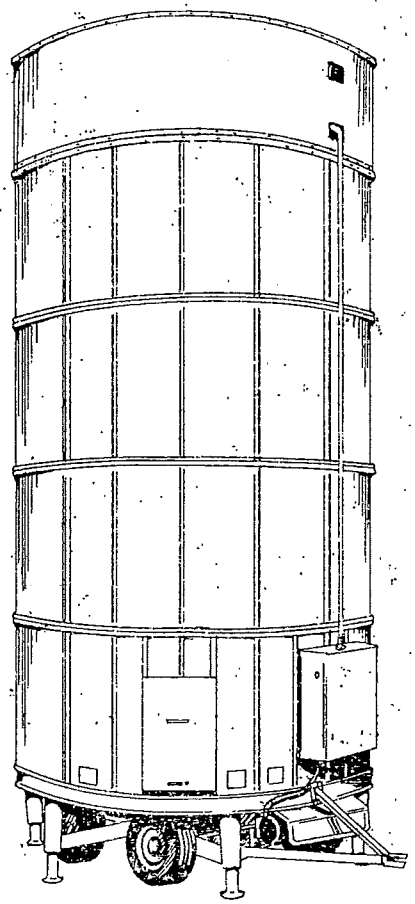
OWNERS MANUAL

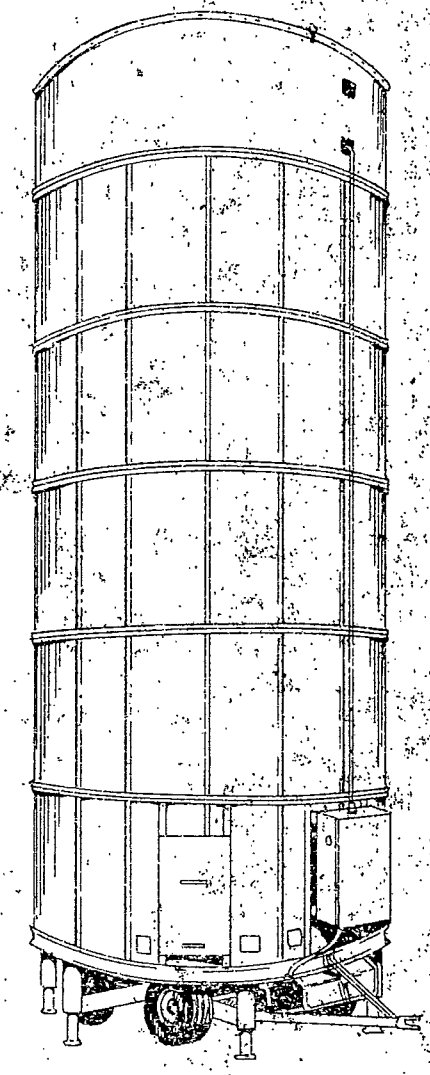
BUTLER®

KAN-SUN®

CONTINUOUS FLOW GRAIN DRYER



MODEL 10-21-210



MODEL 10-25-215

Unit Serial Number_____

Table of Contents

INSTALLATION

Prior to installation, the machine should be inspected. Look for loose bolts, damaged controls and loose wires. Check to make sure the fan blade has sufficient clearance.

TRANSPORTATION

Observe the following safety precaustions:

DO NOT transport a fully assembled machine.
Machine MUST BE empty.
Use safety chain.
DO NOT exceed 20 mph.

SITE SELECTION

Whether an installation is permanent or temporary, the following points should be considered:

1. Select a firm, well drained location.
2. Allow unrestricted air flow around the machine and a clean supply of intake air. (It is recommended locating the machine no closer than 10' to another machine.)
3. Place the fuel tank for L.P. gas machines at least 25' from the dryer.
4. A concrete pad is recommended for permanent installations. (See FIGURE A for minimum recommendations.)
5. Use a ground rod embedded 8'.

ASSEMBLY

1. Position sections as shown in FIGURE B. A boom truck or crane should be used to life sections into place.
2. Be careful not to damage channel rings or perforations while handling.
3. Tighten all bolts.
4. Upon completion of assembly, level the dryer. Dryer legs are adjustable by 1/8" increments. Use a carpenters level to do the job correctly.
5. Anchor machine securely. (See FIGURE C). Guy wires should be used on temporary installations to prevent wind damage.
6. Attach thermistor conduit, solder leads, coat with silicone sealer, and install wire nuts.

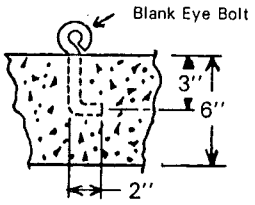
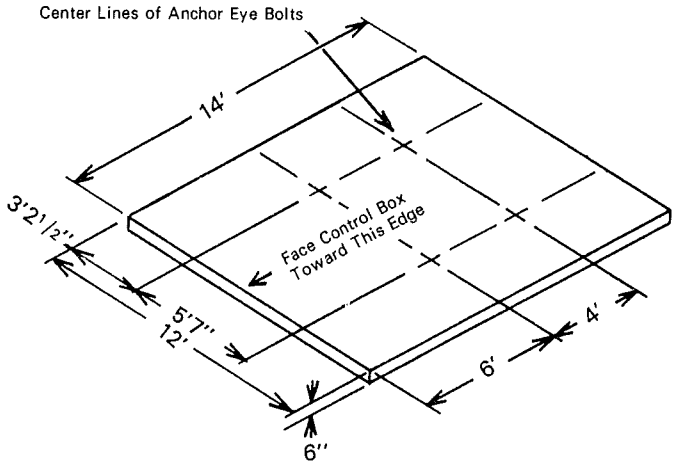


FIGURE A 8'



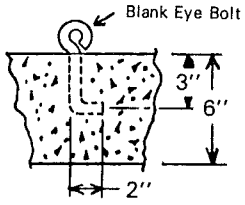


FIGURE A 10'

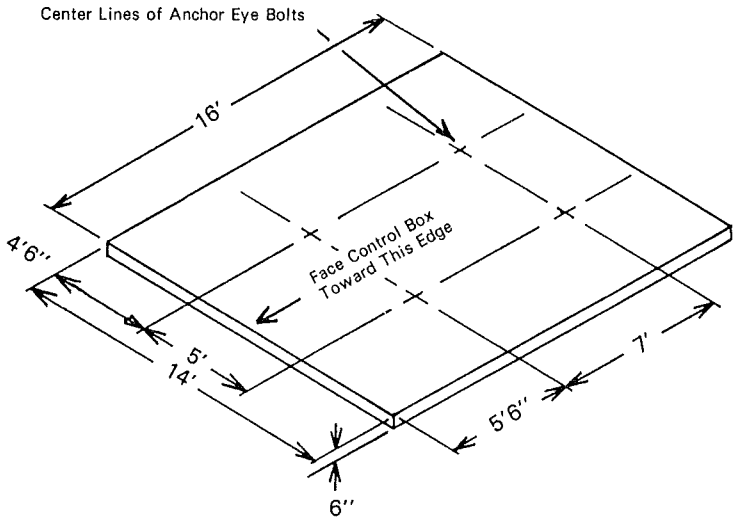


FIGURE B

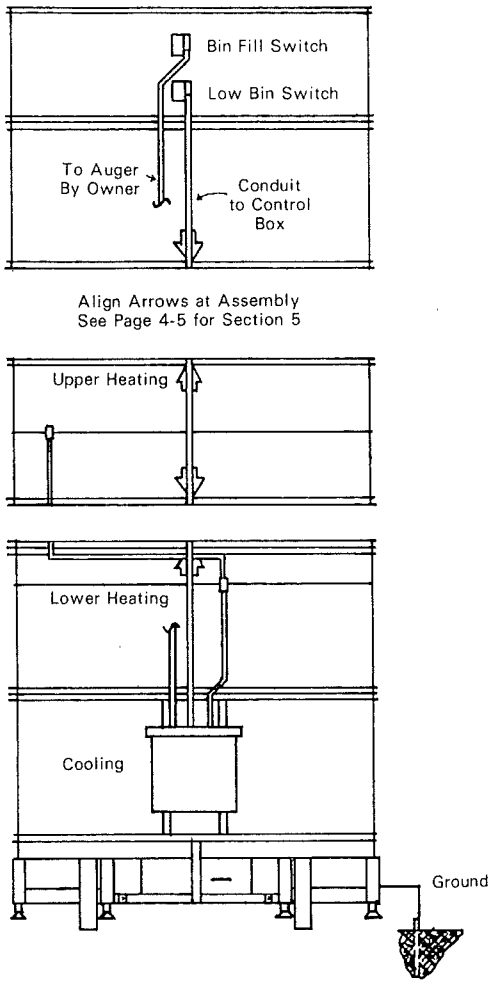


FIGURE C

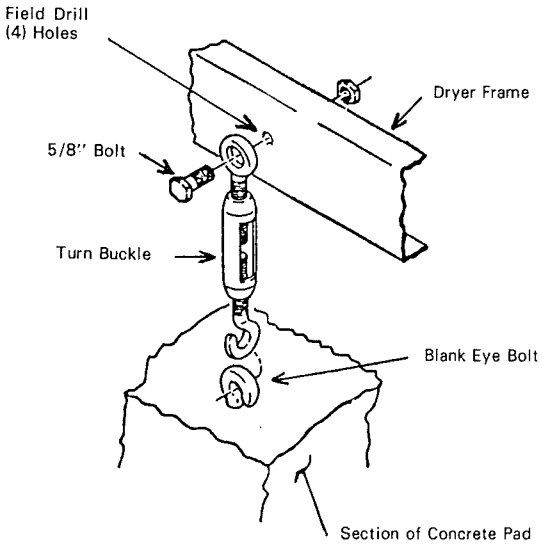
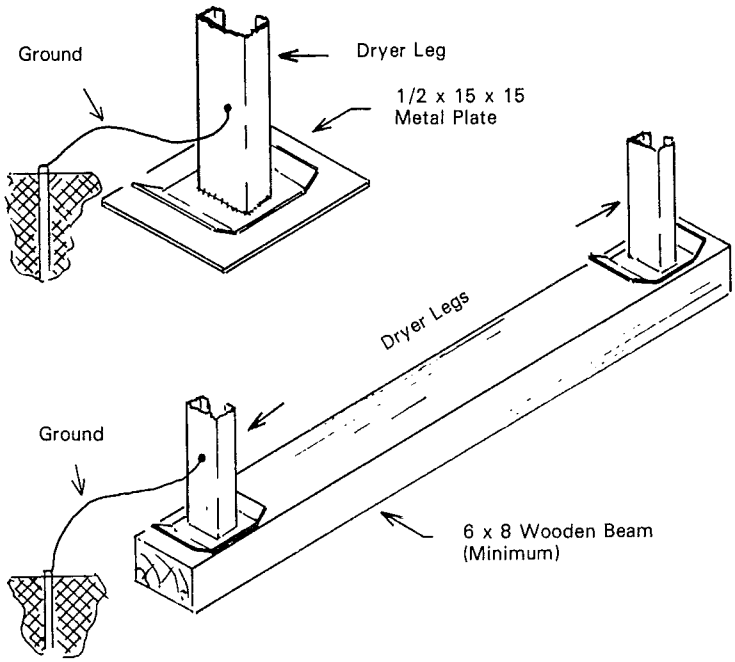
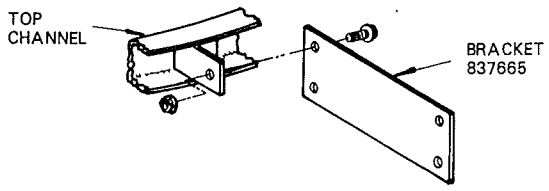


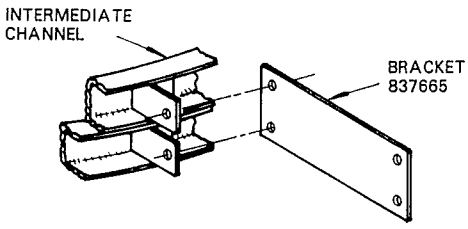
FIGURE D

TEMPORARY INSTALLATION

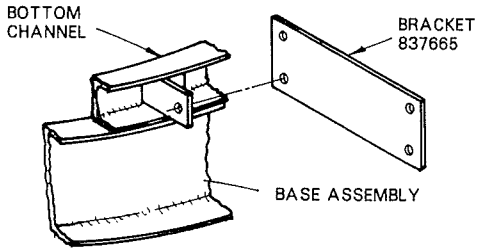




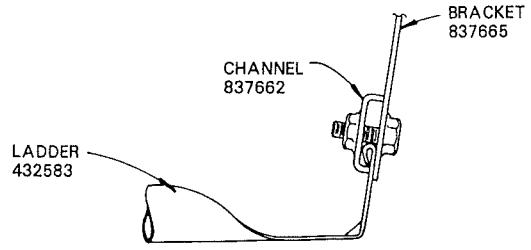
TYPICAL TOP BRACKET MOUNTING



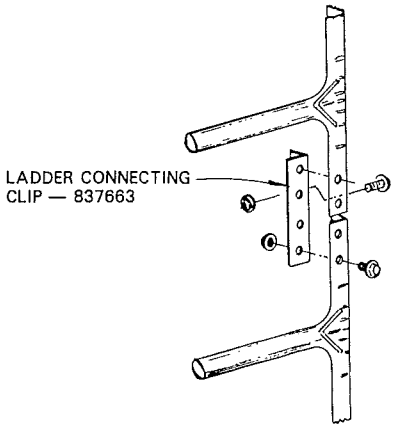
TYPICAL INTERMEDIATE BRACKET MOUNTING



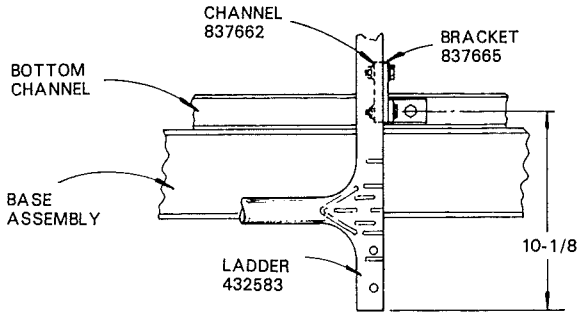
TYPICAL BOTTOM BRACKET MOUNTING



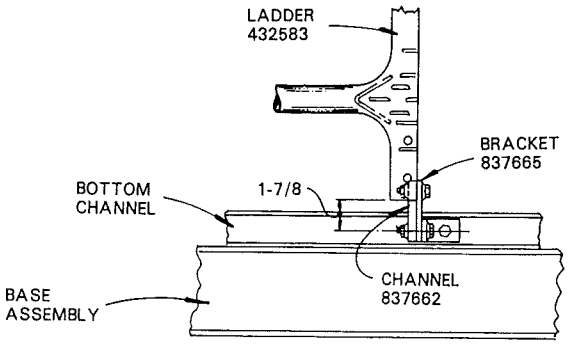
TYPICAL LADDER ATTACHMENT



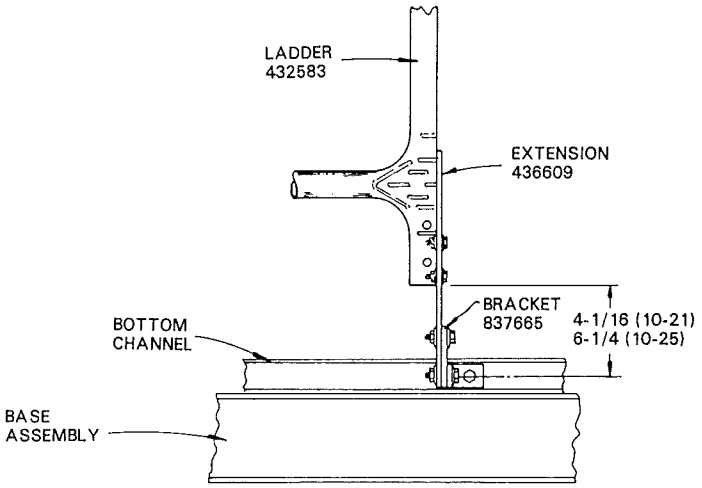
TYPICAL LADDER SPLICE



8-15



8-17

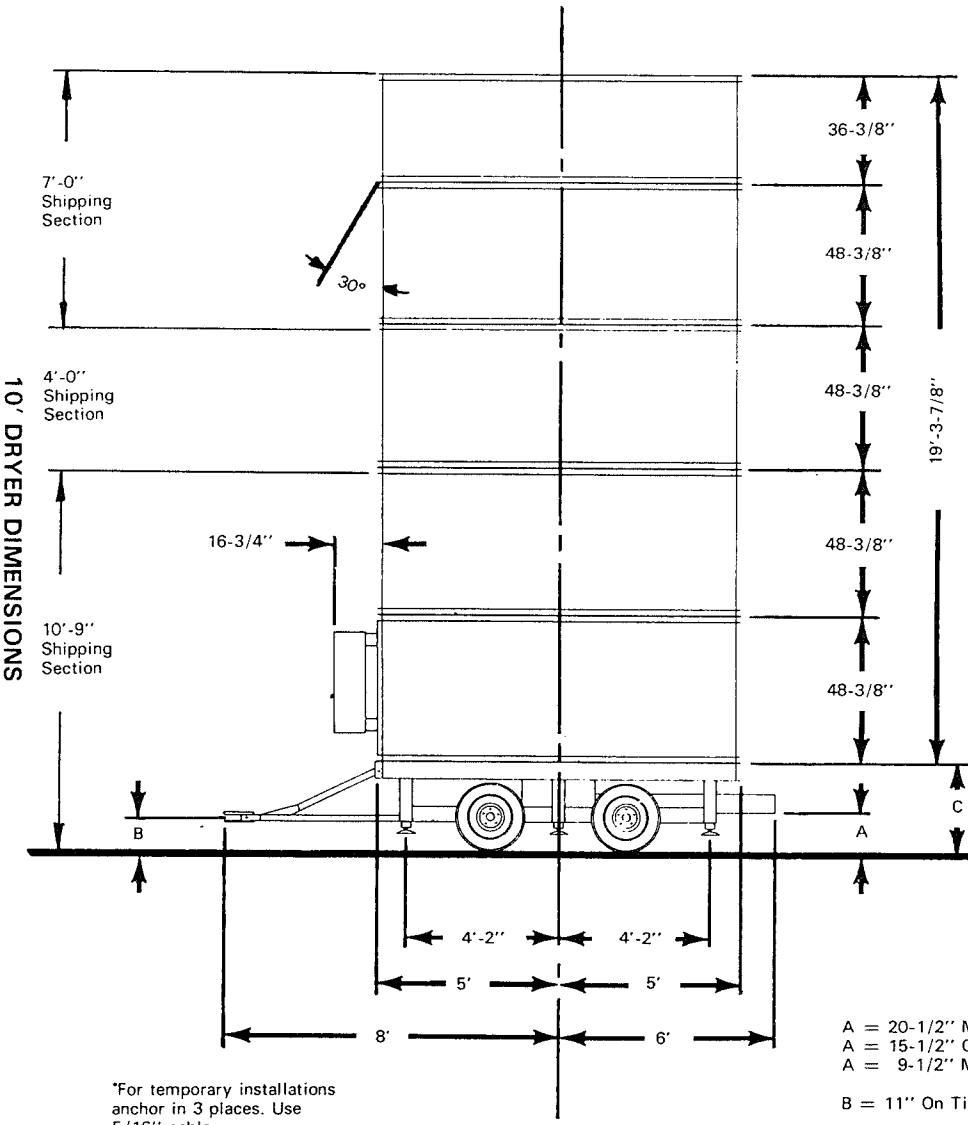


10-21 & 10-25

NOTE:
ALL BOLTS — 5/16 x 3/4 (Tensilock)
ALL NUTS — 5/16 (Self-Locking)

10' DRYER DIMENSIONS

10-21-210



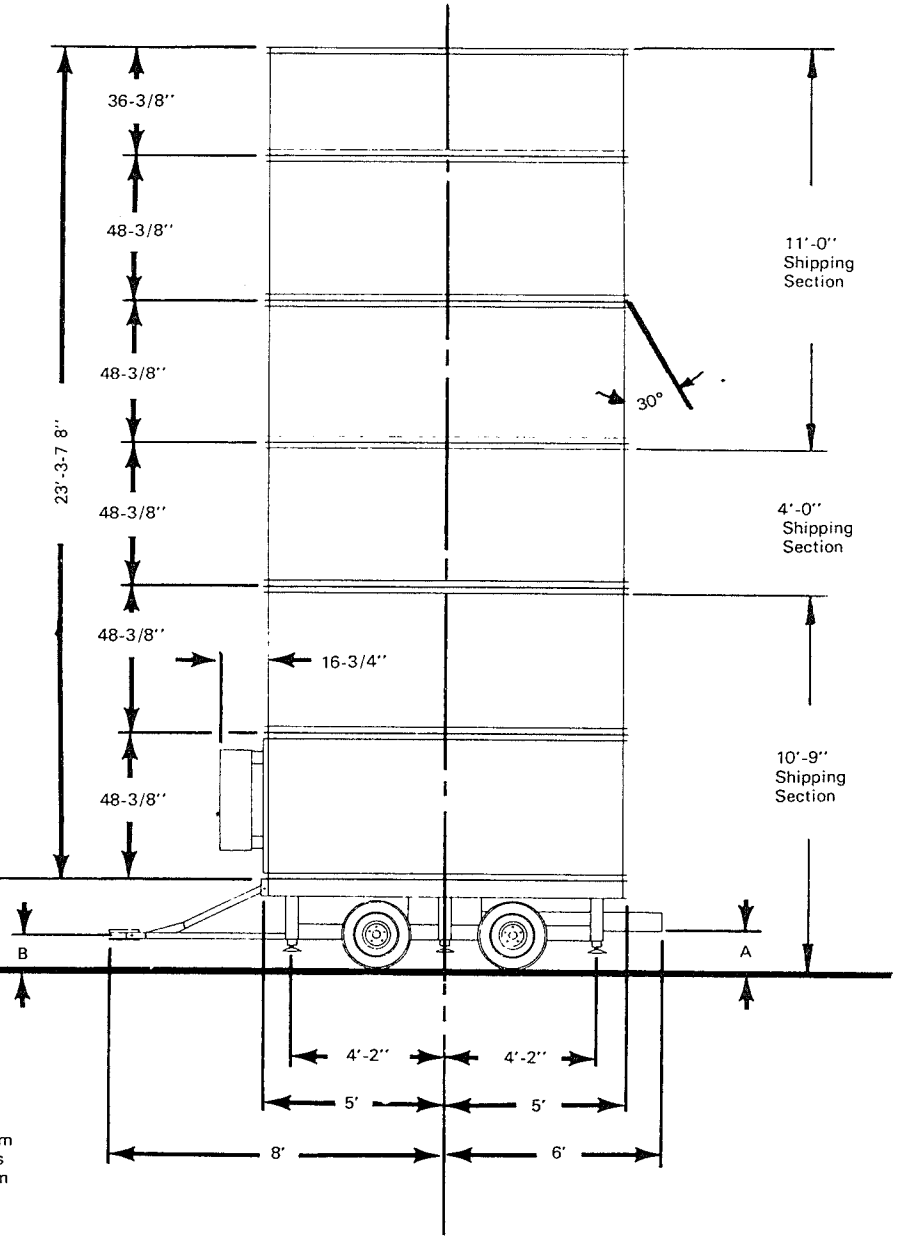
*For temporary installations anchor in 3 places. Use 5/16" cable.

A = 20-1/2" Maximum
A = 15-1/2" On Tires
A = 9-1/2" Minimum

B = 11" On Tires

C = 38" Maximum
C = 33" On Tires
C = 27" Minimum

10-25-215



OPERATING FUEL REQUIREMENTS

	NORMAL CONDITIONS 50′ F AMBIENT—220′ F PLENUM				MAXIMUM CONDITIONS 20′ F AMBIENT—220′ F PLENUM			
	8-15-10	8-17-15	10-21-210	10-25-215	8-15-10	8-17-15	10-21-210	10-25-215
BTU/HR.	1,950,000	2,220,000	3,550,000	4,100,000	2,800,000	3,200,000	5,150,000	5,950,000
G.P.H. (L.P. LIQUID)	21.7	24.7	37.4	45.6	31.1	35.6	57.2	66.1
C.F.H. (NAT. GAS—1000 BTU PER CUBIC FT.)	1950	2200	3550	4100	2800	3200	5150	5950

FUEL REQUIREMENTS & INSTALLATION

L.P. GAS DRYERS

L.P. gas dryers are equipped with an internal vaporizer. The L.P. tank MUST BE equipped for liquid withdrawal. Locate tank at least 25′ from dryer. It is recommended an excess flow valve be installed.

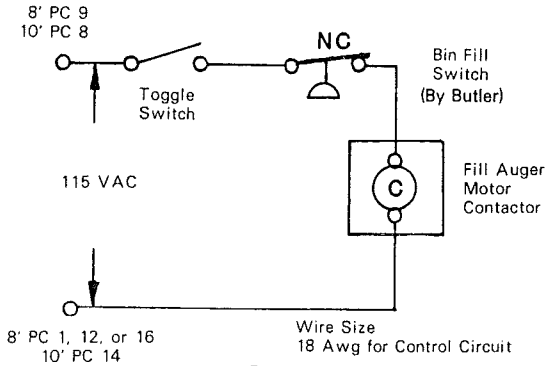
NOTE: Gas line from tank to dryer should be 3/8″ Sch. 80 pipe or 1/2″ I.D. Type K copper tubing.

NATURAL GAS DRYERS

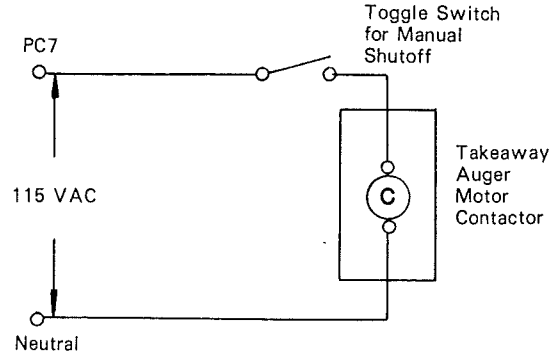
Kan-Sun dryers require 14 PSIG. minimum operating pressure to maintain a 200-220°F. plenum temperature with 20°F ambient. Incoming line size should be 1-1-1/2 inches for 8′ machines and 1-1/2-2 inches for 10′ machines for runs under 200 feet.

SUGGESTED WIRING OF AUXILLIARY EQUIPMENT

TYPICAL FILL CIRCUIT



TYPICAL TAKE AWAY AUGER CIRCUIT

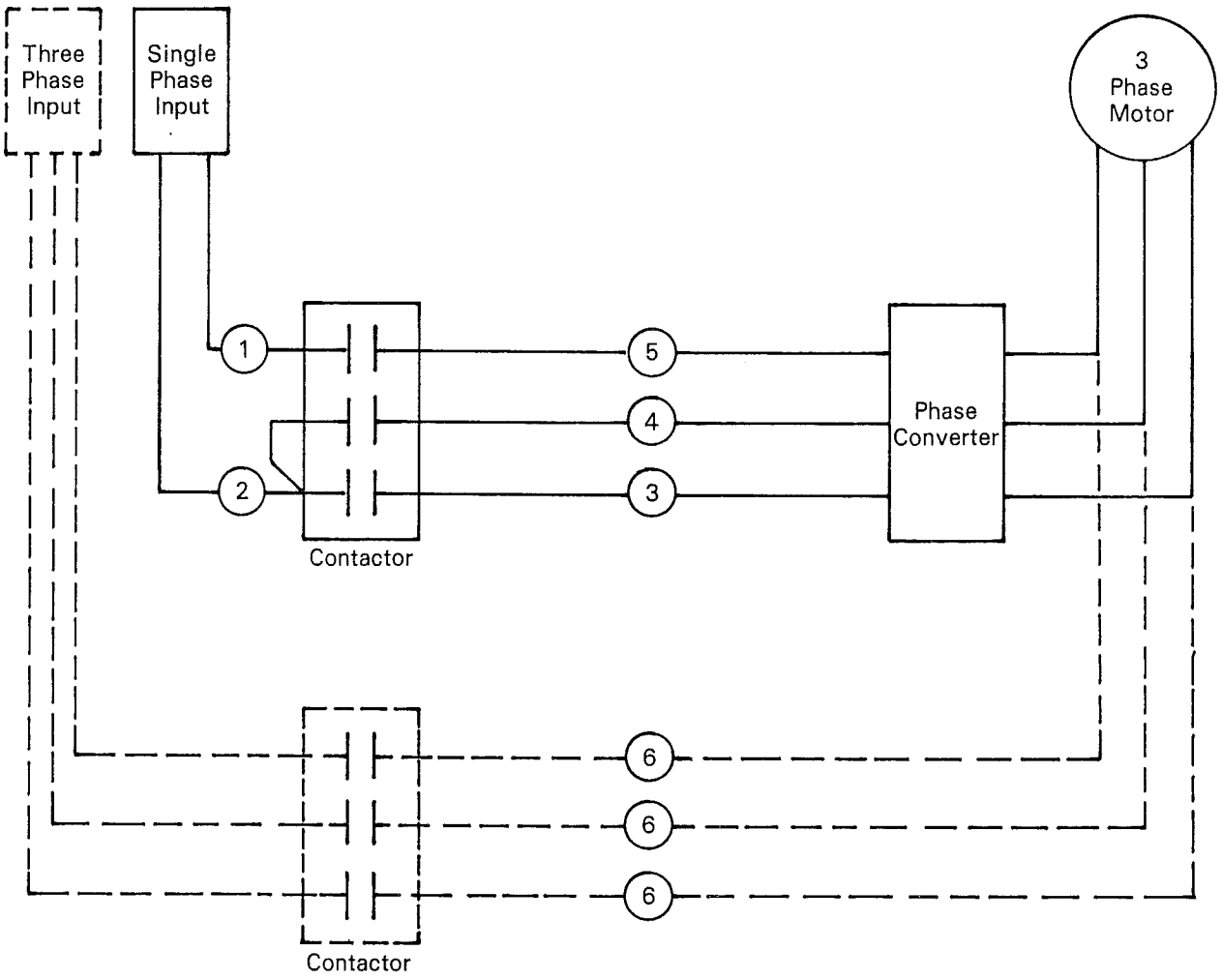


Components Furnished by Owner Unless Otherwise Noted

Kan-Sun axial flow fan motors are constructed to run on regular 3Ø power or on 3Ø converted from 1Ø through an approved phase converter. The 12 motor leads have instructions for connection depending upon power input used.

The phase converter does not give a balanced current to each phase of the motor. However, the motor is sufficiently oversized to allow for the expected unbalance.

The schematic below indicates current measuring points and the nominal expected current readings.

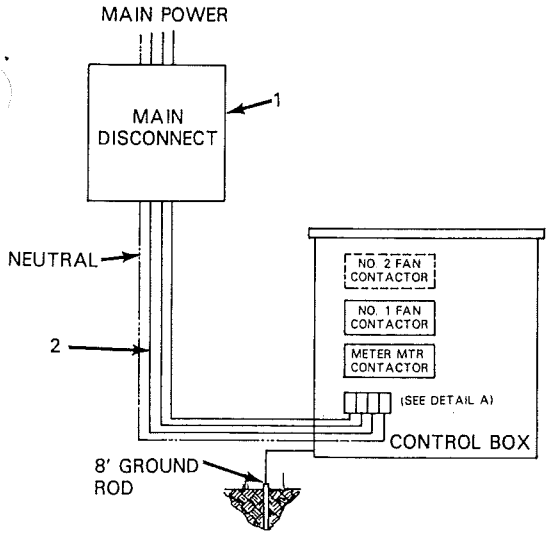


Motor Running Current Loaded (Typical)

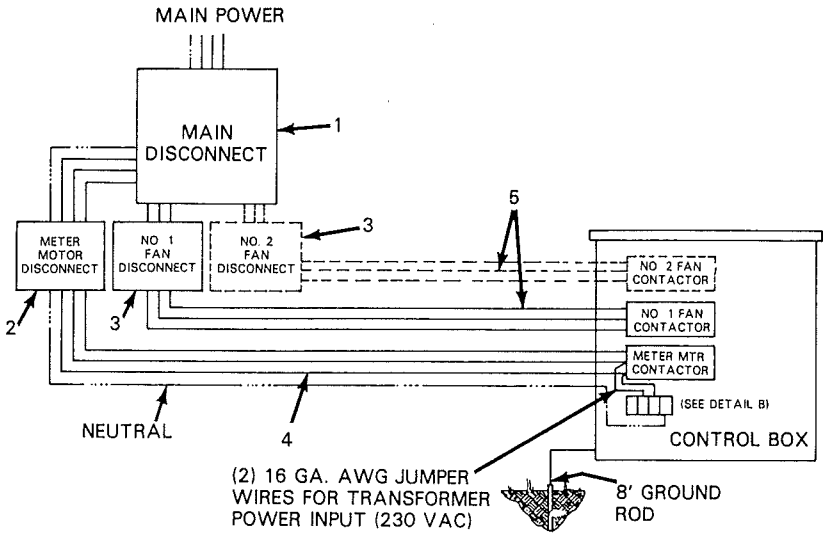
Line No.	1	2	3	4	5	6
10 HP	52	52	46	11.5	52	31
15 HP	62	62	48	20	62	36

Total input current for two fan motors will exceed double the reading for one motor on a dual fan dryer as the static pressure causes the current draw to increase.

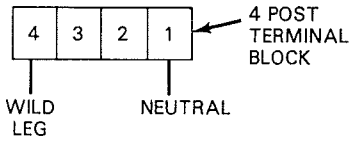
TYPICAL ELECTRICAL HOOK-UPS



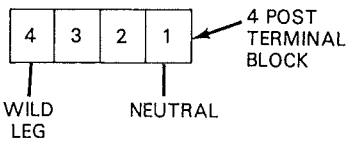
COMBINED MOTOR PROTECTION (FOR STATE CODES WHO ACCEPT OVERLOAD RELAY PROTECTION)



INDIVIDUAL MOTOR PROTECTION (FOR STATE CODES REQUIRING INDIVIDUAL MOTOR PROTECTION)



DETAIL A



DETAIL B

BRANCH CIRCUIT SPECIFICATIONS CHART NO. 1

DRYER MODEL	Full Load Amps (Total)	1* MAIN DISCONNECT Fusetron Size	1* MAIN DISCONNECT Circuit Breaker (Amps)	2** Copper Wire Size THW AWG	2** Conduit Size
220V 1Ø					
8-15-10	74	FRN 90	90	#3	1¼"
8-17-15	85	FRN 100	100	#2	1¼"
10-21-210	126	FRN 150	150	2/0	2"
10-25-215	148	FRN 175	NA	3/0	2"
220V 3Ø					
8-15-10	47	FRN 60	60	#6	1"
8-17-15	54	FRN 60	60	#4	1¼"
10-21-210	80	FRN 100	100	#3	1¼"
10-25-215	94	FRN 110	125	#1	1½"
440V 3Ø					
8-15-10	24	FRS 30	30	#10	¾"
8-17-15	27	FRS 35	35	#8	¾"
10-21-210	40	FRS 50	50	#6	1"
10-25-215	47	FRS 60	60	#6	1"

SEE PAGE 50 FOR MOTOR & TRANSFORMER REWIRING

BRANCH CIRCUIT SPECIFICATIONS CHART NO. 2

DRYER MODEL	Full Load Amps (Total)	1* Main Disconnect Fusetron Size	1* Main Disconnect Circuit Breaker (Amps)	2* Motor Disconnect Fusetron Size	2* Motor Disconnect Circuit Breaker (Amps)	3* Motor Disconnect Fusetron Size	3* Motor Disconnect Circuit Breaker Amps	4** Meter Motor Copper Wire Size THW AWG	4** Meter Motor Conduit Size	5** Fan Motor Copper Wire Size THW AWG	5** Fan Motor Conduit Size
220V 1Ø											
8-15-10	74	FRN 90	90	FRN 30	30	FRN 60	60	#10	½"	#6	1"
8-17-15	85	FRN 100	100	FRN 30	30	FRN 70	70	#10	½"	#4	1"
10-21-210	126	FRN 150	150	FRN 30	30			#10	½"	#6	1"
10-25-215	148	FRN 180	N/A	FRN 30	30			#10	½"	#4	1"
220V 3Ø											
8-15-10	47	FRN 60	60	FRN 15	15	FRN 40	40	#12	½"	#8	¾"
8-17-15	54	FRN 60	60	FRN 15	15	FRN 50	50	#12	½"	#6	1"
10-21-210	80	FRN 100	100	FRN 15	15	FRN 40	40	#12	½"	#8	¾"
10-25-215	94	FRN 120	120	FRN 15	15	FRN 50	50	#12	½"	#6	1"
440V 3Ø											
8-15-10	24	FRS 30	30	FRS 10	10	FRS 20	20	#14	½"	#10	¾"
8-17-15	27	FRS 30	35	FRS 10	10	FRS 25	25	#14	½"	#10	¾"
10-21-210	40	FRS 50	50	FRS 10	10	FRS 20	20	#14	½"	#10	¾"
10-25-215	47	FRS 60	60	FRS 10	10	FRS 25	25	#14	½"	#10	¾"

SEE PAGE 50 FOR MOTOR & TRANSFORMER REWIRING

NOTES: 1 — * SIZED AT 120% OF FULL LOAD AMPS
2 — **SIZED AT 125% OF FULL LOAD AMPS
3 — WIRE SIZES SHOWN ARE FOR RUNS 100 FEET OR LESS. USE 3 WIRE CONDUCTORS FOR 1Ø UNITS AND 4 WIRE CONDUCTORS FOR 3Ø UNITS.
4 — CONTROL BOX, CONTACTORS AND 4-POST TERMINAL BLOCK ARE FURNISHED BY BUTLER MFG. CO., ALL OTHER ITEMS SHOWN ARE TO BE FURNISHED BY CUSTOMER.
5 — DISCONNECTS SHOULD BE 3 POLE FOR 3Ø UNITS AND 2 POLE FOR 1Ø UNITS.

DRYING INFORMATION

DEFINITIONS

AIR VELOCITY: The speed of air flow in feet per minute.

AMBIENT TEMPERATURE: Outside air temperature.

AMBIENT RELATIVE HUMIDITY: Outside relative humidity.

BTU: British Thermal Unit is a unit used to measure heat. One BTU will raise the temperature of one pound of water 1° Fahrenheit.

BTU/Hour: A common standard by which a heating unit is rated.

BUSHELS: One bushel equals 1-1/4 cubic feet. The generally accepted weights in pounds per bushel of grain are as follows:

Shelled Corn	56 Lbs. @ 15.5%
Soybeans	60 Lbs. @ 14.0%
Milo	56 Lbs. @ 14.0%
Wheat	60 Lbs. @ 14.0%
Sunflower Seeds	24-28 Lbs. @ 11.0%

CFM: Cubic Feet per Minute is a common measure of a quantity of air movement.

CONTINUOUS FLOW DRYING: The drying, cooling and discharging of grain in a continuous uninterrupted operation.

DRIED GRAIN: Grain which has been dried to the desired moisture content.

EXHAUSTED AIR: The air leaving the grain after having absorbed as much moisture as possible.

GRAIN COOLING: Reducing the temperature of grain after drying to the desired level.

GRAIN DRYING: Reducing the moisture content of grain to the desired level.

HIGH TEMPERATURE LIMIT: The temperature above which grain should not be dried. This is determined by the end use intended for the grain.

L.P. GAS: A mixture of various petroleum products usually consisting of propane and butane. It is normally stored and transported as a liquid under pressure. This mixture weights about 4.5 lbs. per gallon and has a heating value of approximately 90,000 BTU/Gallon.

MOISTURE CONTENT: The moisture content of grain is measured by dividing the weight of the water which it contains by the total weight of the wet grain. This is the moisture content upon which grain is bought and sold commercially. (Sometimes referred to as wet basis.)

PLENUM TEMPERATURE: Temperature of the air used for drying.

RELATIVE HUMIDITY: A measure of the moisture content of the air relative to fully saturated air.

STATIC PRESSURE: A measure of the air pressure in a container compared to surrounding air. It is expressed in inches of water column. Small kernel grains such as wheat and milo pack closer together and offer greater resistance to air flow. This causes higher static pressure to develop in the plenum chamber reducing drying rate.

TEMPERATURE RISE: The difference between ambient temperature and plenum temperature is referred to as the temperature rise.

MOISTURE MATIC

The moisture matic system regulates discharge rate of grain to maintain moisture at a pre set level. It senses discharge air temperature as an indicator of drying performed.

CAPACITY

Capacity figures listed on page 10 are the average of several years data, and refer to wet bushels into the dryer. In a given year, the rate may be above or below this average.

Drying rate is largely affected by physical characteristics of the grain. Variety, fertilization program, rainfall, sunlight (degree days), planting date, disease/insect damage, and hail and storm damage all affect drying rate. Capacity changes of up to 30% have been observed simply by changing from one field of corn to another of equal moisture content.

Capacity stated by industry standards is for 10 point moisture removal based on 25% dried to 15% moisture content. Five point is from 20% to 15%. Drying below 15% is slower and drying to 13% may reduce capacity as much as 20%.

Trash in grain reduces the drying rate and may cause uneven drying and flow patterns.

DRYING INFORMATION

CAPACITY

Ambient temperature and relative humidity variations have little affect on drying rate. The dryer will burn more fuel as ambient temperatures go down, but will continue to heat and superdry the air to 2-3% R.H.

MOISTURE CONTENT RECOMMENDATIONS

Harvest of grain should not begin until certain moisture levels are reached to minimize kernel damage and threshing losses. In addition, different grains have various allowable moisture levels for safe storage. Recommended moisture contents are shown on page 9.

DRYING TEMPERATURE LIMITS

Commonly dried grains have various maximum allowable drying temperatures depending upon anticipated storage, handling, and end usage.

Excessive temperatures affect palatability to livestock, milling, germination and cracking. Commonly accepted temperature limits are shown on page 10.

COOLING

Grain should be cooled to no more than 10 to 15°F. above outside temperature for safe storage.

Cooling is controlled by the cooling chamber door. Maximum cooling occurs with the door closed and minimum cooling with it open. Cooling requires power thus less cooling allows faster drying. To achieve a maximum drying rate, use an aeration bin to cool the grain with a minimum airflow of 1/2 CFM per bushel and leave the cooling door open. If the cooling door abruptly closed, the plenum temperature will rise so rapidly (faster than the modulating valve can operate) it will trip the high limit switch. Readjust the regulator and restart.

DRYING IN GENERAL

(Corn)

Corn is the most commonly dried grain, thus general drying instructions apply to it as well as other crops.

Clean grain dries faster, more cheaply and more uniformly. All possible trash should be removed in harvesting. Additional cleaning prior to drying is desirable for pollution control and may be necessary in extreme cases.

Drying equipment should be serviced at least daily. Heating and cooling chambers should be inspected and all foreign material removed. Perforated walls may need wire brushing to remove foreign material. Heating chamber cleanout ports should be checked. Plenum temperature, flow rate, and moisture content are established as shown in the operation section. The bottom row of roof louvers may be removed for corn below 27% mc.

Soybeans are not dried as a common practice; however, they are dried successfully by operating at a lower temperature with added inspection for cracks and special handling care.

For air drying roof covers may be removed.

Wheat & Milo

Wheat and milo kernels are smaller than corn and pack more densely causing higher resistance to air flow. The increased resistance results in drying capacity somewhat below that of corn as shown in the capacity table page 10. Fill dryer with fan off. Clean dryer after filling and before starting heater.

Milo, in particular, is frequently very trashy as harvested. This trash, if not removed, will reduce capacity, waste fuel, and cause uneven drying. Trash should be removed at least twice daily to prevent fire. Do not remove solid roof covers.

Sunflower Seeds

Sunflower seed drying requires special operations and constant supervision. The fuzz from sunflower seeds collects in the dryer perforations and heat chamber reducing airflow and increasing the danger of fire.

Walls plus heating and drying chamber floors must be cleaned at least every 6 to 12 hours of operation and more often if buildup is severe. A shop vacuum cleaner is recommended to remove fuzz. Cooling door should face up wind or so as to intake least material. Special handling is desirable to minimize floating fuzz.

Due to potential fire hazards, fire prevention and control equipment should be available.

The solid roof covers should be left on at all times for sunflower seeds. Dryers used primarily for sunflower seed drying should be purchased with solid roofs.

Discharge rate: When removing only a few points of moisture the discharge may be speeded up by installation of a larger pulley on the hyd. motor.

DRYING INFORMATION (Continued)

Sunflower Seeds (Cont'd)

Burner orifice: A 1/8" burner orifice 437168 should be installed to allow very low temperature control.

Pressure switch: Due to very light material the low pressure switch should be readjusted to prevent unwanted automatic shutdown.

1. With the dryer filled and operating in Manual Moisture Control, turn the low pressure adjusting screw (#2 circuit on right) clockwise two turns.
2. Switch dryer control from start up to operate.
3. Manually decrease metering system until discharge drive stop.
4. Turn low pressure adjusting screw (#2 circuit on right) counter clockwise until fan motor and meter motor stops.
5. Repeat steps 3 and 4 to confirm setting. Dryer should shut down within 10 seconds after metering drive stops.

MOISTURE CONTENT RECOMMENDATIONS

Obtain Samples per instructions on Discharge Auger

	Maximum Harvest Wet Basis	Moisture in Storage	
		Short Term	Long Term
Corn	30%	15%	13%
Soybeans		12	11
Wheat & Milo	18-20	12	11
Sunflower Seeds	25	12	9.5

DRYING CAPACITIES
Wet Bushels per Hour

Grain	Drying Temp. ° F.	8-15-10	8-17-15	10-21-210	10-25-21
Corn	220	183	220	365	435
10 pt. removal	220 — 15 Hrs.	2745	3300	5475	6525
	130	108	130	215	255
	110	90	110	180	217
Corn	220	265	320	500	608
5 pt. removal	130	155	190	295	360
	110	133	160	250	304
Wheat & Milo	170	210	250	420	500
5 pt. removal	130	160	190	320	385
	105	135	160	270	325
Sunflower Seeds	Due to many variables of drying sunflower seeds, drying rates have not been established.				
Soybeans	130	113	135	220	260
10 pt. removal	110	95	115	185	222
Soybeans	130	158	193	298	363
5 pt. removal	110	136	163	253	307

RECOMMENDED DRYING TEMPERATURES °F*

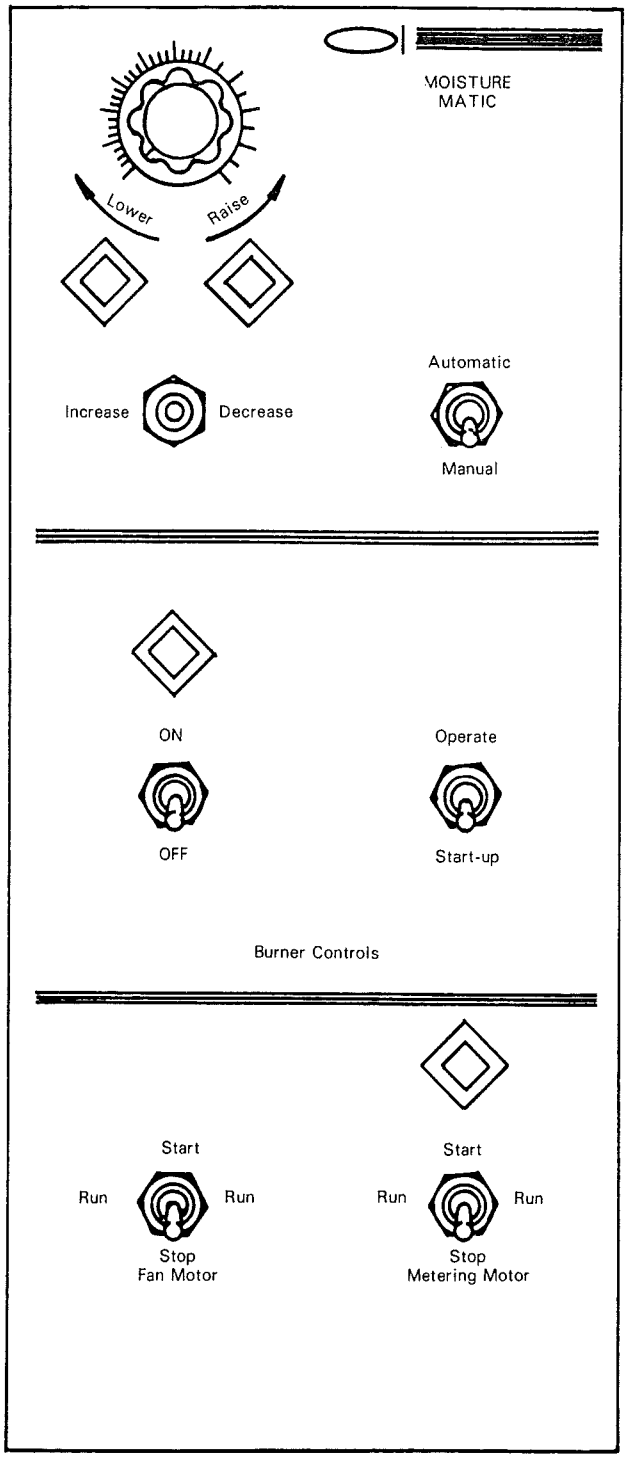
Grain	Seed	Commercial Use	Feed
Corn	110*	130*	220
Soybeans	110	130	—
Wheat & Milo	105	130	170
Sunflower Seeds	80-110	80-110	80-110

DISCHARGE MOISTURE CONTENT — Moisture samples of the discharged grain should be taken every 60 minutes during operation to prevent the possibility of putting grain with excessive moisture into storage. See the page of moisture content recommendations for storage moistures.

*Standard modulating valves supplied with KanSun Dryers have a minimum control range of 140°F. Drying below this temperature requires manual regulation or substitution of a "sunflower" modulating valve listed on page 39.

Low temperature operation with LP will probably require burner orifice 437168 to maintain proof of flame. Low temperature operation with NG will probably require burner orifice 433888 or 437168 drilled out to 5/16 dia. to maintain proof of flame.

OPERATION



MOISTURE CONTROL

The dial sets moisture as indicated by grain moisture tests. The numbers around the dial are non-significant. Dialing clockwise lowers output moisture and vice versa. The lamps indicate system balance when both are turned off.

The left switch is a means of manually positioning the shift motor for desired discharge speed. It functions only when the right switch is in "manual." The right switch allows manual or automatic moisture control.

BURNER SECTION

Left switch turns on burner. Purge time is shown by lamp. When lamp cycles off, burner should ignite. Right switch is "Startup-Operate" switch. Operate section is used after dryer is set and operating. It completes safety circuits.

MOTOR CONTROL SECTION

Left switch starts fan(s) when pushed fully upward. Switch remains in center run position when released. Right switch operates meter motor.

DRYING INFORMATION

INITIAL DRYER START-UP

To eliminate the need to recycle wet grain once the dryer is in operation, fill the grain columns with dry grain up to the plenum floor.

1. Place the "START-UP" "OPERATE" switch in *start-up* position, and the MOISTURE MATIC "MANUAL" — "AUTOMATIC" switch in *"manual"* position. Never go away leaving the machine in *startup.*

2. Check HIGH LIMIT Switch for 250° maximum setting. Set point temperature indicator at the 3 o'clock position for top hinged control boxes.

3. Open control valve on main fuel line.

4. Open fuel valve at dryer.

5. Turn adjusting screw of modulating valve all the way in (clockwise).

6. L.P. GAS — Turn pressure regulator screw about two-thirds of the way out. (The regulator will not register until solenoids open.)

7. Start fan.

8. Switch burner *on.* Machine will purge for up to 60 seconds, solenoids will open, and burner(s) will ignite. Units with adjustable timers should be set for 15 seconds. If burner(s) fail to ignite, press HI LIMIT switch for retry at ignition.

9. After ignition, slowly adjust pressure regulator (ball valve for N.G.) until drying temperature is approximately 20 degrees higher than desired.

   Should the drying air temperature exceed the setting on the high limit control, the burner will go out. To re-ignite burner, push the HIGH LIMIT switch reset arm.

10. To set drying air temperature, slowly adjust modulating valve, waiting about one and a half (1-1/2) minutes between adjustments. Turn counter-clock-wise to decrease temperature or clockwise to increase temperature.

11. Set high limit control 20° higher than drying temperature.

12. Move INCREASE-DECREASE switch to adjust metering pointer to neutral position. Start metering motor. No warm up is necessary. Move INCREASE-DECREASE switch until pointer reaches *"B".*

13. Slowly move the "START-UP" "OPERATE" switch to *"OPERATE."* DO NOT switch machine to *"OPERATE"* until all of the proceeding steps have been completed and all printed circuit lights are on.

CONTROLLING THE MOISTURE CONTENT

Check grain moisture content every 30 minutes, increase or decrease grain discharge rate until the desired moisture content is reached and maintained for 2 hours.

SAMPLING PROCEDURE: Obtain a uniform grain sample by collecting 6 cups of grain at 10 second intervals. Mix samples for accurate test.

The "MOISTURE MATIC" system aids in controlling the final moisture content by varying the rate of grain discharge. The "MOISTURE MATIC" system should not be started until the desired discharge moisture content has been established and maintained for 1 hr. in the manual position.

1. Turn the moisture control dial until RAISE and LOWER lights are off.

2. Set "MANUAL" – "AUTOMATIC" switch to the *"AUTOMATIC"* position.

Continue checking grain moisture content every 60 minutes. Should the moisture content be consistently too wet or too dry, adjust the moisture control dial to raise or lower moisture content.

Grain entering the top of the dryer will require up to 1 hour or more to exit. Keep in mind the time lag required due to flow speed to readjust to a new moisture grain input. Do not readjust the moisture dial on a basis of one moisture sample until you have sufficient experience to anticipate where the unit will stabilize. In the initial process of adjustment, write down the sample reading each 15 minutes and note any corrections made. Any correction made will take up to 45 minutes to affect the discharge. A major source of difficulty in setting the discharge rate comes from too frequent, too large adjustments.

SECOND OR SUBSEQUENT DAY START-UP

All the steps listed under INITIAL DRYER START-UP are not necessary for second or subsequent day starting.

1. Set switches to *Start-up* and *Manual.*
2. Open control valve on main fuel line.
3. Open toggle or ball valve at dryer.
4. Start fan.
5. Switch burner on. Machine will purge for 15 to 60 seconds, solenoids will open, and burner(s) will ignite. If burner(s) fail to ignite, recycle BURNER switch and check reset button on ignition control box(s).

   Decrease flow rate 1/2-1 letter.
6. When plenum temperature reaches 30°F below the desired drying temperature, start metering motor. A continued check of the discharge grain for the first 2 hours will indicate whether the metering should be turned on sooner or not. If the grain left in the dryer overnight comes out TOO DRY, start the metering SOONER next time. Do not adjust regulator for 15 minutes.
7. Slowly move START-UP OPERATE switch to the *"OPERATE"* position. All auxiliary equipment should have automatic shut down provisions too.
8. When LOWER light goes out push MANUAL-AUTOMATIC switch to *"AUTOMATIC"* position.
9. Continue checking discharged grain moisture content every 60 minutes. Should the discharged grain be consistently too wet or too dry, adjust the moisture control to raise or lower moisture content.

STOPPING PROCEDURE

WARNING

NEVER ENTER A DRYER WHICH HAS SHUT DOWN AUTOMATICALLY UNTIL THE FAN(S) HAVE BEEN RUN FOR 15 MINUTES TO PURGE THE PLENUM CHAMBER AND COOL THE GRAIN.

When Dryer Is Full of Grain

1. Set the "START-UP" "OPERATE" switch to *"START-UP"* position, and the "MANUAL-AUTOMATIC" switch to the *"MANUAL"* position.
2. Shut off fuel supply and let fuel burn out.
3. Set BURNER switch to *"OFF"* position.

If stopping the dryer for a period of 30 minutes or more, stop the metering motor and run the fans for about 15 minutes to cool the grain. If the dryer is to be left full of grain for a longer period of time, fans should be operated daily for about 15 minutes to prevent grain damage.

4. Stop fan motor(s).
5. Stop metering motor.

When Emptying the Dryer

When the last grain to be dried has been put into the machine, stop the metering system before the grain has dropped below the low bin switch. Dry this remaining grain in the batch manner.

OFF SEASON STORAGE

Inside Machine

1. Clean all chaff from heating and cooling chambers.
2. Clean grain out of the bottom of the machine.
3. Place plug in burner and cover burner housing with plastic.
4. Grease fan motors at shaft and end bell.

Outside Machine

5. Oil roller chain.*
6. Oil exposed threads on shifting motor screw.
7. Grease fitting on shifting motor screw and run to full increase and back to neutral.
8. Rusty spots on perforations and holding bin should be treated as described on page 15 of the manual.
9. Release spring tension on regulator and modulating valve.
10. Disconnect main power.

*Not required on machines after serial number 4303.

SEASONAL MAINTENANCE

MAINTENANCE INSIDE MACHINE FOR STARTUP

1. Turn power off at main disconnect.

2. Clean out heating and cooling chamber.

3. Remove plug and/or cover from burner.

4. Grease fan motor at top and bottom bearing.
   a. Grease until grease comes out relief port with Chevron SRI-2.

5. Check oil in 50:1 gear box and grease.
   a. Oil must be at least 1/4" over gear.
   b. Grease top bearing with gun grease.

6. Grease U-joint on 50:1 drive shaft.

MAINTENANCE OUTSIDE MACHINE

7. Grease metering motor.
   a. Two pumps per bearing.

8. Check set screws in flex. coupling between motor and hydrostatic for tightness.

9. Hydrostatic transmission
   a. Change fluid.
   b. Change filter.
   c. Check hoses for leaks.

10. Shifting motor screw
    a. Oil motor screw.
    b. Grease fitting.
    c. Oil indicator linkage.

11. Check chain for 1/4" depression and alignment.*
    a. Oil chain.*

12. Check belt for 1/2" depression and alignment.

13. Grease U-joint on drive shaft.*

*Prior to SN4303

MAINTENANCE INSIDE CONTROL PANEL

14. Inspect and clean control panel connections.
    a. Remove 60 sec. (and 6 sec. in 10 ft.) from circuit board.
    b. Spray socket and pins of timers with freon degreaser.

15. Struthers Dunn moisture controller
    a. Remove null relay from moisture control board. Spray socket and pins of relay with freon degreaser.
    b. Remove 11 pin plug from moisture control board. Socket and 11 pin plug with freon degreaser.
    c. Repeat items "A" and "B" any time moisture matic becomes erratic.

PROTECTION OF RUSTING GALVANIZED MATERIAL

In time the galvanized surfaces of the Kan-Sun dryer will rust. To protect the machine, paint rusty surfaces as soon as possible after rust appear. To paint galvanized metal, use any commercially available zinc dust primer, or zinc alkyd primer that is intended for use on galvanized surfaces.

FOLLOW ALL LABEL INSTRUCTIONS.

When painting perforation, avoid plugging the holes in the perforation. Spray painting is preferred. A top coat may be applied if the color of the primer is objectionable. If the inside of the wet holding bin becomes rusty, use the same recommendations as for painting on galvanized surfaces.

When cleaning grain residue from painted surfaces, use only a non-metal brush, as scraping or wire brushing will remove the paint.

EXAMPLES OF ZINC DUST PRIMERS:

Cooks ..... "Primer Coat — 471R112"
CO-OP ..... "Zinc Metal Paint"
Pratt & Lambert ..... "Galvanized Metal Primer"
Tru-Test ..... "Galvanized Metal Primer"
Sherwin-Williams ..... "All Surface Enamel"

Touchup Paint to go on Orange Polyester — BMC 439449.

LUBRICATION

All areas that need lubrication are properly lubricated before leaving the factory. You should maintain a lubrication schedule as described in the following chart:

ITEM	LUBRICATION REQUIRED	INTERVAL
50:1 Gearbox Grease Fitting	Fill 1/4" over gear with SAE 90 gear lubricant. Use five (5) strokes of gun grease.	Maintain proper level. Check every 100 hours. And at beginning and end of season.
U-Joints	Use one (1) stroke of gun grease.	Every 50 hours of operation.
Roller Chain	Lubricate with SAE 30 motor oil.	Every 25 hours of operation.
Fan Motor(s) & Metering Motor	Lubricate with SRI-2 (Chevron) grease or equivalent. (Equivalents below)	Prior to operation & end of season.
Hydrostatic Transmission Oil	Fill to oil level plug with (Vickers) or 2-3/4" below top of filler neck (Sunstrand) Oil listed below.	Change every 500 hours &/or at beginning of each drying season.
Hydrostatic Transmission Oil Filter	Use 25 micron filter.	Change after 1st 30 hours of operation. Change every 500 hours &/or at the beginning of each drying season.
Shifting Motor Screw	Coat with light oil or graphite and Grease fitting.	Prior to operation and end of season — 100 hr.
Shifting Motor Linkage	Lubricate pivot points with SAE 30 motor oil.	Every 100 hours of operation.

FAN AND METERING MOTOR GREASES	HYDROSTATIC OIL	
	VICKERS	SUNDSTRAND 6 QTS.
Chevron SRI-2 Standard Oil of Calif. Aeroshell #16 Shell Oil Co.	5W20 SE 10W SE	ATF Type "F" Hydraulic Transmission Fluid Type used by Agricultural Industry
Hi Temp Texaco, Inc.		Anti-Wear Hydraulic Oil 10W40 SE
	Filters	
	VICKERS	SUNDSTRAND
Andok 260 Humble Oil	Baldwin	Baldwin HS 839
Rykon #2 American Oil	PT 849 25 micron	Cross 1A9021
		Ripley OP-742-10 25 micron
		IH 702 03 C1

SERVICE

SHUT OFF POWER AND FUEL TO PREVENT ELECTROCUTION AND BURNING

Most components are listed by name with functional description and check out means in the component section. Certain electrical components may be tested in the Model 80 tester 438398.

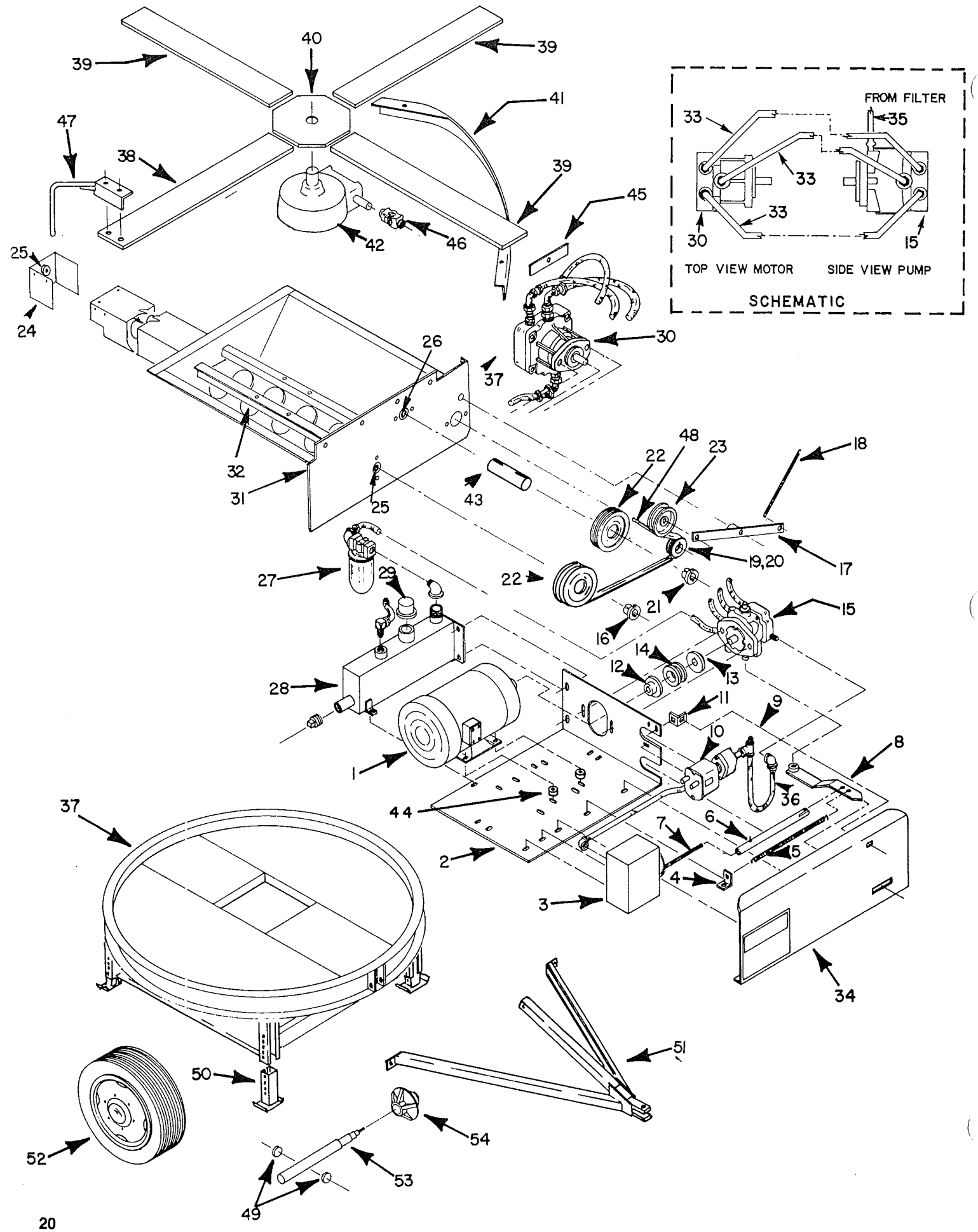
PROBLEM	SOLUTION
Motor(s) fail to start (no power supply).	Check "START UP — OPERATE" switch for startup position.
	Check for power on all lines at 4 terminal block.
	Check for 110-120 volts at control transformer secondary.
	Check No. 3 fuse.
	Reset overloads on motor starter(s).
	Check for voltage thru "STOP" and "START" switches.
	Check auxiliary electrical interlock if motor runs with start switch in start position.
	Check holding coil on starter(s).
	Check for loose wires on starter(s).
	Check No. 2 timer on 10' machine when second fan motor does not attempt to start.
Fan motor(s) hum, but fail to start, or turn slowly.	Check for adequate voltage (180 volts minimum at terminal block when start switch is engaged).
	Check for improperly wired motor.
	Check for loose connections.
	Check motor bearings (spin blade by hand).
	Check phase box(s) for faulty capacitors. (Single phase machines only.)
	Phase box relay may be stuck open or opening too soon.
Magnetic starter(s) trip out repeatedly.	Measure line voltage with all motors running (207 VAC min. 245 VAC max).
	Measure amperage thru each motor lead and compare with motor nameplate (Reference page 4).
	Check heaters for correct size. (See operator's manual).
	Check starter(s) for loose connections.
	Check for improperly wired motor.
No. 2 Fan runs backwards (1 ph)	No. 2 timer set for more than 6 seconds.
Fan(s) run backward (3 ph)	If meter motor also runs backward, switch two wires on the main terminal block.
	If any single motor runs backward, switch two of its three leads.
Machine runs through purge period, but fails to ignite or flame out occurs before temperature reaches high limit setting.	Check gas pressure, regulator and modulating valve setting.
	Check flame monitoring control(s) for malfunction. See ignitor lamps to indicate power thru monitor.
	Check high limit. (High limit light indicates power thru switch).
	Check purge timer and socket if no power to P.C. 3 (8') or P.C. 1 (10').
	Check probes for proper gap, cracks, or shorting.
	Check secondary and high tension lines for cracks or nicks.
	Check for loose ground on terminal blocks.
	Check solenoids.
	Check temperature gauge for accurary (measure at heat chamber clean out pipe.

SERVICE (Continued)

PROBLEM	SOLUTION
High limit control kicks out repeatedly.	Check high limit control setting. Check for clogged heating chamber walls. Check temperature gauge for accuracy (measure at heat chamber clean out pipe). Check high limit control for malfunction or loose connection.
Machine stops when switched into the "OPERATE" circuit.	Meter motor and low bin lamp must be on. Switch moved too fast — try again slowly. Check low bin switch. Check hydrostatic pressure switch circuit no. 2. Check "STARTUP-OPERATE" switch.
Machine will not achieve desired temperature or temperature is erratic.	Check supply tank fill and pressure. Check regulator and modulating valve for proper adjustment. Check temperature gauge. Check excess flow valve at fuel supply for clicking noise or frost indicating blockage. Check for frost on supply line indicating blockage. Check strainer and regulator screens for dirt. Check vaporizer and gas lines for leaks. See Normal Operating Conditions on fuel requirements page.
Pressure gauge indicates excessive pressure.	Check regulator and modulating valve for proper adjustment per operators manual. Check screens and check valves for contamination. Check pressure gauge. Check burner orifice. (L.P. gas machines only)
Machine uses excessive fuel. See page 3 for definition of "Normal."	Check for overdrying. Check for proper grain level in holding bin. Check vaporizer and gas lines for leaks. Check air gap on burner castings.
Uneven moisture content of the discharged grain.	Check fill auger for proper positioning and fines distribution. Check to see if machine is level. Check for even burn on two burner units. Check metering arm. (Centered in dryer with arms sweeping parallel to the lower edge of the inner perforated wall.) Check "MOISTURE MATIC" (See moisture matic trouble shooting section).

PROBLEM	SOLUTION
Machine will not operate continuously in "operate."	Watch function lamps in "start up" for indication of circuit causing problem.
	Check air switch adjustment, travel, and contamination.
	Check low bin switch.
	Check probes and ignition wires.
	Check high limit switch.
	Check meter motor auxiliary.
	Check flame monitoring control(s) for malfunction or loose connections. (Use Model 80 tester).
	Check hydrostatic pressure switch, circuit 1 and circuit 2.
	Check "Start up-Operate" switch.
	Check "Start up-Operate" relay.
	Attach Model 80 tester with external circuit tester and run in "startup" to find cause.
	Check moisture matic if machine shuts down in neutral.
Grain flow thru the columns is uneven.	Check for even grain filling. (May be off center causing uneven distribution of grain and fines on the roof cone.)
	Check to see if machine is properly leveled.
	Check for foreign material at perimeter of base and at bottom of columns.
	Check metering arm (may be off center causing grain to move down a column faster on one side of the machine than the other).
	Check for plugged column.
	Ignore drop rate at door section.
Fans run but purge lamp will not light.	Check No. 4 fuse.
	Check air switch(es), air lamps indicate power to purge timer.
	Check burner switch.
	Check fan motor auxiliary.
	Check purge timer and socket including solder on back of printed circuit board.
Solenoids chatter or will not open.	Push reset in flame controller.
	Check No. 4 fuse.
	Check Ignitor lamp on 8' or ignitor 2 lamp on 10' for indication of power to solenoids.
	Check for ground or loose connection. Either will cause ignitor to refire and chatter valves.
	Check probes and leads.
	Check flame monitoring control(s) with Model 80 tester.
	Check coils in solenoid valves.
	Check diaphragms.
	See orifice note page 11.

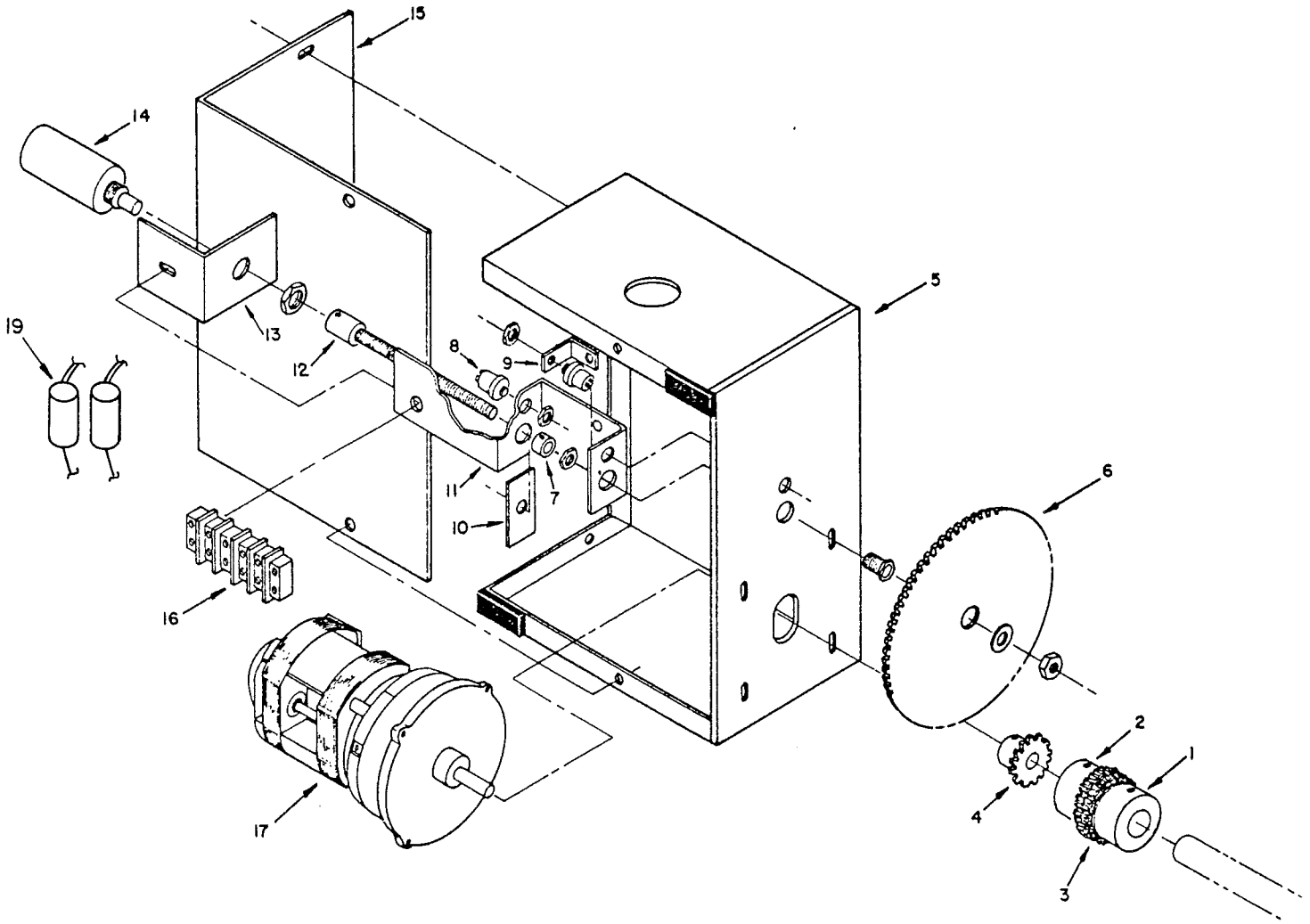
DRIVE AND DISCHARGE ASSEMBLY



DRIVE AND DISCHARGE ASSEMBLY — 10'

REF. NO.	PART NO.	DESCRIPTION	QTY.
1	435943	3Ø METERING MOTOR 3 HP	1
	OR		
	823235	1Ø METERING MOTOR 3 HP	1
2	837823	DRIVE MOUNTING PLATE	1
3	823466	SHIFTING MOTOR ASSEMBLY	1
4	837826	SPRING CLIP	1
5	834716	SPRING, SHIFTING ARM	1
6	821437	SHIFTING ARM	1
7	837821	DRIVE BOLT	1
8	823455	SHIFTING ARM	1
9	096184	PIPE PLUG	1
10	835290	PRESSURE SWITCH	1
11	837825	SHIELD CLIP	1
12	833518	COUPLING, MOTOR HALF	1
13	833382	COUPLING, PUMP HALF	1
14	833383	RUBBER SLEEVE	1
15	823383	VARIABLE PUMP (REPLACEMENT SHAFT SEAL 438569)	1
16	438747	HUB 3/4" BORE	2
17	823465	BELT TIGHTENER	1
18	830843	SPRING, BELT TIGHTENER	1
19	837357	2.65" SHEAVE, DISCHARGE MOTOR	1
20*	837740	HUB 3/4" BORE	1
21	837739	HUB 1" BORE	1
22	837742	6.9" SHEAVE	2
23	833318	DOUBLE BELT IDLER	1
24	436482	AUGER GUARD	1
25	437438	3/4" BEARING W/COLLAR	2
26	821372	BEARING @ CASTING 1"	1
27	823377	SPIN ON FILTER (REPLACEMENT CARTRIDGE & GASKET 837637)	1
28	823451	HYDRAULIC TANK	1
29	442795	TANK BREATHER CAP & DIP STICK ASSEMBLY	1
30	823384	DISCHARGE MOTOR (REPLACEMENT SHAFT SEAL 438568)	1
31	438729	AUGER SUMP ASSY.	1
32	438727	AUGER ASSY 5-1/8 " DIA. (AUGER ASS'Y, 6" DIA. 820098)	1
33	439167	1/2" x 43-1/2" HYDRAULIC HOSE (MTR TO PUMP) (MTR TO TANK)	4
34	837822	DRIVE SHIELD	1
35	837723	1/2" x 20" HYDRAULIC HOSE	1
36	837724	3/16" x 15" HYDRAULIC HOSE	1
37	438021	BASE WELDMENT	1
38	834683	LONG SWEEP ARM	1
39	834682	SHORT SWEEP ARM	3
40	821633	SWEEP ARM HUB	1
41	821649	SWEEP FIN	4
42	437752	50:1 GEARBOX	1
43	830017	DRIVE SHAFT (1" x 6-3/4")	1
44	440729	MOTOR SPACER	4
45	833278	SWEEP FIN FINGER	4
46	820026	1" R. TO 1" R. U-JOINT	1
47	821364	SWEEP ARM FINGER WELDMENT	1
48	837356	DRIVE U BELT	1
49	837848	SPACER FERRULE	8
50	439837	LEG EXTENSION	6
51	439867	HITCH ASSEMBLY	1
52	820104	WHEEL/TIRE ASSEMBLY (WHEEL — 830089 TIRE — 830090)	4
53	821647	SPINDLE ASSEMBLY	4
54	820014	HUB ASSEMBLY	4

REF. NO.	PART NO.	DESCRIPTION	QTY.
1.	834983	COUPLING SPROCKET	1
2.	834984	COUPLING SPROCKET	1
3.	834986	COUPLING CHAIN	1
4.	837832	DRIVE SPROCKET	1
5.	823452	SHIFTING MOTOR WELDMENT	1
6.	837829	POTENTIOMETER SPROCKET	1
7.	837278	LOCKING COLLAR	1
8.	834940	LIMIT SWITCH	2
9.	836881	SWITCH CLIP	1
10.	836876	LIMIT SWTICH ACTIVATOR	1
11.	836878	MOUNTING SWITCH BRACKET	1
12.	837279	ADJUSTING BOLT	1
13.	440625	MOUNTING BRACKET	1
14.	835851	POTENTIOMETER	1
15.	837804	SHIFTING MOTOR COVER	1
16.	835872	TERMINAL BLOCK	2
17.	833304	SHIFTING MOTOR	1
18.	837103	PANEL MOUNT BEARING	1
19.	443197	CAPACITOR	2



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GENERAL OFFICES · KANSAS CITY 26, MISSOURI

SHIFTING MOTOR

DRAWN	CHECKED	DATE
RWJ	GEM	3-13-79

A 442141

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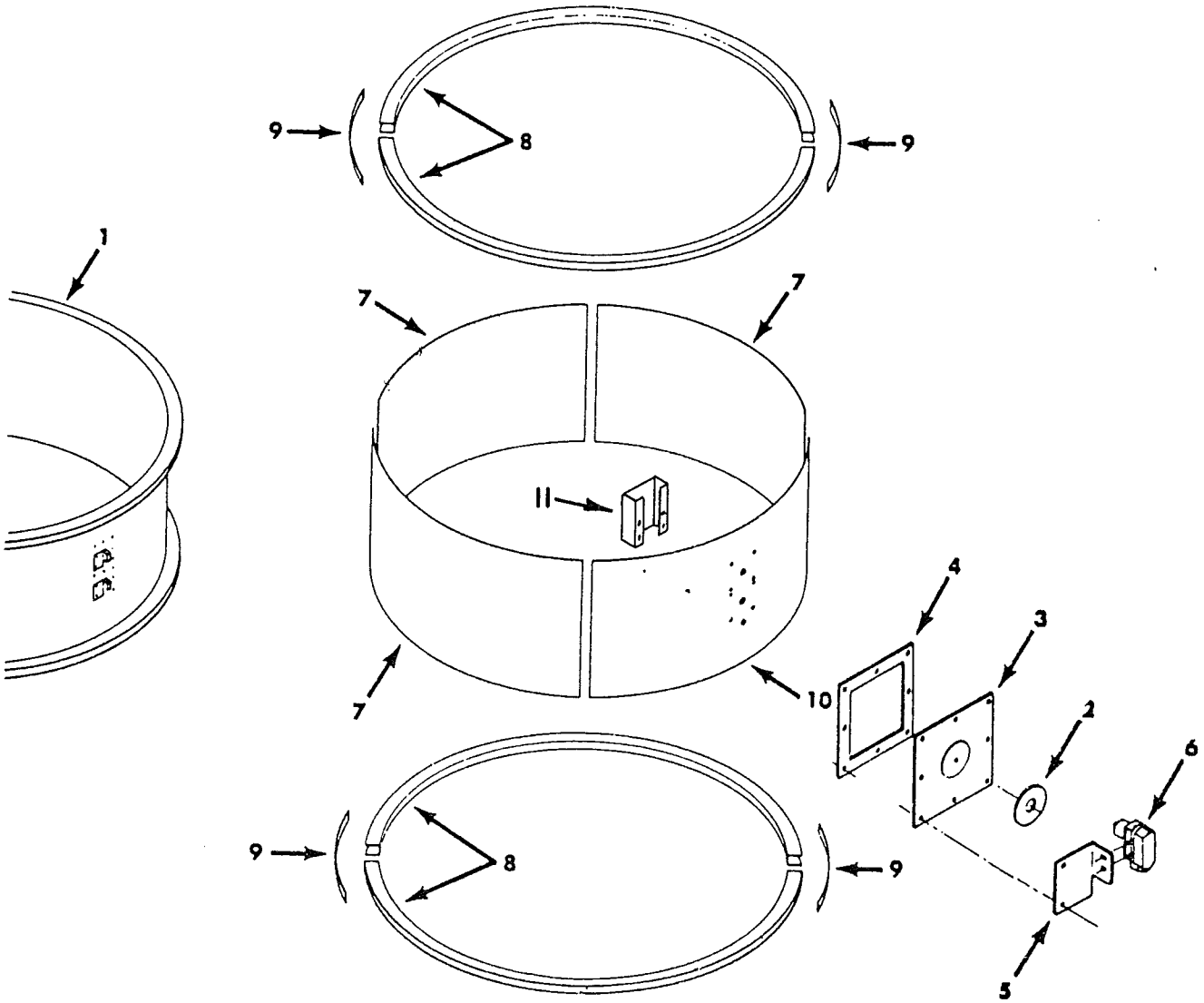
REF. NO.	PART NO.	DESCRIPTION	QTY.
1	822215	TOP BIN SECTION	1
2	830099	NEOPRENE SHIELD	2
3	820033	LIMIT SWITCH DIAPHRAGM	2
4	830100	LIMIT SWITCH PLATE	2
5	833319	LIMIT SWITCH BRACKET	2
6	830096	MICRO SWITCH	2
7	835293	STD. TOP BIN SECTION SHEET	3
8	438761	OUTSIDE CHANNEL RING	4
9	438649	OUTER RING BOLTING TAB	4
10	835294	LIMIT SWITCH TOP BIN SECTION SHEET	1
11	440324	HI-BIN SWITCH COVER (10-50 ONLY)	1



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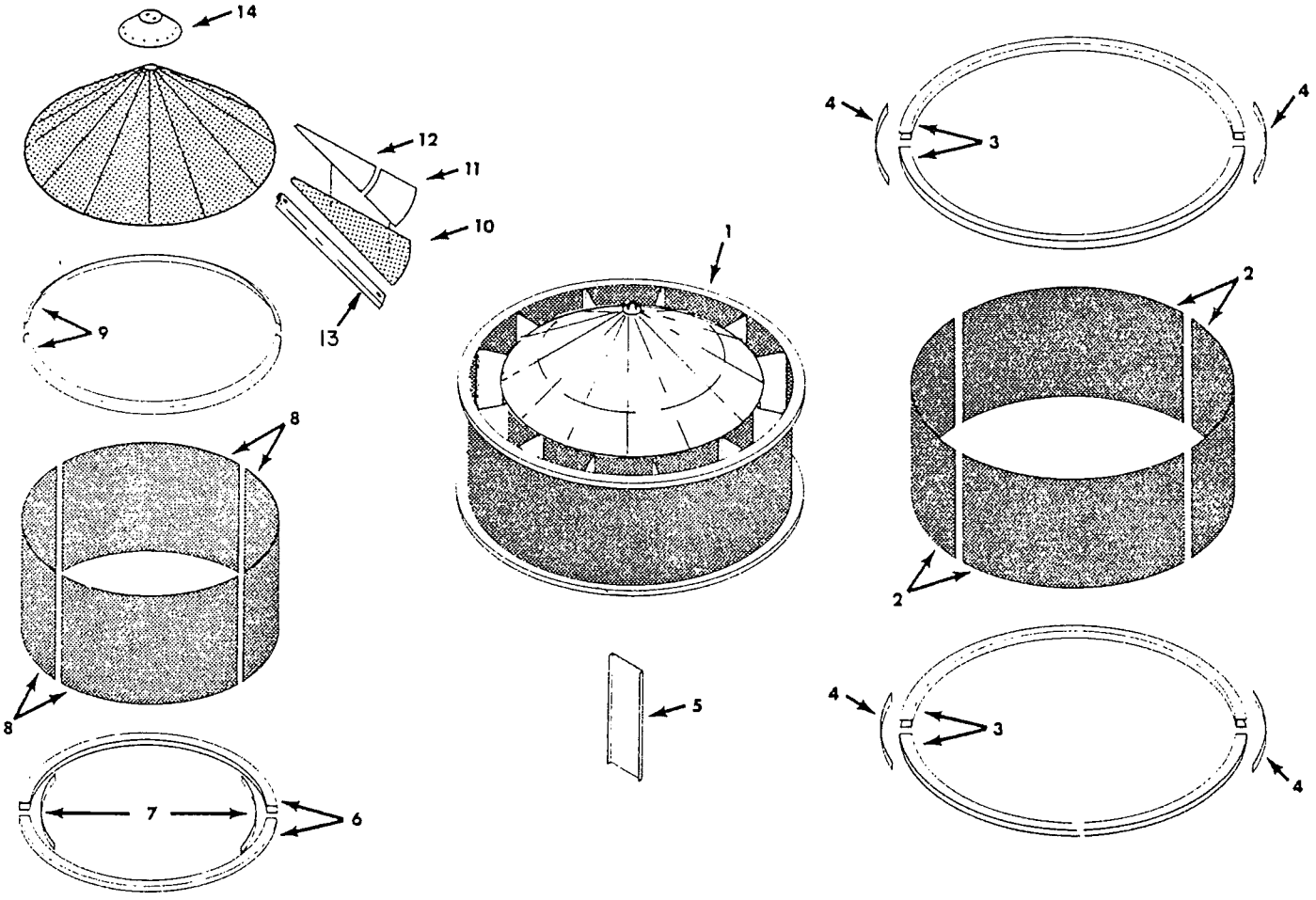
HOLDING BIN SECTION

DRAWN	CHECKED	DATE
RW	GEM	3-13-79

A 442142

REF.NO.	PART NO.	DESCRIPTION	QTY.
1	822213	UPPER HEATING SECTION	1
2	834530	OUTER 4' STD. SHEET	4
3	438761	OUTSIDE CHANNEL RING	4
4	438649	OUTER RING BOLTING TAB	4
5	834589	4' STD. PARTITION	16
6	438760	INSIDE CHANNEL RING	2
7	833353	INNER RING BOLTING TAB	2
8	834531	INNER 4' STD. SHEET	4
9	833219	TRANSITION RING	2
10	439780	ROOF SECTION	16
11	440035	LOWER ROOF INSERT	16
12	440034	UPPER ROOF INSERT	16
13	441551	CHANNEL	16
14	439063	ROOF CAP	1



BUTLER MANUFACTURING COMPANY
GENERAL OFFICES - KANSAS CITY 26, MISSOURI

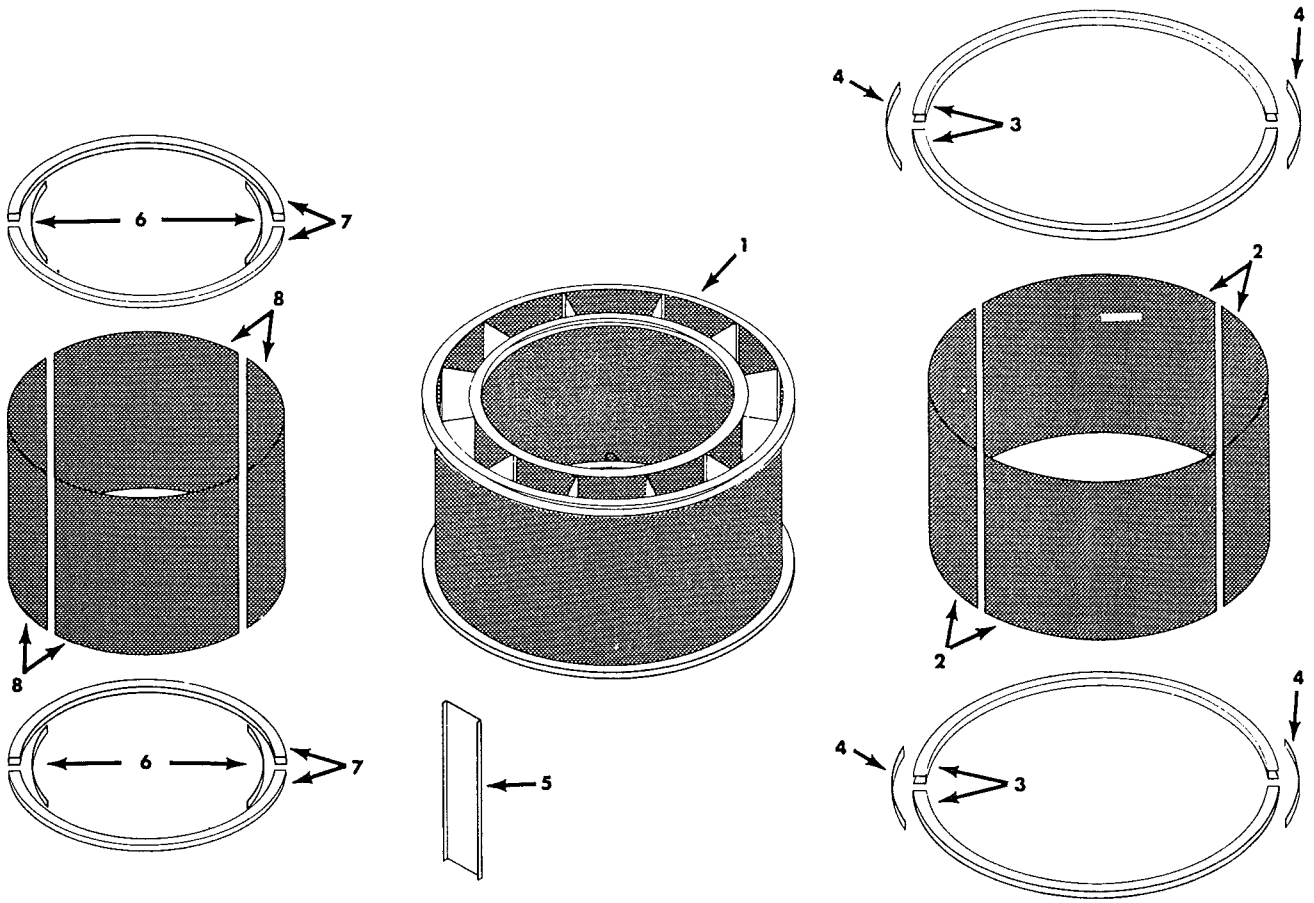
ROOF SECTION

DRAWN	CHECKED	DATE
RW	GEM	3-13-79

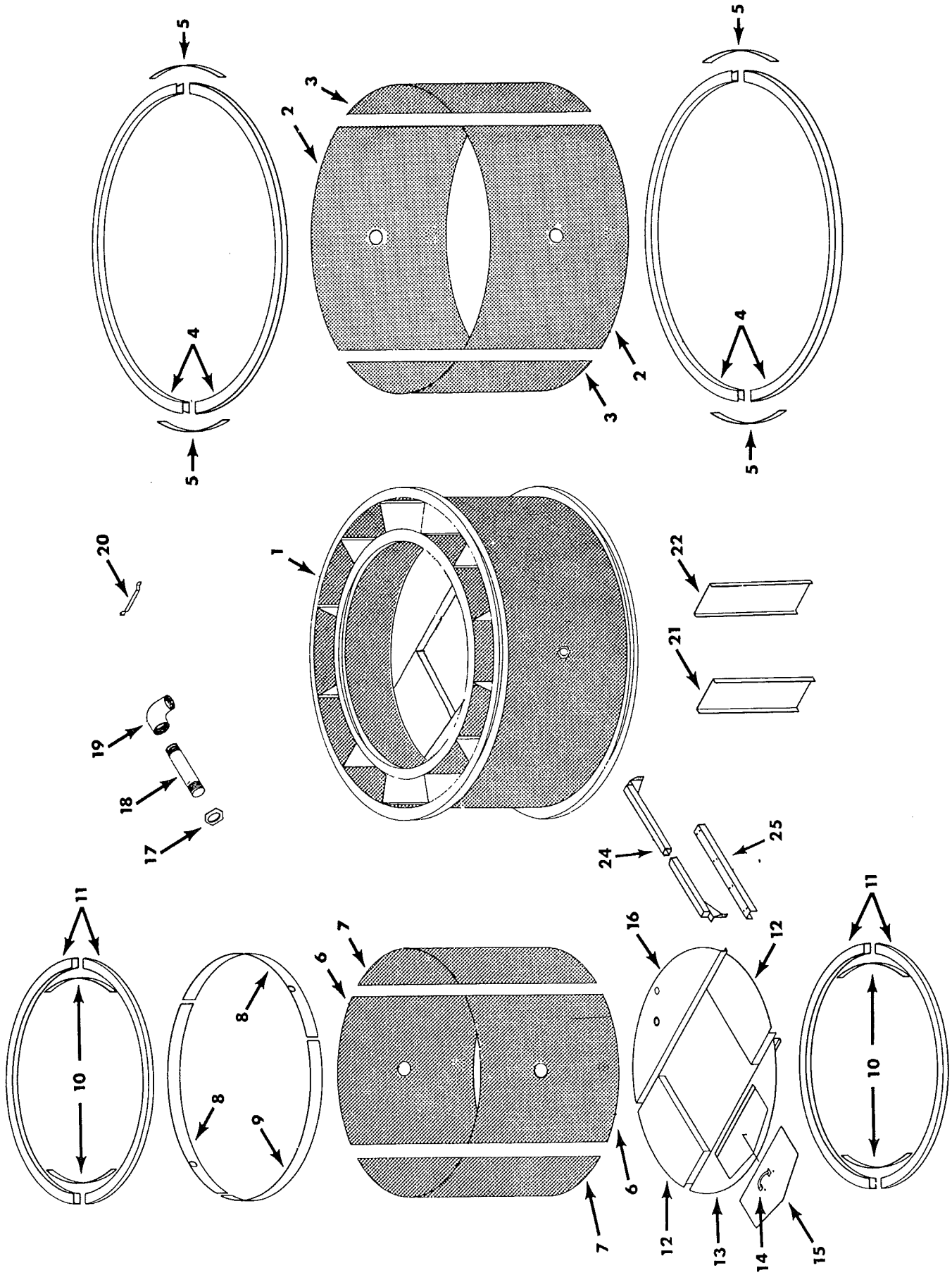
A 442143

10' UPPER HEATING SECTION

REF. NO.	PART NO.	DESCRIPTION	QTY.
1	822282	UPPER HEATING SECTION 10-25	1
1	822210	UPPER HEATING SECTION 10-21	1
2	834530	OUTER 4' STD. SHEET	4
3	438761	OUTSIDE CHANNEL RING	4
4	438649	OUTER RING BOLTING TAB	4
5	834589	4' STD. PARTITION	16
6	833353	INNER RING BOLTING TAB	4
7	438760	INSIDE CHANNEL RING	4
8	834531	INNER 4' STD. SHEET	4
		The 10-21-210 Dryer has the upper row of thermistors installed in this section.	
		The 10-25-215 Dryer has one section as shown and one with the upper row of thermistors.	
		(See Page 28 for Thermistors Parts list)	



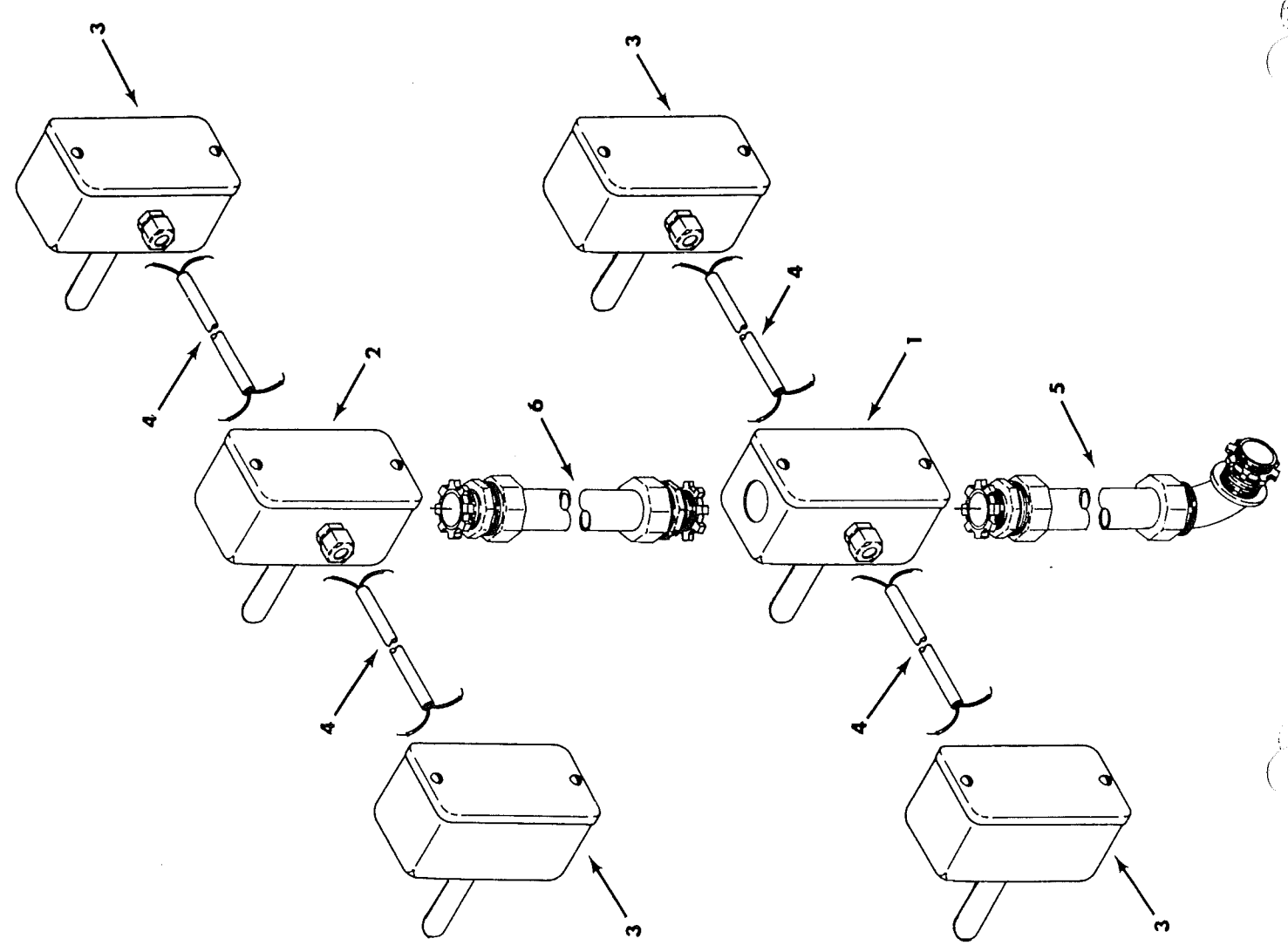
10′ LOWER HEATING SECTION

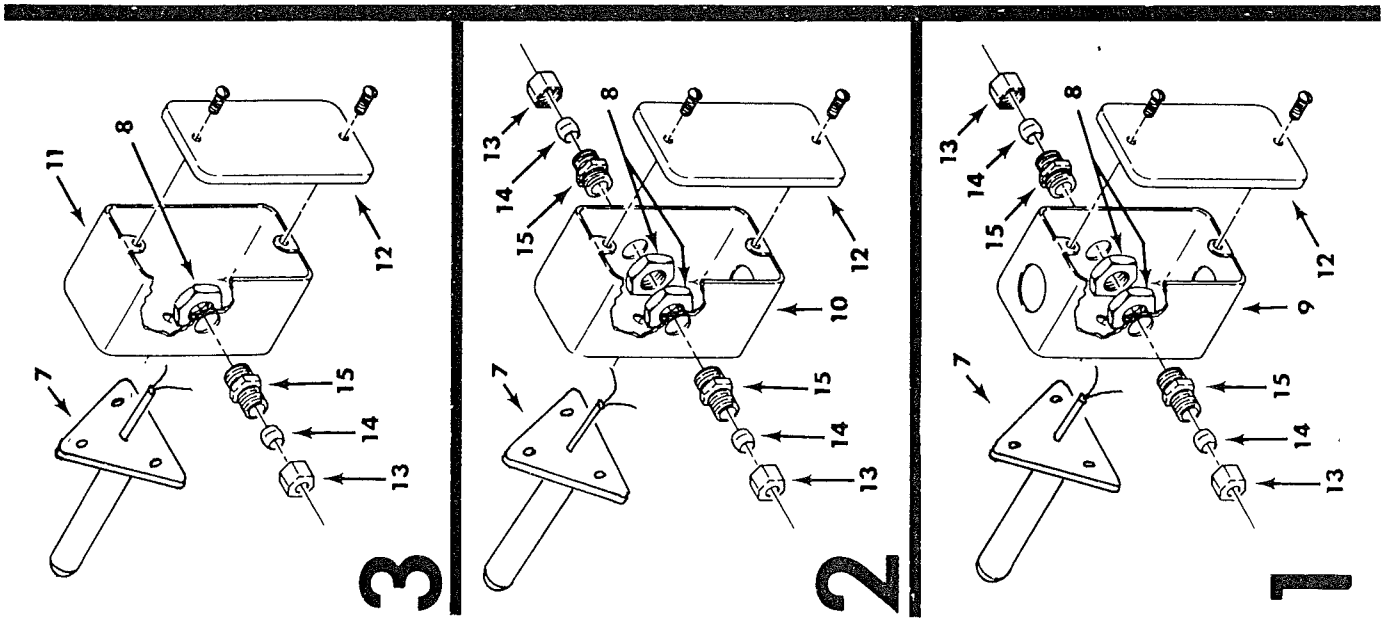


10' LOWER HEATING SECTION

REF. NO.	PART NO.	DESCRIPTION	QTY.
1	437155	4' LOWER HEATING SECTION	1
2	834539	OUTER 4' CLEAN OUT SHEET	2
3	834530	OUTER 4' STD. SHEET	2
4	438761	OUTSIDE CHANNEL RING	4
5	438649	OUTER RING BOLTING TAB	4
6	834540	INNER 4' CLEAN OUT SHEET	2
7	834531	INNER 4' STD. SHEET	2
8	833375	CLEAN OUT PLENUM STRIP	2
9	833348	PLENUM STRIP	1
10	833353	INNER RING BOLTING TAB	6
11	438760	INSIDE CHANNEL RING	6
12	833372	PLENUM FLOOR END SECTION	2
13	833370	PLENUM FLOOR SIDE — ENTRANCE SECTION	1
14	830126	DOOR HANDLE	1
15	821305	PLENUM FLOOR DOOR	1
16	437156	PLENUM FLOOR SIDE SECTION	1
17	837237	CONDUIT LOCKING NUT	2
18	837238	CLEAN OUT PIPE	2
19	837235	CLEAN OUT ELL	2
20	830112	CONTROL BULB HOLDER	1
21	834589	4' STD. PARTITION	14
22	834595	UPPER CLEAN OUT PARTITION	2
23	834596	LOWER CLEAN OUT PARTITION	2
24	821659	PLENUM FLOOR SUPPORT	2
25	833727	BURNER SHROUD SUPPORT	1
		*The lower row ot thermistors are also assembled on this section. See Page 28 for Parts List.	

THERMISTOR ASSEMBLY



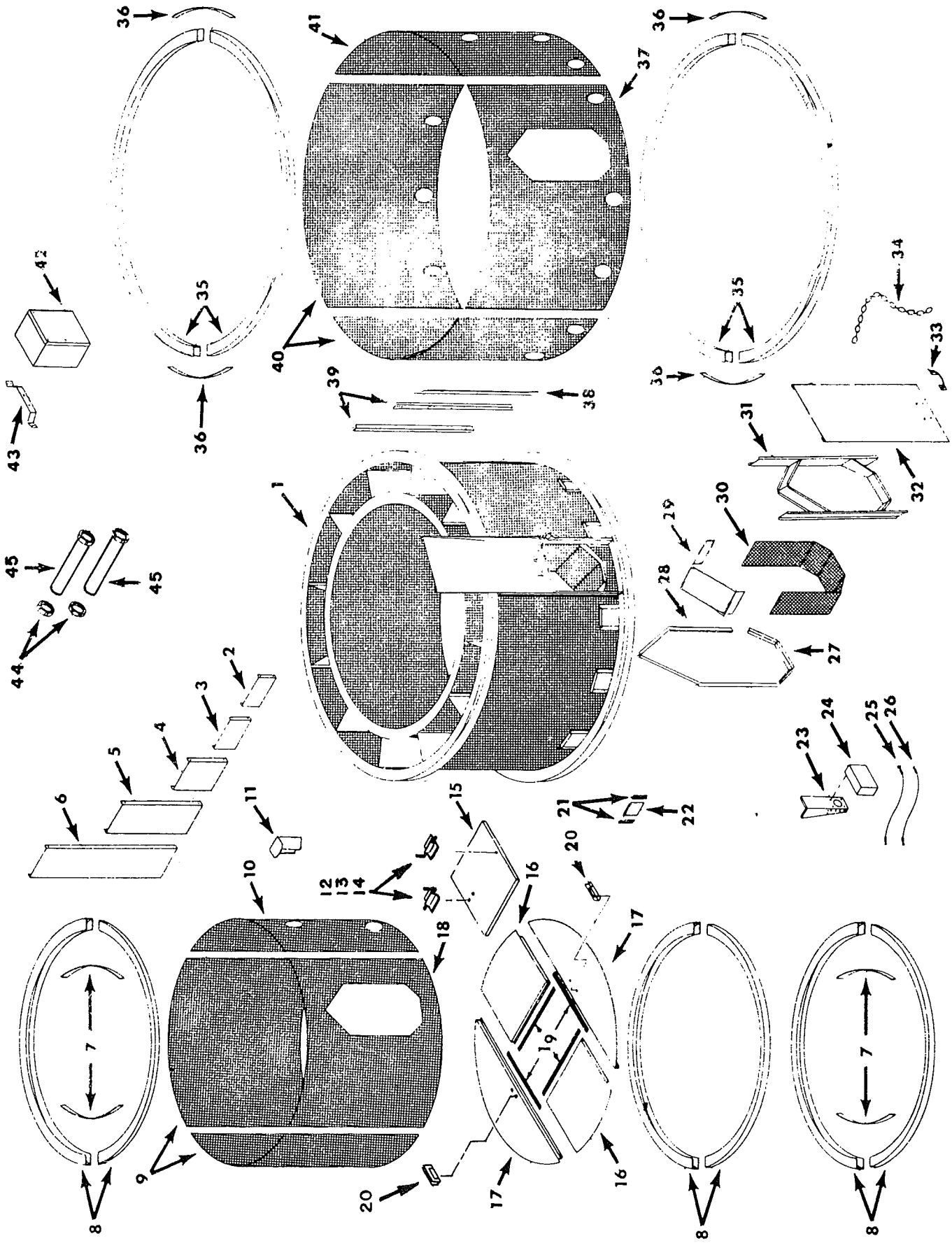


THERMISTOR ASSEMBLY

REF. NO.	PART NO.	DESCRIPTION	QTY.
1	823301	THERMISTOR AND 4 HOLE HANDY BOX ASSEMBLY	1
2	823302	THERMISTOR AND 3 HOLE HANDY BOX ASSEMBLY	1
3	823300	THERMISTOR AND 1 HOLE HANDY BOX ASSEMBLY	4
4	821862	CONDUIT ASSEMBLY	4
5	821865	CONDUIT ASSEMBLY (Control Box to Lower Box)	1
6	821866	CONDUIT ASSEMBLY (Lower Box to Upper Box)	1
7	* 438700	THERMISTOR	6
8	835317	BULKHEAD NUT	8
9	835318	4 HOLE HANDY BOX	1
10	835319	3 HOLE HANDY BOX	1
11	835320	1 HOLE HANDY BOX	4
12	832792	HANDY BOX COVER	6
13	833876	COMPRESSION NUT	8
14	833875	COMPRESSION SLEEVE	8
15	833878	MALE CONNECTOR	8

* Replacement thermistors maybe angled. Install angled down, and may require drilling box.

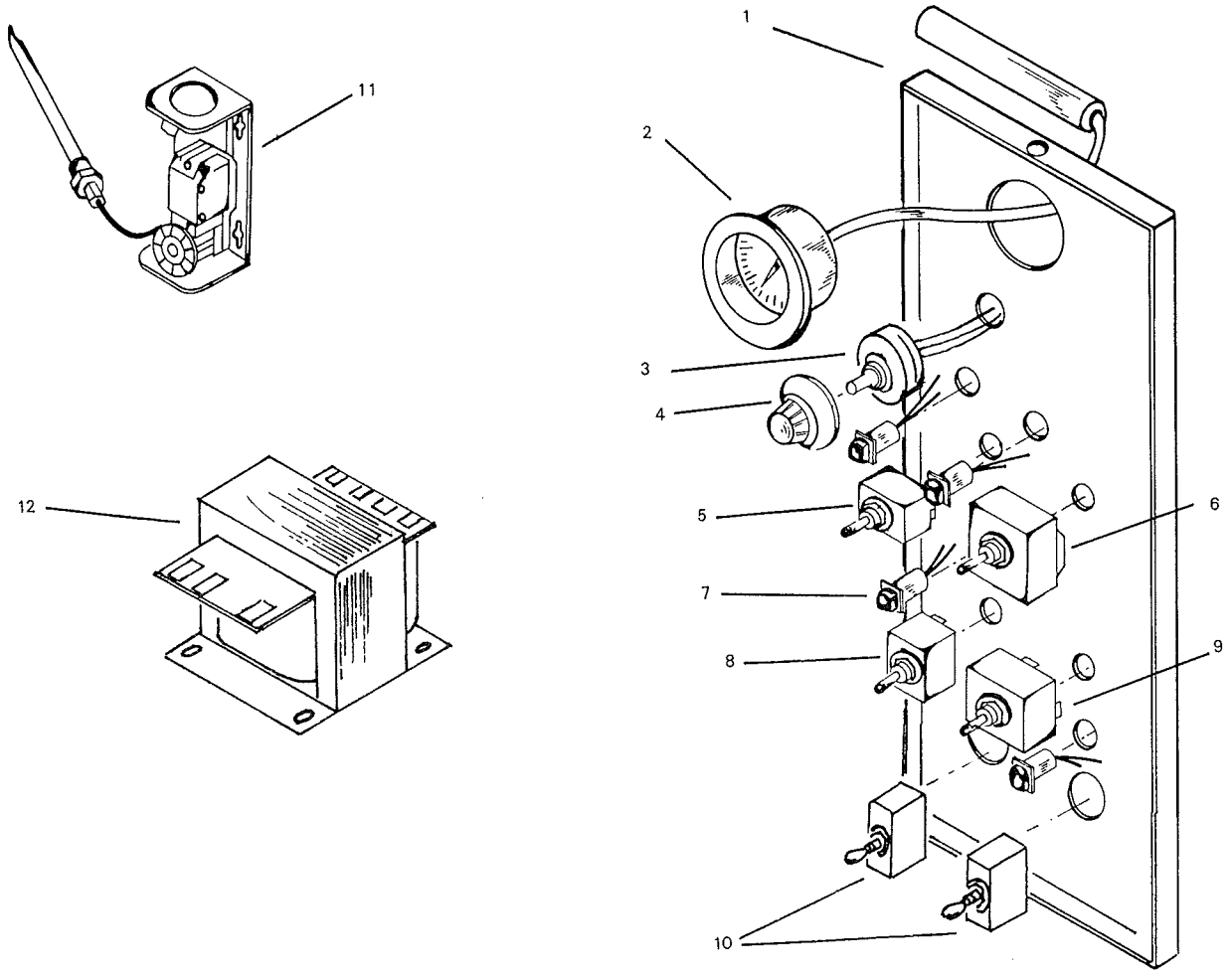
COOLING SECTION



10' COOLING SECTION

REF. NO.	PART NO.	DESCRIPTION	QTY.
1	822205	COOLING SECTION	1
2	834598	SHORT BOTTOM CRAWL DOOR PARTITION	1
3	834597	SHORT TOP CRAWL DOOR PARTITION	1
4	834599	SHORT TOP PVC PARTITION	1
5	834600	LONG BOTTOM PVC PARTITION	1
6	834589	4' STD. PARTITION	14
7	833353	INNER RING BOLTING TAB	4
8	438760	INSIDE CHANNEL RING	6
9	834531	INNER 4' STD. SHEET	2
10	834536	INNER 4' CONTROL BOX SHEET	1
11	833194	COOLING CHAMBER STEP	1
12	438710	LATCH, BEARING CAP. (INCLUDE ITEMS 13 & 14 IN ORDER)	2
13	438709	LATCH HANDLE	2
14	438711	LATCH BEARING PLATE	2
15	833165	COOLING FLOOR HOPPER COVER	1
16	833356	COOLING FLOOR END SECTION	2
17	833355	COOLING FLOOR SIDE SECTION	2
18	834534	INNER 4' CRAWL DOOR SHEET	1
19	833677	COOLING FLOOR SEALING STRIP	1
20	438712	LATCH SIDE PLATE	2
21	833323	DUMP GATE SLIDE	32
22	833324	DUMP GATE	16
23	833524	FLAME MONITORING CONTROL BRACKET	2
24	822741	FLAME MONITORING CONTROL	2
	436929	FLAME MONITOR CIRCUIT BOARD	
	436930	FLAME MONITOR RESET	
25	823552	SECONDARY WIRE	2
26	823551	HIGH TENSION WIRE	2
27	830117	BOTTOM FILLER ANGLE	1
28	830116	TOP FILLER ANGLE	1
29	830114	CRAWL DOOR TOP	1
30	830115	CRAWL DOOR BOTTOM	1
31	440504	CRAWL DOOR FRAME	1
32	830125	CRAWL DOOR	1
33	830126	DOOR HANDLE	1
34	830127	DOOR CHAIN	1
35	438761	OUTSIDE CHANNEL RING	4
36	438649	OUTER RING BOLTING TAB	4
37	834533	OUTER 4' CRAWL DOOR SHEET	1
38	833706	CONTROL BOX MOUNTING BRACKET BRACE	1
39	437169	CONTROL BOX MOUNTING BRACKET	2
40	834532	OUTER 4' STD. COOLING SHEET	2
41	834535	OUTER 4' CONTROL BOX SHEET	1
42	820796	10 HP. PHASE CONVERTER (BALDOR MOTORS ONLY)	2
	OR		
	821420	15 HP. PHASE CONVERTER (BALDOR MOTORS ONLY)	2
43	833411	PHASE BOX MOUNTING BRACKET	4
44	438913	COLLAR	4
45	438912	ENTRANCE TUBE	2

10' CONTROLS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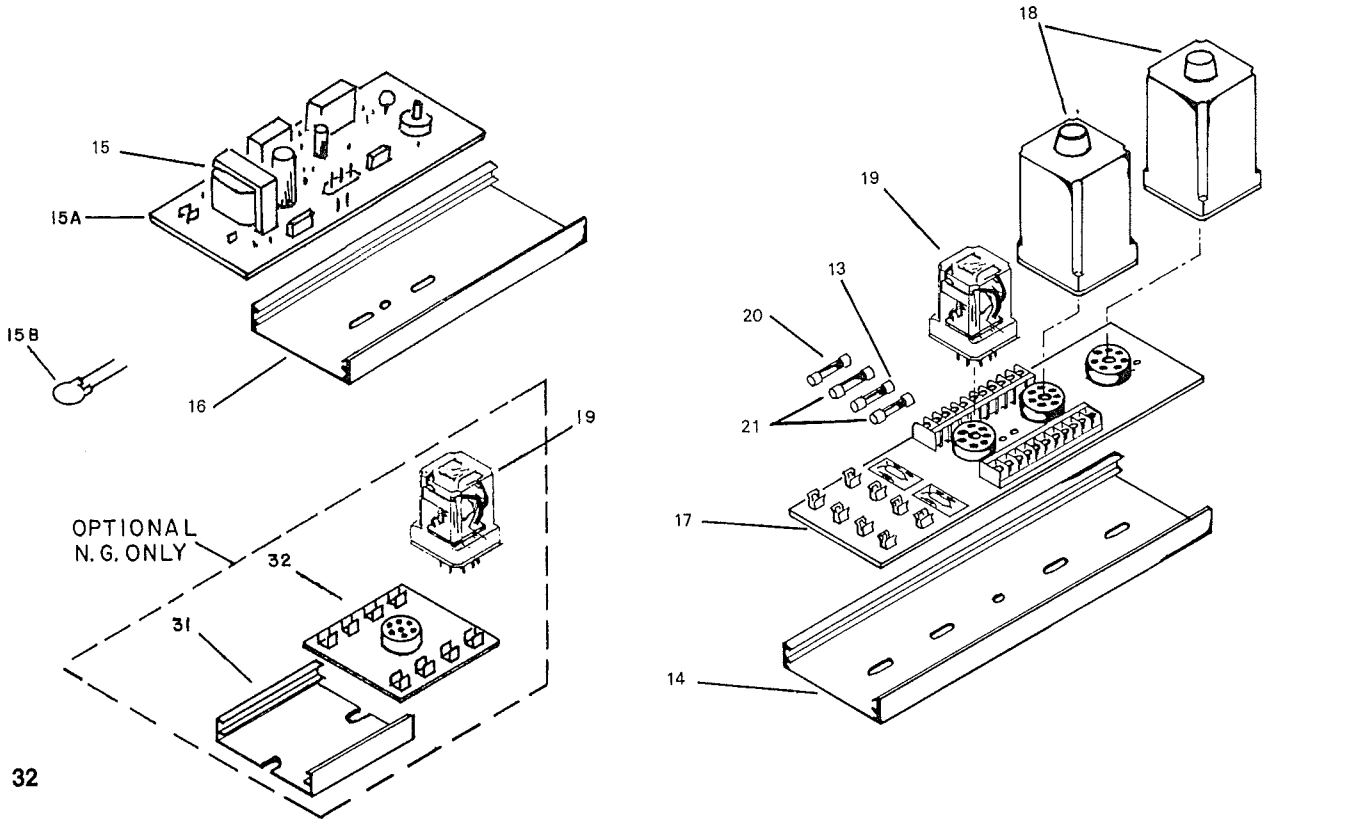
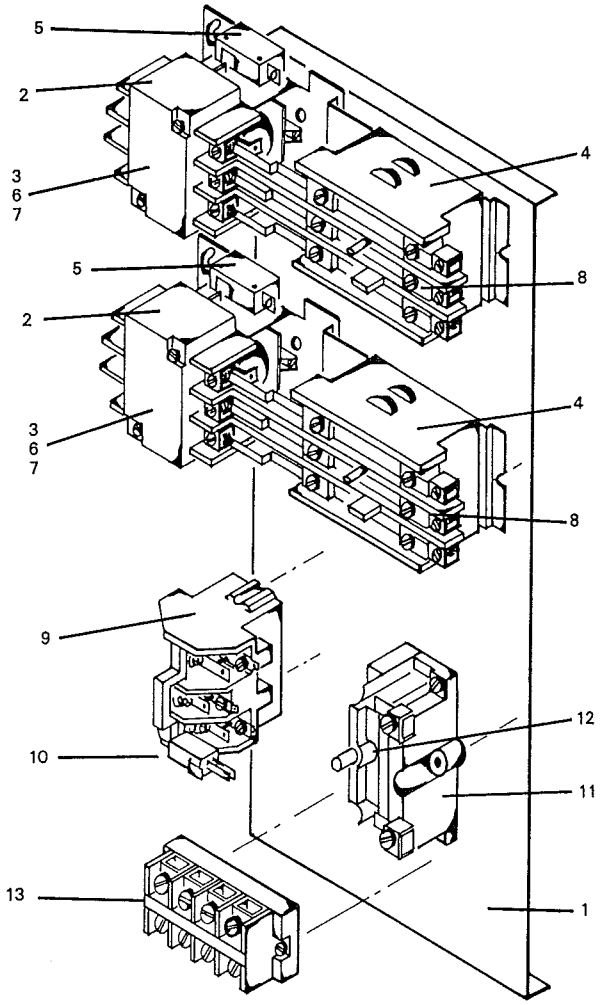

15
15A
15B
16
19
OPTIONAL
N. G. ONLY
32
31
18
19
13
20
21
17
14

10' CONTROLS

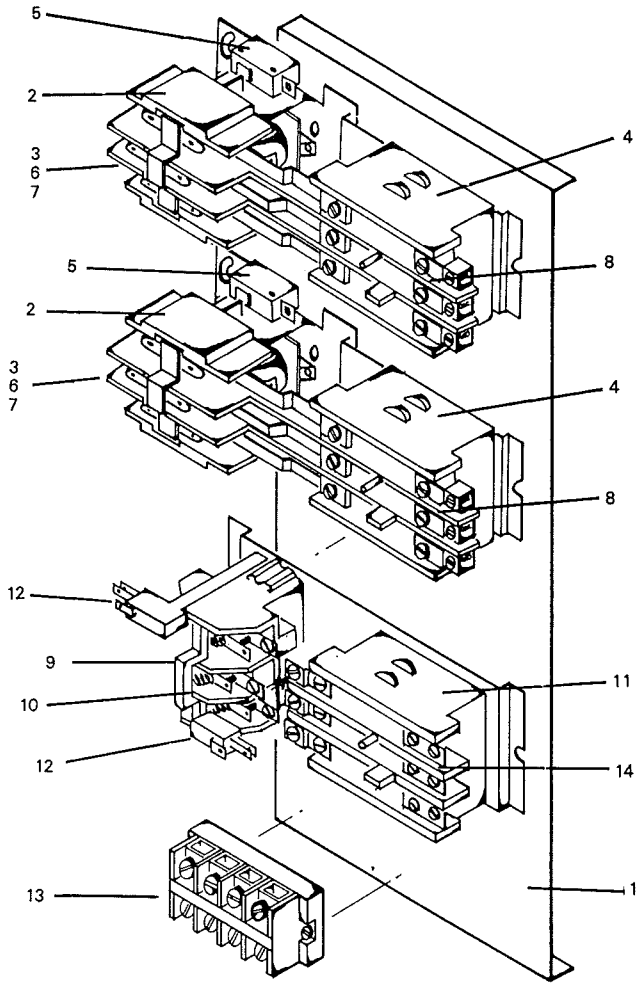
REF. NO.	PART NO.	DESCRIPTION	QTY.
1	438694	CONTROL BOX MOUNTING PLATE	1
2	830155	TEMPERATURE GAGE	1
3	438698	POTENTIOMETER	1
4	438699	KNOB	1
5	438906	SWITCH "INCREASE — DECREASE"	1
6	438904	SWITCH "AUTOMATIC — MANUAL"	1
7	837118	PILOT LIGHT ASS'Y	4
8	438907	SWITCH "BURNER ON-OFF"	1
9	438905	SWITCH "START-UP — OPERATE"	1
10	433658	SWITCH "STOP & START"	2
11	835916	HIGH LIMIT SWITCH	1
12	837102	TRANSFORMER	1
13	833995	FUSE SLO-BLO 2 AMP	1
14	436163	SNAP TRACK	1
15	443202	"MM" BOARD (INCLUDED (2) 15A & (1) 15B)	1
15A	443197	CAPACITORS (SEE SHIFT BOX)	2
15B	443198	METAL OXIDE VARISTOR	1
16	436164	SNAP TRACK	1
17	823050	CIRCUIT BOARD	1
18	438636	TIMER	2
19	832829	RELAY	1
20	835838	FUSE 1 AMP	1
21	833447	FUSE SLO-BLO 1 AMP	2
*23	436405	CONDUIT ASS'Y CONTROL BOX — PHASE BOX (SINGLE PHASE)	2
*24	436407	CONDUIT ASS'Y CONTROL BOX — FAN (THREE PHASE)	2
*25	436418	CONDUIT ASS'Y CONTROL BOX — METER MTR. (SINGLE PHASE)	1
*25	436419	CONDUIT ASS'Y CONTROL BOX — METER MTR. (THREE PHASE)	1
*26	436416	CONDUIT ASS'Y CONTROL BOX — LOW BIN (10-21)	1
*26	436417	CONDUIT ASS'Y CONTROL BOX — LOW BIN (10-25)	1
*27	436411	CONDUIT ASS'Y CONTROL BOX — SHIFT MTR	1
*28	436413	CONDUIT ASS'Y CONTROL BOX — THERMISTORS	1
*29	437158	CONDUIT ASS'Y CONTROL BOX — SOLENOID	1
*30	821405	CONDUIT ASS'Y PHASE BOX—MOTOR (SINGLE PHASE)	2
31	436152	SNAP TRACK 2" LONG	1
32	437966	RELAY BASE	1

*NOT PICTURED

10' MOTOR CONTROLS



SINGLE PHASE



THREE PHASE

10' MOTOR CONTROLS — 3 PHASE

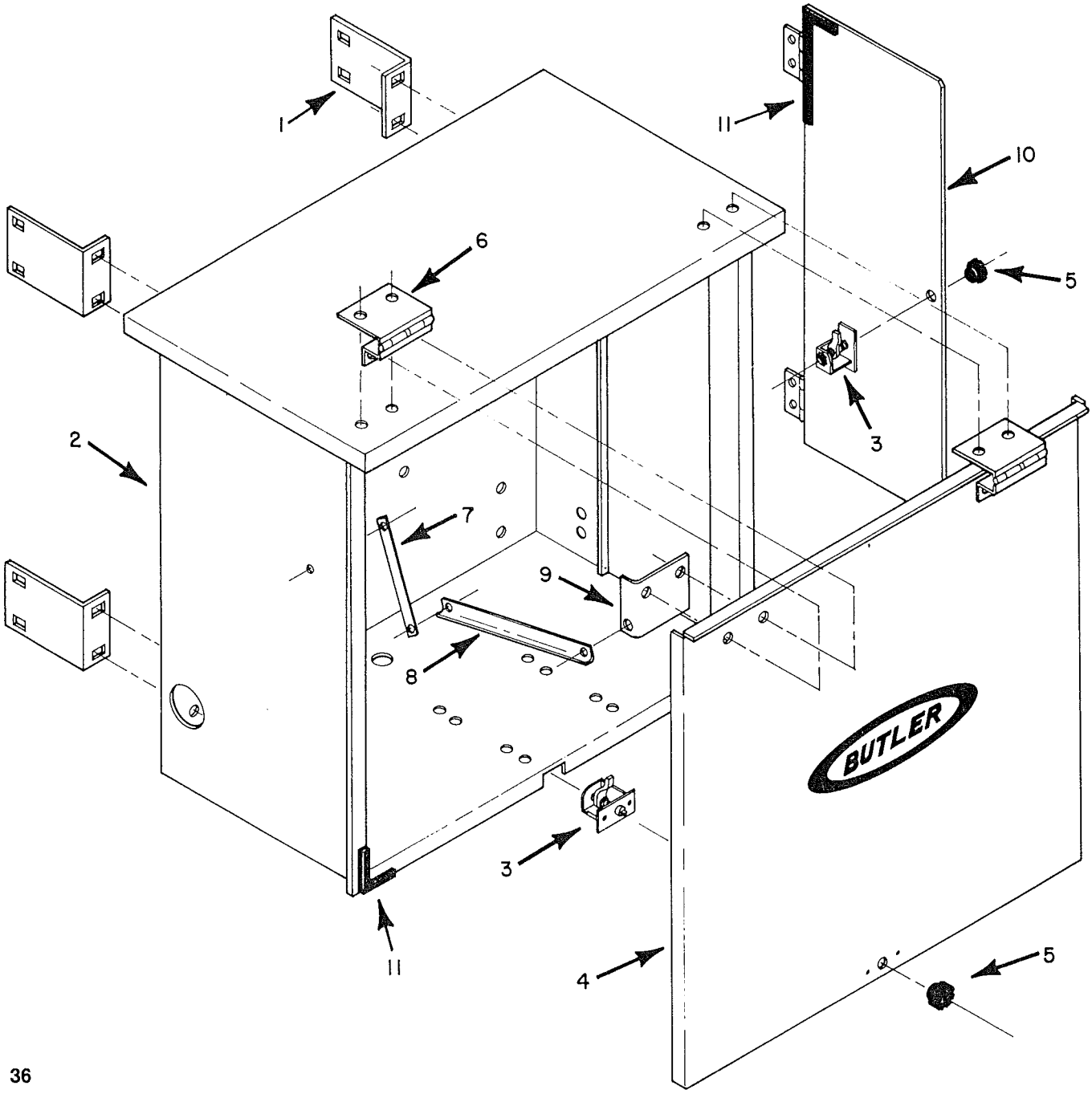
REF. NO.	PART NO.	DESCRIPTION	QTY.
1	437013	MOUNTING PLATE	1
2	437051	MOTOR STARTER — 40 AMP — CONSISTS OF ITEMS 3,4,5	1
3	438522	CONTACTOR — 40 AMP — 3 POLE	1
4	438323	OVERLOAD RELAY FOR 40 AMP STARTER	1
5	431155	AUXILIARY INTERLOCK FOR 40 AMP CONTACTOR	2
6	438322	REPLACEMENT COIL FOR 40 AMP OR 60 AMP CONTACTOR	1
7	438321	REPLACEMENT CONTACTS & SPRINGS FOR 40 AMP CONTACTOR	3
8	437672	HEATER STRIP FOR 10 HP FAN MOTOR 220 V — (E-72)	3
8	436821	HEATER STRIP FOR 10 HP FAN MOTOR 440 V — (E-57)	3
8	837673	HEATER STRIP FOR 15 HP FAN MOTOR 220 V — (E-76)	3
8	436822	HEATER STRIP FOR 15 HP FAN MOTOR 440 V — (E-62)	3
9	437049	MOTOR STARTER — 25 AMP — CONSISTS OF ITEMS 10,11,12	1
10	823258	CONTACTOR — 25 AMP — 3 POLE	1
11	438327	OVERLOAD RELAY FOR 25 AMP STARTER	1
12	437053	AUXILIARY INTERLOCK KIT FOR 25 AMP CONTACTOR	2
13	823360	4 POST TERMINAL BLOCK	1
14	442111	HEATER STRIP FOR 3 HP METER MOTOR 220 V—(E-52)	3
14	442110	HEATER STRIP FOR 3 HP METER MOTOR 440 V—(E-42)	3

10' MOTOR CONTROLS — 1 PHASE

REF. NO.	PART NO.	DESCRIPTION	QTY.
1	437013	MOUNTING PLATE	1
2	437052	MOTOR STARTER — 60 AMP — CONSISTS OF ITEMS 3,4,5	1
3	438521	CONTACTOR — 60 AMP — 3 POLE	1
4	438326	OVERLOAD RELAY FOR 60 AMP STARTER	1
5	431155	AUXILIARY INTERLOCK FOR 60 AMP CONTACTOR	2
6	438322	REPLACEMENT COIL FOR 40 AMP OR 60 AMP CONTACTOR	1
7	438324	REPLACEMENT CONTACTS & SPRINGS FOR 60 AMP CONTACTOR	3
8	837700	HEATER STRIP FOR 10 HP FAN MOTOR (E-78)	3
8	837699	HEATER STRIP FOR 15 HP FAN MOTOR (E-81)	3
9	434821	CONTACTOR — 25 AMP — 3 POLE	1
10	437053	AUXILIARY INTERLOCK KIT FOR 25 AMP CONTACTOR	1
11	835283	OVERLOAD RELAY FOR 25 AMP CONTACTOR	1
12	441560	HEATER STRIP FOR 3 HP METER MOTOR (W-57)	1
13	823360	4 POST TERMINAL BLOCK	1

CONTROL BOX ASSEMBLY

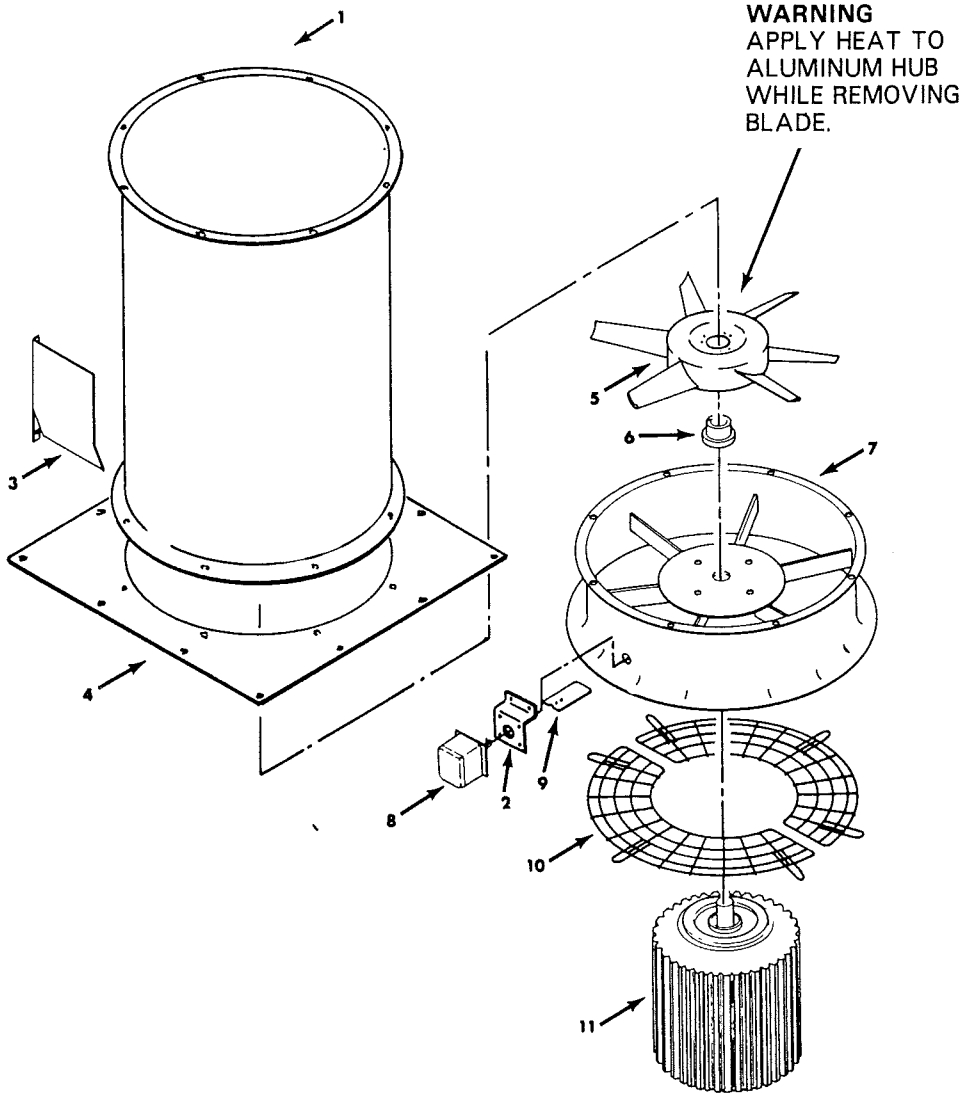
REF. NO.	PART NO.	DESCRIPTION	QTY.
1	836894	CONTROL BOX ATTACHING BRACKET	4
2	438844	CONTROL BOX	1
3	437007	LATCH	2
4	437112	CONTROL BOX COVER	1
5	437008	KNOB	2
6	437009	HINGE	2
7	437012	HOLDER BRACE	1
8	437011	HOLDER ANGLE	1
9	437010	HOLDER BRACKET	1
10	437114	CONTROL BOX DOOR	1
11	436447	48" GASKET STRIP	4



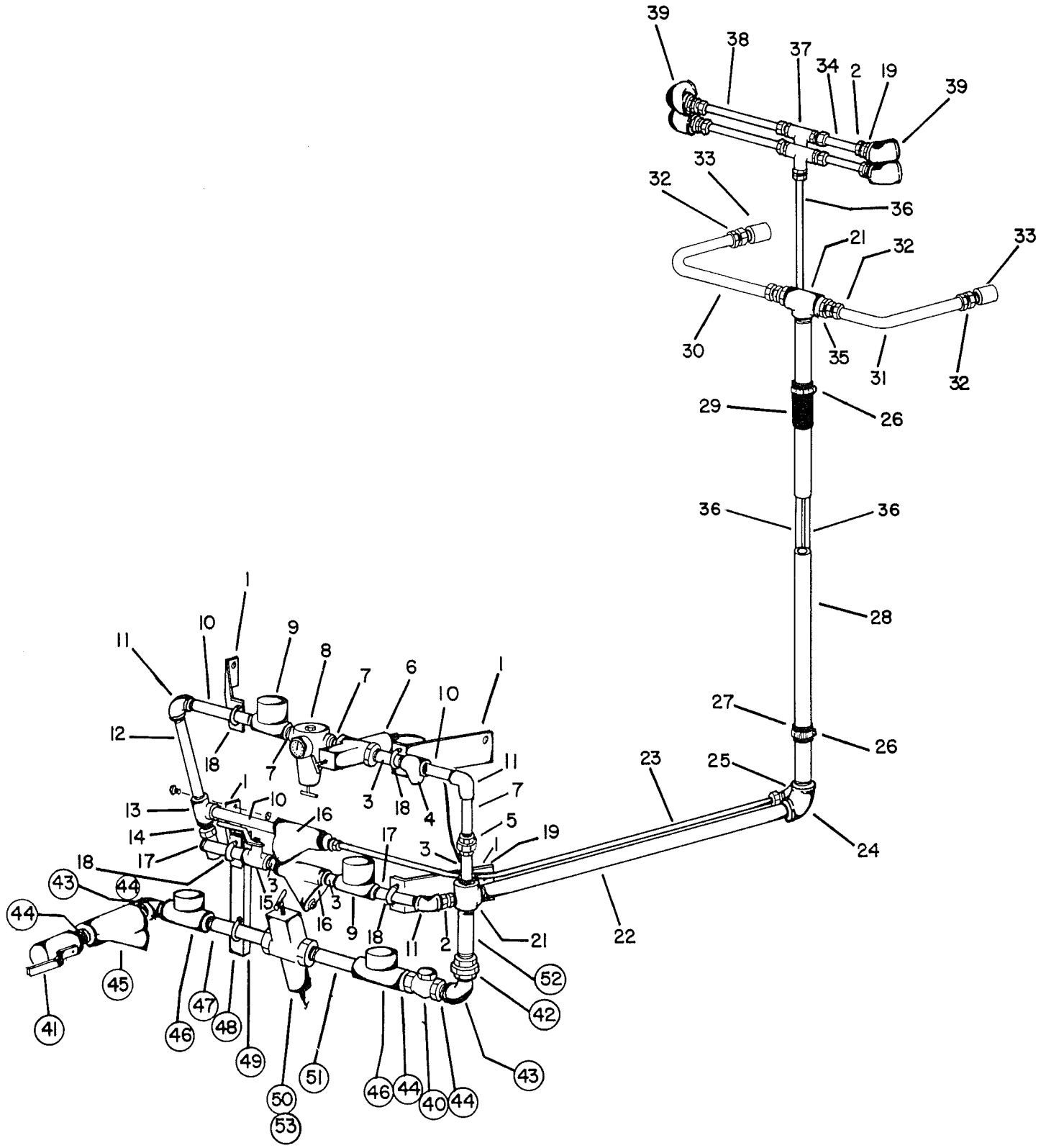
SHROUD & FAN ASSEMBLY

REF. NO.	PART NO.	DESCRIPTION	QTY.
1	438499	BURNER SHROUD	1
2	834568	AIR SWITCH BRACKET	1
3	833224	AIR FIN	6
4	833221	SHROUD FLOOR PLATE	1
5	835253	10 HP VANEAXIAL FAN (6 BLADE) INCLUDES BUSHING.	1
5	835258	15 HP VANEAXIAL FAN (8 BLADE) INCLUDES BUSHING.	1
6	830191	FAN BUSHING	1
7	821316	VENTURI	1
8	821632	AIR SWITCH	1
9	837253	AIR SWITCH SAIL	1
10	833220	FAN GUARD (HALF)	2
11	821576	10 HP BALDOR MOTOR	1
11	821577	15 HP BALDOR MOTOR	1

REPLACEMENT BEARINGS FOR BOTH 10 & 15 HP MOTORS
TOP — 835184, BOTTOM — 835185



NATURAL GAS / L.P. VAPOR PLUMBING ASSEMBLY — 10'



◯ DENOTES ADDITIONAL PARTS FOR NATURAL GAS ONLY PLUMBING

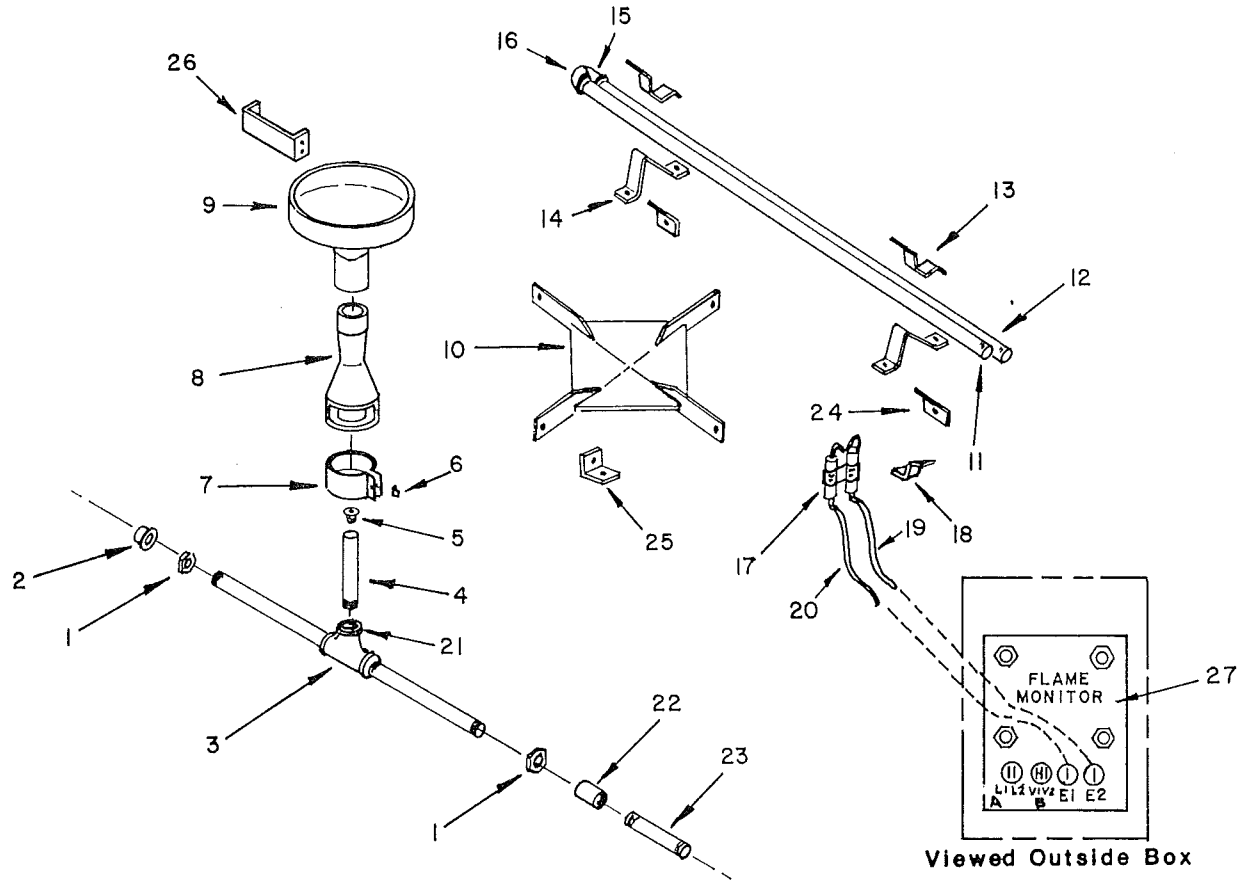
NATURAL GAS / L.P. VAPOR PLUMBING ASSEMBLY — 10'

REF. NO.	PART NO.	DESCRIPTION	QTY.
1	436349	PIPING BRACKET	4
2	436700	MALE CONNECTOR 5/8 CT — 1/2 NPT	6
3	096372	PIPE NIPPLE. 1/2 x 2-1/2 SCH 80	4
4	437085	CHECK VALVE. 1/2 NPT	1
5	096141	UNION. 1/2 NPT 300#	1
6	821439	MODULATING VALVE 140°-250°F. STD. 1/2 NPT	1
6	442587	MODULATING VALVE 90°-210°F. SUNFLOWER. 1/2 NPT	1
7	096371	PIPE NIPPLE 1/2 x 2 SCH 80	3
8	821269	REGULATOR & GAGE ASSY.	1
9	821438	SOLENOID 1/2	2
10	096381	PIPE NIPPLE 1[2 x 4-1/2 SCH 80	3
11	096360	ELBOW 1/2 - 90° 300#	3
12	837218	PIPE NIPPLE 1/2 x 5 SCH 80	1
13	096357	TEE 1/2 300#	1
14	831065	RELIEF VALVE	1
15	823387	BALL VALVE 1/2	1
16	823291	STRAINER .*1/2" (REPLACEMENT SCREEN)	2
17	096382	PIPE NIPPLE 1/2 x 6 SCH 80	2
18	436359	U-BOLT 1/2 PIPE	4
19	096153	BUSHING 1-1/2	5
20	437073	TUBE 5/8 O.D.	1
21	830321	TEE 1 150#	2
22	437079	PIPE 1 x 40 SCH 40	1
23	437072	TUBE 5/8 O.D.	1
24	096046	ELBOW 1-90° 150#	1
25	437146	UNION EL 5/8 CT — 5/8 CT	1
26	437348	PIPE CLAMP	2
27	437144	CLAMP PAD (SMALL)	1
28	437080	PIPE 1 x 72 SCH 40	1
29	437145	CLAMP PAD (LARGE)	1
30	438501	TUBE 3/4 O.D.	1
31	438502	TUBE 3/4 O.D.	1
32	438503	MALE CONNECTOR 3/4 CT — 3/4 NPT	4
33	096000	COUPLING 3/4 150#	2
34	437074	TUBE 5/8 O.D.	2
35	096155	BUSHING 1-3/4	2
36	437076	TUBE 5/8 O.D.	1
37	436702	UNION TEE 5/8 CT	2
38	437075	TUBE	2
● 39	837634	ELBOW 1-90° 300#	4
● 40	437084	CHECK VALVE 1	1
● 41	822284	BALL VALVE 1	1
● 42	096722	UNION 1 150#	1
● 43	096056	STREET ELBOW 1-90° 150#	2
● 44	096094	PIPE NIPPLE 1 x 2 SCH 40	4
● 45	823293	STRAINER .**1" (REPLACEMENT SCREEN)	1
● 46	821449	SOLENOID 1	2
● 47	096097	PIPE NIPPLE 1 x 4 SCH 40	1
● 48	436361	U-BOLT 1 PIPE	1
● 49	437081	PIPING CHANNEL	1
● 50	437086	MODULATING VALVE 140°-250°F. STD. 1	1
● 50	441955	MODULATING VALVE 90°-210°F. SUNFLOWER. 1-1/4"	1
● 51	096098	PIPE NIPPLE. 1 x 5 SCH 40	1
● 52	096095	PIPE NIPPLE. 1 x 3 SCH 40	1
● 53	837630	PIPE BUSHING (SUNFLOWER ONLY). 1-1/4—1	2
		All tubing type L	

● Natural gas

*Cash acme 1/2" Screen 837597
*Keckley 1/2" Screen 837657
**Cash acme 1" Screen 837598
**Keckley 1" Screen 837659

REF. NO.	PART NO.	DESCRIPTION	QTY.
1.	833296	CONDUIT LOCKNUT 3/4"	2
2.	833295	PIPE CAP 3/4"	1
3.	096134	PIPE TEE 3/4"	1
4.	835366	PIPE 3/4"	1
5.	433888	3/16 ORIFICE (NOT INSTALLED)	1
6.	837537	CLIP ON NUT 1/4-20	1
7.	833745	AIR DAMPER	1
8.	835367	BURNER CASTING	1
9.	835368	BURNER SHIELD	1
10.	441000	VAPORIZER BAFFLE ASS'Y.	1
11.	437082	PIPE 1" SCH. 80	1
12.	437083	PIPE 1" SCH. 80	1
13.	437119	VAPORIZER CLAMP	2
14.	437118	VAPORIZER MOUNTING BRACKET	2
15.	837248	STREET EL. 1"-90° 300#	1
16.	837634	EL 1"-90° 300#	1
17.	833227	FLAME CONTROL PROBE	1
18.	835403	PROBE CLIP	1
19.	823552	SECONDARY	1
20.	823551	HIGH TENSION LINE	1
21.	096152	PIPE BUSHING 3/4" to 1/2"	1
22.	096019	PIPE COUPLING 3/4" 150#	1
23.	441633	PIPE 3/4" SCH. 40	1
24.	440106	BAFFLE END RETAINER	2
25.	440917	BAFFLE MOUNTING CLIP	2
26.	440105	BURNER RETAINER	2
27.	822741	FLAME MONITOR ASSY.	1 or 2
27.	440669	FLAME MONITOR ASSY. (SPECIAL 10-50 ONLY)	4



Viewed Outside Box

BUTLER MANUFACTURING COMPANY
GENERAL OFFICES · KANSAS CITY 26 MISSOURI

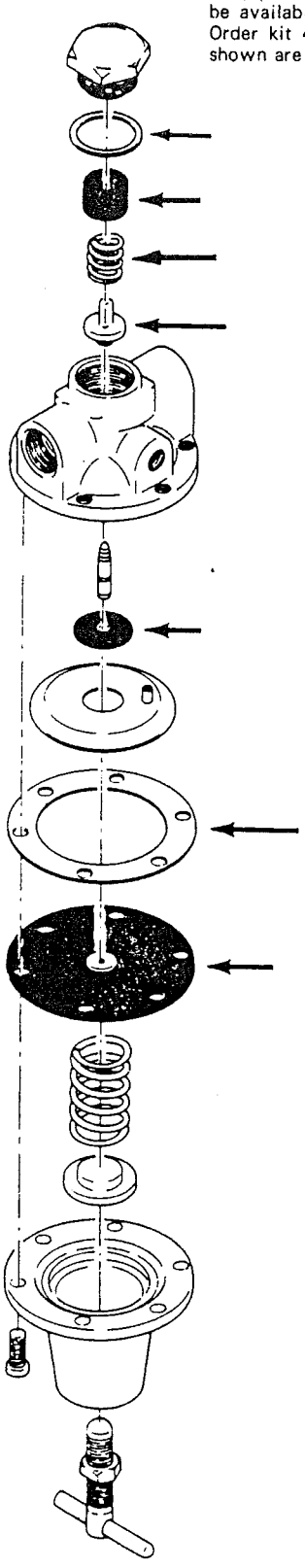
BURNER PLUMBING ASS'Y.

DRAWN	CHECKED	DATE
RWB	GEM	2-16-79

A 442070

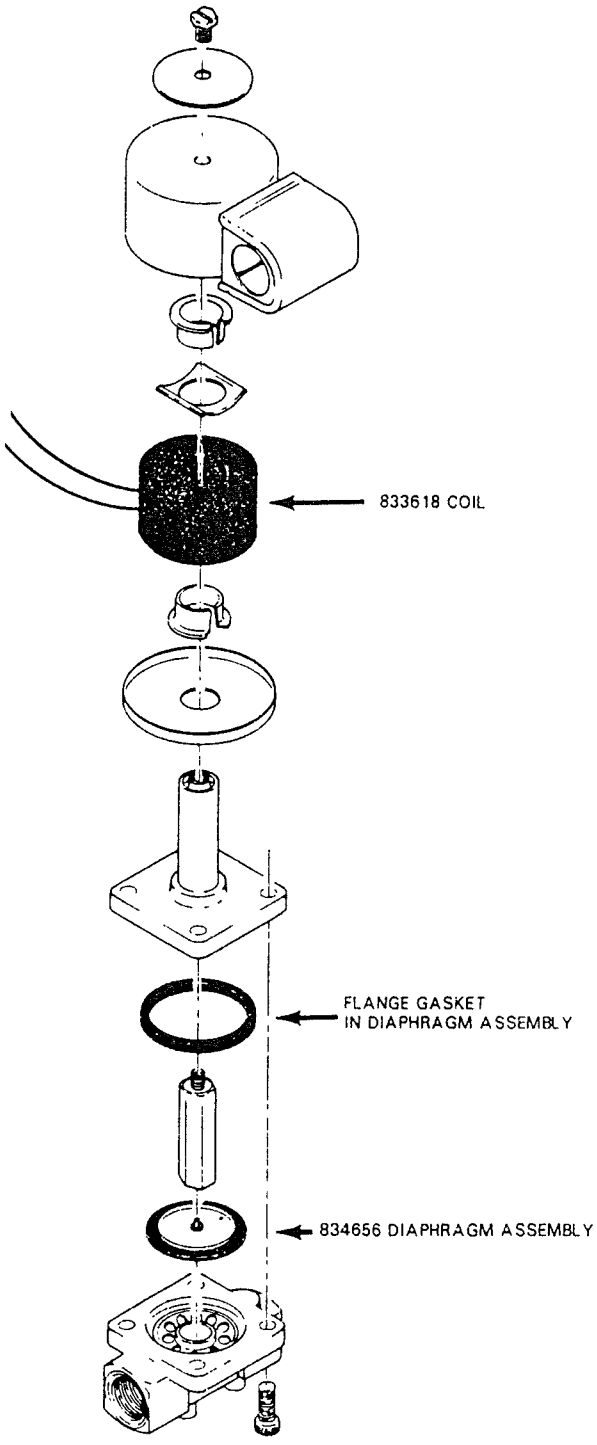
PRINTED IN U.S.A.

Only parts indicated by arrow will be available for field replacement. Order kit 440284. All other parts shown are for proper reassembly.



821269
LP GAS REGULATOR
INCLUDES GAUGE 821268

Only parts listed with part no's. will be available for field replacement. The other parts are shown so the unit can be properly reassembled.



821438
1/2" SOLENOID VALVE

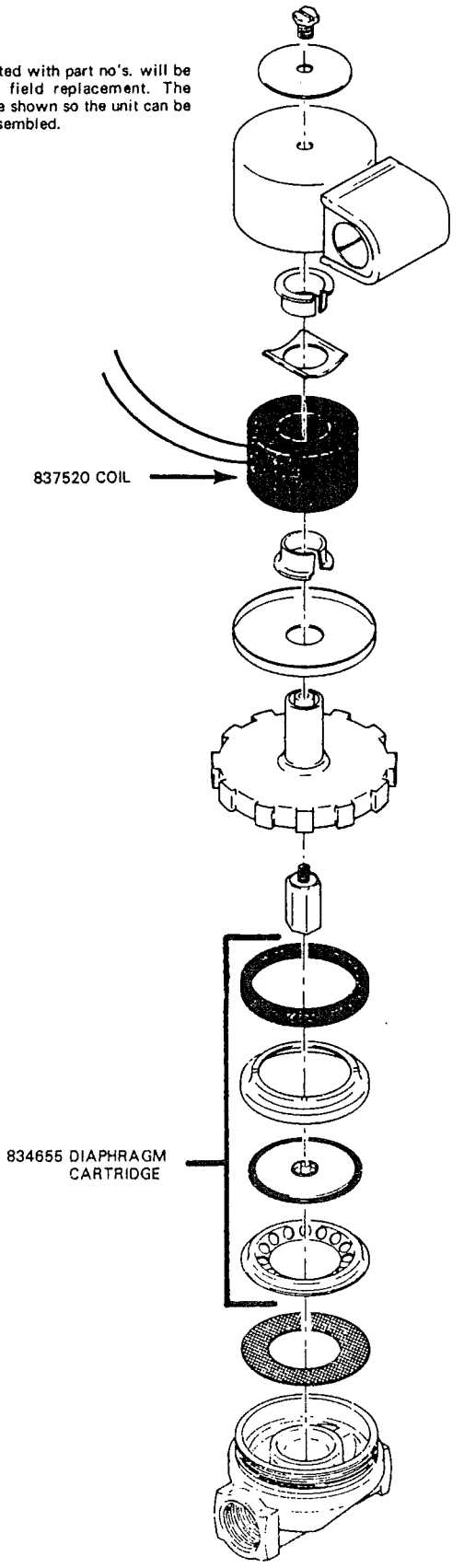
BUTLER | BUTLER MANUFACTURING COMPANY
GENERAL OFFICES - KANSAS CITY 26, MISSOURI

REGULATOR-SOLENOID

DRAWN	CHECKED	DATE
GEM		2-16-79

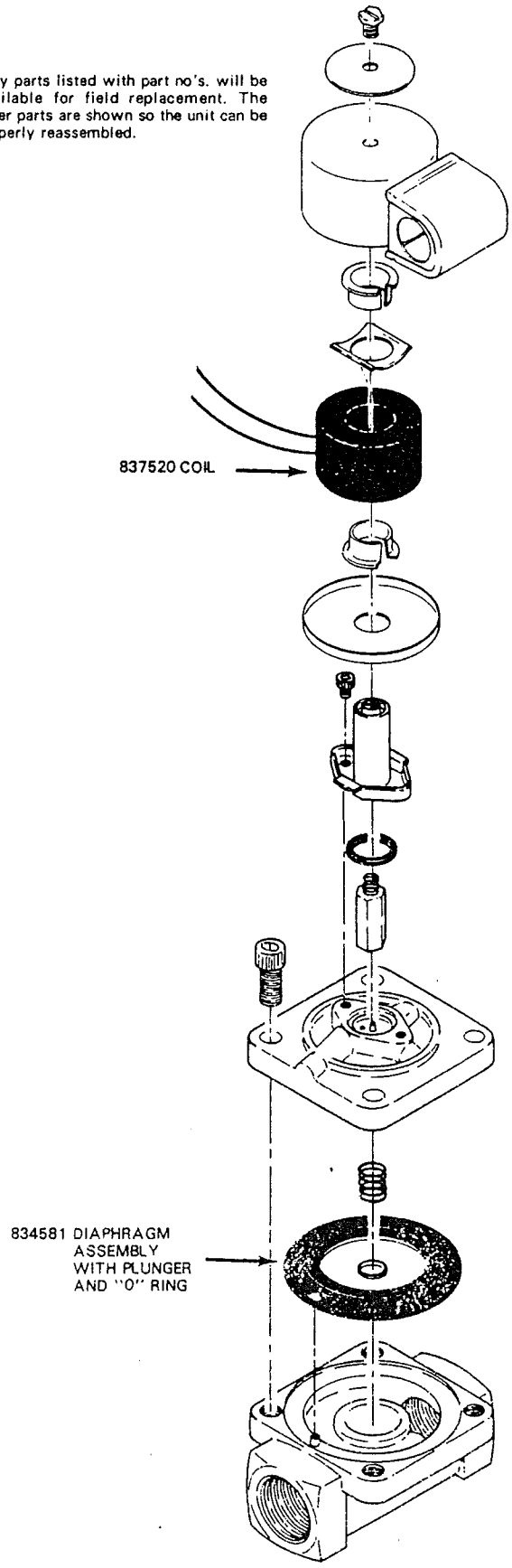
A 442154

Only parts listed with part no's. will be available for field replacement. The other parts are shown so the unit can be properly reassembled.



821440
3/4" SOLENOID VALVE

Only parts listed with part no's. will be available for field replacement. The other parts are shown so the unit can be properly reassembled.



821449
1" SOLENOID VALVE

BUTLER MANUFACTURING COMPANY
GENERAL OFFICES - KANSAS CITY 26, MISSOURI

SOLENOID VALVES

DRAWN	CHECKED	DATE
GEM		2-16-79

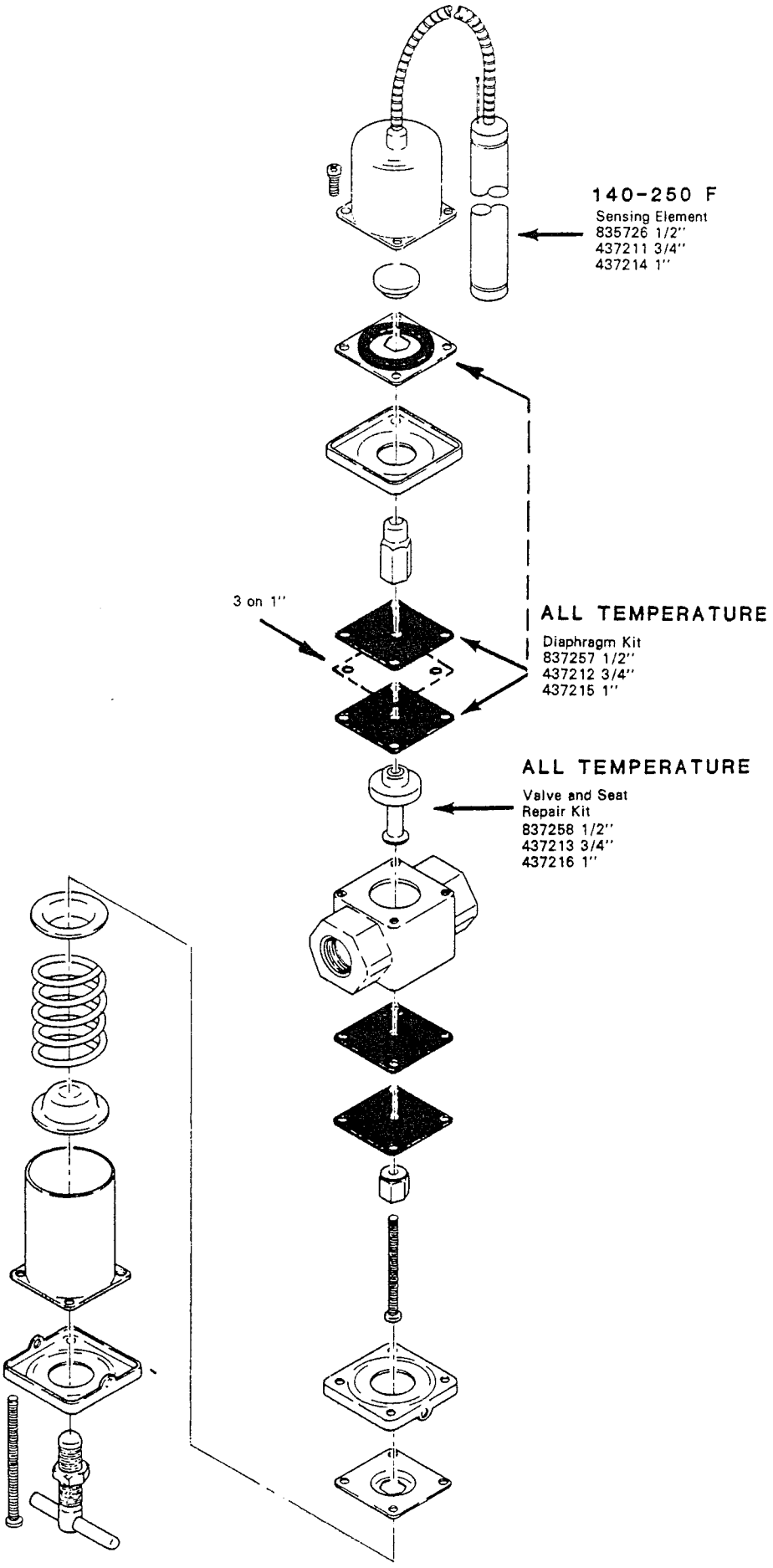
A 442153

821439
1/2" MODULATING VALVE

437088
3/4" MODULATING VALVE

437086
1" MODULATING VALVE

Only parts listed with part no's. will be available for field replacement. The other parts are shown so the unit can be properly reassembled.



BUTLER MANUFACTURING COMPANY
GENERAL OFFICES - KANSAS CITY 26, MISSOURI

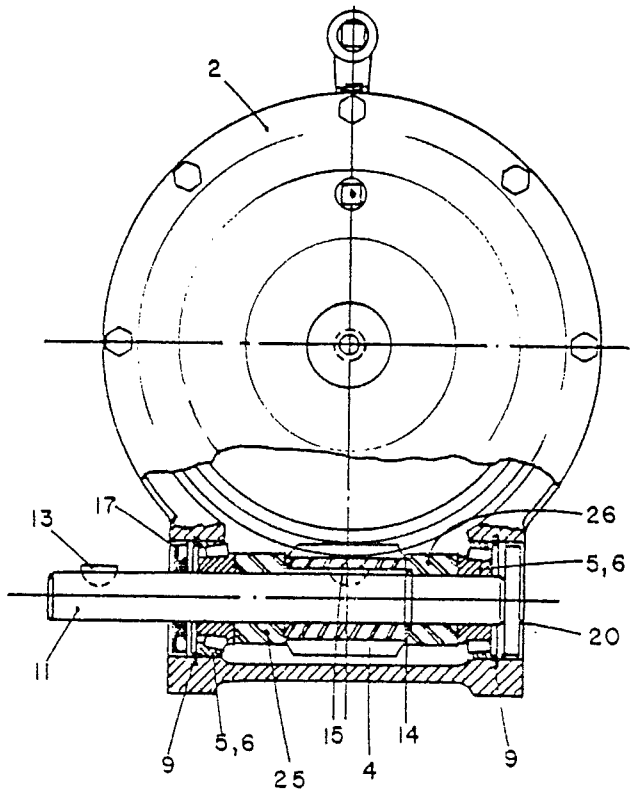
MOD. VALVE (Penn)

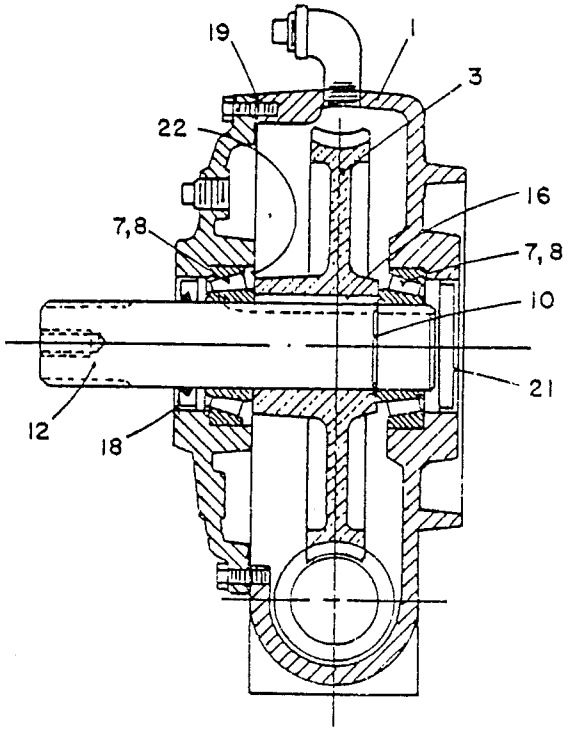
DRAWN	CHECKED	DATE
RW	GM	2-18-80

A 442152

REF. NO.	*BUTLER PART NO.	DESCRIPTION	DURST PART NO.	QTY.
1	437754	HOUSING	A26BE6	1
2	437755	COVER	A27A385	1
3	437756	WORM GEAR (BRONZE)	B28A146CT	1
4	434781	WORM	B31-23	1
5	830588	BEARING CONE	C12	2
6	830589	BEARING CUP	C13	2
7	437759	BEARING CUP	C21	2
8	437760	BEARING CONE	C64	2
9	830604	SNAP RING	D24	2
10	437761	SNAP RING	D136	1
11	437762	INPUT SHAFT	E2205-2	1
12	437763	OUTPUT SHAFT	E3479	1
13	833607	WOODRUFF KEY (SOFT)	J10	1
14	437764	SNAP RING	D197	1
15	837879	WOODRUFF KEY (HARD)	J56	1
16	437765	KEY	J58	1
17	830597	SEAL (INPUT)	K10	1
18	833946	SEAL (OUTPUT)	K25	1
19	830579	GASKET	K47	1
20	835446	CAP (INPUT)	K154	1
21	835447	CAP (OUTPUT)	K155	1
22	437767	NILOS SEAL	K243	1
23	831427	SHIM (INPUT) — NOT SHOWN	P17	
24	437768	SHIM (OUTPUT) — NOT SHOWN	P-50-A	
25	834782	SPACER	P103	1
26	437769	SPACER COUNTER-BORED	P103/CTBR	1

*WHEN ORDERING REPLACEMENT PARTS, USE "DURST" PART NUMBERS ONLY.





BUTLER | BUTLER MANUFACTURING COMPANY
GENERAL OFFICES - KANSAS CITY 26, MISSOURI

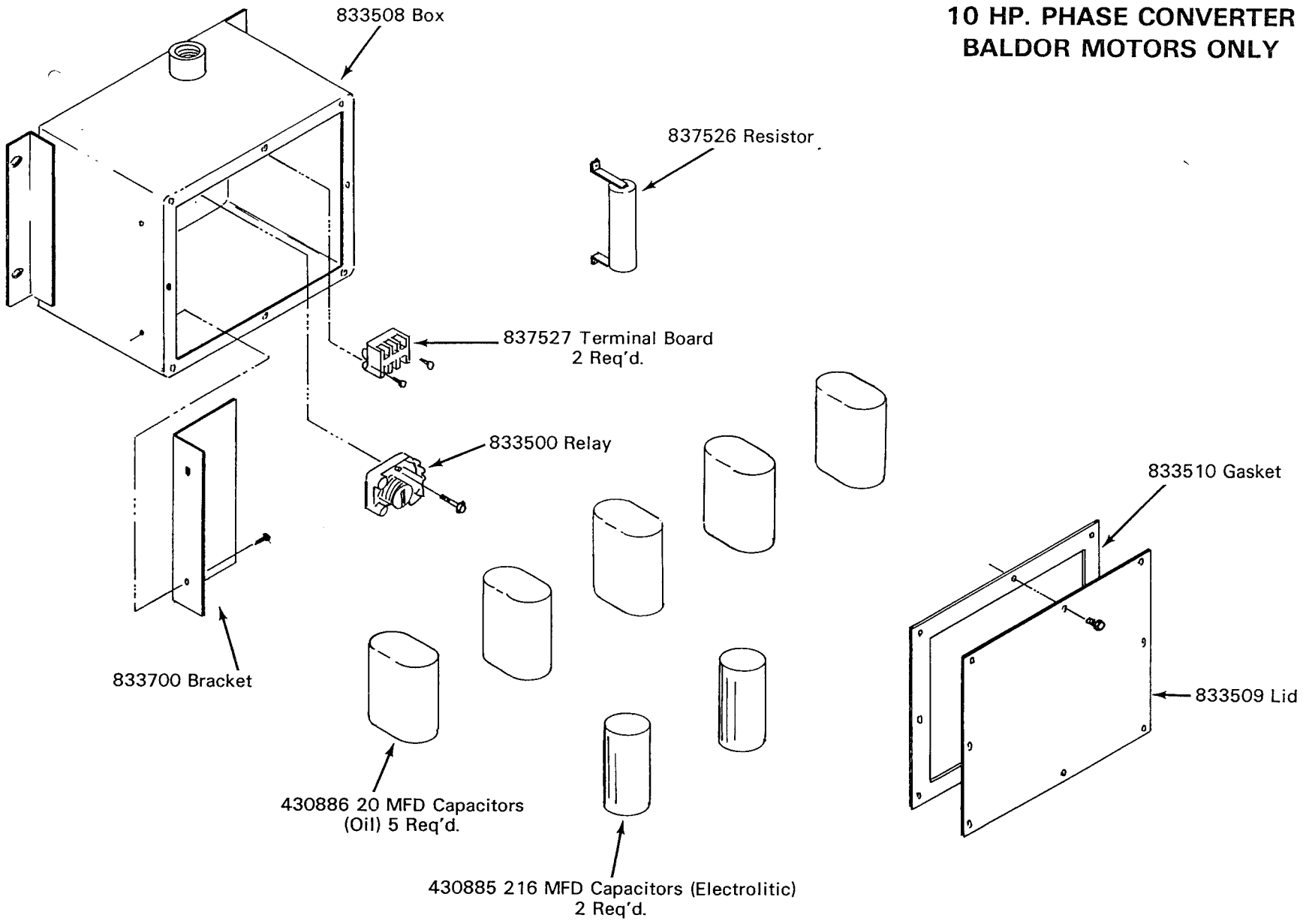
GEAR BOX-437752

DRAWN	CHECKED	DATE
GEM		2-16-79

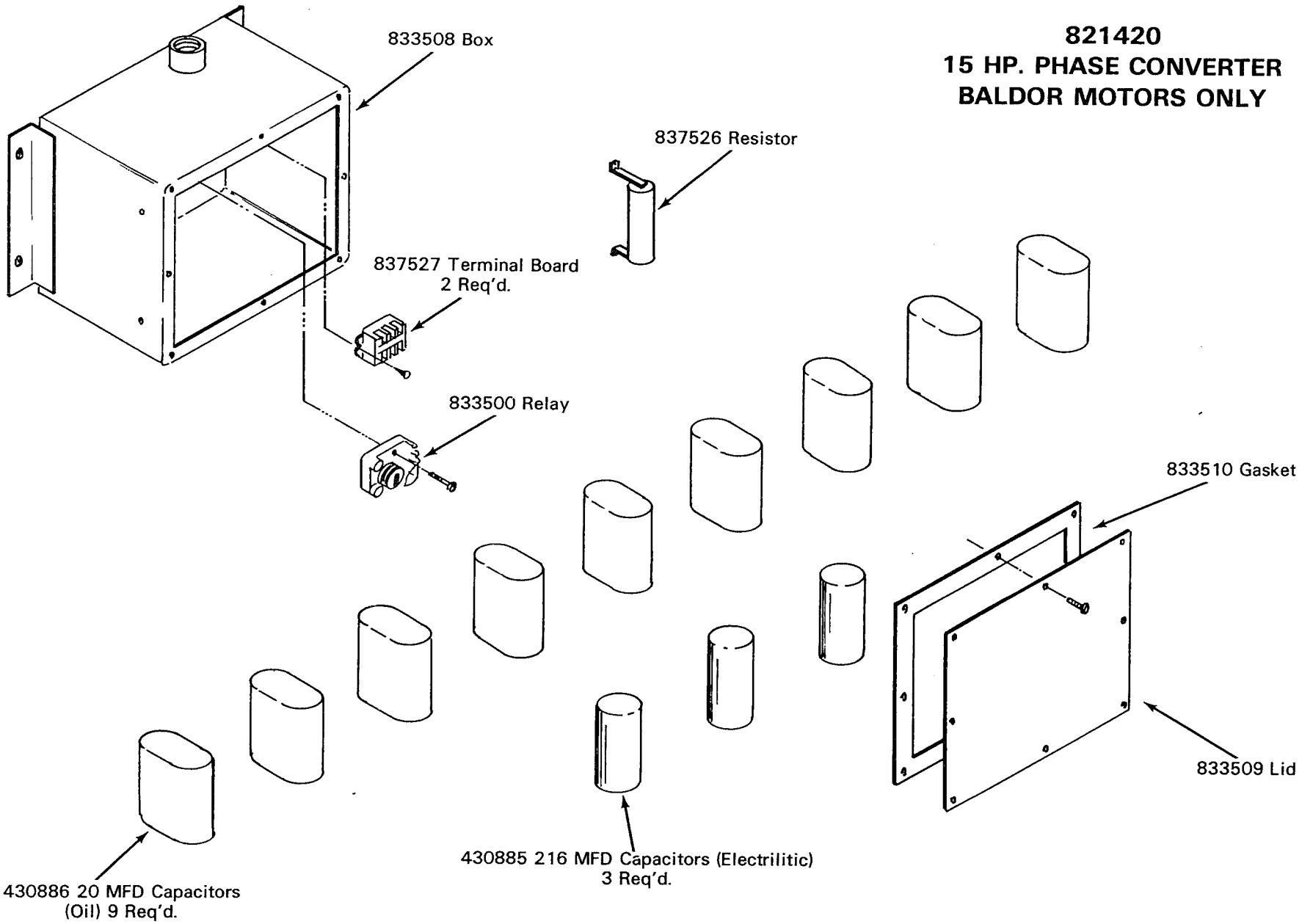
A 442155

PRINTED IN U.S.A.

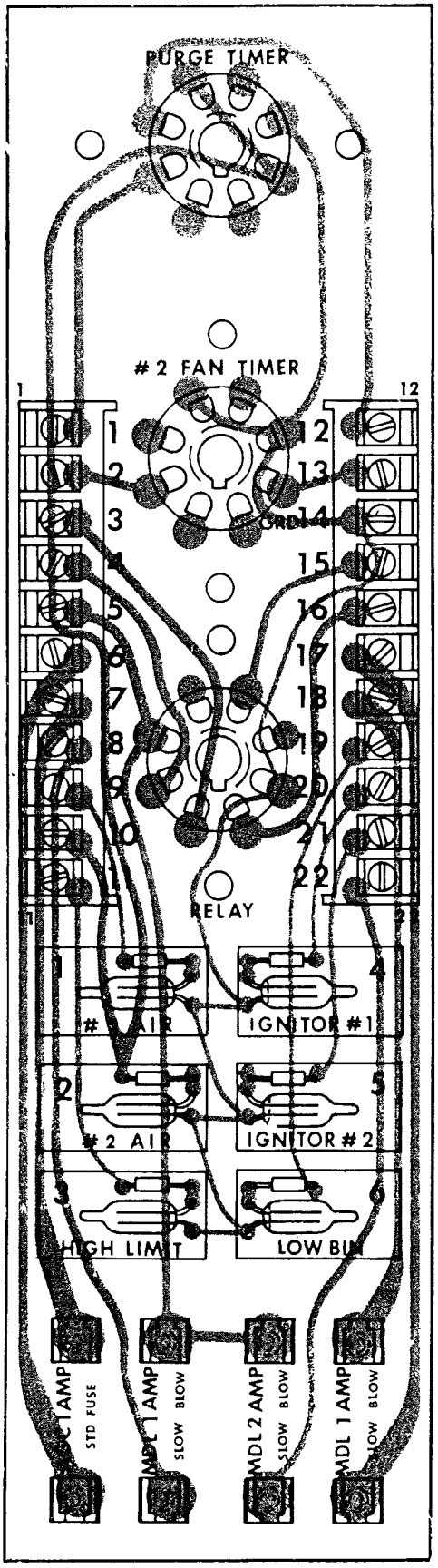
820796
10 HP. PHASE CONVERTER
BALDOR MOTORS ONLY



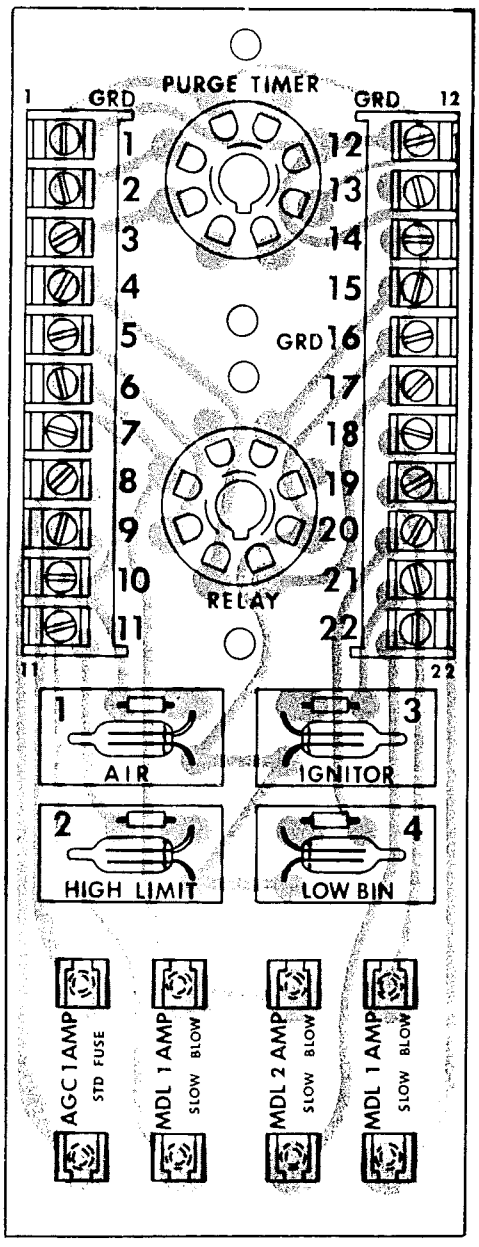
821420
15 HP. PHASE CONVERTER
BALDOR MOTORS ONLY



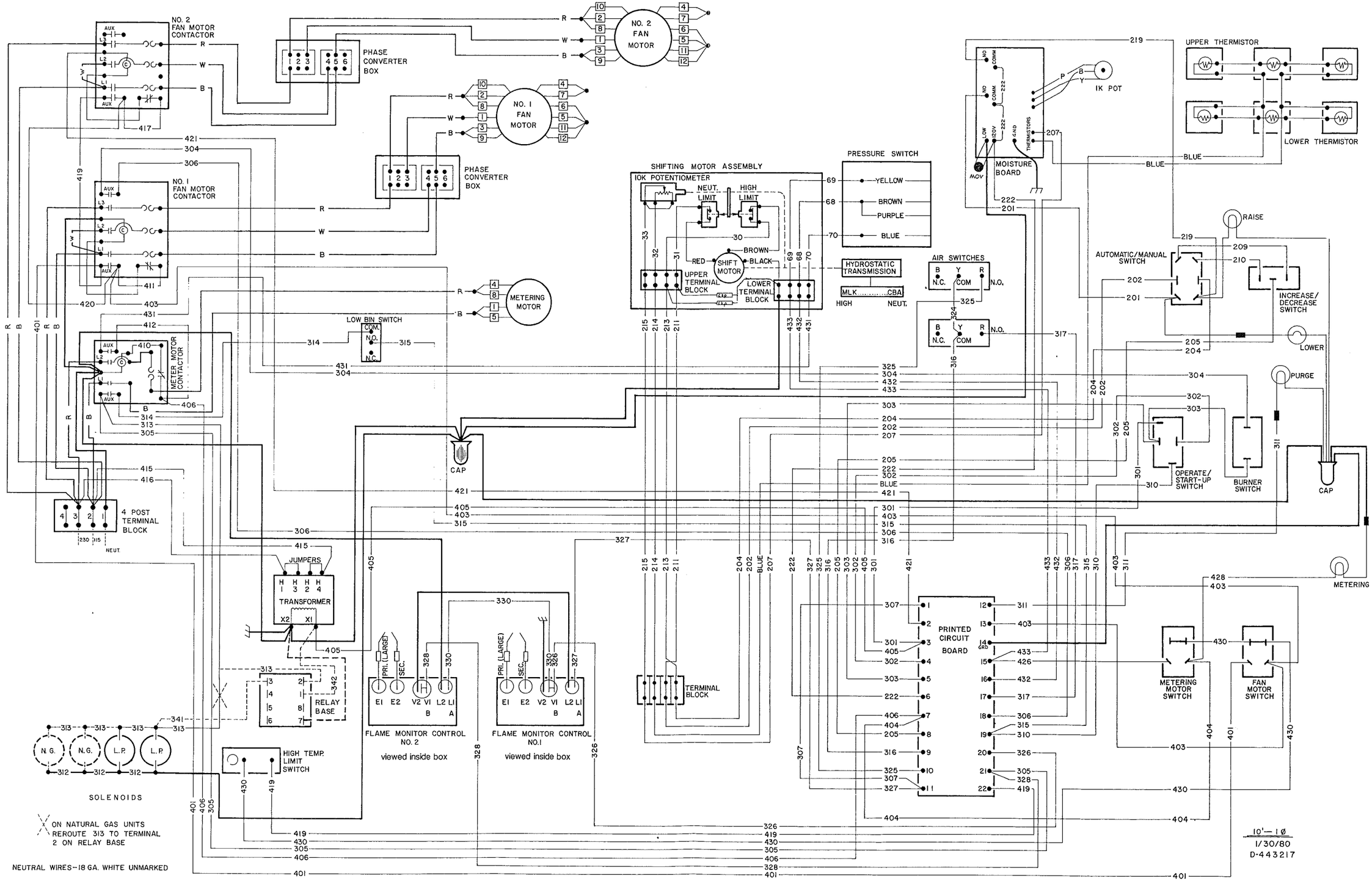
PRINTED CIRCUIT BOARD



10' DRYER



8' DRYER



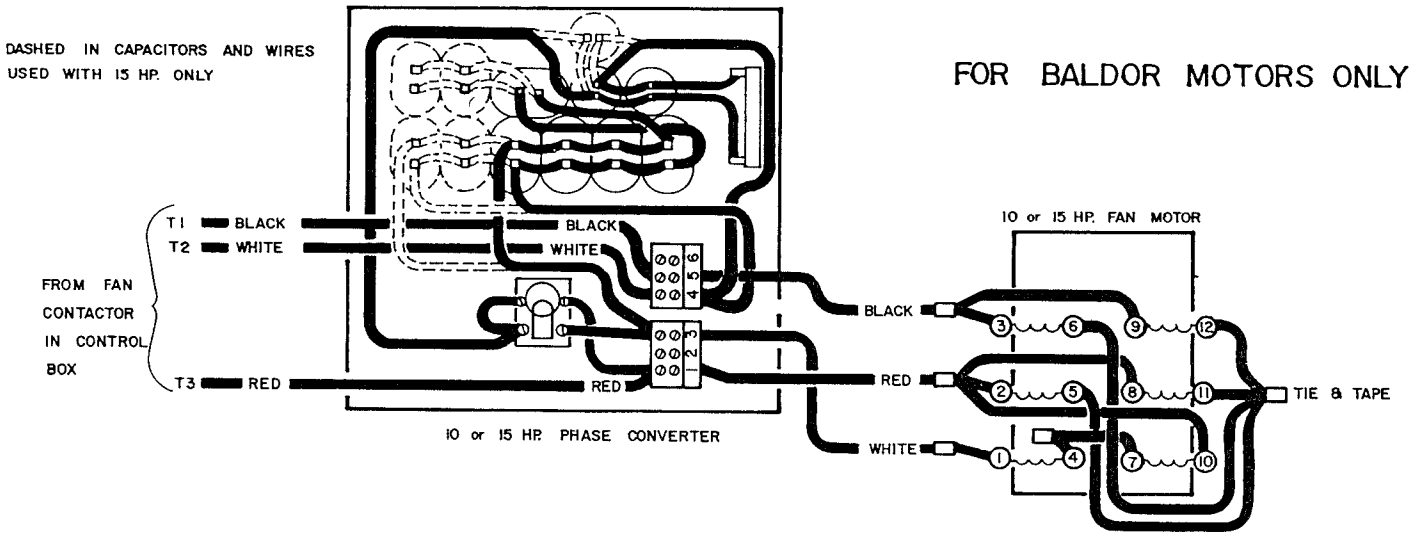
10'— 1Ø
1/30/80
D-443217

Z. Morris

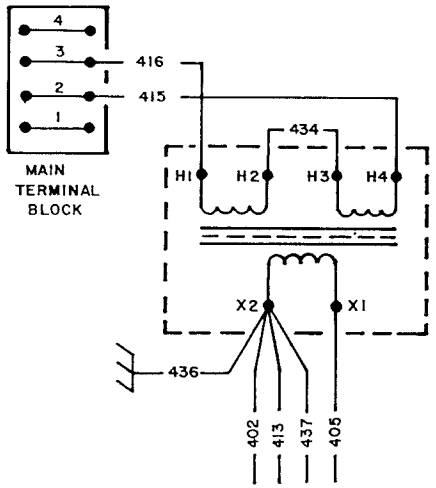
NO. 2 FAN MOTOR CONTACTOR
NO. 1 FAN MOTOR CONTACTOR
METER MOTOR CONTACTOR
FAN MOTOR NO. 2
FAN MOTOR NO. 1
METERING MOTOR
LOW BIN SWITCH
4 POST TERMINAL BLOCK
JUMPERS
TRANSFORMER
RELAY BASE
HIGH TEMP. LIMIT SWITCH
SOLENOIDS
N. G.
N. G.
L. P.
L. P.
ON NATURAL GAS UNITS REROUTE 313 TO TERMINAL 2 ON RELAY BASE
NEUTRAL WIRES-18 GA. WHITE UNMARKED
SHIFTING MOTOR ASSEMBLY
10K POTENTIOMETER
NEUT. LIMIT
HIGH LIMIT
SHIFT MOTOR
UPPER TERMINAL BLOCK
LOWER TERMINAL BLOCK
PRESSURE SWITCH
YELLOW
BROWN
PURPLE
BLUE
HYDROSTATIC TRANSMISSION
MLK
CBA
HIGH
NEUT.
AIR SWITCHES
FLAME MONITOR CONTROL NO. 2
viewed inside box
FLAME MONITOR CONTROL NO. 1
viewed inside box
TERMINAL BLOCK
PRINTED CIRCUIT BOARD
MOISTURE BOARD
MOV
1K POT
UPPER THERMISTORS
LOWER THERMISTORS
AUTOMATIC/MANUAL SWITCH
RAISE
INCREASE/DECREASE SWITCH
LOWER
PURGE
OPERATE/START-UP SWITCH
BURNER SWITCH
CAP
METERING
METERING MOTOR SWITCH
FAN MOTOR SWITCH

10'— 3 Ø
1/30/80
D-443218

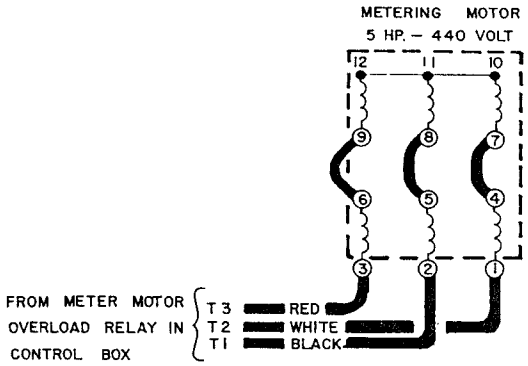
Z. Morris



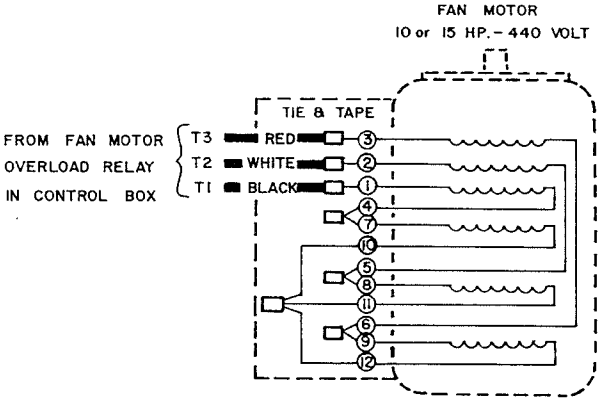
PHASE CONVERTER WIRING DETAILS 220 VAC-1Ø 10 or 15 HP.



TRANSFORMER
440 VAC – 3Ø



METER MOTOR
440 VAC – 3Ø



FAN MOTOR
440 VAC – 3Ø

MOTOR/TRANSFORMER WIRING DETAILS 440 VAC-3Ø 10 or 15 HP.

SPECIFICATIONS

	8-15-10	8-17-15	10-21-210	10-25-215
FANS				
Horsepower Rating	10 HP	15 HP	two-10 HP	two-15 HP
HEATING AIR AVAILABLE	125 cfm/bu.	110 cfm/bu.	105 cfm/bu.	108 cfm/bu.
COOLING AIR AVAILABLE	113 cfm/bu.	133 cfm/bu.	105 cfm/bu.	154 cfm/bu.
OUTER SCREEN AREA				
Heating	146 sq/ft.	195 sq/ft.	306 sq/ft.	429 sq/ft.
Cooling	97 sq/ft.	97 sq/ft.	183 sq/ft.	183 sq/ft.
COLUMN THICKNESS	12 in.	12 in.	12 in.	12 in.
WEIGHT EMPTY	4215 lbs.	4428 lbs.	7020 lbs.	7880 lbs.
MOTOR SIZES				
Fan	10 HP	15 HP	two-10 HP	two-15 HP
Metering	5 HP	5 HP	5 HP	5 HP
HOLDING CAPACITY				
Heating	101 bu.	135 bu.	219 bu.	307 bu.
Cooling	67 bu.	67 bu.	131 bu.	131 bu.
AMPERAGE DRAW (Total Running)				
1Ø	72 amp.	87 amp.	122 amp.	152 amp.
3Ø	47 amp.	55 amp.	81 amp.	97 amp.
DRYING CAPACITY* (Corn-Normal Operating Conditions-Free Air Door Open)				
5 pt. Removal (20 to 15%)	265 bu/hr.	320 bu/hr.	500 bu/hr.	608 bu/hr.
10 pt. Removal (25 to 15%)	183 bu/hr.	220 bu/hr.	365 bu/hr.	435 bu/hr.
10 pt. Removal (15 hr.)	2745 bu.	3300 bu.	5475 bu.	6525 bu.

*Drying rate is shown as wet bushels into the dryer. Actual drying rate may vary depending on weather conditions, hybrid variety, fertilization program, grain maturity and other uncontrolled variables. The figures shown here are averages based on actual field experience.

DANGER

1. KEEP ALL SHIELDS IN PLACE.
2. DISCONNECT POWER SOURCE TO ADJUST OR SERVICE.
3. MAKE CERTAIN EVERYONE IS CLEAR OF EQUIPMENT BEFORE APPLYING POWER.
4. DISCONNECT POWER BEFORE RESETTING MOTOR OVERLOAD.
5. KEEP HANDS, FEET, AND CLOTHING AWAY FROM POWER DRIVEN PARTS IN MOTION.

FAILURE TO HEED MAY RESULT IN PERSONAL INJURY

1. **DO NOT ENTER MACHINE WHILE IN OPERATION.**
2. **CLOSE GAS SUPPLY VALVE AT SOURCE IF MACHINE IS TO BE STOPPED LONGER THAN 30 MINUTES.**
3. **DISCONNECT ELECTRICAL POWER TO MACHINE BEFORE MAKING REPAIRS.**
4. **KEEP CLEAR OF FREE AIR DOOR.**
5. **CLEAN MACHINE DAILY — MAKE SURE CLEAN OUT PORTS ARE OPEN.**
6. **MAKE SURE METERING FLOOR DOOR IS IN POSITION AND FASTENED.**

Most farm accidents, like industrial, home and highway accidents, are caused by the failure of some individual to observe simple and fundamental safe rules or precaution. For this reason farm accidents, just as other types of accidents, can be prevented by recognizing the cause of accidents and doing something about it before accident occurs

Regardless of the care used in the design and construction of farm equipment, there are many points that cannot be completely safeguarded without interfering with accessibility and efficient operation.

A careful operator is the best insurance against an accident.

The complete observance of one simple rule would prevent many thousand serious injuries each year. That rule is "NEVER ATTEMPT TO CLEAN, OIL, OR ADJUST A MACHINE WHILE IN MOTION."

National Safety Council

BUTLER

BUTLER MANUFACTURING COMPANY

7400 EAST 13TH STREET, KANSAS CITY, MO. 64126

Form No. 443291 2/80

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