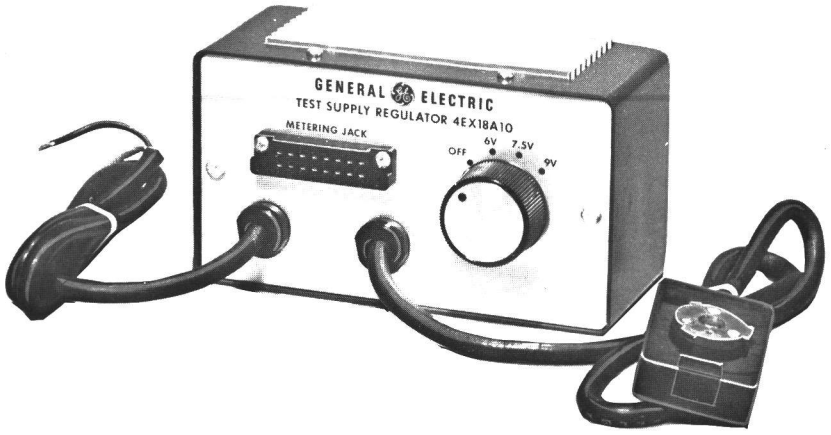
MOBILE RADIO

MAINTENANCE MANUAL

TEST SUPPLY REGULATOR MODEL 4EX18A10 (Option 4465)



SPECIFICATIONS *

Used With	MASTR Personal PE Model Two-Way Radios
Input Voltage	15 Volts DC, ±10%
Input Power	15 Watts
Output Voltages	6 VDC, 7.5 VDC and 9 VDC
Output Current	1 ampere

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

TABLE OF CONTENTS

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 Test Supply Regulator Model 4EX18A10 provides a regulated 6 Volts, 7.5 Volts and 9 Volts for servicing MASTR PE Series Two-Way Personal radios. The Test Regulator is equipped with a centralized metering jack for use with GE Test Set Models 4EX3A10 or 4EX8K11 for metering supply voltage and transmitter current drain.

Two test cables are provided with the Test Regulator (see Figure 1). The RF adaptor cable connects the radio to a wattmeter or signal generator. The receiver extension cable permits the receiver to be serviced while removed from the radio.

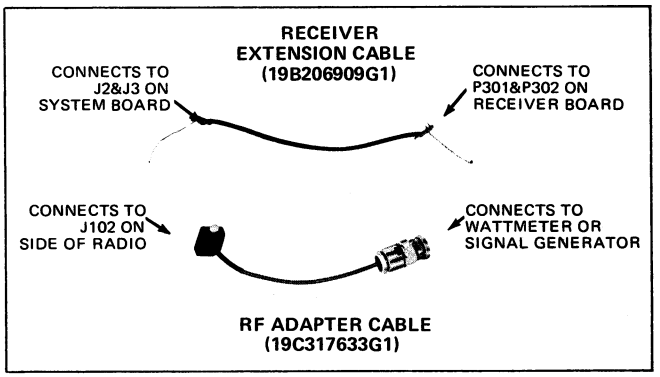


Figure 1 - Test Cables

OPERATION

The Test Regulator may be operated from a 15 Volt DC, 1.5 ampere source. Connect the White supply lead to (+) and the Black input lead to (-). Then connect P1001 to the radio.

WARNING

If an AC power supply is used, make sure that the power supply is connected to a good earth ground.

TRANSMITTER SERVICING

To meter the transmitter current with Test Set model 4EX3A10 or 4EX8K11:

1. Connect the Test Set to J1001 on the Test Regulator.
2. Place the Range Selector switch in the Test 1 position (or 1-Volt position on the 4EX8K11).
3. Place the Test Selector switch in position G, and the Polarity switch to (+).
4. Read the transmitter current drain on the 1 Volt scale as 1 ampere full scale, on the 3-Volt scale as 3 amperes full scale.

To meter the transmitter current using a 20,000 ohms-per-Volt meter with a 1-Volt scale:

1. Connect the meter probes to J1001-1 and J1001-9, and switch the meter to the 1-Volt scale.
2. Read the current on the 1-Volt scale as 1 ampere full scale.

RECEIVER SERVICING

The extension cable shipped with the Test Regulator permits the receiver board to be removed from the radio for servicing. To connect the cable:

1. Remove the receiver board as directed in the Disassembly Procedure in the Maintenance Manual for the radio.

CAUTION

Do not place the receiver board on metal or other conductive surface with power applied. To do so will damage the Integrated Circuit modules. A small "pancake" of Duxseal® provides an excellent insulated work surface for the receiver.

2. Connect one end of the extension cable to J2 and J3 on the radio System Board. Connect the other end to P301 and P302 on the receiver board.
3. Turn the radio ON. The receiver is now ready for servicing.

OUTPUT VOLTAGE

To meter the regulated output voltage with GE Test Set Model 4EX3A10 or 4EX8K11:

1. Connect the Test Set to J1001 on the Test Regulator.
2. Place the Range Selector switch in the Test 1 position (or 1-Volt position on the 4EX8K11).
3. Place the Test Selector switch in Position I, and the Polarity switch to (+).
4. Read the selected output voltage on the 1-Volt scale as 10 Volts full scale.

To meter the output voltage using a 20,000 ohms per-Volt meter with a 1-Volt scale:

1. Connect the meter probes to J1001-12 (+) and J1001-16 (-), and switch the meter to the 1-Volt scale.

2. Read the voltage on the 1-Volt scale as 10 Volts full scale.

MAINTENANCE

DISASSEMBLY

To gain access to the regulator circuitry, remove the Phillips-head screw on each side of the front plate, and carefully slide the chassis out of the housing.

ADJUSTMENT

If it should become necessary to replace Q2 or potentiometers R6, R8 or R9, the potentiometer(s) will have to be readjusted. To adjust the potentiometers with Test Set 4EX3A10 or 4EX8K11:

1. Connect the Test Set to metering jack J1001, and place the Polarity switch in the (+) position.

2. Place the Range Selector switch in the Test 1 position (1-Volt position for 4EX8K11), and the Test Selector switch in position "I".

3. Read the voltage as 10 Volts full scale, and adjust the potentiometers as follows:

   - Switch S1001 to the 6-Volt position and set R6 for a meter reading of 6-Volts.
   - Switch S1001 to the 7.5 Volt position and set R8 for a reading of 7.5 Volts.
   - Switch S1001 to the 9-Volt position and set R9 for 9 Volts.

To adjust R6, R8, or R9 with a multimeter:

1. Connect the positive lead of the multimeter to J1001-12 and the negative lead to J1001-16.

2. Switch the meter to the 1-Volt scale and adjust the potentiometers as described in Step 3 above.

CIRCUIT ANALYSIS

References to symbol numbers mentioned in the following test can be found on the Parts List, Schematic and Outline Diagram as listed in the Table of Contents.

The unit operates as a current-limiting regulator to provide the following DC output voltages:

- 6 Volts for transmitter alignment and low voltage checks.
- 7.5 Volts - normal operating voltage
- 9 Volts - for high voltage checks

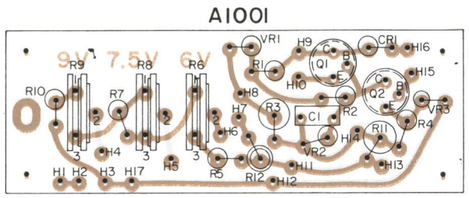
Turning voltage-selector switch S1001 to one of the voltage positions causes Q1001 to conduct. Q1001 is mounted on the aluminum heatsink in the top of the housing. CR1 provides reverse polarity protection for the regulator circuit.

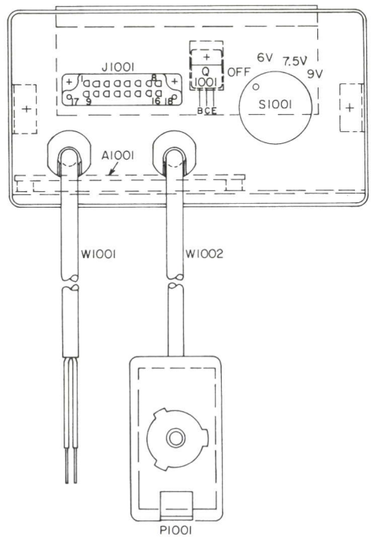
If the output voltage starts to increase beyond the desired level, Q2 starts conducting harder. When Q2 conducts, Q1 conducts less, providing less base current for regulator Q1001. The voltage drop across Q1001 becomes larger, keeping the output constant.

If the output voltage starts to drop, Q2 conducts less. This allows Q1 and Q1001 to conduct harder, reducing the voltage drop across Q1001 which keeps the output constant.

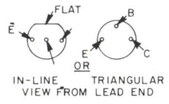
Potentiometers R6, R8 and R9 are used to set the regulator for the desired output. The output voltage is measured at J1001-12 and -16 through metering resistor R12. The output current is measured at J1001-1 and -9 across metering resistor R11.

OUTLINE DIAGRAM



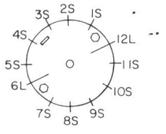


LEAD IDENTIFICATION FOR Q1 & Q2

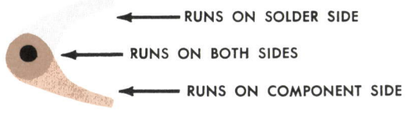


NOTE: LEAD ARRANGEMENT, AND NOT CASE SHAPE, IS DETERMINING FACTOR FOR LEAD IDENTIFICATION.

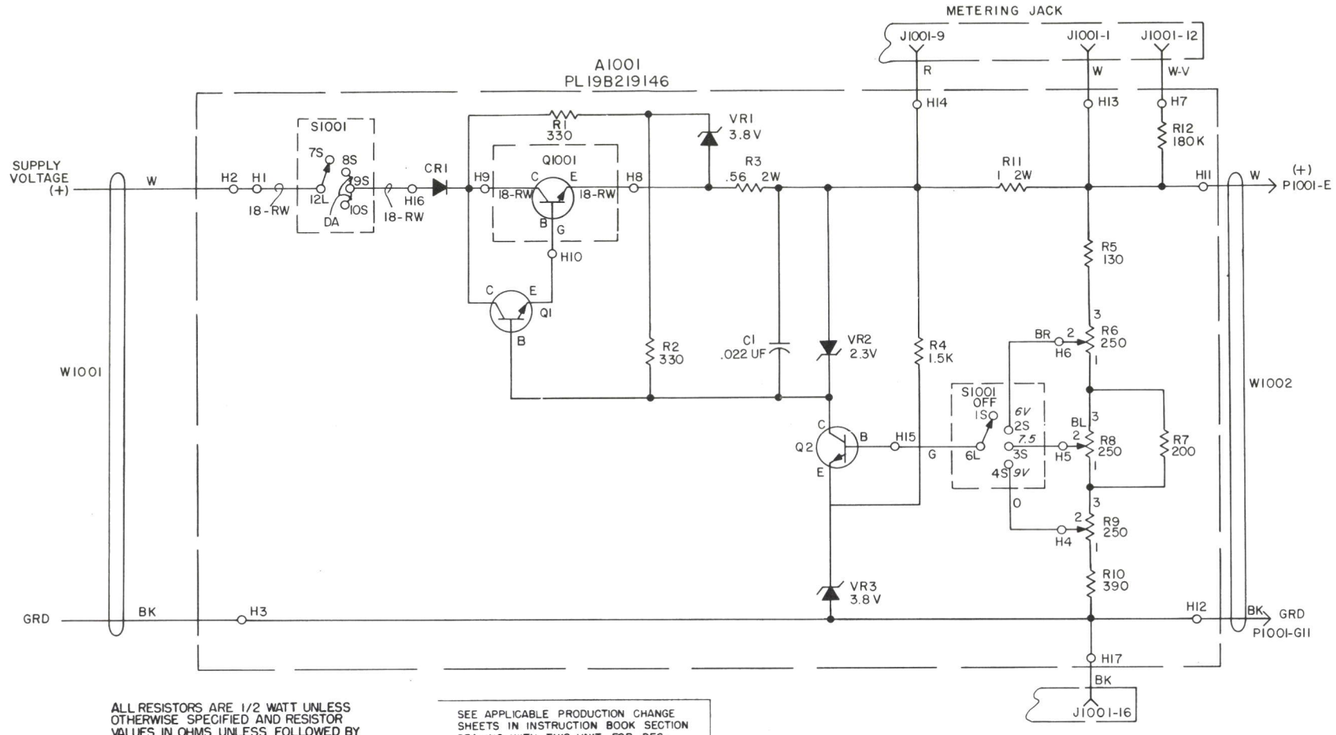
S1001 (TERMINAL VIEW)



(19C317961, Rev. 0)
(19B219142, Sh. 1, Rev. 0)
(19B219142, Sh. 2, Rev. 0)



SCHEMATIC DIAGRAM



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.

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.

SEE APPLICABLE PRODUCTION CHANGE SHEETS IN INSTRUCTION BOOK SECTION DEALING WITH THIS UNIT, FOR DESCRIPTION OF CHANGES UNDER EACH REVISION LETTER.

THIS ELEM DIAG APPLIES TO	
MODEL NO	REV LETTER

NOTES:
1. DA IS #22AWG WIRE.
2. ALL WIRES ARE #N22 UNLESS OTHERWISE SPECIFIED.

(19C317647, Rev. 2)

SCHEMATIC & OUTLINE DIAGRAMS

TEST REGULATOR MODEL 4EX18A10

Issue 1

PARTS LIST

LBI-4262

TEST SUPPLY REGULATOR
MODEL 4EX18A10

SYMBOL	GE PART NO.	DESCRIPTION
A1001		COMPONENT BOARD 19B219146G1
		- - - - - - - - - CAPACITORS - - - - - - - - -
C1	19A116080P103	Polyester: 0.022 µf ±10%, 50 VDCW.
		- - - - - - - DIODES AND RECTIFIERS - - - - -
CR1	4037822P2	Silicon.
		- - - - - - - - - TRANSISTORS - - - - - - - -
Q1 and Q2	19A115300P1	Silicon, NPN; sim to Type 2N3053.
		- - - - - - - - - - RESISTORS - - - - - - - -
R1 and R2	3R77P331K	Composition: 330 ohms ±10%, 1/2 w.
R3	19B209022P109	Wirewound: 0.56 ohms ±10%, 2 w; sim to IRC Type BWH.
R4	3R77P152K	Composition: 1500 ohms ±10%, 1/2 w.
R5	3R77P131J	Composition: 130 ohms ±5%, 1/2 w.
R6	19B209358P101	Variable, carbon film: approx 25 to 250 ohms ±10%, 0.2 w; sim to CTS Type X-201.
R7	3R77P201J	Composition: 200 ohms ±5%, 1/2 w.
R8 and R9	19B209358P101	Variable, carbon film: approx 25 to 250 ohms ±10%, 0.2 w; sim to CTS Type X-201.
R10	3R77P391J	Composition: 390 ohms ±5%, 1/2 w.
R11	19A115416P9	Wirewound: 1.00 ohm ±1%, 2 w; sim to Dale Type RS-2B.
R12	19C314256P 31803	Metal film: 180,000 ohms ±1%, 1/2 w.
		- - - - - - - - VOLTAGE REGULATORS - - - - - - -
VR1	4036887P3	Silicon, Zener.
VR2	4036887P1	Silicon, Zener.
VR3	4036887P3	Silicon, Zener.
		- - - - - - - JACKS AND RECEPTACLES - - - - - -
J1001		Includes:
	19B205689G2	Jack: 16 contacts.
	19C311236P1	Connector.
	19A115853P1	Contact, electrical: sim to Hugh H. Eby 8325-6.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P1001		(Part of W1002).
		- - - - - - - - - TRANSISTORS - - - - - - - -
Q1001	19A116118P2	Silicon, NPN.
		- - - - - - - - - - SWITCHES - - - - - - - - -
S1001	5495227P16	Rotary: 1 section, 2 pole, 5 positions, non-shorting contacts, 2 amps at 28 VDC or 1 amp at 110 VAC; sim to Oak Mfg Co F.
		- - - - - - - - - - CABLES - - - - - - - - - -
W1001	19A115469P2	Cable: 3 conductor, 300 VRMS, approx 30 inches long.
W1002	19B216993G1	Cable: approx 1 inch long. Includes (P1001).
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	4036555P1	Insulator, washer: nylon. (Used with Q1 and Q2).
	19A122719P1	Knob, push-on. (Used with S1001).
	19A116123P1	Contact, electrical: sim to AMP 60839-1. (Used with Q1001).
	19B219149P1	Heat sink. (Used with Q1001).
	19A116022P1	Insulator, bushing. (Used with Q1001).
	19A127515G1	Terminal board, transistor. (Used with Q1001).
	19B206909G1	Receiver extension cable.
	19C317633G1	RF adaptor cable.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.

MOBILE RADIO DEPARTMENT
GENERAL ELECTRIC COMPANY • LYNCHBURG, VIRGINIA 24502

GENERAL ELECTRIC

PRINTED IN U.S.A.

DF-10008