4922c

Instruction Manual
Publication 189 TLA
March 1995

Tachometer Signal Loss Assembly

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HUBBELL

Tach Signal Loss Assy.

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Section Contents

General Description

The 49232-101 &-102 Tachometer Signal Loss Assembly monitors a speed regulated system's DC tachometer signal and compares this signal with the system's commanding speed reference. A speed difference error signal is produced and compared to an adjustable differential window. If the speed difference signal falls outside the differential window for longer than an adjustable time limit, the unit's Low Voltage relay will deenergize. The Low Voltage relay will deenergize immediately if the absolute value of the monitored tachometer signal exceeds 125% of the selected synchronous speed, thus providing a fixed overspeed sensing function.

The Tachometer Signal Loss Assembly can monitor 50V or 100VDC tachometers, can be set for standard 60 hz synchronous motor speeds from 600–1800 rpm, can be set to accept bipolar or positive only speed reference signals of up to 50V in magnitude, and provides adjustments for Differential Error, Error Time, and Speed Reference Signal Attenuation.

There are two signal level Lockout Command inputs and one 120VAC control circuit Isolated Lockout Command input. These inputs are used to override the unit's comparison function during periods of nonspeed regulated operation such as Full Speed regenerative lowering or torque/current limiting reversing plugging. The lockout inputs do not disable the overspeed sensing function.

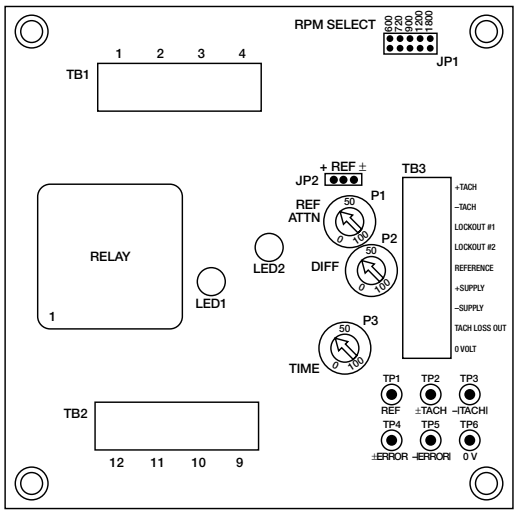
Application Information

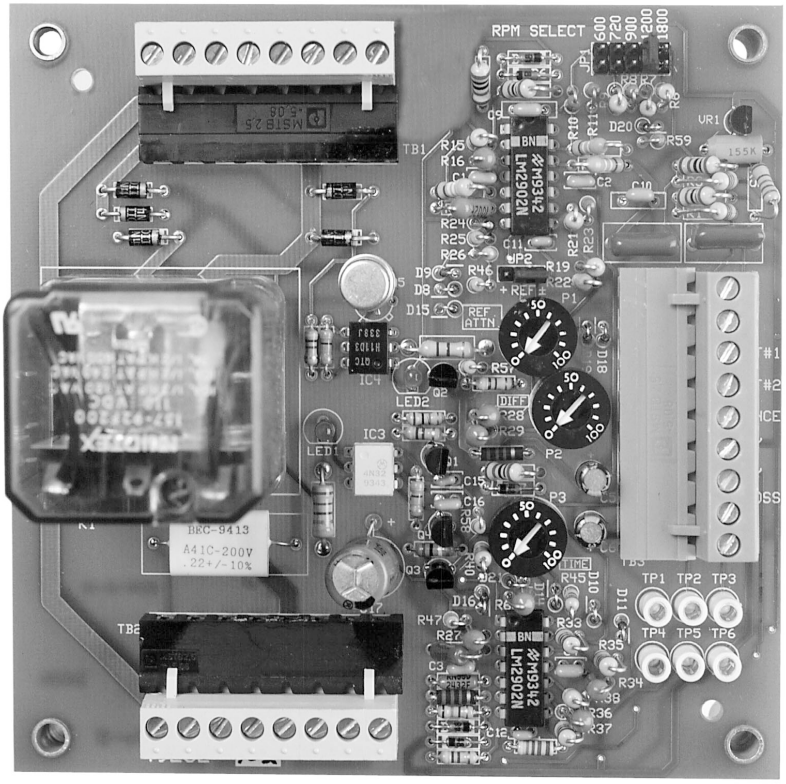
The 49232-101 &-102 Tachometer Signal Loss Assembly can be used to monitor and verify the speed feedback signal of speed regulated control systems. The -101 assembly will monitor 50V tachometers and the -102 assembly will monitor 100V tachometers. The assemblies can be set for any of five standard 60 hz synchronous tachometer speed ranges, and to accept either bipolar, ±Ref, or positive only, +Ref, system speed reference signals. The assemblies also provide immediate detection of overspeed conditions. This function will respond to tachometer signal levels exceeding 125% of the selected speed range.

The assemblies have three adjustment potentiometers:

1. The Reference Attenuation potentiometer allows the system speed reference signal to be adjusted and scaled to match the speed feedback signal requirements.
2. The Differential Potentiometer sets the speed reference error window and determines how precise the speed must follow the system reference.
3. The Time Potentiometer sets the time period that a sensed speed tracking error must exist before the output LV relay is deenergized. The time delay function is bypassed when an overspeed condition is sensed, causing the LV relay to disengage immediately.

The assemblies have two signal level Lockout inputs, and one control circuit Isolated Lockout input. These inputs can be used to inhibit the speed tracking function. When any of these inputs are activated, the output LV relay will remain energized regardless





49232-101 Tachometer Signal Loss Assembly

of the speed to reference error. Overspeed detection is not inhibited by the activation of any of the lockout inputs.

The assemblies have a Tach Loss Output signal. This current sinking output can be connected to 0V referenced circuits and used to confirm to the speed controlling system that the motor and tachometer are tracking the system speed reference signal within the set differential limits. This output can also be used to control an external relay. Note: a free-wheeling diode must be placed in parallel with the coil of the external relay. This output can sink 200 mA to 0V at 70°C.

Figures T2 (on the next page) shows a typical hoist control application of the Tachometer Signal Loss Assembly. The LV relay on the assembly is used as the system low voltage relay. The 120V control voltage is connected to TB1-1,2 and to TB1-3,4. Any LV circuit permissive contacts such as overload or thermostat contacts are connected in series between TB1-5,6 and TB1-7,8. For standard Off-Point reset operation, the Off-Point setup circuit needs to be in place.

This is done by jumpering TB2-5,6 and TB2-3,4, and connecting the Off-Point initiating contacts between TB1-1,2 and TB2-5,6. This completes the 120V control circuit connections for the LV relay.

The motor control system that the Tachometer Signal Loss Assembly is monitoring, supplies the regulated DC power for the unit's electronics. The 0V connection is made to TB3-1. The +8.0 to +12.0VDC power is connected to TB3-4, and the –8.0 to –12.0V power is connected to TB3-3.

The Tachometer Loss output, TB3-2, can be connected to the Tachometer Continuity input on the Speed Regulating system. This signal provides a direct input to the Speed Regulating system's Permissive circuit. Should this connection not be desired, the Tach Loss output can be left open, but the tachometer continuity input on the speed regulating control should be jumpered to 0V to enable the permissive circuit. The latter is the typical connection.

The speed regulating control's Ramp signal is used as the comparison reference for the monitored tachometer signal. The Ramp signal from the speed control is connected to TB3-5.

The system tachometer is connected to TB3-8 and TB3-9. The polarity of the tachometer signal is important when the speed control Ramp signal is bipolar. For typical applications, the positive tachometer line is connected to TB3-9 for the Raise or Hoist motion when a positive speed reference Ramp signal is present at TB3-5.

The Isolated Lockout input is used to disable the speed tracking function of the Tachometer Signal Loss Assembly. The tracking function should be disabled at any time that the speed control system is not actively providing speed control operation, such as full speed, full voltage Raise or Hoist, full voltage regenerative lower, or prolonged current limit operation during a stalled float sequence. The Isolated Lockout is activated by supplying 120VAC from TB2-1,2 to TB1-3, 4

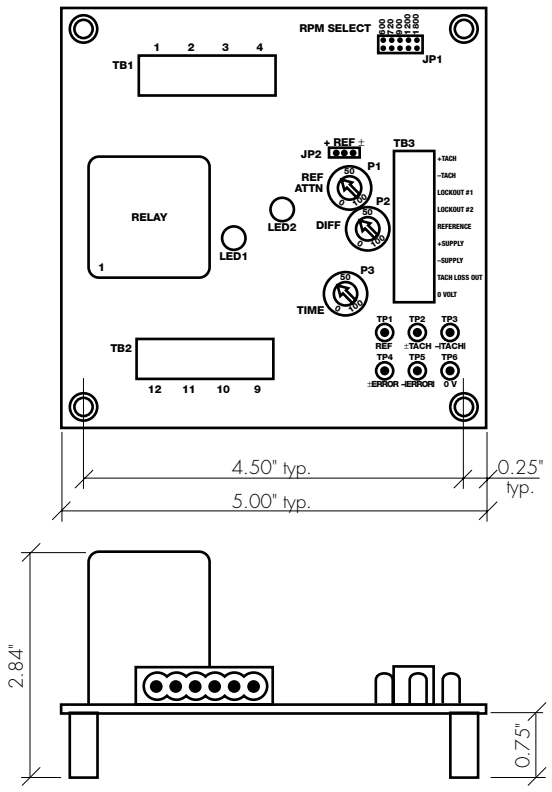


Figure T1 – Outline drawing of TSLA

Specifications

Input Power and Signals

LV Control Circuit	120V AC
Signal Circuit Power Supply	30 mA. loading; ±8.0VDC to ±12.0VDC
Tachometer Signal	
–101 assembly	50V/1000 rpm
–102 assembly.	100V/1000 rpm
System Speed Reference	up to 50VDC
Lockouts #1 and #2	connect to + Supply 10K ohm load to 0V
Isolated Lockout	10 mA loading @ 120VAC

Output

Tach Loss Out	200 mA sink to 0V from +Supply @ 70°C
LV Relay	2 – N.O. @ 10 amps, 120VAC @ 70°C

Adjustments

RPM Select (rpm) (JP1)	600, 720, 900, 1200, 1800
Reference Select (JP2)	±Ref, +Ref
Reference Atten (P1)	input reference signal scaling
Differential (P2)	5% – 100%
Time Delay (P3)	0.25–5.0 seconds

Indicators / Diagnostics

LED1	Isolated Lockout active
LED2	LV Relay engaged
Test Point 1 (TP1)	Scaled speed ref. ±5.0V System Sync Speed
Test Point 2 (TP2)	Scaled ±Tach; ±5.0V for System Sync Speed; ±6.25V for Overspeed level
Test Point 3 (TP3)	–ITachI; –5.0V for System Sync Speed; –6.25V for Overspeed level
Test Point 4 (TP4)	±Error; ±5.0V for trip @ set differential
Test Point 5 (TP5)	–IErrorI; –5.0V for trip @ set differential
Test Point 6 (TP6)	0V
Temperature Range	–4°F (–20°C) to 158°F (70°C)

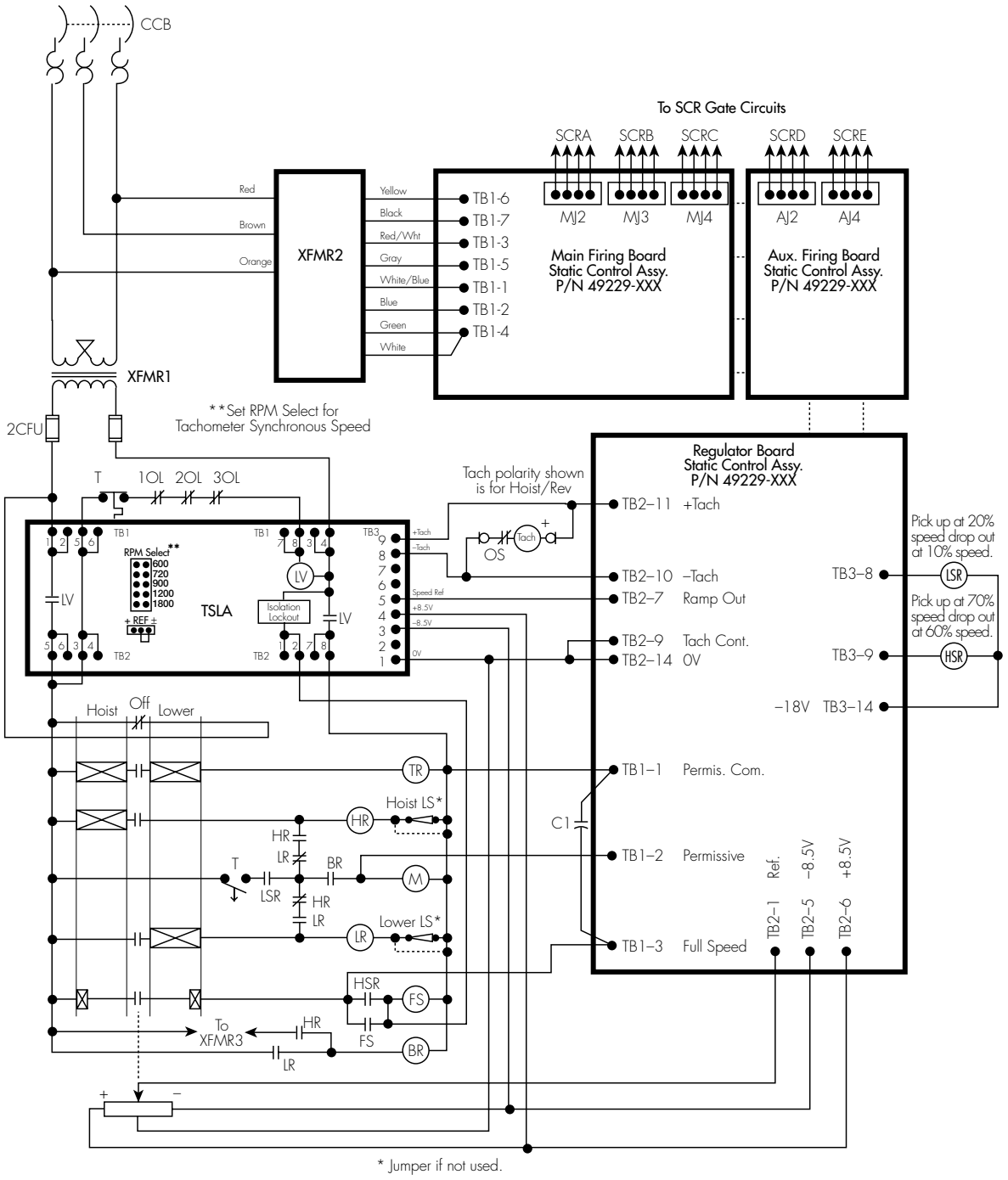


Figure T2 – a typical TSLA installation for a hoist controller

Adjusting TSLA

The jumpers and potentiometers on the Tachometer Signal Loss Assembly must be setup correctly for proper operation of the unit. Below are the major adjustments and each of their respective functions. Adjust them or select them in the following order:

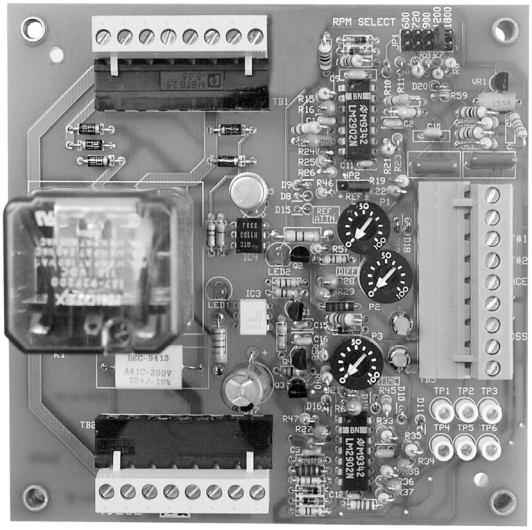
1. RPM Select
2. Ref Select
3. Reference Attenuation Potentiometer
4. Differential Potentiometer
5. Time Potentiometer

RPM Select

This jumper should be set to the rpm value that the system tachometer turns when the controlled motor is running at it's synchronous speed. In direct tachometer to motor connection, this setting will be the motor's synchronous speed. In applications involving a Hubbell Tachometer/Overspeed switch assembly, verify the tachometer speed increase/reduction. Most Tachometer/Overspeed assemblies drive the tachometer at 1200 rpm when the system motor is running at synchronous speed. In these cases, set the jumper to the 1200 rpm position.

Ref. Select

This jumper determines whether a bipolar or positive only system Ramp signal will be used as the speed reference. For speed regulating systems having a bipolar Ramp signal, such as 4922C and 4929C, this jumper must be set in the ±Ref position. For speed regulating systems with positive only Ramp signals, such as 4924C and 4925C, set the jumper to the +Ref position.



Reference Attenuation Potentiometer

This potentiometer is used to scale the speed regulating system's speed reference Ramp signal to match the scaled Tachometer signal. The attenuated speed reference signal can be measured from TP1 to TP6. A value of ±5.0V at this point represents system synchronous speed. During drive setup, when a system Ramp signal which represents synchronous speed is present, adjust the Reference Attenuation potentiometer for 5.0V at TP1. With standard Hubbell SCR adjustable speed drives, this potentiometer can be preset to "80". When the speed control system is operational, operate the motor at a reduced speed point while monitoring the speed error voltage at TP4. When the motor is operating at a constant reduced speed under control of the adjustable speed control, adjust the Reference Attenuation potentiometer for a near 0V reading at TP4.

Time Potentiometer

This potentiometer sets the Tachometer Signal Loss Assembly response time to an error condition. The adjustment range is 0.25 seconds when the Time potentiometer is set fully counterclockwise to approximately 5.0 seconds for a fully clockwise adjustment. A typical setting would be "10" or "20" for a 0.5 second to 1.0 second response time. The time delay function is used to prevent nuisance trips due to normal system speed overshoots or undershoots. This setting can also be adjusted to meet the speed tracking requirements of the system.

Differential Potentiometer

This potentiometer sets the speed error comparison window. The adjustment range is 5% at the fully counterclockwise position to 100% at the fully clockwise position. A typical setting would be "15" or "20" for a 20% to 25% differential range. This setting can be adjusted to meet the speed tracking requirements of the system.

Troubleshooting

The function of the Tachometer Signal Loss Assembly is to compare the speed regulated system's tachometer speed feedback signal to the system speed reference signal. In normal speed regulated operation, these two signals should track due to the controlling action of the speed regulator. If a problem should develop with the tachometer feed back system, such as a broken or loose coupling, broken drive belt, or open tachometer signal circuit, the Tachometer Signal Loss Assembly will deenergize the LV relay on the assembly. A problem with the speed regulating control system that would cause the system speed not to track the speed reference signal will also cause the unit to deenergize the LV relay.

Verify the Setup

Verify the setup of the Tachometer Signal Loss Assembly by following the setup procedure outlined in the Adjusting Tachometer Signal Loss Assembly section.

Unit Power

For proper operation of the unit, 120VAC must be present. This is indicated by having

1. 120VAC at terminals TB1-1,2 to TB1-3,4
2. DC control power in the range of +8.0 to +12.0V must be present at TB3-4 to TB3-1, and –8.0 to –12.0V must be present at TB3-3 to TB 3-1.

LV Relay Doesn't Energize

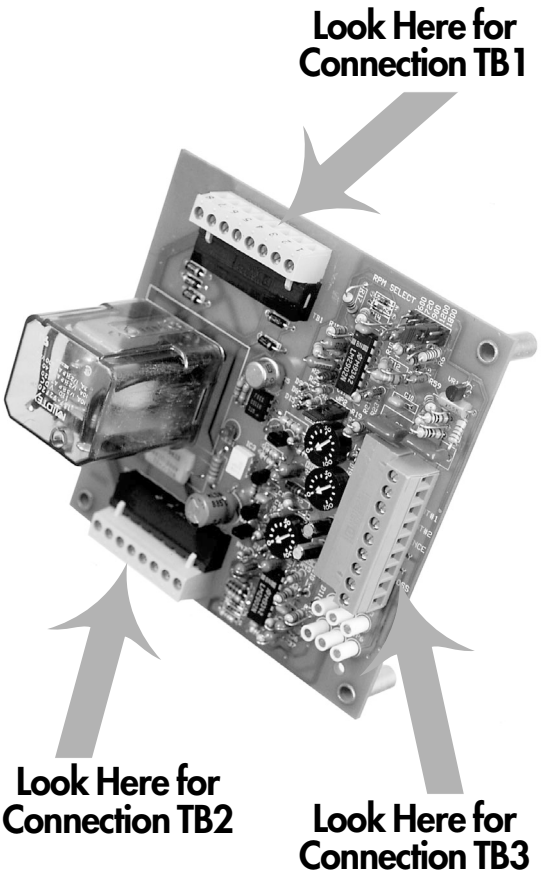
In order for the LV relay to pickup, the unit must be powered as described above, the Off-Point reset circuit must be in place, and the overload/thermostat circuit must be complete. The Off-Point reset circuit connects TB1-1,2 to TB2-5,6. TB2-5,6 must be jumpered to TB2-3,4 for proper Off-Point reset operation. The overload/thermostat circuit connects TB1-5,6 to TB1-7,8. Verify the operation and function of these controlling circuits.

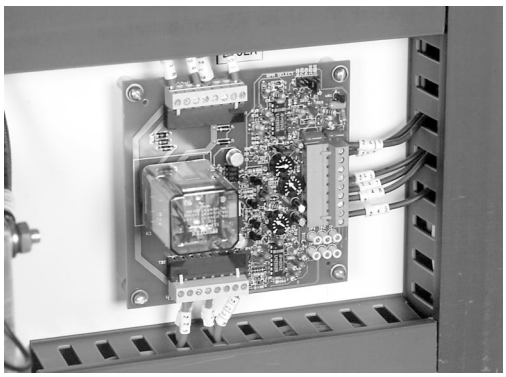
LV Relay is Energized at Off-Point but Drops Out

If the LV relay is energized at Off-Point but drops out when presence of the controlled motion is started, verify the tachometer signal at TB3-8 to TB3-9. For hoisting applications with a positive hoisting speed reference signal, the tachometer signal should be positive on TB3-9. Also verify the presence of valid speed reference signal from the speed regulating system. This signal should be present on TB3-5 to TB3-1 (0V).

Check the position of the RPM Select jumper.

This jumper must be set to a speed value corresponding to the tachometer's driven speed at the motor's synchronous speed. This adjustment allows for discrete gearing or belt reduction ratios. Check the position of the Reference Select Jumper. This jumper must be set to correspond with the type of system speed reference supplied from the speed regulator. Systems such as the 4922C and 4929C use a bipolar speed reference signal. For these systems the Reference Select Jumper must be set to the ±Ref. position. For systems with a positive only speed reference, such as the 4925C, the Reference Select Jumper must be set to the +Ref position.





Shown installed inside a panel.