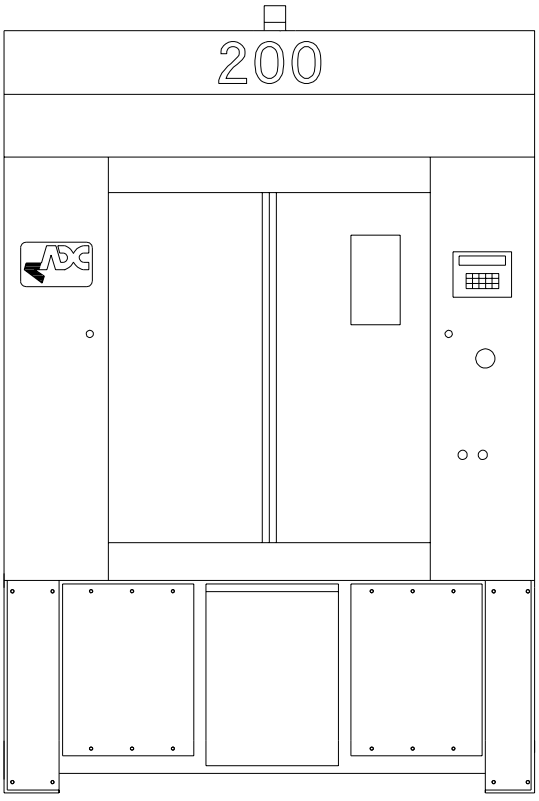
American Dryer Corp.

AD-200 Service Manual

with Non-Tilt Options

1993 thru 1998



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ADC Part No. 450310

Retain This Manual In A Safe Place For Future Reference

American Dryer Corporation products embody advanced concepts in engineering, design, and safety. If this product is properly maintained, it will provide many years of safe, efficient, and trouble-free operation.

ONLY properly licensed technicians should service this equipment.

OBSERVE ALL SAFETY PRECAUTIONS displayed on the equipment or specified in the installation/operator's manual included with the dryer.

WARNING: UNDER NO CIRCUMSTANCES should the door switch or the heat circuit devices ever be disabled.

WARNING: The dryer *must never* be operated with any of the back guards, outer tops, or service panels removed. PERSONAL INJURY or FIRE COULD RESULT.

We have tried to make this manual as complete as possible and hope you will find it useful. **ADC** reserves the right to make changes from time to time, without notice or obligation, in prices, specifications, colors, and material, and to change or discontinue models.

Important

For your convenience, log the following information:

DATE OF PURCHASE _____ **MODEL NO.** **AD-200 Non-Tilting**

DISTRIBUTORS NAME _____

Serial Number(s) _____

_____

_____

Replacement parts can be obtained from your distributor or the **ADC** factory. When ordering replacement parts from the factory, you can FAX your order to **ADC** at (508) 678-9447 or telephone your orders directly to the **ADC** Parts Department at (508) 678-9010. Please specify the dryer **model number** and **serial number** in addition to the **description** and **part number**, so that your order is processed accurately and promptly.

The illustrations on the following pages may not depict your particular dryer exactly. The illustrations are a composite of the various dryer models. Be sure to check the descriptions of the parts thoroughly before ordering.

INSTRUCTIONS TO BE FOLLOWED IN THE EVENT THE USER SMELLS GAS MUST BE POSTED IN A PROMINENT LOCATION. THE INSTRUCTIONS TO BE POSTED SHALL BE OBTAINED FROM THE LOCAL GAS SUPPLIER.

IMPORTANT

YOU MUST DISCONNECT and LOCKOUT THE ELECTRIC SUPPLY and THE GAS SUPPLY or THE STEAM SUPPLY BEFORE ANY COVERS or GUARDS ARE REMOVED FROM THE MACHINE TO ALLOW ACCESS FOR CLEANING, ADJUSTING, INSTALLATION, or TESTING OF ANY EQUIPMENT per OSHA (Occupational Safety and Health Administration) **STANDARDS.**

CAUTION

LABEL ALL WIRES PRIOR TO DISCONNECTION WHEN SERVICING CONTROLS. WIRING ERRORS CAN CAUSE IMPROPER AND DANGEROUS OPERATION.

VERIFY PROPER OPERATION AFTER SERVICING.

CAUTION

DRYER(S) SHOULD NEVER BE LEFT UNATTENDED WHILE IN OPERATION.

WARNING

CHILDREN SHOULD NOT BE ALLOWED TO PLAY ON OR NEAR THE DRYER(S).

CHILDREN SHOULD BE SUPERVISED IF NEAR DRYER(S) IN OPERATION.

WARNING

The dryer must never be operated with any of the back guards, outer tops, or service panels removed. PERSONAL INJURY or FIRE COULD RESULT.

FOR YOUR SAFETY

DO NOT STORE OR USE GASOLINE OR OTHER FLAMMABLE VAPOR AND LIQUIDS IN THE VICINITY OF THIS OR ANY OTHER APPLIANCE.

DO NOT DRY MOP HEADS IN THE DRYER.

DO NOT USE DRYER IN THE PRESENCE OF DRY CLEANING FUMES.

IMPORTANT

PLEASE OBSERVE ALL SAFETY PRECAUTIONS displayed on the equipment and/or specified in the installation/operator's manual included with the dryer.

Dryer(s) **must not** be installed or stored in an area where it will be exposed to water and/or weather.

The wiring diagram for the dryer is located in the front electrical control box area.

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SECTION I

SAFETY PRECAUTIONS

CAUTION: The dryer should never be left unattended while in operation.

WARNING: For your safety, the information in this manual ***must be*** followed to minimize the risk of fire or explosion or to prevent property damage, personal injury, or loss of life.

WARNING: The dryer must never be operated with any of the back guards, outer tops, or service panels removed. PERSONAL INJURY or FIRE COULD RESULT.

1. ***DO NOT*** store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

2. Purchaser/user should consult the local gas supplier for proper instructions to be followed in the event the user smells gas. The instructions ***should be*** posted in a prominent location.

3. WHAT TO DO IF YOU SMELL GAS...

   a. ***DO NOT*** try to light any appliance.

   b. ***DO NOT*** touch any electrical switch.

   c. ***DO NOT*** use any phone in your building.

   d. Clear the room, building, or area of ***ALL*** occupants.

   e. ***Immediately*** call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.

   f. If you ***cannot*** reach your gas supplier, call the fire department.

4. Installation and service ***must be*** performed by a qualified installer, service agency, or gas supplier.

5. Dryers ***must be*** exhausted to the outdoors.

6. Although **ADC** produces a very versatile machine, there are some articles that, due to fabric composition or cleaning method, ***should not*** be dried in it.

WARNING: Dry only water-washed fabrics. ***DO NOT*** dry articles spotted or washed in dry cleaning solvents, a combustible detergent, or "all purpose" cleaner. ***EXPLOSION COULD RESULT.***

WARNING: ***DO NOT*** dry rags or articles coated or contaminated with gasoline, kerosene, oil, paint, or wax. ***EXPLOSION COULD RESULT.***

WARNING: ***DO NOT*** dry mop heads. Contamination by wax or flammable solvent will create a fire hazard.

WARNING: ***DO NOT*** use heat for drying articles that contain plastic, foam, sponge rubber, or similarly textured rubberlike materials. Drying in a heated basket (tumbler) may damage plastics or rubber and also may be a fire hazard.

7. A program ***should be*** established for the inspection and cleaning of lint in the burner area, exhaust duct work, and area around the back of the dryer. The frequency of inspection and cleaning can best be determined from experience at each location.

WARNING: The collection of lint in the burner area and exhaust duct work can create a potential fire hazard.

8. For personal safety, the dryer ***must be*** electrically grounded in accordance with local codes and/or the NATIONAL ELECTRIC CODE ANSI/NFPA NO. 70-LATEST EDITION.

NOTE: Failure to do so will VOID THE WARRANTY.

9. ***UNDER NO CIRCUMSTANCES*** should the dryer door switches, lint drawer switch, or heat safety circuit, ever be disabled.

WARNING: PERSONAL INJURY or FIRE COULD RESULT.

10. This dryer ***is not*** to be used in the presence of dry cleaning solvents or fumes.

11. Remove articles from the dryer as soon as the drying cycle has been completed.

WARNING: Articles left in the dryer after the drying and cooling cycles have been complete can create a fire hazard.

12. **READ and FOLLOW *ALL* CAUTION and DIRECTION LABELS ATTACHED TO THE DRYER.**

WARNING: YOU MUST DISCONNECT and LOCKOUT THE ELECTRIC SUPPLY and THE GAS SUPPLY or THE STEAM SUPPLY BEFORE ANY COVERS or GUARDS ARE REMOVED FROM THE MACHINE TO ALLOW ACCESS FOR CLEANING, ADJUSTING, INSTALLATION, or TESTING OF ANY EQUIPMENT per OSHA (Occupational Safety and Health Administration) **STANDARDS.**

IMPORTANT: Label **ALL** wires prior to disconnection when servicing the microprocessor controller (computer) and the ignition module. **WIRING ERRORS CAN CAUSE IMPROPER and DANGEROUS OPERATION.**

SECTION II

ROUTINE MAINTENANCE

A. CLEANING

A program and/or schedule **should be** established for periodic inspection, cleaning, and removal of lint from various areas of the dryer, as well as throughout the duct work system. The frequency of cleaning can best be determined from experience at each location. Maximum operating efficiency is dependent upon proper air circulation. The accumulation of lint can restrict this air flow. If the guidelines in this section are met, an **ADC** dryer will provide may years of efficient, trouble-free, and - most importantly - safe operation.

WARNING: LINT FROM MOST FABRICS IS HIGHLY COMBUSTIBLE. THE ACCUMULATION OF LINT CAN CREATE A POTENTIAL FIRE HAZARD.

WARNING: KEEP DRYER AREA CLEAR AND FREE FROM COMBUSTIBLE MATERIALS, GASOLINE, and OTHER FLAMMABLE VAPORS and LIQUIDS.

NOTE: REMOVE POWER FROM THE MACHINE BEFORE PERFORMING ANY MAINTENANCE IN THE MACHINE.

NOTE: Suggested time intervals shown are for average usage which is considered six (6) to eight (8) operational (running) hours per day.

SUGGESTED CLEANING SCHEDULE

EVERY THIRD or FOURTH LOAD

Clean the lint basket. A clogged lint basket will cause poor dryer performance. The lint basket is located in the lint drawer in the base of the dryer. Pull out the lint drawer, brush the lint off the lint basket, and remove the lint. Inspect the lint screen and replace if torn.

NOTE: The frequency of cleaning the lint screens can best be determined from experience at each location.

WEEKLY

Open the hinged panels on each side of the tumbler section and remove any lint accumulation from the tumbler drive motor, drive shafts, drive wheels, and drive shaft bearings.

Slide the lint basket all the way out of the dryer and clean any lint accumulation off of the temperature sensor bracket, which is located above the lint basket.

WARNING: TO AVOID THE HAZARD OF ELECTRICAL SHOCK, DISCONTINUE ELECTRICAL SUPPLY TO THE DRYER.

MONTHLY

Empty the compressed air filter bowl.

Clean any lint accumulation from the gas valve/burner area at the top of the dryer, the fan (impellor) motor, and the fan (impellor) bearings located in the dryer base.

EVERY 6 MONTHS

STEAM MODELS - clean the steam coil fins. We suggest using compressed air and a vacuum cleaner with brush attachment.

NOTE: ***When cleaning steam coil fins, be careful not to bend the fins.*** If fins are bent, straighten by using a ***fin comb***, which is available from any local air conditioning supply house.

Inspect and remove any lint accumulation in customer furnished exhaust duct work system and from the dryers internal exhaust ducting.

NOTE: THE ACCUMULATION OF LINT IN THE EXHAUST DUCT WORK CAN CREATE A POTENTIAL FIRE HAZARD.

NOTE: **DO NOT** OBSTRUCT THE FLOW OF COMBUSTION and VENTILATION AIR. CHECK CUSTOMER FURNISHED BACK DRAFT DAMPERS IN THE EXHAUST DUCT WORK. INSPECT and REMOVE ANY LINT ACCUMULATION WHICH CAN CAUSE THE DAMPER TO BIND or STICK.

NOTE: When cleaning the dryer cabinet(s), avoid using harsh abrasives. A product Intended for the cleaning of appliances is recommended.

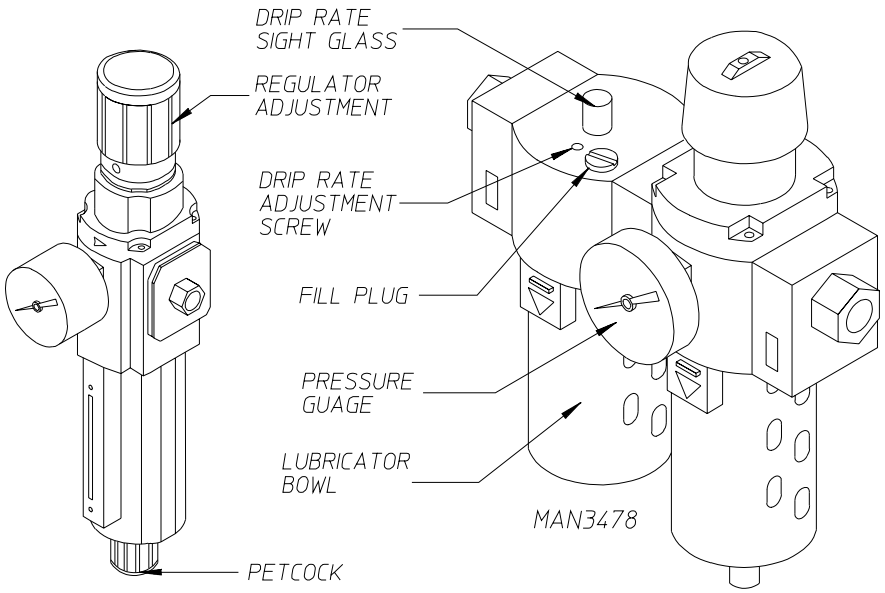
Clean off any lint accumulation on top of the temperature probe and the hi-limit switch located above the lint basket.

B. LUBRICATION

MONTHLY

Check compressed air filter bowl for water. Empty by pressing the rubber petcock to the side. Additionally, check lubricator bowl for oil. If empty, remove the fill plug and add oil. (Use petroleum based 10/150 SSU misting oil.) Replace fill plug.

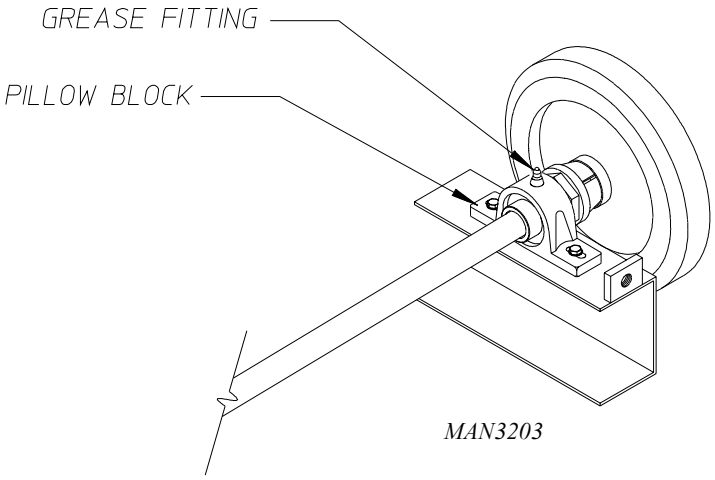
CURRENT PRODUCTION PAST PRODUCTION



NOTE: LUBRICATOR ***SHOULD BE*** SET AT **1 DROP PER CYCLE**.

NOTE: REGULATOR PRESSURE IS TO BE SET AT 80 PSI.

Apply high temperature grease to the four (4) 1-1/2" diameter tumbler drive shaft pillow block bearings and the two (2) 1-3/8" diameter blower shaft pillow block bearings. (Use Shell Alvania #3 grease or equivalent.)



C. ADJUSTMENTS

7 DAYS AFTER INSTALLATION and EVERY 6 MONTHS THEREAFTER

Inspect bolts, nuts, screws, (bearing set screws), nonpermanent gas connections (i.e., unions, shut-off valves, orifices), and grounding connections. Fan (impellor) V-belts, along with the motor and drive belts **should be** examined and replaced if necessary. Tighten loose V-belts when necessary. Complete operational check of controls and valves. Complete operational check of **ALL** safety devices (i.e., door switches, lint drawer switch, sail switch, burner and hi-limit thermostats).

SECTION III

SPECIFICATIONS and DIMENSIONS

A. **SPECIFICATIONS** (Gas and Steam Models)

Maximum Capacity (dry weight)			200 lbs.		**90.9 kg**
Basket (tumbler) Diameter			62-1/2"		**158.75 cm**
Basket (tumbler) Depth			42"		**106.7 cm**
Basket (tumbler) Volume			74.5 cu. ft.		**2.11 cu.m.**
Drive Motor			3 HP		**2.24 kw**
Blower Motor (gas/steam)			7-1/2 HP/15 HP		**5.6 kw/11.2 kw**
Door Opening			36-3/4" Wide x 43" High		**93.3 cm x 109.2 cm**
Door Sill Height - level			37-1/4"		**94.6 cm**
Compressed Air			80 PSI		**5.63 kg/cu.m.**
Compressed Air Connection			3/8" F.P.T.		**.953 cm**
Gas*	Voltage Available		208-460v / 3ø / 3, 4w / 50/60 Hz		
	Heat Input		750,000 btu/hr		**189,000 kcal/hr**
	Approx. Weight (uncrated)		3,369 lbs.		**1,528 kg**
	Airflow		5,300 cfm		**150 cmm**
	Inlet Pipe Size		1-1/4"		**3.18 cm**
Steam*	Voltage Available		208-460v / 3ø / 3, 4w / 50/60 Hz		
	Approx. Weight (uncrated)		3,719 lbs.		**1,687 kg**
	Airflow		6,500 cfm		**184 cmm**
	Steam Comsumption		Boiler HP Normal Load		
	890 lbs/hr	**404.5 kg/hr**	27		
	Operating Steam Pressure		Steam Supply		Steam Return	
	125 psi max	**8.79 kg/sq cm**	1-1/2"	**3.81 cm**	3/4"	**1.91 cm**

Shaded areas are stated in metric equivalents.

* Dryer **must be** provided with a clean, dry, regulated 80 PSI (+/- 10 psi) air supply (equivalent volume - 6 cfh).

NOTE: **ADC** reserves the right to make changes in specifications at any time, without notice or obligation.

SECTION IV

INSTALLATION REQUIREMENTS

Installation **should be** performed by competent technicians in accordance with local and state codes. In the absence of these codes, installation must conform to applicable AMERICAN NATIONAL STANDARDS:

National Fuel Gas Code ANSI Z223.1-LATEST EDITION
or
National Electric Code ANSI/NFPA No. 70-LATEST EDITION

A. Enclosure, Air Supply and Exhaust Requirements

NOTE: The following information is very brief and general. For detailed description, refer to the AD-200 Non-Tilting Installation and Operator's Manual (**ADC** Part No. 112142) included with the dryer.

Bulkheads and partitions around the dryer **should be** made of noncombustible materials. Allowances **should be** made for the opening and closing of the control door and lint door. Also, allowances **should be** made in the rear for ease of maintenance. (Refer to appropriate Installation Manual [**ADC** Part No. 112142] for recommended distances and minimum allowances required.)

When the dryer is operating, it draws in room air, heats it, passes this air through the basket (tumbler), and exhausts it out of the building. Therefore, the room air must be continually replenished from the outdoors. If the make-up air is inadequate, drying time and drying efficiency will be adversely affected. Ignition problems and sail switch "fluttering" problems on gas dryers may result, and you also could have premature motor failure from overheating. The air supply **must be** given careful consideration to insure proper performance of each dryer.

IMPORTANT: Make-up air ***must be*** provided from a source free of dry cleaning fumes. Make- up air that is contaminated by dry cleaning fumes will result in irreparable damage to motors and other dryer components.

Exhaust duct work **should be** designed and installed by a competent technician. Improperly sized duct work will create excessive back pressure which will result in slow drying, increased use of energy, and shutdown of the burner by the airflow (sail) switch, burner hi-limit or lint chamber hi-heat protector thermostat. (Refer to appropriate Installation Manual [**ADC** Part No. 112142] for more detail.)

CAUTION: IMPROPERLY SIZED OR INSTALLED EXHAUST DUCT WORK CAN CREATE A POTENTIAL FIRE HAZARD.

B. Electrical and Gas Requirements

It is your responsibility to have **ALL** electrical connections made by a properly licensed and competent electrician to assure that the electrical installation is adequate and conforms with local and state regulations or codes. In the absence of such codes, **ALL** electrical connections, material, and workmanship **must conform** to the applicable requirements of the National Electric Code ANSI/NFPA No. 70-LATEST EDITION.

IMPORTANT: Failure to comply with these codes or ordinances and/or the requirements stipulated in this manual can result in personal injury or component failure.

The dryer installation **must meet** the AMERICAN NATIONAL STANDARD; National Fuel Gas Code ANSI Z223.1-LATEST EDITION, as well as, local codes and ordinances, and **must be** done by a qualified technician.

NOTE: Undersized gas piping will result in ignition problems and slow drying and can create a safety hazard.

The dryer **must be** connected to the type of gas (natural or L.P.) indicated on the dryer data label. If this information does not agree with the type of gas available, contact the distributor who sold the dryer or contact the factory.

The gas input ratings shown on the dryer data label are for elevations up to 2,000 feet, unless elevation requirements of over 2,000 feet were specified at the time the dryer order was placed with the factory. The adjustment for dryers in the field for elevations over 2,000 feet are made by changing the burner orifices. If this adjustment is necessary, contact the distributor who sold the dryer or contact the factory.

NOTE: Any burner changes ***must be*** made by a qualified technician.

C. Operational Service Check Procedure

After performing any service or maintenance function, an operational check **should be** performed to insure that **ALL** components are performing properly.

1. Make a complete operational check of **ALL** the operating controls to insure that the timing is correct, temperature selection switches are functioning properly.

2. Make a complete operational check of **ALL** safety related circuits, door switch(es), hi-limit thermostat, sail switch, cycling thermostats, etc.

SECTION V

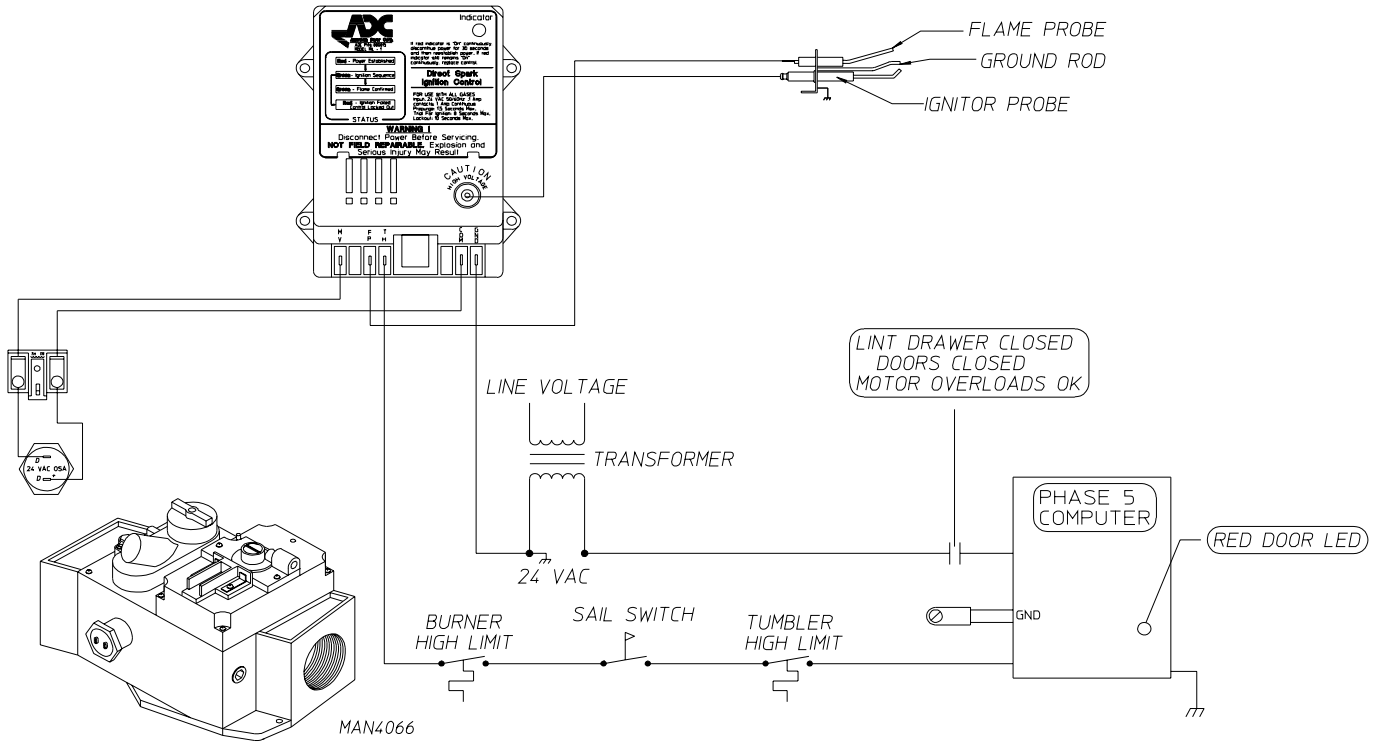
COMPONENT DESCRIPTION

A. Heat Section

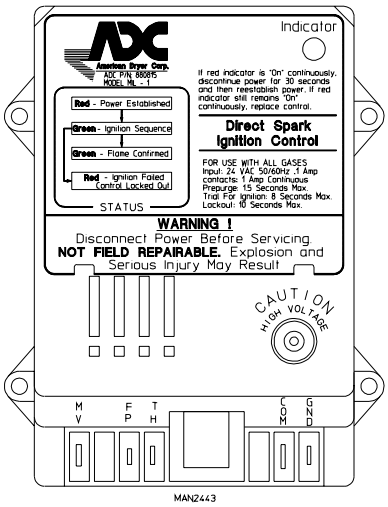
The AD-200 dryer uses three (3) types of heat sources: natural gas, liquid propane (L.P.) gas, and steam. Natural gas and L.P. gas are not directly replaceable. The gas valves need to be modified to use other than the type of heat specified on the nameplate.

1. ADG-200 (gas) dryers utilizes a Direct Spark Ignition (DSI) module to monitor that a flame is established. If for some reason the flame signal is lost, the DSI module will shut off the gas valve and not retry ignition (no try to restart the flame). *A spark of approximately 14,000 volts is used to establish a flame.* The DSI module will turn the gas valve on and ignitor and flame-probe will spark for 8 seconds attempting a flame. Each time the dryer calls for heat the microprocessor controller (computer) will send a 24 VAC signal through the exhaust hi-limit, sail switch, and oven hi-limit. At that point, the DSI module will try for ignition.

DIRECT SPARK IGNITION (DSI) SYSTEM COMPONENTS/FUNCTIONS

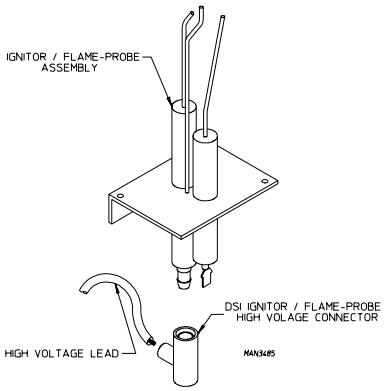


a. The Direct Spark Ignition (DSI) Module is a 24 VAC device designed to be the "controller" of the DSI system. When activated by the dryer controls, this module constantly monitors and controls the functions of the DSI system (i.e., spark activation, gas valve off/on, flame verification, etc.). Additionally, the DSI Module has self diagnostic capabilities.



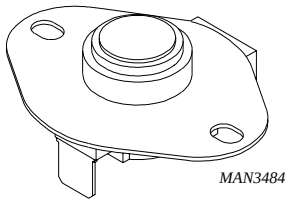
24 VAC
Direct Spark Ignition (DSI) Module

b. The Ignitor and Flame-Probe Assembly is located in the burner flame area and is used to ignite the gas by use of a high voltage spark (approximately 14,000 volts) and to provide feedback information to the DSI Module as to whether the burner flame is evident (on).



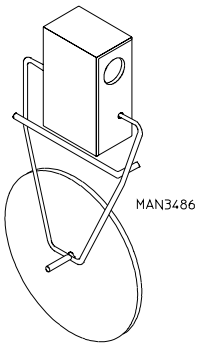
Ignitor/Flame Probe Assembly

c. The Burner Hi-Limit Switch is a thermostat type switch located in the burner. Its function is to discontinue heat (flame) in the event of an over temperature situation (above 330º F).



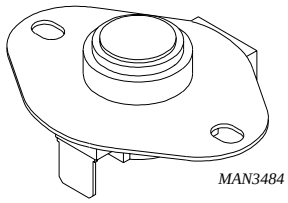
330º F Thermostat

d. The Sail Switch Assembly is located on the burner, downstream of the flame tubes. Its function is to detect whether or not there is sufficient air flow through the dryer.



Sail Switch Assembly

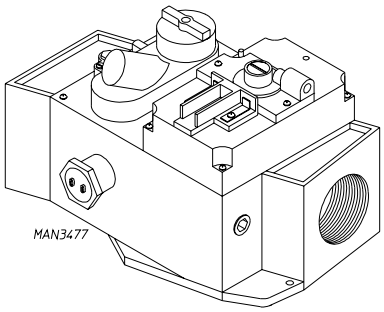
e. The Tumbler Hi-Limit Switch is a thermostat type switch located above the Lint Basket. Its function is to discontinue heat (flame) in the event of an over temperature situation (above 225° F).



225° F Thermostat

f. The gas valve used in the ADG-200 is of the redundant type which means that the gas valve is actually two gas valves in one; one in series with the other. This is a safety feature which provides protection against gas flow in the event that one of the valves does not seat properly. The valve also regulates the incoming gas pressure.

NOTE: THE DSI GAS VALVES ARE NOT FIELD REPAIRABLE.



Redundant Gas Valve

g. Normal Operation of the Direct Spark Ignition (DSI) System (refer to the **illustration** on **page 14**)

1) The DSI System consists of a microprocessor-based control module, along with an Ignitor/Flame-Probe Assembly. This control utilizes a high voltage synchronous spark ignitor and a rectified flame sensor probe signal to locally control **ALL** basic functions in the gas burner.

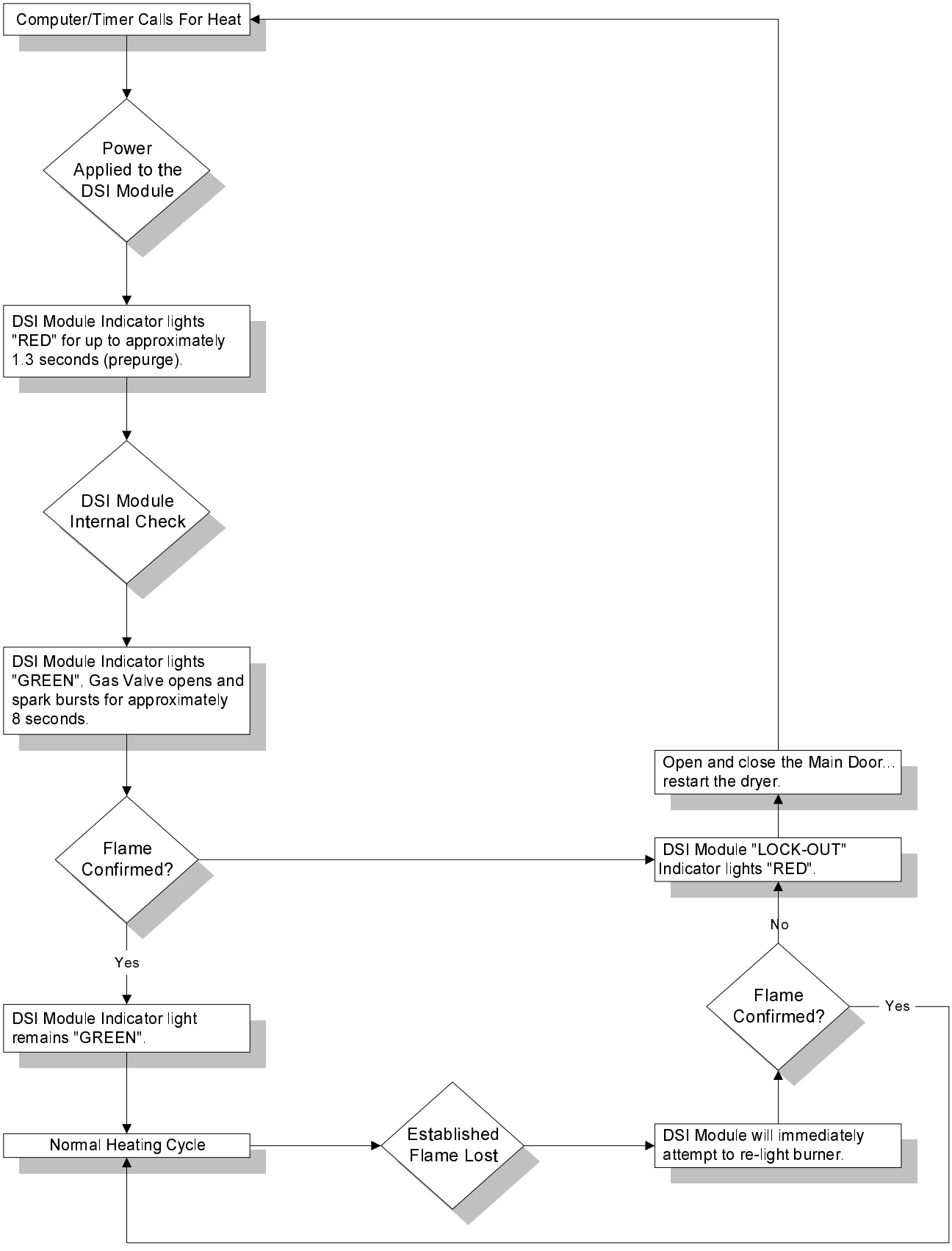
On a call for heat by the dryers' controls, 24 VAC is applied to the DSI module at which time the modules' L.E.D. (light emitting diode) indicator will light "**RED**" indicating that power has been established to the module. Almost immediately (up to approximately 1.5 seconds [pre-purge]) the indicator will light "**GREEN**," the gas valve opens and the spark burst will be evident (on) for approximately 8-seconds. The burner flame **should now be** established/confirmed.

If at this time the flame has not been established and confirmed, the DSI module will "LOCK-OUT" and the modules' L.E.D. indicator will light "**RED**" and stay on continuously. To reset or cancel the "LOCK-OUT" condition, open and close the main door then restart the dryer.

Once the burner flame is established and confirmed, the DSI module indicator will light "**GREEN**," and the burner system will continue through a normal heating cycle, where the DSI system will cycle on and off as required by the dryers controls.

During the normal heating cycle, should a "FLAME-OUT" occur (i.e., severe air turbulence forces the flame away from the ignitor and flame-probe assembly), the DSI module shut the gas valve off and immediately try to reestablish the burner flame. The DSI module will attempt to light the burner ***ONLY ONCE***. If flame is not established, the DSI module will "LOCK-OUT." To reset or cancel the "LOCK-OUT" condition, open and close the main door then restart the dryer.

i. **ADC** Direct Spark Ignition (DSI) Operation Flow Chart



B. Troubleshooting The Direct Spark Ignition (DSI) System

NOTE: The troubleshooting information provided in this manual is intended for use by qualified service technicians only. **OBSERVE ALL SAFETY PRECAUTIONS** displayed on the equipment or specified in the AD-200 Non-Tilting Installation/Operator's Manual (**ADC** Part No. 112142) included with the dryer.

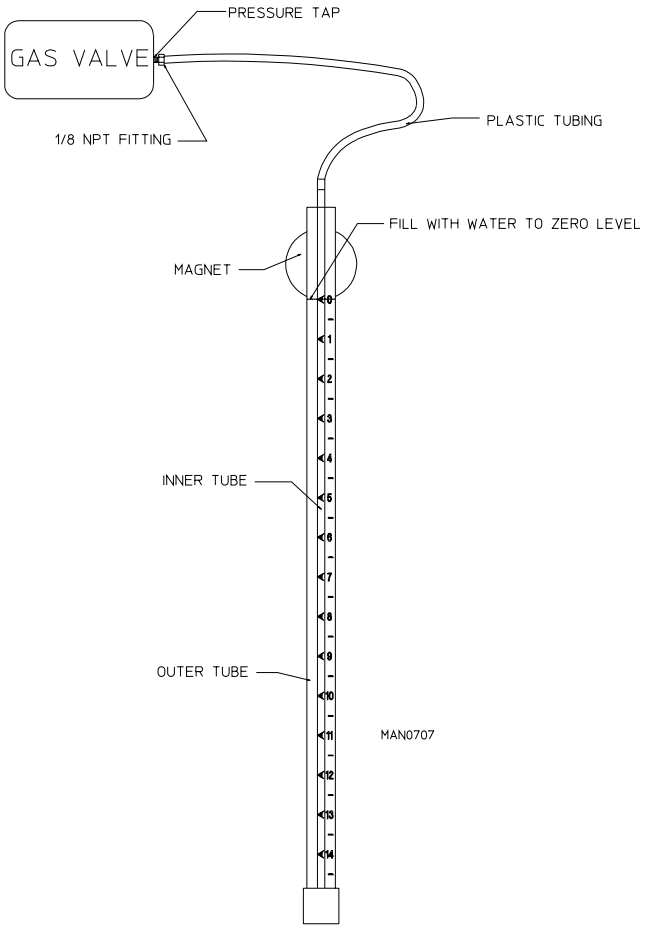
IMPORTANT: UNDER NO CIRCUMSTANCES SHOULD ANY SAFETY or HEAT CIRCUIT DEVICES EVER BE DISABLED.

THE FOLLOWING PIECES OF TEST EQUIPMENT WILL BE REQUIRED TO TROUBLESHOOT THIS SYSTEM WITH MINIMAL TIME AND EFFORT

DSI IGNITOR GAP FEELER GAUGE (1/8")
USED FOR CHECKING GAP BETWEEN IGNITOR/FLAME-PROBE ASSEMBLY AND SPARK ELECTRODE

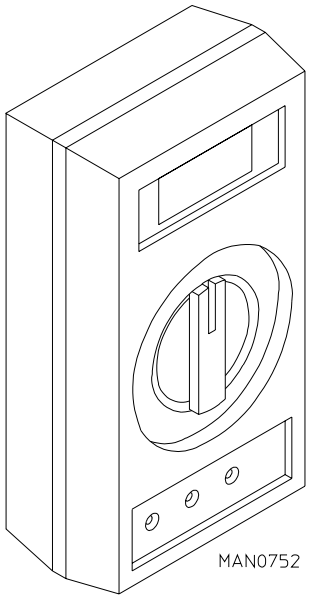
Available From **ADC**

MANOMETER
USED TO MEASURE GAS PRESSURE IN INCHES OF WATER COLUMN (W.C.)



Available From **ADC**

MULTIMETER / VOLTMETER
FOR MEASURING VOLTAGE



1. Direct Spark Ignition (DSI) Troubleshooting Terms (definitions)

   a. DSI MODULE "RED" L.E.D. INDICATOR LIGHT - this "red" L.E.D. (liquid emitting diode) light is located in the upper right corner of the DSI module (refer to the **top illustration** on **page 12**). This is a *diagnostic indicator* that simplifies the operational and troubleshooting procedures of the DSI system.

   b. LOCK-OUT MODE - DSI module "red" L.E.D. indicator light stays on continuously. This indicates there is a system fault and most likely the fault is the DSI module itself.

   c. FLAME-OUT - burner flame shut down by the DSI module due to lack of flame verification. This condition occurs only after ignition is evident but is lost. The DSI system will immediately attempt to relight the burner.

   d. RECYCLE - flame has been sensed but lost. Initiate a new sequence (**THERE ARE NO RETRIES**).

2. Troubleshooting and System Basic Diagnosis

   a. Preliminary Steps

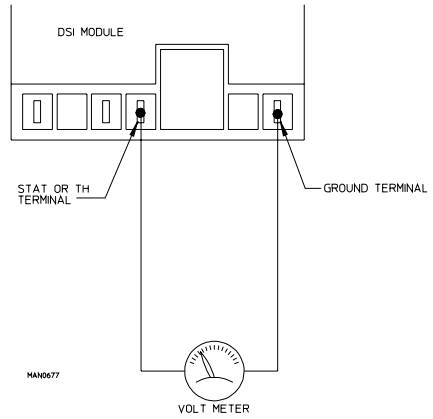
      The following steps **must be** preformed to minimize the time required to isolate cause of fault.

      1) DSI module L.E.D. indicator light is off (no "red" light or no "green" light).

         a) Check for voltage (approximately 24 VAC) across the DSI model terminals "TH" and "GND...

            If voltage (approximately 24 VAC) is evident, then, there is a malfunction within the DSI module itself, and it **must be** replaced.

            If there is no voltage, and then problem is not the DSI module or the ignition system, then the problem elsewhere in the dryer (i.e., dryers' heat circuit [sail switch, hi-limit circuits, etc.]).



      2) DSI module L.E.D. indicator lights "red" for approximately 1.5 seconds (prepurge). This indicates that **ALL** the controls (including **ALL** the safety circuits) are functioning and power is being supplied to the DSI module.

         a) DSI module L.E.D. indicator lights "green." This indicates a normal heating cycle. This also indicates that the preliminary diagnostics of the module has confirmed that the DSI module is functional.

         b) DSI module L.E.D. indicator lights "red" continuously... LOCK OUT MODE. This indicates that there is a system fault and most likely the fault is internal to the DSI module. To make sure, open and close the main door. Restart the dryer ... if the module LOCKS-OUT ("red" L.E.D. indicator light stay on continuously) again, replace the DSI module.

If the dryer repeatedly has DSI module "LOCK-OUT" failures, the cause may be due to high voltage not getting into the DSI module probe circuit.

(1) *Check to insure that the red high voltage wire* (between the ignitor spark electrode and the DSI module) ***is not wrapped around the sensor probe wire*** (the wire between the DSI module FP terminal and the ignitor and flame-probe assembly). *If the wires are touching one another, separate and secure in place* ***AWAY FROM ONE ANOTHER***.

(2) Check to insure that the dryer is properly grounded and that the ground connections (GND) to the DSI module are secure.

(3) If the problem persists, it is most likely to be in the external components (not the DSI module), or wiring , due to a "FLAME-OUT" ... proceed as follows:

NOTE: Preliminary steps - **DO NOT OMIT** - to minimize the time required to troubleshoot this system.

(a) Disconnect the electrical power to the dryer.

(b) Visually check the DSI module components for visual damage.

(c) Check wiring for loose connections, nicks or cracking at the ceramic insulator, or shorting of the sensor to the burner.

(d) Inspect the DSI ignitor and flame-probe assembly...

...check electrode for visible cracking at the ceramic insulator or shorting of sensor to burner

...check to insure that the flame sensor rod is positioned over the flame area

...check for carbon deposits on the flame sensor rod

...check to insure that there is a 1/8" gap between the ground rod and the ignitor spark electrode

b. After preforming these inspections and making corrections - if any - restore power to the dryer ... start the dryer and operate through one (1) complete cycle to insure that **ALL** components are functioning properly. If a no heat condition persists refer to the **Troubleshooting Flow Charts** on **pages 19**, **20**, and **21**.

1) To effectively use this information or the flow charts, each step **must be** completed in sequence, performing whatever test are suggested. After the completion of each test, the guide will direct the Service Technician to the next logical step in the troubleshoot sequence based on the outcome of the previous check.

2) Components **should be** replaced *only* after each step has been completed and replacements after each step has been completed and replacement is suggested in the flow chart. However, the experienced technician realizes that a loose connection or broken or shorted wire may be at fault where electrical components are concerned... and not necessarily the suspected component itself.

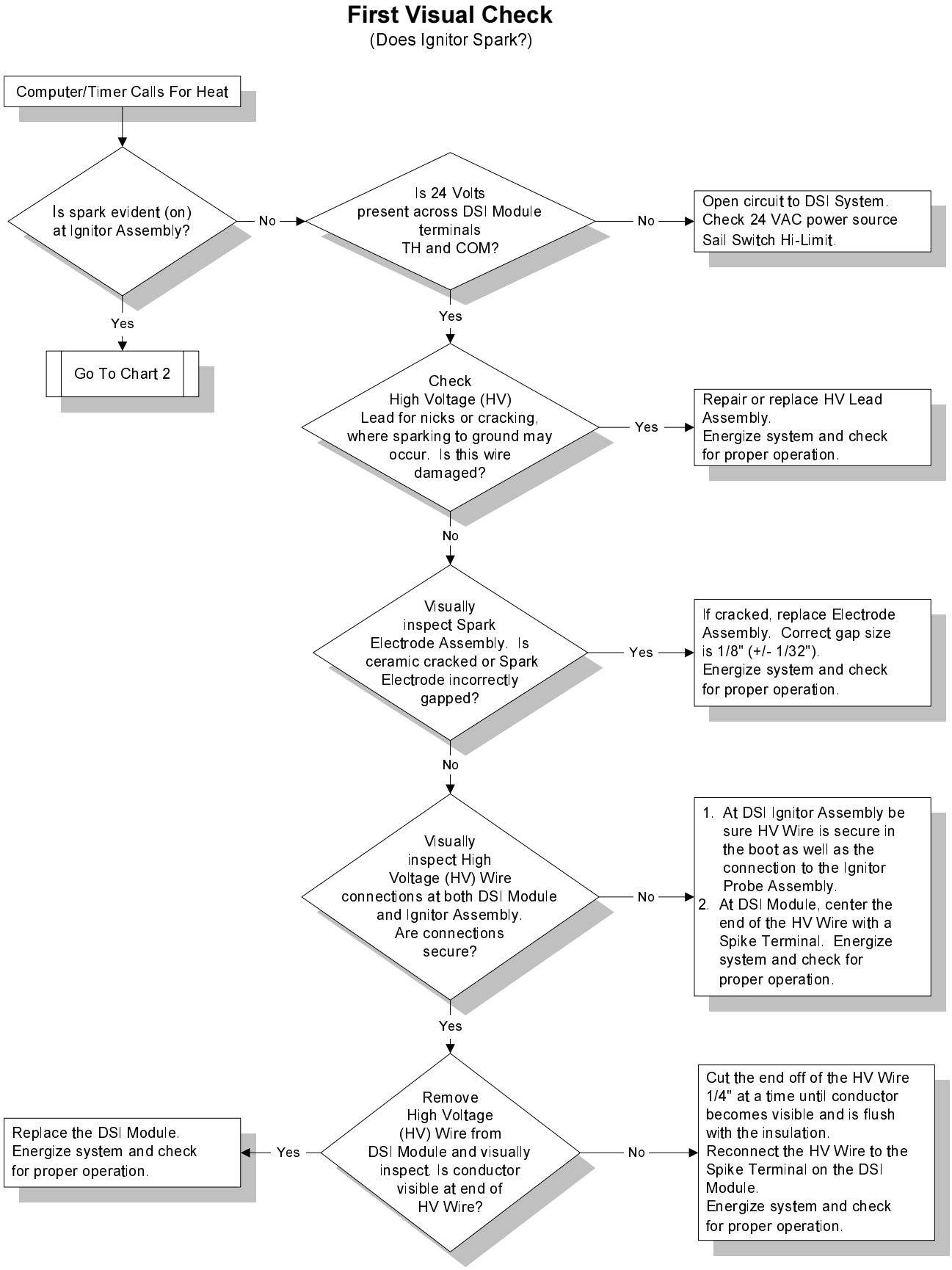
c. Three Visual Checks

1) Does the DSI ignitor/flame-probe assembly start sparking?
If not, refer to the **FIRST VISUAL CHECK** on **page 19**.

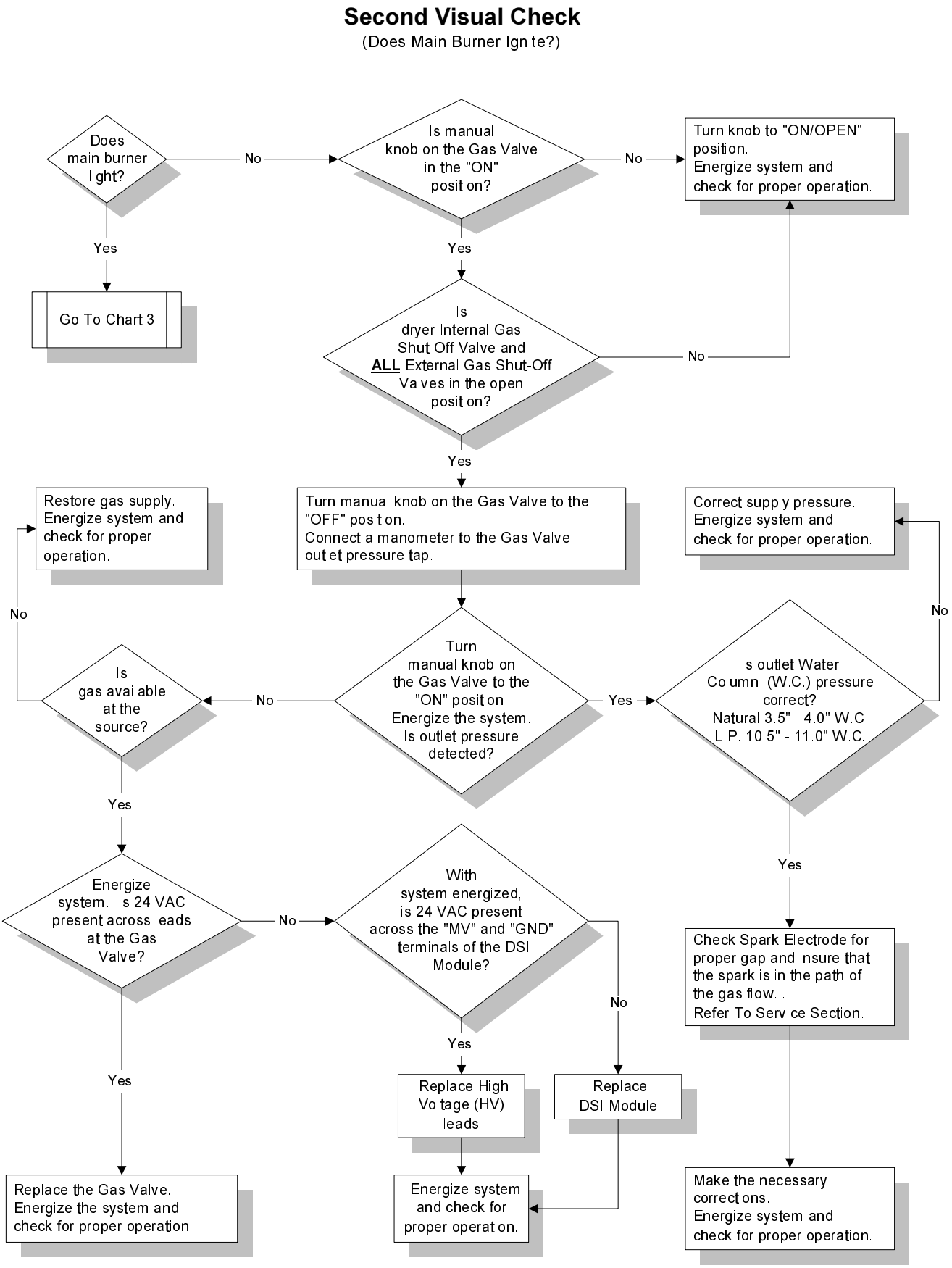
2) Does the main burner ignite?
If not, refer to the **SECOND VISUAL CHECK** on **page 20**.

3) Does the main burner remain lit after ignition has been established ("FLAME-OUT")?
If not, refer to the **THIRD VISUAL CHECK** on **page 21**.

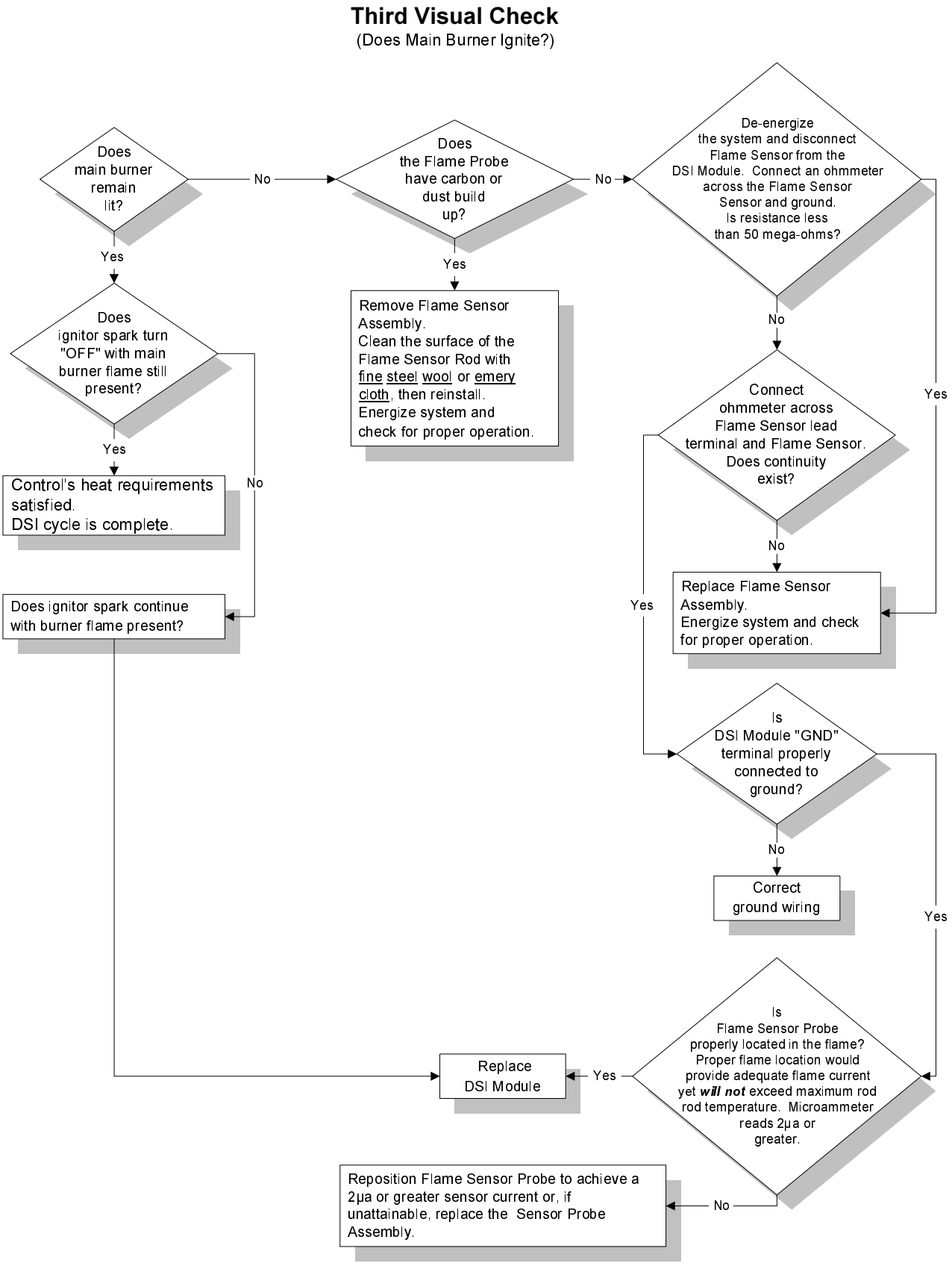
d. Troubleshooting Flow Chart - Quick Reference...



e. Troubleshooting Flow Chart - Quick Reference...



f. Troubleshooting Flow Chart - Quick Reference...



2. Troubleshooting/System Detailed Diagnosis

When the dryer calls for heat, 24 VAC from the step down transformer is applied to the "TH" and "GND" terminals of the DSI module. The DSI module L.E.D. (light emitting diode) indicator will light "red" (for up to approximately 1.5 seconds [prepurge]) then the L.E.D. indicator will light "green"; the gas valve will be energized, and the spark burst will be evident (on) for approximately 8 seconds at the tip of the electrode flame-probe assembly. Flame should now be established and confirmed. If a flame is not sensed and confirmed by the ignitor and flame-probe sensor after the approximate 8 second spark burst, the DSI module will go into the "LOCK-OUT" mode and the L.E.D. will light "red" continuously. **THERE ARE NO RETRIES.**

NOTE: To reset the DSI module if it is in the "LOCK-OUT" mode, open and close the main door, then restart the dryer.

If a flame has been established/confirmed and then lost, the DSI module L.E.D. indicator will continue to light "green" and immediately a spark will be evident (on) for approximately 8 seconds. The flame should now be established/confirmed. If a flame is not sensed/confirmed by the ignitor/flame-probe sensor after the approximate 8 second spark burst, the DSI module will go into the "LOCK-OUT" mode and the L.E.D. will light "red" continuously. **THERE ARE NO RETRIES.**

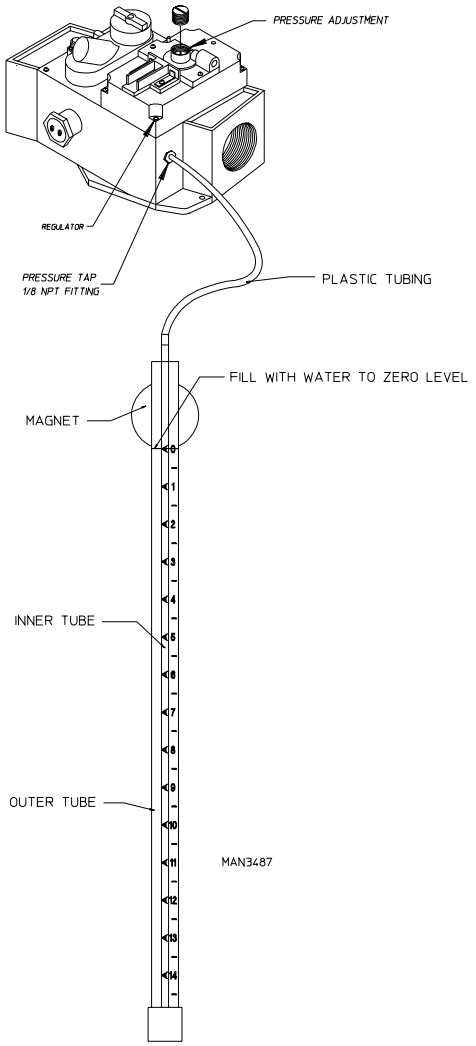
NOTE: To reset the DSI module if it is in the "LOCK-OUT" mode, open and close the main door, then restart the dryer.

a. System Diagnosis

1) Gas Pressure

A gas pressure test **should be** taken at the gas valve pressure tap provided on every gas valve to assure that the water column (W.C.) pressure is correct and consistent.

There are two (2) types of devices commonly used to measure water column (W.C.) pressure. They are the spring and mechanical type gauge and the water column test gauge (manometers). The use of the spring and mechanical type gauges is **NOT RECOMMENDED** because they **are not** always accurate. The preferred type of gauge is the manometer because it is a simple device to use and is highly accurate. A manometer is simply a glass or transparent plastic tube with a scale graduated in inches. When it is filled with water and pressure is applied, the water in the tube rises, showing the exact water column (W.C.) pressure.



WARNING: Test **ALL** connections for leaks by brushing on a soapy water solution. **NEVER TEST FOR LEAKS WITH A FLAME!**

a) Connect the water column test gauge (manometer) to the gas valve pressure tap (1/8" N.P.T.). Refer to the **illustration** on previous page (**<u>page 22</u>**).

b) Start the dryer ... with the burner on, the correct water column pressure (W.C.) reading in inches **should be**:

Natural Gas ..... 3.5 - 4 inches W.C.
L.P. (liquid propane) Gas ..... 10.5 - 11 inches W.C.

When a gas dryer in first started (during initial time of installation and start-up), it has a tendency not to ignite on the first ignition attempt. This is due to the fact that the gas supply piping is filled with air, so it may take a few minutes for the air to be purged from the supply lines. During this purge period there may be insufficient gas pressure for ignition, which might cause the DSI module to go into the "LOCK-OUT" mode (the L.E.D. [light emitting diode] will LIGHT "RED" CONTINUOUSLY).

NOTE: During the purge period, check to be sure that **<u>ALL</u>** shut-off valves are open.

NOTE: To reset the DSI module if it is in the "LOCK-OUT" mode, open and close the main door, then restart the dryer.

c) If gas pressure is low, unscrew slotted regulator cover on top of the gas valve and turn regulator (pressure) adjustment screw (located underneath the cover) clockwise (CW) to increase the pressure.

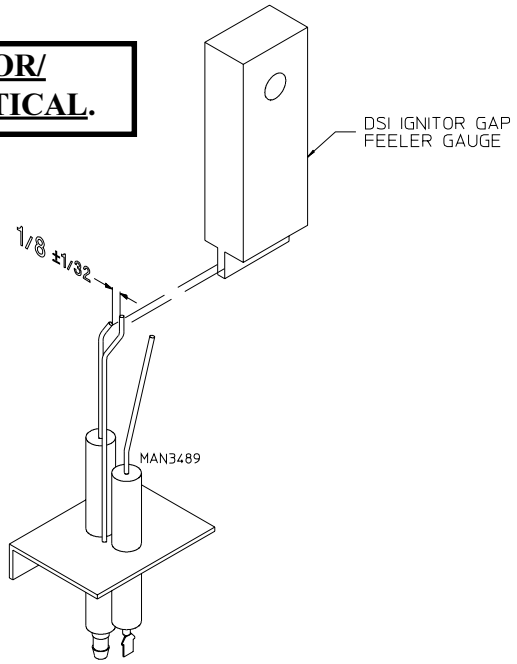
2) Ignitor and Flame-Probe Assembly

The ignitor and flame-probe assembly consists of a ceramic insulated ignitor electrode, a ground rod, and a ceramic insulated flame-probe electrode. ***The GAP between the ignitor electrode and the ground rod is set, and <u>must</u> <u>be</u> maintained at 1/8" +/- 1/32" (.1250 +/- .03121).*** When the DSI module provides the high synchronous spark (14,000 volts) through the high voltage (HV) lead, a spark is produced over the GAP. When this spark is produced, the gas valve is opened. Upon ignition, the flame probe electrode (of the ignitor/flame-probe assembly) has high voltage provided to it that supplies a small current to ground through the flame. Once the current is sensed, it initializes the DSI module to sustain the gas flow (from the gas valve).

IMPORTANT: <u>THE GAP SETTING ON THE IGNITOR/ FLAME-PROBE ASSEMBLY IS CRITICAL</u>.

a) DSI Ignitor and Flame-Probe Assembly Adjustments

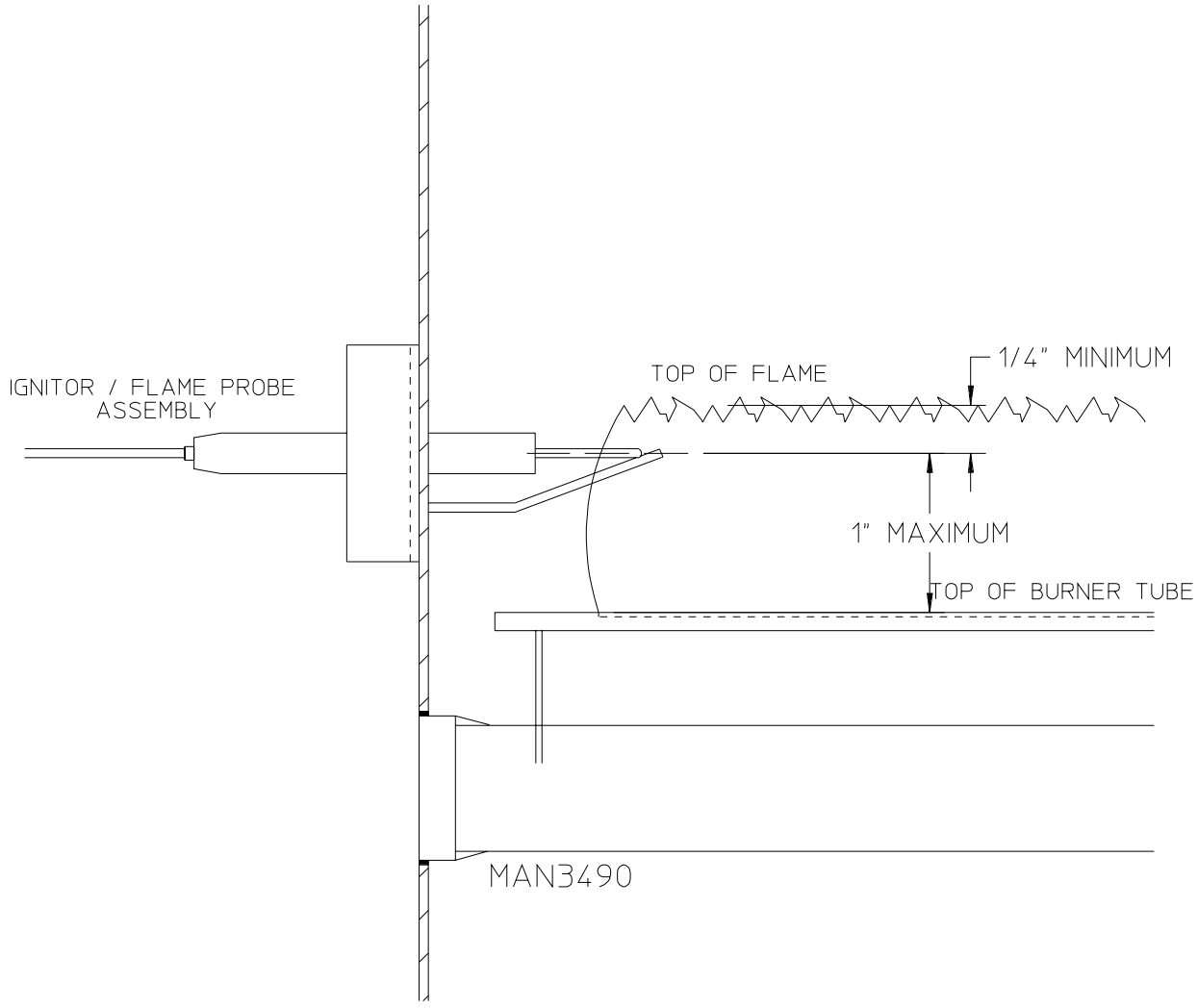
(1) The GAP ***on the ignitor and flame-probe assembly <u>must</u> <u>be</u> set, and held at 1/8" +/- 1/32" (.1250 +/- .03121).*** If this GAP is not maintained (if the GAP is either to large or to small), the DSI module will indicate a system malfunction and go into the "LOCK-OUT" mode (the L.E.D. will LIGHT "RED" CONTINUOUSLY).



(a) To check or set the 1/8" GAP, use a DSI Gap Feeler Gauge or similar device to determine GAP size. **DO NOT USE FEELER TO SET THE GAP**, use it only to determine the size of the gap. If an adjustment is necessary, bend the ground rod to achieve the correct GAP, then recheck the 1/8" GAP with a feeler gauge.

(b) The ALIGNMENT of the ignitor and flame-probe assembly in relation to the GAP on the ignitor electrode and ground rod **must be** maintained in as vertical (straight line) a position as possible (refer to the illustration below) otherwise the DSI module will indicate a system malfunction and go into the "LOCK-OUT" mode (the L.E.D. [light emitting diode] indicator will LIGHT "RED" CONTINUOUSLY).

(c) The POSITIONING of the ignitor and flame-probe assembly is ***extremely important*** because it provides the necessary feedback information to the DSI module. The flame probe electrode **must be** POSITIONED 1/4" minimum into the flame path (refer to the illustration below) and **must be** POSITIONED one (1) inch maximum from the burner tube (refer to the illustration below) otherwise the DSI module will indicate a system malfunction and go into the "LOCK-OUT" mode (the L.E.D. indicator will LIGHT "RED" CONTINUOUSLY).



NOTE: To reset the DSI module if it is in the "LOCK-OUT" mode, open and close the main door, then restart the dryer.

3) Air Turbulence

If there is sail switch flutter due to air turbulence or improper impellor (fan and blower) rotation or a restriction in the exhaust duct work, the DSI module will cycle erratically. This in turn might cause the DSI module to "LOCK-OUT" (where the L.E.D. indicator will LIGHT "RED" CONTINUOUSLY).

a) If air turbulence cause the flame to move away from the flame probe electrode (of the ignitor and flame-probe assembly), or if the flame goes out completely during the heat (flame) cycle, the DSI module will attempt to reestablish a flame by going into a reignition cycle.

4) Direct Spark Ignition (DSI) Module

If there is some sort of *operational interference* in the DSI system, the DSI module (acting as the "controller" for the system) will go into a "LOCK-OUT" mode (where the L.E.D. [light emitting diode] indicator will LIGHT "RED" CONTINUOUSLY).

a) *Operational interference* is any adverse condition (whether internal or external) to the system. (Electrical noise is considered external *noise interference* because it can cause the DSI module to cycle erratically.)

NOTE: To reset the DSI module if it is in the "LOCK-OUT" mode, open and close the main door, then restart the dryer.

If the GAP, the ALIGNMENT, and the POSITION of the ignitor and flame-probe assembly are correct, if the gas flow and pressure is constant and consistent; if there is no adverse air turbulence; and if the DSI module remains in the "LOCK-OUT" mode (where the L.E.D. indicator will LIGHT "RED" CONTINUOUSLY) then, there is a malfunction with the DSI module itself, and it **must be** replaced.

5) Wiring

If the DSI module is in the "LOCK-OUT" mode (where the L.E.D. indicator will LIGHT "RED" CONTINUOUSLY) , and the mechanical components have been checked (i.e., the ignitor/flame-probe assembly, the gas valve, etc.), then, there may be a problem somewhere in the DSI system wiring.

a) Check **ALL** the wiring within the DSI system, especially the ground connections at the DSI module and the ignitor and flame-probe assembly.

NOTE: Check for any possible damage to the ceramic insulators on the ignitor electrode and the flame-probe electrode of the ignitor/flame-probe assembly.

b) Make sure the flame-probe electrode of the ignitor and flame-probe assembly is positioned no more than one (1) inch maximum from the burner tube.

CAUTION: DO NOT LET THE IGNITOR AND FLAME-PROBE ASSEMBLY TOUCH THE BURNER TUBES; OTHERWISE THE ENTIRE ASSEMBLY WILL SHORT OUT.

6) Direct Spark Ignition (DSI) 24 VAC Transformer

The DSI transformer is designed to step down the operating voltage of the dryer to 24 VAC to operate the DSI module. This transformer, like **ALL** transformers is two (2) sided;

a) Primary Side...

This is the incoming voltage side - 208 VAC, 230/240 VAC, 380 VAC, 416 VAC, 480 VAC - of the transformer.

b) Secondary Side...

This is the step down side - 24 VAC - of the transformer.
(If the dryer is above 240 VAC a secondary voltage of 240 VAC will also be present.)

WARNING: **208 VAC and 230/240 VAC ARE NOT THE SAME. ALL** voltage connections ***should be*** checked and confirmed according to the wiring diagram provided with the individual dryer. Any damage done to dryer components due to improper voltage connections will automatically VOID THE WARRANTY.

IMPORTANT: The **ADC** Service Department ***must be*** contacted prior to any wiring change or conversion because, depending on the change or conversion required, some parts may have to be added, deleted, or changed. When contacting the **ADC** Service Department, they **must be** given the correct **model** and **serial numbers** for the dryers.

NOTE: Any wiring changes or conversions should be accomplished by a QUALIFIED ELECTRICAL TECHNICIAN.

C. Natural Gas To L.P. (Liquid Propane) Gas Conversion Instructions

IMPORTANT: CONVERSION ***MUST BE*** PERFORMED BY COMPETENT TECHNICIANS IN ACCORDANCE WITH LOCAL and STATE CODES.

NOTE: Converting the dryer to L.P. Gas disables the internal regulator of the gas valve, therefore, an external regulator ***must be*** provided at the source of the L.P. gas supply (L.P. tank) or the dryer. The water column (W.C.) gas pressure ***must be*** regulated to between 10.5 inches and 11 inches for safe and efficient dryer operation. Low, inconsistent, or too high a gas pressure will result in improper operation of the dryers' heat and safety circuits. **POOR EFFICIENCY CAN CREATE A POTENTIAL SAFETY HAZARD.**

1. Discontinue electrical power to the dryer.

2. Close **ALL** gas shut-off valves in the dryers' gas supply line.

   Turn the gas cock dial to the off position on the gas valve.

3. Disconnect the gas valve wiring.

   Be sure to identify the correct location of *each wire* for correct reinstallation.

4. Disconnect union connection in the gas supply line.

IMPORTANT: Pipe joint compounds that resist the action of natural gas and L.P. gas ***must be*** used.

5. Loosen and remove the screws from the brackets holding the gas valve and manifold assembly to the burner box.

6. Remove the gas valve and manifold assembly from the dryer.

7. Unscrew the main burner orifices and replace them with the L.P. orifices provided.

NOTE: Use extreme care when handling (removing or replacing) orifices. **THESE ORIFICES ARE MADE OF BRASS and CAN BE EASILY DAMAGED.**

8. Remove the two (2) screws on the gas valve regulator.

   Remove the regulator and the gasket.

9. Install the new gasket and L.P. regulator.

   Replace the two (2) screws.

NOTE: USE ONLY NEW PARTS PROVIDED.

10. Reverse the procedure for reinstalling the gas valve and manifold assembly to the dryer.

11. Open **ALL** gas shut-off valves (closed in ***Step #2***).

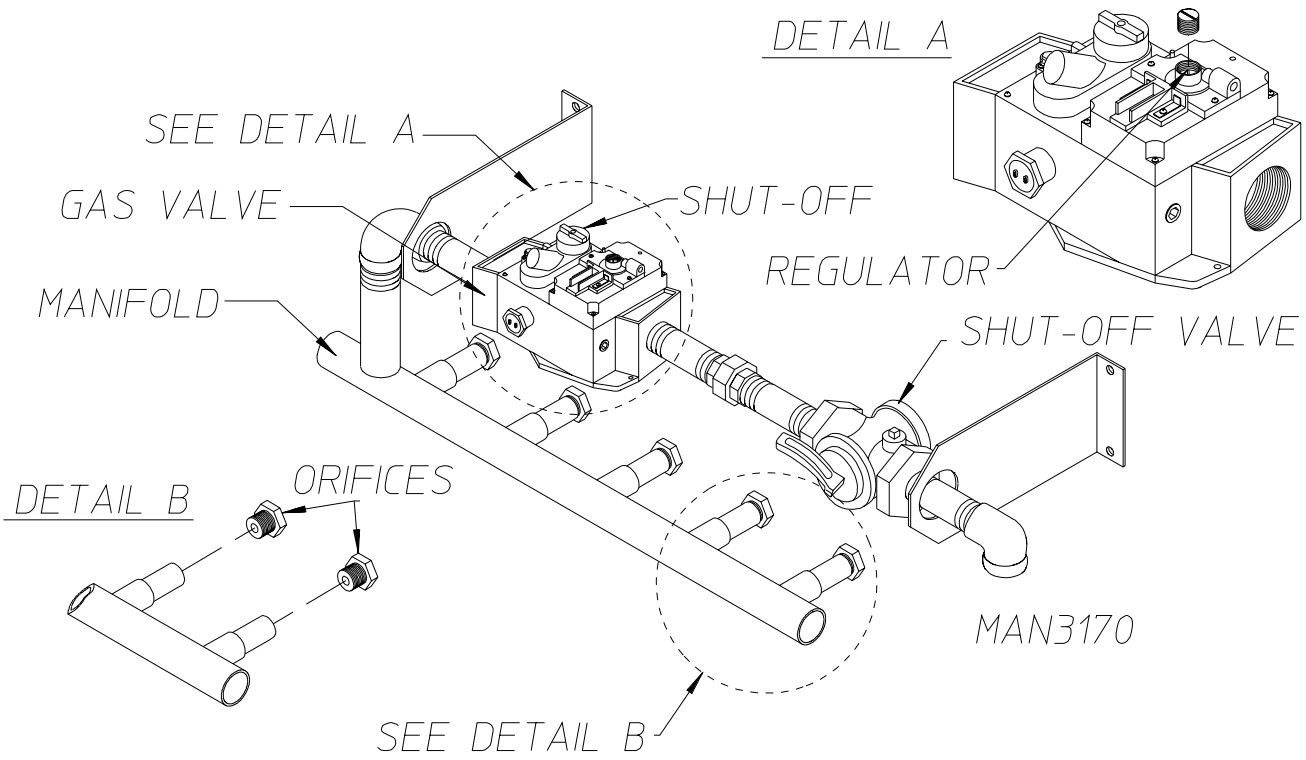
12. Reestablish electrical service to the dryer.

a. Test **ALL** connections for leaks.

IMPORTANT: Test **ALL** connections for leaks by brushing on a soapy water solution (liquid detergent works well).

WARNING: NEVER TEST FOR LEAKS WITH A FLAME!

13. Operate the dryer through one (1) complete cycle to insure proper operation.

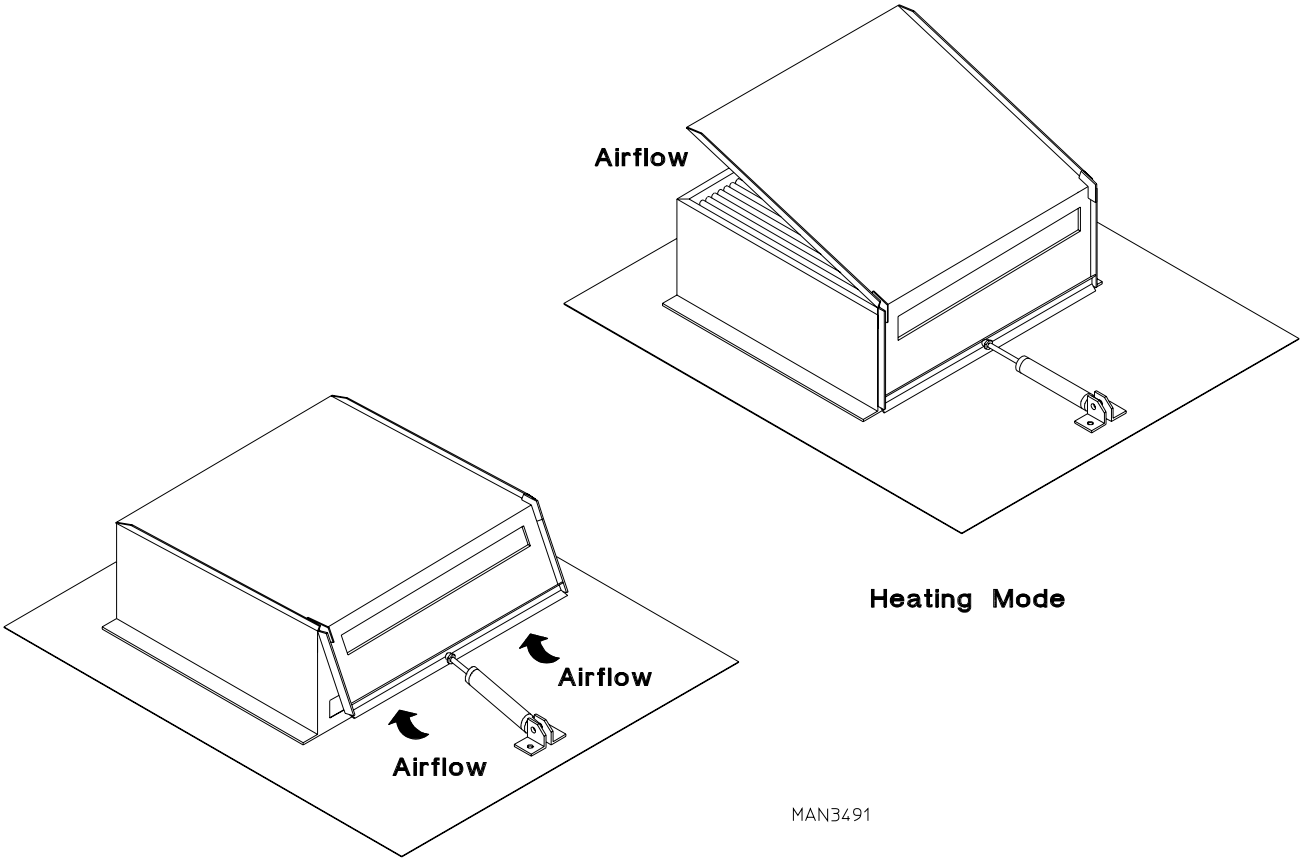


D. Steam Coil System Operation

General Overview

The ADS-200 steam coil is constantly charged thereby eliminating repeated expansion and contraction and also provide instant heating to start the drying process. The steam damper, located on top of the steam coil, is the only temperature controlling device in this system. When the steam damper is open, ambient air is drawn through the coil providing heat to the dryer. When the steam damper is closed, ambient air is drawn directly into the tumbler, bypassing the coil, allowing a rapid cool down.

NOTE: With the dryer off and/or no air supply to the damper piston, the damper is in the Cool Down mode... the coil is constantly charged.



1. Steam Coil PH Level

   The normal PH level for copper type steam coils **must be** maintained between a value of 8.5 to 9.5. For steel type steam coils the PH level **must be** maintained between a value of 9.5 to 10.5. These limits are set to limit the acid attack of the steam coils.

IMPORTANT: Coil failure due to improper PH level will VOID THE WARRANTY.

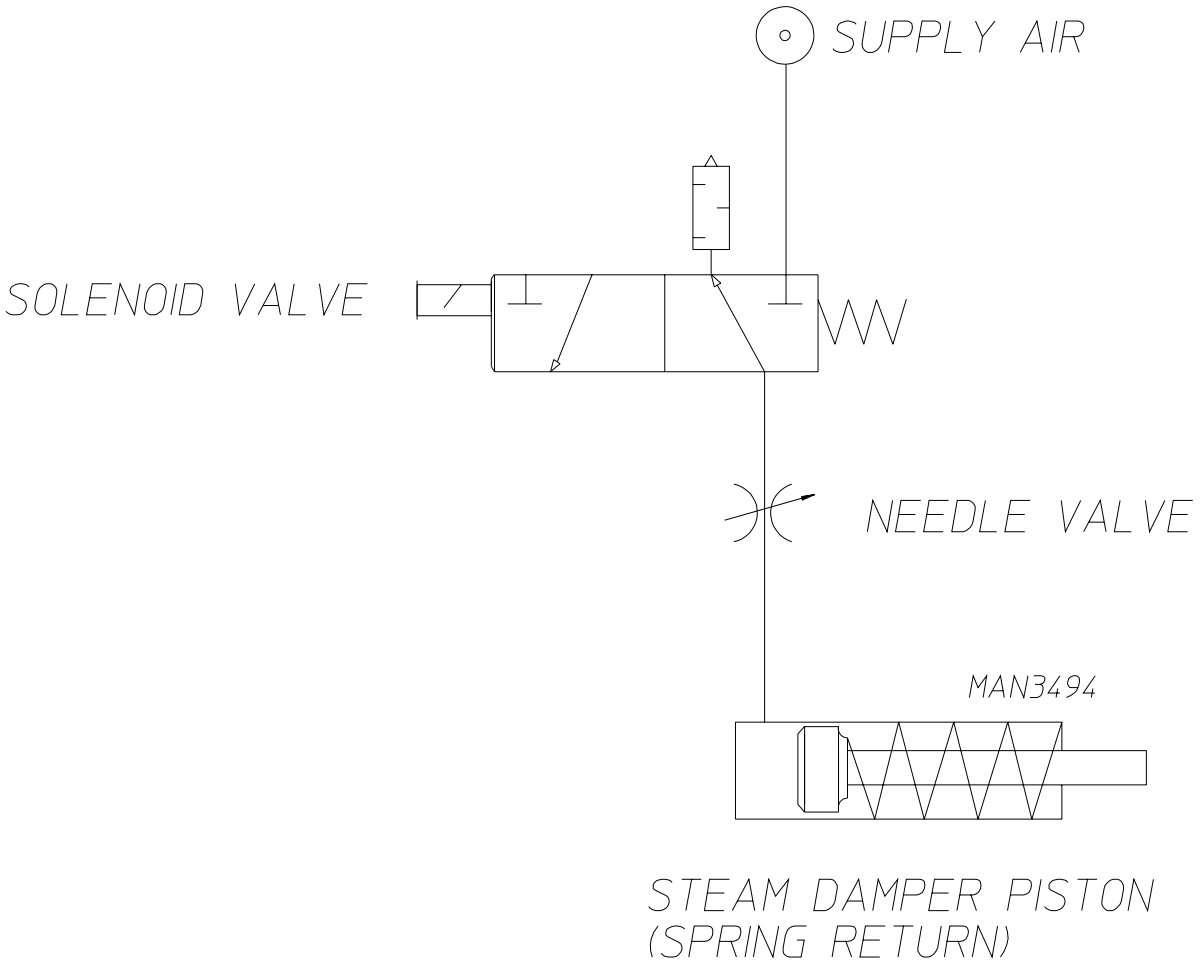
2. Steam Damper Actuator System

The steam damper actuator system consists of a hinged damper plate, pneumatic piston, and a 24 volt solenoid valve with a needle valve to control the speed of the piston actuation.

On a call for heat, a 24 volt signal is applied to the 3-way/2-position solenoid valve. This signal switches the valve so that compressed air is sent to the piston. The piston rod extends, pushing the hinged steam damper plate to the open position. This allows room air to be drawn through the hot steam coil and then through the basket (tumbler).

When the temperature set point has been reached, the 24 volt signal is removed from the solenoid valve, so that the solenoid valve blocks the air supply to the piston, and air in the piston is bled to the atmosphere. The spring in the piston now retracts the piston rod, closing the steam damper. The steam damper plate now covers the steam coil and allows room air to bypass the coil before entering the basket (tumbler) for a rapid cool down.

The steam damper plate should open and close slowly and smoothly. The speed can be modulated by adjusting the needle valve knob. Turning the knob clockwise (CW) restricts the compressed air flow and slows the steam damper movement. Counterclockwise (CCW) adjustment speeds up the steam damper motion. Upon completion of the adjustment, tighten the needle valve's locking nut.



2. Steam Damper Actuator System Service and Replacement

a. Steam Damper Cylinder/Piston Replacement

1) Disconnect compressed air supply from the dryer.

2) Disconnect tubing from the piston.

3) Remove the spring clip from clevis pin then slide out the clevis pin.

4) Remove the steam damper cylinder (piston).

5) To install new steam damper cylinder (piston), reverse above procedure (***steps #4 through #1***).

b. Steam Solenoid Valve Replacement

1) Disconnect compressed air supply from the dryer.

2) Discontinue electrical service to the dryer.

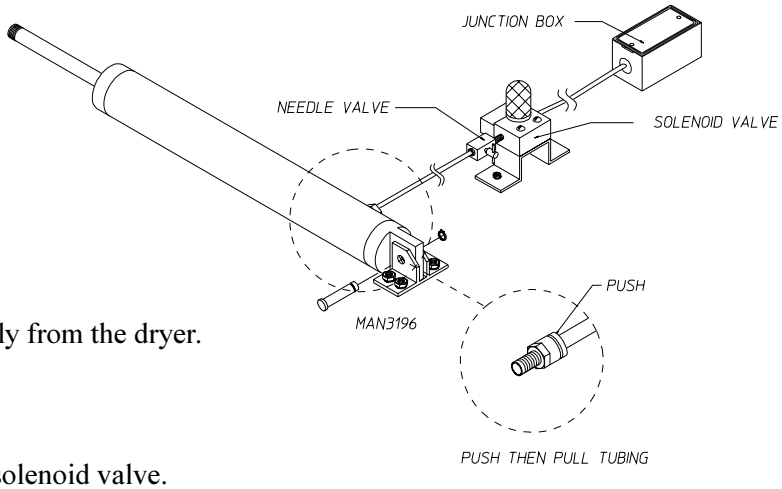
3) Disconnect wires in junction box.

4) Remove tubing from the inlet side of the valve.

5) Remove the valve from the bracket.

6) Unscrew the valve from the outlet side.

7) To install new steam solenoid valve, reverse above procedure (***steps #6 through #1***).



c. Needle Valve Replacement

1) Disconnect compressed air supply from the dryer.

2) Remove tubing from the valve.

3) Unscrew needle valve from the solenoid valve.

4) To install new needle valve, reverse above procedure (***steps #3 through #1***).

d. Steam Coil Replacement

1) Discontinue electric service to the dryer.

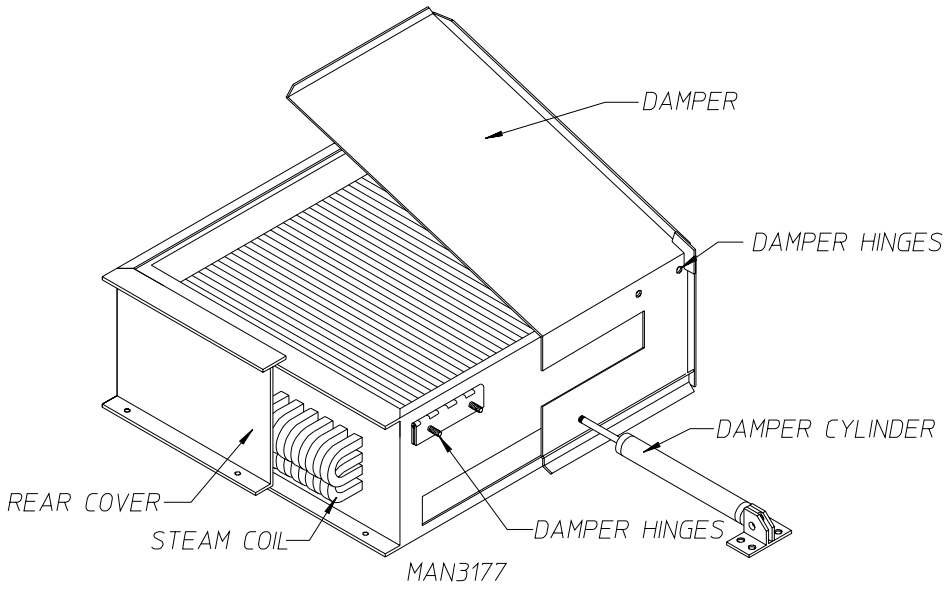
2) Disconnect compressed air supply from the dryer.

3) Shut off **ALL** steam supply lines and steam return valves that feed the steam coil.

4) Wait a sufficient amount of time until **ALL** of the steam lines and the steam coil is cool.

5) Open 1/2" plug on the return line to bleed off any residual steam pressure.

CAUTION: MAKE CERTAIN THAT THE ENTIRE STEAM SYSTEM (coil, lines, valves, etc.) ARE COOLED TO AVOID HOT STEAM ESCAPING and TO AVOID PERSONAL INJURY.



CUT AWAY VIEW OF STEAM COIL ASSEMBLY

6) Remove steam coil damper cylinder (piston).

7) Remove the steam coil damper by unbolting from its hinges.

8) Disconnect steam supply lines and steam return lines at the unions.

9) Remove the remaining piping from the steam coil

10) Remove **ALL** of the panels surrounding the steam coil.

11) Unbolt the steam coil and remove.

WARNING: The steam coil is heavy. A crane may be needed to remove (and install) the steam coil.

12) Remove the steam coil damper hinges from the old coil and install them on the new steam coil.

13) Hoist the new steam coil into place and bolt down.

14) Replace **ALL** of the panels removed in ***Step #10***.

15) Reinstall **ALL** of the piping removed from the old steam coil in ***Step #9***.

NOTE: Thread sealant certified for steam piping ***must be*** applied to the threads.

16) Reconnect **ALL** of the piping (supply lines and return lines) disconnected in ***Step #8***.

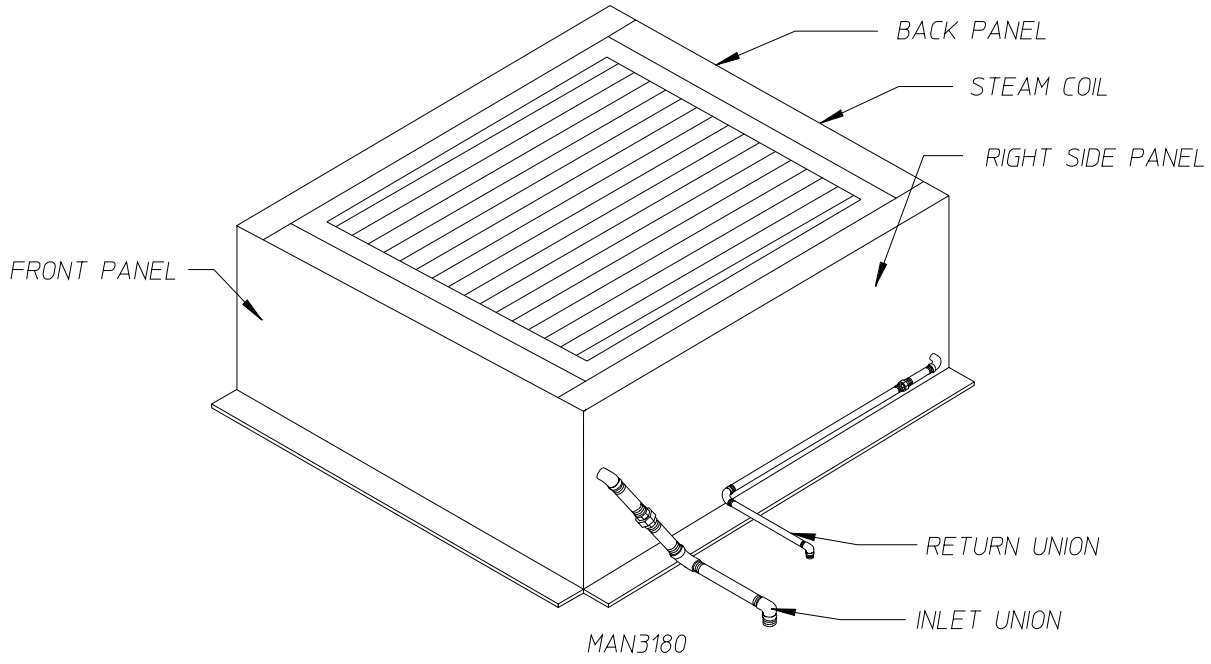
17) Reinstall steam damper cylinder (piston) removed in ***Step #6***.

18) Reestablish electrical service to the dryer.

19) Close the 1/2" plug which was opened in ***Step #5***.

WARNING: THE 1/2" PLUG *MUST BE* CLOSED BEFORE ATTEMPTING TO APPLY ANY STEAM PRESSURE.

20) Open the return line then open the supply line.



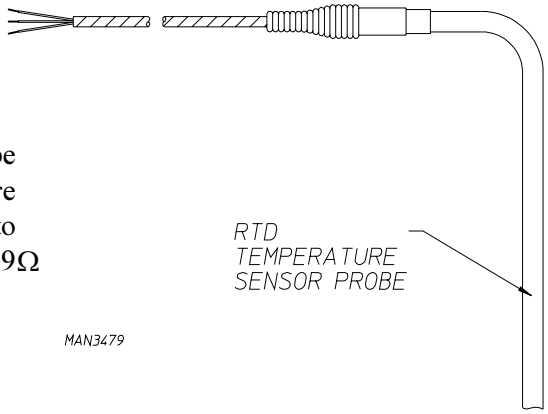
VIEW OF STEAM COIL w/ DAMPER REMOVED

E. Sprinkler System Description

The AD-200 sprinkler system is monitored by a microprocessor based temperature controller as a designated "**FAIL-SAFE**." The microprocessor circuit **must have** power in order to engage main power to the dryer. When cycling the dryer, if the temperature at the Resistive Temperature Device (RTD) reaches 575º F, one (1) set of contact in the controller will open, disabling the power (electric supply) to the dryer. Another set of contacts will close, sounding the alarm and turning on the sprinkler.

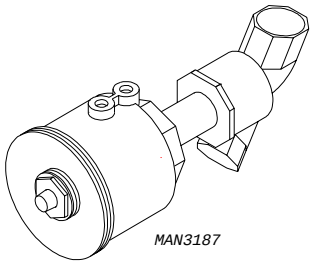
NOTE: The sprinkler as well as the alarm will remain on until the "amber" colored sprinkler reset button is pressed and the temperature in the tumbler (basket) falls below 575º F.

1. Description Of Components



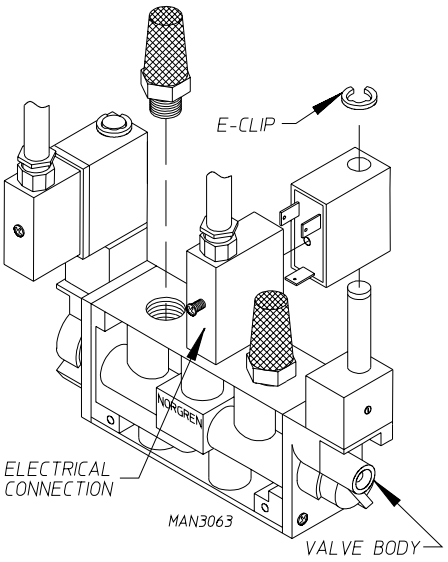
a) Resistive Temperature Device (RTD)

The RTD is located above the tumbler (basket). The probe is a 100Ω (ohm) platinum RTD. As the temperature increases or decreases the resistance value corresponds to the ambient temperature (i.e., 100Ω= 32º F / 0º C ... 109Ω = 75º F / 24º C).



b) Sprinkler Valve

The sprinkler valve is a 2-way, air piloted, normally closed valve. With pilot air pressure applied, the valve opens allowing water to flow.

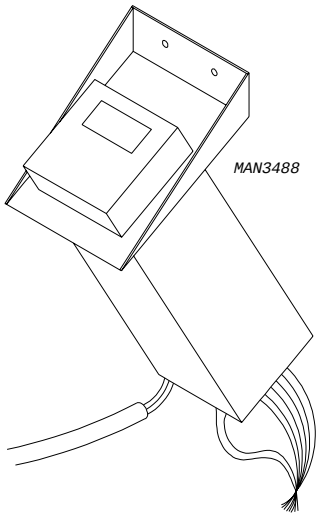


c) Sprinkler Solenoid Valve

The sprinkler solenoid valve is a 3-way/2-position solenoid valve that is used to supply pilot air to the sprinkler valve.

d) Sprinkler Digital Temperature Controller

The sprinkler digital temperature controller is a programmable microprocessor used to monitor temperatures via a Resistive Temperature Device (RTD).



NOTE: Operating parameters are preset at the factory and ***should not*** require any adjustment.

2. Sprinkler System Operation

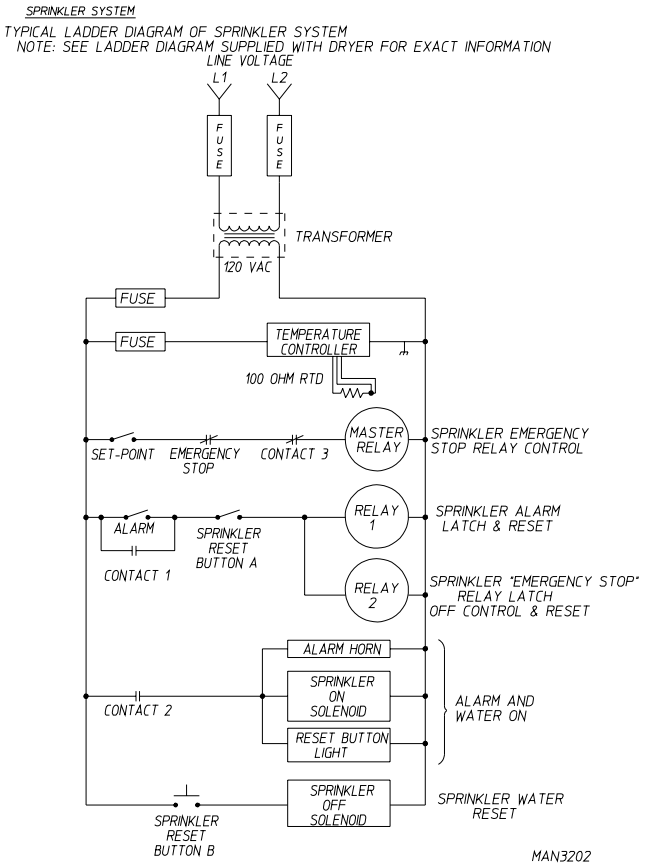
NOTE: Refer to the ladder diagram provided with the dryer for relay logic.

Master Relay -The coil in this relay **must be** energized in order to close the contacts needed to supply power to the dryers control system.

Relay 1 - The coil in this relay energizes if the set-point is reached closing Contact 1 and Contact 2. Contact 1 latches Relay 1 on. Contact 2 closes, turning on the sprinkler, the horn, and the reset button light. Relay 1 will remain energized until the reset button is pushed.

Relay 2 - The coil in this relay energizes if the set-point is reached closing Contact 3, de-energizing the Master Relay, and shutting power off to the dryer. Relay 2 will remain energized until the reset button is pushed.

NOTE: The Sprinkler System will remain on until the tumbler (basket) temperature falls below the set-point, and the reset button is manually activated.



3. Sprinkler System Component Replacement

   a. Resistive Temperature Device (RTD) Replacement

      1) Turn the water supply to the dryer off.

      2) Discontinue electric service to the dryer.

      3) Remove the 1/4" compression fitting.

      4) Remove the two (2) screws from the junction box.

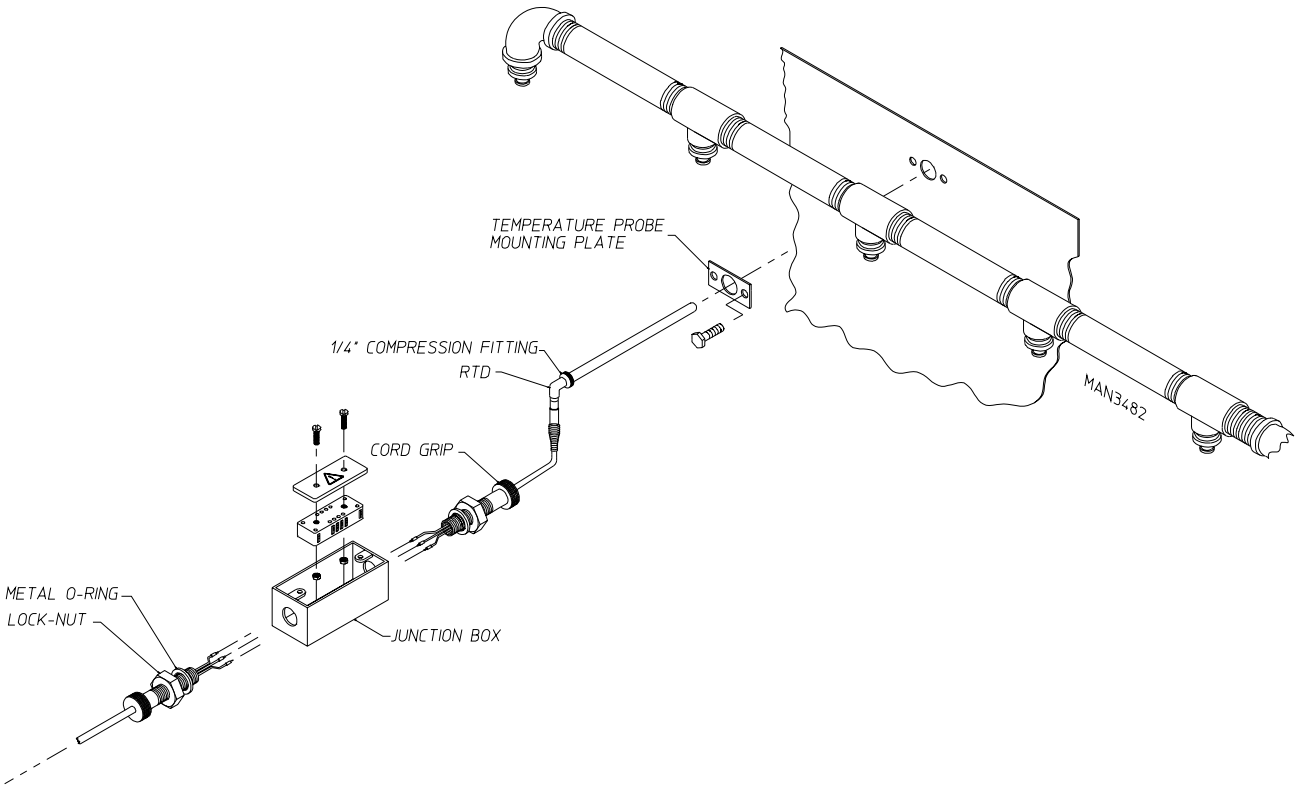
      5) Remove the wires of the RTD from the terminal strip.

NOTE: Identify the wires removed for proper reinstallation.

      6) Loosen the cord grip cap.

      7) Remove Resistive Temperature Device (RTD).

      8) To install new RTD, reverse above procedure (***steps #7 through #1***).



b. Sprinkler Valve Replacement

1) Turn the water supply to the dryer off.

2) Discontinue electric service to the dryer.

3) Disconnect compressed air supply from the dryer.

4) Loosen and remove the hose clamp.

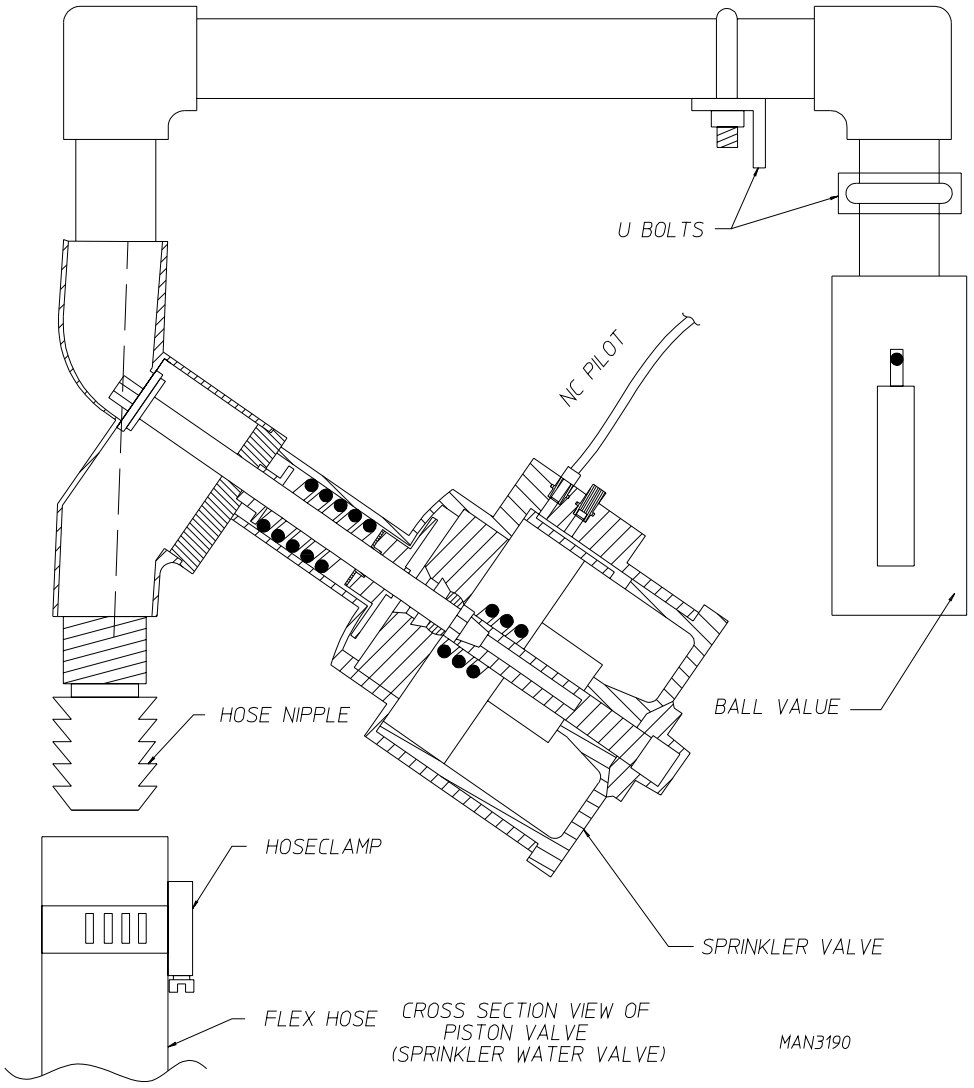
5) Remove any residual water to the valve.

6) Remove 1/4" air tubing going to the valve.

7) Remove the two (2) U-bolts holding the sprinkler valve assembly.

8) Unscrew the sprinkler valve from the tubing.

9) To install new sprinkler valve, reverse above procedure (***steps #8 through #1***).



c. 3 HP Control Relay Replacement

WARNING: THE SPRINKLER CIRCUIT HAS A SEPARATE POWER SUPPLY (then the power supply for the dryer). **DISCONNECT and LOCK-OUT BOTH POWER SUPPLIES BEFORE SERVICING THE DRYER.**

1) Mark and identify the wires that will be removed for proper reinstallation.

2) Press down on the control relay and lift the bottom out and up to remove from the din rail.

3) Remove the wires.

4) Replace the bad control relay.

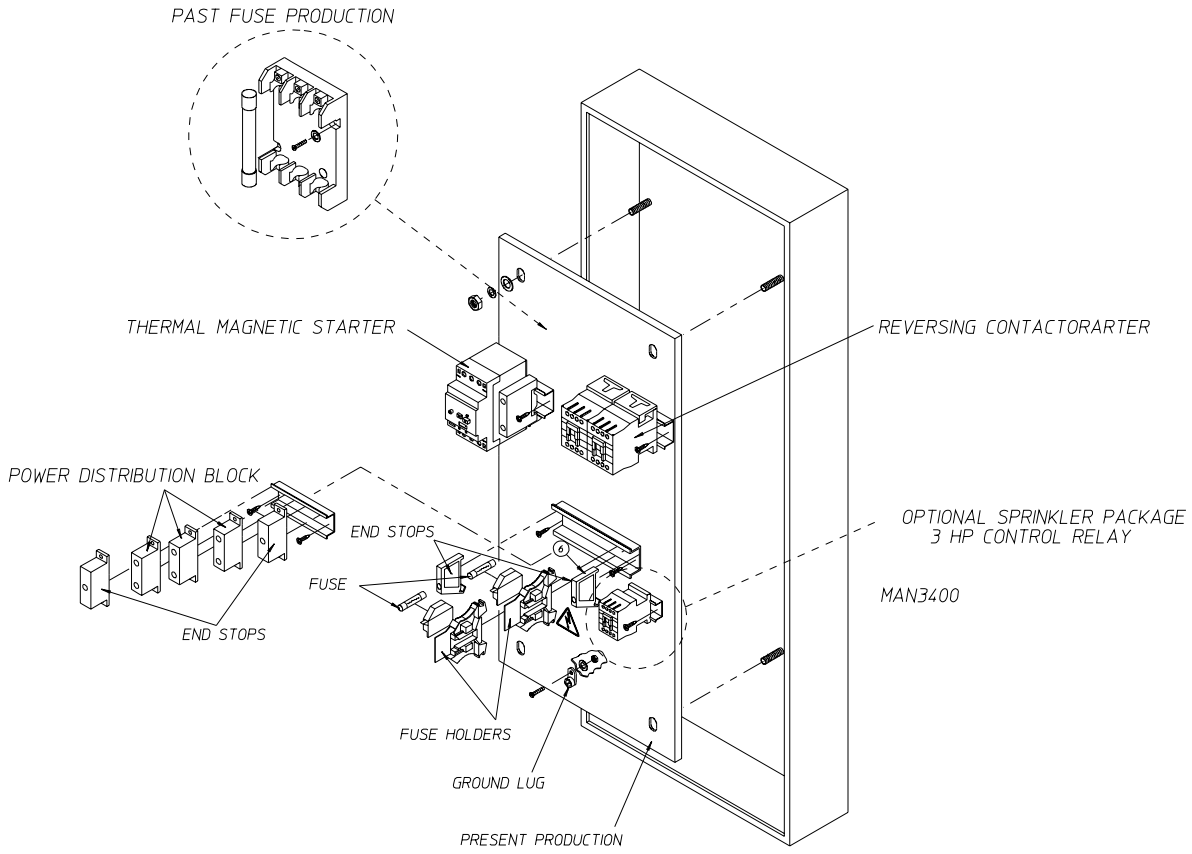
5) Replace the wires removed from ***Step #3***.

NOTE: Make sure wires are properly reinstalled using identifying markings from ***Step #1***.

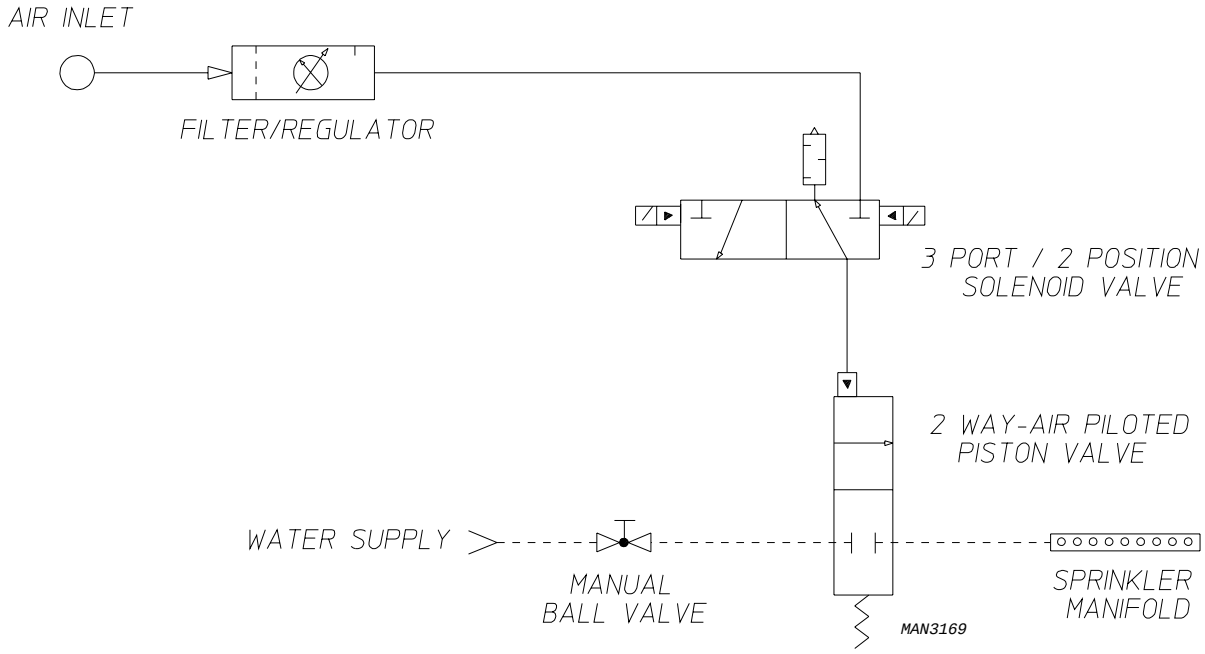
6) Mount the top of the control relay to the top of the din rail, then press down and snap the bottom into the rail.

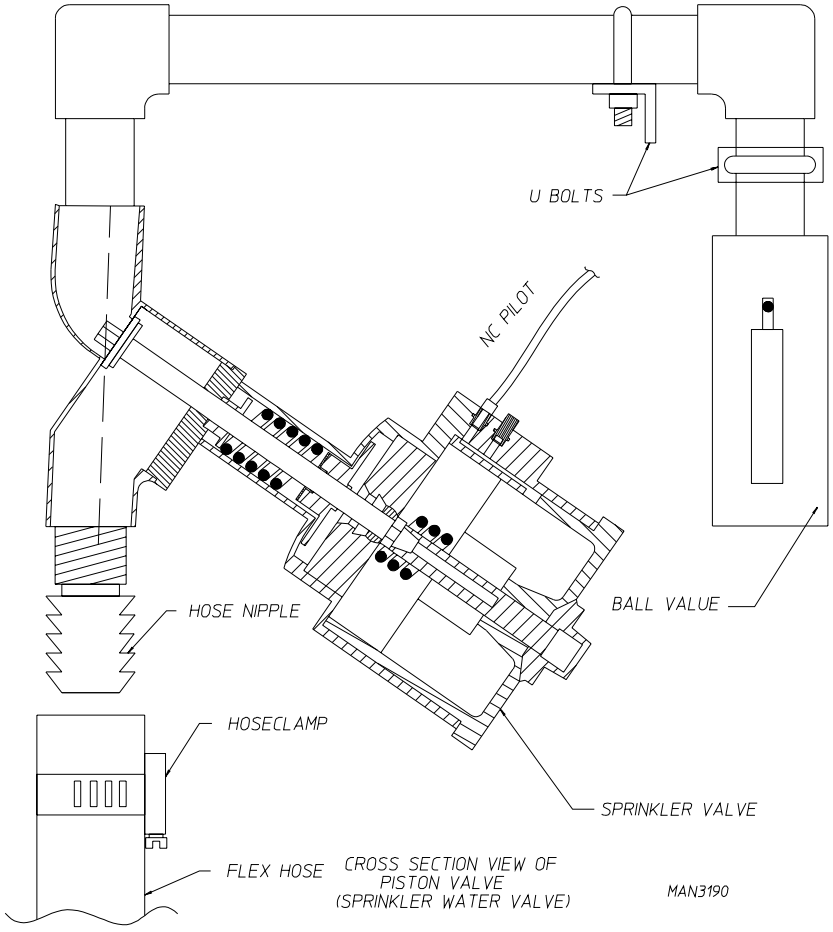
   Set the over load.

7) Inspect the work performed before reestablishing power (electrical service) to the dryer.



SPRINKLER SYSTEM PNEUMATIC DIAGRAM





F. Air Jet Assembly

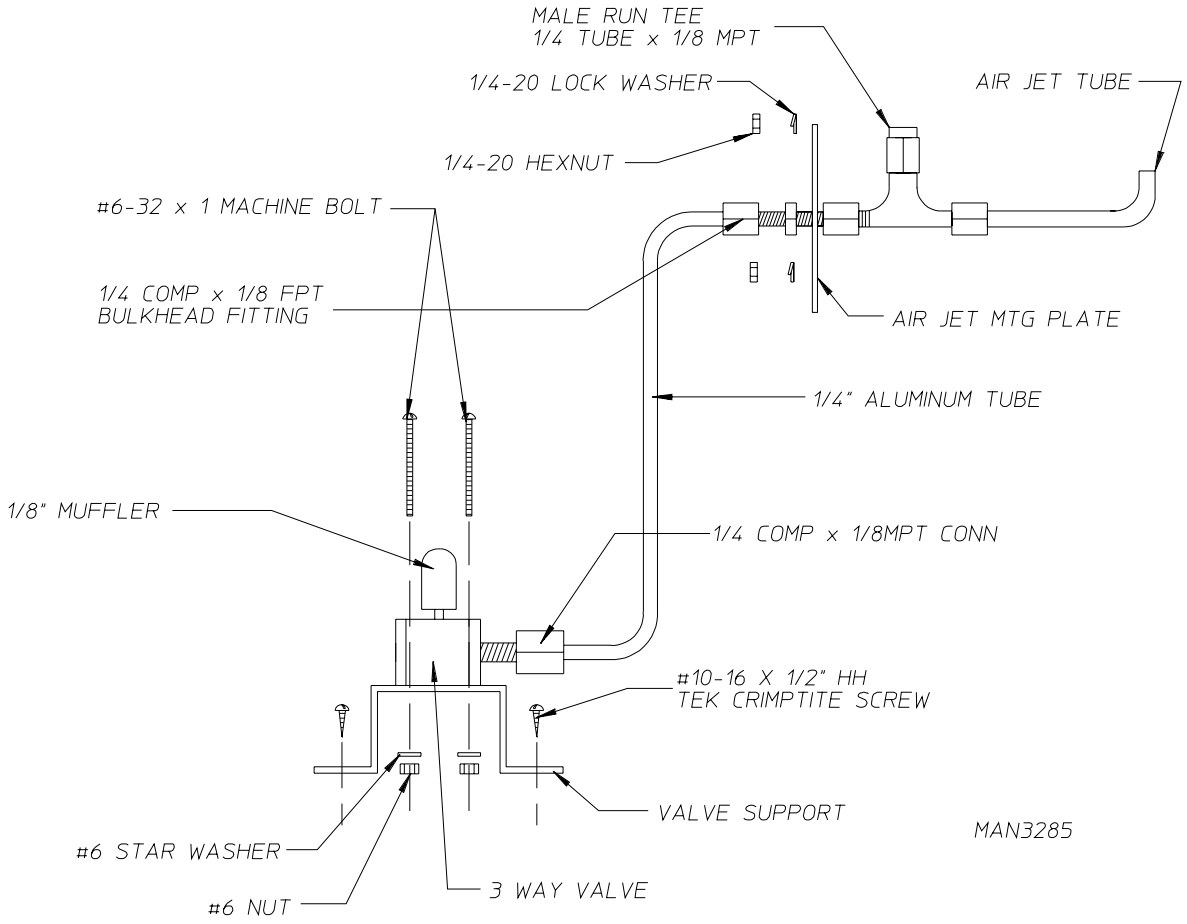
1. Air Jet Assembly Description

   The AD-200 air jet assembly is located in the left front base of the dryer. The air jet is designed to operate at the end of *each cycle* for thirty (30) seconds, to remove lint which may have accumulated on the blower (impellor) fan blades. This function will be interrupted if the main door or lint drawer is opened before the air jet cycle is complete.

2. Air Jet Component Replacement

   a. 24 VAC 3-Way Pressure Valve Replacement

AIR JET ASSEMBLY WITH PNEUMATIC VALVE



1) Disconnect compressed air supply from the dryer.

2) Discontinue electric service to the dryer.

3) Remove the 1/4" x 1/8" M.P.T. connection from the 3-way pressure valve body.

4) Remove the two (2) #10-16 x 1/2" Crimptite TEK screws.

4) Remove the two (2) #10-16 x 1/2" Crimptite TEK screws.

   Remove the valve support.

5) Remove the two (2) #6-32 x 1" hex head machine bolts by removing the two (2) #6 hex nuts and the two (2) #6 star washers.

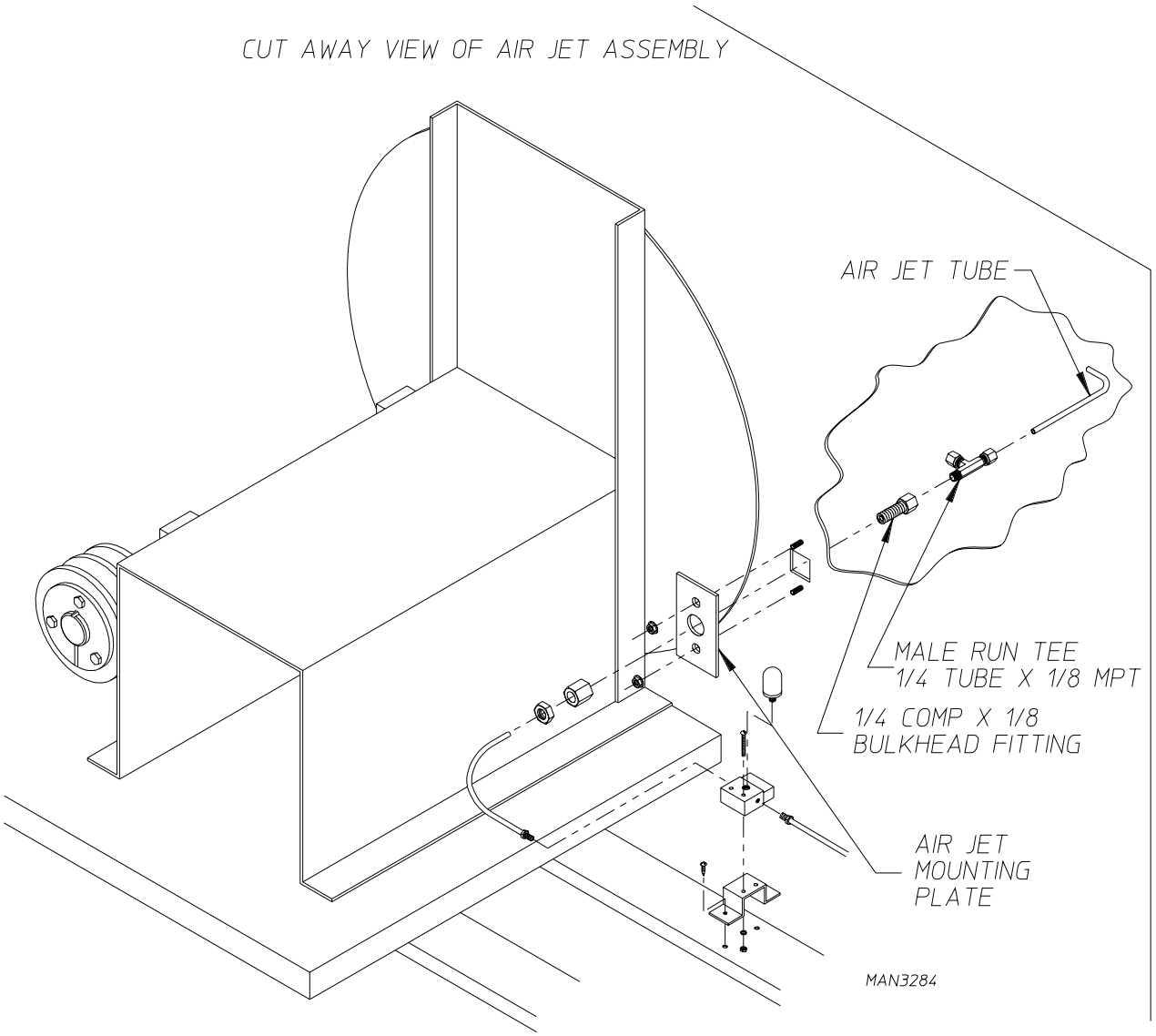
6) To install new air jet assembly, reverse above procedure (***steps #5 through #1***).

b. Pneumatic Valve Muffler Replacement

1) Disconnect compressed air supply from the dryer.

2) Remove damaged or nonfunctional muffler from valve body.

3) Replace muffler by threading into valve body (snug fit).



2. Component Replacement

a) Blower (impellor and fan) Motor Replacement

1) Discontinue electric service to the dryer.

2) Mark and identify the wires that will be removed for proper reinstallation.

3) Loosen the bolts from the motor to the motor base ...

(a) Slide the blower (fan and impellor) motor forward.

(b) Remove the V-belts.

(c) Remove loosened bolts.

4) Remove the bolts from the bushing.

5) Insert bolts into the threaded holes.

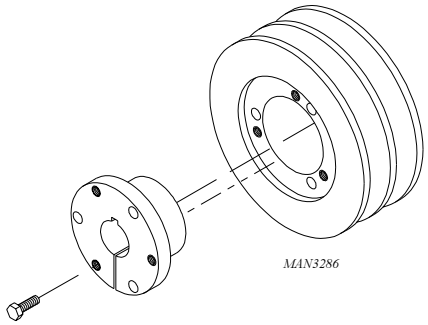
6) Tighten the bolts evenly for motor pulley removal.

7) Mark the inside of the motors' shaft before removing the bushing.

8) Loosen the set screws on the bushing.

9) Remove the bushing.

PULLEY REMOVAL



10) Measure the mark on the shaft (from ***Step #7***) to the end of the shaft and mark the new motors' shaft.

11) Slide the motor pulley on to the new blower (fan/impellor) motors' shaft.

12) Slide the bushing on to the shaft until the inside of the bushing meets the mark (from ***Step #11***) on the new motors' shaft.

13) Tighten the set screws on the bushing.

14) Insert bolts into the large holes on the bushing and thread them into the motor pulley.

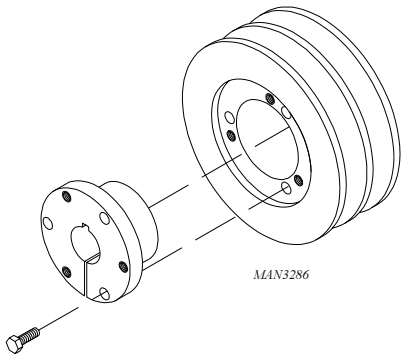
15) Tighten the bolts evenly for motor pulley installation.

16) Aline the pulleys.

17) Tighten (hand tight only) the bolts from the new motor to the motor base ...

Leave enough movement for V-belt adjustment.

PULLEY INSTALLATION



18) Replace the V-belts ...

(a) Adjust to proper tension by adjusting position of the new blower (fan/impellor) motor.

(b) Align the V-belts.

19) Tighten/secure the new motor to the motor base.

20) Rewire the new blower (fan and impellor) motor in the same order as the wiring from the motor that was removed.

A wiring diagram is usually affixed to the side of the motor.

21) Reestablish electric service to the dryer.

b) Shrouded Pillow Block Bearing Replacement

1) Discontinue electric service to the dryer.

2) Remove the bolts securing the blower (fan and impellor) motor.

(a) Slide the blower (fan and impellor) motor forward.

3) Remove the V-belts from the motor pulley and the pulley on the fan (blower) shaft assembly.

4) Move the blower (fan and impellor) motor so as to be able to remove the fan (blower) shaft bearing mount assembly.

5) Remove the bolts securing the fan (blower) shaft bearing mount assembly.

(a) Slide the fan shaft assembly with the fan (impellor and blower) backwards.

6) Remove the two (2) left hand jam nuts and the washer.

7) Remove the squirrel cage fan (impellor) and the 1/4" x 1/4" x 1-3/4" key.

8) Remove the four (4) bolts securing the shrouded pillow block bearing.

9) Remove the fan (blower) shaft assembly from the fan (blower) shaft bearing mount assembly ...

(a) Remove the pillow block on the squirrel cage fan side of the fan shaft by loosening the set screws on the pillow block bearing.

10) To remove the pillow block bearing on the pulley side of the fan shaft the pulley **must be** removed first ...

(a) Remove the V-belts from the bushing.

(b) Insert bolts into the threaded holes.

(d) Mark the inside of the motors' shaft before removing the bushing.

(e) Loosen the set screws on the bushing.

(f) Remove the bushing and the pulley.

11) Remove the shrouded pillow block bearing by removing the set screw.

12) Replace the shrouded pillow block bearing on to the fan shaft ...

(a) Secure the fan (blower) shaft bearing mount assembly.

(b) Tighten the set screws in the shrouded pillow block bearing.

NOTE: Make certain that the squirrel cage fan (impellor and blower) can spin freely.

13) Reinstall the bushing and the pulley.

(a) Line up the bushing to the mark on the motor shaft and tighten and secure the set screw.

(b) Reinstall the bolts into the original holes and tighten evenly for correct pulley installation.

14) Reposition the blower (fan and impellor) motor to its' original position ...

(a) Tighten (hand tight only) the bolts into the motor and the motor base.

(b) Slide the blower (fan and impellor) motor forward.

Align the pulleys before installing the V-belts.

IMPORTANT: *DO NOT* OVERTIGHTEN V-BELTS.

15) When V-belts are properly tensioned, tighten the motor to the motor base.

16) Reestablish electric service to the dryer.

c) Squirrel Cage Fan (impellor) Replacement

1) Discontinue electric service to the dryer.

2) Remove the bolts securing the blower (fan and impellor) motor.

3) Remove the V-belts.

4) Slide the blower (fan and impellor) motor to the side.

5) Remove the bolts from the fan (blower) shaft bearing mount assembly.

(a) Slide the fan (blower) shaft bearing mount assembly backwards.

6) Remove the two (2) left hand jam nuts and the washer.

7) Remove the 1/4" x 1/4" x 1-3/4" key on the fan (impellor) shaft.

(a) Slide the squirrel cage fan (impellor) off of the shaft.

NOTE: Install this 1/4" x 1/4" x 1-3/4" key on to the fan shaft before installing the new squirrel cage fan.

8) To install new squirrel cage fan (impellor) , reverse above procedure (***steps #6 through #1***).

d) V-Belt Replacement

1) Discontinue electric service to the dryer.

2) Loosen the bolts securing the blower (fan and impellor) motor.

(a) Ease off on the tension bolt.

3) Slide the blower (fan and impellor) motor forward.

4) Remove and replace V-belts.

5) Tighten the tension bolt.

IMPORTANT: *DO NOT* <u>OVERTIGHTEN</u> V-BELTS.

6) Using a straight edge, make certain that the motor pulley and V-belts are aligned straight.

7) Tighten bolts from motor to motor base.

8) Reestablish electric service to the dryer.

e) Fan (impellor) Shaft Replacement

The procedure to replace the Fan Shaft is the same procedure used to replace the Shrouded Pillow Block Bearing (refer to **<u>pages 43</u>** and **<u>44</u>**).

3. Blower (impellor and fan) Electrical Components

a) Blower (impellor/fan) Controls and Overloads

1) Thermal Magnetic Starter (TMS)

The thermal magnetic starter is used as a *safety device* to protect the motor from starting in a locked rotor condition. The overload has a dial setting on the face of the device. To set the overload, refer to your specific electrical diagrams. The overload is specifically designed for motor applications. It has a current curve built into it so the initial high current draw by the motor <u>will</u> <u>not</u> trip the overload. On the face of the overload, there are two (2) push buttons - "START" (Black or Tan - 1) and "STOP" (Red - 0) - the overload **has to be** in the "START" mode for the motor to run.

a) Blower (impellor/fan) Controls and Overloads

1) Thermal Magnetic Starter (TMS)

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(a) Thermal Magnetic Starter (TMS) Replacement

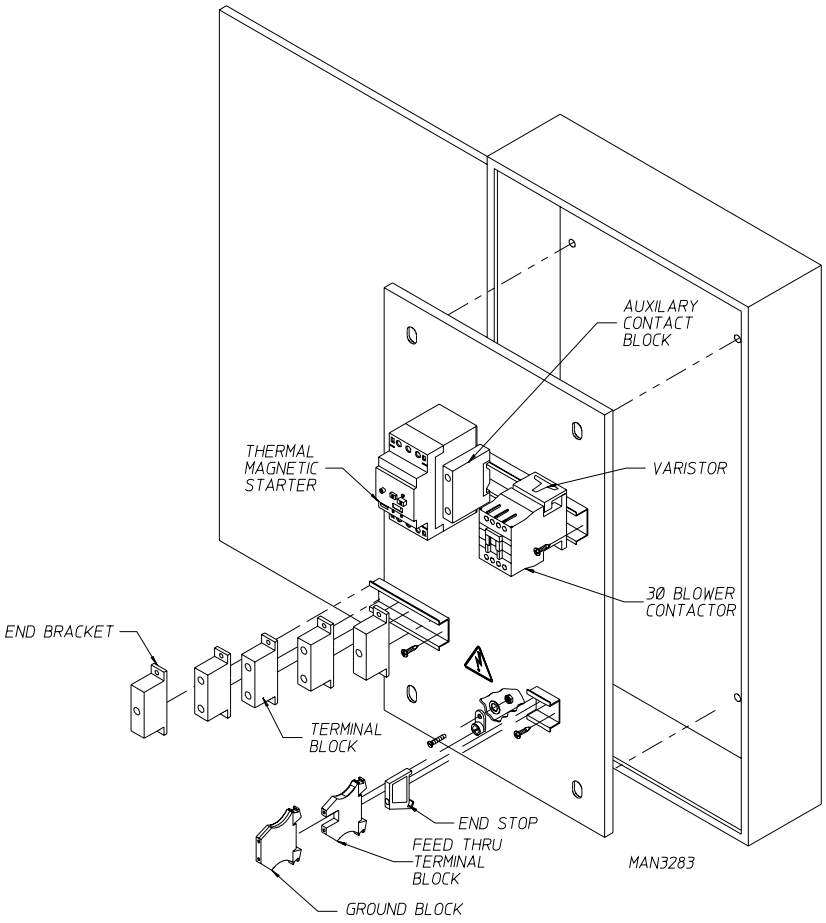
(1) Discontinue electric service to the dryer.

(2) Mark L1, L2, L3, and T1, T2, T3 on the wires to the to the TMS for correct replacement.

(3) Set the amp rating on the TMS according to the manufacturers electrical schematic on the new thermal magnetic starter.

(4) To remove the thermal magnetic starter, pull the tab its' bottom and lift upward.

(5) To install new thermal magnetic starter, reverse above procedure (***steps #4 through #1***).



2) Auxiliary Contact Block

The Auxiliary Contact Block is mounted on the side of the overload. Its' function is to sense an overload trip, thereby triggering a safety fault which will disable the drying cycle. A "DOOR" message will appear on the L.E.D. (light emitting diode) display on the Phase 5 microprocessor controller (computer).

(a) Auxiliary Contact Block Replacement

(1) Discontinue electric service to the dryer.

(2) Remove the auxiliary contact block from the din rail by pulling the tab on the bottom of the contact block and lifting upward.

(3) Remove the two (2) wires going to the auxiliary contact block and label for correct reinstallation.

(4) There are two (2) types of auxiliary contact blocks... one with a screw and the other with a clip ...

To remove the style with the screw with a thermal magnetic starter simply remove the screw. To remove the style with a clip simply push in the clip and remove.

(5) To install new auxiliary contact block, reverse above procedure (***steps #4 through #1***).

b) Varistor (MOV)

The Varistor - MOV (Metal Oxide Varistor) is used to suppress any inductive electrical spikes produce by the energizing and collapsing of the coil voltage.

1) Varistor (MOV) Replacement

(a) Discontinue electric service to the dryer.

(b) Loosen the screws marked A1 and A2 from the varistor.

(c) Remove the varistor.

(d) Reverse procedure to install new varistor.

G. Filter/Regulator Assembly

The purpose of the filter is to remove bulk liquids and solid particles from the compressed air stream. The filter element provides mechanical separation of solids. Centrifugal force inside the filter bowl separates bulk liquids and larger solid particles.

The filter consists of a louver which causes a centrifugal spinning action to separate contaminants. A filter which mechanically separates contaminants is also present. The filter bowl collects the contaminants and a baffle prevents turbulence from picking up contaminants at the bottom of the bowl and returning them to the air stream.

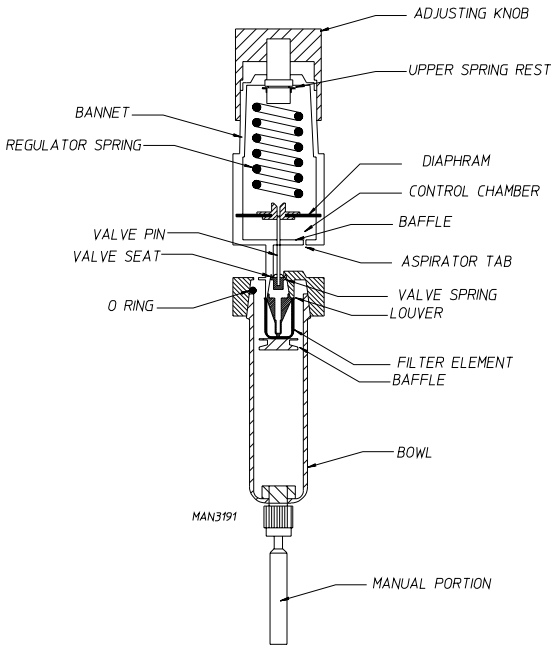
1. Filter Maintenance

   a. To remove filter element ...

      Twist the filter bowl 1/8 turn clockwise (CW). Then pull the bowl down to expose the filter element. To remove the filter element, unscrew the baffle (this will allow element removal).

   b. To clean filter element ...

      The filter element can be cleaned with soap and water.



FILTER / REGULATOR

NOTE: When replacing the filter element bowl care ***must be*** taken to ensure that the O-ring ***does not*** get *pinched.*

2. Regulator Operation

The adjustment knob simply acts upon a spring rest located on the spring and directly compresses the spring as it is adjusted. A non-rising low torque adjustment screw is used on this type of filter/regulator. The upper spring rest is located on top of the regulator spring and transmits force from the adjustment screw to the spring. Regulators use simple wire coil springs for controlling the downstream regulator pressure. The bonnet houses the adjustment spring and is used to help retain the diaphragm. The diaphragm moves up when the downstream pressure reaches its preset pressure level, which in turn closes the valve. A self-relieving regulator is designed to automatically relieve overpressure in the secondary side of the regulator.

NOTE: THIS SELF-RELIEVING FEATURE ***IS NOT*** DESIGNED TO BLEED THE DOWN-STREAM PRESSURE.

Dryer must be provided with a clean, dry, regulated 80 PSI (+/- 10 PSI) air supply (equivalent volume - 6 cfh).

The regulator **should be** set at 80 PSI (+/- 10 PSI). To set pressure, pull the adjusting knob up and either turn the knob clockwise (CW) to increase the pressure or counterclockwise (CCW) to decrease the pressure.

H. Door Systems

The AD-200 utilizes two (2) styles of doors, which are Manual Doors and Pneumatic Automatic Doors.

1. Manual Door Description

   The Manual Doors run on a single aluminum track with a wheel assembly mounted above the doors and a channel with teflon strips mounted on the bottom of the doors ...

   a. For dryers manufactured as of November 1, 1995, there are trolley bolts located at the top of the doors to secure the doors onto the track.

   b. For dryers manufactured prior to November 1, 1995, there are two (2) adjustment plates located at the top of the doors to secure the doors onto the track.

   In the center portion on the top of the doors there is a magnet used in conjunction with proximity sensors which are mounted above the doors.

2. Pneumatic Automatic Description and Operation

   a. Description

   The Pneumatic Automatic Doors run on a single aluminum track mounted above the doors and a split track mounted on the bottom of the doors. The doors are held on the track by four (4) stainless steel wheel assemblies located on the top of the doors. Additionally, in the center portion on the top of the doors there is a magnet used in conjunction with proximity sensors which are mounted above the doors.

   b. Operation

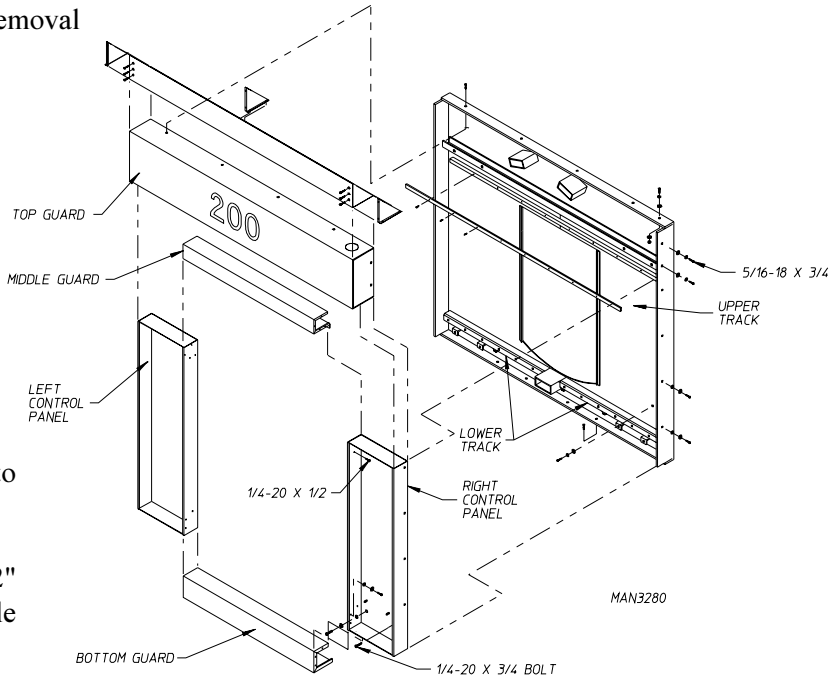
   There are two (2) 1" bore x 18-3/8" stroke cable cylinders attached to the top of the doors to pneumatically open and close the doors. When air is applied into the outside ports of these cable cylinders the doors will open. If air is applied into the inside ports of these cable cylinders the doors will close. On each of the four (4) ports is a flow control valve used for adjusting the opening and closing speeds of the doors. These flow controls only vary the speed in the exhaust direction. Air to the cable cylinders is supplied through a 4-way valve. When 24 VAC is applied to the valve, the doors open... if no power is applied, the doors close. A 3-way is used to supply air to the 4-way valve.

   If the EMERGENCY STOP is engaged, the air is automatically exhausted so that the doors can be opened manually.

   1) In a 2-Door application, there are two (2) additional cable cylinders a 4-way added for the operation of the rear doors.

3. Door Component Replacement/Removal

a. Manual Door Replacement or Removal



1) Discontinue electric service to the dryer.

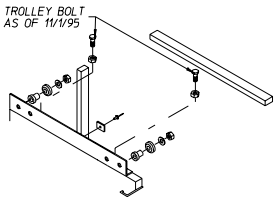
2) Remove the two (2) 1/4-20 x 1/2" bolts from each side of the middle guard and rear guard.

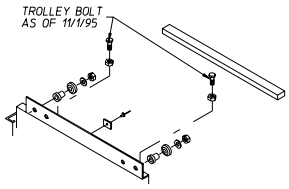
   a) For dryers manufactured as of November 1, 1995, loosen the jam nut and screw down the trolley adjustment plates.

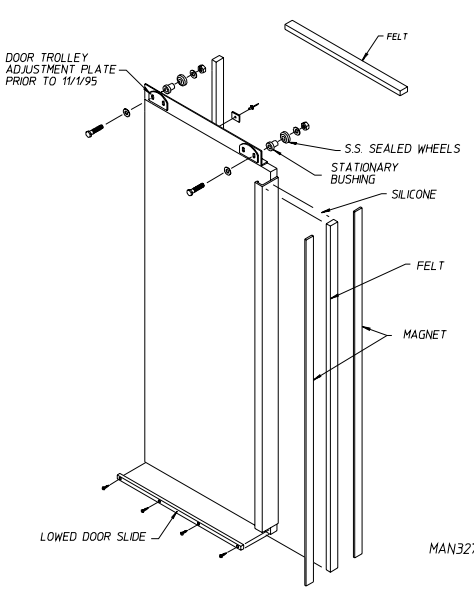
   b) For dryers manufactured prior to November 1, 1995, remove the two (2) trolley adjustment plates.

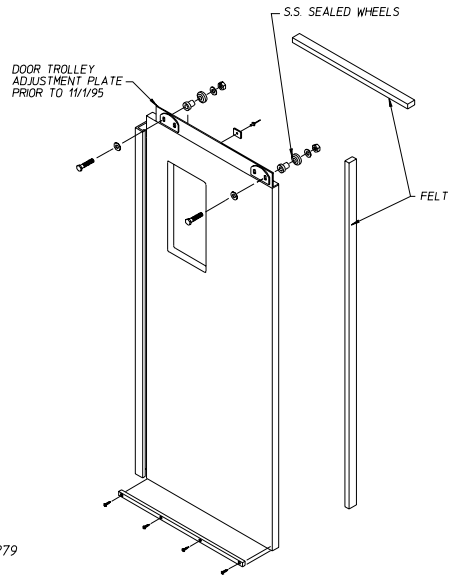
3) Lift the doors off of the tracks and remove.

4) To install new manual door(s) or to reinstall manual door(s), reverse above procedure ***(steps #3 through #1***).

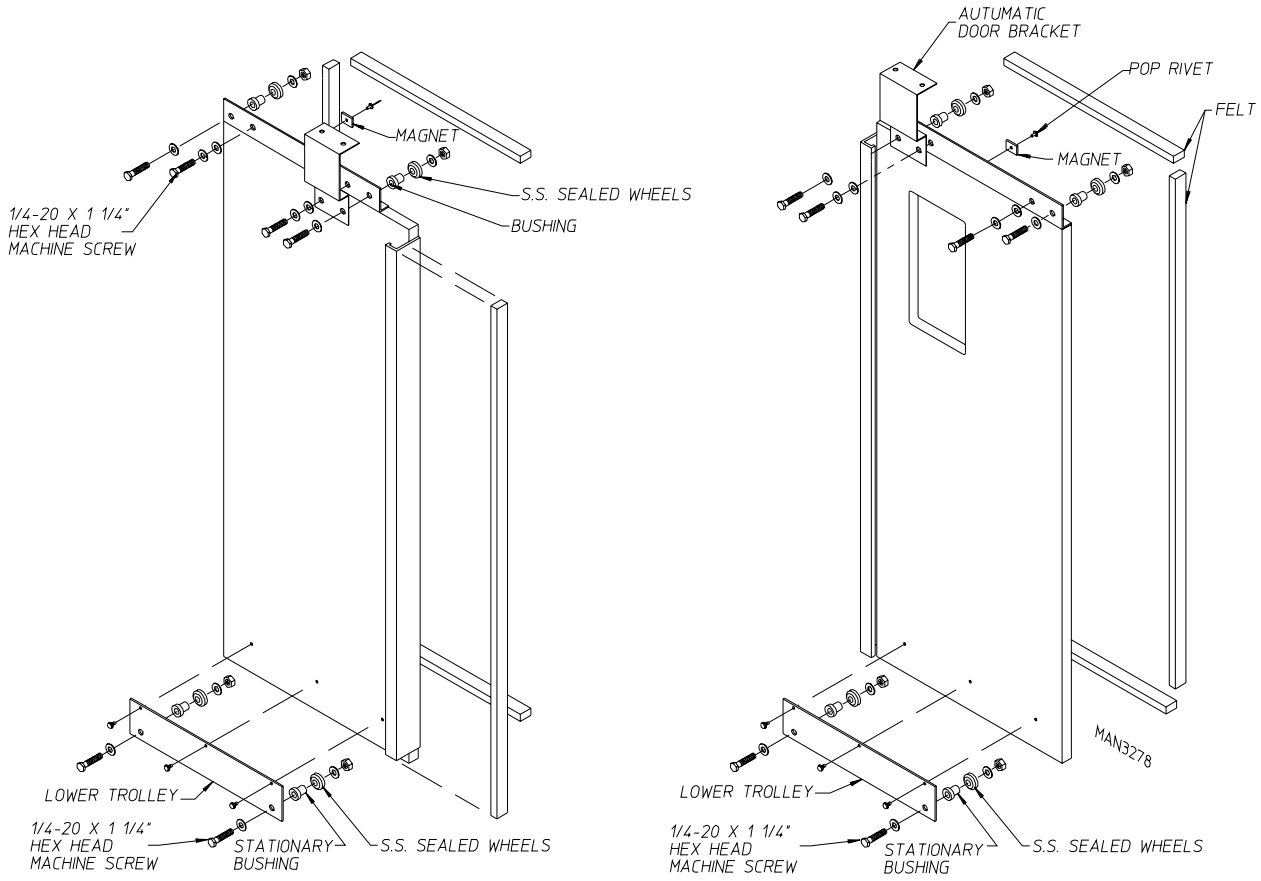








b. Pneumatic Automatic Door Replacement or Removal



1) Discontinue electric service to the dryer.

2) Remove the two (2) 1/4-20 x 1/2" bolts from each side of the middle guard and rear guard.

3) Remove the three (3) 1/4-20 x 3/4" bolts from the bottom guard.

   Remove the bottom guard.

4) Remove the two (2) 8-32 x 3/4" screws on each door that connect/attach the cable cylinder to the door.

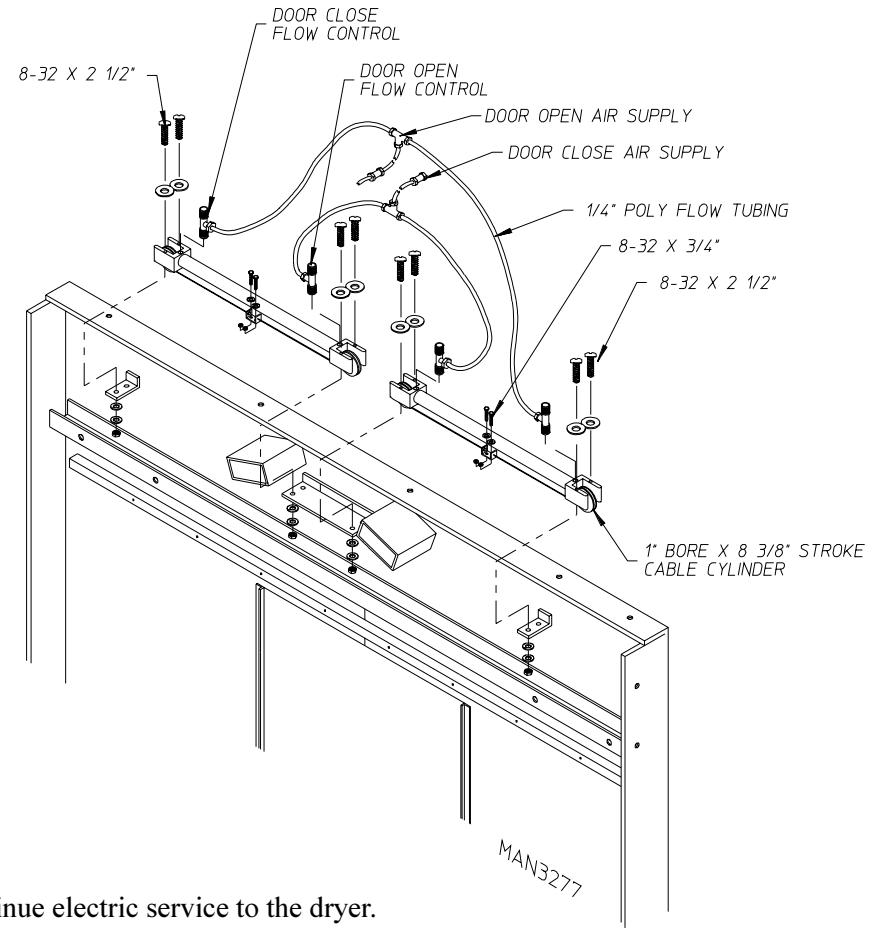
5) Remove the two (2) 1/4-20 x 1-1/4" hex head machine screws ...

   a) Take notice to the wheel assembly configuration.

6) Lift the door(s) off of the track and remove.

7) To install new pneumatic automatic doors or to reinstall pneumatic automatic doors, reverse above procedure ***(steps #6 through #1***).

c. Cable Cylinder Replacement or Removal



1) Discontinue electric service to the dryer.

2) Remove the two (2) 1/4-20 x 1/2" bolts from each side of the middle guard.

   Remove the middle guard.

3) Disconnect the cables in the top of the electrical panel.

4) Remove the hardware from the top guard.

   Remove the top guard.

5) Remove the two (2) 8-32 x 3/4" screws on each door that connect or attach the cable cylinder to the door.

6) Remove the four (4) 8-32 x 2-1/2" screws that hold each cable cylinder.

7) Remove the flow control valve ...

   a) The flow control valve has a quick disconnect on the poly flow tubing side ...

      Push the tubing in while holding in then pull the tubing out.

8) To install new cable cylinders or reinstall cable cylinders, reverse above procedure ***(steps #7 through #1***).

d. Proximity Switch Replacement

1) Discontinue electric service to the dryer.

2) Remove the two (2) 1/4-20 x 1/2" bolts from each side of the middle guard and rear guard.

3) Remove the three (3) 1/4-20 x 3/4" bolts from the bottom guard.

   Remove the bottom guard.

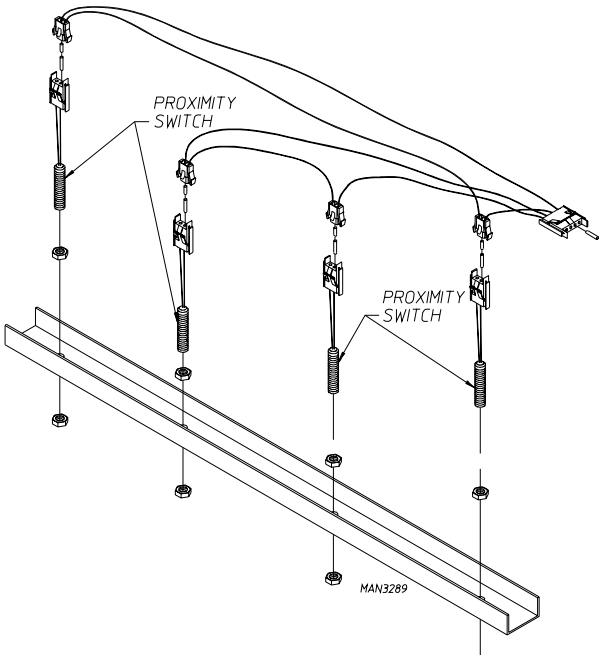
4) Remove the two (2) 8-32 x 3/4" screws on each door that connect/attach the cable cylinder to the door.

5) Remove the two (2) 1/4-20 x 1-1/4" hex head machine screws ...

   a) Take notice to the wheel assembly configuration.

6) Lift the door(s) off of the track and remove.

7) To install new pneumatic automatic door(s) or to reinstall pneumatic automatic door(s), reverse above procedure (***step #6 through #1***).



e. Right Load Door Glass (Window) Replacement

1) Remove **ALL** of the old silicone from around the door glass.

2) Clean glass door opening (with alcohol) to remove **ALL** of the old silicone.

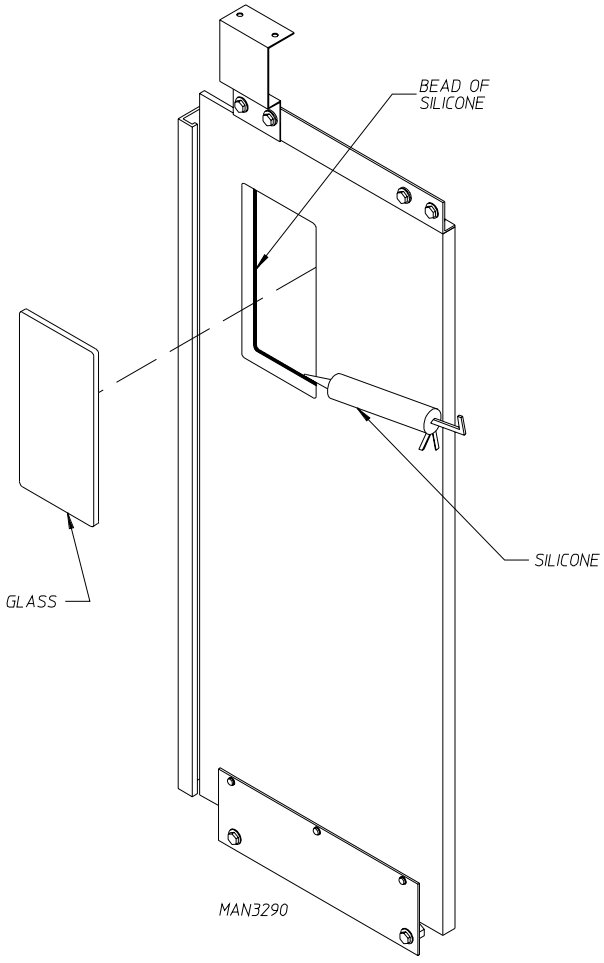
3) Carefully clean new door glass with alcohol prior to installation.

4) Apply a bead of silicone (**ADC** Part No. 170730) to the outer perimeter of the door glass opening.

   Carefully insert new door glass within door glass opening.

5) Allow a full 72 hours for the silicone to cure.

6) Trim excess silicone (with razor blade) after cure time.



f. 4-Way Valve and 3-Way Valve/Supply Air Disable Valve Replacement

1) Discontinue electric service to the dryer.

2) Disconnect compressed air supply from the dryer.

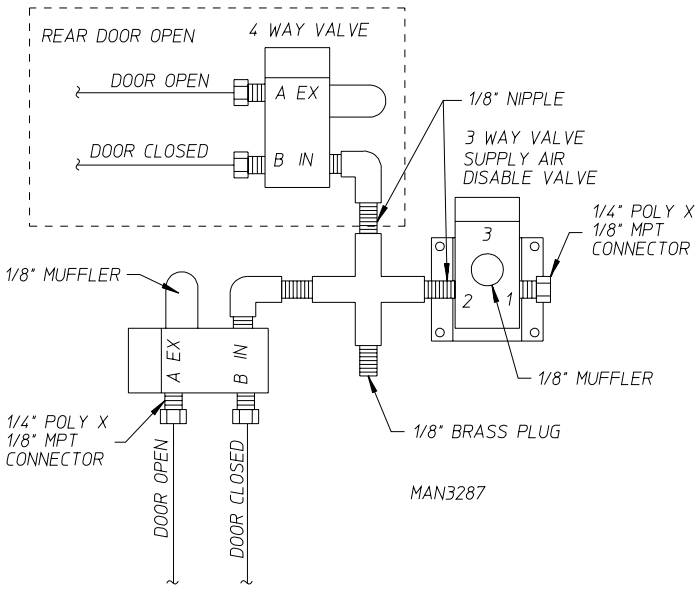
3) Remove the 1/4-20 self-tapping screws securing the pneumatic panel cover.

4) Remove the two (2) 1/4-20 screws securing the junction box cover.

5) Loosen the cord grip cap that the valve wire go through.

6) Loosen the appropriate wire on the terminal strip.

   Identify these wires and make note of their placement.



7) Loosen the bolts holding the assembly to the pneumatic panel.

   (For 3-way valve/supply air disable valve replacement proceed to ***Step #13***.)

8) Remove the two (2) 1/4" poly compression fittings (door open - door close).

9) Remove the two (2) 1/4" poly x 1/8" M.P.T. connectors from the valve body.

10) Twist/remove the 4-way valve body off of the 1/8" street elbow.

11) Remove the muffler off of the valve body.

12) To install new 4-way valve, reverse above procedure (***steps #11 through #1***).

13) Remove the 1/4" poly compression fitting.

14) Remove the 3-way valve/supply air disable valve from the 1/8" M.P.T. nipple.

15) Remove the muffler off of the valve body.

16) To install new 3-way valve/supply air disable valve, reverse ***steps #15, #14, #13,*** and ***#7 through #1***).

I. Control Electrical System

CAUTION: When servicing the HIGH VOLTAGE section of the dryer, the ELECTRIC SERVICE *MUST BE* DISABLED. THE "EMERGENCY STOP" BUTTON *DOES NOT* DISABLE THE HIGH VOLTAGE TO THE DRYER.

1. Control Electrical System Description

   a. 3-Phase (3ø) Electrical Power

   The 3-phase (3ø) electrical power for the dryer enters the dryer through the power distribution block located in the dryer base electrical box. It is then distributed to the blower (impellor and fan) motor, drive (tumbler and basket) motor, and control circuits.

   1) Blower (squirrel cage fan) Motor

   The blower (impellor and fan) motor circuit consists of a blower motor thermal magnetic overload. The overload current is adjustable by a dial located on the face of the overload. (Refer to the electrical specification diagram for correct current setting.)

   Attached to the thermal magnetic starter is an auxiliary contact used to sense an overload trip. This produces a safety error so the dryer service is disabled (the dryer will not start).

   In series with the thermal magnetic overload is the blower motor contactor. This device enables the supply voltage to reach the blower (impellor and fan) motor. The blower motor contactor is controlled by the Phase 5 microprocessor controller (computer). When 24 VAC is applied to coil A1-A2, the contactor closes and enables the circuit.

   The blower (impellor and fan) motor used for ADG-200 gas model dryers is 7-1/2 HP (horsepower) and for ADS-200 steam model dryers is 15 HP (horsepower) . The motor wiring configuration is dependent on the specific voltage of the dryer. When wiring the motor, refer to the motor nameplate.

   2) Drive (tumbler/basket) Motor

   The drive (tumbler and basket) motor converts the 3-phase (3ø) power source entering the drive motor thermal magnetic overload. The overload current is adjustable by a dial located on the face of the overload. (Refer to the electrical specification diagram for correct current setting.) In this circuit, the drive motor contactor follows the thermal magnetic overload.

   The drive motor has two (2) separate sets of coils and two (2) separate sets of contacts. One (1) of these sets is for forward tumbler (basket and drum) rotation and the other for reverse tumbler (basket and drum) rotation. The thermal magnetic overloads and the contactors are located in the left hand electrical cabinet. The direction of the drive motor is determined by the phases going into the motor (i.e., in a reverse direction phase, L1 and L2 are switched). When viewing this contactor, the left hand block connections are for the forward rotation direction (clockwise [CW]) when viewed from the front of the dryer.

   The drive (tumbler and basket) motor is a 3 HP (horsepower) motor. Refer to the motor nameplate for specific terminal box wiring.

3) 24 VAC Transformer

The 24 VAC transformer consists of fuse 1 (F1) and fuse 2 (F2) which is the primary fusing for the transformer. For the proper rating of these fuses refer to the specific electric diagram. The transformer is located in the right hand electrical cabinet.

Dryer models with an ***optional*** Sprinkler System have an energizing stop relay which will disable the dryer functions (shut the dryer down) in the event of a fire. IF THE SPRINKLER SYSTEM IS NOT ENERGIZED (POWERED) **THE DRYER *WILL NOT* OPERATE**. The Energizing Stop Push Button is located on the front right electrical panel. On 2-Door models this Energizing Stop Push Button is located on the right rear side of the electrical panel (when viewed from the rear).

On dryer models manufactured for 208 volt or 240 volt electric service, the step down voltage for the Phase 5 microprocessor controller (computer) and the Programmable Logic Controller (PLC) is supplied from the primary side of the 24 VAC transformer. On dryers that are manufactured for 380 volts and higher, there is an additional secondary on the transformer that is used to supply the step down voltage required to operate the Phase 5 microprocessor controller (computer) and the Programmable Logic Controller (PLC) through fuse 4 (F4).

4) 24 VAC Control Circuit

The secondary side of the 24 VAC transformer supplies 24 VAC to various control circuits through fuse 3 (F) and a 20-amp fuse or an 8-amp fuse (fuse amperage [rating] is dependent on the date that the dryer was manufactured).

The first circuit is the control voltage on/off. Control voltage (24 VAC) goes through the "Master Off" (normally closed) switch and supplies voltage to the "Master On" (normally open) switch. When the "Master On" switch is momentarily engaged, the master control relay (MCR) engages. This closes the MCR-A contactor (which is in parallel with the "Master On" switch) which will keep the MCR enabled. If the power is interrupted or the "Master Off" switch is pressed the MCR will disengage. The MCR-B contactor supplies power to the rest of the 24 VAC circuits.

For dryers manufactured with Automatic Doors - the supply air enables' purpose is to relieve pressure on the automatic door pistons when an energizing stop is engaged.

5) Safety Circuits

The following circuit branches are to verify various safeties, if **ALL** conditions are met ...

a) The first two (2) items are the Auxiliary Contact located on the blower (impellor/fan) motor and the Tumbler (basket) Motor Overload. If either of these devices trip, it will open up the safety circuit thereby preventing the dryer from operating.

b) Front Doors Closed circuit branch ...

There are two (2) magnetic proximity switches mounted in the door closed position and a magnet mounted on top of the doors. When this magnet aligns with the proximity switch, the contacts in the proximity switch close. When both doors are closed, the front doors closed relay (CR2) turns on ...

(1) There are two (2) sets of contacts in the relay... one (1) set of contacts are in the dry enable circuit branch and the other set go to the PLC input front doors closed.

c) Lint Drawer Closed circuit branch ...

The lint drawer closed switch is located in the front of the dryer. When the lint drawer is closed, it closes the switch contacts, powering the lint drawer closed relay. Then, the dry enable relay will close, supplying 24 VAC to the Phase 5 microprocessor (computer) door signal. This sequence will occur only if the following conditions are met;

(1) Blower (impellor and fan) Motor Overload is not tripped.
(2) Drive (tumbler and basket) Motor Overload is not tripped.
(3) Doors are closed.
(4) Lint Drawer is closed.
(5) Dryer is level.

6) Phase 5 Microprocessor Controller (computer)

The Phase 5 microprocessor controller (computer) is powered by 240 VAC on pins #7 and #13. A jumper wire on pins #1 to #11 *is required* to configure the transformer for 240 VAC. The temperature sensor probe is a bullet shaped device that is located above the lint basket. This temperature probe is used to sense the temperature in the exhaust of the dryer. The temperature sensor is a two (2) terminal monolithic integrated circuit temperature transducer that provides an output current proportional to absolute temperature. The transducer acts as a high impedance temperature dependant current source of 1mA/°K.

SECTION VI

BASIC TROUBLESHOOTING

IMPORTANT: YOU MUST DISCONNECT and LOCKOUT THE ELECTRIC SUPPLY and THE GAS SUPPLY BEFORE ANY COVERS or GUARDS ARE REMOVED FROM THE MACHINE TO ALLOW ACCESS FOR CLEANING, ADJUSTING, INSTALLATION, OR TESTING OF ANY EQUIPMENT PER OSHA (Occupational Safety and Health Administration) **STANDARDS.**

The information provided will help isolate the most probable component(s) associated with the difficulty described. The experienced technician realizes, however, that a loose connection or broken/shorted wire may be at fault where electrical components are concerned, not necessarily the suspect component itself. Electrical parts **should always be** checked for failure before being returned to the factory.

IMPORTANT: When replacing blown fuses, the replacement ***must be*** of the exact rating as the fuse being replaced. The information provided ***should not*** be misconstrued as a handbook for use by an untrained person in making repairs.

WARNING: **ALL** SERVICE and TROUBLESHOOTING **SHOULD BE** PERFORMED BY A QUALIFIED PROFESSIONAL or SERVICE AGENCY.

WARNING: WHILE MAKING REPAIRS, OBSERVE **ALL** SAFETY PRECAUTIONS DISPLAYED ON THE DRYER or SPECIFIED IN THIS MANUAL.

A. No Display...

1. **"EMERGENCY STOP"** button pushed in.
2. Service panel fuses blown or tripped breaker.
3. Blown F1 (fuse 1) or F2 (fuse 2) on right hand control panel.
4. Blown F4 (fuse 4) on right hand control panel.
5. Failed microprocessor controller (computer).
6. Optional sprinkler circuit emergency relay not engaged ...
   a. Service panel fuse blown or tripped breaker.
   b. Sprinkler circuit is activated.

NOTE: SPRINKLER **MUST HAVE** POWER FOR THE DRYER TO OPERATE.

B. <u>Drive motor is not operating</u> (does not start)...

*** Microprocessor controller (computer) relay output indicator (either forward "FWD" or reverse "REV") is on.**

1. Blown drive motor contactor fuses or overloads.
2. Failed drive motor contactor.
3. Failed drive motor.

*** Microprocessor controller (computer) relay output indicator (neither forward "FWD" or reverse "REV") is on.**

1. Failed microprocessor controller (computer).

C. <u>Drive motor operates in one direction only... stops and restarts in the same direction</u>...

*** Appropriate microprocessor controller (computer) relay output indicator is on.**

1. Failed reversing contactor (relay).
2. Failed electrical reversing contactor interlock.

*** Appropriate microprocessor controller (computer) relay output indicator is off.**

1. Failed microprocessor controller (computer).

D. <u>Drive motor operates okay for a few minutes and then either repeatedly or occasionally trips the overload protector</u>...

NOTE: WHEN THE OVERLOAD PROTECTOR TRIPS, THE MICROPROCESSOR CONTROLLER (computer) L.E.D. (light emitting diode) DISPLAY WILL READ **"door."**

1. Motor is overheating ...
   a. Motor air vents clogged with lint.
   b. Low voltage to motor.
   c. Failed motor.
   d. Tumbler (basket) is binding... check for an obstruction.
   e. Tumbler bearings are binding.
   f. V-belts are too tight.
   g. Dryer has an oversized load.

h. Voltage to the dryer is incorrect... check dryer data label for specified voltage.

2. Failed overload protector.

E. Impellor (fan) motor is not operating (does not start)... "door" L.E.D. is on.

*** Microprocessor controller (computer) "MTR" relay output indicator is on.**

1. Failed blower (impellor and fan) motor fuses or overloads.

2. Failed blower (impellor and fan) motor contactor (relay).

3. Failed blower (fan and impellor) motor.

*** Microprocessor controller (computer) "MTR" relay output indicator is off.**

1. Failed microprocessor controller (computer).

F. Blower (fan and impellor) motor operates okay for a few minutes and then either repeatedly or occasionally trips the overload protector...

NOTE: WHEN THE OVERLOAD PROTECTOR TRIPS, THE MICROPROCESSOR CONTROLLER (computer) L.E.D. (light emitting diode) DISPLAY WILL READ **"door."**

1. Motor is overheating ...

a. Motor air vents clogged with lint.

b. Low voltage to motor.

c. Failed motor.

d. Tumbler (basket) is binding... check for an obstruction.

e. Failed gear reducer or tumbler bearing.

f. V-belts are too tight.

h. Motor is running at incorrect voltage.

2. Failed overload protector.

G. Both drive motor and blower (fan/impellor) motor are not operating... microprocessor controller (computer) L.E.D. (light emitting diode) motor indicator dots and the "MTR" relay output and forward "FWD" or reverse "REV" L.E.D. indicators are on.

1. Blown drive motor and blower (fan and impellor) motor fuses.

2. Failed motors (both blower [fan/impellor] motor and drive motor).

H. Both drive motor and blower (fan/impellor) motor are not operating... microprocessor controller (computer) L.E.D. (light emitting diode) motor indicator dots and the "door" L.E.D. indicator are on but the relay output L.E.D. indicators are off (microprocessor controller [computer] L.E.D. display *does not* read "door").

1. Failed microprocessor controller (computer).

I. Microprocessor controller (computer) L.E.D. (light emitting diode) display reads "dSFL" continuously and the buzzer (tone) sounds every thirty (30) seconds...

1. Fault in microprocessor heating sensing circuit ...

   a. Failed microprocessor temperature sensor.

   b. Blown "dSFL" 1/8-amp fuse on the microprocessor controller (computer).

   c. Failed microprocessor controller (computer).

   d. Broken wire or connection between the microprocessor controller (computer) and the microprocessor temperature sensor.

J. Microprocessor controller (computer) L.E.D. (light emitting diode) display reads "door" and the microprocessor controller (computer) "DOOR" L.E.D. indicator is off...

1. Fault (open circuit) in main door/lint drawer switch circuit ...

   a. Lint drawer not closed all the way.

   b. Lint drawer switch is out of proper adjustment.

   c. Failed lint drawer switch.

   d. One (1) of the main door switches has failed.

   e. One (1) of the main door switch contact magnets is either missing or is broken.

   f. Failed door switch relay.

   g. Broken wire or connection in main door or lint drawer switch circuit.

   h. Drive motor or blower (fan and impellor) motor thermal overload reset has tripped.

2. Failed 24 VAC step down transformer.

3. Blown 24 VAC control circuit fuse.

K. Microprocessor controller (computer) L.E.D. display reads "door" and the microprocessor controller (computer) "DOOR" L.E.D. (light emitting diode) indicator is on...

1. Failed microprocessor controller (computer).

L. Microprocessor controller (computer) will not accept any keyboard [touchpad] entries, (i.e., L.E.D. [light emitting diode] display reads "FILL" and when keyboard [touchpad] entries are selected, the L.E.D. [light emitting diode] display continues to read "FILL")...

1. Failed keyboard label (touchpad) assembly.

2. Failed microprocessor controller (computer).

M. Microprocessor controller (computer) will only accept certain keyboard (touchpad) entries...

1. Failed keyboard label (touchpad) assembly.

2. Failed microprocessor controller (computer).

N. Microprocessor controller (computer) locks up and L.E.D. (light emitting diode) display reads erroneous message(s) or only partial segments...

1. Transient power voltage spikes... disconnect the electrical power to the dryer, wait one (1) minute and reestablish power to the dryer. If problem is evident ...

   a. Failed microprocessor controller (computer).

   b. Failed keyboard label (touchpad) assembly.

O. Dryer stops during a cycle, microprocessor controller (computer) buzzer (tone) sounds for five (5) seconds, L.E.D. (light emitting diode) display reads "dSFL" for approximately thirty (30) seconds and then returns to "FILL"...

1. Loose connection somewhere between the microprocessor controller (computer) and the microprocessor temperature sensor.

P. Dryer stops during a cycle, microprocessor controller (computer) buzzer (tone) sounds for a few seconds, and then microprocessor controller (computer) L.E.D. (light emitting diode) returns to "FILL"...

1. Loose connection somewhere in the main power circuit to the microprocessor controller (computer).

Q. Microprocessor controller (computer) L.E.D. (light emitting diode) display reads "SEFL"...

1. Rotational sensor circuit failure... fault somewhere in the tumbler (basket) rotation or circuit ...

   a. Tumbler (basket) not rotating ...

      1) Broken tumbler (basket) drive belt.

      2) Failure in drive motor circuit.

   b. Bad rotation sensor.

   c. Broken wire or connection between rotation sensor and microprocessor controller (computer).

   d. Magnet missing or gap to large.

R. Microprocessor controller (computer) L.E.D. (light emitting diode) reads "Hot"...

1. Possible overheating condition... microprocessor controller (computer) has sensed a temperature which has exceeded 220° F.

   "Hot" display will not clear until temperature sensed has dropped to 220° F or lower and the microprocessor controller (computer) is manually reset by pressing the **"CLEAR/STOP"** key.

S. No heat *(for STEAM MODELS ONLY)... both* **microprocessor controller (computer) L.E.D. (light emitting diode) heat indicator dot and the "HEAT" relay output L.E.D. are on...**

1. Fault in 225° hi-heat (limit) switch circuit or thermostat.

2. No (external) compressed air to steam damper... 80 PSI required.

3. Failed steam damper 24 VAC pneumatic solenoid valve.

4. Failed steam damper pistons.

5. Steam damper stuck closed.

T. Dryer operates but is taking too long to dry...

1. Exhaust duct work run is too long or is undersized... back pressure **cannot** exceed .3 inches water column (W.C.).

2. Restriction in duct work... check duct from the dryer all the way to the outdoors.

3. Low and/or inconsistent gas pressure *(for GAS MODELS ONLY)*.

4. Insufficient make-up air.

5. Poor air/gas mixture at burner - yellow or poor flame pattern... Burner orifices not aligned properly in burner tubes (*for GAS MODELS ONLY*)

6. Lint drawer/screen is not being cleaned on a regular basis or often enough.

7. Extractors (washer) not performing properly.

8. Sail switch is fluttering... restriction in exhaust *(for GAS MODELS ONLY)*.

9. Failed microprocessor controller (computer)... temperature calibration is inaccurate.

10. Failed microprocessor temperature sensor... calibration is inaccurate.

11. Failed burner hi-limit *(for GAS MODELS ONLY)*.

12. Failed 225° hi-limit (thermostat).

13. Steam damper system is not functioning properly *(for STEAM DRYER ONLY)* ...

    a. Steam damper sticking closed.

    b. Leak in pneumatic system.

14. Undersized load, dryer requires a minimum load size of approximately 125 lbs for maximum drying efficiency.

U. <u>Excessive noise and vibration</u>...

1. Dryer is not leveled properly.

2. Impellor (fan and blower) out of balance ...

    a. Excessive lint build up on impellor (fan and blower)... check air jet.

    b. Failed impellor (fan and blower).

3. Loose motor mount.

4. Failed idler bearings or tumbler bearings.

5. V-belts either too tight or too loose.

6. Tumbler (basket) drive wheels are worn or are loose.

7. Set screws of tumbler drive shaft bearings are loose.

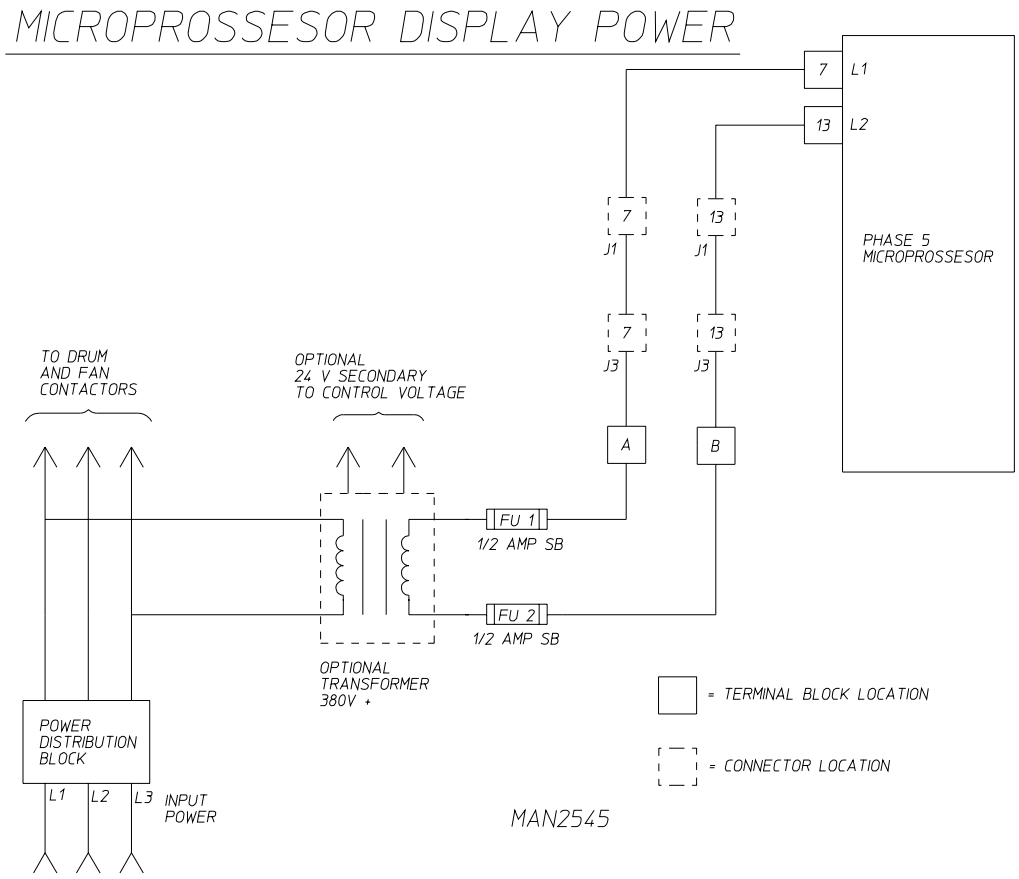
8. Failed motor bearing.

9. Drive wheel trantorque is loose.

SECTION VII

ELECTRICAL TROUBLESHOOTING

1. **Microprocessor Display Power Circuit**

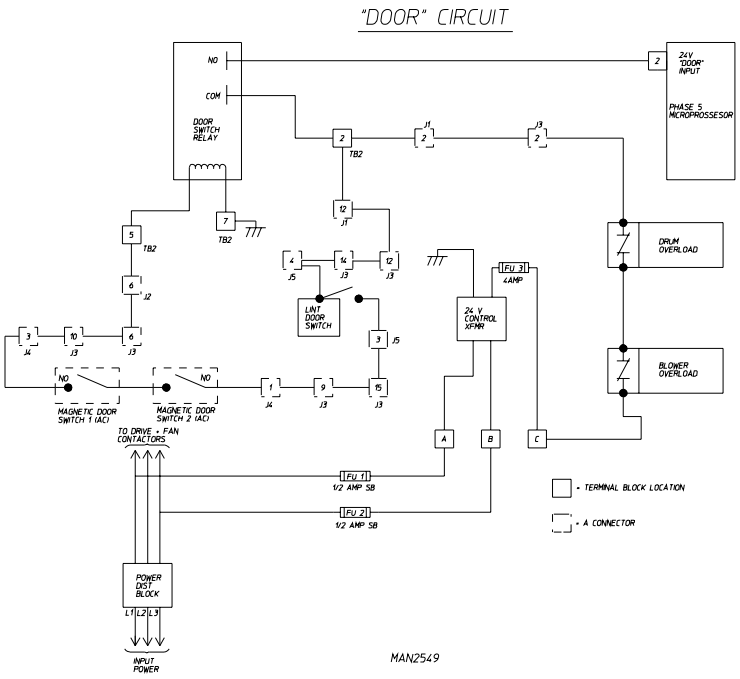


Theory of the Microprocessor Display Power Circuit:

The power distribution block is where the incoming voltage is applied to. L1 and L3 are branched off to supply the 208-240 volts single phase to the two .5 amp slo-blo fuses. This voltage might be stepped down by a step down transformer if the incoming voltage is 380 volts or higher. This 208-240 volts is then supplied to the computer.

Path of Voltage for the Microprocessor Display Power Circuit:

The incoming voltage to the machine is applied to the power distribution block lines L1, L2, and L3. From there this voltage travels to the contactors; drum and blower motor. L1 and L3 branch off of this voltage and travel to a step down transformer if the incoming voltage is 380 volts or higher. If your incoming voltage is 208/240 volts this transformer is not needed. After the transformer (if applicable) the L1 and L3 lines are both fused with .5 amp slo-blo fuses. The L1, L3 voltage now travels to the little 3 position terminal block (A, B, C) letters A and B, then to the J3 connector numbers 7 and 13, from there to the J1 connector 7 and 13, finally to the microprocessor 15 pin connector pin #'s 7 and 13. This is the path of voltage for the microprocessor's display. Always check the two .5 amp fuses first, these are the most common parts to fail when checking this circuit.



2. **"DOOR" Circuit**

Theory of the "DOOR" Circuit:

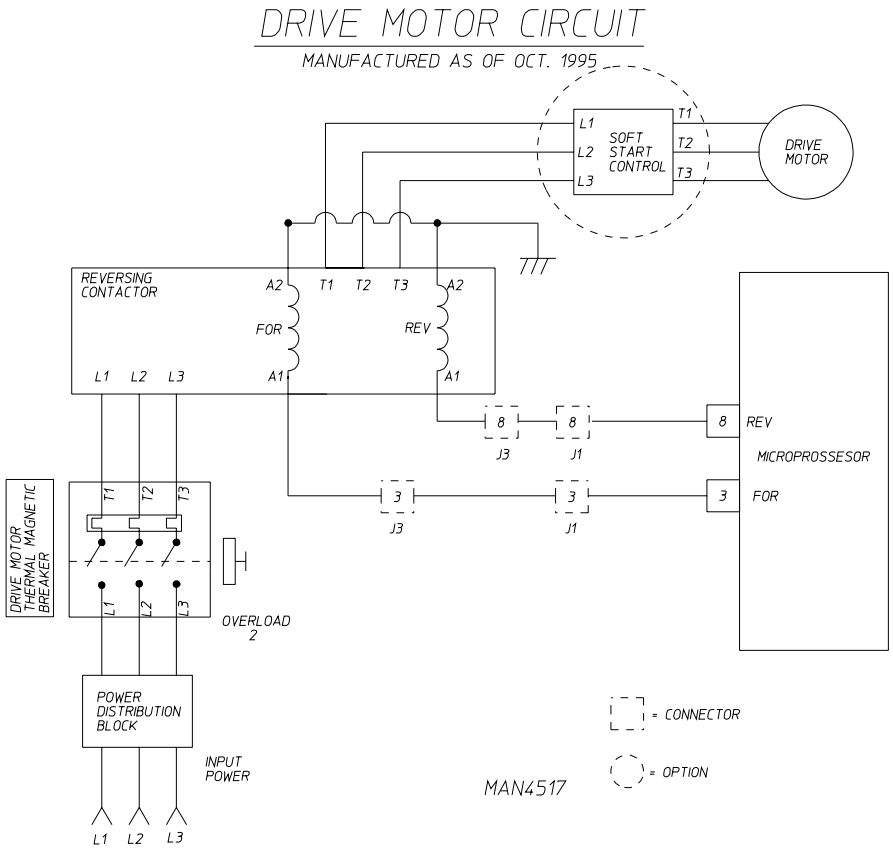
Providing that the 4 amp fuse, the 24 volt transformer, and the overloads (drive and blower) are okay, 24 A/C volts will be supplied to the "COM" terminal of the door switch relay. This 24 volts is branched off through the lint drawer switch, and the two magnetic door switches to then supply the 24 volts to the coil of the door switch relay. The relay will now close sending the 24 A/C volts that was supplied to the "COM" terminal of the relay to the "N/O" terminal of that relay which in turn goes directly into the computer 15 pin connector #2.

Path of the "DOOR" Circuit:

The "DOOR" circuit in the AD-200 is different than other **ADC** dryers. This is a input circuit (24 A/C volts) into the computer pin #2. This is the control voltage that the computer will use to output at various times throughout the cycle to various components. The voltage will first start at the incoming voltage L1, L2, and L3, from there L1 and L3 travel through the two protection fuses (.5 amp slo-blo) to the ABC terminal block letters A and B. The voltage at this point is still 208/240 volts, here is where the 208/240 volts is cut down to 24 volt A/C. One of the secondary wires gets grounded while the other one is fused with a 4 amp buss type fuse, and it's then present at terminal block "C". We should now be able to get the 24 volts A/C between terminal block "C" and ground. If the 24 volts is not present here then the problem could only be bad 4 amp fuse or the 24 volts transformer has failed. The 24 volts leaves "C" and travels through the blower and the drum overloads, this is the first place to check when the "DOOR" signal comes on the display when these overloads trip, it immediately displays "DOOR". The voltage now travels through some connectors (J1 and J3 pin #2 of each) and lands on terminal block #2, connecting point #2. This here is where the voltage will split. From here it will go to the door switch relay "com" terminal, and it will also travel through some connectors, see the diagram above for particular connectors and there pin#'s, and land on one terminal of the lint drawer switch. This is another spot to check if "DOOR" appears on the display. The voltage will then pass through the lint drawer switch, providing the lint drawer is closed, go through a few connectors (see above diagram) and land on one pin of the magnetic door switch. Here we use two magnetic type door switches. When the door is closed there are magnets on the door that should be adjusted so that when the door is closed the magnets are positioned above the pick-ups (door switches). The two magnetic proximity switches (door switches) are in series, they both need to sense the magnets or the voltage will stop here and read "DOOR". From the two door switches the voltage travels through a few more connectors (see above diagram) and it's final destination is one side of the coil of the door switch relay. The other side of this coil is hard wired to ground to complete this circuit.

3. **Drive Motor Circuit:**

IMPORTANT: The L.E.D. indicator on the computer board that reads "DOOR" ***must be*** on in order to successfully troubleshoot the following.



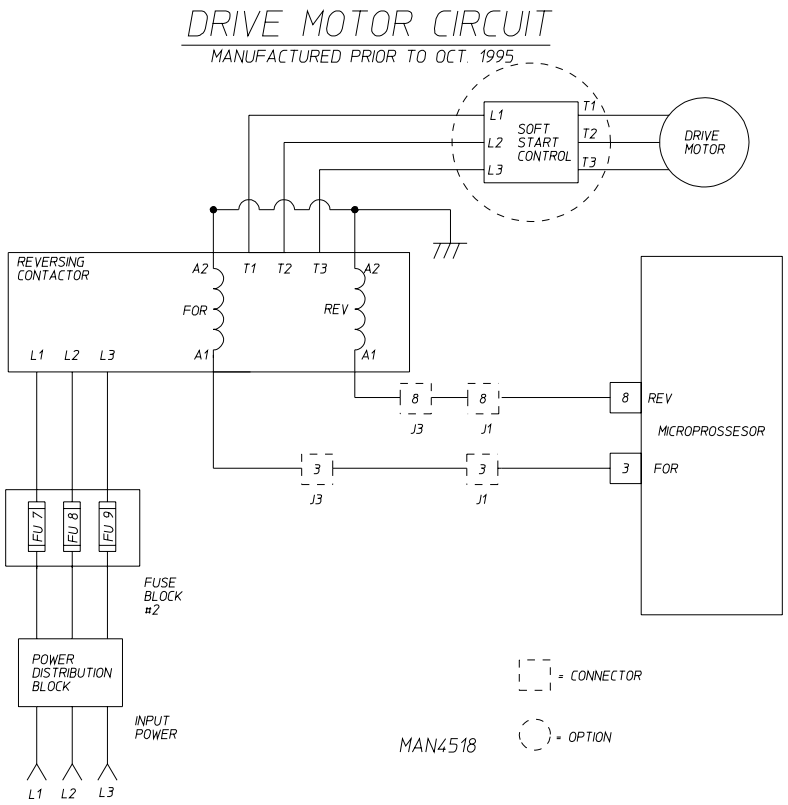
Theory of the Drive Circuit:

The Drive (tumbler and basket) Motor converts the 3-phase (3ø) power source entering the drive motor thermal magnetic overload. The overload current is adjustable by a dial located on the face of the overload. (Refer to the electrical specification diagram for correct current setting.) In this circuit, the drive motor contactor follows the thermal magnetic overload. Providing the 24 A/C volts for the "DOOR" input to the computer is present on pin #2 of the 15 pin computer harness the computer harness the computer is going to output that 24 volts on pin #3 (forward) or pin #8 (reverse) of the 15 pin connector.

Path of Voltage for the Drive Circuit:

Three phase voltage is applied to the power distribution block each line L1, L2, and L3 the voltage then travels to the drive motor thermal magnetic overload. The voltage is then supplied to the reversing contactor marked L1, L2, and L3. As long as the overload is not tripped 208-600 volts will always be here at the contactor. When the computer calls for the forward motion of the basket, 24 A/C volts will output of pin #3 of the computer. This 24 A/C volts will pass through it and J1 and J3 connectors pin #3 on both, and travel to the forward coil of reversing contactor, the contactor will be marked A1. The other side of the coil A2 will be directly grounded. When the 24 A/C volts reaches the coil, the contactor closes and the incoming voltage that is supplied to the top of the contactor L1, L2, and L3 meets the T1, T2, and T3 of the contactor which then travels down to the soft start via the drive motor. The reversing action is projected the same way as the forward with the exception of the 24 A/C volts will output from the computer through pin #8, and the connectors in the path of voltage are still J1 and J3 but now pin #8 on both.

IMPORTANT: The L.E.D. indicator on the computer board that reads "DOOR" ***must be*** on in order to successfully troubleshoot the following.



Theory of the Drive Circuit:

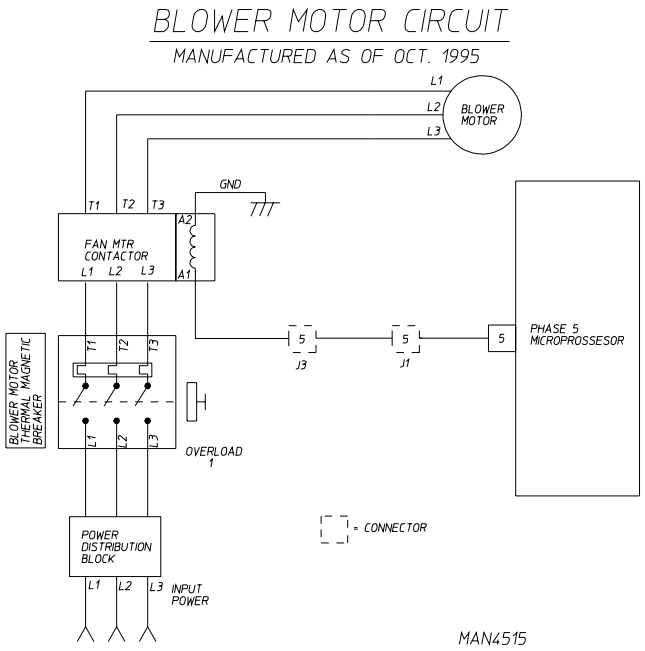
The incoming voltage L1, L2, and L3 are supplied to the power distribution block. Each line of this 3-phase voltage is then fused with cartridge type fuses rated for the different incoming voltages. The voltage is then supplied to the top half (L1,L2, and L3) of the reversing contactor. Providing the 24 A/C volts for the "DOOR" input to the computer is present on pin #2 of the 15 pin computer harness the computer is going to output that 24 volts on pin #3 (forward) or pin #8 (reverse) of the pin computer connector.

Path of Voltage for the Drive Circuit:

Three phase voltage is applied to the power distribution block each line L1, L2, and L3 the voltage then travels to the drive motor thermal magnetic overload. The voltage is then supplied to the reversing contactor marked L1, L2, and L3. As long as the overload is not tripped 208-600 volts will always be here at the contactor. When the computer calls for the forward motion of the basket, 24 A/C volts will output of pin #3 of the computer. This 24 A/C volts will pass through it and J1 and J3 connectors pin #3 on both, and travel to the forward coil of reversing contactor, the contactor will be marked A1. The other side of the coil A2 will be directly grounded. When the 24 A/C volts reaches the coil, the contactor closes and the incoming voltage that is supplied to the top of the contactor L1, L2, and L3 meets the T1, T2, and T3 of the contactor which then travels down to the soft start via the drive motor. The reversing action is projected the same way as the forward with the exception of the 24 A/C volts will output from the computer through pin #8, and the connectors in the path of voltage are still J1 and J3 but now pin #8 on both.

4. Blower Motor Circiut

IMPORTANT: The L.E.D. indicator on the computer board that reads "DOOR" ***must be*** on in order to successfully troubleshoot the following.



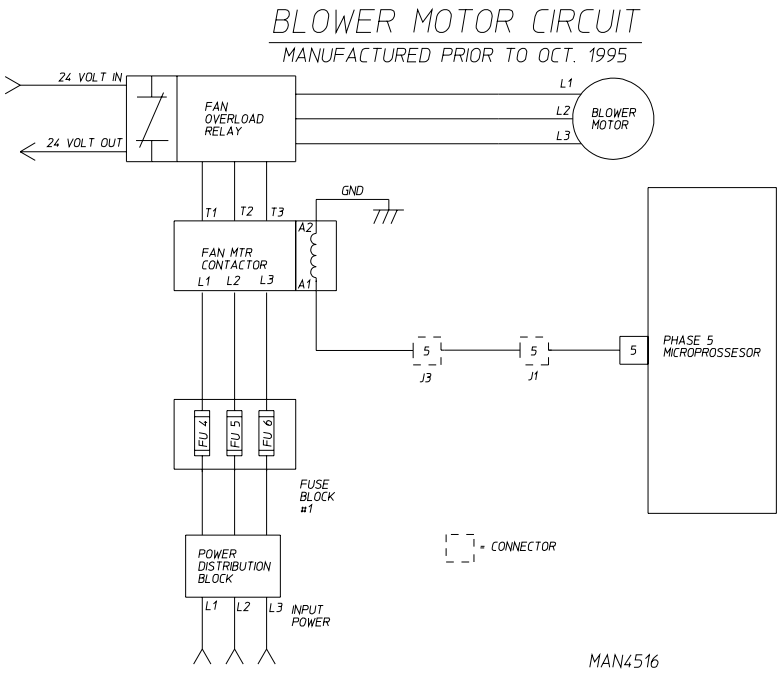
Theory of the Blower Motor Circuit:

The Blower (squirrel cage fan) Motor converts the 3-phase (3ø) power source entering the Blower Motor thermal magnetic overload. The overload current is adjustable by a dial located on the face of the overload. (Refer to the electric specification diagram for correct setting.) The voltage is then supplied to the top half (L1,L2, and L3) of the blower (squirrel cage fan) contactor. Providing the 24 A/C volts for the "DOOR" input to the computer is present on pin #5 of the 15 pin computer harness the computer is going to output that 24 volts on pin #5 upon the start of a cycle which will in turn travel through a couple of connectors and land on the A1 marking of the blower and fan contactor. This will shut closed sending the three phase voltage to the overload. Providing the overload is not tripped, the voltage will then travel to the blower and fan motor.

Path of Voltage for the Blower/Fan Motor Circuit:

Three phase voltage is applied to the power distribution block each line L1, L2, and L3 . The voltage then travels to the Blower (squirrel cage fan) thermal magnetic overload. The voltage is then supplied to the blower and squirrel cage contactor marked L1, L2 and L3. As long as the fuses overload is not tripped 208-600 volts will always be there at the contactor. When the computer calls for the fan to come on, 24 A/C volts will output of pin #5 of the computer. This 24 A/C volts will pass through J1 and J3 connectors pin #5 on both, and travel to the coil of the blower (squirrel cage fan) contactor, the contactor will be marked A1. The other side of the coil A2 will be directly grounded. When the 24 A/C volts reaches the coil, the contactor closes and the incoming voltage that is supplied to the top of the contactor L1, L2, and L3 meets the T1, T2, and T3 of the contactor which then must go through the overload. If this overload is tripped (i.e. "DOOR") the voltage will stop here and not proceed to the blower (squirrel cage fan) motor. If the overload is not tripped the voltage will then proceed down to the blower (squirrel cage fan) motor.

IMPORTANT: The L.E.D. indicator on the computer board that reads "DOOR" ***must be*** on in order to successfully troubleshoot the following.



Theory of the Blower Motor Circuit:

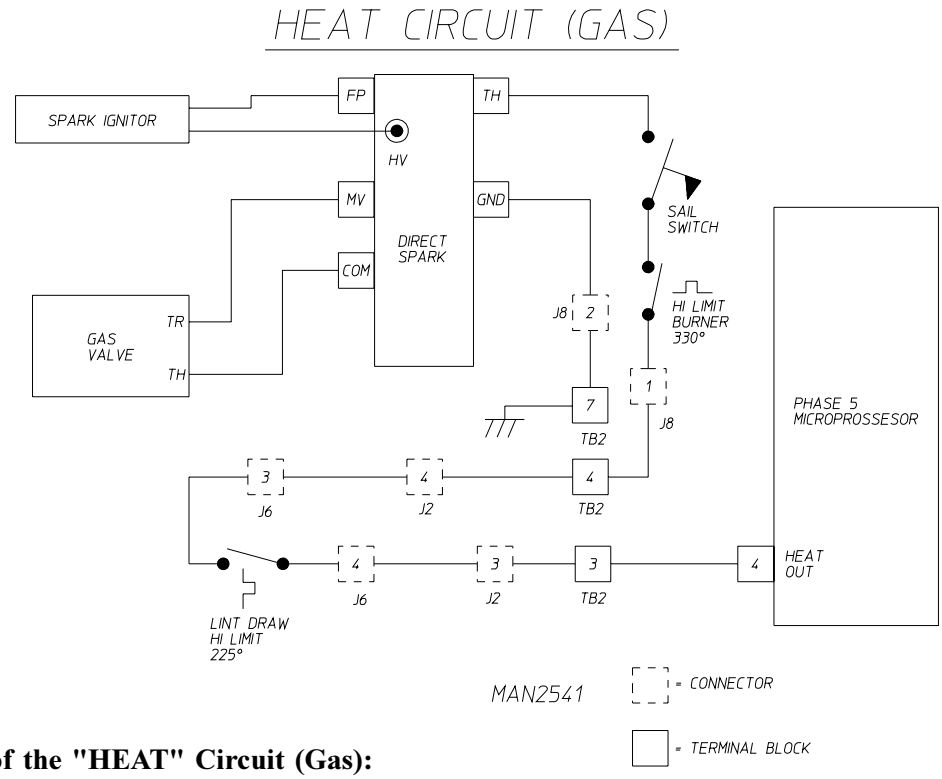
The incoming voltage L1,L2, and L3 are supplied to the power distribution block. Each line of this 3 phase voltage is then fused with cartridge type fuses rated for the different incomings voltages. The voltage is then supplied to the top half (L1,L2, and L3) of the blower and fan contactor. Providing the 24 A/C volts for the "DOOR" input to the computer is present on pin #5 of the 15 pin computer harness the computer is going to output that 24 volts on pin #5 upon the start of a cycle which will in turn travel through a couple of connectors and land on the A1 marking of the blower and fan contactor. This contactor will shut closed sending the three phase voltage to the overload. Providing the overload is not tripped, the voltage will then travel to the blower and fan motor.

Path of Voltage for the Blower/Fan Motor Circuit:

Three phase voltage is applied to the power distribution block each line L1,L2, and L3 are fused with cartridge type fuses. The voltage is then supplied to the blower and fan contactor marked L1,L2 and L3. As long as the fuses and the circuit breakers are okay this voltage 208-600 volts will always be there at the contactor. When the computer calls for the fan to come on, 24 A/C volts will output of pin #5 of the computer. This 24 A/C volts will pass through J1 and J3 connectors pin #5 on both, and travel to the coil of the blower and fan contactor, the contactor will be marked A1. The other side of the coil A2 will be directly grounded. When the 24 A/C volts reaches the coil , the contactor closes and the incoming voltage that is supplied to the top of the contactor L1,L2, and L3 meets the T1,T2, and T3 of the contactor which then must go through the overload if this overload is tripped (i.e. "DOOR") the voltage will stop here and not proceed to the blower and fan motor. If the overload is nt tripped the voltage will then proceed down to the blower and fan motor.

5. **Heat Circuit (Gas Models):**

IMPORTANT: The L.E.D. indicator on the computer board that reads "DOOR" ***must be*** on in order to successfully troubleshoot the following.



Theory of the "HEAT" Circuit (Gas):

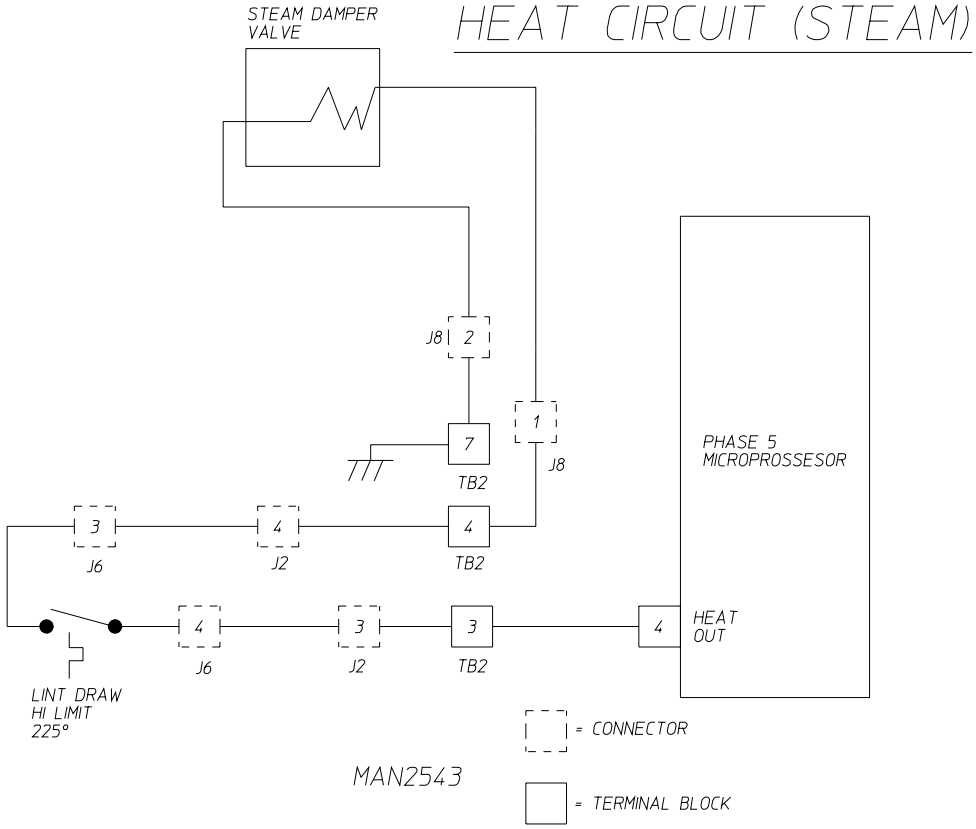
When the computer senses a drop in temperature below the preset temperature it will send 24 A/C volts out of pin #4 of the 15 pin computer harness. There are 3 heat safety devices in the dryer that will stop the voltage from reaching the D.S.I. direct spark module. The first one the voltage must pass is the 225º thermostat. The second one is the 330º burner hi-limit thermostat, and the third safety device is the sail switch. When all three of these safety devices have been satisfied the voltage then arrives at the "TH" terminal of the D.S.I. module. The D.S.I. technical manual P/N-450142 will give you more information on what happens at this point once the voltage reaches the "TH" terminal on the D.S.I. module.

Path of Voltage for the "HEAT" Circuit:

The 24 A/C voltage leaves the computer on pin #4 it then travels to terminal block #2 position #3. Now this voltage travels through connector J2, pin #3, and connector J6 pin #4. After this J6 connector the voltage now is present at the 225º thermostat, the voltage then passes through the thermostat and travels through the same two connectors... different pin #'s of course, J6 PIN #3 and J2 pin #4. This voltage now is present back on terminal block #2 but now it's position #4. The voltage now passes through J8 pin #1 from here the voltage must go through the other two safety devices the burner thermostat (hi-limit) and the sail switch (air flow switch). Before it reaches the "TH" (thermostat) connection on the D.S.I. module. The other side (GND) of the A/C 24 volts from the D.S.I. module travels through J8 pin #2 and then to TB2 #7 (GND).

6. "HEAT" Circuit (Steam Models):

IMPORTANT: The L.E.D. indicator on the computer board that reads "DOOR" ***must be*** on in order to successfully troubleshoot the following.



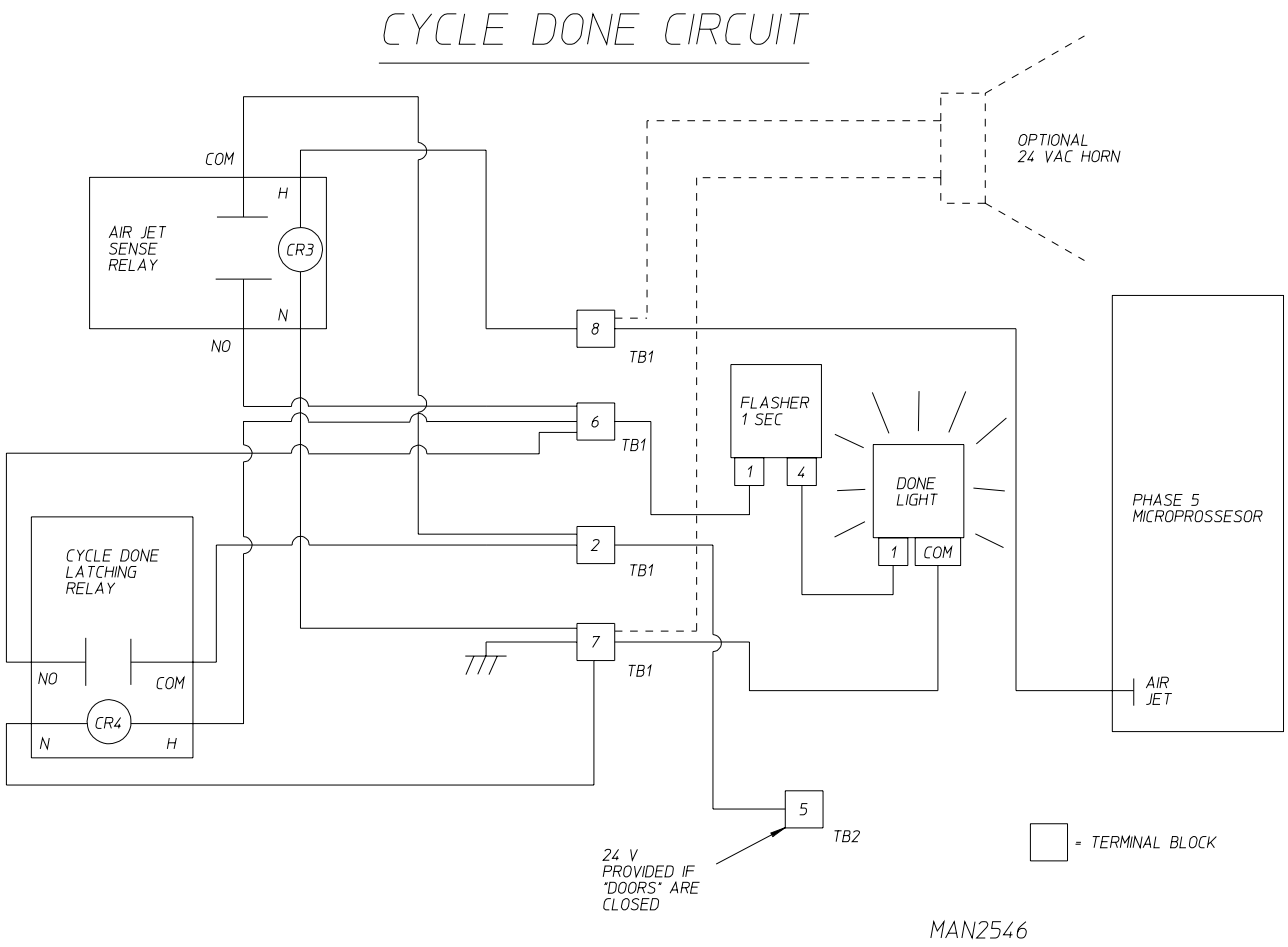
Theory of the "HEAT" Circuit (Steam):

When the computer senses a drop in temperature below the preset temperature it will send 24 A/C volts out of pin #4 of the 15 pin computer harness. There is one heat safety device in the dryer that will stop the voltage from reaching the steam damper valve. The voltage must pass is the 225º thermostat. If the 225º thermostat senses a temperature of 225º or higher the voltage will stop here at the thermostat. Once the temperature drops the thermostat closes and the voltage will now be able to reach the steam damper valve.

Path of Voltage for the "HEAT" Circuit (Steam):

The 24 A/C voltage leaves the computer on pin #4 it then travels to terminal block #2 position #3. Now this voltage travels through connector J2, pin #3 and connector J6 pin #4. After this J6 connector the voltage now is present at the 225º thermostat, the voltage then passes through the thermostat and travels through the same two connectors... different pin #'s of course, J6 pin #3 and J2 pin #4. This voltage now is present back on terminal block #2 but now it's position #4. The voltage now passes through J8 pin #1 then directly to the steam damper valve. The other side (GND side) of the A/C 24 volts from the steam damper valve travels through J8 pin #2 and then to TB #7 (GNDD).

7. **Cycle Done Circuit:**



Theory of the "CYCLE DONE" Circuit:

When the dryer has come to the end of the drying/cooling cycle of the dryer the air jet spade terminal on the microprocessor will be energized with 24 A/C volts. This 24 A/C volts will then be present across the coil of the air jet sensor relay. The relay closes and the 24 volts from the door circuit passes through the air jet sense relay, via cycle done latching relay coil. This cycle done latching relay closes passing through the 24 volts from the door switch circuit to the done light flasher causing the done light to flash.

Path of Voltage for the "CYCLE DONE" Circuit:

The 24 A/C volts for this circuit is taken off the air jet terminal on the computer board. The voltage then travels to TB1 #8 from there it supplies the coil voltage for the air jet sense relay. The COM. terminal of the relay is connected to TB1 #2, which is supplied with 24 A/C volts when the door switch circuit is complete. Now with the relay energized the 24 A/C volts applied to the COM. terminal of the relay will be present on the NO. terminal via, TB1 #6 which now energizes the pin #1 of the 1 sec. flasher. The output of the flasher (PIN #4) will be connected to the "DONE LIGHT" and with the other terminal of the "DONE LIGHT" grounded via TB1 #7 the light will flash in 1 second intervals.

SECTION VIII

PHASE 5 OPL SYSTEM DIAGNOSTICS

ALL major circuits, including door, microprocessor temperature sensor, heat and motor circuits are monitored. The Phase 5 OPL microprocessor controller will inform the user, via the LED display, of certain failure codes, along with indicators both in the LED display and the outputs of each relay, (and door switch circuit) to easily identify failures.

Diagnostic (LED Display) Failure Codes

1. "**door**" - indicates door switch circuit is open.

   a. Keyboard entry was made while main door or lint drawer is open, or
   b. There is a fault in the door switch circuit (external of the Phase 5 OPL microprocessor controller)

2. "**dSFL**" - indicates a fault in the microprocessor temperature circuit.

If fault is detected in the microprocessor heat sensor circuit, the display will read "dSFL", and the tone (buzzer) will sound for approximately 5 seconds every 30 seconds until...

a. The problem is corrected, or
b. Power to the dryer is discontinued and the problem is then corrected

IMPORTANT: The Phase 5 OPL microprocessor controller has its own internal heat sensing circuit fuse protection located on the back side of the Phase 5 OPL computer. If a "dSFL" condition occurs, check to see if this fuse has blown. If it has, **DO NOT** replace the entire Phase 5 OPL microprocessor controller, replace the fuse and do so with a 1/8 amp (Slo-Blo) fuse ONLY.

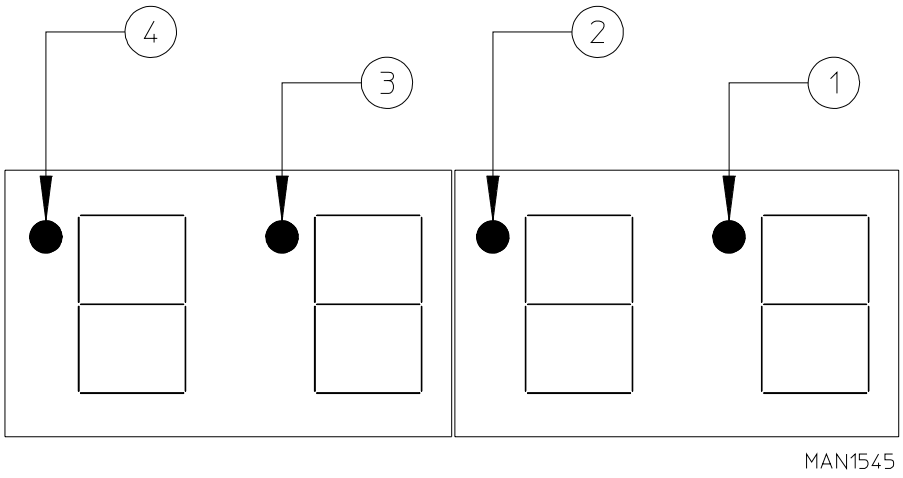
NOTE: Once the Phase 5 OPL microprocessor controller detects a problem in the heat circuit, it updates every 30 seconds. If the problem was a loose connection in this circuit which corrected itself, the "dSFL" condition would automatically be cancelled.

3. "**SEFL**" - indicates rotational sensor circuit failure meaning that there is a fault somewhere in the basket (tumbler) rotation detection circuit, or the Phase 5 OPL microprocessor controller program related to this circuit (Program Location 2) is set incorrectly in the active mode (**SEn**) where the dryer is not equipped with the optional rotational sensor and should be set in the nonactive mode (**nSEn**).

4. "**Hot**" - indicates a possible overheating condition. The Phase 5 OPL microprocessor controller monitors the temperature in the dryer at all times. If the microprocessor controller detects that the temperature in the dryer has exceeded 220° F (104°C), it will disable all outputs (shut the dryer down), the tone (**bUZ**) will sound for approximately 5 seconds, and the LED display will read "Hot" until the temperature has dropped to 220° F or lower and the Phase 5 OPL microprocessor controller is manually reset by pressing the "Clear/Stop" key.

LED Display Indicators

The LED indicator dots located at the top portion of the LED display (as shown in the illustration below) indicate the Phase 5 OPL microprocessor controller output functions while a cycle is in progress. These indicator dots do not necessarily mean that the outputs are functioning. They are only indicating that the function (output) should be active (on).



1. Blower Motor Circuit Indicator - indicator dot is on whenever a cycle is in progress.

2. Heat Controller Indicator - indicator dot is on whenever the Phase 5 OPL microprocessor controller is calling for the heating circuit to be active (on).

3. Reversing Indicator - indicator dot is on when the drive basket (tumbler) motor is operating in the reverse mode (counterclockwise direction).

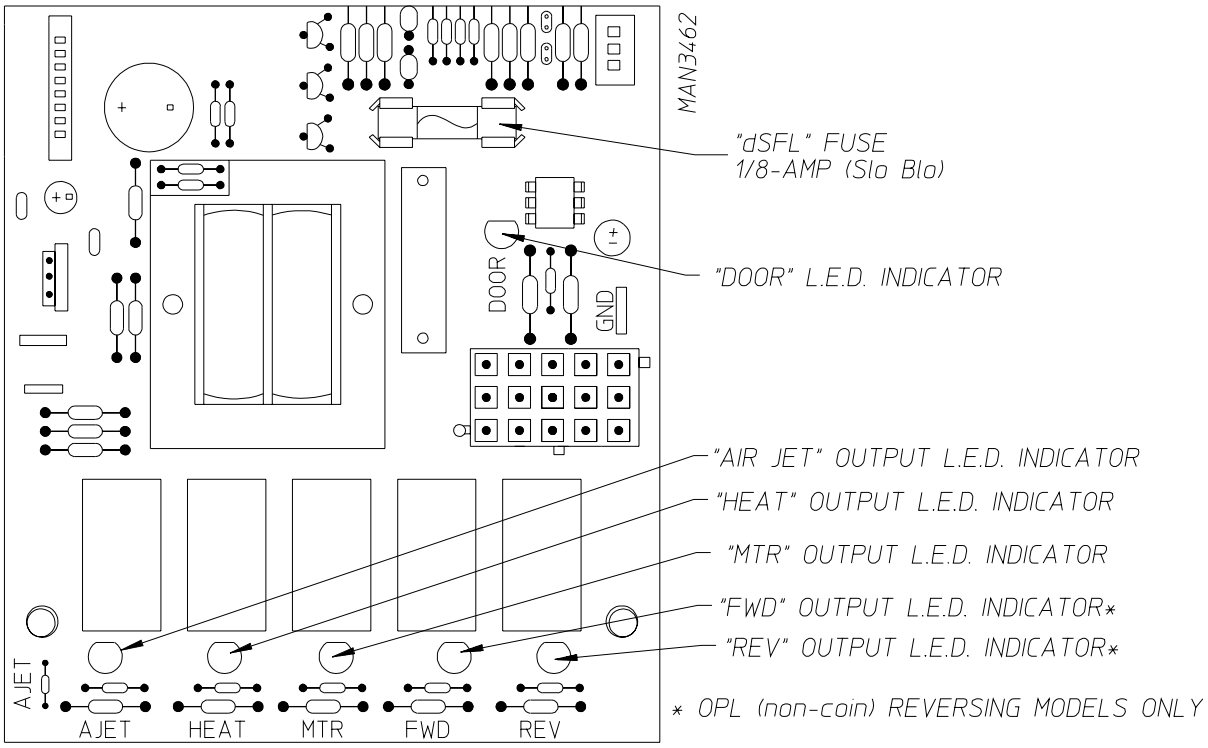
4. Forward Indicator - indicator dot is on when the drive basket (tumbler) motor is operating in the forward mode (clockwise direction).

Phase 5 OPL Microprocessor Controller Relay Output LED Indicators

There are five (5) LED indicators (red lights) located at the lower backside area of the Phase 5 OPL microprocessor controller. They are identified/labeled (from left to right as shown in the illustration on this page) as "HEAT", "MTR" (blower motor), "FWD" (forward), "REV" (reversing), and "DOOR". These LEDs indicate that the outputs of the Phase 5 OPL microprocessor controller or, in the case of the door switch, are functioning.

1. "**HEAT**" Output LED Indicator -

   If the dryer is started and there is no heat, yet the microprocessor controller display heat circuit indicator dot is on, but the heat output LED indicator is off, then the fault is in Phase 5 OPL microprocessor controller itself. If both display heat indicator dot and the heat output LED indicator are on, then the problem is elsewhere (i.e., external of the microprocessor controller).



2. "**MTR**" Output LED Indicator -

If the dryer is started and the motor is not operating, yet both the microprocessor controller display motor indicator dot and the "dOOr" input LED indicator are on, but the motor output LED indicator is off, then the fault is in the Phase 5 OPL microprocessor controller itself. If the motor is not operating and the "MOTOR" output indicator is on, then the problem is elsewhere (i.e., external of the microprocessor controller).

3. "**FWD**" Output LED Indicator -

a. If the dryer is started and the blower motor is operating but the drive basket (tumbler) motor is not, yet the Phase 5 OPL microprocessor controller display "Forward" indicator dot is on, but the "FWD" (forward) motor output LED is off; the fault is the Phase 5 OPL microprocessor controller itself.

b. If the drive basket (tumbler) motor is not operating and the "FWD" indicator is on, then the problem (fault) is elsewhere (i.e., external of the Phase 5 OPL microprocessor controller).

4. "**REV**" Output LED Indicator -

If the dryer is started and the blower motor is operating but the drive tumbler (basket) motor is not, yet the Phase 5 OPL microprocessor controller's display "REVERSE" indicator dot is on, but the "REV" (reverse) motor output LED is off, the fault is the Phase 5 OPL microprocessor controller itself. If the drive tumbler (basket) motor is not operating and the "REV" (reverse) indicator is on, then the problem (fault) is elsewhere (i.e., external of the Phase 5 OPL microprocessor controller).

5. "**DOOR**" LED Indicator -

The indicator **should be** on all the time (even if the dryer is not returning) unless the main door or lint drawer is open or there is a problem (open circuit in the main door or lint drawer circuit).

NOTE: If the dryer is started (LED display indicator dots are on) and there are no outputs (heat or motor output LEDs are off) and the "dOOr" input LED is on, the fault is in the Phase 5 OPL microprocessor controller itself. If the failure was elsewhere (i.e., dryer's door switch circuit) the LED display would read "dOOr" if a keyboard entry was attempted. If the LED display indicators are on the door LED input and motor or heat output LED's are on and the motor or heat is not active (on), then the problem is not the door switch circuit or the Phase 5 OPL microprocessor controller and is elsewhere in the dryer.


American Dryer Corp.