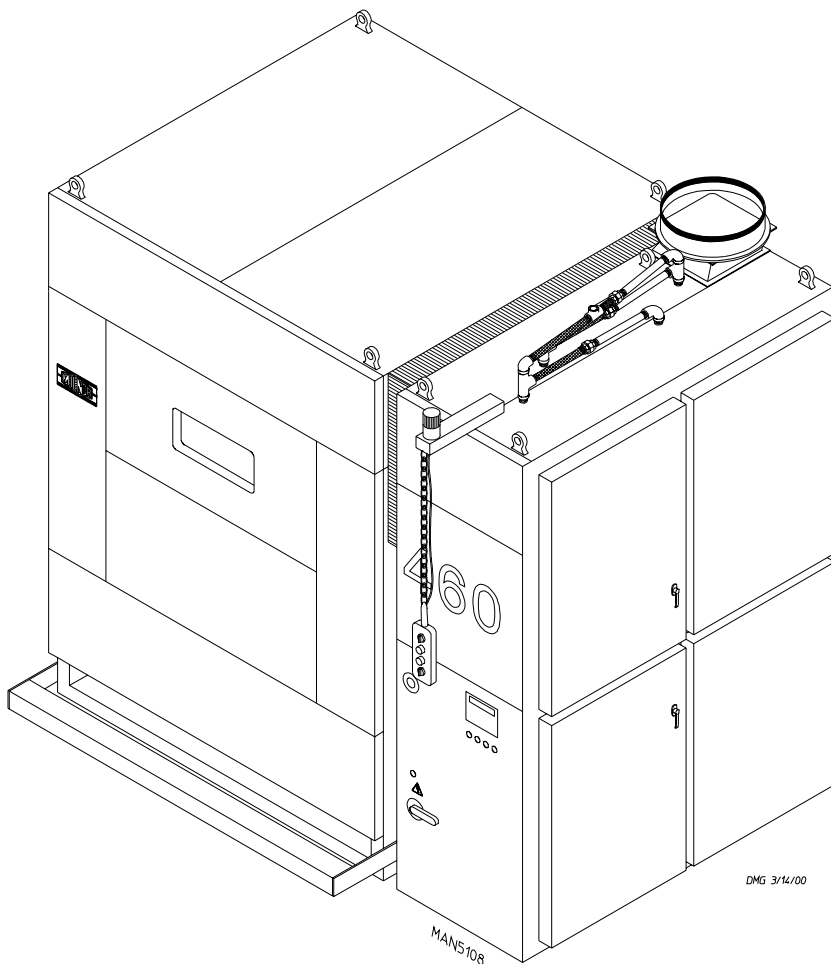




ML-460 Service Manual



American Dryer Corporation
88 Carrant Road
Fall River, MA 02720-4781
Telephone: (508) 678-9000 / Fax: (508) 678-9447
e-mail: techsupport@amdry.com

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 qualified 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.

The following "FOR YOUR SAFETY" caution **must be** posted near the dryer in a prominent location.

FOR YOUR SAFETY

Do not store or use gasoline or other flammable vapors or liquids in the vicinity of this or any other appliance.

POUR VOTRE SÉCURITÉ

Ne pas entreposer ni utiliser d'essence ni d'autres vapeurs ou liquides inflammables dans le voisinage de cet appareil ou de tout autre appareil.

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. **ML-460** _____
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) 678-9000. 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.

"IMPORTANT NOTE TO PURCHASER"

Information must be obtained from your local gas supplier on the instructions to be followed if the user smells gas. These instructions must be posted in a prominent location near the dryer.

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 operation.”

«Attention: Lors des opérations d'entretien des commandes étiqueter tous fils avant de les déconnecter. Toute erreur de câblage peut être une source de danger et de panne.»

CAUTION

DRYERS 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 DRYERS IN OPERATION.**

FOR YOUR SAFETY

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

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.**

WARNING

DRYER MUST NEVER BE OPERATED WITHOUT THE LINT FILTER/SCREEN IN PLACE, EVEN IF AN EXTERNAL LINT COLLECTION SYSTEM IS USED.

IMPORTANT

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

Dryers **must not** be installed or stored in an area where it will be exposed to water or weather.

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

Table of Contents

SECTION I	
SAFETY PRECAUTIONS	3
SECTION II	
ROUTINE MAINTENANCE	5
A. Cleaning	5
B. Lubrication	7
C. Adjustments	8
SECTION III	
SPECIFICATIONS	9
A. Gas Models (ADG-460)	9
B. Steam Models (ADS-460)	10
C. Electrical Service Specifications	11
SECTION IV	
INSTALLATION REQUIREMENTS	12
A. Enclosure/Air Supply/Exhaust Requirements	12
B. Electrical and Gas Requirements	13
C. Operational Service Check Procedure	13
SECTION V	
COMPONENT DESCRIPTION/REPLACEMENT	14
A. Tumbler (Basket) Support and Drive System	14
B. Main Air Blower/Heat Reclaimer System	16
C. Compressed Air System	18
D. Safety Devices	22
E. Blower (Squirrel Cage Fan) Motor Assembly	24
F. Blower (Squirrel Cage Fan) Electrical Components	29
G. Tumbler (Basket) System	31
H. Rotational Sensor Assembly	40
I. Top Of Tumbler (Basket) Temperature Door Assembly	42
J. Tumbler (Basket) Electrical Components	43
SECTION VI	
PLC (PROGRAMMABLE LOGIC CONTROLLER) SYSTEM	45
A. PLC (Programmable Logic Controller) Description	45
B. PLC (Programmable Logic Controller) Component Replacement	49

SECTION VII
BASE SECTION 78
 A. Lint Drawer/Lint Chamber Switches 78
 B. Resistive Temperature Device 81

SECTION VIII
SPRINKLER SYSTEM 83
 A. Sprinkler System Description 83

SECTION IX
AIR JET SYSTEM 87
 A. Air Jet System 87

SECTION X
STACK VALVE ASSEMBLY 88
 A. Pneumatic Valve 88

SECTION XI
PENDANT ASSEMBLY 93
 A. Pendant Assembly Description 93

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. Dryer(s) **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.**

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.**

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.**

SECTION II

ROUTINE MAINTENANCE

A. CLEANING

A 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 many 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 DRYER.

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 screen. A clogged lint screen will cause poor dryer performance. The lint screen is located in the lint drawer in the base of the dryer. Pull out the lint drawer, brush the lint off the lint screen, 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, gear reducer, drive belts, 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 and burner area at the top of the dryer, the fan (impellor/blower) 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.

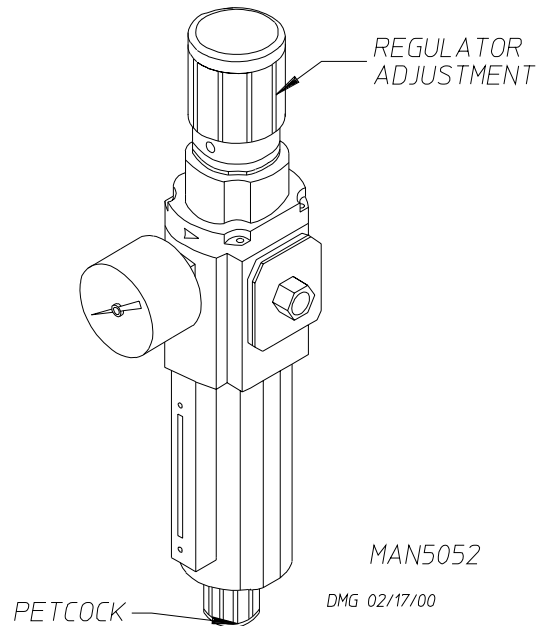
NOTE: When cleaning the dryer cabinet(s), avoid using harsh abrasives. A product intended for the cleaning of appliances is recommended.

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

B. LUBRICATION

MONTHLY

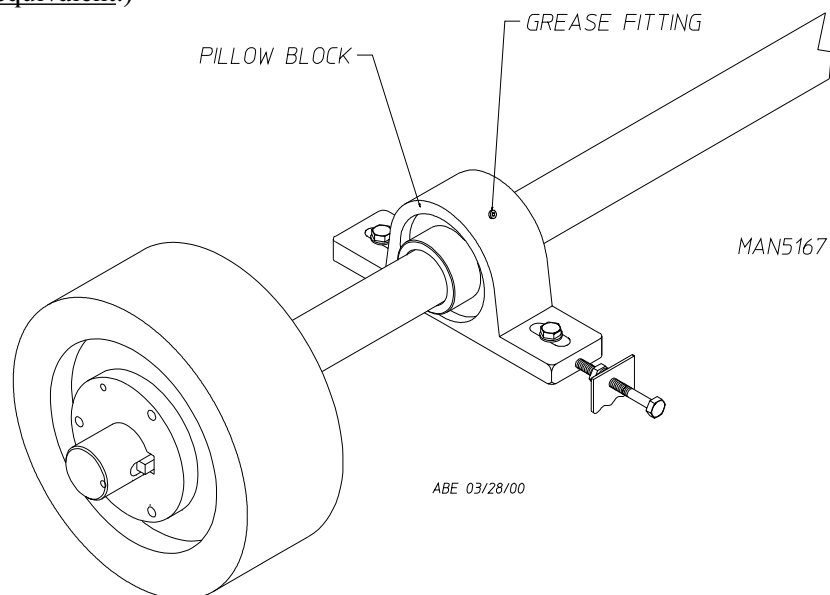
Check compressed air filter bowl for water. Empty by pressing the rubber petcock to the side. Additionally, check lubricator bowl for oil. If empty, remove the fill plug and add oil. (Use petroleum based 10/150 SSU misting oil.) Replace the fill plug.



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

NOTE: REGULATOR PRESSURE IS TO BE SET AT 80 PSI (5.51 bars).

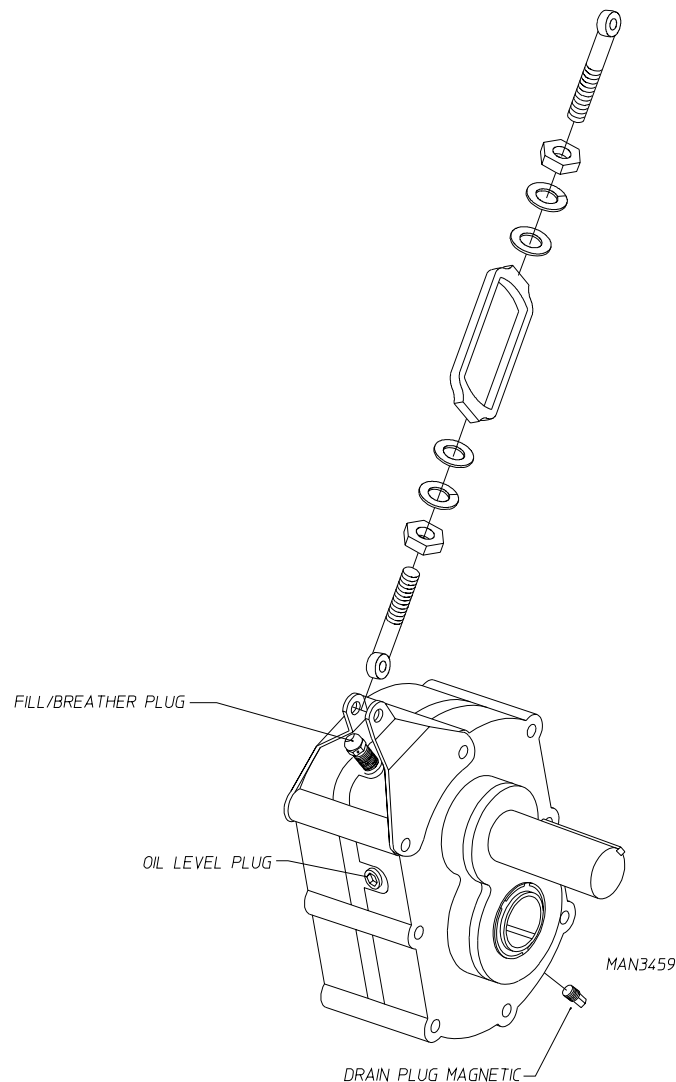
Apply high temperature grease to the four (4) 2-inch (5.08 cm) diameter tumbler drive shaft pillow block bearings and the two (2) 1-3/4 inch (4.45 cm) diameter blower shaft pillow block bearings. (Use Shell Alvania #2 grease or equivalent.)



EVERY 6 MONTHS

Change gear oil in the tumbler shaft gear reducer.

1. Remove the drain plug (located at the bottom rear of the reducer).
2. After oil is completely drained replace the drain plug.
3. Remove the vent plug and pour in 1.4 liters of Mobil Oil DTE HH5G (I.S.O. viscosity grade 460), SAE 90, 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

A. GAS MODELS (MLG-460)

MAXIMUM CAPACITY (DRY WEIGHT)	460 lbs.	208.7 kg
TOTAL WEIGHT	9,695 lbs.	4,397.58 kg
TOTAL SHIPPING WEIGHT	9,850 lbs.	4,467.89 kg
TILT HEIGHT	137-1/4"	348.6 cm
OPERATING HEIGHT	114-1/2"	290.83 cm
FULL TILT DEPTH	117-1/2"	298.45 cm
OPERATING DEPTH	95"	241.3 cm
WIDTH	122"	309.88 cm
TILT LOAD (REAR TILT)	15°	
TILT UNLOAD (FRONT TILT)	15°	
UNLOADING HEIGHT FROM FLOOR	43-3/4"	111.12 cm
LOADING HEIGHT FROM FLOOR	65-5/8"	166.69 cm
DOOR OPENING	53-1/4" x 49"	135.26 cm x 124.46 cm
TUMBLER (BASKET) DIAMETER	69-1/8"	175.58 cm
TUMBLER (BASKET) DEPTH	80-5/16"	203.99 cm
TUMBLER (BASKET) VOLUME	175 cu. ft.	4.96 cu. m
MINIMUM LOAD SIZE	250 lbs.	113.4 kg
MAXIMUM LOAD SIZE	460 lbs.	208.7 kg
BURNER TYPE	On/Off	On/Off
HEAT INPUT*	2,800,000 btu/hr.	705,600 kcal/hr
BLOWER MOTOR	25 HP	18.65 kw
TUMBLER (BASKET) MOTORS (2 MOTORS)	(2) 5 HP	(2) 3.73 kw
BURNER BLOWER MOTOR	1-1/2 HP	1.12 kw
BLOWER MAXIMUM AIRFLOW	13,000 cfm	368 cmm
MAXIMUM DUCT BACK PRESSURE	1.25" (W.C.)	3.1 mbar
MINIMUM DUCT DIAMETER	24"	60.96 cm
COMPRESSED AIR PRESSURE REQUIRED	80 psi (± 10 psi)	5.51 bars (± 0.7 bars)
COMPRESSED AIR VOLUME REQUIRED	20 cfh	0.57 cmh
COMPRESSED CONNECTION	3/8" N.P.T.	---

Shaded areas are stated in metric equivalents

* Gas pressure into the dryer **cannot** exceed 13" W.C. (water column) - 31.95 mb. If the gas supply pressure is higher than 13" W.C. (31.95 mb), an external regulator **must be** installed.

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

B. STEAM MODELS (MLS-460)

MAXIMUM CAPACITY (DRY WEIGHT)	460 lbs.	208.7 kg
TOTAL WEIGHT	11,000 lbs.	4,989.52 kg
TOTAL SHIPPING WEIGHT (STRETCH WRAP/SKID)	11,162 lbs.	5,062.9 kg
TILT HEIGHT	137-1/4"	348.6 cm
OPERATING HEIGHT	114-1/2"	290.83 cm
FULL TILT DEPTH	117-1/2"	298.45 cm
OPERATING DEPTH	95"	241.3 cm
WIDTH	122"	309.88 cm
TILT LOAD (REAR TILT)	15°	
TILT UNLOAD (FRONT TILT)	15°	
UNLOADING HEIGHT FROM FLOOR	43-3/4"	111.12 cm
LOADING HEIGHT FROM FLOOR	65-5/8"	166.69 cm
DOOR OPENING	53-1/4" x 49"	135.26 cm x 124.46 cm
TUMBLER (BASKET) DIAMETER	69-1/8"	175.58 cm
TUMBLER (BASKET) DEPTH	80-5/16"	203.99 cm
TUMBLER (BASKET) VOLUME	175 cu. ft.	4.96 cu. m
MINIMUM LOAD SIZE	250 lbs.	113.4 kg
MAXIMUM LOAD SIZE	460lbs.	208.7 kg
BOILER HORSEPOWER	60 Bhp	
STEAM INLET CONNECTION SIZE*	2-1/2" N.P.T.	---
STEAM RETURN CONNECTION SIZE (2 PLACES)	1 1/4" N.P.T.	---
TUMBLER (BASKET) MOTORS (2 MOTORS)	(2) 5 HP	(2) 3.73 kw
BLOWER MOTOR	25 HP	18.65 kw
BLOWER MAXIMUM AIRFLOW	13,000 cfm	368 cmm
MAXIMUM DUCT BACK PRESSURE	1.25" (W.C.)	3.1 mbars
MINIMUM DUCT DIAMEMTER	24"	60.96 cm
COMPRESSED AIR PRESSURE REQUIRED	80 psi (±10 psi)	5.51 bars (± 0.7 bars)
COMPRESSED AIR VOLUME REQUIRED	20 cfh	0.57 cmh
COMPRESSED AIR CONNECTION	3/8" N.P.T.	---

Shaded areas are stated in metric equivalents

* Size of piping to dryer varies with installation conditions. Contact factory for assistance.

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

C. ELECTRICAL SERVICE SPECIFICATIONS

1. Gas Models

MLG-460 (Gas)						
ELECTRICAL SERVICE SPECIFICATIONS (PER DRYER)*						
IMPORTANT: 208 VAC and 240 VAC ARE NOT THE SAME. When ordering, <i>specify exact voltage.</i>						
NOTES: A. Fuse ratings are dual-element, time-delay, current limiting, class RK1 or RK5 ONLY . B. Circuit breakers are thermal magnetic (industrial) type ONLY . For others, calculate/verify correct breaker size according to appliance amp draw rating and type of breaker used. C. Circuit breakers for 3Ø dryers must be 3-pole type.						
SERVICE VOLTAGE	PHASE	WIRE SERVICE	APPROX. AMP DRAW		FUSING	CIRCUIT BREAKER
			60 Hz	50 Hz	Dual Element Time Delay	
208	3Ø	3/4	107	---	150	150
240	3Ø	3/4	101	98	150	150
380-400	3Ø	3/4	---	53	80	90
416	3Ø	3/4	---	51	60	90
460/480	3Ø	3/4	51	---	60	90
DEDICATED SPRINKLER SERVICE**						
Dryer Nameplate	1Ø	---	2		3.5	5

* Contact factory for information not listed.

** Minimum wire size is #16 AWG Stranded Type Wire...for individual lengths less than 100 feet (31 meters).

2. Steam Models

MLS-460 (STEAM)						
ELECTRICAL SERVICE SPECIFICATIONS (PER DRYER)*						
IMPORTANT: 208 VAC and 240 VAC ARE NOT THE SAME. When ordering, <i>specify exact voltage.</i>						
NOTES: A. Fuse ratings are dual-element, time-delay, current limiting, class RK1 or RK5 ONLY . B. Circuit breakers are thermal magnetic (industrial) type ONLY . For others, calculate/verify correct breaker size according to appliance amp draw rating and type of breaker used. C. Circuit breakers for 3Ø dryers must be 3-pole type.						
SERVICE VOLTAGE	PHASE	WIRE SERVICE	APPROX. AMP DRAW		FUSING	CIRCUIT BREAKER
			60 Hz	50 Hz	Dual Element Time Delay	
200	3Ø	3	117	---	150	150
208	3Ø	3/4	102	---	150	150
240	3Ø	3/4	96	94	125	150
380-400	3Ø	3/4	---	51	60	90
416	3Ø	3/4	---	51	60	90
460/480	3Ø	3/4	49	---	60	90
DEDICATED SPRINKLER SERVICE**						
Dryer Nameplate	1Ø	---	2		3.5	5

* Contact factory for information not listed.

** Minimum wire size is #16 AWG Stranded Type Wire...for individual lengths less than 100 feet (31 meters).

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
and/or
National Electric Code ANSI/NFPA No. 70-LATEST EDITION

A. ENCLOSURE / AIR SUPPLY / EXHAUST REQUIREMENTS

NOTE: The following information is very brief and general. For detailed descriptions, refer to the MLG-460 Installation/Operator's Manual (ADC Part No. 113072) for Gas Model dryers and MLS-460 Installation/Operator's Manual (ADC Part No. 113073) for Steam Model dryers.

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 the MLG-460 Installation/Operator's Manual (ADC Part No. 113072) for Gas Model dryers and MLS-460 Installation/Operator's Manual (ADC Part No. 113073) for Steam Model dryers 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 burner air 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 lint burner switch, over-burner hi-limit or exhaust limit. Refer to the MLG-460 Installation/Operator's Manual (ADC Part No. 113072) for Gas Model dryers and MLS-460 Installation/Operator's Manual (ADC Part No. 113073) for Steam Model dryers for more detail.

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

B. ELECTRICAL REQUIREMENTS 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.

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 switches, hi-limit thermostat, air pressure switches, RTD (Resistive Temperature Device) probes, etc.

SECTION V

COMPONENT DESCRIPTION/REPLACEMENT

A. TUMBLER (BASKET) SUPPORT and DRIVE SYSTEM

IMPORTANT: Always keep the tumbler (basket) section of the dryer in an upright position when moving it.

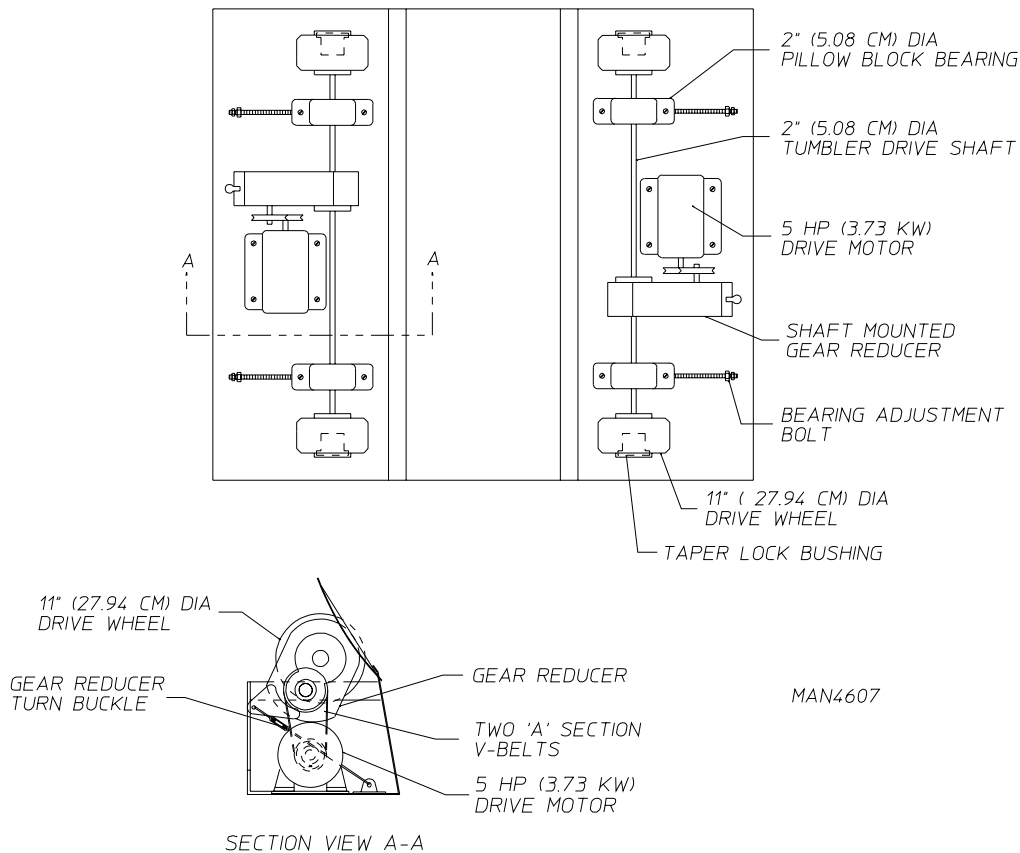
1. Tumbler (Basket)

The tumbler (basket) is made of five (5) 14 gauge stainless steel perforated panels, five (5) stainless steel lifting ribs, and two (2) outer tumbler rings. The tumbler (basket) is a completely welded assembly so the perforated panels are not removable.

2. Tumbler (Basket) Support System

The tumbler (basket) sits on four (4) 11-inch (27.94 cm) diameter heavy-duty rubber roller wheels which supports and drives the tumbler (basket). The rubber wheels are molded into each of four (4) steel hubs. The steel hubs are flattened to the 2-inch (5.08 cm) diameter drive shafts by taper lock bushings. Each drive shaft is supported by two (2) 2-inch (5.08 cm) diameter heavy duty roller bearings. The position of the tumbler (basket) is adjusted by moving these bearings in or out with the four (4) bearings adjustment bolts.

ML - 460 TUMBLER DRIVE SYSTEM

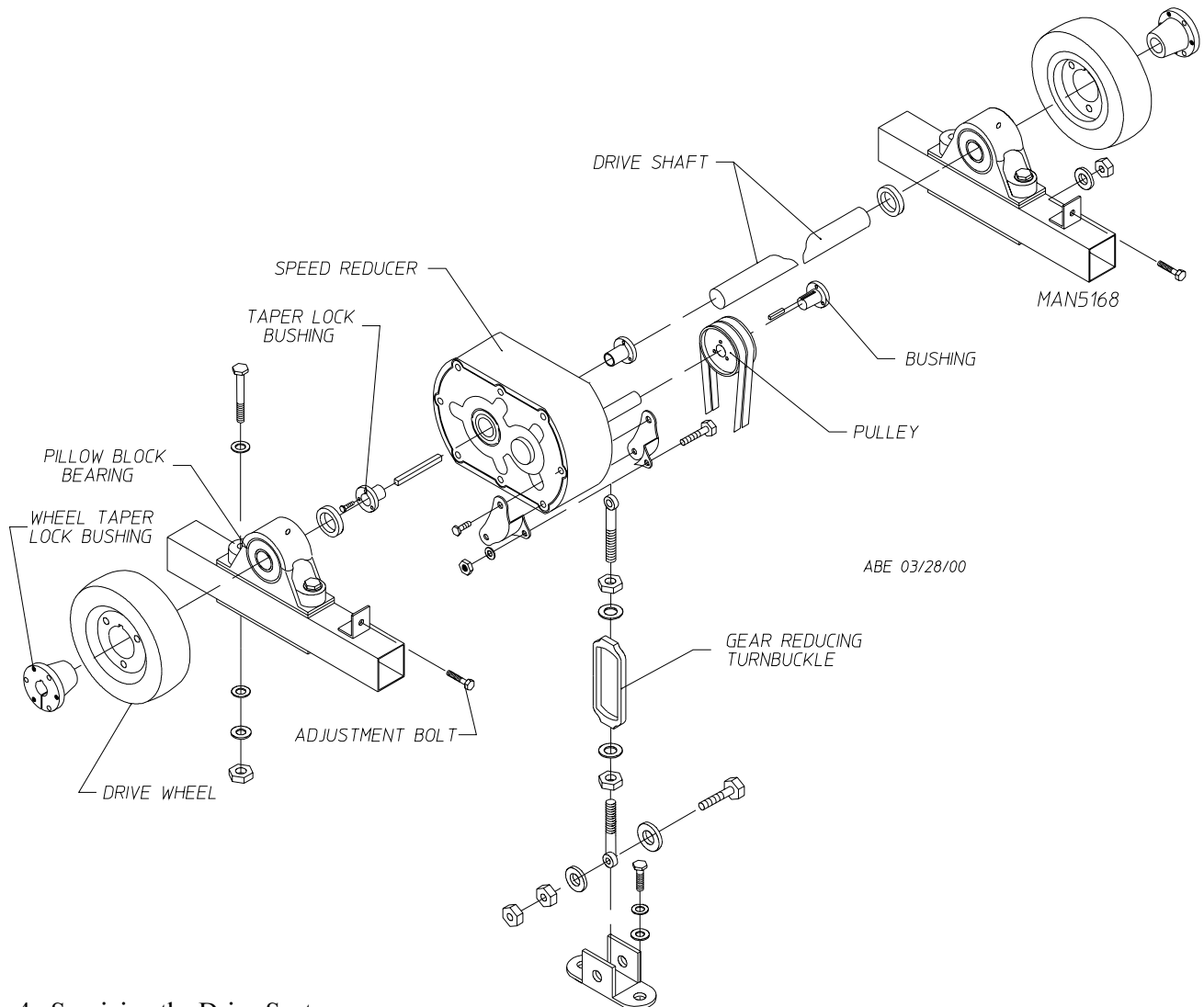


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3. Tumbler (Basket) Drive System

There are two (2) 5 HP (3.73 kw) tumbler (basket) drive motors. Each motor drives one (1) of the 2-inch (5.08 cm) diameter tumbler drive shafts, and the motors spin simultaneously so that **ALL** four (4) sets drive wheels work together to spin the tumbler (basket).

Each motor is connected to the drive shaft by two (2) “A” section V-belts, driving a shaft-mounted (5.6 to ratio) gear reducer. This produces a tumbler (basket) shaft speed of 200 RPM to 205 RPM and a speed of 31.5 RPM. Proper tension is maintained on the V-belts by tightening the gear reducer turnbuckle support. The oil in each gear reducer **must be replaced every six (6) months** by 1.4 liters of I.S.O. viscosity Grade 460 gear oil.



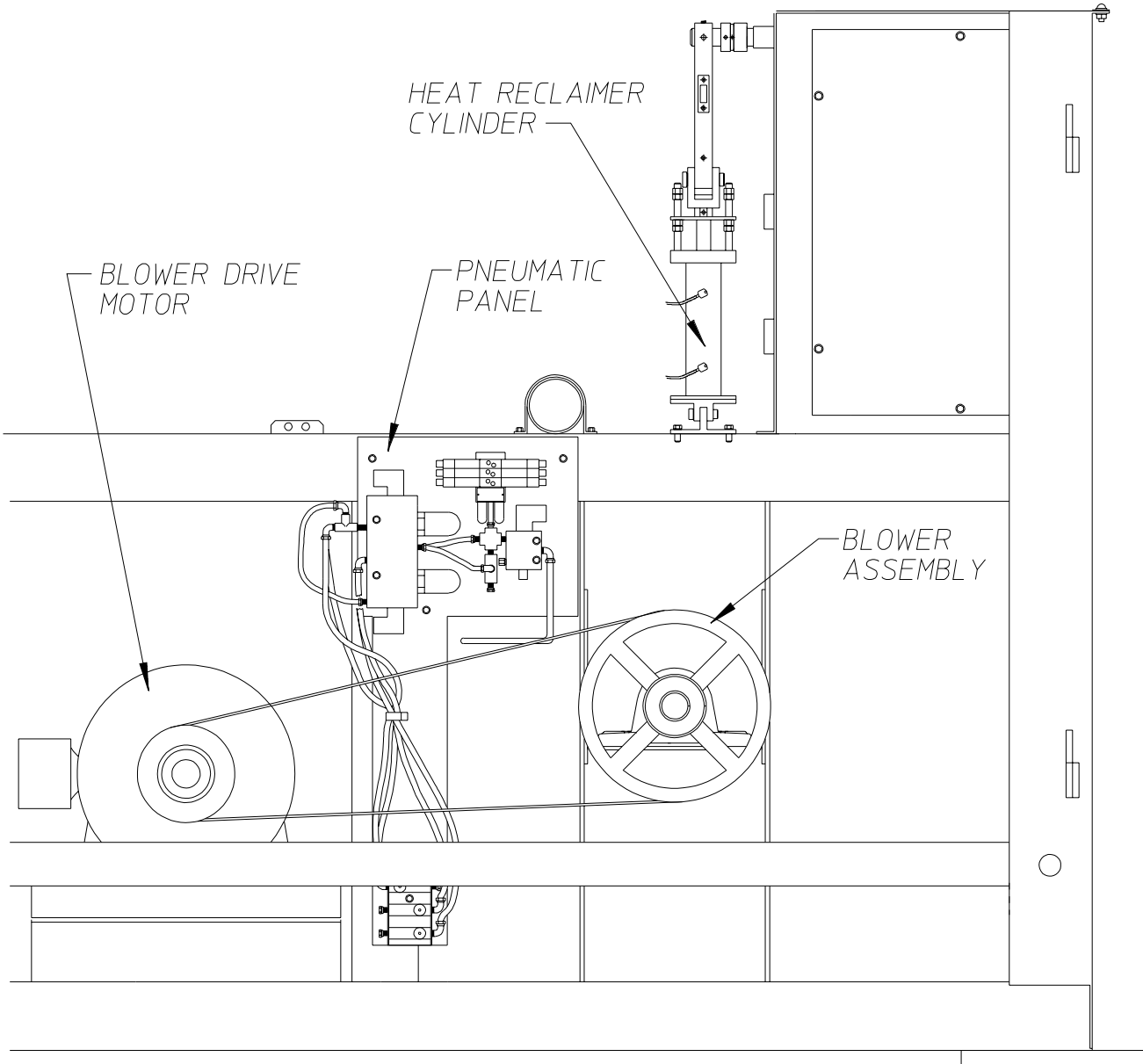
4. Servicing the Drive System

a. Removing a Drive Wheel

The drive wheels are removed through the front and back panels of the dryer, *not through the sides*. The front loading door and back loading door panels are hinged at the top. Remove the bolts holding these panels to tumbler (basket) section frame and swing the panel out. The two (2) 1/4-inch (6.35 mm) poly-flo tubes connected to the load door piston *have to be removed* to allow the panel to swing up far enough to get access to the drive wheels. Additionally, electrical disconnections **must be performed** (refer to "TUMBLER [BASKET] DRIVE SYSTEM REPLACEMENT" on **page 32**).

B. MAIN AIR BLOWER/HEAT RECLAIMER SYSTEM

The fan which moves the exhaust air through the dryer is a 22-inch (55.88 cm) diameter, squirrel cage fan that is driven at 1,100 rpm by a 25 HP (18.65 kw) motor. This fan moves a maximum of 13,000 cfm (368 cmm) air through the dryer.

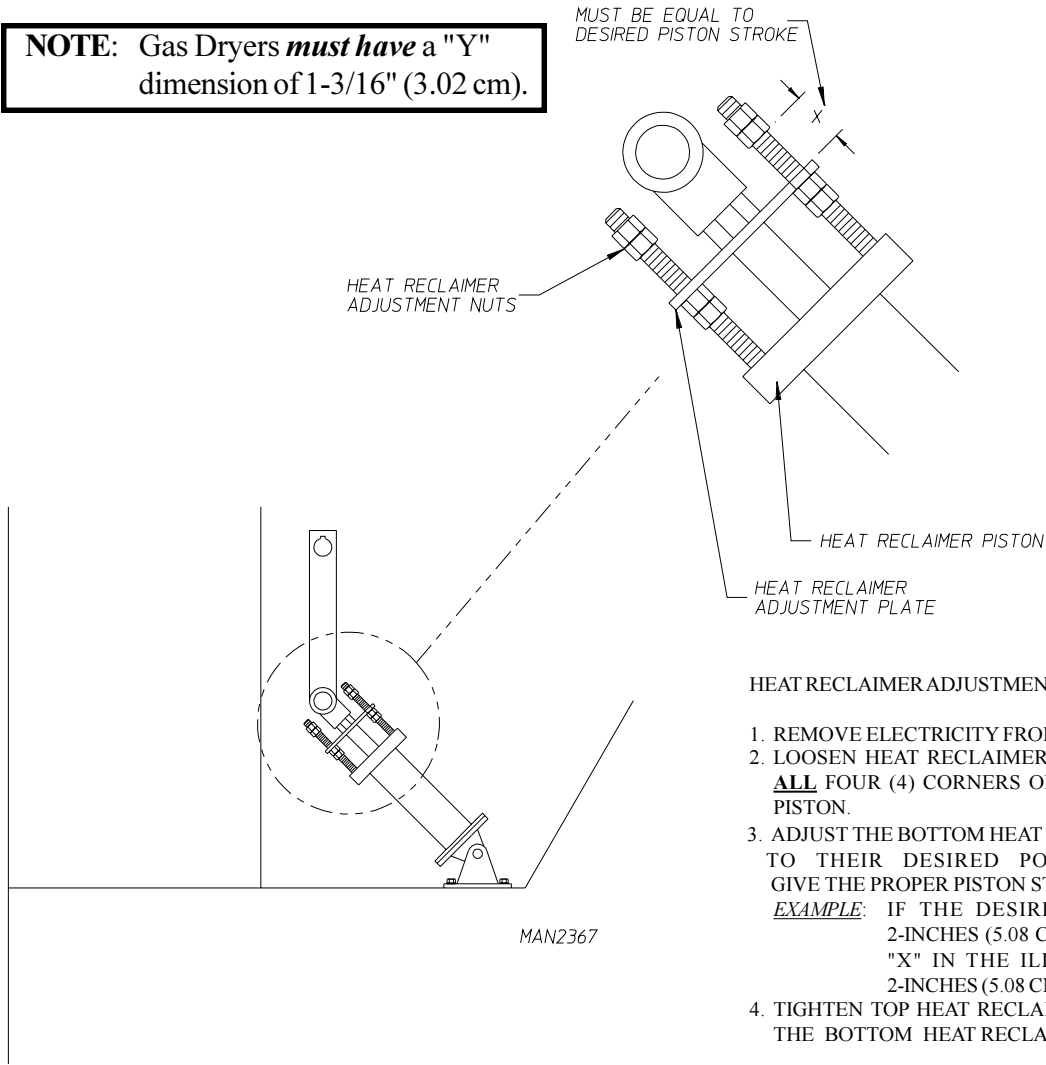


MAN2343

The dryer is equipped with a pneumatically operated heat reclaimer damper, which when opened, will recirculate approximately fifteen-percent (15%) of the dryer's exhaust air.

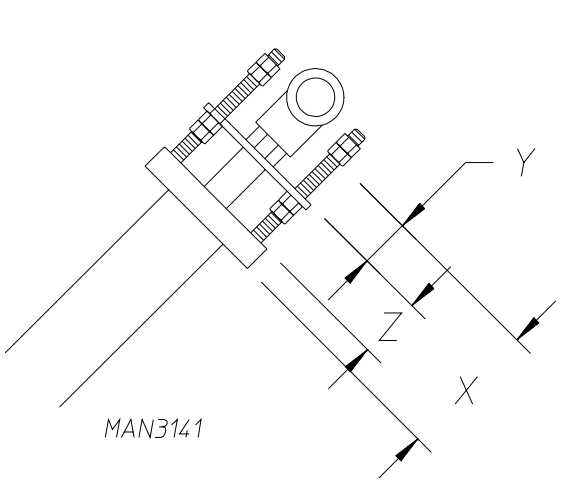
The heat reclaimer dampener is closed until ignition of flame has been established. Then, the damper piston is actuated, opening the damper and recirculating fifteen-percent (15%) of the exhaust air back over the gas burner and into the tumbler. The damper remains open for the rest of the drying cycle. On cool down, the damper closes, exhausting **ALL** of the 13,000 cfm (368 cmm) which ensures a fast cool down of the load.

NOTE: Gas Dryers *must have* a "Y" dimension of 1-3/16" (3.02 cm).



HEAT RECLAIMER ADJUSTMENT

1. REMOVE ELECTRICITY FROM THE UNIT.
2. LOOSEN HEAT RECLAIMER ADJUSTMENT NUTS ON **ALL** FOUR (4) CORNERS OF THE HEAT RECLAIMER PISTON.
3. ADJUST THE BOTTOM HEAT RECLAIMER NUTS DOWN TO THEIR DESIRED POSITION WHICH WILL GIVE THE PROPER PISTON STROKE.
EXAMPLE: IF THE DESIRED PISTON STROKE IS 2-INCHES (5.08 CM), THAN THE DISTANCE "X" IN THE ILLUSTRATION **MUST BE** 2-INCHES (5.08 CM).
4. TIGHTEN TOP HEAT RECLAIMER NUTS DOWN ONTO THE BOTTOM HEAT RECLAIMER NUTS.



HEAT RECLAIMER SETTINGS						
Z = 1-5/8" (4.13 cm)						
Y+Z=X		Y		%HR	Inches Reclaimed	
1-1/8"	2.86 cm	1/2"	12.700 mm	7.46	1-1/4"	3.18 cm
2-5/8"	6.67 cm	1"	2.54 cm	15.67	2-5/8"	6.67 cm
3-1/8"	7.94 cm	1-1/2"	3.81 cm	25.37	4-1/4"	10.8 cm
3-5/8"	9.21 cm	2"	5.08 cm	34.32	5-3/4"	14.61 cm
4-1/8"	10.48 cm	2-1/2"	6.35 cm	43.28	7-1/4"	18.42 cm
4-5/8"	11.75 cm	3"	7.68 cm	50.74	8-1/2"	21.6 cm
5-1/8"	13.02 cm	3-1/2"	8.9 cm	58.95	9-7/8"	25.1 cm
FULL OPEN 16-3/4" (42.55 cm)						

Shaded areas are stated in metric equivalents

C. COMPRESSED AIR SYSTEM

The compressed air system of the dryer consists of a number of pneumatic pistons located throughout the dryer, an FRL (Filter/Regulator/Lubricator) assembly, and pneumatic control panel.

1. Air Pistons

The pistons are actuated by solenoid and flow control valves that are under computer control. The pneumatic pistons are used to;

- Tilt the dryer for loading and unloading.
- Open and close load and unload doors
- Operate heat reclaimers.
- Operate the cool down damper and the intake air damper.

2. Filter and 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.

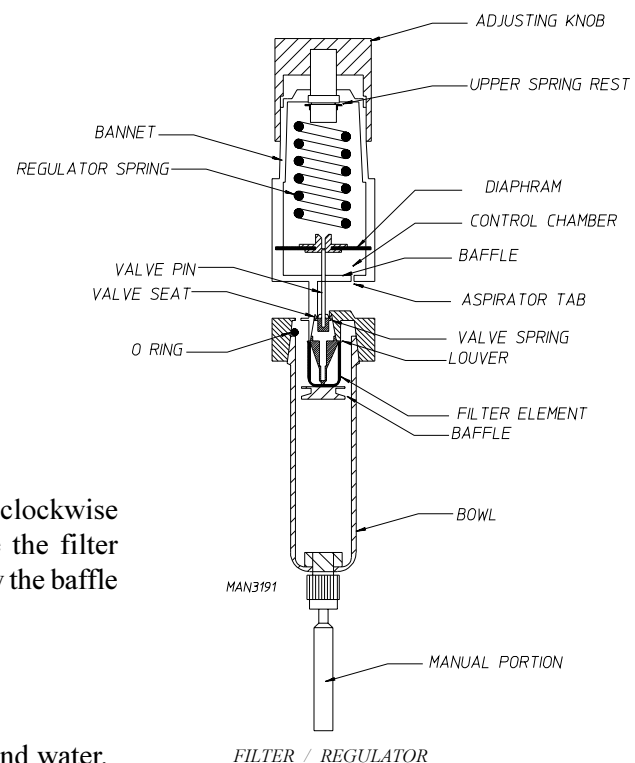
a. Filter Maintenance

- 1) To remove filter element;

Twist the filter bowl 1/8" (3.175 mm) 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).

- 2) To clean filter element,

The filter element can be cleaned with soap and water.



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

b. 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 and 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 DOWNSTREAM PRESSURE.

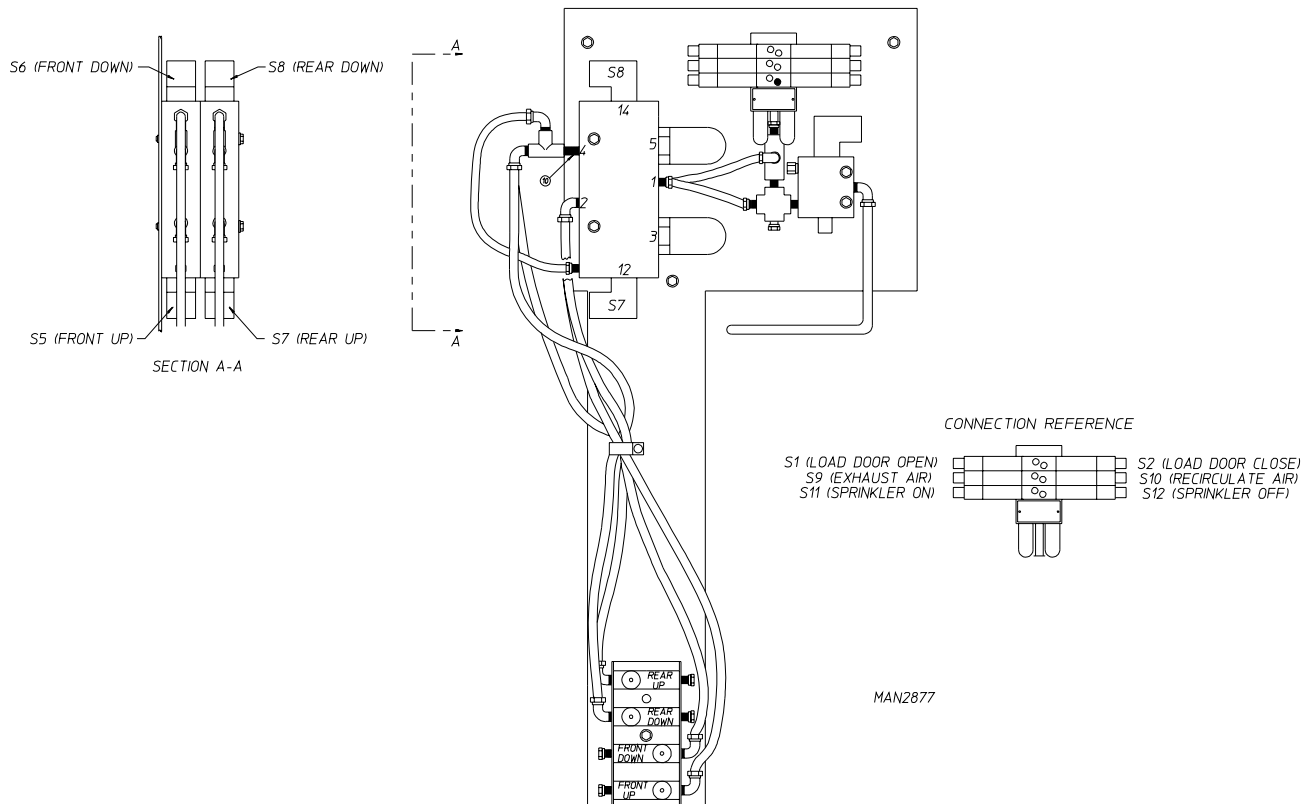
Dryer must be provided with a clean, dry, regulated 80 PSI (± 10 PSI) - 5.51 bars ± 0.7 bars - air supply (equivalent volume - 20 cfh [0.57 cmh]).

The regulator **should be** set at 80 PSI (± 10 PSI) - 5.51 bars ± 0.7 bars. 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.

3. Pneumatic Control Panel

The pneumatic control panel of a 2-Way Tilt dryer has two (2) tilting solenoid valves, one to control the front set of tilting pistons and a second to control the rear set of tilting pistons. A 1-Way Tilt dryer has only one (1) tilting solenoid valve.

Each valve has five (5) 1/2" F.P.T. ports and two (2) electric solenoids, one (1) on each side of the valve.



To tilt the dryer back, a 120 volt signal is applied to the front pistons solenoid connector #S5, and no voltage is applied to the solenoid connector #S8. The internal spool in the valve will move and 80 PSI (5.51 bars) of air will enter the bottom port of the front tilting pistons, extending the front tilting piston rods and tilting the dryer back for loading. The top piston ports are bled to the atmosphere. To level the dryer after loading, the voltage signals are reversed. No voltage is applied to the “S5” solenoid, and 120 volts are applied to the “S8” solenoid. The valve spool will now move so that 80 PSI (5.51 bars) of air is applied at the top piston ports, while the bottom piston ports are bled to the atmosphere. The piston rods will now retract, leveling the dryer. On a 2-way tilt dryer, the rear tilting piston solenoid valve acts in the same manner.

The tilting piston valves are three (3) position valves. This means that, if no voltage is applied to both positions (“S5” and “S8”) **ALL** five (5) valve ports are blocked. If the dryer is tilting or leveling and power to the dryer is shut off, the pistons will lock in position, holding the dryer in a partially tilted position.

The dryer can be made to tilt faster or slower by adjusting the pistons 3/8-inch (9.525 mm) flow control valves which are located on the pneumatic control panel.

4. Internal and External Pilot Air Supply

On 2-Way Tilt dryers, a pneumatic safety circuit is incorporated to prevent both front and rear tilting pistons from extending their rods at the same time. When 120 volts is supplied to the “S5” side of the front tilting piston solenoid valve coil, the round internal spool in the core of the solenoid will move, allowing 80 PSI (5.51 bars) air to flow into the bottom ports of the front tilting pistons, while the top ports of these pistons are bled to the atmosphere. In addition to this 120 volt electrical signal, the spool also requires a 30 PSI (2.07 bars) supply of compressed air to change its position. This pilot air can either be supplied internally, tapped off the 80 PSI (5.51 bars) air supply connected to port no. 1 through holes in the body of the solenoid valve or it can be supplied externally through the 1/8-inch F.P.T. connection located on either end of the solenoid valve. If no pilot air is supplied to the solenoid valve then the spool **cannot** move, even with voltage supplied to the solenoid valve coil.

This can be used to prevent both sets of tilting pistons from extending their rods at the same time. When the front tilting piston rods are extended, 80 PSI (5.51 bars) air is connected to the bottom piston ports, while the top piston ports are bled to the atmosphere. So, by tapping the external pilot air supply to the rear tilting rods are extended, then there is no pilot pressure available to the rear tilting piston solenoid valve so that its spool **cannot** move and the rear tilting piston rods **cannot** extend if a 120 volt signal is sent to its “12” side solenoid valve coil.

The external pilot air supply to the front tilting piston is tapped off the rear tilting piston top port air line so that whenever the rear piston rods are extended, there is no pilot air supplied to the front tilting piston solenoid valve and the front tilting piston rods cannot extend. On the solenoid valve supplied on the dryer, the #12 side valve is externally piloted, while #14 side valve is internally piloted.

A valve can easily be checked for internal or external piloting by removing the two (2) screws which hold the solenoid operator onto the valve. For an internal pilot air to be supplied to the valve spool. For an external pilot, the solid sealing disc **must be** positioned on top of the internal port.

5. Loading Doors and Heat Reclaimer, Cool Down and Intake Air Damper

These solenoid valves are located in the 4-station manifold block on the pneumatic control panel. The front load door piston, rear unload door piston (optional), and the sprinkler water valve are **ALL** controlled by their own 3-way double acting solenoid valve.

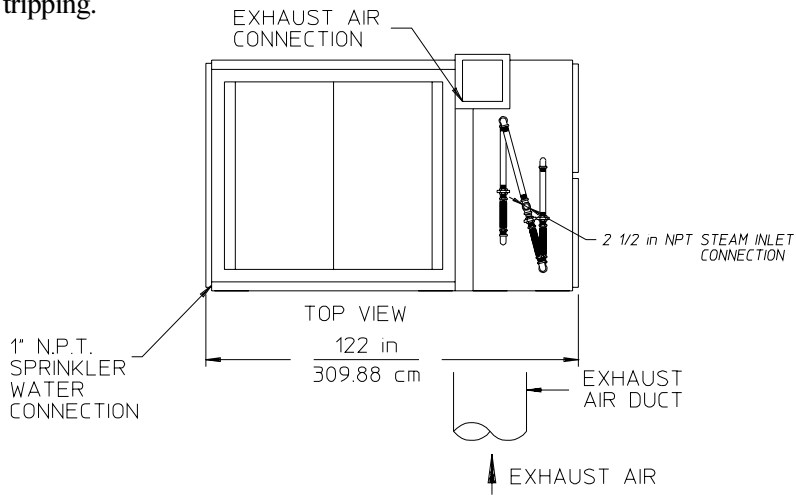
The three (3) pistons that control the heat reclaimer damper, cool down damper, and intake air damper are controlled by a single 3-way double acting solenoid valve.

To open the front loading door, a 120 volt signal is applied to S1, the coil of the valve that supplies air to the load door or the heat reclaimer's bottom port. The valve will open, and 80 PSI (5.51 bars) of air is supplied to the bottom port of the piston. The piston rod will extend, and the door will open. No voltage is applied to S2, the coil of the valve that controls the air supply to the door pistons top port so that this line is bled to the atmosphere.

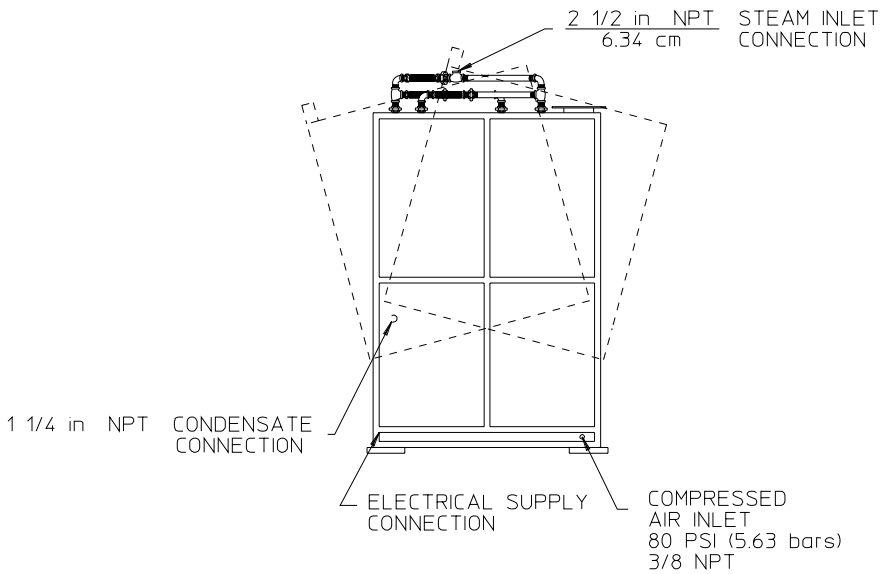
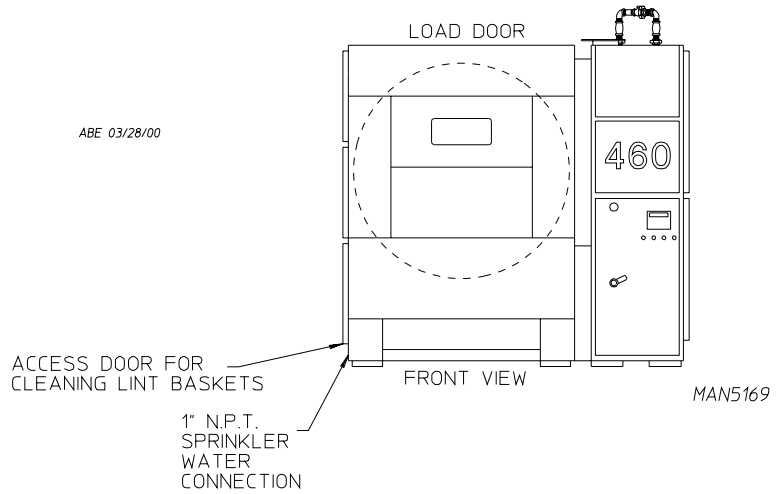
To close the front loading door or heat reclaimer damper, the voltage signals are reversed, and the loading door will close.

D. SAFETY DEVICES

The dryer is equipped with numerous safety devices to ensure that the dryer operates safely. The chart on the following page (**page 23**) lists each device with its location, function, computer display message, and result of tripping.



ABE 03/28/00



1. Safety Devices Locations/Functions/Messages

SAFETY DEVICES	LOCATION	FUNCTION	COMPUTER DISPLAY MESSAGE	RESULT OF TRIPPING
Load Door Switch	Left side of Load door	Ensures dryer load doors are closed	"DOOR OPEN"	Dryer will not run
Unload door switch (Two door unit only)	Right side of unload door	Ensures dryer unload doors are closed	"DOOR OPEN"	DRYER WILL NOT RUN
Tilting Switches	Top left side of base module	Ensures dryer is level	"LEVEL FAULT"	DRYER WILL NOT RUN
Drum Rotation Sensor	Left side of tumbler section	Ensures tumbler is rotating	"DRUM FAULT"	STOPS HEAT ONLY
Lint Chamber air pressure switch	Rear of base module	Ensures proper air flow through dryer	"AIRFLOW FAULT"	STOPS HEAT ONLY
Burner Fan Air Flow Switch (Gas Dryers Only)	Center of heat console	Ensures proper combustion air flow into the burner box	"HEATER FAULT"	STOPS HEAT ONLY
Hi/Lo Gas Pressure Switch (Gas Dryers Only)	Lower left of heat console section	Ensures proper gas supply pressure for adequate ignition	"GAS SUPPLY FAULT"	STOPS HEAT ONLY
Heat Reclaimer Damper Switch	Right side of heat console	Ensures that the heat reclaimer is either opened or closed	Input L.E.D. #13 of the PLC is off	NONE
Heat Console Door Access Door Switch	Inside heat console	Ensures that access doors are closed	"DOOR OPEN"	DRYER WILL NOT RUN
Exhaust Air Temp Control Sensor	Inside burner section duct	Monitors tumbler exhaust air temp	"EXHAUST DSFL"	STOPS HEAT ONLY
Exhaust Air Hi Temp Control Sensor	Inside exhaust duct	Monitors tumbler exhaust and air temp	"HI-TEMP FAULT"	STOPS HEAT ONLY
Intake Air Temp Control Sensor (optional)	Top right of tumbler section	Monitors tumbler air intake temp	"INTAKE DSFL"	STOPS HEAT ONLY
Intake Air Temp Control Sensor	Top right of tumbler section	Monitors tumbler air intake temp	"HI-TEMP FAULT"	STOPS HEAT ONLY
Burner Hi-Limit Safety Sensor	Top of burner section	Monitors air temp above the burner box	"HI-TEMP FAULT"	STOPS HEAT ONLY
Sprinkler Control Safety Sensor	Top right of tumbler section	Open sprinkler system water valve on hi-temp condition	Orange sprinkler pilot light comes on. Alarm horn sounds.	OPENS THE SPINKLER WATER VALVE AND POWER DOWN THE WHOLE DRYER
Lint Drawer Switches	Above lint drawer handles	Disables machine when drawers are open or if drawers have not been cleaned in last five load	Lint Drawer	DRYER WILL NOT RUN

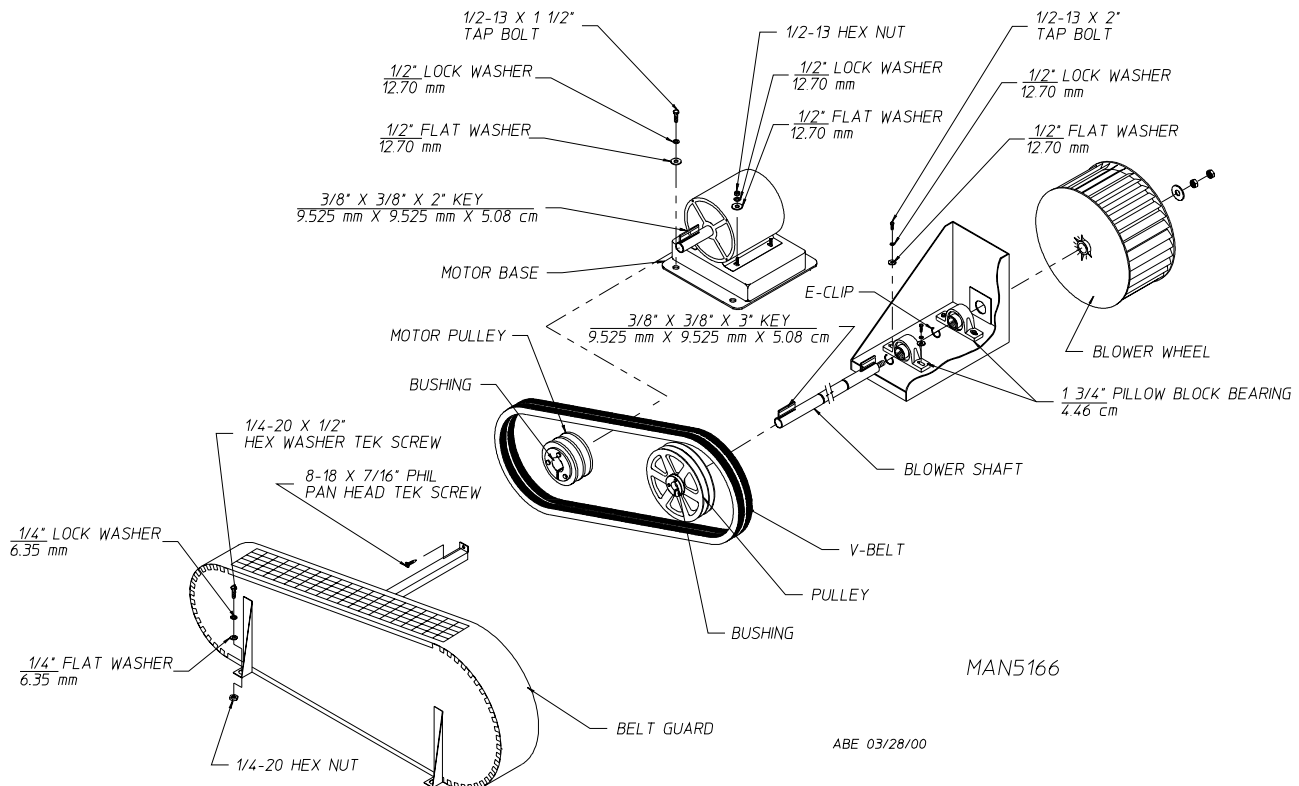
E. BLOWER (Squirrel Cage Fan) MOTOR ASSEMBLY

1. Blower (Squirrel Cage Fan) Motor Description

The dryer uses a 22-1/4 inch (56.52 cm) diameter blower (squirrel cage fan). It rotates (spins) in a counter-clockwise (CCW) direction, when viewed at the blower motor.

The blower shaft is mounted on two (2) 1-3/4" (4.45 cm) diameter pillow block bearings and is driven by two (2) BX type V-belts which are connected to a 25 HP (18.65 kw) blower motor.

The blower motor is mounted on an adjustable base. The motors position can be easily adjusted so that the proper tension can be maintained on the V-belts.



2. Blower (Squirrel Cage Fan) Motor Component Replacement

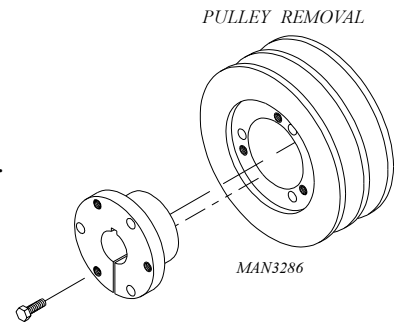
a. Blower Motor Replacement

- 1) Discontinue electrical service to the dryer.
- 2) Remove the belt guard.
- 3) Mark and identify the wires that will be disconnected for proper reinstallation.
- 4) Loosen the bolts securing the blower motor to the motor base;
 - a) Slide the blower motor forward.
 - b) Remove the V-belts.

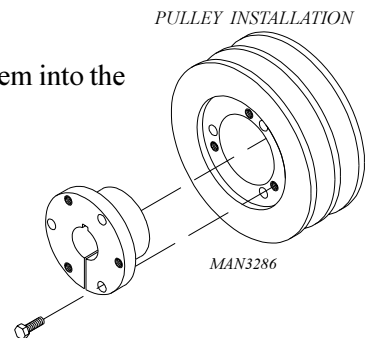
continued on page 25

continued from page 24

- c) Remove loosened bolts.
- d) Remove the blower motor being replaced from the dryer.
- 5) Remove the bolts from the bushing.
- 6) Insert the bolts into the threaded holes.
- 7) Tighten the bolts *evenly* for motor pulley removal.
- 8) Mark the inside of the motors' shaft before removing the bushing.
- 9) Loosen the set screws in the bushing.
- 10) Remove the bushing.
- 11) Measure the mark on the motors' shaft (from **Step #8**) to the end of the shaft and mark the new motors' shaft.
- 12) Install the new blower on to the motor base.
- 13) Slide the motor pulley on to the new blower motors' shaft.
- 14) Slide the bushing onto the shaft until the inside of the bushing meets the mark (from **Step #11**) on the new motors' shaft.



- 16) Insert the bolts into the large holes on the bushing and thread them into the motor pulley.
- 17) Tighten the bolts *evenly* for motor pulley installation.
- 18) Align the pulleys.
- 19) Tighten (*hand tight only*) the bolts for the new motor to the motor base.



Leave enough movement for V-belt adjustment.

- 20) Replace the V-belts;
 - a) Adjust to proper tension by adjusting the position of the new blower motor.
 - b) Align the V-belts.
- 21) Tighten/secure the new motor to the motor base.
- 22) Reconnect the wires onto the new motor that were marked and disconnected in **Step #3**.

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

continued on page 26

23) Reinstall the belt guard removed in **Step #2**.

24) Reestablish electrical service to the dryer.

b. Shrouded Pillow Block Bearing Replacement

1) Discontinue electrical service to the dryer.

2) Remove the belt guard.

3) Loosen the bolts securing the blower motor to the motor base.

4) Remove the V-belts from the motor pulley and the pulley on the blower shaft.

CAUTION: THE BLOWER (Squirrel Cage) FAN IS LOCATED IN THE LINT COMPARTMENT. PROPERLY LOCK and TAG OUT THE ELECTRICAL SERVICE BEFORE ENTERING THE LINT COMPARTMENT.

5) Remove both lint drawers.

6) Remove the eight (8) 1/4-20 bolts which secure the blower funnel to the blower housing assembly.

7) Remove the blower funnel.

8) Remove the two (2) left hand jam nuts and the washers.

9) Remove the blower (squirrel cage) fan along with the 3/8" x 3/8" x 3" (9.525 mm x 9.525 mm x 7.62 cm) key from the blower shaft.

10) Remove the four (4) bolts securing the shrouded pillow block bearings from the blower shaft mount.

11) Remove the complete blower shaft assembly with the shrouded pillow block bearings from the dryer.

12) To remove the shrouded pillow block bearing from the blower (squirrel cage fan) side;

a) Loosen the set screws from the shrouded pillow block bearing.

b) Clean the blower shaft prior to removal of the shrouded pillow block bearing.

13) To remove the shrouded pillow block bearing from the pulley side of the blower shaft, the pulley **must** be removed first;

a) Remove the bolts from the bushing.

b) Insert the bolts into the threaded holes.

c) Mark the inside of the blower motor shaft before removing.

d) Loosen the set screws on the bushing.

continued from page 26

- e) Remove the bushing and the pulley.
- 14) To remove the shrouded pillow block bearing...
- a) Loosen the set screw from the shrouded pillow block bearing.
 - b) Clean the blower shaft prior to the removal of the shrouded pillow block bearing.
- 15) Replace the shrouded pillow block bearing on the blower shaft;
- a) Secure the blower shaft to the blower shaft bearing mount.
 - b) Tighten/secure the set screws in the shrouded pillow block bearing.

NOTE: Install the 3/8" x 3/8" x 3" (9.525 mm x 9.525 mm x 7.62 cm) key on to the blower shaft before installing the blower (squirrel cage fan).

- c) Reinstall the blower (squirrel cage fan) removed in *Step #9*.

IMPORTANT: MAKE CERTAIN THAT THE BLOWER (Squirrel Cage Fan) ROTATES (Spins) FREELY.

- d) Reinstall the blower funnel removed in *Step #7*.
- 16) Reinstall the bushing and the pulley removed in *Step #13*;
- a) Line up the bushing to the mark on the blower shaft, then secure/tighten the set screw.
 - b) Reinstall the bolts into the original holes and tighten *evenly* for correct pulley installation.
- 17) Reposition the blower motor to its original position;
- a) Tighten (*hand tight only*) the bolts into the motor and the motor base.
 - b) Slide the blower motor forward.

Align the pulleys before installing the V-belts.

IMPORTANT: *DO NOT OVERTIGHTEN V-BELTS.*

- 18) When the V-belts are properly tensioned, secure/tighten the blower motor to the motor base.
- 19) Reinstall the belt guard removed in *Step #2*.
- 20) Reestablish electrical service to the dryer.

continued on page 28

c. Blower (Squirrel Cage Fan) Replacement

CAUTION: THE BLOWER (Squirrel Cage Fan) IS LOCATED IN THE LINT COMPARTMENT. **PROPERLY LOCK and TAG OUT THE ELECTRICAL SERVICE BEFORE ENTERING THE LINT COMPARTMENT.**

- 1) Discontinue electrical service to the dryer.
- 2) Remove both lint drawers.
- 3) Remove the eight (8) 1/4-20 bolts which secure the blower funnel to the blower housing assembly.
- 4) Remove the blower funnel.
- 5) Remove the two (2) left hand jam nuts and the washers.
- 6) Remove the blower (squirrel cage fan) along with the 3/8" x 3/8" x 3" (9.525 mm x 9.525 mm x 7.62 cm) key from the blower shaft.

NOTE: Install the 3/8" x 3/8" x 3" (9.525 mm x 9.525 mm x 7.62 cm) key on to the blower shaft before installing the blower (squirrel cage fan).

- 7) To install new blower (squirrel cage) fan, reverse ***Step #7 thru Step #2.***
- 8) Reestablish electrical service to the dryer.

d. V-Belt Replacement

- 1) Discontinue electrical service to the dryer.
- 2) Remove the belt guard.
- 3) Loosen the bolts securing the blower motor to the motor base;
 - a. Ease off on the tension bolt.
- 4) Slide the blower motor forward.
- 5) Remove and replace V-belts.

NOTE: For proper belt replacement, the V-belts ***should be*** replaced in matched sets (both belts).

- 6) Tighten/secure the tension bolt.

IMPORTANT: ***DO NOT OVERTIGHTEN V-BELTS.***

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

continued from page 28

- 8) Secure/tighten the bolts from the motor to the motor base.
- 9) Reinstall the belt guard removed in **Step #2**.
- 10) Reestablish electrical service to the dryer.

e. Blower Shaft Replacement

The procedure to replace the blower shaft is the same procedure used to replace the "SHROUDED PILLOW BLOCK BEARING." (Refer to **page 26 and page 27.**)

F. BLOWER (Squirrel Cage Fan) ELECTRICAL COMPONENTS

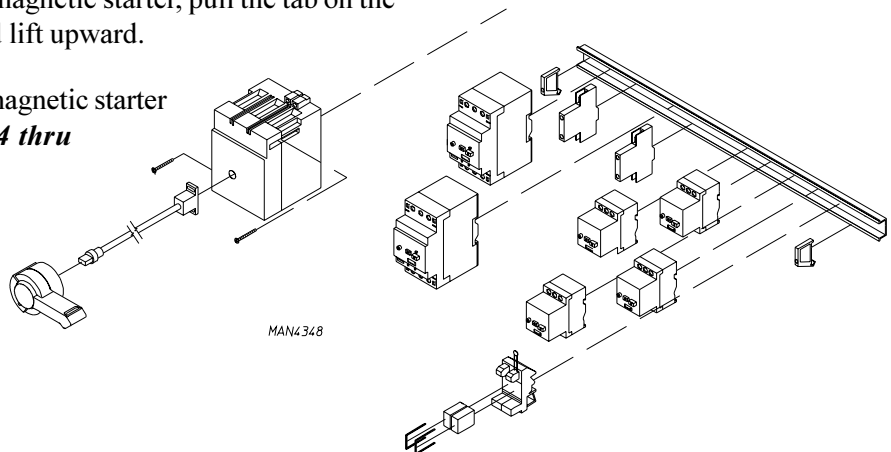
1. Blower (Squirrel Cage Fan) Controls and Overloads

a) Thermal Magnetic Starter (TMS) Description

The thermal magnetic starter (TMS) is used as a safety device to manually disconnect the motor, thereby protecting the motor from being damaged 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 diagram. 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 will not trip the overload. On the face of the overload there are two (2) push buttons, a "START" (Black or Tan-1) and a "STOP" (Red-0). The overload **must be** in the "START" mode for the motor to run.

b) Thermal Magnetic Starter (TMS) Replacement

- 1) Discontinue electrical service to the dryer.
- 2) Mark L1, L2, L3, and T1, T2, T3 on the wires to the thermal magnetic starter (TMS) for correct reinstallation.
- 3) Set the amp (amphere) rating on the TMS according to the electrical schematic supplied with your dryer.
- 4) To remove the thermal magnetic starter, pull the tab on the bottom of the TMS, and lift upward.
- 5) To install new thermal magnetic starter (TMS), reverse **Step # 4 thru Step #2**.
- 6) Reestablish electrical service to the dryer.



2. Auxiliary Contact Block Description

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 motor fault message will appear on the display of the Telemecanique XBT unit.

a. Auxiliary Contact Block Replacement

- 1) Disconnect electrical service to the dryer.
- 2) Remove the thermal magnetic starter (TMS) from the din rail by pulling the tab on the bottom of the contact block and lift 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 style has a screw and the other style has a clip. In both styles, disassembly and assembly is recommended with the thermal magnetic starter (TMS) in the "STOP" position.
 - a) To remove the style that has the screw from the TMS, simply remove the screw.
 - b) To remove the style that has the clip, simply push the clip and twist the auxiliary contact block to remove.
- 5) To install new auxiliary contact block, reverse *Step #4 thru Step #2*.
- 6) Reestablish electrical service to the dryer.

3. Varistor (MOV [Metal Oxide Varistor]) Description

The varistor (MOV) is used to suppress any inductive electrical spikes produced by the energizing and coil voltage.

a) Varistor (MOV [Metal Oxide Varistor]) Replacement

- 1) Discontinue electrical service to the dryer.
- 2) Loosen the screws marked A1 and A2 on the contactor.
- 3) Verify that no additional wires were inadvertently removed.
- 4) To install new varistor, reverse *Step #3 and Step #2*.
- 5) Reestablish electrical service to the dryer.

G. TUMBLER (Basket) SYSTEM

1. Tumbler (Basket) Drive Description

The tumbler (basket) is supported and driven by four (4) 11-inch (27.94 cm) diameter heavy duty rubber roller wheels. The rubber wheels are molded onto each of four (4) steel hubs. The steel hubs are fastened to the 2-inch (5.08 cm) diameter tumbler (basket) drive shafts by taper lock bushings. Each drive shaft is supported by two (2) 2-inch (5.08 cm) diameter heavy duty pillow block bearings. The position of the tumbler (basket) is adjusted by moving these bearings in or out with the four (4) bearing adjustment bolts.

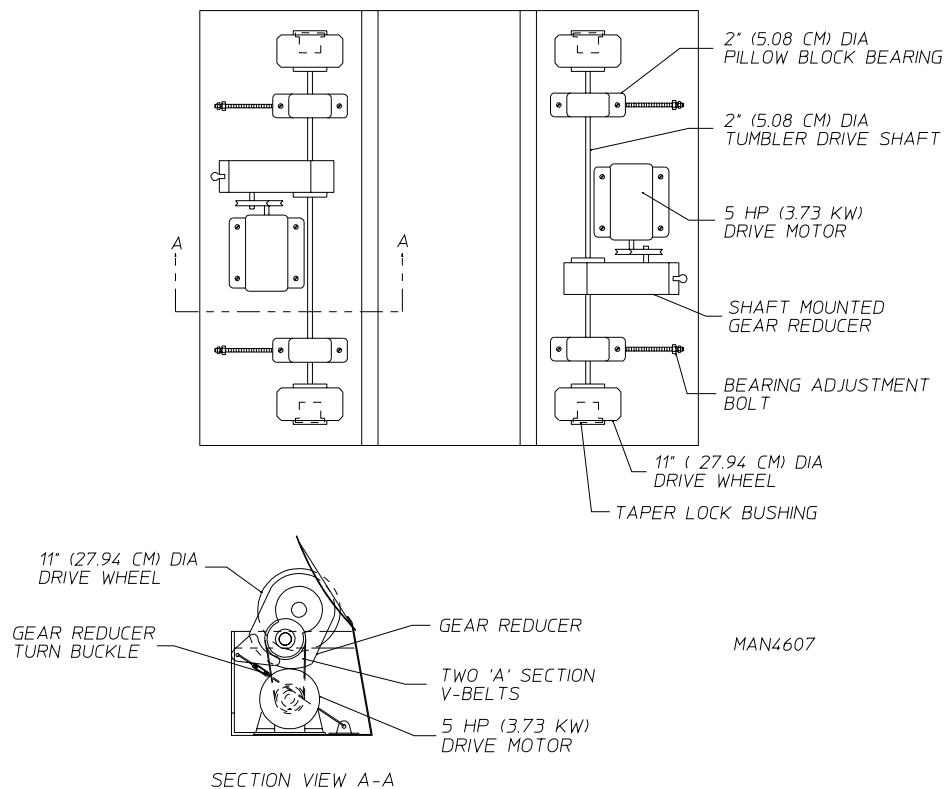
There are two (2) 5 HP (3.73 kw) tumbler (basket) drive motors. Each motor drives one (1) of the 2-inch (5.08 cm) diameter tumbler (basket) drive shafts and the motors spin simultaneously so that **ALL** four (4) sets of drive wheels work together to rotate/spin the tumbler (basket).

Each motor is connected to the tumbler (basket) drive shaft by two (2) "A" type V-belts driving a shaft mounted (5.6 to 1 ratio) gear reducer. This produces a tumbler (basket) shaft speed of 200 to 205 RPM and a tumbler (basket) speed of 315 RPM. Proper tension is maintained on the V-belt by tightening the gear reducer turnbuckle support.

a) The oil in each gear reducer **must be replaced every six (6) months** by 1.4 liters I.S.O. viscosity 460 gear oil.

To keep the tumbler (basket) in the middle of the dryer, there are eight (8) 4-7/16 inch (11.27 cm) diameter retaining wheels which stabilize the tumblers' (baskets') position from the front and from the back. Four (4) of these are mounted on the front panel of the dryer (two [2] on the left and two [2] on the right). Access to these wheels is obtained by removing the vertical front panel and rear panel covers.

ML - 460 TUMBLER DRIVE SYSTEM



2. Tumbler (Basket) Drive System Replacement

a. Tumbler (Basket) Drive Wheel Replacement

- 1) Discontinue electrical service to the dryer.
- 2) Disconnect air supply to the dryer.
- 3) Remove front panels or rear panels that are secured to the front or rear tumbler (basket) section of the dryer by removing the access bolts.
- 4) Remove the eight (8) 3/8-16 x 1" hex head bolts, along with the 3/8" (9.525 mm) flat washers and 3/8" (9.525 mm) lock washers securing the panel to the tumbler (basket) section frame and swing the hinged panel out.
- 5) Disconnect the two (2) 1/4-inch (6.35 mm) poly-flo tubes connected to the load door piston.
- 6) Disconnect the following electrical connections;
 - The front door position switch disconnect plug is located in the left hand side of the front doors. Disconnect this plug and feed the cable through the hole located on the right side of the front panel.
 - Intake temperature probe disconnect plug is located in the burner/heater section of the dryer just above the 25 HP (18.65 kw) motor. Disconnect this plug and route through the hole located on the right side of the front panel.
 - The rear panel controls disconnect plug is located behind the rear panel controls. Disconnect this plug and feed through the hole towards the left hand drum motor section.
 - The rear door position switch disconnect plug is located on the left hand side of the rear doors. Disconnect this plug and feed the cable through the hole located on the right hand side of the tumbler (basket) section.
- 7) Swing the panel up far enough to gain access to the drive wheels.
- 8) Place a block of wood under the tumbler (basket) to prevent the tumbler (basket) from dropping on to the frame.
- 9) Loosen the four (4) 5/8-11 x 5" bolts from the 2-inch (5.08 cm) pillow block bearing.
- 10) Loosen the two (2) 1/2-13 x 3-1/2" full thread adjustment bolts so that the drive wheel lines up with the large hole in the frame.
- 11) Remove the bolts from the wheel taper lock bushing.
- 12) Insert the bolts into the threaded holes.
- 13) Tighten the bolts *evenly* for wheel removal.
- 14) Mark the inside of the tumbler (basket) drive shaft before removing the wheel taper lock bushing.

continued on page 33

continued from page 32

- 15) Loosen the set screws from the taper lock bushing.
 - 16) Remove the taper lock bushing.
 - 17) Remove the drive wheel.
 - 18) Tighten the bolts *evenly* for wheel removal.
 - 19) To install new drive wheel, reverse **Step #17 thru Step #3**.
 - 20) Reconnect air supply disconnected in **Step #2**.
 - 21) Reestablish electrical power to the dryer.
- b. 5 HP (3.73 kw) Drive Motor Replacement
- 1) Discontinue electrical service to the dryer.
 - 2) Mark and identify the wires that will be removed for proper reinstallation.
 - 3) Loosen the turnbuckle and remove the V-belts.
 - 4) Remove the bolts securing the drive motor to the motor mount.
 - 5) Remove the drive motor from the dryer.
 - 6) Mark the inside of the drive shaft before removing the wheel taper lock bushing (for proper re-installation)
 - 7) Remove the taper lock bushing and motor pulley.
 - a) Remove the bolts securing the taper bushing.
 - b) Insert the bolts into the threaded holes and tighten the bolts *evenly* for pulley removal.
 - c) Loosen the set screws on the taper lock bushing and remove the bushing.
 - 8) Measure the mark on the drive motor shaft to the end of the shaft.
 - 9) Mark the shaft of the new drive motor to the measurements from the old motor.

NOTE: For proper belt replacement, the V-belts *should be* replaced in matched sets (both belts).

- 10) Align the taper lock bushing with the mark on the shaft of the new drive motor and install by tightening the set screw.
- 11) Insert bolts into the holes of the taper lock bushing and thread into the motor pulley, then tighten *evenly*.

continued on page 34

- 12) Install new drive motor and *hand tighten* the bolts that secure the drive motor to the motor mount.
- 13) Reinstall the V-belts removed in *Step #3*.
- 14) Check that the motor pulley is properly aligned.
- 15) Secure the drive motor to the motor mount.
- 16) Tighten the turnbuckle.

IMPORTANT: DO NOT OVERTIGHTEN TURNBUCKLE.

- 17) Rewire the new drive motor in the same sequence as the wiring that was removed in *Step #2*.

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

- 18) Reestablish electrical service to the dryer.

c. V-Belt Replacement

- 1) Discontinue electrical service to the dryer.
- 2) Loosen the turnbuckle and tighten the V-belts.
- 3) Install the new V-belts.

NOTE: For proper belt replacement, the V-belts *should be* replaced in matched sets (both belts).

- 4) Tighten the turnbuckle.

IMPORTANT: DO NOT OVERTIGHTEN V-BELTS.

- 5) Reestablish electrical service to the dryer.

d. Taper Lock Bushing and Drive Motor Pulley Replacement

- 1) Discontinue electrical service to the dryer.
- 2) Loosen the turnbuckle and remove the V-belts.
- 3) Mark the inside of the drive motor shaft.
- 4) Remove the bolts securing the taper lock bushing.
- 5) Insert bolts into the threaded holes on the motor pulley and tighten *evenly* for pulley removal.
- 6) Loosen the set screws on the taper lock bushing and remove the bushing.

continued from page 34

- 7) Measure the mark on the motor drive shaft to the end of the shaft.
- 8) Install the new drive motor pulley.
- 9) Align the new taper lock bushing with marks on the shaft and install by tightening the set screws.
- 10) Insert bolts into the holes of the taper lock bushing and thread into the motor pulley, then tighten *evenly*.
- 11) Check that the motor pulley is properly aligned.
- 16) Reinstall the V-belts removed in *Step #2*.
- 17) Tighten the turnbuckle.

IMPORTANT: DO NOT OVERTIGHTEN TURNBUCKLE.

- 18) Reestablish electrical service to the dryer.

e. Pillow Block Bearing Removal

- 1) Discontinue electrical service to the dryer.
- 2) Follow *Step #2 thru Step #17* of the "TUMBLER (BASKET) DRIVE WHEEL REPLACEMENT" instructions on **page 32** and **page 33**.
- 3) *Carefully* file the score marks on the drive shaft from the set screws and lightly sand the shaft with a light grit sand paper before removing the pillow block bearings.
- 4) Loosen the set screws and remove the pillow block bearing.
- 5) For replacement of the pillow block bearings reverse the above procedure, *Step #4 thru Step #2*.

IMPORTANT: Remove the wooden blocks that were inserted under the tumbler (basket).

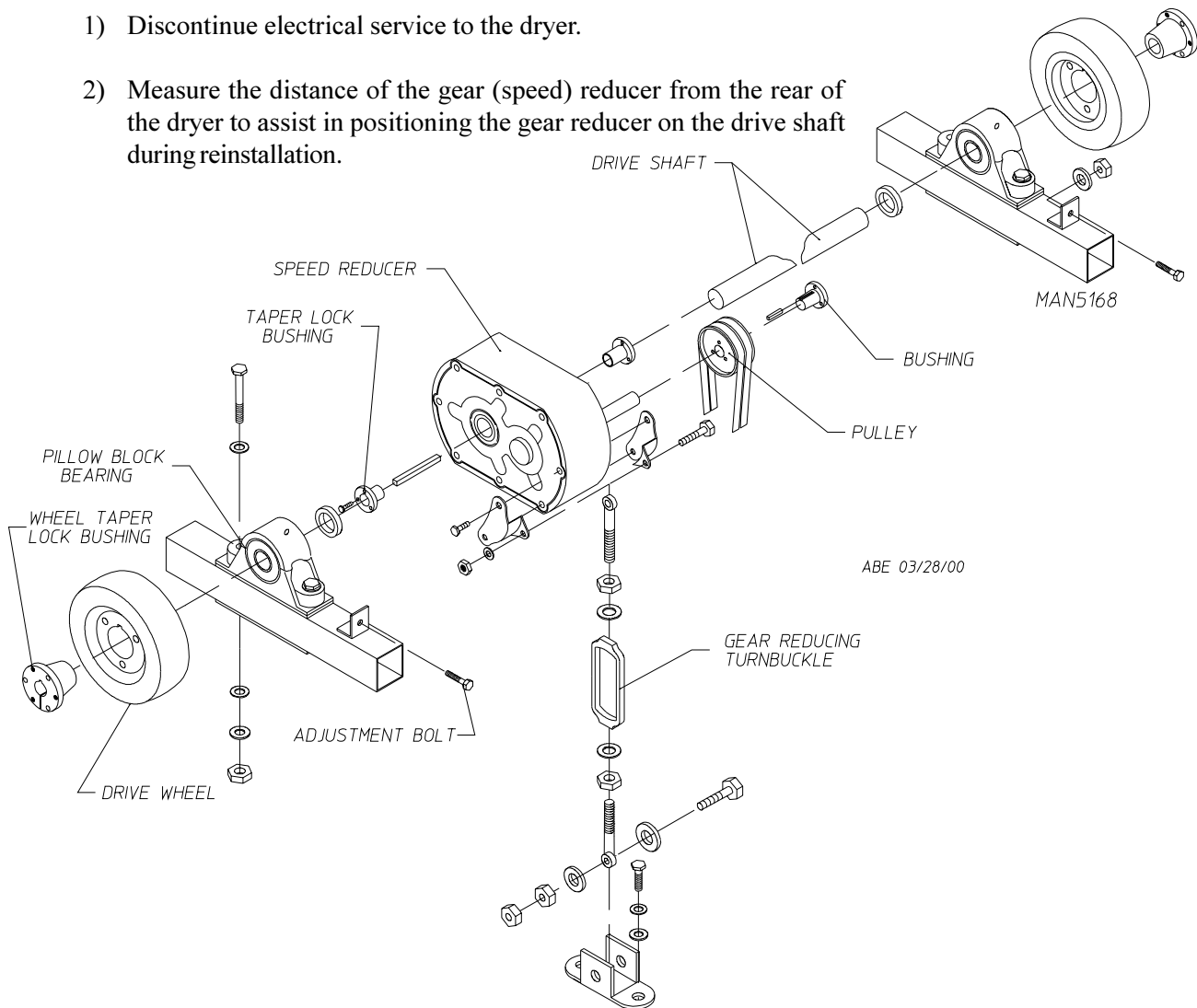
- 6) Reestablish electrical service to the dryer.

f. Gear (Speed) Reducer Replacement

CAUTION: Replacement gear (speed) reducers are shipped without oil. Add proper amount (1.4 liters) of recommended lubricant before operating. **FAILURE TO OBSERVE THESE PRECAUTIONS WILL RESULT IN DAMAGE TO THE DRYER and WILL VOID THE WARRANTY.**

CAUTION: TO MUCH OIL IN THE GEAR REDUCER WILL CAUSE OVERHEATING and TOO LITTLE OIL WILL RESULT IN GEAR FAILURE. CHECK THE OIL LEVEL REGULARLY. **FAILURE TO OBSERVE THESE PRECAUTIONS WILL RESULT IN DAMAGE TO THE DRYER and WILL VOID THE WARRANTY.**

- 1) Discontinue electrical service to the dryer.
- 2) Measure the distance of the gear (speed) reducer from the rear of the dryer to assist in positioning the gear reducer on the drive shaft during reinstallation.



- 3) Follow **Step #2 thru Step #4** of "PILLOW BLOCK BEARING REMOVAL" instructions on **page 35**.
- 4) Loosen the turnbuckle and remove the V-belt.

Remove the bottom turnbuckle mounting bolt.

continued on page 37

continued from page 36

- 5) Remove the three (3) bolts from the taper lock bushing and insert two (2) of these bolts into the threaded holes and tighten *evenly* to remove the taper lock bushing from the gear (speed) reducer.
- 6) Repeat **Step #5** to remove the other taper lock bushing.
- 7) Slide the drive shaft through the hole in the frame of the tumbler section enough to remove the gear (speed) reducer from the shaft.
- 8) Remove the gear (speed) reducer from the drive shaft.
- 9) Check the position of both the drain plug and the breather plug.
- 10) Check the turnbuckle mounting pad on the gear (speed) reducer for the correct application.
- 11) Install the new gear (speed) reducer on to the drive shaft along with the taper lock bushing and the pillow block bearing (set screws in the pillow block bearing face the end of the drive shaft).
- 12) Slide the drive shaft back into position then install the drive and wheel taper lock bushing.
- 13) Properly align the gear (speed) reducer, pillow block bearings, and drive wheels on to the drive shaft and secure/tighten.
- 14) Secure the gear (speed) reducer to the drive shaft by reinstalling the three (3) bolts into the taper lock bushing and tighten *evenly* for proper mounting.
- 15) Repeat **Step #14** to reinstall the other taper lock bushing.
- 16) Reinstall the bolt into the turnbuckle and mounting bracket.
- 17) Reinstall V-belts and tighten the turnbuckle.

IMPORTANT: DO NOT OVERTIGHTEN TURNBUCKLE.

- 18) Prior to operating the new gear (speed) reducer, fill with 1.4 liters of SAE 90 gear oil.
- 19) Mount the pillow block bearing on the mounting pads (using the bolts that were removed).

IMPORTANT: DO NOT OVERTIGHTEN BOLTS.

- 20) Reverse **Step #3** from the "PILLOW BLOCK REMOVAL" instructions on **page 35**.

IMPORTANT: Remove the wooden blocks that were inserted under the tumbler (basket).

NOTE: Verify correct mounting position of the gear (speed) reducer. Make the necessary corrections and/or adjustments to the gear reducer for proper mounting. Changing the drain plug, the breather plug, as well as the turnbuckle mounting pad may be required.

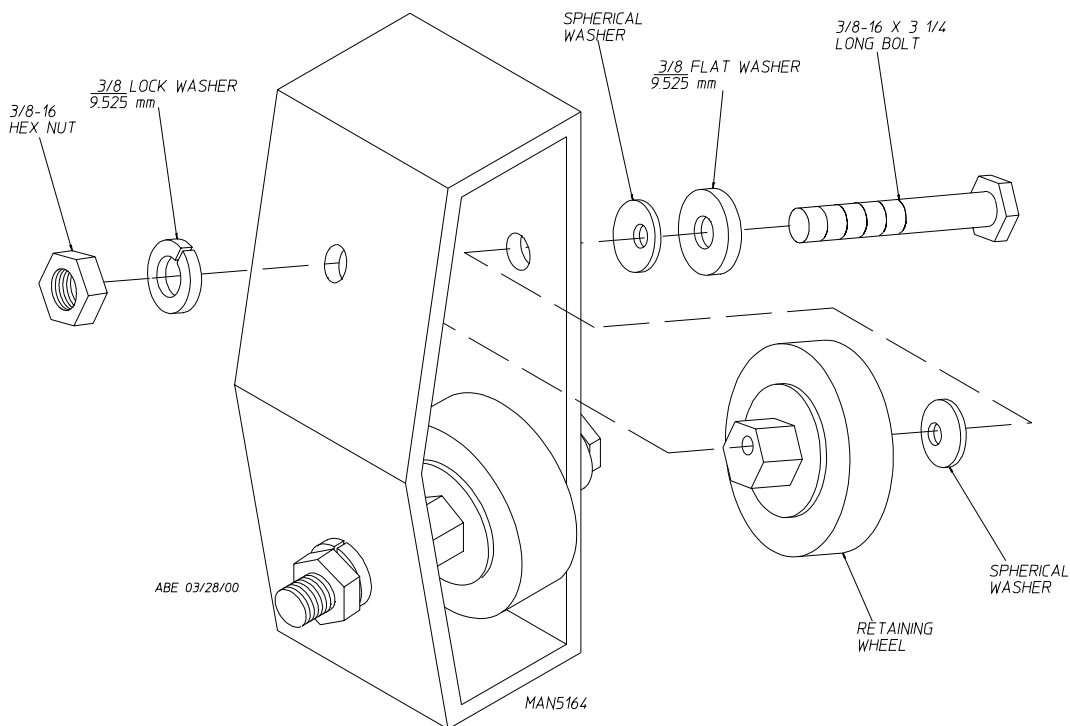
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NOTE: Inspect ALL of the work performed, checking for security of parts and proper alignment.

21) Reestablish electrical service to the dryer.

g. Retaining Wheel Replacement

- 1) Discontinue electrical service to the dryer.
- 2) Remove the front or the rear loading door side panels secured to the front or the rear of the dryer by removing the sixteen (16) 5/16-18 x 3/4" tap bolts, along with the 5/16" (7.937 mm) flat washers and the 5/16" (7.937 mm) lock washers.
- 3) Remove the hardware (i.e., bolt, flat washer, spherical washers, and hex nut) from the wheel mount.
- 4) Remove the retaining wheel that is to be replaced.
- 5) Install the new retaining wheel.



Reinstall the flat washer and then the spherical washer on to the 3/8-16 x 3-1/4" bolt, then insert into the hole of the retaining wheel. Add the second spherical washer to the bolt. Holding the retaining wheel in position, slide the bolt through the retaining wheel and out of the hole on the other side of the mount assembly. Add a 3/8" (9.525 mm) lock washer along with a 3/8-16 hex nut to the bolt *hand tight*.

WARNING: ALL SERVICE and TROUBLESHOOTING SHOULD BE PREFORMED BY A QUALIFIED PROFESSIONAL or SERVICE AGENT.

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

- 6) Reestablish electrical service to the dryer.

Proceed to "RETAINING WHEEL ADJUSTMENT" instructions immediately below.

h. Retaining Wheel Adjustment

- 1) With the dryer operating, turn the off-set hex hub on the retaining wheel until the wheel lightly spins, then stops as the tumbler (basket) rotates. (This is the proper adjustment of the retaining wheels.)

NOTE: Over compression of the retaining wheels against the tumbler (basket) will cause premature failure of the retaining wheels.

- 2) Tighten the 3/8-16 hex nut on the bolt once the proper adjustment has been achieved.
- 3) Discontinue electrical service from the dryer.
- 4) Replace the front or the rear loading door panels.
- 5) Reestablish electrical service to the dryer.

i. Drive Shaft Replacement

- 1) Discontinue electrical service to the dryer.
- 2) Follow **Step #2 thru Step #7** of the "GEAR (SPEED) REDUCER REPLACEMENT" instructions on **page 36 and page 37**.
- 3) *Carefully* place the gear (speed) reducer on the floor and continue to remove the drive shaft from the dryer.
- 4) Measure **ALL** scribe marks from the old shaft and transfer the marks on to the new drive shaft for proper component replacement.
- 5) To install new drive shaft reverse **Step #4 thru Step #2**.

CAUTION: USE EXTREME CARE WHEN SETTING RETAINING WHEEL TENSION. PERSONAL INJURY MAY RESULT.

NOTE: Proper retaining wheel tension has been achieved when the wheel spins and stops when a slight pressure is applied (to the retaining wheel itself).

- 6) Reestablish electrical service to the dryer.

H. ROTATIONAL SENSOR ASSEMBLY

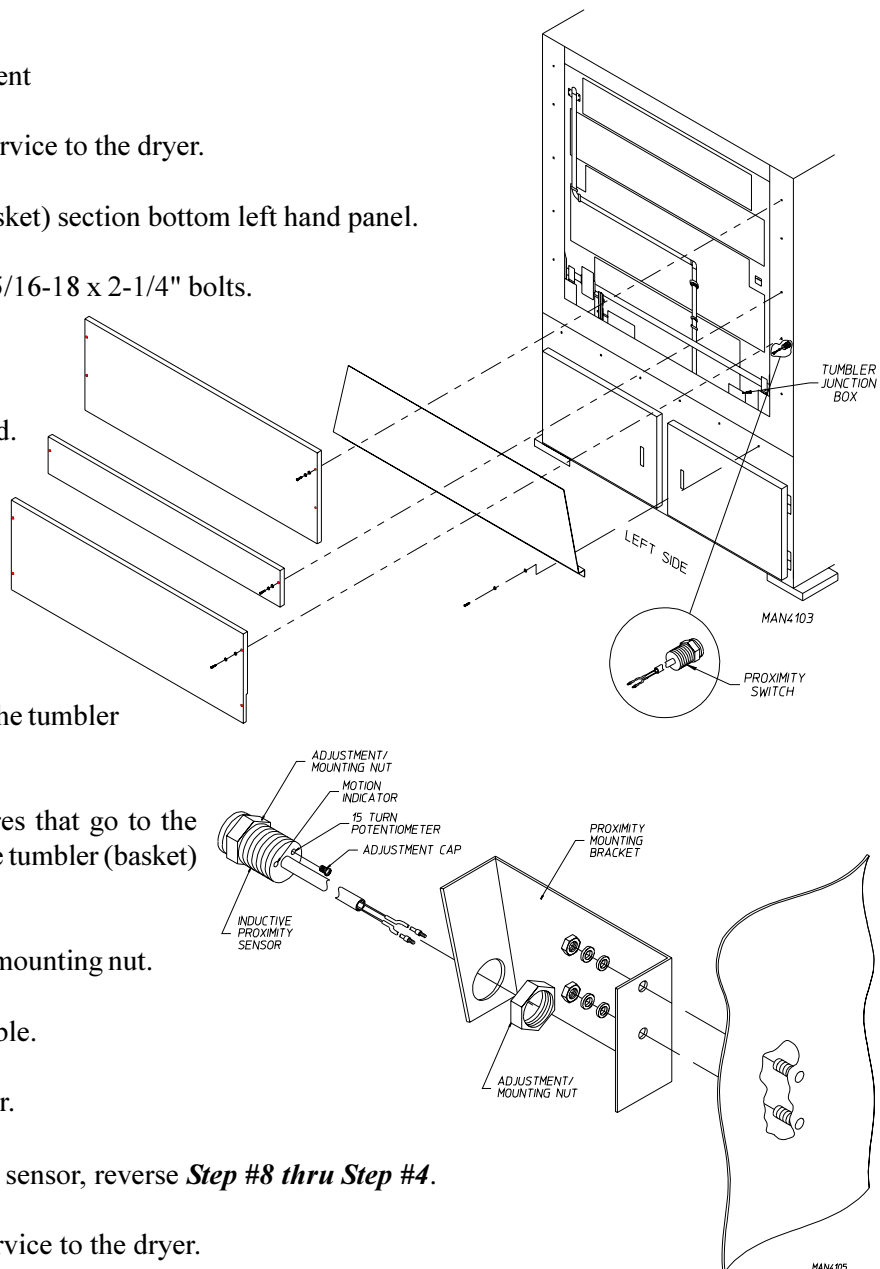
The rotational sensor is a self-contained, motion detector proximity sensor, designed to detect a predetermined stopped drum (tumbler/basket) condition. The rotational sensor is used as a safety device, once the drum has stopped rotating for more than 12-seconds. After this 12-second interval has been reached, the sensor goes into an open state, removing power to PLC (Programmable Logic Controller) input #10. This interruption of power to input #10 signals the PLC that there is a tumbler (basket/drum) fault. This turns control relay #6 (CR6) off, which opens the heat circuit. When the rotational sensor is active (closed) the indicator on the sensor is on. The rotational sensor drops approximately 4 VAC when the dryer is active. When the rotational sensor is off, the is an approximate 120 VAC voltage drop.

WARNING: UNDER NO CIRCUMSTANCES SHOULD THE OUTPUT OF THE ROTATIONAL SENSOR BE GROUNDED. DAMAGE WILL RESULT. A CURRENT LIMITING DEVICE IS REQUIRED.

1. Rotational Sensor

a. Rotational Sensor Replacement

- 1) Discontinue electrical service to the dryer.
- 2) Remove the tumbler (basket) section bottom left hand panel.
 - a) Remove the four (4) 5/16-18 x 2-1/4" bolts.
 - b) Remove the panel.
- 3) Remove the left tilt guard.
 - a) Remove the six (6) 5/16-18 x 3/4" tap bolts.
 - b) Remove the guard.
- 4) Remove the cover from the tumbler (basket) junction box.
- 5) Remove the two (2) wires that go to the rotational sensor from the tumbler (basket) junction box.
- 6) Remove the adjustment/mounting nut.
- 7) Cut tie wraps holding cable.
- 8) Remove rotational sensor.
- 9) To install new rotational sensor, reverse **Step #8 thru Step #4**.
- 10) Reestablish electrical service to the dryer.



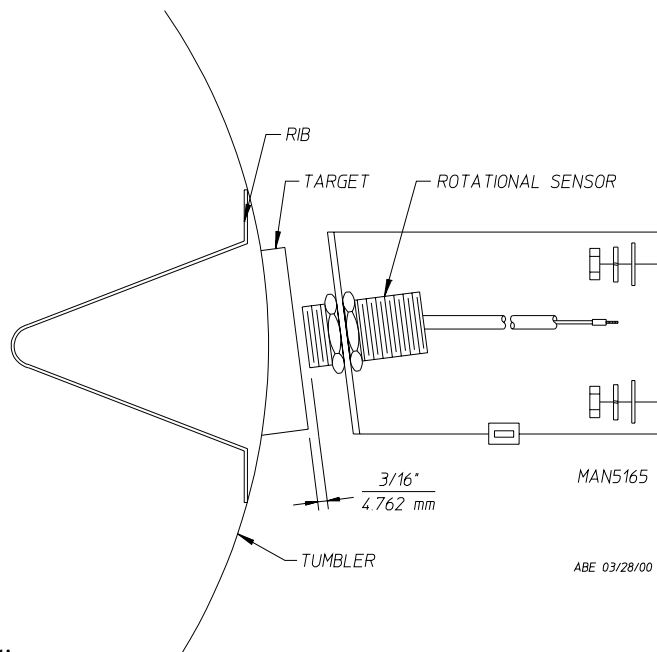
(1) Rotational Sensor Adjustment

Distance Adjustment;

- Pull the rotational sensor as far away from the tumbler (basket) as possible.
- Spin/rotate the tumbler (basket) until the target (target lines up behind one of the tumbler [basket] ribs) is aligned with the rotational sensor.

Mark the tumbler (basket) rib with tape.

- The rotational sensor has to be adjusted towards the target until there is a 3/16" (4.762 mm) gap.



Time Adjustment;

- Jog the tumbler (basket) for 10-seconds.
- Time the rotational sensor (the time is measured from the last time the target (tapered rib) goes by the rotational sensor and the indicator light on the sensor goes out).
- The measured time has to be 12-seconds.
- If an adjustment is required, remove the adjustment cap on the proximity sensor.
- Turn potentiometer on the proximity sensor.
- Re-time the sensor.
- Adjust as needed.

11) Reinstall the left tilt guard removed in **Step #3**.

12) Reinstall the tumbler (basket) section bottom left hand panel removed in **Step #2**.

I. TOP OF TUMBLER (Basket) TEMPERATURE DOOR ASSEMBLY

1. Intake Temperature Probe/Sprinkler Temperature Probe

The intake temperature probe and sprinkler temperature probe are 100 ohm (100 Ω) Resistive Temperature Device (RTD) probes located on the top of the tumbler (basket) section of the dryer. The intake temperature probe measures the intake temperature of the dryer and is monitored by the hi-temperature controller. The sprinkler temperature probe measures the temperature in the tumbler (basket) section of the dryer and is monitored by the sprinkler controller.

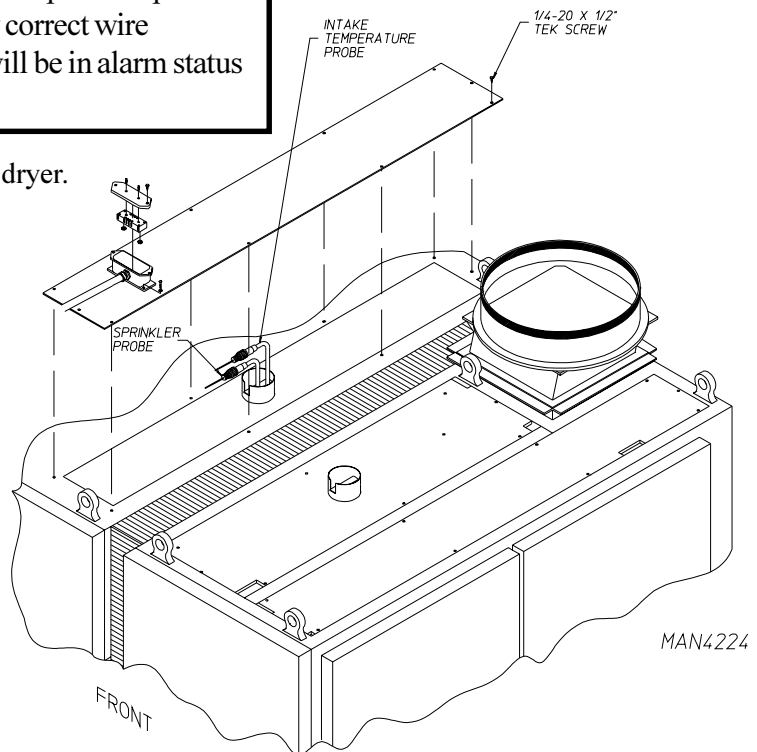
- There are ten (10) TEK screws that **must be** removed prior to the removal of the top cover. Both intake temperature and sprinkler temperature RTD probes are located under the top cover.

a) Intake Temperature Probe/Sprinkler Temperature Probe Replacement;

- 1) Discontinue electrical service to the dryer.
- 2) Remove the ten (10) 1/4-20 x 1/2" TEK screws securing the top cover to the tumbler (basket) section of the dryer.
- 3) Lift outer edge of the top cover and remove the cover from the tumbler (basket) section.
- 4) Remove the wiring from the temperature probe (probe being replaced) from the terminal block which is located in the junction box on the top of the tumbler (basket) section of the dryer.
- 5) Remove the compression fitting securing the temperature probe to the mounting plate.
- 6) To install new temperature probe, reverse **Step #5 thru Step #2**.

IMPORTANT: When reconnecting new temperature probe to the terminal block, verify correct wire placement or the probe will be in alarm status or in an open condition.

- 7) Reestablish electrical service to the dryer.



J. TUMBLER (Basket) ELECTRICAL COMPONENTS

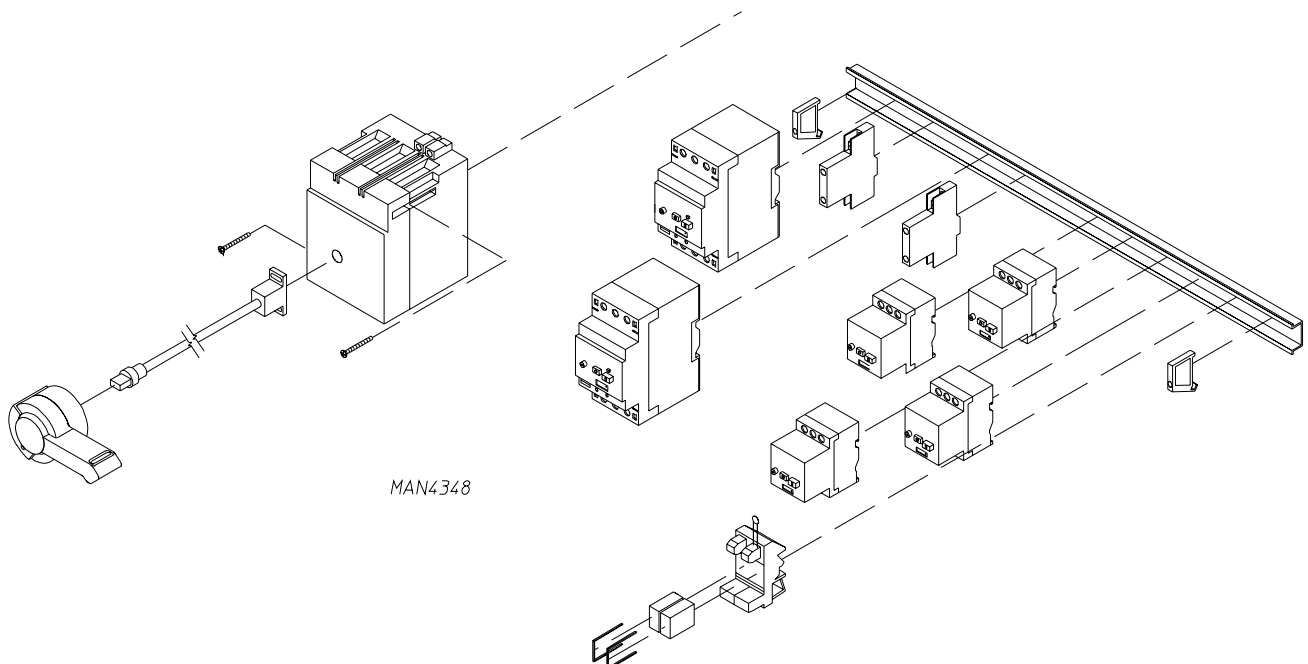
1. Drive Motor Controls and Overloads

a) Thermal Magnetic Starter (TMS) Description

The thermal magnetic starter (TMS) is used as a safety device to manually disconnect the motor, thereby protecting the motor from being damaged 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 diagram. 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 will not trip the overload. On the face of the overload there are two (2) push buttons, a "START" (Black or Tan-1) and a "STOP" (Red-0). The overload **must be** in the "START" mode for the motor to run.

b) Thermal Magnetic Starter (TMS) Replacement

- 1) Discontinue electrical service to the dryer.
- 2) Mark L1, L2, L3 and T1, T2, T3 on the wires to the thermal magnetic starter (TMS) for correct reinstallation.
- 3) Set the amp (ampere) rating on the TMS according to the electrical schematic supplied with your dryer.
- 4) To remove the thermal magnetic starter, pull the tab on the bottom of the TMS, and lift upward.
- 5) To install new thermal magnetic starter (TMS), reverse *Step # 4 thru Step #2*.
- 6) Reestablish electrical service to the dryer.



2. Auxiliary Contact Block Description

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 motor fault message will appear on the display of the Telemecanique XBT unit.

a. Auxiliary Contact Block Replacement;

- 1) Discontinue electrical service to the dryer.
- 2) Remove the thermal magnetic starter (TMS) from the din mounting rail by pulling the tab on the bottom of the contact block and lift 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 (1) style has a screw and the other style has a clip. In both styles, disassembly and assembly is recommended with the thermal magnetic starter (TMS) in the "STOP" position.
 - a) To remove the style that has the screw from the TMS (thermal magnetic starter), simply remove the screw.
 - b) To remove the style that has the clip, simply push the clip and twist the auxiliary contact block to remove.
- 5) To install new auxiliary contact block, reverse *Step # 4 thru Step #2*.
- 6) Reestablish electrical service to the dryer.

3. Varistor (MOV [Metal Oxide Varistor]) Description

The varistor (MOV) is used to suppress any inductive electrical spikes produced by the energizing and coil voltage.

a) Varistor (MOV [Metal Oxide Varistor]) Replacement;

- 1) Discontinue electrical service to the dryer.
- 2) Loosen the screws marked A1 and A2 on the contactor.
- 3) Verify that no additional wires were inadvertently removed.
- 4) Reverse above procedure to install new varistor.

SECTION VI

PLC (PROGRAMMABLE LOGIC CONTROLLER) SYSTEM

A. PLC (Programmable Logic Controller) DESCRIPTION

The heart of the dryer is a TSX17 PLC (Programmable Logic Controller) with twenty-one (21) inputs and twelve (12) outputs. The TSX17 PLC also uses two (2) expansion modules, a relay output module with six (6) outputs, and a 4 mA - 20 mA (milliamphere) analog input module with four (4) inputs. The operator interface for the TSX17 PLC is the XBT digital display unit.

The TSX17 PLC's (Programmable Logic Controller's) main module zero ("0") inputs are as follows:

- The "0" is used to sense that the 110 VAC control voltage has been turned on via the master control relay. If the master control failed to be turned on, the XBT unit will display "CNTRL VOLT OFF" (control voltage off).
- Input 1 monitors the overloads (OL) for motors OL1, OL2, OL3, OL4, and on gas dryers OL8. The overloads have auxiliary contacts in them that are tied in series from the control voltage to Input 0,1. In a case that an overload trips, the XBT unit will display a "motor fault."
- Input 0,2 is used to monitor that the burner fan is on during a heat cycle. (This is not used on steam dryers and is tied to Input 0,10 on steam dryers.) In a case were there is a call for heat and the burner fan does not turn on, the dryer will display a "heater fault."
- Input 0,3 main function is to sense if one (1) of the high limits have tripped due to excessively high temperature in the dryer. If the high limit trips, the XBT unit will display "HI-TEMP FAULT."
- Input 0,4 monitors the gas pressure. If a high gas pressure or a low gas pressure situation arises, voltage is removed from Input 0,4 causing a heat cycle to be discontinued and a "GAS SUPPLY FAULT" to be displayed. On steam models, this input is tied to the PLC's (Programmable Logic Controller's) 110 VAC power source.
- Input 0,5 is used to sense a clogged lint screen or obstruction in the exhaust via an air switch that is located in the lint collection area. A fault in the air flow produces an "AIR FLOW FAULT" message.
- Input 0,6 is used to monitor the front load door if this load door is closed by means of DS1, A (Door Switch 1, A contacts). A drying cycle will not begin until Input 0,6 is on. If a cycle is started and the door is open, the XBT unit will display "DOOR OPEN."
- Input 0,7 monitors the rear door via the DS2, A (Door Switch 2, A) contacts. A cycle **cannot** be begin until the doors are closed. If a cycle is started with the rear door open, the XBT unit will display "DOOR OPEN." in the case of one (1) door dryer, Input 0,7 is tied to 110 VAC.
- Input 0,8 is used to monitor the two (2) lint drawers. This is achieved through two (2) proximity switches, one for each lint drawer. There is a magnet on each of the lint drawers, which when aligned with the proximity switch causes a contact closure which brings 110 VAC to Input 0,8. When a cycle is started and a lint drawer is not closed, the XBT unit will display "CHK. LINT DRAWER" (check lint drawer).

- Input 0,9 is used to sense if the burner doors are closed. This is accomplished through DS4A and DS5A (Door Switch 4, A and Door Switch 5, A) contact sets. If a drying cycle is attempted, the XBT unit will display "DOOR OPEN."
- Input 0,10 is used to monitor a stopped tumbler (basket) condition. An inductive proximity sensor is located in the left wrapper of the tumbler (basket) section. Behind one (1) of the ribs on the front side of the tumbler (basket), a steel target is mounted. As the target passes the proximity switch, it turns its output on (110 VAC), turning on Input 0,10. If the target does not pass the proximity switch within 12-seconds the output turns off, shutting the heat off and the XBT unit will display "DRUM FAULT."
- Input 0,11 and Input 0,12 are used to determine that the dryer is in a level position before a drying cycle can be initiated (started/run). Each set of tilting pistons has a level switch in conjunction with it. If a drying cycle is attempted with a level switch in the normally open position, the XBT unit will display "LEVEL FAULT."
- Input 0,13 is used as a Visual Display ONLY. There is a proximity switch used to sense that the exhaust probe access door is closed. If the door is open, the dryer will shut down and a "DOOR OPEN" message will be displayed via the TSX17 Programmable Logic Controller (PLC) Input 0,9.
- Input 0,14 is used to sense that the burner controller has turned on the incoming gas valve during a heat cycle, which in turn activates the heat reclaimer.
- Input 0,15 and Input 0,16 are used as an operator interface in conjunction with the pendent. With 110 VAC on, Input 0,15 the dryer will prepare for loading. The load door will open and depending on options and programming, the dryer may tilt (Front Up). With Input 0,15 or Input 0,16 on, the dryer will level, close door, and a drying cycle can be initiated (started). Input 0,16 is used for unloading, open door, and if applicable, the rear will tilt up.
- Input 0,17 is used for Jog Forward. It turns/spins the tumbler (basket) in a clockwise (CW) rotation while in a load or unload condition.
- Input 0,18 is used for Jog Reverse. It turns/spins the tumbler (basket) in a counterclockwise (CCW) rotation while in a load or unload condition.
- Input 0,19 is only used on dryers manufactured with *Rear Doors*. When Input 0,19 is on, the rear doors will open and the front of the dryer will tilt to unload if the pistons as well as the software are configured for this operation. If Input 0,15 or Input 0,16 are on, then Input 0,19, will have no affect on the dryer
- Input 0,20 (Drum Reverse) and Input 0,21 (Drum Forward) are used to jog the load during a rear panel unload (Input 0,19 on).

The main module of the TSX17 PLC (Programmable Logic Controller) also has eleven (11) outputs to control various functions of the dryer. The outputs are relay contacts, whereby each of the relays have a common terminal tied to 110 VAC.

- Output 0,0 is used to control the Main Blower Contactor. On a call for fan, the output supplies 110 VAC to the coil of the fan motor contactor. As long as none of the overloads have tripped, the contactor will engage (pull in) starting the dryer.
- Output 0,1 activates the Drum (tumbler) Forward Contactor, which starts the tumbler (basket) running via the two (2) 5 (3.73 kw) horsepower (HP) drive motors.
- Output 0,2 is used to reverse the direction of the drive motors.
- Output 3 was previously used to activate an intended lint collection system. The output was to be used from the beginning of a cycle until 1-minute after the completion of the cycle.
- Output 4 is used to initiate the burner controller at the beginning of a heat cycle. During a heat cycle, the output stays on enabling the standing pilot to be active (on) as long as the burner controller safeties have ALL been met. If ALL the safeties are met, the incoming gas valve will turn on. This puts the dryer in a high fire standby.
- Output 5 is used to cycle high fire on and off in conjunction with Output 4 during the heat cycle. This is the output that maintains the set point temperature.
- Output 6 and Output 7 are used to control the Main Load Door. Output 6 controls the load door opens solenoid (S1) and Output #7 controls the load door close solenoid (S2).
- Output 8 and Output 9 are used to control the Rear Door. Output 8 controls the unload door open solenoid (S3) and Output 9 controls the unload door close solenoid (S4).
- Output 10 is the Front Up control. When it turns on, 110 VAC is supplied to the front up solenoid (S5) through the rear door level switch (LS2B).
- Output 11 controls the Front Door solenoid (S6). When 110 VAC is supplied to the front door solenoid, air is supplied to the top ports of the piston leveling the dryer.

Due to the amount of outputs needed, an additional output module is added to the TSX17 PLC (Programmable Logic Controller). This output module consists of relay contacts with the common tied to 110 VAC.

- Output 1,0 is used to tilt the rear of the dryer up for unloading purposes. If the front of the dryer is up, the front door level switch (LS1B) closed to allow the rear up solenoid (S7) to engage.
- Output 1,1 supplies 110 VAC to the rear down solenoid (S8).
- Output 1,2 and Output 1,3 are used to control the position of the Heat Reclaimer. When Output 1,2 is on, the heat reclaimer is in the exhaust air mode. ALL the air moved by the blower goes out of the exhaust. When Output 1,2 turns off and Output 1,3 turns on, the dryer goes into a recirculating mode (heat reclaimer on) whereby a percentage of the air no longer goes out of the exhaust but goes over the burner as preheated air. The heat reclaimer is on as long the dryer is in a heat mode.

continued on page 47

continued from page 47

- Output 1,4 is the blower (fan) Air Jet which is used to clean lint off of the fan (blower). At the end of a cycle, the Air Jet turns on for 30-seconds.
- Output 1,5 is the End of Cycle light. Once the dryer has reached the end of a cycle, the output turns on, illuminating the End of Cycle light. The output will turn off once a load or unload command is asserted on the pendant.

ANALOG INPUT MODULE

The Analog Input Module is used to measure the temperature in the exhaust of the dryer. The Analog Input Module measures a 4 mA - 20 mA (milliamphere) signal (controlled by the TRY (Programmable Isolated Temperature Transmitter) in conjunction with the 100 ohm (100 Ω) Platinum Resistance Thermometer and converts it to a corresponding temperature. The RTD (Resistive Temperature Device) has predetermined temperature to resistance characteristics. The following chart has a few examples;

°F	°C	RESISTANCE (Ω)
32	0	100
75	24	109
86	30	111
199	93	135.84

The TRY (Programmable Isolated Temperature Transmitter) converts the resistance of the RTD (Resistive Temperature Device) to a 4 mA - 20 mA (milliamphere) current loop. The current in the loop is equal to $.022222 \text{ mA}/(^{\circ}\text{F} - 32) + 4 \text{ mA}$ (measurement in celsius [centigrade] is $.04 \text{ mA}/^{\circ}\text{C} + 4 \text{ mA}$).

$$\begin{aligned} \text{Example: } 200^{\circ} \text{ F} - 32 &= 168 \times .022222 = 3.73 \text{ mA} + 4 \text{ mA} = 7.73 \text{ mA} \\ 93^{\circ} \text{ C} \times .04 \text{ mA} &= 3.72 + 4 \text{ mA} = 7.72 \text{ mA} \end{aligned}$$

The power source for the TRY device is PS1 (Power Supply 1) is a 24 VDC power supply mounted on the main electrical panel.

NOTE: There is approximately a 10° F (18° C) differential between the actual and the displayed temperature on the XBT unit.

TELEMECANIQUE XBT UNIT

The Telemecanique XBT Unit is the user interface to the dryer. **ALL** the user commands are loaded into the XBT unit at the factory. System parameters are stored in the TSX17 PLC (Programmable Logic Controller) via the XBT unit interface. These are the drying recipes and parameters such as Load Level, Spin Time, Dwell Time, etc. The power source for the XBT unit is a 24 VDC power supply mounted on the main electrical panel. A data cable connects the XBT unit to the TSX17 PLC for communication purposes.

HOUR CLOCK

The dryer has a Hour Clock to keep track of how many hours the dryer has been running. The clock runs off of the 24 VAC power supply through a set of contacts on the blower contactor. When the blower contactor closes, it also closes an additional set of contacts to activate the clock.

B. PLC (Programmable Logic Controller) COMPONENT REPLACEMENT

1. TSX17 PLC (Programmable Logic Controller) Assembly

The TSX17 Programmable Logic Controller (PLC) is made up of three (3) components. The first and main component is the TSX17 PLC, then the Relay Outputs, and the Analog Inputs. The TSX17 PLC has a ram backup lithium battery.

a. TSX17 PLC (Programmable Logic Controller) Component Replacement;

- 1) Discontinue electrical service to the dryer.
- 2) Remove the coaxial (coax) cable from the TSX17 PLC.
- 3) Remove the four (4) screws securing the two (2) smoke colored bus terminal strips from the top and bottom of the TSX17 PLC.
- 4) Remove the two (2) screws securing the buss terminator from the TSX17 PLC.
- 5) Lift the cover off of the relay output component.
- 6) Remove the buss terminator from the TSX17 PLC.
- 7) Insert a standard flat head screwdriver into the "red" or "orange" tab and push down. At the same time, lift upward on the TSX17 PLC. This will remove the PLC from the rail.
- 8) To install new TSX17 PLC, reverse ***Step #7 thru Step #2.***
- 9) Reestablish electrical service to the dryer.

2. Relay Output/Analog Input Module

a. Relay Output/Analog Input Module Replacement;

- 1) Discontinue electrical service to the dryer.
- 2) Mark and identify **ALL** the wires that will be removed for proper reinstallation.
- 3) Lift the cover off of the relay output and analog input then remove the two (2) screws securing the buss terminator to the module.
 - a) The buss terminator **must also be** removed from the TSX17 PLC and moved aside.
- 4) Insert a standard flat head screwdriver into the "red" or "orange" tab and push down. At the same time, lift up on the module being replaced.
- 5) To install new module, reverse ***Step #4 thru Step #2.***
- 6) Reestablish electrical service to the dryer.

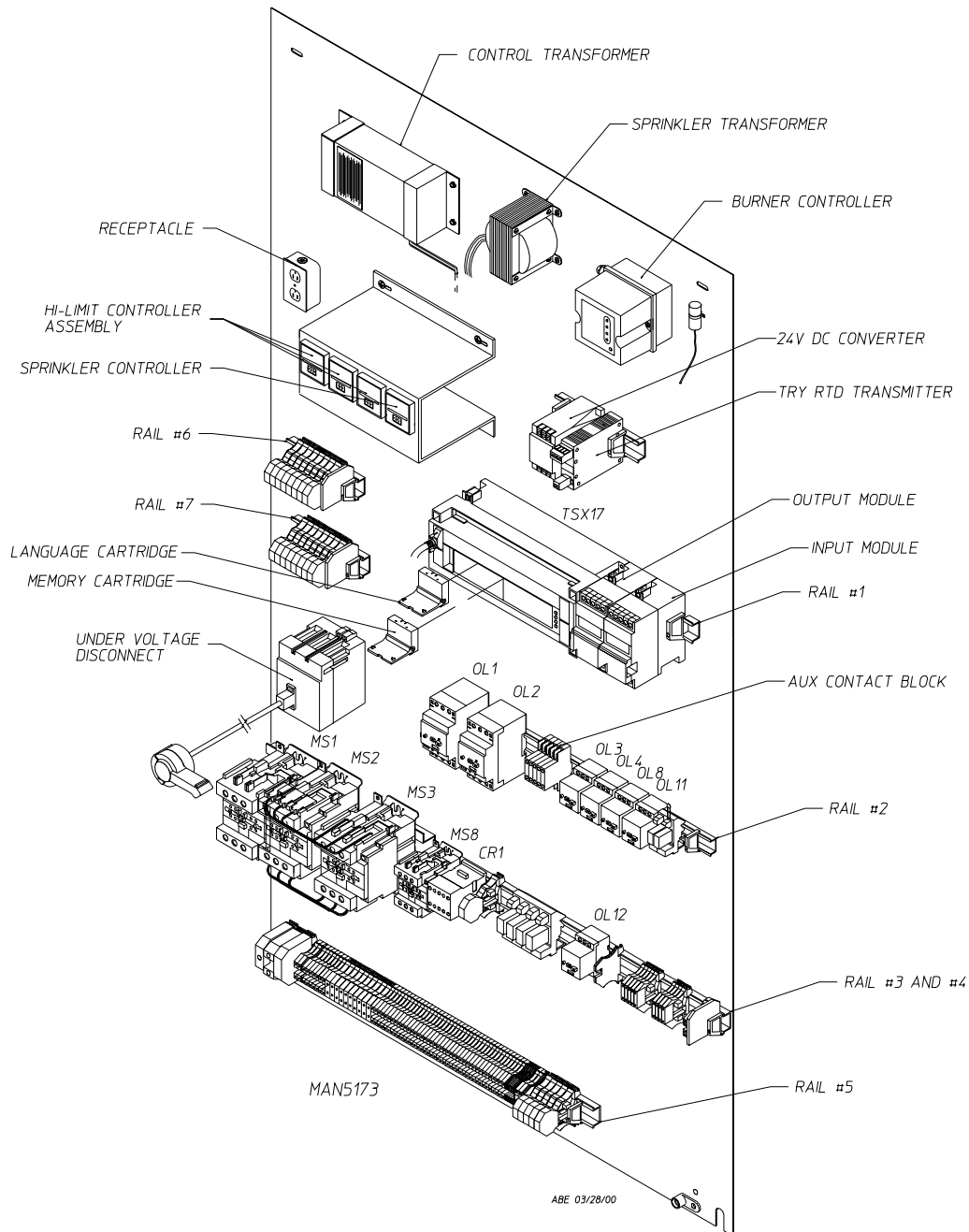
3. Lithium Battery

a. Lithium Battery Replacement

- 1) Discontinue electrical service to the dryer.
- 2) Remove the battery cover which is located directly above the buss terminator on the TSX17 PLC (Programmable Logic Controller) by sliding the cover in an upward direction.

NOTE: The lithium battery is attached to the cover and plugged into the module.

- 3) Remove the plug from the module, then remove the battery from the cover.
- 4) To install new lithium battery, reverse *Step #3 thru Step #1*.



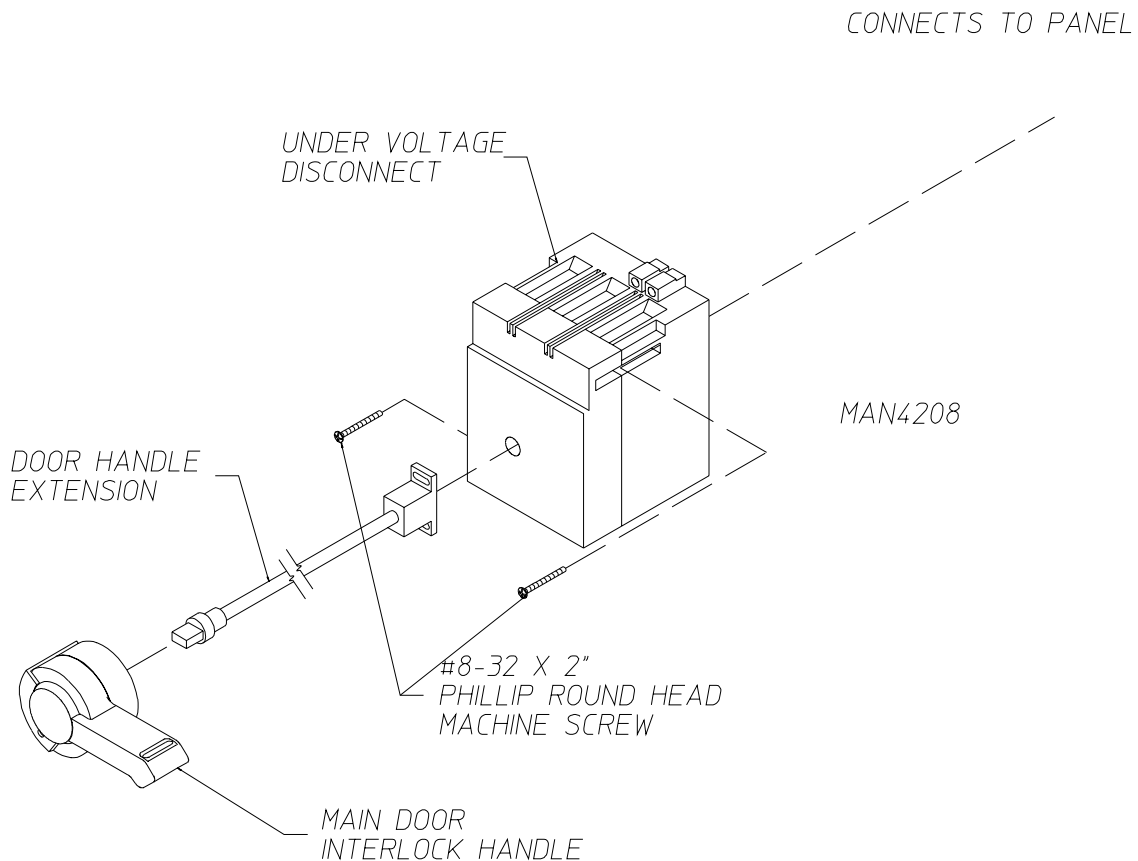
4. Under Voltage Disconnect

The dryer uses a 110 VAC under voltage disconnect. This 110 VAC is supplied from the sprinkler circuit. The sprinkler circuit is part of the safety circuit of the dryer. If the sprinkler circuit is in an alarm condition, the 110 VAC supply to the under voltage disconnect will become discontinued, shutting down the dryer.

NOTE: For steam models that do not have the sprinkler option skip **Step #4**.

a. Under Voltage Disconnect Replacement

- 1) Discontinue electrical service to the dryer.
- 2) Mark and remove wires from L1, L2, and L3.
- 3) Mark and remove wires from L4, L5, and L6.
- 4) Mark and remove wires from L and N.
- 5) Loosen and remove the door handle extension from the under voltage disconnect.
- 6) Remove the two (2) #8-32 x 2" Phillips round head machine screws.
- 7) To install new under voltage disconnect, reverse **Step #6 thru Step #2**.
- 8) Reestablish electrical service to the dryer.



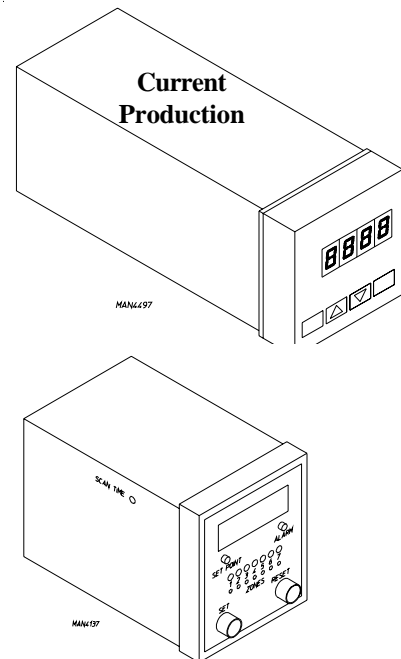
5. Hi-Limit Controller

The dryer utilizes six (6) channel controller (HLC-1) to monitor various locations on the dryer for over temperature faults. The hi-limit controller enables the dryer to continually monitor up to six (6) Resistive Temperature Devices (RTD's) at one time. Each channel is individual with set points. The hi-limit controller scans each channel, and in the event of an alarm, the scanning will halt (stop), and the Single-Pole-Double-Throw (SPDT) will change states signaling a fault. The hi-limit controller will remain in alarm until the reset button is pushed and the temperature has fallen below the set-point temperature. The scan rate can be adjusted from 4 to 12-seconds per channel.

- Channel #1 is used to monitor the exhaust for an over temperature situation.
- Channel #2 is used as an over burner monitor (*for Gas Models Only*).
- Channel #3 is used to monitor intake temperature (*for Gas Models Only*).
- The remaining channels are spares that can be used for future expansion.

a. Hi-Limit Controller Replacement

- 1) Discontinue electrical service to the dryer.
- 2) Loosen the four (4) screws hold the hi-limit mounting bracket.
- 3) Slide the mounting bracket off of the screws through the keyhole.
- 4) Disconnect the plug going to the hi-limit controller.
- 5) Remove the two (2) screws holding the mounting slides.
- 6) Remove the two (2) slides.
- 7) To install new hi-limit controller, reverse **Step #6 thru Step #2**.
- 8) Reestablish electrical service to the dryer.



HI-LIMIT CONTROLLER TEMPERATURE SPECIFICATIONS						
	GAS			STEAM		
	°F	°C	HI-LIMIT NAME	°F	°C	HI-LIMIT NAME
RTD 1	225	107	Exhaust Temp. Limit	225	107	Exhaust Temp. Limit
RTD 2	200	93	Over Burner Temp.	650	343	Intake Temperature
RTD 3	650	343	Intake Temperature	500	260	N/A*
RTD 4	500	260	N/A*	500	260	N/A*
RTD 5	500	260	N/A*	500	260	N/A*
RTD 6	500	260	N/A*	500	260	N/A*

* Not applicable...controller channels **must be** set to 500° F (260 °C).

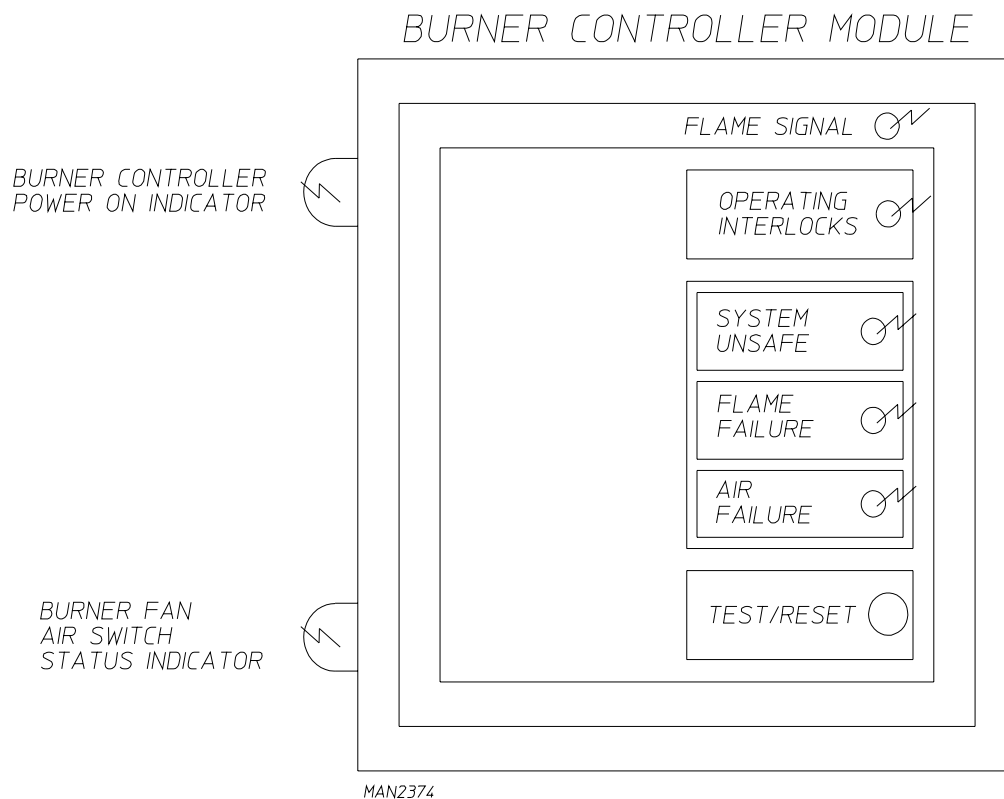
6. Gas Burner and Ignition System

The dryer's gas burner system operates on a on or off gas rate sequences to accurately control the tumbler's (basket's) drying temperature. Maximum firing rate is 2,800,000 million btu/hr (705,600 kcal/hr).

Upon a call from heat, the dryer computer sends a 120 volt signal to the burner controller module (BCM) which initiates and controls the ignition sequences. The BCM insures that **ALL** the safety switches are closed before turning on the combustion air burner fan, then checks to ensure that the burner fan air switch has closed. The pilot gas flame is then established, the flame rod, (which sits in this pilot flame), comes in contact with the flame and signals the BCM. The main motorized gas valves open in sequence, and full operational flame is achieved.

The burner controller module (BCM) has five (5) L.E.D.'s (light emitting diodes) on its cover and two (2) neon displays on the mounting base for ease of troubleshooting, as well as dip switches inside for ease of programming.

The burner controller module controls **ALL** of the gas burner ignition components, except for the motorized gas valve. When the drying set point temperature is reached, the dryer's computer closes the top motorized gas valve, shutting off full flame.



a. Major Burner Components

1) Burner Controller Module (BCM)

The burner controller module (BCM) provides effective burner flame safeguard control through adjustable purge and trial-for-ignition timing. The BCM insures that **ALL** dryer safety switch circuits are closed, delays ignition to allow the combustion chamber to vent, and insures that a healthy pilot flame is established before opening the main gas valves. Five (5) L.E.D.'s (light emitting diodes) on the cover of the BCM allow for easy troubleshooting. Dip switches on the back of the module allow for easy programming.

(a) Dip Switches Selections

- (1) Loosen the two (2) screws on the burner control module cover and pull the module cover off of its base. The dip switches are on the back of the cover.

Switch #1 - Recycling Mode

With this switch in the "ON" position, the burner will recycle the ignition sequence once during each drying cycle after a burner fan air switch or main flame failure, but only if the failure occurs more than 35-seconds after ignition. If this switch is "OFF," the burner will lock out at once.

Switch #2 - Intermittent Pilot

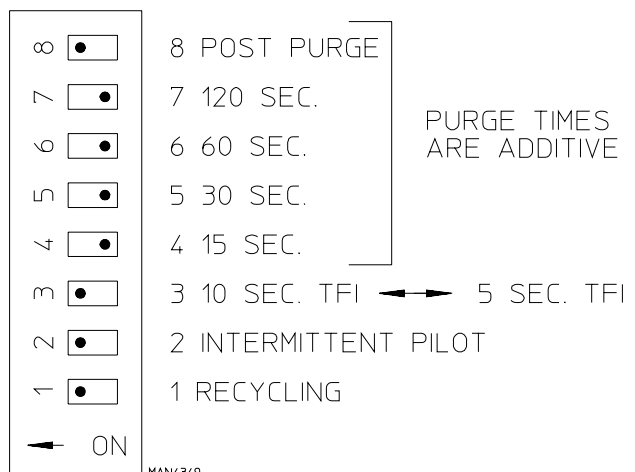
This switch is "ON" for intermittent pilot or "OFF" for interrupted pilot. **ADC** utilizes intermittent pilot so that the pilot flame stays lit during the entire drying cycle. With interrupted pilot, the pilot flame would go out once the main flame is established. This is used mainly on oil burners lit by a gas pilot.

Switch #3 - Trial for Ignition (TFI) Time

When this switch is "ON" a Trial for Ignition (TFI) of ten (10) seconds is set. If it is in the "OFF" position, the TFI is five (5) seconds. The Trial for Ignition Time is the length of time that the pilot is given to light. A ten (10) second TFI is best for the dryer.

Switch #4, Switch #5, Switch #6, Switch #7- Purge Time

Switch #8 is for post purge selection. With switch #8 in the "ON" position, the post purge time will be 15-seconds. When switch #4, switch #5, switch #6, and switch #7 are in the "OFF" position, the post purge time will be 0-seconds.



b. L.E.D. (light emitting diode) and Neon Displays of the BCM (Burner Controller Module)

1) Operating Interlock - L.E.D. is lit when;

ALL safety interlock switches are closed, applying a 110 VAC signal to terminal #7 of the burner controller module (BCM).

2) Operating Interlock - L.E.D. is not lit when;

One (1) or more safety interlock switches (burner doors, load door, optional unload door, gas pressure, lint pressure, hi-temp alarm contacts, tumbler [basket] stopped, and lint drawer) are open. If any of the safety interlocks switches are open the burner ignition sequence will not be attempted.

3) Air Failure - L.E.D. is lit if;

- Burner fan air switch is is not closed within 10 seconds of start-up of blower
- Burner fan air switch is open during firing cycle.

4) System Unsafe - L.E.D. is lit if;

- A loose connection on the flame rod or spark plug.
- **ALL** purge time dip switches are in the off position.
- Flame is detected out of sequence.
- Inductance is detected on sensor wires.
- Wiring fault on terminals #3, #4, and #5.
- An internal controller failure.
- Air switch closed before start-up.

5) Flame Signal - L.E.D. is lit when;

- The flame rod is in contact with the pilot flame and the burner controller module (BCM) converts a microampere (microamp) current between the flame rod and ground into a three (3) 11 volt DC signal that can be measured on the BCM. Inset one (1) probe of a DC volt Meter into the flame signal port and put the other probe to ground. The meter will read out the three (3) 11 volt DC flame signal. If the flame signal L.E.D. (light emitting diode) flickers on and off, this is a result of a weak flame signal which can be caused by an intermittent wiring connection between the flame rod and BCM, a faulty ground connection, bad ground of the dryer, weak pilot flame or dirty or defective flame rod.

6) Burner Controller Power On Indicator - neon display is lit when;

- Burner Controller has its supply voltage of 120 VAC.

7) Burner for Air Switch Status Indicator - neon display is lit when;

- Air switch is closed after start-up of blower (fan) and interlocks are **ALL** closed.

8) Burner Fan Air Switch Status Indicator - Neon Display is not lit;

- Air switch is not closed after start-up of burner fan.
- Door interlocks are open.
- A combustion burner screen is clogged.
- A door on the dryer is open.

9) Test/Reset Button

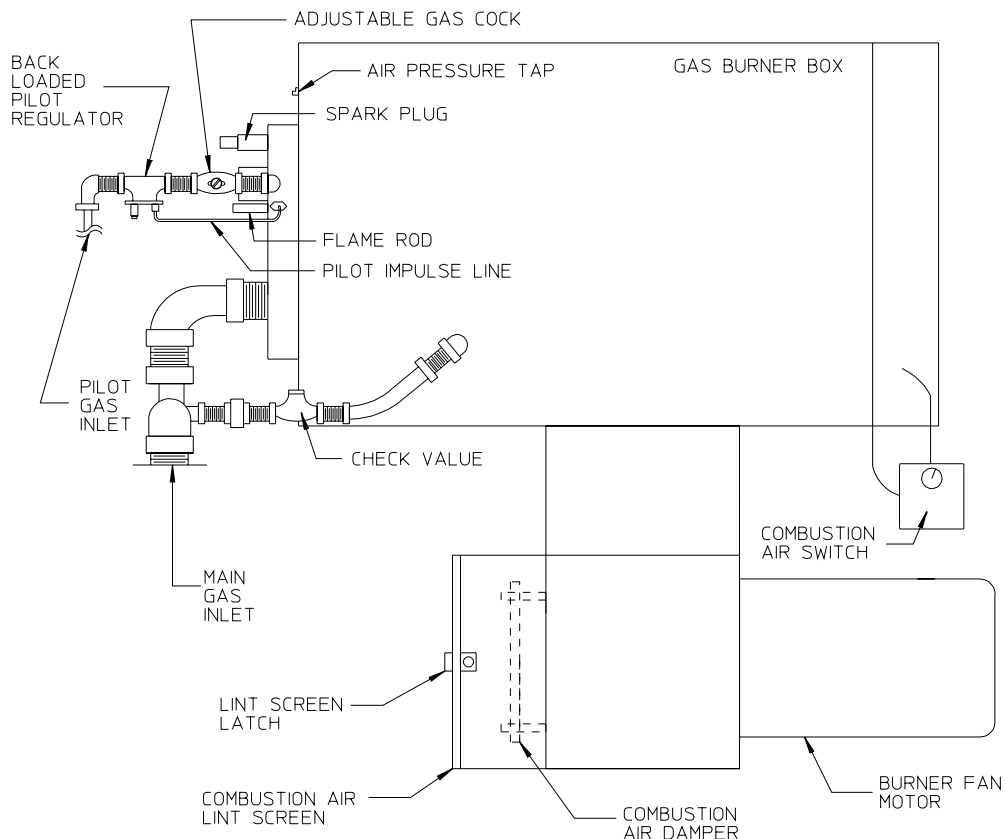
When this button is pushed in, the burner controller module (BCM) will halt the ignition sequence, once the pilot flame is established. This allows the pilot flame to be adjusted.

c. Flame Rod and Spark Plug

The pilot flame is lit by the spark plug, while flame sensing is done through the flame rod. The spark plug is energized when the pilot solenoid slave opens, igniting the pilot flame. The flame rod sits in the pilot flame and sends a 3 volt DC to 11 volt DC signal to the burner controller module when it is in contact with the pilot flame. The pilot flame **should be** about the size of a tennis ball and should heat the flame rod so it is red hot.

d. Burner Fan System

The burner fan provides additional combustion air for proper gas combustion. The fan provides approximately 900 cfm (25.49 cmm) of air in this burner box. The airflow is obtained when the air pressure is measured at the air pressure tap on the gas burner box approximately 1.25 inches water (3.11 millibars). The combustion air system is comprised of the components described on [page 54](#) and [page 55](#).



MAN0639

1) Burner Fan Air Switch

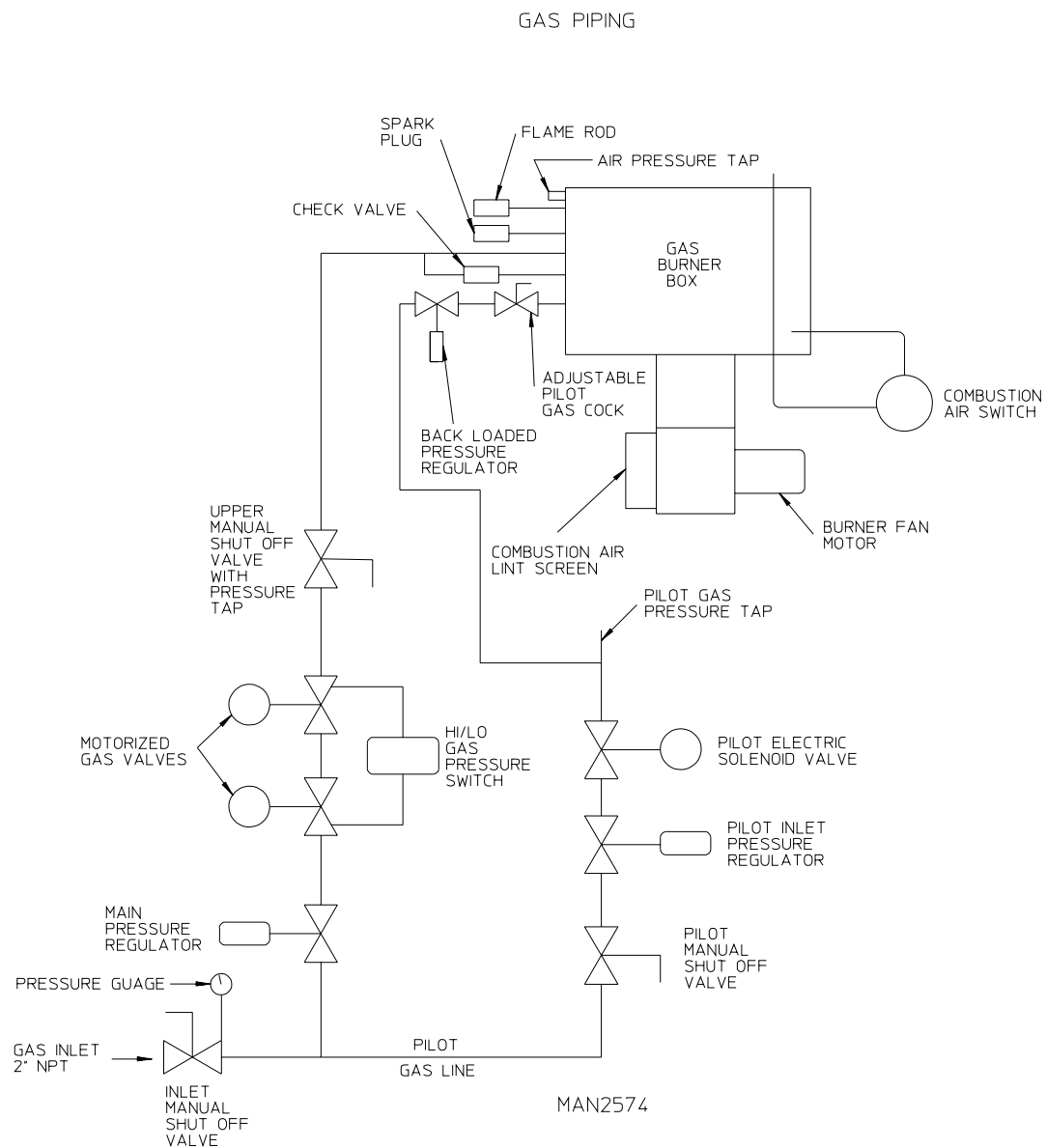
The differential in air pressure is measured by the burner fan air switch, which is located next to the burner fan motor. If the combustion air is inadequate, this switch will prevent ignition. The setting of this switch is adjustable, and it **should be** set at approximately .59-inches of water column (W.C.) - 1.47 millibars - because of slight variances in spring tension characteristics, range settings, and markings are nominal.

2) Burner Fan and Motor

The combustion air is produced by a 6-1/4" (15.88 cm) squirrel cage fan attached to a 1-1/2 HP (1.12 kw), 3,600 RPM motor. The motor **must spin** counterclockwise (CCW) as viewed from the rear of the motor.

3) Combustion Air Lint Filter

The combustion air lint filter is made of a fine mesh stainless steel screen which **must be** cleaned regularly. This screen prevents any lint from entering the burner box.



4) Combustion Air Damper

To produce the required combustion airflow, this damper can be adjusted. Remove the screen to get access to the damper. Moving the damper closer to the blower inlet opening will reduce the combustion airflow, and moving it away from the blower inlet opening will increase the airflow. To measure the combustion airflow, attached a manometer to the air pressure tap on the burner box. The air pressure **should measure** 1.25 inches (3.11 millibars) to 1.5 inches water column (W.C.) - 3.73 millibars.

e. Pilot Gas Supply Line

- 1) The pilot gas supply line consists of a manual shut-off valve, pressure regulator, electric solenoid valve, back-loaded pressure regulator, and an adjustable gas cock.
 - 2) The gas pressure in this line **should be** approximately 3.5 inches water column (W.C.) - 8.7 millibars - for natural gas and approximately 1.5 inches water column (3.11 millibars) for L.P. (liquid propane) gas. This will provide a bushy pilot flame, which produces a signal through the flame rod that is converted to 3 to 11 volts DC in the burner controller module (BMC).
- a) This flame can be adjusted in two (2) ways.

(1) Pilot Inlet Pressure Regulator

Remove the cap and turn the slotted adjustment screw clockwise (CW) for more gas and counterclockwise (CCW) for less gas.

(2) Adjustable Pilot Gas Cock

Remove the cap and turn the slotted adjustment screw clockwise (W.C.) for less gas and counterclockwise (CCW) for more gas.

- b) The pilot line contains a back-loaded pressure regulator with an impulse line connected to the gas burner inlet. The regulator will maintain a constant pilot supply pressure in the burner due to an increase in temperature. **DO NOT adjust this regulator.**

f. Main Gas Supply Line

The main gas supply line consists of a pressure regulator, two (2) motorized shut-off valves, a HI/LO gas pressure switch, and a manual shut-off valve.

The gas pressure at the burner **should be** 2.5 inches water column (W.C.) - 6.22 millibars - for natural gas and 1.25 inches water column (3.11 millibars) for L.P. (liquid propane) gas. This pressure is measured by a manometer at the manual shut-off valve just above the top motorized valve.

1) Motorized Gas Valve

The two (2) 2-inch F.P.T. motorized valve are “ON/OFF” gas flow control valves. The valve motors operate on 120 VAC and are electrically “cascaded” so that upper valve will not open until lower valve has fully opened. A limit switch inside the lower motorized valve provides the signal that the valve is fully opened. These valves will open only when the burner controller module (BCM) is receiving a signal from the flame rod proving that the pilot flame is established.

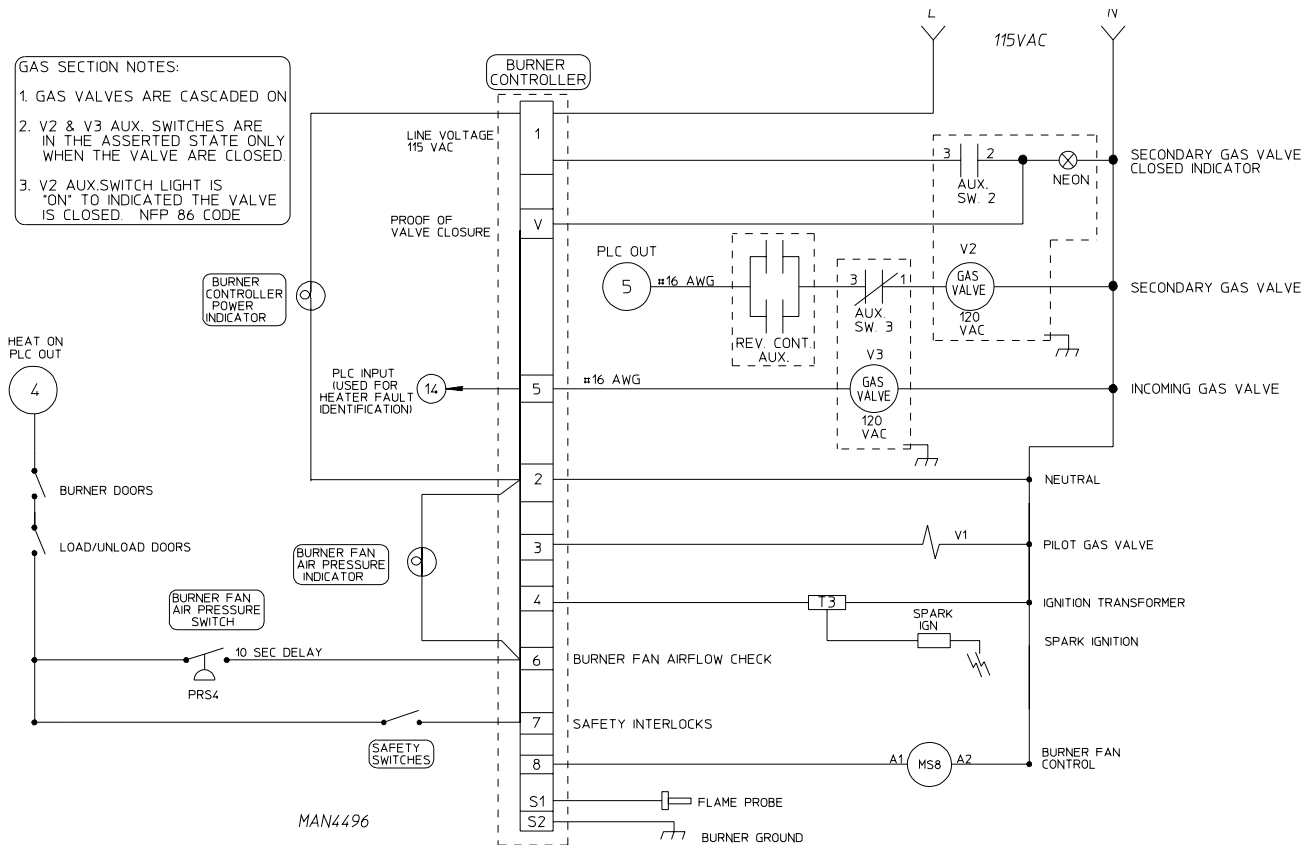
Top Motorized Gas Valve

The valve sets the gas rate of 2,800,000 btu/hr (705,600 kcal/hr). To achieve this rate, the gas pressure **must be** set for 2.5 inches water column (6.22 millibars) for natural gas and 1.25 inches water column (3.11 millibars) for L.P. (liquid propane) gas. To adjust, loosen the pan head screw located on the front of the top motorized valve, while holding the valve body, turn the flow adjustment clockwise (CW) for less gas and counterclockwise (CCW) for more gas. Retighten the pan head screw when correct gas flow is achieved. There is a switch located on the back of the top gas valve that verifies valve closure. The burner controller module (BCM) will go into a system unsafe error and the burner will not begin a burner sequence.

2) Sequence of Operation

With dryer power on, a 120 volt signal is sent to terminal #1 and terminal #2 of the burner controller module (BCM). A power indicator light has been added to the controller base for troubleshooting.

- a. Drying cycle is started
- b. Dryer computer calls for heat.



- c) The burner controller module (BCM) checks that **ALL** of the dryer's safety circuits are closed (terminal #7 of the [BCM]). If this is the case, then the green "operating interlocks" L.E.D. (light emitting diode) on the BCM will light. If a safety switch is open, the green L.E.D. will not light, and the red "SYSTEM UNSAFE" L.E.D. will light. The ignition sequence will stop.

If **ALL** safety switches are closed, the BCM will start the burner fan motor (BCM terminal #8).

The BCM waits 10-seconds to allow the blower motor to get up to speed, and then checks that the burner fan combustion air switch (BCM terminal #6) circuit is closed. If this circuit is open during the drying cycle, the "Air Failure" L.E.D. will light. The gas valve will close, and a "HEATER FAULT" message will be displayed.

In order to prevent this air switch from being jumped out, the BCM checks to insure that this circuit is open prior to start-up, then "SYSTEM UNSAFE" L.E.D. will light.

If the air flow switch closes after the burner fan is turned on, the pilot solenoid valve (BCM terminal #3) is opened for ten (10) seconds, and a spark is produced (BCM terminal #4) by the burner spark plug, igniting the pilot flame.

The flame rod, which extends into the pilot flame, has 300 VAC on it from the BCM (terminal #S1). The flame lets the current flow from the flame rod to ground, which is then converted to 3 to 11 volts DC by the BCM. The "flame signal" L.E.D. on the BCM lights up.

The spark plug will turn off 1.5-seconds after the pilot flame is detected. If the pilot flame should fail during the ten (10) seconds period that the pilot solenoid is open. The BCM will reenergize the spark. If the pilot flame is not established at the end of this 10-second period, the system will lock out and the "FLAME FAILURE" L.E.D. will light.

The 10-second period when the pilot solenoid opens and a spark is produced is called the trial-for-ignition (TFI) time. It is selected at either 5-seconds or 10-seconds by a dip switch located on the back cover of the BCM.

The 3 volt DC to 11 volt DC signal from the flame rod to the BCM can be measured by;

- (1) Closing the manual shut-off valve in the main gas line to the burner. Leave the pilot manual valve open.
- (2) Push the Test and Reset button on the cover of the burner control module in to the "test" position.
- (3) Start a drying cycle...

The burner controller module (BCM) will halt the ignition sequence after the pilot is ignited. The pilot flame **should be** about the size of a tennis ball and *should make* the flame cord red hot.

- (4) Insert the positive probe of a DC Volt Meter in to the "flame signal" port on the cover of the burner controller module (BCM). Connect the negative probe to ground.

- (5) If signal is less than 3 volts DC, then the pilot may be too small or too large, there may be a wiring connection between the flame rod and burner controller module (BCM), the flame rod may be dirty (wash it with soap and water), defective, or the grounding may be faulty.

Once the flame probe signal is detected by the BCM, it waits 5-seconds to allow the pilot to stabilize and then opens the main motorized gas valves (terminal #5 on the BCM) in sequence.

The lower valve opens first. Upon full opening, its external switch closes, enabling the second motorized valve to open and full flame to be achieved.

If flame failure occurs within 35-seconds period, the BCM will recycle the ignition sequence once. If flame fails a second time, the system will lock out and the "FLAME FAILURE" pilot will light.

Once main flame is established, the burner will remain in the full fire mode until the drying set point temperature has been reached. At this point, the dryer computer will cycle the top motorized gas valve closed the position. The "OFF" mode will be maintained until the dryer's temperature falls below the drying set point temperature. The motorized valve will then be returned to the full fire position. The ON/OFF motor of the motorized valve, it moves to the full fire position. "OFF" is achieved when no voltage is applied to the motorized valve.

g. Gas Burner Start-Up

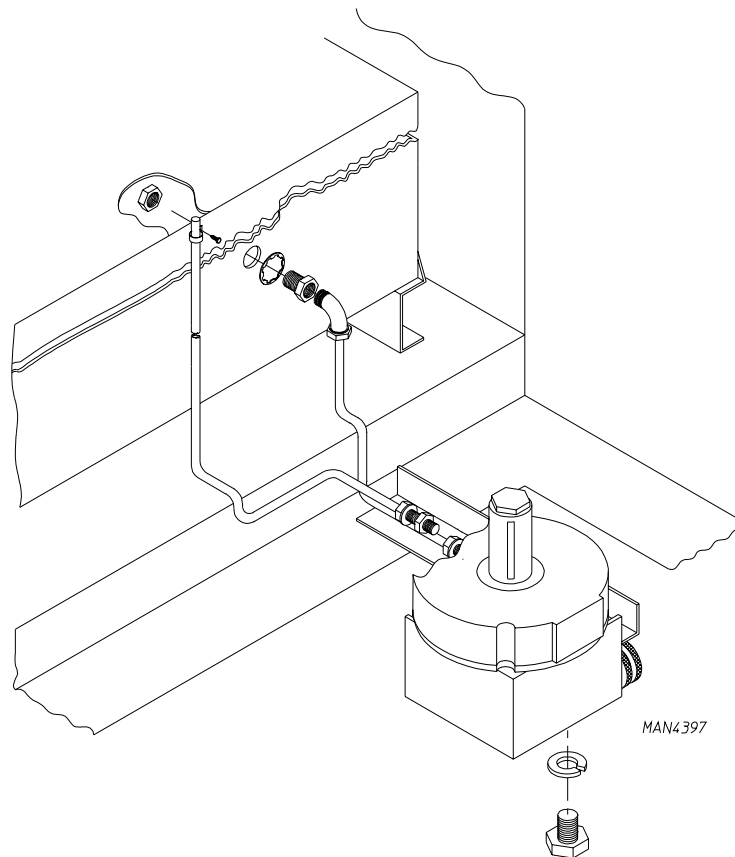
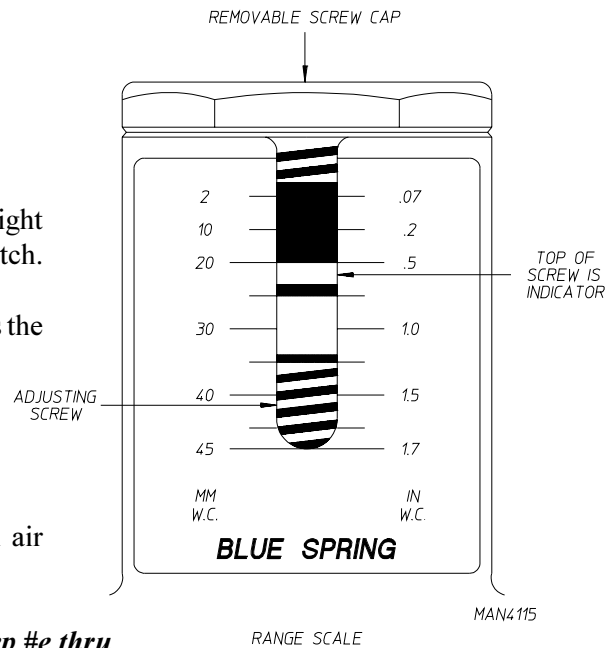
- 1) New gas lines are filled with air and **must be** purged before the burner will light. To do this close the upper manual shut-off valve, but leave the pilot line shut-off open. Push in the test and reset button on the cover of the burner controller module (BCM). This will "freeze" the ignition sequence when the pilot flame ignites. This allows time to examine the pilot flame, and measure the flame rod signal to the BCM.
- 2) Connect a pressure gauge or water tube to the pilot gas pressure tap. Start the dryer. Follow the ignition process by referring to the "Sequence of Operation" section of this manual.
- 3) When the pilot flame is ignited, the pilot gas pressure **should measure** 3.5 inches water column (W.C.) - 8.7 millibars - for natural gas and 1.5 inches water column (W.C.) - 3.11 millibars - for L.P. (liquid propane) gas. The pilot flame **should be** about as big as a tennis ball.
- 4) Once the pilot has been properly set, remove the pressure gauge from the pilot line connect a differential pressure gauge between the main gas pressure tap (HI port) and the air pressure tap (LO port) on the side of the gas burner box. The lines connecting the gauge to these taps **must be** long enough to allow the gauge to sit outside of the dryer so that the burner section access door can be closed when the dryer runs. Running the dryer with these doors open will give an incorrect air pressure reading.
- 5) Once this differential gauge is installed, open the main gas shut-off valve and push the test and reset button on the burner controller module (BCM) so that the button springs out. Restart the dryer. The ignition process **should now continue** to the full gas flow state. The differential gauge **should read** 2.5 inches (water column (W.C.) - 6.22 millibars for natural gas and 1.25 inches water column (W.C.) - 3.11 millibars - for L.P. (liquid propane) gas. If it does not, adjust the top gas valve as described in "TOP MOTORIZED GAS VALVE" on **page 59**.

h. Burner Air Switch

The dryer uses a burner air switch on its burner components. The differential air pressure is measured by this air switch, which is located next to the burner fan motor. If the combustion air is inadequate, this switch will prevent ignition. The setting of this burner air switch is adjustable, and is preset at the factory.

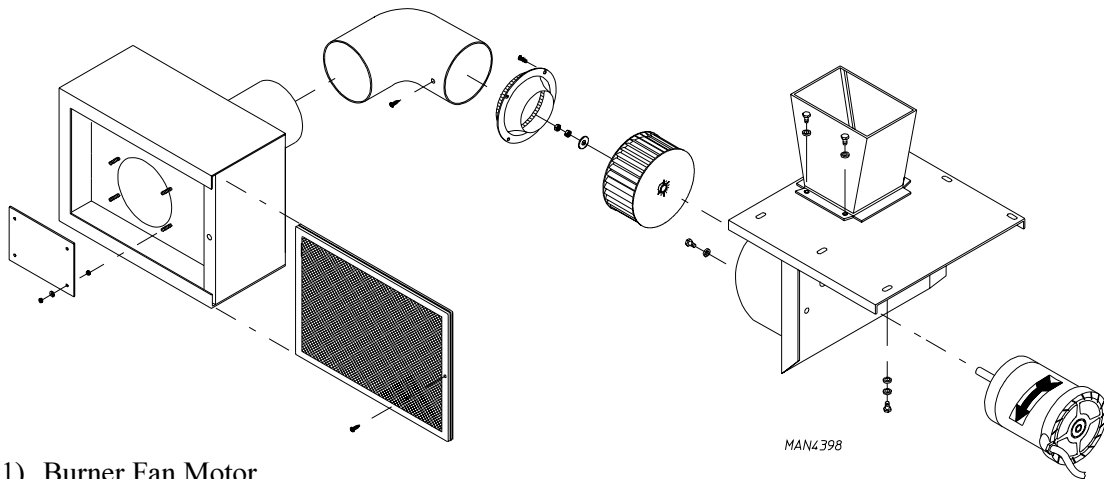
1) Burner Air Switch Replacement

- (a) Discontinue electrical service to the dryer.
- (b) Remove the two (2) 1/4" x 1/8" M.P.T. straight brass connectors from the burner fan air switch.
- (c) Remove the 5/16-18 x 3/4" tap bolt as well as the 5/16" (7.937 mm) lock washer.
- (d) Mark and identify the wires for correct replacement on the new burner air switch.
- (e) Remove the cord grip from the burner fan air switch.
- (f) To install new burner air switch, reverse **Step #e thru Step #b**.
- (g) Reestablish electrical service to the dryer.



i. Burner Squirrel Cage Fan Components

The combustion air is produced by a 6-1/4" (15.88 cm) squirrel cage fan, attached to a 1-1/2 HP (1.12 kw), 3,600 RPM motor. This motor **must spin** counterclockwise (CCW) as viewed from the rear of the motor.



1) Burner Fan Motor

a) Burner Fan Motor Replacement

- (1) Discontinue electrical service to the dryer.
- (2) Remove the four (4) #8-18 x 7/16" TEK screws which secure the inlet ring to the combustion air blower housing.
- (3) Remove the two (2) 1/2-20 left hand jam nuts as well as the 1/2-inch (12.7 mm) flat washer.
- (4) Remove the 6-1/4" (15.88 cm) squirrel cage fan.
- (5) Remove the motor cover plate to reveal the wiring.
- (6) Mark and identify wiring for correct replacement on to the new motor.
- (7) Remove the cord grip and wiring harness from the motor.
- (8) Remove the four (4) 3/8-16 x 3/4" hex head bolts securing the motor to the combustion air blower housing.
- (9) To install new burner fan motor, reverse **Step #8 thru Step #2**.
- (10) Reestablish electrical service to the dryer.

2) Burner Fan Squirrel Cage

a) Burner Fan Squirrel Cage Replacement

- (1) Discontinue electrical service to the dryer.
- (2) For removal of the 6-1/4" (15.88 cm) squirrel cage fan, follow **Step #2 thru Step #4** of the "BURNER FAN MOTOR REPLACEMENT" instructions above.

(3) For replacement of new 6-1/4" (15.88 cm) squirrel cage fan, reverse **Step #4 thru Step #2** of the "BURNER FAN MOTOR REPLACEMENT" instructions on the previous page (**page 63**).

(4) Reestablish electrical service to the dryer.

3) Burner Fan Electrical Components

a) Burner Fan Thermal Magnetic Starter (TMS)

The thermal magnet starter (TMS) is used as a safety device to manually disconnect the motor so that it will be protected from damage in the event of a locked rotor condition. The overload has a dial setting on the face of the device. To set the overload, refer to the specific electrical diagram. 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 will not trip the overload. On the face of the overload are two (2) push-buttons; "START" (Black or Tan) and "STOP" (Red - 0). The overload has to be in the "START" mode for the motor to run.

(1) Thermal Magnetic Starter (TMS) Replacement

(a) Discontinue electrical service to the dryer.

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

(c) Set the amp (amphere) rating on the TMS according to the electrical schematic supplied with the dryer.

(d) To remove the thermal magnetic starter (TMS), pull the tab on the bottom of the TMS and lift upwards.

(e) To install the new thermal magnetic starter (TMS), reverse **Step d thru Step b**.

(f) Reestablish electrical service to the dryer.

(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) Auxiliary Contact Block Replacement

(1) Discontinue electrical service to the dryer.

(2) Remove the thermal magnetic starter (TMS) from the din rail by pulling the tab on the bottom of the auxiliary contact block and lift upwards.

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

(4) There are two (2) types of auxiliary contact blocks...one (1) type has a screw and the other type has a clip. In either type, disassembly and assembly is recommended with the thermal magnetic starter (TMS) in the stop position.

(5) To install the new auxiliary contact block, reverse **Step #4 thru Step #2**.

(6) Reestablish electrical service to the dryer.

(3) Varistor (Metal Oxide Varistor [MOV])

The metal oxide varistor (MOV) is used to suppress any inductive electrical spikes produced by the energizing and collapsing of coil voltage.

(a) Varistor (Metal Oxide Varistor [MOV]) Replacement

((1)) Discontinue electrical service to the dryer.

((2)) Loosen the screws marked A1 and A2 on the contactor.

((3)) Verify that no additional wires were inadvertently removed.

((4)) To install the new metal oxide varistor (MOV), reverse **Step #3 thru Step #1**.

j. Burner Door Switch

The burner door switch is a part of the dryer's safety circuit. If at any time during a drying cycle the burner doors are open, the Programmable Logic Controller (PLC) Input #9 will go off, shutting the dryer down and displaying "DOOR OPEN." (Verify that the burner door switches are not out of adjustment.)

a) Burner Door Switch Adjustment

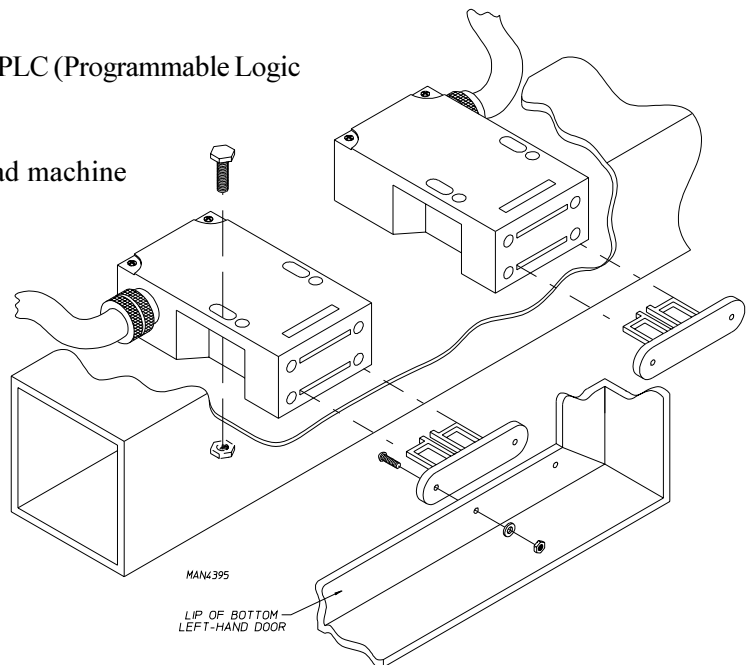
1) With burner doors closed, verify if PLC (Programmable Logic Controller) Input #9 is off.

2) Loosen the 1/4-20 x 3/4" hex head machine bolts.

NOTE: Adjust one (1) switch at a time.

3) Adjust the burner door switch to the outside of the dryer and tighten the 1/4-20 x 3/4" hex head machine bolts.

4) Close the burner doors and verify if PLC Input #9 is on. If PLC Input #9 is off, adjust the other burner door switch.



b) Burner Door Switch Replacement

- 1) Discontinue electrical service to the dryer.
- 2) Loosen the 1/4-20 x 3/4" hex head machine bolts as well as the 1/4-20 hex nut.
- 3) Remove the four (4) Phillips head screws securing the burner switch cover plate to the switch body.
- 4) Mark, identify, and remove the wires from the burner door switch for correct replacement.
- 5) Remove the cord grip from the switch body.
- 6) To install new burner door switch, reverse *Step #5 thru Step #2*.
- 7) Reestablish electrical service to the dryer.

7. Steam Heat System

The steam dryer uses six (6) steam coils to produce a heat input of 60 Bhp (boiler horsepower). The dryer utilizes three (3) separate dampers to direct air in the drying process or cool down process of a cycle.

The first damper is the cool down damper located on the top of the dryer, and is used to bring fresh, room temperature air into the tumbler (basket). When the dryer is in the cool down mode or has reached its set point temperature, the damper will be in the open position further reducing increases in tumbler (basket) temperature. When there is a call for heat, the damper closes, thereby requiring **ALL** of the air entering the tumbler (basket) to go through the steam coils.

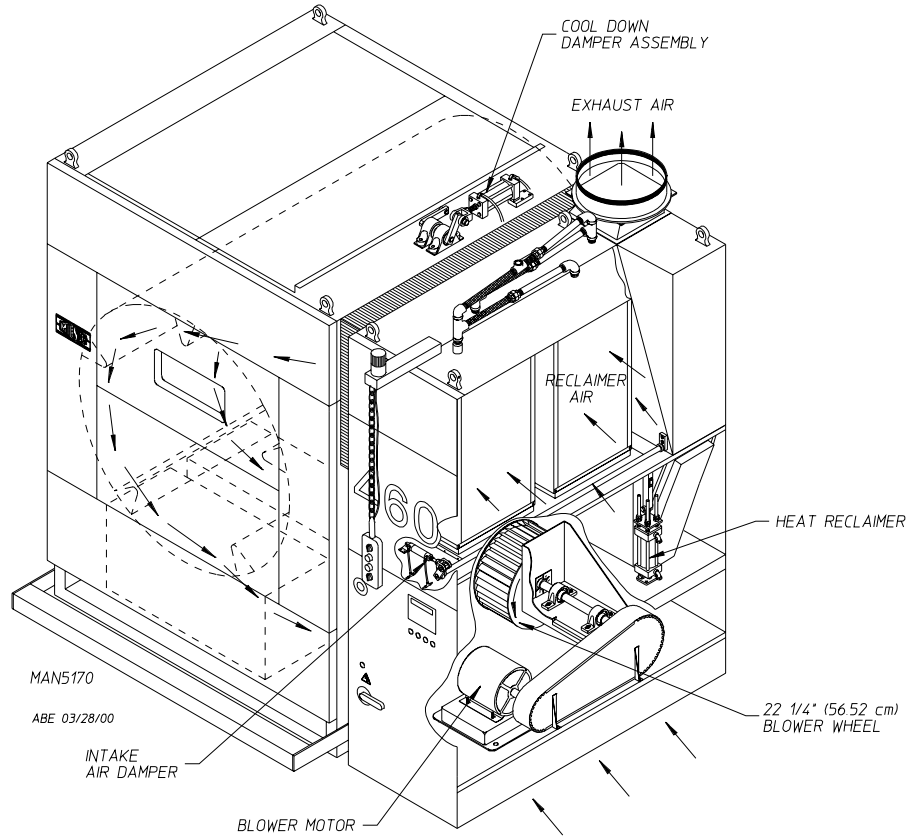
An inlet air damper is located in the middle of the right hand section of the dryer. During a call for heat, this damper opens, which allows ambient air into the dryer, which then goes through the steam coils, heating the air. During cool down, or if the dryer has reached its set point temperature, the damper closes eliminating air from going through the steam coils.

The heat reclaimer is used to divert a portion of the exhausted air and run it through the steam coil, reheating the air. Depending on the stroke at which the heat reclaimer has been set, the amount of reclaimed air will vary. The heat reclaimer is only opened during a call for heat. Once the dryers' set point temperature is reached or during a cool down mode the heat reclaimer will be closed.

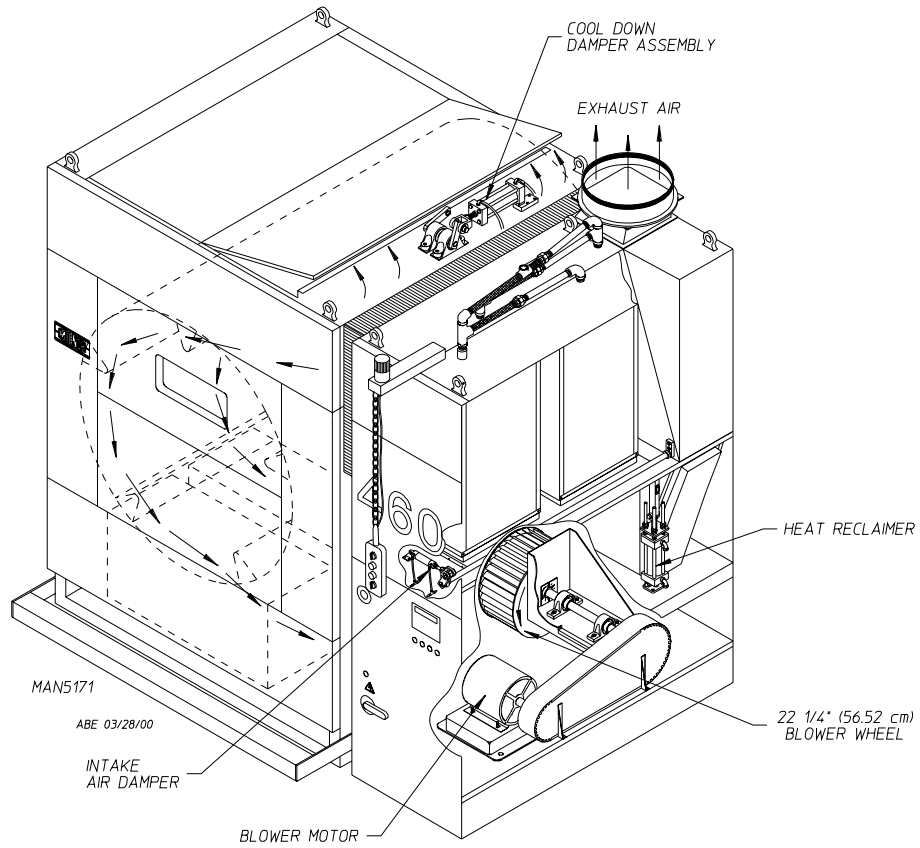
Heat Mode Air Flow - during a call for heat, solenoid S10 turns on and air first enters the dryer on the bottom right side of the dryer. The air then passes through the open inlet air damper, then passes through the six (6) steam coils to heat the air. Next, the air enters the tumbler (basket) heating the load inside. The air then goes through the lint screen. Once the air is filtered by the lint screen it is forced out of the exhaust by the blower. A percentage of the air being exhausted gets reheated by the heat reclaimer to be used again. (Refer to the Drying Cycle illustration [**top illustration**] on **page 67**.)

Temperature Set Point/Cool Down Mode - during a cool down mode, solenoid S10 turns off and solenoid S9 turns on. In this mode, the air enters through the cool down damper on top of the dryer and enters the tumbler (basket). The air then passes through the lint basket and gets pushed out of the exhaust by the blower wheel. (Refer to the Cool Down Cycle illustration [**bottom illustration**] on **page 67**.)

DRYING CYCLE



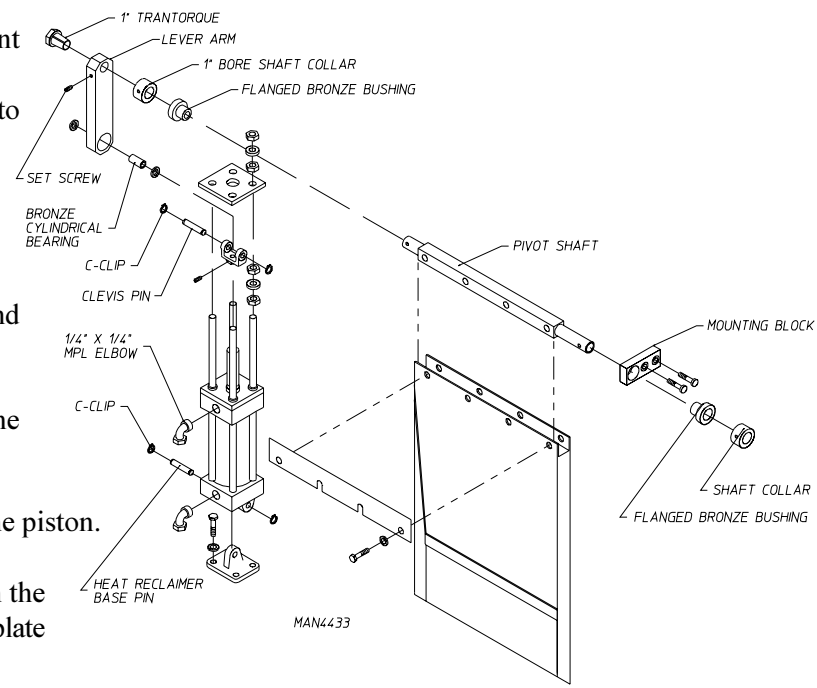
COOL DOWN CYCLE



Heat Reclaimer - the dryer is equipped with a pneumatically operated heat reclaimer, which when open, will recirculate approximately fifteen-percent (15%) of the dryers' exhausted air. The heat reclaimer damper is closed until ignition of flame has been established.

a. Heat Reclaimer Piston Replacement

- 1) Discontinue electrical service to the dryer.
- 2) Discontinue the air supply to the dryer.
- 3) Remove the C-clip from one end of the clevis pin.
- 4) Remove the set screw from the clevis rod.
- 5) Remove the clevis rod from the piston.
- 6) Measure the distance between the adjustment nut and adjustment plate for correct piston stroke.



- 7) Remove the eight (8) 5/16-18 hex nuts as well as the four (4) 5/16\"/>
- 8) Remove the heat reclaimer adjustment plate.
- 9) Remove the air lines from the top and bottom of the piston.
- 10) Remove the 1/4\"/>
- 11) Remove the C-clip from one side of the heat reclaimer base pin.
- 12) Remove the heat reclaimer base pin from the heat reclaimer piston.
- 13) Remove the heat reclaimer piston from the eye bracket.
- 14) To install new heat reclaimer piston, reverse **Step #13 thru Step #3**.
- 15) Reestablish the air supply to the dryer.
- 16) Reestablish electrical service to the dryer.

b. Heat Reclaimer Adjustment.

- 1) Discontinue electrical service to the dryer.
- 2) Loosen the heat reclaimer nuts on **ALL** four (4) corners of the heat reclaimer piston.

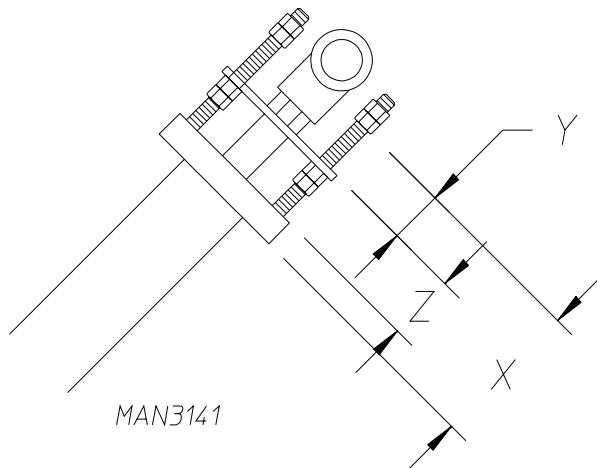
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- 3) Adjust the bottom heat reclaimer nuts down to their desired positions to obtain the proper piston stroke.

Example: If the desired piston stroke is 2-inches (5.08 cm), then the distance "X" in the illustration below **must be** 2-inches (5.08 cm).

- 4) Tighten the top heat reclaimer nuts down onto the bottom heat reclaimer nuts.



HEAT RECLAIMER SETTINGS						
Z = 1-5/8" (4.13 cm)						
Y+Z=X		Y		%HR	Inches Reclaimed	
1-1/8"	2.86 cm	1/2"	12.700 mm	7.46	1-1/4"	3.18 cm
2-5/8"	6.67 cm	1"	2.54 cm	15.67	2-5/8"	6.67 cm
3-1/8"	7.94 cm	1-1/2"	3.81 cm	25.37	4-1/4"	10.8 cm
3-5/8"	9.21 cm	2"	5.08 cm	34.32	5-3/4"	14.61 cm
4-1/8"	10.48 cm	2-1/2"	6.35 cm	43.28	7-1/4"	18.42 cm
4-5/8"	11.75 cm	3"	7.68 cm	50.74	8-1/2"	21.6 cm
5-1/8"	13.02 cm	3-1/2"	8.9 cm	58.95	9-7/8"	25.1 cm
FULL OPEN 16-3/4" (42.55 cm)						

Shaded areas are stated in metric equivalents

Intake Air Damper/Cool Down Damper - steam model dryers require the use of both an intake air damper and a cool down damper. During the heat cycle, the intake air damper is opened to allow fresh air to be drawn across the steam coils. On the cool down cycle, the inlet air damper closes and the cool down damper opens. This draws fresh air into the tumbler (basket) section exhausting **ALL** of the 13,000 cfm (368 cmm) airflow, which insures a fast cool down of the load. (Refer to the bottom **illustration** on **page 67.**)

a. Intake Air Damper Replacement

- 1) Discontinue electrical service to the dryer.
- 2) Discontinue the air supply to the dryer.
- 3) Remove the character panel on the right hand side of the dryer - the 460 perforated panel - to access the pneumatic piston of the air intake damper.
- 4) Remove the two (2) 1/4" poly x 1/4" M.P.T. connectors from the piston.
- 5) Remove the C-clip from one end of the 1/2" (12.7 mm) clevis pin.
- 6) Remove the 7/16-20 clevis rod from the piston.
- 7) Remove the piston from the piston support.

continued on page 70

continued from page 69

8) To install new intake air damper piston, reverse **Step #7 thru Step #3**. (Refer to the previous page [**page 69**].)

9) Reestablish the air supply to the dryer.

10) Reestablish electrical service to the dryer.

b. Cool Down Damper Piston Replacement

1) Discontinue electrical service to the dryer.

2) Discontinue the air supply to the dryer.

3) Remove the two (2) 1/4" poly x 1/4" M.P.T. connectors from the piston.

4) Loosen the 1/4-20 x 3/8" set screw from the clevis and remove the clevis pin.

5) Remove the piston from the damper cylinder mounting plate.

6) To install new cool down damper piston, reverse **Step #5 thru Step #3**.

7) Reestablish the air supply to the dryer.

8) Reestablish electrical service to the dryer.

8. Load Door System

Load Door Assembly - the dryer uses a piston operated cable assembly to open and close the load doors. When the piston is in the retracted position, the doors are closed. The top and bottom section of the load doors have upper and lower, as well as, right and left side clamp plates attached to the doors. The cable (wire rope) is attached to the doors with four (4) cable clamp plates. The cable clamp plate is secured to the clamp plate with a 5/16-18 x 3/4" bolt and 5/16" (7.937 mm) lock washer.

a. Door Piston Replacement

1) Discontinue electrical service to the dryer.

2) Discontinue the air supply to the dryer.

3) Block the bottom load door in the closed position prior to disassembly of any parts.

IMPORTANT: FAILURE TO BLOCK THE BOTTOM LOAD DOOR SECURELY IN THE CLOSED POSITION MAY RESULT IN PERSONAL INJURY.

4) Remove the two (2) 1/4" x 1/4" poly connectors from the piston.

5) Loosen the turnbuckle so that the cable becomes slack.

6) Loosen the set screw securing the cylinder clevis assembly to the piston shaft.

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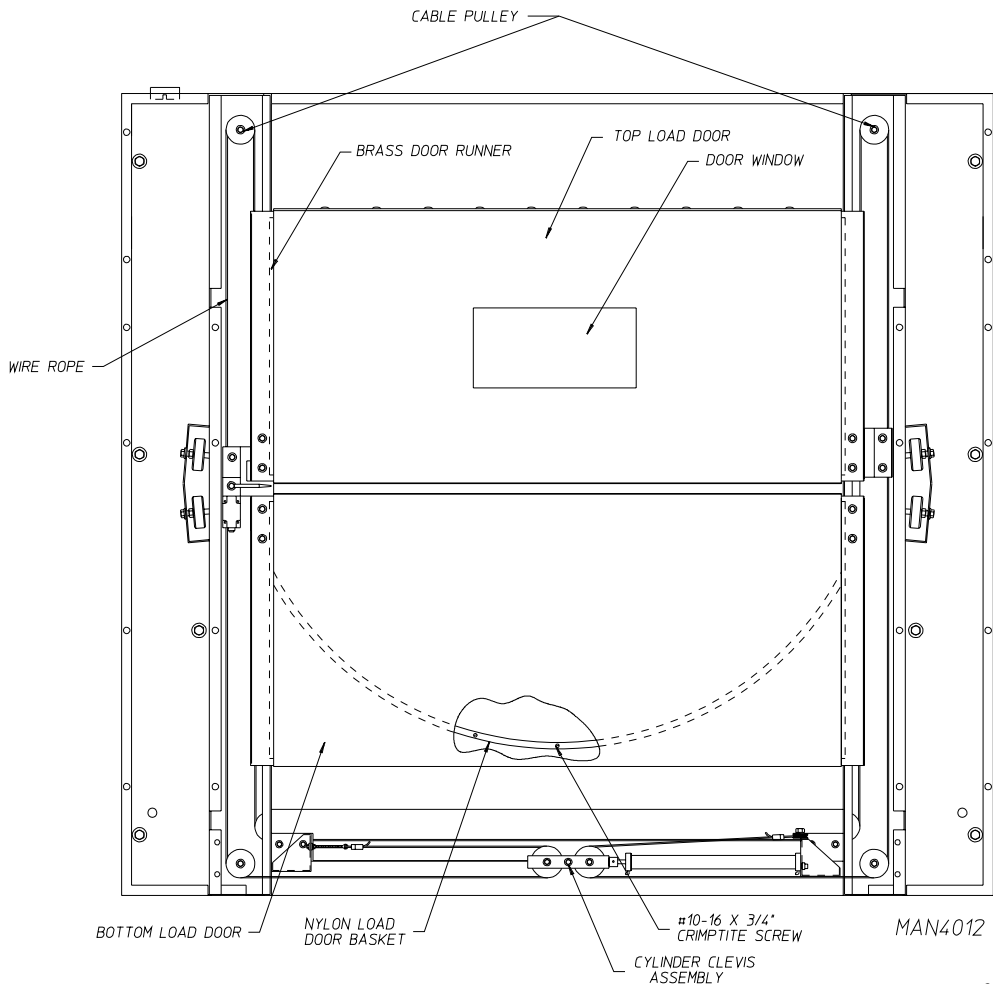
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- 7) Remove the 5/16-24 x 1/4" socket head cap screw and 5/16" (7.937 mm) lock washer from the piston base.
- 8) Unscrew the piston shaft from the cylinder clevis assembly.
- 9) To install new door piston, reverse *Step #8 thru Step #3*.
- 10) Reestablish the air supply to the dryer.
- 11) Reestablish electrical service to the dryer.

b. Cable (Wire Rope) Replacement

- 1) Discontinue electrical service to the dryer.
- 2) Discontinue the air supply to the dryer.
- 3) Block the bottom load door in the closed position prior to disassembly of any parts.

IMPORTANT: FAILURE TO BLOCK THE BOTTOM LOAD DOOR SECURELY IN THE CLOSED POSITION MAY RESULT IN PERSONAL INJURY.



continued on page 72

continued from page 71

- 4) Loosen the turnbuckle so that the cable becomes slack.
- 5) Remove the two (2) cable (wire rope) clamps from the wire rope.
- 6) Loosen the four (4) cable (wire rope) clamp plates from the wire rope.
- 7) Remove the cable (wire rope).

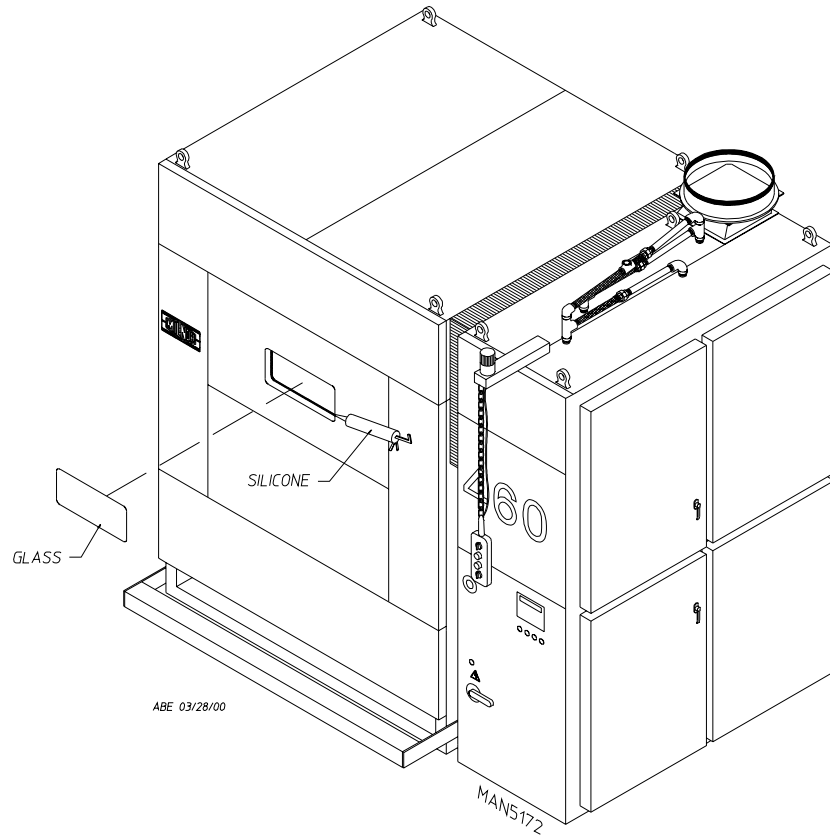
NOTES: For proper cable (wire rope) routing, starting at the piston;

- A. Replace the cable (wire rope) thimble and wire rope clamp to one (1) side of the cable.
- B. Secure the cable (wire rope) to the piston mount with the 3/8-16 x 1" bolt, 3/8" (9.525 mm) fender washer, 3/8" lock washer, and 3/8-16 hex nut.
- C. Feed the cable (wire rope) through the cylinder clevis assembly and around the outer lower right cable pulley, to the upper right cable pulley, to the inner lower right cable pulley, to the inner lower left cable pulley, to the outer lower left cable pulley, and to the cylinder clevis assembly.
- D. Feed the cable (wire rope) through the wire rope clamp.
- E. Feed the cable (wire rope) thimble through the turnbuckle adjustment rod.
- F. Feed the cable (wire rope) around the wire rope thimble.
- G. Feed the end of the cable (wire rope) through the wire rope clamp and tighten.
- H. Adjust the turnbuckle to the proper cable (wire rope) tension.

- 8) To install new cable (wire rope), reverse **Step #7 thru Step #3**.
- 9) Reestablish the air supply to the dryer.
- 10) Reestablish electrical service to the dryer.

c. 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** foreign residue.
- 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.
- 5) *Carefully* insert new door glass within the door glass opening.

IMPORTANT: ALLOW A FULL 72 HOURS FOR THE SILICONE TO CURE.

- 6) *Carefully* trim excess silicone (with a razor blade) after the cure time.

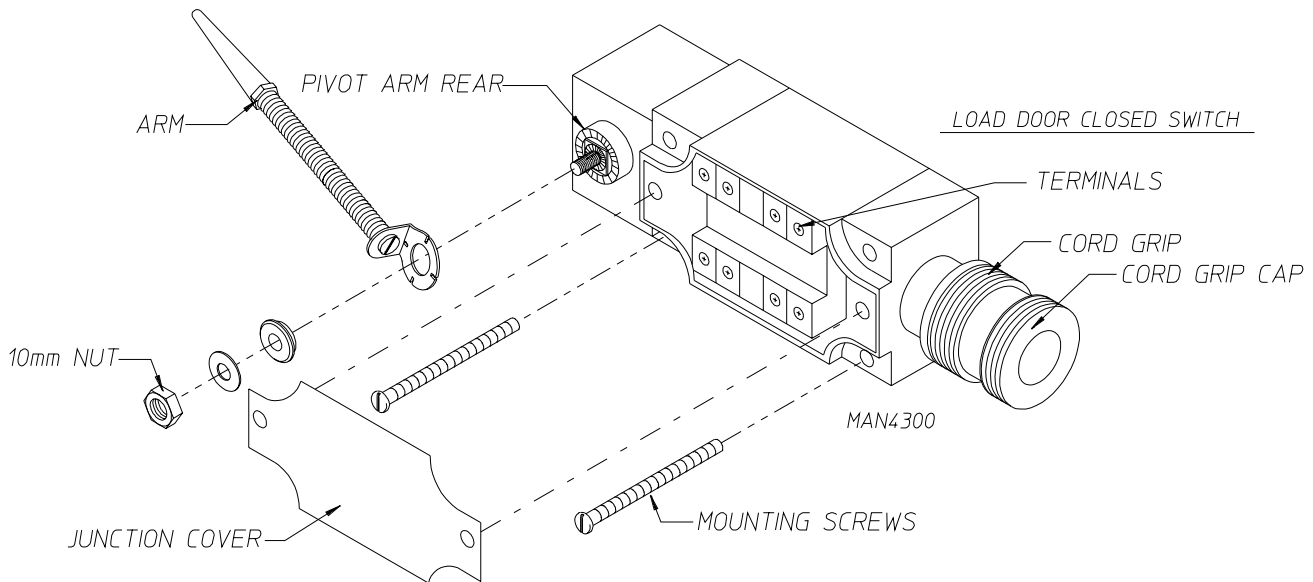
d. Load Door Closed Switch Replacement

- 1) Discontinue electrical service to the dryer.
- 2) Loosen and remove the two (2) screws securing the junction cover.
- 3) Remove the junction cover.
- 4) Mark and identify **ALL** the wires that will be removed for proper reinstallation.

continued on page 74

continued from page 73

- 5) Remove the wires from the terminals.
- 6) Loosen and remove the two (2) mounting screws.
- 7) Loosen and remove the cord grip cap.
- 8) Remove the cord grip.
- 9) To install the new load door closed switch, reverse **Step #8 thru Step #2**.
- 10) Mount the coil spring lever arm in the 1 o'clock position.



NOTE: Verify that the body orientation and head orientation are correct.

IMPORTANT: Verify that the load door closed switch is not in the vertical position or damage will result.

- 11) Hold the coil spring lever arm and tighten up (snug up) on the nut.
 - 12) Hold pivot point with a screwdriver and tighten the nut.
 - 13) Reestablish electrical service to the dryer.
- e. Load Door Closed Switch Adjustment
- 1) Discontinue electrical service to the dryer.
 - 2) To adjust the coil spring lever arm, hold the arm with a #10 metric (10 mm) wrench and loosen the nut.

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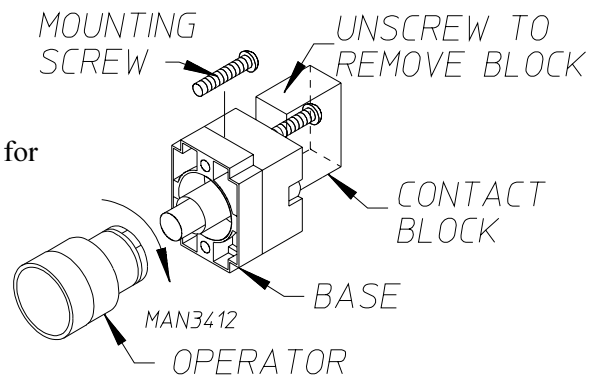
- 3) Place the coil spring lever arm in the 1 o'clock position.

IMPORTANT: Verify that the load door closed switch is not in the vertical position or damage will result.

- 4) Hold the coil spring lever arm and tighten up (snug up) on the nut.
- 5) Hold pivot point with a screwdriver and tighten the nut.
- 6) Reestablish electrical service to the dryer.

f. Main Door Switch Replacement

- 1) Discontinue electrical service to the dryer.
- 2) Mark and identify the wires that will be removed for proper reinstallation.
- 3) Remove the wires
- 4) To remove a contact block, loosen and remove the mounting screw.

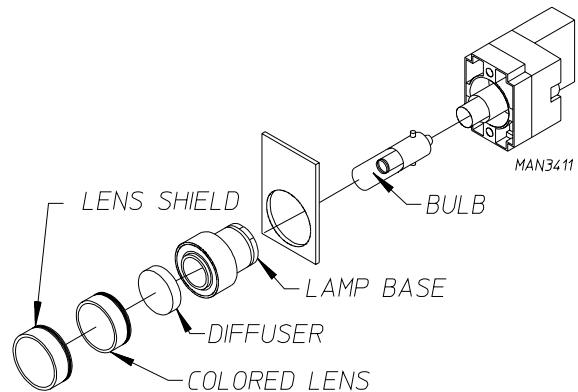


NOTE: Contact Block #1 and Contact Block #2 is normally closed (N.C.) while Contact Block #3 and Contact Block #4 is normally open (N.O.).

- 5) To remove or replace operator, loosen the two (2) screws that hold the switch body away from the door.
- 6) Quarter turn the operator (in the direction shown in the above illustration) and remove.
- 7) Reinstall the wires removed in **Step #3**.
- 8) Reestablish electrical power to the dryer.

g. Switch Bulb Replacement

- 1) Discontinue electrical service to the dryer.
- 2) Unscrew clear lens shield.
- 3) Unscrew colored lens.
- 4) Remove diffuser.
- 5) With finger tip, *gently* push and turn bulb to unlock.

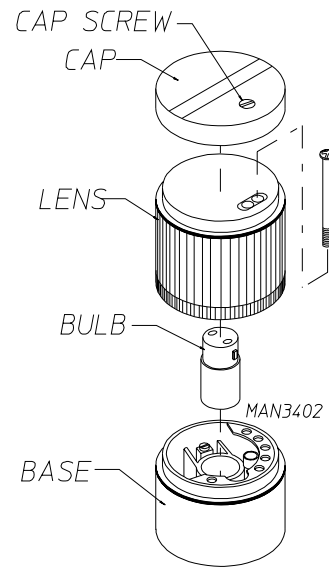


NOTE: A piece of tubing with an inside diameter the size of the bulb may assist in bulb removal and replacement.

- 6) To install new bulb, reverse **Step #5 thru Step #2**. (Refer to the previous page [page 75].)
- 7) Reestablish electrical service to the dryer.

h. End of Cycle Light Replacement

- 1) Discontinue electrical service to the dryer.
- 2) Loosen and remove the cap screw on the top of the cap.
- 3) Remove the cap.
- 4) Loosen and remove the screw going into the lens.
- 5) Twist out lens and remove bulb/light.
- 6) To install new bulb, reverse **Step #5 thru Step #2**.
- 7) Reestablish electrical service to the dryer.

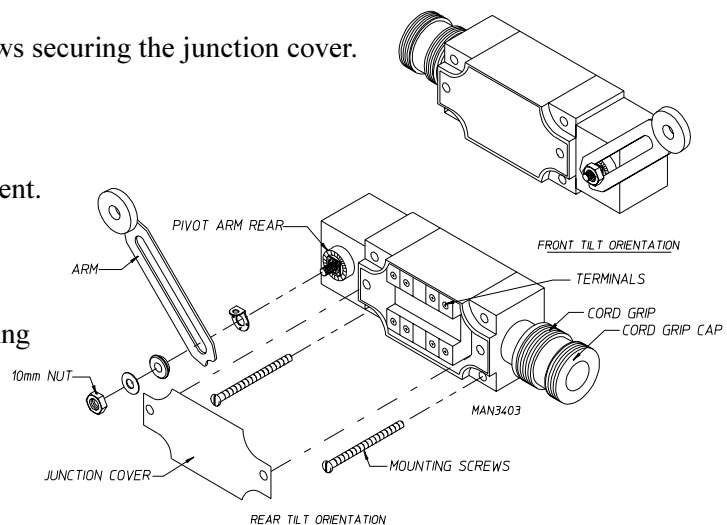


i. Tilt Switch Replacement

- 1) Discontinue electrical service to the dryer.
- 2) Remove the base panel from the left hand side of the dryer.

CAUTION: DO NOT PLACE HANDS BETWEEN THE DRYER BASE AND THE TUMBLER (Basket/Drum) SECTION. SERIOUS INJURY CAN RESULT.

- 3) Unscrew tilt switch.
- 4) Loosen and remove the two (2) screws securing the junction cover.
- 5) Remove the junction cover.
- 6) Mark each wire for proper replacement.
- 7) Remove wires from terminal.
- 8) Loosen and remove the two (2) mounting screws.
- 9) Loosen and remove cord grip cap.
- 10) Remove cord grip.



continued on page 77

continued from page 76

- 11) Place pivot arm in the 1 o'clock position for the front tilt switch and in the 11 o'clock position for the rear tilt switch.

Verify that the body orientation and head orientation are correct.

*Verify that the tilt switch arm **is not** in the vertical position or damage will result.*

- 12) Holding the tilt arm, tighten up (snug up) on the nut.
- 13) Hold pivot point with a screwdriver and tighten the nut.
- 14) Replace the base panel removed in **Step #2**.
- 15) Reestablish electrical service to the dryer.

j. Tilt Switch Adjustment

- 1) Discontinue electrical service to the dryer.
- 2) Remove the base panel from the left hand side of the dryer.

CAUTION: DO NOT PLACE HANDS BETWEEN THE DRYER BASE AND THE TUMBLER (Basket) SECTION. SERIOUS INJURY CAN RESULT.

- 3) To adjust the pivot arm; hold the arm and with a #10 metric wrench and loosen the nut.
- 4) Place pivot arm in the one o'clock position for the front tilt switch and in the 11 o'clock position for the rear tilt switch.

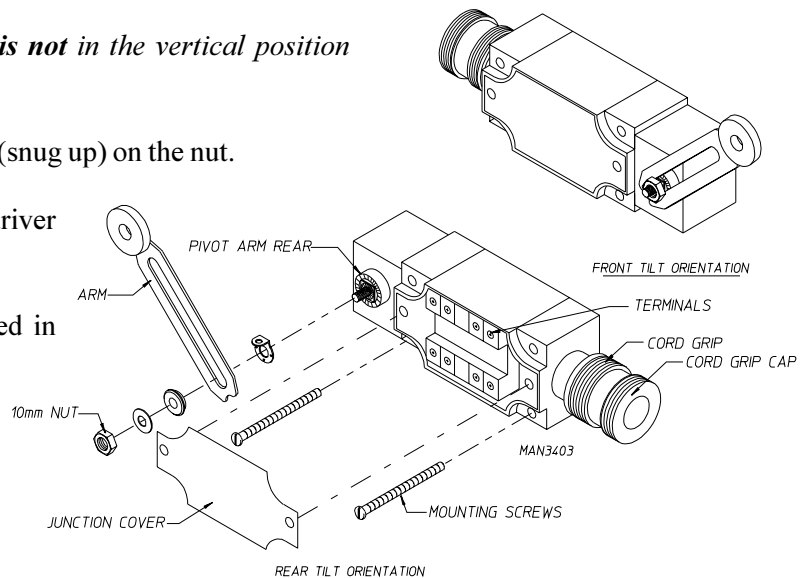
*Verify that the tilt switch arm **is not** in the vertical position or damage will result.*

- 5) Holding the tilt arm, tighten up (snug up) on the nut.

- 6) Hold pivot point with a screwdriver and tighten the nut.

- 7) Replace the base panel removed in **Step #2**.

- 8) Reestablish electrical service to the dryer.



SECTION VII

BASE SECTION

A. LINT DRAWER/LINT CHAMBER SWITCHES

1. Lint Drawer Switches

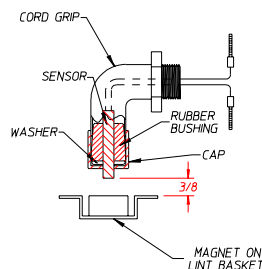
The dryer utilizes two (2) magnetic proximity switches (wired in series) to indicate a lint drawer closed status. The magnetic proximity switch is a device whereby the contacts within the device close when it comes in to close proximity of a magnetic field. If either of the proximity switches are opened, the entire circuit will be open.

- The switch can be checked for failure using an ohm/continuity meter; power down the dryer and place an ohm meter across the two (2) leads that come from the switch. With a magnet in front of the switch...it **should measure** a closed circuit. When the magnet is removed the circuit **should measure** an open circuit.

a. Proximity Switch Replacement

- 1) Discontinue electrical service to the dryer.
- 2) Remove the screws securing the junction box cover.
- 3) Mark and identify the wires that will be removed for proper reinstallation.
- 4) Disconnect the two (2) leads of the defective proximity switch from the terminal block.
- 5) Remove cap and lock washer from the cord grip.
- 6) *Gently* pry the rubber bushing out of the cord grip.
- 7) Pull the proximity switch out of the bushing.
- 8) Replace the proximity switch.
- 9) *Gently* reinstall the rubber bushing removed in **Step #6**.
- 10) Reinstall lock washer (removed in **Step #5**) and reinstall the cap from the grip but **do not tighten**.

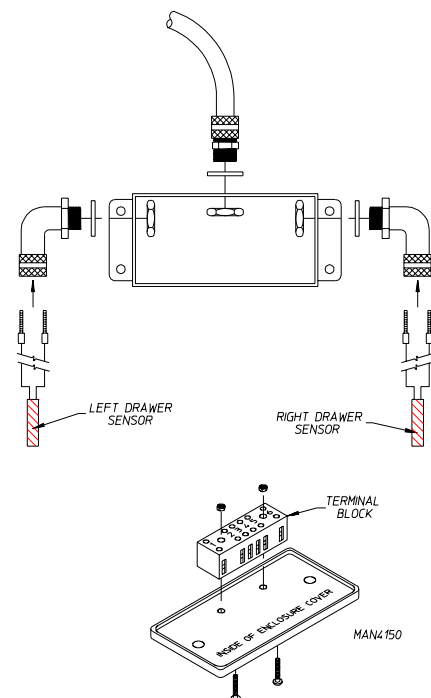
- 11) Adjust the distance between the proximity switch and the magnet to 3/8" (9.525 mm).



- 12) Tighten cap on the cord grip.

- 13) Reverse **Step #4 thru Step #2**.

- 14) Reestablish electrical service to the dryer.



2. Lint Chamber Air Pressure Switch

The lint chamber air pressure switch utilized in the dryer is used to insure that there is proper air flow through the dryer. If there is a problem with this air pressure switch an "AIR FAULT" error message will be displayed via the L.E.D. (light emitting diode) on the Telemecanique XBT digital display unit.

a. Probable causes for an "AIR FAULT" error message;

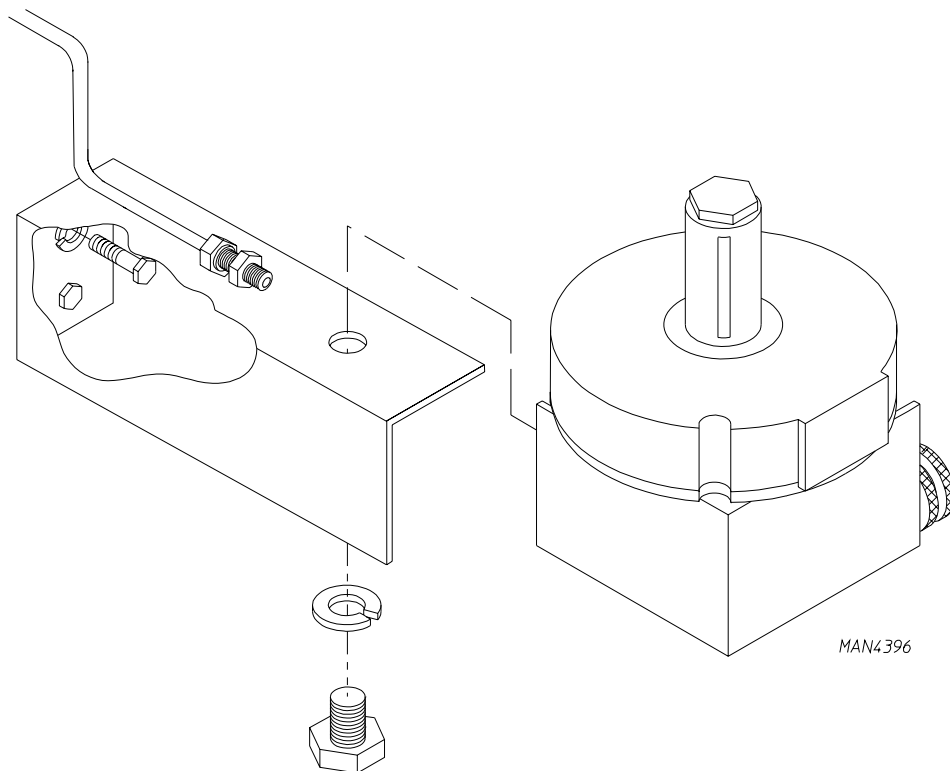
- 1) Clogged lint screen.
- 2) Air pressure setting incorrect.
- 3) Air pressure switch (PS3) or wiring back to the PLC (Programmable Logic Controller).

b. Possible solutions;

- 1) Perform preventive maintenance and lint screen cleaning procedures.
- 2) Set correct air pressure setting.
- 3) For a quick check of the air pressure switch wiring, perform the following:
 - Run a drying cycle.
 - Does the air pressure switch's indicator come "ON"?
 - *If yes*, switch and its adjustment are okay.
 - *If no*, check switch and its adjustment.
 - Verify that the PLC (Programmable Logic Controller) input L.E.D. (light emitting diode) #5 comes on.
 - Does L.E.D. #5 come "ON" when the switch is active?
 - *If yes*, wiring is okay.
 - *If no*, check the following:
 - Air pressure switch, its setting, and wiring.
 - Check wiring back to base electrical junction box.
- 4) Junction Box
 - Check PLC (Programmable Logic Controller).
 - Refer to the electric diagrams;
 - Electrical panel diagram.
 - Junction box diagram.
 - Retest; verify that the signal is operational.

c. Lint Chamber Air Switch Replacement

- 1) Discontinue electrical service to the dryer.
- 2) Remove the 1/4" x 1/8" M.P.T. straight connector.
- 3) Remove the 5/16-18 x 3/4" tap bolt, as well as the 5/16" (7.937 mm) lock washer.
- 4) Mark and identify the wires that will be removed for proper reinstallation.
- 5) Remove the cord grip from the lint chamber air switch.
- 6) To install new lint chamber air switch, reverse **Step #5 thru Step #2**.
- 7) Reestablish electrical service to the dryer.



B. RESISTIVE TEMPERATURE DEVICE (RTD)

1. RTD (Resistive Temperature Device)

The gas dryer utilizes five (5) Resistive Temperature Devices (RTD's);

- One (1) RTD probe is used to control the drying temperature in the tumbler (basket).
- One (1) RTD probe is used to detect an over temperature condition in the dryers' intake.
- One (1) RTD probe is used to monitor for an over temperature condition in the over burner.
- One (1) RTD probe is used to detect an over temperature condition in the dryers' exhaust.
- One (1) RTD probe is used to monitor for an over temperature condition in the sprinkler system.

The steam dryer utilizes two (2) or three (3) Resistive Temperature Devices (RTD's);

- One (1) RTD probe is used to control the drying temperature in the tumbler (basket/drum).
- One (1) RTD probe is used to detect an over temperature condition in the dryers' exhaust.
- The third RTD probe is present if the dryer is equipped with the "optional" sprinkler system.

The RTD probe operates as a resistor that increases in resistance as temperature increases. At 32° F (0° C) the RTD probe reads 100 ohms (100 Ω) with the probe out of circuit. The RTD probe has predetermined temperature to resistance characteristics (i.e., at 77° F [25° C] the RTD probe **should read** 109.73 ohms [109.73 Ω]).

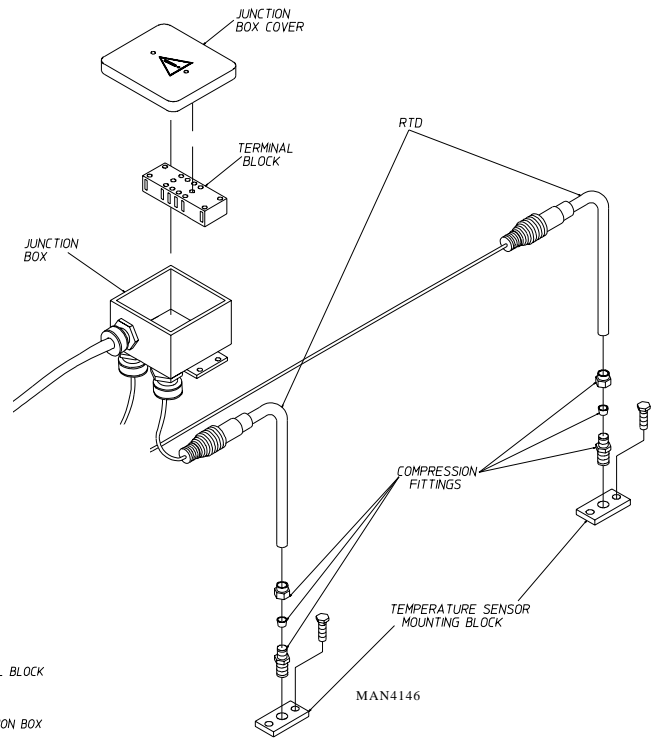
a. RTD (Resistive Temperature Device) Replacement

NOTE: For RTD (Resistive Temperature Device) probe locations refer to the three (3) illustrations on the following page (**page 82**).

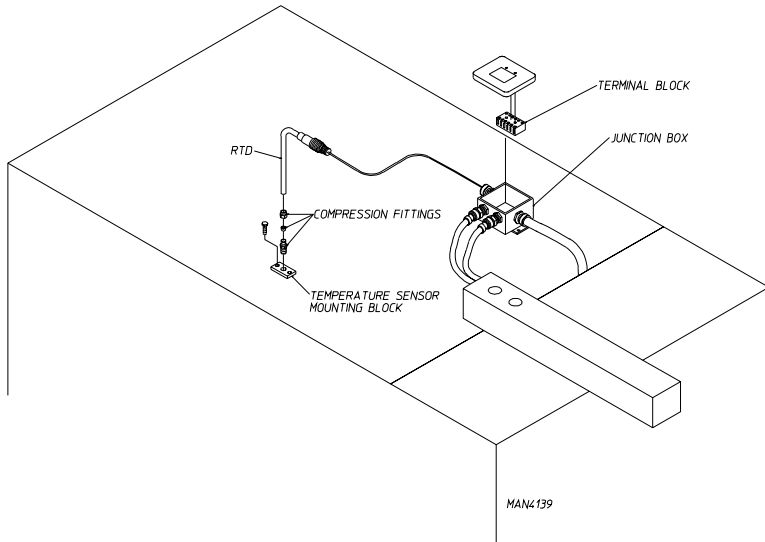
- 1) Discontinue water supply to the dryers' sprinkler system.
- 2) Discontinue electrical service to the dryer.
- 3) Remove probe(s) junction box cover.
- 4) Identify wire(s) from defective RTD probe(s).
- 5) Mark the position of the wire(s) in the terminal block that will be removed for proper reinstallation.
- 6) Remove wire(s) from terminal block.
- 7) Loosen compression fitting(s) and remove defective probe(s).
- 8) To install new probe(s), reverse **Step #7 thru Step #3**.
- 9) Reestablish electrical service to the dryer.
- 10) Reestablish water supply to the dryers' sprinkler system.

2. RTD (Resistive Temperature Device) Locations

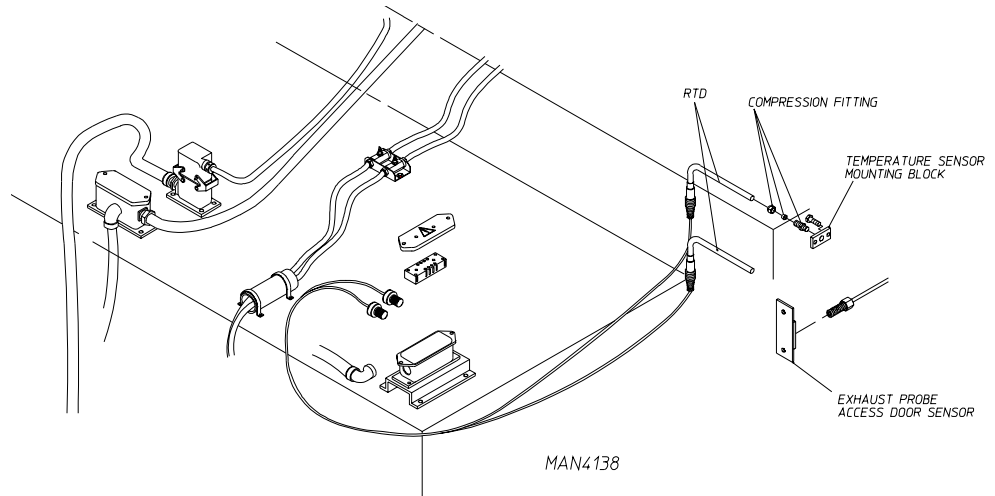
INTAKE HI-LIMIT/SPRINKLER



OVER BURNER HI-LIMIT



EXHAUST TEMPERATURE/EXHAUST HI-LIMIT



SECTION VIII

SPRINKLER SYSTEM

A. SPRINKLER SYSTEM DESCRIPTION

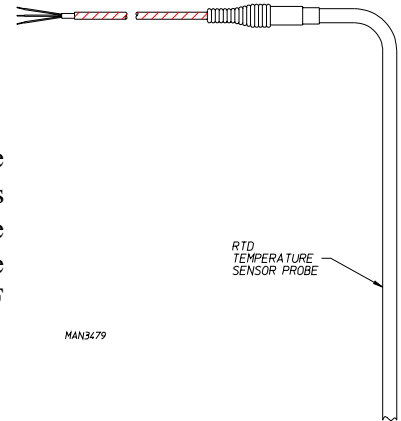
The sprinkler circuit on the dryer requires a dedicated single-phase (1 ϕ) supply from the dryers' voltage. The sprinkler hi-limit temperature is 700° F (371.11° C). In the event of a hi-limit condition, contact #7 and contact #8 on the sprinkler controller will open, disabling the 120 volt supply to the under voltage disconnect. The disconnect will open thereby disabling the power (electrical supply) to the dryer. Another set of contacts will close, sounding the alarm horn and energize the sprinkler pneumatics. This will allow air into the sprinkler valve causing it to open which will allow water to flow.

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 700° F (371.11° C).

1. Description Of Components

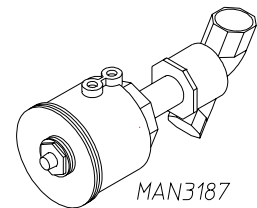
a. Resistive Temperature Device (RTD)

The RTD (Resistive Temperature Device) probe is located above the tumbler (basket). The probe is a 100 ohm (100 Ω) platinum RTD. As the drying temperature increases or decreases, the resistance value corresponds to the ambient temperature (i.e., 100 ohms [100 Ω] will be equivalent to 32° F [0° C], 109 ohms [109 Ω] will be equivalent to 37° F [24° C]).



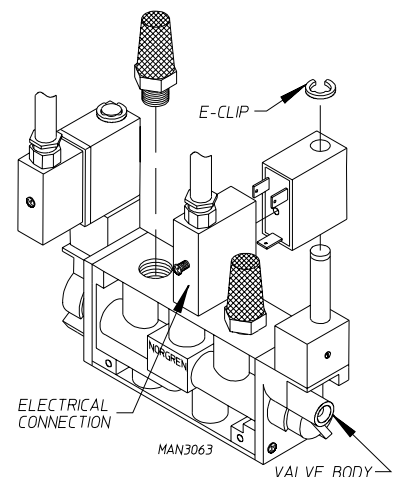
b. Sprinkler Valve

The sprinkler valve is a 3-way, air piloted, normally closed (N.C.) solenoid valve. With pilot air pressure applied, the valve opens allowing water to flow



c. Sprinkler Solenoid Valve

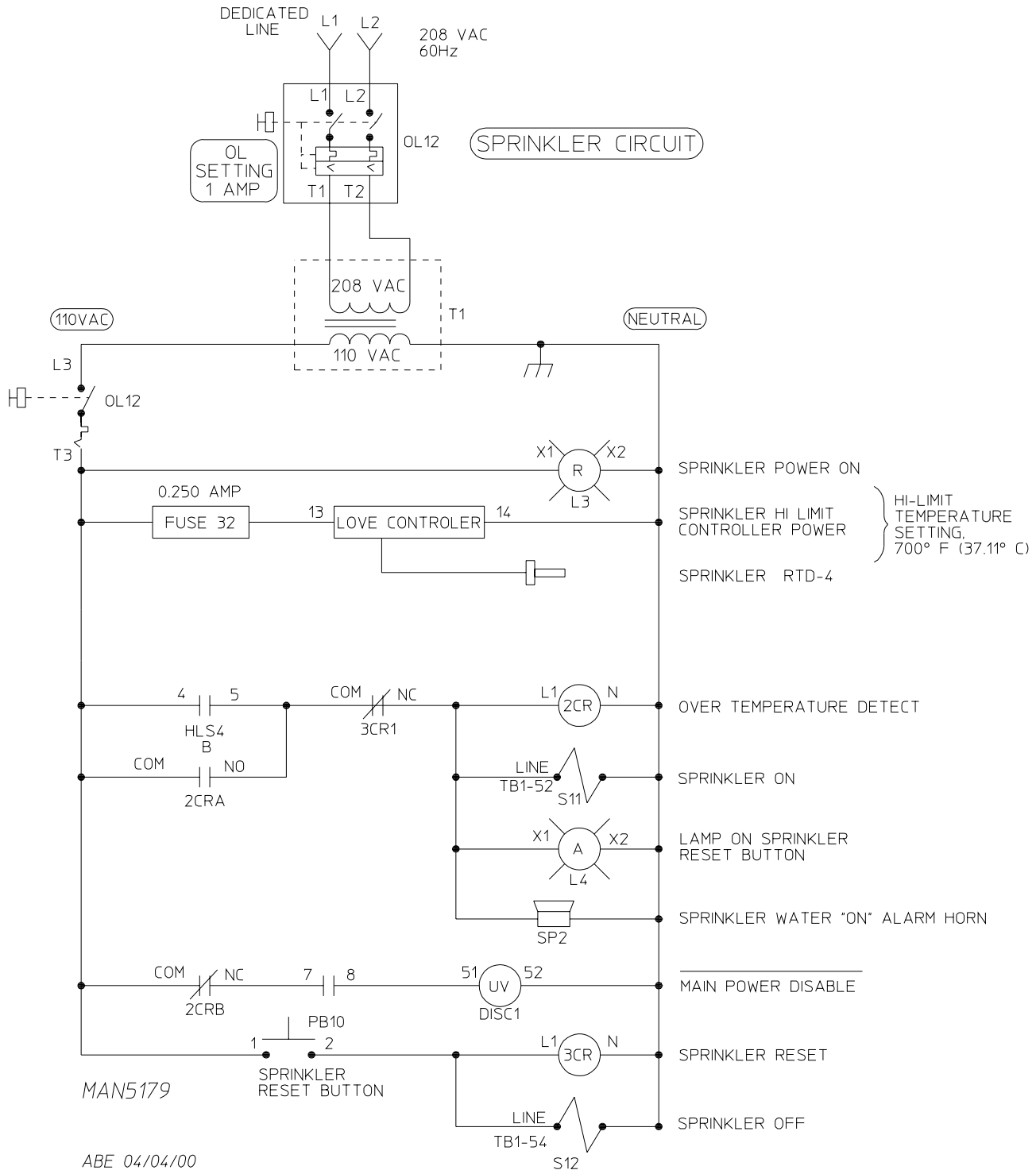
The sprinkler solenoid valve is a 3-port/2-position solenoid valve that is used to supply pilot air to the sprinkler valve.



d. Sprinkler Digital Temperature Controller

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

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



2. Sprinkler System Component Replacement

a. Resistive Temperature Device (RTD) Replacement

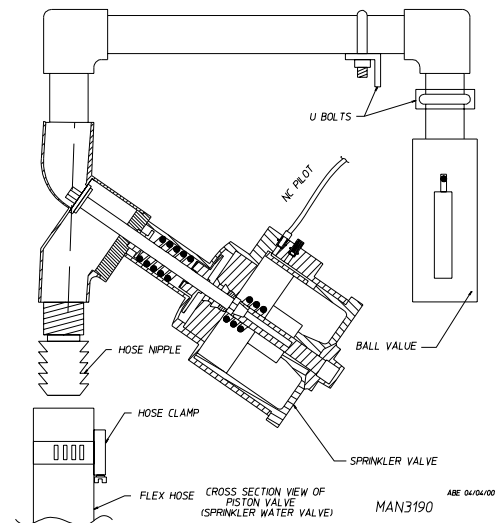
The sprinkler digital temperature controller is a programmable microprocessor (computer). It is used to monitor temperature via a Resistive Temperature Device (RTD).

NOTE: For RTD (Resistive Temperature Device) probe location, refer to the top illustration on **page 80**.

- 1) Discontinue water supply to the dryers' sprinkler system.
- 2) Discontinue electrical service to the dryer.
- 3) Remove probe(s) junction box cover.
- 4) Identify wire(s) from defective RTD probe(s).
- 5) Mark the position of the wire(s) in the terminal block that will be removed for proper reinstallation.
- 6) Remove wire(s) from terminal block.
- 7) Loosen compression fitting(s) and remove defective probe(s).
- 8) To install new probe(s), reverse **Step #7 thru Step #3**.
- 9) Reestablish electrical service to the dryer.
- 10) Reestablish water supply to the dryer.

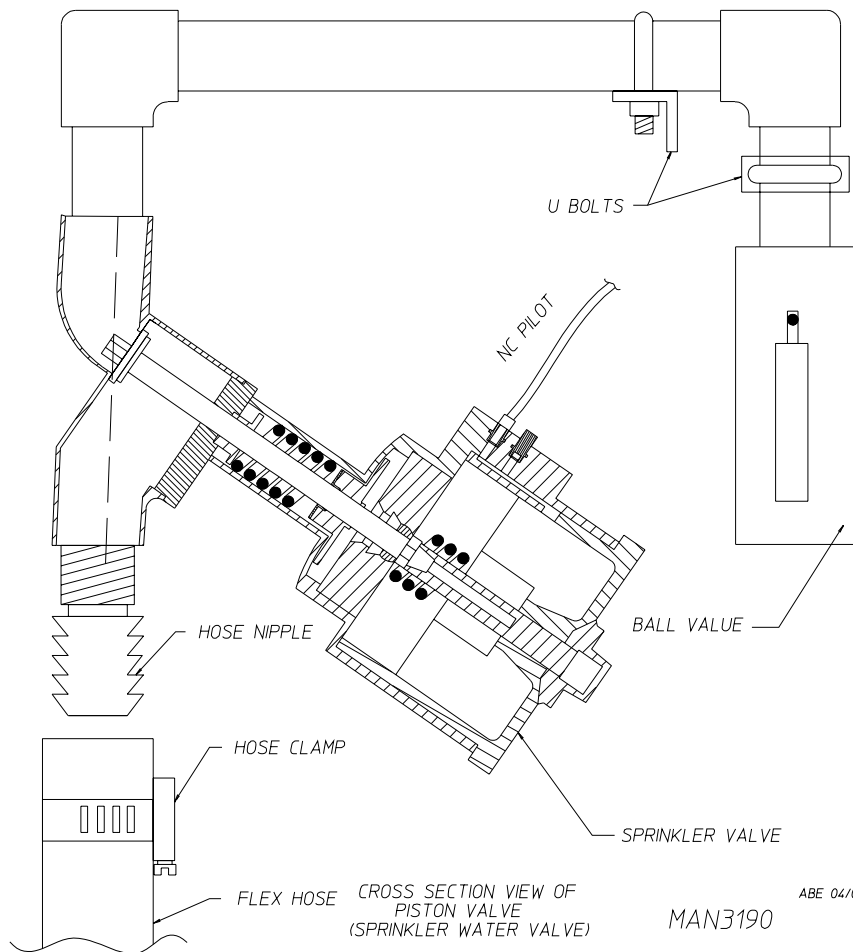
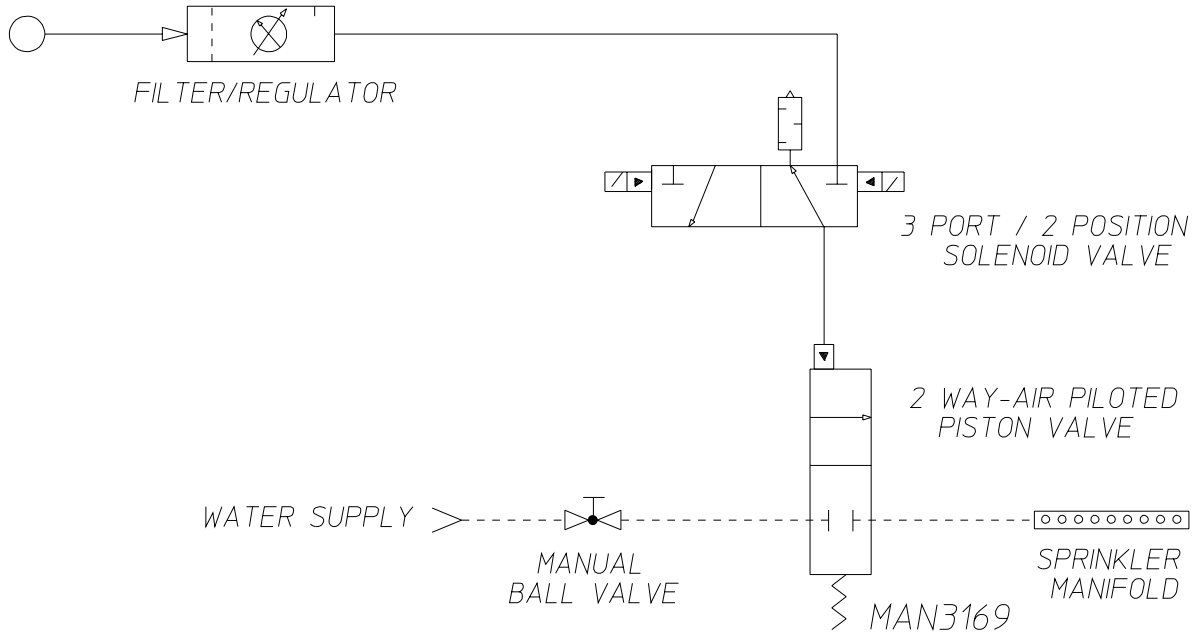
b. Sprinkler Valve Replacement

- 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" (6.25 mm) 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 **Step #8 thru Step #3**.
- 9) Reestablish electrical service to the dryer.
- 10) Reestablish water supply to the dryer.



SPRINKLER SYSTEM PNEUMATIC DIAGRAM

AIR INLET



SECTION IX

AIR JET SYSTEM

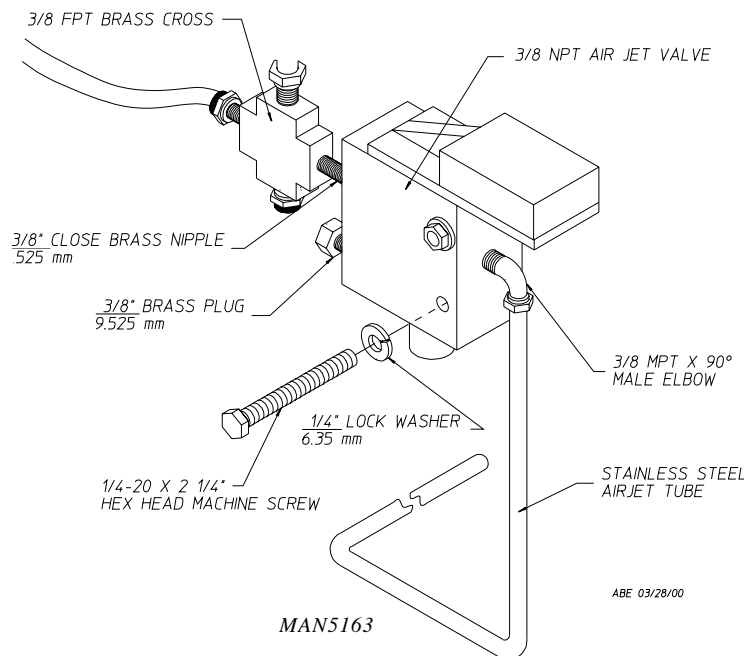
A. AIR JET SYSTEM

The dryer utilizes an air jet system so that at the end of each drying cycle 80 PSI (5.51 bars) of compressed air is blown across the blower squirrel cage fan to remove any lint build up that occurred during the drying cycle.

1. Air Jet Valve

a. Air Jet Valve Replacement

- 1) Discontinue air supply to the dryer.
- 2) Discontinue electrical service to the dryer.
- 3) Remove the poly-flow tubing from the brass tee and the brass cross.
- 4) Remove the stainless steel air jet tubing from the pneumatic solenoid (air jet valve).
- 5) Remove the two (2) 1/4-20 x 2-1/4" hex head machine screws mounting the air jet valve to the pneumatic panel.
- 6) Remove the screw securing the air jet coil harness from the air jet valve.
- 7) To install new air jet valve, reverse **Step #6 thru Step #3**.
- 8) Reestablish electrical survive to the dryer.
- 9) Reestablish air supply to the dryer.



SECTION X

STACK VALVE ASSEMBLY

A. PNEUMATIC VALVE

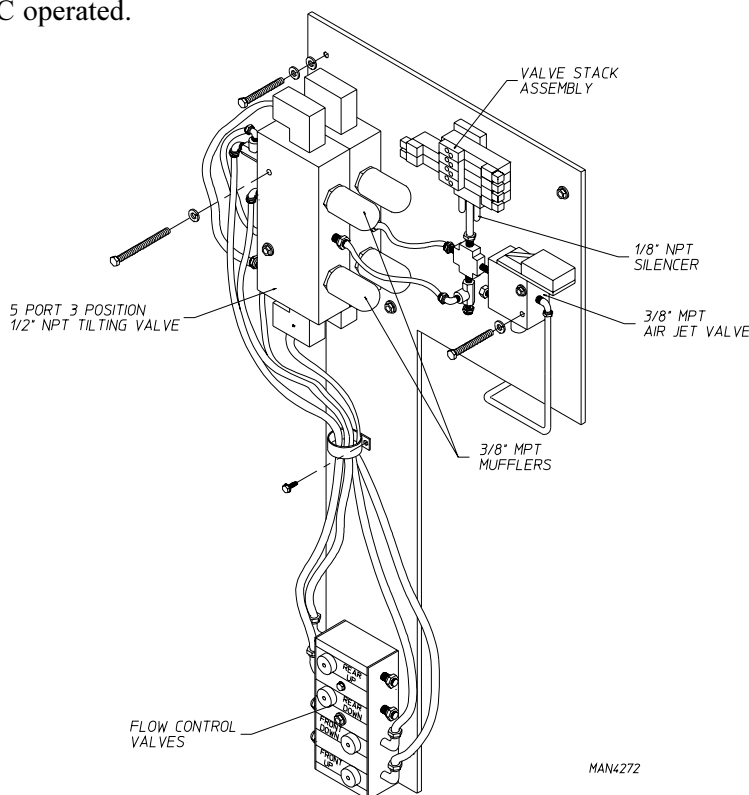
The stack valve assembly consists of two (2) styles of pneumatic solenoids;

- The first type of solenoid is a 2-position/4-way/4-port single operator with a spring return. This valve has a 120 VAC coil and spring return. With no power to the coil, air goes out of the B port and the A port gets exhausted. When the coil is energized, air enters the A port and the B port gets exhausted.
- The second type of solenoid is a 2-position/4-way/4-port double operator. This valve has two (2) 120 VAC coils. With the "A" coil is energized, air enters the A port and the B port gets exhausted. When the B coil is energized, air exhausts the A port and the B port gets charged.

In certain positions, when a spring return piston is used, one (1) of the ports may be plugged with a plug port.

The 28 mm profile bar with 1/8" (3.175 mm) cylinder ports (Blank Station) is used as the mounting medium for the solenoid valves. Two (2) ports are drilled through the center of the Blank Station; one is for the inlet air and the other for the exhaust air. Small holes are drilled through the station at each location to tap off of these ports. There are also additional holes drilled that connect to the individual ports (A port and B port). If a position valve is not used, then a Blank Station with a gasket is placed over the holes to block any air leaks.

The coil can be tested for continuity with a standard ohm meter. With no power applied to the dryer, remove the coil plug. Place your leads across the 1 (+) and 2 (-) pin coming from the coil. The resistance measured **should be** approximately 700 ohms (700 Ω). If the resistance is correct then the chances are that the coil is okay. These coils are **ALL** 120 VAC operated.



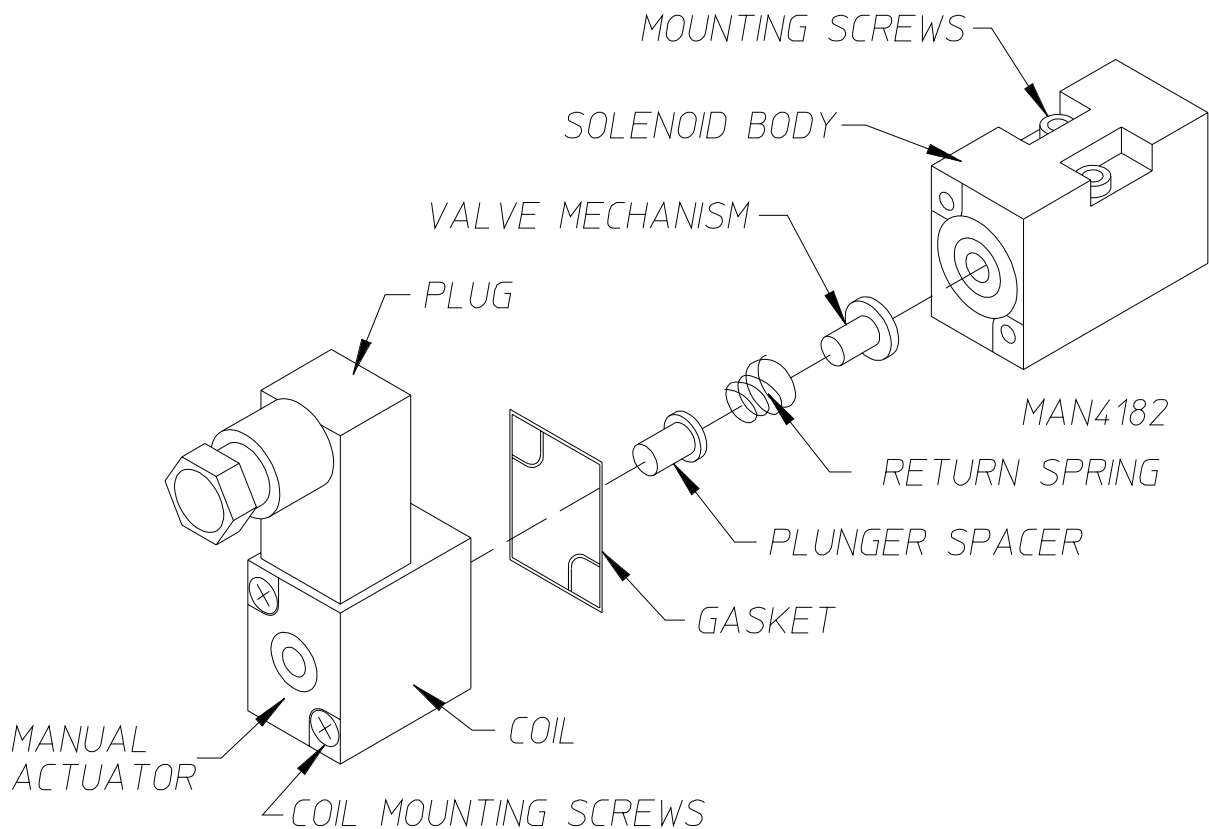
1. Solenoid Coil

a. Coil Replacement

- 1) Discontinue air supply to the dryer.
- 2) Discontinue electrical service to the dryer.
- 3) For models with a sprinkler system, discontinue water supply to the dryers' sprinkler system.
- 4) Loosen coil plug screw and remove the plug.
- 5) *Carefully* remove the coil mounting screw.

IMPORTANT: TAKE NOTICE ... small components!!!

- 6) Note the sequence of the plunger components (i.e., return spring, plunger, etc.).
- 7) Install new coil making sure that component reinstallation (i.e., return spring, plunger, etc.) is in the correct sequence.
- 8) Replace coil plug remove in **Step #4**.
- 9) Reestablish water supply to the dryer.
- 10) Reestablish electrical service to the dryer.
- 11) Reestablish air supply to the dryer.



2. Solenoid Valve

a. Valve Replacement

- 1) Discontinue air supply to the dryer.
- 2) Discontinue electrical service to the dryer.
- 3) For models with a sprinkler system, discontinue water supply to the dryers' sprinkler system.
- 4) Loosen coil plug screw and remove the plug.
- 5) *Carefully* remove the two (2) valve mounting screws.

Take notice of the gasket.

- 6) Install new valve body.

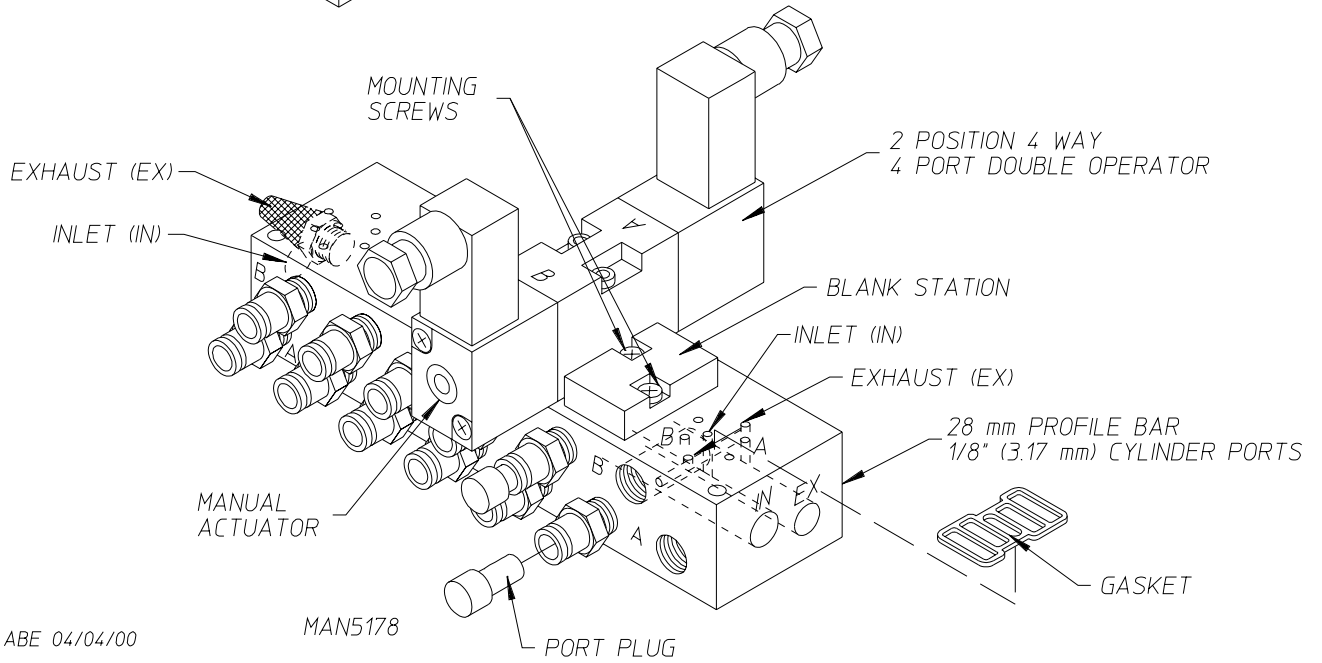
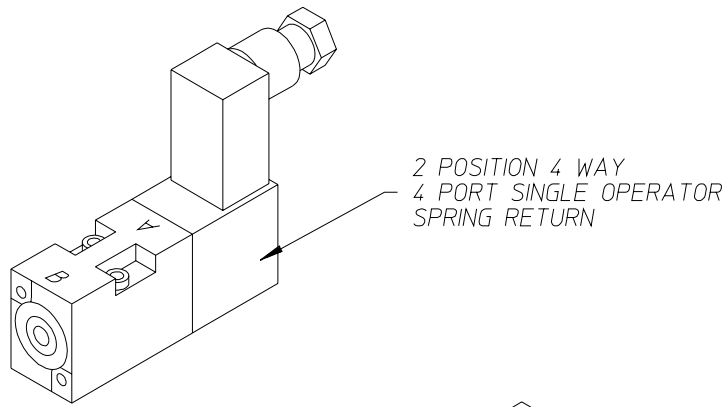
CAUTION: *DO NOT* pinch the gasket.

- 7) Replace coil plug remove in *Step #4*.
- 8) Reestablish water supply to the dryer.
- 9) Reestablish electrical service to the dryer.
- 10) Reestablish air supply to the dryer.

3. Tubing

a. Tubing Replacement

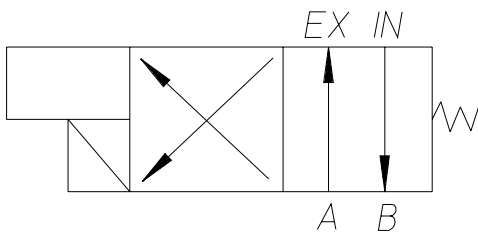
- 1) Discontinue air supply to the dryer.
- 2) Discontinue electrical service to the dryer.
- 3) For models with a sprinkler system, discontinue water supply to the dryers' sprinkler system.
- 4) Push tubing in and at the same time push black ring on disconnect in, then while holding ring, pull tubing.
- 5) Install new tubing into the connector.
- 6) Pull on tubing to verify proper connection.
- 7) Reestablish water supply to the dryer.
- 8) Reestablish electrical service to the dryer.
- 9) Press sprinkler reset button (for models with a sprinkler system).
- 10) Reestablish air supply to the dryer.



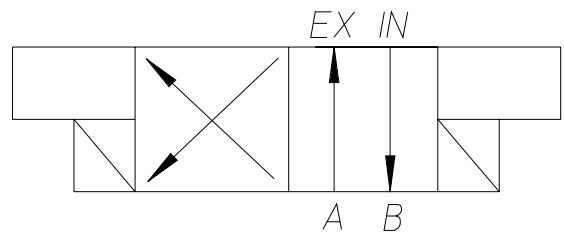
ABE 04/04/00

MAN5178

PORT PLUG



MAN4223



4. Internal Pilot and External Pilot Air Supply

On 2-Way Tilt dryers, a pneumatic safety circuit is incorporated to prevent both front and rear tilting pistons from extending their rods at the same time. When 120 volts is supplied to the “S5” side of the front tilting piston solenoid valve coil, the round internal spool in the core of the solenoid will move, allowing 80 PSI (5.51 bars) air to flow into the bottom ports of the front tilting pistons, while the top ports of these pistons are bled to the atmosphere. In addition to this 120 volt electrical signal, the spool also requires a 30 PSI (2.07 bars) supply of compressed air to change its position. This pilot air can either be supplied internally, tapped off the 80 PSI (5.51 bars) air supply connected to port no. 1 through holes in the body of the solenoid valve or it can be supplied externally through the 1/8" F.P.T. connection located on either end of the solenoid valve. If no pilot air is supplied to the solenoid valve. Then the spool **cannot** move, even with voltage supplied to the solenoid valve coil.

This can be used to prevent both sets of tilting pistons from extending their rods at the same time. When the front tilting piston rods are extended, 80 PSI (5.51 bars) air is connected to the bottom piston ports, while the top piston ports are bled to the atmosphere. So, by tapping the external pilot air supply to the rear tilting rods are extended, then there is no pilot pressure available to the rear tilting piston solenoid valve so that its spool **cannot** move and the rear tilting piston rods **cannot** extend if a 120 volt signal is sent to its “12” side solenoid valve coil.

The external pilot air supply to the front tilting piston is tapped off the rear tilting piston top port air line so that whenever the rear piston rods are extended, there is no pilot air supplied to the front tilting piston solenoid valve and the front tilting piston rods cannot extend. On the solenoid valve supplied on the dryer, the “12” side valve is externally piloted, while “14” side valve is internally piloted.

A valve can easily be checked for internal or external piloting by removing the two (2) screws which hold the solenoid operator onto the valve. For an internal pilot air to be supplied to the valve spool. For an external pilot, the solid sealing disc **must be** positioned on top of the internal port.

SECTION XI

PENDANT ASSEMBLY

A. PENDANT ASSEMBLY DESCRIPTION

The pendant assembly is used on both the gas and steam model dryer. Within the pendant assembly there is a three (3) position selection switch used to tilt the dryer in the load tilted, unload tilted, or level position. When the load tilted or unload tilted selection is made, the load/unload door will open once the door signal has been received, and the dryer will tilt. The jog forward/jog reverse push buttons, when depressed individually, will cause the tumbler (basket) to turn clockwise (CW) for forward and counterclockwise (CCW) for reverse. If both push buttons are depressed together the jog feature is disabled due to the mechanical interlock with the pendant assembly. This feature is used as a safety device to prevent both drive motors from being energized in opposite directions.

The "EMERGENCY STOP" (E-STOP) button is a push-to-stop and twist-to-release switch. When the E-STOP button has been depressed the control power to the dryer is disabled. Voltage is still present at the dryer even though the "EMERGENCY STOP" (E STOP) has been depressed.

1. Pendant Assembly Switch

a. Pendant Assembly Switch Replacement

- 1) Discontinue electrical service to the dryer.
- 2) Remove the four (4) screws that secure the pendant body together.
- 3) Mark and identify the wires that will be removed for proper reinstallation.
- 4) Remove the wires from the contact block being replaced.
- 5) To install new contact block, reverse **Step #4 thru Step #2**.
- 6) Reestablish electrical service to the dryer.

