

INSTRUCTION MANUAL

FOR

HORIZONTAL COOLER

DOUBLE PASS

- INSTALLATION
- OPERATION
- MAINTENANCE
- PARTS LIST

MANUAL NO. DP5-107

KOPPERS

Engineered
Products

Sprout-Waldron

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SECTION I

Foreward

This manual has been written as a guide to the installation, operation, and maintenance of the Sprout-Waldron Horizontal Cooler. The Horizontal Cooler is a quality built piece of machinery designed to simply and effectively dry and cool pellets while giving years of trouble-free service. However, as with any piece of machinery, certain steps must be taken during installation, proper operating practices followed, and regular maintenance performed if the cooler is to function at its design potential. Therefore, we recommend that you read this manual in its entirety to familiarize yourself with this unit and its features prior to assembly, installation, and operation.

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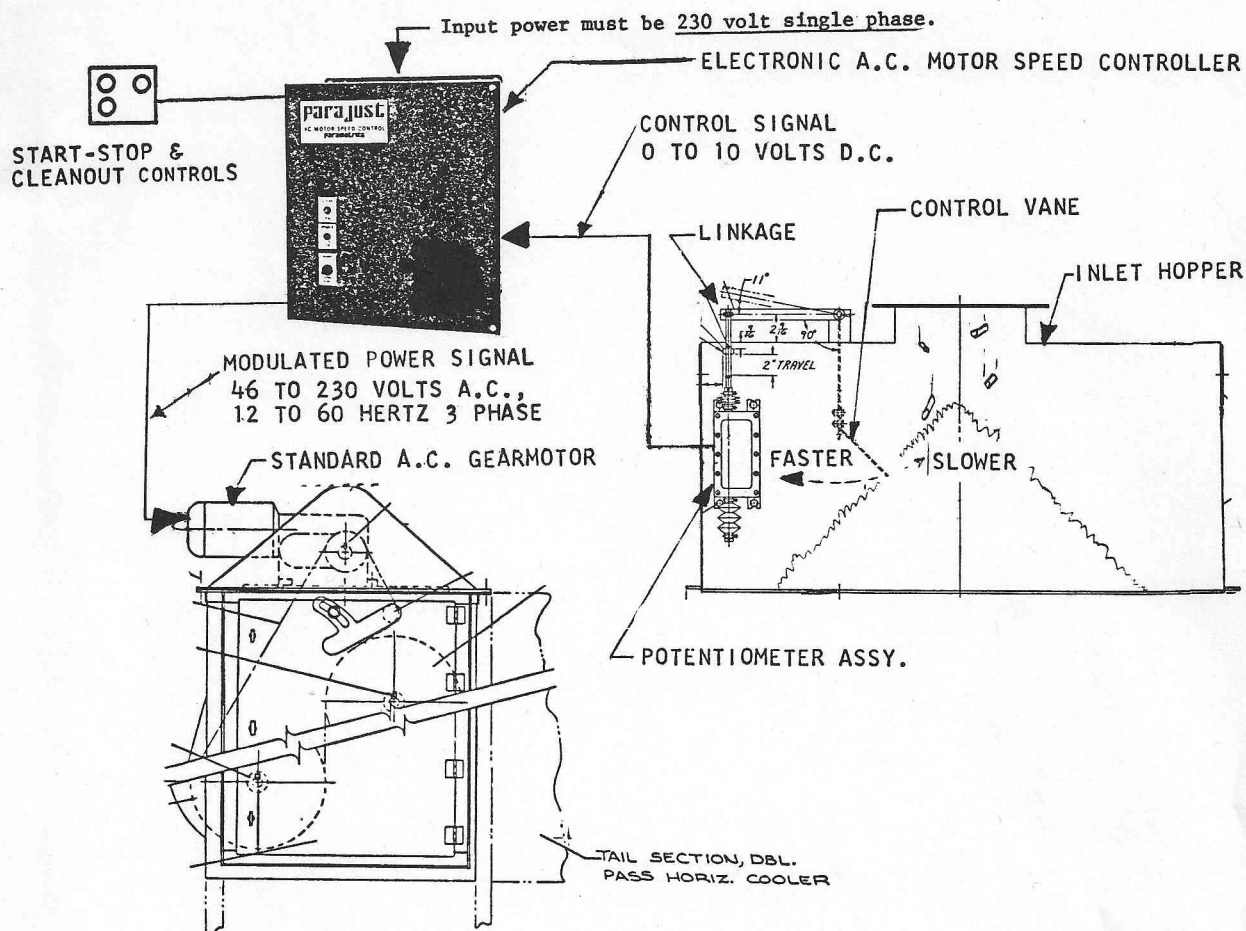
SECTION II

GENERAL DESCRIPTION

The Sprout-Waldron Horizontal Cooler consists of a slowly moving perforated metal carrier enclosed in an air-tight housing. Hot, moist pellets to be cooled and dried, are fed into the center of the inlet hopper-and are distributed across the width of the cooler as they assume their natural angle of repose. The bed depth in the cooler is controlled by a manually adjustable gate located just beyond the inlet hopper. The speed of the belt is automatically controlled/modulated to match the product input rate. Cooling and drying is accomplished as the air surrounding the cooler is drawn through the bed of material.

DRIVE AND DRIVE CONTROLS

The drive and drive controls for the Sprout-Waldron Horizontal Cooler consists of a unique combination of a solid state electronic motor speed controller, a standard explosion proof A.C. gearmotor, and a linear potentiometer linked to a vane in the inlet hopper (See Form 2113 on the following page). The motor speed controller converts the single phase, 60 HZ, 230 volt A.C. input into a three phase, variable frequency, variable voltage output. The variable frequency transforms the constant speed gearmotor into an adjustable speed drive while the variable voltage maintains constant torque. The controller can vary the voltage from 46 to 230 volts and the frequency from 12 HZ to 60 HZ for a 5 to 1 speed range.



FEATURES:

THE ELECTRONIC A.C. MOTOR SPEED CONTROLLER CONVERTS A STANDARD A.C. GEARMOTOR INTO A VARIABLE SPEED DRIVE. THIS ARRANGEMENT ELIMINATES THE TROUBLESOME MECHANICAL VARIABLE SPEED DRIVE.

THIS IS ACCOMPLISHED BY VARYING THE VOLTAGE AND FREQUENCY THROUGH THE USE OF SOLID-STATE ELECTRONICS. THUS THE GEARMOTOR, CONTROLLED BY THE MODULATED POWER SIGNAL IT RECEIVES FROM THE CONTROLLER DRIVES THE COOLER AT A SPEED THAT IS PROPORTIONAL TO THE BED DEPTH IN THE INLET HOPPER.

OPERATION:

AS PELLETS ACCUMULATE IN THE INLET HOPPER, THE CONTROL VANE IS PUSHED TO THE LEFT. THE CONTROL VANE AND POTENTIOMETER SEND A D.C. CONTROL SIGNAL TO THE CONTROLLER THAT IS PROPORTIONAL TO THE HEIGHT OF THE PELLETS IN THE INLET HOPPER.

THE CONTROLLER GRADUALLY SPEEDS UP THE GEARMOTOR, UNTIL THE BED DEPTH STABILIZES IN THE INLET HOPPER. ANY LATER CHANGE IN THE PELLET LEVEL WILL AUTOMATICALLY RESULT IN A NEW MOTOR SPEED SETTING.

NOTE:

1. INPUT POWER TO ELECTRONIC CONTROLLER MUST BE 230 VOLT, SINGLE PHASE ONLY.
2. GEARMOTOR (POWERED BY CONTROLLER) MUST BE WIRED FOR 230 VOLTS, 3 PHASE.

ELECTRONIC SPEED CONTROL

FORM 2113A

(Replaces Form 2111)

The actual speed of the gearmotor is proportional to the position of the linear potentiometer which in turn is related to the depth of material in the inlet hopper.

AUTOMATIC SPEED CONTROL OPERATION

The sequence of operation of the automatic speed control is as follows. At the start of a run, with the control switch in the "RUN" position, the gearmotor will be at minimum speed. As the pellets accumulate in the inlet hopper because the rate of removal is less than the input rate, their level will rise until they begin to move the vane. Movement of vane is translated into movement of the linear potentiometer which in turn causes the motor speed to increase. Increasing the motor speed increases the output rate from the inlet hopper until this rate equals the input rate. From this point on, the motor speed will remain relatively constant unless the input rate changes. Any change in the pellet input rate, up or down, will automatically result in a new motor speed setting.

If unattended at the end of a run, the cooler drive would automatically return to minimum speed and would require approximately twenty minutes to empty the unit. However, switching the control to the "CLEAN-OUT" position, causes the cooler drive to go to maximum speed and the cooler will empty in approximately five minutes. Care must be taken in sizing the capacity of the take-away system from the cooler to be sure it exceeds the maximum discharge rate of the

cooler. Both the minimum and maximum speed of the drive can be varied by changing the potentiometer setting in the motor controller.

THERMODYNAMIC CONSIDERATION

Cooling and drying is accomplished as the surrounding air being drawn through the pellets picks up both heat and moisture. The efficiency of this operation can be increased by initially producing the hottest possible pellet. The hotter the pellet, the faster the heat and moisture moves from the interior of the pellet to its surface and the greater the amount of heat available to vaporize surface moisture. Also, the greater the temperature difference between the air and the pellets, the greater the quantity of heat and moisture which can be transferred. Further, as the temperature of the air increases, its ability to hold moisture also increases. Therefore, for all of the above reasons, it is essential to add just as much heat as possible in the conditioner prior to pelleting to not only increase pelleting efficiency by prolonging die and roller life, but also to increase the efficiency of the drying process.

SECTION III

ASSEMBLY & INSTALLATION

Before your Horizontal Cooler arrives, some thought should be given to the area surrounding its proposed location. Be sure that the cooler can be supplied with an adequate amount of outside air. The best solution for this problem is to install louvers in an outside wall. If air from a heated section of the building is used, the pellets can only be cooled to within 5° to 10° above room temperature. Using colder outside air will allow for a lower final product temperature and will reduce the possibility of condensation in storage.

When your Horizontal Cooler arrives, it will be in either one of two conditions; fully assembled, or with the end sections assembled and the intermediate sections loose for assembly by you. The fully assembled cooler will be mounted on wooded rails for shipping and handling. Do not remove these rails until the cooler is in position on its base or foundation. The base or foundation should be capable of supporting a maximum load of 1,500 pounds per support column. If your unit is completely assembled, you need not continue reading the following instructions, proceed to the section covering installation.

ASSEMBLY

Assembly of your cooler is a simple operation, if done in the following order. These instructions assume that the base or foundation will support the loading of 1,500 pounds per support column. Be sure the foundation is flat or shim as necessary. **BOLT THE COOLER IN PLACE - DO NOT WELD!** DRAW ALL BOLTS ONLY SUFFICIENTLY TIGHT TO HOLD PIECES IN PLACE, BUT STILL ALLOWING MOVEMENT FOR ALIGNMENT. INSTRUCTIONS WILL BE GIVEN WHEN TO MAKE FINAL TIGHTENING.

I. Uncrate and identify the following pieces:

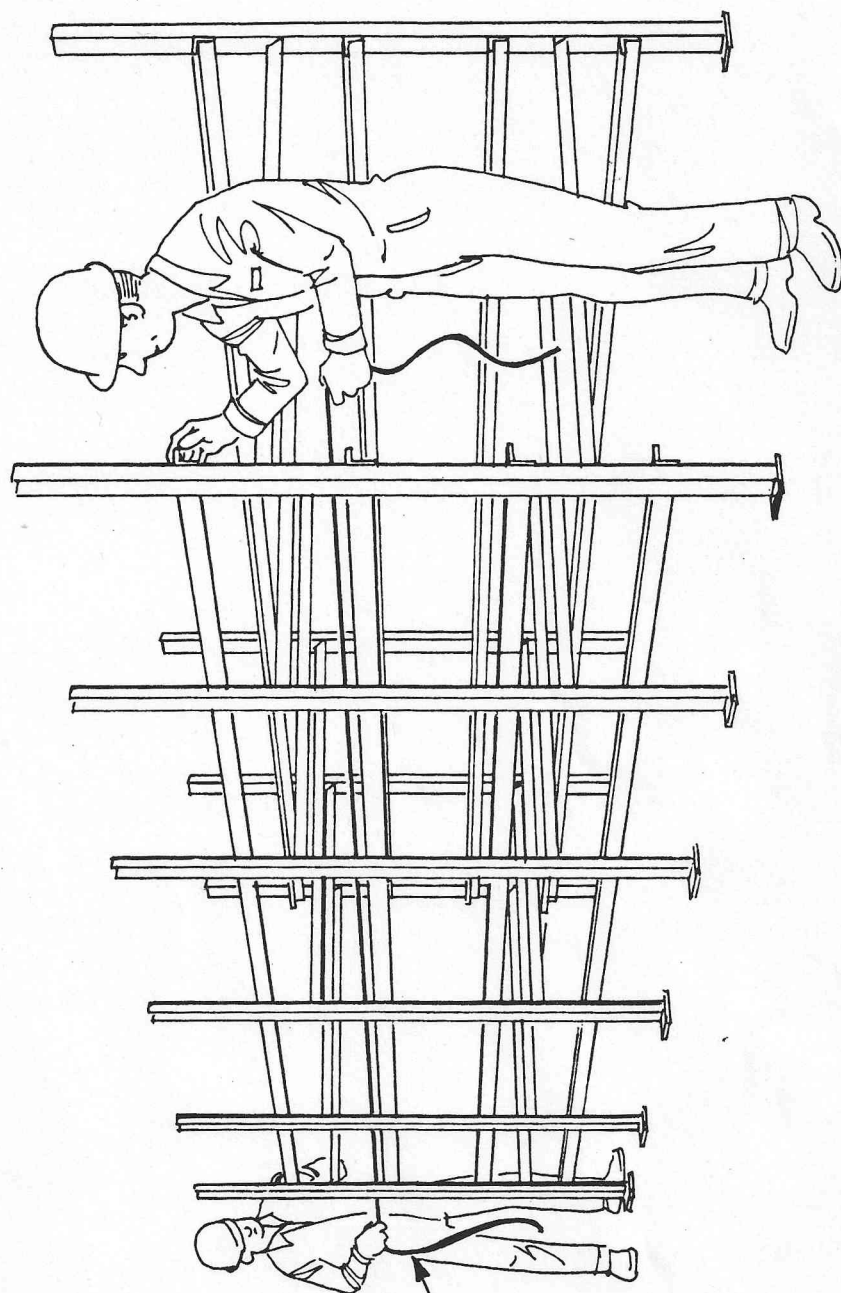
Preassembled inlet end section	Carrier roller chain
Preassembled tail end section	Carrier tray guard
Constant velocity air hood	Fines wiper
Support column	Fines wiper supports
Support column brace	Fines wiper support brace
Shield assembly	
Shield support assembly	Fines wiper clamp
Carrier support angles	3/8x3/4 hex hd. bolts
Adjustable guard	3/8 x 1 hex hd. bolts
Side panel	1/2 x 1-1/4 hex hd. bolts
Side panel angles, RH & LH	3/8 huglock nut
Fines pan	3/8 SAE plain washer
Carrier tray	Drawing D3875-
Carrier tray for fines wiper	Drawing D3870-105
Carrier guard	Drawing D3849-002

II. Locate the preassembled inlet and tail sections, allowing the specified distance between support columns for intermediate sections as shown in View A-A on Drawing D3875-_____.

III. Place the "fines pan" (Pc. No. 18 on Drawing D3849-002) in approximate final position being sure that the lip of the "fines pan" extends toward the inlet end of the cooler.

- IV. Locate the "support columns" (Pc. No. 3 on Drawing D3849-002) per the Bolting Plan shown on Drawing D3875-____, using the two 11/16" holes for 5/8" bolts provided in each base plate.
- V. Bolt the "support column braces" (Pc. No. 16 on Drawing D3849-002) to the "support columns" using 3/8 x 1 bolts with huglock nuts (two braces for double pass, one brace for single pass cooler). Be sure to locate the "support column brace" with the angle as shown in Section CC on Drawing D3849-002.
- VI. Bolt the "fines pans" into position with 3/8 x 1 bolts and huglock nuts. Don't forget to bolt the angles on the bottom of the "fines pan" together using four 3/8 x 1 bolts and huglock nuts. Draw these bolts tight enough to bring the sections of the "fines pan" together--DO NOT OVER-TIGHTEN.
- VII. Bolt all "carrier support angles" (Pc. No. 4 on Drawing D3849-002) to the "support columns" using 3/8 x 1 bolts with huglock nuts. Be sure to locate the "carrier support angles" in the proper holes in the "support column" with the unpunched leg of the angle on top and extending into the cooler as shown in Detail B on Drawing D3849-002.

NOTE: CHECK THE ALIGNMENT OF THE "CARRIER SUPPORT ANGLES" BY LINE TO BE SURE THEY ARE ALL ABSOLUTELY STRAIGHT AND PLUMB and that there are a minimum number of gaps and ridges. Refer to the sketch on the following



USE A STRING
OR WIRE TO ALIGN
THE COOLER
SUPPORT COLUMNS

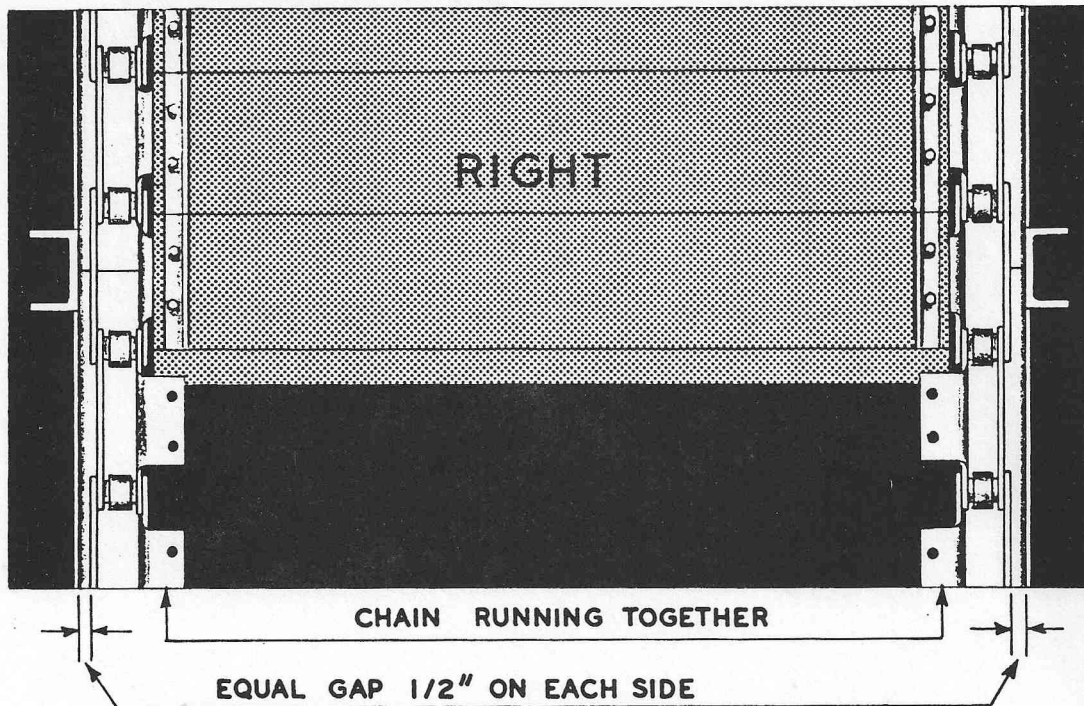
ALIGNMENT OF COOLER FRAME

FORM 2105

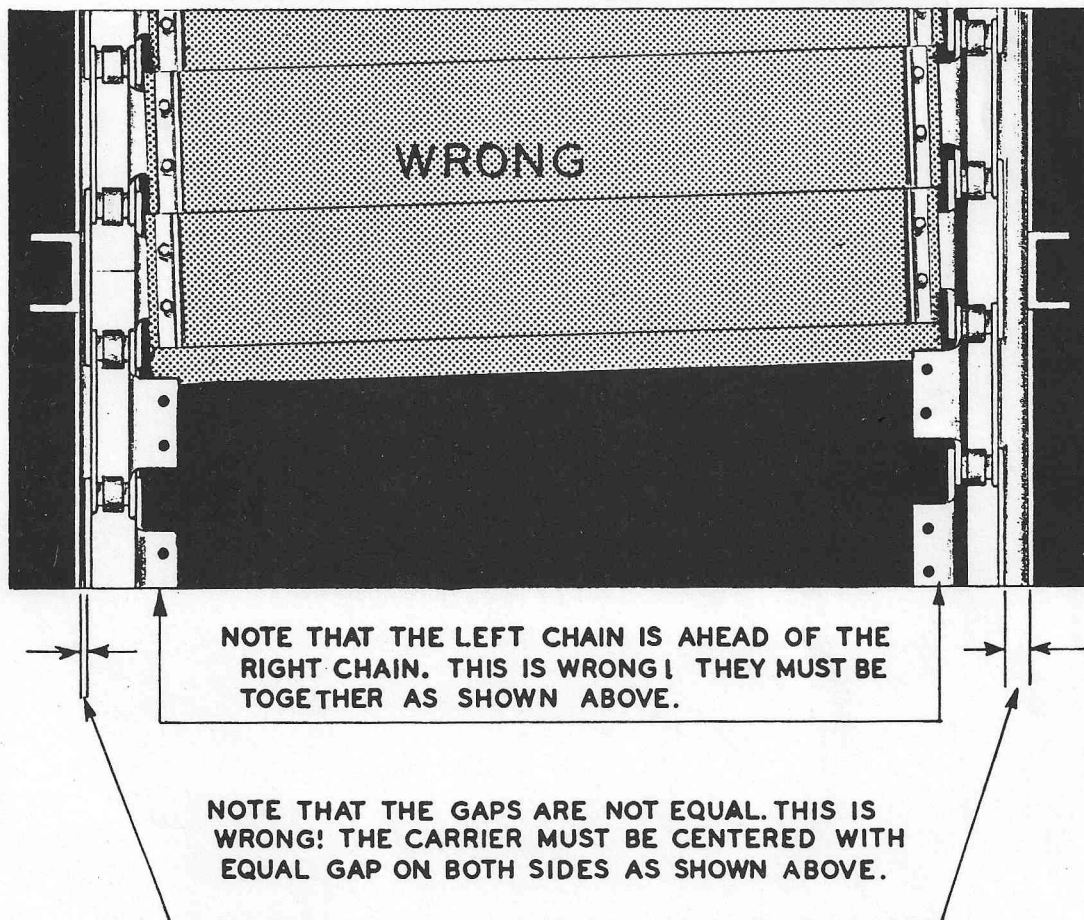
page.

- VIII. After aligning "support carrier angles", tighten all bolts securely.
- IX. Bolt the "fines wiper" (Pc. No. 21 on Drawing D3870-105 to the "fines wiper support" (Pc. No. 20 on Drawing D3870-105, using 3/8 huglock nut and the "fines wiper clamp" (Pc. No. 26 on Drawing D3870-105 as shown in Section AA on Drawing D3870-105. Then, bolt this assembly on the "carrier tray for fines wiper" (Pc. No. 12 on Drawing D3870-105 with the "fines wiper support brace" (Pc. No. 25 on Drawing D3870-105 and the "fines wiper spacer" (Pc. No. 29 on Drawing D3870-105 as shown on the above drawing using 3/8 x 3 bolts and huglock nuts. Adjust the position of the "fines wiper" so that it is approximately 4 inches above the top of the "carrier tray".
- X. Install all the "carrier roller chain" (Pc. No. 13 on Drawing D3870-105 on the "carrier support angles" and remove the slack. If feasible, connect power to the cooler drive motor and run the unit, checking for tracking of the chain, cooler alignment, interference, etc. Even if power is not available, be sure to turn the drive sprocket over to insure that the chain rollers are in the same position on both sprockets--refer to the sketch on the following page.
- XI. Bolt the "carrier trays" (Pc. No. 11 on Drawing D3870-105 and "carrier tray guard" (Pc. No. 19 on Drawing D3870-105 to the "carrier roller chain"--bottom pass only--with 3/8

PROPER INSTALLATION OF CARRIER



IMPROPER INSTALLATION OF CARRIER



CARRIER TRAY ALIGNMENT

FORM 2106

x 1 bolts and huglock nuts as shown in Section AA on Drawing D3870-105. BE SURE THAT THE "CARRIER ROLLER CHAIN" ATTACHMENTS ARE IN THE SAME LOCATION ON EACH SIDE, THAT THE CHAIN IS STRAIGHT, AND THAT THE SAME GAP EXISTS ON BOTH SIDES BETWEEN THE "SUPPORT COLUMN" AND CARRIER ROLLER CHAIN" (APPROXIMATELY 1-9/16 IN. TO CENTERLINE OF CHAIN.)

- XII. Run the cooler to check for tracking of the carrier. If the chain appears to move from side to side (the gap between the chain and the support column varies,) this probably is a result of not having the chain straight while bolting on the trays. To correct this, loosen the tray bolts in the problem area, straighten the chain, and retighten the bolts.
- XIII. Bolt "shield assembly" (Pc. No. 5 on Drawing D3849-002) to "support column"--bottom shield only on double pass cooler--using 3/8 x 3/4 bolts.
- XIV. Slip "shield assembly support" (Pc. No. 6 on Drawing D3849-002) into place as shown in Detail A on Drawing D3849-002 and bolt to the support column with 3/8 x 3/4 bolts.
- XV. Install "adjustable guard" (Pc. No. 7 on Drawing D3849-002) as shown in Detail A on Drawing D3849-002, with 3/8 huglock nut and washer. Set for approximately 1/8" to 1/4" clearance between the "adjustable guard" and top of the "carrier tray".
- XVI. For double pass coolers only, repeat Steps XI through XIV

for top pass, noting that there are no "fines wipers" on the top pass.

- XVII. Bolt "side panels" (Pc. No. 12 on Drawing D3849-002) in place using the center row of bolts in the panel. Nutserts (blind nuts) are provided behind each of these holes; be careful not to overtighten. Be sure to locate the "side panels" with the inspection openings at the inlet end of the cooler.
- XVIII. Locate "left and right side panel angles" (Pc. No. 14 and 13 on Drawing D3849-002 and bolt into place, using 3/8 x 1 bolts where bolting into the "carrier support angles" and 3/8 x 1 bolts with huglock nuts where bolting into the "support column".
- XIX. Bolt "carrier guard" (Pc. No. 15 on Drawing D3849-002) in place using 3/8 x 1 bolts.

XX. Bolt the "constant velocity air hood" to the top of the cooler using 3/8 x 1 bolts and huglock nuts.

Construction of your cooler is now complete!

INSTALLATION

Installation of your Horizontal Cooler for effective operation is a relatively simple matter if attention is given to the following points:

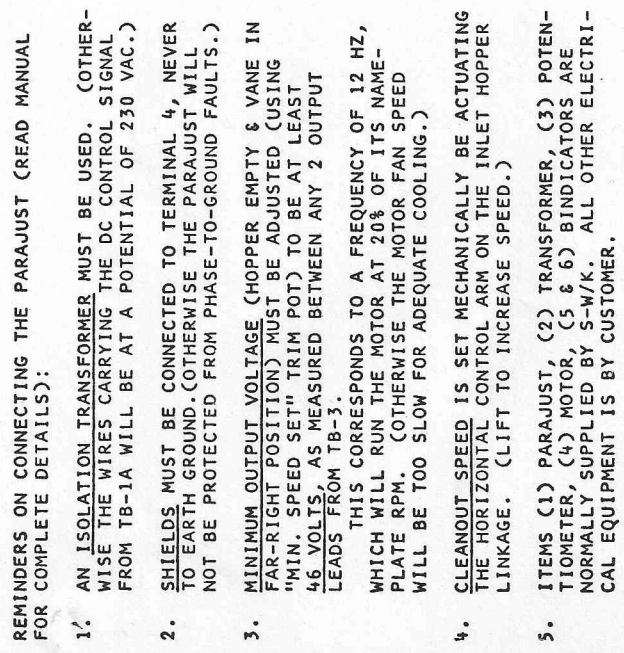
A. Inlet Chute

The configuration of the inlet chute should be designed to have the pellets fall directly in the center of the headbox. If they do not, a vane or baffle must be installed in the chute to direct the flow of material to the center of the headbox. Any insert should be contoured to form as smooth a transition as possible to prevent damage to the pellets.

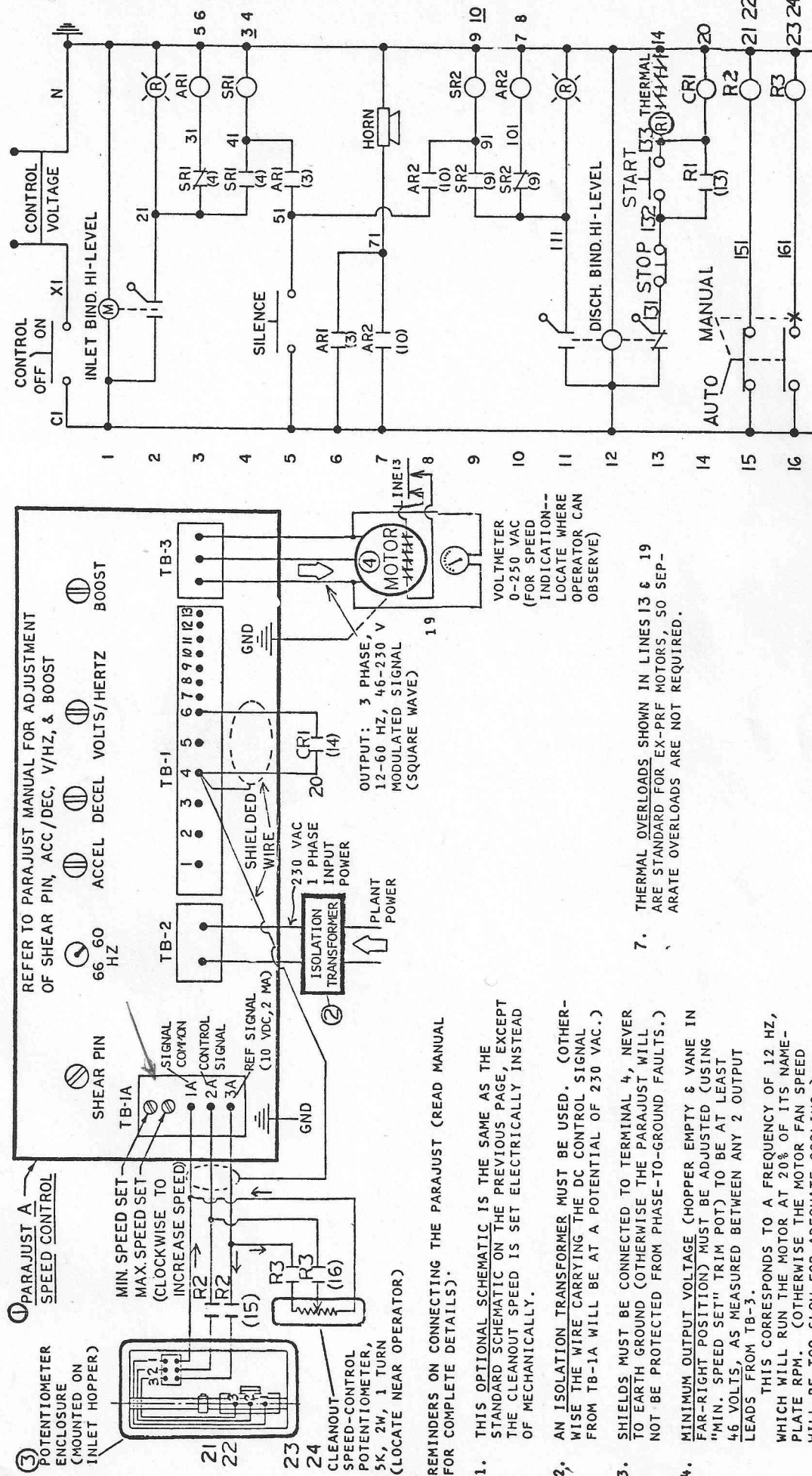
B. Electrical

Make all electrical connections in accordance with applicable codes.

A recommended control system is shown on the right-hand side of the electrical schematic diagram on the following page. Connect the Parajust Motor Speed



FORM 2107C — SCHEMATIC CONTROL DIAGRAM
HORIZONTAL COOLER WITH PARAJUST SPEED CONTROL



REMEMBERS ON CONNECTING THE PARAJUST (READ MANUAL FOR COMPLETE DETAILS).

1. THIS OPTIONAL SCHEMATIC IS THE SAME AS THE STANDARD SCHEMATIC ON THE PREVIOUS PAGE, EXCEPT THE CLEANOUT SPEED IS SET ELECTRICALLY INSTEAD OF MECHANICALLY.
2. AN ISOLATION TRANSFORMER MUST BE USED. (OTHERWISE THE WIRE CARRYING THE DC CONTROL SIGNAL FROM TB-1A WILL BE AT A POTENTIAL OF 230 VAC.)
3. SHIELDS MUST BE CONNECTED TO TERMINAL 4, NEVER TO EARTH GROUND (OTHERWISE THE PARAJUST WILL NOT BE PROTECTED FROM PHASE-TO-GROUND FAULTS.)
4. MINIMUM OUTPUT VOLTAGE (HOPPER EMPTY & VANE IN FAR-RIGHT POSITION) MUST BE ADJUSTED (USING "MIN. SPEED SET" TRIM POT) TO BE AT LEAST 46 VOLTS, AS MEASURED BETWEEN ANY 2 OUTPUT LEADS FROM TB-3.
THIS CORRESPONDS TO A FREQUENCY OF 12 HZ, WHICH WILL RUN THE MOTOR AT 20% OF ITS NAME-PLATE RPM. (OTHERWISE THE MOTOR FAN SPEED WILL BE TOO SLOW FOR ADEQUATE COOLING.)
5. RELAYS R2 & R3 USED IN THE SPEED CONTROL CIRCUIT MUST HAVE LOW-LEVEL CONTACTS. (OTHERWISE THE CONTACTS MAY EVENTUALLY OXIDIZE AND FAIL TO CONDUCT THE SIGNAL.)
6. ITEMS (1) PARAJUST, (2) TRANSFORMER, (3) POTENTIOMETER, (4) MOTOR, (5 & 6) INDICATORS ARE NORMALLY SUPPLIED BY S-W/K. ALL OTHER ELECTRICAL EQUIPMENT IS BY CUSTOMER.

7. THERMAL OVERLOADS SHOWN IN LINES 13 & 19 ARE STANDARD FOR EX-PRF MOTORS, SO SEPARATE OVERLOADS ARE NOT REQUIRED.

FORM 2142A - SCHEMATIC CONTROL DIAGRAM HORIZONTAL COOLER WITH PARAJUST SPEED CONTROL (WITH OPTIONAL ELECTRICAL CLEANOUT SPEED CONTROL)

BILL OF MATERIAL

BSR

REV	BY	DATE	REV	BY	DATE	FIRST CUST.	BY INGRAM	DISTRIBUTION
A	INGRAM	10-9-79	F				DATE 8-14-79	ENGR.
B			G			FIRST ORDER NO.		ORDER DEPT.
C			H			OTHER BILLS OF MATERIAL REQUIRED		STOREROOM
D			J					ASSEMBLY
E			K					

	PAGE NO.	DESCRIPTION	CONTROL NO.	COLOR	
		COVER COVER	DP5-1079		1
		REVERSE SIDE OF COVER			2
	B-1	SAFETY INSTRUCTIONS	HC-0778	PINK	3
A	C	TABLE OF CONTENTS	HC-0479		4
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IDENTITY INSTRUCTION MANUAL NO. DP5
PASS, ELECTRONIC SPEED CONTROL

HORIZONTAL COOLER, 5' WIDE, DOUBLE

BILL OF MATERIAL NO.

DP5-1079

SPROUT, WALDRON & Co.

PARTS LIST

Carrier Tray Assembly (5' wide units)
See Form 2108

<u>PC.</u> <u>NO.</u>	<u>QTY.</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>CODE NUMBER</u>
11		B3744-000/1	Carrier Tray	D22 018 014
12		B3744-001/1	Carrier Tray for	
			Fines Wiper	D22 018 015
13	- - - -		Roller Chain, L-B	
			LXS 6018 with	
			A2 Attachment	H2183 0 001
19		B3747-000/1	Carrier Tray Guard	D07 008 243
20		B3746-005-00	Fines Wiper Support	D21 052 269
21		B3745-001/1	Fines Wiper	D25 005 007
22		B3746-001-00	Fines Wiper Support	D02 018 013
			Brace	
23		B3738-008/1	Fines Wiper Clamp	D02 005 168
			Bar	

PARTS LIST

INLET HOPPER

PER FORM 2109

<u>PC. NO.</u>	<u>QTY</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>	<u>CODE NUMBER</u>
2	1	B665-115/1	Enclosure, Explosion Proof	D05 004 012
3	1	None	Potentiometer, Linear motion, precision conductive, plastic, type 1613, 5000 Ohms, total resistance, 2 Watt power rating, 2 in. total travel, Part No. P1613-2-502.	E11 600 093
4	1	A2792-000/1	Support, Potentiometer	D21 052 273
5	1	A2782-004/1	Bracket, Retaining	D02 019 241
6	1	A2782-005/1	Actuator	D01 010 004
7	1	None	Screw, Rd. Hd. Mach. No. 6-32 x 1-1/4 lg. stl.	None
8	1	A2782-007/1	Bar, Actuator	D02 005 219
9	2	A2782-001/1	Sleeve, Sq. Hole w/Set Screw	D21 026 158
10	2	A2782-002/1	Sleeve, Sq. Hole	D21 026 157
11	2	A2782-003/1	Bellows	E10 200 148
12	4	None	Clamp, Worm Drive, Ideal No. 6208, .297 to 1875 dia. SST.	None
13	2	None	Screw, Soc. Hd., No. 6-32 x 1/4 lg. Stl.	None
14	1	None	Pin, Roll 1/8 dia. x 1-1/4 lg., Stl.	None
15	3	None	Block, miniature terminal flat base, Buchanan Cat. No. P125	F33 000 056
16	1*	None	Section, Eng, miniature terminal, flat base, Buchanan Cat. No. P130	F33 000 057

HC-0978