TECHNICAL MANUAL

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

KOEHLER DISTILLATION APPARATUS

Model 45200

NSN 6630-00-251-2118

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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TM 10-6630-233-13&P, 28 September 1990, is changed as follows:

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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.

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By Order of the Secretary of the Army:

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Chief of Staff

Official:

Milton H. Hamilton

MILTON H. HAMILTON
Administrative Assistant to the Secretary of the Army
03311

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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.

Koehler
INSTRUMENT COMPANY, INC.

K45200 & K45290

K45300 & K45390

DISTILLATION APPARATUS

ASTM D86

DISTILLATION

OF

PETROLEUM PRODUCTS

1595 SYCAMORE AVE.
BOHEMIA, NY 11716
(516) 589-3800
TELEX 4973677 "KOEHLER"
FAX (516) 589-3815

KOEHLER

K45200 & K45290 & K45300 & K45390

DISTILLATION APPARATUS

ASTM D86

TABLE OF CONTENTS

SECTION:

NOTE : The K45300 is the same as the K45200, except that it's a left hand unit. The (A) designation denotes 230V., 50/60 Hz.

SAFETY AND HAZARD WARNING

THIS EQUIPMENT MAY INVOLVE HAZARDOUS MATERIAL AND OPERATIONS. THIS MANUAL DOES NOT PURPORT TO ADDRESS ALL OF THE SAFETY PROBLEMS ASSOCIATED WITH THE USE OF THE EQUIPMENT. IT IS THE RESPONSIBILITY OF WHOEVER USES THIS EQUIPMENT TO CONSULT AND ESTABLISH APPROPRIATE SAFETY AND HEALTH PRACTICES, AND DETERMINE THE APPLICABILITY OF REGULATORY LIMITATIONS PRIOR TO USE.

SECTION A

(1) UNPACKING INSTRUCTIONS:

This unit comes packed upright in a corrugated carton. Lift the back unit condenser from the carton first and place on a firm level bench. Lift the heater section from the carton. Position the heater unit on the condenser by lifting the heater and placing the unit on the protruding hangers welded on the condenser. Remove all tie-downs and crumpled paper from the condenser section. Unpack the styrofoam wrappings from around the heater section and generally clean all wrappings from the units. Unpack the 1¼ inch and 2 inch secondary flask supports and the wooden graduated cylinder support and place in a safe location.

(2) ASSEMBLY INSTRUCTIONS:

(A) Position the heater plate to lay flat on the adjustable elevator plate.

(B) Plug the line cord into a properly fused and grounded receptacle of the correct voltage, as marked on the information plate.

(C) Adjust the front leg on the heater unit to level the apparatus if the table is uneven.

(D) Fill the condenser unit in accordance with ASTM Method D86.

(E) Attach the small connector cable coming from the heater unit to the connector on the bottom of the condenser unit.

(3) OPERATING INSTRUCTIONS:

(A) Adjust the height of the elevator platform to fit the flask. Adjust the platform by pushing in the knob and turning.

(B) Turn the power switch to ON and adjust the power-stat to desired temperature. Allow temperature to stabilize.

(C) Turn the switch to ON in the condenser unit and adjust the thermoregulator to desired temperature, as per the Method.

(D) Place the secondary flask support under the flask and adjust the plate in accordance with ASTM D86.

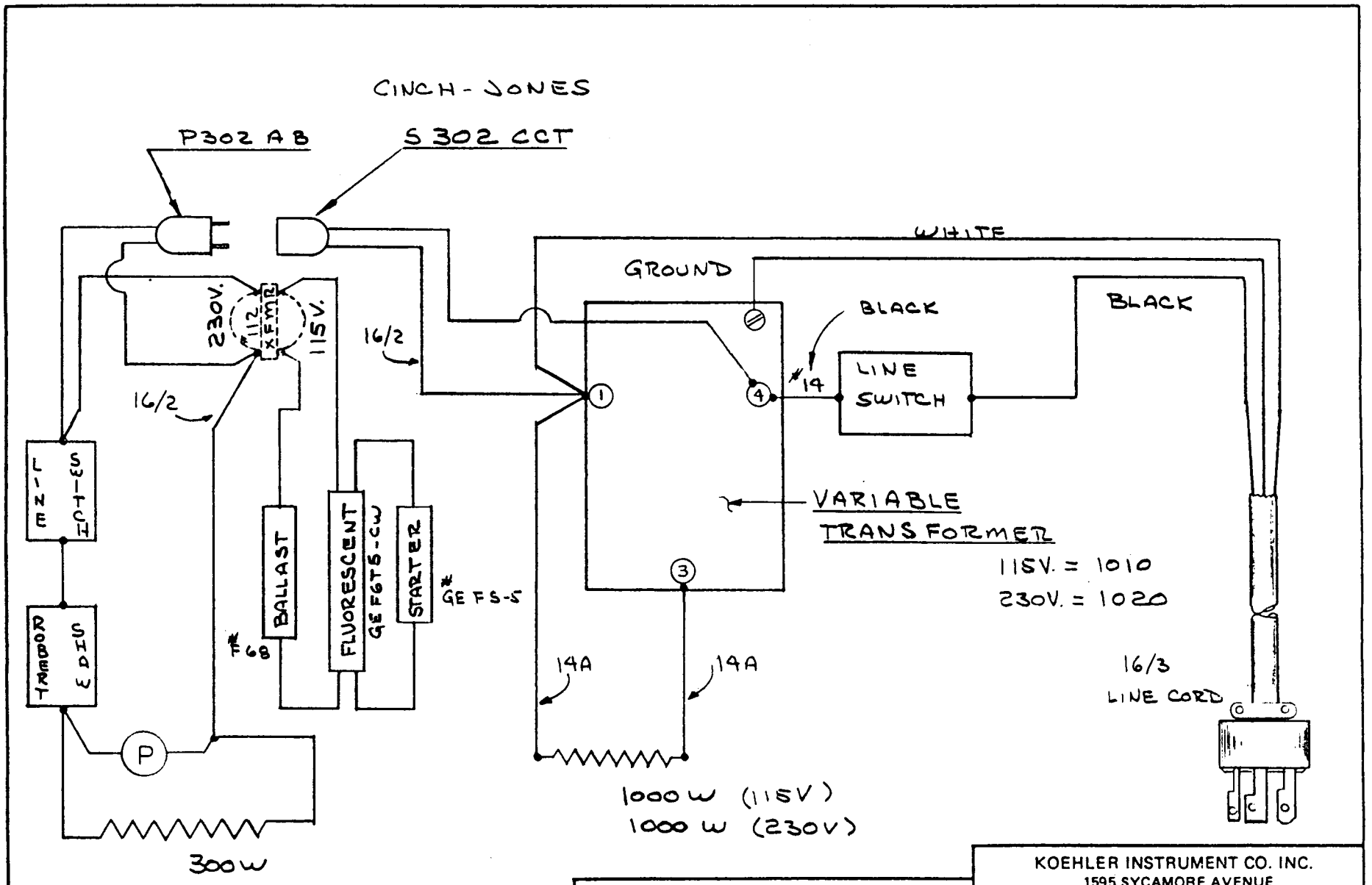
(E) Proceed to test according to the Method.

(4) SERVICE INSTRUCTIONS:

Under normal conditions this unit requires no service. However, any service problems can often be resolved inexpensively by phone or letter.

For further information please contact our office at:

KOEHLER INSTRUMENT COMPANY, INC.
1595 SYCAMORE AVENUE
BOHEMIA, NEW YORK 11716
TELEPHONE: (516) 589-3800
TELEX: 4973677 KOEHLER



INSTRUMENT: K452/K453	NO. REQD. 1	TITLE: GAS, OIL DISTILLATION APPAR. W/ ILLUMINATION	KOEHLER INSTRUMENT CO. INC. 1595 SYCAMORE AVENUE BOHEMIA, N.Y.
MAT. —/— FINISH —/—	DWG. SIZE A	SCALE —/— SHEET 1 OF 1	PART NO. WIRING DIAGRAM REV.

KOEHLER

K45200 & K45290 & K45300 & K45390

SPARE PARTS LIST

PART NO.	DESCRIPTION	QUANTITY
K450-0-3B	WINDOW	1 EACH
K450-0-14	HEATER TRANSITE	1 EACH
K450-0-15	PLATFORM TRANSITE	1 EACH
K450-0-19	BLOTTING PAPER HOLDER	1 EACH
K450-0-20	WOOD GRADUATED CYLINDER SUPPORT	1 EACH
K454-0-1	FLASK SUPPORT BOARD 1 1/4	1 EACH
K454-0-3	FLASK SUPPORT BOARD 2	1 EACH
K450-0-29	COVER GASKET	1 SET
K450-0-30A	HOUSING RACK & PINION ASSY	1 EACH
225-115-002	HEATER, 1000W., 115V.	1 EACH
225-230-002	HEATER, 1000W., 230V.	1 EACH
280-115-002	POWERSTAT, 115V.	1 EACH
280-230-001	POWERSTAT, 230V.	1 EACH
050-001-001	TOGGLE SWITCH	2 EACH
K452-0-3	HEATER, 115V.	1 EACH
K452-0-3	HEATER, 230V.	1 EACH
255-200-001	THERMOREGULATOR	1 EACH
045-115-001	PILOT LIGHT, 115V.	1 EACH
045-230-001	PILOT LIGHT, 230V.	1 EACH
065-002-002	2-PRONG CONNECTOR	1 EACH
060-002-001	SOCKET	1 EACH

Tel. (516) 589-3800

Kochler Instrument Company, Inc.

Manufacturers of

Scientific and Laboratory Instruments

1595 SYCAMORE AVENUE

BOHEMIA, L.I., NEW YORK 11716

WARRANTY POLICY

Any product* manufactured by Koehler Instrument Co., Inc. (hereinafter referred to as the company) is sold on the following basis and none other. ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND OF FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY EXPRESSLY EXCLUDED.

The following warranty shall apply, and no other warranty, express or implied, shall apply:

If within one year from date of shipment the product fails because of defective material or poor workmanship, the company will repair or replace, without charge, any product that has failed provided:

a) the product has been properly installed, operated and maintained.

b) the company is advised in writing of the malfunction and authorizes the return of the product to the factory.

c) All transportation charges for the return to the factory are prepaid. (Products will be returned freight collect.)

d) A complete description of the reason for return must accompany the unit.

NOTE: A nominal handling charge for inspection will be made on units for which a claimed defect cannot be confirmed.

THE COMPANY'S SOLE LIABILITY HEREUNDER SHALL BE TO REPAIR OR REPLACE ANY PRODUCT WHICH HAS NOT COMPLIED WITH THIS WARRANTY.

In no event shall the company be liable for:

1) Prospective profits or special, indirect or consequential damages caused by failure of its product.

2) Any charges for labor or materials for work done on its products by others.

*Wherever used in this Warranty Policy the term "product" shall mean any items manufactured and/or sold by Koehler Instrument Co., Inc.

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
Koeh!er 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 10-6630-234-13&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
Sartorious 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–5030II Calculator . . . . . TM 10-7420-210-13&P

A-5. **Pamphlets.**

The Army Maintenance Management System (TAMMS) . . . . . DA Pam 738-750

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,**[1] including fault **location/troubleshooting,**[2] removal/installation, and disassembly/assembly **procedures;**[3] and maintenance **actions;**[4] 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 - ncompasses 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) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			UNIT		DS	GS	DEPOT		
				O	F	H	D		
01	DISTILLATION APPARATUS (KOEHLER MODEL)	INSPECT REPLACE REPAIR	0.1	 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 Koehler Distillation Apparatus 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 informational 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 Koehler Distillation Apparatus in operation, to operate it, and to perform emergency repairs. Although shipped separately packaged, Bll 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 Bll, 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) ILLUS	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION CAGEC AND PART NUMBER ON CODE	(4) USABLE U/M	(5) QTY
		CYLINDER, GRADUATED, LABORATORY: BOROSILICATE GLASS HEX BASE; W/POURING SPOUT		
	6640-00-912-8656	5 ML; GRADUATED AT 0.1 ML INTERVALS, EVERY TENTH GRADUATION NUMBERED; (80/40) NO. 28-476-5	EA	3
	6640-00-883-8516	100 ML; FOR ASTM TEST D-86 (80/40) 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° ANGLE; CORK MOUTH; 125 ML FOR ASTM TEST D-86; MS36058-3; NNN-F-240, TYPE III, CLASS I, 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

Section I. INTRODUCTION

E-1. **Scope.** This listing is for informational purposes only and is not authority to requisition the listed items. These items are authorized to you by CTA 50-970, Expendable/Durable Items (except medical, class V, repair parts, and heraldic items).

E-2. **Explanation of Columns.**

a. *Column (1) - Item Number.* This number is assigned to the entry in the listing and is referenced in the narrative instructions to identify the material (e.g., Use cleaning compound, item 5, appendix C).

b. *Column (2) - Level.* This column identifies the lowest level of maintenance that requires the listed item.

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

c. *Column (3) - National Stock Number.* This is the National stock number assigned to the item; use it to request or requisition the item.

d. *Column (4) - Description.* Indicates the Federal item name, and, if required, a description to identify the item. The last line for each item indicates the Commercial and Government Entity Code (CAGEC) in parentheses followed by the part number.

e. *Column (5) - Unit of Measure (U/M).* Indicates the measure used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., EA, IN, PR). If the unit of measure differs from the unit of issue, requisition the lowest unit of issue that will satisfy your requirements.

Section II. EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST

(1) Item Number	(2) Level	(3) National Stock Number	(4) Description	(5) U/M
	C		LAMP, FLUORESCENT MIL-F-16377	EA

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

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RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS

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DATE SENT

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE
TM 10-6630-233-13&P	28 Sep 1990	Koehler Distillation Apparatus

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 Cylenders. The engine on my set only has 4 Cylenders. Change the manual to show 4 Cylenders.

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 2910-00-762-3001. 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
JOHN DOE

DA FORM 1 JUL 79 2028-2

PREVIOUS EDITIONS ARE OBSOLETE.

DRSTS-M Overprint 1, 1 Nov 80

P.S.--IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR RECOMMENDATION MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS.

TEAR ALONG PERFORATED LINE

REVERSE OF DA FORM 2028-2
REVERSE OF DRSTS-M OVERPRINT 2,
1 NOV 80

TEAR ALONG PERFORATED LINE

FILL IN YOUR UNIT'S ADDRESS

FOLD BACK

DEPARTMENT OF THE ARMY

OFFICIAL BUSINESS

COMMANDER
U.S. ARMY TROOP SUPPORT COMMAND
ATTN: AMSTR-MCTS
4300 GOODFELLOW BOULEVARD
ST. LOUIS, MO 63120-1798

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RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS

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FROM: (PRINT YOUR UNIT'S COMPLETE ADDRESS)

DATE SENT

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE
TM 10-6630-233-13&P	28 Sep 1990	Koehler Distillation Apparatus

BE EXACT. . .PIN-POINT WHERE IT IS

PAGE NO	PARAGRAPH	FIGURE NO	TABLE NO

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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 decigram = .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