

## FORCE REGULATED SPEED FOLLOWER (FRSF) OPTION ASSEMBLY

**46S02371-0140    SCHEMATIC    45S02371-0140**  
**46S02371-1140    SCHEMATIC    45S02371-1140**

### DESCRIPTION

This option is one of a series available for Louis Allis Saber DC drives. It is designed to monitor the feedback signal from force transducers, then compare this signal with the tension reference feedback, to modify the normal speed regulating function of the drive. This is done by injecting current into the speed regulating node. Since this is basically a trim function, the circuit interaction is limited to 20% of top speed.

The option includes the reference supply and connections for customer's external 5K TENSION potentiometer. In addition, the following items are provided:

1. Selector switch for meter damping and low scale operation.
2. Terminal connections for:
  - a. Transducer input signals.
  - b. Supply voltages  $\pm 15V$ ,  $+5V$  or  $24V$ .
  - c. External damping capacitor.
  - d. External stability capacitor and reset circuit.
  - e. Voltmeter output, one milliamp meter output and 0-2V digital meter output and meter common.
  - f. Upstream and downstream measurement.

- g. Non-extensible and low-scale maximum tension control inputs.
3. Tare weight adjustment (2RH).
4. Span adjustment (3RH).
5. Meter calibration adjustment (4RH).
6. Switch selectable internal tension adjustment (5RH).
7. Relay logic selectable high-range (6RH) and low range (7RH) maximum tension adjustments with 3LED and 4LED indicators controlled by 115 VAC or +24 VDC interfacing.
8. One set of relay logic selectable adjustments for extensible materials with 1LED indicator:
  - a. Extensible GAIN (8RH).
  - b. Extensible RESPONSE (9RH).
  - c. Extensible STABILITY (10RH).
  - d. Extensible DROOP (11RH).
9. One set of relay logic selectable adjustments for non-extensible materials with 2LED indicator:
  - a. Non-extensible GAIN (12RH).
  - b. Non-extensible RESPONSE (13RH).

CHANGE RECORD		4	STD-2666	2-3-87 RCL				
1	STD-1530							
2	Publ Change							
3	STD-1854							
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- c. Non-extensible STABILITY (14RH).
- d. Non-extensible DROOP (15RH).

Two versions of the Force Regulated Speed Follower option are available.

The 46S2371-0140 version operates with a LVDT type transducer and provides an extra LVDT balance adjustment (1RH).

The 46S2371-1140 version operates with a strain gage type transducer and provides an additional selector switch to select between 250mV load cell and 10mV load cell.

INSTALLATION

WARNING

REMOVE ALL INPUT POWER TO THE DRIVE BEFORE INSTALLING THIS OPTION.

See Figure 1. Install the option in the following manner:

1. Install PVC mounting track (L.A. part no. 43T1501-000) to the panel where option is to be mounted, using appropriate hardware.

2. Install option by pressing firmly into mounting track.

3. Using 40 conductor ribbon, fabricate and install a double-ended ribbon cable of sufficient length to fit from 12CONN on the right side of the option to 12CONN on the Main PCB in the regulator power cube, or to 12CONN on the left side of a previously installed option.

IMPORTANT

If other options are already present, the power supply capability from the Saber power cube may not be sufficient when this option is added; if so, a Booster Power Supply option (46S02371-0190) will be required.

INTERCONNECTION

Perform interconnections for this option according to Table 1.

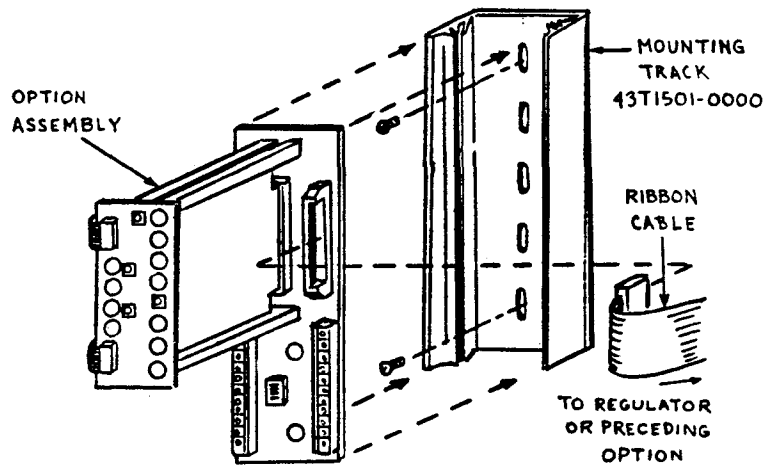


Figure 1.

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TABLE 1.

FROM	TO	REMARKS
LVDT-1 Output Signal (Figure 2)	+ 1TB (6) - 1TB (7)	2-Conductor Shielded Cable.
LVDT-2 Output Signal (Figure 2)	+ 1TB (13) - 1TB (12)	2-Conductor Shielded Cable.
LVDT Shields	1TB (11)	
Strain Gage Output (Figure 3) (See Note 1)	+ 1TB (16) - 1TB (15)	2-Conductor Shielded Cable.  Close 1SS(3) & (4) for 250mV load cell. Open 1SS(3) & (4) for 10mV load cell.
Strain Gage Shield	1TB (14)	
LVDT Supply (Figure 2)	2TB (1)	+24 VDC Supply.
Strain Gage Supply (Figure 3)	2TB (3)	+5 VDC Supply.
Transducer Common	2TB (2)	Supply Common.
Voltmeter	2TB (13)	
1mA Tension Meter	2TB (14)	Calibrated.  Close 1SS(1) for low scale operation. Close 1SS(2) to increase meter damping.
0-2V Digital Meter	2TB (15)	Calibrated, install jumper from 2TB(5) to 2TB(14)

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TABLE 1. (Continued)

FROM	TO	REMARKS
Meter Common	2TB (5)	
2TB (12)	2TB (13)	External Damping capacitor, if required.
2TB (11)	2TB (10)	External Stability capacitor and/or external push-to reset circuit (Push-to-reset is used to eliminate INITIAL charges on stability capacitor).
2TB (9)	2TB (8)	Jumper for Upstream measurement.
2TB (9)	2TB (6)	Jumpers for Downstream measurement.
2TB (7)	2TB (8)	
Customer's external 5K TENSION pot	CW 1TB (9) Wiper 1TB (10) CCW 1TB (8)	5SS must be open. If customer's pot is NOT USED, CLOSE 5SS. This enables the INTERNAL TENSION pot, 5RH.
115 VAC/24 VDC ON/OFF Control for Non-extensible Materials	+ 1TB (4) - 1TB (3)	Jumper must be installed across 1R & 2R for 24 VDC ON/OFF control.
115 VAC/24 VDC ON/OFF Control for Low Range Max. Tension	+ 1TB (2) - 1TB (1)	Jumper must be installed across 3R & 4R for 24 VDC ON/OFF control.

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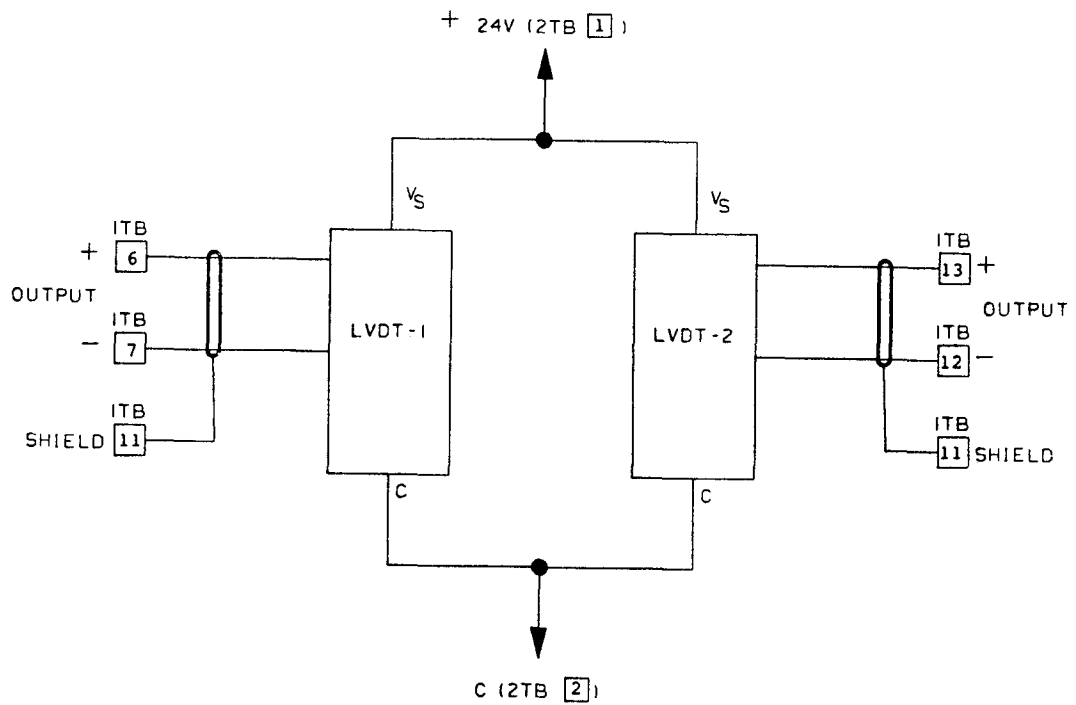


Figure 2. LVDT Transducer Connections

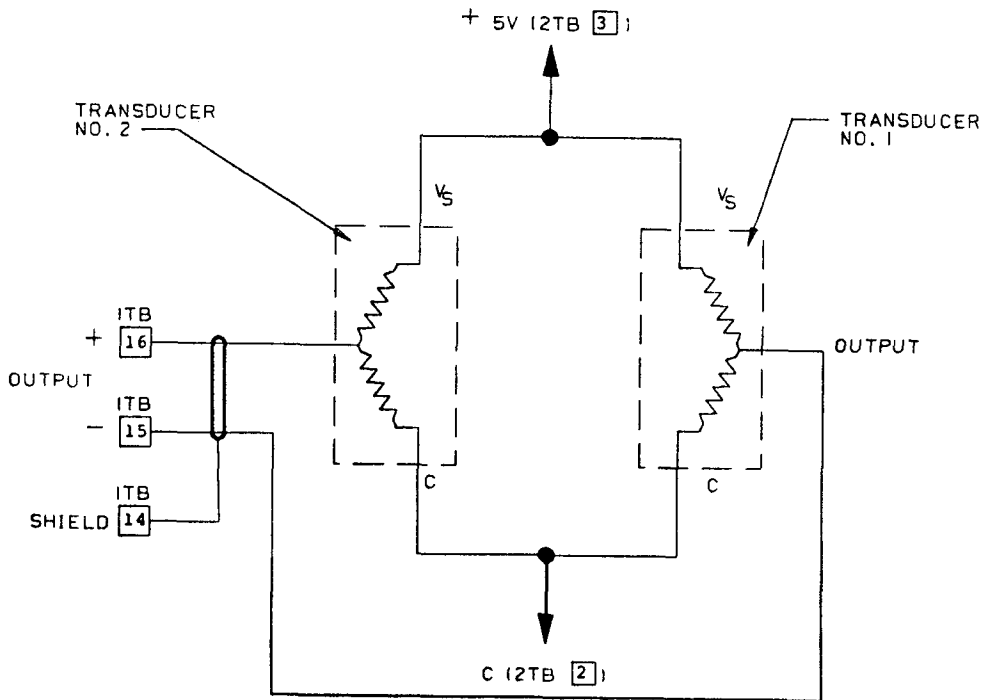


Figure 3. Strain Gage Transducer Connections

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TABLE 2.

DESIGNATORS	ADJUSTMENTS	FUNCTION
On option I/O PCB:		
1RH	LVDT BALANCE	Equalizes the two LVDT output signals.
2RH	TARE WEIGHT	Provides $\pm$ bias to eliminate tare weight effect on the system.
3RH	SPAN	Sets the gain of transducer signals.
4RH	METER CALIBRATION	Sets the maximum indication on the meter with maximum working load on load cells.
On option Adjust PCB:		
5RH	INTERNAL TENSION	Sets the level of reference tension signal.
6RH	HIGH RANGE MAX TENSION	Sets the range of transducer feedback tension for high range operation.
7RH	LOW RANGE MAX TENSION	Sets the range of transducer feedback tension for low range operation.
8RH	EXTENSIBLE GAIN	Sets the gain of the difference between reference tension and transducer feedback tension for extensible materials.
9RH	EXTENSIBLE RESPONSE	Sets the RC time constant of the STABILITY CIRCUIT for extensible materials.
10RH	EXTENSIBILITY STABILITY	Sets the amount of capacitor feedback on the STABILITY CIRCUIT for extensible materials.
11RH	EXTENSIBLE DROOP	Sets the amount of current injected into the speed node.
12RH	NON-EXTENSIBLE GAIN	As 8RH, but for non-extensible materials.
13RH	NON-EXTENSIBLE RESPONSE	As 9RH, but for non-extensible materials.
14RH	NON-EXTENSIBLE STABILITY	As 10RH, but for non-extensible materials
15RH	NON-EXTENSIBLE DROOP	As 11RH, but for non-extensible materials.

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## ADJUSTMENTS

1. Set the following adjustments to 0% BEFORE APPLYING POWER to the drive.

a. SPAN adjustment (3RH).

b. INTERNAL TENSION (5RH) or customer's EXTERNAL TENSION pot.

c. HIGH SCALE (6RH) and LOW SCALE (7RH) MAX TENSION.

d. EXTENSIBLE GAIN (8RH) and NON-EXTENSIBLE GAIN (12RH).

e. EXTENSIBLE DROOP (11RH) and NON-EXTENSIBLE DROOP (15RH).

2. Either install a jumper between testpoints 2TP and 3TP to common, 2TB (2), OR remove load cell inputs.

3. Apply power to drive. Adjust the TARE WEIGHT (2RH) pot for 0.00 VDC at 4TP.

4. Either remove the jumper installed in Step 2 or reconnect the load cell inputs.

5. If strain gauge transducer is used, proceed directly to Step 7 and continue to Step 13.

6. Apply maximum working load on the load cells. On the LVDT version (-0140), adjust the LVDT BALANCE (1RH) until the voltage at 4TP is 75% of that at 2TP and of OPPOSITE polarity.

7. Remove working load from roll. Adjust the TARE WEIGHT (2RH) for 0.00 VDC at 4TP.

### IMPORTANT

Voltage (\*\*) may vary according to application. In these instances, the system schematic will state value required. Always refer to system schematic before performing Step 8.

8. Apply maximum working load on the load cells. Monitor 4TP and adjust the SPAN (3RH) for -10.00 VDC (\*\*).

9. Close 1SS(1) and adjust the METER CALIBRATION (4RH) for maximum indication on the meter which reflects the maximum working load on the load cells.

10. With system running, set the following adjustments for optimum performance:

a. INTERNAL TENSION (5RH) or EXTERNAL TENSION pot.

b. HIGH-RANGE MAX TENSION (6RH).

c. EXTENSIBLE GAIN (8RH), RESPONSE (9RH), STABILITY (10RH) and DROOP (11RH).

11. For low range operation, apply 115 VAC/+24 VDC ON/OFF control as shown in the interconnection table and adjust the LOW SCALE MAX TENSION adjustment (7RH) at the desired range.

12. For non-extensible material operation, apply 115 VAC/+24 VDC ON/OFF control as shown in the interconnection table and set the NON-EXTENSIBLE GAIN (12RH), RESPONSE (13RH), STABILITY (14RH) and DROOP (15RH) at the desired levels.

13. Remove power from drive. Adjustment procedure is complete.

### TROUBLESHOOTING

If other options have been installed, troubleshoot them thoroughly before discarding this option as faulty.

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If the desired function can not be obtained, follow the steps below for troubleshooting:

1. Remove power from the drive and refer to the interconnection table; make sure all connections are correct.

2. Check fuse 1F on the LVDT version (-0140); replace if necessary.

3. Apply power to the drive and note that 1LED and 3LED immediately light. Measure the following supply voltages relative to common, 2TB (2).

+15 VDC  $\pm$ 5% at 7TP and 2TB (4).

-15 VDC  $\pm$ 5% at 9TP and 1TB (5).

-10 VDC  $\pm$ 2% at 1TB (9).

+24 VDC  $\pm$ 20% at 2TB (1) (LVDT version).

+5VDC  $\pm$ 5% at 2TB (3) (Strain Gage version).

4. Check for proper polarities at the load cell inputs by measuring voltages at 1TP, or 2TP and 3TP. The voltages should always be positive with load applied to the load cells. If not, correct wiring.

5. Remove the load cell inputs from the option assembly. With SPAN adjustment (3RH) at 0% and TARE WEIGHT (2RH) at 100%, the voltage at 4TP should be -4.42 VDC  $\pm$ 10%.

6. Verify +4.42 VDC  $\pm$ 10% is at 2TB 13 and 5TP. With HIGH RANGE MAX TENSION (6RH) at 100%, EXTENSIBLE GAIN (8RH) and EXTENSIBLE STABILITY (10RH) at 0%, the voltage at 6TP should be -8.85 VDC  $\pm$ 10% and voltage at 2TB (9) should be +8.85 VDC  $\pm$ 10%.

7. Slowly turn TARE WEIGHT (2RH) CCW until voltage at 5TP is +2.00 VDC and apply 115 VAC/+24 VDC ON/OFF control for LOW-RANGE MAX TENSION: 4LED should be lit. With LOW RANGE MAX TENSION (7RH) at 100%, voltage at 6TP is -7.30 VDC  $\pm$ 10%.

8. Turn NON-EXTENSIBLE GAIN (12RH) to 0% and apply 115 VAC/+24 VDC ON/OFF control for NON-EXTENSIBLE: 2LED should be lit and voltage at 6TP is still -7.30 VDC  $\pm$ 10%.

#### OPTION RECORDS:

After completing installation of this option, insert this instruction sheet immediately behind the front cover of the Controller instruction manual.

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