

Instruction Sheet

Model 4000 and 4050 With Dancer Position

IS-539-16/B
3/22/93

Dynamatic

Introduction

These instructions relate specifically to the following Model 4000 and 4050 controllers which are assembled for Speed Control with the Dancer Position modification.

Model 4000, 4.3 Amp Controllers:

- 15-533-1016 Panel Mount
- 15-535-1016 Standard Enclosure
- 15-536-1016 Blank Cover

Model 4050, 8 Amp Controllers:

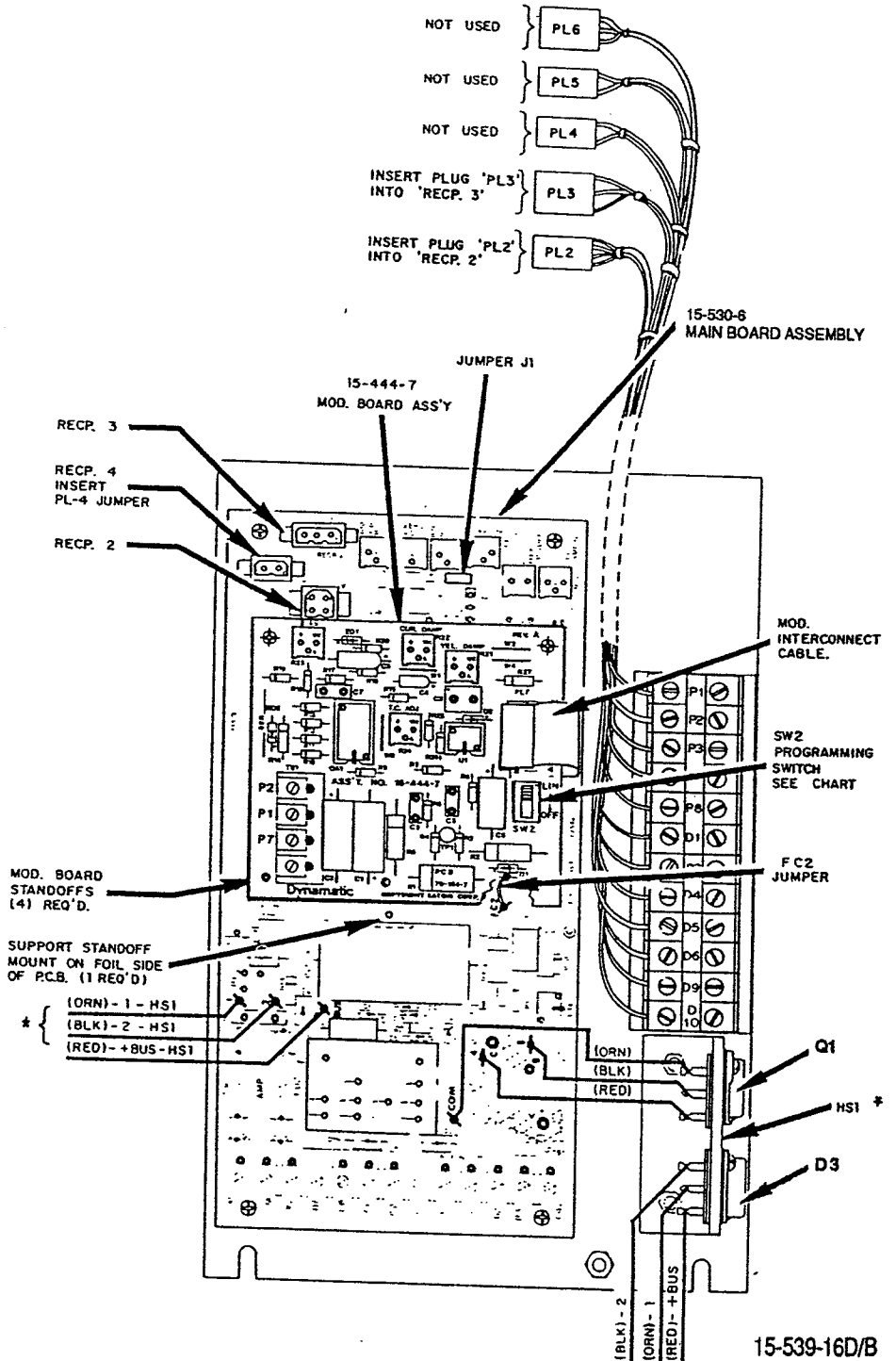
- 15-539-0016 Panel Mount
- 15-540-0016 Standard Enclosure

Connection diagram, schematic diagram, switch programming, plug wiring connection, adjustment procedure and recommended spare parts list for these specific assemblies are contained in this instruction sheet. Any differences between these two controllers are clearly noted.

Use instruction manual IM-130006-83XX with this instruction sheet for complete installation, operation and maintenance instructions.

CAUTION: Above ground electrical potentials can be hazardous. Always disconnect electrical power before working on the controller.

* Heat sink assembly, HS1, and its wiring apply only to the Model 4050 controllers. These parts are not supplied on Model 4000 controllers. The parts are mounted on the 15-530-5 main 4000 board.



Model 4050 Controller Panel with Modification Board 15-444-7
Dancer Position



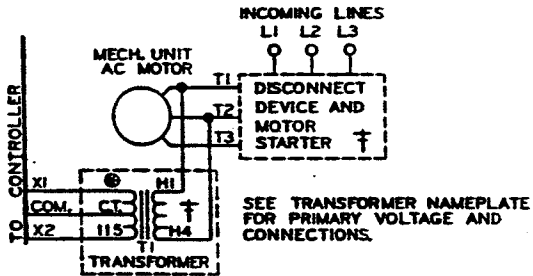
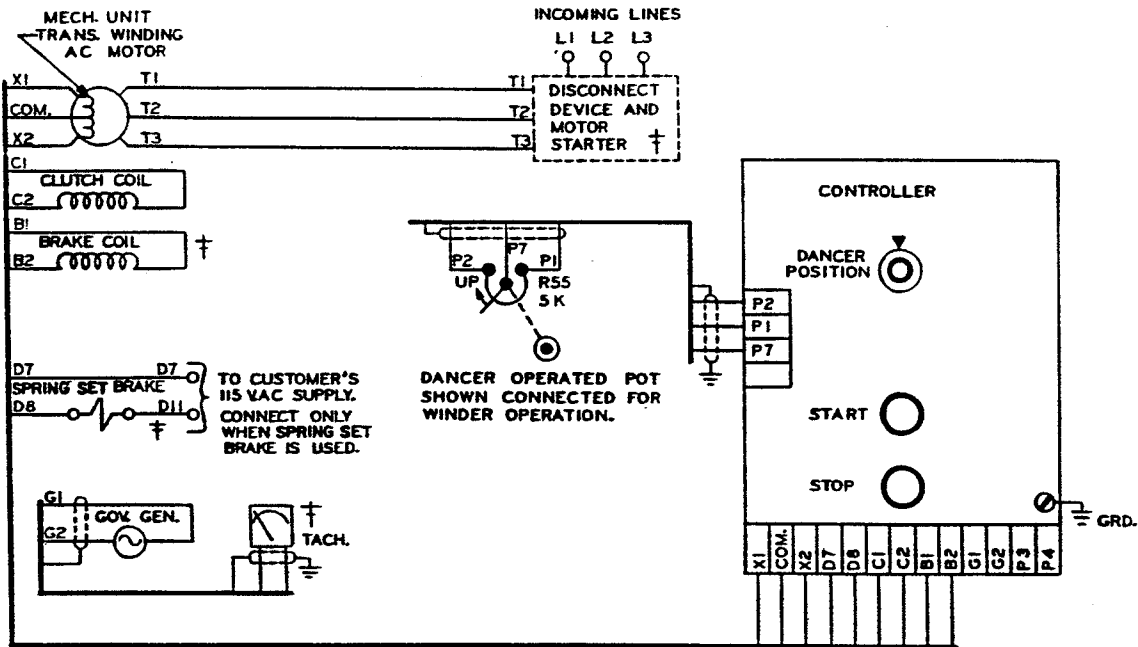
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Connection Diagram for Standard Cast Enclosure 4000 Controller



CONTROL PROGRAMMING

15-530-5/6 P.C.B.

J1-POSITION-NORM T.C. ADJUST R26- SET PER TABLE

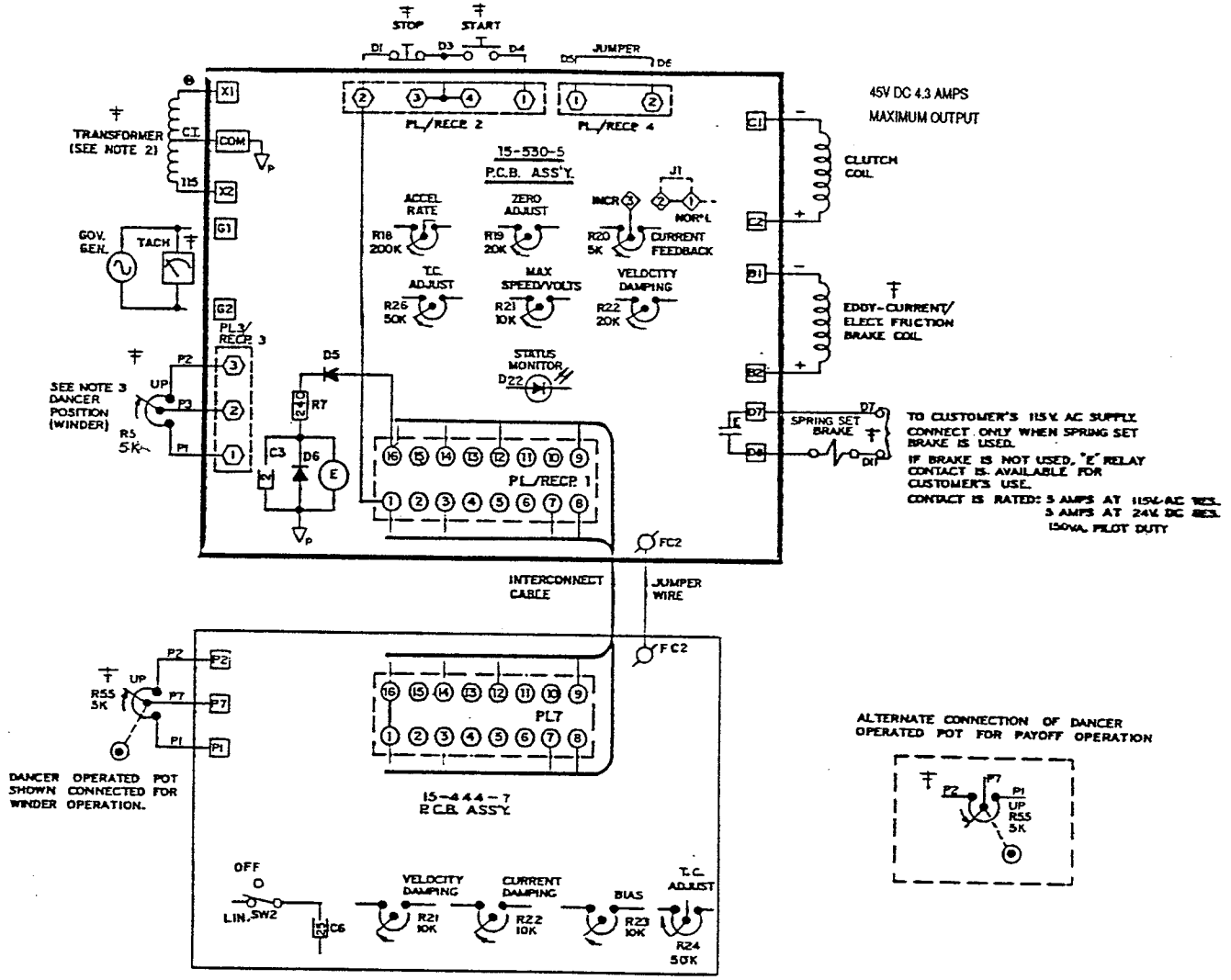
15-444-7 P.C.B.

SW2- POSITION-LIN

TO ELIMINATE LINEAR ACCELERATION,
PUT SW2 IN "OFF" POSITION
T.C. ADJUST R24- SET PER TABLE

ED-58216/A

Schematic Diagram for 4000 Controller

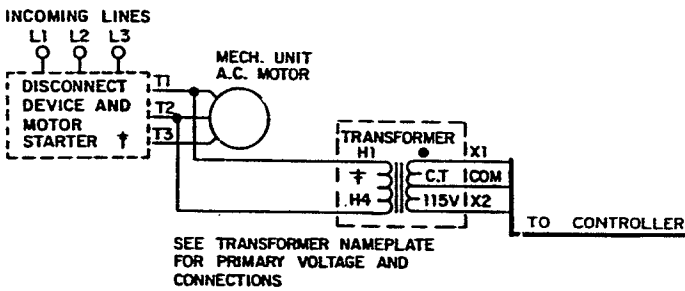
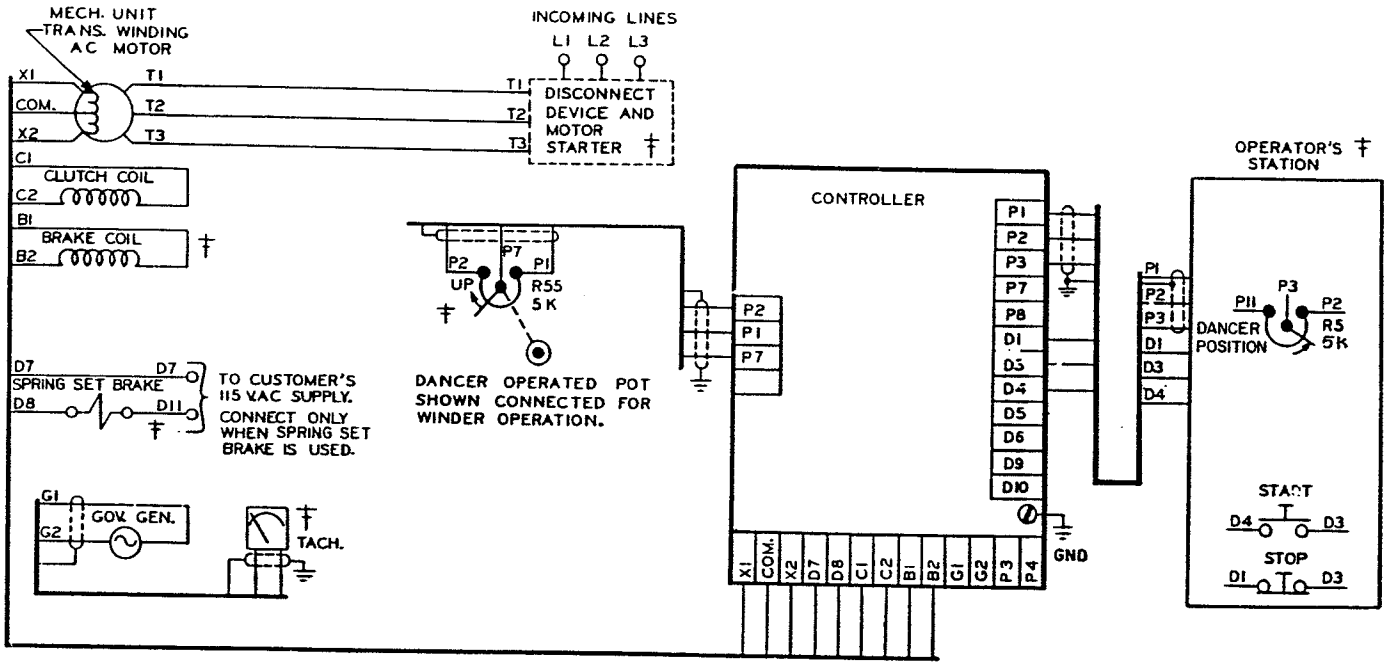


Modification PCB Mounting

If you have purchased a complete controller this section may be passed over and you may proceed to General Description.

- Place the Main PCB in front of you with the long dimension in a horizontal position and the terminal strip to the left.
- Remove the DIP switch by pulling it straight out of the receptacle, RECP 1. Then, peel the adhesive-backed label off the other half of RECP 1.
- Insert the arrow-type locking head of the four nylon stand-offs supplied into the four 0.188" diameter holes in the main PCB and press in. The tabs will snap out to lock the stand-offs permanently in position.
- Hold the modification PCB assembly over the stand-offs with the ribbon connector toward you and insert the ribbon connector plug into RECP 1. Be careful to see that all 16 pins are started properly into the receptacle before pressing the plug in.
- Align the holes in the modification PCB assembly over the stand-offs and press over the tapered posts until the locking flanges snap out to lock the board in position.

Connection Diagram for 4000 Panel Mount/Blank Cover and 4050 Controllers



CONTROL PROGRAMMING

15-530-5/6 P.C.B.

JI-POSITION-NORM T.C. ADJUST R26- SET PER TABLE

15-444-7 P.C.B.

SW2- POSITION-LIN

TO ELIMINATE LINEAR ACCELERATION, PUT SW2 IN "OFF" POSITION T.C. ADJUST R24- SET PER TABLE

ED-56816/C

Note 1:

This equipment must be installed in compliance with National electrical code and all applicable state and local codes.

Note 2:

Transformer may be supplied as a winding in the ac motor or as a separate item. Standard connections to winding in mechanical unit and loose transformer connections are both shown above.

Note 3:

Dancer Position pot R5 is shown wired for winder operation.

For use with payoff drive, pot rotation will be reversed - rotating the Dancer Position pot R5 toward the zero (P1) end

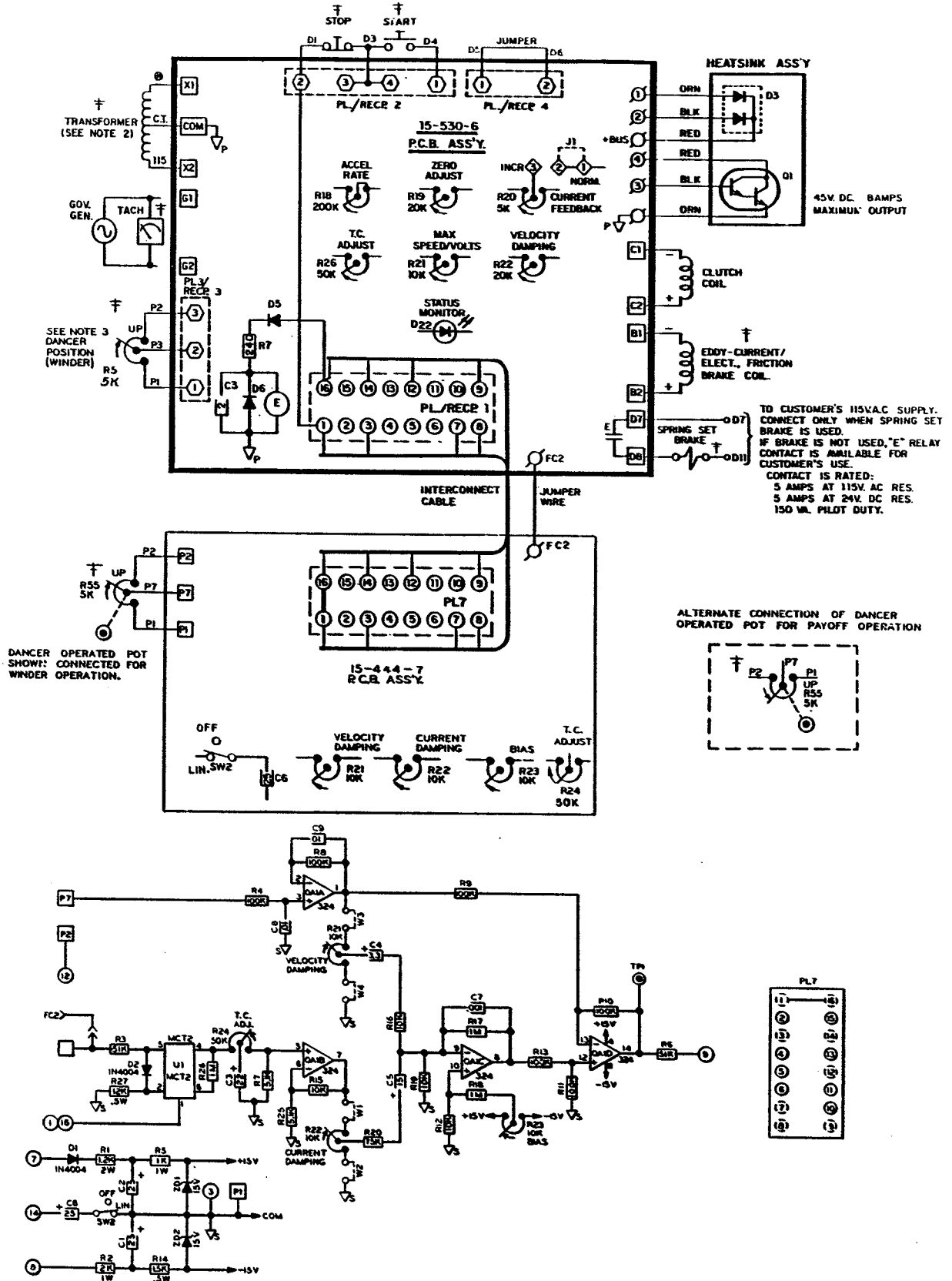
will cause the dancer to rise.

Note 4:

Values shown are typical. See BOM for actual values.

- ⊗ Programming and Mod. interconnect plug/recp.
- Operator's station and PCB interconnect plug/recp.
- Screw terminal
- ↗ Signal common
- ↘ Power common
- ⊕ Items furnished only when specified

Schematic Diagram for 4050 Controller



Dancer Position Modification PCB 15-444-7

General Description

The Dancer Position modification converts the standard 4000 and 4050 controllers into a position control system. The feedback quantity to the Main PCB becomes the position of a Dancer Operated potentiometer rather than the drive output shaft velocity. The steady state position of the "dancer" is actually controlled by adjusting the drive velocity so that a constant take-up reel, outer edge tangential velocity, equal to the line speed, is maintained. The modification circuit includes a supplementary clutch current bandpass filter circuit and a position rate circuit to provide the lead compensation necessary for stability. The current gains are adjustable so that the dynamic response of a specific system can be tuned.

Visual Inspection

1. Before proceeding to the set-up procedure, check the controller for any damage that may have occurred during shipment, such as loose connections and damaged wire or components.
2. Check all interconnecting wires for conformance to connection diagram and schematic as supplied in this instruction sheet.
3. Check the Operator's controls (which are supplied by customer) to see if they are connected properly per the connection diagram. This includes the Dancer Position pot R5 and the Start and Stop pushbutton controls.

Preliminary Adjustment

Perform the following preliminary adjustments (with no power applied to the controller).

- A. Operator's Controls (supplied by customer unless specified)
 1. Dancer Position Potentiometer R5
 - a. For Winder operation only, set the Dancer Position potentiometer

R5 to 0% (Full CCW).

- b. For Payoff operation only, set the Dancer Position potentiometer R5 to 0% (Full CCW).
- c. Note location of Start and Stop pushbuttons.

B. Main PCB 15-530-5 or 15-530-6

The pots used are screwdriver adjust, single turn pots. Do not use a screwdriver with a blade width exceeding 1/8 inch.

1. Set the Accel Rate potentiometer R18 to 50%. The acceleration time range is 2-25 seconds. The Accel Rate potentiometer controls the rate of rise of the Dancer Operated pot R55 when the drive is first energized or when the Dancer Position pot R5 is changed during operation.
2. Set the Zero Adjust potentiometer R19 to 0% (Full CCW).
3. Set the Max Speed/Volts potentiometer R21 to 0% (Full CCW) (not used).
4. Set the Velocity Damping potentiometer R22 to 0% (Full CCW) (not used).
5. Set the Time Constant (TC) Adjust potentiometer R26 as follows (see trimpot illustration):

Mechanical Unit Model Numbers		TC Adjust Setting
AC/ACM/ACS/PD/VT Fractional Hp (FHP)	AS/AT/AE/VT/EC	
FHP/181/182		0%
184/186/214	14/18/112/132/140/180	15%
216/254/256/280	21/160/210	30%
320/360/440	25/27/180/225/250/280	100%
	320/360/440	100%

*Typical product number stamped on mechanical unit nameplate:

- 1) A1-100214-0053, specific mechanical model is AC-214.
- 2) B2-100210-0008, specific mechanical model is AS-21.

- Set the Current Feedback potentiometer R20 to 0% (Full CCW) (not used).

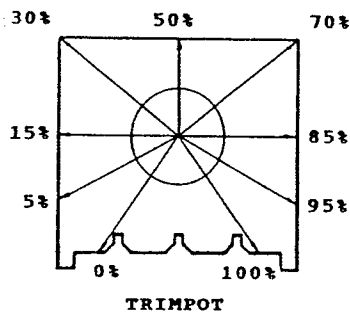
C. Dancer Position Mod PCB 15-444-7

- Set the Velocity Damping potentiometer R21 to 25% CW.
- Set the Current Damping potentiometer R22 to 50% CW.
- Set the Bias potentiometer R23 to 0% (Full CCW).
- Set the TC Adjust potentiometer R24 as follows (see trimpot illustration):

Mechanical Unit Model Numbers		TC Adjust Setting
AC/ACM/WCS/PD/VT Fractional Hp (FHP)	AS/AT/AE/VT/EC	
FHP/181/182		0%
184/186/214	14/18/112/132/140/180	15%
216/254/256/280	21/160/210	30%
320/360/440	25/27/180/225/250/280	100%
	320/360/440	100%

*Typical product number stamped on mechanical unit nameplate:

- A1-100214-0053, specific mechanical model is AC-214.
- B2-100210-0008, specific mechanical model is AS-21.



TRIMPOT ILLUSTRATION

- Set the Lin Accel switch SW2 to the OFF position.

D. The Dancer Operated potentiometer R55 is located externally to the controller and operator station and is driven by a moveable dancer roll.

Adjustment Procedure

Do not have material attached to winding roll for this procedure.

Note - The following procedure is for vertical motion dancers. For horizontal motion dancers on both winders and pay-offs, the maximum storage position would correspond to the extreme low end of travel on a vertical motion dancer.

For Winder Operation: The Dancer Operated potentiometer must be at the extreme low end of travel.

For Payoff Operation: The Dancer Operated potentiometer must be at the extreme high end of travel.

- Using a voltmeter on the 0-10 Vdc range, connect the meter leads to terminals -P1 and test point +TP1 on the modification PCB.
- Start the motor and apply power to the controller.
- Adjust the Bias potentiometer R23 CW on the 15-444-7 modification board until a zero reading is obtained on the meter. Remove power and disconnect the meter.
- Connect a voltmeter on the 0-50 Vdc range to clutch leads -C1 and +C2. Depress the Start pushbutton. CAUTION: the drive may rotate.
- Turn the Zero Adjust potentiometer R19 CW until the needle starts to deflect; then back off CCW until the reading is just zero. Remove power and disconnect the meter.

ZERO ADJUST R19 with LED monitor - Slowly increase the Zero Adjust Pot R19 CW while monitoring the LED, D22. When the controller output is turned ON or clutch voltage is turned ON (or the drive shaft begins to rotate), the LED should start flashing. Now just back off slowly until the flashing stops. Remove power.

6. For Winder Operation only:

- Connect a voltmeter on the 0-10 Vdc range to the Dancer Operated pot R55 terminals -P1 and +P7.

Apply power to the controller. With the dancer at the bottom of its travel, the meter should read zero volts. Raise the dancer to the top of its travel. The meter should read approximately 9 Vdc. If these readings are not obtained, check for slippage of the Dancer Operated pot. Adjust pot linkages if required until these readings are obtained.

- b. Raise the dancer roll to the desired running height and hold it in this position.
- c. Connect a voltmeter on the 0-50 Vdc range to clutch coil leads -C1 and +C2. Press the Start pushbutton. The meter should read zero. Adjust the Dancer Position pot R5 CW until the meter starts to deflect. Then back off until a zero reading is obtained.
- d. Push the Stop pushbutton. Place SW2 in the Lin position.
- e. Thread the material through the machine with the dancer lowered.
- f. Start the controller with the Start pushbutton.
- g. The dancer should rise to mid-point of its travel without overshooting and should be stable at this point. If the dancer is unstable, increase the setting of the Current Damping pot R22 CW.
- h. Start the main drive. The dancer should drop slightly, and then recover and rise to its set point. If the dancer drops too low and then overshoots, increase the setting of the Velocity pot R21 slightly.

Important Note 1 - Under normal Dancer Position Operation the Velocity Damping setting should not be set at more than half the

Current Damping setting. Some critical systems may require higher settings, but care should be taken when doing so. Higher than required Velocity Damping settings can cause unstable operation.

If the dancer drops but does not quickly recover, the Current Damping pot R22 may be set too high. Decrease the setting as required.

- i. After the dancer has been critically damped (minimum drop with no overshoot), run the machine at various line speeds and check for stability. If the dancer becomes erratic and hunts (oscillates), increase the setting of the Current Damping pot R22 CW until stability is obtained.
- j. A certain amount of dancer drop is normal when starting the main drive or changing the line speed. These position changes can be minimized by careful and correct adjustments of the Velocity Damping and Current Damping pots. A certain amount of trial and error will have to be made to obtain optimum performance.

7. For Payoff Operation only:

- a. Connect a voltmeter on the 0-10 Vdc range to the Dancer Operated pot R55 terminals -P1 and +P7. Apply power to the controller. With the dancer at the top of its travel, the meter should read zero volts. Lower the dancer to the bottom of its travel. The meter should read approximately 9 Vdc. If these readings are not obtained, check for slippage of the Dancer Operated pot. Adjust pot linkage if required until these readings are obtained.
- b. Lower dancer roll to the desired running height and hold it in this position.

- c. Connect a voltmeter on the 0-50 Vdc range to clutch coil leads -C1 and +C2. (Press the Start pushbutton.) The meter should read zero. Adjust the Dancer Position pot R5 CW until the meter starts to deflect. Then back off until a zero reading is obtained.
- d. Push the Stop pushbutton. Place SW2 in the Lin Position.
- e. Thread the material through the machine with the dancer lowered.
- f. Start the controller with the Start pushbutton.
- g. Start the Winder.
- h. The dancer should rise to the midpoint of its travel without overshooting. If the dancer overshoots, the system is underdamped. Increase the setting of the Velocity Damping pot R21 CW slightly.

Important Note 1 - Under normal Dancer Position Operation the Velocity Damping setting should not be set at more than half the Current Damping setting. Some critical systems may require higher settings, but care should be taken when doing so. Higher than

required Velocity Damping settings can cause unstable operation.

Note 2 - When making damping adjustments, it is important that the payoff have a full roll of material. This is normally the most difficult roll condition at which to stabilize a dancer. As the payoff approaches the core, the system will appear overdamped. This is due to the change in torque and loading on the drive.

- i. After the Dancer has been critically damped (minimum rise time with no overshoot), run the machine at various line speeds and check for stability. If the dancer becomes unstable and hunts (oscillates), increase the setting of the Current Damping pot R22 CW until stability is obtained.
- j. A certain amount of dancer drop is normal when changing line speed. These position changes can be minimized by careful and correct adjustments of the Velocity and Current Damping pots. A certain amount of trial and error will have to be made to obtain optimum performance.

This completes the adjustment procedure.

Renewal Parts List for Standard 4000 and 4050 Controllers with Dancer Position

Qty	Part Number	Description	Legend
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MODEL 4000 CONTROLLERS

15-530-0005 MAIN PCB ASSEMBLY**			
1	27-123-0001	Mini-jumper	J1
* 2	32-018-4091	Fuse, 4 Amp, 250 V	FU1,2
* 1	53-398-0001	Relay, 4pdt, plug-in	E
15-533-1016 PANEL MOUNT			
1	15-530-0005	Main PCB (Refer to PCB parts list above.)	
* 1	15-444-0007	Dancer Position PCB assembly	
4	36-298-0010	Circuit board support	
15-535-1016 STANDARD ENCLOSURE			
1	15-530-0005	Main PCB (Refer to PCB parts list above.)	
* 1	15-444-0007	Dancer Position PCB assembly	
1	15-531-1001	Base assembly	
1	15-532-0011	Cover assembly (Dancer Position)	
1	12-007-0003	Cover, 1 knob	
* 1	15-529-0001	Pushbutton assembly	PB1,2
* 1	15-529-0010	Dancer Position pot	R5
4	36-298-0010	Circuit board support	
15-536-1016 BLANK COVER			
1	15-530-0005	Main PCB (Refer to PCB parts list above.)	
* 1	15-444-0007	Dancer Position PCB assembly	
1	15-531-1001	Base assembly	
1	15-532-0000	Cover assembly (blank)	
4	36-298-0010	Circuit board support	

MODEL 4050 CONTROLLERS

15-530-0006 MAIN PCB ASSEMBLY**			
1	27-123-0001	Mini-jumper	J1
* 2	32-028-0100	Fuse, 10 Amp, 250 V	FU1,2
* 1	53-398-0001	Relay, 4pdt, plug-in	E
15-539-0016 PANEL MOUNT			
1	15-530-0006	Main PCB (Refer to PCB parts list above.)	
* 1	15-444-0007	Dancer Position PCB assembly	
1	15-529-0019	Heat sink assembly, incl. Q1 & D3	
4	36-298-0010	Circuit board support	
15-540-0016 STANDARD ENCLOSURE			
1	15-539-0016	Panel assembly (Refer to Panel Mount parts list above.)	
1	49-309-502	External Dancer Operated pot	R55

* denotes minimum spare parts.

** denotes suggested spares when downtime is critical.



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