

SUPPLEMENTAL INSTRUCTIONS

Goulds Dynamic Seal Pump

Model 3175

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I. Introduction

This supplemental instruction booklet, in conjunction with the Model 3175 Maintenance Manual, is intended to assist those involved with the installation, operation and maintenance of the Goulds Dynamic Seal Pump. It is recommended that these instructions be thoroughly reviewed prior to installing or performing any work on the Dynamic Seal Pump.

II. Operation Principal

The Dynamic Seal arrangement utilizes a standard 3175 power frame and casing with a special shaft sleeve, stuffing box cover, a repeller and a backplate. Under static (shutdown) conditions, the diaphragm seal or stuffing box packing controls leakage through the stuffing box much the same as a standard 3175 pump with an equivalent type of stuffing box sealing. On start-up, the repeller acts like another impeller and pumps the liquid away from the stuffing box area. Outside air is drawn through the stuffing box area and forms an air/liquid interface part way out on the repeller. Sealing during operation is accomplished at this air/liquid interface. This feature of operation minimizes contamination and abrasive wear from the pumpage in the stuffing box sealing area and consequently, an external flush is not required, except to provide lubrication for the packed box option. (This flush is not required if self-lubricating Grafoil* packing is utilized).

* Union Carbide Corp., T.M.

III. Features

The Goulds Dynamic Seal is available in two configurations - diaphragm seal and the packed box design. Each of these use the same stuffing box cover, shaft sleeve, backplate and repeller for a given pump group. The standard material of construction for the stuffing box cover and backplate is cast iron or 316 stainless steel, 316 stainless steel for the repeller and 316 stainless steel with a hard metal coating which provides excellent wear resistance for the shaft sleeve. The repeller is a one piece casting which is driven by the impeller key and in turn drives the shaft sleeve. The repeller has a clearance fit onto the shaft and is clamped in place by the impeller. Teflon "O" rings provide sealing on each side of the repeller where it contacts the impeller hub and shaft sleeve face. This positive sealing, in conjunction with the impeller screw "O" ring, provides the 3175 with a "dry shaft" configuration.

The backplate and stuffing box cover form the chamber in which the repeller rotates. The plate is bolted to the stuffing box cover with studs and hex nuts. These studs and nuts are externally accessible and are sealed from the pumpage by a .060" non-asbestos gasket located between the backplate and stuffing box cover.

The impellers are standard Model 3175 impellers. Depending on suction conditions, balance holes are sometimes added. This balance holes reduce the pressure in the repeller chamber, thus allowing higher sealing capability. The remainder of the pump, i.e. bearing frame, shaft, bearings, adaptor and casing are all standard 3175 parts.

Each of the two stuffing box sealing arrangements has its own features and is described separately below:

1. Diaphragm Seal

The Diaphragm Seal design (see figure on page 18) consists of a one-piece ring type gland plate, and elastomeric diaphragm and a follower. The follower is sealed on the shaft with an "O" ring and driven with a set screw. The position of the follower is set at the factory, but should be checked prior to start-up. The step on the follower should line up with the face of the gland plate. This seal is non-contacting during operation - NO flush is recommended. Any entry of liquid into the box will cause the diaphragm to contact the follower during operation, destroying it.

NOTE: Do not flush the stuffing box when a diaphragm seal is used. This will cause failure of the seal! When idle, liquid from the pump will enter the stuffing box, force the diaphragm against the follower and effect a seal.

2. Packed Box Design

The packed box design consists of three rings of packing and a lantern ring. Standard packing will be the same as normally used on a Model 3175 pump of the same construction, i.e. non-asbestos or teflon impregnated non-asbestos. These packings must be supplied with a flushing liquid for lubrication, as the repeller will prevent any pumpage from lubricating the packing during operation. Grafoil* pacing is available and can be used without lubrication. Because lubrication is not required, a lantern ring is not utilized when using Grafoil* packing. Packing will, of course, leak when the pump is idle.

* Union Carbide Corp., T.M.

V. Preparation for Operation

Prior to installing and operating the Goulds Dynamic Seal pump, review and follow all applicable installation and operation instructions outlined in the accompanying Goulds Model 3175 Maintenance Manuals.

1. Prestart-up Checks

The Dynamic Seal pump requires few additional checks other than the steps outlined in the standard maintenance manual. Prior to start-up, the packing flush, if required, should be installed and flow established. In instances where a repeller chamber flush is necessary, such as paper stock or other services with suspended solids, this should also be installed and adjusted at this time. Also, the position of the follower should be checked if the diaphragm seal option is being utilized.

NOTE: Running the Dynamic Seal pump in reverse rotation can result in severe damage to the pump. DO NOT couple the unit until the rotation is correct as indicated by the arrow cast in the pump casing.

2. Start-Up

The unit can be placed in service after all installation and prestart-up checks have been satisfactorily completed.

VI. Disassembly

REFER TO FIGURE ON PAGE 18

1. Lock out power supply
2. Close suction and discharge valves. On units supplied with a case drain connection, open the case drain and drain casing. When a case drain is not provided, take the necessary steps to protect personnel and other equipment from toxic or other harmful pumpage.
3. Remove the coupling guard and any auxiliary piping that will interfere with back pullout removal.
4. Uncouple the motor from the pump. Follow coupling manufacturer's instruction.
5. Remove oiler bottle and drain oil (remove drain plug).
6. Loosen and remove bearing frame foot to baseplate hold down screws.
7. Support the back pullout assembly with lifting apparatus on the eyebolt (132). Remove backpullout assembly to casing screws (370).
8. Remove back pullout assembly. Jack screws are provided to assist in removal of back pullout. Tighten jack screws evenly using an alternating pattern. If shims are present between the frame foot and baseplate, mark them prior to removal for reassembly.
9. Remove case gasket (351).
10. Restrain the coupling end of shaft (122) and loosen impeller screw (198). Screw has right hand threads and loosens in a counterclockwise direction. Remove the impeller screw and teflon "O" ring (412B).
11. Remove impeller (101) from shaft. If removal is difficult, a pulling stud can be fabricated (see page 3A of standard 3175 instruction manual for dimensions of puller stud) and utilized to ease removal.
12. Loosen and remove backplate to stuffing box hex nuts (265A). Remove backplate (444) and backplate gasket (264). Exercise care when removing backplate so that shaft surface is not damaged.

13. Slide the impeller key (178) forward in the keyway until it is clear of the (262) then remove.
14. Slide repeller (262) and teflon "O" ring (412U) off shaft.
15. Remove the repeller to sleeve key (178J).
16. **Units Supplied with Diaphragm Seal Design**
Loosen and remove diaphragm seal gland stud nuts (355). Remove diaphragm seal gland (250) with diaphragm (147) from face of stuffing box. Mark position of follower on shaft sleeve. Loosen follower setscrew (222K) and slide follower (385) and o-ring (496D) off shaft sleeve.
17. **Units Supplied with Packed Box Design**
Loosen and remove packing gland stud nuts (355). Slide packing gland (107) away from face of stuffing box. Packing (106) and lantern ring (105) [if utilized] can be removed after stuffing box cover (184) has been taken off bearing frame adaptor (108).
18. Loosen and remove stuffing box cover to bearing frame adaptor screws (370H).
19. Remove stuffing box cover (184). Do not allow the stuffing box cover to strike the shaft or sleeve (126).
20. Remove shaft sleeve (126) with teflon "O" ring (412F) from shaft. The shaft sleeve has a slip fit on the shaft.
21. Refer to Goulds Model 3175 Instruction Manual for further disassembly procedures.

VII. Inspection of Parts

REFER TO FIGURE ON PAGE 18

1. Shaft sleeve (126). Replace if shaft sleeve is worn (particularly where packing contacts sleeve), or shows other physical damage on the "O" ring sealing face. Sleeve surfaces that run in stuffing box bore must be smooth and free of grooves.
2. Repeller (262). Replace repeller if vanes are corroded, eroded or show other physical damage that would impair performance. "O" ring sealing faces must be smooth and free of surface imperfections. Bore of repeller should be in good condition. Repeller has .001" - .0025" diametrical clearance fit on the pump shaft.
3. Impeller (101). Replace if impeller shows excessive erosion (especially on pumpout vanes on back side of impeller), corrosion, extreme wear or vane breakage. Teflon "O" ring groove and impeller hub section must be in good condition. If impeller has balance holes, check that they are not plugged or show other signs of damage. Check impeller balance.
4. Backplate (444). Replace if backplate shows excessive erosion, corrosion or extreme wear.
5. Backplate gasket (264) and case gasket (351). Replace if gaskets are cut, torn or overcompressed as a result of continued reuse.
6. Teflon "O" rings (412B, 412F, 412U). It is recommended that these be renewed on each overhaul.
7. Diaphragm (147). Replace diaphragm if elastomer is torn or is otherwise damaged.
8. Follower (385). Replace if follower face shows excessive wear.
9. Refer to Goulds Model 3175 Instruction Manual for additional information related to inspection of parts.

VIII. Reassembly

REFER TO FIGURE ON PAGE 18

1. Install shaft sleeve (126), with new teflon "O" ring (412F), on shaft.
2. Units supplied with Diaphragm Design
Slide follower (385) with o-ring (496D) on sleeve i.e. approximate position at face of stuffing box. Do not tighten set screw. Place diaphragm (147) and gland (250) on face of stuffing box and tighten gland stud nuts (355). Nuts should be tightened evenly and not overtightened. Diaphragm should remain parallel to face of box.
3. Units Supplied with Packed Stuffing Box Design
Install packing gland (107) on shaft sleeve. Install lantern ring (105) on shaft sleeve.
4. Install stuffing box cover (184). Align frame adaptor ears to stuffing box cover bolt holes.
5. Install and tighten stuffing box cover to frame adaptor screws (370H). Ensure that stuffing box and/or gland flush connections are in original position prior to bolting up stuffing box cover.
6. Lubricate and install shaft sleeve to repeller key (178J). Install a new teflon "O" ring (412U) into the "O" ring groove of the repeller (262) and slide the repeller on to the shaft. Line up keyways and slide against the shaft sleeve. Repeller vanes should face toward bearing frame, with smooth surface of repeller toward the pump suction. Should repeller come into contact with the stuffing box cover face, utilize the external impeller adjustment (Section XI) to shift rotating element.
7. Install backplate gasket (264) and backplate (444). Install and tighten backplate to stud nuts (265A). Backplate must be tightened sufficiently to provide full backplate to stuffing box cover contact.

NOTE: It may be necessary to readjust the element if adjustment was made in step 6.

8. Lubricate shaft keyway and insert impeller key (178), ensuring that the key enters the repeller keyway securely.
9. Lubricate shaft and slide impeller onto shaft. (See footnote*).
10. Install teflon "O" ring (412B) into impeller screw (198) and thread into end of pump shaft. Restrain coupling end of shaft from turning and torque impeller screw to 200 ft./lbs.

NOTE: To ensure positive locking, all impeller screw threads are coated with Nylock-Detroit VC-3 #205 thread compound. This coating is normally good for several reuses. However, the threads should be inspected prior to reassembly to determine if the coating is intact. If coating is not intact, impeller screw must have a reapplication of VC-3 thread compound or a new screw must be used.

11. Utilizing the external impeller adjustment (see Section XI), shift the element towards the stuffing box until the impeller lightly contact the face of the backplate (444).
NOTE: In some instances, the repeller will contact the stuffing box face before the impeller contacts the backplate. Because of this, the shaft should be rotated during impeller adjustment to determine if the repeller (26) is contacting the face of the stuffing box cover (184). Should the repeller (262) contact the face of the stuffing box cover (184) before the impeller (101) contacts the face of the backplate (444), further tightening of the adjustment bolts should not be attempted, as damage to the repeller or stuffing box cover may occur.

12. Install case gasket (351) on fit of stuffing box cover (184). Support back pullout assembly with lifting apparatus and guide into casing. Install and tighten case screws (370) evenly using alternating pattern.
CAUTION: Flange of frame adaptor DOES NOT go metal to metal with casing.
13. Reinstall and tighten bearing frame foot to bedplate screws. Insure that any shims found under the frame foot at disassembly are reinstalled as they came out.
14. Reset pump impeller clearance to .015" using impeller clearance adjustment (Section XI).
15. Pumps Supplied with Diaphragm Seal Design
Position follower (385) so that step on follower O.D. is flush with back of gland. It should not touch diaphragm. Tighten follower setscrew (222K).
NOTE: If the pump is leaking around the diaphragm seal while the pump is in the static position (shutdown), the follower (385) will need to be adjusted. The follower is either pushed too far into the stuffing box or it is not in far enough. Loosen the set screw (333K) and adjust the follower (385) until the leakage stops.
16. Pumps Supplied with Packed Box Design
Repack the stuffing box by first installing one ring of packing (106) followed by the lantern ring (105) and then two more rings of packing. Position the packing gland and draw up nuts (355) loosely for start-up.
NOTE: When Grafoil* packing is used, delete the lantern ring and install another two ring soft packing.
17. Check pump oil level. Refer to Goulds Model 3175 Instruction Manual for proper oil setting and oil quantity.

18. Check alignment between motor and pump. Refer to Goulds Model 3175 Instruction Manual for procedures and tolerances.
19. Recouple motor and pump. Follow coupling manufacturers instructions supplied with the coupling.
20. Install the coupling guard and any auxiliary piping.
21. Open pump suction valve and fill pump. Pump is now ready to be put back in service.

IX. Ordering Spare Parts

Refer to sectional drawing on page 18 when ordering spare parts unique to the Dynamic Seal pump and the standard Goulds Model 3175 for parts common to both models.

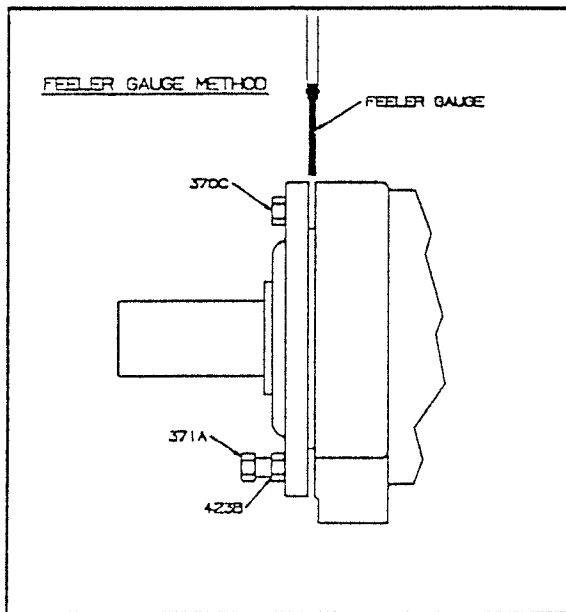
Impeller Clearance Adjustment

If a gradual loss in head and/or capacity occurs, performance can be restored by adjusting the impeller. If performance cannot be restored by adjustment, pump should be disassembled as directed in Section VI and the impeller and casing inspected for wear.

Either a feeler gauge or a dial indicator can be used to set the impeller clearance.

1. Feeler Gauge Method

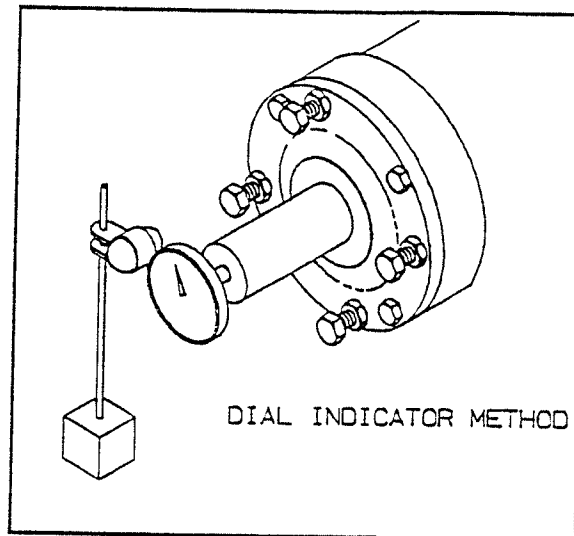
- a. Loosen adjustment bolts and nuts (D).
- b. Tighten bolts (C) evenly, while slowly rotating the shaft, until the impeller just starts to rub on the casing.



- c. Loosen each bolt (C) until a 0.015" feeler gauge can be placed between the bearing housing flange and underside of head of bolts (C).
- d. Be sure that jam nuts on bolts (D) are loose. Tighten each bolt (D) a flat at a time until bearing housing is tight against bolts (C). Be sure that all bolts (C&D) are tight. Tighten jam nuts on bolts (D).

2. Dial Indicator Method

- a. Remove one bolt (C) and thread a pipe or rod in its place. This is to hold a dial indicator as shown in Fig. 3A.
- b. Loosen adjustment bolts and nuts (D).
- c. Tighten each bolt (C) evenly, while slowly rotating the shaft, until impeller just starts to rub against casing.
- d. Clamp a dial indicator so that the button rests against the end of the shaft, or against the front of the face of the coupling, and set indicator at 0.



- e. Loosen bolts (C) about 6 flats.
- f. Be sure that jam nuts on the bolts (D) are loose. Tighten bolts (D) a flat at a time, until the dial indicator shows that the shaft has moved 0.015".
- g. Tighten bolts (C), then check to be sure all bolts (D) are tight. Finally, tighten jam nuts on bolts (D).

With either of the above methods, the rotating element and impeller have been moved .008" to .015" away from the casing, thus giving the required clearance between these two parts. Rotate shaft several times to check for free turning.

XII. IMPELLER BALANCE HOLES

NOTE: On applications with positive suction pressure, it is necessary to drill impeller balance holes to obtain full benefit of the repeller. Hole should be located and drilled per chart below. Angle A is measured from the leading edge of the back pump out vanes on the impeller (see illustration on the last page). Balance holes are not recommended for pumps operation on suction lift or with a suction pressure less than atmospheric pressure.

3175 S Group

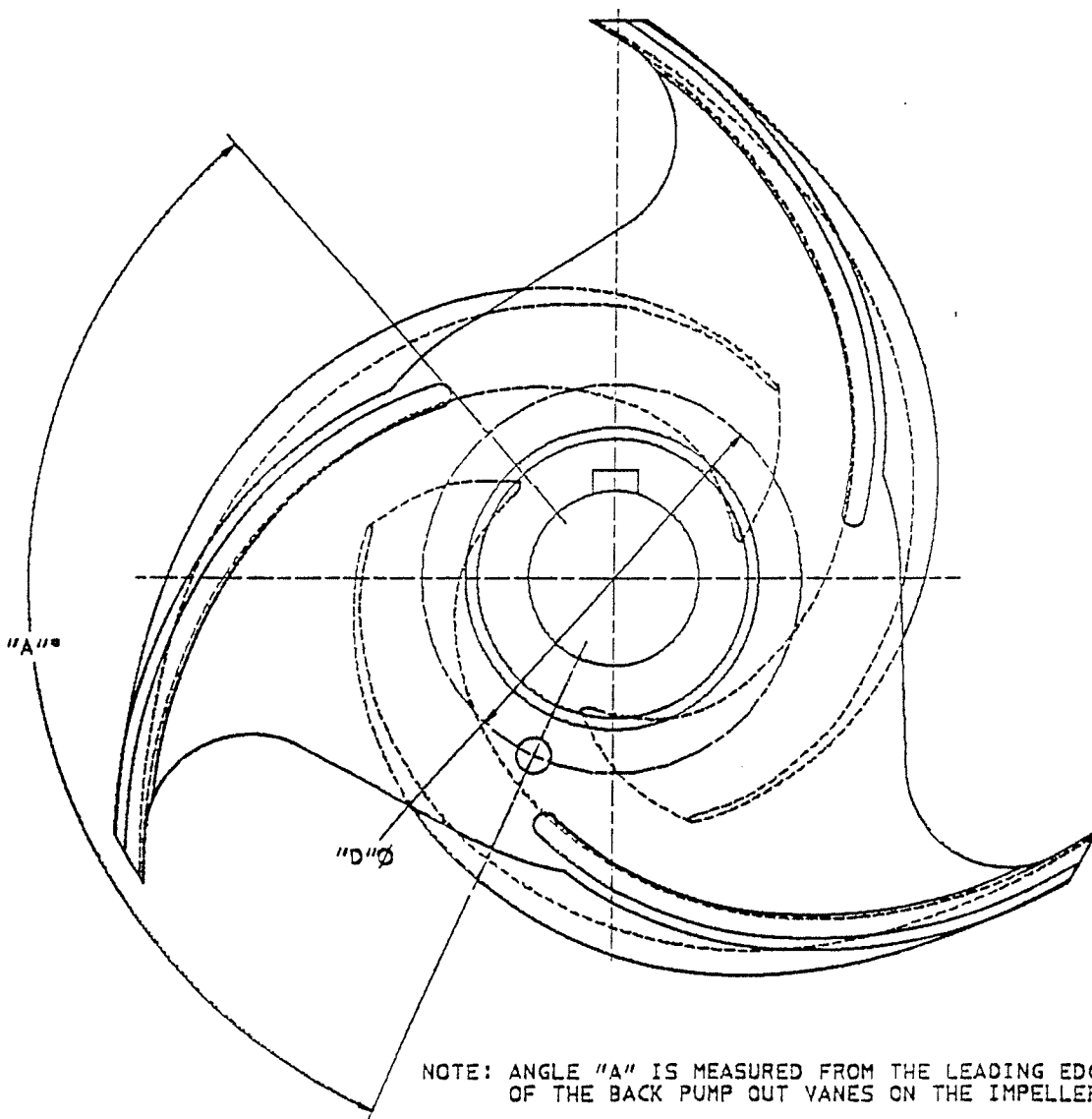
SIZE	DWG.	PATT.	BOLT CIRCLE	NO. & SIZE OF HOLES	ANGLE A	RE MACHINE DWG.	
3x6-12	D01386A01	58570	4"	3-5/8"	114	91991 #81	
	D01386A02	58571				91991 #82	
3x6-14	257-99	55925	4"	2-5/8"	23	91991 #5	
	255-52	55530				91991 #6	
	257-95	55921				91991 #7	
3x6-14	259-3	54524	4-1/4"	2-5/8"	23	91991 #4	
	D00139A01	57589		5-3/4"		91991 #8	
	D00139A02	57590		5-3/4"		91991 #9	
4x6-12	D00617A01	58615	3-3/4"	3-9/16"	111	91991 #85	
	D00617A02	58616				91991 #86	
4x6-12	C01301A	63232	4-1/8"	4-5/8"	87	91991 #83	
	C01311A	63223				91991 #84	
4x6-14	255-53	55531	4"	2-5/8"	163	91991 #12	
	256-4	54525				91991 #10	
	257-96	55922				91991 #13	
4x6-14	257-101	55929	4"	2-5/8"	163	91991 #11	
	D00137A01	57584		5-9/16"		91991 #14	
	D00137A02	57585		5-9/16"		91991 #15	
4x6-18	255-54	55532	4"	2-3/4"	174	91991 #24	
	256-5	54566				91991 #23	
	257-97	55923				91991 #22	
4x6-18	257-102	55930	4"	2-3/4"	174	91991 #23	
	D0012A01	57567	5-1/2"	5-11/16"	40	91991 #26	
	D00129A02	57568	5-1/2"	5-11/16"	40	91991 #27	
6x8-12	D00609A01	58604	3-3/4"	3-5/8"	114	91991 #87	
	D00609A02	58605				91991 #88	
6x8-12	D01351A01	58547	3-7/8"	6-5/8"	56	91991 #89	
	D01351A02	58548				91991 #90	
6x8-14	255-55	55533	4"	2-9/16"	142	91991 #18	
	256-6	54527				91991 #16	
	257-98	55924				91991 #19	
6x8-14	257-103	55931	4"	2-9/16"	142	91991 #17	
	D00130A01	57574				53	91991 #20
	D00130A02	57573				53	91991 #21
8x8-12	D02459A01	63323	4-1/8"	3-5/8"	29	91991 #93	
	D02459A02	63324				91991 #94	
8x8-12	D01093A01	58954	4"	5-5/8"	64	91991 #91	
	D01093A02	58946				91991 #92	

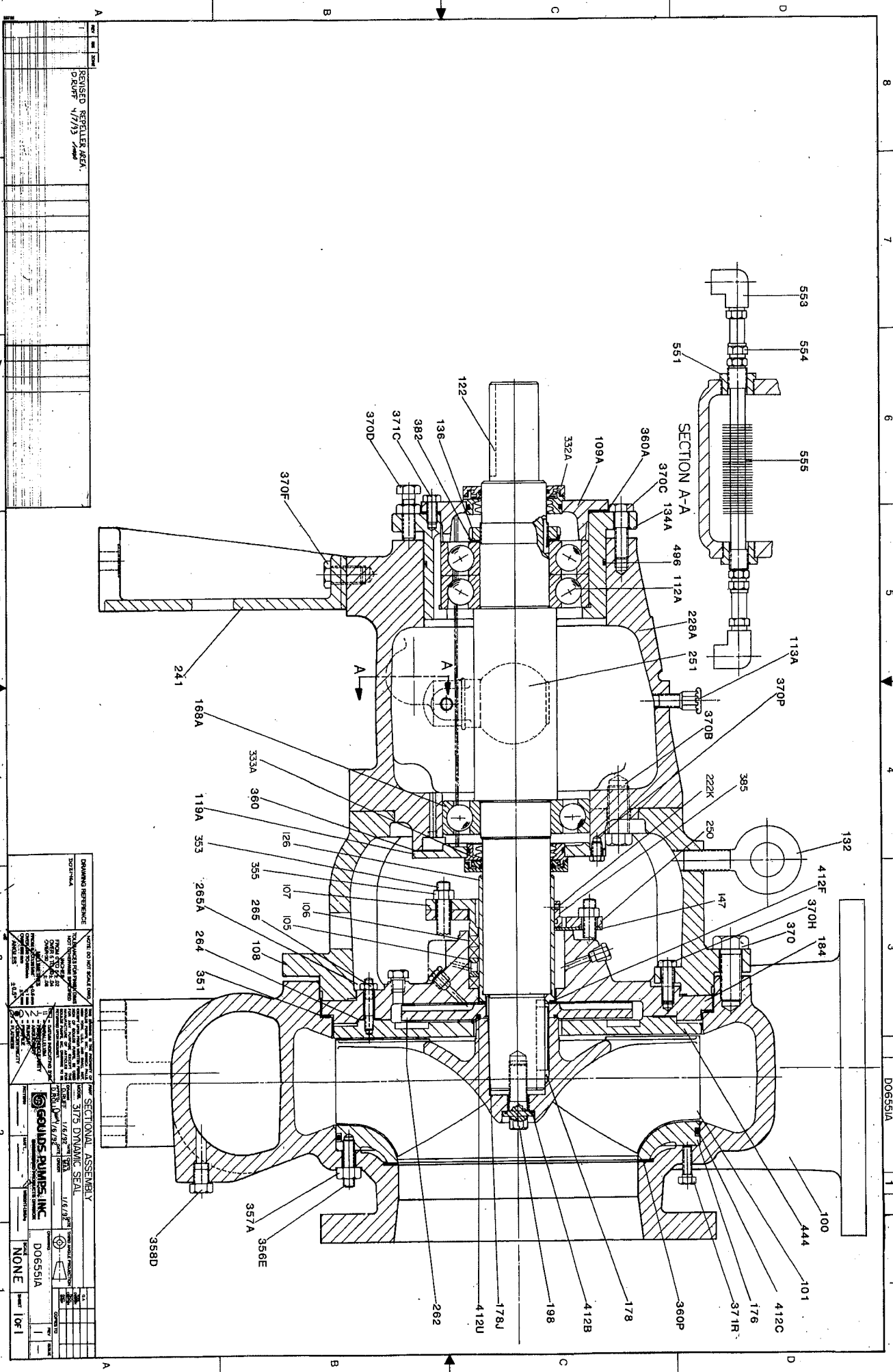
3175 M Group

SIZE	DWG.	PATT.	BOLT CIRCLE	NO. & SIZE OF HOLES	ANGLE A	RE MACHINE DWG.		
6x8-18	255-56	55534	5-1/2"	2-1"	20	91991 #30		
	259-7	54528				91991 #28		
	259-75	56267				91991 #29		
6x8-18	260-64	56265	5-1/2"	2-1"	20	91991 #31		
	D00128A01	57565				5-5/8"	35	91991 #32
	D00128A02	57566				5-5/8"	35	91991 #33
6x8-22	255-7	55535	8"	4-1/2"	28	91991 #46		
	259-64	56162				91991 #47		
6x8-22	D00125A01	56622	8-3/8"	5-1/2"	54	91991 #48		
	D00125A02	57552				91991 #49		
8x10-14	256-9	54530	5-1/8"	2-3/4"	27	91991 #54		
	259-67	56165				91991 #57		
8x10-14	D00150A01	57595	5-1/2"	6-9/16"	48	91991 #56		
	D00150A02	57760				91991 #57		
8x10-18	256-10	54531	5-1/4"	2-9/6"	157	91991 #34		
	259-68	56166				91991 #35		
8x10-18	D00157A01	57598	5-1/2"	4-9/16"	74	91991 #36		
	D00157A2	57599				91991 #37		
8x10-18	D00296A	57798	5"	7-9/16"	27	91991 #38		
	D00297A	57800				91991 #39		
8x10-18H	256-12	54533	5-1/4"	2-5/8"	168	91991 #40		
	259-69	56167				91991 #41		
8x10-18H	259-88	56195	5-1/2"	4-5/8"	78	91991 #42		
	259-89	56196				91991 #43		
8x10-22	259-59	56151	9-1/2"	4-5/8"	83	91991 #52		
	259-72	56192				91991 #53		
10x12-18	255-62	55540	5-1/2"	4-5/8"	73	91991 #44		
	259-84	56198				91991 #45		

3175 L Group

SIZE	DWG.	PATT.	BOLT CIRCLE	NO. & SIZE OF HOLES	ANGLE A	RE MACHINE DWG.
10x12-22	259-109	56226	7"	4-3/4"	62	91991 #50
	259-110	56227				91991 #51
12x14-18	255-67	55545	6"	6-5/8"	41	91991 #60
	259-7	56173				91991 #61
12x14-18	255-96	55590	6"	4-5/8"	80	91991 #58
	258-100					91991 #59
14x14-18	259-13	5542	6-7/8"	4-3/4"	66	91991 #62
	260-85	57616				91991 #63
14x14-22	256-110	55807	6-1/2"	6-3/4"	32	91991 #72
	259-6	56174				91991 #73





REV	DATE	DESCRIPTION
1	1/17/73	REVISED REPELLER AREA D.RUFF

SECTIONAL ASSEMBLY
3175 DYNAMIC SEAL
1/8/72

SOUNDS PUMPS, INC.
1/8/72

DOUGLASSIA
NONE
1 OF 1

DRAWING REFERENCE
THIS DRAWING IS FOR THE PUMP ASSEMBLY
DRAWING NO. 3175 DYNAMIC SEAL
DATE 1/8/72
DRAWN BY D.RUFF
CHECKED BY J. J. JONES
APPROVED BY J. J. JONES