



D.C. Motor Control

Instruction Manual

Models

TDP502-000	TDP503-000
TDP502-E00	TDP503-E00
TDP502-00T	TDP503-00T
TDP502-E0T	TDP503-E0T
TDP502-0RT	TDP503-0RT
TDP502-ERT	TDP503-ERT
TDP502-0PF	TDP503-0PF
TDP502-EPF	TDP503-EPF

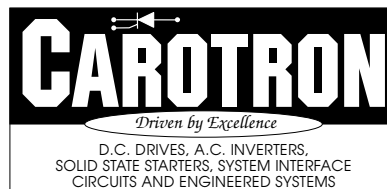


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1 General Description

The TROOPER® TDP500 Series of DC motor controls provides full range speed or torque control of shunt wound or permanent magnet D.C. motors. Model TDP502 operates motors between 1/8 and 2 horsepower. Model TDP503 operates motors between 1/2 and 3 horsepower. Both models are offered in a compact chassis or enclosed NEMA 4 version. Some standard features of these models are as follows:

- Model TDP502 operates at 115 or 230 VAC input for 90 or 180 VDC motor armatures
- Model TDP503 operates at 230 VAC input for 180 VDC motor armatures
- Armature voltage, tachometer, or encoder feedback selectable by programming jumper
- Adjustable acceleration from 1 to 25 seconds
- Digital logic for sequencing Start, Stop and Jog functions

- A hard firing gating circuit
- Inner current loop for fast stable response under varying load conditions
- I.C. regulated power supplies, metal film resistors and cermet potentiometers for stable operation with fluctuations in temperature and line voltage
- .100 quick connect type terminals for test points and optional circuit access
- Power On/Off switch (enclosed models only)
- Membrane switch control panel for Start, Stop and Jog pushbuttons (enclosed models only)
- Torque/Taper control function with provisions for external Torque pot (Optional)
- Manual reversing - Armature and Encoder feedback only (Optional)
- Process follower feature for 4-20 mA input (Optional)

2 Specifications

2.1 Electrical

AC Input

115 VAC $\pm 10\%$, 50/60 Hz, ± 2 Hz
230 VAC $\pm 10\%$, 50/60 Hz, ± 2 Hz

Suitable for use on a circuit capable of delivering not more than 5000 RMS symmetrical amps, 240V maximum.

Cet appareil est conçu de fonctionner sur des circuits qui ne peuvent pas produire plus que 5000 RMS ampères symétriques, 240 volts maximum.

Armature Output

0- 90 VDC for 115 VAC input
0-180 VDC for 230 VAC input

Field Output

50/100 VDC @ 1 Amp for 115 VAC input
100/200 VDC @ 1 Amp for 230 VAC input

TDP502 Horsepower Range

1/8 - 1 HP @ 90 VDC
1/4 - 2 HP @ 180 VDC

TDP503 Horsepower Range

1/2 - 3 HP @ 180 VDC

Encoder Supply

50mA @ 12 VDC

Current Limit

150% of current range selected

Adjustments

MAX: (Speed Mode) -20 to +10% of full speed
(Torque Mode) -20 to +10% of rated torque

MIN: (Speed Mode) 0 to 25% of full speed
(Torque Mode) 0 to 10% of rated torque

IR COMPENSATION: Range set by current range jumper

ACCEL: Independently adjustable from 1 to 25 seconds

TORQUE (Torque/Taper Option Only): Sets tension level for core diameter

TAPER (Torque/Taper Option Only): Sets tension level for full package diameter

Speed Regulation

Armature Feedback: $\pm 1\%$ of base speed
Tachometer Feedback: (7V1000RPM) $\pm 0.5\%$ of base speed
Encoder Feedback: (60 PPR): $\pm 0.5\%$ of base speed

Torque Regulation

±2% of range selected

Speed Range

20 to 1

Power Dissipation

TDP502: 30 Watts Maximum

TDP503: 40 Watts Maximum

Temperature Range

Chassis: 0 - 55° C

Enclosed: 0 - 40° C

2.2 Physical

Refer to dimension drawings C1 1681 and C11682 in Section 8 for complete mounting dimension information on all models.

3 Installation

3.1 Circuit Protection

All TROOPER® models should be installed in accordance with the National Electric Code and any applicable local or state codes.

All wiring should be rated at a minimum of 90° C.

On all TROOPER® models, field wiring terminals at TB2 and TB5 are for copper conductors only and should be torqued to 12 in. - lbs.

On all TDP502 models, field wiring terminals at TB1 and TB3 are for copper conductors only and should be torqued to 7 in. - lbs.

On All TDP502 models, field wiring terminals at TB4 are for copper conductors only and should be torqued to 12 in. - lbs.

On all TDP503 models, field wiring terminals at TB1 and TB3 are for copper conductors only and should be torqued to 9 in. - lbs.

On all TDP503 models, field wiring terminal lugs L1, L2, A1, A2 and TB4 are for copper conductors only and should be torqued to 16 in. - lbs.

On TDP502 models, a 20 amp maximum circuit breaker should be used for branch circuit protection. On TDP503 models, a 30 amp maximum circuit breaker should be used for branch circuit protection.

The drives are supplied from the factory with line fuses (FU1 & FU2) sized to allow maximum horsepower rating. Use the following table to determine fuse sizes if maximum horsepower is not required.

3.1 Protection du Circuit

Le modèle TROOPER® devrait être installé selon les normes décrites au code de sécurité électrique national et tous normes réglementaires locaux.

Tout filage doit être capable de résister à des températures de 90 dég. C minimum.

Connections aux bornes TB2 et TB5 doit être serrés a 12 lb.-po. de couple.

Connections aux bornes TB1 et TB3 doit être serrés a 7 lb.-po. de couple (modèle TDP502).

Connections aux borne TB4 doit être serrés a 12 lb.-po. de couple (modèle TDP502).

Connections aux bornes TB1 et TB3 doit être serrés a 9 lb. -po. de couple (modèle TDP503).

Connections aux bornes L1, L2, A1, A2 & TB4 doit être serrés a 16 lb. -po. de couple (modèle TDP503).

Un disjoncteur d'un maximum de 20 ampe `re doit être utilisé afin de protéger le circuit d'alimentation pour les mode`les TDP502 et un disjoncteur d'un maximum de 30 ampères pour les modèles TDP503.

Les contrôles fournit par l' usine sont équipés de fusibles de ligne d'alimentation (FU1 et FU2) choisis afin de permettre la puissance motrice maximale. Utiliser le tableau ci-dessous afin de déterminer l' ampérage de la fusible si la puissance maximale n'est pas requise.

Table 1: Fuse Sizing

Model	Hp	Input Voltage	Input A.C. Current @ F.L.	Recommended Fuse
Modèle	Puissance Motrice	Tension D'alimentation	Courant D'alimentation C.-A. A Pleine Puissance	Fusible Recommandee
TDP502	1/8	115 VAC	2.3 Amps	3 Amp, 326
	1/4	115 VAC	4.3 Amps	5 Amp, 326
	1/2	115 VAC	7.9 Amps	8 Amp, 326
	3/4	115 VAC	11.7 Amps	15 Amp, 326
	1	115 VAC	15.0 Amps	20 Amp, 326
	1/4	230 VAC	2.3 Amps	3 Amp, 326
	1/2	230 VAC	4.3 Amps	5 Amp, 326
	1	230 VAC	7.9 Amps	8 Amp, 326
	1 1/2	230 VAC	12.2 Amps	15 Amp, 326
TDP503	2	230 VAC	15.0 Amps	20 Amp, 326
	1/2	230 VAC	4.3 Amps	5 Amp, FLM
	1	230 VAC	7.9 Amps	8 Amp, FLM
	1 1/2	230 VAC	12.2 Amps	15Amp, FLM
	2	230 VAC	15.0 Amps	20Amp, FLM
	3	230 VAC	22.0 Amps	30Amp, FLM

Note: Fuses shown are manufactured by Littelfuse. Bussmann type MDA may be substituted for type 326. Gould type TRM may be substituted for type FLM. Refer to Section 6.

Note: Les fusibles affichés sont fabriqués par "Littelfuse", des fusibles de marque "Gould type TRM" peut être substituée pour type FLM. "Bussmann type MDA" peut être substituée pour type 326. Référez à la Section 6.

3.2 Connection Information

Refer to connection diagram D11675 for all -000 models, D1 1676 for all -E00 models, D11677 for all -00T & -0RT models, and D11678 for all -E0T & -ERT models. Also refer to Section 3.1 to insure proper installation.

WIRING PRECAUTIONS

WARNING:

CIRCUIT COMMON ON THE TROOPER® IS NOT EARTH OR CHASSIS GROUND. HIGH VOLTAGE POTENTIALS CAN BE PRESENT BETWEEN EARTH GROUND AND ANY POINT IN THE CIRCUIT. ALL TEST INSTRUMENTS SHOULD BE ISOLATED FROM EARTH GROUND TO PREVENT DAMAGE TO THE INSTRUMENT OR THE CONTROL. ANY INSTRUMENT CONNECTED TO THE CIRCUIT IS FLOATING AT POTENTIALS THAT

3.2 Information de Connection

Veillez référer au diagramme de connection D11675 pour les modèles -000. Veillez référer au diagramme de connection D1677 pour les modèles -00T/0RT. Veillez référer au diagramme de connection D11678 pour les modèles -E0T/ERT. Aussi, veuillez référer à la section 3.1 afin d'assurer une bonne installation.

PRECAUTIONS DE FILAGE

AVERTISSEMENT!

LA MASSE DU CIRCUIT DE TROOPER® N'EST PAS LA MASSE A LA TERRE NI LA MASSES DE BOITIER. DES POTENTIELS DE TENSION ELEVES PEUVENT EXISTER ENTRE LA MASSES A LA TERRE ET TOUT POINT SUR LE CIRCUIT. TOUS LES INSTRUMENTS DE MESURE UTILISER POUR AJUSTER LE CONTROLE DOIVENT ETRES ISOLES DE LA MASSE AL LA TERRE AFIN D'EVITER DES DOMMAGES A L'INSTRUMENT DE MESURE OU AU CONTROLE. TOUT INSTRUMENT QUI EST BRANCHER SUR LE CIRCUIT EST FLOTTANT A UN

APPROACH THE A.C. LINE AND SHOULD BE HANDLED WITH CARE.

Ground the control only at TB2-7 on TDP502 models and TB2-1 on TDP503 models.

Use shielded cable for all speed pot, tachometer, encoder, start, stop, and jog wiring. Connect the shield to circuit common at the control end only. These wires should be routed away from all A.C. power, armature, field and relay coil wiring.

WARNING:

CONNECTION OF THE SHIELD TO CIRCUIT COMMON PLACES THE SHIELD AT LINE POTENTIAL WITH RESPECT TO EARTH GROUND AND REQUIRES THAT THE SHIELD BE INSULATED FROM GROUND AT BOTH ENDS. FAILURE TO INSULATE PROPERLY CAN CAUSE DAMAGE TO THE CONTROL.

Any relays, contactors, motor starters, solenoids, etc. located in close proximity to or on the same A.C. line as the TROOPER® control should have a transient suppression device in parallel with the coil to minimize interference with the control.

VOLTAGE QUI APPROCHE LA TENSION DE LA LIGNE ALIMENTRICE C. -A. ET DOIT ETRE MANIPULER AVEC SOINS. La mise-à-la-terre du contrôle doit se faire seulement aux bornes designés, soit TB2-7 pour le TDP502 et TB2-1 pour le TDP503.

On doit utiliser du câble armé pour tout connexion de potentiomètre d'ajustement de vitesse, tachymètre, encodeur, arrêt, départ et marche-à-coups. L'armement du câble doit être brancher a la masse du circuit de contrôle seulement. Ces câbles doivent être passer a l'abri du filage d'alimentation C.-A., d'armature et de bobine du relai.

AVERTISSEMENT!

LA CONNEXION DE L'ARMEMENT DU CABLE A LA MASSE DU CIRCUIT CREE UN RISQUE DE TENSION ELEVE ENTRE L'ARMEMENT ET LA MASSE A LA TERRE. CECI NECESSITE QUE L'ARMEMENT DU CABLE SOIT ISOLE DE LA MASSE A LA TERRE AUX DEUX EXTREMITES A DEFAUT DE CAUSER UN ENDOMMAGEMENT SERIEUX AU CONTROLE.

Tout relai, contacteur, démarreur du moteur, solénoïde, etc...en proximité ou branché sur le même circuit alimentatrice du contrôle doit être muni d'un élément de supprimeparasite branché en parallèle avec la bobine afin de réduire des interférences avec le contrôle.

TDP502 & TDP503 TERMINAL CONNECTIONS

TB1-1,2, & 3 (SPEED POT): A potentiometer with a resistance value between 2K and 10K ohms connects to these terminals. The CCW lead and shield connect to terminal 1. The wiper connects to terminal 2 and the CW lead connects to terminal 3.

Start/Stop with Momentary Remote Operators (3-Wire Control)

■ **TB1-4 & 7 (START):** Momentarily closing a set of contacts across these terminals will start the drive, and allows the output to accelerate to a level set by the speed pot. No connection to these terminals is required for enclosed models, but may be used for an optional remote station.

■ **TB1-5 & 7 (STOP):** The momentary contact action required to initiate a STOP function is determined by the position of Jumper J7. For a Normally Open remote STOP operator (momentarily close to stop), place J7 in the NO position. For a normally closed remote STOP operator (momentarily open to stop), place J7 in the NC position. If no remote STOP operator is required, place J7 in the NO position and make no connection to the terminals.

Start/Stop with Maintained Remote Contact (2-Wire Control)

■ **TB1-4/5 & 7 (START/STOP):** If the drive is

to be Started and Stopped with a single maintained contact, connect TB1-4 to TB1-5 and select the NC position for J7. Connect the maintained Start/Stop contact between TB1-4/5 and TB1-7; the drive will start when the contact is closed and stop when it is opened.

Caution: If 2-wire control is used with an enclosed drive, the operation of the enclosure mounted Start and Stop membrane switches is altered; both function only when they are maintained closed (pressed in). These switches can be disabled by disconnecting connector CN1 on the Trooper board.

■ **TB1-6 & 7 (JOG):** Closing a set of contacts across these terminals allows the output to accelerate to 20% output. No connection to these terminals is required for enclosed models, but may be used for an optional remote station.

■ **TB1-8, 9 & 10 (ENCODER INPUT):** An optional motor mounted 60 PPR encoder, magnetic pickup or reluctance pickup may be connected to these terminals. Any encoder or pickup used should be capable of operating down to zero speed and have a square wave type output. Terminal 8 connects to the encoder output (open collector also acceptable), terminal 9 is the 12 VDC supply for the encoder, and terminal 10

connects to the encoder common. See connection diagrams in Section 8 for further connection information.

TB1-10 & 11 (TACHOMETER): An optional motor mounted 7 VDC/1000 RPM tachometer may be connected to these terminals for speed feedback with 1750 RPM base speed motors. Terminal 11 connects to the positive lead and terminal 10 connects to the negative lead of the tachometer. See connection diagrams in Section 8 for further connection information.

NOTE: Tachometer feedback cannot be used with reversing models.

TDP502 POWER TERMINAL CONNECTIONS

TB2-1 & 2 (AC INPUT): These terminals are used for the A.C. line input. TDP502 models will accept either 115 VAC or 230 VAC input. If 115 VAC input is used, place jumpers J2, 5 & 6 in the 115V position. If 230 input is used, place jumpers J2, 5 & 6 in the 230V position.

TB2-3 & 4 (ARMATURE): Motor lead A1 connects to terminal 3 and motor lead A2 connects to terminal 4. These connections will produce CCW motor rotation when viewed from the commutator end and with the field connected as shown on the connection diagram. The armature leads should be switched if reverse rotation is desired.

NOTE: When operating in tachometer feedback, the tachometer leads must also be reversed when motor rotation is reversed.

TB2-5 & 6 (FIELD): Motor field lead F2 connects to terminal 6 and motor field lead F1 connects to terminal 5. There is no connection required for these terminals when a permanent magnet type motor is used.

TB2-7 (GROUND): This is the only terminal that should be connected to earth or chassis ground.

TDP503 POWER TERMINAL CONNECTIONS

L1 & L2 (AC INPUT): TDP503 models accept only 230 VAC input which connects to these terminals.

A1 & A2 (ARMATURE): Motor lead A1 connects to terminal A1 and motor lead A2 connects to terminal A2. These connections will produce CCW motor rotation when viewed from the commutator end and with the field connected as shown on the connection diagram.

The armature leads should be switched if reverse rotation is desired.

NOTE: When operating in tachometer feedback, the tachometer leads must also be reversed when motor rotation is reversed.

TB2-1 (GROUND): This is the only terminal that should be connected to earth or chassis ground.

TB2-2 & 3 (FIELD): Motor field lead F2 connects to terminal 3 and motor field lead F1 connects to terminal 2. There is no connection required for these terminals when a permanent magnet type motor is used.

OPTIONAL TERMINAL CONNECTIONS

TDP502 REVERSING & TORQUE TAPER

TB3-1,2 & 3 (EXTERNAL TORQUE): A potentiometer with a resistance value between 2K and 10K ohms connects to these terminals if an external torque pot is desired when using the Torque/Taper option. The CCW lead and shield connects to terminal 1. The wiper connects to terminal 2, and the CW lead connects to terminal 3.

TB3-4 & 5 (FORWARD OR REVERSE SELECT): These terminals should be connected to a selector or toggle switch when the reversing option is used. When the contact across these terminals is open, the drive will produce CCW rotation. When the contact across these terminals is closed the drive will produce CW rotation. The motor must be at zero speed before the direction of the motor can be changed.

TB4-1 & 2 (ARMATURE INPUT): TB4-1 should be connected to TB2-3 and TB4-2 should be connected to TB2-4 when the reversing option is used.

TB4-3 & 4 (ARMATURE OUTPUT): Motor lead A1 connects to TB4-3 and Motor lead A2 connects to TB4-4 when the reversing option is used.

TDP503 REVERSING & TORQUE TAPER

TB3-1,2 & 3 (EXTERNAL TORQUE): A potentiometer with a resistance value between 2K and 10K ohms connects to these terminals if an external torque pot is desired when using the Torque/Taper option. The CCW lead and shield connects to terminal 1. The wiper connects to terminal 2, and the CW lead connects to terminal 3.

TB3-4 & 5 (FORWARD OR REVERSE SELECT): These terminals should be connected to a selector or toggle switch when the reversing option is used. When the contact across these terminals is open, the drive will produce CCW rotation. When the contact across these terminals is closed the drive will produce CW rotation. The motor must be at zero speed before the direction of the motor can be changed.

TB4-A1-OUT & A2-OUT (ARMATURE OUTPUT): Motor lead A1 connects to TB4-A1-OUT, and motor lead A2 connects to TB4-A2-OUT when the reversing option is used.

PROCESS FOLLOWER

TB5-1 (WIPER): On the enclosed TROOPER® models, this is the wiper from the potentiometer of the front of the enclosure. For chassis models, this is the input voltage signal for the unisolated (manual) drive. Normally a potentiometer with a resistance value between 2K and 10K ohms is used. The CCW lead and shield are connected to TB1-1.

The wiper connects to TB5-1, and the CW lead connects to TB1-3.

TB5-2 (OUTPUT): This is the signal output terminal from the Process Follower Option board. A jumper is connected from TB5-2 to TB1-2.

TB5-3 & 4 (MAN/AUTO): A SPST switch is connected across these two terminals. When the switch is open, the drive is set to manual control. When the switch is closed, the drive is set to automatic control.

TB5-5 (VOLTS IN): This terminal is used if the reference signal is to be 0 to 10V. Remember to set the J3 jumper to VOLTS.

TB5-6 (AMPS IN): This terminal is used if the reference signal is to be 4 to 20 mA. Remember to set the J3 jumper to AMPS.

TB5-7 (INPUT COMMON): This is the circuit common for the isolated (automatic) input signal.

4 Programming & Adjustments

4.1 Programming Jumpers

J1 (SPEED TORQUE): J1 selects either speed or torque mode.

J2 (AC INPUT VOLTAGE): J2 selects the armature feedback voltage level according to the A.C. line voltage to be used. Position at 115V for 115 VAC input or 230V for 230 V AC input.

NOTE: TDP502 models only. Jumper is omitted on TDP503 models.

J3 (ARMATURE CURRENT/TORQUE RANGE): Five full load current ranges are selectable for different motors. The Current Limit range is fixed at 150% of the value selected. Refer to the following tables to select the proper jumper location based on motor horsepower and input voltage.

Table 2: Model TDP502

INPUT VOLTAGE	J3 JUMPER POSITION				
	1.5 A	3 A	6 A	8 A	10 A
115 VAC	1/8 HP	1/4 HP	1/2 HP	3/4 HP	1 HP
230 VAC	1/4 HP	1/2HP	1 HP	1 1/2 HP	2 HP

Table 3: Model TDP503

INPUT VOLTAGE	J3 JUMPER POSITION				
	3 A	6 A	8 A	10 A	15 A
230 VAC	1/2 HP	1 HP	1 1/2 HP	2HP	3 HP

J4 (FEEDBACK MODE): Either armature, tachometer, or encoder feedback is selected by J4. For Torque Regulator mode, remove J4 so that no speed feedback is applied to the circuit.

NOTE: When operating in tachometer or encoder feedback, the IR COMP pot must be turned full CCW. Also, tachometer feedback cannot be used with reversing models.

J5 & J6 (A.C. INPUT VOLTAGE): The J5 and J6 jumper wires program the supply transformer according to the A.C. line voltage to be used. Position each at 115V for 115VAC input or 230V for 230VAC input.

NOTE: TDP502 models only. Jumpers are omitted on TDP503 models.

J7 (STOP MODE): Jumper J7 determines the type of remote operator required to STOP the Trooper control. For a Normally Open STOP operator, place J7 in the NO position. For a Normally closed STOP operator, place J7 in the NC position. If no remote STOP operator is required, place J7 in the NO position and make no connection to Terminal TB1-5. Reference Section 3.2 for additional information.

4.2 Potentiometers

P1 ACCEL (ACCELERATION TIME):

ACCEL sets the acceleration time from 1 to 25 seconds. Clockwise rotation increases the time taken to accelerate the motor linearly to full speed. To accelerate to speeds less than full speed will take less time. To accelerate to 50% speed would take 50% of the accel time.

P2 MAX (MAXIMUM): MAX sets the maximum motor speed when the speed pot is set for 100%. Clockwise rotation increases speed. When the control is used as a torque regulator, the MAX pot sets the maximum torque level.

P3 MIN (MINIMUM): MIN sets the minimum motor speed when the speed pot is set to zero. Clockwise rotation increases the output speed. In the torque regulator mode, this pot sets the minimum torque level.

P4 IR (IR COMP): IR provides a signal proportional to armature current to compensate for motor losses as the motor load increases. This improves speed regulation in armature feedback. Clockwise rotation increases the compensation. When tachometer or encoder feedback is used, or when the control is operated as a torque regulator, the IR pot should be set to minimum (full CCW).

4.3 Adjustment Procedure: Speed Regulator

STEP 1

Visually inspect all connections to check for tightness, proper insulation and agreement with the connection diagram. ONLY TB2-7 on TDP502 models and TB2-1 on TDP503 models should be connected to earth ground.

Verify the proper line voltage level. On TDP502 models, verify the proper jumper locations of J2, J5 & J6.

Place jumper J1 in the SPD position.

Note the motor nameplate full load current and select the proper current range at J3. Place jumper J4 in the ARM position even if tachometer or encoder feedback is to be used.

Initially set the potentiometers as follows:

MINfully CCW
MAXmid-range
IRfully CCW
ACCELmid-range

STEP 2

With no load on the motor or machine and with the speed pot at zero, apply power to the control. Momentarily close a set of contacts across TB1-4 & 7 to start the drive. Enclosed models only require pressing the start button.

Increase the MIN pot CW until the motor just begins to creep and then CCW until the motor just stops.

STEP 3

Rotate the speed pot to maximum. Measure the motor speed or armature voltage. Adjust the MAX pot for base speed or full rated armature voltage.

STEP 4

NOTE: Armature Feedback Only - Omit this step if tachometer feedback is used.

Adjust the speed pot to mid-range or if known the speed at which the motor will be run most often. Closely note the motor or line speed. Apply rated or normal machine load to the motor. The speed will usually drop off a small percentage. Increase the IR pot clockwise until the loaded speed matches the unloaded speed. Recheck the unloaded speed level and repeat this step until there is no difference in speed from no load to full load.

NOTE: The signal from the IR pot may affect the MIN and MAX pot settings. Recheck MIN and MAX speed after adjusting the IR pot and readjust if necessary.

STEP 5

NOTE: Tachometer Feedback Only - Omit this step if Armature or Encoder Feedback is used.

With the control in Armature Feedback, run the motor and measure the tachometer voltage at TB1-11 and 10. Verify that terminal 11 is positive with respect to terminal 10. Remove power and reverse the connections if necessary to correct the polarity.

Remove power from the control. Move J4 from the AFB position to the TFB position. Adjust the IR pot to minimum (full CCW).

NOTE: The decel rate on the TROOPER® is fixed. If the decel rate is required to be the same as the accel rate, clip diode D4 out of the circuit.

4.4 Adjustment Procedure: Torque Regulator

STEP 1

Visually inspect all connections to check for tightness, proper insulation and agreement with the connection diagram. ONLY TB2-7 on TDP502 models and TB2-1 on TDP503 models should be connected to earth ground.

Verify the proper line voltage level. On TDP502 models, verify the proper jumper locations of J2, J5 and J6.

Place jumper J1 in the TORQ position.

Note the motor nameplate full load current and select the proper current range at J3. Remove jumper J4.

Initially set the pots as follows:

MINfull CCW
MAXmid-range
IRfull CCW
ACCELmid-range

NOTE: In the following steps, motor torque should be monitored directly by use of a D.C. ammeter in series with the armature. Full rated torque is produced at full rated current. The motor shaft must be mechanically locked to prevent rotation.

STEP 2

In the Torque Regulator mode, the external pot connected to TB1-1, 2, & 3 becomes the torque reference pot. Turn this pot full CCW. Apply power to the control and momentarily close a set of contacts across TB1-4 & 7 to start the drive. Enclosed models only require pressing the start button.

STEP 3

Adjust the MIN pot clockwise to set the minimum current level with the torque reference pot at zero.

STEP 4

Turn the torque reference pot to 100%. Adjust the MAX pot clockwise to set the current for 100% of rated motor current.

NOTE: DO NOT operate the motor for more than several seconds at full load while stalled to prevent overheating.

STEP 5

Adjust the ACCEL to control the desired rate of increase in current in response to a change in the torque reference pot.

STEP 6

Turn off the power and remove the mechanical lock from the motor shaft. The Torque Regulator is now ready for use. Use caution in operating the motor at slow speeds near rated torque to prevent over heating. Verify the speed range of the motor to determine the lowest continuous operating speed at full torque.

4.5 Adjustment Procedure: Torque Taper Mode (Optional)

STEP 1

Refer to connection diagram D1 1677 for all -00T & 0RT models and D11678 for all -E0T & -ERT models.

Visually inspect all connections to check for tightness, proper insulation and agreement with the connection diagram. ONLY TB2-7 on TDP502 models and TB2-1 on TDP503 models should be connected to earth ground.

Place J1 in the VEL position and J4 in the AFB position.

Verify the proper line voltage level. On TDP502 models, verify the proper jumper locations of J2, J5 and J6.

Note the motor nameplate full load current and select the proper current range at J3.

Place a jumper between TB1-2 & 3.

Initially set the potentiometers as follows:

MINfull CCW
MAXmid-range
IRfull CCW
ACCELmid-range
TORQUEfull CW
TAPERfull CCW

STEP 2

If an External Torque Potentiometer is used, turn the P.C. board mounted TORQUE potentiometer full counter clockwise. Connect the external torque pot to TB3 with the CCW lead on TB3-1, the wiper on TB3-2 and the CW lead to TB3-3.

STEP 3

Turn the TORQUE potentiometer full clockwise.

STEP 4

With no load on the motor, apply power to the drive. Momentarily close a set of contacts across TB1-4 and 7. Enclosed models only require pressing the start button. Adjust the

no load speed (core speed) using the MAX potentiometer. Use the ACCEL potentiometer to adjust the acceleration time on start-up.

STEP 5

Adjust the TORQUE potentiometer counter clockwise to set the tension at core (counter clockwise decreases tension). The Limit light turns on when the drive begins to limit the output current. Adjust the TAPER potentiometer clockwise to set the tension at full roll diameter (clockwise increases torque).

4.6 Adjustment Procedure: Process Follower (Optional)

STEP 1

Refer to the connection diagram D11679 for all -0PF models and D11680 for all -EPF models.

Visually inspect all connections to check for tightness, proper installation, and agreement with the connection diagram. ONLY TB2-7 on TDP502 models and TB2-1 on TDP503 models should be connected to earth ground.

STEP 2

Place J3 in the VOL TS position if the automatic (or remote) signal is to be a voltage reference between 0 and +10 volts. If the reference is to be a current reference between 4 and 20 mA, place J3 in the AMPS position.

STEP 3

Initial TROOPER® setup can be done in either automatic or manual mode by simply selecting the desired mode with the AUTO/MAN switch and following the proper adjustment procedure. For Speed Regulator mode, refer to Section 4.3. For Torque Regulator mode, refer to Section 4.4.

5 Contactor Reversing, Torque/Taper & Process Follower Models

There are 12 models which have either Reversing and Torque/Taper, Torque/Taper only, or Process Follower Options. The TDP502 models cover the 1/8 to 2 HP range, and the TDP503 models cover the 1/2 to 3 HP range. The reversing models are provided with a zero speed circuit which prevents the motor from changing direction until the motor is brought to a complete stop.

MODEL TDP502-00T is a chassis unit which has only the torque/taper option. It operates from 115 or 230 VAC for 90 or 180 VDC motors. Refer to connection diagram D11677 in section 8 for connections to model TDP502-00T.

MODEL TDP502-0RT is a chassis unit which has both the torque/taper and reversing options. It operates from 115 or 230 VAC for 90 or 180 VDC motors. Refer to connection diagram D11677 in section 8 for connections to model TDP502-0RT.

MODEL TDP502-0PF is a chassis unit which features a process follower option. This option allows the drive to be operated with a 4 to 20 mA signal or an external voltage reference that may be common to other drives or equipment. It operates from 115 or 230 VAC for 90 or 180 VDC motors. Refer to connection diagram D11679 in Section 8 for connections to model TDP502-0PF.

MODEL TDP502-E0T is an enclosed unit which has only the torque/taper option. It operates from 115 or 230 VAC for 90 or 180 VDC motors. Refer to connection diagram D11678 in section 8 for connections to model TDP502-E0T.

MODEL TDP502-ERT is an enclosed unit which has both the torque/taper and the reversing options. It operates from 115 or 230 VAC for 90 or 180 VDC motors. Refer to connection diagram D11678 in Section 8 for connections to model TDP502-ERT.

MODEL TDP502-EPF is an enclosed unit which features a process follower option. This option allows the drive to be operated with a 4 to 20 mA signal or an external voltage reference that may be common to other drives or equipment. A mounted switch allows operation in manual or auto mode. It operates from 115 or 230 VAC for 90 or 180 VDC motors. Refer to connection diagram D11680 in Section 8 for connections to model TDP502-EPF.

MODEL TDP503-00T is a chassis unit which has only the torque/taper option. It operates at 230 VAC for 180 VDC motors. Refer to connection diagram D11677 in Section 8 for connections to model TDP503-00T.

MODEL TDP503-0RT is a chassis unit which has both the torque/taper and reversing options. It operates at 230 V AC for 180 VDC motors. Refer to connection diagram D1 1677 in Section 8 for connections to model TDP503-0RT.

MODEL TDP503-0PF is a chassis unit which features a process follower option. This option allows the drive to be operated with a 4 to 20 mA signal or an external voltage reference that may be common to other drives or equipment. It operates at 230 V AC for 180 VDC motors. Refer to connection diagram D11679 in Section 8 for connections to model TDP503-0PF.

MODEL TDP503-E0T is an enclosed unit which has only the torque/taper option. It operates at 230 V AC for 180 VDC motors. Refer to connection diagram DD1678 in

Section 8 for connections to model TDP503-E0T.

MODEL TDP503-ERT is an enclosed unit which has both the torque/taper and the reversing options. It operates at 230 V AC for 180 VDC motors. Refer to connection diagram D11678 in Section 8 for connections to model TDP503-ERT.

MODEL TDP503-EPF is an enclosed unit which features a process follower option. This option allows the drive to be operated with a 4 to 20 mA signal or an external voltage reference that may be common to other drives or equipment. A mounted switch allows operation in manual or auto mode. It operates at 230 V AC for 180 VDC motors. Refer to connection diagram D11680 in Section 8 for connections to model TDP503-EPF.

6 Spare Parts

Motor Control Assemblies

2 HP	D10783-000
3 HP	D10980-000

Printed Circuit Assemblies

2 HP Reversing & Torque/Taper Option	C10820-000
2 HP Torque/Taper Option	C10820-001
3 HP Reversing & Torque/Taper Option	C1036-000
3 HP Torque/Taper Option	C1036-001
Process Follower Option	C1087-000

Fuses

FU1 & FU2: Line Fuse, time delay, 250 VAC

20 Amp (2 HP)

Carotron	FS1005-05
Littelfuse326020
Bussmann	MDA-20

30 Amp (3 HP)

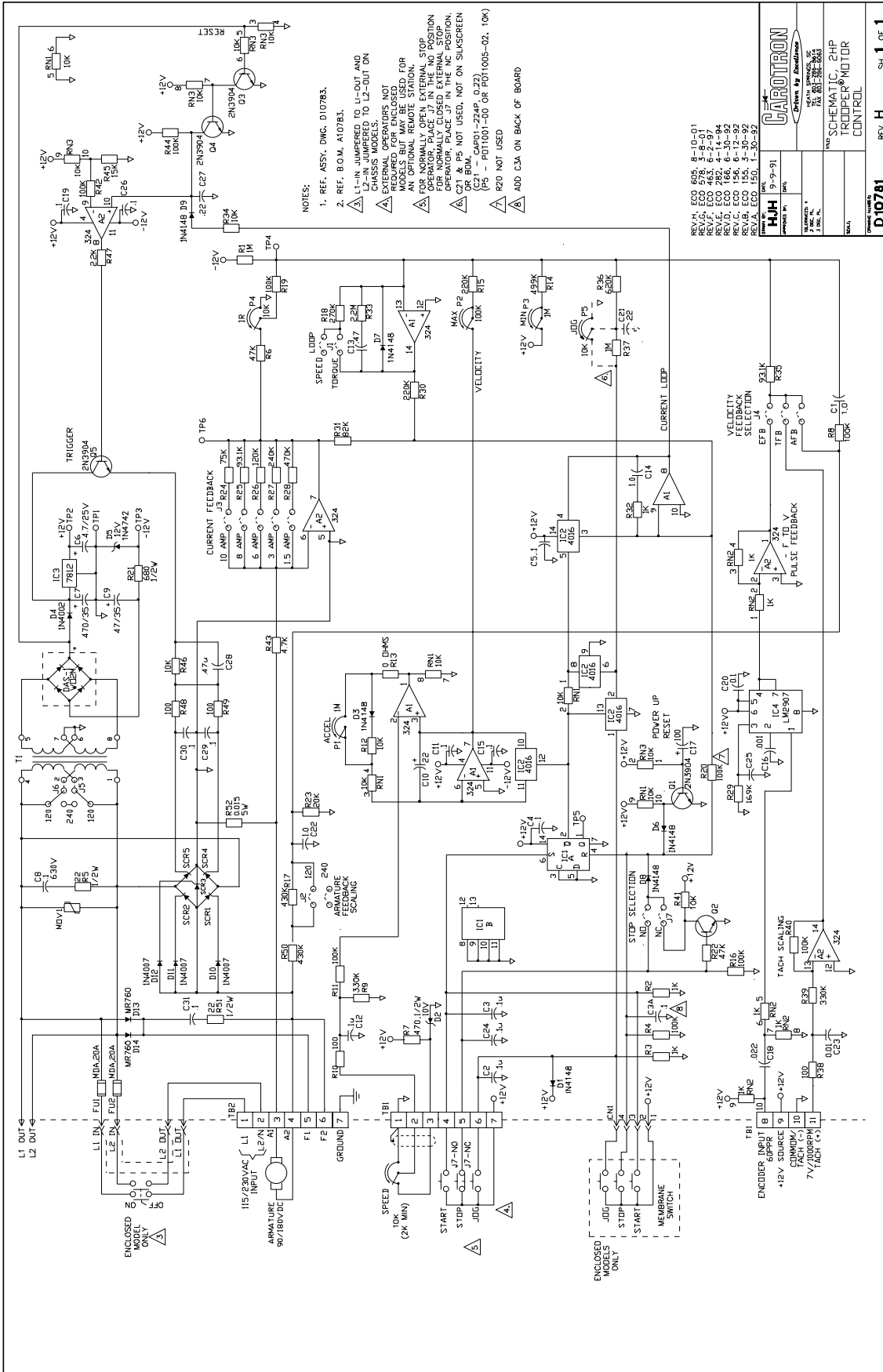
Carotron	FS1001-05
LittelfuseFLM-30
GouldTRM-30

Miscellaneous

Control Panel (membrane switch)	SWI5002-00
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7 Conversion Kits

Torque/Taper Conversion Kit	TDP500-001
Reversing & Torque/Taper Conversion Kit	TDP500-002
Process Follower Conversion	TDP500-005



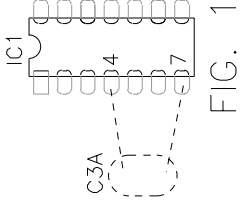
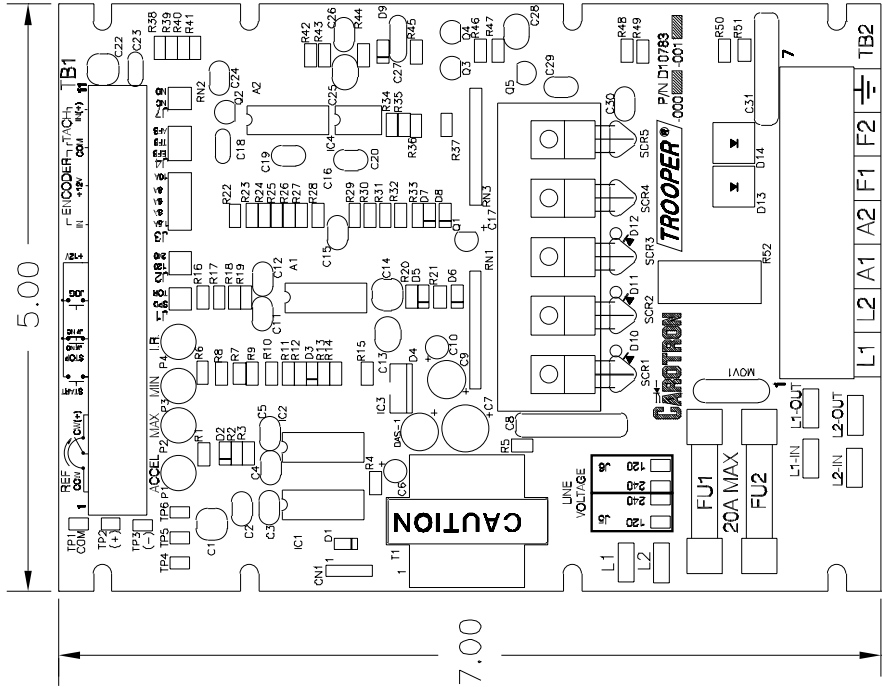


FIG. 1

- NOTES:
1. REF. SCHEM. DWG. D10781
 2. REF. B.O.M. A10783
 3. ADD C3A PER FIG. 1 (ECO 605) ON BACK OF BOARD.

REV. ECO 605, 8-10-01
 REV. ECO 578, 3-5-01
 REV. ECO 604, 6-12-01
 REV. ECO 156-6-12-92
 REV. ECO 150.2-4-92

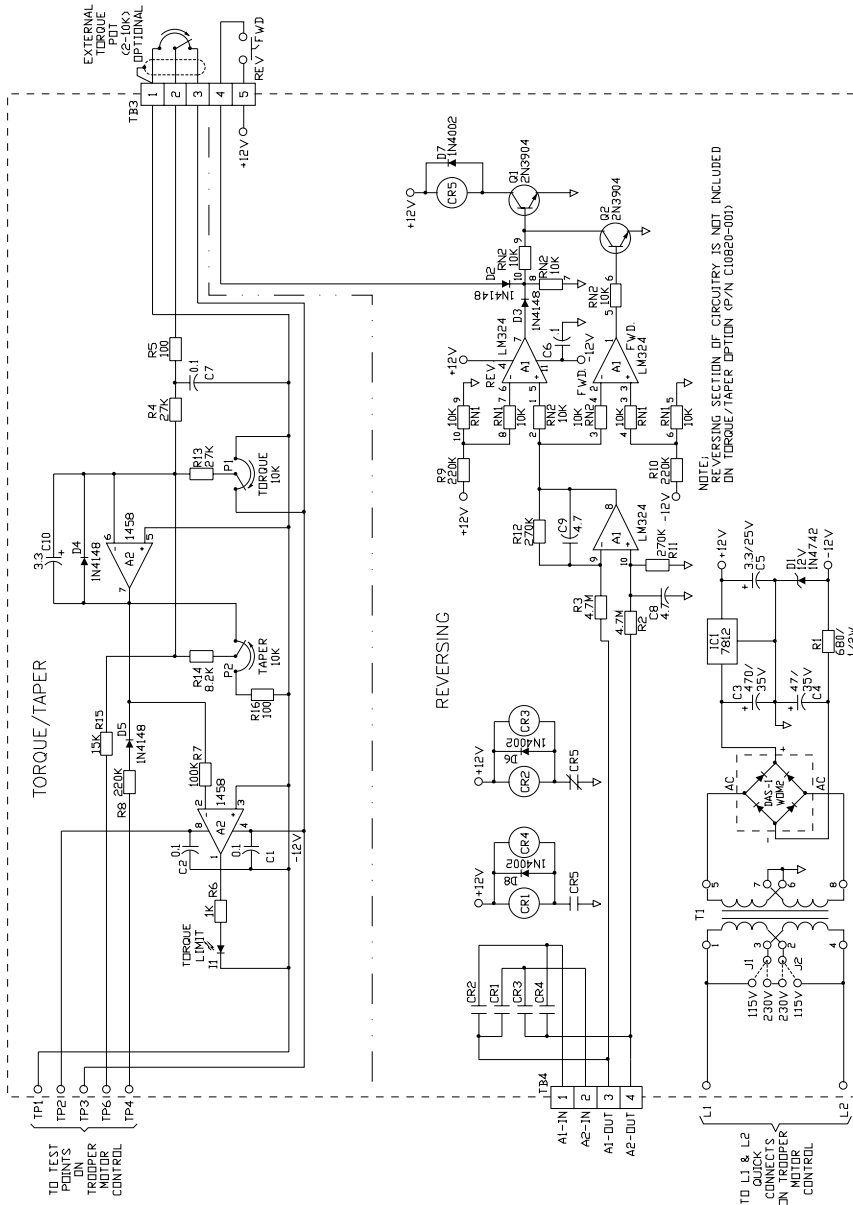
DATE: 12-11-91
 DRAWN BY: WRM
 CHECKED BY: [blank]

SCALE: 1
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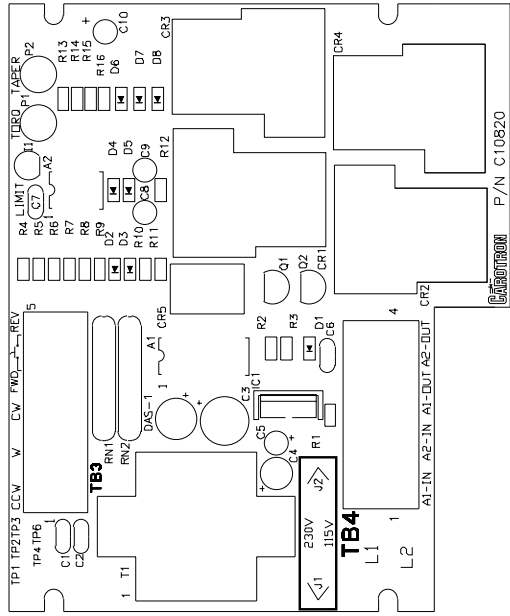
REV. ASSY, TROOPER 2HP
 MOTOR CONTROL

DRAWING NUMBER: **D10783** REV. **E** SH. **1** OF **1**



SCHMATIC C10818

- NOTES:
1. REF. ASSY. DWG. C10820.
 2. REF. B.O.M. ASSY. C10820-000 - INCLUDED ON TDP500-002
 3. REF. B.O.M. ASSY. C10820-001 - INCLUDED ON TDP500-001



ASSEMBLY C10820

- NOTES:
1. REF. B.O.M. ASSY. C10820-000: A10820-000
 2. REF. B.O.M. ASSY. C10820-001: A10820-001
 3. REF. SCHEM. DWG. C10818
- C3, C4, C5, C6, C8, C9, J1, J2, D1, D2, D3, D6, D7, D8, DAS-1, IC1, A1, CR1-5, R1, R2, R3, R9, R10, R11, R12, RN1, RN2, TB4, T1, Q1 & Q2 ARE NOT USED ON ASSY C10820-001

PART NO. D11673	REV. 1
TITLE SCHEMATIC OF ASSEMBLY, REVERSING/TORQUE TAPER OPTION	SH. 1
DRAWING NUMBER D11673	REV. 1

