P/L 500c #732
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1-3-603
2nd Edition

ELECTRA-SCREW® COMPRESSORS
Base & Tank Mounted

MODELS

EBCRB, EBCQB (BESB) — 7.5 HP

EBCRC, EBCQC (BESC) — 10 HP

EBCRD, EBCQD (BESD) — 15 HP

Service Manual

1-3-603

COOPER INDUSTRIES

GARDNER-DENVER
INDUSTRIAL MACHINERY DIVISION

GARDNER-DENVER

ELECTRA-SCREW® AND ELECTRA-SAVER® COMPRESSORS

WARRANTY

Gardner-Denver (the "Company") warrants its products only as follows:

GENERAL PROVISIONS AND LIMITATIONS

The Company warrants to each original retail purchaser ("Purchaser") of its new products from the Company or its authorized distributor that such products are, at the time of delivery to the Purchaser, made with good material and workmanship, provided that no warranty is made with respect to:

1. Any product which has been repaired or altered in such a way, in the Company's judgment, as to affect the product adversely.

2. Any product which has, in the Company's judgment, been subject to negligence, accident, improper storage, or improper installation or application.

3. Any product which has not been operated or maintained in accordance with normal practice and with the recommendations of the Company.

4. Components or accessories manufactured, warranted and serviced by others, except as separately rated.

5. Any reconditioned or prior owned product.

Claims for items described in (4) above should be submitted directly to the manufacturer.

The Company's obligation under this warranty is limited to furnishing repaired part or, at its option, replacement part, during normal business hours at an authorized service facility of the Company, for any part which in its judgment proved not to be as warranted within the applicable Warranty Period. During the first 90 days from initial use, not to exceed 120 days from date of shipment to first Purchaser, labor for installation of such a part will be provided without charge to the user during normal working hours at an authorized service facility of the Company. All costs of transportation of parts claimed not to be as warranted and of repaired or replacement parts and service personnel from such service facility shall be borne by the Purchaser. The Company may require the return of any part claimed not to be as warranted to one of its facilities as designated by Company, transportation prepaid by Purchaser, to establish a claim under this warranty.

Replacement parts provided under the terms of this warranty are warranted for the remainder of the Warranty Period of the product upon which installed to the same extent as if such parts were original components thereof.

WARRANTY PERIOD

Basic compressor air ends, consisting of all parts within and including the compressor cylinder and gear housing, are warranted for 24 months from date of initial use or 27 months from date of shipment to the first Purchaser, whichever occurs first.

Electric motors and oil coolers are warranted for 12 months from date of initial use or 15 months from date of shipment to first Purchaser, whichever occurs first.

All other components are warranted for 6 months from date of initial use or 9 months from date of shipment to first Purchaser, whichever occurs first.

DISCLAIMER

THE COMPANY MAKES NO OTHER WARRANTY OF ANY KIND WHATSOEVER EXPRESSED OR IMPLIED AND ALL WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED BY THE COMPANY. THE COMPANY SHALL IN NO CASE BE SUBJECT TO ANY OTHER OBLIGATIONS OR LIABILITIES WHATSOEVER WITH RESPECT TO PRODUCTS OR SERVICES MANUFACTURED OR FURNISHED BY IT OR ANY ACTS OR OMISSIONS RELATING THERETO. THE REMEDY PROVIDED UNDER THIS WARRANTY SHALL BE THE SOLE, EXCLUSIVE AND ONLY REMEDY AVAILABLE TO PURCHASER. UNDER NO CIRCUMSTANCES SHALL THE COMPANY BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES, EXPENSES, LOSSES OR DELAYS HOWSOEVER CAUSED.

No statement, representation, agreement, or understanding, oral or written, made by any agent, distributor, representative, or employee of the Company which is not contained in this Warranty will be binding upon the Company unless made in writing and executed by an officer of the Company.

This warranty shall not be effective as to any claim which is not presented within 30 days after the date upon which the product is claimed not to have been as warranted. Any action for breach of this warranty must be commenced within one year after the date upon which the cause of action occurred.

Any adjustment made pursuant to this warranty shall not be construed as an admission by the Company that any product was not as warranted.

THIS BOOK COVERS THE FOLLOWING MODELS:

	BASE MOUNTED	TANK MOUNTED
7.5 HP	EBCRB (BESBG)	EBCQB (BESBH)
10 HP	EBCRC (BESCG)	EBCQC (BESCH)
15 HP	EBCRD (BESDG)	EBCQD (BESDH)

DANGER — *Failure to observe a DANGER notice could result in injury to, or death of personnel.*

WARNING — *Failure to observe a WARNING notice could result in damage to equipment.*

CAUTION — *CAUTION notices set forth general reminders of good safety practice, or direct attention to unsafe practices.*

NOTE — Information furnished in a NOTE will include general information or the highlights of a procedure.

FOREWORD

Gardner-Denver ELECTRA-SCREW® Compressors are the result of advanced engineering and skilled manufacturing. To be assured of receiving maximum service from this machine, the owner must exercise care in its operation and maintenance. This book is written to give the operator and the maintenance department essential information for day-to-day operation, maintenance and adjustment. Careful adherence to these instructions will result in economical operation and minimum downtime.

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SECTION 1

GENERAL INFORMATION

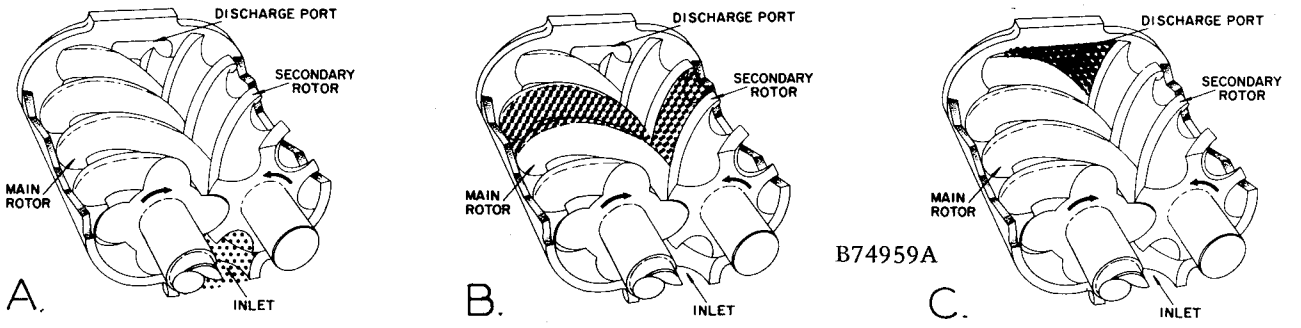


FIGURE 1-1. — COMPRESSION CYCLE

COMPRESSOR — The compressor used on these Gardner-Denver Tank or Base-Mounted Electra-Screw® Compressors is a single stage, positive displacement rotary machine using meshing helical rotors to effect compression. Both rotors are supported between large capacity anti-friction bearings located outside the compression chamber.

COMPRESSION PRINCIPLE (Figure 1-1) — Compression is accomplished by main and secondary rotors synchronously meshing in a one-piece cylinder. The main (driven) rotor has four helical lobes 90° apart. The secondary (idler) rotor has six matching helical flutes 60° apart to allow meshing with main rotor lobes.

The air inlet port is located on top of the compressor near the drive shaft end. The discharge port is near the bottom of the opposite end of the compression chamber. Figure 1-1 is an inverted view to show inlet and discharge ports. Compression begins as the rotors unmesh at the inlet port and air is drawn into the cavity between the main rotor lobes and the secondary rotor flutes (A). When the rotors pass the inlet port cutoff, air is trapped in the interlobe cavity and flows axially with the meshing rotors (B). As meshing continues, more of the main rotor lobe enters the secondary rotor flute, volume is reduced and pressure increases. Oil is injected into the cylinder to remove the heat of compression and seal internal clearances. Volume reduction and pressure increase continues until the air-oil mixture trapped in the interlobe cavity by the rotors passes the discharge port (C) and is released to the oil reservoir.

AIR FLOW (Figures 2-1 & 1-3) — Air enters through a dry-type air filter and passes through the antiblowback unloader valve to the compressor. Passing through the compressor, the air is compressed and mixed with oil. At the compressor discharge port, the air-oil mixture passes into the oil reservoir section where most of the entrained oil is removed by velocity change and impingement and drops back into the reservoir. A multiple element final separator removes remaining oil and returns it to the compressor inlet, and allows air to pass through the check valve to the air receiver. *This system is not intended for use where true oil-free air is required.*

LUBRICATION, COOLING AND SEALING — Air pressure in the oil reservoir section forces oil through the oil cooler, thermostatic mixing valve (where used) and oil filter to supply the compression chamber with lubricating oil. A portion of the oil is directed through internal passages to the inlet end bearings to insure complete lubrication. The balance of the oil is injected directly into the cylinder to cool and lubricate the rotors and seal internal clearances. At the discharge end, a controlled amount of the oil is carried along the shafts for lubrication of the discharge end bearings.

COMPRESSOR SIZES — The Gardner-Denver Tank or Base-Mounted Air-Cooled Electra-Screw® Compressors are supplied in three (3) sizes (7.5, 10 and 15 Horsepower) and four (4) pressure ranges as listed below:

7.5 HP — 100 PSIG & 125 PSIG
10 HP — 100 PSIG, 125 PSIG, 150 PSIG & 175 PSIG
10 HP — 100 PSIG, 125 PSIG, 150 PSIG & 175 PSIG

These units are supplied as base-mounted or tank-mounted units. The tank-mounted units are supplied with a 120 gallon receiver.

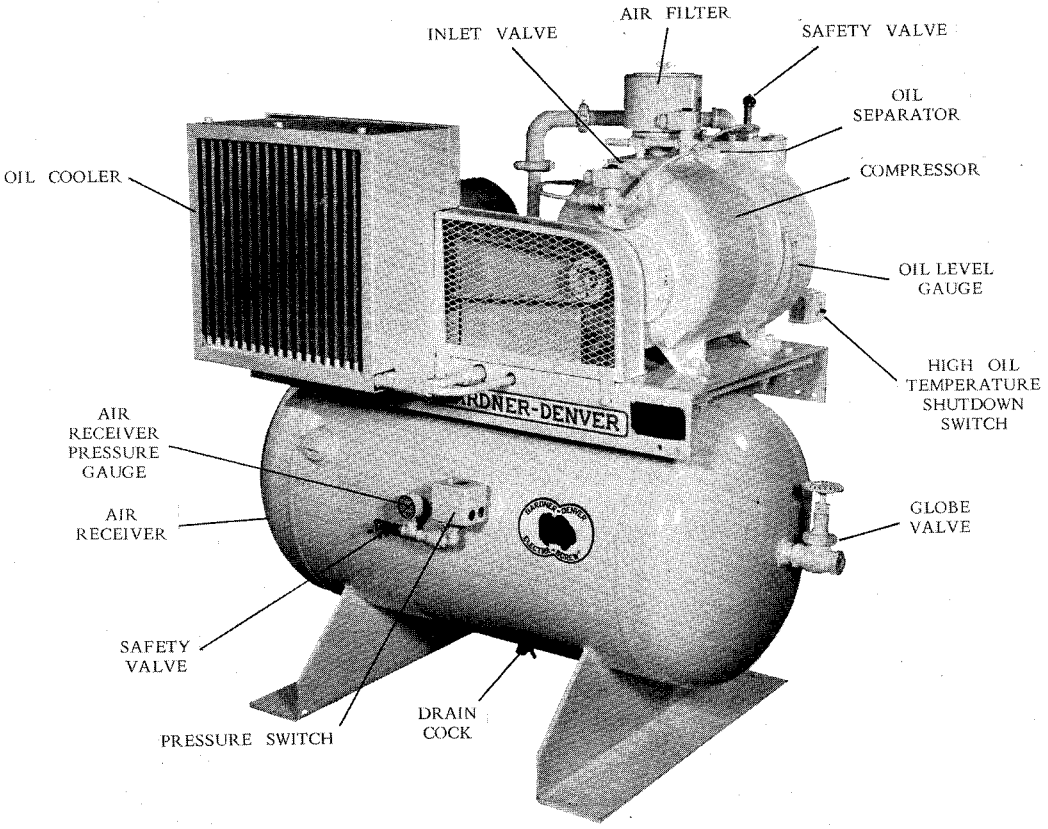


FIGURE 2-1. – TANK-MOUNTED ELECTRA-SCREW® UNIT

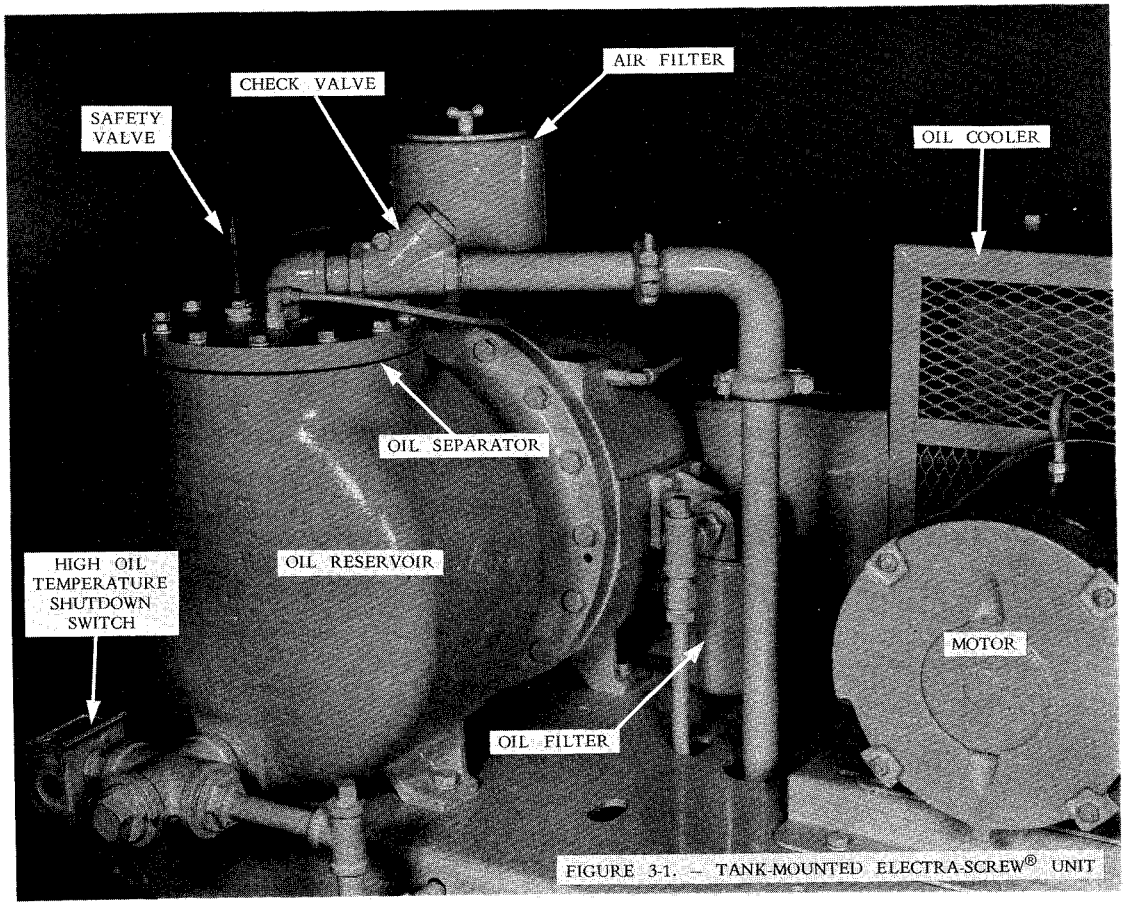


FIGURE 3-1. – TANK-MOUNTED ELECTRA-SCREW® UNIT

SAFETY PRECAUTIONS

Safety is everybody's business and is based on your use of good common sense. All situations or circumstances cannot always be predicted and covered by established rules. Therefore, use your past experience, watch out for safety hazards and be cautious.

Some general safety precautions are given below:

⚠ CAUTION

- STOP THE UNIT IF ANY REPAIRS OR ADJUSTMENTS ON OR AROUND THE COMPRESSOR ARE REQUIRED.
- ALL COMPRESSED AIR SUPPLY HOSES EXCEEDING 1/2 INCH INSIDE DIAMETER SHOULD HAVE AN EXCESS FLOW VALVE. (OSHA REGULATION, SECTION 1518.302)
- DO NOT EXCEED THE RATED MAXIMUM PRESSURE VALUES SHOWN ON THE NAME PLATE.
- DO NOT OPERATE UNIT IF SAFETY DEVICES ARE NOT OPERATING PROPERLY CHECK PERIODICALLY. NEVER BYPASS SAFETY DEVICES.

⚠ DANGER

- KEEP FINGERS AND CLOTHING AWAY FROM REVOLVING FAN, DRIVE COUPLING, ETC.
- DO NOT USE THE AIR DISCHARGED FROM THIS UNIT FOR BREATHING — NOT SUITABLE FOR HUMAN CONSUMPTION.
- DO NOT LOOSEN OR REMOVE THE OIL FILLER PLUG, DRAIN PLUGS, COVERS, THE THERMOSTATIC MIXING VALVE, OR BREAK ANY CONNECTIONS, ETC. IN THE COMPRESSOR AIR OR OIL SYSTEM UNTIL THE UNIT IS SHUT DOWN AND THE AIR PRESSURE HAS BEEN RELIEVED.
- ELECTRICAL SHOCK CAN AND MAY BE FATAL.
- COMPRESSOR UNIT MUST BE GROUNDED IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE. A GROUND JUMPER EQUAL IN SIZE TO THE EQUIPMENT GROUND CONDUCTOR MUST BE USED TO CONNECT THE COMPRESSOR MOTOR BASE TO THE UNIT BASE.
- FAN MOTORS HAVE BEEN AND MUST REMAIN GROUNDED TO THE MAIN BASE THROUGH THE STARTER MOUNTING PANEL IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE.
- OPEN MAIN DISCONNECT SWITCH BEFORE WORKING ON THE CONTROL.
- DISCONNECT THE COMPRESSOR UNIT FROM ITS POWER SOURCE BEFORE WORKING ON THE UNIT — THIS MACHINE IS AUTOMATICALLY CONTROLLED AND MAY START AT ANY TIME.

Notes

SECTION 2

CONTROLS AND INSTRUMENTATION

GENERAL — The Gardner-Denver Tank or Base-Mounted Electra-Screw® Compressors are sold with customer-furnished motor starter, or with optional factory-furnished motor starter, having either 120 volt or full motor voltage controls. If customer-furnished starter is used, the starter and control should be wired by a competent electrician according to Gardner-Denver wiring diagram furnished with unit.

A dual 2-wire control (constant speed/auto-start-stop) is supplied on all factory-furnished starters. Customer-furnished starters may use either the above or one of the systems shown below:

Constant Speed — 3-Wire Control

Automatic Start-Stop — 2-Wire Control

Consult wiring diagram furnished with unit for more detail.

With factory-furnished starters, control function is as follows:

In the "HAND" or "CONSTANT" position, the motor will run continuously and the compressor will load or unload as necessary to meet air demand. When unloaded, the oil reservoir is blown down to a minimum pressure necessary to provide sufficient oil circulation for cooling and lubricating purposes. This reduced pressure in the reservoir allows the compressor to operate with lower power consumption during the unload cycle.

When the hand switch is in the "AUTO" position, the unit will unload, the motor will stop and the oil reservoir will be blown down (for loadless starting) when the preset pressure level is reached. When pressure in the system falls, the motor will automatically start and the compressor will load.

The center position of the hand switch turns the compressor completely off.

DANGER

WHEN OPERATING IN "AUTO" MODE, UNIT MAY START WITHOUT WARNING. BE CERTAIN UNIT IS TURNED COMPLETELY OFF AND MAIN DISCONNECT IS OPEN BEFORE MAKING ADJUSTMENTS OR SERVICING!

WARNING

IF OPERATING CONDITIONS ARE SUCH THAT THE UNIT CYCLES MORE THAN TEN (10) TIMES PER HOUR, IT SHOULD NOT BE OPERATED IN THE "AUTO" MODE. DO NOT START ELECTRIC MOTOR MORE THAN TEN (10) TIMES PER HOUR AS PERMANENT DAMAGE MAY OCCUR TO THE MOTOR.

CONTROL AND PROTECTIVE DEVICES — The unloader and blowdown functions are controlled by a two-way normally open solenoid valve.

Unloader — The unloader is a pressure-operated, spring return, positive check unloader.

Pressure Switch — An adjustable pressure switch controls motor and unloader shutdown and load/unload signals. Standard machines are set at the factory to operate with a 25 PSIG pressure differential between the load and unload points. The cutout or unload pressure is set at the factory according to maximum operating pressure specified. The cutout pressure is set by adjusting screw "A" (Figure 1-2). The differential can be increased by turning screw "B" (Figure 1-2) in a clockwise direction. **Do not force this adjustment beyond its limits as differential may become erratic.** Normally there is no need to reset the factory-set differential.

CAUTION

DO NOT, UNDER ANY CIRCUMSTANCES, ADJUST THE CUTOUT PRESSURE HIGHER THAN THE MAXIMUM UNIT RATING. MINIMUM OPERATING PRESSURE IS 25 PSIG FOR SHORT PERIODS (UNDER 3 MINUTES) AND 40 PSIG FOR SUSTAINED PERIODS.

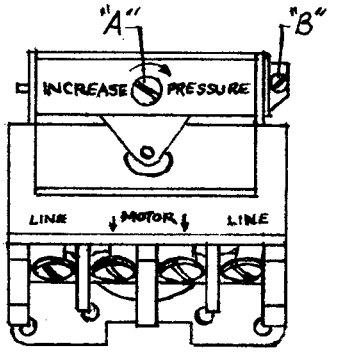


FIGURE 1-2. — PRESSURE SWITCH ADJUSTMENT

This pressure switch is located in the receiver of tank-mounted units. It is "shipped loose" on base-mounted units, and should be installed in the customer's receiver.

High Oil Temperature Shutdown Switch — The compressor is protected by a high oil temperature switch (normally closed) located at the compressor oil discharge line. This switch is set at the factory and normally need not be reset. For proper operation and maximum protection, the switch should be set at approximately 235° F. Should the switch be tripped, it must be manually reset by pressing the reset button in the cover.

Safety Valve — A safety valve installed in the oil separator cover is set at the factory at 110% maximum rated pressure. Periodic checks should be made to insure its proper operation. The valve is sufficient to protect the unit against itself. If additional compressors are piped into the same

system, good general practice suggests that safety valves should be provided to protect the other compressors and a check valve should be installed between each unit and the remaining air system.

Air Pressure Gauge — A direct reading air pressure gauge is supplied and indicates air pressure in the receiver of the unit. This gauge is shipped loose on base-mounted units and should be installed in the customer's receiver or system.

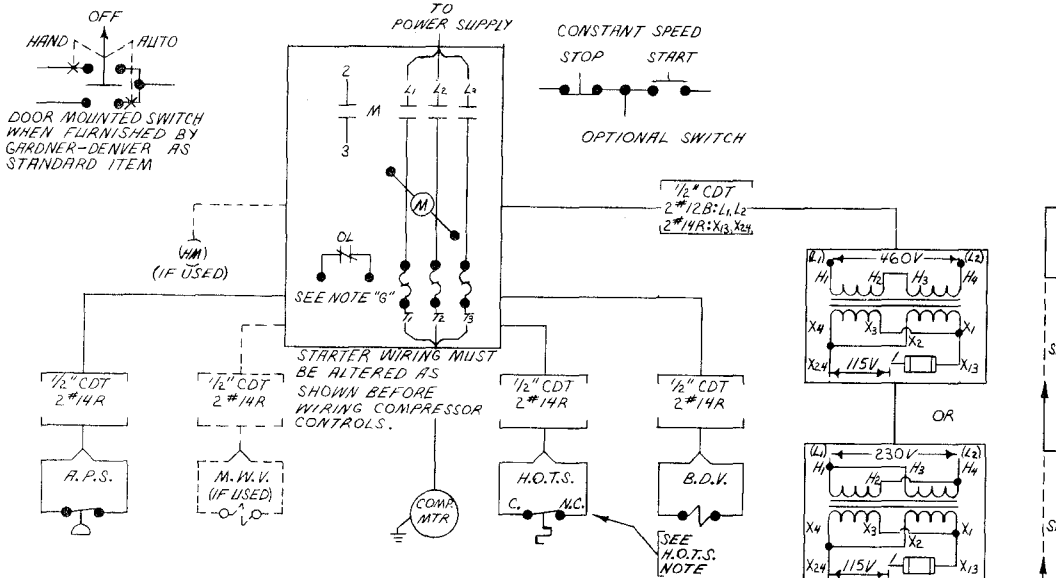
PURGE AIR VALVE — (15 HP Models Only) — Purge air valve is a two-way normally open solenoid valve which admits extra bleed-air to the compressor during the unloaded cycle to allow for quieter operation. If compressor becomes noisy when unloaded, valve may be inoperative.

OPTIONAL MODULATING CONTROL — The optional modulating control allows the compressor to unload and load gradually as air requirements demand. The control is especially suited where the unit will run under part load conditions for extended periods of time or where no air receiver is to be used. The modulating control can be adjusted by turning the screw in the dome of the subtractive pilot. The operating differential is fixed, but the unload point can be decreased by turning the screw counterclockwise. The pressure switch adjustment (Figure 1-2) must be coordinated with (set slightly lower than) the subtractive pilot setting or the motor may not shut off in the "AUTO" mode and the reduced horsepower benefits during the unload cycle in the "HAND" or "CONSTANT" run mode will not be realized.

ELECTRICAL GROUNDING — The compressor unit must be grounded in accordance with the National Electrical Code Table 250-95. A ground jumper equal in size to the equipment ground conductor must be used to connect the compressor motor base to ground. If equipment ground is connected to the air receiver, then a bonding jumper equal in size to equipment ground must be used to connect motor base to air receiver ground.

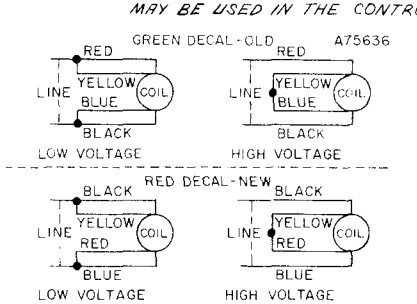
DANGER

Disconnect the compressor unit from its power source before working on unit.


OFF
HAND
AUTO
DOOR MOUNTED SWITCH WHEN FURNISHED BY GARDNER-DENVER AS STANDARD ITEM
TO POWER SUPPLY
CONSTANT SPEED
STOP
START
OPTIONAL SWITCH
1/2" CDT 2#12 B: L1, L2 2#14R: X3, X24
(HM) (IF USED)
SEE NOTE "G"
STARTER WIRING MUST BE ALTERED AS SHOWN BEFORE WIRING COMPRESSOR CONTROLS.
1/2" CDT 2#14R
A.P.S.
M.W.V. (IF USED)
COMP. MTR
H.O.T.S.
B.D.V.
SEE H.O.T.S. NOTE
460V
230V
115V
OR
200V OR 600V

H.O.T.S. NOTE: C-PURPLE; N.C.-BLACK; N.O.-NOT USED - REMOVE WIRE (BLUE) IF ON SWITCH

TRANSFORMERS THAT MAY BE USED IN THE CONTROL



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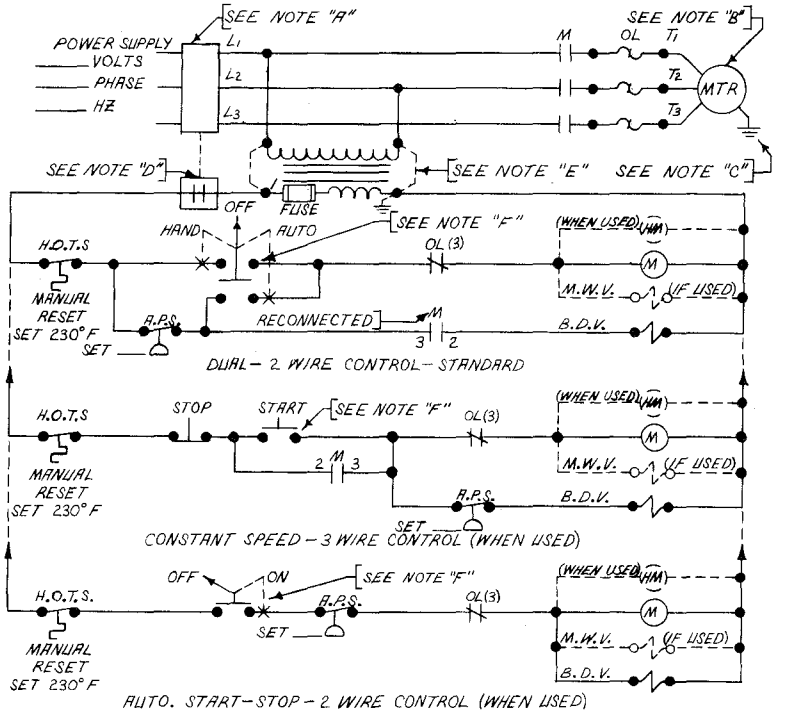


NOTE "A" — Fused switch or circuit breaker (not furnished as standard item — if ordered it must be remote mounted by customer).

NOTE "B" — Since most A.C. motors are wound for dual voltage, be certain leads are connected for the correct voltage.

NOTE "C" — Equipment must be grounded in accordance with Table 250-95 of the National Electrical Code.

NOTE "D" — If control voltage is to be from a separate voltage source, an auxiliary interlock switch on the fused switch or the circuit breaker, or a separate disconnect switch must be installed per Article 730-74 of the National Electrical Code.

NOTE "E" — Fused 115 volt control circuit transformer (not furnished as a standard item — if ordered, a fused 250 VA transformer will be mounted and wired). When transformer is used, the control circuit may be grounded as shown if desired.

NOTE "F" — Hand (Constant Speed) — Off — Auto. (Start-Stop) selector switch furnished as standard item — mounted in starter cover. Control may be changed to Constant Speed (3-wire control) only, or Auto. Start-Stop only by changing control switch and rewiring the components per the appropriate schematic.

NOTE "G" — Full voltage magnetic starter shown. Starter wiring has been changed to conform to wiring diagram. See diagram furnished with starter for original internal wiring. Numbers 2 and 3 are starter interlock numbers.

NOTE "H" — Hourmeter, when used, is mounted and wired by others.

Components Shown By G-D Part No. Are NEMA 1 Only.

A.P.S. — Air Pressure Switch — 88A64
B.D.V. — Blowdown Valve 2W.N.O.

	125 Lbs. Max.	175 Lbs. Max.
115 V		91B11
200 V		91B12
230/460 V	91B9	91B10
575 V		91B13

H.M. — Hourmeter (if used)
H.D.T.S. — High Oil Temperature Switch 21D5 — Set 230° F. — Manual Reset
FUSE — 2¼AMP — 250 V — Buss Midget Fusetron FNM2¼(when used)
M. — Motor Starter Coil & Contacts
M.W.V. — Magnetic Water Valve (if used) 2W.N.C.
O.L. — Overload

All equipment must be connected and phased exactly as shown. All piping, wiring and other equipment not specified on order is to be supplied by other than Gardner-Denver Company.

FIGURE 2-2. — WIRING DIAGRAM

Notes

SECTION 3

LUBRICATION

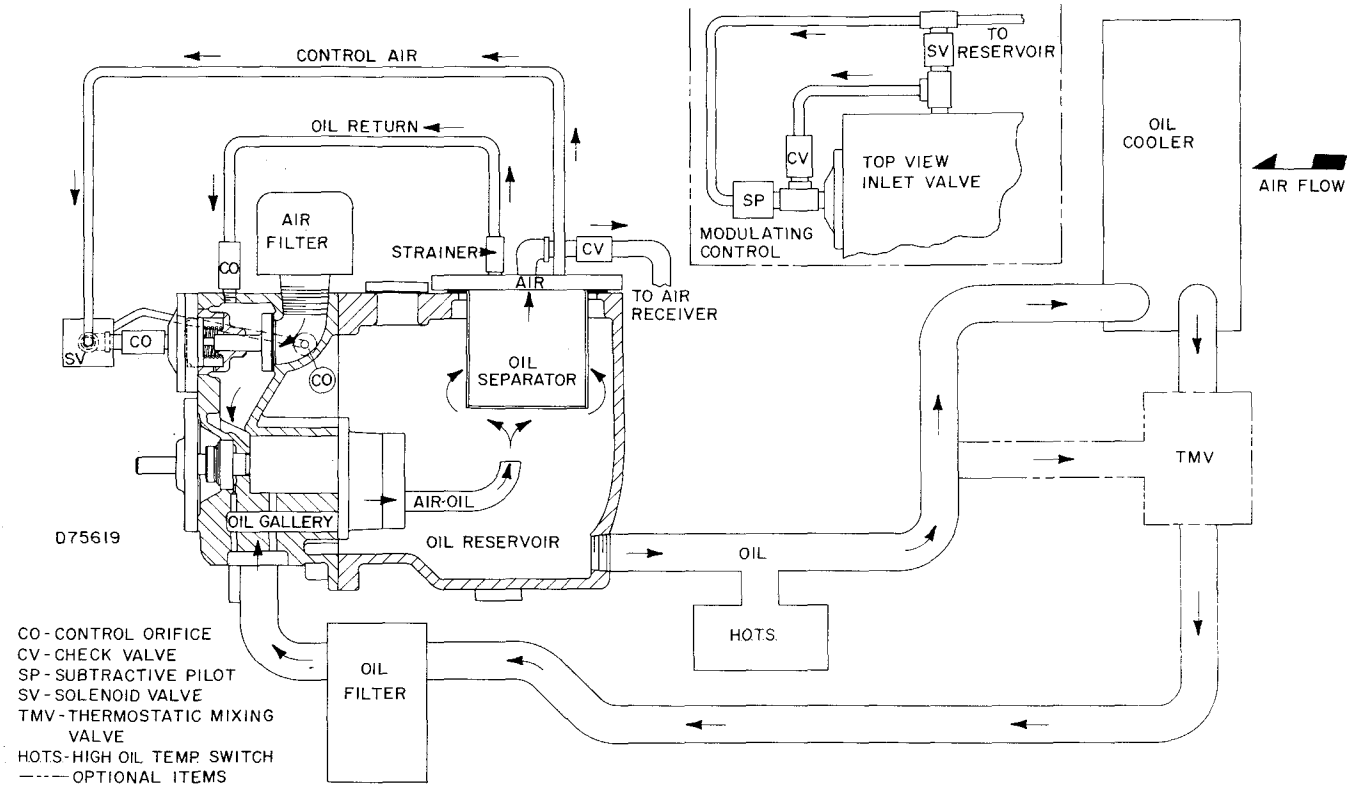


FIGURE 1-3. — AIR-OIL FLOW DIAGRAM

The compressor oil system consists basically of the oil reservoir section of the compressor, oil cooler, thermostatic mixing valve (optional) and oil filter. The oil is circulated through the system by pressure differential and serves three purposes in the compressor: (1) cooling, (2) lubrication, (3) sealing internal clearances.

OIL SPECIFICATIONS — The recommended compressor lubricant is automatic transmission fluid meeting General Motors Dexron specification. The oil must contain the following additives to be suitable for Electra-Screw® compressor use: (a) corrosion inhibitor, (b) oxidation inhibitor, and (c) foam inhibitor. Any other additives the above oil may contain as a standard of the refiner are acceptable. Mixing of different types, or the use of lubricants without sufficient oxidation inhibitor will result in formation of heavy varnish and sludge deposits throughout the system. See "Compressor Oil Separator".

SYSTEM CAPACITY is two and one-half (2-1/2) to three (3) gallons on all models.

OIL QUALITY — There are many brands of lubricating oils which are represented by the suppliers as meeting the specification listed. The ability of an oil to meet the minimum performance level of a specification is determined by the supplier. Therefore, the responsibility for the QUALITY of the oil and its PERFORMANCE IN SERVICE rests with the oil supplier.

COLD AMBIENT OPERATION — (See "Thermostatic Mixing Valve" this section.) Experience clearly indicates that an oil with a pour point near the ambient temperature may chill in the oil cooler and block oil flow to the compressor. The loss of circulation causes excessive discharge air temperatures and may result in compressor damage and/or a flash fire in the oil reservoir. This rise of discharge air temperature occurs very rapidly, and damage may result before the high oil temperature shutdown switch can actuate to stop the unit.

Following the lubrication recommendations will greatly reduce the possibility of the above circumstances taking place.

SYNTHETIC LUBRICANTS — Certain lubricants such as the synthetic hydrocarbon, synthetic diester or the polyether fluids are being marketed as suitable for rotary compressor use. If such fluid is to be used, care should be taken to insure that its viscosity, foam, oxidation and corrosion characteristics are equal or superior to those of the recommended automatic transmission fluid.

Other synthetic fluids such as the phosphate esters (so called fireproof fluids) should not be used without changing of certain materials and coatings used in the unit, because of the rapid deterioration caused by this type of fluid. If fireproof fluids must be used, consult your Gardner-Denver representative for recommendations.

ADDITION OF OIL BETWEEN CHANGES must be made when level of oil in the gauge is at or below the "ADD" mark *while the unit is operating and on load.* Stop unit and BE SURE THAT NO AIR PRESSURE IS IN THE SYSTEM. Wipe away all dirt around the oil filler plate. Remove the oil filler plate and add oil as necessary to return the oil level to the "FULL" mark when the compressor is operating. Repeated additions of oil between oil changes may indicate excessive oil carry-over and should be investigated; see Section 9 "Trouble Shooting".

OIL CHANGE INTERVAL is determined by air filter maintenance, operating conditions and quality of oil. Good practice is to change oil often enough that the drained oil is relatively clean. Under good operating conditions automatic transmission fluid may be used up to 2000 hours or six months of operation, whichever occurs first. When operating conditions are severe (very dusty, high humidity or high temperature) it may be necessary to change oil more frequently. Operating conditions and appearance of drained oil must be surveyed and oil change intervals planned accordingly by the user. **Change the oil filter every 1000 hours.**

DRAINING AND CLEANING OIL SYSTEM — STOP UNIT. **Be sure no air pressure is in the sytem.** Always drain the complete system. Draining when the oil is hot will help to prevent varnish deposits and to carry away impurities.

FILLING THE OIL RESERVOIR — Wipe away all dirt before removing the oil filler plate. Add required oil. This amount may bring the oil level above the "FULL" mark. After start-up, the level will fall to between the "FULL" and "ADD" marks as the system components are filled. If necessary, add oil to maintain the level between the "FULL" and "ADD" marks when the unit is operating on load. ALWAYS STOP THE UNIT AND RELEASE ALL PRESSURE IN THE SYSTEM BEFORE ADDING OIL. During the unloaded operation and after shutdown, the oil may partially drain back into the compressor and the oil level may read over "FULL". **Do not drain to correct;** on the next loaded cycle or start, oil will again fill the system and the gauge will indicate proper operating level. **Do not overfill** as oil carry-over may result.

COMPRESSOR OIL FILTER — An oil filter of the spin-on type is mounted on the side of the compressor. The filter is a vital part in maintaining a trouble-free compressor, since it removes dirt and abrasives from the circulated oil. The filter is the disposable type and is equipped with a relief valve that opens in the event the element becomes dirty enough to block the oil flow.

To replace the filter, merely spin off the oil filter and discard, then spin on the new filter by hand, tightening firmly enough to prevent oil leaks. When changing the filter between oil changes, add one (1) quart of lubricant to the system to replace the oil retained in the oil filter.

At initial start-up **the oil filter should be changed after the first 100-200 hours of operation;** this is highly important, since during assembly and early operation of the compressor, a certain amount of impurities enter the system and are caught in the oil filter. Regular maintenance schedule should be followed after this initial filter change.

For regular maintenance, **the oil filter must be replaced every 1000 hours of operation;** more frequent changes improve the system's reliability and are recommended.

DANGER

USE ONLY GARDNER-DENVER REPLACEMENT FILTERS as other filters, similar in appearance, MAY NOT HAVE SUFFICIENT PRESSURE-BURST STRENGTH!

COMPRESSOR OIL COOLER — The fan is direct connected to the motor shaft and exhausts air through the oil cooler away from the unit. Keep both faces of the oil cooler core clean for efficient cooling of the compressor oil. An adequate air supply is important. See Section 6.

COMPRESSOR OIL SEPARATOR located in the oil reservoir section of the compressor, is a one-piece renewable agglomerator element and removes oil from the air stream. Oil from inside the separator is returned through tubing to the compressor suction.

Oil carry-over through service lines may be due to oil level being too high, oil which foams excessively, oil return line clogged, oil return pickup tube inside element being loose or broken, or operation below minimum pressure specified. When it is determined that none of the above is the cause of oil carry-over, inspect the element for rupture. Rupture may be caused by heavy dirt or varnish deposits resulting from inadequate air filter service, use of improper oil, or using oil too long. Collapsing of the element is usually due to heavy dirt and varnish buildup in the filtering material.

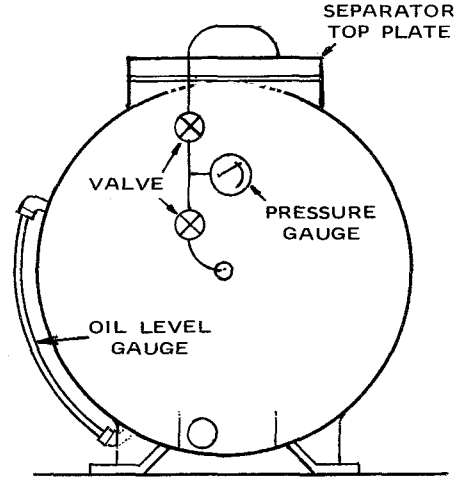


FIGURE 2-3. — PRESSURE DROP CHECK

Element life will vary greatly depending on the type of service and the quality of oil used, therefore it is impractical to set a figure for life expectancy. The condition of the element can be determined by a pressure drop check. Connect a pressure gauge as shown in Figure 2-3 so the pressure reading on either side of the separator can be made by opening and closing the valves. If the pressure drop exceeds 8 PSI, the separator should be changed. Replace the element as required — do not attempt cleaning for reuse.

To remove the agglomerator element for inspection or replacement:

1. Disconnect all tubing. Disconnect clamp on flexible elbow.

2. Remove bolts holding top plate to compressor. To avoid puncturing separator, lift top plate straight up

until oil return pipe clears top of separator.

3. Lift element from reservoir section, using care not to dent or damage the element.

4. Inspect element; using drop light inside may reveal rupture or areas of heavy dirt or varnish deposits. Inspect condition of gaskets bonded to each side of separator flange.

5. To install the element, lower element in place using care not to dent or damage the element.

6. As top plate is lowered, make sure oil pickup pipe does not puncture sides of element.

7. Position top plate and tighten all bolts (30 foot-pounds). Reconnect all tubing removed in Step 1.

THERMOSTATIC MIXING VALVE (Optional) — The thermostatic mixing valve (Figure 1-3) allows the compressor to operate at a sufficiently high temperature to help reduce condensation of moisture from atmospheric air in the reservoir. On start-up with unit cold, the thermal element is open to the bypass line, allowing oil to circulate directly from oil reservoir to compressor during warm-up period. As the oil warms up, the thermal element gradually opens to allow oil from the cooler to mix with oil from the bypass line. After unit is warmed up, the control maintains oil injected into the compressor at a minimum of 130° F.

If the unit shuts down due to high oil temperature, thermal element may be stuck open to the bypass position blocking the cooler out of the system. To check the thermal element, heat in oil — it should be wide open at 130° F. When flushing the oil system, remove the thermal element and clean all parts thoroughly.

Notes

SECTION 4

AIR FILTER

GENERAL — The air filter must receive proper maintenance if maximum service is to be obtained from the unit. Establishing adequate and timely filter service is MOST IMPORTANT. A wide range of operating hours is possible. With wide variation of dust conditions encountered, only experience can determine the proper time interval for servicing filters.

AIR FILTER — Air-Maze Type DM — Instructions are given in the following sections: Filter Element and Filter Element Life.

Filter Element — The element should be serviced when inspection indicates an accumulation of dirt on the outside of the element. Clean every 100 to 500 operating hours depending on dust conditions. Inspect every few days until experience determines proper time interval for servicing.

To Service:

(a) Remove element from filter housing.

(b) Blow off excess dirt with air nozzle. Direct air blast parallel to element pleats at a slight inward angle. Do not point air blast directly at element.

(c) Elements contaminated with dry dirt only:

(1) Mix a sufficient amount of warm water and houshold detergent to allow the element to be fully submerged.

(2) Place element into cleaning solution and allow to soak for five minutes.

Elements contaminated with oil or greasy dirt deposits:

(1) Mix a sufficient amount of the following cleaning solution to allow the element to be fully submerged. To one gallon of lukewarm water add four tablespoons of mild household detergent and one-half teaspoon of trisodium phosphate. Mix well.

(2) Place element into cleaning solution and allow to soak for five minutes. Agitate in solution for two more minutes and remove.

(3) Discard dirty solution and mix a new batch of cleaning solution as above.

(4) Place element in clean solution and agitate for five minutes.

(d) Remove from solution, drain, and flush with clear water from the inside out by using hose. Use a gentle water stream and do not point directly at element.

(e) Inspect for rupture by placing a bright light inside the element. The slightest rupture requires replacement of the element.

(f) Allow element to dry before reinstalling.

WARNING
Do not oil this element. Do not wash in other cleaning fluids. Never operate unit without element. Never use elements that are damaged or ruptured. Never use elements that won't seal. Keep spare elements on hand to reduce down time. Store elements in a protected area free from damage, dirt and moisture. Handle filter parts with care.

Filter Element Life — The element should be replaced after eight cleanings or if visual inspection indicates a rupture, crack or pin hole in the pleated media. Inspection should be done by placing a bright light inside the element.

Notes

SECTION 5

DRIVE

⚠ WARNING

DO NOT OVERTENSION DRIVE BELTS AS PERMANENT DAMAGE TO COMPRESSOR AND MOTOR BEARING AND SHAFT CAN RESULT.

Proper drive belt tension and alignment are provided at the factory, however, good practice dictates checking the drive after shipment and before initial start-up. Sheaves should align straight across the front with a straight edge. Proper tension will allow belts to deflect approximately 1/2 inch at center of span when depressed with moderate pressure with the thumb. Best tension is just enough tension to keep belts from "squealing" on start-up.

Belts can be changed when necessary by removing fan shroud and belt guard, loosening motor to motor base mounting nuts and moving motor in, using two adjusting screws in motor base. To tighten new belts, reverse this procedure. DO NOT OVERTIGHTEN. New belts will sometimes stretch after several hours operation and should be checked.

Notes

SECTION 6

INSTALLATION

GENERAL — On receipt of the unit, check for any damage that may have been incurred during transit. Report any damage or missing parts as soon as possible.

WARNING

DO NOT electric weld on the compressor or base; bearings can be damaged by passage of current through compressor.

DANGER

The eyebolts or lugs provided on the motor are for lifting the motor only and should not be used to lift any additional weight. All eyebolts must be securely tightened. When lifting the motor the lifting angle must not exceed 15 degrees. Failure to observe this warning may result in damage or personal injury.

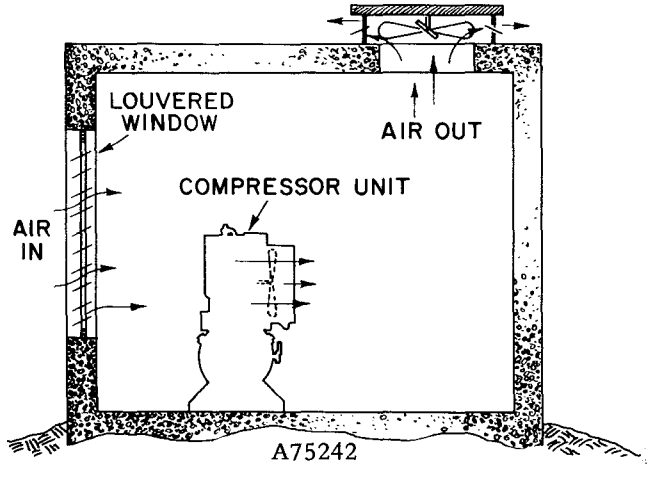


FIGURE 1-6. — COMPRESSOR ENCLOSURE

LOCATION — The compressor should be installed in a clean, well-lighted, well-ventilated area with ample space all around for maintenance. Select a location that provides a cool, clean, dry source of air. If the unit is to be operated in an enclosed space, provide an adequate inlet and outlet for cooling air. Proper ventilation MUST be provided for adequate cooling; hot air must be exhausted from the enclosure. Do not block air flow through the cooler. Allow two (2) feet from the cooler face to nearest obstruction. Figure 1-6 is a typical inlet-outlet air flow arrangement.

FOUNDATION — The ELECTRA-SCREW® compressor requires no special foundation, but should be mounted on a smooth, solid surface. Whenever possible, install unit near level.

Mounting bolts are not normally required, but are suggested where convenient. Installation conditions such as piping rigidity, angle of tilt, or danger of shifting from outside vibration or moving vehicles may require the use of mounting bolts to the floor.

CONDENSATE EJECTOR DRAIN — As an optional feature, the unit can be equipped with a condensate ejector piped to the bottom of the air receiver. The ejector operates each time the compressor unloads. The condensate should be piped away from the unit to a suitable drain.

AFTERCOOLER — An aftercooler will provide control of moisture entering the shop air lines. It will also reduce the normal low discharge temperature of about 170° F. at 100 PSIG discharge to near compressor inlet temperature.

When an aftercooler is used, a moisture separator should be mounted between the aftercooler and the auxiliary air receiver or shop system with a condensate drain provided at the bottom.

For complete installation and maintenance instructions on any accessory equipment, refer to the manufacturer's bulletin included in the unit data package.

INLET LINE — Where an inlet line is used between the air filter and the compressor, it must be thoroughly cleaned on the inside to prevent dirt or scale from entering the compressor. If welded construction is used, the line must be shot blasted and cleaned to remove welding scale. In either case, the inlet line must be coated internally by galvanizing or painting with a moisture- and oil-proof sealing lacquer. The inlet line should be at least the full size of the inlet opening on the compressor.

Accessibility for inlet air filter servicing must be considered when relocating the filter from the unit to a remote location.

Notes

SECTION 7

STARTING AND OPERATING PROCEDURES

A new unit as received from the factory has been prepared for shipping only. Do not attempt to operate the unit until it is checked and serviced as follows:

1. **Compressor Oil** — Fill the oil reservoir with the proper amount and grade of oil recommended in "Lubrication" Section 3, if necessary. Check oil level gauge. Do not mix different types of oils.

   Initial fill, or filling after a complete draining of the system, may show the oil level over the "FULL" mark. After start-up, the level will fall to between the "FULL" and "ADD" marks as system components are filled. If necessary, add oil to maintain the level between "FULL" and "ADD" when the unit is operating on load.

DANGER

ALWAYS STOP THE UNIT AND RELEASE ALL PRESSURE IN THE SYSTEM BEFORE ADDING OIL.

   During unloaded operation and after shutdown, the oil may partially drain back into the compressor and the oil level may read over "FULL" DO NOT DRAIN OIL TO CORRECT; on the next loaded cycle or start, oil will again fill the system and the gauge will indicate operating level.

2. **Air Filter** — Inspect the air filter to be sure it is clean and tightly assembled. Refer to Section 4 "Air Filter" for complete servicing instructions. Be sure the inlet line, if used, is tight and clean.

3. **Alignment** — Check all bolts and cap screws for tightness. Check drive alignment and tension; refer to Section 5 "Drive" for procedure.

4. **Piping** — Refer to Section 6 "Installation" and make sure the piping meets all recommendations.

5. **Electrical** — Check the wiring diagrams furnished with the unit to be sure it is properly wired. See Section 2 "Controls and Instrumentation" for general wiring diagrams.

6. **Rotation** — Check the motor rotation by "jogging" the motor. Compressor drive shaft rotation is counterclockwise standing facing the compressor sheave.

7. **System Pressure** — Set the subtractive pilot and/or operating air pressure switch to the desired unload pressure and differential if other than factory setting is required.

CAUTION

DO NOT EXCEED MAXIMUM OPERATING PRESSURE ON COMPRESSOR NAMEPLATE.

   See Section 2 "Controls and Instrumentation" for procedure.

8. **Operating Mode** — Refer to Section 2 for detailed information on the control system with which your unit is equipped (Constant Speed, Automatic Start-Stop, or Dual Control).

STARTING UNIT

Unit Cold — If discharging into a pressurized air system, close the air service valve between the main air system and the unit. Start the unit and run for one minute. Open the air service valve. If receiver pressure drops below 40 PSI, partially close valve to maintain at least 40 PSI until system is pumped up to that point.

Unit Hot — No warm-up period is required. Close the air service valve. Start unit. Open the air service valve, observe minimum pressure precautions above. Never run unit with less than 40 PSI in receiver.

DAILY CHECK — Refer to Section 8 "Maintenance Schedule".

STOPPING UNIT

Unit Operating On Constant Speed — Close the air service line valve, allow the unit to build up to full unloaded pressure and turn switch off. Stopping the unit at a pressure below full receiver may cause oil blowback. The oil reservoir will automatically blow down as the motor stops. Open air service valve to remove pressure from air receiver section.

Unit Operating On Automatic Start-Stop — If the unit is operating, close the air service line valve, allow the unit to build up to full receiver pressure and stop automatically, then turn switch off. Stopping the unit at a pressure below full receiver may cause blowback. If the unit is stopped because of full receiver pressure, turn switch off. Open air service valve to remove pressure from air receiver section.

Notes

SECTION 8

MAINTENANCE SCHEDULE

AIR FILTER — Because operating conditions determine frequency of service, refer to Section 4 "Air Filter" and plan maintenance accordingly.

SERVICE CHECK LIST

Every 8 Hours Operation

1. Check the compressor oil level — add oil if required. If oil consumption is high, refer to "Compressor Oil Separator" in Section 3.
2. Observe if the unit loads and unloads properly.
3. Drain the moisture from air receiver and moisture separator (if used).

Every 125 Hours Operation

1. Check for dirt accummulation on oil cooler and after-cooler core faces and the fan and fan motor. If cleaning is required clean the exterior fin surfaces of the cores by blowing compressed air carrying a nonflammable safety solvent in a direction opposite that of the cooling fan air flow. This cleaning operation will keep the exterior cooling surfaces clean and ensure effective heat dissipation.

Every 1000 Hours Operation

1. Change the oil filter.

Every 2000 Hours Operation

1. Change compressor oil. UNDER ADVERSE CONDITIONS, CHANGE MORE FREQUENTLY (refer to "Oil Change Interval" in Section 3). Flush system if required.
2. Change oil filter.

Notes

SECTION 9

TROUBLE SHOOTING

IF THE UNIT FAILS TO START, check:

1. Wiring system for wrong lead connections.
2. Temperature shutdown switch.
3. Fuse in the control enclosure, 115 V control.
4. Motor starter overload heaters.

UNIT STARTS BUT STOPS AFTER A SHORT RUN, check:

1. High oil temperature switch.
2. High oil temperature caused by:
   (a) Low compressor oil level.
   (b) Clogged oil cooler or oil filter.
   (c) Thermostatic mixing valve (if used) stuck.
   (d) Accummulation of grease, oil or dirt on exterior fin surfaces of oil cooler (refer to maintenance schedule for cleaning procedure).
   (e) Unit operating in an area with poor ventilation.
3. Temperature shutdown switch.
4. Motor starter overload heaters.

COMPRESSOR DOES NOT UNLOAD, check:

1. Solenoid valve and pressure switch for malfunction, control lines for restriction or leaks.
2. Pressure switch for dirt or leaking diaphragm.
3. Wiring and tubing to pressure switch.

SOLENOID BLOWDOWN VALVE CONTINUES TO PASS AIR, check for:

1. Loose wiring to the blowdown valve.
2. Coil failure.

EXCESSIVE OIL CONSUMPTION, check for:

1. Oil carry-over through the discharge line caused by overfilling the reservoir.
2. Clogged, broken or loose oil return line.
3. Ruptured oil separator element, defective separator flange gaskets.
4. Oil foaming.
5. Oil leaks at all fittings and gaskets.
6. Operation at low pressure (below 40 PSIG) for extended periods of time.

COMPRESSOR LOW ON DELIVERY AND PRESSURE, check for:

1. Clogged air filter.
2. Restricted inlet valve.
3. Broken inlet valve spring.
4. Binding inlet valve piston.
5. Incorrect motor speed.
6. Pilot adjustment and/or malfunction (modulating control).
7. Belts slipping.

GOOD OPERATING PRACTICE:

Carelessness in operation and maintenance can be hazardous to personnel. In addition to good equipment operating and safety practice, Gardner-Denver suggests the following:

1. Always open main disconnect switch and make certain all power is removed from unit before performing maintenance or making adjustments to the machine.
2. Always relieve system pressure before removing any parts from unit or breaking any lines.
3. Do not attempt to service any part while machine is operating or operate machine without any of its safety guards.
4. Periodically check all safety and protective devices for proper operation.
5. Make certain there is always a safety relief valve between the compressor discharge and any shutoff valve which is installed in the line.
6. Do not operate the compressor in areas where there is the possibility of flammable fumes entering compressor inlet.
7. Do not operate compressor at speeds or pressures in excess of name plate values.
8. Compressed air is not a toy; do not play with compressed air.
9. Do not use compressed air for breathing unless it has been properly purified.

Notes

SECTION 10

COMPRESSOR OVERHAUL

COMPRESSOR DISASSEMBLY AND ASSEMBLY INSTRUCTIONS — General disassembly and assembly instructions are explained in the text.

DISASSEMBLY INSTRUCTIONS

Removal of Compressor From Base — Pull main breaker switch and tag "DO NOT START". Drain compressor oil system. Remove oil lines, tubing and piping as required to clear compressor for removal from base. Remove air filter and oil filter . Cover openings in oil lines, tubing, oil filter and air filter to keep out dirt. Disconnect electrical line from high air temperature shutdown switch and unloader control. Remove switch and control. Remove belt guard from compressor. Loosen belts and remove from sheave. Remove four (4) screws holding compressor to base. Lift compressor from base using suitable and safe lifting device. **Compressor weight is approximately 315 pounds.** Remove sheave from compressor shaft.

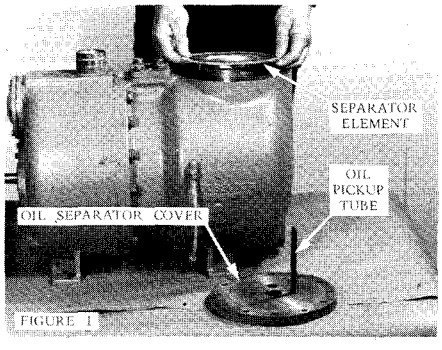


FIGURE 1

Disassembly of Compressor

1. Remove cap screws on oil separator cover. Lift separator cover straight up to avoid damage to separator element by the oil pickup tube. Lift separator element from oil reservoir section of unit.

2. Place blocks under compressor and oil reservoir to support. Remove fifteen (15) cap screws holding oil reservoir to compressor. Carefully separate compressor from reservoir, being careful not to bind on dowel pins.

3. Remove six (6) discharge end plate cap screws and remove plate and gasket.

4. Fabricate special wrench shown in Sketch "A". This tool is used both during disassembly and assembly to hold drive shaft to keep it from turning. DO NOT USE PIPE WRENCH OR PLIERS as damage to shaft and keyway will result.

   Using special wrench, hold main drive shaft from turning and remove both discharge bearing retainer plates and shims.

5. Remove discharge bearing housing to cylinder cap screws. Make plate per Sketch "B"; this plate will serve both at the discharge and inlet ends. Mount plate as shown and using spacers between the plate and ends of rotors, progressively tighten nuts to pull bearing housing and bearings from ends of rotors. When well started, block underneath to keep discharge bearing plate from falling.

   Remove bearings from bores. If bearings are to be reused, wrap and tag for reassembly.

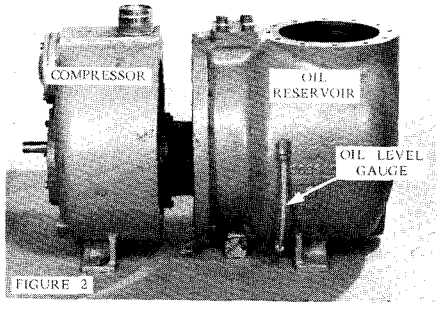


FIGURE 2

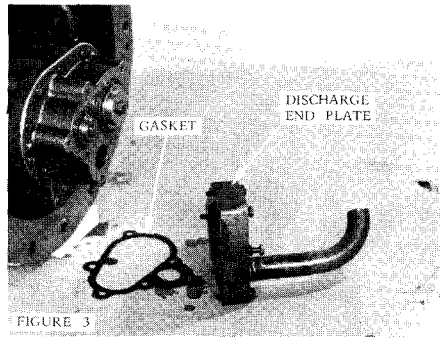
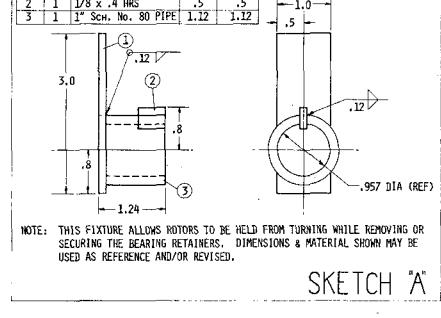


FIGURE 3

DET.	QTY.	DESCRIPTION	LENGTH	TOT. LG.
1	1	1/8 x 1" HRS	3.0	3.0
2	1	1/8 x .4 HRS	.5	.5
3	1	1" SCH. NO. 80 PIPE	1.12	1.12



NOTE: THIS FIXTURE ALLOWS ROTORS TO BE HELD FROM TURNING WHILE REMOVING OR SECURING THE BEARING RETAINERS. DIMENSIONS & MATERIAL SHOWN MAY BE USED AS REFERENCE AND/OR REVISED.

SKETCH "A"

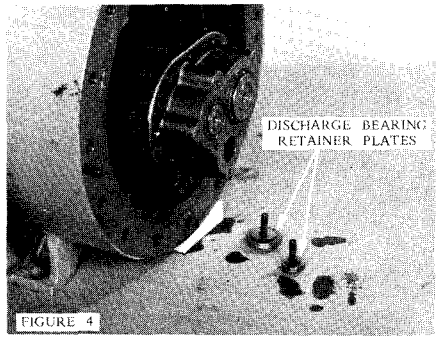
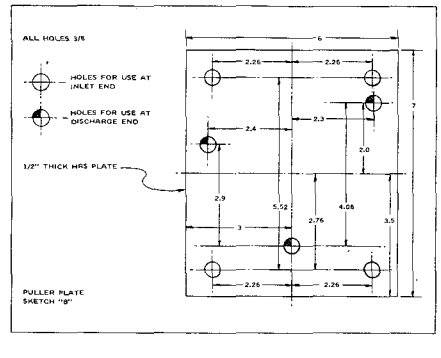


FIGURE 4



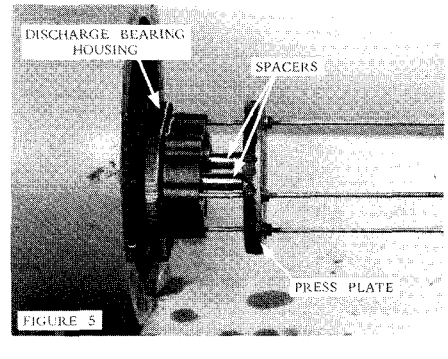


FIGURE 5

NOTE
Never reuse worn bearings.

6. On units with early seal, ONLY, using small snap-ring pliers remove oil seal retainer from drive shaft.

NOTE
It is well to have a new snap-ring on hand in case ring is damaged or broken during assembly.

7. ALL UNITS: Remove cap screws. Using two (2) jack bolts, pull inlet cover plate from cylinder. Jack bolts should have rounded or flat ends and be well lubricated. Tighten jack bolts evenly to prevent binding on dowel pins. Take care not to strike carbon ring of seal on shaft.

8. On early units, if oil seal is to be replaced, press down on spring-loaded carbon ring and turn approximately 1/8 turn to align slots and release. Lift carbon ring from bore. It is not recommended that the metal back-up plate (shell assembly) be removed unless it has been damaged. The spring-loaded carbon ring is the part that more frequently needs replacement.

Current Construction ONLY: Push oil seal seat (mating ring) from inlet bearing cover plate taking care not to damage "O" ring on O.D. of seat. Protect polished face of seat.

9. On early units, remove oil seal spacer and mating ring from shaft. Remove the mating ring with care to prevent damage to the "O" ring in the groove in the I.D. of the mating ring.

Current Construction ONLY: Slip seal assembly from end of shaft. If seal is to be reused, be sure to protect carbon face of seal to prevent damage.

10. Loosen Allen head screws in inlet bearing retainer nuts. Hold shaft from turning and remove retainers.

11. Use press plate (Sketch "B"). Mount plate as shown — spacer must be used on the secondary rotor. USE SHAFT PROTECTORS TO PREVENT DAMAGE TO ENDS OF ROTOR SHAFTS. Progressively tighten nuts to press rotors through inlet end bearings. Take care as rotors are pressed through to avoid dropping bearings. Care must be used in removing the rotors

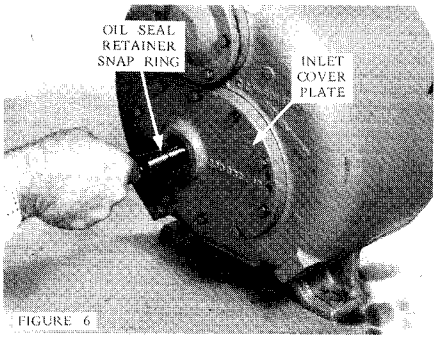


FIGURE 6

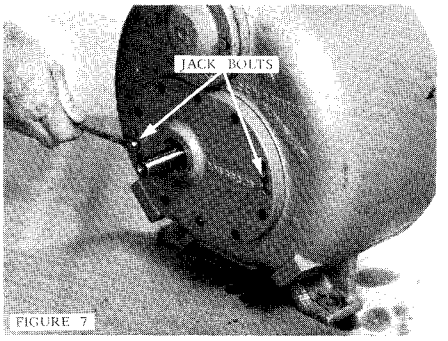


FIGURE 7

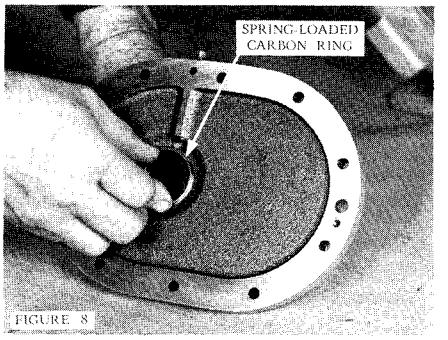


FIGURE 8

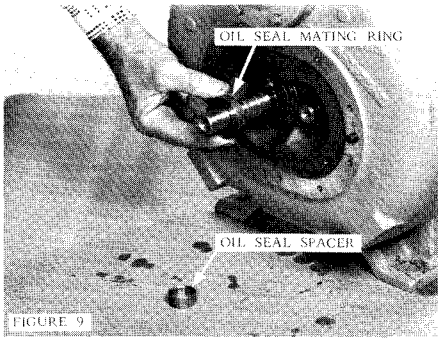


FIGURE 9

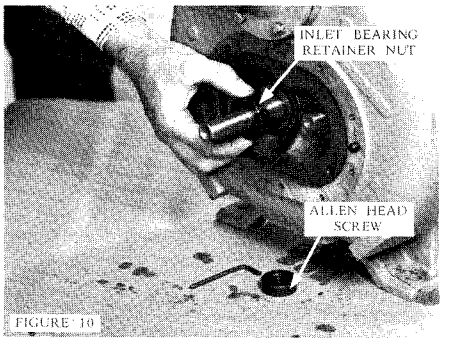


FIGURE 10

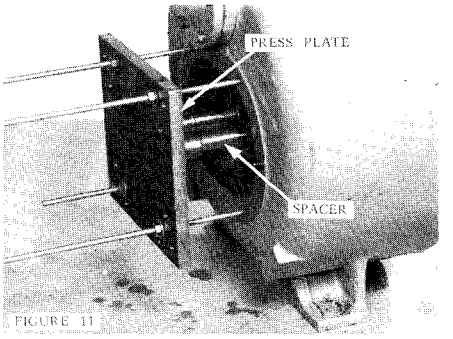


FIGURE 11

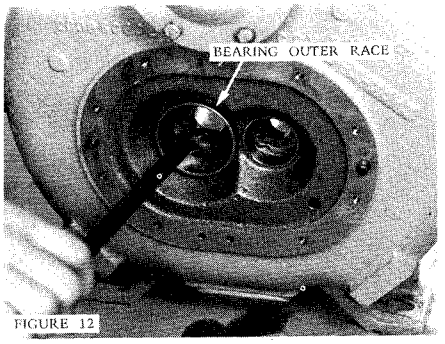


FIGURE 12

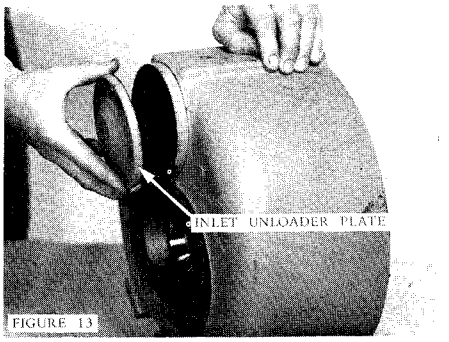


FIGURE 13

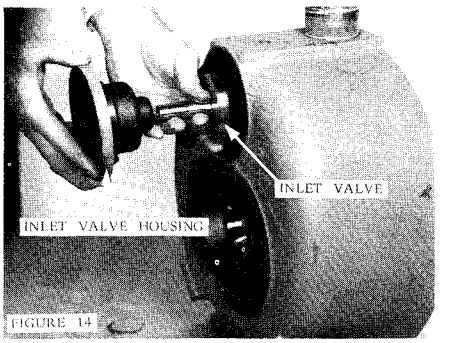
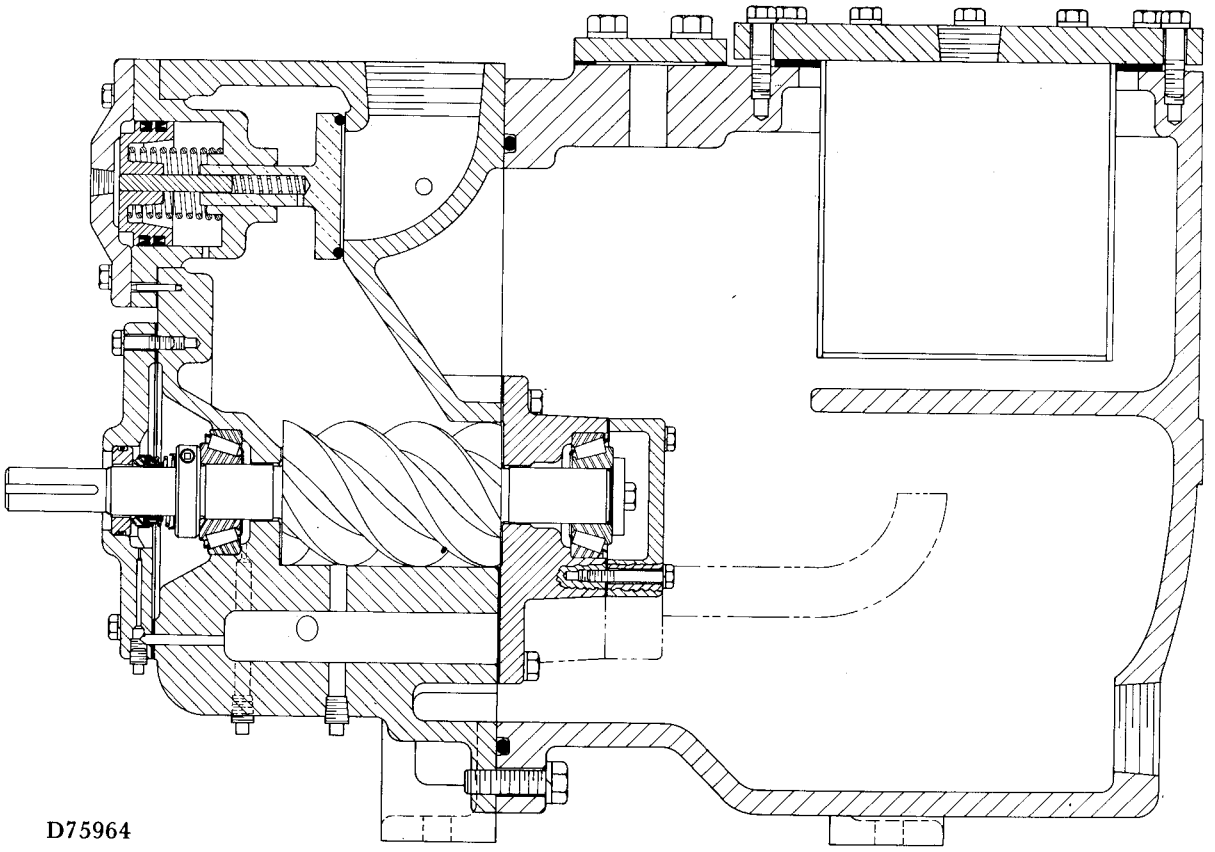


FIGURE 14



SECTIONAL VIEW OF COMPRESSOR

from the cylinder to prevent burrs on rotors or cylinders.

If bearings are to be reused, wrap and tag for re-assembly.

NOTE
Never reuse worn bearings.

12. If bearings are to be reused, the outer races may be left in place in the cylinder bores. If bearings are to be replaced, remove outer races as shown.

13. Remove cap screws from inlet unloader plate and remove plate.

14. Remove inlet valve cylinder with piston and spring and inlet valve from compressor cylinder, being careful not to bind on spring roll pin.

ASSEMBLY INSTRUCTIONS

The Electra-Screw® compressor is manufactured with close tolerances for efficient operation. All parts must be handled carefully to prevent burrs which will give false tolerance readings and/or cause rapid wear. All parts and oil passages must be thoroughly cleaned of dirt which will cause galling of close running parts. Clean work area, washing tank, tools and wiping rags must be provided.

The adjustments and procedures described in the following instructions must be done accurately for an efficient and quiet operating compressor. The procedures establish total rotor end clearance (inlet end plus discharge end) and fix the rotor in position to give correct discharge end clearance.

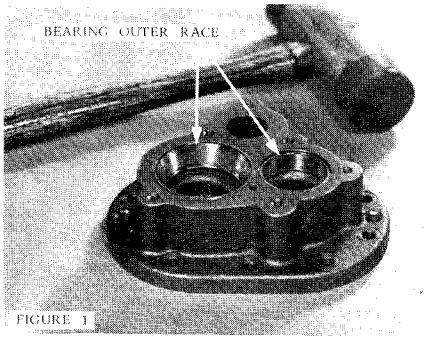


FIGURE 1

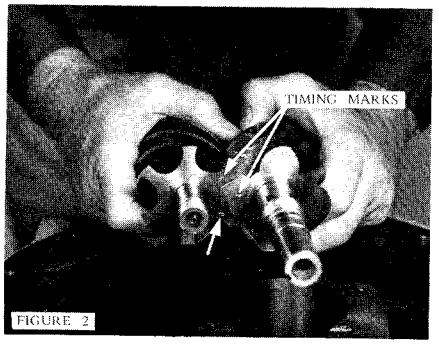


FIGURE 2

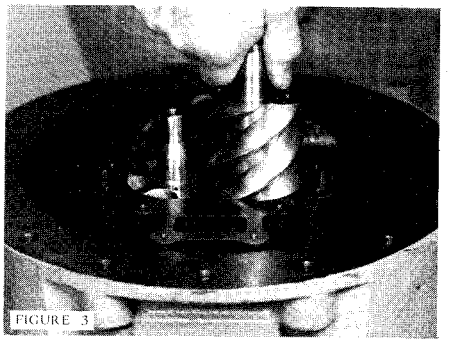


FIGURE 3

The bearings hold these close clearances when they are locked in position.

Other clearances, such as rotor O.D. to cylinder, do not require measurement or setting since they are controlled by close manufacturing tolerances. As a general rule, if the assembled compressor turns freely, without drag or tight spots, proper clearances have been established within the machine. Dimensions, running clearances and fits are tabulated at the back of this section.

1. Drive bearing outer race in both bearing bores of discharge bearing housing and in inlet end of cylinder. To prevent damage to race, use fiber or plastic hammer. Use brass or hardwood to drive race below flush and solidly against shoulder in bore.

2. Place cylinder on blocking (inlet side down) high enough to clear longest rotor shaft.

   Coat cylinder walls and rotors with oil to be used in unit.

   NOTE
   Each rotor carries identification marks which are also timing marks. Rotors which have been "worn in" should be returned to original relationship to assure smooth operation.

3. Install rotors in cylinder matching timing marks. Take care not to burr rotors or cylinder.

4. Coat both rotor shaft extensions liberally with "moly" type grease. This will aid installation of bearings as well as give initial lubrication to air seal area through housing. Place gasket on end of cylinder matching contours. Place discharge bearing housing over rotor extensions. Install cap screws and pull down evenly. Torque to 17 foot-pounds.

5. Drive bearing inner race and roller assemblies over rotor shaft extensions. Bearings are a light press fit on shaft. USE A FIBER HAMMER. Drive sleeves can be made using 1-1/4" and 1" pipe by 6" long; be sure ends are square. Sleeves must be clean to prevent dirt or scale from entering bearings.

   NOTE
   Do not use steel hammer and heavy blows, as damage to bearing rollers or race may result.

6. Install bearing retainer plates (less shims) and pull tight so that ends of rotors are pulled tight against inner (under) face of bearing housing, giving zero clearance. Rotors must be held from turning with special tool used in disassembly. When zero clearance has been obtained, remove retainer plates.

7. With a depth micrometer, measure the distance from end of rotor to face of bearing inner race. Make this measurement on both rotors and record each measurement under main rotor and secondary rotor.

8. To determine amount of shims needed to position each rotor to give correct discharge end clearance, use the measurements recorded in Step 7 plus .002" for clearance. Be sure to apply dimensions and shims for the main rotor to the main rotor shaft, and those for the secondary rotor to the secondary rotor shaft.

   DO NOT INTERCHANGE.

   Check shim set thickness with an outside micrometer.

   Install shims on ends of rotors.

9. Reinstall bearing retainer plates and pull down tight. Hit ends of rotors with plastic or fiber hammer to transfer discharge end clearance to between end of rotors and bearing end plate.

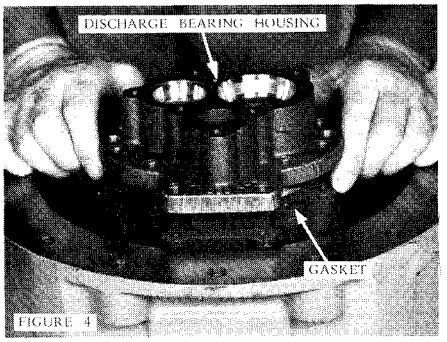


FIGURE 4

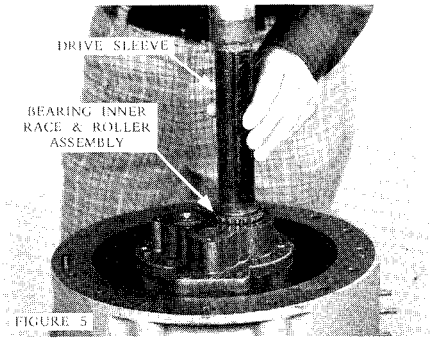


FIGURE 5

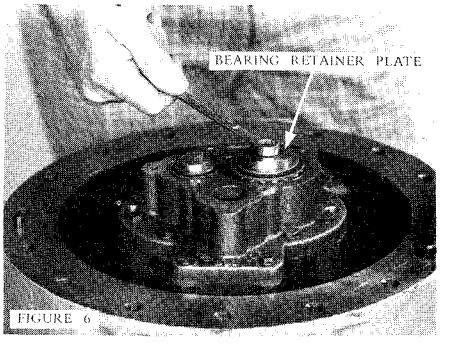


FIGURE 6

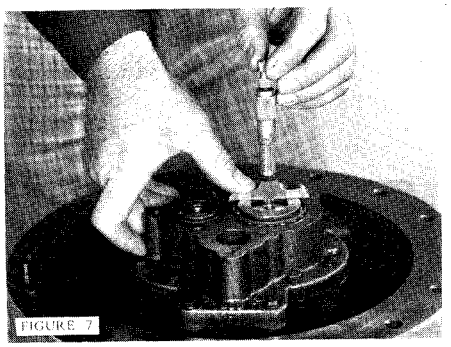


FIGURE 7

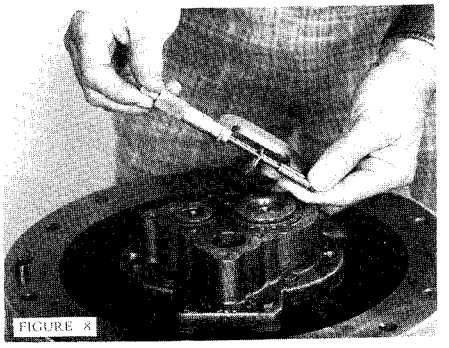


FIGURE 8

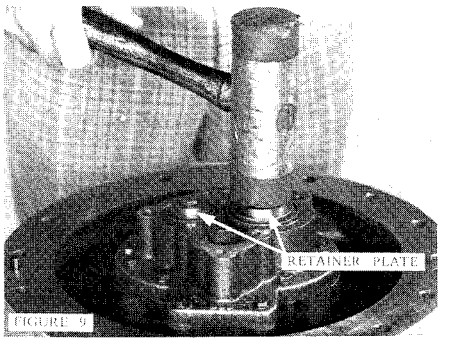


FIGURE 9

10. Remove bearing housing to cylinder cap screws and raise the housing and rotor assembly up and block to check the discharge end clearance with feeler gauge as shown. Check all around both rotors. Minimum clearance is .001". If less than this, repeat Steps 6, 7, 8 and 9 and then recheck.

    When correct clearance has been established and checked, lower the assembly back into cylinder. Reinstall cap screws and torque to 17 foot-pounds.

11. Set compressor cylinder on its feet and wedge to steady.

    Install inlet bearing inner race and roller assemblies in the same manner as described for discharge end bearings (Step 5).

12. Check bearing locknuts for burrs. Oil bearings and threads of shaft and locknuts. Install locknut on secondary rotor and pull up until a slight drag can be felt when rotating assembly. DO NOT TIGHTEN ENOUGH TO LOCK BEARINGS. With a fiber hammer tap each end of rotor while checking rotation to determine if there is any change in feel of rotation. Tighten locknut, if required, to maintain slight drag.

    Back bearing locknut up 1/8 turn and torque locknut clamp screw to 17 foot-pounds. This adjustment gives bearing running clearance and positions rotors proper distance from discharge end plate.

    Install and adjust bearing locknut on main rotor as described above. Check assembly for free rotation.

13. Install discharge bearing cover and gasket. Torque cap screws to 17 foot-pounds.

14. Check shaft for burrs.

    Early Units ONLY: Lubricate shaft and I.D. of oil seal mating ring and "O" ring with "moly" type grease. Install seal mating ring with polished face out toward carbon ring of seal. Install with care to avoid damaging "O" ring as it is forced up over chamfer on shaft. Mating ring must be pushed back until there is metal-to-metal contact between ring and shoulder on shaft.

    Install seal spacer over shaft, chamfered end towards mating ring.

    Current Construction ONLY: Lubricate shaft and I.D.

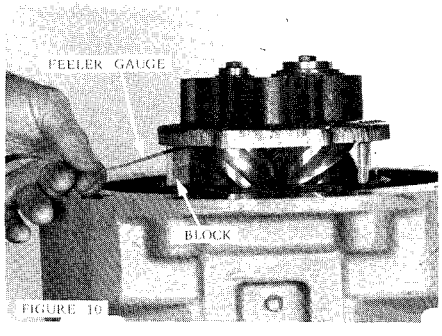


FIGURE 10

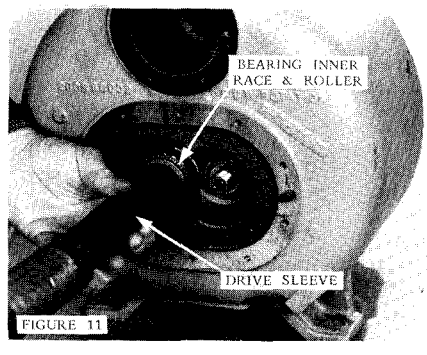


FIGURE 11

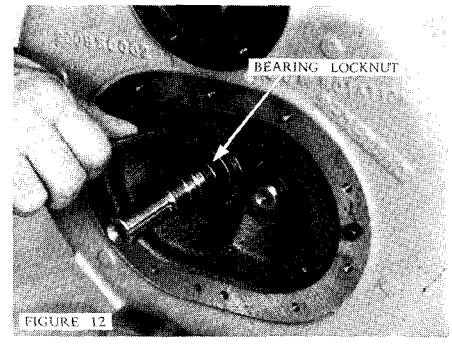


FIGURE 12

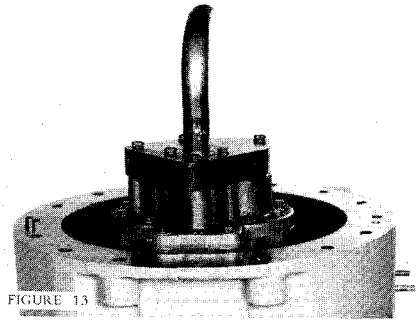


FIGURE 13

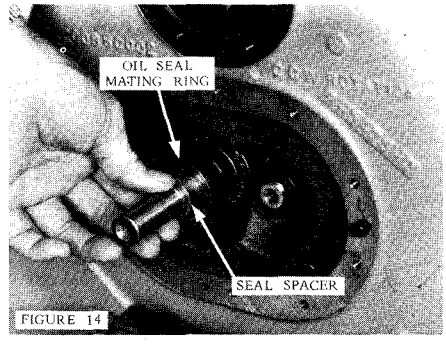
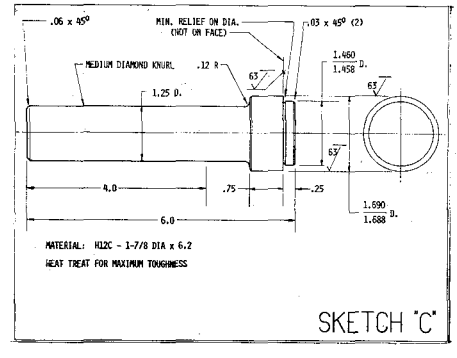


FIGURE 14



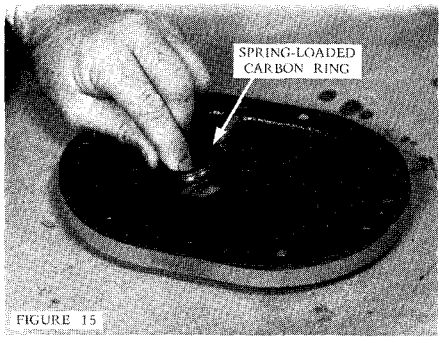


FIGURE 15

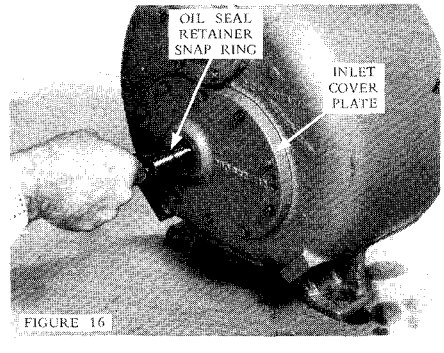


FIGURE 16

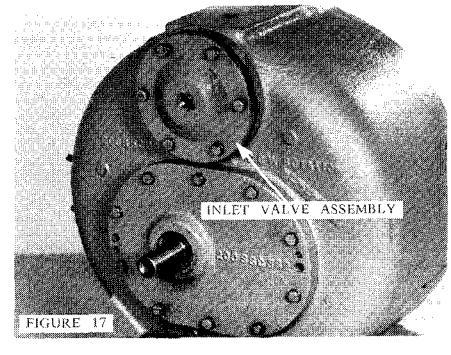


FIGURE 17

of oil seal. Slip seal over end of shaft taking care not to damage carbon face of seal. Spring end of seal goes against bearing lock nut. Wipe carbon face to remove any dust.

15. Early Units ONLY: If oil seal shell assembly was removed from inlet end cover, a special tool is required to drive it into bore of cover. This tool may be made per Sketch "C". This tool may also be borrowed, as available, from your nearest Sales and Service Office or Distributor.

    Use gasket sealer on O.D. of shell assembly and in housing bore. Start shell assembly squarely in bore. Using installation tool described above, drive shell assembly in bore and against shoulder in housing. Thoroughly clean excess gasket sealer from housing and shell assembly.

    To install spring-loaded carbon ring of seal, wipe carbon ring free of lint or dust. Lower ring into bore, carbon face up. Press down with fingers and turn clockwise until it locks. Release pressure.

    Current Construction ONLY: Check condition of "O" ring on seal mating ring (seat); replace as necessary. Remove any burrs from seal mating ring bore edge to avoid damage to "O" ring on installation. Lubricate "O" ring to facilitate installation in cover. Install mating ring in bearing cover bore with polished face to the INSIDE. Take care not to damage polished face of seat or the "O" ring as it is installed.

    All Units: Lubricate oil seal mating ring and carbon face of seal. Install inlet bearing cover and gasket. Torque screws to 17 foot-pounds.

16. Install seal retainer snap ring (Early construction only).

17. Inspect condition of "O" ring imbedded in face of inlet valve. This ring is not replaceable and if damaged, the inlet valve must be replaced. Check condition of piston packing rings and replace if

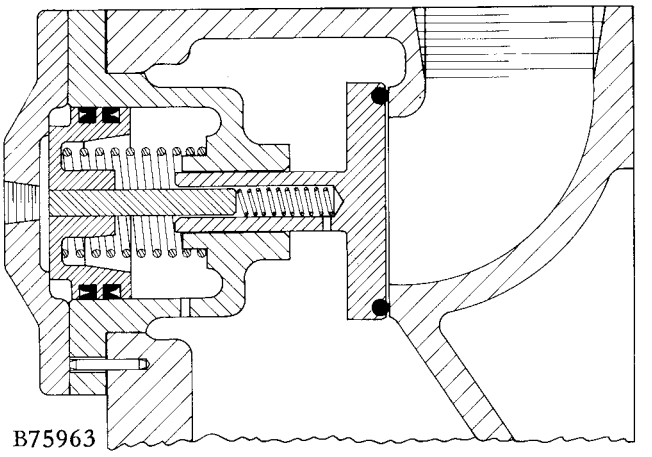


FIGURE 17A.

necessary. These rings must be mounted back to back as shown in Figure 17A. Check condition of springs and replace if necessary. Lubricate inlet valve cylinder bore and piston packing before installing piston in cylinder. Assemble all parts as shown in Figure 17A outside the compressor using new gaskets as required, then install as a unit, using the spring roll pin to properly align the assembly. Torque cap screws to 17 foot-pounds.

18. Check condition of cylinder to reservoir "O" ring gasket; replace if needed. Install reservoir section to cylinder. Torque cap screws to 75 foot-pounds.

19. Check condition of oil separator element and the gaskets bonded to both surfaces of the mounting flange. Use new element if required. Install element in top of reservoir.

    Install oil separator cover. Take care as cover is lowered into place that the element is not damaged by the oil pick-up tube.

    Install cap screws and torque to 31 foot-pounds.

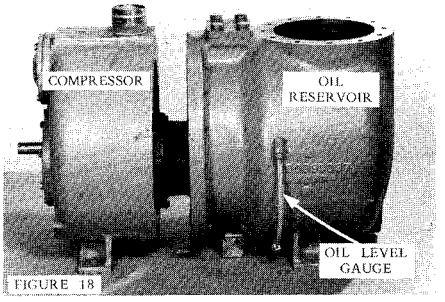


FIGURE 18

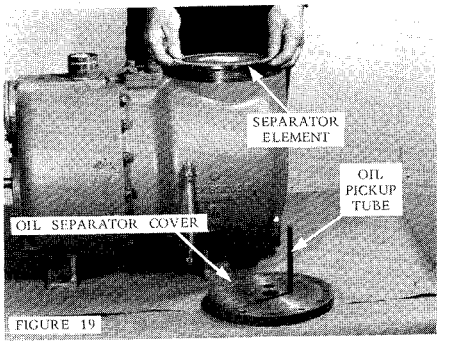


FIGURE 19

DIMENSIONS (Inches)

Center of Main Bore to Center of Secondary Bore	2.250/2.252
Cylinder Bore Diameter	
Main	2.933/2.936
Secondary	2.705/2.708
Rotor Body O.D.	
Main	2.927/2.926
Secondary	2.700/2.699
Rotor Body Length	4.393/4.391
Shaft Air Seal Diameter	
Main Rotor	
Suction	1.1265/1.1260
Discharge	1.1265/1.1260
Secondary Rotor	
Suction	.7510/.7505
Discharge	1.0010/1.0005
Shaft Bearing Diameter	
Main Rotor	1.1260/1.1255
Secondary Rotor	.7510/.7505
Shaft Oil Seal Diameter	1.001/0.999
Shaft Oil Seal Clamp Sleeve Diameter	.937/.936
Length, Main Rotor Suction Face to Oil Seal Rear Stop Shoulder	2.428/2.425
Length, Main Rotor Suction Face to Oil Seal Clamp Sleeve Snap Ring Groove, Far Side	3.382/3.384
Shaft Coupling Diameter	.8750/.8740
Shaft Coupling Length	2.04
Bearing Bore Diameter	
Main Rotor Side	2.5312/2.5322
Secondary Rotor Side	1.7810/1.7820

DIMENSIONS (Continued)

Bearing Bore Depth	
Main Rotor Side, Discharge End	0.70
Secondary Rotor Side, Discharge End	0.60
Both Sides, Suction End	0.60
Housing Air Seal Bore Diameter	
Main Rotor Side, Discharge End	1.130/1.131
Secondary Rotor Side, Discharge End	1.005/1.006
Main Rotor Side, Suction End	1.135/1.140
Secondary Rotor Side, Suction End	.760/.765
Air Seal Bore Length	0.60

RUNNING CLEARANCES (Inches)

Rotor to Cylinder — Diametral —	
Main	.006/.010
Secondary	.005/.009
End Face to Rotor — Axial —	
Suction	.029/.046
Discharge	.001/.002
Air Seal — Diametral —	
Main Rotor Side, Discharge End	.0035/.005
Secondary Rotor Side, Discharge End	.0040/.0055
Main Rotor Side, Suction End	.0085/.0140
Secondary Rotor Side, Suction End	.0082/.0137

FITS (Inches)

Bearing Inner Race to Shaft	.0000/.0010T
Bearing Outer Race to Bore	.0010L/.0010T