

Servicing of Surge Alamo Vacuum Pumps

BEFORE YOU DO ANY REPAIR WORK:

Inspect the vacuum pump at the dairy farm for:

1. VISUAL APPEARANCE
2. OVERHEATING
3. CHECK THE HOUSING TEMPERATURE.
4. CHECK THE LEVEL OF THE OILER (ask the dairyman if the pump has ever been run without oil.)
5. CHECK THE PULLEY BELT for proper tension.
6. CHECK THE EXHAUST arrangement to be sure that it complies with the recommendations outlined on preceding pages in this section.

The following parts are most often used in the repair of Surge Alamo Pumps.

13963	.002 Thick Shims (Red)
13964	.003 Thick Shims (Green)
13965	.005 Thick Shims (Blue)
13957	Ball Bearings (Earlier Pumps)
13529	Ball Bearings (Present Pumps)
13970	Outer Roller Bearings/Seal
13988	Vanes for Alamo 550, 40+, 30+, 20+
13905	Vanes for Alamo 1200, 1400, 200+ 100+, 75+, 60+, 50+
13918	Dowel Pin
88941	Gasket Sealant
12652	Repl. End Plate — Shaft side all pumps, except (*)
12653	Repl. End Plate — Dead side all pumps, except (*)
*12648	Repl. End Plate — Shaft side 1200 only
*12649	Repl. End Plate — Dead side 1200 only
†12629	Repl. Rotor/Shaft Ass'y 550, 40+, 30+, 20+
†12647	Repl. Rotor/Shaft Ass'y — 200+ CW only
†12678	Repl. Rotor/Shaft Ass'y — 1200 only
12679	Repl. Rotor/Shaft Ass'y — all pumps, except (†)

.004 x 12" and
.002 x 12"/.003 x 12"
STRIP GAUGES



.002 to
.020 GAP
GAUGE

5/8" COLD CHISEL

3/16" DRIFT PUNCH



7/16" x 2 1/2" CAP SCREWS
(With out Heads)

7/16" END WRENCH

1/2" END WRENCH

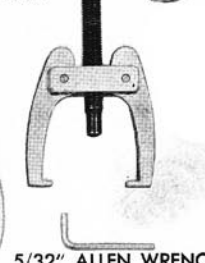
8" FILE



16 OZ. BALL PEAN HAMMER



SNAP LOCK
RING PLIERS

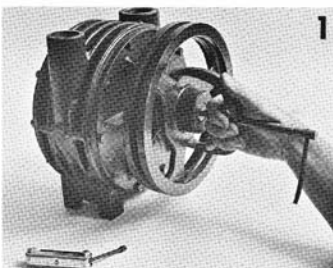


5/32" ALLEN WRENCH



1 3/4" x 5" COLD IRON PUNCH

Shown above are the tools that you will need to properly repair a Surge Alamo Vacuum Pump.



END PLATE CAP
(NO. 13525) —
MODIFIED WITH
1 1/2" HOLE

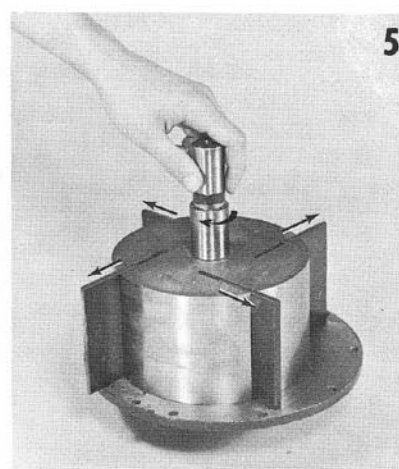
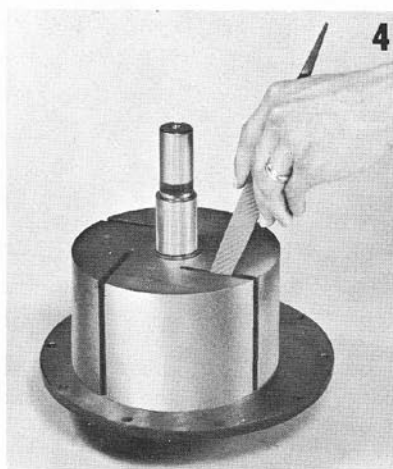
1/4"-20 x 1 1/2"
SCREWS - (3)

5/16"-18 x 1 3/4"
CAPSCREW

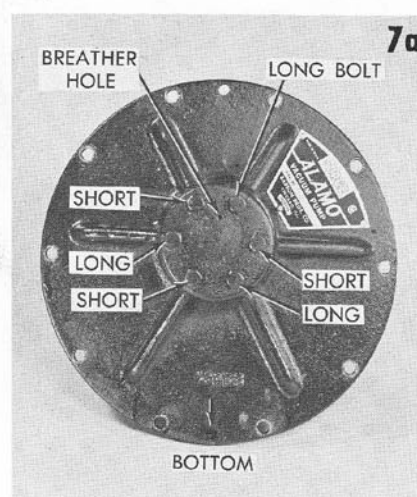
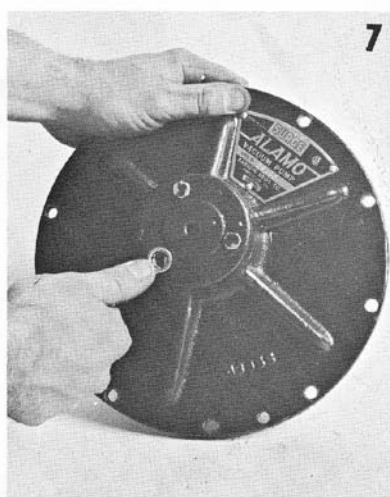


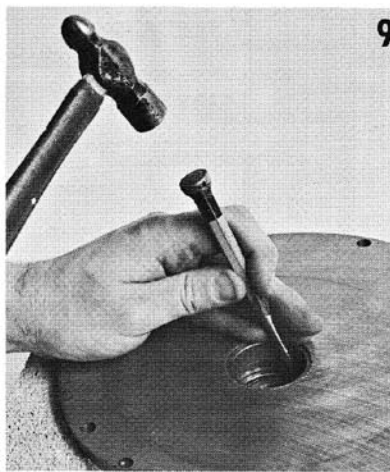
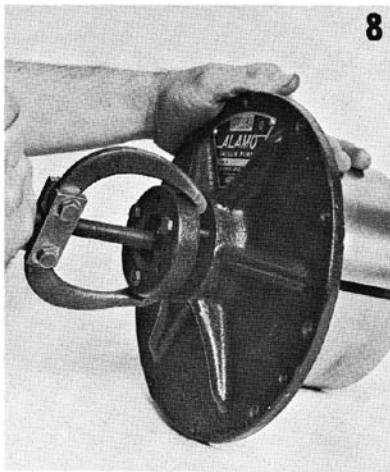
Prior to beginning repair of pump, remove Oil Reclaimer or L-2/L-3 Oilers and all oil line assemblies.

1. As shown, place pump on workbench or table. Remove Allen set-screws from 10 inch pulley or coupling flange. Remove pulley or coupling with wheel puller. File shaft to remove any burrs.



2. Tap out dowel pins (2) from the dead end plate of pump. Turn the pump over on its top and support with blocks of wood. Remove all the 5/16" bolts from the end plate and knock the end plate free from the pump body. Make sure that the key-way slot on the shaft is directly up and in full view. If not up, it will cut the oil seal as the rotor assembly is removed from the pump body.
3. Remove the end plate with rotor assembly from the pump body. To keep from damaging the oil seal, (or on earlier models from breaking its clamp ring), support the rotor with your hand and slowly slide the end plate and rotor assembly straight out of the pump body. **THE PUMP BODY MUST BE UPSIDE DOWN AND SUPPORTED DURING THIS PROCEDURE!**
4. Clean the end plates, end cap, cylinder, rotor and vanes with a non-flammable solvent, and file any rough surfaces. Special attention should be given to vane slots. Examine vanes for mushrooming, splitting or chips and replace if necessary. Mushroomed edge may be filed.
5. Be sure vanes slide freely in rotor slots. Vanes should slide out of slots when rotor is turned. If vanes are **not** of the new "Fiberestos" material, they should be replaced with the new vanes.
6. Place end plate and rotor assembly on workbench with the end plate hanging over the edge of the work surface. Check ball bearing by trying to rock the end plate. If there is any "play," replace the bearing. Also check for end plate to rotor clearance with .004 feeler gauge. Any measurement greater than .004 should result in the end plate and rotor assembly being disassembled and rebuilt.
7. To inspect ball bearings, the end plate must be removed from rotor assembly. Remove three cap screws. Remove cap screw with lockwasher and positioning washer to allow access to ball bearing. After washers are removed, install bolt into rotor. This will prevent damage to the threads of the shaft.
- 7a. On earlier models (with 6 screw end cap), care should be taken to loosen the 3 long bolts first,





turning them slowly and equally to prevent breakage of the clamp ring. Then the three short cap screws may be removed. (Refer to photo 7a for determining long and short bolts before loosening any bolts.)

8. To remove the end plate, take the three longer bolts and the end cap with the hole in it – place on end plate and tighten bolts evenly, leaving room for the lips of the wheel puller. Pull end plate from rotor with wheel puller, as shown.
9. Knock bearing from end plate assembly by using a punch from the inside.
- 9a. On earlier models where bearing is to be replaced, place lip of wheel puller (lip should be ground off to 5/32") behind the clamp ring No. 13960. Often times, the clamp ring will break upon removal. Make sure a replacement clamp with oil seal No. 13996 is on hand before attempting removal.
10. Inspect the bearing stop in the end plate. It should measure 5/64 of an inch from the intersurface. **THIS IS A VERY CRITICAL DIMENSION AND THE PUMP CANNOT BE REBUILT PROPERLY**

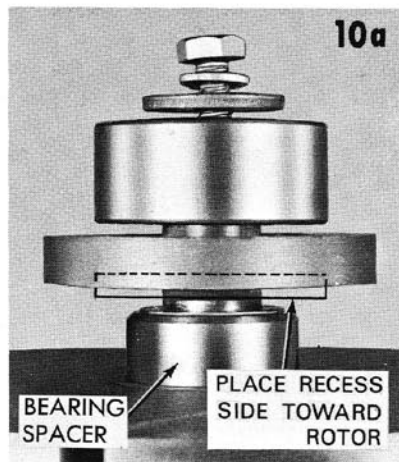
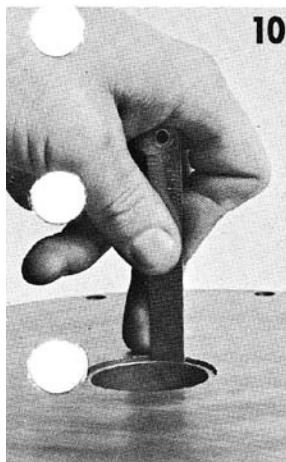
WITHOUT THIS DIMENSION BEING HELD. Removal of the end plate alone can cause this bearing stop to move as can a number of other pump failures cause it to move.

The position of the bearing stop is what allows for proper shimming and end plate clearance. If possible the measurement should be more, but never less than the 5/64 of an inch, since the stop can be moved back during the pump rebuilding procedure. Check all parts for wear, the effects of heat, and for rotor scoring. Clean all parts thoroughly.

- 10a. On earlier models, inspect the bearing spacer No. 13961. If the spacer is scored, it should be replaced. To replace this spacer, split with a cold chisel and remove. Replace with new spacer.

The oil seal and clamp ring should be purchased as one unit for best service. (See No. 13996.) Replace this unit on rotor shaft with seal toward rotor, as shown, and replace bearing and washers.

11. With the rotor assembly supported on the workbench with the shaft side down, position the dead end end plate (WITH THE BEARING STOP

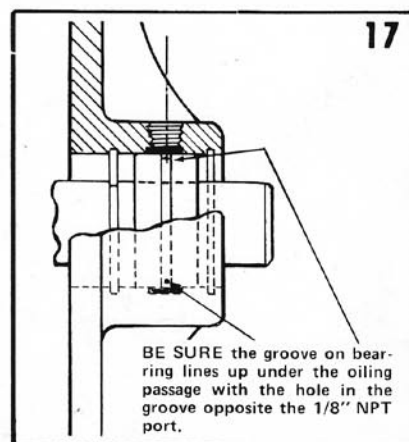
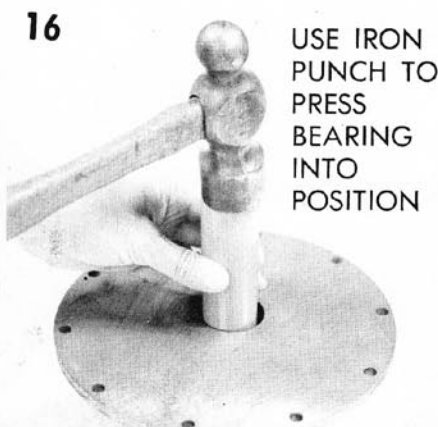




PROPERLY SET) on the rotor assembly and check to see that the end plate is resting squarely on the rotor. Gently tap the bearing onto the shaft and into the end plate to get bearing started. Using the longer 5/16" bolt with washer, pull the bearing into place. Remove longer bolt and replace with grade 5 bolt, lockwasher and positioning washer, as shown. Tighten to 200 in-lbs. A thread locking sealant is also recommended to prevent the bolt from backing out.

- 11a. On earlier models, assemble end cap No. 13962 to rotor assembly. The two "headless" 7/16" x 2 1/2" cap screws can be used as guide bolts to aid positioning, as shown. Note that the breather hole (as shown in Photo 11a) must be at top of pump.

12. Place two headless bolts into the dead end plate bearing hub and place the end cap on the end plate. By applying pressure to the end cap,



measure the gap between end plate and end cap. Remove the headless bolts and save for later use.

13. Take the equivalent value in shims which equalled the measurement taken between the end plate and end cap. These shims are needed to keep the end cap from pushing the bearing and bearing stop too far so that the proper clearance between rotor and end plate (.004 - .005) cannot be obtained. (RED SHIM is .002; GREEN SHIM is .003; BLUE SHIM is .005)

Position the shims below the end cap and tighten bolts evenly. Measure the gap between the rotor and end plate at a few different places. The range should be .004 - .005 of an inch. If no gap exists, remove the end cap and remove .004 from the total shims. Replace the cap and repeat the measuring procedure.

ONLY REMOVE .004 IF NO GAP EXISTS, SINCE YOU CANNOT ADD SHIMS AFTER YOU HAVE REMOVED THEM AND TIGHTENED DOWN THE END CAP. If in the second pass a gap of .002 was measured, only remove an additional .002 so that the total gap after re-tightening will be in the .004-.005 of an inch range.

14. When checking the gap between the end plate and rotor, a measurement can be tight, meaning under the required reading, or loose, which is over the

reading. The prescribed reading would be as follows: .004 LOOSE/.005 TIGHT. A point to remember is that the total internal pump clearance is .010 of an inch.

If a pump is put together with too much clearance on one side, it will rub on the opposite side end plate, in much the same way that it will rub if not enough clearance is allowed for on the dead end plate side.

5. Inspect the roller bearing and oil seal on the shaft end side of the pump. Check bearing by applying pressure with the fingers to check for roughness. Examine the cage for flat spots or wear marks. Check the oil seal for cracks and brittleness.

If replacement of either bearing or oil seal is required, remove both snap rings with snap ring pliers and follow the procedure used in step 9. If replacement is required, the end plate must be removed from the pump body and all parts cleaned thoroughly.

16. To assemble the roller bearing into the shaft side end plate, insert the outer snap ring and press the oil seal into the housing from the machined side using a 1 3/4" dia. punch. The metal side should be toward the machined side, which is the same side the seal is driven in with.

Next, press in the bearing (check step 17 for bearing position) using the same punch and from the same side that the oil seal was inserted. Install the inner snap ring and apply a good grade of grease to the lip of the oil seal as well as the roller bearing.

17. The roller bearing has a groove down its center with an oiling hole in the groove. The small oiling hole in the bearing groove should be positioned toward the bottom (opposite the oiler port) when set into the end plate.

18. To re-assemble the pump, remove all four dowel pins from pump body and clean mating surfaces of gasket sealant. Turn the pump body upside down and support the body with wood blocks. Apply gasket sealant No. 88941 to the pump body,

just outside the O-Ring, no more than 1/32" wide. In cases where no O-Ring groove exists, center the gasket sealant on the mating surface.

Carefully slide the end plate and rotor assembly into the pump body. Position the end plate to the body and hand tighten all ten 5/16" grade 5 bolts, with the two center being wrench tight. If the shaft side end plate wasn't removed, its bolts should still be loosened with the two center being wrench tight. If it was removed, it should be cleaned and gasket sealant applied.

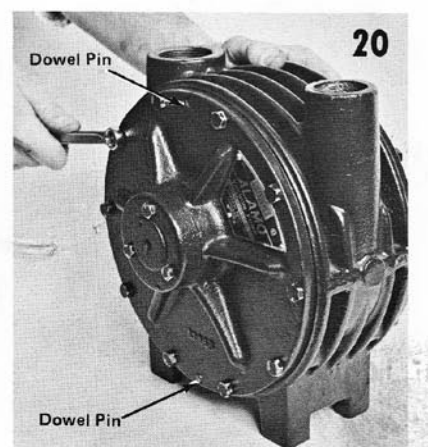
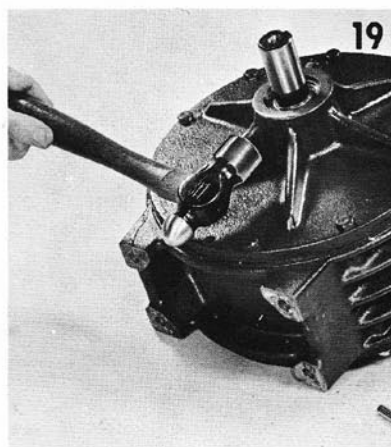
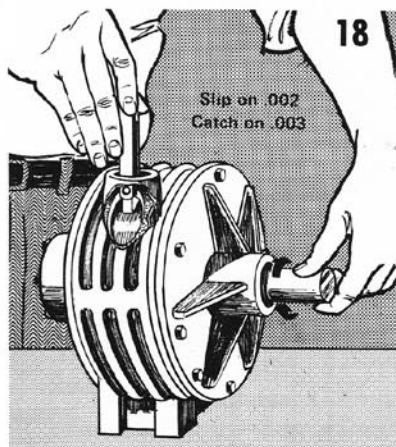
Turn the pump rightside and check for clearance between the top of rotor and cylinder by access through the exhaust port. ROTOR SHOULD CLEAR .002 AND CATCH ON .003 AT BOTH END PLATE POSITIONS.

19. If adjustment is necessary, tap the end plate accordingly to get the proper pump clearance. Once the pump is set, tighten all the bolts on both end plates. Rotate the pump and check for any binding. Use the .002 feeler gauge to check top clearance. If binding still occurs it most likely is in the end plates and the pump should be rebuilt starting from step 13.

20. Take completed pump and torque all 5/16" grade 5 bolts to 200 in-lbs. Check dowel pin holes for alignment and install all four pins. Some dowel pin hole re-drilling might be required, as in the case with replacement end plates which have 1/8" dia. pilot holes 15 degrees off center. Use a 5/16" dia. drill for this procedure along with the roll pin and not the solid dowel pin.

Place two or three ounces of Surge Rotary Pump Oil in the exhaust port and rotate the shaft by hand. This will insure lubrication of the internal pump parts and will aid in keeping the pump lubricated during initial startup.

NOTE: AFTER RETURNING A REBUILT PUMP INTO SERVICE, RUN THE PUMP FOR 15 MINUTES AND CHECK: CFM @ 15" Hg, MOTOR AMPERAGE AND THAT OILERS ARE DRIPPING.



MAINTENANCE & CARE OF EARLIER MODEL SURGE ALAMO 150 PLUS & 200 PLUS (WATER COOLED) VACUUM PUMPS

GENERAL PRECAUTIONS:

It is important that the pump **not be subjected to temperatures below 32° F.** Since the pump jacket is water cooled, injury to pump may result. Water systems should have sufficient pressure to maintain flow of 1 quart p/min. and not to exceed 100 p.s.i.

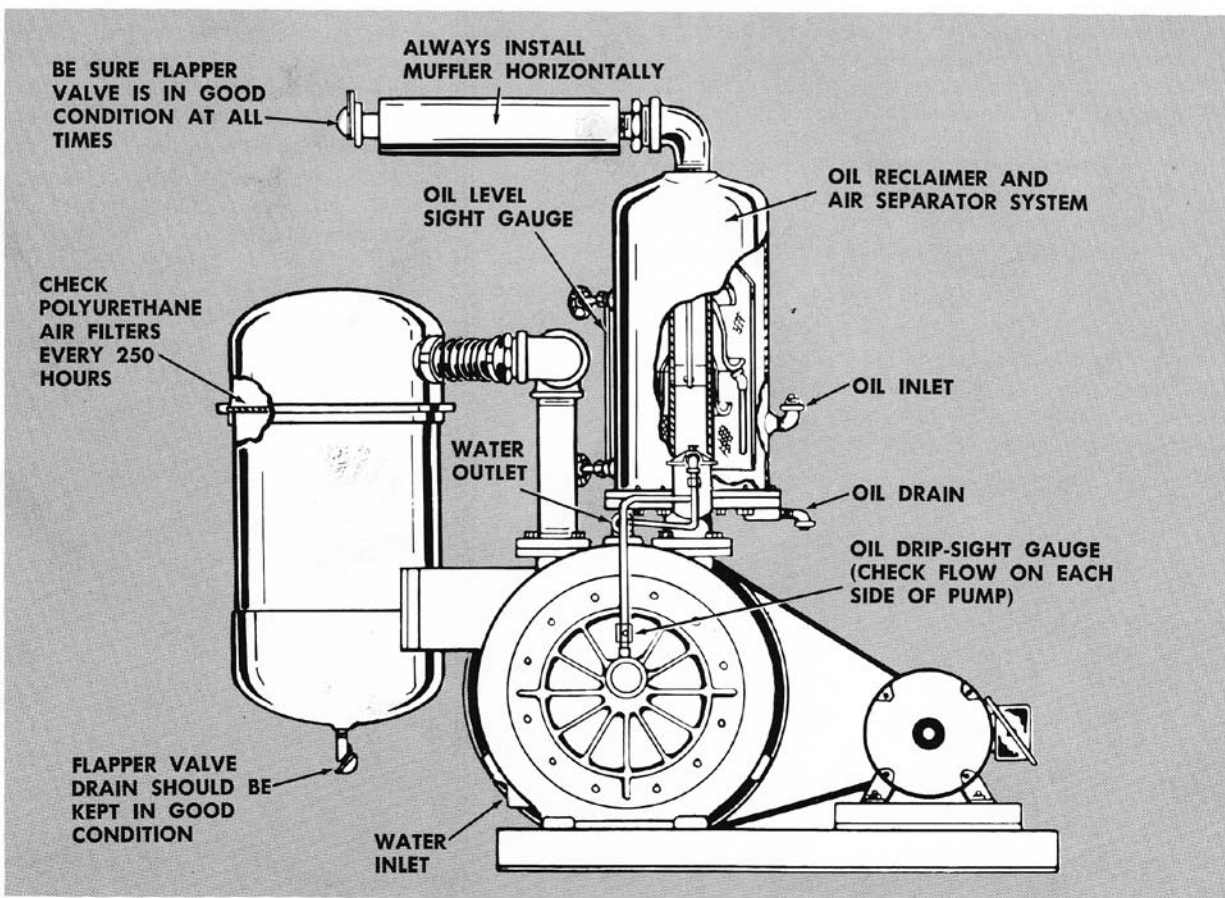
BELT TENSION AND ALIGNMENT should be checked before beginning operation. Adjust tension so that the belts can be **pressed down 1/2 inch** midway between pulleys. Check alignment of pulleys by holding a straight edge against pulleys and adjusting pump or motor mount accordingly. (See sketch below.)

FILTER CARE: The 15 3/4" polyurethane filter (No. 14926) should be checked every 200 hours of operation and replaced when filled with dirt. It is recommended that the filter be inspected after the first 100 hours of operation in order to determine whether or not more frequent inspection or replacement may be required. This is particularly important in areas where the air contains large amounts of dust, dirt or moisture. Always maintain a supply of Surge Alamo Filters.

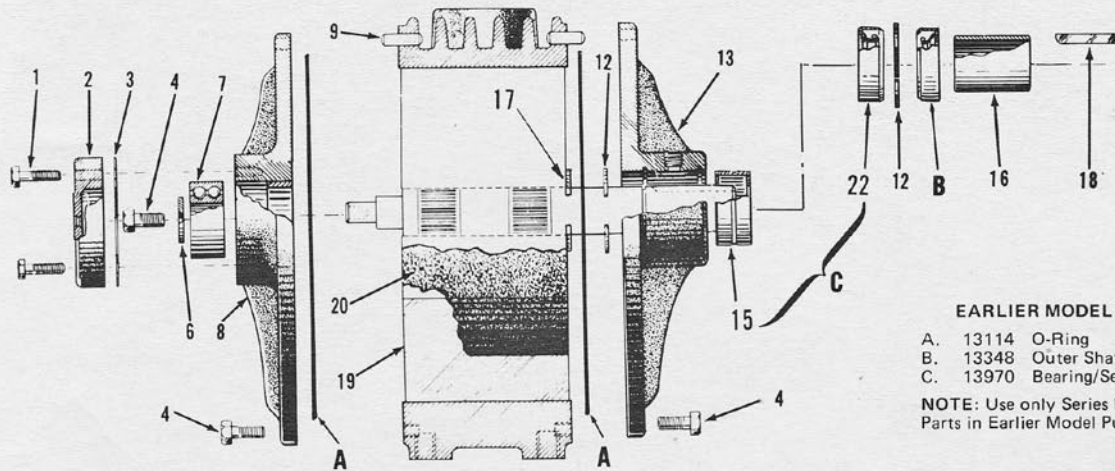
LUBRICATION: The lubrication and oil reclaiming system requires 3 gallons of oil on its initial fill. It is important that only the special **Mobil DTE-105 Oil** — (for water cooled, rotary vacuum pumps only) be used. To fill, remove the oil-fill plug and slowly fill with required amount of oil. The oil level sight gauge indicates the desired oil level either in secured or operating position.

Oil flow to the pump is preset by means of a Capillary Tube located above the drip-sight gauge on each side of the pump. Rate of flow from each gauge should be 20 to 40 drops per minute. Be sure to check oil flow to each side of pump. If at normal operating temperatures oil flow is below 20 drops per minute, malfunction is indicated. Oil level deficiency or a dirty oil filter cartridge may be indicated.

The oil level and oil flow rate should be checked weekly. The entire supply of oil **should be changed every 2,000 hours of operation or once each year**, whichever occurs first. On later models, the "Y" type oil strainer should be cleaned.



**PARTS DRAWING FOR SERIES 550 SURGE ALAMO VACUUM PUMP
NO. 13170 REPLACEMENT PUMP 550
(ALSO COVERS ALL EARLIER MODELS 20+, 30+ & 40+ PUMPS)**



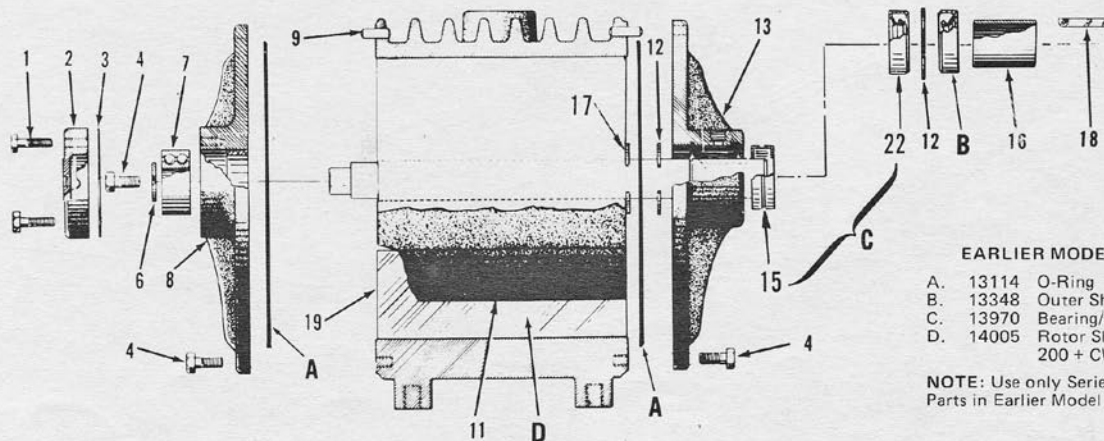
EARLIER MODEL PARTS

- A. 13114 O-Ring
- B. 13348 Outer Shaft Seal
- C. 13970 Bearing/Seal Set

NOTE: Use only Series 550 Pump Parts in Earlier Model Pump Repair.

- | | |
|---|---|
| 1. 13590 Cap Screw — 1/4" 20 x 1" Lg | 12. 13915 Snap Ring (End Plate) |
| 2. 13525 End Plate Cap | 13. 12568 End Plate Repl. 1200 only |
| 3. 13964 Shims (.003") Green | 12588 End Plate Repl. 1400 & 550 |
| 13963 Shims (.002") Red | Also used on Earlier 20+ - 200+ Pumps |
| 13965 Shims (.005") Blue | |
| 4. 13589 Cap Screw 5/16" 18 x 1" lg. | 15. 13908 Outer Bearing |
| 6. 13959 Bearing Positioning Washer | 16. 13958 Inner Bearing Race |
| 7. 13529 Bearing | 17. 13914 Snap Ring |
| 8. 12569 End Plate Assy. Repl. 1200 only | 18. 13919 Key |
| 12589 End Plate Assy. Repl. 1400 & 550 | 19. 13988 Vane 550 & Earlier 20+ - 40+ Pumps |
| Also used on Earlier 20+ - 200+ Pumps | 13905 Vane 1200 & 1400 |
| 9. 13918 Dowel Pin — 5/16" x 7/8" | Also used on Earlier 60+ - 200+ Pumps |
| 11. 12678 Rotor & Shaft Assy. Repl. 1200 only | 20. 12629 Rotor & Shaft Assy. 550 & Earlier 20+ - 40+ Pumps |
| 12679 Rotor & Shaft Assy. Repl. 1400 | 22. 13971 Oil Seal |
| Also used on Earlier 60+ - 200+ CCW Pumps | |

**PARTS DRAWING FOR SERIES 1200/1400 ALAMO VACUUM PUMPS
NO. 12698 REPLACEMENT PUMP 1200
NO. 12699 REPLACEMENT PUMP 1400
NO. 13155 REPLACEMENT PUMP FOR 60+ & 75+
(ALSO COVERS ALL EARLIER MODELS 50+, 60+, 75+, 100+ & 200+ PUMPS)**



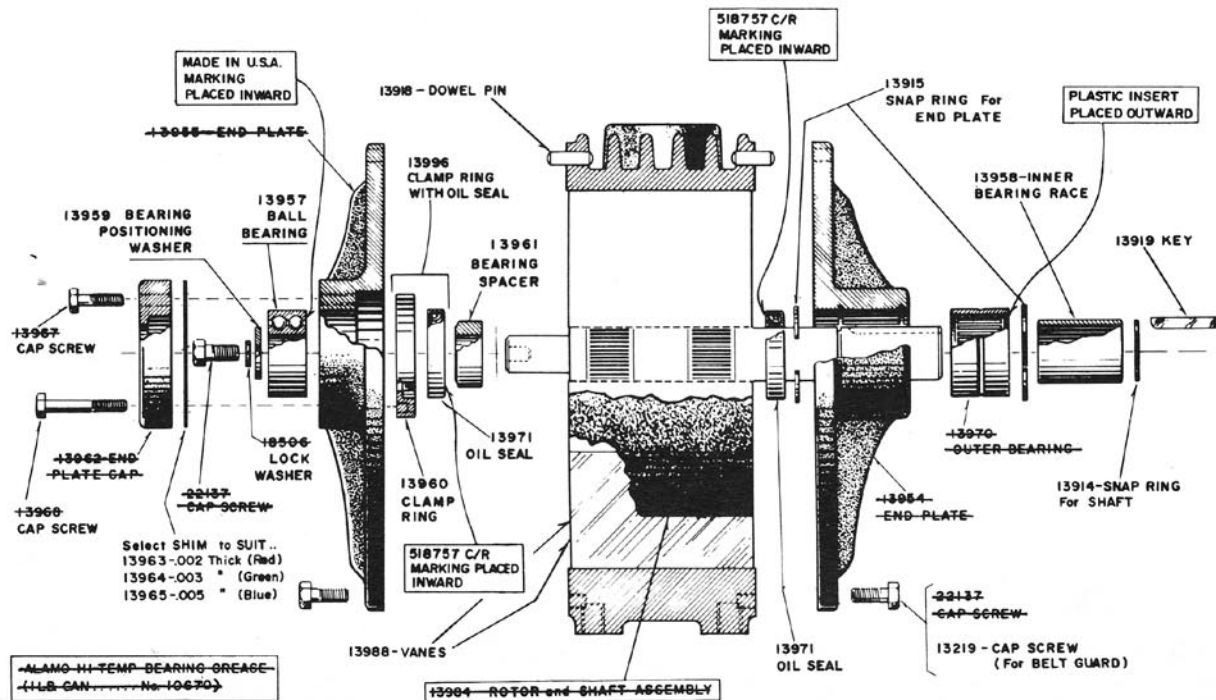
EARLIER MODEL PARTS

- A. 13114 O-Ring
- B. 13348 Outer Shaft Seal
- C. 13970 Bearing/Seal Set
- D. 14005 Rotor Shaft Ass'y 200+ CW

NOTE: Use only Series 1400 Pump Parts in Earlier Model Pump Repair.

PARTS DRAWING For 30-PLUS ALAMO VACUUM PUMP

FOR EARLIER MODEL NOS. 13018, 13019



50-PLUS & 75-PLUS ALAMO VACUUM PUMPS

FOR EARLIER MODEL NOS. 13095, 13096, 13097, 13098

