

MAINTENANCE INSTRUCTION

BATTERY FIELD SCR ASSEMBLY - 9316438

DESCRIPTION

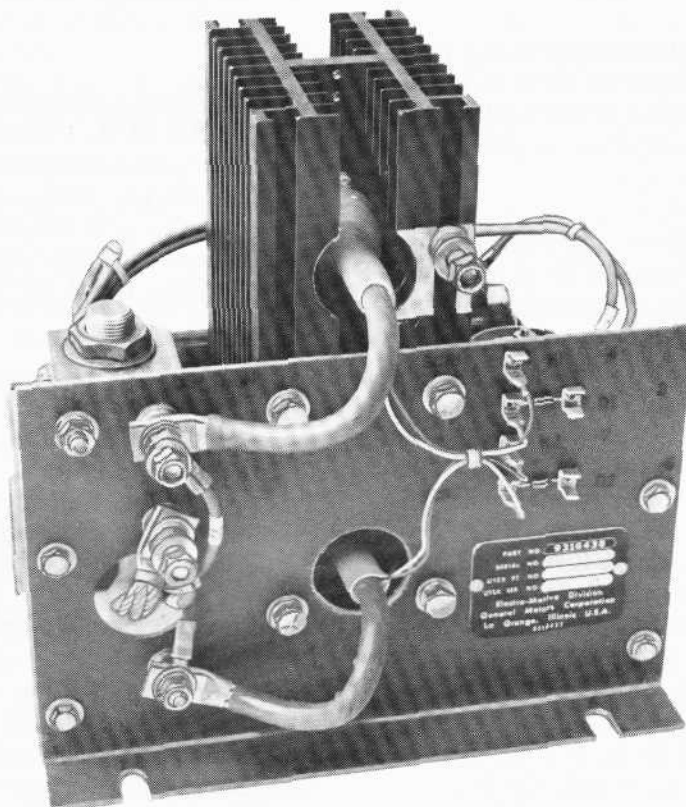
The battery field SCR assembly BF SCR, Fig. 1, is part of the excitation system for DC generators which use the auxiliary 74 volt system as the excitation supply. It applies rapid pulses of full supply voltage to the battery field. The relationship of +74 VDC "on" pulse time to 0 VDC "off" time determines the average DC level applied to the battery field.

The assembly consists of two SCR's mounted on a common heat sink, a capacitor, a resistor, a "free-wheeling" diode, and two small diodes to protect the SCR gates.

MAINTENANCE

The BF SCR assembly requires no routine maintenance other than visual inspection. Do not disassemble the unit for inspection or disturb the nuts that fasten the silicon devices to the heat sinks. The devices are tightened to the heat sink to ensure proper heat transfer.

If the SCR assembly is suspected of failure, inspect it and perform bench tests as necessary to isolate the malfunctioning component.



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Fig.1 - Battery Field SCR Assembly

INSPECTION AND TESTS

VISUAL INSPECTION

1. Remove dust and dirt with a brush or air hose.
2. Check for damaged and loose terminals.
3. Check wiring for damaged insulation.

ON-LOCOMOTIVE FUNCTIONAL TEST OF BF SCR ASSEMBLY

1. If engine is running, shut it down and open the battery switch.
2. Apply hand brake.
3. Disconnect locomotive leads from BF SCR assembly terminals 3 and 6. Do not let the terminations on the disconnected leads accidentally touch any conductive objects.
4. Close the battery switch, start the engine, set up the controls for power application, and select the Throttle 1 position.
5. Connect a DC voltmeter to check the battery field voltage at BF SCR terminal 1 with respect to terminal 5. Set the meter to the 0-100 VDC range.
6. While observing the meter, momentarily touch the terminal lug of the loose BF SCR terminal 6 lead to terminal 3. The battery field voltage should rise to at least +72 VDC and remain at that level until the next step.
7. While observing the meter, momentarily touch the terminal lug of the loose BF SCR terminal 6 lead to terminal 6. The battery field voltage should drop sharply from approximately +72 VDC to zero or near zero volts.
8. Move the throttle back to the IDLE position, center the reverser, stop the engine, and open the battery switch.
9. Reconnect locomotive BF SCR terminal 3 and 6 leads to the proper terminals.

BENCH TEST OF BF SCR ASSEMBLY AND COMPONENTS

1. Before testing the BF SCR assembly, check BF SCR diodes D1, D2, and D3, Fig. 2, with an ohmmeter for forward direction conduction and reverse direction blocking; forward direction

resistance should be near zero, and reverse direction resistance should be near infinity.

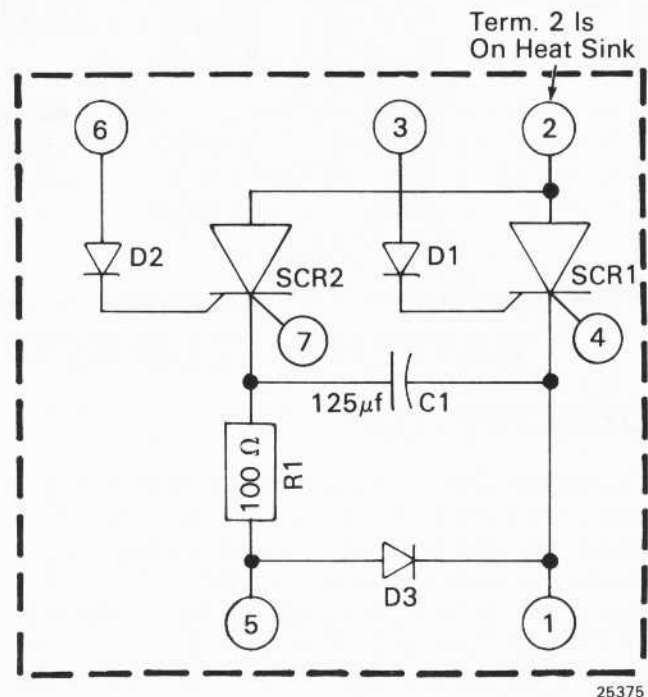


Fig.2 – BF SCR Assembly Schematic Diagram

2. Also before testing the BF SCR assembly, use the ohmmeter to check BF SCR resistor R1, which should be between 95 and 105 ohms.
3. Connect a well filtered 74 VDC power supply to the BF SCR. Connect the negative (-) power supply lead directly to BF SCR terminal 5, and connect the positive (+) power supply lead to one side of a limiting resistor or test lamp. Connect the other side of the limiting resistor or test lamp to BF SCR terminal 1.
4. Turn on the DC power supply.
5. Using a DC voltmeter, check the voltage across the terminals of BF SCR capacitor C1 and resistor R1. Full supply voltage should appear across C1, and no voltage should appear across R1.
6. Turn off the DC power supply.
7. Connect a 10 ohm load resistor between BF SCR terminals 1 and 5. Connect the positive (+) DC power supply lead directly to BF SCR terminal 2 (the heat sink terminal), and leave the negative (-) DC power supply lead connected to BF SCR terminal 5.

8. Turn on the DC power supply.
9. Check the voltage across the load resistor and across BF SCR resistor R1. In both cases, the voltage should be zero.
10. Turn off the DC power supply.
11. Connect a center tapped 500 ohm resistor across the DC power supply, that is, across BF SCR terminals 2 and 5.
12. Turn the power supply on.
13. Momentarily connect a lead from the resistor center tap to BF SCR terminal 3, then check the voltage between BF SCR terminals 1 and 5. The terminal 1 voltage with respect to terminal 5 should be only slightly (1 or 2 volts) below supply voltage level.
14. Momentarily connect a lead from the resistor center tap to BF SCR terminal 6 while observing the voltage at BF SCR terminal 1 with respect to terminal 5. The terminal 1 voltage should immediately drop to near zero, or zero, and should remain there.
15. Check the voltage across BF SCR resistor R1. It should be only slightly less (1 or 2 volts) than the supply voltage.

NOTE

An unfiltered or poorly regulated DC power supply may not sustain the potential across R1.

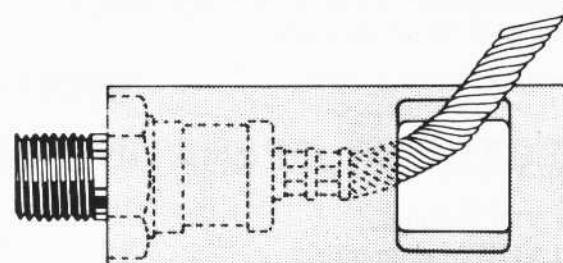
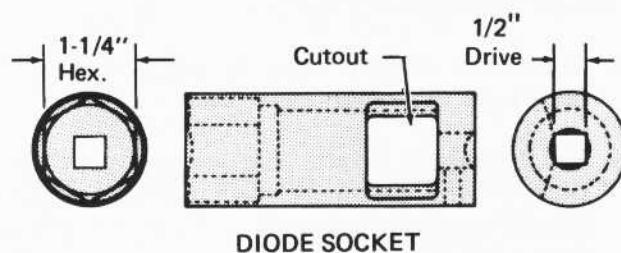
REMOVAL AND REPLACEMENT OF DIODE D3

1. Disconnect anode lead of the D3 diode, the lead labeled "5A," from BF SCR terminal 5.
2. Using a 1-1/4" wrench to hold the diode stud, loosen the diode retaining nut/washer with a 1-1/8" wrench, then remove the diode.
3. Make sure diode contact area on underside of BF SCR diode mounting bracket is clean.
4. Apply a thin coat of joint compound to only the underside of the hex on the replacement diode.

CAUTION

Do not apply joint compound to threaded stud portion of diode. The specified mounting torque presumes dry threads.

5. Mount replacement diode on BF SCR diode bracket, finger tight.
6. Slide special diode socket 8361524 over the anode lead of the diode and set the socket onto the diode hex, as shown in Fig. 3.



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Fig.3 - Special Diode Socket 8361524

7. While holding the diode with the special diode socket, tighten the diode mounting nut/washer with a 1-1/8" wrench to the torque value specified in Service Data.
8. Remove the special socket, then connect the diode anode lead to BF SCR terminal 5.

REMOVAL AND REPLACEMENT OF SCR1 OR SCR2

1. Disconnect the cathode lead of the SCR being replaced from the BF SCR terminal to which it is connected, terminal 1 or terminal 8. Pull the SCR K and G leads off their respective BF SCR terminals; K1 and G1, or K2 and G2.
2. Feed the three loose diode leads (cathode lead, "K" lead, and "Gate" lead) through the center of special diode socket 8361524 and out of the socket through one of its side slots, then seat it on the SCR hex in the same manner as shown in Fig. 3.
3. While holding the SCR with the special socket, remove the SCR mounting nut/washer with a 1-1/8" socket from the other side of the heat sink, then remove the SCR.

4. Apply a thin coat of joint compound to only the underside of the hex on the replacement SCR.

CAUTION

Do not apply joint compound to threaded stud portion of SCR. The specified mounting torque presumes dry threads.

5. Make sure circular SCR mounting areas on both sides of heat sink are clean.
6. Feed the three leads of the replacement SCR through the center of special diode socket 8361524 and out one of the slots in the side of the socket in the same manner as shown in Fig. 3, then place the SCR into the heatsink with the special socket and hold it in place.

7. Use a 1-1/8" socket to turn the SCR mounting nut/washer onto the SCR threaded stud from the other side of the heatsink until it is just finger tight.

8. Holding the SCR mounting nut/washer in place with the 1-1/8" socket, tighten down the SCR to the heatsink with the special diode socket. Tighten it to the torque value specified in Service Data.

9. Connect the SCR cathode lead to its proper BF SCR terminal; terminal 1 for SCR 1, or terminal 8 for SCR 2. Connect the SCR's K and G leads to their proper BF SCR terminals; K1 and G1 for SCR1, or K2 and G2 for SCR2.

SERVICE DATA

ELECTRICAL OPERATING CHARACTERISTICS

74 VDC Nominal
 80 VDC Maximum
 80 Amperes Maximum

COMPONENT MOUNTING INFORMATION

<u>Description</u>	<u>EMD Part No.</u>	<u>Mounting Torque (Min. - Max.)</u>
Free Wheeling Diode, D3	8452952	31-37 N·m* (275-325 in.-lbs*)
SCR1 & SCR2	8452948	36-41 N·m* (320-360 in.-lbs*)

*Diode mounting torque is applied to diode hex, SCR mounting torque is applied to mounting nut/washer.

EQUIPMENT

- Joint Compound 141.8 g (5 ounce) tube 8346481
- Special diode socket (Fig. 3) 8361524
- DC Voltmeter with 0-100 V range
- Ohmmeter
- DC power supply, well filtered, 74 V, 15 amps
- Limiting resistor or test lamp, of sufficient resistance to protect the DC supply if connected across it
- Load resistor, 10 ohms, 600 watts
- Center tapped resistor, 500 ohms, 25 watts
- 1-1/8" deep socket wrench
- Torque wrench, 0-50 ft-lbs, 1/2" drive