

TACH FEEDBACK SPEED REGULATOR MODIFICATION (3PC)

PCB P/N 46S02452-0010

INTRODUCTION

This modification PCB is one of a series available for the Saber 3202 drive. It consists of components necessary for modifying the basic controller for the Tach Feedback Speed Regulator function. It also includes modification diagrams for the basic Saber 3202 manual.

DESCRIPTION

The Tach Feedback Speed Regulator modification provides 1% speed regulation. Speed regulation is always defined as a percentage of top speed, NOT set speed.

This means an adjustable speed drive with 1% regulation and a 1750 RPM motor will have a possible speed variation of 17.5 RPM at all operating speeds. The actual operating speed may vary more than 1% when the load is first applied, but will not vary any more than 1% after the speed has stabilized.

Either an AC or DC tach may be used, as the tach signal is fed into an Absolute Value Circuit. The output of an Absolute Value Circuit is always positive. This positive speed feedback signal is then compared with the negative speed reference supplied by the SPEED pot. The speed feedback signal will always be opposite in polarity to the speed reference signal. If the two signals

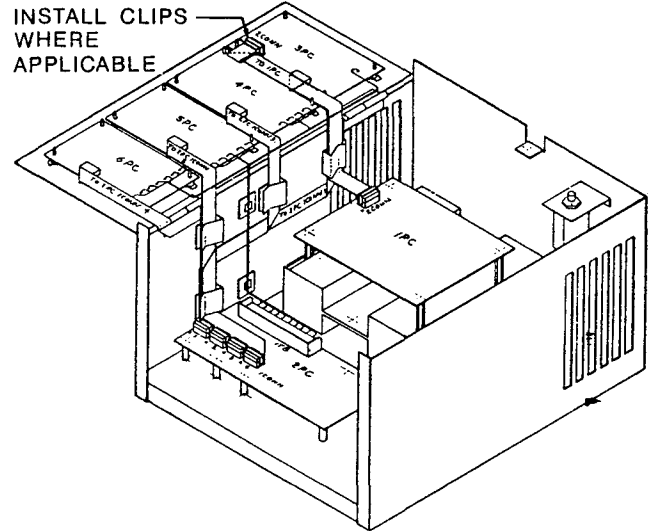


Figure 1. Layout

are equal and opposite in polarity they cancel each other. When they are not equal and opposite, an error signal is developed. It is this error signal which controls the firing time of the Power Bridge SCRs, to increase or decrease armature voltage as required. Armature voltage may vary from zero to 180 VDC; the higher the armature voltage, the faster the DC motor turns.

Table 1 lists the potentiometer adjustments, according to reference designator, name, and function, located on 3PC Tach Feedback Speed Regulator.

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Table 1. Function of Adjustments

DESIGNATOR	CONTROL NAME	FUNCTION
1RH	DECEL TIME	Sets deceleration rate of the drive. Turning CW increases deceleration rate.
2RH	ACCEL TIME	Sets acceleration rate of the drive. Turning CW increases acceleration rate.
3RH	MAX. SPEED	Sets maximum desired speed of the drive. Turning CW increases max. operating speed.
4RH	PROPORTIONAL GAIN	Adjusts the amount of instantaneous droop as a function of load and provides damping from drive system disturbances.
5RH	CURRENT LIMIT	Limits maximum average drive current available. Turning CW increases current available.
6RH	INTEGRAL GAIN	Adjusts the response time of the drive to drive system disturbances.
7RH	MIN. SPEED	Sets minimum speed of the drive. Turning CW increases min. operating speed.
8RH	ANTI-HUNT	Sets the amount of compensation for system inertia to stabilize the drive. Turning CW increases the amount of compensation.

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E-STOP: The E-STOP (Emergency Stop) push button is an optional feature. If present, it provides an alternate method of stopping the motor. The push button may be mounted either in the Operator's Control Station (OCS) or in any optimum location selected by the user.

DBR: The DBR (Dynamic Braking Resistor) is also an optional feature installed at time of manufacture.

When the STOP or E-STOP push button is pressed, relay switching places the DBR across the motor armature bringing the motor to a very rapid stop. During this period, the motor acts as a generator and the rotational energy is dissipated by the DBR in the form of heat.

INSTALLATION: (See Figure 1)

WARNING

REMOVE ALL INPUT POWER TO DRIVE
BEFORE INSTALLING THIS MODIFICATION.

1. Disconnect ribbon cable from 3PC-2CONN.
2. Disconnect 3PC's ribbon cable from 2PC-1CONN position 1.
3. Remove 3PC from standoffs.
4. Install modification PCB on the standoffs at position 3PC.

INTERCONNECTION

Reference the Tach Feedback Speed Regulator Relay Logic and Interconnection diagram (sheet 6) and Signal Flow diagram (sheet 7) when making interconnections.

There are two types of interconnections to be made; Internal and External. Internal connections consist of wiring within the Saber 3202 controller. External connections consist of wiring between the controller and Operator Control Station (OCS). The interconnections are described below.

Internal

Route and dress the ribbon cable as shown in Figure 1 - Layout, and connect it to 2PC-1CONN (position 1). Install locking clip.

Connect ribbon cable (from 1PC) to 2CONN receptacle on this PCB.

Route and dress the individual wire (B1) as indicated, and connect it to 8TB-1 of the Controller.

IMPORTANT

Both internal and external connections must be completed as illustrated in the Relay Logic and Interconnection diagram for your drive. Installation of multiple modification kits may require the REMOVAL of various terminal jumpers. Always verify that the wire/jumper connections are completed as illustrated in the interconnection diagram specific to your drive before applying input power.

External

Connect the OCS and motor (with tach) to the controller as shown on the appropriate interconnection diagram.

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ADJUSTMENTS

Preliminary Adjustments

WARNING

INSURE ALL INPUT POWER IS REMOVED.

1. The table below shows the proper settings of switch 1SS for different tachs. Place 1SS settings (on 3PC) according to the tach being used.

DC TACH	AC TACH	1SS-SETTING			
RANGE	RANGE	(1)	(2)	(3)	(4)
IN VDC	IN VAC				
120-180	85-127	ON	OFF	OFF	OFF
75-120	53-85	OFF	OFF	ON	OFF
43-75	31-53	OFF	ON	OFF	OFF
31-43	22-31	OFF	OFF	OFF	ON
16-31	12-22	OFF	OFF	OFF	OFF

2. Set the SPEED pot (in OCS) fully counterclockwise (CCW).

3. Set the following pots on the Tach Feedback Speed Regulator fully counterclockwise (CCW):

MIN SPEED	7RH
MAX SPEED	3RH
ACCEL	2RH
DECEL	1RH

4. Set the following pots on the Tach Feedback Speed Regulator to mid-range:

PROPORTIONAL GAIN	4RH
INTEGRAL GAIN	6RH
ANTI-HUNT	8RH

Adjustments - Drive Energized

1. Apply 230 VAC, single phase power to drive unit.

2. Press the RUN push button.

3. Turn MIN SPEED potentiometer clockwise (CW) until desired minimum operating speed is reached.

4. Slowly turn SPEED pot CW and observe drive speed increase. With the SPEED pot fully CW, turn MAX SPEED potentiometer CW until desired maximum operating speed is reached.

CAUTION

DO NOT SET MAX SPEED POTENTIOMETER TO A SETTING WHICH WILL ALLOW A MOTOR SPEED OR ARMATURE VOLTAGE HIGHER THAN THAT INDICATED ON THE MOTOR NAMEPLATE.

5. Start and stop the drive several times (by pressing the RUN and STOP push buttons) and observe the acceleration and deceleration rates. Adjust the ACCEL and DECEL potentiometers to give desired acceleration and deceleration rates.

6. Press the RUN push button and set the SPEED pot about 30% CW (from the fully CCW position).

7. Turn the ANTI-HUNT pot CCW until drive speed becomes erratic and "hunts". Then slowly turn the ANTI-HUNT pot CW until the drive is stable again.

8. Turn the PROPORTIONAL GAIN pot CCW until the drive becomes unstable, then turn the pot CW 10%.

9. Turn the INTEGRAL GAIN pot CCW until drive instability results, then turn the pot CW 10%.

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IMPORTANT

The CURRENT LIMIT (5RH) pot has been set at the factory and should not need to be re-adjusted. Your CURRENT LIMIT is set properly at 150% of rated motor current. If it becomes necessary to re-adjust the CURRENT LIMIT pot, refer to paragraph 5.4, in the Saber 3202 manual.

MODIFICATION RECORDS

A. Remove 02Y00025-0326 sheets 1 and 2 from the back of your Saber 3202 manual.

B. Place this instruction sheet in the back of your Saber 3202 manual (in front of any other 02Y00025 instruction sheets).

C. If the Controller was not custom designed, and if this modification was customer installed, change digit IV of the 53SFA serial number recorded on page 1-4 of the manual from a "1" to a "2".

TROUBLESHOOTING

If other modifications have been installed, be sure to troubleshoot them thoroughly before discarding this option as faulty.

1. REMOVE INPUT POWER, and then insure all required interconnections and jumpers are properly installed. Check the ribbon cables 1CONN and 2CONN.

2. Set 1RH and 2RH fully CCW. Apply power to the drive. Press the RUN push button. As the SPEED pot is turned from fully CCW to fully CW, the voltage at 4TB-4 on 2PC should vary from 0V to -10

VDC $\pm 5\%$ and the voltage at 1TP on this board should vary from 0V to -5 VDC $\pm 5\%$. If these voltage ranges are not attained, replace the modification PCB.

3. With the SPEED pot at 100%, voltage at 2TP on 3PC should vary from 0V to +10 VDC $\pm 10\%$ as the CURRENT LIMIT pot is turned from fully CCW to fully CW. If not, replace the modification PCB.

4. If motor speed is too fast or too slow, make sure that ISS settings are correct and the MAX SPEED pot 3RH is properly adjusted. If not, correct as required.

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