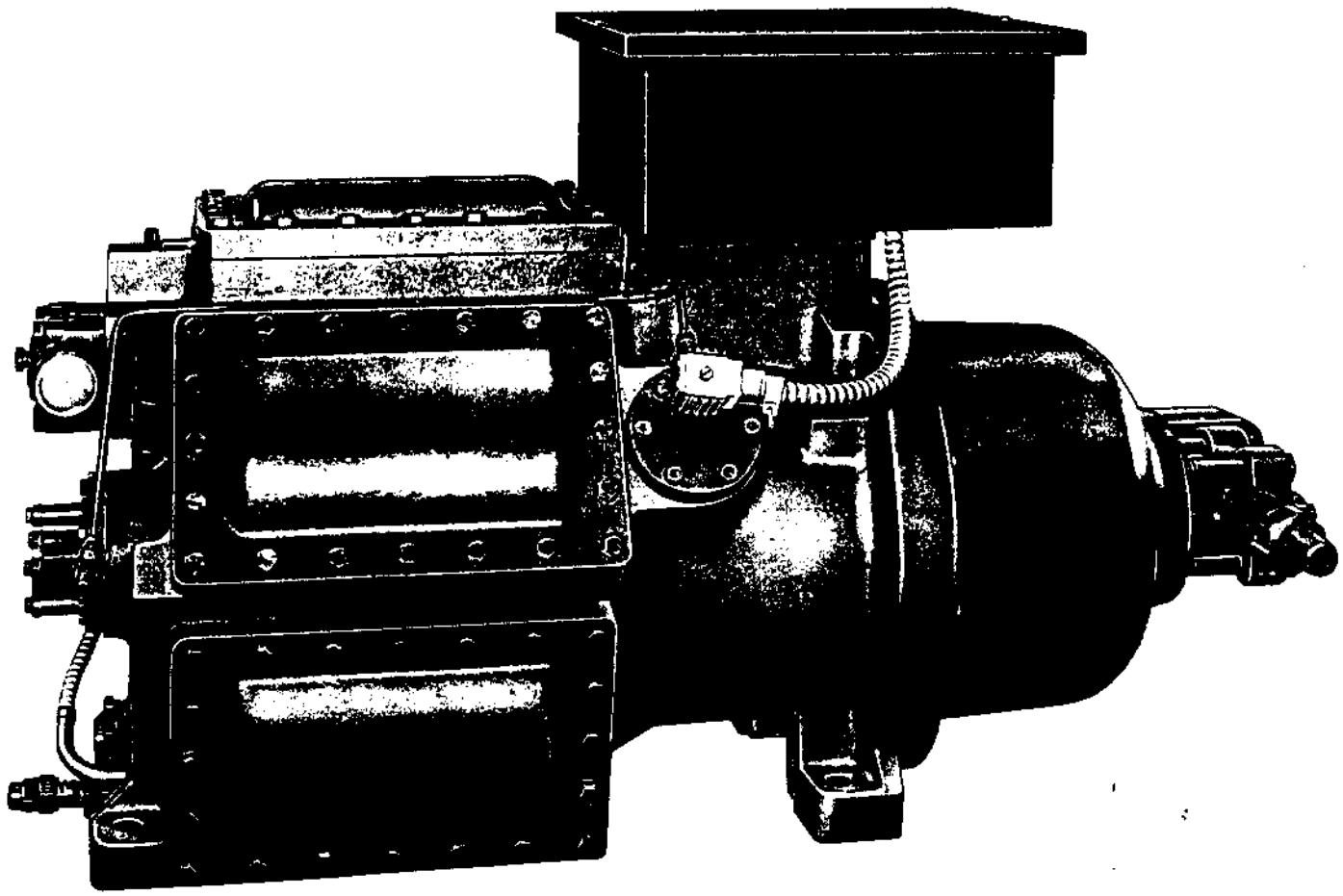
MODELS
Z4H, Z4J, Z4K, Z4M,
Z6N, Z6R, Z6S, Z6W

(See Page 3 for Complete Model Nomenclature)



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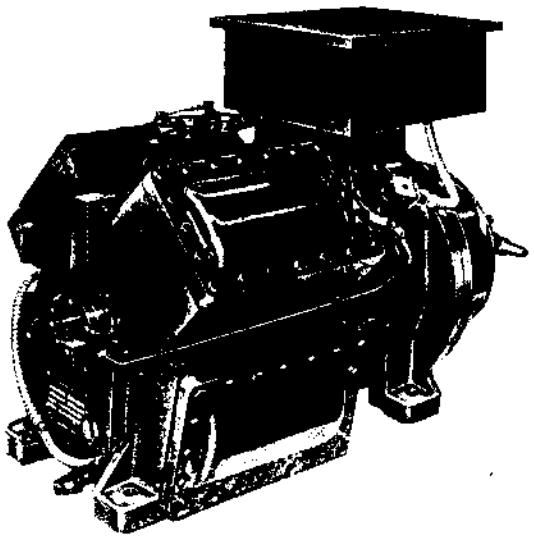
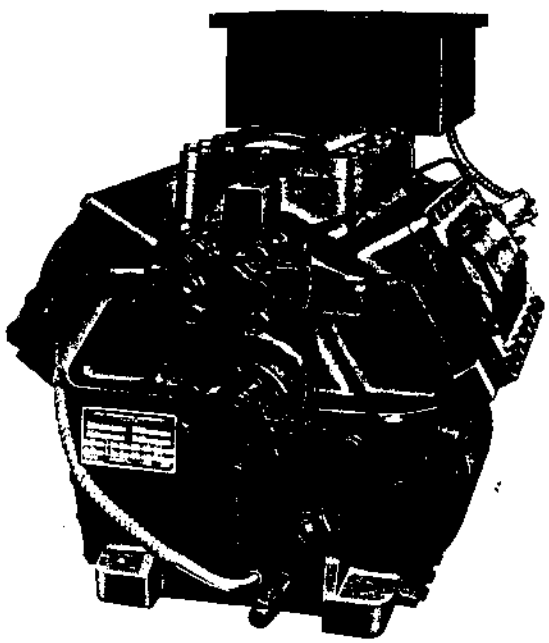


4 CYLINDER



6 CYLINDER

FIG. 1 – COMPRESSORS

SECTION I - GENERAL

GENERAL DESCRIPTION

YORK Model Z Hermetic Compressors are designed to meet air conditioning requirements using R12 or R22. They are available in 4 or 6 cylinder models in various displacements (See NOMENCLATURE). Varying steps of capacity are available utilizing solenoid valves. (Control of solenoid valves must be by external device.) Nominal compressor speeds are 1740 RPM (60 Hz) and 1460 RPM (50 Hz).

NOMENCLATURE

COMPRESSOR IDENTIFICATION

Each compressor is identified by nomenclature as shown below. The nomenclature is printed on a data plate which is located next to the oil pump as shown in Fig. 2. When contacting the factory or ordering renewal parts, include the complete Nomenclature, Serial Number, and Date Code. Be sure these numbers are copied accurately.

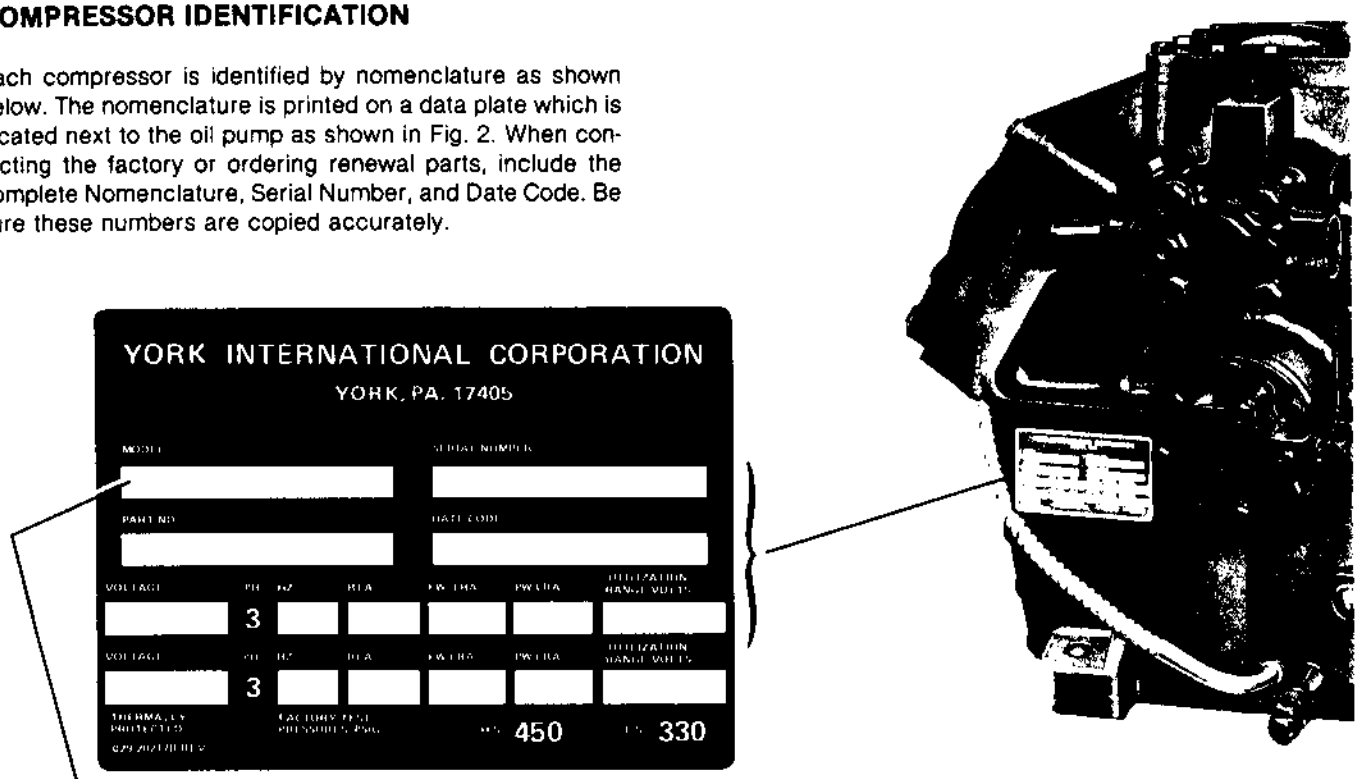
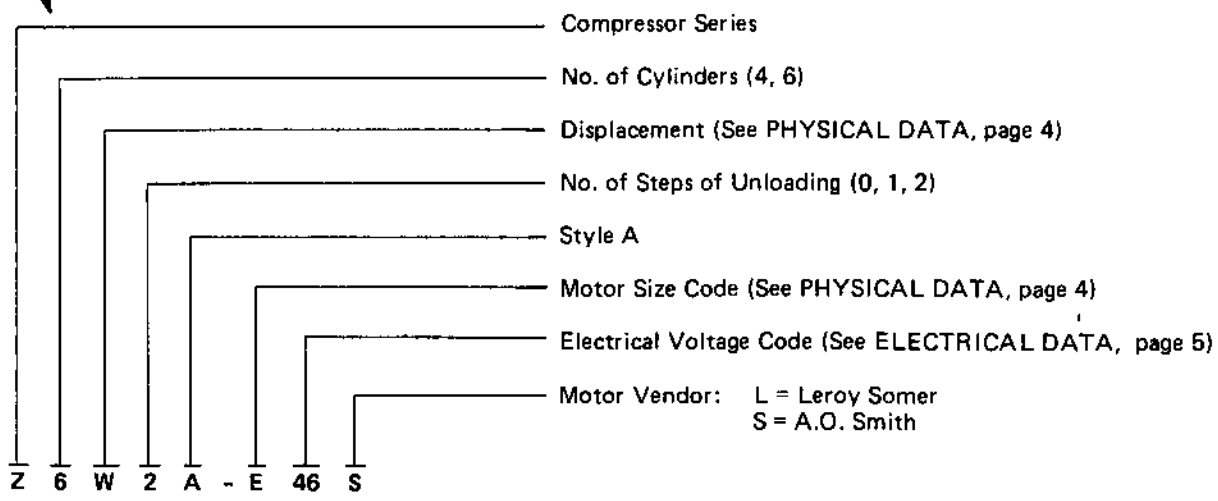


FIG. 2 — COMPRESSOR DATA PLATE



PHYSICAL DATA

COMPRESSOR MODEL →	Z4H	Z4J	Z4K	Z4M	Z6N	Z6R	Z6S	Z6W
No. of Cylinders	4	4	4	4	6	6	6	6
Bore (Inches)	2.7165	2.9135	2.7165	2.9135	2.7165	2.9135	2.7165	2.9135
Stroke (Inches)	2.4	2.4	3	3	2.4	2.4	3	3
Displacement (CFM) 60 Hz.	56.03	64.45	70.03	80.56	84.04	96.67	105.05	120.84
50 Hz.	46.69	53.71	58.36	67.13	70.03	80.56	87.54	100.70
Motor Code	A	B	B	C	C	D	D	E
Suction Conn. (ODF)	1-5/8	1-5/8	2-1/8	2-1/8	2-1/8	2-5/8	2-5/8	3-1/8
Discharge Conn. (ODF)	1-3/8	1-3/8	1-5/8	1-5/8	1-5/8	1-5/8	1-5/8	1-5/8
Oil Charge (Gals.)	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75
Weight (Lbs.)	720	740	780	800	860	920	940	960

LIMITATIONS

VOLTAGE LIMITATIONS

The following voltage limitations are absolute and operation beyond these limits may cause serious damage to the compressor or motor.

Voltage Code	Nameplate Voltage	Minimum Voltage	Maximum Voltage
-17	200-3-60	180	220
-28	230-3-60	207	253
-40	380-3-60	342	418
-43	440-3-50	396	484
-46	460-3-60	414	506
-50	380/415-3-50	342	457
-58	575-3-60	517	632
-59	190-3-50	171	209
-63	220-3-50	198	242
-64	346-3-50	311	381
-70	500-3-50	450	550

COMPRESSOR OPERATING LIMITATIONS

Maximum Compression Ratio	9.5:1
Maximum Operating Differential (PSI)	330
Maximum Suction Pressure (PSIG)	120
Maximum Discharge Temp. (°F)	275
Superheat (Nominal)(At Compressor)	20°F
Min. Oil Pressure (above suction pressure)	50 psi
Maximum Oil Temperature[1]	160°F
Maximum Sat. Discharge Temp.[2]	155°F
Maximum Ambient	130°F
Minimum Ambient	0°F

[1]Measured externally on pump shown in Fig. 3.

[2]Motor selection and operating conditions may limit maximum saturated discharge temperature to lower values.

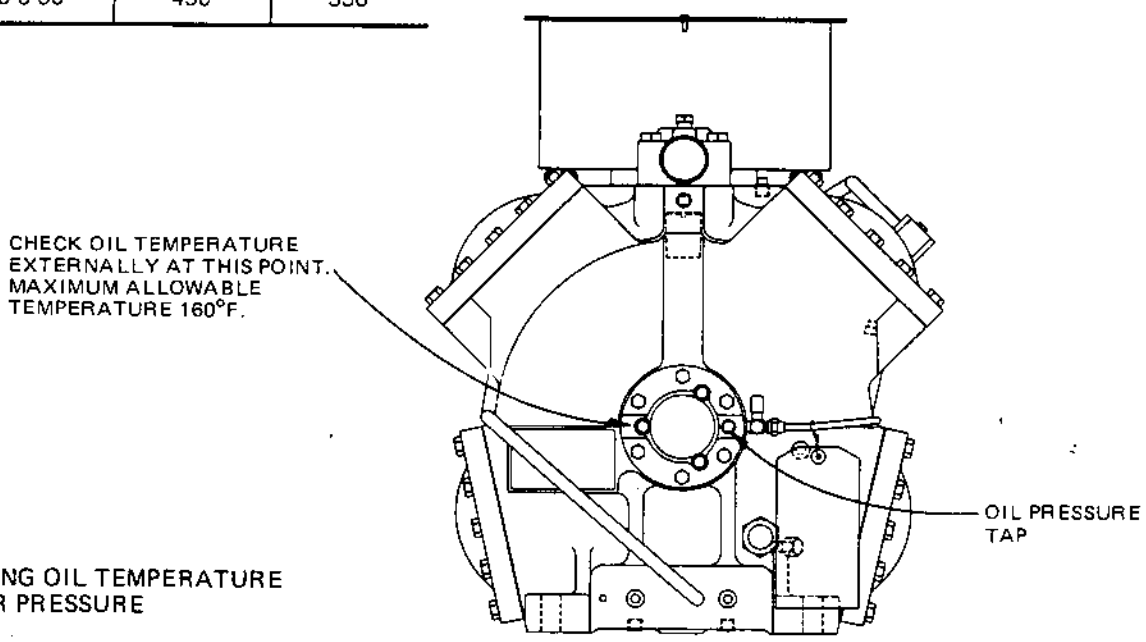


FIG. 3 – CHECKING OIL TEMPERATURE AND/OR PRESSURE

ELECTRICAL DATA

MOTOR SIZE CODE*	VOLTAGE CODE**	VOLTAGE	PHASE	HZ	LOCKED ROTOR AMPS	
					FW	PW
A	17	200	3	60	511	311
	28	230	3	60	444	270
	59	190	3	50	422	254
	40	380	3	60	269	163
	64	346	3	50	232	139
	46	460	3	60	222	135
	50	†380/415	3	50	211	127
	58	575	3	60	178	108
	70	500	3	50	160	96.5
	63	220	3	50	364	219
	43	440	3	50	182	110
B	17	200	3	60	582	368
	28	230	3	60	506	320
	59	190	3	50	486	296
	40	380	3	60	306	194
	64	346	3	50	267	163
	46	460	3	60	253	160
	50	†380/415	3	50	243	148
	58	575	3	60	202	128
	70	500	3	50	185	112
	63	220	3	50	420	256
	43	440	3	50	210	128
C	17	200	3	60	674	414
	28	230	3	60	586	360
	59	190	3	50	558	338
	40	380	3	60	355	218
	64	346	3	50	306	186
	46	460	3	60	293	180
	50	†380/415	3	50	279	169
	58	575	3	60	234	144
	70	500	3	50	212	128
	63	220	3	50	482	292
	43	440	3	50	241	146
D	17	200	3	60	741	582
	28	230	3	60	644	506
	59	190	3	50	612	480
	40	380	3	60	390	306
	64	346	3	50	337	264
	46	460	3	60	322	253
	50	†380/415	3	50	306	240
	58	575	3	60	258	202
	70	500	3	50	230	180
	63	220	3	50	529	415
	43	440	3	50	264	207
E	17	200	3	60	880	675
	28	230	3	60	765	587
	59	190	3	50	726	558
	40	380	3	60	463	355
	64	346	3	50	397	305
	46	460	3	60	383	294
	50	†380/415	3	50	363	279
	58	575	3	60	306	235
	70	500	3	50	272	209
	63	220	3	50	627	482
	43	440	3	50	314	241

*Sixth character in NOMENCLATURE (see page 3).

**Seventh and eighth characters in NOMENCLATURE (see page 3).

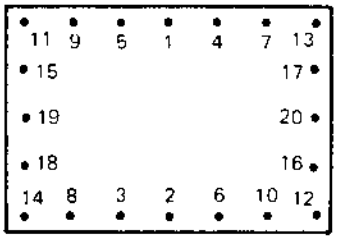
†380/415-3-50 Locked Rotor Amp Values are at 380 volts.

THREADED FASTENER TORQUES AND SEQUENCE

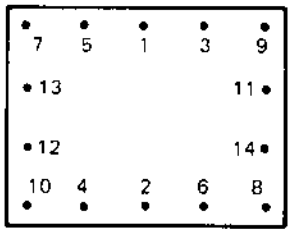
When assembling a compressor or compressor parts, it is essential to tighten all nuts and cap screws to their proper torque, using an accurate torque wrench. Table 1 shows the recommended torques for this compressor. All cap screws or bolts should be oiled lightly unless they are intended for use with a sealing compound. Insert all cap screws and tighten them lightly. Then, using the torque wrench, tighten each to its proper torque.

When tightening the screws on the top heads, crankcase covers, and terminal block, it is important that the screws be tightened in the proper sequence. This will help to eliminate leaks and/or damage to the parts or gaskets. Figure 4 shows the recommended tightening sequence.

It is advisable to "double-check" the torque on all screws before starting the compressor.



TOP HEAD AND CRANKCASE COVER

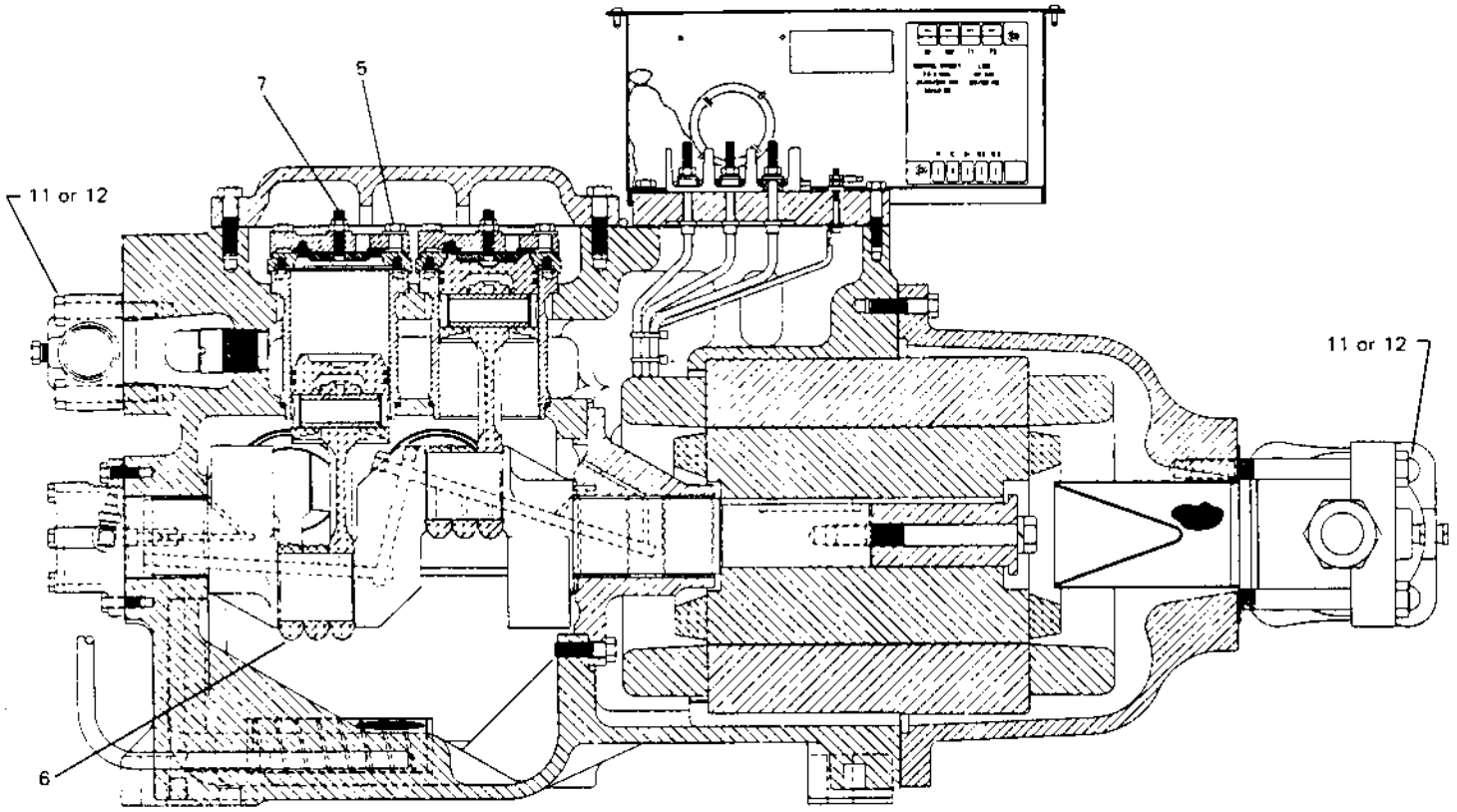


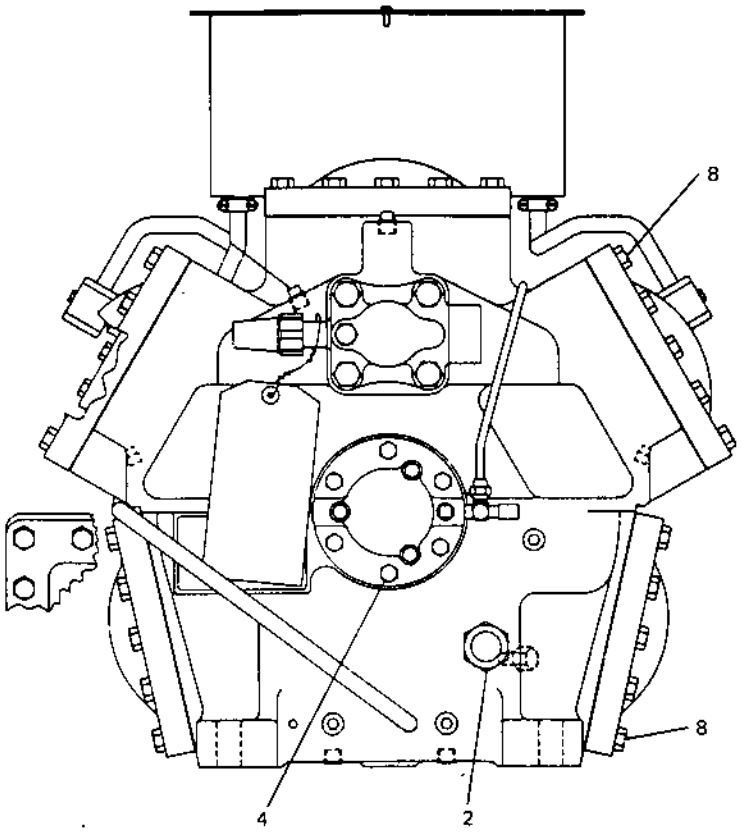
TERMINAL BLOCK

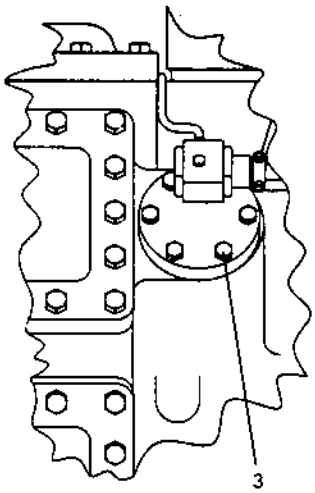
FIG. 4 – SCREW TIGHTENING SEQUENCE

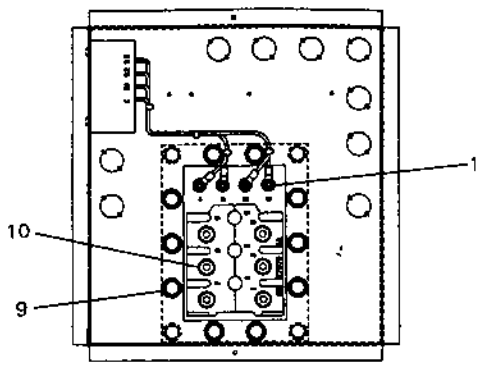
TABLE 1 – THREADED FASTENER TORQUE

LOCATION	THREAD	GRADE	TORQUE		REF. KEY (See page 7)
			LB.-IN.	LB.-FT.	
Protector Terminal Screw	No. 8-32 UNC.	—	30	—	1
Sight Glass	1-11-1/2 NPT	—	—	95-100	2
Unloader Cover Plate	5/16-18 UNC	2	—	13-15	3
Oil Pump	5/16-18 UNC	5	—	19-22	4
Valve Cage/Valve Plate	5/16-18 UNC	5	—	19-22	5
Connecting Rod	5/16-18 UNC	5	—	19-21	6
Discharge Valve Disk	5/16-24 UNF	8	—	25-30	7
Access Cover	7/16-14 UNC	5	—	55-64	8
Terminal Block	5/16-18 UNC	5	—	19-22	9
Power Terminal Stud (NUT)	1/4-28 UNF	—	90-110	—	10
Service Valve	5/8-11 UNC	2	—	107-123	11
Service Valve	1/2-13 UNC	2	—	54-62	12









THREADED FASTENER LOCATIONS (SEE TABLE 1)

GASKETS AND "O" RINGS

It is recommended that new gaskets and/or "O" rings be installed each time a compressor part is removed or the compressor is dis-assembled. This will assure that the compressor will function properly when returned to operation. Use care when installing gaskets so that they are installed properly. Be sure that any holes in the gasket for oil passage etc. are aligned with the matching hole in the related part or parts. Also, check that "O" rings are not cut or damaged in any way. Gaskets and "O" rings should be coated LIGHTLY with YORK "C" oil. *Do not soak gaskets or "O" rings in oil.* Also, do not apply oil to the mating surfaces. Grease must never be applied to gaskets or "O" rings.

HANDLING COMPRESSOR PARTS

Internal machined parts of the compressor such as valves, pistons, connecting rods, etc. must be protected from damage due to crushing or scratching. They should be coated with oil, wrapped in clean tough paper and stored in a safe place.

Before reassembling any compressor part, it should be thoroughly cleaned by immersing or flushing it with an approved safety solvent and allowing it to dry in air without touching any wearing or contact surfaces. After it is cleaned, each part should be carefully examined to be sure it is free from cracks, flaws, bump marks, burrs or distortion and the part oiled to prevent damage due to rusting or oxidation. New clean oil should be applied to the wearing surfaces of any part just before it is installed.

RIGGING THE COMPRESSOR

When it becomes necessary to remove a compressor 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. Do not attempt to lift a compressor with eye bolts threaded into tapped holes in the compressor casing. Instead, use approved and well maintained slings as illustrated in Fig. 5. Be sure slings are of adequate strength to safely lift the compressor. Compressor weights are shown in PHYSICAL DATA, page 4. The use of chains or cables is not recommended.

COMPRESSOR OIL SYSTEM

The compressor oil system has two functions as follows:

1. Lubrication of all moving parts.
2. Furnishing hydraulic pressure for operation of cylinder unloading system.

LUBRICATION SYSTEM — See Fig. 6 — The compressor oil supply is contained in the crankcase which is provided with

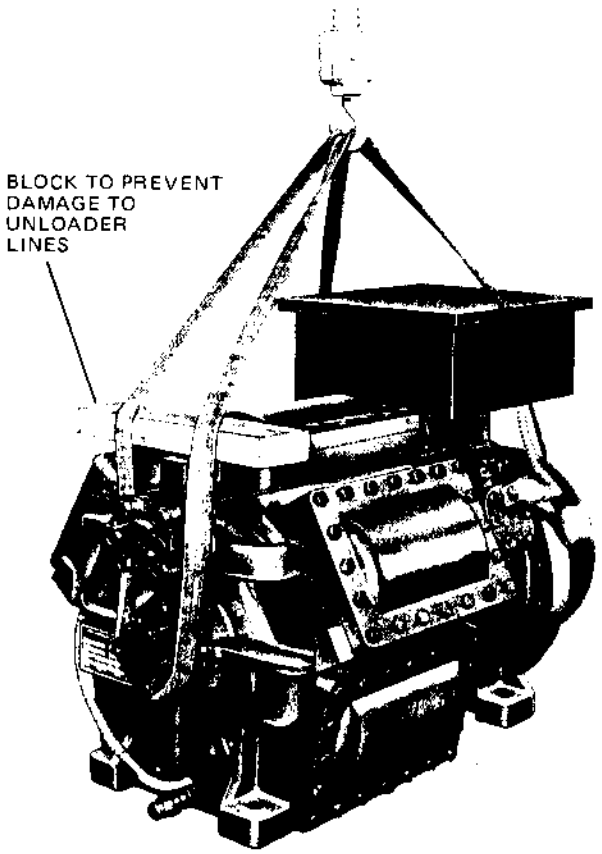


FIG. 5 — RIGGING THE COMPRESSOR

an oil sight glass (located in the pump end of the compressor) to permit a visual check of the oil level.

> THE OIL LEVEL IN THE COMPRESSOR IS CORRECT WHEN LIQUID OIL CAN BE SEEN IN THE SIGHT GLASS DURING ALL OPERATING CONDITIONS. YORK REFRIGERATION OIL "C" SHOULD ALWAYS BE USED IN THESE COMPRESSORS.

The Gerotor type oil pump, which is designed to operate with either clockwise or counter-clockwise compressor rotation, is directly connected to the crankshaft and is located externally on the compressor housing.

Internal passages in the compressor housing connect to an internal suction tube which in turn connects to the oil strainer. The oil strainer consists of a large area wire mesh cylinder with sheet metal ends and an internal spring to prevent collapse of the strainer screen if it should become coated with foreign material.

LUBRICATION, MAIN BEARINGS, OIL PUMP END & MOTOR END — Oil under pressure leaves the oil pump and flows internally through the pump housing to lubricate the pump end bearing.

Simultaneously, oil is fed through internal oilways in the crankshaft to supply oil to the thrust collar and motor end bearings.

The thrust collar positions the crankshaft longitudinally in the compressor housing and takes the thrust forces imposed upon the shaft. Radial grooves for oil are provided on the inner or thrust surface which is in contact with the crankshaft shoulder.

LUBRICATION, CYLINDER WALLS, CONNECTING ROD AND PISTON PIN BEARINGS — Oil under pressure is conducted through drilled oilways in the crankshaft to the crankpins. The crankpin is provided with one radially drilled hole (which connects with the drilled oilway in the crankshaft) for each connecting rod bearing.

Lubrication of the cylinder walls and piston pins is accomplished by the spray from the spaces between the connecting rod bearings and between these bearings and the cheeks of the crankpin as some of the pressurized oil leaves these bearings.

CAPACITY CONTROL OIL PRESSURE — In addition to supplying oil pressure to the compressor lubrication system as described above, the compressor oil pump also provides oil pressure to operate the compressor Capacity Control System (see next page).

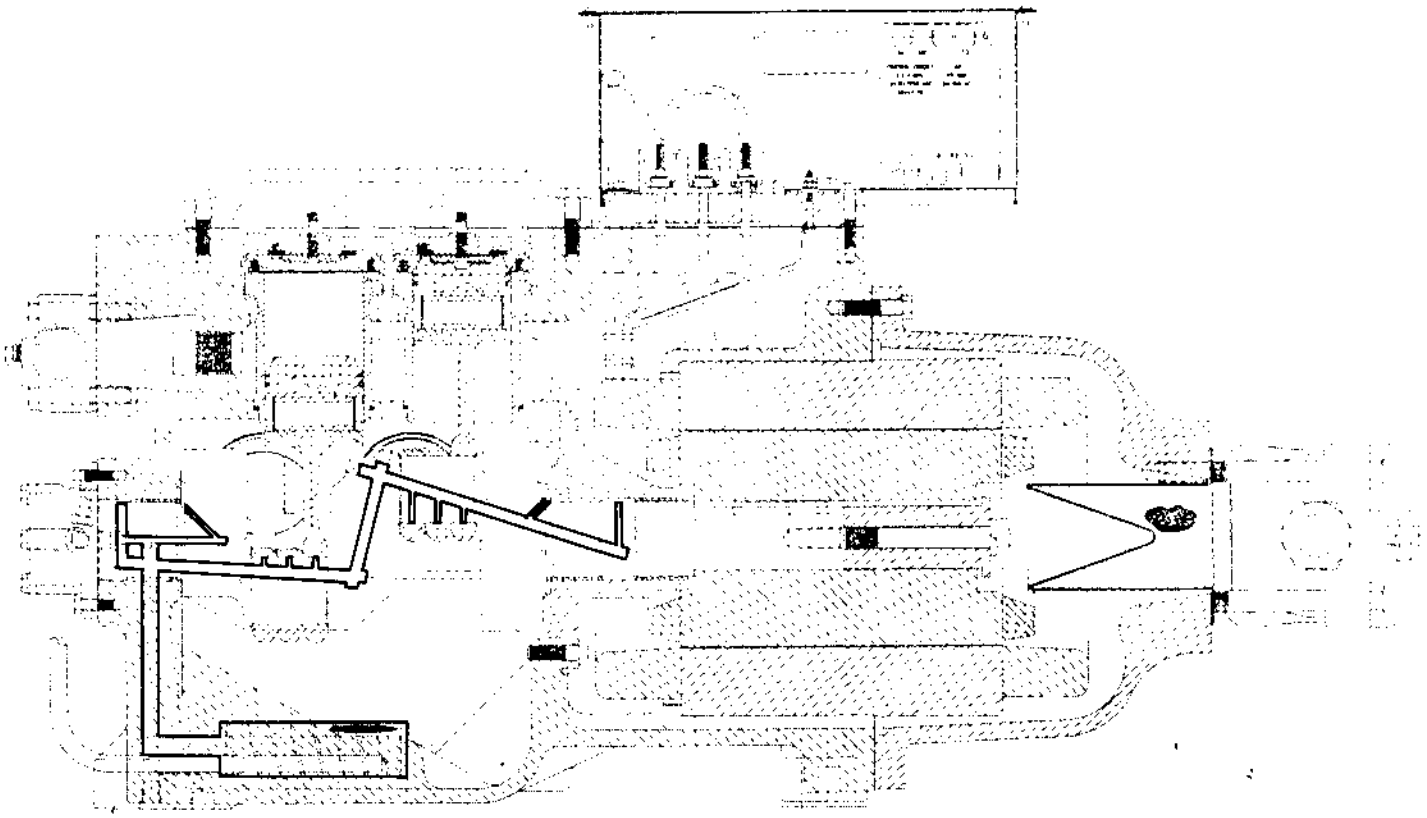


FIG. 6 — COMPRESSOR LUBRICATION SYSTEM

CAPACITY CONTROL SYSTEM

Capacity of the YORK Model Z Compressor is controlled automatically. Externally mounted solenoids, controlled by a signal from a remote device, provide reliable response to system load.

Capacity is reduced by unloading one or more banks of cylinders. Some cylinder banks are not equipped with unloaders. This prevents the possibility of overheating, since a definite minimum volume of cool refrigerant gas flows through the compressor at all times during operation regardless of load conditions.

Unloading is accomplished by preventing (blocking) the suction gas from entering one or more of the suction plenums of the compressor.

An external oil line, connected to the side of the oil pump, supplies high pressure oil to the unloader mechanism which is mounted next to the associated bank of cylinders.* The unloader mechanism consists of a solenoid valve integrally mounted on the outside of the cover plate, and an internal spring loaded piston.

UNLOADING

When the solenoid valve is energized, oil pressure is applied to the top of the unloader piston, forcing it down against spring pressure. The bottom end of the piston seats against the recessed opening to the suction plenum, effectively blocking the flow of gas into the cylinders. The cylinders are now unloaded.

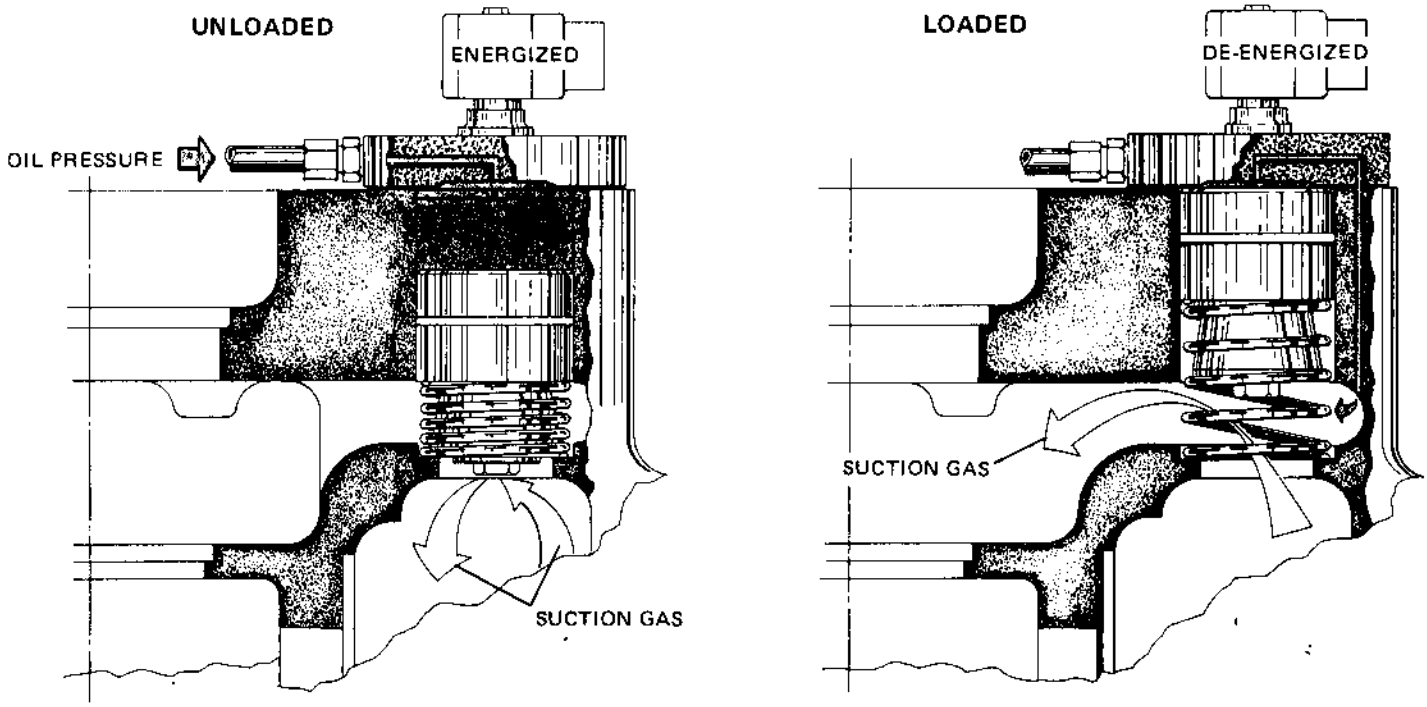
LOADING

When the solenoid valve is de-energized, oil pressure on top of the unloader piston is relieved to the suction plenum. The coil spring forces the piston up, uncovering the recessed opening which allows the suction gas to flow through the port and into the cylinders. The cylinders are now loaded.

When wiring a standard 6 cylinder compressor, the capacity control solenoid valves should be wired so that solenoid No. 1 is energized first and solenoid No. 2 is energized last. (See Fig. 8.) They should be de-energized in the reverse order. This will assure that the compressor cylinders load (and unload) in the proper sequence.

SUMMARY OF OPERATION

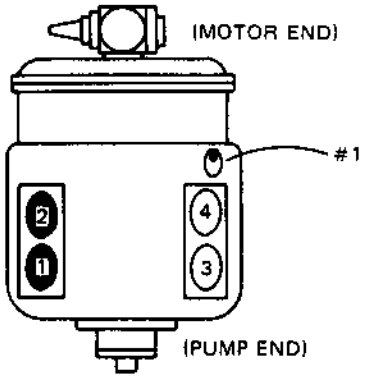
UNLOADED	LOADED
Solenoid Energized	Solenoid De-energized
Oil Pressure Applied To Unloader Piston	Oil Pressure Relieved To Suction Plenum
Unloader Piston Seated (DOWN)	Unloader Piston Unseated (UP)



Note: On some compressors, discharge gas pressure is used instead of oil pressure. A line connected to the high pressure area of the compressor housing supplies high pressure gas to the unloader mechanism. Also, the return passage to the suction plenum is fitted with a restrictor orifice. Operation is the same as described for oil pressure actuated.

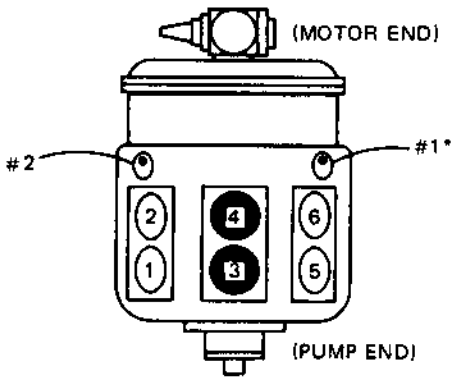
FIG. 7 — CAPACITY CONTROL OPERATION

STANDARD

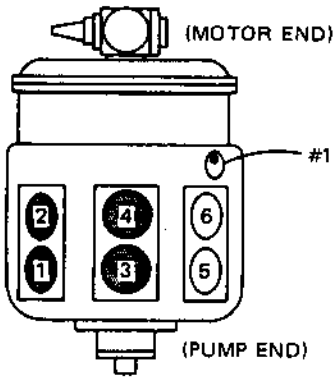


4 CYLINDER

OPTIONAL



6 CYLINDER



6 CYLINDER

*Solenoid #1 should be energized (cylinders unloaded) first

NUMBER OF CYLINDERS	CAPACITY REDUCTION STEPS (%)	
	STANDARD	OPTIONAL
4	100, 50	–
6	100, 67, 33	100, 67

FIG. 8 – CYLINDER UNLOADING STEPS

ORDERING RENEWAL PARTS

All compressor parts are designed and manufactured for a specific application. They are selected to withstand the pressures normally associated with compressor operation. The substitution of non-standard parts is not recommended as these parts could cause serious damage to the compressor or operator. Parts should be replaced with genuine YORK Renewal Parts. The Renewal Parts Manual Form 180.45-RP1 lists replacement parts for these compressors. When ordering parts be sure to follow all instructions included in the Renewal Parts Manual.

ANALYSIS OF FAULTY COMPRESSOR VALVE OPERATION

The operator soon becomes accustomed to the sound of the compressor when it is running under normal conditions. As long as the compressor runs normally, and the sound does not change, it can safely be assumed that the compressor is operating properly. Any unusual noise within the compressor should be investigated immediately.

External indications of trouble within the compressor are as follows:

1. When operating on suction pressure control, long "on" cycles with short "off" periods may indicate leaking or broken compressor valves, piston rings or both.

2. A definite rise in temperature of the discharge gas may indicate defective suction or discharge valves, or a leaking relief valve, or both.

3. Failure to pull down is a possible indication of a broken suction or discharge valve, or both.

4. Unusual pressure gauge readings.

5. The operator should feel the heads periodically to check for hot spots or one particular head which is running hot. If this condition occurs, it is an indication of broken or leaking valves within that bank of cylinders.

If leaking or broken valves are suspected, the heads should be removed and the valves should be examined for breakage. YORK recommends that valves be replaced annually or every 5,000 hours of running time.

TABLE 2 — MANUFACTURING AND WEAR LIMITS (INCHES)

PART	MANUFACTURING TOLERANCE	ALLOWABLE WORN SIZE
Top Dead Center Clearance (Piston To Discharge Valve)	.019—.043	—
Thrust Clearance	.013—.027	—
Crankpin Dia.	2.0000—1.9995	1.9975
Connecting Rod - Crank End	2.0031—2.0024	2.0045
Connecting Rod - Piston End	.9903—.9900	.9918
Wrist Pin Dia.	.9896—.9894	.9889
Piston Wrist Pin Bore	.9903—.9899	.9918
Small Piston Dia.	2.7115—2.7105	2.709
Large Piston Dia.	2.908—2.907	2.905
Small Cyl. Sleeve Bore	2.717—2.716	2.7185
Large Cyl. Sleeve Bore	2.914—2.913	2.9155

SECTION II — DIS-ASSEMBLY & RE-ASSEMBLY

GENERAL

Service on these compressors should be performed only by qualified service personnel, trained in the service of this type of equipment, and equipped with the proper tools and familiar with their use.

Before opening a compressor for repairs, the following paragraphs should be thoroughly checked to aid in locating and correcting the trouble:

1. Check the compressor oil level. (See page 8.)

2. Check the refrigerant charge to be sure the system is fully charged. The unit sight glass should be clean and dry.

3. Be sure the faulty operation of the unit is caused by the compressor and not some other part of the unit. Unit safety and operating controls should be checked for proper operation as explained in the SERVICE INSTRUCTION included with the unit.

4. The voltage at the compressor motor must be within the limits shown on the unit data plate and page 4.

5. Check for a burnout in the motor windings. This may be evidenced by discoloration of the compressor oil or by a burnt odor. A further check for motor burnout would be to use an ohmmeter and check if the windings are grounded, or check for an open circuit between motor terminals 1, 2, 3 or 7, 8, 9. These are an indication of motor burnout.

6. Check the resistance of each thermistor in the protector circuit. This resistance must be between 500 and 2600 ohms at room temperature. The measurement of this resistance shall be made with a meter which applies NO MORE THAN ONE VOLT ACROSS THE THERMISTOR.

7. Dismantle only the part of the hermetic compressor necessary to correct the fault.

8. Never open any part of a hermetic compressor which is under vacuum; be sure there is some pressure inside the compressor. If the compressor is opened while under a vacuum, moisture laden air may be drawn into the system and rapid corrosion of internal machined parts may result. The refrigerant is an excellent cleaning agent and will remove any natural protective coating from the iron or steel, leaving the raw metal exposed.

9. Internal machined parts of the compressor such as valves, pistons and connecting rods must be immediately protected as they are removed from the compressor. See HANDLING COMPRESSOR PARTS, page 8.

10. When assembling a compressor or compressor parts, it is essential to draw all nuts and cap screws to their proper torque, using an accurate torque wrench. See THREADED FASTENER TORQUES & SEQUENCE, page 6.

WARNING

Before dis-assembling any part of the compressor, be sure the following Safety Precautions are read and observed. Do not attempt to service any part of the compressor that is not covered in this Instruction.

HANDLING

When performing service on the compressor it may be convenient to remove it from the unit base. If so, refer to RIGGING THE COMPRESSOR, page 8.

DISCONNECT ELECTRICAL POWER

Before attempting any service on the compressor, all disconnect switches must be locked out and tagged to prevent accidental starting of the compressor and/or electrical shock.

VENTING THE COMPRESSOR BEFORE REPAIRS

Before opening the compressor for repairs, the pressure within the compressor must be relieved. Close the suction and discharge stop valves, loosen the pressure tap next to the adjusting stem on the suction stop valve, and vent the compressor to the atmosphere.

EVACUATION AFTER REPAIRS

During the compressor repair procedure, the crankcase and oil should be examined for the presence of metal particles. This may indicate wearing of parts within the compressor. New oil should be charged into the compressor using the oil charging valve. (See PHYSICAL DATA.)

The compressor should be given a thorough leak test as explained in instruction Form 55.05-NM.

If the compressor was open for only a few hours, it should be evacuated to a vacuum of 300 microns using a quality vacuum pump and following the procedure outlined in instruction Form 55.05-NM.

If the compressor was open for more than 24 hours, the compressor should be completely dehydrated; then evacuated to a vacuum of 300 microns following the procedures outlined in Form 55.05-NM.

REPLACING THE OIL PUMP

If it becomes necessary to replace the oil pump, a complete new pump assembly should be installed. To replace the oil pump, refer to Fig. 9 and proceed as follows:

1. Disconnect the unloader oil line from the side of the oil pump housing.

2. Remove the oil pump cover cap screws and pull the pump assembly out of the bearing head.

3. **Note that the 50 Hz. pump includes a roll pin which acts as an orifice at the oil relief port. Be sure that the replacement pump is identical.**

4. Install the new oil pump assembly using a new gasket. Be sure that the holes in the gasket are aligned with the holes in the housing. Be sure that the flat end of the pump drive shaft engages the slot in the end of the compressor crankshaft and the unloader oil supply fitting is in the 3 o'clock position. Check that the valve core is installed under the seal cap of the valve; not under the oil line connection.

NOTE: The bolt hole pattern is irregular so that the pump can only be installed in the correct position.

5. Tighten the pump cover cap screws evenly by drawing down opposite and alternate pairs.

6. Re-connect the unloader oil line.

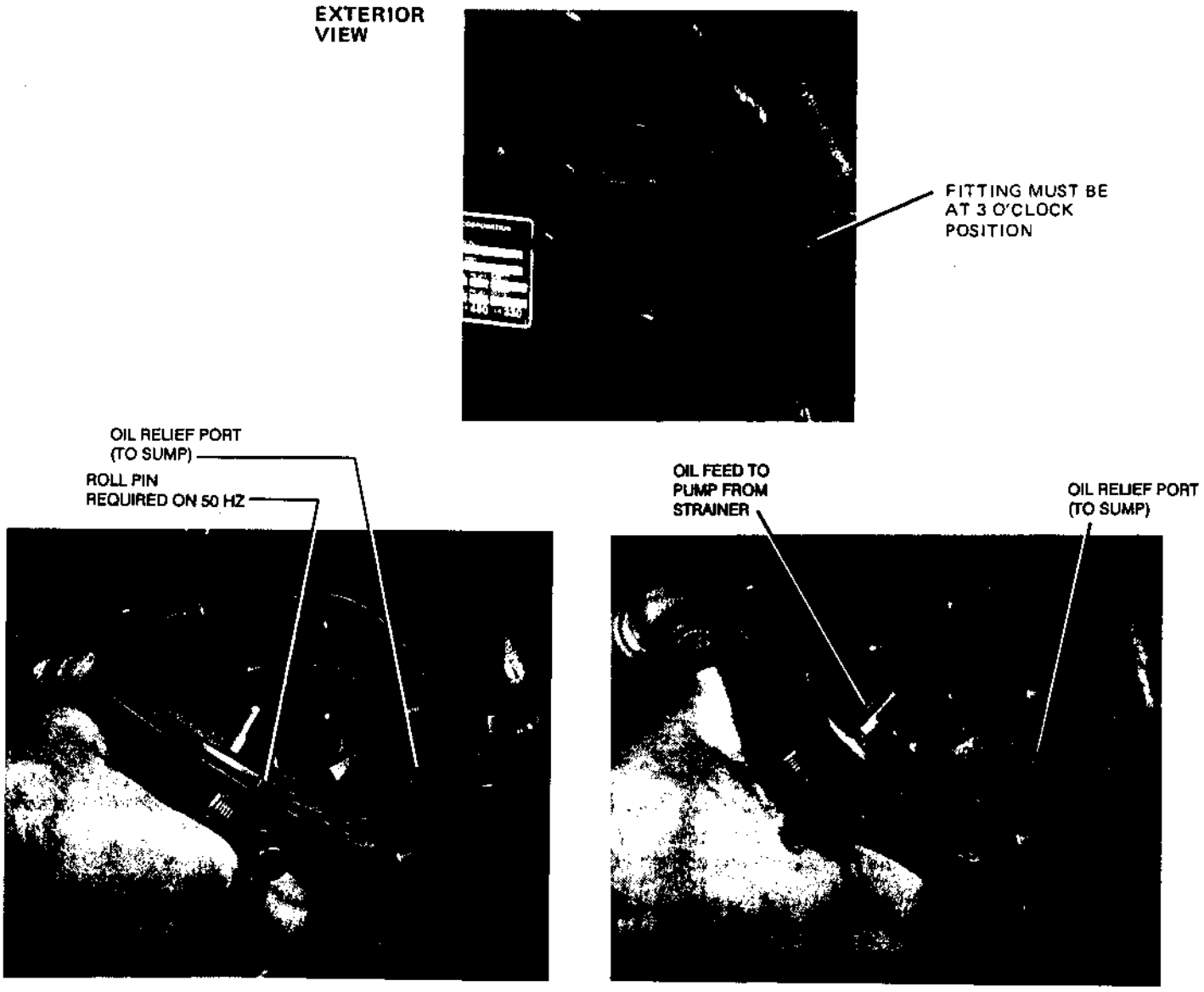


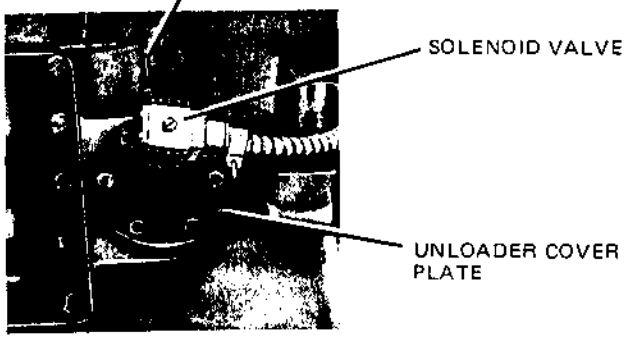
FIG. 9 — COMPRESSOR OIL PUMP

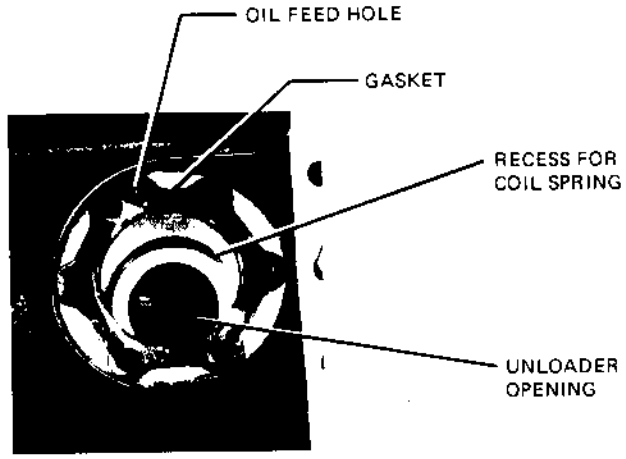
CAPACITY CONTROL COMPONENTS (See Fig. 10.)

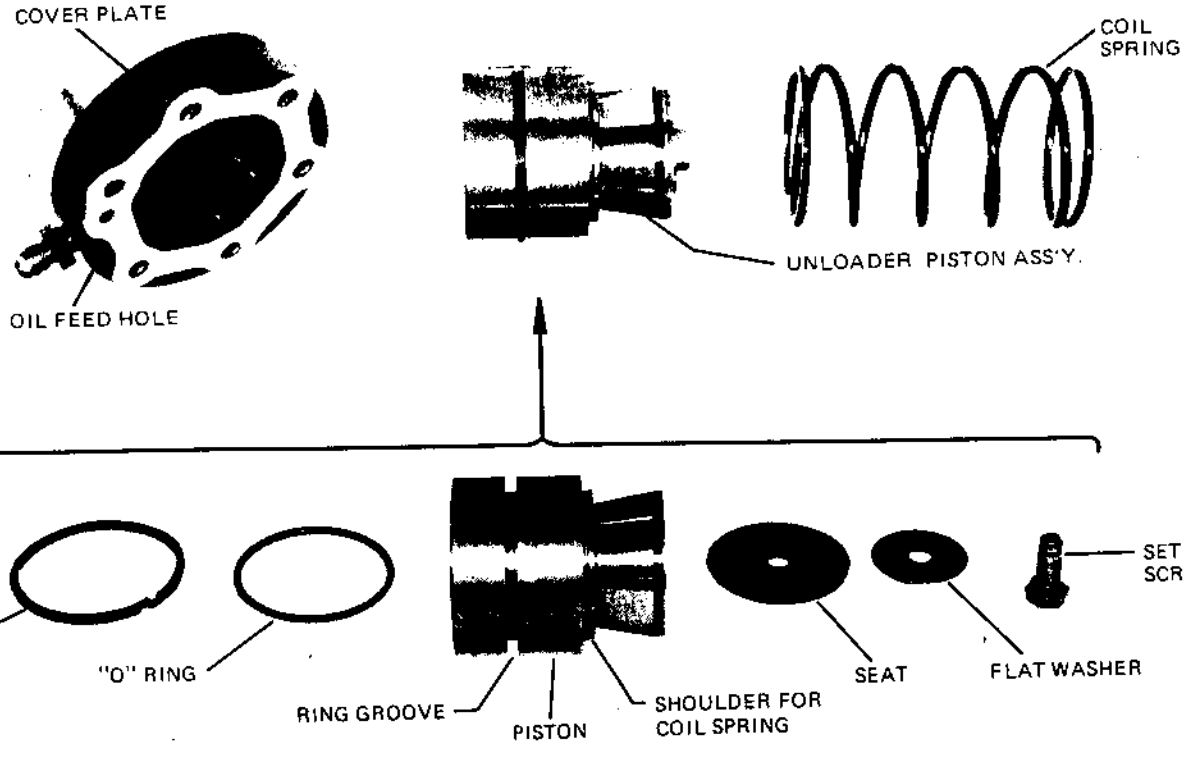
SOLENOID COIL

Normally, the coil is the only part of the solenoid valve that requires replacement. To replace the coil, proceed as follows:

1. Remove the leads of the coil from the compressor terminal box; then remove the conduit from the leads.
2. Remove the screw from the top center of the valve and remove the coil.
3. Install the new coil. Reconnect the wires and the conduit.







CAPACITY CONTROL COMPONENTS

UNLOADER SOLENOID VALVE

The unloader solenoid valve is an integral part of the unloader cover plate. If the valve becomes defective, the valve and the cover plate must be replaced as a unit. To replace the solenoid valve, proceed as follows:

1. Remove the solenoid valve coil.

2. Disconnect the oil line from the side of the unloader cover plate.

3. Carefully loosen the cap screws holding the cover plate to the compressor. The cover plate should spring free due to the action of the unloader spring. Remove the cap screws, the unloader cover plate and gasket.

4. Be sure the unloader piston moves freely, then install the new unloader cover plate with valve using a new gasket. Be sure the oil passage in the cover plate and gasket align with the matching hole in the housing.

5. Re-connect the oil supply tubing.

6. Re-install the solenoid coil.

UNLOADER PISTON ASSEMBLY

The unloader piston assembly can be removed for inspection and/or service as follows:

1. Remove the solenoid valve and cover plate as described previously.

2. Remove the unloader piston and coil spring.

3. Dis-assemble the components of the unloader piston. Clean and examine all parts for signs of wear and replace parts as necessary. The seat should be turned over when re-installed. If both sides of the seat have been used, install a new seat. Do not re-use a used seat. Apply Loctite (York Part No. 013-01671) to the threads of the cap screw. Install the "O" ring in the piston groove; then carefully fit the piston ring over it. If the "O" ring is swollen to the point that re-assembly is difficult, replace the "O" ring and piston ring.

4. Re-install the coil spring. Be sure it seats properly into the recess in the bottom of the unloader opening.

5. Apply a light coating of oil to the outside of the unloader piston assembly. Insert the assembly into the unloader opening, checking to see that the coil spring fits properly over the shoulder on the piston. Use care so that the piston ring is not pinched or damaged in any way. Check that the piston moves freely up and down in the opening against the action of the coil spring.

6. Install the cover plate using a new gasket. Be sure all bolt holes, oil hole and gasket holes are properly aligned.

7. Re-connect the oil feed line and re-install the solenoid coil.

CRANKCASE OIL HEATER

The crankcase heater is located on the oil pump end of the compressor. The heater is located within a well in the compressor casing; it is not in direct contact with the refrigerant or oil. To replace the heater, remove the heater wires and conduit from the compressor terminal box. Pull the heater from the compressor. (See Fig. 11.)

When installing the new heater, coat it with heat conductive compound. (York Part No. 013-00898.)

OIL STRAINER

The one-piece line between the strainer and the compressor crankcase is rolled into a hole in the compressor crankcase and therefore is not readily removable in the field.

REMOVING THE SUCTION STRAINER

The compressor suction strainer is located in the motor housing cover just under the suction stop valve. (See Fig. 12.) To clean or replace the suction strainer proceed as follows:

1. Remove the four bolts which hold the suction stop valve to the motor housing cover.

2. Pull the suction strainer out of the housing and clean with an approved safety solvent or install a new strainer if required.

3. Replace the suction strainer using new gaskets. Note that two gaskets are used; one between the suction stop valve and the suction strainer, the other between the suction strainer and the compressor housing.

4. Bolt the suction valve in place, making sure that it seats squarely.

REPLACING THE OIL SIGHT GLASS

Compressors are equipped with a plug type sight glass located on the pump end of the compressor. (See Fig. 11.) If it becomes broken or damaged in any way, it must be replaced. Proceed as follows:

1. Drain the oil level below the sight glass.

2. Remove the damaged sight glass.

3. Clean the threads in the housing and on the new sight glass with an approved safety solvent.

4. Apply LOCTITE to the threads of the sight glass and screw it into the compressor housing using a socket wrench. Do not over-tighten as this may crack the glass (See Table 1.)

5. Fill the crankcase with clean oil.

FIG. 11 — CRANKCASE HEATER & SIGHT GLASS

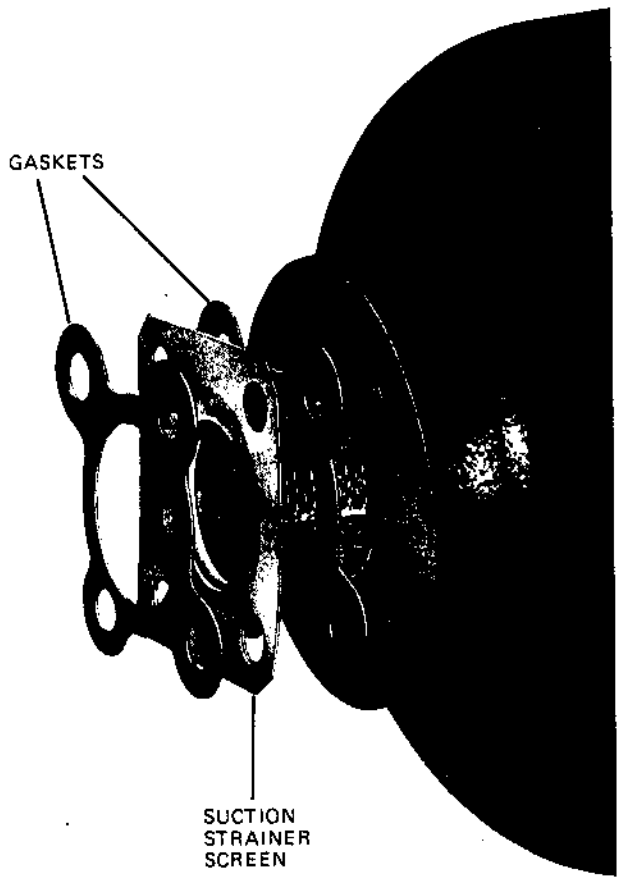


FIG. 12 — COMPRESSOR SUCTION STRAINER

HIGH PRESSURE RELIEF VALVE

The high pressure relief valve is screwed into the compressor housing beneath the discharge stop valve. (See Fig. 13.) It is factory set at 375 psi to relieve abnormally high discharge pressure back to the suction side of the compressor. If leakage of the valve is suspected, proceed as follows:

1. Disconnect and remove the discharge stop valve.
2. Unscrew the leaking relief valve and install a new relief valve in its place. Do not use thread sealing compound.
3. Re-connect the discharge stop valve.

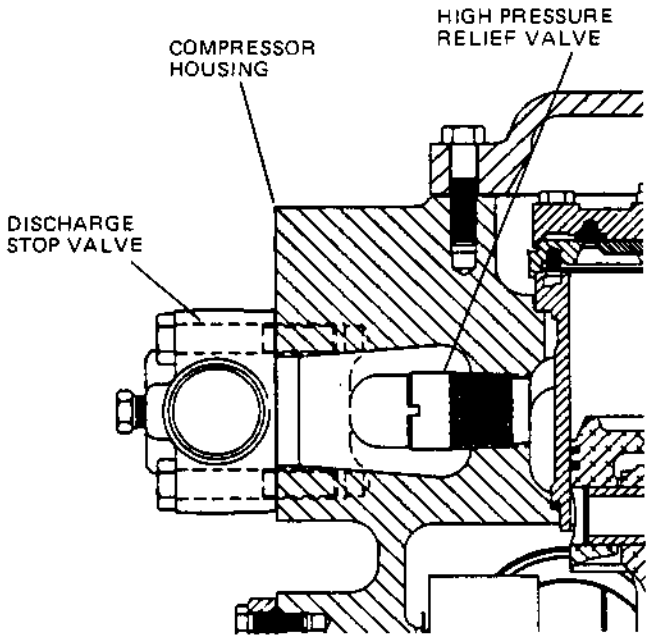


FIG. 13 — LOCATION OF HIGH PRESSURE RELIEF VALVE – 6 CYLINDER COMPRESSOR SHOWN

REMOVING THE DISCHARGE VALVES, SUCTION VALVES & CYLINDER SLEEVES

To remove the discharge valves, suction valves and cylinder sleeves, proceed as follows:

1. Remove the compressor top head(s). The use of guide pins is recommended to prevent damage to the compressor and/or injury to the serviceman. (See Figs. 14 & 15.)
2. Remove the four cap screws that hold the discharge valve cage assembly to the housing and lift this assembly out of the compressor. The inner discharge valve plate, the discharge valve, and the discharge valve springs will come out with the cage as an assembly. (See Fig. 16.)

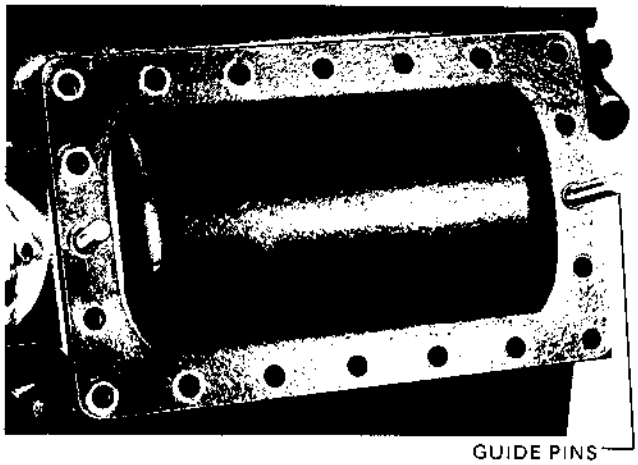


FIG. 14 – TOP HEAD REMOVAL

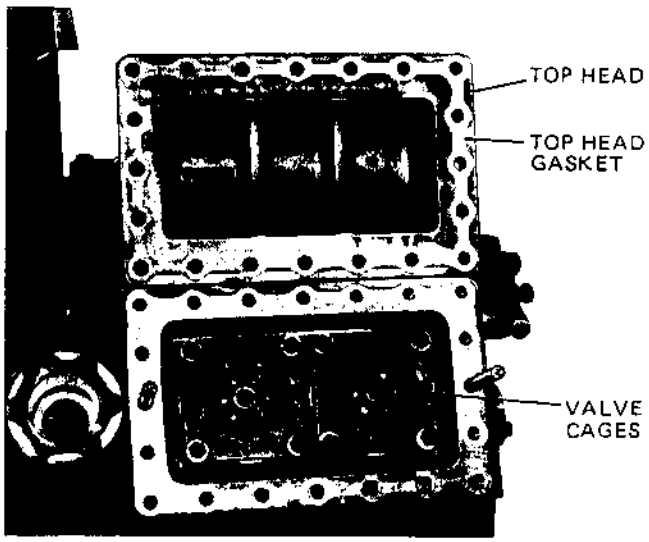


FIG. 15 – TOP HEAD REMOVED

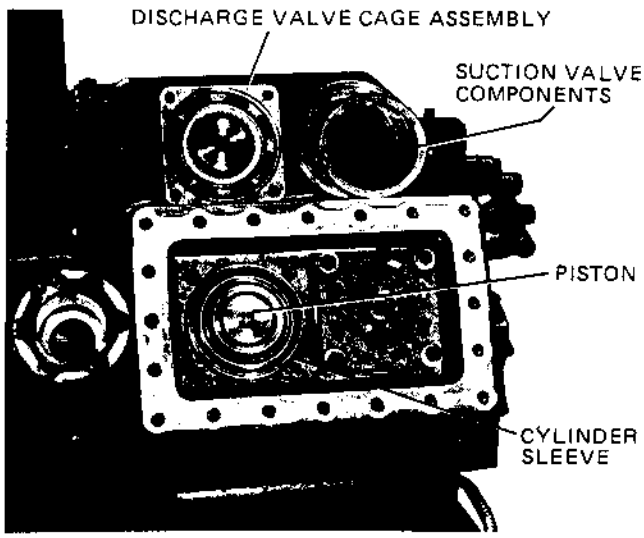


FIG. 16 – DISCHARGE & SUCTION VALVES REMOVED

3. Slip the fingers inside the suction valve plate and under the suction valve. Lift off the suction valve plate, the suction valve, and suction valve springs.

4. Remove the cylinder sleeve(s). On unloading type cylinders, use of the tools similar to those shown in Fig. 17 may be useful since the cylinder sleeve is sealed with an "O" ring at the bottom and is a rather tight fit in the compressor. Use care that the piston is not damaged by striking the compressor housing. Remove the "O" ring from the compressor housing if it did not come out with the cylinder sleeve. (Unloading cylinders only.) (See Fig. 18.)

5. Dis-assemble the discharge valve cage assembly. Remove the locking nut and center screw. Then lift out the inner discharge valve seat, discharge valve and springs.

6. Clean, dry and inspect all parts. Replace all parts that show wear or damage.

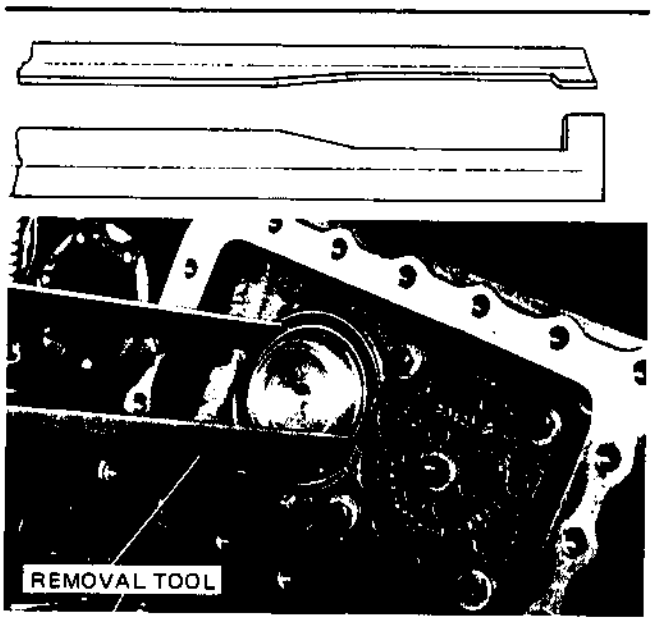


FIG. 17 – REMOVING CYLINDER SLEEVE

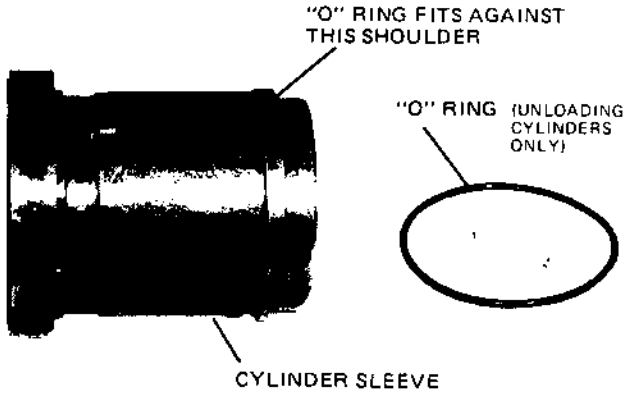


FIG. 18 – CYLINDER SLEEVE

INSTALLING CYLINDER SLEEVES

1. Install a new "O" ring on the bottom of the cylinder sleeve. (Unloading type cylinders only.)

CAUTION: Never rotate the crankshaft when one or more piston and connecting rod assemblies are in place unless the related cylinder sleeve or sleeves are secured in their proper position in the compressor housing. If this caution is not observed, serious damage could occur.

2. Oil the inside of the cylinder sleeve.

3. Carefully lower the cylinder sleeve over the piston and into the compressor housing. Push the cylinder sleeve down until it enters the hole in the lower compressor deck. The bottom end of the cylinder sleeve is chamfered to facilitate compressing the piston rings and entering the compressor deck. Enter the sleeve squarely into the housing and rotate it as it is being lowered. Be sure that the "O" ring enters the recess in the compressor deck without binding or being damaged in any way. (Unloading type cylinders only.)

INSTALLING SUCTION AND DISCHARGE VALVES

When re-installing valves, install as originally removed, matting the seats; do not turn over.

To install the suction and discharge valves, refer to Figs. 19 & 20 and proceed as follows:

1. With the spring pocket side of the suction valve plate up, assemble the suction valve springs in their pockets and set the suction valve in place. Expanded coil is to be located in the bottom of the spring pocket. Push spring gently into hole until the expanded coil snaps to retain the spring.

2. To hold the suction valve and springs firmly in place during installation, two sheet metal clips should be placed over the suction valve plate and suction valve. These clips may be ordered from the Factory — York Part No. 064-37274.

3. Assemble the discharge valve cage assembly.

   a. Insert the discharge valve springs in their recesses in the valve cage and set the discharge valve in place.

   b. Insert the discharge valve screw through the inner discharge valve plate and the discharge valve cage. Then bolt the assembly together, using the self locking nut. Check that the discharge valve operates freely. (See Table 1.)

   e the suction valve plate, with suction valve clipped e, on the cylinder sleeve. Using one hand, hold tion valve plate firmly against the cylinder sleeve. With your free hand remove the valve clips. A distinct click will be heard as the clips are removed, if the valve is seated properly.

5. Holding the suction valve plate in place on top of the cylinder sleeve, place the discharge valve gage assembly on top of the suction valve plate. Insert two cap screws through holes in diagonally opposite corners of the discharge valve cage and tighten them "finger-tight". Insert remaining cap screws and tighten all cap screws to their proper torque.

6. Using new gaskets if required, install the compressor top heads.

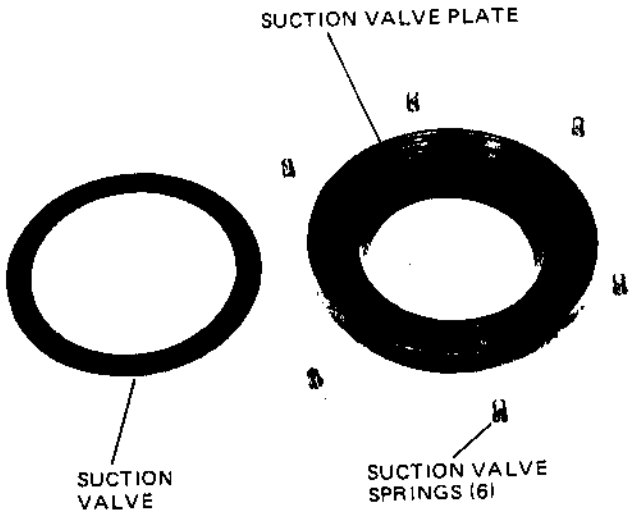


FIG. 19 – SUCTION VALVE ASSEMBLY

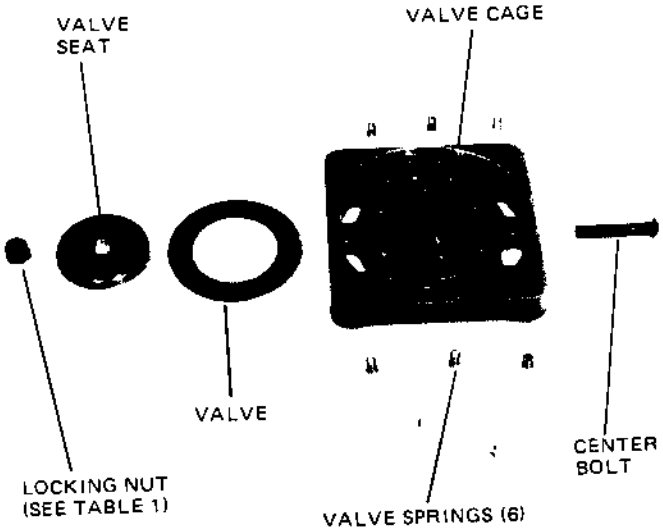


FIG. 20 — DISCHARGE VALVE ASSEMBLY

REMOVING PISTONS AND CONNECTING RODS

To remove the pistons and connecting rods, refer to Fig. 21 and proceed as follows:

NOTE: The width of the connecting rods at their large end is greater than the inside diameter of the cylinder sleeve. Before a piston and connecting rod assembly can be removed from the compressor housing, the cylinder sleeve must be removed. Then the piston and connecting rod assembly can be pulled outward from the compressor.

1. Remove the suction and discharge valve assemblies following procedures outlined previously. Allow the cylinder sleeve to remain in place in the housing.

2. Remove the crankcase hand hole cover plate(s).

3. With the cylinder sleeves in place, rotate the crankshaft to a position that will permit ready access to the connecting rod bolts to be removed. Loosen the cap screws and remove the lower half of the connecting rod bearing. Note the identification number stamped on the half-bearing just removed.

4. Using care to make certain that the upper half of the connecting rod bearing remains in place on its crankpin, rotate the crankshaft to the point where the piston is very near the top of its stroke.

5. Remove the cylinder sleeve. Use care that the piston is not damaged by striking the compressor housing.

6. Lift out the piston and its connecting rod. Note that the identification number stamped on the upper half of the rod bearing, matches the number on the lower half of the rod bearing. These numbers should ALWAYS match.

CAUTION: Never rotate the crankshaft when one or more piston and connecting rod assemblies are in place unless the related cylinder sleeve or sleeves are secured in their proper position in the compressor housing. If this caution is not observed, serious damage could occur. Make certain also that when the bottom half of the rod bearing has been removed and it is necessary to rotate the crankshaft, that the upper half of the rod bearing does not leave its proper place on its crankpin.

7. Remove piston assemblies ONE AT A TIME, repeating the above steps 3 through 6 for each piston assembly.

NOTE: Only a small amount of clearance between the piston pin and its holes in the connecting rod and the bosses of the piston is permissible. (See TABLE 2.) When the piston and connecting rod assembly is removed from the compressor, this clearance may be checked by holding the top of the piston downward against a flat, solid surface to keep the piston stationary, and sliding the connecting rod back and forth on its piston pin. When the clearance is correct, the rod can be moved back and forth freely from one piston boss to the other with no "rocking" or angular movement. If such movement exists, wear is indicated and the piston, piston pin, and connecting rod should be checked and replaced if necessary.

8. Remove the piston pin retaining rings.

9. Push the piston pin out of the piston.

10. Remove the piston rings.

11. Clean, inspect, dry and oil all parts.

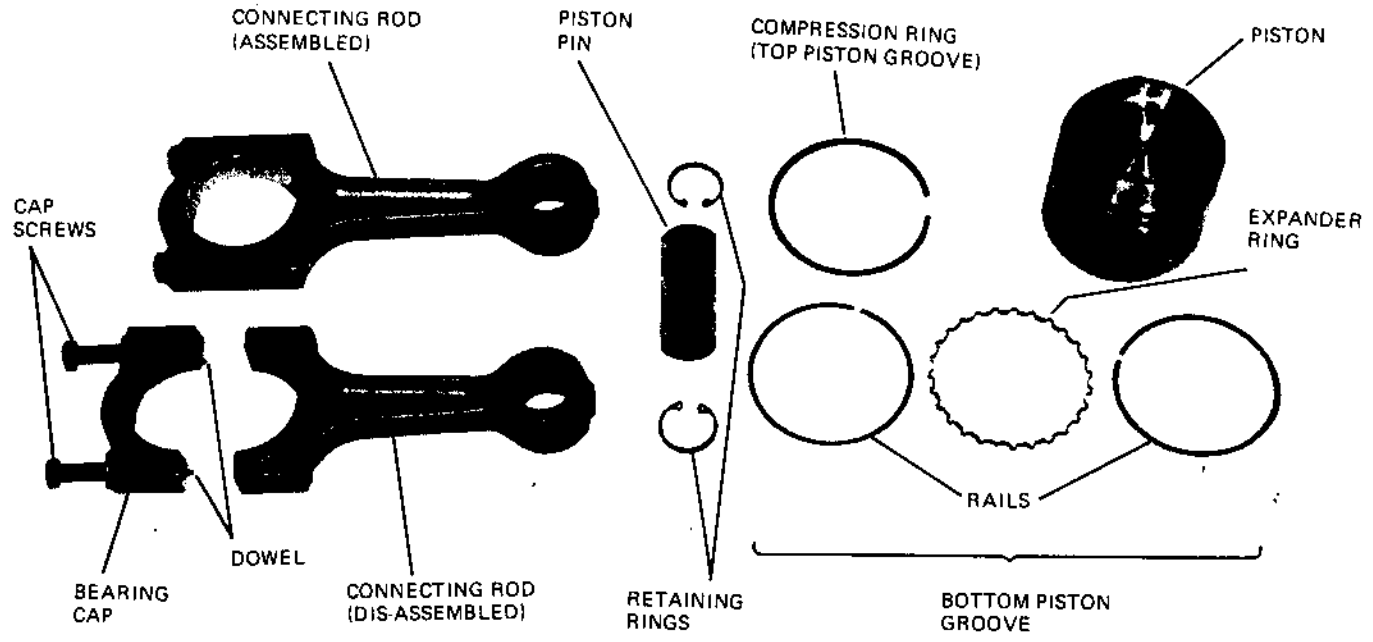


FIG. 21 — PISTON AND CONNECTING ROD COMPONENTS

INSTALLING PISTONS AND CONNECTING RODS

To install the piston and connecting rod assemblies, refer to Figs. 21-26 and proceed as follows:

1. Each piston is equipped with the following rings:

   a. A compression ring which fits into the top groove of the piston.

   b. An oil ring which fits into the bottom groove of the piston. This oil ring consists of three components: a top rail, an expander spacer, and a bottom rail.

   It is important that all rings be installed properly to insure that the compressor operates satisfactorily. Check the piston ring grooves to see that they are clean and free of burrs.

2. Place the expander spacer in the **bottom** piston groove. The ends of the expander must butt or lock as shown in Fig. 22.

3. Install the top rail over the expander ring in the direction shown in Fig. 23. The gaps in the expander sleeve and top rail should be staggered approximately 90°.

4. Install the bottom rail over the expander ring in the direction shown in Fig. 24. This gap should be staggered approximately 180° from the gap in the top rail.

5. Install the compression ring in the **top** groove of the piston. Note that this ring is tapered and must be installed correctly. The wider part of the ring must be down (toward the bottom of the piston). The top surface of the ring is stamped with a dot. (See Fig. 25.)

6. With the top of the piston placed downward on a clean surface, insert the piston pin into one of the holes in the piston and push it inward using thumb or hand pressure until it just protrudes from the boss on the inside of the piston. Place a few drops of oil on the bearing surface in the small end of the connecting rod, insert this end of the rod in the piston and push the pin through the rod bearing and into the remaining piston pin boss. Center the piston pin and insert the piston pin locking springs.

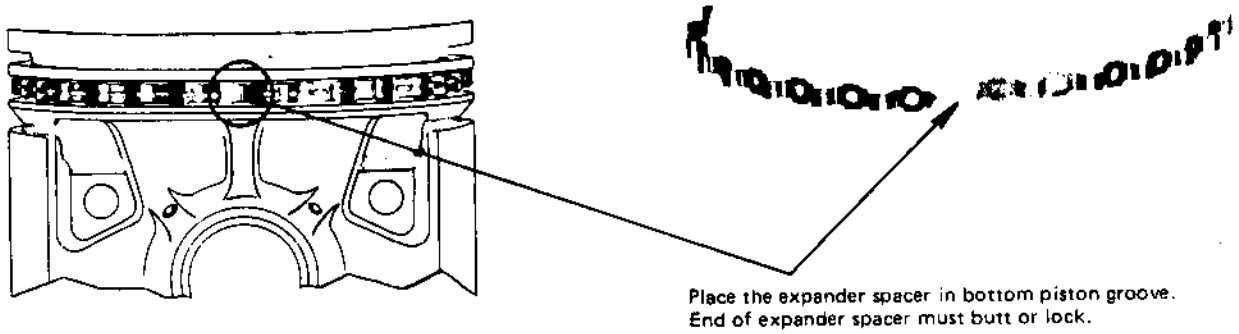
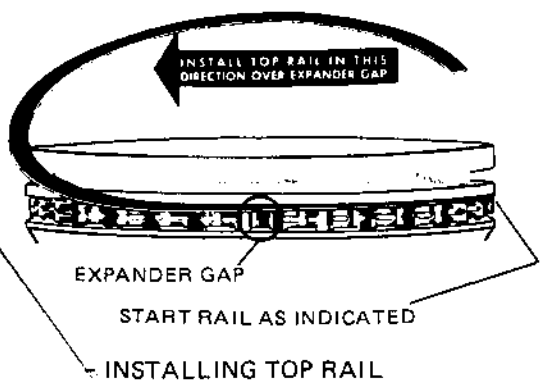


FIG. 22 – INSTALLING EXPANDER SPACER



– INSTALLING TOP RAIL

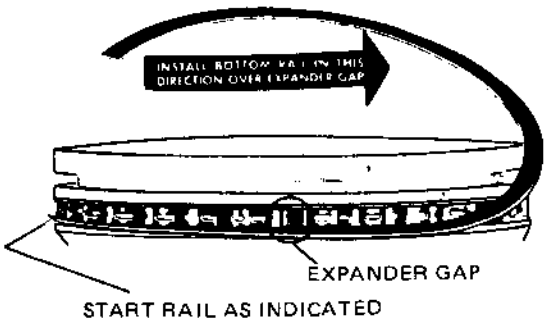


FIG. 24 – INSTALLING BOTTOM RAIL

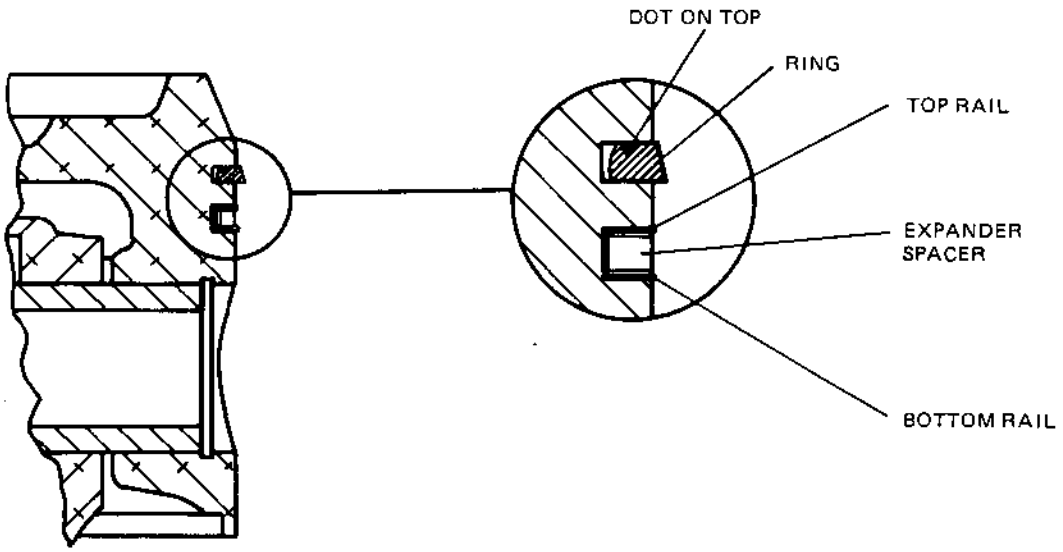


FIG. 25 – INSTALLING COMPRESSION RING

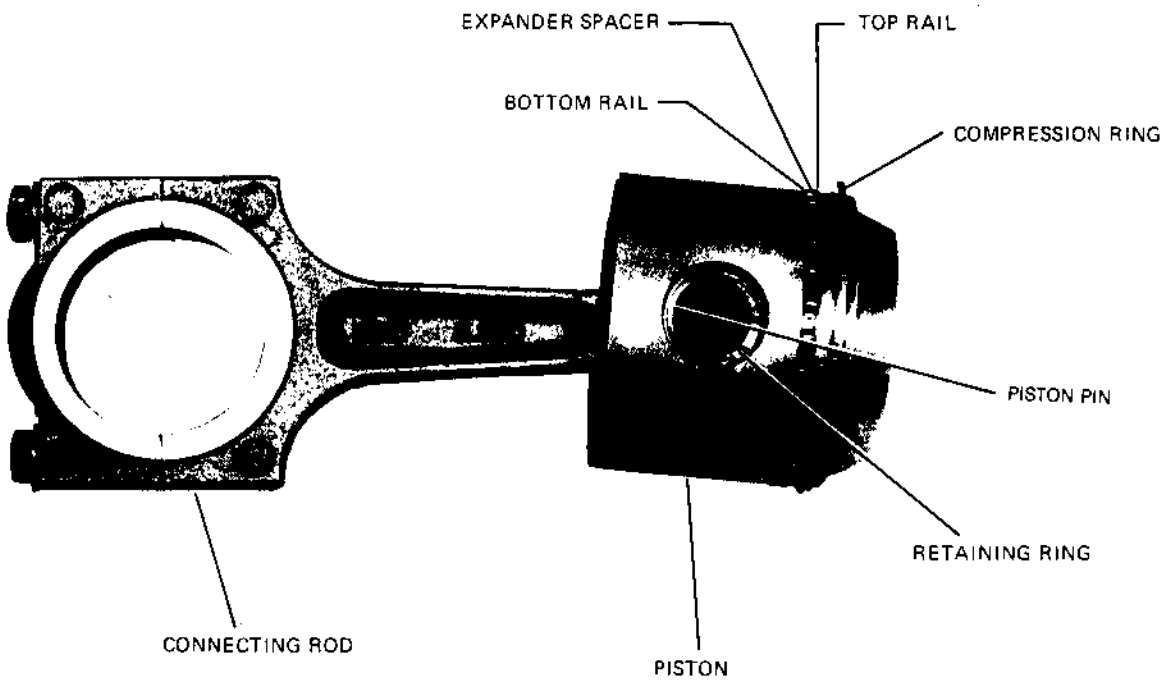


FIG. 26 – PISTON/CONNECTING ROD ASSEMBLY

YORK®

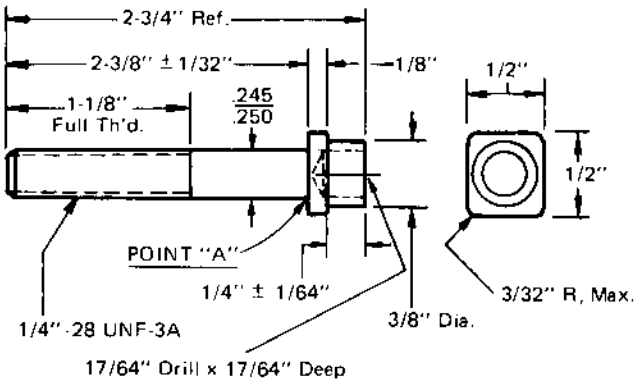
MODEL Z — STYLE A
HERMETIC COMPRESSORS

SUPPLEMENT | Supersedes: Nothing | 989 | Form 180.45-M1 (Supl. 1)

MODELS
Z4H, Z4J, Z4K, Z4M,
Z6N, Z6R, Z6S, Z6W

PART 1 — TERMINAL BOLTS

We have become aware of a potentially serious problem concerning the terminal bolts used for the power connections on the new "Z" compressors. The terminal bolts can break-off while being torqued or through normal fatique due to vibration while running. Referring to the sketch below, the terminals may break off with minimal effort at Point A if the 17/64" diameter x 17/64" deep hole is drilled too deep. Drilling the hole too deep leaves essentially no material between the square shoulder and the 1/4" diameter body of the bolt at Point A.



After the problem became known, all defective terminal bolts in stock were scrapped.

There are several ways to determine whether a terminal bolt has broken off at the shoulder. These include:

1. The most obvious way is to observe that the body of the bolt is loose in the terminal block and may be lifted from the terminal block. To check for looseness the unit power lead and jumper bar, if used, must be removed.

2. A somewhat less obvious method involves making resistance measurements of the motor windings across the terminal bolts. Precise resistance measurements may also identify a terminal which is nearly broken off or one which has severed but the portion inside the compressor has not fallen out of the hole in the terminal block and may be barely touching the body of the bolt. Nominal values of stator winding resistance for the most popular 60 Hz voltages of the Code A, B, C, D & E motors are shown below.

Motor Code	Motor Mfgr.	Voltage (60 Hz)	Nominal Resistance Terminals 1-2, 2-3, 3-1, 7-8, 8-9, 9-7
A	A.O. Smith	200V	0.171 ohms
		230V	0.216
		460V	0.866
B	A.O. Smith	200V	0.138
		230V	0.182
		460V	0.728
C	A.O. Smith	200V	0.128
		230V	0.163
		460V	0.652
D	Leroy Somer	200V	0.082
		230V	0.108
		460V	0.433
E	Leroy Somer	200V	0.068
		230V	0.090
		460V	0.360

The stator winding resistance must be measured with either a digital ohmmeter which reads to at least three significant figures or a Wheatstone bridge.

The motor code and voltage can be determined from the model number of the compressor shown on the compressor nameplate. The motor size code and voltage appear in the model number as follows:

EX: Z6S2A-D 46 S

- S = A.O. Smith
  L = Leroy Somer
- 17 = 200V, 60 Hz
  28 = 230V, 60 Hz
  46 = 460V, 60 Hz
- A = Code (size) A motor
  B = Code (size) B motor
  C = Code (size) C motor
  D = Code (size) D motor
  E = Code (size) E motor

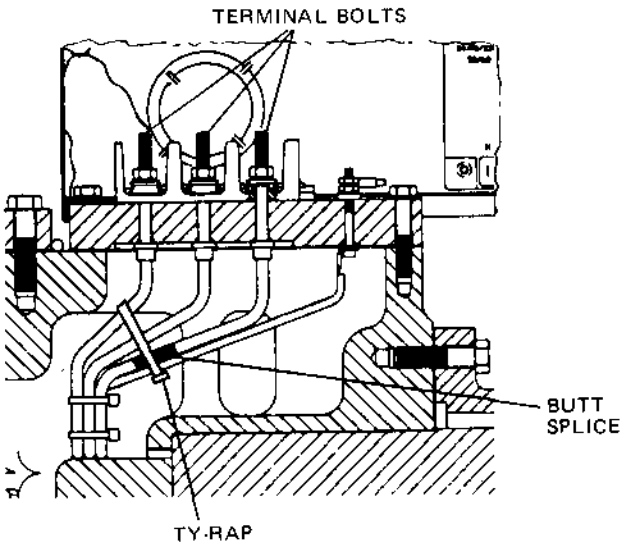
The resistance from terminals 1, 2, 3, 7, 8 or 9 to the housing of the compressor should be essentially infinite unless a terminal has broken off and is touching the housing. This resistance value may still be infinite if the terminal has broken off but is not touching the housing.

3. A third possible symptom of a broken terminal bolt is tripout of the motor over-current circuit in the chiller micro panel within a few seconds of start-up when the compressor is loaded.

   A single broken terminal will cause a single phase current to flow in the set of motor windings, 1-2-3 or 7-8-9, which has the break. This will cause the current to increase in two of the three phases feeding the compressor. It may also show up as a bad current unbalance between the three phases.

Normally the feed-thru terminals are connected to the end of the stator leads at the factory by crimping the barrel of the terminal onto the lead using a special hydraulically operated crimping tool. This tool is not available in the field for terminal replacement; therefore, an alternate means must be used as follows.

Cut off the motor lead just beyond the crimp joint of the broken terminal. Obtain a new terminal(s) from YORK factory service (you must specify motor size and voltage), which has a short piece of lead wire already crimped to the terminal. Make a butt (in-line) splice of the motor lead to the short piece of lead wire attached to the terminal. Slip a 1½ - 2" length of shrink sleeving, supplied by the factory, over the wire before making the butt connection. *Note: Use only materials furnished by the factory. Do not substitute with any item obtained locally.* Crimp the two ends of the butt splice to the wires using a hand operated tool. Heat the shrink tubing using a heat gun, blow drier, etc. to shrink tightly around the connection. The lead should be made as short as possible to prevent it from rubbing against the housing. The finished splice should then be bundled and ty-rapped to the associated group of leads, ie, 1-2-3 or 7-8-9. See sketch below showing a properly applied and tied splice.



PART 2 – CORRECTION TO PHONE NUMBER OF RE-MANUFACTURING FACILITY.

The correct phone number of the re-manufacturing facility shown on page 23 of Form 180.45-M1 is:

YORK International Corp. – Service
1326 South Wolf Road
Wheeling, IL 60090-6487
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