

**TECHNICAL MANUAL  
OPERATOR'S, UNIT AND  
DIRECT SUPPORT MAINTENANCE MANUAL  
(INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST)  
FOR  
TEEL SUBMERSIBLE PUMP  
MODEL 1 P914**

This technical manual is an authentication of the manufacturer's commercial literature and does not conform with the format and the content requirements normally associated with Army technical manuals. This technical manual does, however, contain all essential information required to operate and maintain the equipment.

Approved for public release; distribution is unlimited.

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**HEADQUARTERS, DEPARTMENT OF THE ARMY  
28 SEPTEMBER 1990**

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### **SUPPLEMENTARY INTRODUCTORY MATERIAL**

#### 1-1. Maintenance Forms and Records.

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

#### 1-2. 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 letters, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual, directly to: Commander, U.S. Army Troop Support Command, ATTN: AMSTR-MCTS, 4300 Goodfellow Blvd., St. Louis, MO 63120-1798. A reply will be furnished to you.

#### 1-3. Destruction of Army Material to Prevent Enemy Use.

Refer to TM 750-244-3 for instructions covering the destruction of Army Material to prevent enemy use.

#### 1-4. Administrative Storage of Equipment.

a. Placement of equipment in administrative storage should be for short periods of time when a shortage of maintenance effort exists. Items should be in mission readiness within 24 hours or within the time factors as determined by the directing authority. During the storage period appropriate maintenance records will be kept.

b. Before placing equipment in administrative storage, current preventive maintenance checks and services should be completed. Shortcomings and deficiencies should be corrected, and all modification work orders (MWO's) should be applied.

c. Storage site selection. Inside storage is preferred for items selected for administrative storage. If inside storage is not available, trucks, vans, conex containers and other containers may be used.

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OPERATING INSTRUCTIONS & PARTS MANUAL  
SUBMERSIBLE PUMP  
MODEL 1P914

FORM  
5S2069  
08210

0789/355  
VP

READ INSTRUCTIONS CAREFULLY BEFORE ATTEMPTING TO INSTALL, OPERATE OR SERVICE THE TEEL PUMP. PROTECT YOURSELF AND OTHERS BY OBSERVING ALL SAFETY INFORMATION AND ADDITIONAL INSTRUCTIONS INCLUDED WITH THIS EQUIPMENT. FAILURE TO COMPLY WITH INSTRUCTIONS COULD RESULT IN PERSONAL INJURY AND/OR PROPERTY DAMAGE! RETAIN INSTRUCTIONS FOR FUTURE REFERENCE.



Figure 1

**Description**

The Teel submersible pump is designed for water removal in home and industrial applications. Pump can be used for sump service and dewatering. Unit is constructed of hi-impact corrosion resistant plastic with a built-in carrying handle. Screened inlet prevents large solids from entering pump and enables pumping within 3/16" from area being drained.

**NOTICE:** This unit is not designed for applications involving salt water or brine.

**Specifications**

Power supply required.....	115V, 60Hz
Motor .....	1/6 HP single phase, oil filled
Motor duty.....	Continuous
Thermal protector.....	Yes, automatic
Liquid temp. range .....	32°F to 120°F
Operating position .....	Vertical
Circuit requirement (min.).....	5 amp

Weight ..... 8 lbs.  
 Overall dimensions ..... 9 1/2"H x 7"D  
 Construction  
   Housing ..... Nylon  
   Case ..... ABS Plastic

**Specifications (con't)**

  Incased motor ..... Zinc  
   Shaft ..... 416 Stainless  
   Lip seal & O-ring ..... Buna N  
 Operating depth                      Beginning min. .... 1/2"  
 (water level)                      Ending max. .... 3/16"  
 Power cord set ..... Neoprene, 8 ft. 3-prong  
 Discharge  
   Garden hose ..... 3/4"  
   Pipe ..... 1"

**Performance**

GPH IN TOTAL FEET*					
3'	5'	10'	15'	20'	23'
1300	1200	960	720	360	0

GPH ratings shown are for 1" pipe. Flow rate is reduced when using garden hose.

**Unpacking**

Packaged in this carton is one pump and one adapter for use with 3/4" garden hose.

**General Safety Information**

1. Know the pump application, limitations, and potential hazards.

**WARNING**

**Do not use in explosive atmospheres. Pump water only with this pump. Failure to follow this warning can result in personal injury and/or property damage.**

2. Disconnect power before servicing.
3. Release all pressure within the system before servicing any component.
4. Drain all water from the system before servicing.
5. Secure the discharge line before starting the pump. An unsecured discharge line will whip, possibly causing personal injury and/or property damage.
6. Check hoses for weak or worn condition before each use, making certain that all connections are secure.
7. Periodically inspect pump and system components. Perform routine maintenance as required. (See Maintenance.)
8. Provide a means of pressure relief on pumps whose discharge line can be shut off or obstructed.
9. Personal safety:
  - a. Wear safety glasses at all times when working with pumps.

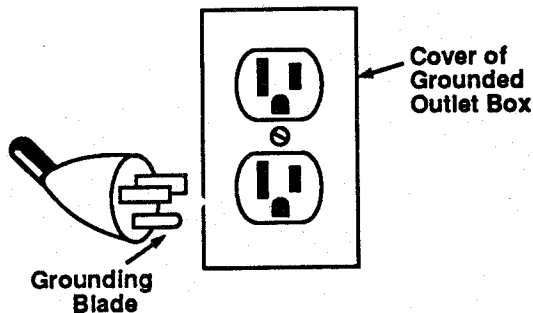
- b. Keep work area clean, uncluttered and properly lighted-replace all unused tools and equipment.
- c. Keep visitors at a safe distance from the work area.
- d. Make workshop child-proof-with padlocks, master switches, and by removing starter keys.

10.

**WARNING**

**General Safety Information (Continued)**  
**Risk of electric shock.**

This equipment is only for use on 115 volt (single phase) and is equipped with an approved 3-conductor cord and 3-prong, grounding type plug (as shown in Figure 2) for your protection against shock hazards. Plug pump directly into a properly installed and grounded 3-prong grounding type receptacle, as shown in Figure 2.



**Figure 2 - Grounding Methods**

The motor must be securely and adequately grounded for your protection against shock hazards! Where a 2-prong wall receptacle is encountered, it must be replaced with a properly grounded 3-prong receptacle installed in accordance with the National Electrical Code, local codes and ordinances.

- 11. All wiring should be performed by a qualified electrician.
- 12. Protect electrical cord from sharp objects, hot surfaces, oil and chemicals. Avoid kinking the cord. Replace or repair damaged or worn cords immediately.
- 13. Make certain that the power source conforms to the requirements of your equipment.
- 14. Do not touch an operating motor. Modern motors are designed to operate at high temperatures.
- 15. Do not handle a pump or pump motor with wet hands or when standing on a wet or damp surface, or in water.

**WARNING**

**If your basement has water or moisture on the floor, do not walk on wet area until all power has been turned off. If shut off box is in basement, call the electric company to shut off service to the house, Or call your local fire department for instructions. Failure to follow this warning can result in fatal electrical shock.**

**Installation**

**WARNING**

**Do not use in hazardous or explosive locations.**

1. Pump should be located and should rest on a level, solid foundation. Do not suspend pump by means of the discharge pipe or power cord. Keep pump inlet screen clear.

**NOTICE:** Do not use ordinary pipe joint compound on plastic pipe or pump. Pipe joint compound can attack plastics and damage pump.

2. Install inlet and discharge plumbing. When using rigid pipe, use plastic pipe. Wrap thread with Teflon tape or use Plasto Joint Stik\*. Screw pipe into pump hand tight +1-1 1/2 turns.

**NOTICE:** Do not loosen or remove bolts or fittings. Any evidence of tampering will void the warranty.

3. It is strongly recommended that this pump motor be electrically connected to a ground fault circuit interrupter. Consult your local electrician for availability and installation.

4. Install any auxiliary components (e.g. float switch, timer, etc.)

#### POWER SUPPLY

Pump is designed for 115V, 60 Hz operation and requires a circuit of 15 amperes or more capacity. Pump is supplied with a 3-wire cord set with grounding-type plug for use in a 3-wire grounded outlet. A 3-wire extension cord of at least 14 AWG size is suggested with larger sizes for runs over 25 ft. For safety, always electrically ground pump to a suitable electrical ground such as a grounded water pipe or a properly grounded metallic raceway, or ground wire system. Do not cut off the round grounding prong.

After all piping and controls have been installed, unit is ready for operation.

#### **Operation**

#### **WARNING**

**Do not touch the pump, water or discharge piping when the pump is connected. Always disconnect the pump cord (power cord) before handling.**

1. Plug unit into 115V outlet.

2. Pump should never be allowed to run dry. Shaft seal depends on water for lubrication. Do not operate the pump unless it is in at least 1/2" of water. Dry running (pump not pumping water) will cause seal damage and eventual pump failure.

3. This pump will pump water down to 3/16"; this means that it will not remove all water. If unit has been operating and suddenly no water comes out discharge hose, shut off unit immediately. Water level is probably very low and unit has broken prime. Use mop or squeegee to remove remaining water.

#### **WARNING**

**Before attempting to service, always disconnect power from unit.**

4. The pump motor is equipped with an automatic resetting thermal protector and may restart unexpectedly. (See Specifications.) Protector tripping is an indication of motor overloading as a result of operating the pump at low heads (low discharge restriction), excessively high or low voltage, inadequate wiring, incorrect motor connections, or a defective motor or pump.

**NOTICE:** Dirty water (laden with sand, dirt, small stones, etc.) will adversely affect seal life and shorten pump life.

**NOTICE:** This pump has an anti-airlock hole in the base of the volute. This hole allows pump to start priming within 1 5 seconds in as little as 1/2" of water. Leakage from anti-airlock hole is normal.

**Maintenance**

**WARNING**

**Make certain that the pump is unplugged before attempting to service.**

**NOTICE:** Disassembly of the pump will void the warranty. It might also cause internal leakage and damage to the unit. If repairs are required return the pump to the dealer from whom it was purchased.

1. The motor is sealed in oil. No additional lubrication is necessary.
2. Inlet screen should be kept clean and free of all foreign objects.
3. When used in automatic service, such as a sump pit, pump should be checked for proper operation weekly or monthly by filling the sump pit with water and watching pump performance. ON/OFF levels, etc. If performance level has changed since the pump was new, the pump should be removed from the pit and examined.

**Troubleshooting Chart**

SYMPTOM	POSSIBLE CAUSE(S)	CORRECTIVE ACTION
Pump won't start or run	<ol style="list-style-type: none"> <li>1. Blown fuse</li> <li>2. Low line voltage</li> <li>3. Pump may be filled with mud or debris</li> <li>4. Water level too low (if automatic switch is used)</li> <li>5. Seal worn out, motor burned out</li> </ol>	<ol style="list-style-type: none"> <li>1. If blown, replace with fuse of proper size.</li> <li>2. If voltage under recommended minimum, check size of wiring from main switch on property. If OK, contact power company.</li> <li>3. Back flush with water in pump discharge or by dipping pump up and down in clean water.</li> <li>4. The water level must rise almost to the top of the pump to turn unit on.</li> <li>5. Caused by pumping dirty water. Replace pump.</li> </ol>
Pump starts and stops too often	<ol style="list-style-type: none"> <li>1. Low line voltage</li> <li>2. Clogged impeller</li> <li>3. Very low head or lift</li> </ol>	<ol style="list-style-type: none"> <li>1. If voltage under recommended minimum, check size of wiring from main switch on property. If OK, contact power company</li> <li>2. Back flush with water in pump discharge or by dipping pump up and down in clean water.</li> <li>3. Increase head or lift.</li> </ol>
Pump operates, but delivers little or no water	<ol style="list-style-type: none"> <li>1. Low line voltage</li> <li>2. Fouled sediment screen</li> <li>3. Pump airbound</li> </ol>	<ol style="list-style-type: none"> <li>1. If voltage under recommended minimum, check size of wiring from main switch on property. If OK, contact power company.</li> <li>2. Clean.</li> <li>3. Turn off pump for few seconds and then restart.</li> </ol>

**Replacement Parts List**

PART NO.	DESCRIPTION	QTY
FT0013-43	Adapter (1" male NPT to 3/4' male garden hose)	1
OV-ELCOR1	Cord set, 8 ft.	1

**NOTE**

**The above items are the only replacement parts available.**

**ORDER REPLACEMENT PARTS THROUGH DEALER FROM WHOM PRODUCT WAS PURCHASED**

1-800-3234-0620 (in Illinois)

1-800225-7149 (outside Illinois)

Please provide the following information: | If dealer cannot supply, order from

· Model Number

\* Serial Number (if any)

Par description and Number as shown in parts list

Dayton Electric Mfg. Co.  
Parts Department  
1250 Busch Parkway  
Buffalo Grove, Illinois 60089



### **LIMITED WARRANTY**

**DAYTON ONE YEAR LIMITED WARRANTY.** Teel submersible utility pumps, Model 1P914 is warranted by Dayton Electric Mfg. Co. (Dayton) to the original user against defects in workmanship or materials under normal use for one year after date of purchase. Any part which is determined to be defective in material or workmanship and returned to an authorized service location, as Dayton designates, shipping costs prepaid, will be, as the exclusive remedy, repaired or replaced at Dayton's option. For limited warranty claim procedures, see PROMPT DISPOSITION below. This limited warranty gives purchasers specific legal rights which vary from state to state.

**LIMITATION OF LIABILITY.** To the extent allowable under applicable law, Dayton's liability for consequential and incidental damages is expressly disclaimed. Dayton's liability in all events is limited to, and shall not exceed, the purchase price paid.

**WARRANTY DISCLAIMER.** Dayton has made a diligent effort to illustrate and describe the products in this literature accurately; however, such illustrations and descriptions are for the sole purpose of identification, and do not express or imply a warranty that the products are merchantable, or fit for a particular purpose, or that the products will necessarily conform to the illustrations or descriptions.

Except as provided below, no warranty or affirmation of fact, expressed or implied, other than as stated in "LIMITED WARRANTY" above is made or authorized by Dayton.

**PRODUCT SUITABILITY.** Many states and localities have codes and regulations governing sales, construction, installation, and/or use of products for certain purposes, which may vary from those in neighboring areas. While Dayton attempts to assure that its products comply with such codes, it cannot guarantee compliance, and cannot be responsible for how the product is installed or used. Before purchase and use of a product, please review the product application, and national and local codes and regulations, and be sure that the product, installation, and use will comply with them.

Certain aspects of disclaimers are not applicable to consumer products; e.g., (a) some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you; (b) also, some states do not allow limitations on how long an implied warranty lasts, consequently the above limitation may not apply to you; and (c) by law, during the period of this Limited Warranty, any implied warranties of merchantability or fitness for a particular purpose applicable to consumer products purchased by consumers, may not be excluded or otherwise disclaimed.

**PROMPT DISPOSITION.** Dayton will make a good faith effort for prompt correction or other adjustment with respect to any product which proves to be defective within limited warranty. For any product believed to be defective within limited warranty, first write or call dealer from whom product was purchased. Dealer will give additional directions. If unable to resolve satisfactorily, write to Dayton at address below, giving dealer's name, address, date and number of dealer's invoice, and describing the nature of the defect. Title and risk of loss pass to buyer on delivery to common carrier. If product was damaged in transit to you, file claim with carrier.

**Manufactured for Dayton Electric Mfg. Co., 5959 W. Howard St., Chicago, IL 60648**

APPENDIX A

REFERENCES

A-1. **Scope.** This appendix contains all forms, pamphlets and technical manuals referenced in both the Air mobile and Semitrailer mounted Laboratories.

A-2. **Forms.**

Recommended Changes to Publications .....	DA Form 2028
	DA Form 2028-2
Quality Deficiency Report.....	SF 368
Equipment Inspection and Maintenance Work Sheet.....	DA Form 2404
Hand Receipts.....	DA Form 2062

A-3. **Field Manuals.**

Petroleum Testing Facilities: Laboratories and Kits.....	FM 10-72
Inspecting and Testing Petroleum Products.....	FM 10-70
ASTM Test Method Supplement to.....	FM 10-92C1/C2

A-4. **Technical Manuals.**

Atlas-Copco Compressor.....	TM 10-4310-392-13&P
Alcor Jet Fuel Thermal Oxidation Tester Operating and Maintenance Manual.....	TM 10-6635-210-13&P
Bacharach Gas Alarm and Calibration Data .....	TM 10-6665-297-13&P
Brother Portable Typewriter.....	TM 10-7430-218-13&P
Chemtrix Field Ph Meter .....	TM 10-6630-237-13&P
Elkay Manufacturing 30 GPH Cooler .....	TM 10-4130-240-13&P
Emcee Micro-Separometer .....	TM 10-6640-222-13&P
Foxboro Pressure Recording Gauge .....	TM 10-6685-365-13&P
Gammon Aqua Glo Water Detector.....	TM 10-6640-221-13&P
Gammon Mini Monitor Fuel Sampling Kit.....	TM 10-6630-230-13&P
Jelrus Burn-Out Furnace .....	TM 10-6640-231-13&P
Koehler Cleveland Open Tester .....	TM 10-6630-236-13&P
Koehler Cloud and Pour Point Chamber.....	TM 10-6630-238-13&P
Koehler Copper Strip Corrosion Bomb Bath .....	TM 10-6640-220-13&P
Koehler Distillation Apparatus .....	TM 10-6630-233-13&P
Koehler Dropping Point Apparatus .....	TM 10-6635-211-13&P
Koehler Electric Pensky-Martins Tester .....	TM 10-6630-231-13&P
Koehler Foaming Characteristics Determination Apparatus .....	TM 10-6640-228-13&P
Koehler Kinematic Viscosity Bath .....	TM 10-6630-239-13&P
Koehler Tag Closed Cup Flash Tester.....	TM 10-6630-235-13&P
Lab-Line Explosion Proof Refrigerator.....	TM 10-6640-219-13&P
Lily Freezer .....	TM 10-6640-234-13&P
Millipore OM 39 Filter Holder .....	TM 10-6640-225-13&P
Millipore Vacuum Pump .....	TM 10-6640-217-13&P
Ohaus Harvard Trip Balance.....	TM 10-6670-278-13&P
Precision Gas-Oil Distillation Test Equipment .....	TM 10-6630-219-13&P
Precision General Purpose Water Bath.....	TM 10-6640-229-13&P

Precision High Temperature Bronze Block Gum Bath .....	TM 10-630-234-13&P
Precision General Purpose Ovens.....	TM 10-6640-218-13&P
Precision Heater Instruction Manual and Parts List.....	TM 10-6640-223-13&P
Precision Oxidation Stability Bath .....	TM 10-640-232-13&P
Precision Pensky-Martens Flash Testers.....	TM 10-6630-231-13&P
Precision Reid Vapor Pressure Bath.....	TM 10-6640-226-13&P
Precision Slo-Speed Stirrer .....	TM 10-6640-224-13&P
Precision Universal Centrifuge .....	TM 10-6640-230-13&P
Precision Universal Penetrometer .....	TM 10-6640-228-13&P
Sargent-Welch Vacuum Pump .....	TM 10-4310-391-13&P
Sartorius Analytical Balance.....	TM 10-6670-277-13&P
Scotsman Cuber .....	TM 10-6640-227-13&P
Soltec VOM-Multimeter.....	TM 10-6625-3127-13&P
Teel Self-Priming Centrifugal Pump.....	TM 10-6640-217-13&P
Teel Submersible Pump.....	TM 10-4320-320-13&P
Texas Instrument TI-503011 Calculator.....	TM 10-7420-210-13&P

**A-5. Pamphlets.**

The Army Maintenance Management System (TAMMS) .....	DA Pam 738-750
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**A-6. Miscellaneous Publications.**

The Army Integrated Publishing and Printing Program .....	AR 25-30
Laboratory, Airmobile, Aviation Fuel .....	MIL-L-52733A(ME)
Apparatus, Instruments, Chemicals, Furniture, and Supplies for Industrial, Clinical, College and Government Laboratories .....	Fisher Scientific Laboratories Catalog
Petroleum-Petrochemical Testing Equipment.....	Precision Scientific Catalog

## APPENDIX B

## MAINTENANCE ALLOCATION CHART

## Section I. INTRODUCTION

## B-1. General.

a. This section provides a general explanation of all maintenance and repair functions authorized at various maintenance categories.

b. The Maintenance Allocation Chart (MAC) in Section II designates overall authority and responsibility for the performance of maintenance functions on the identified end item or component. The application of the maintenance functions to the end item or component will be consistent with the capacities and capabilities of the designated maintenance categories.

c. Section III lists the tools and test equipment (both special tools and common tool sets) required for each maintenance function as referenced from Section II.

d. Section IV contains supplemental instructions and explanatory notes for a particular maintenance function.

## B-2. Maintenance Functions. Maintenance functions will be limited to and defined as follows:

a. Inspect. To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination (e.g., by sight, sound, or feel).

b. Test. To verify serviceability by measuring the mechanical, pneumatic, hydraulic, or electrical characteristics of an item and comparing those characteristics with prescribed standards.

c. Service. Operations required periodically to keep an item in proper operating condition, i.e., to clean (includes decontaminate, when required), to preserve, to drain, to paint, or to replenish fuel, lubricants, chemical fluids, or gases.

d. Adjust. To maintain or regulate, within prescribed limits, by bringing into proper or exact position, or by setting the operating characteristics to specified parameters.

e. Align. To adjust specified variable elements of an item to bring about optimum or desired performance.

f. Calibrate. To determine and cause corrections to be made or to be adjusted on instruments or test, measuring, and diagnostic equipments used in precision measurement. Consists of comparisons of two instruments, one of which is a certified standard of knob accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.

g. Remove/Install. To remove and install the same item when required to perform service or other maintenance functions. Install may be the act of emplacing, seating, or fixing into position a spare, repair part, or module (component or assembly) in a manner to allow the proper functioning of an equipment or system.

h. Replace. To remove an unserviceable item and install a serviceable counterpart in its place. "Replace" is authorized by the MAC and is shown as the third position code of the SMR code.

*i. Repair.* The application of maintenance services, <sup>1</sup>including fault location/troubleshooting, <sup>2</sup>removal/installation, and disassembly/assembly procedures, <sup>3</sup>and maintenance actions <sup>4</sup>to identify troubles and restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item, or system.

*j. Overhaul.* That maintenance effort (service/action) prescribed to restore an item to a completely serviceable/operational condition as required by maintenance standards in appropriate technical publications (i.e., DMWR). Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like-new condition.

*k. Rebuild.* Consists of those services/actions necessary for the restoration of unserviceable equipment to a like-new condition in accordance with original manufacturing standards. Rebuild is the highest degree of materiel maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours/miles, etc.) considered in classifying Army equipment/components.

### B-3. Explanation Of Columns In The MAC, Section II.

*a. Column 1. Group Number.* Column 1 lists functional group code numbers, the purpose of which is to identify maintenance significant components, assemblies, subassemblies, and modules with the next higher assembly. End item group number shall be "00."

*b. Column 2. Component/Assembly.* Column 2 contains the names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

*c. Column 3. Maintenance Function.* Column 3 lists the functions to be performed on the item listed in column 2. (For a detailed explanation of these functions, see paragraph B-2.)

*d. Column 4. Maintenance Category.* Column 4 specifies, by the listing of a work time figure in the appropriate subcolumn(s), the category of maintenance authorized to perform the function listed in column 3. This figure represents the active time required to perform that maintenance function at the indicated category of maintenance. If the number or complexity of the tasks within the listed maintenance function vary at different maintenance categories, appropriate work time figures will be shown for each category. The work time figure represents the average time required to restore an item (assembly, subassembly, component, module, end item, or system) to a serviceable condition under typical field operating conditions. This time includes preparation time (including any necessary disassembly/ assembly time), troubleshooting/fault location time, and quality assurance/quality control time in addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the maintenance allocation chart. The symbol designations for the various maintenance categories are as follows:

- 
1. *Services inspect, test, service, adjust, align, calibrate, and/or replace.*
  2. *Fault locate/troubleshoot the process of investigating and detecting the cause of equipment malfunctioning; the act of isolating a fault within a system or unit under test (UUT).*
  3. *Disassemble/assemble encompasses the step-by-step taking apart (or breakdown) of a spare/functional group coded item to the level of its least componency identified as maintenance significant (i.e., assigned an SMR code) for the category of maintenance under consideration.*
  4. *Actions welding, grinding, riveting, straightening, facing, remachining, and/or resurfacing.*

- C ..... Operator/Crew
- O ..... Unit Maintenance
- F ..... Direct Support Maintenance
- H ..... General Support Maintenance
- D ..... Depot Maintenance

e. Column 5. Tools and Equipment. Column 5 specifies, by code, those common tool sets (not individual tools) and special tools, TMDE, and support equipment required to perform the designated function.

f. Column 6. Remarks. This column shall, when applicable, contain a letter code, in alphabetic order, which shall be keyed to the remarks contained in section IV.

**B-4. Explanation Of Columns In Tool And Test Equipment Requirements, Section III.**

a. Column 1. Reference Code. The tool and test equipment reference code correlates with a code used in the MAC, section II, column 5.

b. Column 2. Maintenance Category. The lowest category of maintenance authorized to use the tool or test equipment.

c. Column 3. Nomenclature. Name or identification of the tool or test equipment.

d. Column 4. National Stock Number. The National stock number of the tool or test equipment.

e. Column 5. Tool Number. The manufacturer's part number.

**B-5. Explanation Of Columns In Remarks, Section IV.**

a. Column 1. Reference Code. The code recorded in column 6, Section II.

b. Column 2. Remarks. This column lists information pertinent to the maintenance function being performed as indicated in the MAC, section II.

**Section II. MAINTENANCE ALLOCATION CHART**

(1) Group Number	(2) Component/ Assembly	(3) Maint. Function	(4) MAINTENANCE LEVEL					(5) Tools and Equipment	(6) Remarks
			Unit		Direct Support	General Support	Depot		
			C	O	F	H	D		
01	PUMP, SUBMERSIBLE	INSPECT REPLACE REPAIR	0.2	0.2	2.0			1 1,2, 3	A B

**Section III. TOOL AND TEST EQUIPMENT REQUIREMENTS  
FOR  
MAINTENANCE ALLOCATION CHART**

(1) TOOL/TEST EQUIP. REF CODE	(2) MAINTENANCE CATEGORY	(3) NOMENCLATURE	(4) NSN	(5) TOOL NUMBER
1		TOOL KIT, GENERAL AUTOMOTIVE	5180-00-177-7033	(50980) SC 5180-90- CL-N26
2		SHOP EQUIPMENT, AUTOMOTIVE MAINTENANCE AND REPAIR: COMMON #1 (LESS POWER)	4910-00-754-0654	(19204)  SC 4910-95
3		MULTIMETER, 0-500 V	6625-00-691-2453	

**Section IV. REMARKS**

REFERENCE CODE	REMARKS
A	REPLACE DEFECTIVE PARTS PER TROUBLESHOOTING GUIDE.
B	REPAIR LIMITED TO REPLACEMENT OF PARTS LISTED IN THE MANUAL.

APPENDIX C

COMPONENTS OF END ITEM AND BASIC ISSUE ITEMS LISTS  
NOT APPLICABLE

C-1/(C-2 Blank)/



APPENDIX D

ADDITIONAL AUTHORIZATION LIST  
NOT APPLICABLE

D-1/(D-2 Blank)

APPENDIX E

EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST  
NOT APPLICABLE

E-1/(E-2 Blank),

By Order of the Secretary of the Army:

**CARL E. VUONO**  
*General, United States Army*  
*Chief of Staff*

Official:

**THOMAS F. SIKORA**  
*Brigadier General, United States Army*  
*The Adjutant General*

DISTRIBUTION:

To be distributed in accordance with DA Form 12-21A, Operator, Unit and Direct Support Maintenance requirements for Laboratory, Petroleum, MTD

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RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS

 <div style="border: 1px solid black; border-radius: 15px; padding: 5px; display: inline-block; margin-left: 20px;"> <p style="margin: 0;"><i>THEN...JOT DOWN THE DOPE ABOUT IT ON THIS FORM. CAREFULLY TEAR IT OUT, FOLD IT AND DROP IT IN THE MAIL.</i></p> </div>		SOMETHING WRONG WITH PUBLICATION	
		FROM: (PRINT YOUR UNIT'S COMPLETE ADDRESS)	
PUBLICATION NUMBER		DATE SENT	
PUBLICATION DATE		PUBLICATION TITLE	
BE EXACT PIN-POINT WHERE IT IS			
PAGE NO.	PARA- GRAPH	FIGURE NO.	TABLE NO.
<div style="text-align: center; font-weight: bold; margin-bottom: 20px;">IN THIS SPACE, TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT.</div> <div style="border: 1px dashed black; width: 20%; margin: 0 auto; height: 20px;"></div>			
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## 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 decigrams = .035 ounce  
 1 decagram = 10 grams = .35 ounce  
 1 hectogram = 10 decagrams = 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

<i>To change</i>	<i>To</i>	<i>Multiply by</i>	<i>To change</i>	<i>To</i>	<i>Multiply by</i>
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
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