



CENTRIFUGAL COMPRESSORS

SERVICE INSTRUCTION

Supersedes: NEW RELEASE

Form 160.49-M3 (1205)

USED WITH YORK MODEL YK CENTRIFUGAL LIQUID CHILLERS

COMPRESSOR CODE	COMPRESSOR MODEL	COMPRESSOR PART NUMBER
P1	YDHF-39DD	364-50103-201
P2	YDHF-40DD	364-50103-202
P3	YDHF-42DD	364-50103-203
P4	YDHF-44DD	364-50103-204
P5	YDHF-41DD	364-50300-202
Q7	YDHF-52DD	364-50757-201
P6	YDHE-46DD	364-50389-202
P7	YDHE-52DD	364-50369-202
P8	YDHE-58VDD (VGD)	364-51056-202
P9	YDHE-62VDD (VGD)	364-51056-205
H3	YDHC-61DD	364-51147-202
H4	Superceded by P6	Superceded by P6
H5	YDHE-50NDD	364-50453-202
	YDHE-50WDD	364-50453-203
H6	YDHE-57DD	364-50433-202
H7	YDHE-59DD	364-50433-205
H8	YDHE-61DD	364-50433-208
H9	YDHE-70VDD (VGD)	364-51182-202
J1	YDHG-65DD	364-50422-203
	YDHG-65VDD (VGD)	364-50791-203
J2	YDHG-73DD	364-50422-206
	YDHG-73VDD (VGD)	364-50791-206
J3	YDHA-81DD	364-50427-208
	YDHA-81VDD (VGD)	364-50630-208
J4	YDHA-90DD	364-50427-209
	YDHA-90VDD (VGD)	364-50630-209
J5	YDHA-104VDD (VGD)	364-50630-215
J7	YDHJ-119VDD (VGD)	364-51491-201

IMPORTANT!

READ BEFORE PROCEEDING!

GENERAL SAFETY GUIDELINES

This equipment is a relatively complicated apparatus. During installation, operation, maintenance or service, individuals may be exposed to certain components or conditions including, but not limited to: refrigerants, oils, materials under pressure, rotating components, and both high and low voltage. Each of these items has the potential, if misused or handled improperly, to cause bodily injury or death. It is the obligation and responsibility of operating/service personnel to identify and recognize these inherent hazards, protect themselves, and proceed safely in completing their tasks. Failure to comply with any of these requirements could result in serious damage to the equipment and the property in

which it is situated, as well as severe personal injury or death to themselves and people at the site.

This document is intended for use by owner-authorized operating/service personnel. It is expected that this individual possesses independent training that will enable them to perform their assigned tasks properly and safely. It is essential that, prior to performing any task on this equipment, this individual shall have read and understood this document and any referenced materials. This individual shall also be familiar with and comply with all applicable governmental standards and regulations pertaining to the task in question.

SAFETY SYMBOLS

The following symbols are used in this document to alert the reader to areas of potential hazard:



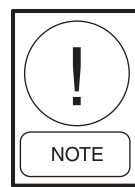
DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.



CAUTION identifies a hazard which could lead to damage to the machine, damage to other equipment and/or environmental pollution. Usually an instruction will be given, together with a brief explanation.



WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



NOTE is used to highlight additional information which may be helpful to you.

REFERENCE LITERATURE	
Installation – Unit	160.49-N1
Operation – Unit	160.49-O1
Renewal Parts – Unit	160.49-RP1
Renewal Parts – Compressor	160.49-RP4
Coupling Assembly	160.49-N4

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SECTION 1 GENERAL

GENERAL DESCRIPTION

These compressors are applied to YORK Model YK Centrifugal Liquid Chillers.

The compressor is a single-stage centrifugal type powered by an open-drive steam turbine, or gas engine. The casing is fully accessible with vertical circular joints and fabricated of close-grain cast iron. The complete operating assembly is removable from the compressor scroll housing. Compressor casting are designed for 300 PSIG working pressure and hydrostatically pressure tested at 900 PSIG.

The rotor assembly consists of a heat-treated alloy steel drive shaft with a lightweight, high strength, cast aluminum, fully shrouded impeller. The impeller is designed for balanced thrust and is dynamically balanced and overspeed tested for smooth, vibration-free operation.

The insert type journal bearings are fabricated of aluminum alloy and are precision bored and axially grooved. Thrust bearings are of the deflection-pad type design. The specially engineered, single helical gears with crowned teeth are designed so that more than one tooth is in contact at all times to provide even distribution of compressor load and quiet operation. Gears are integrally assembled in the compressor rotor support and are film lubricated. Each shaft is individually mounted in its own journal and thrust bearings.

The open-drive compressor shaft seal consists of a spring-loaded, bellows seal, high-temperature elastomer O-ring static seal, and a stress-relieved, precision lapped collar. The seal features a small face area and low rubbing speed. It provides an efficient seal under high pressure conditions. The seal is oil-flooded at all times and is pressure-lubricated during compressor operation.

Compressors are available in various impeller sizes (see NOMENCLATURE below).

NOMENCLATURE

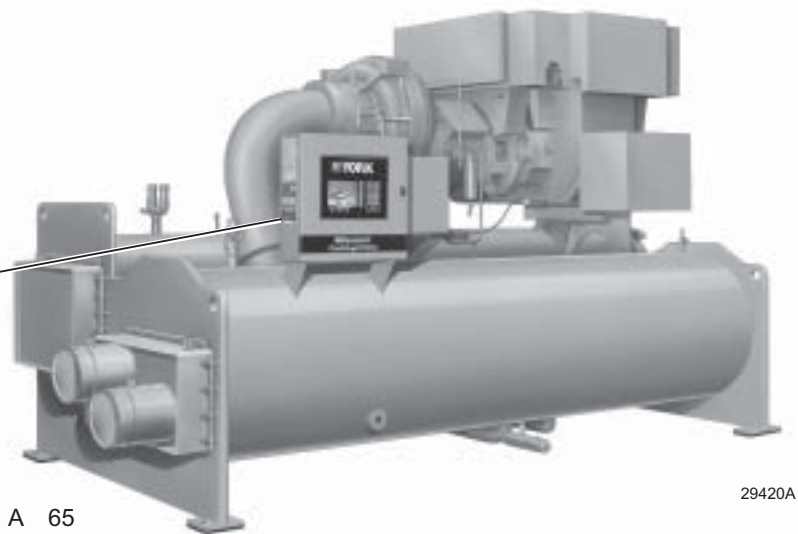
COMPRESSOR IDENTIFICATION

Each compressor is identified by nomenclature as shown below. The nomenclature is printed on a data plate which is located on the side of the unit control panel (see Fig. 1).

When contacting the factory or ordering renewal parts, include the complete compressor model and serial number. Be sure these numbers are copied accurately.

YORK CODEPAK			
LIQUID CHILLING SYSTEM			
UNIT MODEL <input type="text"/>			
REFRIG. DWP. PSIG:	<input type="text"/>	COOLER	CLG. COND.
LIQUID DWP. PSIG:	<input type="text"/>	<input type="text"/>	H.R. COND.
NO. OF PASSES:	<input type="text"/>	<input type="text"/>	<input type="text"/>
SHELL TEST PRESS. PSIG:	<input type="text"/>	<input type="text"/>	<input type="text"/>
REFRIGERANT	<input type="text"/>	REFRIG. CHARGE LBS.	<input type="text"/>
CHARGED:	FACTORY <input type="checkbox"/>	FIELD	<input type="checkbox"/>
CHARGE WITH YORK REFRIGERANT OIL SEE STARTER NAMEPLATE AND CONTROL PANEL NAMEPLATE FOR ELECTRICAL DATA			
FOR REMOTE STARTER SEE YORK STD. R <input type="checkbox"/>			
STARTER SUPPLIED BY: FACTORY <input type="checkbox"/> FIELD <input type="checkbox"/>			
FIELD SUPPLY:			
VOLTS	<input type="text"/>	PHASE	<input type="text"/>
		HERTZ	<input type="text"/>
MIN. CIRCUIT AMPACITY <input type="text"/>			
MAX. DUAL ELEMENT FUSE AMPS <input type="text"/>			
MAX. CIRCUIT BREAKER AMPS <input type="text"/>			
COMPRESSOR: MODEL	<input type="text"/>	CODE	<input type="text"/>
SERIAL NO. <input type="text"/>			
OIL PUMP	<input type="text"/>	HP	<input type="text"/>
		VOLTS-PHASE-HZ	<input type="text"/>
		FLA	<input type="text"/>

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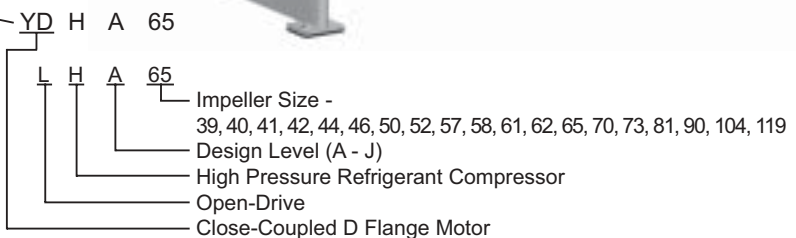


FIG. 1 – COMPRESSOR IDENTIFICATION

SECTION 2

COMPRESSOR SERVICE

The compressor is the heart of the chiller and every effort should be made to maintain and keep it operating at peak efficiency. Being a precision-built machine, it is important to check the lubrication system for cleanliness by changing the oil filter as documented in the Preventative Maintenance section of the Operating Instructions.

The compressor should not be disassembled for inspection purposes only. However, if the compressor fails to function as outlined in the OPERATING MANUAL, it may be necessary to do so. Individual parts are available for replacement as described in the following compressor servicing section.

SERVICE GUIDELINES

The overhaul and replacement of parts of these compressors, like any other mechanical operation on machinery, is best accomplished by experienced service personnel using tools and measuring instruments to accomplish accuracy in their work.

There are a number of good practices that should be followed in disassembly and reassembly of the compressor; some of these are listed below.

Do Not Mix Parts - Keep parts in some general order when removing them from the compressor. It is suggested that parts be laid out to follow exploded views as shown in the many illustrations outlining the disassembly and assembly of the various parts.

Do Not Mix Cap Screws and Washers - Cap screws are suited to the location in which they are used. Too long or too short a cap screw can result in leakage and/or interference with some interior parts. Washers have been selected for specific screws, etc. It is very important to use correct washers or lock washers. The Parts List and Figures in this instruction show the correct length and size of screws and washers. See the Renewal Parts Manual to order the correct part numbers.

Inspect As Compressor is Disassembled - If possible, it is desirable to record shaft and impeller runouts and thrust clearances before disassembly. Once compressor parts have been disassembled and cleaned, many valuable indications of the compressor condition are lost. Materials found in oil or on burned surfaces can often give an indication as to why a part or parts have failed.

Protect Parts and Surfaces - Do not pile or throw parts indiscriminately. Oil surfaces are likely to rust. Tape surfaces subject to scratching or nicking during repair operations. Plug off any passages likely to accumulate dust or abrasives. Do not tape the seals.

Clean Thoroughly - No compressor is completely overhauled if it is not cleaned internally to "new part" condition. Dirty parts can not be inspected or fitted and will cause excessive wear when the compressor is in operation.

CLEANING AND CHECKING WEARING PARTS

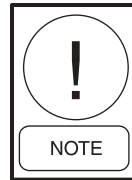
Before reassembling the compressor, all parts should be thoroughly checked for wear.

Worn parts should be replaced with new and each new part should be thoroughly examined for shipping damage.

While the rotor support is open, carefully clean the interior, using an approved safety solvent and a lint free cloth.

Clean and check all oil passageways and all tubing.

Before assembling parts, all friction surfaces should be lightly coated with a molybdenum disulfide lubricant such as "Molykote" or "Molkolube" and oil. Be sure to use new YORK refrigerant Oil.



"Molkolube" is available from:
Dow Corning Corporation
 Dept. A0021
 P.O. Box 1767
 Midland, Michigan

Westinghouse Electric Corporation (Sales offices in all major cities). When ordering "Molkolube" No. 8565-3, available from YORK Part No. 364-21508 in 2 oz. cans.

When reassembling parts, each part should be carefully checked for signs of uneven wear, keeping in mind that a nicely polished surface is not an indication of excessive wear. Sudden, excessive wear on any part of the compressor is not normal but is usually caused by some other condition which must be determined and corrected to assure long periods of trouble-free operation.

Bearings and seals may be reused if their rubbing surfaces and matching surfaces of their corresponding rotating parts are nicely polished with no sign of uneven wear or gouging.

The impeller should be checked around its outside circumference for evidence of rubbing. If this condition is found, excessive bearing wear is indicated, and the impeller may be worn sufficiently to require replacement.

All gaskets and O-rings should be replaced with new when reassembling the compressor to assure that all surfaces have a tight seal after reassembly.

RIGGING THE COMPRESSOR OR MOTOR

When it becomes necessary to remove a compressor or motor from a unit or base, proper rigging methods must be used to avoid damage to the equipment and/or injury to service personnel. Portable cranes must be of adequate

capacity and properly positioned and blocked to prevent tipping or slipping while lifting the compressor or motor. Be sure chains are of adequate strength. Compressor weights are shown in Table 1.

2

TABLE 1 – COMPRESSOR WEIGHTS (LBS.) - LESS MOTOR

COMPRESSOR CODE	COMPLETE COMPRESSOR	ROTOR SUPORT COMPLETE W/ ALL RUNNING GEAR	SCROLL ASSEMBLY W/ PRV & NOZZLE BASE
P1-P5	2,600	1,500	1,100
G4, H0-H9, P6-P9	3,650	2,250	1,400
J1 & J2	4,150	2,525	1,625
J3 & J4	5,150	2,525	2,625
J5	5,750	2,525	3,225
J7	8,400	2,800	5,600

NOTE – MOTOR WEIGHTS (LBS.) (LOCATED ON MOTOR DATA PLATE)

TABLE 2 – TORQUE VALUES

BOLT SIZE INCHES		TORQUE POUND FOOT
1/4"	HEX HD	10
	12PT OR SOC HD	14
3/8"		35
1/2"		85
5/8"		200**
3/4"		300

Unless otherwise specified, all screws must be tightened to the following torque values with lightly oiled threads.

** Lubricated with oil and graphite on male and female threads and under bolt heads. Moly-kote not acceptable.

SPECIAL TOOLS

Special tools are available as an option and will be furnished when ordered. These tools are listed in Tables 3 thru 11. Use of the tools is shown in Figs. 2 thru 10.

TABLE 3 – COMPRESSOR TOOL KIT (364K50048)

ITEM NO.	DESCRIPTION	QTY. PER KIT	PART NO.
1	GEAR LOCKING TOOL	1	364-50212
2	CAP SCREW - .375-16	2	021-01511
3	WASHER PLAIN .375	14	021-01262
4	HEX NUT - .375-16	2	021-00467
5	GUIDE PIN #10-24	2	064-46488
6	EYE BOLT .3125-18	2	021-12420
7	WASHER PLAIN .3125	16	021-05166
8	GUIDE PIN .250-20	2	064-46499
9	HOOK TOOL	2	064-46610
10	GUIDE PIN .375-16	2	064-18716
11	STUD SPL	1	064-14500

ITEM NO.	DESCRIPTION	QTY. PER KIT	PART NO.
12	HEX NUT - .500-20	1	021-00483
13	EYEBOLT - .875	1	021-07703
14	WASHER, PLAIN - .875	2	021-05158
15	EYE BOLT - .375-16	3	021-13498
16	WASHER, PLAIN - .375	39	021-05167
17	SPACER	1	064-50213
18	SCREW CAP HEX .625-16	1	021-08389
19	TOOL SPACER	1	064-50211
20	PULLER TOOL	1	064-50211
21	SCREW CAP HEX .500-20	1	021-10832
22	SCREW CAP HEX .500-20	1	021-14162

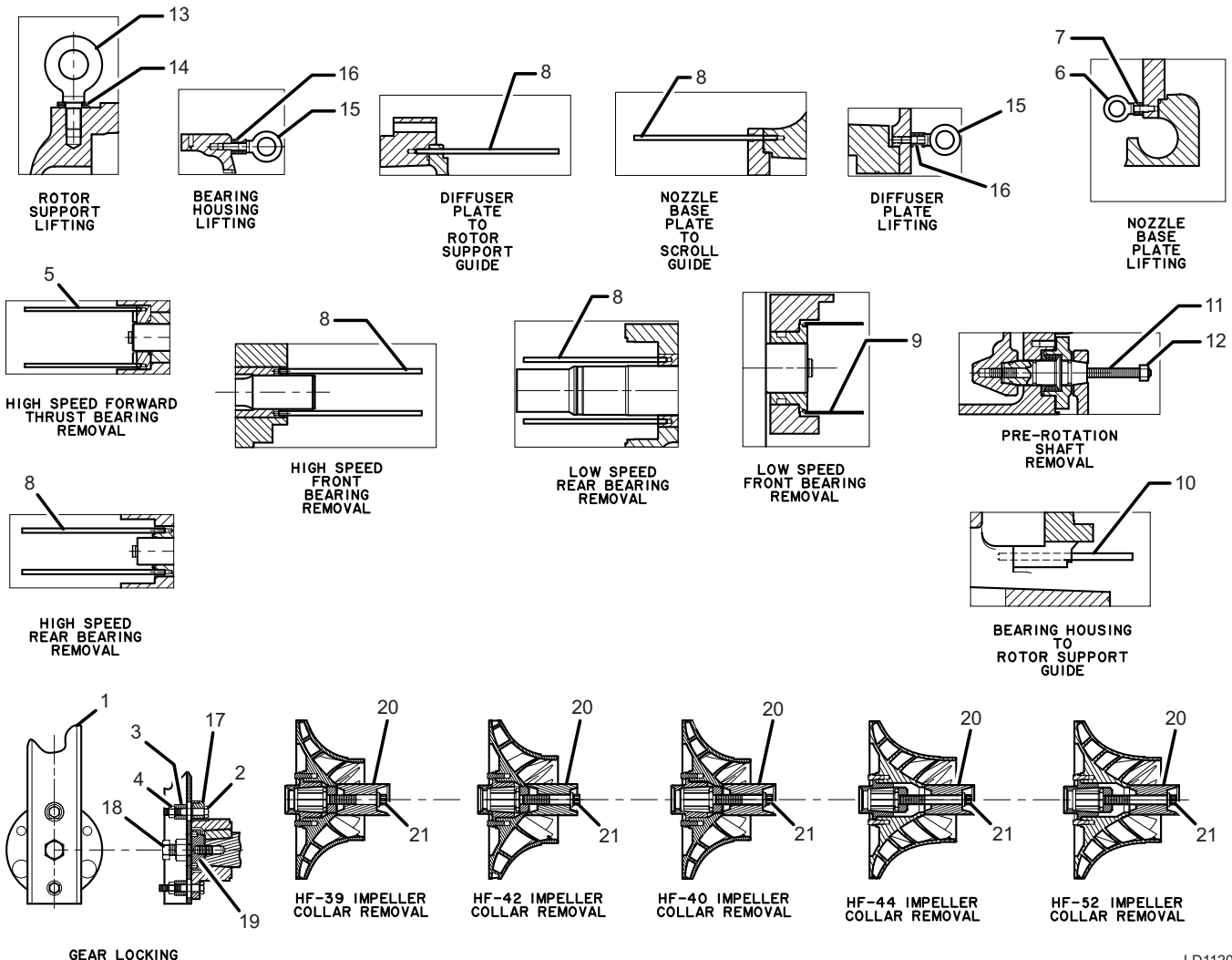


FIG. 2 – USE OF COMPRESSOR TOOLS (-39, -40, -42, -44, -52)

TABLE 4 – COMPRESSOR TOOL KIT (364-48026)

ITEM NO.	DESCRIPTION	QTY. PER KIT	PART NO.
1	GEAR LOCKING TOOL	1	364-48023
2	SCREW CAP - 5/8"	1	021-08389
3	SPACER TOOL	1	364-48022
4	CAP SCREW - 1/2"	2	021-08388
5	WASHER, PLAIN - 1/2"	2	021-01276
6	BAR TOOL	1	064-47031
7	HEX NUT - 1/4"	4	021-00451
8	PIN GUIDE	2	064-46499
9	HOOK TOOL	2	064-46610
10	GUIDE PIN	1	064-18716
11	STUD	1	064-14500

ITEM NO.	DESCRIPTION	QTY. PER KIT	PART NO.
12	HEX NUT - 1/2" HEAVY	1	021-00483
13	EYE BOLT - 7/8"	1	021-07703
14	WASHER PLAIN - 7/8"	5	021-05158
15	EYE BOLT - 3/8"	3	021-13498
16	WASHER PLAIN - 3/8"	11	021-05167
17	EYE BOLT - 5/16"	2	021-12420
18	WASHER PLAIN - 5/16"	2	021-05166
19	PINION TOOL (MOD. 65 & 73)	1	064-48028
20	PINION TOOL (MOD. 50 & 57)	1	064-48029
21	PIPE	1	023-15508

2

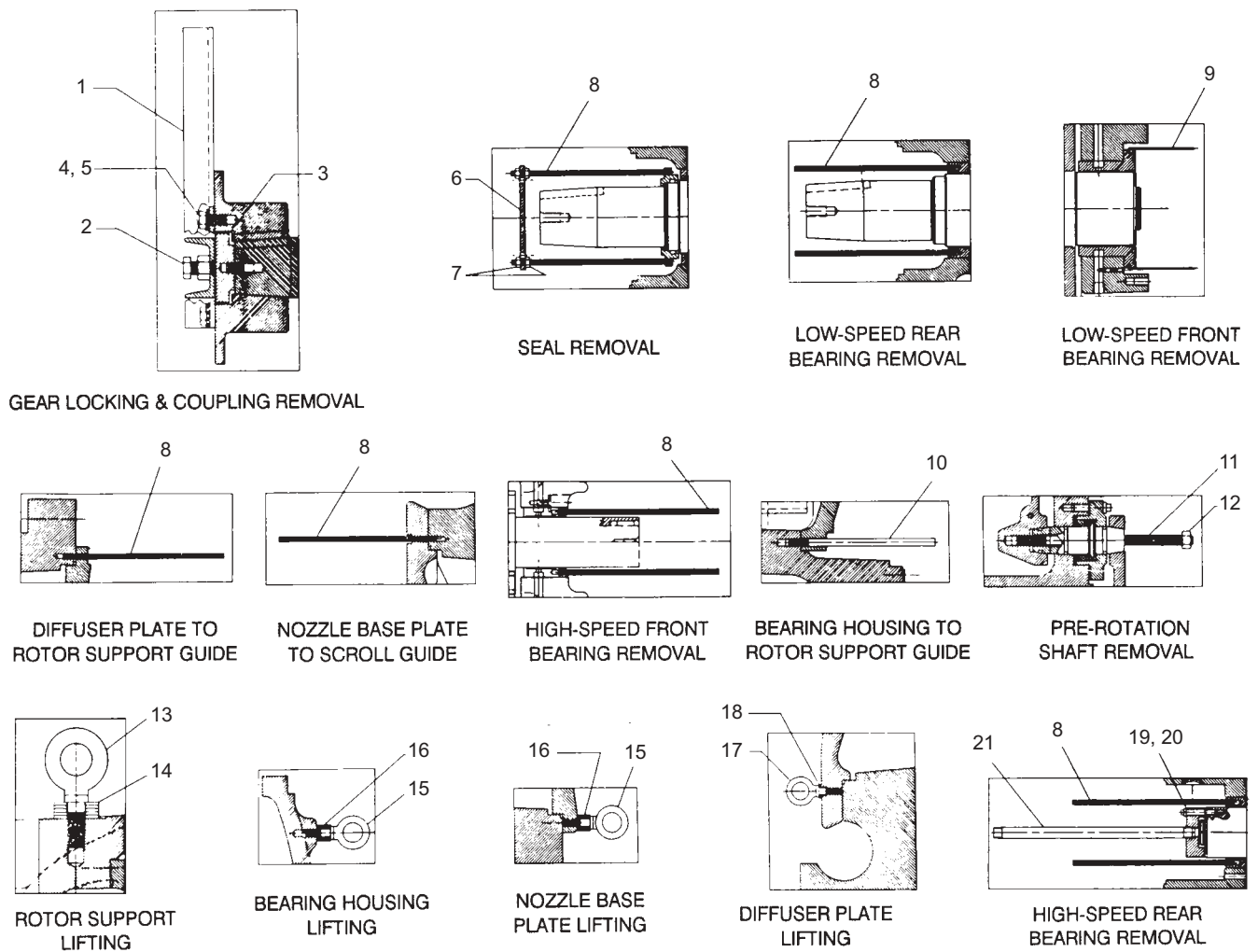
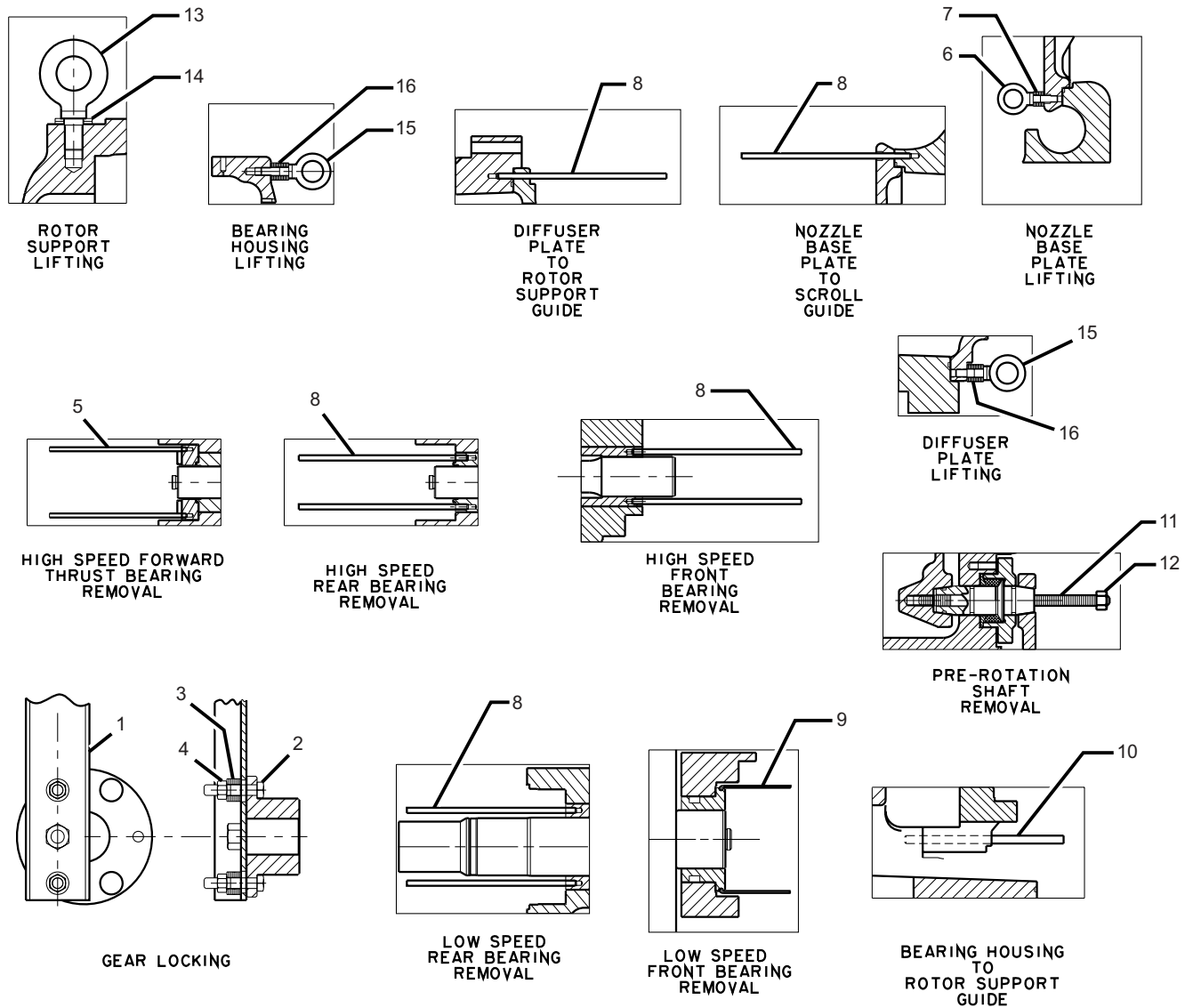


FIG. 3 – USE OF COMPRESSOR TOOLS (-65, -73, -81, -90)

TABLE 5 – COMPRESSOR TOOL KIT (364-49275)

ITEM NO.	DESCRIPTION	QTY. PER KIT	PART NO.
1	GEAR LOCKING TOOL	1	364-48023
2	SCREW CAP HEX - 1/2"	2	021-14249
3	WASHER PLAIN - 17/32"	14	021-01276
4	NUTN HEX HEAVY - 1/2"	2	021-02860
5	PIN GUIDE	2	064-46488
6	EYE BOLT - 5/16"	2	021-12420
7	WASHER PLAIN - 11/32"	16	021-05166
8	PIN GUIDE - 1/4-20UNC	2	064-46499

ITEM NO.	DESCRIPTION	QTY. PER KIT	PART NO.
9	HOOK TOOL	2	064-46610
10	PIN GUIDE 3/8"	2	064-18716
11	STUD SPECIAL	1	064-14500
12	NUT HEX HEAVY - 1/2"	1	021-00483
13	EYE BOLT - 7/8"	1	021-07703
14	WASHER PLAIN - 15/16"	2	021-05158
15	EYE BOLT - 3/8"	3	021-13498
16	WASHER PLAIN - 13/23"	39	021-05167



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FIG. 4 – USE OF COMPRESSOR TOOLS (-46, -50, -57, -59, -61)

TABLE 6 – COMPRESSOR TOOL KIT (364-48145)

ITEM NO.	DESCRIPTION	QTY. PER KIT	PART NO.
1	GEAR LOCKING TOOL	1	364-48023
2	SCREW CAP HEX - 5/8"	1	021-08389
3	TOOL SPACER	1	364-48022
4	SCREW CAP HEX - 1/2"	2	021-08388
5	WASHER PLAIN - 17/32"	2	021-01276
6	BAR TOOL	1	064-48345
7	NUT HEX - 1/4"	4	021-00451
8	PIN GUIDE - 1/4"	2	064-46499
9	HOOK TOOL	2	064-46610
10	PIN GUIDE - 3/8"	3	064-18716
11	STUD SPECIAL - .500	1	064-14500

ITEM NO.	DESCRIPTION	QTY. PER KIT	PART NO.
12	NUT HEX HVY - 1/2"	1	021-00483
13	EYE BOLT - 7/8"	1	021-07703
14	WASHER PLAIN - 15/16"	5	021-05158
15	EYE BOLT - 3/8"	3	021-13498
16	WASHER PLAIN - 13/32"	11	021-05167
17	EYE BOLT - 3/8"	2	021-12420
18	WASHER PLAIN - 11/32"	2	021-05166
19	TOOL SPECIAL	1	064-48133
23	SEAL O-RING - 7/16"	1	028-12551
25	ADAPTER IMPR 36-41	1	064-48282
26	PULLER TOOL 36-44 IMP	1	064-48281

2

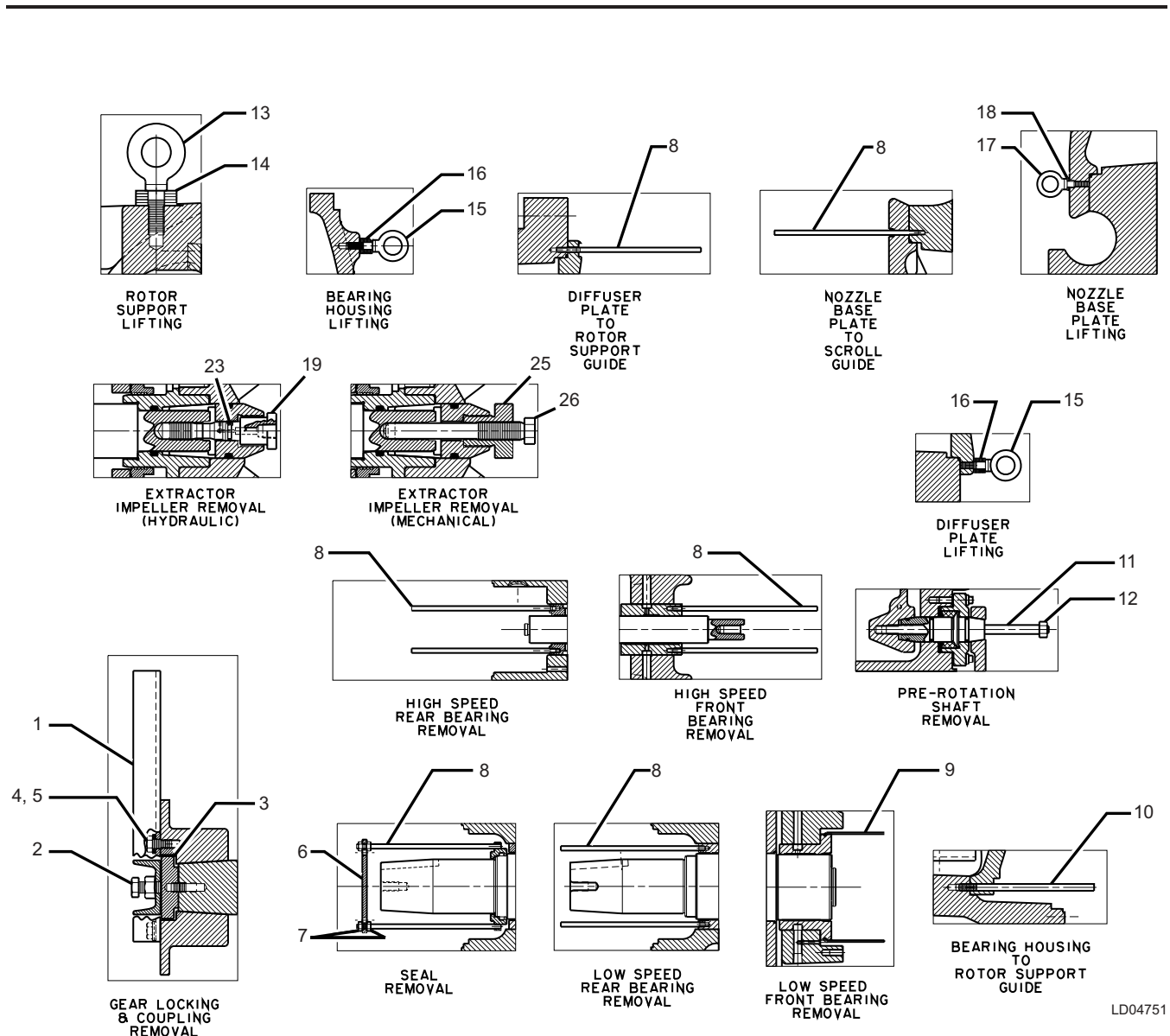
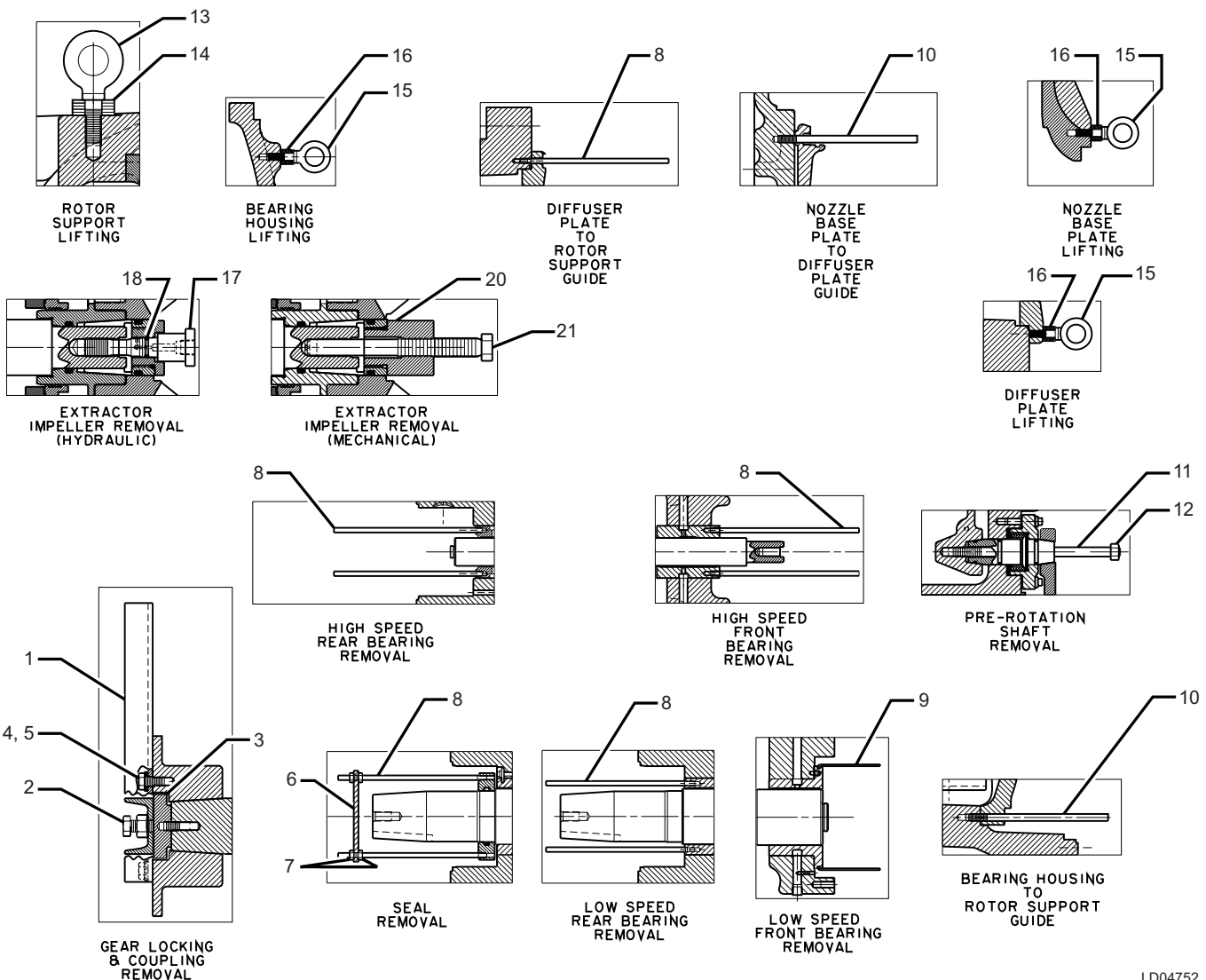


FIG. 5 – USE OF COMPRESSOR TOOLS (-41)

TABLE 7 – COMPRESSOR TOOL KIT (364-48343)

ITEM NO.	DESCRIPTION	QTY. PER KIT	PART NO.
1	GEAR LOCKING TOOL	1	364-48023
2	SCREW CAP HEX - 5/8"	1	021-08389
3	TOOL SPACER	1	364-48022
4	SCREW CAP HEX - 1/2"	2	021-08388
5	WASHER PLAIN - 17/32"	2	021-01276
6	BAR TOOL	1	064-48345
7	NUT HEX - 1/4"	4	021-00451
8	PIN GUIDE - 1/4"	2	064-46499
9	HOOK TOOL	2	064-46610
10	PIN GUIDE - 1/4"	3	064-18716

ITEM NO.	DESCRIPTION	QTY. PER KIT	PART NO.
11	STUD SPECIAL - .500	1	064-14500
12	NUT HEX HVY - 1/2"	1	021-00483
13	EYE BOLT - 7/8"	1	021-07703
14	WASHER PLAIN - 15/16"	5	021-05158
15	EYE BOLT - 3/8"	3	021-13498
16	WASHER PLAIN - 13/32"	11	021-05167
17	TOOL SPECIAL	1	064-48133
18	SEAL O-RING - 7/16"	1	028-12551
20	ADAPTER IMPR	1	064-48318
21	* I PULLER TOOL	1	064-48318



LD04752

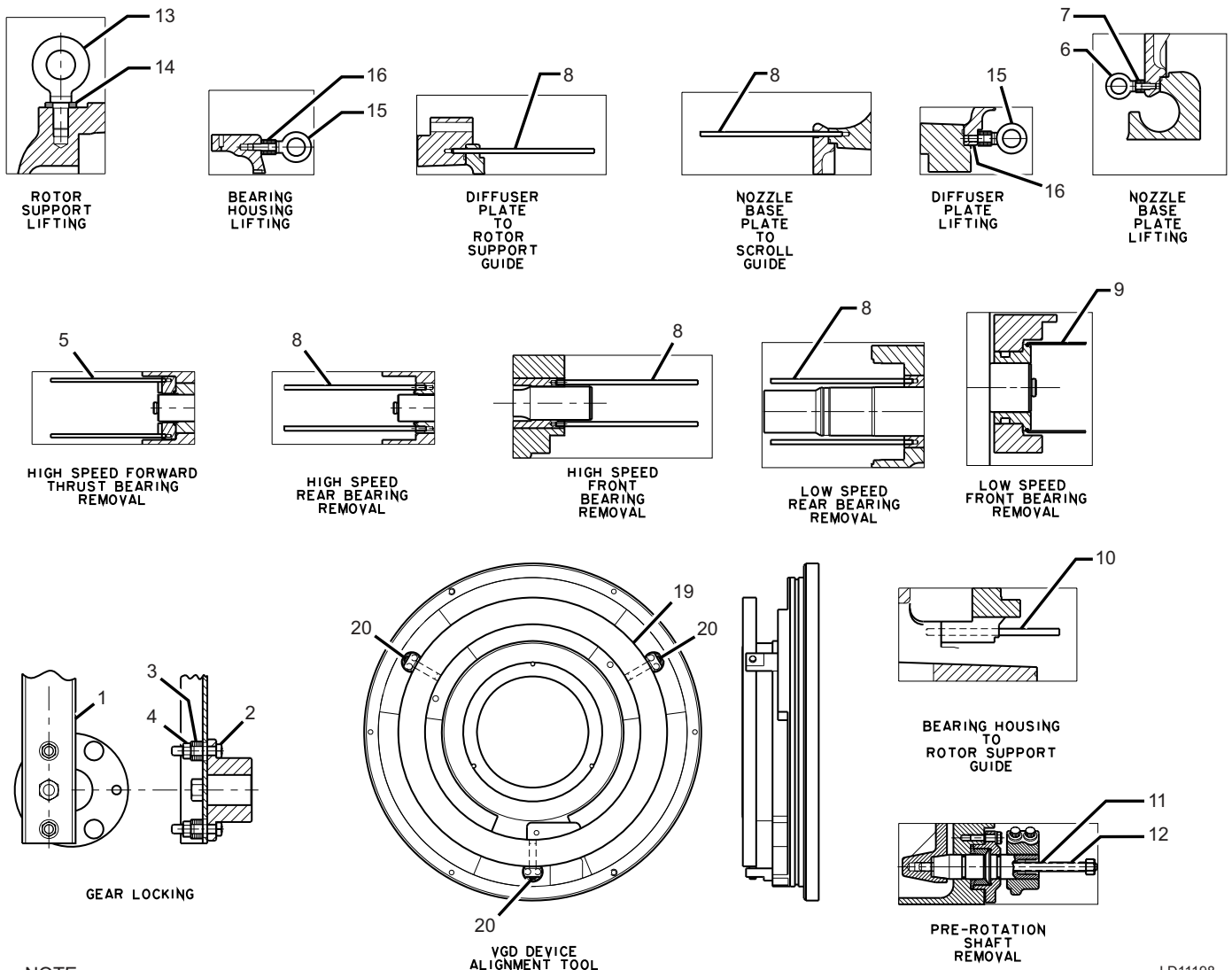
FIG. 6 – USE OF COMPRESSOR TOOLS (-61)

TABLE 8 – COMPRESSOR TOOL KIT (364K51286)

ITEM NO.	DESCRIPTION	QTY. PER KIT	PART NO.
1	GEAR LOCKING TOOL	1	364-48023
2	SCREW CAP HEX - 13 X 2.5	2	021-14249
3	WASHER 17/32" ID X 1/16"	14	021-01276
4	NUT HEX HEAVY 1/2"-13	2	021-02860
5	PIN GUIDE - 10-24UNC X 6-1	2	064-46488
6	EYE BOLT 5/16"-18NC CA1	2	021-12420
7	WASHER 11/32" ID X 11/16"	16	021-05166
8	PIN GUIDE 1/4"-20UNC X 8	2	064-46499
9	HOOK TOOL	2	064-46610
10	PIN GUIDE - 3/8"-16UNC X 7-1	2	064-18716

ITEM NO.	DESCRIPTION	QTY. PER KIT	PART NO.
11	STUD SPECIAL .500-20UNF	1	064-14500
12	NUT HEX HVY - 1/2"-20UNF	1	021-00483
13	EYE BOLT - 7/8"	1	021-07703
14	WASHER PLAIN - 15/16"-20UNF	2	021-05158
15	EYE BOLT - 3/8"-16UNC-2A	3	021-13498
16	WASHER - 13/32" ID X 13/16"	39	021-05167
17	INSTR 1 COPY OF DWG	1	035-20954
18	PKG KIT	1	330-22072
19	RING VGD ALLIGNMENT TOOL	1	064-51446
20	PIN DOWEL TAPPED 3/8 DIA.	3	029-18459

2



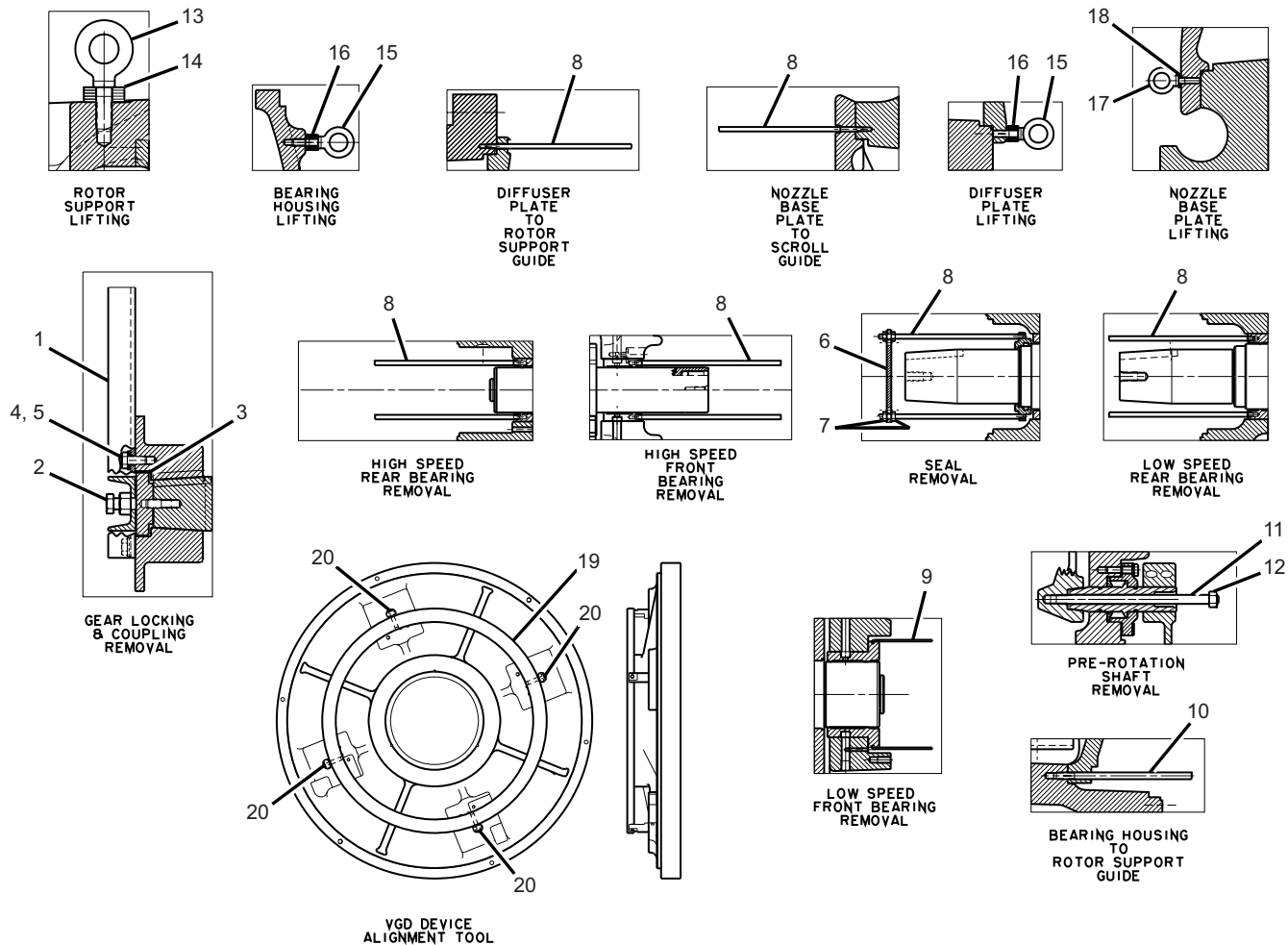
NOTE:
The number of Dowel Pins (20) may vary according to vintage of compressor.

FIG. 7 – Use of Compressor Tools (-58, -62)

TABLE 9 – COMPRESSOR TOOL KIT (364K51288)

ITEM NO.	DESCRIPTION	QTY. PER KIT	PART NO.
1	GEAR LOCKING TOOL	1	364-48023
2	SCREW CAP HEX - .625-11 X 1.25	1	021-14249
3	TOOL SPACER HA 50-73	1	364-48022
4	SCREW CAP HEX - 1/2"-13UNC	2	021-08388
5	WASHER 17/32"ID X 1-1/16"	2	021-01276
6	BAR TOOL YTK131 & 144 HA	1	064-47031
7	NUT HEX 1/4"-20UNC	4	021-00451
8	PIN GUIDE 1/4"-20UNC X 8	2	064-46499
9	HOOK TOOL	2	064-46610
10	PIN GUIDE - 3/8"-16UNC X 7-1	2	064-18716
11	STUD SPECIAL .500-20UNF	1	064-14500

ITEM NO.	DESCRIPTION	QTY. PER KIT	PART NO.
12	NUT HEX HVY - 1/2"-20UNF	1	021-00483
13	EYE BOLT - 7/8"	1	021-07703
14	WASHER PLAIN - 15/16"-20UNF	2	021-05158
15	EYE BOLT - 3/8"-16UNC-2A	3	021-13498
16	WASHER - 13/32" ID X 13/16"	39	021-05167
17	EYE BOLT - 5/16"-18NC	1	021-12420
18	WASHER 11/32" ID X 11/16"	2	021-05166
19	RING VGD ALLIGNMENT TOOL	1	064-51446
20	PIN DOWEL TAPPED 3/8" DIA.	4	029-18459
22	PKGG KIT	1	330-22072



NOTE:
The number of Dowel Pins (20) may vary according to vintage of compressor.

LD11199

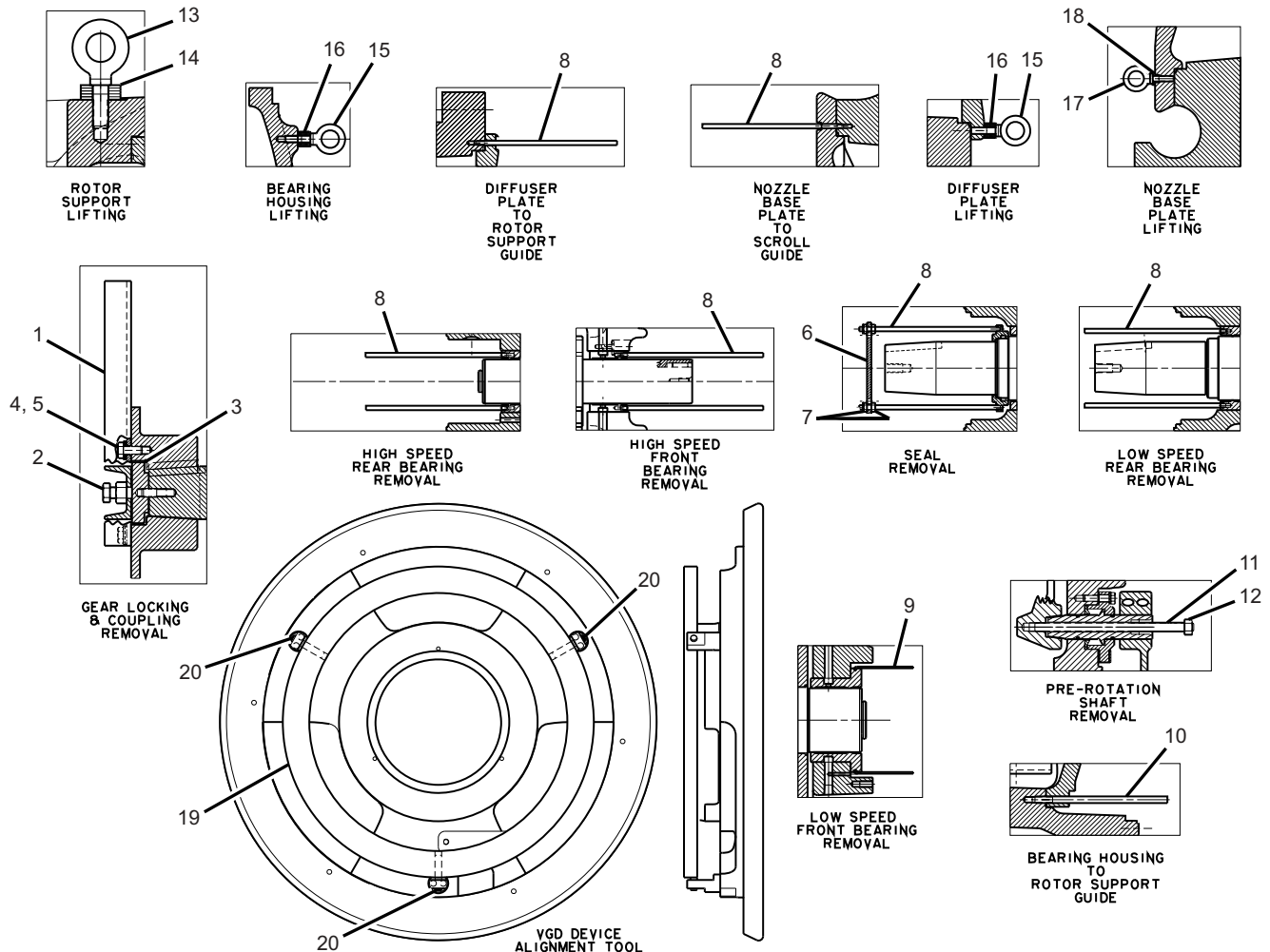
FIG. 8 – Use of Compressor Tools (-81, -90, -104)

TABLE 10 – COMPRESSOR TOOL KIT (364K51287)

ITEM NO.	DESCRIPTION	QTY. PER KIT	PART NO.
1	GEAR LOCKING TOOL	1	364-48023
2	SCREW CAP HEX - .625-11 X 1.25	1	021-08389
3	TOOL SPACER HA 50-73	1	364-48022
4	SCREW CAP HEX - 1/2"-13UNC	2	021-08388
5	WASHER 17/32"ID X 1-1/16"	2	021-01276
6	BAR TOOL YTK131 & 144 HA	1	064-47031
7	NUT HEX 1/4"-20UNC	4	021-00451
8	PIN GUIDE 1/4"-20UNC X 8	2	064-46499
9	HOOK TOOL	2	064-46610
10	PIN GUIDE - 3/8"-16UNC X 7-1	2	064-18716
11	STUD SPECIAL .500-20UNF	1	064-14500

ITEM NO.	DESCRIPTION	QTY. PER KIT	PART NO.
12	NUT HEX HVY - 1/2"-20UNF	1	021-00483
13	EYE BOLT - 7/8"	1	021-07703
14	WASHER PLAIN - 15/16"-20UNF	2	021-05158
15	EYE BOLT - 3/8"-16UNC-2A	3	021-13498
16	WASHER - 13/32" ID X 13/16"	39	021-05167
17	EYE BOLT - 5/16"-18NC	1	021-12420
18	WASHER 11/32" ID X 11/16"	2	021-05166
19	RING VGD ALLIGNMENT TOOL	1	064-51446
20	PIN DOWEL TAPPED 3/8" DIA.	3	029-18459
22	PKGG KIT	1	330-22072

2



NOTE:
The number of Dowel Pins (20) may vary according to vintage of compressor.

LD11200

FIG. 9 – Use of Compressor Tools (-65, -73)

TABLE 11 – COMPRESSOR TOOL KIT (364K51665)

ITEM NO.	DESCRIPTION	QTY. PER KIT	PART NO.
1	GEAR LOCKING TOOL	1	364-48023
2	SCREW CAP HEX - .625-11 X 1.25	1	021-08389
3	TOOL SPACER HA 50-73	1	364-48022
4	SCREW CAP HEX - 1/2"-13UNC	2	021-08388
5	WASHER 17/32"ID X 1-1/16"	24	021-01276
6	BOLT, EYE 1/2-13 NC	3	021-14620
7	PIN GUIDE 10-24UNC X 6.5	2	064-46488
8	PIN GUIDE 1/4"-20UNC X 8	2	064-46499
9	HOOK TOOL	2	064-46610
10	PIN GUIDE - 3/8"-16UNC X 7-1	2	064-18716
11	STUD SPECIAL .500-20UNF	1	064-14500

ITEM NO.	DESCRIPTION	QTY. PER KIT	PART NO.
12	NUT HEX HVY - 1/2"-20UNF	1	021-00483
13	EYE BOLT - 7/8"	1	021-07703
14	WASHER 15/16" ID X 1-3/4"	5	021-05158
15	EYE BOLT - 3/8"-16UNC-2A	3	021-13498
16	WASHER - 13/32" ID X 13/16"	11	021-05167
17	PIN 7/16" DIA.	4	064-51727
18	RING VGD ALLIGNMENT TOOL	1	064-51664

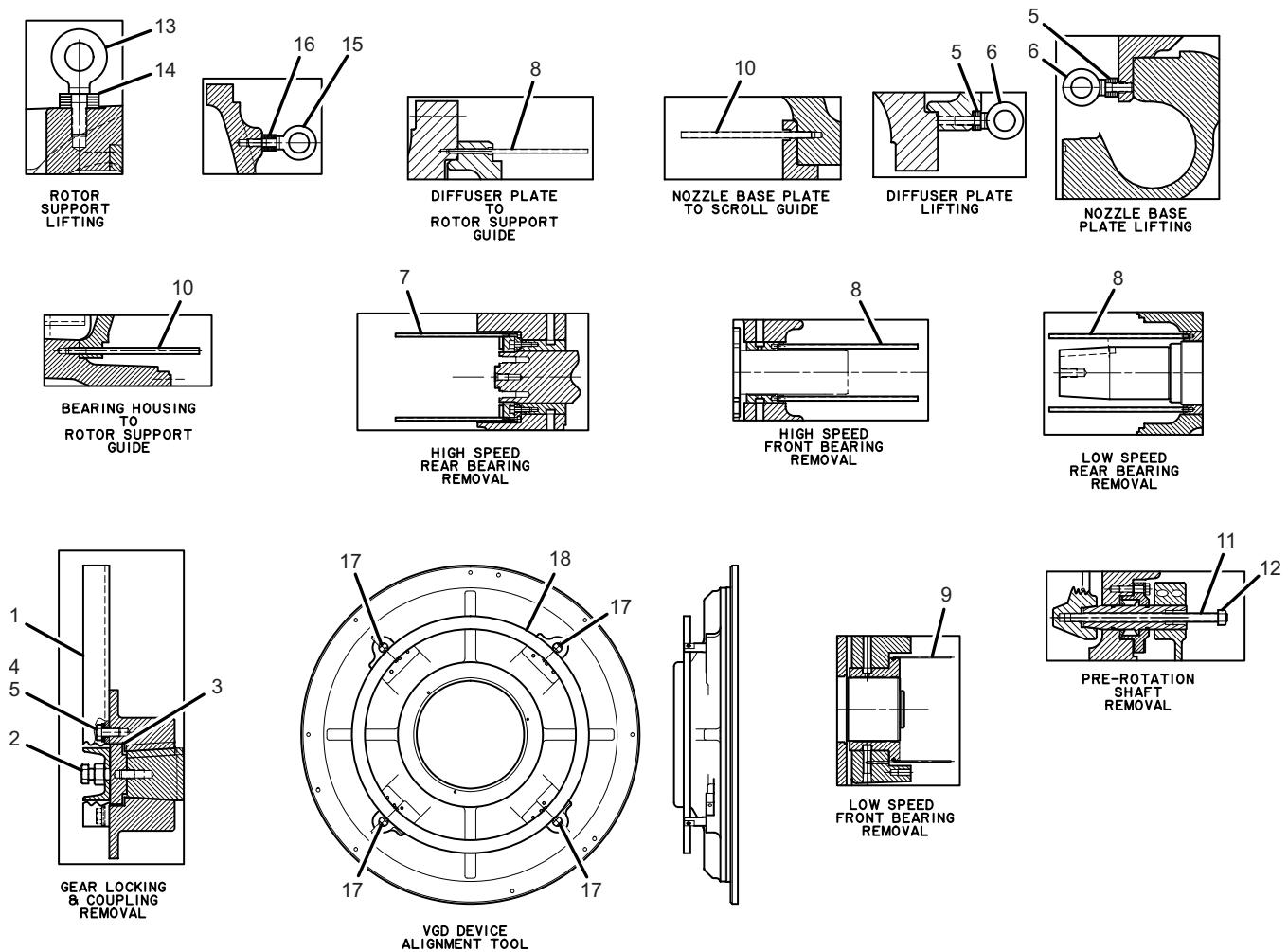


FIG. 10 – Use of Compressor Tools (-119)

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MOTOR REMOVAL AND REPLACEMENT



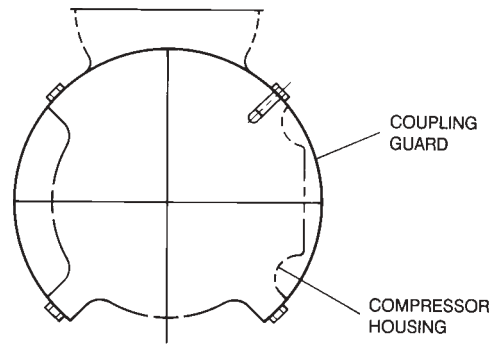
Be sure the main disconnect switch to the compressor motor is open and tagged, then disconnect the electrical leads at the motor terminals and tape the end of each lead. Make sure leads are marked correctly for later identification.

REMOVAL (MOTOR ONLY)

The following paragraphs outline the procedure for replacing or servicing the motor. Always contact the nearest YORK District Service Office when replacing or servicing the motor.

Close-Coupled Models

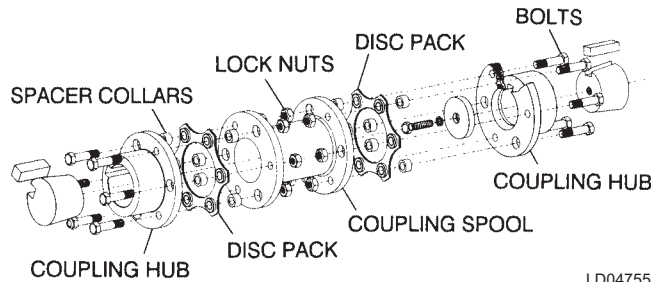
1. Support the weight of the motor from a hoist using eyebolts at locations provided in the motor housing.
2. Remove the hex head cap screws that hold the sheet metal covers to the compressor motor adapter. NOTE: Applicable on all except for HE, HD, & HF. After all screws are removed, remove covers (see FIG. 11).
3. Remove the internal coupling guard. The internal coupling guard is fastened to the compressor with (4) hex hd. cap screws (see FIG. 12).
4. Remove the bolts holding the coupling hubs to the coupling spool and the disc pack. Note arrangement of these parts (see FIG. 13). Remove the coupling spool and disc packs. If disc packs are required to be replaced, they must be purchased from the manufacturer. All couplings have the Mfg.'s ID on the face.



LD04754

NOTE: HD, HE, HF, HG, & HJ NOT UTILIZED

FIG. 12 – INTERNAL COUPLING GUARD



LD04755

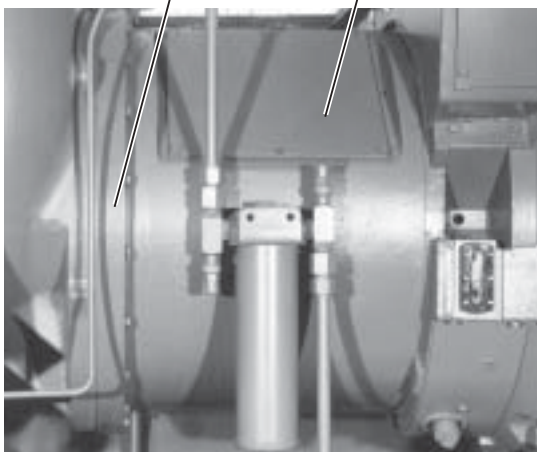
FIG. 13 – COMPRESSOR COUPLING

5. Taking care to see that the motor is properly supported, remove the bolts that hold the motor to the motor adapter.
6. Remove the bolts, nuts, and washers holding the motor to the mounting rails. Note location of any shims.
7. Lift the motor and pull it away from the compressor. Lower motor to floor for servicing. Remove shims from motor mounting rails.

Open-Drive Models

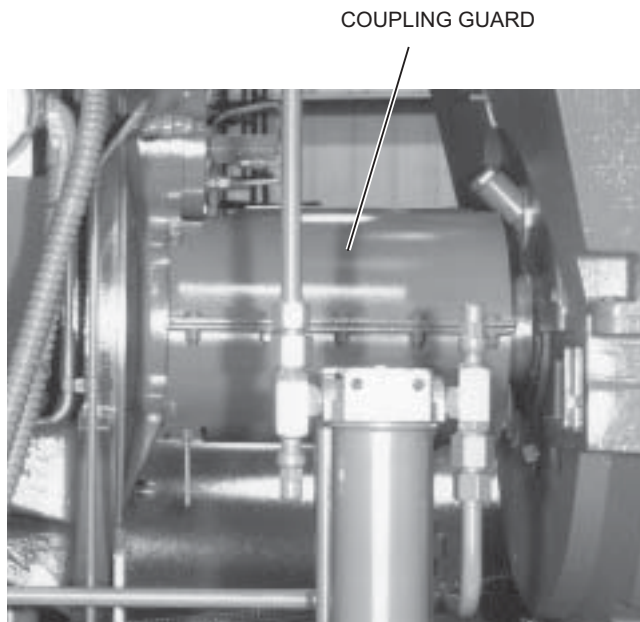
1. Remove the coupling guard (see FIG. 14).
2. Remove the bolts holding the coupling hubs to the coupling spool and the disc pack. Note arrangement of these parts (see FIG. 13). Remove the coupling spool and disc packs.
3. Remove the bolts, nuts and lockwashers holding the motor to the mounting channels. Note location of any shims.
4. Prior to performing Step 5, be sure to support the back end of the rotor support.
5. Taking care to see that the motor is properly supported, remove the bolts that hold the motor to the motor adapter.
6. Lift the motor and pull away from the compressor. Lower motor to floor for servicing. Remove shims from motor mounting channels.

MOTOR ADAPTER COVER



LD11576

FIG. 11 – MOTOR ADAPTER



LD11577

FIG. 14 – COUPLING GUARD (OPEN-DRIVE MODELS)

INSTALLATION

Close-Coupled Models

1. Place the number of shims originally required on each motor mounting rail.
2. Lift motor to the proper location and push motor carefully against the compressor motor adapter.
3. Line up holes in the face of the motor with the holes in the compressor motor adapter. Place the hex hd. cap screws through the compressor motor adapter and screw into the tapped holes on the motor, (but do not fully tighten screws) (Refer to FIG. 14).
4. Place the hex hd. cap screws and washers in holes in motor feet. Make sure the motor is shimmed correctly. Place hex nuts on screws and tighten and torque.
5. Tighten and torque screws holding motor to motor adapter.
6. Assemble the coupling. Refer to Form 160.49-N4.

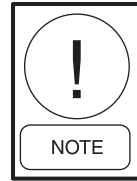
Open-Drive Models

1. Place the number of shims originally required on each motor mounting channel.
2. Lift motor to its proper location on the motor mounting channels. Fasten with cap screws, washers, and hex nuts.
3. Assemble the coupling. Refer to Form 160.49-N4.
4. Re-assemble the coupling guard.



Before opening any part of the compressor, the compressor must be pumped down to atmospheric pressure.

BELLOWS TYPE SEALS

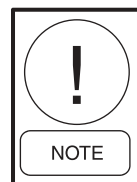


There are 2 versions of the bellows type shaft seals used on compressors manufactured after May of 1998. One version is used on the HA, HB, HC, HH and HG family of compressors has a separate sleeve spacer and C-ring that needs to be manually inserted before installing the seal assembly. The HD, HE, HF, and HJ version have the sleeve spacer and C-ring already installed in the seal. Below are the instructions on how to properly remove and install these seals.

Seal Removal (Bellows Type)

To remove/replace the bellows type shaft seal, proceed as follows:

1. Remove compressor coupling as described on previous pages under MOTOR REMOVAL AND REPLACEMENT. Also remove the compressor coupling hub from the compressor shaft.
2. Remove the oil drain line.
3. Loosen the two set screws (C) shown in FIG. 16.
4. Remove the flat head screws and re-attach the retaining clips in the installation position.

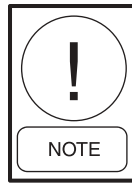


It is important that the shaft seal sleeve is securely attached to the compressor shaft prior to removal of the retaining clips. These clips protect the seal internals from harm during the assembly process and insure the positioning of the shaft seal for proper seal face loading. Anytime a seal cartridge is outside the compressor, the retaining clips need to be in their installation position.

5. Loosen the 4 set screws (B) shown in FIG. 16.
6. Remove the 8 hex head screws holding the shaft seal to the compressor housing.
7. Using guide pins, carefully remove the seal assembly from the rotor support.
8. Remove the C-ring and sleeve spacer from the compressor shaft on HA, HB, HC, HG and HH style compressors.
9. Remove the O-ring from the rotor support housing.

Installation (Bellows Type)

1. Be sure the shaft seal cavity is absolutely clean by cleaning it with an approved safety solvent and blowing it dry with compressed air.
2. Inspect all wearing surfaces and replace parts as necessary. See “CLEANING AND CHECKING WEARING PARTS”, page 6. Discard all O-rings and replace with new.
3. Thoroughly lubricate shaft and sleeve O-ring and or C-ring with clean YORK refrigerant oil prior to installation. For HD, HE, HF and HJ compressors, proceed to step 6.
4. Install the sleeve spacer on the shaft and slide it all the way onto the shaft.
5. Thoroughly lubricate C-ring with clean YORK refrigerant oil. Install the C-ring with the open side of the ring facing the compressor. As pressure increases the C-ring spring will expand to assure an appropriate seal.



Care needs to be taken when installing the C-ring to prevent damage to the ring. Any burrs on the shaft or on the snap ring groove may damage the seal.

6. Install shaft seal cover O-ring in rotor support housing.
7. Using guide studs, install seal cartridge in rotor support housing and secure with 3/8” or 1/4” mounting screws. Be careful not to get shim wedged between sleeve and shaft. **NOTE: NO shim on the HE, HF, or HJ style compressors.**
8. Before tightening the shaft seal sleeve set screw, rotate the compressor shaft to insure that the set screws straddle the shaft keyway.
9. Without removing the two shaft seal retaining clips, tighten the 4 accessible set screws to the compressor shaft (see FIG. 16).
10. Remove the retaining clips and tighten the remaining 2 set screws. Torque all 6 set screws (see FIG.16) to 60 inch pounds, except for HC, & HG which gets torqued to 96 inch pounds, unless otherwise stamped on the seal face. Install the retaining clips in the operating position on the seal face.

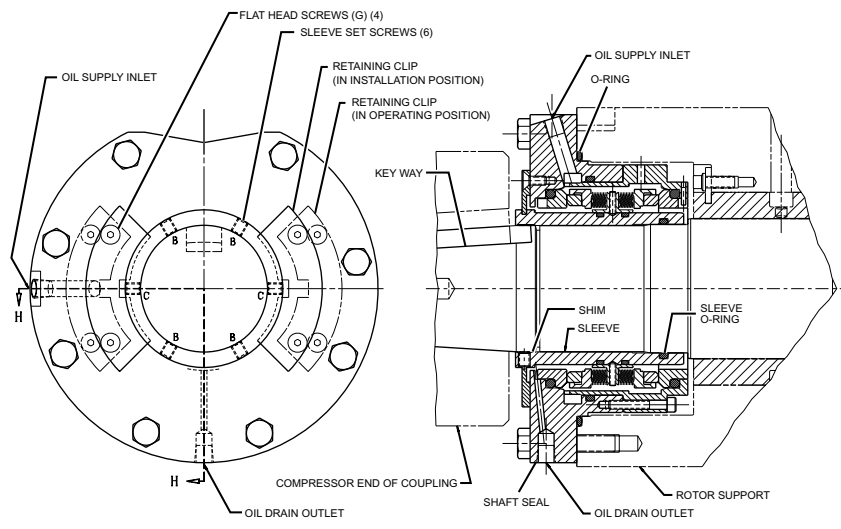
Compressor	IN-LBS.
HA	60
HB/HC/HD/HE HF/HH/HJ/HG	96

11. Re-connect the oil drain line (if required) and re-install the compressor coupling if no further service is planned.



After installation of clips to operation position and after the oil pump has been energized the clip should line up with the collar groove.

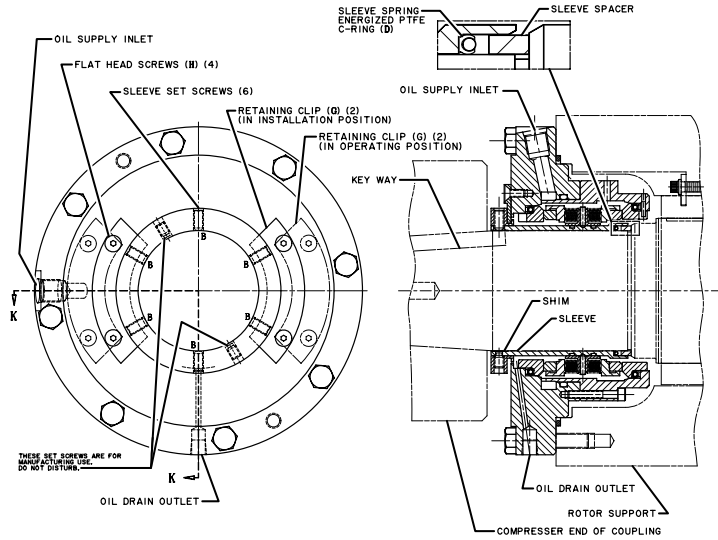
FIG. 15 – RETAINING CLIP POSITION



TYPE I

SECTION H-H

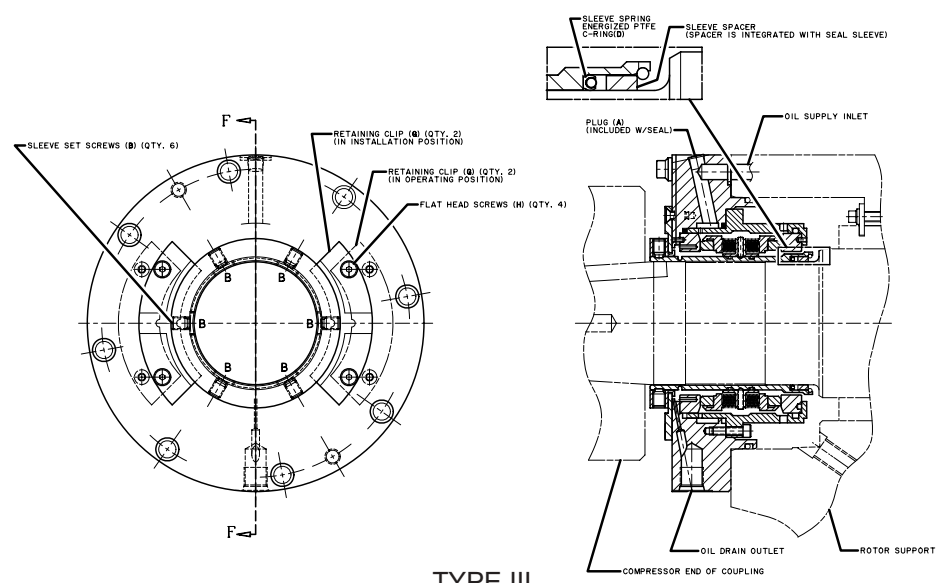
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TYPE II

SECTION K-K

LD11536



TYPE III

SECTION F-F

LD11539

FIG. 16 – BELLOWS TYPE SHAFT SEAL

DISASSEMBLY OF ROTOR SUPPORT

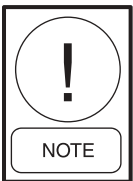
The following paragraphs outline the procedure for separating the rotor support from the rotor scroll if it becomes necessary to service internal parts:

Removing the Rotor Support from Rotor Scroll



For steps 1 thru 3 follow the procedures listed on previous pages of this instruction.

1. Remove the compressor coupling.
2. Remove all external piping from the rotor support.
3. Using proper rigging techniques, temporarily support the weight of the back end of the rotor support.
4. Taking care that the motor is properly supported, remove the bolts that hold the motor to the motor adapter. Remove the motor from the chiller and place it away from the work area. See “Motor Removal and Replacement” (page 18). Do **NOT** remove the motor adapter from the compressor.
5. Insert the eye bolt into the top of the rotor support and using the proper rigging methods support the weight of the rotor support (see TABLE 1).
6. Remove (2) of the 12-pt. cap screws holding the rotor support to the rotor scroll. Insert guide pins in place of the (2) cap screws.
7. Loosen the remaining cap screws. Do not remove the (2) set screws/studs with nuts from the bottom of the flange near the drain pipe. Remove the nuts only.



On the HE and HF family of compressors it may be necessary to temporarily rig a support for the oil sump. The sumps on these compressors are not attached to the shell.

8. Use (3) of the cap screws as jacking screws in the tapped holes provided to loosen the rotor support from the rotor scroll (see FIG. 17). Carefully pull the rotor support out of the rotor scroll. Rotate the shaft by hand when removing the rotor support to prevent damage to the impeller inlet seal ring.
9. The rotor support can now be removed and rested on the end of the motor adapter.

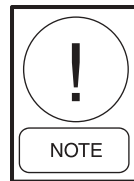
REMOVING THE IMPELLER

1. Before removing the impeller, measure and record the following (see FIG. 19).
 - A. Impeller Rim Runout (Design 0.003” max.)
 - B. Impeller Eye Runout (Design 0.002” max.)
 - C. High Speed Axial Thrust (see TABLE 12)
 - D. Low Speed Axial Thrust (see TABLE 12)

TABLE 12 -

Compressor	Axial Thrust	Min-Max.
HA/HB/HC/ HG/HJ	Low Speed	.011” - .019”
	High Speed	.008” - .021”
HD/HE/HF	Low Speed	.011” - .019
	High Speed	.009” - .020”

2. Install the gear locking tool on the low-speed shaft (see FIG. 44).
3. Remove the 3 (or 6) screws that hold the impeller to the high-speed shaft (see FIG. 21). Or remove the cap screw and O-ring from the impeller clamping collar. Pull the impeller from the high-speed shaft.
- 4a. Mechanical Method – Install the adapter and puller tool, found in the tool kit, as shown in FIG. 22. Apply a wrench to the puller tool to remove the impeller clamping collar.



Considerable torque will have to be applied to the wrench in order to remove the impeller clamping collar.

- 4b. Hydraulic Method – Install the hydraulic removal tool, found in tool kit, as shown in FIG. 23. Connect a source of hydraulic pressure (5000 psi minimum) to the head of the removal tool (1/8” NPT). Carefully and gradually apply hydraulic pressure until the clamping collar is loosened.
5. Pull the impeller from the high speed shaft. Use care when removing the impeller so that the balance piston seal is not damaged.

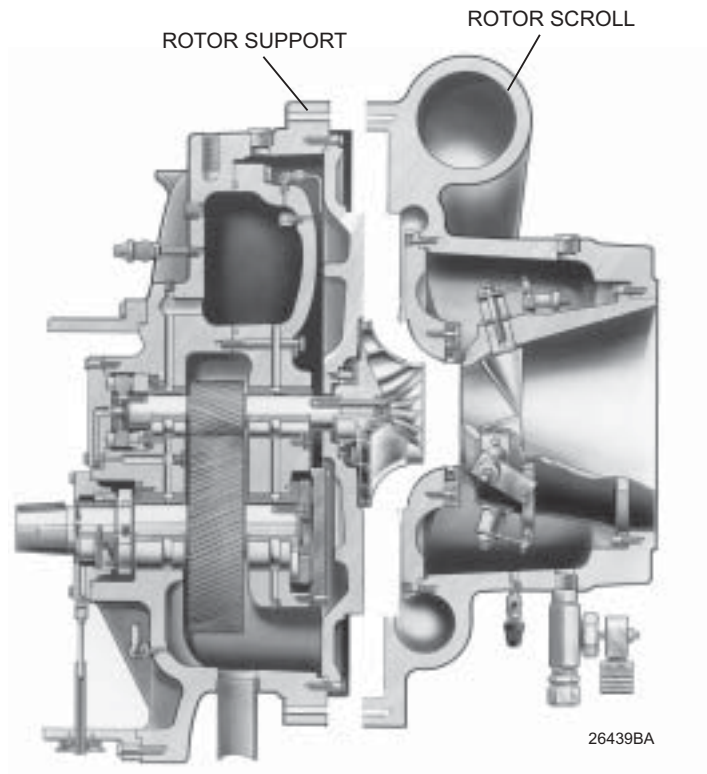


FIG. 17 – DISASSEMBLY OF ROTOR SUPPORT FROM THE ROTOR SCROLL

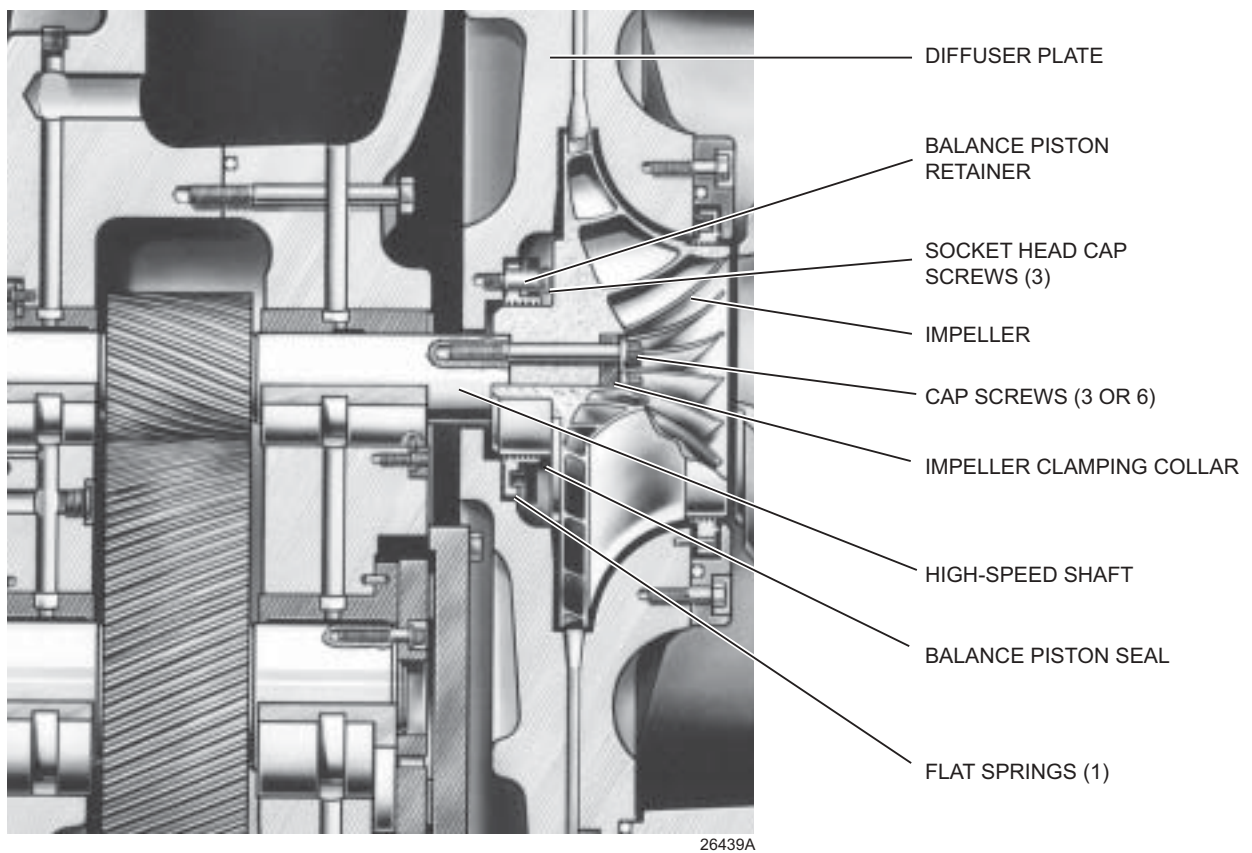


FIG. 18 – IMPELLER AND BALANCE PISTON (IMPELLER SIZES 46 AND LARGER)



DETAIL A – CHECKING RIM RUNOUT 26347A

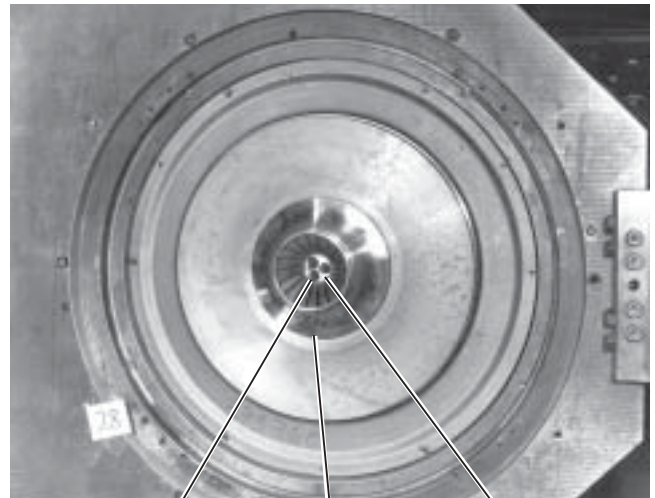
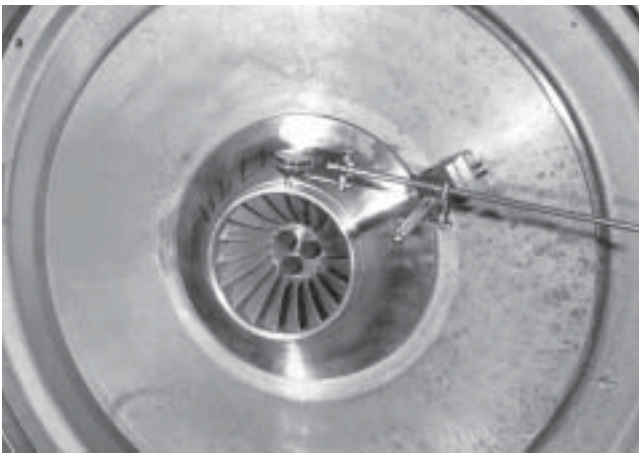


FIG. 20 – REMOVING IMPELLER (HF MODELS)
 CAP SCREWS IMPELLER IMPELLER CLAMPING COLLAR 26345A



DETAIL B – CHECKING EYE RUNOUT 26346A



DETAIL C – CHECKING AXIAL THRUST 26348A

FIG. 19 – CHECKING IMPELLER TOLERANCES

REMOVING THE IMPELLER (HA 41 Compressors)(See FIGS. 21 & 22)

1. Before removing the impeller, measure and record the following (see FIG. 19). Position compressor so that it is sitting on the correct horizontal plane to assure correct readings.

- A. Impeller Rim Runout (Design 0.003” max.)
- B. Impeller Eye Runout (Design 0.002” max.)
- C. Low Speed Axial Thrust (see TABLE 12)
- D. High Speed Axial Thrust (see TABLE 12)

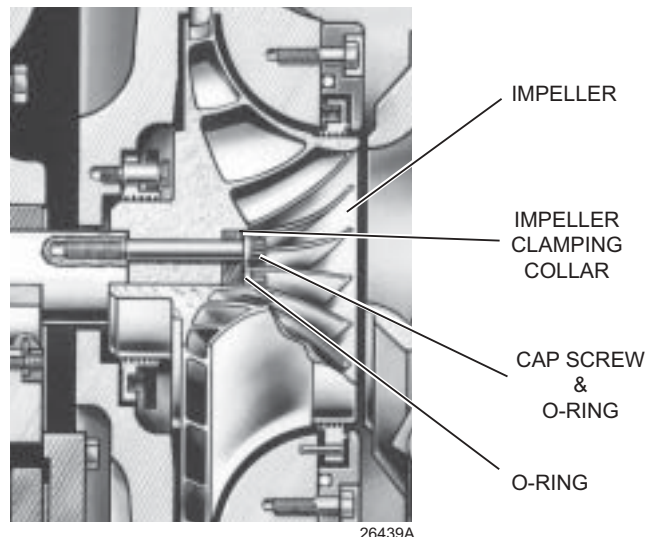
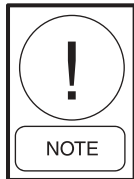


FIG. 21 – IMPELLER MOUNTING 26439A

2. Install the gear locking tool on the low-speed shaft (see FIG. 44).
3. Remove the cap screw from the impeller clamping collar.
- 4a. Mechanical Method – Install the adapter and puller tool, found in the tool kit, as shown in FIG. 22. Apply a wrench to the puller tool to remove the impeller clamping collar.



Considerable torque will have to be applied to the wrench in order to remove the impeller clamping collar.

- 4b. Hydraulic Method – Install the hydraulic removal tool, found in tool kit, as shown in FIG. 23. Connect a source of hydraulic pressure (5000 psi minimum) to the head of the removal tool (1/8" NPT). Carefully and gradually apply hydraulic pressure until the clamping collar is loosened.
5. Pull the impeller from the high speed shaft. Use care when removing the impeller so that the balance piston seal is not damaged.

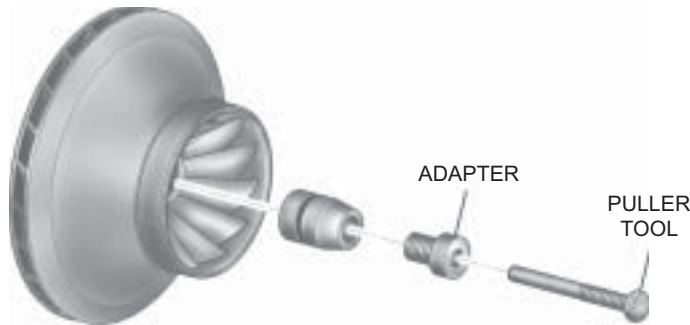


FIG. 22A –REMOVING THE IMPELLER (HA 41)

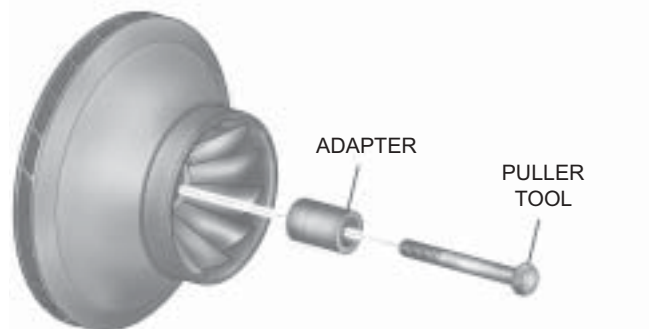
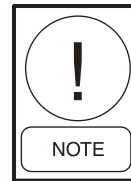


FIG. 22B –REMOVING THE IMPELLER (HF)

LD11403

REMOVING THE IMPELLER (HF COMPRESSORS)

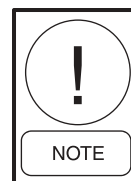
1. Before removing the impeller, measure and record the following (see FIG. 19).
 - A. Impeller Rim Runout (Design 0.003" max.)
 - B. Impeller Eye Runout (Design 0.002" max.)
 - C. High Speed Axial Thrust (see TABLE 12)
 - D. Low Speed Axial Thrust (see TABLE 12)
2. Install the Gear Locking Tool on the low-speed shaft (see FIG. 44).
3. Remove the cap screw from the impeller. Install Puller Plate and Puller Tool, found in the tool kit, onto the impeller. Apply a wrench to the puller to remove the impeller clamping collar.



Considerable torque will have to be applied to the wrench in order to remove the impeller clamping collar, removing balance piston seal and diffuser plate

REMOVING BALANCE PISTON SEAL AND DIFFUSER PLATE

1. Remove the (3) socket head cap screws (shoulder bolts) that fasten the balance piston retainer and balance piston seal to the diffuser plate (see FIG. 24 and 25). Remove the balance piston retainer and balance piston seal.
2. Remove (2) of the (6) cap screws that secure the diffuser plate to the bearing housing. Insert guide pins where cap screws were removed. Loosen the (4) remaining cap screws (see FIG. 25). Insert jacking screws into holes provided to loosen diffuser plate from bearing housing.
3. Insert eyebolts from tool kit into jacking holes and use proper rigging methods to lift diffuser plate from compressor. Also, remove the O-ring from the back of the diffuser plate.



Original design balance piston seals were equipped with (8) coil springs. Current design uses (16) coil springs. All current compressor the balance piston seal uses a flat spring washer in place of the coil spring (see FIG. 27 - HF style Balance Piston Seal Assembly).

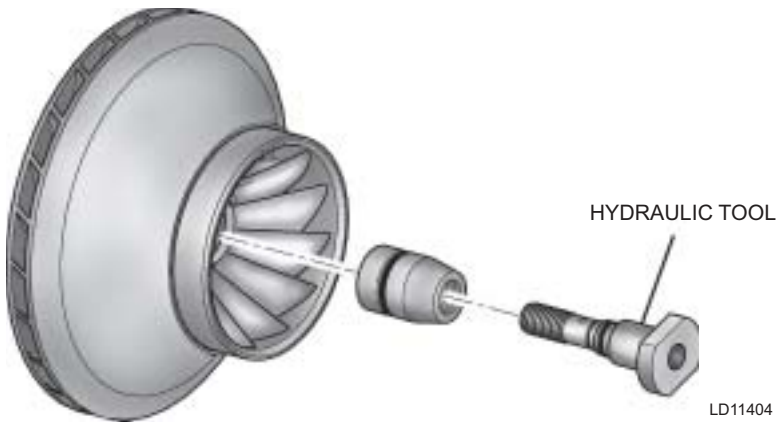


FIG. 23 – REMOVING THE IMPELLER - HYDRAULIC METHOD (IMPELLER SIZES 36 & 41)

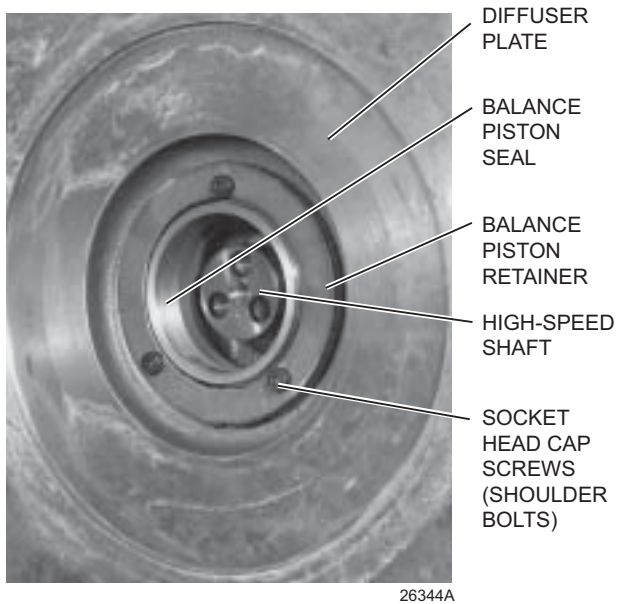


FIG. 24 – BALANCE PISTON SEAL

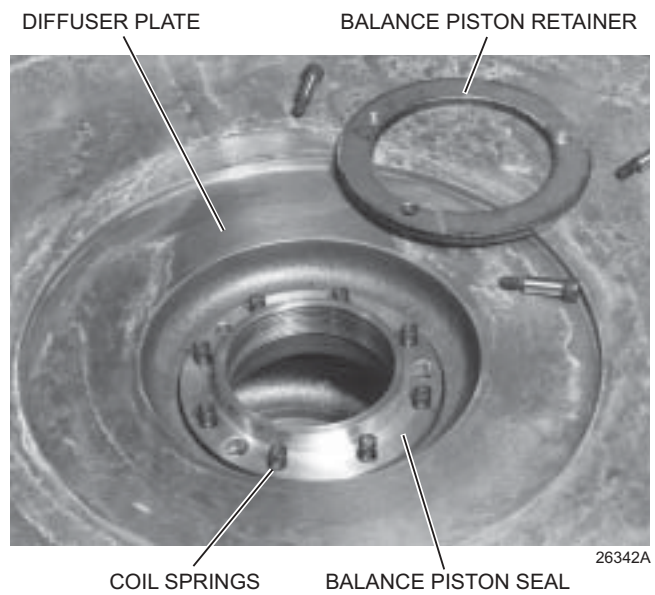


FIG. 26 – BALANCE PISTON SEAL (DISASSEMBLED)

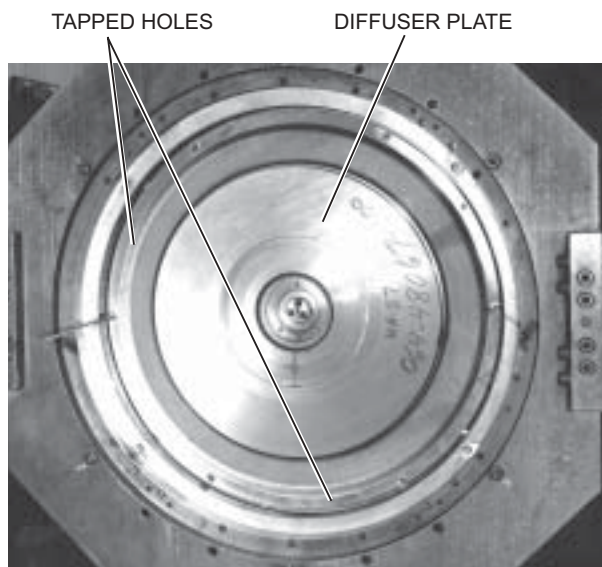


FIG. 25 – REMOVING DIFFUSER PLATE

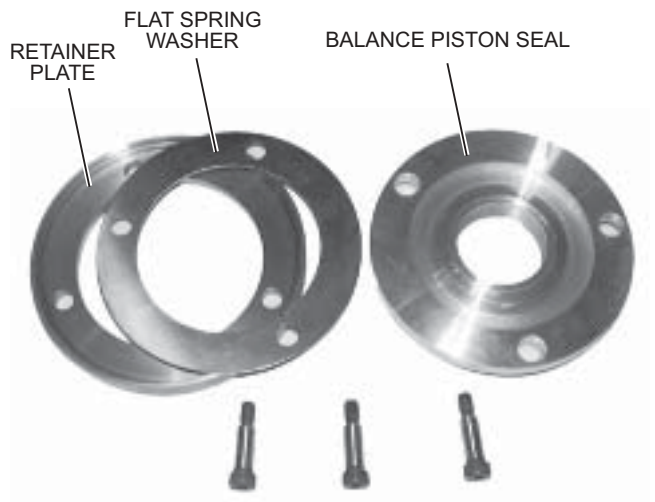


FIG. 27 – HF BALANCE PISTON SEAL ASSEMBLY

REMOVING FRONT LOW-SPEED BEARINGS (SEE FIG. 33)

1. Remove the (6) hex head cap screws that hold the low-speed thrust bearing to the bearing housing, and using (2) guide pins, remove the thrust bearing. Be sure not to damage the bearing pads (see FIG. 29 & 30).
2. Before removing the low-speed thrust collar mount an indicator, as shown in FIG. 31, and check the runout of the thrust collar. Maximum runout should not exceed .001" T.I.R. (It will be necessary to remove the shaft locking tool in order to take this measurement.)
3. Re-install the shaft locking tool. Remove the socket head cap screws that hold the low-speed thrust collar to the low-speed shaft, and remove the thrust collar (see FIG. 32). Use care when handling so that the surfaces are not damaged.

4. To remove the low-speed bearing, use (2) hook tools (shown in FIG. 33). Carefully pull the bearing out of the bearing housing. Note position of roll pin (see FIG. 34).

REMOVING FRONT HIGH-SPEED BEARING (SEE FIG. 35)

1. Remove the cap screw and retainer clip (see FIG. 34).
2. Using (2) 1/4" puller rods as shown in FIG. 35, pull the high-speed bearing out of the bearing housing.

2

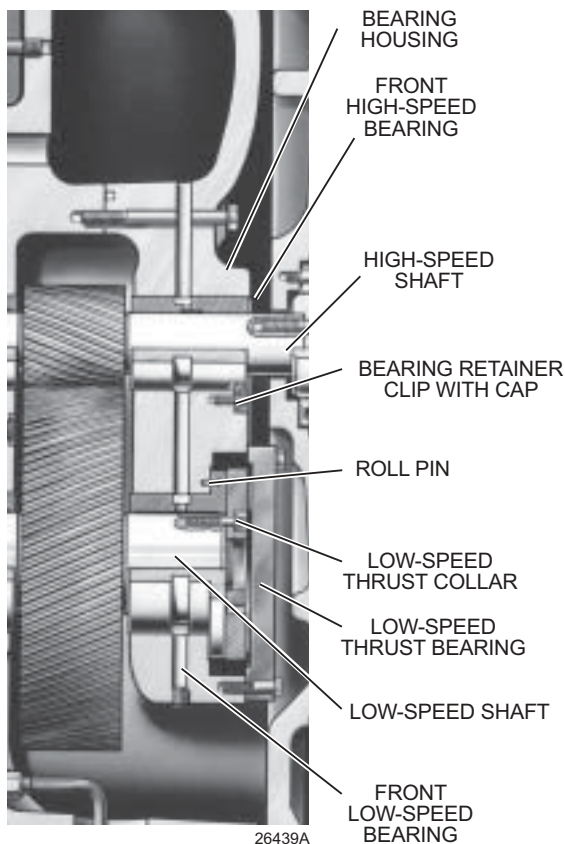


FIG. 28 – FRONT BEARING COMPONENTS

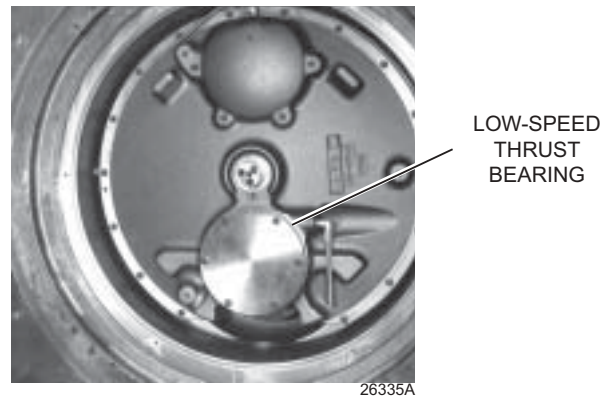


FIG. 29 – LOW-SPEED THRUST BEARING

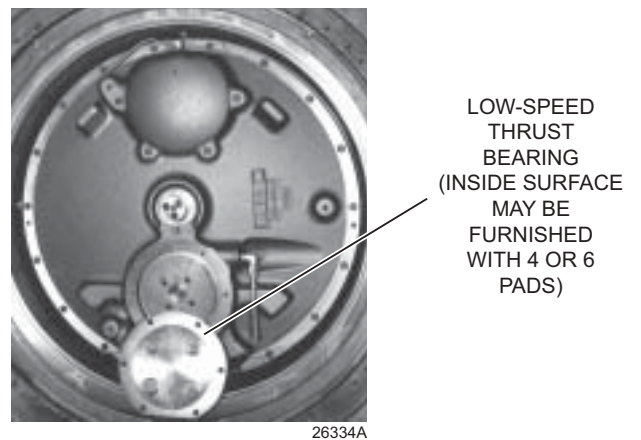


FIG. 30 – LOW-SPEED THRUST BEARING REMOVED

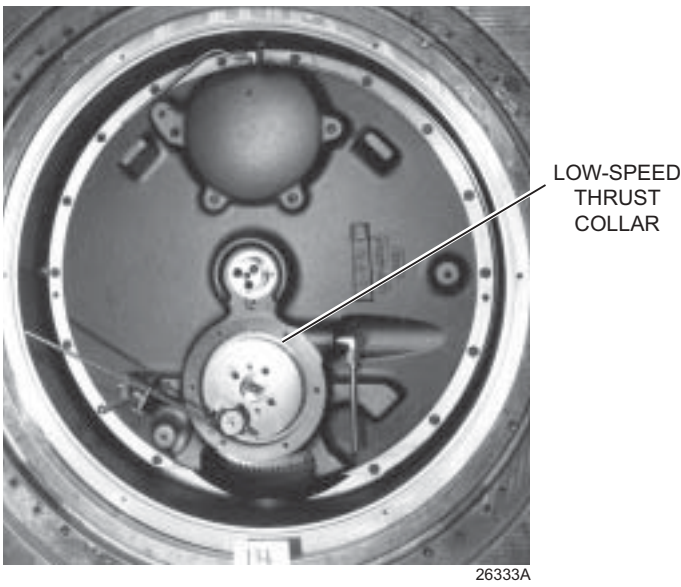


FIG. 31 – CHECKING LOW-SPEED THRUST RUNOUT

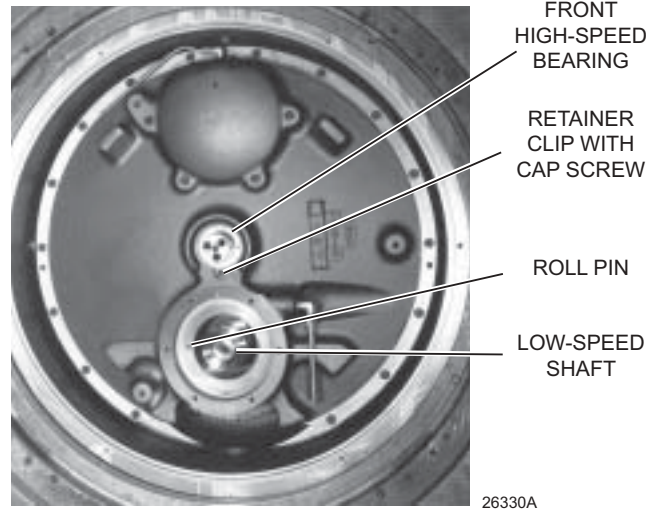


FIG. 34 – LOW-SPEED BEARING REMOVED WITH HIGH-SPEED BEARING IN PLACE

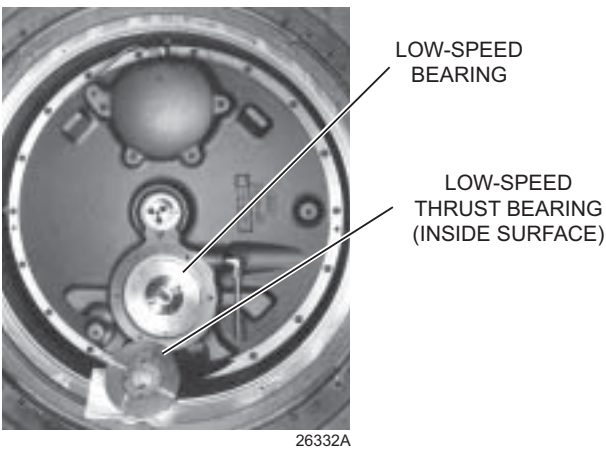


FIG. 32 – LOW-SPEED THRUST COLLAR REMOVED

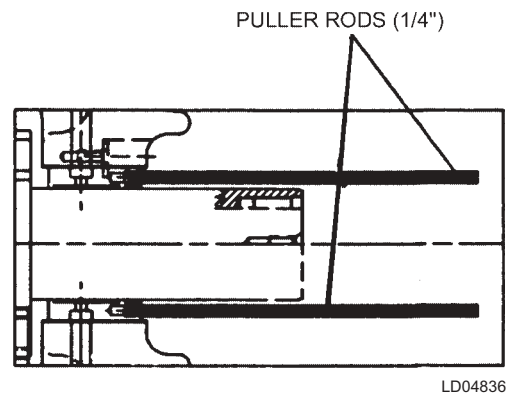


FIG. 35 – FRONT HIGH-SPEED BEARING REMOVAL

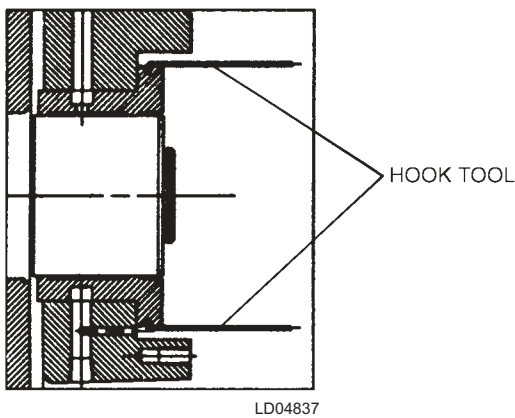


FIG. 33 – FRONT LOW-SPEED BEARING REMOVAL

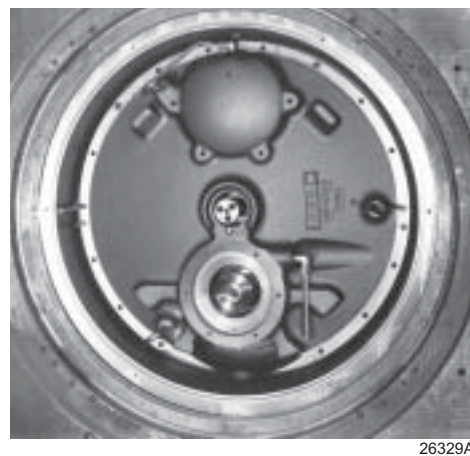


FIG. 36 – ALL FRONT END BEARINGS REMOVED

REMOVING BEARING HOUSING AND GEARS

Bearing Housing

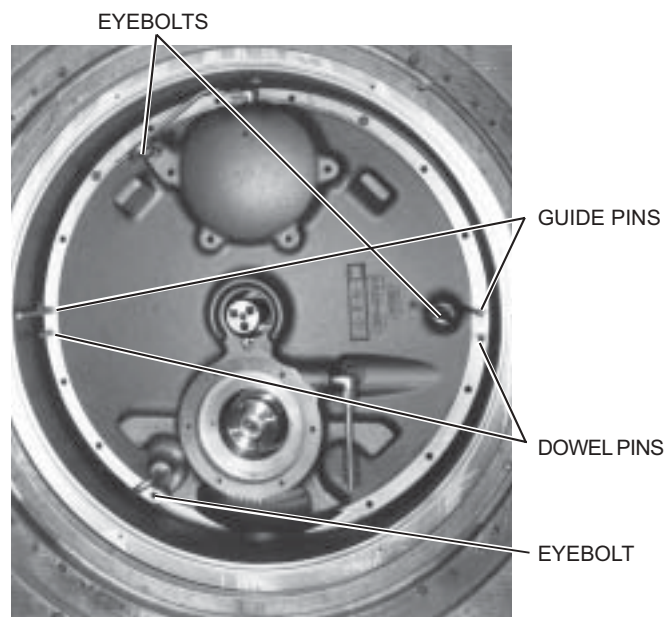
1. Remove (2) of the cap screws that hold the bearing housing to the rotor support and insert (2) 3/8" guide pins as shown in FIG. 37. Also insert (3) 3/8" eyebolts as shown. On the HE and HF style compressors, the (3) 1/2" cap screws shown in FIG. 37 are used to secure the dowel pins which align the bearing housing with the rotor support.
2. Attach proper rigging, remove the remaining cap screws.



Remove the bearing housing, using care so that the compressor is not damaged and that no injury occurs to service personnel as the bearing housing is quite heavy.

Gears

1. Remove the high-speed reverse thrust bearing, high-speed thrust collar, and high-speed forward thrust bearing.
2. Remove the shaft locking tool.
3. Remove the compressor shaft seal. Do NOT remove the rear low-speed bearing.
4. Rotate the high-speed gear as necessary to free the gear teeth while pulling the gear from the rotor support.



NOTE:
Dowel Pin quantities (2 or 3) will vary according to vintage of unit.
HJ Dowel Pins have socket head plugs.

FIG. 37 – REMOVING BEARING HOUSING

5. To remove the low-speed gear, use a 1/2" - 13 eyebolt in the end of the shaft and pull the gear out of the rotor support.

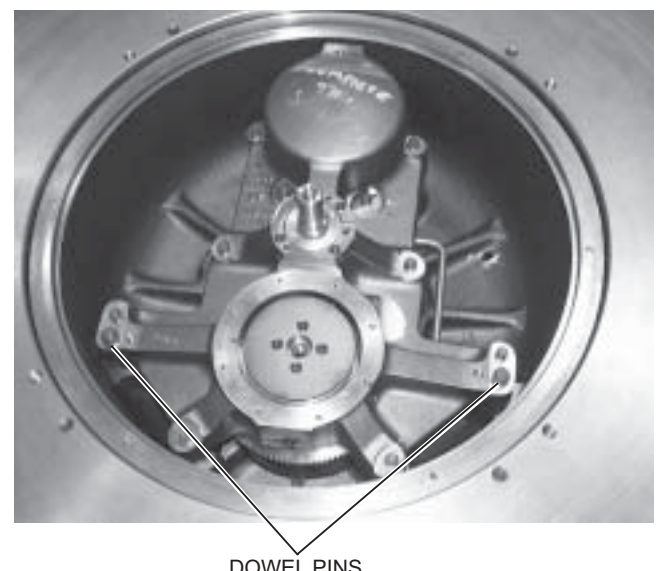
Before re-assembly, be sure the compressor housing is absolutely clean by cleaning it with an approved safety solvent and blowing it dry with compressed air. Inspect all wearing surfaces and replace parts as necessary. See "CLEANING AND CHECKING WEARING PARTS", page 6. Discard O-rings and replace with new.

REAR LOW-SPEED BEARING (SEE FIG. 39)

Removal

To remove/replace the rear low-speed bearing, proceed as follows:

1. Remove the compressor coupling spool as described on previous pages under "MOTOR REMOVAL AND REPLACEMENT". Also remove the compressor coupling hub from the compressor shaft.
2. Remove the compressor shaft seal as described on previous pages.
3. Remove the screw holding the retainer clip to the compressor.
4. Using the (2) 1/4" puller rods as shown in FIG. 40, remove the bearing from the compressor.
5. Inspect the bearing. See "CLEANING AND CHECKING WEARING PARTS", page 6. Replace with new bearing if necessary.

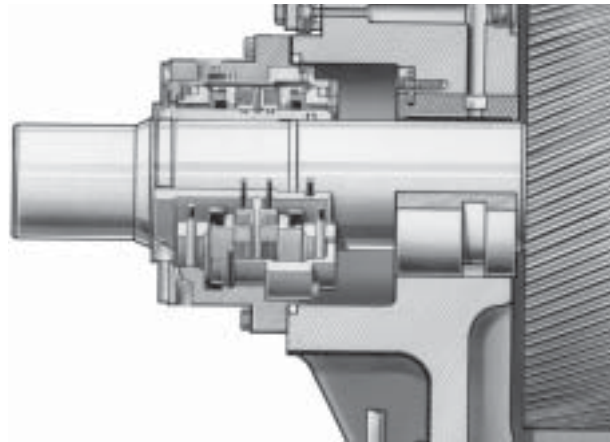


NOTE: (LOCATED UNDER 1/2" CAP SCREWS)
Dowel Pin quantities (2 or 3) will vary according to vintage of unit.

FIG. 38 – BEARING HOUSING DOWEL PINS

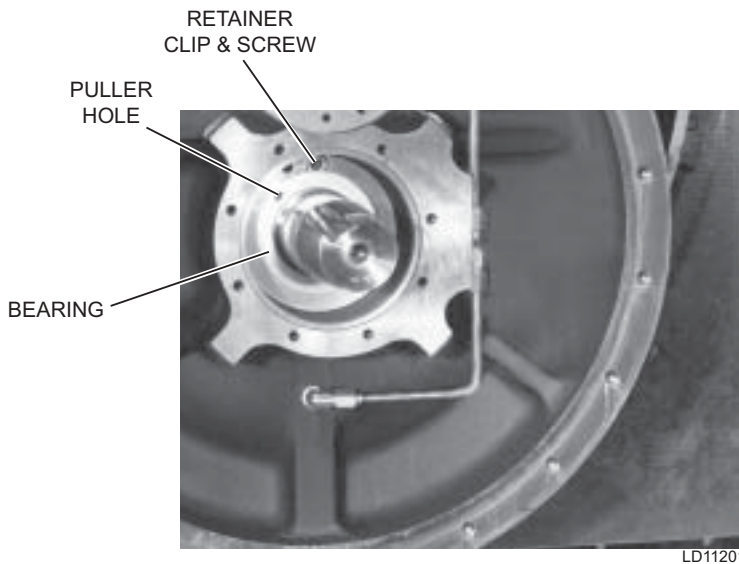
Installation

1. Inspect the bearing surface of the drive shaft, and be sure the drive shaft is absolutely clean.
2. Apply a light coating of oil and Molykote to the driveshaft and to the inside and outside surfaces of the bearing.
3. Carefully slide the bearing into position over the drive shaft. Be sure it is turned so that the slot for the retainer clip is at the top (see FIG. 39).
4. Install the retainer clip and cap screw.
5. Install the shaft seal and coupling following procedures outlined previously in this manual.

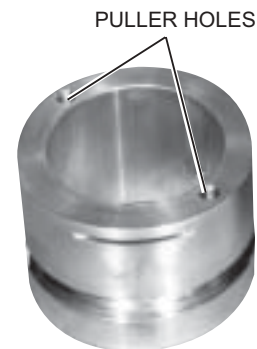


29370AE

BELLOWS TYPE SEAL

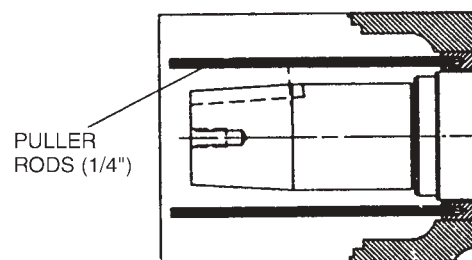


LD11201



26323A

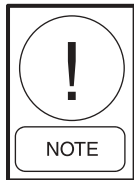
FIG. 39 – REAR LOW-SPEED BEARING



LD04838

FIG. 40 – LOW-SPEED REAR BEARING REMOVAL

REAR HIGH-SPEED BEARING COMPONENTS



Rear High-Speed Bearings are of 2 slightly different designs.

- *The original design, shown in FIG. 41, is applicable to HA, HB, HC, HG and HH compressors.*
- *The design shown in FIG. 51, is applicable to HD, HE, HF and HJ compressors.*

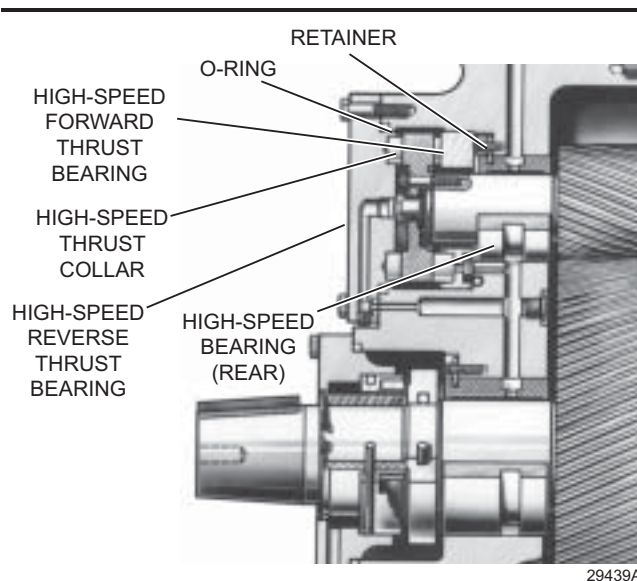


FIG. 41 – HIGH-SPEED BEARING COMPONENTS

To remove/replace any of the components shown in FIG. 41, proceed as follows:

1. Remove the Proximity Probe.
2. Remove the cap screws holding the high-speed reverse thrust bearing and remove the high-speed reverse thrust bearing (see Fig. 42). Note alignment of oil passages.
3. Before removing the high-speed thrust collar, it is advisable to measure the run-out on the collar face. Mount a dial indicator as shown in FIG. 43 and rotate the compressor shafts. Maximum allowable run-out is .001”.

4. To remove the high-speed thrust collar, it is necessary to lock the shafts to prevent isolation. Use the gear locking tool from the tool kit as illustrated in FIG. 44.
5. Remove the cap screws that hold the high-speed thrust collar to the high-speed shaft (see FIG. 45), and remove the thrust collar (1/4”-20 puller holes are provided for convenience).
6. Remove the high-speed forward thrust bearing (see FIG. 46), #10-24 puller holes are provided for convenience. When inserting puller bolts, use care that bearing pads are not damaged. Note position of indexing roll pin and mating hole in casing (see FIG. 47).
7. Remove the cap screw holding the high-speed bearing (rear) retainer clip to the casing (see FIG. 48). Using items from the tool kit as shown in FIG. 49, remove the bearing from the compressor.
8. Inspect all parts removed above. See “CLEANING AND CHECKING PARTS”, page 6. Replace with new parts as necessary.

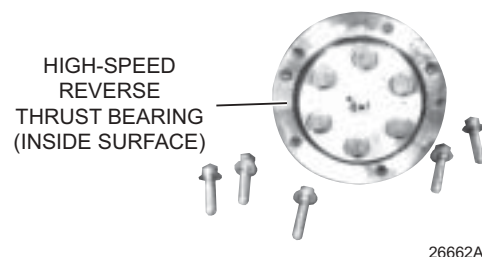
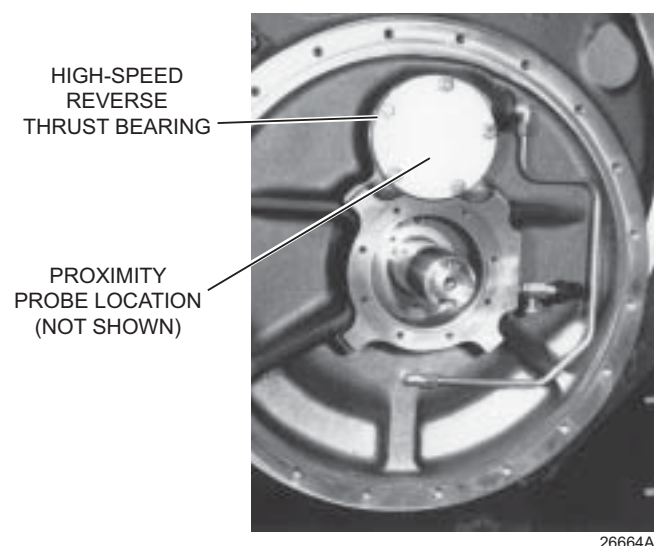
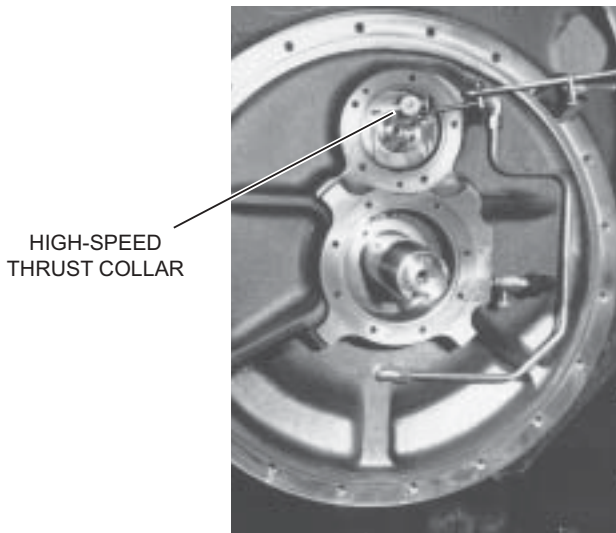
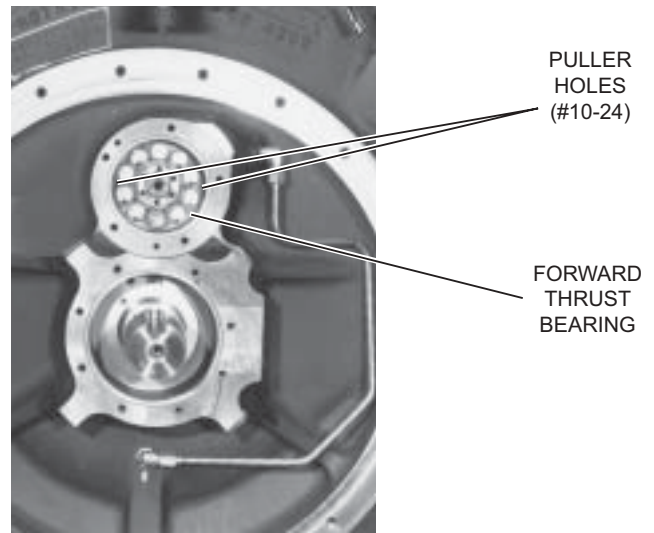


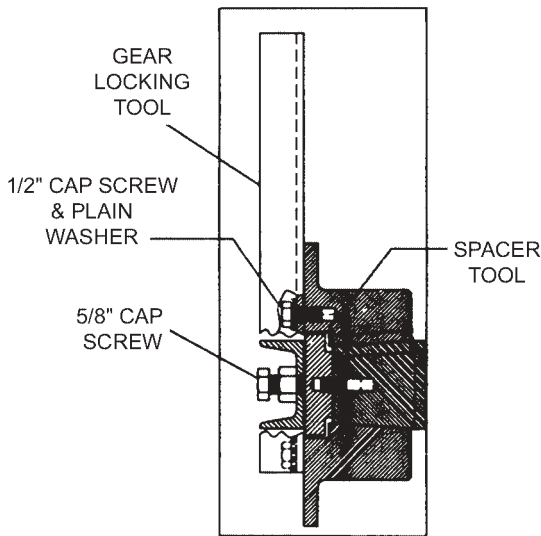
FIG. 42 – HIGH-SPEED REVERSE THRUST BEARING



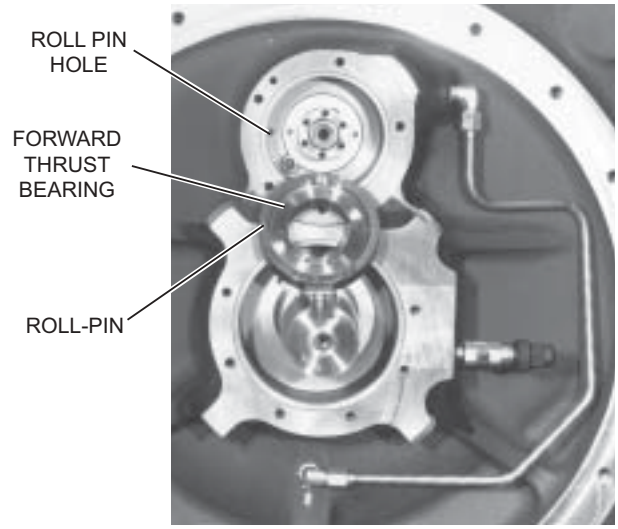
26663A
FIG. 43 – CHECKING HIGH-SPEED THRUST COLLAR RUN-OUT



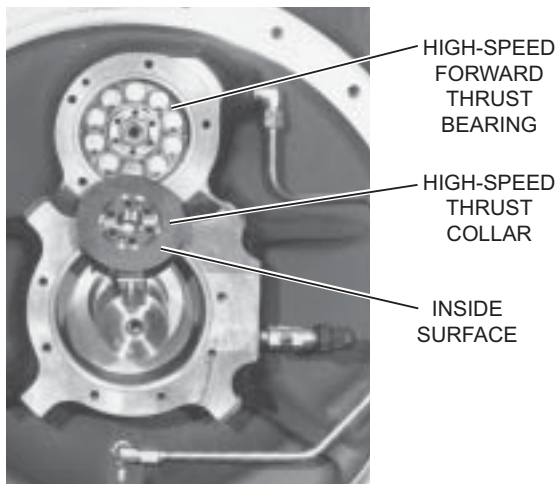
26338A
FIG. 46 – HIGH-SPEED FORWARD THRUST BEARING



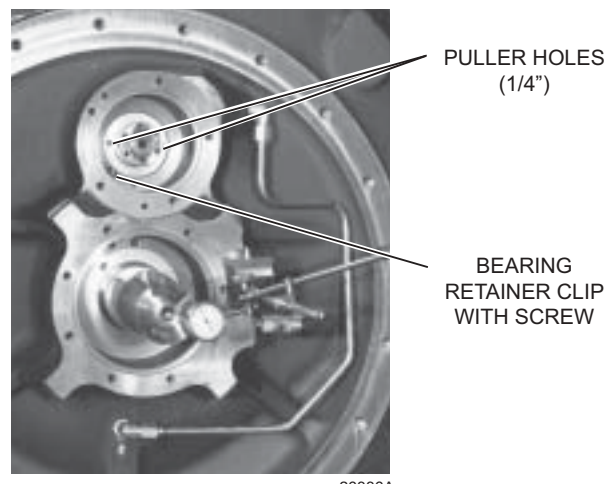
LD04839
FIG. 44 – GEAR LOCKING



26337A
FIG. 47 – FORWARD THRUST BEARING REMOVED



26339A
 NOTE:
 Oil Piping configuration may vary according to vintage of unit.
FIG. 45 – HIGH-SPEED THRUST COLLAR REMOVED



26336A
 NOTE:
 Oil Piping configuration may vary according to vintage of unit.
FIG. 48 – REAR HIGH-SPEED JOURNAL BEARING

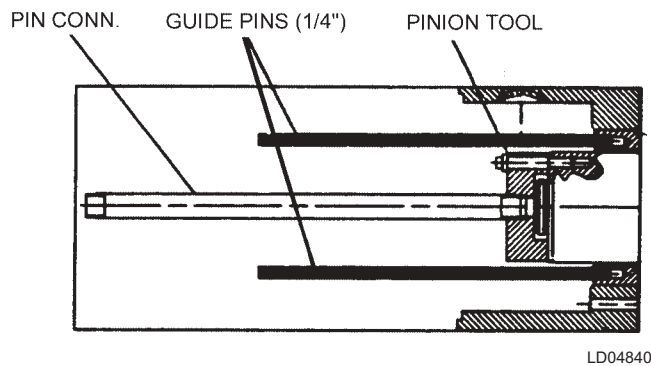
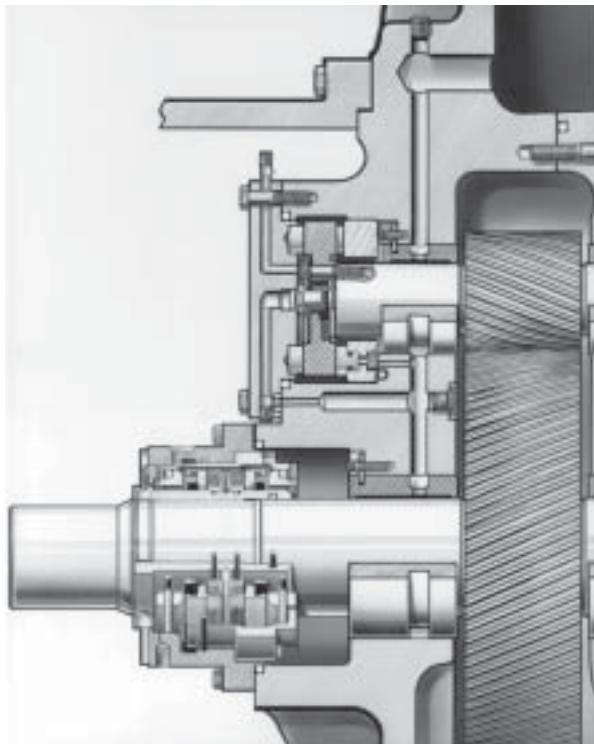


FIG. 49 – HIGH-SPEED REAR BEARING REMOVAL

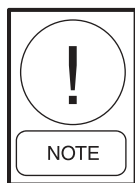


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FIG. 50 – HIGH-SPEED BEARING COMPONENTS
- REAR (HA, HB, HC & HG COMPRESSORS)

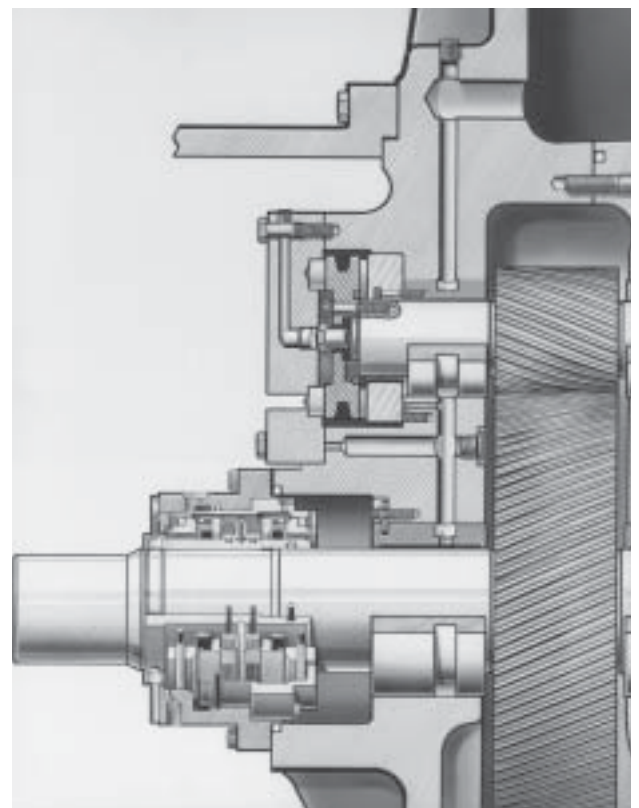
To remove/replace any of the components shown in FIG. 51, proceed as follows:

1. Remove the Proximity Probe or Pressure Switch Assembly.



On HE & HF style compressors the proximity probe has been replaced with a pressure switch (see FIG. 52). This pressure switch is installed on a brass tube that has its tip protruding into a groove on the high speed thrust collar. If the thrust tolerance exceeds a determined distance, the sacrificial brass tip will wear through, pressurize the tube with oil and trip the pressure switch to shut down the chiller.

2. Remove the cap screws holding the high-speed reverse thrust bearing and remove the high-speed reverse thrust bearing (see FIG. 51). Note alignment of oil passages.
3. Before removing the high-speed thrust collar, it is advisable to measure the run-out on the collar face. Mount a dial indicator as shown in FIG. 43 and rotate the compressor shafts to record the run-out. Maximum allowable run-out is .001”.
4. To remove the high-speed thrust collar, it is necessary to lock the shafts using the gear locking tool from the tool kit.
5. Remove the (4) hex socket head cap screws that hold the washer and thrust collar to the high-speed shaft (see FIG. 45). Remove the thrust collar (1/4”-20 puller holes are provided for convenience). NOT on HF style Compressors.
6. Loosen but do NOT remove the (3) hex head cap screws that hold the high-speed forward thrust bearing to the high-speed bearing.
7. Use the #10-24 puller rods to pull the high-speed forward thrust bearing and high-speed bearing from the compressor.
8. Inspect all parts removed above. See “CLEANING AND CHECKING PARTS”, page 6. Replace with new parts as necessary.



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FIG. 51 – HIGH-SPEED BEARING COMPONENTS
- REAR (HD, HE & HF COMPRESSORS)

REAR HIGH-SPEED BEARINGS INSTALLATION (HA, HB, HC, HG & HH COMPRESSOR DESIGN LEVELS)

1. Be sure the bearing surface of the high-speed shaft is clean and is in good condition.
2. Apply a light coating of oil and Molykote to the high-speed shaft and to the inside and outside surfaces of the high-speed bearing.
3. Carefully slide the high-speed bearing with the bearing retainer clip into position. Insert the cap screw into the retainer clip and tighten.
4. Apply a light coating of oil and Molykote and re-install the high-speed forward thrust bearing taking care that the roll pin enters the hole in the compressor casing. Note position of indexing roll pin and mating hole in casing (see FIG. 47).
5. Apply a light coating of oil and Molykote to both sides of the thrust collar. Install the thrust collar and tighten the hex socket cap screws to the high-speed shaft. Check the run-out of the shaft collar. Maximum run-out is .001”.
6. Apply a light coating of oil and Molykote to the pads of the high-speed reverse thrust bearing. Install the reverse thrust bearing using a new O-ring. Be sure oil passages in the bearing line up with the oil passages in the compressor casing.
7. Re-install the Proximity Probe.



After reinstalling the Proximity Probe, a Calibration Procedure, as outlined in Form 160.49-M2, must be performed before restarting the compressor.

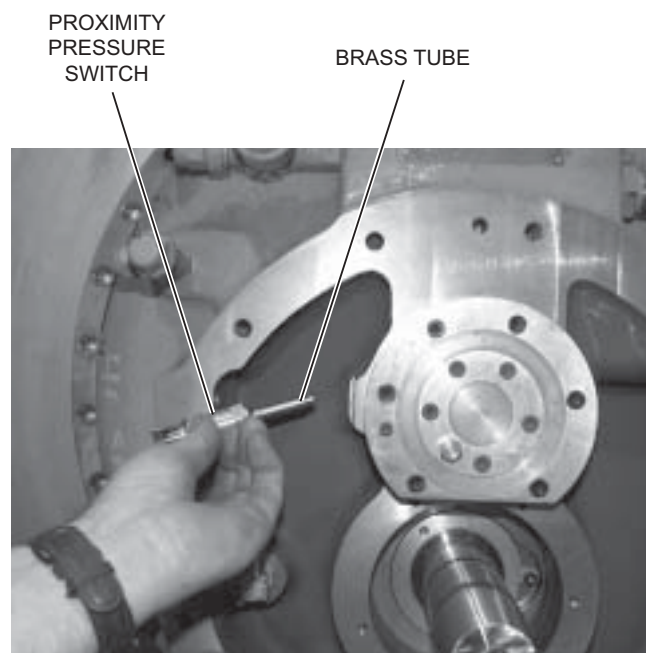
REAR HIGH-SPEED BEARINGS INSTALLATION (HD, HE, HF & HJ COMPRESSORS)

1. Be sure the bearing surface of the high-speed shaft is clean and is in good condition.
2. Apply a light coating of oil and Molykote to the high-speed shaft and to the inside and outside surfaces of the high-speed bearing. On HF style compressors install a new O-ring on the high-speed bearing.
3. Apply a light coating of oil and Molykote to the inside diameter and pads of the forward thrust bearing.

4. Insert but do NOT tighten the (3) hex head socket screws that hold the high-speed forward thrust bearing to the high-speed bearing.
5. Carefully slide the the high-speed bearing and high speed forward thrust bearing into position. Be sure the roll-pin on the forward thrust bearing enters the hole in the compressor casing. Tighten the (3) cap screws that secure the forward thrust bearing to the high-speed bearing.
6. Apply a light coating of oil and Molykote to both sides of the thrust collar. Install the thrust collar and tighten the hex socket cap screws to the high-speed shaft. Check the run-out of the shaft collar. Maximum run-out is .001”.
7. Apply a light coat of oil and Molykote to the pads of the high-speed reverse thrust bearing. Install reverse thrust bearing using a new O-ring. Be sure oil passages in the bearing line up with the oil passages in the compressor casing.
8. Re-install the Proximity Probe or Pressure Switch assembly.



After reinstalling the Proximity Probe, a Calibration Procedure, as outlined in Form 160.49-M2, must be performed before restarting the compressor.



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FIG. 52 – HE & HF PROXIMITY SWITCH

INSTALLING GEARS INTO ROTOR SUPPORT

1. Oil the bearing surface on the drive end of the low-speed gear, and carefully insert the low-speed gear into the rear bearing.
2. Oil the rear bearing surface of the high-speed shaft, and insert it into the rear bearing. Mesh the high-speed and low-speed gear teeth and rotate the gears as the gear is installed.
3. Check the clearance between the high-speed pinion and the spray header. Clearance should be 0.12" min. / 0.18" max. Adjust if necessary.

INSTALLING BEARING HOUSING

1. Install a new O-ring in the groove around the oil reservoir cavity (see FIG. 53). Coat the O-ring with a suitable O-ring lubricant to hold it in the groove.
2. Insert (2) guide pins 180° apart into the rotor support.
3. Lift the bearing housing and carefully push in place over the guide pins. Note location of dowel pins. Be careful not to damage any of the machined surfaces on either the high-speed or low-speed shafts. Leave the guide pins in position to help support the bearing housing.
4. Install the cap screws and dowel pins. Tighten cap screws to proper torque as outlined in TABLE 2. On HD, HE, & HF style compressors install the (3) 1/2" cap screws used to secure the dowel pins as shown in FIG. 38. The J7-3 uses 7/16 plugs.

INSTALLING FRONT HIGH-SPEED BEARINGS (SEE FIG. 28)

1. Apply a coating of oil and Molykote to the bearing surface of the high-speed shaft.
2. Apply a coating of oil and Molykote to the inside and outside surfaces of the high-speed bearing.
3. Carefully slide the high-speed bearing into place over the shaft and into the cavity in the bearing housing. Install the retainer clip and cap screw.

INSTALLING FRONT LOW-SPEED BEARINGS

1. Apply a coating of oil and Molykote to the bearing surface of the low-speed shaft.
2. Apply a coating of oil and Molykote to the inside and outside surfaces of the low-speed bearing.
3. Carefully slide the low-speed bearing into place over the shaft and into the cavity in the bearing housing. Be sure hole in bearing flange engages roll-pin in bearing housing (see FIG. 34).

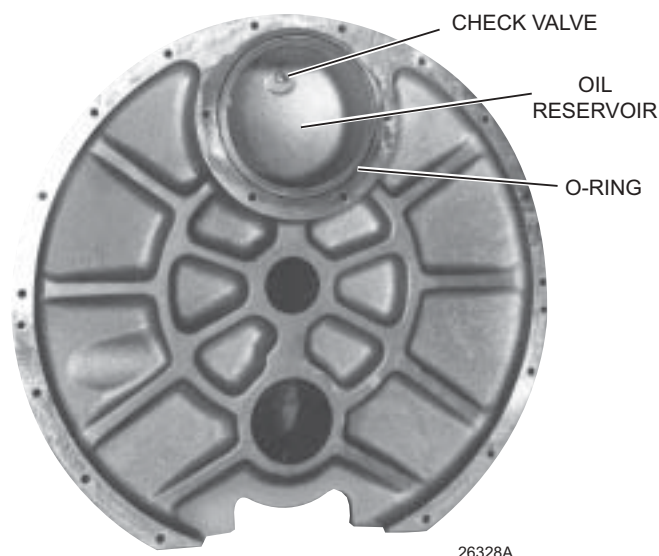


FIG. 53 – BEARING HOUSING

4. Re-install the shaft locking tool.
5. Apply a coating of oil and Molykote to the lapped surfaces of the low-speed thrust collar, using care that no damage occurs. Place the thrust collar into position on the end of the low-speed shaft, insert cap screws, and tighten to the proper torque (see TABLE 2).
6. Mount a dial indicator as shown in FIG. 31 and check the run-out of the thrust collar (It will be necessary to remove the shaft locking tool in order to take this measurement). Maximum run-out should not exceed .001" T.I.R.. If run-out exceeds .001" T.I.R. DO NOT proceed with further assembly; contact the YORK Factory Service Dept. for assistance.
7. Re-install the shaft locking tool.
8. Apply a coating of oil and Molykote to the bearing pads of the low-speed thrust bearing and to the low-speed thrust collar. Install the low-speed thrust bearing.

INSTALLING BALANCE PISTON AND DIFFUSER PLATE

1. Install a new O-ring on the diffuser plate.
2. Insert (2) 1/4" dia. guide pins into the rotor support.
3. Using proper rigging methods, slide the diffuser plate over the guide pins and into position against the rotor support (see FIG. 25).
4. Insert (4) of the bolts before removing rigging and guide pins; then insert remaining bolts and tighten.
5. Place the flat spring onto the balance piston seal. On all other style compressors, install the (8) or (16) helical springs, large end first, into the balance piston seal. Rotate each spring to lock it into place (see FIG. 26).
6. Apply Loctite and insert the (3) cap screws and fasten the balance piston seal and balance piston retainer to the diffuser plate.
7. After tightening the (3) cap screws, check that the balance piston is free to "float".

INSTALLING THE IMPELLER (Impeller Sizes 46 and Larger)

1. Re-install the shaft locking tool.
2. Apply a light coat of oil or Molykote to the inside diameter of the balance piston seal and impeller.
3. Slide impeller into position on the high speed shaft using care not to damage the balance piston seal.
4. Install the impeller clamping collar and the (3) or (6) cap screws onto the high-speed shaft.
5. Torque cap screws to 120 ft.lbs in (2) equal steps. Refer to FIG. 54 for the proper sequence of tightening screws.
6. Remove the shaft locking tool and check rim and eye radial runout using a dial indicator (see FIG. 19). Maximum runout on rim is .003" and the runout on eye is .002". If T.I.R. deviates from specification, increase torque to 140 ft.lbs. max to the bolts op-

posite to the high side. Repeat as necessary until allowable T.I.R is achieved.

7. Check high-speed thrust clearance. Acceptable thrust tolerance is between .008" to .021" (See TABLE 12).
8. Check low-speed thrust clearance. Acceptable thrust tolerance is between .011" to .019" (See TABLE 12). Note that this measurement must be taken with the shaft seal installed.

PERMISSIBLE RUNOUT OF IMPELLER

RIM RADIAL	EYE RADIAL
.003	.002

Impeller for HA36 and HA41

1. Re-install the shaft locking tool.
2. Apply a light coat of oil and Molykote to the inside diameter of the balance piston seal & impeller.
3. Install O-ring in impeller and install on the high-speed shaft using care not to damage the balance piston seal.
4. Install O-ring on impeller clamping collar and install in impeller bore over high-speed shaft.



Make absolutely certain that O-rings are in place prior to installing and torquing cap screw.

5. Torque cap screw to 120 ft.lbs.
6. Remove that shaft locking tool and check the rim and eye radial runout using a dial indicator (see FIG. 19). Maximum runout on rim is .003" and for the eye maximum is .002".
7. Check the high-speed thrust clearance (See TABLE 12).
8. Check low-speed thrust clearance. Acceptable thrust tolerance is between .011" to .019". Note that this measurement must be taken with the shaft seal installed.

Impeller for HF Compressors

1. Re-install the shaft locking tool.
2. Apply a light coating of oil and Molykote to the inside diameter of the balance piston seal & impeller.
3. Install the impeller and clamping collar on the high-speed shaft.
4. Torque cap screw to 90 ft.lbs.

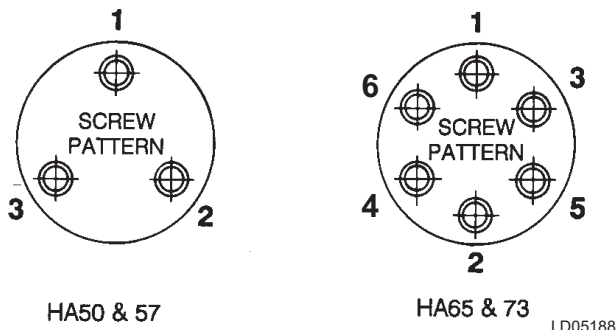


FIG. 54 – IMPELLER MOUNTING SCREWS TIGHTENING SEQUENCE

5. Remove the shaft locking tool and check rim and eye radial runout using a dial indicator (see FIG. 19). Maximum runout on rim is .003" and the runout on the eye is .002".
6. Check high-speed thrust clearance. Acceptable thrust tolerance is between (See TABLE 12).
7. Check low-speed thrust clearance. Acceptable thrust tolerance is between (See TABLE 12). Note that this measurement must be taken with the shaft seal installed.

DISASSEMBLY OF ROTOR SCROLL

1. Support the weight of the rotor support and motor using proper rigging methods.
2. Remove the cap screws, then fasten the suction connection and the discharge connection to the scroll housing.
3. Remove all other external piping from the rotor scroll.
4. Support the rotor scroll by proper rigging methods; then remove the bolts holding the rotor scroll to the unit.
5. Carefully remove the rotor scroll from the unit base, making sure the rotor scroll is out and away from the seal, and rest it on the end of the suction housing. Do not lose any parts of isolators that were beneath the compressor feet. Be sure the rotor scroll is resting solidly – block if necessary (see Fig. 55).

REMOVING THE NOZZLE BASE PLATE (NON-VGD)

1. Remove the cap screws that hold the nozzle base plate to the rotor scroll housing. Note that (2) of these holes are spaced 180° apart (J7 has 3 holes spaced at 120° apart) are tapped for the eyebolts.
2. Using eyebolts lift the nozzle base plate from the rotor scroll housing.
3. It may be necessary to turn the nozzle base plate over (180°) to remove the impeller eye seal components.

REMOVING THE NOZZLE BASE PLATE (VGD)

1. Remove hand hole cover. Disconnect the VGD Drive linkage at VGD Drive Ring.
2. Remove the cap screws that hold the nozzle base plate to the rotor scroll housing. Note that (2) of these holes are spaced 180° apart (J7 has 3 holes spaced at 120° apart) are tapped for the eyebolts.
3. Using eyebolts, lift the nozzle base plate from the rotor scroll housing.

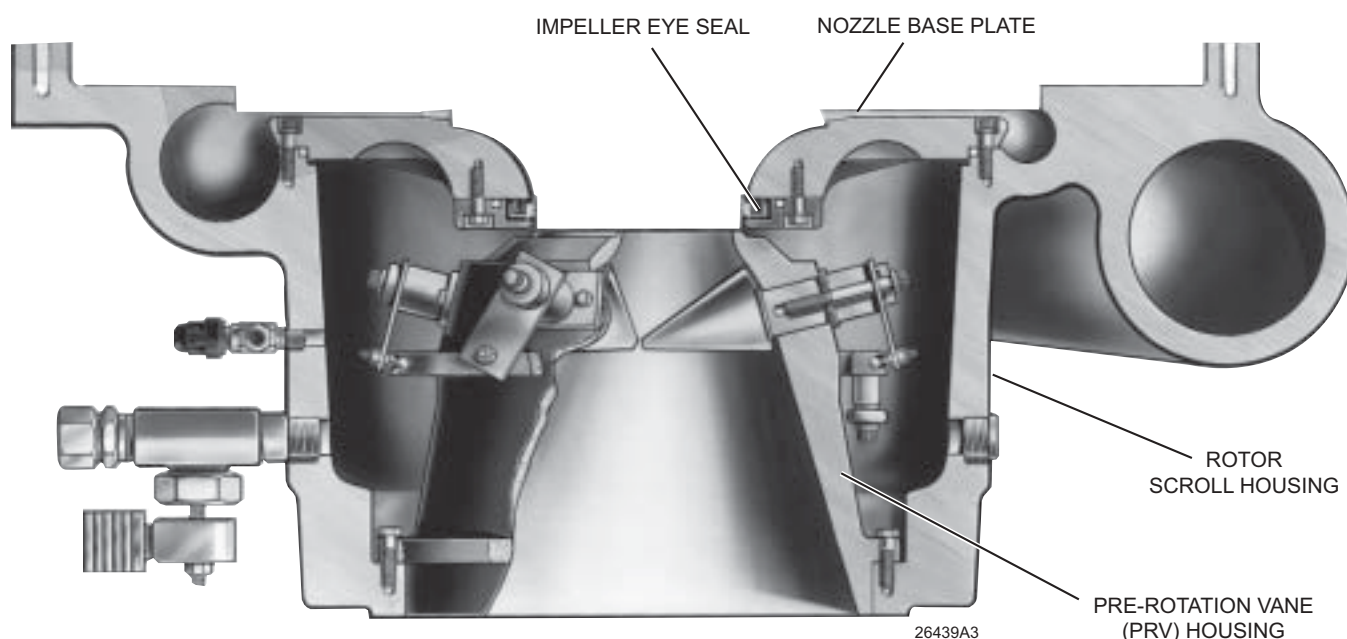
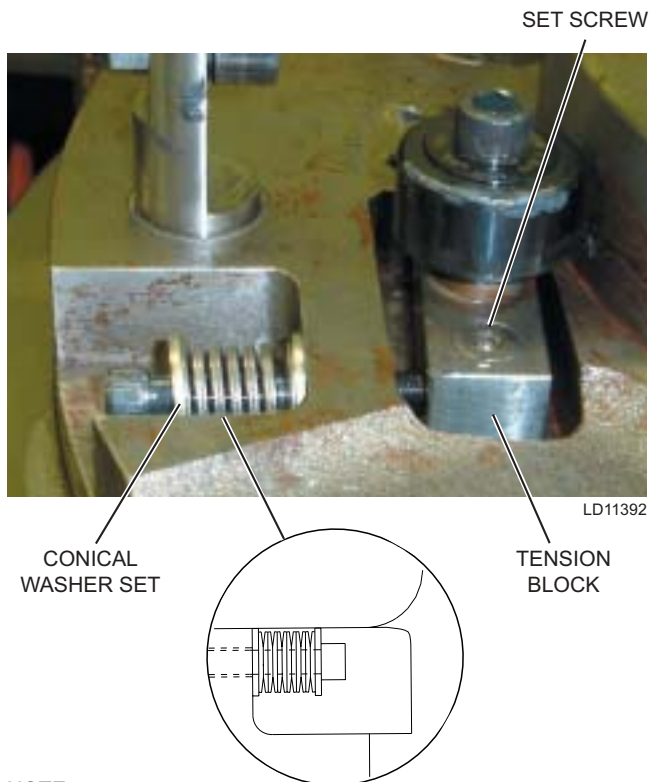


FIG. 55 – ROTOR SCROLL

NOZZLE BASEPLATE DISASSEMBLY (VGD)

1. Remove brass tipped set screw from tensioner pin in tensioner block.
2. Remove tensioner bolt and conical washer set.
3. Remove tensioner pin from tensioner block.
4. Remove two cap screws from each axial bearing block and remove blocks (3 or 4).
5. Remove nuts and washers and remove bearings from bearing block.
6. Remove stop bolt from drive ring.
7. Rotate drive ring clockwise and remove from bearings on drive pins.
8. Remove cap screws, radial bearings and spacers (3 or 4).
9. Remove the shoulder bolt and tensioner block.
10. Remove nuts and remove bearings and washers from drive pins (3 or 4).
11. Working from the nozzle base plate face, remove cap screws (3 or 4 pair) in diffuser ring and remove ring.
12. Remove the drive pins.
13. Remove the bushings from the nozzle base.



NOTE:
Conical Washer Set Orientation Required as Illustrated above.

FIG. 56 – TENSION BLOCK

NON VGD

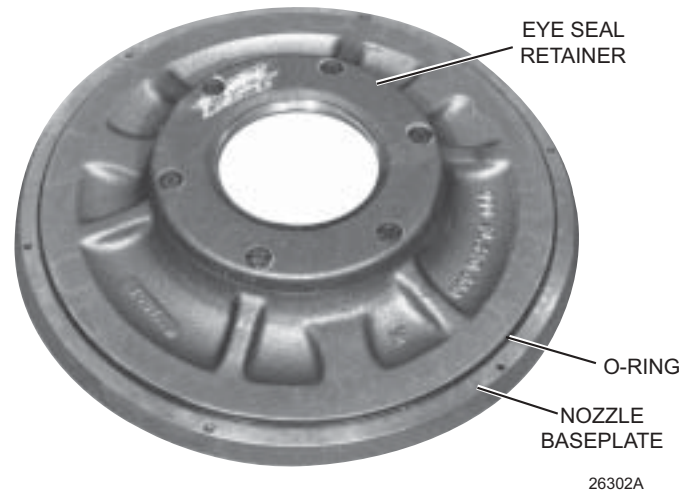


FIG. 57 – NOZZLE BASE PLATE (NON-VGD)

VGD

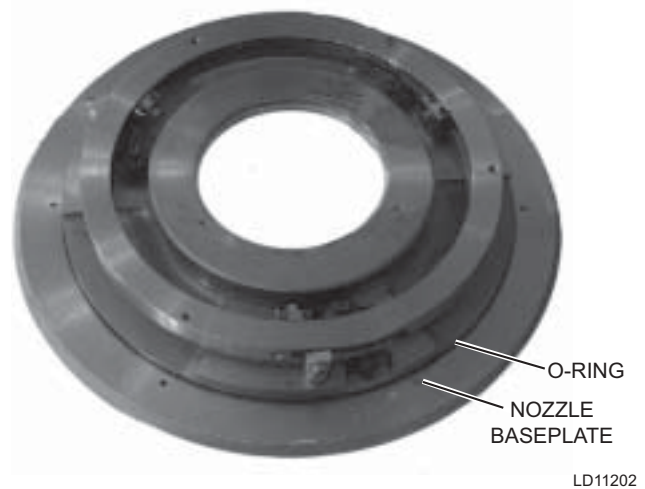
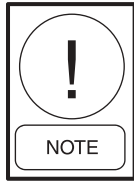


FIG. 58 – NOZZLE BASE PLATE

REMOVING THE IMPELLER EYE SEAL

1. Remove the (6) cap screws that hold the eye seal retainer to the nozzle base plate (see FIG. 58).
2. Remove the eye seal retainer and the eye seal ring from nozzle base plate (see FIG. 59).



The Pre-Rotation Vane (PRV) Assembly cannot be removed from the suction connection side of the compressor on the HA, HB, and HD style compressors. It must be removed from the inside of the rotor scroll housing after the nozzle base plate is removed. If disassembly of the PRV housing is anticipated, proceed to “Removing The Pre-Rotation Vane Housing”, page 42. Otherwise, proceed with re-assembly of the compressor as follows.

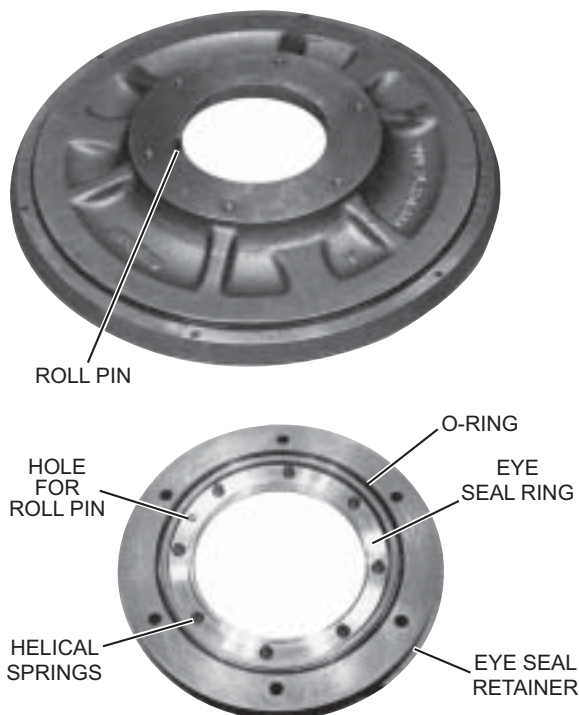


FIG. 59 – EYE SEAL COMPONENTS

26301A

RE-ASSEMBLY OF THE EYE SEAL (HA, HB, and HD Style Compressors)

1. Inspect all parts before re-assembly. See “Cleaning And Checking Wearing Parts”, page 6. Replace with new parts as necessary.
2. Be sure the springs (Helical or Flat) are securely locked in pockets. Give each spring a clockwise twist to lock it into place. Install a new O-ring in the eye seal retainer.

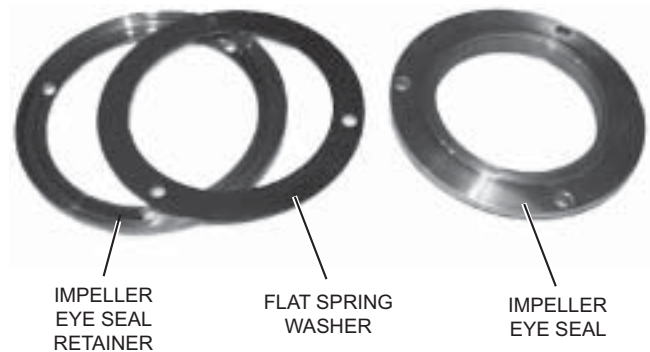


FIG. 60 – EYE SEAL

00592VIP

3. Place the eye seal ring and retainer into position on the nozzle base plate. Be sure the hole in the eye seal ring fits over the roll pin in the nozzle base plate (see Fig. 59). Insert cap screws and tighten. Check that the seal ring is free to “float”.

(Flat Style Springs Only)

1. Inspect all parts before re-assembly. See “Cleaning And Checking Wearing Parts”, page 6. Replace with new parts as necessary.
2. Place flat spring washer into retainer and position eye seal over spring retainer.
3. Take complete eye seal assembly and position on nozzle base plate. Insert cap screws and tighten. Check that the seal ring is free to “float”.

RE-ASSEMBLY OF NOZZLE BASE PLATE (NON-VGD)

1. Install a new O-ring on the nozzle base plate (see FIG. 58).
2. Carefully turn the nozzle base plate over (180°) and insert eyebolts into the two tapped holes.
3. Insert guide pins into 2 of the holes in the scroll housing.
4. Using proper rigging methods, lower the nozzle base plate over the guide pins into position in the scroll housing. Remove eyebolts and guide pins; insert cap screws and tighten to specified torque in TABLE 2.

RE-ASSEMBLY OF NOZZLE BASE PLATE (VGD)

1. Install two bushings in each drive pin hole. Inner bushing should be driven to within 1/32" of diffuser ring groove on front of nozzle base plate. Use caution not to protrude into groove area. Outer bushing should be driven flush with machined surface.

MODEL	Bearing Drive Dimension
J3/J4/J5/J7	1.70"
J1/J2/U1/U2	.97"
H9	.88"
P8/P9	1.06"

2. To true up the bushings, insert a pin in the hole and tap side to side in 4 directions with a rubber mallet until slip fit is obtained. Do NOT install pins at this time.
3. Flip nozzle base plate over and install the diffuser ring. Center holes in ring over drive pin holes. Center ring in groove by shimming ID with .004" (.10mm) shims. Verify that ring sits flush or below face of nozzle base plate (see FIG. 61).



LD11394

FIG. 61 – DRIVE RING FLUSH VERIFICATION

4. Install drive pins in nozzle base plate, lubricate with 50/50 mix of Molybdenum disulfide and grease, use care not to get 50/50 mix into tapped holes. Attach with two cap screws. Do NOT tighten (see FIG. 62).



LD11393

FIG. 62 – DRIVE PIN

5. Flip nozzle base plate over and align drive pins using alignment tool and dowel pins inserted through holes in pin.
6. Remove cap screws one at a time, apply Loctite 243 and torque to 30 ft. lbs.
7. Remove shims and install fixture or block to hold diffuser ring in retracted position.
8. Install cam followers, washers (located between cam followers and pins) and nuts to drive pins, apply Loctite 243 and torque nuts to 95 in. lbs. (250 in. lbs. for J7).
9. Install one or two radial bearing tension blocks to nozzle base plate using the screws and torque to 18 ft.lbs.
10. Install one or two tensioner pins into tensioner blocks. Position pins so that the tapped holes are aligned with the hole in the tensioner blocks
11. Make up one or two tensioner spring assemblies from screws, washers, and conical washers, note the orientation of conical washers (See FIG. 56).
12. Insert tensioner spring assemblies through holes in nozzle base plate, into tensioner blocks and just start to engage in the tapped holes in the tensioner pins. Do NOT tighten at this time.
13. Assemble radial bearings and spacers to the nozzle base plate and tensioner using screws, apply Loctite 243 and torque to 35 ft.lbs.
14. Lower drive ring over drive pin cam followers and rotate counter clockwise into fully retracted position.
15. Install drive ring stop screw.
16. Tighten tensioner spring assemblies to a finger tight condition. Do NOT tighten with tools. This will provide just enough tension to keep drive ring centered.

ASSEMBLY AND ADJUSTMENT OF AXIAL BEARINGS (ALL EXCEPT J7)

1. Assemble axial support blocks, bearings, washers, and nuts do NOT tighten.
2. Use wedges to hold drive ring away from nozzle and keep diffuser ring fully retracted.
3. Determine shim quantity:
 - a. Measure "H" (between nozzle and lower edge of the inside groove at the drive pins of the drive ring. Measure at each pin location).
 - b. Utilize wooden wedge between nozzle base and the drive ring to force the drive ring up as high as possible before measuring (see FIG. 63).
 - c. Measure "L" (the distance from hole in axial bearing block to bottom of block, measure all blocks).
 - d. Determine "T" for each block. $T = (H + .125) - L$
 - e. Determine the number of .015" thick shims to place under the axial bearing block.

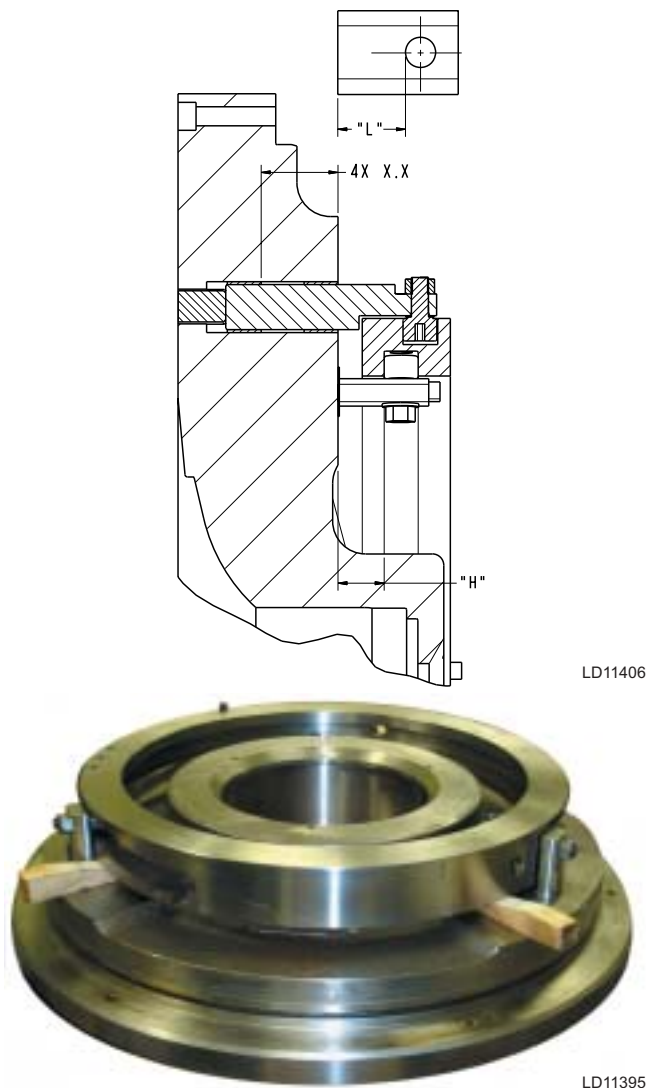


FIG. 63 – WEDGE PLACEMENT

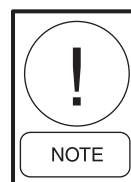
"T"	SHIM QTY.
0-.010	0
.011-.025	1
.026-.040	2
.041-.055	3

- Assemble the shims and axial support block/ bearing assemblies to the nozzle base plate. Align the blocks such that the face of the block is parallel to the inside diameter of the drive ring. Apply Loctite 243 and torque screws to 14 ft.lbs.
- Snug the nuts on the axial bearing just enough to seat the axial bearings against face of the support block.
- Rotate the drive ring counterclockwise until it stops.
- Working through the hole in the drive ring, rotate the axial bearings to move the drive ring to the furthest most position away from the nozzle base plate. Work one bearing at a time.

- Using a dial indicator on the drive ring top face, re-adjust the axial bearings to obtain a .001"-.002" axial backlash to the drive ring at all four locations.
- Apply Loctite 243 and torque the axial bearing retaining nuts to 95 in. lbs.
- Verify the backlash at the axial bearings.

ASSEMBLY AND ADJUSTMENT OF AXIAL BEARING (J7 ONLY)

- Assemble axial support blocks, bearings, washers, nuts, and mounting screws to nozzle base plate, do not tighten screws or nuts.
- Align the axial support blocks such that the face is parallel to the inside diameter of the drive ring. Apply Loctite 243 and torque to 30 ft.lbs. the one mounting screw that is opposite the cut in each block.
- Snug the mounting screws on the cut side of the blocks.
- Snug the nuts on the axial bearings just enough to seat axial bearings against the face of the support blocks.
- Rotate the drive ring counterclockwise until it stops.
- Working through the hole in the drive ring, rotate the axial bearings to move the drive ring the furthest most position away from the nozzle base plate. Working only one bearing at a time.
- Using a dial indicator on the drive ring top face, re-adjust the axial bearings to obtain a .001"-.002" axial back lash to the drive ring at all four locations.
- Apply Loctite 243 and torque the axial support block mounting screws on the cut side of each block to 30 ft. lbs.
- Apply Loctite 243 and torque the axial bearing retaining nuts to 250 in. lbs.
- Verify the backlash at axial bearings.



WHEN ring is fully retracted the ring should be flush or below the nozzle face. It is OK to be .005 inches maximum above the face.

RADIAL BEARING TENSIONER ADJUSTMENT (ALL)

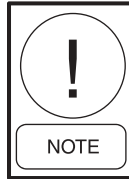
1. Adjust radial bearing tensioner(s) by tightening screws 1-1/2 to 1-3/4 turns for two tensioner units and 3 turns for single tensioner units.
2. Apply Loctite 243 and assemble set screw into tensioner pin using care to not get sealer between pin and block. Torque the set screw to 30 in. lbs.
3. Remove any fixtures or blocking. Operate mechanism, it should operate smoothly through the full range of travel without any binding.
4. Lubricate all moving surfaces with 50/50 mix of Molybdenum disulfide and grease.

ADJUSTMENT OF VGD MOTOR LINKAGE

1. With the drive link disconnected from the external lever (motor lever installed and drive link connected to motor lever), manually operate the VGD control to the fully retracted position (the most clockwise position of the actuator motor).
2. Loosen the the two set screws that hold the external lever to the feed through shaft. Verify that these are tight (torque to 120 ft.lbs.). This is just a clamped joint, there is no key or spline.
3. Rotate the external lever counter clockwise approx. 30° with respect to the feed through shaft.
4. Snug the lever screws enough to work the VGD mechanism, but not loose enough to slip on the shaft.
5. Slowly rotate the external lever clockwise (retracting the VGD mechanism) until it reaches the internal hard limit.
6. Check the alignment of the holes between the external lever and and the link. The center of the hole should be to the right of the center of the external lever hole.
7. With the VGD mechanism against the internal limit, loosen the external lever clamp bolts just enough to allow rotation of the lever about the shaft but not loose enough to be overly free.



Do NOT make bolts too loose as the shaft may want to rotate counter clockwise.

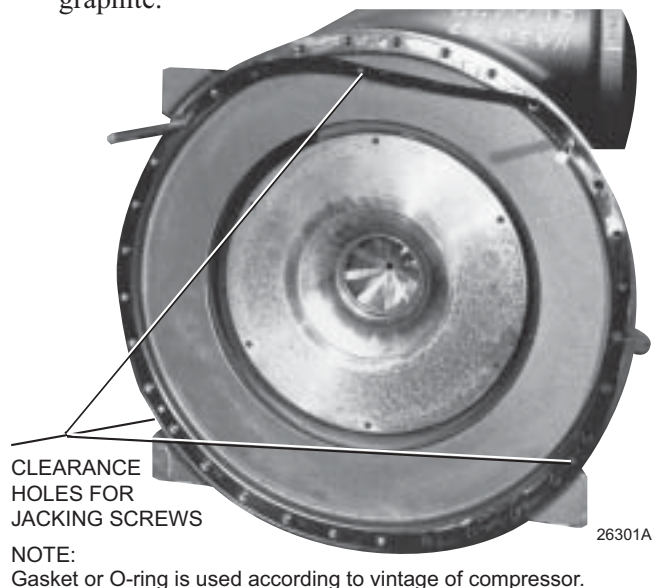


Proper alignment is obtained when the center of the hole in the lever is approx. 1/8" to the right (over traveling) of the centerline of the hole in the link

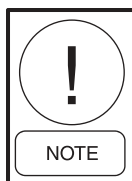
8. Continue holding the VGD mechanism against the internal stop and rotate the external lever clockwise (slipping on the shaft) to properly align the holes in the link with the hole in the lever. this assures that the VGD mechanism does not bind against the internal limit when fully retracted.
9. Tighten the actuating arm clamping bolts, torque to 120 ft. lbs.
10. Reassemble the link to the lever.
11. Cycle the VGD mechanism through full travel. The link should never get tight or bind and should always be loose when shaken.

RE-ASSEMBLY OF SCROLL HOUSING TO ROTOR SUPPORT

1. Using proper rigging methods, lift scroll housing assembly into place on unit base.
2. Using new gaskets, re-connect suction and discharge piping.
3. Insert guide pins into the scroll housing and install a new gasket or O-ring. Note that the gasket contains three holes to clear the jacking screws in the rotor support. Be sure the gasket is installed correctly (see FIG. 64). Coat gasket with a mixture of oil and graphite.



**FIG. 64 – SCROLL HOUSING READY FOR
RE-ASSEMBLY TO MOTOR SUPPORT**



On all newer style compressors except HF this sealing surface uses an O-ring instead of a gasket. Coat the O-ring with Loctite 515 or 518 to secure the O-ring into the groove during assembly.

4. Apply a light coating of oil and Molykote to the impeller where it enters the eye seal ring.
5. Using proper rigging methods, raise the rotor support with motor adapter into proper position, and slide it into place over the guide pins.
6. Carefully slide the rotor support into place against the scroll housing. Use care that the impeller is not damaged as it enters the eye seal ring by rotating the shaft. **NOTE: HF models have a visual gap of 3/32".**
7. Insert the cap screws and tighten to the proper torque specified in TABLE 2.
8. Re-install the compressor coupling (see form 160.49-N4).
9. Bolt the motor to the motor adapter.
10. Re-connect all external piping.

REMOVING THE PRE-ROTATION VANE HOUSING

The Pre-Rotation Vane Assembly cannot be removed from the suction side of the compressor on all but HF style compressors. The rotor support must first be removed from the rotor scroll and the rotor scroll must be dis-assembled as described previously.

On the HF style compressor, access to the PRV assembly can be made by removing the suction piping and removing the cap screws that secure the PRV plate support to the rotor scroll. Insert the proper guide pins and using the proper rigging methods, remove the PRV support plate from the compressor scroll to gain access the PRV assembly (see FIG. 65).

1. Remove the 12 pt. hd. cap screw and fill piece to disconnect the adjustable bearing rod from the vane driving ring (see FIG. 66).
2. Remove 2 hex hd. cap screws at approximately 180° apart. Replace these screws with two guide pins from the tool kit. Then remove the remaining screws from around the perimeter of the PRV assembly. Carefully pull the PRV assembly about halfway on the guide studs. Hook a lifting device to the assembly. Pull it off the guide studs and place on a bench to replace any parts.

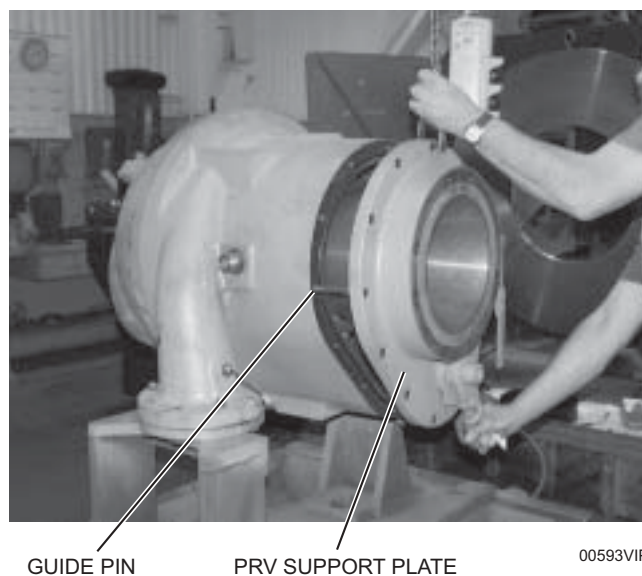


FIG. 65 – REMOVING PRV SUPPORT

3. The PRV vanes are actuated by a rotating vane driving ring through individual vane arms to each vane. Individual vanes may be removed by:
 - (a) unscrewing the cap screw which secures the vane arm to the vane
 - (b) lifting off the vane arm
 - (c) lifting off the two special washers and pulling the vane out toward the inside of the vane housing (see FIG. 67)
4. If any of the individual vanes were removed or replaced, coat the vane shank with oil and Molykote. Tighten the vane cap screws when clamped in the closed position to the torque as indicated in TABLE 2.
5. Re-assemble the pre-rotation vane assembly and the nozzle base plate together in reverse order. Torque all screws in accordance with TABLE 2.

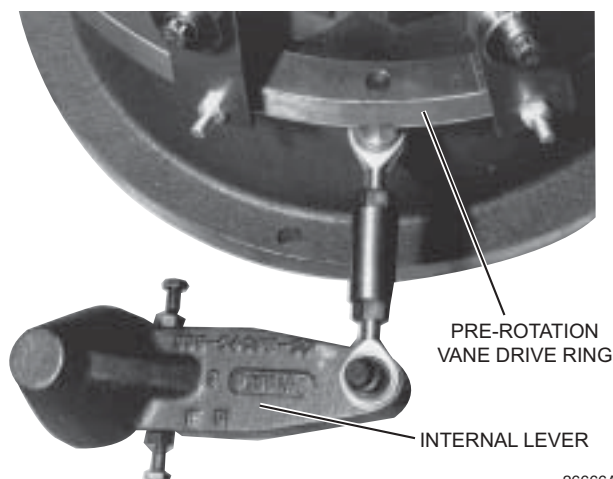
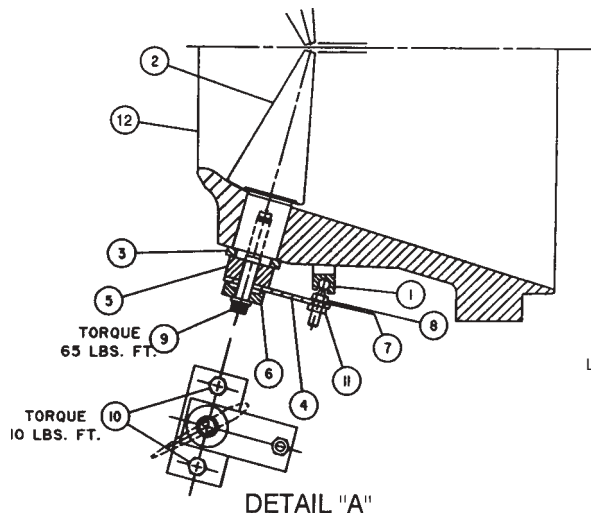
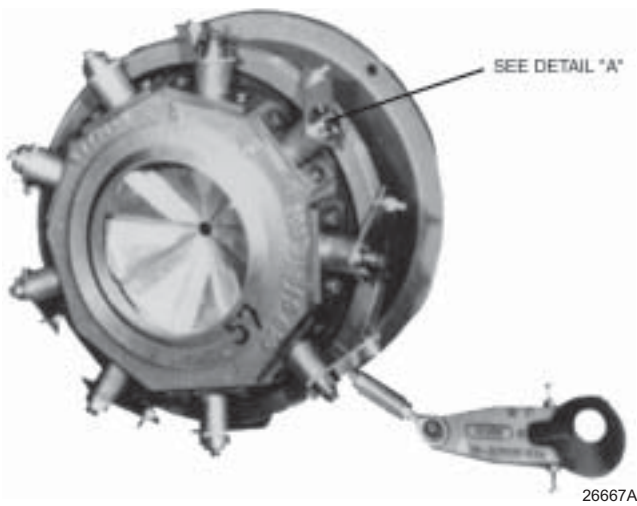


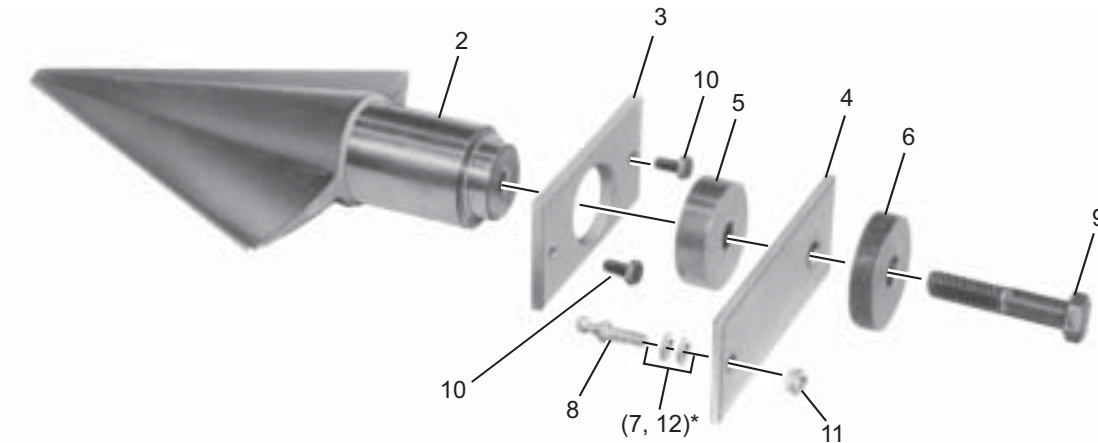
FIG. 66 – INTERNAL PARTS - PRE-ROTATION VANE ASSEMBLY



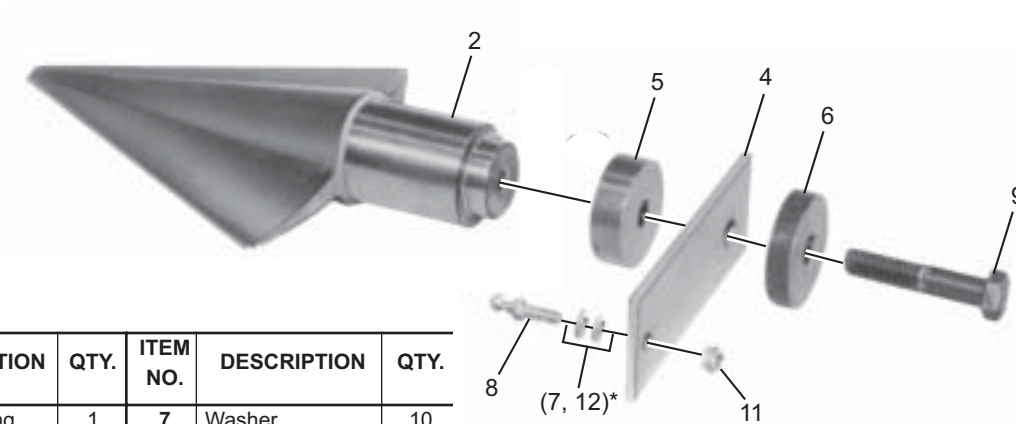
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FIG. 67 – PRE-ROTATION VANE HOUSING ASSEMBLY

METHOD 1



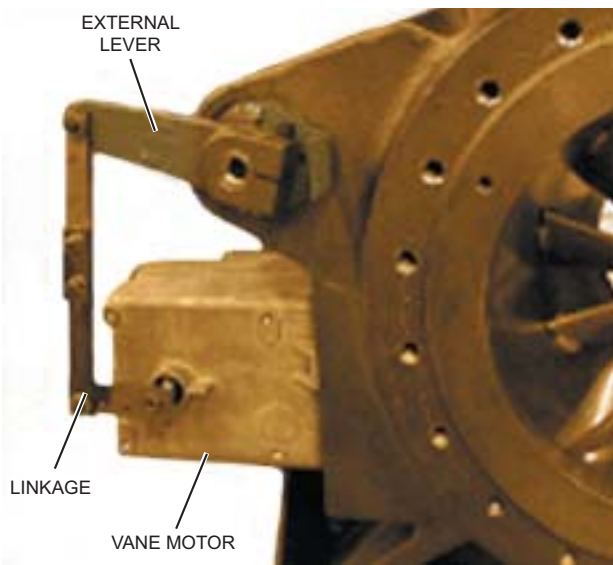
METHOD 2



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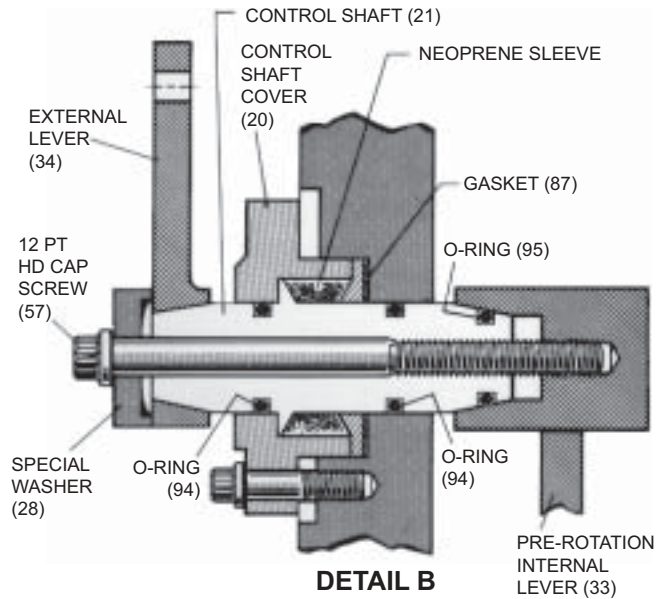
ITEM NO.	DESCRIPTION	QTY.	ITEM NO.	DESCRIPTION	QTY.
1	Ring, Driving	1	7	Washer	10
2	Vane	9	8	Stud, Ball	9
3	Retainer	9	9	Screw – 12 pt.	9
4	Arm, Vane	9	10	Screw – Hex HD	18
5	Spacer, Arm	9	11	Nut, Self-Locking	9
6	Washer	9	12	Housing	1

FIG. 68 – PRE-ROTATION VANE ASSEMBLY



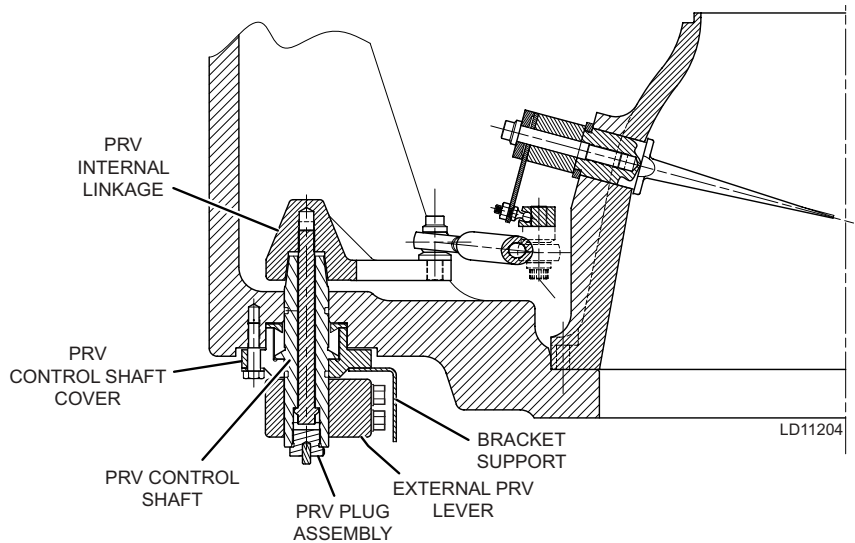
DETAIL A

LD11203



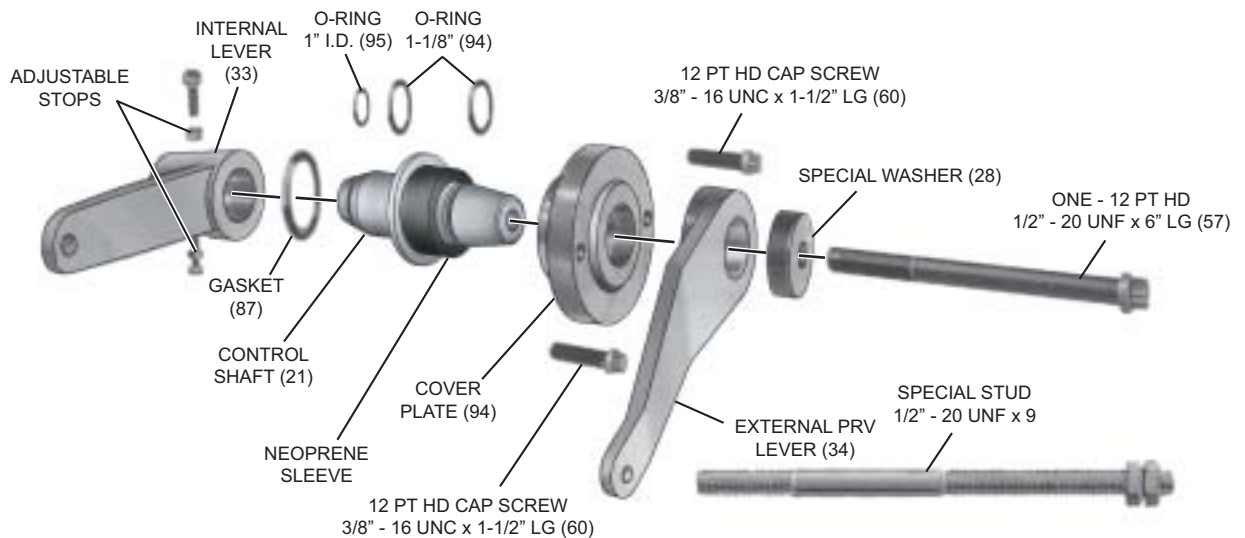
**DETAIL B
(TAPER DRIVE)**

LD05198



**DETAIL C
(SQUARE DRIVE)**

LD11204



NOTE: CAN BE TAPERED OR SQUARE DRIVE

FIG. 69 – CONTROL SHAFT ASSEMBLY

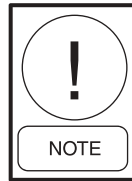
LD11538

REPLACING CONTROL SHAFT ASSEMBLY

The external and internal levers are secured to the control shaft by means of a single 12 pt. hd. cap screw threaded into the internal lever (refer to FIG. 69). Adjustable stops are provided in the internal lever arm. These stops are NOT to be used to stop the vanes in the extreme positions of normal travel, but are supplied as protection should some external force be applied to the linkage. The stops are set about 1/32" away from the rotor scroll casting walls when the vanes are in their extreme position, and will prevent overtravel from damaging the internal vane mechanism. Loctite 243 is used on the threads when the stops are initially positioned to prevent any change in position. The compound should be used again if the stops are ever removed.

To replace control shafts, refer to FIG. 69 and proceed as follows:

1. Reduce the system pressure to slightly above atmospheric pressure.
2. Disconnect the linkage from the external lever (refer to FIG. 69, Detail A).
3. Loosen and remove the 12 pt. hd. cap screw and washer (refer to FIG. 69, Detail B). For square drive design, the O-ring plug must be removed from the end of the shaft to gain access to the cap screw.
4. Remove external lever (loosen pinch bolts on split lever).
5. Insert the special stud (see FIG. 4 - Special Tools) through the hole in the control shaft, and screw the stud into the internal lever. Be sure to put a nut on the outside end of the special stud (refer to Fig. 69).
6. Using a hammer and block of hard wood, tap the outside end of the stud to loosen the internal lever. **DO NOT REMOVE THE SPECIAL STUD.**
7. Remove the cover plate cap screws.
8. Remove the external lever and the control shaft cover from the scroll.
9. Replace the existing gasket with a new one.
10. Install the new O-rings in their respective grooves in the new control shaft. Liberally coat the control shaft (O-rings and neoprene sleeve) and the inside of the cover plate with YORK Valve Stem Lubricant. Do NOT lubricate the tapered surfaces of the shaft or gasket face.
11. Slide the new shaft with O-rings into position over the special stud.
12. Install the cover plate, but do not tighten the cap screws at this time.
13. Tighten the nut on the outside end of the stud against the end of the control shaft to pull the internal lever hard up on the taper of the shaft.
14. With the cover plate loosely installed, close the vanes by turning the nut on the outside end of the stud. Position the external lever on the control shaft so that the indicator pin punch mark or split on the lever aligns with the closed "C" mark on the housing. Push external lever arm slightly to seat on taper for taper type or snug pinch bolts for the split lever.
15. Remove the nut and stud (taper type only).
16. Install the 6" cap screw and washer. Draw the cap screw tight. Move the external lever to the "open" and "closed" positions, to check the indicator points on the cover plate. Readjust the external lever position, if necessary.
17. Using a torque wrench, tighten the cap screw to a torque of 75 ft. lbs for taper type and 85 ft. lbs. for square drive.
18. Move the external lever to its midposition (vanes half open) and tighten the cover plate cap screw to a torque of 35 ft. lbs.



This is important and assures that the sleeve will twist equally when the vanes are moved to either the wide open or the fully closed position.

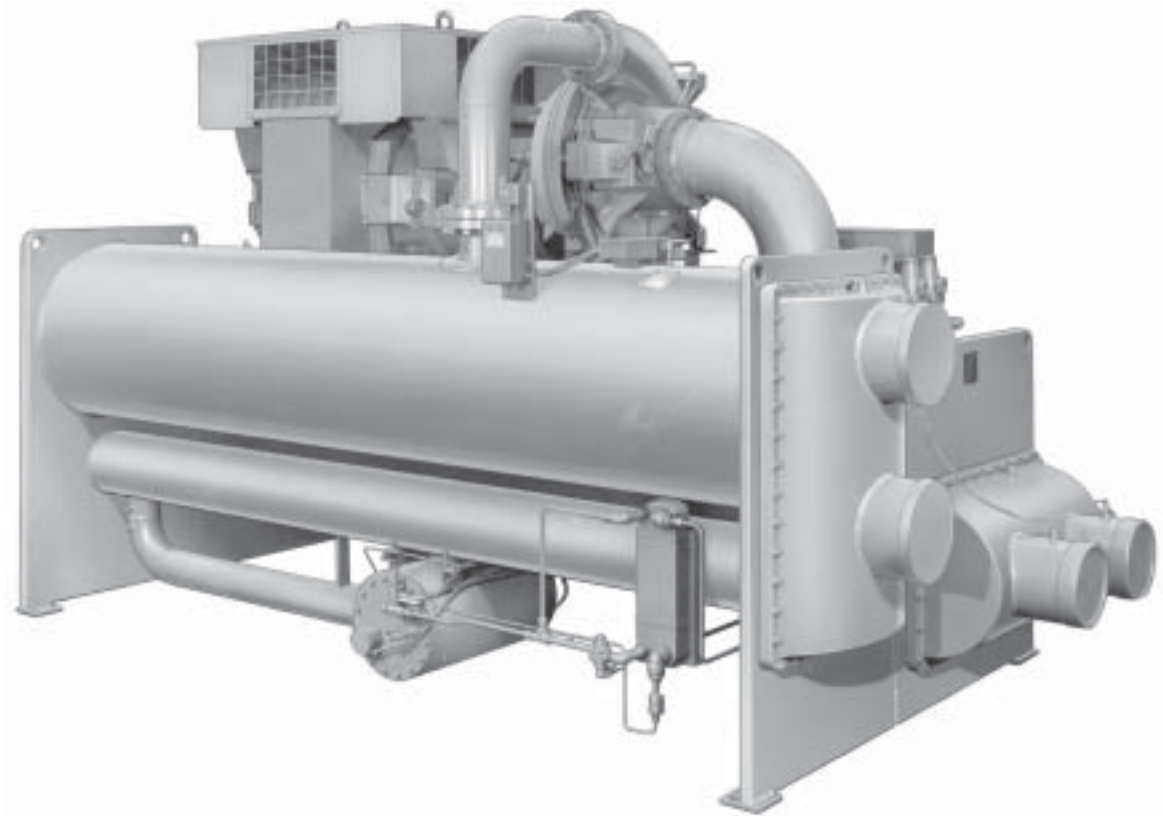
19. Connect the linkage to the external lever.
20. For square drive/split lever design only, torque the lever pinch bolts to 121 ft. lbs. and install the O-ring plug into the end of the shaft.

When connecting the vane linkage to the electric motor, rotate the motor shaft to the closed position and connect the vane linkage while holding the vanes in the closed position. Operate the vane motor open and closed several times to be sure the motor does not jam at either end of its travel. Adjust as necessary by either lengthening or shortening the distance between the motor linkage and the external lever to be sure the vanes are wide open and tightly closed as the motor rotates from one end of its travel to the other.

IT IS IMPORTANT that the arm length from motor centerline to force point, the arm length from control shaft centerline to force point and the length of connection arm be the same as they were set at the factory. Also, the angular position of the motor shaft must be as it came from the factory.

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SECTION 3 OIL PUMP SERVICE



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OIL PUMP

The oil pump supplies oil to the compressor's rotating components prior to start-up, during compressor operation and during coastdown (post lube). If it is necessary to service the oil pump, use the following procedure:

REMOVING OIL PUMP FROM THE OIL SUMP

1. Remove the power supply to the oil pump and oil sump heater. Remove electrical leads from fusite connections and transducers.
2. Drain oil from oil sump through drain valve on oil pump housing cover plate.
3. Remove oil eductor line and oil line at the pressure regulator. (note that on Rev. level E chillers and above that the oil regulating valve has been replaced by using a variable speed oil pump).
4. Remove the 5/8" hex head bolts from the oil pump cover (see Fig. 70).
5. After all bolts are removed, pull the oil sump cover loose and remove the cover and oil pump assembly (see Fig. 71).

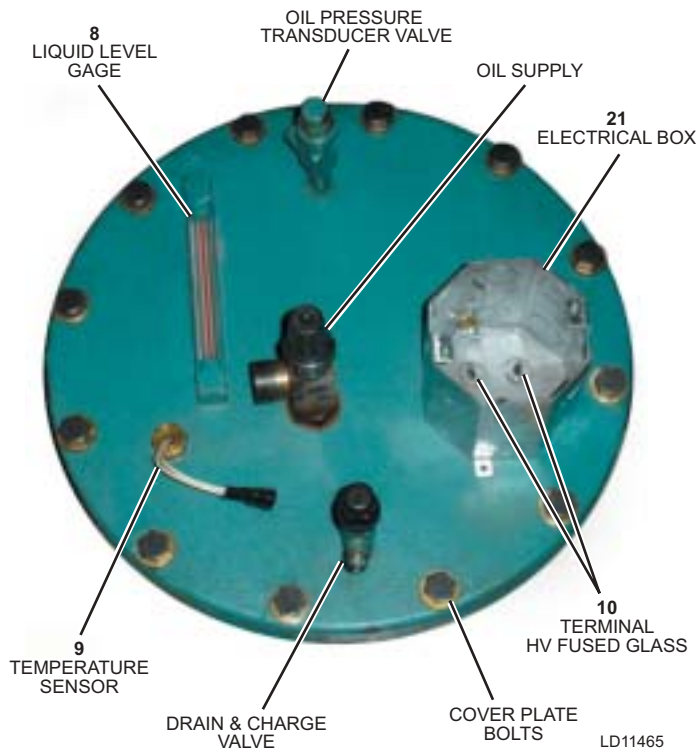


FIG. 70 – OIL PUMP HOUSING COVER PLATE

REASSEMBLING OIL PUMP ASSEMBLY INTO OIL SUMP

Before assembling oil pump into oil sump pump, clean the oil sump with an approved solvent, using the utmost care to eliminate all dirt.

1. Replace oil sump cover gasket with a new one. Lubricate gasket with YORK refrigerant oil and graphite.
2. Assemble the gasket and the oil pump and sump cover assembly to oil sump using the 3/8” hex bolts, apply one drop of Loctite 243 or equivalent to the threads. Tighten bolts using the alternating tightening method. Torque to 155 ft. lbs.
3. Tighten Cover Plate bolts to a recommended torque value of 120 LB. FT. Minimum.
3. Reconnect all electrical leads to fusite connection on sump cover (see FIG. 70). Reconnect oil lines. Reconnect transducers.
4. Charge oil into oil sump. See “Operating Instructions”, Form 160.49-01. Be sure oil is compatible with refrigerant being used.
5. Make sure there are no leaks around the cover and connections.

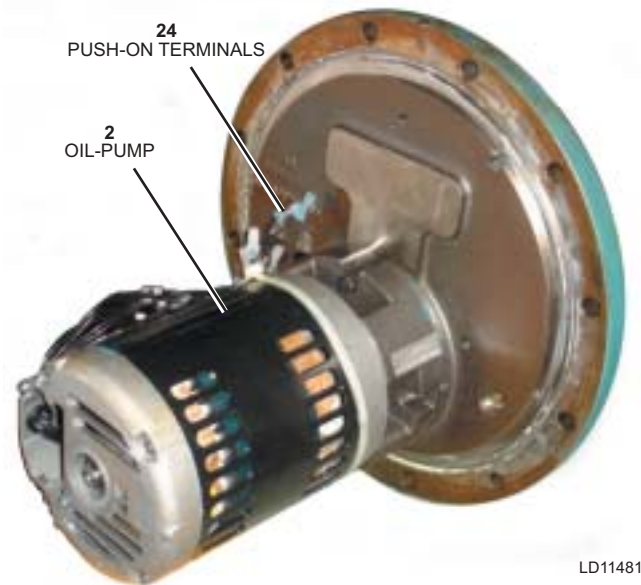


FIG. 71 – OIL PUMP & COVER PLATE REMOVAL

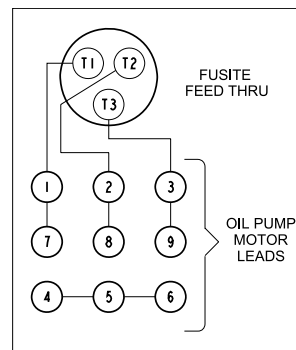


FIGURE 1
208-346 V

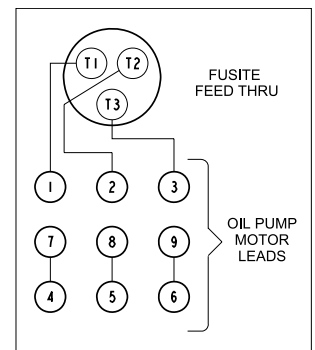


FIGURE 2
415-600 V LD11466

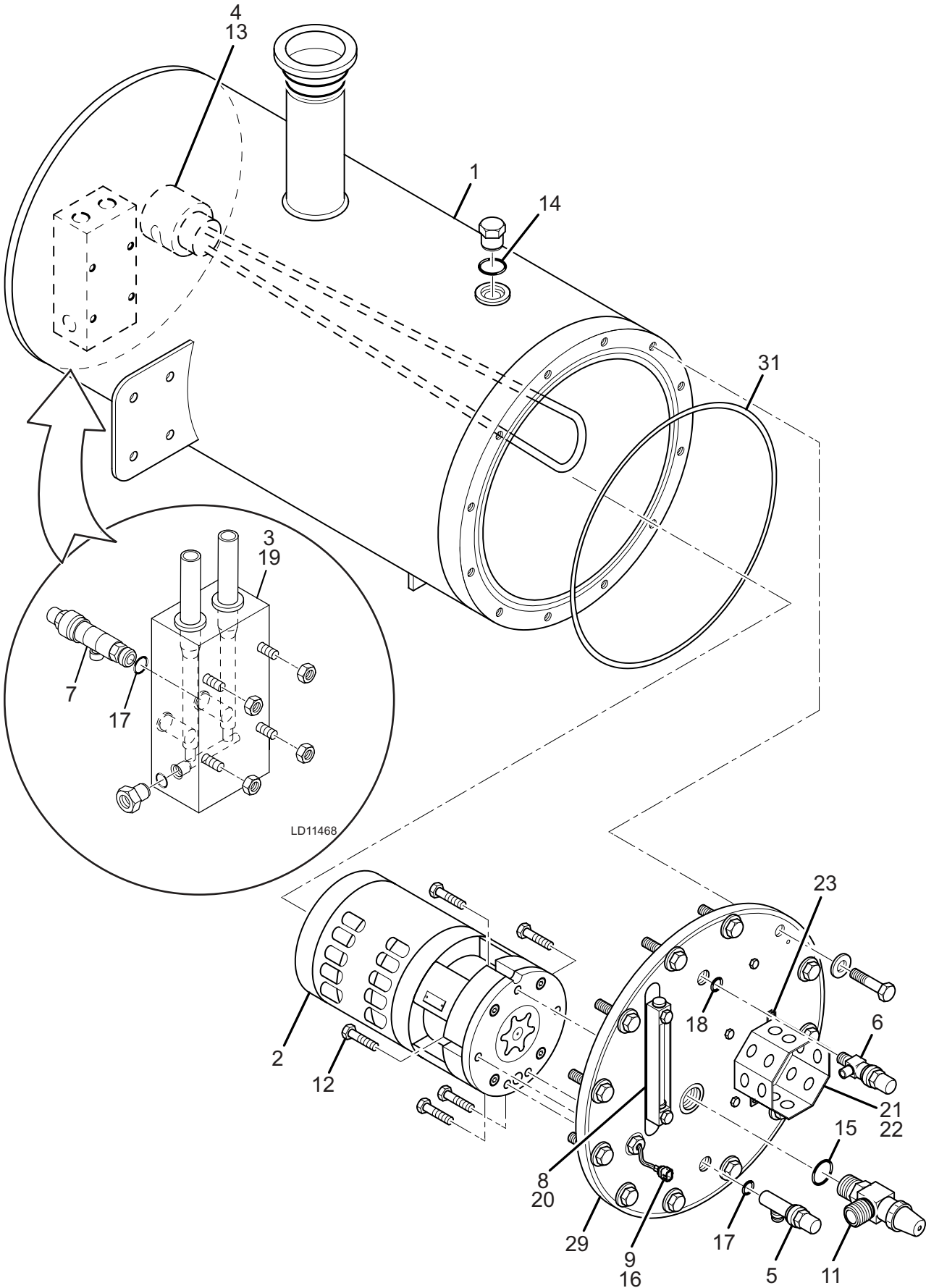
P/N	VOLTS-PHASE-Hz	FIGURE
-001	200-3-60	1
	208-3-60	1
	220-3-60	1
	230-3-60	1
	240-3-60	1
	220-3-50	1
-002	346-3-50	1
	415-3-60	2
	380-3-60	2
	380-3-50	2
	400-3-50	2
-003	415-3-50	2
	440-3-60	2
	440-3-50	2
	460-3-60	2
	480-3-60	2
	550-3-60	2
	575-3-60	2
	600-3-60	2

FIG. 72 – OIL PUMP MOTOR LEADS

OIL PUMP HOUSING PARTS

ITEM	DESCRIPTION	FIG.	YORK P/N
1	Body, Oil Pump Housing Welding H9	73	375-59318-001
2	Pump, Oil 20 GPM YK	73	026-37937-000
3	Block, Oil Eductor Special K	73	026-37533-000
4	Heater, Electric Immer TY (200-346 volt)	73	025-32909-000
	Heater, Electric Immer TY (380-416 volt)	73	025-32917-000
	Heater, Electric Immer TY (440-600 volt)	73	025-32918-000
5	Valve, Stop Angle Vertical	73	022-09578-000
6	Valve, Stop Angle Vertical	73	022-09577-000
7	Valve, Stop Angle Vertical	73	022-10054-000
8	Cage, Liquid Level Sight Front	73	026-37571-000
9	Sensor, Temperature 50,000 OHMS	73	025-33288-000
10	Terminal, HV Fused Glass	70	025-32933-000
11	Valve, Stop Angle Vertical	73	022-10047-000
12	Screw, Cap Hex SOC HD 3/8	73	021-01508-000
13	Seal, O-ring Neoprene	73	028-12961-010
14	Seal, O-ring Neoprene	73	028-12961-008
15	Seal, O-ring Neoprene	73	028-12961-006
16	Seal, O-ring Neoprene	73	028-12961-004
17	Seal, O-ring Neoprene	73	028-12961-003
18	Seal, O-ring Neoprene	73	028-12961-035
19	Seal, O-ring 5/8 ID X 3/32	73	028-12961-001
20	Seal, O-ring Neoprene	73	028-12961-035
21	Box, Elec 4 Octagon X 4 Deep	73	025-33238-000
22	Cover, Filter Output Assy	73	375-26580-000
23	Screw, Mach Pan HD Recd 1	73	021-03741-000
24	Term, Push-on STR 14-10	71	025-09455-000
25	Strap, Cable T & B L7-50-9-M	*	025-09607-000
26	Cap, Sealing, Caplug 250	*	028-04574-000
27	Insr, Elec	*	025-10371-000
28	Ferr, Splice Cap	*	025-10372-000
29	Plate, Oil Pump MTG Machining	73	075-54038-000
30	Pin, Slot Spg 3/16 X 1/2	*	029-04138-000
31	Seal, O-ring Neoprene	73	028-11977-000

NOTE: Items with an * are not represented.



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FIG. 73 – OIL PUMP HOUSING ASSEMBLY

LD11467

SECTION 4 VGD THEORY

GENERAL DESCRIPTION

VGD = “Variable Geometry Diffuser”

VGD eliminates the rise in noise and vibration - as issue that can arise with all centrifugal compressors when they encounter extreme conditions.

VGD accomplishes this by eliminating aerodynamic turbulence within the diffuser by tuning the diffuser geometry (width) to match flow.

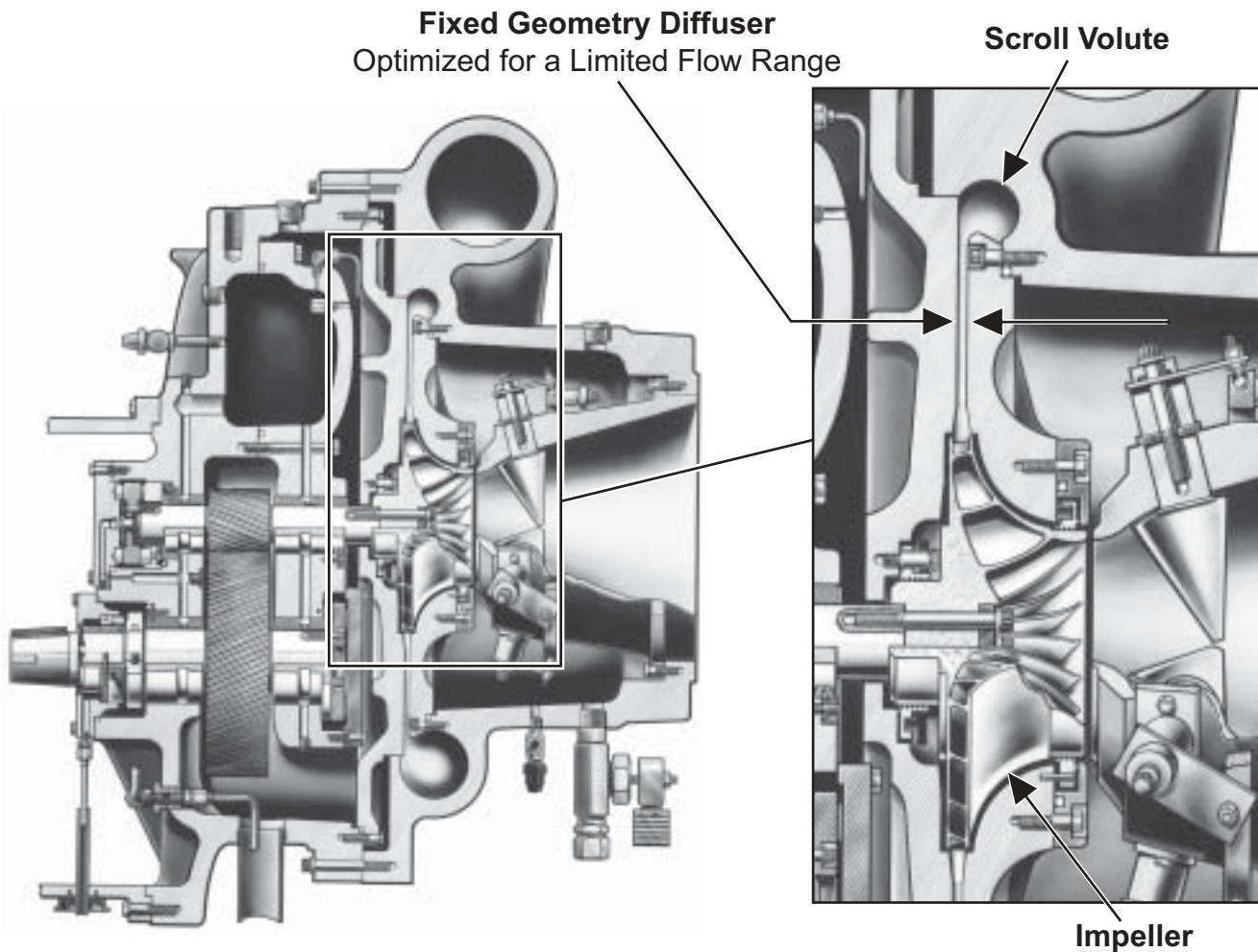
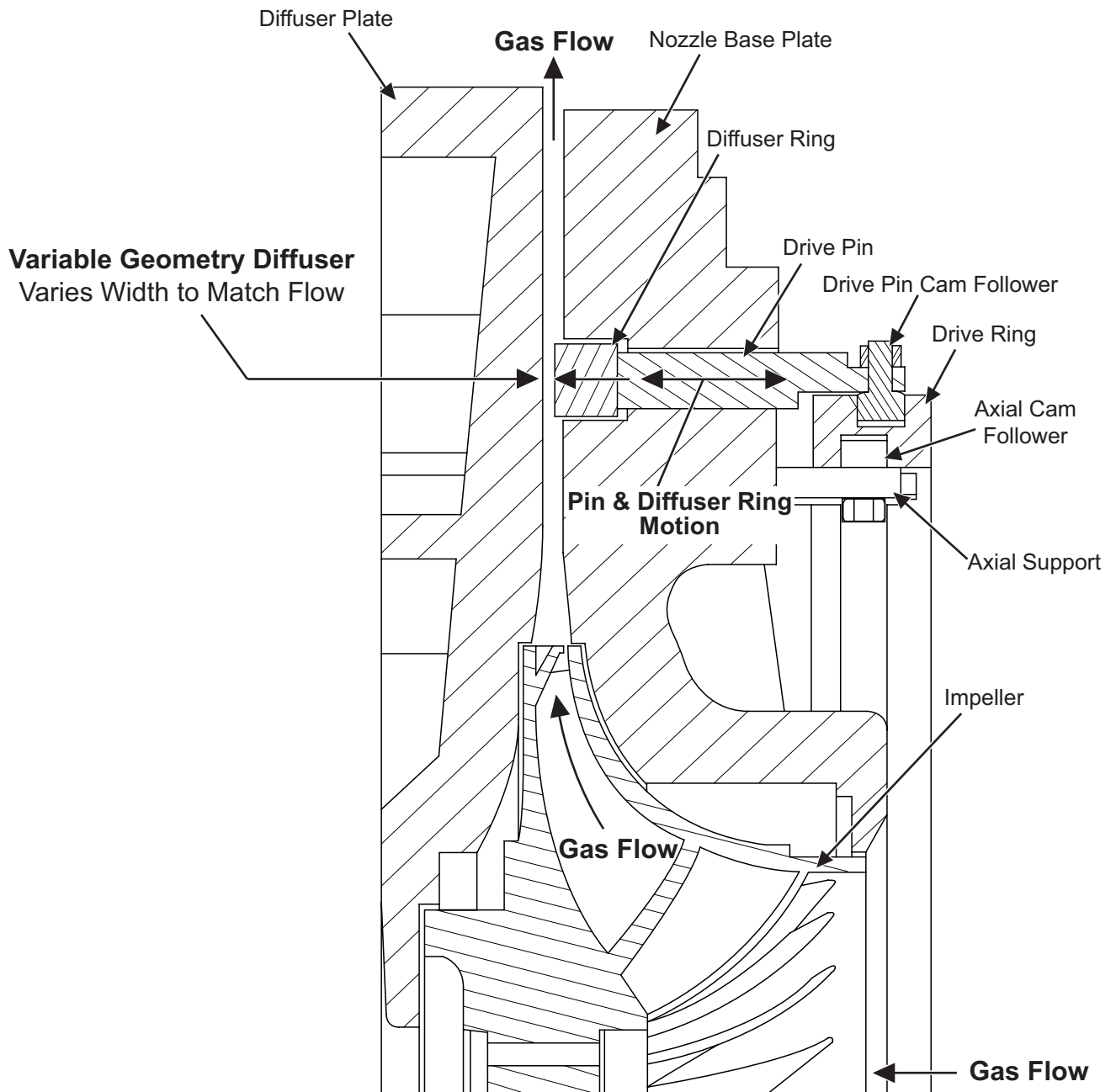


FIG. 74 – TYPICAL CENTRIFUGAL COMPRESSOR

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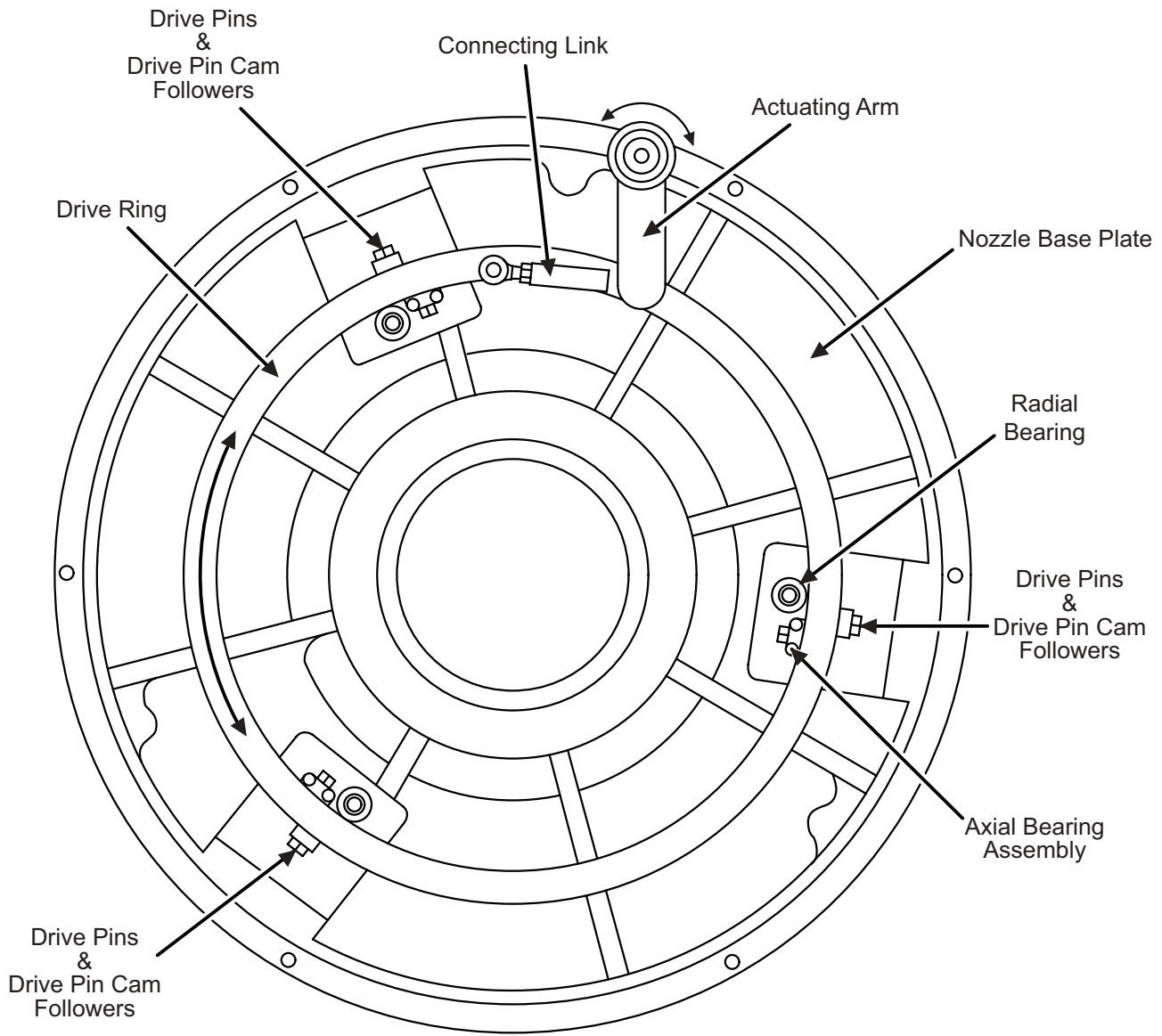
DRIVE RING - Circular rotating Drive Ring is driven by an external actuating motor.

DRIVE PIN CAM FOLLOWER - Follows precision cam-groove machined into the Drive Ring OD.

DRIVE PIN - Multiple drive pins are pushed and pulled by the Drive Pin Cam-Follower.

DIFFUSER RING - This circular ring is pushed in and out of the diffuser gap, by the drive pins, continuously varying the diffuser width to match the changing flow.

FIG. 75 – TYPICAL VGD SECTION



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ACTUATING ARM - Driven by an external actuating-motor this arm rotates the Drive Ring.

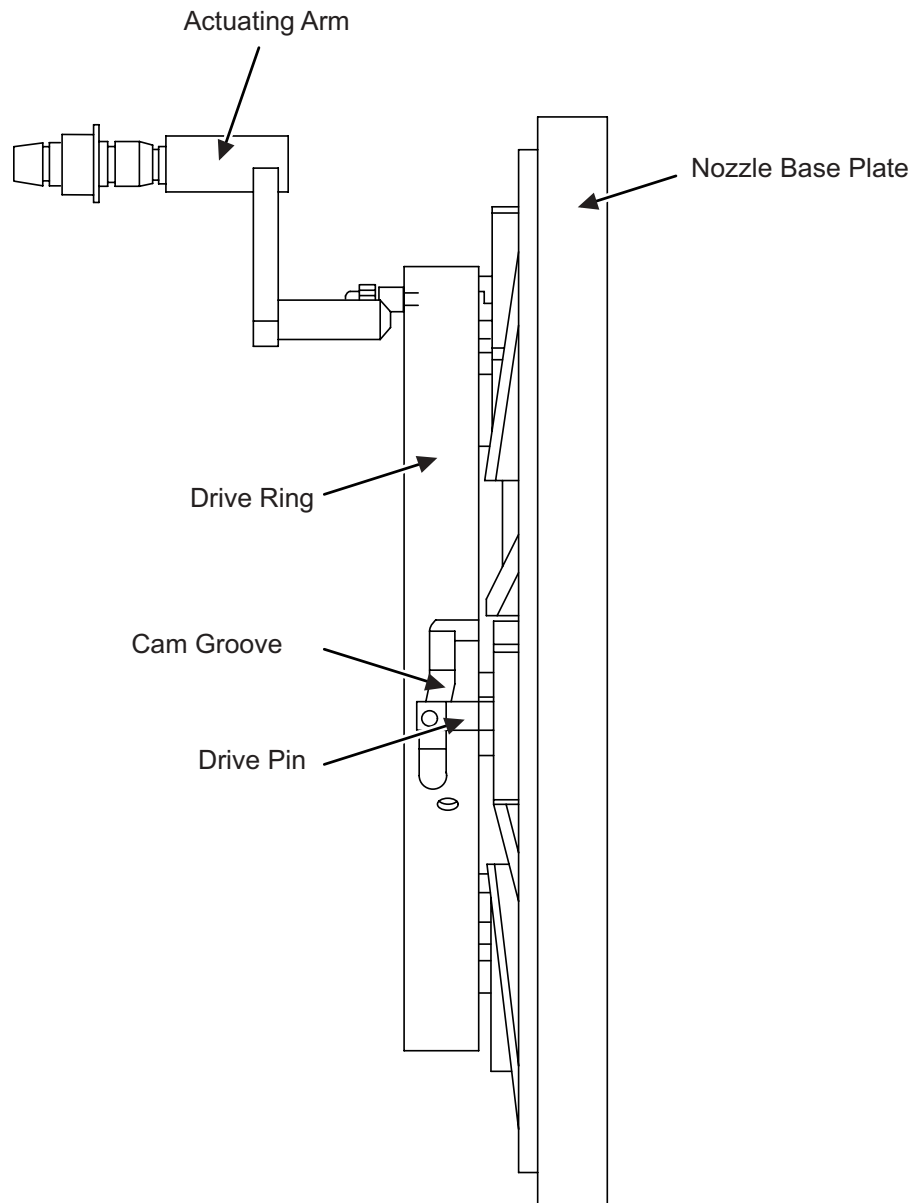
DRIVE RING - Circular rotating Drive Ring is driven by an external actuating-motor.

DRIVE PIN CAM FOLLOWER - Follows precision cam-groove machined into the Drive Ring OD.

DRIVE PIN - Multiple Drive Pins are pushed and pulled by the Drive Pin Cam-Follower.

DIFFUSER RING - This circular ring is pushed in and out of the diffuser gap, by the Drive Pins, continuously varying the diffuser width to match the changing flow. Cannot be seen from this view.

FIG. 76 – REAR VIEW OF DIFFUSER



ACTUATING ARM - Driven by an external actuating-motor this arm rotates the Drive Ring.

DRIVE RING - Circular rotating Drive Ring is driven by an external actuating motor.

CAM GROOVES - Drive-Pin Cam-Followers (hidden behind the Drive Pins) ride in this groove.

DRIVE PIN - Multiple drive pins are pushed and pulled by the Drive Pin Cam-Follower.

DIFFUSER RING - This circular ring is pushed in and out of the diffuser gap, by the drive pins, continuously varying the diffuser width to match the changing flow. Cannot be seen from this view.

FIG. 77 – SIDE VIEW OF DIFFUSER

HOW THE VGD IS CONTROLLED

1. Compressor Discharge-mounted Pressure Transducer monitors discharge pressure.



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Pressure Transducer

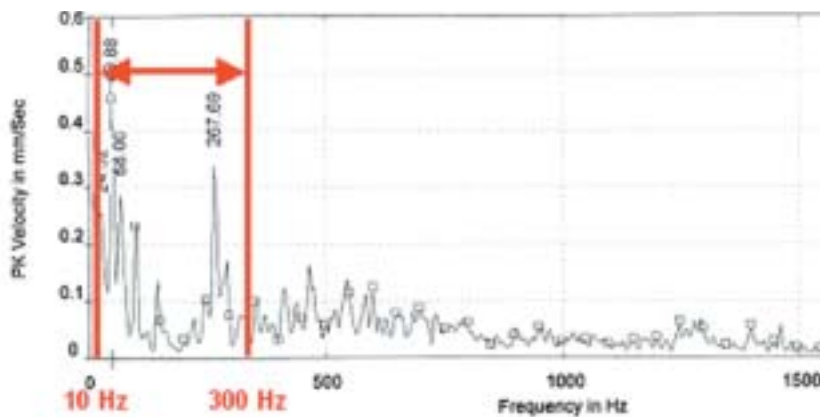
2. Dynamic Pressure Signal sent to Solid State Signal Processor.



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Solid State Signal Processor

3. Solid State Signal Processor filters & processes signal monitors 10-300Hz range.

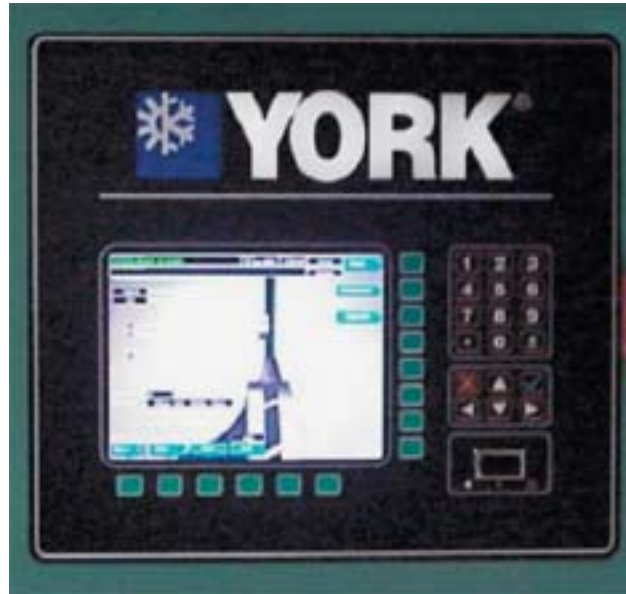


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Typical Compressor Spectrum

4. Output to *OptiView* Control Panel

5. Signal in from Dynamic Pressure Transducer.



YORK *OptiView*
Computerized Control Panel

LD11526

6. Internal Solid-State Signal Processor output is used by control logic to optimize chiller performance by adjusting the VGD and Pre-Rotation Vanes for lowest noise and vibration yielding best operating efficiency.



VGD Equipped Compressor

LD11527

7. Adjust VGD & PRV Actuators for optimum performance

NOTES

NOTES

