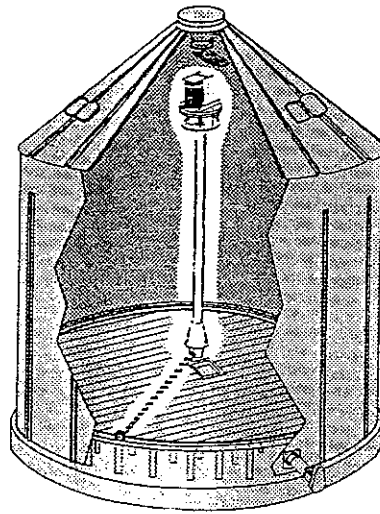


# *Shivers*

## CIRCU-LATOR JR.



## OPERATION MANUAL

*Shivers*

614 W. ENGLISH • P.O. BOX 467  
CORYDON, IA 50060  
515-872-1005

P-10414

I M P O R T A N T !

SHIVVERS DOES NOT RECOMMEND THAT YOU OPERATE YOUR CIRCULATOR JUNIOR WITH ONLY AN ON-OFF CONTROL. OPERATING YOUR CIRCULATOR JUNIOR WITH AN ON-OFF CONTROL CAN EASILY RESULT IN SPOILED GRAIN BY NOT GETTING ALL LAYERS OF THE GRAIN DRIED AND CAN ALSO EASILY RESULT IN MECHANICAL DAMAGE TO THE MACHINE BY AUGERING EXCESSIVELY WET GRAIN THRU THE CIRCULATOR JUNIOR.

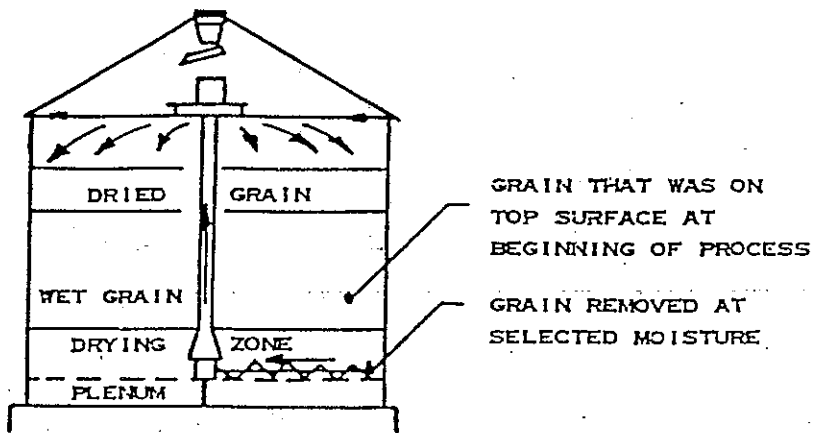
For a single bin operation, the lowest cost control that is recommended is the Econ-A-Trol (584 series). This unit will give satisfactory moisture control at a minimum of cost.

To obtain more exacting moisture control and also have the option of expanding to a multiple bin operation in the future, we recommend the Compact Control Center (583 series), equipped with an hour meter.

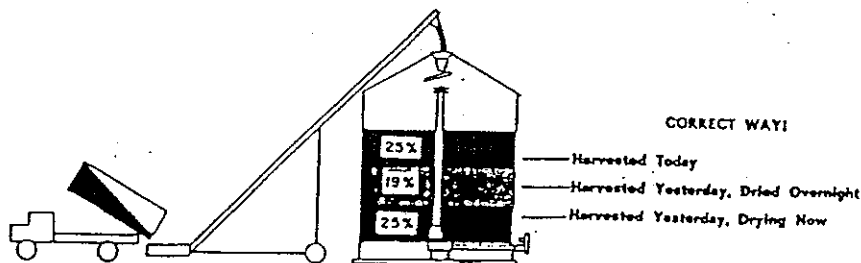
THIS EQUIPMENT IS MANUFACTURED UNDER ONE OR MORE OF THE FOLLOWING U.S. & CANADIAN PATENTS: D246388, 3,563,399, 3,765,547, 3,765,548, 905108.

APRIL 1, 1988

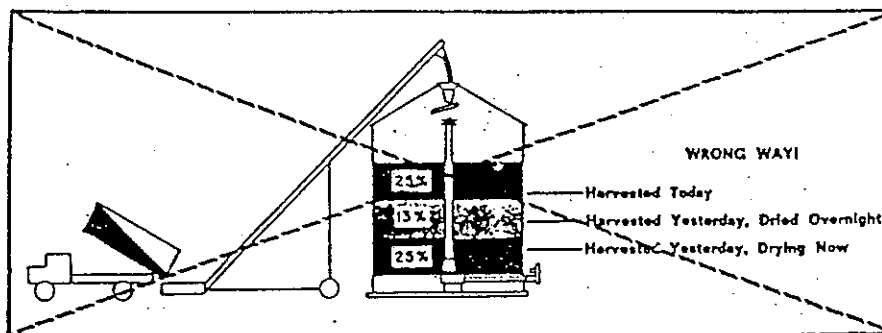
# CIRCU-LATOR JUNIOR



Successful recirculation drying requires two or more passes. The first pass drying your grain down to 18-20% moisture, so as to prevent short term spoilage (which can occur with grain over 20% moisture. The last pass dries the grain to the final percent moisture.



In this illustration, the 13% grain must be passed through the drying zone to enable the top 25% grain to be dried. This would result in over-drying grain from the 13% layer.



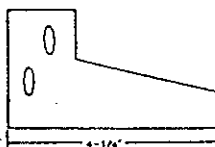
**NOTE: Successful Recirculation Drying requires TWO or MORE Passes!**

# CENTER VERTICAL "FLAPPERS"

During installation of your machine, a flipper was installed at the top of the center vertical to give a certain grain spread pattern for grain. You should have also been presented with two others that were not installed. If you did not receive them contact your dealer. These are important to achieve proper grain spreading. You may need to use different flippers to attain a proper spread pattern for different grains with different moisture percents.

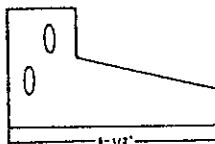
It is intended that this be used as a guide only. It should not be inferred that these flippers will only work as suggested here.

WHICHEVER FLIPPER GIVES YOU THE BEST SPREAD SHOULD BE USED FOR YOUR APPLICATION



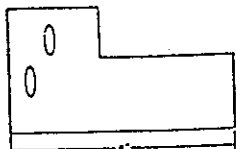
572-014P

Install on bins 18'-0" and under



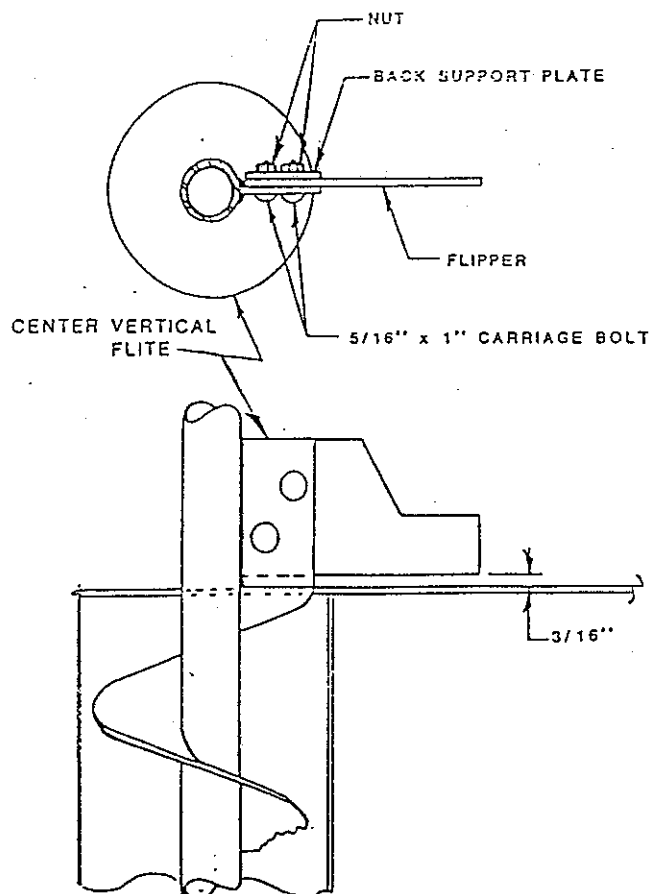
572-010P

Install on bins over 18'-0" to 24'-0"



572-011P

Install on bins over 24'-0"



SAFE STORAGE TIME TABLE				
Maximum storage time for shelled corn, assuming proper operation.*				
STORAGE AIR TEMPERATURE (°F)	CORN MOISTURE CONTENT			
	15%	20%	25%	30%
75°	58	12	4	2
70°	78	16	5	3
65°	104	21	7	4
60°	130	27	9	5
55°	169	35	12	7
50°	233	48	17	10
45°	363	75	27	16
40°	453	94	34	20
35°	570	118	42	25
	DAYS	DAYS	DAYS	DAYS

\*Storage times given are those beyond which loss in corn quality will bring about a lowering of grade. It should not be inferred that corn held within these limits will suffer no loss in quality. These figures should only be used as guidelines.

PLENUM TEMPERATURE RANGE TABLE	
GRAIN	TEMPERATURE
White Corn	100-120
Yellow Corn	100-140
Sunflower	105-115
Sorghum	110-140
Soybean	100-120
Wheat	100-120
Milo	110-140
Barley	100-115
Rice	90-100

Temperature ranges are general recommendations only. It should not be inferred that this is the only grain temperatures that may be used.

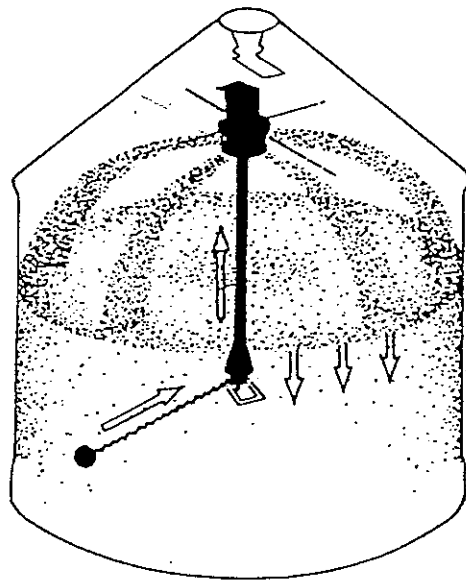
10

11

12

# Operating Procedure

## Recirculation Drying



WHEN

Filling the Bin Requires

More Than 2 Days

RECIRCULATION DRYING

FOR FILLING THE BIN IN MORE THAN 2 DAYS

KEY SAFETY FACTOR

DESCRIPTION OF OPERATION


SEQUENCE OF OPERATION


1. Position tapered sweep auger approx. 18" past the grain thermostat probe.
2. Fill bin with 6" - 12" of grain.
3. Start machine for 5 seconds then turn off.
4. Start fan only--DO NOT start heater.
5. Fill bin to approx. 6' of grain.
6. Start heater. Continue running fan. Set plenum temperature to range recommended in chart on page 3.

-----  
 -----  
 Allows grain to get below and around the sweep auger.

-----  
 Allows natural air drying of grain to begin & cools grain in bin to extend safe storage time.

-----  
 Allows grain drying to begin to prevent spoilage of excessively wet grain.

-----  
 DO NOT ENTER the bin any time that machine has power to it. Check bin to insure that no persons are in bin prior to filling.

-----  
 DO NOT ENTER the bin any time that machine has power to it.

NOTE: IF THE SAFE STORAGE TIME FOR YOUR GRAIN MOISTURE LEVEL WOULD BE EXCEEDED BEFORE THIS 6' LEVEL IS ATTAINED, IT WILL BE NECESSARY TO START THE HEATER AND CIRCU-LATOR JUNIOR TO ROTATE THE GRAIN IN THE BIN. DO NOT EXCEED THE SAFE STORAGE TIME FOR YOUR GRAIN MOISTURE LEVEL.

7. Run heater 1 1/2 - 2 hours.  
 Starts to create a "drying zone" in the grain bin.

8. Turn on your Circu-Lator Junior (Manual on).



SEQUENCE OF OPERATION

DESCRIPTION OF OPERATION

KEY SAFETY FACTOR

9. Continue filling bin or complete harvest. DO NOT overfill bin. (Overfilling the bin may mean that you have exceeded the safe storage time for your grain moisture level, or exceeded the maximum recommended operating depth (16') of the Shivers unit.)

10. Keep the machine on. Run your Circu-Lator Junior continuously until all grain is at or below 19% moisture. Consult turnover time table on page 4 and periodically take a moisture test on a sample of grain. Obtain this sample by hanging a bucket on a stout rope or chain from the roof opening. It will take approx. 5 minutes to obtain enough grain for a good sample.

11. After entire bin is at or below 19% moisture, turn Circu-Lator Junior machine off.

12. If your bin is completely filled for the season, proceed to Step 13, but if you will be adding more grain in a few days, then--leave the Circu-Lator Junior off, turn off the heater, but keep your fan running. When you add grain that is wetter than 19%, repeat steps 9 through 12 until your bin is filled for the season.

-----

Dries entire bin to a maximum moisture level at or below 19% to avoid short term spoilage.

-----

-----



DO NOT ENTER the grain bin at any time during the filling operation.



DO NOT ENTER the bin unless all power to machine has been locked off.

NOTE: PROCEED WITH STEPS 12 THROUGH 25 ONCE YOUR BIN IS FILLED FOR THE SEASON.

## KEY SAFETY FACTOR

## DESCRIPTION OF OPERATION

## SEQUENCE OF OPERATION

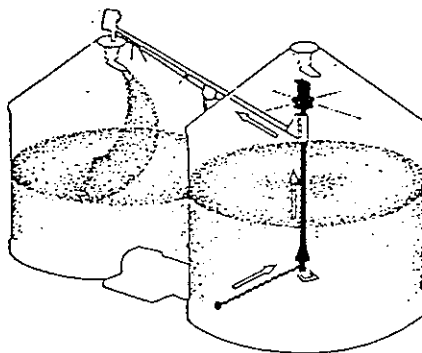
23. When all the grain is dry, turn off the Circu-Lator Junior & the heater. Leave fan on 1 day to cool the grain, then shut off.
24. If grain is to be stored in this bin for a long period, it is wise to "core" the bin. Do this by opening the unload slide gate and removing 1 to 2 wagon loads of grain from the center of the bin. Respread this grain on top of the grain in this bin. This will help distribute the fines of the grain in this bin enabling better aeration of the stored grain.
25. Wait 1 - 2 days, then turn your fan on without any heat and let it run for 3-4 days, as long as your weather is not rainy.

Grain in storage should be kept within 100 of the outside temperature. This helps prevent moisture migration in the stored grain, with condensation and spoilage along the bin sidewalls.

# Operating Procedure

## Continuous Flow

### Drying



APRIL 1, 1988

CONTINUOUS FLOW DRYING  
FOR USE ONLY WITH TWO OR MORE BINS

SEQUENCE OF OPERATION      DESCRIPTION OF OPERATION      KEY SAFETY FACTOR

<p>1. Position tapered sweep auger approx. 18" past the grain thermostat probe.</p>	<p>-----</p>	<p>-----</p>
<p>2. Fill bin with 6" - 12" of grain.</p>	<p>-----</p>	<p>DO NOT ENTER the bin anytime that machine has power to it. Check bin to insure that no persons are in bin prior to filling.</p>
<p>3. Start machine for 5 seconds then turn off.</p>	<p>Allows grain to get below and around the sweep auger.</p>	<p>DO NOT ENTER the bin anytime that machine has power to it.</p>
<p>4. Start fan only--DO NOT start heater.</p>	<p>Allows natural air drying of grain to begin &amp; cools grain in bin to extend safe storage time.</p>	<p>-----</p>
<p>5. Fill bin to approx. 6' of grain.</p>	<p>-----</p>	<p>-----</p>
<p>6. Start heater. Continue running fan. Set plenum temperature to range recommended in chart on page 3.</p>	<p>Allows grain drying to begin to prevent spoilage of excessively wet grain.</p>	<p>-----</p>
<p>7. Run heater 1 1/2 - 2 hours.</p>	<p>Starts to create a "drying zone" in the grain bin.</p>	<p>-----</p>
<p>8. Turn machine and transfer auger on.</p>	<p>Removes some grain from drying zone.</p>	<p>DO NOT ENTER bin anytime power is on to machine.</p>

SEQUENCE OF OPERATION

DESCRIPTION OF OPERATION

KEY SAFETY FACTOR

9. Take grain sample and test for moisture. DO NOT run machine longer than necessary to obtain grain sample.

Tells you when you have gotten near your final grain moisture for transfer.

NOTE: REPEAT STEPS 8 & 9 ABOUT EVERY 1/2 TO 1 HOUR UNTIL THE GRAIN MOISTURE IS AT YOUR DESIRED LEVEL. THIS MAY TAKE FROM 1 TO 6 HOURS.

10. When desired moisture level is reached, turn machine to automatic. Turn the grain thermostat setting counter-clockwise (to a lower temperature setting) until the machine starts. Turn the knob very, very slowly without pushing in or pulling on the knob.

NOTE: TO INCREASE DRYING SPEED, YOU CAN RAISE THE PLENUM TEMPERATURE. IT IS RECOMMENDED THAT YOU NOT RAISE THE PLENUM TEMPERATURE ABOVE THE MAXIMUM TEMPERATURE RANGE FOR YOUR GRAIN AS LISTED IN THE CHART ON PAGE 3.

RULE OF THUMB: Rising plenum temperature creates a 3 to 1 ratio in the grain temperature. Plenum temperature raised 150; grain temperature raises 50. Each time you change the plenum temperature, you will have to readjust the grain thermostat setting.

11. The Circu-Lator Junior should now run until the tapered sweep passes underneath the grain thermostat probe. It should then shut itself off and stay shut off for a waiting period until the next layer of grain is dry. It will then start itself automatically. This wait can be anywhere from 30 minutes to 3-4 hours depending upon your installation.

KEY SAFETY FACTOR

DO NOT ENTER the drying bin for any reason unless all power has been locked off at the main control.



DESCRIPTION OF OPERATION

SEQUENCE OF OPERATION

12. When the dryer starts itself automatically, take a sample of the dry grain during the entire time it is running. Take sample from grain sampling valve several times as sweep is making a complete revolution or hand an empty bucket from the bin roof and retrieve it after the unit has turned itself off. Mix the sample thoroughly and take a moisture reading.

13. Adjust the grain thermostat setting slightly to get your desired moisture content. To get wetter grain, turn the thermostat to a lower temperature setting; a higher temperature setting produces dryer grain.

14. Repeat steps 12 & 13 until you have "fine tuned" your dryer.

NOTE: BE SURE YOUR HEATER IS MAINTAINING A CONSTANT PLENUM HEAT. THIS IS VERY IMPORTANT TO "FINE TUNE" YOUR MOISTURE CONTROL.

15. As your drying continues, periodically (once or twice a day), check your moisture content to be sure everything is staying "OK".

16. When storage bin is full, turn off transfer auger to storage bin. Do this when machine is NOI cycling to insure that transfer auger is not left full of grain.

SEQUENCE OF OPERATION

DESCRIPTION OF OPERATION

KEY SAFETY FACTOR

17. If grain is still in Circu-Lator Junior unit, refer to recirculation directions for filling bin in 2 days or less. Begin at step 8.

NOTE: BE SURE TO FOLLOW GOOD AERATION PROCEDURES OF THE GRAIN IN YOUR STORAGE BIN. GOOD AERATION WILL HELP ELIMINATE MANY PROBLEMS ASSOCIATED WITH ON FARM GRAIN STORAGE.

MOISTURE CONTENT TABLE		
Grain	Required for Safe Storage	
	for 1 yr	for 5 yrs
Barley	13	11
Corn	13	10-11
Oats	14	11
Rice	12-14	10-12
Rye	13	11
Sorghum	12-13	10-11
Wheat	13-14	11-12

The above applies to climates where the grain is usually grown. It should not be inferred that grain within these limits will suffer no loss in quality. These figures should only be used as a guideline.



## Diagnosing Dry Stored Grain Problems.

Observation	Probable Cause	Solution/Recommended Action
Musty or spoiled grain odor.	Heating, moisture accumulation in one spot.	Run the fan, smell the exhaust while in the bin or in front of the exhaust fan—run the fan to cool any hot spots. Severe damage: remove grain.
Hard layer or core below grain surface.	High moisture or spoiled, caked grain mass.	Run aeration or drying fan, check to see if caked or compacted mass blocks airflow. Cool out and dry if airflow is adequate, otherwise unload to remove all spoiled grain.
Warm grain below the top surface.	Moisture content too high.	Run the fan, irrespective of weather conditions until exhaust air temperature equals the desired grain temperature.
Slight skiffs of grain on bin surface sticking together, dragging on shoes.	Early signs of moisture migration, often noticeable only 1-2 weeks after binning.	Run aeration fan—Cool grain until exhaust temperatures equal desired grain temperature or outside air temperatures.
Hard surface crust, caked, and blocking airflow, possibly strong enough to support a man.	Severe moisture migration and condensation in the top surface.	Remove the spoiled layer. <i>Wear a dust mask to filter mold spores.</i> Run the fan to cool grain when spoilage is removed. Sample grain with probe to determine condition throughout center mass below the crust. Consider marketing grain to arrest further spoilage.
Under-roof condensation, drip back, surface wetting.	Warm grain in cold weather severe convection circulation and moisture migration.	Run the aeration until exhaust air temperature equals desired grain temperature or approximate cooling air temperature at beginning of aeration cycle.
Wet or spoiled spots on grain surface outside center point.	Condensate drip from bolt end or under roof fixture that funnels condensate flow; possible roof leak.	Check grain for heating. Check roof under surface at night. Check for caulking around roof inlets, joints.
Wet, spoiled spot directly under fill cap.	Leaking roof cap. If gravity spout, condensate from gravity spout.	Check bin cap seal, hold down. Block or disconnect gravity spout so air from bin and grain cannot flow up tube. Marginal solution: Hang bucket under spout inlet, check bucket for water accumulation.
No air flow through grain with aeration fan running.	Moldy, caked grain mass blocking flow; possible moldy grain layer immediately above perforated aeration duct or floor on pressure system.	Try to determine location and scope of spoilage. Unload storage and market or re-bin good grain.
White dust visible whenever grain is stirred.	Mold on grain but not sufficient spoilage to seal top surface.	Evaluate grain condition throughout bin where possible. Observe caution in continued storage because grain condition has deteriorated to some degree.
Cooling time required much longer than usual.	Increased fines in grain resisting and reducing airflow, increased fines can cause airflow resistance to increase as much as 2-4 times over that of clean grain.	Run the fan longer time; operate fan until grain and exhaust air temperature readings indicate grain is at desired temperature, <i>irrespective of the fan time required.</i>
Exhaust air temperatures in center of bin surface warmer than storage of those away from center.	Fine material accumulation in storage center resisting airflow; through center mass grossly reduced compared to relatively clean grain around outside of storage.	Run the fan sufficient time to cool the center, irrespective of the outside grain temperatures. Draw down the bin center to remove fines and decrease the grain depth for easier air passage in the center core.
Unknown grain conditions in the bin center.	Too deep to probe; bin too full to access; no temperature sensing cables installed.	Withdraw some grain from all bins and feed or market. Observe (look, feel, smell) <i>first</i> grain to flow in each withdrawal, since it was resting in the center core. Withdraw any storage fill above level full, as soon as possible following harvest, to reduce moisture migration tendencies and permit access for observation and sampling.

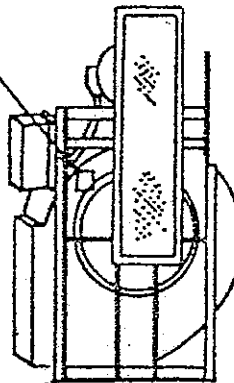
Source: MSU Ag Facts E-1431 July 1981

# Factory Installed Decals

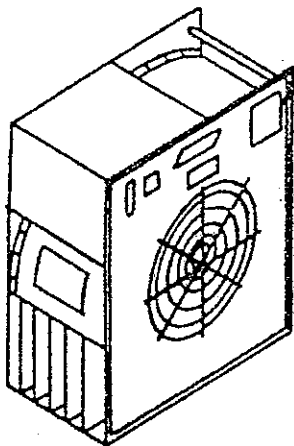
DECAL P-10221 5-3/4" x 5-3/8"

**WARNING**  
**ROTATING BLADES AND SUCTION.....**

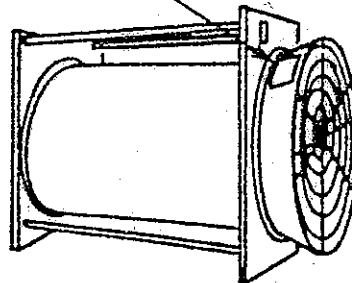
1 decal on Fan near guard



BIG BLUE FAN



CENTRIFUGAL FAN



BLUE FLAME DRYER

# Factory Installed Decals

Roof Cap

Manhole

DECAL: P-9198 5-3/4" x 6-3/16"

P-10226 3-7/8" x 4-3/16"

WARNING  
DANGEROUS VOLTAGE.....

Install 1 decal where appropriate:

- a) on front cover
  - b) on inside cover of Machine Control Box.
- Install 1 on top of Heater Control Box.

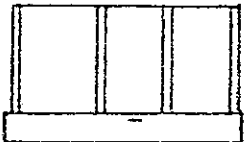
**WARNING**

DANGEROUS VOLTAGE

DO NOT OPEN THIS COVER UNTIL ALL ELECTRICAL POWER TO THE UNIT HAS BEEN DISCONNECTED AND LOCKED OUT. FAILURE TO HEED CAN RESULT IN FATAL ELECTRICAL SHOCK.

Horiz. Unload Belt Shield

Control Box  
Fuse or Circuit Breaker  
Master Disconnect Switch



Heater Control Box

**WARNING**

DANGEROUS VOLTAGE

DO NOT OPEN THIS COVER UNTIL ALL ELECTRICAL POWER TO THE UNIT HAS BEEN DISCONNECTED AND LOCKED OUT. FAILURE TO HEED CAN RESULT IN FATAL ELECTRICAL SHOCK.

Fan/Burner

