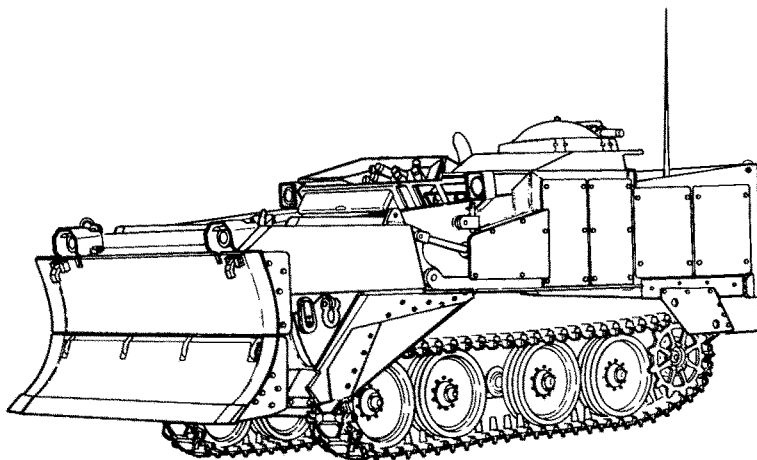


TM 5-2350-262-20-3

TECHNICAL MANUAL UNIT MAINTENANCE MANUAL

VOLUME 3 OF 3

HYDRAULIC TROUBLESHOOTING
TEST PROCEDURES



ARMORED COMBAT EARTHMOVER
(ACE), M9
(NSN 2350-00-808-7100)

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DEPARTMENT OF THE ARMY
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HYDRAULIC TROUBLESHOOTING TEST PROCEDURES

ARMORED COMBAT EARTHMOVER (ACE), M9
(NSN 2350-00-808-7100)

VOLUME 3 OF 3

REPORTING OF ERRORS AND RECOMMENDING IMPROVEMENTS

You can improve this publication. If you find any mistakes, or if you know of a way to improve the procedures, please let us know. Submit your DA Form 2028-2 (Recommended Changes to Equipment Technical Publications), through the Internet on the Army Electronic Product Support (AEPS) website. The Internet address is <http://aeps.ria.army.mil>. If you need a password, scroll down and click on "ACCESS REQUEST FORM". The DA Form 2028 is located in the ONLINE FORMS PROCESSING section of the AEPS. Fill out the form and click on SUBMIT. Using the form on the AEPS will enable us to respond quicker to your comments and better manage the DA Form 2028 program. You may also mail, fax or email your letter, DA Form 2020, or DA Form 2028-2 direct to: Commander, U.S. Army Tank-automotive and Armaments Command, ATTN: AMSTA-AC-NML, Rock Island, IL 61299-7630. The email address is amsta-ac-nml@ria.army.mil. The fax number is DSN 793-0726 or Commercial (309) 782-0726.

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HOW TO USE THIS MANUAL

This manual describes hydraulic troubleshooting test procedures for the M9, Armored Combat Earthmover (ACE). Before performing any work on the M9, you should become thoroughly familiar with this manual, its content, organization, and features.

ABOUT YOUR MANUAL

- a. Spend some time looking through this manual. You'll find that it has an new look, different than most of the TMs you've been using. New features added to improve the convenience of this manual and increase your efficiency are:
 1. **Accessing Information** - Extensive troubleshooting guides for specific systems lead directly to step by step directions for problem solving and troubleshooting tasks.
 2. **Illustrations** - A variety of methods are used to make locating and fixing components much easier. Locator illustrations with keyed text, exploded views, and cutaway diagrams make the information in this manual easier to understand.
 3. **Keying Text With Illustrations** - Instructions are located together with figures that illustrate the specific task you are working on. In most cases, the task steps are located after the figures making part identification and procedure sequence easier to follow.

The TM is the fundamental means by which the Army communicates to soldiers the requirements and procedures necessary to perform hydraulic troubleshooting.

- b. **General Features.** Your TM is the best source available for providing information and data critical to vehicle hydraulic troubleshooting:
 - Safety summary (warning page a through c)
 - General information and equipment descriptions (chapter 1)
 - Principles of operation (chapter 2, section I)
 - Troubleshooting (chapter 3, section II)
 - Special Tools, TMDE, and Support Equipment (appendix B)
 - Special Tools, Hydraulic Troubleshooting Parts Kit, 5705562 (appendix C)
 - Torque Value Guide for Hydraulic Fittings (appendix D)
 - Schematic Diagram (appendix E)

A typical example of how to use this manual is provided on the following pages.

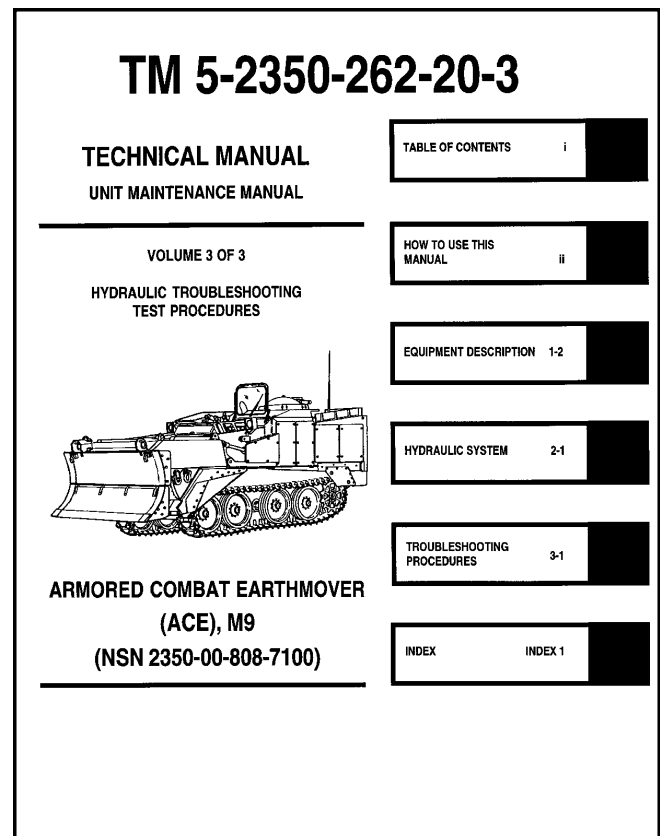
USING YOUR MANUAL: AN EXAMPLE

- a. **TASK:** The operator of an M9 ACE vehicle has complained that the apron will not raise. The vehicle has been assigned to you for repair.

b. **TROUBLESHOOTING STEPS:**

1. Look at the cover of this manual. You'll see chapter titles listed from top to bottom on the right hand side.

2. Look at the right edge of the manual. On some of the pages you'll see black bars (bleed-to-edge indicators) that are aligned with the chapter bars on the cover. These are the locations of the chapters in the text.



3. Look for "TROUBLESHOOTING PROCEDURES" on the cover. This is where the troubleshooting information is located.
4. Turn to those pages with the edge indicator matching the black bar for troubleshooting procedures. Page numbers are also listed next to chapter titles.
5. Chapter 3 is divided into two sections:
- Section I - General Hydraulic System Troubleshooting Procedures
 - Section II - Troubleshooting Procedures

Section II. TROUBLESHOOTING PROCEDURES

SCOPE

This section contains information on locating faults and causes of hydraulic malfunctions that may develop in the M9 ACE. An alphabetical symptom index is provided.

GENERAL

Before you begin troubleshooting, ensure the defect is real. If possible, talk to the operator or mechanic that reported the problem. Look for any other problems that could cause the system or component to malfunction, such as a switch or lever in the wrong position. Refer to TM 5-2350-262-10 for correct operating procedures. Check fluid levels as shown in TM 5-2350-262-10.

Many faults can be located by a good visual inspection. Look for leaks, loose or corroded connections, damaged controls, and loose or damaged linkages.

When working on the hydraulic system, follow the general hydraulic system repair methods and refer to the general hydraulic system troubleshooting procedures.

If you use the optional STE/ICE-R tests, use the STE/ICE-R Operator's Manual (TM 9-4910-571-12&P) for reference before and during testing.

When trying to isolate a fault, review the past maintenance record on the affected vehicle. Although it doesn't happen often, an incomplete or poorly performed maintenance task may lead to another problem.

USING THE TROUBLESHOOTING PROCEDURES

Find the symptom in the symptom index. Go to the page referenced for that symptom. All possible malfunctions cannot be listed. If the specific malfunction is not listed in this section, refer to vehicle hydraulic schematic diagram for additional information or reference data.

6. Turn to section II, "TROUBLESHOOTING PROCEDURES" (page 3-14).

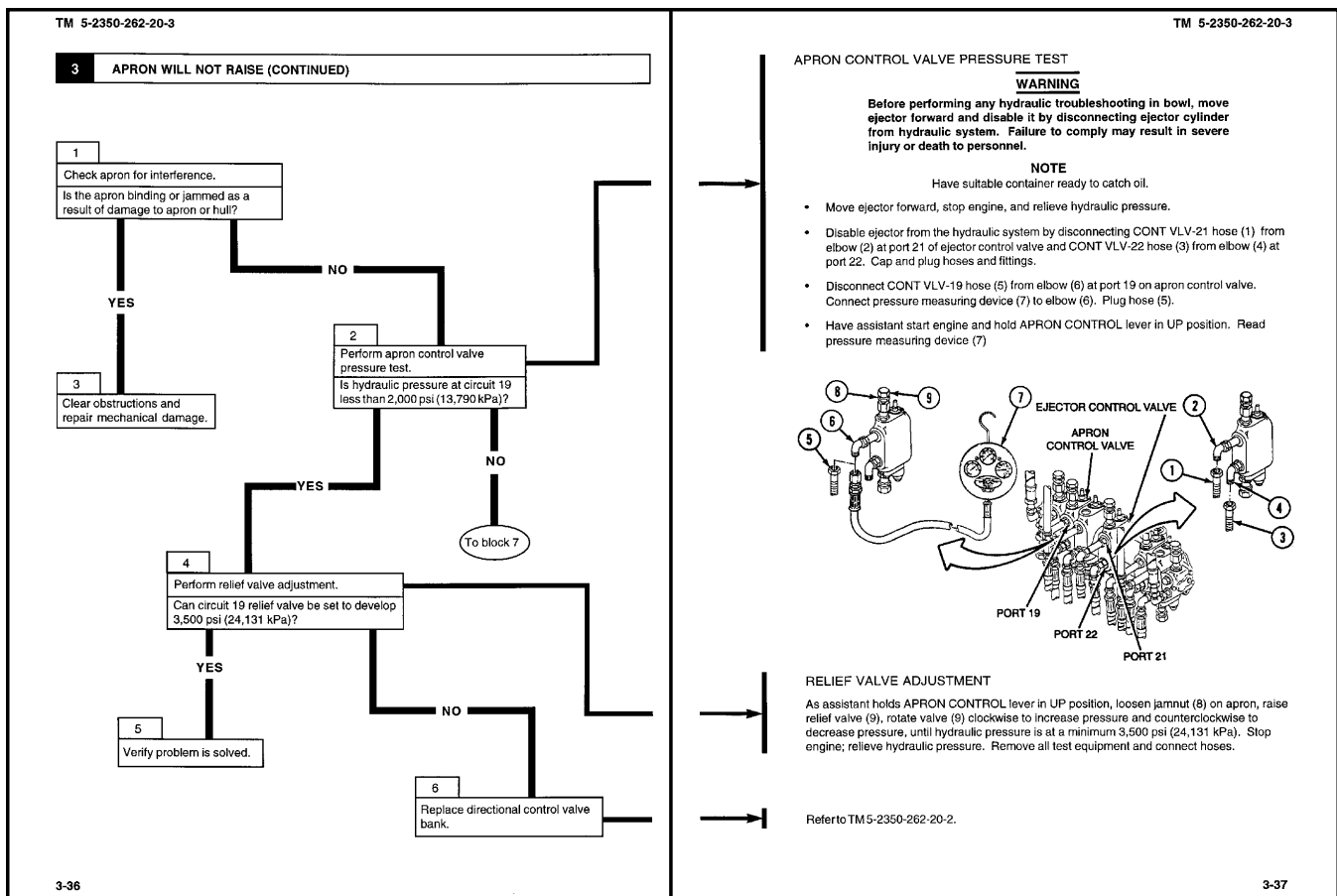
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6	Ejector Does Not Extend or Retract	3-62
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7. The second page of this section is the "SYMPTOM INDEX" (turn to page 3-15).

8. Look down the list of symptoms until you find "APRON WILL NOT RAISE."

9. Turn to the test indicated.



10. On page 3-36, steps relating to resolving the problem of apron not raising are listed in the form of a flow chart.

11. Just answer the questions on the left hand page and follow the YES or NO path. Helpful information about the question is also on the right hand page.

12. The procedures presume a basic working knowledge of the equipment to be used, but references are included for less experienced personnel.

13. At this point the diagnostic flow chart will direct you to a specific detailed procedure to solve the problem.

NOTE: Before attempting to repair or replace any hydraulic component you must:

- Determine the maintenance responsibility for repair or replacement of the component.
- If the task is at your echelon of maintenance responsibility, you must identify the tools needed and the replacement parts required.

Refer to the Maintenance Allocation Chart - MAC to determine not only the maintenance responsibility of the item, but also to obtain an estimate of the time required to perform the task, tools needed, and any special notes/requirements necessary.

Refer to TM 5-2350-262-24P, Unit Direct Support and General Support Maintenance Repair Parts and Special Tools List for requisition data concerning replacement parts for this task.

LIST OF PROCEDURES

Hydraulic troubleshooting procedures included in this manual are listed below and on the following pages. Use the table of contents for page reference by chapter and section, and use the alphabetical index for page cross reference to procedures by component/part name.

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CHAPTER 1 INTRODUCTION

Section I. GENERAL INFORMATION

SCOPE

Type of Manual: Hydraulic Troubleshooting

Model Number and Equipment Name: M9, Armored Combat Earthmover (ACE)

Purpose of Equipment: A combat engineer vehicle used for dozing, grading, hauling and defilade preparation.

MAINTENANCE FORMS, RECORDS, AND REPORTS

Department of the Army forms and procedures used for equipment and maintenance will be those prescribed by DA Pam 738-750, Functional Users Manual for the Army Maintenance Management System (TAMMS).

REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR'S)

If your M9 ACE needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design. Put it on an SF 368 (Quality Deficiency Report). Mail it to:

Commander
U.S. Army Tank-automotive and Armaments Command
Attn: AMSTA-AC-NML
Rock Island, IL 61299-7630

SCOPE

This section contains information that is useful when performing unit level hydraulic troubleshooting tasks on the M9. The following information is provided in this section:

- Equipment Characteristics, Capabilities, and Features
- Location and Description of Major Components
- Safety, Care, and Handling

SECTION II. EQUIPMENT DESCRIPTION

EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES

The M9 ACE is an armored, amphibious (wades) combat earthmover, used for:

- Dozing.
- Rough grading.
- Excavating.
- Hauling.
- Scraping.

It is a multi-purpose vehicle, and can be used as:

- An earth hauler.
- A cargo carrier.
- A prime mover.

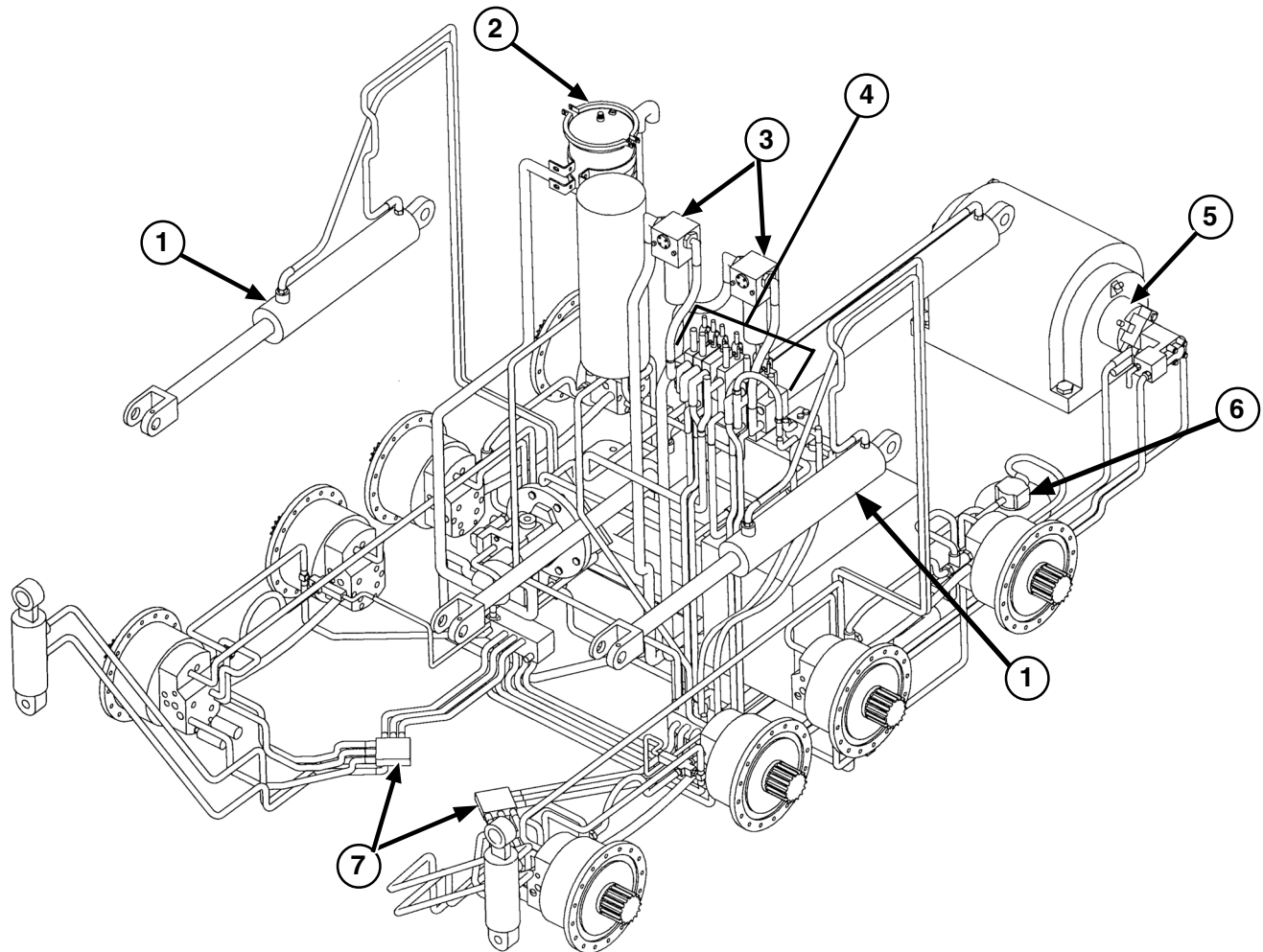
Some of the M9 capabilities are:

- Travels on land up to 30 mph (48 km/h).
- Climbs up to 60 percent grades.
- Drawbar pull of up to 30,000 lb (13,620 kg) at 1.5 mph (2.4 km/h).
- Winch (Invar) pull of up to 25,000 lb (11,350 kg).
- Winch (Lakeshore) pull of up to 35,000 lb (15,891 kg).

The features of the M9 are:

- Full-tracked.
- Air-transportable.
- Highly mobile.
- Armored.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS



- (1) APRON CYLINDER. Raises and lowers apron and dozer assembly (one each side).
- (2) RETURN LINE FILTER. Filters out contaminants from hydraulic oil that is returning to reservoir.
- (3) HIGH PRESSURE FILTERS. Two high-pressure filters located directly in front of driver's compartment filter hydraulic fluid from the main hydraulic pump while it is enroute to the directional control valve bank.
- (4) DIRECTIONAL CONTROL VALVE. Activated by mechanical linkages from the operator's controls to activate hydraulic functions in the vehicle. Controls direction of fluid flow and pressure.
- (5) WINCH MOTOR. Operates the winch which is used in recovery operations.

NOTE

Although the Bilge Pump is considered Not Mission Essential and will no longer be supported with spare and repair parts, this manual contains troubleshooting procedures For Your Information Only. See TB 43 0001-62-7 (dated Oct 98) for Instructions to Isolate and Disconnect a Non-functional Bilge Pump.

- (6) BILGE PUMP MOTOR. Starts bilge pump operation through hydraulic pressure when bilge pump control lever is activated.
- (7) FORWARD MANIFOLD. Routes the flow of hydraulic fluid to components.