ROTARY SCREW STATIONARY AIR COMPRESSOR

Installation-Operation Maintenance and Service Manual

MODELS W60SS-W75SS

Le ROI DRESSER

LeRoi Division,
Dresser Industries, Inc.
Sidney, Ohio 45365

Form No. W60-75SS JSS 7/86

Printed in U.S.A.

SAFETY NOTICE

Le ROI Division, Dresser Industries, Inc., has strived through constant research and development to provide this equipment with every necessary safety device. However, there is no substitute for safe operating procedures.

This manual contains numerous "Notes", "Cautions" and "Warnings" intended to protect the equipment from damage and the operator from injury.

The "Notes", "Cautions" and "Warnings" are not, however, all inclusive. Extreme care must be exercised when operating or servicing this equipment.

The operator/serviceman should:

1. Learn all he can about his equipment.
2. Develop safe working habits.
3. Never operate a unit without guards and shields in place.
4. Never operate a unit that is not properly grounded.
5. Never service a unit without disconnecting and locking out the electrical power supply unless following specific operation manual instructions.
6. Never service a unit with air pressure in the air receiver-oil reservoir unless following specific operation manual instructions.
7. Take all necessary precautions, when adjusting controls, etc., to prevent electrical shock.

Air delivered by these compressor **must not** be used for breathing air.

DON'T PLAY WITH COMPRESSED AIR!

DON'T POINT AIR HOSES AT ANYONE!

DON'T USE COMPRESSED AIR TO BLOW DIRT FROM CLOTHING!

At close range, compressed air, at the pressures these units develop, can put out eyes, burst ear drums, cause serious skin blisters and other injuries.

Check Pressure Relief valves daily to make certain they are working properly. An over pressurized air receiver has the potential destructive force of a small bomb.

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AGAINST AN ACCIDENT

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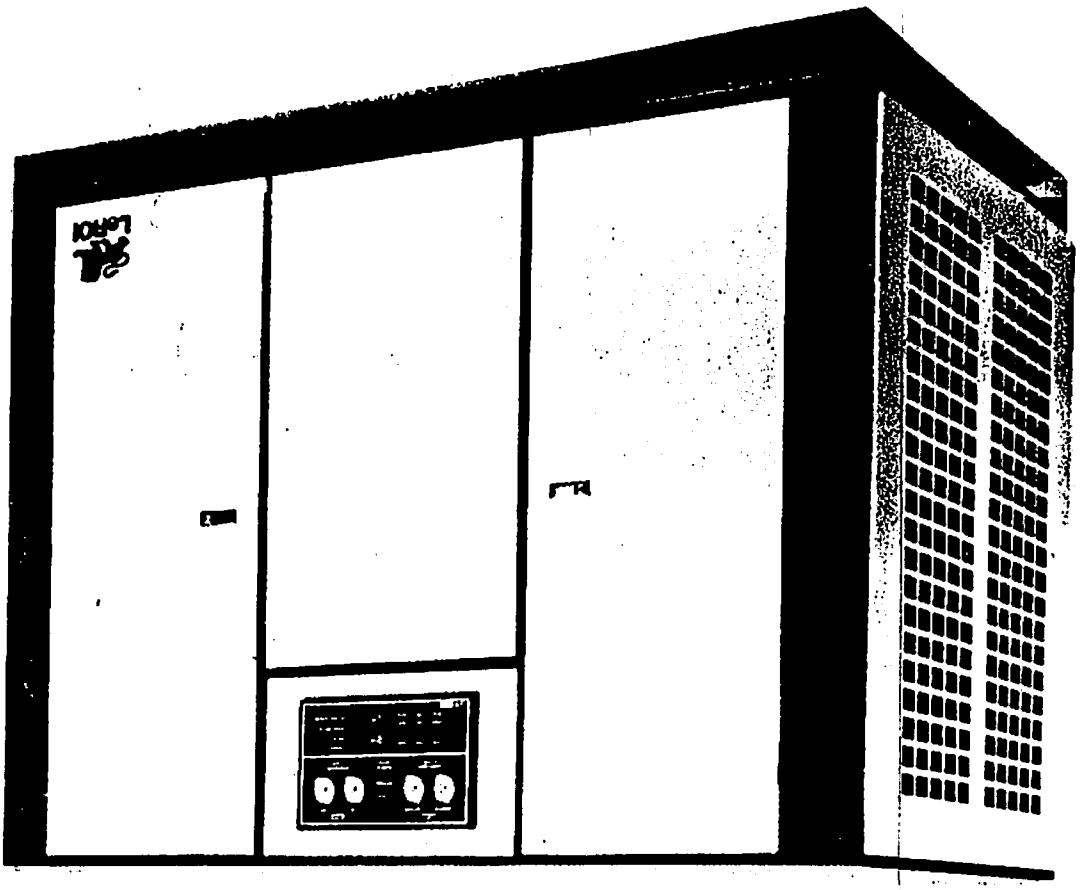

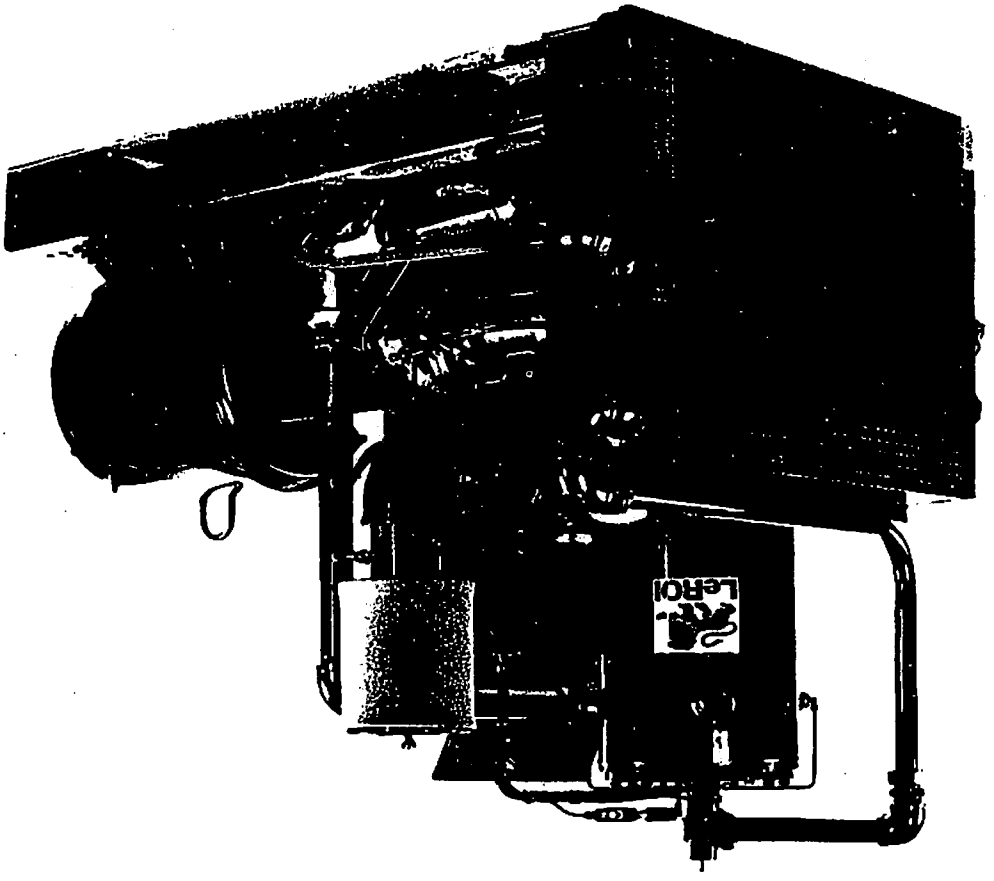

Section I
GENERAL INFORMATION

This manual includes installation and operating instructions, and maintenance and service procedures for the Model W60SS and W75SS Air Compressor units.

An explanation of the model code follows:

Example: W60SS or WH60SS

W — Indicates the series

H — Maximum operating pressure above 125 PSI.

60 — Approximate horsepower required to drive the air end.

SS — Stationary screw

This series of air compressor units are electric motor driven, oil flooded, single stage, rotary screw type.

These compressor units may be either air or watercooled and with or without a housing. Aftercooler is standard for air cooled and optional for water cooled units.

AIR END (Figure 1)

The air end is directly driven using a flexible coupling between the electric motor and the air end.

The male rotor is driven by a gear mounted on an independent input shaft and a mating gear on the male rotor. The female rotor is driven by the male rotor because the rotors are meshed. Figure 2 shows direction of rotor rotation and the air/oil flow through the air end. Note that the air flow through the air end is between the rotors and the inside diameter of the cylinder.

Each rotor is mounted with two angular contact ball bearings at the rear or discharge end. This provides positive rotor location. The front or inlet end of each rotor is supported by single row roller bearing. This allows the rotors or cylinder to freely expand or contract due to changes in temperature without affecting critical running clearances.

The independent input (drive) shaft is supported by a deep groove single row ball bearing at the front end and a single row roller bearing at the rear.

The rear bearing retainer provides for mounting a full flow oil filter element. A spring loaded ball type filter by-pass valve is also located in the rear bearing retainer.

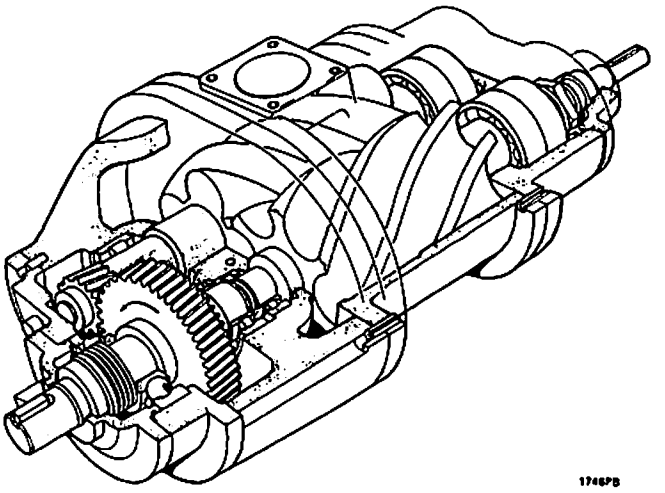

Figure 1 — Air End

AIR AND OIL FLOW

Air circulates through the sytem beginning at the air cleaner, passes through the intake valve and into the air end where it is compressed. From the air end compressed air is discharge at rated pressure into the unit air receiver-oil reservoir.

Separation of the oil from the air, which was injected into the air end during compression, begins in the unit air receiver-oil reservoir. From 90 to 95% of the oil separation from the air is accomplished with a decrease in air velocity, changes in flow direction, adequate baffling and proper location of the air receiver-oil reservoir inlet port.

Final air/oil separation is obtained using a composition material "can" type separator element to provide nearly oil free air at the separator out or service connection. Oil collected by the separator element is returned to the system by a filter equipped separator drain line.

To prevent over pressuring the air receiver-oil reservoir, an air pressure relief valve is installed in the receiver-reservoir. This pressure relief valve is located on the upstream or wet side of the separator element.

For both air and water cooled units, oil flows, forced by air pressure, from the air receiver-oil reservoir to the thermal valve. Then depending on oil temperature, oil flow by-passes the oil cooler (cold oil) or flows through the oil cooler (hot oil). From the thermal valve and/or the oil cooler, oil is forced

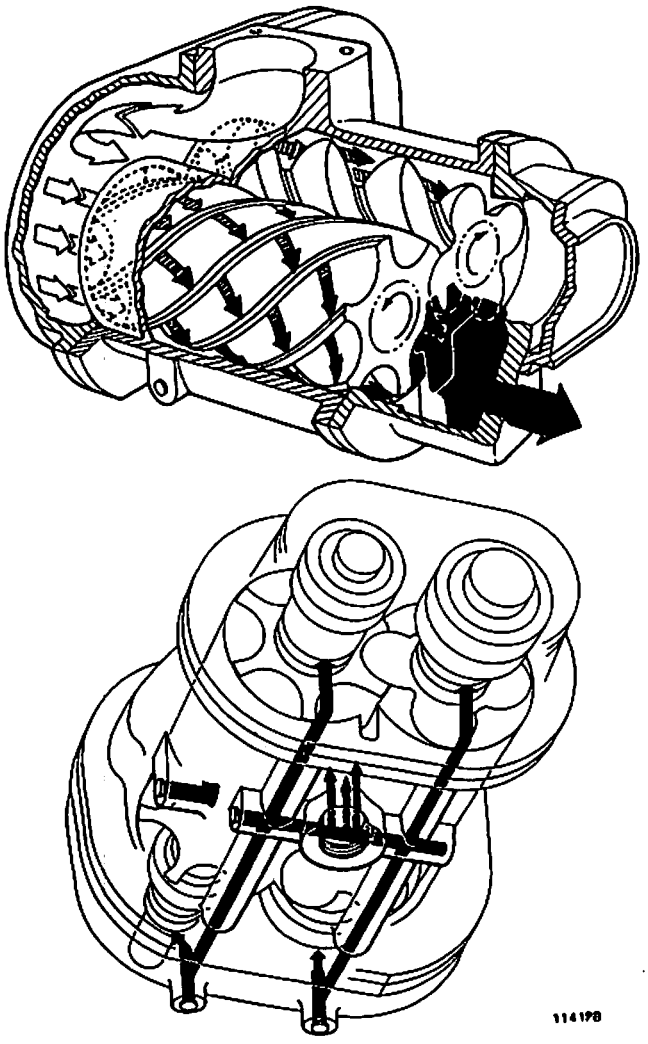

Figure 2 — Air and Oil Flow-Typical

through the filter and injected into the air end to provide cooling, sealing and lubrication. The temperature of the oil is controlled automatically by the thermal by-pass valve.

Water cooled units are also equipped with a temperature controlled automatic water flow control valve. This allows metering water flow for water conservation.

Oil injection temperatures for air cooled units should be 130° to 160°F depending on ambient air temperature. Oil injection temperature for water cooled units should be 140° to 160°F depending on water temperature and flow.

Air flow to/through the air end is controlled by the intake valve. When there is a demand for air, up to the rated capacity of the air end, the intake valve will be open (air end fully loaded). When there is no demand for air the intake valve will be closed (air end fully unloaded).

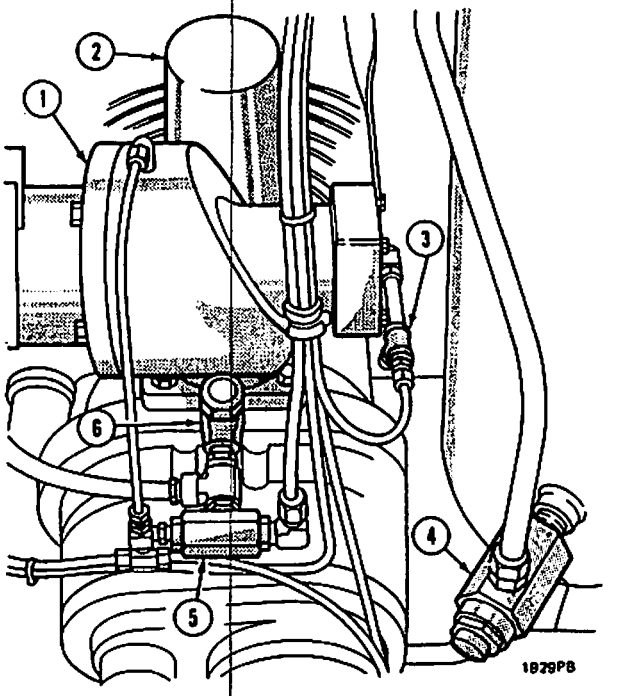

Figure 3

1. Intake Valve
2. Oil Filter
3. Control Bleed Orifice (when used)
4. Thermal By Pass Valve
5. Blow Down (Dump) Valve
6. Check Valve

When a unit is equipped with the modulating control option the intake valve will open and close (modulate) based on air demand.

CONTROL FUNCTION

Five basic modes of control are available for these units. These are:

1) Load/Unload Control
2) Modulating Control
3) Dual Control (Modulating and Start/Stop)
4) Auto Dual Control (Modulating and Timed Stop)
5) Lead/Lag Control

The basic modes of control are predetermined by installing the required electrical and pneumatic control components and properly positioning selector switches on the control circuit board.

All but three electrically operated components are mounted on a printed circuit board which is located in the instrument panel enclosure. The remaining three components (2 for auto dual, 1 additional for lead/lag) are mounted in or on the electrical control enclosure.

When operating a unit with a predetermined basic mode of control other than load/unload, the

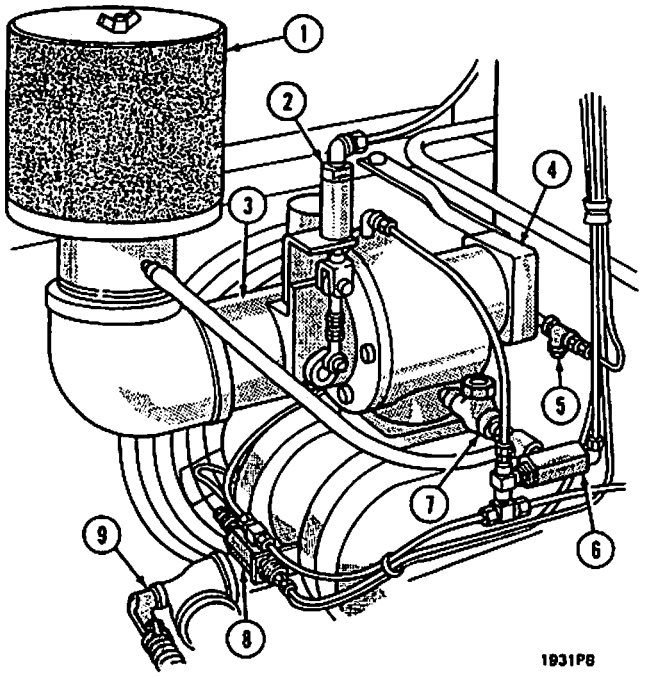

Figure 4

1. Air Cleaner
2. Air Cylinder
3. Starting Unloader Valve
4. Intake Valve
5. Control Bleed Orifice (when used)
6. Blow Down (Dump) Valve
7. Check Valve
8. Pilot Valve
9. Discharge Temperature Switch

user may select either of two types of control available, in each basic mode. As an example, a unit equipped with auto dual control may be operated with modulating (continuous run) or timed stopped control.

The selection of type of control is made at the instrument panel.

LOAD/UNLOAD CONTROL (STANDARD)

Load/unload control consists of a pilot valve which, when the maximum desired operating pressure is reached, will open allowing control (storage receiver) air pressure to close the intake valve (unload). At the same time the blow down (dump) valve is actuated (opened to atmosphere) by control air pressure to blow down the unit air receiver to reduce power requirements.

When there is a demand for air (falling storage receiver pressure - 15 PSI approximately), the pilot valve will close removing control air pressure from the intake valve allowing it to open (load).

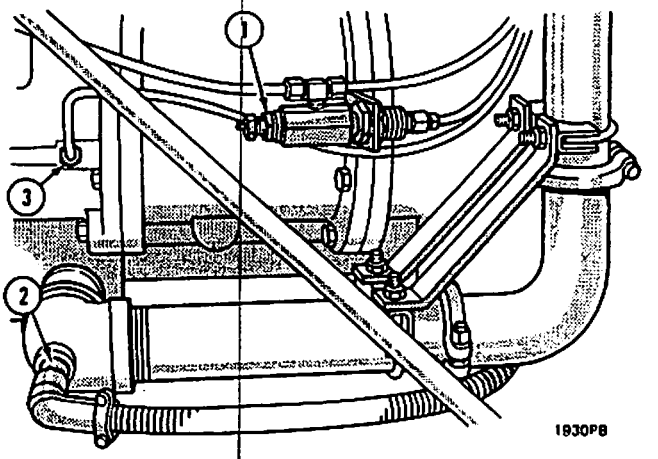

Figure 5

1. Pilot Valve
2. Discharge Temperature Switch
3. Separator Drain Line Connection

Also, air (control) pressure is removed from the blow down (dump) valve. The blow down valve will close preventing air from escaping from the unit receiver to atmosphere for loaded operation.

This mode of control requires using a plant system storage receiver to prevent too rapid cycling of controls. (Also refer to receiver size note under Auto-Dual Control)

MODULATING CONTROL (STANDARD)

To obtain modulating control, a control pressure regulator is added to the control circuit.

The control pressure regulator valve functions to partially or fully unload the air end based on air demand. As air demand is reduced (unit air receiver pressure rises), the control pressure regulator will gradually close the intake valve.

When/if air demand is increased (air receiver pressure falls) the control pressure regulator valve will gradually allow the intake valve to open. When the demand for air is less than the rated capacity of the air end, the control pressure regulator valve will hold the intake valve partially closed causing the air end to deliver air in direct proportion to demand.

When/if there is no demand for air both the unit and storage receiver pressures will rise to the maximum operating pressure. The pilot valve will then open, fully unload the air end, and dump the unit air receiver to atmosphere as described under load/unload control.

A plant system or additional storage receiver may not be required for the modulating control option provided the air demand is very near the rated air delivery of the unit on a continuous basis.

If the air demand varies widely (short periods of high demand with short periods of low or no demand) a system receiver is desirable and recommended to prevent too frequent cycling of the controls.

DUAL CONTROL (OPTIONAL)

Dual control will have, in addition to the pilot valve and control pressure regulator valve, two pressure switches, PS-1 and PS-2.

One pressure switch (PS-1) will start and stop the unit. The second pressure switch (PS-2) will prevent the unit from restarting if unit air receiver-oil reservoir air pressure is above 20 PSI, approximately.

This mode of control requires using a plant system storage receiver to prevent too rapid cycling of controls. (Also refer to receiver size note under auto dual control.)

AUTO-DUAL (Timed Stop) CONTROL (OPTIONAL)

Auto-Dual control consists of the same components as Dual control with the addition of a timer.

The timer functions to stop the unit after it has run unloaded for a pre-determined time (timer setting).

Auto-Dual control units require the use of system storage receiver. This receiver is to be part of the plant air distribution system. A nominal system air receiver size is 400 gallon.

NOTE

Actual receiver size varies depending on distribution pipe size, air usage, etc. For further information on sizing a storage receiver, consult the CAGI handbook.

Auto-Dual control may be used in single unit applications but is especially well suited for multiple unit installations.

For single unit installations the timer should be adjusted for longer time delay periods (10 minutes).

In multiple unit installations, the controls may be adjusted so that one (or more) unit(s) operate in the rated pressure range with time delay stop times of 10 minutes.

The second unit(s) (one or more) would have the controls set 5 PSI below the first unit with a short (5 minute) delay stop setting.

When air demand is no more than what is delivered by the first unit(s) the second unit(s) will stop.

If/when there is a demand for air greater than what the first unit(s) will deliver, the second unit(s) will restart.

NOTE

Additional units may be added for very high air demands. The controls of these additional unit(s) can then be set at 5 PSI below the first and second unit(s). This allows the controls to automatically put an additional unit(s) "on line" to meet air demands.

LEAD/LAG CONTROL

Lead/Lag control is obtained by modifying the control piping, adding a control solenoid to the circuit and correctly adjusting pressure switch PS-1.

The solenoid valve may be actuated either electrically or pneumatically.

The air pressure switch PS-1 must be adjusted to actuate (close) at 5 PSI below the opening pressure of the pilot valve.

Changing unit operation from lead to lag may be obtained by correctly positioning the selector switch on the instrument panel.

COMPONENT FUNCTION

Piping and wiring diagrams have been provided to assist in locating components on the unit and determining component function.

The following explanation of component function will assist in determining if the compressor is operating properly. This information may then be used to locate component malfunctions.

INTAKE VALVE

The intake valve is located on top of the air end. The primary purpose of the intake valve is to control air flow to the air end. The secondary purpose of the intake valve is to check off possible reverse air/oil flow when the unit is shut down.

STARTING UNLOADER VALVE

The starting unloader valve is mounted in the inlet housing of the intake valve. The purpose of the starting unloader valve is to partially unload the air end to allow it to reach rated speed at start up. This is a normally closed butterfly valve which is opened by an air operated cylinder using pressure from the unit air receiver-oil reservoir.

AIR RECEIVER-OIL RESERVOIR

The air receiver-oil reservoir provides an oil sump, primary oil separation and a mounting loca-

tion for the separator element. The separator element is mounted in the receiver-reservoir by clamping the separator mounting flange, with gaskets, between the receiver-reservoir cover and top flange. Other components which are mounted on the receiver-reservoir are the minimum pressure/check valve, pressure relief valve and control pressure regulator valve (when used).

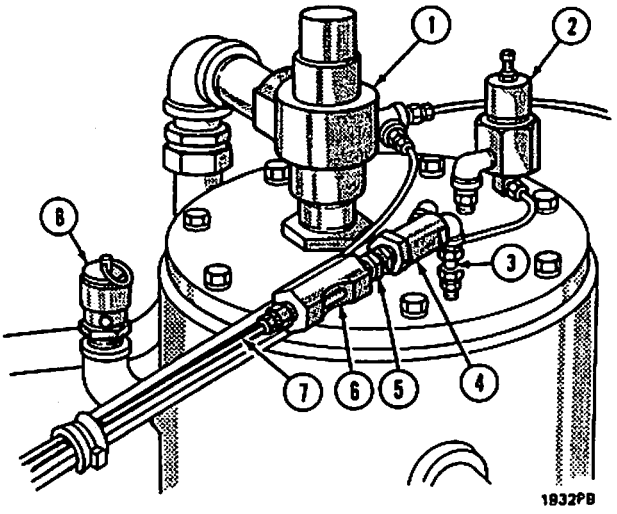

Figure 6

1. Minimum Pressure/Check Valve
2. Control Pressure Regulator Valve
3. Separator Drain Tube
4. Drain Line Filter
5. Check Valve
6. Sight Gage
7. Separator Drain Line
8. Pressure Relief Valve

MINIMUM PRESSURE/CHECK VALVE

The minimum pressure/check valve is located on the air receiver-oil reservoir cover in the separator out port.

The purpose of this valve is to maintain minimum air pressure in the air receiver-oil reservoir.

The valve consists of a spring loaded piston which opens when air pressure reaches approximately 80 PSI and maintains a minimum pressure of 60 to 70 PSI.

In addition, this valve checks off the return flow of air from the system receiver (storage tank and/or distribution system) when the compressor is stopped or running unloaded.

NOTE

Compressor should not be operated at minimum pressure for extended periods. Excessive oil loss will result.

SEPARATOR DRAIN LINE

The separator drain line is connected, at the air receiver-oil reservoir cover, to a tube which extends down into and touches the bottom of the separator element.

The other end of the drain line is connected to a low pressure port on the air end.

The drain line is equipped with a filter, a check valve and a flow sight gage.

The filter prevents foreign matter from entering the air end. The check valve allows free flow of air/oil from the separator to the air end but prevents reverse air/oil flow at shut down. The sight gage may be used to assist with service diagnosis.

HIGH AIR TEMPERATURE SHUT DOWN SWITCH

The high air temperature shut down switch is located in the discharge cavity of the rear bearing retainer on the air end.

This is a normally closed temperature sensitive switch. The purpose of this switch is to shut the unit down in the event the air/oil temperature at the air end discharge rises above 230 °F ± 7 °.

CAUTION

The cause of shut down due to high air/oil temperature must be corrected before restarting the unit.

To restart a unit allow the unit to cool, push the stop button to reset the electrical controls and then push the start button.

BLOW DOWN (DUMP) VALVE

The air receiver-oil reservoir blow down or dump valve is located on the side of the intake valve.

The purpose of this valve is to allow air to escape from the air receiver-oil reservoir when the unit is running unloaded or stopped.

This is a normally closed valve which is opened by air pressure. When the unit is running unloaded air pressure to open this valve is supplied by the control circuit.

This valve is opened by air pressure from the intake valve when the unit is shut down.

Blow down (dump) air flows to atmosphere through the air cleaner.

RETURN AIR BLEED LINE

The atmospheric blow down (dump) line is used to provide a return air bleed back circuit when the unit is running unloaded.

This line connects, with suitable fittings and a check valve, between the side of the intake valve and the air cleaner.

When the unit is running unloaded (intake valve closed) a small amount of air is allowed to enter the air end from either atmosphere or from the unit air receiver-oil reservoir.

The check valve is installed directly into the side of the intake valve to prevent air from escaping from the air end when the unit is shut down.

PILOT VALVE (LOAD-UNLOAD CONTROL-STANDARD)

The pilot valve is located on the air end near the intake valve.

The purpose of the pilot valve is to actuate control components.

The pilot valve is a normally closed spring loaded valve which is opened by air pressure supplied from the system receiver.

CONTROL PRESSURE REGULATOR VALVE (OPTIONAL MODULATING, DUAL OR AUTO-DUAL CONTROL ONLY)

The control pressure regulator valve is located on the unit air receiver-oil reservoir cover.

The purpose of this valve is to furnish control pressure to operate the intake valve for modulating and/or dual or auto-dual (timed stop) control.

This valve senses unit air receiver-oil reservoir air pressures between 100 and 110 PSI (approximately) and opens or closes the intake valve to control air delivery based on demand.

The higher the unit receiver air pressure, the higher the control pressure and the more the intake valve is closed. (low demand)

The lower the unit receiver air pressure, the lower the control pressure and the more the intake valve is opened. (high demand)

When the unit air receiver air pressure falls below 100 PSI (approximately) the control pressure regulator can no longer maintain control pressure. This allows the intake valve to fully open. (full load)

NOTE

The pilot valve and control pressure regulator valve, on some units, may be adjusted to obtain a maximum of 150 PSI full load pressure. The control operation as described above would then work between 150-160 PSI. (approximately) Check the specifications for each unit to obtain the maximum operating pressure before making adjustments.

PRESSURE SWITCHES PS-1 and PS-2 — OPTIONAL-DUAL AND AUTO-DUAL — (TIMED STOP) CONTROL

Pressure switches PS-1 and PS-2 are located in the electrical control enclosure.

The function of pressure switch PS-1 is to stop and start the unit for dual control and start the timer for auto-dual (timed stop) mode of operation.

Pressure to actuate this switch is obtained from a control line connected to the pilot valve. When the pilot valve opens, at the maximum desired operating pressure, pressure switch PS-1 will actuate stopping the unit or start the timed stop function.

PS-1 pressure switch must be adjusted to actuate at some pressure below maximum operating pressure.

The function of pressure switch PS-2 is to prevent the unit from restarting until unit receiver pressure falls below 20 PSI (approximately).

This switch must be connected electrically to operate as a normally closed switch.

Pressure to actuate this switch is obtained from the unit receiver.

CONTROL LINE SHUTTLE CHECK VALVE — LOAD-UNLOAD (STANDARD) CONTROL UNITS ONLY

The shuttle check valve used on the load-unload (standard) control unit is located in the control piping at the pilot port of the blow down (dump) valve. The dump valve is located on the side of the intake valve.

The purpose of this shuttle check valve is to:

1. Allow the pilot valve to unload the air end, (close intake valve) and open the blow down valve without allowing air to pass into the air end when the unit is running unloaded.

OR

2. Allow the normal build up of air pressure, in the air end, to hold the intake valve closed and open the blow down (dump) valve when the unit is shut down.

CONTROL LINE SHUTTLE CHECK VALVES — OPTIONAL MODULATING, DUAL and AUTO DUAL (timed stop) CONTROL

One shuttle check valve is located in the pilot port of the air receiver blow down (dump) valve. (The blow down valve is located on the side of the intake valve.)

The function of this check valve is to:

1. Allow control pressure to open the blow down valve when the unit is running unloaded.

OR

2. Allow normal air pressure build up, in the air end, to open the blow down (dump) valve when the unit is shut down.

The second shuttle check valve is located on the operating piston cover end of the intake valve.

The function of this check valve is to:

1. Allow modulated control pressure, from the control pressure regulator valve, to open and close the intake valve for modulating control.

OR

2. Allow the pilot valve (unmodulated control pressure) to fully close the intake valve when the storage receiver pressure rises to the maximum desired operating pressure.

WATER FLOW CONTROL VALVE — WATER COOLED UNITS

The water flow control valve is located at the water inlet port of the oil cooler, or aftercooler, if used.

The purpose of the automatic adjustable water flow control valve is to provide sufficient cooling with minimum water usage.

The oil cooler water flow, when an aftercooler is used, is piped in series with aftercooler. The aftercooler is first in the series.

The temperature sensing probe (capillary) is always located in the oil flow piping of the air end.

INSTRUMENTATION

Instrumentation (gages and indicators) are provided on these units to monitor function and provide assistance with service diagnosis.

The following chart lists the instrumentation, location of each and a brief description of function.

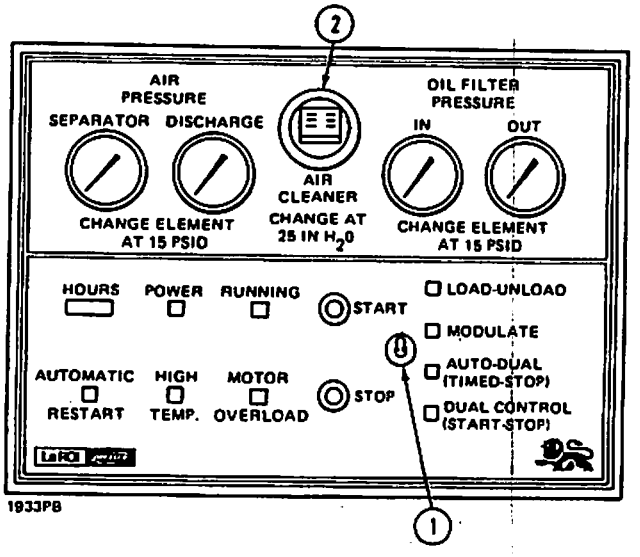

Figure 7 — Instrument Panel

1. Mode Selector Switch
2. Air Cleaner Restriction Indicator

BE ALERT

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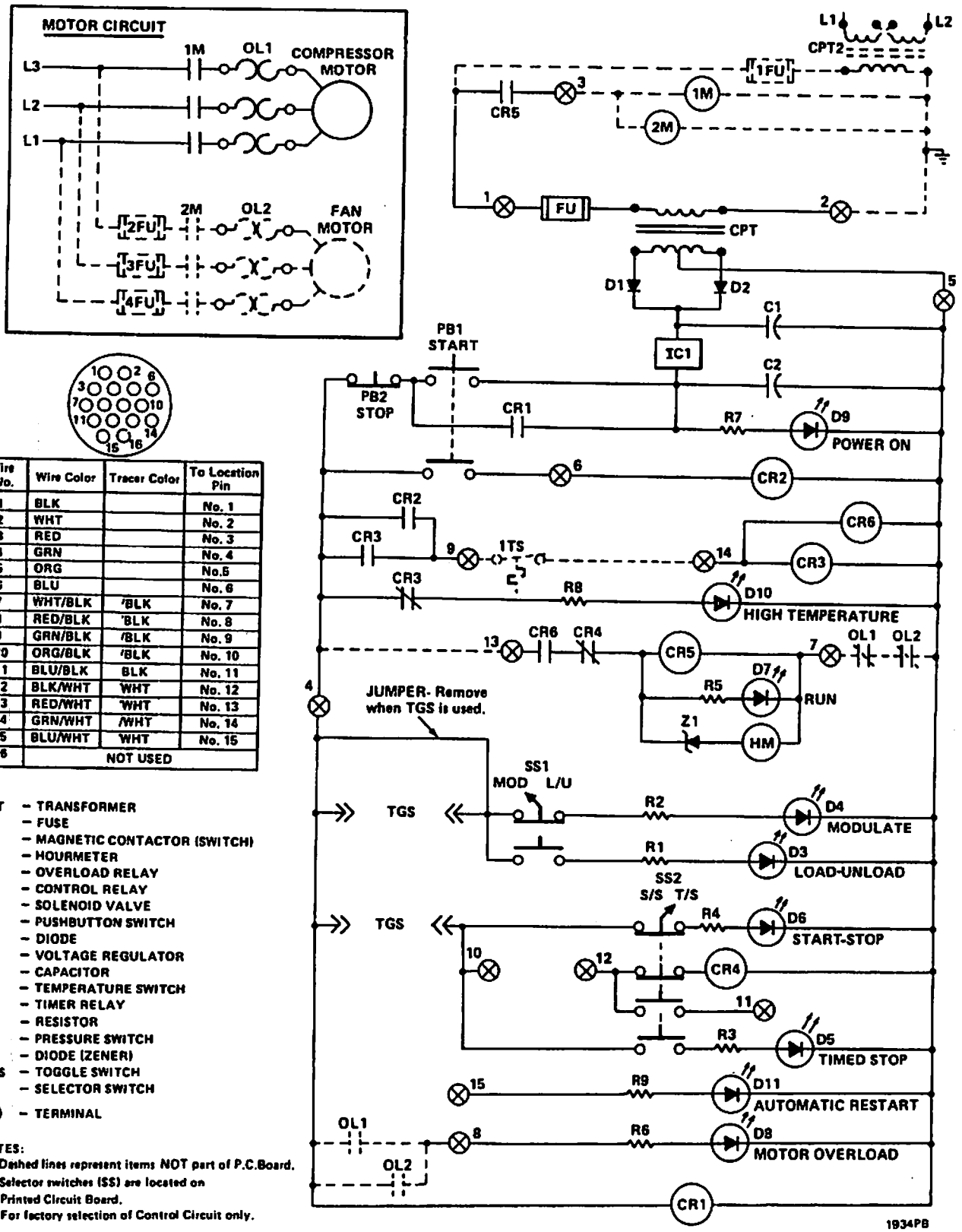
ITEM	LOCATION	INDICATION
"POWER" ON LAMP	Instrument Panel	Shows power to unit is turned on. Ready to start.
HOURMETER	Instrument Panel	Shows unit total run time.
AIR CLEANER RESTRICTION INDICATOR	Instrument Panel	Shows restriction of air cleaner and need for service. (25" of water maximum)
OIL PRESSURE GAGE(S)	Instrument Panel	(1) Shows filter inlet oil pressure (1) Shows filter outlet pressure. Used to check oil pressure drop across filter.
AIR PRESSURE GAGE(S)	Instrument Panel	(1) Shows air pressure upstream (wet) side of separator element. (1) Shows air pressure downstream (dry) side of the separator element (storage and distribution system). Used to check air pressure drop across separator element.
"RUNNING" LAMP	Instrument Panel	Indicates unit is running.
"LOAD/UNLOAD" LAMP	Instrument Panel	Indicates unit will operate continuous run with load/unload control.
"MODULATE" LAMP	Instrument Panel	Indicates unit will operate continuous run with modulating control.
"DUAL CONTROL" LAMP	Instrument Panel	Indicates unit will operate continuous run or start/stop.
"AUTO DUAL" LAMP	Instrument Panel	Indicates unit will operate continuous run or time delay stop.
"AUTOMATIC RESTART" LAMP	Instrument Panel	Indicates unit is stopped. Could restart at any time.
"MOTOR OVERLOAD" LAMP	Instrument Panel	Indicates unit shut down due to tripped motor overload relay (switch).
"HIGH TEMPERATURE" LAMP	Instrument Panel	Indicates cause of shut down due to high air temperature at air end discharge.
CONTROL SELECTOR SWITCH	Instrument Panel	Provides user selection of type of control in basic mode of control. I.E. Dual Control-Select Modulating or Start/Stop Control.

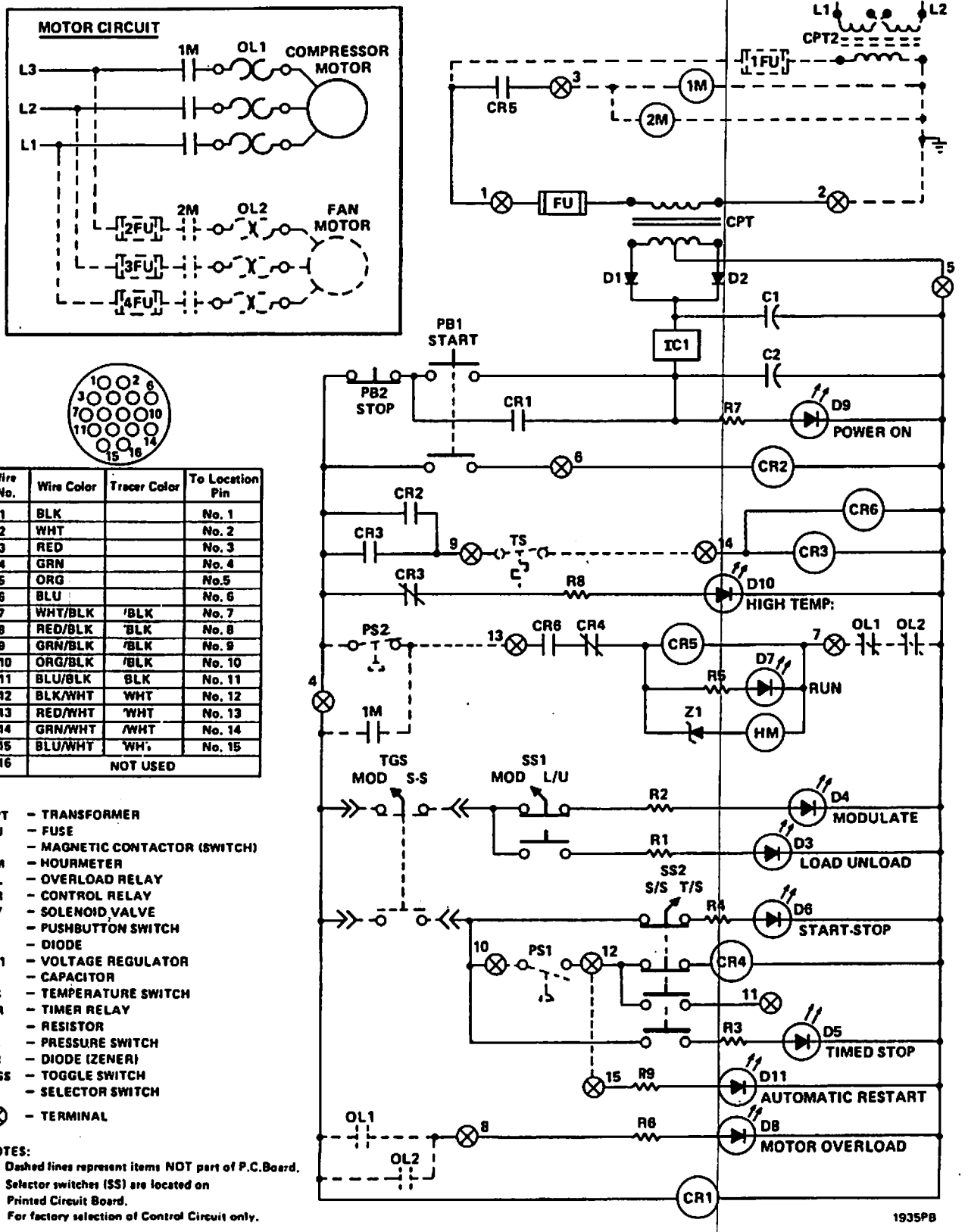


Wire No.	Wire Color	Tracer Color	To Location Pin
1	BLK		No. 1
2	WHT		No. 2
3	RED		No. 3
4	GRN		No. 4
5	ORG		No.5
6	BLU		No. 6
7	WHT/BLK	BLK	No. 7
8	RED/BLK	BLK	No. 8
9	GRN/BLK	BLK	No. 9
10	ORG/BLK	BLK	No. 10
11	BLU/BLK	BLK	No. 11
12	BLK/WHT	WHT	No. 12
13	RED/WHT	WHT	No. 13
14	GRN/WHT	WHT	No. 14
15	BLU/WHT	WHT	No. 15
• 16	NOT USED		

CPT – TRANSFORMER
FU – FUSE
M – MAGNETIC CONTACTOR (SWITCH)
HM – HOURMETER
OL – OVERLOAD RELAY
CR – CONTROL RELAY
SV – SOLENOID VALVE
PB – PUSHBUTTON SWITCH
D – DIODE
IC1 – VOLTAGE REGULATOR
C – CAPACITOR
TS – TEMPERATURE SWITCH
TR – TIMER RELAY
R – RESISTOR
PS – PRESSURE SWITCH
Z1 – DIODE (ZENER)
TGS – TOGGLE SWITCH
SS – SELECTOR SWITCH
⊗ – TERMINAL

NOTES:
1. Dashed lines represent items NOT part of P.C.Board.
2. Selector switches (SS) are located on Printed Circuit Board. For factory selection of Control Circuit only.

Figure 8 — Wiring Diagram-Load/Unload and Modulating Control



Wire No.	Wire Color	Tracer Color	To Location Pin
1	BLK		No. 1
2	WHT		No. 2
3	RED		No. 3
4	GRN		No. 4
5	ORG		No.5
6	BLU		No. 6
7	WHT/BLK	/BLK	No. 7
8	RED/BLK	/BLK	No. 8
9	GRN/BLK	/BLK	No. 9
10	ORG/BLK	/BLK	No. 10
11	BLU/BLK	/BLK	No. 11
12	BLK/WHT	/WHT	No. 12
13	RED/WHT	/WHT	No. 13
14	GRN/WHT	/WHT	No. 14
15	BLU/WHT	/WHT	No. 15
• 16	NOT USED		

CPT – TRANSFORMER
FU – FUSE
M – MAGNETIC CONTACTOR (SWITCH)
HM – HOURMETER
OL – OVERLOAD RELAY
CR – CONTROL RELAY
SV – SOLENOID VALVE
PB – PUSHBUTTON SWITCH
D – DIODE
IC1 – VOLTAGE REGULATOR
C – CAPACITOR
TS – TEMPERATURE SWITCH
TR – TIMER RELAY
R – RESISTOR
PS – PRESSURE SWITCH
Z1 – DIODE (ZENER)
TGS – TOGGLE SWITCH
SS – SELECTOR SWITCH
⊗ – TERMINAL

NOTES:
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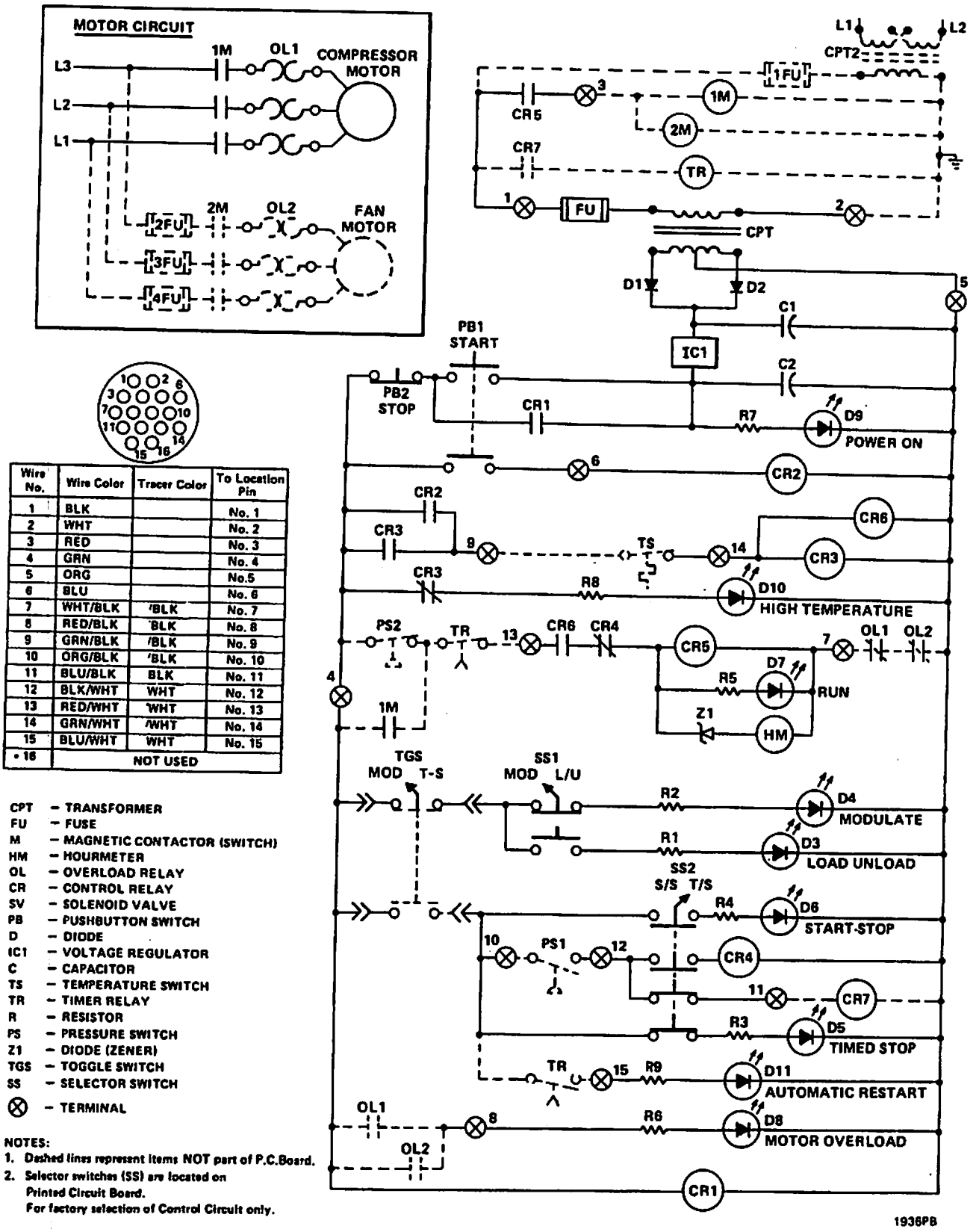
2. Selector switches (SS) are located on Printed Circuit Board. For factory selection of Control Circuit only.

Figure 9 — Wiring Diagram-Dual Control

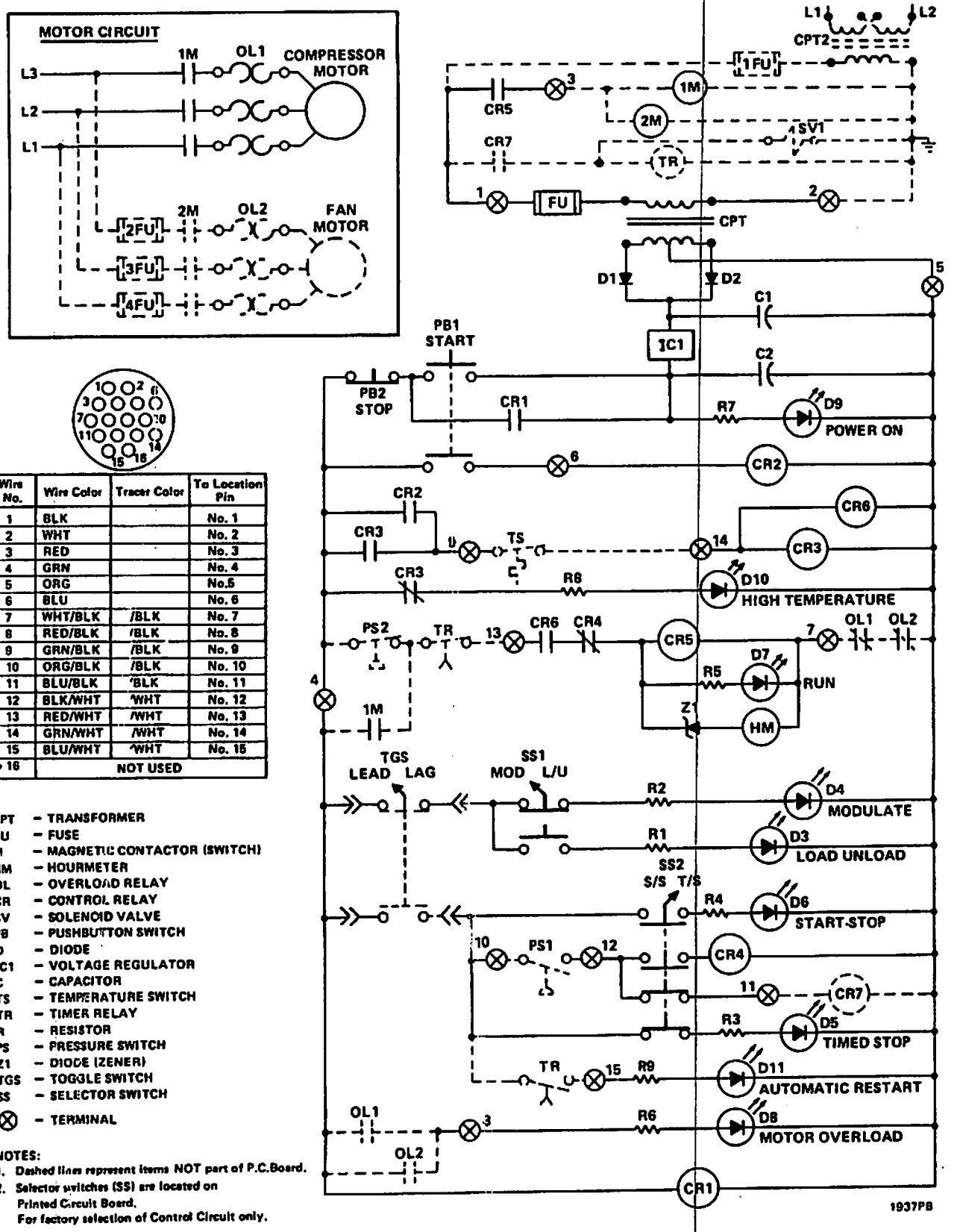


Wire No.	Wire Color	Tracer Color	To Location Pin
1	BLK		No. 1
2	WHT		No. 2
3	RED		No. 3
4	GRN		No. 4
5	ORG		No.5
6	BLU		No. 6
7	WHT/BLK	BLK	No. 7
8	RED/BLK	BLK	No. 8
9	GRN/BLK	BLK	No. 9
10	ORG/BLK	BLK	No. 10
11	BLU/BLK	BLK	No. 11
12	BLK/WHT	WHT	No. 12
13	RED/WHT	WHT	No. 13
14	GRN/WHT	WHT	No. 14
15	BLU/WHT	WHT	No. 15
16	NOT USED		

CPT – TRANSFORMER
FU – FUSE
M – MAGNETIC CONTACTOR (SWITCH)
HM – HOURMETER
OL – OVERLOAD RELAY
CR – CONTROL RELAY
SV – SOLENOID VALVE
PB – PUSHBUTTON SWITCH
D – DIODE
IC1 – VOLTAGE REGULATOR
C – CAPACITOR
TS – TEMPERATURE SWITCH
TR – TIMER RELAY
R – RESISTOR
PS – PRESSURE SWITCH
Z1 – DIODE (ZENER)
TGS – TOGGLE SWITCH
SS – SELECTOR SWITCH
⊗ – TERMINAL

NOTES:
1. Dashed lines represent items NOT part of P.C.Board.
2. Selector switches (SS) are located on Printed Circuit Board. For factory selection of Control Circuit only.

Figure 10 — Wiring Diagram-Auto Dual (Timed Stop) Control

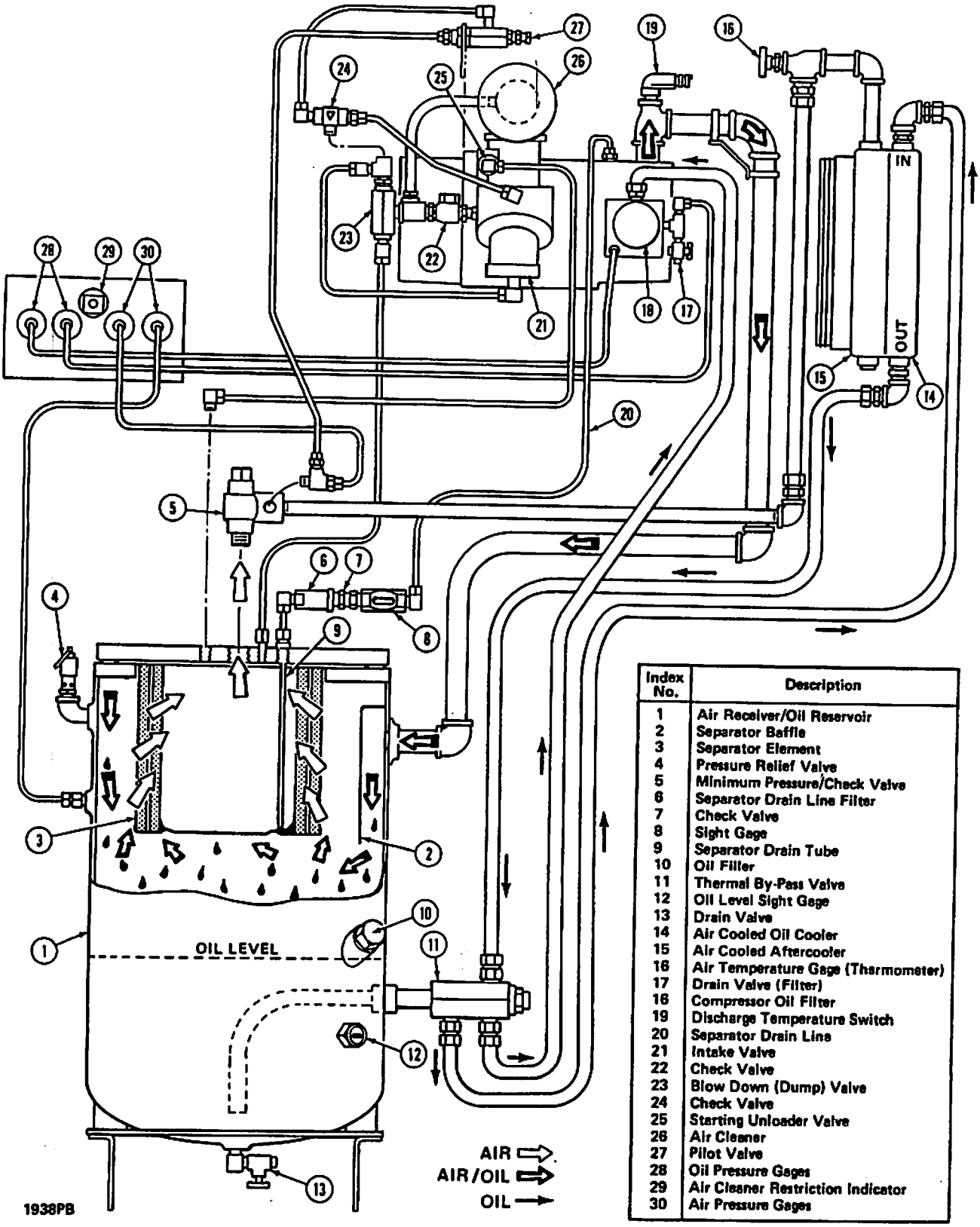


Wire No.	Wire Color	Tracer Color	To Location Pin
1	BLK		No. 1
2	WHT		No. 2
3	RED		No. 3
4	GRN		No. 4
5	ORG		No.5
6	BLU		No. 6
7	WHT/BLK	/BLK	No. 7
8	RED/BLK	/BLK	No. 8
9	GRN/BLK	/BLK	No. 9
10	ORG/BLK	/BLK	No. 10
11	BLU/BLK	/BLK	No. 11
12	BLK/WHT	/WHT	No. 12
13	RED/WHT	/WHT	No. 13
14	GRN/WHT	/WHT	No. 14
15	BLU/WHT	/WHT	No. 15
• 16	NOT USED		

CPT – TRANSFORMER
FU – FUSE
M – MAGNETIC CONTACTOR (SWITCH)
HM – HOURMETER
OL – OVERLOAD RELAY
CR – CONTROL RELAY
SV – SOLENOID VALVE
PB – PUSHBUTTON SWITCH
D – DIODE
IC1 – VOLTAGE REGULATOR
C – CAPACITOR
TS – TEMPERATURE SWITCH
TR – TIMER RELAY
R – RESISTOR
PS – PRESSURE SWITCH
Z1 – DIODE (ZENER)
TGS – TOGGLE SWITCH
SS – SELECTOR SWITCH
⊗ – TERMINAL

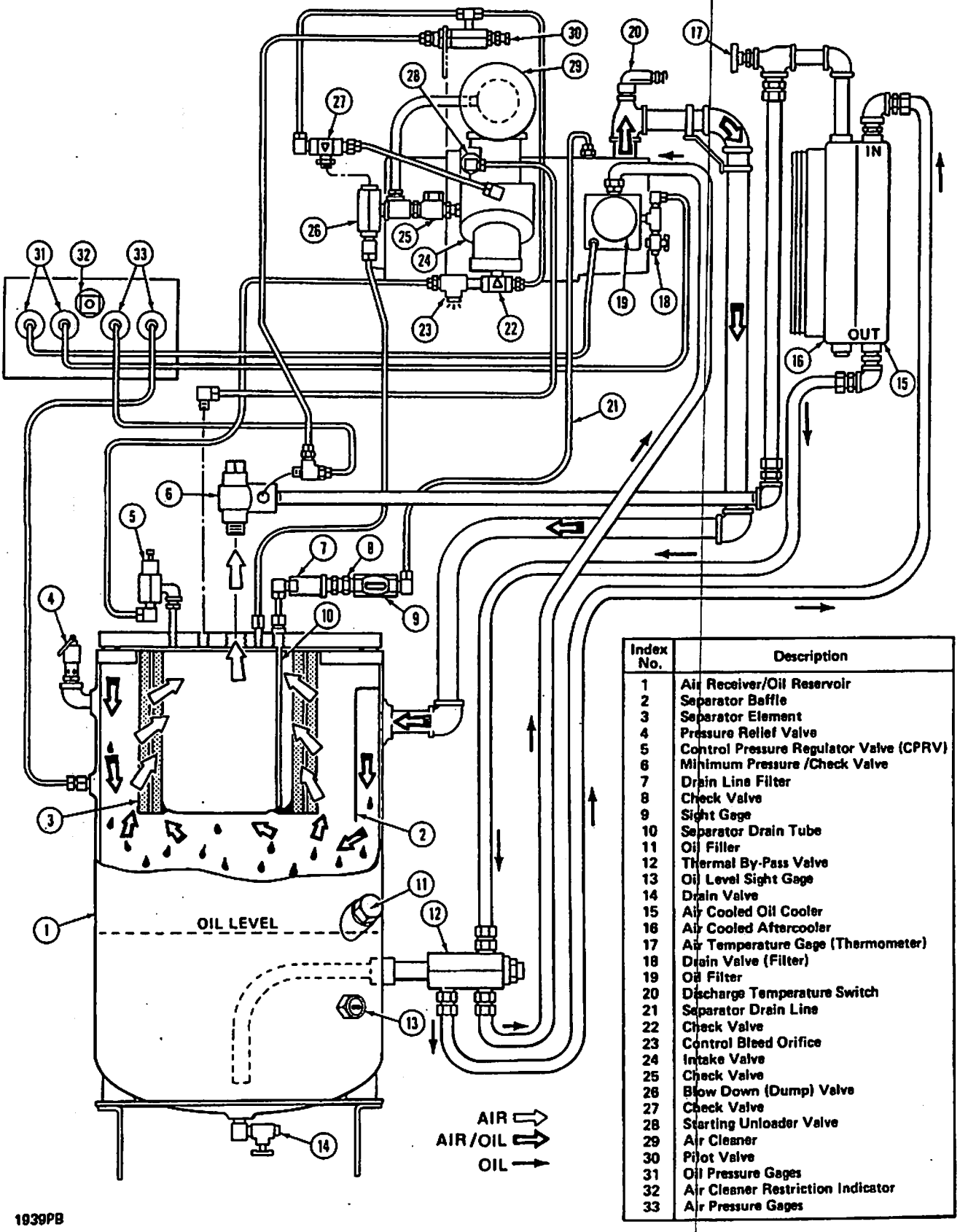
NOTES:
1. Dashed lines represent items NOT part of P.C.Board.
2. Selector switches (SS) are located on Printed Circuit Board. For factory selection of Control Circuit only.

Figure 11 — Wiring Diagram-Lead/Lag Control



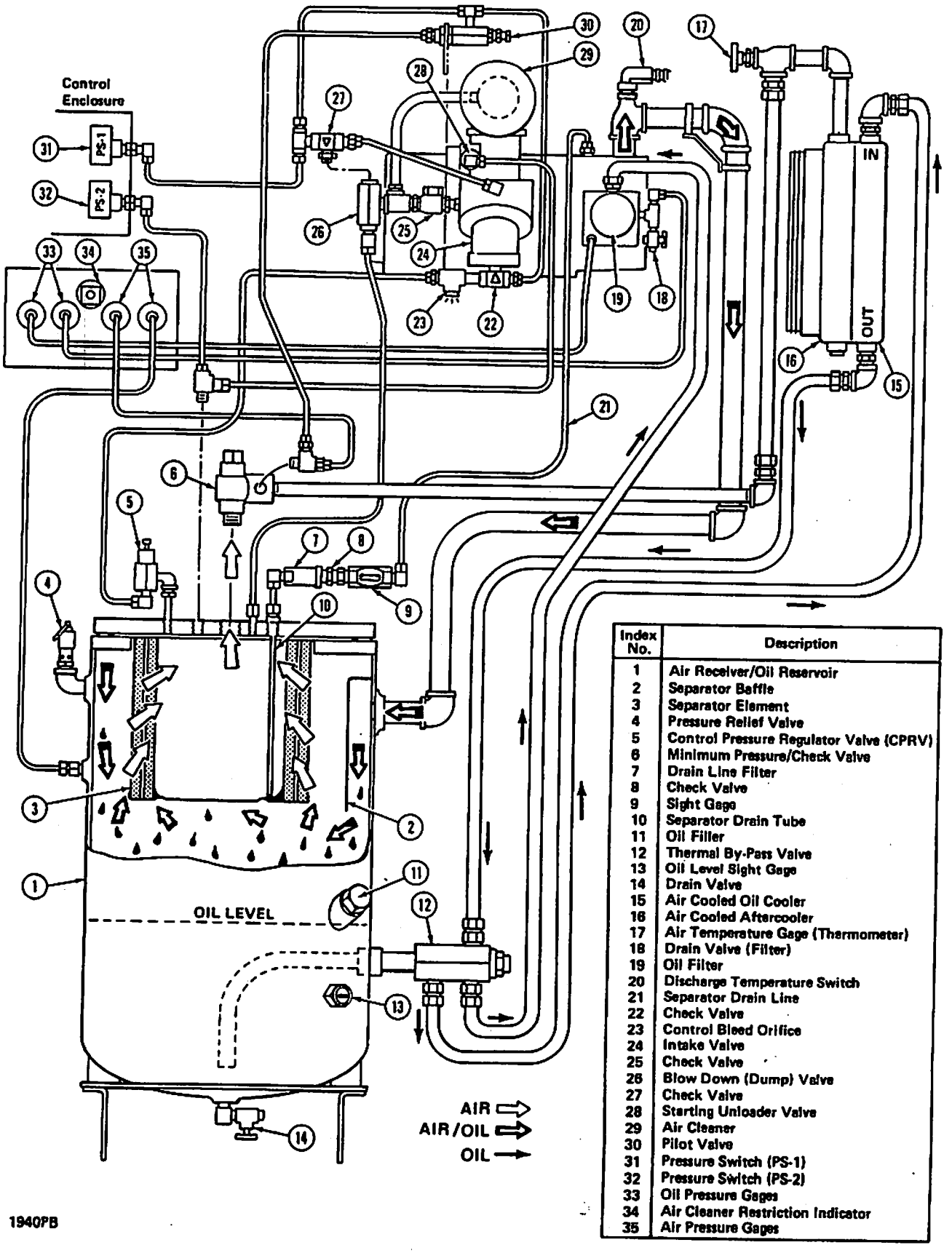
Index No.	Description
1	Air Receiver/Oil Reservoir
2	Separator Baffle
3	Separator Element
4	Pressure Relief Valve
5	Minimum Pressure/Check Valve
6	Separator Drain Line Filter
7	Check Valve
8	Sight Gage
9	Separator Drain Tube
10	Oil Filter
11	Thermal By-Pass Valve
12	Oil Level Sight Gage
13	Drain Valve
14	Air Cooled Oil Cooler
15	Air Cooled Aftercooler
16	Air Temperature Gage (Thermometer)
17	Drain Valve (Filter)
18	Compressor Oil Filter
19	Discharge Temperature Switch
20	Separator Drain Line
21	Intake Valve
22	Check Valve
23	Blow Down (Dump) Valve
24	Check Valve
25	Starting Unloader Valve
26	Air Cleaner
27	Pilot Valve
28	Oil Pressure Gages
29	Air Cleaner Restriction Indicator
30	Air Pressure Gages

Figure 12 — Piping Diagram-Load/Unload Control



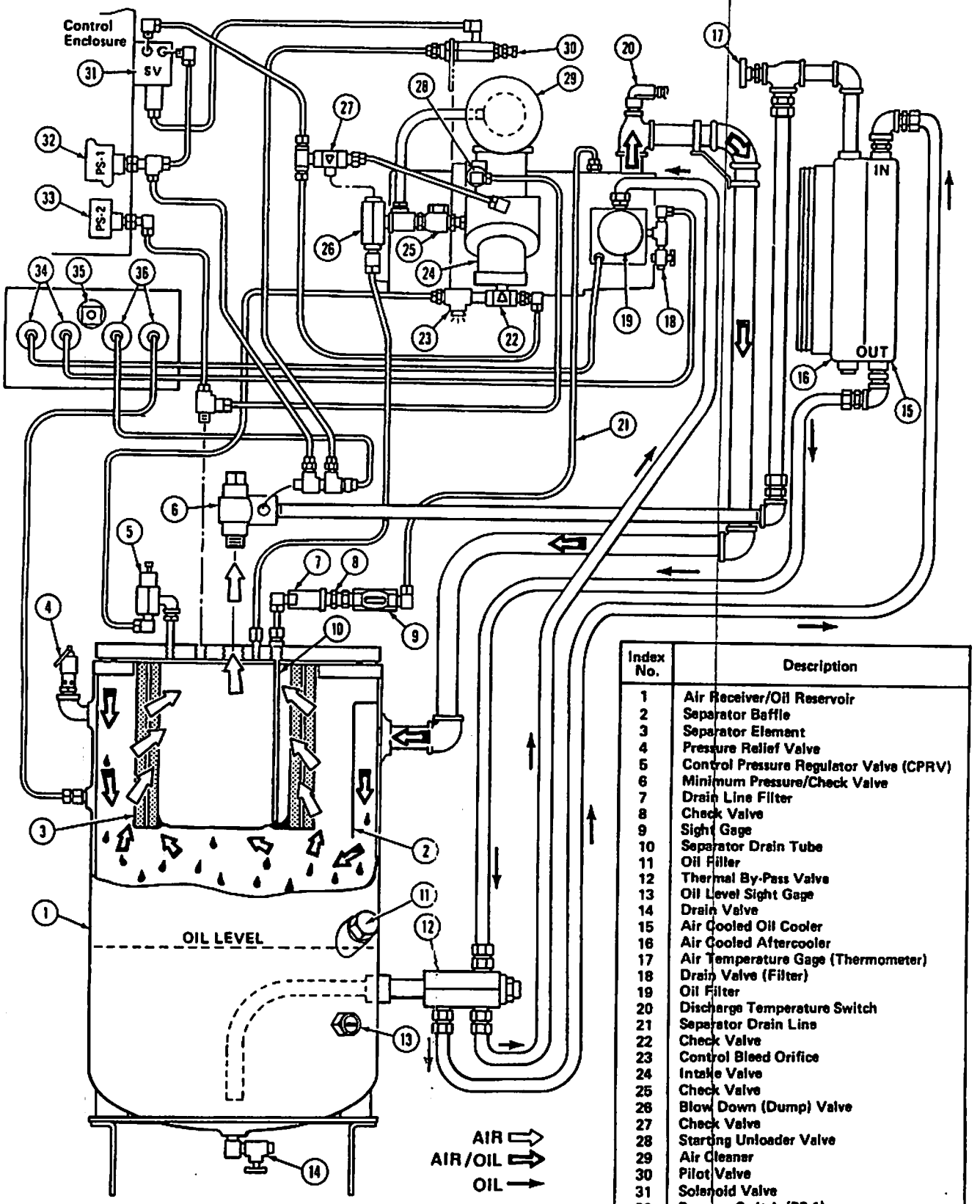
Index No.	Description
1	Air Receiver/Oil Reservoir
2	Separator Baffle
3	Separator Element
4	Pressure Relief Valve
5	Control Pressure Regulator Valve (CPRV)
6	Minimum Pressure /Check Valve
7	Drain Line Filter
8	Check Valve
9	Sight Gage
10	Separator Drain Tube
11	Oil Filler
12	Thermal By-Pass Valve
13	Oil Level Sight Gage
14	Drain Valve
15	Air Cooled Oil Cooler
16	Air Cooled Aftercooler
17	Air Temperature Gage (Thermometer)
18	Drain Valve (Filter)
19	Oil Filter
20	Discharge Temperature Switch
21	Separator Drain Line
22	Check Valve
23	Control Bleed Orifice
24	Intake Valve
25	Check Valve
26	Blow Down (Dump) Valve
27	Check Valve
28	Starting Unloader Valve
29	Air Cleaner
30	Pilot Valve
31	Oil Pressure Gages
32	Air Cleaner Restriction Indicator
33	Air Pressure Gages

Figure 13 — Piping Diagram-Modulating Control



Index No.	Description
1	Air Receiver/Oil Reservoir
2	Separator Baffle
3	Separator Element
4	Pressure Relief Valve
5	Control Pressure Regulator Valve (CPRV)
6	Minimum Pressure/Check Valve
7	Drain Line Filter
8	Check Valve
9	Sight Gage
10	Separator Drain Tube
11	Oil Filler
12	Thermal By-Pass Valve
13	Oil Level Sight Gage
14	Drain Valve
15	Air Cooled Oil Cooler
16	Air Cooled Aftercooler
17	Air Temperature Gage (Thermometer)
18	Drain Valve (Filter)
19	Oil Filter
20	Discharge Temperature Switch
21	Separator Drain Line
22	Check Valve
23	Control Bleed Orifice
24	Intake Valve
25	Check Valve
26	Blow Down (Dump) Valve
27	Check Valve
28	Starting Unloader Valve
29	Air Cleaner
30	Pilot Valve
31	Pressure Switch (PS-1)
32	Pressure Switch (PS-2)
33	Oil Pressure Gages
34	Air Cleaner Restriction Indicator
35	Air Pressure Gages

Figure 14 — Piping Diagram-Dual and Auto Dual (Timed Stop) Control



Index No.	Description
1	Air Receiver/Oil Reservoir
2	Separator Baffle
3	Separator Element
4	Pressure Relief Valve
5	Control Pressure Regulator Valve (CPRV)
6	Minimum Pressure/Check Valve
7	Drain Line Filter
8	Check Valve
9	Sight Gage
10	Separator Drain Tube
11	Oil Filter
12	Thermal By-Pass Valve
13	Oil Level Sight Gage
14	Drain Valve
15	Air Cooled Oil Cooler
16	Air Cooled Aftercooler
17	Air Temperature Gage (Thermometer)
18	Drain Valve (Filter)
19	Oil Filter
20	Discharge Temperature Switch
21	Separator Drain Line
22	Check Valve
23	Control Bleed Orifice
24	Intake Valve
25	Check Valve
26	Blow Down (Dump) Valve
27	Check Valve
28	Starting Unloader Valve
29	Air Cleaner
30	Pilot Valve
31	Solenoid Valve
32	Pressure Switch (PS-1)
33	Pressure Switch (PS-2)
34	Oil Pressure Gages
35	Air Cleaner Restriction Indicator
36	Air Pressure Gages

Figure 15 — Piping Diagram-Lead/Lag Control

Section II
SPECIFICATIONS — GENERAL

MODEL	W60SS	WH60SS	W75SS	WH75SS
Type	Rotary Screw	Rotary Screw	Rotary Screw	Rotary Screw
Stages	One	One	One	One
Type of Drive	Direct with gears	Direct with gears	Direct with gears	Direct with gears
Motor/Input Shaft Speed, RPM	3550	3550	3550	3550

NOTE

All pressures shown are maximum full load.

Male Rotor Speed, RPM (100 PSI)	5329	N/A	6422	N/A
Female Rotor/Fan Speed RPM (100 PSI)	3554	N/A	4283	N/A
Male Rotor Speed, RPM (125 PSI)	4828	N/A	5758	N/A
Female Rotor/Fan Speed RPM (125 PSI)	3220	N/A	3840	N/A
Male Rotor Speed, RPM (150 PSI)	N/A	4197	N/A	5329
Female Rotor/Fan Speed RPM (150 PSI)	N/A	2800	N/A	3554
Rated Delivery, CFM @100 PSI	275	N/A	360	N/A
Rated Delivery, CFM @125 PSI	250	N/A	330	N/A
Rated Delivery, CFM @150 PSI	N/A	220	N/A	275
Minimum Working Pressure, PSI Gage	80 (5.44 Bar)	80 (5.44 Bar)	80 (5.44 Bar)	80 (5.44 Bar)
Minimum Pressure Valve Set, PSI Gage	70 (4.76 Bar)	70 (4.76 Bar)	70 (4.76 Bar)	70 (4.76 Bar)
Oil Reservoir Capacity, U.S. Gallons	10	10	10	10
Air Receiver-Oil Reservoir Maximum Working Pressure PSI Gage	175 (11.9 Bar)	175 (11.9 Bar)	175 (11.9 Bar)	175 (11.9 Bar)
Pressure Relief Valve Set PSI Gage	145 (9.86 Bar)	170 (11.6 Bar)	145 (9.86 Bar)	170 (11.6 Bar)
Air Cleaner Type	Dry Type			
Air Cleaner Change Interval, Hours	As Required			

CAUTION

Observe the air cleaner restriction indicator. Change element when indicator shows red. Under dirty operating conditions, the air cleaner element will require changing more often.

Oil Filter Change Interval, Hours	1000	1000	1000	1000

NOTE

To prevent spilling excessive amounts of oil, allow the unit to sit, shut down, approximately 10 minutes before removing the oil filter.

OR

Drain the filter with the filter drain valve provided.

CAUTION

Conditions in which the unit is running may require changing the oil filter more often. Always renew the oil filter at each oil change.

Oil pressure gages (filter in, filter out) are provided so that the pressure drop across the filter, (filter condition) may be checked.

If a difference in oil prsesure (rated pressure, normal operating temperature) readings (filter in, filter out) is 15 PSI or greater, change the filter.

Oil Separator Element Change Interval as Required.

CAUTION

Always check the separator drain line and drain line filter for damage or plugging before condemning a separator element.

Observe the air pressure gages furnished to check the pressure drop across the separator element. (Rated pressure, normal operating temperature) If the pressure drop is 15 PSI or higher, renew the separator element.

LUBRICATION — COMPRESSOR

The useful life of compressor oil depends on the quality of the oil and the conditions in which the unit is operating.

For these reasons oil and oil filter change intervals are to be determined by oil sampling and analysis.

Oil sampling and analysis is recommended every 200 hours of compressor operation at least until an oil/oil filter change pattern or schedule is established.

It is recommended that LeROI SSL-32 (petroleum) or SSL-46 (synthetic) lubricant be used.

Either of these lubricants may be obtained, conveniently packaged from your nearest LeROI distributor.

If SSL-32 or SSL-46 is not available contact your local lubricant supplier for a lubricant which meets the specifications given below.

TYPICAL LUBRICANT SPECIFICATIONS

Non-Detergent Turbine or Hydraulics Oil:

Viscosity @ 100°F	160-220 SSU
Viscosity @ o°F	11,000 SSU or Less
Minimum Viscosity Index	90
Pour Point, °F	20° lower than lowest expected starting temperature.
Minimum Flash Point, °F	400
Rust Inhibitor	ASTM, D665 (latest) No rust after 24 hours sea water.
Oxidation Inhibitor	ASTM, D943 (latest) Neutral No. 2.0 or less after 1000 hours.
Anti-Foam Additive	ASTM, D892 (latest) 3 cycles stability nil.

LUBRICATION-ELECTRIC MOTOR

Refer to the motor manufacturer's recommendation for motor bearing lubrication.

Amercia industrial oil 46

Section III
INSTALLATION MOUNTING AND SPACE REQUIREMENTS

A suitable smooth floor should be provided for placing the compressor.

A special foundation is not required unless the floor or other mounting surface is extremely rough or unable to support the weight of the unit. The unit should sit level. It is advisable to use shims, as required, to make certain the frame is resting firmly on the mounting surface.

If there is danger of the unit being moved out of position for any reason it may be bolted to the mounting surface.

Adequate space must be provided to service the unit once it is installed. Both housed and unhoused units must be positioned at least 24" away from a wall or other obstruction on all sides to allow adequate cooling air circulation and service access.

NOTE

It is recommended that the cooling air outlet opening of the unit be positioned away from any obstruction to prevent uncontrolled recirculation of hot air.

The following tables show the approximate overall dimensions and weights which may be used for selecting a suitable location for the compressor.

TABLE I

	Length, In.	Width, In.	Height, In.	Weight, Lbs.
AIR COOLED WITHOUT HOUSING				
W60SS	70.5	45.0	53.2	1640
WH60SS	70.5	45.0	53.2	1640
W75SS	70.5	45.0	53.2	1640
WH75SS	70.5	45.0	53.2	1640
AIR COOLED WITH HOUSING				
W60SS	75.8	48.6	59.1	1850
WH60SS	75.8	48.6	59.1	1850
W75SS	75.8	48.6	59.1	1850
WH75SS	75.8	48.6	59.1	1850
WATER COOLED WITHOUT HOUSING				
W60SS	70.0	33.9	53.2	1530
WH60SS	70.0	33.9	53.2	1530
W75SS	70.0	33.9	53.2	1530
WH75SS	70.0	33.9	53.2	1530
WATER COOLED WITH HOUSING				
W60SS	75.8	48.6	59.1	1740
WH60SS	75.8	48.6	59.1	1740
W75SS	75.8	48.6	59.1	1740
WH75SS	75.8	48.6	59.1	1740

ELECTRICAL SUPPLY

An adequate electrical power supply of the correct voltage must be provided. All control enclosure wiring has been completed at the factory. This includes magnetic starter wiring for units furnished with starter. Units furnished without a starter require wiring the starter on the job site.

The electrical supply should be equipped with

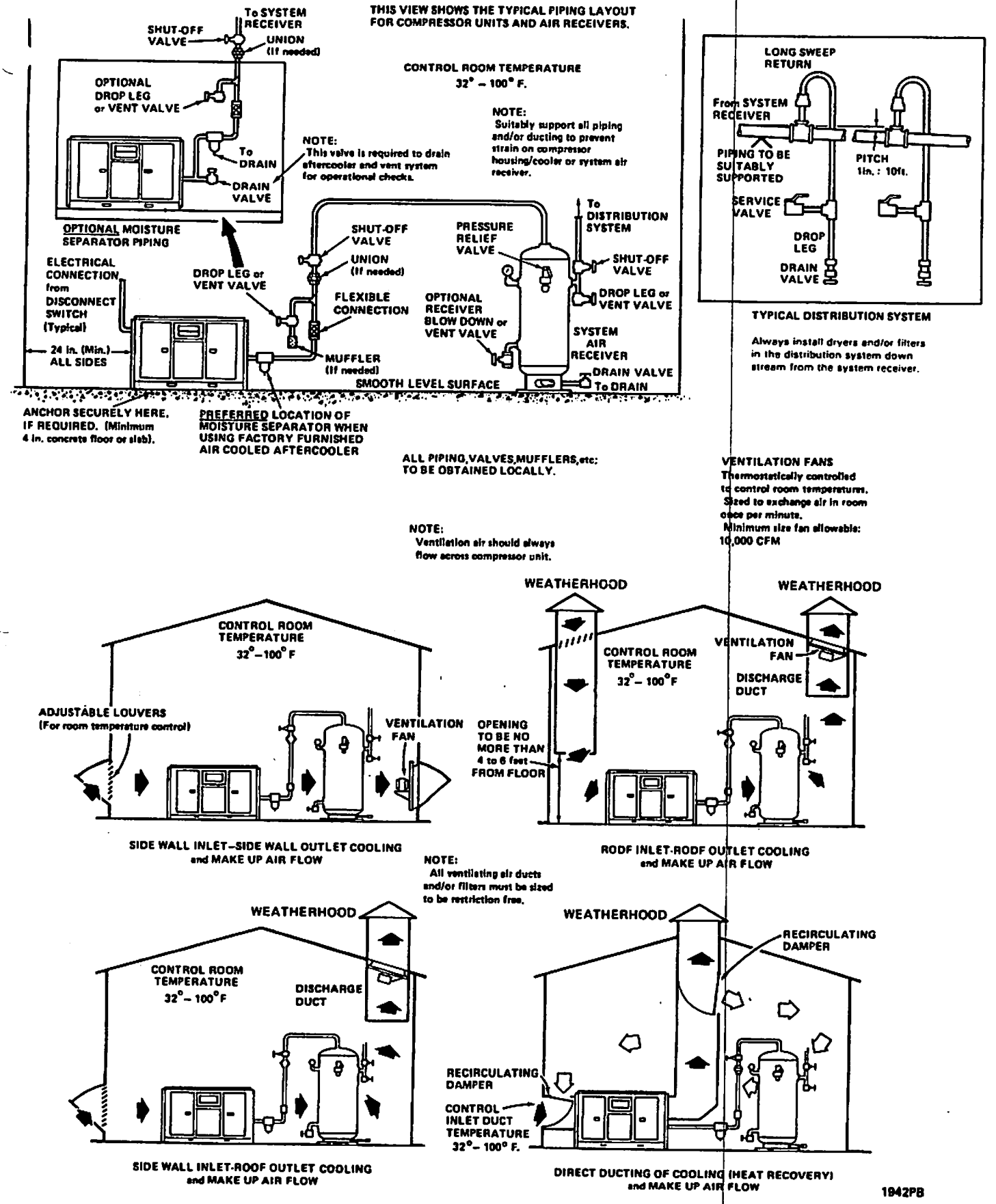


Figure 16 — Typical Installation

a fused line disconnect switch or circuit breaker so that electrical power may be disconnected while the unit is being serviced.

The fused line disconnect should be located and mounted in accordance with all state, local and national regulations.

The unit must be properly grounded to provide adequate ground fault protection. As a guide, it is suggested that the ground wire be equal in size to one of the conductors which feeds the compressor motor circuit. Make certain the ground wire connections are clean and tight.

The wire used to feed the compressor circuit should be selected and sized based on the following conditions:

(1) Motor full load amperage plus service factor.
(2) Ambient temperature in the area where the wire is located.
(3) Length of wire.
(4) Insulation type.

This information may be found in the latest edition of the National Electrical Code.

When installing a unit in a "Hazardous Location"; that is in a location where fire or explosion is a definite hazard, refer to the appropriate section of the National Electrical Code for further information.

CAUTION

In all cases local, state and national electrical codes must be strictly followed.

AIR SUPPLY TO COMPRESSOR (COOLING AND COMPRESSION)

Air supplied to the compressor should be free of contaminants such as paint spray mist and vapors, and other chemical vapors as well as normally air borne dust and dirt particles.

Inlet air to the compressor may vary slightly in temperature without adversely affecting the performance of the compressor. However, ambient air temperature should be maintained between 32° and 100°F to obtain desirable performance.

The air filter supplied with the compressor has an adequate flow capacity for most applications. In particularly dirty locations clean air may be ducted in from a clean air source or special air cleaners may be installed. Generally, most adverse conditions may be overcome by regular servicing of the filter furnished with the unit.

When bringing outside air into the compressor building for cooling and/or compression the air inlet to the compressor building should be located away from contaminants such as engine exhaust, gases, steam and other harmful vapors.

Also the opening to the duct/building must be protected from rain, snow and other air borne debris by hoods as well as being located above the ground/roof to prevent other foreign matter pick up. For a typical ducting arrangement refer to Figure 16.

When mounting ducts directly on the compressor housing caution should be used to minimize the load and stress, due to duct weight and movement to prevent excessive strain on the housing.

Both inlet and outlet ducts must be sized so that they are restriction free. Where ambient temperatures are below 32°F (inlet air) the temperature may be tempered by controlled recirculation. This may be accomplished by using adjustable louvers (or duct dampers) to admit warm air from the outlet duct back into the inlet duct at a controlled rate.

If duct filters are used, the filters must be restriction free. Typical furnace filter material may be used.

The following table shows the air flow in cubic feet per minute (CFM) required for cooling:

TABLE II
AIR COOLED

MODEL	W60SS	WH60SS	W75SS	WH75SS
Cooling Air Flow, CFM @ 100 PSI	6000	N/A	7100	N/A
Cooling Air Flow, CFM @ 125 PSI	5400	N/A	6400	N/A
Cooling Air Flow, CFM @ 150 PSI	N/A	4700	N/A	6000

COOLING WATER SUPPLY

For water cooled units a sufficient supply of water must be piped to the unit.

Total hardness of the water should be limited to 50 PPM (parts per million) of calcium carbonate ($CACO_3$) to limit scale formation in the coolers.

To further reduce scale formation in the coolers, it is also desirable to limit the water outlet temperature, from the cooler(s), to 120 °F.

In some cases it may be necessary to limit the corrosive materials in the cooling water by special treatment.

"Closed Systems" or systems where cooling towers are used may also require special water treatment to prolong the life of the compressor cooler(s) in addition to preventing freezing.

The following table lists the approximate water flow in GPM (gallons per minute) with various water temperatures required to maintain the oil temperatures shown.

This information may be used to make certain water piping size is adequate, for the temperature of the water available, during installation.

TABLE III

COOLING WATER FLOW
WATER COOLED OIL COOLER WITH AFTERCOOLER*

MODEL	W60SS	WH60SS	W75SS	WH75SS
Oil Injection Temperature, °F	160	160	160	160
Maximum Water Flow, GPM @ 60 °F	5.0	5.0	6.0	6.0
Maximum Water Flow, GPM @ 70 °F	5.0	5.0	8.0	8.0
Maximum Water Flow, GPM @ 75 °F	6.0	6.0	8.0	8.0
Maximum Water Flow, GPM @ 85 °F	6.0	6.0	8.0	8.0
Maximum Water Flow, GPM @ 90 °F	8.0	8.0	12.0	12.0

*For units without aftercooler the water flow rates in gallons per minute (GPM) may be slightly less.

For temperatures of water not shown use the next higher flow rate and water temperature shown in Table III.

DISCHARGE PIPING

It is recommended that all units be equipped with a system receiver or storage tank. Such a receiver is considered to be part of the plant equipment (not furnished with the compressor). The nominal size of the storage tank should be 400 gallons.

The only exception to this would be where only one unit, with load/unload or modulating control, is installed and matched in size to actual air demand so that the unit is running nearly fully loaded continuously.

WARNING

THE SYSTEM STORAGE RECEIVER MUST BE EQUIPPED WITH A PRESSURE RELIEF VALVE WITH THE CORRECT PRESSURE RELIEF SETTING AND FLOW CAPACITY.

The compressor should be located as near the plant storage receiver as possible. Piping should be as short and as direct as possible with minimum number of elbows and fittings. Never reduce discharge line size. Never install dryers or filters (except a moisture separator on aftercooled units) in the discharge line.

Manual shut off valves should also be included in the discharge piping so that the compressor and/or the system receiver may be isolated from the rest of the system to permit servicing the compressor.

It is also necessary to install a drop leg and valve in the discharge piping. Refer to Figure 16 for a typical piping arrangement.

All piping must be adequately supported to prevent excessive strain on the compressor or plant storage receiver.

CHECKS TO BE MADE AT INITIAL START UP:

(1) Make certain that all electrical, air and water (if required) connections have been properly made.

(2) Check the compressor reservoir oil level and correct as required. (Use correct type of oil)

(3) Turn on cooling water, if required.

(4) Close the line disconnect switch. The "Power" signal lamp should be glowing.

(5) Jog the compressor motor by actuating the START switch immediately pushing the STOP switch. Observe the air end for correct rotation.

NOTE

Rotation of the air end is correct when the input (drive) shaft turns counterclockwise when viewing the air end from the rear or discharge end.

If rotation is incorrect, disconnect the line switch and rewire the compressor motor to obtain correct direction of rotation. After rewiring return to Steps 4 and 5 to double check rotation and correct as required.

(6) Determine the type of control. (Load/Unload, Modulating, Dual or Auto-Dual). Also determine full load operating pressure. (100, 125 or 150 PSI)

NOTE

To determine the mode (type) of control observe for the following:

a. Load/unload control will have a pilot valve only located on a bracket near the air end.

b. Modulating control will have a pilot valve (same location as above) and a control pressure regulator valve (CPRV) located on the unit air receiver-oil reservoir cover.

c. Dual control will have a pilot valve, control pressure regulator (CPR) valve, CPRV (same location as above) and two pressure switches located in the control enclosure.

d. Auto-Dual control will have a pilot valve, control pressure regulator valve (CPRV), two pressure switches in the locations listed above and a timer located in the control enclosure.

e. Lead/Lag control may be identified by the instrument panel selector switch legend decal.

For single mode (load/unload) control use step 7. For all other modes of control begin with step 8.

LOAD-UNLOAD CONTROL (STANDARD)

(7) a. Make certain the electrical line disconnect switch is closed. The "Power" signal lamp should glow.

b. Close the shut off valve located between the system receiver and the system distribution piping.

c. Open the system receiver or compressor drop leg or vent valve.

WARNING

AIR ESCAPING TO ATMOSPHERE IS NOISY. ALWAYS WEAR EAR PROTECTION TO PROTECT HEARING.

d. Start the unit by actuating the START switch. The unit should start and continue to run.

e. Slowly close the drop leg or vent valve. As pressure rises in the unit and system receiver(s) the pilot valve should open fully unloading the unit (close the intake valve). (110, 135 or 160 PSI) In addition, the blow down (dump) valve should open to lower unit receiver air pressure. With the drop leg valve closed the unit should continue to run unloaded.

f. Slowly open the drop leg or vent valve. As pressure falls in the system storage receiver the pilot valve and the blow down valve should close. The intake valve should open, returning the unit to full load operation.

g. Slowly open and close the drop leg valve to cycle the controls. If the controls operate as described, the unit is ready for use.

MODULATING CONTROL

(8) a. Make certain the electrical line disconnect switch is closed. The "Power" signal lamp should glow.

NOTE

If the unit is equipped with Dual or Auto-Dual Control make certain the mode selector switch is positioned for Modulating Control. The "Modulate" control lamp should glow.

b. Close the shut off valve located between the system receiver and system distribution piping.

c. Open the system receiver vent or drop leg valve.

WARNING

AIR ESCAPING TO ATMOSPHERE IS NOISY. ALWAYS WEAR EAR PROTECTION TO PROTECT HEARING.

d. Start the unit by actuating the START switch. The unit should start and continue to run.

e. Slowly close the drop leg or vent valve. As air pressure rises in the unit and system receiver(s) the control pressure regulator (CPR) valve should begin to unload the unit at the pressure for which the CPR valve is set. (100, 125 or 150 PSI)

f. Observe that, as the system receiver pressure approaches the full unload pressure (110, 135 or 160 PSI) the pilot valve will open, fully unloading the unit (close intake valve) and open the blow down (dump) valve lowering unit receiver pressure.

g. Slowly open and close the drop leg valve to cycle the controls. If the controls operate as described, the unit is ready for use.

DUAL CONTROL

(9) a. Make certain the electrical line disconnect switch is closed. The "Power" signal lamp should glow.

b. Position the control selector switch to the Dual Control position. The "Dual Control" signal lamp should glow.

c. Close the shut off valve located between the system storage receiver and the system distribution piping.

d. Open the system receiver vent or drop leg valve.

WARNING

AIR ESCAPING TO ATMOSPHERE IS NOISY. ALWAYS WEAR EAR PROTECTION TO PROTECT HEARING.

e. Start the unit by actuating the START switch. The unit should start and continue to run.

f. Slowly close the drop leg or vent valve. As air pressure rises in the unit and system receiver(s) the control pressure regulator (CPR) valve should begin to unload the unit at the pressure for which the CPR valve is set. (100, 125 or 150 PSI)

g. Observe that as the system receiver pressure approaches the full unload pressure (110, 135 or 160 PSI) the pilot valve will actuate fully unloading the unit (close intake valve), open the blow down (dump) valve and actuate pressure switch PS-1 stopping the unit. The "automatic restart" lamp should glow.

h. Slowly open and close the drop leg or vent valve to cycle the controls. If the controls operate as described, the unit is ready for use.

NOTE

When the unit stops automatically, or is manually shut down it will not restart until the unit air receiver-oil reservoir air pressure is below 20 PSI (approximately). If the unit attempts to start/starts before the unit receiver pressure falls below 20 PSI, shut down and refer to Control Adjustment Procedures.

AUTO-DUAL (Timed Stop) CONTROL

(10) a. Make certain the electrical line disconnect switch is closed. The "Power" signal lamp should glow.

b. Position the control mode selector switch in the Auto-Dual Control position. The "Auto-Dual" signal lamp should glow.

c. Close the shut off valve located between the system receiver and system distribution piping.

d. Open the system receiver vent or drop leg valve.

WARNING

AIR ESCAPING TO ATMOSPHERE IS NOISY. ALWAYS WEAR EAR PROTECTION TO PROTECT HEARING.

e. Locate the time delay timer (T-1) in the electrical control enclosure and adjust the timer to minimum time. (30 seconds approximately.)

f. Start the unit by actuating the START switch. The unit should start and continue to run.

g. Slowly close the drop leg or vent valve. As air pressure rises in the unit and system receivers, the control pressure regulator (CPR) valve

should begin to unload the unit at the pressure for which the CPR valve is set. (100, 125 or 150 PSI)

h. Observe that, as the system receiver pressure approaches the full unload pressure (110, 135 or 160 PSI) the pilot valve will open fully unloading the unit, (close intake valve) open the blow down (dump) valve and actuate pressure switch PS-1 turning on the timer. The "timed stop" lamp should glow.

i. The unit should continue to run unloaded, until the "set" time of the timer elapses (30 seconds approximately), and then stop automatically. The "automatic restart" lamp should glow.

j. Slowly open and close the drop leg valve to cycle the controls allowing time for the delay timer to stop the unit. When testing is completed reset the desired time delay. (Suggest 10 minutes).

If the controls operate as described, the unit is ready for use.

NOTE

If the unit stops automatically, or is manually shut down for any reason, it will not restart until the unit air receiver-oil reservoir air pressure is below 20 PSI (approximately). If the unit attempts to Start/Starts shutdown and refer to control adjustment procedures.

LEAD/LAG CONTROL

11. a. Make certain the electrical line disconnect switch(es) is/are closed. The "Power" signal lamp should glow on both the lead and lag units.

b. Position the lead/lag control selector switch to lead on the first unit and to lag on the second unit.

c. Close the shut off valve located between the system receiver and the system distribution piping.

d. Open the system receiver vent or drop leg valve.

WARNING

AIR ESCAPING TO ATMOSPHERE IS NOISY. ALWAYS WEAR EAR PROTECTION TO PROTECT HEARING.

e. Locate the time delay timer in the electrical enclosure on both units. Adjust the timer to minimum time. (30 seconds, approximately.)

f. Start both units by actuating the START switch. Both units should start and continue to run.

g. Slowly close the drop leg or vent valve. As air pressure rises in the unit and system receivers, the control pressure regulator (CPR) valve(s) should begin to unload both units at the pressure for which the CPR valves are set (100, 125 or 150 PSI)

h. Observe that, as the system receiver pressure rises the pressure switch PS-1 will actuate and the lag unit will fully unload. The "Timed Stop" lamp should glow.

i. The lag unit should continue to run unloaded, until the "set" time of the timer elapses (30 seconds approximately) and the stop automatically. The "Automatic Restart" lamp should glow.

NOTE

The lead unit will continue to run with modulating control.

j. Slowly open and close the drop leg valve to cycle the controls allowing time for the delay timer to stop the unit.

k. Shut down both units. Reposition the lead/lag selector switch to lag on the first unit and to lead on the second unit.

l. Repeat Steps f through j above to check the operation of the unit selected for lag control. When testing is completed reset the desired time delay.

If the controls operate as described, the units are ready for use.

NOTE

When a unit stops automatically, or is manually shut down for any reason, it will not restart until the unit air receiver-oil reservoir air pressure is below 20 PSI (approximately). If a unit attempts to start/starts shut down and refer to Control Adjustment Procedure.

Section IV
OPERATION AND PREVENTIVE MAINTENANCE

Satisfactory performance of a stationary screw air compressor requires a good preventive maintenance program.

The following information is provided as a guide for such a program.

START UP

Daily start up may be accomplished as follows:

(1) Drain the condensate (water) from the oil reservoir. Close the drain valve securely when oil appears.

(2) Check the compressor oil reservoir oil level.

NOTE

The reservoir is full when the oil level reaches the bottom of the filler hole. If oil covers the sight gage it is safe to operate the unit.

(3) Operate the air receiver-oil reservoir pressure relief valve manually to make certain it will open.

(4) Make certain adequate ventilation and cooling water, if required, is supplied.

(5) Open the service valve which connects the unit to the system receiver (distribution piping) and actuate the START switch to start the unit.

(6) Observe instrument panel indicators and all gages for proper readings.

SHUT DOWN

(1) Allow the unit to fully unload.

(2) Push the stop switch to shut the unit down.

PREVENTIVE MAINTENANCE

Regular testing of oil as specified in the following maintenance guide is intended to assist in establishing oil and oil filter change intervals.

It is possible, however, to obtain information about the wear characteristics of the machine with continued oil testing. The oil tests performed should include analyzing the particulate matter in the oil sample, as well as testing for oxidation inhibitors and anti-rust additives.

As an example, an increase in cast iron particles in an oil sample may give advance warning of excessive wear. This information could possibly prevent damaging the entire unit beyond repair, without periodic disassembly and visual inspections.

Normally the oil analysis sheet will list the results of the oil test, in addition to recommendations of the analyzing laboratory showing what maintenance is required.

The following information is furnished as a guide to the critical limits of items which are listed on an oil analysis sheet.

Viscosity increase	10% over new oil
Neutral No. Increase (total acid)	0.5% over new oil
Total solids by weight	0.20%
Oxidation, by weight, oxidized material	0.10%
Sediment, by volume	0.20%
Water, by volume	0.5%

DAILY

(1) Check the air cleaner and service as required.

(2) Drain water (condensate) from the oil reservoir. Close the drain valve securely when oil appears.

NOTE

Always drain condensate after the unit has been shut down for a reasonable length of time (usually over night) allowing the water to settle.

(3) Check the compressor oil reservoir oil level. Add correct type of oil as required. Do not over fill.

NOTE

Fill until oil reaches the bottom of the filler hole. Oil must be added if it does not cover the sight gage.

(4) Operate air receiver-oil reservoir pressure relief valve manually to make certain it will open before starting the unit.

(5) Visually inspect all air and oil lines and fittings for leaks. This includes the air cleaner and any inlet piping of the air induction system. Correct leaks as required.

(6) Start and run the unit at rated full load pressure long enough to reach normal operating temperature. (N. O. T.)

(7) Observe the air cleaner restriction indicator. If the restriction indicator shows a red "flag", the air cleaner element must be cleaned or renewed.

(8) With the unit running, observe the oil pressure gages (instrument panel) and compare the pressure readings. (Filter In-Filter Out) A difference in pressure reading of 15 PSI or more indicates that the oil filter element must be renewed.

(9) With the unit running, observe the air pressure gages (instrument panel) and compare the pressure readings. (Pressure drop across separator element) A difference in pressure readings of 15 PSI or more indicates the separator element is restricted.
If the restriction is caused by dirt or other foreign matter, renew the separator element.

NOTE

Oil saturation can cause excessive restriction across a separator element. Always check the separator drain tube and line, the check valve (installation & condition) and clean the drain line filter before condemning a separator element.

(10) WATER COOLED UNITS ONLY—
After the unit has been running for approximately 30 minutes, check separator out air temperature. (Thermometer in air line) This temperature should be between 160° and 180°F. This temperature may be changed/corrected by adjusting the water flow control valve (Refer to Section V, "Temperature Actuated Water Flow Control Valve.") Allow time after each adjustment for the air temperature to stabilize before making further adjustments.

EVERY 200 HOURS

(1) Repeat daily service as applicable.

(2) Remove surface dirt and dust from the exterior surfaces of the oil cooler and aftercooler, if required. (Air cooled units.)

(3) Obtain an oil sample from the compressor oil system and have the sample analyzed for condition. Change oil and oil filter, if required, based on results of the oil analysis.

NOTE

Oil samples may be obtained from the oil reservoir (at filler, not drain) or from the oil system drain valve located near the oil filter on the air end.

EVERY 1000 HOURS

(1) Repeat daily and 200 hours service as applicable.

(2) Change compressor oil filter element.

NOTE

To prevent spilling excessive amounts of oil, allow the unit to sit, shut down, approximately 10 minutes before removing the oil filter.

OR

Drain the filter with the filter drain valve provided.

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Section V
CONTROL ADJUSTMENT PROCEDURE

CONTROLS

Adjustments to all of the controls are made very carefully at the factory. However, it may be necessary to make certain adjustments at the time the unit is installed, to fit specific applications, or after repair or replacement of components.

LOAD/UNLOAD CONTROL units require the adjustment of the pilot valve.

MODULATING CONTROL units require adjustments to the pilot valve and the control pressure regulator (CPR) valve.

DUAL CONTROL units require adjustment to the pilot valve, control pressure regulator (CPR) valve and pressure switches PS-1 and PS-2.

AUTO-DUAL CONTROL (timed stop) units require adjustments to the pilot valve, the control pressure regulator (CPR) valve, pressure switches PS-1 and PS-2 and the delay timer.

CAUTION

Do not exceed the specified maximum full load operating pressure of any unit. Refer to "Specifications", Section II.

The air pressure gages installed on the unit may be used to make the following adjustments, if they are not broken or damaged.

However, for more accurate results, it is recommended that test gages of known accuracy be used for adjusting pressures.

LOAD/UNLOAD CONTROL-PILOT VALVE ADJUSTMENT

To adjust the pressure at which the pilot valve will open (unload compressor) loosen the locknut (2) and turn adjusting nut (sleeve) (1) in (counterclockwise) to increase pressure or out (clockwise) to decrease pressure. Tighten locknut (2) securely when adjustment has been completed.

To adjust the difference between opening and closing pressures (differential) of the pilot valve, loosen the locknut (4) and turn the adjusting nut (sleeve) (3) in (clockwise) to increase differential (lower closing pressure) or out (counterclockwise) to decrease differential (raise closing pressure). Tighten locknut (4) securely when adjustment has been completed.

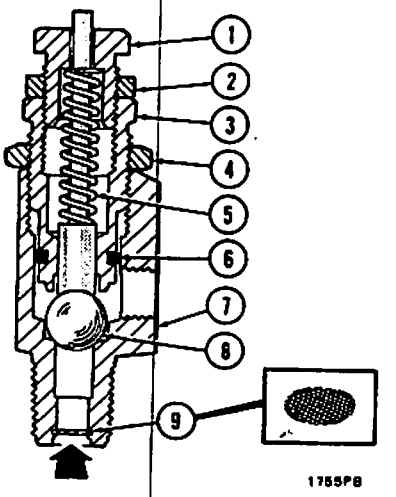

Figure 17 — Pilot Valve

1. Adjusting Nut (Sleeve)
2. Locknut
3. Adjusting Nut (Sleeve)
4. Locknut
5. Spring
6. O-Ring Seal
7. Valve Body
8. Ball
9. Filter Screen

NOTE

Any change in adjustment to either the unload pressure or the differential will change both settings. For this reason these adjustments must be made and rechecked/adjusted alternatvely and carefully to obtain correct settings.

Follow this procedure:

(1) Install pressure test gages (Minimum pressure range 200 PSI), if needed, in place of the existing air pressure gages.

(2) Start the unit as outlined under "Start Up", Section IV.

(3) Allow the unit to run long enough to reach normal operating temperature.

(4) Cycle the controls by adjusting the service (drop leg or vent) valve to raise and lower system receiver pressure.

(5) Follow the instructions on pilot valve adjustment under "Load-Unload Control . . .", Section V and adjust the pilot valve to the pressure settings given in Table A. Make certain all locknuts are securely tighten when finished.

(6) Shut down the unit and remove any test gages. Reconnect/reinstall unit gages. Restart and check for/correct any leaks.

TABLE A

LOAD/UNLOAD CONTROL
PILOT VALVE PRESSURE SETTINGS

FULL LOAD PRESSURE		W60SS W75SS		WH60SS WH75SS	
		Unload (Open)	Load (Close)	Unload (Open)	Load (Close)
100	PSI	110	95	N/A	N/A
125	PSI	135	120	N/A	N/A
150	PSI	N/A	N/A	160	145

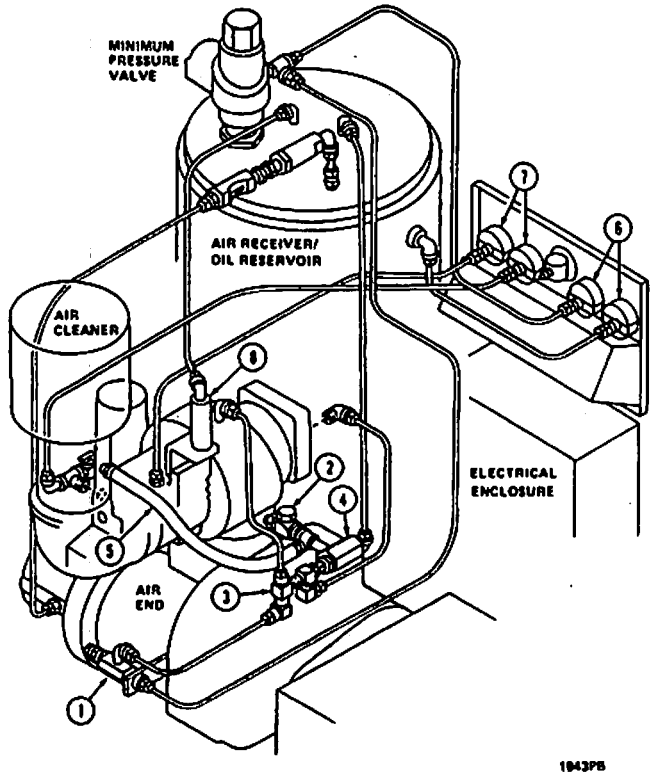

Figure 18 — Load/Unload Control

1. Pilot Valve
2. Check Valve
3. Shuttle Check Valve
4. Blow Down (Dump) Valve
5. Blow Down Vent Line
6. Air Pressure Gages
7. Oil Pressure Gages
8. Starting Unloader Cylinder

MODULATING, DUAL AND AUTO-DUAL CONTROL-PILOT VALVE AND CONTROL PRESSURE REGULATOR (CPR) VALVE

Refer to "Load-Unload Control . . .", Section V, for pilot valve adjustment instructions.

To change the pressure at which the CPR (control pressure regulator) valve will fully unload the compressor, loosen the adjusting screw locknut and turn the adjusting screw in (clockwise) to increase or out (counterclockwise) to decrease pressure. Tighten the locknut securely when finished.

Follow this procedure:

(1) Install/connect pressure test gages (minimum pressure range 200 PSI), if required, in place of the existing air pressure gages.

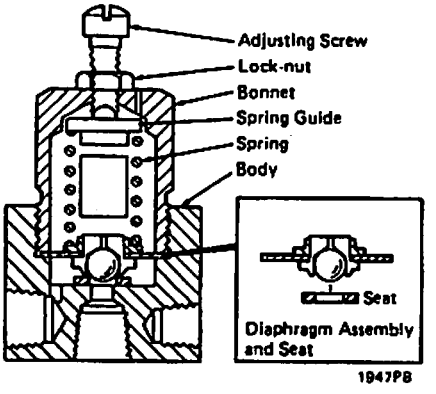

Figure 19 — Control Pressure Regulator Valve

(2) Connect a pressure test gage with a minimum range of 100 PSI in the control pressure line near the control bleed orifice. (Install a tee fitting - do not remove bleed orifice).

NOTE

If the unit has optional Dual or Auto-Dual Control make certain the mode selector switch is positioned in the Modulate Control position.

(3) Start the unit as outlined under "Start Up", Section IV. Allow the unit to run

long enough to reach normal operating temperature.

(4) Close the drop leg or vent valve to raise both the unit and system receiver air pressure.

Observe the pressure test gage connected in the control pressure line. Loosen the locknut on the control pressure regulator valve adjusting screw and turn the screw in (clockwise) until control pressure always reads zero (drop leg or vent valve closed).

(5) Adjust the pilot valve according to the instructions given under "Load-Unload Control . . .", Section V to the pressure shown in Table A. Be certain to use the correct full load pressure range (i.e. 100, 125 or 150 PSI) for the unit being adjusted.

After the pilot valve adjustment has been completed make certain the adjustment locknuts are tightened securely.

(6) Adjust the service (drop leg or vent) valve to maintain a constant full load pressure. (i.e. 100, 125 or 150 PSI)

(7) Observe the pressure test gage connected in the control pressure line. Adjust the control pressure regulator (CPR) valve by turning the adjusting screw out (counterclockwise) until a pressure of 3 to 5 PSI is observed on the control line test gage.

(8) Then turn the CPR valve adjusting screw in (clockwise) far enough to obtain a control pressure of zero. (No control air bleed)

(9) Cycle the controls by adjusting the service (drop leg or vent) valve to raise and lower both unit and system receiver air pressure.

Observe that the CPR valve (modulated) control pressure rises and begins to unload the compressor. When the air pressure in the system receiver reaches the pressure for which the pilot valve is set (see Table A for correct pressure range) the pilot valve should actuate (open) fully unloading the compressor. After the pilot valve opens the dump valve should actuate lowering unit receiver pressure. Modulated control pressure (test gage) should fall to zero. As the system receiver air pressure falls the pilot valve should close. Rising system receiver pressure should cause the controls to repeat the above sequence of events.

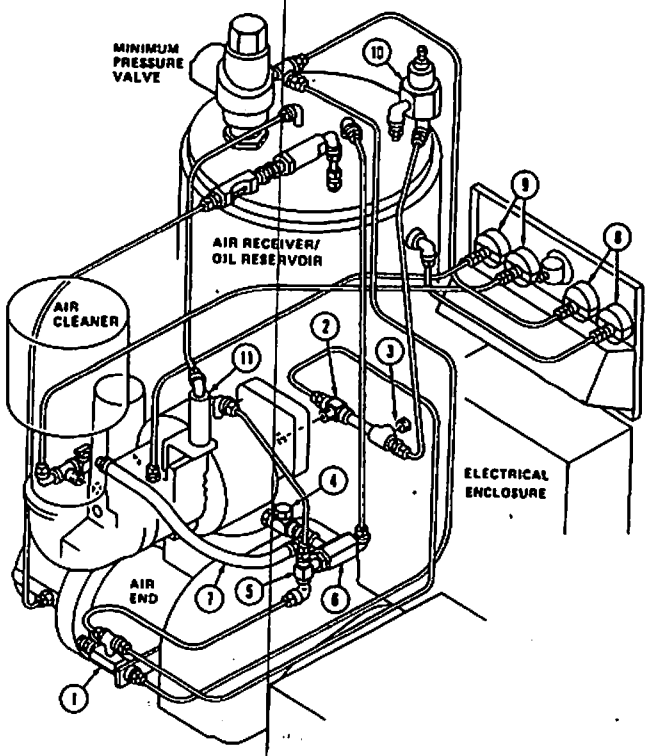

Figure 20 — Modulating Control

1. Pilot Valve
2. Shuttle Check Valve
3. Control Bleed Orifice
4. Check Valve
5. Shuttle Check Valve
6. Blow Down (Dump) Valve
7. Blow Down Vent Line
8. Air Pressure Gages
9. Oil Pressure Gages
10. Control Pressure Regulator Valve
11. Starting Unloader Cylinder

(10) Cycle the controls long enough to make certain adjustments are correct. Repeat adjustments as required.

(11) Shut the unit down and remove all test equipment. Restart, check for and correct any leaks.

DUAL AND AUTO-DUAL (TIMED STOP) CONTROL-PRESSURE SWITCH ADJUSTMENT

To change a pressure switch adjustment turn the hexagonal head adjusting screw.

Thread the adjusting screw out (counterclockwise) to decrease the pressure setting or in (clockwise) to increase the setting.

The pressure setting of pressure switch PS-1 should be 50 PSI. (Approximately).

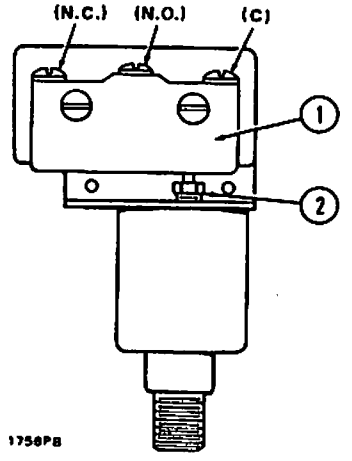

Figure 21 — Pressure Switch

1. Switch
2. Adjusting Screw

The pressure setting of pressure switch PS-2 should be 20 PSI.

The pressure of setting on pressure PS-1 is correct if the timer turns on when the unit is running fully unloaded in the Auto-Dual mode of operation. To adjust this switch to 50 PSI it is recommended the switch be removed from the unit and adjusted independently of other controls. (Use shop air supply)

NOTE

Make certain the pilot valve and control pressure regulator (CPR) valve are correctly adjusted before proceeding.

To check/adjust the pressure setting of pressure switch 2 (PS-2) proceed as follows:

(1) Set the mode selector switch to the Dual or Auto-Dual position.

(2) Start the unit as outlined under "Start Up", Section IV.

(3) Allow the unit to reach full rated pressure and unload. (Timer on)

(4) Stop the unit by actuating the stop switch.

(5) Wait several seconds and actuate the START switch. The unit should not start.

(6) Observe the unit air receiver air pressure gage for falling pressure. The unit should not restart automatically until the air receiver pressure falls to or below 20 PSI.

CAUTION

If the unit should attempt to start before the air pressure falls to 20 PSI shut down immediately by actuating the STOP switch.

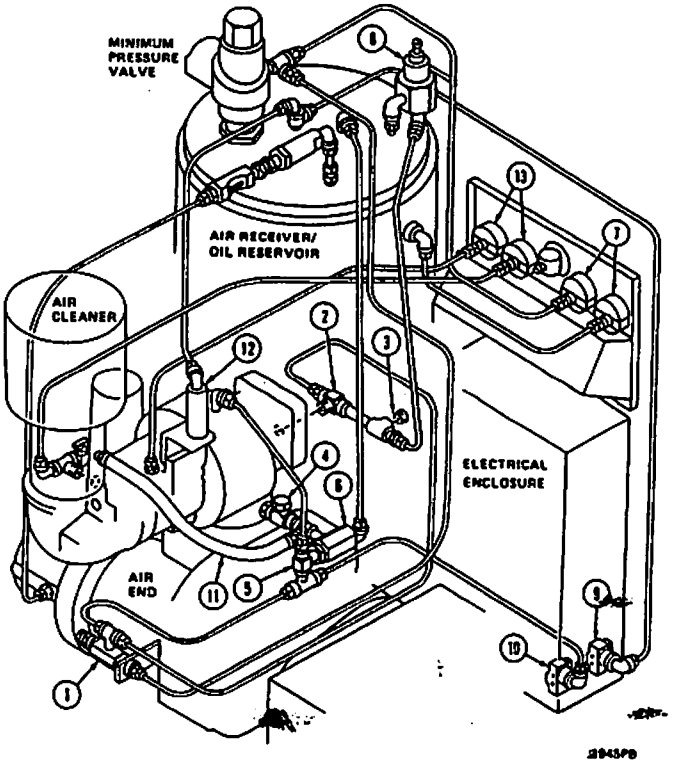

Figure 22 — Dual and Auto Dual Control

1. Pilot Valve
2. Shuttle Check Valve
3. Control Bleed Orifice
4. Check Valve
5. Shuttle Check Valve
6. Blow Down (Dump) Valve
7. Air Pressure Gages
8. Control Pressure Regulator Valve
9. Pressure Switch (PS-2)
10. Pressure Switch (PS-1)
11. Blow Down Vent Line
12. Starting Unloader Cylinder
13. Oil Pressure Gages

(7) Adjust the pressure setting on pressure switch PS-2 following instructions under "Pressure Switch Adjustment" above.

(8) Restart the unit and repeat steps 3 through 7 until the correct setting is obtained.

LEAD/LAG CONTROL ADJUSTMENT PROCEDURE

Lead/lag control requires that pressure switch PS-1 be set to actuate (open) at 5 PSI below the pilot valve setting.

Example:

Pilot valve adjusted to open at 110 PSI. Set pressure switch to PS-1 to actuate at 105 PSI. Both units.

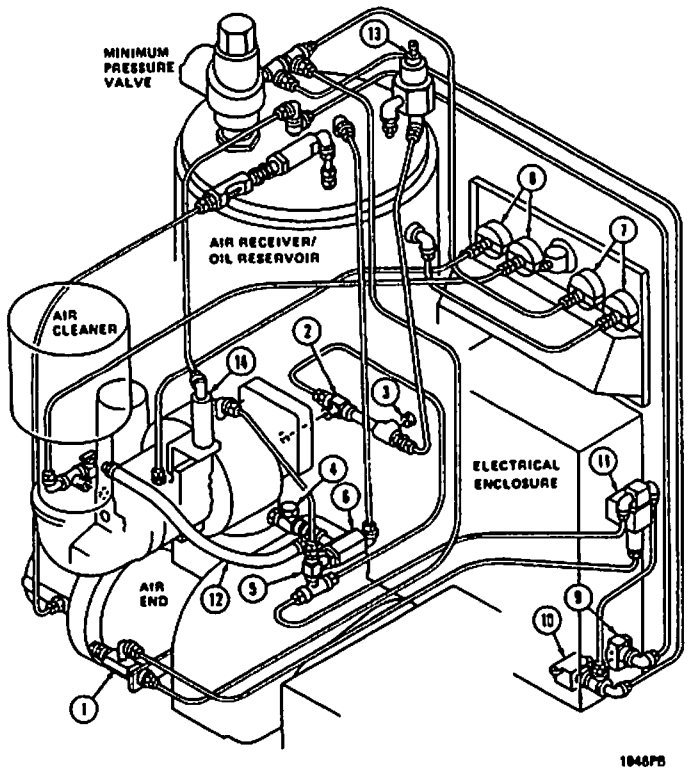

Figure 23 — Lead/Lag Control

1. Pilot Valve
2. Shuttle Check Valve
3. Control Bleed Orifice
4. Check Valve
5. Shuttle Check Valve
6. Blow Down (Dump) Valve
7. Air Pressure Gages
8. Oil Pressure Gages
9. Pressure Switch (PS-2)
10. Pressure Switch (PS-1)
11. Solenoid Valve (SV-1)
12. Blow Down Vent Line
13. Control Pressure Regulator Valve
14. Starting Unloader Cylinder

TEMPERATURE ACTUATED WATER FLOW CONTROL VALVE ADJUSTMENT PROCEDURE

The temperature actuated water flow control valves may be adjusted by turning the slotted adjusting screw located on top of the valve.

Turn the adjusting screw counter-clockwise to increase the temperature of the oil or the service connection air temperature. Turn the screw clockwise to decrease the temperature.

Water flow to the oil cooler should be adjusted to obtain an oil temperature of 140° to 160°F at the compressor oil filter inlet.

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Section VI
SERVICE PROCEDURES-COMPONENTS

PILOT VALVE SERVICE (Figure 17)

The pilot valve is furnished only as a complete assembly.

The only service required is to clean the air inlet screen/filter periodically.

The screen is located in the bottom of the valve. To gain access remove the fitting in the bottom of the valve.

CONTROL PRESSURE REGULATOR VALVE SERVICE (Figure 19)

The control pressure regulator valve is furnished either as a complete unit, or may be serviced with a diaphragm assembly and valve seat.

Installation of the diaphragm and seat may be accomplished as follows:

(1) Remove the control pressure regulator from the unit.

(2) Loosen the adjusting screw lock nut and turn the screw counterclockwise to release spring pressure on the diaphragm.

(3) Support the hexagon body in a bench vise or other suitable fixture. With a wrench unthread the bonnet from the body and remove the bonnet.

(4) Remove the spring guide and spring from the body.

(5) Remove the diaphragm assembly from the body and discard.

(6) Remove the valve seat from the valve body. Discard the valve seat.

(7) Clean the remaining parts thoroughly.

(8) Lubricate the new valve seat with silicone grease. (Suggest Dow Corning 55M). Install the new valve seat in the valve body, centered over the hole, with the small chamfer on the outside diameter down.

(9) Install the new diaphragm in the body. Reinstall the spring and spring guide in the body.

(10) Install the bonnet in the body and tighten securely.

The control pressure regulator valve may now be mounted on the unit and adjusted according to instruction in Section V of this manual.

STARTING UNLOADER VALVE SERVICE (Figure 24)

The starting unloader valve may require shaft bushing replacement. Proceed as follows:

1. Remove the air cleaner. Disconnect the unloader cylinder air line.
2. Mark the starting unloader valve flange and intake valve body to assist in correct reassembly.
3. Remove the starting unloader flange to intake valve body attaching capscrews and remove the unloader with gasket.
4. Disconnect the unloader air cylinder to valve shaft linkage. Remove the air cylinder bracket to unloader valve body attaching capscrews and remove the cylinder with bracket.
5. Working through the valve inlet opening, remove the valve plate to shaft attaching capscrews and remove the valve plate.
6. Slide the valve shaft assembly out of the valve body.
7. Clean all parts thoroughly. Inspect the shaft bushing in the valve body. If the bushings are worn replace the bushings using the correct size bushing removal/installation tool.

To reassemble and reinstall the starting unloader valve, reverse the disassembly procedure.

Adjust the cylinder to valve shaft linkage, if required, to position the valve plate in the closed position when the air cylinder is fully retracted.

INTAKE VALVE SERVICE

The only service that the intake valve may require is the replacement of the inlet flange gasket or the piston ring including the backup o-ring.

However, all parts are available if required.

(1) Disconnect the air cleaner at the intake valve inlet. Disconnect the control air lines. Suitably mark all lines to assist in reassembly. Remove the intake valve from the unit.

NOTE

Cover the air end inlet port to prevent foreign matter from entering the cylinder.

(2) Suitably mark the starting unloader valve body and intake valve body to assist in realigning these parts during reassembly.

(3) Remove the starting unloader flange to intake valve body attaching capscrews and remove the unloader and gasket.

(4) Remove the intake valve plate by sliding the plate and plate spring off the valve shaft. (The spring will push the valve plate off the shaft.)

(5) Remove the piston retainer (cover) to valve body attaching capscrews and remove the retainer and retainer to body gasket.

WARNING

THE PISTON IS UNDER PRESSURE. REMOVE RETAINER (COVER) CAREFULLY.

(6) Remove the piston and shaft assembly, with spring, from the valve body.

(7) Remove the piston ring and back-up o-ring from the piston.

(8) Clean all parts thoroughly. Inspect parts for wear or damage and renew as required.

NOTE

Further disassembly is generally not required. However, if it is necessary to replace a piston, shaft, or valve body bushings proceed with Step 9. If the above parts do not require replacement continue with Step 10.

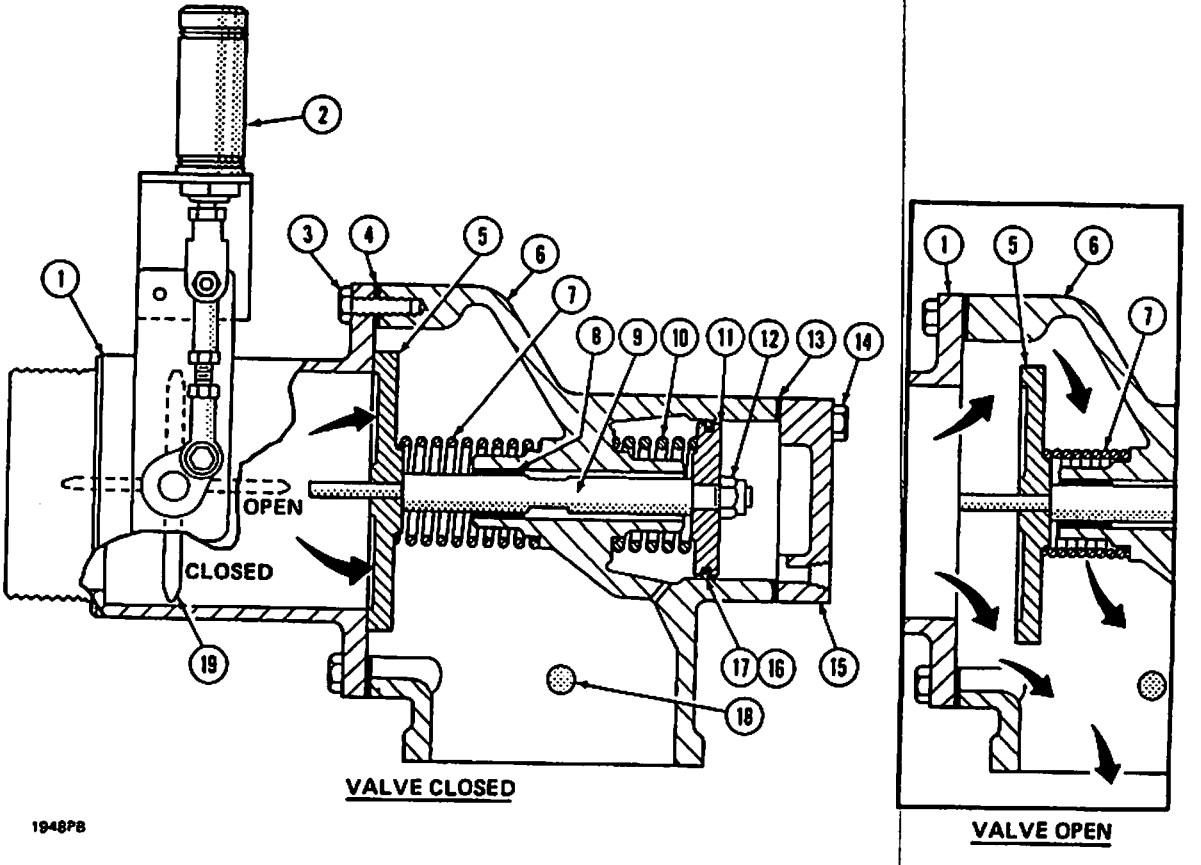

Figure 24 — Intake Valve

1. Starting Unloader Valve Body
2. Air Cylinder
3. Capscrew
4. Gasket
5. Intake Valve Plate
6. Intake Valve Body
7. Spring
8. Bushing
9. Shaft
10. Spring
11. Piston
12. Nut
13. Gasket
14. Capscrew
15. Cover (Retainer)
16. O-Ring
17. Piston Ring
18. Control Port
19. Unloader Valve Plate

(9) a. Place the piston and shaft assembly in a soft jaw (copper, brass, or wood lined jaws) vise with the piston end up.

b. Remove the nut from the piston shaft with a suitable wrench. Remove the piston from the shaft.

c. Clean parts thoroughly. Renew damaged or worn parts as required.

NOTE

If the self-locking capability of the nut is questionable obtain a new nut.

d. Reassemble the piston and shaft and install and securely tighten the self locking nut.

NOTE

If the shaft bushing in the valve body is worn proceed with Step E.

e. With a suitable tool (shoulder drift of correct size) press the shaft bushing out of the valve body.

f. Press in the new bushing with a suitable tool, positioned as shown in Figure 24.

(10) Install the back-up o-ring in the piston groove. Install the piston ring in the ring groove over the o-ring.

NOTE

Thoroughly lubricate the piston ring and valve body piston bore with silicone base lubricant. (Suggest Dow Corning 55M)

(11) Install the piston spring and piston in the valve body. Compress the piston ring carefully (use a ring compressor if required) as the ring enters the valve body to prevent damage to the ring.

(12) Holding the piston in place, install the piston retainer (cover) and retainer gasket on the valve body. Reinstall the retainer to body attaching capscrews and tighten securely.

(13) Install the valve plate spring and valve plate in the valve body. Slide the valve plate on the shaft. Make certain the plate slides freely on the shaft.

(14) Reinstall the starting unloader and gasket on the valve body, with assembly marks properly aligned. (Use a new gasket.)

(15) Reinstall the starting unloader flange to intake body attaching capscrews and tighten capscrews securely.

(16) Reinstall the intake valve on the unit using a new intake valve to air end gasket. Reinstall the intake valve to air end attaching capscrews and tighten securely.

(17) Reconnect the control air line(s) to the intake valve. Reinstall the air cleaner on the inlet flange. Tighten all fittings securely.

MINIMUM PRESSURE/CHECK VALVE SERVICE

The minimum pressure valve may be purchased as an assembly if required. Service parts are available, however, to repair/overhaul this valve. This valve may be serviced as follows:

(1) Remove the service and control piping from the minimum pressure valve.

(2) Remove the valve from the air receiver-oil reservoir cover.

(3) Clamp the valve securely in a vertical position (cap end up) in a suitable fixture (bench vise).

(4) With a suitable wrench remove the valve cap from the valve body.

WARNING

THE SPRING BENEATH THE CAP IS UNDER PRESSURE. EXERCISE EXTREME CARE WHEN REMOVING CAP.

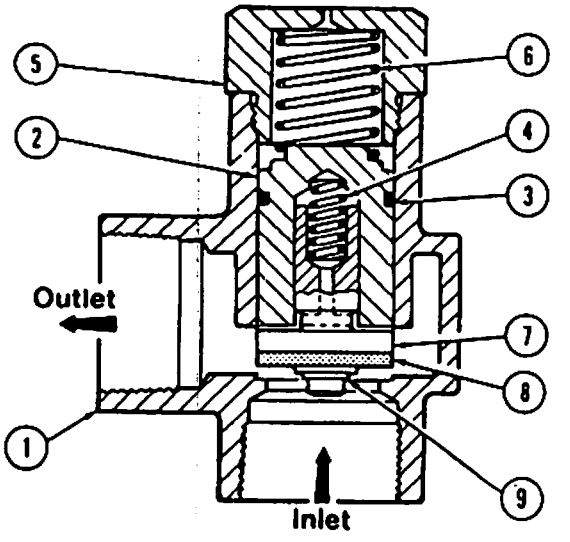

Figure 25 — Minimum Pressure/Check Valve

1. Valve Body
2. Piston
3. O.Ring
4. Small Spring
5. Cap
6. Large Spring
7. Check Valve Piston
8. Seat
9. Socket Head Screw

(5) Remove the spring from the body.

NOTE

Save spring shim(s) (washers) (if any) for reuse.

(6) Insert a suitable tool (wood stick) into the inlet port of the valve and push the piston and valve assembly upward and out of the body.

(7) Remove the check valve piston from inside the larger piston. Take care not to lose the small spring.

(8) Remove the o-ring from the large piston and discard the o-ring.

(9) With an allen wrench remove the socket head screw from the check valve. Remove the check valve seat and discard. (Hold small piston in soft jaw vise)

(10) Thoroughly clean all remaining parts. Visually inspect all parts for damage or wear. Replace as required.

(11) Install a new seat on the check valve. Reinstall the seat retaining socket head screw and tighten screw securely.

(12) Install a new o-ring on the large piston.

(13) Reassemble the small check valve piston, with the spring, in the large piston.

(14) Lubricate the o-ring on the piston with a silicone base lubricant. (Example: Dow Corning 55M).

(15) Reinstall the check valve and piston assembly in the valve body. Take care not to damage the o-ring during installation.

(16) Install the large spring in the valve body on top of the piston. Reinstall spring shim(s).

(17) Lightly coat the cap threads with "Loctite" 271 and install the cap (compress the spring) by threading the cap into the valve body. Torque the cap to 60-70 ft. lbs.

(18) Reinstall the minimum pressure valve on the air receiver-oil reservoir cover. Use a good grade of pipe thread sealer on all pipe threads. Tighten securely. Do not over tighten.

(19) Reconnect the service and control piping to the valve using pipe thread sealer on the pipe threads. Tighten service piping securely. Do not over tighten.

BLOW DOWN (DUMP) VALVE

The blow down (dump) valve is furnished as a complete assembly. No service is required.

OIL SEPARATOR SERVICE

An oil separator element may be removed as follows:

(1) Remove the separator out (service) piping separator drain piping and control piping from the air receiver/oil reservoir cover.

NOTE

Mark or tag the piping/fittings to make certain they will be reconnected correctly.

(2) Remove the receiver/reservoir cover to flange capscrews and washers. Remove the cover.

(3) Lift the element out of the air receiver-oil reservoir.

To install a new separator element, reverse the above removal sequence. Make certain the flange and cover surfaces are clean.

Make certain the element flange gaskets have a grounding staple. Torque the separator to flange capscrews evenly and securely to 142 ft. lbs. Make certain also that the separator drain tube touches the bottom of the element. (Make a new tube, if necessary).

For information concerning the conditions which indicate a separator element is defective refer to the service diagnosis chart, Section VII.

CAUTION

Receiver/reservoir cover retaining capscrews are special. Do not substitute common bolts in place of these capscrews.

AIR END

The air end for these units is serviced only as a complete assembly using a new or factory rebuilt air end.

Parts available for field service include the input shaft rotary oil seal and seal retainer o-ring for both air and water cooled units. Also the fan drive shaft rotary seal and seal retainer o-ring is available for air cooled units.

AIR END INPUT SHAFT OIL SEAL REPLACEMENT

The air end input shaft rotary oil seal may be replaced as follows:

(1) Remove the coupling guard. Install a

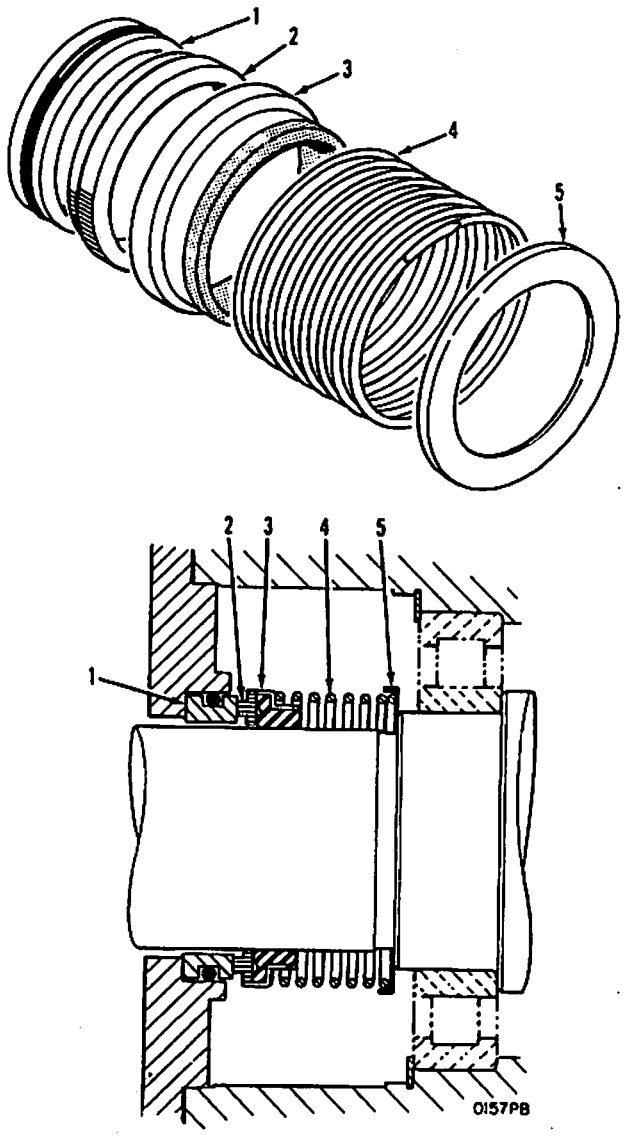

Figure 26 — Air End Input Shaft Oil Seal

1. Oil Seal Face Insert
2. Carbon Ring
3. Shaft Seal Assembly
4. Spring
5. Spring Guide

suitable hose clamp around the outside diameter of the flexible coupling member and draw the clamp tight enough to retain the flexible member in the same condition it is mounted.

(2) Remove the six flexible member to hub retaining bolts. Rotate the motor and air end hubs far enough to disengage the flexible member drive "ears" from the hubs. Remove the flexible member.

(3) Remove the motor mounting studs/nuts (bolts). Raise the motor sufficiently to swing the motor shaft away from the air end to allow removal of the air end input shaft hub.

CAUTION

Do not mix or misplace motor mounting shims.

(4) Loosen the air end drive hub set screws. Remove the air end hub.

(5) Remove the oil seal retainer to front retainer attaching capscrews and remove the retainer.

(6) Remove the oil seal assembly, including the spring and spring guide, from the input shaft.

(7) Remove the oil seal face insert, with o-ring seal, from the seal retainer. Remove the retainer o-ring seals (one large, one small). Discard the face insert, with o-ring seal, and retainer o-ring seals.

(8) Thoroughly clean all remaining parts.

(9) Lubricate the new seal face insert, and o-ring seal with clean compressor oil and install the insert in the seal retainer. Install the new retainer o-ring seals (one large, one small for oil gallery) and lubricate with clean compressor oil.

(10) Lubricate the rotary seal assembly with clean compressor oil, including the carbon ring, and install the seal spring guide, spring, and seal assembly on the input shaft.

CAUTION

Be careful not to scratch the seal face insert or scratch or break the carbon ring of the seal assembly. Wipe the lapped (mating) surfaces of the seal insert and carbon ring with a clean lint free cloth before installing the seal retainer.

(11) Carefully reinstall the seal retainer, retainer capscrews and tighten capscrews securely.

(12) Reinstall the air end input shaft drive hub. Remount the motor and align the drive hubs as described under "Drive Coupling Hub Alignment".

(13) Reinstall the drive coupling flexible member as described in Steps 4 through 6 of "Drive Coupling Renewal". Reinstall the coupling guard.

FAN DRIVE SHAFT OIL SEAL REPLACEMENT

The fan drive shaft rotary oil seal may be replaced as follows:

(1) Disconnect and remove service piping. (Moisture separator, etc.) Housed units only - remove the end panel from the cooler end of the housing.

(2) Disconnect oil cooler and aftercooler (if so equipped) piping at the coolers.

(3) Remove the fan guard to shroud attaching capscrews. Position the fan guard toward the air end and suitably support.

(4) Support the oil cooler (and aftercooler, if so equipped) assembly and remove the two shroud to frame attaching bolts. Move the cooler assembly away from the fan far enough to gain access to the fan.

NOTE

Save and mark the spacers that fit between the shroud and the frame.

(5) Loosen the fan hub to fan drive shaft set screws (there are two) and pull or tap the fan off the shaft.

(6) Remove the oil seal retainer to rear bearing retainer attaching capscrews and remove the seal retainer.

(7) Remove the oil seal assembly, including spring and spring guide, from the fan drive shaft. Discard the seal assembly.

(8) Remove the oil seal face insert, with o-ring seal, from the seal retainer. Remove the retainer o-ring seal. Discard the face insert, with o-ring seal, and the retainer o-ring seal.

(9) Thoroughly clean all remaining parts. (Retainer, seal cavity, shaft, etc.) Check the condition of the shaft and remove all nicks and burrs.

(10) Lubricate the new seal face insert with clean compressor oil and install the seal in the retainer.

(11) Lubricate the rotary seal assembly with clean compressor oil, including the carbon ring, and install the seal spring guide, spring, and seal assembly on the fan drive shaft.

CAUTION

Be careful not to scratch the seal face insert or scratch or break the carbon ring of the seal assembly. Wipe the lapped (mating) surfaces of the seal insert and carbon ring with a clean lint free cloth before installing the seal retainer.

(12) Carefully reinstall the seal retainer, retainer attaching capscrews and tighten securely.

(13) Reinstall the fan on the fan drive shaft. Tighten the fan hub set screws securely.

(14) Reinstall the cooler assembly on the frame. Make certain the shroud to frame spacers are installed and are in the correct location. Install the shroud to frame attaching bolts and tighten securely.

(15) Reinstall the fan guard on the shroud. Tighten attaching capscrews securely.

(16) Reconnect oil and air piping to the cooler(s).

(17) Reinstall the housing end panel. Tighten all panel attaching capscrews.

(18) Reinstall all service piping. Use a good grade of pipe thread sealer on all pipe threads. Tighten securely. Do not over tighten.

(19) Following the start up procedure, start and run the unit long enough to reach normal operating temperature. Check for and correct all leaks.

DRIVE COUPLING FLEXIBLE MEMBER RENEWAL

Renewal of the drive coupling flexible member may be accomplished as follows:

(1) Remove the coupling guard. Install a suitable hose clamp around the outside diameter of the rubber flexible member. Tighten the clamp enough to retain the flexible member in the same condition it is mounted.

(2) Remove the six flexible member to hub retaining bolts.

(3) Rotate the motor and air end hubs far enough to disengage the flexible member drive "ears" from the hubs. Remove the flexible member.

NOTE

The replacement flexible member is fitted with a clamp on the outside diameter. Do not remove the clamp at this time.

(4) Install the new flexible member between the hubs and rotate hubs as necessary to position it correctly.

(5) Reinstall the six flexible member to hub retaining bolts. Torque the hub to flexible member retaining bolts to the specified limits. (75 ft. lbs.)

(6) Remove the clamp from the outside diameter of the flexible member.

(7) Reinstall the coupling guard.

DRIVE COUPLING HUB ALIGNMENT

Proper alignment of the drive coupling is important to obtain optimum service life from the coupling. Proper alignment of the coupling is obtained by adding or subtracting shims between the motor mounting pads and/or the compressor mounts and the bedplate.

The shims used to adjust vertical motor and compressor position are made of steel or plastic. Four thicknesses of shims are available. The thickness of the shims is identified by color as follows:

Steel ..... .059" or .1345" Thick
Yellow ..... .020" Thick
Translucent ..... .0075" Thick
Blue ..... .005" Thick

If the motor or compressor is removed from the base, the shims under each leg should be kept separate and tagged as to location from which they were removed. This will make coupling realignment easier.

NOTE

If the motor or air end position is changed for any reason, the alignment of the coupling should be checked and corrected as required.

For drive coupling hub alignment the following guidelines for alignment tolerances are:

(1) Angular misalignment.

Tolerance.....2° Maximum

(With a straight edge positioned across the "ears" of the hubs one degree of misalignment is equal to .017" gap between the straight edge and the edge of the hub ears per inch of space between the hub faces.)

(2) Parallel misalignment.

Tolerance .....1/32" Maximum

(For purposes of clarity the following explanation is used to describe the angular and parallel alignment - (or misalignment).

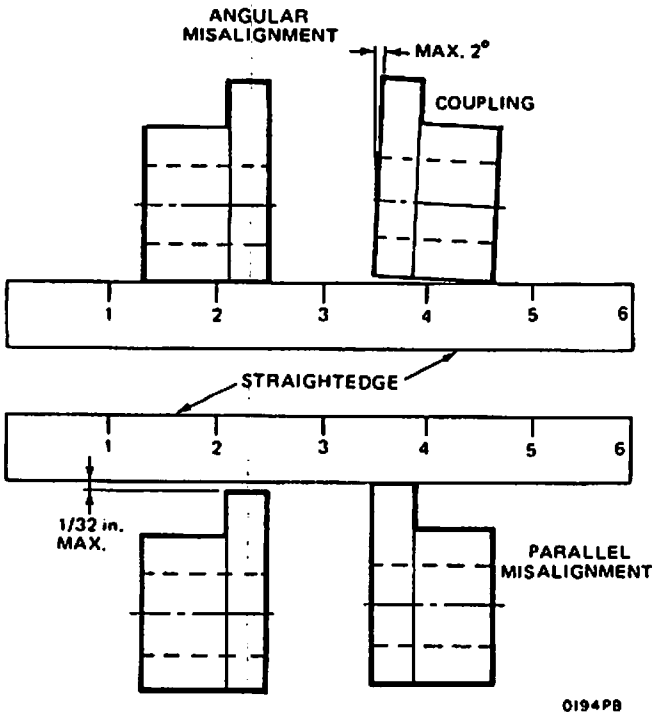

Figure 27

Angular misalignment is the misalignment present when the end faces of the two (2) shafts (or hub faces) do not meet squarely.

Parallel misalignment is the misalignment present when two (2) shafts, when viewed from one end, are not concentric.

Refer to Figure 28 for the correct use of the tools needed to align the coupling hubs. (Note: The flexible member must be removed.)

Start checking the hub parallel alignment by checking the motor shaft position in the vertical plane.

To do this, turn the hubs so that one corner ("ear") of each hub is up. Lay a straight edge across the hubs (See Figure 28) and use a feeler gage to check for clearance between either hub and the straight edge. If the clearance is greater than the maximum clearance allowed (1/32") loosen the motor mounting stud nuts (bolts) and install or remove shims at the motor feet (raise or lower motor) to obtain the correct vertical parallel alignment.

To check the horizontal plane parallel alignment, turn the hub corners to the horizontal plane (turn top ears 90°). Lay the straight edge against the coupling ears and check for clearance between the straight edge and either hub. If the clearance is greater than the maximum allowed (1/32"), loosen the air end mounting bracket to bedplate capscrews and shift the air end to obtain the correct alignment.

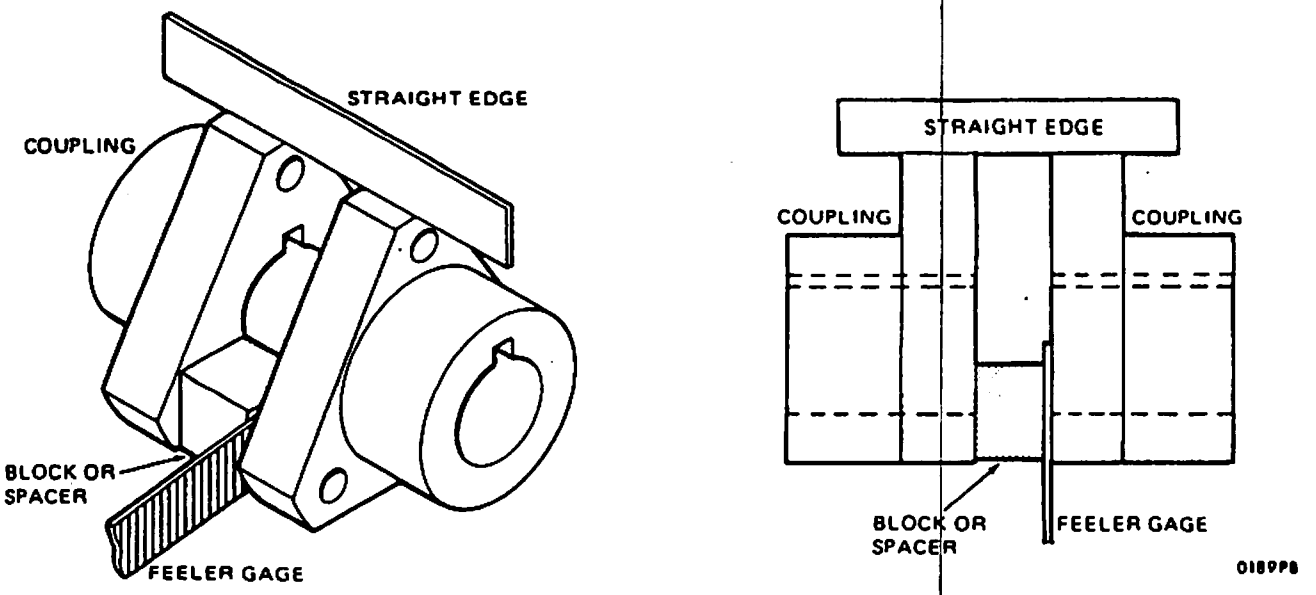

Figure 28 — Coupling Alignment

Recheck both the vertical and horizontal parallel alignment and adjust as required to obtain the specific alignment. Lightly tighten both the motor and compressor mounting bolts.

Slide the hub on the shafts to a position convenient to allow the insertion of a square block in addition to a suitable thickness feeler gage between the hub faces.

If required, slide the compressor into a position that allows inserting the spacer block and feeler gage between the hubs at all three (3) hub corners. (See Figure 28). Feeler gage "feel" will be equal at all three hub corners when the alignment is correct. This should be the only measurement required to obtain the correct angular hub alignment in the horizontal plane.

If the angular alignment in the vertical plane is incorrect, install or remove shims at the motor mounting feet to obtain the correct alignment. Securely tighten the motor and compressor mounting bolts and nuts. Recheck the final alignment as outlined above and readjust as required to obtain the specified alignment.