# TECHNICAL MANUAL

# OPERATOR'S, UNIT AND

# DIRECT SUPPORT MAINTENANCE MANUAL

# (INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST)

# FOR

# KOEHLER FOAMING CHARACTERISTICS DETERMINATION APPARATUS

# MODEL K43000

**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.**

H E A D Q U A R T E R S , D E P A R T M E N T O F T H E A R M Y
2 8 S E P T E M B E R 1 9 9 0

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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.

# K43000 & K43090

# FOAM TEST APPARATUS

# ASTM D892

# FOAMING CHARACTERISTICS

# OF

# LUBRICATING OILS

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

*Quality Test Equipment for Petroleum Products*

**KOEHLER**

**K43000 & K43090**

**FOAM TEST APPARATUS**

**ASTM D892**

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NOTE: The K43090 Foam Test Apparatus is the same as the K43000, except the voltage is 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.

Koehler
INSTRUMENT COMPANY, INC.

**PLEASE NOTE**

Due to the difficulty in obtaining Certified Norton Diffuser Stones we are currently supplying as an alternate the Mott 5 Micron Stainless Steel Diffuser. This improved Diffuser is currently under evaluation by ASTM and has produced consistent comparative results to the Norton Diffuser Stone. It is expected to be incorporated into the method as an alternate in the near future. Please call or write if you have a problem using this Diffuser.

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## SECTION A

(1) UNPACKING INSTRUCTIONS: (See Shipping Diagram)

The K430 Bath comes packed in one carton. Remove the bath top, 1000ML jar and the air delivery tube assembly and place in a safe location. Remove the inner boxes next and unpack the pyrex jar. Inside the jar are the flow gauge, shelf and lead collar, packed separately. Remove the base from the carton and take away the packing from around the components and carefully proceed to assemble the instrument.

(2) ASSEMBLY INSTRUCTIONS:

NOTE: The Foam Test Bath should be assembled and placed on a firm level table in a room free of excessive drafts.

(A) Place the base on a firm level table, and install' the pyrex jar with the shelf installed.

(B) Fill the jar with clean water or clear oil to the level prescribed in ASTM D892. Capacity 8.8 Gals.

(C) Place the bath top assembly on the jar and plug the control cable into the receptacle on the top of the control unit.

(D) Install the thermistor probe in the top with cork provided.

(E) Plug the control unit line cord into a properly fused and grounded receptacle of the correct voltage as marked on the rear plate of the control unit.

(F) Install the flow gauge assembly and connect the air supply to the flow gauge, as shown in assembly drawing.

(G) Connect the cooling coils to a cold water line for use when running low temperature tests.

(3) OPERATING INSTRUCTIONS:

(A) Bath is now ready for operation. Make sure all switches are OFF.

(B) Turn all switches to ON, and adjust the Ten-Turn Potentiometer clockwise all the way.

(C) When the bath is about 100 below the desired temperature, turn the continuous heater OFF and adjust the Ten-Turn Potentiometer until the pilot light blinks ON and OFF.

(D) Allow the bath temperature to stabilize. Adjust the Ten-Turn Potentiometer to bring bath temperature to exact set point.

(E) Clean the 1000ML Graduated Cylinder as per instructions in ASTM D892 and pour the test sample into the cylinder to the recommended level as per ASTM D892.

(F) Clean and flush the air delivery tube assembly (diffusion stone) as per ASTM D892.

(G) Place the 1000ML Cylinder with the lead collar on the shelf in the bath, and proceed with the test as per ASTM D892.

(H) Read and record the test results in accordance with the ASTM Method.

(4) SERVICE INSTRUCTIONS:

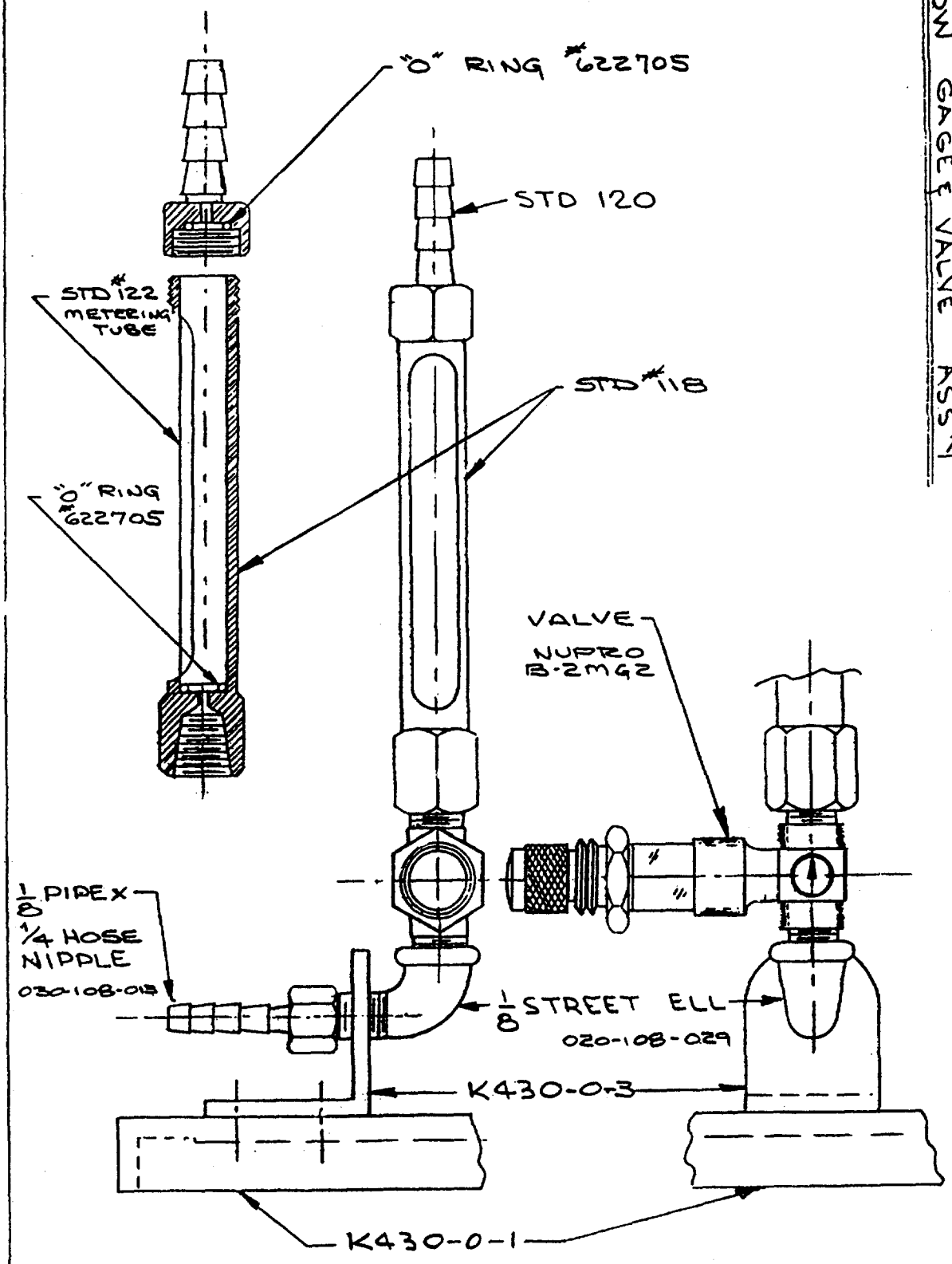
Under normal conditions service is not required. However, any service problems can often be resolved quickly and inexpensively by phone or letter. Please contact our office at:

KOEHLER INSTRUMENT
COMPANY, INC.
1595 SYCAMORE AVENUE
BOHEMIA, NEW YORK 11716

TELEPHONE: (516) 589-3800

TELEX: 4973677 KOEHLER

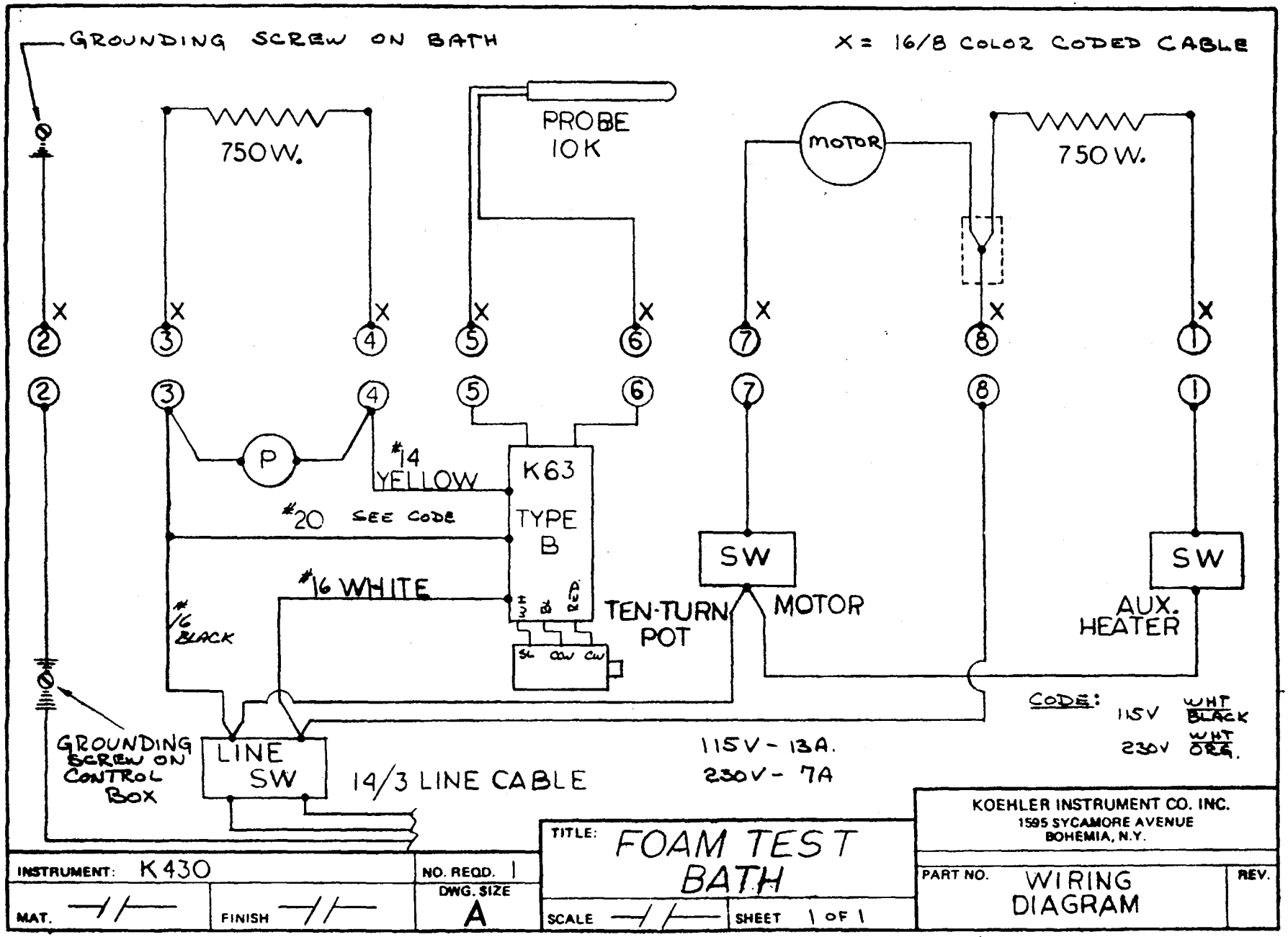
FOAM TEST BATH K430
FLOW GAGE & VALVE ASS'Y



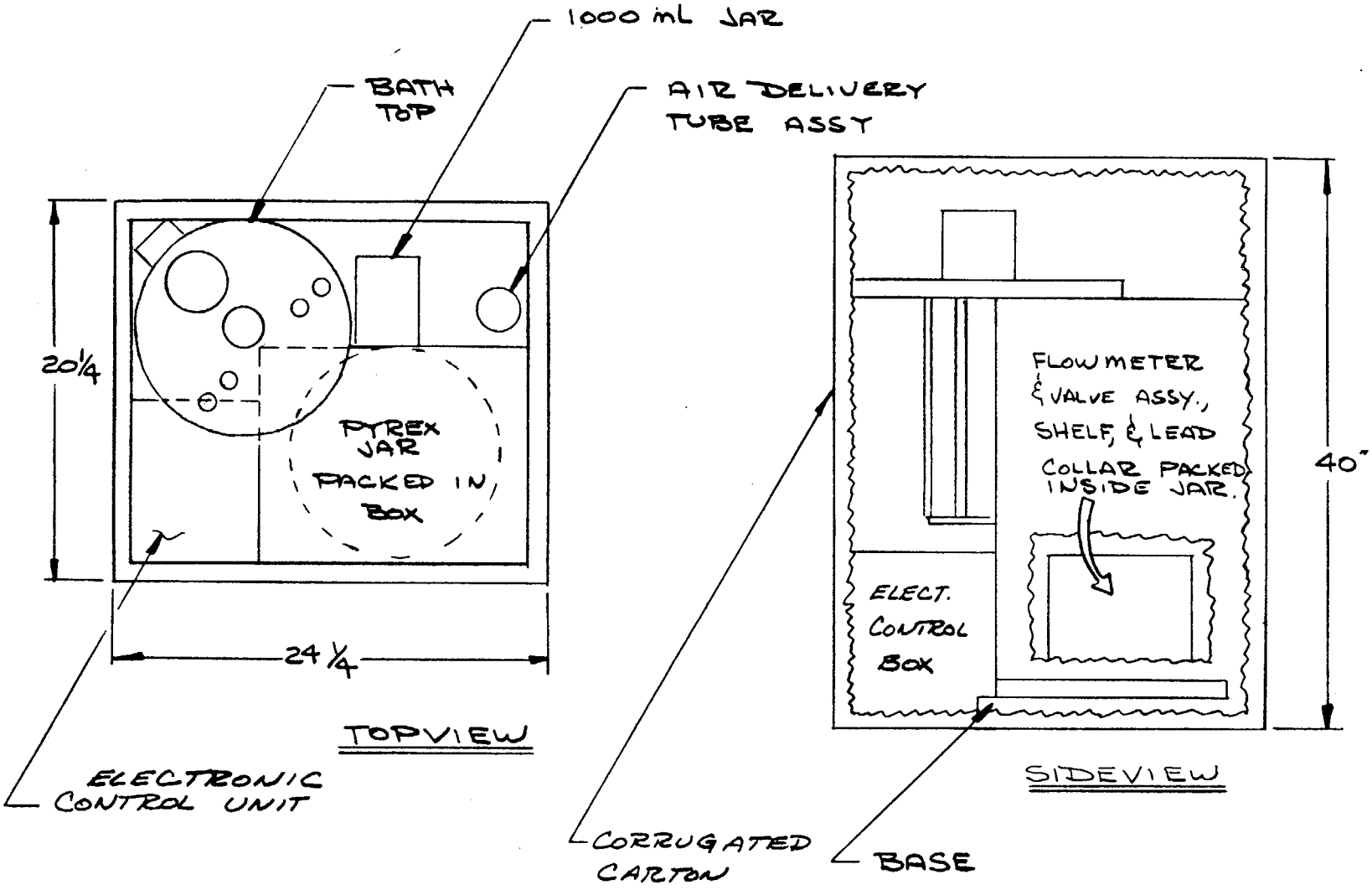

K-430-2
FULL SCALE

7-30-85

EFFECTIVE FROM JUNE 16, 77 TO DATE




| | | | |
|---|---|---|---|
| INSTRUMENT: K430 | NO. REQD. 1 | TITLE: FOAM TEST BATH | 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. |




| | | | |
|---|---|---|---|
| INSTRUMENT: K430 FOAM TEST | NO. REQD. 1 | TITLE: SHIPPING ARRANGEMENT | KOEHLER INSTRUMENT CO. INC. 1595 SYCAMORE AVENUE BOHEMIA, N.Y. |
| MAT. —//— FINISH —//— | DWG. SIZE A | SCALE NONE SHEET 1 OF 1 | PART NO. K430 REV. |

K43000 & K43090

FOAM TEST APPARATUS

| Part No. | Description | Quantity |
|---|---|---|
| K233-0-5 | Base | 1 each |
| 332-001-003 | Pyrex Jar | 1 each |
| K430-0-12 | 1000ML Pyrex Cylinder | 1 each |
| K430-0-8 | Rubber Stopper | 1 each |
| K430-3C | Air Delivery Tube W/Certified Ball | 1 each |
| K430-3B | Air Delivery Tube W/Mott Diffuser | 1 each |
| 010-115-002 | Type B Controller with 10K | 1 each |
| 010-103-001 | Probe, 12" long | |
| 045-115-001 | Pilot Light, Neon 115V. | 1 each |
| 045-230-001 | Pilot Light, Neon 230V. | 1 each |
| 288-115-004 | Motor, 115V. 230V. | 1 each |
| 010-010-001 | 10 Turn Dial | 1 each |
| 010-010-002 | 10 Turn Pot | 1 each |
| 050-001-001 | Toggle Switches | 2 each |
| 050-002-004 | Line Switch | 1 each |
| K430-2 | Flow Gauge and Valve | 1 each |
| 170-000-001 | Metering Tube only | 1 each |
| 344-100-01C | Certified Porous Ball Only | 1 each |
| 344-005-001 | Mott Diffuser | 1 each |
| K430-0-2A | Control Heater (115V) | 1 each |
| K430-0-2B | Continuous Heater (115V) 1 each | |
| K430A-0-2A | Control Heater (230V) | 1 each |
| K430A-0-2B | Continuous Heater (230V) 1 each | |
| K430-0-13 | Air Outlet Elbow | 1 each |

Koehler
INSTRUMENT COMPANY, INC.

# 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.

1595 SYCAMORE AVE.
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FAX (516) 589-3815

*Quality Test Equipment for Petroleum Products*

PRODUCT: Foaming Characteristics of Lubricating Oils

Foaming Characteristics Determination Apparatus

- Conforms to ASTM D892, FTM 791-3211, 3213* and related specifications

- Calibrated and certified air diffuser stone

- Sensitive solid state temperature controller with thermistor sensor probe

- Highly accurate direct reading flowmeter

Fully equipped constant temperature bath tests foaming characteristics of lubricating oils to determine their suitability for high speed gearing, splash lubrication, high volume pumping and other applications. Aerates sample through diffuser stone at 94 + 5 ml/min. and maintains sample temperature at 24.5 $\pm$ 93.5 + 0.5°C (75 and 200 $\pm$ 1°F) for three-sequence testing.

Features precise solid state temperature control with thermistor sensor probe for convenient reliable operation. A silent 1/20 hp ball bearing stirrer provides complete circulation to assure temperature uniformity.

Chrome plated cooling coil with serrated hose connections allows for accurate control at 24.5°C (75°F). Bath components are mounted in a sturdy machined 1/2" (1.27 cm) composition top plate, which rests on A 12 x 18" (30.5 x 46 cm) Pyrex jar.

Certified diffuser stone meets ASTM specifications, eliminating the need for calibration by the operator. A sensitive direct reading 0-200 ml/min. flowmeter and needle valve assembly controls air flow to the air diffuser at the specified rate.

## SPECIFICATIONS

Conforms to the specifications of:

ASTM D892, FTM 791-3211,
3213*, IP 146, DIN 51566

Temperature Range: Ambient to 275°F
(134°C)
Controller Sensitivity: ± 1°F
(± 0.5°C)

Heater Range: 0-1500W
Bath Capacity/Medium: 9 gal (38.5 1)
water or white
technical oil

## DIMENSIONS

Bath Interior: 12" dia x 18" h
(30 x 46 cm)
Overall:
Bath: 14 5/8" dia x 28" h
(37 x 71 cm)
Control Housing: 9 1 x 8 w x 6 ½" h
(23 x 20 x 17 cm)

## SHIPPING INFORMATION

Net Weight: 57 lbs (25.8 kg)
Shipping Weight: 100 lbs (45.4 kg)
Dimensions: 28 x 24 x 43"
(71 x 61 x 109 cm)

## ORDERING INFORMATION

Includes Pyrex TM1000 ml graduated sample cylinder with lead ring and stainless steel support tripod, cast aluminum bath support, control cabinet with multiconductor connector cable and diffuser stone with calibration certificate. Order thermometer separately.

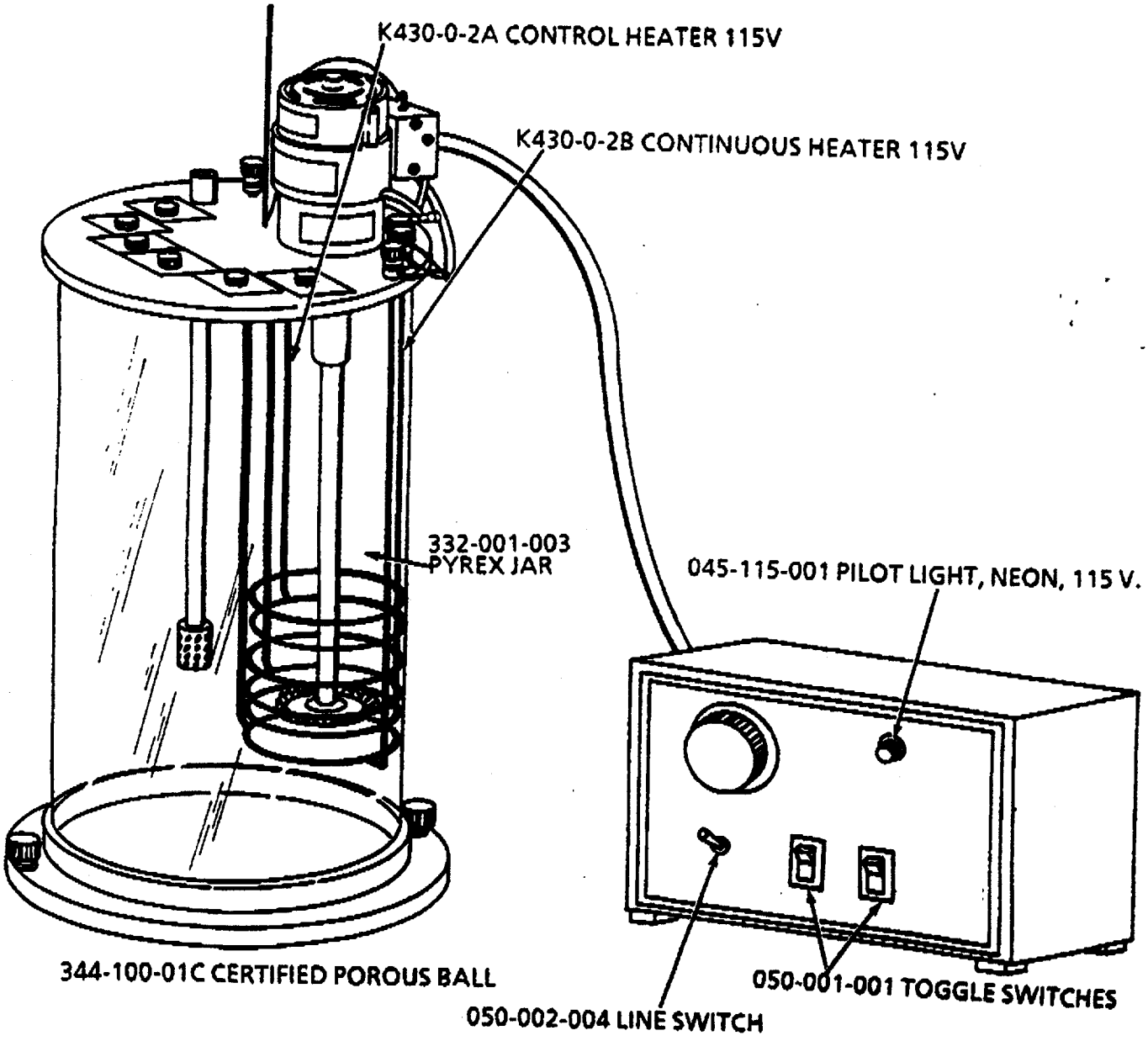
| Catalog No. | Description |
|---|---|
| K43000 | Foaming Characteristics Test Apparatus 115V 50/60 Hz |
| K43090 | Foaming Characteristics Test Apparatus 220-240V 50/60 Hz |

*For FTM 791-3213 operation (Foaming Characteristics of Aircraft Turbine Lubricating Oils), flowrator to deliver 1000 cc air/min. and 500 ml sample cylinder are supplied in place of standard equipment. 'Specify when ordering.

### Accessories and Replacements

| | |
|---|---|
| K43010 | Certified Diffuser Stone Calibrated and certified for compliance with ASTM specifications K43020 Diffuser Stone Non-calibrated |
| K43030 | Stainless Steel Diffuser |
| K43025 | Diffuser Stone Apparatus For maximum pore diameter and permeability tests on non-calibrated diffuser stones. Consists of 90 cm flowmeter, 500 ml flask, and control valve. Mounted on a steel base. |
| 355-001-001 | White Technical Oil |
| 250-000-12F | ASTM 12F Thermometer Range: -5 to 215°F Graduations: 0.5°C |
| 250-000-12C | ASTM 12C Thermometer Range: -20 to 102°C Graduations: 0.2°C |

K430-0-12 1000 ML PYREX CYLINDER
K430-0-8 RUBBER STOPPER




KOEHLER K43000 FOAM TEST APPARATUS

## 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 10-6630-234-13&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-503011 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 equipment 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, including fault location/troubleshooting,2 removal/installation, and disassembly/assembly procedures3 and maintenance actions4 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*. O*verhaul*. 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 I. 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) | (2) | (3) | (4) MAINTENANCE LEVEL | | | | | (5) | (6) |
|---|---|---|---|---|---|---|---|---|---|
| | | | UNIT | | DS | GS | DEPOT | | |
| GROUP NUMBER | COMPONENT/ ASSEMBLY | MAINTENANCE FUNCTION | C | O | F | H | D | TOOLS AND EQUIPMENT | REMARKS |
| 01 | APPARATUS, FOAMING CHARACTERISTICS DETERMINATION | INSPECT<br>REPLACE<br>REPAIR | 0.2 | 0.3 | 1.0 | | | | 1 |

## Section III. TOOL AND TEST EQUIPMENT REQUIREMENTS

## FOR

## MAINTENANCE ALLOCATION CHART

| (1) TOOL/TEST EQUIP. REF CODE | (2) MAINTENANCE CATEGORY | (3) NOMENCLATURE | (4) NSN NUMBER | (5) TOOL |
|---|---|---|---|---|
| 1 | 0 | TOOL SET, GENERAL AUTOMOTIVE | 5180-00-177-7033 | (50980) SC 5180-90-CL-N26 |

## 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 Foaming Characteristics Determination 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 Foaming Characteristics Determination Apparatus 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) ILLUS NUMBER | (2) NATIONAL STOCK NUMBER | (3) DESCRIPTION CAGEC AND PART NUMBER | USABLE ON CODE | (4) U/M | (5) QTY |
|---|---|---|---|---|---|
| | | THERMOMETER RANGE: -5 TO 215°F<br>W/ GRADUATIONS: 0.5°F ASTM 12F<br>(23035) 250-000-12 F | | EA | 1 |
| | | THERMOMETER RANGE: -20 TO 102°C<br>W/ GRADUATIONS: 0.2°C ASTM 12C<br>(23035) 250-000-12 C | | EA | 1 |

## 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 | | TECHNICAL OIL, WHITE (23035)355-001-001 | CN |

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

***U.S. GOVERNMENT PRINTING OFFICE: 1990 554-123/20058**

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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 decagram = 10 grams = .35 ounce
acres
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 milliters = .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

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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