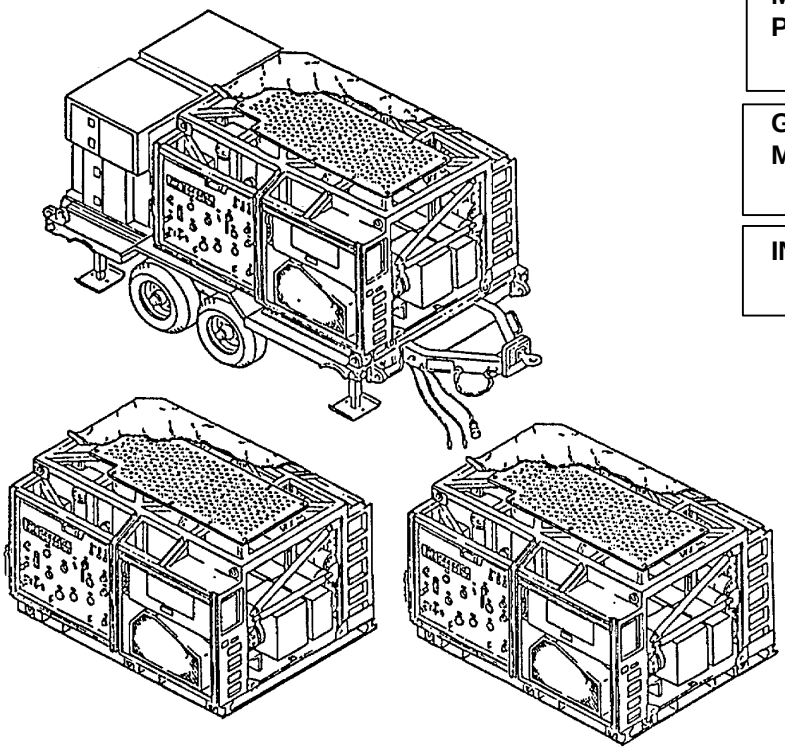
TECHNICAL, MANUAL

UNIT, DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE MANUAL FOR WATER PURIFICATION UNIT, REVERSE OSMOSIS, 600-GPH

TRAILER-MOUNTED, FLATBED CARGO
5-TON, 4-WHEEL TANDEM
MODEL WPES-10 (ARMY)
(NSN 4610-01-341-6289)
AND
SKID-MOUNTED
MODEL WPES-20 (AIR FORCE)
(NSN 4610-01-341-6288)
MODEL WPES-30 (NAVY)
(NSN 4610-01-341-6287)



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HEADQUARTERS, DEPARTMENTS OF THE ARMY
AND AIR FORCE
15 JANUARY 1993

TECHNICAL MANUAL

NO. 10-4610-241-24

HEADQUARTERS
DEPARTMENTS OF THE ARMY AND AIR FORCE
WASHINGTON, D.C., 15 JANUARY 1993

Unit, Direct Support, and General Support Maintenance Manual For WATER PURIFICATION UNIT, REVERSE OSMOSIS (ROWPU) 600 GPH TRAILER MOUNTED, FLATBED CARGO, 5 TON 4 WHEEL TANDEM MODEL WPES-10 (ARMY) (NSN 4610-01-341-6289) MODEL H-9518-1 (ARMY) (NSN 4610-01-420-7547) AND 600 GPH SKID MOUNTED MODEL WPES-20 (AIR FORCE) (NSN 4610-01-341-6288) MODEL H-9518-2 (AIR FORCE) (NSN 4610-01-420-7546) MODEL WPES-30 (NAVY) (NSN 4610-01-341-6287) MODEL H-9518-3 (NAVY) (NSN 4610-01-420-7548)

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REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this bulletin. If you find any mistakes or if you know of a wayto 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 directly to Commander, U. S. Tank-Automotiveand Armaments Command, Attn:AMSTA-AC-NML, Rock Island, IL 61299-7630. You may also submit your recommended changes buyE-mail directly to amsta-ac-nml@ria-emh2.army.mi1, or fax number 309/782-0726/DSN 793-0726. A reply will be furnished directly to you. Instructions for sending an electronic 2028 may be found at the back of this manual immediately preceding the hard copy 2028.

For Air Force, submit AFT0 Form 22 (Technical Order System Publication Improvement Report and Reply) in accordance with paragraph 6-5, Section VI, T.O. 00-5-1. Forward to Commander, San Antonio Air Logistics Center, ATTN: SA-ALC/TIRTR, Kelly Air Force Base, TX 78241-5000.

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HOW TO USE THIS MANUAL

Spend a few minutes looking through this manual. It has a new look that is very different from the manuals you've been using. You'll find the new look is a lot easier to use, and you can find what you're looking for a lot faster.

Each chapter begins with an index that lists each paragraph or section in the chapter. Each section in the maintenance chapter also has an index that lists the procedures in the section and gives page numbers. Or you can look for the information you want in the alphabetical subject index at the back of the manual.

We got rid of as many words as we could and put in lots of illustrations to show just about everything you'll be doing to maintain your equipment.

The text is keyed to the illustration with callout numbers (sometimes words). The callout numbers are in parentheses in the text.

So, HOW DO YOU USE THIS MANUAL?

Like This:

1. Suppose the trailer vibrates when being towed and you want to troubleshoot the unit.

2. Look at the cover and you'll see index boxes near the right-hand edge with subject titles in them. You'll find "UNIT TRUBLESHOOTING 2-7." You can skip over to page 2-7.

   OR

3. Bend the pages a bit and look at the edges. You'll see black bars on some of the pages that are lined up with the index boxes on the cover.

ARMY TM 10-4610-241-24
AIR FORCE TO 40W4-13-42

TECHNICAL MANUAL

UNIT, DIRECT. SUPPORT, AND GENERAL SUPPORT MAINTENANCE MANUAL FOR WATER PURIFICATION UNIT, REVERSE OSMOSIS (ROWPU).

600 GPH TRAILOR MOUNTED, FLATBED CARGO 5-TON, 4-WHEEL TANDEM,
MODEL WPES-10(ARMY) (NSN 4610-41-341-6289)
MODEL H-9518-1 (ARMY) (NSN 4610-01-420-7547)
AND
600 GPH SKID-MOUNTED.
MODEL WPES-20 (AIR FORCE) (NSN 4610-01-341-6288)
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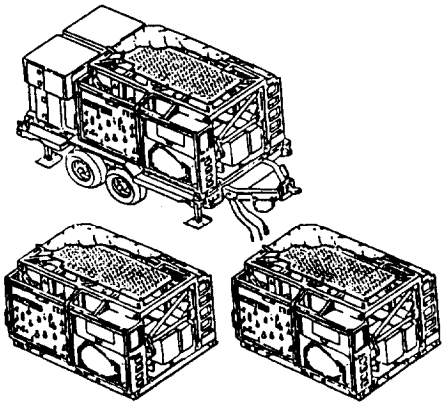
MODEL H-9518-3 (NAVY) (NSN 4610-01-420-7548)



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15 JANUARY 1993

SECTION IV. UNIT TROUBLE, ESHOOTING

2-8.INTRODUCTION

This section provides the troubleshooting information for the Unit Maintenance level. It consists of the sympton index, listing the most common malfunction systoms, and the troubleshooting table, Table 2-2. This table repeats the malfunctions, and provides the procedural steps and corrective actions necessary to return the system to operational readiness.

2.9. TROUBLESHOOTING.

a. Use of Tables. To use this information in the most effective manner the following general procedure should be followed.

(1) If possible, talk to the operator to find out the systems and any corrective action that may have been taken.

(2) Go to the System Index and find the entry that describes your problem.

(3) Go to the page to which the Index sends you.

(4) Read the Warnings, Notes and Cautions.

(5) Perform the steps in the order provided in the table.

(6) When you have found the problem, perform the indicated corrective action.

b. Limitations. In troubleshooting tables like this, it is impractical to list every possible malfunction or to include every possible step or corrective action. If the malfunction you are experiencing is not listed, or if the procedure given does not isolate the problem, you should consult with your supervisor.

SYMPTON INDEX

Equipment Symptom	Page
ROWPU ASSEMBLY	
1. ALL PUMPS INOPERABLE	2-10
PIPING INSTALLAION	
1. HIGH PRESSURE RELIEF VALVE FAILS TO OPERATE	2-12
2. HIGH-PRESURE RELIEF VALVE OPENS BELOW 1100 PSI	2-12
3 REPTURE DISK RUPTURES (Models WPES-10, WPES-20 and WPES-10 only)	2-12
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2. PUMP ASSEMBLY IS NOISY	2-25
CHEMICAL FEED PUMP ASSEMBLY	
1. PUMP ASSEMBLY FAILS TO PRIME	2-26
2. INADEQUATE FLOW OF CHEMICALS	2-26
3. PUMP ASSEMBLY IS NOISY	2-28
4. PUMP ASSEMBLY FAILS TO OPERATE (ALL LIQUID HEAD ASSEMBLIES)	2-29
R.O. PUMP ASSEMBLY	
1. PUMP DRIVE BELTS FRAY AFTER SHOW SHORT OR BREAK FREQUENTLY (Models WPES-10, WPES-20 and WPES-30 only)	2-30
2. PUMP ASSEMBLY IS NOISY	
3. PUMP ASSEMBLY SHUTS DOWN AND/OR FAILS TO START	
4. PUMP MOTOR OVERHEATS	
DISTRIBUTION PUMP ASSEMBLY	
1. PUMP MOTOR RUNS HOT	2-36
2. PUMP ASSEMBLY IS NOISY	2-36
3. PUMP ASSEMBLY SHUTS DOWN AND/OR FAILS TO START	2-36

4. If you put your thumbnail on the black bar that is lined up with the box on the cover for UNIT TROUBLESHOOTING and open the manual, you'll be on page 2-7.

5. On page 2-11, you'll find Section IV, TROUBLESHOOTING. The first major item in the section is a SYSTEM INDEX, listing the systems and major assemblies that make up the flatbed cargo trailer and the ROWPU. Look for TRAILER ELECTRICAL SYSTEM in the Equipment column. Item 2 under TRAILER ELECTRICAL SYSTEM will give you page number 2-68 for "DIM OR FLICKERING LIGHTS."

Table 2.2. Unit Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
TRAILER ELECTRICAL SYSTEM (Model WPES-10) - continued
Step 3. Check that chassis ground wire is securely mounted to the trailer.
a. If ground wire is loose, tighten it.
b. If ground wire appears tight, remove it, clean mounting surfaces and reinstall securely. If trouble persists continue with step 4.
Step 4. Disconnect trailer power cable assembly from wiring harness assembly at in line connectors and check it for availability of 24VDC at each connector while operating the required controls on the vehicle. Use chassis as ground.
Replace trailer cable assembly if it is defective. Refer to Paragraph 2-81.
Step 5. Disconnect trailer wiring harness at light assembly connectors and check for availability of 24VDC at each connector while operating the required controls on the vehicle. Use chassis as ground.
a. If wiring harness is not defective, replace light assembly. Refer to Paragraph 2-80
b. If wiring harness is defective, replace it. Refer to Paragraph 2-82.
2. DIM OR FLICKERING LIGHTS.
Step 1. Disconnect trailer cable assembly from towing vehicle and check for bent, broken or corroded pins.
If pins are defective, repair or replace cable assembly. Refer to Paragraph 2-81.
Step 2. Check for loose or corroded chassis ground wire.
a. If wire is loose tighten it.
b. If wire is not loose, remove it from trailer, clean mounting surfaces and reconnect securely

2-68

6. Turn to page 2-68 and find the symptom "DIM OR FLICKERING LIGHTS."

7. As you do the tests and corrective actions in the order listed, you will get to "If pins are defective, repair or replace power cable assembly. Refer to paragraph 2-81."

2.81. TRAILER CABLE ASSEMBLY REPLACE(MODEL WPES-10).

2-81. TRAILER CABLE ASSEMBLY REPLACE (MODEL WPES-10).

This task consists of: a. Removal b. Installation c. Test

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Material/Parts Required
Lockwashers
Equipment Condition
Reference
Power shut down (Generator Manual)
Trailer Cable disconnected from Towing Vehicle (TM 10-4610-241-10).

a. Removal.

NOTE
Tagging wires, noting connection points will facilitate installation. Be sure to transfer tags to replacement parts before discarding defective parts or turning them in to Supply.

(1) Remove six connectors (1) from spring clips of clamps (2).

(2) Separate two halves of six connectors (1).

(3) Remove screw (3) and lockwasher (4) and disconnect ground wire (5) from clamp (2).

(4) Remove nut (7), screw (8) and cable clamp (9).

(5) Remove cable assembly (10) from drawbar (6) of trailer.

b. Installation.

(1) Position trailer cable assembly (10) in place on drawbar (6) of trailer.

(2) Secure cable assembly (10) to drawbar (6) with cable clamp (9), screw (8) and nut (7).

(3) Install ground wire (5), lockwasher (4), and screw (3) on clamp (2).

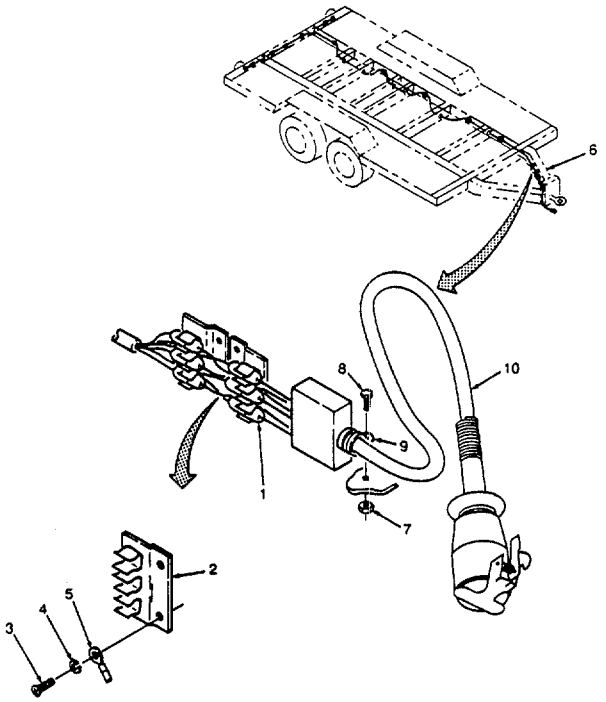
(4) Match halves of six connectors (1) as tagged at removal. Push halves together until they lock.

(5) Push six connectors (1) into spring clips of clamp (2).

(6) Connect trailer cable assembly to towing vehicle and check for proper operation of lights (TM 10-4610-241-10).

2-318

2-81. TRAILER CABLE ASSEMBLY REPLACE (MODEL WPES-10) - continued.



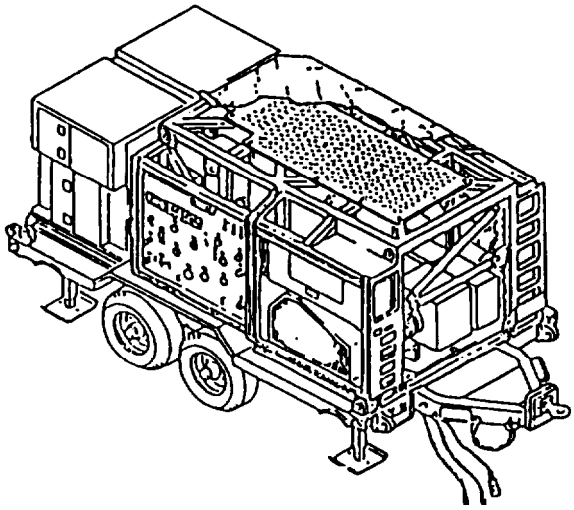
2-319

8. Turn to paragraph 2-81 and look at the procedure. The 'INITIAL SETUP" section tells you what tools, materials, and parts are needed to do this task. It also tells you anything you must do before starting this task and it gives general warnings about hazards that can exist while you do this task.

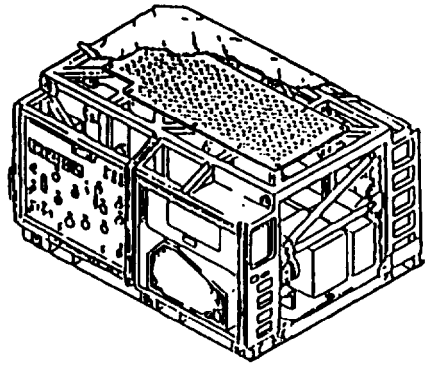
9. The procedure itself has a picture to show you where to look and what to look at, plus the steps you will do to perform the task.

10. Notice the numbered arrows. These are the callout numbers. As you read each step, we tell you where to look by including the callout number (in parentheses) after the name of each thing we call out.

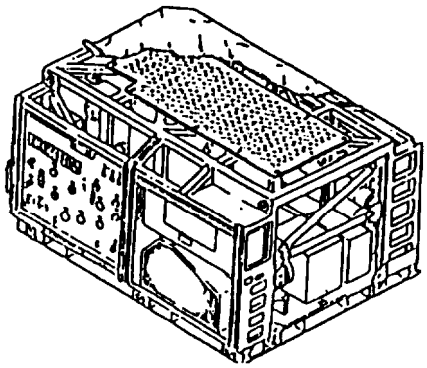
11. Do the procedure, then check to see if you have corrected the fault.



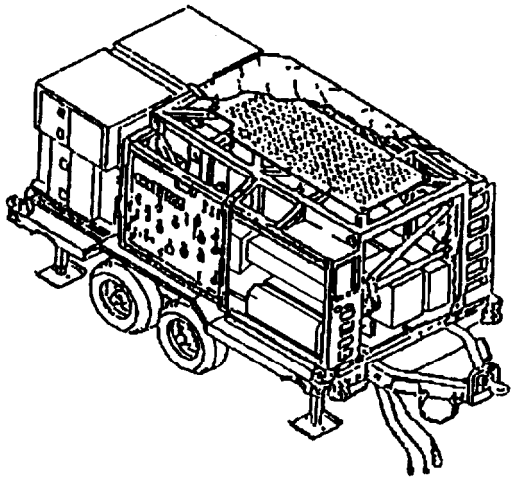
MODEL WPES-10



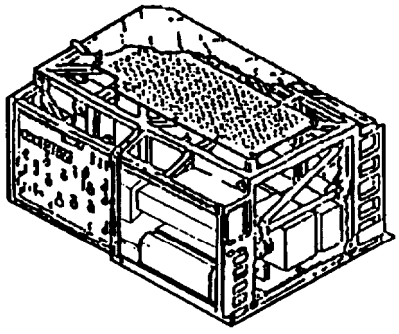
MODEL WPES-20



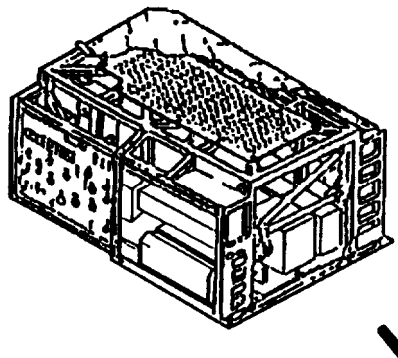
MODEL WPES-30



MODEL H-9518-1



MODEL H-9518-2



MODEL H-9518-3

CHAPTER I
INTRODUCTION

section I. General Information
section II. Equipment Description and Data
section III. Technical Principles of Operation

Section I. GENERAL INFORMATION

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Maintenance Forms, Records, and Reports	1-2
Official Nomenclature, Names and Designations	1-5
Preparation for Storage or Shipment	1-4
Reporting Equipment Improvement Recommendations (EIRS)	l-6
Safety, care and Handling	1-8
scope	l-1
Warranty Information	1-7

1-1. SCOPE

This manual covers Unit, Direct Support, and General Support troubleshooting and maintenance procedures required to repair and maintain the 600-gallon per hour (gph) Reverse Osmosis Water Purification Unit (ROWPU), Models WPES-10 and H-9518-1 (Army), WPES-20 and H-9518-2 (Air Force), and WPES-30 and H-9518-3 (Navy). The ROWPU produces up to 600 gph of drinking water from any nonpure water source; i.e., streams, rivers, lakes, or salt water.

1-2. MAINTENANCE FORMS, RECORDS, AND REPORTS.

a. Reports of Maintenance and Unsatisfactory Equipment. Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA Pam 738-750, as contained in Maintenance Management Update. Air Force personnel will comply with MASCOM requirements for maintenance data reporting.

b. Report of Packaging and handling Deficiencies. Fill out and forward SF 364 [Report of Discrepancy (ROD)] as prescribed in AR 735-11/2DLAR 4140.55/NAVMATINST 4355.73B MCO 4430.3H.

c. Discrepancy in Shipment Report (DISREP) (SF 361). Fill out and forward Discrepancy in Shipment Report (DISREP) (SF 361) as prescribed in AR 55-38/NAVSUPINST 4610.33C/MCO P4610.19D/DLAR 4500.1.

1-3. DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE.

Methods and/or procedures for the destruction of Army materiel to prevent enemy use are covered in TM 750-244-3.

1-4. PREPARATION FOR STORAGE OR SHIPMENT.

Instructions on preparation for storage or shipment are found in Chapter 2, Section VI.

1-5. OFFICIAL NOMENCLATURE, NAMES AND DESIGNATIONS.

Common Name	Official Nomenclature
ROWPU	Reverse Osmosis Water Purification Unit, 600 GPH

1-6. REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIRs).

a. Army. If your ROWPU 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. Put it on an SF 368 (Quality Deficiency Report). Mail it to us at: Commander, U. S. Army Troop Support Command, ATTN: AMSAT-I-MDO, 4300 Goodfellow Boulevard, St. Louis, MO 63120-1798, We'11 send you a reply.

b. Air Force. AF personnel submit improvement reports in accordance with AFR 900-4 or T.O. 00-5-1 as applicable.

1-7. WARRANTY INFORMATION.

The ROWPU is warranted by Engineered Air Systems, Inc. and Highland Engineering, Inc. in accordance with the terms of contracts DAAK-01-91-C-0178 and DAAK01-95-D-0024. Refer to TB 10-4610-241-24 for details of the warranty program. Report all defects in material or workmanship to your supervisor who will take appropriate action.

1-8. SAFETY, CARE AND HANDLING.

Observe all WARNINGS, CAUTIONS and NOTES in this manual. This equipment can be dangerous or may be damaged if these instructions are not followed.

Section II. EQUIPMENT DESCRIPTION AND DATA

Alphabetical Index

Paragraph Title **Paragraph**

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Equipment Data.. 1-12
Equipment Characteristics, Capabilities, and Features 1-9
Location and Description of Major Components.. 1-10