TECHNICAL MANUAL

OPERATOR'S, UNIT AND DIRECT SUPPORT MAINTENANCE MANUAL (INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST) FOR TEEL SELF-PRIMING CENTRIFUGAL PUMP

MODEL 2P373

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

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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.

TEEL INDUSTRIAL SERIES

OPERATING INSTRUCTIONS & PARTS MANUAL

SELF-PRIMING CENTRIFUGAL PUMPS

STAINLESS STEEL MODELS 2P121 THRU 2P128
BRONZE MODELS 2P373 THRU 2P380

FORM 5S2583 01615

DAYTON ELECTRIC MANUFACTURING CO. CHICAGO 60648

1286/458/1M

READ INSTRUCTIONS CAREFULLY BEFORE ATTEMPTING TO INSTALL, OPERATE OR SERVICE TEEL PUMPS. FAILURE TO COMPLY WITH INSTRUCTIONS COULD RESULT IN PERSONAL INJURY AND/OR PROPERTY DAMAGE! RETAIN INSTRUCTIONS FOR FUTURE REFERENCE.

Description

Teel self-priming centrifugal pumps are designed for continuous transfer pumping of chemicals from tanks and sumps, and in chemical process and batch lines, waste water treatment and agricultural pumping applications. Pumps self-prime (after filling pump casing) to 12 feet suction lift and will handle liquids with entrapped gases. Maximum liquid temperature is 250°F for stainless steel units and 180°F for bronze units and maximum viscosity is 100 SSU. See Pump Selection Guide. Pumps have 11/2" NPT suction and discharge ports available in three flow ranges with balanced semi-open impellers which can handle some solids to 3/8" diameter. Pumps use standard NEMA 56C frame, keyed shaft, 3450 RPM, CCW rotation motors. Pumps are available with or without TEFC electric motors installed. Not for use with chemicals and/or solutions that can set up, crystalize and/or solidify depending on temperature, atmospheric conditions, humidity, etc.

316 STAINLESS STEEL UNITS

Stainless steel pumps will handle many nonflammable liquids, acids, alkalis, caustics, trichlorethylene, nonflammable solvents, brines and other fluids compatible with Type 316 stainless steel cast body and impeller and Teflon mechanical seal. Units include Type 316 stainless steel shaft sleeve, hardware and adapter bracket.

BRONZE UNITS

Bronze units handle some acids and organic material or any other liquid compatible with bronze and Viton mechanical seal. Units include bronze body and impeller and Type 316 stainless steel shaft sleeve.

CLOSE COUPLED MODELS

Models 2P121 thru 2P125 and 2P373 thru 2P377 are completely assembled to Dayton 3450 RPM, 60 Hz capacitor-start and 50/60 Hz 3-phase TEFC electric motors with 1.0 service factor. Pumps with single-phase motors have automatic reset thermal protection. Pumps require field wiring.

PUMPING UNIT ONLY MODELS

Models 2P126 thru 2P128 and 2P377 thru 2P380 are not equipped with motors. They are suitable for mounting to 3450 RPM, NEMA 56C face keyed shaft electric or air motors. The horsepower requirement of the motor depends on the pump head selected, flow required and specific gravity of the fluid to be pumped. See Centrifugal Pump Selection Guide (page 4) for assistance in selection of proper motor horsepower. All units have stainless steel fasteners throughout. An optional Neoprene cartridge/Ni-Resist seat mechanical seal assembly is available for pumping some caustic solutions with abrasive properties.

Unpacking

When unpacking the unit, inspect carefully for any damage that may have occurred during transit. Check for loose, missing or damaged parts.

LIMITED WARRANTY

DAYTON ONE-YEAR LIMITED WARRANTY Teel stainless steel self-priming centrifugal pumps, Models 2P12l thru 2P128 & 2P373, thru 2P380, are warranted by Dayton Electric Mfg. Co. (Dayton) to the original user against defects in workmanship or materials under normal use or one year after date of purchase. Any part which is determined by Dayton to be defective in material or workmanship and returned to an authorized service location, as Dayton designates, shipping costs prepaid, will be, as the exclusive remedy, repaired or replaced at Dayton's option. For limited warranty claim procedures, see PROMPT DISPOSITION below. This limited warranty gives purchasers specified legal rights which very from state to state.

LIMITATION OF LIABILITY To the extent allowable under applicable law, Dayton's liability for consequential and incidental damages is expressly disclaimed. Dayton's liability in all events is limited to, and shall not exceed, the purchase price paid.

WARRANTY DISCLAIMER. Dayton has made a diligent effort to illustrate nd describe the products in this literature accurately; however, such illustrations and descriptions are for the sole purpose of identification, end do not express or imply a warranty that the products are merchantable, or fit for a particular purpose, or that the products will necessarily conform to the illustrations or descriptions

Except as provided below, no warranty or affirmation of fact, expressed or implied, other then as stated in "LIMITED WARRANTY" above is made or authorized by Dayton.

PRODUCT SUITABILITY. Many states and localities have codes and regulations governing sales, construction, installation, and/or use of products for certain purposes, which may vary from those in neighboring areas. While Dayton attempts to assure that its products comply with such codes, it cannot guarantee compliance, and cannot be responsible for how the product is installed or used. before purchase and use of a product, please review the product application, and national and local codes and regulations, and be sure that the product, installation, and use will comply with them.

Certain aspects of disclaimers are not applicable to consumer products; e.g.. (a) some states do not allow the exclusion or limitation of incidental or consequential damages, so the above Imitation or exclusion may not apply to you; (b) also, some states do not allow limitations on how long an implied warranty lasts, consequently the above limitation may not apply to you, and (c) by law, during the period of the Limited Warranty. any implied warranties of merchantability or fitness for a particular purpose applicable to consumer products purchased by consumers, may not be excluded or otherwise disclaimed

PROMPT DISPOSITION. Dayton will make a good faith effort for prompt correction or other adjustment with respect to any product which proves to be defective within limited warranty. For any product behaved to be defective within limited warranty, first write or call dealer from whom product was purchased. Dealer will give additional directions. If unable to resolve satisfactory, write to Dayton at address below, giving dealer's name, address, date and number of dealer's invoice, and describing the nature of the defect. Title end risk of loss pass to buyer on delivery to common carrier. If product was damaged in transit to you, file claim with carrier

Dayton Electric Mfg. Co., 5959 W. Howard St., Chicago, IL 60648

Specifications

MODEL NO. & BASIC CONTRUCTION				MOTOR			PORT SIZE		APPROX. PUMP WEIGHT
316 STAIN-LESS STEEL	SEAL MAT'L	CAST BRONZE	SEAL MAT'L	HP	RPM	VOLTAGE	INLET	OUTLET	
2P121	Teflon	2P373	Viton	3/4	3450	115/230,60 Hz	1½	1½	45
2P122	Teflon	2P374	Viton	1½	3450	115/230,60 Hz	1½	1½	55
2P123	Teflon	2P375	Viton	3/4	3450	208-220/440,50/60 Hz	1½	1½	40
2P124	Teflon	2P376	Viton	1½	3450	208-220/440,50/60 Hz.	1½	1½	48
2P125	Teflon	2P377	Viton	2	3450	208-220/440,50/60 Hz	1½	1½	50
2P126	Teflon	2P378	Viton	*	3450	*	1½	1½	18
2P127	Teflon	2P379	Viton	*	3450	*	1½	1½	18
2P128	Teflon	2P380	Viton	*	3450	*	1½	1½	18

*Pumping units only, motor not included.

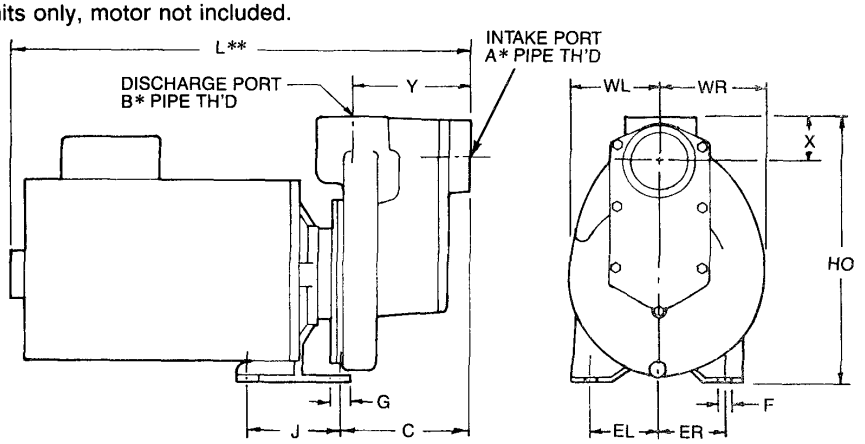

Figure 1 — Dimensions

ALL DIMENSIONS HAVE A TOLERANCE OF ± 1/8"

MODEL NO.	A*	B*	C	EL	ER	F	G	HO	J	L**	WL	WR	X	Y
2P121, 2P373	1½	1½	4 9/16	2¼	2¼	1/2	3/4	9½	3	15 13/16	2⅞	3½	1¼	3 15/16
2P122, 2P374	1½	1½	4 9/16	2¼	2¼	1/2	3/4	9½	3	17 5/16	2⅞	3½	1¼	3 14/16
2P123, 2P375	1½	1½	4 9/16	2¼	2¼	1/2	3/4	9½	3	15 3/16	2⅞	3½	1¼	3 15/16
2P124, 2P376	1½	1½	4 9/16	2¼	2¼	1/2	3/4	9½	3	16 5/16	2⅞	3½	1¼	3 15/16
2P125, 2P377	1½	1½	4 9/16	2¼	2¼	1/2	3/4	9½	3	16 5/16	2⅞	3½	1¼	3 15/16
2P126, 2P378	1½	1½	4 9/16	2¼	2¼	1/2	3/4	9½	3	▲	2⅞	3½	1¼	3 15/16
2P127, 2P379	1½	1½	4 9/16	2¼	2¼	1/2	3/4	9½	3	▲	2⅞	3½	1¼	3 15/16
2P128, 2P380	1½	1½	4 9/16	2¼	2¼	1/2	3/4	9½	3	▲	2⅞	3½	1¼	3 15/16

*Standard NPT pipe thread. ** This dimension may vary due to motor manufacturing specifications.
▲ Pumping units only, length depends on motor selected.

Performance

MODEL NO.		REF. NO.	MIN. HP REQ.	GPM AT TOTAL HEAD IN FEET							MAX HEAD	EQUIVA-LENT PSI*
				0'	10'	20'	30'	40'	50'	60'		
2P121 **2P123** **2P126**	**2P373** **2P375** **2P378**	A	0.56	75	67	57	45	28	—	—	50 FT	21.6
2P122 **2P124** **2P127**	**2P374** **2P376** **2P379**	B	1.10	108	99	87	70	48	10	—	51 FT	22.1
2P125 **2P128**	**2P377** **2P380**	C	1.90	130	123	113	99	82	61	26	63 FT	27.3

*Max. head × 0.434 = equivalent PSI.

1. Know the pump application, limitations and potential hazards.

WARNING: PUMP SHOULD ONLY BE USED WITH LIQUIDS COMPATIBLE WITH PUMP COMPONENT MATERIALS. WHEN PUMPING HAZARDOUS OR DANGEROUS MATERIALS, USE ONLY IN ROOM OR AREA DESIGNATED FOR THAT PURPOSE. FOR YOUR PROTECTION, ALWAYS WEAR PROPER CLOTHING, EYE PROTECTION, ETC. IN CASE OF ANY MALFUNCTION. FOR PROPER HANDLING TECHNIQUES AND CAUTIONS, CONTACT YOUR CHEMICAL SUPPLIER, INSURANCE COMPANY AND LOCAL AGENCIES (FIRE DEPT., ETC.). FAILURE TO COMPLY WITH THIS WARNING COULD RESULT IN PERSONAL INJURY AND/OR PROPERTY DAMAGE.

2. Make certain that the power source conforms to the requirements of your equipment.
3. Provide adequate protection and guarding around moving parts.
4. Disconnect power before servicing. If the power disconnect is out of sight, lock in the open position and tag it to prevent unexpected application of power. Failure to do so could result in fatal electrical shock!
5. Release all pressure within the system before servicing any component.
6. Drain liquids from the system before servicing.
7. Secure the discharge line before starting the pump. An unsecured discharge line will whip, possibly causing personal injury and/or property damage.
8. Check hoses for weak or worn condition before each use. Make certain that all connections are secure.
9. Periodically inspect pump and system components. Perform routine maintenance as required (see Maintenance section).
10. Provide a means of pressure relief for pumps whose discharge line can be shut off or obstructed.
11. Personal Safety:
    a. Wear safety glasses at all times when working with pumps.
    b. Wear a face shield and proper apparel when pumping hazardous chemicals.
    c. Keep work area clean, uncluttered, and properly lighted; replace all unused tools and equipment.
    d. Keep visitors at a safe distance from the work area.
    e. Make workshop child proof - with padlocks, master switches, and by removing starter keys.
12. This unit is not waterproof and is not intended to be used in showers, saunas, or other potentially wet locations. The motor is designed to be used in a clean dry location with access to an adequate supply of cooling air. Ambient temperature around the motor should not exceed 1040F (400C). For outdoor installations, motor must be protected by a cover that does not block airflow to and around the motor. This unit is not weatherproof nor is it able to be submersed in water.
13. When wiring an electrically driven pump, follow all electrical and safety codes, as well as the most recent National Electrical Code (NEC) and the Occupational Safety and Health Act (OSHA).
14. **WARNING: RISK OF ELECTRIC SHOCK!** The motors on Models 2P123, 2P124, 2P125, 2P375, 2P376, & 2P377 are for use with 208-220/440 (3-phase) power. These units are for permanent installation using a power supply with a ground.
    To reduce the risk of electric shock, electric motor must be adequately grounded to a metal raceway system, or by suing a separate grounding wire connected to bare metal on the motor frame, or to the grounding screw located inside motor terminal box, or by other suitable means. Refer to the most recent National Electrical Code (NEC) Article 250 (Grounding) for additional information. ALL WIRING SHOULD BE DONE BY A QUALIFIED ELECTRICIAN.
15. **WARNING: RISK OF ELECTRIC SHOCK!** This equipment (Models 2P121, 2P122, 2P373 & 2P374) can be used for either 115V (single phase) or 230V (single phase). These units can be wired for either portability, with flexible 3-wire cord, or permanent installation using a supply with a ground.
    To reduce the risk of electric shock, the motor must be securely and adequately grounded! This can be accomplished by either: 1) Inserting plug (portable) directly into a properly installed and grounded 3-prong grounding type receptacle (as shown) in Figure A for 110-120 volt, or Figure B for 220-240 volt); 2) Permanently wiring the unit with a grounded, metal raceway system; 3) Using a separate ground wire connected to the bare metal of the motor frame; 4) Other suitable means. The green (or green and yellow) conductor in the cord is the grounding wire. Figure 2 Grounding Methods

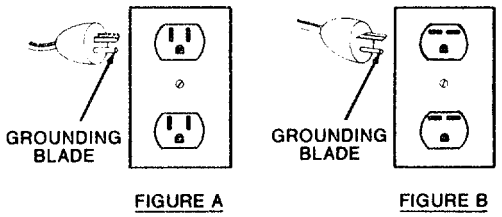

Figure 2 - Grounding Methods

WARNING: NEVER CONNECT THE GREEN (OR GREEN AND YELLOW) WIRE TO A LIVE TERMINAL

Where a 2-prong wall receptacle is encountered, it must be replaced with a properly grounded 3-prong receptacle installed in accordance with the National Electrical Code, local codes and ordinances. To ensure a proper ground, the grounding means must be tested by a qualified electrician. Use only 3-wire extension cords that have 3-prong, grounding type plugs, and 3-pole receptacles that accept the equipment plug.

16. Use only 3-wire extension cords that have 3-prong, grounding type plugs and 3-pole receptacles that accept the equipment plug.

17. All wiring should be performed by a qualified electrician
18. Protect electrical cord from sharp objects, hot surfaces, oil, and chemicals Avoid kinking the cord Replace or repair damaged or worn cords immediately
19. Keep fingers and foreign objects away from ventilation and other openings Do not insert any objects into the motor
20. Use wire of adequate size to minimize voltage drop at the motor.
21. Disconnect power before servicing a motor or its load If the power disconnect is out-of-sight, lock it in the open position and tag it to prevent unexpected application of power
22. Do not touch an operating motor Modern motors are designed to operate at high temperatures

WARNING: DO NOT HANDLE A PUMP OR PUMP MOTOR WITH WET HANDS OR WHEN STANDING ON A WET OR DAMP SURFACE, OR IN WATER.

WARNING: ALL SINGLE PHASE PUMP MOTORS ARE EQUIPPED WITH AN AUTOMATIC RESETTING THERMAL PROTECTOR AND MAY RESTART UNEXPECTEDLY. PROTECTOR TRIPPING IS AN INDICATION OF MOTOR OVERLOADING AS A RESULT OF OPERATING THE PUMP AT LOW HEADS (LOW DISCHARGE RESTRICTION), EXCESSIVELY HIGH OR LOW VOLTAGE, INADEQUATE WIRING, INCORRECT MOTOR CONNECTIONS, OR A DEFECTIVE MOTOR OR PUMP.

Installation

WARNING: IN ORDER TO SAFELY USE THIS PRODUCT FAMILIARIZE YOURSELF WITH THIS PUMP AND ALSO WITH THE LIQUID (CHEMICAL, ETC. THAT IS GOING TO BE PUMPED THRU THE UNIT EVEN THOUGH THIS PUMP IS SUITABLE FOR MANY LIQUIDS, IT IS NOT SUITABLE FOR ALL LIQUIDS!

IMPORTANT IN INSTALLATIONS WHERE PROPERTY DAMAGE MIGHT RESULT FROM AN INOPERATIVE OR LEAKING PUMP DUE TO POWER OUTAGES, DISCHARGE LINE BLOCKAGE OR ANY OTHER REASON, A BACK-UP SYSTEM(S) AND/OR WARNING SYSTEM(S) SHOULD BE USED

CENTRIFUGAL PUMP SELECTION GUIDE

Know the characteristics of the liquid being pumped, including its type, concentration, viscosity, pH factor, specific gravity, temperature, etc This information is available from your chemical supplier When the pump is used with liquids other than water, factory warranty must be extended by application Write or call nearest Dayton Electric Mfg. Co distributor for Pump Application Form No 5S1763 Complete and return form, indicating chemical type, concentration, specific gravity, pH, pump use, etc for warranty validation

Determine GPM required and total feet of head (suction lift + discharge head + friction losses) Suction lift is the vertical distance pump is above liquid. Discharge head is vertical distance pump must "push" liquid (Feet of head = 2.31 X discharge pressure in PSI). Friction losses depend on flow (GPM), pipe size, total feet of pipe, and number of valves, elbows, tees, etc. In 1/12 " 50 GPM dives 0.7 PSI drop for every 10 feet of pipe and 100 GPM dives 2.7 PSI drop. 2" pipe at 100 GPM dives 0.8 PSI drop. For each elbow or tee in line, add equivalent PSI drop for 10 feet of pipe. Read down from Total Feet of Head to Performance chart (Ref. No. A, B or C) which dives desired GPM

Determine whether or not horsepower available is sufficient to power the pump. Multiply the HP required for the pumping unit times the specific gravity of the liquid being pumped. This is the minimum electric motor horsepower required. Proposed motor horsepower at service factor (motor HP x service factor) must exceed pump's minimum horsepower required Select a 3450 RPM, NEMA 56C face, keyed shaft electric or air motor of the proper horsepower rating. Explosion-proof electric and air motors may be acceptable for applications involving flammable liquids, such as acetone (see following Warning). The completely assembled Models 2P121 to 2P124 and 2P373 to 2P376 can handle liquids with specific gravities up to approximately 1.30. Models 2P125 and 2P377 can handle liquids with specific gravities up to 1.05. Example Select pump to transfer trichlorethylene (1 47 specific gravity) at a rate of 50 GPM at 30 feet of total head

Reading down from 30' column, pumping unit Ref. No. B is needed; Minimum electric motor horsepower is 1.10 HP x 1.47 = 1.62 HP. Completely assembled pumps Model 2P122 or 2P374 do not have sufficient horsepower. Therefore, order 2P127 or 2P379 pumping unit and 3N238 (2 HP, 3 PH, 3450 RPM) electric motor-or 4Z231 1 3/4 HP) air motor with 6X889 flange.

WARNING: OPEN DRIPPROOF TOTALLY ENCLOSED FAN COOLED (TEFC), TOTALLY ENCLOSED NONVENTILATED (TENV) AND OTHER SIMILAR MOTORS SHOULD NOT BE USED WITH FLAMMABLE OR EXPLOSIVE ATMOSPHERES. IN HAZARDOUS LOCATIONS, WHERE ELECTRIC MOTORS ARE DESIRED, EXPLOSION-PROOF ELECTRIC OR AIR MOTORS MAY SATISFY REQUIREMENTS. EACH APPLICATION SHOULD BE REVIEWED FOR COMPLIANCE WITH YOUR LOCAL CODES, FIRE DEPTS., INSURANCE COMPANIES, NEC, ETC. FOR THE PROPER CLASS AND GROUP OF THE EXPLOSION-PROOF MOTOR NEEDED.

IMPORTANT. SOME CHEMICALS AND/OR SOLUTIONS CAN SET UP, CRYSTALIZE AND/OR SOLIDIFY DEPENDING ON TEMPERATURE, ATMOSPHERIC CONDITIONS, HUMIDITY, ETC THIS COULD CAUSE PUMP AND SEAL CLOGGING, AND EVENTUAL LEAKAGE

MOTOR INSTALLATION

1. Place motor on end opposite shaft, on a level surface, support If necessary. Remove suction plate (Ref. No. 19) (See figure 3.)
2. Assemble two halves of shaft adapter clamp (Ref. No 2) with two socket head capscrews (Ref. No.1), leave assembly loose and slide onto shaft adapter of pumping unit assembly (See figure 3).
3. Slide pumping unit assembly onto motor shaft and mounting face (See figure 3).
4. Install two 3/8-16 x 1" hex capscrews (Ref. No. 7) with washers (Ref No 6) into motor through two opposite holes in adapter (Ref No 5) of pumping unit

assembly. Tighten screws with 9/16 wrench so the adapter seats firmly on motor mounting face. (See Figures 3 & 4.)

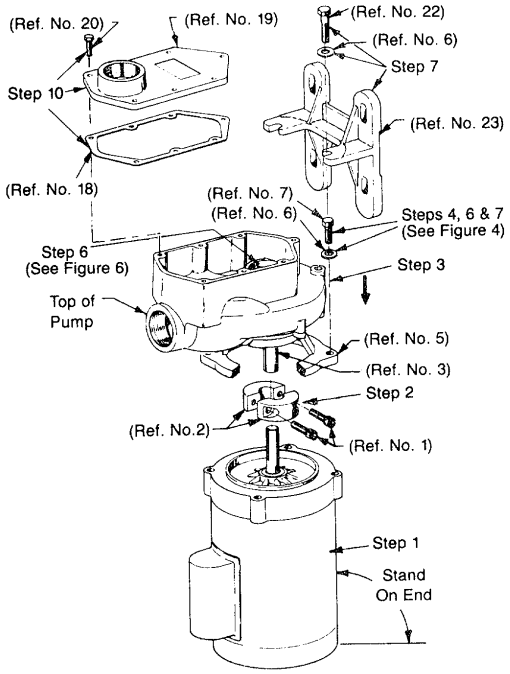

Figure 3

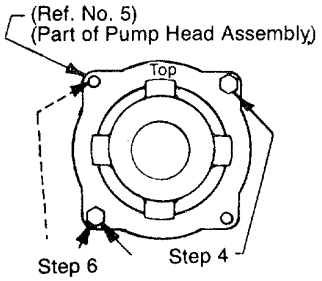

Figure 4

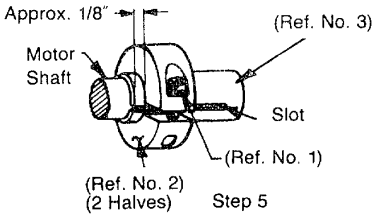

Figure 5

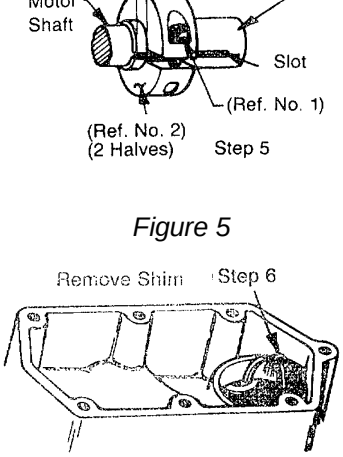

Figure 6

5. Slide the assembled shaft adapter clamp (Ref. No. 2) to within 1/8" from the end of the shaft adapter (Ref. No. 3). Align the slot in the shaft adapter with the gap between the two clamp halves and tighten the two socket head capscrews (Ref. No. 1) with 3/16 hex key (allen wrench) (See Figures 3 & 5).
6. Loosen the 3/8-16 x 1" hex capscrews (Ref. No. 7) previously installed. Remove the 0.020" shim from the opening in the front of the casing (See Figure 6). Remove the screw (Rev. No. 7) and washer (Ref. No. 6) installed in the bottom hole of adapter and rethread it into the top hole in adapter (See Figure 4).
7. Thread two 3/8-16 x 1¼ hex capscrews (Ref. No. 22) with washers (Rev. No. 6) into two bottom holes in adapter. Install mounting foot (Ref. No. 23) with the longer leg towards the rear of motor. Tighten all four hex capscrews with 9/16" wrench (See Figure 3).
8. Turn impeller (Ref. No. 14) with a socket wrench on the impeller locknut (Ref. No. 16), to insure the impeller turns freely (turn clockwise only). Impeller nut (Ref. No. 16) is turned CW to tighten down the impeller. Pump motor rotation is CCW facing front of pump.
9. Place suction plate gasket (Ref. No. 18) on casing face. Place suction plate (Ref. No. 19) on gasket and casing face with the inlet to the top of pump. Thread (7) 1/4-20 x 3/4 hex capscrews through plate into casing and tighten with 7/16" wrench (See Figure 3).
10. Pump may now be returned to normal position and is ready for installation.

PUMP INSTALLATION

1. Locate the pump as close to the fluid source as possible making the suction line as short as possible.

CAUTION: The unit should be located where motor is protected from weather and extremes of heat, cold and humidity.

2. Mount the unit on a solid foundation. On fixed installations, install both a union and a gate valve (not furnished) on the discharge side of the pump for service convenience. -To, facilitate priming, install a Tee in the discharge of the pump itself. Use the horizontal leg of the Tee as the pump discharge and place a pipe plug in vertical leg. This plug can be removed and installed easily for filling the casing with the liquid necessary for initial priming

CAUTION: Do not use globe or other restricting type of valve at the discharge, as this would seriously restrict the capacity of the pump.

3. Attach suction piping to the suction inlet and discharge pipe to the discharge outlet. The suction line should be positioned such that there is a continual upward slope from the fluid source to the pump. Avoid using loops or sections of pipe or fittings which might permit air to become trapped.

WARNING: SUPPORT PUMP AND PIPING WHEN ASSEMBLING AND WHEN INSTALLED. FAILURE TO DO SO MAY CAUSE PIPING TO BREAK, PUMP TO FAIL, MOTOR BEARING FAILURES, ETC. ALL OF WHICH CAN RESULT IN PROPERTY DAMAGE AND/OR PERSONAL INJURY.

NOTE: If plastic or fabric hose is used for the suction piping, it should be of a reinforced type so as not to collapse under suction. The suction piping should be the same size or one size larger than the discharge piping.

4. It is recommended that a foot-valve be used on the suction line to assure quick priming and that a suitable suction strainer be attached to the suction line so that large pieces of foreign material are not drawn into the pump.

NOTE: A foot-valve is required when the suction lift is over 10 feet or when long suction line runs are involved. The maximum opening in the suction strainer should be 1/4".

5. Inspect impeller for proper rotation. When viewing the pump end, the motor should rotate counterclockwise.

CAUTION: Clockwise rotation when facing pump inlet will destroy motor. Incorrect wiring is not covered under limited warranty.

6. Make necessary wiring connection for the voltage outlet supply, using a wire of adequate size to minimize voltage drop at the motor. DOUBLE CHECK ALL CONNECTIONS. (Refer to wiring diagram on motor nameplate or the inside cover of the connection box in the motor end bell.)

WARNING: NEVER CONNECT THE GREEN (OR GREEN AND YELLOW) WIRE TO A LIVE TERMINAL!

7. A ground wire (Ref. No. 25) is included with each unit. One end has been attached to the pump. Attach the loose end to an acceptable ground, as determined by a qualified electrician or as required by codes governing installation.

WARNING: EACH APPLICATION SHOULD BE REVIEWED FOR COMPLIANCE WITH LOCAL CODES, FIRE DEPARTMENTS, INSURANCE COMPANIES, NATIONAL ELECTRICAL CODE (NEC), ETC. FOR PROPER GROUNDING OF STATIC ELECTRICITY.

CAUTION: Always wire the motor with a three wire system, insuring that a ground wire runs to a good electrical ground such as a grounded water system or conduit. Also, insure that a good electrical ground is provided at the supply end of the line. Connections should be made with flexible conduit to minimize vibration transmission.

8. Install auxiliary components (e.g. - pressure switch, timer, etc.).

Operation

1. It is necessary to prime the pump casing before initially starting the pump. The quickest and easiest method is to remove the pipe plug from the tee in the discharge and fill the casing with liquid (it holds about a quart). If the tee was not installed in the discharge, the casing can be primed by removing the discharge piping.

NOTE: This pump is designed so that it should make it unnecessary to continually reprime. When the pump is shut down, enough liquid normally remains in the casing so that it will not have to be reprimed.

CAUTION: Do not run pump dry as permanent damage to the mechanical seal will result.

2. Activate the unit.

NOTE: It may take up to five minutes for unit to prime once casing has been filled with liquid. In runs over 10 ft. horizontally or vertically a foot-valve must be used and unit totally primed including the inlet (suction) piping and the casing.

CAUTION: The proper impeller (motor) rotation is CCW facing the front of the pump. Wrong rotation will give low performance, low head and could damage unit and/or injure personnel. Maintenance

WARNING: MAKE CERTAIN THAT THE POWER SOURCE IS DISCONNECTED BEFORE ATTEMPTING TO SERVICE OR DISASSEMBLE ANY COMPONENTS! IF THE POWER DISCONNECT IS OUT OF-SIGHT, LOCK IT IN THE OPEN POSITION AND TAG TO PREVENT APPLICATION OF POWER.

ROUTINE

Pump should be checked daily, weekly, monthly, etc. for proper operation. If anything has changed since unit was new, unit should be removed and repaired or replaced. Only qualified electricians or servicemen should attempt to repair this unit. Improper repair and/or assembly can cause an electrical shock hazard.

Should the pump require servicing, refer to the Replacement Parts Illustration (Figure 9) as an aid in disassembly and reassembly procedures. Replace all worn or damaged parts.

STORAGE

If the pump is located in an area subject to freezing temperatures, the pump should be drained when not in operation. ALSO, THE PUMP SHOULD BE FLUSHED AFTER EACH USE, IF USED WITH GUMMY SUBSTANCES OR SIMILAR FLUIDS.

MECHANICAL SEAL REPLACEMENT

Should the mechanical seal, which consists of seal cartridge (Ref. No. 11) and seal seat (Ref. No. 12) require replacement, proceed as follows and refer to Figures 7, 8, and 9.

IMPORTANT: ALWAYS REPLACE BOTH THE SEAL SEAT AND THE SEAL CARTRIDGE TO INSURE PROPER MATING OF COMPONENTS! IT IS RECOMMENDED THAT THE TEFLON IMPELLER O-RING (REF. NO. 15) ALSO BE REPLACED WHEN REPLACING THE PUMP SEAL.

1. Unthread capscrews (Ref. No. 9) and remove casing (Ref. No. 17) and O-ring (Ref. No. 10).
2. Unscrew impeller locknut (Ref. No. 16) from the shaft adapter (Ref. No. 3) counterclockwise.

NOTE: Insert the long leg of a 3/16" hex key (Allen wrench) into the head recess of one of the socket head capscrews (Ref. No. 1) in the shaft adapter clamp, and hold it against one of the adapter (Ref. No. 5) ribs to prevent the shaft from turning.

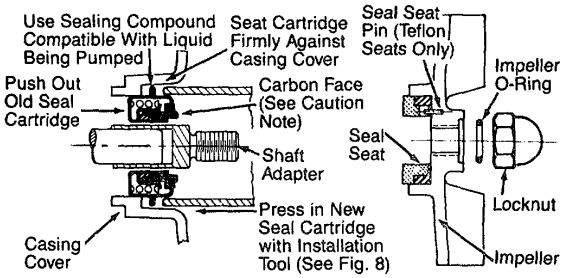

Figure 7. Mechanical Seal Replacement (Teflon Seal Shown)

3. Unscrew impeller (Ref. No. 14) from the shaft adapter. Remove the impeller O-ring (Ref. No. 15) and clear all sediment from impeller. Inspect the impeller O-ring, replace if deeply scarred or worn.

NOTE: DO NOT remove or adjust shaft adapter (Ref. No. 3).

4. Pry seal seat (Ref. No. 12) from recess of impeller. Use caution so as not to damage or remove seal seat pin (Ref. No. 13) on Teflon seal equipped units.
5. Remove the adapter and casing cover (Ref. Nos. 5 & 8) by unthreading four fasteners (Ref. Nos. 7 & 22; two of each).
6. Press seal cartridge (Ref. No. 11) from the rear of the casing cover.
7. Clean casing cover and impeller seal recesses and shaft adapter. Make certain all surfaces are perfectly clean before installing new seal parts.

CAUTION: Handle seal parts with extreme caution and keep them clean. Do not touch seal faces (either ceramic or carbon) with your hands. Do not apply lubricants on seal faces. This could cause a leak or premature seal failure.

8. Apply a light coat of sealing compound to new seal cartridge (See Figure 7) and press it into the casing cover recess using the proper size tube or installation tool (See Figure 8). DO NOT press on carbon face or top of metal cup of the seal cartridge. Install using flange only.
9. Slide the assembled adapter and casing cover (Ref. Nos. 5 & 8) onto motor mounting face. Fasten with four fasteners (Ref. Nos. 7 & 22; two of each), making sure that the mounting foot (Ref. No. 23) is in place.
10. Press new seal seat (Ref. No. 12) squarely into the impeller recess. Align slot in the seal seat with seal seat pin (Ref. No. 13) on Teflon equipped units. Avoid scratching the ceramic surface.

NOTE: Use a soft, clean piece of cloth on seal seat face when installing to prevent marring.

11. Screw the impeller back in place, tightening until it is firmly seated.
12. Install the impeller 0-ring (Ref. No. 15) and install and tighten impeller locknut (Ref. No. 16).
13. Reinstall O-ring seal (Ref. No. 10) on casing cover rabbet. Remount casing (Ref. No. 17) with six fasteners (Ref. No. 9).
14. If 3/16" hex key (Allen wrench) was inserted into the shaft adapter clamp screw to prevent shaft rotation, remove it. Pump may now be returned to service.

NOTE: Always flush pump thoroughly before use so as not to contaminate liquid being pumped.

IMPELLER CLEARANCE ADJUSTMENT

When installing replacement motor, shaft adapter (Ref. No. 3), adapter (Ref. No. 5), casing cover (Ref. No. 8), impeller (Ref. No. 14) or casing (Ref. No. 17), it may be necessary to adjust the clearance between the impeller and casing faces.

NOTE: A proper running clearance is less than 0.021".

CAUTION: If the impeller (Ref. No. 14) is replaced, the seal assembly should also be replaced as the seal is usually damaged in disassembly. Also replace Teflon washer (Ref. No. 15).

1. After the replacement components have been installed, reassemble the pump as described under "Mechanical Seal Replacement". DO NOT remount pump casing (Ref. No. 17) at this time.
2. Loosen lock screws (Ref. No. 1) in shaft adapter clamp (Ref. No. 2) as the impeller will move in and out freely. Leave loose but do not remove the assembly from the motor shaft (screws are accessible through adapter openings).
3. Stand the pump up on motor end if possible and place a 0.020" feeler gauge in the face of the impeller (if feeler gauge is not available, use five to six thicknesses of newspaper. Make sure impeller and casing are absolutely dry and clean). With pump still on end, remount the casing (Ref. No. 17) tightening fasteners (Ref. No. 9) evenly.
4. Make certain the full width of shaft adapter clamp (Ref. No. 2) is in place on shaft adapter and the split in the shaft adapter (Ref. No. 3) is aligned with the part between the clamp halves and retighten lock screws (Ref. No. 1).
5. Unthread fasteners (Ref. No. 9) and remove casing (Ref. No. 17). Remove feeler gauge (or newspaper pieces). Then mount casing making certain all fasteners are tight.

NOTE: Make certain that O-ring seal (Ref. No. 10) is in place.

6. Check shaft to make sure it turns freely (turn shaft with shaft adapter clamp). This procedure should insure the proper running clearance and will deliver maximum performance from the pump.

NOTE: If shaft will not turn, remove casing (Ref. No. 17) and repeat above procedure beginning with step 2.

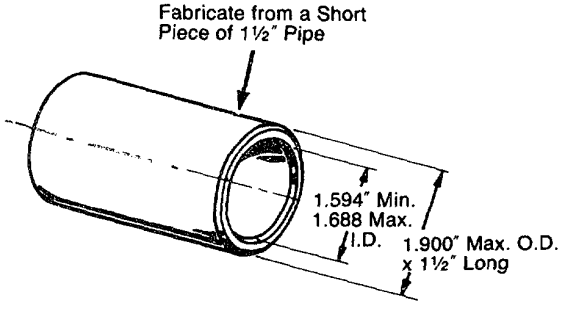

Figure 8 - Seal Installation Tool

SYMPTOM	POSSIBLE CAUSE(S)	CORRECTIVE ACTION
Pump will not prime or retain prime after operating	1. Air leak in suction line 2. Suction line inlet above liquid level	1. Repair or replace. 2. Submerge suction line in liquid.
Pump will not start or run	1. Improperly wired 2. Blown fuse or open circuit breaker 3. Loose, broken, or incorrect wiring 4. Defective pressure switch 5. Piping to pressure switch plugged 6. Motor shorted out	1. Check voltage supply outlet and rewire motor connections, if necessary. 2. Replace fuse or close circuit breaker. 3. Rewire any incorrect circuits. Tighten connections, replace defective wires. 4. Adjust switch setting. Clean contacts with emery cloth, if dirty. Replace if necessary. 5. Clean or replace piping. 6. Replace motor.
Pump runs, but no fluid	1. Faulty suction piping 2. Pump located too far from fluid 3. Gate valve closed 4. Clogged strainer 5. Fouled foot valve 6. Suction line inlet above liquid level	1. Replace. 2. Relocate. 3. Open. 4. Clean or replace. 5. Clean or replace 6. Submerge suction line in liquid.
Liquid drips from point where shaft enters the pump housing, when pump is full of liquid	Damaged mechanical seal	Replace. (See MECHANICAL SEAL REPLACEMENT)
Pump starts and stops too often	1. Faulty pressure switch 2. Leak in suction valve 3. Leak in foot-valve	1. Repair or replace 2. Repair. 3. Repair or replace.
Excessive noise while pump is in Operation	1. Pump not secured to firm foundation 2. Piping not supported to relieve any strain on pump assembly 3. Motor improperly connected.	1. Secure properly. 2. Make necessary adjustments. 3. Rewire electrical connections.

Service Record

DATE	MAINTENANCE PERFORMED	REPLACEMENT COMPONENTS REQUIRED

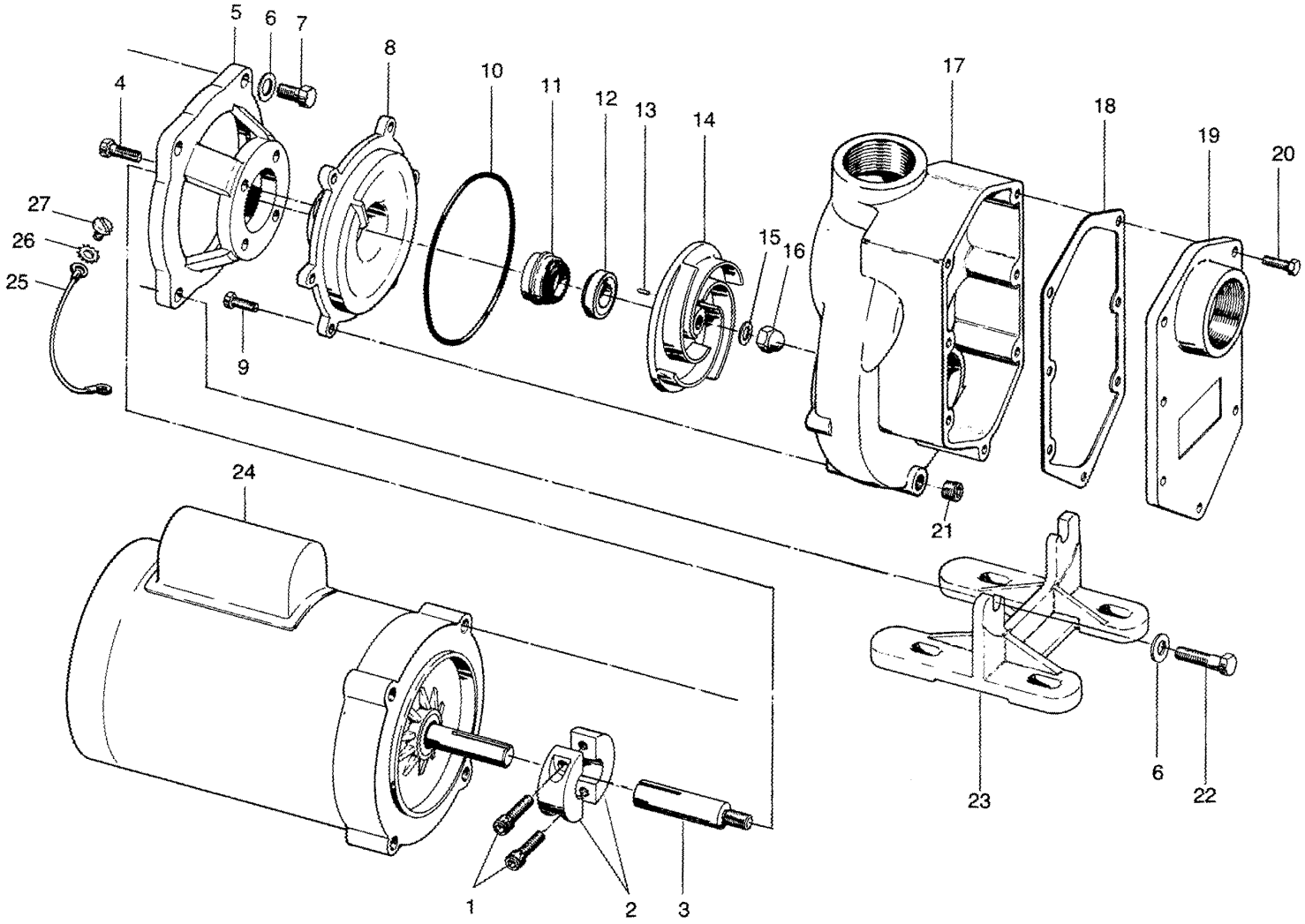

Figure 9. Replacement Parts Illustration

Replacement Parts List

REF. NO.	DESCRIPTION	PART NO. FOR MODELS: 2P121 THRU 2P128 STAINLESS STEEL	PART NO. FOR MODELS: 2P373 THRU 2P380 BRONZE	QTY.
1	S.S. socket head capscrew, 1/4-28 x 5/8"	1737.00	1737.00	2
2	S.S. shaft adaptor clamp (2 halves)	2105.12	2105.12	1
3	S.S. shaft adaptor	2105.11	2105.11	1
4	S.S. hex head capscrew, 5/16-18 x 3/4"	1745.01	1745.01	4
5	Adapter	2105.0001	2105.3201	1
6	S.S. flat washer, 3/8" SAE	1793.08	1793.08	4
7	S.S. hex head capscrew, 3/8-16 x 1"	1755.01	1755.01	2
8	*Casing cover*	2105.0301	2105.1701	1
9	S.S. hex head capscrew, 1/4-20 x 1/2"	1715.02	1715.02	6
10	Teflon encapsulated O-ring seal, #245 Viton rubber O-ring seal, #245	2105.04 —	— 2105.23	1 1
11 & 12	▲Teflon seal assembly (standard 2P121 thru 2P128) ▲Viton seal assembly (standard 2P373 thru 2380) ▲Neoprene/Ni-Resist seal assembly (optional)	E1696.47 E1696.49 (opt.) E1696.46	E1696.47 (opt.) E1696.49 E1696.46	1 1 1
13	†S.S. seal seat pin	1652.06	—	1
14	Impeller 0.56 HP Models 2P121, 2P123, 2P126, 2P373, 2P375 & 2P378 Impeller 1.10 HP Models 2P122, 2P124, 2P127, 2P374, 2P376 & 2P379 Impeller 1.90 HP Models 2P125, 2P128, 2P377 & 2P380	2105.0601 2105.0702 2105.0901	2105.1901 2105.2002 2105.2201	1 1 1
15	Impeller O-ring	2105.31	2105.37	1
16	Impeller locknut	1784.01	1784.03	1
17	Casing	2105.0101	2105.1601	1
18	Suction plate gasket	2105.10	2105.10	1
19	Suction plate	2105.0501	2105.1801	1
20	S.S. hex head capscrew, 1/4-20 x 3/4"	1719.00	1719.00	7
21	Pipe plug, 1/8" NPT	1768.01	1768.00	1
22	*S.S. hex head capscrew, 3/8-16 x 1¼"*	*1757.01*	*1757.01*	*2*
23	Mounting foot	1506.00	1506.00	1
24	Motor for 2P121 & 2P373 — 3/4 HP, 1PH Motor for 2P122 & 2P374 — 1½ HP, 1PH Motor for 2P123 & 2P375 — 3/4 HP, 3PH Motor for 2P124 & 2P376, 1½ HP, 3PH Motor for 2P125 & 2P377 — 2HP, 3PH	6K831 6K832 3N472 3N473 3N238	6K831 6K832 3N472 3N473 3N238	1 1 1 1 1
25	Ground wire	2105.42	2105.42	1
26	S.S. lockwasher, 1/4"	1788.00	1788.00	1
27	S.S. slotted round hd. screw, 1/4-20 x 5/16"	1712.20	1712.20	1

▲Seal assembly available as a set only. Includes both seal cartridge and seal seat.
†*Seal seat pin used for teflon seals only.*

ORDER REPLACEMENT PARTS THROUGH DEALER FROM WHOM PRODUCT WAS PURCHASED

Please provide following information:

- Model Number
- Serial Number (if any)
- Part Description and Number as shown in Parts List.

If dealer cannot supply order from:
Dayton Electric Mfg. Co., Parts Department
1250 Busch Parkway
Buffalo Grove, IL 60015
Call Toll Free
1-800-323-0620 (outside Illinois)
1-800-225-7149 (within Illinois)

Notes

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 10-640-221-13&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 10-635-211-13&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 104630-239-13&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 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/troubleshooting2 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. 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 I. 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 I. 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	PUMP, SELF-PRIMING	INSPECT	0.2						
		REPLACE		2.0				1, 3	A
		REPAIR		2.0	4.0			1, 2, 3	B

SECTION III. TOOL AND TEST EQUIPMENT REQUIREMENTS

FOR

MAINTENANCE ALLOCATION CHART

(1) TOOL/TEST EQUIPMENT REF CODE	(2) MAINTENANCE CATEGORY	(3) NOMENCLATURE	(4) NSN	(5) TOOL NUMBER
1	O, F	TOOL KIT, GENERAL AUTOMOTIVE	5180-00-177-7033	SC 5180-90-CL-N26
2	O, F	SHOP EQUIPMENT, AUTOMOTIVE MAINTENANCE AND REPAIR: COMMON #1 (LESS POWER)	4910-00-754-0654	SC 4910-95-CL-A74
3	O, F	MULTIMETER, 0-500V	6625-00-691-2453	

Section IV. REMARKS

REFERENCE CODE	REMARKS
A	Replace defective pressure switch assembly and tube.
B	Repair is limited to replacement of defective parts.

APPENDIX C
COMPONENTS OF END ITEM AND BASIC ISSUE ITEMS LISTS

NOT APPLICABLE

APPENDIX D
ADDITIONAL AUTHORIZATION LIST

NOT APPLICABLE

APPENDIX E
EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST

NOT APPLICABLE

By Order of the Secretary of the Army:

CARL E. VUONO
General, United States Army
Chief of Staff

Official:

THOMAS F. SIKORA
Brigadier General, United States Army
The Adjutant General

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The Metric System and Equivalents

Linear Measure

1 centimeter = 10 millimeters = .39 inches
1 decimeter = 10 centimeters = 3.94 inches
1 meter = 10 decimeters = 39.37 inches
1dekameter = 10 meters = 32.8 feet
1 hectometer = 10 dekameters = 328.08 feet
1 kilometer = 10 hectometers = 3,280.8 feet

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

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

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. ft.
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
pounds-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

PIN: 047246-000