'G' Pumps OPERATOR'S MANUAL for Self-priming Centrifugal Pumps with built-in basket strainer

OPERATION AND SERVICE GUIDE 0-1800C

Before reading or using this manual be certain of the materials of construction of your pump. Check the model number label on the pump as follows: NORYL pumps have model numbers beginning with GNOK and price codes beginning with 60-6. NORYL pumps have a basket strainer molded of POLYROPYLENE. RYTON pumps have model numbers beginning with GRYK and price codes beginning with 60-8. RYTON pumps have a basket strainer and volute plate molded of ECTFE.

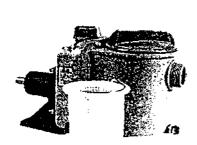
SAFFTY WARNING

Verify the chemical compatibility of the materials of your pump with the liquid you want to pump. If you are uncertain regarding chemical compatibility contact your dealer for applications assistance and request a copy of our Corrosion Resistance Charts. Do not use a pump that is not chemically compatible with the liquid you intend to pump or serious bodily injury, death, fire, explosion, or environmental damage could result.

Table of Contents PLEASE READ SECTIONS I, II A1ND III BEFORE OPERATING PUMP.

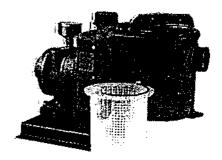
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ELECTRIC DRIVE CLOSE COUPLED



OPERATOR'S MANUAL FOR SELF PRIMING CENTRIFUGAL PUMPS

'G'Series Table of Contents

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SAFETY WARNING

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I. SAFETY PRECAUTIONS

WAR NING:

- A. Never use these pumps for pumping flammable liquids such as gasoline. AN EXPLOSION AND SERIOUS INJURY MAY RESULT IF THIS WARNING IS IGNORED.
- B. In pumping corrosive materials, extreme caution should be exercised. Provide safety guards, ventilation, and drains to protect people and property in case of a leak in the pump. Handling instructions from the manufacturer(s) of the liquids being pumped should be closely followed.
- C. Before starting the pump, follow all of the instructions in this manual and any supplemental instructions supplied with the pump.
- D. Any person operating this pump and its' power unit should be fully aware of its' safe operation before they start using it.
- E. Never operate an engine driven unit in an explosive atmosphere, near combustible materials, or where insufficient ventilation exists unless specific provisions have been made regarding the power unit so as to prevent possible injury and damage. Be certain any other power unit is safe for the area in which it is to be operated.
- F. Always be sure that the unit is on a secure footing and keep the immediate pump and power unit area free of all unauthorized personnel. If the pump is sitting beside a pit, be sure it is well anchored so that it does not fall in.
- G. Never operate the unit with any guards removed.

- H. With engine driven pumps:
 - Observe all safety precautions for the handling of fuel.
 - 2. Never refuel the engine while running, and care should be exercised so that no fuel is spilled on a hot engine. ALWAYS ALLOW ENGINE TO COOL AT LEAST TWO MINUTES BEFORE REFUELING.
- I. Before working on this pump make sure that the power unit cannot inadvertantly be started.
- J. Be sure that the power unit, pump, wiring and piping installations are suitable for the liquid being pumped, and comply with all applicable codes and regulations.
- K. Do not use torches or apply fire or flames to this pump for any reason.
- L. This pump must not be subjected to more than 40 pounds per square inchinternal pressure. The pump itself, normally cannot develop more than 30 pounds per square inch pressure. The pump must not be used under any of the following unusual conditions which can result in excessive pressures being developed:
 - 1. Pump shaft speed over 3600 RPM.
 - Quick closing valves in suction or discharge line or any other device which may introduce hydraulic shock into the system.
 - 3. Possible sudden obstruction of discharge line such as vehicle driving over hose.
 - 4. High positive suction pressures (such as with a flooded suction) which would increase the total system pressure to 40 PSI or above.

- 5. Do not pump liquids with specificgravities exceeding 1.5. The specific gravity is the ratio of the weight of the liquid to be pumped to the weight of an equal volume of water. Water has a specific gravity of 1.0. Therefore, a liquid which is heavier than water has a specific gravity greater than 1.0.
- M. Do not overtighten the drain plugs. Hand tighten only. Excessive force may damage the threads or the pump body. Do not use metal plugs
- N. Use at least one foot of flexible hose to make plumbing connections to the pump body. Rigid piping may put stresses on the pump, causing damage. If rigid piping must be used, property support it so as to eliminate stresses on the pump.
- 0. Do not tighten Inlet and discharge fittings more than one turn beyond hand tight. Exces- sive force will damage the pump or fittings.
- P. Be sure strainer cover and drain plugs and their respective O-rings are securely in place prior to starting pump. HAND TIGHTEN ONLY.

- Q. Long suction and discharge hoses must be supported so that the weight of the hose filled with liquid does not damage the pump.
- R. Use replacement parts supplied by the manu- facturer only.
- S. Do not run the pump dry. Always fill the pump body with the liquid to be pumped be- fore starting the pump. It is not necessary to drain the pump body after use, unless there isdanger of freezing, settling of solids, or crystallization.
- T. Do not restrict flow through the pump such as with a closed discharge valve or "starved" suction line. Harmful heat build up will result. If it is necessary to restrict flow through the pump for longer than 5 minutes, either the pump must be stopped or a discharge by- pass line installed to keep liquid temperatures below the maximum recommended operating temperatures.
- U. Do not subject pump to solvents or extreme conditions of acidity or basicity. Consult factory for specific recommendations con- cerning chemicals and temperature.

II. PREPARING FOR OPERATION

A. Pump Preparation

- 1. Inspect unit for shipping damage immediately upon receipt and before signing for merchandise. If any visible damage exists, note damage on shipping bill of lading or receiving document (s) before signing. Also notify your dealer or distributor immediately of any damage to the shipment.
- 2 Read these instructions and the power unit instructions until you are sure you can operate it safely and correctly.

B. Power unit oreparation-Gasoline Engines

- 1. For complete operating and maintenance information consult the engine manufac- turer's instructions included with the pump.
- 2 Before starting, fill crankcase with oil specified by the engine manufacturer. Use a high quality detergent oil classified for service SC, SD, SE, or SF.Do not add anything to herecommended oil.
- 3. Before starting, fill fuel tank with clean, fresh, unleaded automotive gasoline. Do not mix oil with gasoline. Refer to engine manu- facturer's operating manual for further in- structions.

CAUTION: Always remove spark plug or spark plug wire before working on unit to prevent accidental starting.

CAUTION: The engine governor is set at the factory. Do not tamper with any part

which may increase the governed engine speed. Pump may be damaged.

C. Power unit preparation-Electric Motors:

- 1. Make certain the input power to your electric motor is proper, single phase or three phase, and is of the proper voltage accord- ing to the motor specification plate,
- 2. Be sure of the proper motor rotation. Pump impeller should rotate counterclockwise, looking from the suction inlet side. For single phase motors consult the motor manufacturer's instructions for wiring for counterclockwise rotation. Three phase motor rotation may be reversed by inter- changing any two of the three power leads.
- 3. Make certain that wiring for your electric motor and motor starter complies with all existing local codes.

D. Power unit preparation-Pneumatlc Motors:

Consult the separate instruction sheet sup- plied with each motor.

Power requirements:

NOTE: For liquids having specIfIc gravities greater than 1.0, increase the rated horse- power (from catalog) by a factor equal to the specific gravity of the liquid being pumped. . (Ex. Catalog HP x Specific gravity = Actual HP required)

III. PUMP OPERATING INSTRUCTIONS

Fill the pump body with liquid before starting. Do not run the pump dry; damage to the seal may result. There are no points on the pump which need lubrication. The shaft seal is self lubricating, and designed to handle clean liquids.

B. Make certain that all hose and pipe connections are airtight.

IMPORTANT: An air leak in the suction line may prevent priming, and will reduce the capacity of the pump. C. Always place the pump as close to the liquid to be pumped as

short and straight as possible. Avoid sharp bends in hoses. Keep the pump on a level foundation.

D. Drain the pump body whenever there is a danger of freezing.

E. Always flush out the pump at the end of opera-tion if the liquid being pumped may leave a solid or sticky residue in the pump. If this Is not done, damage to the pump may result.

IV. PUMP TROUBLE SHOOTING AND REPAIR

DIAGNOSIS

A. Does not prime or does not pump

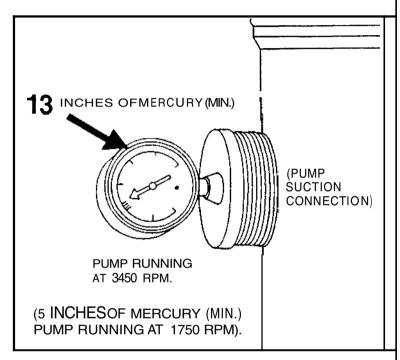


FIGURE 4

TREATMENT

- 1. Fill pump with clean liquid and try priming again 2. Be certain that there are no kinks, closed valves, or other blockage in the discharge and suction lines.
- 3. SHUT OFF POWER SOURCE TO PUMP. Shut off valves to and from pump. While observing all safety precautions for the liquid being pumped, disconnect suction and discharge lines and drain the pump completely. Fill the pump with water. Install a vacuum gauge in the suction port (see figure 4). Turn on power source. Vacuum should exceed 13' of mercury when pump shaft is rotating at 3450 RPM and should equal or exceed 5of mercury with pump shaft at 1750 RPM. If vacuum is below these values, check the following:
 - a. Leak at suction fitting.
- b. Pump rotation. Impeller should rotate counterclockwise when viewing through suction end.
- c. Pump speed. (Maximum vacuum performance drops off rapidly with decreasing RPM).
- d. Check for worn impeller, volute plate, ar or volute. If necessary, replace theseparts. (See items 8, 8.A, & 8.B of section V).
- e. Loose strainer cover (item 9). HAND TIGHTEN ONLY.
- f. Damaged or missing strainer cover O-ring (item 10). Replace.
- g. Loose drain plug (item 26) on strainer housing. HAND TIGHTEN ONLY.
- h. Damaged or missing O-ring (item 27) on strainer housing drain plug. REPLACE.
- i. Loose housing screws and nuts (items 14 & 22). lighten until housing halves meet. DO NOT OVERTIGHTEN.
- j. Damaged, missing or pinched body O-ring (item 15). Remove and re-insert. If leakage persists, replace per assembly instructions. See section V. -
- k. Warn shaft seal. See exploded view drawing for "item #" mentioned above.
- 4. If pump suction tests OK, attach suction line and check suction at end of suction line. Failure to get suction here indicates leaking connections, leaking hoses, pipes, or obstructions in the lines. Liners of suction hose will occasionally collapse inside the hose.
- 1. Check same items as in 1,2,3 and 4 above.
- 2. Replace any worn or broken components; check clearance between impeller vanes and volute face. (See section V paragraph C.8).
- 3. Correct RPM is indicated on motor nameplate. Check as follows:

B. Pump has insufficient flow

Pump has insufficient flow (continued).	While the pump is running, slowly close off the discharge valve(s) so that there is no flow. A pressure gauge located between the pump and the valve(s) should give one of the following pressure readings, depending upon the HP of your pump and when rpm's are 3450:			
	Impeller 58-0617 58-0618	Pressure 18 psi 20 psi	Impeller 58-0619 58-0620 58-0621	Pressure 24 psi 30 psi 30 psi
	If you obtain the proper pressure reading for your pump, then the motor is operating at the correct RPM. If you do not obtain the proper pressure continue on: Shut off power source. Open terminal access plate on motor and double check wiring for correctness and proper motor rotation. If wiring checks out o.k., (with power still off) rotate the motor shaft while feeling and listening for rubbing or obstructions. If rubbing is evident in pump, reshim per paragraph "C.8" of section V. Remove any obstructions. Check again by hand and re-start. If motor still seems slow, remove it and take it to a reputable motor repair shop for checking.			
	5. Check for ex	cessive suction oser to liquid so	_	
C. Low pressure and low flow rate	See item #3 Clean baske Check for ob		triction in suc	tion line.
D. High pressure but low flow rate.	1. Check for ob	struction or res	triction in disc	charge line.
E Pump operates but with steadily reduced capacity after long term use.	abrasive mater Replace above parts list in this	er, volute plate ials, sand, or ot components at manual for rep paragraph C.8.	her small obje fter inspection lacement part	ects). n. Use the
F. Pump suddenly stops, fuse on panel blows or circuit breaker opens.	source to pumpy valves to and felectric short contraction or contraction or contraction or contraction of the contraction of th	ce fuse or closed before proceed from pump, and freuit in motor particular in motor pa	ding further. Some drain liquid. (nower feed.) Repeller area for the feed. If no obstration of impeller strainer and ove procedured you replace in pump funs a	Shut off Check for emove or uction or er. Fill pump d cover, e and any the fuse or again, test for d be an

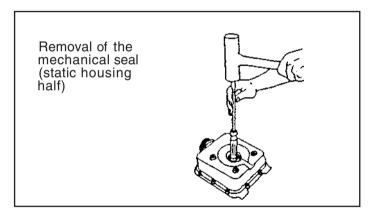
V. PUMP DISASSEMBLY AND REPAIR

The following assembly and disassembly instructions are oriented toward close coupled models for convenience. The same instructions apply to pedestal mounted models.

NOTE: "item #" refers to exploded view drawing on the last page. Basic pump maintenance should involve little more than cleaning the filter basket periodically and maintaining a clear dry area around the motor. Should a pump require service, the following procedure should be followed:

- A. REMOVING THE PUMP FROM SERVICE Shut off electric supply and disconnect motor. Shut off all valves to and from the pump (this is mandatory in all below liquid level installations). Remove both drain plugs and their Orings (items 26 & 27). Disconnect suction and discharge fittings. Allow pump body to drain.
- B. DISASSEMBLY AND REPAIR OF PUMP (For motor repairs, disassemble pump from motor as below, and consult motor repair facility). Prepare a clean surface for disassemble and part layout
- 1. Remove two nuts, washers and bolts (item 23, 24 and 25) holding pump to base. Re-move motor strap (item 18).
- 2. Remove 10 strainer housing screws and nuts (items 14 and 22). Remove and protect strainer housing (item 13). Strainer, cover and O-ring (items 12, 9 & 10) may remain assembled to prevent damage.
- 3. Remove volute plate (item 16) and the related O-ring (item 15), lubricate O-ring with vegetable oil only and store in protective container (plastic bag, etc.). . .KEEP . CLEAN.
- 4. Remove impeller screw (item #34) and the screw o-ring (item #35). Remove the impeller (item #33). The impeller is keyed onto the motor shaft, however, the key is molded into the impeller and so is not a separate part. If the impeller does not pull off easily insert two screw drivers-one on each side of and behind the impeller 180 dgrs apart and gently prv the impeller off the shaft. Note: Early models of the pump used a threaded impeller. These models are easily identified by the absence of an impeller screw (item #34) in the end of the impeller hub and its accompanying o-ring (item #35). These impellers may be screwed off the shaft in a counterclockwise rotation when viewing the front (vanes) of the impeller. IMPORTANT IMPELLER SHIMS (item 6), ARE NOW EX- POSED AND MUST BE REMOVED, COUNTED AND STORED UNTIL RE- ASSEMBLY. SAME AMOUNT OF SHIM- MING MUST BE REPLACED WHEN RE- ASSEMBLING PUMP. NOTE THAT SHIMS MAY BE OF VARIOUS THICKNESSES.
- 5. Remove the two (2) volute O-ring segments (item 8A & 8B). wipe with vegetable oil only and store in sate place.. .KEEP CLEAN.

- 6. To remove volute (item 7) remove the 4 screws (item 32) and pull the volute straight out. The volute O-ring (item 28) should be wiped with vegetable oil only and protected as with all other O-rings. Note: If plugs (item 60) are installed over volute screws on your pump, remove the plugs with their O-ring by threading a housing screw (item 14) into hole in plug and carefully pulling them out.
- 7. To disassemble the pump body (item 2) from the motor, remove the 4 screw protector plugs (item 5) and their orings (item 4) and unscrew the 4 mounting screws (item 3) with their O-rings (item 36). The pump body may now be removed. Note the orientation of the motor wiring and capacitor housing for correct re-assembly.
- 8. REMOVAL OF THE MECHANICAL SEAL- STATIONARY (BODY) HALF (ITEM 31). If the seal is to be discarded (replace if the face is severely worn, or if it is scored at all), it may be removed by placing a screwdriver handle against the back of the seal (motor side) and tapping on the blade until the seal slips out. Avoid damage to the O-ring seat area. When it is desirable to save the seal, use a round wooden peg 1 1/8"in diameter and care-fully press the seal out straight, onto a soft cloth. Remove the O-ring (item 29) from around the shaft seal and wipe the O-ring and seal case clean. Place in a protective bag.



9. REMOVAL OF THE MECHANICAL SEAL- ROTATING (IMPELLER) HALF (item 30). This may be accomplished by placing plier jaws around the outside diameter and rotating, while lifting, the seal. This process may damage the seal which should be of no concern if replacement is the intent. If you wish to retain the used seal, soften the plier jaw grip with cardboard or tape.

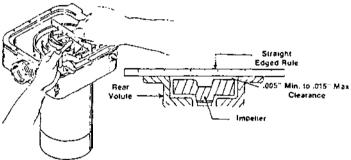
C. RE-ASSEMBLY OF THE PUMP

1. INSTALLATION OF THE MECHANICAL SEAL -ROTATING (IMPELLER) HALF (ITEM 30).
Lubricate the rubber Section of the seal (item30) with
vegetable oil. Insert the seal by pressing with a dean piece
of 1" plastic pipe 1 1/4"long.Protect the smooth sealing
surface from damage when pressing in the seal. Insure that
the seal is fully seated in the impeller (item 33). The flat face
of the seal should be completely exposed after installation.

- 2. INSTALLATION OF THE MECHANICAL SEAL -STATIONARY (BODY) HALF (ITEM31). Lubricate the seal-O-ring (item 29) with vegetable oil. Slip the O-ring onto the seal case (item 31) and locate the seal within its seat area in the body (item 2). Using an arbor press, press the seal into place. Use a piece of pipe that will bear only on the flange of the seal case. Damage to the smooth face will cause leakage. Be sure the seal is fully seated. The seal should never be inserted by impact (e.g., hammering)!
- 3. Reassemble the pump body (item 2) to the motor (note the motor orientation). Seat the body over the circular flange on the motor mounting face. Align the holes. Place one Oring (item 36) on each screw (item 3). Apply a drop of Loctite 242 thread sealant to each screw and torque to 20-25 foot lbs.
- 4. INSTALLING THE SCREW PROTECTOR PLUGS You may find that the plugs (item 5) seem to "spring out' after insertion. This is caused by air trapped between the plug and the screw (the plug is sealed with an O-ring (item 4). Volute installation will press these into place. Rotate the rectangular standoff on the plug (item 5) to align with the ribs on the inside back of the body.
- 5. Place the volute O-ring (item 28) over the circular volute-locating pilot. Install the volute, locating the protruding key in the slot on the housing. Using the 4 self-threading screws (item 32), fasten the volute to the pump body. Fasten two screws diagonally opposite until tight, then fasten the remaining two. DO NOT OVERTIGHTEN. If volute screw plugs and o-rings (item 60) are to be used with your pump, install them at this time with the plug hole facing out. Be certain the O-rings are clean and lightly wiped with vegetable oil.
- Install the volute O-ring segments (item 8A & 88). Match
 the O-ring segment length with the length of the groove into
 which it fits. Each segment should fill the molded groove in
 the volute vanes.
- 7. INSTALLING THE IMPELLER Careful handling is required when installing the impeller (item 33). The seal face must be protected from contact with the motor shaft end. Even a hairline scratch will destroy the ability of the polished faces to seal. With the motor and pump assembly positioned vertically on the work surface install the impeller shims (item 6) on the end of the shaft. If you are re-assembling the pump to the original motor, the shims which were removed will be of the correct height. If the pump is to be assembled to a replacement motor, it is suggested that the original shims be tried., but re-shimming may be required. If re-shimming is necessary. see Paragraph C8 for impeller clearance adjustment. Insert impeller screw and tighten hand tight so that impeller is secure on shaft. Do not overtighten.

NOTE: Be sure impeller screw O-ring item #35 has been installed on impeller screw, prior to inserting screw into shaft.

8. The pump will operate at its maximum efficiency with .005" to .015" final clearance between the impeller vanes and the volute plate face (item 16). To obtain this clearance, the assembler must shim the impeller to adjust for variances in the length of the motor shaft. The correct impeller setting can be obtained by measuring the distance between the front of the impeller vanes, and the front surfaces of the rear volute (item#7). To check, place a six inch steel rule or other suitable straightedge across the volute surfaces (see illustrations below), and using automotive type feeler gages, measure the clearance between front of impeller vanes and straightedge. If this distance is less than .005" or greater than .015", remove impeller and add or subtract either .006" or .015" thick impeller shims to obtain clearance of .005" to .015".



- 9. Place the teflon gasket (item 61), Ryton pumps only, onto the inner lip of the pump body (item 2). Place the volute plate (item 16)-waffled side out-into the pump body (item 2). Orient it such that the impeller screw can be seen at the center of the hole in the volute plate. Lubricate the body O-ring (item 15) with vegetable oil only and press it into place in the groove formed between the volute plate and body-use fingers only.
- 10. Assemble the strainer housing (item 13) to the pump body using the 10 screws (item 14) and 10 nuts (item 22) . IT IS RECOMMENDED THAT YOU PERIOICALLY CHECK THAT THE IMPELLER IS FREE TO ROTATE DURING THE PROCESS OF TIGHTENING THE BODY SCREWS. WITH ELECTRIC CONNECTED. ROTATE THE IMPELLER THE PARTS DURING ASSEMBLY MAY PELLER, REQUIRING THE REMOVAL OF ONE IMPELLER SHIM item 6. AFTER AGAIN TO SEE THAT THE IMPELLER WISE DIRECTION. IF THE IMPELLER DOES NOT SPIN FREELY RESHIM PER BLY INSTRUCTIONS. SUPPLY SHUT OFF AND MOTOR DIS- COUNTER-CLOCKWISE. FLEXING OF BIND THE VOLUTE PLATE TO THE IM- TIGHTENING ALL BODY CREW CHECK ROTATES FREELY IN A COUNTERCLOCK- PARAGRAPH 'C.8' ABOVE UNDER ASSEMBLY INSTRUCTIONS.

VI. SPECIAL INFORMATION

A. FLEXIBLE COUPLED PUMPS: COUPLING ALIGNMENT

Measure the diameter of the pump shaft and power unit shaft. Choose the appropriate coupling for your pump and power unit. (See flexible couplings chart number VI-A). Proper shaft and coupling alignment reduces vibration and prevents premature coupling failure. The following 8 steps help in obtaining proper shaft alignment:

- 1. Make sure you use a rigid base plate large enough for the assembly of the pump and the driveunit. We offer kit 58-0028 for this purpose. (See baseplate kit listed after couplings chart VI-A)"
- 2. Place the pump and drive-unit on the base plate. Put 13/64" (.200") of shimming under all 4 mounting holes of the bearing pedestal.
- 3. Measure the distance between the center- line of the pump shaft and the base plate surface.
- 4. Measure the distance between the center- line of the drive-unit shaft and base plate.
- 5. Compare measurements obtained from steps 3 and 4 and use spacer blocks under the motor for height adjustment to insure alignment of both shafts.
- 6. Place the coupling halves over each shaft, put the "spider" between the two halves and couple the two halves together.
- 7. To assure parallel alignment (Figure 5) place a straight edge along the side of both coupling halves in two different locations. 90 degrees apart. the coupling is aligned when the straight edge rests squarely on the sides of both coupling halves.

90°ANGLE DRIVE SHAFT

8. To avoid angular misalignment, insert a

measuring device (taper gauge or feeler gauge)

between the coupling faces at four locations 90"

apart (See arrows in Figure 6) and measure the

equal. Reshimming may be required to achieve

gap at each of the four locations. For proper

alignment all four measurements should be

this alignment.

FIGURE 6

COUPLING PART NUMBER	POWER UNIT SHAFT' DI AM ETER	ELECTRIC MOTOR FRAME SIZES
58-0785	.625"	56
58-0786	.875"	182-184 143T-145T
58-0875	1"	
58-0876	.75"	

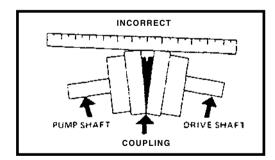
FLEXIBLE-COUPLINGS CHART VI-A

'One-half of each coupling has a .750" diameter bore to fit the pedestal pump shaft.

**BASEPLATE KIT

This kit contains a baseplate, coupling guard, shims and hardware for mounting a pedestal pump to the power units listed. All necessary mounting holes are provided in the baseplate.

58-0028-Baseplate kit for these electric motor frame sizes: 56, 143T, 145T, also can be used to mount a 3.5 to 5.5 H.P. engine.



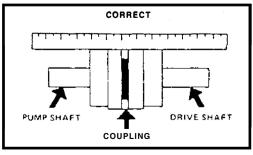
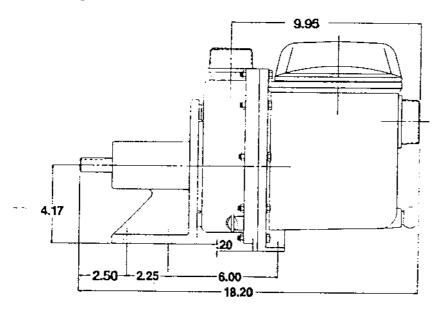
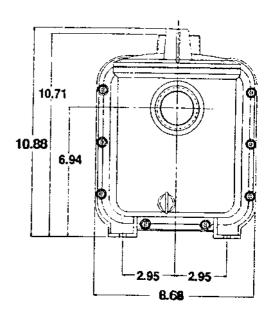


FIGURE 5

B. PEDESTAL PUMP DIMENSIONS (in inches)

cast iron bearing housing





C. CLOSE COUPLED ELECTRIC DRIVE DIMENSIONS (in inches)

with polypropylene baseplate

