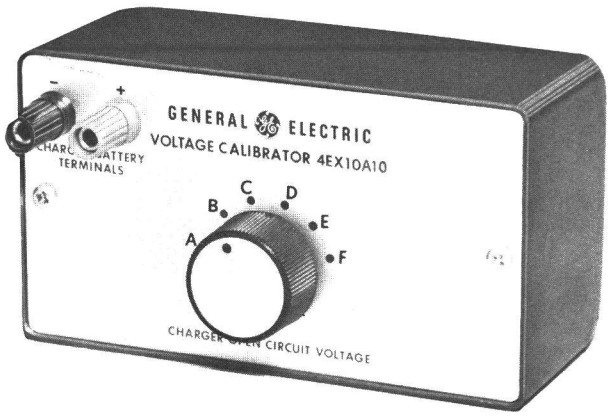
MOBILE RADIO

MAINTENANCE MANUAL

VOLTAGE CALIBRATOR MODEL 4EX10A10
(OPTION 4383)



SPECIFICATIONS *

Used With	Personal Series Battery Chargers
Operating Current Range	7 to 300 milliamperes
Voltage Co-efficient	0.3 millivolt per milliampere
Voltage Accuracy at Specified Current	±0.01 volt
Voltages Provided	
Position A	4.18 volts @ 8 milliamperes
B	8.35 volts @ 200 milliamperes
C	8.45 volts @ 200 milliamperes
D	8.78 volts @ 70 milliamperes
E	8.88 volts @ 70 milliamperes
F	16.8 volts @ 8 milliamperes

EX-10-A

*These specifications are intended primarily for the use of the serviceman. Refer to the appropriate Specification Sheet for the complete specifications.

GENERAL ELECTRIC

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WARNING

No one should be permitted to handle any portion of the equipment that is supplied with high voltage; or to connect any external apparatus to the units while the units are supplied with power. KEEP AWAY FROM LIVE CIRCUITS.

DESCRIPTION

General Electric Voltage Calibrator Model 4EX10A10 provides highly accurate voltages for setting the switching voltage on Personal Series battery chargers.

The calibrator is a precision shunt regulator with a six-position switch for selecting the different voltages. Operating power for the calibrator is supplied by the battery charger being serviced.

The procedure for setting the charger sensing circuits for the proper switching voltage is contained in the applicable charger Maintenance Manual.

CIRCUIT ANALYSIS

The shunt regulator circuitry in the voltage calibrator consists basically of a differential amplifier (Q3 and Q4), and DC amplifiers Q1 and Q2. The proper calibrated switching voltage for each charger is selected by a double-pole, six position switch (S1001).

Functionally, the calibrator appears to the battery charger as a zener diode with six selectable break-down voltages.

Connecting a battery charger to jacks J1001 and J1002 applies power to the calibrator. The voltage across J1001 and J1002 is applied through a voltage divider to the base of Q3. The proper voltage divider network is selected by S1001. Resistors R10, R11 and R12 are also selected by S1001 to keep the current applied to VR2 at the proper level.

When the voltage at the base of Q3 approaches the voltage at the base of Q4 (2.3 volts), Q3 just starts to conduct, turning on DC amplifiers Q2 and Q1. When conducting, Q2 and Q1 will draw only enough current to lower the voltage across J1001 and J1002 to a level that barely allows Q2 to continue conducting. This assures the proper voltage at J1001 and J1002 for setting the battery charger switching circuits.

ADJUSTMENT PROCEDURE

If any of the potentiometers or resistors in the voltage divider networks (R13 through R23) are replaced, it will be necessary to re-adjust the potentiometer in the applicable network. If R6, Q3, Q4 or VR1 are replaced, it will be necessary to re-adjust all four of the potentiometers (R13, R17, R20 and R22).

Equipment Required

- An unregulated, 20-volt, power supply
- A milliammeter (0-200 ma)

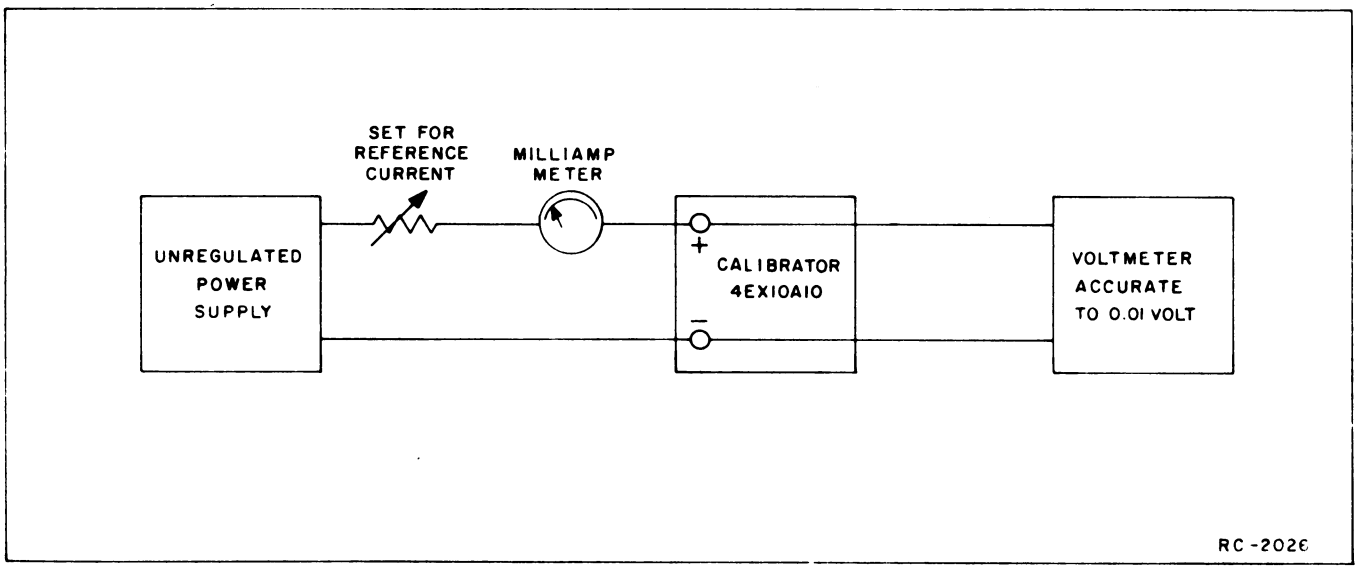


Figure 1 - Adjustment Set-Up

- A potentiometer
- A DC voltmeter accurate to ±0.01 volt

CAUTION

Do not attempt to adjust the calibrator unless a DC voltmeter that is accurate to ±0.01 volt is used. Use of an inaccurately adjusted calibrator may result in an improperly charged battery, or damage to the battery pack.

Procedures:

1. Connect the equipment as shown in Figure 1.
2. While applying the proper reference current for the calibrator switch position, adjust the calibrator potentiometer (R13, R17, R20 or R22) for the voltage indicated in the following chart.

Calibrator Switch Position	Reference Current (mA)	Adjust	Calibrator Voltage
A	8 ± 1	R22	4.18
B	200 ± 20	R20	8.35
C	200 ± 20	See Note 1	8.45
D	70 ± 7	R17	8.78
E	70 ± 7	See Note 1	8.88
F	8 ± 1	R13	16.80

NOTE

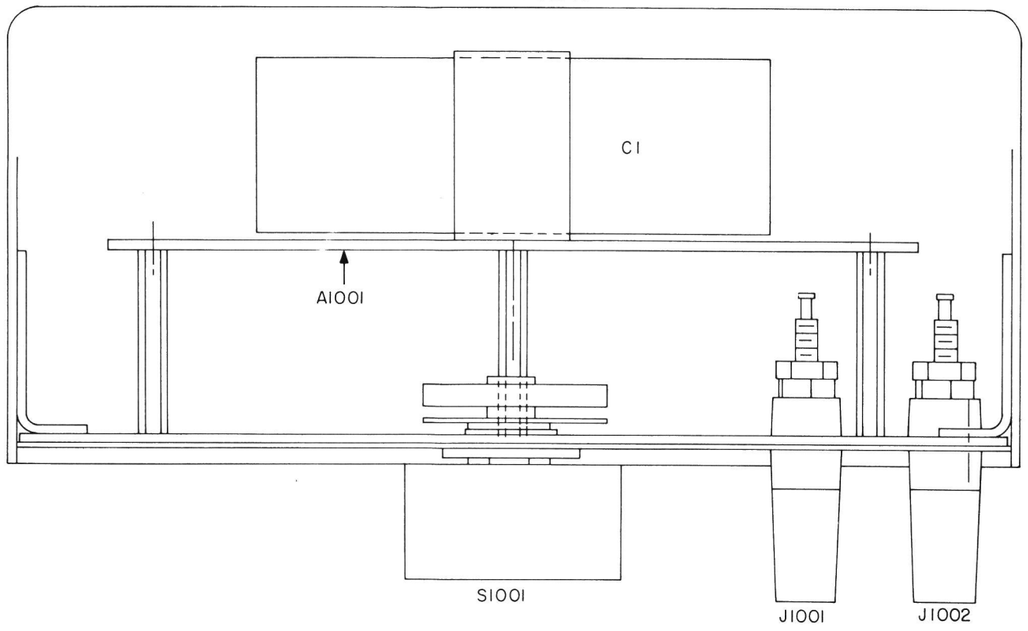
Voltages at position "C" and "E" are fixed at 0.1 volt above the voltages at positions "B" and "D".

VOLTMETER CALIBRATION

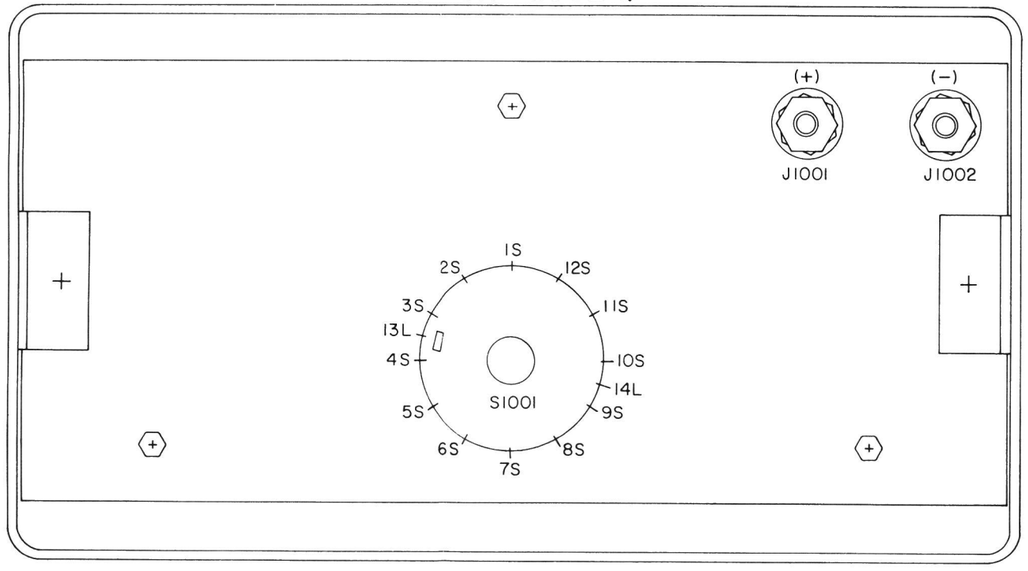
The calibrator can be used to check the calibration of standard DC voltmeters due to the extreme accuracy of the calibrator voltages (±0.01 volt). Simply connect the equipment as shown in Figure 1, using a standard DC voltmeter instead of a digital voltmeter.

While applying the proper reference current as shown in the chart, check the voltmeter readings in Positions A through F against the calibrator voltages shown in the chart.

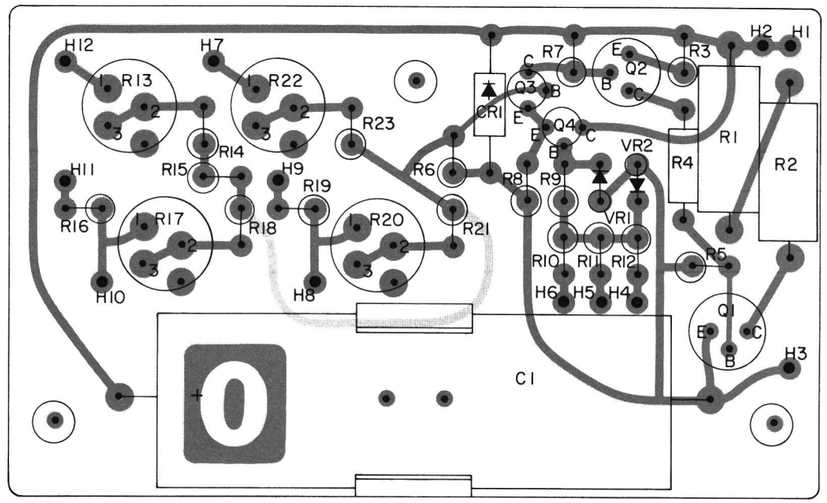
TOP VIEW



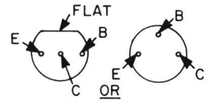
REAR VIEW
(FRONT COVER)



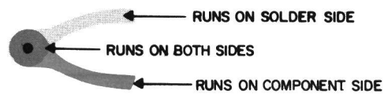
A1001



LEAD IDENTIFICATION
FOR Q1-Q4



NOTE: LEAD ARRANGEMENT, AND NOT CASE SHAPE, IS DETERMINING FACTOR FOR LEAD IDENTIFICATION.

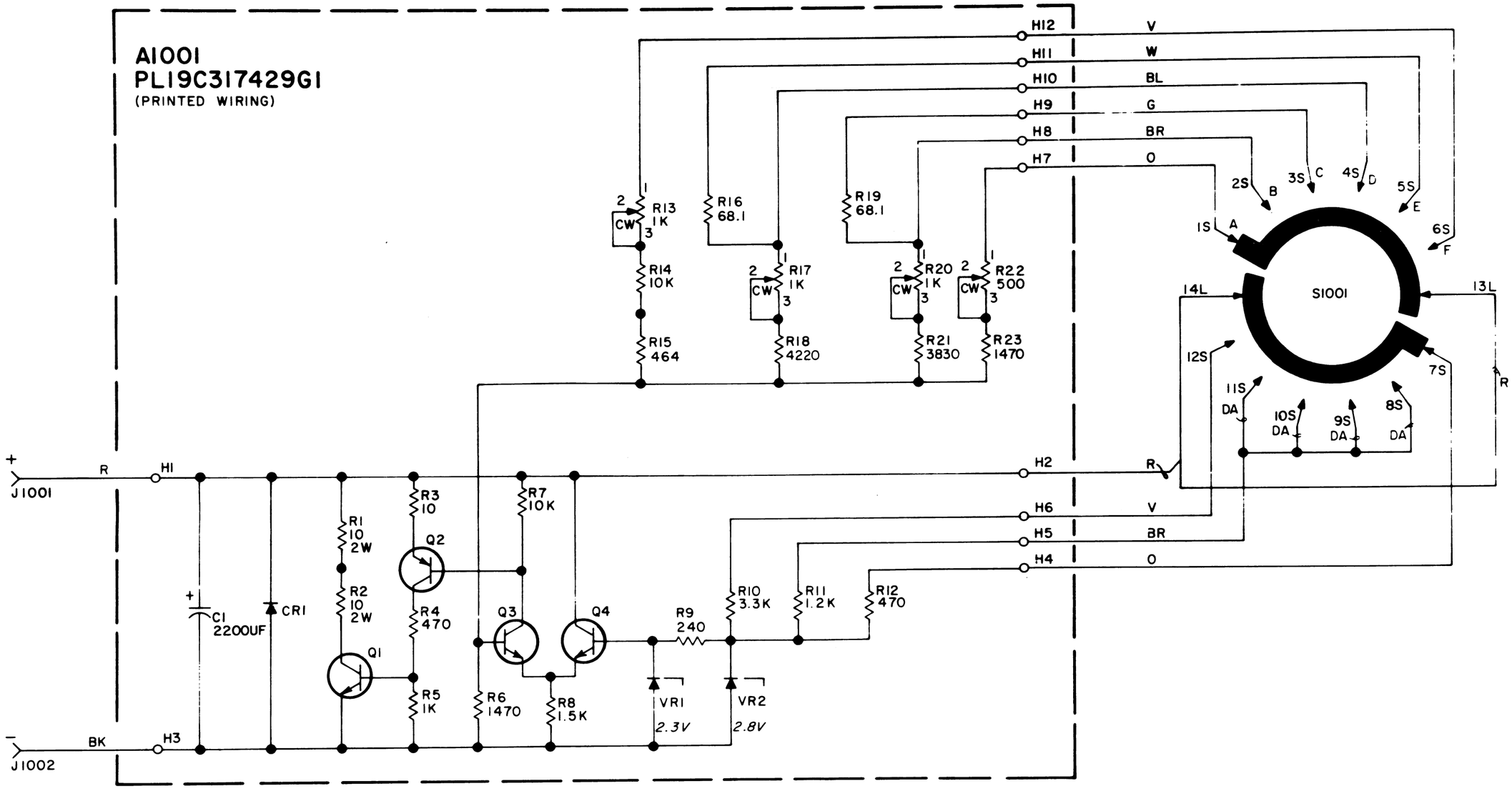


(19D413820, Rev. 0)
(19C317421, Sh. 1, Rev. 0)
(19C317421, Sh. 2, Rev. 0)

OUTLINE DIAGRAM

VOLTAGE CALIBRATOR
MODEL 4EX10A10

A1001
PL19C317429G1
(PRINTED WIRING)



(19D413577, Rev. 2)

IN ORDER TO RETAIN RATED EQUIPMENT PERFORMANCE, REPLACEMENT OF ANY SERVICE PART SHOULD BE MADE ONLY WITH A COMPONENT HAVING THE SPECIFICATIONS SHOWN ON THE PARTS LIST FOR THAT PART.

ALL RESISTORS ARE 1/2 WATT UNLESS OTHERWISE SPECIFIED AND RESISTOR VALUES IN OHMS UNLESS FOLLOWED BY K=1000 OHMS OR MEG=1,000,000 OHMS. CAPACITOR VALUES IN PICOFARADS (EQUAL TO MICROMICROFARADS) UNLESS FOLLOWED BY UF=MICROFARADS. INDUCTANCE VALUES IN MICROHENRYS UNLESS FOLLOWED BY MH=MILLIHENRYS OR H=HENRYS

NOTE:
ALL WIRES ARE SF-24, UNLESS OTHERWISE SPECIFIED.

SCHEMATIC DIAGRAM

VOLTAGE CALIBRATOR
MODEL 4EX10A10

PARTS LIST

LBI-4099

VOLTAGE CALIBRATOR
MODEL 4EX10A10

SYMBOL	GE PART NO.	DESCRIPTION
A1001		COMPONENT BOARD 19C317429-G1
		- - - - - - - - - CAPACITORS - - - - - - - - -
C1	19A123282-P2	Electolytic: 2200 µf +75% -10%, 25 VDCW; sim to Sprague Type 39D.
		- - - - - - - DIODES AND RECTIFIERS - - - - - -
CR1	4037822-P1	Silicon.
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q1	19A115300-P1	Silicon, NPN; sim to Type 2N3053.
Q2	19A115706-P1	Silicon, PNP; sim to Type 2N3638.
Q3 and Q4	19A115123-P1	Silicon, NPN; sim to Type 2N2712.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1 and R2	3R79-P100J	Composition: 10 ohms ±5%, 2 w.
R3	3R77-P100J	Composition: 10 ohms ±5%, 1/2 w.
R4	3R77-P471J	Composition: 470 ohms ±5%, 1/2 w.
R5	3R77-P102J	Composition: 1000 ohms ±5%, 1/2 w.
R6	19A116278-P217	Metal film: 1470 ohms ±2%, 1/2 w.
R7	3R77-P103J	Composition: 10,000 ohms ±5%, 1/2 w.
R8	3R77-P152J	Composition: 1500 ohms ±5%, 1/2 w.
R9	3R77-P241J	Composition: 240 ohms ±5%, 1/2 w.
R10	3R77-P332J	Composition: 3300 ohms ±5%, 1/2 w.
R11	3R77-P122J	Composition: 1200 ohms ±5%, 1/2 w.
R12	3R77-P471J	Composition: 470 ohms ±5%, 1/2 w.
R13	5492251-P105	Variable, composition: 1000 ohms ±10%, 0.25 w; sim to Allen-Bradley Type F.
R14	19A116278-P301	Metal film: 10,000 ohms ±2%, 1/2 w.
R15	19A116278-P165	Metal film: 464 ohms ±2%, 1/2 w.
R16	19A116278-P81	Metal film: 68.1 ohms ±2%, 1/2 w.
R17	5492251-P105	Variable, composition: 1000 ohms ±10%, 0.25 w; sim to Allen-Bradley Type F.
R18	19A116278-P261	Metal film: 4220 ohms ±2%, 1/2 w.
R19	19A116278-P81	Metal film: 68.1 ohms ±2%, 1/2 w.
R20	5492251-P105	Variable, composition: 1000 ohms ±10%, 0.25 w; sim to Allen-Bradley Type F.
R21	19A116278-P257	Metal film: 3830 ohms ±2%, 1/2 w.
R22	5492251-P4	Variable, composition: 500 ohms ±20%, 0.12 w; sim to Allen-Bradley Type F.
R23	19A116278-P217	Metal film: 1470 ohms ±2%, 1/2 w.
		- - - - - - - - VOLTAGE REGULATORS - - - - - - - -
VR1	4036887-P2	Silicon, Zener.
VR2	4036887-P1	Silicon, Zener.
		- - - - - - - JACKS AND RECEPTACLES - - - - - - -
J1001	19B209238-P2	Binding post: black, 15 amp; sim to HH Smith 1517.
J1002	19B209238-P1	Binding post: red, 15 amp; sim to HH Smith 1517.

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - SWITCHES - - - - - - - - - -
S1001	5495454-P13	Rotary: 1-sect, 2-pole, 2 to 6-pos (adj stop), non-shorting cont, 2 amps at 25 VDC or 1 amp at 110 vac; sim to Oak A.
		MECHANICAL PARTS
1	NP257970	Nameplate: etched aluminum.
2	19A122719-P1	Knob. (Used with S1001).
3	7142162-P55	Spacer. (Located between chassis and A1001).
4	19A123197-P2	Clip, spring tension. (Used with C1).
5	4036555-P1	Insulator, washer: nylon. (Used with Q1 and Q2).
6	19A121252-P1	Heat sink. (Used with Q1).
7	4029006-P3	Clip, compression: sim to Tinnerman C5426-014-24. (Used with Q1).

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

ORDERING SERVICE PARTS

Each component appearing on the schematic diagram is identified by a symbol number, to simplify locating it in the parts list. Each component is listed by symbol number, followed by its description and GE Part Number.

Service parts may be obtained from Authorized GE Communication Equipment Service Stations or through any GE Radio Communication Equipment Sales Office. When ordering a part, be sure to give:

1. GE Part Number for component
2. Description of part
3. Model number of equipment
4. Revision letter stamped on unit

These instructions do not purport to cover all details or variations in equipment nor to provide for every possible contingency to be met in connection with installation, operation or maintenance.

Should further information be desired, or should particular problems arise which are not covered sufficiently for the purchaser's purposes, contact the nearest Radio Communication Equipment Sales Office of the General Electric Company.

MAINTENANCE MANUAL

LBI-4136

DF-10008

GENERAL ELECTRIC

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