

TM 9-2320-312-24-3

TECHNICAL MANUAL

UNIT, DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE MANUAL

FOR

**TRUCK, TRACTOR, YARD TYPE:
46,662 GVWR, DED, 4 X 2, M878A2
(NSN 2320-01-452-5579)**



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HEADQUARTERS, DEPARTMENT OF THE ARMY

December 2003

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HOW TO USE THIS MANUAL

NOTE

If at any time you are unsure how to use this manual or you cannot locate the information you need, notify your supervisor.

INTRODUCTION

1. This manual is designed to help you perform Unit, Direct Support, and General Support Maintenance on the M878A2 Yard Tractor.
2. The *Repair Parts and Special Tools List (RPSTL)*, TM 9-2320-312-24P, is to be used in conjunction with this manual, to locate and obtain the repair parts and special tools needed to maintain this equipment.
3. This manual consists of three volumes: Volume 1 contains maintenance and troubleshooting for yard tractor components NOT covered in the Commercial Service Manuals. Volumes 2 and 3 are a compilation of Commercial off-the-Shelf (COTS) Service Manuals.
4. A *Table of Contents* at the front of Volume 1 lists the contents of all volumes of this publication. Each volume also contains a *Table of Contents* for that particular volume.
5. Volume 1 is written in work package format, in accordance with MIL-STD-40051A:
 - a. Chapters divide the manual into major categories of information (e.g. *Introductory Information with Theory of Operation, Troubleshooting Procedures, Unit Maintenance, Direct Support Maintenance, General Support Maintenance, and Supporting Information*).
 - b. Each Chapter is divided into work packages, which are identified by a 6-digit number (e.g. 0001 00, 0002 00, etc.) located on the upper right-hand corner of each page. The work package page number (e.g. 0001 00-1, 0001 00-2, etc.) is located centered at the bottom of each page.
 - c. If a Change Package is issued to this manual, added work packages use the 5th and 6th digits of their number to indicate new material. For instance, work packages inserted between WP 0001 00 and WP 0002 00 are numbered WP 0001 01, WP 0001 02, etc.
6. Volumes 2 and 3 are provided in commercial format.
7. Scan through all volumes of this manual to become familiar with their organization and contents before attempting to maintain the equipment.

ORGANIZATION OF MATERIAL

1. Maintenance procedures in each volume are sequenced in accordance with the following major assembly groups, as outlined in the Maintenance Allocation Chart (MAC) in Volume 1:
 - a. Group 020—engine
 - b. Group 040—fuel
 - c. Group 050—exhaust
 - d. Group 060—cooling
 - e. Group 070—transmission
 - f. Group 080—front axle (includes front axle steering components and front service brakes)
 - g. Group 090—rear axle (includes rear service brakes)
 - h. Group 110—steering
 - i. Group 115—frame
 - j. Group 120—propshaft
 - k. Group 140—cab and sheet metal
 - l. Group 150—air piping and brake

ORGANIZATION OF MATERIAL - CONTINUED

- m. Group 160—miscellaneous
 - n. Group 170—electrical
 - o. Group 180—power take-off (PTO)
 - p. Group 190—oil piping (all fluid lines except air)
2. In the Commercial Service Manuals, troubleshooting is located in the same section as the maintenance procedures for that assembly group. For instance, engine troubleshooting is located within Group 020; transmission troubleshooting is located within Group 070.
 3. In the work package-formatted material, troubleshooting for ALL assembly group components is located in work package 0006 00. However, the Troubleshooting Symptom Index in WP 0005 00 contains a listing of ALL troubleshooting procedures, to include those contained in the Commercial Service Manuals.

CONTENTS OF VOLUME I (WORK PACKAGE-FORMATTED MANUAL)

1. A *Warning Summary* is located at the beginning of this volume. Become familiar with these warnings before performing troubleshooting or maintenance on the vehicle.
2. A *Table of Contents*, located in the front of this volume, lists all chapters and work packages in the publication, as well as the contents of Volumes 2 and 3.
 - a. The *Table of Contents* also provides *Reporting Errors and Recommending Improvements* information and DA Form 2028 addresses, for the submittal of corrections to this manual.
 - b. If you cannot find what you are looking for in the *Table of Contents*, refer to the alphabetical *Index* at the back of the manual.
3. Chapter 1, *Introductory Information with Theory of Information*, provides general information on the manual and the equipment.
4. Chapter 2, *Troubleshooting Procedures*, contains troubleshooting.
5. Chapter 3 covers all *Unit Maintenance*.
6. Chapter 4 covers all *Direct Support Maintenance*.
7. Chapter 5 covers all *General Support Maintenance*.
8. Chapter 6 covers *Supporting Information: References, Maintenance Allocation Chart (MAC) Introduction, Maintenance Allocation Chart (MAC), Expendable and Durable Items List, and Tool Identification List*.
9. There are electrical system *Foldouts* at the back of this Volume 1.

CONTENTS OF VOLUMES 2 AND 3 (COMMERCIAL SERVICE MANUALS)

1. Volume 2 contains Group 020—engine.
2. Volume 3 contains:
 - a. Group 070—transmission.
 - b. Group 080—front axle
 - c. Group 090—rear axle
 - d. Group 110—steering
 - e. Group 120—propshaft
 - f. Group 140—cab and sheet metal
 - g. Group 150—air piping and brake
 - h. Group 160—miscellaneous

FEATURES OF VOLUME I (WORK PACKAGE-FORMATTED MANUAL)

1. Because the major assembly groupings used in this manual do not correspond to military function group codes (FGC) and are unfamiliar to the soldier, maintenance tasks in Volume I include in their initial setups the following information:

- a. MAC Reference (e.g., MAC Group 160)
- b. RPSTL Reference (e.g., RPSTL Group 160, Figure 003)

This information will assist the user to locate appropriate MAC guidance and repair parts for the component being maintained.

2. WARNINGS, CAUTIONS, NOTES, subject headings, and other important information are highlighted in **BOLD** print as a visual aid.

WARNING

A WARNING indicates a hazard that may result in death or serious injury.

CAUTION

A CAUTION is a reminder of safety practices or directs attention to usage practices that may cause damage to equipment.

NOTE

A NOTE is a statement containing information that will make the procedures easier to perform.

3. Statements and words of particular interest may be printed in CAPITAL LETTERS to create emphasis.
4. Within a procedural step, reference may be made to another work package in this volume of the manual or to another volume of this manual or another manual. These references indicate where you should look for more complete information.
 - a. If you are told: "Fill hydraulic reservoir (WP 0129 00)", go to work package 0129 00 in Volume 1 of this manual for instructions on filling the hydraulic reservoir.
 - b. If you are told: "Raise fifth wheel (TM 9-2320-312-10)", go to TM 9-2320-312-10 for complete instructions on raising the fifth wheel. Use the *Table of Contents* or alphabetical *Index* in TM 9-2320-312-10 to find the procedure.
 - c. If you are told "Repair transmission torque converter (Group 070 Commercial Service Manuals)", go to Group 070 in the Commercial Service Manuals (Volume 3) to find the procedure.
5. Illustrations are placed after, and as close to, the procedural steps to which they apply. Callouts placed on the art may be text or numbers, or both.
6. Numbers located at the lower right corner of the art (e.g. 376-001, 376-002, etc.) are art control numbers and are used for tracking purposes. Disregard these numbers.
7. Dasher leader lines used in illustrations indicate that called-out items are not visible in the view depicted (i.e. they are located within or behind the structure). In Lubrication Charts (WP 0008 00, *Unit PMCS Introduction*) and in *Unit PMCS* (WP 0009 00), dashed leader lines indicate a lubrication that is required on both sides of the equipment.
8. Technical instructions include metric units as well as standard units. For your reference, a *Metric Conversion Chart* is located on the inside back cover of the manual.

NOTE

The M878A2 Yard Tractor is equipped with an MD 3560P Transmission.

Service Manual

Allison Transmission

MD 3560P

**Revision 1: 2000 December
1998 December**



Allison Transmission

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ELECTRONIC CONTROL UNIT AND DIAGNOSTIC DATA READER/TOOL DISPLAYS AND BUTTON NAMES

Shift Selector or Diagnostic Data Reader/Tool (DDR) button and display names are printed in bold capital letters (**UP** (↑) arrow, **DOWN** (↓) arrow, **DISPLAY MODE**, **MONITOR**, **SELECT**, etc.).

The actual message displayed (text and/or letters) is printed within double quotation marks (“O L”, “O K”, etc.).

TRADEMARK USE

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- Teflon® is a registered trademark of the DuPont Corporation.
- Loctite® is a registered trademark of the Loctite Corporation.
- Spiralock® is a registered trademark of Spiralock of Michigan.

NOTE:

This publication is revised periodically to include improvements, new models, special tools, and procedures. A revision is indicated by letter suffix to the publication number. Check with your Allison Transmission service outlet for the currently applicable publication. Additional copies of this publication may be purchased from authorized Allison Transmission service outlets. Look in your telephone directory under the heading of Transmissions — Truck, Tractor, etc.

IMPORTANT SAFETY NOTICE

IT IS YOUR RESPONSIBILITY to be completely familiar with the Warnings and Cautions described in this Service Manual. These Warnings and Cautions advise against the use of specific service methods that can result in personal injury, damage to the equipment, or cause the equipment to become unsafe. It is, however, important to understand that these Warnings and Cautions are not exhaustive. Allison Transmission could not possibly know, evaluate, and advise the service trade of all conceivable ways in which service might be done or of the possible hazardous consequences of each way. Consequently, Allison Transmission has not undertaken any such broad evaluation. Accordingly, **ANYONE WHO USES A SERVICE PROCEDURE OR TOOL WHICH IS NOT RECOMMENDED BY ALLISON TRANSMISSION MUST** first be thoroughly satisfied that neither personal safety nor equipment safety will be jeopardized by the service methods selected.

Proper service and repair are important to the safe, reliable operation of the equipment. The service procedures recommended by Allison Transmission and described in this Service Manual are effective methods for performing service operations. Some of these service operations require the use of tools specifically designed for the purpose. The special tools should be used when and as recommended.

WARNINGS, CAUTIONS, AND NOTES

Three types of headings are used in this manual to attract your attention:

WARNING!

is used when an operating procedure, practice, etc., which, if not correctly followed, could result in personal injury or loss of life.

CAUTION:

is used when an operating procedure, practice, etc., which, if not strictly observed, could result in damage to or destruction of equipment.

NOTE:

is used when an operating procedure, practice, etc., is essential to highlight.

LIST OF WARNINGS

This manual contains the following warnings —

IT IS YOUR RESPONSIBILITY TO BE FAMILIAR WITH ALL OF THEM.

- **If you leave the vehicle and the engine is running, the vehicle can move suddenly and you or others could be injured. If you must leave the engine running, do not leave the vehicle until you: Put the transmission in N (Neutral)...and — Apply the parking brake and emergency brakes and make sure they are properly engaged...and — Chock the wheels and take any other steps necessary to keep the vehicle from moving.**
- **Avoid contact with the hot fluid or the sump when draining transmission fluid. Direct contact with the hot fluid or the hot sump may result in bodily injury.**
- **While conducting a stall check, the vehicle must be positively prevented from moving. Apply the parking brake and service brake, and chock the wheels securely. Warn personnel to keep clear of the vehicle and its travel path. Failure to do so can cause serious injury.**
- **Use appropriate safety equipment such as safety glasses, safety shoes, and gloves.**
- **Do not burn discarded Teflon® seals; toxic gases are produced by burning Teflon®.**
- **Never dry bearings by spinning them with compressed air. A spinning bearing can disintegrate, allowing balls or rollers to become lethal flying projectiles. Also, spinning a bearing without lubrication can damage the bearing.**
- **MD Product Line transmission dry weights are as follows: with PTO provision — 260 kg (575 lbs).**
- **The control module assembly weighs approximately 25 kg (56 lb). Handle carefully to avoid personnel injury or control module damage.**
- **Piston springs are highly compressed. Be extremely careful during removal and installation. Personal injury can occur if the spring force is not controlled.**
- **Transmissions installed in overhaul stands must be positioned vertically before installing control module. Failure to do so could result in personal injury.**

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