MOBILE RADIO

MAINTENANCE MANUAL

VEHICULAR CHARGER MODELS 4EP63A10 & 4EP63A11 (OPTIONS 4353 THRU 4357, 4359 & 4364)

SPECIFICATIONS *

VEHICULAR CHARGER

Model 4EP63A10	12-Volt, Negative Ground				
Model 4EP63A11	12 to 72 Volts, ± Ground				
Used With	PR Series Two-Way Radios				
Input Voltage	12 V (Neg. Gnd)	12 V (±Gnd)	24 V (±Gnd)	48 V (±Gnd)	72 V (±Gnd)
Current Drain					
Charging	210 mA	400 mA	200 mA	200 mA	200 mA
Not Charging	20 mA	300 mA	150 mA	150 mA	150 mA
Charging Current	200 mA	200 mA	200 mA	200 mA	200 mA
Trickle-Charge Current	75 mA	75 mA	75 mA	75 mA	75 mA
Maximum Charge Time					
100% Charge	14 hours				
70% Charge	6 hours				
Temperature Range	+5°C to 45°C (+41°F to 113°F)				

SPEAKER AMPLIFIER

Audio Power Output	10 Watts
Audio Input	500 Milliwatts
Distortion	Less than 10% at rated audio
Power Drain	
Standby	80 Milliamperes
Full Power	1.5 amperes maximum
Input Voltage	±12 and ±24 volts

*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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OPTIONS

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12-Volt, ± Ground Charger	4354
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12-Volt, Neg. Ground Charger, Junction Box 19C317619G1, Microphone Model 4EM25E10, and Speaker Model 4EZ18A13	4359
Handset Model 4EM26C10 and Hookswitch 19B204867-G7	4364

WARNING

Under no circumstances should any person be permitted to handle any portion of 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 Vehicular Charger Models 4EP63A10 and 4EP63A11 are used for mounting MASTR Personal PR Series two-way radios in a vehicle so that the radio can be used as a mobile unit while recharging the battery. The vehicular charger will recharge the nickel-cadmium battery in the radio in 14 hours or less.

The charger is equipped with a circuit that prevents the battery from overcharging. When the battery is charged to 70% of capacity, the circuit switches to trickle charge for the remainder of the charging time (approximately 5 to 6 hours). The radio can be left on trickle charge indefinitely without damage to the battery.

When necessary to leave the vehicle, the radio can be locked in the charger, or quickly removed from the charger and carried with the operator.

The optional junction box provides connections to the radio for a 10-watt speaker-amplifier and military microphone. A handset and hookswitch option is available for applications where the military microphone is not required. The hookswitch provides speaker muting whenever the handset is removed.

INSTALLATION

CHARGER

Install the charger where it will be within convenient reach of the operator, and where it will not interfere with the safe operation of the vehicle. The charger is normally mounted on the underside of the instrument panel.

To mount the charger:

1. Use the mounting bracket as a template and drill the two pilot holes with a #29 (9/64-inch) drill.
2. Attach the bracket to the mounting surface with the #10 x 5/8-inch self-tapping screws and lockwashers provided.
3. Mount the charger in the mounting bracket with the four machine screws and lockwashers provided.
4. Connect the Red fused lead to battery plus, and the Black fused lead to battery negative. Leave sufficient slack so that the charger may be pulled out of its case for servicing with the power applied.

ANTENNA

Installation instructions for the antenna are packaged with the antenna. The antenna must be installed in accordance with good engineering practice for optimum results.

For the 132—470 MHz antenna, the most effective mounting position is usually in the center of the roof of the vehicle. The antenna cable will normally run from antenna jack J502 on the back of the charger, behind sections of the interior trim to a door or window post, and then up between the roof and header in the passenger compartment to the antenna base.

JUNCTION BOX

The junction box should be installed where it will not interfere with the safe operation of the vehicle. The junction box can be mounted on the underside of the vehicular charger or instrument panel. To install the junction box, refer to the Junction Box Installation Instructions as listed in the Table of Contents.

SPEAKER-AMPLIFIER

Mount the speaker where it will direct sound to the operator but not interfere with his vision. In exposed locations or areas of high humidity, mount the speaker so that moisture will not accumulate in the speaker cone.

The universal mounting bracket enables the speaker to be mounted on the top or bottom of the instrument panel, on the firewall, above the windshield in trucks, or behind the speaker grille in some vehicles.

To mount the speaker:

1. Use the mounting bracket as a template and drill three mounting holes with a #29 (9/64-inch) drill.
2. Attach the bracket to the mounting surface with the #10 x 5/8-inch self-tapping screws supplied with the unit.
3. Attach the speaker to the mounting bracket and connect the speaker plug cable to the speaker jacks on the junction box.

HANDSET & HOOKSWITCH

Mount the hookswitch where the handset will be within easy reach of the operator

but will not interfere with the safe operation of the vehicle. To mount the hookswitch:

1. Use the hookswitch as a template and drill the two mounting holes with a #32 (1/8-inch) drill.

2. Mount the hookswitch with the two #8 x 1-1/4 inch screws provided.

3. Connect the hookswitch leads to TB2 in the speaker as shown in the Hookswitch Installation Instructions listed in the Table of Contents.

4. Connect the handset plug to the microphone jack on the junction box.

OPERATION

To use the vehicular charger, place the radio into the charging insert with the speaker facing down (see Figure 1). Then press in the radio against the bottom of the charging insert until the latch catches, holding the radio in the charger. This automatically connects the radio to the external antenna (if present). Next, turn the OFF-ON switch to the ON position. The red Charge light will glow when the battery is charging.

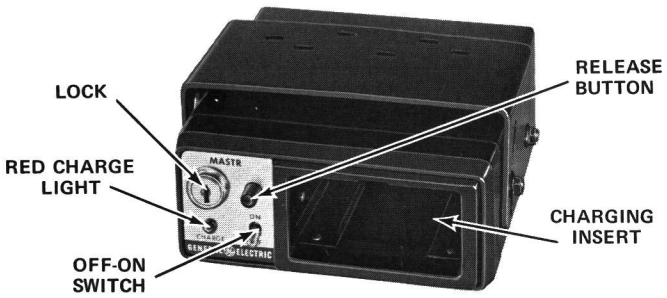


Figure 1 - Layout Diagram

The radio can be used to send and receive messages while charging - although it will probably take longer to recharge the battery. An external microphone and a Personal Series radio equipped for Remote Push-To-Talk are required for this application.

To remove the radio from the charger, simply press the release button on the front of the charger and slide the radio out of the insert. When it is necessary to leave the radio in the charger, use the key supplied with the charger and turn the lock all the way to the right. This blocks the release button, locking the radio in the charger.

When using the 10-watt speaker, set the speaker output for a comfortable listening level with the VOLUME control on the radio.

NOTE

Due to the temperature characteristics of nickel-cadmium batteries, the batteries will not accept a full charge at temperature extremes. For maximum capacity, recharge the battery pack at a room temperature of from 65° to 85° Fahrenheit whenever possible.

CIRCUIT ANALYSIS

VEHICULAR CHARGES

Both of the vehicular chargers are equipped with an OFF-ON switch, red CHARGE light, charging circuit, lock and fused power leads. The 4EP63A11 is also equipped with a DC-to-DC converter to permit operation in positive and negative ground vehicle systems. Modifications required for positive or negative ground, 12-volt through 72-volt operation are listed in the Maintenance section of this manual (see Table of Contents).

References to symbol numbers mentioned in the following text can be found on the Schematic Diagram, Outline Diagram and Parts List (see Table of Contents).

DC-To-DC Converter

Transistors Q1 and Q2 and transformer T1 on charger board A502 operate as a conventional, inductively-coupled DC-to-DC converter. Placing S501 in the ON position applies the supply voltage to the collectors of Q1 and Q2 through the primary windings of T1.

Q1 and Q2 act as switches, with one conducting while the other is off. Due to the inherent differences in the transistors, one will start conducting before the other when power is applied to their emitters.

Assume that Q1 starts to conduct first, causing current to flow through one half of the primary winding of T1. The induced voltage in the feedback winding of T1 is coupled to the base of Q1, further increasing collector current. Regenerative action continues until the primary of T1 is saturated. When saturation is reached, there is no increase of collector current and no voltage is induced in the feedback winding. The magnetic field starts to collapse, sending a current through the transformer in the opposite direction. This reverses the polarity of the induced voltage in the feedback winding which cuts off Q1 and

provides a forward bias for Q2 causing it to conduct. The two transistors continue to conduct alternately at a frequency of approximately 4000 hertz.

The AC voltage developed across the secondary windings of T1 is rectified by CR3 through CR6 and applied to the charging circuit.

Charging Circuit

Placing a radio into the charger causes Q3 to conduct, applying a 200 milliampere charging current to the battery. The charging current is limited by CHARGE light DS501.

When Q3 is conducting, Q4 and Q5 are turned off. Whenever the battery charges up to 70% of capacity, the voltage developed across the voltage reference circuitry (VR1, CR7, CR8, R8, R4 and R7) causes Q4 to start conducting. This causes Q3 to begin to turn off. As Q3 starts turning off, its collector voltage begins to rise. When the voltage rises to over 11 volts, Zener diode VR3 conducts and turns on Q4. Turning on Q4 turns off Q3 and CHARGE light DS501. The switching action is assisted by this positive feedback through VR3.

When Q3 is turned off, the circuit is "latched" in the trickle-charge mode. The trickle-charge current is limited by current limiting resistor R13. The charger will remain on trickle-charge until the radio is removed from the charger.

The setting of potentiometer R4 determines the voltage level that causes the charger to switch to the trickle-charge mode. Complete instructions for setting R4 are contained in the Adjustment section as listed in the Table of Contents.

Removing the radio from the charger causes the voltage at the positive charging terminal to rise to approximately 14 Volts. The voltage at the junction of R8 and R10 rises to approximately 5 Volts, which turns on Q5. Turning on Q5 turns off Q4 and keeps C3 discharged, resetting the charging circuit. Load resistor R14 and Zener diode VR2 keep the converter input voltage from rising in 48- and 72-volt systems when no radio is in the charger.

Placing a radio into the charger instantly turns off Q5. Capacitor C3 keeps Q4 turned off so that Q3 starts conducting, re-starting the charging cycle.

SPEAKER-AMPLIFIER

Speaker-Amplifier Model 4EZ18A13 is designed for operation in 12- and 24-volt systems only. The speaker-amplifier is normally shipped from the factory wired for 12-volt systems. Jumper charges for 24-volt systems are described in the MAINTENANCE section of this manual.

Audio from the Pager is coupled through transformer T1 to the base of the Class B, push-pull amplifier transistors Q1 and Q2. Base bias is provided by resistors R4, R5, R8, R9 and RT1. R5, R8 and R9 may be shorted by jumper leads to provide proper bias for the 24-volt operation. Thermistor RT1 and resistor R4 form a parallel compensating network which stabilizes the emitter current of Q1 and Q2 under varying temperature conditions.

The output taken from the emitters of Q1 and Q2 is coupled through impedance matching auto-transformer T2 to speaker LS2.

ADJUSTMENT

PREFERRED METHOD

Potentiometer R4 is adjusted and secured with a sealant at the factory to prevent tampering. However, if either CR7, CR8, VR1 or Q4 is replaced, it is recommended that R4 be replaced to facilitate adjustment. If it becomes necessary to adjust R4 and no replacement part is available, the sealant may be loosened by heating the metal ring on R4 with a soldering iron while making the adjustment.

Calibrator Model 4EX10A10 is designed for use with the desk charger and multi-charger for properly setting R4. When using the calibrator, set R4 as follows:

1. Remove the charger from its housing, as directed in the Disassembly Procedure.

2. Connect a clip lead from the red jack on the calibrator to the positive charger terminal (E501). Then connect a clip lead from the black jack on the calibrator to the negative charger terminal (E502).

3. Place the calibrator switch in Position B.

4. Rotate R4 until the CHARGE light turns on. Then carefully adjust R1 until the CHARGE light just turns off.

ALTERNATE METHOD

This alternate method of adjusting R4 may be used if Calibrator Model 4EX10A10 is not available. This procedure requires a DC-VTVM that is accurate to .02 Volts, and a fully charged battery pack.

CAUTION

Failure to adjust potentiometer R4 to within .02-volt may result in an insufficient charge or damage to the battery.

Set R1 as follows:

1. Connect the positive meter lead to the positive charging terminal (E501) and the negative meter lead to the negative charging terminal (E502).

2. Place the battery into the charger. If necessary, rotate R4 until the CHARGE light turns on. Then turn R4 until the light just turns off.

3. Remove and then replace the battery pack in the charger. Note the meter reading when the CHARGE light turns off. If reading is not 8.35 Volts, adjust R4 slightly.

4. Repeat Step 3 until the CHARGE light turns off when the meter reads 8.35 Volts.

MAINTENANCE

CHARGER

To gain access to the charger circuitry for servicing, remove the four Phillips-head screws in the rear of the housing and slide the charger out of the housing.

To remove A501/A502 for servicing, remove the Phillips-head screws in each corner of the board. Next, remove the CHARGE light from its holder and carefully lift the board out of the chassis.

To replace the CHARGE light; remove the two screws in each side of the front casting then pull off the casting.

SPEAKER-AMPLIFIER

To gain access to the speaker-amplifier circuitry, remove the two screws on each side of the speaker case. Then lift off the front section of the speaker housing.

TROUBLESHOOTING

Should a difficult service problem arise, the Troubleshooting Procedure for the Charger listed in the Table of Contents is provided to assist the serviceman. The procedure includes DC voltage readings of the transistor stages in the charge, trickle-charge and reset mode, and voltage readings for the converter circuit.

CHARGER VOLTAGE CHANGES

The following circuit changes must be performed when changing the 4EP63A11 for 12-, 24-, 48- and 72-volt, positive or negative ground operation. Refer to the Outline and Schematic Diagrams for the location of components changed.

12-Volt Operation

1. Connect a jumper from H9 to H11, and from H14 to H16 on charger board A502.

2. If present, remove dropping resistor R1 or R2 (located under the shield on the back of the charger housing) and connect a jumper from TB1-1 to TB2-1.

24-Volt Operation

1. Connect a jumper from H9 to H10, and from H15 to H16 on charger board A502.

2. If present, remove dropping resistor R1 or R2 (located under the shield on the back of the charger housing) and connect a jumper from TB1-1 to TB2-1.

48-Volt Operation

1. Connect a jumper from H9 to H10, and from H15 to H16 on charger board A502.

2. If present, remove the jumper connected from TB1-1 to TB2-1.

3. Mount dropping resistor R1 (125 ohms, 20 watts) as shown on the Outline Diagram. Connect one lead to TB1-1 and the other lead to TB2-1. Sleeve the leads before connecting.

4. Mount the protective shield (19B216774-P1) over R1.

72-Volt Operation

1. Connect a jumper from H9 to H10, and from H15 to H16 on charger board A502.

2. If present, remove the jumper connected from TB1-1 to TB2-1.

3. Mount dropping resistor R2 (250 ohms, 20 watts) as shown on the Outline Diagram. Connect one lead to TB1-1 and the other to TB2-1. Sleeve the leads before connectiong.

4. Mount the protective shield (19B216774-P1) over R2.

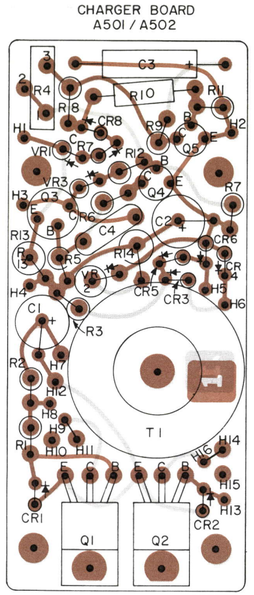
SPEAKER VOLTAGE CHANGES

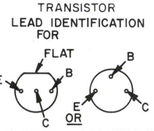
The speaker-amplifier Schematic Diagram is shown with the jumper connections made for 12-volt operation. Refer to the Outline and schematic Diagram for the location of components mentioned in the following procedure.

For 24-Volt Operation

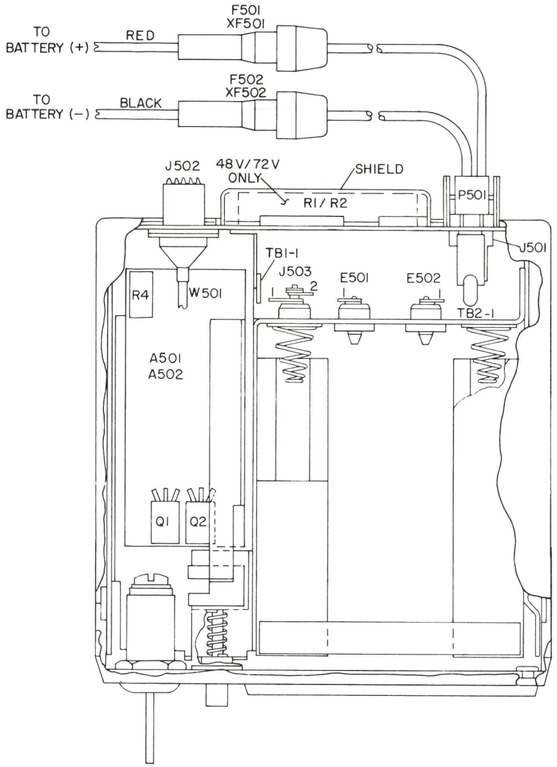
1. Connect P1 to TB2-J3.
2. Connect P2 to TB2-J6.
3. Connect P3 to TB1-J3.

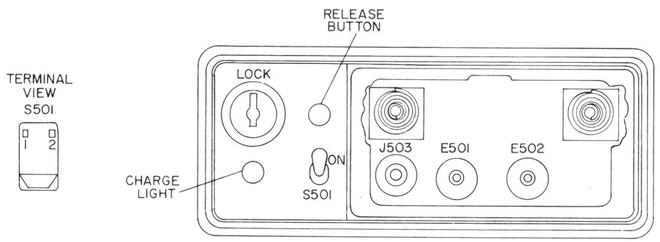
OUTLINE DIAGRAM





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





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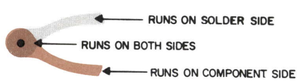
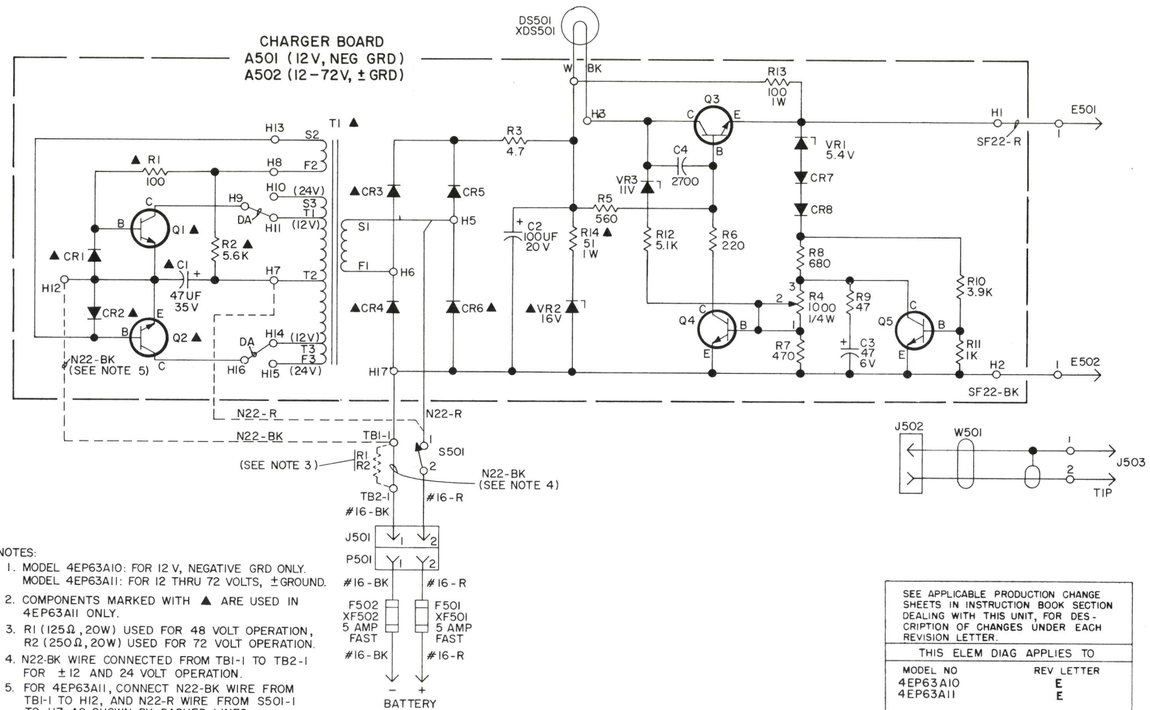
(19B216705, Sh. 1, Rev. 1)
(19B216705, Sh. 2, Rev. 1)



SCHEMATIC DIAGRAM



NOTES:

1. MODEL 4EP63A10: FOR 12 V, NEGATIVE GRD ONLY. MODEL 4EP63A11: FOR 12 THRU 72 VOLTS, ±GROUND.
2. COMPONENTS MARKED WITH ▲ ARE USED IN 4EP63A11 ONLY.
3. RI (125Ω, 20W) USED FOR 48 VOLT OPERATION, R2 (250Ω, 20W) USED FOR 72 VOLT OPERATION.
4. N22-BK WIRE CONNECTED FROM TBI-1 TO TB2-1 FOR ±12 AND 24 VOLT OPERATION.
5. FOR 4EP63A11, CONNECT N22-BK WIRE FROM TBI-1 TO HI2, AND N22-R WIRE FROM S501-1 TO H7 AS SHOWN BY DASHED LINES.
6. DA= #22 AWG WIRE SIZE.

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
4EP63A10	E
4EP63A11	E

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.

(19C317304, Rev. 8)

SCHEMATIC & OUTLINE DIAGRAM

VEHICULAR CHARGER MODELS 4EP63A10 & 11

Issue 2

PARTS LIST

LBI-4079A

VEHICULAR CHARGER
4EP63A10 12 V NEG GRD
4EP63A11 12/24 POS or NEG GRD

SYMBOL	GE PART NO.	DESCRIPTION
A501 and A502		COMPONENT BOARD A501 19C317252G1 A502 19C317252G2
		- - - - - - - - - CAPACITORS - - - - - - - - -
C1	5496267P20	Tantalum: 47 µf ±20%, 35 VDCW; sim to Sprague Type 150D.
C2	5496267P16	Tantalum: 100 µf ±20%, 20 VDCW; sim to Sprague Type 150D.
C3	5496267P2	Tantalum: 47 µf ±20%, 6 VDCW; sim to Sprague Type 150D.
C4	5494481P127	Ceramic disc: 2700 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
		- - - - - - - - DIODES AND RECTIFIERS - - - - - -
CR1 and CR2	19A115250P1	Silicon.
CR3 thru CR6	5494922P3	Silicon. sim to 1N458.
CR7 and CR8	19A115250P1	Silicon.
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q1 and Q2	19A116118P1	Silicon, NPN.
Q3	19A115300P1	Silicon, NPN; sim to Type 2N3053.
Q4	19A115362P1	Silicon, NPN; sim to Type 2N2925.
Q5	19A115123P1	Silicon, NPN; sim to Type 2N2712.
		- - - - - - - - - - RESISTORS - - - - - - - - -
R1	3R77P101K	Composition: 100 ohms ±10%, 1/2 w.
R2	3R77P562K	Composition: 5600 ohms ±10%, 1/2 w.
R3	7147161P12	Composition: 4.7 ohms ±10%, 1/2 w.
R4*	19B209358P103	Variable, carbon film: approx 25 to 1000 ohms ±10%, 0.2 w; sim to CTS Type X-201.
		In Models of REV B and earlier:
	19B209358P102	Variable, carbon film: approx 25 to 500 ohms ±10%, 0.2 w; sim to CTS Type X-201.
R5	3R77P561K	Composition: 560 ohms ±10%, 1/2 w.
R6	3R77P221K	Composition: 220 ohms ±10%, 1/2 w.
R7*	3R77P471J	Composition: 470 ohms ±5%, 1/2 w.
		In Models of REV A and B:
	3R77P391J	Composition: 390 ohms ±5%, 1/2 w.
		In Models earlier than REV A:
	3R77P361J	Composition: 360 ohms ±5%, 1/2 w.
R8*	3R77P681J	Composition: 680 ohms ±5%, 1/2 w.
		In Models of REV A and earlier:
	3R77P511J	Composition: 510 ohms ±5%, 1/2 w.
R9	3R77P470K	Composition: 47 ohms ±10%, 1/2 w.
R10	3R77P392K	Composition: 3900 ohms ±10%, 1/2 w.
R11	3R77P102K	Composition: 1000 ohms ±10%, 1/2 w.
R12	3R77P512J	Composition: 5100 ohms ±5%, 1/2 w.
R13	3R78P101J	Composition: 100 ohms ±5%, 1 w.
R14	3R78P510J	Composition: 51 ohms ±5%, 1 w.
		- - - - - - - - - TRANSFORMERS - - - - - - - - -
T1	19C317251G1	Coil.
		- - - - - - - - VOLTAGE REGULATORS - - - - - - - -
VR1	4036887P5	Silicon, Zener.
VR2	19A115528P6	Silicon, Zener.
VR3	4036887P8	Silicon, Zener.
		- - - - - - - - - INDICATORS - - - - - - - - -
DS501	19C307037P29	Lamp, incandescent: 6.3 v; sim to GE 44.
		- - - - - - - - - - TERMINALS - - - - - - - - -
E501 and E502		(See RC-1931, items 33, 36 thru 40).
		- - - - - - - - - - FUSES - - - - - - - - - -
F501 and F502	1R16P8	Quick blowing: 5 amps at 250 v; sim to Littelfuse 312005 or Bussmann MTH-5.
		- - - - - - - - JACKS AND RECEPTACLES - - - - - -
J501		(See RC-1931, 43, 44).
J502		(Part of W501).
J503		(See RC-1931, items 26 thru 36).
		- - - - - - - - - - PLUGS - - - - - - - - - -
P501		(See RC-1931, items 41, 42).
		- - - - - - - - - - SWITCHES - - - - - - - - - -
S501	5491899P5	Toggle: SPDT, 3 amps at 250 VAC; sim to Cutler-Hammer 8280K15.
		- - - - - - - - TERMINAL BOARDS - - - - - - - - -
TB1 and TB2	7775500P44	Phen: 2 terminals.
		- - - - - - - - - - CABLES - - - - - - - - - -
W501	19A127521G2	RF: approx 6 inches long. (Includes J502).
		- - - - - - - - - - SOCKETS - - - - - - - - - -
XDS501	4032220P1	Lampholder, miniature: sim to Drake N517.
XF501	19A122111G1	Fuse lead.
XF502	19A122111G4	Fuse lead.
		MODIFICATION KIT 19A127671G1 48 V +/- GRD 19A127671G2 72 V +/- GRD
		- - - - - - - - - - RESISTORS - - - - - - - - -
R1	5493035P36	Wirewound: 125 ohms ±10%, 20 w; sim to Hamilton Hall Type HR.
R2	5493035P37	Wirewound: 250 ohms ±10%, 20 w; sim to Hamilton Hall Type HR.
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19B216774P1	Shield.
		- - - - - - - - - - ANTENNAS - - - - - - - - - -
	4EY12A13	132-470 MHz Antenna.
		MECHANICAL PARTS (RC-1931)
1	19A121902G1	Mounting bracket.
2	19A121891G2	Cover.
3	4036555P1	Insulator, washer: nylon. (Used with Q3 on A501 and A502).
4	19B216888P1	Actuator.
5	19A128033P1	Spring.
6	19A127777G1	Locking plate.
7	19A127776P1	Pin.
8	19C307038P3	Nut, push on.
9	19C317288G1	Chassis.
10	19D413410G1	Support.
11	19A127392P1	Spring.
12	19C317260P1	Casting.
13	19C317255P1	Sleeve.
14	19C317276P1	Guide.
15	19C317276P2	Guide.
16	19B216731P1	Support.
17	19B216726P1	Button.
18	19A127633P1	Spring.
19	19C317271P1	Plunger.
20	5491682P9	Cam, lock.
21	5491682P18	Lock, rim.
22	19B216312P2	Contact.
23	NP257986	Nameplate.
24	19C307038P6	Nut, push on.
25	19B204949P1	Jewel, red.
26	19B216533P1	Contact. (Part of J503).
27	19A127502P1	Insulator. (Part of J503).
28	19B216536P1	Collar. (Part of J503).
29	19B216714P2	Bushing. (Part of J503).
30	N402P4C13	Flatwasher, No. 3. (Part of J503).
31	N207P3C13	Nut: No. 2 56 x 3/16. (Part of J503).
32	N402P2C13	Flatwasher, No. 2. (Part of J503).
33	4033714P14	Terminal, solderless. (Part of J503, E501, and E502).
34	4033714P3	Terminal, solderless. (Part of J503).
35	19A129130P1	Spring. (Part of J503).
36	19C307038P9	Nut, push on. (Part of J503, E501 and E502).
37	19A127497P1	Pin, contact. (Part of E501 and E502).
38	N402P33C13	Flatwasher, No. 2. (Part of E501 and E502).
39	N80P5003C13	Phillips screw, No. 2-56 x 3/16. (Part of E501 and E502).
40	19A127498P1	Spring. (Part of E501 and E502).
41	19A115884P8	Contact, electrical. (Part of P501).
42	19A115884P6	Shell. (Part of P501).
43	19A115884P5	Shell. (Part of J501).
44	19A115884P7	Contact, electrical. (Part of J501).

*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.

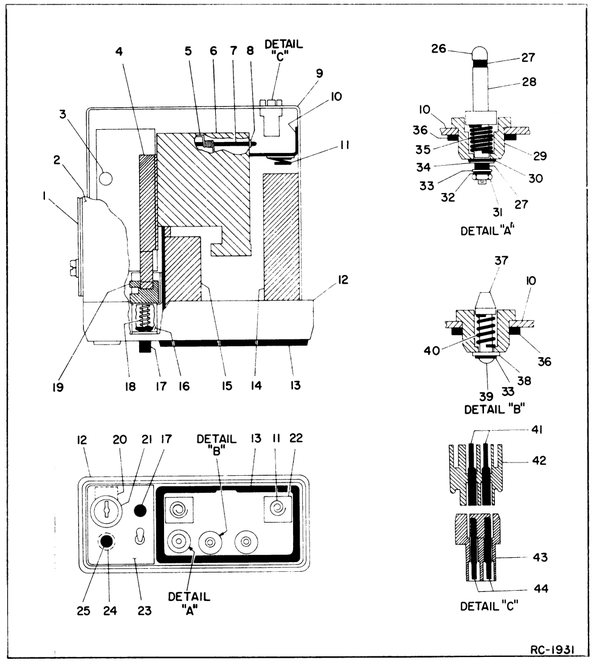
REV. A - To shift the adjustment range of the changer shut-off point, changed R7.

REV. B - To allow aroper setting of Charger shut-off point. Changed R8.

REV. C - To provide adjustment of the cut-off circuit with a wide range of diode tolerances. Changed R4 and R7.

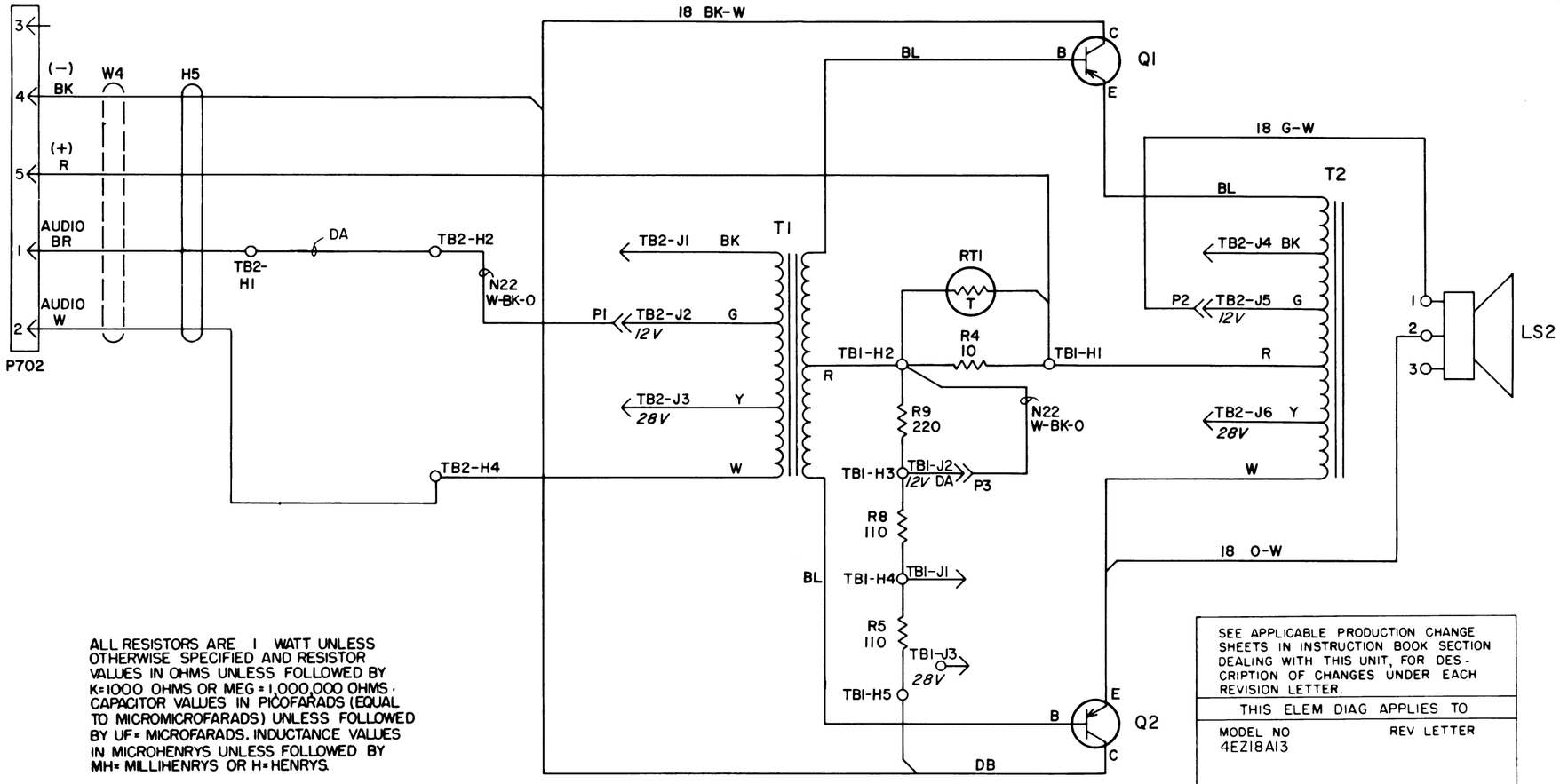
REV. D - To provide one key for all charger locks. Changed lock 5491682-P15.

REV. E - To improve the antenna connection. Redesigned the latching device and the antenna plug.



VEHICULAR CHARGER 4EP63A10,11

SCHEMATIC DIAGRAM



ALL RESISTORS ARE 1 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.

(19C317673, Rev. 0)

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
4EZ18A13	

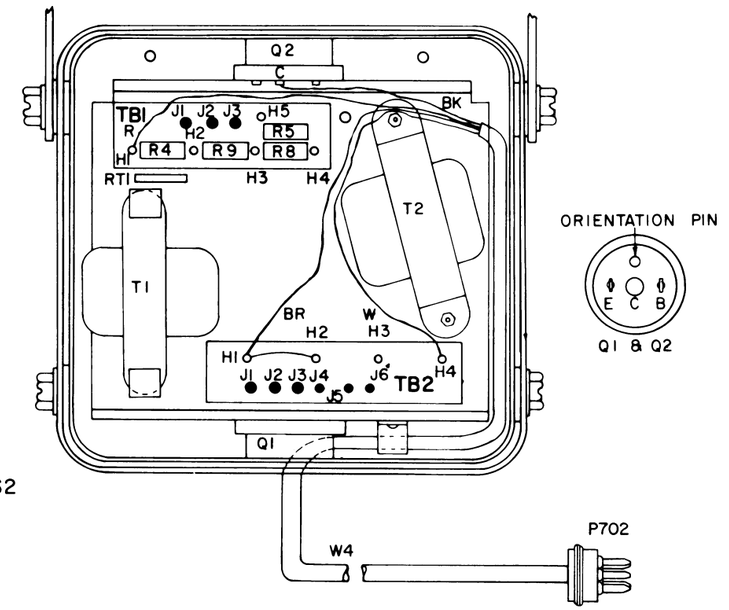
RESISTANCE READINGS

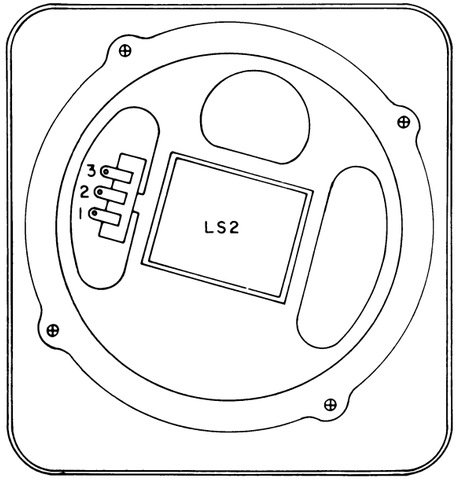
READINGS TAKEN FROM TRANSISTOR PIN TO RED LEAD OF SPEAKER CABLE (POSITIVE).

TRANSISTORS	BASE	EMITTER
Q1 & Q2	3.0Ω*	0.2Ω

*MEASURED AT 70° F AMBIENT

OUTLINE DIAGRAM





(19C317906, Rev. 0)

SCHEMATIC & OUTLINE DIAGRAM

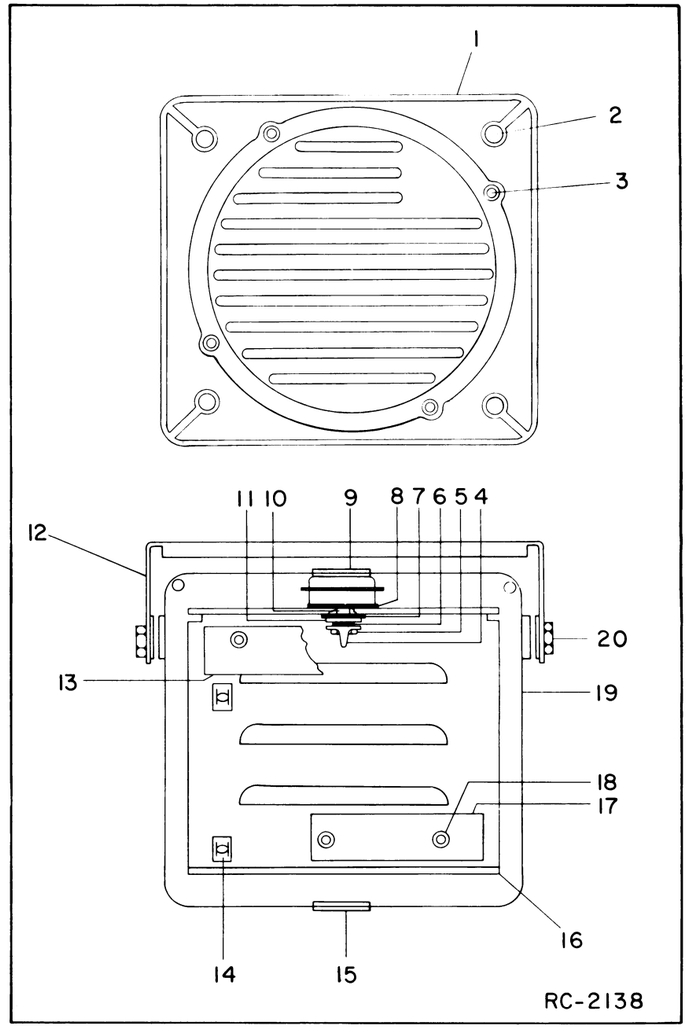
SPEAKER-AMPLIFIER
MODEL 4EZ18A13

PARTS LIST

LBI-4238

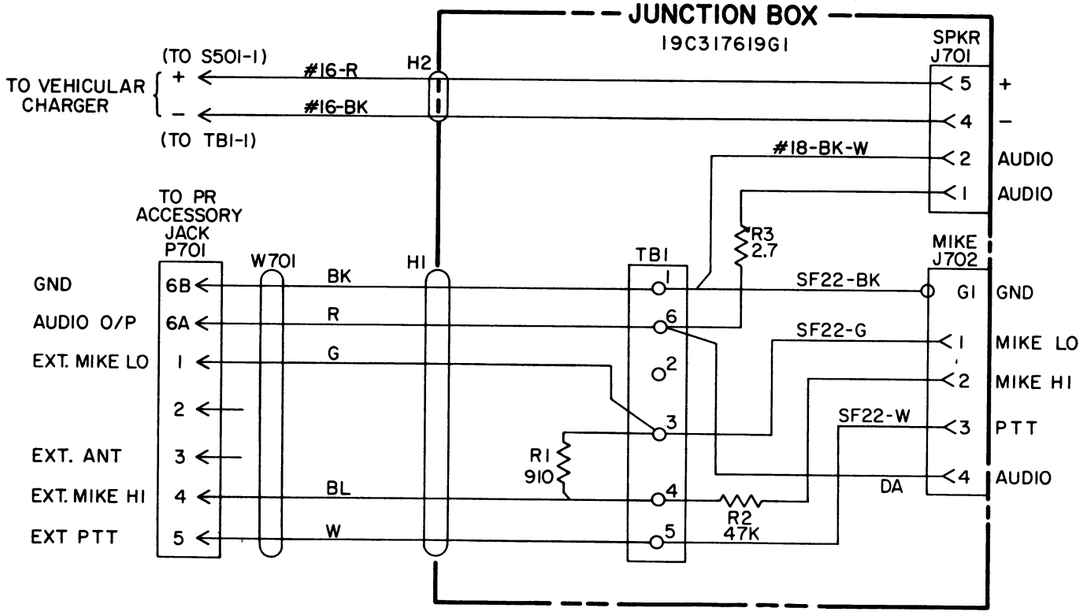
SPEAKER-AMPLIFIER
MODEL 4EZ18A13 (19D402449G16)

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - LOUDSPEAKERS - - - - - - - - -
LS2	5491260P7	Permanent magnet, 5-inch: 3.2 ohms ±10% voice coil imp, 15 w max operating, 385 Hz ±15% resonance, paper dust cap; sim to Jensen Model P5-VAS12761.
		- - - - - - - - - - - PLUGS - - - - - - - - - -
P1	4036731P1	Contact, friction: sim to Bead Chain M152-30.
P2	4029840P1	Contact, electrical: sim to AMP 41854.
P3	4029840P2	Contact, electrical: sim to AMP 42827-2.
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q1 and Q2	5490810P1	Germanium, PNP.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R4	3R78P100J	Composition: 10 ohms ±5%, 1 w.
R5	3R78P111J	Composition: 110 ohms ±5%, 1 w.
R8	3R78P111J	Composition: 110 ohms ±5%, 1 w.
R9	3R78P221J	Composition: 220 ohms ±5%, 1 w.
		- - - - - - - - - THERMISTORS - - - - - - - - -
RT1	19C300048P3	Disc: 1 ohm ±10%.
		- - - - - - - - - TRANSFORMERS - - - - - - - - -
T1	19B209220P1	Audio freq: 0.3-3 KHz freq range nominal, Pri: 0.17 ohm DC res max, Sec: 5.2 ohms DC res max.
T2	19B209218P1	Audio freq: 0.3-3 KHz freq range nominal, 0.3 ohm DC res max.
		- - - - - - - TERMINAL BOARDS - - - - - - - - -
TB1		BOARD 19A121707G1
		- - - - - - - JACKS AND RECEPTACLES - - - - - -
J1 thru J3	4033513P12	Contact, electrical: sim to Bead Chain L93-3.
TB2		BOARD 19A121291G1
		- - - - - - - JACKS AND RECEPTACLES - - - - - -
J1 thru J3	4033513P12	Contact, electrical: sim to Bead Chain R125-17.
J4 thru J6	4033513P4	Contact, electrical: sim to Bead Chain L93-3.
		- - - - - - - - - - CABLES - - - - - - - - - -
W4	19B205410G1	Power: 4-conductor, 300 VRMS, approx 4 feet (modified).
P702	5493018P2	Plug, phen: 5 contacts; sim to Cinch 204-31-05-010.
		MECHANICAL PARTS (SEE RC-2138)
1	19B216269G1	Housing.
2	19P201806P5	Insert.
3	19B201806P2	Insert.
4	4036835P1	Terminal: solder; sim to Shakeproof 2118-10-01-2520N.
5	4032596P1	Nut: No. 10-32.
6	N405P9C13	Lockwasher: No. 10.
7	19A115221P3	Insulator, washer: mica.
8	4031291P1	Insulator: approx 1-1/8 inch dia.
9	5490407P6	Grommet, rubber. (Upper)
10	4034215P2	Bushing: approx 3/8 inch dia.
11	4034225P1	Flatwasher: approx 1/2 inch dia.
12	19A121521G1	Mounting support.
13	19A121711P1	Insulator: approx 2-1/2 x 3/4 inches.
14	4038072P2	Speed nut: sim to Tinnerman C8092-632-1.
15	19A115470P1	Grommet, rubber: (Lower) sim to Atlantic India Rubber 2279 (without hole).
16	19B204603G2	Chassis.
17	19A121645P1	Insulator.
18	7150186P105	Spacer.
19	19A121550G3	Rear Cover.



*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

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.

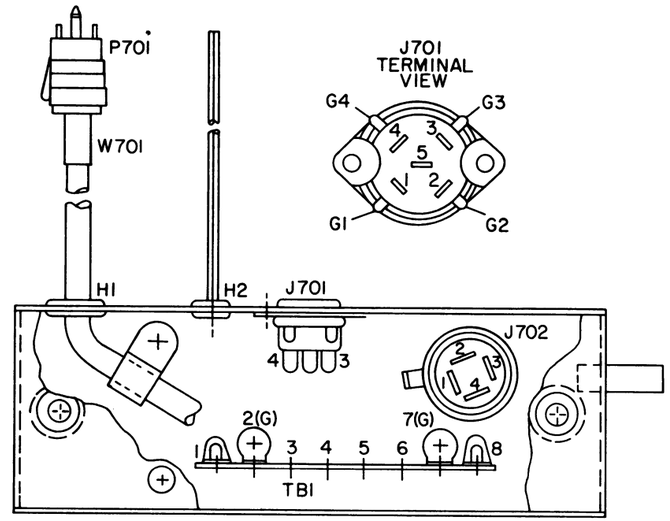
IN ORDER TO RETAIN RATED EQUIPMENT PERFORMANCE, REPLACEMENT OF ANY SERVICE PART SHOULD BE MADE ONLY WITH A COMPONENT HAVING THE SPECIFICATIONS SHOWN ON THE PARTS LIST FOR THAT PART.

(19B219120, Rev. 3)

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
PLI9C317619G1	A

OUTLINE DIAGRAM



(19B219343, Rev. 0)

SCHEMATIC & OUTLINE DIAGRAM

JUNCTION BOX 19C317619-G1

Issue 1

PARTS LIST

LBI-4235

JUNCTION BOX
19C317619G1

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - JACKS AND RECEPTACLES - - - - - -
J701	5493018P1	Connector: 5-contact, molded black phenolic, steel mounting saddle; sim to Cinch Mfg Co 203-41-05-081.
J702	19A116061P1	Connector, chassis: 4 female contacts; sim to Amphenol Type 91-PN4F-1000.
		- - - - - - - - - - - PLUGS - - - - - - - - - -
P701		(Part of W701).
		- - - - - - - - - RESISTORS - - - - - - - - - -
R701	3R77P911J	Composition: 910 ohms ±5%, 1/2 w.
R702	3R77P473J	Composition: 47,000 ohms ±5%, 1/2 w.
R703	7147161P6	Composition: 2.7 ohms ±5%, 1/2 w.
		- - - - - - - TERMINAL BOARDS - - - - - - - - -
TB1	7775500P24	Phen: 8 terminals.
		- - - - - - - - - - CABLES - - - - - - - - - -
W701	19B219027G1	Cable: approx 24 inches. (Includes P701).
		- - - - - - - - - MISCELLANEOUS - - - - - - - -
	19A116509P1	Holder (P701).
	5409407P2	Grommet, rubber. (Used with power cable).
	5490407P4	Grommet, rubber. (Used with W701).
	7763541P3	Clip, spring tension. (Used with W701).
	4031457P1	Support. (Part of Microphone Mounting bracket).
	4031458P1	Spring. (Part of Microphone Mounting bracket).

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

PRODUCTION CHANGES

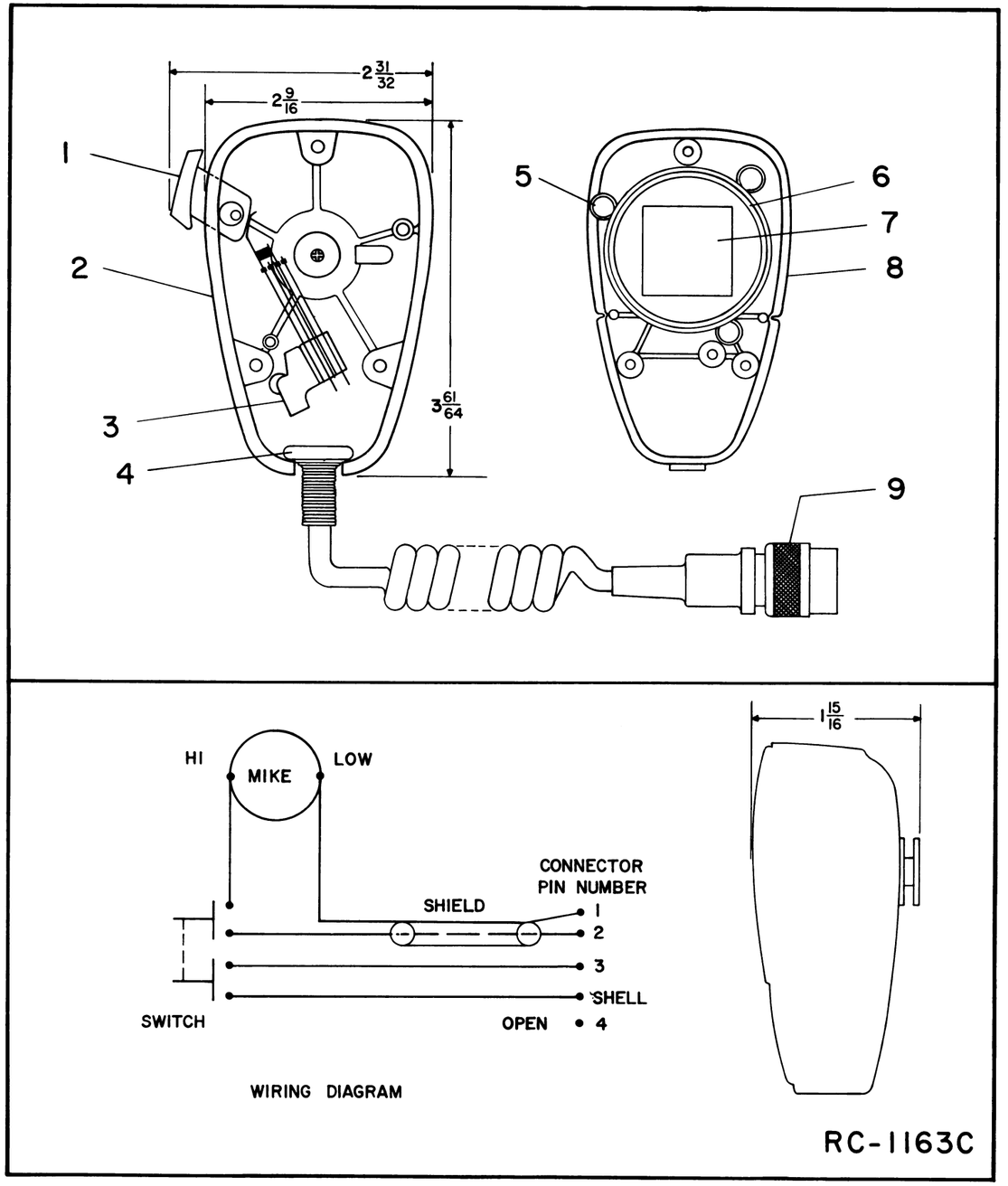
Changes in the equipment to improve performance or to simplify circuits are identified by a "Revision Letter", which is stamped on the unit includes all previous revisions. Refer to the Parts List for description of parts affected by these revisions.

REV. A - To reduce alternator whine.
Moved connections from TB1-2 to TB1-3.

PARTS LIST

LBI-4236

MICROPHONE
MODEL 4EM25E10
(19B209102P2)
(SEE RC-1163)

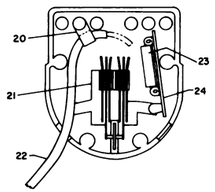


SYMBOL	GE PART NO.	DESCRIPTION
1		Cable clamp. Shure Brothers RP16.
2		Switch. Shure Brothers RP26.
3		Case (back) and mounting button: plastic. Shure Brothers RP96. (RP96 also includes item 8).
4		Switch button: gray plastic. Shure Brothers RP97.
5		Spring. Shure Brothers RP1.
6		Shield. Shure Brothers RP23.
7		Magnetic controlled cartridge. Shure Brothers RP13.
8		Case (front) plastic. Shure Brothers RP96. (RP96 also includes item 3).
9		Cable and plug: approx 6 feet long. Shure Brothers RP14.

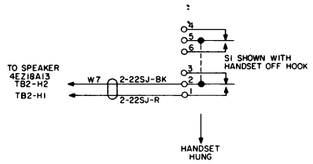
*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

SCHEMATIC & OUTLINE DIAGRAM

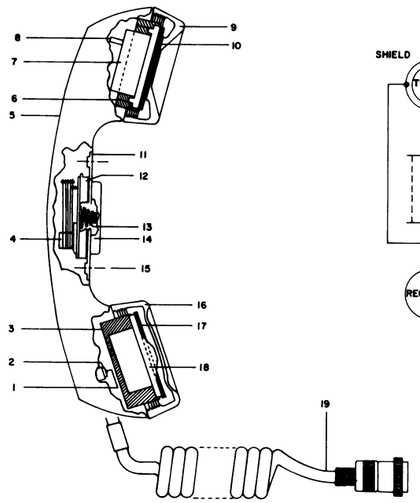
MILITARY MICROPHONE 4EM25E10

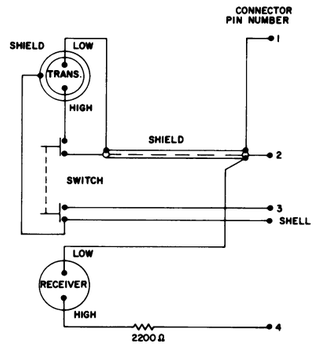


HOOKSWITCH



HOOKSWITCH
WIRING DIAGRAM





HANDSET
WIRING DIAGRAM

SCHEMATIC & OUTLINE DIAGRAM

HANDSET MODEL 4EM26C10 &
HOOKSWITCH 19B204867-G7

PARTS LIST
LBI-4237

HANDSET MODEL 4EM26C10
AND
HOOKSWITCH 19B204867G7

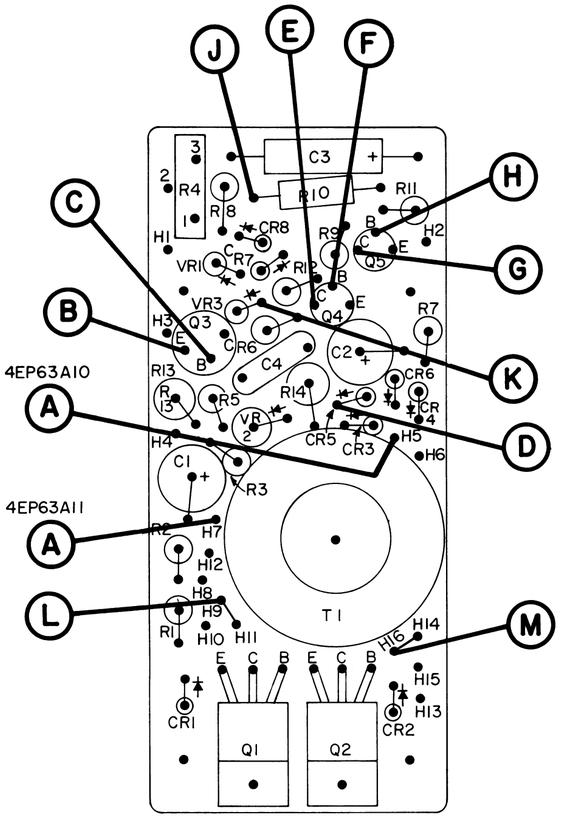
SYMBOL	GE PART NO.	DESCRIPTION
		HANDSET 19B209100P3
1		Self tap screw, bind head: No. 4 x 5/16. Shure Brothers 30C640C.
2		Cable clamp. Shure Brothers 53A532.
3		Shield. Shure Brothers RP19.
4		Switch. Shure Brothers RP81.
5		Handle. Shure Brothers RP49.
6		Adapter. Shure Brothers 65A230.
7		Magnetic controled cartridge. Shure Brothers RP41.
8	3R77P222K	Resistor, composition: 2200 ohms ±10%, 1/2 w.
9		Receiver cap. (Part of item 5).
10		Washer. Shure Brothers 34A321.
11		Escutcheon. Shure Brothers 53A536A.
12		Actuator. Shure Brothers 53A556.
13		Spring. Shure Brothers 44A140.
14		Plunger bar. Shure Brothers RP82.
15		Flat head screw, socket cap: No. 4-40 x 1/4. Shure Brothers 30C557B.
16		Transmitter cap. (Part of item 5).
17		Washer. Shure Brothers 34A309.
18		Magnetic controled cartridge, Transmitter. Shure Brothers RP13.
19		Cable and plug.
		HOOKSWITCH ASSEMBLY 19B204867G7
20	4029851P12	Cable clamp; sim to Weckesser 1/8-4-140.
21	19A121612P1	Holder and switch: thermoplastic case, contact rating 1 amp at 125 v.
22	19A128059P1	Cable: approx 3 feet long.
23		(Not Used).
24		(Not Used).

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

VOLTAGE READINGS FOR 4EP63A11

Except for readings at L and M , these voltage readings are typical DC readings measured with GE Test Set 4EX3A10, 4EX8K11 or equivalent 20,000 ohms-per-volt meter, and measured from the metering point shown to component board ground. AC readings measured with an AC-VTVM.

	Metering Point	With No Battery	High Charge Rate (Charge Light On)	Trickle Charge (Charge Light Off)
Ⓐ	Input Voltage at H7	13.6 V	13.6 V	13.6 V
Ⓑ	Q3 Emitter	15.2 V	7.5 - 8.4 V	8.1 - 8.5 V
Ⓒ	Q3 Base	15.8 V	8.1 - 9.1 V	4.9 V
Ⓓ	Rectifier Output Junction of CR5 and R3	16 V	14.8 V	15.7 V
Ⓔ	Q4 Collector	15.8 V	8.1 - 8.9 V	0.9 V
Ⓕ	Q4 Base			0.7 V
Ⓖ	Q5 Collector	0.08 V	0.8 V	0.6 V
Ⓗ	Q5 Base	0.74 V	0.2 - 0.35 V	0.3 V
Ⓙ	Junction of R8 and R10	8 V	1.6 V	1.6 V
Ⓚ	Junction of R12 and VR3	4.9 V	.45 - .6 V	4.2 V
Ⓛ	H9	13.6 DC 15.0 AC	13.6 DC 15.0 AC	13.6 DC 15.0 AC
Ⓜ	H16	13.6 DC 15.0 AC	13.6 DC 15.0 AC	13.6 DC 15.0 AC



(19D413695, Rev. 0)
(RC-1986)

VOLTAGE READINGS FOR 4EP63A10

These voltage readings are typical DC readings measured with GE Test Set 4EX3A10, 4EX8K11 or equivalent 20,000 ohms-per-volt meter, and measured from the metering point shown to component board ground.

	Metering Point	With No Battery	High Charge Rate (Charge Light On)	Trickle Charge (Charge Light Off)
Ⓐ	Input Voltage at H5	13.6 V	13.6 V	13.6 V
Ⓑ	Q3 Emitter	12.1 V	7.5 - 8.4 V	8.3 V
Ⓒ	Q3 Base	12.7 V	8.1 - 9.1 V	4 - 6 V
Ⓓ	Junction of CR5 and R3	12.8 V	12.5 V	12.6 V
Ⓔ	Q4 Collector	12.7 V	8.1 - 8.9 V	0.65 V
Ⓕ	Q4 Base	0.1 V		0.65 V
Ⓖ	Q5 Collector	0.1 V	0.5 - 0.7 V	0.7 V
Ⓗ	Q5 Base	0.7 V	0.2 - 0.3 V	0.3 V
Ⓙ	Junction of R8 and R10	5.0 V	1.5 V	1.5 V
Ⓚ	Junction of R12 and VR3	2.0 V	0.45 - 0.6 V	1.6 V

QUICK CHECKS

SYMPTOM	CHECK FOR:
Battery will not charge at the high rate (charge light won't come on).	1. Open DS501, F502 or F501 2. Defective Q3 3. Q5 not resetting charging circuit 4. Open C3, or battery contact damanged 5. On 4EP63A11, voltage input jumpers connected incorrectly
Battery pack won't charge at high rate.	1. Defective or excessively discharged battery 2. Defective VR3, R4, VR1, or R4 improperly adjusted
Charger switches to trickle charge too soon.	1. Improper adjustment of R4 - NOTE - A new battery will not reach full charge on 1st or 2nd charge-discharge cycle
Charger remains on high charge rate.	1. Improper adjustment of R4, or R4 defective 2. Shorted Q3 or open Q4 3. Shorted Q5 or Q3 4. On 4EP63A11, voltage input jumpers connected incorrectly

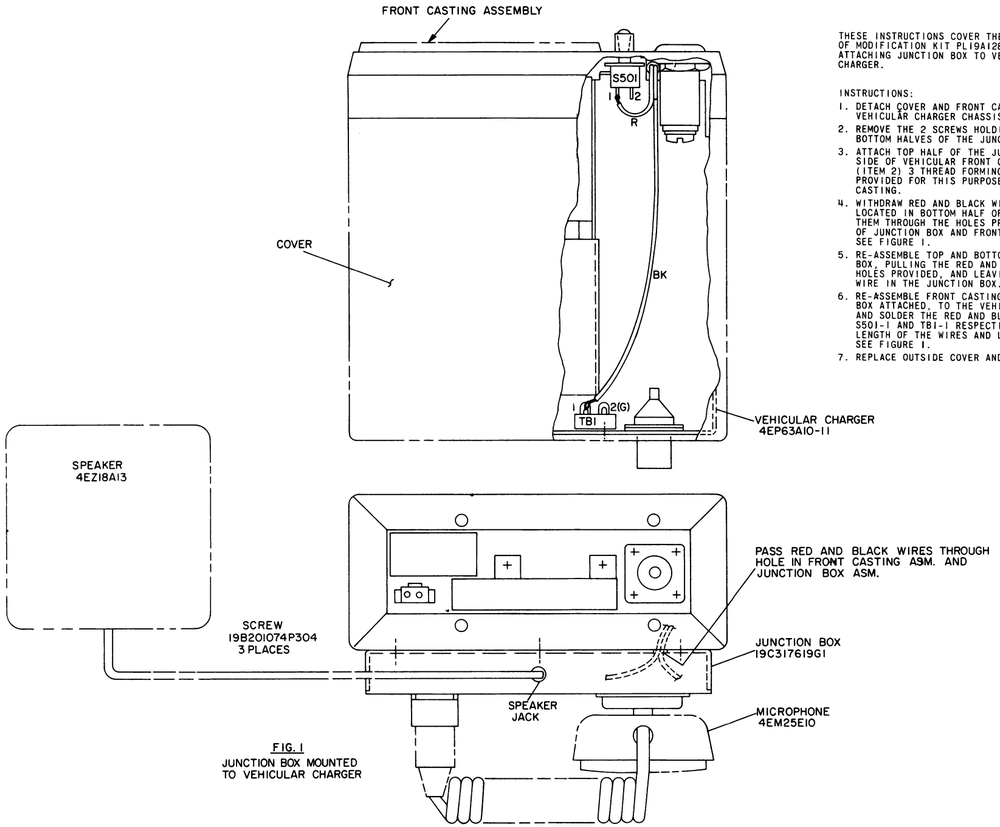


FIG. 1
JUNCTION BOX MOUNTED
TO VEHICULAR CHARGER

(19C317657, Sh. 1, Rev. 1)

THESE INSTRUCTIONS COVER THE INSTALLATION OF MODIFICATION KIT PL19A128050 FOR ATTACHING JUNCTION BOX TO VEHICULAR CHARGER.

INSTRUCTIONS:

1. DETACH COVER AND FRONT CASTING ASSEMBLY FROM VEHICULAR CHARGER CHASSIS, BY REMOVING 8 SCREWS.
2. REMOVE THE 2 SCREWS HOLDING THE TOP AND BOTTOM HALVES OF THE JUNCTION BOX TOGETHER.
3. ATTACH TOP HALF OF THE JUNCTION BOX TO UNDERSIDE OF VEHICULAR FRONT CASTING ASSEMBLY, USING (ITEM 2) 3 THREAD FORMING SCREWS, AND HOLES PROVIDED FOR THIS PURPOSE IN BOTTOM OF FRONT CASTING.
4. WITHDRAW RED AND BLACK WIRES FROM RUBBER GROMMET LOCATED IN BOTTOM HALF OF JUNCTION BOX, AND PASS THEM THROUGH THE HOLES PROVIDED IN THE TOP HALF OF JUNCTION BOX AND FRONT CASTING ASSEMBLY. SEE FIGURE 1.
5. RE-ASSEMBLE TOP AND BOTTOM HALVES OF JUNCTION BOX, PULLING THE RED AND BLACK WIRES THROUGH HOLES PROVIDED, AND LEAVING THE MINIMUM SLACK WIRE IN THE JUNCTION BOX.
6. RE-ASSEMBLE FRONT CASTING ASSEMBLY WITH JUNCTION BOX ATTACHED, TO THE VEHICULAR CHARGER CHASSIS, AND SOLDER THE RED AND BLACK WIRES TO POINTS S501-1 AND TB1-1 RESPECTIVELY, CUTTING BACK THE LENGTH OF THE WIRES AND LEAVING MINIMUM SLACK. SEE FIGURE 1.
7. REPLACE OUTSIDE COVER AND SECURE ALL SCREWS.

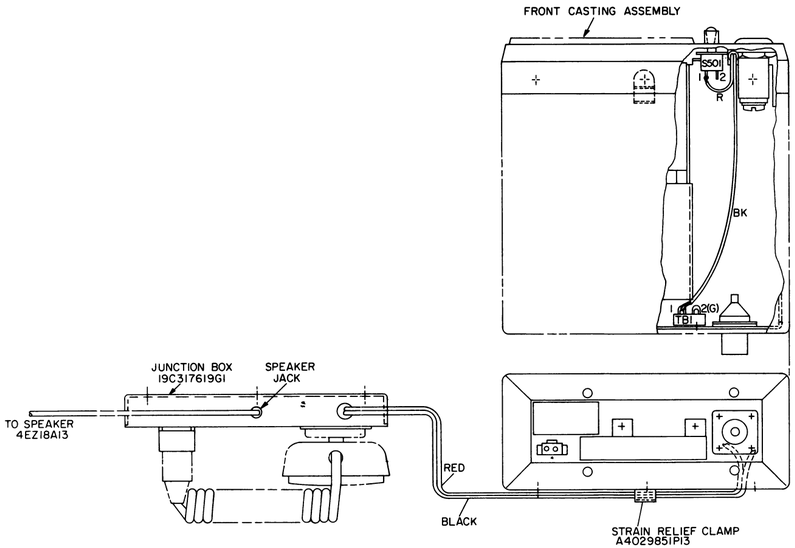


FIG. 2

INSTRUCTIONS;
THE SAME AS FOR FIGURE 1 BUT MOUNT JUNCTION BOX ON EITHER SIDE OF VEHICULAR CHARGER AND CUT LENGTH OF RED AND BLACK WIRES TO SUIT ADJACENT LOCATIONS OF JUNCTION BOX; ALSO WIRES ARE TO REMAIN EXITING FROM THE JUNCTION BOX THROUGH THE RUBBER GROMMET.

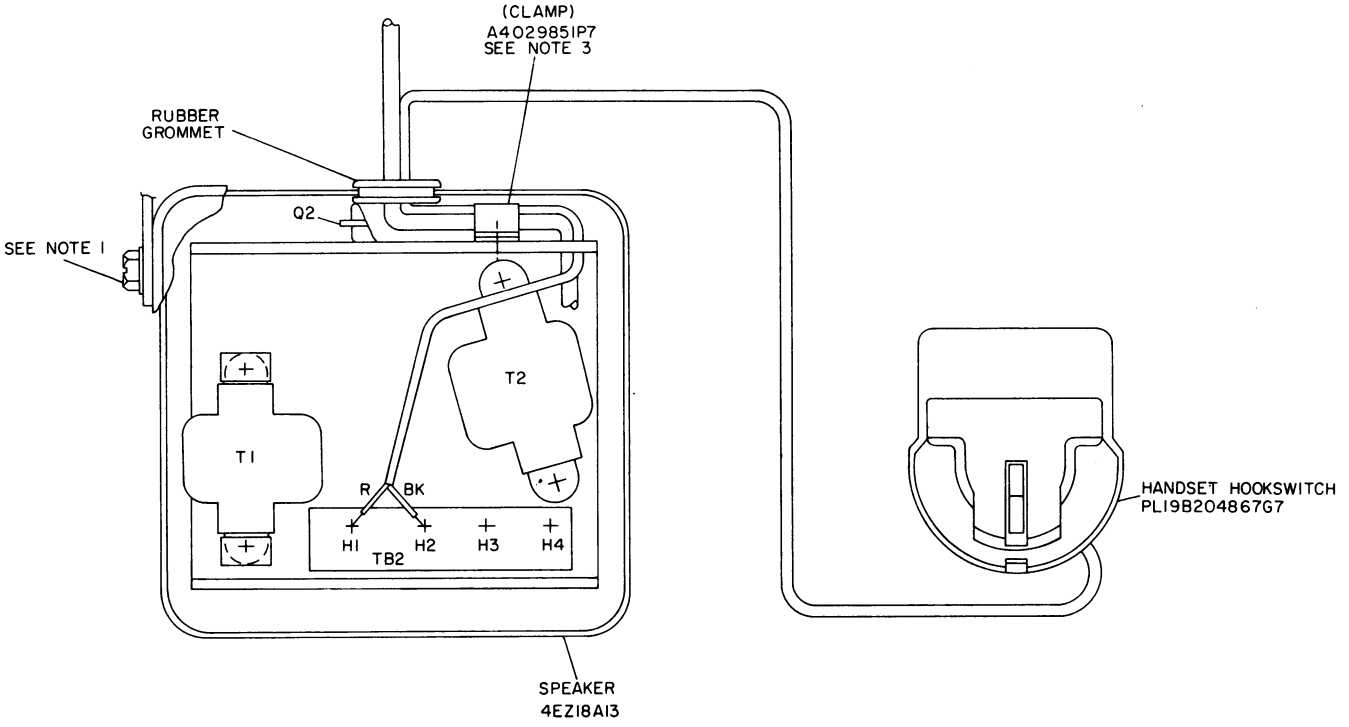
(19C317657, Sh. 2, Rev. 1)

INSTRUCTIONS:

1. DETACH COVER AND FRONT CASTING ASSEMBLY FROM VEHICULAR CHARGER BY REMOVING 8 SCREWS.
2. PASS THE RED AND BLACK WIRES EXITING FROM THE RUBBER GROMMET IN THE JUNCTION BOX, THROUGH THE HOLE PROVIDED IN THE BOTTOM OF THE FRONT CASTING ASSEMBLY; AND SOLDER WIRES TO POINTS S501-1 AND TB1-1 RESPECTIVELY. SEE FIGURE 2.
3. RE-ASSEMBLE VEHICULAR CHARGER AND SECURE THE 8 SCREWS BACK IN POSITION.
4. LOCATE JUNCTION BOX IN ANY POSITION ADJACENT TO VEHICULAR CHARGER, WHICH THE LENGTH OF RED AND BLACK WIRES WILL PERMIT. SECURE WIRES IN STRAIN RELIEF ITEM 4 AS SHOWN IN FIG. 2. USE THREAD FORMING SCREW ITEM 2, TO ATTACH STRAIN RELIEF TO FRONT CASTING ASM, USING CENTER HOLE PROVIDED.

INSTALLATION DIAGRAM

JUNCTION BOX 19C317619-G1



INSTRUCTIONS:

1. DETACH FRONT COVER OF SPEAKER, BY REMOVING 4 SCREWS.
2. REMOVE WIRE BETWEEN TB2-H1 AND TB2-H2.
3. REMOVE CABLE CLAMP AND DISCARD, REPLACE WITH NEW CABLE CLAMP.
4. ROUTE CABLE FROM HANDSET HOOKSWITCH THROUGH RUBBER GROMMET IN TOP OF SPEAKER, AND ALSO NEW CABLE CLAMP, MAKE WIRE CONNECTIONS PER CHART.
5. SOLDER ALL ELECTRICAL CONNECTIONS.
6. REPLACE FRONT COVER AND SECURE ALL SCREWS.

CONNECTION CHART		
FROM	TO	WIRE COLOR
HOOKSWITCH	TB2-H1	2-22SJ-R
HOOKSWITCH	TB2-H2	2-22SJ-BK

(19C317629, Rev. 1)

INSTALLATION DIAGRAM

HANDSET MODEL 4EM26C10 & HOOKSWITCH 19B204867-G7

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 no 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-4118

MOBILE RADIO DEPARTMENT
GENERAL ELECTRIC COMPANY • LYNCHBURG, VIRGINIA 24502

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