

**TECHNICAL MANUAL**

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

**PRECISION REID VAPOR  
PRESSURE BATH**

**MODEL TS-74893-AP-6**

**NSN 6640-00-359-9629**

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

**Approved for public release; distribution is unlimited.**

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**HEADQUARTERS, DEPARTMENT OF THE ARMY**

**28 SEPTEMBER 1990**



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#### SUPPLEMENTARY INTRODUCTORY MATERIAL

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

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

##### 1-2. Reporting Errors and Recommending Improvements.

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letters, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual, directly to: Commander, U.S. Army Troop Support Command, ATTN: AMSTR-MCTS, 4300 Goodfellow Blvd., St. Louis, MO 63120-1798. A reply will be furnished to you.

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

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

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

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

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

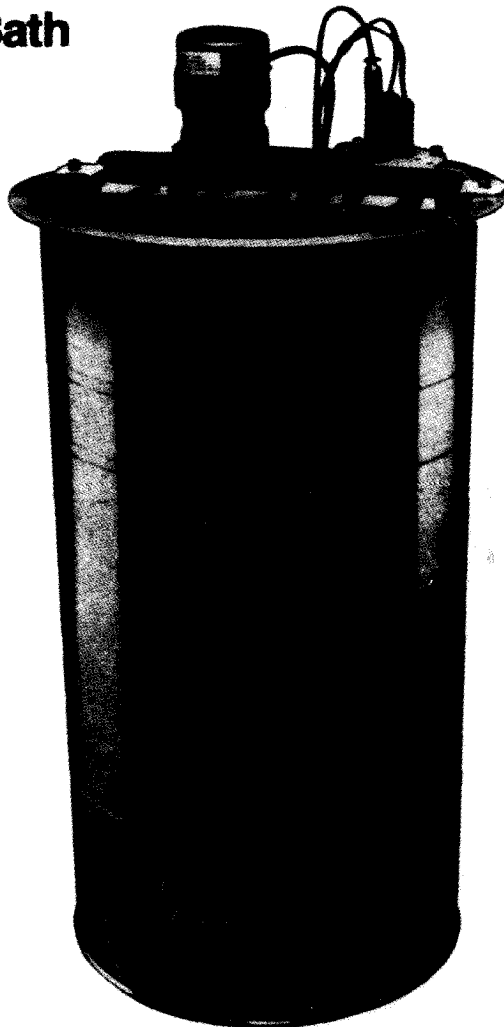
c. Storage site selection. Inside storage is preferred for items selected for administrative storage. If inside storage is not available, trucks, vans, conex containers and other containers may be used.



# Precision™

## Instruction Manual TS-74893-AP-6

**Reid Vapor Pressure Bath  
Catalog 74893, 74884**







GCA CORPORATION  
Precision Scientific Group

3737 West Cortland Street  
Chicago, Illinois 60647  
Telephone 312-227-2660  
Telex 25 4028

# Precision™ Instruction Manual

TS-74893 AP -6

## Reid Vapor Pressure Bath Catalog 74893, 74884

### Introduction

Your satisfaction and safety are important to GCA/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: Always wear safety glasses when working with this apparatus, as a routine laboratory precaution.**

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 GCA/PRECISION SCIENTIFIC, please supply the nameplate data, including catalog number and serial number.



**General information**

These instructions encompass the Reid Vapor Pressure Baths listed below with their specific electrical characteristics:

Cat. No.	Volts	Hertz	Watts	Amps
74893	120	50/60	550	5
74884	220	50/60	550	2.5

The Reid Vapor Pressure Bath is designed to conform with ASTM D-323 and D-1267.

ASTM D-323 covers the determination of the absolute vapor pressure of volatile crude oil and volatile non-viscous petroleum products, except liquified petroleum gases.

ASTM D-1267 covers the determination of the gage vapor pressures of liquified petroleum products under test temperature conditions at 37.8°C (100°F) and is pertinent to problems of selecting properly designed storage vessels, shipping containers, and customer utilization of equipment to ensure the safe handling of such products.

ASTM methods can be obtained from:

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

The bath has a capacity for three Reid Vapor Pressure bombs (see "Accessories") and can be recess mounted in a table top or operated free-standing.

**Technical specifications**

<b>Rated Temperature</b>	<b>100°(37.8°C) Fixed</b>
<b>Time to 100°F</b>	<b>3 hrs. 10 min.</b>
<b>Uniformity</b>	<b>±0.1°F (±0.05°C)</b>
<b>Recovery Time with Load</b>	<b>2 min. (3 bombs)</b>
<b>Bath Capacity</b>	<b>18 gal. (68.1 liters)</b>
<b>Exterior Dimen.</b>	<b>18-1/4"(463.6 mm) dia. 33" (838.2 mm) H</b>
<b>Interior Dimen.</b>	<b>17" (431.8 mm) dia. 22-1/2"(571.5 mm) H</b>
<b>Rim Dimension</b>	<b>19-1/2"(495.3 mm) dia.</b>
<b>Clearance Height</b>	<b>40-1/2"(1028.7 mm)</b>

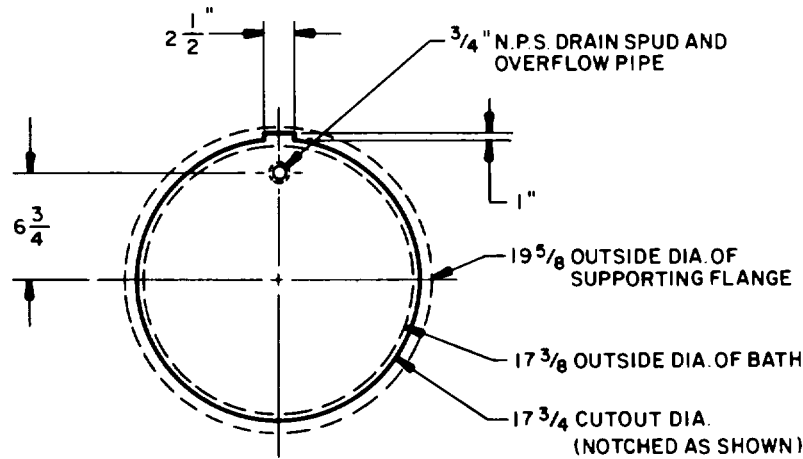
**Installation**

Location: The most uniform operating conditions and results will be obtained by placing the bath in an area remote from drafts, ventilating outlets, radiators, and other rapidly changing ambient conditions. The bath should be located near a drain sewer so that drain connections from the bath can be conveniently installed.

Drain Connections: A drain spud with 3/4" N.P.S. threads is provided on the bottom of the bath, and drain pipe connections should be completed to the sewer before filling the bath. If the bath is to be operated in the free-standing position rather than recess mounted, elevate it sufficiently for the piping to pass underneath, if necessary.



**DIMENSIONAL DRAWING FOR RECESS MOUNTING  
OF REID VAPOR PRESSURE MONITOR**



**TOP VIEW**

WEIGHT OF BATH COMPLETE WITH WATER AND BOMBS _____	300 LBS.
BATH EXTENSION BENEATH FLANGE _____	33 IN.
RECOMMENDED TABLE HEIGHT _____	37 IN.

**INSTALLATION (Contd.)**

Fill the bath with distilled water up to the top of the overflow pipe which is assembled internally to the drain spud. The overflow pipe is factory set to maintain a water level of at least 1 inch above the immersed bombs, as specified by ASTM. The bath can be drained by removing the overflow pipe—turn counterclockwise with a pipe wrench.

To remove algae and to clean the bath, a detergent solution is recommended. Should algae or any other undesirable microorganisms form on top of the bath media, add a little formaldehyde or zephiran chloride to alleviate this problem.

**WARNING:** Exercise care when handling the above chemicals and follow the procedures shown on the container label as supplied by the chemical supplier/manufacturer.

Install the thermoregulator into the opening provided in the heater thermoregulator support bracket located on top of the bath. Connect the cord and socket to the plug on top of the thermoregulator.

Electrical Connections: Important  
(Please Read Carefully.)

**CAUTION:** DO NOT connect bath to power supply unless bath is filled with water and all switches are 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



INSTALLATION (Contd.)

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.

**Operation**

After the bath has been filled with water and the thermoregulator has been installed, place the line switch and motor switch in the "On\*" position.

When the pilot "glows,\*" the heater is "On" and will continue to glow until the bath reaches 100°F. The thermoregulator will control the temperature at 100°F and the pilot light will cycle "On-Off," indicating that the bath temperature has stabilized.

**NOTE:** Refer to ASTM D-323 for test procedures.

**Servicing**

**WARNING:** Hazardous high voltage conditions exist inside the control compartment. Disconnect all electrical power to the unit before removing the control panel. Only qualified electrical instrument personnel are authorized to perform troubleshooting and/or servicing.

**LUBRICATION:** Oil the motor approximately every four months with #20 SAE oil.

**Troubleshooting**

**Problem:** No heat.

1. Check the branch circuit (line) fuse and be certain the line cord is inserted into proper electrical receptacles. Check for loose electrical connections.
2. Check line switch for continuity.
3. Check the thermoregulator for separations in the mercury column or gas bubbles in the bulb. If present, immerse the thermoregulator bulb into a constant temperature bath set at 85°C (185°F) to join the mercury or to remove gas bubbles. Remove the thermoregulator and allow to cool.
4. Check Thermoregulator for dirty or worn contacts. Clean contacts with 600 grit silicon carbide abrasive paper or, if contacts are worn, replace thermoregulator.



TROUBLESHOOTING (Contd.)

5. Check for continuity between the thermoregulator bayonet cap terminals and terminals 5 and 6 on the terminal block (see wiring diagram).

6. Check relay for proper operation. With the line switch "On," connect a voltmeter across terminals 2 and 4, and an insulated jumper wire between terminals 5 and 6; voltmeter should read 0 volts.

7. Check heater continuity or resistance.

<u>Cat. No.</u>	<u>Voltage</u>	<u>Wattage</u>	<u>Resistance (Ohms)</u>
74893	120	500	27
74884	220	500	97

**WARNING: Disconnect apparatus from its electric power source before proceeding.**

A terminal cap, canopy, and wire leads are assembled to the top of the heaters. Remove the terminal cap from the canopy by turning counterclockwise to gain access to the wire connections. Disconnect wire leads from the heater before measuring resistance.

REMOVE 4 SCREWS THAT FASTEN THE CONTROL PANEL, LOCATED ON THE LOWER FRONT OF THE BATH, TO GAIN ACCESS TO THE ELECTRONIC CONTROL CHASSIS.

8. Check transformer voltages (see wiring diagrams).

Problem: Heat, but no temperature control.

1. See Steps 3, 4, 5, and 6 in previous paragraph (No heat).

2. Check stirring motor for proper operation.

Problem: No stirring.

1. Check motor switch for continuity.

2. Remove motor leads from adjacent connections and energize separately.

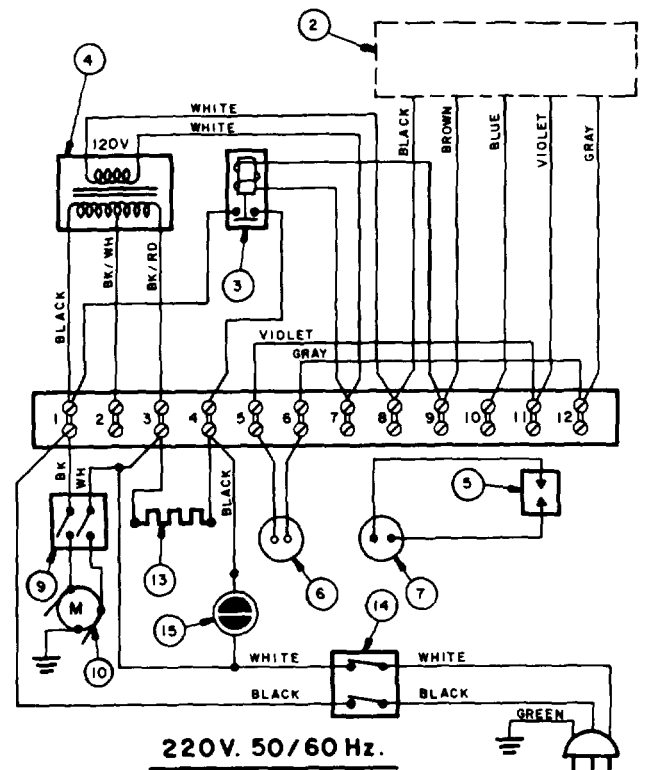
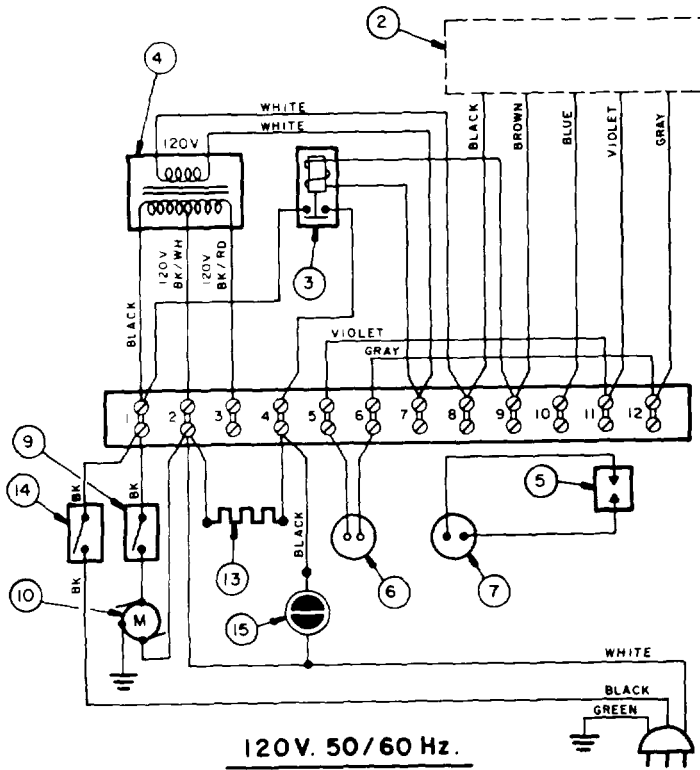
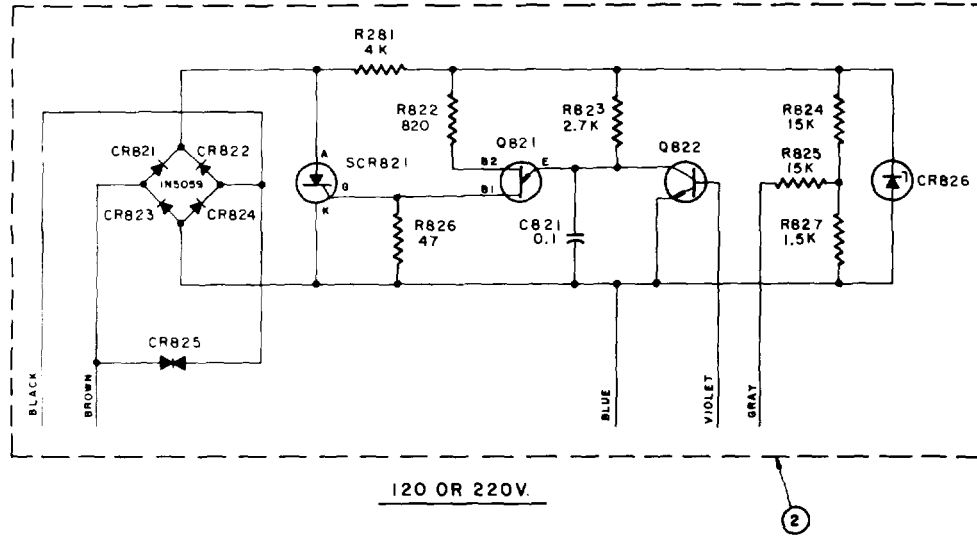


CATALOG NUMBER		74893 (120V)	74884 (220V)
ITEM	DESCRIPTION	PART NO.	
1	Electronic Relay Control	536423	
2	Printed Circuit Board	535348	
3	Relay, Mercury	248162	
4	Transformer, 120/240 V., 50/60 Hz.	225181	
5	Thermoregulator, 100°F ± 0.2°F	522235	
6	Socket	236024	
7	Plug	228010	
8	Stirrer Assembly	65741	540023
9	Switch	240005	240330
10	Motor, 1/30 H.P.	223536	223537
11	Shaft Assembly	502539	
12	Bracket, Motor Mounting	532889	
13	Heater, 500 W	511908	540022
14	Switch, Line	240119	240311
15	Pilot Light	234026	
16	Terminal Cap, Heater	540122	
17	Terminal Canopy, Heater	540123	
18	Bracket, Heater and Regulator	505776	
19	Thermometer Well	533804	
20	Thermometer Coupling	501357	
21	Rack, 3 Bomb Capacity	511919	

**Accessories**

Description	Cat. No.
Reid Vapor Pressure Bomb, Immersion Model	74877
Reid Vapor Pressure Bomb, Pressure Model	74878
Bleeder Valve and Adapter Assembly - converts 74878 Bomb for testing LPG	74879
0-5 lbs Gauge, 0.1 divisions	74885
0-15 lbs Gauge, 0.1 divisions	74886
0-30 lbs Gauge, 0.2 divisions	74887
0-45 lbs Gauge, 0.2 divisions	74888
0-60 lbs Gauge, 0.25 divisions	74889
0-100 lbs Gauge, 0.5 divisions	74890
0-250 lbs Gauge, 1.0 divisions	74891

WIRING DIAGRAM FOR REID VAPOR PRESSURE BATHS







## Exclusive PRECISION® Warranty

GCA/Precision Scientific Group (Precision) 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.

Precision's sole obligation shall be to repair or replace at Precision's option, F.O.B. its plant or locally, without charge, any part(s) that prove defective within the warranty period, provided the customer notifies Precision promptly and in writing of any such defect. Compensation for labor by other than Precision's employees will not be Precision's obligation. Part(s) replacement does not constitute an extension of the original warranty period.

PRECISION 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 will not assume responsibility for unauthorized repairs or failure as a result of unauthorized product modifications, or for repairs,

replacements, or modifications negligently or otherwise improperly made or performed by persons other than Precision employees or authorized representatives.

While Precision's 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's formal sales contracts shall be controlling; and any changes must be in writing and signed by an authorized executive of the GCA/Precision Scientific Group.

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

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





**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 Fiiter 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

**TM 10-6640-226-13&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 TI-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 .....	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, 'including fault location/troubleshooting,<sup>2</sup> removal/installation, and disassembly/assembly procedures,<sup>3</sup>and maintenance actions,<sup>4</sup>to identify troubles and restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item, or system.

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

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

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

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

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

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

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

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<sup>1</sup>Services – inspect, test, service, adjust, align, calibrate, and/or replace.

<sup>2</sup>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).

<sup>3</sup>Disassemble/assemble - encompasses the step-by-step taking apart (or breakdown) of a spare/functional group coded item to the level of its least component identified as maintenance significant (i.e., assigned an SMR code) for the category of maintenance under consideration.

<sup>4</sup>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, Tool 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	BATH, REID VAPOR	INSPECT REPLACE REPAIR CALIBRATE	0.1  0.3	0.5 1.0	2.0			1,2,3 1,2,3 1	A A, B C

**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, 0-500 V	6625-00-691-2453	
3	O, F	MANOMETER, 25 INC	6685-00-842-4665	

**Section IV. REMARKS**

REFERENCE CODE	REMARKS
A	Repair is limited to the replacement of those parts listed in the parts listing. Specific parts replacement by the organization include the mercury relay, thermoregulator, heater, line switches, pilot light and stirrer relay.
B	Repair above DS level is to be accomplished by returning instrument to manufacturer.
C	The RVP bath must be verified for accuracy after each test when vapor pressure of motor gasoline is being determined. When determining the vapor pressure of aviation fuels (aviation gasoline and turbine engine fuel), the gage must be verified for accuracy before and after each test by operating personnel. The accuracy of RVP gages is verified by using the manometer. When the gage reading and the manometer reading differ by 1% or less, the gage is considered accurate; i.e., the gage correction factor must not be greater than 0.05 psi for 0 to 5 pound gages or 0.15 psi for 0 to 15 pound gages. If the readings differ by more than 1%, the gage is considered inaccurate and must be replaced.

## 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 Reid Vapor Pressure Bath 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 Reid Vapor Pressure Bath 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	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION CAGEC AND PART NUMBER	USABLE ON CODE	(4) U/M	(5) QTY
	6685-00-194-1699	GAGE (RVP) PETROLEUM TEST: FOR ASTM TEST D-323; (20056) G 19504; (22527) 13-419-30-A; (21519) G 19504		EA	2
	6685-00-194-1683	GAGE (RVP) REPTROLEUM TEST: FOR ASTM TEST D-323; (2519) G 19505; (22527) 13-419-30-15		EA	1
	4820-00-557-0182	KIT, PRESSURE, REGULATOR (53477) NO. 3562-8000		EA	1
	6685-00-842-4565	MANOMETER: WALL MTD: IN.; W/NO. SC 4606 - DUPLEX SCALE PSI MERCURY; CALIBRATED (39739) NO. 30EA15WM		EA	1
	4820-00-957-5639	REGULATOR, (AIR PRESSURE) PETROLEUM TEST: DIAPHRAGM; SPRING TENSION ADJUSTABLE; DELIVERED PRESSURE CONTROLLED TO WITHIN CLOSE LIMITS; DESIGNED FOR INPUT PRESSURE REGULATED 0-20 PSI; INLET AND OULET CONNECTIONS, 1/4 IN. STD PIPE THD; (22527) NO. 1-088		EA	1
	6685-00-179-2534	THERMO REGULATOR (MICRO SET): SEALED GLASS UNIT; TWIN CAPILLARIES IN STEM, SEALED, W/INERT GAS UNDER PRESSURE; BULB, 7/16 IN. DIA TOP, 1 1/8 IN. LG TOP, 23/8 IN.; REGULATING; 50 TO 220@F RANGE; 14 1/2 IN. LG; BULB, 2 1/8 IN. (80740) NO. 81-608-01		EA	1



**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	5330-00-169-0557	GASKET (RVP) PETROLEUM TEST: FOR ASTM TEST D-323; (80740) NO. 69-005	EA
	C	5330-00-292-0570	GASKET (RVP) PETROLEUM TEST: FOR ASTM TEST D-323; (48617) NO.23-2069	EA



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*General, United States Army*  
*Chief of Staff*

Official:

**THOMAS F. SIKORA**  
*Brigadier General, United States Army*  
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BE EXACT. PIN-POINT WHERE IT IS				IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:
PAGE NO	PARA-GRAPH	FIGURE NO	TABLE NO	
<b>6</b>	<b>2-1 a</b>			<i>In line 6 of paragraph 2-1a the manual states the engine has <u>6</u> cylinders. The engine on my set only has <u>4</u> cylinders. Change the manual to show <u>4</u> cylinders.</i>
<b>B1</b>		<b>4-3</b>		<i>Callout 16 on figure 4-3 is pointing at a <u>bolt</u>. In key to figure 4-3, item 16 is called a <u>shim</u>. Please correct one or the other.</i>
<b>125</b>	<b>line 20</b>			<i>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</i>

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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
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