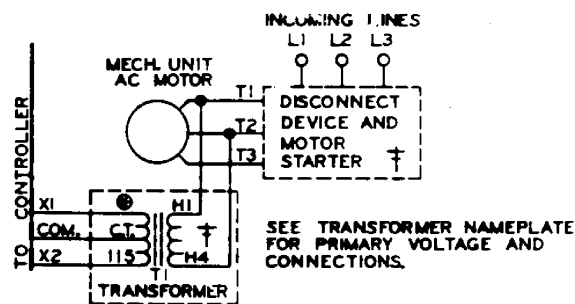
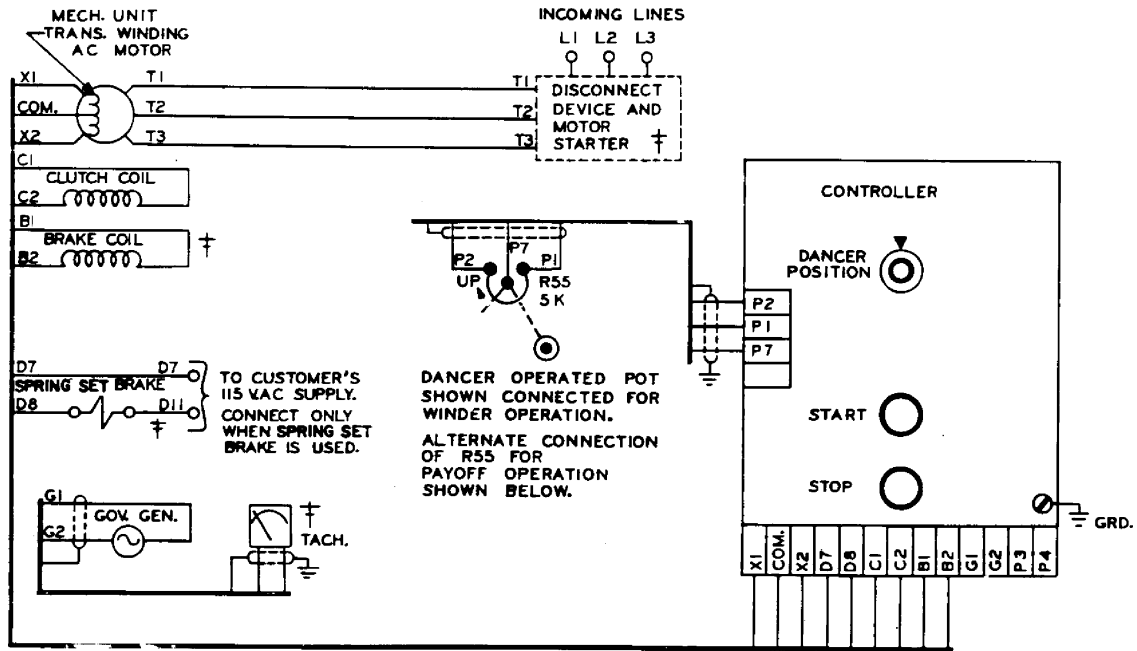




|                                                           |           |
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# Connection Diagram for Standard Enclosure 4000 Controller

ED-58216



## CONTROL PROGRAMMING

### 15-530-5 P.C.B.

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

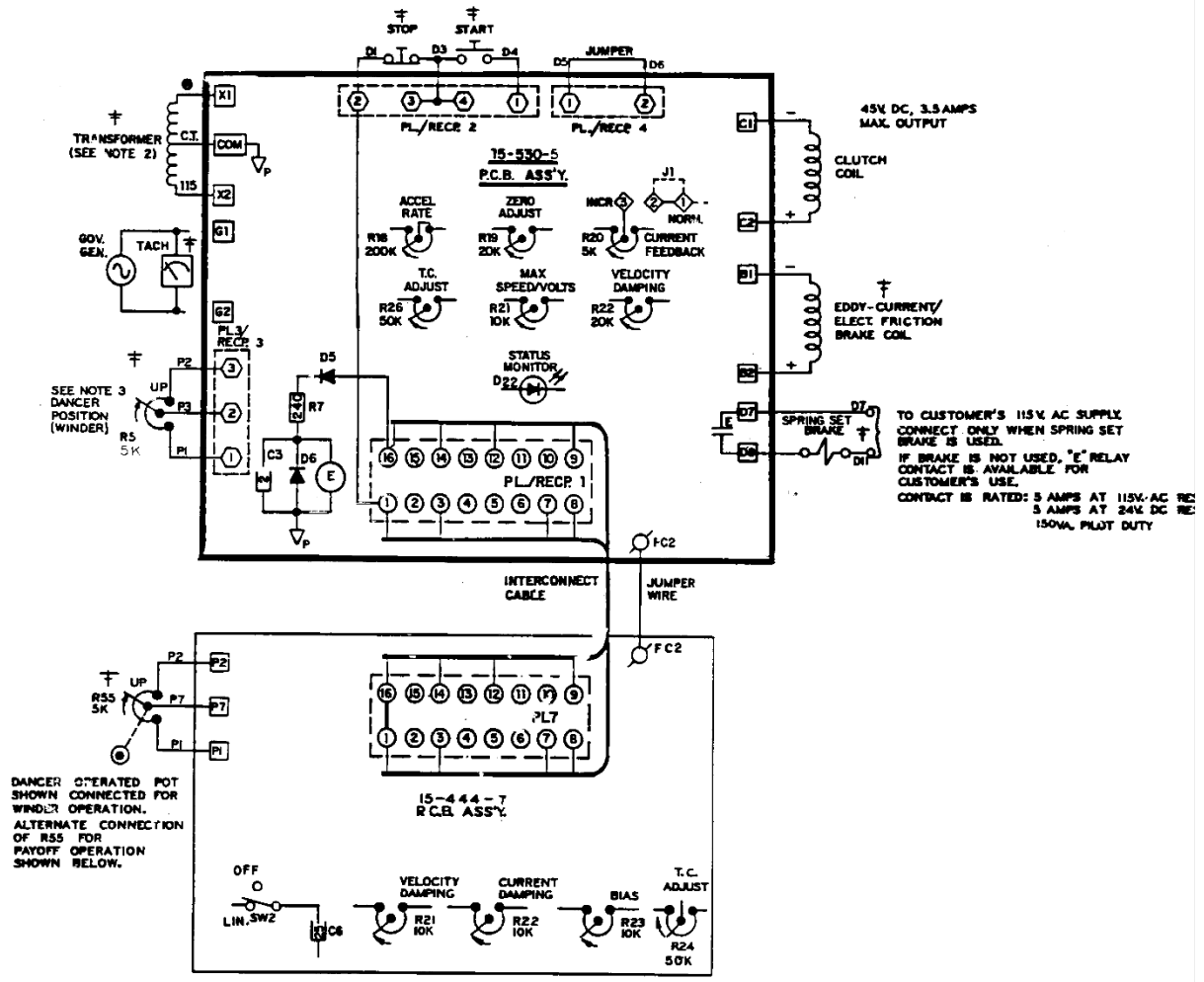
| MECH. UNIT      | T.C. ADJ R24 & R26<br>(PERCENT) |
|-----------------|---------------------------------|
| FRACT. /181/182 | 0                               |
| 184/186/214     | 15                              |
| 216/254/256     | 30                              |

### 15-444-7 P.C.B.

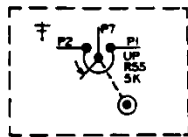
SW2- POSITION-LIN

ELIMINATE LINEAR ACCELERATION.  
IF SW2 IN "OFF" POSITION  
ADJUST R24- SET PER TABLE ABOVE

# Schematic Diagram for 4000 Controller

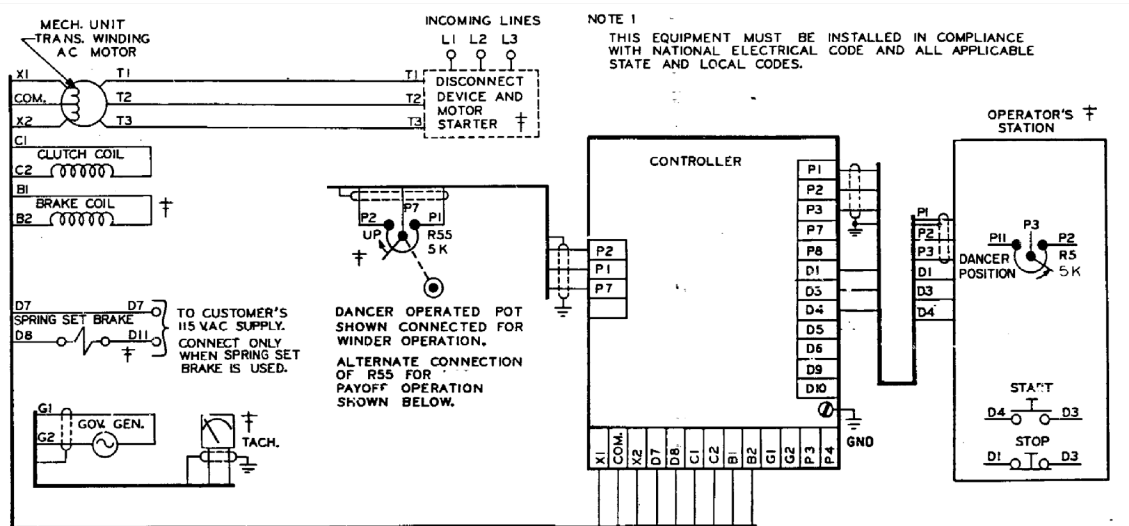


ALTERNATE CONNECTION OF DANGER OPERATED POT FOR PAYOFF OPERATION



## Connection Diagram 4000 Panel Mount and 4050 Controller

ED-56816



### CONTROL PROGRAMING

15-530-6 P.C.B.

J-POSITION-NORM T.C. ADJUST R26- SET PER TABLE BELOW

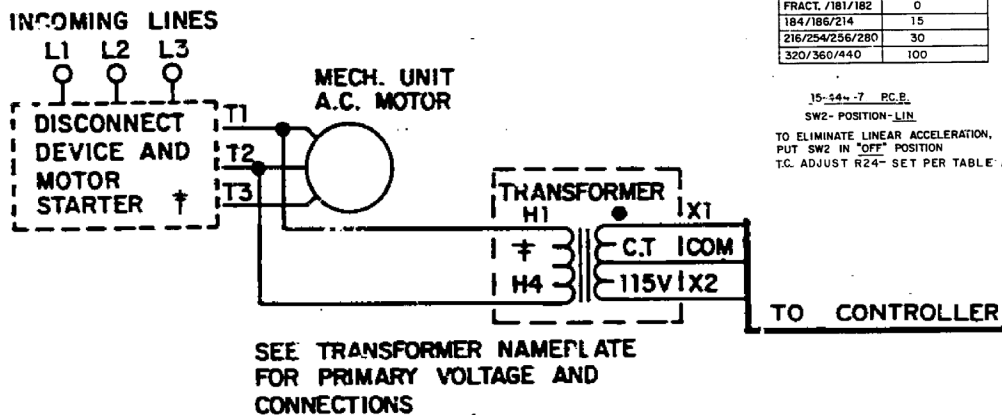
| MECH. UNIT      | T.C. ADJ. R24 (PERCENT) |
|-----------------|-------------------------|
| FRACT. /181/182 | 0                       |
| 184/186/214     | 15                      |
| 216/254/256/280 | 30                      |
| 320/360/440     | 100                     |

15-544-7 P.C.B.

SW2- POSITION-LIN

TO ELIMINATE LINEAR ACCELERATION, PUT SW2 IN "OFF" POSITION

T.C. ADJUST R24- SET PER TABLE ABOVE



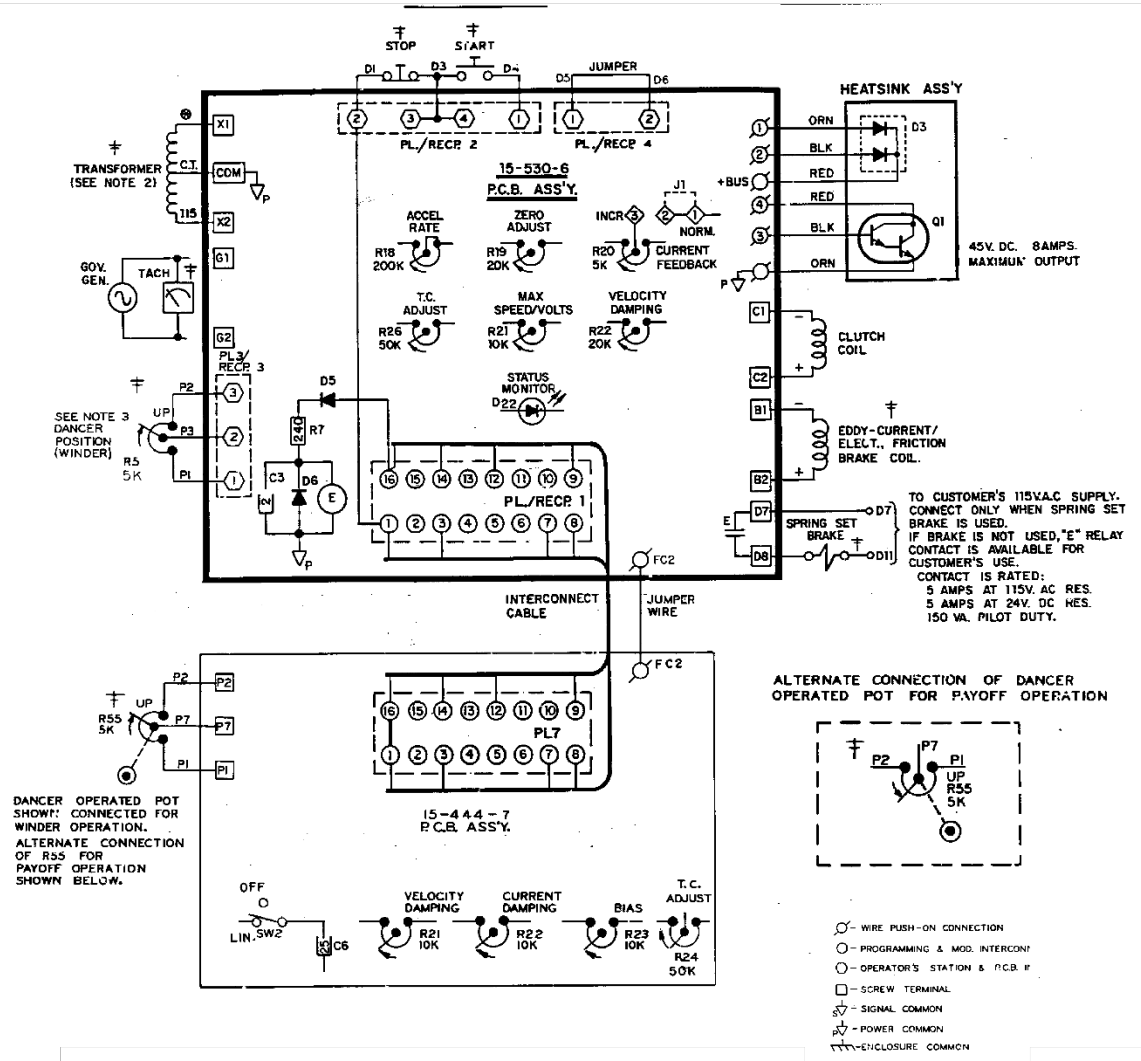
Note 1: This Equipment must be installed in compliance with National electrical code and all applicable state and local codes

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.

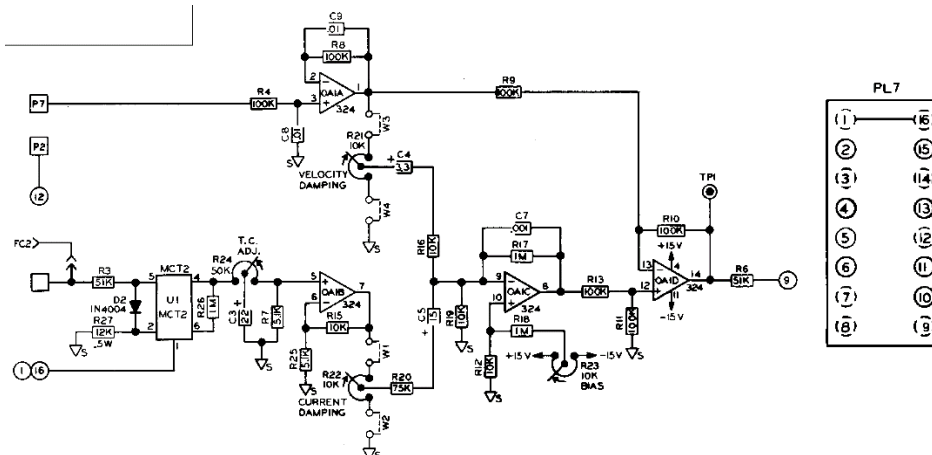
Note 3: Dancer Position pot R5 is shown wired for winder operation. For use with payoff, pot rotation will be reversed- rotating the Dancer Position pot R5 toward the zero (P1) and will cause the dancer to rise

Note 4: Values shown are typical. See BOM for actual values

## Schematic Diagram for 4050 Controller



## Dancer Position Modification PCB 15-444-7



## Modification PCB Mounting

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

1. Place the Main PCB in front of you with the long dimension in a horizontal position and the terminal strip to the left.
2. 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.
3. 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.
4. 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.
5. 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.

## 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 interconnection 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) (Note Used)
5. Set the Time Constant (TC) Adjust potentiometer R26 as follows (See trimpot illustration):
6. Set the Current Feedback potentiometer R20 to 0% (Full CCW) (Not Used)

| Mechanical Unit Model Numbers           |                       | TC Adjust Setting |
|-----------------------------------------|-----------------------|-------------------|
| AC/ACM/ACS/PD/VT<br>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

C. *Dancer Position Mod PCB 15-444-7*

1. Set the Velocity Damping potentiometer R21 to 25% CW
2. Set the Current Damping potentiometer R22 to 50% CW
3. Set the Bias potentiometer R23 to 0% (Full CCW)
4. Set the TC adjust potentiometer R24 as follows (see trimpot illustration):
5. Set the Lin Accel switch SW2 to the OFF position

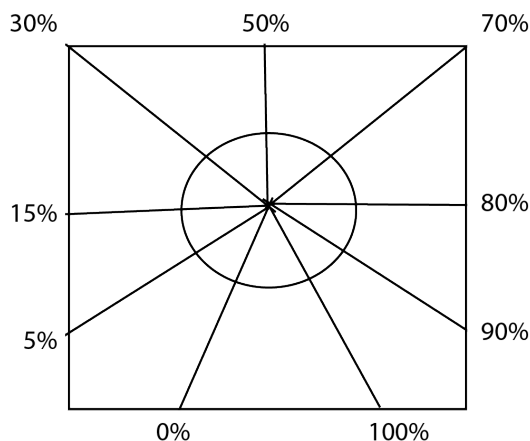
| Mechanical Unit Model Numbers           |                       | TC Adjust Setting |
|-----------------------------------------|-----------------------|-------------------|
| AC/ACM/ACS/PD/VT<br>Fractional Hp (FHP) | AS/AT/AE/VT/EC        |                   |
| FHP/181/182                             |                       | 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

Figure1: Trimpot Illustration



- 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 payoffs, 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.***

1. Using a voltmeter on the 0-10 Vdc range, connect the meter leads to terminals – P1 and test point +TP1 on the modification PCB.
2. Start the motor and apply power to the controller.
3. Adjust the Bias potentiometer R23 CW on the 15-444-7 modification board until a zero reading is obtained on the meter. Remove and disconnect the meter.
4. Connect a voltmeter on the 0-50 Vdc range to clutch leads -C1 and +C2. Depress the Start pushbutton. ***Caution: The drive may rotate.***
5. 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:

- 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 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 midpoint 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 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 setting can cause unstable operation.

If the dancer drops but does not quickly recover, the Current Damping pot R22 may be set to 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 over shooting. If the dancer over shoots, 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 setting, 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 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 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 & 4050 Controllers with Dancer Position

| Qty                              | Part Number | Description                                            | Legend |
|----------------------------------|-------------|--------------------------------------------------------|--------|
| 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                                  |        |
| 15-551-1016 Standard Enclosure   |             |                                                        |        |
| 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                                  |        |
| 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                                  |        |
| 15-553-0016 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

Drive Source International/Dynamatic  
7900 Durand Ave Bldg 3 Sturtevant, WI 53177  
800-548-2169 • sales@dynamatic.com  
www.Dynamatic.com