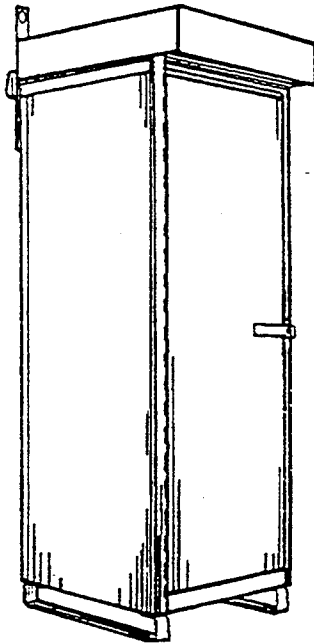


AIR DRYER
INSTRUCTION MANUAL
MODEL P-3100STD-3/P-4200STD-3



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PUREGAS INSTRUCTION MANUAL
FOR AIR DRYER MODELS
P-3100STD-3/P-4200STD-3

TABLE OF CONTENTS

	<u>Page</u>
TABLE OF CONTENTS	i-ii
PREFACE	iii
WARRANTY	iv
I GENERAL	
A. Introduction and Outline Dimensions	1
B. Unit Description and Specifications	2
II PRINCIPLES OF OPERATION	
A. Air Dryer Operation	4
B. Heatless Dryer (Dehydrator)	4
C. Capacity Control Valve	6
D. Cabinet Temperature Control	6
III INSTALLATION AND OPERATION	
A. Electrical Power Requirements and Connections	12
B. Alarm Connection	12
C. Cabinet Mounting	12
D. Outdoor Installation	13
E. Initial Start-up	14
IV ALARMS AND ADJUSTMENTS	
A. Low Pressure Alarm	15
B. Humidity Alarm	15
V GENERAL MAINTENANCE	
A. Safety	17
B. Routine Checks	17
C. Air Compressor Safety Relief Valve	17-18
D. Air Compressor Pressure Switch Adjustment	18
E. Capacity Control Valve	19
F. Heatless Dryer and Compressor Capacity	19
G. Replacement Parts List	21
VI AIR COMPRESSOR MAINTENANCE	
A. General	26
B. Maintenance Instructions	26
C. Maintenance Kit	26
D. Compressor Disassembly	26-27
E. Mtce. Kit Installation/Compressor Reassembly	27-28
F. Air Compressor Parts List	30

PUREGAS INSTRUCTION MANUAL
FOR AIR DRYER MODELS
P-3100STD-3/P-4200STD-3

TABLE OF CONTENTS
(continued)

	<u>Page</u>
VII DEHYDRATOR MAINTENANCE	
A. General	31
B. Maintenance Instructions	31
C. Maintenance Kit	31
D. Solenoid Valve Repair Kit	31
E. Dehydrator Parts List	33
VIII TROUBLESHOOTING GUIDE	
A. Air System	34
B. Humidity Alarm System	35
C. Electrical System	36
D. Dehydrator	37

FIGURES, CHARTS AND DRAWINGS

1	Air Dryer Outline Dimensions	1
2	Unit Specifications	2
3	Model P-3100STD-3/P-4200STD-3 Air Dryer	3
4	Air Flow Schematic	5
5	Dehydrator Air Flow Diagram	5
6	Front View	7
7	Front Panel (Down Position)	8
8	Air Compressor (Slide Out)	8
9	Alarm Schematic	10
10	Cabinet Mounting	11
11	Low Pressure Alarm Switch	16
12	Humidity Alarm Board	16
13	Air Compressor Pressure Switch	20
14	Dryer Capacity Compressor Capacity Graph	20
15	Pressure Regulator Repair Kit	22
16	Bypass Solenoid Repair Kit	23
17	Wiring Diagram	24
18	Electrical Schematic	25
19	Air Compressor Troubleshooting Chart	28
20	Exploded View of Air Compressor/Motor Assembly	29
21	Exploded View of Heatless Dryer (Dehydrator, Solid State)	32

PREFACE

This instruction manual is produced for the benefit of our customers. It is intended to provide basic information which will enable our customers to install, maintain and service PUREGAS air dryers economically, capably and with minimum delay. Careful observation of these instructions and maintenance procedures will ensure maximum life and efficiency of the unit.

This manual should be read thoroughly before installing, operating or servicing the air dryer to familiarize the technician with the unit and the proper operating and repair procedures. This will minimize the possibility of damage to the unit due to improper operation, handling or disassembly.

Please direct all inquiries to:

PUREGAS

226A Commerce St.

Broomfield, CO 80020

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**NO PART OF THIS TECHNICAL MANUAL
MAY BE REPRODUCED WITHOUT THE EXPRESS WRITTEN
CONSENT OF PUREGAS, LLC.**

LIMITED WARRANTY AGREEMENT

Puregas air dryers carry a one-year warranty against defective workmanship and material. This period starts at date of shipment. Not included are components subject to normal replacement during a years operating time. These parts include, but are not limited to, electrical components, pressure switches, pressure regulators and piston-type air compressors which carry a one year warranty.

On refrigeration type dryers, the basic refrigeration circuit carries a five-year warranty. This warranty covers the refrigeration compressor, refrigeration tubing and coils but NOT the thermostat, thermometer, or fan motor.

Liquid-ring compressors, heatless dryers and circuit boards carry a one-year warranty.

No claims for labor in replacing defective parts or for consequential damages will be allowed. Replacement parts will be invoiced in the regular way with invoices subject to adjustment after the parts claimed defective are examined at our factory. In addition, no material or parts will be accepted at our factory for in-warranty repairs or credit without previous authorization from Puregas.

Responsibility for damages incurred in-transit will be borne by the user and the user, in turn should file any damage claim against the carrier. All warranty items are F.O.B. our plant. Freight charges are the responsibility of the user.

This warranty shall not apply to any air dryer which shall have been repaired or altered in any way by anyone other than Puregas, so as to affect, in our judgement, its proper functioning or reliability neither will it apply to a dryer which has been subjected to misuse, negligence or accident.

**THE INSTALLING OF PARTS PURCHASED
FROM OTHER THAN PUREGAS WILL VOID THE
WARRANTY ON OUR AIR DRYERS.**

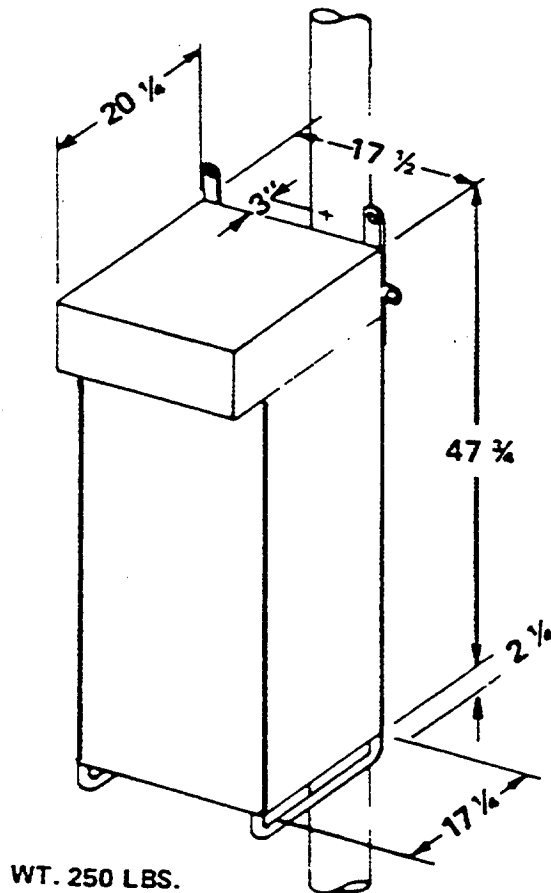
PUREGAS INSTRUCTION MANUAL
FOR OUTDOOR AIR DRYER MODELS P-3100STD-3/P-4200STD-3

I GENERAL

- A. Introduction and Outline Dimensions - This instruction manual covers the description, installation and maintenance of the Puregas Models P-3100STD-3/P-4200STD-3 outdoor air dryers. The purpose of this air dryer is to supply a normal continuous delivery of 1800 SCFD or 2600 SCFD of dry air at pressure of 0-15 PSIG for continuous feed pressure cables, waveguides or other devices requiring dry air. Model P-3100STD-3 will deliver a maximum of 3100 SCFD and model P-4200STD-3 will deliver a maximum of 4200 SCFD of dry air under emergency conditions. These model air dryers are designed for outdoor use and come equipped with hardware for pole-mounting.

AIR DRYER OUTLINE DIMENSIONS

FIGURE 1



- B. Unit Description and Specifications - These air dryers employ the principles of compression and adsorption and the operation is fully automatic and relatively maintenance-free. Essentially the unit consists of a motor driven oilless air compressor, an automatic self-reactivating dehydrator (Heatless dryer), an air receiver and the necessary gauges and controls to ensure the delivery of dry air at proper pressure and humidity.

The cable system pressure is monitored by an adjustable pressure alarm switch that will close the alarm circuit if the pressure is below a pre-established setting. A failure of the humidity bypass solenoid valve coil will close dry air delivery to the outlet. This failure will activate the low pressure alarm as outlet pressure falls.

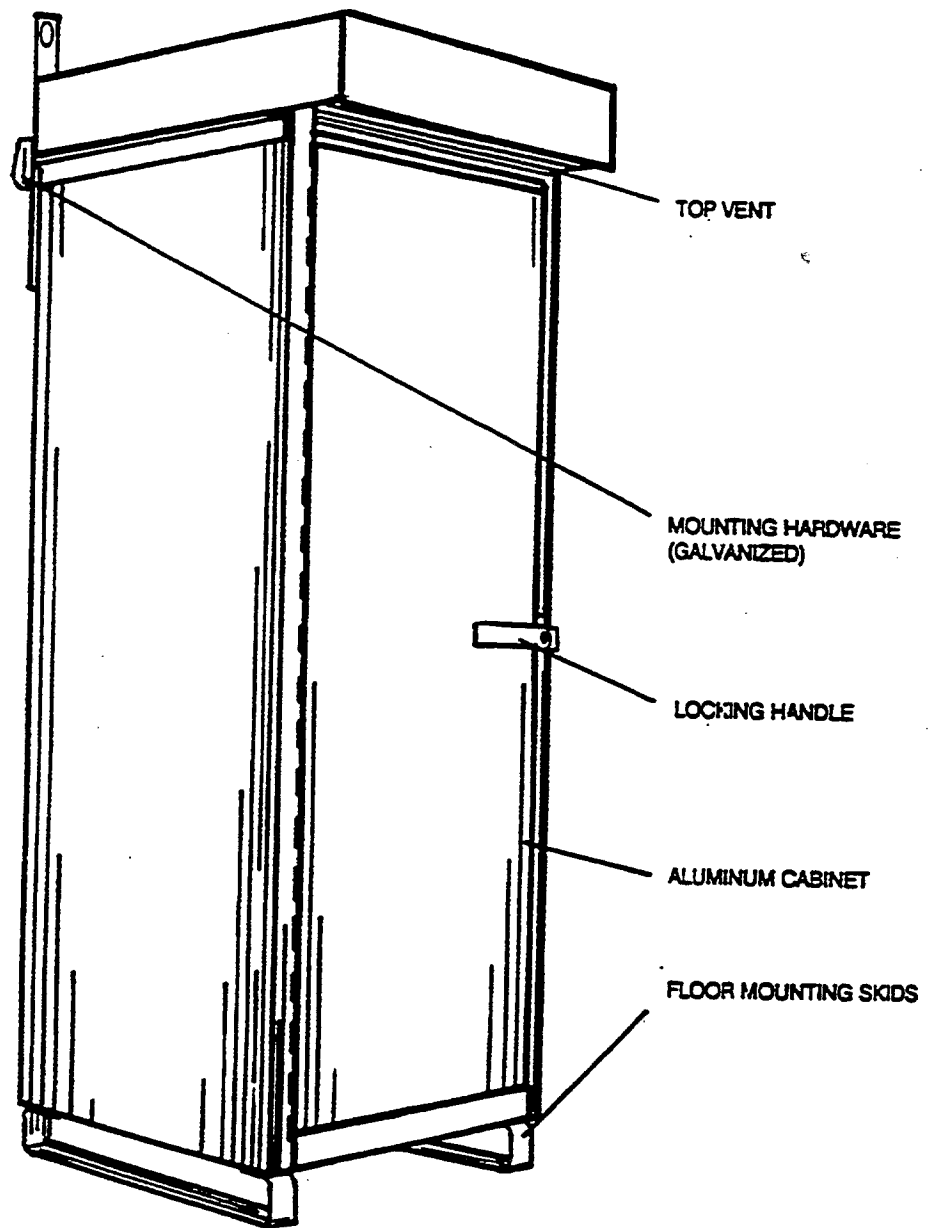
UNIT SPECIFICATIONS

FIGURE 2

DELIVERED AIR	3100 STD	NORMAL CAPACITY	1800 STANDARD CU. FT. OF DRY AIR PER DAY Rated at ambient conditions of 95° F. dry bulb/80° F. wet bulb.	
		MAXIMUM EMERGENCY CAPACITY	3100 STANDARD CU. FT. OF DRY AIR PER DAY Rated at ambient conditions of 70° F. dry bulb.	
	4200 STD	NORMAL CAPACITY	2600 STANDARD CU. FT. OF DRY AIR PER DAY Rated at ambient conditions of 95° F. dry bulb/80° F. wet bulb.	
		MAXIMUM EMERGENCY CAPACITY	4200 STANDARD CU. FT. OF DRY AIR PER DAY Rated at ambient conditions of 70° F. dry bulb.	
AMBIENT TEMP. RANGE	EFFLUENT DEWPOINT		BELOW MINUS 40° F.	
	PRESSURE		0-15 PSIG ADJUSTABLE	
	MIN. OPERATING TEMP.		-40° F.	
	MAX. OPERATING TEMP.		120° F.	
AIR COMPRESSOR	INTERMITTENT OPERATION		Air compressor is equipped for start-stop operation. Intermittent operation prolongs the life of the oilless air compressor parts and increases the interval between maintenance visits.	
	OILLESS FEATURE		Bearings in both the oilless air compressor and motor are grease packed and permanently sealed. Assures outlet air which is completely free from oil.	
POWER REQUIREMENTS	VOLTAGE/HERTZ		115 Volts 60 Hertz	
	3100	AMPERES (Full Load)	12 amperes	
	4200	AMPERES (Full Load)	15 amperes	

MODEL P-3100STD-3/P-4200STD-3 AIR DRYER

FIGURE 3



II. PRINCIPLES OF OPERATION

A. Air Dryer Operation – The airflow is shown schematically. See Air Flow Schematic, Figure 4. The Steps involved are summarized below:

1. Ambient air is drawn through the intake filter on the air compressor, is compressed and delivered through flexible tubing to the dehydrator.
2. In the heatless dryer (dehydrator) the moisture vapor in the compressed air is absorbed in a desiccant chamber which is automatically reactivated every 30 seconds.
3. From the heatless dryer the dry air is delivered through a capacity control valve to the dry air storage tank. The air compressor runs intermittently and is controlled by a pressure switch which stops the air compressor when the pressure reaches 50 PSIG and re-starts the air compressor when the pressure falls to 20 PSIG. The air compressor may operate continuously under high flow conditions. The capacity control valve prevents the air dryer from delivering more than the maximum emergency capacity of dry air.

B. Heatless Dryer (Dehydrator) – The dehydrator consists of two desiccant-filled towers, a manifold, a timer and two solenoid valves arranged and cycled so that as one tower delivers dry air, the desiccant in the other tower is purged (or dried) by a small quantity of the dry air supplied by the first tower. The tower functions reverse at 30-second intervals. A diagram of the dehydrator is shown in Figure 5.

Dehydrator operation is summarized as follows:

1. Tower 1 – Air from the compressor enters through the solenoid valve, which is controlled by an electric timer and is forced upward by its own pressure through the desiccant in the tower. Moisture is removed from the air as it passes over the desiccant. The dried air is then forced down through the air tube in the center of the desiccant tower, out through an open ball check valve and a constantly opened bypass orifice and finally out of the dehydrator to the air receiver.
2. Tower 2 – Simultaneously with the operation of Tower 1 (as described above) the solenoid valve of Tower 2 is opened to the atmosphere. The main dry air supply from Tower 1 is prevented from entering Tower 2 by automatic closure of the ball check valve. However, a small controlled quantity of the dry air is forced through the bypass orifice, into the air tube in the center of the tower, then down through the desiccant bed and finally expelled to the atmosphere through the solenoid valve. As the dry air passes over the desiccant bed, it picks up the moisture previously collected while Tower 2 was furnishing dry air (as Tower 1 is doing at this time) and the moisture is expelled with the air. The desiccant in Tower 2 is thus dried and made ready for the cycle reversal.
3. Towers 1 and 2 then reverse their functions and Tower 2 takes over the air drying operation, while the desiccant in Tower 1 is being dried.

AIR FLOW SCHEMATIC

FIGURE 4

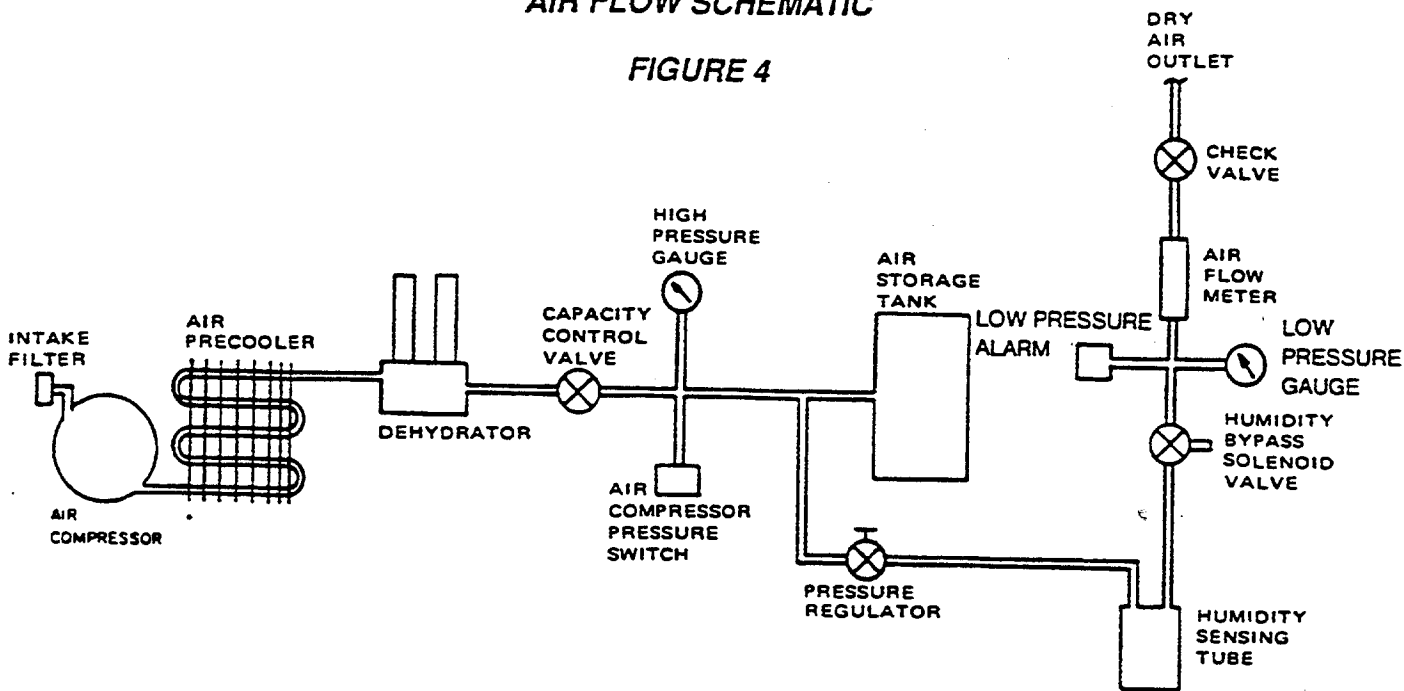
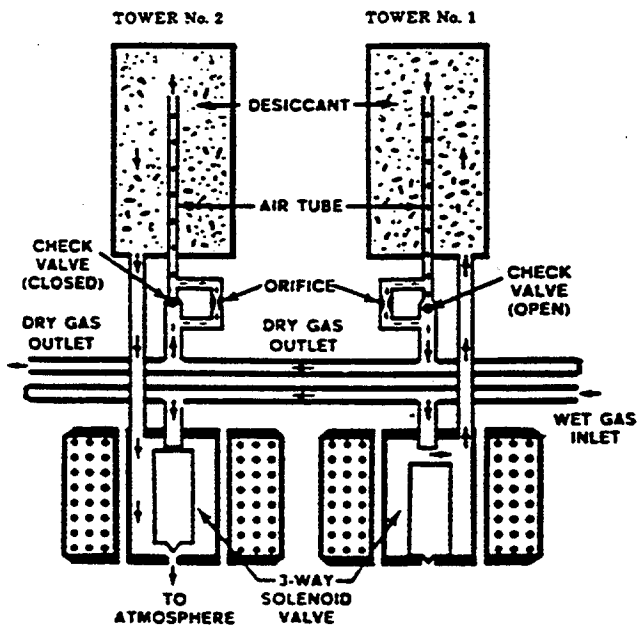


DIAGRAM OF DEHYDRATOR AIR FLOW

FIGURE 5



II. PRINCIPLES OF OPERATION (Continued)

C. Capacity Control Valve – The function of this valve is threefold:

1. Maintain the dryer operating pressure at 50 PSIG.
2. Prevent the dryer from delivering more than its maximum designed flow capacity.
3. Act as a check valve which prevents the stored air from bleeding to the atmosphere through the dryer purge ports when the compressor and heatless dryer are not operating.

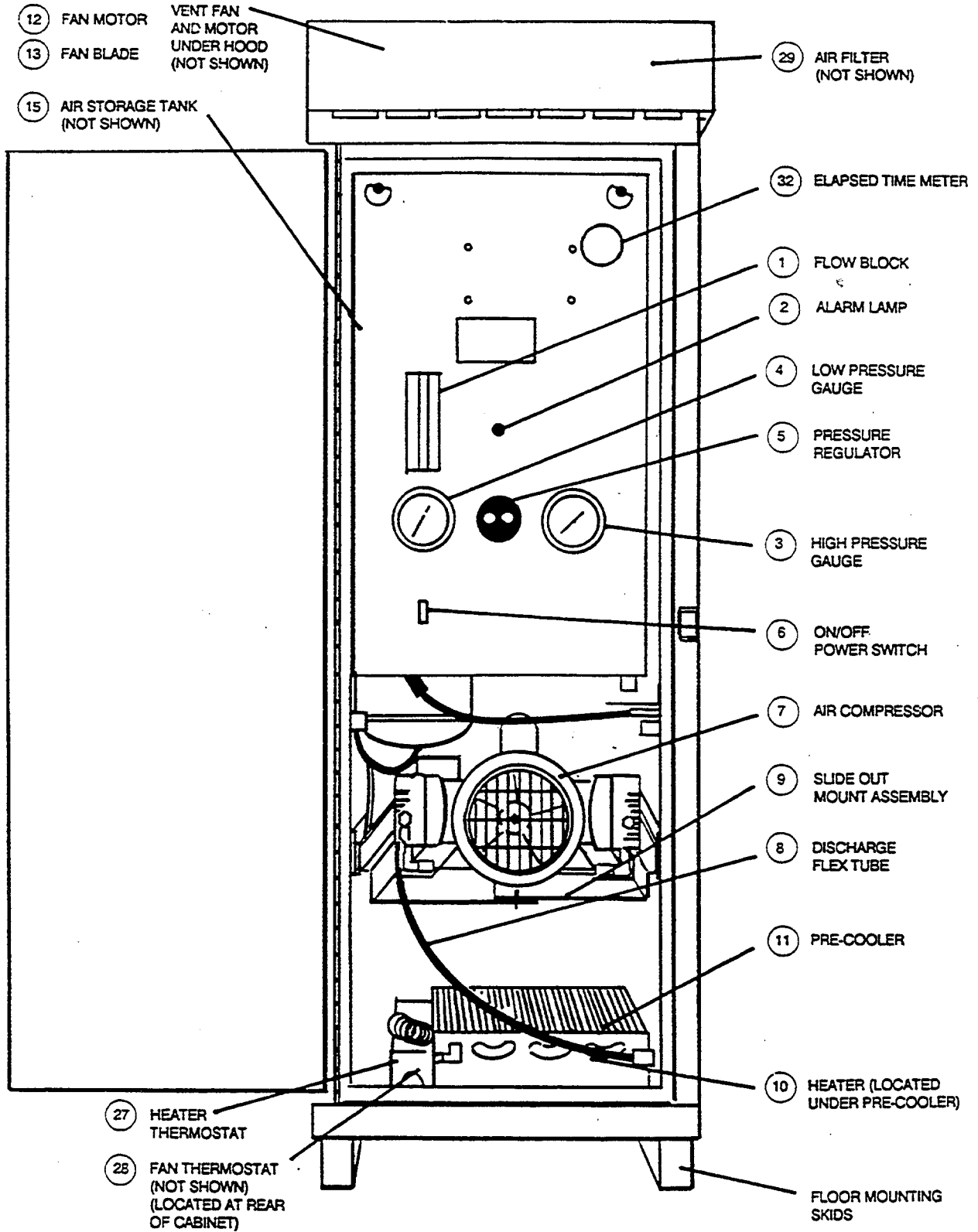
D. Cabinet Temperature Control – The dryer is designed to operate satisfactorily within an ambient temperature range of -40° - $+120^{\circ}$ F. and is equipped with a thermostatically controlled ventilating fan for warm weather operation and a thermostatically controlled heater for cold weather operation.

1. Warm Weather Operation – The fan thermostat operates the fan when the temperature inside the cabinet exceeds approximately $+80^{\circ}$ F. The fan draws ambient air through the vent screen in the top of the unit and exhausts it through the vent screen located in the bottom section of the cabinet. A cleanable filter is located under the hinged top hood.
2. Cold Weather Operation – During extended periods when the cabinet ambient temperature falls, the fan thermostat automatically shuts off the ventilating fan at approximately 70° F. When the temperature in the cabinet falls to approximately 38° F., the cabinet heater will be energized.

Note: A damper can also be provided as optional equipment for those air dryers which are expected to operate continuously at extremely low temperatures. When the cabinet temperature falls to approximately 50° F., the damper will close on those dryers equipped with this option.

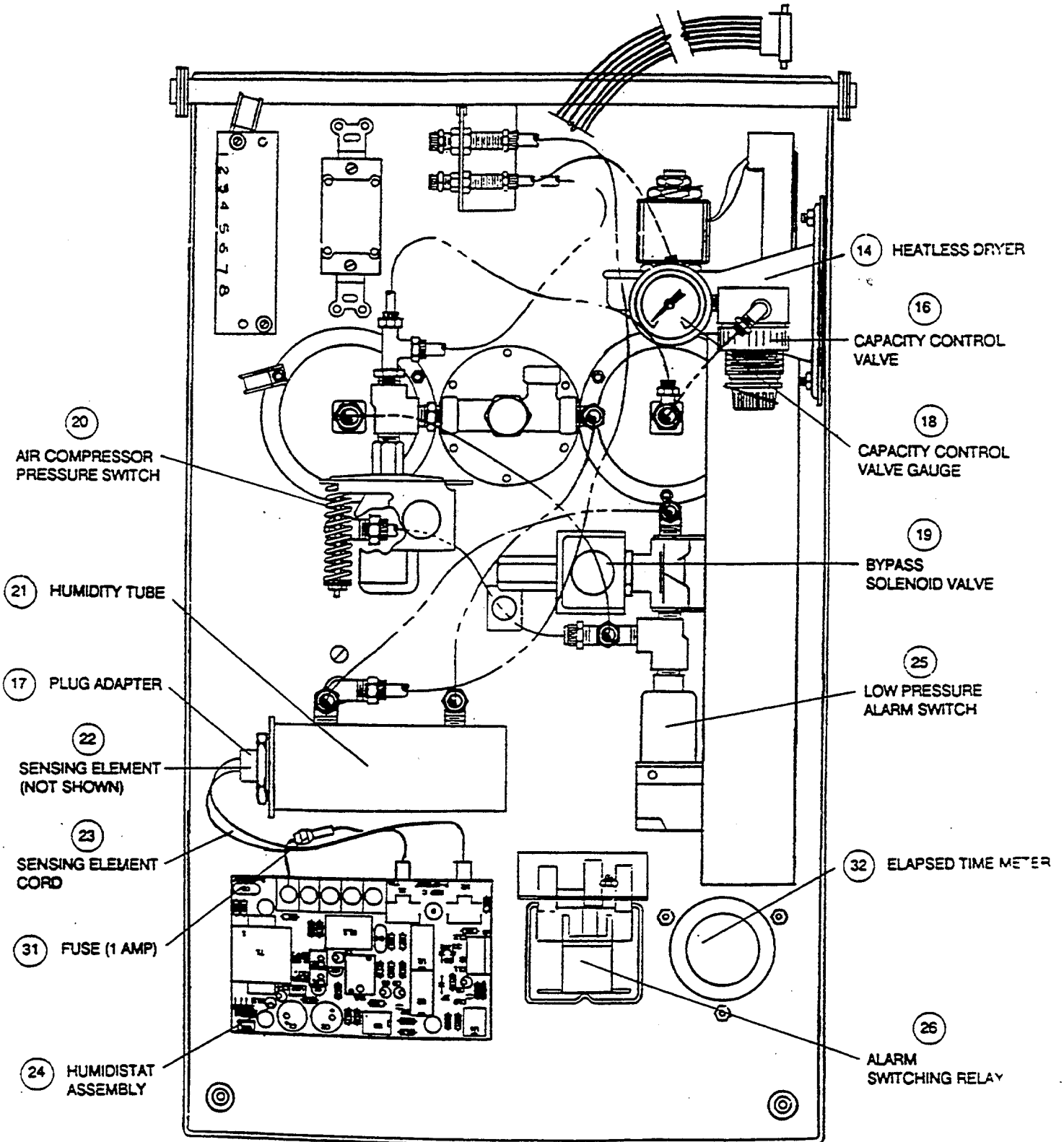
FRONT VIEW

FIGURE 6



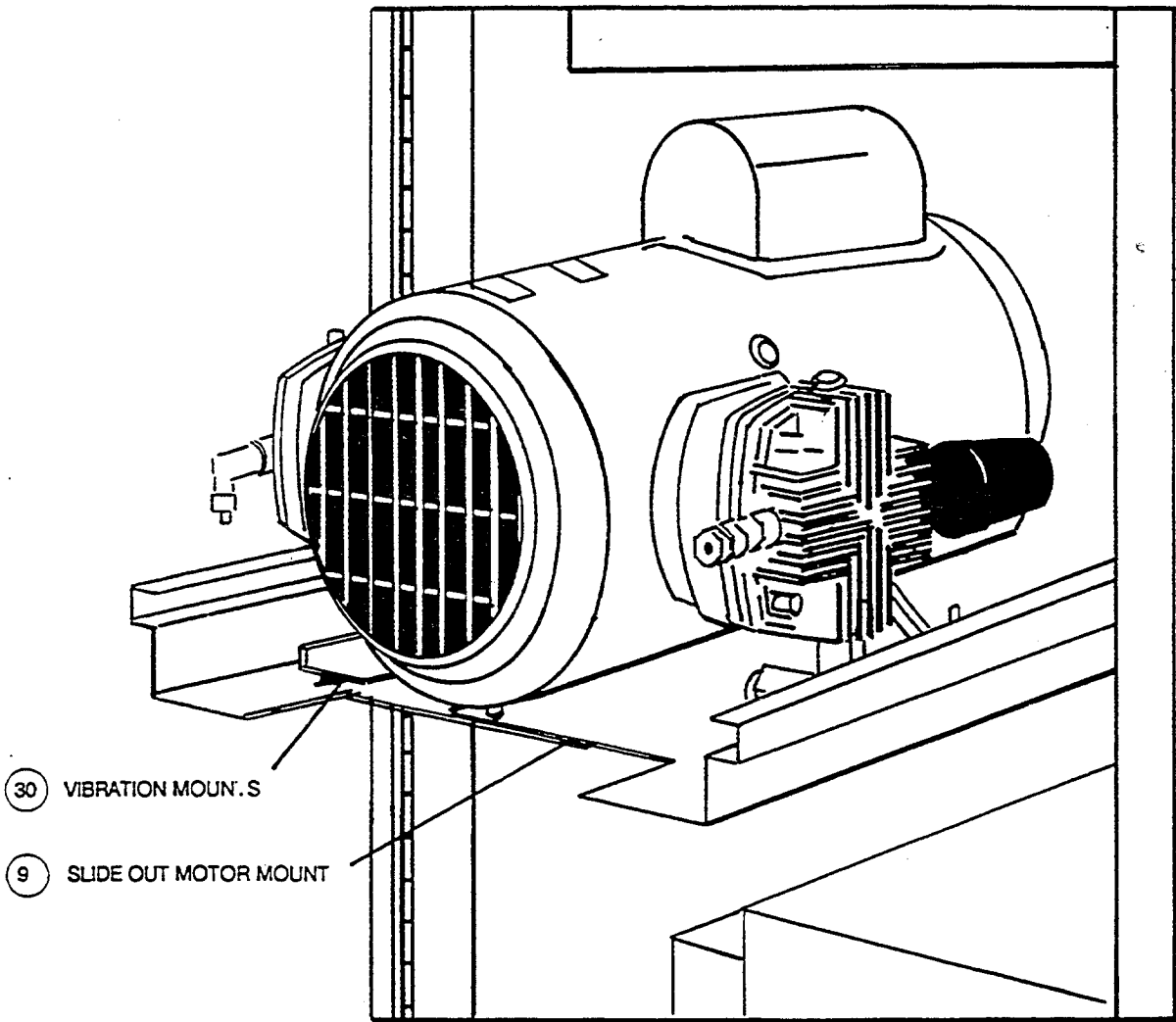
FRONT PANEL (DOWN POSITION)

FIGURE 7



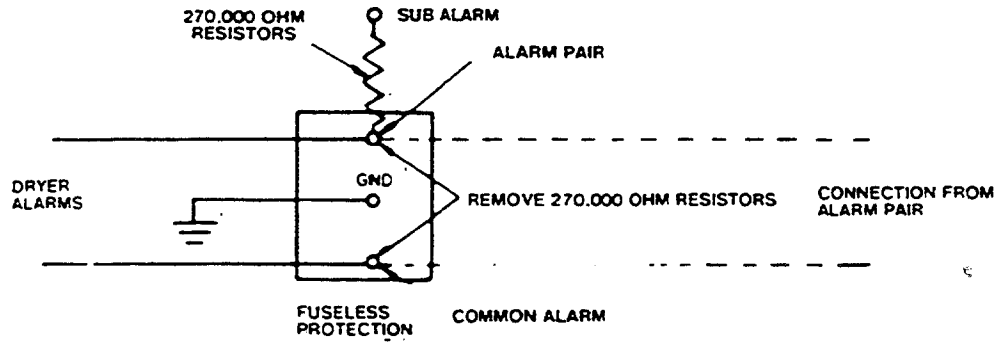
AIR COMPRESSOR (SLIDE OUT)

FIGURE 8

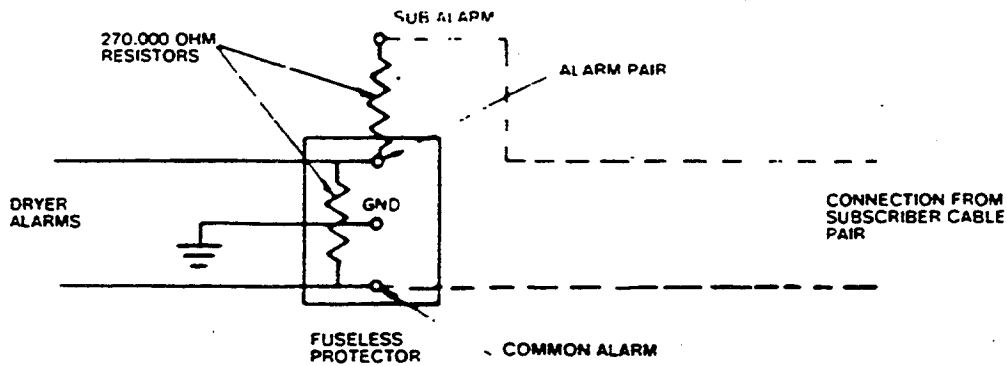


ALARM SCHEMATIC

FIGURE 9



EXTERNAL ALARM SCHEMATIC FOR ASSIGNED PAIR

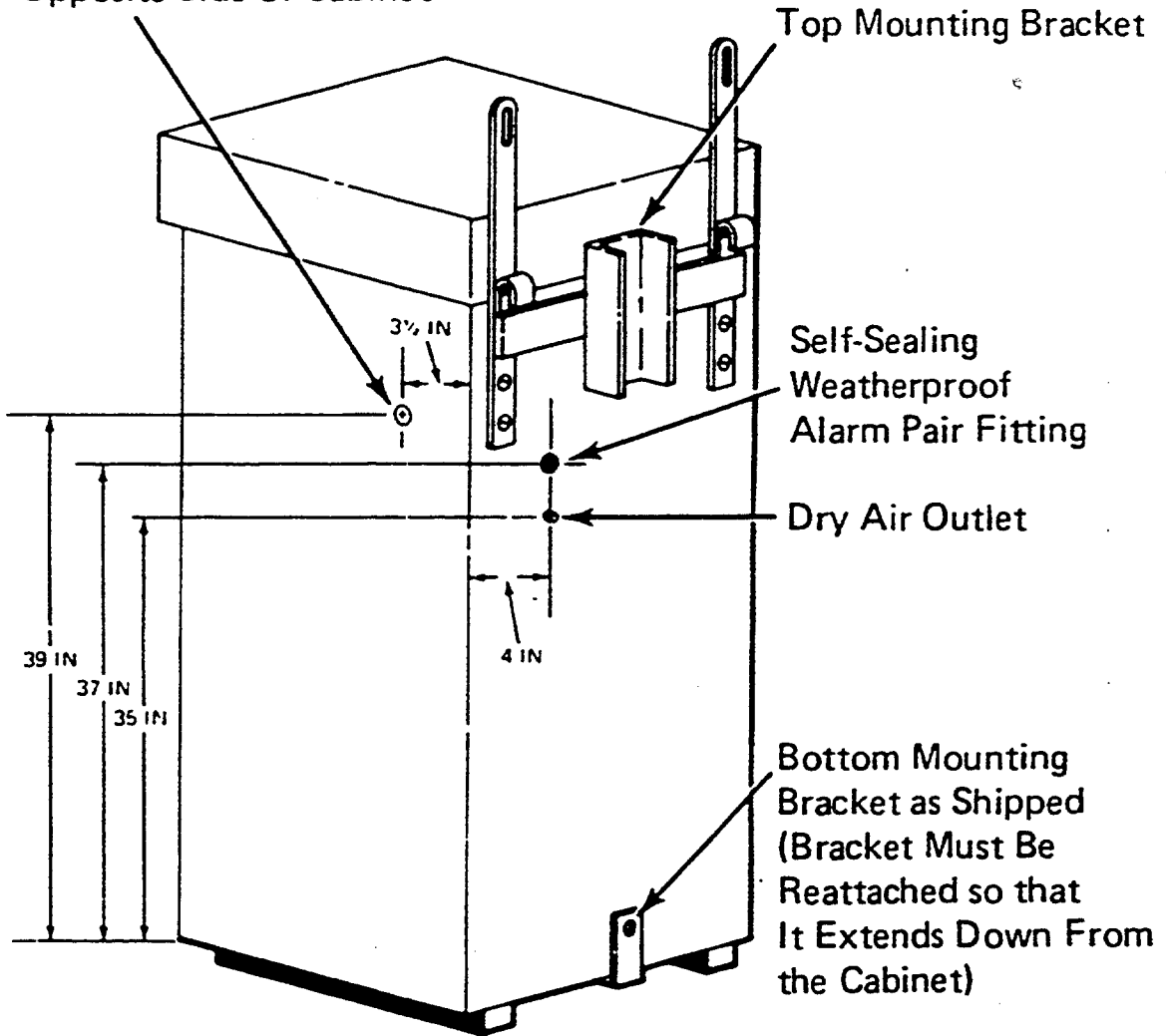


EXTERNAL ALARM SCHEMATIC FOR SUBSCRIBER PAIR

CABINET MOUNTING

FIGURE 10

E-1 Conduit Entrance Knockout
(Conduit Adapter in Accessory Kit)
A Second Knockout is Available on
Opposite Side of Cabinet



III · INSTALLATION AND OPERATION

- A. Electrical Power Requirements and Connections - A 115V, 60 Hz power supply, fused for 20 amps must be provided at the dryer location. A 3/4" rigid metallic conduit adapter has been provided on the side of the cabinet for power service entry. Terminate the power service on the binding posts marked "L1", "L2 and "GND" on the power terminal strip located at the top rear of the cabinet.
- B. Alarm Connection - A self-sealing weatherproof fitting is located in the rear of the cabinet for bringing the alarm pair from the cabinet. Insert the end of the alarm pair into the fitting. The wire opening in the fitting contracts to provide a neoprene seal around the alarm pair when the fitting nut is turned clockwise. Terminate the alarm pair on the on the fuseless protector.
1. If the alarm is to be connected to a separate alarm pair, terminate the wires on the binding posts "Common" and "Alarm". This arrangement will short circuit the line when the alarm operates.
 2. If a subscriber line has been assigned for the alarm, terminate the pair on the "Common Alarm" and "Sub-Pair" binding posts. The fuseless protector is equipped with two 270,000 ohm resistors and both resistors (total 540,000 ohms) are normally across the line, thus providing a means of verifying from the test center that the dryer alarm circuit is connected to the assigned pair. When an alarm condition occurs, the resistor across the Common Alarm and Alarm Pair binding posts will be short circuited leaving a resistance of 270,000 ohms across the line.
- C. Cabinet Mounting
1. Inspect the air dryer for evidence of any exterior or interior shipping damage and immediately report to the carrier.
 2. Remove the two shipping wing nuts and bolts which hold down the compressor base. Remove the two wooden spacer blocks from beneath the compressor base.
 3. The air dryer may be used indoors. Floor mounting is recommended for indoor installations. Locate the unit in a well ventilated area.

III INSTALLATION AND OPERATION (continued)

D. Outdoor Installation

1. The necessary mounting hardware for outdoor pole-mounting is included for each unit: two mounting hooks, two lifting lugs, two spacers and a bottom mounting angle.
2. The air dryer may be mounted on a pole at either ground working level or at higher levels, if required. If placed at ground working level, mount the unit where it will not interfere with pedestrian traffic and where it will not be vulnerable to damage by motor vehicles. If placed at a high level, the bottom of the cabinet should not be less than 10 feet above a sidewalk or 12 feet above a driveway to a residence garage.
3. At 3 inches below the level at which the top of the cabinet will be located, bore an 11/16-inch bolt hold through the pole.
4. Remove the top mounting bracket from the cabinet hanger hooks and secure it to the pole with a crossarm bolt of suitable length. Place a 2 1/4" square washer under the nut and tighten the nut securely.
5. Remove the bottom mounting bracket and bolt.
6. Using the lifting lugs at the upper rear corners, raise the cabinet into place and engage the two hooks over the channel crosspiece of the top mounting bracket. Secure the cabinet in place by tightening the setscrews in each hook.
7. Align the cabinet so that it hangs in a vertical position when viewed from the front and from the side. Place a board or wedge between the pole and the back of the cabinet to hold the cabinet in a vertical position.
8. Attach the bottom mounting bracket to the underside of the cabinet, using the slotted hole in the bracket. The other leg of the bracket should extend down from the cabinet. Position the bracket so that the back surface is in contact with the pole. Tighten the bracket nut securely to the cabinet.
9. Fasten the bracket to the pole with a 1/2" by 4 1/2" drivescrew.
10. Remove the wedge between pole and cabinet after completing the installation.

III INSTALLATION AND OPERATION (continued)

E. Initial Start-up

The following steps should be performed when initially putting the air dryer into service.

1. Release the adjustment knob locking mechanism on the standard outlet pressure regulator and turn the adjustment knob counterclockwise to initially cut off outlet flow for leak testing.
2. Apply power to the air dryer and allow the tank pressure to build up to about 50 PSIG (as read on the tank pressure gauge).
3. Soap test for air leaks all air connections between the air compressor and the inlet of the outlet pressure regulator.
4. Turn the outlet pressure regulator knob clockwise until air starts to bleed either from the outlet fitting at the rear of the unit or from the humidity bypass solenoid valve. The outlet flow should be low enough to allow the compressor to fill the air storage tank from 25-50 PSIG in 60-90 seconds.
5. Allow the dryer to run for about 15 minutes to purge moisture from the dry air lines, or until the humidity alarm has cleared.
6. Turn the adjustment knob of the outlet air pressure regulator counterclockwise until air is no longer bleeding from the dry air outlet.
7. Connect the equipment to the cable or waveguide system. The air outlet is a 3/8" O.D. copper tubing compression fitting.

IV ALARMS AND ADJUSTMENTS

A. Low Pressure Alarm - Refer to Low Pressure Alarm drawing, Figure 11.

The low pressure alarm pressure switch is a snap action, single pole, double throw switch which is not sensitive to minor vibrations and will provide repetitive accuracy. The pressure alarm switch is factory set to alarm at 6.5 PSIG and should be reset to conform to your specifications. Adjustment can be set as follows:

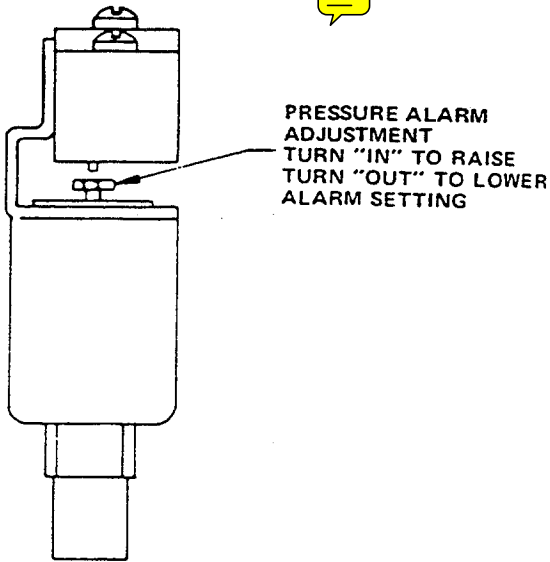
1. Adjust the pressure regulator to the desired alarm pressure.
2. Turn the hexagon pressure alarm adjustment on the pressure switch clockwise (in) to raise the pressure setting, or counterclockwise (out) to lower the setting. The setting should be made so that the alarm is just activated at the set pressure.

B. Humidity Alarm - Refer to Humidity Alarm Board drawing - Figure 12.

1. The humidity alarm includes a plug-in LED humidity monitoring system, consisting of four green and three red LEDs, which will always remain lit when the outlet air is below 2% relative humidity at 70° F. The LEDs will progressively go out as the relative humidity of the outlet air exceeds the percentage shown for each light.
2. Operation of the alarm may be checked by reducing the outlet pressure to 0 PSIG and by removing the sensing element from the humidity tube and breathing on it. An alarm condition will result and under normal operation conditions, the optional wet air bypass solenoid valve will discharge air through an orifice to the atmosphere. The alarm should clear shortly after reinstalling the sensing element and adjusting the outlet pressure to its original setting.

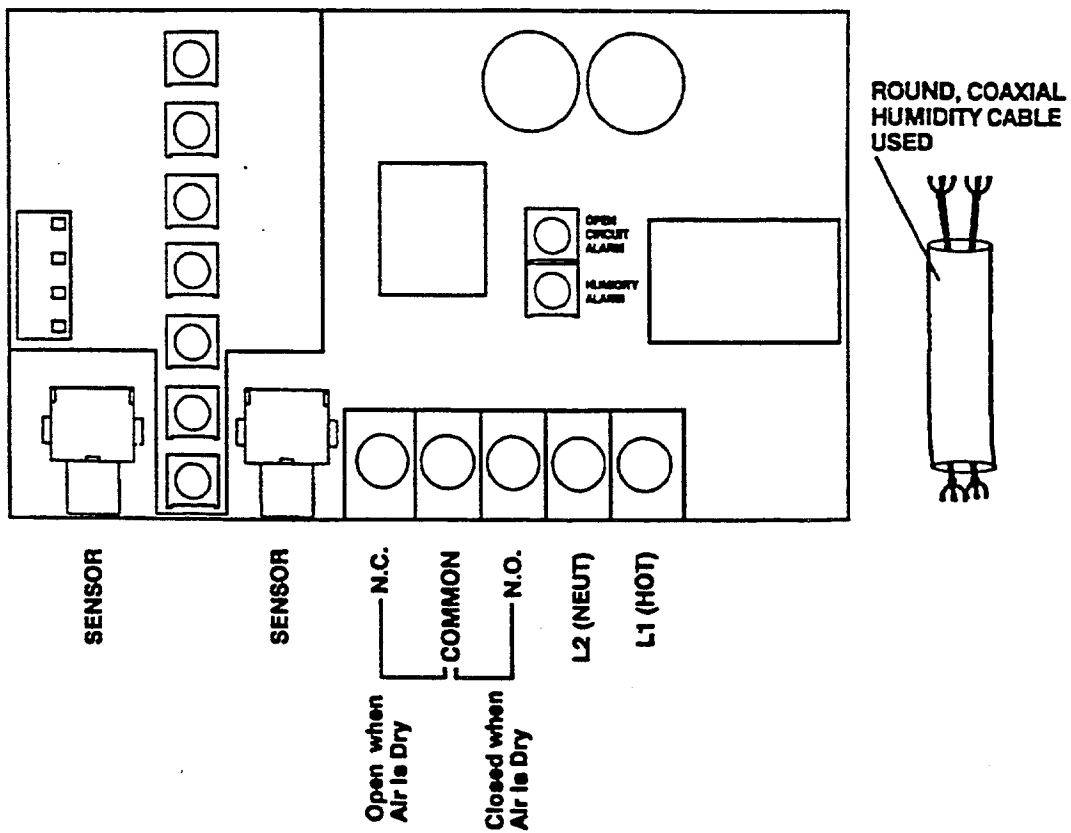
LOW PRESSURE ALARM

FIGURE 11



HUMIDITY ALARM BOARD

FIGURE 12



V GENERAL MAINTENANCE

- A. Safety - This section requires access to the components of the air dryer unit. Except in the special cases where an energized and operating unit is specified, **personal safety requires that the electrical power be turned off and the electric supply be disconnected from the unit.** When the equipment is energized for tests or adjustments, exercise constant care to avoid contact with live electrical or moving parts.
- B. Routine Checks - It is recommended that the following inspection procedures be performed at 6 month intervals to insure continued satisfactory operation:
1. Air Compressor safety relief valve - *See Maintenance, Paragraph C.*
 2. Compressor pressure switch - *See Maintenance, Paragraph D.*
 3. Capacity control valve - *See Maintenance, Paragraph E.*
 4. Heatless dryer/compressor capacity - *See Maintenance, Paragraph F.*
 5. Compressor intake filters - *See Replacement Parts List Paragraph G.*
 6. Pressure alarm - *See Section 4, Paragraph A.*
 7. Humidity alarm - *See Section 4, Paragraph B.*
- C. Air Compressor Safety Relief Valve - *See Air Compressor Exploded View, Figure 20.*
1. Check safety relief valve setting as follows:
 - a. With the compressor running, release the adjustment locking mechanism on the capacity control valve and turn knob clockwise to increase pressure to 60 PSIG, as shown on the capacity control valve pressure gauge. If the pressure cannot be increased above 60 PSIG with an additional turn or two of the adjustment knob, the relief valve is set properly.
 - b. With the air compressor running and the tank pressure gauge reading below 35 PSIG, turn the capacity control valve adjustment knob counterclockwise until the capacity pressure gauge indicated 50 PSIG. Using the locking mechanism, lock the adjustment knob and check the setting by observing the capacity pressure gauge. The gauge should reach a pressure reading of 50 PSIG within 5 seconds after the compressor starts running.

- V. GENERAL MAINTENANCE (continued)
- C. Air Compressor Safety Relief Valve (continued)

- 2. Safety relief valve adjustment is as follows:
 - a. Adjust the capacity control valve to 65 PSIG.
 - b. Referring to Figure 20, loosen the safety valve locknut (item 15) and adjust the screw (item 1) until the maintained pressure is 60 PSIG on the capacity control valve gauge and the relief valve is bleeding air.
 - c. Tighten the locknut (item 15) of the relief valve. After tightening the locknut, the gauge should still read 60 PSIG.
 - d. Reset the capacity control valve to 50 PSIG. For setting instructions refer to Paragraph C.1 of this section.
 - e. Allow the compressor to cycle through the tank pressure range several times and check to be sure the compressor safety valve has reseated properly and is not leaking.

CAUTION:

The relief valve must remain closed during the time the compressor is running and the air tank pressure is 50 PSIG or below, otherwise increased the compressor run time or continuous compressor operation could result.

- D. Air Compressor Pressure Switch Adjustment - Refer to Figure 13, Page 20. The air compressor ON/OFF pressure switch is factory set to maintain the dry air storage tank pressure between 20-50 PSIG. Adjustment is as follows:
 - 1. Range Adjustment Nut - Each turn of this nut changes both cut-in and cut-out pressure. To increase cut-out pressure, turn clockwise. To decrease cut-out pressure, turn counterclockwise.
 - 2. Differential Adjustment Nut - Each turn of this nut changes only the cut-in pressure (or differential). To increase differential, turn nut clockwise. To decrease differential, turn nut counterclockwise.

V. GENERAL MAINTENANCE (continued)

E. Capacity Control Valve - This valve has been factory set to 50 PSIG to prevent the dryer from delivering more than its maximum rated dry air capacity. If the capacity control valve pressure gauge reads less than (or more than) 50 PSIG within seconds after the compressor starts to run, adjustments will be necessary. These adjustments are as follows:

1. Make sure the air compressor is running and the tank pressure gauge is below 35 PSIG at the time of the adjustment.
2. Release the adjustment knob locking mechanism. Turn the knob clockwise to increase and counterclockwise to decrease the pressure until 50 PSIG is read on the capacity control valve pressure gauge.
3. Lock adjustment knob and check setting by observing pressure. It should be 50 PSIG, within 3-5 seconds after compressor starts running.

F. Heatless Dryer and Compressor Capacity - See *Dryer and Compressor Capacity Graphs, Page 20*. These graphs show dryer capacity vs. compressor run time and compressor off time. A thorough check of the compressor performance should be made if the compressor run time has increased to two times the theoretical run time. Proceed as follows:

1. Determine the amount of time the compressor is running.
2. Determine the amount of time the compressor is off.
3. Refer to the appropriate model number capacity graph.
4. Estimate the flow rate (SCFD) to determine the theoretical run time.
5. If the actual run time obtained in Step 1 is longer than the theoretical run time, check for air leakage at all fittings and components located between the compressor and the outlet of the dryer.

*Note: When checking for air leaks upstream of the capacity control valve, the compressor must be running. There is pressure in these lines **ONLY** when the compressor is running.*

6. Time the compressor running period after carefully removing the filter felt from the compressor intake filter housing. If the run time shows a significant improvement, install a new filter element.

Note: Do not remove the filter housing from the compressor.

7. If, after replacing the intake filter element, the compressor run time is still about one and a half times the theoretical run time for the flowrate obtained in Step 4, proceed with maintenance of the compressor as described in Section VI.

AIR COMPRESSOR PRESSURE SWITCH

FIGURE 13

ADJUST IN PROPER SEQUENCE

STEP NO. 1

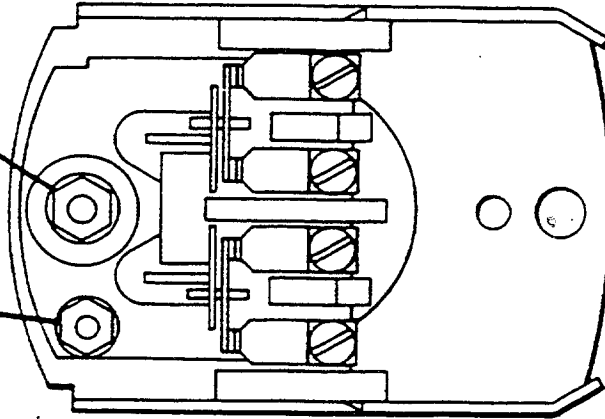
RANGE ADJUST

TURN DOWN FOR HIGHER CUT-IN PRESSURE. OR UP FOR LOWER CUT-IN

STEP NO. 2

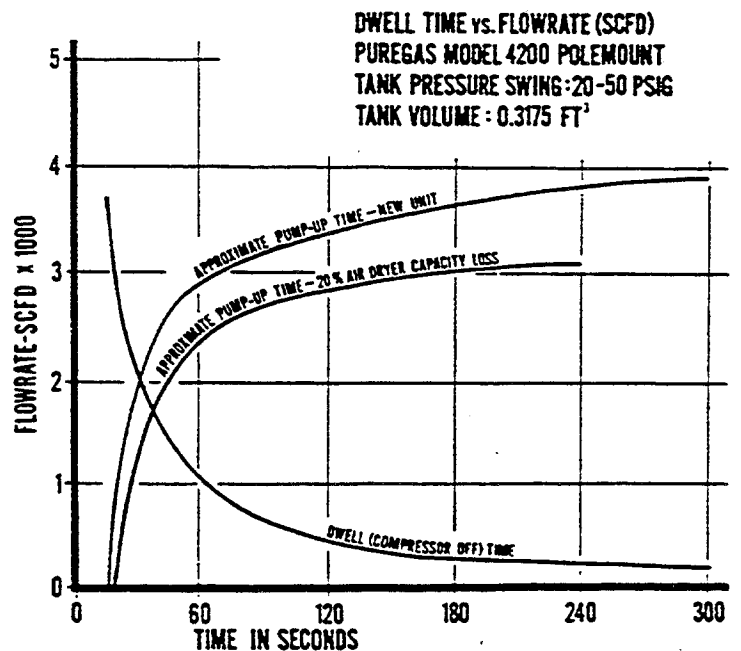
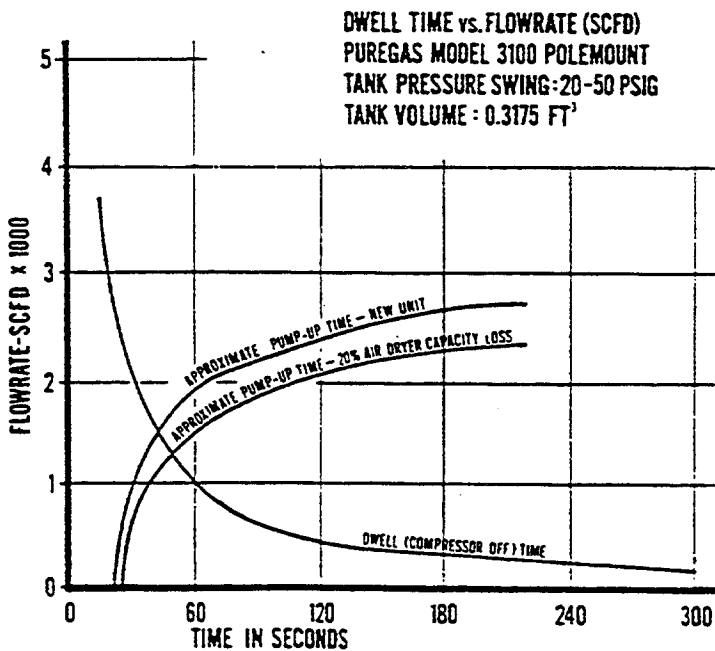
DIFFERENTIAL ADJUST

TURN DOWN FOR HIGHER CUT-OUT, OR UP FOR LOWER CUT-OUT



DRYER CAPACITY AND COMPRESSOR CAPACITY GRAPH

FIGURE 14



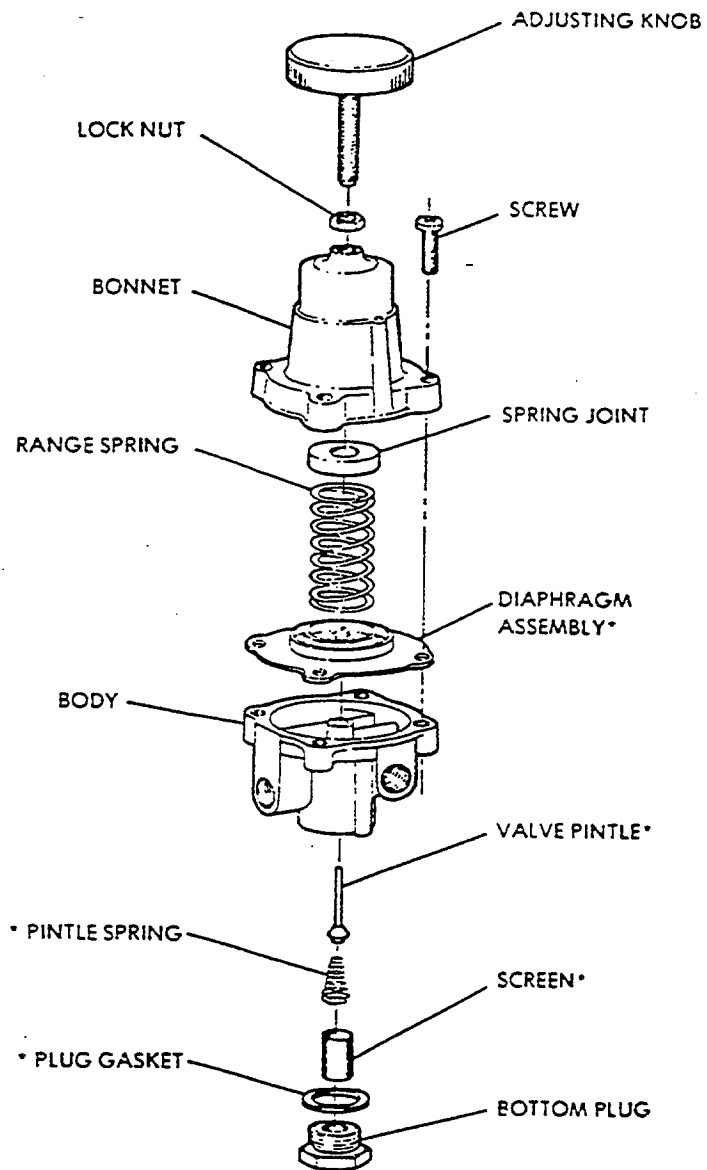
V GENERAL MAINTENANCE (continued)

G. Replacement Parts List - For air dryer component parts reference numbers **see Figures 6, 7 and 8.**

<u>Ref.</u>	<u>Description</u>	<u>P-3100STD</u>	<u>P-4200STD</u>
1	Flow Block	P-8805	P-02301
2	Alarm Lamp	P-3450	P-3450
3	High Pressure Gauge	P-B-101	P-B-101
4	Low Pressure Gauge (0-30 PSIG)	P-02281	P-02281
5	Pressure Regulator	P-01548	P-0 3348
6	On/Off Switch	P-B-117	P-B-117
7	Air Compressor	P-02293	P-3966-3L
8	Discharge Flex Tube	P-B-431	P-B-431
9	Slide-Out Motor Mount Assy.	P-9638	P-9638
10	Cabinet Heater	P-3175	P-3175
11	Pre-Cooler Assy.	P-4642	P-4642
12	Fan Motor	P-4562	P-4562
13	Fan Blade	P-4561	P-4561
14	Heatless Dryer (HF2C-112-034)	P-4644	
	Heatless Dryer (HF2C-112-041)		P-01237
15	Air Storage Tank	P-9647	P-9647
16	Capacity Control Valve	P-4634	P-4634
17	Plug Adapter	P-4157	P-4157
18	Heatless Dryer Gauge (0-100 PSIG)	P-3197	P-3197
19	Bypass Solenoid Valve	P-5000-1-85	P-5000-12-85
20	Air Compressor Pressure Switch	P-4564	P-4564
21	Humidity Tube	P-4601	P-4601
22	Humidity Sensing Element (not shown)	P-5000-6-47D	P-5000-6-47D
23	Sensing Element Cord	P-07579-G4	P-07579-G4
24	Humidity Board	P-07580-F2	P-07580-F2
25	Low Pressure Alarm Switch	P-8818	P-8818
23	Alarm Switching Relay (Mfg. after 8/85 solid black)	P-4547	P-4547
	Alarm Switching Relay (Mfg. before 8/85 clear plastic)	P-02253	P-02253
27	Thermostat, Heater	P-B-118	P-B-118
28	Thermostat, Fan	P-B-119	P-B-119
29	Air Filter, Cabinet	P-02235	P-02235
30	Vibration Mounts	P-4582S	P-4582S
31	Fuse	T-1338	PAT-1338
	Fuse Holder Assy.	P-05519	P-05519
32	Elapsed Time Meter	P-02358	P-02358

PRESSURE REGULATOR REPAIR KIT (P-02306)

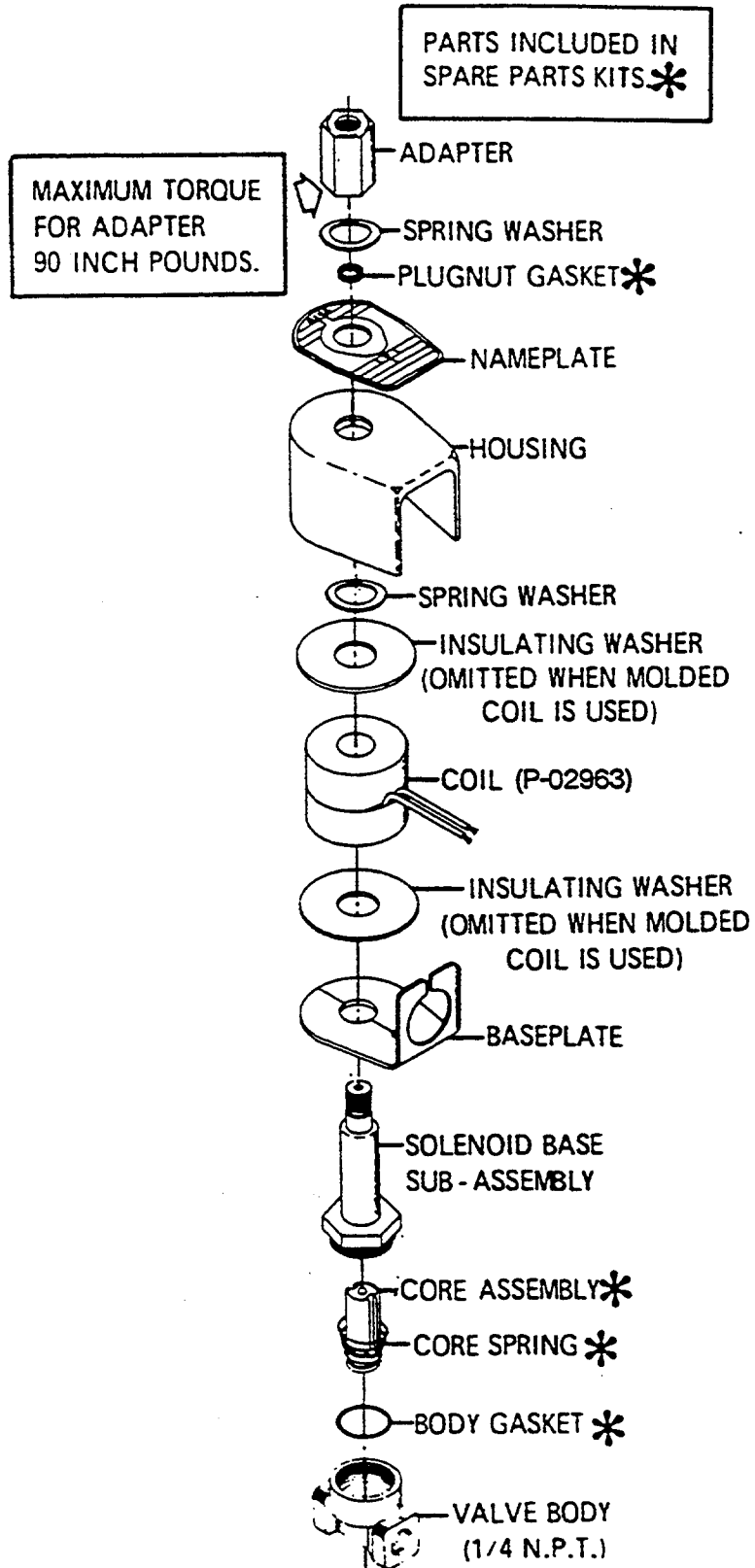
FIGURE 15



* THESE PARTS INCLUDED IN P-02306 REPAIR KIT

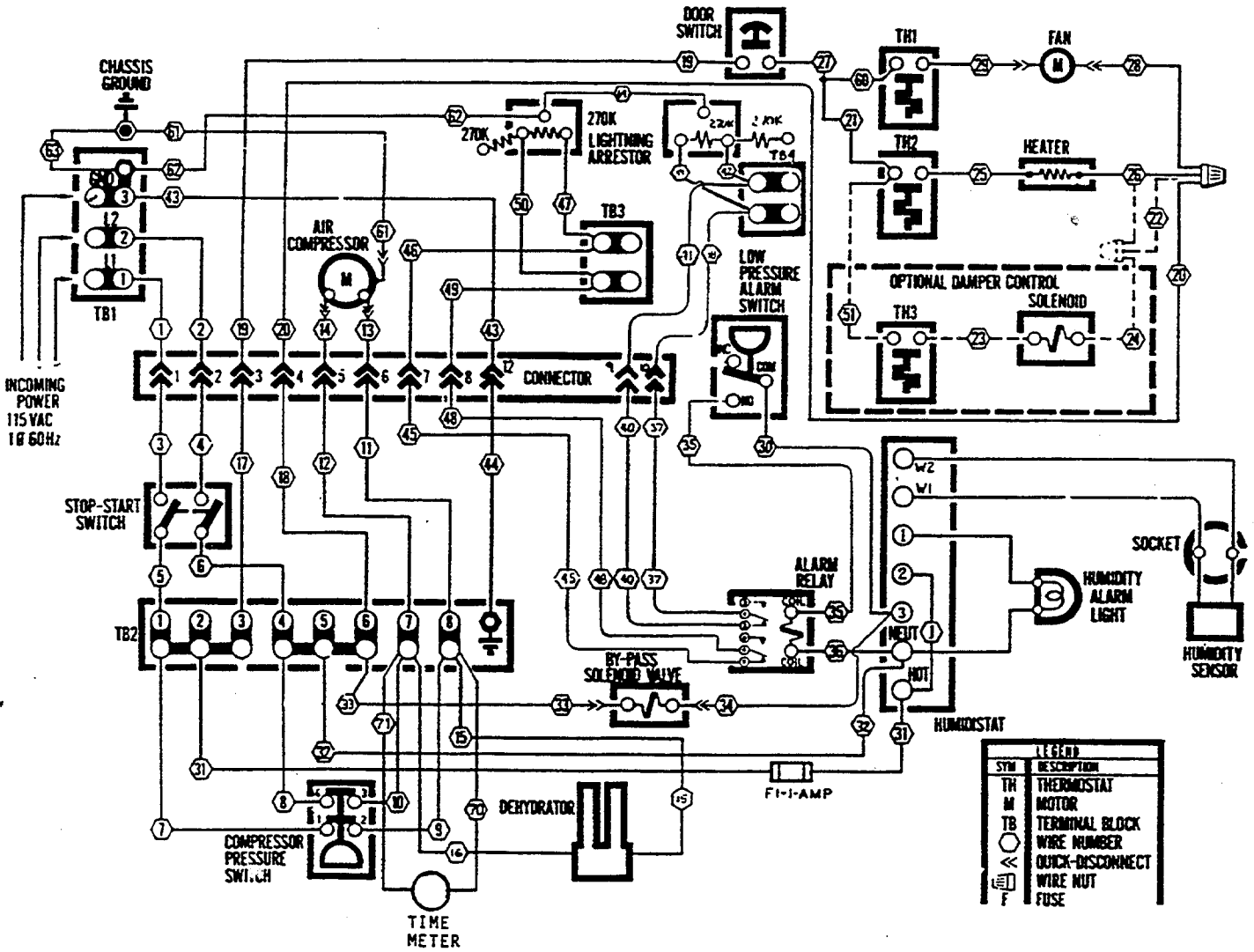
BYPASS SOLENOID REPAIR KIT (P-02964)

FIGURE 16



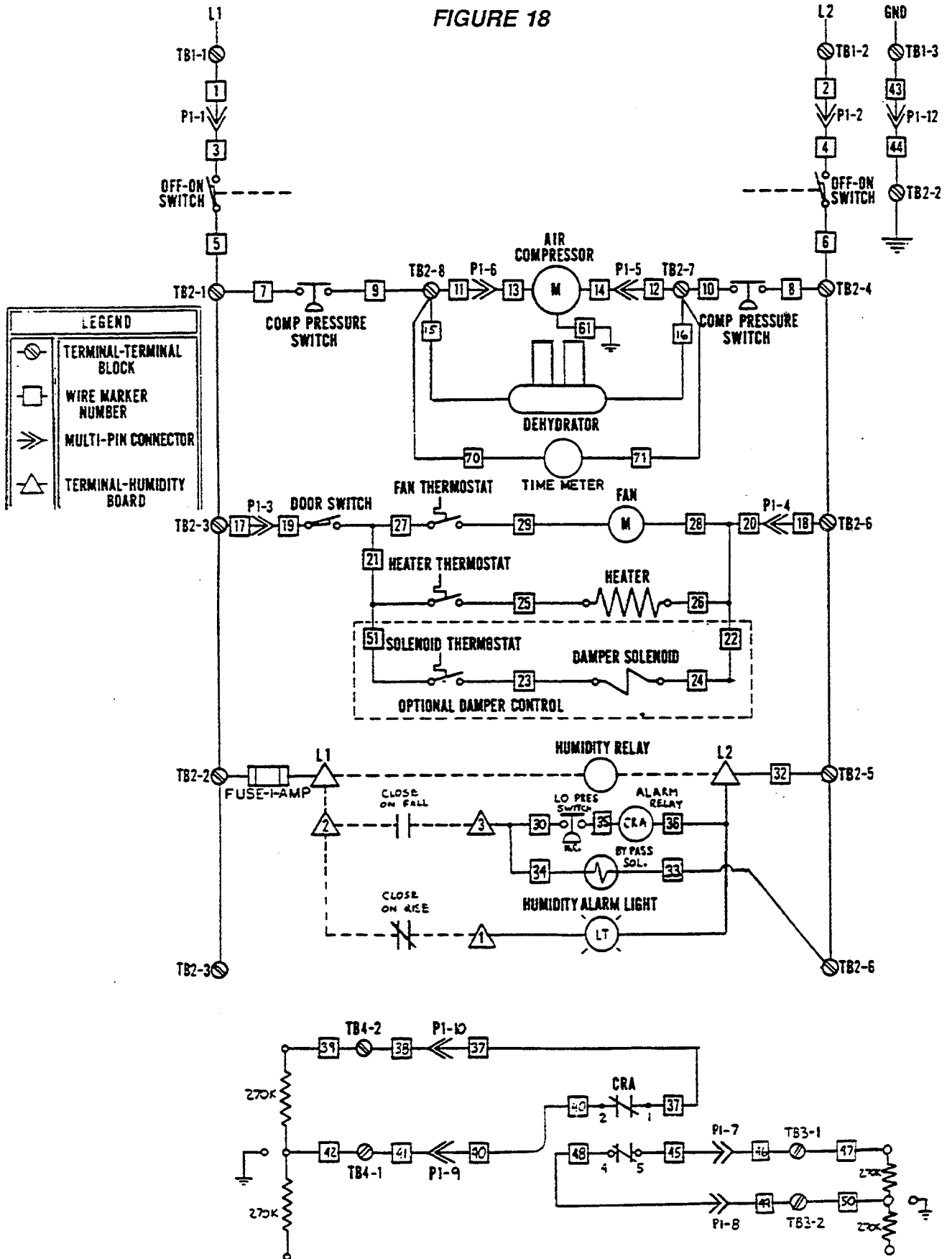
WIRING DIAGRAM

FIGURE 17



ELECTRICAL SCHEMATIC

FIGURE 18



VI AIR COMPRESSOR MAINTENANCE

A. General - Air Compressor Maintenance is recommended every 4000 hours of operation. *For reference numbers, see Air Compressor Exploded View, Figure 20.* Tools required for this routine maintenance are: Phillips-head screwdriver, 3/16 Allen wrench (P-B-104), adjustable wrench, sheets of Emery cloth 240 and 400 grit.

B. Maintenance Instructions - The wear of the air compressor rings are affected by ambient conditions. At 80-85° F. maximum ambient temperature and 40% relative humidity (maximum average), it is suggested the compressor life between maintenance checks be set at approximately 4,000 hours of run time.

Note: At higher ambient temperatures, maintenance must be performed more frequently.

The air compressor is oilless and requires no lubrication. After approximately 4000 hours of compressor operation, it is recommended that the piston rings, piston seals, rider rings, inlet valves, outlet valves, valve plate and gaskets be replaced.

C. Maintenance Kit - This kit is designed to provide the parts necessary for one year's maintenance on the Model P-3100STD/4200STD air dryer. The kit ordering part number is P-3865 and includes the following items:

<u>Part Number</u>	<u>Description</u>	<u>Qty.</u>	<u>Ref. No.</u>
P-3861	Piston Seal	4	29
P-3862	Piston Ring	4	28
P-3864	Manifold Sleeve	2	40
P-3866	Head Gasket	2	21
P-3867	Outlet Valve	2	22
P-3868	Inlet Valve	2	24
P-3869	Cylinder Gasket	2	25
P-3870	Valve Plate	2	23
P-3986	Filter Felt	4	5

D. Compressor Disassembly - Refer to Air Compressor Exploded View, Figure 20.

1. Remove the filter felt from the filter assembly by gently turning the filter housing counterclockwise approximately 1/3 turn. It is not necessary to remove the filter assembly from the cylinder head.
2. Remove the 4 screws which secure the compressor shroud and pull shroud forward and off the compressor housing.
3. Remove the 4 head screws and lift off the cylinder head and valve components.

VI AIR COMPRESSOR MAINTENANCE (continued)

D. Compressor Disassembly (continued)

4. Remove the 2 cylinder screws and 2 lock washers and lift out the cylinder.
5. Remove the piston seals, piston rings and rider rings.
6. The air compressor gaskets may have become firmly attached to the cylinder or cylinder head. Use a knife to remove the old gasket material, being careful not to mar the flat gasket sealing surfaces. Use No. 240 grit emery cloth (or wet/dry abrasive material) to flat-sand the gasket surfaces of the cylinder and cylinder head. Follow with No. 400 grit emery cloth to dress these flat surfaced before reassembly with new gaskets. **Do not use abrasives on the cylinder wall.**
7. Clean all components, except the cylinder, with an industrial, non-flammable, non-toxic cleaning solvent before reassembly.

CAUTION:

Do not flood the piston wrist pin or connecting rod main bearing with solvent, as the permanent lubricant will be washed away.

E. Maintenance Kit Installation and Compressor Reassembly

1. Install the new piston seals, piston rings and the rider rings on the piston. Locate the ring joints approximately opposite each other.
2. Attach cylinders to bracket with the cylinder screws and lock washers. ***Tighten screws finger tight.*** Move the piston to the top dead center position and adjust the cylinder flush with the top of the piston and tighten down on the cylinder screws. (Torque the cylinder screws to 150-160 Lb. In. Retorque a second time.)
3. Stack and install the valve components observing the two sets of small alignment holes as shown in Figure 20. The leaves on the inlet and outlet valves have been pre-bent and should not be adjusted in any way.
4. Install the head assembly using the lock washers and head screws. On the top of each cylinder head the end 2 fins have been omitted. They are always in the exhaust port. Torque all head screws to 110-120 Lb. In. Retorque a second time.
5. Install a new filter element on the inlet filter base and replace the filter housing. Push the housing into the base as far as it will go and turn the housing clockwise 1/3 turn to the stop.
6. Install manifold nuts and new sleeves on the manifold and assembly to the elbow fitting on the head assembly. ***Do not tighten.***

VI AIR COMPRESSOR MAINTENANCE (continued)

E. Maintenance Kit Installation and Compressor Reassembly (continued)

7. Install the second head assembly and assemble the manifold. Retighten all head screws and manifold nuts.
8. If a compressor can be easily rotated by hand, install shroud.
9. Apply power to the compressor motor. If the compressor or motor is excessively hot or noisy; disconnect the power. Review assembly instructions and Figure 20 again to check for the proper installation of the compressor maintenance kit.
10. Soap test all fittings.

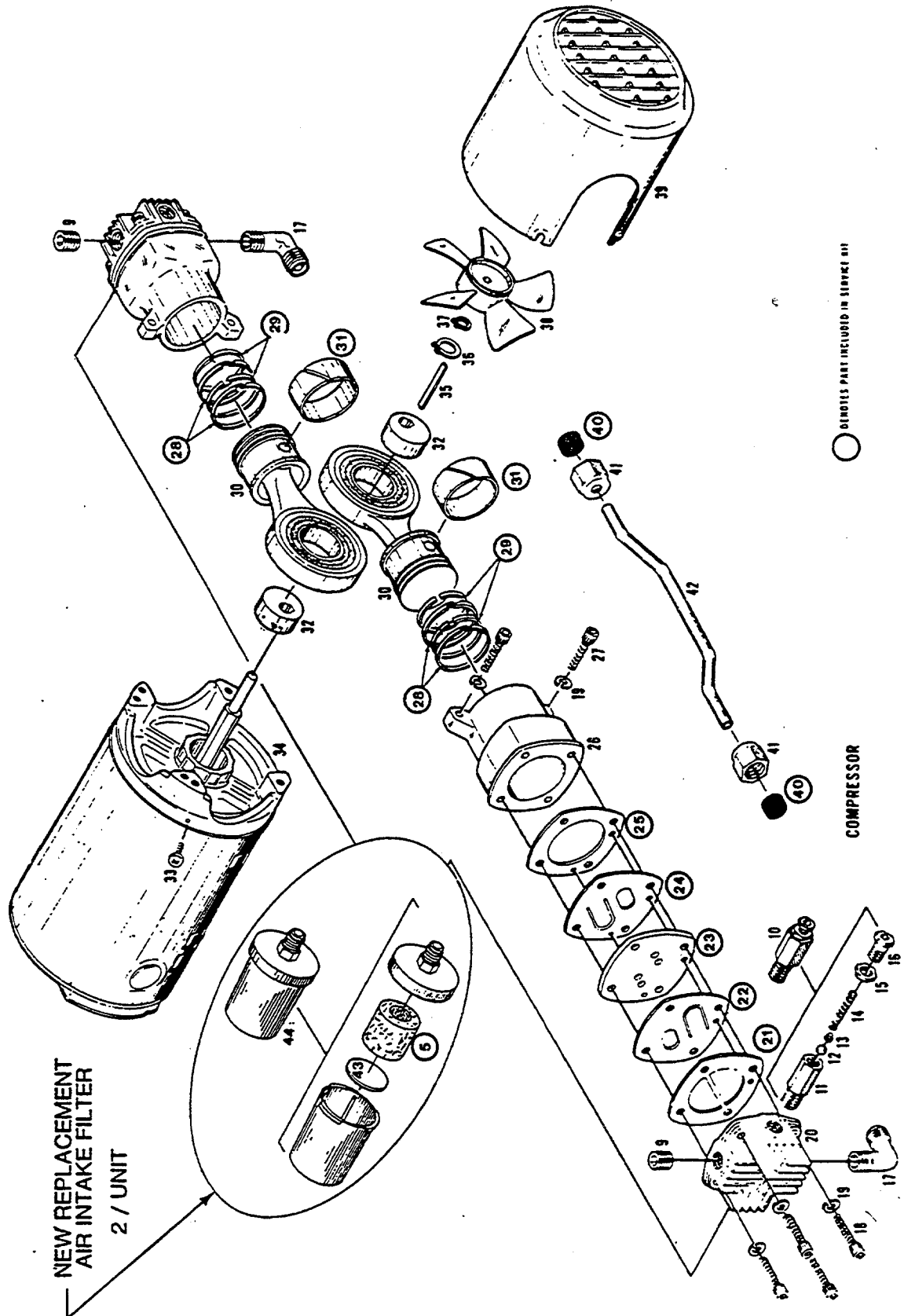
AIR COMPRESSOR TROUBLESHOOTING CHART

FIGURE 19

REASON	COMPLAINT			
	<i>Low Pressure</i>	<i>Overheating or excessive AMP Draw</i>	<i>Excessive Noise</i>	<i>Won't Start Under Load</i>
Worn Piston Rings	X			
Worn Rider Rings	X		Piston Hitting Cylinder	
Dirty Valves	X			
Bent Valves	X			
Blown Head Gasket	X		Air Blowing Out Intake Filter	
Dirty Filters	X			
Low Voltage		X		X
Cylinder Mis-adjustment		Piston Hitting Intake Valve	Piston Hitting Intake Valve	X
Leaky Connections	X			
Relief Valve Set Too High		X		
Relief Valve Set Too Low	X			
Wrong Voltage Hookup		X	X	X
Dirt or Liquid in Top of Piston	X	X	X	X

EXPLODED VIEW OF AIR COMPRESSOR AND MOTOR ASSEMBLY

FIGURE 20



VI AIR COMPRESSOR MAINTENANCE (continued)

F. Air Compressor Parts List
(Refer to Figure 20)

Ref.	<u>No.</u>	<u>Description</u>	<u>P3100STD</u>	<u>P-4200STD</u>
	9	Pipe Plug (2 required)	P-3998	P-3998
	10	Safety Valve	P-3996	P-3996
	11	Body		
	12	Ball	P-3994	P-3994
	13	Spring Button	P-3993	P-3993
	14	Spring	P-3992	P-3992
	15	Lock Nut	P-3991	P-3991
	16	Adjustment Screw	P-3990	P-3990
	17	Manifold, Elbow (2 required)	P-4024	P-4024
	18	Head Screw (8 required)	P-4025	P-4025
	19	Lock Washer (12 required)	P-4026	P-4026
	20	Cylinder Head (2 required)	P-3875	P-3875
	21	Head Gasket (2 required)	P-3866	P-3866
	22	Valve Outlet (2 required)	P-3867	P-3867
	23	Valve Plate (2 required)	P-3870	P-3870
	24	Valve Inlet (2 required)	P-3868	P-3868
	25	Cylinder Gasket	P-3869	P-3869
	26	Cylinder (2 required)	P-3874	P-3874
	27	Cylinder Screw (4 required)	P-4025	P-4025
	28	Piston Ring (4 required)	P-3862	P-3862
	29	Piston Seal (4 required)	P-3861	P-3861
	30	Piston Rod Assy. (2 required)	P-3872	P-3872
	31	Rider Ring (2 required)	P-3981	P-3981
	32	Eccentric (2 required)	P-02645	P-02138
	33	Screw (4 required)	P-4033	P-4033
	34	Bracket	P-02646	P-01239
	35	Key	P-4040	P-4040
	36	Not Supplied		
	37	Retaining Ring	P-4021	P-4021
	38	Fan	P-3873	P-3873
	39	Shroud	P-3871	P-3871
	40	Manifold Sleeve (2 required)	P-3864	P-3864
	41	Manifold Nut (2 required)	P-4043	P-4043
	42	Manifold	P-02647	P-01240
	5	Filter Felt (2 required)	P-3986	P-3986
	44	Air Intake Filter Assy.(2/required)	P-02619	P-02619

VII DEHYDRATOR MAINTENANCE (Refer to Figure 21)

A. General - The dehydrator has a timer which switches from one tower to the other every 30 seconds. This is heard as an air purge and can be timed. If this purge cannot be heard, the dehydrator is defective.

B. Maintenance Instructions

1. **Wet Air Condition** - A wet air condition can be caused by low delivered air pressure to the dehydrator. If a wet air condition cannot be corrected by air compressor maintenance, the trouble lies in the dehydrator. Prior to checking out the dehydrator, ensure that none of the air fittings leak.
2. **Air Purge** - If there is no air purge every 30 seconds ($\pm .5$ seconds) the cause may be a defective timer or defective solenoid valve.
3. **Orifice** - Purge orifice glands are screwed into the manifold beneath the desiccant chambers. To change orifices, unscrew the chamber and use a standard 7/8" socket wrench for the orifice. The cycle timer can be replaced in the field.
4. **Desiccant** - Improper packing of the desiccant chambers can cause channeling of the gas stream and improper purification. For this reason **No attempt should be made to repack desiccant chambers in the field.** Contact Puregas Customer Service to obtain replacement chambers.

C. Maintenance Kit - Normally, the only maintenance required on the dehydrator is the installation of a maintenance kit once every two years (or 8000 hours of operation). The ordering part number for this maintenance kit is P-200-499S. This kit contains the following:

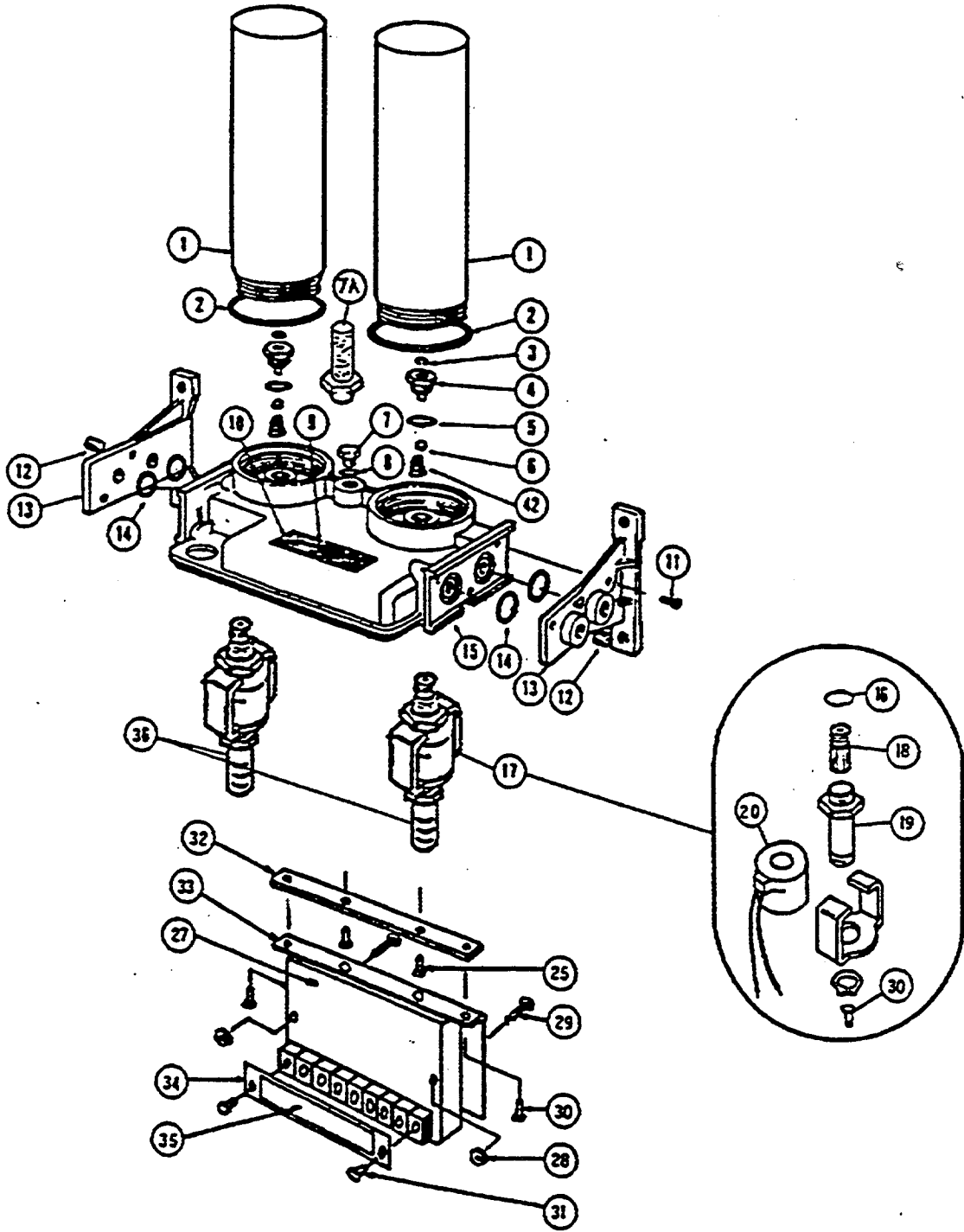
<u>Part Number</u>	<u>Description</u>	<u>Qty.</u>
P-06723	O Ring	2
P-300-507	Check Ball Spring	2
P-400-589-12	Core Assembly	2
P-400-589-13	Base Assembly	2
P-400-312-908	O Ring	2
P-400-312-924	O Ring	2
P-400-313-110	O Ring	2
P-400-375	Check Ball	2

D. Solenoid Valve Repair Kit - Contains all the parts necessary to repair one solenoid valve. Part number P-200-498S. This kit contains the following:

<u>Part Number</u>	<u>Description</u>	<u>Qty.</u>
P-400-589-12	Core Assembly	1
P-400-589-13	Base Assembly	1

EXPLODED VIEW OF HEATLESS DRYER (DEHYDRATOR, SOLID STATE)

FIGURE 21



VII DEHYDRATOR MAINTENANCE (continued)

E. Dehydrator Parts List - Refer to Figure 21

<u>Ref. No.</u>	<u>Qty.</u>	<u>Description</u>	<u>P-3100STD</u>	<u>P-4200STD</u>
1	2	Desiccant (12") Chamber Assy. (incl. Ref.No. 2)	P-200-403-12	same
2	2	O Ring	P-400-312-924	same
3	2	O Ring	P-400-313-110	same
4	2	Purge Orifice Assy. (incl. #3 & 5)	P-200-404-34	P-200-404-41
5	2	O Ring	P-400-312-908	same
6	2	Ball Check Valve	P-400-375	same
7	1	Hex Plug	P-400-307-4	same
7A	1	Moisture Indicator	P-200-405	same
8	1	O Ring	P-400-312-904	same
9	1	Name Plate	P-300-737	same
10	2	Drive Screw No. 4x 3/16" (Type U Rnd, hd, st, st)	P-400-322-1	same
11	6	Screw, No. 10-24x5/8" Pan Hd.	P-400-361-2	same
12	2	Pipe Plug, 1/4" 18 socket hd.	P-400-320-3	same
13	2	Mounting Bracket	P-300-497P	same
14	4	O Ring	P-400-313-209	same
15	1	Air Manifold	P-300-495P	same
16	2	O Ring	P-400-313-018	same
17	2	Solenoid Valve Assy.	P-400-589-DC1	same
20	2	Coil (53 VDC)	P-400-589-DC11	same
25	2	Screw No. 6-32X x 3/8" Pan. Hd.	P-400-361-1	same
27	1	Solid State Timer (110 V 50/60 Hz)	P-06521-F1	same
28	2	Nut, Keps 8-32	H-NK01-OHC-R5	same
29	2	Screw No. 6-21 x 1 1/4" BH	H-SB83-OFC-04	same
30	2	Screw No. 6-32 x 1/2"	H-SB83-OFC-02	same
31	2	Screw No. 8-32 X 1", BH	H-SB83-OHC-10	same
32	1	Plate-Adapter-SS Timer Bracket	P-06496	same
33	1	Bracket - Mtg. SS Timer	P-06497	same
34	1	Terminal Cover	P-06499	same
35	1	Terminal Cover Decal	P-06498	same
42	2	Spring, Check Ball	P-300-507	same

Note: The quantities listed above are for one complete dehydrator.

VIII. TROUBLESHOOTING GUIDE**A. Air System****Problem A: Low Pressure Alarm**

	<u>Possible Cause:</u>	<u>Check</u>	<u>Corrective Action</u>
A1.	Outlet pressure is too low.	Check the outlet pressure gauge/ (The factory preset alarm point is 6 PSIG.)	If setting is below 6 PSIG, readjust the pressure regulator.
A2.	Leak in the air system.	With no outlet flow, check All fittings with an appropriate leak testing solution.	Tighten any loose connections and fittings as required.
A3.	Defective outlet pressure gauge.	Using a digital pressure gauge, check the outlet pressure test valve.	The readings should be the same (± 1 PSIG). If so, proceed to Step 7. If not, replace gauge.
A4.	Weak air compressor.	Check to see if compressor runs excessively.	Install routing maintenance kit.
A5.	Pressure alarm out of adjustment or defective	Check the low outlet pressure alarm setting as described in Section IV A.	Readjust the pressure switch or replace if defective.
A6.	High ambient temperature.	Check the ambient temperature.	If above 120° F., cool area around air dryer or relocate air dryer to a cooler environment.
A7.	Defective pressure switch.	Disconnect wire from the switch.	If alarm clears, replace pressure switch.

Problem B: Low Pressure Alarm.

B1.	Incorrect compressor safety relief valve setting.	Check for too low safety relief valve setting.	See Section V C.
B2.	Compressor requires maintenance.	Check rings and valves for excessive wear.	Install maintenance kit.
B3.	Capacity control valve is defective or requires adjustment	Check capacity control valve for proper adjustment.	Adjust to 50 (± 2) PSI.

Problem C: Rapid On/Off Cycling

C1.	Leak in Air System.		See Problem A, above.
C2.	Incorrect capacity control valve adjustment.	Check the capacity control valve. It should be a 50 ± 2 PSIG when compressor is operating. When compressor is off, it should be at 0 PSIG.	Adjust (clockwise) capacity control valve to 50 ± 2 PSIG as described in Section V E.
C3.	Pressure Switch	Bad Contacts	Replace Pressure Switch

VIII TROUBLESHOOTING GUIDE

B. Humidity Alarm System

Problem A: Air Dryer in Humidity Alarm.

<u>Possible Cause:</u>	<u>Check</u>	<u>Corrective Action</u>
A1. Humidity circuit defective.	Check the humidity alarm circuit (see Section IV B).	See Section V B.
A2. Loose or poor electrical connections.	Check wire connections.	Replace as necessary
A3. Low system pressure.	Check the capacity control valve setting. It should be at 50 ± 2 PSIG.	Adjust capacity control valve to 50 ± 2 PSIG as described in Section V E.
A4. Defective timer in dehydrator	Refer to Section II B for proper timer operation.	Replace timer if it is defective.
A5. Excessively high ambient temperature.	Check ambient temperature. It should be below 120° F.	Cool environment around dryer or relocate dryer to cooler environment.

Problem B: Air Dryer Humidity Alarm Doesn't Function.

Note: The following are possible causes for a humidity condition. After isolating and correcting the problem, the air dryer may have to be run up to 5 minutes to dry out the entire system and clear the alarm. The higher the system pressure, the faster the towers will dry out. It is advisable to run the dehydrator at 48-52 PSIG to dry out the towers.

CAUTION:

DO NOT MEASURE SENSING ELEMENT OR IN ANY WAY APPLY DC VOLTAGE TO THE SENSING ELEMENT

B1. Defective humidity sensing element.	Toggle the humidity switch or the humidity board test switch.	If the dryer does not go into a humidity condition and hold that condition, replace the sensing element.
B2. Loose or poor electrical connections.	Check wires for good connections.	

VIII TROUBLESHOOTING GUIDE

C. Electrical System

Problem A: No Power To The Air Dryer.

<u>Possible Cause:</u>	<u>Check</u>	<u>Corrective Action</u>
A1. Power has been interrupted to the air dryer.	Check the main power supply or fuse panel.	Reset the main power supply or replace the bad fuse.
A2. Circuit breaker tripped at main power supply.	Check for 115 VAC at power connections.	If sufficient voltage is found, reset circuit breaker.
A3. Loose or poor electrical connections.	Check power connections.	Repair any bad electrical connections.

Problem B: No Power To The Air Compressor, But Other Components Have Power.

B1. Loose or poor electrical connections.	Check for 155 VAC to the air compressor	Repair any bad electrical connections.
B2. Tank pressure switch	Check for 115 VAC across terminals	Replace pressure switch.

Problem C.: Power To Dryer, But The Air Compressor Does Not Operate.

C1. Loose or poor electrical connections.	Check power connections at terminal block.	Repair any bad electrical connections.
C2. Tank pressure switch.	This switch operates on 115 VAC. When the contacts are closed, the compressor will operate.	Change sides of the switch or clean contacts.
C3. Compressor overload protection switch has been activated.	Check fresh air ventilating fan for operation.	Replace if necessary.
	Check cabinet air filter for restrictions.	Clean if necessary.
	Check compressor inlet filters for clogging.	Replace if necessary.
	Rapid on/off cycling.	See Air System, Problem C.

VIII TROUBLESHOOTING GUIDE

D. Dehydrator

Problem A: Heatless Dryer Delivers Wet Air.

<u>Possible Cause:</u>	<u>Check</u>	<u>Corrective Action</u>
A1. Defective solenoid valve.	Check core assembly for broken spring and proper seating.	Defective parts should be replaced (core assembly or worn parts).
A2. Purge orifice plugged.	Check orifice for residue.	Clean orifice with air pressure. Do not use wire or anything abrasive. This will damage orifice.
A3. Solenoid coil burned out.	Check magnetic pull of coil with screwdriver. (Refer to next step before replacing coil.) <i>Note: Each coil should be energized every 30 seconds.</i>	Replace if necessary.
A4. Improper operation of cycle timer.	Check for 115 VAC on screws L1 and L2. Tighten connections, if needed.	If no operation with voltage applied, replace timer.

Problem B: A White Powder Is In The Flowmeter or Exhaust.

B1. Deteriorated desiccant towers.	Check movement of perforated disc at open end of chambers. Disc should not depress more than 1/4" from retaining ring.	Replace chamber or have repacked. (Puregas recommends tower be repacked at the factory.)
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Problem C: Heatless Dryer Has Excessive Drop In Outlet Pressure.

C1. Improper operating conditions.	See Heatless dryer characteristics. II, B.	Install the maintenance kit. P-200-499S.
C2. Solenoid coil burned out.	Check to see if every 30 seconds exhaust air will purge from the bottom of one side or the other.	If one side fails to purge, replace solenoid valve.
C3. Improper operation of cycle timer.	Check to see if every 30 seconds the timer switches sides of operation.	If proper voltage is applied and this switching does not occur, replace the timer.
C4. Valve balls not seated properly.	Check Rings and valves for excessive wear.	Replace if necessary.

