

TECHNICAL MANUAL

**OPERATOR'S, UNIT AND
DIRECT SUPPORT MAINTENANCE MANUAL
(INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST)**

FOR

**PRECISION DISTILLATION TESTING
EQUIPMENT**

MODEL 76002

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.

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

CHANGE
NO. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 15 January 1993

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NSN 6630-00-251-2118

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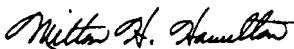
TM 10-6630-219-13&P, 28 September 1990, is changed as follows:

1. Change cover to same subject as above.
2. Remove and insert" pages as indicated below. New or changed text material is indicated by a vertical bar in the margin. An illustration change is indicated by a miniature pointing hand.

Remove pages	Insert pages
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3. Retain this sheet in front of manual for reference purposes.

By Order of the Secretary of the Army:

Official:


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Administrative Assistant to the
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03307

GORDON R. SULLIVAN
General, United States Army
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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.

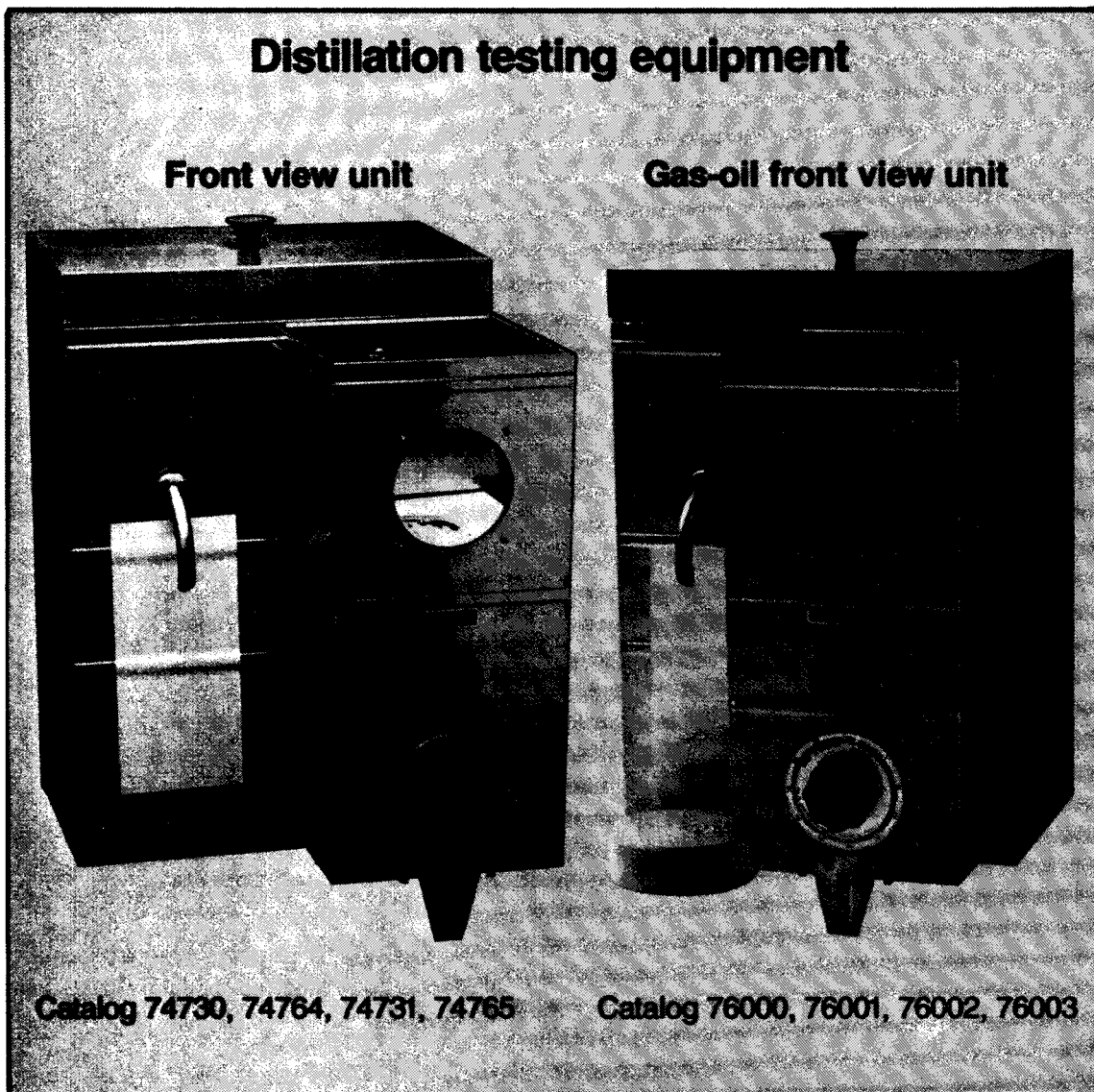
a. Placement of equipment in administrative storage should be for short periods of time when a shortage of maintenance effort exists. Items should be in mission readiness within 24 hours or within the time factors as determined by the directing authority. During the storage period appropriate maintenance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

Precision[®]

Instruction Manual TS-74730 AX-1



Precision Scientific

Front view and Gas-oil front view distillation units

Introduction

Your satisfaction and safety are important to PRECISION SCIENTIFIC and a complete understanding of this unit is necessary to attain these objectives.

As the ultimate user of this apparatus, it is your responsibility to understand its proper function and operational characteristics. This instruction manual should be thoroughly read and all operators given adequate training before attempting to place this unit in service. Awareness of the stated cautions and warnings, and compliance with recommended operating parameters--together with maintenance requirements--are important for safe and satisfactory operation. The unit should be used for its intended application; alterations or modifications will void the Warranty.

WARNING : As a routine laboratory precaution, always wear safety glasses when working with this apparatus.

This product is not intended, nor can it be used, as a sterile or patient connected device. In addition, this apparatus is not designed for use in Class I, II, or III locations as defined by the National Electrical Code.

Unpacking and damage

Save all packing material if apparatus is received damaged. This merchandise was carefully packed and thoroughly inspected before leaving our factory.

Responsibility for its safe delivery was assumed by the carrier upon acceptance of the shipment; therefore, claims for loss or damage sustained in transit must be made upon the carrier by the recipient as follows:

Visible Loss or Damage: Note any external evidence of loss or damage on the freight bill, or express receipt, and have it signed by the carrier's agent. Failure to adequately describe such external evidence of loss or damage may result in the carrier's refusing to honor your damage claim. The form required to file such a claim will be supplied by the carrier.

Concealed Loss or Damage: Concealed loss or damage means loss or damage which does not become apparent until the merchandise has been unpacked and inspected. Should either occur, make a written request for inspection by the carrier's agent within 15 days of the delivery date; then file a claim with the carrier since the damage is the carrier's responsibility.

By following these instructions carefully, we guarantee our full support of your claim to be compensated for loss from concealed damage.

DO NOT -- FOR ANY REASON -- RETURN THIS UNIT WITHOUT FIRST OBTAINING AUTHORIZATION . In any correspondence to PRECISION SCIENTIFIC please supply the nameplate data, including catalog number and serial number.

General information

These instructions encompass the Front View and Gas-Oil Front View Distillation Units listed below with their specific electrical characteristics:

FRONT VIEW UNITS

Cat. No.	Volts	Hertz	Watts	Amps
74730*	120	50/60	1000	8.4
74764*	220	50/60	1000	4.5
74731**	120	50/60	1000	8.4
74765**	220	50/60	1000	4.5

GAS-OIL FRONT VIEW UNITS

Cat. No.	Volts	Hertz	Watts	Amps
76000*	120	50/60	1300	10.8
76001*	220	50/60	1300	5.9
76002**	120	50/60	1300	10.8
76003**	220	50/60	1300	5.9

* Right-hand unit

** Left-hand unit

SAFETY CONSIDERATIONS AND WARNINGS:

The following guidelines are presented to supplement the existing safety rules enforced by your company:

1) Safety glasses should be worn by the operator and by anyone in the vicinity who could be struck by glass fragments caused by flask or graduate breakage or by splashing from handling liquid samples.

2) It is recommended that a fire extinguisher of Halon 1211 or CO₂ (at least a 5-lb. tank size) be placed conveniently in reach of the operator of the distillation unit to protect against sample fires which might accidentally occur during test.

3) Service or circuit testing should be attempted only by a qualified person who has been trained with regard to the potential danger of working with live electrical circuitry.

WARNING: Disconnect the unit from the power source whenever replacing electrical components.

4) Insulated gloves should be used when handling hot flasks and distillation boards.

Technical specifications

Distillation Heater (Shield): 0 to 1000 W.

Condenser capacity: 2 gal.(7.6 liters)

The following specifications are for Gas Oil units only:

Condenser Temperature range: 32 to 140°F
(0 to 60°C)

Condenser Heater: 300 W.

Installation

Location: The most uniform operating conditions and results will be obtained by placing the unit in an area remote from drafts, ventilating outlets, radiators, and other rapidly changing ambient conditions.

INSTALLATION (Contd.)

Electrical Connections: Important
(Please read carefully.)

CAUTION: The condenser on the Gas-Oil unit contains an immersion heater. The unit must not be connected to a power source unless the condenser is filled with liquid and the line switch is in the "Off" position. This will prevent the heater from burning out.

WARNING : For personal safety, this apparatus must be properly grounded.

The power cord of this instrument is equipped with a three-prong (grounding) plug which mates with a standard three-prong (grounding) wall receptacle to minimize the possibility of electric shock hazard from this apparatus. The user should have the wall receptacle and circuit checked by a qualified electrician to make sure the receptacle is properly grounded. Where a two-prong receptacle is encountered, it is the personal responsibility and obligation of the user to have it replaced with a properly grounded three-prong wall receptacle.

WARNING: DO NOT, under any circumstances, cut or remove the third (ground) prong from the power cord. DO NOT use a two-prong adapter plug.

Determine the total amount of current presently being used by other apparatus connected to the circuit that will be used for this unit. It is critical that the added current demand and other equipment on the circuit not exceed the rating of the fuse or circuit breaker in use.

CAUTION: Be sure the power supply is of the same voltage as specified on the nameplate.

Operating procedures

The Front View and Gas-Oil Distillation Units are designed to conform with the following test methods:

ASTM D-86 (groups 1, 2, and 3)*
ASTM D-216
ASTM D-233
ASTM D-447
ASTM D-850
ASTM D-1078
1P-123
1P-191
DIN-51761
D1N-51751

* NOTE: In addition, the Gas-Oil Distillation Unit conforms to ASTM D-86 (Group 4).

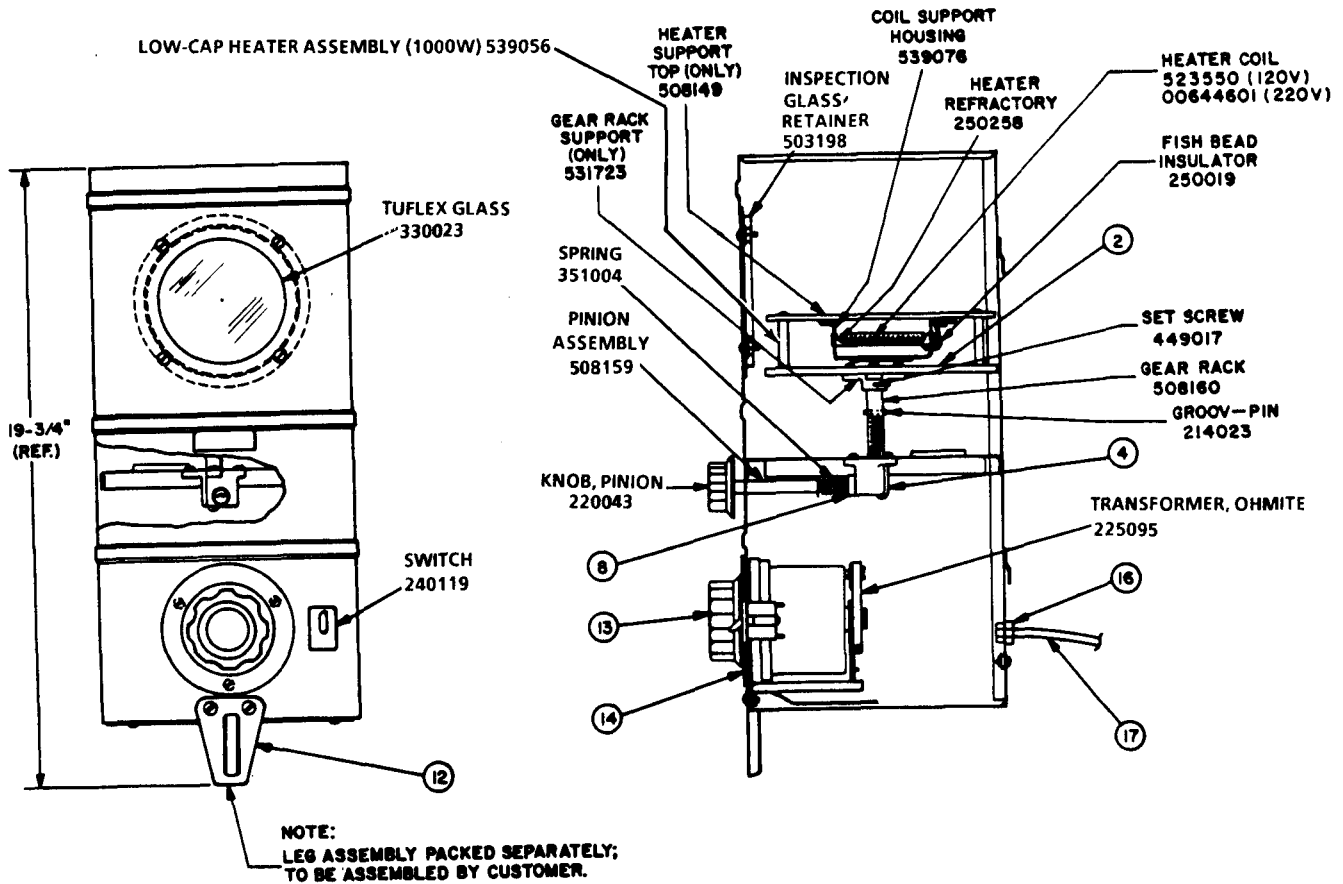
Preparation of the apparatus, preparation of the sample, test procedure, calculations and reporting, and appropriate tables are supplied in the ASTM Methods.

ASTM test methods can be obtained from:

American Society for Testing Materials
1916 Race Street
Philadelphia, Pennsylvania 19103

NOTE : Heater Height Adjustment (Shield) Push heater elevating knob (Item 7) inwards and simultaneously turn knob to reach the required heater height. Turning the knob only will strip either the gear rack or the pinion shaft.

SHIELD ASSEMBLY



PRECISION DISTILLATION UNIT
 NO. 74730120 V. 50/60 HZ, 1000W., 8.4 AMP (RIGHT HAND UNIT)
 NO. 74731120 V. 50/60 HZ, 1000W., 10.8 AMP (LEFT HAND UNIT)

PRECISION TM INSTRUCTION MANUAL

PARTS LIST

NO.	DESCRIPTION	QTY	CAT. NO.		CAT. NO.	
			74730	76000	74764	76001
			74731	76002	74765	76003
			PART NO.			
1	LO-CAP HEATER ASSEMBLY (1000 W)	1	539056		00644101	
	HEATER SUPPORT TOP	1		508149		
	COIL SUPPORT HOUSING	1		539076		
	HEATER REFRACTORY	7		250258		
	HEATER COIL	1	523550		00644601	
	INSULATOR, FISH BEAD	22		250019		
2	BOARD, HEATER SUPPORT	1		513621		
3	GEAR RACK SUPPORT ASSEMBLY	1		531722		
	GEAR RACK SUPPORT	1		531723		
	GEAR RACK	1		508160		
	SET SCREW	1		449017		
	GROOV PIN (3/32" DIA., 3/4" LONG)	1		214023		
4	PINION AND RACK HOLDER ASSEMBLY	1		531724		
5	SPRING	1		351004		
6	PINION ASSEMBLY	1		508159		
7	KNOB, PINION	1		220043		
8	SPACER	1		513786		
9	TUFLEX GLASS	1		330023		
10	INSPECTION GLASS RETAINER	1		503198		
11	SWITCH	1	240119		240311	
12	LEG KIT	1		539791		
	LEG	1		503187		
	#8-32 X 1/2 PAN HEAD MACHINE SCREW	2		456508		
	#8 INT. S.S. WASHER	2		449131		
13	KNOB, TRANSFORMER	1		220005		
14	DIAL	1	315459		00829401	
15	TRANSFORMER, OHMITE	1	225095		225246	
	BRUSH, TRANSFORMER		225087		225263	
16	STRAIN RELIEF BUSHING	1		215160		
17	CABLE AND PLUG ASSEMBLY (SHIELD)	1	539189		00644301	
	PLUG, 4 CONTACT	1		228070		
18	SOCKET, 4 CONTACT	1		236096		

PRECISION TM INSTRUCTION MANUAL

PARTS LIST (CONTD.)

ITEM NO.	DESCRIPTION	QTY	CAT. NO.		CAT. NO.	
			74730	76000	74764	76001
			74731	76002	74765	76003
			PART NO.			
*19	PILOT LIGHT	1			234026	
*20	SWITCH	1			240311	
*21	HEATER, 300 W.	1	513796			00644201
*22	RUBBER SLEEVE (FOR 300 W. HEATER)	2			260189	
*23	NUT (FOR 300 W. HEATER)	2			260208	
*24	THERMOSTAT	1			239079	
*25	PACKING (FOR THERMOSTAT)	1			221027	
*26	WASHER (FOR THERMOSTAT)	1			501887	
*27	PACKING NUT (FOR THERMOSTAT)	1			501390	
	**COVER, CONDENSER	1			506055	
	**CONDENSER TUBE (RIGHT-HAND)	1			507492	
	**CONDENSER TUBE (LEFT-HAND)	1			507493	
	**SUPPORT, CYPRESS WOOD	1			503211	
	**GRADUATE CYLINDER COVER	1			509886	
	**HEAT-ROC DISTILL. BOARD, 1-1/4" DIA. HOLE	1			76026	
	**HEAT-ROC DISTILL. BOARD, 2" DIA. HOLE	1			76208	

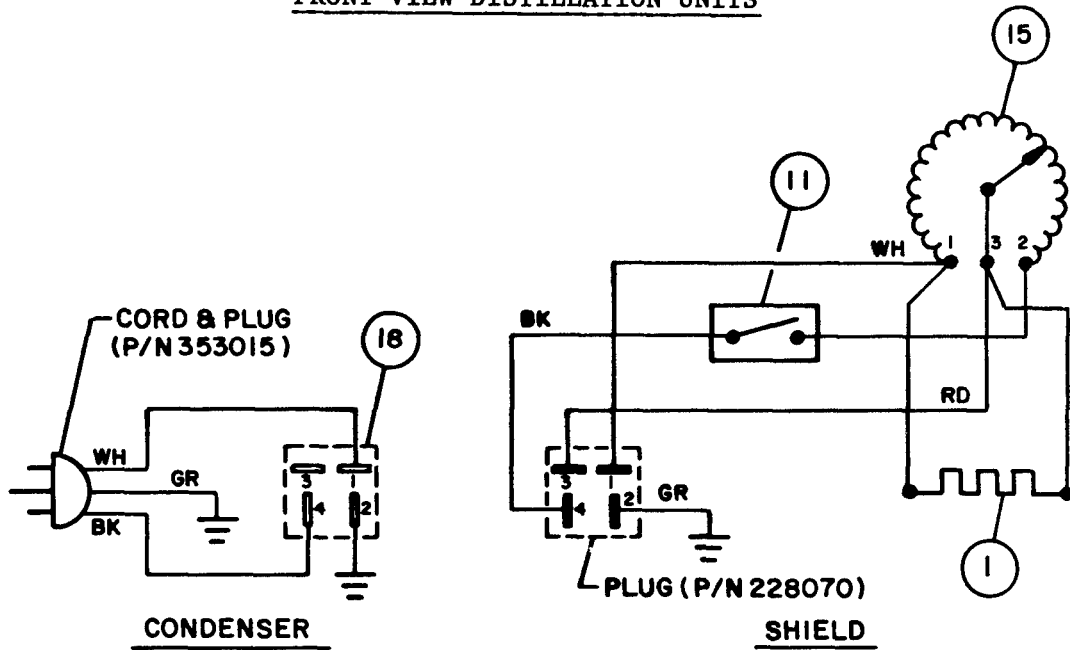
ACCESSORIES

HEAT-ROC DISTILL. BOARD, 1" DIA. HOLE	76025
HEAT-ROC DISTILL. BOARD, 1-1/2" DIA. HOLE	76027
HEAT-ROC DISTILL. BOARD, 2-3/4" DIA. HOLE	76029
MOD 254 MECH. REFRIG. CIRCULATING SYSTEM (120V., 60 HZ.)	66623
WATT METER (120V., 60 HZ.)	74721

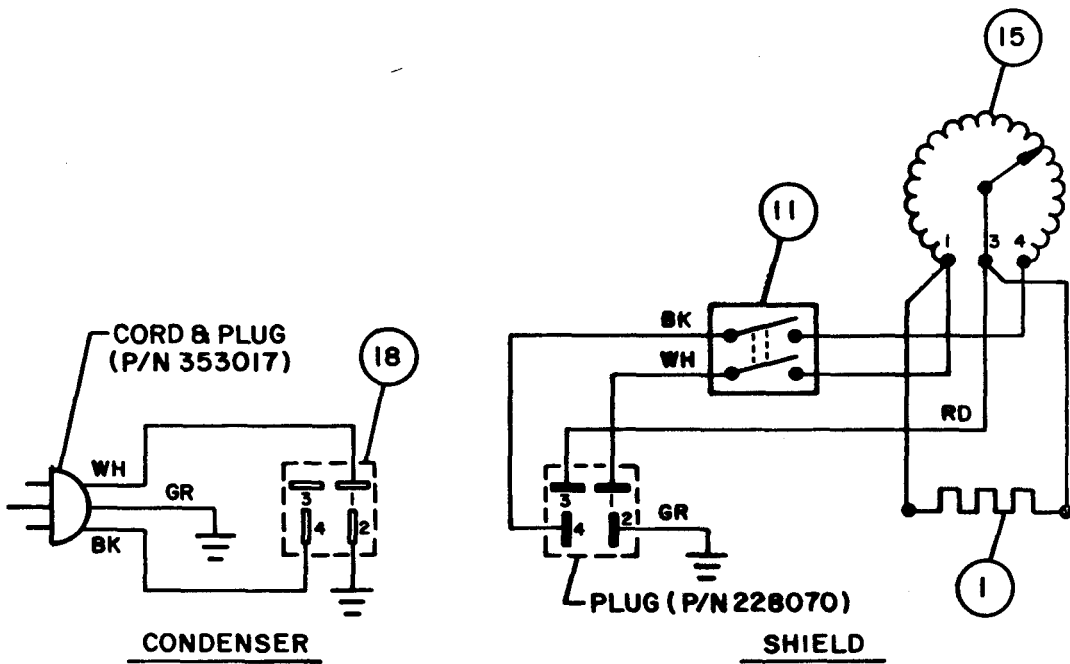
NOTE: THOSE ITEMS SHOWN WITH A SINGLE ASTERISK () ARE SUPPLIED ON THE GAS-OIL CONDENSER ONLY.

THOSE ITEMS SHOWN WITH A DOUBLE ASTERISK () ARE ITEMS NOT SHOWN ON WIRING DIAGRAMS AND THE "SHIELD ASSEMBLY" ILLUSTRATION.

WIRING DIAGRAMS
FOR
FRONT VIEW DISTILLATION UNITS

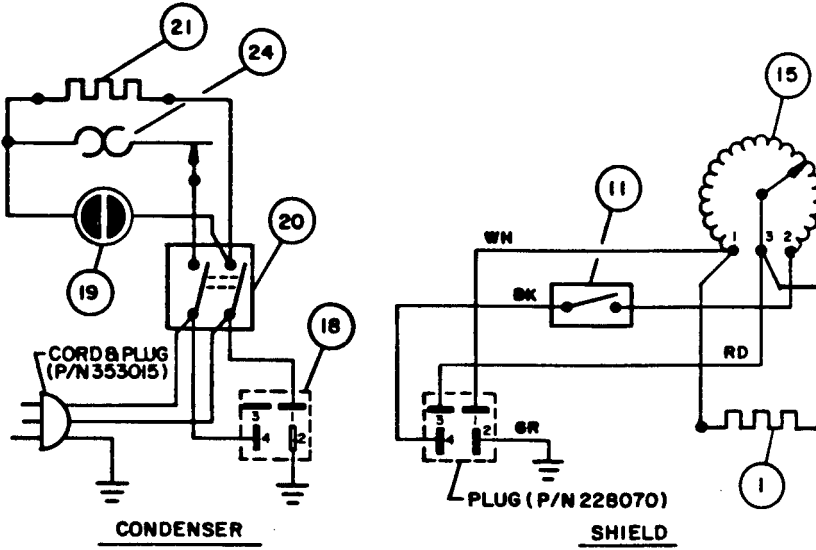


CAT. NO'S 74730 & 74731 (120V.)

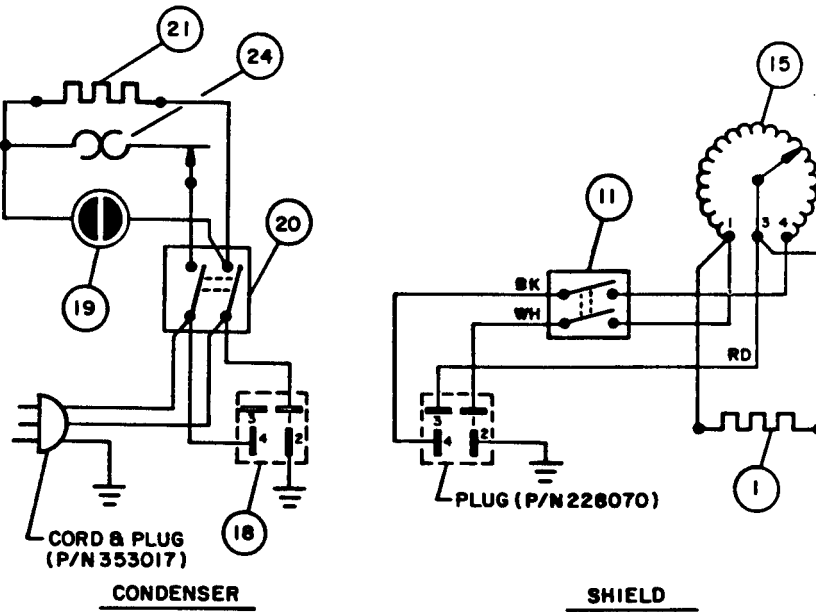


CAT. NO'S 74764 & 74765 (220V.)

FOR
GAS-OIL FRONT VIEW DISTILLATION UNITS



CAT. NO.'S 76000 & 76002 (120V.)



CAT. NO.'S 76001 & 76003 (220V.)

Exclusive Precision® Warranty

PRECISION SCIENTIFIC warrants its products against defects in material or in workmanship, when used under appropriate conditions and in accordance with appropriate operating instructions for a period of no less than one (1) year from the date of delivery of the products.

Sole obligation of PRECISION SCIENTIFIC shall be to repair or replace at our option, FOB factory or locally, without charge, any part(s) that prove defective within the warranty period, provided the customer notifies PRECISION SCIENTIFIC promptly and in writing of any such defect. Compensation for labor by other than PRECISION SCIENTIFIC employees will not be our obligation. Part(s) replacement does not constitute an extension of the original warranty period.

PRECISION SCIENTIFIC MAKES NO WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR ANY OTHER WARRANTY, EXPRESSED OR IMPLIED, AS TO THE DESIGN, SALE, INSTALLATION, OR USE OF ITS PRODUCTS, AND SHALL NOT BE LIABLE FOR CONSEQUENTIAL DAMAGES RESULTING FROM THE USE OF ITS PRODUCTS.

PRECISION SCIENTIFIC will not assume responsibility for unauthorized repairs or failure as a result of unauthorized product modifications, or for repairs, replacements, or modification negligently or otherwise improperly made or performed by persons other than PRECISION SCIENTIFIC employees or authorized representatives.

While our personnel are available to advise customers concerning general applications of all manufactured products, oral representations are not warranties with respect to particular applications and should not be relied upon if inconsistent with product specifications or the terms stated herein.

In any event, the terms and conditions contained in PRECISION SCIENTIFIC formal sales contracts shall be controlling; and any changes must be in writing and signed by an authorized executive of PRECISION SCIENTIFIC.

All defective components will be replaced without charge one (1) year from the date of delivery. There will be no charge for labor if the apparatus is returned to the factory prepaid.

Conditions and qualifications of the warranty statement shall prevail at all times.

Precision® is a registered trademark of **Precision Scientific Inc.**

1. Preventive Maintenance Checks and Services. Routine maintenance ensures trouble-free operation. Checks and services outlined below should be performed on a daily basis and before and after each use.

<u>Check/Service</u>	<u>Note</u>
Check condenser bath is clean and clear of foreign objects.	Wash bath with mild soap or detergent.
Check immersion heater is clean.	
Check operation of heater shelf mechanism by engaging pinion knob and turning knob to elevate the shelf. Release knob and the shelf. Release knob and the shelf should remain elevated.	If shelf falls when pinion knob is released, see paragraph 2.1.

WARNING

Before performing maintenance on this equipment, ensure that it is electrically disconnected. Failure to comply with this warning could result in serious injury or death.

2. Maintenance - Repair and Remove/Replace Procedures.

Condenser Bath - No maintenance or repair is required for this portion of the apparatus with the exception of an occasional cleaning with a mild soap or detergent.

Heater Shield - The components of this unit are easily accessible and replaceable.

2.1 REPAIR

When the heater shelf will not remain in the elevated position, it is usually caused by the groove pin which engages the gear teeth of the pinion to lock the elevating mechanism. If this pin has slipped out of position, it may be replaced by removing the transformer drip shield from the bottom of the heater shield to gain access. Using pliers, reset the groove pin by forcing it into the bronze rack and pinion housing.

2.2. REMOVE/REPLACE

a. The Lo-Cap Heater can be easily replaced by lifting the front of the heater and disconnecting the asbestos covered lead wire at the leader terminal. Similarly, remove the lead wire from the rear heater terminal and lift the entire heater out of the shield.

b. Removal and replacement of the variable power transformer is accomplished by removing the shield unit from its physical and electrical connection to the condenser and laying the shield unit on its side or top. The transformer knob should be removed by inserting an Allen wrench into the opening at the side of this knob. After loosening this setscrew, the knob will easily slide off the rotor extension shaft. The three flat head screws, directly below the knob-dial on the face of the shield, should be removed at the same time supporting the weight of the transformer. Remove the cover plate if present, at the back of the transformer, and electrically disconnect it making certain that the wires are tagged.

c. The brush of the transformer is easily replaceable by unscrewing the two screws that hold it in place.

d. The line switch, installed on each heater shield, is of a type having spring steel clips at the sides of the switch body. This type of switch is easily removable by compressing the spring clips and pushing the unit outward. Wires are then easily removed. To install, the unit is simply pushed into the square opening in the sheet metal.

ADDENDUM A

This addendum covers the Precision Scientific Gas-Oil Distillation Testing Equipment Model 76002 and contains the following information:

<u>Paragraph</u>	<u>Title</u>
1	Preventive Maintenance Checks and Services
2	Maintenance - Repair and Remove/Replace Procedures

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	SF368
Equipment inspection and Maintenance Work Sheet	DA Form 2404
Hand Receipts	DA Form 2062

A-3. **Field Manuals.**

Petroleum Testing Facilities:	
Laboratories and Kits	FM10-72
inspecting and Testing Petroleum Products	FM10-70
ASTM Test Method Supplement to	FM10-92C1/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 10-6630-235-13P
Lab-Line Explosion Proof Refrigerator	TM 10-6640-219-13&P
Lily Freezer	TM 10-6640-234-13&P
Millipore OM39 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 10-6630-234-13&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 10-6640-232-13&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 T1-5030II 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	AR25-30
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,¹including fault location/troubleshooting,² removal/installation, and disassembly/assembly procedures,³and maintenance actions⁴to 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:

¹Services - inspect, test, service, adjust, align, calibrate, and/or replace.

²Fault 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).

³Disassemble/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.

⁴Actions - 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) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			UNIT		DS	GS	DEPOT		
			C	O	F	H	D		
01	DISTILLATION TESTING EQUIPMENT (PRECISION)	INSPECT REPLACE REPAIR	0.3	0.5	1.0			1, 2	

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	O,F	TOOL KIT, GENERAL AUTOMOTIVE	5180-00-177-7033	(50980) SC 5180-90- CL-N26
2	O,F	MULTIMETER, 0-500V	6625-00-691-2453	

SECTION IV. REMARKS

NOT APPLICABLE

APPENDIX C

COMPONENTS OF END ITEM AND BASIC ISSUE ITEMS LISTS

Section I. INTRODUCTION

C-1. Scope.

This appendix lists components of end item and basic issue items for the Distillation Test Equipment (Precision model) to help you inventory items required for safe and efficient operation.

C-2. General.

The Components of End Item and Basic Issue Items Lists are divided into the following sections:

a. Section II. Components of End Item. This listing is for information purposes only, and is not authority to requisition replacements. These items are part of the end item, but are removed and separately packaged for transportation or shipment. As part of the end item, these items must be with the end item whenever it is issued or transferred between property accounts. Illustrations are furnished to assist you in identifying the items.

b. Section III. Basic Issue Items. These are the minimum essential items required to place the Distillation Test Equipment (Precision model) in operation, to operate it, and to perform emergency repairs. Although shipped separately packaged, BII must be with the shelter during operation and whenever it is transferred between property accounts. The illustrations will assist you with hard-to-identify items. This manual is your authority to request/requisition replacement BII, based on TOE/MTOE authorization of the end item.

C-3. Explanation of Columns.

The following provides an explanation of columns found in the tabular listings:

a. Column (1) - Illustration Number (Illus Number). This column indicates the number of the illustration in which the item is shown.

b. Column (2) - National Stock Number. Indicates the National stock number assigned to the item and will be used for requisitioning purposes.

c. Column (3) - Description. Indicates the Federal item name and, if required, a minimum description to identify and locate the item. The last line for each item indicates the CAGEC (in parentheses) followed by the part number.

d. Column (4) - Unit of Measure (U/M). indicates the measure used in performing the actual operational/maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in, pr).

e. Column (5) - Quantity required (QTY RQR). indicates the quantity of the item authorized to be used with/on the equipment.

SECTION II. COMPONENTS OF END ITEM				
(1)	(2)	(3)	(4)	(5)
ILLUS	NATIONAL STOCK NUMBER	DESCRIPTION CAGEC AND PART NUMBER	USABLE ON CODE U/M	QTY
	6640-00-912-8656	CYLINDER, GRADUATED, LABORATORY; BOROSILICATE GLASS; HEX BASE; W/ POURING SPOUT; 5ML GRADUATED AT 0.1 ML INTERVALS, EVERY TENTH GRADUATION NUMBERED; (80740) NO. 28-476-5	EA	3
	6640-00-883-8516	CYLINDER, GRADUATED, LABORATORY; BOROSILICATE GLASS; HEX BASE; W/ POURING SPOUT; 100 ML; FOR ASTM TEST D-86; (80740) NO. 28-476; (22527) NO. 8-552E	EA	6
	6640-00-423-8500	FLASK, DISTILLING; BOROSILICATE GLASS; STRAIGHT SIDE ARM JOINED TO NECK AT 75 DEG ANGLE; CORK MOUTH; 125 ML FOR ASTM TEST D-86, MS 36058-3 NNN-F-240, TYPE III, CLASS 1, STYLE 1, SIZE 3	EA	6

SECTION III. BASIC ISSUE ITEMS

NOT APPLICABLE

APPENDIX D
ADDITIONAL AUTHORIZATION LIST

NOT APPLICABLE

APPENDIX E
EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST
NOT APPLICABLE

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:

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THEN... JOT DOWN THE DOPE ABOUT IT ON THIS FORM, CAREFULLY TEAR IT OUT, FOLD IT AND DROP IT IN THE MAIL!

SOMETHING WRONG WITH THIS PUBLICATION?

FROM: (PRINT YOUR UNIT'S COMPLETE ADDRESS)

PFC JOHN DOE
COA, 3d ENGINEER BN
FT. LEONARD WOOD, MD 63108

DATE SENT

PUBLICATION NUMBER

TM 10-6630-219-13&P

PUBLICATION DATE

28 SEPT 1990

PUBLICATION TITLE PRECISION

DISTILLATION TESTING EQUIPMENT

BE EXACT... PIN-POINT WHERE IT IS

PAGE NO	PARA-GRAPH	FIGURE NO	TABLE NO
6	2-1 a		
B1		4-3	
125	line 20		

IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

In line 6 of paragraph 2-1a the manual states the engine has 6 Cylinders. The engine on my set only has 4 Cylinders. Change the manual to show 4 Cylinders.

Callout 16 on figure 4-3 is pointing at a bolt. In key to figure 4-3, item 16 is called a shim - Please correct one or the other.

I ordered a gasket, item 19 on figure B-16 by NSN 2 910-00-762-3001. I got a gasket but it doesn't fit. Supply says I got what I ordered, so the NSN is wrong. Please give me a good NSN

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER

JOHN DOE, PFC (268) 317-7111

SIGN HERE

JOHN DOE

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OFFICIAL BUSINESS

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U.S. ARMY TROOP SUPPORT COMMAND
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ST. LOUIS, MO 63120-1798

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TEAR ALONG PERFORATED LINE

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 dekagram = 10 grams = .35 ounce
 1 hectogram = 10 dekagrams = 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

To change	To	Multiply by	To change	To	Multiply by
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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