MOBILE RADIO

MAINTENANCE MANUAL

TEST SUPPLY REGULATOR MODEL 4EX19A10 (OPTION 4637)

SPECIFICATIONS *

Used With	MASTR® Personal PE Model Two-Way Radios
Input Voltage	15 Volts DC, ±10%
Input Power	27 Watts
Output Voltages	6 VDC, 7.5 VDC and 9 VDC
Output Current	1.8 ampere

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

GENERAL ELECTRIC

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 4EX19A10 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 4EX3A11 (combination TM16) or 4EX8K12 for metering supply voltage and transmitter current drain.

Two test cables are provided with the Test Regulator (see Figure 1). The RF adapter 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.

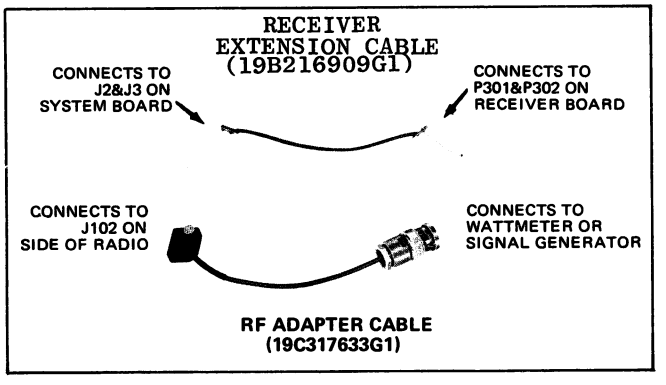


Figure 1 - Test Cable

OPERATION

The Test Regulator may be operated from a 13-16 Volts DC, 1.8 ampere source. Connect the White supply lead to (+) and the Black input lead to (-). The connect P3001 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 4EX3A11 or 4EX8K12:

1. Connect the Test Set to J3001 on the Test Regulator.
2. Place the Range Selector switch in the Test 1 position (or 1-Volt position on the 4EX8K12.
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 or 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 or 3-Volt scale:

1. Connect the meter probes to J3001-6 and J3001-5, and switch the meter to the 1-Volt or 3-Volt scale.
2. Read the current on the 1-Volt scale as 1 ampere full scale or on the 3-Volt scale as 3 amperes 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 4EX3A11 or 4EX8K12:

1. Connect the Test Set to J3001 on the Test Regulator.
2. Place the Range Selector switch in the Test 1 position (or 1-Volt position on the 4EX8K12.
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 J3001-7 (+) and J3001-9 (-), and switch the meter to the 1-Volt scale.
2. Read the voltage on the 1-Volt scale as 10 Volts full scale.

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

Supply voltage is applied to the collector of NPN pass transistor Q3001 through switch S3001 and diode CR1.

The output voltage of the Test Supply Regulator is fed through a voltage divider selected by switch S3001. The selected voltage is compared to a fixed reference voltage at Pin 2 of integrated circuit VR1. The reference voltage is on Pin 4 of VR1 and is adjusted by bias adjust R2. If the output voltage of the regulator starts to increase, the voltage at Pin 2 of VR1 increases causing the output voltage at Pin 6 of VR1 to decrease. The decreased voltage on the base of Q3001 will cause Q3001 to conduct less and reduce the voltage to P3001 keeping the output voltage constant.

If the output voltage to P3001 starts to decrease, the voltage at Pin 2 of VR1 will decrease causing the output voltage at Pin 6 of VR1 to increase. The increased output voltage at Pin 6 of VR1 causes Q3001 to conduct harder to increase the output voltage to P3001 and again keep the voltage constant.

Current limiting is provided when the voltage drop across R4 increases above approximately .65 Volts. This voltage sensed by Pins 1 and 10 of VR1 causes the output at Pin 6 of VR1 to drop and causes Q3001 to conduct less.

MAINTENANCE

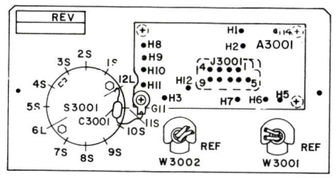
DISASSEMBLY

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

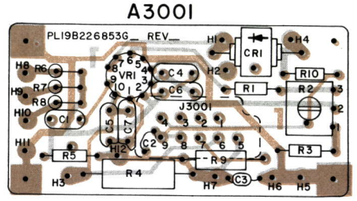
To adjust the regulator output voltage, switch S3001 to the 7.5V range. Meter the output voltage at P3001 and set bias adjust R2 so the output voltage is 7.55 Volts (no load).

OUTLINE DIAGRAM



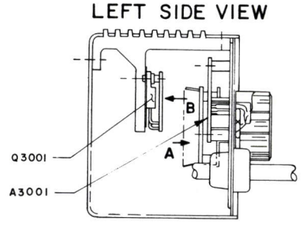
VIEW "A"

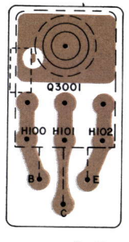
A3001



(19C321606, Sh. 2, Rev. 1)
(19C321606, Sh. 3, Rev. 1)

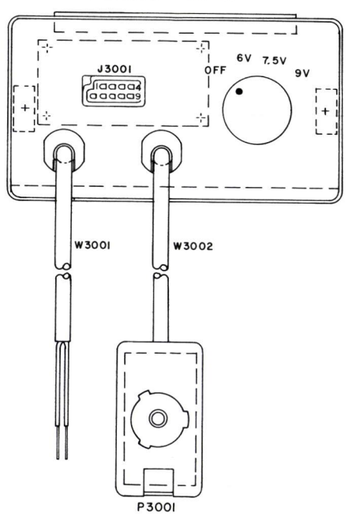
LEFT SIDE VIEW



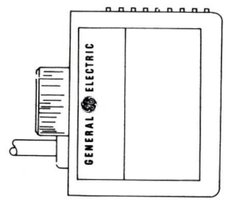


VIEW "B"

FRONT VIEW



RIGHT SIDE VIEW

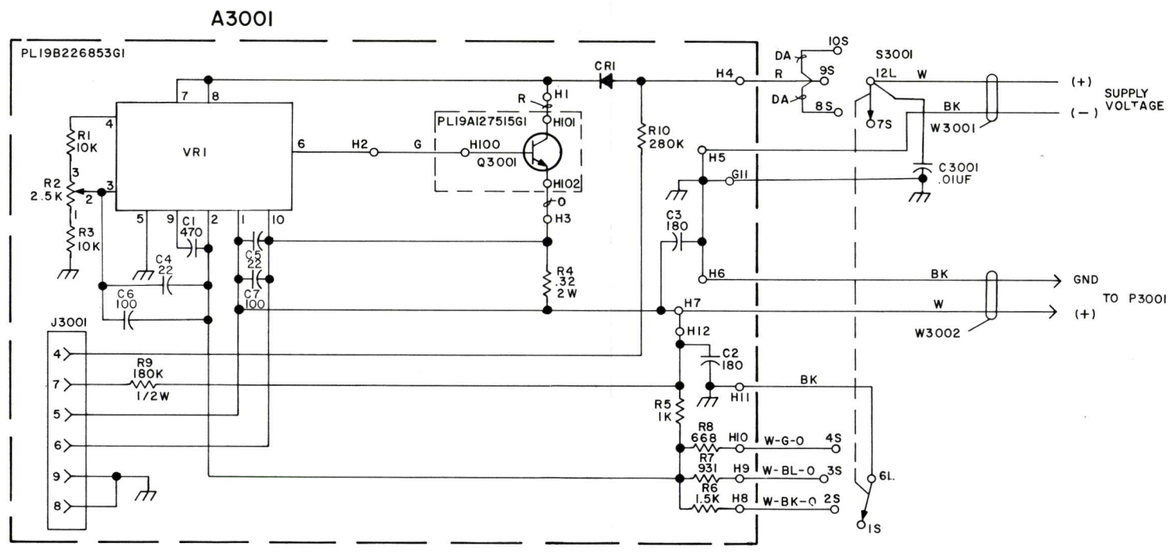


(19C327230, Rev. 2)

(19A127512, Sh. 1, Rev. 0)
(19A127512, Sh. 2, Rev. 0)

RUNS ON SOLDER SIDE
RUNS ON BOTH SIDES
RUNS ON COMPONENT SIDE

SCHEMATIC DIAGRAM



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 1/4 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.

MODEL NO	REV LETTER
4EX19A10	A

NOTES:

1. ALL WIRES ARE SF22 EXCEPT AS NOTED.

(19C321624, Rev. 3)

SCHEMATIC & OUTLINE DIAGRAM

TEST REGULATOR MODEL 4EX19A10

Issue 2

PARTS LIST

LBI30079A

TEST SUPPLY REGULATOR
4EX19A10 (19C321622G1)

SYMBOL	GE PART NO.	DESCRIPTION
A3001		COMPONENT BOARD 19B226853G1
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1	5494481P7	Ceramic disc: 470 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C2 and C3	19A116114P10073	Ceramic: 180 pf ±10%, 100 VDCW; temp coef -3300 PPM.
C4* and C5*	5496218P47	Ceramic disc: 22 pf ±5%, 500 VDCW, temp coef 0 PPM. Added by REV A.
C6* and C7*	5496218P863	Ceramic disc: 100 pf ±5%, 500 VDCW, temp coef -1500 PPM. Added by REV A.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR1	19A116783P1	Silicon.
		- - - - - - - JACKS AND RECEPTACLES - - - - - -
J1	19B219374G1	Connector: 9 contacts.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	19C314256P21002	Metal film: 10K ohms ±1%, 1/4 w.
R2	19A116559P104	Variable, cermet: 2.5K ohms ±20%, .5 w; sim to CTS Series 360.
R3	19C314256P21002	Metal film: 10K ohms ±1%, 1/4 w.
R4	19A115416P11	Wirewound: 0.32 ohms ±1%, 2 w; sim to Dale Type RS-2B.
R5	19C314256P21001	Metal film: 1K ohms ±1%, 1/4 w.
R6	19C314256P21501	Metal film: 1.5K ohms ±1%, 1/4 w.
R7	19C314256P29310	Metal film: 931 ohms ±1%, 1/4 w.
R8	19C314256P26680	Metal film: 668 ohms ±1%, 1/4 w.
R9	19C314256P31803	Metal film: 180K ohms ±1%, 1/2 w.
R10	19C314256P22803	Metal film: 280K ohms ±1%, 1/4 w.
		- - - - - - - - VOLTAGE REGULATORS - - - - - - -
VR1	19A116841P1	Integrated circuit, linear: Positive Voltage Regulator; sim to Fairchild µA723C.
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C3001	19A116080P101	Polyester: 0.01 µf ±10%, 50 VDCW.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P3001		(Part of W3002).
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q3001	19A116118P2	Silicon, NPN.
		- - - - - - - - - - SWITCHES - - - - - - - - - -
S3001	5495227P16	Rotary: 1 section, 2 poles, 2-5 positions, non-shorting contacts, 2 amps at 28 VDC or 1 amp at 110 VAC; sim to Oak Mfg Co F.
		- - - - - - - - - - CABLES - - - - - - - - - -
W3001	19A115469P2	Cable: 3 conductors, No. 18 AWG. Strd. wire.
W3002	19C321869G1	Cable assembly. (Includes P3001).

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	NP279958	Faceplate.
	19A116768P2	Bushing, strain relief. (Used with W3001, W3002).
	19A115837P1	Knob, push-on. (S3001).
	19B201074P204	Tap screw, Phillips POZIDRIV®: No. 4-40 x 1/4. (Located on top of Test Set).
	19B201074P305	Tap screw, Phillips POZIDRIV®: No. 6-32 x 5/16. (Located on faceplate).
	19B209209P204	Tap screw, Phillips POZIDRIV®: No. 4-40 x 1/4. (Located on back side of Test Set- Secures heat sink to housing).
	19A116023P1	Insulator, plate. (Used with Q3001).
	19A116022P1	Insulator, bushing. (Used with Q3001).
	19B219149P1	Heat sink. (Used with Q3001).
	19A127515G1	Terminal board. (Used with Q3001).
	7150186P9	Spacer, sleeving. (Secures A3001).
	7165075P2	Hex nut, brass: thd. size No. 3/8-32. (Used with S3001).
	7115130P9	Lockwasher, internal tooth: No. 3/8; sim to Shakeproof 1220-2. (Used with S3001).

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.

PRODUCTION CHANGES

Changes in the equipment to improve performance or to simplify circuits are identified by a "Revision Letter," which is stamped after the model number of the unit. The revision stamped on the unit includes all previous revisions. Refer to the Parts List for descriptions of parts affected by these revisions.

REV. A - 4EX19A10
To improve RF filtering.
Added C4 through C7.