

## PRINCIPLE OF OPERATION

This pump is a 2:1 pressure ratio single acting pump powered by compressed air. The 2:1 ratio is achieved by simultaneously applying air pressure over a single end of each of two pistons connected in series by a shaft. The two pressurized ends are those most distant from the pumped fluid, with the force from the air pressure exerted in the direction of the pumped fluid. The combined force is transferred through to the single end of the piston nearer to the pumped fluid—the single piston end having an area equal to one-half that of the two “air” ends—and then through a fluid cell to a single pumping diaphragm.

On this single acting pump the suction stroke is independent of all discharge conditions and requires less air pressure than the discharge stroke. The suction stroke is accomplished through an air regulator which pressurizes the piston area in the rear cylinder adjacent to the intermediate bracket, while simultaneously exhausting the other two piston areas: one in the front cylinder, adjacent to the intermediate bracket, and the other behind the rear cylinder piston, adjacent to the cap end.

## OPERATION

The regulator is factory preset to 30 psi. After the pump is installed and in operation, the operator should raise or lower the setting until maximum performance is determined by trial and error. A setting which is too high will result in excessively rapid and noisy operation, with a loss in performance and eventually shortened pump life.

The hose assemblies deliver air to the non-wetted portions of the pump, and care should be taken that they are neither crimped nor cut.

## INSTALLATION PROCEDURES

Position the pump as close as possible to the source of the liquid to be pumped. Avoid long or undersize suction lines and use the minimum number of fittings.

For permanent installation involving rigid piping, install short flexible sections of hose between the pump and piping. This reduces strains and permits easier removal of the pump for service when required.

## AIR SUPPLY

Do not connect the unit to an air supply in excess of 125 PSI (8.61 bars). Install a shutoff valve in the air supply line to permit removal of the unit for servicing. When connecting an air supply of rigid piping, mount a section of flexible line to the pump to eliminate piping strain. In permanent installations, an air line filter is recommended.

## FREEZING OR ICING OF EXHAUST

Icing of the air exhaust can occur under certain conditions of temperature and humidity on compressed air power equipment. Icing is more likely to occur at high discharge pressures. Use of the Warren Rupp Air Dryer should eliminate the problem.

## MAINTENANCE AFTER USE

When the pump is used for materials that tend to settle out or transform from liquid to solid form, care must be taken after each use or during idle time to remove them and flush the pump as required to prevent damage. In freezing temperatures the pump must be completely drained when idle. This model must be tilted to allow the liquid from the chambers to run out of the discharge port.



### **! IMPORTANT**

*Read these safety warnings and instructions in this manual completely, before installation and start-up of the pump. It is the responsibility of the purchaser to retain this manual for reference. Failure to comply with the recommendations stated in this manual will damage the pump, and void factory warranty.*



### **! CAUTION**

*Before pump operation, inspect all gasketed fasteners for looseness caused by gasket creep. Re-torque loose fasteners to prevent leakage. Follow recommended torques stated in this manual.*



### **! WARNING**

*Before maintenance or repair, shut off the compressed air line, bleed the pressure, and disconnect the air line from the pump. The discharge line may be pressurized and must be bled of its pressure.*



### **! WARNING**

*In the event of diaphragm rupture, pumped material may enter the air end of the pump, and be discharged into the atmosphere. The air exhaust must be piped to an appropriate area for safe disposition.*



### **! WARNING**

*Take action to prevent static sparking. Fire or explosion can result, especially when handling flammable liquids. The pump, piping, valves, containers or other miscellaneous equipment must be grounded.*

## CHECK VALVE SERVICING

Need for inspection or service is usually indicated by poor priming, unstable cycling, reduced performance or the pump's cycling but not pumping.

## DIAPHRAGM SERVICING/FILLING DRIVER FLUID

Motive power is delivered to the single diaphragm of the pump through a fluid cell located between the diaphragm and the drive piston. During preventative maintenance servicing (where the diaphragm has not ruptured, and the fluid cell is still filled), the fluid should be drained from the chamber by removing the pipe plug, in the lower most portion of inner chamber, item 54.

To fill the fluid cell, the piston(s) must be on full discharge stroke. To do this and hold during fill procedure, remove item 46, (fitting) from the cylinder cap (item 15) and insert air pressure. This need not be more than 10 PSI. This will move the piston(s) and hold them in the discharge position. Remove the pipe plug at the top of the fluid chamber, and fill the chamber with ethylene glycol (anti-freeze). The chamber will take 3000 ml (101.5 fluid ounces) of fluid. If the diaphragm is Teflon, use 2800 ml (95 fluid ounces). Tilt the pump to evacuate air pockets from the fluid chamber. A box wrench can be used to flex the diaphragm and purge air from the fluid chamber. Fill the chamber to the top of the fill hole, and re-insert the pipe plug, using thread compound.

If the glycol cell fluid is not compatible with the pumped product or would form a potentially dangerous mixture if the diaphragm ruptured, consult the factory before choosing an alternative fluid.

## CYLINDER PISTON SERVICING

The driver fluid must be drained (see above) to service the cylinder piston. The piston seals are different on the air side versus the driver fluid side. Typically, the fluid side will require replacement before the air side. Remove the nuts and washers that secure the air side piston cap and inner fluid chamber to the intermediate bracket. The cylinders may now be removed. Inspect the cylinder wall carefully. Scratches can cause driver fluid to leak to the air side of the pump, which can find its way to the exhaust muffler. Scratches on the air cylinder will cause too much air to leak when on pressure stroke. The locknuts holding the cylinder to the rod can now be removed. Carefully inspect the piston for scratches, burrs and wear, especially if the piston seals are worn.

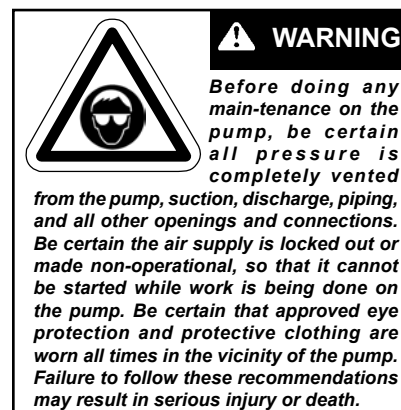
The piston seals can now be inspected or replaced. **AIR SIDE**—The air side piston has a T-Seal. If the seal is worn showing flat areas or gouges, it will require replacement. Remove seal and back-up (spacer). Remove wear rings and carefully inspect for wear. During reassembly make sure the ends of the back up spacer and wear ring end are not across from each other. **WET SIDE**—The wet side piston has a yellow PSP seal. Inspect for flat spots and gouges. Behind the seal is an energizer ring that helps to load the seal against the cylinder wall. (The energizer ring is included with the new seal.) The wear rings are the same as on the air side. Again, make sure the ends are not across from each other.

Reassembly of both pistons is the opposite of removal. Make sure the side of the **locknut with the seal is next to the piston**. The groove in the piston or o-ring (item 35), must be toward the pump center (o-ring seals next to the rod). Apply a heavy oil to the piston seals when sliding on the cylinder. The piston/nut should be torqued at 500 in./lbs. (56.49 Newton meters). The studs that secure the cylinders to the intermediate should be torqued at 250 in./lbs. (28.24 Newton meters). **IMPORTANT NOTE:** Reassembly of the wet side piston/seal assembly differs from the air side in that it must be carefully pressed into the cylinder. An arbor press is commonly used for this purpose.

## AIR VALVE LUBRICATION

The SANDPIPER pump's pilot valve and main air valve assemblies are designed to operate **WITHOUT** lubrication. This is the preferred mode of operation. There may be instances of personal preference, or poor quality air supplies when lubrication of the compressed air supply is required. The pump air system will operate with properly lubricated compressed air supplies. Proper lubrication of the compressed air supply would entail the use of an air line lubricator (available from Warren Rupp) set to deliver one drop of 10 wt., non-detergent oil for every 20 SCFM of air the pump consumed at its point of operation. Consult the pump's published performance curve to determine this.

It is important to remember to inspect the sleeve and spool set routinely. It should



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Pump complies with EN809 Pumping Directive, Directive 2006/42/EC Machinery, according to Annex VIII.

move back and forth freely. This is most important when the air supply is lubricated. If a lubricator is used, oil accumulation will, over time, collect any debris from the compressed air. This can prevent the pump from operating properly.

Water in the compressed air supply can create problems such as icing or freezing of the exhaust air causing the pump to cycle erratically, or stop operating. This can be addressed by using a point of use air dryer (available from Warren Rupp) to supplement a plant's air drying equipment. This device will remove excess water from the compressed air supply and alleviate the icing or freezing problem.

## **ESADS: Externally Serviceable Air Distribution System**

Please refer to the exploded view drawing and parts list in the Service Manual supplied with your pump. If you need replacement or additional copies, contact your local Warren Rupp Distributor, or the Warren Rupp factory Literature Department at the number shown below. To receive the correct manual, you must specify the MODEL and TYPE information found on the name plate of the pump.

### **Main Air Valve**

The main air valve sleeve and spool set is located in the valve body mounted on the pump with four hex head capscrews. The valve body assembly is removed from the pump by removing these four hex head capscrews.

With the valve body assembly off the pump, access to the sleeve and spool set is made by removing four hex head capscrews (each end) on the end caps of the valve body assembly. With the end caps removed, slide the spool back and forth in the sleeve. The spool is closely sized to the sleeve and must move freely to allow for proper pump operation. An accumulation of oil, dirt or other contaminants from the pump's air supply, or from a failed diaphragm, may prevent the spool from moving freely. This can cause the spool to stick in a position that prevents the pump from operating. If this is the case, the sleeve and spool set should be removed from the valve body for cleaning and further inspection.

Remove the spool from the sleeve. Using an arbor press or bench vise (with an improvised mandrel), press the sleeve from the valve body. Take care not to damage the sleeve. At this point, inspect the o-rings on the sleeve for nicks, tears or abrasions. Damage of this sort could happen during assembly or servicing. A sheared or cut o-ring can allow the pump's compressed air supply to leak or bypass within the air valve assembly, causing the pump to leak compressed air from the pump air exhaust or not cycle properly. This is most noticeable at pump dead head or high discharge pressure conditions. Replace any of these o-rings as required or set up a routine, preventive maintenance schedule to do so on a regular basis. This practice should include cleaning the spool and sleeve components with a safety solvent or equivalent, inspecting for signs of wear or damage, and replacing worn components.

To re-install the sleeve and spool set, lightly lubricate the o-rings on the sleeve with an o-ring assembly lubricant or lightweight oil (such as 10 wt. air line lubricant). Press the set into the valve body easily, without shearing the o-rings. Re-install one end cap, gasket and bumper on the valve body. Using the arbor press or bench vise that was used in disassembly, press the sleeve back into the valve body. You may have to clean the surfaces of the valve body where the end caps mount. Material may remain from the old gasket. Old material not cleaned from this area may cause air leakage after reassembly. Take care that the bumper stays in place allowing the sleeve to press in all the way. Reinstall the spool, the opposite end cap, gasket and bumper on the valve body. After inspecting and cleaning the gasket surfaces on the valve body and intermediate, reinstall the valve body on the pump using new gaskets. Tighten the four hex head capscrews evenly and in an alternating cross pattern.

## **PILOT VALVE ACTUATOR SERVICING**

The bushings for the pilot valve actuators are threaded into the intermediate bracket from the outside. The plunger may be removed for inspection or replacement from the inside by removing the air distribution valve body and the pilot valve body from the pump. The plungers should be visible as you look into the intermediate from the top. Depending on their position, you may find it necessary to use a fine piece of wire to pull them out.

Under rare circumstances, it may become necessary to replace the o-ring seal. The bushing can be pushed through the inner chamber by removing the outer chamber the assembly to reach the bushing.

## **TROUBLE SHOOTING**

### **1. Pump will not cycle**

A. Check to make sure the unit has enough pressure to operate and that the air inlet valve is open.

B. Check the discharge line to insure that the discharge line is neither closed nor blocked.

C. If the spool in the air distribution valve is not shifting check the main spool. It must slide freely.

D. Excessive air leakage in the pump can prevent cycling. Air leakage from the exhaust port indicates leakage in the air distribution valve. See further service instructions.

E. Blockage in the liquid chamber can impede movement of diaphragm.

### **2. Pump cycles but will not pump**

A. Suction side of pump pulling in air. Check the suction line for air leaks and be sure that the end of the suction line is submerged. Check flange bolting. Check valve flanges and manifolds to chamber flange joints.

B. Make certain the suction line or strainer is not plugged. Restriction at the suction is indicated by a high vacuum reading when a vacuum gauge is installed in the suction line.

C. Check valves may not be seating properly. To check, remove the suction line and cover the suction port with your hand. If the unit does not pull a good suction (vacuum), the check valves should be inspected for proper seating.

D. Static suction lift may be too high. Priming can be improved by elevating the suction and discharge lines higher than the check valves and pouring liquid into the unit through the suction inlet. When priming at high suction lifts or with long suction lines operate the pump at maximum cycle rate.

### **3. Low performance**

A. Capacity is reduced as the discharge pressure increases. Performance capability varies with available inlet supply. Check air pressure at the pump inlet when the pump is operating to make certain that adequate air supply is maintained.

B. Check vacuum at the pump suction. Capacity is reduced as vacuum increases. Reduced flow rate due to starved suction will be evident when cycle rate can be varied without change in capacity. This condition will be more prevalent when pumping viscous liquids. When pumping thick, heavy material the suction line must be kept as large in diameter and as short as possible, to keep suction loss minimal.

C. Low flow rate and slow cycling rate indicate restricted flow through the discharge line. Low flow rate and fast cycling rate indicate restriction in the suction line or air leakage into suction.

For more information, refer to the Warren Rupp Troubleshooting Guide.

**WARRANTY:** This unit is guaranteed for a period of five years against defective material and workmanship.

For high pressure pumps used in conjunction with another diaphragm pump in "skid mount" system: The EH2-M will not prime against the head created by the fill pump. Run both simultaneously at start-up.

## **RECOMMENDED WARREN RUPP® ACCESSORIES TO MAXIMIZE PUMP PERFORMANCE:**

- **Tranquilizer® Surge Suppressor.** For nearly pulse-free flow.
- **Warren Rupp Air Dryer.** For clean, dry compressed air.
- **Warren Rupp Filter/Regulator.** For modular installation and service convenience.
- **Warren Rupp Speed Control.** For manual or programmable process control. Manual adjustment or 4-20mA reception.

**For more detailed information on these accessories, contact your local Warren Rupp Factory-Authorized Distributor, or Warren Rupp corporate headquarters.**

| ITEM NO. | PART NUMBER        | DESCRIPTION                                | TOTAL RQD. |
|----------|--------------------|--------------------------------------------|------------|
| 1        | 008-013-080        | Adapter                                    | 1          |
| 2        | 020-008-000        | Regulator w/Gauge                          | 1          |
| 3        | <b>031-012-000</b> | <b>Sleeve &amp; Spool Set</b>              | <b>1</b>   |
| 4        | <b>095-073-000</b> | <b>Assy., Pilot Valve*</b>                 | <b>1</b>   |
| 4-A      | <b>095-070-551</b> | <b>Valve Body</b>                          | <b>1</b>   |
| 4-B      | <b>755-025-000</b> | <b>Sleeve (without o-ring)</b>             | <b>1</b>   |
| 4-C      | <b>560-033-360</b> | <b>O-Ring (Sleeve)</b>                     | <b>4</b>   |
| 4-D      | <b>775-026-000</b> | <b>Spool (without o-ring)</b>              | <b>1</b>   |
| 4-E      | <b>560-023-360</b> | <b>O-Ring (Spool)</b>                      | <b>2</b>   |
| 4-F      | <b>675-037-080</b> | <b>Retaining Ring</b>                      | <b>1</b>   |
| 5        | 095-040-156        | Valve Body                                 | 1          |
| 6        | 114-002-156        | Bracket, Intermediate                      | 1          |
| 7        | 070-006-170        | Bearing, Sleeve                            | 2          |
| 8        | 115-045-000        | Bracket                                    | 1          |
| 9        | 115-067-080        | Mounting Bracket Ass'y (EH2 only)          | 1          |
| 10       | <b>132-002-360</b> | <b>Bumper, Diaphragm</b>                   | <b>2</b>   |
| 11       | <b>132-014-358</b> | <b>Bumper, Spool</b>                       | <b>2</b>   |
| 12       | <b>135-008-000</b> | <b>Actuator, Bushing Ass'y with o-ring</b> | <b>2</b>   |
| 13       | <b>560-001-360</b> | <b>O-Ring (installs inside item 12)</b>    | <b>2</b>   |
| 14       | 165-011-157        | Cap, Valve Body                            | 2          |
| 15       | 165-047-010        | Cap, Cylinder                              | 1          |
| 16       | 170-024-330        | Capscrew, Hex Head (EH2 only)(CI)          | 2          |
|          | 170-024-330        | Capscrew, Hex Head (EH2 only) (SS)         | 4          |
| 17       | 170-032-330        | Capscrew, Hex Head                         | 8          |
| 18       | 170-045-330        | Capscrew, Hex Head                         | 4          |
| 19       | 170-050-330        | Capscrew, Hex Head                         | 2          |
| 20       | 170-052-330        | Capscrew, Hex Head (EH2, CI)               | 6          |
|          | 170-066-330        | Capscrew, Hex Head (EH2, SS)               | 4          |
| 21       | 170-057-330        | Capscrew, Hex Head (EH2 only)              | 6          |
| 22       | 170-060-330        | Capscrew, Hex Head                         | 8          |
| 23       | 275-009-331        | Cylinder                                   | 2          |
| 24       | 326-003-080        | Foot, Mounting (EH2 only)                  | 1          |
| 25       | <b>360-010-425</b> | <b>Gasket, End Cap</b>                     | <b>2</b>   |
| 26       | <b>360-041-425</b> | <b>Gasket, Valve Body</b>                  | <b>1</b>   |
| 27       | 360-048-425        | Gasket, Valve Body                         | 1          |
| 28       | 426-009-000        | Hose Assembly                              | 2          |
| 29       | 426-015-000        | Hose Assembly                              | 1          |
| 30       | 530-036-000        | Muffler                                    | 1          |
| 31       | 545-007-330        | Nut, Hex (EH2 only) (CI)                   | 18         |
|          | 545-007-330        | Nut, Hex (EH2 only) (SS)                   | 20         |
| 32       | 547-009-080        | Nut Lock                                   | 2          |
| 33       | <b>560-020-360</b> | <b>O-Ring</b>                              | <b>6</b>   |
| 34       | <b>560-022-360</b> | <b>O-Ring</b>                              | <b>5</b>   |
| 35       | <b>560-076-360</b> | <b>O-Ring</b>                              | <b>2</b>   |
| 36       | 605-012-151        | Piston                                     | 2          |
| 37       | 618-007-330        | Plug, Pipe                                 | 1          |
| 38       | <b>620-004-114</b> | <b>Plunger, Actuator</b>                   | <b>2</b>   |
| 39       | 685-043-120        | Rod, Connecting                            | 1          |
| 40       | <b>720-004-360</b> | <b>Seal, U-Cup</b>                         | <b>2</b>   |
| 41-A     | <b>720-022-360</b> | <b>T-Seal with 2 backups</b>               | <b>1</b>   |
| 41-B     | 720-034-000        | PSP Seal with energizer                    | 1          |
| 42       | 677-001-542        | Wear Ring                                  | 4          |
| 43       | 807-047-080        | Stud                                       | 8          |
| 44       | 866-025-162        | Connector, Male                            | 2          |

Repair Parts shown in **bold face (darker)** type are more likely to need replacement after extended periods of normal use. They are readily available from most Warren Rupp distributors. The pump owner may prefer to maintain a limited inventory of these parts in his own stock to reduce repair downtime to a minimum.

**IMPORTANT:** When ordering repair parts always furnish pump model number, serial number and type number.

#### MATERIAL CODES

##### The Last 3 Digits of Part Number

|               |                                                                             |
|---------------|-----------------------------------------------------------------------------|
| 000...        | Assembly, sub-assembly; and some purchased Items                            |
| 010...        | Cast Iron                                                                   |
| 012...        | Powered Metal                                                               |
| 015...        | Ductile Iron                                                                |
| 020...        | Ferritic Malleable Iron                                                     |
| 025...        | Music Wire                                                                  |
| 080...        | CarbonSteel AISI B-1112                                                     |
| 100...        | Alloy 20                                                                    |
| 110...        | Alloy Type 316 Stainless Steel                                              |
| 111...        | Alloy Type 316 Stainless Steel (Electro Polished)                           |
| 112...        | Alloy "C"                                                                   |
| 113...        | Alloy Type 316 Stainless Steel (Hand Polished)                              |
| 114...        | 303 Stainless Steel                                                         |
| 115...        | 302/304 Stainless Steel                                                     |
| 117...        | 440-C Stainless Steel (Martensitic)                                         |
| 120...        | 416 Stainless Steel (Wrought Martensitic)                                   |
| 123...        | 410 Stainless Steel (Wrought Martensitic)                                   |
| 148...        | Hardcoat Anodized Aluminum                                                  |
| 149...        | 2024-T4 Aluminum                                                            |
| 150...        | 6061-T6 Aluminum                                                            |
| 151...        | 6063-T6 Aluminum                                                            |
| 152...        | 2024-T4 Aluminum (2023-T351)                                                |
| 154...        | Almag 35 Aluminum                                                           |
| 155 or 156... | 356-T6 Aluminum                                                             |
| 157...        | Die Cast Aluminum Alloy #380                                                |
| 158...        | Aluminum Alloy SR-319                                                       |
| 159...        | Anodized Aluminum                                                           |
| 162...        | Brass, Yellow, Screw Machine Stock                                          |
| 165...        | Cast Bronze, 85-5-5-5                                                       |
| 166...        | Bronze SAE 660                                                              |
| 170...        | Bronze, Bearing Type, Oil Impregnated                                       |
| 180...        | Copper Alloy                                                                |
| 310...        | Kynar Coated                                                                |
| 330...        | Zinc Plated Steel                                                           |
| 331...        | Chrome Plated Steel                                                         |
| 332...        | Electroless Nickel Plated                                                   |
| 335...        | Galvanized Steel                                                            |
| 336...        | Zinc Plated Yellow Brass                                                    |
| 337...        | Silver Plated Steel                                                         |
| 340...        | Nickel Plated                                                               |
| 342...        | Filled Nylon                                                                |
| 354...        | Injection Molded #203-40 Santoprene - Duro 40D ± 5; Color: RED              |
| 355...        | Thermoplastic Elastomer                                                     |
| 356...        | Hytrel                                                                      |
| 357...        | (Urethane Rubber) Color                                                     |
| 358...        | (Urethane Rubber) Color coded: PURPLE (Some Applications, Compression Mold) |
| 359...        | Urethane Rubber                                                             |
| 360...        | Nitrile Rubber Color coded: RED                                             |
| 361...        | Nitrile                                                                     |
| 363...        | FKM Color coded: YELLOW                                                     |
| 364...        | E.P.D.M. Rubber Color coded: BLUE                                           |
| 365...        | Neoprene Rubber Color coded: GREEN                                          |
| 370...        | Butyl Rubber Color coded: BROWN                                             |
| 371...        | Phlthane (Tuftane)                                                          |

List continued next page

| ITEM NO.                                        | PART NUMBER         | DESCRIPTION                                       | TOTAL RQD. |
|-------------------------------------------------|---------------------|---------------------------------------------------|------------|
| 45                                              | 866-040-162         | Fitting                                           | 2          |
| 46                                              | 866-041-162         | Fitting                                           | 2          |
| 47                                              | 900-001-330         | Washer, Lock                                      | 2          |
| 48                                              | 900-004-330         | Washer, Lock (EH2 only)                           | 6          |
| 49                                              | 900-006-330         | Washer, Lock (EH2, CI Models)<br>(EH2, SS Models) | 18<br>20   |
| 50                                              | 132-022-360         | Bumper (goes to head of item 38)                  | 2          |
| 51                                              | 901-005-330         | Washer, Flat (EH2 only)                           | 6          |
| 52                                              | <b>050-005-354</b>  | <b>Ball, Check Valve (EH2, CI Only)</b>           | <b>2</b>   |
|                                                 | <b>050-005-360</b>  | <b>Ball, Check Valve (EH2, CI Only)</b>           | <b>2</b>   |
|                                                 | <b>050-005-363</b>  | <b>Ball, Check Valve (EH2, CI Only)</b>           | <b>2</b>   |
|                                                 | <b>050-005-364</b>  | <b>Ball, Check Valve (EH2, CI Only)</b>           | <b>2</b>   |
|                                                 | <b>050-005-365</b>  | <b>Ball, Check Valve (EH2, CI Only)</b>           | <b>2</b>   |
|                                                 | <b>050-010-600</b>  | <b>Ball, Check Valve (EH2, CI Only)</b>           | <b>2</b>   |
|                                                 | <b>050-017-354</b>  | <b>Ball, Check Valve (EH2, SS Only)</b>           | <b>2</b>   |
|                                                 | <b>050-017-360W</b> | <b>Ball, Check Valve (EH2, SS Only)</b>           | <b>2</b>   |
|                                                 | <b>050-017-364W</b> | <b>Ball, Check Valve (EH2, SS Only)</b>           | <b>2</b>   |
|                                                 | <b>050-017-365W</b> | <b>Ball, Check Valve (EH2, SS Only)</b>           | <b>2</b>   |
|                                                 | <b>050-017-366W</b> | <b>Ball, Check Valve (EH2, SS Only)</b>           | <b>2</b>   |
|                                                 | <b>050-018-600</b>  | <b>Ball, Check Valve (EH2, SS Only)</b>           | <b>2</b>   |
| 53                                              | 115-064-080         | Bracket, Mounting (EH2, CI Only)                  | 1          |
|                                                 | 115-072-080         | Bracket, Mounting (EH2, SS Only)                  | 1          |
| 54                                              | 196-029-015         | Chamber, Inner                                    | 1          |
| 55                                              | 196-053-010         | Chamber, Outer (EH2 only)                         | 1          |
|                                                 | 196-047-110         | Chamber, Outer (EH2 only)                         | 1          |
| 56                                              | <b>286-036-354</b>  | <b>Diaphragm</b>                                  | <b>1</b>   |
|                                                 | <b>286-036-360</b>  | <b>Diaphragm</b>                                  | <b>1</b>   |
|                                                 | <b>286-036-363</b>  | <b>Diaphragm</b>                                  | <b>1</b>   |
|                                                 | <b>286-036-364</b>  | <b>Diaphragm</b>                                  | <b>1</b>   |
|                                                 | <b>286-036-365</b>  | <b>Diaphragm</b>                                  | <b>1</b>   |
|                                                 | <b>286-036-366</b>  | <b>Diaphragm</b>                                  | <b>1</b>   |
| 57                                              | 312-046-020         | 90° Street Elbow (EH2, CI Only)                   | 1          |
|                                                 | 312-046-110         | 90° Street Elbow (EH2, SS Only)                   | 1          |
| 58                                              | 334-038-010         | Flange, Suction (EH2 only)                        | 1          |
|                                                 | 334-044-110         | Flange, Suction (EH2 only)                        | 1          |
| 59                                              | 334-039-010         | Flange, Discharge (EH2 only)                      | 1          |
|                                                 | 334-043-110         | Flange, Discharge (EH2 only)                      | 1          |
| 60                                              | 618-003-330         | Plug, Pipe (EH2, CI Only)                         | 1          |
|                                                 | 618-003-110         | Plug Pipe (EH2, SS Only)                          | 1          |
| 61                                              | 722-040-110         | Seat Check Valve (EH2, SS Only)                   | 2          |
|                                                 | 722-042-080         | Seat, Check Valve (EH2, CI Only)                  | 2          |
| 62                                              | 560-079-360         | O-Ring (CI Only)                                  | 4          |
|                                                 | 560-079-611         | O-Ring (CI Only)                                  | 4          |
|                                                 | 560-106-360         | O-Ring (SS Only)                                  | 4          |
|                                                 | 560-106-363         | O-Ring (SS Only)                                  | 4          |
|                                                 | 560-106-364         | O-Ring (SS Only)                                  | 4          |
|                                                 | 560-106-365         | O-Ring (SS Only)                                  | 4          |
|                                                 | 720-060-600         | Seal (SS Only)                                    | 4          |
| 69                                              | 618-003-110         | Plug, Pipe                                        | 1          |
| 70                                              | 326-006-080         | Foot (SS Only)                                    | 1          |
| For models with PTFE overlay pumping diaphragm: |                     |                                                   | 1          |
| 63                                              | 612-097-110         | Plate, Diaphragm (Outer)                          | 1          |
|                                                 | 612-039-010         | Plate, Diaphragm (Outer)                          | 1          |
| 64                                              | 286-020-604         | Diaphragm                                         | 1          |
| 65                                              | 286-005-365         | Diaphragm                                         | 1          |
| 66                                              | 612-047-330         | Plate, Diaphragm (Inner)                          | 1          |
| 67                                              | 900-007-330         | Washer, Lock                                      | 1          |
| 68                                              | 545-009-330         | Nut, Hex                                          | 1          |
| Not Shown:                                      |                     |                                                   |            |
|                                                 | 545-008-330         | Nut, Hex (SS Only)                                | 4          |
|                                                 | 900-003-330         | Washer, Lock (SS Only)                            | 4          |

\* Available in kit form. Order P/N 031-055-000 which also includes Items 26, 27, 38 & 50.

Repair Parts shown in **bold face (darker)** type are more likely to need replacement after extended periods of normal use. They are readily available from most Warren Rupp distributors. The pump owner may prefer to maintain a limited inventory of these parts in his own stock to reduce repair downtime to a minimum.

**IMPORTANT:** When ordering repair parts always furnish pump model number, serial number and type number.

#### MATERIAL CODES

##### The Last 3 Digits of Part Number

*Continued from previous page*

375...Fluorinated Nitrile  
378...High density Polypropylene  
405...Cellulose Fibre  
408...Cork and Neoprene  
425...Compressed Fibre  
426...Blue Gard  
440...Vegetable Fibre  
465...Fibre  
500...Delrin 500  
501...Delrin 570  
505...Acrylic Resin Plastic  
520...Injection Molded PVDF Natural Color  
540...Nylon  
541...Nylon  
542...Nylon  
544...Nylon Injection Molded  
550...Polyethylene  
551...Polypropylene  
552...Unfilled Polypropylene  
553...Unfilled Polypropylene  
555...Polyvinyl Chloride  
570...Rulon II  
580...Ryton  
590...Valox  
591...Nylatron G-S  
592...Nylatron NSB  
600...Virgin PTFE  
601...Virgin PTFE (Bronze and moly filled)  
602...Filled PTFE  
603...Blue Gylon  
604...Virgin PTFE  
606...Virgin PTFE  
610...PTFE Encapsulated Silicon  
611...PTFE Encapsulated Viton

Delrin, Virgin PTFE, Viton and Hytrel are registered tradenames of E.I. DuPont.

Gylon is a registered tradename of Garlock, Inc.

Nylatron is a registered tradename of Polymer Corp.

Rulon II is a registered tradename of Dixon Industries Corporation.

Hastelloy-C is a registered tradename of Cabot Corp.

Ryton is a registered tradename of Phillips Chemical Company.

Valox is a registered tradename of General Electric Company.

SANDPIPER, PortaPump, Tranquilizer, SludgeMaster and Warren Rupp are registered tradenames of Warren Rupp, Inc.

## AVAILABLE REPAIR PART KITS

### ITEM

### NO. PART NUMBER DESCRIPTION

---

|             |                                                                                                              |
|-------------|--------------------------------------------------------------------------------------------------------------|
| 476-100-000 | AIR END KIT (for both EH2 and SH2) Gaskets, O-Rings, Seals, Air Valve Sleeve and Spool, Pilot Valve Assembly |
|-------------|--------------------------------------------------------------------------------------------------------------|

#### **Repair Parts Kit for EH2:**

|             |                                                                                                                                   |
|-------------|-----------------------------------------------------------------------------------------------------------------------------------|
| 476-048-360 | WETTED END KIT (CI Only) FKM<br>Diaphragm, Check Balls and O-Rings, Carbon Steel Seats                                            |
| 476-048-363 | WETTED END KIT (CI Only) FKM<br>Diaphragm and Check Balls, PTFE O-Rings, Carbon Steel Seats                                       |
| 476-048-364 | WETTED END KIT (CI Only) EPDM<br>Diaphragm and Check Balls, PTFE O-Rings, Carbon Steel Seats                                      |
| 476-048-365 | WETTED END KIT (CI Only) Neoprene<br>Diaphragm and Check Balls, Buna O-Rings, Carbon Steel Seats                                  |
| 476-048-633 | WETTED END KIT (CI Only) FKM<br>Diaphragm, PTFE Check Balls and O-Rings, Carbon Steel Seats                                       |
| 476-048-635 | WETTED END KIT (CI Only) Neoprene<br>Backup Diaphragm, PTFE Overlay Diaphragm and O-Rings, Carbon Steel Seats                     |
| 476-056-635 | WETTED END KIT EH2 (SS Only) Neoprene<br>Backup Diaphragm, PTFE Overlay Diaphragm, Check Balls and O-Rings, Stainless Steel Seats |
| 476-056-360 | WETTED END KIT (SS Only) Buna Diaphragm, Check Balls and O-Rings, Stainless Steel Seats                                           |
| 476-056-364 | WETTED END KIT (SS Only) EPDM<br>Diaphragm and Check Balls, PTFE O-Rings, Stainless Steel Seats                                   |
| 476-056-365 | WETTED END KIT (SS Only) Neoprene<br>Diaphragm and Check Balls, Buna O-Rings, Stainless Steel Seats                               |
| 476-056-633 | WETTED END KIT (SS Only) Viton<br>Diaphragm, PTFE Check Balls and O-Rings, Stainless Steel Seats                                  |

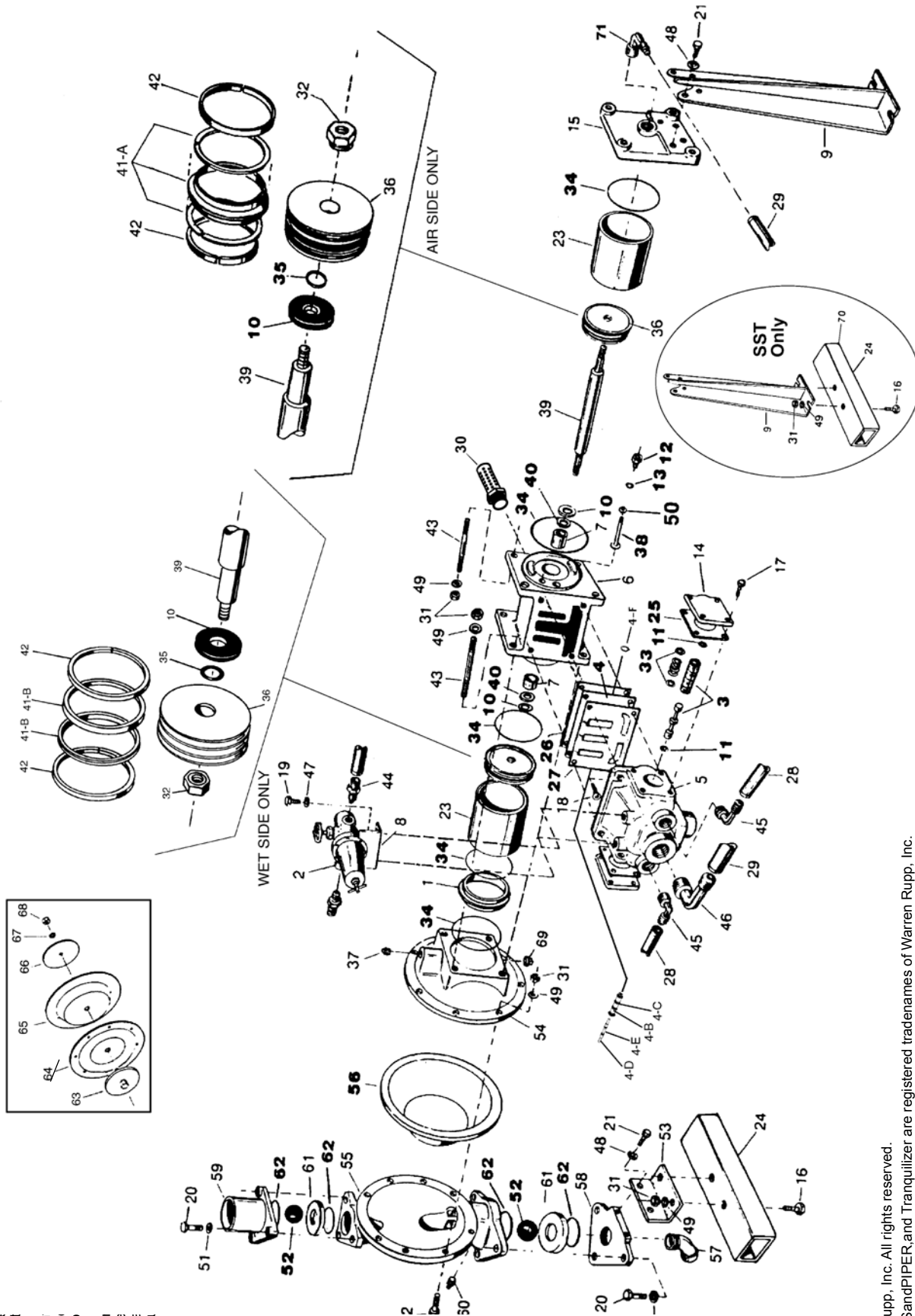
#### **Repair Parts Kit for SH2:**

|             |                                                                           |
|-------------|---------------------------------------------------------------------------|
| 476-055-360 | WETTED END KIT Buna Diaphragm, Flap Valves, Hinge Pads and Seats          |
| 476-055-363 | WETTED END KIT FKM Diaphragm, Flap Valves, Hinge Pads and Seats           |
| 476-055-364 | WETTED END KIT EPDM Diaphragm, Flap Valves, Hinge Pads and Seats          |
| 476-055-365 | WETTED END KIT Neoprene Diaphragm, Flap Valves and Hinge Pads, Buna Seats |

# **USE OF Virgin F**

When the T<sub>1</sub> required, an out plate (item 66) diaphragm's cen and elastomeric. the outer plate to the lock washer (54.23 Newton ) specified in the section of this me driver fluid when i

**SERVING.**



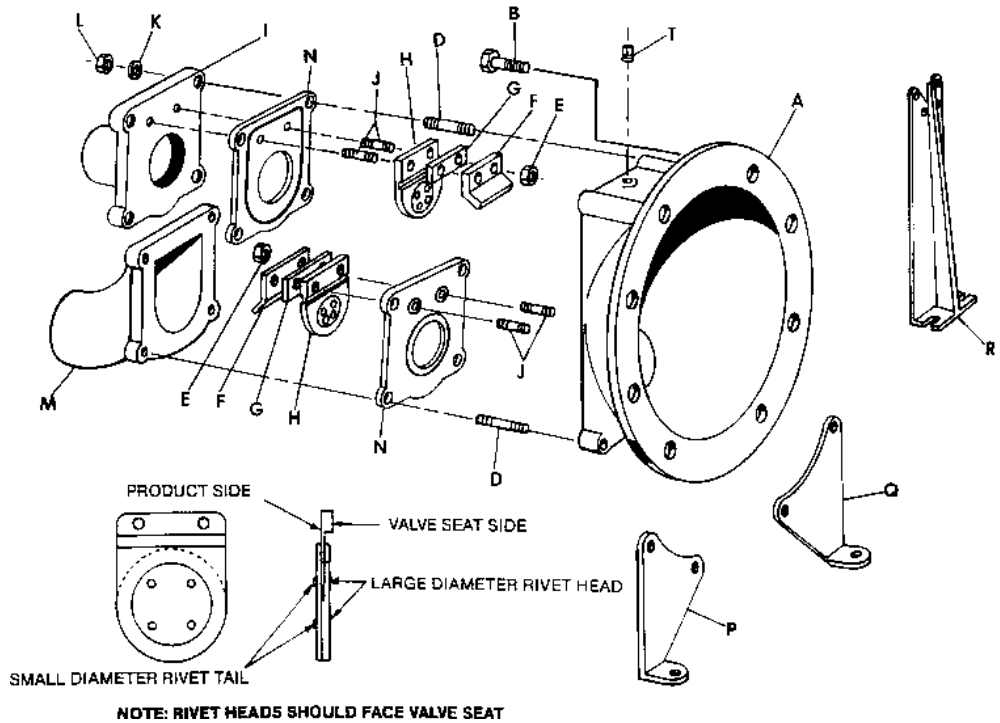
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# SH2-M TYPE 7 SANDPIPER PUMP - ADDER SHEET

The SH2-M Type 7 SANDPIPER Pump is a flap valve version of the EH2-M pump.

The SH2-M pump is identical to the EH2-M except for the wetted parts.

New items on SH2-M pump are as shown on this exploded view. Part numbers are shown below.



## NEW SH2-M PARTS

| ITEM | PART NO.    | DESCRIPTION               | QTY |
|------|-------------|---------------------------|-----|
| A.   | 196-002-155 | Outer Chamber             | (1) |
|      | 196-002-010 | Outer Chamber             | (1) |
| B.   | 170-060-330 | Hex Head Cap Screw        | (8) |
| D.   | 807-008-330 | Stud                      | (8) |
| E.   | 547-002-110 | Stop Nut                  | (4) |
| F.   | 670-005-110 | Flap Valve Retainer       | (2) |
| G.   | 570-001-360 | Hinge Pad Flap Valve      | (2) |
|      | 570-001-363 | Hinge Pad Flap Valve      | (2) |
|      | 570-001-364 | Hinge Pad Flap Valve      | (2) |
|      | 570-001-365 | Hinge Pad Flap Valve      | (2) |
| H.   | 338-005-360 | Flap Valve                | (2) |
|      | 338-005-363 | Flap Valve                | (2) |
|      | 338-005-364 | Flap Valve                | (2) |
|      | 338-005-365 | Flap Valve                | (2) |
|      | 338-010-357 | Flap Valve                | (2) |
| I.   | 334-014-156 | Suction Flange            | (1) |
|      | 334-014-010 | Suction Flange            | (1) |
| J.   | 807-018-110 | Stud                      | (4) |
| K.   | 900-005-330 | Lock Washer               | (8) |
| L.   | 545-005-330 | Hex Nut                   | (8) |
| M.   | 334-015-156 | Discharge Flange          | (1) |
|      | 334-015-010 | Discharge Flange          | (1) |
| N.   | 722-070-360 | Flap Valve Seat           | (2) |
|      | 722-070-363 | Flap Valve Seat           | (2) |
|      | 722-070-364 | Flap Valve Seat           | (2) |
| P.   | 115-062-080 | Left Hand Mounting Foot   | (1) |
| Q.   | 115-063-080 | Right Hand Mounting Foot  | (1) |
| R.   | 115-075-080 | Mounting Bracket Assembly | (1) |
| T.   | 618-003-330 | Pipe Plug                 | (2) |

## EH2-M PARTS REPLACED

| ITEM | PART NO.    | DESCRIPTION               | QTY. |
|------|-------------|---------------------------|------|
| 9.   | 115-067-080 | Mounting Bracket Assembly | (1)  |
| 16.  | 170-024-330 | Hex Head Capscrew         | (2)  |
| 20.  | 170-052-330 | Hex Head Capscrew         | (6)  |
| 21.  | 170-057-330 | Hex Head Capscrew         | (2)  |
| 22.  | 170-060-330 | Hex Head Capscrew         | (8)  |
| 24.  | 326-003-080 | Mounting Foot             | (1)  |
| 31.  | 545-007-330 | Hex Nut                   | (2)  |
| 48.  | 900-004-330 | Lock Washer               | (2)  |
| 49.  | 900-006-330 | Lock Washer               | (2)  |
| 51.  | 901-005-330 | Flat Washer               | (6)  |
| 52.  | 050-000-000 | Check Ball                | (2)  |
| 53.  | 115-000-000 | Mounting Bracket          | (1)  |
| 55.  | 196-000-000 | Outer Chamber             | (1)  |
| 57.  | 312-046 000 | 90° Street Elbow          | (1)  |
| 58.  | 334-000-000 | Suction Flange            | (1)  |
| 59.  | 334-000-000 | Discharge Flange          | (1)  |
| 60.  | 618-003-000 | Pipe Plug                 | (1)  |
| 61.  | 722-000-000 | Check Valve Seat          | (2)  |

## FLAP CHECK VALVE SERVICING

Valve inspection requires removal of (4)  $\frac{3}{8}$ " hex nuts. On the suction side the flange, when removed, carries the valve and seat as an assembly. On the discharge side, the valve and seat will stay with the diaphragm housing. Visual inspection and cleaning is possible. If parts are to be replaced, remove the self locking nuts and all parts are accessible.

# **WARREN RUPP, INC.®**

## **Declaration of Conformity**

### **Manufacturer:**

**Warren Rupp, Inc.®, 800 N. Main Street, P.O. Box 1568,  
Mansfield, Ohio, 44901-1568 USA**

certifies that Air-Operated Double Diaphragm Pump Series: HDB, HDF, M Non-Metallic, S Non-Metallic, M Metallic, S Metallic, T Series, G Series, RS Series U Series, EH and SH High Pressure, W Series, SMA and SPA Submersibles, and Tranquilizer Surge Suppressors comply with the European Community Directive 2006/42/EC on Machinery, according to Annex VIII. This product has used Harmonized Standard EN809:1998+A1:2009, Pumps and Pump Units for Liquids - Common Safety Requirements, to verify conformance.

David Roseberry  
Signature of authorized person

October 20, 2005  
Date of issue

David Roseberry  
Printed name of authorized person

Engineering Manager  
Title

Revision Level: F

April 19, 2012  
Date of revision

**IDEX**  
CORPORATION



# **WARREN RUPP, INC.<sup>®</sup>**

## **EC Declaration of Conformity**

In accordance with ANNEX VIII ATEX Directive 94/9/EC,  
Equipment intended for use in potentially explosive environments.

**Manufacturer:**

Warren Rupp, Inc.<sup>®</sup>  
A Unit of IDEX Corporation  
800 North Main Street  
P.O. Box 1568  
Mansfield, OH 44901-1568 USA

**Applicable Standard:**

EN13463-1: 2001,  
EN13463-5: 2003



**Air Operated Double Diaphragm Pumps**

II 2 GD c T5

II 3/2 GD c T5 (non-conductive fluids)

**SANDPIPER<sup>®</sup>**  
A WARREN RUPP, INC. BRAND

DATE/APPROVAL/TITLE:  
3 January 2013

*David Roseberry*  
David Roseberry, Engineering Manager

**IDEX**  
CORPORATION