MOBILE RADIO

Scaqueth (Mack)

MAINTENANCE MANUAL

Polarity Converter MODEL 4EP54A10
(OPTIONS 8021 THRU 8023)

SPECIFICATIONS *

Used With	MASTR® Executive Series Mobile Combinations
Dimensions (H x W x D)	3" x 6" x 3"
Input (Positive Ground)	13.6 VDC ±20%
Output (Negative Ground)	13.6 VDC ±20%
Battery Drain (No Load)	Less than 5 milliamps
Duty Cycle	Continuous
Temp. Range	-30°C to +70°C

hese 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

ILLUSTRATIONS

EQUIPMENT INDEX

EQUIPMENT	MODEL OR PL NUMBER
FOR FRONT-MOUNT COMBINATIONS (Option 8021)	
Converter	4EP54A10
9-Foot Battery Cable	19A122538-G1
9-Foot Battery Cable (Fused)	19B205623-G1
Power Cable	19C303982-G1
FOR TRUNK-MOUNT COMBINATIONS (Option 8022) (1 and 2 Frequency)	
Converter	4EP54A10
9-Foot Battery Cable	19A122538-G1
9-Foot Battery Cable (Fused)	19B205623-G1
Power/Control Cable	19C303910-G1
FOR TRUNK-MOUNT COMBINATIONS (Option 8023) (3 and 4 Frequency)	
Converter	4EP54A10
9-Foot Battery Cable	19A122538-G1
9-Foot Battery Cable (Fused)	19B205623-G1
Power/Control Cable	19C303910-G3

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 Converter Model 4EP54A10 is a compact, fully transistorized polarity converter required for operating a MASTR® Executive Two-Way Mobile radio in a 12-volt, positive-ground vehicle system. Silicon transistors and diodes are used for added reliability.

The converter provides a nominal +12 volt supply for the mobile receiver and 10-volt regulator (figure 1). Filament voltage is taken from the hot side of the battery.

The mobile power supply has a "floating ground" and operates directly from the battery to provide plate, screen, and bias voltages for the transmitter multiplier and power amplifier stages.

INSTALLATION

The converter can be mounted inside of the vehicle on the bottom of the instrument panel or on the firewall. The unit may also be mounted in a dry location in the engine compartment. Refer to the step-by-step instructions on the following pages.

To Mount the Converter:

1. Remove the two hex-head screws in the front panel and slide off the back cover (Figure 2).
2. Use the cover as a template and mark and drill three mounting holes with a #32 (1/8-inch) drill.
3. Mount the back cover with the three #8 sheet metal screws provided, and reassemble the converter.

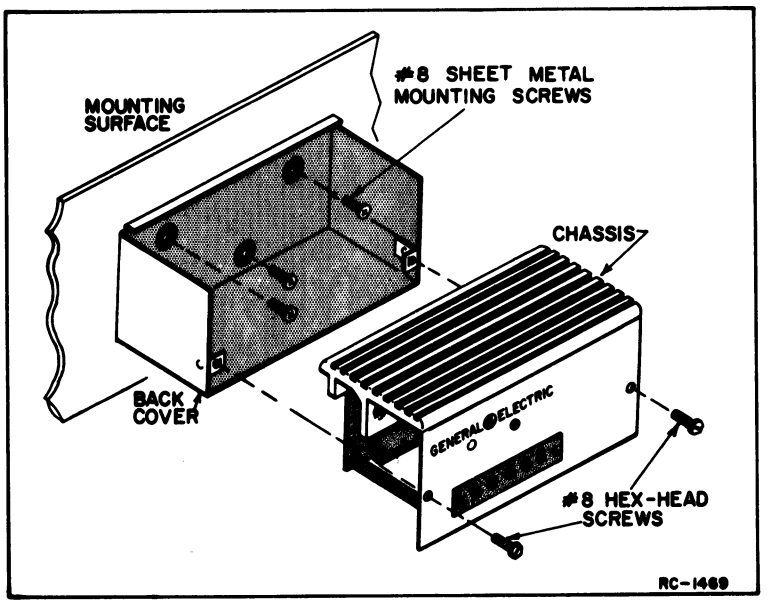


Figure 2 - Mounting the Converter

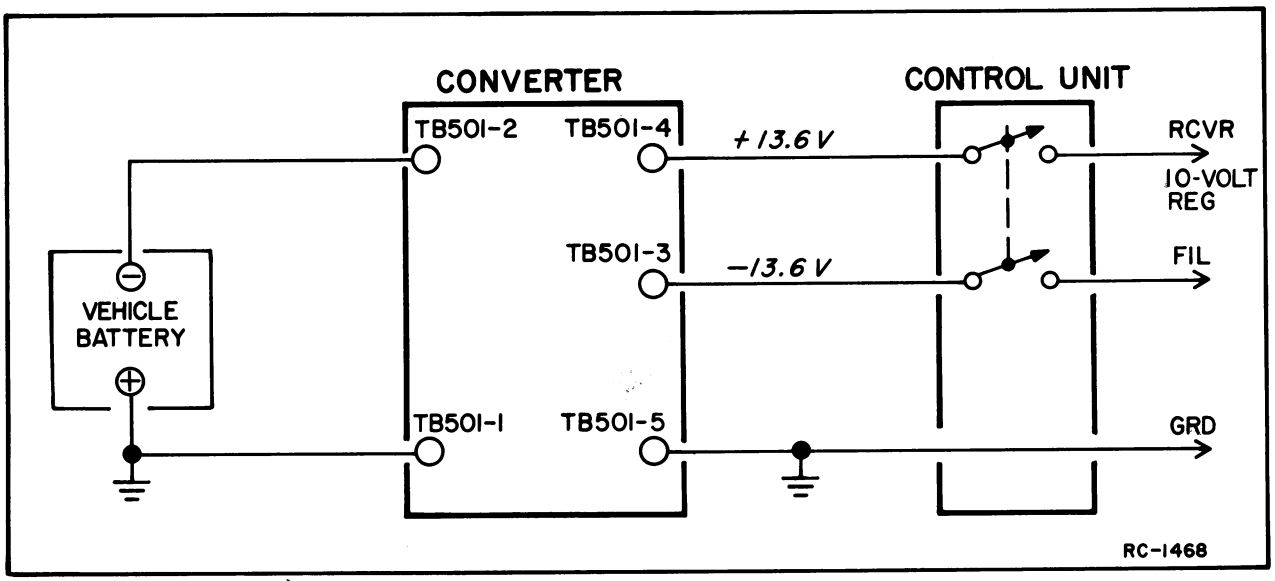


Figure 1 - Converter Power Distribution Diagram

Use orng. cable connect as such (same as neg gnd)

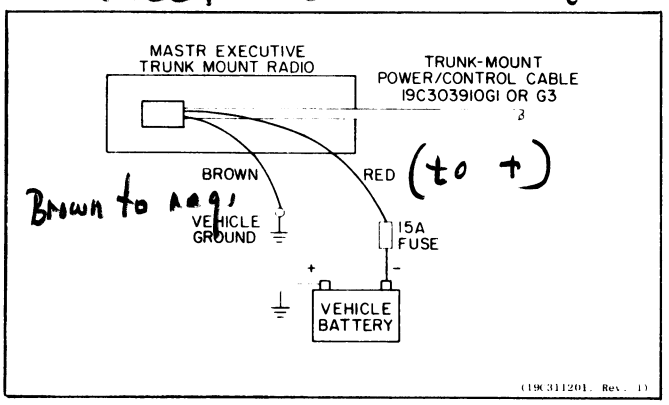


Figure 3 - Power/Control Cable Connections

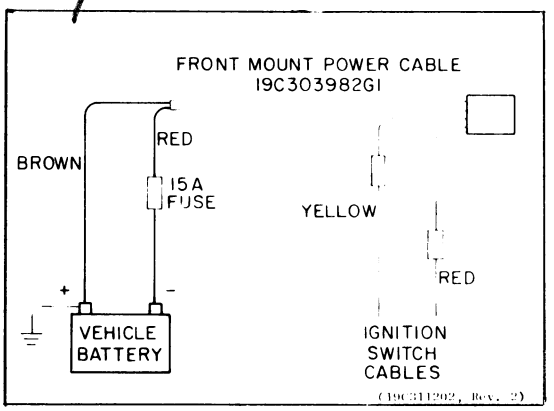


Figure 4 - Power Cable Connections

CABLE CONNECTIONS

TRUNK-MOUNT POWER/CONTROL CABLE (Figure 3)

Starting with the plug end of the Power/Control cable at the location of the Trunk-Mount unit, run the black control cable to the control unit location. Tape the numbered leads before running the cable.

Run the red battery lead to the vicinity of the battery. Cut the red lead and connect the fuseholder in the red lead with ring terminals provided. Then mount the fuseholder near the battery, and connect the red lead to the negative (-) battery terminal. Connect the brown lead to a good vehicle ground in the trunk compartment.

FRONT-MOUNT POWER CABLE (Figure 4)

Starting with the plug end of the Power Cable at the location of the Front-Mount unit, run the gray cable to the battery. Strip off the gray cable cover, cut the red lead and connect the fuseholder in the red lead with the ring terminals provided. Mount the fuseholder near the battery, and connect the red lead to the negative (-) battery terminal. Connect the brown lead to the positive (+) battery terminal.

BATTERY & IGNITION SWITCH CABLE CONNECTIONS

The battery and ignition switch cables may be connected for three different modes of operation, depending on the way the cables are connected in the system. The three types of operation are:

1. Ignition Switch Standby

   With the ignition switch in the OFF position, the receiver is in the standby position, ready to receive messages. Turning the ignition switch to the ON or Accessory position supplies transmitter filament voltage. Turning the OFF-VOLUME switch to the OFF position removes all power to the two-way radio.

2. Ignition Switch Control

   The transmitter and receiver will operate only when the ignition switch is in the Accessory or ON position. Turning the OFF-VOLUME switch to OFF removes all power to the radio.

3. Ignition Switch Bypass

   Both the transmitter and receiver operate independently of the ignition switch, and can be turned on and off only by the OFF-VOLUME switch on the control unit.

After selecting the type of control desired, connect the battery and ignition switch cables as shown in Figure 5.

CIRCUIT ANALYSIS

The converter consists of a load-controlled switching circuit and a multivibrator circuit that supplies +12 volts for the receiver and 10-volt regulator.

SWITCHING CIRCUIT

The switching circuit was designed to automatically start the multivibrator whenever a load is applied, and stop the multivibrator when the load is removed. This prevents a continuous drain on the vehicle battery by the converter when the Ignition Switch Standby or Ignition Switch Bypass control method is used. The load is applied or removed by the OFF-VOLUME control on the mobile control unit.

When the Ignition Switch Control method

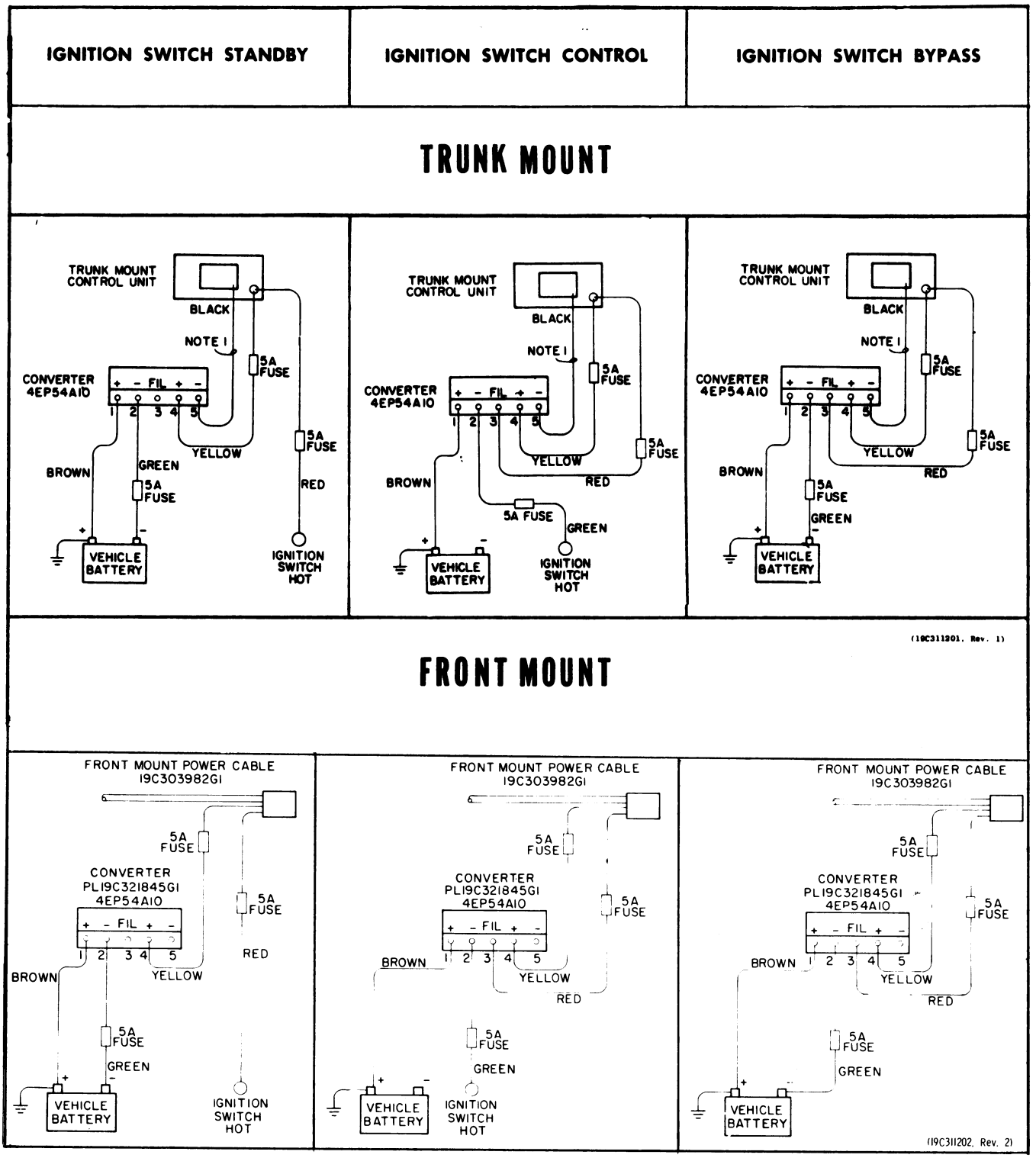


Figure 5 - Battery & Ignition Switch Cable Connections

NOTE 1 - The black ignition switch wire from the trunk-mount control unit may be connected to vehicle ground instead of terminal 5 on the converter.

is used, the ignition switch controls the power input to the converter, and the load is applied to the unit when the OFF-VOLUME control switch is turned on.

Turning the external switch ON causes current to flow in the secondary circuitry of T501. This causes Q506 to conduct, turning on Q502 and Q501. When Q501 conducts, a positive potential is applied to terminal 2 of transformer T501 which starts the multivibrator, Q503 and Q504.

With the multivibrator running, a voltage drop occurs across diodes CR504 and CR505 which turns on Q505 and turns off Q506. The output of Q505 keeps Q502 and Q501 conducting, and the multivibrator continues to operate until the load (or power) is removed.

Turning the external switch OFF stops the current flow through diodes CR504 and CR505. With no voltage drop across these diodes, Q505 stops conducting and the multivibrator stops operating. The converter draws less than 5 milliamps with no load applied.

Protective diode CR501 prevents damage to the converter in case the battery polarity is accidentally reversed.

MULTIVIBRATOR CIRCUIT

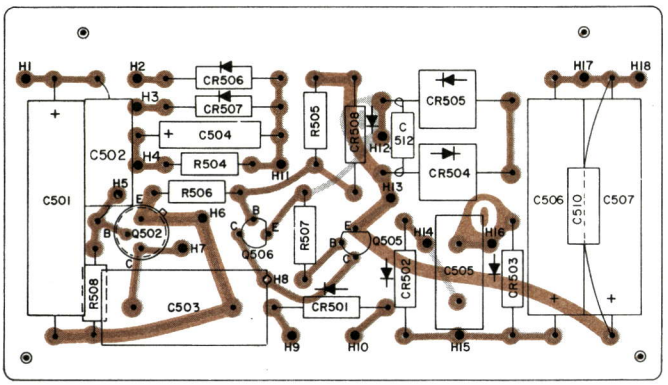
Transistors Q503 and Q504 are used as switches in an inductively-coupled multivibrator circuit (square wave generator). When biased on by the switching circuit, the transistors connect the battery voltage across alternate halves of the primary of T501, resulting in alternating square waves. The output is rectified by full-wave rectifiers CR502 and CR503, and filtered by C506, C507 and L502. The two transistors conduct alternately at a frequency of approximately 3,000 cycles per second.

TROUBLESHOOTING PROCEDURE

SYMPTOM	PROCEDURE
Converter won't start when load is connected	1. Check all fuses and power connections. 2. Connect a jumper from the collector to the emitter of Q501. If the converter starts, remove the jumper and proceed with Step 3. If the converter doesn't start, remove the jumber and proceed with Step 4. 3. Check transistors Q502, Q505, Q506 and Q501, and diodes CR503, CR504, and CR505. 4. A. Check Q502 and Q503. B. Make continuity check of transformer T501. C. Check for excessive load in the transformer secondary. The rated load is approximately 900 milliamps.
Low output voltage	5. Check for excessive load in the transformer secondary. The rated load is 900 milliamps.
Converter won't stop when load is removed	6. Check for an extraneous load (Meter, etc.) connected across output terminals. 7. Check transistors Q502, Q505, Q506 and Q501, and diodes CR503, CR504, and CR505.

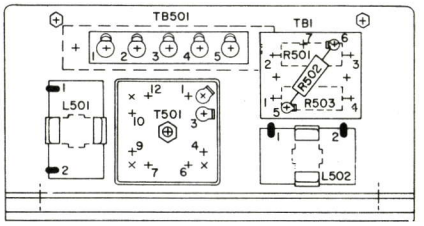
OUTLINE DIAGRAM

PRINTED CIRCUIT BOARD
19C311175-G1

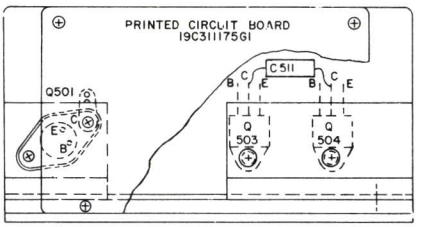


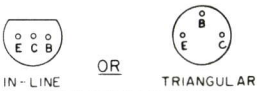
(19C311316, Rev. 4)
(19B205617, Sh. 1, Rev. 0)
(19B205617, Sh. 2, Rev. 0)

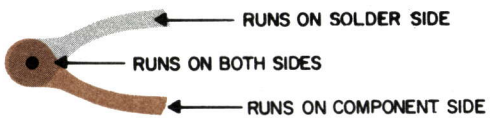
FRONT PANEL
(REAR VIEW)



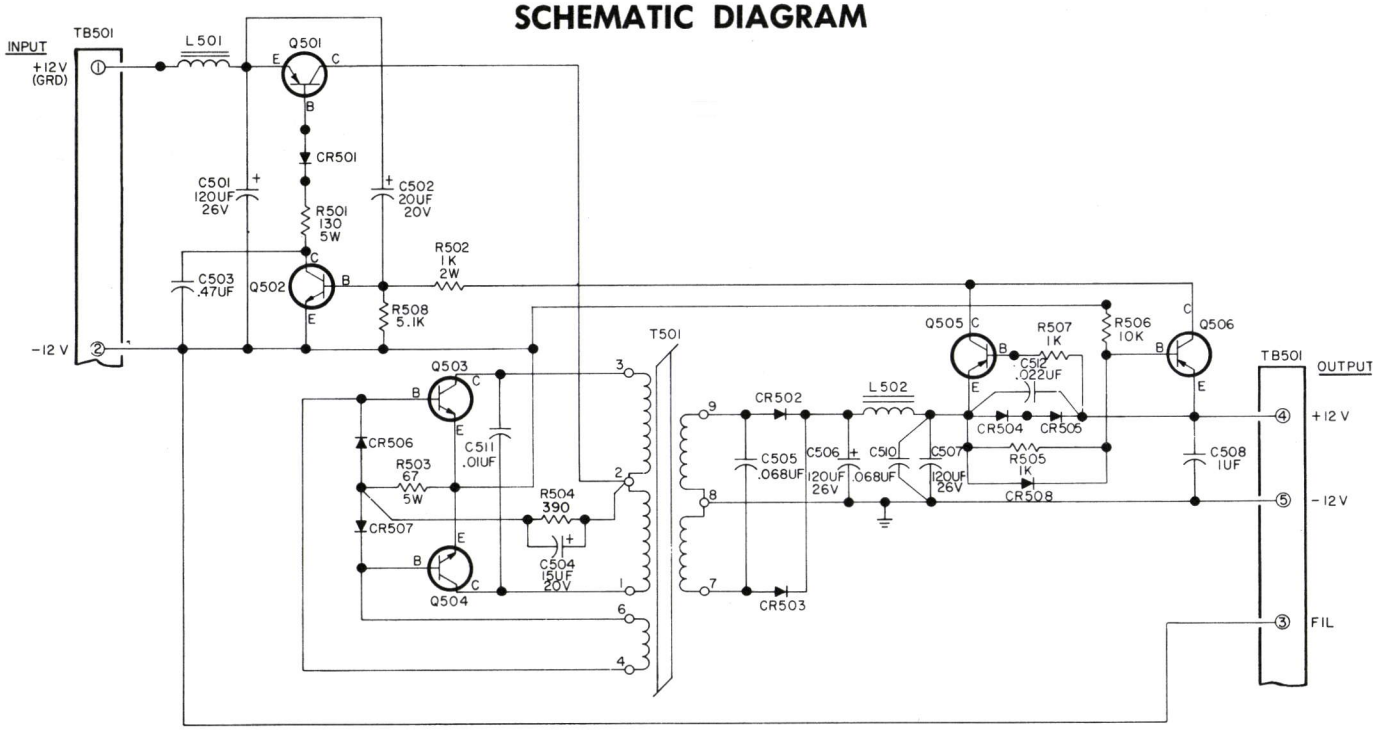
CHASSIS
(REAR VIEW)







SCHEMATIC DIAGRAM



(19C311315, Rev. 5)

OUTLINE & SCHEMATIC DIAGRAM

POLARITY CONVERTER MODEL 4EP54A10

PARTS LIST

LBI-3793B

CONVERTER MODEL 4EP54A10
19C311173-G1
REV A

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C508	7491930-P13	Polyester: 1 µf ±20%, 100 VDCW; sim to GE Type 61F.
C509*	19A115028-P17	Polyester: 0.33 µf ±20%, 100 VDCW. Deleted by REV A.
C511*	5491189-P6	Polyester: 0.1 µf ±20%, 50 VDCW. Added by REV B.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L501 and L502	7143944-P2	Choke, RF: 120 µh ±10%, .064 ohm DC res max.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q501	19A115792-P1	Silicon, PNP.
Q503* and Q504*	19A116203-P2	Silicon, NPN.
		Earlier than REV D:
	19A115527-P1	Silicon, NPN.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R501	5493035-P22	Wirewound: 130 ohms ±5%, 5 w; sim to Tru-Ohm Type X-60.
R502	3R79-P102K	Composition: 1000 ohms ±10%, 2 w.
R503	5493035-P19	Wirewound: 67 ohms ±5%, 5 w; sim to Tru-Ohm Type X-60.
		- - - - - - - - - - TRANSFORMERS - - - - - - - - -
T501	19C303894-G2	Transformer.
		- - - - - - - - - TERMINAL BOARDS - - - - - - - - -
TB501	7117710-P5	Phen: 5 terminals; sim to Cinch 1775.
		COMPONENT BOARD 19C311175-G1
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C501	19A115680-P9	Electrolytic: 120 µf +150%-10%, 26 VDCW; sim to Mallory Type TT.
C502*	19A115680-P3	Electrolytic: 20 µf +150% -10%, 25 VDCW; sim to Mallory Type TT.
		Earlier than REV A:
	5496267-P14	Tantalum: 15 µf ±20%, 20 VDCW; sim to Sprague Type 150D.
C503	19A115028-P119	Polyester: 0.47 µf ±20%, 100 VDCW.
C504	5496267-P14	Tantalum: 15 µf ±20%, 20 VDCW; sim to Sprague Type 150D.
C505	19A115028-P112	Polyester: .068 µf ±20%, 200 VDCW.
C506 and C507	19A115680-P9	Electrolytic: 120 µf +150%-10%, 26 VDCW; sim to Mallory Type TT.
C510*	5491189-P5	Polyester: .068 µf ±20%, 50 VDCW. Added by REV A.
C512*	5491189-P2	Polyester: .022 µf ±20%, 50 VDCW. Added by REV C.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR501 thru CR507	4037822-P1	Silicon.
CR508	19A115250-P1	Silicon.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q502	19A115300-P1	Silicon, NPN; sim to Type 2N3053.
Q505 and Q506	19A115768-P1	Silicon, PNP; sim to Type 2N3702.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R504	3R77-P391K	Composition: 390 ohms ±10%, 1/2 w.
R505	3R77-P102K	Composition: 1000 ohms ±10%, 1/2 w.
R506	3R77-P103K	Composition: 10,000 ohms ±10%, 1/2 w.
R507	3R77-P102K	Composition: 1000 ohms ±10%, 1/2 w.
R508	3R77-P512J	Composition: 5100 ohms ±5%, 1/2 w.
		BATTERY CABLE 19B205623-G1
		- - - - - - - - - - FUSES - - - - - - - - - -
F501	1R16-P8	Quick blowing: 5 amps at 250 v; sim to Littelfuse 312005 or Bussmann MTH-5.
		- - - - - - - - - - SOCKETS - - - - - - - - - -
XF501	19A115776-P2	Phenolic: sim to Bussmann Type HHJ.
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19C311147-P1	Heat Sink.
	19A122484-P1	Spacer, hex. (Located between component board and housing).
	7118719-P4	Clip, spring tension: sim to Prestole E-50005-038. (Used with LS501 and LS502).
	19A122538-G1	Cable, battery. (Brown)
	4036555-P1	Insulator, washer: nylon. (Used with Q502).
	19A115730-P1	Insulator, bushing. (Used with Q503 and Q504).
	19A116023-P2	Insulator, plate. (Used with Q503 and Q504).
	N402P35	Washer. (Used with Q503 and Q504).

*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 - To assure that the converter stops when the load is removed. Changed C502, deleted C509 and added C510.

REV. B & REV. C - To allow use of higher gain transistor.
REV. B - Added C511
REV. C - Added C512

REV. D - To incorporate a different transistor. Changed Q503 and Q504.

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.

MOBILE RADIO DEPARTMENT
GENERAL ELECTRIC COMPANY • LYNCHBURG, VIRGINIA 24502

GENERAL ELECTRIC

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