TM 9-6650-215-34

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

FIELD MAINTENANCE MANUAL
BINOCULAR M18

HEADQUARTERS, DEPARTMENT OF THE ARMY
31 MARCH 1964

Field Maintenance Manual

BINOCULAR M18

CHANGE No. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, D.C., 14 May 1964

TM 9-6650-215-34, 31 March 1964, is changed as follows:

On the inside front cover page, delete the words "DEATH ON CONTACT" and substitute "SEVERE SHOCK."

By Order of the Secretary of the Army:

EARLE G. WHEELER,
General, United States Army,
Chief of Staff.

Official:
J. C. LAMBERT,
Major General, United States Army,
The Adjutant General

Distribution :

Active Army:

CNGB (1)
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Units organized under following TOE's (2 copies ea):
9-7 9-12
9-9 9-25
9-26
9-27
9-57
9-65
9-66
9-67
9-76
9-167
9-367
9-500 (Tms BA, FA, EC, LA)
29-51
29-55
29-57
29-105
29-106

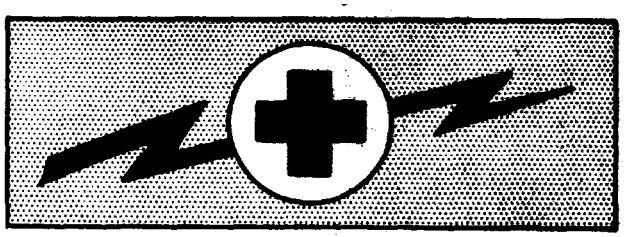
NG: None.

USAR: Same as active Army except allowance is one copy Lo each unit.

For explanation of abbreviations used see AR 320-50.

TAG0 1975A, May 700-475°-64

U.S. GOVERNMENT PRINTING OFFICE: 1964



ORD 85101

WARNING

HIGH VOLTAGE

is used in the operation
of this equipment

DEATH ON CONTACT

may result If personnel fail to observe
safety precautions.

The highest potential used is 16,000 volt dc power require to energize the infrared image converter tubes. Be careful not to contact the output connections of the power supply or the input connects of the converter tubes when operating or maintaining the equipment.

For artificial respiration, refer to FM 21-11.

Technical Manual
No. 9-6650-215-34

HEADQUARTERS,
DEPARTMENT OF THE ARMY
WASHINGTON, D.C. 20325 *31 March 1964*

BINOCULAR M18

CHAPTER 1
INTRODUCTION

Section I. GENERAL

1. Scope

a. This manual contains instructions for the field maintenance of binocular M18 with equipment (fig. 1).

b. These instructions are used in conjunction with and are supplementary to those in the operator and organizational maintenance manual, Instructions for operation, operator's maintenance, and organizational maintenance are in TM 9-6650-215-12. It may be necessarytorefer to this manual for complete procedures.

c. A description of the item, serviceability inspections, inspection procedures, and repair operations are presented in this manual.

d. The appendix contains a list of current references, including supply and technical manuals, forms, and other available publications applicable to binocular M18.

2. Comments

This first edition is being published in advance of complete technical review. The direct reporting of errors, omissions, and recommendations for improving this equipment manual by the individual user is authorized and encouraged. DA Form 2028 will be used for reporting these improvements. This form may be completed using pencil, pen, or typewriter. DA Form 2028 will be completed in triplicate and forwarded by the individual using the manual. The original and one copy will be forwarded direct to Commanding Officer, Frankford Arsenal, ATTN: SMUFA-3100, Philadelphia, Pennsylvania, 19137. One information copy will be provided to the individual's immediate superior,

3. Maintenance Allocation and Parts

a. Field maintenance responsibilities are limited to those specified in the maintenance allocation chart, appendix III, TM 9-6650-215-12.

b. Repair parts and special tools authorized to field maintenance units are listed in TM 9-6650-215-35P.

4. Maintenance Technique

a. The maintenance technique IROAN (Inspect, Repair, Only As Necessary) will be used to restore this materiel to serviceable condition.

b. IROAN is the systematic isolation and remedy of a malfunction or defective component through tests, diagnosis, and singular repair. No segment of the materiel is disassembled before the definite need for disassembly has been established.

5. Forms, Records, and Reports

a. General. Responsibility for the proper execution of forms, records, and reports rests upon the commanding officers of all units maintaining binocular M18. However, the value of accurate records must be fully appreciated by allpersons responsible for their compilation, maintenance, and use. Records, reports, and authorized forms are normally utilized to indicate the type, quantity, and condition of materiel to be inspected, to be repaired, or to be used in repair. Properly executed forms convey authorization and serve as records of work performed. The forms, records, and reports establish the work required, the progress of the work, and the status of the materiel upon completionof its repair.

b. Authorized Forms. The forms generally applicable to units maintaining this materiel are listed in TM 38-750.

c. Field Report of Accidents. The reports necessary to comply with the requirements of the Army safety program are prescribed in detail in AR 385-40.

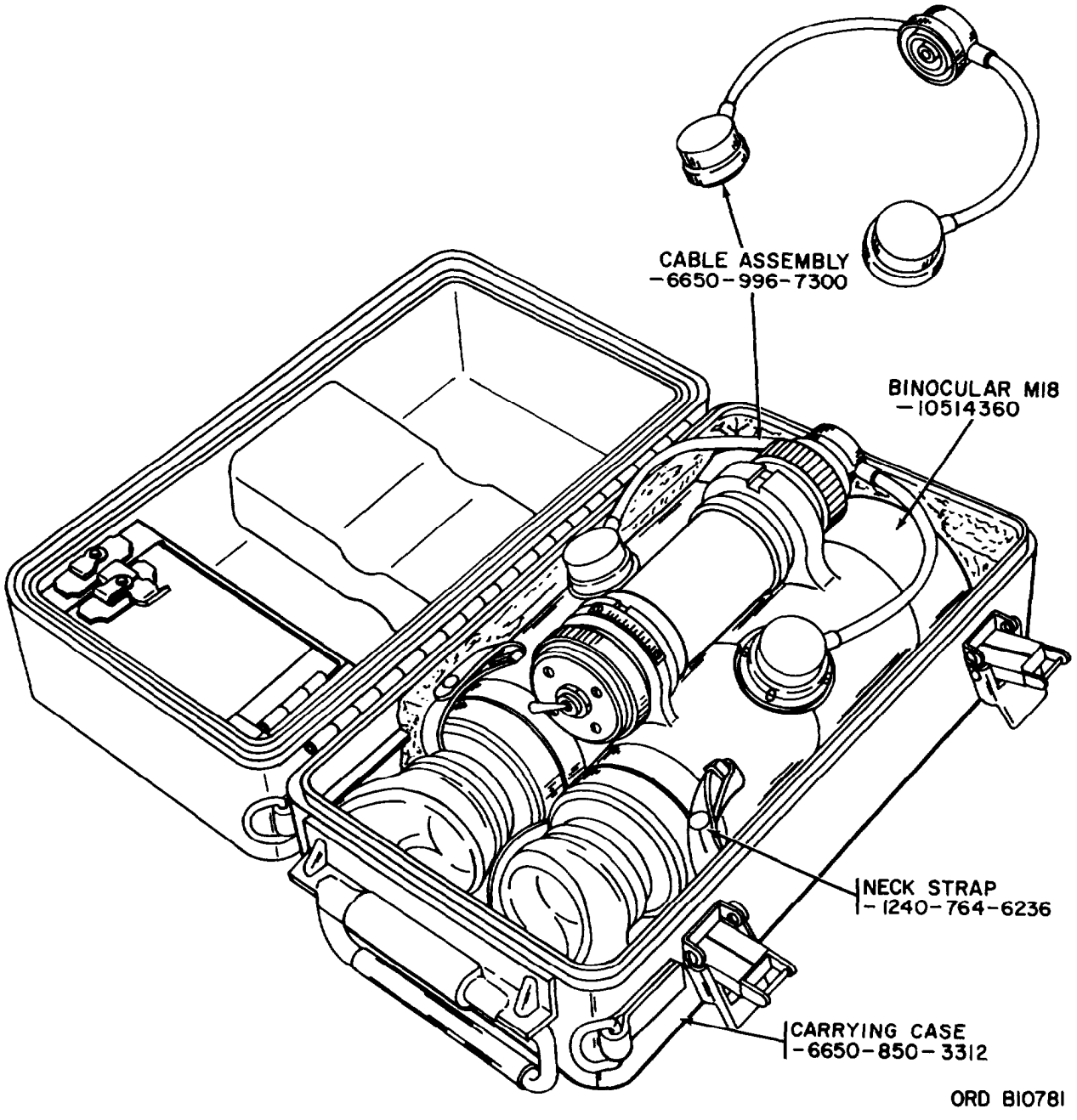


Figure 1. Binocular M18 with equipment 6650-863-5667 in carrying case 6650-850-3312.

These reports are required whenever accidents involving injury to personnel or damage to materiel occur.

d. Equipment Improvement Recommendations. Deficiencies detected in the equipment or materials should be reported using the Equipment Improvement Recommendation Section of DA Form 2407.

Section II. DESCRIPTION AND DATA

6. Description

a. Binocular M18 (fig. 2) is an infrared viewing device that enables the user to observe enemy targets at night using an infrared radiation source, such as a xenon light. The binocular consists of two monocular bodies with independent optical systems. The two monocular bodies are joined together by a hinge assembly. The interior of the hinge assembly-provides a compartment for housing the battery, power supply, and switch assembly.

b. The optical system of each monocular body consists of an eyepiece assembly, an electronic (image converter) tube, and an objective assembly, arranged as indicated in figure 3.

bination. The refractive-reflective combination bends the infrared rays, as shown in figure 3, to extend the effective focal length of the objective assembly. The

c. Invisible infrared rays from the object being viewed enter the objective lens assembly, which consists of four optical elements in a refractive-reflective com-

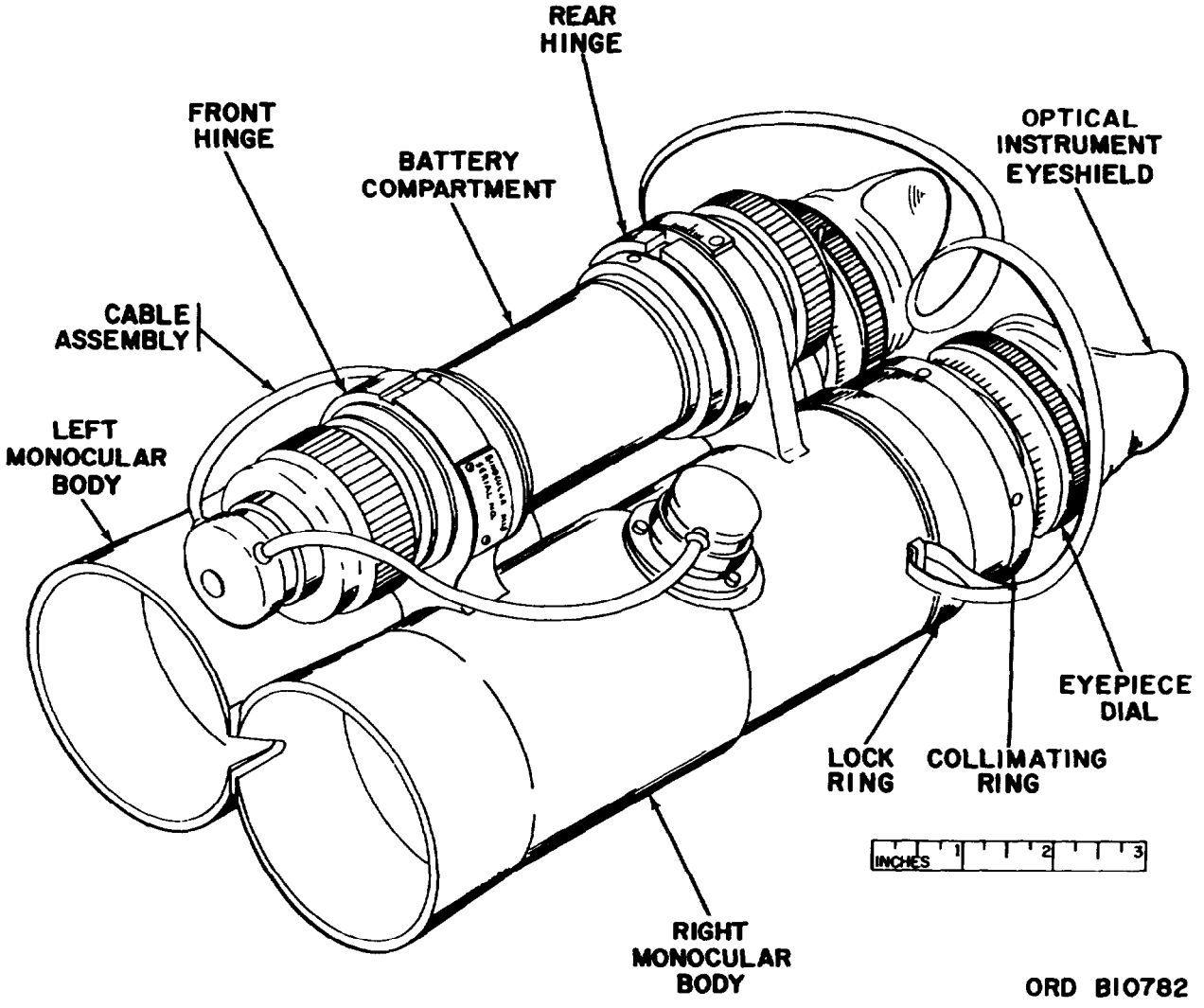


Figure 2. Binocular M18-bottom view.

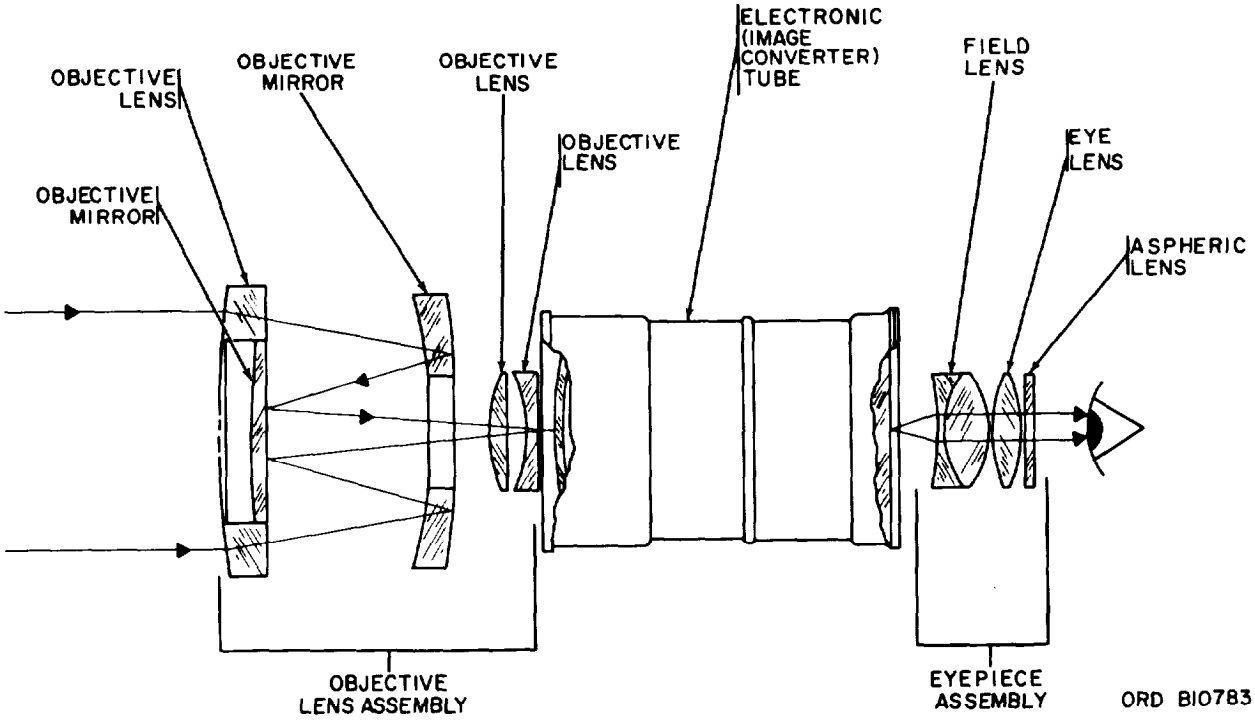


Figure 3. Binocular M18-optical system.

final objective lens forms the invisible infrared image of the object on the front face (photo-cathode) of the electronic (image converter) tube. The image is then electronically transferred to the rear face (fluorescent-anode) of the electronic (image converter) tube, where it appears as a visible image when viewed through the eyepiece assembly.

d. The eyepiece assembly (fig. 3) consists of a field lens, an eyelens, and an aspheric lens. Its focus can be adjusted through a range of ±1-1/2 diopters by rotation of the eyepiece dial (fig. 2). The optical instrument eyeshield (fig. 2) on the eyepiece assembly prevents the entrance of stray light between the eye and the eyepiece assembly.

e. The hinge assembly (fig. 2) joins the two monocular bodies and permits the adjustment of interpupillary distance between 64 and 75 millimeters. The hinge assembly (front and rear hinge) maintains a set interpupillary distance under normal handling conditions. Angular corrections for partially eollimating the optical axis of the monocular bodies are provided by eccentric rings, mounted within the hinge assembly. Setscrews are used to hold the eccentric rings in position once the angular corrections have been made. The battery compartment (fig. 2) houses the power supply, the 1-1/2-volt battery, and the ON-OFF switch.

f. Power for the binocular electrical system (fig. 4) is supplied by the 1-1/2-volt battery. The battery is connected through the ON-OFF switch to the power supply, which, in turn, supplies the power for the electronic (image converter) tubes through the cable assembly (fig. 2). The miniaturized power supply converts the 1-1/2 volts dc supplied by the battery to 16,000 volts dc, required to energize the electronic (image converter) tubes.

Caution: When the ON-OFF toggle switch has been set to OFF, the electronic (image converter) tube will remain energized until the anode voltage had time to dis-Charge.

g. A waterproof carrying case 6650-850-3312 (fig. 1) is used to hold the

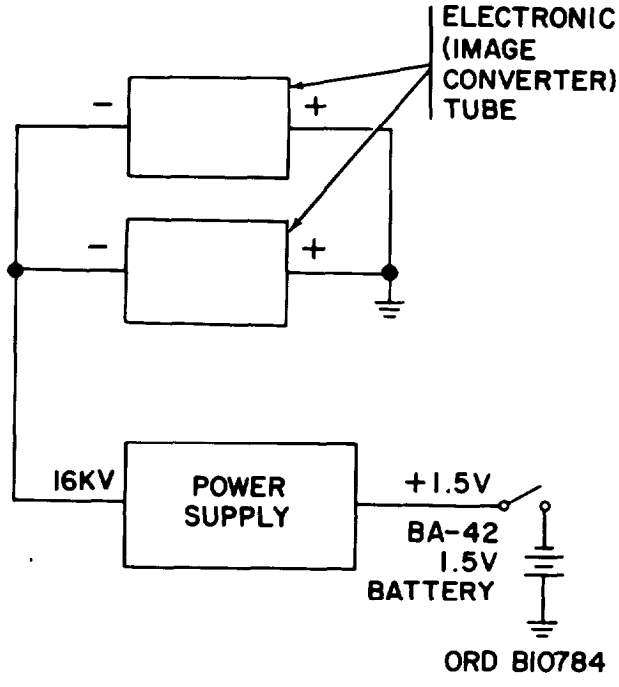


Figure 4. Binocular M18-electrical system.

binocular when it is not being used. The carrying case contains packing, preformed to the shape of the binocular, to protect from vibration and shock. The packing also serves as insulation between the binocular and the metal surfaces of the carrying case. Two spare 1-1/2-volt batteries and a cable assembly are stored in a separate compartment in the carrying case,

7. Data

a. Physical Characteristics.

Binocular:

Weight (without carrying case and batteries)	4 lb 12 oz
Weight (with carrying case and batteries)	9 lb 12 oz
Width	5-3/4 in.
Length	10-5/8 in.
Height	4-3/8 in.

Carrying case:

Weight	5 lb
Height	6 in.
Width	7 in.
Length	12-3/4 in.

b. Optical Characteristics.

Magnification of system	3.5 power
Field of view	12° 30'
Equivalent focal length (EFL) objective	3.780 in.
Magnification of image converter tube	0.77 power
Clear eye distance	0.42-in.
Diopter adjustment	±1-1/2 diopters
Interpupillary distance adjustment	64 to 75 mm

c. Electrical Characteristic.

Power source	1-1/2-v, BA-42 dry battery

CHAPTER 2

TOOLS AND EQUIPMENT

8. General

Tools and equipment over and a b o v e those available to the using organization are supplied to field maintenance units for repair and ajustment of binocular M18.

9. Common Tools and Equipment

Standard and commonly used tools and equipment having general application to this materiel are authorized for issue by tables of allowances and tables of organization and equipment.

10. Special Tools and Equipment

Special tools and equipment are tabulated in table I. This tabulation contains only those tools and equipment necessary to perform the operations described in this technical manual. It is included for information only, and is not to be used as a basis for requisitions, Requisitioning data will be obtained from TM 9-6650-215-35P, SM 9-4-4931-551, and SM 9-4-4931-J52. Special tool sets are authorized by the applicable tables of allowances and tables of organization and equipment.

Table I. Special Tools and Equipment for Field Maintenance.

Item	Federal stock no.	References		Use
		Fig.	Para	
COLLIMATOR, double	4931-561-0798	5	23	Checks collimation.
DIOPTOMETER	4931-536-5557	6	24, 33	Checks diopter adjustment.

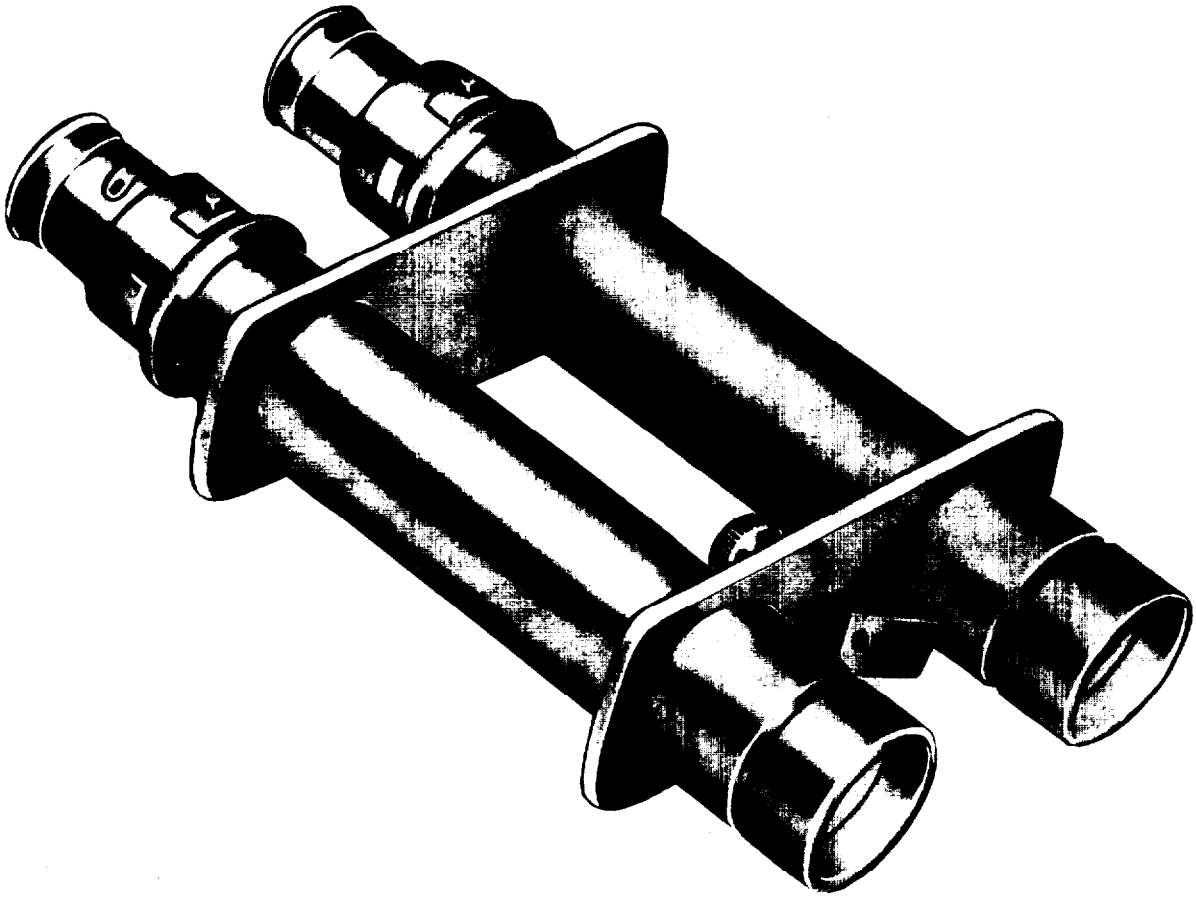


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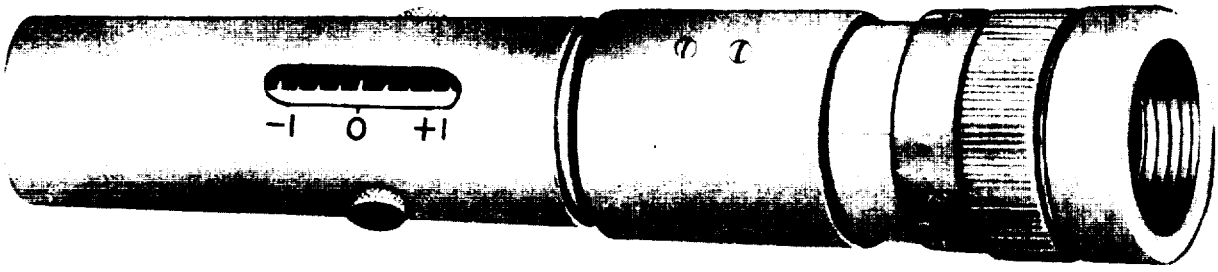
Figure 5. Double collimator 4931-561-0798.



ORD B10786

Figure 6. Dioptometer 4931-536-5557.

CHAPTER 3
INSPECTION

Section I. GENERAL

11. Scope

This chapter provides specific instructions for the technical inspection by maintenance personnel of binocular M18, either in the hands of troops or in a field maintenance shop.

12. Purpose

a. Inspection in the Hands of Troops.

(1) Insure that preventive maintenance services are being performed and are effective.
(2) Ascertain the serviceability, completeness, or readiness of materiel in the hands of troops.
(3) Render any necessary assistance to the using organization.
(4) Provide instructions for organizational supply and maintenance.
(5) Determine the most prevalent deficiencies in maintenance of materiel.
(6) Anticipate unusual supply demands.
(7) Make a record of condition of materiel in the hands of troops.

b. Inspection in the Repair Shop.

(1) Determine the nature of the required repair.
(2) Determine the extent of repair required to return the materiel to serviceability in order that its disposition may be planned.
(3) Assure that work in process is being performed properly.
(4) Insure that work performed complies fully with approved standardS.

13. Forms and Reports

Authorized forms and reports for technical inspections by field maintenance personnel are listed in TM 38-750. Preventive maintenance logs, if available, will be examined to determine the maintenance background of the materiel.

14. Modification Work Orders

All urgent modification work orders must have been applied. Check to see that no unauthorized alterations have been made, and that no work beyond the authorized scope of the unit is being attempted. Check DA Pam 310-4 and the current modification work order files to determine applicable modification work orders.

15. Serviceability Determination

a. An item in the hands of troops will be considered serviceable as indicated in (1) and (2) below:

(1) It is complete and performs its intended function.
(2) All urgent modification work orders have been applied.

Note. When practical, correct defects on the spot. However, do not remove any components which would expose interna1 optical elements in open areas.

b. When troops have reported a critical malfunction, a requisition will be prepared to exchange the unserviceable item for a serviceable one.

C. Investigate any difficulties that troops are having or have reported. Check for causes such as inadequate design, poor workmanship or material, lack of knowledge, misinformation, neglect, improper handling and storage, or preservation.

d. Check completeness of repair parts and equipment. Refer to appendix II of TM 9-6650-215-12 for basic issue items list.

e. Inspect storage facilities if item is stored when not in use.

f. Check knowledge of usingpersonnel in supply and preventive maintenance procedures.

g. Perform serviceability inspections in accordance with table II.

Note. Table II will be used by the inspector for inspection of the binocular in the hands of troops and for acceptance, in-process, and final inspection. Any repair work designated for the 5th echelon will be performed by depot maintenance shops.

Table II. Serviceability Inspections

Serviceability inspection	Acceptable condition	Reasons for nonacceptance	Lowest repair echelon	References	
				Fig.	Para
1. Completeness	All components in proper position and securely attached. Refer to TM 9-6650-215-35P for complete listing of parts authorized for replacement.	Missing or loosely attached components.	3	7	17, 29
2. Appearance	Eyeshields fit properly and are free from deterioration, cuts, or tears.	Eyeshields stretched, cut, or torn.	2	7	18a, 30a
	Cable assembly free from cracks, breaks, or other damage.	Cable assembly frayed, cracked, or broken.	2	7	18b, 30a
	Straps free from cuts, tears, or other damage.	Strap frayed, cut or, tom	2	---	l8c, 30a
	All painted surfaces completely covered.	Bare spots, chipped or loose paint.	3	---	18d, 30b
	Scales and nameplates clearly defined and easily read.	Engraved lines, numbers, or indexes filled with paint or dirt.	3	---	18e,30c
	External surfaces free from dents or cracks.	Cracked or broken housings.	5	---	18f
3. Condition of optics	No dirt, fungus, condensate, or fractures that interfere with performance.	Objectionable dirt, fungus or condensate on exterior surface of eyepiece or objective lenses.	3	---	19a, 31
		Objectionable dirt, fungus, or condensate on interior optics.	5	---	19b
		Fractured lenses --------	5	---	19c
4. Image steadiness	No visible flicker or movement or audible sparking when image is observed for 1 minute.	Image not stable ---------	3	7	20, 32
		Audible sparking occurs	3	7	20, 32
5. Range of focus	Eyepieces can be moved ±1-1/2 diopters about zero setting.	Eyepiece moves less than ±1-1/2 diopters.	5	---	21
	At same diopter setting, both eyepieces extend equally within 1/16-in.	Eyepieces do not extend equally.	5	---	21
6. Interpupillary distance adjustment	Interpupillary scale indicates interpupillary distance within 1 mm.	Interpupillary scale inaccurate by more than 1 mm.	2	---	22
7. Collimation	Dipvergence of conjugate rays emerging from eyepiece less than 15 minutes of arc.	Dipvergence exceeds 15 minutes of arc.	5	---	23
	Divergence of conjugate rays emerging from eyepiece lees than 30 minutes of arc.	Divergence exceeds 30 minutes of arc.	5	---	23
8. Diopter adjustment	With target image in sharpest focus, each diopter scale indicates 0 0±0.25 diopter.	Diopter scaler indicate more than 0±0.25 diopter.	3	---	24, 33
9. Sealing	No apparent leaks or openings in sealing.	Leaks or openings in sealing.	5	---	25

Section II. INSPECTION PROCEDURES

16. General

The following paragraphs describe the inspection procedures that can be performed by field maintenance personnel.

17. Completeness

Insure that all components of the binocular are in their proper positions and securely attached. Refer to TM 9-6650-

215-35P for a complete listing of parts authorized for replacement.

18. Appearance

Inspect the binocular for surface defects as follows:

a. Insure that eyeshields fit properly and are free from deterioration, cuts, and tears. If either eyeshield is torn, stretched, or otherwise damaged, replace it as directed in TM 9-6650-215-12.

b. Check cable assembly for cracks, breaks, and other damage. If cable assembly is frayed, cracked, or broken, replace it as directed in TM 9-6650-215-12.

c. Check straps for cuts, tears, and other damage. If straps are frayed, cut, torn, or otherwise damaged, replace them as directed in TM 9-6650-215-12.

d. Insure that all painted surfaces are completely covered. Repair bare spots and chipped or loose paint as directed in paragraph 30 b.

e. Check that all nameplates, scales, and indexes are clearly defined and easily read. If any engraved lines, numbers, or indexes are filled with paint, remove the paint as directed in paragraph 30 c.

f. Check that all external surfaces of binocular are free from dents and cracks. If housings are cracked or broken, return binocular to depot maintenance shops for overhaul.

19. Condition of Optics

Check the optical elements of the binocular for fungus, condensate, and fractures as follows:

a. Insure that there is no dirt, fungus, or condensate on external eyelens or objective lens, If necessary, clean eyelens and objective lens as directed in paragraph 31.

b. Insure that there is no dirt, fungus, or condensate on internal optics. If internal optics are dirty, return binocular to depot maintenance shops for cleaning.

c. Insure that internal and external optics are not chipped, cracked, fractured, or scratched. If internal or external optics are damaged, return binocular to depot maintenance shops for overhaul.

20. Image Steadiness

Check the image steadiness of the binocular as follows:

a. If necessary, install battery in battery compartment as directed in TM 9-6650-215-12.

b. Turn on binocular by setting ON-OFF toggle switch to ON.

c. View suitable target through binocular for one minute. There should be no visible flicker or movement of the image and no audible sparking. If image is not steady, or if audible sparking occurs, the battery, cable assembly, power supply, or ON-OFF toggle switch may be malfunctioning. Replace each of these parts, as directed in paragraph 32 and repeat test after each part is replaced until image steadiness is corrected. If image steadiness is not corrected by replacing these parts, return binocular to depot maintenance shops for overhaul.

21. Ronge of Focus

Caution: **Do not attempt to adjust the lock ring or the collimating ring (fig. 2). These items are to be adjusted by depot personnel only because the binocular will become unserviceable if the rings are adjusted without the aid of alinement tools.**

Check the range of focus of the binocular as follows:

a. Insure, by rotating eyepiece dial, that focus of each eyepiece can be adjusted ±1-1/2 diopters about zero setting. If focus cannot be adjusted ±1-1/2 diopters about zero setting, return binocular to depot maintenance shops for overhaul.

b. Set each eyepiece to same diopter setting. Both eyepieces should extend the same distance within 1/16-inch. If eyepieces do not extend equally, return binocular to depot maintenance shops for overhual.

c. Repeat b above at several different diopter settings.

22. Interpupillary Distance Adjustment

Check the accuracy of the binocular interpupillary distance adjustment as directed in TM 9-6650-215-12.

23. Collimation

Check the collimation of the binocular as follows:

a. Place binocular in a suitable fixture and adjust it to obtain true horizontal and vertical planes.

b. Set ON-OFF toggle switch to ON.

c. Place double collimator 4931-561-0798 (fig. 5) up against eyeshields.

d. View a suitable target through left

24. Diopter Adjustment

Check the accuracies of the binocular diopter adjustments as follows:

a. Place binocular in a suitable fixture so that binocular faces a suitable target.

b. Set ON-OFF toggle switch to ON.

c. Set both binocular diopter dials to zero.

d. View target through one monocular monocular body of binocular and left collimator of double collimator.

e. Adjust left monocular body and left collimator until target image is positioned on fifth graticle from left side of left collimator reticle.

f. View target through right monocular body and right collimator. Target image position should not exceed 6 graticle lines (30 minutes of arc) in divergence and 3 graticle lines (15 minutes of arc) in dipvergence MIL-STD/241. There should be no convergence. If collimation is not within specified limits, return binocular to depot maintenance shops for overhaul. body of binocular and dioptometer 4931-536-5557 (fig. 6).

e. Adjust dioptometer until a sharp and precise target image is obtained. Dioptometer should indicate 0±0.25 diopter.

f. If necessary, adjust dioptometer scale as directed in paragraph 33.

g. Repeat d, e. and f above for other monocular body.

25. Sealing

Check the binocular for proper sealing as follows:

a. Check outside of binocular for missing seals and gaskets. If necessary, return binocular to depot maintenance shops for replacement of missing seals and gaskets.

b. Look through eyepieces and check inside of monoculars for water vapor or condensation on internal optical elements. If there is water vapor or condensationon internal optical elements, return binocular to depot maintenance shops for overhaul.

CHAPTER 4

REPAIR

Section I. GENERAL

26. Scope

This chapter contains specific maintenance instructions for field repair of binocular M18 when the equipment does not meet the serviceability inspections. The scope of field maintenance is determined by the listing of field maintenance repair parts and special tools in TM 9-6650-215-35P and the maintenance allocation chart.

27. Maintenance Technique

Whenever possible, repair is to be accomplished in the field. The maintenance technique IROAN, as defined in paragraph 4, will be adhered to.

28. General Maintenance Procedures

TM 9-254 presents those general maintenance procedures that are most often encountered in repairing fire control materiel. These procedures are presented as guides to maintenance personnel in the performance of their duties.

Section II. REPAIR PROCEDURES

29. Completeness

The procedures for replacing screws, washers, and nuts do not require detailed explanations. The procedures for replacing other parts authorized for replacement are described in paragraph 32.

30. Appearance

a. Replacing Optical Instrument Eyeshields, Cable Assembly and Straps. Refer to TM 9-6650-215-12 for instructions on replacing optical instrument eyeshields, cable assembly, and straps.

b. Repairing Painted Surfaces. Repair painted surfaces as follows:

(1) Remove. all loose paint with a scraper.

(2) Smooth chipped paint and bare areas with fine sandpaper. Adjacent painted areas should be feathered to form a smooth transition from painted area to chipped or bare area.

(3) Thoroughly clean sanded area to remove all grit and dust.

(4) Coat sanded areas with primer 8010-828-7054 and black finish, MIL-STD-171, as directed in TM 9-254.

c. Removing Paint From Engraved Lines, Numbers, and Indexes. Remove paint from engraved lines, numbers, and indexes by wiping with a cloth dampened with a suitable paint thinner. Do not allow paint thinner to come in contact with painted surfaces. After paint has been removed from engraved lines, numbers, and indexes, wipe area with clean, dry cloth to remove all traces of paint thinner.

31. Condition of Optics

a. Cleaning Eyelens. Clean exterior surface of eyelens as follows:

(1) Remove optical instrument eyeshield as directed in TM 9-6650-215-12.

(2) Remove dirt, fungus, or condensate from exterior surface of eyelens with bleached, white cheesecloth dampened with ethyl alcohol 6814-264-6614,

(3) Reinstall optical instrument eyeshield as directed in TM 9-6650-215-12.

b. Cleaning Exterior Surface of Objective Lens. Remove dirt, fungus, or condensate from exterior surface of objective lens with bleached, white cheesecloth dampened with ethyl alcohol.

32. Image Steadiness

a. Replacing Battery and Cable Assembly. Refer to TM 9-6650-215-12 for instructions on replacing battery and cable assembly.

b. Replacing Power Supply. Replace power supply as indicated in figure 7. The procedure does not require a detailed explanation.

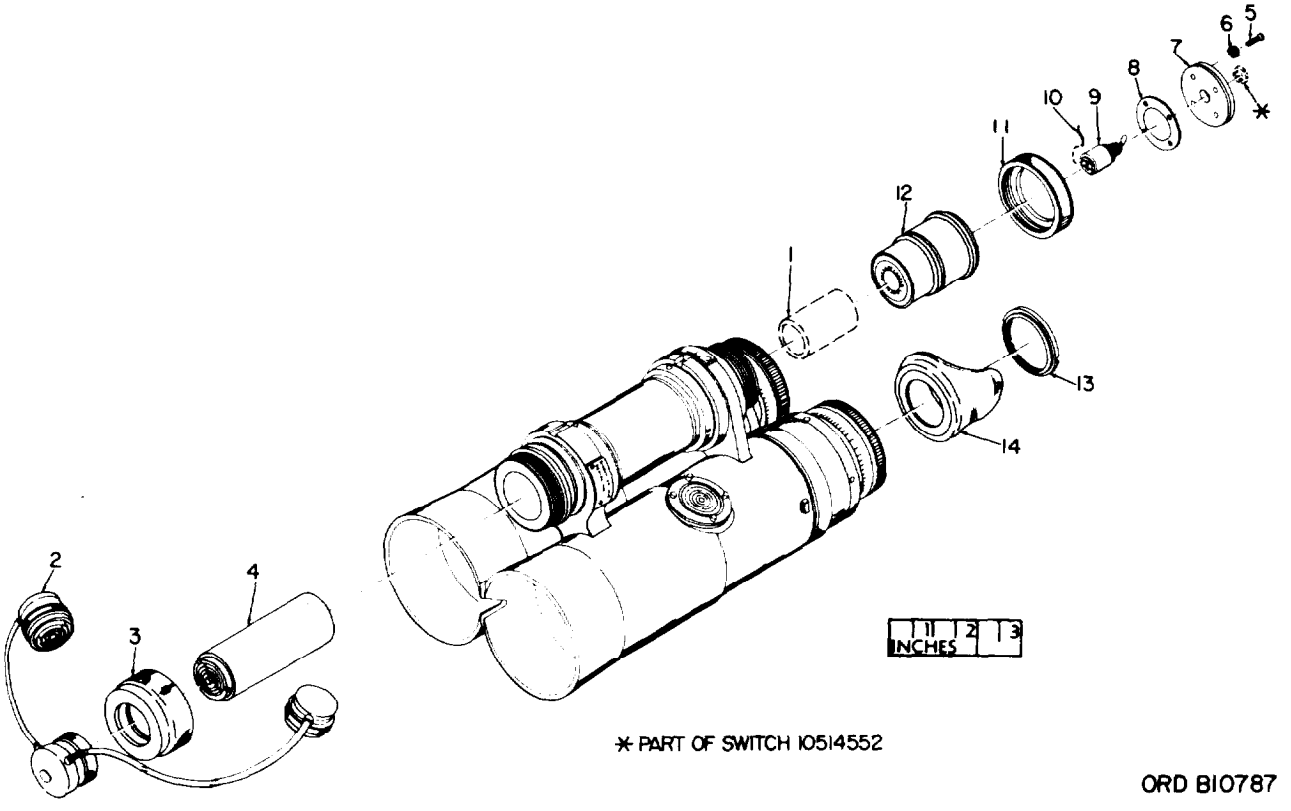
Warning: **Before starting the power supply replacement procedure, insure that the ON-OFF toggle switch has been set to OFF for at least 15 minutes.**

c. Replacing ON-OFF Switch. Replace ON-OFF toggle switch as follows:

Note. The key numbers shown below in parentheses refer to figure 7.

(1) Remove ON-OFF toggle switch, its related parts (5 through 11), and housing assembly (12) as a unit from battery compartment by unthreading ring (11).

(2) Remove plate (7)) gasket (8), and ON-OFF toggle switch (9) from



1-1-1/2-volt dry battery BA-42 6135-120-1010
2-Cable assembly 6650-996-7300
3-Cap 8620083
4-Power supply 6650-996-7293
5-NO. 2-56 x 7/16 pan-head screw 5305-543-2761
6-NO. 2 internal-tooth lockwasher 5310-543-4652
7-Plate 8565569
d-Gasket 6650-996-7295
9-ON-OFF toggle switch 5930-991-6792
10-Wire type E-24
11-Ring 8620178
12-Housing assembly
13-Externally-threaded ring 6650-996-7301
14-Optical instrument eyeshield 6650-995-6778

Figure 7. Binocular M18-partial exploded view.

housing assembly (12) by taking out four pan-head screws (5) and four internal-tooth lockwashers (6).

(3) Unsolder wire (10) from switch (9).

(4) Remove ON-OFF toggle switch (9) from plate (7) by taking off the attaching nut. Be careful not to damage or lose gasket (8).

(5) Install replacement ON-OFF toggle switch (9) on plate (7), and secure with attaching nut.

(6) Solder wire (10) to ON-OFF toggle switch (9) with solder, QQ-S-571, type SN60, in accordance with MIL-S-6872A.

(7) Place gasket (8) in position on plate (7).

(8) Place ring (11) in positionon housing assembly (12).

(9) Install plate (7) on, housing assembly (12), and secure with four No. 2-56 x 7/16 pan head screws (5) and four No. 2 internal-toothlockwashers (6).

(10) Install housing assembly (12) in battery compartment, and secure by tightening ring (11).

33. Adjustment of Diopter Adjustment Accuracy

Adjust the accuracy of the binocular diopter adjustment as follows:

a. Remove optical instrument eyeshields (14, fig. 7) as directed in TM 9-6650-215-12.

b. If necessary, install battery (1, fig. 7) as directed in TM 9-6650-215-12.

c. Set ON-OFF toggle switch to ON.

d. Set dioptometer (fig. 6) to 0 diopter.

e. View suitable target through one monocular body of binocular and dioptometer.

f. Adjust binocular diopter dial until a sharp and precise target image is obtained.

g. Remove diopter dial from binocular and reinstall it so that zero mark is alined with index within ±0.25 diopter.

h. Repeat e, f, and g above for other monocular body.

i. Set ON-OFF toggle switch to OFF.

j. Install optical instrument eyeshields (14, fig. 7) as directed in TM 9-6650-215-12.

APPENDIX

REFERENCES

1. Publication Indexes

The following publication indexes should be consulted frequently for latest change or revisions of references given in the appendix and for new publications relating to materiel covered in this manual.

Military Publications:
- Index of Administrative Publications . . . . . DA Pam 310-1
- Index of Blank Forms . . . . . DA Pam 310-2
- Index of Supply Manuals; Ordnance Corps . . . . . DA Pam 310-29
- Index of Technical Manuals, Technical Bulletins, Supply Bulletins, Lubrication Orders, and Modification Work Orders. DA Pam 310-4

2. Supply Manuals

The following supply manuals of the Department of the Army pertain to this materiel:

- Brushes, Paints, Sealers, and Adhesives . . . . . SM 5-C8000-IL
- Fire Control Maintenance and Repair Shop Specialized Equipment Tool Set, Field and Depot Maintenance General Purpose, Special Tools (4931-574-6433). SM 9-4-4931-J51
- Fire Control Maintenance and Repair Shop Specialized Equipment Wrench Set, Spanner, Field and Depot Maintenance Tubular, Double End Concave Inserted Blade, Set of 76 Wrenches (4931-580-0012). SM 9-4-4931-J52

3. Forms

Refer to TM 38-750 for pertinent forms.

4. Other Publications

a. General.
- First Aid for Soldiers . . . . . FM 21-11
- Military Terms, Abbreviations, and Symbols :
  - Authorized Abbreviations and Brevity Codes . . . . . AR 320-50
  - Dictionary of United States Army Terms . . . . . AR 320-5
  - Optical Terms and Definitions MIL-STD-1241
  - Principles of Fire Control Materiel . . . . . TM 9-3305-2
  - Safety: Accident Reporting and Records . . . . . AR 385-40
  - The Army Equipment Record System and Procedures . . . . . TM 38-750

b. Maintenance.
- General Specification for Soldering Process MIL-S-6872A
- Maintenance of Supplies and Equipment:
  - Cleaning of Ordnance Materiel . . . . . TM 9-208-1
  - Field and Depot Maintenance Repair Parts and Special Tool Lists for Binocular M18. TM 9-6650-215-35P
  - General Maintenance Procedures for Fire Control Materiel . . . . TM 9-254
  - Operator and Organizational Maintenance: Binocular M18 . . . . . TM 9-6650-215-12

Organizational Maintenance Repair Parts and Special Tool Lists for Binocular M18.	
Painting Instructions for Field Use	TM 9-213
Preparation for Painting and Finishing for Metal and Wood Surfaces.	MIL-STD-171

By Order of Secretary of the Army:

EARLE G. WHEELER,
General, United States Army,
Chief of Staff.

Official:
J. C. LAMBERT,
Major General, United States Army,
The Adjutant General.

Distribution:

Active Army:

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Rock Island Arsenal (2)	9-500 (Tms BA, FA, EC, LA)
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Pueblo Army Dep (2)	29-105
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NG: None.
USAR: Same as Active Army except allowance is one copy to each unit.
For explanation of abbreviations used, see AR 320-50.

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS

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P.S.--IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR RECOMMENDATION MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS.

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			

Temperature (Exact)

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

PIN: 028032-001