MagneTek Louis Allis Drives & Systems

For Saber DC Drives

FIELD REGULATOR ASSEMBLY (FIELD CROSSOVER) ADJUSTMENT

ASSY P/N 46S02483-0010,-0020
ASSY P/N 46S02483-0011,-0021
ASSY P/N 46S02483-0040

SCHEMATIC 45S02483-0000
SCHEMATIC 45S02483-0001
SCHEMATIC 45S02483-0040

1.0 GENERAL

Field range is accomplished by using armature voltage to regulate the shunt field current of the DC drive motor in a field weakened condition. Below base speed of the motor, the field regulator is full on, thereby causing rated field current to be present in the shunt field. As base speed of the motor is reached (rated armature volts of the motor), the field starts to weaken. This is accomplished by summing a reference bias signal with a feedback signal proportional to armature voltage. The bias signal, controlled by the CROSSOVER POINT potentiometer, is used to bias the field full-on below base speed and also sets the armature volts at which the field starts to weaken. As the SPEED potentiometer is increased commanding a speed higher than base speed, the signal proportional to armature volts gets slightly larger than the bias signal, thereby overcoming the bias signal. This causes the field regulator to reduce its output as required to satisfy the speed reference and feedback control loop formed by the SPEED potentiometer as reference and the tachometer-generator as feedback.

2.0 ADJUSTMENT PROCEDURE

NOTE

In addition to the standard instructions for this drive, the following adjustments must be made.

2.1 Field Anti-Hunt and Response. These potentiometers on the Field Regulator assembly are used to adjust the stability of the drive when operating above base speed in the field weakened range. They should be adjusted as required for stable operation throughout the field range. (The motor should not hunt or have slow oscillations in speed).

2.3 Field Bottoming Resistor (when provided). This slide wire resistor is in the power supply circuit and is used to provide a minimum current to the motor field in the event of a field regulator amplifier and SCR firing circuit failure. Adjust as follows:

a. Remove wire from 1TB-4 on bottom board of Field Regulator assembly.

b. Monitor field current and adjust field bottoming resistor for a field current approximately 10% below the minimum weak field or field economy current, whichever is lower. Refer to motor nameplate for exact value of weak field current. This adjustment must be made with the field at operating temperature.

c. Set Field Loss relay TRIP adjustment so that relay drops out at a field current just under the minimum field current set in the preceding step.

d. Replace wire removed from 1TB-4 in step a.

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2.4 Maximum Field Current. Adjust MAX FIELD CURRENT potentiometer to obtain rated hot field current. This adjustment should be done after the field bottoming resistor adjustment. (2SS must be "closed" for MAX FIELD CURRENT pot to be active).

2.5 Armature Crossover Point. Before making this adjustment, the field bottoming resistor should be adjusted. The CROSSOVER POINT adjustment determines the armature volts at which the field starts to weaken. It must be set in conjunction with the SPEED potentiometer setting as described in the following steps.

a. Set CROSSOVER POINT potentiometer to 100%. Set 1SS on Field Regulator assembly to OPEN position (closed for armature voltage greater than 250 VDC).

b. Set SPEED potentiometer to a point corresponding to base speed of the motor. Since the motor has a field range of N, where:

$$N = \frac{\text{Max speed}}{\text{Base speed}}$$, set SPEED potentiometer

to $P = \frac{100\%}{N}$

c. Adjust MAX SPEED potentiometer for base speed of the motor, approximately full armature volts.

d. Turn CROSSOVER POINT potentiometer down until armature volts just starts to decrease.

e. Set SPEED potentiometer to maximum and adjust MAX SPEED potentiometer to obtain maximum RPM. Note armature volts and re-adjust CROSSOVER POINT potentiometer as required to maintain approximately full volts on the armature.

f. If maximum RPM cannot be reached without an appreciable rise in armature volts, the minimum current set by the field bottoming resistor may be too high. If this is the case, repeat field bottoming resistor adjustment (paragraph 2.3), setting it for a slightly lower current.

2.6 Trip. This adjustment sets the bias level of a transistorized relay which senses the current thru the motor field. Upon loss of field current, the relay drops out. This opens the control circuit causing the drive to stop. TRIP adjustment is discussed in paragraph 2.3.c. The Field Loss relay is set to drop out at a level of field current just below the minimum field current established by the field bottoming resistor.

IMPORTANT

STABILITY and RESPONSE adjustments on the drive may have to be re-adjusted due to interaction of the TACH DAMPING and field ANTI-HUNT adjustments.

2.7 Field Economy (when provided). The field economy current (field current when DC motor armature contactor is open) is set by the FIELD ECONOMY pot (5RH). Field economy is used to avoid overheating the motor while stopped. The field economy set point should be set for 60% of rated field current (base speed) or less, but not less than the Field Loss relay "trip" point set in step 2.6 above. Switch 3SS should be "open" for drives with field economy, and "closed" for drives without field economy.