

TM 9-1240-375-34

TECHNICAL MANUAL

Direct Support and General Support Maintenance Manual
for

QUADRANT, FIRE CONTROL: M17
(1290-01-037-3883);

QUADRANT, FIRE CONTROL: M18
(1290-01-037-7289);

MOUNT, TELESCOPE AND QUADRANT: M171
(1240-01-039-7273);

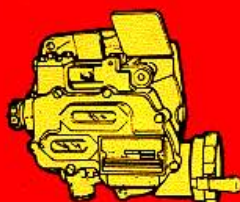
MOUNT, TELESCOPE AND QUADRANT: M172
(1240-01-037-7290);

TELESCOPE, PANORAMIC: M137
(1240-01-038-0531); AND

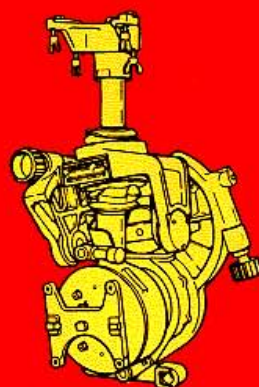
TELESCOPE, ELBOW: M138
(1240-01-038-0530)



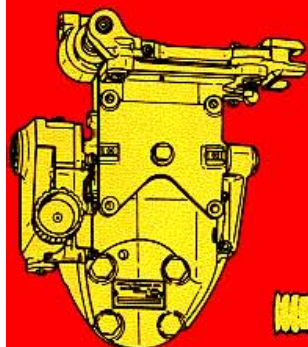
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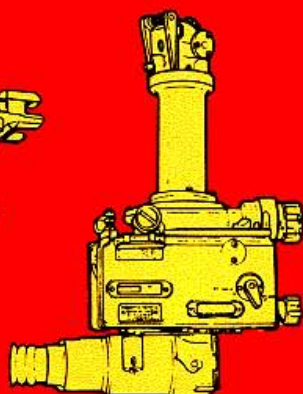
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HEADQUARTERS, DEPARTMENT OF THE ARMY
SEPTEMBER 1980

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This copy is a reprint which includes current
pages from Changes 1 and 2.

WARNING

All personnel that operate and/or maintain fire control equipment must be aware of the following special precautions.

RADIOACTIVE MATERIALS



RADIATION HAZARD

Rules and Regulations

Copies of the following rules and regulations are maintained at HQ, ARRCOM Rock Island, IL 61299. Copies may be requested, or information pertinent to these rules and regulations obtained, by contacting the ARRCOM Radiological Protection Officer (RPO), AUTOVON 793-6982, Commercial (309)794-5843.

10CFR Part 19—Notices, Instructions, and Reports to Workers; Inspections.

10CFR Part 20—Standards for Protection Against Radiation.

NRC license, license conditions, and license application.

Safety Precautions

The radioactive material used in these instruments is tritium gas (H_3) sealed in pyrex tubes. It poses no significant hazard to the re-

pairman when intact. These sources illuminate the instrumentation for night operations. Tampering with or removal of the sources in the field is prohibited by Federal law. In the event there is no illumination, notify the local Radiological Protection Officer. Do not attempt to repair or replace the instrument in the field! If skin contact is made with any area contaminated with tritium, immediately wash with nonabrasive soap and water.

Identification

Radioactive self-luminous sources are identified by means of radioactive warning labels (as above). These labels should not be defaced or removed, and should be replaced immediately when necessary. Refer to the local RPO or the ARRCOM RPO for instructions on handling, storage, or disposal.

Storage and Shipping

All radioactively illuminated instruments or modules which are defective will be evacuated to a depot maintenance activity. These items must be placed in a plastic bag (TM 9-1025-211-10) and packaged in the shipping container from which the replacement was taken before evacuation to a higher echelon is made. Spare equipment must be stored in the shipping container, as received, until installed on the weapon. Storage of these items is recommended to be in an outdoor shed-type storage or unoccupied building.

First Aid

For further information on first aid, see FM 21-11.

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No. 9-1240-375-34)

TM 9-1240-375-34
HEADQUARTERS,
DEPARTMENT OF THE ARMY
Washington, DC, 26 September 1980

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Maintenance Manual
for
QUADRANT, FIRE CONTROL: M17
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(1290-01-037-7289);
MOUNT, TELESCOPE AND QUADRANT: M171
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TELESCOPE, PANORAMIC: M137
(1240-01-38-0531);
AND
TELESCOPE, ELBOW: M138
(1240-01-038-0530)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2, located in the back of this manual direct to: Commander, US Army Armament, Munitions and Chemical Command, IATTN: AMSMC-MAS, Rock Island, IL 61299-6000. A reply will be furnished directly to you.

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HOW TO USE THIS MANUAL

GENERAL

References in the manual are to pages and other technical manuals.

INDEXES

This manual is organized to help the user quickly find the information needed. There are several useful indexes.

- a. **Front Cover Index.** Is a tabbed index of chapters and appendixes. Keyed to tabbed pages in the manual.
- b. **Table of Contents.** Lists in order all chapters, sections, and appendixes. Gives page references.
- c. **Nomenclature Cross-Reference List and List of Abbreviations.**

(1) **Nomenclature Cross-Reference List.** Gives an alphabetical list of common item names used in the manual. Official nomenclature is given for each item (p 1-2).

(2) **List of Abbreviations.** Is an alphabetical list of uncommon abbreviations used in the manual (p 1-3).

d. **Chapter Indexes.** At the beginning of each chapter. List paragraphs in alphabetical order. Reference pages.

e. **Chapter Overviews.** Summarize material covered in the chapter. Are located after chapter index at the beginning of each chapter.

f. **Symptom Index.** Located just before the troubleshooting table in each maintenance chapter. Lists in alphabetical order parts with possible malfunctions. References pages of the troubleshooting tables.

g. Alphabetical Index. Located at the end of the manual. An extensive subject index for everything in the manual. Gives page references.

MAINTENANCE PROCEDURES

There are six maintenance chapters, one each for: M17 fire control quadrant, M18 fire control quadrant, M171 telescope and quadrant mount, M172 telescope and quadrant mount, M137 panoramic telescope, and M138 elbow telescope. Section IV and V of each chapter begins with a summary procedure, followed by detailed procedures for the maintenance tasks.

a. Summary Procedure. Made up of two parts-initial setup and list of tasks. Used only when doing maintenance on an entire piece of fire control equipment. (For maintenance of an individual part, use the detailed procedures immediately following each summary procedure.)

(1) Initial Setup. Is a list of everything needed to perform maintenance on fire control equipment:

Test Equipment--Lists required test equipment.

Special Tools--Lists tools required to perform the maintenance procedure.

Materials/Parts--Lists expendable materials. Each material or part is followed by a part number or appendix reference. If more than one part is needed, the quantity needed precedes the part number or reference.

References--Lists other publications containing necessary information.

Troubleshooting References--Lists malfunctions which can be corrected by following the maintenance procedure.

Equipment Conditions--Lists conditions to be met before starting the procedure. The reference on the left of the condition is a page reference to instructions for setting up the condition. At the end of each condition is a reference to the task numbers on the list of tasks to which the condition applies.

Special Environmental Conditions--Lists environmental conditions (such as lighting, temperature) needed before starting the task.

(2) List of Tasks. Summarizes in outline form the major tasks involved in your procedure. Gives page references to troubleshooting table and detailed procedures.

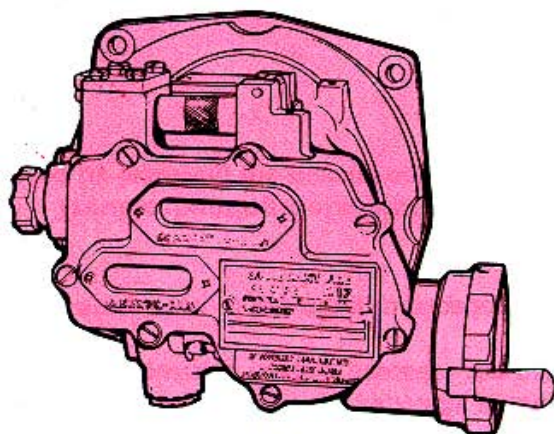
b. Detailed Procedures. Immediately follow each summary procedure. Also contain an initial setup plus step-by-step procedures.

(1) Initial Setup. Gives a list of everything needed in order to do maintenance on one part of a fire control equipment (for example, the adapter assembly for the M172 mount on p 510). See explanation of initial setup above.

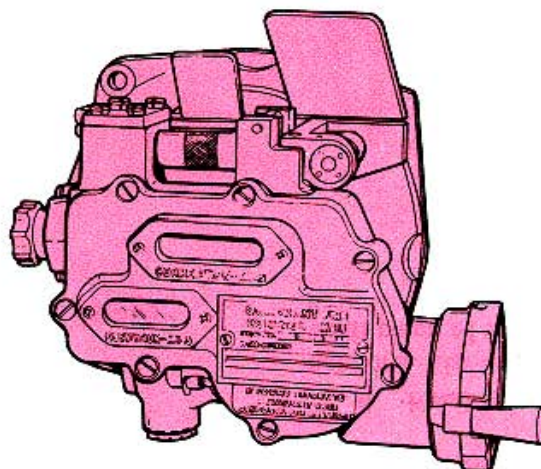
(2) Step-By-Step Procedures. Are illustrated procedures for maintenance authorized in the MAC (TM 9-1025211-20&P) and the RPSTL (TM 9-1240-375-34P).

c. Troubleshooting. Also included in section III of each chapter are procedures for direct support and general support troubleshooting.

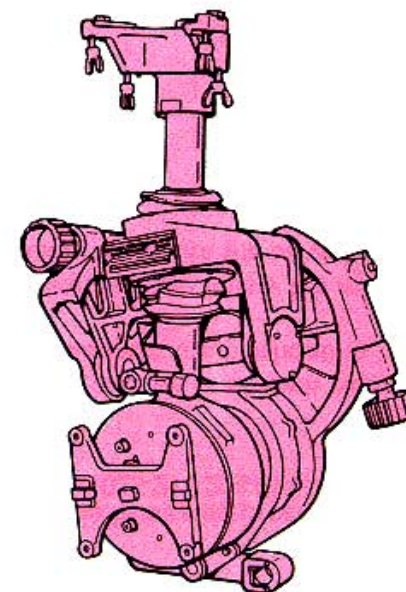
d. Final Inspection Procedures. Immediately follow the maintenance sections. List inspections and tests required to ensure the serviceability of each piece of fire control equipment.



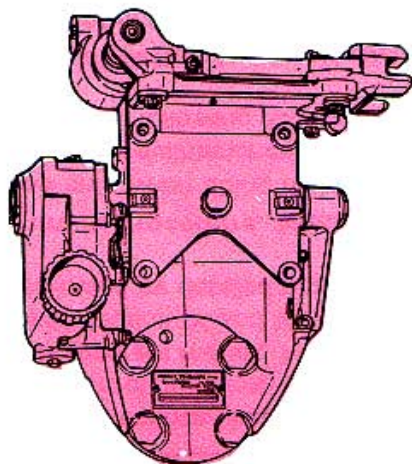
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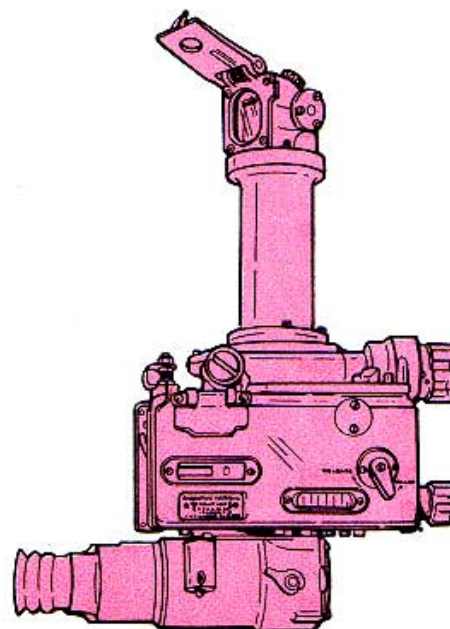
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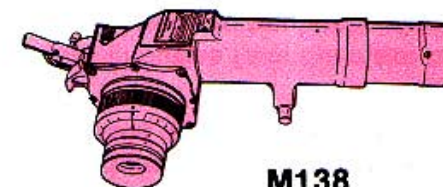
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CHAPTER 1 INTRODUCTION

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CHAPTER OVERVIEW

Section I references applicable maintenance forms, records, and reports; gives the procedure for reporting equipment improvement recommendations; and provides a cross-reference list of nomenclature and list of abbreviations. General descriptions, tabulated data, and locations for the M198 howitzer fire control equipment are provided in section II.

Section I. GENERAL INFORMATION

1-1. SCOPE

- a. Type of manual: Direct and general support maintenance.
- b. Model numbers and equipment names:
 - (1) M17 fire control quadrant.
 - (2) M18 fire control quadrant.
 - (3) M171 telescope and quadrant mount.
 - (4) M172 telescope and quadrant mount.
 - (5) M137 panoramic telescope.
 - (6) M138 elbow telescope.
- c. Purpose of equipment:
 - (1) M17 Quadrant. Measures cannon elevation during one-person operation.
 - (2) M18 Quadrant. Measures cannon elevation during two-person operation.

1-1. SCOPE (cont)

c. Purpose of equipment: (cont)

- (3) M171 Mount. Provides a mount for the M17 quadrant and M137 telescope.
- (4) M172 Mount. Provides a mount for the M18 quadrant and M138 telescope.
- (5) M137 Telescope. Provides a means of measuring horizontal direction in the indirect fire operation.
- (6) M138 Telescope. Provides direction in the direct fire operation.

1-2. MAINTENANCE FORMS, RECORDS. AND REPORTS

Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA PAM 738-750, The Army Maintenance Management System.

1-3. REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR)

EIR's will be prepared using SF 368 (Quality Deficiency Report). Instructions for preparing EIR's are provided in DA PAM 738-750, The Army Maintenance Management System. EIR's should be mailed directly to Commander, US Army Armament, Munitions and Chemical Command, ATTN: AMSMC-QAD, Rock Island, IL 61299-6000. A reply will be furnished directly to you.

1-4. NOMENCLATURE CROSS-REFERENCE LIST AND LIST OF ABBREVIATIONS

a. Nomenclature Cross-Reference List.

Common Name	Official Nomenclature
Adapter	Quadrant testing fire control maintenance final inspection fixture
Azimuth counter	Rotating counter
Azimuth counter cover	Counter cover
Azimuth counter eccentric	Eccentric
Azimuth knob	Knob
Azimuth knob assembly	Knob assembly
Bracket	Rotating eye bracket
Collimator telescope	M1A1 infinity aiming reference collimator
Correction counter	Rotating counter
Correction knob	Knob
Correction knob assembly	Knob assembly
Cross level knob	Knob
Cross level vial	Level vial
Deflection counter	Rotating counter
Deflection counter eccentric	Eccentric
Elevation counter	Rotating counter
Elevation knob	Shouldered knob
Elevation knob assembly	Knob assembly
Elevation level vial	Level vial
Eyeshield	Optical eyeshield
Eyeshield	Optical instrument eyeshield
Felt	Mechanical preformed felt
Felt holder	Felt mechanical holder
Grease	Aircraft grease (aircraft instrument)

Common Name	Official Nomenclature
Grease	Aircraft grease (corrosion-resistant)
Housing	Worm gear housing
Housing	Worm housing body
Latch	Lock-release latch
Lever	Lock-release lever
Lever	Plunger-release lever
Locking ring .	Ring
Lock wire.....	Nonelectrical wire
M137 telescope	M137 panoramic telescope
M138 telescope	M138 elbow telescope
M17 quadrant	M17 fire control quadrant
M171 mount	M171 telescope and quadrant mount
M172 mount	M172 telescope and quadrant mount
M18 quadrant	M18 fire control quadrant
Packing	Preformed packing
Plunger	Detent plunger
Radioactive material caution plate	Instruction plate

Common Name	Official Nomenclature
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Section II. EQUIPMENT DESCRIPTION AND DATA

NOTE

All fire control quadrants and telescopes contain radioactive sources, used to illuminate areas that in other instruments were illuminated by an external battery source. The sources are completely sealed tubes, and do not present any external radiation hazard. The tubes used in these instruments are of various sizes, shapes, and lengths. Each is shock mounted in clear potting compound and assembled in the interior of the equipment to protect it from damage.

Shop set	Instrument and fire control shop equipment
Support assembly	Quadrant support assembly
Telescope head spacer	Optical element spacer
Tool box	Instrument and fire control system repair shop equipment
Tool kit.....	Field artillery mechanics tool kit
Tool set	Fire control maintenance and repair shop specialized equipment tool set

b. List of Abbreviations.

Abbreviation	Definition
app.	Appendix
ft-lb	Foot-pound
in.-lb	Inch-pound
in.-oz	Inch-ounce
N-m	Newton/meter

1-5. EQUIPMENT PURPOSE, CAPABILITIES, AND FEATURES

a. M17 and M18 Fire Control Quadrants. The dual fire control quadrants are identical with the following exceptions: The M17 quadrant contains a left-hand worm shaft assembly and gear, and the M18 quadrant contains a right-hand worm shaft assembly and gear. Also, the M18 quadrant features a cross level vial, which is not present on the M17 quadrant. Both quadrants have the capability of measuring elevation to 1433 mils. The dual equipment permits either the assistant gunner or the gunner to lay the cannon in elevation. The counters and level vials are self-illuminated.

1-5. EQUIPMENT PURPOSE, CAPABILITIES, AND FEATURES(cont)

b. M171 Telescope and Quadrant Mount. The M171 mount supports the M137 telescope and the M17 quadrant. The M171 mount is installed on the left trunnion of the M198 howitzer. It provides an adjustable base for leveling the M137 telescope and the M17 quadrant. The adjustable base compensates for azimuth and elevation errors introduced by cant when the weapon is elevated. Self-illuminated level vials are provided for cross and elevation-leveling.

c. M172 Telescope and Quadrant Mount. The M172 mount supports and provides an adjustable base for leveling and boresighting the M138 telescope and the M18 quadrant. The M172 mount is installed on the right trunnion of the M198 howitzer.

d. M137 Panoramic Telescope. The M137 telescope is a 4power, 10-degree field of view instrument with digital counters. All counters and the reticle are self-illuminated by radioactive isotopes. The M137 telescope is the basic instrument used in laying the M198 howitzer in azimuth. It is mounted to the upper part of the M171 mount. This instrument is hermetically sealed and can be flushed with dry nitrogen.

a. M138 Elbow Telescope. The M138 telescope is an 8-power, 8 degree field of view instrument. A self-illuminated elevation reticle is provided for direct fire. The M138 telescope also has a mil scale reticle that is inscribed in meters for range and is self-illuminated. The optical system is composed of the following:

- A two-component objective lens system
- An amici prism
- A flat reticle
- A reticle lens
- A field lens
- A center lens
- An eye lens

1-6. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS

a. M17 Fire Control Quadrant.

(1) Fire Control Level Assembly (1). The fire control level assembly consists of an elevation level vial in a vial holder. The fire control level assembly is used in checking the M199 cannon in elevation.

(2) Cover Assembly (2). The cover assembly includes the counter windows, the radioactive sources that illuminate the dials, the identification plate, and the instruction plate.

(3) Correction Knob Assembly (3). The correction knob assembly is located on the left side of the M17 quadrant. It is used to set elevation correction increments on the correction counter.

