INSTRUCTION MANUAL

MODEL E7
TENSION CONTROLLER

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MODEL E7 ELECTRIC TENSION CONTROLLER

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SECTION

E7 ELECTRICAL TENSION CONTROLLER INSTALLATION

ELECTRICAL RATINGS

INPUT --- 120 Volts, 60 HZ. @ 4 Amps., Standard.

OUTPUT--- 0-90 Volts DC @ 3 Amps., Variable, as required to maintain set tension, Standard.

LOCATION OF CONTROLLER

Mount the controller in a dry place, away from any source of heat or excessive vibration. It should not be more than 7 feet from the floor.

WIRING

All external connections are made to terminal strips on the panel. Refer to external connection drawing E1222C. Transducers are connected via amphenol connectors. Transducer cables are shielded. Connect the end marked "G" to the controller.

If the controller is a panel only type, use shielded cable for the tension meter, tension set point potentiometer and transducer wiring. Ground the shield at the controller end ONLY!

DOUBLE CHECK ACCURACY OF ALL CONNECTIONS BEFORE APPLYING POWER TO THE CONTROLLER.

DESCRIPTION OF OPERATION

SYSTEM OPERATION

The model E7 Electric 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.

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.

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 0VDC to +5VDC output signal.
2. Provides an external 0VDC to +100mVDC 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 tension is too high compared to the tension set point setting.

U3 is a Sample and Hold IC that is used with a multiply/divide circuit to provide smooth operation during flying splices on either unwinds or rewinds.

Amplifier U5 is part of the Soft Start circuitry which prevents brake lock-up when starting with a slack web. Its associated circuitry sets the trip level that determines whether the controller should be in the automatic mode or the soft start mode. The 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 onto 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 meter's full scale reading. When the tension set point potentiometer is set high, the soft start trip point is at approximately 10% of the tension meter's full scale reading. When the controller goes into the soft start mode, a low value of voltage is applied to the brake. This low value automatically tracks the adjustment of the auto set point pot. 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 Driver Card (D1) accepts the resulting error signal (from the regulator card) and triggers the SCR firing circuitry. The Line synchronization circuit times the trigger pulses so that the appropriate SCR will be turned on only when forward conduction is possible. Once enabled, the firing circuit produces a train of 100 microsecond pulses. This establishes SCR on-state current and insures that the SCR's will continue to conduct regardless of any line notching.
Also on the card are emergency stop, manual circuitry with tracking to provide bumpless switching between auto and manual and a minimum output circuit. A fuse protects the output SCR bridge circuit and a snubber network prevents SCR dv/dt-failure due to line spikes and transients.

C. The Power Supply Card (PS6)
This card contains the following power supplies:
   1. +15VDC - Powers Electronic circuitry
   2. -15VDC - Powers Electronic circuitry
   3. +24VDC - Powers all relays
   4. 5VDC (isolated) - Powers Transducers
   5. 5VDC (isolated) - Optional Power Supply
   6. Sync Pulse Supply - Synchronizes SCR gate pulses with the AC line

START-UP PROCEDURE

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 zero percent to as much as 50%.

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

RESPONSE - Adjusts how quickly the unit is allowed to respond to fast changes that might occur in the web handling 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 voltage 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 voltage 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 the output voltage 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 voltage 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.

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 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 STEPS ABOVE FOR DUAL CALIBRATION

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 doesn't 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.

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 to 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.

TAPER ADJUSTMENT

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

1. Turn the TAPER on/off switch ON.
2. Set the TAPER adjustment pot ½ turn CW. Run the machine and wind up to a full roll while watching the tension meter. Adjust the TAPER adjustment pot as required until the desired amount of tension decrease is achieved.

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 for the web to stabilize.

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 OFF.

E-7/E-10

- Minimum output pot. can be used to vary the minimum output voltage to the brake or clutch from 0VDC (Fully CCW) to approximately 35VDC (Fully CW).

MINIMUM OUTPUT ADJUSTMENT

1. Remove rewind shaft.

2. Install jumper wire or provide a closed contact when minimum output is needed between pins 32 & 33 on terminal block TB12 of the D-1 driver card.

3. Adjustment E-10 Rewind Controller;
   a. Auto set pot. fully CCW or off.
   b. Connect voltmeter across clutch output.
   c. Turn tension on; Output should be approximately 15VDC (preset at factory). Turn min. output pot. R238 CCW to adjust output down to 0VDC.

4. Turn tension off; Install rewind shaft with empty core.

5. Turn tension on; Adjust minimum output up until shaft just starts to turn at core. Note this voltage for future reference.

* This is a general set up procedure and may need to be varied due to the wide range of applications the controller is used for.

TROUBLE-SHOOTING PROCEDURE, E7

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 screwdriver or TV tuning tool to adjust potentiometers
(3) An oscilloscope having at least a 10MHZ. range

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.

****EACH STEP IN THE FOLLOWING PROCEDURE MUST BE PERFORMED IN THE ORDER GIVEN!!**

1. Turn off power to the E7 controller panel.
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)

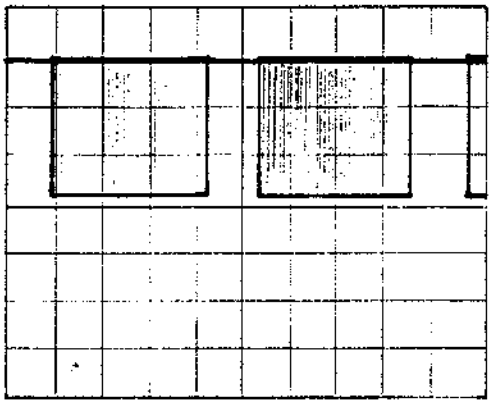
4. The voltage between TP18 and TP15 (+) should be 15 VDC.
5. The voltage between TP18 (+) and TP14 should be 15 VDC.
6. The voltage between TP18 and TP17 (+) should be 24 VDC. (±3 VDC)
7. The voltage between TP10 (+) and TP11 should be 5 VDC.

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 auto set 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 (±1 VDC).
10. Turn the Max pot fully CW. Switch the soft start on-off switch on. The voltage between TP2 and TP8 (+) should be 1.4 VDC (±.3 VDC)
11. Using the zero pot, adjust CW until the tension meter reads 25% of full scale. The voltage between TP2 and TP8 (+) should be 8.6 VDC (±.3 VDC).
12. Set the auto set pot to off (fully CCW). The voltage between TP8 and TP2 (+) should be .3 VDC (±.3 VDC).
13. Set the auto set pot 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.

DRIVER CARD (D1)

14. The voltage between TP34 (+) and TP35 (-) should be 18 VDC (±3 VDC).
15. The voltage between TP35 (+) and TP 31 (-) should be 9.5 VDC.
16. Using an oscilloscope, observe the waveform at TP32. Use TP35 or GND. for scope reference. The waveform should look like this:



Turn the auto set pot. fully CCW. The pulse width of the waveform should gradually decrease as the firing circuit turns off. When fully off, the waveform at TP32 will be a straight line, 15 VDC above ground.

THIS COMPLETES THE TROUBLESHOOTING PROCEDURE FOR THE BASIC E7 CONTROLLER. CONSULT THE FACTORY IF FURTHER ASSISTANCE IS REQUIRED.

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 dry, soft brush to remove dust.

If a solvent is necessary, use denatured alcohol.

INSTRUCTIONS FOR USING TLS

(TENSION LIMIT SWITCH)

Overview: Theory of operation, Adjustments of the Low Set and High Set potentiometers and the Delay potentiometers.

Theory of Operation: Refer to Drawing E1300D

The TLS circuit uses two OP-Amps and other discrete 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 rises above these preset reference voltages.

When U110 or U111 output is high, relay K102 or K103 is energized through Q112, 113 or Q114, 115 when U110 or U111 output is low, relay K102 or K103 is de-energized.

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, 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: Ref. E1300D Drawing

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 Fig. A. 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

FIG. A

With A.C. 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 & 15, TB7-16 & 17, and also opens the contacts of TB7-13 & 15, TB7-17 & 18.

When tension decreases below 26% of F.S. (13 minor div) relay K102 de-energizes, closing the contacts of TB7-13 & 15/17 & 18, and opening the contacts of TB7-14 & 15/ 16 & 17.

HIGH SET Ref. E1300D Drawing

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 Fig. B for an approximate setting of R184.

FIG. B

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 O'CLOCK	 9 O'CLOCK	 10 O'CLOCK	 11 O'CLOCK	 12 O'CLOCK	 1 O'CLOCK	 2 O'CLOCK	 3 O'CLOCK	 4 O'CLOCK

With A.C. 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 & 24/26 & 27 and also opening contacts TB7-22 & 23/25 & 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 R178 & R189

The delays 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 K103.

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.

7. 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.

8. 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.

9. 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 or refund. 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.

10. 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.

11. 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.

12. 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.

13. 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

E7 ELECTRICAL TENSION CONTROLLER

MODEL: E7
DIAGRAM: E1140E
REF:

	DES	PART	DESCRIPTION	QTY		MFR
1		EA887C	R4, REGULATOR CARD	1		
2		EA1169C	PS6, POWER SUPPLY CARD	1		
3		EA1155C	D1, DRIVER CARD	1		
4		EA1296C	O5, OPTIONS CARD	1		
5						
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11						
12						
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14						
15						
16						
17			DIAGRAMS			
18						
19		E1140E	E7 SCHEMATIC	1		
20		E1835D	EXTERNAL CONNECTIONS DRAWING	1		
21		E1300D	O5, OPTIONS CARD SCHEMATIC	1		
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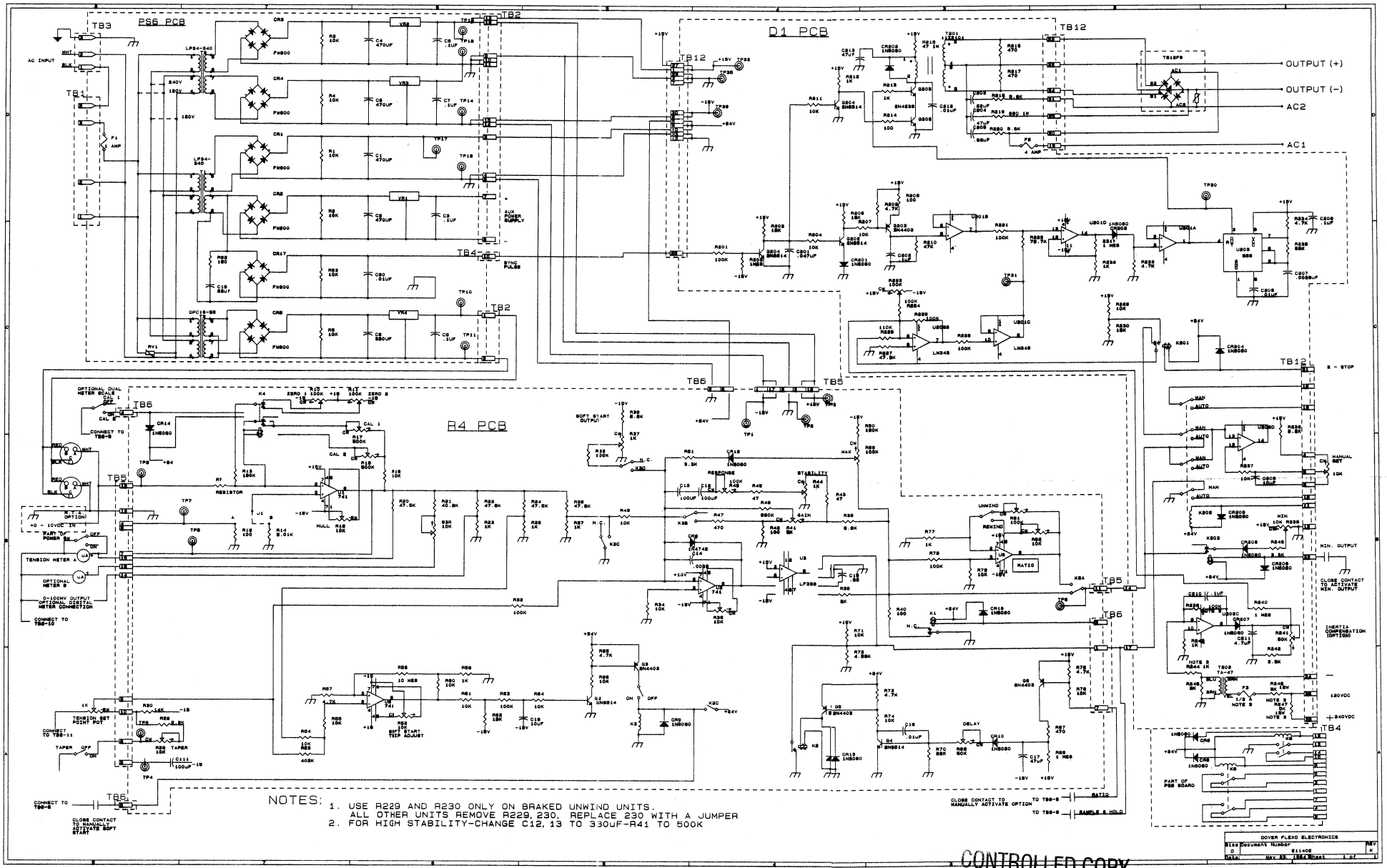
PS6 PCB
D1 PCB
R4 PCB
TB1
TB2
TB3
TB4
TB5
TB6
TB12
AC INPUT
OUTPUT (+)
OUTPUT (-)
AC2
AC1
E - STOP
NOTES:
1. USE R229 AND R230 ONLY ON BRAKED UNWIND UNITS. ALL OTHER UNITS REMOVE R229, 230, REPLACE 230 WITH A JUMPER
2. FOR HIGH STABILITY-CHANGE C12, 13 TO 330uF-R41 TO 500K
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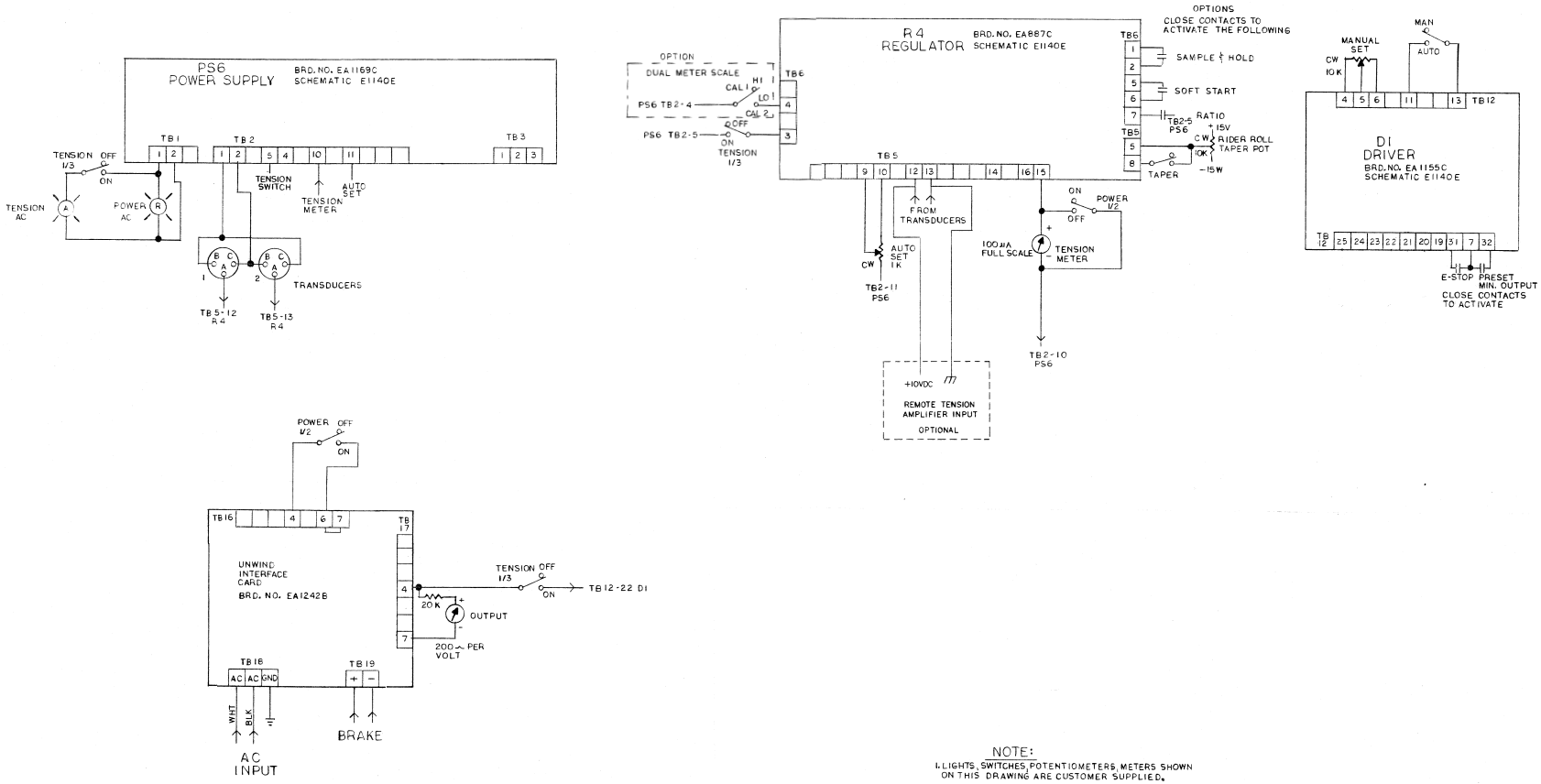
OBSOLETE



NOTE:
1. LIGHTS, SWITCHES, POTENTIOMETERS, METERS SHOWN ON THIS DRAWING ARE CUSTOMER SUPPLIED.

REFER TO EA1795D FOR CHASSIS LAYOUT

				MATL.	REF.	PART EXTERNAL CONNECTIONS E7 CC	DOVER FLEXO ELECTRONICS INC. ROCHESTER, N.H. 03867
				MACHINED LIMITS OTHERWISE	DIMENSION UNLESS SPECIFIED	MODEL	DR. BY TR DATE 12-18-90 SCALE
K.C.	7-16-91	A		.X ± .04		USE	DRAWING NO E1835D
BY	DATE	REV.		.XX ± .02			
				.XXX ± .005			

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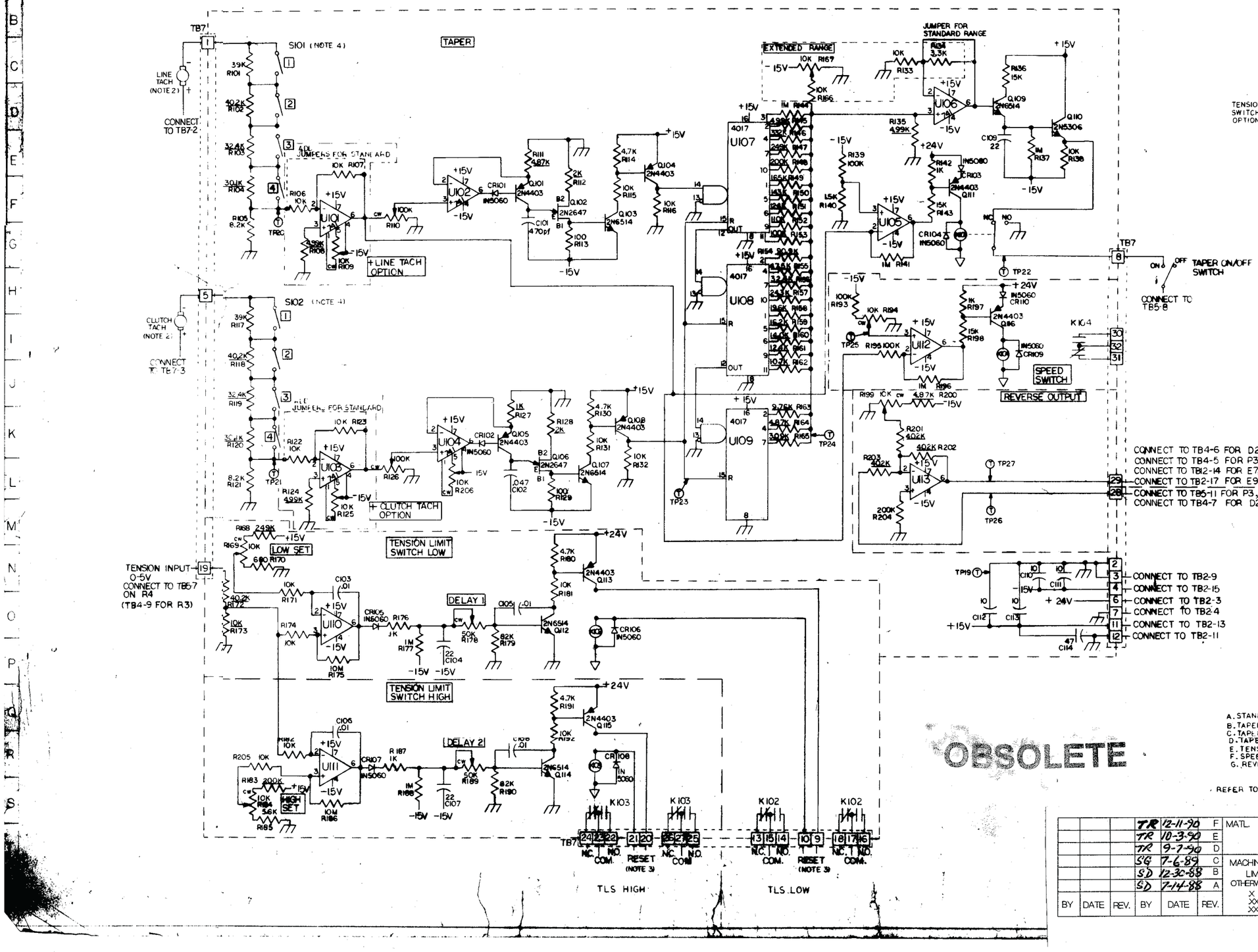

NOTES:

1) UNLESS OTHERWISE NOTED:
   - A) ALL CAPACITOR VALUES ARE IN MICROFARADS (μf)
   - B) ALL RESISTORS ARE 1/2W 5% TOLERANCE.
   - C) ALL UNDERLINED RESISTORS ARE 1/2W 1% TOLERANCE.
2) USE SHIELDED CABLE ON TACH INPUTS.

TENSION LIMIT SWITCH LOW OPTION ONLY

3) JUMPER TB7-9 TO TB7-10 & TB7-20 TO TB7-21 FOR AUTOMATIC RESET. FOR MANUAL RESET, INSTALL A MOMENTARY PUSHBUTTON. MAINTAIN CONTACT CLOSURE UNTIL TENSION RISE ABOVE SET POINT.
4) SWITCHES S101 AND S102 ARE FACTORY SET TO CUSTOMER SPECIFICATIONS. DO NOT CHANGE POSITION OF SWITCHES OR CIRCUIT MAY BE DAMAGED.

INPUT	S101—102
0-10V	1-4 CLOSED
10-50V	1-3 CLOSED 4 OPEN
50-100V	1,2 CLOSED 3,4 OPEN
100-150V	1 CLOSED 2 3 4 OPEN
150-200.	1-4 OPEN

OPTIONS

A. STANDARD TAPER
B. TAPER TENSION W/POSITIVE LINE OR PULSE TACH INPUT
C. TAPER TENSION W/POSITIVE CLUTCH OR PULSE TACH INPUT
D. TAPER TENSION W/EXTENDED RANGE
E. TENSION LIMIT SWITCH
F. SPEED SWITCH
G. REVERSE OUTPUT

OBSOLETE

REFER TO EA1296C FOR BOARD NUMBER
EA1767D FOR ASSEMBLY

BY	DATE	REV.	BY	DATE	REV.
			TR	12-11-90	F
			TR	10-3-90	E
			TR	9-7-90	D
			SG	7-6-89	C
			SD	12-30-88	B
			SD	7-14-88	A

MATL. | REF.

MACHINED DIMENSION LIMITS UNLESS OTHERWISE SPECIFIED
X ± .04
XX ± .02
XXX ± .005

PART: SCHEMATIC 06 OPTION CARD
MODEL:
USE: REF ONLY

DOVER FLEXO ELECTRONICS INC.
ROCHESTER, NH 03867

DRBY	DATE	SCALE
SHARON	5-20-88	---

DRAWING NO. E1300D