

**OPERATOR'S MANUAL**

**MCT-135**

**JOY<sup>®</sup>**

**TWISTAIR<sup>®</sup>**

**ROTARY SCREW COMPRESSOR**

**TA MODELS 007 thru 040**

NOTICE

Enter information from machine nameplate:

MODEL \_\_\_\_\_

SERIAL NO. \_\_\_\_\_

# OPERATOR'S MANUAL

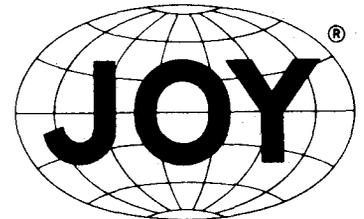
## JOY<sup>®</sup>

## *TWISTAIR*<sup>®</sup>

Rotary Screw Compressor



**TA Models 007 thru 040**



**JOY MANUFACTURING COMPANY**  
*INDUSTRIAL COMPRESSOR GROUP*  
MICHIGAN CITY, INDIANA 46360

# WARRANTY

## INDUSTRIAL SCREW COMPRESSOR

The JOY Manufacturing Company warrants that this compressor conforms to applicable drawings and specifications approved in writing by JOY and that the rotary screw compressor, stator and rotor assembly will be free from defects in material and workmanship for a period of 24 months from the date of initial start-up or 30 months from the date of shipment from the factory, whichever period first expires, and in the case of all other components of JOY's manufacture will be free from defects in material or workmanship for a period of 12 months from the date of initial start-up or 18 months from the date of shipment from the factory, whichever period first expires. In cases where a unit is in Distributor stock and start-up is beyond 6 months from shipment from the factory, it will be necessary for the Distributor to obtain approval of satisfactory condition from an authorized JOY Representative to initiate warranty from the date of start-up. Any work or parts necessary to restore the unit to satisfactory condition prior to start-up will be for the Distributor's account. If within such periods, JOY receives from the Buyer written notice of any alleged defect in or non-conformance of the compressor, and if in JOY's judgment the compressor does not conform or is found to be defective in material or workmanship, JOY will at its option either: (a) furnish a Service Representative to correct defective workmanship, or (b) upon return of the component F.O.B. JOY's designated plant in order to receive warranty consideration, defective material must be shipped within 30 days of receipt of authorized return instructions, repair, or replace the component or issue credit for the replacement part ordered by Buyer, or (c) refund the full purchase price for the compressor without interest. Deterioration or wear occasioned by chemical and/or abrasive action or excessive heat shall not constitute defects.

Joy's sole responsibility and Buyer's exclusive remedy hereunder is limited to such repair, replacement, or repayment of the purchase price. Component parts or assemblies not of Joy's manufacture are warranted only to the extent that they are warranted by the original manufacturer. Joy shall have no responsibility for any cost or expense incurred by Buyer from Joy's inability to repair under said warranty when such inability is beyond the control of Joy or caused solely by Buyer.

THERE ARE NO OTHER WARRANTIES, EXPRESS, STATUTORY OR IMPLIED, INCLUDING THOSE OF MERCHANTABILITY AND OF FITNESS FOR PURPOSE; NOR ANY AFFIRMATION OF FACT OR REPRESENTATION WHICH EXTENDS BEYOND THE DESCRIPTION ON THE FACE HEREOF.

This warranty shall be void and Joy shall have no responsibility to repair, replace, or repay the purchase price of defective or damaged parts or components resulting directly or indirectly from the use of repair or replacement parts not of Joy's manufacture or approved by Joy or from Buyer's failure to store, install, maintain, and operate the compressor according to the recommendations contained in the Operating and Maintenance Manual and good engineering practice.

The total responsibility of Joy for claims, losses, liabilities or damages, whether in contract or tort, arising out of or related to its products shall not exceed the purchase price. In no event shall Joy be liable for any special, indirect, incidental or consequential damages of any character, including, but not limited to, loss of use of productive facilities or equipment, loss profits, property damage, expenses incurred in reliance on the performance of Joy, or lost production, whether suffered by buyer or any third party.

**NOTE: UNAUTHORIZED DISASSEMBLY OR REPAIR OF AIR ENDS IN THE FIELD WILL VOID THE WARRANTY AND ADVERSELY AFFECT THE TRADE-IN VALUE.**

### **SCREW COMPRESSOR AIR END EXCHANGE PROGRAM:**

A factory re-manufactured screw compressor air end can be purchased on an exchange basis. This is not just a factory-rebuilt air end, but one which is re-manufactured to the same high quality as new. All bearings, seals, gaskets, and the inlet valve are always replaced. All other parts not meeting our quality standards are also replaced. The air end is then thoroughly factory tested prior to shipment. When you purchase a re-manufactured air end there is a warranty which is twelve (12) months from date of shipment in accordance with the terms set forth in the above warranty.

# OPERATOR'S MANUAL

# JOY<sup>®</sup>

# *TWISTAIR*<sup>®</sup>

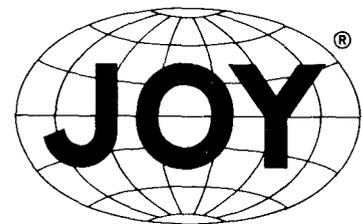
## Rotary Screw Compressor

### WARNING

THIS MANUAL CONTAINS VITAL INFORMATION FOR THE SAFE USE AND EFFICIENT OPERATION OF THIS UNIT. CAREFULLY READ THE OPERATOR'S MANUAL BEFORE STARTING THE UNIT. FAILURE TO ADHERE TO THE INSTRUCTIONS COULD RESULT IN SERIOUS BODILY INJURY.



## TA Models 007 thru 040



**JOY MANUFACTURING COMPANY**  
*INDUSTRIAL COMPRESSOR GROUP*  
MICHIGAN CITY, INDIANA 46360

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TSP 6/87

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 **DANGER**



DISCHARGE AIR USED FOR BREATHING.  
WILL CAUSE SEVERE INJURY OR DEATH.

CONSULT FILTRATION SPECIALIST FOR AD-  
DITIONAL FILTRATION AND TREATMENT  
EQUIPMENT TO MEET HEALTH AND SAFETY  
STANDARDS.

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## SPECIFICATIONS

COMPRESSOR MODEL	TA-007	TA-010	TA-015	TA-020	TA-025	TA-030	TA-040
<b>COMPRESSOR:</b>							
Delivery (CFM) @ 100 PSIG	29	40	60	84	103	123	165
Maximum Operating Pressure (PSIG)	125	125	125	125	125	125	125
Minimum Operating Pressure (PSIG)	70	70	70	70	70	70	70
Normal Control Range (PSI)	10	10	10	10	10	10	10
Ambient Operating Temperature Range	35 Deg. F. To 100 Deg. F.						
Oil Sump Capacity	3.5 Gals.	3.5 Gals.	3.5 Gals.	3.5 Gals.	3.5 Gals.	3.5 Gals.	13 Gals.
Weight:							
Tank Mounted (dry Approx.)	730 lbs.	760 lbs.	780 lbs.	1230 lbs.	1300 lbs.	1370 lbs.	1850 lbs.
Base Mounted (dry Approx.)	545 lbs.	575 lbs.	595 lbs.	860 lbs.	930 lbs.	1000 lbs.	1200 lbs.
<b>MOTOR, Compressor Drive:</b>							
Horsepower	7.5	10	15	20	25	30	40
Current	3 Phase 60 Hertz						
Voltage	200, 230, 460,575						
Type	Squirrel Cage Induction						
Enclosure	Open Drip Proof						
<b>DIMENSIONS</b>							
<b>TANK MOUNTED</b>							
Length	51.4	51.4	51.4	56.0	56.0	56.0	75.8
Width	26.3	26.3	26.3	34.8	34.8	34.8	39.3
Height	59.3	59.3	59.3	72.0	72.0	72.0	78.7
<b>DIMENSIONS</b>							
<b>BASE MOUNTED</b>							
Length	47.3	47.3	47.3	54.8	54.8	54.8	59.7
Width	26.3	26.3	26.3	34.8	34.8	34.8	39.3
Height	31.3	31.3	31.3	37.9	37.9	37.9	44.5
Receiver Capacity	80 Gals.	80 Gals.	80 Gals.	130 Gals.	130 Gals.	130 Gals.	200 Gals.

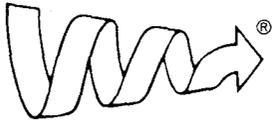
JOY Manufacturing Company reserves the right to alter or improve the design or construction of its machinery as described herein and to furnish it, when so altered, without reference to the illustrations in this bulletin.

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# SECTION 1

## DESCRIPTION AND INSTALLATION

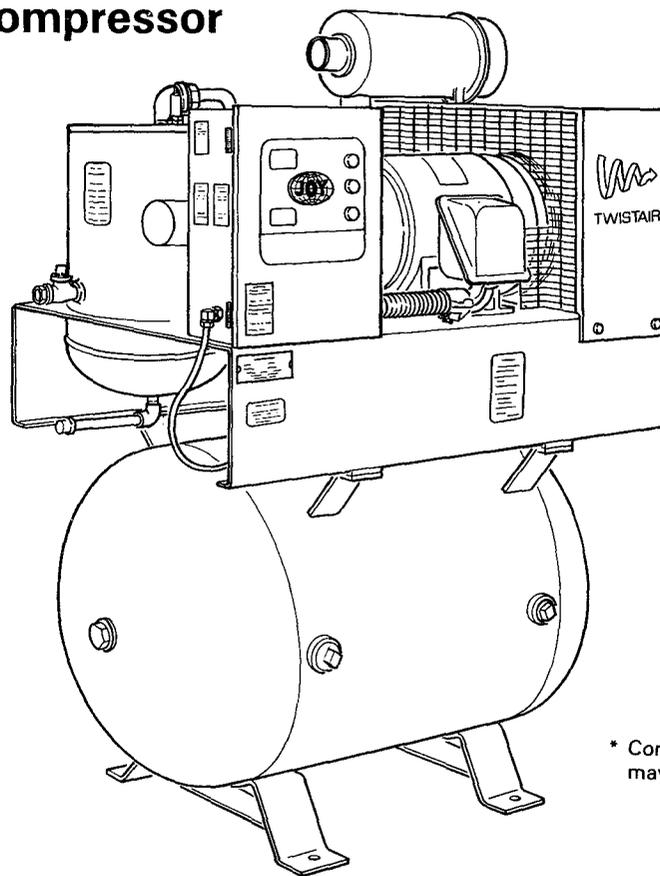
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# JOY<sup>®</sup>

# TWISTAIR<sup>®</sup>

## Rotary Screw Compressor



\* Component locations on the TA-040 units may vary from the TA-007-030 units.

FIGURE 1\*  
Rotary Screw Compressor—TA-007-030

80-82C

### INTRODUCTION

The JOY<sup>®</sup> rotary screw compressor is an electric motor-driven, single-stage, screw-type, heavy-duty air compressor. It is sold as a complete package unit, tank mounted or on a heavy steel base (see Figure 1). The package includes the compressor, motor, air intake system, electrical starting unit, cooling system, air/oil separator, and control system. Installation requires only the connection of electric power and a service line.

There are seven models of TWISTAIR<sup>®</sup> compressors covered in this manual. Refer to "Specifications" for the air delivery capability and horsepower of each unit. All models are air cooled and are intended for indoor installation.

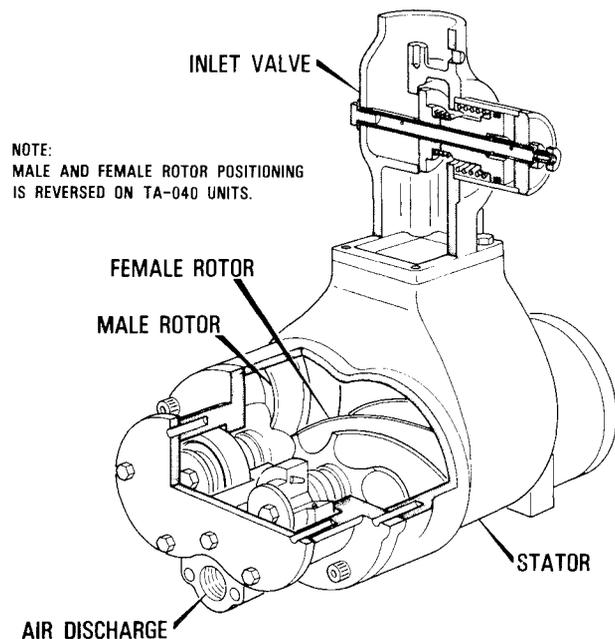


FIGURE 2  
Cut-Away View of Compressor Unit  
And Inlet Valve

80-25

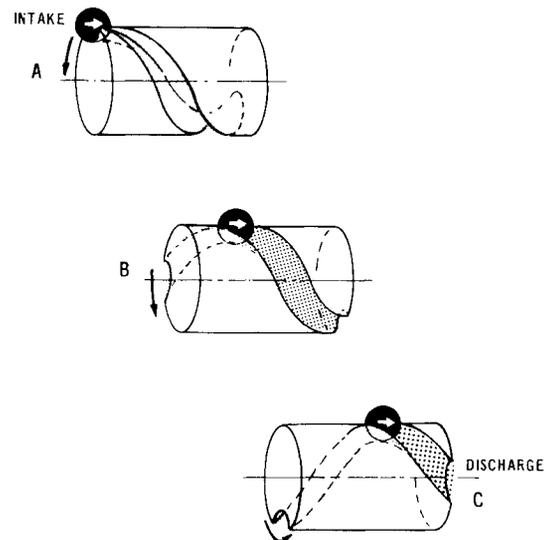


FIGURE 3  
Principles of Compression

74-61A

## COMPRESSOR

### COMPRESSOR AND MOTOR

The compressor assembly is a positive displacement, oil flood lubricated, screw type unit employing one stage of compression to achieve the desired pressure. Components include a housing (stator), two screws (rotors), bearings and bearing supports (see Figure 2). The male rotor is driven through multiple v-belts by the motor. The male rotor has four lobes and the female has six.

In operation, two helically grooved rotors (Figure 2) mesh to compress air. Inlet air entering the casing is compressed as the male lobes roll down the female grooves, pushing trapped atmospheric air along and compressing it in one stage of compression. This process delivers smooth-flowing air at full pressure to the oil sump.

To illustrate the compression sequence, consider the action of the male lobe as similar to a ball. In Figure 3, one compression cycle has been isolated for simplification. As a helix rotates, the ball (male lobe) meshes with the groove to start a compression cycle with trapped atmospheric air (A). As the ball moves down the groove, air is compressed (B). The compressed air is discharged as the ball reaches the end of the groove (C). Atmospheric air fills in behind the ball preparing the groove for another compression cycle as rotation continues and the male lobe again meshes with the groove.

During the compression cycle, oil is injected into the compressor for the purpose of lubricating, cooling, and sealing. Compressed air laden with oil leaves the compressor unit through a discharge port which is designed to give optimum performance within the desired discharge pressure range.

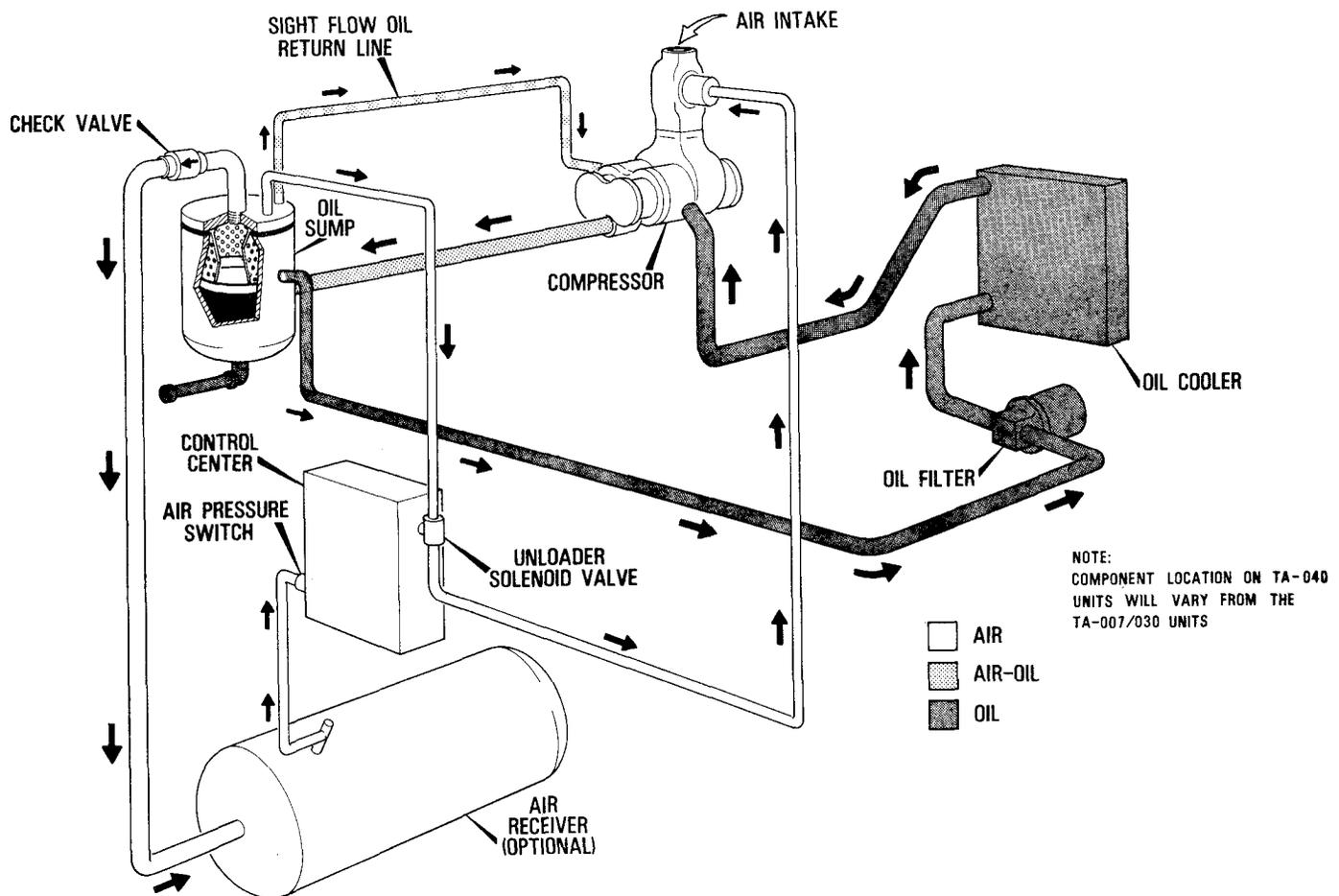
Related components in the compressor assembly include the air filter and the inlet valve. The air filter is a two-stage, dry type with a pleated paper replaceable element.

The inlet valve (Figure 2) is pneumatically operated and functions in response to air demand. It opens at a preset minimum and closes at a preset maximum pressure determined by the air pressure switch settings.

### COMPRESSOR LUBRICATION SYSTEM

The oil that is directed to the compressor from the oil sump serves three purposes:

1. Lubricates the rotating parts and bearings.
2. Serves as a cooling agent for the compressed air to maintain the discharge air temperature within 100 deg. F. of ambient temperature.
3. Helps assure high efficiency and maximum air delivery by sealing the running clearances.



**FIGURE 4**  
Air & Oil Flow Diagram

80-26A

### OIL SUMP AND AIR/OIL SEPARATOR

Compressed, oil-laden air enters the oil sump directly from the compressor discharge through a large unrestricted pipe to a point well above the oil level of the sump (see Figure 4). As the oil-laden air enters the sump, much of the oil is separated from the air as it strikes the walls of the tank. The oil then accumulates at the bottom of the sump, is filtered, and finally returned through the oil cooler for recirculation through the compressor—completing the cycle.

An air/oil separator is located in the top of the oil sump. When air is demanded at the service line, it first passes through the separator element which is the final stage of oil separation. Any oil that does pass through the element will collect at the bottom of the separator (refer to Figure 4).

### OIL RETURN LINE

The oil return line is provided to remove any oil accumulation from the bottom of the separator and return it to the compressor. A semi-clear tubing is provided in this line to observe the oil flow daily. Under normal conditions, oil bubbles will continuously trickle through the tubing. If the tubing shows full of oil or no oil flow at all, it is a sign that oil is not being drained (see Figure 4 and 6).

### CONTROL CENTER

The control center (Figure 5) houses the electrical components which support starting and automatic operation. Replacement components may vary somewhat. (Refer to Wiring Diagram 8 and 8A).

## CONTROLS

**WARNING**

A LOCKABLE DOOR IS PROVIDED FOR SAFETY PURPOSES. THE DOOR SHOULD ONLY BE OPEN TO A QUALIFIED ELECTRICIAN. BE CAREFUL OF ELECTRICAL SHOCK WHEN DOOR IS OPEN. FAILURE TO COMPLY WITH THIS WARNING MAY CAUSE DAMAGE TO PROPERTY AND SERIOUS BODILY HARM.

**Start Button**

The start button will start the compressor providing the main disconnect is connected and the safety circuit is cleared (reset) (Figure 5).

**Shutdown Sequence Button**

This button will initiate the normal shutdown sequence of unloading the compressor before stopping.

**Emergency Stop**

This button will stop the compressor at any time.

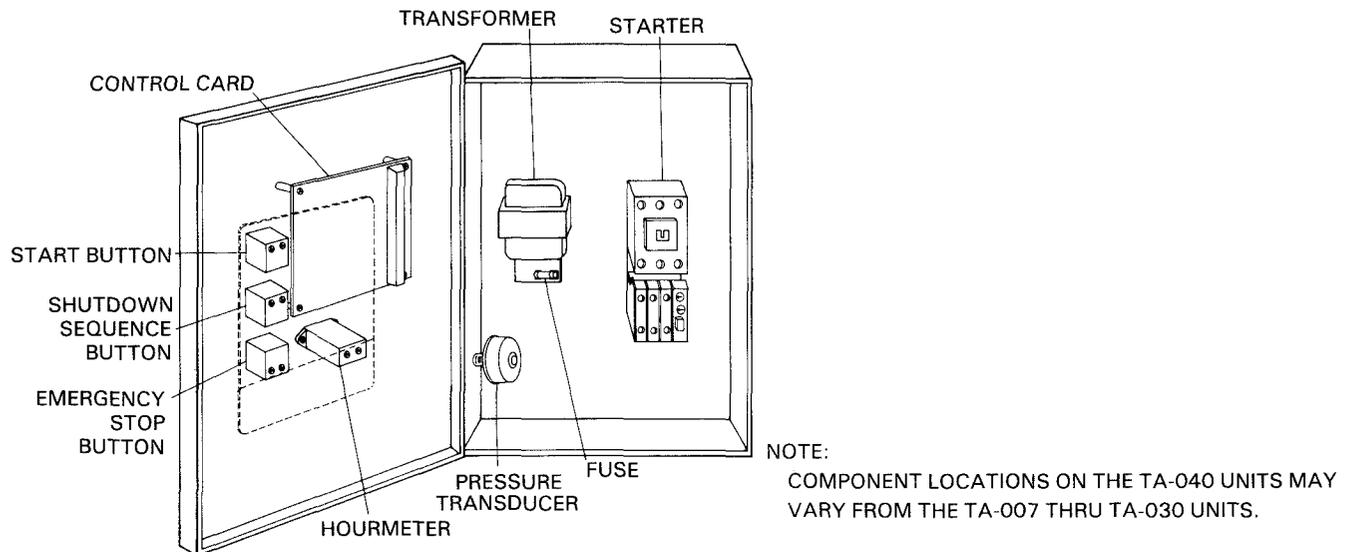
The compressor will remain off until the receiver pressure drops to the low point pressure switch setting at which time the compressor will start again and continue running until it reaches the high limit of the pressure switch setting.

**NOTICE**

IF OPERATING CONDITIONS ARE SUCH THAT THE INTERVALS OF MOTOR STARTS ARE MORE THAN FOUR TIMES AN HOUR, THEN THE SELECTOR SWITCH SHOULD BE MOVED TO THE CONSTANT SPEED POSITION.

**CONTROL SYSTEM COMPONENTS**

Following is an explanation of the function served by components in the control system (refer to Figure 5).



**FIGURE 5**  
*Control Center Components*

87-4

### Unloader Solenoid Valve

The unloader solenoid valve provides the control air signal required to operate the inlet valve in response to the air pressure switch. The valve also acts to blowdown the compressor system upon shutdown. The inlet valve is designed so that the system pressure is released through the inlet valve to the atmosphere during unloading or blowdown.

### High Discharge Temperature Switch

The high discharge temperature switch functions in the compressor safety circuit to effect shutdown should operating temperature become excessive (235 deg. F.). After a high air temperature shutdown, the cause should be corrected and the machine must be allowed to cool below 195 deg. F. before it can be restarted.

### Control Card

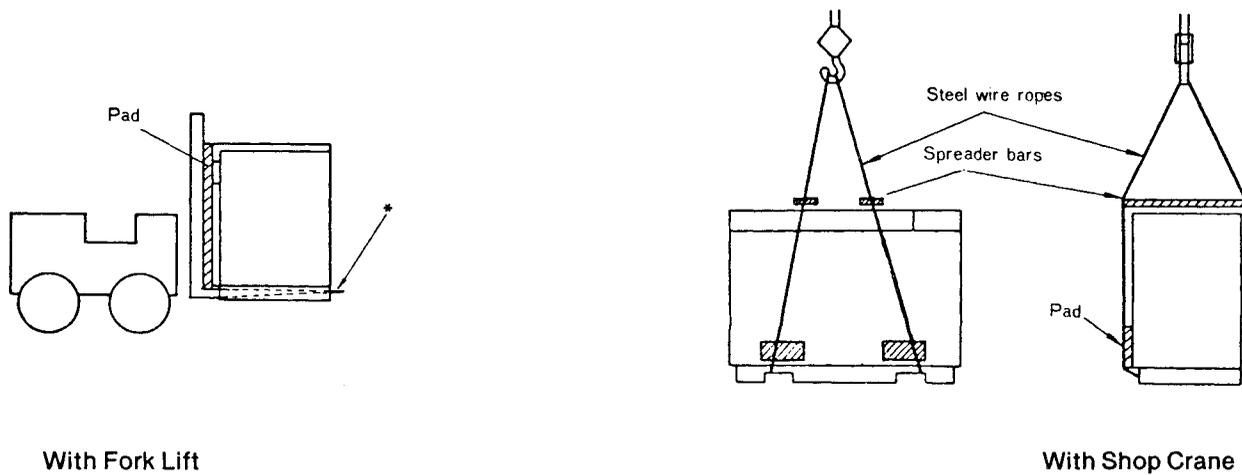
The control card contains the unload start circuit, control relay, auto dual control timing circuit, shutdown sequence circuit, air pressure switch and digital readout.

### WARNING

UNIT CAN AUTOMATICALLY RESTART AND WILL CAUSE PERSONAL INJURY.  
KNOW MODE OF OPERATION BEFORE WORKING ON OR NEAR THE MACHINE.

### DRIVE BELTS

The compressor drive is equipped with v-belts using the 3V cross section. Proper v-belt tension and sheave alignment is extremely important to belt life, bearing life, and power transmission. Correct tensioning and alignment was provided at time of shipment from the factory; however, it is recommended that sheave alignment and v-belt tensioning be



With Fork Lift  
**FIGURE 18**  
 Compressor Handling

85-24

checked before initial startup. V-belts are made of materials allowing them to stretch. It is very important to periodically check the belts. If tensioned below its minimum recommended level, a belt may have its life significantly reduced by slippage. The majority of elongation is observed in the first 5 to 10 hours of operation. Therefore, new belts should have their tension and alignment checked several times in the first 5 to 10 hours of operation and periodically thereafter (reference Section 3, Figures 14 and 15).

## INSTALLATION

### RECEIVING

For shipment, the compressor is encased in a protective crate. Upon receiving, remove the crating and inspect unit for signs of damage in shipment.

Refer to "Specifications" for compressor weight and dimensions.

### HANDLING

#### With Fork Lift Truck

The unit can be moved with a fork lift truck. Be sure that the forks extend completely through the width of the unit\*, and be sure to apply pad material to the enclosure to prevent any damage.

#### With Shop Crane

To move the unit with a shop crane, steel wire ropes can be used but spreader bars must also be used to prevent the wire rope from exerting a force against the top of the enclosure, and be sure to apply pad material to the enclosure to prevent any damage.

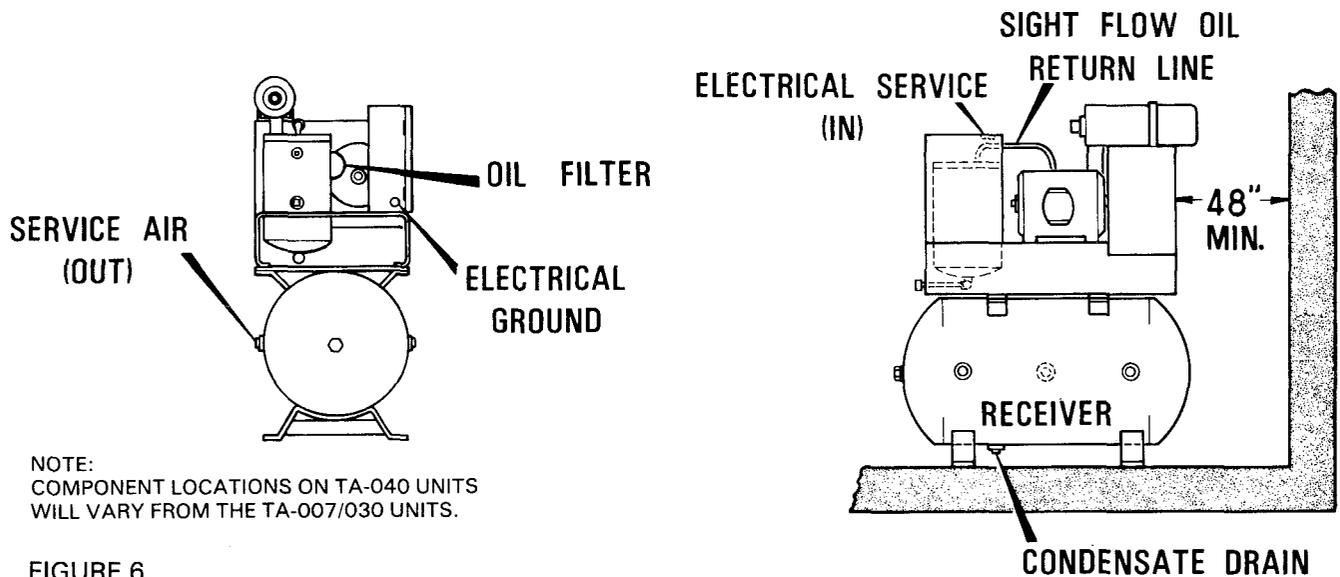
### LOCATION

The compressor is designed for indoor operation in ambient temperatures ranging from 35 deg. F. to 110 deg. F. In selecting the location for the compressor, it is important that there is an ample supply of cool, clean, well-circulated air. Do not set the unit with the oil cooler side closer than 48 inches from a wall or other obstruction which would restrict the free flow of air through the cooler. A good circulation of air through the cooler is important. See INSTALLATION DIAGRAM.

If contaminated air containing acid, paint, or corrosive matter is present, then an outside source of air must be provided for the compressor air intake.

### FOUNDATION

No special foundation is required. It is only necessary that the unit be located on a floor that will give adequate support. It is recommended that the unit be bolted to the floor.



NOTE:  
COMPONENT LOCATIONS ON TA-040 UNITS  
WILL VARY FROM THE TA-007/030 UNITS.

FIGURE 6  
*Typical Installation, Tank Mounted Model*

80-28B

### ELECTRICAL CONNECTIONS

Have electrical connections to the power source made by a competent electrician in accordance with local codes.

The electrical source must have the same characteristics and voltage as indicated on the motor nameplate and as is called for on the compressor nameplate.

### UNIT MUST BE GROUNDED

Ground from ground connection on side of control center to a metal, cold water pipe or other good ground. Use #8 wire or larger (Figure 6).

Complete connection details for the electrical wiring are provided in Figures 8 and 8A.

### CAUTION

INLET AIR CONTAINING REACTIVE GASES WILL CAUSE FAILURE OF THE LUBRICANT AND EQUIPMENT. INSURE AN AIR SUPPLY IS WELL AWAY FROM ANY REACTIVE GAS SOURCES.

### AIR INTAKE PIPING

A clean air supply is desirable for the satisfactory operation of your JOY® compressor. Where alternate sources of intake air are available, select the source supplying the cleanest air. The standard air filter with which the compressor is equipped is of sufficient size and design to meet all normal operating conditions.

When an outside air intake source is used, a flexible sleeve should be provided to connect the filter inlet to the inlet piping. The machine should be located as close as possible to the intake source because a restriction at the inlet will result in a capacity loss for the machine. It is not intended that the filter be removed except for maintenance. In making up this installation, consideration should be given to the following:

1. Keep the piping as short and direct as possible.
2. Piping size must be at least as large as the inlet opening.
3. MAKE ABSOLUTELY SURE THAT INLET PIPING IS CLEANED AFTER FABRICATION.
4. Consider using corrosion resistant piping such as plastic, aluminum, etc.
5. Support piping properly so that its weight is carried by supports and not by compressor.
6. See that there are no leaks in the intake piping which would permit the entrance of dirt.

### DISCHARGE PIPING TO SERVICE LINES

As previously stated, the compressor should be located as close as possible to the point of compressed air usage. Whatever piping is used in the distribution system should be constructed to offer a minimum amount of resistance to air flow between the receiver and point of use. Long radius elbows and pipe of no smaller size than the receiver discharge opening should be used.

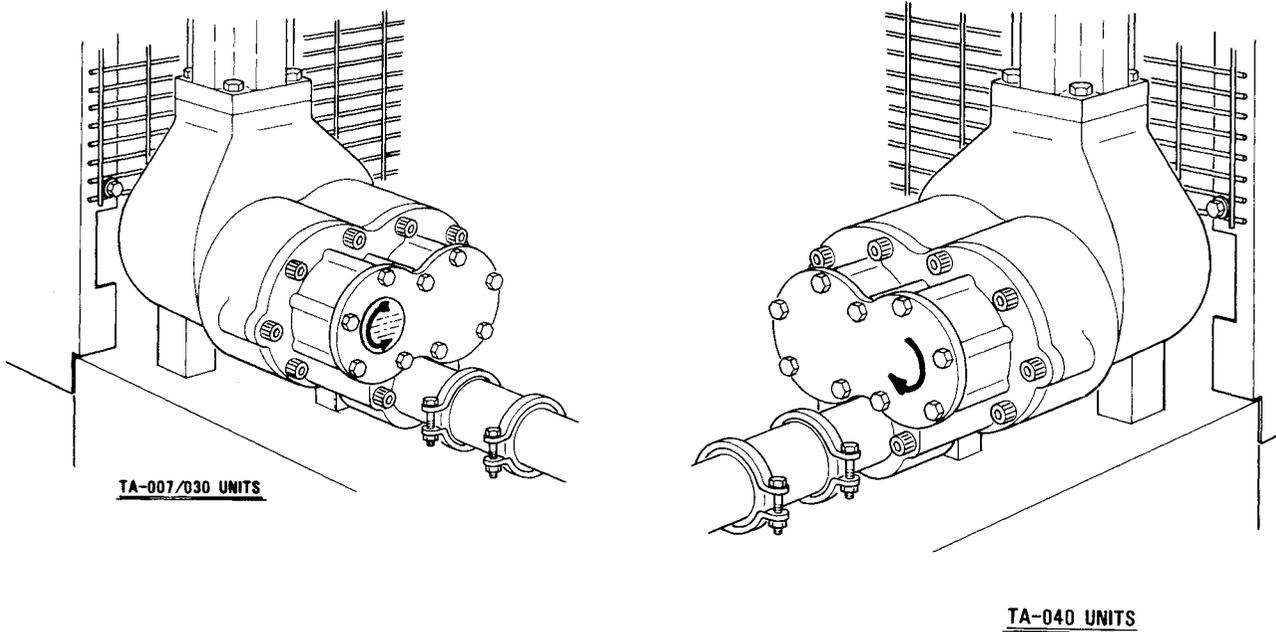


FIGURE 7  
Air End Rotation Arrow

80-29

**WARNING**

IT IS EXTREMELY IMPORTANT THAT THE WIRING IS INSTALLED PROPERLY TO ASSURE CORRECT ROTATION OF THE COMPRESSOR AS INDICATED BY THE DIRECTION OF THE ROTATION ARROW ON THE COUPLING END OF THE COMPRESSOR (FIGURE 7). FAILURE TO COMPLY WITH THIS WARNING MAY CAUSE DAMAGE TO PROPERTY AND SERIOUS BODILY HARM.

In cases where the compressor is in the same line as a reciprocating compressor, a surge volume chamber must be installed in the line between the two compressors to dampen pulsations. This applies only to base-mounted units. On tank-mounted units, the receiver acts as a surge chamber.

If the compressor is discharging into a plant system that has other compressors in the system, it is recommended that a gate valve be placed in the discharge line from the compressor. This is to isolate the unit for service. The valve should be of the same size as the discharge pipe. The use of a check valve is not recommended. For a base-mounted unit, it is necessary to provide a safety relief valve between the compressor and the gate valve.

## PRECAUTIONS

### AIR COMPRESSOR OPERATING AND SAFETY PRECAUTIONS

Because an air compressor is a high-speed, rotating piece of machinery, the same common sense safety precautions should be observed as with any piece of machinery of this type where carelessness in operation or maintenance is hazardous to personnel.

In addition to the many obvious safety rules that should be followed with this type of machinery, we are suggesting additional safety precautions as listed below:

1. Pull main disconnect switch and disconnect any separate control lines, if used, before attempting to work or perform maintenance on the unit.
2. Do not attempt to remove any compressor parts without first relieving the entire system of pressure.
3. Do not attempt to service any part while machine is operating.
4. Do not operate the compressor at pressures in excess of its rating as indicated on the compressor nameplate.
5. Do not operate the compressor at speeds in excess of its rating as indicated on the compressor nameplate.
6. Do not remove any guards, shields, or screens while the compressor is operating.
7. Observe terminal pressure gauge daily to be sure automatic control system is governing compressor operation within proper limits.
8. Periodically check all safety devices for proper operation.
9. Do not play with compressed air. Pressurized air can cause serious injury to personnel.
10. Be sure no tools, rags, or loose parts are left on the compressor or drive parts.
11. Do not use flammable solvents for cleaning parts.
12. Exercise cleanliness during maintenance and when making repairs. Keep dirt away from parts by covering parts and exposed openings with clean cloth or kraft paper.
13. Do not operate the compressor without guards, shields, and screens in place.
14. Do not install a shut-off valve in the discharge line without installing a safety relief valve in the line between the shut-off valve and the compressor discharge.
15. Do not operate compressor in areas where there is a possibility of ingesting flammable or toxic fumes.
16. Never disconnect (or jumper) high air temperature switch and operate the machine.
17. Know what mode a machine is in before working around it. The Power can be on and a machine may not be running, as the machine may be in AUTO RESTART MODE.

Pressure vessels (receivers, aftercoolers, intercoolers) may require ASME Code stamping to meet local codes. Investigate code requirements before operation to make sure all requirements have been met.

The owner, lessor, or operator of the compressor is hereby notified and forewarned that any failure to observe these safety precautions may result in damage or injury.

Joy Manufacturing Company expressly disclaims responsibility or liability for any injury or damage caused by failure to observe these specified precautions or by failure to exercise that ordinary caution and due care required in operating or handling the compressor even though not expressly specified above.

#### CAUTION

IT IS IMPORTANT THAT THE COMPRESSOR OIL BE OF A RECOMMENDED TYPE AND THAT THIS OIL, AS WELL AS THE AIR FILTER, OIL FILTER AND AIR/OIL SEPARATOR ELEMENTS BE INSPECTED AND REPLACED AS STATED IN THIS MANUAL. FAILURE TO COMPLY WITH THIS WARNING MAY CAUSE SERIOUS BODILY HARM.

#### DANGER

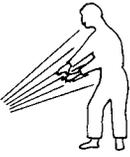
**DISCHARGE AIR USED FOR BREATHING.  
WILL CAUSE SEVERE INJURY OR DEATH.**

**CONSULT FILTRATION SPECIALIST FOR ADDITIONAL  
FILTRATION AND TREATMENT EQUIPMENT TO MEET  
HEALTH AND SAFETY STANDARDS.**

The following decals are designed to warn the user of potential hazards and to protect against personal injury and property damage. Locate each safety decal on the machine and adhere to instructions. Also, review additional safety information that is located throughout this book.

# SAFETY DECALS

**⚠ DANGER**



Hot oil under pressure.  
Will cause severe personal injury or death.

Shutdown compressor and relieve system of all pressure before removing valves, caps, and plugs.

01228378 0058

See Section 3  
Pages 2 and 5

**⚠ DANGER**

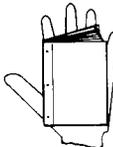


Discharge air used for breathing.  
Will cause severe injury or death.

Consult filtration specialist for additional filtration and treatment equipment to meet health and safety standards.

01228378 0057

**⚠ WARNING**



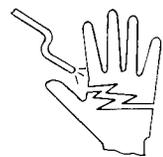
Read the operator's manual before starting this unit. Failure to adhere to instructions can result in severe personal injury.

Replacement manuals can be purchased from:

Joy Manufacturing Company  
900 S. Woodland Avenue  
Michigan City, IN 46360

01228378 0062

**⚠ WARNING**



High voltage/Electrical shock.  
Can cause severe injury or death.

Ground unit and disconnect all power supplies to unit before opening enclosure.

01228378 0071

See Section 1  
Pages 4 and 6

**⚠ CAUTION**



Machine damage.  
Can occur due to improper lifting.

Do not lift machine with the motor eyebolt.

01228378 0059

**⚠ CAUTION**



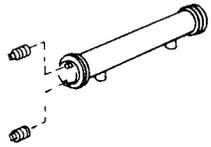
Reverse rotation of compressor and fan.  
Will cause machine damage.

Check for correct rotation of compressor and fan. See operator's manual.

01228378 0063

See Section 1  
Page 7

**NOTICE**

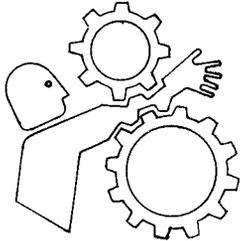


Assemble connecting plugs to aftercooler before starting unit.

Failure to do so will result in loss of water from unplugged openings.

01228378 0060

**⚠ WARNING**

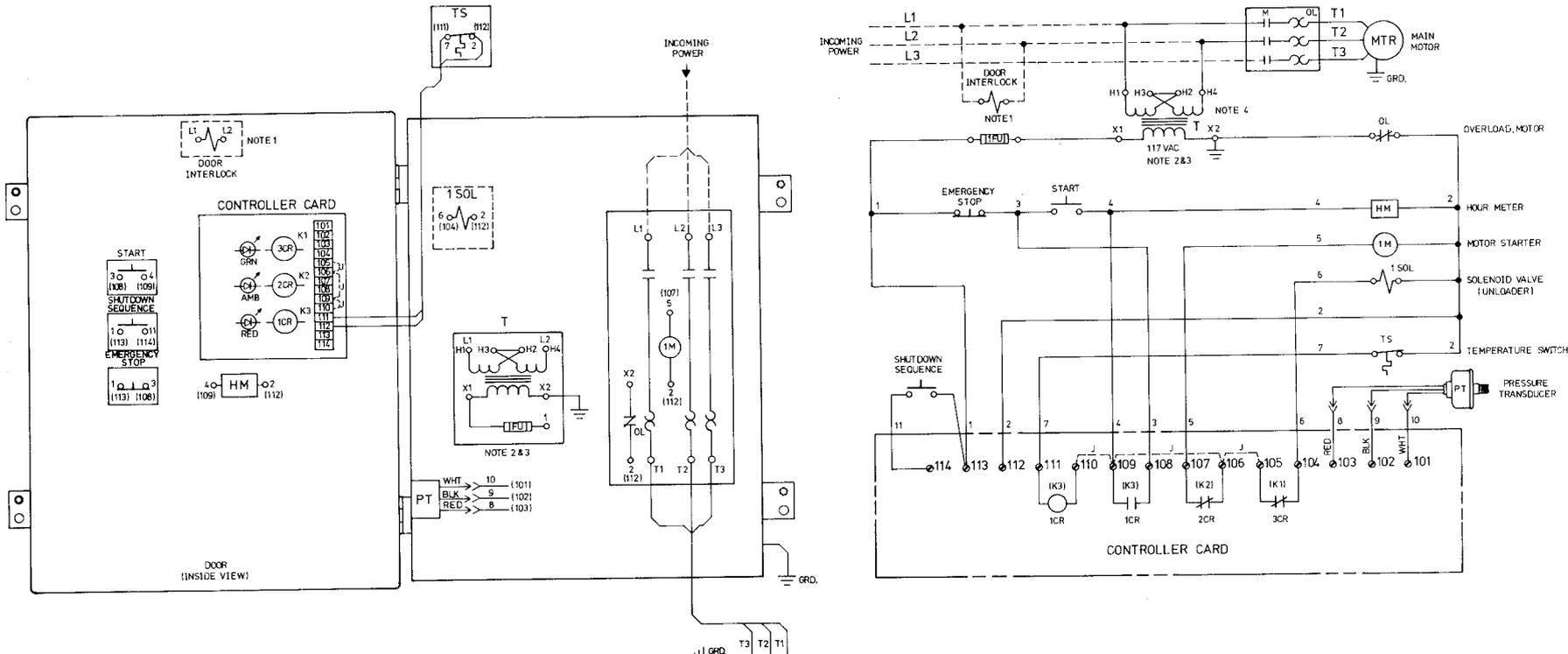


Unit can automatically restart.  
Will cause personal injury.

Know mode of operation before working on or near the machine.

01228378 0070

See Section 1  
Page 4



**NOMENCLATURE**

- FU - FUSE
- CR - CONTROL RELAY
- T - TRANSFORMER
- ( ) - TERMINAL NOS ON CONTROLLER CARD
- J - INTERNAL JUMPERS ON CONTROLLER CARD

**NOTES:**

1. WHEN REQUIRED, MOUNTED TO INSIDE TOP OF DOOR AND WIRED BY CUSTOMER.
2. TRANSFORMER SHOWN WIRED FOR 460 VOLTS PRIMARY.
3. SEE CHART.
4. CONTROL CENTER SUPPLIER TO WIRE TRANSFORMER PRIMARY H1 & H4 TO L1 & L2, ALSO X2 TO GROUND.

NOTE 3

CONTROL TRANSFORMER (T)			
TYPE	INCOMING VOLTAGE	JUMPER	TO LINE
230 / 460 V PRI. 117 V SEC.	460	H3 & H2	H1-H4
	230	H1 & H3 H2 & H4	H1-H4

**FIGURE 8**  
Wiring Diagram - TA-007-030

WD13639



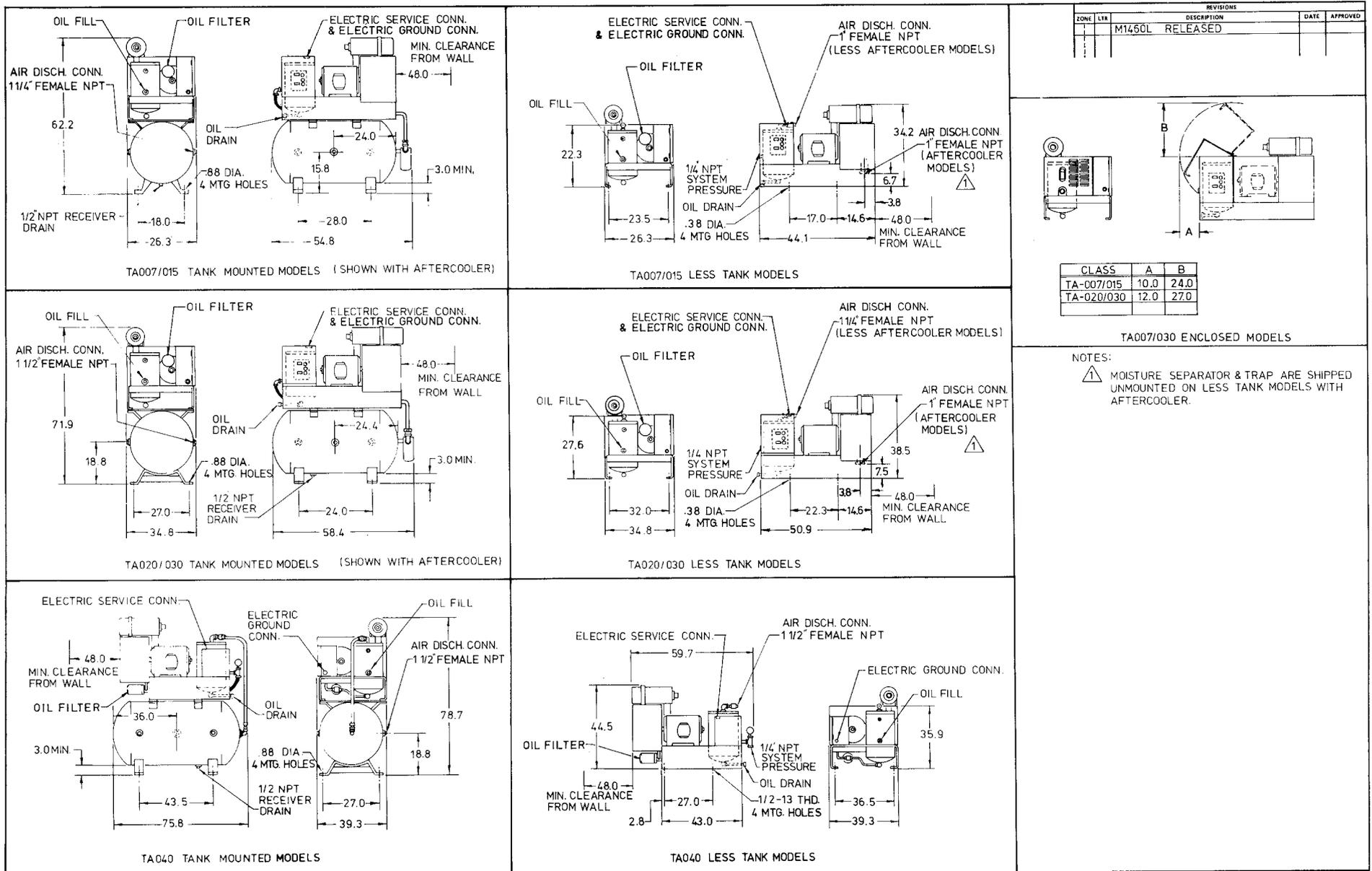


FIGURE 9  
Installation Diagram

S2949-0004

## OPERATION

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### INTRODUCTION

Every JOY® compressor is operated and thoroughly tested at the factory before shipment. The test assures that the compressor will deliver its rated capacity and is in good working order. However, regardless of the care taken at the factory, there is a possibility that damage may occur in shipment. For this reason, it is recommended that the unit be carefully inspected for evidence of possible damage or malfunction during the first few hours of operation.

#### WARNING

EXCEEDING MAXIMUM PRESSURE WILL CAUSE COMPONENT AND SYSTEM DAMAGE. DO NOT EXCEED MAXIMUM PRESSURE INDICATED ON COMPRESSOR NAMEPLATE.

### PREPARATION FOR INITIAL START-UP

1. Pull main disconnect switch to assure that no power is connected to the unit.
2. Review installation as covered in Section 1 to see that applicable instructions have been complied with.

#### WARNING

DO NOT ATTEMPT TO OPERATE COMPRESSOR ON VOLTAGE OTHER THAN THAT SPECIFIED ON THE COMPRESSOR NAMEPLATE. FAILURE TO COMPLY WITH THIS WARNING MAY CAUSE SERIOUS BODILY HARM

3. Inspect unit for any visible signs of damage that could have occurred in shipment or during installation.
4. Make sure that protective covering (paper) has been removed from air intake filter, enclosure openings and any other components or area that could require protection from painting or shipping.
5. Fill sump to proper level with oil as specified in Section 3, "Lubrication." Do not over-fill. If sump is over-filled, drain to proper level. **TIGHTEN OIL FITTING SECURELY. REMEMBER THIS IS A PRESSURIZED VESSEL.**
6. On water cooled units, make sure that water supply is connected and open to give proper flow.
7. Reconnect main disconnect switch.
8. Jog motor (press start and then stop button quickly) and check for proper direction of rotation as indicated by direction arrow on discharge end bearing cap (Figure 7). If rotation direction is wrong, reverse input connections L1 and L2 (ref. Figure 8 and 8A).
9. Close receiver gate valve (ref. Section 1 "Discharge, Piping, and Service Line") and move selector switch to desired operating position. Constant Speed setting is recommended for initial startup.
10. With receiver gate valve closed, let machine pump up to operating pressure. At this stage, the automatic controls will take over.
11. Open receiver gate valve.
12. Check calibration, make sure unit is at '0' before start-up. Refer to Page 6 of Section 3.

After unit has run for several minutes, shut it down and check oil level. It may be necessary to add oil to compensate for the amount of oil needed to fill the entire system.

#### CAUTION

REVERSE ROTATION OF THE COMPRESSOR WILL CAUSE AIR END DAMAGE. AFTER ANY CHANGE OR RECONNECTION OF WIRING, CHECK FOR CORRECT ROTATION OF COMPRESSOR AND FAN. DO NOT ALLOW COMPRESSOR TO RUN IN REVERSE ROTATION.

### **NORMAL STARTING**

1. Press START button; let machine build up to operating pressure; at this stage, the automatic controls will take over.

It is especially important to let the machine warm up to operating temperature in cold ambients prior to giving the unit an air demand. If this is not done, it is possible to collapse the air/oil separator element on start up because of the oil saturating the element.

ON WATER COOLED UNITS, SEE THAT WATER IS TURNED ON.

### **NORMAL STOPPING**

1. Press the "Shutdown Sequence" button. This will unload the compressor and run for another 30 seconds. After 30 seconds the machine will stop.
2. Stop flow of cooling water if machine is water cooled.

### **Dual Control (Time Delay Relay Shutdown)**

A time delay relay will automatically shutdown the compressor after a pre-determined interval, from 10 minutes to 30 minutes, of unloaded operation. This interval is factory set for 20 minutes. Automatic re-start will occur at the low limit of the air pressure switch control range.

The 20 minute minimum delay interval is based on the motor manufacturers' recommendation of three starts per hour.

Any reloading during the timing interval will reset the timer to zero. The green "Run" light on the control center will be lit when the machine is in a shutdown interval.

### **EMERGENCY SHUTDOWN**

Press the "Emergency Stop" button at anytime you require the compressor to stop immediately.

### **RESTART AFTER POWER FAILURE**

1. Check fuses and re-set starters.
2. Check to see that main disconnect is connected.
3. Follow Normal Starting Procedure.

### **RESTART AFTER SAFETY CIRCUIT SHUTDOWN**

(Pull main disconnect switch prior to correcting problem).

1. After the cause of shutdown is corrected, press stop-reset button.
2. Follow Normal Starting Procedure.

### **PREPARATION FOR STORAGE AND START-UP AFTER PROLONGED STORAGE**

Prolonged shutdown or storage requires special consideration as there are many conditions which could affect the compressor. Storage, indoors, outdoors in freezing temperatures, salt air, dampness, etc., only to mention a few. Unless otherwise stated in the sales agreement (sales order), the standard preparation for compressor shipment provides for up to eight weeks of indoor storage, starting from the time the machine leaves the factory.

Should prolonged storage or shutdown become necessary, the following action should be taken to offset a possible malfunction upon start-up:

## **STORAGE**

### **IN PREPARATION FOR STORAGE:**

1. Cover and seal all machine openings to prevent the entrance of dirt and water.
2. Cover all openings on open-drip-proof type motors to prevent the entrance of rodents.
3. If the machine is to be stored for any length of time at all in freezing conditions, it is necessary to drain all the water that may have accumulated in water-cooled coolers, air-cooled aftercoolers, traps, and attendant air piping prior to sealing all machine openings.
4. If the machine is to be stored outside, it must be protected from the weather to prevent the entrance of all dirt and water from any machine components especially the electrical controls.
5. It is suggested that any machine be completely covered with a waterproof tarpaulin that can be easily removed for in-storage maintenance.

**IN-STORAGE MAINTENANCE**

It is extremely important that the air end shaft be rotated several revolutions every two to three months to protect the bearings from receiving flat spots.

**PREPARATION FOR START-UP:**

Prior to start-up, after long term storage, the steps for preparation for initial start-up on Page 1, Section 2 should be followed.

**NOTICE**

**IF MACHINE HAS BEEN IN STORAGE FOR MORE THAN A YEAR, IT IS SUGGESTED THAT A FRESH CHARGE OF OIL BE ADDED PRIOR TO START-UP.**

If prolonged storage in extreme conditions not considered above becomes necessary, your JOY representative should be contacted immediately so that he may recommend additional precautions which may be taken to offset a possible malfunction upon start-up. It is our desire to maintain customer satisfaction by advising you in anticipation of a trouble-free start-up.

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# SECTION 3

## LUBRICATION, MAINTENANCE AND ADJUSTMENT

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### LUBRICANT

#### LUBRICANT

Your machine has been tested and filled with Syn Flo 80 lubricant. This fluid is a compounded olefin specifically formulated to optimize the performance of Rotary Screw compressors. In most installations, this lubricant will last significantly longer than standard petroleum oils.

No matter how good a lubricant, it cannot replace proper maintenance attention. We suggest you adhere to regular filter changes as outlined in the maintenance section of this manual. The filter system of your Joy compressor has been specifically designed to remove particular contaminant down to tolerable levels. It is therefore essential to use only genuine Joy replacement parts, since substitutes could impair performance.

To detect these contaminants and to further optimize lubricant life, we recommend an oil sampling program. When properly applied, it will confirm continued useful lubricant life. It will also indicate symptoms of problems, i.e., reactive gas intake, which should be addressed for continued good operation.

#### NOTICE

YOUR DISTRIBUTOR WILL PROVIDE YOU WITH AN OIL SAMPLE KIT. WE PROPOSE SAMPLING INTERVALS OF EVERY SIX MONTHS, CONDITIONS OR THE OIL ANALYSIS COMPANY MAY DICTATE SHORTER SAMPLING INTERVALS.

#### NOTICE

JOY MANUFACTURING COMPANY DOES NOT RECOMMEND MIXING DIFFERENT TYPES OR BRANDS OF LUBRICANTS DUE TO THE POSSIBILITY OF A DILUTION OF THE ADDITIVES OR A REACTION BETWEEN ADDITIVES OF DIFFERENT TYPES.

#### Prime Lubricant Characteristics

1. Viscosity
  - a. 1200 SSU or less at 50°F.
  - b. 160–210 SSU at 100°F.
  - c. 47 SSU or greater at 210°F.
2. Flash Point 400°F. minimum (ASTM D-92-COC).
3. Pour Point must be at least 20°F. lower than the lowest expected ambient temperature.
4. Contain rust and oxidation inhibitors.
5. Contain foam suppressors if required.

#### Types Of Oil To Be Considered

##### *Industrial Type Oils*

Industrial oils should be of premium quality non-detergent mineral oil, viscosity grade SAE 10. Generally, industrial oils are better for high humidity and/or low load factor where condensed moisture and emulsification may occur.

Water, which will separate, must be drained from the oil sump. In addition to the prime oil characteristics, good water separation, therefore, is preferred.

### *Heavy Duty Detergent Motor Oils*

Heavy duty detergent motor oils should be SAE viscosity Grade 10. The following have proven by experience to be satisfactory for use:

API Designation	Military Identification
CD/SC	MIL-L-2104C
CC/SE	MIL-L-45152
CC/SC	MIL-L-2104B

Generally, detergent motor oils are better where severe oil oxidation can occur due to heavy duty, high temperature conditions.

### *Automatic Transmission Fluids*

Automatic transmission fluid (ATF) can be used. Generally, ATF fluids are used in heavy duty, high temperature conditions or in ambients consistently below 20°F.

### *Synthetic Lubricants*

Insofar as known, all elastomeric components and all metals used in the compressor are fully compatible with synthetic lubricants. The viscosity grade chosen for synthetic lubricants should be based upon the suggested viscosity ranges listed under prime lubricant characteristics and the lubricant supplier. However, the synthetic lubricant should not employ viscosity index improver additives. These will precipitate out plugging oil passages and filters, ultimately causing unit failure.

### **Oil Sump Capacity**

The compressor oil sump capacity is given in "Specifications" – Section 1. Maintain oil level at center of sight gauge ( Figure 10 ). Do not overfill. An overfilled sump could cause hydraulic locking of the compressor. Oil level must be checked either prior to start up or after shutdown when oil has had a few minutes to settle.

### **Adding or Changing Oil**

The oil sump contains all the oil required for compressor operation. Oil is added through the fill fitting ( Figure 10 ) located on the side of the oil sump.

## **WARNING**

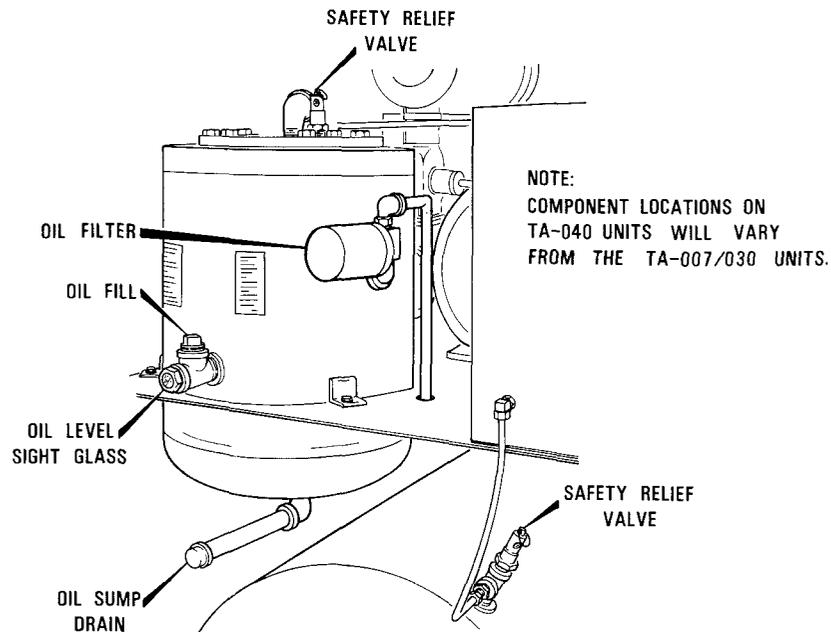
DO NOT ATTEMPT TO ADD OIL WHEN THE COMPRESSOR IS OPERATING OR WHEN SUMP IS UNDER PRESSURE. LIFT THE HANDLE OF SAFETY VALVE RELIEF VALVE TO RELIEVE SYSTEM OF ALL PRESSURE. FAILURE TO COMPLY WITH THIS WARNING MAY CAUSE SERIOUS BODILY HARM.

### **Motor**

Grease-lubricated motors are properly lubricated at the time of manufacture and it is not necessary to relubricate prior to initial start-up. However, if motor has not been run for a period of six months or longer, it is recommended that it be lubricated before starting. For the type of lubricant to use and the method of lubrication, contact local manufacturer's representative. See motor nameplate for motor identification.

### **Initial Oil Change**

Regardless of the care taken during machine assembly, there are impurities that enter the machine. In the initial hours of operation, these impurities are flushed out and caught by the oil filter. Because of this, it is recommended that the oil filter be changed and the separator element be checked after the first 300–400 hours of operation. Thereafter the element change interval should be as indicated by the maintenance indicators and in accordance with the following periodic maintenance schedule.



**FIGURE 10**  
*Compressor Components*

80-32C

## PERIODIC MAINTENANCE SCHEDULE

### DAILY OR EVERY 8 HOURS

#### Prior to Start-Up:

Check for correct sump oil level. Level should be at center of bulls-eye sight glass.

#### In Operation:

Observe oil return line tubing for oil flow.

#### Periodically

1. Inspect air intake filter element for clogging or holes.
2. Clean oil return line orifice. (Fig. 12).
3. Clean cooling system heat exchangers.
4. Drain condensate from oil sump (Figure 10). Depending on the humidity of the climate, this may be necessary daily. Prior to draining, the compressor should be shut down for two hours to allow the water and oil to separate.
5. Check belt tension and sheave alignment.
6. Check sump pressure relief valve for operation. This valve is factory set and no attempt should be made to adjust it.
7. Check machine for oil leaks and loose fastenings/connections. Also, hose condition and correct or replace if necessary.
8. Check maintenance indicators and clean if necessary, to insure reliable operation.

## HOURLY METER

To be used to record the total hours of operation for periodic maintenance.

## SEPARATOR MAINTENANCE INDICATOR

A red pop-up indicator is slowly raised as the pressure drop through the separator element increases. When the indicator shows all red, the air/oil separator element should be replaced.

## Every Six Months or 1000 Hours

1. Change compressor oil, or as indicated by oil sampling program, and replace oil filter elements.
2. Check air/oil separator element and replace if damaged or extremely dirty.

# MAINTENANCE

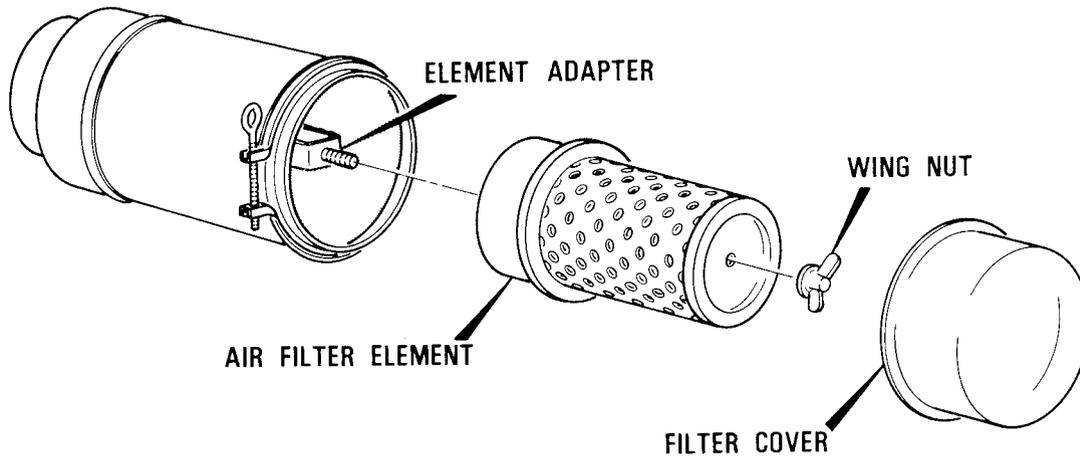


FIGURE 11  
Air Intake Filter

80-33

**NOTICE**

THE USE OF SYNTHETIC DIESTERS HAVING EXTENDED USEFUL LIFE DOES NOT CHANGE THE OIL FILTER ELEMENT CHANGE INTERVAL.

**WARNING**

SUMP FIRES CAN CAUSE SEVERE INJURY, DEATH, OR PROPERTY DAMAGE. AIR/OIL SEPARATOR + DIRT + OXIDIZED OIL PRODUCTS + INCREASED AIR VELOCITY = FIRE.

MAKE SURE AIR/OIL SEPARATOR, OIL, OIL FILTER, AND AIR FILTER ELEMENTS ARE INSPECTED AND REPLACED AS STATED IN THIS MANUAL OR SOONER AS NECESSARY.

**Air Intake Filter**

Scheduled service based on a set number of operating hours is not required nor recommended.

**CAUTION**

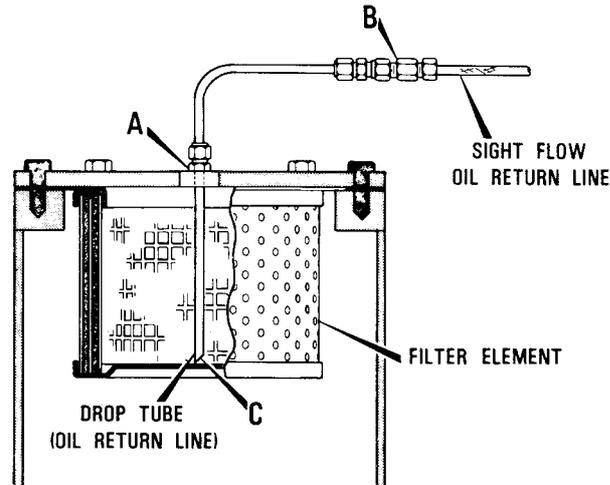
DO NOT WORK ON THE AIR INTAKE FILTER WHILE THE MACHINE IS IN OPERATION.

**CAUTION**

DO NOT USE COMPRESSED AIR TO DRY A WET ELEMENT.

The procedure for servicing the air filter element is as follows:

1. Loosen the wingnut assembly which will allow you to remove the filter cover.
2. Unscrew the wingnut from element and pull element off of adaptor.



**FIGURE 12**  
*Sectional View of Air/Oil Separator*

80-34

### NOTICE

A MACHINE OPERATING FOR AN EXTENDED PERIOD OF TIME WITH AN EXCESSIVELY DIRTY ELEMENT WILL REQUIRE AIR FILTER SERVICE. IF THIS IS NOT INDICATED BY THE SERVICE INDICATOR, CHECK THE FOLLOWING.

1. Make sure the element is installed properly.
2. Check the element for holes or breaks.
3. Check all inlet piping and connections for leaks.

### Oil Filter

Service oil filter element every 1000 hours or sooner.

This oil filter (Figure 4) has an element of the "spin on" disposable type. To install new element, simply remove and replace. Ascertain that element is secure and gasket is serviceable and in place.

### DANGER

HOT OIL UNDER PRESSURE WILL CAUSE SEVERE INJURY, DEATH, PROPERTY DAMAGE. BE SURE COMPRESSOR IS SHUT DOWN AND RELIEVED OF ALL PRESSURE BEFORE ATTEMPTING ANY WORK ON COMPRESSOR.

### Air/Oil Separator

The procedure for servicing the separator filter element is as follows:

1. Disconnect necessary piping at separator cover. The oil return line must be first separated at coupling B, Figure 12, loosened at fitting A on the separator cover and then the tube pulled up out of the separator.
2. Unbolt cover and remove.
3. Lift out separator element.
4. Install new element (gaskets are attached). Make sure flange surfaces are clean. All elements will have either a staple in the gasket or a sheet metal tab attached to the inside of the separator. These items are attached to provide metal to metal contact between the element and the sump head. It has been proven that these items reduce the possibility for sump fires.
5. Refer to TABLE 2 for torque values.
6. Reconnect all piping. Ascertain that the oil return tube is "bottomed" at C in the separator.

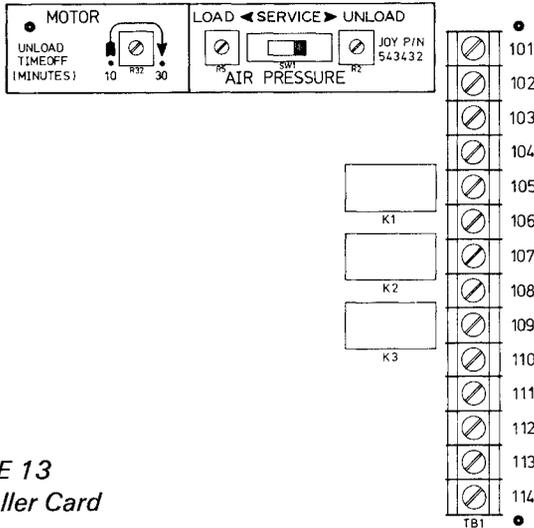


FIGURE 13  
Controller Card

87-7

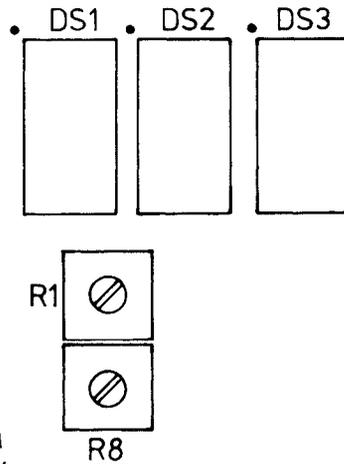


FIGURE 13A  
Display Card

87-8

**Oil Return Line**

The oil return line tubing (Figure 12) serves to visually ascertain that any oil accumulation at the bottom of the air/oil separator is being removed. This tubing should be observed daily (during operation) for an indication of oil flow, a light air/oil mist is normal. If the tube shows completely full of oil, it indicates that the oil line is clogged and oil is not being removed. If the tube shows no flow at all, the oil line may be clogged or the drop tube may not be properly "bottomed" in the separator element. This results in excessive oil consumption and oil in service lines. If clogging is indicated, remove and clean the orifice (Figure 12) by blowing with a reverse flow of air. The plastic tubing will sometimes discolor with age due to the lubricant. If it becomes impossible to distinguish oil flow in the tube, it will be necessary to clean the tube or replace it. A bright light placed behind the tube may also reveal oil flow in a discolored tube.

**NOTICE**

A NEW AIR/OIL SEPARATOR MAY NOW SHOW OIL IN TUBING FOR APPROXIMATELY THE FIRST 90 HOURS OF OPERATION.

**Control Card Set-Up (Ref. to Fig. 13)**

1. Preset the Controls and Switches as follows:
  - A. "LOAD" and "UNLOAD" potentiometers to mid-scale.
  - B. Potentiometer on the "MOTOR UNLOAD TIMEOFF DELAY" to maximum CW rotation.
2. Turn the Power Switch on and verify the Digital Display lights up indicating the unit is "ready". After above requirements have been met, air compressor pressure settings can be made by:
  - A. On the "AIR PRESSURE SETTING", move the "LOAD/UNLOAD" slide switch to "UNLOAD" position.
  - B. Adjust the "UNLOAD" potentiometer so the Digital Display reads desired Unload Pressure setting for the Compressor. This may be adjusted to any pressure from 70 to 125 PSI.

**CAUTION**

TO AVOID ANY INTERACTION OF ADJUSTMENTS THE "UNLOAD" PRESSURE MUST BE ADJUSTED BEFORE THE "LOAD" PRESSURE ADJUSTMENT.

- C. Move the "LOAD/UNLOAD" slide switch to the "LOAD" position.
- D. Adjust the "LOAD" potentiometer until the Digital Display reads the desired Load Pressure setting. This value will be in the range of 5 to 18 PSI lower than Unload Pressure.
- E. Return Air Pressure Switch to center "SERVICE" position.

This completes Air Pressure Settings to the Compressor.

Fine adjustments to system can now be made by observing the digital display and "LOAD" LEDs on the Compressor Controller Card. Fine tuning should be done while system is fully on-line and operating.

### Delivering Air

Maximum differential set point between load and unload (low and high set point) is 18 PSI. Under normal operation, air pressure will fluctuate between these two setpoints.

### 3. 10–30 MINUTE SHUTDOWN TIMER

The adjustable shutdown timer can be set from 10 to 30 minutes. If there has been no demand for air over the set time, the timer will shut compressor motor off. The timer is activated when compressor unloads. If compressor loads before the set time, timer is disabled and reset. If timer times out, motor control relay, 2CR, is energized, opening the contacts of 2CR (pins 106 and 107 of terminal strip), and motor starter 1M is de-energized, shutting compressor motor off. Compressor is then in auto restart mode. If air pressure drops to the load setpoint, 2CR is de-energized. When 2CR is de-energized contacts connected to pins 106 and 107 will close, and (after eight second delay) 3CR will become de-energized, closing contacts connected to pins 104 and 105. This allows the compressor motor to start unloaded and resume normal operation. Timer should be set so that motor will only start the allowable times per hour (i.e. 20 minutes equals a maximum of three times on the hour).

### Pressure Transducer and Span Controls (Ref. to Fig. 13A)

The Pressure Transducer adjustment "zero" and "span" controls are set at the factory for 1 Volt to equal 0 PSI and 4 Volts to equal 150.PSI. Due to variations in transducers (tolerances of + or – 2 percent), these controls will probably have to be adjusted for the particular transducer at time of installation. To accomplish this, the following is necessary:

- A. The Transducer is wired to terminals 101–103 on TB1 as follows:
  1. TB101 Transducer White (Signal)
  2. TB102 Transducer Black (Ground)
  3. TB103 Transducer Red (+ Voltage)
- B. Using an air pressure regulator and pressure gauge, apply 0 pounds air pressure to the transducer.
- C. The "zero" adjust and "span" controls are located on display board below LED digital display. To obtain access to these controls the two mounting screws and nuts on end of the controller card with solid standoffs must be removed; the card then can be swung out away from panel on the swivel standoffs to gain access to controls.
- D. Turn the Compressor Controller Card ON, and allow a few seconds for circuit to stabilize. Adjust pressure transducer adjustment "zero" (R1) control to obtain a reading of "000" on delivery air pressure display.
- E. Apply a fixed air pressure as close as possible to your maximum desired delivery air pressure (reference this pressure to a known accurate pressure gauge). Adjust the "span" (R8) control so digital pressure display agrees with reading on the pressure gauge.
- F. If an accurate pressure gauge is not available, set up a pressure of approximately 100 PSI. Using a Digital Volt Meter (DVM), measure the voltage on terminals 101 and 102 (Red (+) to TB101 Black (–) to TB102). The DVM should read approximately 3.00 Volts. Adjust the delivery pressure for a reading of 3.00 Volts on the terminals. Adjust the "span" (R8) control for a reading of 100 PSI on the delivery air pressure display. If a reading of 3 Volts is not attainable, the following table may be used to adjust the "span" (R8) control. The transducer output starts at 1 Volt and increments .02 Volts for each pound of increased air pressure. This results in the following pressure readings for the corresponding transducer voltages:

0 PSI = 1.00 Volts	85 PSI = 2.70 Volts	110 PSI = 3.20 Volts
25 PSI = 1.50 Volts	90 PSI = 2.80 Volts	115 PSI = 3.30 Volts
50 PSI = 2.00 Volts	95 PSI = 2.90 Volts	120 PSI = 3.40 Volts
75 PSI = 2.50 Volts	100 PSI = 3.00 Volts	125 PSI = 3.50 Volts
80 PSI = 2.60 Volts	105 PSI = 3.10 Volts	

This will calibrate the delivery air pressure display and transducer.

- G. Replace the two mounting screws and nuts to secure the controller card to the panel.

NOTE:  
ILLUSTRATION REPRESENTS  
TA-007-030 UNITS. TA-040  
MOTORS ARE ON OPPOSITE  
SIDE OF FRAME.

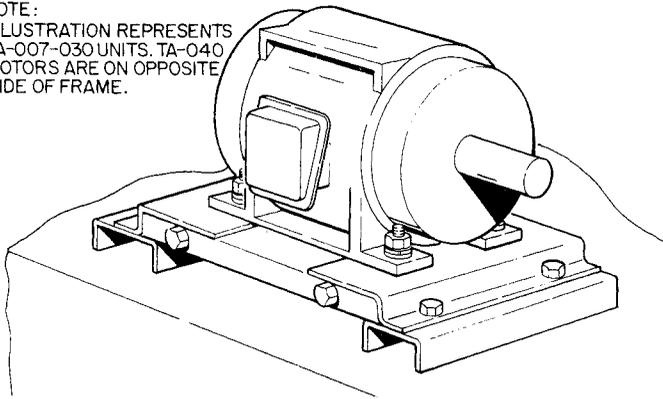


FIGURE 14  
Motor Adjustment

86-2

DEFLECTION 1/64" PER  
INCH OF SPAN

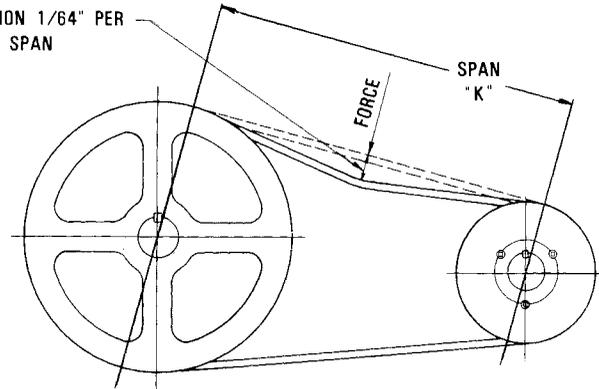


FIGURE 15  
Measuring Forces

80-37

**NOTICE**

TO AVOID PROBABLE BELT DAMAGE, NEVER FORCE BELTS OVER THE SHEAVES. OIL SPILLED OR SPLASHED ONTO THE BELTS IN ANY QUANTITY WILL CAUSE SLIP-PAGE AND SEVERELY REDUCE BELT LIFE.

**Replacing V-Belts**

To replace the drive v-belts, first loosen motor hold-down bolts. Then slide the motor toward the compressor via the drive screws to provide sufficient slack for belt removal and replacement. Tension belts by using motor drive screws. Check sheave alignment, adjust as necessary and then tighten hold-down bolts securely.

**Belt Tensioning Procedure**

1. Place the belts in the sheave grooves and adjust the two (2) motor adjustment screws (Figure 14) until belts are seated. Pull drive through by hand to equalize tension.
2. Measure the span length K (Figure 15).
3. Apply the force (perpendicular to span at center of the span) required to deflect the belt 1/64" per inch of span length (K). The force can be applied by means of a simple spring scale.
4. Compare the force required with the values given in Table I. The force required should be within the minimum and maximum values shown.
5. Recheck tension of new belts several times in the first ten hours of operation and adjust if necessary.

**Sheave Alignment**

To align the sheaves, place a long steel straight edge across the rims of both sheaves. Always align the motor sheave to the compressor sheave. The straight edge must be flat across the compressor sheave. Horizontal alignment is determined by placing the straight edge close to the sheave's center. Swing the straight edge to the top and bottom of the motor sheave to determine vertical alignment.

**Tension Testing Tool**

A tension testing tool is available. This tool facilitates checking belt tensions. Scales are provided on the tool for reading both the required force and the distance of belt deflections which are used in properly tensioning belts as described above. Order from Joy Manufacturing Company by part number 543217.

**TABLE I  
BELT TENSION FORCES**

H.P.	Deflection Inches	Initial Tensioning Force Lbs.	Normal Force Lbs.	
			Min.	Max.
7.5	3/16	6.5	3	5
10	13/64	6.5	3	5
15	7/32	6.5	3	5
20	17/64	8.5	4.5	6.5
25-30	9/32	8.5	4.5	6.5
40	5/16	8.5	4.5	6.5

### MAINTENANCE SCHEDULE

INTERVAL	ACTION
DAILY OR EVERY 8 OPERATING HOURS  * PRIOR TO START-UP	1. MAINTAIN OIL LEVEL AT CENTER OF SUMP SIGHT GLASS* 2. OBSERVE OIL RETURN LINE TUBING FOR OIL FLOW 3. DRAIN CONDENSATE FROM OIL SUMP
PERIODICALLY DURING OPERATION	1. INSPECT AIR INTAKE FILTER ELEMENT FOR CLOGGING 2. CLEAN OIL RETURN LINE ORIFICE 3. CHECK COOLING WATER HEAT EXCHANGERS 4. DRAIN CONDENSATE FROM OIL SUMP 5. CHECK BELT TENSION AND SHEAVE ALIGNMENT 6. LUBRICATE WATER TEMPERATURE REGULATING VALVE STEM 7. CHECK FOR CLEANLINESS OF HEAT EXCHANGES (AIR-COOLED) 8. CHECK MACHINE FOR OIL LEAKS AND LOOSE FASTENINGS/CONNECTIONS
6 MONTHS OR EVERY 1000 OPERATING HOURS	1. CHANGE COMPRESSOR OIL 2. CHANGE OIL FILTER ELEMENT 3. CHECK AIR/OIL SEPARATOR ELEMENT

FIGURE 16  
Maintenance Schedule

82-41B

#### TABLE 2

#### RECOMMENDED TORQUE SPECIFICATIONS

CAPSCREW		TIGHTENING TORQUE	
SIZE	GRADE	DRY	LUBRICATED
1/4-20 UNC	5	96 IN LBS	75 IN LBS
5/6-18 UNC	5	17 FT LBS	13 FT LBS
3/8-16 UNC	5	30 FT LBS	23 FT LBS
1/2-13 UNC	5	75 FT LBS	55 FT LBS
3/4-10 UNC	5	260 FT LBS	200 FT LBS
*3/4-10 UNC	8	380 FT LBS	280 FT LBS

\* These are sump head capscrews

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# SECTION 4

## TROUBLESHOOTING AND TESTING

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### INTRODUCTION

This section contains instructions for trouble shooting the equipment following a malfunction to permit selection of the maintenance procedure which must be utilized to restore the equipment to operating condition.

The trouble shooting procedures to be performed on the equipment are listed (SEE TROUBLE SHOOTING CHART). Each symptom of trouble for a component or system as listed is followed by a list of probable causes of the trouble and suggested procedures to be followed to eliminate the cause.

In general, the procedures should be performed in the order in which they are listed, although the order may be varied if the need is indicated by conditions under which the trouble occurred. In any event, the procedures which can be performed in the least amount of time and with the least amount of removal or disassembly of parts should be performed first.

### AUTOMATIC SHUTDOWN

If the compressor discharge temperature exceeds 235°F., the unit will automatically shut down. To determine the cause of this excessive high discharge temperature, SEE CHART.

It should be noted that the recommended water flow in "Specifications" is based on 80°F. inlet water. Should the inlet temperature be significantly less than 80°F., the recommended water flow could result in a cold boundary layer of oil insulating the hot oil from the cold water. In this case the water flow should be reduced to prevent over temperature shutdown.

### FREQUENT SEPARATOR PLUG-UP OR COLLAPSE

If the separator element has to be replaced frequently because it is plugging up, it is an indication the compressor oil filter is faulty, oil is breaking down, or dirt is entering the inlet system.

#### Oil Filter

1. Make sure filter has the correct element.
2. Make sure filter is not leaking.

#### Oil Breakdown (Causes)

1. Extreme operating conditions such as high compressor discharge temperature and high receiver pressure.
2. Wrong type of oil.
3. Ingestion of chemically active gases.

#### Inlet System

1. Check all piping joints leading to inlet valve for leaks.
2. Check air filter element for breaks.

If the separator element collapses, it could be an indication the element is plugging and should be treated as outlined above.

Starting-up in cold ambient conditions when the unit has an immediate air demand can collapse the element. Allow unit to warm-up.

#### Control Card

Refer to Section 3 pages 6 and 7.

## TROUBLE SHOOTING

SYMPTOM	PROBABLE CAUSE
FAILURE TO START	<ol style="list-style-type: none"> <li>1. MAIN SWITCH DISCONNECTED</li> <li>2. POWER FAILURE</li> <li>3. SAFETY CIRCUIT SHUTDOWN</li> <li>4. FAULTY START SWITCH OR CONNECTION</li> <li>5. OVERLOADS OUT</li> <li>6. RESET BUTTON OUT</li> <li>7. FAULTY ICR COIL</li> </ol>
HIGH AIR TEMPERATURE SWITCH (W/C UNITS) AUTOMATIC SHUTDOWN	<ol style="list-style-type: none"> <li>1. LOW SUMP OIL LEVEL</li> <li>2. CLOGGING TUBES OR HEATERS</li> <li>3. LEAKY THERMAL BY-PASS VALVE (OPTIONAL)</li> <li>4. PLUGGED OIL FILTER</li> <li>5. INSUFFICIENT SUPPLY OF COOLING WATER</li> <li>6. HIGH AIR TEMPERATURE SWITCH</li> <li>7. PLUGGED OR DIRTY OIL COOLER FINS</li> <li>8. CONTAMINATED OIL COOLER</li> </ol>
HIGH AIR TEMPERATURE SWITCH (A/C UNITS) AUTOMATIC SHUTDOWN	<ol style="list-style-type: none"> <li>1. LOW SUMP OIL LEVEL</li> <li>2. LEAKY THERMAL BY-PASS VALVE (OPTIONAL)</li> <li>3. RESTRICTION OF HEAT EXCHANGER AIR FLOW</li> <li>4. PLUGGED OIL FILTER</li> <li>5. HIGH AIR TEMPERATURE SWITCH</li> <li>6. INSUFFICIENT AIR CIRCULATION AT OIL COOLER</li> <li>7. PLUGGED OR DIRTY OIL COOLER FINS</li> </ol>
IMPROPER LOW DISCHARGE PRESSURE  *IMPROPER HIGH DISCHARGE PRESSURE	<ol style="list-style-type: none"> <li>1. EXCESSIVE AIR DEMAND</li> <li>2. SERVICE VALVE OPEN</li> <li>3. LEAKY SERVICE LINE</li> <li>4. IMPROPER INLET VALVE OPENING*</li> <li>5. PLUGGED AIR CLEANER</li> <li>6. FAULTY SAFETY VALVE*</li> <li>7. PLUGGED UP OIL SEPARATOR</li> <li>8. MISADJUSTED CONTROL CARD</li> </ol>
EXCESSIVE OIL CONSUMPTION	<ol style="list-style-type: none"> <li>1. OVERFILLED OIL SUMP</li> <li>2. BROKEN OIL LINE</li> <li>3. PLUGGED OIL RETURN LINE</li> <li>4. OIL RETURN LINE NOT BOTTOMED IN SEPARATOR</li> <li>5. OPERATING BELOW RATED PRESSURE</li> <li>6. FAULTY COMPRESSOR SHAFT SEAL</li> <li>7. DAMAGED SEPARATOR</li> </ol>
FREQUENT SEPARATOR PLUG-UP	<ol style="list-style-type: none"> <li>1. DIRT IS ENTERING THE INLET SYSTEM</li> <li>2. FAULTY AIR FILTER ELEMENT</li> <li>3. FAULTY OIL FILTER</li> <li>4. OIL IS BREAKING DOWN OR OF WRONG VISCOSITY</li> </ol>

FIGURE 17  
Trouble Shooting Chart

## OPTIONAL EQUIPMENT

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### INTRODUCTION

Several optional accessory items are available for convenience of special applications. These accessories have been selected as being particularly suitable for use on this air compressor and are to be installed in the field. All accessories are boxed kits containing all necessary hardware and installation information.

### BELT TENSION TOOL

Used to determine the proper tension of V-belt drive.

### DOOR INTERLOCK SOLENOID

Complies with California Code. This solenoid prevents the control center door from being opened when the main power is connected to the compressor.

### WASHINGTON D.C., MASSACHUSETTS, AND PENNSYLVANIA CODE CONVERSION KIT (TANK-MOUNTED UNITS ONLY)

Contains a nine-inch pedestal, a receiver drain valve, and a gauge cock for pressure inspection. Necessary to comply with state codes.

### AUTOMATIC CONDENSATE TRAP

Automatically collects and removes moisture and condensate from the receiver.

### WATER-COOLED OIL COOLER

An adequate supply of clean water must be available to the oil cooler and the aftercooler. The use of dirty or scale-forming water should be avoided. Dirty water clogs tubes and reduces cooling efficiency.

The supply line should be provided with a valve for shutting off the water supply on the discharge side of the cooler.

The discharge water should be accessible to allow temperature checks. Excessive temperature will indicate an overheated condition due to insufficient cooling water or as outlined in "Automatic Shutdown" Section 4. Discharge water temperature should be kept between 100 deg. F. and 120 deg. F. in operation.

A suggested water flow is as follows:

TA007 - 4 GPM	TA020 - 5 GPM
TA010 - 4 GPM	TA025 - 8 GPM
TA015 - 5 GPM	TA030 - 10 GPM
	TA040 - 10 GPM

### WATER—COOLED OIL COOLER AND AFTERCOOLER WITH AUTOMATIC COMBINATION CONDENSATE SEPARATOR AND TRAP

The aftercooler is used to reduce the temperature of the compressed air and remove moisture before it reaches the service lines. In reducing the air temperature at the aftercooler, moisture is condensed out of the air and separated by action of the moisture separator. Water and other impurities removed here accumulate at the moisture trap and are automatically eliminated before they enter the receiver. This will not eliminate water condensation within the receiver. Condensate should be piped to an "open" drain. Avoid freezing conditions. Keep the line the same size as the connection provided. The line should be pitched slightly downward away from the installation.

**WATER-COOLED OR  
AIR-COOLED AFTERCOOLER**

The aftercooler is used to reduce the temperature of the compressed air and remove moisture before it reaches the service lines. It is recommended that the "Automatic Condensate Trap" option be used with this kit due to increased condensation in the receiver.

**WATER SOLENOID VALVE**

Automatically shuts off water supply when compressor is shut down. This is designed to be installed downstream from the coolers.

**AUTOMATIC OIL TEMPERATURE  
REGULATOR**

Automatically regulates the amount of oil flowing through the cooler at any given time to maintain a desirable oil temperature. This will decrease the probability of water build up in the sump when operating in highly humid conditions.

**AIR FILTER MAINTENANCE INDICATOR**

A red signal is slowly raised as the pressure drop through the air filter increases. When the indicator reaches a preset maximum, the red signal will lock into full view indicating air filter maintenance is required. The red signal must then be released by depressing the reset button on the indicator.

**TOUCH UP PAINT**

An aerosol can of paint matching the compressor.

**COOLER GUARD**

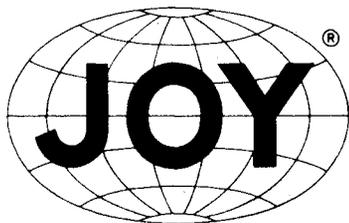
An air cooled cooler guard that mounts onto the front cooler shroud panel is available to protect the aftercooler.

**ENCLSOURE**

The enclosure is applicable to the "G" revision level machines only. It is available factory mounted or can be obtained for field mounting.

**NOTICE**

FOR COMPLETE DETAILS REGARDING OPTIONAL EQUIPMENT, CONTACT YOUR JOY REPRESENTATIVE. ALSO, DETAILS REGARDING INSTALLATION OF THESE OPTIONS WILL BE PROVIDED.



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