive checks or frost patterns require return of the instrument to an arsenal for overhaul.
- c. Using the collimating telescope (No. 90, optical repair kit), focus the eyepiece for sharpness and definition of the reticle. The reading at optimum focus should be approximately zero.
- d. The reticle cross lines should be upright when the interpupillary scale is set at 64 mm.
- e. Test the optical axes of the two telescopes for parallelism with each other at the 64-mm setting of the interpupillary scale. Lay the field glass on a block and point one telescope at a well-defined distant object as a smoke stack or steeple. Move the glass until the image of the object just appears in either the right or left edge of the field of view. Then through the other telescope look at the same object. If the image does not appear in the same location the porro prisms may require adjustment.

5. Maintenance and repair.—*a. Optical repair kit for Field Artillery.*—An optical repair kit containing the necessary tools, fixtures, cements, oils, etc., for use with these instruments is furnished to ordnance companies. 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. 90, which is furnished with the kit is of the nonerecting type. It is adjusted for parallax by the usual means of focusing the eyepiece on the cross wires and then removing parallax by focusing the objective, temporarily loosening the drawtube clamping screw in the side of the telescope for the purpose. The magnifying power of the collimating telescope is 9.78X; the field of view is 4°20'.

b. Disassembly and assembly.—Disassembling of the instrument may be required for cleaning or repair. Repairs involving realignment, removal, or replacement of optical parts, 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 the disassembly procedure except where indicated. Assembly of the field glass should be undertaken in a dust-free, dry atmosphere.

(1) *Eyepieces.*—Scribe a light reference line on the body cover coinciding with the engraved line on the sleeve. Withdraw the special headless screw, A36189, and unscrew the diopter scale, B16443, using the two holes provided for gripping. Unscrew the eyepiece from the body. Remove the eyepiece washer, A36209, from the body.

(2) *Body assemblies.*—To separate the body assemblies (fig. 1, sec. A-A)—

(a) Remove the clamp screw, A36207, washer, A36212, hinge stop ring, A36210, and the special headless screw, A36204.

(b) Remove the screws, A36199 and A36205, the interpupillary scale, B16451, and the screws, A36204 and A36206.

(c) Push or pull the hinge pin, A36203, out (using the screw, A36207, if necessary for gripping) and separate the bodies. Do not lose the washer, A36208.

(d) To remove the bushing, B16446, withdraw the locking screws, A36196, and unscrew the bushing.

(3) *Objective assembly.*—Before removing the objective assembly, mark the location of the cell with respect to the adapter and of the adapter with respect to the cover. Unscrew the cell. The adapter may stay with the cover or may unscrew with the cell.

(4) *Stop*.—To remove the stop, A36202, withdraw the screw, A36197 (fig. 1, sec. B-B), and the spring, A36200.

c. Adjustment.—(1) *Porro prisms*.—To aline the porro prisms, use the six headless cone-point special screws in each telescope.

(a) To adjust the porro prisms nearest the objective end, use the four headless cone-point screws, A36195, arranged in a plane around the body. The prisms may be shifted or rotated slightly in position by proper movement of the screws.

(b) To adjust the porro prisms nearest the eyepiece, use the two remaining headless cone-point screws visible on the outside of each body. These move the porro prisms diagonally up toward the center of the instrument or down and away from the center.

(c) When adjusting the porro prisms, always be sure to loosen the opposing screws before tightening up the screws shifting the prism in the desired direction. This avoids the danger of chipping or straining the prisms. In most cases the total adjustment required will be very small.

(d) When the adjustment is satisfactory, check the headless cone-point adjusting screws to make sure that all are bearing on the porro prisms. Seal the holes with sealing compound and touch up with paint where necessary.

(2) *Reticle*.—If the reticle is excessively out of line, remove the left eyepiece and unscrew the reticle cell, A36191 (fig. 1, sec. C-C). Loosen the retainer, B16445, slightly and turn the reticle in its cell in the desired direction. Before reassembling, wash the reticle carefully in ethyl alcohol.

(3) *Diopter scale*.—If the diopter scale, B16443, does not register zero at optimum focus, loosen the headless special screw, A36189 (fig. 1, sec. C-C), and set the scale at zero. When tightening the headless special screw, avoid excessive pressure against the thread of the diopter scale.

6. Care and preservation.—*a. Care in handling*.—The instrument contains precise optical parts and although rugged in construction should be handled with care. When the field glass is not in use it should be kept in the case provided.

b. Lubrication.—The field glass may be sparingly greased at long intervals with grease, special, low temperature, furnished by the Ordnance Department for fire-control instruments. The only parts requiring lubricant are the eyepiece threads and the hinge.

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 paper tissue.

(4) To remove oil or grease from optical surfaces, apply ethyl alcohol, sparingly, with a clean camel's-hair brush and rub gently with clean tissue paper. If alcohol is not available, breathe on the glass and wipe off with clean tissue paper; repeat this operation several times until clean.

(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 with the fingers.

(7) Use of polishing liquids or pastes for polishing lenses is forbidden.

(8) Before removing optical assemblies, mark their positions for reassembly. On removing, wash the exposed optical surfaces in ethyl alcohol, then wrap the assembly in clean tissue paper pending reassembly.

(9) A thin layer of sealing compound should be applied to the surfaces to be sealed when reassembling eyepieces to covers or when reassembling objective cells to covers. The sealing compound is obtainable from the optical repair kit. Care should be taken to avoid excessive quantities and possibility of loose compound dropping on the optical surfaces.

7. Accessories.—*a. Neck strap.*—When the field glass is in use, a russet leather strap, secured to the strap loops of the instrument, protects it from accidental falls, etc., and keeps it within easy reach. The observer slips the strap over his head and carries the field glasses at chest height.

b. Carrying case.—A russet leather carrying case (fig. 3), fitted with blocking and padding and provided with a carrying loop and shoulder strap, protects the field glass when it is not in use. The instrument is carried in the case with the objective end up. When replacing the field glass in the case, the focus need not be disturbed, but the hinge may require opening or closing.

FIELD GLASS, TYPE EE

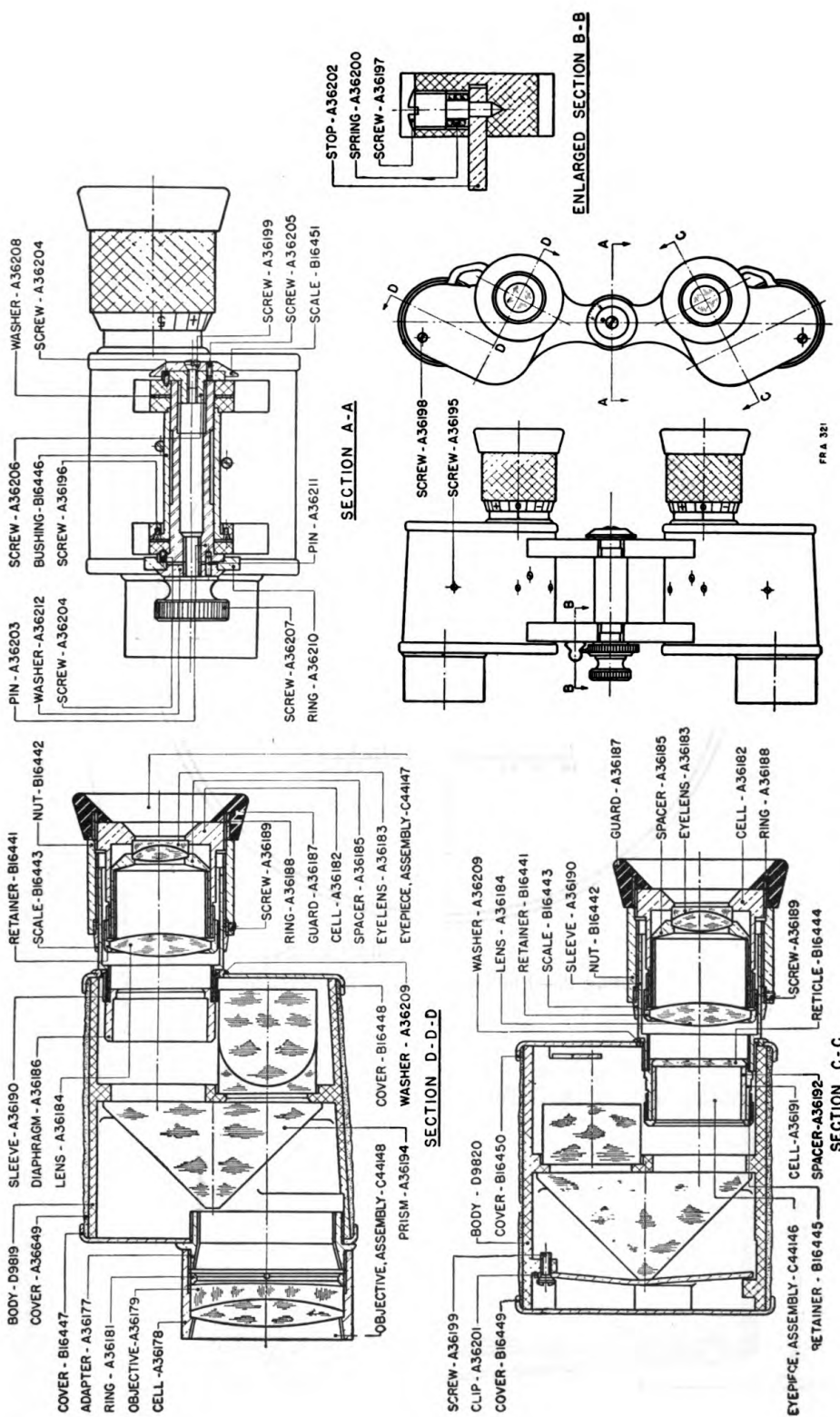
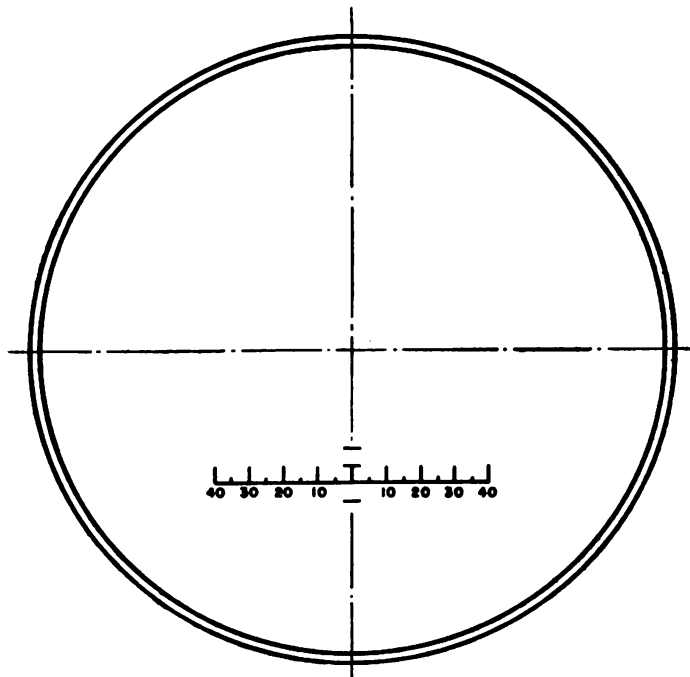


FIGURE 1.—Field glass, type EE—assembled and sectioned views.



RA FSD 1243

FIGURE 2.—Field glass, type EE—reticle.

FIELD GLASS, TYPE EE

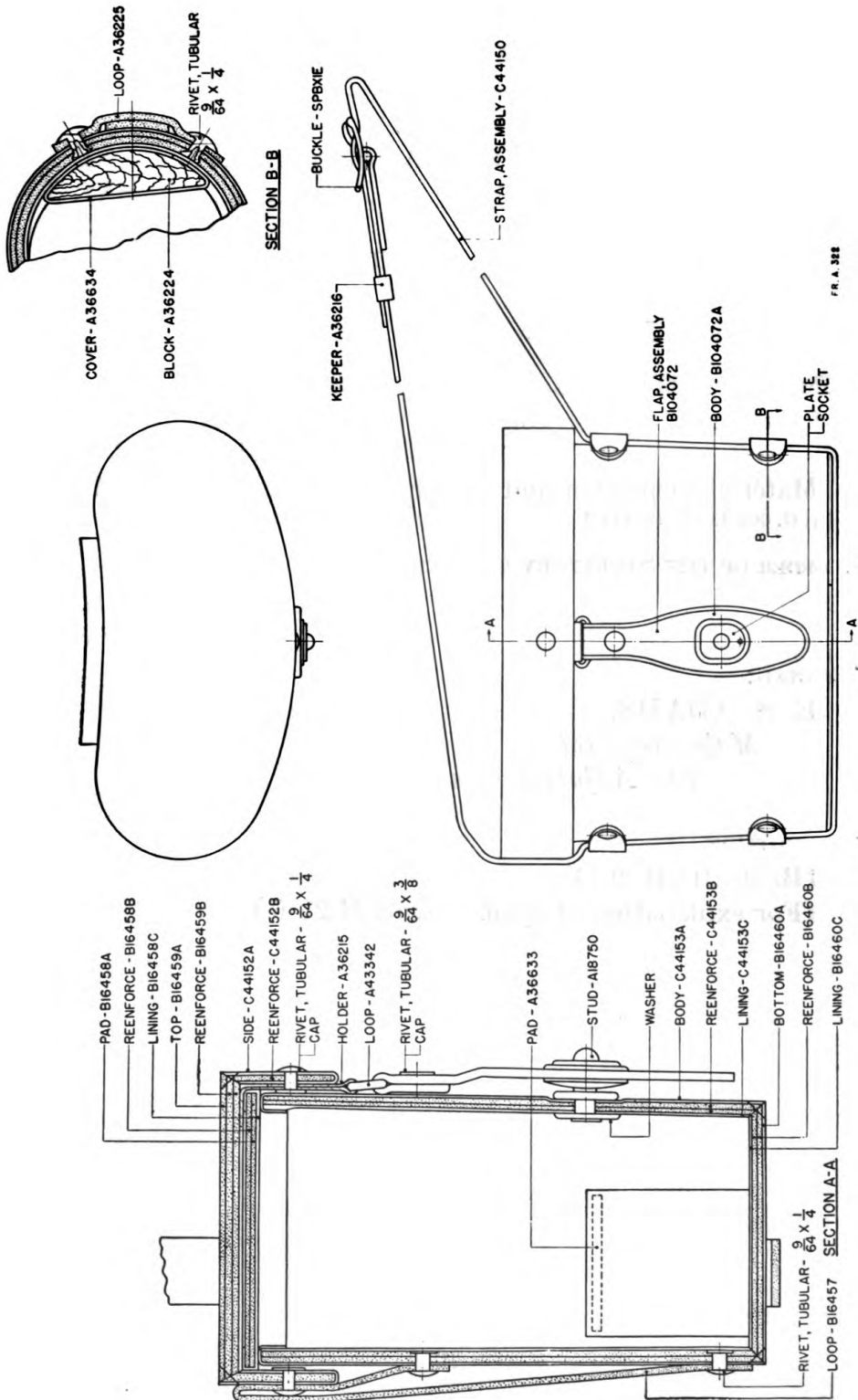


FIGURE 3.—Field glass, type EE—carrying case.

ORDNANCE DEPARTMENT

APPENDIX

LIST OF REFERENCES

1. Standard Nomenclature Lists.

- Kit, repair, optical, for Field Artillery----- SNL F-21
- Glasses, field (all types)----- SNL F-34
- Glass, field, type E, 6 power
- Glass, field, type EE, 6 power (U. S. naval gun
factory)
- Glass, field, Huet type, 8 power----- SNL F-146

2. Technical Manuals.

- Cleaning and preserving materials----- TM 9-850
(now published as TR 1395-A)
- Matériel inspection and repair----- TM 9-1100
[A. G. 062.11 (7-29-41).]

BY ORDER OF THE SECRETARY OF WAR:

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DISTRIBUTION:

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

