OPERATOR'S MANUAL

MC-2528

JOY®

ROTARY SCREW COMPRESSOR

MODELS
TA-300 thru TA-750
RCS-300 thru RCS-750

FORM NO. MC-2528

OPERATOR'S MANUAL

JOY™

Rotary Screw Compressor

TA Models 300 thru 750
RCS Models 300 thru 750

WARNING

This unit was shipped with a detailed Operator's Manual. 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 or property damage.

Replacement manuals can be purchased from:

Joy Manufacturing Company
900 South Woodland Avenue
Michigan City, Indiana 46360

Form No. MC-2528
Printed in U.S.A. – TSP 9/79
Price $5.00

JOY MANUFACTURING COMPANY
INDUSTRIAL COMPRESSOR GROUP
MICHIGAN CITY, INDIANA 46360

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COMPRESSOR SPECIFICATIONS

COMPRESSOR MODEL ▲	TA-300	TA-340	TA-370	TA-400	TA-450	TA-480	TA-510	TA-590	TA-630	TA-600	TA-690	TA-750
COMPRESSOR: Delivery (CFM)	300	340	370	400	450	480	510	590	630	600	690	750
Maximum Operating Pressure (PSIG)	150	125	110	150	125	110	150	125	110	150	125	110
Minimum Operating Pressure (PSIG)	70	70	70	70	70	70	70	70	70	70	70	70
Normal Control Range (PSI)	10	10	10	10	10	10	10	10	10	10	10	10
Ambient Operating Temperature Range	35°F. to 100°F. *											
Oil Sump Capacity	35 Gallons			35 Gallons			35 Gallons			35 Gallons		
Weight (Dry Approx.)	5100 lbs.			5400 lbs.			6000 lbs.			6400 lbs.		
Length	96"			96"			96"			96"		
Width	62"			62"			62"			62"		
Height	68"			68"			68"			68"		
MOTOR, Compressor Drive: Horsepower	75			100			125			150		
Current	3 Phase, 60 Hertz											
Voltage	200, 230, 460, 575											
Type	Squirrel Cage Induction											
Standard Enclosure	Open Drip Proof											
MOTOR: Fan: Horsepower (Air Cooled Units) (With Aftercooler)	1 3			3 5			3 (Remote) 7.5 (Remote)			5 (Remote) 10 (Remote)		
Type	Squirrel Cage Induction											
Standard Enclosure	TEFC			TEFC			TEFC			TEFC		
MOTOR, Fan:† Enclosure Horsepower	1/2			1/2			1/2			1/2		
Type	Squirrel Cage Induction											
Standard Enclosure	TEFC			TEFC			TEFC			TEFC		
WATER COOLED UNITS Water Flow Rate	15 GPM			21 GPM			27 GPM			32 GPM		
Maximum Water Inlet** Temperature	80°F.			80°F.			80°F.			80°F.		
AIR COOLED UNITS Remote Oil Cooler Piping	N/A			N/A			1-1/2"			1-1/2"		

*Cold Weather Option Available
**Coolers Available for 95°F. Inlet Water
▲RCS Models Indicate Skid Base
†Applies to all Water Cooled Units and 125-150 HP Air Cooled Units

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SECTION ONE
DESCRIPTION & INSTALLATION

JOY™

Rotary Screw Compressor

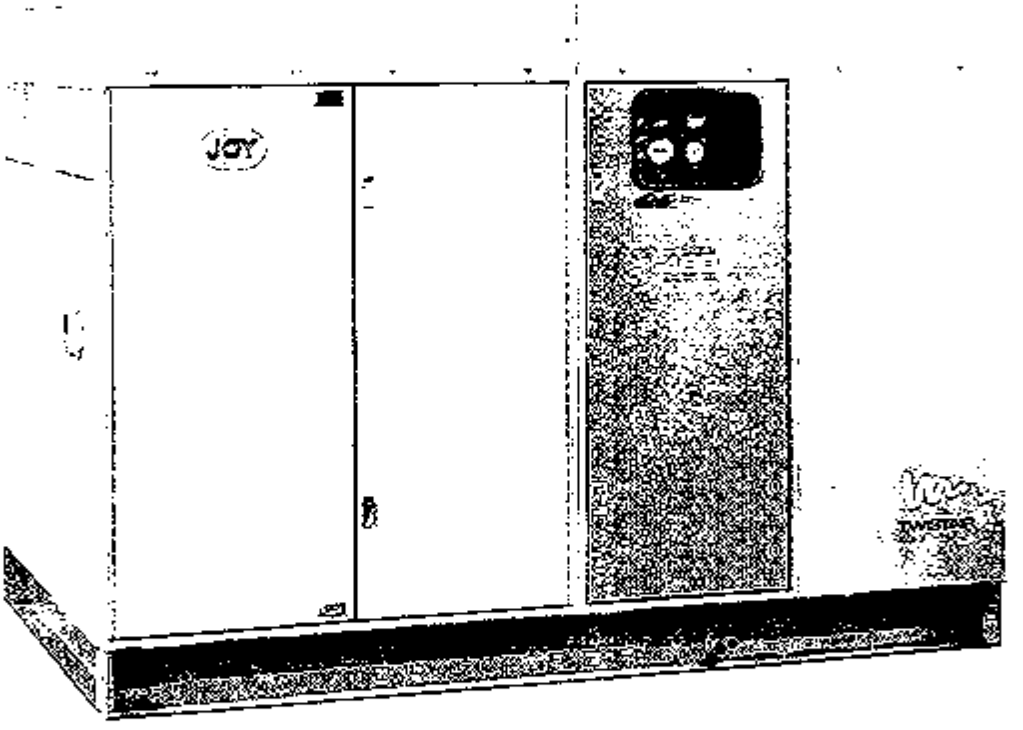

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FIGURE 1
TA Models 300 Thru 750

The JOY™ rotary screw compressor is an electric motor driven, single stage, screw type, heavy duty air compressor. It is sold as a complete package* unit mounted on a heavy steel base. See Figure 1. The package includes the compressor, motor, air intake system, electrical starting unit, control system, air/oil separator and instrument panel. Installation requires only the connection of electric power, a service line, and when applicable, a water line and drain.

* The air cooled models TA510 thru TA750 have a remote cooler installation see Figure 15.

There are several models of rotary screw compressors covered in this manual. The model number of each reveals the compressors air delivery capability in cubic feet per minute with respect to the designed operating pressure. See "Specifications". All models are available either air or water cooled. They are intended for indoor installation, however, a cold weather option is available. Although the unit is generally totally enclosed and sound attenuated, it can be ordered without enclosure or on a skid base when semiportability is desired.

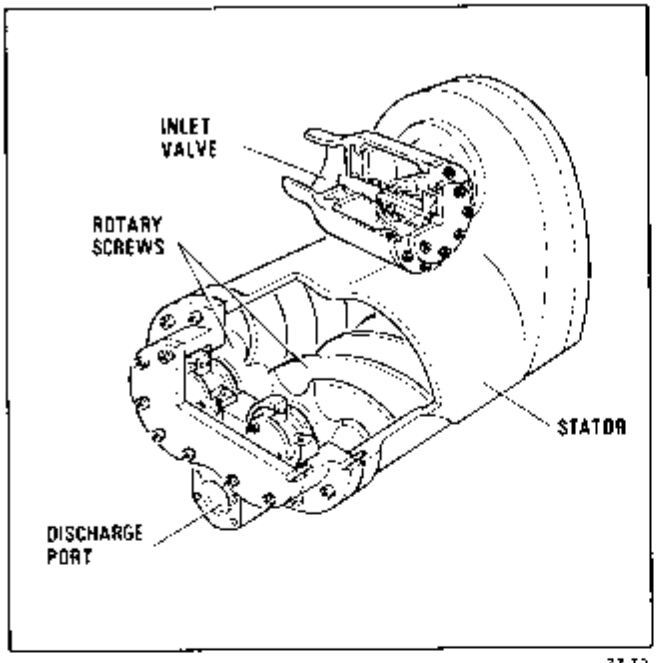

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FIGURE 2
Cut-Away View of Compressor Unit

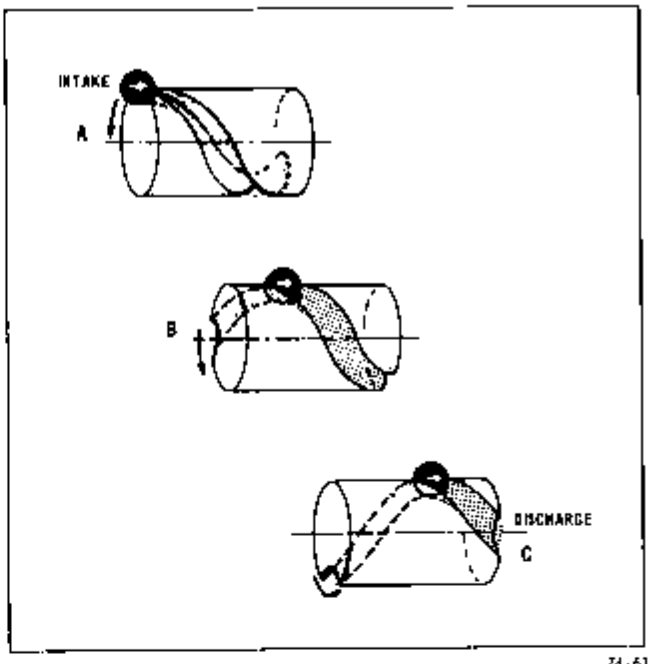

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FIGURE 3
Principles of Compression

DESCRIPTION

The complete operating unit consists of the following major components.

1. compressor and motor
2. oil sump/separator
3. oil cooling system
4. air cooling group
5. electrical control
6. instrument panel

COMPRESSOR AND MOTOR

The compressor assembly is a positive displacement, 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 gear driven through speed-up gears 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, compressing it in one stage of compression, until it uncovers a discharge port in the end plate and delivers smooth-flowing, pulse-free air at full pressure to the receiver.

Action of male lobe is similar to a ball. In Figure 3 one compression cycle has been isolated for simplification. As helix rotates, ball (male lobe) meshes with groove to start compression cycle with trapped atmospheric air (A). As ball moves down groove, air is compressed (B). Air is further compressed (C) until groove uncovers discharge port in end plate, and compressed air is discharged as ball continues to end of groove. Atmospheric air fills in behind ball preparing groove for another compression cycle as rotation continues and male lobe again meshes with the groove.

During the compression cycle, oil is injected into the compressor for the purpose of lubrication, 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, the inlet valve and an oil pump. The air filter is a two-stage, dry type with a corrugated paper replaceable element.

The inlet valve (Figure 2) is pneumatically operated. It functions in response to the control system which regulates the amount of valve opening and closing in proportion to the air demand.

The oil pump, located at the coupling end of the compressor unit (Figure 4), serves to assure adequate lubrication to the bearings in the gear case section of the compressor stator.

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 cooling agent for the compressed air to maintain the discharge air temperature within 100 Deg. F. of ambient temperature.

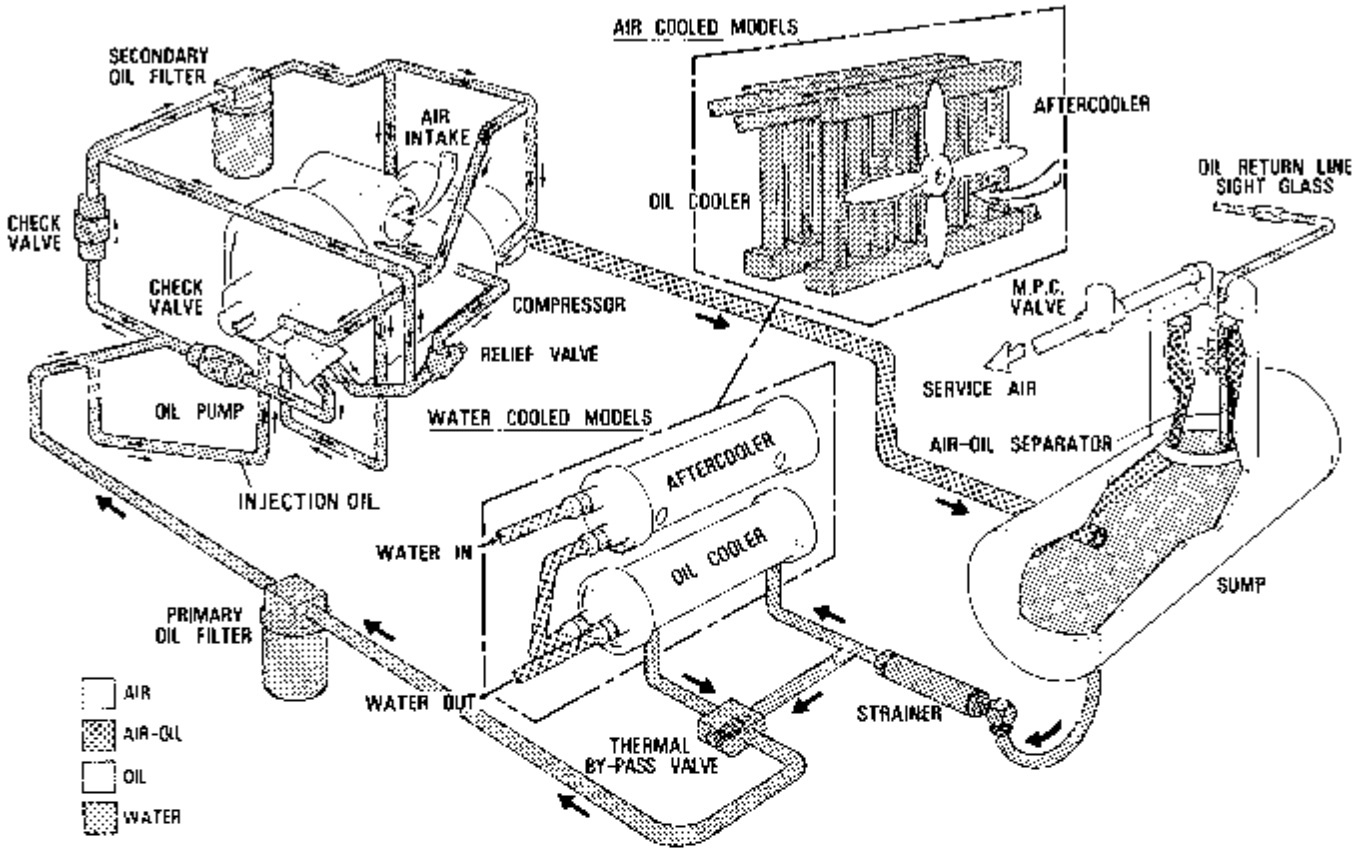

FIGURE 4 and 5
Air and Oil Flow Diagram

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3. Assures high efficiency and maximum air delivery by helping to seal the running clearances.

As oil passes through the compressor, it mixes with the air being compressed and is discharged with the compressed air into the oil sump, where nearly all the oil in the air drops out due to impingment and velocity change. The air then passes through the separator where most of the remaining oil is removed. The oil thus separated is returned to the system.

The flow schematics, Figures 4, and 5, illustrate air/oil separation and the circulation of oil in an air or water cooled system.

MINIMUM PRESSURE VALVE

The minimum pressure valve (See Figures 4 and 6) serves two important functions in the compressor system. First of all, it establishes a minimum air pressure in the oil sump of 70 PSIG to insure proper oil flow to the compressor. Secondly, by maintaining service air pressure above 70 PSIG, maximum efficiency of the air/oil separator is obtained. It also acts as a check valve; in the event the compressor is manifolded with other compressors, it will not be pressurized as a result of shutdown.

AIR/OIL SEPARATOR AND OIL SUMP

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 runs downward and accumulates at the bottom of the sump for recirculation.

An oil separator is located in a vertical leg 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. Here, an oil return line is provided to continuously remove the oil accumulation. Refer to Figures 4 and 20.

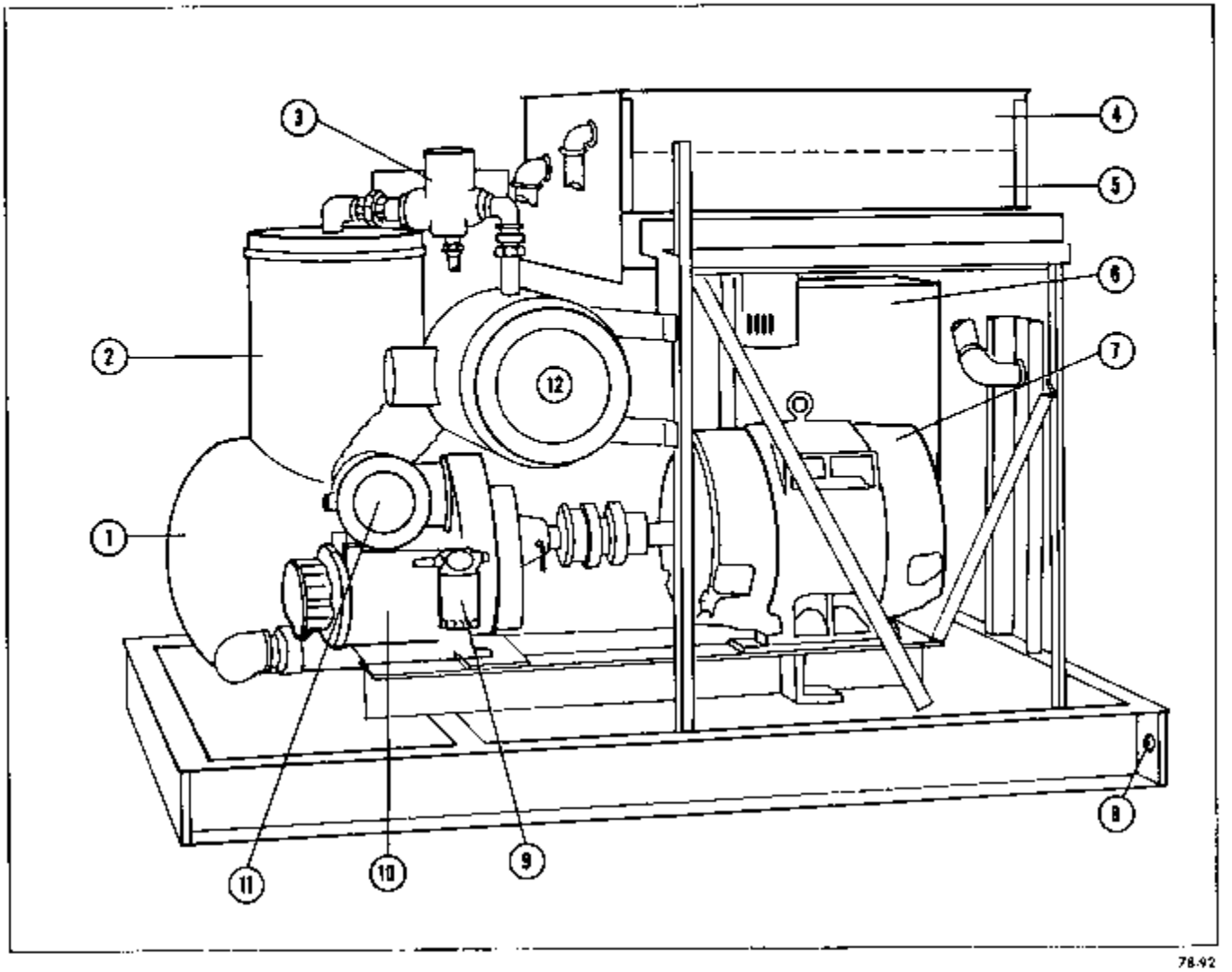

FIGURE 6
Major Compressor Components (Air Cooled Model Without Enclosure Shown)

1. Compressor Oil Sump
2. Air/Oil Separator
3. Minimum Pressure Valve
4. Oil Cooler
5. Aftercooler
6. Controller
7. Compressor Motor
8. Lifting
9. Secondary Oil Filter
10. Compressor Unit
11. Inlet Valve Assy.

Oil Return Line

The oil removed through the oil return line leads to the inlet of the compressor. A sight glass is provided in this line to check to see that oil is being removed. Under normal conditions oil will flow only on the inside surface of the sight glass. If the glass shows full of oil it is a sign that oil is not being drained. See Figures 18 and 20.

OIL FILTERS

The unit has two oil filters, one for the primary oil circuit through which all of the oil must pass and a second additional filter (Figure 6) for the bearings and gears only. The primary oil filter is of the full flow replaceable element type and the bearing/gear oil filter is of the spin-on replaceable element type. The filters selected have a filtering capacity that will require changing the element only when the respective oil filter maintenance indicator light signals a clogging element.

OIL COOLING SYSTEM

The prime components of the oil cooling system include a strainer, thermal valve and oil cooler. The thermal valve (Figure 18) is the center of the compressor temperature regulating system in that the discharge air temperature is in direct relation to the injection oil temperature. The discharge air temperature is also dependent on the ambient air temperature, the quantity of oil for injection; and if water cooled, the temperature and quantity of cooling water supplied. The thermal valve is located in the oil cooler piping and is designed to be fully open until the oil temperature reaches 140 Deg. F. thus allowing the oil to bypass the cooler to insure compressor

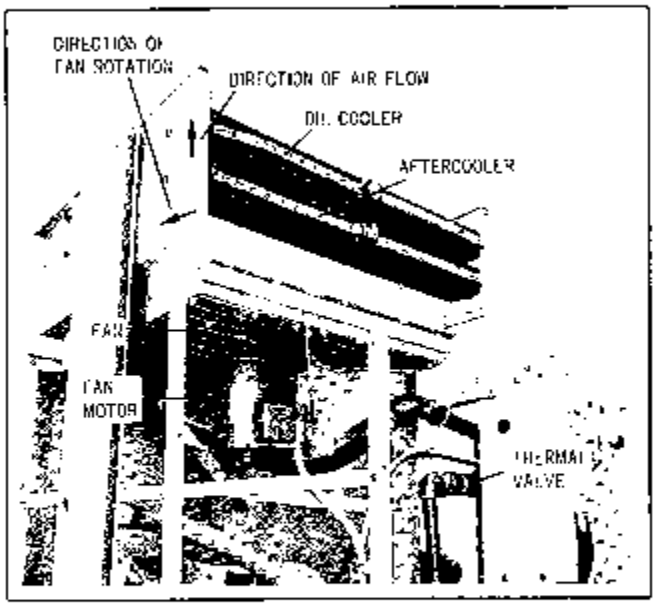

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FIGURE 7
Air Cooled Oil Cooler and Aftercooler

lubrication at startup. Above 140 Deg. F, the thermal valve gradually strokes to allow cooled oil from the cooler to mix with the hotter oil from the sump to maintain the injection temperature so that the discharge air temperature will be approximately 100 Deg. F over ambient.

The oil cooler may be either air or water cooled. If air cooled, a finned heat exchanger is used and a fan provides cooling air circulation through the exchanger. When water cooled, a shell and tube bundle cooler is used and a cooling water supply is required. See Figures 6 and 7.

AIR COOLING GROUP (Optional Equipment)*

The air cooling group is made up of an aftercooler, a moisture separator and automatic condensate trap. The aftercooler is used to reduce the temperature of the compressed air and remove moisture before it reaches the service lines. Depending on the configuration the cooling medium used for aftercooling may be air or water. If air cooled, a finned, radiator type aftercooler is used. Water cooled units are provided with a shell and tube bundle aftercooler. See Figure 4.

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. See Figure 25.

INSTRUMENT PANEL

The instrument panel (Figure 8) contains all the necessary gauges and instruments for operation. Following is an explanation of their use.

*See optional equipment — Section 5.

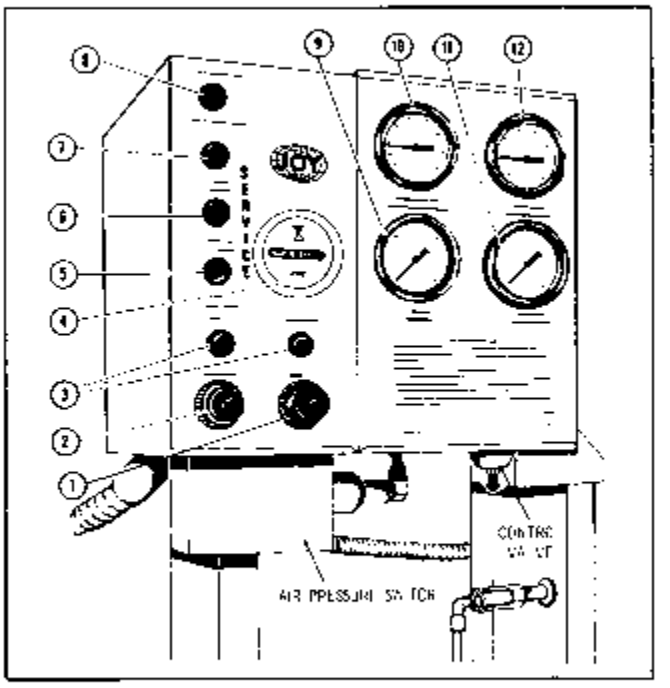

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FIGURE 8
Instrument Panel

1. Stop Button
2. Start Button
3. Power Lights
4. Hourmeter
5. Air/Oil Separator
6. Bearing Oil Filter
7. Rotor Oil Filter
8. Discharge Air Over Temp.
9. Service Air Filter
10. Rotor Coolant Injection Temp.
11. Discharge Air Pressure
12. Discharge Air Temperature

STOP BUTTON

The Stop button (1) will stop the compressor at any time. When the stop button is pushed the "Run" light will go out and the "Power On" light will become lighted.

The reset feature of this button is connected to the compressor's safety circuit. Whenever the compressor shuts down due to a malfunction detected by the safety circuit, it will be necessary that the trouble be corrected and that the stop-reset button pushed before another start is tried.

START BUTTON

The "Start" button (2) will start the compressor providing the main disconnect is connected and the safety circuit is cleared (Re-Set).

POWER LIGHTS

When main power is made available to the compressor, the "Power On" light (3) will light up. This notifies the operator that there is power to the compressor and that it can be started at any time. When the compressor is started the "Power On" light will go off and the (green) "Run" light will go on.

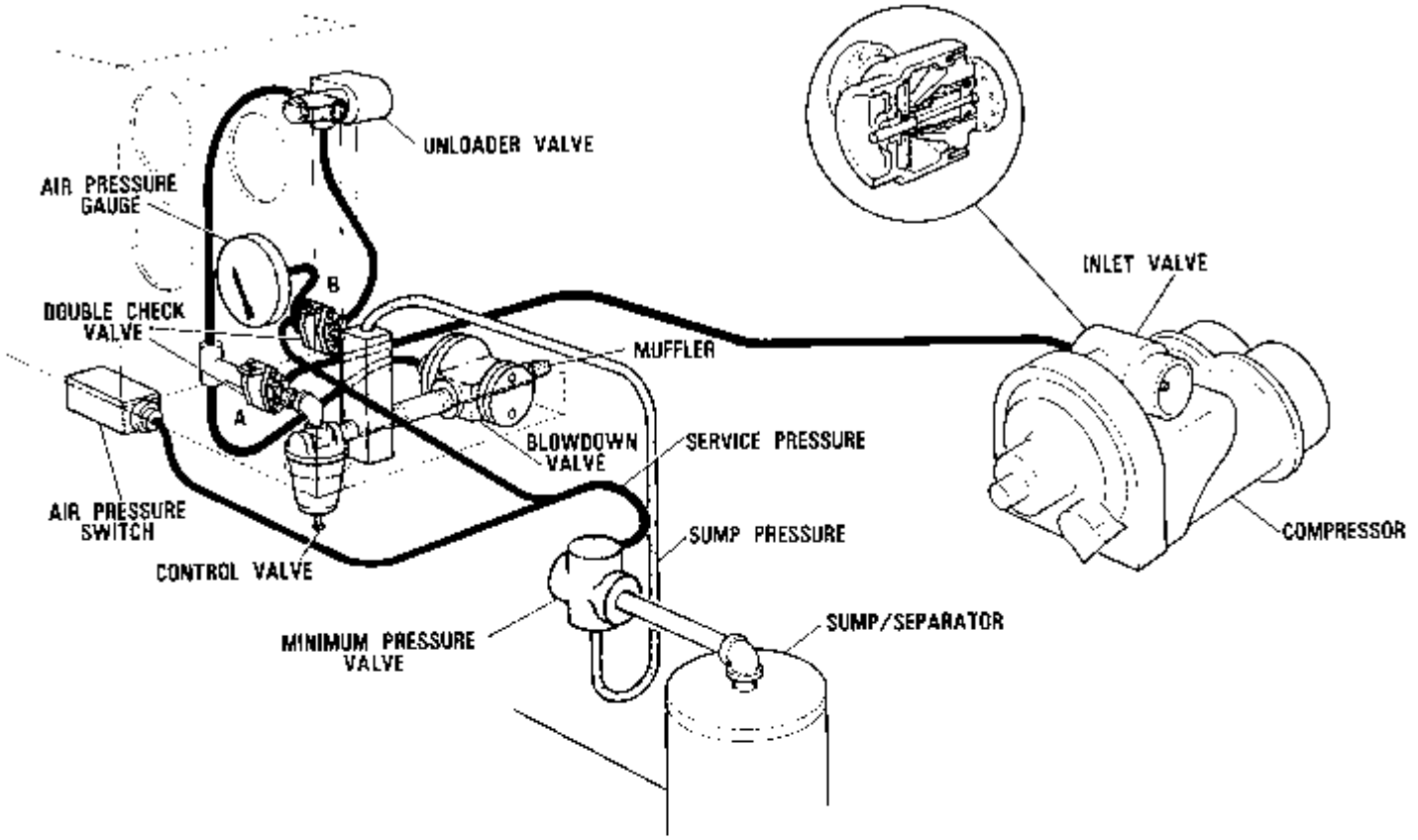

FIGURE 9
Control Circuit Diagram

There are times when the demand for air is zero, that the compressor will run for a period of time and then shut itself off. The Run light will continue to stay on, however, which means that the compressor could start at any time there is a demand for compressed air.

HOURMETER

The hourmeter (4) records the accumulated total hours of compressor operation. It serves to determine when periodic inspections and maintenance should be performed.

MAINTENANCE INDICATOR LIGHTS

There are three yellow maintenance indicator lights on the instrument panel. The air/oil separator light (5), bearing oil filter light (6) and rotor oil filter (7). Their purpose is to warn that the maximum recommended pressure differential of the respective element has been reached. These lights are actuated by pre-set pressure differential switches located on the top of the instrument panel. The switch settings are selected based on test results and manufacturer's recommendations. These switches will not shut down the unit, only indicate that the respective elements will no longer be as effective. The air/oil separator maintenance setting is selected to preclude excessive oil consumption. The two oil filters maintenance settings are selected to preclude excessive pressure drop and ineffective filtration. Transient conditions, such as cold start or as the pressure differential approaches the set point, may cause the yellow lights to come on intermittently. This should not be considered as malfunction but an accurate signal of machine conditions.

DISCHARGE AIR OVER TEMPERATURE

When this red light (8) comes ON it signals that the compressor is overheating (235 Deg. F.) and automatic shut-down will occur. Its function and compressor shut-down is effected by the High Discharge Temp. Switch and senders. Refer to Figures 11 and 6.

SERVICE AIR FILTER

The service air filter gauge (9) measures the pressure differential across the inlet air filter for the purpose of determining when the filter element is clogging. When the gauge pointer reads 25 inches, H_2O it is time to replace the compressor air intake filter element (Figure 6). Refer to Figure 19.

ROTOR COOLANT INJECTION TEMPERATURE

This gauge (10) shows temperature of the oil just prior to injection into the compression chamber. Normal temperature in operation is approximately 40-60 Deg. F. below the discharge air temperature.

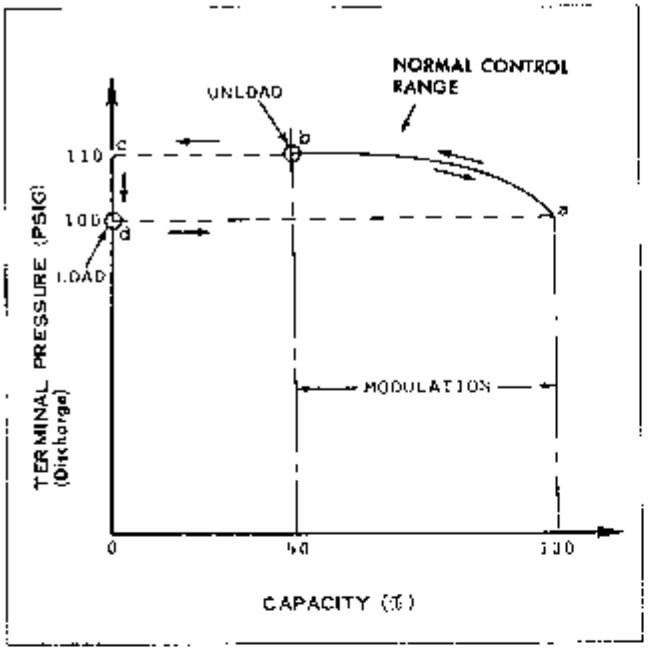

FIGURE 10 69-60A
Modulation Control Diagram

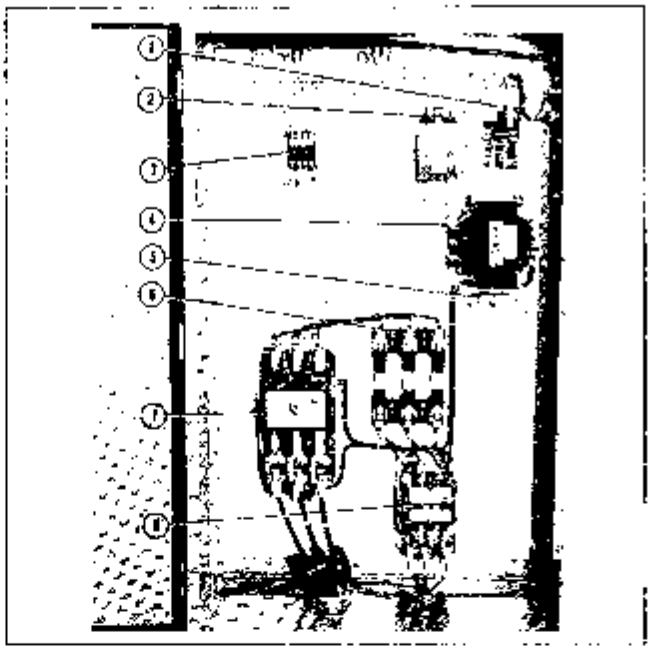

FIGURE 11 79-57
Controller

1. High Air Temperature Switch
2. Timed Shutdown Relay*
3. Control Relay
4. Control Transformer
5. Control Transformer Fuse
6. Fuses (Fan Motor)
7. Main Motor Starter
8. Fan Motor Starter

* Option

DISCHARGE AIR PRESSURE

The discharge pressure gauge (11) is a measure of the pressure available at the service lines. The indicated pressure is taken downstream of the minimum pressure check valve.

DISCHARGE AIR TEMPERATURE

This gauge (12) indicates the temperature of the compressed air immediately after final compression. Normal temperature in operation is approximately 100 Deg. F. above ambient.

CONTROLLER

The controller (Figure 11) houses the electrical components which support starting and automatic operation. Items included in the controller will depend upon the compressor model and options. The placement of components will also vary somewhat. Figure 11 for example, illustrates the controller as used for a standard unit. Some of these items may not be included for all models. Also, the main motor starter will, for some models, be remote mounted. (Refer to Wiring Diagrams 17 thru 17G).

WARNING

Do not leave controller door open while the unit is powered. The door should be opened by a qualified electrician only. Failure to comply with this warning may result in serious bodily injury.

CONTROL SYSTEM

The compressor control system (Figure 9) is designed to match output capacity to the air demand by operating the inlet valve. As the air demand varies within the control range* the inlet valve will modulate the intake air flow to the necessary capacity.

*See Figure 10.

The primary components in the control system that govern the operation of the inlet valve are the control valve, an air pressure switch and an unloader valve. In operation, let us assume that the compressor is to operate at 110 psig maximum pressure. On start-up the inlet valve will be fully open. As compression commences pressure rises. At 100 psi the control valve will begin to send a secondary pressure to the inlet valve which will start to close the inlet valve. Thus, as discharge pressure increases, capacity diminishes. See a to b Figure 10. If discharge pressure should drop, control valve pressure will decrease allowing the inlet valve to move open and capacity to increase. Between 100 psi and 110 psi, output capacity will modulate between 40 percent and 100 percent.

At 110 psig the unloader valve is de-energized by the air pressure switch sending discharge pressure to close the inlet valve — reducing capacity to 0% (See c to d) Sump pressure will drop to 0 psig. At 100 psig the air pressure switch energizes the unloader valve, allowing the inlet valve to open and capacity to go to 100% (See d to a).

At shut-down the inlet valve is closed and the blow-down valve opened by the unloader valve. This relieves system pressure. A double check valve (B, Figure 12) drains the compressor system if plant system pressure is insufficient to open the blow-down valve.

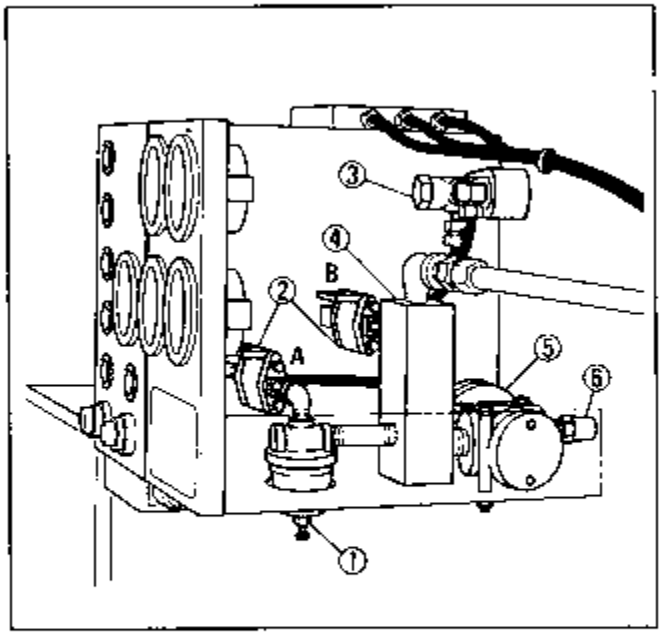

FIGURE 12 78-53

Control Components

1. Control Valve
2. Double Check Valves
3. Unloader Valve
4. Manifold Block
5. Blow-Down Valve
6. Blow-Down Exhaust

CONTROL SYSTEM COMPONENTS

Following is an explanation of the function served by components in the control system (Refer to Figure 8, 11 and 12.

Control Valve

The control valve provides the control air signal required to operate the inlet valve when discharge pressure is in the "normal control range." (See Figure 10 and Section 3 — "Control Valve" for additional details.

Double Check Valve (A)

The purpose of this device differentiates between control pressures for load and unload sequences. During the load cycle it supplies the blowdown valve and inlet valve with modulation pressure. When the air pressure switch opens the unloader valve, the pressure shifts the shuttle valve adding pressure to the blowdown and inlet valves, unloading the machine.

Double Check Valve (B)

This device differentiates between sump and service pressures for control air pressure. In using the higher of the two pressures for control the unit will vent the air, trapped in the sump, to atmosphere through the blowdown valve on all shutdowns.

Air Pressure Switch

The air pressure switch functions in response to discharge pressure to close or open the electrical circuit to the unloader valve. This action causes the unloader valve to pneumatically close the inlet valve and "unload" the compressor; or, to vent the unloading air line to atmosphere and allow the compressor to "load".

When control pressure rises to the top setting of the pressure switch the electrical circuit to the unloader valve is opened and the compressor "unloads". When control pressure drops to the lower setting the circuit is closed and the compressor "loads".

Unloader Valve

The unloader valve is a 3-way, normally open, solenoid valve that functions in response to the air pressure switch to pneumatically operate the inlet valve and the blow-down valve.

High Discharge Temperature Switch

The high discharge temperature switch (Figure 11) functions in the compressor safety circuit to effect shut down should operating temperature become excessive (235 Deg. F.). A red warning light on the panel will light simultaneously with shutdown.

Blow-Down Valve

The blow-down valve serves to relieve the compressor system of pressure upon shut-down and while operating "unloaded". It functions in response to the air pressure switch by action of the unloader valve.

Control Relay

The function of the control relay is the primary control of the compressor and all its circuitry. Energizing the control relay through the start-stop push button latches the compressor "on" through a control relay contact in parallel with the start push button. Any one of three failure modes may shut down the compressor. They are high air temperatures, main motor and fan motor overcurrent, and loss of compressor control or main power. All of these, as well as the stop push button, de-energize the control relay, stopping the compressor. To re start, the start push button must be manually actuated. After high air temperature shutdown, the stop-reset push button and then the start push button must be manually actuated.

Timed Shutdown Relay (Option)

A time delay relay (Figure 11) may be provided to automatically shut down the compressor after a pre-determined delay interval, commencing when the compressor unloads at the maximum operating pressure limit. The delay interval is factory set for 10 minutes, which is the minimum setting recommended. Automatic re-start will occur at the low limit of the control range.

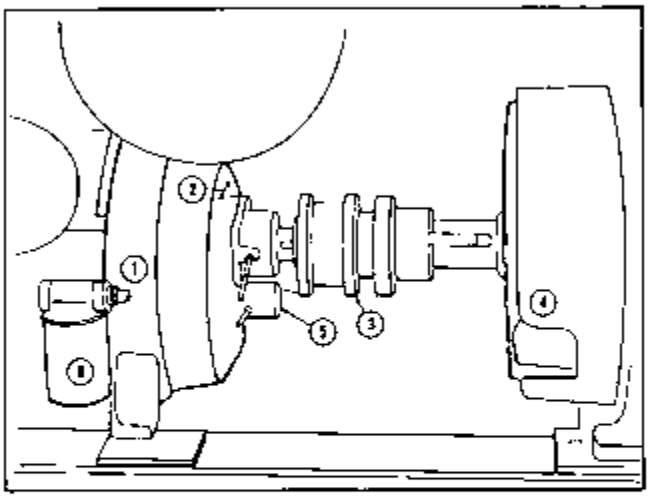

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FIGURE 13

Coupling Between Compressor and Power Unit

1. Compressor Unit
2. Rotation Arrow
3. Coupling
4. Power Unit
5. Oil Pump
6. Secondary Oil Filter

COUPLING (Compressor To Motor)

The coupling assembly (Figure 13) used to drive the compressor unit is of the flexible type. It is provided to compensate for minor misalignment and to accept torsional stress as necessary in operation. Couplings may be of two styles; both are detailed in Section 3.

INSTALLATION

(Refer to Figures 16 thru 16C)

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

Refer to "Specifications" for compressor weight and dimensions.

LOCATION

In order to avoid excessive pressure loss through use of extended pipe or hose lines, the compressor should be located as close as possible to the point where the compressed air is to be used. In selecting the location it is important that the compressor has an adequate supply of cool, clean well circulated air.

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.

ELECTRICAL CONNECTIONS

Have electrical connections to the power source made by a competent electrician in accordance with local codes. It is extremely important that the wiring is accomplished to assure proper rotation of the compressor as indicated by the direction of rotation arrow on the coupling end of the compressor. See Figure 13.

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 base to a metal, cold water pipe or other good ground.

Complete connection details for the electrical wiring are provided in Figures 17 thru 17G.

AIR SUPPLY

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.

Enclosed units are provided with a ventilating fan to circulate cooling air throughout the inside of the enclosure. See Figure 14. It is important that the inlet and outlet openings are free from obstructions. Refer to "Preparation for Initial Start-Up" — Section 2 (Item 10).

When an outside air intake source is used, a vibration isolator must be provided and a flanged adaptor must be fabricated to connect the compressor inlet to the inlet piping. 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 closely as possible to the point of compressed air usage. However, whatever piping is used in the distribution system should be constructed to offer a minimum amount of resistance to air flow between the compressor and point of use. Long radius elbows and pipe of sufficient size should be used. In no case should the piping be of smaller size than the discharge opening.

In cases where the compressor is in the same line as a reciprocating compressor, a surge volume cham-

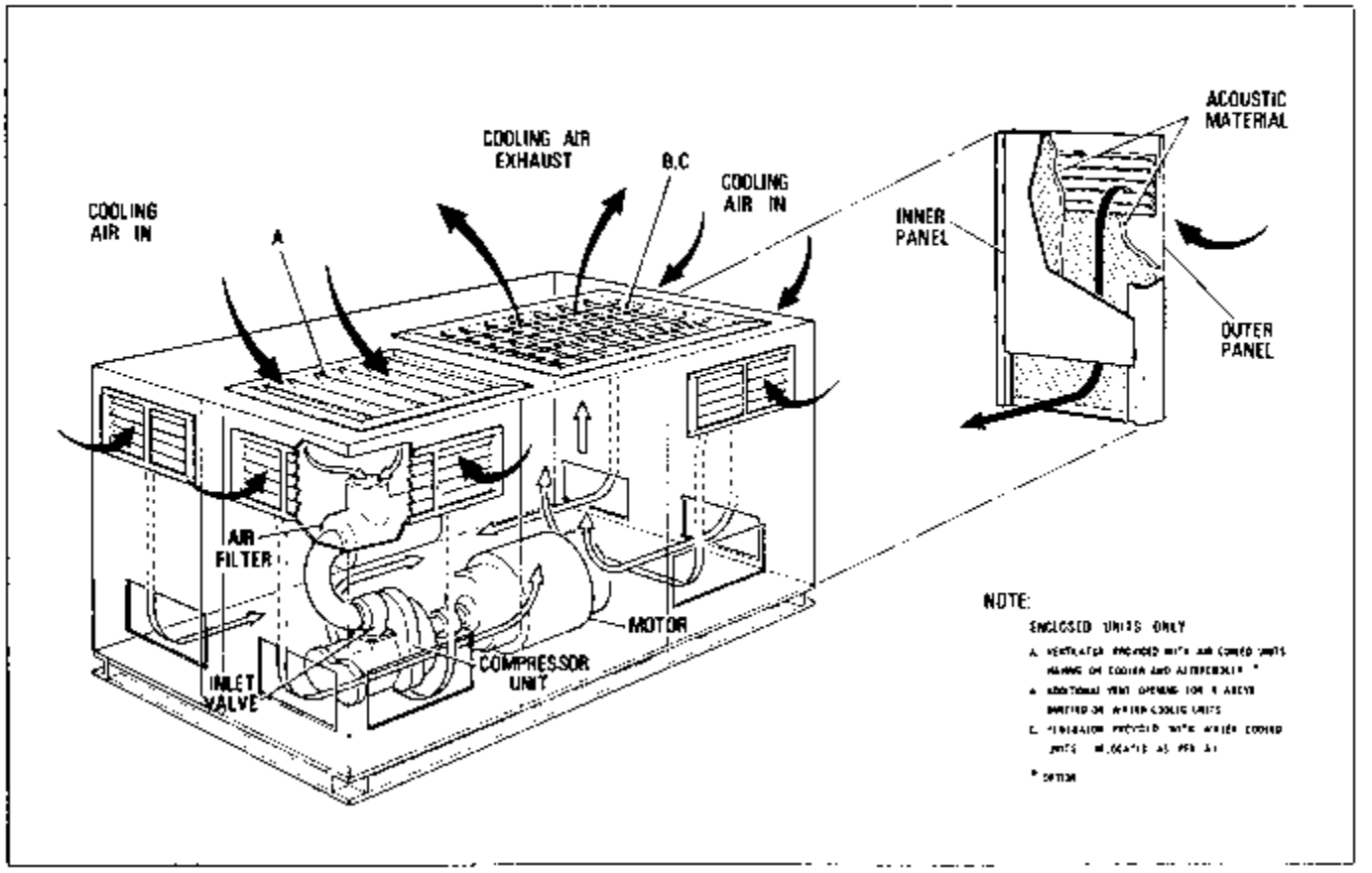

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FIGURE 14

Air Circulation Through Enclosed Unit

ber must be installed in the line between the two compressors to dampen pulsations.

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. Provide a safety relief valve between the compressor and gate valve.

MOISTURE SEPARATOR AND TRAP* (Aftercooler Condensate Drain)

The automatic drain connection is from the moisture trap. See Section 5. Condensate should be piped to an "open" drain. Avoid freezing conditions. Keep line the same size as connection provided. Line should be pitched slightly downward away from installation.

COOLING WATER (Water Cooled Units Only)

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.

Connect the supply and discharge water piping to the points indicated in Figure 15. The supply line should be provided with a valve for shutting off the water supply.

For units without a temperature regulating valve the discharge water should flow into an open funnel to allow temperature checks. Excessive temperature will indicate an overheated condition due to insufficient cooling water or as outlined in "Automatic Shut-down" — Section 4. Discharge water temperature should be kept between 100 Deg. F. and 120 Deg. F. in operation. See "Specifications for cooling water requirements.

TEMPERATURE REGULATING VALVE*

A temperature regulating valve may be included in the cooling system to automatically regulate the cooling water flow as necessary to maintain the desired compressor operating temperature. This valve is located in the outlet water supply piping. It thermostatically modulates the water flow in response to a sensing element located in the oil outlet from the oil cooler. The valve has been factory adjusted to maintain the compressor operating temperature at approximately 90 Deg. above ambient.

An additional feature of the temperature regulating valve is that by constant modulation, maximum efficiency of the water supply is assured; thus, the amount of water used is maintained at a minimum.

*See optional equipment — Section 5.

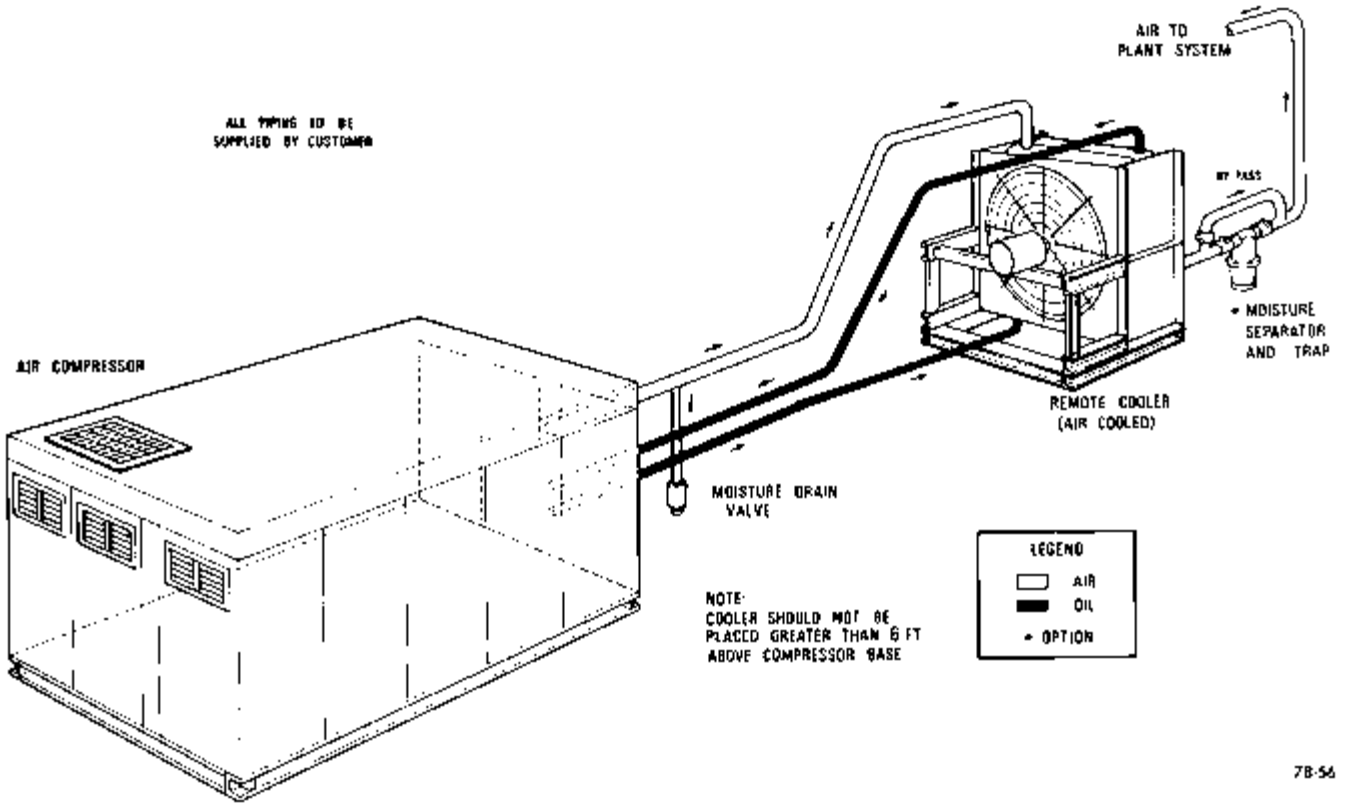

FIGURE 15

Typical Remote Cooler Installation (Air Cooled Models)

REMOTE COOLING UNITS

Air cooled compressors are provided with a remote compressor oil cooling unit. This cooler may also contain an optional air cooled aftercooler. The cooler should be positioned in relationship to the compressor according to the following limitations:

1. Total one way piping distance should not exceed 30 ft. between compressor and cooler.
2. Cooler should not be placed greater than 6 ft. above compressor base.
3. Adequate ventilation must be available for the removal of heat. Ambient temperatures in excess of those specified for a particular compressor must not be exceeded at the cooler fan inlet. Re-circulation of exhausted air must be avoided.
4. The cooler is furnished for mounting with fan air flow in the horizontal direction. It may be mounted such that the air flow is vertical, however, the customer is responsible for suitable framing since the cooler mount is not designed for this arrangement.
5. If remote coolers are placed outdoors in sub-zero ambients, it will be necessary to provide some heat for the oil lines to insure proper oil flow. Aftercoolers exposed to sub-freezing temperatures are subject to damage from freezing condensate.

In addition, the following must be observed for safe and successful operation:

a. Oil piping between the compressor and cooler must have a minimum rating of 165 psig at 235°F. max. continuous service during normal operation of the compressor. Extended lengths of solid piping may require expansion devices to allow for temperature fluctuations.

Materials such as standard weight pipe or suitable hydraulic tubing may be used. Hydraulic hose which meets the minimum service requirements is acceptable providing it is compatible with the lubricant which will be used.

NOTE

The application of materials by the end user is their acceptance of responsibility for those materials selected. Consult the factory if necessary for direction in this area.

b. Oil piping between the compressor and the oil cooler must not be smaller than the size listed in the "Compressor Specifications".

c. Coolers must not support attendant piping. Damage to cooler cores may result.

d. Moisture which may condense in overhead air piping systems between the compressor and the aftercooler section of the cooler module must not be allowed to drain back to the compressor. A drop leg and automatic moisture drain should be provided.

e. Any ducting of the cooling air must be designed such that not more than .25" W.C. restriction is developed. As a rule, no more than 20 ft. of straight ducting with a cross sectional area at least equal to the area of the cooler face will be acceptable. Turns and fittings in any ducting will drastically reduce the allowable total length.

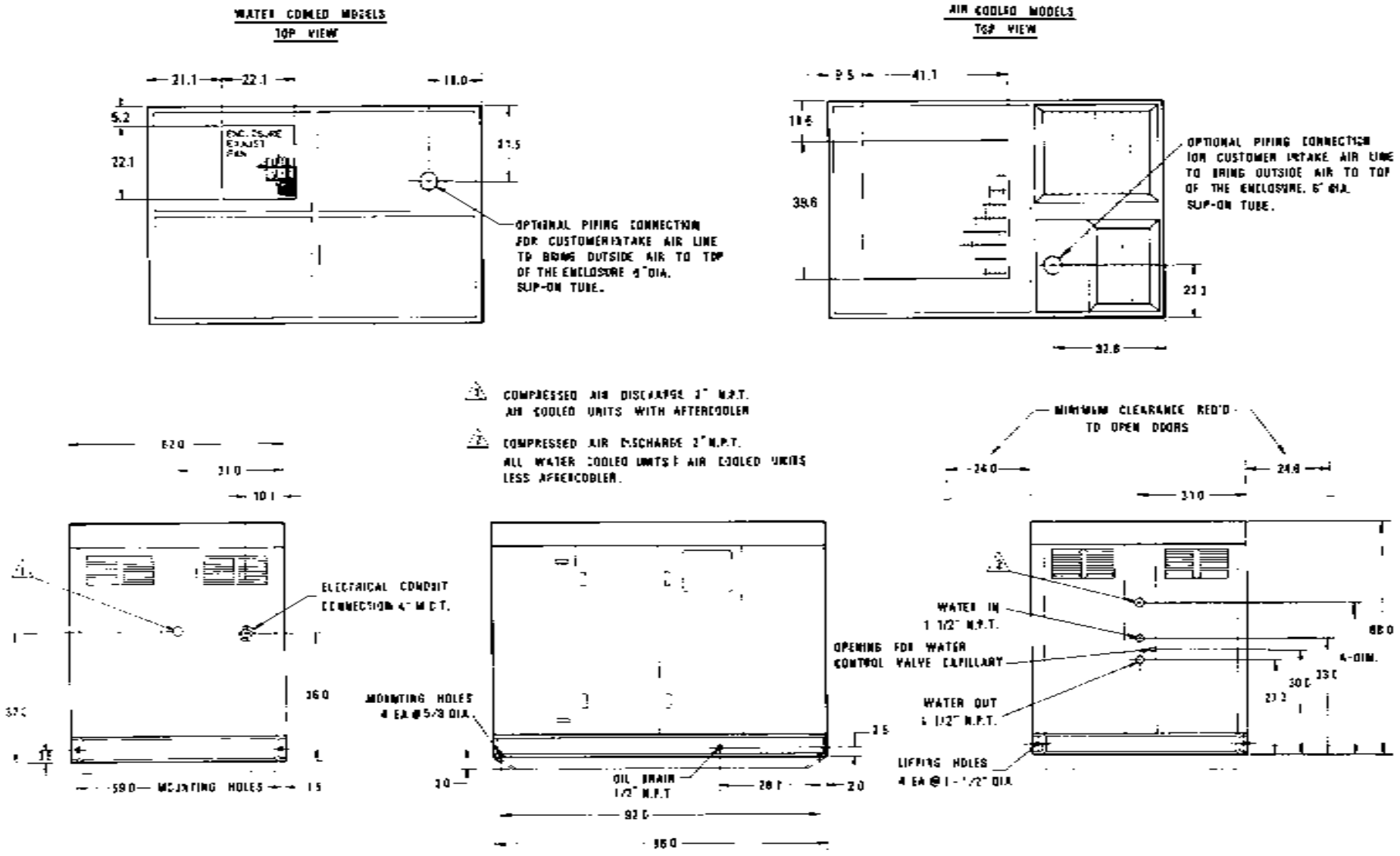

FIGURE 16

Installation Drawing TA and RCS-300 thru 480 "E" Models

Dwg. S-2650-1

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REMOTE COOLER ASSEMBLY DIMENSIONS

MODEL	A	B	C	D	E	F	G	H	J	K	L	M	N	P
TA0510[illegible] W/AFTERCOOLER	60.3	1.2	9.4	4.2	7.1	7.1	43.2	41.1	6.5	3.1	6.4	5.3	4.2	2.0
TA0510[illegible] LESS AFTERCOOLER	56.8	0.6	—	5.3	—	5.3	40.6	37.5	—	1.9	—	3.9	—	0.3
TA0[illegible] W/AFTERCOOLER	60.3	1.2	9.4	4.2	7.1	7.1	43.2	41.1	6.5	3.1	6.4	5.3	4.2	2.0
TA0[illegible] LESS AFTERCOOLER	56.8	0.6	—	4.2	—	4.2	43.2	41.1	—	1.9	—	4.2	—	2.0

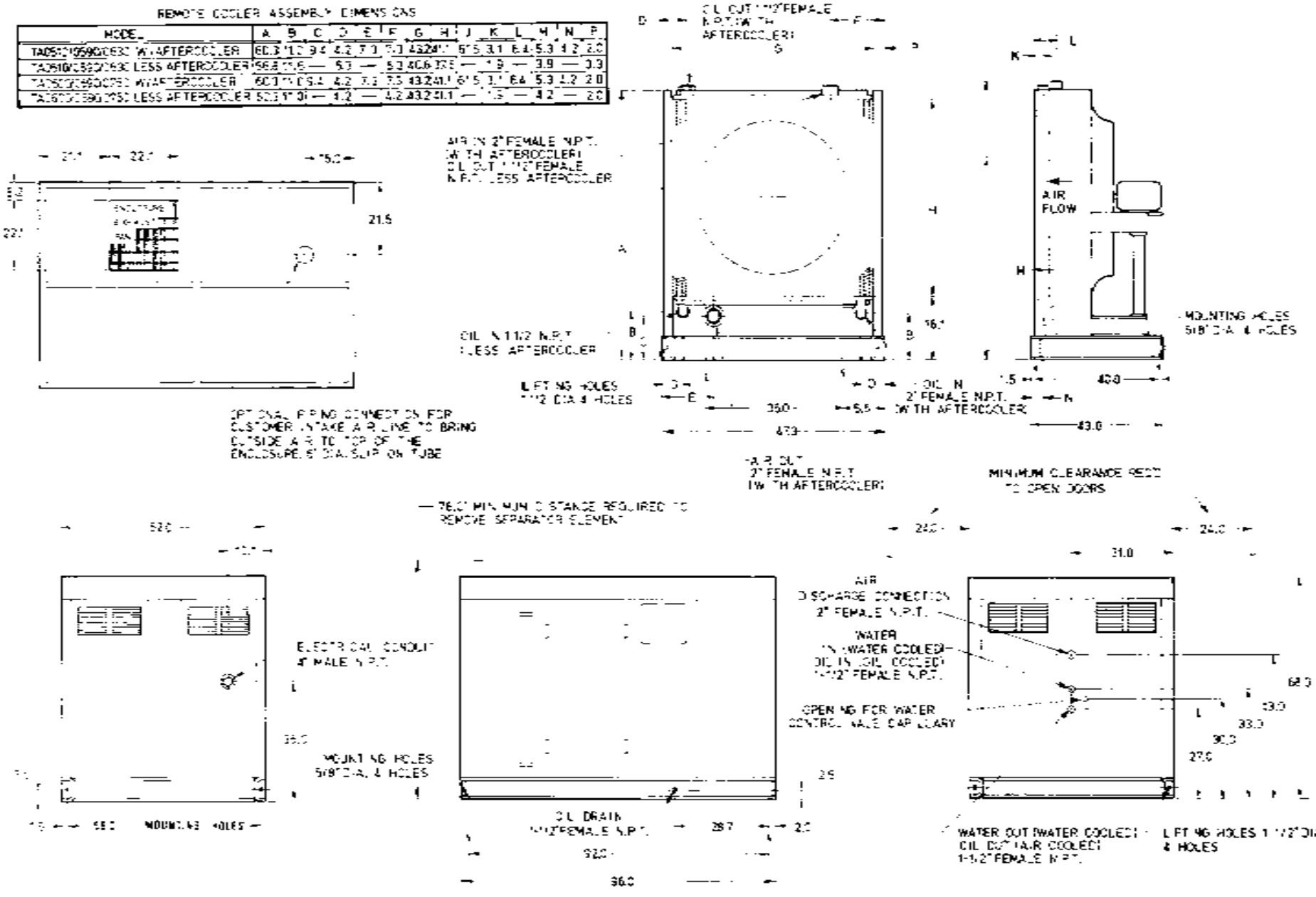

FIGURE 16A

Installation Drawing TA and RCS-510 thru 750 "E" Models

Dwg. S-2650-7

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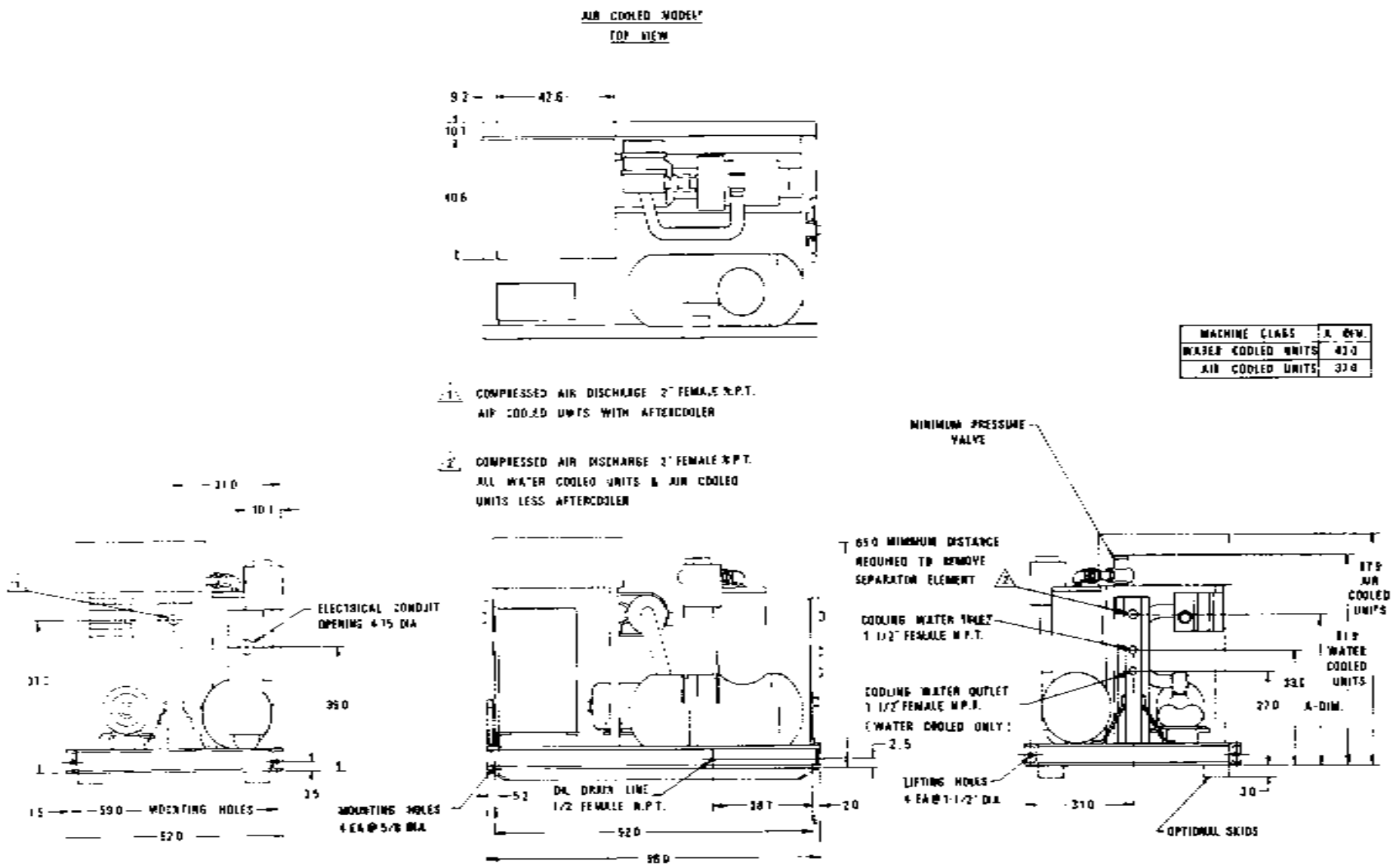

FIGURE 16B

Installation Drawing TA and RCS-300 thru 480 "B" Models

Dwg. S-2650-3

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REMOTE COOLER ASSEMBLY DIMENSIONS

MODEL	A	B	C	D	E	F	G	H	J	K	L	M	N	P
TA05D1550/60C W/AFTERCOOLER	50.3	11.0	9.4	4.2	7.0	7.3	43.2	41.1	6.5	3.1	5.4	5.3	4.2	2.0
TA05D1550/60C LESS AFTERCOOLER	56.8	11.6	—	5.3	—	5.3	49.8	39.5	—	1.9	—	3.9	—	3.3
TA06D0550/75C W/ AFTERCOOLER	50.3	11.0	9.4	4.2	7.3	7.3	43.2	41.1	6.5	3.1	6.4	5.3	4.2	2.0
TA06D0550/75C LESS AFTERCOOLER	60.8	11.0	—	4.2	—	4.2	49.8	41.1	—	1.9	—	4.2	—	2.0

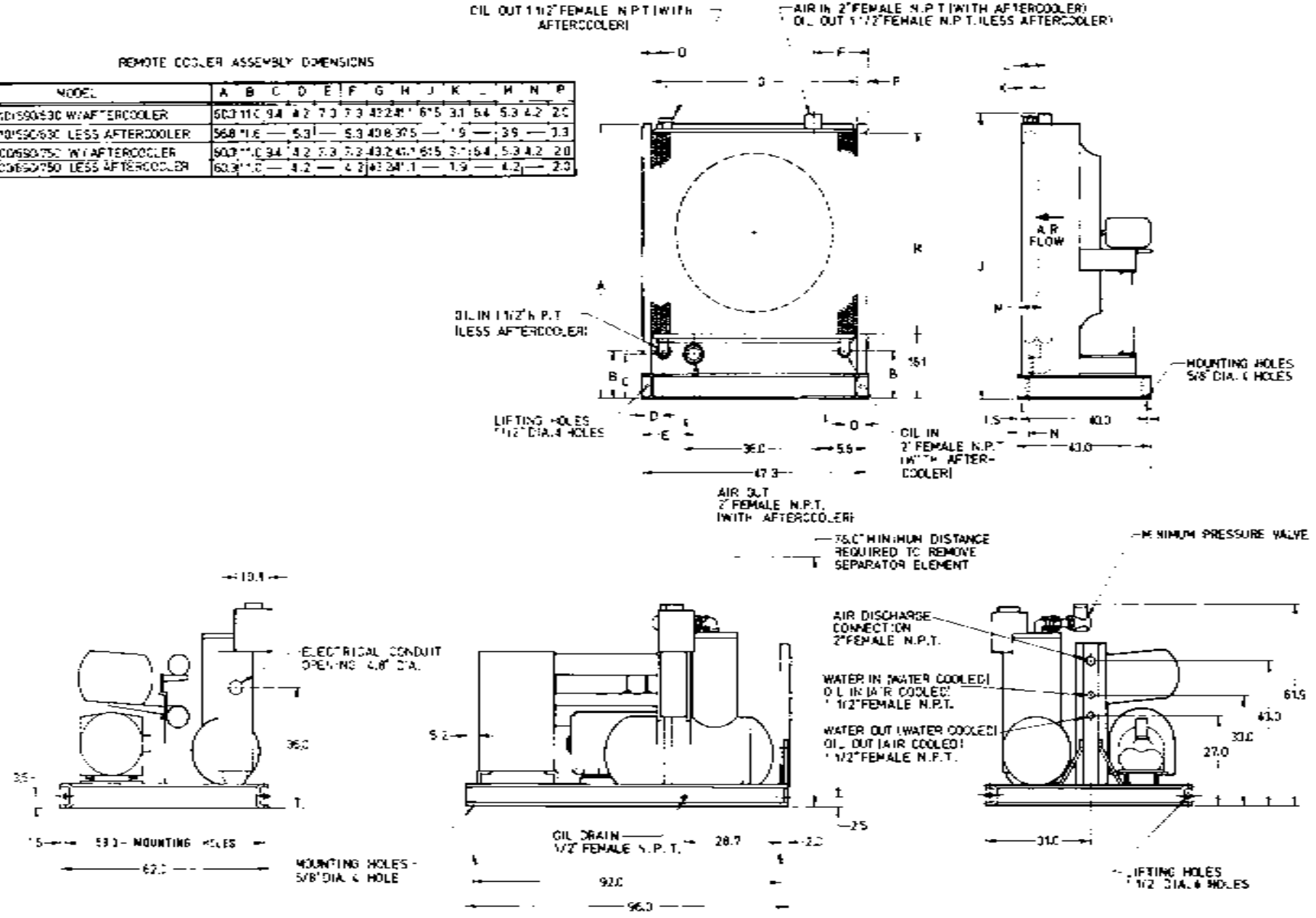

FIGURE 16C

Installation Drawing TA-510 thru 750 "B" Model

Dwg. S-2650-B

79-36

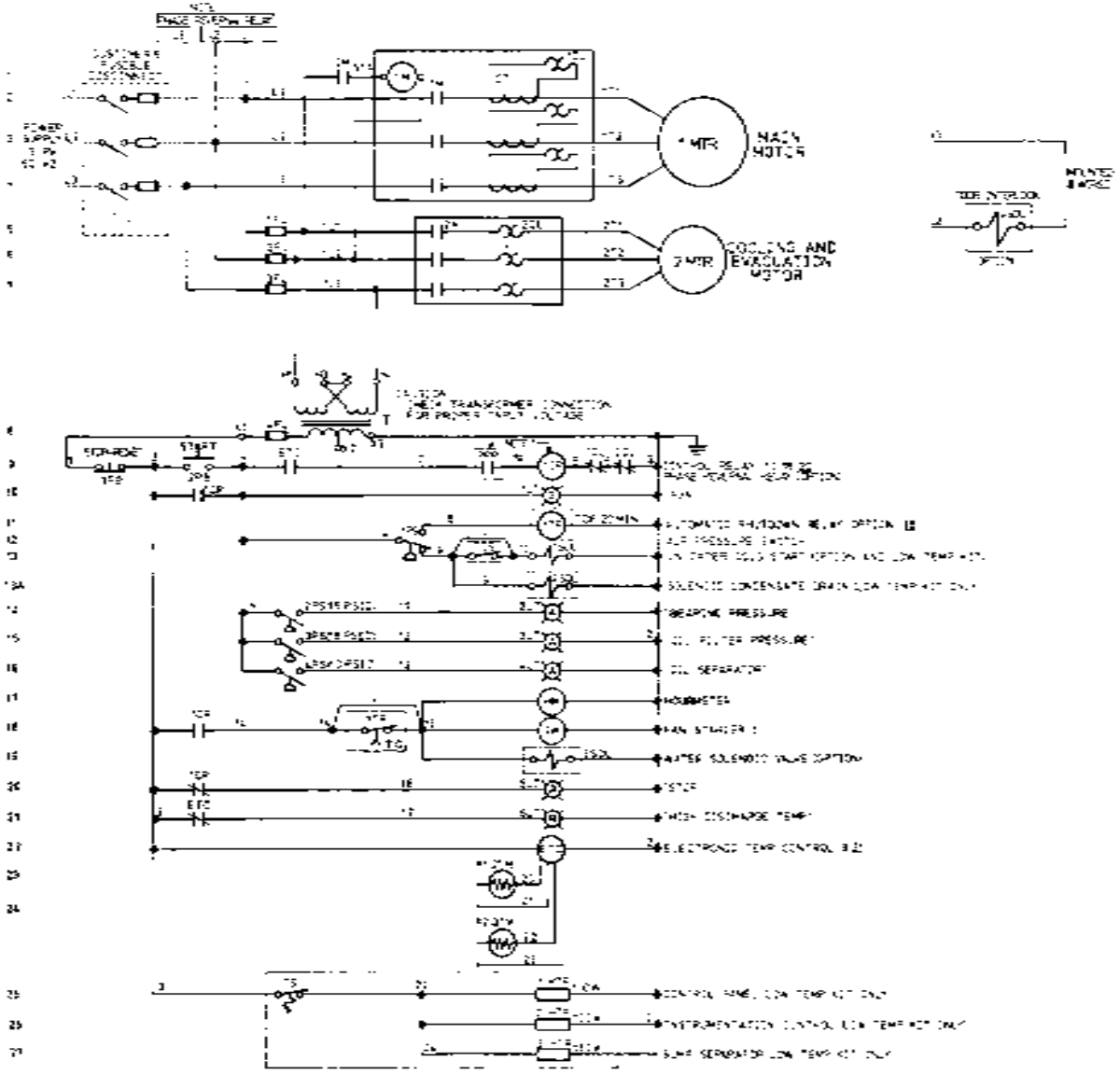

FIGURE 17

Wiring Diagram (On Package Starter) Part 1 of 2

Dwg. WD-13263-1

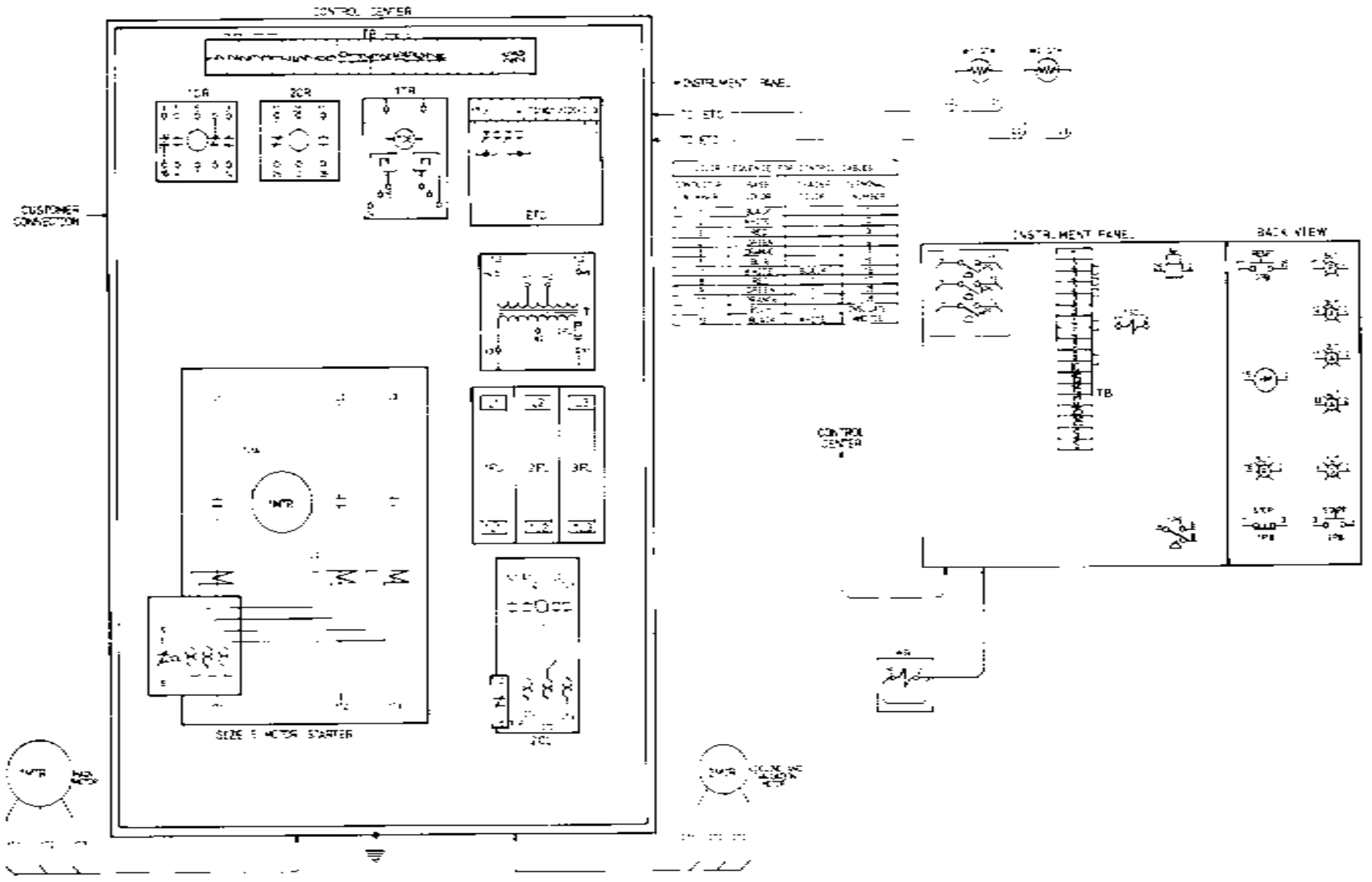

FIGURE 17A

Wiring Diagram On Package Starter Part 2 of 2

Dwg. WD-13263-1

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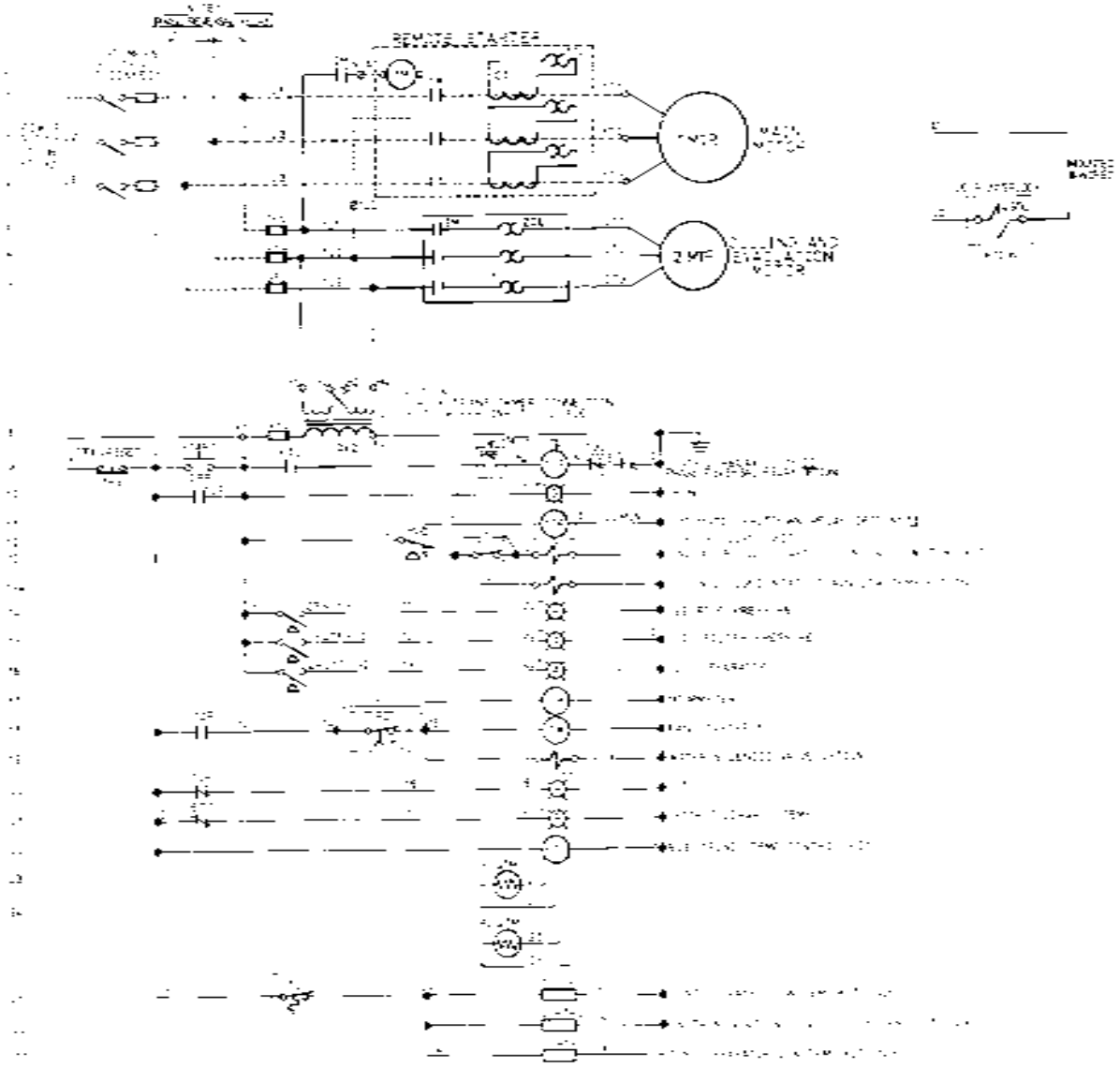

FIGURE 17B
Wiring Diagram Remote Starter: Part 1 of 2

Dwg. WD-13273-1

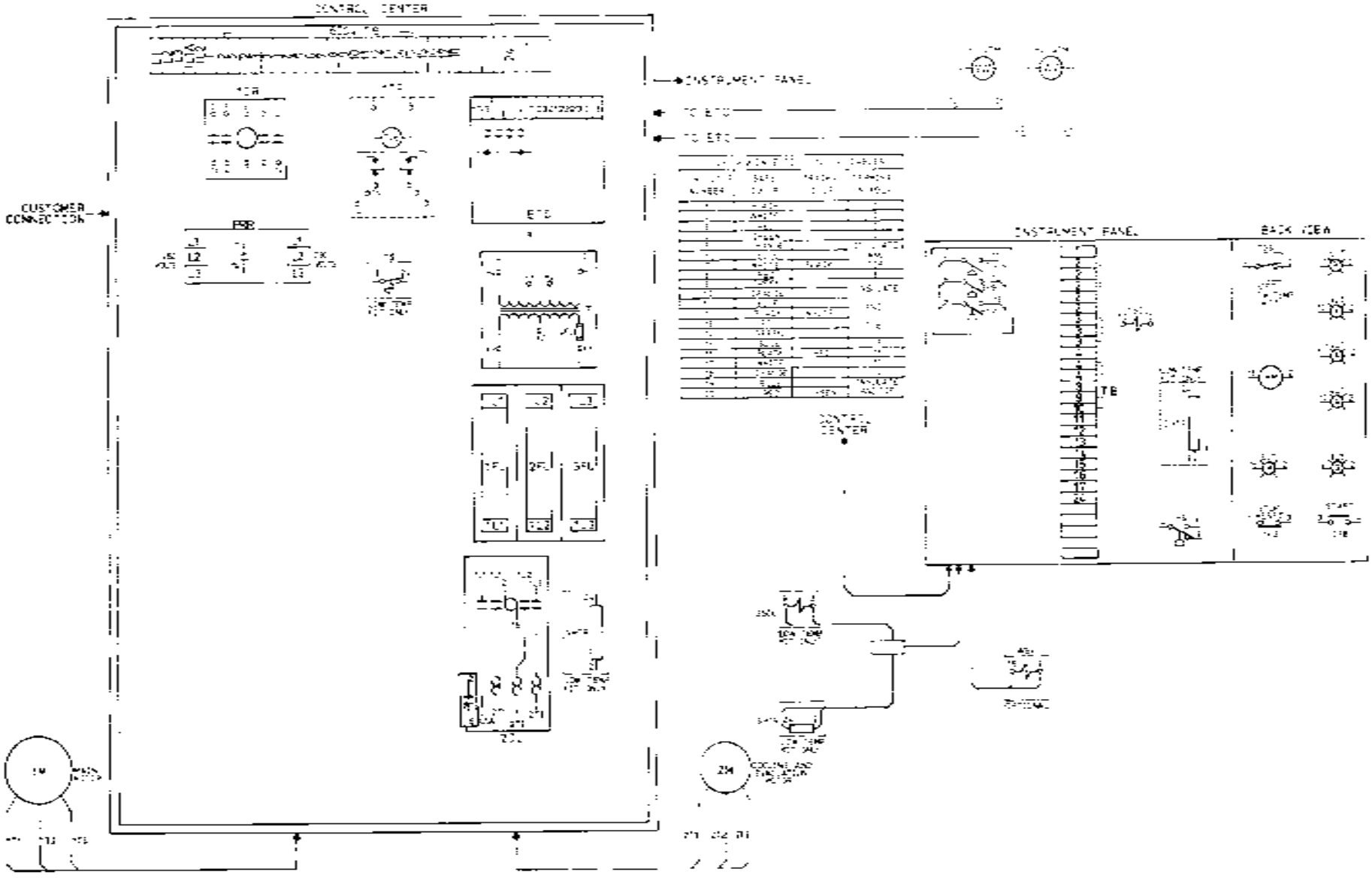

FIGURE 17C
Wiring Diagram (Remote Starter) Part 2 of 2

Dwg. WD-13273-1

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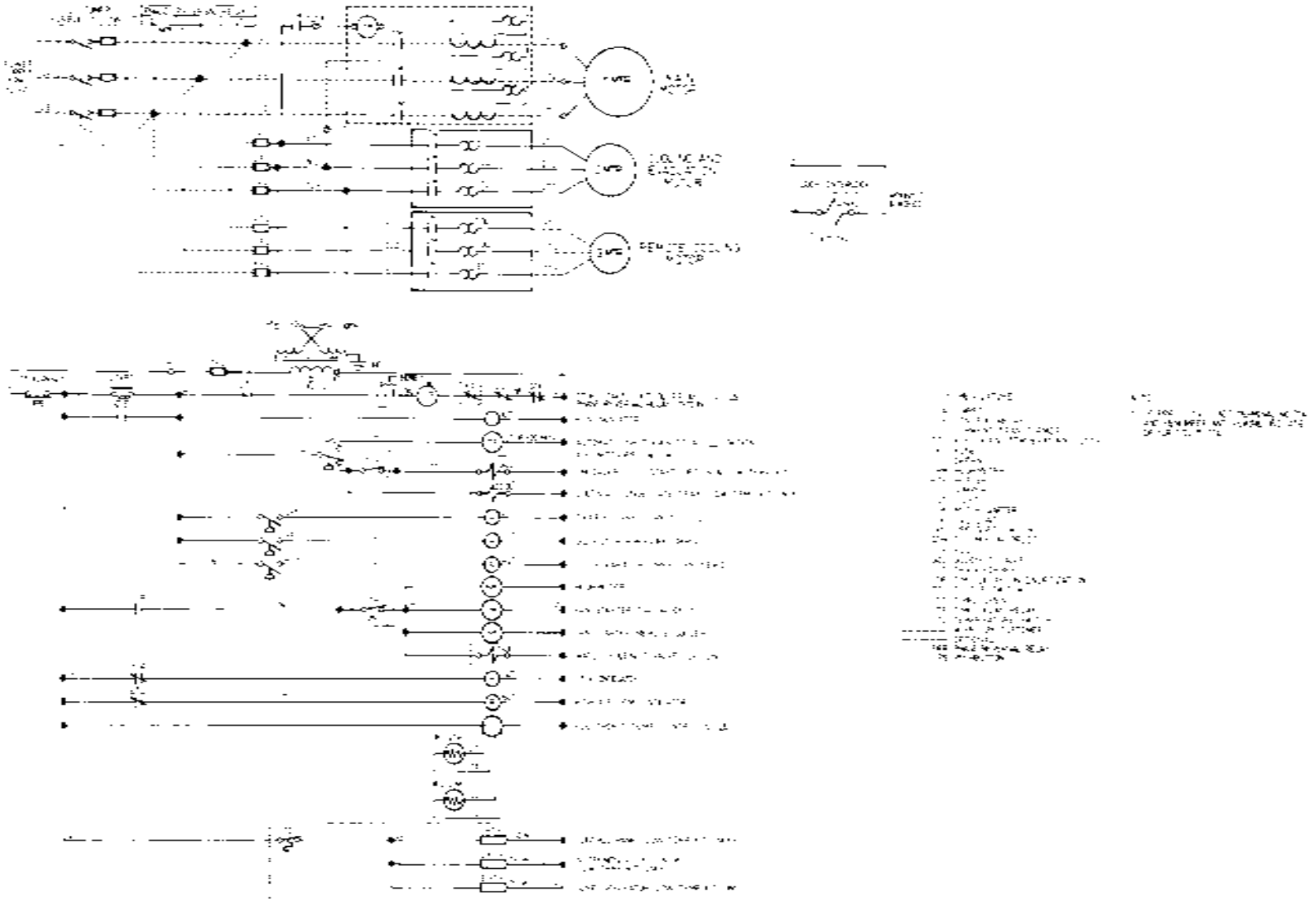

FIGURE 17D

Wiring Diagram (On Package Starter) Part 1 of 2

WD13350

Dwg. ~~WD-13349~~

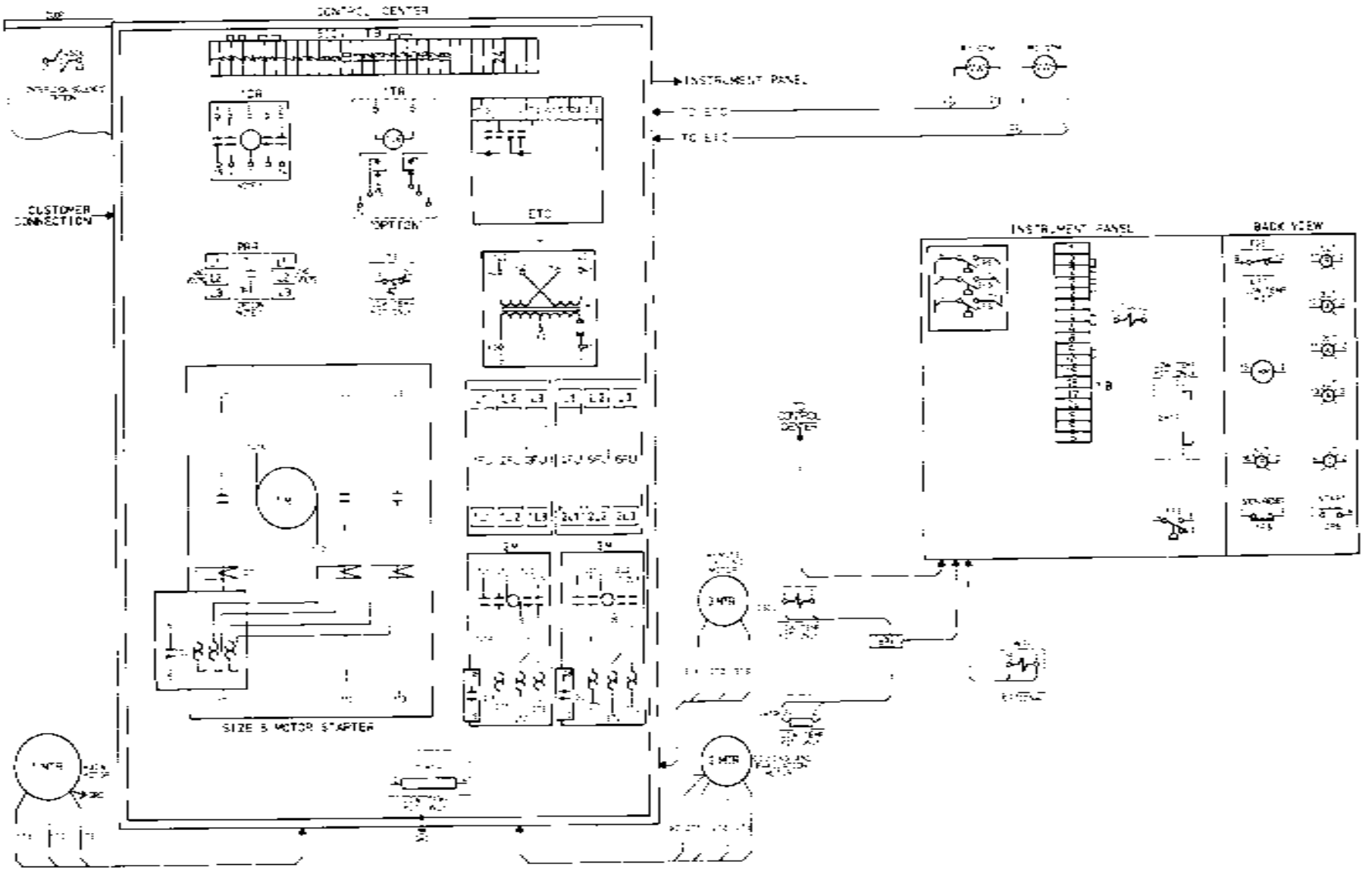

FIGURE 17E
Wiring Diagram -On Package Starter- Part 2 of 2

WD13350
Dwg. ~~13349~~

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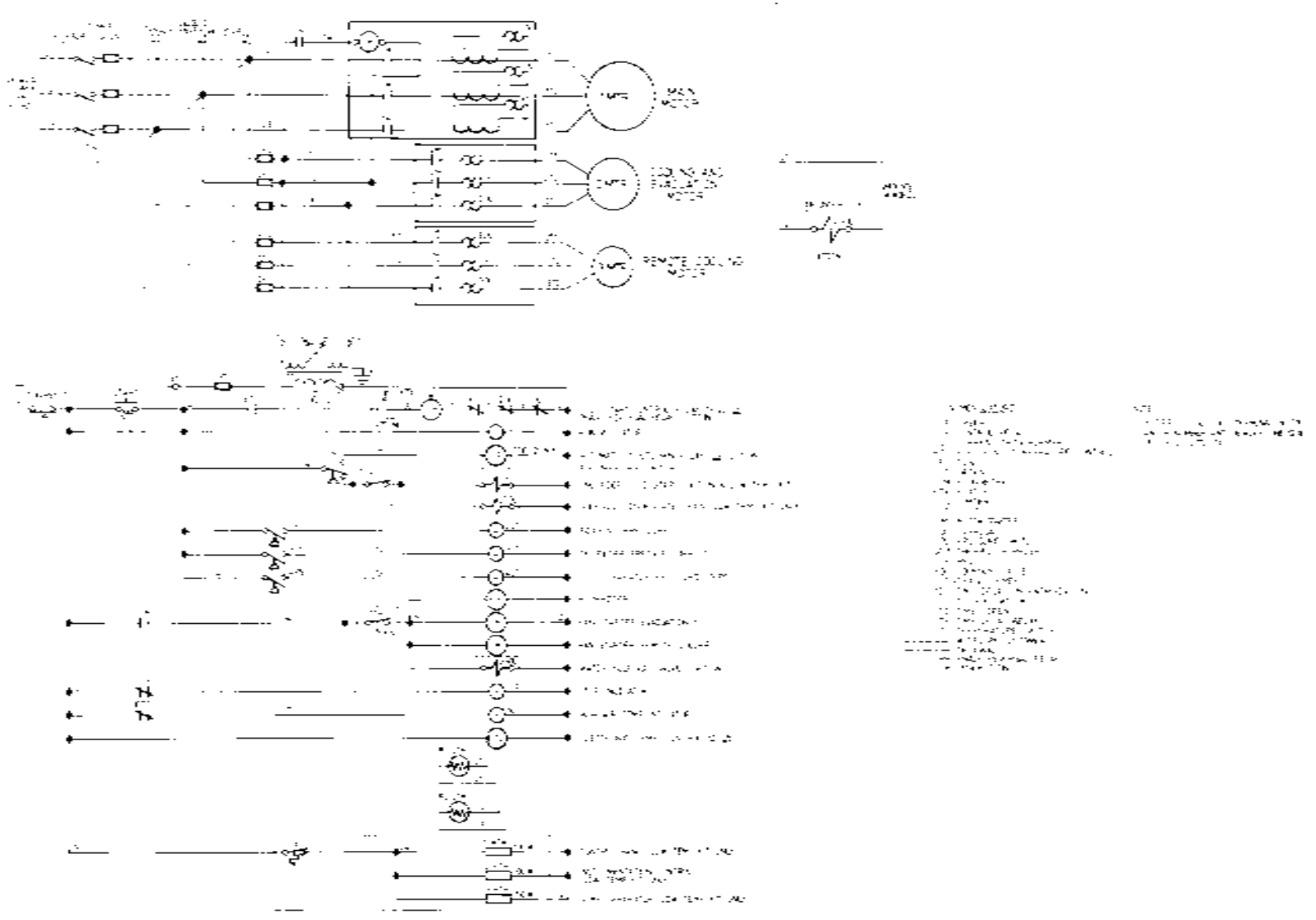

FIGURE 17F
Wiring Diagram -Remote Starter- Part 1 of 2

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Dwg. WD-~~13350~~ 1-0

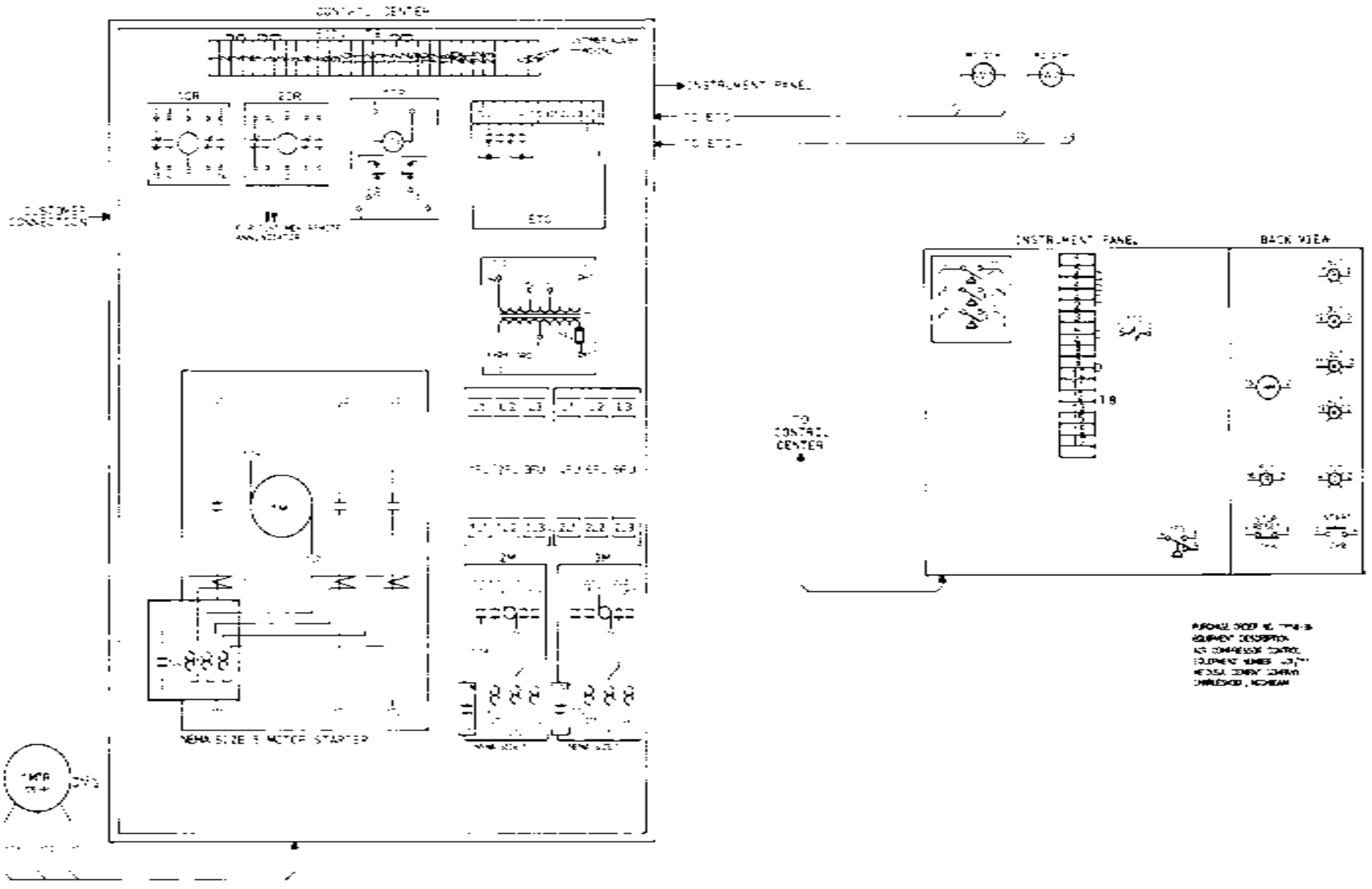


FIGURE 17G
Wiring Diagram (Remote Starter) Part 2 of 2

WD13349
Dwg. ~~WD-13269~~ 1/C

AIR COMPRESSOR 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:

Pull main disconnect switch and disconnect any separate control lines, if used, before attempting to work or perform maintenance on the unit.

Do not attempt to remove any compressor parts without first relieving the entire system from pressure.

Do not attempt to service any part while machine is operating.

Do not operate the compressor at pressures in excess of its rating as indicated on the compressor nameplate.

Do not operate the compressor at speeds in excess of its rating as indicated on the compressor nameplate.

Do not remove any guard shields or screens while the compressor is operating.

Observe terminal pressure gauge daily to be sure automatic control system is governing compressor operation within proper limits.

Periodically check all safety devices for proper operation.

Do not play with compressed air. Pressurized air can cause serious injury to personnel.

WARNING

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.

The combination of an air/oil separator element loaded with dirt and oxidized oil products together with increased air velocity as a result of this clogged condition may produce a critical point while the machine is in operation where ignition can take place. This may in turn cause a fire in the oil sump.

Failure to comply with this warning may cause damage to property and serious bodily harm.

Be sure not tools, rags or loose parts are left on the compressor or drive parts.

Do not use flammable solvents for cleaning parts.

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.

Do not operate the compressor without guard shields or screens in place.

Do not install a shut-off valve in the discharge line, without installing a safety relief valve in the line between ths shut-off valve and the compressor discharge.

Do not operate compressor in areas where there is a possibility of ingesting flammable or toxic fumes.

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.

WARNING

Do not use Joy Manufacturing Company compressors to provide breathing air. Such usage, whether supplied immediately from the compressor source, or supplied to breathing tanks for subsequent use, CAN CAUSE SERIOUS BODILY INJURY.

Joy Manufacturing Company disclaims any and all liabilities for damage or loss due to personal injuries, including death, and/or property damage including consequential damages arising out of any Joy compressors used to supply breathing air.

SECTION TWO
OPERATION

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 the possibility that damage may occur in shipment. For this reason, it is recommended that the unit be carefully inspected for evidence of possible damage in shipment. During the first few hours of operation the machine should be observed for any possible malfunction.

NOTE

Do not allow the compressor to operate in excess of the maximum pressure indicated on the 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.
3. If there is evidence of rough handling in shipment check the alignment of the coupling. Refer to "Coupling" — Section 3.

NOTE

Do not attempt to operate compressor on voltage other than that specified on the compressor nameplate.

4. Inspect unit for any visible signs of damage that could have occurred in shipment or during installation.
5. Make sure that protective covering (paper) has been removed from air intake filter, enclosure openings or any other components or areas that could require protection from painting or shipping.
6. 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 fill fitting securely. Remember this is a pressurized vessel.
7. On water cooled units make sure that water supply is connected and open to give proper flow.
8. Reconnect main disconnect switch.
9. Refer to Section 1, Instrument Panel, in regard to the functions of the panel components.
10. Jog motor (press start and then stop button quickly) and check for proper direction of rotation as indicated by direction arrow on coupling end of compressor (Figure 13). Coupling may be observed through access door at rear of enclosure. If rotation direction is wrong, reverse input connections L1 and L2 (Ref. Figure 16 or 17) Also, check to see that fan is blowing OUTWARD.

    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.

WARNING

Do not allow compressor to run in reverse rotation. After any change or reconnection of wiring, check for correct rotation of compressor and fan. Failure to comply with this warning may cause damage to property and serious bodily injury.

NORMAL STARTING

NOTE

On water cooled units, see that water is turned on.

If necessary, manually open safety relief valve (Figure 18) to accelerate system pressure relief.

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

NORMAL STOPPING

1. Press STOP-RESET button to stop compressor.
2. Stop flow of cooling water if unit is water cooled.

EMERGENCY SHUT-DOWN

To shut down the compressor in case of an emergency, press STOP-RESET button.

RESTART AFTER POWER FAILURE

1. Check fuses and re-set starter.
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.

LUBRICANT RECOMMENDATIONS

The following general characteristics categorize lubricants which have been found to be satisfactory for use in JOY ™ portable and stationary helical screw type air compressors. Due to the impossibility of establishing limits on all physical and chemical properties of lubricants which can affect their performance in the compressor over a broad range of environmental influences, the responsibility for recommending and consistently furnishing a suitable heavy-duty lubricant must rest with the individual supplier. The lubricant supplier's recommendation must, therefore, be based upon not only the following general characteristics, but also upon his own knowledge of the suitability of the recommended lubricant in portable and stationary helical screw type air compressors operating in the particular environment involved.

NOTE

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 Diester and Synthesized Hydrocarbon Lubricants

Insofar as known, all elastomeric components and all metals used in the compressor are fully compatible with synthetic diester and synthesized hydrocarbon lubricants. The viscosity grade chosen for synthetic diester base or SHC lubricants should be based upon the suggested viscosity ranges listed under prime lubricant characteristics and the lubricant supplier.

Due to unknown environmental influences such as the ingestion of some reactive gases or vapors which may lead to chemical changes in any oil and premature failure of the lubricant, we must warn that the useful life of all "extended life" lubricants may be shorter than quoted by the lubricant supplier. Because the normal "drain and replace" period may be exceeded using synthetic lubricants, differing from those specified in this manual, Joy Manufacturing Company encourages the user to closely monitor the lubricant condition and to participate in an oil analysis program with the supplier.

No lubricant, however good and/or expensive, can replace proper maintenance and attention. It is the life-blood of your compressor. Select and use it wisely.

SECTION THREE
LUBRICATION, MAINTENANCE & ADJUSTMENT

LUBRICATION

COMPRESSOR OIL SPECIFICATIONS

The use of quality lubricating oil combined with appropriate oil, drain and filter change intervals is an important factor in maintaining compressor performance. Joy Manufacturing Company does not recommend any specific brand of lubricating oil. The responsibility for meeting the specifications, quality and performance of lubricating oils must necessarily rest with the oil supplier. As an aid in selecting the oil to be used in your compressor see LUBRICANT RECOMMENDATIONS Section 2.

NOTE

When converting a machine to synthetic diester lubricants from petroleum base lubricants, the machine should be "flushed out" thoroughly with an approved solvent and both oil filter elements should be replaced. The condition of the air/oil separator should also be checked to establish its relative cleanliness. These steps should be taken to avoid excessive oil consumption and clogging of filters.

OIL SUMP CAPACITY

The compressor oil sump capacity is given in "Specifications" — Section I. Maintain oil level at center of sight gauge (3, Figure 18). Do not overfill. Oil level must be checked prior to start-up and oil has 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 (4) located on the side of the oil sump.

WARNING

Do not remove cap from oil fill fitting or attempt to add oil when the compressor is operating or sump is under pressure. Failure to comply with this warning may cause damage to property and serious bodily harm.

The sump oil drain valve (2) is provided with an outlet through which a pipe nipple can be connected to facilitate draining oil.

INITIAL OIL CHANGE

During machine assembly there are a certain amount of impurities that, regardless of the care taken to prevent their entrance, are in 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 and oil filter element be changed after the first 300 400 hours of operations. Thereafter the oil and oil filter element change interval should be as indicated by the oil filter maintenance indicator and in accordance with the following Periodic Maintenance Schedule.

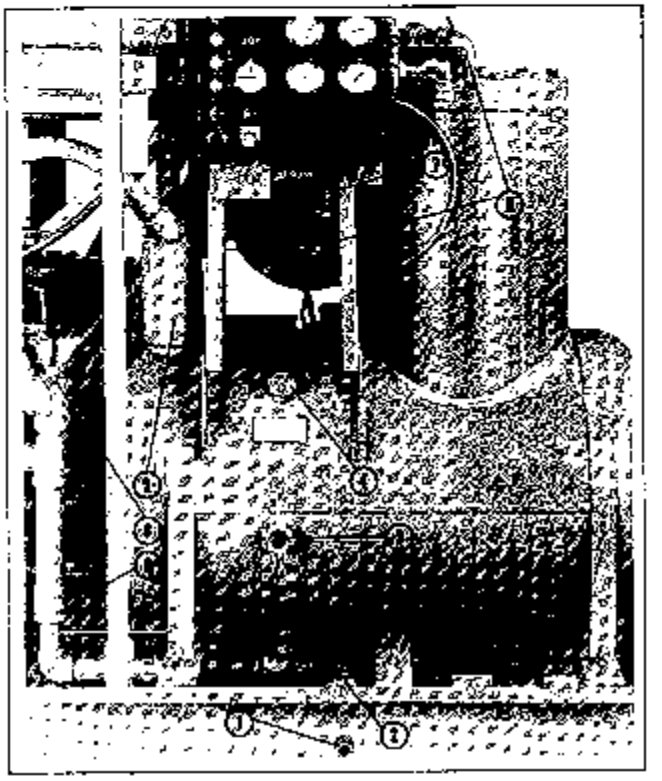


FIGURE 18

Area Viewed From Front Access Opening.

1. Sump Oil Drain
2. Drain Valve
3. Oil Level Gauge
4. Oil Fill Plug
5. Primary Oil Filter
6. Oil Return Line and Sight Glass
7. Sump Pressure Relief Valve
8. Thermal Valve
9. Oil Strainer

MOTOR

Grease lubricated motors are properly lubricated at the time of manufacture and it is not necessary to re-lubricate prior to initial start-up. However, if motor has not been run for a period of 6 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.

COUPLING

Refer to instructions provided at the end of this Section.

PERIODIC MAINTENANCE SCHEDULE

DAILY OR EVERY 8 HOURS

Prior to Start Up:

1. Drain condensate from oil sump.
2. Check for correct sump oil level. Level should be at center of bulls-eye sight glass.

In Operation:

The following gauges should be checked for normal indication of operation. Refer to "Instrument Panel" for details.

1. Service Air Filter.
2. Rotor Coolant Injection Temperature.
3. Discharge Air Pressure.
4. Discharge Air Temperature.
5. Maintenance Indicator Lights.

EVERY 6 MONTHS OR 1000 HOURS

1. Change compressor oil and replace oil filter elements. Clean oil strainer.

NOTE

The use of synthetic diesters having extended useful life does not change the oil filter element change interval.

PERIODICALLY

1. Inspect air intake filter element for clogging or holes.
2. Clean oil return line orifice.
3. Clean oil strainer.
4. Lubricate water temperature regulating valve stem. (Option Item)
5. Clean cooling sytem heat exchangers.

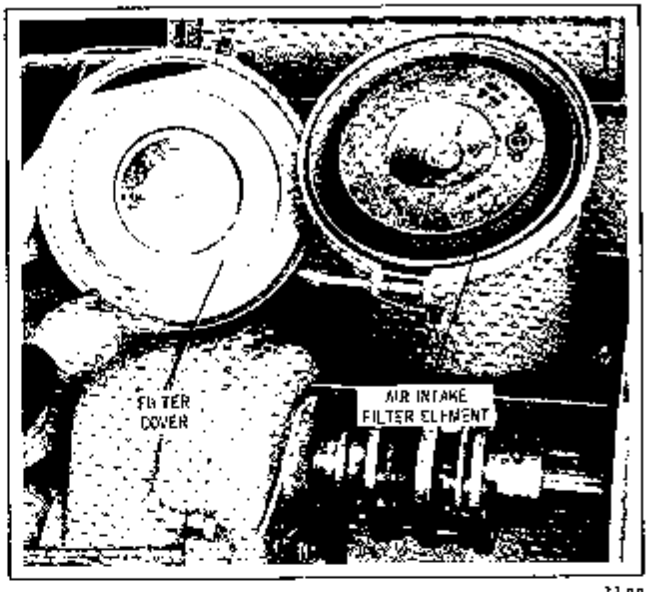
MAINTENANCE

ACCESS DOORS AND ENCLOSURE REMOVAL

The primary service or inspection components are located behind access doors at the front and rear of the enclosure. When opening the double doors on the front of the enclosure, one will have easy access to the control box, primary oil filter, and oil return line sight glass. When opening the rear door, one will have easy access to the air filter, bearing/gear oil filter, main drive coupling, and the shaft seal. The air/oil separator can be serviced by either removing the overhead access panel or the enclosure panel in front of the pressure vessel. Panel removal is accomplished by removing four screws, two at the top and two at the bottom, for each panel to provide additional access to any and all machine components. All the panels and door assemblies can be removed in the same manner.

AIR INTAKE FILTER

Service the air intake filter element (Figure 19) only when indicated by the service filter gauge (9, Figure 8), with compressor operating under full load, full speed condition. **Scheduled service based on a set number of operating hours is not required nor recommended.**



77-BR

FIGURE 19
Air Intake Filter

To service, first remove filter cover and clean (Figure 19). Then unscrew wingbolt from element and pull element off of adapter. The element may be cleaned dry using compressed air (not to exceed 100 PSI). Direct air blast from inside element. If wet cleaning is required soak element in household detergent and warm water for 15 minutes. Rinse in clear water and allow to dry (do not use compressed air to dry wet element). Inspect element using lightbulb inside. If pinholes or larger are detected, replace element.

NOTE

If air filter service gauge does not indicate the need for service after an extended period of operating with an element that appears excessively dirty, check to make sure that element is installed properly. Then, check the element for holes or breaks and that it is seating properly. Check all inlet piping and connections for leaks. Leaks in the inlet system will not only prevent the filter service gauge from indicating properly but will allow dust and dirt to enter the compressor.

PRIMARY OIL FILTER

The primary oil filter (5, Figure 18) has an element of the disposable type. To install new element first shut the compressor off and allow oil to settle. Then, proceed as follows:

1. Place oil spill pan under filter.
2. Unscrew filter body at hex head at bottom of filter.
3. Remove used filter element and discard.

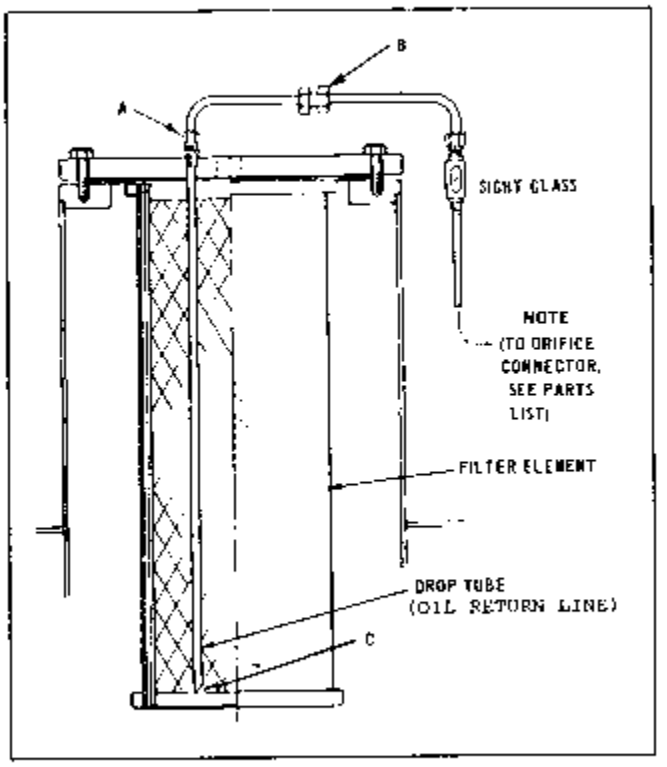


FIGURE 20
Section Through Air/Oil Separator

4. Clean all parts especially center tube.
5. Reassemble using new element. Make sure all gaskets are in place.
6. Secure filter assembly to filter head by tightening hex head at base of filter body.
7. After compressor is in operation check for leaks.

SECONDARY OIL FILTER

"This oil filter (Figure 13) 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.

AIR/OIL SEPARATOR

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

1. Remove separator access panel from top of enclosure, or side panel in front.
2. Disconnect necessary piping at separator cover. Refer to Figure 18. Necessary couplings have been provided. The oil return line must be first separated at coupling B, Figure 20, loosened at fitting A on the separator cover and then the line pulled up out of the separator.
3. Unbolt cover and remove.
4. Lift out separator element.
5. Install new element (gaskets are attached). Make sure flange surfaces are clean.
6. Replace cover and secure.
7. Reconnect all piping. Ascertain that oil return line is "bottomed" at C in the separator.

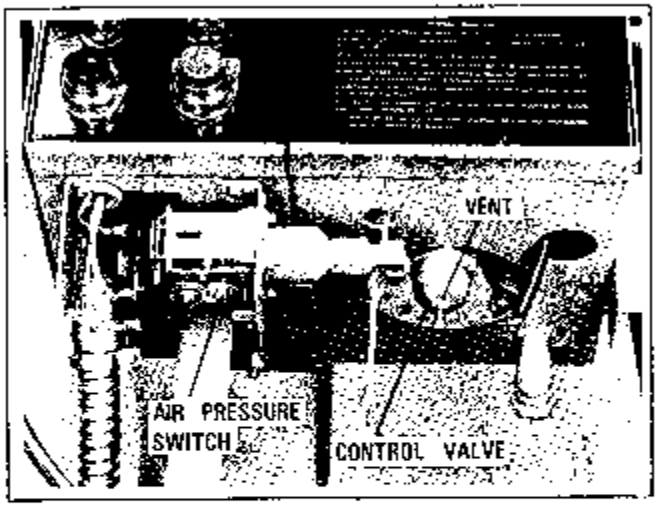


FIGURE 21
Control Air Valve, Air Pressure Switch

THERMAL BY-PASS VALVE

The thermal by-pass valve, Figure 4 and 18, should be inspected if the unit shuts down due to high compressor discharge air temperature. A piece of sediment may lodge on the valve seating surface and prevent it from closing and allowing the hot oil to pass into the compressor.

The valve may be inspected by removing from the by-pass housing.

WARNING

Do not remove thermal by-pass valve while unit is pressurized. Disconnect power and relieve all pressure in unit before removing by-pass valve. Failure to comply with this warning may cause damage to property and serious bodily harm.

OIL STRAINER

An oil strainer is provided in the suction line of the sump (Figure 18). Check the sump outlet strainer screen for signs of clogging each time the separator element is removed. Clean thoroughly and replace.

OIL RETURN LINE SIGHT GLASS

The oil return line sight glass (Figure 18) serves to visually ascertain that any oil accumulation at the bottom of the air/oil separator is being removed (Ref. Figure 20). This sight glass should be observed daily (during operation) for an indication of oil flow. If glass shows completely full of oil it indicates that the oil line is clogged and oil is not being removed. This results in excessive oil consumption and oil in service lines. If clogging is indicated remove and clean the orifice fitting (See note in Figure 20) by blowing with reverse flow of air.

ADJUSTMENTS

CONTROL VALVE

Proper adjustment of the control valve can be ascertained when on rising pressure venting starts, at the control valve vent hole (Figure 21), immediately after discharge pressure reaches the low limit of the

control range. For example, if a machine has a maximum operating pressure of 110 psig the normal control range is from 100 psig to 110 psig. Thus, venting should start at 100 psig.

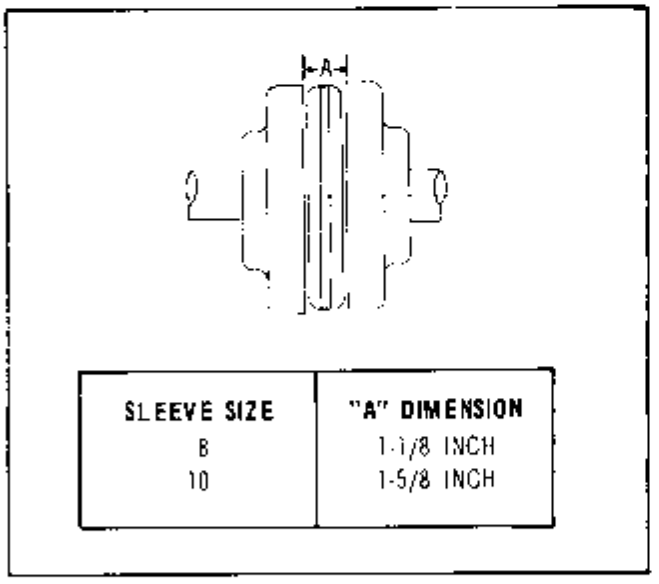
If control pressure is indicated too soon turn the adjustment screw inward to raise the level at which control pressure starts. Turn screw outward to start control pressure at lower level.

There are three operating conditions under which control valve venting will vary as follows:

1. When the compressor is operating within the normal control range, venting will modulate — that is, low venting will indicate that the inlet valve is open wide. As venting increases the inlet valve will gradually close.
2. When the compressor reaches its maximum operating limit it will be unloaded by action of the air pressure switch and venting will, in a short period, stop.
3. At any time that the compressor is operating at a pressure below the normal control range, there should be no venting.

NOTE

If air pressure switch setting is changed, readjust control air valve. Tighten locknut on adjusting screw after correct setting is obtained.



SLEEVE SIZE	"A" DIMENSION
8	1-1/8 INCH
10	1-5/8 INCH

FIGURE 22

Compressor to Motor Coupling Alignment
(Elastomeric Type Coupling)

AIR PRESSURE SWITCH

The air pressure switch (Figure 21) is factory set to the limit indicated on the compressor nameplate. It may be set lower if desired, however, do not set lower than 60 psi. The normal control range is 10 psi. See instructions inside cover of switch for details on adjustment.

TIME DELAY RELAY

The time delay relay (optional), Figure 11, is set at the factory for a minimum delay of 10 minutes. It should not be set for a shorter delay interval.

MINIMUM PRESSURE CHECK VALVE

The minimum pressure check valve is set at the factory and should require no further adjustment. When in proper adjustment this valve will open at approximately 65 psig.

COUPLINGS
ELASTOMERIC TYPE COUPLING

1. The coupling flanges should be positioned on the shafts to achieve the "A" dimension shown in Figure 22. There should be an equal length of shaft extending into each flange.
2. Check parallel alignment by setting indicator on outer surface of flange (Figure 23A). Rotate motor noting the maximum and minimum indicator reading. Move motor as necessary to reduce indicator reading to a minimum. Care must be taken not to disturb setting in Step 1.
3. Check angular alignment with a dial indicator (Figure 23A). Mount indicator on compressor flange with stem on face of motor flange. Rotate motor by hand noting maximum and minimum indicator reading. Adjust motor as necessary to reduce total indicator reading to .002" or less for each inch of diameter at the indicator stem.

GRID TYPE (Ref. Figure 23 and 23A)
COUPLING ALIGNMENT

1. To check angular misalignment mound indicator on compressor flange with stem on face of motor flange. Rotate motor by hand noting maximum and minimum indicator reading. Move motor as necessary to reduce the total indicator reading to .002" or less for each inch of diameter at the indicator stem.

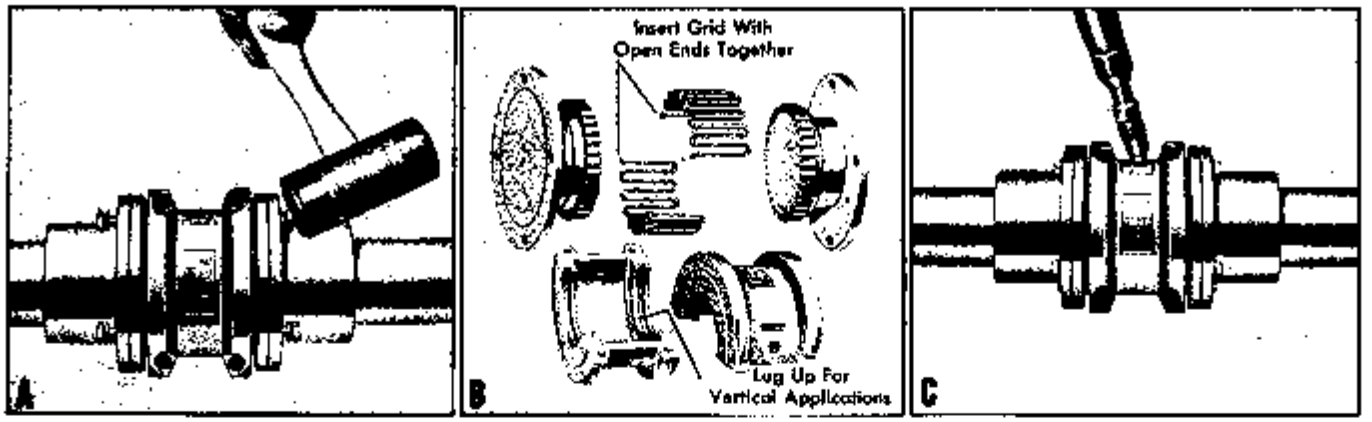


FIGURE 23
Grid Type Coupling

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2. To check parallel misalignment set indicator stem on outer surface of flange. Rotate motor noting maximum and minimum indicator reading. Move equipment as necessary to reduce indicator reading to a minimum, taking care not to disturb the setting of Step 1.
3. Repeat Steps 1 and 2 as necessary.
4. Coupling should be rotated several revolutions to make sure no "endwise creep" in connected shafts is measured.
5. Tighten all bolts securely.

REMOVAL DISASSEMBLY AND ASSEMBLY

Removal, disassembly and assembly of the spacer coupling is as follows:

1. Remove lube plugs and all but two cap screws in each hub opposite each other. Loosen these about one-quarter inch and tap them with a mallet to disengage spacer from the shaft hubs. Remove cap screws and spacer. See A, Figure 23.
2. To disassemble the spacer, remove cover and pry the grid out with a screw driver in even gradual stages.
3. When grids are furnished in two segments, install them so that all cut ends extend in the same direction. Since grid rungs are truly radial, it is necessary to spread the grid slightly to pass it over the coupling teeth. To minimize spreading, start grid at either end and then tap it into place. DO NOT attempt to force grid to the bottom of the groove; it will seat easily after all rungs are positioned. Pack grid with grease.
4. Check gap between spacer and faces:

Size	Gap
20 to 90	3/16"
100 to 110	1/4"
120 to 140	3/8"

5. Lightly oil seals and assembly covers together. Tighten cover bolts and check seals for proper seating.

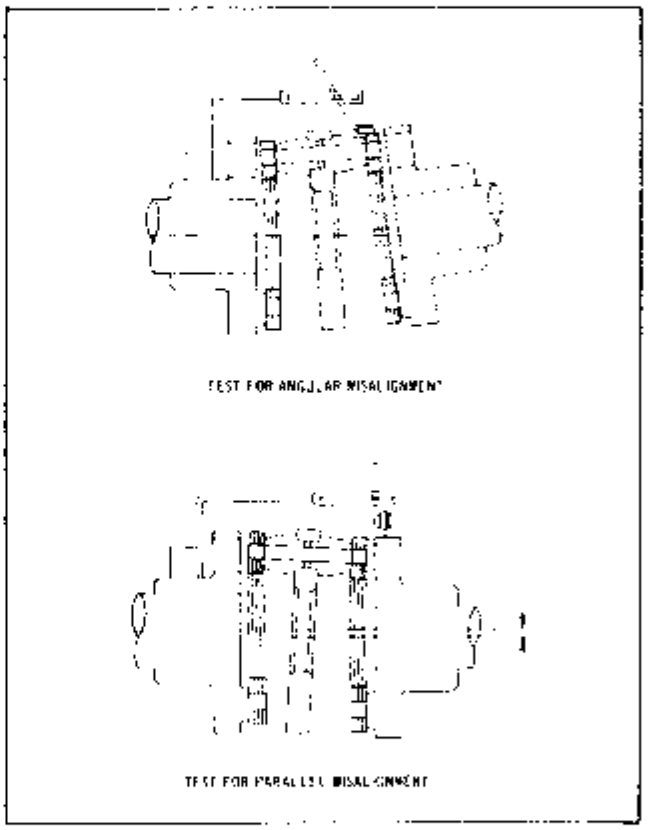

FIGURE 23A
Compressor to Motor Coupling Alignment. (Grid Type) (Elastomeric Type Coupling)

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6. Install spacer assembly using reverse of removal procedure.
7. With BOTH lube plugs removed, insert lube fitting and fill the coupling with recommended grease until an excess appears at the other opening. When lubrication is complete, INSTALL BOTH LUBE PLUGS.

Consult the coupling dealer or a reputable lubricant supplier to obtain the recommended grease lubricant for filling the coupling.

SECTION FOUR
TROUBLESHOOTING & TESTING

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 below. 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 listed 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.

FAILURE TO START

If the compressor will not start, the probable causes are as follows:

1. Main switch disconnected.
2. Power failure.
3. Safety circuit shutdown.
4. Faulty start switch or connection.
5. Overloads out.
6. Reset button out.

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 check the following:

1. Check sump oil level. Add oil if required. See Section 3 for Oil Specifications.
2. Check "Maintenance Indicator Lights — Section 1.
3. On water cooled units, check for proper supply of cooling water. Check for clogging of tubes or headers.
4. On air cooled units, check for restriction of air flow thru cooling heat exchangers due to dirt accumulation or obstruction.
5. If 3 and 4 are not causing the problem, the oil circuit should be checked. See Figure 4 or 5, Section 1 for Air-Oil flow diagram. Starting at the oil sump, the thermal by-pass may be leaking, the compressor oil filter may be plugged or the oil pump may be defective.

IMPROPER DISCHARGE PRESSURE

1. Too much air demand.
2. Service valve open.
3. Excessive leaks in service lines.
4. Inlet valve not fully open.
5. Plugged air cleaner. Service air cleaner element.
6. Improper control operation. If discharge pressure is too high or safety valve blows, check the following:
   a. Faulty safety valve. However, before resetting the safety valve, the terminal pressure gauge should be checked for accuracy.
   b. Faulty discharge air pressure gauge.
   c. Oil separator plugged up. This should be indicated by separator maintenance indicator on instrument panel. Replace separator element.
7. Control valve out of adjustment.
8. Air pressure switch out of adjustment.

EXCESSIVE OIL CONSUMPTION OR OIL IN SERVICE LINE

Check for the following:

1. Overfilling of oil sump.
2. Broken oil line.
3. Plugged oil return line. Check oil return orifice.
4. Oil return line not bottomed in separator.
5. Clogged or defective air/oil separator.
6. Operating below rated pressure.
7. Leaking automatic blow-down valve.
8. Compressor shaft seal failure. Large quantity of oil will be present in the region of the drive coupling.

FREQUENT SEPARATOR PLUG-UP

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

The complete inlet system starting with the air cleaner, and all joints in piping to inlet valve should be checked for leaks. The air filter element should be thoroughly inspected for holes by placing a lamp inside and carefully checking for areas of bright light passing through the element.

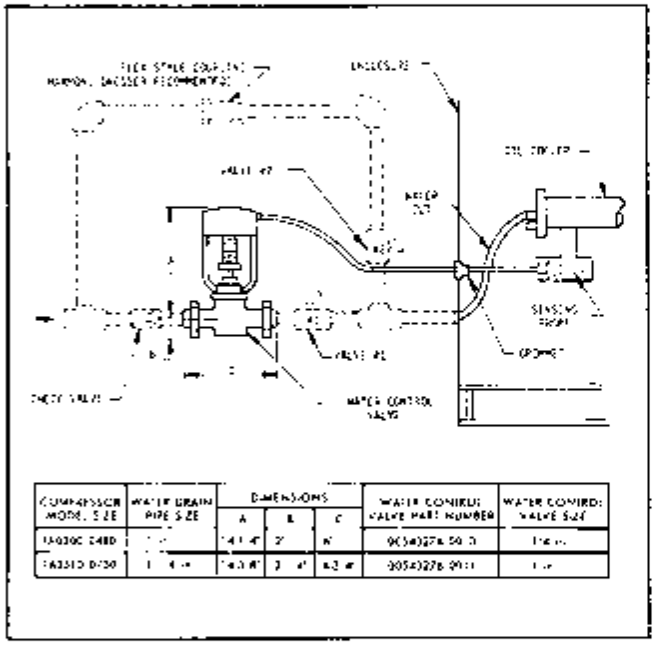
The compressor oil filters should be checked to make sure they have the proper element and that they are not leaking.

Compressor oil will break down prematurely for a number of reasons. Extreme operating conditions such as high ambient temperature and high receiver pressure will accelerate breakdown. Of course, if the wrong type of oil is used it will break down too soon.

SECTION FIVE
EQUIPMENT AND OPTIONS

INTRODUCTION

This section contains information for optional equipment that may be supplied with your compressor. Coverage of equipment other than that supplied may also be included. Check the identification plate or decal on each piece of equipment to ascertain applicable instructions. The service requirements of these components should be included with your Periodic Maintenance Schedule as outlined in Section 3.



COMPRESSOR MODEL SIZE	WATER DRAIN PIPE SIZE	DIMENSIONS A	B	C	WATER CONTROL VALVE PART NUMBER	WATER CONTROL VALVE SIZE
TA030C 04BD	[illegible]	[illegible]	[illegible]	[illegible]	9054278 5003	[illegible]
TA035D 07SD	[illegible]	[illegible]	[illegible]	[illegible]	9054278 9001	[illegible]

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FIGURE 24

Water Control Valve Installation
(Temperature Regulator Valve)

WATER CONTROL VALVE (TEMPERATURE REGULATOR)

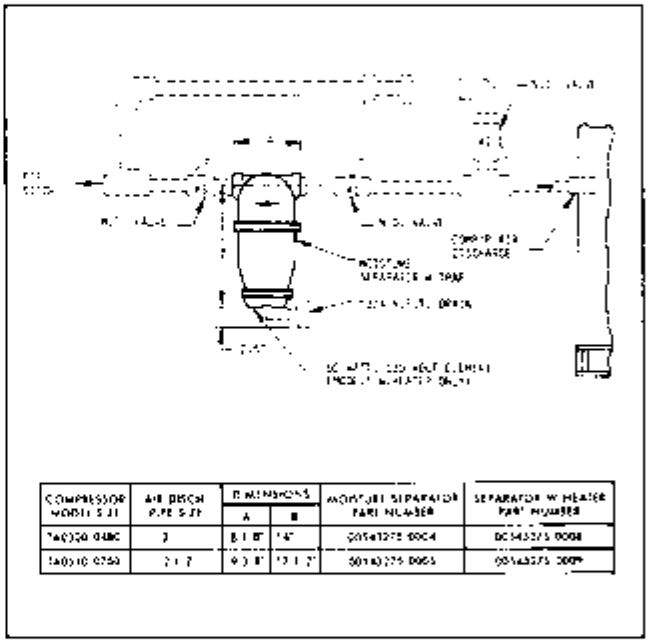
To install water control valve, remove plenum panel (on right side of water service connections) by taking out the four screws that hold it in place. Remove plug from tee under oil cooler and install sensing probe. Place capillary tube in split grommet in support panel. Replace enclosure panel and install water control valve.

NOTE

Gate type valves, open No.2, close No. 1 for by-pass.

NOTE

For complete details regarding Optional Equipment contact your Joy Representative. Also, details regarding installation of these options will be provided.



COMPRESSOR MODEL SIZE	AIR DISCH PIPE SIZE	DIMENSIONS A	B	MOISTURE SEPARATOR PART NUMBER	SEPARATOR W HEATER PART NUMBER
TA030 04BC	3	[illegible]	14"	9054275 0004	9054275 0008
TA035 07SD	3	[illegible]	[illegible]	9054275 0005	9054275 0009

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FIGURE 25

Moisture Separator W/Trap Installation

MOISTURE SEPARATOR WITH TRAP

Units provided with the aftercooler option will also include this separator with trap. See "AIR COOLING GROUP" and "MOISTURE SEPARATOR & TRAP" — Section 1. Refer to Figure 25 for installation.

NOTE

Gate type valves, open No. 2, close No. 1 and No. 3 for by-pass.

OUTDOOR AND LOW TEMPERATURE KITS

Outdoor and/or low ambient temperature kits are available for air-cooled models only. You may select from the following optional protective devices to meet

your specific requirements for low temperature operation.

Outdoor Kit may consist of one or more of the following:

NEMA 4 electrical controls and instrument panel, water tight and dust tight

TEFC totally enclosed, fan-cooled main motor

Low temperature kit.

Low Temperature Kit includes all of the following:

- Cold start switch for unloaded starting.
- Thermostatically controlled electric heater under sump-separator (assures prompt oil flow on start-up).
  (The heater is sized to retain the residual heat in the oil reservoir. It is suggested that the power remain ON so that heaters are functional between Stop and Restart. If additional heat is required for successful starting of the unit in cold ambients, consult the factory for recommended procedures.
- Enclosed, electrically heated control panel with automatic temperature control for protection of instrumentation control lines
- Solenoid operated condensate drain in discharge air circuit (when unit is equipped with optional aftercooler) automatically drains moisture on shut-down. (On 75 & 100 HP air cooled units only).

In addition, a heated condensate trap integral with the moisture separator can be supplied as part of the low temperature kit. This is an optional extra when the compressor is furnished with an aftercooler.

DUAL CONTROL (AUTOMATIC)

Provides for the selection of constant speed control or automatic start — stop control. For additional details see "Timed Shutdown Relay" — Section 1.

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