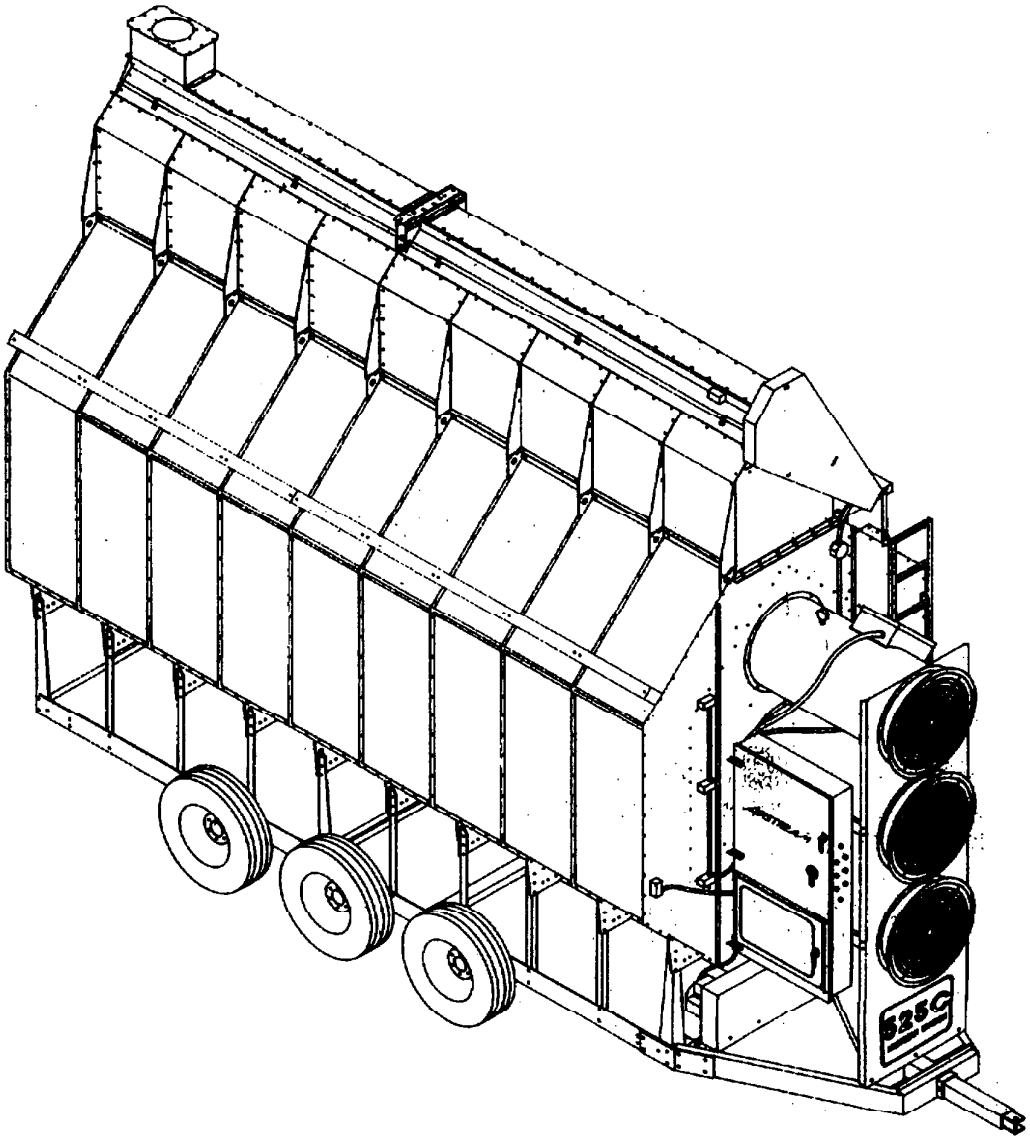
AIRSTREAM



INSTALLATION & OPERATION MANUAL

AIRSTREAM C-SERIES MULTI-FAN GRAIN DRYERS

GSI GRAIN SYSTEMS, INCORPORATED
ASSUMPTION, IL 62510 217/226-4421

PNEG-169
9/7/90

WARRANTY

GRAIN SYSTEMS INC. warrants its products to be free of defects in material and workmanship. The only obligation of the manufacturer is to repair or replace products which have been submitted and found to be defective within 24 months after installation. If so found defective, the products will be repaired or replaced without charge, this constituting and entirely fulfilling the warranty obligation. Grain Systems Inc. assumes no liability for expenses incurred without written authorizations; in no event shall its liability include special or consequential damages, or exceed the selling price of the product.

This warranty does not cover products or parts which have been damaged by negligent use, misuse, alteration or accident. Electric motors, tires, and other components supplied by outside manufacturers are warranted separately by those suppliers. This warranty is exclusive and in lieu of all other warranties, expressed or implied. Grain Systems Inc. reserves the right to make design or specification changes at any time, without any contingent obligations to purchasers of products already sold.

All instructions shall be construed as recommendation only; because of the many variable conditions in actual installation, Grain Systems Inc. assumes no liability for results arising from the use of such recommendations. Any alteration in design or operation of any Grain Systems Inc. product must be submitted and approved in writing by Grain Systems Inc. before alteration is made.

READ THESE INSTRUCTIONS BEFORE INSTALLATION AND OPERATION. SAVE FOR FUTURE REFERENCE.

Thank you for choosing an AIRSTREAM C-Series Multi-Fan grain dryer. These units are one of the finest grain dryers ever built; designed to give you excellent performance and service for many years.

This manual describes the installation and operation for all standard production 410C and 525C dryers. These dryers are available for liquid propane or natural gas fuel supply, with either single phase 230 volt, or three phase 220 or 440 volt electrical power.

USE CAUTION IN THE OPERATION OF THIS EQUIPMENT

The design and manufacture of this dryer is directed toward operator safety. However, the very nature of a grain dryer having a gas burner, high voltage electrical equipment and high speed rotating parts does present a hazard to personnel which can not be completely safeguarded against without interfering with efficient operation and reasonable access to components.

Use extreme caution in working around high speed fans, gas-fired heaters, augers and auxiliary conveyors which may start without warning when the dryer is operating on automatic control.

Continued safe, dependable operation of automatic equipment depends, to a great degree, upon the owner. For a safe and dependable drying system, follow the recommendations within the manual and make it a practice to regularly inspect the operation of the unit for any developing problems or unsafe conditions.

Take special note of the Operating Precautions listed on Page 2 before attempting to operate the dryer.

Keep the dryer clean. Do not allow fine material to accumulate in the plenum chamber.

A CAREFUL OPERATOR IS THE BEST INSURANCE AGAINST AN ACCIDENT.

02-01-89

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OPERATING PRECAUTIONS

1. Keep the dryer CLEAN. Do not allow fine material to accumulate in the plenum chamber.
2. Set pressure regulator to avoid excessive gas pressure applied to burner during ignition and when burner is in operation. See Chart for operating procedures. Do not exceed maximum recommended drying temperature.
3. Power supply should be OFF for service of electrical components. Use CAUTION in checking voltages or other procedures requiring power to be ON.
4. Do not operate the dryer if any gas leaks are detected. Shut down and repair before further operation.
5. Clean grain is easier to dry. Fine material increases resistence to air flow and requires removal of extra moisture.
6. Use CAUTION in working around high speed fans, gas burners, augers, and auxiliary conveyors which start automatically.
7. Keep auger drive belts tight enough to prevent slippage.
8. Be certain that capacities of auxiliary conveyors are matched to dryer auger capacities.
9. Do not operate in an area where combustible material will be drawn into the fan.
10. Never operate dryer while guards are removed.
11. Before attempting to remove and reinstall the propellor, make certain to read the recommended procedure listed within the SERVICING section of the manual.
12. Never attempt to operate the dryer by jumping or otherwise bypassing any safety devices on the unit.
13. Read and understand the operating manual before attempting to operate the unit.

SPECIFICATIONS

TYPE: Continuous multi-stage, 525C has three independently controlled fan-heater units for staged drying temperatures, while the 410C has two; equipped for staged, intermittent discharge or continuous flow discharge.

GRAIN COLUMNS: Two grain columns, 14" thickness, with grain movement through columns controlled by variable speed metering rolls; grain column construction of galvanized steel, with heavy steel partitions each two feet of length, and with meter roll access panels and grain clean out mechanism.

FANS: The 410C has two heavy duty axial fans while the 525C has three heavy duty axial fans, direct drive, 3450 RPM, with total air flow, static pressure, and horsepower matched to grain volume, and with full motor overload protection.

HEATERS: High capacity direct fired heaters, with ACCU-FIRE burners, full electric ignition, and thermostat temperature control by two level fuel flow modulation (Hi-Lo burner control).

AUTO CONTROL: Fully equipped for: (1)Dry and Cool, Staged Automatic, (2)Dry and Cool, Continuous Flow, (3)Full Heat, Staged Automatic, (4)Full Heat, Continuous Flow. Automatic control of all functions - loading, drying, cooling, and discharge. Staged Automatic process controlled by automatic reset timers; Continuous Flow process controlled by adjustable rate metering roll system. Full safety control system; automatic shut-down on wet grain outage or excessive temperature; moisture check thermostat control circuit; circuit monitor system to identify cause of safety shut-down; hour meter.

SPECIFICATIONS CHART FOR MULTI-FAN MODEL DRYERS

	410C	425C	510C	525C
GRAIN COLUMNS GRAIN COLUMN HOLDING CAPACITY	14",14' Long 415 Bu.	14", 14' Long 415 Bu.	14", 18' Long 540 Bu.	14", 18' Long 540 Bu.
TRANSPORT LENGTH (Hitch to Discharge Auger) TRANSPORT WIDTH TRANSPORT HEIGHT TRANSPORT WEIGHT	23'-1" 8' 13'-5" 7100 Lbs.	23'-1" 8' 13'-5" 7100 Lbs.	27'-1" 8' 13'-5" 8260 Lbs.	27'-1" 8' 13'-5" 8260 Lbs.
INSTALLED LENGTH INSTALLED WIDTH INSTALLED HEIGHT (Above Foundation Supports)	21'-1" 8' 15'- 9"	21'-1" 8' 15'- 9"	25'-1" 8' 15'-9"	25'-1" 8' 15'-9"
Fan	5-7 HP, 24" 10-15 HP, 28"	(3) 5-7 HP, 24"	(1) 10-16 HP, 36" (1) 10-12 HP, 26"	(3) 7.5-10 HP, 24"
Heater (Max. BTU)	(1) 2 MIL Btu/Hr (1) 3 MIL Btu/Hr	(3) 2 MILL Btu/Hr	(1) 4.6 MILL Btu/Hr (1) 2 MILL Btu/Hr	(2) 3 MILL Btu/Hr
TOP LOADING AUGER CAPACITY BOTTOM AUGER METER ROLL SYSTEMS, MAX. RATE *1	8", 5 HP 2800 BPH 8", 10" Tube, 5HP SCR 3/4 HP 1800 BPH	8", 5 HP 2800 BPH 8", 10" Tube, 5HP SCR 3/4 HP 1800 BPH	8", 5 HP 2800 BPH 8", 10" Tube, 5HP SCR 3/4 HP 2300 BPH	8", 5 HP 2800 BPH 8", 10" Tube, 5HP SCR 3/4 HP 2300 BPH
ELECTRIC LOAD (Fan, Top Aug., Bot. Aug.) *2 Single phase, 230 V Three phase, 220 V Three phase, 440 V.	 136 Amps. 75 Amps. 38 Amps.	 148 Amps 71 Amps 35 Amps	 159Amps 94 Amps 47 Amps	 169 Amps 110 Amps 55 Amps
DRYING CAPACITY, SHELLED CORN *3 DRY & COOL, 25% to 15% *4 DRY & COOL, 20% to 15% FULL HEAT, 25% to 15% *4 FULL HEAT 20% to 15%	 260 BPH 405 BPH 410 BPH 680 BPH	 265 BPH 415 BPH 425 BPH 690 BPH	 325 BPH 520 BPH 510 BPH 910 BPH	 355 BPH 555 BPH 525 BPH 925 BPH

*1 Actual discharge rate is controlled by meter roll speed adjustment, at 0% to 100% of maximum rate.

*2 Excludes auxiliary load and unload motors.

*3 Capacities listed are wet bushels at input moisture content.

*4 Grain discharged hot from the dryer at 17% output moisture should result in a final moisture content of 15% to 15 1/2% after cooling (dryeration).

TRANSPORTING DRYER

The dryer is available with an optional Transport Kit for transporting the unit by truck or tractor. Make certain to observe the following safety precautions.

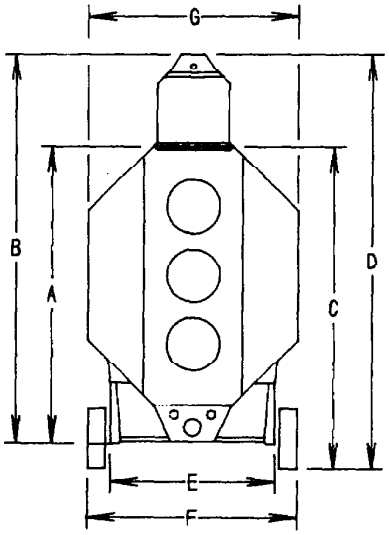
1. Recommended Towing Hitch Height 16-17 Inches.
2. Hitch Pin to be NOT LESS THAN 3/4 INCH in DIA. and SECURELY FASTENED so it WILL NOT COME OUT in TRAVEL.
3. Use a Safety Chain.
4. Dryer must be towed empty and in accordance with applicable state or Provincial Regulations.
5. Recommended tire pressures 55-60 P.S.I. (Cold)
6. Maximum towing speed 45 Miles Per Hour.
7. After first 50 miles and every 200 miles thereafter:
   a. Check hub and spindle temperature immediately after stopping. Temperature should not exceed 150°F.; May be hot to touch, but not melting lubricant.
   b. Check wheel bolts; They are factory torqued at 115 to 120 Ft.-Lbs. Retighten, if required, to approximately 90 Ft.-Lbs.

INSTALLATION

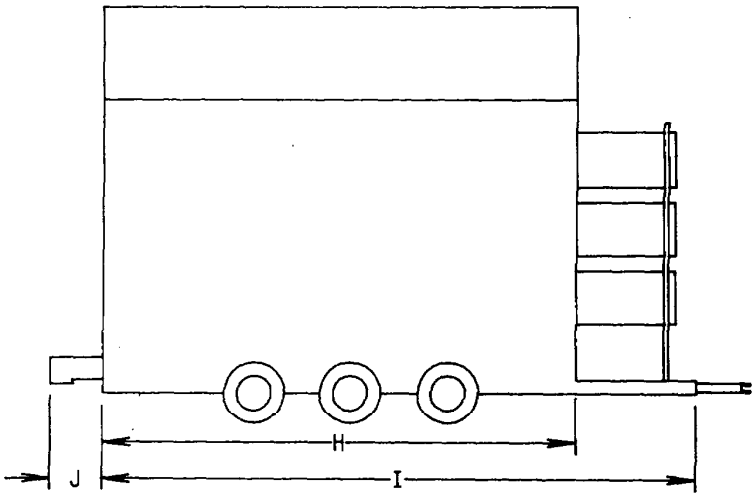
SYSTEMS LAY-OUT: Consider the grain handling systems and the location of storage bins and existing conveyors in selecting the dryer site, to facilitate wet grain supply and dry grain discharge to conveyors.

SITE SELECTION: The dryer is not to be operated inside a building or in any area not permitted by electrical codes, fuel installation regulations, or insurance requirements. Do not operate in an area where combustible material can be drawn into the fans. Maintain a minimum distance of three feet to other structures. Refer to Fig. 1 for dryer dimensions.

BLOCK SUPPORT: The wheels are provided only for transportation of the empty dryer. Before loading any grain into the dryer, it is necessary to support the frame of the unit on each side, by concrete blocks or other means, to carry the total weight when filled with grain. Use shims to provide uniform, level support, at a minimum of 16" above the concrete slab, to provide space for clean-out and for auxiliary conveyors. Use a minimum of four supports on each side, plus one support at the hitch point. The hitch tongue should be removed, but the hitch assembly and the fan support must be left on during operation; they are not a part of the transport assembly.



REAR VIEW



SIDE VIEW

AIRSTREAM MODEL	A	B	C	D	E	F	G	H	I	J
410C & 425C	11'-4 1/2"	14'-11"	12'-3 1/2"	15'-10"	6'-4"	8'-3"	8'	14'- 1/2"	18'-9"	24"
510C & 525C	11'-4 1/2"	14'-11"	12'-3 1/2"	15'-10"	6'-4"	8'-3"	8'	18'- 1/2"	22'-9"	24"

FIG. 1

AUGER DRIVE DATA

410C/525C AUGER DRIVE DATA	AUGER		MOTOR			SHEAVES	
	SIZE	APPROX. CAPACITY BU.\HR.*	HP	RPM	BELTS	DRIVE OD	DRIVEN OD
TOP AUGER	8"	2800	5	1750	BX120 (TWO)	2BK40	2TB184
BOTTOM AUGER	8"	1800 (410C,425C)** 2300 (510C,525C)	5	1750	BX81 (TWO)	2BK32	2TB160

* Dryer auger capacities and power requirements vary with grain moisture content and amount of fine material in grain.

** The 1800 and 2300 bu./hr. listings represent the maximum metering roll discharge rate. The bottom auger capacity exceeds the max. metering roll rate.

FIG. 2

CONCRETE SLAB: A reinforced concrete slab is recommended as the basic support for the dryer, located in a well drained area. The slab should be large enough to provide working area around the dryer, with a surface elevation consistent with other parts of the grain handling and storage systems.

TIE-DOWN ANCHORS: *Anchor points may be cast into the* concrete slab, or the dryer may be tied down by cable and turn-buckle to anchors installed at the edge of the slab. In any case, prevent overturn or lateral movement by wind forces.

FILLING POINT: Wet grain must enter the dryer at the hopper at the rear of the top auger, since the top auger moves grain forward, toward the paddle switch controlling the top auger (except for special front-loading units).

WET GRAIN SUPPLY: A wet holding bin provided, with gravity flow into the dryer loading conveyor, or gravity flow from a wagon or truck into a loading conveyor may be used to fill the dryer. The top leveling auger will accept grain at any rate up to about 2800 bu. per hour. In any case, the dryer must have a constant supply of wet grain. Auxiliary loading conveyors should be sized to nearly match the capacity of the top auger, to avoid air loss problems caused by under filling during high drying rate operations.

WET GRAIN LOADING: The dryer will automatically start the top auger and any loading conveyor electrically connected to the power circuit provided in the Main Control Box. At the beginning, the dryer will completely fill. During drying, the top auger will start and stop, as required, depending upon the dry grain discharge rate and grain shrinkage, to maintain the dryer full of wet grain.

LOAD TIMER: The unit is equipped with a load timer (within Control Box), to provide automatic shut-down on wet grain outage. If the top auger operates for a time exceeding the setting *of the top load timer (field adjustable), the dryer will shut down.*

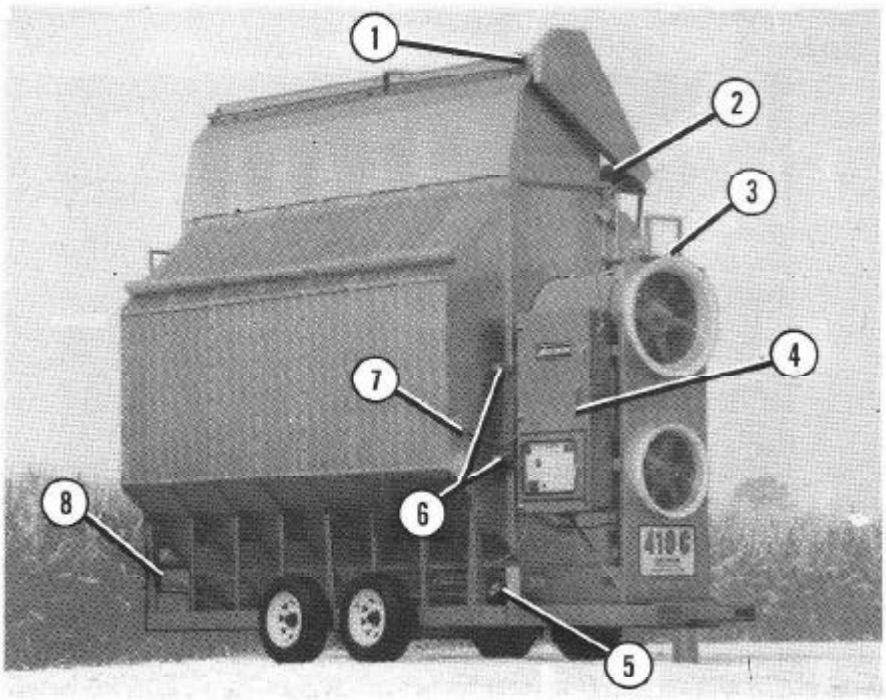
OVERLOAD RELAYS

STANDARD EQUIPMENT: The dryer is equipped with a complete set of current overload relays with heater ratings as shown by Fig. 6. The safety control circuit of the dryer includes 5 current overload relays, plus a thermal overload protector in each fan motor winding.

MANUAL RESET: All current overload relays are manually reset, except for the automatic reset locked rotor overload and the thermal protector on the single phase fan motors. If an electrical overload occurs, the Control Box must be opened to push the reset lever.

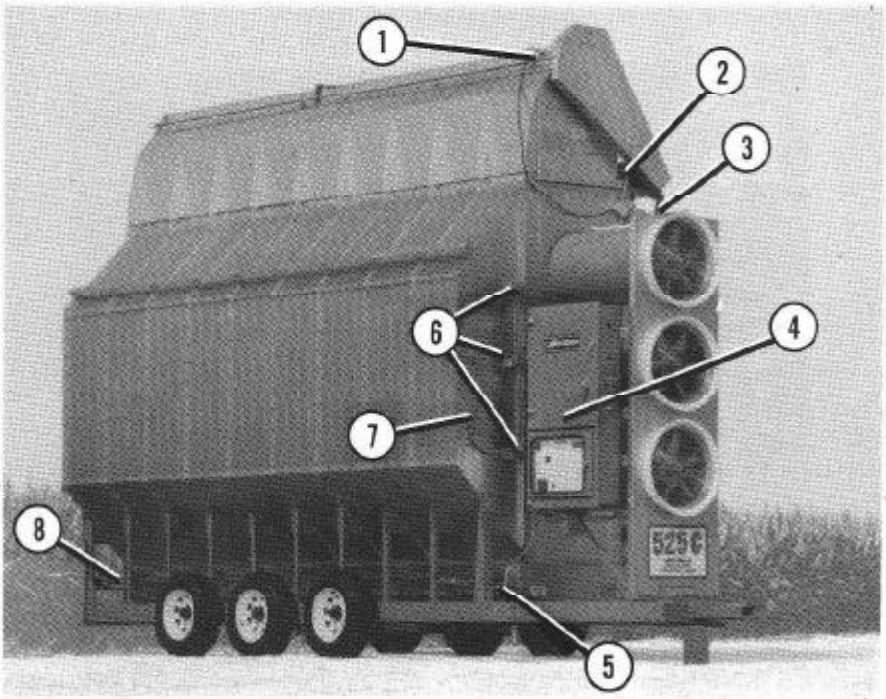
LOAD ADJUSTMENT: Current overload relays are adjustable from 85% to 115% of the rated current of the heater strip, by turning the knob (clockwise turning to 85%).

AUXILIARY CONVEYOR OVERLOAD RELAYS: Overload relays are provided for up to 5 HP motors for on the auxiliary conveyors. It is necessary to provide the heater elements to provide running load protection for the motors. See Fig. 6 for heater element specification.



AIRSTREAM 2 FAN MODEL GRAIN DRYER

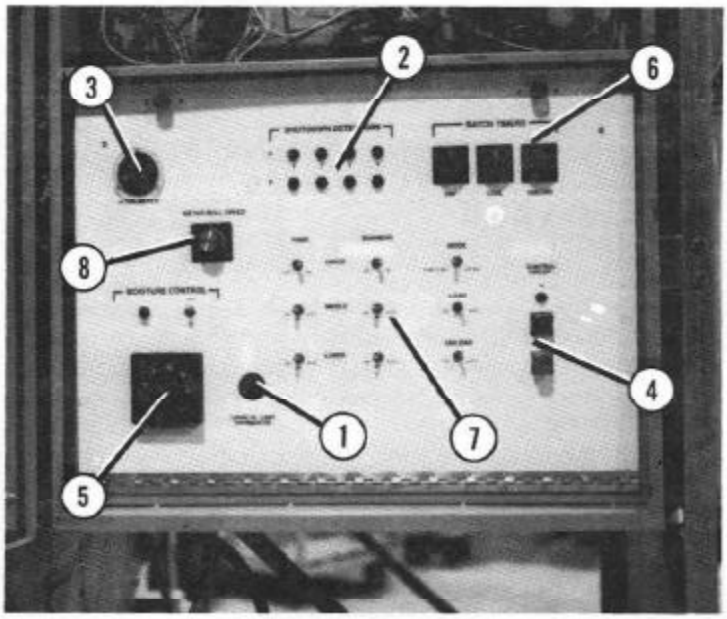
1. MERCURY SWITCH
2. LOADING MOTOR
3. FAN-HEATER CONTROL BOX
4. MAIN CONTROL BOX
5. UNLOADING MOTOR
6. PLENUM HI-LIMIT
7. GRAIN HI-LIMIT
8. BOTTOM AUGER CLEAN-OUT MECHANISM



AIRSTREAM 3 FAN MODEL GRAIN DRYER

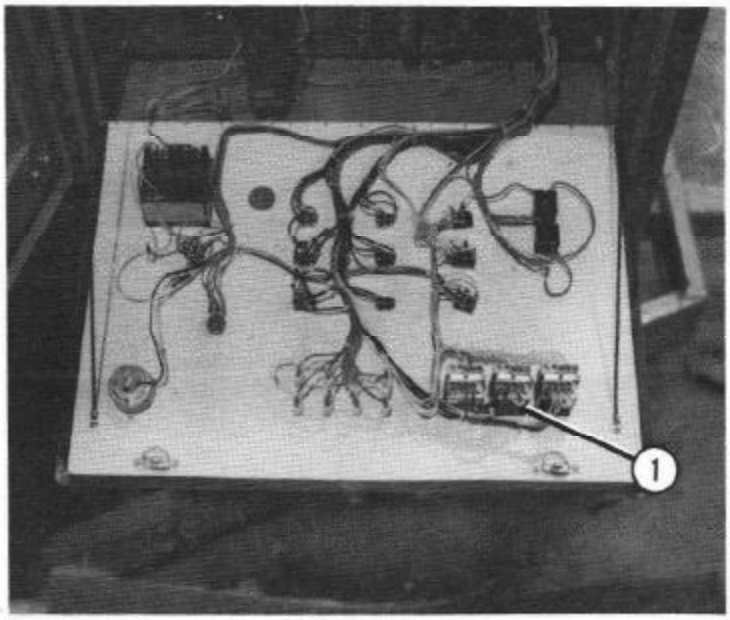
1. MERCURY SWITCH
2. LOADING MOTOR
3. FAN-HEATER CONTROL BOX
4. MAIN CONTROL BOX
5. UNLOADING MOTOR
6. PLENUM HI-LIMIT
7. GRAIN HI-LIMIT
8. BOTTOM AUGER CLEAN-OUT MECHANISM

1. ADJUSTABLE GRAIN HI-LIMIT THERMOSTAT
2. SHUT DOWN INDICATOR LIGHTS
3. HOUR METER
4. STOP & START SWITCHES
5. MC THERMOSTAT
6. BATCH TIMERS
7. CONTROL SWITCHES
8. METER ROLL ADJUSTMENT



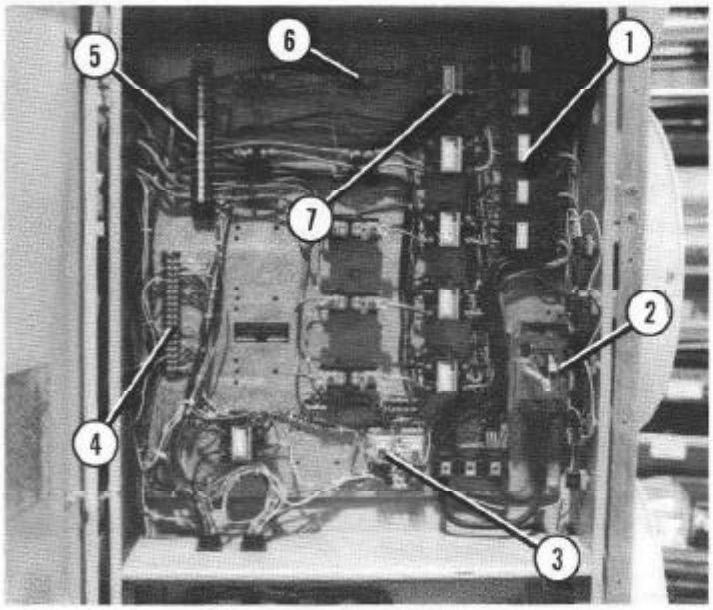
DRYER CONTROL BOARD

1. BATCH TIMERS



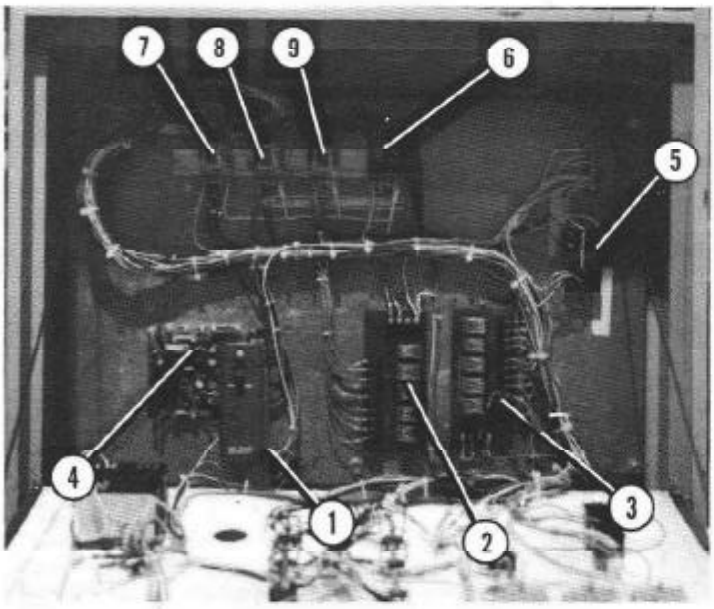
CONTROL BOX- FRONT PANEL

1. CIRCUIT BREAKERS
2. SAFETY DISCONNECT
3. RS1, RS2
4. CONTROL TERMINAL
5. POWER TERMINAL
6. OVERLOAD RELAYS
7. CONTACTORS

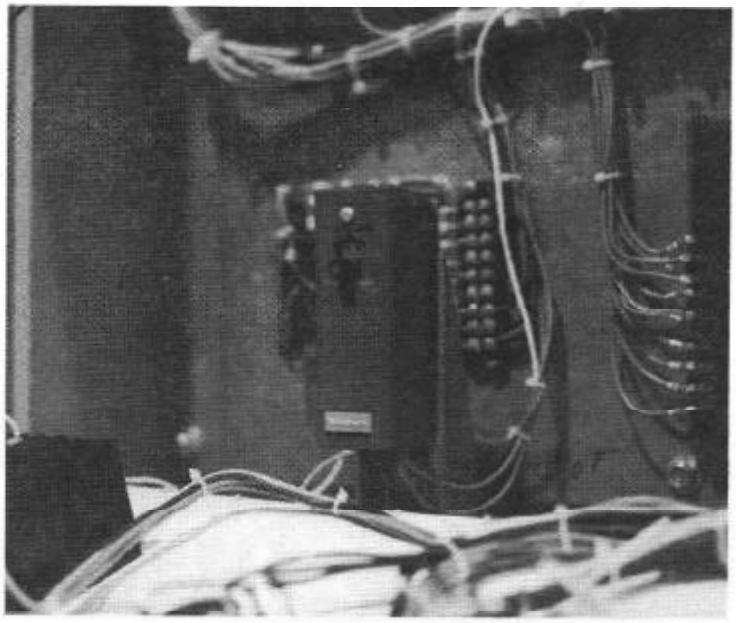


CONTROL BOX- UPPER BACK PANEL

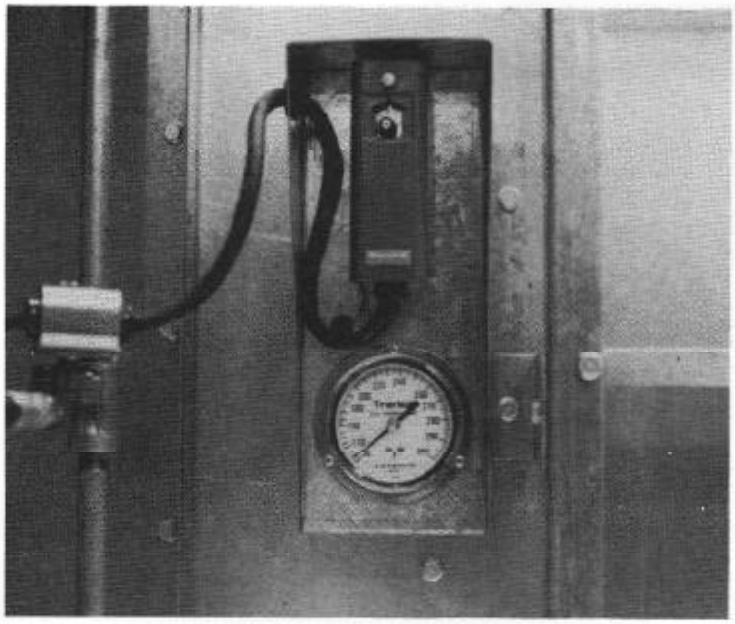
1. ADJUSTABLE GRAIN HI-LIMIT THERMOSTAT
2. SAFETY CIRCUIT BOARD B
3. SAFETY CIRCUIT BOARD A
4. D.C. DRIVE BOARD
5. TIME DELAYS
6. LOAD TIME
7. FAN RELAY
8. BURNER RELAY
9. R1 RELAY



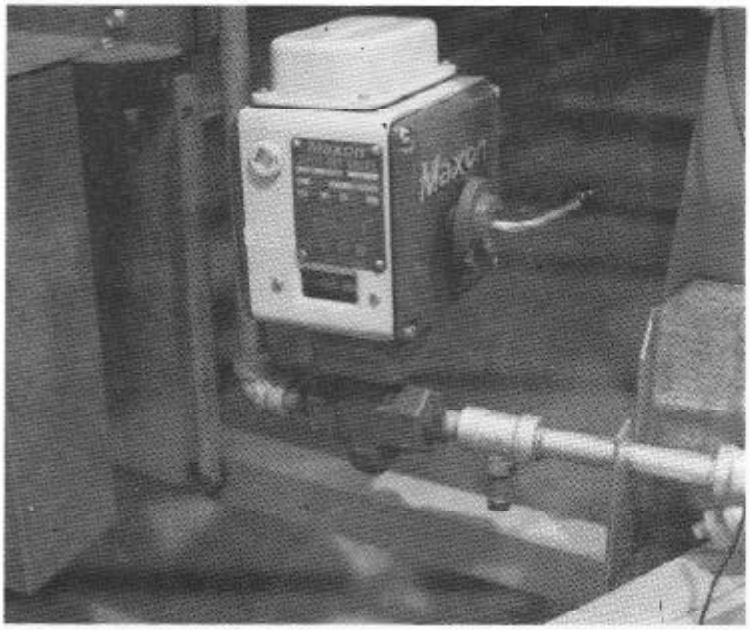
CONTROL BOX- LOWER BACK PANEL



ADJUSTABLE GRAIN HI-LIMIT

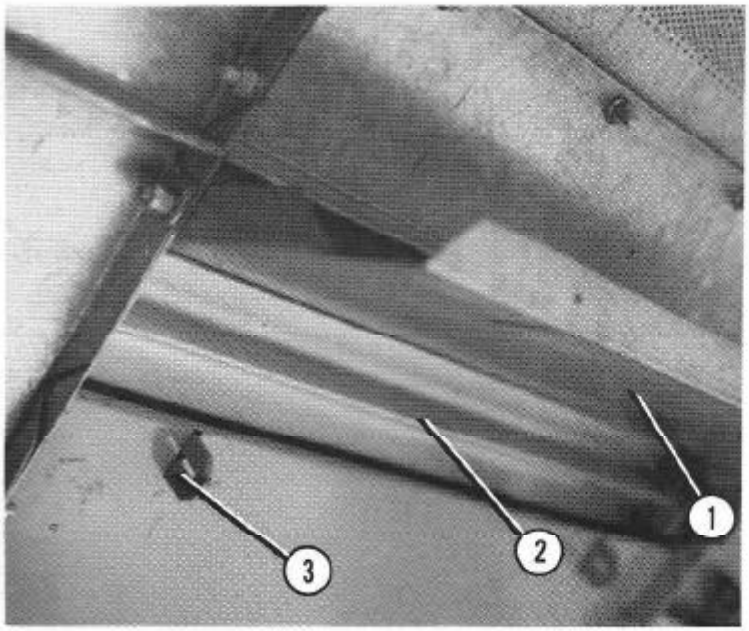


HI - LO THERMOSTAT

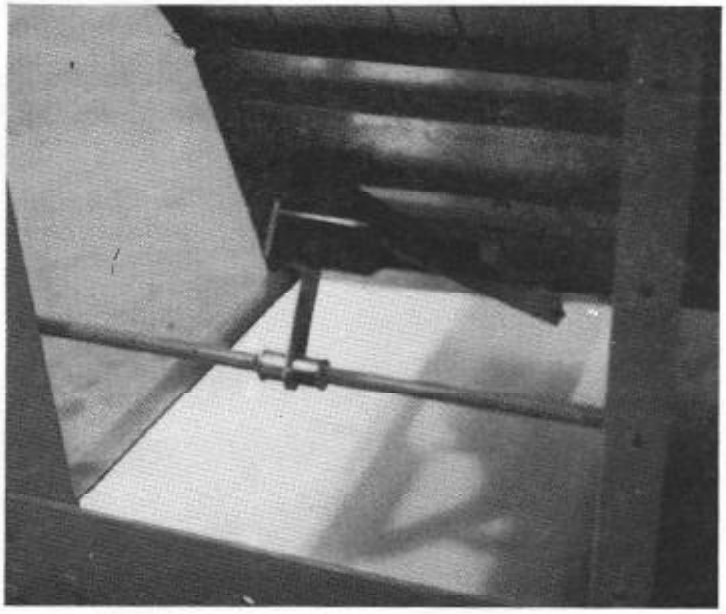


ELECTRONIC SAFETY SHUT-OFF VALVE

1. ACCESS DOOR
2. METER ROLL
3. ACCESS DOOR LATCH

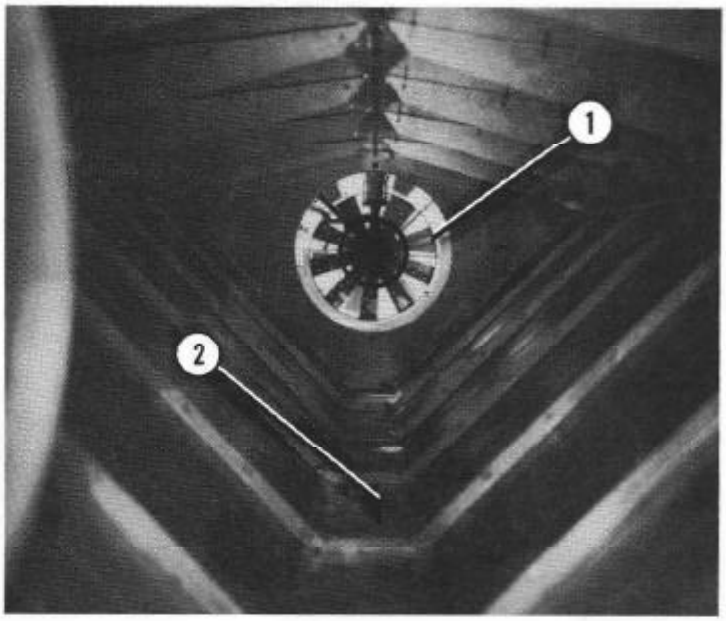


METERING ROLL ACCESS DOOR



CLEAN-OUT DOOR MECHANISM

1. FAN-HEATER
2. PLENUM BOTTOM CLOSURE PANEL



DRYER PLENUM

FUEL CONNECTION

LIQUID PROPANE (LP) DRYERS WITH INTERNAL VAPORIZERS

LIQUID DRAW: The dryer is designed to operate on liquid propane, with liquid draw from the supply tank. A piping system is provided on the dryer, including strainer, pressure relief valve, and electronic safety shut-off valve; a pressure regulator is provided on the fan-heater unit, between the vaporizer and burner.

AMMONIA TANKS: Do not use propane supply tanks which have previously contained ammonia or fertilizer solutions. These substances are extremely corrosive and damaging to fuel supply and burner parts.

OIL OR WATER IN TANKS: With liquid draw from the supply tank, any water present in the tank may freeze in the piping and controls in cold weather. To ensure that tanks are free of moisture, the usual precaution is to purge with methanol. Avoid tanks which may contain an accumulation of oil or heavy hydrocarbon from long use on a vapor withdrawal system.

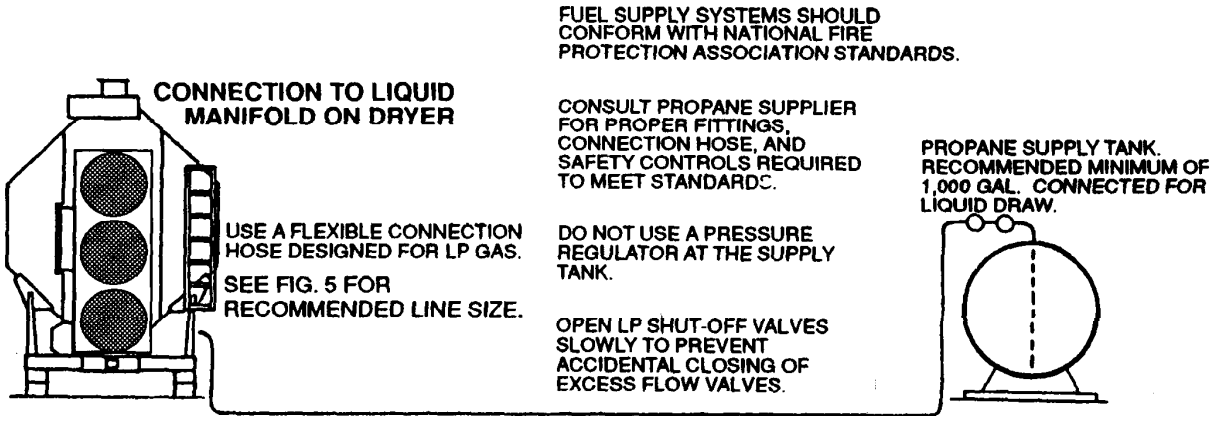


FIG. 3 LIQUID PROPANE FUEL SUPPLY

NATURAL GAS (N)

GAS VOLUME AND PRESSURE: The dryer is designed to operate on natural gas having a heat value of about 1,000 BTU per cubic foot.

The dryer is equipped with a natural gas supply pipe system connected to the heater solenoid valves. A regulated pressure of 10 PSI must be provided at the connection to the dryer, with gas available in sufficient volume to maintain the operating pressure.

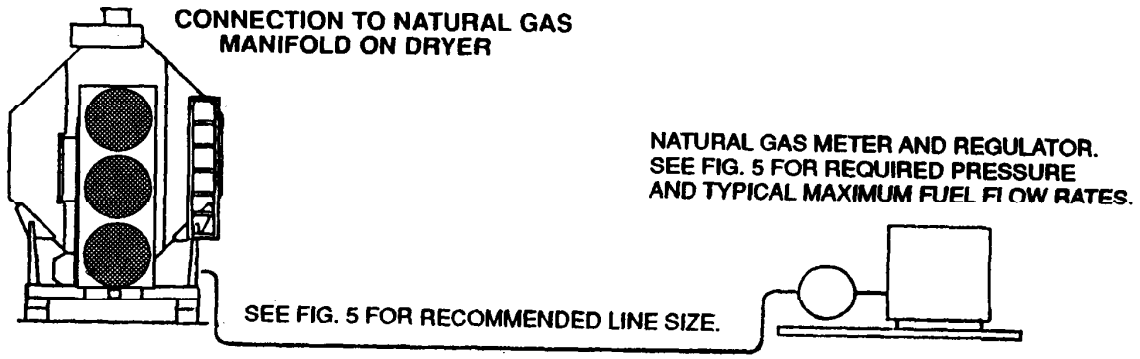


FIG. 4 NATURAL GAS FUEL SUPPLY

FUEL SYSTEM SPECIFICATIONS & RECOMMENDATIONS

		410C	425C	510C	525C
	MAXIMUM HEAT CAPACITY (BTU PER HOUR)	5,200,000	6,000,000	6,000,000	7,000,000
LIQUID PROPANE (LP)	TYPICAL MAXIMUM FUEL FLOW *(GALLONS PER HR.)	64	64	64	75
	RECOMMENDED LIQUID LINE SIZE	1/2" PIPE	1/2" PIPE	1/2" PIPE	1/2" PIPE
	HEATER ORIFICE DRILL SIZE	.218 INCH	.218 INCH	.250 PIPE	.218 INCH
	OPERATING PRESSURE RANGE (heater pressure gauge), PSI	4-20	4-20	4-20	4-20
	LO-FIRE PRESSURE SETTING, PSI	4 PSI	4 PSI	4 PSI	4 PSI
NATURAL GAS (N)	TYPICAL MAXIMUM FUEL FLOW * (CUBIC FT. PER HR.)	5,200	6,000	6,000	7,000
	MINIMUM PRESSURE AT CONNECTION TO DRYER, PSI	8 PSI	8 PSI	8 PSI	8 PSI
	RECOMMENDED MINIMUM LINE SIZE -100' DISTANCE	1 1/2" PIPE	1 1/2" PIPE	2" PIPE	2" PIPE
	HEATER ORIFICE DRILL SIZE	.3125 INCH	.3125 INCH	.375 INCH	.3125 INCH
	OPERATING PRESSURE RANGE (heater pressure gauge), PSI	2-8 PSI	2-8 PSI	2-8 PSI	2-8 PSI
	LO-FIRE PRESSURE SETTING, PSI	2 PSI	2 PSI	2 PSI	2 PSI

*MAXIMUM FUEL FLOW RATES LISTED ASSUME FULL HEAT OUTPUT FOR GAS LINE SIZING PURPOSES. IN NORMAL OPERATION THE FLOW RATES WOULD BE CONSIDERABLY LOWER THAN INDICATED, DUE TO ACTUAL PRESSURE SETTINGS USED & CYCLING OF HEATER.

FIG. 5 FUEL SYSTEMS SPECIFICATIONS AND RECOMMENDATIONS

ELECTRICAL POWER SUPPLY

POWER SUPPLY: An adequate power supply and proper wiring supply are important factors for maximum performance and long life of the dryer. Electrical service must be adequate size to prevent low voltage damage to motors and control circuits. Power supply for 1-phase models must include a neutral wire. All dryers should be field provided with a dependable equipment ground. Electrical power supply should conform to local, state, or provincial requirements.

POWER SUPPLY DISCONNECT: All dryers are equipped with a power disconnect switch in the Control Box to permit total power shut-down before opening dead front, as required for inspection and service. The power disconnect switch is located on the door of the dryer Control Box for quick shut-down.

TRANSFORMERS WIRING VOLTAGE DROP: Contact the service representative of the power supplier, to advise them of the additional load to be placed on the line. Check on KVA rating of transformers, considering total horsepower load. The power supply wiring, main switch equipment, and transformers must be capable of providing adequate motor starting and operating voltage. Voltage drop during motor starting should not exceed 14% of normal voltage, and running voltage (after motor is at full speed) should be within 8% of normal voltage.

ELECTRICAL LOAD: Fig. 6 indicates the electrical load in horsepower and full load current, for the motor on the dryer, and for auxiliary loading and take-away conveyors which can be directly connected to the power circuits in the dryer Control Panel.

OVERLOAD RELAYS: Overload relays are adjustable from 85% to 115% of normal load in amperes, as shown by the overload relay heater specifications of Fig. 6, by an adjustable knob in each relay. Dryers are shipped with overload relay, for auxiliary conveyors (adjacent to top and bottom auger contactors) to operate 5 HP, 1 phase, or 10 HP, 3 phase motors for 525C, and 7.5 HP 1 phase, or 10 HP 3 phase for 410C; if different motors are used, the heater elements must be changed to provide adequate motor overload protection.

NOTE: The heater elements are not provided with the relays for the auxiliary conveyors.

CONNECTING AUXILIARY CONVEYORS: The maximum size auxiliary conveyor motors which can be powered directly from the power terminals of the dryer are 5 HP, 1 phase, or 10 HP, 3 phase motors for 525C, and 7.5 HP 1 phase, 10 HP 3 phase for 410C, 425C, and 510C. See appropriate power circuit wiring diagram for terminal connection numbers.

To connect auxiliary auger motors which are LARGER than the maximum, refer to the following information:

A. Motors must be powered from a source outside of the dryer with the use of a separate contactor and overload protection device for each motor for 110V coil operation.

B. For automatic operation with auxiliary loading, connect one lead to the top of the load contactor wire yellow number 3. Connect the other led to the grounding lug.

C. For automatic operation with auxiliary unloading, connect one lead to the top of the unload contactor wire orange number 13. Connect the other led to the grounding lug.

D. When conveyor motors are powered from an external source and are connected for automatic type operation, their overload protective switches should be connected in series and then connected into the dryer safety circuit. For recommended connections, refer to motor overload protection connections shown within the SAFETY CIRCUIT wiring diagram.

ELECTRICAL LOAD, OVERLOAD RELAYS, & CIRCUIT BREAKERS

MODEL 410C DRYER	VOLTAGE	FAN	TOP AUGER	BOTTOM AUGER	CONVEYOR (1) MOTORS
HORSEPOWER	1-PH.-230 V. 3-PH.-220 V. 3-PH.-440 V.	5-7, 10-15 5-7, 10-15 5-7, 10-15	5 5 5	5 5 5	7.5(TWO) 10(TWO) 10(TWO)
FULL LOAD CURRENT AMPS/ MOTOR	1-PH.-230 V. 3-PH.-220 V. 3-PH.-440 V.	35, 58 15, 34 7.5, 17	24 13.0 6.5	24 13.0 6.5	31 26 13
MAX. RUNNING LOAD DRYER ONLY-AMPS	1-PH.-230 V. 3-PH.-220 V. 3-PH.-440 V.	141 75 37.5			
MAX. RUNNING LOAD (1) WITH AUX. CONV.-AMPS	1-PH.-230 V. 3-PH.-220 V. 3-PH.-440 V.	203 127 63.5			
RECOMMENDED SERVICE EQUIP. RATING-AMPS	1-PH.-230 V. 3-PH.-220 V. 3-PH.-440 V.	225 150 100			
CONTROL PANEL OVERLOAD RELAY HEATER ELEMENT SPEC.	1-PH.-230 V. 3-PH.-220 V. 3-PH.-440 V.	C30.3, F65.8 C21.4, C33.0 C12.5, C1808	C22.8 C46.3 C8.67	C22.8 C46.3 C8.67	C30.3 C25.0 C13.7
CONTROL PANEL CIRCUIT BREAKER RATING-AMPS	1-PH.-230 V. 3-PH.-220 V. 3-PH.-440 V.	60, 100 50 100 (one breaker)	100 60	100 60	(2) (2)

FIG. 6a

MODEL 510C DRYER	VOLTAGE	FAN	TOP AUGER	BOTTOM AUGER	CONVEYOR (1) MOTORS
HORSEPOWER	1-PH.-230 V. 3-PH.-220 V. 3-PH.-440 V.	10-12, 10-16 15 15	5 5 5	5 5 5	7.5 10 10
FULL LOAD CURRENT AMPS/ MOTOR	1-PH.-230 V. 3-PH.-220 V. 3-PH.-440 V.	40, 74 40 20	24 13.0 6.5	24 13.0 6.5	31 26 13
MAX. RUNNING LOAD DRYER ONLY-AMPS	1-PH.-230 V. 3-PH.-220 V. 3-PH.-440 V.	162 106 53			
MAX. RUNNING LOAD (1) WITH AUX. CONV.-AMPS	1-PH.-230 V. 3-PH.-220 V. 3-PH.-440 V.	224 158 79			
RECOMMENDED SERVICE EQUIP. RATING-AMPS	1-PH.-230 V. 3-PH.-220 V. 3-PH.-440 V.	250 200 100			
CONTROL PANEL OVERLOAD RELAY HEATER ELEMENT SPEC.	1-PH.-230 V. 3-PH.-220 V. 3-PH.-440 V.	F614B, F848B C440B C250B	C228B C163B C867A	C228B C163B C867A	C228B C228B C137B
CONTROL PANEL CIRCUIT BREAKER RATING-AMPS	1-PH.-230 V. 3-PH.-220 V. 3-PH.-440 V.	100 50 100 (one breaker)	100 60	100 60	(2) (2)

FIG. 6b

ELECTRICAL LOAD, OVERLOAD RELAYS, & CIRCUIT BREAKERS (Continued)

MODEL 425C DRYER	VOLTAGE	FAN	TOP AUGER	BOTTOM AUGER	CONVEYOR (1) MOTORS
HORSEPOWER	1-PH.-230 V. 3-PH.-220 V. 3-PH.-440 V.	5-7 5-7 5-7	5 5 5	5 5 5	7.5 10 10
FULL LOAD CURRENT AMPS/ MOTOR	1-PH.-230 V. 3-PH.-220 V. 3-PH.-440 V.	35 15 7.5	21.5 13.0 6.5	21.5 13.0 6.5	32 26 13
MAX. RUNNING LOAD DRYER ONLY-AMPS	1-PH.-230 V. 3-PH.-220 V. 3-PH.-440 V.	148 71 35.5			
MAX. RUNNING LOAD (1) WITH AUX. CONV.-AMPS	1-PH.-230 V. 3-PH.-220 V. 3-PH.-440 V.	212 123 61.5			
RECOMMENDED SERVICE EQUIP. RATING-AMPS	1-PH.-230 V. 3-PH.-220 V. 3-PH.-440 V.	225 150 100			
CONTROL PANEL OVERLOAD RELAY HEATER ELEMENT SPEC.	1-PH.-230 V. 3-PH.-220 V. 3-PH.-440 V.	C30.3 C21.4 C8.67	C22.8 C16.3 C6.95	C22.8 C16.3 C6.95	C30.3 C25.0 C13.7
CONTROL PANEL CIRCUIT BREAKER RATING-AMPS	1-PH.-230 V. 3-PH.-220 V. 3-PH.-440 V.	60 50 100 (one breaker)	100 60	100 60	(2) (2)

FIG. 6c

MODEL 525C DRYER	VOLTAGE	FAN	TOP AUGER	BOTTOM AUGER	CONVEYOR (1) MOTORS
HORSEPOWER	1-PH.-230 V. 3-PH.-220 V. 3-PH.-440 V.	7.5-10 7.5-10 7.5-10	5 5 5	5 5 5	5(TWO) 10(TWO) 10(TWO)
FULL LOAD CURRENT AMPS/ MOTOR	1-PH.-230 V. 3-PH.-220 V. 3-PH.-440 V.	42 28 14	21.5 13.0 6.5	21.5 13.0 6.5	21.5 26 13
MAX. RUNNING LOAD DRYER ONLY-AMPS	1-PH.-230 V. 3-PH.-220 V. 3-PH.-440 V.	169 110 55			
MAX. RUNNING LOAD (1) WITH AUX. CONV.-AMPS	1-PH.-230 V. 3-PH.-220 V. 3-PH.-440 V.	212 110 55			
RECOMMENDED SERVICE EQUIP. RATING-AMPS	1-PH.-230 V. 3-PH.-220 V. 3-PH.-440 V.	225 200 100			
CONTROL PANEL OVERLOAD RELAY HEATER ELEMENT SPEC.	1-PH.-230 V. 3-PH.-220 V. 3-PH.-440 V.	F48.7 C30.3 C16.3	C22.8 C16.3 C8.67	C22.8 C16.3 C8.67	C22.8 C25.0 C13.7
CONTROL PANEL CIRCUIT BREAKER RATING-AMPS	1-PH.-230 V. 3-PH.-220 V. 3-PH.-440 V.	60 50 100 (one breaker)	100 60	100 60	(2) (2)

(1) The motor current and maximum dryer running loads shown are based upon the listed HP auxiliary conveyor motors. The maximum size motor which can be powered directly through the dryer control box islisted for each dryer. All larger than maximum auxiliary conveyor motors require separate contactors and overload protectors with coil circuits connected to the dryer for automatic operation.

IMPORTANT: ALL STANDARD MODEL DRYERS ARE FACTORY EQUIPPED WITHOUT OVERLOAD RELAY HEATER ELEMENTS SIZED FOR LISTED HP AUXILIARY MOTORS. Heater elements must be matched to the actual horsepower motors used.

(2) Auxiliary motors are controlled by the top and bottom auger circuit breakers.

FIG. 6d

OPERATING INFORMATION

LOAD SWITCH (TOP AUGER)

The load switch has three positions ON - OFF - AUTO. When the switch is set to AUTO, the load timer will be energized whenever the top auger is operating. If the top auger and timer operate continuously for a period longer than the timer setting, the timer will automatically shut down the dryer. The AUTOMATIC switch position is the normal setting and is used to automatically stop the dryer when the wet grain supply is exhausted.

When the switch is set in the ON position, the load timer will not operate. The ON position is recommended when filling an empty dryer.

With the switch in either AUTO or ON, the top auger will automatically start and stop as required to keep the dryer full of grain.

UNLOAD SWITCH (BOTTOM AUGER)

The UNLOAD switch has two positions: OFF-AUTO. When operating in AUTOMATIC, the bottom auger will operate continuously if not being held by the MC thermostat. If the switch is turned OFF, only the unloading will stop and the dryer fan and burner will continue to operate.

MODE SWITCH

The MODE SWITCH is used to select either the CONTINUOUS FLOW or STAGED AUTOMATIC mode of dryer operation. The Batch Timers will not operate when switched to Continuous Flow.

FAN SWITCH

***FOR 2 FAN MODELS (410C & 510C)**

The top fan switch has two positions ON or OFF. The fan will run continuously if the fan is in the ON position. The bottom fan has three positions ON or OFF or AUTO. If set to the ON position the fan will run continuously. If the switch is set to the AUTOMATIC position, the fan will automatically stop during unloading when operating in the staged automatic mode.

***FOR 3 FAN MODELS (425C & 525C)**

The fan switch for the bottom and the middle fans have two operating positions. If either switch is set to the ON position, the fan will operate continuously. If the switch is set to AUTOMATIC, the fan will automatically stop during unloading when the dryer is operating in the staged automatic mode.

The top fan switch is designed only for ON-OFF manual type control of the fan.

BURNER SWITCH

***FOR 2 FAN MODELS (410C & 510C)**

The burner switch for the top burner controls the ON-OFF operation of the burner. With this arrangement, the burner is either operating or shut off.

The burner switch for the bottom burner has two operating positions. When it is set in the ON position, the burner will operate continuously. When set in AUTO, the burner will be controlled by the dry timer and will automatically stop during cooling and unloading, IF THE DRYER IS OPERATING IN THE STAGED AUTOMATIC MODE. If the switch is set in the OFF position, the burner will not operate.

***FOR 3 FAN MODELS (425C & 525C)**

The burner switches for the bottom and the middle burners have two operating positions. When either switch is set to the ON position, the burner will operate continuously. When set in AUTOMATIC, the burner will be controlled by the dry timer and will automatically stop during cooling and unloading, IF THE DRYER IS OPERATING IN THE STAGED AUTOMATIC MODE. If the switch is set in the Off position, the burner will not operate.

The top heater switch controls the ON-OFF operation of the burner. With this arrangement, the burner is either operating or shut off.

Refer to the appropriate STAGED AUTOMATIC OR CONTINUOUS FLOW operation chart for recommended burner switch settings for the different drying times and the type of drying process.

As a general rule: (1) If the fan switch is set in the AUTOMATIC position, the corresponding burner switch should also be set in AUTOMATIC. (2)(3 Fan Models) If the middle fan and burner switches are set in AUTOMATIC, the bottom fan switch should be set to the ON position and the bottom burner switch in the OFF position.

> NOTE: REGARDLESS OF SWITCH POSITION, THE HEATER WILL NOT OPERATE UNLESS THE FAN IS RUNNING.

GRAIN COLUMN HI-LIMIT THERMOSTAT

*** FOR 2 FAN MODELS (410C & 510C)**

The Hi-Limit thermostats are located in electrical boxes mounted on both sides of the front panel and sense the grain temperature near the outside of both grain columns above the plenum divider. The thermostats are a safety monitoring device designed to shut down the dryer, if the grain column temperature exceeds the thermostat setting.

*** FOR 3 FAN MODELS (425C & 525C)**

The Hi-Limit thermostats are located in electrical boxes mounted on both sides of the front panel and sense the grain temperature near the outside of both grain columns at the middle burner. The thermostats are safety monitoring devices designed to shut down the dryer, if the grain column temperature exceeds the thermostat setting.

Both models have one Adjustable Hi-Limit Thermostat, located with the Main Control Box, and one Fixed Hi-Limit.

MOISTURE CHECK (MC) THERMOSTAT AND INDICATOR LIGHT

The function of the MC thermostat is to sense the temperature of the grain being dried within the grain column and to automatically hold any loads of higher moisture grain for additional drying until the grain temperature reaches the MC thermostat setting. With the thermostat properly set, it will prevent the unusually wet grain from being discharged at too high of a moisture content.

When the MC thermostat is "holding" the grain for further drying, the MC indicator light will be ON, indicating that the grain temperature is below the MC setting.

The MC switch controls the operation of the MC thermostat within the dryer. The MC thermostat is located within the Main Control Panel and is equipped with a long sensor lead which monitors the grain temperature near the outside of the right-hand grain column, for 425C and 525C, at the middle burner. For the 410C and 510C, it is located above the plenum divider.

The Electronic Control Option: This option consists of an Electronic Moisture Control Thermostat, with 4 sensing points, two in each column. Operating lights are also included in this package.

WITH THE MC SWITCH IN THE ON POSITION, THE MC THERMOSTAT SHOULD BE SET AS FOLLOWS:

SETTING MC THERMOSTAT FOR CONTINUOUS FLOW OPERATION

ADJUSTMENT PROCEDURE:

1. Turn the MC thermostat down to lowest setting.
2. Operate the dryer and make the final changes in DRYING TEMPERATURES and DRYER UNLOADING SPEED until the dry grain being discharged is stabilized at the desired moisture content.
3. Turn the MC thermostat dial up to the highest setting. As the dial is turned up, the MC indicator light will come ON and the Meter Roll should stop unloading.
4. Immediately after the light comes ON, SLOWLY turn down the thermostat until the light just goes out and the Meter Roll starts unloading. The exact point where the MC light shuts off is the correct thermostat setting.

SETTING MC THERMOSTAT FOR BATCH OPERATION

ADJUSTMENT PROCEDURE:

1. Turn the MC thermostat dial down to the lowest setting.
2. Operate dryer and make final changes in DRYING TEMPERATURES until the dry grain being discharged is stabilized at the desired moisture content.
3. Turn the MC thermostat dial up to the highest setting.
4. When the drying timer has completed and the MC hold indicator light comes ON, slowly turn the MC setting DOWN until the light goes out and the next cycle begins.
5. This initial setting must be confirmed by testing the final grain moisture content during the unloading cycle.

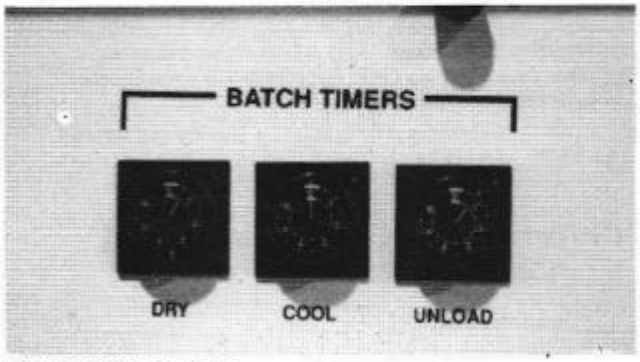


FIG. 7 BATCH TIMERS

TIMER SETTING AND ADJUSTMENT

Factory production dryers are shipped with the timers set in the 60M (sixty minutes) mode of operation, with the timer memory adjustments screw set in the "ON" position. These settings should normally not be changed for the COOL TIMER and the UNLOAD TIMER; however, for the DRY TIMER, with the DRY AND COOL method, the 60M mode will normally be limited only to moderately wet grain (less than 25% moisture). When drying 25%, or more, initial moisture content grain, it will be necessary to set the DRY TIMER to the 12HR (twelve-hour) mode of operation, as describe within "ADJUSTING THE DRYING TIME RANGE", to allow longer timer settings. See chart for suggested drying times.

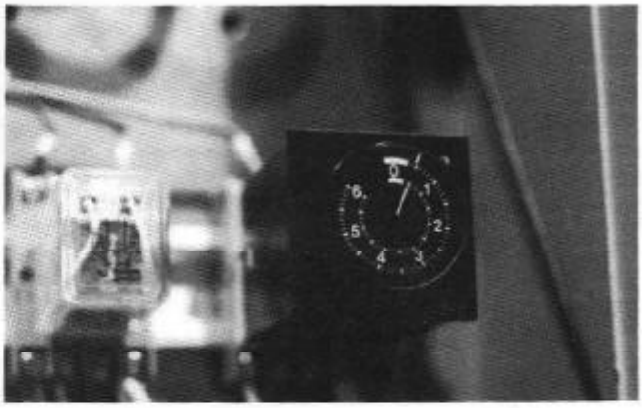


FIG. 8 LOAD TIMER

The load timer shown in Fig. 8 is located within the Control Box. It is an adjustable, automatic reset type timer and is designed to provide automatic shut-down of the dryer if the top auger operates continuously for a time period exceeding the adjustment setting, thereby indicating an absence of wet grain.

> **NOTE:** The timer is factory set in the 60 minute mode, with the memory set in the off position. This setting is correct for the load timer.

To adjust the time on any of the four timers, simply rotate the front dial to desired setting when the timer is not energized. The No.1 mark equals one-sixth of the selected range (for example, 1/6 of 60 Min. range = 10 minutes). The dial acts as a cycle progress indicated during operation, in that the outer mark shows the cycle time setting and the elapsed time.

> **NOTE:** When a timer is energized the time setting may be immediately decreased manually, but the setting cannot be increased until later when the timer is de-energized and becomes reset.

ADJUSTING THE TIME RANGE

To adjust the time RANGE (not the time setting) of the timer, proceed as outlined:

A. Use a small screwdriver and rotate the time range adjustment screw to the desired range (either 60M or 12HR) as shown in FIG. 9.

B. If the timer has been replaced or the memory adjustment has been disturbed, use a small screwdriver and rotate the memory adjustment screw to the "ON" position as shown. The screw is located on the base end of the timer. With the memory "ON", if a power interruption occurs the timer will not be reset, but will remain at that point in the time cycle and start timing from the point when the power is restored.

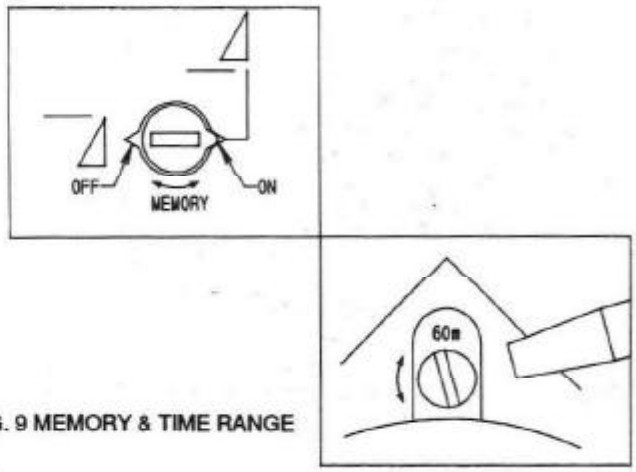


FIG. 9 MEMORY & TIME RANGE

ADDITIONAL OPERATING INSTRUCTION - STAGED AUTOMATIC

Refer to the following Staged Automatic Operation Chart and find the suggested dry timer setting, depending upon the type of grain, initial moisture content and drying method (DRY AND COOL, or FULL HEAT). The method may be changed from the DRY AND COOL to the FULL HEAT, by rotating the COOL TIMER dial fully counterclockwise to the "0" position.

The load timer is designed to shut down when the grain supply is exhausted. The Load Timer will reset after each filling cycle.

The drying timer, when set to the recommended setting, will allow the burner to operate for this predetermined time at the temperature set by the burner thermostat. At the end of the drying period, the moisture check (MC) thermostat will monitor the grain, and if the grain temperature satisfy the moisture check setting, the burner will stop operating and the cooling cycle will start. If the dryer is filled with unusually high moisture grain, the MC thermostat will remain on "MC HOLD" and continue the drying process until it meets the MC requirements.

> **NOTE:** Refer to MC thermostat section for additional details. The MC thermostat can be set so high as to "hold" on each drying cycle, in an attempt to obtain automatic moisture control. However, the MC thermostat may not provide sufficient accuracy in controlling final moisture, with uniform and consistent results, considering the somewhat variable relationship between grain temperature and final moisture, as well as the effect of other operating variables. Proper adjustment of the Dry Timer is a more reliable method of controlling final grain moisture.

The cool timer is easily adjusted for either full cooling or any degree of partial cooling. At the completion of the cooling cycle, the unloading cycle will start.

The unload timer is set at the time to unload the full content of the bottom stage. During this unloading cycle, wet grain is being added, thus eliminating the down time to load, as is required in typical batch dryers. Also the fan continues to run, permitting cooling to continue during unloading. For the Staged Auto drying mode, the meter rolls should be adjusted to provide maximum (100%) discharge rate.

At the completion of the unloading cycle, the time delay relay will allow a 10 second time delay, and will then automatically reset all three timers to their initial setting and a new drying cycle will begin.

SETTING THE LOAD TIMER - STAGED

To set the timer, observe the normal time required for the dryer to refill, then set the timer at the average refill time plus five additional minutes.

SETTING THE UNLOAD TIMER - STAGED

Check the final grain moisture during unloading. The discharge grain should be dry up to the completion of the unloading cycle. To make a quick check at the end of the cycle, immediately change the mode selector setting to "CF" to briefly continue the dryer unloading. The desired Unload Timer setting will allow a few additional bushels of dry grain to be discharged (15 to 30 seconds of unloading) before wet grain is observed. Make the necessary unload timer adjustments and return the mode selector and unloading switch to their original positions.

HI-LO FIRE BURNER THERMOSTAT & GAS PRESSURE SETTINGS

THERMOSTAT OPERATION: The drying temperature from the fan-heater unit is controlled by the HI-LO FIRE burner thermostat located on the front left of the dryer.

The thermostat senses the air plenum temperature and cycles the burner from HI-FIRE to LO-FIRE operation to maintain the desired drying temperatures as INDICATED BY THE THERMOSTAT.

HI-FIRE LO-FIRE: When the heater is operating on HI-FIRE, the burner is supplied with a relative large flow of gas from both the HI-FIRE gas solenoid valve and the flow control valve. When the burner is operating on LO-FIRE, only the flow control valve supplies the flow of gas in order to sustain burner operation.

PROPANE MODELS

HI-FIRE: The HI-FIRE gas pressure for the burner is controlled by the gas pressure regulator. For maximum heat capacity, the regulator should be adjusted WHILE OPERATING ON HI-FIRE to provide approximately 10-20 PSI, shown by the pressure gauge on the fan-heater.

LO-FIRE: Set the LO-FIRE gas pressure to approximately 4 PSI by rotating the knob on the flow control valve. Lock the setting after making this adjustment. The burner must be operating on LO-FIRE when making this adjustment.

NATURAL GAS MODELS

HI-FIRE: The HI-FIRE gas pressure is controlled by adjusting the large manual shut-off valve within the line which supplies the fan- heater. For maximum heat, set the shut-off valve to provide approximately 7 PSI WHILE THE BURNER IS OPERATING ON HI-FIRE.

LO-FIRE: Turn the handle on the small gas shut-off valve to produce a LO-FIRE gas pressure of approximately 2 PSI while the burner is operating on LO-FIRE.

BURNER CYCLE: When the burner is operating properly, it should automatically cycle at regular intervals from HI-FIRE to LO-FIRE, as indicated by the corresponding pressure change on the gas pressure gauge. It is not necessary for the burner to cycle with short 5 to 10 second intervals, BUT IT IS IMPORTANT THAT THE BURNER DOES CYCLE OCCASIONALLY.

If the burner remains in HI-FIRE and does not cycle, increase the gas regulator setting on propane models, or the main gas supply pressure on natural gas models, in order to satisfy the thermostat setting. DO NOT EXCEED 20 PSI FOR PROPANE MODELS, OR 8 PSI FOR NATURAL GAS.

If the burner remains in LO-FIRE and does not cycle, decrease the LO-FIRE gas pressure slightly by readjusting the flow control valve. **DO NOT DECREASE THE VALVE SETTING TO THE EXTENT WHERE A NOTICEABLE BURNER FLUTTER OR POPPING NOISE CAN BE HEARD, AS CAUSED BY FLAME BACKFIRE INTO THE BURNER CUP.**

METER ROLL ADJUSTMENT DIAL

DISCHARGE RATE: The meter roll adjustment shown in Fig. 10 controls the rate of dry grain discharge through the dryer.

The mechanism is equipped with a dial and 0 to 100 scale to represent the flow of grain past the metering rolls as a percent of the maximum grain discharge rate for the dryer. The maximum setting of 100% represents approximately 1800 bu/hr on the 410C or 425C, and 2300 bu./hr. on the 510C or 525C.

ADJUSTMENT: Turning the dial CLOCKWISE will INCREASE the grain discharge rate, whereas COUNTERCLOCKWISE rotation will DECREASE the discharge rate.

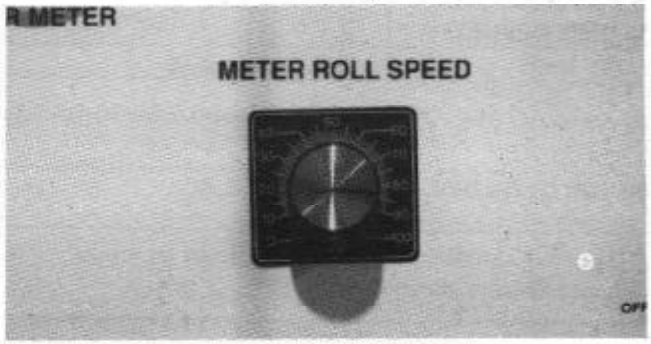


FIG. 10 METER ROLL ADJUSTMENT

SHUT-DOWN INDICATOR

LIGHT OPERATION: The shut-down indicator lights are connected within the 115 volt safety control circuit to identify the cause of unexpected dryer shut-down problems.

Due to the special circuitry of the shut-down indicators, they will quickly verify power interruption problems and locate intermittent malfunctions within the various self-resetting type safety devices within the dryer. Once an indicator light is activated, it will continue to identify the cause of dryer shut-down until the dryer is manually restarted. This will apply even if a safety device which has interrupted the dryer circuit may have already reset itself.

Anytime the circuit breakers are turned ON to energize the safety and control circuits the Fan Heater indicator light should come ON and remain ON until the dryer has been started. Once the start button has been depressed and the dryer starts operating, the light should go out.

NOTE: The detector unit is designed so that if a malfunction occurs within the unit, such as a bad light or poor wiring connections, it will not prevent the dryer from operating, but will only cause abnormal action of the indicator lights.

TO RESTART THE DRYER AFTER SHUT-DOWN

LIGHT PRIORITY:

1. Investigate the cause of shut-down and perform any necessary adjustment or corrections. For additional information, refer to heading "Control Circuit Not Energized" within trouble analysis procedure. As a future reference, it may be advisable to make a record of the cause, as indicated by the shut-down indicator.

NOTE: On rare occasions, several dryer safety devices may act to interrupt the safety control circuit. If this occurs, the LOWEST NUMBER INDICATOR LIGHT on the detector will always take priority, as the unit is constructed to indicate only one cause at a time.

IMPROPER OPERATION:

2. Press the dryer START button. When the start button is pressed, the dryer control light should come ON, indicating the dryer is operational.

   If the dryer still not restart, the cause must be further investigated and corrected. In the event of a dryer shut-down where the dryer will not restart and there is no detector light ON, the problem can be further indentified as follows:

   A. Depress the dryer start button and observe if the dryer circuit becomes energized.

   B. If the dryer will now start while the button is held depressed, it will isolate the problem to within the dryer safety circuit and verify that the detector unit is not operating properly. Refer to TROUBLE-SHOOTING and THE SAFETY CIRCUIT WIRING DIAGRAM for additional information.

   C. The reason the dryer may now restart is due to the fact that holding the button depressed will act to by-pass the various safety devices within the circuit of the dryer.

SHUT-DOWN INDICATOR LIGHT IDENTIFICATION

CONTROL	LOCATION	MONITOR BOARD CONNECTION TERMINALS		
		CONTROL CONNECTION	SENSOR TERMINALS	TERMINAL
FAN-HEATER LOWER	FAN-HEATER	17 +16	2 + 3	2-3
FAN-HEATER MIDDLE	FAN-HEATER	16 + 15	3 + 4	3-4
FAN-HEATER TOP *SEE BELOW	FAN-HEATER	15 + 14	4 + 5	4-5
FIXED GRAIN HI-LIMIT THERMOSTAT	LEFT-HAND COLUMN: In Handy Box on front panel (behind ladder).	18 + 17	1 + 2	1-2
ADJUSTABLE GRAIN HI-LIMIT THERMOSTAT	IN CONTROL BOX		3 + 4	3-4
LOAD TIMER	IN CONTROL BOX		4 + 5	4-5
PLENUM HI-LIMIT THERMOSTAT	RIGHTHAND SIDE ON FRONT PANEL	14 + 13	1 + 2	1-2
MOTOR OVERLOAD	IN CONTROL BOX		2 + 3	2-3

* The safety controls being monitored in the fan-heater consist of a fan motor thermal overload, burner hi-limit thermostat and burner lockout.

FIG. 11

OPERATING PRECAUTIONS

1. Keep the dryer CLEAN. Do not allow fine material to accumulate in the plenum chamber.
2. Set pressure regulator to avoid excessive gas pressure applied to burner during ignition and when burner is in operation. See Chart for operating procedures. Do not exceed maximum recommended drying temperature.
3. Power supply should be OFF for service of electrical components. Use CAUTION in checking voltages or other procedures requiring power to be ON.
4. Do not operate the dryer if any gas leaks are detected. Shut down and repair before further operation.
5. Clean grain is easier to dry. Fine material increases resistence to air flow and requires removal of extra moisture.
6. Use CAUTION in working around high speed fans, gas burners, augers, and auxiliary conveyors which start automatically.
7. Keep auger drive belts tight enough to prevent slippage.
8. Be certain that capacities of auxiliary conveyors are matched to dryer auger capacities.
9. Do not operate in an area where combustible material will be drawn into the fan.
10. Never operate dryer while guards are removed.
11. Before attempting to remove and reinstall the propellor, make certain to read the recommended procedure listed within the SERVICING section of the manual.
12. Never attempt to operate the dryer by jumping or otherwise bypassing any safety devices on the unit.
13. Read and understand the operating manual before attempting to operate the unit.

TEST FIRING

Before the dryer is filled and placed into actual drying operation, thoroughly inspect the unit and check out the operation as described:

1. SET CONTROLS AND SWITCHES AS DESCRIBED IN THE FOLLOWING CHART:

CONTROL	TEST FIRING SETTING
MC SWITCH	ON
MC THERMOSTAT	MINIMUM TEMPERATURE
HI-LIMIT THERMOSTATS	MAXIMUM TEMPERATURE
LOAD SWITCH	OFF
UNLOAD SWITCH	OFF
ALL FAN SWITCH	OFF
ALL BURNER SWITCH	OFF
LOADING TIMER	30 MINUTES
METERING RATE ADJUSTMENT	0
DRY TIMER	1 MINUTE
COOL TIMER	1 MINUTE
UNLOAD TIMER	30 SECONDS
MODE SWITCH	CONTINUOUS FLOW

2. INSPECT METERING ROLLS: Open all metering roll access doors and inspect each compartment for any bolts, nuts or other foreign hardware. Remove any material present to prevent possible jamming of the metering rolls.
3. Set all circuit breakers to ON position and turn ON the Safety Disconnect.
4. Open the main fuel supply valve at the tank, also turn on electric shut off valve to allow fuel flow to the dryer and inspect all gas lines and connections for possible leaks.

ANY GAS LEAKS MUST BE CORRECTED, IMMEDIATELY.

NOTE: On LP models, open shut-off valves SLOWLY to prevent accidental closing of excess flow valve within the system.

5. Depress the dryer Start button. The red indicator light should immediately come ON indicating that the safety circuit and control circuit are energized to allow dryer operation.

   NOTE: The dryer is designed so the red indicator light will not come ON unless ALL CIRCUIT BREAKERS ARE TURNED ON.

6. CHECK CONVEYOR MOTORS FOR PROPER DIRECTION OF ROTATION
   A. With the wet grain supply shut off, quickly bump (jog) the LOADING switch to the ON position. The top auger should rotate CLOCKWISE, as viewed from the drive end. Any wet grain auxiliary supply conveyors connected to the dryer power terminals should also start and rotate in the proper direction.
   B. Flip the UNLOADING switch to AUTO position. Turn up the meter roll dial until the meter roll begins. The bottom auger and metering roll drive motor should rotate COUNTERCLOCKWISE, as viewed from the drive end. Any dry grain auxiliary conveyors connected to the dryer power terminals should also start and rotate in the proper direction.
   C. After checking bottom auger motor, leave the unloading switch in AUTO position and slowly turn up the MC Thermostat control. As the MC Thermostat setting is increased, the MC indicator light should come ON and the meter roll should stop operating.

      NOTE: The bottom auger will stop after the one minute cleanout, if the dryer is still being held by the MC Thermostat.

      Rotate the MC Thermostat down to its minimum setting. The MC light should go OFF again, and the meter roll should restart. The bottom auger will restart provided they had previously stopped.

7. CHECK METERING ROLL OPERATION:

   With bottom auger still operating, turn the metering roll adjustment dial and check the metering roll drive mechanism for proper operation through out the full speed range of operation. Make sure all drive chains are properly tensioned and that all sections of the metering rolls rotate properly.

   Turn the UNLOAD switch to OFF position after checks are completed.

8. CHECK FAN MOTOR DIRECTION OF ROTATION:

   Bump (jog) fan switch and observe direction of motor rotation. On 410C models, the 24" fan (bottom) should run clockwise, while the 28" (top) fan should run counterclockwise. On the 425C and 525C, all fans should run clockwise. On the 510C, both fans should run counterclockwise.

   NOTE: On three phase model dryers, if all of the motors run backward, they can easily be reversed by interchanging wires L1 and L3 (leaving the high leg in the center) of the three power supply connections to the dryer. Auxiliary conveyors which have been field connected may have to be reversed individually.

9. CHECK BURNER SAFETY LOCK-OUT FUNCTION

   Start the bottom fan (and turn bottom burner switch to the ON position. WITH THE MAIN GAS SHUT-OFF VALVE CLOSED, THE SAFETY CIRCUIT WITHIN THE BURNER CONTROL SYSTEM MUST FUNCTION AFTER A SHORT INTERVAL AND CAUSE THE DRYER TO SHUT DOWN.

   Turn bottom fan switch to OFF position, then wait for several minutes and turn the next fan and burner switches to the ON position. Depress the start button and perform the same type of safety circuit check for this burner.

For 3 FAN MODELS (425C & 525C)

Repeat this test for the top burner to verify that the burner safety circuits for all fan-heaters are functioning properly.

If any burner can not be forced into the safety lock-out condition, consult local serviceman or the Factory Service Department. **DO NOT ATTEMPT TO PLACE THE DRYER INTO ACTUAL OPERATION UNTIL THE PROBLEM HAS BEEN LOCATED AND CORRECTED.**

10. **BURNER FIRING**

    Turn on Main Fuel Supply Line.

    Start all fans and turn all burner switches to the ON position. All burners should fire after a short purge interval and gas pressure should be indicated on the pressure gauge for each burner.

    Adjust bottom burner Hi-Lo fire thermostat to approximately 200°F to cause burner to operate on Hi-Fire. Observe gas pressure indicated on pressure gauge, then turn thermostat down to its minimum setting to cause burner to cycle into Lo-Fire. As the burner thermostat is turned down, the gas pressure gauge should show a noticable drop in pressure, indicating the Hi-Fire gas solenoid valve has closed and the burner is being supplied with only the reduced flow of gas through the flow control valve.

    NOTE: For additional information concerning the actual recommended gas pressure setting and the adjustment procedure, refer to the operating instructions.

    Repeat procedures for each burner and verify that all burners will function in both Hi-Fire and Lo-fire.

11. **CHECK STAGED AUTOMATIC MODE OF OPERATION**

    A. With the unload switch OFF and the control circuit activated, set bottom and middle burner switches to AUTO position. For 410C and 510C, set just the bottom switch.

    B. Turn bottom fan switch to Auto position and set middle fan switch to ON position. Both fans should start operating and the burners should fire after the purge interval. For 410C and 510C, set just the bottom switch.

    C. Turn the control selector switch to STAGED AUTOMATIC and set the unloading switch to AUTO position. Observe the following events as they occur:

    The dryer timer will become energized and begin.

    After approximately one minute, both burners will shut down and the fans will continue to operate.

    After another minute the cooling timer will reach zero. This will cause the unloading timer to begin. At the same time, the bottom auger and any auxiliary unloading conveyors should start, and bottom fan should stop operating.

    When the unloading timer reaches zero it will automatically reset to its original setting and cause the drying timer to operate and begin. At the same time: (1) the unloading should stop, (2) Bottom fan should start operating after the short purge period.

12. STOP DRYER OPERATION

    Push the STOP button. The fan, burner, and augers should immediately stop operating as the button is depressed.

    With dryer properly functioning, as described in previous steps, the unit may be considered ready for drying operation. REFER TO OPERATING INSTRUCTIONS FOR PROCEDURE AND CONTROL SETTINGS.

DRYER OPERATION

FULL HEAT DRYING

FULL HEAT OPERATION: With this type of drying, the grain is discharged hot, with no cooling. Drying capacity is substantially higher with FULL HEAT than the DRY AND COOL process. Refer to FULL HEAT OPERATION CHART for additional information concerning dryer settings and drying capacity.

DRYERATION PROCESS: The full heat process is called "Dryeration". Recommended procedure is to temper the hot grain for 4 to 10 hours in a cooling bin or storage bin, then cool by an aeration fan at an air flow rate of 1/2 to 1 CFM per bushel of grain in the hot batch being cooled. The process of tempering and slow cooling provides higher quality in shelled corn because of less stress cracking of kernels and less breakage during subsequent handling of the grain.

FINAL MOISTURE: From 1 to 3% moisture is usually removed in the cooling process, so hot shelled corn is removed from the dryer at about 17% moisture if the final desired moisture content is 15%.

DRYING TEMPERATURES

THERMOMETER: The drying temperature is shown by the thermometer located on the front left-hand side of the dryer.

SHELLED CORN: For shelled corn with an initial moisture content of 25-30%, the recommended maximum drying temperature is 210°–230° F. For lower initial moisture content, lower drying temperatures are recommended.

SMALL GRAIN: For drying small grain (wheat, oats, milo), 150° F is suggested.

RICE, SOYBEANS: Drying temperatures are critical in drying rice and soybeans. A temperature of 130°-140° F. is recommended to keep grain temperature low.

DRYING EFFICIENCY: The general rule for obtaining the highest drying efficiency is to use the highest possible drying temperatures which will not adversely affect grain quality.

FINAL MOISTURE CONTENT

METER ROLL ADJUSTMENT: It is necessary to frequently check the moisture content of discharged grain while the proper meter roll setting is being established, and moisture should subsequently be checked periodically to indicate the need of any change in the setting. Such change will be necessary if there is an appreciable change in average initial moisture content.

DRYER SHUT-DOWN

COOLING HOT GRAIN: If the dryer is to be shut down while filled with grain, it is recommended that hot grain be cooled for 10 to 15 minutes, especially in cold weather, to prevent water vapor condensation and possible freezing of such condensate following shut down.

FUEL BURN-OUT: When a vaporizer-equipped burner is to be shut down for several hours or more, it is recommended that pressure be relieved on vaporizer and supply lines by first closing the valve at the supply tank, then letting the burner operate until the flame stops from lack of fuel; immediately turn burner OFF. After the burner is OFF, close all other valves in fuel supply piping.

SHUT-DOWN: To stop the dryer, push control circuit STOP button, turn OFF safety disconnect, move all circuit breakers OFF, turn main power supply OFF, and close all valves in the fuel supply lines to the dryer.

OPERATING INSTRUCTIONS CHART

1. Refer to OPERATING CONTROLS for important information concerning adjustments for gas pressure, thermostat settings, load auger timer, meter rolls, and control settings.
2. Measure moisture content of wet grain.
3. Refer to DRYING TIME TABLE and determine the approximate drying time required to provide the required moisture reduction.
4. Refer to TEST FIRING and START-UP INSTRUCTION chart and perform the procedures listed.
5. Using the recommended drying time, refer to the OPERATION CHARTS for suggested drying settings and other information.
6. For Continuous Flow mode, decrease meter roll discharge rate for lower final moisture content in the dried grain. Increase the discharge rate for higher final moisture content. Raising or lowering drying air temperatures will reduce or increase final moisture. Changes in moisture content of wet grain require adjustment of discharge rate.

APPROXIMATE DRYING TIME TABLE FOR VARIOUS INITIAL MOISTURE CONTENTS

DRYING PROCESS	FINAL MOISTURE IN DRYER	DRYINGTIME-MINUTES * — INITIAL MOISTURE CONTENT - PERCENT (20 30 40 50 60 70 80 90 100)
DRYERATION-SHELLED CORN To approximate 17% final moisture in dryer: 15% in cooling bin by full heat process. 200-220°F average drying temp.	17%	20 21 23 25 27 29 30
COMBINATION DRYING-SHELLED CORN To approximate 20% final moisture in dryer. 220-230°F. average drying temp. 15% in bin by low temperature drying.	20%	23 25 27 29 30 32
To approximate 22% final moisture in dryer. 220-230°F. Average drying temp. 15% in bin by low temperature drying.	22%	25 28 30 32
FULL HEAT-OTHER GRAINS Wheat, Milo, Soybeans, Rough Rice to approximately 13% final moisture in dryer. 150°F. drying temperature for Wheat and Milo, 130°F. drying temperatures for Soybeans and Rough Rice.	13%	15 17 18 20 22

* **Actual drying time varies with grain physiological factors (kernel size, chemical composition, seed variety, seasonal weather), weather conditions during drying, and other operating variables; lower final moisture content significantly increases drying time; moisture contents are % wet basis.**

Basic Definition-Bushel, Shelled Corn: 56lbs. @15.5%; 56x.845=47.32lbs. Dry Matter

To Yield a Bushel @ 15.5%: 47.32/.85 = 55.67 lbs. @ 15%; 47.32/.80 = 59.15 lbs. @ 20%; 47.32/.75 = 63.09 lbs. @ 25%

Dry to Wet Bushel Conversion Ratios: 20-15%, 59.15/55.67 = 1.06; 25-15%, 63.09/55.67 = 1.13

CONTINUOUS FLOW START-UP PROCEDURE - 410C & 510C

TEST OPERATE the dryer immediately prior to start-up, to make certain all motors and controls are functional before loading the dryer with wet grain.

1. Set Controls As Listed:
   A. Temporarily set all burner (plenum) thermostats at the drying temperature recommended for normal operation of the top stage burner (for example; 220°-230°F for shelled corn).
   B. MC selector OFF.
   C. Control selector on CONTINUOUS FLOW.
   D. Loaders OFF; Unloaders OFF.
   E. Fans OFF; Burners OFF.
2. Depress the dryer START button; the red indicator light should come on.
3. Load ON; fill the dryer.
4. First, determine the approximate total drying time for the type of grain and the drying process to be from the Drying Time Table.
   NOTE: For example, with 25% moisture shelled corn, using the DRY AND COOL process, and final desired moisture of 15% (10% removal), the estimated drying time is 60 minutes.
5. Using the total drying time from Step 4, refer to the appropriate drying time chart for Continuous Flow operation and determine the normal drying time per stage.
   NOTE: For the 60 minute drying time example mentioned earlier, the drying time per stage would be 30 minutes for the 410C with the DRY AND COOL process.
6. Turn BOTTOM FAN and BURNER switches ON and operate bottom stage for one start-up time period, as established in Step 5.
7. Operate the dryer for an additional start-up period.
8. For DRY AND COOL operation, turn BOTTOM BURNER switch OFF. For FULL HEAT drying keep BOTTOM burner switch ON and readjust bottom stage drying temperature to the normal recommended setting.
9. Turn TOP FAN and BURNER switches ON.
10. Operate dryer for approximately one start-up time, as determined in Step 5.
11. While dryer is operating, adjust the metering roll dial to the recommended trial setting. To determine the setting, refer to the appropriate drying time chart for CONTINUOUS FLOW OPERATION and determine the approximate drying capacity corresponding to the proper total drying time. Then, use this capacity and refer to the metering roll discharge chart (located at the far right-hand side of the chart) to determine the required initial dial setting.
12. At the end of this cycle, turn the unload switch to AUTO and set all FLOW OPERATION controls as indicated by the appropriate dryer time chart.
13. Check the final moisture content and readjust the unloading rate slightly, if required.
   NOTE: The time required for the grain to pass completely through the dryer is the time necessary to notice a stabilized change in final moisture content after adjust

STAGED AUTOMATIC START-UP PROCEDURE - 410C & 510C

TEST OPERATE the dryer immediately prior to start-up, to make certain all motors and controls are functional before loading the dryer with wet grain.

1. Set Controls As Listed:
   A. Temporarily set all burner (plenum) thermostats at the drying temperature recommended for normal operation of the top stage burner (for example, 220°-230°F for shelled corn).
   B. MC Selector OFF.
   C. For start-up purposes only, set control selector on CONTINUOUS FLOW
   D. Loaders OFF; Unloaders OFF
   E. Fans OFF; Burners OFF
2. Depress the dryer START button; red indicator light should come on.
3. Loaders ON; fill the dryer
4. First, determine the approximate total START-UP drying time for the type of grain and the drying process to be used from the Drying Time Table.
   NOTE: For example, with 25% moisture shelled corn using the DRY AND COOL process, and final desired moisture of 15% (10% removal), the estimated drying time is 60 minutes.
5. Using the total drying time from Step 4, refer to the appropriate drying time chart for Staged Automatic operation and determine the normal operating drying times.
   NOTE: For the 60 minutes drying time example mentioned earlier, the dry timer would be 5.6 and cool timer would be 18 minutes for the 410C with the DRY AND COOL process.
6. The start-up time is equal to the normal operating time plus 3.7 minutes (3.7 minutes is the approximate unload time at 100% discharge rate).
7. Turn BOTTOM FAN and BURNER switches ON and operate bottom stage for one start-up drying time period, as determined in Step 6.
   NOTE: The dry timer may be used as a timing device by setting it to the required time, and then moving the selector switch to STAGED AUTOMATIC and observing timer operation.
8. Readjust BOTTOM STAGE drying temperature to the normal BOTTOM STAGE drying temperature (approximately 170°F for earlier examples).
9. Set selector switch to STAGED AUTOMATIC.
10. Set all controls as listed in the appropriate drying time chart for the estimated drying time and proceed in the described staged automatic mode of operation.

NOTE: The timer settings listed are based upon a meter roll adjustment setting of 100%. This setting provides an unload time of approximately 3.7 minutes for the bottom stage. IF A LOWER DISCHARGE RATE IS REQUIRED, THE UNLOADING TIMER SETTING SHOULD BE INCREASED BY THE AMOUNT OF ADDITIONAL UNLOADING TIME NEEDED. THE DRYING TIMER NEEDS TO BE DECREASED SO THAT THE OVER ALL TIME REMAINS THE SAME.

11. A couple cycles are required for final moisture content to stabilize. Check final moisture and readjust the timers, as required.

DRYING TIME CHART

C - SERIES 410C - CONTINUOUS FLOW OPERATION

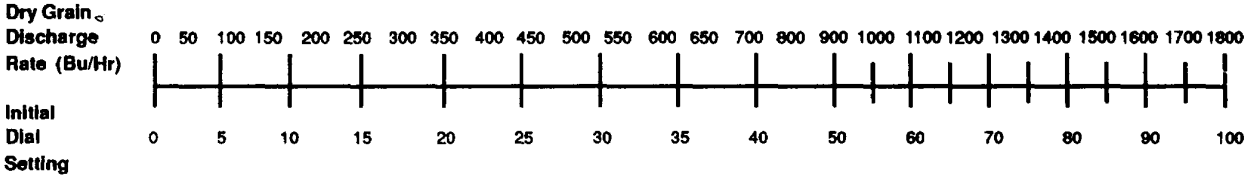
	DRY AND COOL PROCESS			FULL HEAT PROCESS	
TOTAL *1 DRYING TIME MIN	DRYING TIME PER STAGE MIN.	COOL TIME MIN.	APPROX. *2 DRYING CAP. BU/HR	DRYING TIME PER STAGE MIN.	APPROX. *2 DRYING CAP. BU/HR
20	10	10	640	6.7	962
24	12	12	533	8.0	802
28	14	14	457	9.3	688
32	16	16	400	10.7	602
36	18	18	356	12.0	535
40	20	20	321	13.3	481
44	22	22	292	14.7	438
48	24	24	267	16.0	401
52	26	26	247	17.3	370
56	28	28	229	18.7	344
60	30	30	214	20.0	321
64	32	32	200	21.3	301
68	34	34	189	22.7	283
72	36	36	178	24.0	267
76	38	38	169	25.3	253
80	40	40	160	26.7	241
84	42	42	153	28.0	229
88	44	44	146	29.3	219
92	46	46	139	30.7	209
96	48	48	134	32.0	200
100	50	50	128	33.3	192
104	52	52	123	34.7	185
108	54	54	119	36.0	178
112	56	56	115	37.3	172

TOP AUGER SWITCH	AUTOMATIC	AUTOMATIC
BOTTOM AUGER SWITCH	AUTOMATIC	AUTOMATIC
MODE SWITCH	CONTINUOUS FLOW	CONTINUOUS FLOW
BOTTOM FAN	ON	ON
BOTTOM BURNER	OFF	ON
TOP FAN & BURNER	ON	ON
MC SELECTOR SWITCH	ON	ON
BATCH TIMERS	NOT USED	NOT USED
METER ROLL ADJUSTMENT	SEE METER ROLL DISCHARGE CHART	SEE METER ROLL DISCHARGE CHART

*1. See Drying Time Table for estimated drying time for various grain drying processes and moisture reductions.

*2. Approx. drying capacities are shown as dry bushels or 1.25 cu ft.; wet bushels of 25% corn – 1.13 x dry bushels.

METERING ROLL DISCHARGE CHART



DRYING TIME CHART

C - SERIES 410C - STAGED AUTOMATIC OPERATION

	DRY AND COOL PROCESS						FULL HEAT PROCESS		
TOTAL *1 DRYING TIME MIN.	DRY TIMER SETTING MIN.	COOL TIMER SETTING MIN.	UNLOAD TIMER SETTING MIN.	BOTTOM FAN SWITCH	BOTTOM BURNER SWITCH	APPROX. *3 DRYING CAP. BU/HR	DRY TIMER SETTING MIN	UNLOAD TIMER SETTING MIN.	APPROX. *3 DRYING CAP. BU/HR
20 *2	7.0	0	3.5	ON	OFF	609	3	3.5	962
24 *2	8.5	0	3.5	ON	OFF	533	4	3.5	802
28 *2	10.5	0	3.5	ON	OFF	457	6	3.5	688
32 *2	12.5	0	3.5	ON	OFF	400	7	3.5	602
36 *2	13.5	0	3.5	ON	OFF	376	8	3.5	535
40 *2	16.5	0	3.5	ON	OFF	330	10	3.5	491
44 *2	18.5	0	3.5	ON	OFF	292	11	3.5	438
48	1.6	18.0	3.5	AUTO	AUTO	277	12	3.5	401
52	3.0	18.0	3.5	AUTO	AUTO	262	14	3.5	370
56	4.3	18.0	3.5	AUTO	AUTO	248	15	3.5	344
60	5.6	18.0	3.5	AUTO	AUTO	236	16	3.5	321
64	7.0	18.0	3.5	AUTO	AUTO	225	18	3.5	301
68	8.3	18.0	3.5	AUTO	AUTO	215	19	3.5	283
72	9.6	18.0	3.5	AUTO	AUTO	206	20	3.5	267
76	11.0	18.0	3.5	AUTO	AUTO	197	22	3.5	253
80	12.3	18.0	3.5	AUTO	AUTO	189	23	3.5	241
84	13.6	18.0	3.5	AUTO	AUTO	182	24	3.5	229
88	15.0	18.0	3.5	AUTO	AUTO	176	26	3.5	219
92	16.3	18.0	3.5	AUTO	AUTO	169	27	3.5	209
96	17.6	18.0	3.5	AUTO	AUTO	164	28	3.5	200
100	19.0	18.0	3.5	AUTO	AUTO	158	30	3.5	192
104	20.3	18.0	3.5	AUTO	AUTO	153	31	3.5	185
108	21.6	18.0	3.5	AUTO	AUTO	149	32	3.5	178
112	23.0	18.0	3.5	AUTO	AUTO	144	34	3.5	172

TOP AUGER SWITCH	AUTOMATIC	AUTOMATIC
BOTTOM AUGER SWITCH	AUTOMATIC	AUTOMATIC
MODE SWITCH	STAGED AUTOMATIC	STAGED AUTOMATIC
BOTTOM FAN & BURNER	SET AS INDICATED	ON
TOP FAN & BURNER	ON	ON
MC SELECTOR SWITCH	ON	ON
DRY TIMER	SET AS INDICATED	SET AS INDICATED
COOL TIMER	SET AS INDICATED	0
METER ROLL ADJUSTMENT	100%	100%

*1 See Drying Time Table for estimated drying time for various grain drying processes and moisture reductions.

*2 Grain may not be sufficiently cooled with this setting. Please check with factory representive.

*3 Drying capacities assume a meter roll adjustment setting of 100% and are shown as dry bushels or 1.25 cu.ft.:wet bushels of 25% corn = 1.13 x dry bushels. Greater or less actual unloading rate affects drying capacity for SA and D&C.

DRYING TIME CHART

C - SERIES 510C - CONTINUOUS FLOW OPERATION

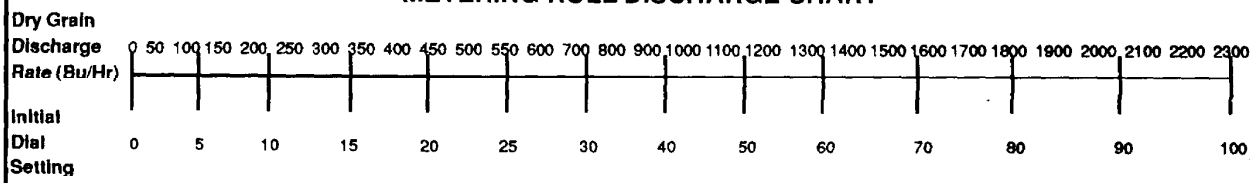
	DRY AND COOL PROCESS			FULL HEAT PROCESS	
TOTAL *1 DRYING TIME MIN	TOTAL TIME IN DRYER MIN.	COOL TIME MIN.	APPROX. *2 DRYING CAP. BU/HR	DRYING TIME PER STAGE MIN.	APPROX. *2 DRYING CAP. BU/HR
20	30	10	824	6.7	1233
24	36	12	686	8.0	1027
28	42	14	588	9.3	881
32	48	16	515	10.7	765
36	54	18	457	12.0	685
40	60	20	412	13.3	614
44	66	22	384	14.7	561
48	72	24	343	16.0	507
52	78	26	316	17.3	472
56	84	28	294	18.7	436
60	90	30	274	20.0	409
64	96	32	257	21.3	383
68	102	34	242	22.7	365
72	108	36	228	24.0	338
76	114	38	216	25.3	320
80	120	40	206	26.7	303
84	126	42	196	28.0	294
88	132	44	187	29.3	276
92	138	46	179	30.7	267
96	144	48	171	32.0	258
100	150	50	164	33.3	249
104	156	52	158	34.7	240
108	162	54	152	36.0	231
112	168	56	147	37.3	222

TOP AUGER SWITCH	AUTOMATIC	AUTOMATIC
BOTTOM AUGER SWITCH	AUTOMATIC	AUTOMATIC
MODE SWITCH	CONTINUOUS FLOW	CONTINUOUS FLOW
BOTTOM FAN	ON	ON
BOTTOM BURNER	OFF	ON
TOP FAN & BURNER	ON	ON
MC SELECTOR SWITCH	ON	ON
BATCH TIMERS	NOT USED	NOT USED
METER ROLL ADJUSTMENT	SEE METER ROLL DISCHARGE CHART	SEE METER ROLL DISCHARGE CHART

*1. See Drying Time Table for estimated drying time for various grain drying processes and moisture reductions.

*2. Approx. drying capacities are shown as dry bushels or 1.25 cu ft.; wet bushels of 25% corn = 1.13 x dry bushels.

METERING ROLL DISCHARGE CHART



DRYING TIME CHART

C - SERIES 510C - STAGED AUTOMATIC OPERATION

	DRY AND COOL PROCESS						FULL HEAT PROCESS		
TOTAL *1 DRYING TIME MIN.	DRY TIMER SETTING MIN.	COOL TIMER SETTING MIN.	UNLOAD TIMER SETTING MIN.	BOTTOM FAN SWITCH	BOTTOM BURNER SWITCH	APPROX. *2 DRYING CAP. BU/HR	DRY TIMER SETTING MIN	UNLOAD TIMER SETTING MIN.	APPROX. *2 DRYING CAP. BU/HR
20	7.0	0	3.5	ON	OFF	824	3	3.5	1216
24	8.5	0	3.5	ON	OFF	686	4	3.5	1012
28	10.5	0	3.5	ON	OFF	588	6	3.5	868
32	12.5	0	3.5	ON	OFF	515	7	3.5	759
36	13.5	0	3.5	ON	OFF	457	8	3.5	675
40	16.5	0	3.5	ON	OFF	412	10	3.5	607
44	18.5	0	3.5	ON	OFF	375	11	3.5	552
48	1.6	18	3.5	AUTO	AUTO	355	12	3.5	506
52	3.0	18	3.5	AUTO	AUTO	336	14	3.5	467
56	4.3	18	3.5	AUTO	AUTO	318	15	3.5	434
60	5.6	18	3.5	AUTO	AUTO	303	16	3.5	405
64	7.0	18	3.5	AUTO	AUTO	289	18	3.5	379
68	8.3	18	3.5	AUTO	AUTO	276	19	3.5	357
72	9.6	18	3.5	AUTO	AUTO	264	20	3.5	337
76	11.0	18	3.5	AUTO	AUTO	253	22	3.5	319
80	12.3	18	3.5	AUTO	AUTO	243	23	3.5	303
84	13.6	18	3.5	AUTO	AUTO	234	24	3.5	289
88	15.0	18	3.5	AUTO	AUTO	226	26	3.5	276
92	16.3	18	3.5	AUTO	AUTO	218	27	3.5	264
96	17.6	18	3.5	AUTO	AUTO	210	28	3.5	253
100	19.0	18	3.5	AUTO	AUTO	203	30	3.5	243
104	20.3	18	3.5	AUTO	AUTO	197	31	3.5	233
108	21.6	18	3.5	AUTO	AUTO	191	32	3.5	225
112	23.0	18	3.5	AUTO	AUTO	185	34	3.5	217

TOP AUGER SWITCH	AUTOMATIC	AUTOMATIC
BOTTOM AUGER SWITCH	AUTOMATIC	AUTOMATIC
MODE SWITCH	STAGED AUTOMATIC	STAGED AUTOMATIC
BOTTOM FAN & BURNER	SET AS INDICATED	ON
TOP FAN & BURNER	ON	ON
MC SELECTOR SWITCH	ON	ON
DRY TIMER	SET AS INDICATED	SET AS INDICATED
COOL TIMER	SET AS INDICATED	0
METER ROLL ADJUSTMENT	100%	100%

*1 See Drying Time Table for estimated drying time for various grain drying processes and moisture reductions.

*2 Drying capacities assume a meter roll adjustment setting of 100% and are shown as dry bushels or 1.25 cu.ft.;wet bushels of 25% corn = 1.13 x dry bushels. Greater or less actual unloading rate affects drying capacity for SA and D&C.

CONTINUOUS FLOW START-UP PROCEDURE - 425C & 525C

TEST OPERATE the dryer immediately prior to start-up, to make certain all motors and controls are functional before loading the dryer with wet grain.

1. Set Controls As Listed:
   A. Temporarily set all burner (plenum) thermostats at the drying temperature recommended for normal operation of the top stage burner (for example, 220°-230° F for shelled corn).
   B. MC selector OFF.
   C. Control selector on CONTINUOUS FLOW.
   D. Loaders OFF; Unloaders OFF.
   E. Fans OFF; Burners OFF.
2. Depress the dryer START button; the red indicator light should come on.
3. Loaders ON; fill the dryer.
4. First, determine the approximate total drying time for the type of grain and the drying process to be from the Drying Time Table.
   NOTE: For example, with 25% moisture shelled corn, using the DRY AND COOL process, and final desired moisture of 15% (10% removal), the estimated drying time is 60 minutes.
5. Using the total drying time from Step 4, refer to the appropriate drying time chart for continuous flow operation and determine the normal drying time per stage.
   NOTE: For the 60 minute drying time example mentioned earlier, the drying time per stage would be 30 minutes for the DRY AND COOL process.
6. Turn BOTTOM FAN and BURNER switches ON and operate bottom stage for one start-up time period, as established in Step 5.
7. Readjust BOTTOM STAGE drying temperature to the normal MIDDLE STAGE drying temperature (approximately 180°F for the Dry and Cool example mentioned earlier).
8. Turn MIDDLE FAN and BURNER switches ON and operate both bottom and middle stages for an additional start-up time period.
9. For DRY AND COOL operation, turn BOTTOM BURNER switch OFF. For FULL HEAT drying, keep BOTTOM BURNER switch ON and readjust bottom stage drying temperature to the normal recommended setting.
10. Readjust MIDDLE stage drying temperature to the normal recommended setting.
11. Turn TOP FAN and BURNER switch ON.
12. Operate dryer for approximately 1/2 of the start-up time, as determined in Step 5.
13. While dryer is operating, adjust the metering roll dial to the recommended trial setting. To determine the setting, refer to the appropriate drying time chart for CONTINUOUS FLOW OPERATION and determine the approximate drying capacity corresponding to the proper total drying time. Then, use this capacity and refer to the metering roll discharge chart (located at the far right-hand side of the chart) to determine the required initial dial setting.
14. At the end of the third start-up cycle, turn unload switch to AUTO and set all FLOW OPERATION controls as indicated by the appropriate drying time chart.
15. Check the final moisture content and readjust the unloading rate slightly, if required.
    NOTE: The time required for the grain to pass completely through the dryer is the time necessary to notice a stabilized change in final moisture content after adjustment. During start-up, some variation will naturally occur.
16. Set MC thermostat as described in the manual.

STAGED AUTOMATIC START-UP PROCEDURE - 425C & 525C

TEST OPERATE the dryer immediately prior to start-up, to make certain all motors and controls are functional before loading the dryer with wet grain.

1. Set Controls As Listed:
   A. Temporarily set all burner (plenum) thermostats at the drying temperature recommended for normal operation of the top stage burner (for example, 220°-230° F for shelled corn).
   B. MC Selector OFF.
   C. For start-up purposes only, set control selector on CONTINUOUS FLOW.
   D. Loaders OFF; Unloaders OFF
   E. Fans OFF; Burners OFF
2. Depress the dryer START button; red indicator light should come on.
3. Loaders ON; fill the dryer.
4. First, determine the approximate total START-UP drying time for the type of grain and the drying process to be used from the Drying Time Table.
   NOTE: For example, with 25% moisture shelled corn using the DRY AND COOL process, and final desired moisture of 15% (10% removal), the estimated drying time is 60 minutes.
5. Using the total drying time from Step 4, refer to the appropriate drying time chart for staged automatic operation and determine the normal operating times.
   NOTE: For the 60 minutes drying time example mentioned earlier, the operating times would be 5.6 for the dry timer and 18 for cool timer.
6. The start-up time is equal to the normal operating time plus 3.7 minutes (3.7 minutes is the approximate unload time at 100% discharge rate).
7. Turn BOTTOM FAN and BURNER switches ON and operate bottom stage for one start-up drying time period, as determined in Step 6.
   NOTE: The dry timer may be used as a timing device by setting it to the required time, and then moving the selector switch to STAGED AUTOMATIC and observing timer operation.
8. Readjust BOTTOM STAGE drying temperature to the normal MIDDLE STAGE drying temperature (approximately 200°F for earlier examples).
9. Turn MIDDLE FAN and BURNER switches ON and operate both bottom and middle stages for an additional start-up time period.
10. Set selector switch to STAGED AUTOMATIC.
11. Reset BOTTOM and MIDDLE stage drying temperatures to recommended settings (approximately 230°F for top stage, 200°F for middle stage, and 170°F for bottom stage for earlier shelled corn example).
12. Set all controls as listed in the appropriate dryer time chart for the estimated drying time and proceed in the described staged automatic mode of operation.

NOTE: The timer settings listed are based upon a meter roll adjustment setting of 100%. This setting provides an unload time of approximately 3.7 minutes for the bottom stage. IF A LOWER DISCHARGE RATE IS REQUIRED, THE UNLOADING TIME SETTING SHOULD BE INCREASED BY THE AMOUNT OF ADDITIONAL UNLOADING TIME NEEDED. THE DRYING TIMER WILL NEED TO BE DECREASED, TO KEEP OVER ALL DRYING TIME THE SAME.

13. Several cycles are required for final moisture content to stabilize. Check final moisture and readjust the timers, if required.

DRYING TIME CHART

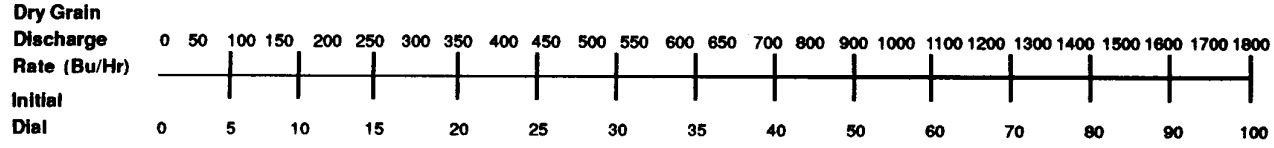
C-SERIES 425C - CONTINUOUS FLOW OPERATION

	DRY AND COOL PROCESS				FULL HEAT PROCESS	
TOTAL *1 DRYING TIME MIN.	DRYING TIME PER STAGE MIN.	COOL *3 TIME MIN.	NO 2 BURNER SWITCH	APPROX. *2 DRYING CAP. BU/HR	DRYING TIME PER STAGE MIN.	APPROX. *2 DRYING CAP. BU/HR
20	20	40	OFF	321	6.7	962
24	24	48	OFF	267	8.0	802
28	28	56	OFF	229	9.3	688
32	32	64	OFF	200	10.7	602
36	18	18	ON	356	12.0	535
40	20	20	ON	321	13.3	481
44	22	22	ON	292	14.7	438
48	24	24	ON	267	16.0	401
52	26	26	ON	247	17.3	370
56	28	28	ON	229	18.7	344
60	30	30	ON	214	20.0	321
64	32	32	ON	200	21.3	301
68	34	34	ON	189	22.7	285
72	36	36	ON	178	24.0	267
76	38	38	ON	169	25.3	253
80	40	40	ON	160	26.7	241
84	42	42	ON	153	28.0	229
88	44	44	ON	146	29.3	219
92	46	46	ON	139	30.7	209
96	48	48	ON	134	32.0	201
100	50	50	ON	128	33.3	192
104	52	52	ON	123	34.7	185
108	54	54	ON	119	36.0	178
112	56	56	ON	115	37.3	172

TOP AUGER SWITCH	AUTOMATIC	AUTOMATIC
BOTTOM AUGER SWITCH	AUTOMATIC	AUTOMATIC
MODE SWITCH	CONTINUOUS FLOW	CONTINUOUS FLOW
BOTTOM FAN	ON	ON
BOTTOM BURNER	OFF	ON
MIDDLE FAN	ON	ON
MIDDLE BURNER	SET AS INDICATED	ON
TOP FAN & BURNER	ON	ON
MC SELECTOR SWITCH	ON	ON
BATCH TIMERS	NOT USED	NOT USED
METER ROLL ADJUSTMENT	SEE METER ROLL DISCHARGE CHART	SEE METER ROLL DISCHARGE CHART

*1. See Drying Time Table for estimated drying time for various grain drying processes and moisture reductions.
*2. Approx. drying capacities are shown as dry bushels or 1.25 cu. ft.; wet bushels of 25% corn = 1.13 x dry bushels.
*3. Assumed cooling time is 18 mins.; greater or less actual required cooling time will affect capacity.

METERING ROLL DISCHARGE CHART



DRYING TIME CHART

C-SERIES 425C - STAGED AUTOMATIC OPERATION

	DRY AND COOL								FULL HEAT		
TOTAL *1 DRYING TIME	DRY *2 TIMER MIN.	COOL *3 TIMER MIN.	UNLOAD TIMER MIN.	BOTTOM FAN SWITCH	BOTTOM BURNER SWITCH	MIDDLE FAN SWITCH	MIDDLE BURNER SWITCH	APPROX *4 DRYING CAP.	DRY TIMER MIN.	UNLOAD TIMER MIN.	APPROX DRYING BU/HR
20	6.1	4.2	3.5	ON	OFF	AUTO	AUTO	463	3.1	3.5	962
24	8.8	2.8	3.5	ON	OFF	AUTO	AUTO	422	4.4	3.5	802
28	11.4	1.5	3.5	ON	OFF	AUTO	AUTO	388	5.8	3.5	688
32	14.1	0.2	3.5	ON	OFF	AUTO	AUTO	359	7.1	3.5	602
36	0.0	14.4	3.5	ON	OFF	ON	ON	356	8.4	3.5	535
40	0.0	16.4	3.5	ON	OFF	ON	ON	321	9.8	3.5	481
44	0.0	18.4	3.5	ON	OFF	ON	ON	292	11.1	3.5	438
48	1.6	18	3.5	AUTO	AUTO	ON	ON	277	12.4	3.5	401
52	3.0	18	3.5	AUTO	AUTO	ON	ON	262	13.8	3.5	370
56	4.3	18	3.5	AUTO	AUTO	ON	ON	248	15.1	3.5	344
60	5.6	18	3.5	AUTO	AUTO	ON	ON	236	16.4	3.5	321
64	7.0	18	3.5	AUTO	AUTO	ON	ON	225	17.8	3.5	301
68	8.3	18	3.5	AUTO	AUTO	ON	ON	215	19.1	3.5	283
72	9.6	18	3.5	AUTO	AUTO	ON	ON	206	20.4	3.5	267
76	11.0	18	3.5	AUTO	AUTO	ON	ON	197	21.8	3.5	253
80	12.3	18	3.5	AUTO	AUTO	ON	ON	189	23.1	3.5	241
84	13.6	18	3.5	AUTO	AUTO	ON	ON	182	24.4	3.5	229
88	15.0	18	3.5	AUTO	AUTO	ON	ON	176	25.8	3.5	219
92	16.3	18	3.5	AUTO	AUTO	ON	ON	169	27.1	3.5	209
96	17.6	18	3.5	AUTO	AUTO	ON	ON	164	28.4	3.5	200
100	19.0	18	3.5	AUTO	AUTO	ON	ON	158	29.8	3.5	192
104	20.3	18	3.5	AUTO	AUTO	ON	ON	153	31.1	3.5	185
108	21.6	18	3.5	AUTO	AUTO	ON	ON	149	32.4	3.5	178
112	23.0	18	3.5	AUTO	AUTO	ON	ON	144	33.8	3.5	172

Top Auger Switch	AUTO	AUTO
Bottom Auger Switch	AUTO	AUTO
Mode Switch	STAGED AUTO	STAGED AUTO
Bottom Fan & Burner Switch	Set as Indicated	ON
Middle Fan & Burner Switch	Set as Indicated	ON
TOP Fan & Burner Switch	ON	ON
MC Selector Switch	ON	ON
	If cooling in NO. 2 stage, set to OFF	
Dryer Timer	Set as Indicated	Set as Indicated
Cool Timer	Set as Indicated	0
Unload Timer	Set as Indicated	Set as Indicated
Meter Roll Adj. Dial	100%	100%

*1 See Drying Time Table for estimated drying time for various grain drying processes and moisture reductions.

*2 Dry timer setting is equal to minutes of bottom and middle burner operation when on Automatic.

*3 Assumed cooling time is 18 mins.; greater or less actual required cooling time will affect capacity.

*4 Drying capacities assume a meter roll adjustment setting of 100% and are shown as dry bushels or 1.25 cu/ft.; wet bushels of 25% corn = 1.13 x dry bushels. Greater or less actual unloading rate affects drying capacity for SA, D&C.

DRYING TIME CHART

C-SERIES 525C - CONTINUOUS FLOW OPERATION

	DRY AND COOL PROCESS				FULL HEAT PROCESS	
TOTAL *1 DRYING TIME MIN.	DRYING TIME PER STAGE MIN.	COOL *3 TIME MIN.	NO 2 BURNER SWITCH	APPROX. *2 DRYING CAP. BU/HR	DRYING TIME PER STAGE MIN.	APPROX. *2 DRYING CAP. BU/HR
20	20	40	OFF	412	6.7	1238
24	24	48	OFF	343	8.0	1030
28	28	56	OFF	294	9.3	884
32	32	64	OFF	258	10.7	773
36	18	18	ON	458	12.0	687
40	20	20	ON	412	13.3	618
44	22	22	ON	375	14.7	562
48	24	24	ON	343	16.0	515
52	26	26	ON	317	17.3	476
56	28	28	ON	294	18.7	442
60	30	30	ON	275	20.0	412
64	32	32	ON	258	21.3	386
68	34	34	ON	242	22.7	364
72	36	36	ON	229	24.0	343
76	38	38	ON	217	25.3	325
80	40	40	ON	206	26.7	309
84	42	42	ON	196	28.0	294
88	44	44	ON	187	29.3	281
92	46	46	ON	179	30.7	269
96	48	48	ON	172	32.0	258
100	50	50	ON	165	33.3	247
104	52	52	ON	158	34.7	238
108	54	54	ON	153	36.0	229
112	56	56	ON	147	37.3	221

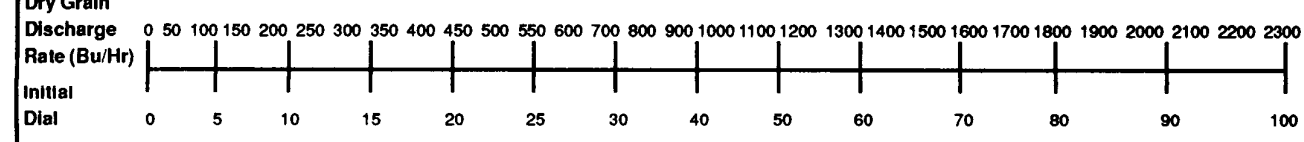
TOP AUGER SWITCH	AUTOMATIC	AUTOMATIC
BOTTOM AUGER SWITCH	AUTOMATIC	AUTOMATIC
MODE SWITCH	CONTINUOUS FLOW	CONTINUOUS FLOW
BOTTOM FAN	ON	ON
BOTTOM BURNER	OFF	ON
MIDDLE FAN	ON	ON
MIDDLE BURNER	SET AS INDICATED	ON
TOP FAN & BURNER	ON	ON
MC SELECTOR SWITCH	ON	ON
BATCH TIMERS	NOT USED	NOT USED
METER ROLL ADJUSTMENT	SEE METER ROLL DISCHARGE CHART	SEE METER ROLL DISCHARGE CHART

*1. See Drying Time Table for estimated drying time for various grain drying processes and moisture reductions.

*2. Approx. drying capacities are shown as dry bushels or 1.25 cu. ft.; wet bushels of 25% corn = 1.13 x dry bushels.

*3. Assumed cooling time is 18 mins.; greater or less actual required cooling time will affect capacity.

METERING ROLL DISCHARGE CHART



DRYING TIME CHART

C-SERIES 525C - STAGED AUTOMATIC OPERATION

	DRY AND COOL								FULL HEAT		
TOTAL *1 DRYING TIME	DRY *2 TIMER MIN.	COOL *3 TIMER MIN.	UNLOAD TIMER MIN.	BOTTOM FAN SWITCH	BOTTOM BURNER SWITCH	MIDDLE FAN SWITCH	MIDDLE BURNER SWITCH	APPROX *4 DRYING CAP.	DRY TIMER MIN.	UNLOAD TIMER MIN.	APPROX DRYING BU/HR
20	6.1	4.1	3.3	ON	OFF	AUTO	AUTO	594	3.0	3.3	1238
24	8.8	2.8	3.3	ON	OFF	AUTO	AUTO	542	4.3	3.3	1030
28	11.4	1.5	3.3	ON	OFF	AUTO	AUTO	498	5.7	3.3	884
32	14.1	0.1	3.3	ON	OFF	AUTO	AUTO	461	7.0	3.3	773
36	0	14.4	3.3	ON	OFF	ON	ON	458	8.3	3.3	687
40	0	16.3	3.3	ON	OFF	ON	ON	412	9.7	3.3	618
44	0	18.3	3.3	ON	OFF	ON	ON	375	11.0	3.3	562
48	1.6	18	3.3	AUTO	AUTO	ON	ON	355	12.3	3.3	515
52	2.9	18	3.3	AUTO	AUTO	ON	ON	336	13.7	3.3	476
56	4.2	18	3.3	AUTO	AUTO	ON	ON	318	15.0	3.3	442
60	5.6	18	3.3	AUTO	AUTO	ON	ON	303	16.3	3.3	412
64	6.9	18	3.3	AUTO	AUTO	ON	ON	289	17.7	3.3	386
68	8.2	18	3.3	AUTO	AUTO	ON	ON	276	19.0	3.3	364
72	9.6	18	3.3	AUTO	AUTO	ON	ON	264	20.3	3.3	343
76	10.9	18	3.3	AUTO	AUTO	ON	ON	253	21.7	3.3	325
80	12.2	18	3.3	AUTO	AUTO	ON	ON	243	23.0	3.3	309
84	13.6	18	3.3	AUTO	AUTO	ON	ON	234	24.3	3.3	294
88	14.9	18	3.3	AUTO	AUTO	ON	ON	226	25.7	3.3	281
92	16.2	18	3.3	AUTO	AUTO	ON	ON	218	27.0	3.3	269
96	17.6	18	3.3	AUTO	AUTO	ON	ON	210	28.3	3.3	258
100	18.9	18	3.3	AUTO	AUTO	ON	ON	203	29.7	3.3	247
104	20.2	18	3.3	AUTO	AUTO	ON	ON	197	31.0	3.3	238
108	21.6	18	3.3	AUTO	AUTO	ON	ON	191	32.3	3.3	229
112	22.9	18	3.3	AUTO	AUTO	ON	ON	185	33.7	3.3	221

Top Auger Switch	AUTO	AUTO
Bottom Auger Switch	AUTO	AUTO
Mode Switch	STAGED AUTO	STAGED AUTO
Bottom Fan & Burner Switch	Set as indicated	ON
Middle Fan & Burner Switch	Set as Indicated	ON
TOP Fan & Burner Switch	ON	ON
MC Selector Switch	ON	ON
Dryer Timer	Set as Indicated	Set as Indicated
Cool Timer	Set as Indicated	0
Unload Timer	Set as Indicated	Set as Indicated
Meter Roll Adj. Dial	100%	100%

*1 See Drying Time Table for estimated drying time for various grain drying processes and moisture reductions.

*2 Dry timer setting is equal to minutes of bottom and middle burner operation when on Automatic.

*3 Assumed cooling time is 18 mins.; greater or less actual required cooling time will affect capacity.

*4 Drying capacities assume a meter roll adjustment setting of 100% and are shown as dry bushels or 1.25 cu/ft.; wet bushels of 25% corn = 1.13 x dry bushels. Greater or less actual unloading rate affects drying capacity for SA , D&C.

SERVICE

SEASONAL INSPECTION AND SERVICE

The dryer is made of weather resistant construction and is designed to require a minimum of service; however, we recommend the following items be checked before the unit is used each season. Replace any damaged or questionable parts. THESE CHECKS WILL HELP ELIMINATE POSSIBLE FAILURES AND ASSURE DEPENDABLE OPERATION OF THE EQUIPMENT WHEN IT IS NEEDED.

1. Shut-off electrical power. Open main Control Box and remove Fan-Heater Control Box cover and inspect for moisture, rodent damage, or accumulated foreign material. Remove any foreign material present. INSPECT FOR AND TIGHTEN ANY LOOSE TERMINAL CONNECTIONS. Replace any damaged or deteriorated wiring.
2. Check propellor for freedom of rotation and uniform tip clearance. It should also be inspected for accumulated dirt and grain dust, ESPECIALLY INSIDE THE HUB, as any additional weight can seriously affect the balance and result in harmful vibrations and shortened bearing life. Keep inside of the housing free of dirt build-up for efficient fan performance.
3. Check propellor for free side play. Any side play is an indication of defective motor bearings which should be replaced to prevent a complete motor failure. MAKE SURE MOTOR MOUNT BOLTS ARE TIGHT.
4. Motor bearings should be relubricated periodically, depending upon operating conditions. Under normal usage, it is desirable to have the motor cleaned and checked and the bearings repacked by an authorized service station every two to three seasons. If the unit is operated continuously through most of the year, this service should be performed each year.

   NOTE: If on site bearing relubrication is to be performed, see LUBRICATION INSTRUCTIONS FOR BALL BEARING MOTORS, FIG. 15.

   To keep motor bearings properly lubricated and dispel any accumulation of moisture within the windings, the fan and auger motors should be operated for 15 to 30 minutes each month.

   The motor manufacturers' Authorized Service Station list is packed with all units and should be saved for reference and identification of service stations.
5. Remove and clean the gas line strainers. Make certain gas valves are closed and that gas is purged from systems before attempting disassembly.
6. Inspect the primary air screen (at the top of the burner casting) and the burner cup for any accumulation of foreign material. Clean if required. Foreign material in the burner cup or casting will not burn out and will impair burner operation.
7. Inspect ignitor plug and clean the electrodes, if required. Use an ignition point file to remove carbon and rust between the electrode surfaces. Spark gap should be about 1/8 inch.
8. Inspect flame switch for possible damage or poor connections. Flame switch and ignitor plug wires must be in good condition.
9. Inspect and manually rotate the top auger paddle assembly. The paddle unit must rotate freely without any indication of sticking or binding.
10. Inspect the top auger and bottom auger drive lines for proper adjustment and condition. Readjust line tension, as required. See Fig. 16.

    NOTE: All of the auger and meter roll bearings are lifetime lubricated and do not require service relubrication.
11. Operate dryer clean-out levers and check clean-out hatch mechanism for proper operation. With hatch open, inspect for and remove any accumulation of dirt, fines, and foreign material from the bottom auger trough area.

LUBRICATION INSTRUCTIONS FOR BALL BEARING MOTORS (FIG. 15)

SUGGESTED RELUBRICATION INTERVALS *

HOURS OR SERVICE PER YEAR	H.P. RANGE	SUGGESTED RELUBE INTERVAL
5000	1/8 to 7 1/2 10 to 40 50 to 150	5 years 3 years 1 year
Continuous Normal Applications	1/8 to 7 1/2 10 to 40 50 to 150	1 year 3 years 9 months
Seasonal Service Motor is Idle for 6 Months or More	All	1 year (beginning of season)
Continuous High Ambients, Dirty or Moist Locations, High Vibrations or where Shaft End is Hot (Pumps-Fans)	1/8 to 40 50 to 150	6 months 3 months

* THE BEARINGS HAVE BEEN LUBRICATED AT THE FACTORY, THUS, NO LUBRICATION NEED BE ADDED BEFORE START-UP.

SUGGESTED LUBRICANTS

INSULATION CLASS	CONSISTENCY	TYPE	TYPICAL GREASE	FRAME TYPE
A & B	Medium	Polyurea	Shell Dolium R	215T & smaller
A & B	Medium	Polyurea	Shell Dolium R	254 & Larger
F & H	Medium	Polyurea	Shell Dolium R	All

PROCEDURE: If motor is equipped with Alemite fitting, clean tip of fitting and apply grease gun. Use 1 to 2 full strokes on motors in NEMA 215 frame and smaller. Use 2 to 3 strokes on NEMA 254 thru NEMA 365 frame. Use 3 to 4 strokes on NEMA 404 frames and larger. On motors having drain plugs, remove grease drain plug and operate motor for 20 minutes before replacing drain plug.

On motors equipped with slotted head grease screw, remove screw and apply grease tube to hole. Insert 2 to 3 inch length of grease string into each hole on motors in NEMA 215 frame and smaller. Insert 3 to 5 inch length on larger motors. On motors having grease drain plugs, remove plug and operate motor for 20 minutes before replacing drain plug.

CAUTION: Keep grease clean. Lubricate motors at standstill. Remove and replace drain plugs at standstill. Do not mix petroleum grease and silcone grease in motor bearings.

NOTE: Do not allow high moisture material to collect within the trough area as it may adversely affect metal parts.

12. Inspect entire dryer for loose, worn, or damaged parts. Include check of auger flighting, meter rolls, and other internal parts. Check that temperature sensors within air plenum chamber are secured within insulated clamps and do not chafe on other

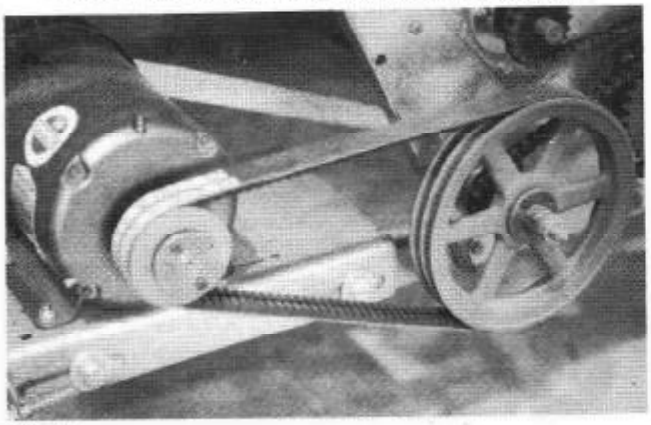


FIG. 16

metal parts.

13. Inspect that all dryer guards and warning decals are securely installed. Make certain guards do not interfere with moving parts.
14. Test fire the dryer several weeks ahead of the drying season. Include check for possible gas leaks. See earlier TEST FIRING heading for procedure.

BURNER CONTROL - SEQUENCE OF OPERATION

The operating principle of the burner control is listed as follows (see burner control wiring diagram):

1. Power is available to the burner control ONLY WHEN THE FAN IS OPERATING.

   With the fan operating and the burner switch closed, power is transmitted from the indicated motor lead wires through the fuse, burner switch and flame switch to supply power to the Fenwal board.
2. Shortly after the heater starts operating, the flame switch responds to burner heat and maintains burner operation.
3. The heater will operate on HI-FIRE with both the main supply and the HI-FIRE gas solenoid valves energized until the HI-LO thermostat control opens its contacts and interrupts the circuit to de-energize the HI-FIRE gas solenoid valve.

   When the thermostat control senses that additional heat is required and closes its contact points, the HI-FIRE gas solenoid valve will immediately open and repeat the ON-OFF cycle to maintain the desired heat.
4. If the heater fails to start operating, due to lack of fuel or possible malfunction, after the ignition transformer and gas solenoid valves are energized:

   A. The flame switch remaining in its COLD (closed contacts) position will interrupt burner operation, thereby providing automatic shut-down.

VAPORIZER ADJUSTMENT

LIQUID PROPANE MODELS ONLY - After initial installation and occasionally during the drying operation, check the temperature of the regulator and the Fan-Heater Control Box. ALLOW HEATER TO OPERATE AND STABILIZE TEMPERATURES BEFORE MAKING THIS CHECK.

NOTE: If the gas temperature exceeds 220°F the high vapor temperature thermostat will open the electrical circuit to the liquid solenoid valve and shut-off fuel flow to heater, thereby causing automatic shut-down of the dryer.

If the gas line is very cold or "frosted" move the vaporizer slightly closer to the flame. If gas line is too hot to touch, move vaporizer slightly away from the flame. The small wedge-shaped heat baffles can also be removed from the burner vanes to reduce the vapor temperature. If due to extreme operating conditions it is necessary to further reduce the vapor temperature, the vaporizer coil may be withdrawn slightly toward the fan housing. If vaporizer coil is shifted, use care not to kink gas lines or allow vaporizer to contact burner vanes.

FAN PROPELLOR REMOVAL AND INSTALLATION

The fan propellor is secured to the motor shaft by the use of a taper-lock bushing, motor shaft key, and three capscrews. Fig. 17 shows a cut away sketch of the propeller and bushing installation.

CAUTION: Although the taper-lock method of retaining the propellor onto the motor shaft is very simple and obvious, IT IS ESSENTIAL THAT THE FOLLOWING POINTS BE READ CAREFULLY AND FULLY UNDERSTOOD, AS IMPROPER INSTALLATION CAN RESULT IN SERIOUS OR FATAL INJURY CAUSED BY A LOOSE, FLYING PROPELLOR.

THREADED BUSHING HOLES - THE THREADED HOLES WITHIN THE BUSHING ARE PROVIDED FOR DISASSEMBLY PURPOSES ONLY, See Fig. 17. DO NOT ATTEMPT TO USE THESE HOLES FOR REASSEMBLY, AS THEY WILL NOT ALLOW THE PARTS TO BECOME LOCKED ONTO THE SHAFT, THEREBY CAUSING A HAZARDOUS OPERATING CONDITION.

CLEARANCE HOLES - When reassembling parts, the capscrews must be installed through the UNTAPPED CLEARANCE HOLES, as shown in Fig. 18 to cause the propellor to be pulled forward onto the tapered bushing, thus locking the parts securely onto the motor shaft. Refer to text for assembly details.

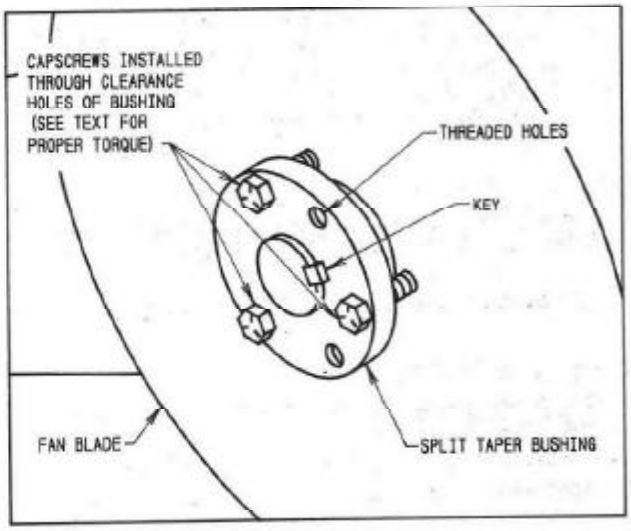


FIG. 17 FAN BLADE INSTALLATION

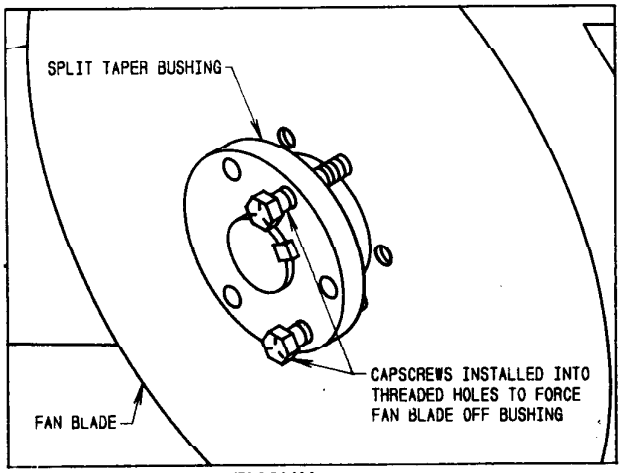


FIG. 18 FAN BLADE REMOVAL

Whenever any drying fan servicing is to be performed which requires removal and installation of the propellor, make sure the propellor is removed and installed properly. The recommended procedure is as follows:

REMOVAL

1. LOCK OUT THE FAN POWER SUPPLY and remove the fan guard, also the venturi, as required on some models of equipment.
2. Remove the three capscrews from the clearance holes in the taper-lock bushing.
3. Install two GRADE 5 CAPSCREWS into the THREADED HOLES in the bushing and turn them in by hand until they bottom against the front surface of the propellor.

   NOTE: DO NOT ATTEMPT TO USE LOW STRENGTH (UNMARKED) BOLTS TO REMOVE THE BUSHING, AS THE BOLTS MAY BREAK OFF.
4. Block propellor to prevent it from turning, and GRADUALLY TURN IN THE CAPSCREWS (up to 1/4 turn at a time), as shown in Fig. 18, until the propellor breaks loose from the bushing and motor shaft. Carefully remove bushing and propellor. With the propellor free from the bushing, a wheel puller can be used to pull the bushing off of the motor shaft, if required. Reattach bushing onto propellor to prevent the loss of parts.

   NOTE: During manufacture, the propellor and bushing are balanced together and both parts are marked with a small dot to identify their original alignment position. Observe bushing and propellor to make sure they have alignment marks. Mark the alignment of the propellor and bushing, if required.

INSTALLATION

1. Carefully clean motor shaft, key, bushing and bore of propellor. MAKE SURE MAIN POWER IS LOCKED OUT, and that shaft and key are completely free of rust and burrs.

   WARNING: DO NOT LUBRICATE THE BUSHING

   ! **OR CAPSCREWS!**

   CHECK AND MAKE SURE ALL MOTOR MOUNT BOLTS ARE PROPERLY TIGHTENED.
2. Slide propellor over motor shaft and locate it against the motor.
3. Align the key way in the bushing with the key and SLIDE bushing onto motor shaft. Do not attempt to drive the bushing onto the shaft, as it may damage the motor bearings.
4. Rotate the bushing and propellor so their alignment marks are in line and loosely attach the propellor to the bushing. MAKE SURE THE CAPSCREWS ARE INSERTED INTO THE UNTHREADED CLEARANCE HOLES IN THE BUSHING. Refer to previous CAUTION note. Locate the bushing so it is approximately flush with end of motor shaft.

   NOTE: The bushing must be located far enough forward so the inside web portion of the propellor will not contact the motor. If the motor has a short shaft, it may be necessary to position bushing slightly beyond the end of shaft.
5. Slide the propellor forward onto the taper-lock bushing and turn the capscrews in by hand as far as possible.
6. Use an INCH-POUND torque wrench and GRADUALLY TIGHTEN the three capscrews (up to 1/4 turn at a time) until the taper bushing becomes fully seated; under normal conditions, a minimum tightening force of 175-180 in.-lbs. (15 ft. lbs.) will be required to firmly seat the bushing. DO NOT EXCESSIVELY OVERTIGHTEN THE BUSHING. See Fig. 18.
7. Turn propellor by hand and check it for freedom of rotation and uniform tip clearance before reinstalling the fan guard.

FAN MOTOR REMOVAL AND INSTALLATION

In the event of motor failure, remove the motor, as described and take it to the nearest authorized service station. AUTHORIZED SERVICE STATIONS ARE THE ONLY PLACES THAT CAN PROVIDE POSSIBLE MOTOR WARRANTY. Motor service and repair at other places will be at owners expense.

If the service station determines motor failure to be caused by faulty material or workmanship, repair will be under warranty when within the warranty period. Motor failure because of external causes will result in a charge to the owner for repair.

1. Make certain power is shut-off and locked out, then remove fan guard and propellor, as outlined earlier.
2. Remove cover from Fan-Heater Control Box and disconnect the motor lead wires from within the box.

   NOTE: Tag or otherwise identify wires for ease of re-assembly.
3. Remove motor mount bolts. If there are any shims between the motor and its base, note their location so they can be properly installed during reassembly.
4. Disconnect the upper end of the motor conduit if required, then carefully pull conduit and wires through hole in Fan-Heater housing. Remove motor with conduit still attached from Fan-Heater unit. If motor requires service, take it to an authorized service station.
5. To re-install motor, slide onto motor base plate and replace shims (if required) between motor and base plate. Re-install motor mount bolts and washer, BUT DO NOT FULLY TIGHTEN THEM AT THIS TIME.

   Re-install conduit and wires through hole in Fan-Heater housing and carefully remake all electrical wiring connections.

   Check and adjust position of motor by temporarily mounting fan blade on motor shaft, and rotate it by hand, making the necessary adjustments so that the tip clearance between blade and housing is uniform. Remove the fan blade, if required, and FULLY TIGHTEN ALL FOUR MOTOR MOUNTING BOLTS.

   NOTE: Make sure to install and tighten the propellor in accordance with earlier instructions.

HEATER PARTS REMOVAL AND INSTALLATION

Most of the heater parts can be removed by simply identifying any attached wiring and then disconnecting the obvious mounting parts.

The following list provides information and procedures for some of the more important parts:

1. FLAME DETECTOR - Disconnect the slip-on connector and unscrew the flame switch out of its mounting bracket.
2. GAS SOLENOID VALVE COIL - Unsnap either the plastic cap, or the metal clip, on the gas valve and slide the housing and coil off the valve stem and body. DO NOT ENERGIZE THE COIL WHEN IT IS REMOVED, AS THE COIL MAY BECOME DAMAGED DUE TO EXCESSIVE CURRENT FLOW.
3. REGULATOR AND GAS SOLENOID VALVE(S) - The gas regulator and solenoid valve(s) are DIRECTIONAL and must be connected as indicated by the markings near the port openings. MAKE SURE GAS IS SHUT-OFF AND PURGED FROM THE SYSTEMS BEFORE REMOVING PARTS.

   When installing a liquid gas solenoid valve on LP models, do not over-tighten the connection into the inlet side, as the inlet orifice may become partially blocked.
4. MAIN GAS ORIFICE - With fuel shut-off and gas purged from system, proceed as follows:
   A. Disconnect gas supply line close to the Fan-Heater Control Box and disconnect the plumbing support from side of Control Box. Refer to Fig. 19.
   B. Disconnect the pressure gauge line fitting from the pipe tee.
   C. Disconnect electrical connections to gas solenoid valve located within Control Box.
   D. Lift pipe tee (with orifice, solenoid valve, and other parts attached) straight up and remove from Control Box. Orifice and other parts can now be removed from pipe tee, if desired.
5. REASSEMBLY - To reassemble parts, reverse the disassembly procedure, noting the following special points:
   A. Make sure all parts are thoroughly cleaned and open.
   B. Use a dependable brand of high temperature pipe caulking compound when assembling gas connections. Apply only a light coating onto male threaded end of fittings.
   C. Solenoid valves and gas regulator are directional and must be properly installed. Do not attempt to connect gas solenoid valve by applying force to the valve core stem as it may ruin the unit.
   D. Make sure all electrical wires are properly connected. Refer to wiring diagrams.

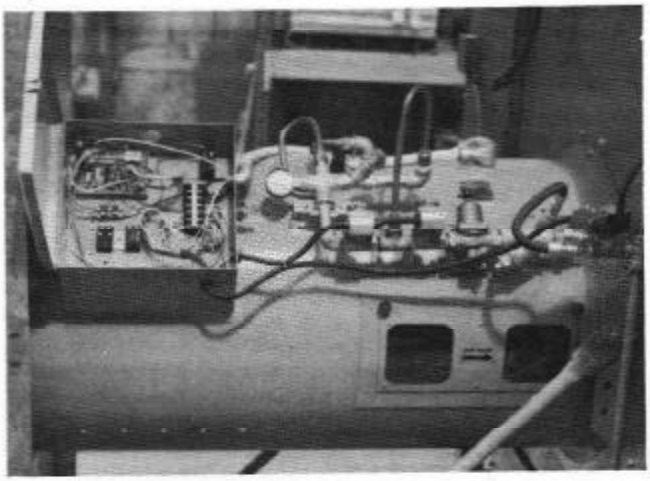


FIG. 19 FAN HEATER

METERING ROLL SERVICING

DESCRIPTION & OPERATION

This dryer is equipped with SCR metering roll drive assembly. The metering rolls are driven by a separate DC type electric motor. The speed of the motor is variable and is controlled by an electric SCR (silicon controlled rectifier) control within the Main Control Box.

MAIN CONTROLS

1. SCR SPEED CONTROL - The control unit dial on the front of the Control Box regulates the speed of the DC motor which drives the metering rolls.

   The markings on the scale from 0 to 100 represent the flow of grain past the metering rolls as a percent of the maximum grain discharge rate for the dryer. The maximum setting of 100% provides a maximum discharge of 1800 BPH for 410C & 425C and 2300 BPH for 510C & 525C model dryers.

   NOTE: When the control is set to the maximum discharge rate (100%), the metering roll speed should be 15.5 RPM.
2. DC ELECTRIC MOTOR - The 3/4 HP direct current motor provides the drive for the meter roll and is located on the rear left-hand side of standard (rear discharge) model dryers. The output shaft of the motor is connected directly to the gear box assembly.

   The DC motor requires no operational adjustments as it is completely controlled from the Control Box.
3. SPEED REDUCER GEAR BOX - The direct drive gear box provides the required speed reduction and transmits power to the metering rolls through a drive chain arrangement.

   The gear box does not require adjustment, but should be checked occasionally for proper oil level. Maintain the oil level up to the filler plug opening with a high quality 90-140 weight gear oil. The drive chain should also be periodically lubricated and re-tension as required.
4. UNLOADING AUGER TIME DELAY RELAY - This special relay is located within the Control Box. The relay is specially connected into the bottom auger system in such a manner it causes the unloading auger (and any connected auxiliary unloading conveyors) to continue to operate for approximately 60 seconds AFTER the metering rolls stop operating. This feature permits the cleanout of grain within then unloading equipment at the end of all discharge cycles.

   In the event a foreign object becomes lodged in the metering rolls and jams the system, the following events would occur. The unloading auger would stay in motion. However, the metering roll drive would stop. The DC motor should stall out.

HOW TO DETERMINE METERING PROBLEM

To determine if the metering problem is caused by blockage, perform the following test with the power off. Remove the drive chain by loosening the motor mounting bracket and adjustment bolt. Refer to Fig. 20 and place a pipe wrench on the hub of the roller chain sprocket of the left-hand metering roll at the discharge end of the dryer and apply up to 100 ft. lbs. of force to attempt to rotate the roll toward the outside of the dryer. If the metering roll will turn, it can be assumed that no blockage exists and that the problem is due to some other cause. Check for break in power train, chain, drive key, pin, etc.

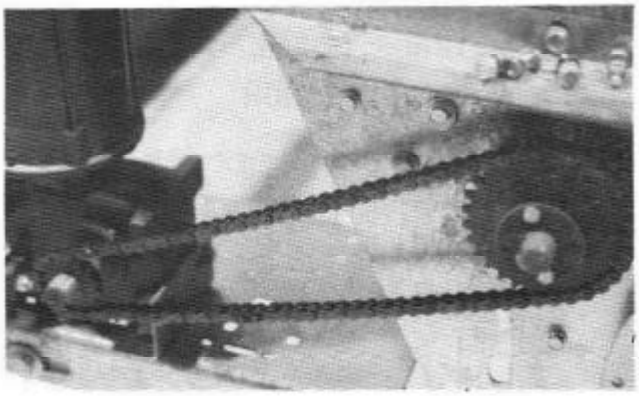


FIG. 20 METER ROLL DRIVE

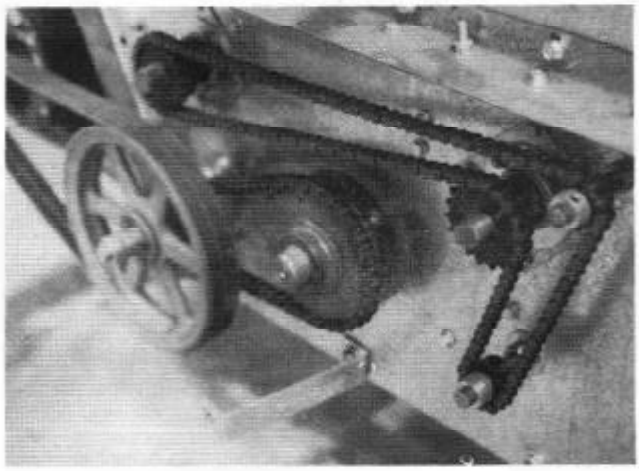


FIG. 21 METER ROLL CROSS OVER

TO LOCATE THE JAM

To determine if the right-hand or left-hand metering roll is jammed, go to the front end of the dryer and feel the tension in the top and bottom section of the metering roll crossover chain (FIG. 21). If the tension is equal in both sections, it can be assumed that the right-hand roll is clear. However, if the lower section is extremely tight and the tension will not equalize when attempting to deflect the bottom section, it can be assumed that the jam is in the right-hand roll. If one is unable to determine the jammed side, cautiously remove the crossover chain (loosen tightener) and place pipe wrench on one of the meter roll sprockets and turn it towards the outside of the dryer.

CAUTION: **Keep hands away from sprocket teeth to avoid injury that may result from chain backlash as a result of torsional build up in the system caused by the jam. If it turns then the jam is located in the other roll.**

TO CLEAR JAMMED ROLLER

At this time, place a pipe wrench on the hub of the sprocket of the jammed metering roll and turn the roll, first backward and then forward several times in and attempt to dislodge the object and clear it through the roll. If this is not successful, have an assistant turn the metering roll and attempt to locate the jam by sound. Shut down the fan-heater and eliminate any other noise when making this check. Once the location is determined, access can be made to the roll from the outside by opening access door (before opening doors SEE FIG. 22) to remove foreign object. The service tool must be inserted before opening doors. Before this can be done swing open the plenum bottom closure panel. Meter Roll Adjustment Damper must be removed (see Main Assembly). Remove the four bolts in the base of the Meter Roll Upper Shield.

SERVICE TOOL

THIS COLUMN CUT-OFF DAMPER IS DESIGNED TO INSERT THROUGH THE GRAIN COLUMN (FROM THE INSIDE OF THE DRYER) IMMEDIATELY ABOVE THE METER ROLL. THIS PERMITS OPENING OF THE METER ROLL ACCESS DOOR. FOR SERVICE OR INSPECTION WITHOUT UNLOADING DRYER THE PLENUM BOTTOM CLOSURE PANEL & METER ROLL ADJUST DAMPER MUST BE REMOVED PRIOR TO USING SERVICE TOOL.

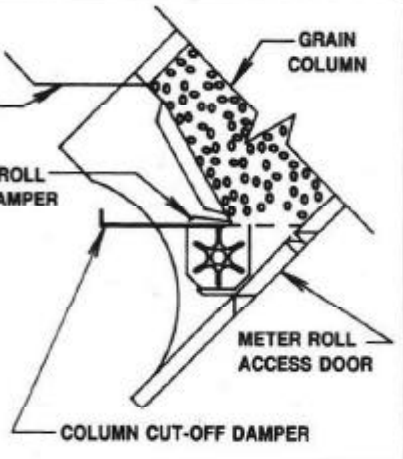
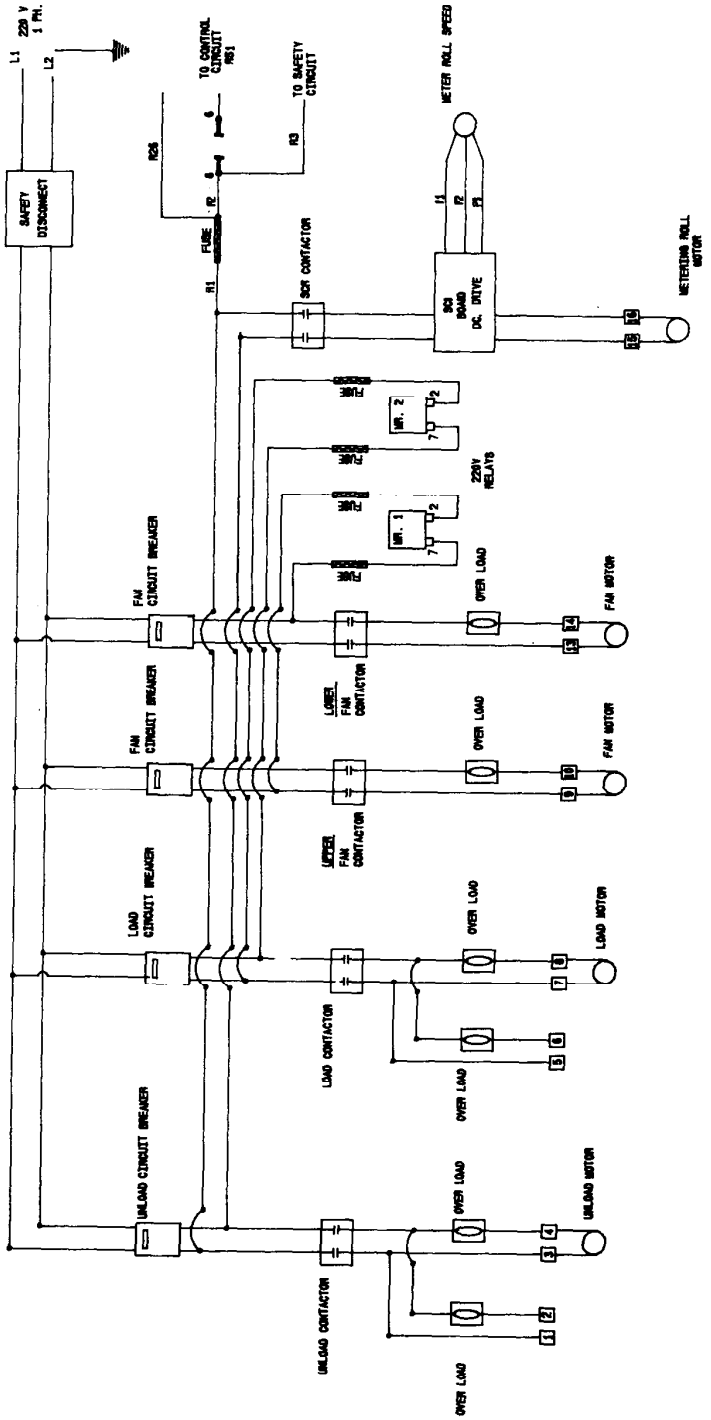


FIG. 22 SERVICE TOOL DECAL

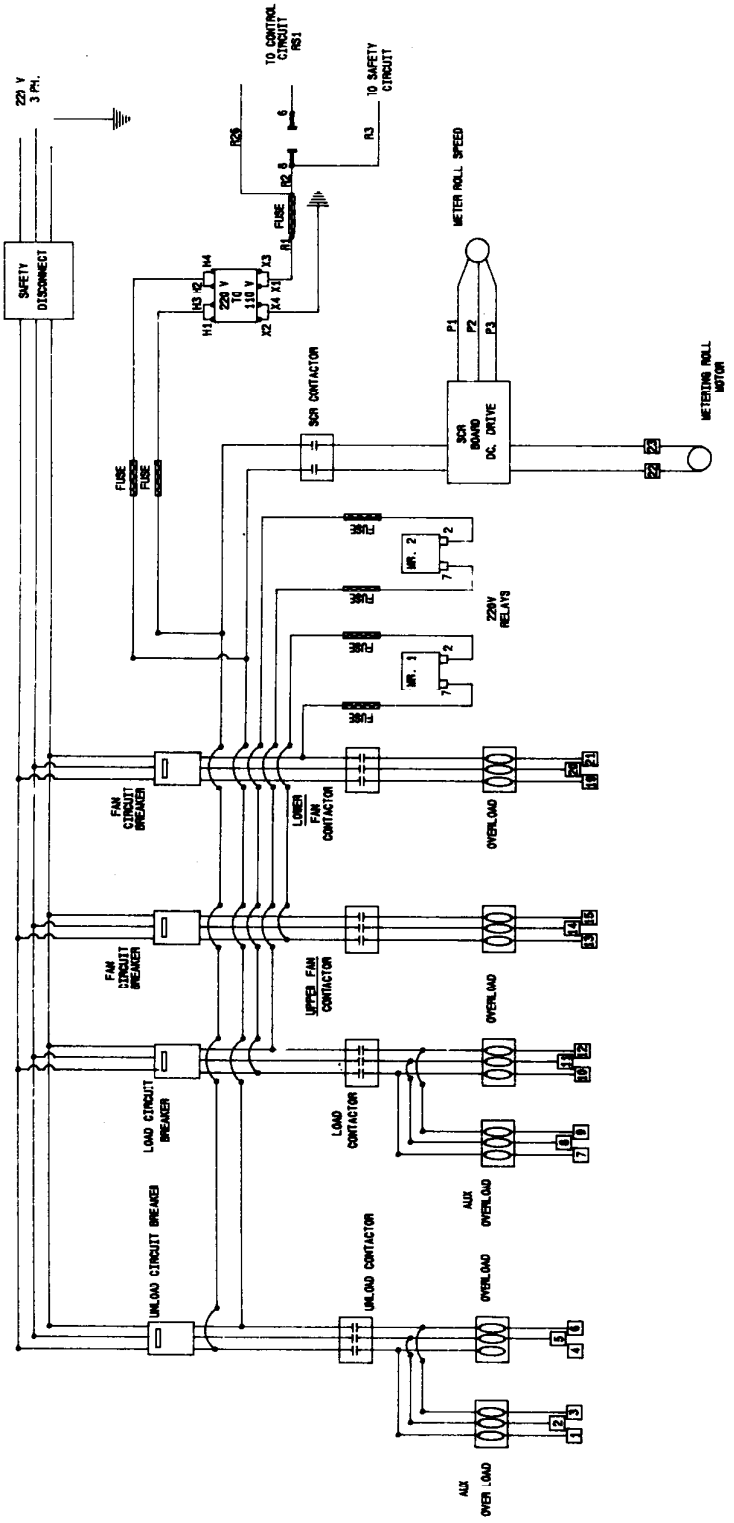
410C & 510C POWER WIRE CIRCUIT

1 PH. 220 V.



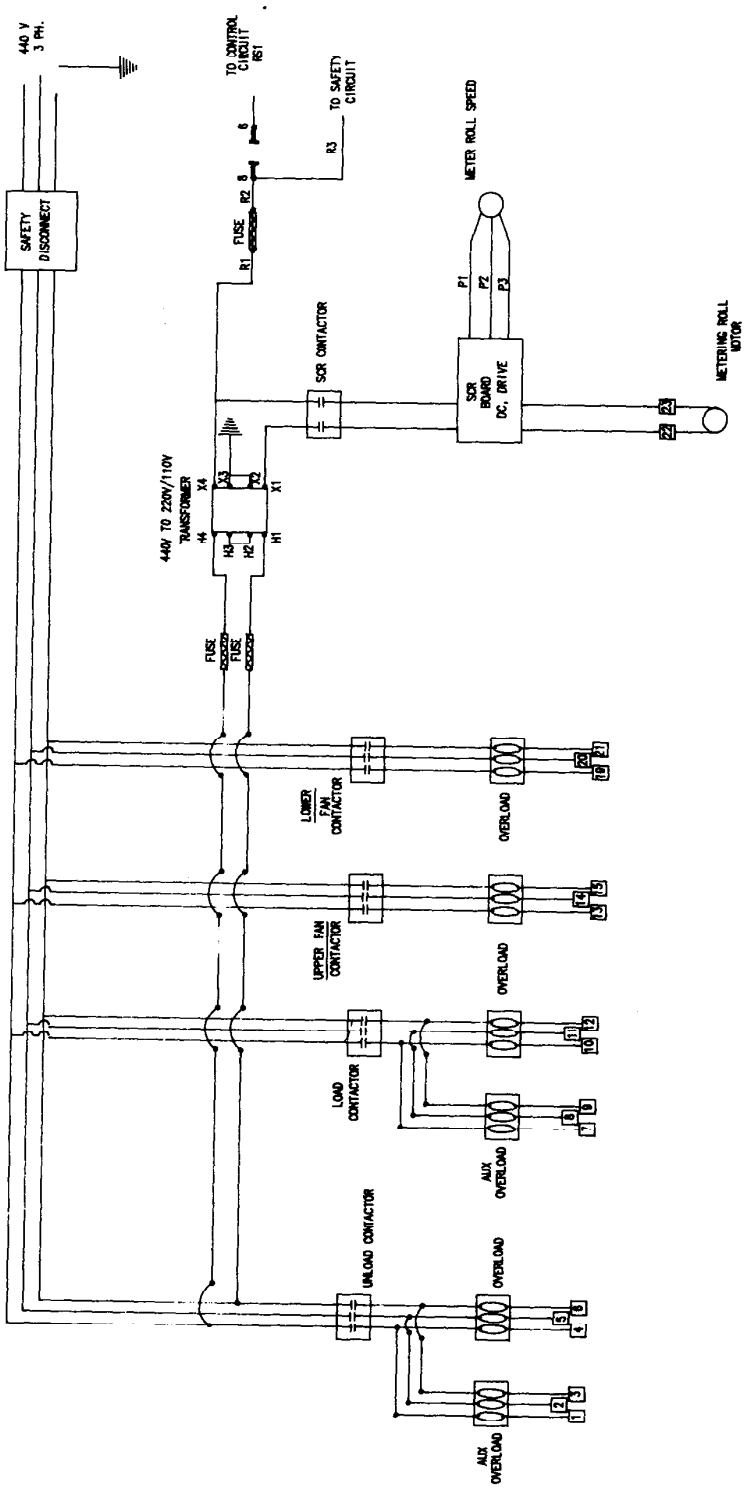
410C & 510C POWER WIRE CIRCUIT

3 PH. 220 V.

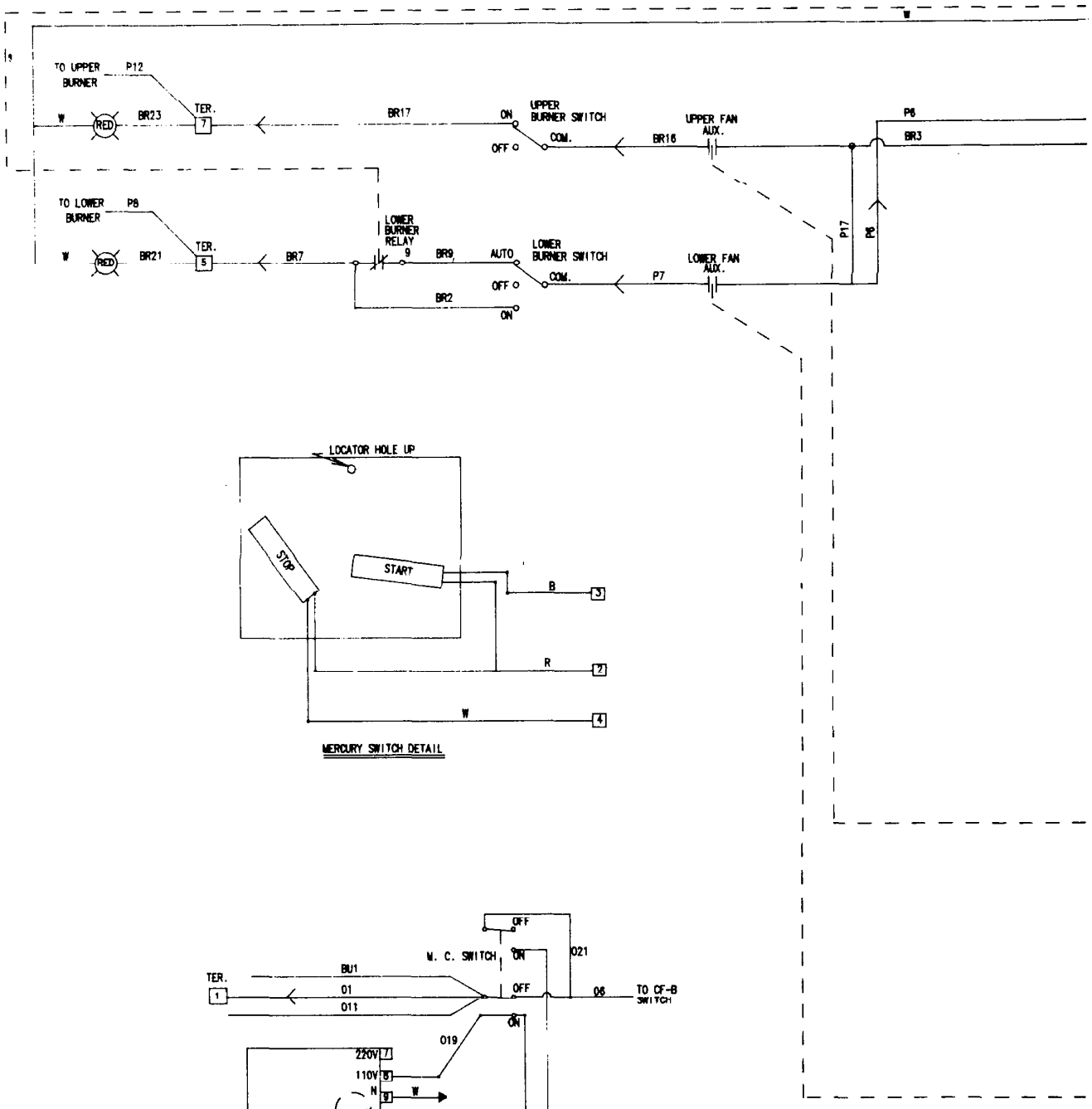


410C & 510C POWER WIRE CIRCUIT

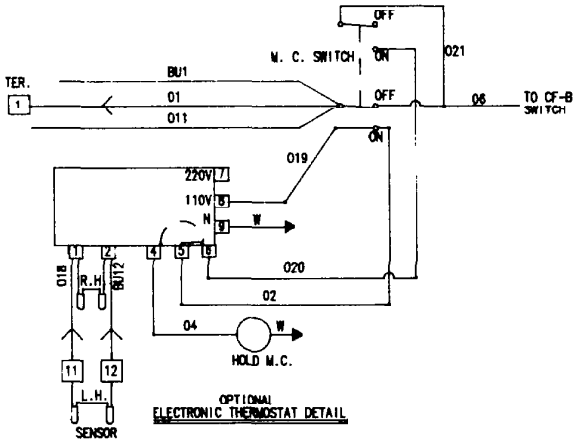
3 PH. 440 V.



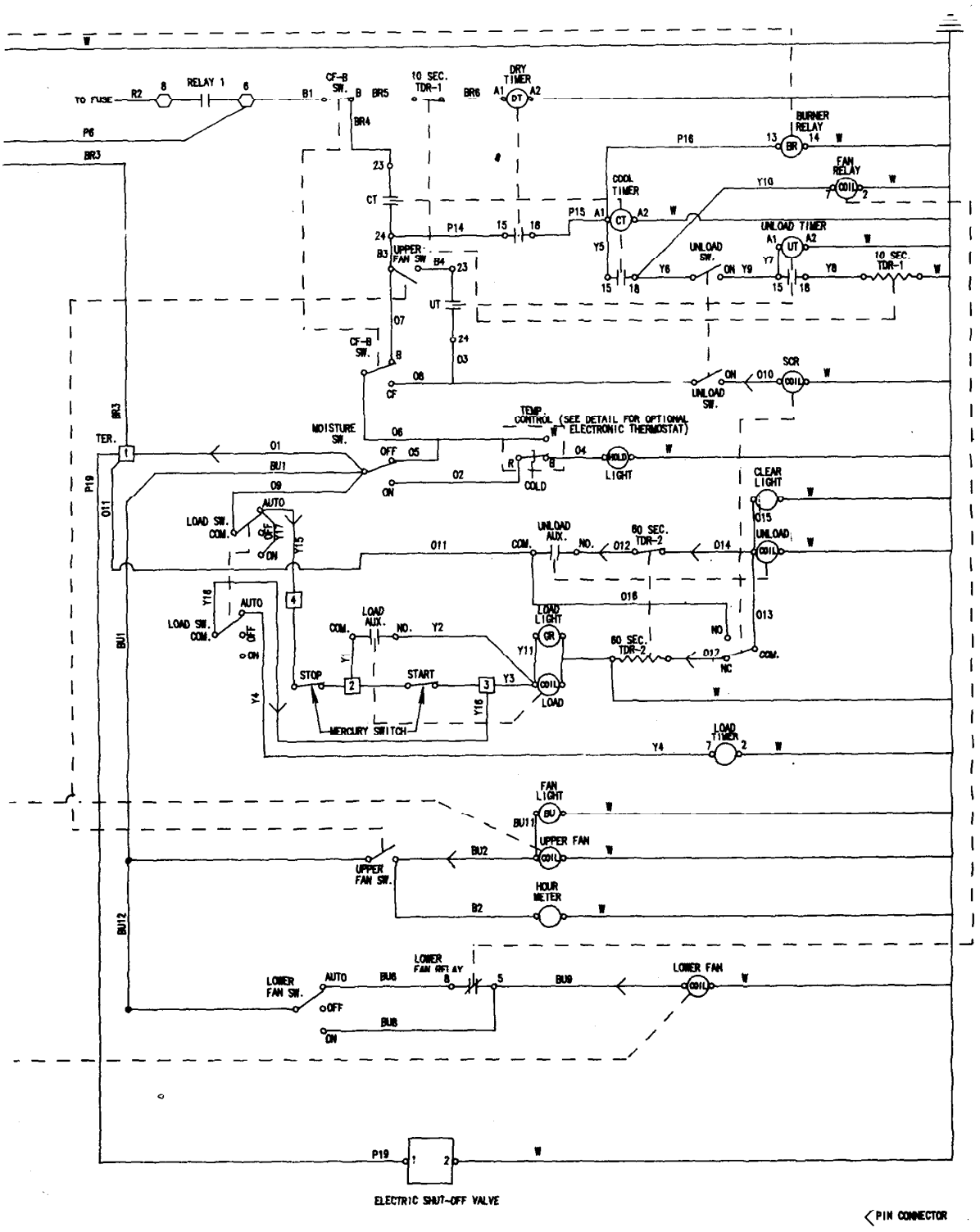
410C & 510C GENERAL CONTROL CIRCUIT



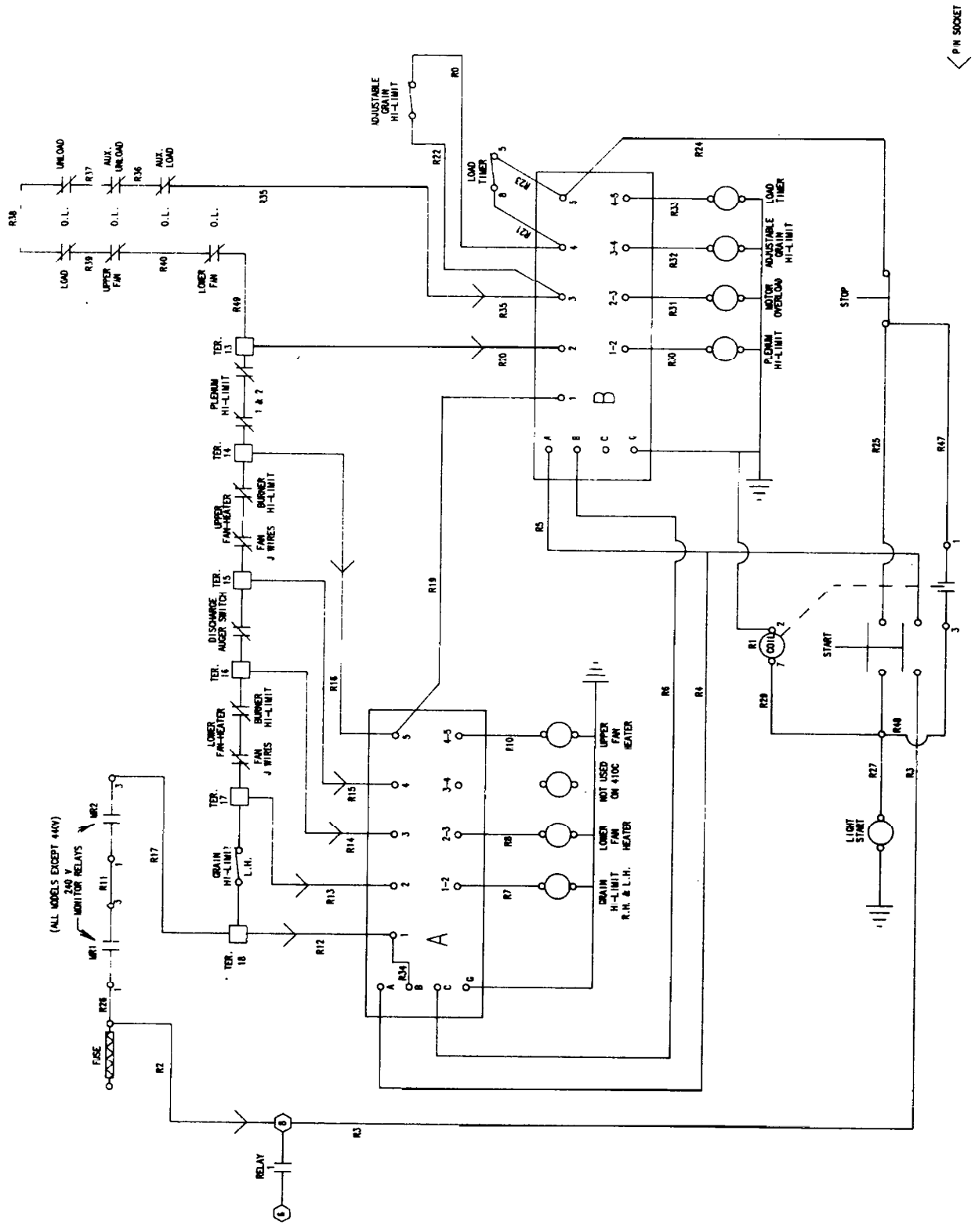
MERCURY SWITCH DETAIL



OPTIONAL ELECTRONIC THERMOSTAT DETAIL

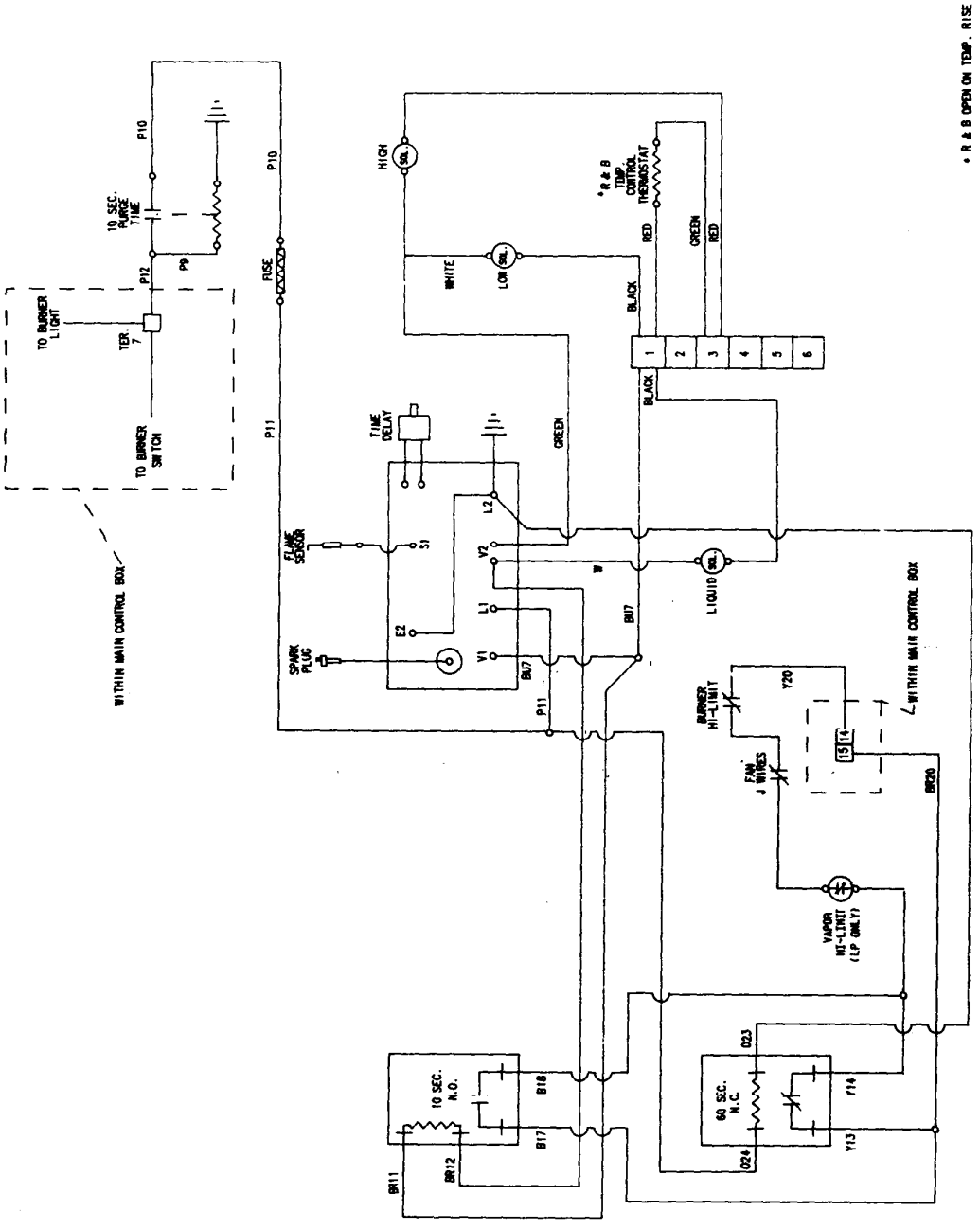

TO FUSE
RELAY 1
CF-B SW.
10 SEC. TDR-1
DRY TIMER
BURNER RELAY
FAN RELAY
COOL TIMER
UNLOAD TIMER
UNLOAD SW.
UPPER FAN SW
CF-B SW.
SCR
MOISTURE SW.
TEMP. CONTROL (SEE DETAIL FOR OPTIONAL ELECTRONIC THERMOSTAT)
HOLD LIGHT
COLD
CLEAR LIGHT
LOAD SW.
UNLOAD AUX.
60 SEC. TDR-2
LOAD AUX.
LOAD LIGHT
STOP
START
MERCURY SWITCH
LOAD
LOAD TIMER
FAN LIGHT
UPPER FAN
UPPER FAN SW.
HOUR METER
LOWER FAN SW.
LOWER FAN RELAY
LOWER FAN
ELECTRIC SHUT-OFF VALVE
PIN CONNECTOR

410C & 510C SAFETY CIRCUIT



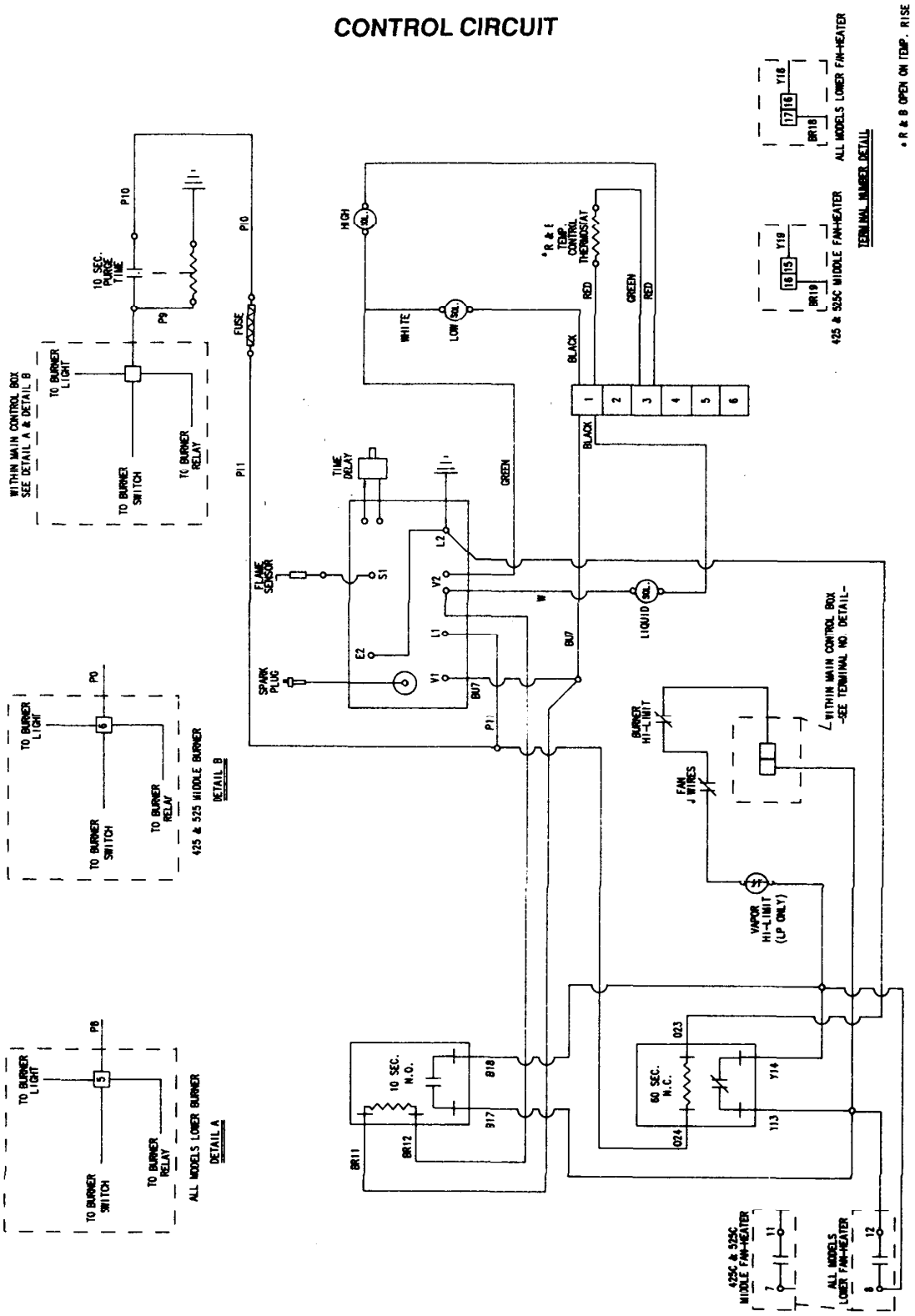
ALL MODELS UPPER BURNER

CONTROL CIRCUIT



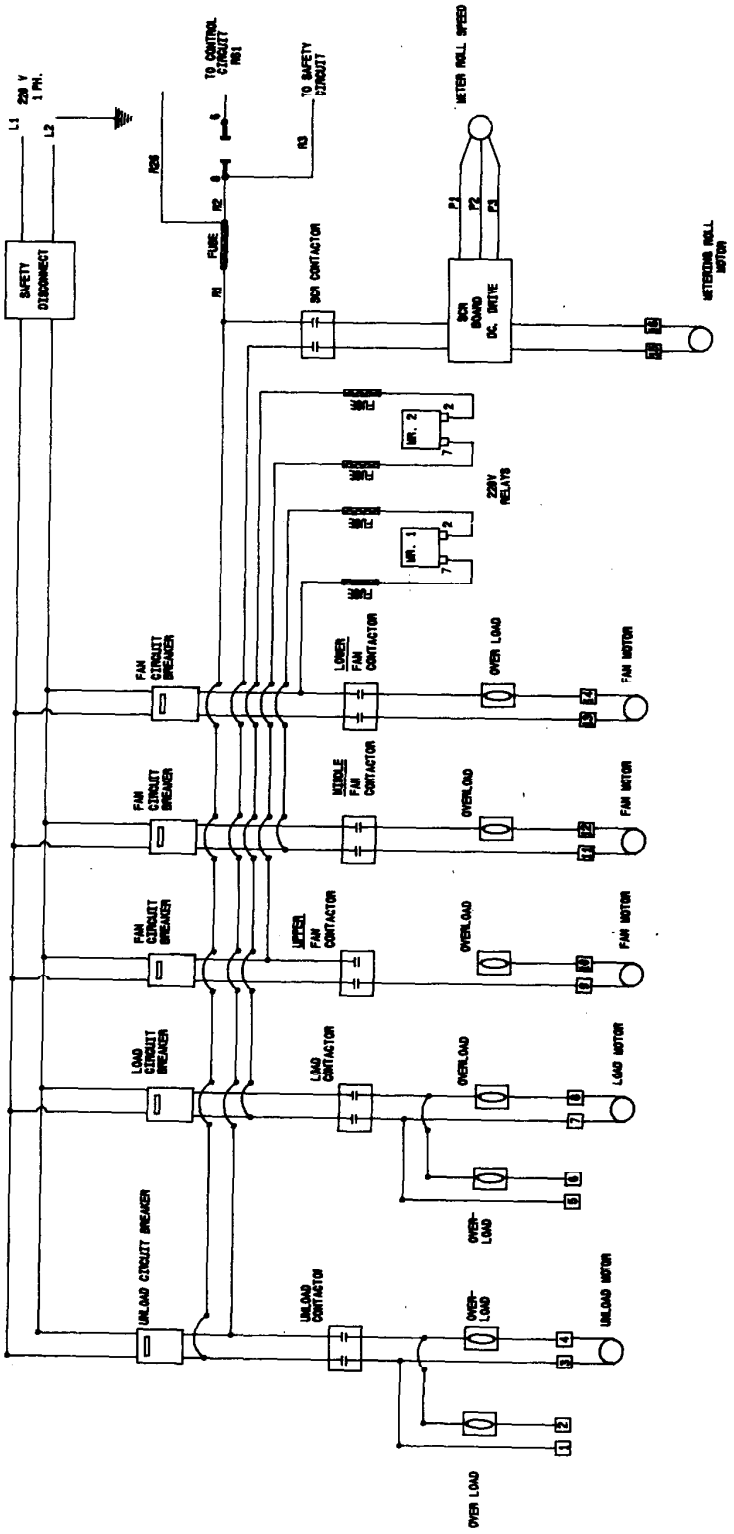
ALL MODELS MIDDLE & LOWER BURNER

CONTROL CIRCUIT



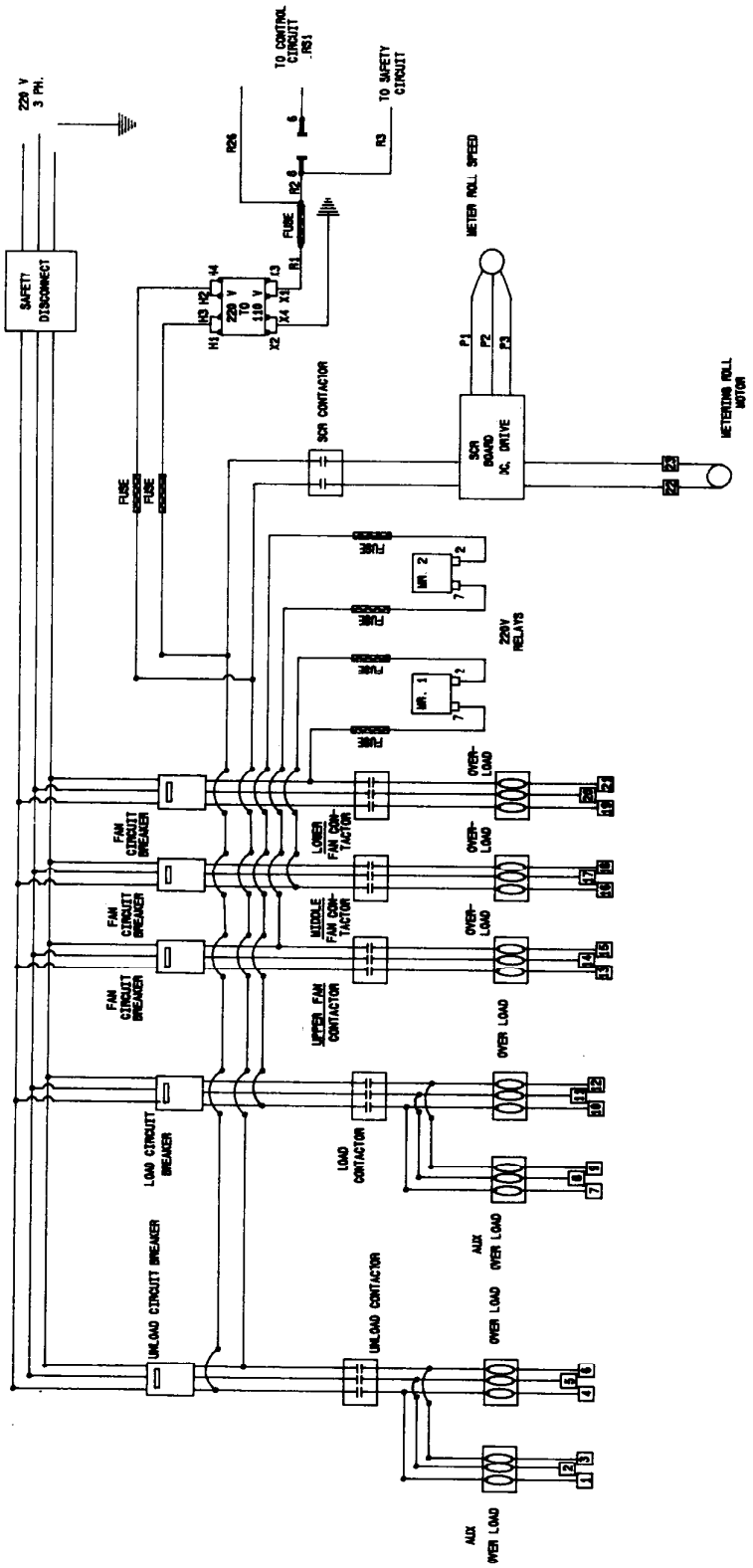
425C & 525C POWER WIRE CIRCUIT

1 PH. 220 V.



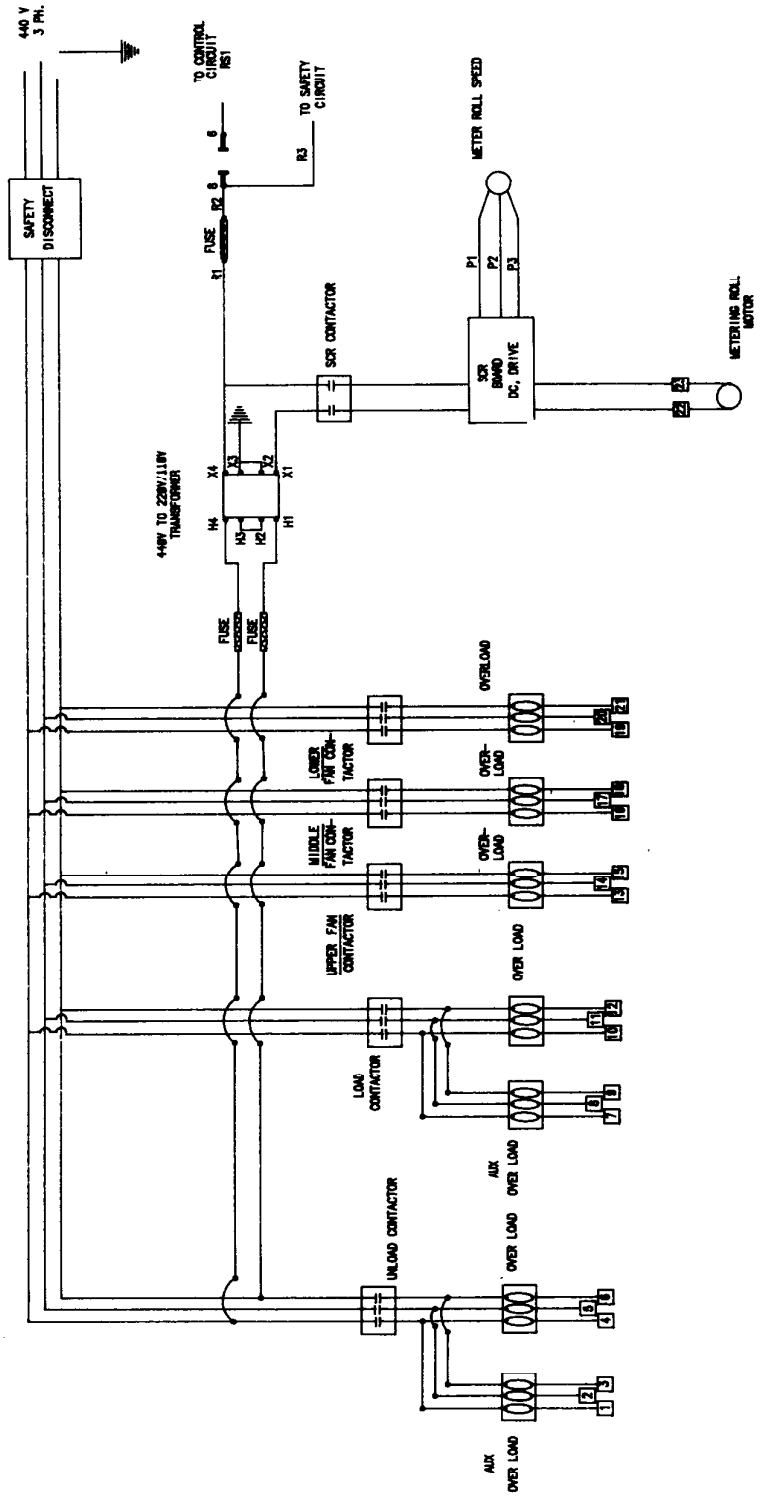
425C & 525C POWER WIRE CIRCUIT

3 PH. 220 V.

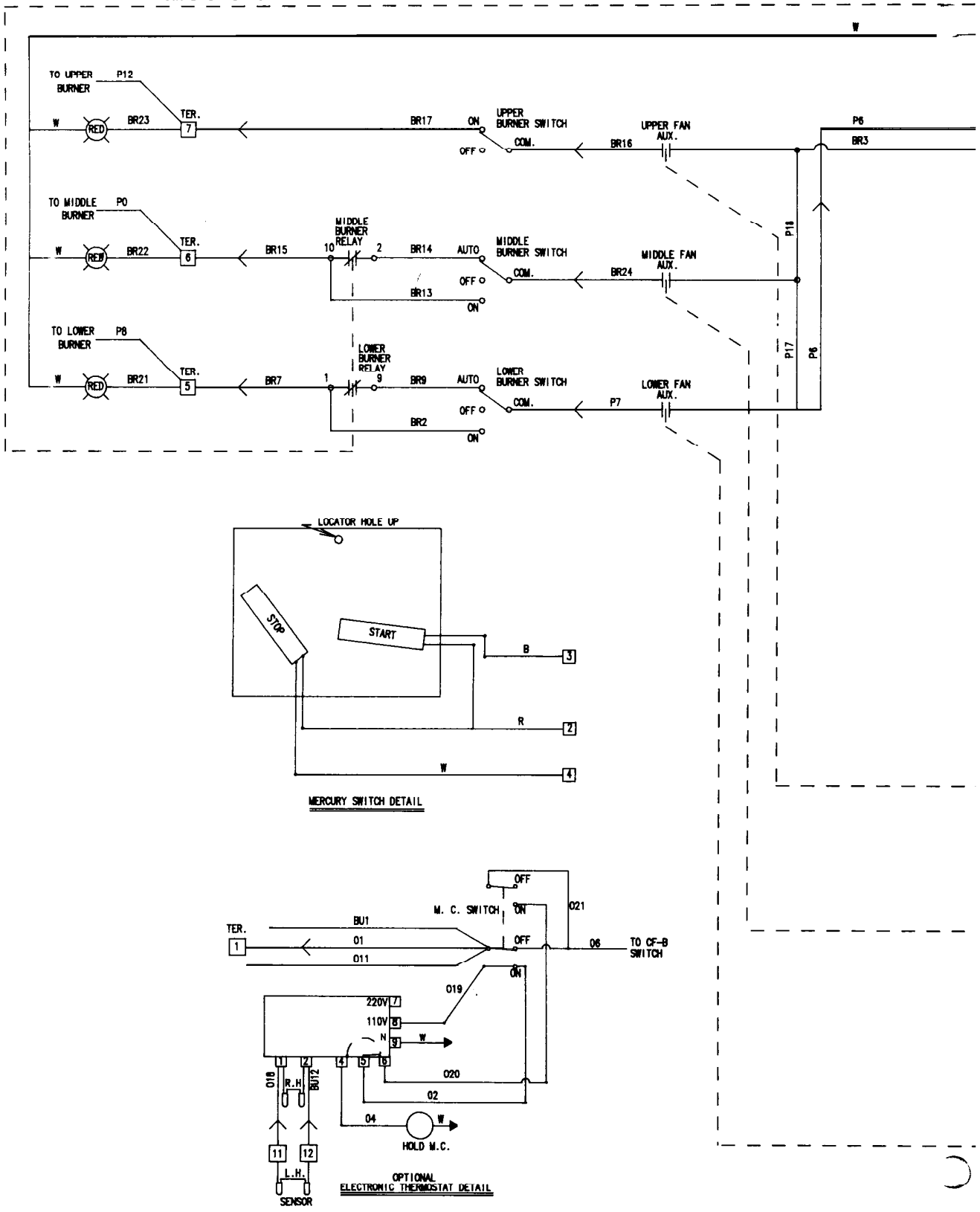


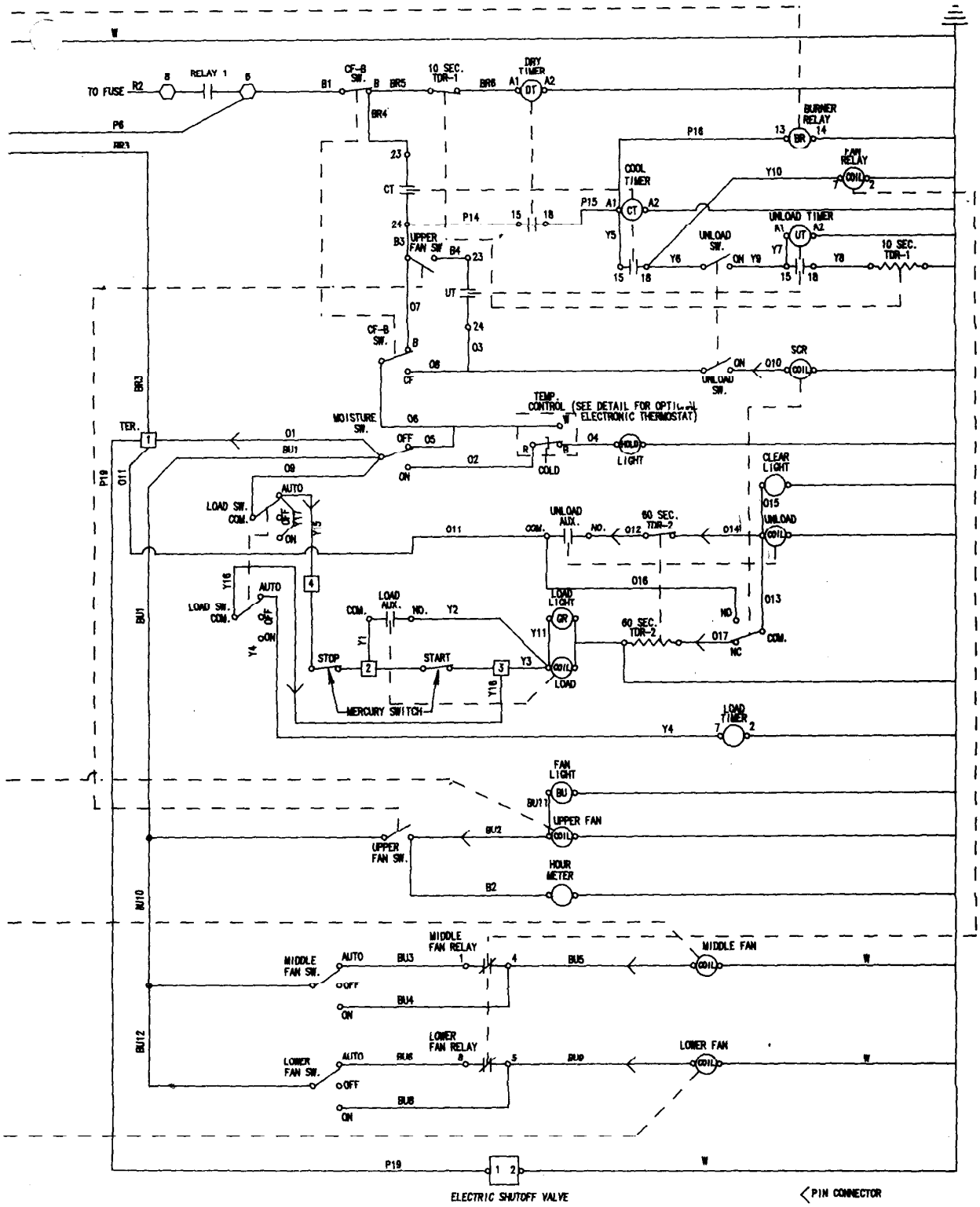
425C & 525C POWER WIRE CIRCUIT

3 PH. 440 V.

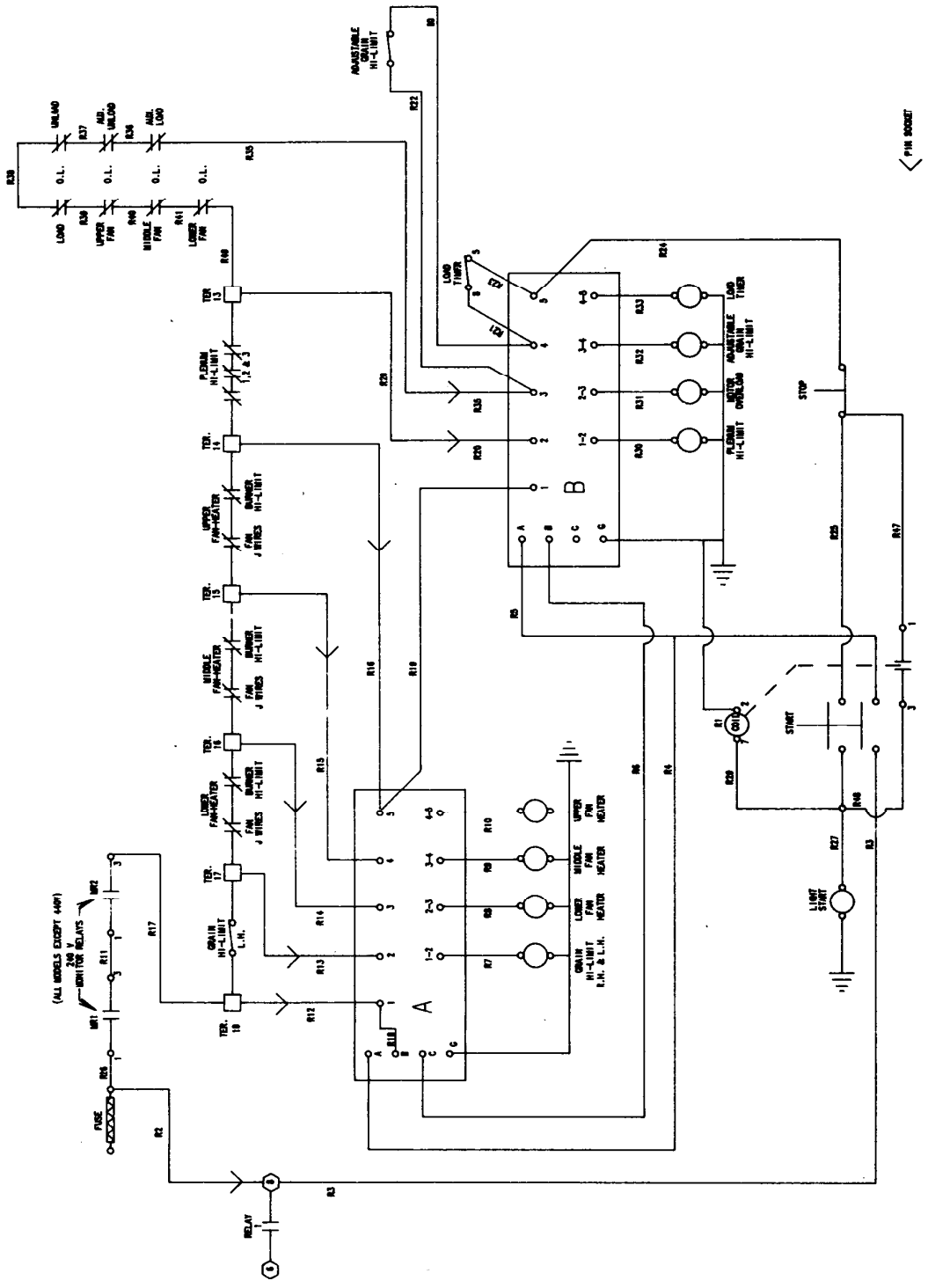


425C & 525C GENERAL CONTROL CIRCUIT




TO FUSE
RELAY 1
CF-B SW.
10 SEC. TDR-1
DRY TIMER
BURNER RELAY
FAN RELAY
COOL TIMER
UNLOAD TIMER
UNLOAD SW.
UPPER FAN SW
CF-B SW.
SCR
MOISTURE SW.
TEMP. CONTROL (SEE DETAIL FOR OPTIONAL ELECTRONIC THERMOSTAT)
HOLD LIGHT
CLEAR LIGHT
LOAD SW.
UNLOAD AUX.
60 SEC. TDR-2
LOAD AUX.
LOAD LIGHT
STOP
START
MERCURY SWITCH
LOAD TIMER
FAN LIGHT
UPPER FAN
UPPER FAN SW.
HOUR METER
MIDDLE FAN SW.
MIDDLE FAN RELAY
MIDDLE FAN
LOWER FAN SW.
LOWER FAN RELAY
LOWER FAN
ELECTRIC SHUTOFF VALVE
PIN CONNECTOR

425C & 525C SAFETY CIRCUIT



TROUBLE ANALYSIS PROCEDURE

A voltmeter is required for some of the following check-out procedures. Before performing any tests, make certain if the dryer power supply is 1 phase, 230 volt, or 3 phase, 230 volt.

The burner control circuit is 115 volts on all standard U.S. production dryers.

The general control circuit and safety circuit are 115 volt on all model dryers. When checking these circuits, MEASURE VOLTAGE BETWEEN THE CIRCUIT TEST LOCATION AND TO GROUND.

REFER TO WIRING DIAGRAMS AND PARTS LIST FOR IDENTIFICATION OF PARTS AND ELECTRICAL TERMINALS.

CAUTION: When making high voltage tests with "live" circuits, be extremely careful...follow established safety practices. Turn power ON for testing only. DO NOT ATTEMPT TO MAKE THE DRYER OPERATE BY USING A JUMPER WIRE TO BY-PASS A DEFECTIVE COMPONENT.

PROBLEM:	POSSIBLE CAUSE:
CONTROL CIRCUIT NOT ENERGIZED **Panel light and shut-down indicator light OFF.**	1. POWER SUPPLY : Check that **MAIN POWER SUPPLY** and **CIRCUIT BREAKERS** are turned **ON**. Also check for tripped circuit breaker. 2. **FUSES:** Check for blown 5 amp fuses. See **POWER CIRCUIT** diagram for location and number used. 3. **OVERLOAD RELAY:** Check for a tripped overload relay. 4. **STOP OR START SWITCHES:** Check for a defective STOP or START switch. Also check switch wiring connections. 5. **R1 RELAY:** Check for a defective R1 relay, relay base, or faulty wiring connections.

PROBLEM:	POSSIBLE CAUSE:
CONTROL CIRCUIT NOT ENERGIZED- Panel light OFF with shut-down indicator light ON.	1. FAN THERMAL OVERLOAD: The fan thermal overload device is the self-resetting type and is located within the windings of 1 phase fan motors to indicate excessive motor temperature. If the thermal overload causes dryer shut-down, check for voltage supply problems, or for a defective motor. If this type of problem exists, do not continue restarting and operating the dryer, as it may cause the motor to burn out. 2. BURNER LOCK-OUT: Burner lock-out is provided by the lock-out breaker which is a part of the burner control located within the Fan-Heater Control Box. If this safety control operates, check for an interruption in the fuel supply, or for a defective or improperly located flame switch. 3. BURNER HI-LIMIT THERMOSTAT: The Burner Hi-Limit Thermostat is mounted on the fan housing and is a fast acting device which monitors the temperature within the rear end of the fan-heater housing. Most dryers are equipped with a manual reset type thermostat which must be reset by hand before the dryer can be restarted. If the Burner Hi-Limit causes shut-down, check for inadequate airflow, as caused by blockage at air inlet, or fan motor failure. NOTE: In the event the dryer shuts down, the back-draft currents of hot air passing through the housing may cause the Burner Hi-Limit to trip open. 4. GRAIN HI-LIMIT THERMOSTAT INDICATOR LIGHT-FIXED (non-adjustable) GRAIN HI-LIMIT THERMOSTATS: The Grain Hi-Limit thermostat is a fixed temperature, automatic self-resetting type and act to monitor the temperature of the grain within the dryer columns. If the grain temperature becomes excessive (approx. 210°F), the thermostats will automatically shut down the dryer. The left-hand column thermostat is located within a handy box on the front L-H side of the dryer. The thermostat has a long sensor tube which extends almost the full length of the grain column. 5. GRAIN HI-LIMIT THERMOSTAT INDICATOR LIGHT ADJUSTABLE: The thermostat is located within the control box. The averaging probe runs in the righthand grain column. If the grain temperature exceeds the set limit, the dryer will shut down. 6. LOAD TIMER INDICATOR LIGHT: The load timer is located within the dryer Control Box and is designed to automatically stop the dryer if it does not refill with grain within the selected time setting of the timer knob. If the load timer causes shut down of dryer, it normally indicates the wet grain supply was either reduced, interupted, or exhausted, or that the timer was improperly adjusted.

PROBLEM:	POSSIBLE CAUSE:
CONTROL CIRCUIT NOT ENERGIZED- **Panel light OFF with shut-down indcator light ON** (continued)	7. **PLENUM HI-LIMIT THERMOSTAT INDICATOR LIGHT:** This thermostat is of a fixed temperature, automatic self-resetting type, and acts to monitor the drying air temperature within the air plenum chamber of the dryer. If thermostat causes shut down of the dryer, it indicates excessive drying temperature, usually due to improper burner adjustment or blocked airflow within dryer perforations. 8. **IMPROPER LIGHT OPERATION SHUT-DOWN DETECTOR:** In the event of a malfunction within the detector, or poor wiring connections within its leads, the unit will not prevent the dryer from operating, but will cause only improper action or the indicator lights. If the dryer shuts down due to any of the above listed items and can be restarted again without any of the indicator lights coming ON, or if any lights stay "ON" when the dryer is operating, it indicates improper operation of the unit. If this condition occurs, it is possible to continue operating the dryer and delay repairing the detector unit until a convenient time. When inspecting the unit, make certain to check for loose wiring connections, and for a faulty relay or printed circuit board.
TOP AUGER WILL NOT START	1. Check that the top auger circuit breaker and switch are turned ON. 2. Check position of upper auger paddle switch- must be "down" to start auger 3. Inspect for secure mounting and wiring of mercury switches in terminal box on top auger paddle switch shaft. Include check for defective mercury switch. 4. Verify closing of top auger contactor: check voltage on load side of contactor, power terminals 7 and 8 (1-phase), or 10, 11 and 12 (3-phase). Inspect contactor for defective points or a burned out coil 5. Inspect connections and check voltage applied to motor leads in motor junction box to determine if motor is defective. 6. Check that Handy Box on Paddle shaft is right side up (small hole on back of box should be on the top side).
FAN MOTOR WILL NOT START	1. Check that fan circuit breaker and fan switch is ON; also for defective switch or bad wiring connections. 2. Verify closing of fan motor contactor: check voltage on load side of contactor, see appropriate Power Wiring Circuit for Power Terminal Numbers Inspect contactor for defective points or a burned out coil. 3. Inspect connections and check voltage applied to motor leads in Fan-Heater Control Box to determine if motor is defective. 4. Check capacitors on single phase motors; replace if defective. If motor starts slowly, check for low voltage during starting, due to excessive voltage drop power supply wiring.

PROBLEM:	POSSIBLE CAUSE:
BOTTOM AUGER WILL NOT START	1. Check that the bottom auger circuit breaker is on. 2. Check that the **UNLOAD** switch is on **AUTO.** 3. Check for an improperly adjusted or defective MC thermostat. Also, check switch and thermostat wire connections. 4. Verify closing of bottom auger contactor; check voltage on load side of contactor, power terminals 3 and 4 (1-phase), or 4, 5 and 6 (3-phase).
BURNER WILL NOT FIRE WITH FAN OPERATING (control circuit malfunction)	1. Burner switch must be ON. 2. Check for 115 volts across burner side of fuse located within Fan-Heater Control Box. Replace fuses, if blown, and determine cause of excess current (shorted wiring; connections, etc.).
BURNER WILL NOT FIRE- No gas pressure with fan operating at least 15 seconds (gas supply or fan-heater component malfunction)	1. Check gas supply. Also, check gas filter and gas line for possible obstruction or closed valves. Refill tank and service parts, as required. 2. If 115 volts is present; a. Inspect gas solenoid valves (includes liquid valve on LP units) for defective coils or improper wiring. Replace valve or valve coil if valve will not open with proper voltage applied. b. Inspect for a defective high vapor thermostat (LP Models only). Replace thermostat if its circuit is open (without overheated vapor). 3. **FUEL SUPPLY:** Inspect gas line piping, fuel strainer, burner venturi and orifice for possible obstructions. Clean parts, as required. 4. Check for 115 volts across L1 & L2 and across V1 & V2 on Fenwal Board.
BURNER WILL NOT FIRE- but gauge shows gas pressure	1. **FENWAL BOARD:** Check board for spark by removing ignition wire from board and holding an insulated handle screwdriver against the output terminal and 1/4" away from the case. There should be a strong spark. Check board wiring and connections. Replace the Fenwal Board, if required. Make sure board is properly grounded to heater housing. 2. **IGNITOR PLUG:** Check that ignitor plug is properly gapped to 1/8 inch and has a strong spark. Inspect ignition wire and its connections. Make sure wire is not shorted or broken. Check ignitor plug for damaged electrodes or cracked insulator. Replace or clean and service ignitor plug, as required.

PROBLEM:	POSSIBLE CAUSE:
BURNER OPERATES- BUT WILL NOT CYCLE FROM LO-FIRE TO HI-FIRE	1. Check for an excessive Lo-Fire gas adjustment setting. Observe pressure shown on gauge and compare reading with recommended flow control valve pressure setting listed in manual. Readjust Lo-Fire setting on flow control valve, if required. 2. Check for improperly adjusted or defective Hi-Lo Fire thermostat control. Temporarily increase the temperature setting. If heater will still not cycle, check for problem in control cord wires, connections or thermostat. The control cord should be connected to the R and B, so the switch will open on temperature rise. If burner will cycle to Hi-Fire with control cord wires connected together, the thermostat is faulty. 3. Check for improperly connected or faulty Hi-Fire gas vapor solenoid valve. Correct any poor connections or defective wiring. If wiring appears proper, problem may be caused by a burned-out valve coil or defective valve. Replace Hi-Fire solenoid valve, or its coil, if defective.
BURNER OPERATES- BUT WILL NOT CYCLE FROM HI-FIRE TO LO-FIRE	1. Check gas pressure reading on gauge. Problem may be due to insufficient gas regulator setting. Temporarily decrease the Hi-Lo Fire thermostat setting to verify that thermostat will function and cause the burner to cycle. If burner will cycle at reduced thermostat setting, it indicates that problem was due to insufficient heat to satisfy the original thermostat setting. Reset thermostat to original setting and increase gas regulator setting for additional heat output. Do not exceed the maximum pressure listed in manual. 2. Hi-Lo Fire thermostat control may be defective. If burner still will not cycle to Lo-Fire after decreasing the thermostat, the problem may be due to a broken or kinked thermostat sensor tube. Observe reading on thermometer. Replace control assembly if it cannot be set to cause its switch to go to the open circuit position with normally hot air plenum temperatures. 3. If burner continues to operate on Hi-Fire, check the Hi-Fire gas solenoid valve for a stuck or blocked open condition, or for reversed gas pipe connections. THE SOLENOID VALVE MUST NOT ALLOW GAS FLOW WHEN ITS COIL IS NOT ENERGIZED.
BURNER MAINTAINS DESIRED DRYING TEMP. BUT CYCLES FROM HI-FIRE TO OFF (without going into Lo-Fire)	1. Make sure the flow control valve is not set completely closed. Valve must be adjusted open to provide the proper Lo-Fire gas pressure listed in manual. 2. Check Lo-Fire selinode valve for proper operation.