

TECHNICAL MANUAL

OPERATOR'S 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

TECHNICAL MANUAL
TM 9-2320-312-10

HEADQUARTERS
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Washington, D.C., 17 December 2003

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REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help 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 (*Recommended Changes to Equipment Technical Publications*), through the Internet, on the Army Electronic Product Support (AEPS) website. The Internet address is <http://aeprs.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 this 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 e-mail your letter, DA Form 2028 direct to: AMSTA-LC-CI/TECH PUBS, TACOM-RI, 1 Rock Island Arsenal, Rock Island, IL 61299-7630. The e-mail address is: TACOM-TECH-PUBS@ria.army.mil. The fax number is DSN 793-0726 or Commercial (309) 782-0726.

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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 operate the M878A2 Yard Tractor and perform operator troubleshooting and maintenance on the equipment.
2. This manual is written in work package format:
 - a. Chapters divide the manual into major categories of information (e.g., *Introductory Information with Theory of Operation*, *Operating Instructions*, *Operator Troubleshooting*, *Operator Maintenance Instructions*, 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.
3. Scan through this manual to become familiar with its organization and contents before attempting to operate or maintain the equipment.

CONTENTS OF THIS MANUAL

1. A *Warning Summary* is located at the beginning of this manual. Become familiar with these warnings before operating or performing operator troubleshooting or maintenance on the vehicle.
2. A *Table of Contents*, located in the front of the manual, lists all chapters and work packages in the publication.
 - 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, *Operating Instructions*, explains and illustrates all operator controls and indicators and contains a *Stowage and Decal*, *Data Plate*, and *Stencil Guide*. It also describes how to perform all operating procedures for the yard tractor: *Operation Under Usual Conditions* and *Operation Under Unusual Conditions*.
5. Chapter 3 covers all *Operator Troubleshooting*. WP 0009 00 contains a *Troubleshooting Symptom Index*. If the M878A2 malfunctions, this index should always be consulted to locate the appropriate troubleshooting procedure.
6. Chapter 4 deals with *Operator Maintenance*: Major areas covered are *Preventive Maintenance Checks and Services (PMCS)* and operator level maintenance tasks.
7. Chapter 5 includes *Supporting Information: References*, *Components of End Item (COEI)* and *Basic Issue Items (BII) Lists*, *Additional Authorization List (AAL)*, and *Expendable and Durable Items List*.

FEATURES OF THIS MANUAL

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

WARNING

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

CAUTION

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

NOTE

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

2. Statements and words of particular interest may be printed in CAPITAL LETTERS to create emphasis.
3. Within a procedural step, reference may be made to another work package in this manual or to another manual. These references indicate where you should look for more complete information.
 - a. If you are told: “Refuel vehicle (WP 0013 00)”, go to work package 0013 00 in this manual for instructions on refueling.
 - b. If you are told: “For preparation for storage or shipment procedures, refer to TM 9-2320-312-24”, go to TM 9-2320-312-24, which is listed in the *References* work package, for complete information. Use the *Table of Contents* or alphabetical *Index* in TM 9-2320-312-24 to find the procedures.
4. Illustrations are placed after, and as close to, the procedural steps to which they apply. Callouts placed on the art are text or numbers.
5. Numbers located at lower right corner of art (e.g. 376-001; 376-002, etc.) are art control numbers and are used for tracking purposes. Disregard these numbers.
6. Dashed leader lines used in illustrations indicate that called out items are not visible in the view depicted (i.e. they are located within the structure).
7. 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.

CHAPTER 1
INTRODUCTORY INFORMATION WITH
THEORY OF OPERATION

GENERAL INFORMATION

0001 00**SCOPE**

1. **Type of Manual.** This manual is for use in operating and performing operator troubleshooting and maintenance on the M878A2 Yard Tractor.
2. **Equipment Name and Model Number.** Truck, Tractor, Yard Type: 46,662 GVWR, DED, 4 X 2, M878A2.
3. **Purpose of Equipment.** The M878A2 is a 4 X 2 tractor used to move ("spot") trailers within a terminal yard environment. It is also used in roll-on/roll-off (RO/RO) marine operations. Use of this vehicle on a public road or highway is NOT authorized.

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, *Functional User's Manual for the Army Maintenance Management System (TAMMS)*, as contained in the Maintenance Management Update.

REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIRs)

If your tractor 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 or performance. Put it on an SF Form 368 (*Product Quality Deficiency Report*). Mail it to us at: Commander, U.S. Army Tank-automotive and Armaments Command, ATTN: AMSTA-LC-CIP-WT, Rock Island, Illinois 61299-7630. We'll send you a reply.

HAND RECEIPT MANUALS

This manual has a companion document with a TM number followed by "-HR" (which stands for Hand Receipt). TM 9-2320-312-10-HR consists of preprinted hand receipts that list end item related equipment (i.e., COEI, BII, and AAL) that must be accounted for. As an aid to property accountability, additional HR manuals may be requisitioned through normal publication channels.

CORROSION PREVENTION AND CONTROL (CPC)

1. Corrosion Prevention and Control (CPC) of Army materiel is a continuing concern. It is important that any corrosion problems with this item be reported so that the problem can be corrected and improvements can be made to prevent the problem in future items.
2. While corrosion is typically associated with rusting of metals, it can also include deterioration of other materials, such as rubber and plastic. Unusual cracking, softening, swelling, or breaking of these materials may be a corrosion problem.
3. If a corrosion problem is identified, it can be reported using SF Form 368 (*Product Quality Deficiency Report*). Use of key words such as "corrosion," "rust," "deterioration," or "cracking" will ensure that the information is identified as a CPC problem. The form should be submitted to the address specified in DA Pam 738-750.

DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE

For destruction of Army materiel to prevent enemy use, refer to TM 750-244-6.

PREPARATION FOR STORAGE OR SHIPMENT

For preparation for storage or shipment procedures, refer to TM 9-2320-312-24-1.

WARRANTY INFORMATION

The M878A2 Yard Tractor is warranted by Crane Carrier Corporation in accordance with TB 9-2320-312-14. Warranty starts on the date found in block 23, DA Form 2408-9, *Equipment Control Record*. Report all defects in material or workmanship to your supervisor, who will take appropriate action.

GENERAL INFORMATION - CONTINUED**0001 00****NOMENCLATURE CROSS-REFERENCE LIST****COMMON NAME****OFFICIAL NOMENCLATURE**

Dipstick	Oil Level Gauge
Engine Coolant	Antifreeze, Ethylene Glycol Mixture
Gladhand	Quick Disconnect Coupling

LIST OF ABBREVIATIONS**NOTE**

Refer to ASME Y14.38-1999 for standard abbreviations.

ABBREVIATION**DEFINITION**

AAL	Additional Authorization List
BII	Basic Issue Items
C	Centigrade or Celsius
CCC	Crane Carrier Corporation
cfm	Cubic Feet per Minute
cm	Centimeter
COEI	Components of End Item
ECM	Electronic Control Module
ECU	Electronic Control Unit
F	Fahrenheit
GVWR	Gross Vehicle Weight Rating
HEUI	Hydraulic Electronic Unit Injector
IAP	Injection Actuation Pressure
kg	Kilogram
km	Kilometer
kPa	Kilopascal
kph	Kilometers per Hour
L	Liter
lb-ft	Pound Foot
LCD	Liquid Crystal Display
LED	Light-Emitting Diode
lph	Liters per Hour
mm	Millimeter
Nm	Newton Meter
PMCS	Preventive Maintenance Checks and Services
RO/RO	Roll-On/Roll-Off

END OF WORK PACKAGE

EQUIPMENT DESCRIPTION AND DATA

0002 00***EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES*****1. Characteristics.**

- a. The M878A2 Yard Tractor moves (“spots”) trailers in a terminal yard environment and in roll-on/roll-off (RO/RO) marine operations. Use of this vehicle on a public road or highway is NOT authorized.
- b. The M878A2 has a Gross Vehicle Weight Rating (GVWR) of 46,662 lb (21,185 kg).
- c. A hydraulically-controlled fifth wheel can be raised or lowered 32 in (81 cm), has a 70,000 lb (31,780 kg) vertical load capacity, and is compatible with a two-inch kingpin.
- d. A cab-controlled, air-operated latching cylinder unlocks fifth wheel coupler jaws from inside the cab.

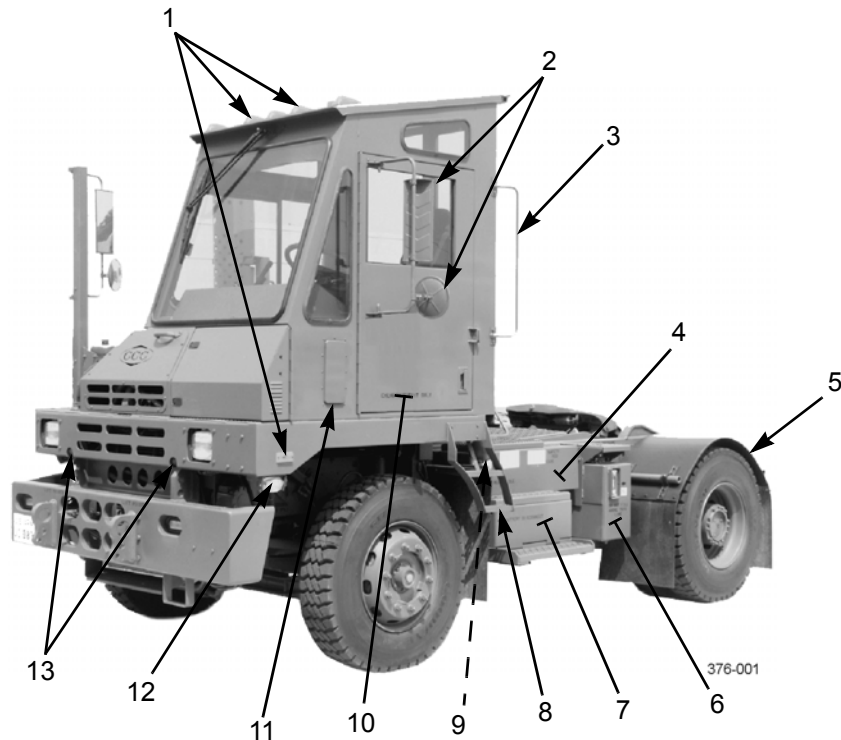
2. Capabilities and Features.

- a. The M878A2 has a wheelbase of 122.00 in (309.88 cm) and an overall length of 205.75 in (522.61 cm).
- b. The maximum speed of the M878A2 is 21 mph (34 kph). Maximum speed while towing is 15 mph (24 kph).
- c. The M878A2 is equipped with an instrument panel-mounted speedometer and tachometer that register vehicle forward speed and engine speed.
- d. The M878A2 has the following capabilities and features:
 - (1) Caterpillar 7.2L, electronically-controlled, turbocharged, 275 horsepower diesel engine;
 - (2) MD3560P Allison transmission with four (4) forward speeds, neutral, and reverse;
 - (3) Spicer 1710 propshaft;
 - (4) Eaton E-1460I front steering axle;
 - (5) Dana D90-14-2S single rear axle with dual wheels;
 - (6) front and rear air-activated s-cam brakes; rear axle spring-loaded parking brakes;
 - (7) Sheppard power steering gear;
 - (8) air conditioning system;
 - (9) backup lights and alarm;
 - (10) 45-degree cab tilt system;
 - (11) cab sliding rear door; and
 - (12) KBI 40kJ Ultra Capacitor starting system.
- e. A fire extinguisher and an M16 rifle mount are located behind the driver’s seat inside the cab.
- f. An auxiliary arctic heater (WP 0018 00) is available for installation if tractor is to operate in temperatures below -25°F (-32°C).
- g. If installation of an auxiliary radio is desired, wiring is available behind access panel located inside cab above sun visor.

EQUIPMENT DESCRIPTION AND DATA - CONTINUED

0002 00

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS

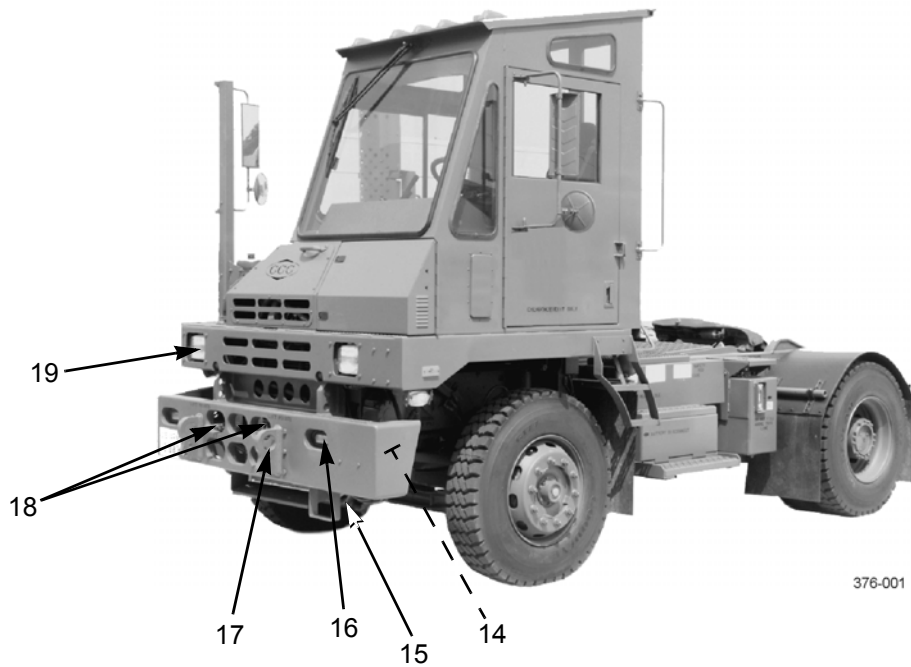


KEY	COMPONENT	DESCRIPTION
1	Marker Clearance Lights	Indicates outline of tractor.
2	Side Mirror and Spotter Mirror	Provide driver with a view to the rear of both sides of tractor and trailer, if towing.
3	Grabhandles	Provide a handhold for personnel climbing on tractor.
4	Cab Tilt Controls	Includes pump, pump controls, and safety prop release cable used to operate cab tilt system.
5	Fender	Prevents water and debris from spraying.
6	Hydraulic Reservoir	Stores hydraulic fluid for operation of power steering system and fifth wheel lift. Contains sight gauge to determine level of fluid in reservoir.
7	Battery Box and Steps	Box holds vehicle batteries, capacitor(s) and 25A ignition system circuit breaker. Steps provide access to rear platform and cab.
8	Steps	Use only in an emergency to exit cab through side door.
9	Slave Receptacle	Receptacle for NATO slave cable to slave start tractor.
10	Side Door	To be used only in an emergency. Use rear sliding door under normal circumstances.
11	Cab Side Vent	Provides ventilation inside cab. Opens and closes from inside cab.
12	Auxiliary Lights	Assist visibility when turning, during night or low light operating conditions.
13	Cab Pivots	Front cab pivots allow for forward tilting of cab.

EQUIPMENT DESCRIPTION AND DATA - CONTINUED

0002 00

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - CONTINUED

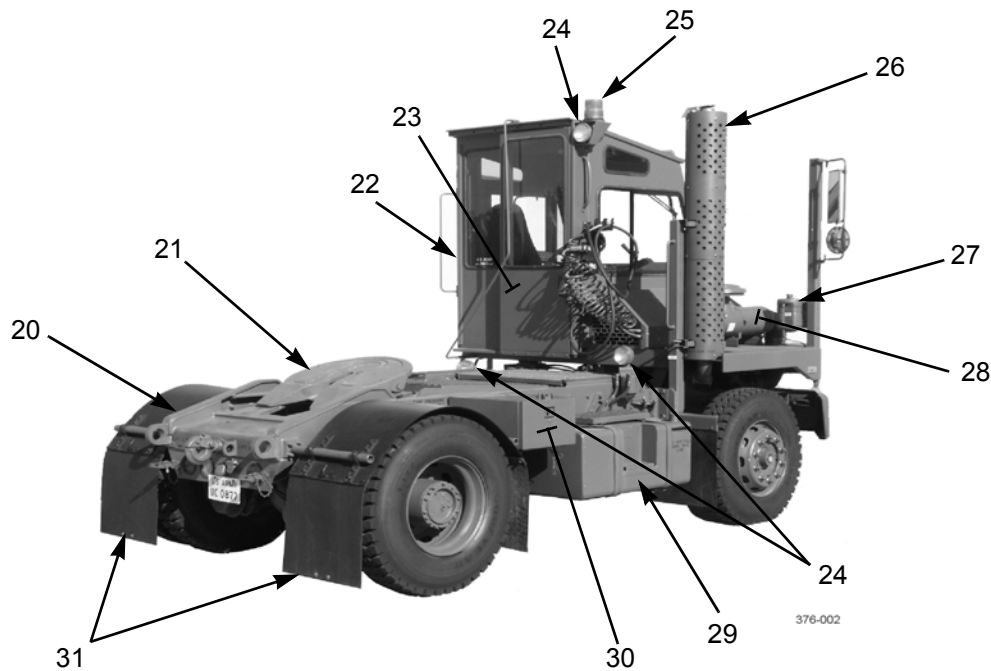


KEY	COMPONENT	DESCRIPTION
14	Windshield Washer Reservoir and Pump	Reservoir and pump supplies windshield washer fluid to windshield.
15	Tiedown Points	Used to tie tractor down when being shipped.
16	Turn Signals	When turned on, flash to indicate direction tractor is turning.
17	Lift and Tow Points	Provide attachment point for lifting and towing devices. Topmost eyes are for lifting; middle and bottommost eyes are for towing tractor.
18	Front Gladhands	Provide service and emergency air connections when tractor is towed from the front.
19	Headlights	Include high and low beam.

EQUIPMENT DESCRIPTION AND DATA - CONTINUED

0002 00

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - CONTINUED



KEY	COMPONENT	DESCRIPTION
20	Ramp	Sloped surface serves as an approach to fifth wheel and facilitates trailer coupling to tractor.
21	Fifth Wheel	Adjustable-height coupling device for trailers with two-inch kingpins. Adjusts from a lowered height of 48 in (122 cm) to a fully raised height of 80 in (203 cm), as measured from top of fifth wheel plate to the ground.
22	Cab	Provides weatherproof enclosure for driver and driver controls.
23	Rear Door	Slides open to allow driver access into cab.
24	Floodlights	Illuminate area to rear of cab, specifically the fifth wheel/kingpin coupling. When floodlight switch is turned to REV, all floodlights also serve as backup lights, when tractor is in R (Reverse).
25	Strobe Warning Light	Flashes to alert other vehicles of presence of tractor.
26	Exhaust Muffler	Deadens noise of engine exhaust.
27	Coolant Overflow Bottle	Contains cooling system overflow. Provides means for operator to visually check coolant level and add coolant to system.
28	Engine Air Cleaner	Filters incoming air to engine intake manifold.
29	Fuel Tank and Steps	Stores fuel supply for vehicle. Steps mounted to tank provide access to cab and rear platform.
30	Stowage Compartment	Provide stowage for BII items and other items.
31	Mudflaps	Prevent water and debris from spraying. Mudflaps may be hooked up out of the way to prevent their damage, when negotiating steep ramps during RO/RO operations.