INSTALLATION AND
OPERATION MANUAL

AB-120A AND AB-180A
GRAIN DRYERS
READ THESE INSTRUCTIONS BEFORE INSTALLATION AND OPERATION. SAVE FOR FUTURE REFERENCE.

This grain dryer is a versatile piece of equipment, adaptable to a variety of conditions. As such, it features a number of adjustments for automatic control of the drying process. Operation should not be attempted before reading this manual; these instructions include the information necessary to successful operation and care of the dryer.

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 cannot 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 components 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 1 before attempting to operate the dryer.

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

A CAREFUL OPERATOR IS THE BEST INSURANCE AGAINST AN ACCIDENT

Warranty

Farm Fans, 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 12 months after installation. If so found defective, the products will be repaired or replaced without charge, this constituting and entirely fulfilling the warranty obligation. Farm Fans, Inc., assumes no liability for expenses incurred without written authorization; 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 manufacturers are warranted separately by those suppliers. This warranty is exclusive and in lieu of all other warranties, expressed or implied. Farm Fans, Inc., reserves the right to make design or specification changes at any time, without any contingent obligation to purchasers of products already sold.

All instructions shall be construed as recommendations only; because of the many variable conditions in actual installation, Farm Fans, Inc., assumes no liability for results arising from the use of such recommendations.
OPERATING PRECAUTIONS

1. Read and understand the operation manual before attempting to operate the unit.

2. Keep ALL guards, safety decals, and safety devices in place. Never operate dryer while guards are removed.

3. Keep visitors, children and untrained personnel away from dryer at all times.

4. Never attempt to operate the dryer by jumping or otherwise bypassing any safety devices on the unit.

5. Always open the main power supply disconnect switch and lock it in the open position using a padlock before performing any service or maintenance work on the dryer or the auxiliary conveyor equipment.

6. Before attempting to remove and reinstall the propeller, make certain to read the recommended procedure listed within the SERVICING section of the manual.

7. Keep the dryer and wet holding equipment CLEAN. Do not allow fine material to accumulate.

8. Set pressure regulator to avoid excessive gas pressure applied to burner during ignition and when burner is in operation. See Fig. 5 for operating gas pressures. Do not exceed maximum recommended drying temperatures.

9. Do not operate the dryer if any gas leak is detected. Shut down and repair before further operation.

10. Clean grain is safer and easier to dry. Fine material can be highly combustible, and it also increases resistance to air flow and requires removal of extra moisture.

11. Use CAUTION in working around high speed fans, gas burners, augers, and auxiliary conveyors which start automatically.

12. Keep auger drive belts tight enough to prevent slippage.

13. Be certain that capacities of auxiliary conveyors are matched to dryer auger capacities.

14. Do not operate in an area where combustible material will be drawn into the fan.
**SPECIFICATIONS**

**TYPE:** Staged automatic, with automatically controlled fan/heater unit for high and low heat drying stages; dry and cool (three stages) or full heat (two stages).

**GRAIN COLUMNS:** Two 12" thickness grain columns, with special perforated panels for uniform airflow.

**FAN:** Heavy duty axial fan, with air volume, horsepower, and static pressure matched to dryer size; automatically controlled, with full overload protection, single or three phase.

**HEATER:** High capacity heater, with Star Fire burner, full electric ignition, and thermostat control of high and low fire drying temperatures; available for liquid propane (with vaporizer) or natural gas.

**AUGERS:** Top leveling auger and bottom discharge auger, automatically controlled; power circuits provided for loading and take-away conveyors, with overload protectors for each motor.

**AUTO CONTROL:** Automatic control of all functions - loading, drying, cooling, unloading; automatic reset timer; full safety control circuits; automatic shutdown on wet grain outage or excessive temperature; moisture check thermostat control circuit; unload delay control for alternate use of dry grain conveyor; hour meter; cycle counter.

<table>
<thead>
<tr>
<th></th>
<th>Model AB-120A</th>
<th>Model AB-180A</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Grain Column Length</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total Holding Capacity</strong></td>
<td>120 Bu.</td>
<td>180 Bu.</td>
</tr>
<tr>
<td><strong>Length - with Transport</strong></td>
<td>15&quot; - 2&quot;</td>
<td>19&quot; - 2&quot;</td>
</tr>
<tr>
<td><strong>Width - with Transport</strong></td>
<td>7&quot; - 8&quot;</td>
<td>7&quot; - 8&quot;</td>
</tr>
<tr>
<td><strong>Height - with Transport</strong></td>
<td>10&quot; - 0&quot;</td>
<td>10&quot; - 0&quot;</td>
</tr>
<tr>
<td><strong>Fan Horsepower</strong></td>
<td>7½ - 9 HP</td>
<td>10 - 13 HP</td>
</tr>
<tr>
<td><strong>Fan Diameter</strong></td>
<td>24&quot;</td>
<td>28&quot;</td>
</tr>
<tr>
<td><strong>Heater Capacity, BTU/Hr.</strong></td>
<td>2,300,000</td>
<td>3,000,000</td>
</tr>
<tr>
<td><strong>Top Auger HP</strong></td>
<td>1 HP</td>
<td>2 HP</td>
</tr>
<tr>
<td><strong>Top Auger Capacity, Bu./Hr.</strong></td>
<td>1500</td>
<td>1500</td>
</tr>
<tr>
<td><strong>Bottom Auger HP</strong></td>
<td>1 HP</td>
<td>2 HP</td>
</tr>
<tr>
<td><strong>Bottom Auger Capacity, Bu./Hr.</strong></td>
<td>900</td>
<td>1100</td>
</tr>
<tr>
<td><strong>Max. Running Amps., 1 PH, 230V.</strong></td>
<td>73</td>
<td>94</td>
</tr>
<tr>
<td>(with 5 HP load and unload conv.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Max. Running Amps., 3 PH, 220V.</strong></td>
<td>44</td>
<td>52</td>
</tr>
<tr>
<td>(with 5 HP load and unload conv.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Drying Capacity</strong>, Wet Bu. Shelled Corn</td>
<td>100 Bu. Per Hr.</td>
<td>160 Bu. Per Hr.</td>
</tr>
<tr>
<td><strong>Dry and Cool, 25% to 15%</strong></td>
<td>140 Bu. Per Hr.</td>
<td>210 Bu. Per Hr.</td>
</tr>
<tr>
<td><strong>Dry and Cool, 20% to 15%</strong></td>
<td>135 Bu. Per Hr.</td>
<td>200 Bu. Per Hr.</td>
</tr>
<tr>
<td><strong>Full Heat, 25% to 15%</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Full Heat, 20% to 15%</strong></td>
<td>190 Bu. Per Hr.</td>
<td>280 Bu. Per Hr.</td>
</tr>
</tbody>
</table>

* Excluding load and unload time
INSTALLATION

SYSTEM LAY-OUT

Consider the grain handling system 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 two supports on each side of AB-120A; use a minimum of three supports on each side of AB-180A, 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.

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 system.

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, the dryer must be securely anchored to the support blocks and concrete base, to prevent overturn or lateral movement by wind forces.

Table: Dimensions

<table>
<thead>
<tr>
<th>MODEL</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E*</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>I**</th>
<th>J</th>
<th>K</th>
<th>L</th>
<th>M</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>AB-120A</td>
<td>15-3/16”</td>
<td>7-1/8”</td>
<td>10-3/8”</td>
<td>7-7/8”</td>
<td>15-1/2”</td>
<td>49-1/2”</td>
<td>65-1/2”</td>
<td>8-3/4”</td>
<td>20”</td>
<td>5-11-3/4”</td>
<td>8-8”</td>
<td>3/4”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AB-180A</td>
<td>19-5/8”</td>
<td>7-1/8”</td>
<td>10-3/8”</td>
<td>7-7/8”</td>
<td>15-1/2”</td>
<td>56-1/2”</td>
<td>65-1/2”</td>
<td>12-3/4”</td>
<td>20”</td>
<td>5-11-3/4”</td>
<td>8-8”</td>
<td>3/4”</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*E dimension for removable wheel assemblies will vary, depending on axle system used is of the 15½” or 12” clearance type. Installed height (dimension C) depends on height of blocks used to support dryer on concrete slab.

**Standard discharge is 20” length. Optional discharge auger extension kits are available to provide discharge lengths (1” dimension) of 22” to 102” in increments of 1”.

Figure 1. Dryer dimensions
WET GRAIN must enter the dryer at the hopper at the rear end 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).

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 of each cycle, the dryer will completely fill, requiring 120 wet bushels for AB-120A and 180 bushels for AB-180A. Refill for shrink occurs only during the drying period, not during cooling. Cycle timer settings range from 25 to 125 minutes for various moisture contents and drying methods. The total cycle time, including load and unload time, is 10 to 36 minutes longer than the cycle timer setting, depending upon the actual rate of loading and unloading. Cycle times for various types of drying are shown by the CYCLE TIME CHART, Fig. 7.

A wet holding bin may be provided, with gravity flow into the dryer loading conveyors, 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 1500 bu. per hour. In any case, the dryer must have a constant supply of wet grain. Gravity flow directly into the dryer from an overhead wet holding bin requires a special gravity fill kit (AB-GF-100) to prevent wet grain flow into the dryer while it is unloading.

The unit is equipped with a top auger timer, (bottom terminal section of main 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 auger timer (field adjustable).

At the end of the cooling period (or at the end of the drying period for full heat), the bottom auger will automatically start, along with any take-away conveyor electrically connected to the dryer main control panel. Standard drive sheaves provide unloading rates of about 900 bu. per hour for AB-120A, and 1100 bu. per hour for AB-180A.

Some variation in discharge rate can be obtained by adjusting the height of the auger shield when the dryer is empty. Raise shield to increase unloading rate, or lower it to decrease rate. Further change in discharge rate requires change of sheaves and/or motor speed as shown in Fig. 2.

Special discharge auger extension kits are available, with a total length of 2 to 10 feet (one foot increments) to provide dry grain discharge points at various distances from the rear of the dryer, for direct discharge into elevator legs or other conveyors.

The bottom auger will operate for an additional 30 seconds after the dryer is empty, to clear the take-away conveyor. If a longer time interval is needed, time delay relay No. 2 must be changed.

Overload relays for the loading conveyors and take-away conveyor are factory equipped with heater elements for 5 H.P. motors on the auxiliary conveyors. If other H.P. ratings are used, it is necessary to change the heater elements to provide running load protection for the motors. See Fig. 6 for heater element specifications.

The UNLOAD AUGER switch may be set OFF to stop the automatic cycle when the dryer would normally begin unloading. To start the bottom auger, move switch to AUTO. The ability to "hold" or delay the unloading is of advantage when an elevator leg may be in use for wet grain when the dryer would start unloading if on AUTO, or where the operator desires to be present when unloading occurs.

<table>
<thead>
<tr>
<th>MODEL</th>
<th>BELT DRIVE</th>
<th>Rate</th>
<th>MOTOR HP</th>
<th>RPM</th>
<th>FRAME</th>
<th>SHEAVE* O.D. Bore</th>
<th>AUGER SHEAVE* RPM</th>
<th>O.D. Bore</th>
<th>BELTS</th>
<th>APPROX. AUGER CAP** Bu./hr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>AB-120A</td>
<td>Top Auger, 6&quot; Dia.</td>
<td>Std. 1</td>
<td>1750</td>
<td>56</td>
<td>56</td>
<td>2.5</td>
<td>5/8</td>
<td>367</td>
<td>12.25</td>
<td>1-1/4</td>
</tr>
<tr>
<td></td>
<td>Bottom Auger, 6&quot; Dia.</td>
<td>Std. 1</td>
<td>1750</td>
<td>56</td>
<td>56</td>
<td>2.5</td>
<td>5/8</td>
<td>367</td>
<td>12.25</td>
<td>1-1/4</td>
</tr>
<tr>
<td></td>
<td>Top Auger, 6&quot; Dia.</td>
<td>Min. 3/4</td>
<td>1100</td>
<td>56</td>
<td>56</td>
<td>2.0</td>
<td>5/8</td>
<td>196</td>
<td>12.25</td>
<td>1-1/4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Max. 2</td>
<td>1750</td>
<td>184</td>
<td>184</td>
<td>3.45</td>
<td>7/8</td>
<td>493</td>
<td>12.25</td>
<td>1-1/4</td>
</tr>
<tr>
<td>AB-180A</td>
<td>Bottom Auger, 6&quot; Dia.</td>
<td>Std. 2</td>
<td>1750</td>
<td>184</td>
<td>184</td>
<td>2.5</td>
<td>7/8</td>
<td>367</td>
<td>12.25</td>
<td>1-1/4</td>
</tr>
<tr>
<td></td>
<td>Top Auger, 6&quot; Dia.</td>
<td>Min. 2</td>
<td>1100</td>
<td>184T</td>
<td>184T</td>
<td>2.5</td>
<td>1-1/8</td>
<td>233</td>
<td>12.25</td>
<td>1-1/4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Max. 2</td>
<td>1750</td>
<td>184</td>
<td>184</td>
<td>3.4</td>
<td>7/8</td>
<td>493</td>
<td>12.25</td>
<td>1-1/4</td>
</tr>
</tbody>
</table>

*All auger drive sheaves are 2 groove for 2 belt drive.

**Top auger capacity and power requirement varies with wet grain moisture content and amount of fine material in grain. Bottom auger capacity and power requirement varies with amount of fine material and position of bottom auger shield.

Figure 2. Belt drive data for augers.
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 manual 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 hydrocarbons from long use on a vapor withdrawal system.

Fuel supply system should conform with National Fire Protection Association standards.

Consult propane supplier for proper fittings, connection hose, and safety controls required to meet standards.

Do not use a pressure regulator at the supply tank.

Open L.P. shut-off valves slowly to prevent accidental closing of excess flow valve.

Connection to liquid manifold on dryer.

Use a flexible connection hose designed for L.P. gas.

See Fig. 5 for recommended line size.

Minimum distance of 36”

Propane supply tank. Recommended minimum of 1000 gal. connected for liquid draw.

Figure 3. Liquid propane (LP) 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 5 to 10 PSI must be provided at the connection to the dryer, with gas available in sufficient volume to maintain the operating pressure.

Connection to natural gas manifold on dryer.

Natural gas meter and regulator.

See Fig. 5 for required pressure and typical maximum fuel flow rates.

See Fig. 5 for recommended line size.

Min. dist. as determined by supplier

Figure 4. Natural gas (N) fuel supply.

<table>
<thead>
<tr>
<th>Maximum Heat Capacity, BTU per Hour</th>
<th>AB-120A</th>
<th>AB-180A</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2,300,000</td>
<td>3,000,000</td>
</tr>
<tr>
<td>Liquid Propane (LP)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Typical Maximum Fuel Flow, Gallons per Hour*</td>
<td>25</td>
<td>32</td>
</tr>
<tr>
<td>Recommended Liquid Line Size</td>
<td>3/8” Pipe</td>
<td>1/2” Pipe</td>
</tr>
<tr>
<td>Heater Orifice Drill Size</td>
<td>.218”</td>
<td>.250”</td>
</tr>
<tr>
<td>Operating Pressure Range (heater pressure gauge), PSI</td>
<td>4-20</td>
<td>3-15</td>
</tr>
<tr>
<td>Lo-Fire Pressure Setting, PSI</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Natural Gas (N)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Typical Maximum Fuel Flow, Cubic Feet per Hour*</td>
<td>2,300</td>
<td>3,000</td>
</tr>
<tr>
<td>Minimum Pressure at Connection to Dryer, PSI</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Recommended Minimum Line Size</td>
<td>100’ Dist.</td>
<td></td>
</tr>
<tr>
<td>Heater Orifice Drill Size</td>
<td>1” Pipe</td>
<td>1¼” Pipe</td>
</tr>
<tr>
<td>Operating Pressure Range (heater pressure gauge), PSI</td>
<td>.312”</td>
<td>.375”</td>
</tr>
<tr>
<td>Lo-Fire Pressure Setting, PSI</td>
<td>2-0</td>
<td>2-7</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

* Maximum fuel flow rates listed assume full heat output for gas line sizing purposes. In normal operation the flow rates would be substantially lower than indicated, due to actual pressure setting used and cycling of the burner.

Figure 5. Fuel system specifications and recommendations.
ELECTRICAL POWER SUPPLY

POWER SUPPLY
An adequate power supply and proper wiring are important factors for maximum performance and long life of the dryer. Electrical service must be of 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 should be equipped with a power disconnect switch external to the ASC Control Box to permit total power shut down before opening ASC dead front, as required for inspection and service. The power disconnect switch should also be located close to the dryer for quick shut down.

TRANSFORMERS WIRING VOLTAGE DROP
Contact the service representative of the power supplier, to advise 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 three motors 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 adjustment knob on each relay. Dryers are shipped with overload relay heaters for auxiliary conveyors (adjacent to top and bottom auger contactors) to operate 5 H.P., 1 phase or 5 H.P., 3 phase motors; if different motors are used, the heater elements should be changed to provide adequate motor overload protections.

NOTE: A third heater element may be added to 3 phase overload relays if required by the electrical code.

SHIPPING BRACKET
The attachment bracket between the control box and the fan housing is for shipping only, and should be removed before operation.

AUXILIARY CONVEYORS
See Fig. 19 for connection terminals for auxiliary conveyors, single phase or three phase.

<table>
<thead>
<tr>
<th>Horsepower</th>
<th>1 Ph. 230V.</th>
<th>3 Ph. 220V.</th>
<th>Fan Motor</th>
<th>Top Auger</th>
<th>Bottom Auger</th>
<th>Aux. Conv. Motors</th>
</tr>
</thead>
<tbody>
<tr>
<td>7 1/4 HP</td>
<td>1 Ph. 230V.</td>
<td>1 Ph. 230V.</td>
<td>1/4 HP</td>
<td>1/4 HP</td>
<td>1/4 HP</td>
<td>1/4 HP</td>
</tr>
<tr>
<td>3 HP. 220V.</td>
<td>3 HP. 220V.</td>
<td>3 HP. 220V.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Full Load Current Amps. Per Motor</th>
<th>1 Ph. 230V.</th>
<th>3 Ph. 220V.</th>
</tr>
</thead>
<tbody>
<tr>
<td>42 1/2 HP</td>
<td>28 1/2 HP</td>
<td>25 1/2 HP</td>
</tr>
<tr>
<td></td>
<td>6.0 HP</td>
<td>2.9 HP</td>
</tr>
<tr>
<td></td>
<td>6.0 HP</td>
<td>2.9 HP</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Max. Running Load**</th>
<th>1 Ph. 230V.</th>
<th>3 Ph. 220V.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dryer Only, Amps.</td>
<td>48 HP</td>
<td>31 HP</td>
</tr>
<tr>
<td>With Aux. Conv., Amps.</td>
<td>73 HP</td>
<td>44 HP</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Recommm. Service Equip., Rating, Amps.</th>
<th>1 Ph. 230V.</th>
<th>3 Ph. 220V.</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 HP</td>
<td>100 HP</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Control Panel O/L Relay Specs.</th>
<th>1 Ph. 230V.</th>
<th>3 Ph. 220V.</th>
</tr>
</thead>
<tbody>
<tr>
<td>F42.0 HP</td>
<td>25.0 HP</td>
<td></td>
</tr>
<tr>
<td>C5.92 HP</td>
<td>C3.01 HP</td>
<td></td>
</tr>
<tr>
<td>C5.92 HP</td>
<td>C3.01 HP</td>
<td></td>
</tr>
<tr>
<td>C22.8 HP</td>
<td>C13.7 HP</td>
<td></td>
</tr>
<tr>
<td>F66.8 HP</td>
<td>C33.0 HP</td>
<td></td>
</tr>
<tr>
<td>C11.3 HP</td>
<td>C5.92 HP</td>
<td></td>
</tr>
<tr>
<td>C11.3 HP</td>
<td>C5.92 HP</td>
<td></td>
</tr>
<tr>
<td>C22.8 HP</td>
<td>C13.7 HP</td>
<td></td>
</tr>
<tr>
<td>Control Panel CB Rating, Amps.</td>
<td>1 Ph. 230V.</td>
<td>3 Ph. 220V.</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>-------------</td>
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</tr>
<tr>
<td>80 HP</td>
<td>50 HP</td>
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<td>60 HP</td>
<td>50 HP</td>
<td></td>
</tr>
<tr>
<td>60 HP</td>
<td>50 HP</td>
<td></td>
</tr>
</tbody>
</table>

*Horsepower, current and max. running load based upon 5 HP auxiliary conveyor motors; max. HP which can be served from dryer power circuit is 7 1/2 HP (1 PH. and 3 PH.); larger auxiliary conveyors require separate contractors and overload protectors, with coil circuits connected to the dryer control panel terminals for automatic operation.

**Max. running load is less than total connected load; max. load occurs with fan, top auger, and auxiliary loading conveyor in operation, during refill or shrink, during the drying period.

***Auxiliary auger motors are controlled by the top and bottom auger circuit breakers.

Figure 6. Electrical load, overload relays, and circuit breakers.
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 switches and controls, as listed in the following chart:

<table>
<thead>
<tr>
<th>Control</th>
<th>Test Firing Setting*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cycle Timer**</td>
<td>45 to 50 Minutes**</td>
</tr>
<tr>
<td>Burner Switch</td>
<td>AUTO</td>
</tr>
<tr>
<td>Unload Auger Switch</td>
<td>AUTO</td>
</tr>
<tr>
<td>Hi-Limit Thermostat</td>
<td>Maximum Temperature</td>
</tr>
<tr>
<td>MC Thermostat</td>
<td>Minimum Temperature</td>
</tr>
<tr>
<td>Hi-Heat Thermostat</td>
<td>200°F</td>
</tr>
<tr>
<td>Lo-Heat Thermostat</td>
<td>160°F</td>
</tr>
</tbody>
</table>

* These settings are for test firing purposes only. For suggested grain drying settings, refer to OPERATING PROCEDURE test and CYCLE TIMING CHART and OPERATING INSTRUCTIONS CHART.

** If fan circuit breaker is ON, timer reset button must be held depressed while adjusting cycle timer.

2. Turn ON main power supply to dryer, and OPEN all fuel supply shut-off valves. Inspect gas line connections for possible leaks. ANY GAS LEAKS MUST BE CORRECTED.

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

   1980 and later natural gas model dryers are factory equipped with an electric type main/safety gas shut-off valve. On these dryers, the control circuit must be energized before the gas valve can be opened.

3. Move FAN, TOP AUGER and BOTTOM AUGER circuit breakers ON.

4. Depress CONTROL CIRCUIT START button. The control circuit panel light should come ON (indicating power is being supplied thru circuit), and the top auger and any connected loading conveyor should immediately start operating.

   NOTE: The safety control circuit includes the loading timer, plenum and grain column hi-limit thermostats, all current overload relays, fan motor thermal overload protectors (1-phase only), burner hi-limit thermostat, and burner control lockout, all of which must be in the closed circuit position to activate the control circuit panel light.

   CAUTION: Loading and unloading conveyors start automatically. KEEP AWAY FROM MOVING PARTS.

5. Move the TOP AUGER circuit breaker OFF and observe the direction of auger rotation. Top auger must rotate CLOCKWISE, as viewed from drive end.

6. Check fan motor direction of rotation (3-phase models) by pressing the MANUAL RE-START button and then quickly depressing the dryer STOP button to cause momentary fan operation. FAN MUST TURN FREELY IN A COUNTER-CLOCKWISE DIRECTION WHEN VIEWED FROM FAN INLET.

   NOTE: On three phase model dryers, if all of the motors run backward they can easily be reversed by interchanging ANY TWO of the three power supply connections to the dryer. Auxiliary conveyors which have been field connected may have to be reversed individually.
7. Restart fan by pressing the CONTROL CIRCUIT START button and the MANUAL RESTART button.

NOTE: The fan should reach full speed in less than 7 seconds, and motor running current should be within acceptable limits to the full load Amps. Shown in Fig. 6.

After the fan has been running for about 15 seconds for the purge cycle, the heater should automatically start operating. With the CYCLE TIMER at 45 to 90 minutes, the HI-HEAT THERMOSTAT (set at 200°F) controls the heater.

For test firing purposes, set the gas pressure regulator to provide about 15 PSI on the heater pressure gauge for LP models, or natural gas models, regulate supply pressure to provide about 6 to 8 PSI.

NOTE: If heater fails to ignite within one to two minutes (due to gas being shut-off at any other reason), the safety lock-out timer within the burner control will automatically shut-down the entire dryer. If this condition occurs, wait several minutes for the lock-out to cool before again restarting the dryer and attempting to fire the burner.

8. Temporarily turn HI-HEAT THERMOSTAT down to its minimum setting to cause heater to cycle into LO-FIRE. As the thermostat is turned down, the gas pressure gauge should show a noticeable drop, indicating the No. 1 (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. For test purposes, the Lo-Fire gas pressure should be about 3-4 PSI for LP models and 2 PSI for natural gas. Readjust flow control valve to change gas pressure, if required.

NOTE: Gas pressures and thermostat settings cannot be finalized until the dryer is filled with grain. Refer to Fig. 5 for gas pressure information.

9. Allow dryer to continue operating with the HI-HEAT THERMOSTAT controlling (turned fully down with heater on Lo-Fire) and observe action of heater when cycle timer reaches the 40 minute setting. This is the standard factory time setting of the No. 3 cam in cycle timer for switching heater control from the HI-HEAT THERMOSTAT to the LO-HEAT THERMOSTAT. At 40 minutes when the LO-HEAT THERMOSTAT (previously set at 160°F) starts controlling the heater, the heater will automatically respond to the LO-HEAT THERMOSTAT setting and cause the No. 1 (Hi-Fire) gas solenoid valve to OPEN, as indicated by a noticeable increase on the gas pressure gauge.

10. Temporarily turn LO-HEAT THERMOSTAT down to its minimum setting to cause heater to cycle into Lo-Fire and verify that Lo-Heat Thermostat is functioning properly to control heater output.

Reset LO-Heat and HI-HEAT THERMOSTATS to their original test settings, as listed in Step 1.

11. With heater operating, check GRAIN COLUMN HI-LIMIT THERMOSTAT for proper operation by temporarily turning it down to the MINIMUM SETTING. As the thermostat is turned down, its switch contacts should open and cause dryer shut-down.

NOTE: On single phase models, the starting capacitors for the fan motor can be damaged by heat if the motor is started repeatedly. Allow time for capacitors to cool down before restarting motor.

12. Reset COLUMN HI-LIMIT THERMOSTAT to its maximum setting, then restart the unit (including fan and heater) by depressing the CONTROL CIRCUIT START button and the MANUAL RESTART button.
13. With fan and heater operating (burner switch on AUTO.), hold the moving CYCLE TIMER POINTER with one hand, then hold the TIMER RESET button depressed (to release timer clutch) and rotate the pointer back to about 5 minutes to place the dryer in the cooling period. Release TIMER RESET button to engage timer clutch. As timer is being rotated back (at about 15 to 18 minute setting) the heater should automatically STOP, with the fan continuing to operate.

   NOTE: If M.C. thermostat is not turned down to the MINIMUM setting, as listed in Step 1, it could cause the heater to stay ON (M.C. hold). If this condition occurs, depress the MANUAL RESTART button.

14. Allow dryer to continue with only the fan operating and observe operation when CYCLE TIMER runs down to 0. When timer reaches 0, the fan should automatically STOP and the bottom auger (along with any connected auxiliary unloading auger) should START operating.

   With dryer empty, the bottom auger should operate for only about 30 seconds, then the Automatic System Control should reset the CYCLE TIMER for the start of a new operating cycle.

   NOTE: At this point, the top auger would automatically start again if its circuit breaker was ON.

15. Restart fan and burner by depressing the START button and the MANUAL RESTART button. After heater starts operating, check BURNER LOCK-OUT CONTROL for proper operation by shutting off the manual fuel supply valve and observing action of dryer. Within a few minutes after heater stops due to lack of fuel, the lock-out control should function and cause shut-down of the dryer.

16. After all checks have been successfully completed, shut-off the circuit breakers and the main power supply, and close any other fuel supply valves.
DRYER OPERATION

Operating Instructions Chart

Refer to Operating Procedures for important instructions for:
- Adjustment of operating gas pressures
- Setting HI-HEAT and LO-HEAT thermostats
- Setting MC thermostat
- Changes in CYCLE TIMER cam settings

After these adjustments are made, the dryer can be operated on full automatic control.

AUTOMATIC OPERATION, DRY AND COOL:
1. Turn main power supply ON and OPEN all manual gas supply valves.
2. Set CYCLE TIMER to the desired DRY AND COOL time. See CYCLE TIME CHART for suggested cycle times for various types of drying.
3. All circuit breakers ON.
4. BURNER and UNLOAD AUGER switches to AUTO.
5. Press CONTROL CIRCUIT START button.
6. Dryer will operate automatically to load, dry, cool, and unload.

AUTOMATIC OPERATION, FULL HEAT:
As above, but set BURNER switch to ON.

TO RESTART DRYER OR CHANGE CYCLE TIMER SETTING
With control circuit ON, press TIMER RESET button and move timer pointer to the desired point in the cycle; release TIMER RESET button; push MANUAL RESTART button.

FINAL MOISTURE CONTENT
Increase cycle time for lower final moisture content in the dried grain; reduce cycle time 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 cycle time.

---

Cycle Time Chart

<table>
<thead>
<tr>
<th>Type of Grain</th>
<th>Estimated Moisture Reduction</th>
<th>Suggested Initial Cycle Time Min. (1)</th>
<th>Total Drying Time Min. (2)</th>
<th>Dry Bu./Hr. Excluding Load and Unload Time</th>
<th>Wet Bu./Hr. Including Load and Unload Time [3]</th>
</tr>
</thead>
<tbody>
<tr>
<td>DRY AND COOL SHELLED CORN</td>
<td>18-15%</td>
<td>45</td>
<td>27</td>
<td>160</td>
<td>240</td>
</tr>
<tr>
<td></td>
<td>20-15%</td>
<td>55</td>
<td>37</td>
<td>130</td>
<td>195</td>
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<tr>
<td></td>
<td>23-15%</td>
<td>60</td>
<td>47</td>
<td>110</td>
<td>166</td>
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<td>25-15%</td>
<td>75</td>
<td>57</td>
<td>95</td>
<td>145</td>
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<tr>
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<td>28-15%</td>
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<td>67</td>
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<tr>
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<td>77</td>
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<td>85</td>
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<tr>
<td>MILO, WHEAT, SOYBEANS</td>
<td>16-13%</td>
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<td>27</td>
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<td></td>
<td>18-13%</td>
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<tr>
<td></td>
<td>20-13%</td>
<td>75</td>
<td>57</td>
<td>95</td>
<td>145</td>
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<tr>
<td>FULL HEAT (DRIERATION) SHIELLED CORN</td>
<td>18-15%</td>
<td>25</td>
<td>25</td>
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<td>430</td>
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<td>22-15%</td>
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<td>115</td>
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<td>MILO, WHEAT, SOYBEANS</td>
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<td>145</td>
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<tr>
<td></td>
<td>22-13%</td>
<td>60</td>
<td>60</td>
<td>120</td>
<td>180</td>
</tr>
</tbody>
</table>

(1) Suggested cycle times are based upon the following temperature settings. Lower drying temperatures are used for lower initial moisture contents.
- 25% Shelled Corn: 230°F Hi-heat, 170°F Lo-heat
- 18% Milo, Wheat: 175°F Hi-heat, 140°F Lo-heat
- 18% Soybeans: 140°F Hi-heat, 120°F Lo-heat
(2) Drying time is equal to cycle timer setting plus 18 minutes for cooling (factory setting of 2400 Lb/hr).
(3) Standard auger capacities: 1500 bu./hr. load and 900 bu./hr. unload. Greater drying capacities may be achieved by auger adjustment to decrease load and unload time.

Figure 7 — Cycle Time Chart for AB-120A and AB-180 Dryers
### Pressure Regulator and Flow Control Valve

<table>
<thead>
<tr>
<th>HI-HEAT PRESSURE PROPA</th>
<th>When the dryer is operating in the hi-heat part of the time cycle (above the 40 minute factory setting of No. 3 timer cam), the HI-HEAT thermostat opens and closes No. 1 vapor solenoid valve, resulting in gas pressure fluctuating from “high-side” to “low-side” as the No. 1 solenoid valve opens and closes. See Fig’s 10, 11 and 12. for identification of components.</th>
</tr>
</thead>
<tbody>
<tr>
<td>NATURAL GAS</td>
<td>For maximum heat on natural gas units, the supply pressure to the dryer should be regulated to provide a high side pressure of about 8 PSI on AB-120A, or 7 PSI on AB-180A model dryers.</td>
</tr>
<tr>
<td>HI-HEAT THERMOSTAT CONTROL</td>
<td>The general requirement is that high-side pressure must be in the correct range to allow the HI-HEAT thermostat to control at its hi-heat setting by opening and closing No. 1 solenoid valve. If No. 1 valve is open continuously, the high-side pressure is too low. If the high-side pressure is set too high, ignition failure may occur, or excessive heat may be produced in the plenum chamber.</td>
</tr>
<tr>
<td>LO-HEAT LOW-SIDE PRESSURE FLOW CONTROL VALVE PROPA</td>
<td>When the dryer is operating in the lo-heat part of the time cycle, (below the 40 minute factory setting of No. 3 timer cam), the LO-HEAT thermostat opens and closes No. 1 vapor solenoid valve, resulting in gas pressure fluctuating from “high-side” to “low-side” as No. 1 solenoid valve opens and closes. The low-side (Lo-Fire) pressure is controlled by the manually adjustable flow control valve (see fig’s. 10, 11 and 12).</td>
</tr>
<tr>
<td>NATURAL GAS</td>
<td>On propane units, the low-side pressure should be adjusted to about 3 to 5 PSI by turning the knob on the flow control valve. Lock the setting with an Allen wrench after making this adjustment.</td>
</tr>
<tr>
<td>LO-HEAT THERMOSTAT CONTROL</td>
<td>For natural gas, the flow control valve should be set to produce a low-side pressure of about 2 PSI.</td>
</tr>
</tbody>
</table>

### Drying Temperatures

| TWO DRYING STAGES THERMOMETER SHELLED CORN SMALL GRAIN | The dryer is designed for a two stage drying period, with automatic reduction of the drying air temperature during the last part of the drying period. The temperature reduction from hi-heat to lo-heat occurs at 40 minutes on the CYCLE TIME, when heater control shifts from the HI-HEAT thermostat to the LO-HEAT thermostat. The drying temperature is shown by the dial thermometer located at the front of the plenum chamber. For shelled corn with an initial moisture content of 25 to 30%, the suggested HI-HEAT thermostat setting is 220 to 240 degrees, with a LO-HEAT thermostat setting of 160 to 180 degrees. For other types of grain, and lower initial moisture contents, lower drying temperatures are recommended. For small grain drying, HI-HEAT and LO-HEAT temperatures of 170 and 140 degrees are suggested, except for rough rice, where 140 and 120 degrees are suggested. Lower drying temperatures usually produce higher quality grain. The general rule is to use the lowest drying temperature which will produce the required capacity through the dryer. |

Cycle Timer

The cycle timer is an automatic reset timing device, containing three cams to activate switches at various points in the cycle. The timer recycles (the moving pointer returns to full cycle setting) each time voltage is removed from its clutch. Therefore, the timer will recycle each time the clutch power supply is interrupted; the clutch is connected ahead of the control circuit relay, so the moving pointer will show the time when the dryer stopped because of an open safety control circuit.

The cycle timer may be manually set to any point in the cycle by holding the TIMER RESET button depressed and moving the pointer to the desired time, then releasing the TIMER RESET button to engage the clutch. The MANUAL RESTART button must be pressed also to restart within a cycle.

Refer to the CYCLE TIME CHART, Fig. 7, for suggested initial cycle timer settings for various types of drying, by reference to the examples, and by making allowance for higher or lower initial or final moisture contents. Since the examples are only approximate, it is necessary to check final moisture and adjust the drying time and/or drying temperature.

The last 18 minutes of the cycle time are for cooling (factory setting), any increase in time setting will provide that much more drying time, without affecting cooling time. For example, a timer setting of 70 minutes provides 52 minutes of drying and 18 minutes of cooling; if the setting was increased to 75 minutes, the drying time would be 57 minutes, with 18 minutes for cooling.

The discharge grain moisture content should be checked periodically to indicate the need for any change in cycle time. Any appreciable change in wet grain moisture content will require an adjustment in cycle time.

The cycle time is set by rotating the entire pointer assembly to the desired number of minutes for dry and cool. ALWAYS PRESS THE TIMER RESET BUTTON WHILE MAKING THIS ADJUSTMENT.

Cycle Timer Cam Settings

CAM NO. 1 STARTS DISCHARGE The cycle timer contains three cams, numbered from the clock face as follows: Cam No. 1 stops the fan at the end of the cooling period and starts the bottom auger. The factory setting is 0 minutes and this cam should NOT be field adjusted.

CAM NO. 2 STARTS COOLING Cam No. 2 stops the burner and starts the cooling period (burner switch on AUTO). The factory setting is 18 minutes, but the setting can be changed to provide greater or less cooling time.

CAM NO. 3 HI-HEAT TO LO-HEAT Cam No. 3 causes the burner to go from HI-HEAT to LO-HEAT. The factory setting is 40 minutes, but the setting can be changed to provide more or less hi-heat and lo-heat during the drying period. For example, with a 70 minute cycle timer setting, there would be 30 minutes of hi-heat, 22 min. of lo-heat, and 18 min. of cooling. Changing No. 3 cam to 50 min. would result in 20 min. in hi-heat, 22 min. of lo-heat, and 18 min. of cooling.

The No. 3 cam setting of 40 min. should be satisfactory for most applications, since lower initial moisture will require shorter cycle times, resulting in shorter hi-heat periods when the No. 3 cam is left at 40 min. On the other hand, very high initial moisture contents will require a longer cycle time and will automatically receive more time on hi-heat if the No. 3 cam is left on 40 minutes.

NO. 3 CAM SETTING The No. 2 and No. 3 cam settings can be changed by holding the timer pointer (with power OFF and timer clutch disengaged) and manually rotating the cam on the shaft; the cam has a friction fit on the shaft. Rotate the pointer and shaft to observe when the cam moves the micro-switch lever.

CHANGING CAM SETTINGS

Hi-Limit Thermostat

SETTING HI-LIMIT THERMOSTAT The hi-limit thermostat has a sensing element in the grain column to provide shut-down of the dryer if the grain temperature becomes too high. This thermostat is electrically connected in the safety control circuit. The setting should be 40 degrees below the hi-heat drying temperature.
Moisture Check (MC) Thermostat

MC HOLD

The function of the MC thermostat is to continue heater operation for additional drying, at the point where the cooling would normally begin (factory setting of 18 min.), if the temperature in the grain column is below the MC thermostat setting, thereby preventing discharge of grain with excessive moisture content. When the MC thermostat is "holding" the timer at the 18 minute point, with burner operating, the MC indicator light will be ON, showing that the temperature in the grain column is below the MC setting.

After drying temperatures have been adjusted and the cycle time has been set to produce the desired final moisture content, the MC thermostat can be set as follows:

A. While the cycle timer is in the drying period, any time before the cooling period begins, turn the MC up from its minimum setting to maximum setting.

B. When the timer reaches the beginning of the cooling period, the burner will not stop in the usual manner; the MC thermostat will "hold" and the burner will continue to operate, with the timer stopped, and the MC indicator light ON.

C. Turn the MC down until the indicator light goes OFF, and leave it at that setting.

D. For full heat drying (no cooling), follow the same procedure, just before the cycle timer reaches 18 minutes (factory setting of No. 2 cam).

The MC thermostat, as set above, will prevent grain from being discharged from the dryer at too high a moisture content, such as might occur with an increase in wet grain moisture content (if the cycle time has not been increased).

The MC thermostat can be set so high as to "hold" on each cycle, in attempting 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 cycle timer is a more reliable method of controlling final moisture.

Dry Grain Discharge

PADDOLE SWITCH

When the cycle timer reaches 0, the No. 1 cam micro-switch starts the bottom auger (with unload auger switch on AUTO); the bottom auger continues to operate until the swinging vane or paddle moves to the dryer "empty" position, and tilts the mercury switch (paddle switch) to close the electrical circuit, causing time delay No. 2 (TDN2) to open the circuit to the cycle timer (after a 30 second delay), resulting in timer recycle.

TIME DELAY

See Fig. 2 for standard discharge rates, and the variation in discharge rate which may be provided by changing sleeves and/or drive motors. Some change in discharge rate can be made by raising or lowering the bottom auger shield.

DISCHARGE RATE

The paddle at the discharge end of the dryer swings through an arc of about 20° from its straight down (dryer empty) position to the up position with grain against the paddle. The position of the mercury switch on the paddle shaft is adjustable by loosening the clamping nut; the mercury switch should be locked on the paddle shaft so it is "closed circuit" for the bottom 1/3 to 1/2 of the paddle swing arc, and "open circuit" for the top 1/3 to 1/2 of the paddle swing. The mercury switch must be positioned in its mounting clip so that there is no interference between the switch and housing.

ADJUSTMENT OF PADDLE SWITCH

Full Heat Drying

FULL HEAT

If the burner switch is set ON, the heater will operate throughout the entire cycle timer period, eliminating the cooling process.

DRYERATION PROCESS

Hot grain will be discharged from the dryer. This type of drying process, called "Dryeration", increases drying capacity and can increase grain quality. The usual 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 a controlled rate. Dryeration provides higher quality in shelled corn because of less stress cracking of kernels in the process of tempering and slow cooling. From 1 to 3% moisture is removed in the cooling process, so hot shelled corn is removed from the dryer at about 17% if the desired final moisture is 15%.

CAM NO. 3

The full heat process results in somewhat shorter cycle times and it may be desirable to reduce the 40 min. factory setting of No. 3 Cam to provide more burner operation time on Hi-Heat. A 50 min. cycle time would provide only 10 min. of Hi-Heat; if the No. 3 Cam setting was reduced to 30 min., the Hi-Heat period would then be 20 min., with the remaining 30 min. on Lo-Heat.
Top Auger Timer

FUNCTION
The top auger timer is in the main control box, as indicated by Fig. 14. It is an automatic reset timer, with adjustable setting, to provide shut-down of the dryer if the top auger (and any connected loading conveyor) operates continuously for a time period exceeding the timer setting, thereby indicating an absence of wet grain.

TIMER SETTING
Observe the time required for the dryer to fill, then set the top auger timer at the average fill time plus 3 or 4 minutes. The timer will open the safety control circuit for shut-down if the top auger operates continuously for a time equal to the setting, either during filling or ref ill for shrink.

Unload Delay

UNLOAD AUGER SWITCH
The UNLOAD AUGER switch may be set OFF to stop the automatic cycle when the dryer would normally begin unloading. To start the bottom auger, move the UNLOAD AUGER switch to AUTO. This ability to “hold” or delay the unloading is of advantage where an elevator leg may be in use for wet grain when the dryer would start unloading if on AUTO, or where the operator desires to be present when unloading occurs.

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 single phase units includes 5 current overload relays, plus one thermal overload protector in the fan motor winding, as shown in Fig’s. 19 and 14. Three phase units have 5 current overload relays in the control circuit as shown in Fig’s. 19 and 15.

MANUAL RESET
All current overload relays are manual reset, except for the automatic reset thermal protector on single phase fan motors. If an electrical overload occurs, the control box must be opened to push the reset lever. Note: Pushing reset levers while holding the control circuit START button depressed will indicate which overload relay is open. Use CAUTION to avoid contact with electrical parts which are energized.

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%).

Dryer Operator Light

LIGHT OPERATION
The dryer operator light is designed to act as either a dryer monitor signal light, or a nighttime convenience light.

The three position switch provides ON, OFF, or MONITOR operation. When the switch is in ON position, the light will stay ON regardless if the dryer is operating or shut down. When the switch is in MONITOR position, the light will be ON only when the dryer is operating.

The light circuit is 115 Volts and is intended for 100 watt bulb operation. Do not install an over-size bulb as it may overload the circuit.

NOTE: To reverse the monitor function, whereby the light will be OFF during dryer operation and ON when there is a dryer shut-down, connect the MONITOR position lead of the switch to terminal 5 on the R1 relay, instead of terminal 6, as shown in Fig. 20 wiring diagram.
Main/Safety Gas Shut-Off Valve

The main/safety gas shut-off valve is installed only onto natural gas model dryers. The valve is equipped with an electric solenoid which is energized only when the dryer control circuit is turned ON.

To manually open the valve, a manual reset lever movement is utilized. The “free handle” lever will not open valve until the solenoid is energized which will allow the lever to engage. Only then can the lever be manually raised to the latched position, opening the valve. The valve will trip closed (shut) instantly when the solenoid is de-energized or when lever is rotated to the closed position.

Visual indication of “open” and “shut” positions is accomplished by a highly visual position indicator in the side of the operating movement. An orange indicating bar aligns itself with the words “open” or “shut.”

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 vaporizer-equipped burners are 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 the 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, move all circuit breakers OFF, turn main power supply OFF, and CLOSE all valves in the fuel supply lines to the dryer.
FIG. 14 - INSIDE CONTROL PANEL PARTS - 1 PHASE MODEL

FIG. 15 - INSIDE CONTROL PANEL PARTS - 3 PHASE MODEL

* The power and control terminal strip wiring connections are shown in Figs. 19 and 20 wiring diagrams by either a single or double box symbol. Refer to legend under each wiring diagram for full identification information.
Fig. 16 - Bottom Auger Drive Components

Fig. 17 - Motor Mount and Belt Tension Adjusting Bolt Details
Periodically open BOTTOM CLEANOUTS of dryer and remove all accumulation of foreign material under bottom auger.

IMPORTANT: KEEP INSIDE OF DRYER CLEAN. DO NOT ALLOW CHAFF AND OTHER COMBUSTIBLE MATERIAL TO ACCUMULATE WITHIN AIR PLENUM CHAMBER.

MAKE CERTAIN TO TURN OFF AND LOCK-OUT THE MAIN POWER SUPPLY BEFORE ENTERING THE DRYER.

FIG. 18 - TYPICAL VIEW WITHIN AIR PLENUM CHAMBER OF DRYER
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 MINOR FAILURES AND ASSURE DEPENDABLE OPERATION OF THE EQUIPMENT WHEN IT IS NEEDED.

1. Shut-off electrical power. Open main ASC control box and remove fan-heater control box cover and inspect for moisture, rust or 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 propeller for freedom of rotation and uniform tip clearance. It should also be inspected for accumulated dirt and grain dust. ESPECIALLY INSIDE THE MUD, 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 propeller 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, USE CHEVRON SRI-Z high temperature grease or a compatible equivalent product.

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 system before attempting disassembly.

6. Inspect the primary air screen (at the top of the burner casing) 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 3/32-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 and the grain column paddle assemblies. Both paddle units must rotate freely without any indication of sticking or binding.

10. Inspect the top auger and bottom auger drive belts for proper tension and condition. If any belts are badly worn or damaged, they should be replaced with a new set. Readjust belt tension, as required. See Fig. 17.

NOTE: All of the auger 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.

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 flights and other internal parts. Check that temperature sensors within air plenum chamber are secured within insulated clamps and do not chafe on other metal parts.
13. Inspect that all dryer guards and warning decals are securely installed. Make certain guards do not interfere with belts and other 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 PL-02 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 two fuses, burner switch and flame switch to supply power to P/L Terminals No. 2 and No. T. thereby energizing the heater elements within the purge and lock-out tubes.

2. After the purge tube has been energized for approximately 15 seconds, the purge tube contacts CLOSE the circuit between P/L Terminals No. 5 and No. 1 and energizes the control relay coil. As the relay coil becomes energized it supplies voltage to the ignition transformer and gas solenoid valves by CLOSING the relay contact points located between P/L Terminals No. 3 and No. T. thereby starting ignition spark and gas flow.

3. Shortly after the heater starts operating, the flame switch responds to burner heat and OPENS its contact points, thereby de-energizing the purge tube and lock-out tube heater element circuit. After the circuit becomes de-energized and the purge tube contacts reopen, a second set of closed contact points within the relay act to keep the relay coil energized to maintain heater operation.

4. The heater will operate on Hi-Fire with both gas solenoid valves energized until the thermostat control (either Hi-Heat or Lo-Heat thermostat) opens its contacts and interrupts the circuit to de-energize the No. 1 (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.

5. 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 continue to energize the lock-out tube heater circuit.

   **B.** After the lock-out heater has been energized for approximately 60 seconds, the lock-out tube contacts will OPEN and interrupt the circuit, thereby providing automatic shut-down.

   **C.** Once the dryer shuts down, the lock-out tube will cool down within several minutes and automatically reset itself.

**Vaporizer Adjustment**

**LIQUID PROPANE MODELS ONLY** - After initial installation and occasionally during the drying operation, check the temperature of the gas line between the regulator and pressure gauge. 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 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 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. 18A shows a cutaway sketch of the propellor 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. 18B. 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.

CLEANANCE HOLES - When reassembling parts, the capscrews must be installed through the UNTAPPED CLEARANCE HOLES, as shown in Fig. 18C, 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.

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 MAIN 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 three GRADE 5 CAPSCREWS (having approximately 3 inches of threads) into the THREADED HOLES in the bushing and turn them in by hand until they bottom against the front surface of the propellor.

   NOTE: Early type bushings have only two threaded holes, whereas the current type have three holes to provide a more uniform pushing force. DO NOT ATTEMPT TO USE LOW STRENGTH (UNMARKED) BOLTS TO REMOVE THE BUSHING, AS THE BOLTS MAY BREAK OFF. This is especially important for the early two hole type bushing which provides off-center forcing action.

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. 18B, 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.

FIG. 18A - CUTAWAY DRAWING OF TYPICAL PROPELLOR INSTALLATION
INSTALLATION

1. Carefully clean motor shaft, key, bushing and bore of propeller. MAKE SURE MAIN POWER IS LOCKED OUT, and
that shaft and key are completely free of rust and burns. Do not lubricate the bushing or capscrews.

CHECK AND MAKE SURE ALL MOTOR MOUNT BOLTS ARE PROPERLY TIGHTENED.

2. Slide propeller over motor shaft and locate it against the motor.

3. Align the keyway 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 propeller so their alignment marks are in line and loosely attach the propeller to the bushing.
MAKE SURE THE CAPSCREWS ARE INSERTED INTO THE UNTHEADED 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 propeller will not
contact the motor. If motor make has a short shaft, it may be necessary to position bushing slightly beyond
end of shaft.

5. Slide the propeller forward onto the taper-lock bushing and turn the capscrews in by hand as far as possible.

6. Use an INCH-POUNDS 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.
18C.

7. Turn propeller 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 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 propeller, 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 reassembly.
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 washers. 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 propeller 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. FI AME SWITCH - Disconnect the two slip-on connectors and unscrew the flame switch out of its mounting bracket. Make sure to use a wrench. DO NOT ATTEMPT TO TURN BY TWISTING THE TERMINALS, AS IT MAY RUIN THE SWITCH.

2. GAS SOLENOID VALVE COIL - Unsnap either the plastic cap, or the metal clip, on the 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 SYSTEM BEFORE REMOVING PARTS.

   When installing a liquid gas solenoid valve on LP models, do not overtighten 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 remove plumbing parts which extend into the control box. Refer to Figs. 10, 11 and 12.

   B. Disconnect the pressure gauge line fitting from the pipe too.

   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.
(1) Manual reset type safety device - if this device trips to open circuit position, it must be reset before the dryer can be restarted.

(2) Three phase model dryers powered from a phase converter should be connected with the manufactured phase line from converter to dryer L2 connection to avoid possible problems with dryer and burner controls.

(3) Loading timer terminals no's. 6 and 7 shown apply to Eagle make timers. Alternate Delkor timer terminals are common and normally closed.

**Legend:**

- 1. Coil, Loading Contactor
- 2. Coil, Fan Contactor
- 3. Coil, Unloading Contactor
- 4. No. 1 Power Terminal
- 5. No. 2 Power Terminal
- 6. Amber Pilot Light
- 7. Noted Relay Coil
- 8. No. 2 Terminal On Noted Relay Base
- 9. No. 2 Terminal On Noted ELEC. Control
- 10. Motor Overload Relay Heater-Single Phase
- 11. Noted Control Breaker
- 12. Noted Motor
- 13. Noted Contactor
- 14. Motor Overload Relay Heater-Three Phase

**FIG. 19 - AB-120A AND AB-180A POWER CIRCUIT AND SAFETY CONTROL CIRCUIT**
Manual Reset Safety Device - If this device trips to open circuit position, it must be reset before dryer can be restarted.

FIG. 21  AB 120A AND AB 180A BURNER CONTROL CIRCUIT
Mercury Switch Paddle Position

Location in wiring schematic, showing switch condition at various paddle positions with power ON.

Free hang--dryer calling for grain.
Switches "A" & "B" both closed.
Switch "C" open; fan not started.

Partially activated--dryer almost full.
Switch "A" closed.
Switch "B" opens.
Switch "C" closes; fan starts.

Fully activated--dryer full.
Switches "A" & "B" both open.
Switch "C" closed & fan contactor interlocked by aux. contacts.

Switch Function: "A"--Top Auger Stop
"B"--Top Auger Start
"C"--Fan Start

NOTE: For legend of symbols used, see General Control Circuit Diagram

FIG. 22 - AB-120A AND AB-180A TOP AUGER MERCURY SWITCH WIRING DETAILS

-30-
BOTTOM AUGER MERCURY SWITCH WIRING DETAILS

Mercury Switch Paddle Position

FREE HANG - Dryer empty paddle position with unload mercury switch CLOSED. When switch closes it energizes TOB which after a short delay interrupts cycle timer clutch to reset the cycle timer. Timer automatically stops bottom auger and starts a new filling and drying cycle.

LOCATION IN WIRING SCHEMATIC, SHOWING SWITCH CONDITION AT VARIOUS PADDLE POSITIONS WITH POWER ON.

TO POWER SUPPLY - FROM TERMINAL NO. 8 ON R3 RELAY BASE THRU TIMER RESET SWITCH

TO POWER SUPPLY - FROM TERMINAL NO. 1 OF CYCLE TIMER THRU UNLOAD AUGER SWITCH

NOTE: For legend of symbols used, see General Control Circuit Diagram

FIG. 23 - AB-120A AND AB-180A BOTTOM AUGER MERCURY SWITCH WIRING DETAILS
TROUBLE ANALYSIS PROCEDURE

A voltmeter is required for many of the following check-out procedures. Before performing any tests, make certain to determine if the dryer power supply is 1 phase 230 volts, or 3 phase 220 volts.

The burner control circuit is 230 volts on all standard U.S. production dryers. When performing tests within the burner circuit, measure voltage ACROSS BOTH SIDES OF THE LINES AND NOT TO GROUND.

The general control circuit and safety circuits 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.

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<th>CHECK-OUT PROCEDURE</th>
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| Control Circuit Not Energized - Panel Light Off | **PRELIMINARY CHECKS** - Check that main power supply is ON. Check for a tripped circuit breaker or a blown fuse (15A and 5A). Check for a tripped overload relay. Pushing reset levers while holding start button depressed will indicate which O/L relay has tripped. Check for proper setting of top auger timer and grain column hi-limit thermostat. Also, depress button on high limit thermostat located in fan-heater control box.  
If these checks fail to correct problem, refer to dryer power and safety control circuit wiring diagrams and perform the following electrical tests. Check for loose wiring connections and replace parts, as required. |
| TEST 1 - Use a 115 volt test light or voltmeter and check for proper voltage between R1 relay terminal No. 8 and chassis ground. If no voltage is present, lift test lead from terminal 8 and trace control circuit back downstream thru fan circuit breaker. 15 amp and 5 amp fuses, to locate problem. |
| TEST 2 - If voltage was present in Test 1, move test lead from R1 terminal 8 and check for proper voltage between CONTROL TERMINAL No. 9 and chassis ground. If no voltage, lift test lead from control terminal 9 and trace circuit from R1 relay terminal 8 thru loading timer, plenum and column hi-limit thermostats, and overload relays to locate open circuit condition. |
| TEST 3 - If voltage was present in TEST 2, move test lead from control terminal 9 to terminal No. 10 and observe reading. If no voltage is present, trace control circuit from terminal 9 thru burner high-limit thermostat and burner control board terminals L and No. 4. If voltage is present at board terminal L, but not at No. 4, replace burner lock-out tube and repeat test. Include check of tube socket and pin contacts. Refer to burner control circuit diagram for wiring connections. |
| TEST 4 - If Test 3 indicated voltage, move lead from control terminal 10 to R1 relay terminal No. 7, then hold start button depressed and check for proper voltage. If no voltage, trace circuit and check for a defective start-stop switch or poor wiring connections. |
| TEST 5 - If voltage is present at R1 relay terminal 7 and the control circuit light still will not become energized, check the panel light bulb and the R1 relay for proper operation. Include check of tube base and that ground wire is securely connected to terminal No. 2 of R1 relay. Replace parts, as required. |
| Top auger will not start | 1. Check top auger circuit breaker.  
2. Timer pointer must be above setting of No. 2 cam (18 min. factory setting).  
3. Check position of upper auger paddle switch – must be “down” to start auger.  
4. Inspect for secure mounting and wiring of mercury switches in terminal box on top auger paddle switch shaft.  
5. Verify closing of top auger contactor; check voltage on load side of contactor, power terminals 1 and 2 (1 Ø), or 4, 5 and 6 (3 Ø). Inspect contactor points.  
6. Inspect connections and check voltage applied to motor leads in motor junction box to determine if motor is defective. |
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| Fan motor will not start                    | 1. Timer pointer must be above 0.  
2. If dryer is not full (to deflect top auger paddle switch), press MANUAL RESTART button to energize fan motor contactor.  
3. Verify closing of fan motor contactor; check voltage on load side of contactor, power terminals 3 and 4 (1 Ω), or 13, 14 and 15 (3 Ω). Inspect contactor points.  
4. Inspect connections and check voltage applied to motor leads in fan-heater control box to determine if motor is defective.  
5. Check capacitors on single phase motors; replace if defective. If motor starts slowly, check for low voltage during starting, due to excessive voltage drop in power supply wiring. |
| Bottom auger will not start                 | 1. Check bottom auger circuit breaker.  
2. Timer pointer must be at 0 and bottom auger paddle must be in "up" position to open the mercury switch. Time Delay No. 2 will keep the unload auger running for about 30 seconds after paddle swings down, before timer clutch releases and timer recycles, leaving the 0 position.  
3. UNLOAD AUGER SWITCH must be on AUTO.  
4. Check action of bottom auger paddle and mercury switch assembly, and electrical connections to mercury switch, control terminals 3 and 4.  
5. Verify closing of bottom auger contactor; check voltage on load side of contactor, power terminals 5 and 6 (1 Ω), or 10, 11 and 12 (3 Ω).  
6. Inspect connections and check voltage applied to motor leads in motor junction box to determine if motor is defective. |
| Cycle timer does not operate                | 1. With control circuit ON and timer pointer above 0, (with fan running) check Time Delay No. 1 by a jumper across delay base terminals 5 and 7. If timer motor runs, replace Time Delay No. 1.  
2. Check voltage at timer motor terminals (115 volts); replace complete timer if motor does not operate with voltage applied. |
| Cycle timer does not recycle                | 1. Check Time Delay No. 2 and wiring to terminals 2 and 3 on delay base. Replace Time Delay No. 2 if timer clutch does not release automatically about 30 seconds after completion of unloading. (TDR2 should open its contact points about 30 seconds after voltage is applied to terminals 2 and 3.)  
2. Replace complete timer if clutch will not release with no voltage applied to clutch coil terminals. |
| Burner will not fire with fan operating (control circuit malfunction) | 1. Burner switch must be ON or AUTO. If set on AUTO, timer pointer must be in "dry" part of cycle, above setting of No. 2 cam (factory setting of 18 min.).  
2. Check for 230 volts across burner side of fuses located within fan-heater control box. Replace fuses if blown and determine cause of excess current (shorted wiring connections, etc.).  
3. Check for 230 volts across P/L Terminals No. 1 and No. 5. If there is no voltage, check for improper wiring connections.  
4. Check for proper voltage across No. 1 and No. T terminals. If there is no voltage, check burner switch circuit. If proper voltage exists with switch ON, but not with switch in AUTO (with fan running, and timer pointer in DRY part of cycle), check Relay No. 2 (R2). Replace R2 relay if defective. |
| 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 obstructions or closed valves. Refill tank and service parts as required.  
2. Check for proper voltage across P/L Terminals No. 2 and No. T. If there is no voltage, check for a defective flame switch, burner switch, or improper wiring.  
3. Check voltage across Terminals No. 2 and 3. If no voltage, substitute a new purge tube, lock-out tube and control circuit relay and repeat test. If these new parts do not correct the problem, replace the printer circuit base and repeat test.  
4. If 230 volts is present across Terminals No. 2 and 3, but burner will not operate, check the following:  
   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.  
   Inspect for a defective high vapor thermostat (LP models only). Replace thermostat if its circuit is open (without overheated vapor). |
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<td>Burner fires - but operates only about one minute and dryer shuts down</td>
<td>1. Wait for several minutes for the lock-out tube to cool down, then restart the dryer. Immediately after the burner starts operating, connect voltmeter leads across Terminals No. 2 and No. 7 and continue to observe the meter. When burner first comes ON (with a cold flame switch), the voltmeter should indicate 230 volts. After the flame switch becomes HOT and opens its contacts, the meter should read Ω. If burner shuts down without the meter indicating that the contact points have opened, it indicates either a defective flame switch or insufficient heat exposure on the flame switch.</td>
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| Burner will not fire - but gauge shows gas pressure | 1. IGNITION TRANSFORMER - Check transformer for spark by removing ignition wire from transformer and holding an insulated handle screwdriver against the output terminal and 1/4” away from the case. There should be a strong spark. Check transformer wiring and connections. Replace the ignition transformer if required. Make sure transformer case is properly grounded to housing heater.  
2. IGNITOR PLUG - Check that ignition plug has a strong spark. Refer to “Specifications” heading for proper electrode setting. Inspect ignition wire and its connections. Make sure wire is not shorted or broken. Check ignitor plug for damaged electrodes or cracked insulator. Clean and service ignitor plug as described in manual.  
3. FUEL SUPPLY - Inspect gas line piping, fuel strainer, burner venturi and orifice for possible obstructions. Clean parts as required. |
| 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-Fire or Lo-Fire thermostats (depending upon cycle timer setting). Temporarily increase the temperature setting of the appropriate thermostat (Lo-Fire thermostat starts to control from 40 min. setting down to cooling cycle). If heater will still not cycle, check for problem in control cord wires, connections or thermostat. Remove cover from thermostat and connect jumper wire from black to white wires. If burner now cycles to Hi-Fire, thermostat is faulty.  
3. Check for improperly connected for faulty Hi-Fire (No. 1) 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-Fire or Lo-Fire thermostat setting (depending upon cycle timer 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-Fire or Lo-Fire thermostat may be defective. If burner still will not cycle to Lo-Fire after decreasing the appropriate thermostat (Lo-Fire thermostat starts to control from 40 min. setting down to cooling cycle) the problem may be due to a broken or kinked thermostat sensor tube. Observe reading on dial thermometer mounted onto front panel of dryer. Replace appropriate thermostat if it cannot be set to cause its switch to go to the open circuit position with normally hot air plenum temperatures. **NOTE:** If the burner continues to operate on Hi-Fire with one of the controlling thermostat wires disconnected, it is an indication that other problems exist. |
| 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. AB-180A only - Check that Lo-Fire (#2) gas solenoid valve wires are properly connected into the circuit and that wires and terminals are not loose or defective.  
3. AB-180A only - Check for a burned-out coil within the Lo-Fire solenoid valve, or for a stuck or otherwise defective valve. |