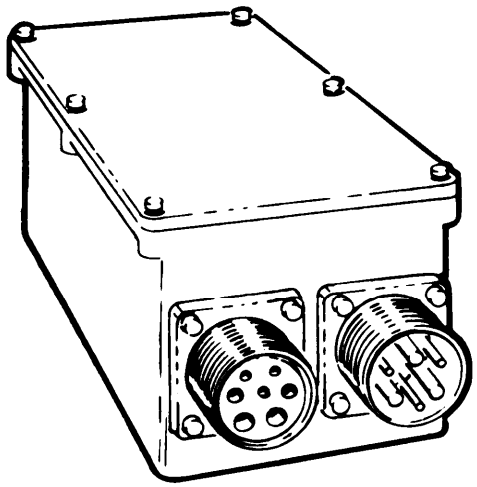
DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

100 AMP REGULATOR

(SOLID STATE)

NSN 2920-00-900-7993

CHECKOUT AND REPAIR PROCEDURES



HEADQUARTERS, DEPARTMENT OF THE ARMY

10 NOVEMBER 1981

TECHNICAL BULLETIN
No. 9-2920-225-34–1

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, *10 November 1981*

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(SOLID STATE)
(NSN 2920-00-900-7993)
CHECKOUT AND REPAIR PROCEDURES

REPORTING OF ERRORS

Reporting Errors and Recommending Improvements. You can help improve this bulletin. If you find a mistake or if you know of away to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this bulletin to: US Army Tank-Automotive Command, ATTN: DRSTA-MB, Warren, MI 48090. A reply will be furnished direct to you.

LIST OF ILLUSTRATIONS

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CHAPTER 1
INTRODUCTION

Section I. GENERAL

1-1. Scope. These procedures are applicable to Direct Support and General Support levels. The instructions are limited to the model described, but may also aid in repairing other 100 AMP regulator (Solid State) models which may be in use. Repair beyond that covered is permissible if time and skills are available.

1-2. Purpose. This bulletin describes the checkout and repair procedures for the 100 AMP regulator (Solid State), NSN 2920-00-900-7993.

1-3. General. *a.* The 100 AMP (Solid State) regulator, NSN 2920–00–900–7993, procured under a military standard performance-type specification. As such, the design and detail drawings are proprietary to each of the manufacturers and are not available. At present, there are three suppliers of the regulators:

(1) *Leece-Neville.*
Code Ident 35510 (FSCM)
Sheller-Glove Corp.
Leece-Neville Cleveland Div.
1374 E. 51 St.
Cleveland, OH 44103
Telephone AC *216 431–0740*

(2) DC Electronics.
Successors in 1978 to Vap-Air
Code Ident 34904 (FSCM)
DC Electronics Inc.
544 N. Highland Ave.
Aurora, IL 60506
Telephone AC 312844-5170

(3) *Leland Electrosystems Inc.*
Code Ident 07639 (FSCM)
Leland Electrosystems Inc.
740 E. National Road
P.O. Box 128
Vandalia, OH 45377
Telephone AC 513898-5881

b. The 100 AMP regulator was originally designated as non-repairable. However, since fielding, the regulator has consistently appeared as a back order item. This bulletin is provided as an interim solution to this problem, until maintenance and provisioning studies are finalized, at which time pertinent information may be incorporated in TM 9–2920-225-34 and TM 9–2920–225-34P. The 100 AMP regulator is illustrated in figure l–l.

c. This bulletin contains instructions for the repair of nine different models which are described in the chapters listed below:

Chapter 2	Vap-Air (four models)
Chapter 3	Leece-Neville (four models)
Chapter 4	Leland Airborne (one model)

For simplicity, the regulator model numbers are abbreviated with a portion of the last digits e.g., Vap-Air model 26440002–05 is abbreviated as model 05, Leece-Neville model R0015027RA is abbreviated as model 5027RA.

d. A 100 AMP regulator checker is described in chapter 5. In addition, TB 9–2300-409-30, (Generator System Tester (Go/No-Go), provides fabrication instructions for a regulator test stand.

e. Replacement parts which are not identical with the original parts may cause a change in performance of the regulator. The repair facility should remain aware of this possible performance change and use substitute parts with reasonable caution. Replacement parts should be obtained with the following priorities:

(1) Where parts are available in the supply system, the stock number is provided.

(2) Where no stock number is available, the part should be either obtained from a non-repairable regulator (cannibalization) or ordered from the manufacturer.

(3) Appendix A lists all National Stock Numbers (NSNS) in ascending National Item Identification Number (NIIN) sequence for quick referral to the Federal Supply Code for Manufacturer (FSCM). Addresses for FSCMS are listed in SB 708-41/42.

(4) When all else fails, try a substitute part and monitor the performance of the repaired regulator.

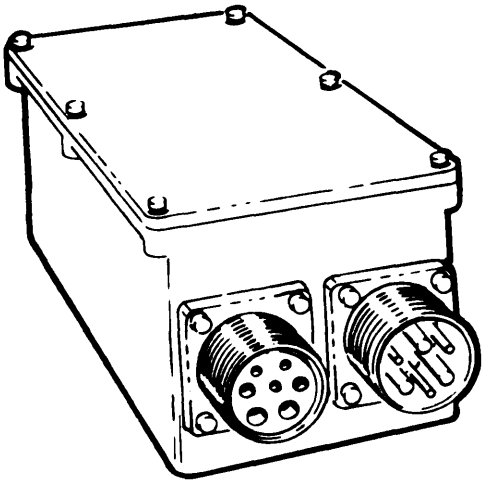

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Figure 1–1. 100 AMP regulator.

1-4. Removal and Installation. The regulator must be removed from the vehicle for testing and repair. The procedures given in this bulletin are for bench testing and repair only. Refer to the appropriate vehicle manual for removal and installation procedures for your particular vehicle.

1-5. Major Items Affected. Because of the numerous vehicles affected, a listing of the vehicles will not be supplied. Check the regulator's NSN (2920-00-900-7993) or part number (10947439) in section IV of your vehicle's repair parts manual for applicability.

Section II. FUNDAMENTALS OF SOLID STATE COMPONENT CHECKOUT AND REPAIR

1-6. Introduction. *a.* Checkout and repair of solid state voltage regulators involves techniques different from those employed with mechanical voltage regulators.

b. Before attempting checkout and repair of solid state voltage regulators, follow the instructions of paragraphs 1–7 and 1–8,

1-7. Meters. *a.* The type of meter used to checkout solid state components is critical and should be limited to quality meters such as the TS-352 or the Simpson 260 multimeters, or their equivalent. When using an ohmmeter with unknown technical specifications or characteristics, the following checks can be made to determine if the ohmmeter scales will cause damage to low power transistors.

(1) Check the voltage across the ohmmeter leads as the ranges are switched. No scale should be used if the voltge exceeds 3 volts.

(2) If the instrument is a combination volt-ohmmeter, the positive voltmeter lead may not be the positive ohmmeter lead. The polarity of the ohmmeter leads must be known. Polarity can be determined by connecting the ohmmeter to a voltmeter. If the voltmeter moves up scale the ohmmeter has the same polarity as the voltmeter. If the voltmeter attempts to move down scale the ohmmeter leads have opposite polarity, e.g., TS–352 multimeter. If necessary mark the ohmmeter leads positive and negative for reference.

b. The ohmmeter readings obtained when checking semiconductor devices depends on the internal makeup of the meter, scale used, type of transistor and its temperature. Therefore, exact resistance readings are seldom given. Readings are usually referred to as low resistance, which is less than *20* ohms; and high resistance which is more than 200 ohms. Occasional failures may occur which can be detected by these tests. If readings obtained are doubtful or operation of the regulator is not proper, replace the transistors.

1-8. DOs AND DON'Ts For Circuit Repair.

a. DO—When replacing solid state circuit boards, clip the connecting wires, leaving a small portion of wire with insulation to act as a reference for connecting points on the replacement board.

b. DON'T—Attempt to interchange circuit boards between regulator models.

c. DO—Use high quality resin core solder of 60–40 tin lead composition.

d. DO—Use a 60W AC or DC soldering iron. Solid state components are easily damaged by excessive heat.

e. DON'T—Allow wires to become pinched betweencovers, heat sinks, circuit boards, etc.

f. DON'T—Use a screwdriver to pry up transistors during removal. The mica washer between the transistor and the circuit board or heat sink is thin and can be easily damaged.

g. DON'T—Drop transistors since they are easily damaged. If a transistor is dropped it should be checked before being installed in the circuit.

h. DO—Check transistor insulating washers and replace if cracked, broken, or missing. Coat washers with insulation compound (silicone) per MIL-S-8660, NSN 6850–00–880–7616.

i. DO—After repair, remove all excess solder. Check for loose wires, screws, and washers which could cause short circuits and burnouts when power is applied to the regulator.

j. DO—Check the regulator cover seal, replace if cracked or missing. Coat the seal with insulation compound (silicone) per MIL-S-8660, NSN 6850-00–880–7616.

k. DO—Apply adhesive 8040–877–9872 to the adjustment access plug or screw.

CHAPTER 2
VAP-AIR MODELS

Section I. INTRODUCTION

2-1. Introduction. Four models were produced by Vap-Air, a division of Vapor Corporation.

Code Ident 80234 (FSCM)
Vapor Corp.
6420 W. Howard St.
Chicago, IL 60648

In 1978, the voltage regulator product line was sold to DC Electronics Corporation.

Code Ident 34904 (FSCM)
DC Electronics Inc.
544 N. Highland Ave.
Aurora, IL 60506

TELEPHONE AC 312844-5170

DC Electronics now provides parts and engineering support for all Vap-Air models. The Vap-Air part numbers for each model are:

26440001-01
26440001–03
26440001-04
26440001-05

2-2. General Inspection. This chapter applies to all Vap-Air models.

a. Regulator Box Assembly (external). Check for missing or stripped cover, connector mount, retainer screws, and voltage adjustment access plug.

Check connectors for signs of arcing, bent, or pushed in pins, broken connectors, and thread damage. Correct deficiencies by utilization of serviceable components from unrepairables or requisitioning components from the manufacturer.

(1) The pin receptacle (J2) is P/N 7064706 FSCM 19207 or MS3102A28-22P FSCM 96906 per MIL-C-5015.

(2) The socket receptacle (Jl) is P/N 7064-706 FSCM 19207, an Army number for which there is no equivalent NSN number. An assembly is available from Bendix.

CODE IDENT 77820 (FSCM)
Bendix Corp.
The Electrical Components Div.
Sherman Ave.
Sidney, NY 13838

It should be ordered as part number 60–42228-10S; it will arrive as a complete assembly with the shell marked 8701337.

b. Regulator Box Assemblly (internal). If water leakage or corrosion is detected, it is possible that extensive damage has been done and the regulator cannot be easily repaired. Components should be performance tested and retained if acceptable. Check for disconnected or burnt wires, missing components, and replace repair as necessary. Carefully remove the transistor mounting plate, noting the position of the screws, washers and rubber insulators. Visually inspect the circuit board for burnt components. Replace the circuit board through cannibalization if burnt components are found. Carefully reinstall the transistor mounting plate.

c. Regulator Verification Check. After performing the above inspection, if the regulator appears to be in good condition, check its performance on a test stand. If the regulator fails this check, proceed to the following component tests.

2-3. Bench Testing. Figures 2–1 and 2–2 show the method for testing NPN transistors; these figures apply to all models in this chapter. If the original transistors are replaced with substitute part numbers, the repaired regulators should be carefully tested to ensure proper operation.

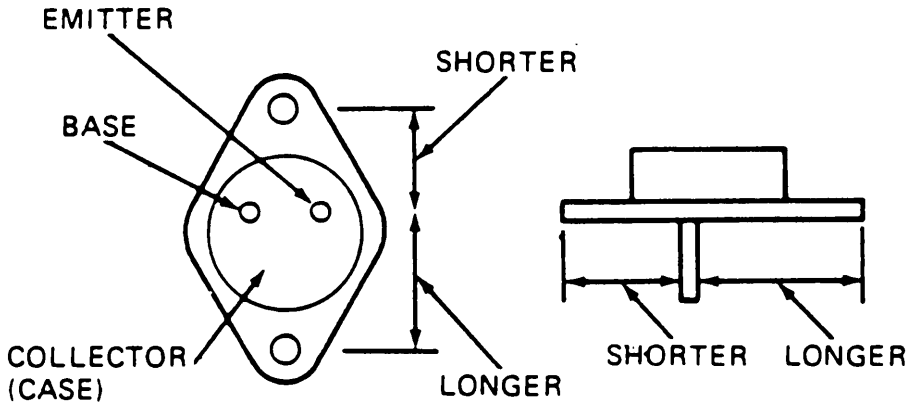

Figure 2-1. NPN tranistor (Vap-Air).

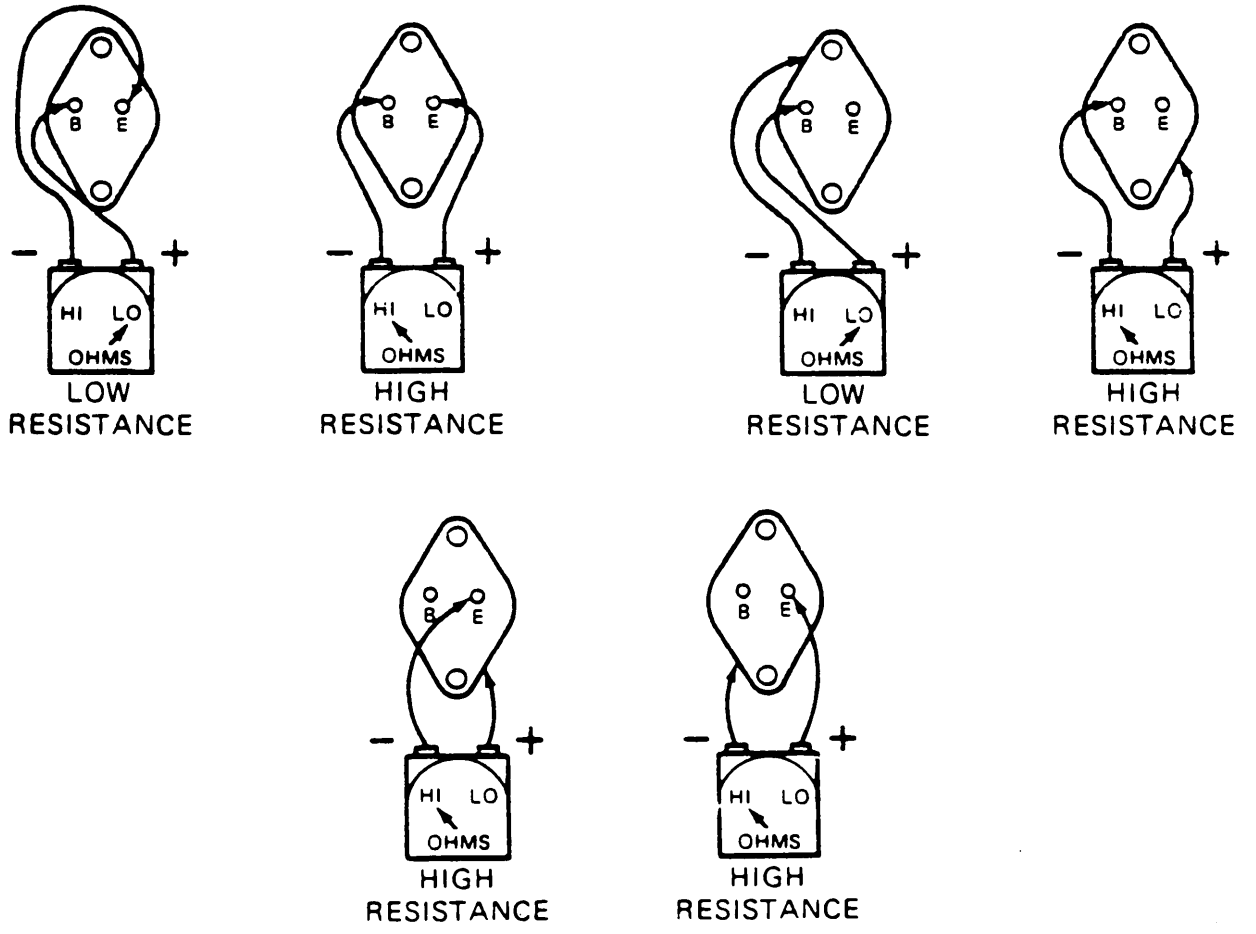

Figure 2-2. Transistor resistance checks (Vap-Air).

Section II. VAP-AIR MODEL 26440001-01

2-4. General. Figures 2–3 and 2–4 show two views of the regulator and its parts. Diode and transistor NSNS and parts numbers with substitute NSNS and part numbers are listed in table 2–1.

2-5. Checkout and Repair.

a. Voltage Adjustment Rheostat (R6) (power disconnected).

(1) Remove voltage adjustment access plug (see fig. 2-3).

(2) Place ohmmeter test probes to terminals of the rheostat (see fig. 2-3).

(3) Rotate rheostat fully clockwise; reading should be less than 5 ohms.

(4) Rotate rheostat fully counterclockwise; reading should be approximately 2500 ohms.

(5) If other readings are obtained, replace rheostat.

b. Transistors.

(1) Carefully remove transistors Q7, Q8, and Q9 (see fig. 2-3).

(2) Position transistor as shown in figure 2-1, and check each separately (see fig. 2-2).

(3) If resistance values differ from the values shown in figure 2–2, replace the transistor according to table 2–1.

NOTE

Transistors Q8 and Q9 are identical and can be interchanged. Transistors Q7 must be replaced by a like item in the same socket (see fig. 2-3).

(4) Check the mica insulating washer between the transistor and mounting plate. Replace if cracked, broken, or missing. Coat washers with insulation compound per MIL-S-8660, NSN 6850–00–880-7616.

c. Diode.

(1) Remove four screws holding transistor mounting plate and move plate to one side.

(2) Place negative ohmmeter probe to the connector side of diode CR6 (see fig. 2–3).

(3) Place positive probe to the circiut board side of CR6. Meter should indicate low resistance.

(4) Reverse probes. Meter should indicate high resistance.

(5) If other readings are obtained, replace diode CR6 (MR1122), NSN 5961–00-103–1519 (see fig. 2-4).

(6) Reinstall transistor mounting plate.

d. Circuit Board. If no faulty components were detected after performance tests a, *b,* and c above, replace the circuit board.

e. Functional Check. Check the performance of the regulator on the test stand and make final voltage adjustments. Voltage output should read 28 volts. If the regulator does not function properly, perform the following:

(1) Check wires and connections.

(2) Replace circuit board.

(3) Perform bench test procedures.

NOTE

After final repair, check regulator on the test stand.

If the regulator still does not function correctly it will be necessary, if local skills permit, to test each component. All the parts should be checked with an ohmmeter and the capacitors checked with a capacitance meter. The circuit board traces should be checked with an ohmmeter to make sure that there are no cracked traces. Traces with hairline cracks will show good at lower temperatures and will tend to show open circuit at higher temperatures. If the board seems good at room temperature, but the regulator still fails, this could be the cause.

Table 2–1. Replacement Parts List—Model 01

Ref	P/N	NSN
CR6	MR1122	5961–00–103–1519
Q8 & Q9	26316033–20	5961–00–133–0396
	2N5039	5961–00–215–5999
	2N5039	5961–00–262–0729
	8106497–1	5961–00–462–3077
	2N5671	5961–00–481–4205
	JAN 2N5038	5961–00–858–8960
	2N3447	5961–00–899–9899
	2N5038	5961–00–935–6479

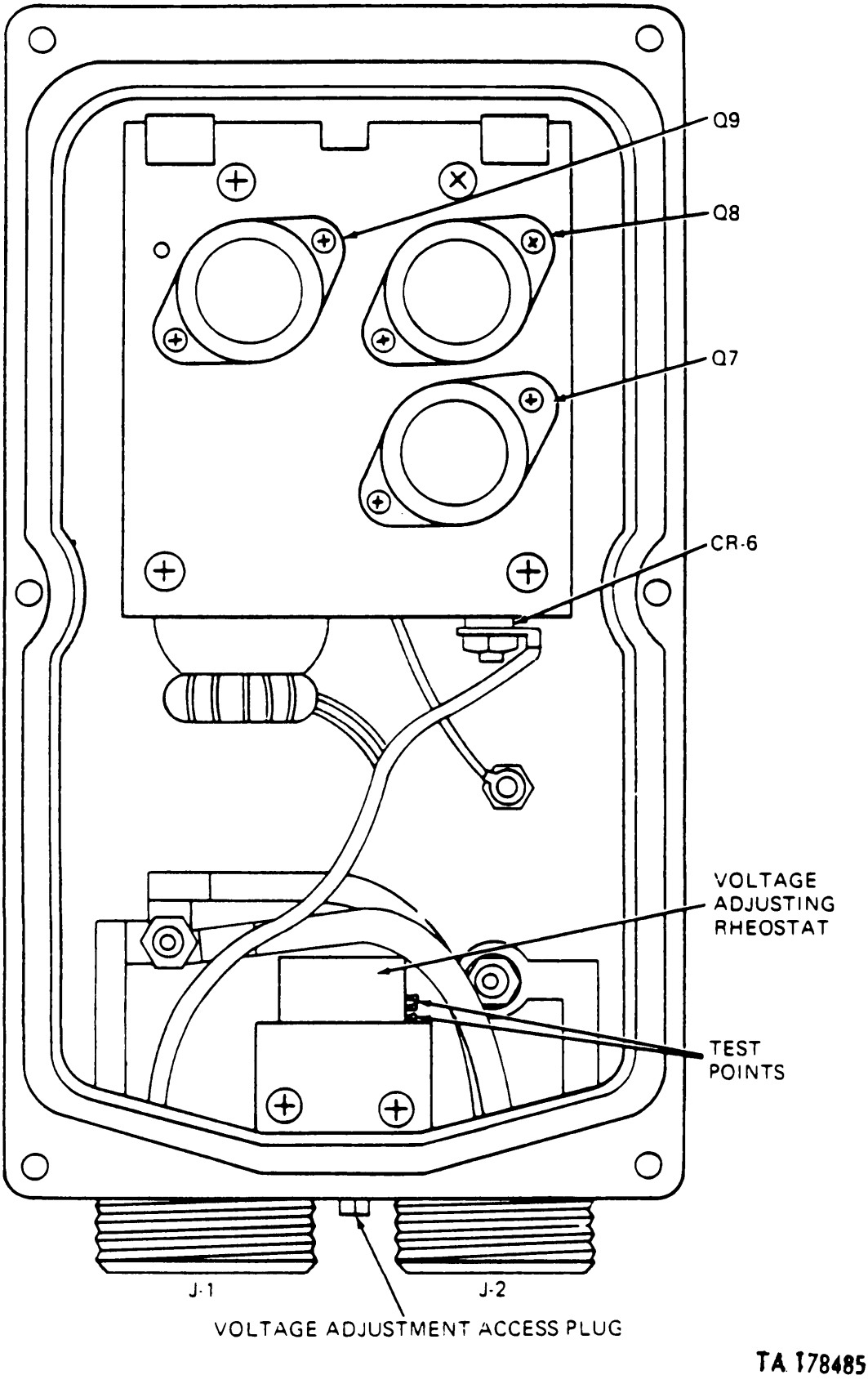

Figure 2~3. Vap-Air model 26440001-01.

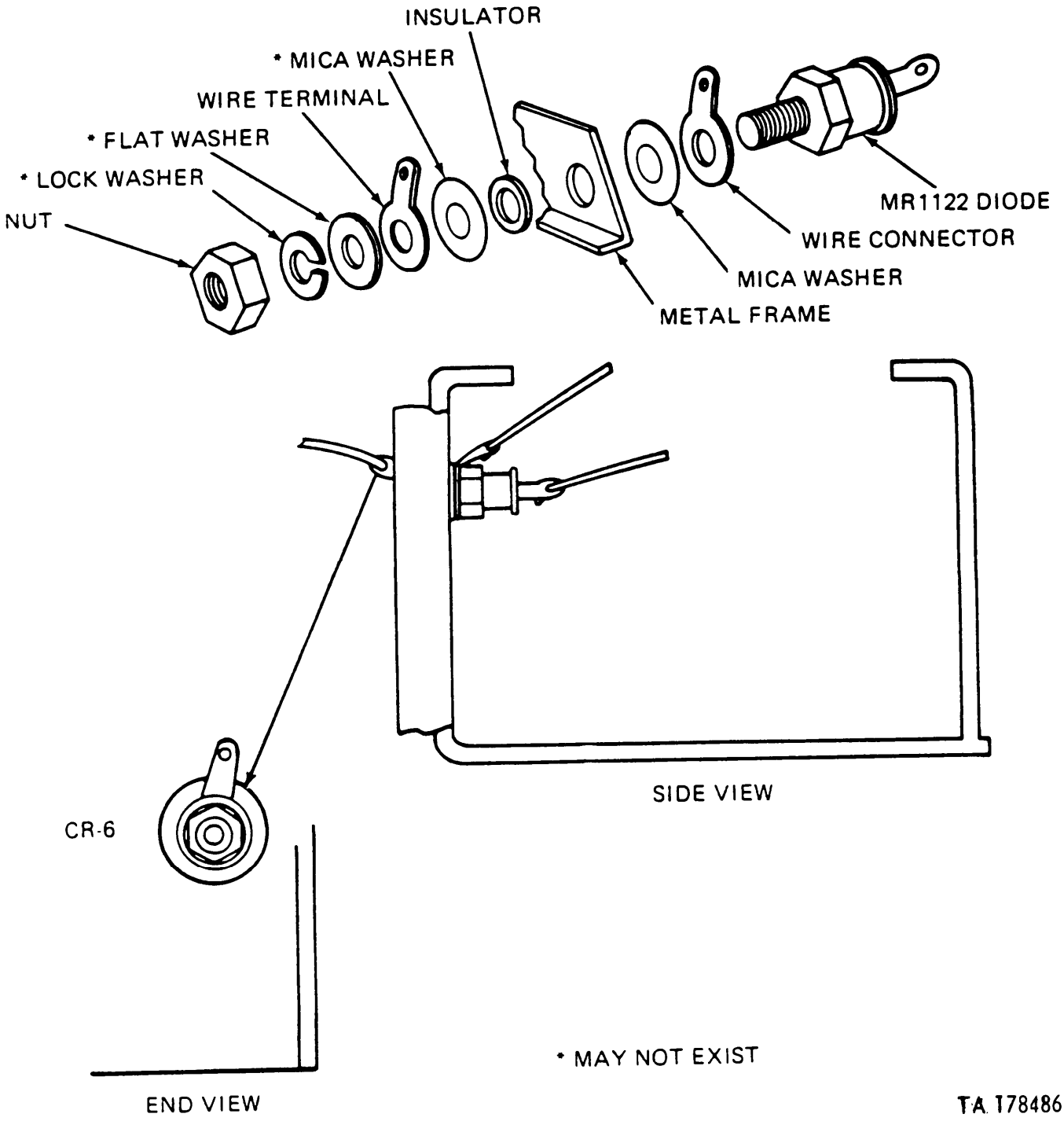

Figure 2–4. Diode mounting-model 01.

Section III. VAP-AIR MODEL 2640001-03

2-6. General. Figure 2–5 is a plan view of the regulator with the cover off. Figure 2–6 is an end view of the regulator showing the voltage adjustment point and some test points. Figure 2–7 is a view of the circuit board. Figure 2–8 is a view of the circuit board showing some of the electrical test points. There are 21 electrical test points. Figure 2–9 is an electrical schematic diagram of

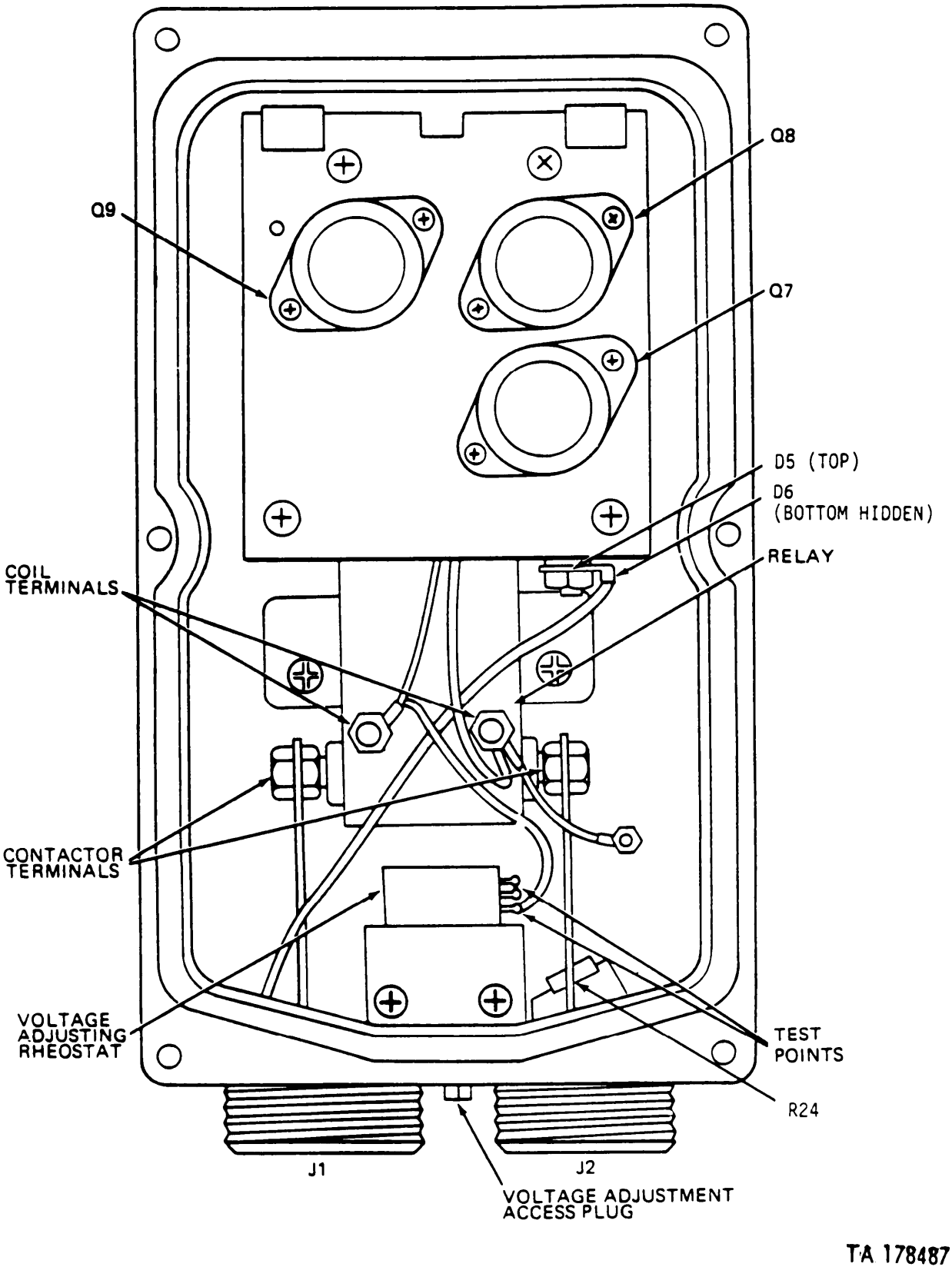

Figure 2–5. Vap-Air model 26440001-03.

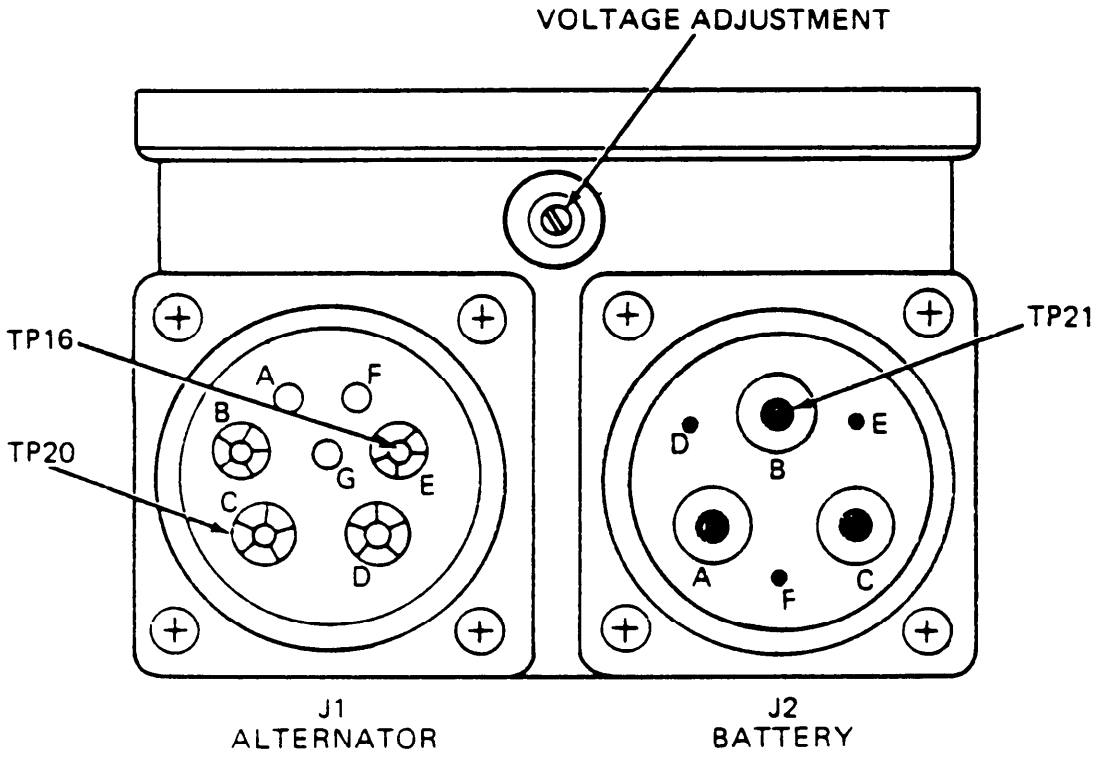

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Figure 2–6. End view-model 03.

the regulator. Table 2–2 gives the resistance checks, and table 2–3 gives the voltage checks. Table 2–4 is a diode substitution list.

2-7. Checkout and Repair.

a. Voltage Adjustment Rheostat (R6) (power disconnected).

(1) Remove voltage adjustment access plug (see fig. 2-5).

(2) Place ohmmeter test probes to terminals of the rheostat (see fig. 2–5).

(3) Rotate rheostat. fully clockwise; reading should be less than 5 ohms.

(4) If other readings are obtained, replace rheostat with Vap-Air part number 26527097.

b. Transistors.

(1) Carefully remove transistors Q7, Q8, and Q9 (see fig. 2-5).

(2) Position transistors as shown in figure 2–1 and check each separately (see fig. 2-2).

(3) If resistance values differ from the values shown in fig. 2–2, replace the transistor with a new device. Q7 is Vap-Air part number 26316033–19; Q8 and Q9 are Vap-Air part number 26316033-20.

NOTE

Transistors Q8 and Q9 are identical and can be interchanged. Transistor Q7 must be replaced by a like item in the same socket (see fig. 2–5).

(4) Check the mica insulating washers between the transistors and mounting plate. Replace if cracked, broken or missing. Coat washers with insulation compound per MIL-S-8660, NSN 6850-00-880-7616.

c. Diode.

(1) Remove four screws holding transistor mounting plate and move plate to one side.

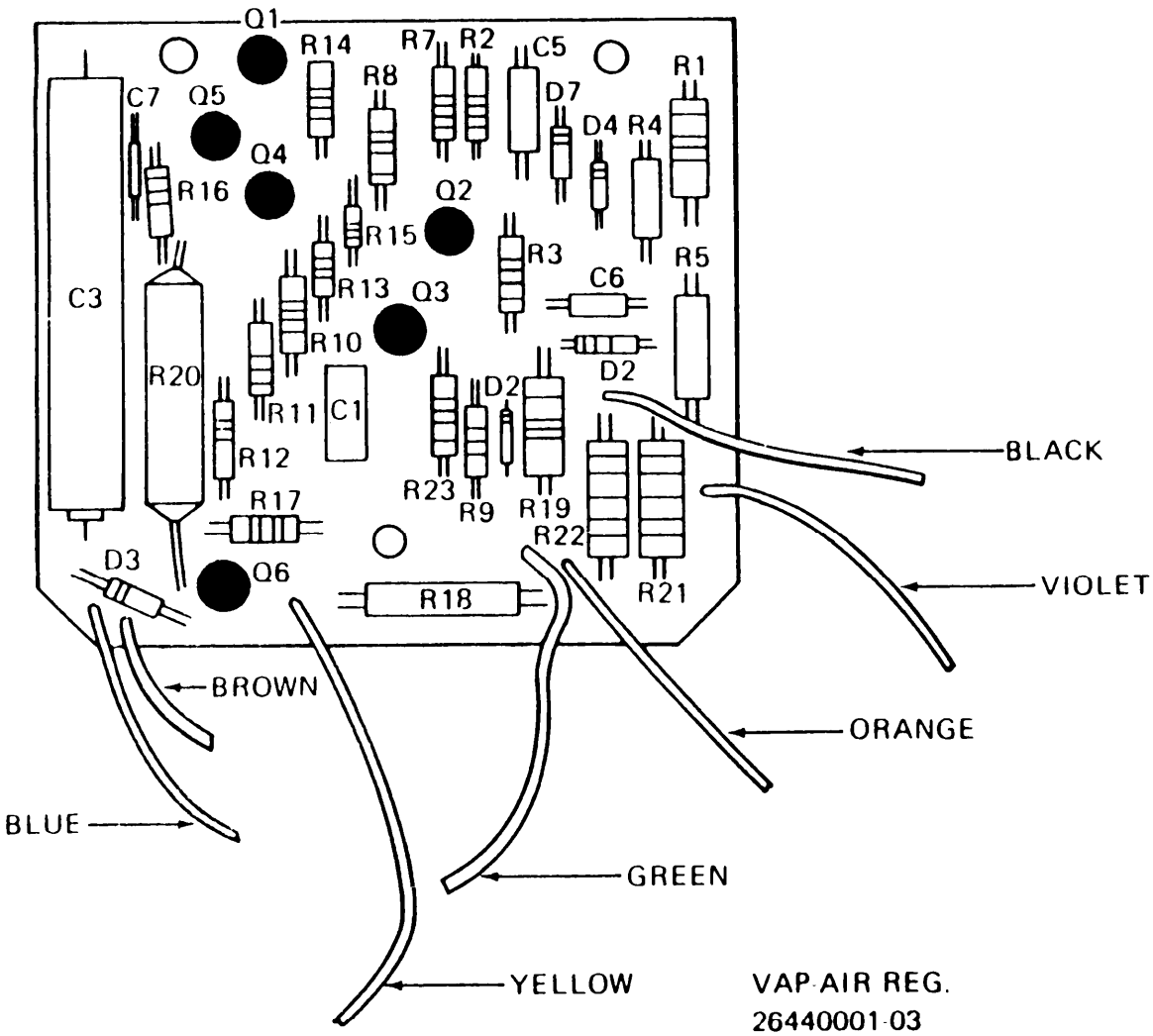
(2) Place negative ohmmeter probe to the connector side of diode D5 and D6, individually (see figs. 2-5 and 2-9).

(3) Place positive probe to the circuit board side of D5 and D6, individually. Meter should indicate high resistance.

(4) Reverse probes. Meter should indicate low resistance.

(5) If other readings are obtained, replace diodes D5 and D6, NSN 5961–00–103–1519 (see fig. 2-5).

(6) Reinstall transistor mounting plate.



LEGEND

R1	270 ohms, 1W	R13	1.8K ohms, 1/2 W	C1	.01 MFD
R2	680 ohms, 1/2 W	R14	1.8K ohms, 1/2 W	C2	.1 MFD (BELOW POWER TRANSISTOR HEAT SINK)
R3	1.5K ohms, 1/2 W	R15	390 ohms, 1/4 W		
R4	680 ohms, 1/2 W	R16	1K ohms, 1/2 W	C3	37 MFD
R5	270 ohms, 1W	R17	470 ohms, 1/2 W	C4	.1 MMFD (BELOW POWER TRANSISTOR HEAT SINK)
R6	VAR 100 ohms	R18	390 ohms, 1W		
R7	1.5K ohms, 1/2 W	R19	470 ohms, 1/2 W	C5	6.8 MFD
R8	12K ohms, 1/2 W	R20	18 ohms, 2W	C6	1 MFD
R9	10K ohms, 1/2 W	R21	27 ohms, 1W	C7	.22 MFD
R10	1K ohms, 1/2 W	R22	27 ohms, 1W		
R11	6.8K ohms, 1/2 W	R23	5.6K ohms, 1/2 W		
R12	1K ohms, 1/2 W	R24	.39 ohms, 1W		

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Figure 2-7. Circuit board–model 03.

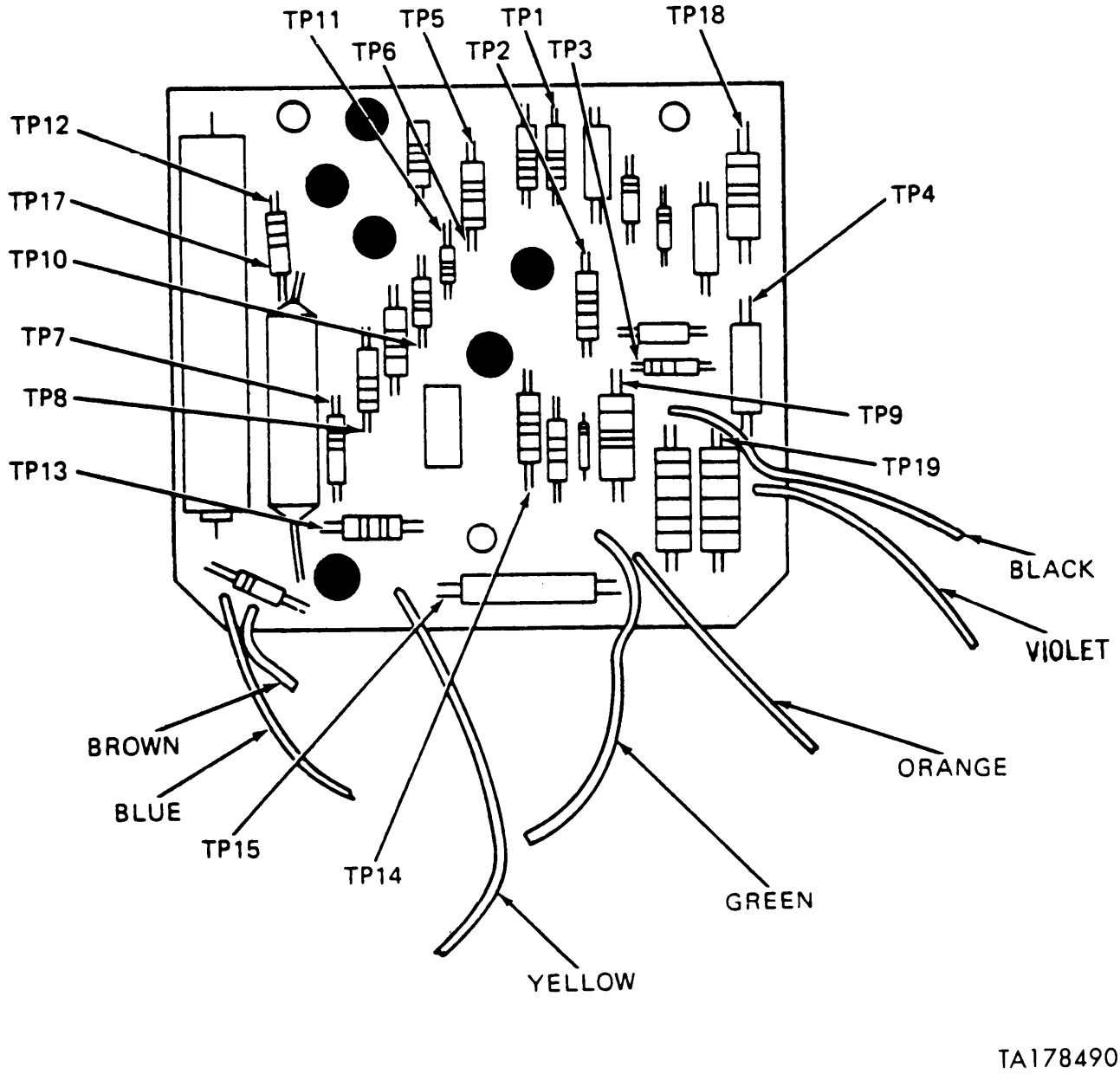

Figure 2-8. *Test points–model 03.*

d. Relay.

(1) Place ohmmeter probes across relay coil terminals (see fig. 2-5). Meter should read approximately 60 ohms.

(2) Place ohmmeter probes across contactor terminals (see fig. 2-5). Meter should read infinity (open circuit).

(3) If other readings are obtained, replace relay with NSN 2920-00-735–9542.

e. Detailed Circuit Checks.

(1) Table 2-2 contains *"power off"* resistance checks of the circiut (see figs. 2–6 and 2–8 for test points).

(2) Table 2-2 contains *"power on"* voltage checks of the circuit (see figs. 2-6 and 2-8 for test points).

f. Functional Check. Check the performance of the regulator on the test stand and make final voltage adjustments. Voltage output should read 28 volts. If the regulator does not function properly, perform the following:

(1) Check wires and connections.

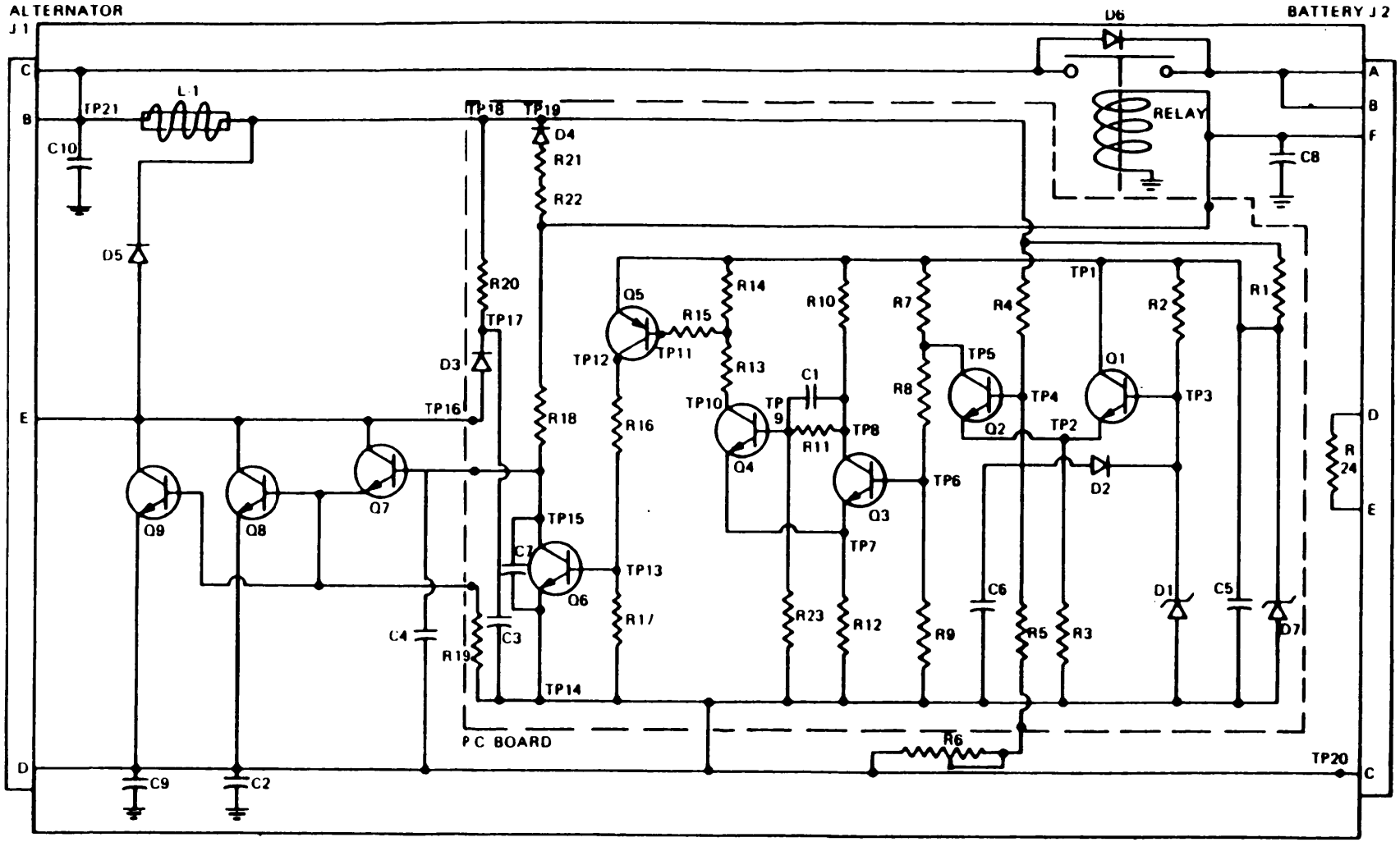

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Figure 2-9. Schematic diagram—model 03.

Table 2-2. Resistance Checks (Power Off) — Model 03

NOTE

REMOVE TRANSISTORS Q7, Q8, Q9 FROM THE CIRCUIT AND ADJUST R6 FULLY CLOCKWISE MAKING THE CHECKS.

Red for TS352 Negative	Black for TS352 Positive	Resistance (OHMS)	Resistance Scale (TS352 Meter)	Component	NSN
TP1	TP2	2000–3000			
TP2	TP1	150–250			
TP2	TP3	150–250			
TP3	TP2	2000–3000	R x 10	TRANSISTOR	
TP3	TP1	350–550		Q1	
TP1	TP3	100–250		2N2405	5960-00-730-3284
TP5	TP2	1500–2500			
TP2	TP5	1700–2500			
TP2	TP4	150–250	R x 10	TRANSISTOR	
TP4	TP2	1500–2500		Q1	
TP4	TP5	1500–2000		2N2405	5961-00-730-3284
TP5	TP4	150–250			
TP7	TP8	1000–2000			
TP7	TP6	150–250			
TP6	TP7	4000–10,000	R x 10	TRANSISTOR	
TP6	TP8	4000–10,000		Q3	
TP8	TP6	150–250		2N2405	5961-00-730-3284
TP7	TP10	3000–5000			
TP10	TP7	1500–2500			
TP7	TP9	150–250	R x 10	TRANSISTOR	
TP9	TP7	3000–5000		Q4	
TP9	TP10	3500–5500		2N2405	5961-00-730-3284
TP10	TP9	150–250			
TP1	TP12	300–800			
TP12	TP1	2000–4000			
TP12	TP11	4000–6000	R x 10	TRANSISTOR	
TP11	TP12	500–700		Q5	
TP11	TP1	500–700		2N3638A	5961-00-912-9008
TP1	TP11	1000–2000			
TP14	TP15	250–350			
TP15	TP14	400–500			
TP14	TP13	150–300	R x 10	TRANSISTOR	
TP13	TP14	400–500		Q6	
TP13	TP15	800–1200		2N2405	5961-00-730-3284
TP15	TP13	150–250			
TP3	TP4	15–35		DIODE D2	
			R x 1		
TP4	TP3	OVER 500		1N936B	5961-00-879-7145
TP16	TP17	OVER 500		DIODE D3	
			R x 1		
				1N4002	5961-00-880-4783
TP17	TP16	15–30		or 1N2482	5961-00-833-9050
TP18	TP19	15–30		DIODE D4	
			R x 1		
				1N4002	5961-00-880-4783
				or 1N2482	5961-00-833-9050
TP19	TP18	OVER 500		DIODE D4	
			R x 1	1N4002	5961-00-880-4783
				or 1N2482	5961-00-833-9050
TP16	TP18	OVER 500		DIODE D5	
			R x 1		
TP18	TP16	15–25		MR1122	5961-00-103-1519
TP20	TP12	OVER 500		DIODE D6	
			R x 1		
TP21	TP20	15–25		MR1122	5961-00-103-1519

(2) Replace circuit board, Vap-Air part number 26644321.

(3) Perform bench test procedures.

NOTE

After final repair, check regulator on the test stand.

Table 2-3. Voltage Checks (Power On)–Model 03

NOTE

REMOVE TRANSISTORS Q7, Q8, AND Q9 FROM CIRCUIT AND ADJUST R6 FULLY COUNTERCLOCKWISE BEFORE MAKING THESE CHECKS. TO PREVENT A SHORT CIRCUIT, SLIDE TRANSISTOR HEAT SINK IN SLOT ON LEFT SIDE OF THE REGULATOR.

Red for TS352 Positive	Black for TS352 Negative	Voltage* (Volts)	Regulator Applied Voltage	Component	NSN
TP1	J1–PIN D	15.5	20.0	DIODE D7 1N4745	Cannibalize
TP2	" "	8.2	"	DIODE D1 **1N936	5961-00-811-3752
TP3	" "	8.8	"	DIODE D1 **1N936	5961-00-811-3752
TP4	" "	6.0	"		
TP5	" "	1.7	"		
TP6	" "	6.0	"		
TP7	" "	5.5	"		
TP8	" "	8.2	"		
TP9	" "	3.5	"		
TP10	" "	15.0	"		
TP11	" "	15.0	"		
TP12	" "	0.0	"		
TP13	" "	0.0	"		
*TP14	" "	0.0	"		
TP15	" "	15.0	"		
TP16	" "	20.0	"		
TP17	" "	20.0	"		
TP18	" "	20.0	"		
TP19	" "	20.0	"		
TP20	" "	20.0	"		
TP21	" "	20.0	"		
TP1	J1–PIN D	16.0	30.0	DIODE D7 IN4745	Cannibalize
TP2	" "	8.3		DIODE D1 **1N936	5961-00-879-7145 5961-00-811-3752
TP3	" "	9.0		DIODE D1 **1N936	5961-00-811-3752
TP4	" "	8.6	"		
TP5	" "	14.0	"		
TP6	" "	6.3	"		
TP7	" "	5.9	"		
TP8	" "	8.6	"		
TP9	" "	3.7	"		
TP10	" "	15.5	"		
TP11	" "	15.5	"		
TP12	" "	0.0	"		
TP13	" "	0.0	"		
TP14	" "	0.0	"		
TP14	" "	0.0	"		
TP15	" "	18.5	"		
TP16	" "	30.0	"		
TP17	" "	30.0	"		
TP18	" "	30.0	"		
TP19	" "	30.0	"		
TP20	" "	30.0	"		
TP21	" "	30.0	"		

*Values may vary ± 5%

**See Table 3–4 for substitutes

Table 2-4. Substitutes for D1-Model 03

P/N	NSN
1N936	5961-00-811-3752
1N936A	5961-00-892-3195
1N936B	5961-00-879-7145
JAN 1N937B	5961-00-226-5134
JANTX 1N937B	5961-00-484-5035
1N938	5961-00-620-9770
1N938A	5961-00-078-0628
JAN 1N938B	5961-00-892-0889
JANTX 1N938B	5961-00-484-5036
JAN 1N939B	5961-00-852-5174

If the regulator still does not function correctly it will be necessary, if local skills permit, to test each component. All the parts should be checked with an ohmmeter and the capacitors checked with a capacitance meter. The circuit board traces should be checked with an ohmmeter to make sure that there are no cracked traces. Traces with hair-line cracks will show good at lower temperatures and will tend to show open circuit at higher temperatures. If the board seems good at room temperature, but the regulator still fails, this could be the cause.

Section IV. VAP-AIR MODEL 26440001-04

2-8. General. Figure 2-10 is a plan view of the regulator with the cover off. Figure 2-11 is an end view of the regulator showing the receptacles and the voltage adjustment points. Figure 2–12 is an exploded view of the diode mounting. Figure 2–13 is a relay location. Figure 2–14 is a view of the circuit board and transistor heat sink. Figure 2–15 is a view of the circuit board showing the electrical test points. There are 12 electrical test points. Figure 2–16 is an electrical schematic diagram of the regulator. Table 2–5 lists the resistance checks, and table 2-6 1ists the voltage checks. Table 2–7 is a transistor substitution list.

2-9. Checkout and Repair.

a. Voltage Adjustment Rheostat (Rz) (Power Disconnected).

(1) Place ohmmeter test probes to terminals of the rheostat (see fig. 2-10).

(2) Rotate rheostat fully clockwise, reading should be approximately 250 ohms.

(3) Rotate rheostat fully counterclockwise, reading should be less than 5 ohms.

(4) If other readings are obtained, replace rheostat.

b. Transistors.

(1) Remove transistors Q4 and Q5 (see fig. 2–l0).

(2) Position transistors as shown in figure 2-1, and check them separately (see fig. 2–2).

(3) If resistance values cliffer from the values shown in figure 2–2, replace the transistors through cannibalization or requisition transistor Q4, Vap-Air part number 26316033-12 (2N3441), NSN 5961–00–054–4141, or transistor Q5, Vap-Air P N 26316033–70 (2N3773), NSN 5961–00–929–5014 (see table 2–7 for substitutes).

(4) Check the mica insulating washers between the transistors and mounting plate. Replace if cracked, broken or missing. Coat washers with insulation compound per MIL–S–8660, NSN 6850–00-880-7616.

c. Diode.

(1) Remove four screws holding transistor and circiut board mounting plate, and move plate to one side.

(2) Place negative ohmmeter probe to the topside of diode D4 (see fig. 2-12).

(3) Place positive probe to the bottom of D4. Meter should indicate low resistance.

(4) Reverse probes. Meter should indicate high resistance.

(5) If other readings are obtained replace diode D4 (MR1122), NSN 5961–00–103–1519 (see fig. 2-12) .

d. Relay.

(1) Place ohmmeter probes across relay coil terminals (see fig. 2-13).

(2) Place ohmmeter probes across terminals (see fig. 2-13). Meter should read infinity (open circuit).

(3) If other readings are obtained, replace relay, NSN2920–00–735–9542.

(4) Reinstall transistor and circuit board mounting plate.

e. Detailed Circuit Checks.

(1) Table 2–5 contains *"power off''* resistance checks of the circuit (see fig. 2–15 for test points).

(2) Table 2-6 contains *"power on"* voltage checks of the circuit (see fig. 2–15 for test points).

f. Functional Check. Check the performance of the regulator on the test stand and make final voltage adjustments. Voltage output should read 28 volts. If the regulator does not function properly, perform the following:

(1) Check wires and connections.

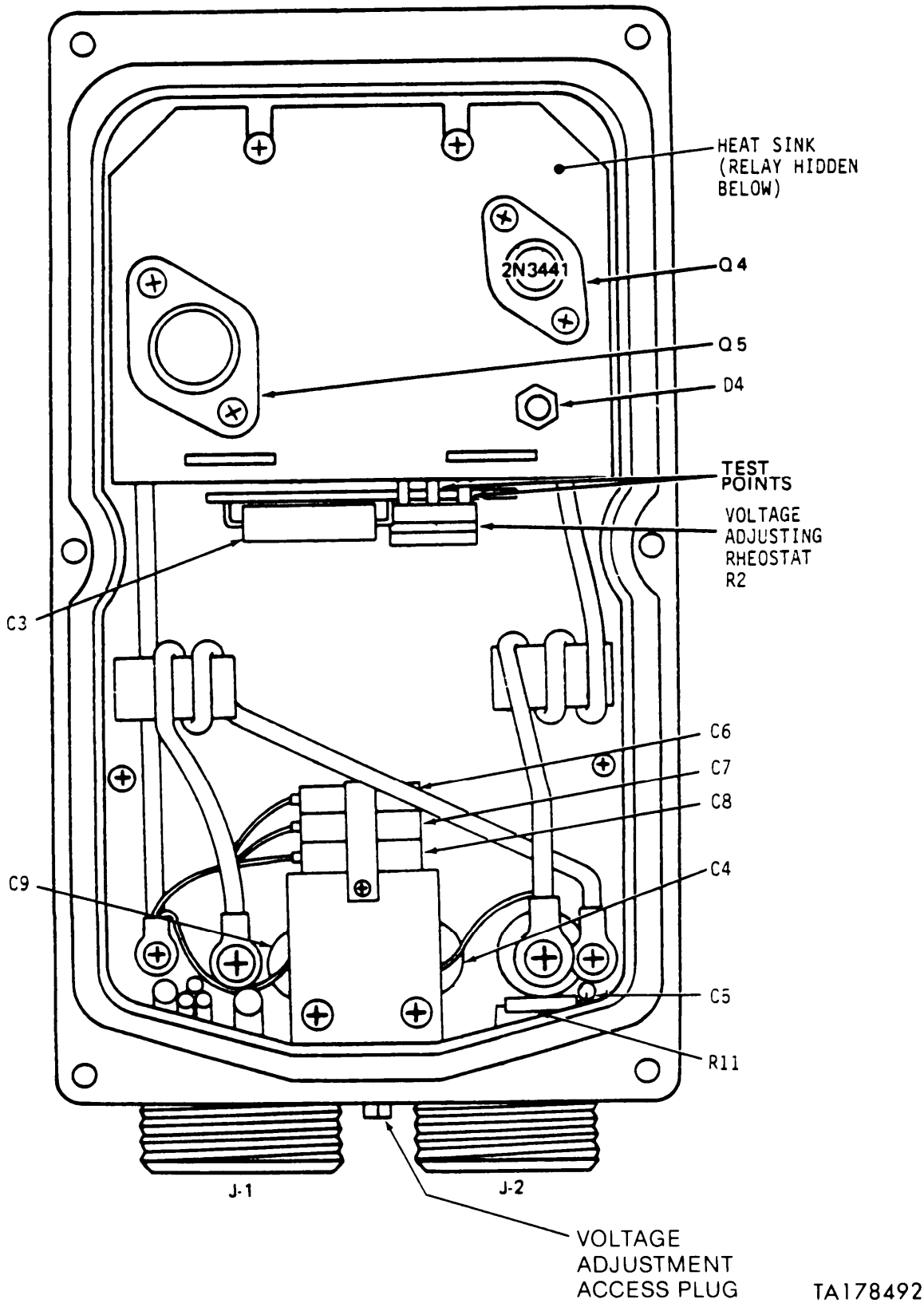


Figure 2-10. Vap-Air model 26440001-04.

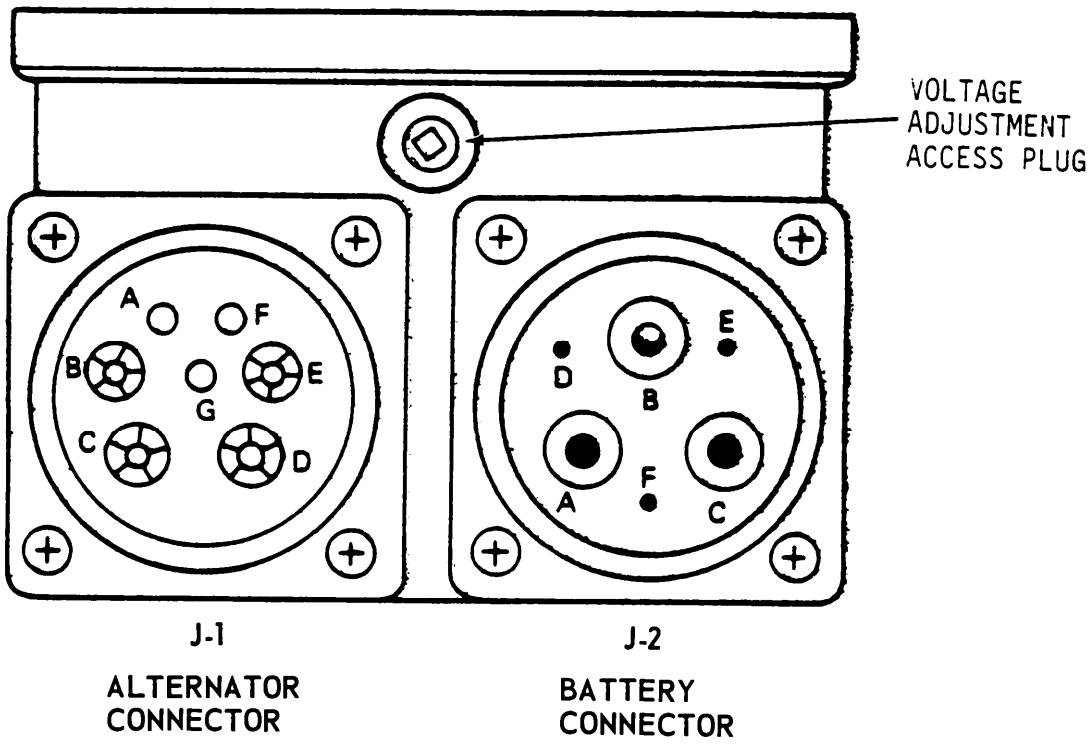


Figure 2-11. End view—model 04.

(2) Replace circuit board, Vap-Air part number 27134372.

(3) Perform bench test procedures.

NOTE

After final repair, check regulator on the test stand.

Table 2–5. Resistance Checks (Power Off)–Model 04

NOTE

REMOVE TRANSISTORS Q4, Q5 FROM THE CIRCUIT AND ADJUST R2 FULLY CLOCKWISE BEFORE MAKING THESE CHECKS.

Red for TS352 Negative	Black for TS352 Positive	Resistance (OHMS)	Resistance Scale (TS352 Meter)	Component	NSN
TP1	TP2	250–500			
TP2	TP1	750–1500		TRANSISTOR	
TP1	TP3	130–400	R x 10	Q3	
TP3	TP1	1500–5000		2N2222A	5961-00-951-8757
TP2	TP3	150–400			
TP3	TP2	700–1500			
TP5	TP4	1000–3500			
TP4	TP5	3000–7000		TRANSISTOR	
TP6	TP5	150–300	R x 10	Q2	
TP5	TP6	2000–5000		2N3638A	5961-00-912-9008
TP6	TP4	150–300			
TP4	TP6	7,500–12,000	R x 100		

Table 2-5. Resistance Checks (Power Off)–Model 04–continued

Red for TS352 Positive	Black for TS352 Negative	Resistance (OHMS)	Resistance Scale (TS352 Meter)	Component	NSN
TP7	TP8	3000–5000			
TP8	TP7	10,000–20,000			
TP8	TP9	1500–2500		TRANSISTOR	
TP9	TP8	5000–7000	R x 100	Q1	
TP7	TP9	1500–2500		2N2222A	5961-00-951-8757
TP9	TP7	10,000–20,000			
TP10	TP11	15–25		DIODE D3	
TP11	TP10	OVER 1000	R x 1	1N5402	5961-00-761-4631
TP2	TP12	15–25		DIODE D2	
TP12	TP2	OVER 1000	R x 1	1N2482	5961-00-833-9050
J1–PIN B	J1–PIN E	5000–15,000		DIODE D4	
J1–PIN E	J1–PIN B	25,000–50,000	R x 100	MR1122	5961-00-103-1519

Table 2-6. Voltage Checks (Power 0n)—Model 04

NOTE

REMOVE TRANSISTORS Q4, Q5 FROM THE CIRCUIT AND ADJUST R2 FULLY CLOCKWISE BEFORE MAKING THESE CHECKS.

Red for TS352 Positive	Black for TS352 Negative	Voltage* (Volts)	Regulator Applied Voltage	Component	NSN
TP1	J1–PIN D	1.2	20.0	DIODE D1	
TP2	" "	0.0	"	1N756A	5961-00-068-2001
TP3	" "	0.0	"	1N756A	5961-00-845-6458
TP4	" "	0.0	"		
TP5	" "	20.0	"	JANTX 1N756A	5961-00-105-5734
TP6	" "	20.0	"	1N959A	5961-00-400-1992
TP7	" "	20.0	"		
TP8	" "	8.2	"		
TP9	" "	8.0	"		
TP10	" "	19.0	"		
TP11	" "	20.0	"		
TP12	" "	.6	"		
TP1	" "	.05	30.0		
TP2	" "	0.0	"		
TP3	" "	.8	"		
TP4	" "	30.0	"		
TP5	" "	30.0	"		
TP6	" "	29.5	"		
TP7	" "	8.5	"		
TP8	" "	8.4	"	DIODE D1	
TP9	" "	9.2	"	IN2482	5961-00-833-9050
TP10	J1–PIN D	29.0	30.0		
TP11	" "	30.0	"		
TP12	" "	.65	"		

*Values may vary ± 5%

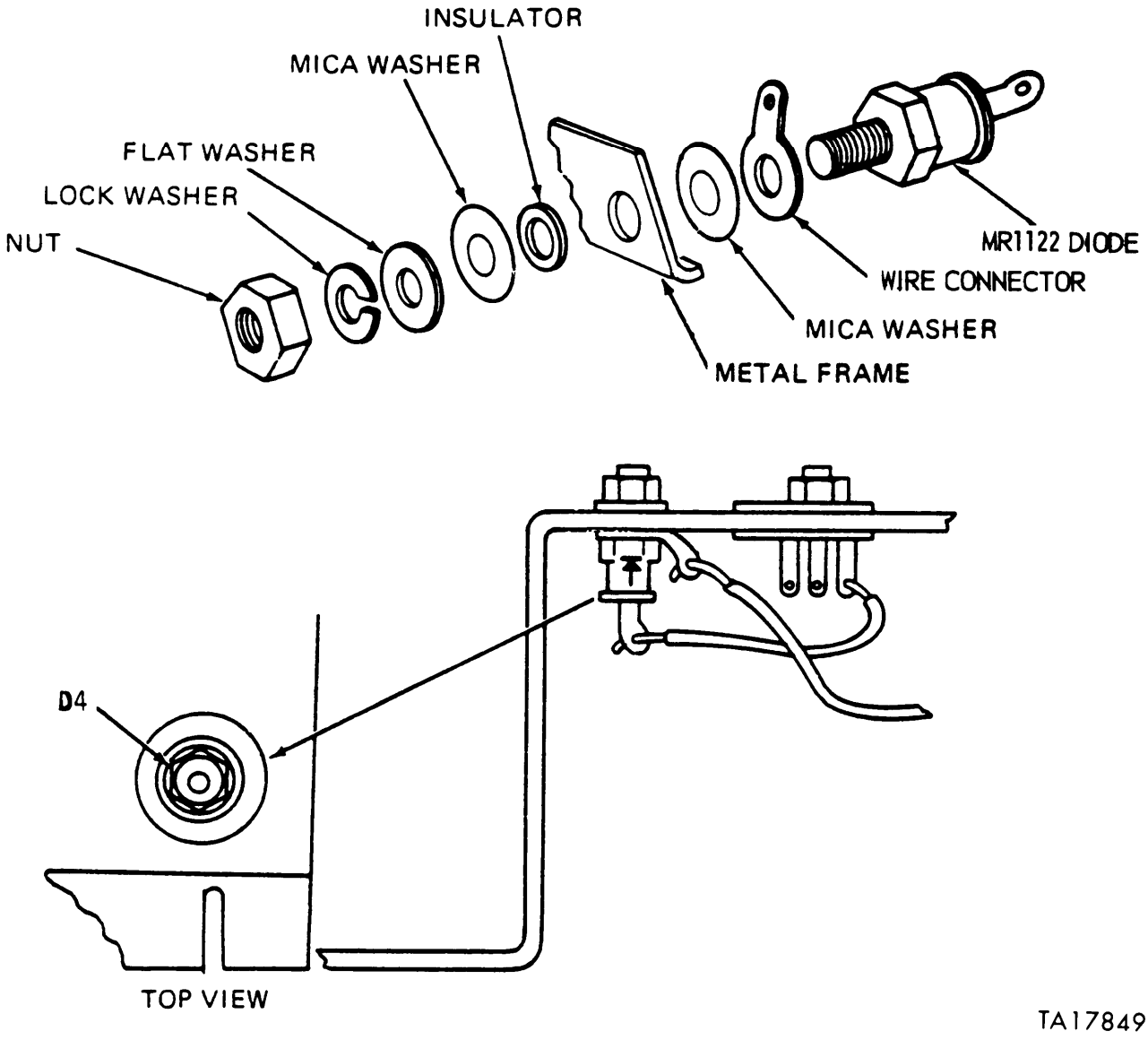


Figure 2-12. Diode mounting-model 04.

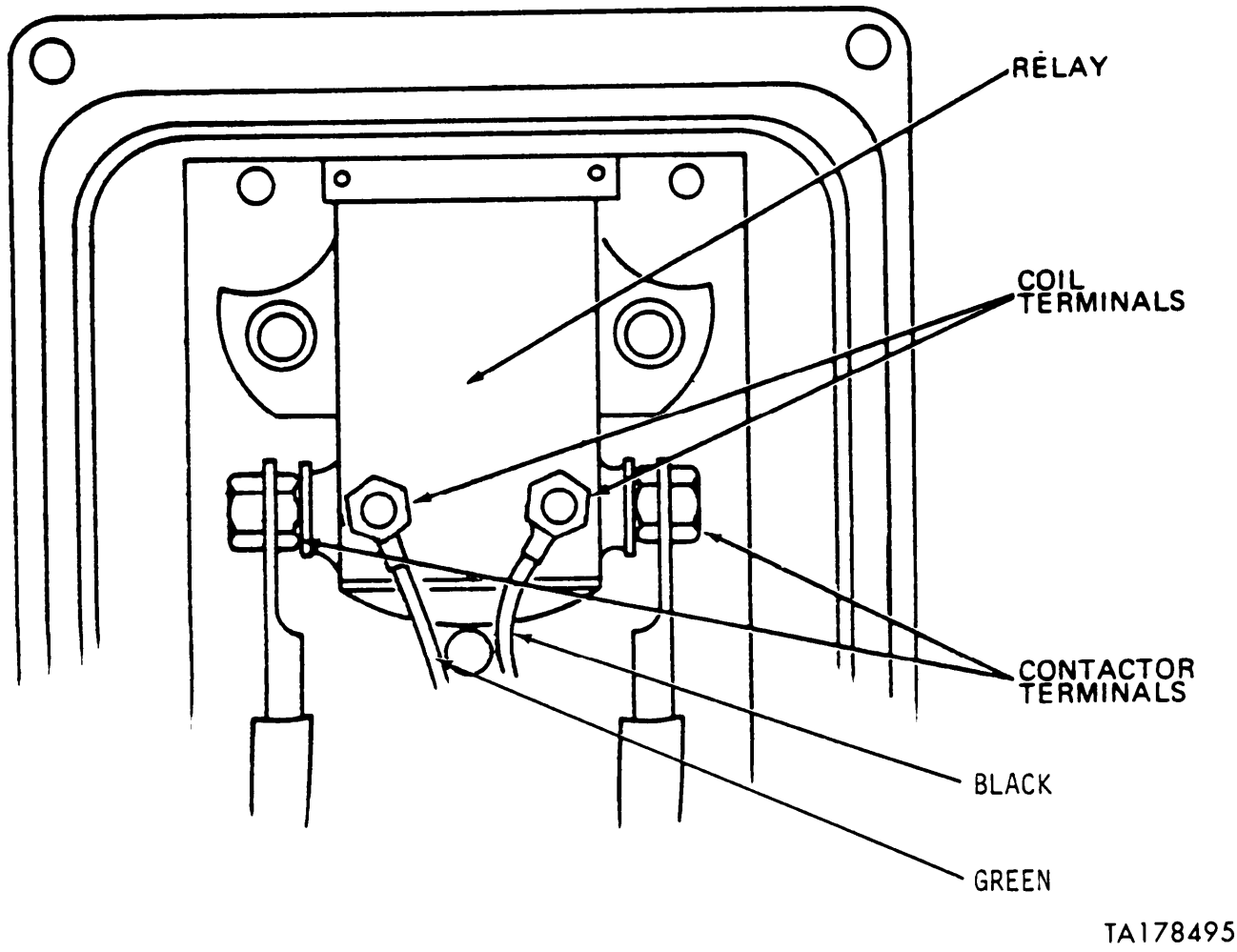


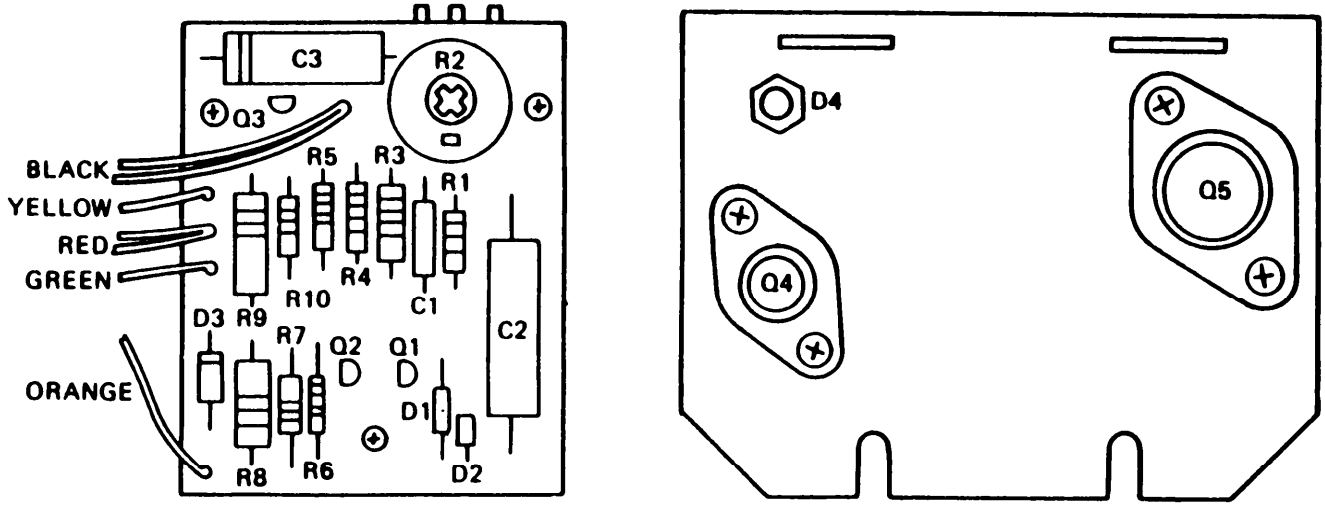
Figure 2-13. Relay location-model 04.

Table 2-7. Substitutes for transistor Q5–.Model O4

P/N	NSN
2N3773	5961-00-327-8280
2N3773	5961-00-929-5014
JAN 2N3771	5961-00-431-7863
JANTX 2N3771	5961-00-758-5816
2N3772	5961-00-438-2156
2N3772	5961-00-854-6759
2N3772	5961-00-864-7527
JAN 2N3772	5961-00-403-2566
JA[illegible] 5961-00-760-1302	5961-00-760-1302
2N5038	5961-00-935-6479
JAN 2N5038	5961-00-858-8960
JANTX 2N5038	5961-00-359-5752
2N5039	5961-00-215-5999
2N5039	5961-00-262-0729
JANTX 2N5039	5961-01-033-0822
2N5671	5961-00-481-4205
JAN 2N5671	5961-01-019-6400
2N5672	5961-00-523-9171
2N5672	5961-00-003-0584
JANTX 2N5672	5961-00-017-0990
2N6258	5961-00-255-9986

Table 2-7. Substitutes for transistor Q5–Model 04— continued

If the regulator still does not function correctly it will be necessary, if local skills permit, to test each component. All the parts should be checked with an ohmmeter and the capacitors checked with a capacitance meter. The circuit board traces should rechecked with an ohmmeter to make sure that there are no cracked traces. Traces with hairline cracks will show good at lower temperatures and will tend to show open circuit at higher temperatures. If the board seems good at room temperature, but the regulator still fails, this could be the cause.



LEGEND

Q1 2N222A	R1	13.2K ohms, 1/2W	C1	2.2 MFD	D1 1N756A
Q2 2N3638A	R2	VAR. 250 ohms, 2W	C2	82 MFD	D2 1N2482
Q3 2N2222A	R3	62.1K ohms, 1/2W	C3	8.2 MFD	D3 1N2482
Q4 2N3441	R4	5.1K ohms, 1/2W	C4	8MFD	D4 MR 1122
Q5 2N3773	R5	8.2K ohms, 1/2W	C5	.0047 MFD	
	R6	3.3K ohms, 1/4W	C6	.47 MFD	
	R7	4.7K ohms, 1/2W	C7	.47 MFD	
	R8	300 ohms, 1W	C8	.47 MFD	
	R9	300 ohms, 1W	C9	8 MFD	
	R10	1K ohms, 1/2W			
	R11	.39 ohms, 1W			

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Figure 2-14. Circuit board and transistor heat sink–model 04.

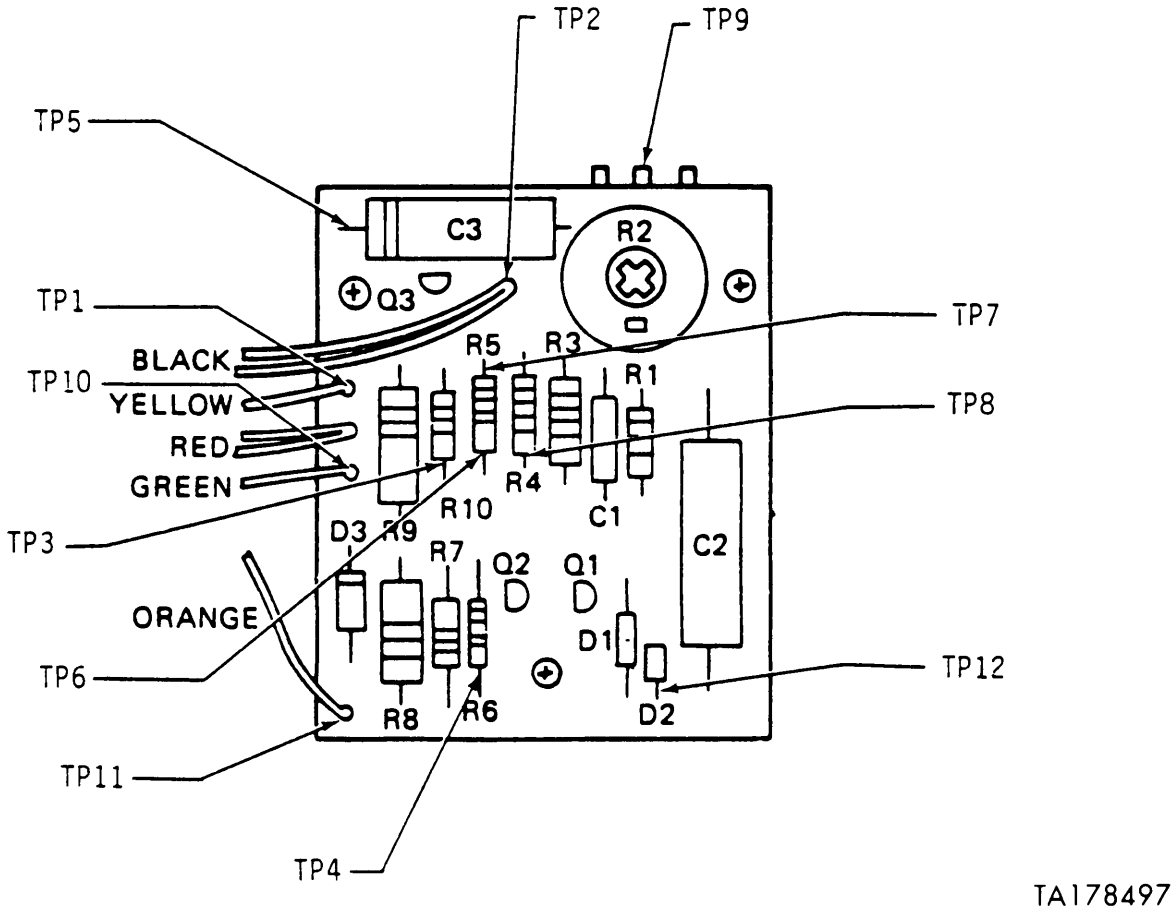


Figure 2–15. Test points–model 04.

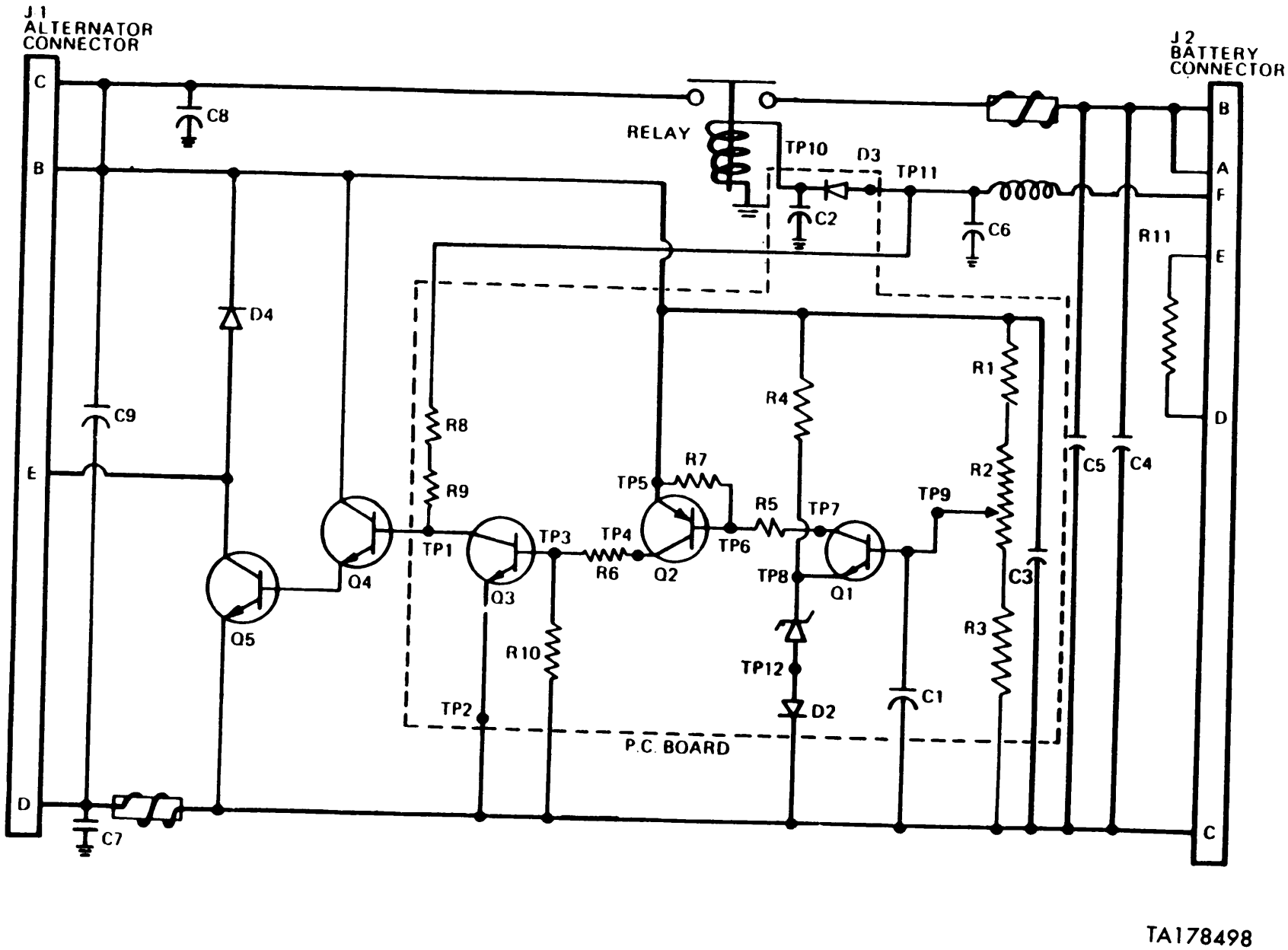


Figure 2-16. Schematic diagram—model 04.

Section V. VAP-AIR MODEL 26440001-05

2-10. General. Figure 2–17 is a plan view of the regulator with the cover off. Figure 2–18 is the end view of the regulator showing the receptacles and the voltage adjustment point. Figure 2-19 is an exploded view of the diode mounting. Figure 2-20 is a relay location drawing. Figure 2-21 is a view of the circuit board and transistor heat sink. Figure 2–22 is a view of the circuit board showing the electrical test points. There are 12 electrical test points. Figure 2–23 is an electrical schematic diagram of the regulator. Table 2–8 lists the resistance checks. Table 2-9 lists the voltage checks. Table 2-10 is a transistor substitution list.

2-11. Checkout and Repair.

a. Voltage Adjustment Rheostat (R2) (power disconnected).

(1) Place ohmmeter test probes to the violet and brown wire terminals of the rheostat (see fig. 2-17) .

(2) Rotate rheostat fully clockwise, reading should be approximately 250 ohms.

(3) Rotate rheostat fully counterclockwise, reading should be less than 5 ohms.

(4) If other readings are obtained, replace rheostat.

b. Transistors.

(1) Remove transistors Q4 and Q5 (see fig. 2-17).

(2) Position transistors as shown in figure 2-1, and check each separately (see fig. 2–2).

(3) If resistance values differ from the above, replace the transistors through cannibalization or requisition transistor Q4, Vap-Air part number 26316033-12 (2N3441), NSN 5961-00–054-4141, or transistor Q5, Vap-Air part number 26316033–70 (2N3773), NSN 5961-00–929–5014 (see table 2–10 for substitutes).

(4) Check the mica insulating washers between the transistors and mounting plate. Replace if cracked, broken or missing. Coat washers with insulation compound per MIL-S-8660, NSN 6850–00–880-7616.

c. Diode.

(1) Remove four screws holding transistor and circuit board mounting plate, and move plate to one side.

(2) Place negative ohmmeter probe to the top side of diode CR3 (see fig. 2-19).

(3) Place positive probe to the bottom side of CR3. Meter should indicate low resistance.

(4) Reverse probes. Meter should indicate high resistance.

(5) If other readings are obtained replace diode CR3 (MR1122), NSN 5961-00-103-1519 (see fig. 2-19).

d. Relay.

(1) Place ohmmeter probes across relay coil terminals (see fig. 2–20). Meter should read approximately 60 ohms.

(2) Place ohmmeter probes across contactor terminals (see fig. 2–20). Meter should read infinity (open circuit).

(3) If other readings are obtained, replace relay, Vap-Air part number 27124377, NSN 2920-00–735-9542.

(4) Reinstall transistor and circuit board mounting plate.

e. Detailed Circuit Checks.

(1) Table 2-8 contains *"power off"* resistance checks of the circuit (see fig. 2–22 for test points).

(2) Table 2–9 contains *"power on"* voltage checks of the circuit (see fig. 2–22 for test points).

f. Functional Checks. Check the performance of the regulator on the test stand and make final voltage adjustments. Voltage output should read 28 volts. If the regulator does not function properly, perform the following:

(1) Check wires and connections.

(2) Replace circuit board, Vap-Air part number 27534930.

(3) Perform bench test procedures.

NOTE

After final repair, check regulator on the test stand.

If the regulator still does not function correctly it will be necessary, if local skills permit, to test each component. All the parts should be checked with an ohmmeter and the capacitors checked with a capacitance meter. The circuit board traces should be checked with an ohmmeter to make sure that there are no cracked traces. Traces with hairline cracks will show good at lower temperatures and will tend to show open circuit at higher temperatures. If the board seems good at room temperature, but the regulator still fails, this could be the cause.

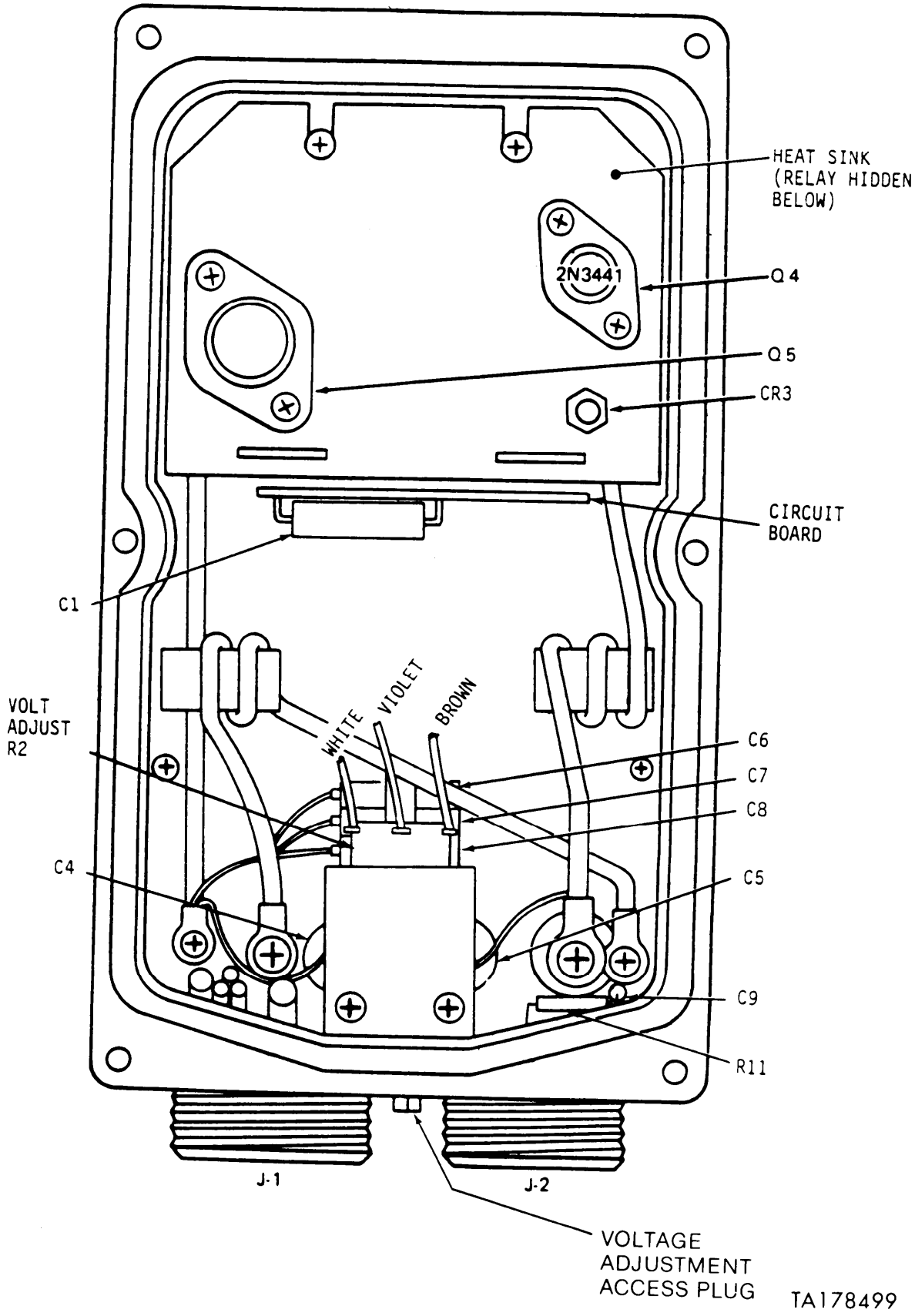


Figure 2-17. Vap-Air model 26440001–05.

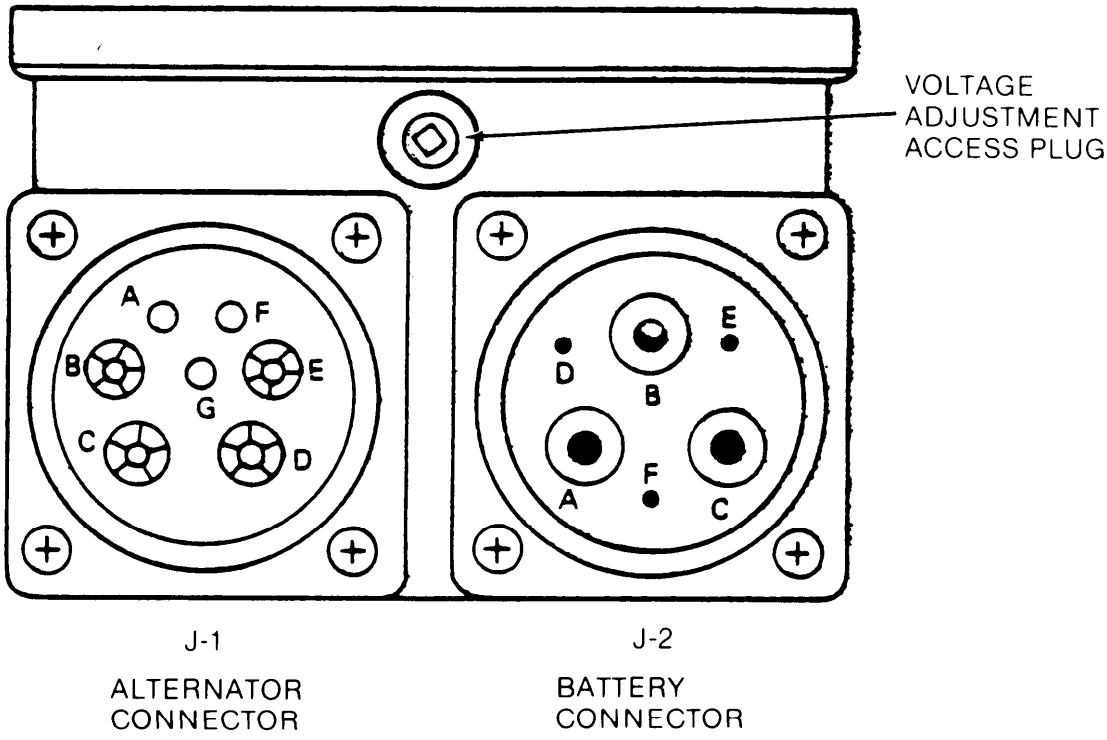


Figure 2-18. End view–model 05.

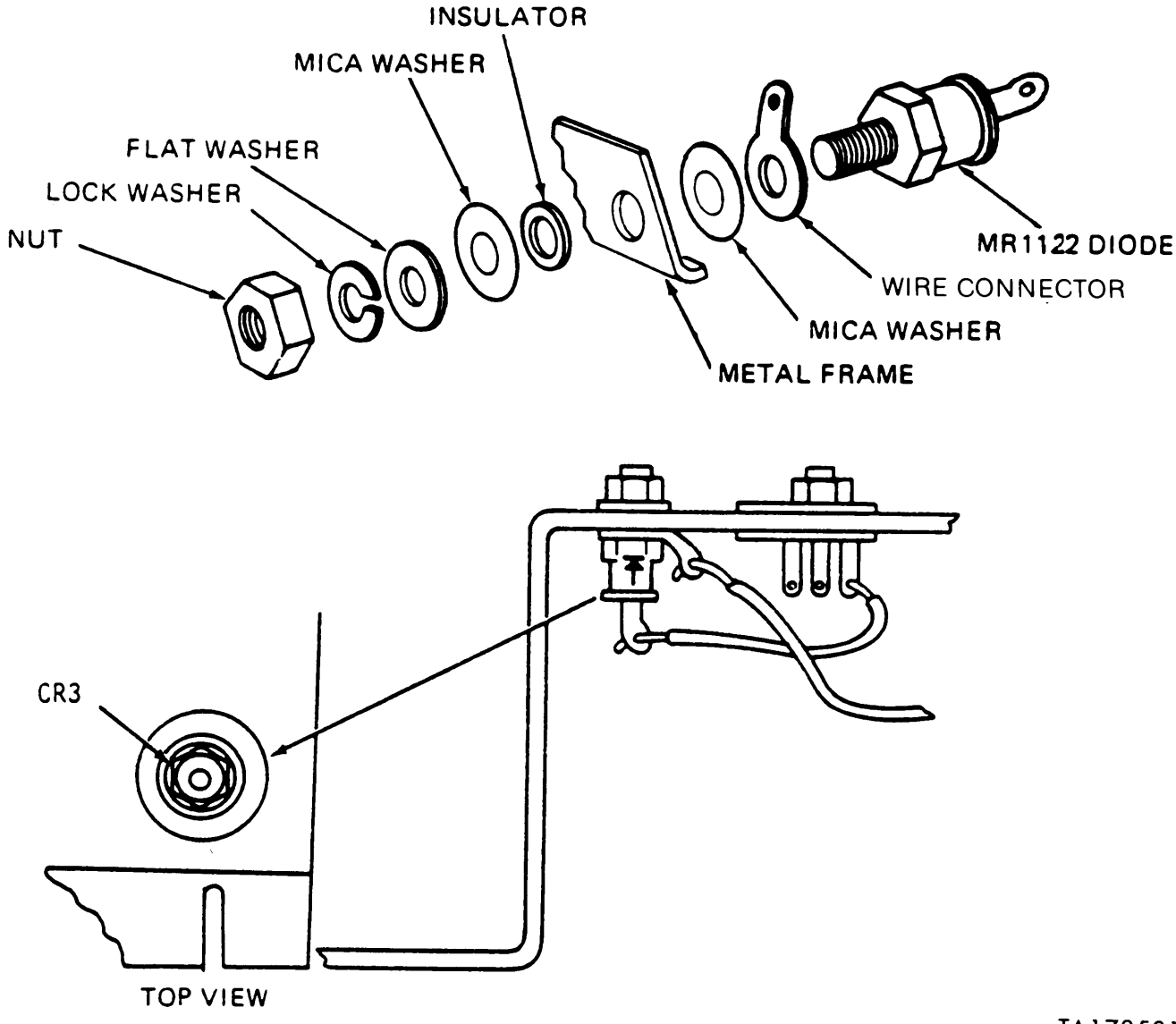


Figure 2-19. Diode mounting—model 05.

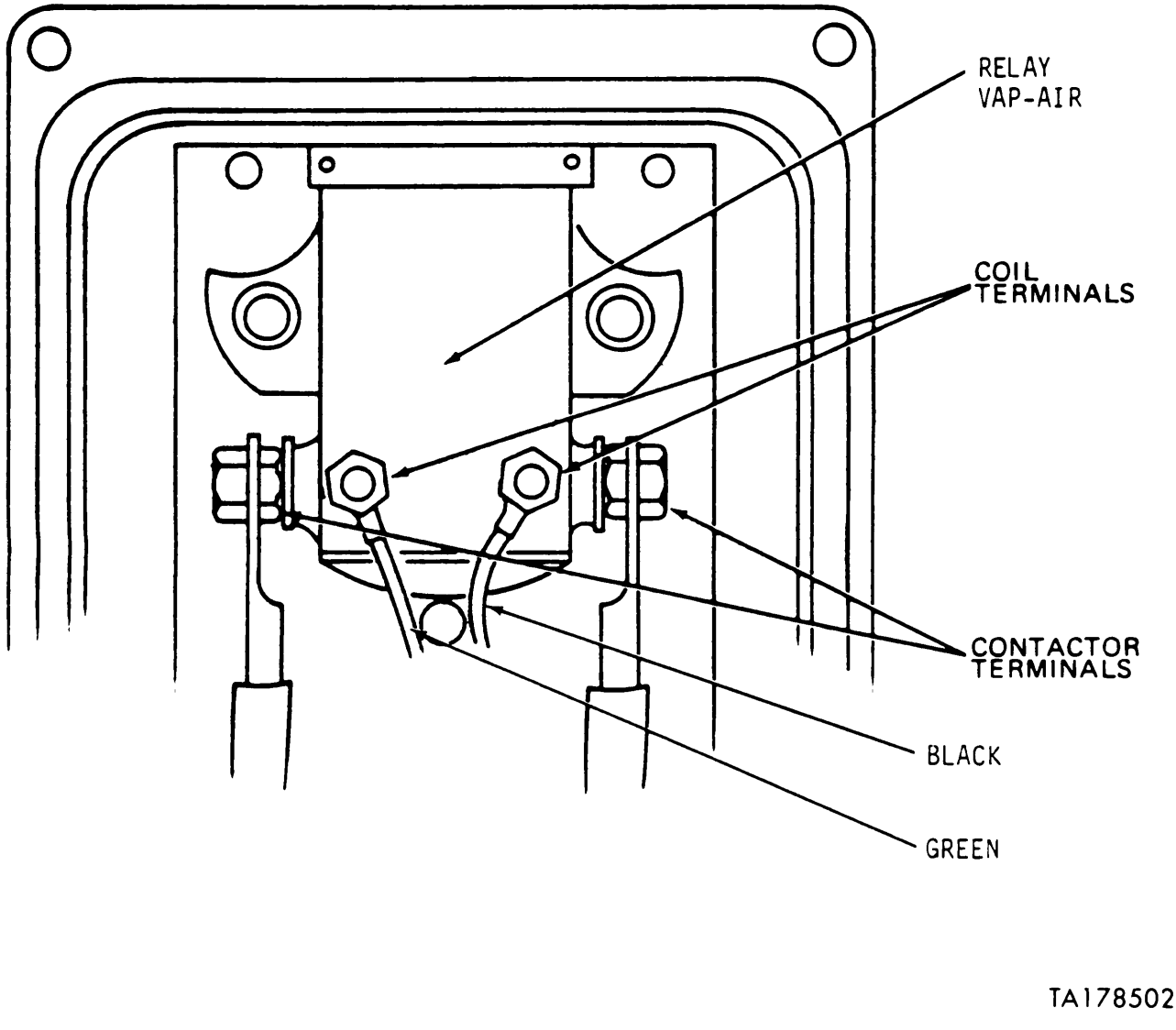
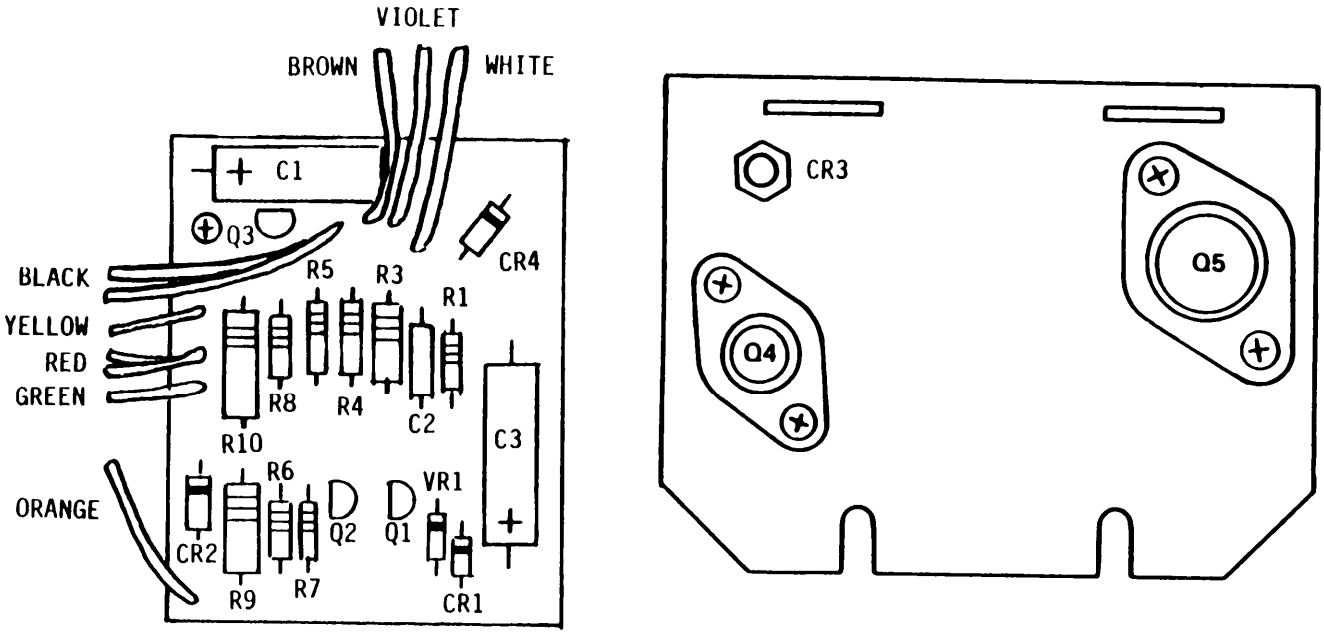


Figure 2-20. Relay location—model 05.



LEGEND

Q1	2N2222A	R1	13.2K ohms, 1/2W	C1	8.2 MFD	CR1	1N2482
Q2	2N3638A	R2	VAR.250 ohms, 2W	C2	2.2 MFD	CR2	1N5402
Q3	2N2222A	R3	62.1K ohms, 1/2W	C3	82 MFD	CR3	MR 1122
Q4	2N3441	R4	5.1K ohms, 1/2W	C4	8 MFD	CR4	1N5402
Q5	2N3773	R5	8.2K ohms, 1/2W	C5	8 MFD	VR1	1N756A
		R6	4.7K ohms, 1/2W	C6	.47 MFD		
		R7	3.3K ohms, 1/4W	C7	.47 MFD		
		R8	1K ohms, 1/2W	C8	.47 MFD		
		R9	300 ohms, 1W	C9	.0047 MFD		
		R10	300 ohms, 1W				
		R11	.39 ohms, 1W				

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Figure 2–21. Circuit board and transistor heat sink–model 05.

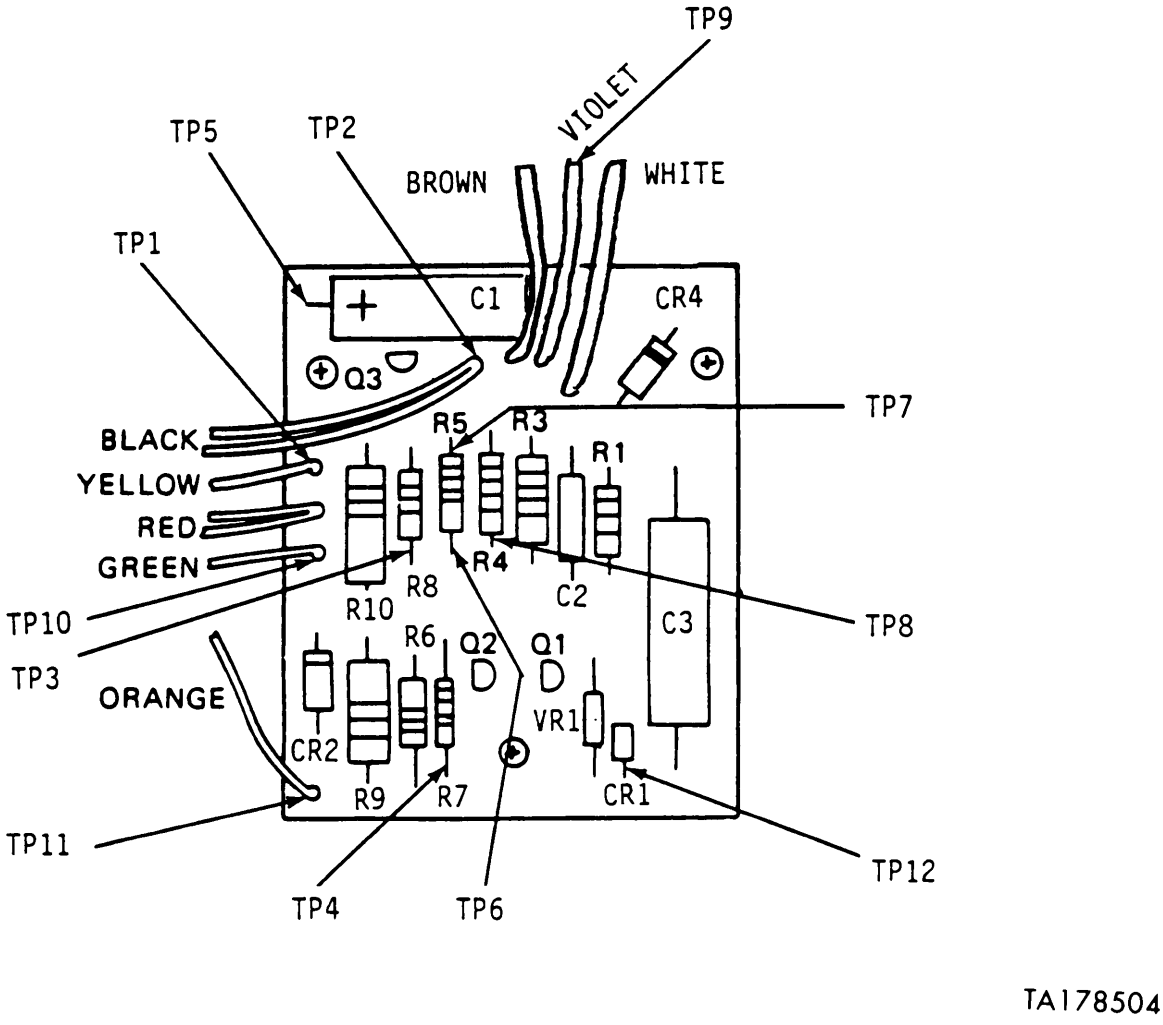


Figure 2–22. Test point–model 05.

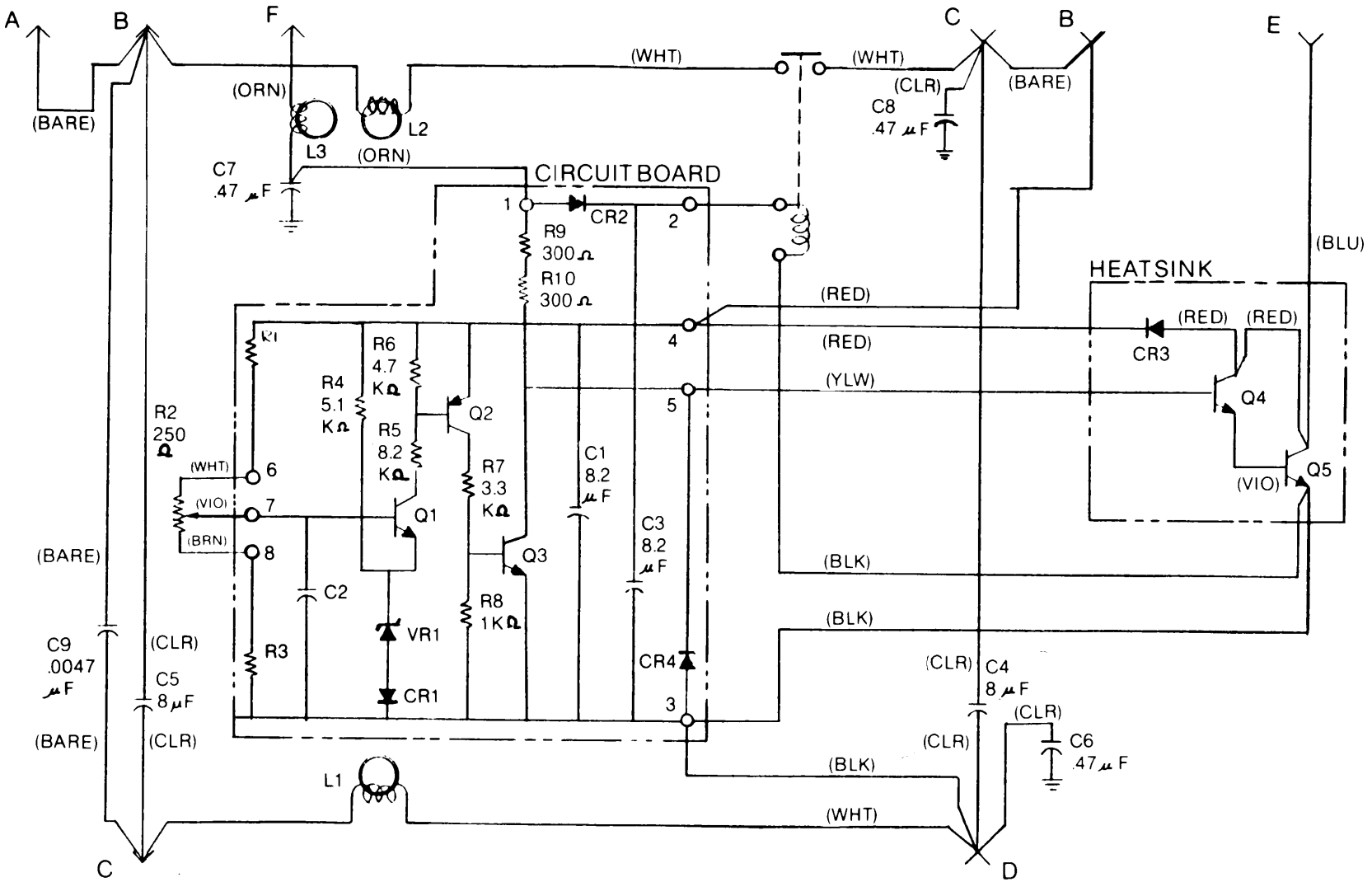


Figure 2-23. Schematic diagram—model 05.

Table 2-8. Resistance Checks (Power Off)—Model 05

NOTE

REMOVE TRANSISTORS Q4, Q5 FROM THE CIRCUIT AND ADJUST R2 FULLY CLOCKWISE BEFORE MAKING THESE CHECKS.

Red for TS352 Negative	Black for TS352 Positive	Resistance (OHMS)	Resistance Scale (TS352 Meter)	Component	NSN
TP1	TP2	250–500			
TP2	TP1	750–1500		TRANSISTOR	
TP1	TP3	130–400	R x 10	Q3	
TP3	TP1	1500–5000		2N2222A	5961-00-951-8757
TP2	TP3	150–400			
TP3	TP2	700–1500	*Note:* See also test for CR4, at end of table3–8		
TP5	TP4	1000–3500			
TP4	TP5	3000–7000		TRANSISTOR	
TP6	TP5	150–300	R x 10	Q2	
TP5	TP6	2000–5000		2N3638A	5961-00-912-9008
TP6	TP4	150–300			
TP4	TP6	7500–12,000	R x 100		
TP7	TP8	3000–5000			
TP8	TP7	10,000–20,000			
TP8	TP9	1500–2500			
TP9	TP8	5000–7000		TRANSISTOR Q1	
TP7	TP9	1500–2500	R x 100	2N2222A	5961-00-951-8757
TP9	TP7	10,000–20,000			
TP10	TP11	15–25		DIODE CR2	
TP11	TP10	OVER 1000	R x 1	1N5402	5961-00-761-4631
TP2	TP12	15–25		DIODE CR1	
TP12	TP2	OVER 1000	R x 1	1N2482	5961-00-833-9050
J1–PIN B	J1–PIN E	5000–15,000		DIODE CR3	
J1–PIN E	J1–PIN B	25,000–50,000	R x 100	MR1122	5961-00-103-1519
TP1	TP2	MORE THAN 200	R x 1	DIODE CR4	
TP2	TP1	LESS THAN 50		1N5402	5961-00-761-4631
				SUBSTITUTES	
				1N4141	5961-00-938-7649
				OR	
				1N4721	5961-00-450-0922
				1N4721	5961-00-929-4975

Table 2-9. Voltage Checks (Power On)—Model 05

NOTE

REPLACE TRANSISTORS Q4, Q5 AND ADJUST R2 FULLY COUNTERCLOCKWISE BEFORE MAKING THESE CHECKS.

TP1	J1–PIN D	1.2	20.0		
TP2	" "	0.0	"	DIODE VR1	
TP3	" "	0.0	"	1N756A	5961-00-068-2001
TP4	" "	0.0	"	JAN 1N756A	5961-00-845-6458
TP5	" "	20.0	"	JANTX 1N756A	5961-00-105-5734
TP6	" "	20.0	"		
TP7	" "	20.0	"	1N959A	5961-00-400-1992
TP8	" "	8.2	"		
TP9	" "	8.0	"		
TP10	" "	19.0	"		
TP11	" "	20.0	"		
TP12	" "	.6	"		
TP1	" "	.05	30.0		
TP2	" "	0.0	"		
TP3	" "	.8	"		

Table 2–9. Voltage Checks (Power On)—Model 05–continued

Red for TS352 Positive	Black for TS352 Negative	Voltage* (Volts)	Regulator Applied Voltage	Component	NSN
TP4	J1–PIN D	30.0	"		
TP5	" "	30.0	"		
TP6	" "	29.5	"		
TP7	" "	8.5	"		
TP8	" "	8.4	"	DIODE CR1	
TP9	" "	9.2	"	1N2482	5961-00-833-9050
TP10	J1–PIN D	29.0	30.0		
TP11	" "	30.0	"		
TP12	" "	.65	"		

*Values may vary ± 5%

Table 2-10. Substitutes for Transistor Q5—Model 05

P/N	NSN
2N3773	5961-00-327-8280
2N3773	5961-00--929-5014
JAN 2N3771	5961-00-431-7863
JANTX 2N3771	5961-00-758-5816
2N3772	5961-00-438-2156
2N3772	5961-00-854-6759
JAN 2N3772	5961-00-403-2566
JANTX 2N3772	5961-00-760-1302
2N5038	5961-00-935-6479
JAN 2N5038	5961-00-858-8960
JANTX 2N5038	5961-00-359-5752
2N5039	5961-00-215-5999
JAN 2N5039	5961-00-262-0729
JANTX 2N5039	5961-01-033-0822
2N5671	5961-00-481-4205
JAN 2N5671	5961-01-019-6400
2N5672	5961-00-523-9171
2N5679	5961-01-003-0584
JANTX 2N5672	5961-01-017-0990
2N6258	5961-00-255-9986

CHAPTER 3
LEECE-NEVILLE MODELS

Section I. INTRODUCTION

3-1. Introduction. Four models were produced by Leece-Neville, a division of Sheller Globe Corporation.

Code Ident 35510 (FSCM)
Sheller Globe Corp.
Leece-Neville Cleveland Div.
1374 E. 51st St.
Cleveland, OH 44103
TELEPHONE AC 216 431–0740

The Leece-Neville part numbers for each model are:

R0015027RA
R0015027RB
R0015027RC
R0015027RD

3-2. General Inspection. This chapter applies to all Leece-Neville models.

a. Regulator Box Assembly (external). Check for missing or stripped cover, connector and mount retainer screws, and voltage adjustment access plug. Check connectors for signs of arcing, bent or pushed in pins, broken connectors and thread damage.

Correct deficiencies by utilization of serviceable components from unrepairables or requisitioning components from the manufacturer.

(1) The pin receptacle (J2) is P/N 7064429 FSCM 19207 or MS3102A28-22P FSCM 96906 per MIL-C-5015.

(2) The socket receptacle (Jl) is P/N 7064706 FSCM 19207, an ordnance number for which there is no equivalent NSN number. An assembly is available as an ordnance part from Bendix.

Code Ident 77820 (FSCM)
Bendix Corp.
The Electrical Components Div.
Sherman Ave.
Sidney, NY 13838

It should be ordered as part number 60-42228-10S; it will arrive as a complete assembly with the shell marked 8701337.

b. Regulator Box Assembly (Internal). If water leakage or corrosion is detected, it is possible that extensive damage has been done and the regulator cannot be easily repaired. Components should be performance tested and retained if acceptable. Check for disconnected or burnt wires, missing components and replace/repair as necessary. Carefully remove the transistor mounting plate, noting the position of the screws, washers and rubber insulators. Visually inspect the circuit board for burnt components. Replace the circuit board through cannibalization if burnt components are found. Carefully reinstall the transistor mounting plate.

c. Regulator Verification Check. After performing the above inspection, if the regulator appears to be in good condition, check its performance on a test stand. If the regulator fails this check, proceed to the following component tests.

3-3. Bench Testing. Figures 3–1 and 3–2 show the method for testing NPN transistors. These figures apply to all models in this chapter.

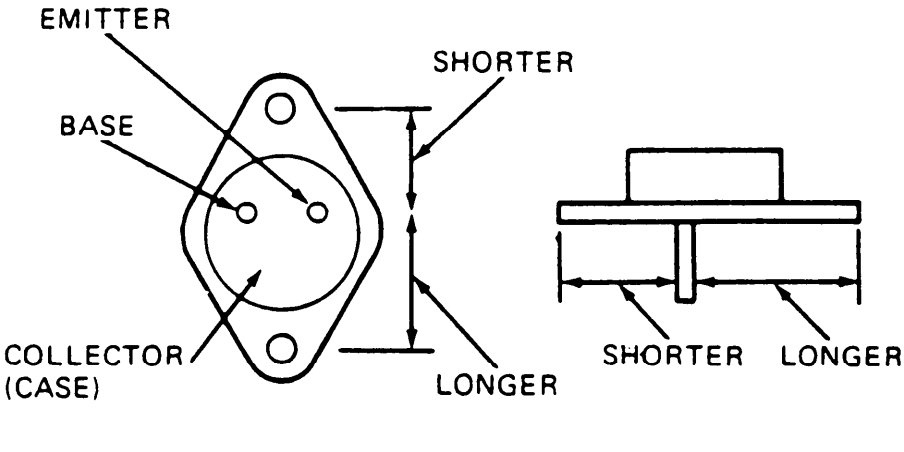


Figure 3-1. NPN transistor (Leece-Neville).

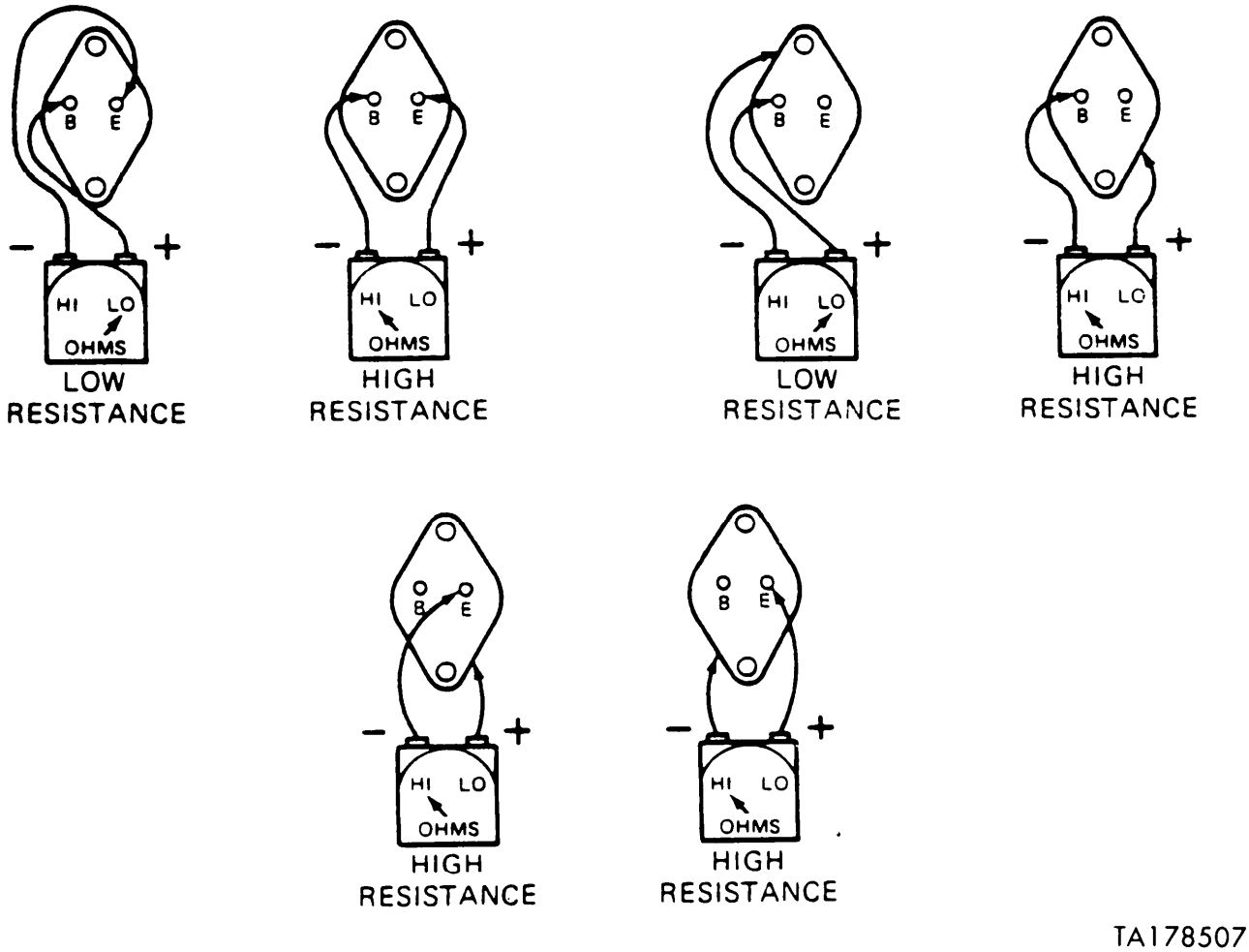


Figure 3–2. Transistor resistance checks (Leece-Neville).

Section II. LEECE-NEVILLE MODEL R0015027RA

3-4. General. Figure 3–3 is a plan view of the regulator with the cover removed, showing the remaining test points. There are 10 total test points. Figure 3–5 is an electrical schematic diagram of the regulator circuit.

3-5. Checkout and Repair.

a. Diode D2 and Relay (see fig. 3–3 *and* 3–5*) (voltage off).*

(1) Place positive probe of ohmmeter to pin F of connector J2 and negative probe on TP1. Meter should read 0 ohms.

(2) Place positive probe on TP1 and negative probe on TP2. Meter should read low ohms (hundreds).

(3) Reverse probes in (2) above. Meter should read high ohms (thousands).

(4) If other readings are obtained in (2) or (3) above, replace diode D1.

(5) Place positive probe on TP2 and negative probe on Pin C of connector J2. Meter should read approximately 55 ohms.

(6) If another reading is obtained, remove and replace both the relay and diode D2.

b. Resistor R1. Replace ohmmeter probe across resistor R1 (see figs. 3-3 and 3-5). Meter should read approximately 0.4 ohms.

c. Voltage Adjustment Rheostat (R15).

(1) Remove voltage adjustment access screw from the cover of regulator.

(2) Place ohmmeter probes to terminals of the rheostat (see figs. 3-4 and 3-5).

(3) Rotate rheostat fully clockwise; reading should be approximately 45 ohms.

(4) Rotate rheostat fully counterclockwise; reading should be less than 5 ohms.

(5) If other readings are obtained, replace the rheostat, NSN 5905-00–581-1405.

d. Power Resistor R2. Place ohmmeter probes across power resistor R2 (see figs. 3-4 and 3–5). Meter should read approximately 30 ohms.

e. Detailed Circuit Checks.

(1) Table 3–1 contains *"power off"* resistance checks of the circuit (see figs. 3-3 and 3–4 for test points).

(2) Table 3-2 contains *"power on"* voltage checks of the circuit (see figs. 3–3 and 3-4 for test points).

f. Functional Check. Check the performance of the regulator on the test stand and make final voltage adjustments. Voltage output should read 28 volts. If the regulator does not function properly, perform the following:

(1) Check wires and connections.

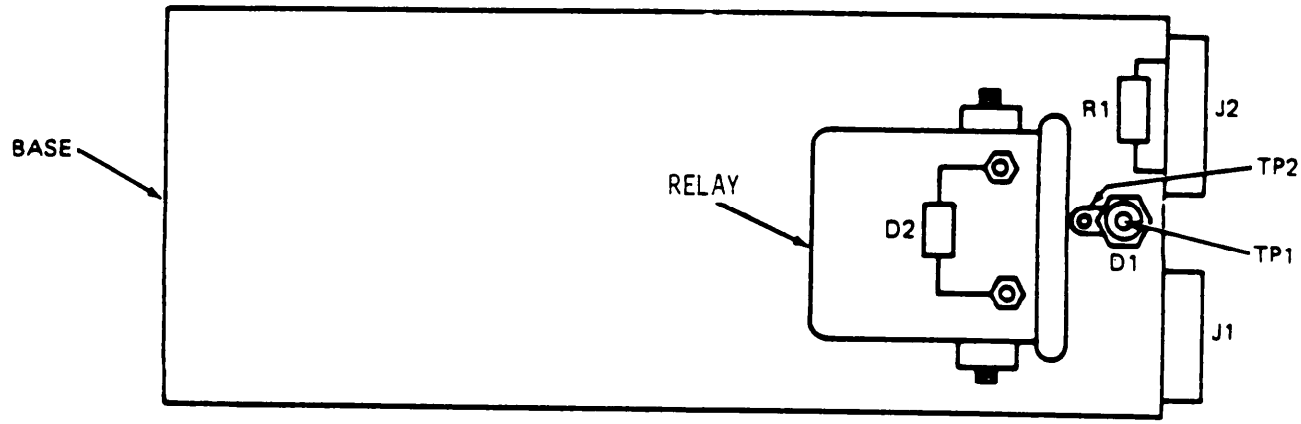


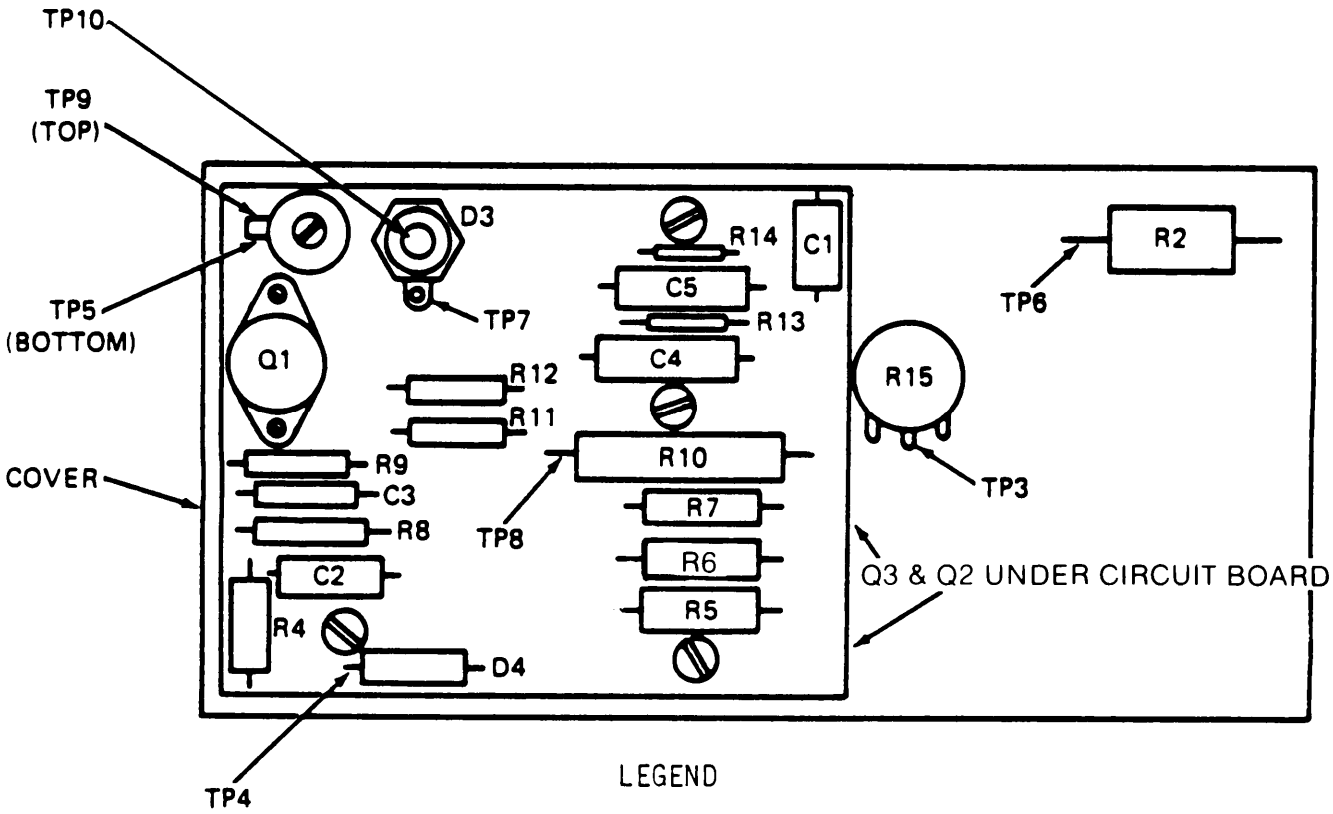
Figure 3–3. Top-view (Leece-Neville)–model R0015027RA.

(2) Replace cover assembly.
(3) Perform bench test procedures.

NOTE

After final repair, check regulator on the test stand.

If the regulator still does not function correctly it will be necessary, if local skills permit, to test each component. All the parts should be checked with an ohmmeter to make sure that there are no cracked traces. Traces with hairline cracks will show good at lower temperatures and will tend to show open circuit at higher temperatures. If the board seems good at room temperature, but the regulator still fails, this could be the cause.



LEGEND

R1	.4 OHMS, 1W	R12	2.5K OHMS, 1/2W
R2	30 OHMS, 8W	R13	820 OHMS, 1/4W
R3	.05 OHMS, 8W	R14	100 OHMS, 1/4W
R4	150 OHMS, 1/2W	R15	500 OHMS VAR, 2W
R5	50 OHMS, 1/2W	C1	.22 MFD, 100 VDC
R6	50 OHMS, 1/2W	C2	47 MFD, 35 VDC
R7	120 OHMS, 1/2W	C3	.22 MFD, 100 VDC
R8	220 OHMS, 1/2W	C4	22 MFD, 100 VDC
R9	4 OHMS, 2W	C5	.47 MFD, 100 VDC
R10	500 OHMS, 3W	TP3 thru TP10	TEST POINT #3 thru TEST POINT #10
R11	4000-6000 OHMS @ 80°F*		
D3	1N1341AR		
D4	1N3022A		

*(NOTE: AS TEMPERATURE INCREASES RESISTANCE DECREASES.)

TA178509

Figure 3-4. Circuit board-model R0015027RA.

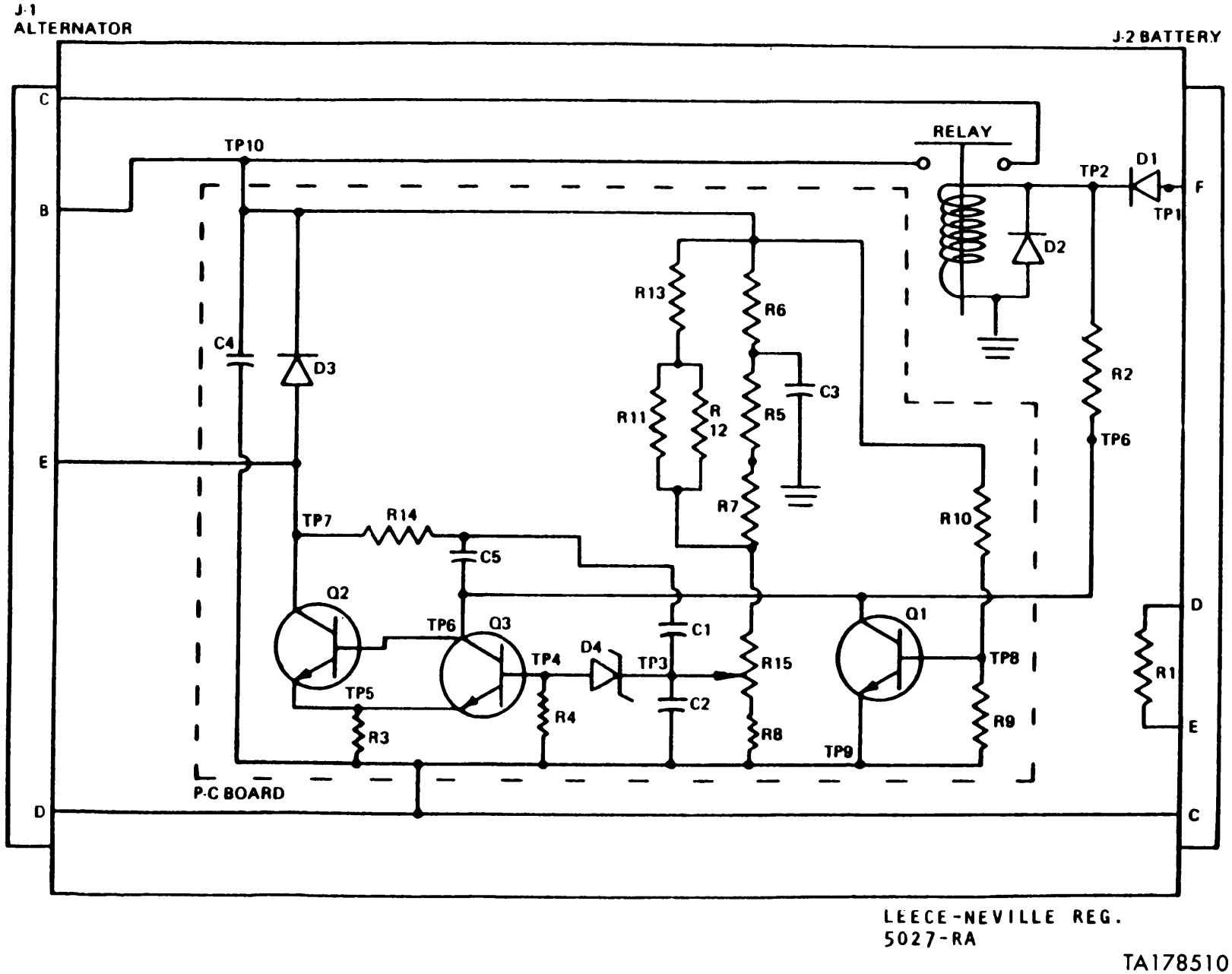


Figure 3–5. Schematic diagram—model R0015027RA.

Table S-1. Resistance Checks (Power Off)–Mode1 5027RA

NOTE

ADJUST (R15) FULLY CLOCKWISE BEFORE MAKING THESE CHECKS.

Red for TS352 Negative	Black for TS352 Positive	Resistance (OHMS)	Resistance Scale (TS352 Meter)	Component	NSN
TP1	TP2	OVER 500	R x 1	DIODE D1	
TP2	TP1	15–30		1N1342A	5961-00-054-9138
TP2	TP9	15–25		RELAY	
				71136	5945-00-270-1209
TP9	TP2	30–50	R x 1	DIODE D2	
				1N4820	5961-00-624-4929
TP7	TP10	15–30	R x 1	DIODE D3	
TP10	TP7	300–700		1N3022B	5961-01-038-0809
TP3	TP4	15–30	R x 1	DIODE D3	
TP4	TP3	200–500		1N3022B	5961-01-038-0809
TP5	TP4	15–25			
TP4	TP5	100–200			
TP4	TP6	150–500		TRANSISTOR	
TP6	TP4	15–25	R x 1	Q3	
TP6	TP5	10–25		26316033–20	5961-00-133-0396
TP5	TP6	10–25			
TP6	TP7	300–700			
TP7	TP6	10–25			
TP5	TP7	300–700	R x 1	TRANSISTOR	
TP7	TP5	15–30		Q3	
TP5	TP6	10–25		2N3447	5961-00-899-9899
TP6	TP5	10–25			
TP6	TP7	300–700			
TP7	TP6	10–25			
TP5	TP7	300–700	R x 1	TRANSISTOR	
TP7	TP5	15–30		Q2	
TP5	TP6	10–25		2N3447	5961-00-899-9899
TP6	TP5	10–25			
TP6	TP8	10–25			
TP8	TP6	20–30			
TP8	TP9	4	R x 1	TRANSISTOR	
TP9	TP8	4		Q1	
TP9	TP6	10–25		2N3447	5961-00-899-9899
TP6	TP9	10–25			

Table 3-2. Voltage Checks (Power On)—Model 5027RA

NOTE

ADJUST R15 FULLY CLOCKWISE BEFORE MAKING THESE CHECKS.

Red for TS352 Positive	Black for TS352 Negative	Voltage* (Volts)	Regulator Applied Voltage	Component	NSN
TP1	J1-PIN D	20.0	20.0		
TP2	" "	19.5	"		
TP3	" "	12.0	"		
TP4	" "	BELOW .25	"	DIODE D4	
TP5	" "	0.0	"	1N3022B	5961-01-038-0809
TP6	" "	.8	"		
TP7	" "	.10	"		
TP8	" "	.20	"		
TP9	" "	0.0	"		
TP10	" "	20.0	"		

See footnote at end of table.

Table 3–2. Voltage Checks (Power On—Model 5027RA-continued

Red for TS352 Positive	Black for TS352 Negative	Voltage* (Volts)	Regulator Applied Voltage	Component	NSN
TP1	J1–PIN D	30.0	30.0		
TP2	" "	29.5	"		
TP3	" "	13.0	"		
TP4	" "	.75	"	DIODE D4 1N3022B	5961-01-038-0809
			"		
TP5	" "	0.0	"		
TP6	" "	.15	"		
TP7	" "	30.0	"		
TP8	" "	.25	"		
TP9	" "	0.0	"		
TP10	" "	30.0	"		

*Values may vary ± 5%

Section III. LEECE-NEVILLE MODEL R0015027RB

3-6. General. Figure 3–6 is an exploded view of the regulator, listing the major subassemblies. Figure 3–7 is a plan view of the box and an underside view of the cover, showing the interconnect wiring.

3-7. Checkout and Repair.

a. Diode and Relay (power disconnected).

(1) Place positive probe of ohmmeter to pin F of connector J2 (see fig. 3-7).

(2) Place negative probe to top connection of diode CR2, (see fig. 3–7). Meter should read O ohms.

(3) Place negative probe to TP1. Meter should indicate low resistance.

(4) Reverse probes. Meter should indicate high resistance.

(5) If other readings are obtained, replace diode CR2.

(6) Move negative probe to pin C of connector J1. Meter should read approximately 55 ohms.

(7) If another reading is obtained, replace relay (see fig. 3–7).

b. Power Resistor. Place ohmmeter probes across power resistor R1 (see fig. 3–7). Meter should read approximately 40 ohms.

c. Voltage Adjustment Rheostat.

(1) Remove voltage adjustment access screw from the cover of regulator.

(2) Place ohmmeter probes to terminals of the rheostat (see fig. 3-7).

(3) Rotate rheostat fully clockwise, reading shoud be approximately 45 ohms.

(4) Rotate rheostate fully counterclockwise, reading should be less than 5 ohms.

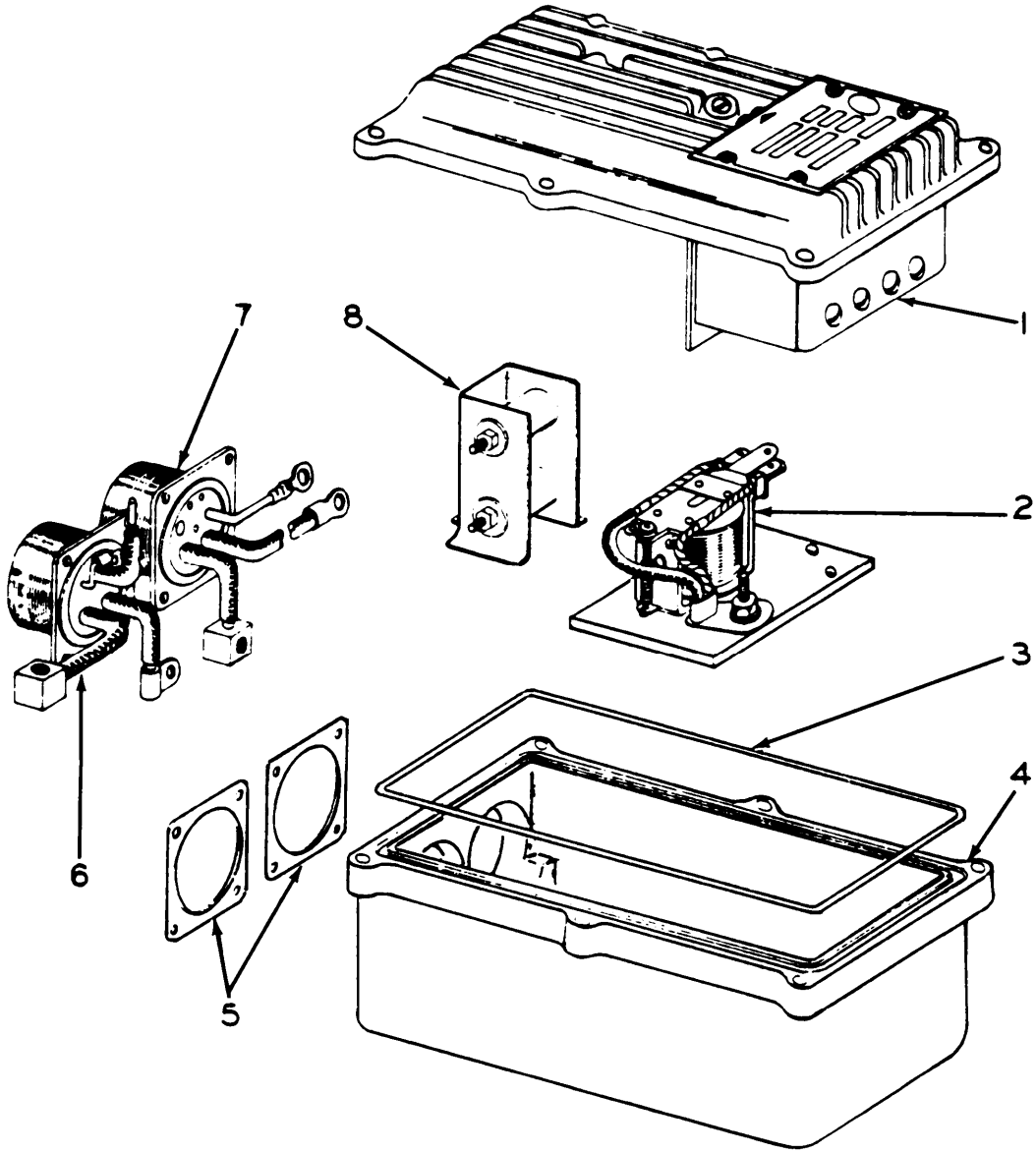
(5) If other readings are obtained, replace the rheostat.

d. Transistor and Circuit Board. If no faulty components were detected after performing tests a, b, and c, replace the cover assembly (see fig. 3-7) .

NOTE

After final repair, check regulator on the test stand.

If the regulator still does not function correctly it will be necessary, if local skills permit, to test each component. All the parts should be checked with an ohmmeter and the capacitors checked with a capacitance meter. The circuit board traces should be checked with an ohmmeter to make sure there are no cracked traces. Traces with hairline cracks will show good at lower temperatures and will tend to show open circuit at higher temperatures. If the board seems good at room temperature, but the regulator still fails, this could be the cause.



Ref. No.	Part No.	Qty	Description
1	71110	1	Cover Assembly, Regulator
2	71111	1	Panel & Element Assembly
3	36010	1	"O" Ring, Regulator Box
4	71106	1	Box & Insert Assembly
5	36071	2	Gasket, Receptacle
6	71107	1	Connector & Lead Assembly
7	71108	1	Connector & Lead Assembly
8	71109	1	Capacitor & Bracket Assembly

TA178511

Figure 3-6. Leece-Neville model 5027RB exploded view.

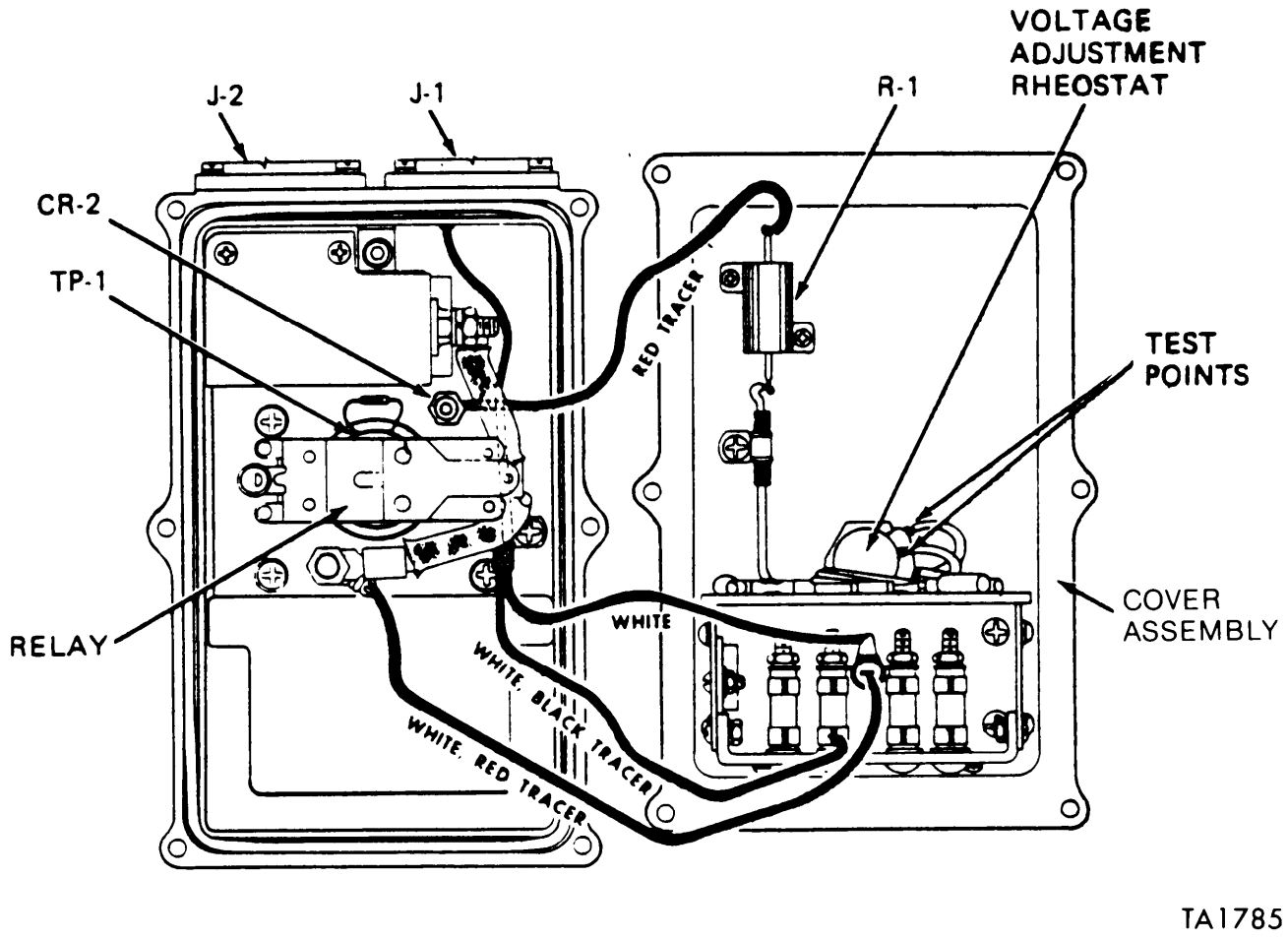


Figure 3-7. 0pen view–model 5027RB.

Section IV. LEECE-NEVILLE MODEL R0015027RC

3-8. General. Figure 3–8 is an exploded view of the regulator, listing the major subassemblies. Figure 3–9 is a plan view of the box subassembly and an underside view of the cover subassembly, showing the interconnect wiring. Figure 3–10 is a plan view of the box and an underside view of the cover showing the components and test points. There are 10 test points. Figure 3–11 is an electrical schematic diagram of the regulator circuit.

3-9. Checkout and Repair.

a. Diode D2 and Relay (see jigs. 3–8 through 3–11) (voltage off).

(1) Place positive probe of ohmmeter to pin F of connector J2 and negative probe on TP1. Meter should read 0 ohms.

(2) Place positive probe on TP1 and negative probe on TP2. Meter should read low ohms (hundreds).

(3) Reverse probes in (2) above. Meter should read high ohms (thousands).

(4) If other readings are obtained in (2) or (3), replace diode D1.

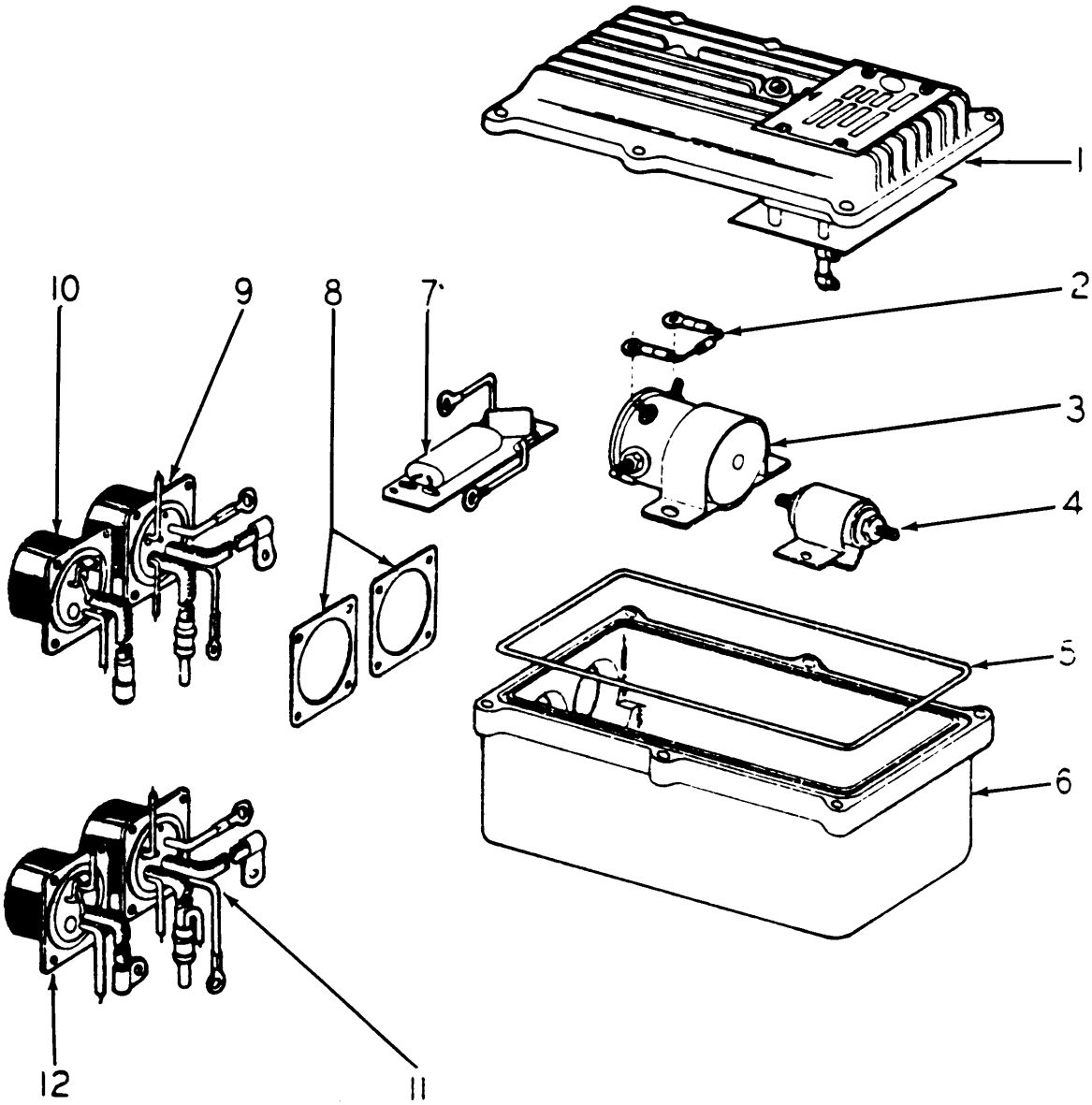
(5) Place positive probe on TP2 and negative probe on pin C of connector J2. Meter should read approximately 55 ohms.

(6) If another reading is obtained, remove and replace both the relay and diode D2.

b. Resistor R1. Place ohmmeter probes across resistor R1 (see figs. 3-9, 3-10, and 3–11), Meter should read approximately 0.4 ohms.

c. Voltage Adjustment Rheostat.

(1) Remove voltage adjustment access screw from cover of regulator.



SERIAL NO. 0 - 25,000			
Ref. No.	Part No.	Qty.	Description
1	71131	1	Cover Assembly, Regulator
2	71137	1	Diode Assembly
3	71136	1	Relay
4	71135	1	Capacitor & Bracket Assembly
5	36010	1	"O" Ring, Regulator Box
6	71132	1	Box & Insert Assembly
8	36071	2	Gasket, Receptacle
9	71133	1	Connector & Lead Assembly
10	71134	1	Connector & Lead Assembly

SERIAL NO. 25,000 - UP			
Ref. No.	Part No.	Qty	Description
1	71131	1	Cover Assembly, Regulator
2	71137	1	Diode Assembly
3	71136	1	Relay
5	36010	1	"O" Ring, Regulator Box
6	71146	1	Box & Insert Assembly
7	71148	1	Panel Assembly
8	36071	2	Gasket, Receptacle
11	71147	1	Connector & Lead Assembly
12	71145	1	Connector & Lead Assembly

TA178513

Figure 3–8. Leece-Neville model 5027RC exploded view.

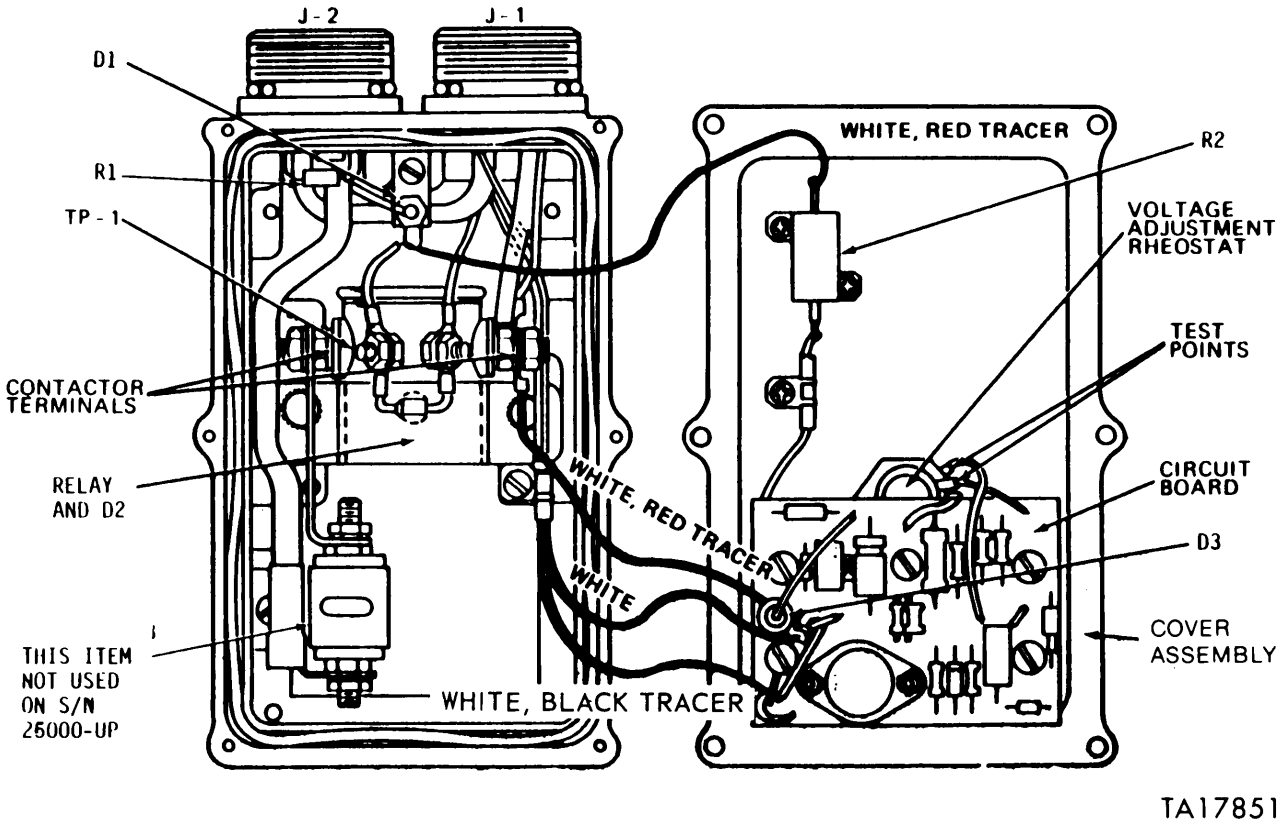


Figure 3-9. Open view-mode 5027 RC.

(2) Place ohmmeter probes to the terminals of the rheostat (see figs. 3-9,3-10, and 3-11).

(3) Rotate rheostat fully clockwise; reading should be approximately 45 ohms.

(4) Rotate rheostat fully counterclockwise, reading should be less than 5 ohms.

(5) If other readings are obtained, replace the rheostat.

d. Power Resistor R2. Place ohmmeter probes across power resistor R2 (see figs. 3-9, 3–10, and 3-11). Meter should read approximately 30 ohms.

e. Detailed Circuit Checks.

(1) Table 3-4 contains "power off" resistance checks of the circuit (see figs. 3–9, 3–10, and 3–11 for test points).

(2) Table 3-4 contains *"power on"* voltage checks of the circuit (see figs. 3-9, 3-10, and 3-11 for test points).

NOTE

Power transistors on the circuit board and heat sink can be checked as outlined on figures 3–1 and 3–2. However, since they are soldered into the circuit, removal and replacement is more time consuming.

f. Functional Check. Check the performance of the regulator on the test stand and make final voltage adjustments. Voltage output should read 28 volts. If the regulator does not function properly, perform the following:

(1) Check wires and connections.

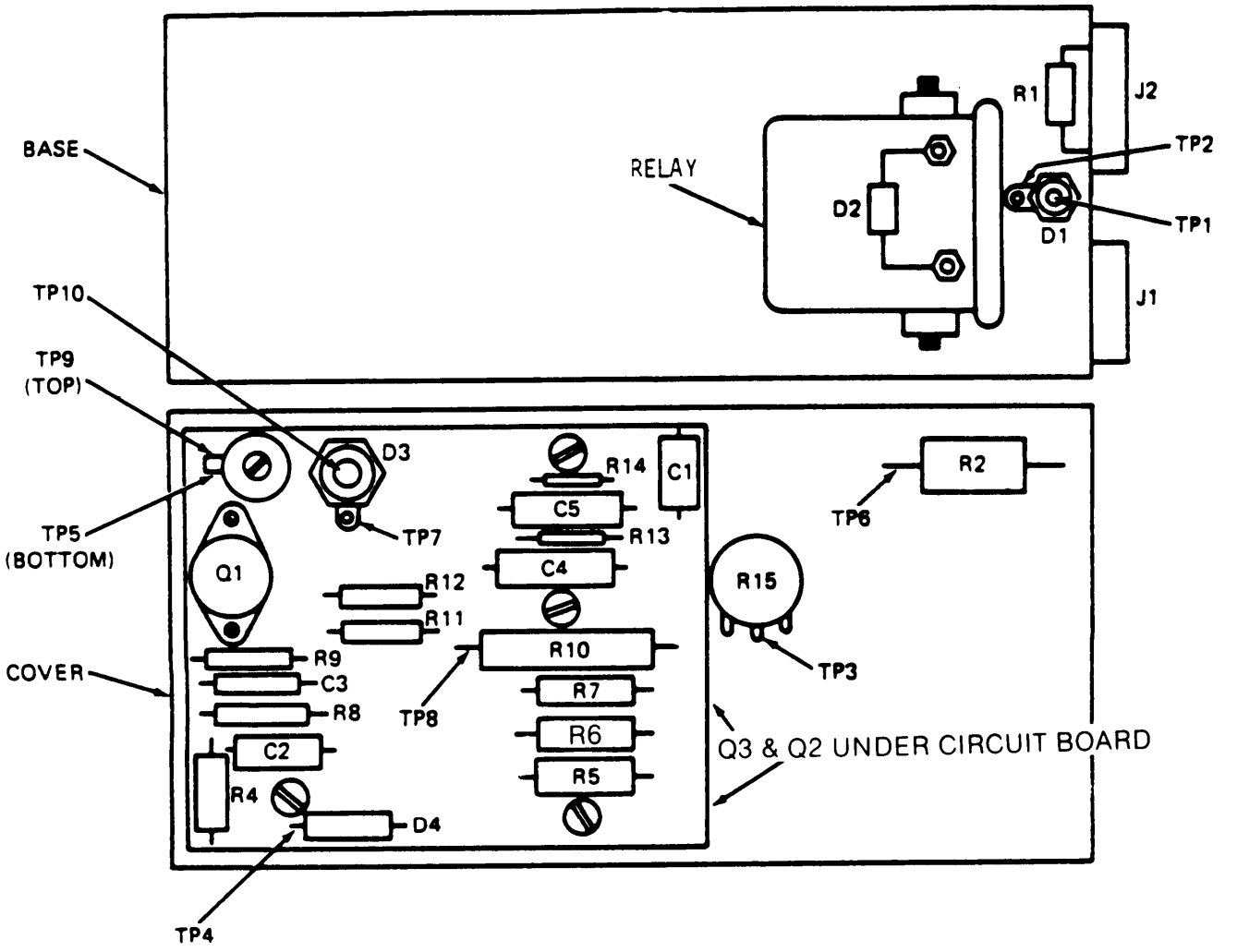
(2) Replace circuit board or cover assembly.

(3) Perform bench test procedures.

NOTE

After final repair, check regulator on the test stand.

If the regulator still does not function correctly it will be necessary, if local skills permit, to test each component. All the parts should be checked with an ohmmeter and the capacitors checked with a capacitance meter. The circuit board traces should rechecked with an ohmmeter to make sure that there are no cracked traces. Traces with hairline cracks will show good at lower temperatures and will tend to show open circuit at higher temperatures. If the board seems good at room temperature, but the regulator still fails, this could be the cause.

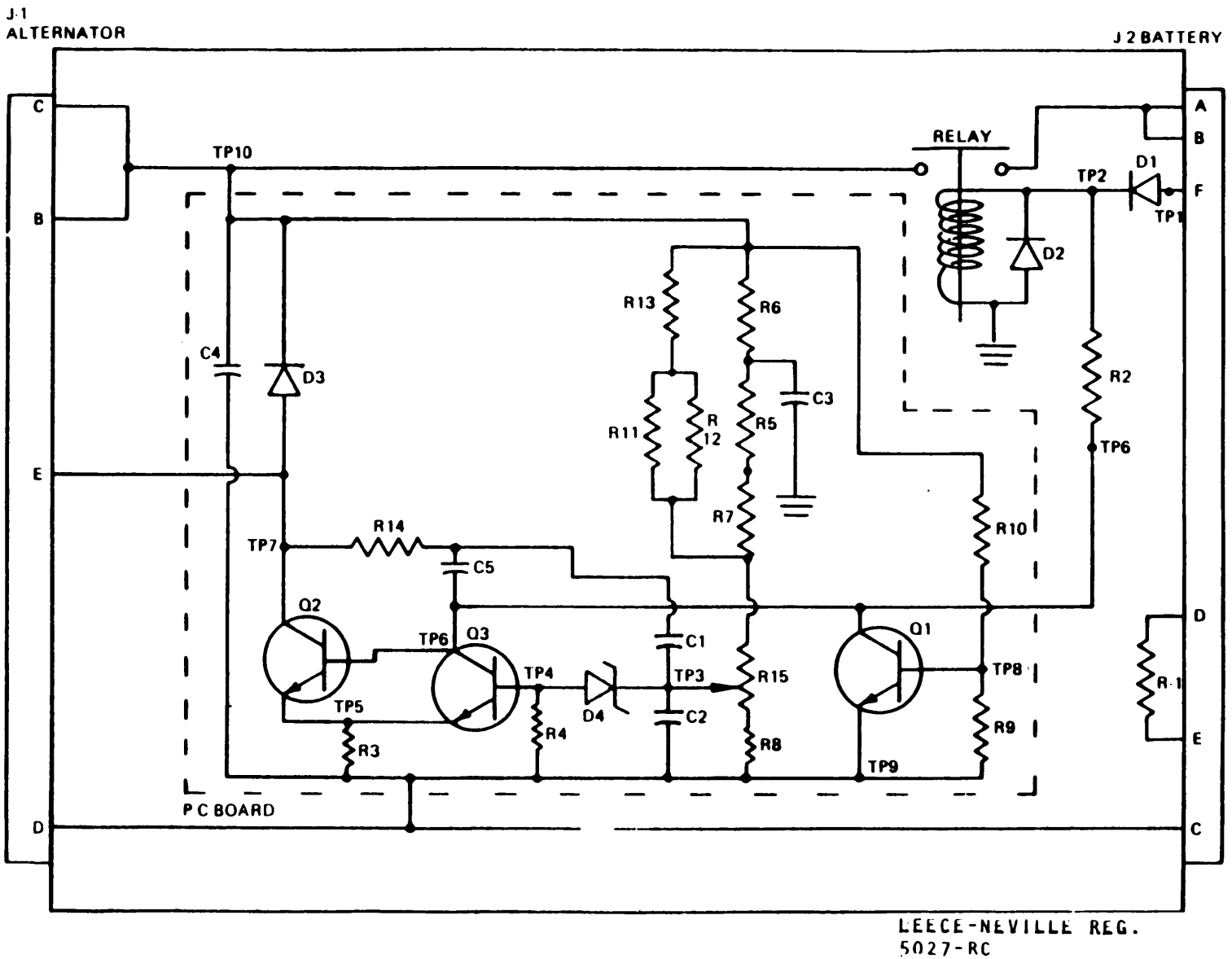


LEGEND

R1	.4 OHMS, 1W		R12	2.5K OHMS, 1/2W
R2	30 OHMS, 8W		R13	820 OHMS, 1/4W
R3	.05 OHMS, 8W	(NOTE: AS TEMPERATURE	R14	100 OHMS, 1/4W
R4	150 OHMS, 1/2W	INCREASES RESISTANCE	R15	500 OHMS, VAR, 2W
R5	50 OHMS, 1/2W	DECREASES.)	C1	.22 MFD, 100 VDC
R6	50 OHMS, 1/2W		C2	47 MFD, 35 VDC
R7	120 OHMS, 1/2W		C3	.22 MFD, 100 VDC
R8	220 OHMS, 1/2W		C4	22 MFD, 100 VDC
R9	4 OHMS, 2W		C5	.47 MFD, 100 VDC
R10	500 OHMS, 3W		TP1	TEST POINT =1
R11	4000-6000 OHMS @ 80°F		thru	thru
			TP10	TEST POINT =10

TA178515

Figure 3-10. Circuit board model 5027RC.



TA178516

Figure 3-11. Schematic diagram—model 5027RC.

Table 3-3. Resistance Checks (Power Off) - Model 5027RC

NOTE

ADJUST R15 FULLY CLOCKWISE BEFORE MAKING THESE CHECKS

Red for TS352 Negative	Black for TS352 Positive	Resistance (OHMS)	Resistance Scale (TS352 Meter)	Component	NSN
TP1	TP2	OVER 500	R x 1	DIODE D1	
TP2	TP1	15–30		1N1342A	5961-00-054-9138
TP2	TP9	15–25	R x 1	RELAY	
				11602713	2920-00-735-9542
				DIODE D2	
TP9	TP2	30–50		1N4820	5961-00-624-4929
TP7	TP10	15–30	R x 1	DIODE D3	
TP10	TP7	300–700		1N3022B	5961-00-038-0809
TP3	TP4	15–30	R x 1	DIODE D3	
TP4	TP3	200–500		1N3022B	5961-00-038-0809
TP5	TP4	15–25			
TP4	TP5	100–200			
TP4	TP6	150–500		TRANSISTOR	
TP6	TP4	15–25	R x 1	Q3	
TP6	TP5	10–25		26316033–20	5961-00-133-0396
TP5	TP6	10–25			
TP6	TP8	10–25			
TP8	TP6	20–30			
TP8	TP9	4		TRANSISTOR	
TP9	TP8	4	R x 1	Q1	
TP9	TP6	10–25		2N3447	5961-00-899-9899
TP6	TP9	10–25			

Table 3-4. Voltage Checks (Power On)—Mode1 5027RC

NOTE

ADJUST R15 FULLY CLOCKWISE BEFORE MAKING THESE CHECKS

Red for TS352 Positive	Black for TS352 Negative	Voltage* (Volts)	Regulator Applied Voltage	Component	NSN
TP1	J1–PIN D	20.0	20.0		
TP2	" "	19.5	"		
TP3	" "	12.0	"		
TP4	" "	BELOW .25	"	DIODE D4	
				1N3022B	5961-01-038-0809
TP5	" "	0.0	"		
TP6	" "	.80	"		
TP7	" "	.10	"		
TP8	" "	.20	"		
TP9	" "	0.0	"		
TP10	" "	20.0	"		
TP1	J1–PIN D	30.0	30.0		
TP2	" "	29.5	"		
TP3	" "	13.0	"		
TP4	" "	.75	"	DIODE D4	
				1N3022B	5961-01-038-0809
TP5	" "	0.0	"		
TP6	" "	.15	"		
TP7	" "	30.0	"		
TP8	" "	.25	"		
TP9	" "	0.0	"		
TP10	" "	30.0	"		

*Values may vary ± 5%

Section V. LEECE-NEVILLE MODEL R0015027RD

3-10. General. Figure 3–12 is a plan view of the regulator with the cover removed, showing the heat sink and the circuit board. The components are indicated by their reference designations, and on the circuit board the terminals are associated wire colors are also indicated. Figure 3–13 is a plan view of the regulator with the cover, heat sink and circuit board removed, showing the relay and remaining components. The components are indicated by their reference designations, and test points 1 through 5 are shown. Figure 3-14 is a plan view of the regulator with the cover removed, showing test points 6 through 18. There are 18 total test points. Figure 3-15 is an electrical schematic diagram of the regulator circuit.

3-11. Checkout and Repair.

a. Relay (see Figs. 3–13 and 3–14) (power disconnected).

(1) Place positive probe of ohmmeter on pin F of connector J2 and negative probe on TP1 (white/yellow wire). Meter should read low ohms (hundreds).

(2) Reverse probes. Meter should read high ohms (thousands).

(3) If other readings are obtained, see detailed circuit check below.

(4) Place ohmmeter positive probe on TP2 and negative probe on TP1. Meter should read approximately 50 ohms.

(5) Reverse probes. Meter should read low ohms (more than 10 and less than 100).

(6) If other readings are obtained, disconnect the WHT/YLW wire on TP1 and repeat (4) and (5) looking for a meter reading of 40 to 60 ohms in each case. If other readings are obtained replace the relay, NSN 5945–00-409-3883. Replace the WHT/YLW wire on TP1.

(7) Place ohmmeter probes on TP3 and TP4. Meter should read infinity (open circuit). If other readings are obtained replace the relay, NSN 5945-00-409-3883.

(8) Place positive ohmmeter probe on TP17 and negative probe on TP8. The reading should be greater than 10 ohms and less than 100 ohms; if not replace Ql, NSN 5961–00–730–3284.

(9) Place positive ohmmeter probe on TP12 and negative probe on TP13. Rotate the potentiometer. Full counterclockwise should be 0 ohms, gradually increasing to 100 ohms at full clockwide. If not, replace the potentiometer. The potentiometer is a 100 ohm, 2 watt, tab-mounted device. Failed devices have been successfully replaced with part number 71590–WT-100 by performing some minor mechanical modification.

Globe-Union Inc. FSCM 71590
Centralab Electronics Div.
Hwy. 20 W. P.O. Box 858
Fort Dodge, IA 50501

(10) Place positive ohmmeter probe on TP15 and negative probe on TP16. The reading should be greater than 10 ohms and less than 100 ohms; if not, replace D3.

b. Resistor R10.

(1) Place ohmmeter probes on pins D and E of connector J2. Meter should read approximately 0.4 ohms.

(2) If other readings are obtained, replace resistor.

c. Resistor R9.

(1) Place ohmmeter probes on TP5 and pin C of connector J2. Meter should read 0 ohms plus (resistor is actually rated at 0.05 ohms).

(2) If other readings are obtained, check the wiring from the bottom terminal of the resistor to pin C on connector J2. If the wire continuity is good, replace the resistor.

d. Detailed Circuit Checks. Table 3–5 contains "power off" resistance checks of the circuit (see figs. 3–12, 3-14 and 3-15 for test points).

e. Functional Check. Check the performance of the regulator on the test stand and make final voltage adjustments. Voltage output should read 28 volts. If the regulator does not function properly, perform the following:

(1) Check wires and connections.
(2) Replace cover assembly.
(3) Perform bench test procedures.

NOTE

After final repair, check regulator on the test stand.

If the regulator still noes not function correctly it will be necessary, if local skills permit, to test each component. All the parts should be checked with an ohmmeter and the capacitors checked with a capacitance meter. The circuit board traces should be checked with an ohmmeter to ensure that there are no cracked traces. Traces with hairline cracks will show as good at lower temperatures and will tend to show open circuit at higher temperatures. If the board seems good at room temperature, but the regulator still fails, this could be the cause.

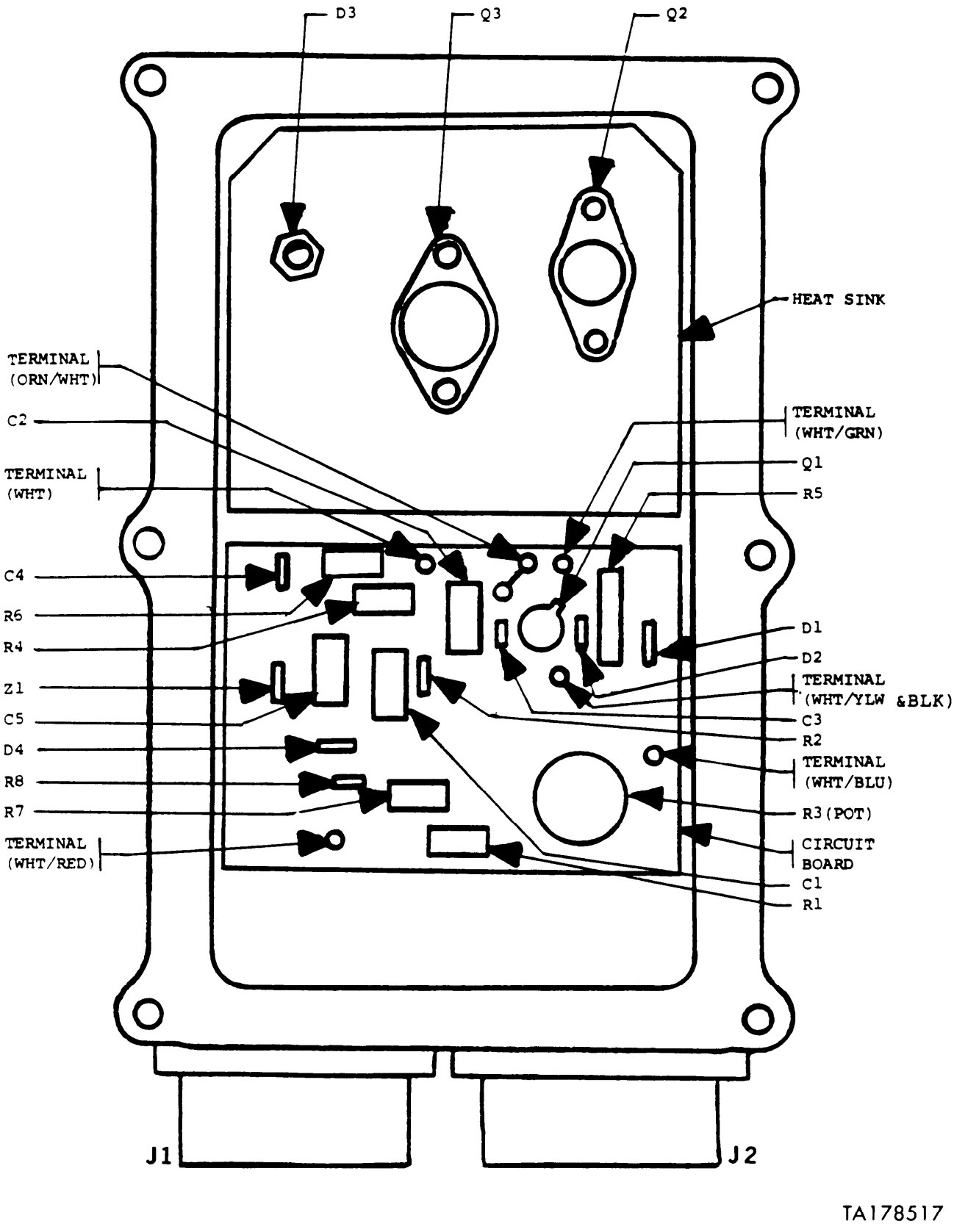


Figure 3-12. Leece-Neville-model 5027RD.

Table 3-5. Resistance Checks (Power Off) - Model 5027RD

NOTE

ADJUST R3 FULLY COUNTERCLOCKWISE BEFORE MAKING THESE CHECKS

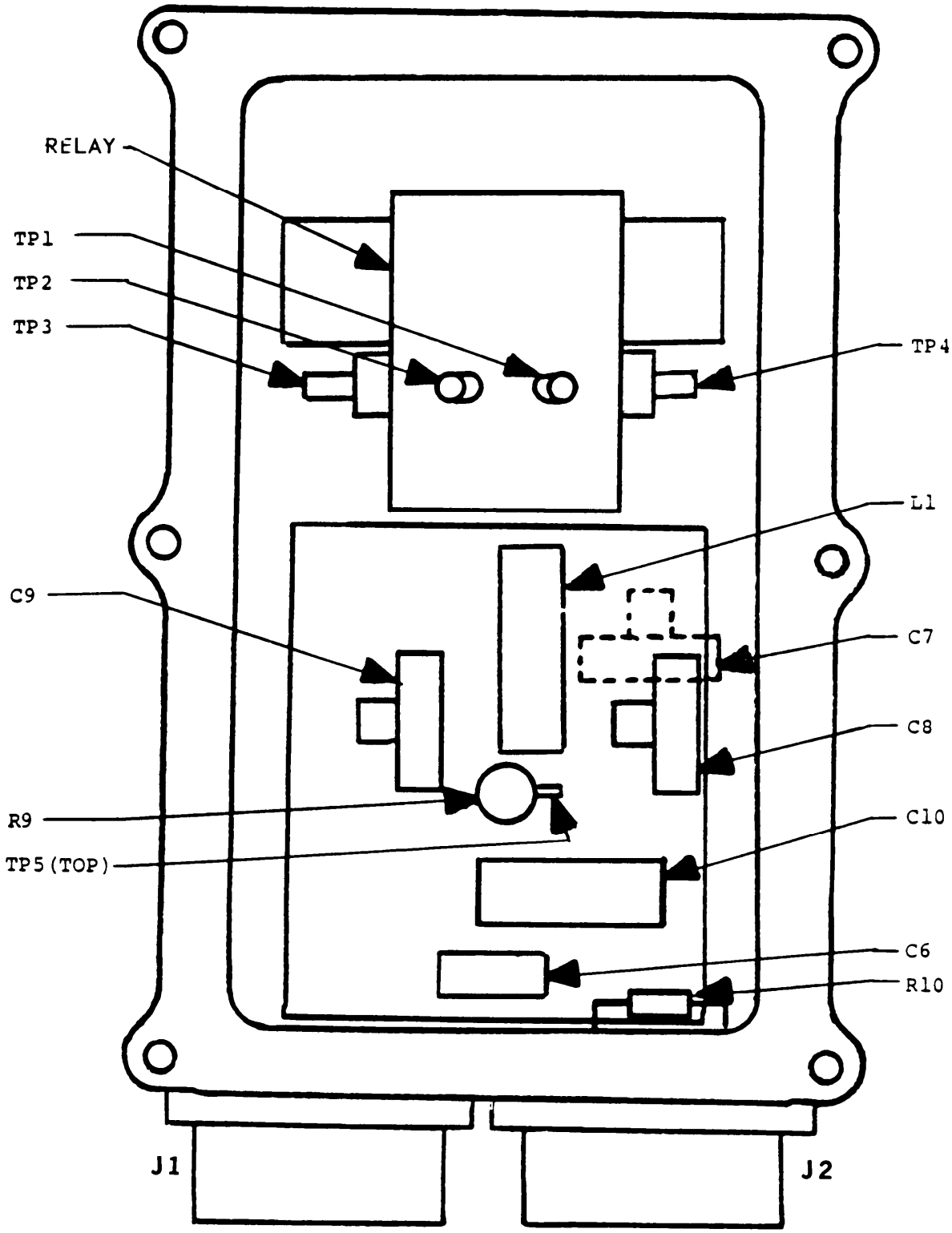
Red for TS352 Negative	Black for TS352 Positive	Resistance (OHMS)	Resistance Scale	Component	NSN
TP10 TP11	TP11 TP10	OVER 500 UNDER 100	R x 1	DIODE D1 MR 502	5961-00-577-0771
TP10 J2-C	J2-C TP10	APPROX. 50 APPROX. 50	R x 1	DIODE D2 1N4004 and RELAY COIL	5961-00-914-6005
J1-C J1-E	J1-E J1-C	OVER 500 UNDER 100	R x 1	DIODE D3 MR1122R	5961-00-103-1519
TP6 TP7	TP7 TP6	OVER 500 UNDER 100	R x 1	DIODE D4 1N4004	5961-00-914-6005
TP9 TP8	TP8 TP9	OVER 500 UNDER 100		DIODE Z1 1N746	(See table 3-6 for substitutes)

Table 3-6. Substitutes for Diode Z1-Model 5027RD

P/N	NSN
1N746A	5961-00-018-8383 5961-00-847-5246

LEGEND TO FIGURE 3-12

C1 22 Micro Farad 35 Volt
C2 22 Micro Farad 15C Volt
C3 .047 Micro Farad
C4 .047 Micro Farad
C5 22 Micro Farad 150 Volt
D1 MR502 Diode, 3A 200 Volt NSN 5691-00-577-0771
D2 1N4004 Diode
NSN 5961-00-914-6005
D4 1N4004 Diode
R1 250 ohm, ½ Watt
R2 250 ohm, ½ Watt
R3 100 ohm Potentiometer, 2 Watt
R4 410 ohm, ½ Watt
R5 500 ohm, 3 Watt
R6 5.1 Kohm, ½ Watt
R7 1.8 Kohm, ½ Watt
R8 Thermistor
Z1 1N746 Zener Diode 3.3 Volts VZ
Q1 2N2405 NSN 5961-00-730-3284



C6 .47 Micro Farad 200 Volt
C7 .47 Micro Farad 150 Volt
C8 .47 Micro Farad 150 Volt
C9 .47 Micro Farad 150 Volt
C10 4 Micro Farad 200 Volt
R9 .05 ohm, 8 Watt
R10 .4 ohms, 1 Watt

Figure 3-13. Circuit board removed-model 5027RD.

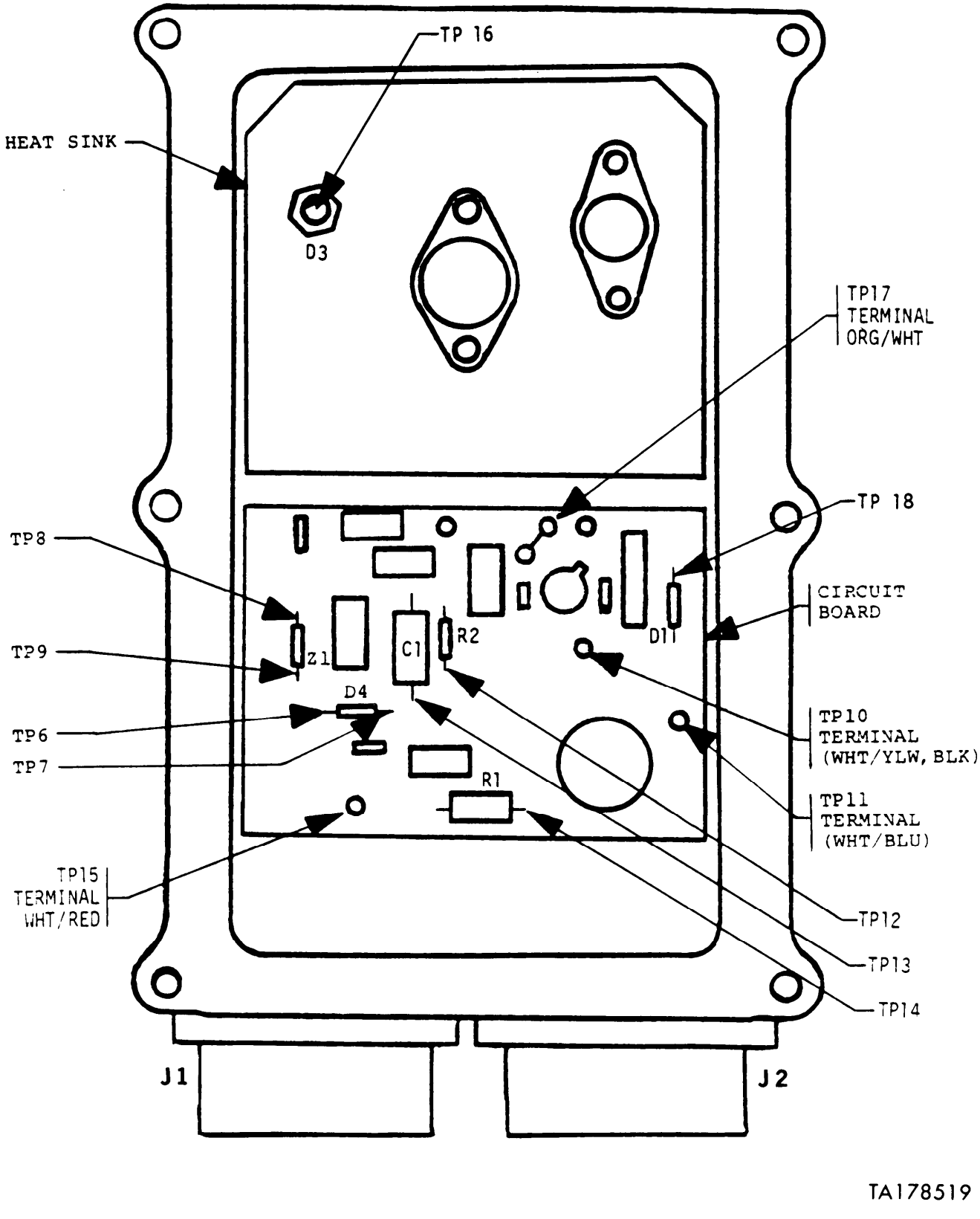
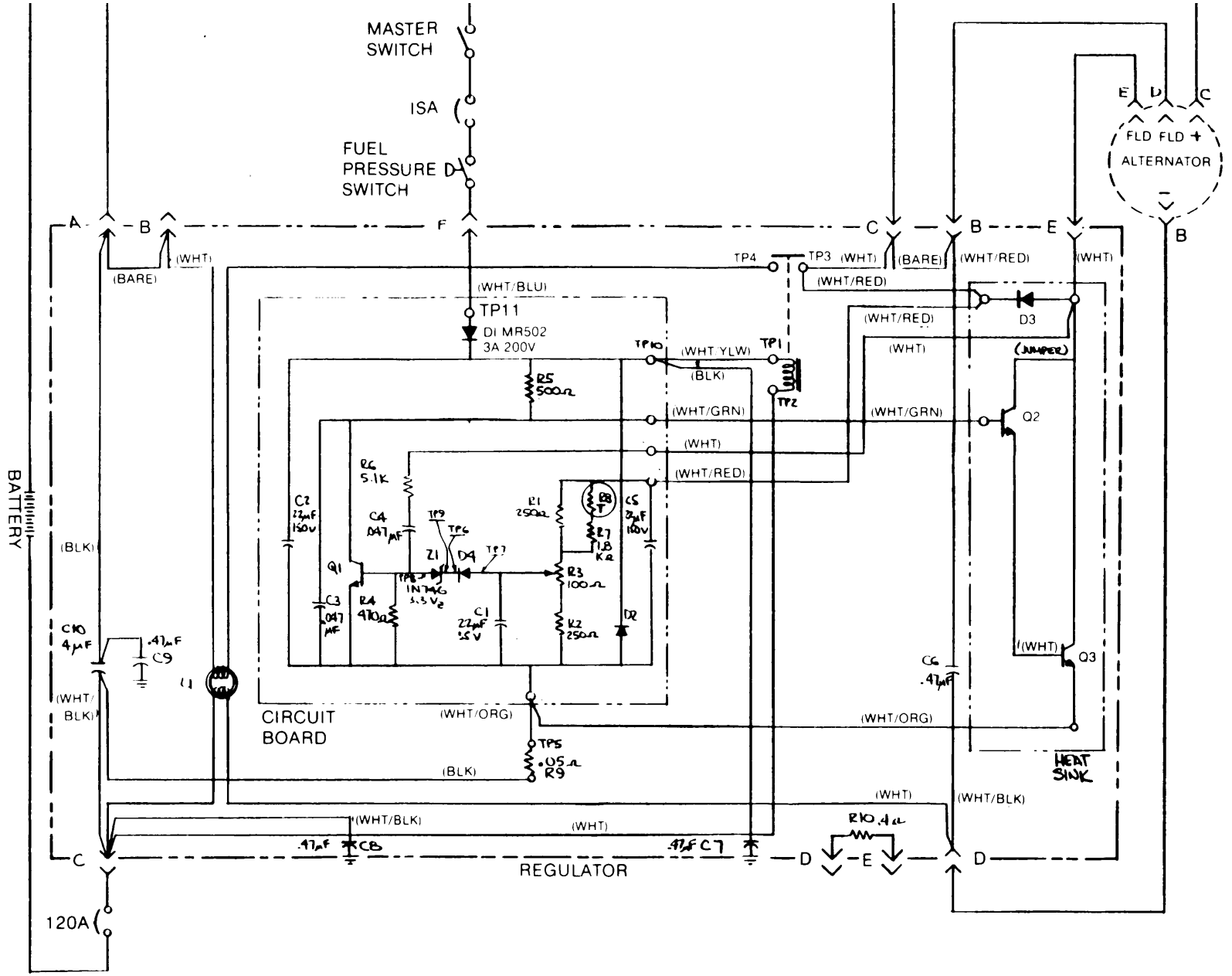


Figure 3-14. Test points-model 5027RD.



TA178520

Figure 3–15. Schematic diagram—model 5027RD.

CHAPTER 4
LELAND AIRBORNE MODEL

4-1. Introduction. One model was produced by Leland Airborn Products Division of American Machine and Foundry Co. The manufacturer's name is now:

CODE IDENT 07639 (FSCM)
Leland Electrosystems Inc.
740 E. National Road
P.O. Box 128
Vandalia, OH 45377

TELEPHONE AC 513898-5881

The manufacturer is also now known as AMF Electrosystems Division at the same address. The manufacturer's part number for this model is CSV 2183-1.

4-2. General Inspection.

a. Regulator Box Assembly (external). Check for missing or stripped cover, connector and mount retainer screws and voltage adjustment access plug. Check connectors for signs of arcing, bent or pushed in pins, broken connectors and thread damage. Correct deficiencies by utilization of serviceable components from unrepairables or requisitioning components from the manufacturer. The pin receptacle (J2) is part number 19207–7064429 or MS3102A28–22P per MIL-C-5015. The socket receptacle (Jl) is part number 19207-7064706, for which there is no equivalent NSN number.

As assembly is available from Bendix.

CODE IDENT 77820 (FSCM)
Bendix Corp. The Electrical Components Div.
Sherman Avenue
Sidney, NY 13838

It should be ordered as part number 60–42228–10S, it is possible that extensive damage has been done and the regulator cannot be easily repaired. Components should be performance tested and retained if acceptable. Check for disconnected or burnt wires, missing components and replace/repair as necessary. Carefully remove the transistor mounting plate noting the position of the screws, washers and rubber insulators. Visually inspect the circuit board for burnt components. Replace the circuit board through cannibalization if burnt components are found. Carefully reinstall the transistor mounting plate.

c. Regulator Verification Check. After performing the regulator appears to be in good condition, check its performance on a test stand.

If the regulator fails this check, proceed to paragraph 4–3.

4-3. Bench Testing.

a. General. Figures 4-1 and 4-2 show the method for testing NPN transistors. Figure 4-3 shows a plan view of the circuit board assembly, the regulator with the cover and circuit board removed, and an electrical schematic diagram of the regulator.

b. Diode and Relay.

(1) Remove six screws and place the circuit board to one side.

(2) Place positive probe of ohmmeter to pin F of connector J2, (see fig. 4-3).

(3) Place negative probe to TP1. Meter should indicate low resistance.

(4) Reverse probes. Meter should indicate high resistance.

(5) If other readings are obtained, replace diode CR6, (see fig. 4-3).

(6) Move negative probe to TP2. Meter should read approximately 250 ohms.

(7) If another reading is obtained, replace the relay, (see fig. 4–3).

c. Field Discharge Diode.

(1) Place positive probe of ohmmeter to pin E of connector J1 (see fig. 4-3).

(2) Place negative probe to pin B of J1. Meter should indicate low resistance.

(3) Reverse the probes. Meter should indicate high resistance.

(4) If other readings are obtained, replace diode CR7.

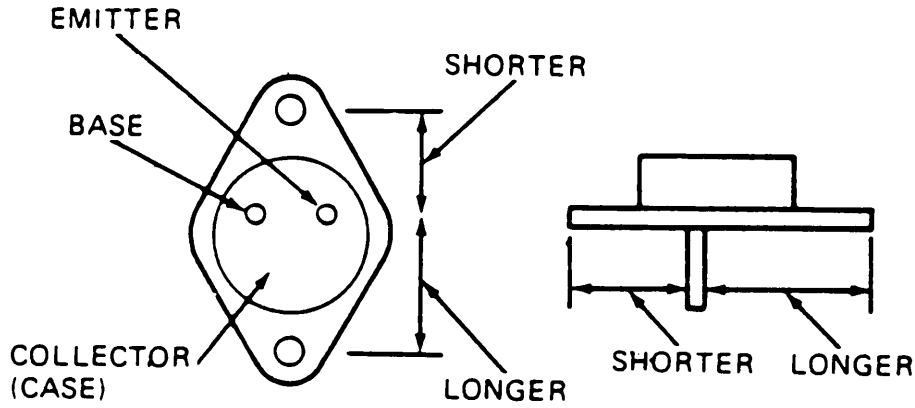


Figure 4-1. NPN transistor (Leland Airborne model).

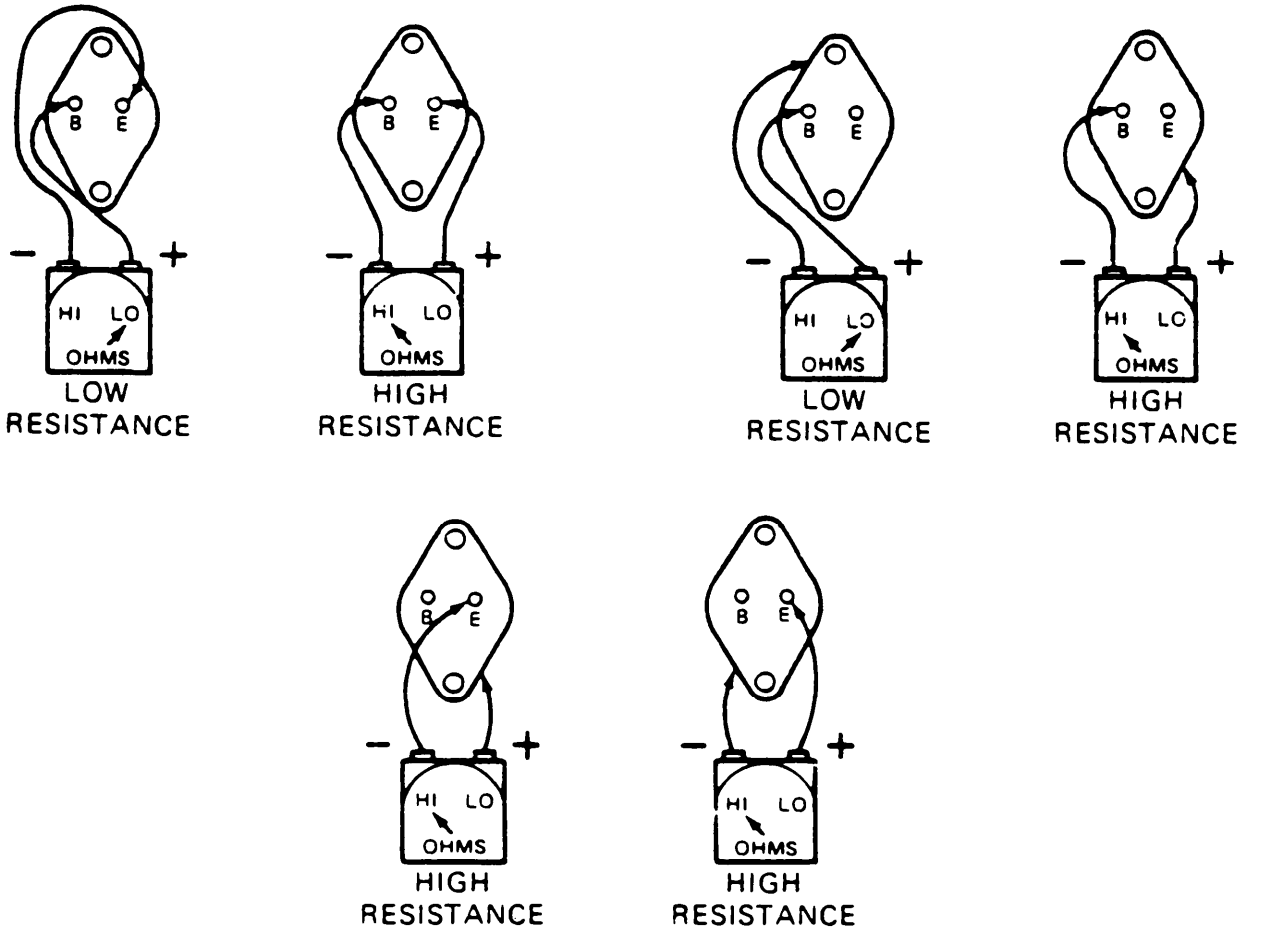


Figure 4-2. Transistor resistance checks (Leland Airborne model).

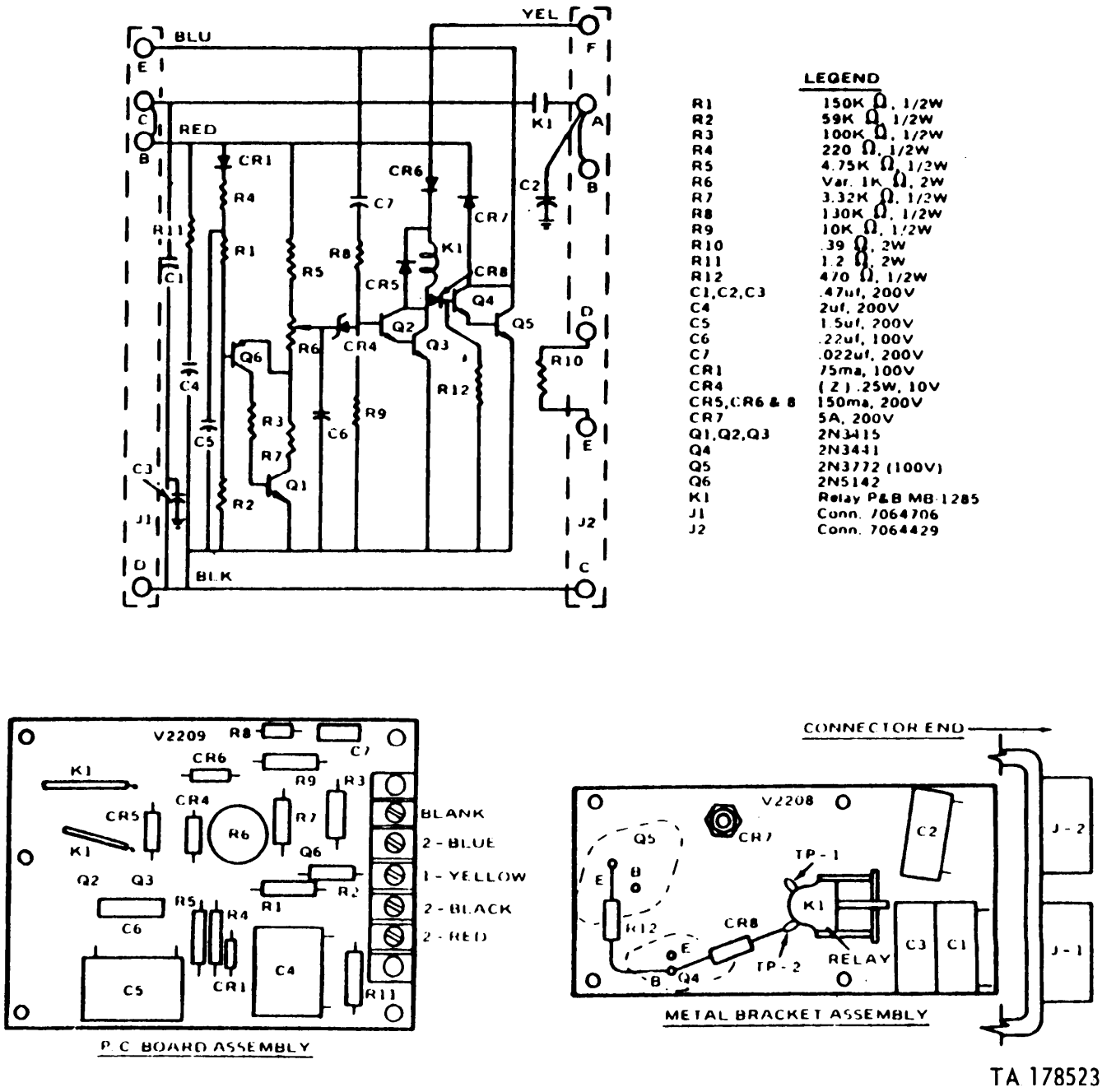


Figure 4-3. Schematic diagram, circuit board, and bracket assy (Leland Airborne model).

d. Transistors.

NOTE

Transistors Q4 and Q5 can be checked fairly accurately without removing them from the circuit.

(1) Check transistors Q4 and Q5, (see fig. 4-3), inaccordance with figures 4-l and 4-2.

NOTE

Due to the connection of Q4 in the circuit, omit the emitter to collector check in figure 4-2.

(2) If other readings are obtained, replace transistors Q4 and Q5.

e. Circuit Board. If no faulty components were detected after performing tests a, b, and c, replace the circuit board.

f. Functional Check. Check the performance of the regulator on the test stand and make final voltage adjustments. Voltage output should read 28 volts. If the regulator does not function properly, perform the following:

(1) Check wires and connections.
(2) Replace circuit board.
(3) Perform bench test procedures.

NOTE

After final repair, check regulator on the test stand.

If the regulator still does not function correctly it will be necessary, if local skills permit, to test each component. All the parts should be checked with an ohmmeter and the capacitors checked with a capacitance meter. The circuit board traces should be checked with an ohmmeter to ensure that there are no cracked traces. Traces with hairline cracks will show good at lower temperatures and will tend to show open circuit at higher temperatures. If the board seems good at room temperature, but the regulator still fails, this could be the cause.

Table 4-1. Replacement Parts List-Leland Airborne Model

REPLACEMENT PARTS LIST		
Ref	**P/N**	**NSN**
CR1, CR5, CR6, CR8	1N4004	5961-00-914-6005
CR4	1N4697	5961-00-247-3046
CR7	1N1614R 1N1616R	5961-00-069-6767 or 5961-00-926-0208
Q1, Q2, Q3	2N3415	5961-00-931-8231
Q4	2N3441	5961-00-054-4141
Q5	2N3772	5961-00-438-2156 5961-00-854-6759 or 5961-00-864-7527
Q6	2N5142	5961-00-483-4396

CHAPTER 5
100 AMP REGULATOR CHECKER

5-1. Purpose. This checker is intended to provide quick bench tests to determine the general condition f the regulator. The checker is not intended to replace the authorized test stands which are necessary to determine the accurate operating condition of the regulator.

5-2. Construction. The regulator checker can be locally fabricated using salvaged components. The mini-ammeter is an optional feature and most any meter can be used, provided it is shunted to give midscale reading.

5-3. Power Supply. The regulator checker is used in conjunction with a variableexternal power supply having the following characteristics:

a. Voltage range 0-32 volts DC minimum.

b. Current range must be at least 2 AMPS.

c. The output power must be well filtered.

NOTE

The 500 AMP test stands, external power supply is adequate if additional filtering is added.

5-4. Operation.

a. Connect the checker to the regulator to be tested.

b. Connect power supply to the checker.

CAUTION

Be sure proper polarity is maintained.

c. Advance the power supply voltage control and note the voltage when the regulator relay is closed and the main circuit light comes on. This is the relay closing voltage.

d. Advance the voltage to 20 volts. The field indicator light should come on if the regulator switching transistors are functioning.

e. Advance the voltage until the field light turns off (maximum of 32 volts). The light should shut off if the regulating and switching transistors are functioning correctly.

f. Adjust the power supply voltage to *28* volts, adjust the regulator voltage adjusting rheostat until the field indicator light turns off.

g. If the regulator fails these checks, perform bench tests and repairs.

h. If the regulator passes these checks, perform final tests on the authorized test stand.

5-5. Mini-Ammeter Operation. If the regulator checker is equipped with the optional meter, the following additional data can be obtained.

a. Note the average regulator current draw from several regulators which are known to be in good operating condition.

b. While performing the above, check if the meter reading is higher than normal, check for shorted components and circuit. If the reading is lower than normal, check for open circuits and components.

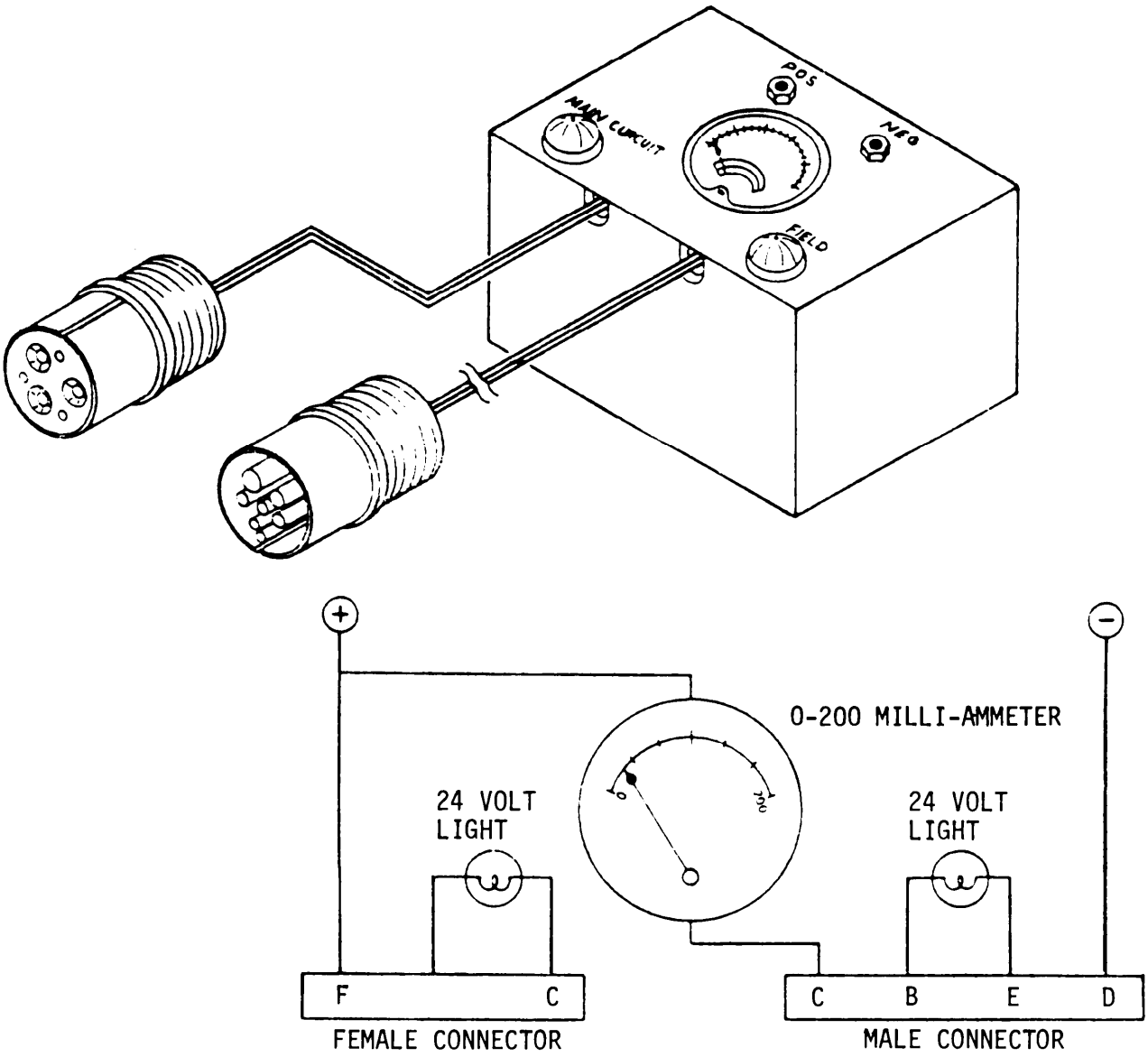


Figure 5–1. 100 AMP solid state regulator checker.

APPENDIX A

CONSOLIDATED NATIONAL STOCK NUMBERS (NSN) AND FEDERAL SUPPLY CODES FOR MANUFACTURERS (FSCM)

National numbers listed in this appendix are in National Item Identification Number Sequence (NIIN).

NSN	P/N	FSCM
5961-00-018-8383	1N746A	15818
5961-00-054-4141	2N3441	81349
5961-00-054-9138	1N1342A	05277
5961-00-068-2001	1N756A	01281
5961-00-069-6767	1N1614R	08225
5961-00-078-0628	1N938A	04713
5961-00-103-1519	MR1122	04713
5961-00-105-5734	JANTX 1N756A	81349
5961-00-133-0396	26316033-20	99167
5961-00-215-5999	2N5039	02735
5961-00-223-2230	MR1122R	04713
5961-00-226-5134	JAN 1N937B	81349
5961-00-247-3046	1N4697	01281
5961-00-255-9986	2N6258	02735
5961-00-262-0729	2N5039	81349
5945-00-270-1209	71136	35510
5961-00-327-8280	2N3773	54590
5961-00-359-5752	JANTX 2N5038	81349
5961-00-400-1992	1N959A	01281
5061-00-403-2566	JAN 2N3772	81349
5945-00-409-3883	EK212	31211
5961-00-431-7863	JAN 2N3771	81349
5961-00-438-2156	2N3772	02735
5961-00-450-0922	1N4721	04713
5961-00-462-3077	8106497-1	31550
5961-00-481-4205	2N5671	01281
5961-00-483-4396	2N5142	27014
5961-00-484-5035	JANTX 1N937B	81349
5961-00-484-5036	JANTX 1N938B	81349
5961-00-523-9171	2N5679	94990
5961-00-577-0771	MR502	04713
5905-00-581-1405	669-0150	02032
5961-00-620-9770	1N938	04713
5961-00-624-4929	1N4820	01295
5961-00-730-3284	2N2405	01281
2920-00-735-9542	11602713	19207
5916-00-758-5816	JANTX 2N3371	81349
5961-00-760-1302	JANTX 2N3772	81349
5961-00-761-4631	1N5402	05277
5961-00-811-3752	1N936	85005
5961-00-833-9050	1N2482	12045
5961-00-845-6458	1N756A	81349
5961-00-847-5246	1N746A	25228
5961-00-852-5174	JAN 1N939B	81349
5961-00-854-6759	2N3772	21929
5961-00-858-8960	JAN 2N5038	81349
5961-00-864-7527	2N3772	54590
8040-00-877-9872	MIL-A-64106	91349
5961-00-879-7145	1N936B	12954
5961-00-880-4783	1N4002	04713
6850-00-880-7616	MIL-S-8660	81349
5961-00-892-0889	JAN 1N938B	81349
5961-00-892-3195	1N936A	04713
5961-00-899-9899	2N3447	04713
5961-00-912-9008	2N3638A	12040
5961-00-914-6005	1N4004	04713
5961-99-926-0208	1N1616R	81349
5961-00-929-4975	1N4721	14028
5961-00-929-5014	2N3773	04713
5961-00-931-8231	2N3415	08257
5961-00-935-6479	2N5038	13715
5961-00-938-7649	1N4141	06288
5961-00-951-8757	2N2222A	81349
5961-01-003-0584	2N6579	04713
5961-01-017-0990	JANTX 2N5672	81349
5961-01-019-6400	JAN 2N5671	81349
5961-01-033-0822	JANTX 2N5039	81349
5961-01-038-0809	1N3022B	04713

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THE METRIC SYSTEM AND EQUIVALENTS

NEAR MEASURE

. Centimeter = 10 Millimeters = 0.01 Meters = 0.3937 Inches
1 Meter = 100 Centimeters = 1000 Millimeters = 39.37 Inches
1 Kilometer = 1000 Meters = 0.621 Miles

WEIGHTS

Gram = 0.001 Kilograms = 1000 Milligrams = 0.035 Ounces
1 Kilogram = 1000 Grams = 2.2 lb.
1 Metric Ton = 1000 Kilograms = 1 Megagram = 1.1 Short Tons

LIQUID MEASURE

1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces
1 Liter = 1000 Milliliters = 33.82 Fluid Ounces

SQUARE MEASURE

1 Sq. Centimeter = 100 Sq. Millimeters = 0.155 Sq. Inches
1 Sq. Meter = 10,000 Sq. Centimeters = 10.76 Sq. Feet
1 Sq. Kilometer = 1,000,000 Sq. Meters = 0.386 Sq. Miles

CUBIC MEASURE

1 Cu. Centimeter = 1000 Cu. Millimeters = 0.06 Cu. Inches
1 Cu. Meter = 1,000,000 Cu. Centimeters = 35.31 Cu. Feet

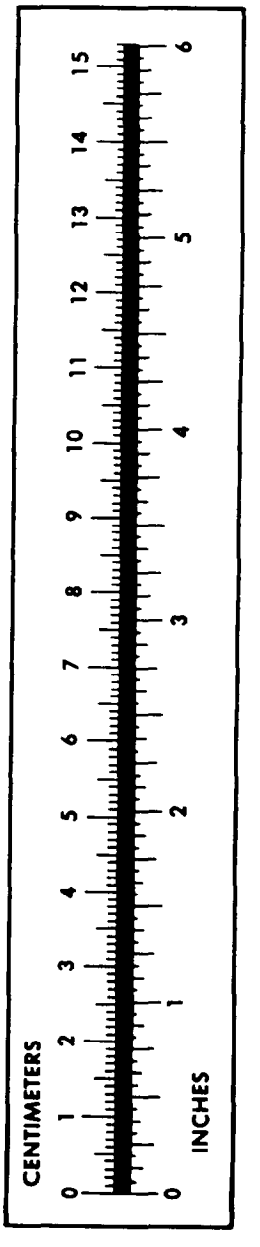
TEMPERATURE

5/9(°F - 32) = °C
212° Fahrenheit is evuivalent to 100° Celsius
90° Fahrenheit is equivalent to 32.2° Celsius
32° Fahrenheit is equivalent to 0° Celsius
9/5C° + 32 =°F

APPROXIMATE CONVERSION FACTORS

TO CHANGE	TO	MULTIPLY BY
Inches	Centimeters	2.540
Feet	Meters	0.305
Yards	Meters	0.914
Miles	Kilometers	1.609
Square Inches	Square Centimeters	6.451
Square Feet	Square Meters	0.093
Square Yards	Square Meters	0.836
Square Miles	Square Kilometers	2.590
Acres	Square Hectometers	0.405
Cubic Feet	Cubic Meters	0.028
Cubic Yards	Cubic Meters	0.765
Fluid Ounces	Milliliters	29.573
ıts	Liters	0.473
arts	Liters	0.946
allons	Liters	3.785
Ounces	Grams	28.349
Pounds	Kilograms	0.454
Short Tons	Metric Tons	0.907
Pound-Feet	Newton-Meters	1.356
Pounds per Square Inch	Kilopascals	6.895
Miles per Gallon	Kilometers per Liter	0.425
Miles per Hour	Kilometers per Hour	1.609

TO CHANGE	TO	MULTIPLY BY
Centimeters	Inches	0.394
Meters	Feet	3.280
Meters	Yards	1.094
Kilometers	Miles	0.621
Square Centimeters	Square Inches	0.155
Square Meters	Square Feet	10.764
Square Meters	Square Yards	1.196
Square Kilometers	Square Miles	0.386
Square Hectometers	Acres	2.471
Cubic Meters	Cubic Feet	35.315
Cubic Meters	Cubic Yards	1.308
Milliliters	Fluid Ounces	0.034
Liters	Pints	2.113
Liters	Quarts	1.057
ers	Gallons	0.264
ms	Ounces	0.035
ograms	Pounds	2.205
Metric Tons	Short Tons	1.102
Newton-Meters	Pounds-Feet	0.738
Kilopascals	Pounds per Square Inch	0.145
lometers per Liter	Miles per Gallon	2.354
meters per Hour	Miles per Hour	0.621



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