ELECTRO-MOTIVE

M.I. 9668

MAINTENANCE INSTRUCTION

MODERNIZATION RECOMMENDATION
VR13 MODULE IMPROVEMENTS

PURPOSE: Since June 1981, VR13 Module 9528276 has replaced VR11 Module 8457997 for use with AC auxiliary generators. Over the past year, several design improvements have been made to the VR13. This Modernization Recommendation outlines the performance and reliability improvements that have been made basic on VR13's.

Any VR13 Module with serial number 83K and later will have all of the modifications incorporated.

MATERIAL REQUIRED PER MODULE: Kit 9570452 contains the following:

ITEM	QUANTITY	DESCRIPTION
2	9542836	Transistors Q4 And Q5
1	9549915	Diode D7
1	9539587	100 pF Capacitor C10
12	9550858	Ferrite Beads
1	9320327	1K-1/8 Watt Resistor R22

ADDITIONAL MATERIAL REQUIRED: (Not included in kit.)

As Required	8458375	Conformal Coating (16 oz. Spray Can)
As Required	9549614	Heat Sink Compound (25 Grams)
As Required	8449045	Kit, Adhesive, Epoxy, (Two 4 oz. Tubes)

PROCEDURE

REPLACEMENT OF Q4 & Q5 AND ADDITION OF FERRITE BEADS, Figs. 1, 2, & 3

Transistors Q4 and Q5, part number 9321802, are to be replaced by transistor part number 9542836. In order to accomplish this, the following steps should be taken.

1. Remove the four 1/4" bolts from the back of the circuit board that retains the heat sink for Q4 and Q5.
2. Rotate the heat sink 90 degrees as shown in Fig. 3.
3. De-solder the base and emmiter leads at the transistors.

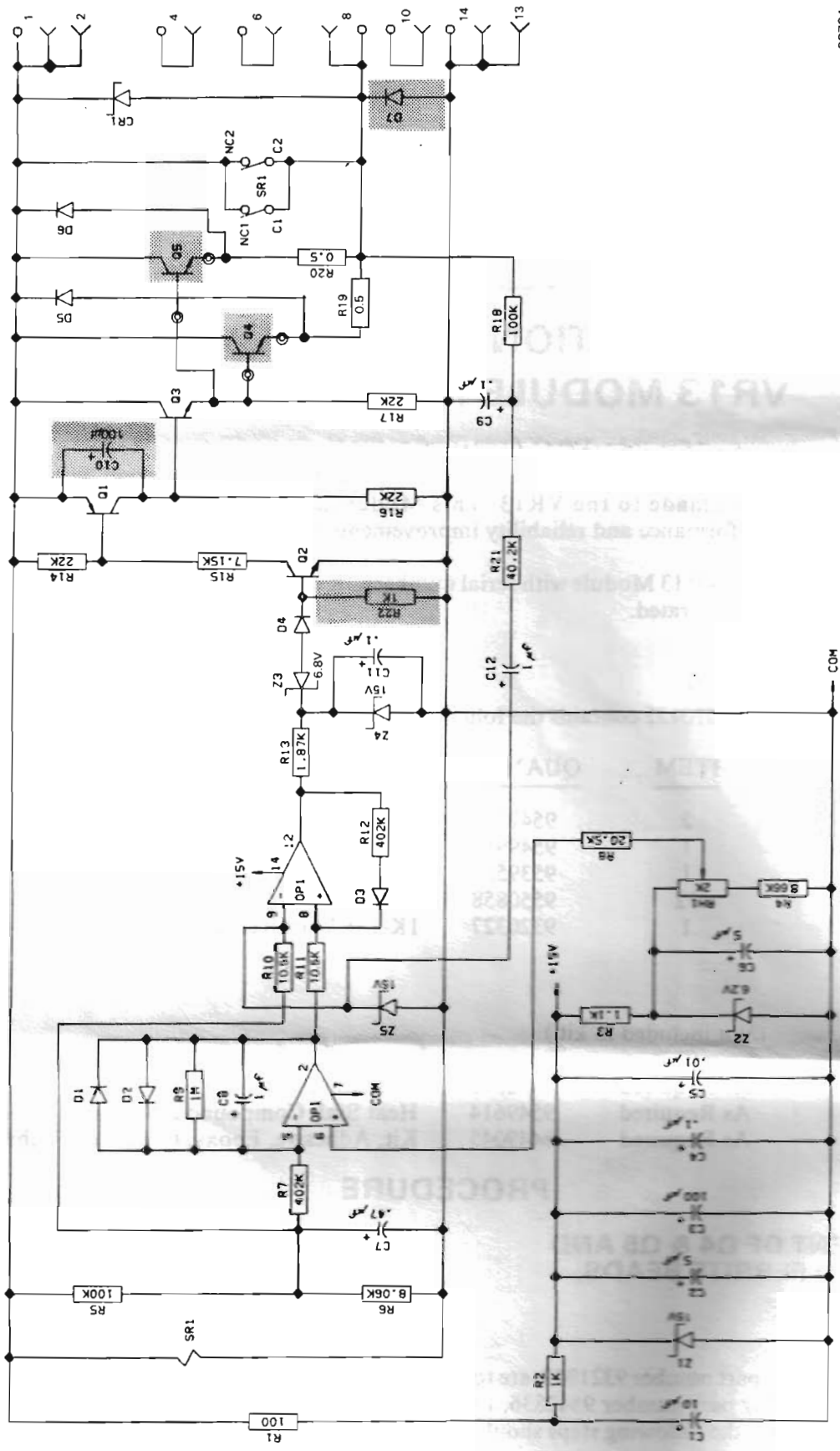

Fig.1 – Circuit Diagram VR13

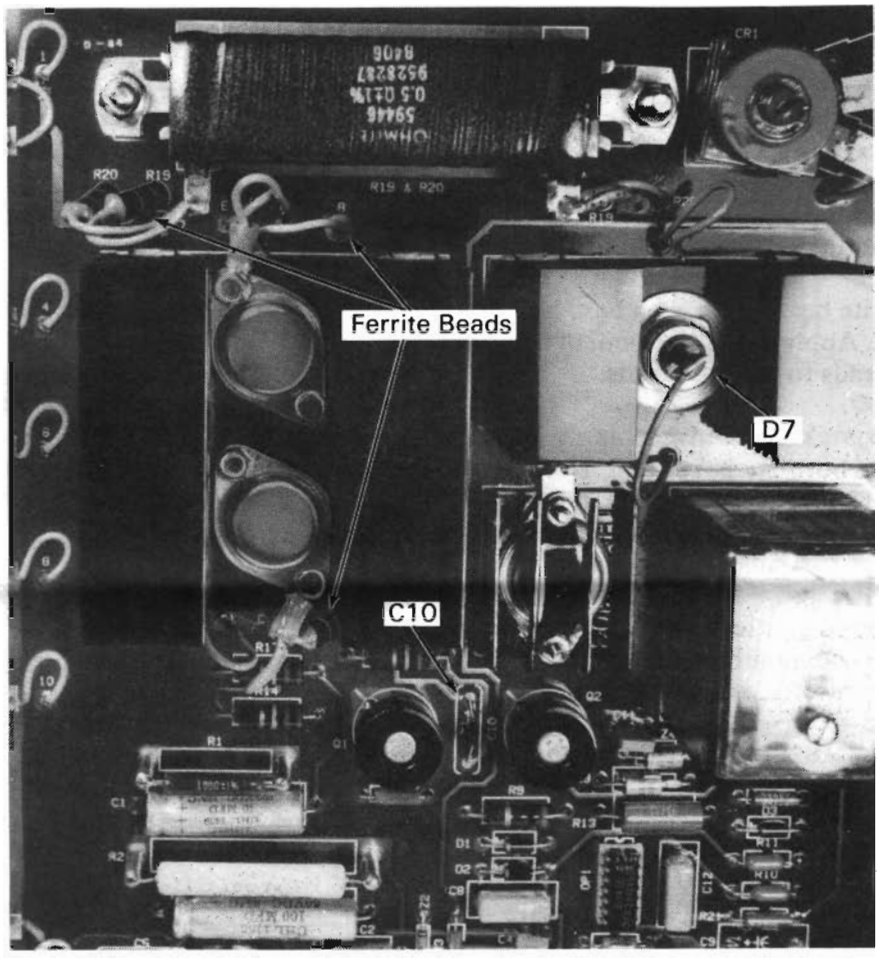

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Fig.2 – Application Of Ferrite Beads

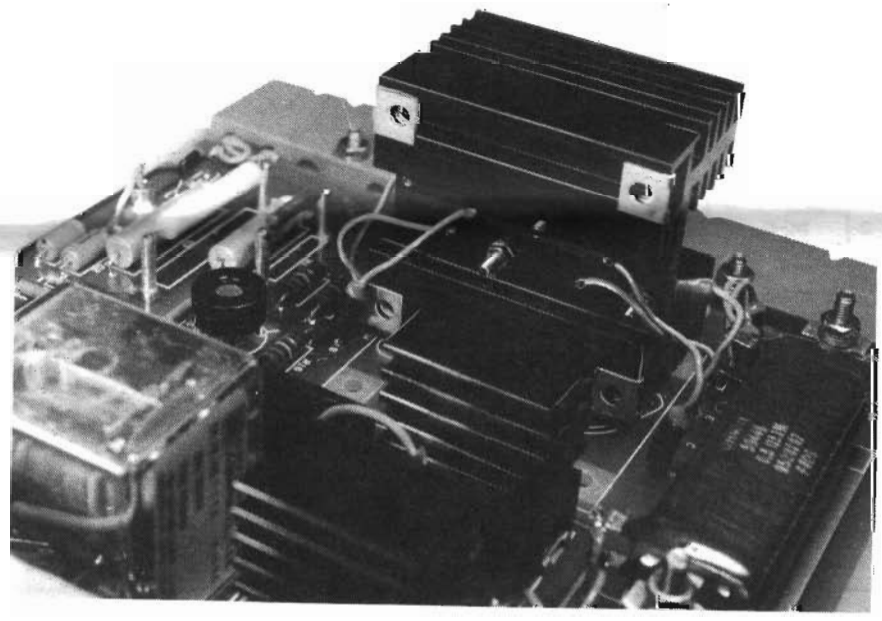

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Fig.3 – Heat Sink Detached And Rotated 90 Degrees

4. Unbolt and remove the collector leads at the transistors.

5. Remove the heat sink and transistor assembly. Replace the existing Q4 and Q5 with new 9542836 transistors. Apply a small amount of heat sink compound under the cases of Q4 and Q5 before mounting to the heat sink.

6. Slide three ferrite beads over each base lead as shown in Fig. 2. Apply a small amount of epoxy to secure the beads to the base leads.

7. While the heat sink is removed, apply three ferrite beads to both leads running from the R19 & R20 resistors to the circuit board as shown in Fig. 2. Apply a small amount of epoxy to secure the ferrite beads to the leads.

8. Solder the base and emitter leads to the bottom of the transistors being sure to apply the proper leads to the proper terminals as shown in Fig. 3.

9. Reapply the collector leads to the top of the transistors and secure.

10. Rotate the heat sink back to its original position and secure with 1/4" bolts.

REPLACEMENT OF DIODE D7

The D7 silicone rectifier should be changed from 8323484 to 9549915.

The new diode will reduce current spikes as the transistors turn on, and provide faster switching characteristics.

To replace the diode simply unbolt the heat sink, rotate the assembly, de-solder the leads at the diode, and replace it. Apply a small amount of heat sink compound under the new diode and reassemble.

ADDITION OF CAPACITOR C10

Capacitor C10 should be added in the location as shown in Fig. 2. Some VR13's may have a capacitor presently in the C10 location. If so, it should be removed and replaced with the new capacitor. On those modules without a capacitor, C10 should be added.

ADDITION OF R22

Under certain enviromental conditions, transistors Q4 and Q5 have been found to lose regulation due to leakage current at the base of the transistors. The addition of R22 reduces the sensitivity of the VR13 Module to humidity.

To modify the module attach the resistor to the top side of the board from the cathode of D4 (left side) to the anode (right side) of Z4, Fig. 4.

Once all of the modifications have been made, the module should be sprayed with conformal coating, concentrating on the newly soldered connections.

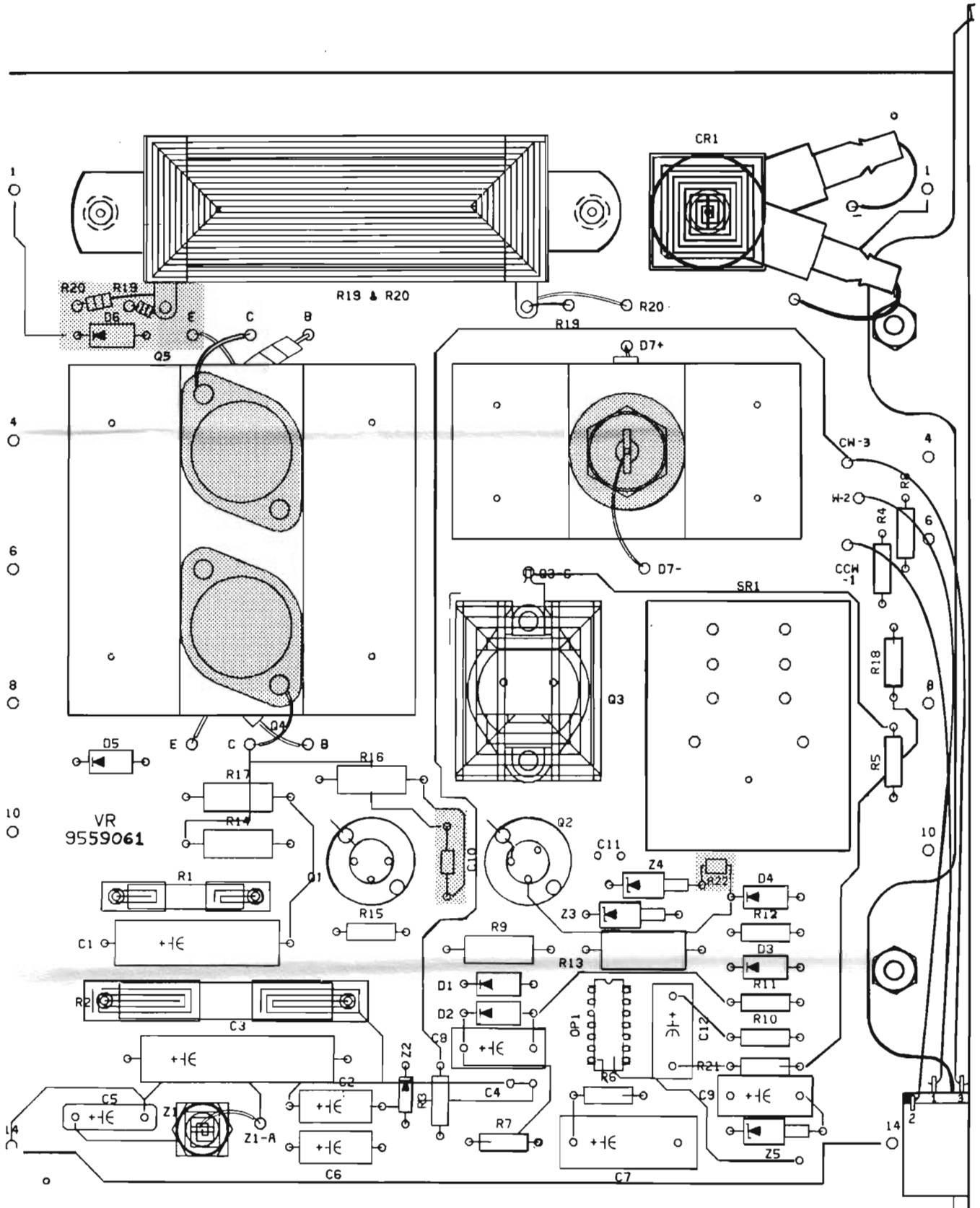

Fig.4 – Pictorial Indicating Modified Items 28787

A Service Department Publication

Electro-Motive Division Of General Motors La Grange, Illinois 60525

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