

INSTRUCTION MANUAL

MODEL P3 PNEUMATIC TENSION CONTROLLER

DOVER FLEXO ELECTRONICS
217 Pickering Rd.
Rochester, NH 03867
(603) 332-6150 FAX (603) 332-3758
E-mail: techsupport@dfc.com Internet: www.dfc.com

TABLE OF CONTENTS

<u>SECTION</u>	<u>SUBJECT</u>	<u>PAGE</u>
1	<u>INSTALLATION</u>	1
	1.1 Controller Ratings	1
	1.2 Location of Controller	1
	1.3 Controller Connections	1
2	<u>DESCRIPTION OF OPERATION</u>	2
	2.1 System Operations	2
	2.2 Transducer Operation	2
	2.3 Circuit Card Function	2
	2.4 Pneumatic Circuit Function	3
3	<u>START-UP PROCEDURE</u>	5
	3.1 Description of all adjustments	5
	3.2 Calibration	6
	3.3 Tuning the Controller	7
	3.4 Adjusting the Max Circuit	7
	3.5 Taper Adjustment	7
	3.6 Ration Off Delay	8
	3.7 Soft Start Operation	8
	3.8 Tension Limit Switch Instructions (TLS Option)	8
4	<u>TROUBLESHOOTING AND MAINTENANCE</u>	10
	4.1 Tools and Test Conditions	10
	4.2 Troubleshooting Procedure	10
	4.3 Preventive Maintenance	12
	TERMS AND CONDITIONS OF SALES	13
	DIAGRAMS	

1.1 CONTROLLER RATINGS

ELECTRICAL RATING:

Input - 117 Volts, 60 Hz @ 1 amp

PNEUMATIC RATINGS:

Input - 75 to 120 PSIG pressure @ 15CFM

Output - 0 to 75 PSIG Variable, as required to maintain set tension

1.2 LOCATION OF CONTROLLER

Mount the controller in a dry place, away from any source of heat. It should not be more than 7 feet from the floor. The mounting surface should be free of excessive vibration. The bottom of the cabinet must be accessible to allow cleaning of the air filter.

Try to mount the controller close to the brake or clutch so no more than 25 feet of tubing is required between the brake or clutch and the controller.

1.3 CONTROLLER CONNECTIONS

WIRING:

All external connections are made at the terminal strips on the panel. Refer to the external connection diagram provided.

1. Use shielded cable for tension meter, tension set-point potentiometer, and transducer wiring. *Ground the shield at the controller end only!*
2. Double check accuracy of all connections before applying power to the controller.

PNEUMATIC CONNECTIONS:

1. Air input - Use 5/16" O.D. tubing nylon or polyethylene.
2. Air output - use 1/4" O.D. tubing.

2.1 SYSTEM OPERATION

The P3 Tension Controller is part of a closed loop (negative feedback) control system. Also included in the system are the tension transducers, brake or clutch, and the tension set point potentiometer.

Briefly, the system functions in this way: The press operator sets the tension set point pot. to the desired tension. The transducers measure actual tension. The controller compares actual tension with desired tension and adjusts torque output of the brake or clutch to make actual tension the same as desired tension. The controller automatically varies brake or clutch torque to compensate for speed changes, roll diameter changes and other factors to maintain desired tension. Web tension is displayed on a large meter so the operator can see it easily at a glance.

2.2 TRANSDUCER OPERATION

The tension transducers convert web tension into an electrical signal which is linearly proportional to tension. Two transducers are used, one on each end of an idler roll. The two signals are added together so the sum represents average web tension.

Each transducer contains two strain gages connected in series. They are wired so the four gages form a bridge which is excited by 5 Volts DC. As web tension applies force to the transducers, the resistance of the strain gages changes and a small output voltage signal is produced.

2.3 CIRCUIT CARD FUNCTION

A. The REGULATOR CARD (R4) accepts the transducer signal and amplifies it via amplifier U1. This amplified web tension signal is used for many functions;

1. Provides an external 0 VDC to +5 VDC output signal.
2. Provides an external 0 VDC to +100m VDC output signal.
3. Provides (2) separate tension meter outputs.
4. Conditions the web tension signal for other circuit functions.

Amplifier U2 accepts the conditioned web tension signal and compares it to the signal from the tension set point potentiometer. A difference between these two signals will cause a resulting error signal. The error signal will be high if the web tension is too low compared to the tension set point setting and will be low if the web tension is too high compared to the tension set point setting.

Amplifier U3 is a Sample and Hold amplifier that is used to hold the output air pressure constant during a splicing operation.

Amplifier U5 is part of the Soft Start circuitry contained on this card, and its associated circuitry sets the trip level that determines whether the controller should be in the automatic mode or the soft start mode. Then tension signal is continually being monitored by the soft start circuitry. If the tension (on the web) goes below the soft start trip point, the unit will go into the soft start mode after a 3 second time delay. If the tension (on the web) is above the soft start trip point, then the unit will immediately go into the automatic mode. The soft start trip point automatically tracks and changes as the desired tension level is dialed in. When the tension set point potentiometer is set low the soft start trip point is at approximately 4% of the tension meters full scale reading. When the tension set point potentiometer is set high the soft start trip point is at approximately 10% of the tension meters full scale reading. When the controller goes in to the soft start mode, a low value of air pressure is applied to the unit's output. This low value of air pressure automatically tracks and changes as the desired tension level is dialed in. A switch is provided to allow the soft start feature to be enabled or disabled.

The regulator card also contains the stability and gain circuits and the adjustable MAX which limits the maximum brake or clutch torque to a value chosen by the machine operator. The Dual Calibration option and the Ratio are also contained on this card.

- B The POWER SUPPLY CARD (PS6) Accepts the resulting error signal (from the regulator card) and via drive circuitry controls the current flow through the servo valve coil.

This card contains the following power supplies:

1. +15 VDC - Powers Electronic Circuitry
2. -15 VDC - Powers Electronic Circuitry
3. +24 VDC - Powers All Relays
4. 5 VDC (isolated) - Powers Transducers
5. 5 VDC (isolated) - Optional Power Supply

Also located on this card is the Emergency Stop circuitry, part of the optional "Remote Tension On/Off Control" circuitry, and the Minimum Output circuitry. The min. pot. can be used to vary the minimum output air pressure to the brake or clutch from 0 psi fully CCW to 15 psi (1,03 bar) fully CW.

2.4 PNEUMATIC CIRCUIT FUNCTION

- A. Filter - Removes dirt and water from the air. 5 micron element should be cleaned monthly. Water is drained from the bowl automatically when it reaches the proper level.
- B. Air Pressure Regulators - Determines the maximum pressure applied to the brake or clutch. Set at 75 psi (5,17 bar) for automatic mode operation. Set as required for manual mode operation, but do not exceed 75 psi (5,17 bar).

- C. Solenoid Valve - Solenoid valve L1 is pneumatically connected so that when de-energized, air flow to the brake or clutch is blocked and the brake or clutch is exhausted to atmosphere. When L1 is energized, air flows from the servo valve to the brake or clutch.

- D. Servo Valve - Takes the variable current output from the power supply and converts it to the correct air pressure which is then applied to the brake or clutch.

3.1 DESCRIPTION OF ALL ADJUSTMENTS

Located on the regulator (R4).

ZERO 1 - Used to adjust the tension meter to zero.

ZERO 2 - (Option) used to adjust the tension meter to zero.

CALIBRATE 1 - Used to calibrate the tension meter to a known tension applied at the tension sensing roll.

CALIBRATE 2 - (Option) used to calibrate the tension meter to a known tension applied at the tension sensing roll.

TAPER - Adjusts the amount (percent) that the tension decreases as the roll diameter increases. Adjustable from 0% to as much as 50%.

STABILITY - Used to tune the unit for overall stability and stable operation. Also determines the amount of integration occurring in the processing (or regulator) section.

RESPONSE - Adjustment used to allow the unit to respond to fast changes that might occur during the unwinding process. When fast or large tension changes occur on the web, the response pot determines how much the output of the unit should change to correct for these tension changes.

MAX - used to limit the maximum air pressure output to the brake or clutch.

RATIO OFF DELAY - Adjusts the amount of time delay (0 to 8 seconds) that the ratio off delay circuit is enabled once the splice sequence has ended.

RATIO SELECTOR SWITCH - Set this switch according to the application. When in the unwind position, the output is multiplied when the circuit is activated. When in the rewind position, the output is divided down when the circuit is activated. To prevent the roll from coasting while the machine is stopping, set the ratio switch to unwind. Use the unwind ratio pot to adjust the amount of additional air pressure applied to the brake or clutch. Set the ratio off delay pot fully clockwise.

SOFT START ON/OFF SWITCH - Activates or de-activates the soft start circuitry.

GAIN - (Should not be adjusted unless stability cannot be achieved). Used to adjust the controller overall circuit gain in the processing (or regulator) section.

UNWIND RATIO - Used to adjust the amount of the output air pressure increases when the ratio circuit is energized. When fully counterclockwise, there will be little change (the ratio is approximately 1:1). When the pot. is fully CW, the ratio is approximately 10:1.

REWIND RATIO - Used to adjust the amount the output air pressure decreases when the ratio circuit is energized. When fully clockwise, the ratio is approximately 1:1. When the pot is fully CCW, the ratio is approximately 1:10.

3.2 CALIBRATION

1. Check the transducers to be sure they are properly mounted and oriented. (Refer to the Transducer Installation instructions).
2. Before applying power to the tension controller, check the small tension meter needle. If it is not on zero, adjust the small screw below the meter scale until the needle rests on zero.
3. Turn on power to the controller and let it warm up for 5 minutes.
4. Turn the ZERO 1 pot. on the regulator card until the meter reads zero. (Turning the pot. clockwise will increase the meter reading).
5. Thread a length of rope over the center of the tension sensing roll following the exact same path as the web will take. Do not pass the rope over dead bars, driven rolls, braces or any other non-free wheeling member. The sliding friction introduced by these members will cause inaccurate calibration. Fasten one end of the rope securely.
6. Attach a weight of known value to the other end of the rope. (Its weight should be about half the maximum scale reading of the tension meter). Or use a spring scale to apply the required force.
7. Turn the CALIBRATE 1 pot. on the regulator card until the meter reading is the same as the weight.
8. If the tension meter reads backwards, reverse the two white wires in the transducer cables.
9. Remove the load from the sensing roll and observe the tension meter. If it does not return to zero, repeat steps 4, 7, and 9.

REPEAT ABOVE STEPS FOR DUAL CALIBRATION.

3.3 TUNING THE CONTROLLER FOR STABLE OPERATION

1. Web up the press.
2. Locate the regulator card.
 - A. Stability - The stability pot. is a 1 turn (320°) pot. Set the stability pot. 60% CW.
 - B. Response - The response pot. is a 1 turn (320°) pot. Set the response pot. 25% CW.
3. Run the press at 150 FPM and observe the tension meter. If tension fluctuates more than 2 or 3 divisions, adjust the stability and response pots to minimize fluctuation.

TURN THE POTS VERY SLOWLY!

NOTE: Stability is usually set high and response is usually low. If response is too high it will cause instability.

4. If adjusting the stability and response pots does not stabilize the controller, turn the GAIN pot CCW slowly until stability is achieved.
5. Run the press at maximum speed and observe the tension meter. If necessary, tension variations can be minimized by slowly adjusting the stability and response pots.

3.4 ADJUSTING THE MAX CIRCUIT

The MAX circuit prevents web breakage or stretching during splicing or while the machine is starting. This is accomplished by limiting the maximum torque of the brake or clutch that required by the full roll.

1. Install a full roll.
2. Turn MAX completely CW.
3. Run the machine at 200 FPM and adjust tension to the desired value.
4. Turn MAX CCW slowly until tension just begins to decrease. Leave at this setting.

3.5 TAPER ADJUSTMENT

This circuit allows the tension to decrease as the roll diameter increases.

1. Turn the TAPER On/Off switch to On.
2. Set the TAPER adjustment pot 1/2 turn CW. Run the machine and wind up to a full roll while watching the tension meter. Adjusting the TAPER adjustment pot as required until the desired amount of tension decrease is achieved.

3.6 RATIO OFF DELAY

The RATIO OFF DELAY pot is a 1 turn (320°) pot. Set the RATIO OFF DELAY pot. 50% CW. Run the machine and make a splice. While watching the tension meter, note how long it takes for the web to stabilize after the splice has been made. Adjust the RATIO OFF DELAY pot for about 1 second longer than it takes the web to stabilize.

3.7 SOFT START OPERATION

SOFT START circuitry has been designed to eliminate "locked up" and/or high tension start ups when the controller is used as an unwind. **Note:** If this controller is used as a rewind, the SOFT START OPERATION is not desirable. To eliminate the SOFT START OPERATION when the controller is used as a rewind, switch the SOFT START On/Off switch to Off.

3.8 TENSION LIMIT SWITCH INSTRUCTIONS (OPTION)

Theory of Operation

Refer to Drawing E1300D. The TLS circuit uses two OP-amps and other discreet components to monitor the tension signal produced on the regulator card.










Low Set and High Set potentiometers are adjusted to set low and high reference voltages to U110 and U111, which change states when the tension input signal falls below or rise above these preset reference voltages

When U110 or U111 output is high, relay K102 or K103 is energized through Q112, or Q113. When U110 or U111 output is low, relay K102 or K103 is de-energized through Q114 or Q115.

The amount of time it takes relay K102 or K103 to de-energize is dependent on delay 1 pot or delay 2 pot. At fully CCW there is no delay, and at fully CW there is a delay of about 3 or 3 1/2 seconds before the appropriate relay de-energizes

Adjustment of the Set Potentiometers

LOW SET - Reference Drawing E1300D. Low set pot R169 is used to set the low end tension limit of detection. From 0 to about 60% off full scale is the range of adjustability. Refer to table below for an approximate setting of R169.










RELAY K102	PERCENTAGE OF FULL SCALE								
ENERGIZE	60%	57%	50%	42%	32%	22%	13%	8%	6%
DE-ENERGIZE	55%	52%	45%	38%	26%	16%	8%	2%	1%
POT SETTING R169									
	4 o'clock	3 o'clock	2 o'clock	1 o'clock	12 o'clock	11 o'clock	10 o'clock	9 o'clock	8 o'clock

With AC power applied, relay K102 is de-energized until tension is brought higher than set pot R169. In this example, R169 is set at 12 o'clock.

As tension increases past 32% of full scale (16 minor divisions on the tension meter), relay K102 energizes, closing the contacts of TB7-14 and 15, and TB7-16 and 17, and also opens the contacts of TB-13 and 15, and TB7-17 and 18.

When tension decreases below 26% of full scale (13 minor divisions), relay K102 de-energizes, closing the contacts of TB7-13 and 15, and TB7-17 and 18, and opening the contacts of TB7-14 and 15, and TB7-16 and 17.

HIGH SET - Reference Drawing E1300D. High set pot R184 is used to set the high end tension limit of detection, from 0% to over full scale is the range of adjustability. Refer to table below for an approximate setting of R184.

RELAY K103	PERCENTAGE OF FULL SCALE								
DE-ENERGIZE	42%	44%	54%	64%	74%	84%	96%	110%	125%
ENERGIZE	38%	40%	50%	58%	68%	80%	90%	110%	125%
POT SETTING									
R184	8:00 o'clock	9:00 o'clock	10:00 o'clock	11:00 o'clock	12:00 o'clock	1:00 o'clock	2:00 o'clock	3:00 o'clock	4:00 o'clock

With AC power applied, relay K103 is automatically energized, unless at that time tension is higher than set pot R184.

In this example, R184 is set at 12 o'clock, as tension increases past 74% of full scale (37 minor divisions) relay K103 de-energizes, closing contacts on TB7-23 and 24 and TB7-26 and 27, and also opening contacts TB7-22 and 23 and TB7-25 and 27. Relay K103 will energize again when tension is allowed to drop below pot 184 setting (68% of full scale) 34 minor divisions.

Delay Potentiometers R17 & R189

- The delay pots are adjustable from 0 sec. (CCW) to about 3 1/2 sec. (CW).
- The low set delay starts when tension drops below low set pot R169 setting.
- The high set delay starts when tension increases above high set pot 184 setting.
- The delay set pot 's R178 & 189, delay the de-energizing of relays K102 and K013.

4.1 TOOLS AND TEST CONDITIONS

The procedure detailed here is intended to help the electrician to determine which circuit card is faulty so it may be replaced with a new one. No instruction is given for repair of the cards themselves.

Equipment Required:

- (1) AC-DC multi-meter having 0-1 volt and 0-100 volt scales.
- (2) Small screwdrivers or TV tuning tools to adjust potentiometers

Test Conditions:

The machine must be stopped. The web must lay slack or be removed from over the transducer roll.

ALL TESTS SHOULD BE DONE BY A QUALIFIED ELECTRICIAN!

Points to remember:

- ! All voltages given are approximate. actual values may vary 20%.
- ! The tests are written to describe proper operation of each card. Results which are much different from those given indicate that a problem exists.
- ! Do not change the setting of any pot until told to do so.

4.2 TROUBLESHOOTING PROCEDURE

VERY IMPORTANT!

THE FOLLOWING PROCEDURE MUST BE PERFORMED IN THE ORDER GIVEN!

1. Turn off power to the P3 controller.
2. Take a few moments to locate and identify each circuit card. Notice, each card has several test jacks that are identified by a number such as TP1, TP2, etc. These test points will be "referred to" throughout the trouble-shooting procedure. The test jacks will accept the standard .080 "diameter test probes on most multimeters."
3. Turn on power to the controller.

POWER SUPPLY CARD (PS6)

4. The voltage between TP18 and TP15 (+) should be 15 VDC.
5. The voltage between TP18 (+) and TP14 should be 15 VDC.
6. The voltage between TP18 and TP17 (+) should be 24 VDC (± 3 VDC).
7. The voltage between the TP10 (+) and TP11 should be 5 VDC.

REGULATOR CARD (R4)

8. Using the zero pot, adjust CW until the tension meter reads full scale. Unless the cal pot is at least 25% CW, the zero pot will not have enough range. The voltage between TP2 and TP5 (+) should be 4.8 VDC.
9. Using the zero pot, adjust CCW until the tension meter reads zero. Switch the soft start on-off switch off. Set the tension set point pot (located on the front cover) to 5. Turn the Max pot fully CW. The voltage between TP2 and TP8 (+) should be 8.6 VDC (± 3 VDC).

POWER SUPPLY CARD (PS6)

10. Turn the max pot (located on the regulator card) fully CCW. The voltage between the TP18 and TP12 (+) should be 0 VDC.

REGULATOR CARD (R4)

11. Turn the max pot fully CW. Switch the soft start on-off switch on. The voltage between the TP2 and TP8 (+) should be 1.4 VDC (± 3 VDC).
12. Using the zero pot, adjust the CW until the tension meter reads 25% of full scale. The voltage between TP2 and TP8 (+) should be 8.6 VDC (± 3 VDC).
13. Set the tension set point pot (located on the front cover) to off (fully CCW). The voltage between TP8 and TP2 (+) should be .3 VDC (± 3 VDC).
14. Set the tension set point pot (located on the front cover) to 5. Using a jumper wire, jumper between TB6-6 and TB6-5. The voltage between TP2 and TP8 (+) should be 1.4 VDC (± 3 VDC). Remove jumper.

POWER SUPPLY CARD (PS6)

15. Set the tension set point pot (located on the front cover) to off (fully CCW). Using a jumper wire, jumper between TB2-4 and TB2-18. The voltage between TP18 and TP12 (+) should be a 7.8 VDC (± 3 VDC). Remove jumper.

This completes the troubleshooting procedure for the basic controller (without options). Refer to the START-UP PROCEDURE section for calibration and tuning, or continue with the trouble-shooting procedure covering any option your controller may have. It is not necessary to follow the "options" troubleshooting procedure in the order given, go directly to the options your controller has.

DUAL SCALE TENSION METER WITH SWITCH OPTION (R4 CARD)

1. Switch the dual scale meter switch to HI. Using the ZERO 1 pot, adjust the tension meter to full scale. The voltage between TP2 and TP5 (+) should be 4.85 VDC. Using the ZERO 1 pot, adjust the tension meter to zero.
2. Switch the dual scale meter switch to LO. Using the ZERO 2 pot, adjust the tension meter to full scale. The voltage between TP2 and TP5 (+) should be 4.85 VDC. Using the ZERO 2 pot, adjust the tension meter to zero.

4.3 PREVENTIVE MAINTENANCE

Preventive maintenance for electronic equipment consists of keeping it clean. Layers of dust cause overheating of electronic components. If the dust is conductive it can cause short circuits and produce all kinds of strange behavior.

Check the equipment at least once a month. It doesn't take long and could prevent costly down-time.

DO NOT USE COMPRESSED AIR FOR CLEANING. DAMAGE COULD RESULT.

Use a soft brush to remove dust. If a solvent is necessary, use denatured alcohol.

TERMS AND CONDITIONS OF SALE AND SHIPMENT

1. THE COMPANY

Dover Flexo Electronics, Inc. is hereinafter referred to as the Company.

2. CONFLICTING OR MODIFYING TERMS

No modification of, additions to or conflicting provisions to these terms and conditions of sale and shipment, whether oral or written, incorporated into Buyer's order or other communications are binding upon the Company unless specifically agreed to by the Company in writing and signed by an officer of the Company. Failure of the Company to object to such additions, conflicts or modifications shall not be construed as a waiver of these terms and conditions nor an acceptance of any such provisions.

3. GOVERNING LAW

This contract shall be governed by and construed according to the laws of the state of New Hampshire, U.S.A.

4. PENALTY CLAUSES

Penalty clauses of any kind contained in orders, agreements or any other type of communication are not binding on the Company unless agreed to by an officer of the Company in writing.

5. WARRANTY

Dover Flexo Electronics, Inc. warrants its' products to be free of defects in material and workmanship for one year from date of original shipment. During the warranty period the Company will repair or replace defective products free of charge if such products are returned with all shipping charges prepaid and if, upon examination, the product is shown to be defective. This warranty shall not apply to products damaged by abuse, neglect, accident, modification, alteration or mis-use. All repairs and replacements under the provisions of this warranty shall be made at Dover Flexo Electronics or at an authorized repair facility. The Company shall not be liable for expenses incurred to repair or replace defective products at any other location or by unauthorized persons or agents. This warranty contains all of the obligations and warranties of the Company. There are no other warranties, either expressed or implied. No warranty is given regarding merchantability or suitability for any particular purpose. The Company shall not be liable in either equity or law for consequential damages, losses or expenses incurred by use of or inability to use its' products or for claims arising from same. No warranty is given for products of other manufacturers even though the Company may provide these products with its' own or by themselves. The provisions of this warranty can not be changed in any way by any agent or employee of the Company. Notice of defects must be received within the warranty period or the warranty is void.

6. PAYMENTS

Standard terms of credit are net 30 days from date of shipment, providing satisfactory credit is established with the Company. Amounts past due are subject to a service charge of 1.5% per month or portion thereof. The Company reserves the right to submit any unpaid late invoices to a third party for collection and Buyer shall pay all reasonable costs of such collection in addition to the invoice amount. All quoted prices and payments shall be in U.S. Dollars.

If the Company judges that the financial condition or payment practices of the Buyer does not justify shipment under the standard terms or the terms originally specified, the Company may require full or partial payment in advance or upon delivery. The Company reserves the right to make collection on any terms approved in writing by the Company's Finance Department. Each shipment shall be considered a separate and independent transaction and payment therefore shall be made accordingly. If the work covered by the purchase order is delayed by the Buyer, upon demand by Company payments shall be made on the purchase price based upon percentage of completion.

7. TAXES

Any tax, duty, custom, fee or any other charge of any nature whatsoever imposed by any governmental authority on or measured by any transaction between the Company and the Buyer shall be paid by the Buyer in addition to the prices quoted or invoiced.

8. RETURNS

Written authorization must be obtained from the Company's factory before returning any material for which the Buyer expects credit, exchange, repairs under the Warranty. Returned material (except exchanges or repairs under the Warranty) shall be subject to a minimum re-stocking charge of 15%. Non-standard material or other material provided specially to the Buyer's specification shall not be returnable for any reason. All material returned, for whatever reason, shall be sent with all freight charges prepaid by the Buyer.

9. SHIPPING METHOD AND CHARGES

All prices quoted are F.O.B. the Company's factory. The Company shall select the freight carrier, method and routing. Shipping charges are prepaid and added to the invoice of Buyers with approved credit, however the Company reserves the right to ship freight-collect if it prefers. Shipping charges will include a charge for packaging. Company will pay standard ground freight charges for items being returned to Buyer which are repaired or replaced under the Warranty.

10. CANCELLATION, CHANGES, RESCHEDULING

Buyer shall reimburse Company for costs incurred for any item on order with the Company which is cancelled by the Buyer. Costs shall be determined by common and accepted accounting practices.

A one-time hold on any item ordered from the Company shall be allowed for a maximum of 30 days. After 30 days, or upon notice of a second hold, Company shall have the right to cancel the order and issue the appropriate cancellation charges which shall be paid by Buyer. Items held for the Buyer shall be at the risk and expense of the Buyer unless otherwise agreed upon in writing. Company reserves the right to dispose of cancelled material as it sees fit without any obligation to Buyer.

If Buyer makes, or causes to make, any change to an order the Company reserves the right to change the price accordingly.

11. PRICES

Prices published in price lists, catalogs or elsewhere are subject to change without notice and without obligation. Written quoted prices are valid for thirty days only.

12. EXPORT SHIPMENTS

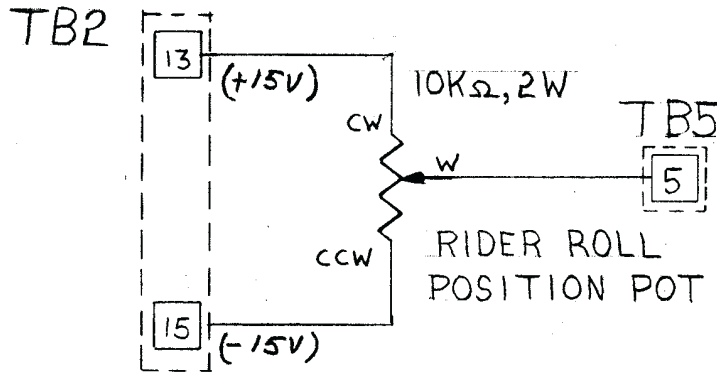
Payment for shipments to countries other than the U.S.A. and Canada or to authorized distributors shall be secured by cash in advance or an irrevocable letter of credit approved by an officer of the Company. An additional charge of 10% will apply to any letter of credit. There will be an extra charge for packaging and documentation.

DOVER FLEXO ELECTRONICS

P3 Pneumatic Tension Controller

MODEL: P-3

	PART	DESCRIPTION	QTY	MFR
1		Diagrams		
2	EA887C	R4 Regulator Card	1	
3	EA1169C	PS6, Power Supply Card	1	
4	EA1296C	05, Options Card	1	
5				
6	RO7-200-RNKA	Pressure Regulator	1	
7	5PG-320-000	Output Pressure Gauge	1	
8	E168A	Servo Valve	1	
9	F11-200	Air Filter, 5 Micron	1	
10	V54DA2075	Solenoid Valve	1	
11				
12		DIAGRAMS		
13	E661A	Taper Circuit using Rider Arm	1	
14	M1174A	Pneumatic Schematic	1	
15	E1172C	External Electrical Connections (11 x 17)	1	
16	E1300D	05 Card Schematic (11 x 17)	1	
17	E1177D	P3 Schematic (11 x 17)	1	
18				
19				
20				
21				
26				



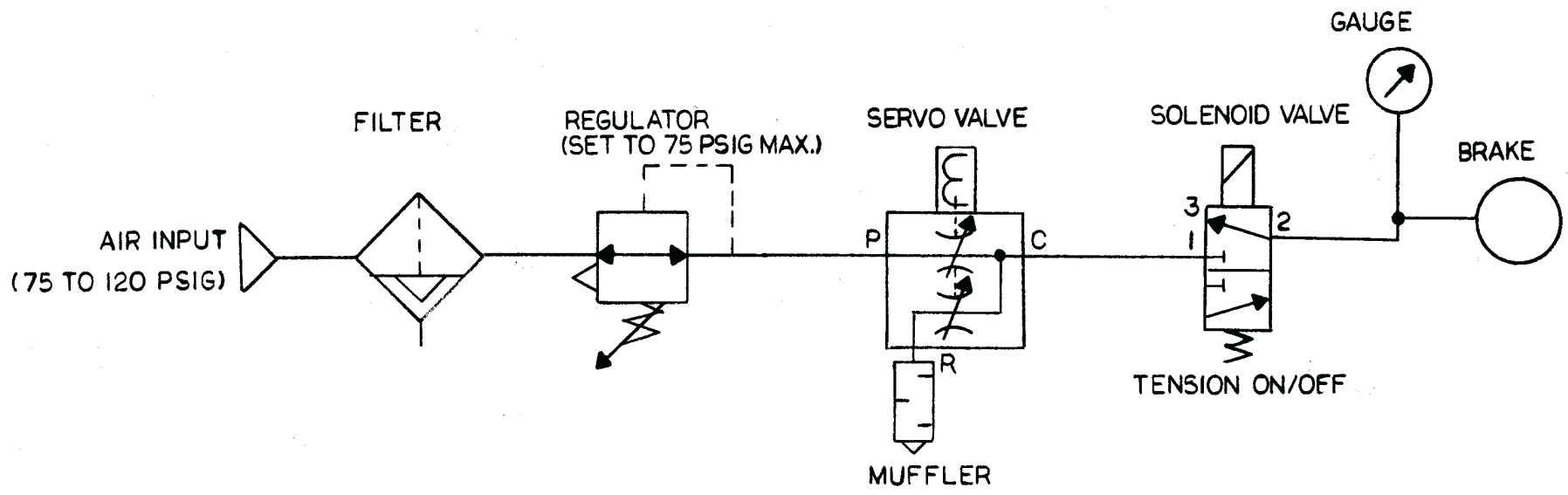
NOTES:

- 1) MAXIMUM TAPER CAPABILITY: 80% TAPER FROM CORE TO FULL ROLL, PROVIDED THE RIDER ROLL POSITION POT ROTATION IS 30°
- 2) RIDER ROLL POSITION POT ROTATION MUST BE IN THE CW DIRECTION FROM CORE TO FULL ROLL.

SET UP PROCEDURE: TURN TAPER ON/OFF SWITCH OFF. USING A DC VOLTMETER CONNECT THE (-) LEAD TO TP2 AND CONNECT THE (+) LEAD TO TP4. ADJUST THE POSITION OF THE RIDER ROLL POSITION POT SO THAT THE VOLTMETER READS -1.20 VDC WHEN THE RIDER ROLL IS AT THE CORE. TURN THE TAPER ON/OFF SWITCH ON. USE THE TAPER ADJUST POT TO ADJUST THE AMOUNT OF DESIRED TAPER.

OBSOLETE

					F	MATL.	REF.	PART	DOVER FLEXO		
					E			TAPER CIRCUIT	ELECTRONICS INC.		
					D			USING RIDER ROLL	ROCHESTER, NH 03867		
					C	MACHINED DIMENSION		MODEL	DRBY	DATE	SCALE
					B	LIMITS UNLESS		USE	TH	3-15-84	--
					A	OTHERWISE SPECIFIED		P3	DRAWING NO.		
BY	DATE	REV.	BY	DATE	REV.	X ± .04		REF. ONLY	E661A		
						XX ± .02					
						XXX ± .005					

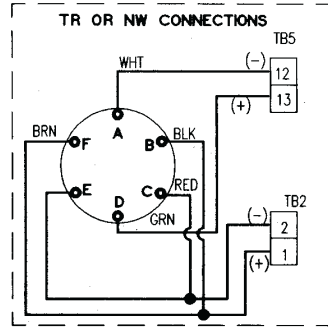
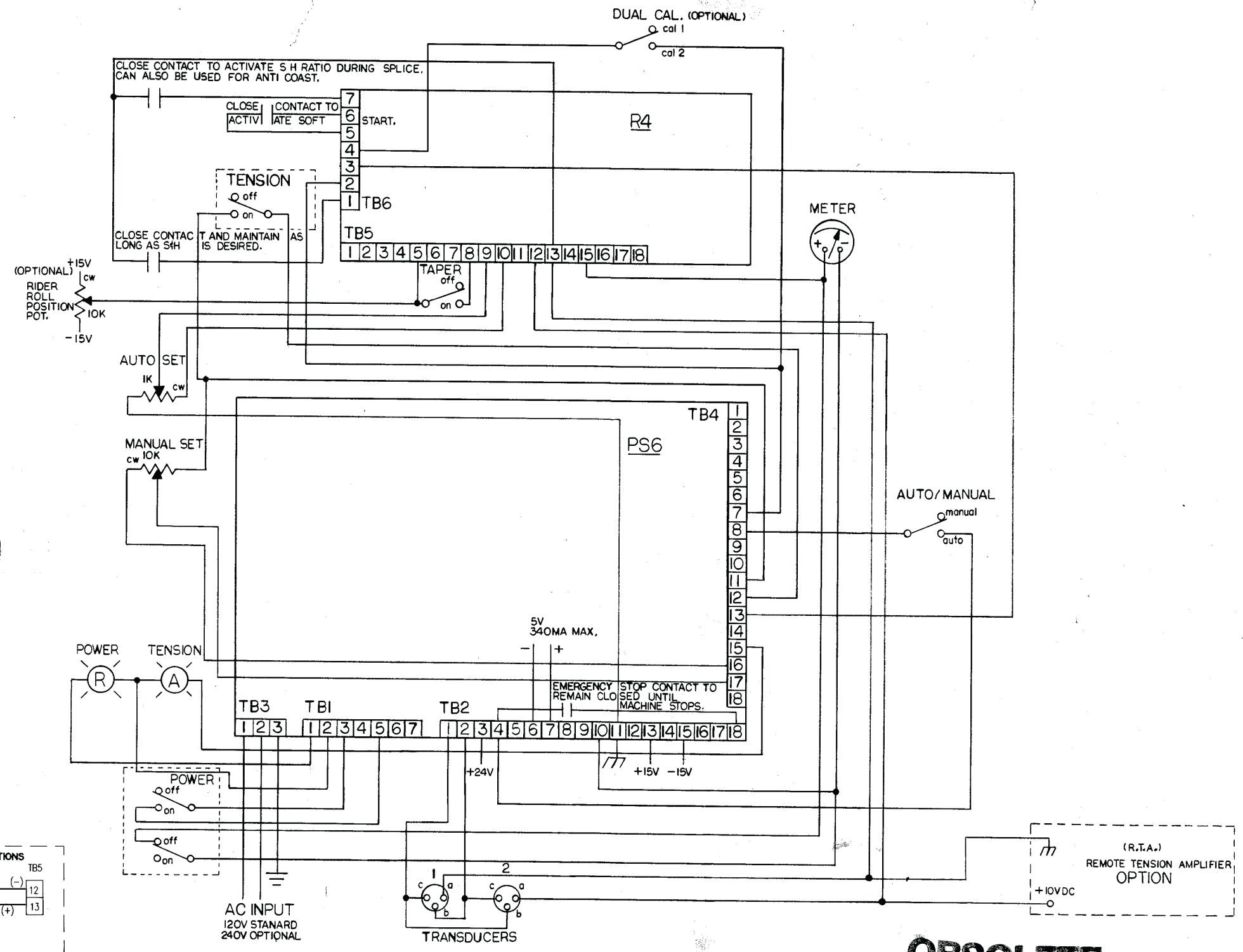


B4
 Release
 11/14/87

OBSOLETE

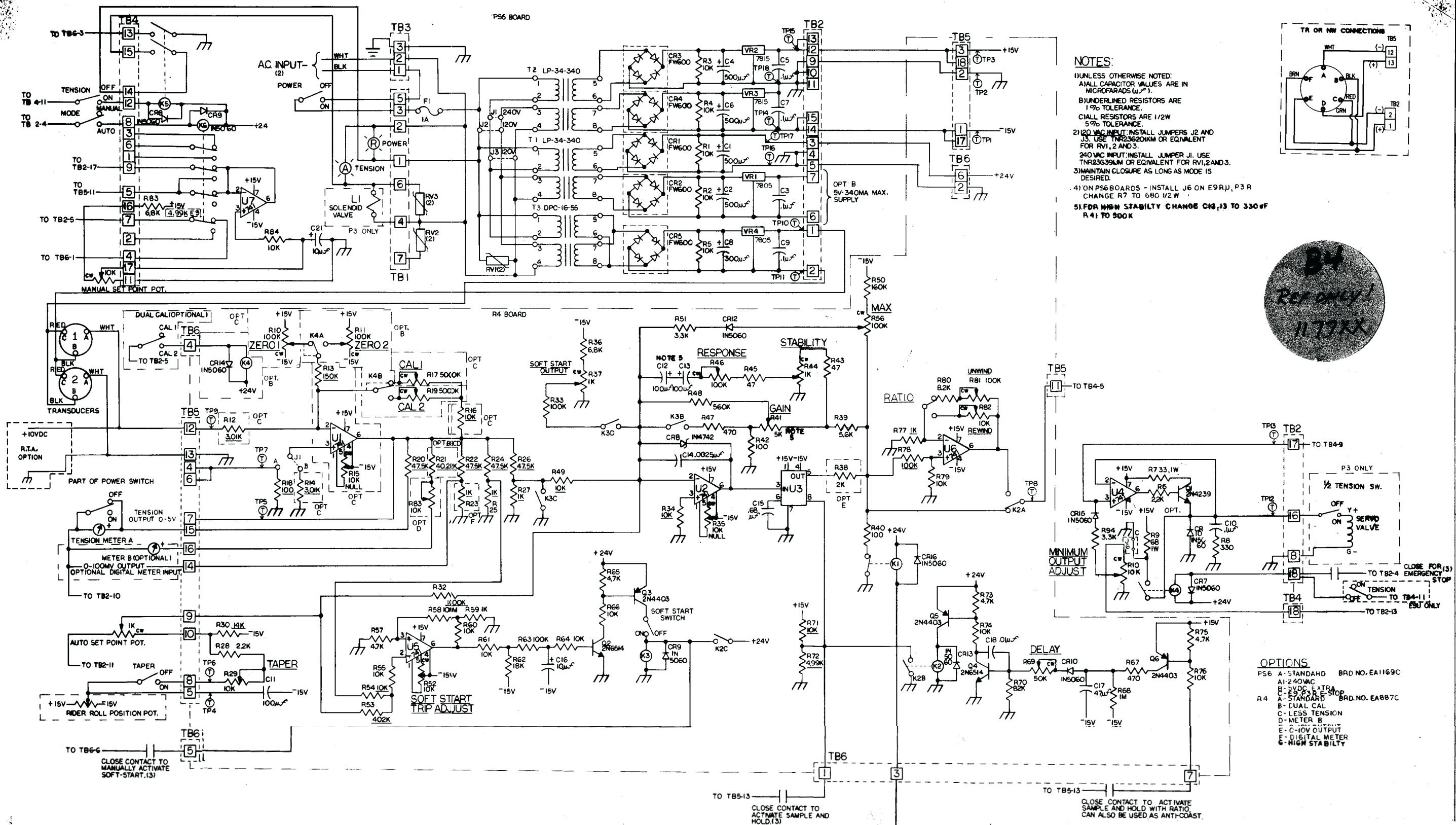
					F	MATL.	REF.	PART	DOVER FLEXO			
					E			PNEUMATIC	ELECTRONICS INC.			
					D			SCHEMATIC	ROCHESTER, NH 03801			
					C	MACHINED DIMENSION		MODEL	P3	SCALE		
					B	LIMITS UNLESS		USE		DRBY	DATE	SCA
					A	OTHERWISE SPECIFIED					6-30-87	--
BY	DATE	REV.	BY	DATE	REV.	X	± .04	REF. ONLY				
						XX	± .02					
						XXX	± .005					
								DRAWING NO.		M1174A		

B4
Ref only
1172X

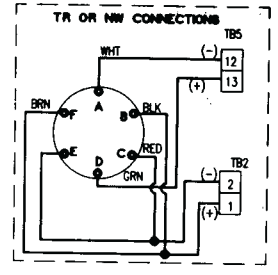


OBSOLETE

F		MATL.	REF.	PART	EXTERNAL CONNECTIONS	DOVER FLEXIO ELECTRONICS INC.
E				MODEL	P3	ROCHESTER, NH 03867
D				USE		DATE 8-5-87
C		MACHINED DIMENSION LIMITS UNLESS OTHERWISE SPECIFIED				SCALE --
B		X	+ .04			DRYBY MC 8-5-87
A		XX	+ .02			DRAWING NO. E1172C
		XXX	+ .005			
BY	DATE	REV.	BY	DATE	REV.	REF ONLY



- NOTES:**
- UNLESS OTHERWISE NOTED: ALL CAPACITOR VALUES ARE IN MICROFARADS (μF).
 - UNDERLINED RESISTORS ARE 1% TOLERANCE.
 - ALL RESISTORS ARE 1/2W 5% TOLERANCE.
 - 240 VAC INPUT: INSTALL JUMPERS J2 AND J3. USE TNR23520XMM OR EQUIVALENT FOR RV1, 2 AND 3.
 - 240 VAC INPUT: INSTALL JUMPER J1. USE TNR23539UM OR EQUIVALENT FOR RV1, 2 AND 3.
 - MAINTAIN CLOSURE AS LONG AS MODE IS DESIRED.
 - ON PS6 BOARDS - INSTALL J6 ON E9R, P3 CHANGE R7 TO 680 Ω W
 - FOR HIGH STABILITY CHANGE C18, 13 TO 330 μF R41 TO 500K



B4
REF ONLY
1177XX

- OPTIONS**
- PS6 A - STANDARD BRD NO. EA1169C
 - A1 - 240VAC
 - B - 5VDC EXTRA
 - C - 5VDC STOP
 - R4 A - STANDARD BRD NO. EA887C
 - B - DUAL CAL
 - C - LESS TENSION
 - D - METER B
 - E - 0-10V OUTPUT
 - F - DIGITAL METER
 - G - HIGH STABILITY

DATE	REV.	MATL.	REF.	PART	DOVER FLEXO ELECTRONICS INC. ROCHESTER, NH 03867
5-14-90	F			SCHEMATIC	DRBY DATE SCALE
7-5-88	E				
5-10-88	D				
7-15-91	J				
3-21-88	C				
3-22-91	H			MACHINED DIMENSION LIMITS UNLESS OTHERWISE SPECIFIED	
4-5-90	G				9-30-87

TO TB5-13 CLOSE CONTACT TO ACTIVATE SAMPLE AND HOLD (15)
TO TB4-13 P3, E9R, E9U
TO TB5-13 CLOSE CONTACT TO ACTIVATE SAMPLE AND HOLD WITH RATIO CAN ALSO BE USED AS ANTI-COAST.

