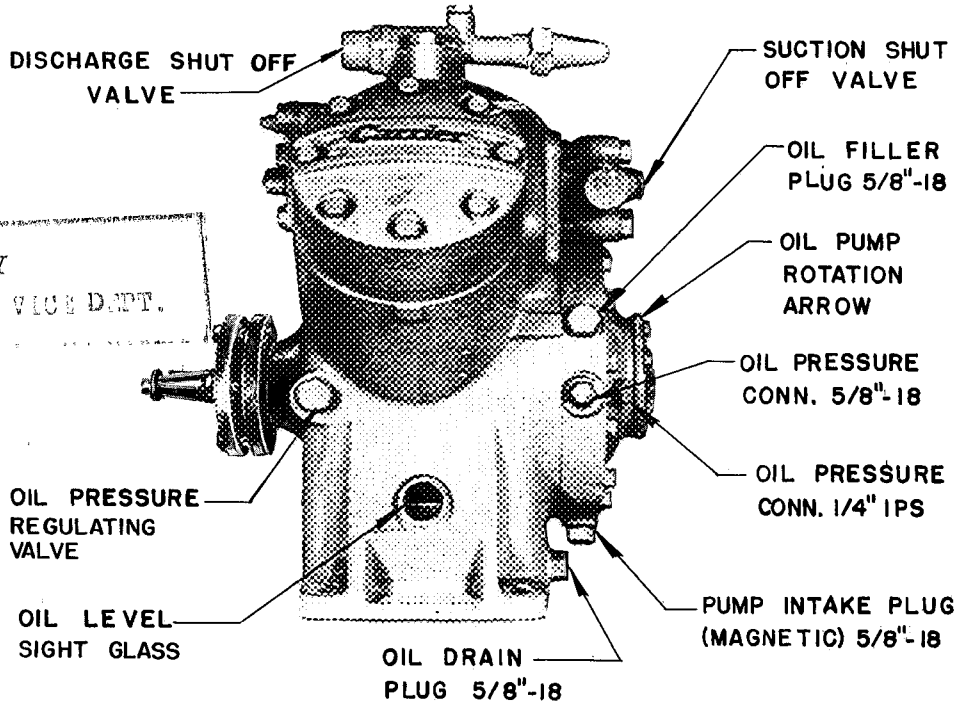


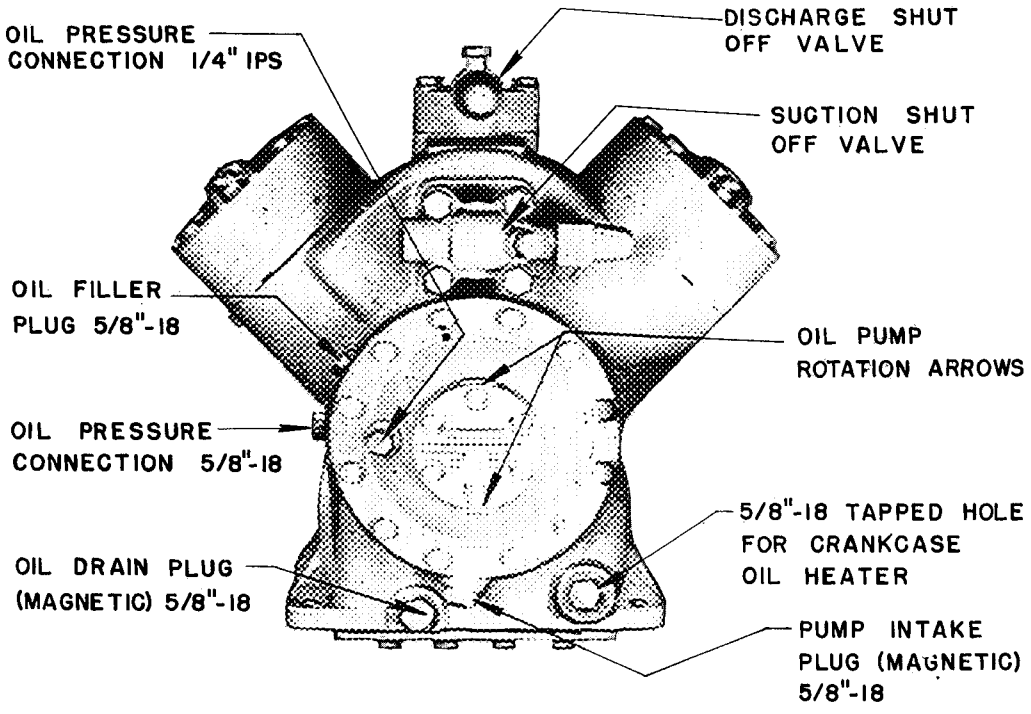
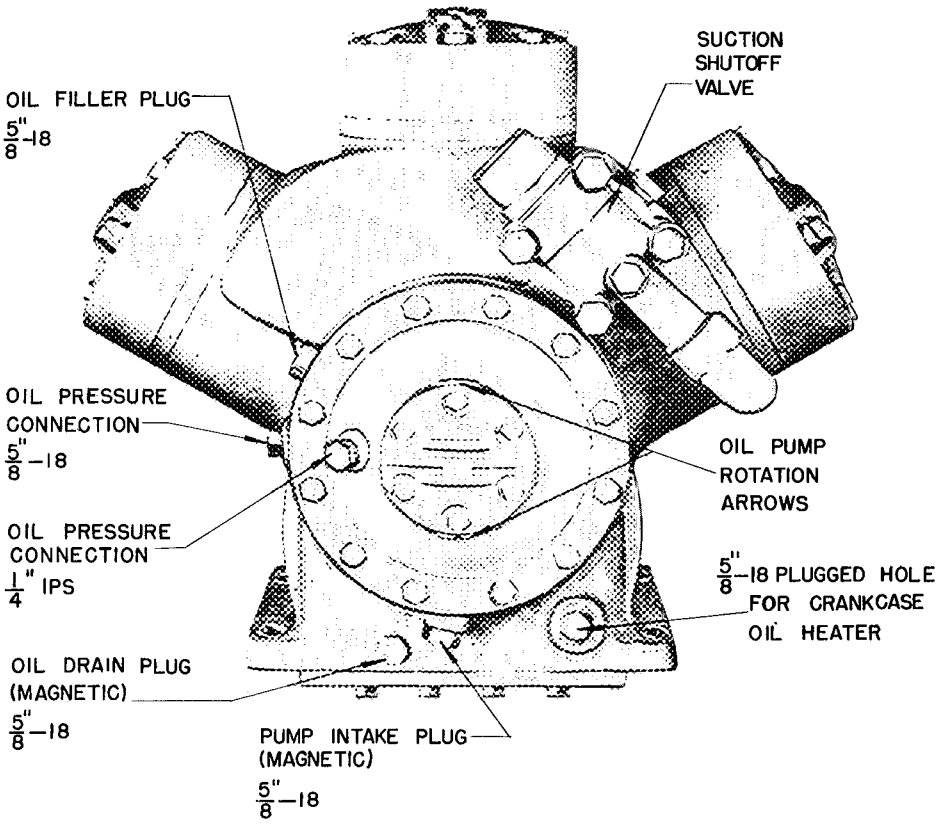


FIG. 1 — 5F20 COMPRESSOR (SIDE AND PUMP END VIEW)



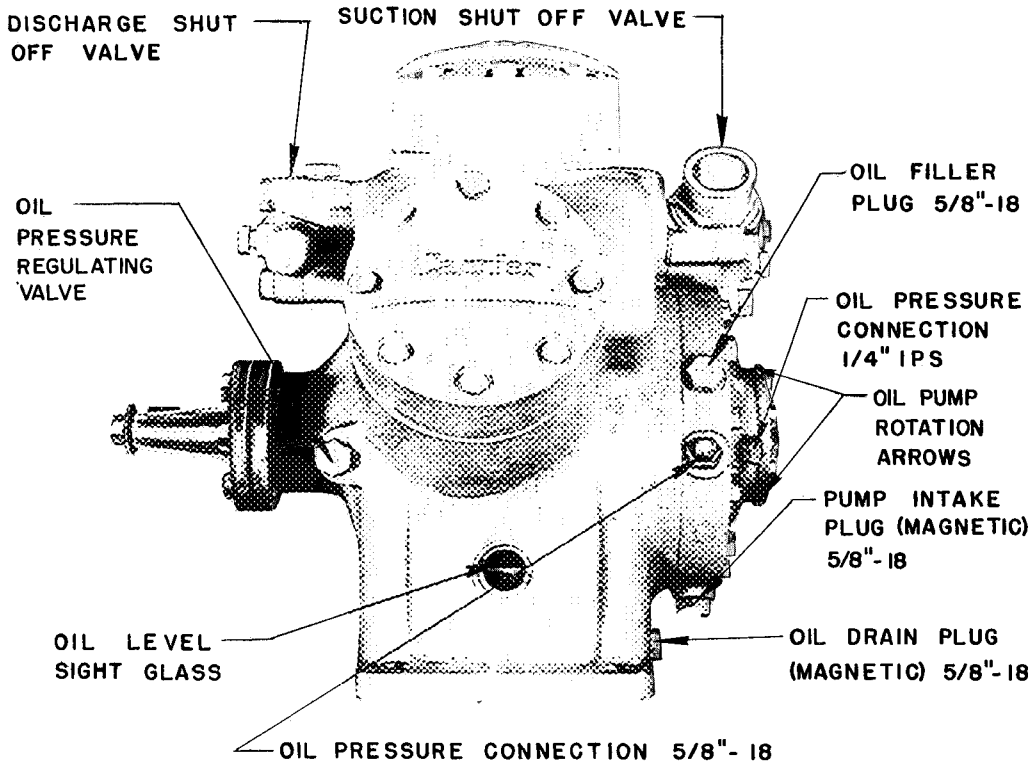
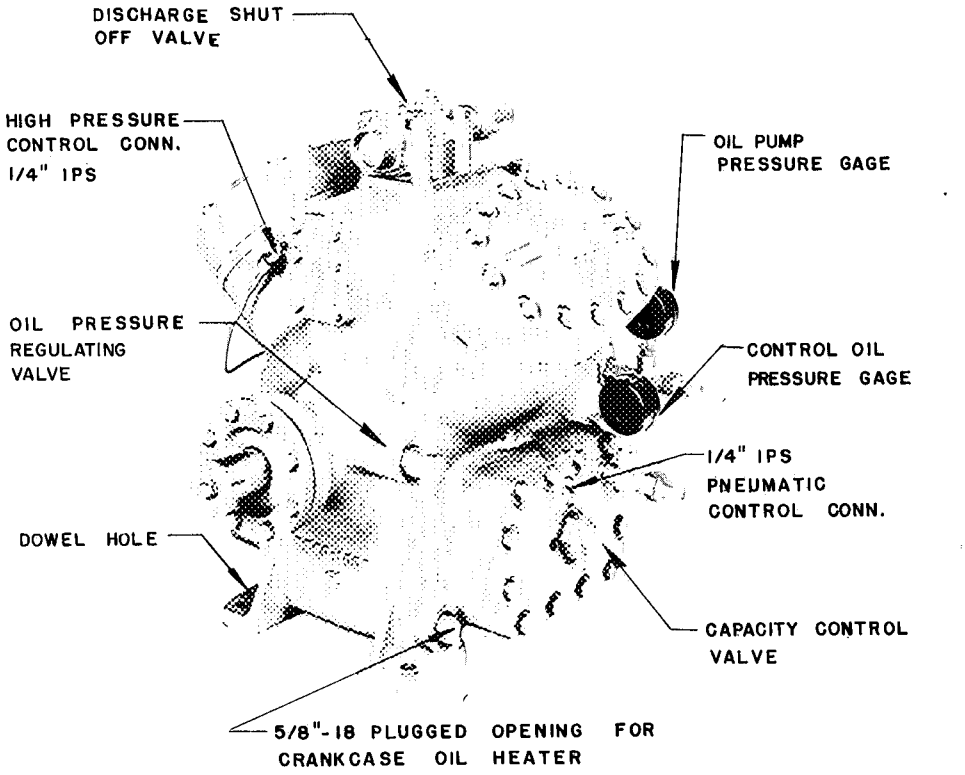


FIG. 2 — 5F30 COMPRESSOR (SIDE AND PUMP END VIEW)



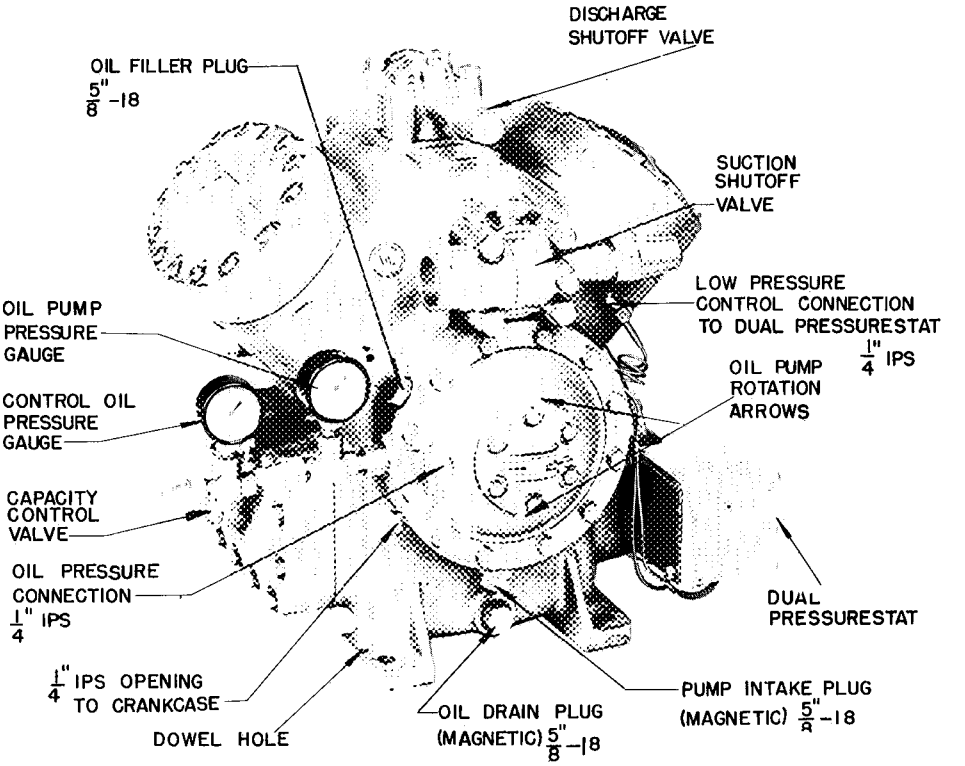
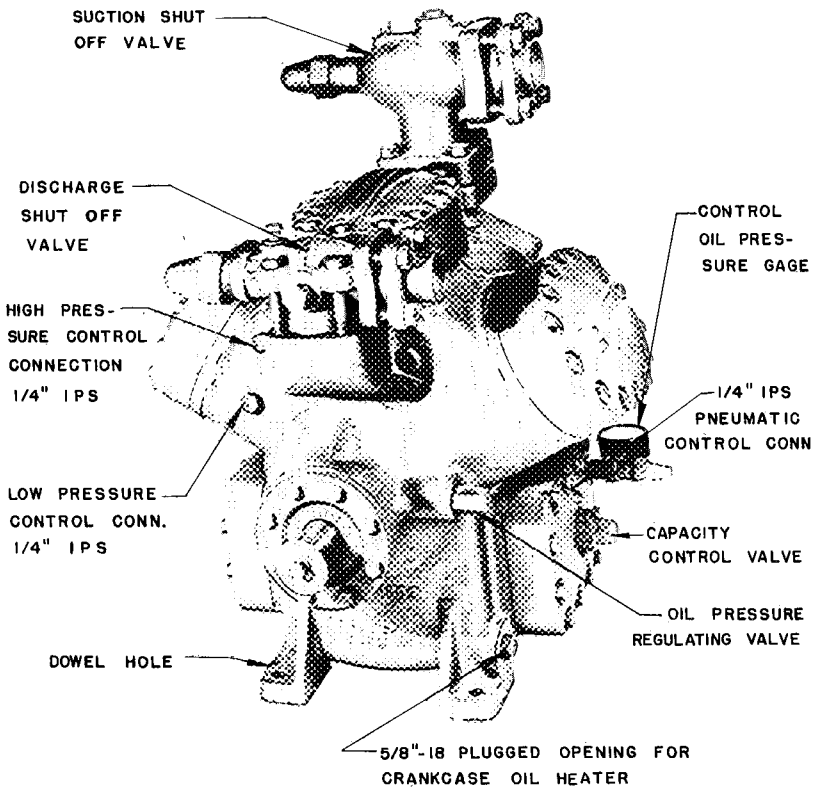


FIG. 3 — 5F40 COMPRESSOR (SIDE AND PUMP END VIEW)



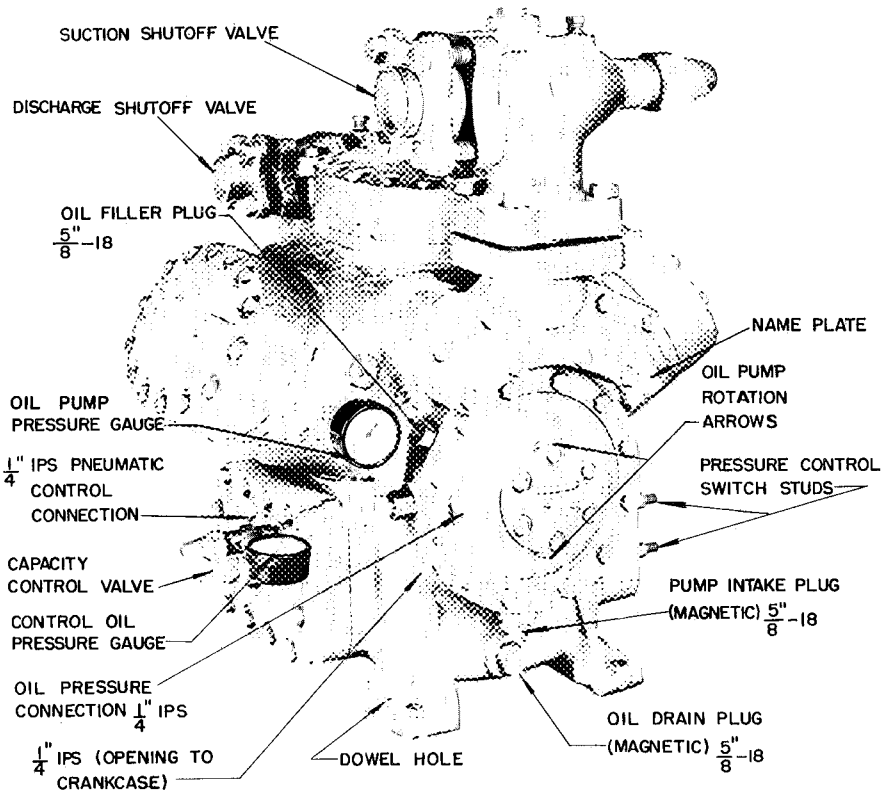
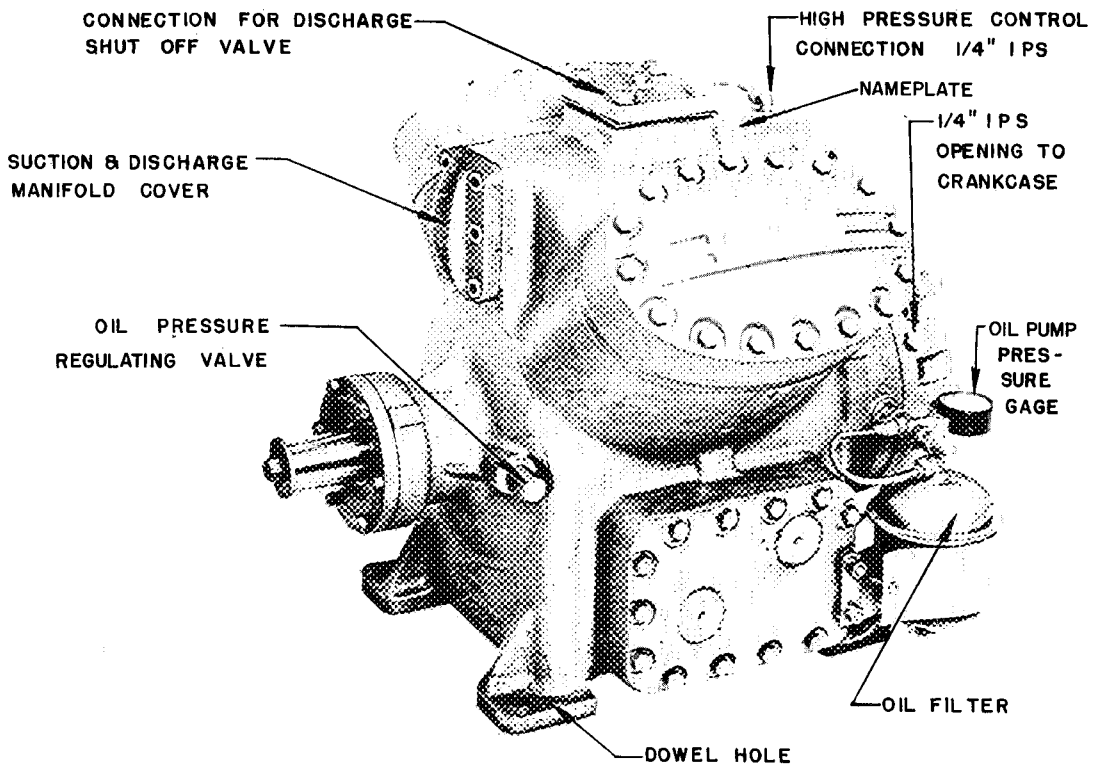


FIG. 4 — 5F60 COMPRESSOR (SIDE AND PUMP END VIEW)



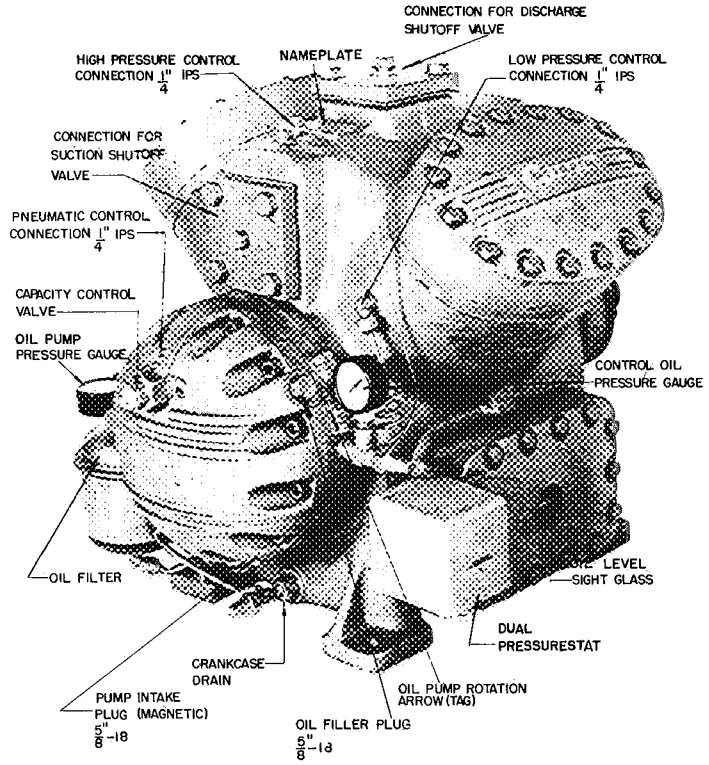
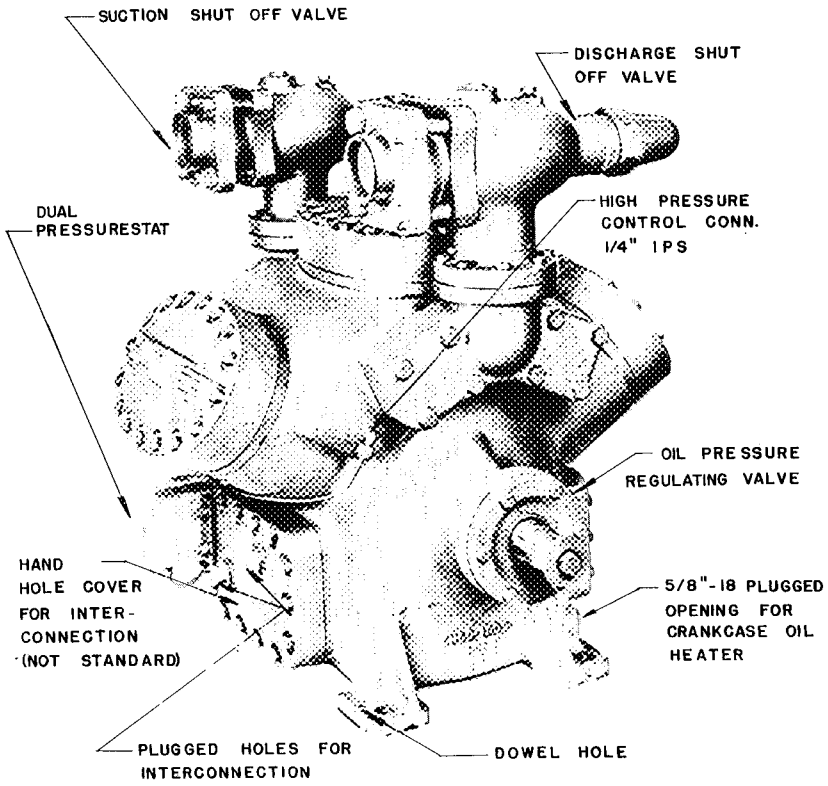


FIG. 5 — 5H40 COMPRESSOR (SIDE AND PUMP END VIEW)



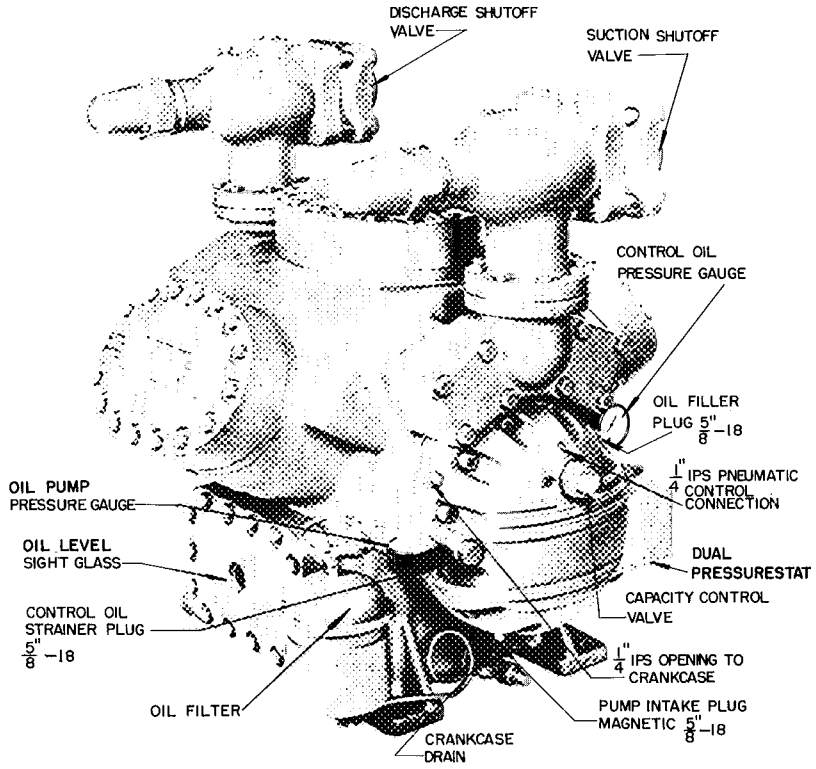
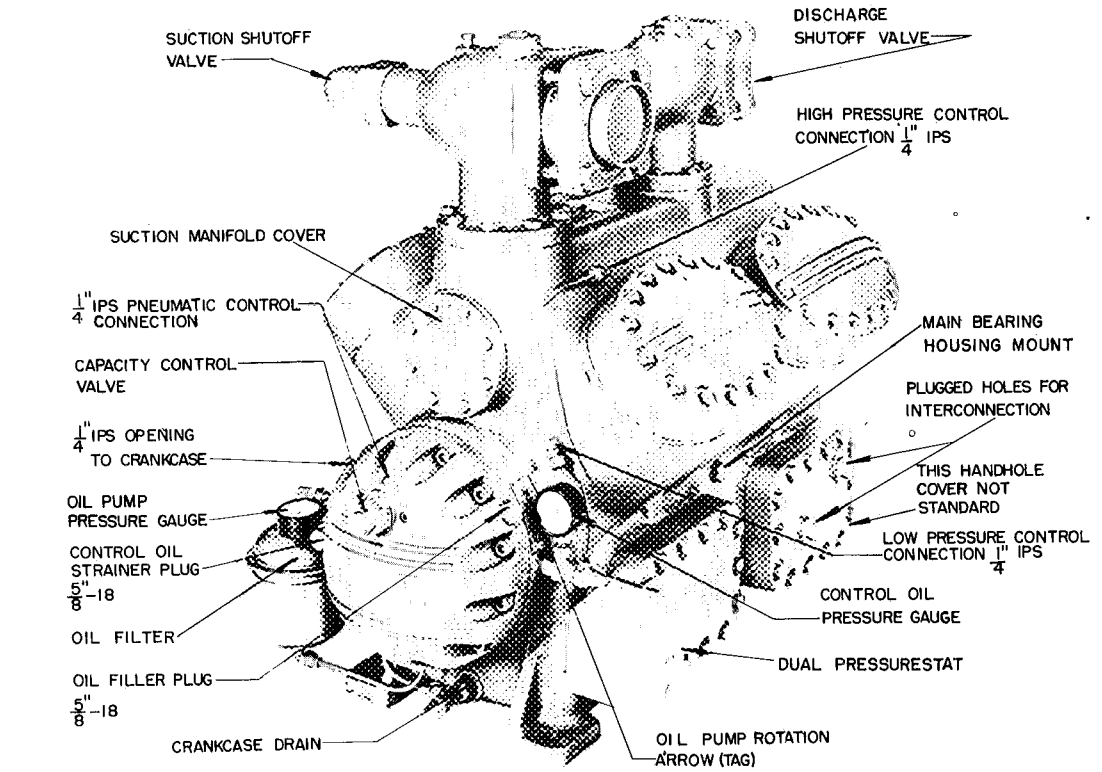


FIG. 6 — 5H60 COMPRESSOR (SIDE AND PUMP END VIEW)



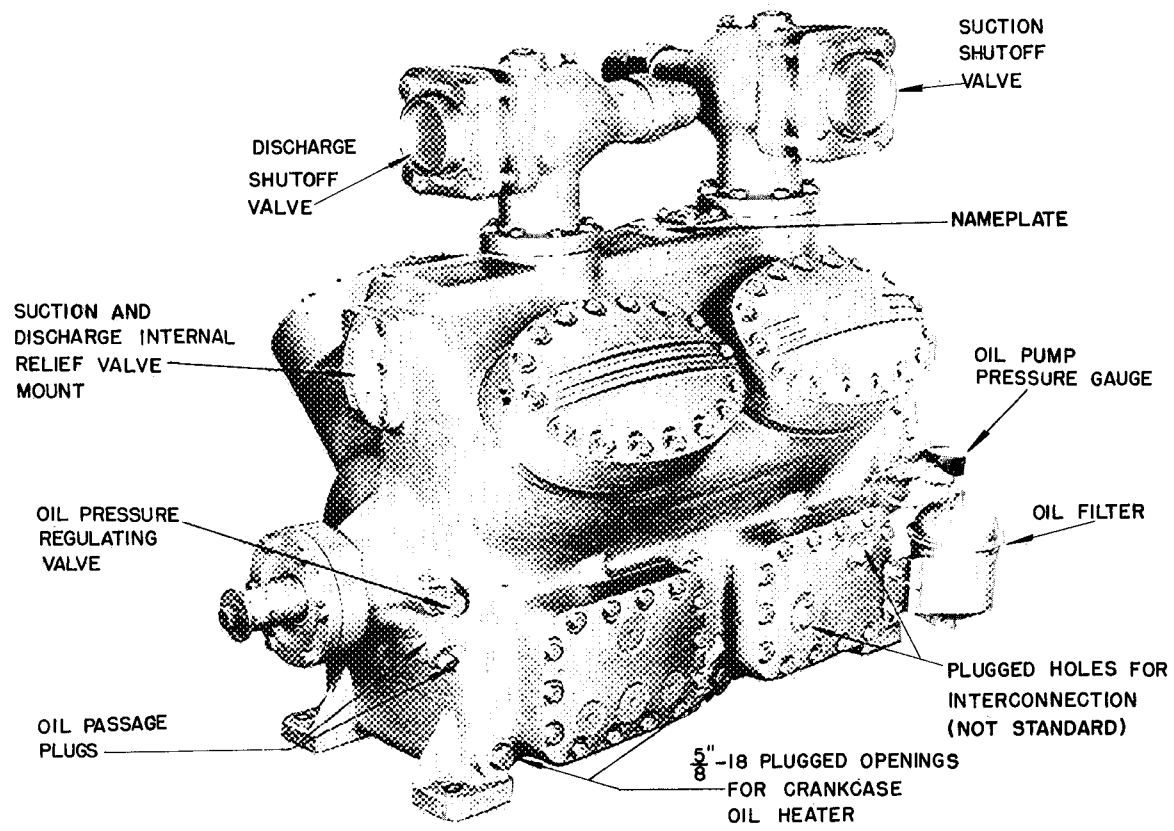


FIG. 7 — 5H80 COMPRESSOR (SIDE AND PUMP END VIEW)

Carrier

TABLE 1 — 5F & 5H FREON COMPRESSOR SPECIFICATIONS

UNIT		5F20	5F30	5F40	5F60	5H40	5H60	5H80
Nominal Horsepower		5	7 1/2	10	15	25	40	50
No. of Cylinders		2	3	4	6	4	6	8
Bore, In.		2-1/2	2-1/2	2-1/2	2-1/2	3-1/4	3-1/4	3-1/4
Stroke, In.		2	2	2	2	2-3/4	2-3/4	2-3/4
Maximum RPM		1750	1750	1750	1750	1750	1750	1750
Min. Speed in RPM	For Unldr. Operation	600	700	800	900	800	900	1100
	For Lubric.	400	400	400	400	400	400	400
Recommended Oil press., psi		45-55	45-55	45-55	45-55	45-55	45-55	45-55
Net Wt. of Compressor only, Lb.		175	215	290	360	520	710	1000
Comp. Suct. Gas Conn. Size, In.		1-3/8 ODF	1-5/8 ODF	2-1/8 ODF	2-1/8 ODF	2-5/8 ODF	3-1/8 ODF	3-5/8 ODF
Comp. Disch. Gas Conn. Size, In.		1-1/8 ODF	1-3/8 ODF	1-3/8 ODF	1-5/8 ODF	2-1/8 ODF	2-5/8 ODF	3-1/8 ODF

TABLE 2 — 5F & 5H WATER COOLED CONDENSER SPECIFICATIONS

CONDENSER SIZE	5F20	5F30	5F40	5F60	5H40	5H60	5H80
Nominal Tonnage	5	$7\frac{1}{2}$	10	15	25	37	50
No. of Passes	6 or 12	8 or 16	4 or 8	4 or 8	4 or 8	4 or 8	4 or 8
Shell OD, In.	7	7	$8\frac{5}{8}$	$8\frac{5}{8}$	$10\frac{3}{4}$	$12\frac{3}{4}$	$12\frac{3}{4}$
Overall Cond. Lgth., In.	$41\frac{1}{2}$	49	63	74	77	$79\frac{1}{2}$	$95\frac{1}{4}$
Water Conn., In.	2 - $\frac{3}{4}$ MPT 1 - 1 MPT	2 - $\frac{3}{4}$ MPT 1 - 1 MPT	2 - $1\frac{1}{4}$ FPT 1 - $1\frac{1}{2}$ FPT	2 - $1\frac{1}{4}$ FPT 1 - $1\frac{1}{2}$ FPT	2 - $1\frac{1}{2}$ FPT 1 - 2 FPT	2 - 2 FPT 1 - 3 FPT	2 - 2 FPT 1 - 3 FPT
Refr. Inlet Conn. Size, In.	$1\frac{1}{8}$ & $1\frac{3}{8}$ OD	$1\frac{3}{8}$ OD	2	2	$2\frac{1}{2}$	3	3
Refr. Outlet Conn. Size, In.	$\frac{5}{8}$ ODF	$\frac{5}{8}$ ODF	$\frac{7}{8}$ ODF	$1\frac{1}{8}$ ODF	$1\frac{3}{8}$ ODF	$1\frac{3}{8}$ ODF	$1\frac{5}{8}$ ODF
Fusible Union Size, In.	$\frac{3}{8}$ M Fl.	$\frac{3}{8}$ M Fl.	$\frac{1}{2}$ M Fl.	$\frac{1}{2}$ M Fl.	$\frac{5}{8}$ M Fl.	$\frac{5}{8}$ M Fl.	$\frac{5}{8}$ M Fl.
Water Drain & Vent Plug Size, In.	-	-	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{3}{8}$
Max. Storage Cap., Lbs. of F-12	41	44	78	88	139	187	233
Operating Charge, Lbs.	4	4	14	16	24	36	45
Condenser Type	Shell & Coil	Shell & Coil	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube

LOCATING THE EQUIPMENT

SPACE FOR SERVICING

Leave room enough around the compressor and motor so they can be serviced. Allow head room enough so that cylinder heads and valve plates may be removed. Allow room at the pump end of the compressor (opposite the motor coupling or flywheel) approximately equal to the overall length of the compressor so that the crankshaft may be removed, if necessary. In locating the condenser allow room for cleaning and replacing tubes.

MACHINERY ROOM TEMPERATURES

The compressor should be located in a well ventilated space; as is usually required by codes. If natural ventilation is inadequate or cannot be supplied through windows and doors, forced ventilation through ductwork should be provided.

On pressure controlled commercial refrigeration and air conditioning jobs, the compressor should be located where it is warmer than the evaporator during shut-down periods. Otherwise, the pressure at the compressor will be less than at the evaporator and this will prevent the pressurestat from starting the compressor.

Be sure to protect water cooled condensers, water lines, and accessories from freezing damage during either winter shutdown or operation.

FLOOR STRENGTH

If the compressor is located on a floor of medium or light construction, it should be supported by the joists or beams under the floor in order to take full advantage of their strength and rigidity. When floors are weak or inadequate, supplementary floor supports must be provided. These supports should not contact the weaker floor between supports as this would tend to transmit vibrations to a larger surrounding area.

CONCRETE FOUNDATIONS

If the machine is to be mounted on a concrete foundation, it should be heavy enough to absorb operating vibrations. As a rule, the concrete foundation should weigh 1 to 2 times the total weight of the machinery it supports. Good concrete will weigh around 150 lbs. per cubic foot. To insure proper isolation locate a concrete foundation not less than 6" from footings of building walls or columns.

CODES

The location and installation of these machines should be in accordance with local and other code requirements. Reference is made to ASA-B9, American Standards Association's "Mechanical Refrigeration Safety Code."

INSTALLATION OF COMPRESSOR UNITS

VIBRATION ISOLATORS

It is recommended that vibration isolators be used in mounting all units having steel bases. In addition to providing more quiet operation, vibration isolators will make allowance for slight irregularities in mounting which otherwise might result in distortion of the base and drive. Selection and rating data for vibration isolators are given in 5F,H,J-51PDI and Sec. 15X-1.

MOUNTING UNITS ON VIBRATION ISOLATORS

(1) Mount the unit on a reasonably level surface.

(2) Lift one end of the base at a time and install vibration isolators.

(3) Check the compressed height of the isolators with compressor and motor in position. Use shims between isolator and floor where necessary to make isolators height equal. This serves to equalize the load on the isolators.

(4) The "Motor Fastening Set" supplied with "5" line compressor units of sizes 5F40 to 5H80 includes a number of bevel washers. These bevel washers provide a square surface for the capscrews which are used to mount the compressor base either directly on a foundation, on condenser stands, or on vibration isolators.

It is especially *IMPORTANT* that the bevel washers are installed when mounting the compressor base on vibration isolators (See Fig. 8) since the length of the capscrews are based upon use with bevel washers. Without the bevel washers the capscrew could in some cases, strike the foundations making the isolator ineffective; and if the isolator were lagged to the floor, a long bolt could possibly pull the isolator in two.

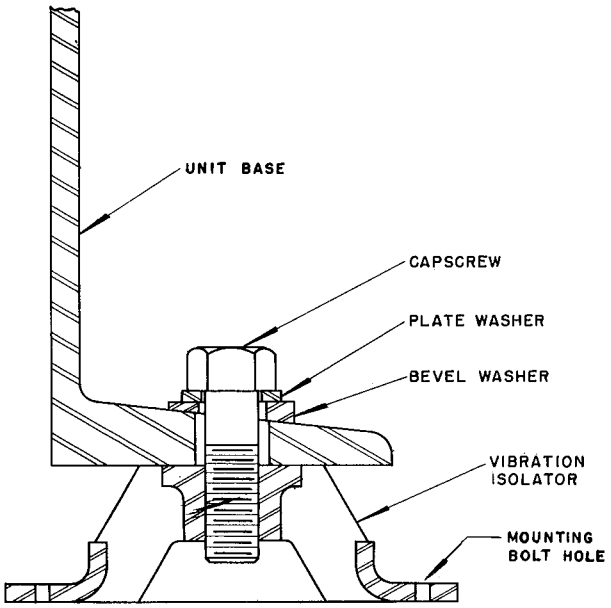


FIG. 8 — TYPICAL VIBRATION ISOLATOR MOUNTING

FLEXIBLE COUPLING ASSEMBLY AND ALIGNMENT

(A) Refer to Fig. 9 for identification of coupling parts. Couplings should be disassembled in this manner when ready to install.

(B) Clean compressor and motor shafts and motor flanges; also inspect for burrs.

(C) *Fit* compressor flange to the compressor shaft. *Do not* use bolt and flywheel washer to draw flange into place. Note that the flange has a tapered bore. After flange is in place, tighten securely with bolt and flywheel washer provided with the compressor.

(D) *Fit* motor flange to motor shaft. If necessary, fit key. Note that all parts should fit together snug but easily. Do not force. The above (B,C, & D) will prevent operating noises and excessive wear if properly performed.

(E) Before reassembling coupling measure the total amount of end play in the motor shaft. Set the motor shaft at half this measurement and mark the shaft in this position. The coupling should then be aligned with the shaft in this approximate running position.

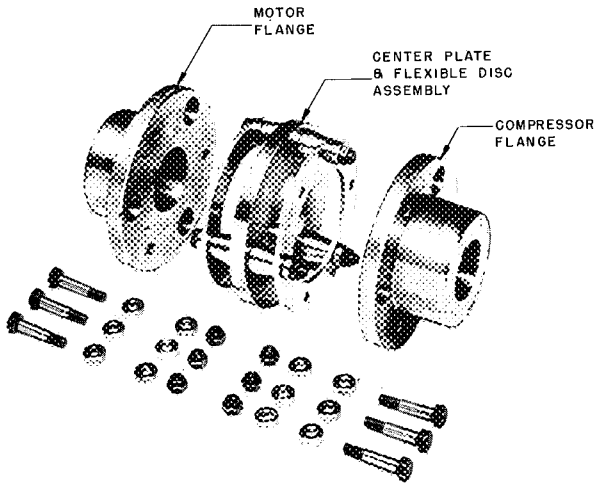


FIG. 9 — DISMANTLED COUPLING READY FOR ASSEMBLY TO COMPRESSOR AND MOTOR

(F) Reassemble coupling and check dimension "E", (the distance between flanges,) at several points around the circumference. For couplings 5F40-613 and 5F40-623, dimension "E" should be 2-7/16". In all other couplings, dimension "E" should be 2-15/16". After dimension "E" has been checked, secure the motor flange to the motor shaft with the set screws provided. Motor hold-down bolts should be loose enough to permit adjustment during alignment.

(G) Fig. 10, 11, 12 and 13 illustrate forms of aligned and mis-aligned couplings. Suggested tools for alignment are: the straight edge, inside calipers, feeler gauge and a steel rule graduated in 64ths.

(H) Fig. 13 shows the coupling with correct alignment. In this position dimensions A, B, C, and D, are all equal within 1/64 (.016"), at all points around the circumference. If these dimensions are not equal with the motor and compressor hold-down bolts tight, follow through steps J, K, and L.

(J) Angular mis-alignments should be eliminated first. Approximate angular alignment can be obtained using inside calipers to check the spacing between flanges at four similar points around the circumference. Approximate parallel alignment can be obtained by lining up flanges

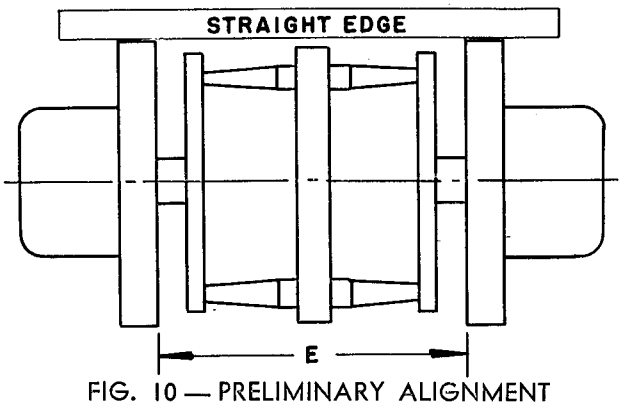


FIG. 10 — PRELIMINARY ALIGNMENT

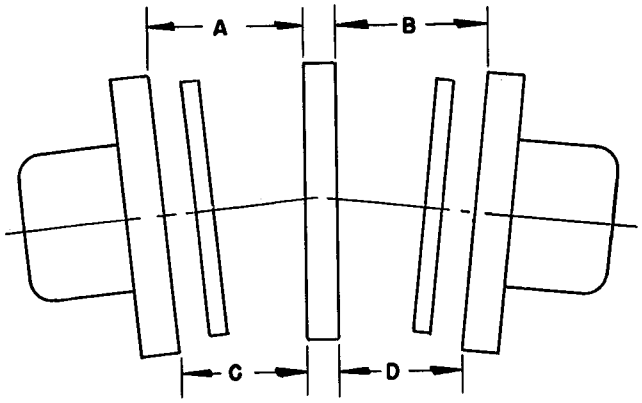


FIG. 11 — ANGULAR MISALIGNMENT

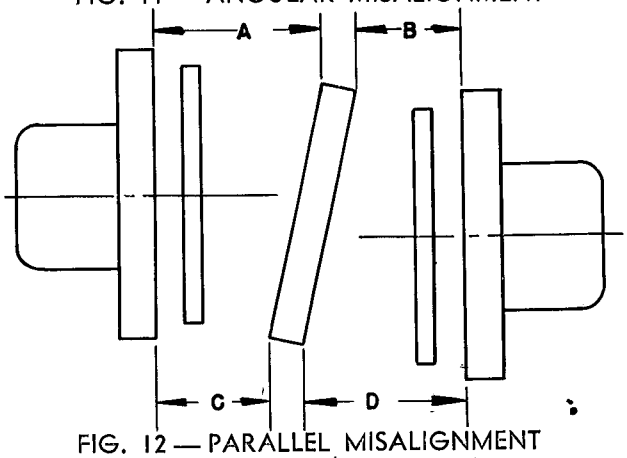


FIG. 12 — PARALLEL MISALIGNMENT

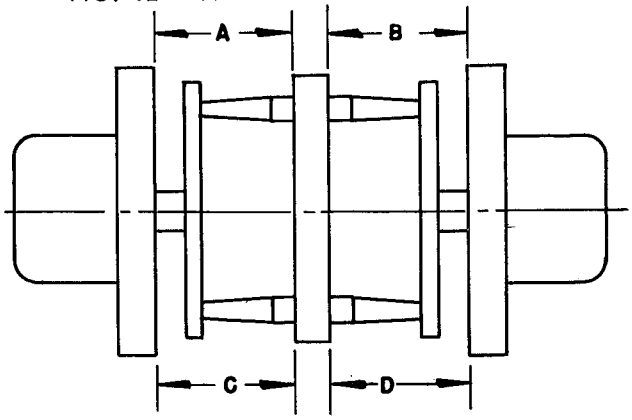


FIG. 13 — CORRECT ALIGNMENT

with a straight-edge, placed across the two flanges at four points equally spaced around the circumference.

(K) If dimensions "A" and "B" are not equal to "C" and "D" angular mis-alignment exists as in Fig. 11. If dimensions "A" and "D" are not equal to "B" and "C", there is parallel mis-alignment as in Fig. 12. All measurements are made at the outside diameter of the flanges, using a caliper and steel rule. To correct either of these conditions, move and/or shim the motor or compressor as required. Since the compressor will be bolted and doweled to the steel base, it is suggested that only the motor be shimmed. For a duplex unit it is suggested that the motor be aligned to one compressor and the second compressor may be aligned to the motor. A convenient way to compare dimensions A, B, C, and D, is to set an inside caliper at the smaller of the two dimensions and then measure the extra width at the larger dimension with a feeler gauge. All final checks must be made with the motor and compressor hold-down bolts tight.

(L) When the coupling has been aligned in accordance with the above, carefully tighten all coupling bolts and set screws. Also, be sure that both motor and compressor keys fit tightly, then check for alignment. After this initial alignment, run the unit long enough to let the motor and compressor warm up and check the alignment again. It is important that the coupling be correctly aligned, otherwise serious damage to the equipment may result.

(M) The dial indicator can be a help in correcting *parallel* mis-alignment, providing the user fully understands our limits on mis-alignment, where to measure, and what the dial indicator reading means. Because of the difficulty which would be encountered, we do not recommend that the dial indicator be used for angular mis-alignment. To determine if parallel mis-alignment exists, refer to paragraph "K" of this section. Before proceeding to use the dial indicator, the coupling should be placed in approximate alignment, using the straight-edge as in Fig. 10. Once this has been done, the dial indicator should be clamped securely to one of the flanges. See Fig. 14. We have found that a "C" clamp tightened to the hub of one of the flanges will provide an adequately stiff

member to which may be fastened the dial indicator assembly. The indicator button should be placed on the opposite flange and the indicator clamped in place, so that the dial is approximately in the middle of its travel. Further care should be taken to see that the indicator button is directed perpendicularly toward the surface of the hub.

Make sure that the indicator assembly joints are tightly clamped and that the indicator assembly, as shown in Fig. 14, is stiff. Set the indicator dial so that the pointer shows a reading of zero. Rotate the coupling and note the readings at the top and bottom and at each side. Reading the indicator while at the bottom may be facilitated by the use of a small mirror. The thickness of the shims to be used under the motor feet is one half the difference between the top and the bottom reading. The motor must be moved sideways to make the indicator reading equal on each side. For example, if the indicator is attached to the compressor flange, and the readings were as follows:

Top	0"
Bottom	+20
Right side	-10
Left side	+30

Shims - .010" would be required under the motor feet and the motor would have to be moved .020" to the right to bring the coupling into parallel alignment. Note: It is well to get the dial indicator readings as near equal as possible, since these readings do not show the total mis-alignment between the motor and compressor. After correcting for parallel mis-alignment, a check for angular mis-alignment should be made.

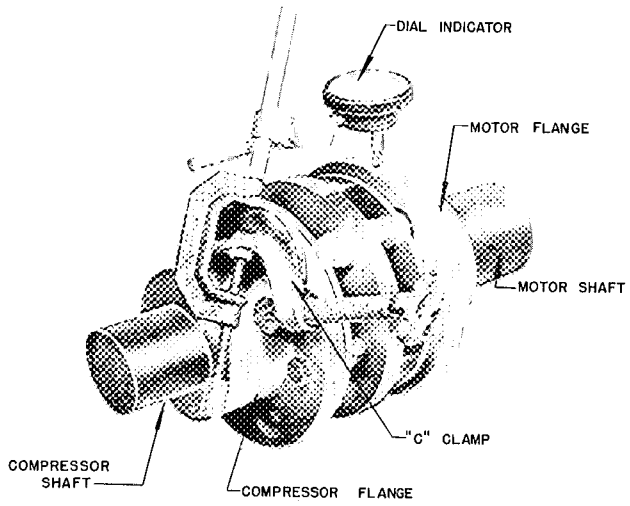


FIG. 14 — SETUP FOR MEASURING PARALLEL MISALIGNMENT WITH DIAL INDICATOR

SECURING MOTOR TO BASE

After the motor and compressor have been correctly aligned drill 9/32" holes and taper ream with #6 Taper Reamer through two diagonally opposite motor feet so that #6 X 2-1/2 taper dowel pins may be driven in. Locating the motor in this way will prevent damage to the equipment which can result from misalignment should the motor shift from its lined-up position. It is not necessary to dowel the motors to the base in the case of the 5F20 and 5F30 units. These machines are belt driven so the motors should be movable in order to take up belt slack.

INSTALLATION OF BELT DRIVEN COMPRESSORS ON A CONCRETE BASE

REFERENCE DATA

Drawings and tables are included at the end of this section which give dimensions required in constructing concrete foundations and making up foundation templates. This material also provides drive data including motor pulley and belt details for various compressor speeds.

SETTING THE EQUIPMENT

(1) The foundation must be thoroughly dry before mounting the motor or compressor, allow about 3 days for concrete to set.

(2) Set the compressor down over the foundation bolts and level, both along the line of the shaft and at right angles to it. A suggested method is to remove the discharge stop valve and use the face of the flange on the compressor as a leveling pad.

(3) In leveling the compressor, make allowance for pouring a grout of 3/8" to 1/2" deep on the foundation. After leveling, the foundation bolts should be made hand tight. Do not use a wrench.

(4) Locate motor on slide rails on the foundation. Tighten hold down bolts hand tight.

(5) To prevent belt side thrust level the motor shaft by locating shims under the motor feet.

GROUTING

(1) The foundation form should be constructed so that it will extend far enough above the top of the foundation to hold a grout 3/8" to 1/2" deep.

(2) Suggested grouting is a mixture of 1 part Portland Cement and 2 or 3 parts of clean sharp sand with sufficient water added to give a consistency of heavy cream, or so it will pour easily.

(3) The concrete foundation should be thoroughly wetted before the grout is poured.

(4) The grout should be well tamped, so that it fills all spaces between the foundation and the machinery. Pour sufficient mixture to provide a grout 3/8" to 1/2" deep.

(5) The grout may be smoothed up after drying for several hours.

(6) Allow 24 to 36 hours for grouting to harden before permanently tightening foundation bolts with a wrench. Moderate tightening is all that is required; too much strain on the bolts may result in misalignment.

ALIGNMENT OF BELT DRIVEN COMPRESSORS

ALIGNMENT PROCEDURE

(1) Clean the motor and compressor shafts and the bore of the flywheel and motor pulleys using emery cloth as required.

(2) Install the motor pulley and compressor flywheel. See that keys fit tightly along the sides and that the pulley and flywheel are properly secured to the shafts.

(3) Install belts by sliding the motor on its rails until the belts slip easily into grooves.

(4) Move the motor back into place by means of the adjusting bolts until the belt slack has been taken up.

(5) Line up the flywheel and motor pulley (Fig. 15, 16 & 17) using a straight edge or string so that the shafts are parallel and the belt grooves in the same straight line. Alignment may also be checked by placing a length of round rod in the belt grooves.

(6) A belt guard should be erected to cover the flywheel, motor pulley, and belts. The sides and top of this guard may be made of solid sheet steel for rigidity and protection. The end or front of the guard may be made from expanded metal mesh or perforated sheet metal to allow the passage of air necessary for cooling the motor. Allow at least 2" clearance in all directions between the belt guard and the flywheel, bolts and pulley. Brace the belt guard firmly so that it cannot be pushed into contact with the moving parts. Parallel and angular misalignment illustrated in Figs. 15, 16, 17 will result in excessive belt wear and added thrust on motor bearings.

BELT TENSION

A generally applicable rule for correct tension is difficult to state. The aim should be to run the belts with just enough tension to avoid slippage either at start or during operation. One method is to loosen belts just to the point that slippage occurs at start (usually evidenced by belt squeal) then tighten up just enough to eliminate the slippage.

Some experienced operators judge belt tension by the amount a single belt can be depressed at the center of span with one finger. Only experience can properly evaluate this test but as a guide a large belt on a 24" span should deflect about an inch. Lighter belts or longer spans should deflect proportionately more.

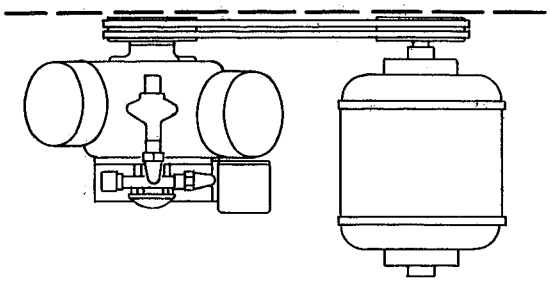


FIG. 15 — CORRECT BELT ALIGNMENT

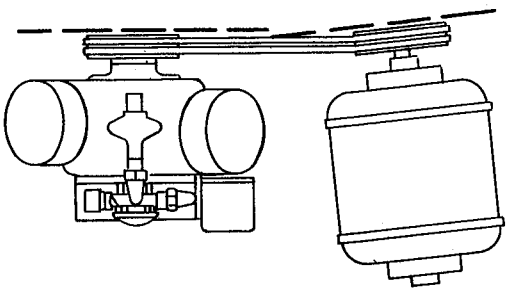


FIG. 16 — ANGULAR MISALIGNMENT

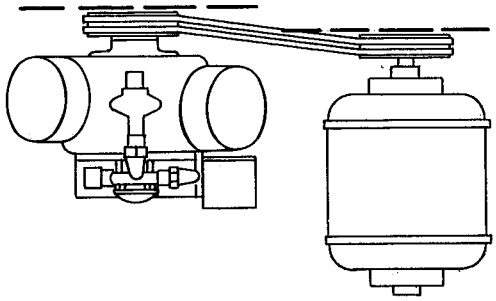


FIG. 17 — PARALLEL MISALIGNMENT

INSTALLATION OF CONDENSERS

PROCEDURE

The following steps outline the proper procedure for field assembly of condenser packages to compressor units:

(1) Set up the two cast-iron stands in their correct location. The distance "C" between the tapped holes on the top face of the stands should be equal to the distance between the holes in the lower flange of the compressor unit base. Fig. 18 illustrates condenser assembled to stands.

(2) The lower straps should be loosely bolted to the lower side of each condenser stand. Note that for some units the upper condenser strap is slightly deeper than the lower strap.

(3) Place the condenser on the stands with the front water head at the compressor end of the base. The hot gas inlet should face directly upward, and the condenser should overhang the stands by about the same distance at each end.

(4) Assemble the upper condenser straps loosely.

(5) Place the compressor unit on top of the condenser stands and bolt down using the cap-screws and lockwashers provided.

(6) Loose connect the compressor discharge line and adjust the condenser so the discharge line flange is in line with the condenser inlet.

(7) Place the strips of fabrica provided between the lower support straps and the condenser.

(8) Tighten the lower support strap bolts enough to lift the condenser off the stands.

(9) Bolt the discharge line to the condenser using the gasket, cap screws and washers provided. Adjust the condenser as required to prevent distortion of the discharge line.

(10) Place fabrica strips between the condenser and the upper straps. Tighten the upper strap bolts to secure the condenser to the stands.

Condenser assembly procedure for type 5F20 and 5F30 condensing units is similar to the above. For these units only lower straps are required. Place the extra fabrica strips provided between the top of the condenser and the base.

CONDENSER WATER PIPING

The water piping for the 5 series water cooled condensers may be arranged for either series or parallel pass operation. Fig. 19 illustrates series pass connection. This is the common method of connection to city water supply and where ample water pressure is available. Fig. 20 shows parallel connection. This arrangement is used where city water pressure is low or where a cooling tower is used.

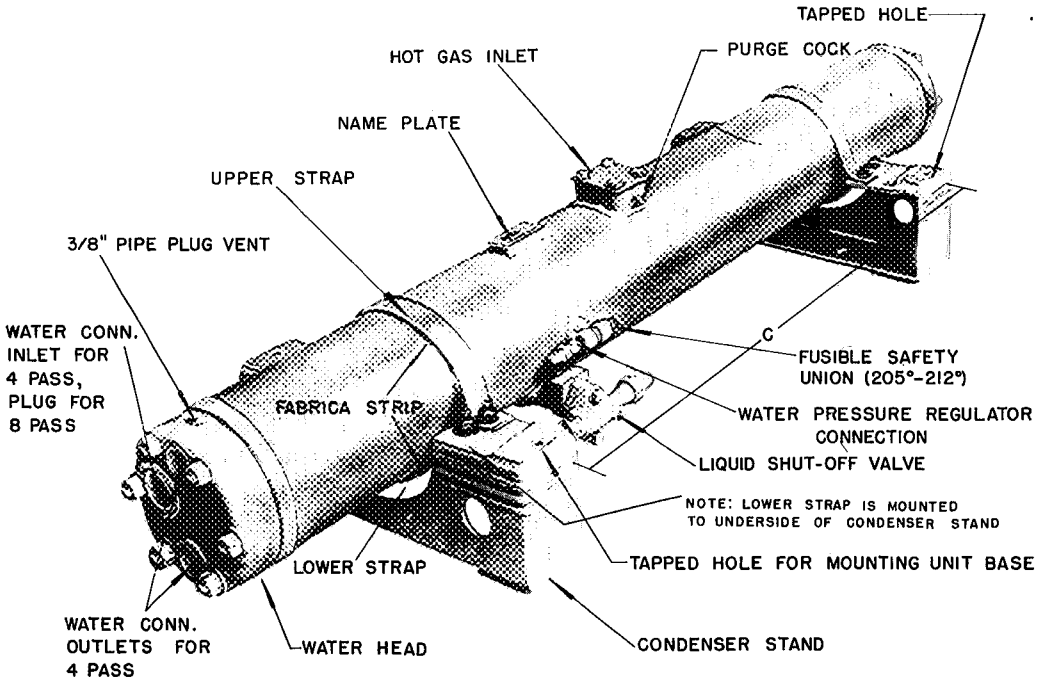


FIG. 18 — ASSEMBLED CONDENSER PACKAGE

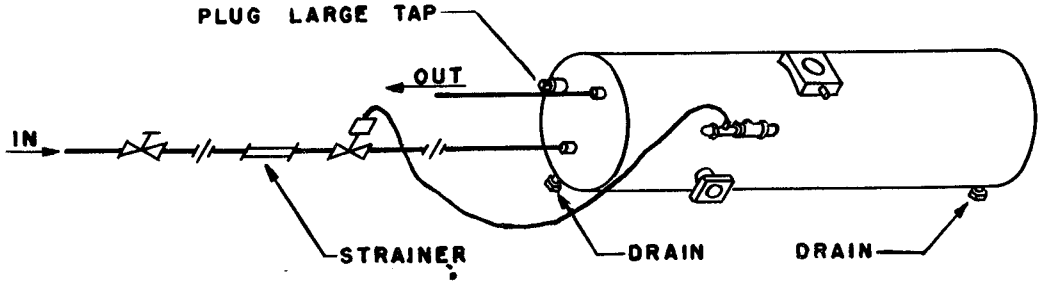


FIG. 19 — SERIES PASS CONNECTION

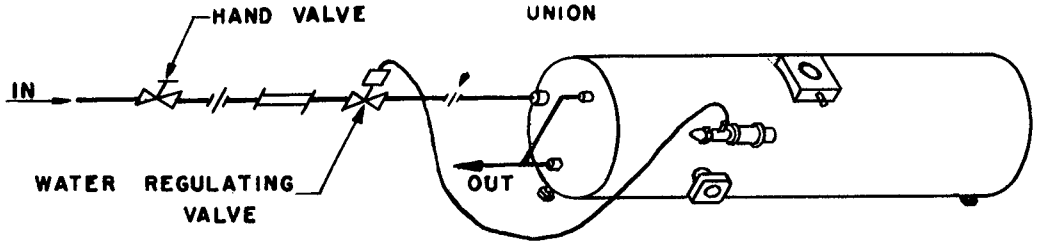


FIG. 20 — PARALLEL PASS CONNECTION

INSTALLING AND WIRING ELECTRIC MOTORS

LUBRICATION

Before starting the motor see that it is properly lubricated.

Some motors are equipped with oil wells, some with grease fittings and others with sealed bearings; therefore, it is advisable to observe motor manufacturers' instructions which are attached to the motor.

Most ball bearing motors are provided with a grease relief plug. This plug should be removed when the motor is lubricated in order to prevent grease from being forced into the motor beyond the bearing.

Sleeve bearing motors are commonly provided with an oil ring. This should be checked at time of installation to be sure it has not been displaced from its groove.

ROTATION

The normal direction of electric motor rotation is clockwise when viewed from the shaft end.

Before operating the compressor, turn the motor over briefly in order to check its direction of rotation.

The direction of rotation for all compressors with a manually reversible oil pump is shown by an arrow. This arrow is cast on the top of the pump cover on 5F compressors and is printed on a plate attached to side of the pump end bearing housing on 5H compressors.

The direction of rotation for all compressors with an automatic reversing oil pump can be in either direction. *No arrow will appear on these machines.*

IMPORTANT: To reverse rotation of compressors with manually reversible oil pumps, see instructions under "Compressor Lubrication".

Wherever possible belt drives should be operated with the slack on top to give the maximum arc of belt contact.

OVERLOAD PROTECTION

A combination safety switch and fuse block for cartridge fuses should be installed in the circuit.

Thermal overload should be included in all starting equipment whether manually or automatically controlled, fuses alone will not provide necessary protection. Fuses will give protection against high momentary current but are sized too large to protect motors from overloading.

In case the motor burns out, the motor manufacturer normally assumes no responsibility unless the motor has proper thermal protection.

All electrical wiring should be done in accordance with any electrical codes which apply.

INSTALLATION OF ACCESSORIES

SPECIAL HAND HOLE COVER PLATES

Type 5F and 5H compressors, 5F40 and larger, have removable hand hole covers. Crankcases may be interconnected by removing the standard hand hole cover plate and replacing it with a special plate which is shown in Fig. 21. This special cover plate has tapped connections for both oil and gas equalization. 5F20 and 5F30 compressors are not fitted with standard provisions for interconnection, but may be drilled and tapped as indicated in Fig. 22.

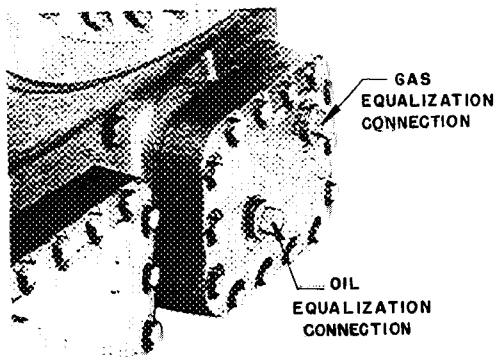


FIG. 21 — SPECIAL HAND HOLE COVER PLATE FOR INTERCONNECTION

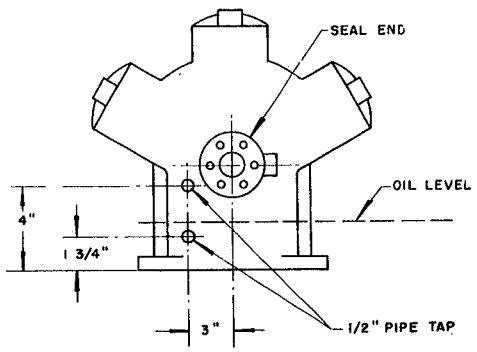


FIG. 22 — LOCATION OF CRANKCASE INTERCONNECTION TAPPINGS — 5F20 & 5F30 COMPRESSORS

OIL SAFETY SWITCH (5F20-933)

DESCRIPTION

The Oil Safety Switch Package 5F20-933 contains the following:

1 HK06BA-102 Differential Pressure Switch
1 HN68AD-006 Time Delay Relay
1 HN71AZ-131 Heater Coil
1 HT01AC-150 Transformer
2 DD07DA-051 Couplings 1/4 MPT x 1/4 M Flare
4 DD01CA-051 Flare Nuts 1/4 OD
1 5F20-1311 Adapter 1/4 FPT x 5/8 - 18 MPT
1 AU51YA-011 Adapter Gasket
1 5F20-271 Instruction Packet

This package is applicable to 110, 208 or 220, 440 and 550 volts AC applications. For 230 volt DC replace the transformer with a 160 ohm resistor. (Package 5F20-943, Resistor HT21AM-180 is supplied in place of transformer and differential pressure switch HK06BA-102 is replaced by HK06BA-103 which is a DC switch).

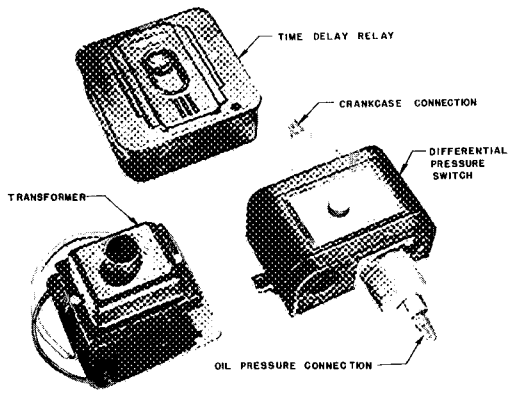


FIG. 23 — COMPONENTS OF PACKAGE 5F20-933

OPERATION

The purpose of this safety device is to protect the compressor in case of insufficient oil pressure.

The Differential Pressure Switch in the 5F20-933 package is normally closed. It is set to open when the pump oil pressure exceeds the crankcase pressure by about 18 pounds per square inch and to close at approximately 10 pounds per square inch.

The two contacts in the Time Delay Relay are normally closed. Current flowing through the Heater Coil for approximately 30 seconds will open them.

The operation is as follows:

An automatic starting device energizes the compressor motor starter and the transformer, thereby causing current to flow through the Heater Coil in the Time Delay Relay.

If satisfactory oil pressure is obtained, the Differential Pressure Switch will open, breaking the flow of current through the Heater Coil.

If satisfactory oil pressure is *NOT* obtained the continued flow of current through the Heater Coil will cause the Time Delay Relay to open, thereby de-energizing the holding coil on the motor starter and stop the compressor. When the system has been shut down in this manner it will be necessary to manually restart by pressing the reset button on the Time Delay Relay.

If, at any time during operation of the system, the oil pressure falls below the set minimum, the Differential Pressure Switch will close, causing current to flow through the Heater Coil. If the oil pressure then remains low for 15 to 60 seconds, the Time Delay Relay will open, and the compressor will stop.

INSTALLATION

The Differential Pressure Switch should be located close to the compressor to keep oil lines short. Provide a firm mounting so that vibration will not break electrical connections and damage internal parts. Check to be sure oil pressure is 45-55 pounds per square inch above suction pressure before installing the switch, then pump down the compressor. Locating the switch above the oil level will help keep sediment out of the switch bellows.

To install the switch on a 5F compressor, remove the oil fill plug and replace with an adapter gasket and 1/4" coupling. Then connect the crankcase pressure side of the switch to this coupling. Remove the 1/4" pipe plug on the pump end bearing head and insert a coupling. Connect the oil pressure side of the differential switch to this coupling.

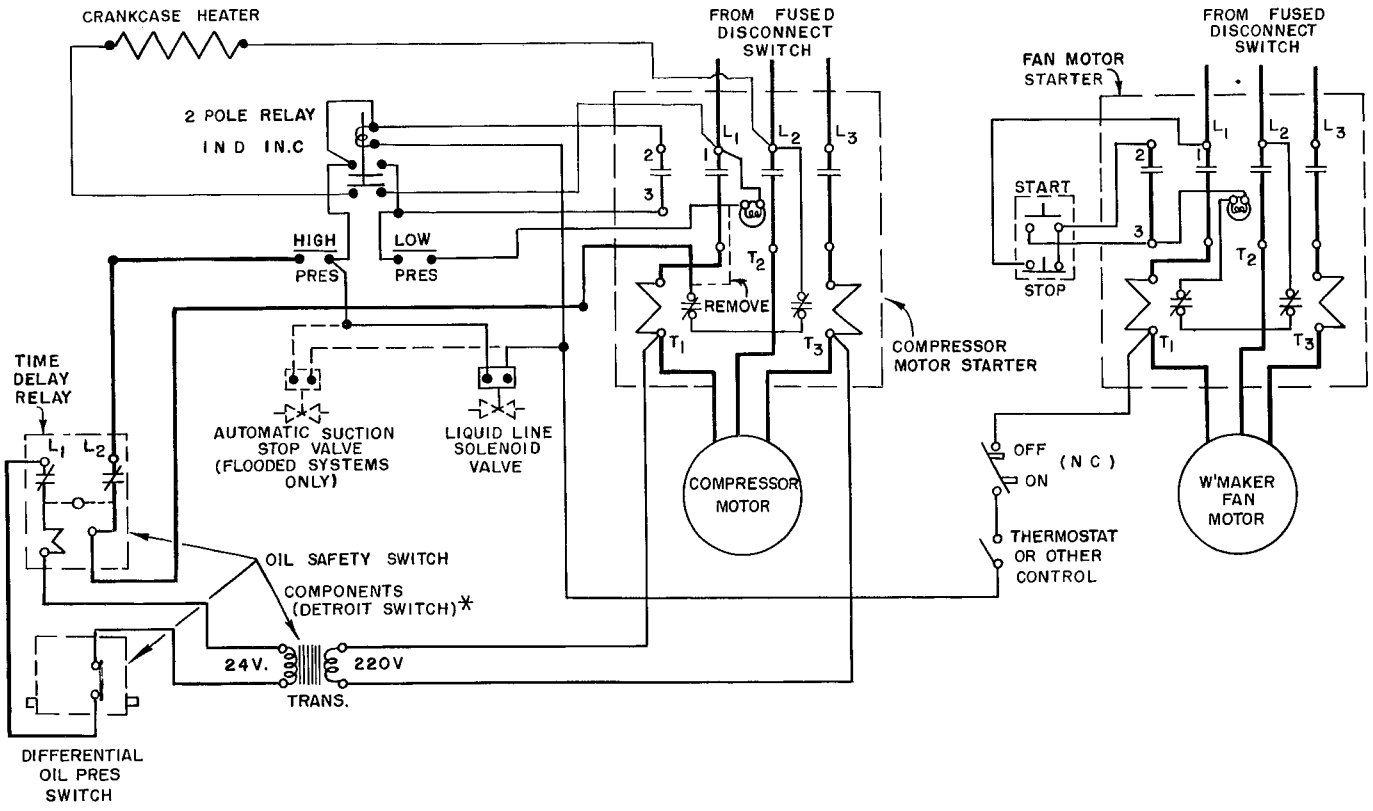


FIG. 24 — WIRING DIAGRAM — 5F20-933

To install the switch on the 5H compressors, remove the 1/4" pipe plug on the periphery of the capacity control end bell and replace it with a 1/4" coupling (pipe thread). Connect the crankcase pressure side of the switch to this coupling. Remove the control oil strainer plug and replace with an adapter, gasket and coupling. Connect this coupling with the oil pressure side of the switch.

NOTE: Make the following changes in the above instructions when installing the switch on a compressor manufactured previous to 1950 (a compressor that has old type pump end bearing head).

On the 5F40 and 5F60 machines connect the oil pressure side of the switch at 5/8"-18 control oil pressure connection by replacing it with the proper adapter, gasket and coupling.

On the 5H machines connect the crankcase side of the differential switch at the oil fill plug, by removing the oil fill plug and replacing with the proper adapter, gasket and coupling. An additional adapter will be necessary when making installation on older machines.

TESTING

Check to be sure wire and pipe connections are tight. Test the switch by holding the Differential Pressure Switch closed with the compressor running. The compressor should stop in approximately one minute. After making this test it will be necessary to reset the heater switch. As an additional check with a controlled source of pressure to operate the Differential Pressure Switch and check operation as above. Be sure the Differential Pressure Switch closes when the compressor is shutdown.

WARNING

DO NOT by-pass or manually control the differential pressure switch in order to operate the compressor. If the oil failure switch operates to stop the compressor it is a signal that something is wrong. In order to protect the compressor from serious damage, a serviceman should find the trouble which caused the oil failure switch to operate before the compressor is restarted for normal operation.

OIL SAFETY SWITCH (5F20-933-2)

DESCRIPTION

The Oil Safety Switch Package 5F20-933-2 contains the following:

1 HK06BA-108 Differential Pressure Switch
2 DD07DA-051 Couplings 1/4 MPT x 1/4 M Flare
4 DD01CA-051 Flare Nuts 1/4 OD
1 5F20-1311 Adapter 1/4 FPT x 5/8 - 18 MPT
1 AU51YA-011 Adapter Gasket
1 5F20-271 Instruction Packet

The differential pressure switch in this package contains the pressure switch, time delay relay and heater coil. A transformer is not required with this package for voltages of 115, 208 or 230 volts AC or DC. For 440 and 550 volt AC a step down transformer should be provided to supply 115 to 230 volts for the control circuit. On 230 volt DC the switch is suitable up to a maximum of 57.5 volt amps.

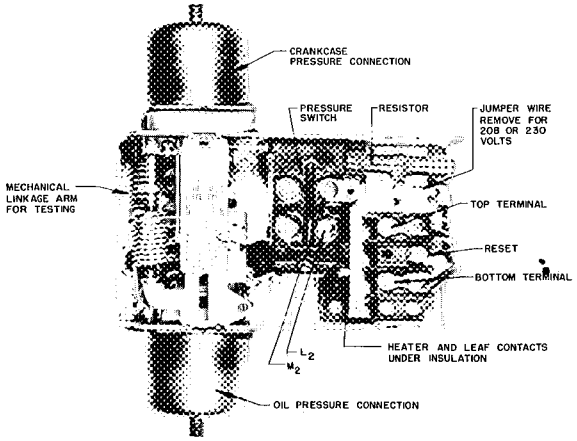


FIG. 25 — DIFFERENTIAL PRESSURE SWITCH (PACKAGE 5F20-933-2)

OPERATION

The purpose of this Safety device is also to protect the compressor in case of insufficient oil pressure.

The switch in the 5F20-933-2 package is factory set to open when the pump oil pressure exceeds the crankcase pressure by about 18 pounds per square inch and to close at a differential pressure of about 10 pounds per square inch, It should not be adjusted in the field. Oil pressure is transmitted through the bellows to a mechanical linkage. This linkage is connected to a normally closed switch shown as the pressure switch in Fig. 25.

If satisfactory oil pressure is obtained the pressure switch opens and breaks the circuit to the heater element shown in the wiring diagram. If satisfactory oil pressure is not obtained current will continue to flow through the heater element, distorting a bi-metallic strip and opening the leaf contacts in approximately one minute. The opening of these contacts breaks the compressor starter holding coil circuit and the compressor stops. Before the holding coil circuit can be remade, the leaf contacts must be manually reset by pushing the reset button on the face of the switch.

INSTALLATION

Installation for the 5F20-933-2 Oil Safety Switch is the same as for the 5F20-933, explained in the paragraph under installation of 5F20-933 Oil Safety Switch.

TESTING

Check to be sure wire and pipe connections are tight. Test the Differential Pressure Switch by moving the arm on the left side of the Switch towards the coil spring (see Fig. 25). The compressor should stop in approximately one minute. After making this test it will be necessary to reset the heater switch.

As an additional check use a controlled source of pressure to operate the differential pressure switch and check operation as above. Be sure the differential switch closes when the compressor is shut down.

WARNING

DO NOT by-pass or manually control the differential pressure switch in order to operate the compressor. If the oil failure switch operates to stop the compressor it is a signal that something is wrong. In order to protect the compressor from serious damage, a serviceman should find the trouble which caused the oil failure switch to operate before the compressor is restarted for normal operation.

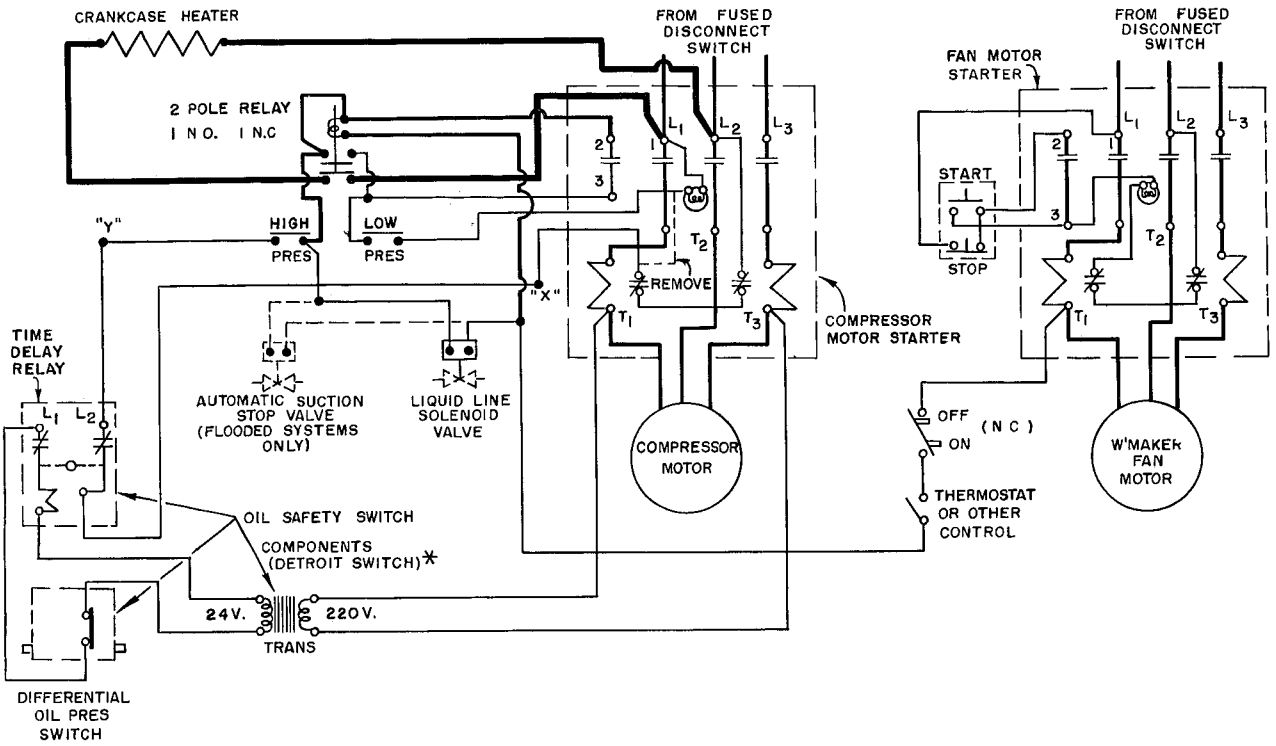


FIG. 26 — WIRING DIAGRAM — 5F20-933-2

CRANKCASE OIL HEATER

APPLICATION

The crankcase heater should be de-energized during the compressor operating cycle to prevent excessive crankcase temperatures and waste of power and refrigeration. This can be done by using either a relay or a set of normally closed auxiliary contacts on a compressor motor starter so equipped. The controlling circuit determines relay coil voltage to be specified when ordering. These relays should be mounted vertically.

It is recommended that where a heater is installed the system should operate on a single pump-out of the compressor before shutdown as explained in AE51-8. Fig. 27 illustrates the system using a single pump-out method.

INSTALLATION OF HEATER CASING

Before installing the crankcase heater, pump down compressor vent and drain crankcase. Fig. 1 through 7 show general location of the boss provided for heater casing installation on the current Type 5 compressor.

On the Type 5 compressor not having a heater casing boss on the crankcase, the heater casing is installed at the oil drain opening. When installing a heater at the oil drain opening it will be necessary to relocate the oil filter return line on machines so equipped. The adapter and angle valve can be installed in place of the magnetic plug on the pump end bearing housing above the oil drain opening and the filter return line bent to fit.

5H compressors have a 1/4" IPS plug on the pump end cover at the same relative position as the oil fill plug, but on the opposite side, This plug may be removed to accommodate the oil filter return line, if desired.

After installing the heater casing using the new gasket provided, leak test and charge compressor with oil. The heater element should be inserted into the case to its full depth and the wiring done in accordance with the local codes and the diagram shown.

Two 5H heater packages should be used on the 5H80 compressor. However only one relay is required. The 5H80 compressors are equipped with two openings as shown in Fig. 7.

NOTE: When installing heaters on a Duplex unit they should be wired in parallel with one relay. *Caution!* Operation of the heater without oil in the crankcase may cause burnout of the heater element.

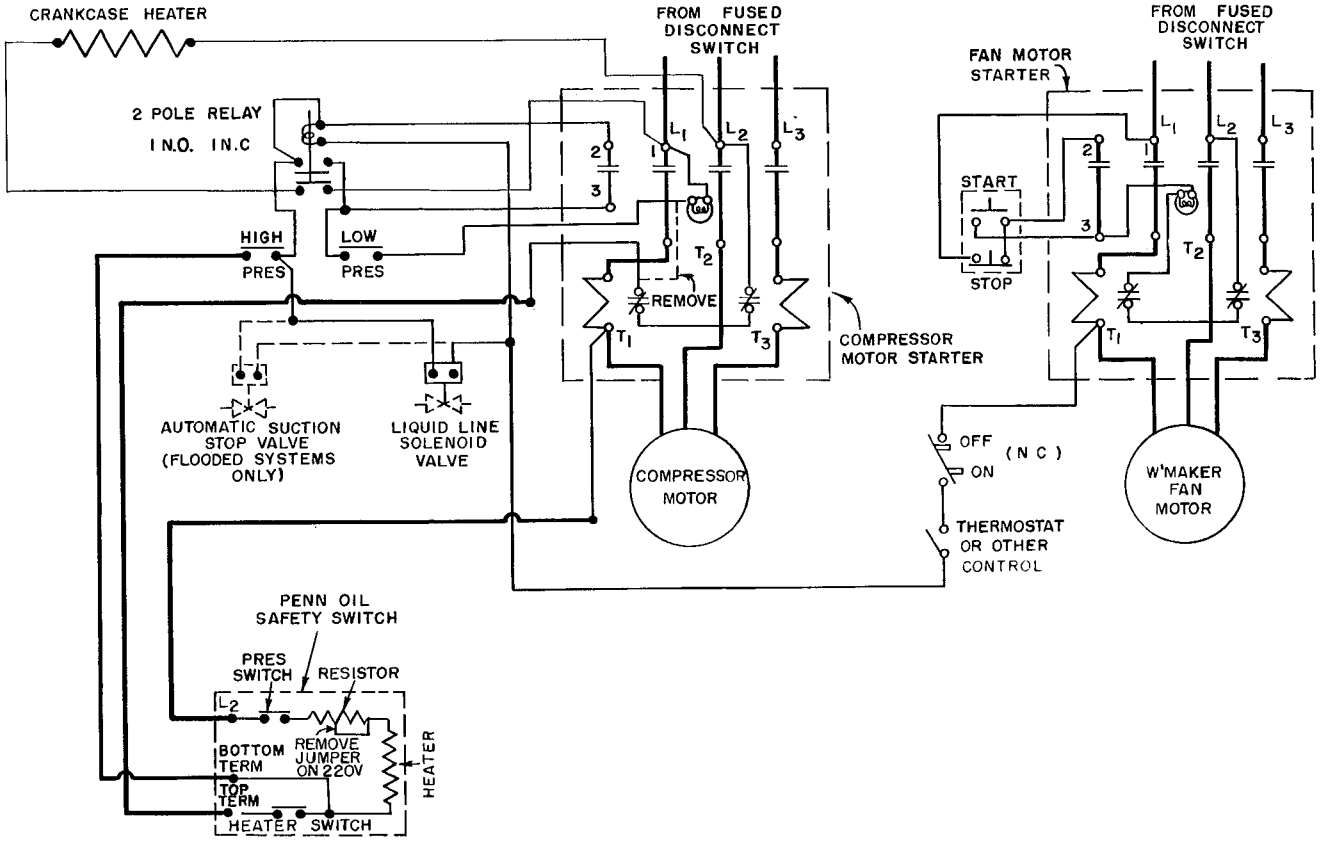


FIG. 27 — WIRING DIAGRAM

TABLE 3 — HEATER PACKAGES

Compressor Model No.	Voltage	Part No. of Heater Pkg.	
		For Compressor with Standard Heater Opening	For Compressor without Standard Heater Opening
5F20 & 5F30	115	5F20-281	
	230	5F20-291	
5F40 & 5F60	115	5F20-281	5F40-882
	230	5F20-291	5F40-892
5H40, 5H60 & 5H80	115	5H40-281	5H40-882
	230	5H40-291	5H40-892

COMPRESSOR MUFFLER

Mufflers are furnished as part of the discharge line in the condenser package for type 5H compressors. They also are recommended for all remote condenser installations. They may be installed either horizontally or vertically. In horizontal installations the outlet should be at the bottom in order to prevent oil trapping. Mufflers should be located as close as possible to the compressor. Note the arrow indicating direction of flow. See Fig. 28.

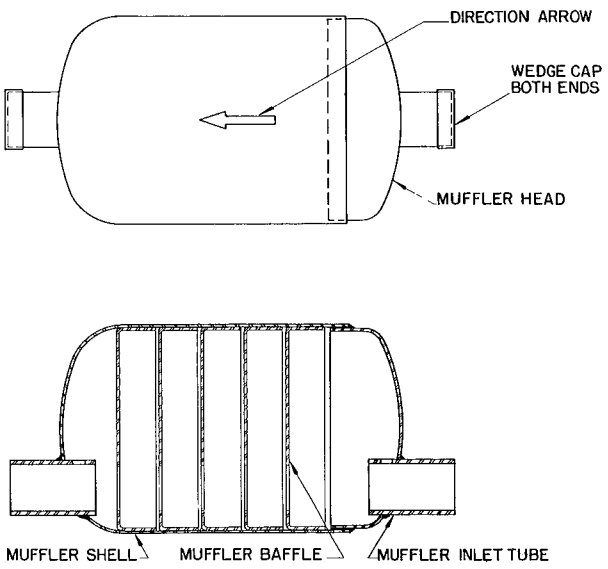


FIG. 28 — TYPICAL HOT GAS MUFFLER

OIL SEPARATORS

Most small separators have pipe thread connections to which flare or solder adapters may be connected. Larger separators usually have sweat connections. They are arranged for either base or hanger mounting. They should be supported and piped so that the weight of the separator will be carried on its supports and not on the piping.

Connect the separator inlet to the compressor discharge and the separator outlet to the condenser. Connect the oil return line from the separator to compressor crankcase. Use adapter plug 5F20-1311 (5/8"-18 X 1/4" FPT) where necessary in connecting to the crankcase oil filler connection. DO NOT connect the oil return to the suction line. If the compressor is equipped with oil equalizer tappings connect the oil return line to the upper connection or to the lower line where compressors are installed in parallel.

The connecting tube should be of copper and of 1/4" or 3/8" size with sufficient length to give flexibility and freedom from strain or fittings. To facilitate service with minimum refrigerant loss it is advisable to install a small shut-off valve in the oil return line.

The use of a separator usually calls for additional oil charge. The compressor oil level should be *carefully watched* for the first few hours of operation of jobs requiring oil separators. The separator operation should also be checked during this same initial run to make sure the float valve is operating properly. The oil return line should warm intermittently or when oil is actually being returned. Some manufacturers use a small screw through the separator shell to prop the float valve open during shipment. This screw is inside a plugged pipe fitting which is welded to the shell and must be removed before starting the compressor. Failure to remove this screw will cause excessive heating of the compressor crankcase since the propped open valve will allow a continuous blowback of hot discharge gas into the crankcase. A faulty valve seat or dirt under the valve will cause the same trouble.

SYSTEM CLEANING

The compressor must be installed only in a clean system. When installations are made using existing piping, evaporators and condensers, a thorough cleaning process must be followed. Remember that F-12 and related refrigerants are excellent cleaners. Dirt will, therefore, be washed off by them and may be carried to the controls or to the compressor where it can cause damage.

When doing any installation work, be especially careful to avoid admitting dirt into the system. Special care should be exercised to prevent filings or cuttings from entering the pipe.

In the above cases large capacity suction line strainers, external to the strainer located in the compressor suction manifold must be used. This external strainer should also be used on new systems which are constructed of steel or wrought iron.

In order to solder or braze copper tubing, its temperature must be raised to a point where, in the presence of air, the copper will oxidize. If left on the inside of the tubes, this black oxide will flake and wash off and eventually get into the compressor. This oxidation can be prevented by filling the parts with an inert gas such as nitrogen. A small amount of this gas permitted to flow through the parts will assure a neutral atmosphere while the work is being done.

When soldering or brazing parts that have been operated on a system, be sure to blow them out and clean off any oil film so that a carbon deposit is not left on the inside of the tube.

Refrigeration piping may come to you clean, deoxidized, and dehydrated and sealed by the mill that produced it. Try to keep it as near this condition as possible when using it, and be sure to seal the open ends of what is left. When you must use tubing or pipe not in this condition, clean it! This can be done by using a blast of dry air to blow out each length or coil of tubing, then draw a cloth swab back and forth in the tube until it is clean and shiny. The swab should be tight enough to clean the tube, but should not bind. Do not use waste or other material which might leave lint.

If a dark discoloration is found in copper tubing a swab of .00 steel wool should be pulled through the pipe with a wire until it is bright and clean. Then remove any dirt and grease as well as any trace of the steel wool by pulling a swab of lintless cloth saturated with compressor oil through the pipe.

Steel and iron pipe may have dirt or scale to be cleaned out. Remember that sand may have been used to make steel pipe bends, and that sand particles may still be present in the bend.

On new installations a felt filter should be installed to keep any dirt, which may remain in the system after installation, out of the compressor.

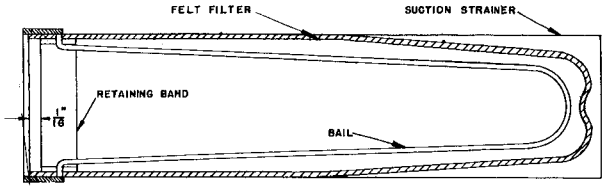


FIG. 29 — FELT FILTER

To install, remove the suction strainer(s). Insert the ends of the bail into the holes of the retaining band. Insert the retaining band and bail into the felt filter so that the bail is at right angles to the seam on the filter and approximately 1/16" of felt extends beyond the edge of the band. Work the ends of the bail through the felt. Insert the filter assembly into the suction strainer with the filter seam out. Be sure the filter does not extend beyond the edge of the strainer.

It is important that the felt filter be removed after approximately 50 hours of operation. Failure to remove the felt filter after the initial operating period will result in excessive pressure drop and possible failure of the strainer. It is therefore important that the warning tag, found in the filter package, be filled out and attached to the machine.

If this filter is very dirty after the first 50 hours of compressor operation, the filter should be cleaned and replaced for another 50 hours. Filters can be cleaned with kerosene or some other recommended solvent. Be sure to indicate on the warning tag that the filter has been replaced.

LEAK TESTING AND DEHYDRATION

PRECAUTIONS

DO NOT use the compressor instead of a vacuum pump. It was not designed to handle air and will not pull down to as low a vacuum as a pump designed for that service.

Use a refrigerant or an inert gas such as nitrogen to build up pressure in a system. DO NOT use the compressor to pump up the system, it is not designed to be used as an air compressor.

If the compressor is used to pump air, serious overheating and consequent damage may result.

LEAK TESTING

After the refrigerant piping is completed the system should be checked for leaks. The most effective way of finding a leak in a "Freon" system is with a halide leak detector. Testing with oil or soap suds at joints will only locate the larger leaks and is, therefore, unsatisfactory in determining the tightness of a system. See Fig. 30.

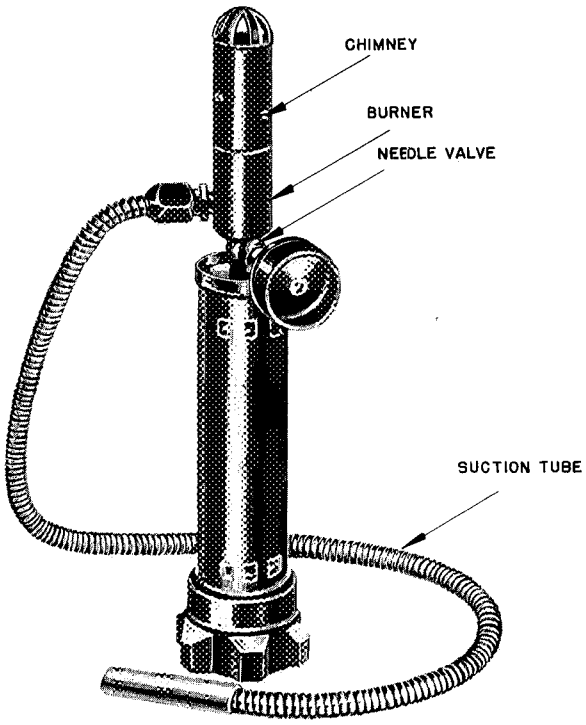


FIG. 30 — HALIDE LEAK DETECTOR

The halide leak detector consists essentially of a burner, a needle valve, a suction tube and a chimney with a copper reaction plate. Two types of torches are in general use - one uses alcohol as a fuel while the other uses propane. The detector flame should be adjusted so that the top of the flame cone is level with or slightly above the chimney. In checking for leaks place the end of the exploring tube at the joint or point of test and observe the lamp flame. The exploring tube pulls a sample of air into the burner where any refrigerant present will decompose into free acids which will react with the copper plate and change the flame color. Small leaks give a greenish tint while larger leaks color the flame a vivid blue.

When testing a new system for leaks disconnect the lines from the water valve and pressurestat and cap the connections to the system. This is done to prevent injury to the bellows by the high test pressure. Charge a small amount of refrigerant into the system (a couple of pounds for systems over 10 tons and less for smaller jobs).

Replace the refrigerant drum with a cylinder of nitrogen or carbon dioxide (nitrogen which is usually drier is preferable) and build up pressure to that required by local codes. *Caution: Do not use oxygen* to build up pressure in the system as serious explosions have resulted from pure oxygen and oil in a system under pressure. If not governed by any code a pressure of between 100 and 150 psi should be adequate for the purpose of locating leaks. When a test pressure greater than a 150 psi is required the compressor should be isolated to prevent damage to the seal. Disconnect cylinder after maximum test pressure has been reached.

Test each joint and connection for leaks. The small amount of refrigerant will act as an indicator. Relieve pressure and repair any leaks. Reconnect lines to water valve and pressurestat and dehydrate system.

Never enter a room in which a leak is suspected with a lighted torch until the room has been thoroughly aired out. In a heavy concentration of Methyl Chloride (8% to 18%) there is danger of combustion. A heavy concentration of gas will also decrease the accuracy of the test since the flame will indicate gas present anywhere in the room.

DEHYDRATION

PREPARATION

It is extremely important that all refrigeration and air conditioning systems be free of moisture. Moisture in the system can cause sludging of the oil in the crankcase, resulting in corrosion and lack of proper lubrication. In any system moisture is likely to collect at the expansion valve and freeze, thus stopping the flow of refrigerant. The best method of dehydrating a system is the evacuation method. This is done with a small vacuum pump especially designed for this work.

Before starting a dehydration job, it is important that:

1. The vacuum pump to be used be tested and found capable of drawing a vacuum of .2" Hg abs.

2. Suitable means be available to accurately measure the vacuum. (Carrier Vacuum Indicator recommended).

3. The system be tested and found free from leaks.

4. Ambient temperature be above 60°F in order to expedite the process.

VACUUM INDICATOR

The vacuum indicator consists of a wet bulb thermometer located in a glass tube containing pure water (preferably distilled) and enclosed in an insulated protective casing. Part of the tube is exposed to allow reading of the thermometer and an opening is also provided in the case to show the water level in the tube. See Fig. 31.

When connected to the vacuum pump suction line the thermometer will read the temperature of the water in the tube which is directly related to the degree of vacuum or absolute pressure existing in the tube and in the system. Table 4 shows the absolute pressure corresponding to various temperatures. The vacuum readings are based on a 30" barometer and are given to show how inaccurate a reading on a compound gauge would be.

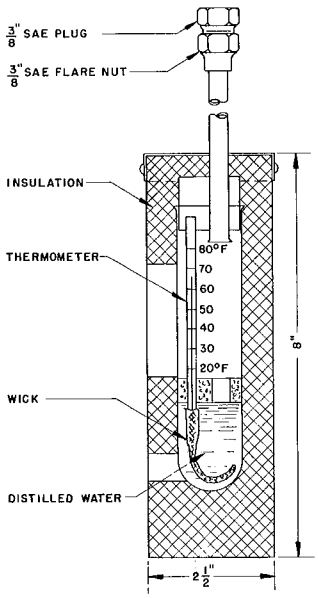


FIG. 31 — VACUUM INDICATOR

TABLE 4 — VAPOR PRESSURES OF WATER

Temperature °F	Absolute Pressure Inches of Mercury	Vacuum In. of Mercury
70	0.739	29.261
60	0.522	29.478
55	0.436	29.564
50	0.363	29.637
45	0.300	29,700
40	0.248	29,752
35	0.204	29,796
32	0.181	29,819

The vacuum indicator is a delicate instrument so handle with caution. The indicator must be vacuum tight in order to give a true reading. The top seal is not strong enough to support a long run of connection tubes. When the instrument is connected into the circuit, the connecting tubing should be supported to relieve strain from the indicator.

Water used in the indicator must be distilled water and the wick of the thermometer must be clean. Any oil contained in the wick of the thermometer will cause an erroneous reading. There is a tendency for oil to be drawn into the indicator when the dehydrating pump shuts down. This can easily be prevented by taking the following precautions:

1. Trap the line between the indicator and its point of connection to the system.

2. Place a valve on the indicator line so that the instrument may be cut off from the system and pump at the time of shutdown.

3. Manipulate valves in the following sequence:

(a) Close valve in line to indicator.

(b) Shut valve between dehydration pump and refrigeration system.

(c) Shut down dehydration pump.

4. Make the connection for the indicator from the top of the pump connection line in order that oil cannot flow by gravity into the indicator.

Cut the indicator out of the system during dehydration except when a reading is taken. This decreases the quantity of water vapor which the pump must handle and lessens the possibility of oil getting into the indicator and fouling the wick.

DEHYDRATING A SYSTEM

Assuming that the vacuum pump and indicator are connected and dehydration started, the first step is air removal, causing the pressure in the system to drop but not affecting the original indicator reading. The indicator will not show a change in temperature until the pressure in the system reaches the pressure corresponding to the vapor pressure of the water in the system. For

example, (Fig. 32) if the temperature of the water in the system was 60°F at the start of dehydration, the pressure in the system would have to drop to 29.40" vac. before the indicator would start to show a drop in temperature.

As the pressure is further reduced due to the action of the vacuum pump, the indicator readings will fall rapidly until the water in the system starts to boil. From this point on, the indicator will drop more slowly and may fluctuate due to changes in ambient temperature and area of moisture surface.

The time required to go from a pressure of approximately 29.4" vac.to 29.54" vac. will depend on the quantity of moisture originally present, but failure to reach the lower point after considerable running is an indication of a leak in the system or absorbed refrigerant in the oil. This could occur when dehydrating following a repair job when the oil was not drained. In such a case, the Freon will eventually boil out, but the time required will be increased.

After the free moisture has been evaporated and pumped from the system, the indicator will again

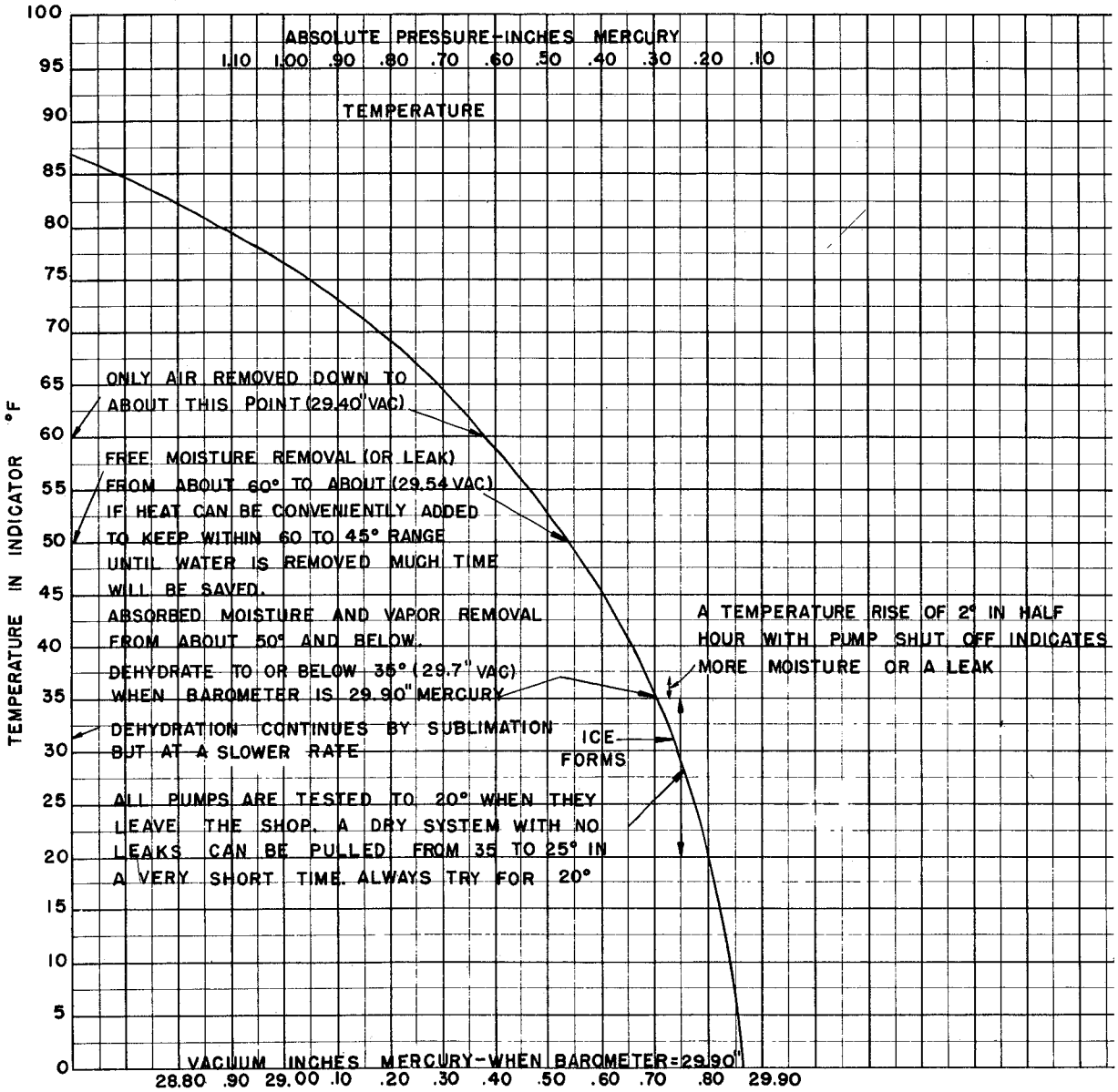


FIG. 32 — DEHYDRATION PULL-DOWN CURVE

drop as the pump removes the remaining air and most of the absorbed moisture. This operation should be allowed to continue until the indicator shows a reading of 35°F which corresponds to a pressure of 29.7" vac.

Even after this procedure, there will normally be too much moisture in the system, and further steps should be taken to remove the remaining moisture.

This may be done by breaking the vacuum with refrigerant or opening the system to the atmosphere at a point as far from the pump as possible, and admitting a small amount of air, leaving the pump running while doing so.

NOTE: In a damp atmosphere or as an extra precaution, the air admitted could be drawn through a new dryer.

In any event, although the entering air may carry some moisture, much of the remaining moisture in the system will be purged out and that not swept out greatly diluted. The dehydration process can then be repeated after first of course closing the system. The vacuum indicator should be disconnected from the system during this second dehydration. The degree of evacuation can be judged by noting if any air is still being drawn out by the vacuum pump. By this double dehydration process, it is possible to obtain a system containing as little as 1 part of moisture/million parts of Freon.

As an added safeguard against small amounts of moisture that may enter the system through service operation, etc., it is generally recommended that a dryer be installed in the system. There are many drying agents available and while one material or type dryer may excel for one type service and another for some other type service, we probably cannot say that there is one material or type better than all others for all applications. As a general rule, a reasonable average amount of drying material to be installed as a precautionary measure in a dry system is about 0.05 lbs. of dryer per pound of refrigerant while as much as 0.1 lbs. of dryer, per pound may be used in some cases. The best guide in selecting the type and size dryer to use is to rely on manufacturers of dryers for their advice.

The use of alcohol or other similar commercial preparations for the purpose of overcoming freezing trouble at expansion valves due to moisture in the system is not recommended. This cure may lead to more trouble than the cause.

COMPRESSOR LUBRICATION

COMPRESSOR OIL PUMPS

The oil pump used on all type 5 compressors is located in the pump end bearing head and is a gear type positive displacement pump. Some pumps are automatic reversing and will operate in either direction without requiring adjustment while others require manual adjustment for operation in a reverse direction.

All 5F compressors using the manual reversable pump have direction arrows cast on the top of the pump cover plate while all 5H compressors equipped with the manual reversing pump have a direction arrow on the pump end bearing head adjacent to the oil filler plug.

When it is necessary to operate a type 5F compressor in the opposite direction of rotation than shown by the arrow on the top of the oil pump cover plate, proceed as follows:

Remove the six capscrews from the oil pump cover and remove the cover taking care not to damage the gasket. Rotate the cover 180° and reinstall so that the bottom arrow will now be on top. This arrow will now show the new direction of rotation and due to the construction of the cover the pump is now set for operation in the direction shown by the arrow,

To adjust a type 5H compressor manual reversing oil pump for reverse direction operation it is first necessary to remove the pump end cover and control assembly to expose the oil pump cover. The oil should be drained to below the level of the pump end cover before it is removed. Then the oil pump cover may be removed and rotated 180° just as in the case of the type 5F machines.

In addition the external direction arrow on the pump end bearing head adjacent to the oil fill plug should also be reversed to agree with the arrow on the top of the oil pump cover plate so that direction setting may be checked in the future without removing the pump end cover and control assembly.

The presence or absence of a directional arrow can be used as an indication of the type of pump in the compressor. Compressors with manually reversing type oil pumps have a rotation arrow as mentioned above. Compressors with automatically reversing oil pumps have no arrow on the compressors.

CAUTION – If the special gasket between the oil pump cover and oil pump is damaged replace only with correct gasket and check oil pump end clearance before operating compressor. See service instructions covering oil pump. Always check oil pressure on any pressure lubricated compressor when putting equipment into operation. See Fig.33.

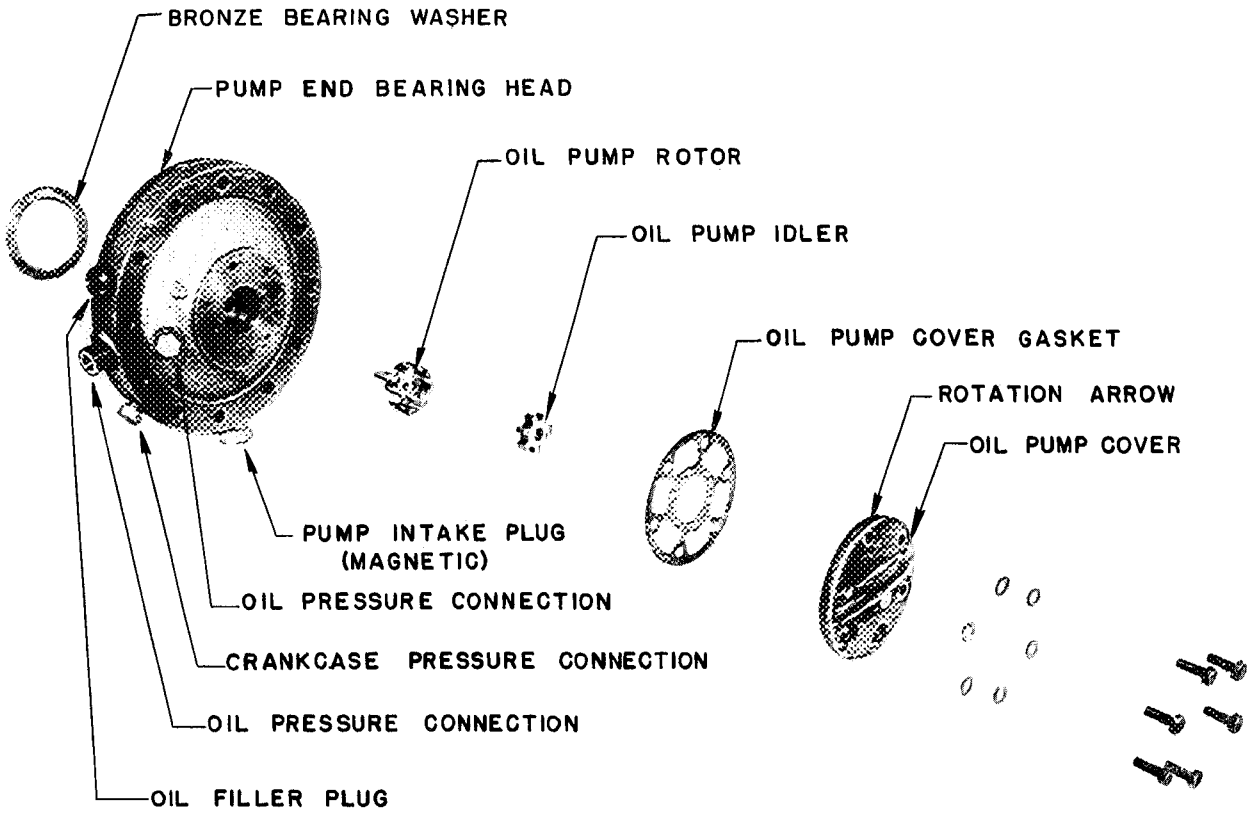


FIG. 33 — BLOW-UP OF 5F OIL PUMP

OIL PRESSURE

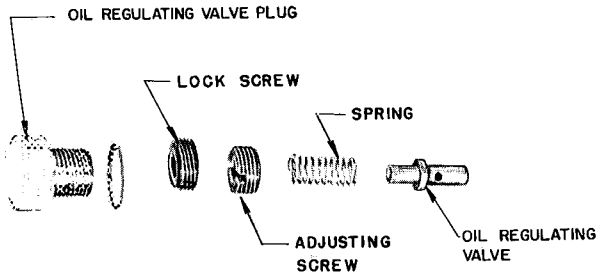
Correct oil pressure is important in maintaining adequate lubrication and satisfactory unloader operation. All 5F and H compressors are designed to operate with from 45 to 55 psi oil pressure above suction pressure. For example, if the suction gauge reading were 40 psi, the correct oil pressure gauge reading should be from 85 to 95 psi.

The oil pressure regulating valve is located on the side of the crankcase adjacent to the seal housing on 5F and H compressors.

Some compressors have a cartridge type pressure relief valve which requires no adjustment, while others are equipped with a pressure relief valve which may be adjusted in the field if necessary. Both type valves are shown below.

The adjustable relief valve can be distinguished from the cartridge type by the cap. The cartridge type relief valves have a cap approximately 1-5/16" long while the adjustable has a regular 5/8 - 18 pipe plug. See Fig. 34.

OIL REGULATING VALVE (NON-ADJUSTABLE)



OIL REGULATING VALVE (ADJUSTABLE)

FIG. 34 — PRESSURE REGULATORS

To make oil pressure adjustments where the adjustable valve is used, proceed as follows:

(A) Pump the compressor down.

(B) Remove the oil pressure adjustment plug and washer.

(C) Remove the internal threaded lock screw with an Allen wrench.

(D) Turn the adjusting screw (clockwise will increase the oil pressure). The pressure will be varied approximately 5 psi for one full turn.

(E) Replace the lock screw, capscrew and washer. Caution: The beveled side of the lockscrew should be turned in facing the adjusting screw.

(F) Open the suction shut-off valve.

(G) Check oil pressure.

CAUTION: This valve should not be adjusted to within less than one full turn of completely closed. If this is necessary replace valve.

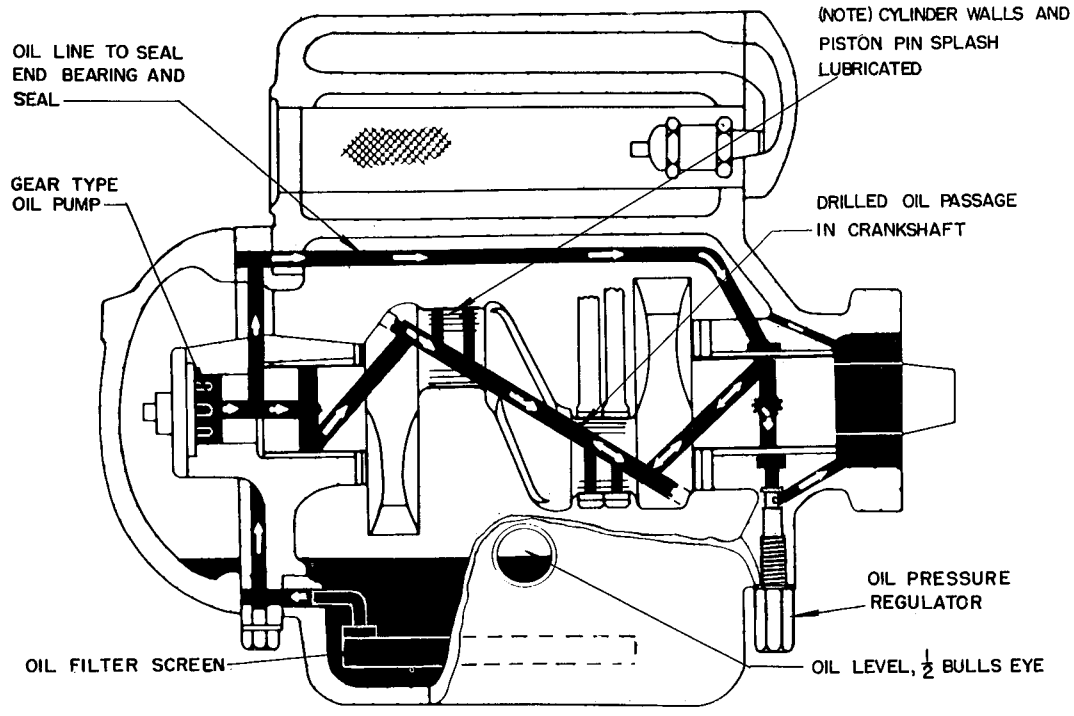


FIG. 35 — TYPICAL LUBRICATION SYSTEM — 5FH COMPRESSORS

OIL CHARGE

Compressors are charged with oil at the factory in accordance with Table 5. The oil level in the crankcase should be about the middle of the bull's eye during steady operating conditions. If it is necessary to add oil, use a dehydrated wax-free refrigeration grade oil of suitable viscosity. See Service Instructions for detailed specifications. Carrier Corporation supplies a carefully selected high grade oil which is especially suited for use in these compressors.

Since the Freon will carry some oil over into the other parts of the system, it may be necessary to increase the charge of oil above that mentioned in the Table. Add enough oil to bring the level in the crankcase to the middle of the bull's eye during steady operating conditions.

TABLE 5 — COMPRESSOR CRANKCASE OIL CHARGE

Compressor	5F20	5F30	5F40	5F60	5H40	5H60	5H80
Oil Charge In Pints	5	5-1/2	12	13	18	21	41

CAPACITY CONTROL

After the compressor is installed and running, the capacity control mechanism should be adjusted to obtain the proper design suction pressure. This adjustment can be made by turning the external adjusting stem of the capacity control valve. This valve is located on the hand hole cover of the 5F40 and 5F60 compressors and on the pump end cover of all 5H compressors. When received, the external adjusting stem will be backed out all the way and the compressor will be loaded at all times. Turning the stem clockwise will unload the machine by steps depending upon how far the stem is turned until all the controlled cylinders are unloaded. For detailed instructions on setting the capacity control mechanism see 5FH Service Section.

Carrier

INSTALLATION CHECK LIST

Shown below is a copy of the Installation Check List furnished with each compressor as a part of the instruction packet. This list serves as a reminder of some of the most important checks to be made when the compressor is put into operation. Also when properly filled out it serves as a record of start-up conditions. When starting a new installation be on the alert for any sign of trouble.

Job Name_____ Job Number_____

Model_____ Serial No._____ Date_____

TYPE 5F AND 5H FREON COMPRESSORS

Carrier

INSTALLATION CHECK LIST

ITEM	CHECK POINT OR REFERENCE	READING
Coupling Alignment or Belt Tension and Alignment	Proper alignment necessary for satisfactory operation. See instructions attached to unit in special envelope, or see 5F, H, J-51PD2.	Maximum coupling misalignment _____Thousandths.
Oil Pressure	Oil Pressure should be 45-55 psig more than suction pressure under steady operating conditions. See 5F, H, J-51PD2.	Oil Press._____ Suction Press._____ Net Oil Press._____
Oil Safety Switch	The Oil Safety Switch should be checked at start-up and at least once a season by holding the switch closed manually. The compressor should stop in approximately one minute. See 5F, H, J-51PD2.	Time required to stop compressor with switch closed. sec._____
Oil Return	Check at minimum load conditions. Observe oil level at sight glass to be sure oil level is maintained. See 25X-2.	Discharge Press._____ Suction Press._____ Oil Return Yes_____ No_____
Oil Level	Oil level should be at ½ bullseye during steady running operation. Be sure to check oil level when adding refrigerant. See 5F, H, J-51PD2.	Oil Level_____
Discharge Gas Temperature	The discharge temperature measured in the discharge line within 12 inches of the compressor should not exceed 250° F. See 5F, H, J-51PD2.	Suction Press._____ Discharge Press._____ Discharge Temp._____

Signed_____ Installation Supervisor _____ Date

Approved_____ Engineer _____ Date

5F20-2841
Rev. 9-51

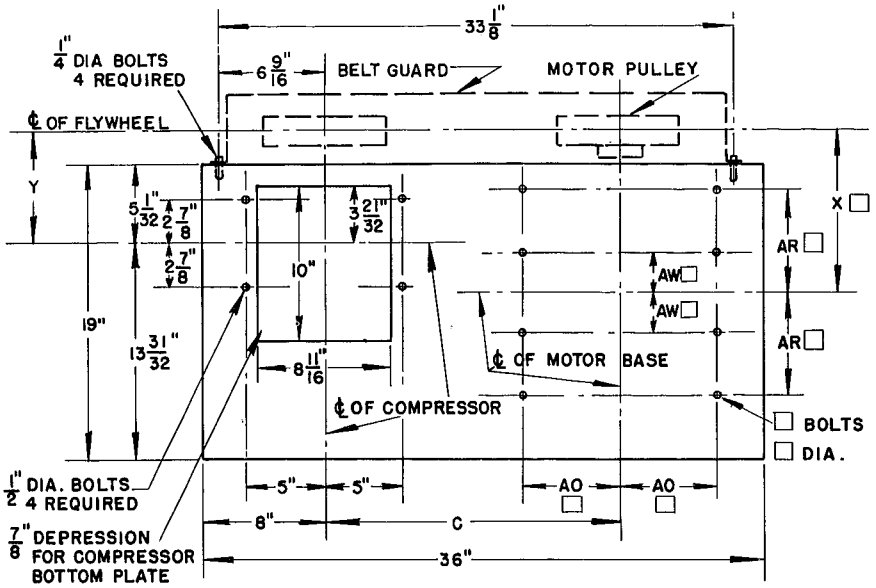
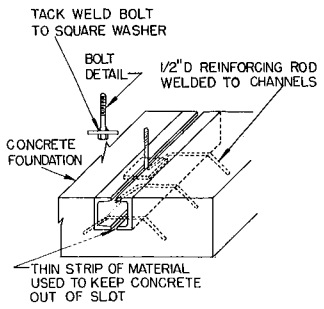
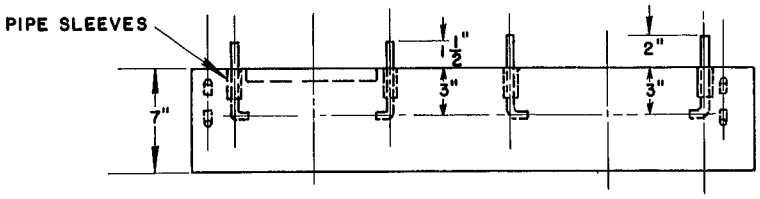
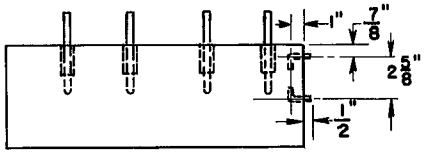


FIG. 36
5F20 CONCRETE BASE DETAILS



ALTERNATE CONSTRUCTION: USE STANDARD STEEL SECTION, TO PROVIDE PROPER ADJUSTMENT.
NOTE: GROUTING SHOULD BE TAMPED INTO SLOT AFTER ALIGNMENT





NOTES:

NUMBER AND SIZE OF BOLTS VARY WITH MOTOR M'F'RS

AO, AR AND AW DIMENSIONS APPLY TO MOTOR RAILS

BELT GUARD PART NO. 5F20-354

AO AND AR DIMENSIONS LISTED BELOW APPLY TO CARRIER BASES

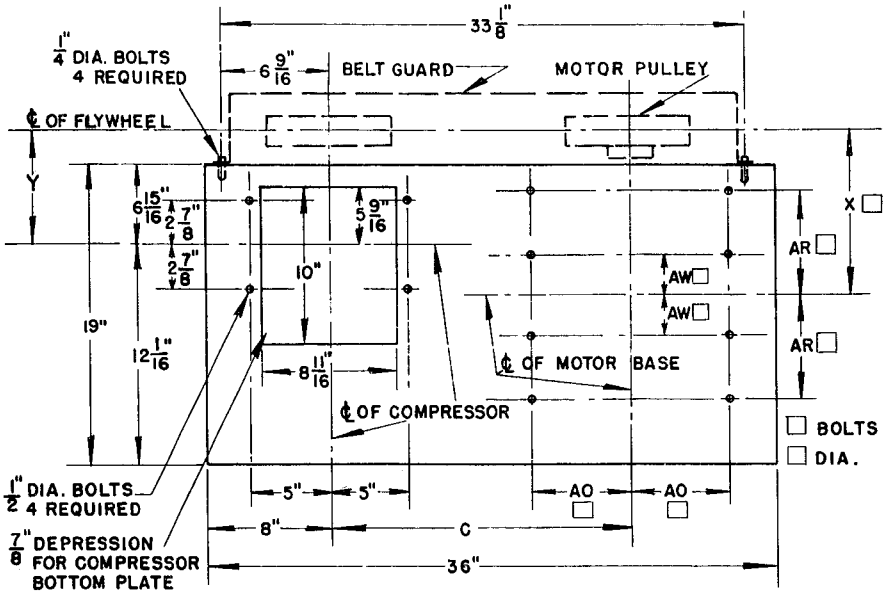
"X" DIMENSION MAY BE CALCULATED BY CONSULTING APPROPRIATE MOTOR AND PULLEY CATALOGS

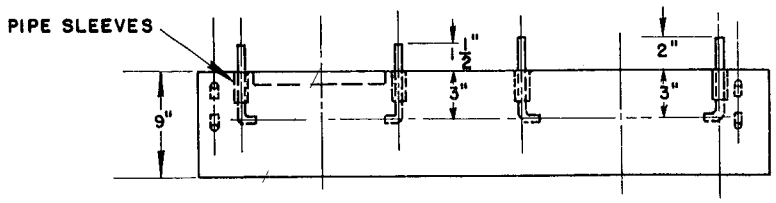
TABLE 6 — DRIVE CHART FOR 5F20 COMPRESSORS

Motor Hp	Comp. Speed Rpm	MOTOR			MOTOR BASE			Complete Drive Pkg. No.*	DRIVE PACKAGE COMPONENTS									DIM. (IN.)	
									FLYWHEEL		MOTOR PULLEY				BELTS†				
		Cycles	Rpm	Frame	Part No.	AO Dim. (In.)	AR Dim. (In.)		Part No.	P.D.	Part No.	P.D. (In.)	Bore (In.)	Keyway	No. Req. and Section	Part No.†	C	Y
3	1160	60	1750	225	HD97FW004	5 1/2	5 3/4	5F20-822	5F20-1053	7.5	KR12BE012	5.0	1	1/8 x 1/4	2B	KR20BA058	18 1/4	7 13/32
	1450							5F20-812			KR12BF212	6.2				KR20BA062	19 1/4	
	1750							5F20-802			KR12BG412	7.4				KR20BA063	18 3/4	
	1160	50	1450					5F20-812			KR12BF212	6 2				KR20BA062	19 1/4	
	1450							5F20-802			KR12BG412	7 4				KR20BA063	18 3/4	
	1750							5F20-862			KR12BJ012	9.0				KR20BA065	18 1/2	
5	1450	60	1750	254	HD97FW005	6 1/4	6 5/8	5F20-842			KR12BF214	6.2	1 1/8			KR20BA062	19 1/4	
	1750							5F20-832			KR12BG414	7.4				KR20BA063	18 3/4	
	1450	50	1450					5F20-832			KR12BG414	7.4				KR20BA063	18 3/4	
	1750							5F20-872			KR12BJ014	9.0				KR20BA065	18 1/2	
7 1/2	1750	60	1750	284	HD97FW006	7	7 1/2	5F20-852			KR12BG416	7.4	1 1/4			KR20BA063	18 3/4	
	1750	50	1450					5F20-942			KR12BJ016	9.0				KR20BA065	18 1/2	

*Complete drive package — Flywheel, Belts, Pulley

†Last two digits designate outside belt length. (In.)





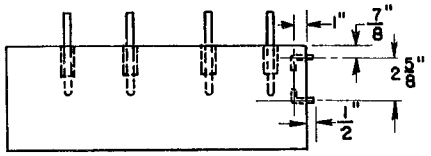


FIG. 37
5F30 CONCRETE
BASE DETAILS

See Page 34 for Alternate Construction Detail.

NOTES:

NUMBER AND SIZE OF BOLTS VARY WITH MOTOR M'F'RS.
AO, AR AND AW DIMENSIONS APPLY TO MOTOR RAILS
BELT GUARD PART NO. 5F20-354
AO AND AR DIMENSIONS LISTED BELOW APPLY TO CARRIER BASES
"x" DIMENSION MAY BE CALCULATED BY CONSULTING APPROPRIATE MOTOR AND PULLEY CATALOGS

TABLE 7 — DRIVE CHART FOR 5F30 COMPRESSORS

Motor Hp	Comp. Speed Rpm	MOTOR			MOTOR BASE			Complete Drive Pkg. No.*	DRIVE PACKAGE COMPONENTS								DIM. (IN.)	
		Cycles	Rpm	Frame	Part No.	AO Dim. (In.)	AR Dim. (In.)		FLYWHEEL		MOTOR PULLEY				BELTS†		C	Y
									Part No.	P.D.	Part No.	P.D. (In.)	Bore (In.)	Keyway	No. Req. and Section	Part No.†		
5	1160	60	1750	254	HD97FW005	6 1/4	6 5/8	5F30-802	5F30-1053	7.5	KR13BE014	5.0	1 1/8	1/8 x 1/4	3B	KR20BA058	18 1/4	8 7/8
	1450							5F20-842	5F20-1053		KR12BF214	6.2			2B	KR20BA062	19 1/4	8 1/2
	1750							5F20-832	5F20-1053		KR12BG414	7.4			2B	KR20BA063	18 3/4	
	1160	50	1450					5F30-842	5F30-1053		KR13BF214	6.2			3B	KR20BA062	19 1/4	8 7/8
	1450							5F20-832	5F20-1053		KR12BG414	7.4			2B	KR20BA063	18 3/4	8 1/2
	1750							5F20-872	5F20-1053		KR12BJ014	9.0			2B	KR20BA065	18 1/2	
7 1/2	1450	60	1750	284	HD97FW006	7	7 1/2	5F30-822	5F30-1053		KR13BF216	6.2	1 1/4		3B	KR20BA062	19 1/4	8 7/8
	1750							5F30-812			KR13BG416	7.4				KR20BA063	18 3/4	
	1450	50	1450					5F30-812			KR13BG416	7.4				KR20BA063	18 3/4	
	1750							5F30-832			KR13BJ016	9.0				KR20BA065	18 1/2	
10	1750	60	1750					5F30-812			KR13BG416	7.4				KR20BA063	18 3/4	
	1750	50	1450					5F30-832			KR13BJ016	9.0				KR20BA065	18 1/2	

*Complete drive package — Flywheel, Belts, Pulley

†Last two digits designate outside belt length. (In.)

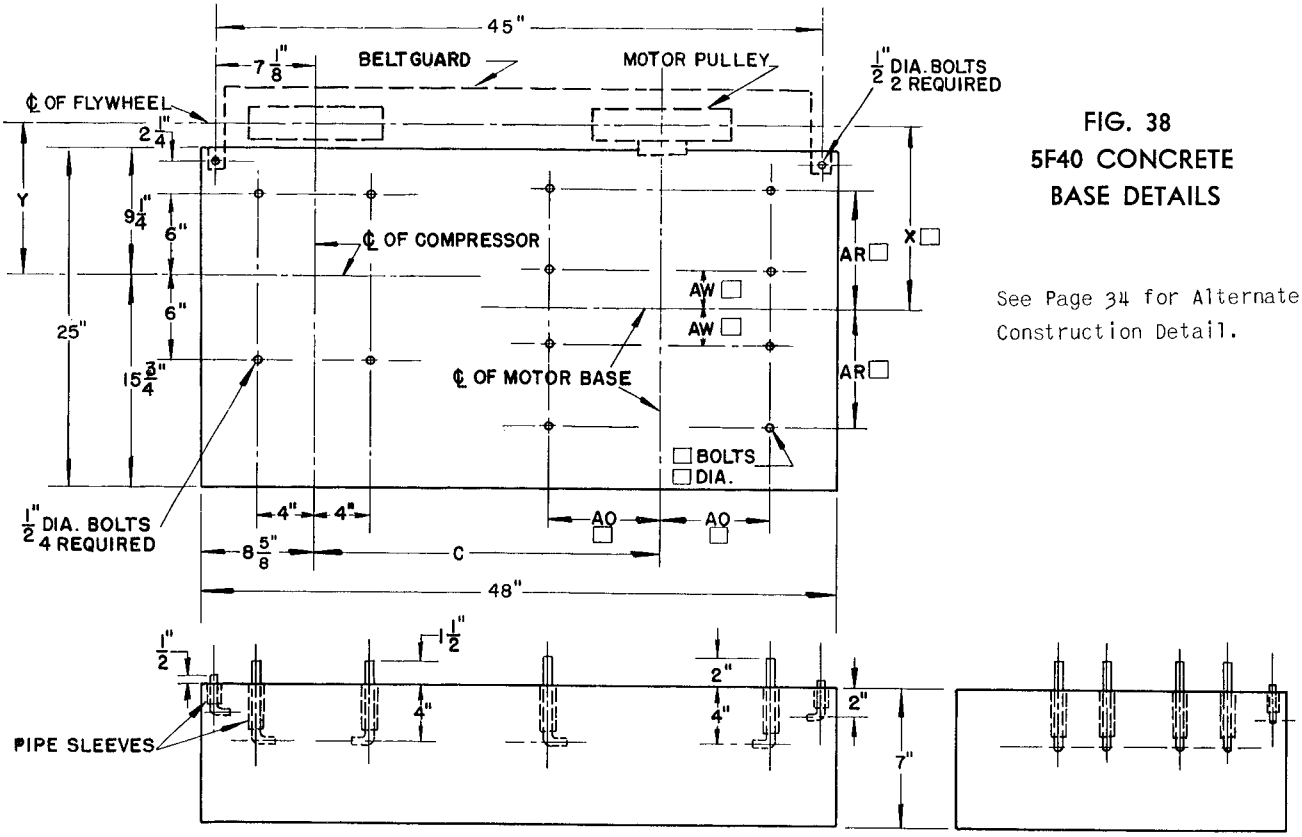


FIG. 38
5F40 CONCRETE
BASE DETAILS

See Page 34 for Alternate Construction Detail.

NOTES:
NUMBER AND SIZE OF BOLTS VARY WITH MOTOR M'F'RS.
AO, AR AND AW DIMENSIONS APPLY TO MOTOR RAILS
BELT GUARD PACKAGE NO. 5F40-197
AO AND AR DIMENSIONS LISTED BELOW APPLY TO CARRIER BASES
"X" DIMENSION MAY BE CALCULATED BY CONSULTING APPROPRIATE MOTOR AND PULLEY CATALOGS

TABLE 8 — DRIVE CHART FOR 5F40 COMPRESSORS

Motor Hp	Comp. Speed Rpm	MOTOR Cycles	MOTOR Rpm	MOTOR Frame	MOTOR BASE Part No.	MOTOR BASE AO Dim. (In.)	MOTOR BASE AR Dim. (In.)	Complete Drive Pkg. No.*	DRIVE PACKAGE COMPONENTS: FLYWHEEL Part No.	FLYWHEEL P.D.	MOTOR PULLEY Part No.	MOTOR PULLEY P.D. (In.)	MOTOR PULLEY Bore (In.)	MOTOR PULLEY Keyway	BELTS† No. Req. and Section	BELTS† Part No.†	DIM (IN.) C	DIM (IN.) Y
7½	1160	60	1750	284	HD97FW006	7	7½	5F40-822	5F40-1054	9.5	KR13BF216	6.2	1¼	1/8 x 1/4	3B	KR20BA078	25½	10¾
	1450							5F40-812			KR13BH016	8.0				KR20BA081	25¾	
	1750							5F40-802			KR13BJ416	9.4				KR20BA081	24¾	
	1160	50	1450					5F40-862			KR13BG416	7.4				KR20BA078	25	
	1450							5F40-802			KR13BJ416	9.4				KR20BA081	24¾	
	1750							5F40-852			KR13BL516	11.5				KR20BA084	24½	
10	1450	60	1750	324	HD97FW007	8	8½	5F40-842			KR13BH022	8.0	1⅝	3/16 x 3/8		KR20BA081	25¾	
	1750							5F40-832			KR13BJ422	9.4				KR20BA081	24½	
	1450	50	1450					5F40-832			KR13BJ422	9.4				KR20BA081	24½	
	1750							5F40-872			KR13BL522	11.5				KR20BA084	24½	
15	1750	60	1750	326	HD97FW008	8	9¼	5F40-832			KR13BJ422	9.4				KR20BA081	24½	
	1750	50	1450					5F40-872			KR13BL522	11.5				KR20BA084	24½	

*Complete drive package — Flywheel, Belts, Pulley

†Last two digits designate outside belt length. (In.)

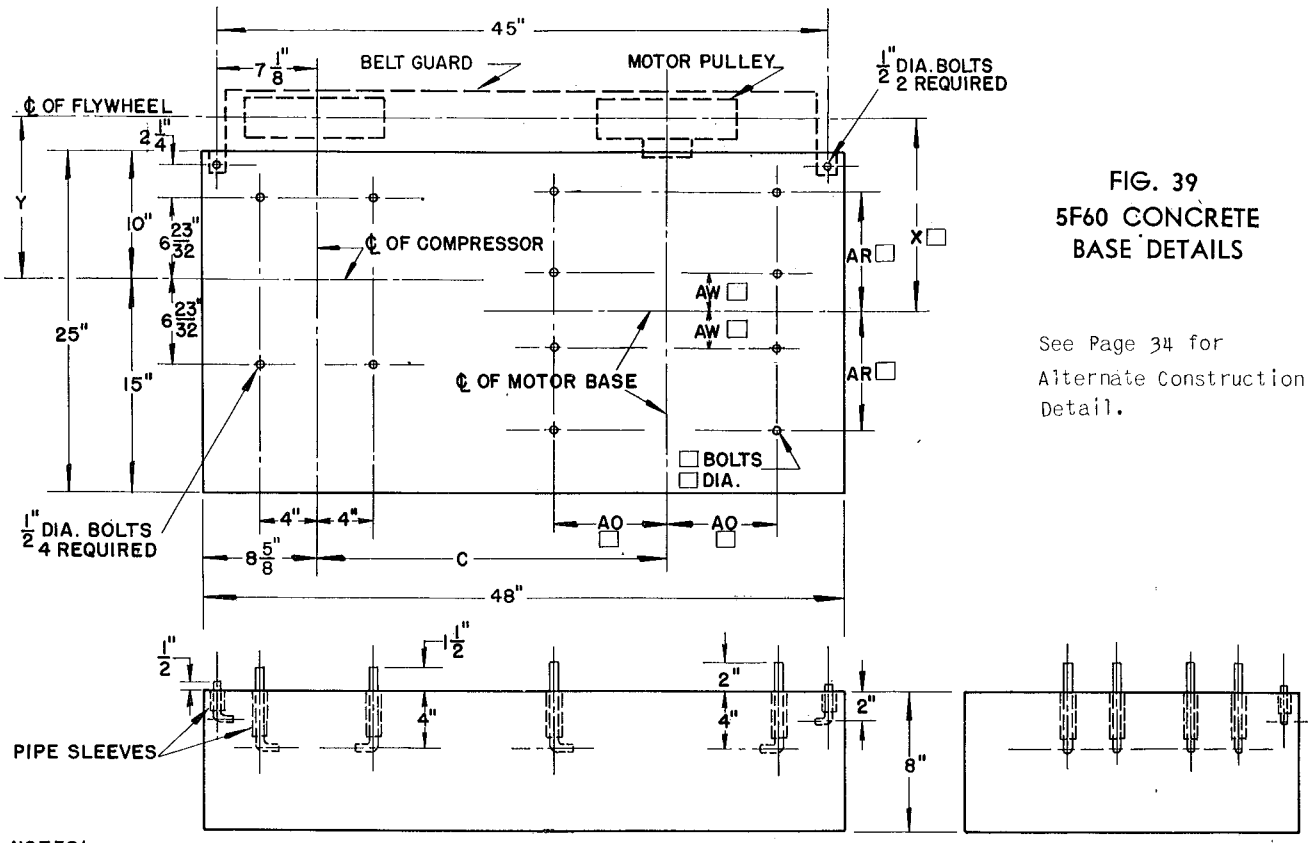


FIG. 39
5F60 CONCRETE BASE DETAILS

See Page 34 for Alternate Construction Detail.

NOTES:

NUMBER AND SIZE OF BOLTS VARY WITH MOTOR M'F'RS

AO, AR AND AW DIMENSIONS APPLY TO MOTOR RAILS

BELT GUARD PACKAGE NO. 5F40-197

AO AND AR DIMENSIONS LISTED BELOW APPLY TO CARRIER BASES

"X" DIMENSION MAY BE CALCULATED BY CONSULTING APPROPRIATE MOTOR AND PULLEY CATALOGS

TABLE 9 — DRIVE CHART FOR 5F60 COMPRESSORS

Motor Hp	Comp. Speed Rpm	MOTOR			MOTOR BASE			Complete Drive Pkg No *	DRIVE PACKAGE COMPONENTS								DIM (IN.)	
		Cycles	Rpm	Frame	Part No.	AO Dim. (In)	AR Dim. (In.)		FLYWHEEL		MOTOR PULLEY				BELTS†		C	Y
									Part No.	P.D.	Part No	P.D. (In)	Bore (In.)	Keyway	No. Req. and Section	Part No.†		
10	1160	60	1750	324	HD97FW007	8	8½	5F60-802	5F60-1054	9.5	KR14BF222	6.2	1⅝	3/16 x 3/8	4B	KR20BA078	25½	11⅞
	1450							5F40-842	5F40-1054		KR13BH022	8.0			3B	KR20BA081	25¾	11½
	1750							5F40-832	5F40-1054		KR13BJ422	9.4			3B	KR20BA081	24½	
	1160	50	1450					5F60-842	5F60-1054		KR14BG422	7.4			4B	KR20BA078	24¾	11⅞
	1450							5F40-832	5F40-1054		KR13BJ422	9.4			3B	KR20BA081	24½	11½
	1750							5F40-872	5F40-1054		KR13BL522	11.5			3B	KR20BA084	24½	
15	1450	60	1750	326	HD97FW008	8	9¼	5F60-822	5F60-1054		KR14BH022	8.0			4B	KR20BA081	25¾	11⅞
	1750							5F60-812			KR14BJ422	9.4				KR20BA081	24½	
	1450	50	1450					5F60-812			KR14BJ422	9.4				KR20BA081	24½	
	1750							5F60-852			KR14BL522	11.5				KR20BA084	24½	
20	1750	60	1750	364	HD97FW009	9	9⅛	5F60-832			KR14BJ426	9.4	1⅞	¼ x ½	4B	KR20BA081	24½	
	1750	50	1450					5F60-862			KR14BL526	11.5				KR20BA084	24½	

*Complete drive package — Flywheel, Belts, Pulley

†Last two digits designate outside belt length. (In.)

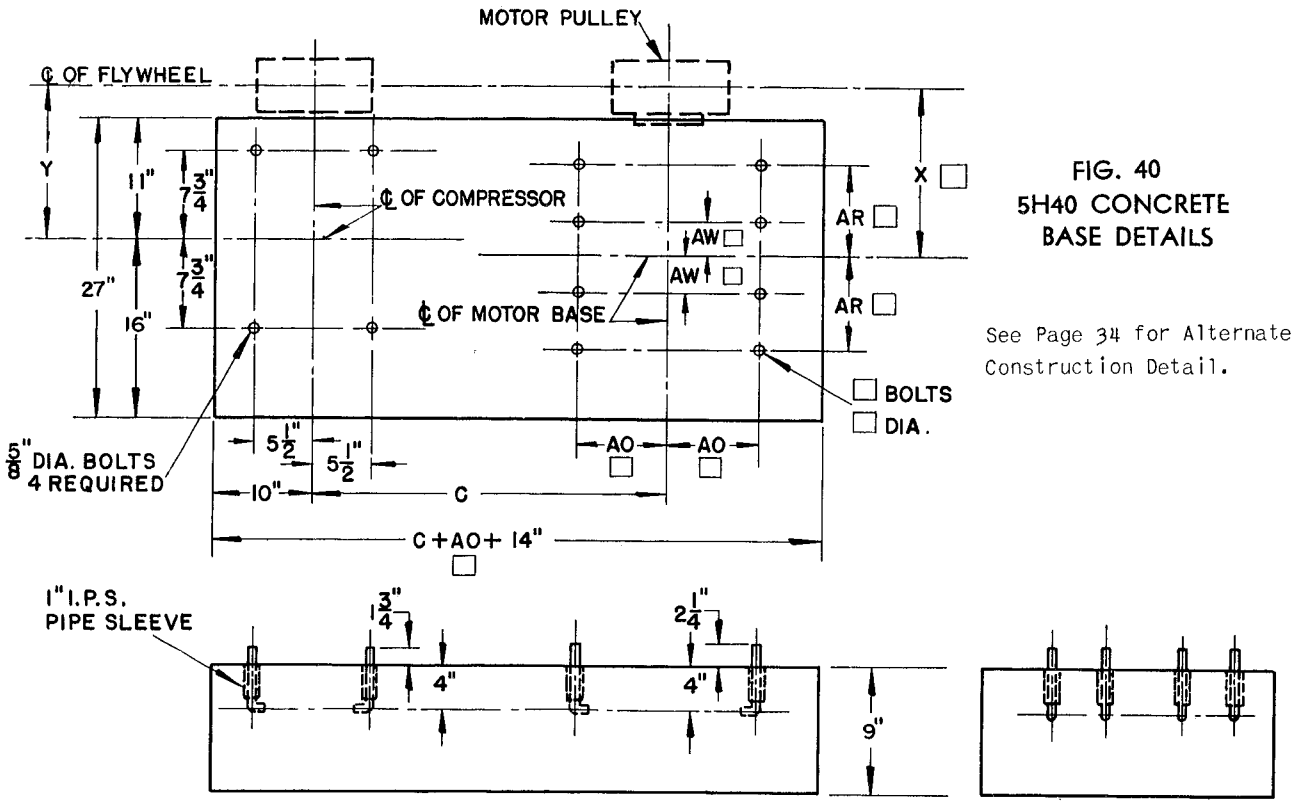


FIG. 40
5H40 CONCRETE BASE DETAILS

See Page 34 for Alternate Construction Detail.

NOTES:

NUMBER AND SIZE OF BOLTS VARY WITH MOTOR M'F'RS.

AO, AR AND AW DIMENSIONS APPLY TO MOTOR RAILS

BELT GUARD PACKAGE NO. 5H40-694

AO AND AR DIMENSIONS LISTED BELOW APPLY TO CARRIER BASES

"X" DIMENSION MAY BE CALCULATED BY CONSULTING APPROPRIATE MOTOR AND PULLEY CATALOGS

TABLE 10 — DRIVE CHART FOR 5H40 COMPRESSORS

Motor Hp	Comp. Speed Rpm	MOTOR			MOTOR BASE			Complete Drive Pkg. No *	DRIVE PACKAGE COMPONENTS								DIM. (IN.)	
		Cycles	Rpm	Frame	Part No.	AO Dim. (In.)	AR Dim. (In.)		FLYWHEEL		MOTOR PULLEY				BELTS†		C	Y
									Part No.	P.D.	Part No.	P.D. (In.)	Bore (In.)	Keyway	No. Req. and Section	Part No.†		
20	1160	60	1750	364	HD97FW009	9	9 1/8	5H60-812	5H60-1104	11	KR15CB426	7.4	1 7/8	1/4 x 1/2	5C	KR20CA093	31	13 3/4
	1450							5H40-812	5H40-1104		KR13CJ026	9.0			3C	KR20CA093	29 3/4	13 1/2
	1750							5H40-802	5H40-1104		KR13CL026	11.0			3C	KR20CA099	31 1/4	
	1160	50	1450					5H60-802	5H60-1104		KR15CJ026	9.0			5C	KR20CA093	29 3/4	13 3/4
	1450							5H40-802			KR13CL026	11.0			3C	KR20CA099	31 1/4	
	1750							5H40-822			KR13CN026	13.0			3C	KR20CA099	29 3/4	
25	1450	60	1750	364	HD97FW009	9	9 1/8	5H40-812			KR13CJ026	9.0			3C	KR20CA093	29 3/4	
	1750							5H40-802	5H40-1104		KR13CL026	11.0			3C	KR20CA099	31 1/4	13 1/2
	1450	50	1450	365	HD97FW010	9	9 5/8	5H40-802			KR13CL026	11.0			3C	KR20CA099	31 1/4	
	1750							5H40-822			KR13CN026	13.0			3C	KR20CA099	29 3/4	
30	1750	60	1750	365	HD97FW010	9	9 5/8	5H40-802			KR13CL026	11.0			3C	KR20CA099	31 1/4	
	1750	50	1450	404	HD97FW011	10	9 7/8	5H40-832			KR13CN030	13.0	2 1/8		3C	KR20CA099	29 1/2	

*Complete drive package — Flywheel, Belts, Pulley

†Last two digits designate outside belt length. (In.)

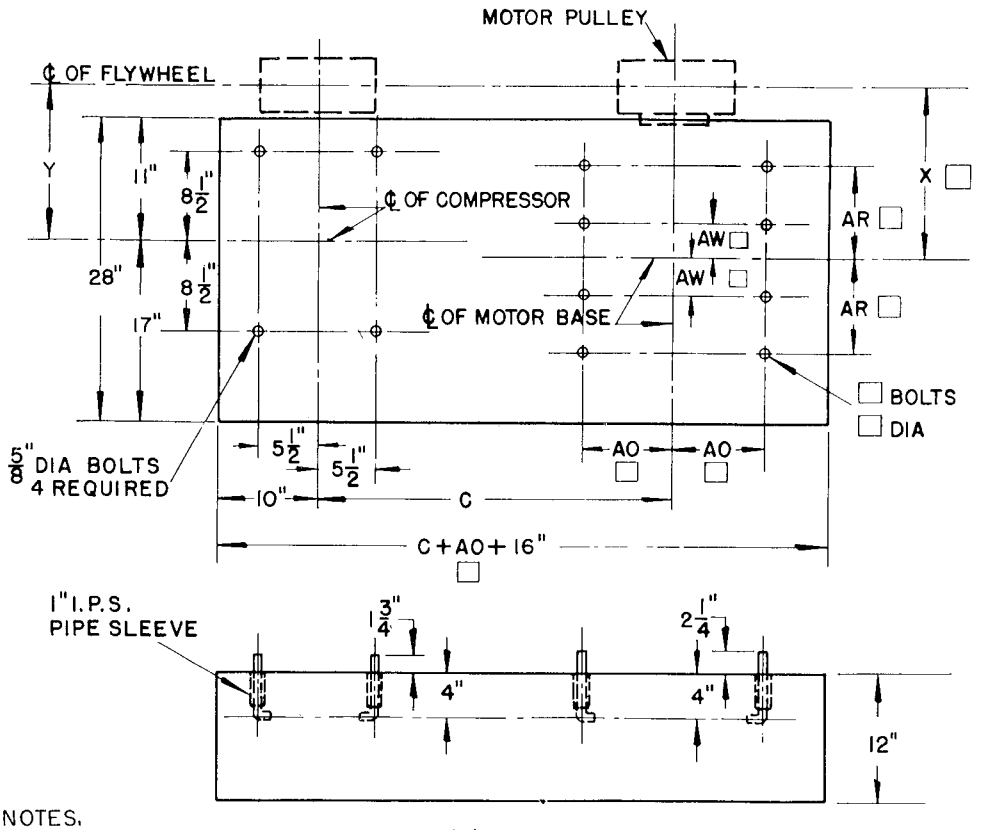


FIG. 41
5H60 CONCRETE
BASE DETAILS

See Page 34 for Alternate Construction Detail.

NOTES.
NUMBER AND SIZE OF BOLTS VARY WITH M'F'RS
AO AR AND AW DIMENSIONS APPLY TO MOTOR RAILS
BELT GUARD PACKAGE NO.
AO AND AR DIMENSIONS LISTED BELOWAPPLY TO CARRIER BASES
"X" DIMENSION MAY BE CALCULATED BY CONSULTING APPROPRIATE MOTOR AND PULLEY CATALOGS

TABLE 11 — DRIVE CHART FOR 5H60 COMPRESSORS

Motor Hp	Comp. Speed Rpm	MOTOR			MOTOR BASE			Complete Drive Pkg. No.*	DRIVE PACKAGE COMPONENTS								DIM. (IN.)	
									FLYWHEEL		MOTOR PULLEY				BELTS†			
		Cycles	Rpm	Frame	Part No.	AO Dim. (In.)	AR Dim. (In.)		Part No.	P.D.	Part No.	P.D. (In.)	Bore (In.)	Keyway	No. Req. and Section	Part No. †	C	Y
30	1160	60	1750	365	HD97FW010	9	9 5/8	5H60-812	5H60-1104	11	KR15CG426	7.4	1 7/8	1/4 x 1/2	5C	KR20CA093	31	14 1/2
	1450							5H60-802	5H60-1104		KR15CJ026	9.0			5C	KR20CA093	29 3/4	
	1750							5H40-802	5H40-1104		KR13CL026	11.0			3C	KR20CA099	31 1/4	14 1/4
	1160	50	1450	404	HD97FW011	10	9 7/8	5H60-832	5H60-1104		KR15CJ030	9.0	2 1/8		5C	KR20CA093	29 3/4	14 1/2
	1450							5H60-822	5H60-1104		KR15CL030	11.0			5C	KR20CA099	31	
	1750							5H40-832	5H40-1104		KR13CN030	13.0			3C	KR20CA099	29 1/2	14 1/4
40	1450	60	1750					5H60-832	5H60-1104		KR15CJ030	9.0			5C	KR20CA093	29 3/4	14 1/2
	1750							5H60-822			KR15CL030	11.0			5C	KR20CA099	31	
	1450	50	1450	405	HD97FW012	10	10 5/8	5H60-822			KR15CL030	11.0			5C	KR20CA099	31	
	1750							5H60-842			KR15CN030	13.0			5C	KR20CA099	29 1/2	
50	1750	60	1750	405	HD97FW012	10	10 5/8	5H60-822			KR15CL030	11.0			5C	KR20CA099	31	
	1750	50	1450	444	HD97FW013	11	11	5H60-852			KR15CN034	13.0	2 3/8	5/8 x 5/16	5C	KR20CA099	29 1/2	

*Complete drive package — Flywheel, Belts, Pulley

†Last two digits designate outside belt length. (In.)

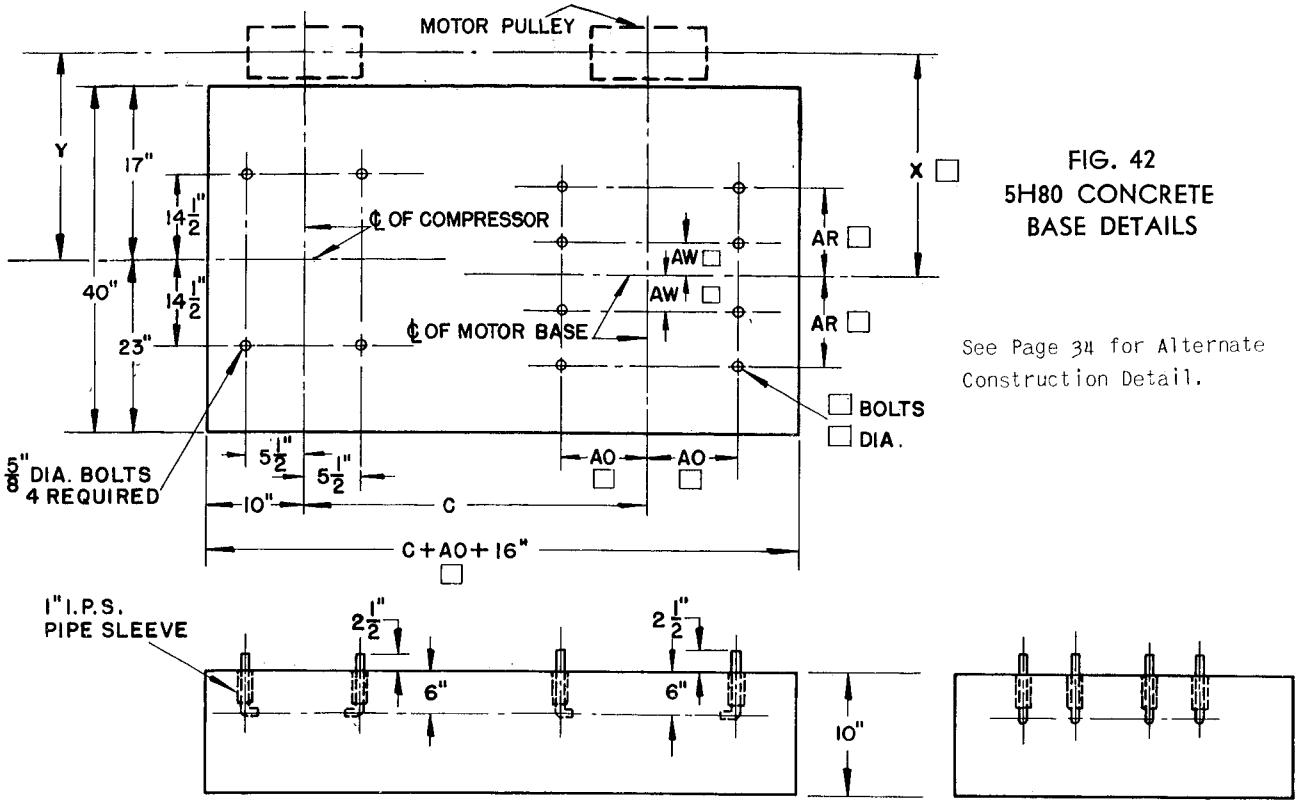


FIG. 42
5H80 CONCRETE
BASE DETAILS

See Page 34 for Alternate Construction Detail.

NOTES:

NUMBER AND SIZE OF BOLTS VARY WITH MOTOR M'F'RS.

AO, AR AND AW DIMENSIONS APPLY TO MOTOR RAILS

BELT GUARD PACKAGE NO. 5H40-694 EXCEPT 5H81-812 AND 5H81-802 DRIVE PACKAGES

AO AND AR DIMENSIONS LISTED BELOW APPLY TO CARRIER BASES

"X" DIMENSION MAY BE CALCULATED BY CONSULTING APPROPRIATE MOTOR AND PULLEY CATALOGS

TABLE 12 — DRIVE CHART FOR 5H80 COMPRESSORS

Motor Hp	Comp. Speed Rpm	MOTOR			MOTOR BASE			Complete Drive Pkg. No.*	DRIVE PACKAGE COMPONENTS								DIM. (IN.)	
		Cycles	Rpm	Frame	Part No.	AO Dim. (In.)	AR Dim. (In.)		FLYWHEEL		MOTOR PULLEY				BELTS†		C	y
									Part No.	P.D.	Part No.	P.D. (In.)	Bore (In.)	Keyway	No. Req. and Section	Part No.†		
40	1160	60	1750	404	HD97FW011	10	9⅞	5H81-812	5H81-1104	17.4	KR15CL430	11.4	2⅛	¼ x ½	5C	KR20CA108	30	20
	1450							5H80-802	5H80-1104	11	KR16CJ030	9.0			6C	KR20CA093	29¾	18⅝
	1750							5H60-822	5H60-1104		KR15CL030	11.0			5C	KR20CA099	31	20½
	1160	50	1450	405	HD97FW012	10	10⅝	5H81-802	5H81-1104	17.4	KR15CP030	14			5C	KR20CA108	28¼	20
	1450							5H80-822	5H80-1104	11	KR16CL030	11.0			6C	KR20CA099	31	18⅝
	1750							5H60-842	5H60-1104		KR15CN030	13.0			5C	KR20CA099	29½	20½
50	1450	60	1750	405	HD97FW012	10	10⅝	5H80-802	5H80-1104	11	KR16CJ030	9.0			6C	KR20CA093	29¾	18⅝
	1750							5H80-822			KR16CL030	11.0				KR20CA099	31	
	1450	50	1450	444	HD97FW013	11	11	5H80-832			KR16CL034	11.0	2⅜	⅝ x 5/16		KR20CA099	31	
	1750							5H80-842			KR16CN034	13.0				KR20CA099	29½	
60	1750	60	1750					5H80-832			KR16CL034	11.0				KR20CA099	31	
	1750	50	1450	445	HD97FW014	11	12	5H80-842			KR16CN034	13.0				KR20CA099	29½	

*Complete drive package — Flywheel, Belts, Pulley

†Last two digits designate outside belt length. (In.)