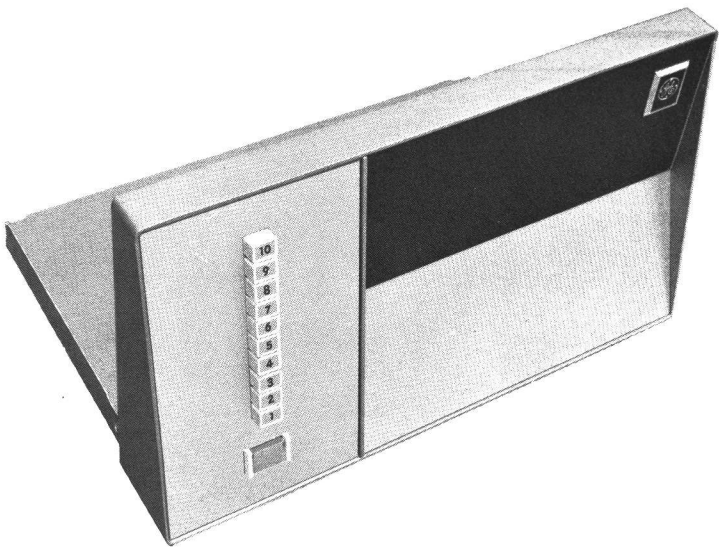
MOBILE RADIO

MAINTENANCE MANUAL

TYPE 90 TONE ENCODER

MODELS 4EH19B10 THRU 18



EH-19-B

SPECIFICATIONS *

Tone Frequencies	1050 to 1650 Hz 1800 to 2400 Hz
Channel Spacing	150 Hertz
Frequency Stability	±0.3%
Tone Pulse Length	1 sec ±20% (Adjustable)
Transmit Drain	2 milliamperes
Frequency Adjustment Range	±1%
Temperature Range	-30°C to +60°C (-22°F to +140°F)
Input Voltage Requirements	+24 VDC

hese 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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TABLE 1 - ENCODER APPLICATION CHART

MODEL NUMBER	NUMBER OF TONES	FREQUENCY RANGE	USED WITH:
4EH19B10	5	1050-1650 Hz	Blank Right Panel
4EH19B11	5	1800-2400 Hz	Blank Right Panel
4EH19B12	10	1050-2400 Hz	Blank Right Panel
4EH19B13	5	1050-1650 Hz	Single-Channel Voting Control Panel
4EH19B14	5	1800-2400 Hz	Single-Channel Voting Control Panel
4EH19B15	10	1050-2400 Hz	Single-Channel Voting Control Panel
4EH19B16	5	1050-1650 Hz	Two-Channel Voting Control Panel
4EH19B17	5	1800-2400 Hz	Two-Channel Voting Control Panel
4EH19B18	10	1050-2400 Hz	Two-Channel Voting Control Panel

DESCRIPTION

The General Electric Type 90 Pulse Tone Encoders Models 4EH19B10-18 are designed for use in the turret right-section of a Command mounted on a 19-inch drawer-type chassis which can be easily removed from the turret for maintenance and servicing. The encoders are fully transistorized and are capable of modulating a station transmitter with up to ten separate audio tones for selective calling or remote switching applications. Tone frequencies are controlled by frequency networks that are made with precision components for excellent stability and reliability.

Primary power (+24 Volts DC) is obtained from the power supply in the center panel of the Command Control Center. The application of the different Model Encoders is shown in Table 1.

OPERATION

A vertical row of ten inter-locking push-button switches on the front of the panel provides frequency selection. In the case of 5-tone encoders, buttons 6 through 10 are mechanically locked to prevent operation. After the tone has been selected, pressing the TRANSMIT button on the tone panel front keys the station transmitter and provides a continuous tone for modulating the RF carrier. If the tone encoder is keyed remotely (i.e. from the console center section), a timed burst of tone is provided. Provision is made for strapping out the timed tone remote keying, while maintaining the continuous tone function of the tone panel TRANSMIT button. The TRANSMIT button on the tone panel lights whenever the tone encoder is keyed by either method.

NOTE

Automatic timer operation can be disabled by simply changing wiring at A1203 as indicated on the Schematic Diagram. In this case, the TRANSMIT button on the front of the tone panel must be pressed to actuate the encoder and key the station transmitter.

CIRCUIT ANALYSIS

The tone encoder includes a tone network, oscillator, emitter-follower, automatic tone burst timer circuit, and transmit indicator circuit. Basically the 5-tone encoders and the 10-tone encoder are the same. The 5-tone encoders are available for low frequency range (1050-1650 Hz) or high frequency range (1800-2400 Hz) operation; while the 10-tone encoder incorporates both the low and high range circuits.

OSCILLATOR

Transistor Q1 operates as a Hartley oscillator. Feedback necessary to sustain oscillation is coupled to the base of Q1 through the split inductance in the tone network. Frequency selection is obtained by switching capacitors across the tone network, with the push-button Tone Select Switches.

EMITTER-FOLLOWER

The emitter-follower stage (Q2) isolates the tone encoder circuitry from the console center section input circuit. A proper impedance match is obtained through tone level control R7 and the output resistive network consisting of R8, R9 and R10.

AUTOMATIC TONE BURST TIMER (A1203)

The Automatic Tone Burst Timer Circuit (A1203) consists of transistorized timer Q1 and transistorized switch Q2. Both transistors are turned off until the transmitter is keyed.

The timer function operates when the tone encoder is keyed from a external source (for example, the transmit switch on the console center section or the microphone) but is disabled when the TRANSMIT switch on the front of the tone panel is used. The two keying modes are described in the following text.

External Keying

Keying the tone encoder from an external source connects ground to terminal 2 of TB1201 (see Figure 1). This grounds A1203-J4 and makes the base of Q2 negative. Q2 conducts and connects +13 Volts (through the appropriate Tone Select Switch) to the tone oscillator, starting the tone pulse.

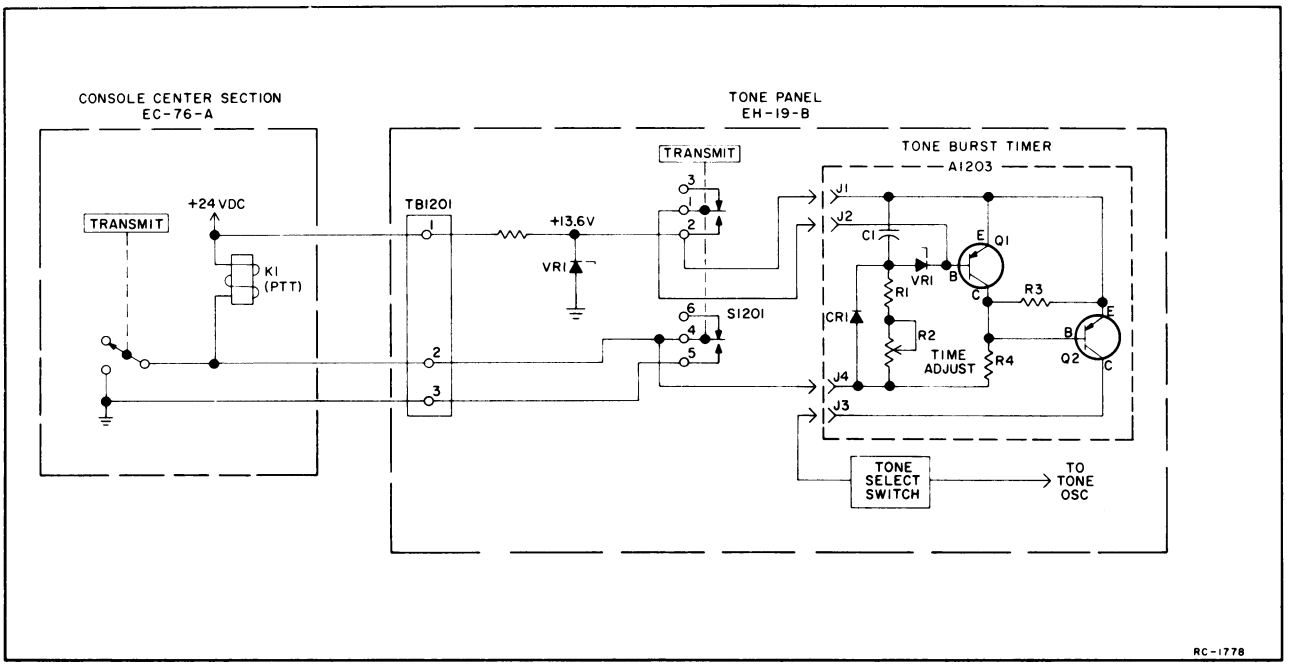


Figure 1 - Tone Keying Circuit

Timer Q1 determines the duration of the tone pulse. When A1203-J4 is grounded (transmitter keyed), C1 begins to charge through R1 and R2 to build a negative charge at the base of Q1. When the negative charge is sufficient to operate Q1, this transistor turns on, making the base of Q2 positive. Q2 turns off, removing the +13 volts from the tone oscillator to end the tone burst. Adjustable resistor R2 determines the duration of the tone burst and is set to provide tone for approximately 1 second.

Internal Keying

Keying the tone encoder from the TRANSMIT switch (S1201) on the tone panel front connects ground to A1203-J4. This turns Q2 on and applies +13 volts to the tone oscillator. Timer Q1 is held off by the positive voltage applied to its base through contacts 1 and 2 of the TRANSMIT switch. Therefore, a continuous tone is transmitted as long as the TRANSMIT switch on the tone panel is operated.

VOLTAGE REGULATOR AND TRANSMIT INDICATOR (A1204)

The +24 volts DC applied to TB1201-1 is regulated to approximately 13.6 volts by VR1. This regulated voltage is used for all encoder circuits except the transmit indicator circuit (DS1201 & DS1202) which operates directly from the +24 volt source while tone is being transmitted.

When the tone encoder is keyed, a positive voltage is connected to the base of A1204-Q1. This allows Q1 to conduct and complete the +24 volt transmit indicator lamp circuit.

ADJUSTMENT

TONE LEVEL ADJUSTMENT

Tone level is controlled by R7. To set tone level:

1. Connect a Deviation Monitor to the transmitter output.
2. Remove the tone encoder from the console turret (see Maintenance Section).
3. For 5-tone encoders:
   a. Press Tone Select Switch #1.
   b. Press the TRANSMIT switch and adjust R7 (on A1201/A1202) for ±3 kHz deviation.
4. For 10-tone encoder:
   a. Press Tone Select Switch #1.
   b. Press the TRANSMIT switch and adjust R7 on A1201 for ±3 kHz deviation.
   c. Press Tone Select Switch #6.
   d. Press the TRANSMIT Switch and adjust R7 on A1202 for ±3 kHz deviation.

TRIMMER ADJUSTMENT

To obtain maximum system performance, trimmers have been provided to facilitate setting the tone network on the center frequency. It is recommended that the frequency be checked twice a year, and whenever the tone network is changed. Tone networks are available in two frequency ranges: a low range network (from 1050 Hz to 1650 Hz) and a high range network (from 1800 Hz to 2400 Hz). The 5-tone encoders

are available with low or high range networks, while the 10-tone encoder is equipped with both networks.

5-Tone Encoders

1. Remove the tone encoder from the console turret (see Maintenance Section) and connect a frequency counter between TB1201-4 (tone output) and TB1201-5 (ground).

2. Press Tone Select Switch #5. Press the TRANSMIT Switch and adjust trimmer C1 for 1650 Hz (low range) or 2400 Hz (high range).

3. For low range encoders, press Tone Select Switch #2. Then press TRANSMIT Switch and adjust trimmer C1249 for 1200 Hz.

4. Press Tone Select Switch #1. Press the TRANSMIT Switch and adjust trimmer C1250 for a frequency of 1050 Hz (low range) or 1800 Hz (high range).

10-Tone Encoder

1. Remove the tone encoder from the console turret (see Maintenance Section) and connect a frequency counter between TB1201-4 (tone output) and TB1201-5 (ground).

2. Press Tone Select Switch #10. Press the TRANSMIT Switch and adjust trimmer C1 (on A1202) for 2400 Hz.

3. Press Tone Select Switch #6. Press the TRANSMIT Switch and adjust trimmer C1250 (on A1202) for 1800 Hz.

4. Press Tone Select Switch #5. Press the TRANSMIT Switch and adjust trimmer C1 (on A1201) for 1650 Hz.

5. Press Tone Select Switch #2. Press the TRANSMIT Switch and adjust trimmer C1249 (on A1201) for 1200 Hz.

6. Press Tone Select Switch #1. Press the TRANSMIT Switch and adjust trimmer C1250 (on A1201) for 1050 Hz.

TONE BURST TIMER ADJUSTMENT

The tone pulse time length may be adjusted from approximately 0.2 to 3.0 seconds by R2 on A1203. The adjustment has been set at the factory to provide a tone pulse of 1 second ±20%. If it is desirable to change the pulse time length, use the following procedure.

1. Connect an oscilloscope across TB1201-4 and -5.

2. Press Tone Select Switch #1.

3. Key the encoder by applying ground to TB1201-2 and adjust R2 for the desired tone time length.

MAINTENANCE

REMOVING TONE ENCODER FROM TURRET

Remove the tone encoder from the console turret in the following manner:

1. Grasp the tone encoder panel frame and pull the encoder forward until the stop is reached.

2. To completely remove the encoder from the turret, lift the encoder to clear the stop and pull forward. No electrical disconnections are required to set the encoder on the desk top.

TRANSMIT INDICATOR LAMP REPLACEMENT

Replace defective push-button switch indicator lamps as follows:

1. Grasp the switch lens (nameplate) and pull forward to remove the indicator assembly and gain access to the indicator lamps.

2. Remove the defective indicator lamp from its socket by pressing on the bulb end, and install the new lamp.

3. Reinstall the indicator assembly. The assembly must be in the extended configuration shown in Figure 2 before it can be reinstalled in the panel.

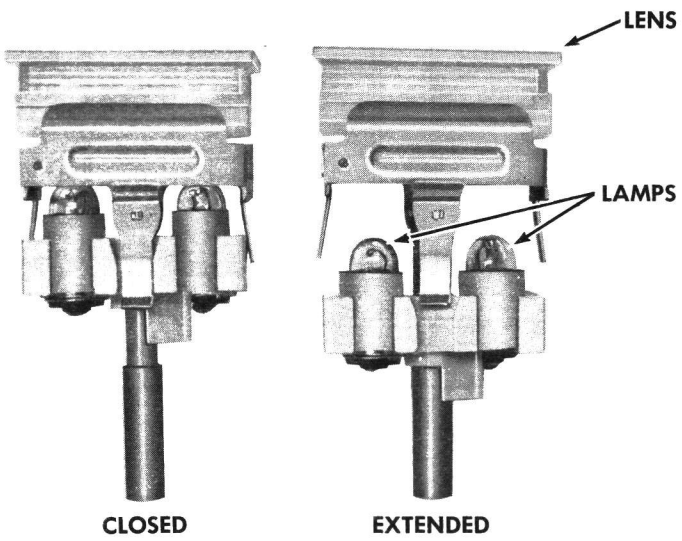
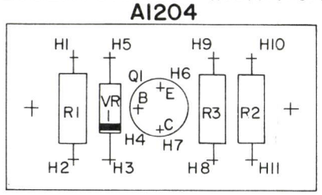
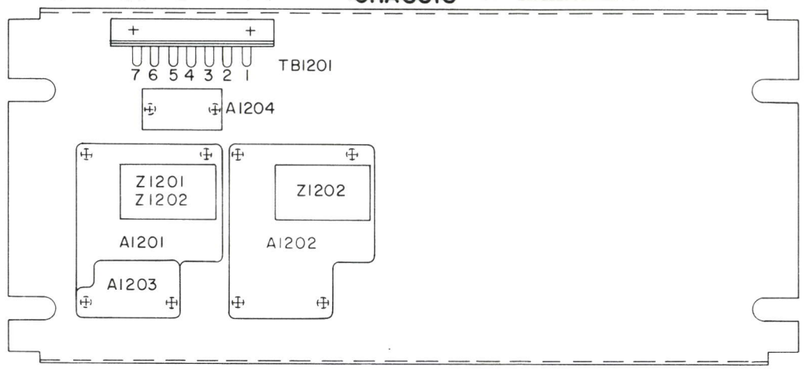


Figure 2 - Switch Indicator Assembly

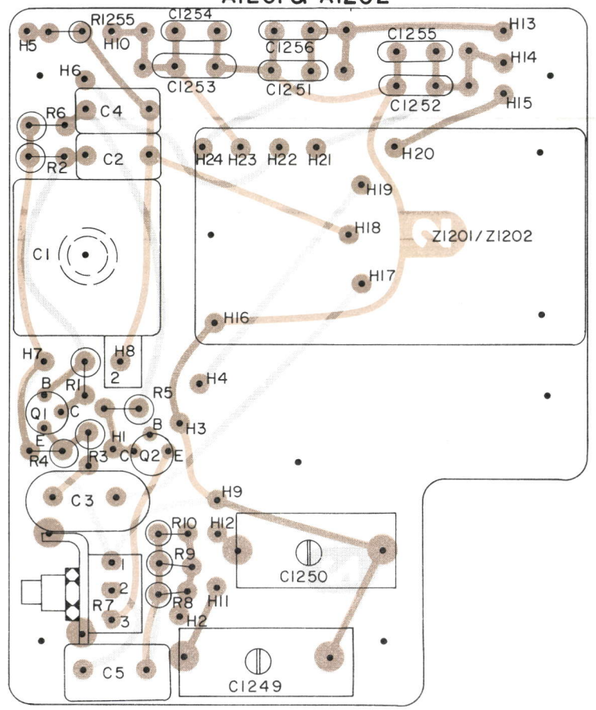
REGULATOR/XMIT INDICATOR
A1204



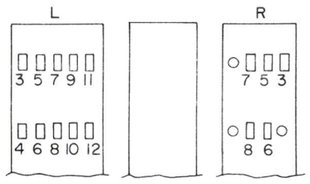
CHASSIS



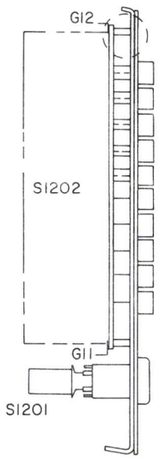
COMPONENT BOARD
A1201 & A1202



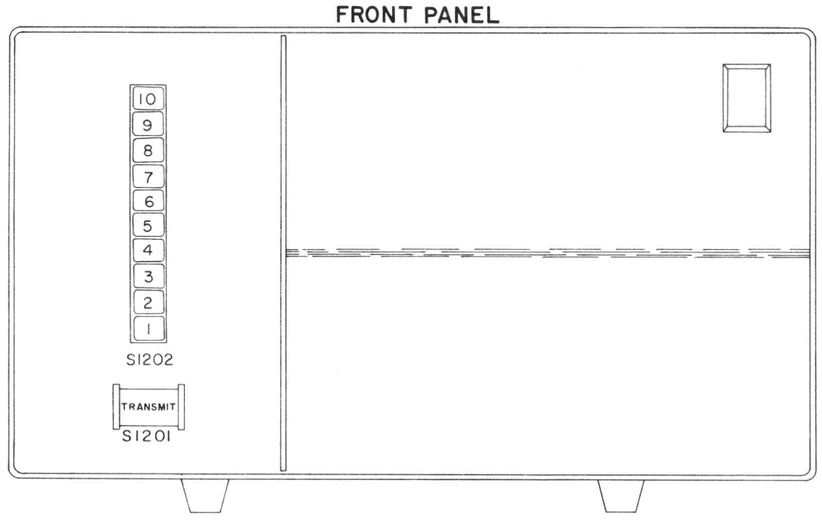
TYPICAL TERMINAL VIEW
OF
PUSH-BUTTON SWITCHES



S1202-1 THRU-10

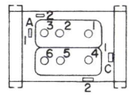


FRONT PANEL



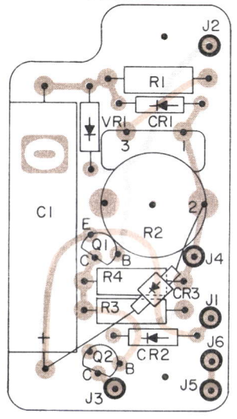
(19D413266, Rev. 1)

TERMINAL VIEW
OF
S1201

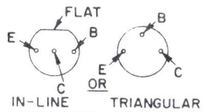


TONE BURST TIMER
A1203

(19B205072, Sh. 1, Rev. 2)
(19B205072, Sh. 2, Rev. 2)



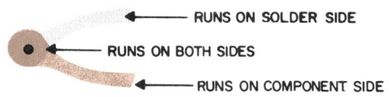
TRANSISTOR LEAD
IDENTIFICATION



VIEW FROM LEAD END

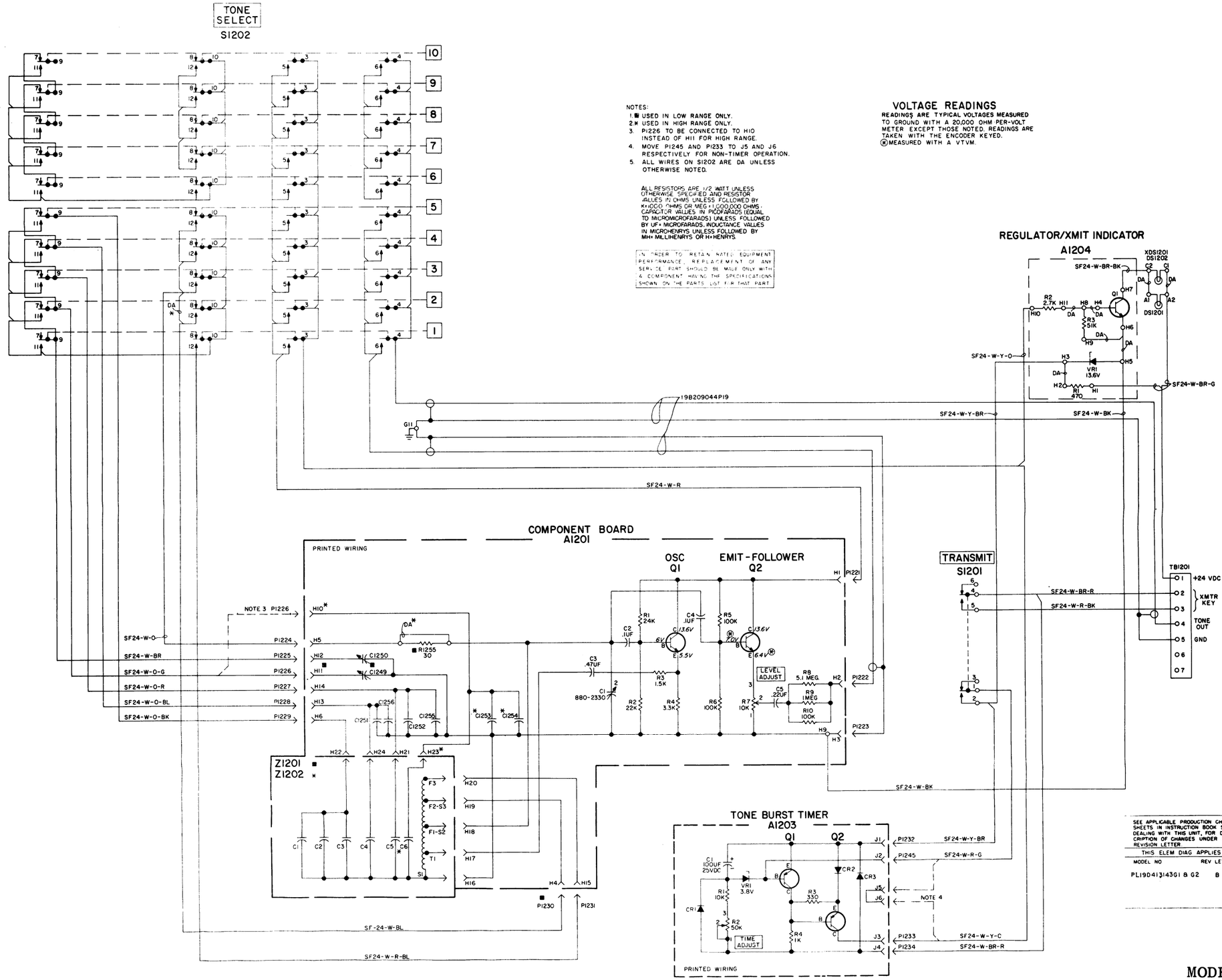
NOTE: LEAD ARRANGEMENT, AND NOT CASE SHAPE, IS DETERMINING FACTOR FOR LEAD IDENTIFICATION.

(19A122713, Sh. 1, Rev. 0)
(19A122713, Sh. 2, Rev. 0)



OUTLINE DIAGRAM

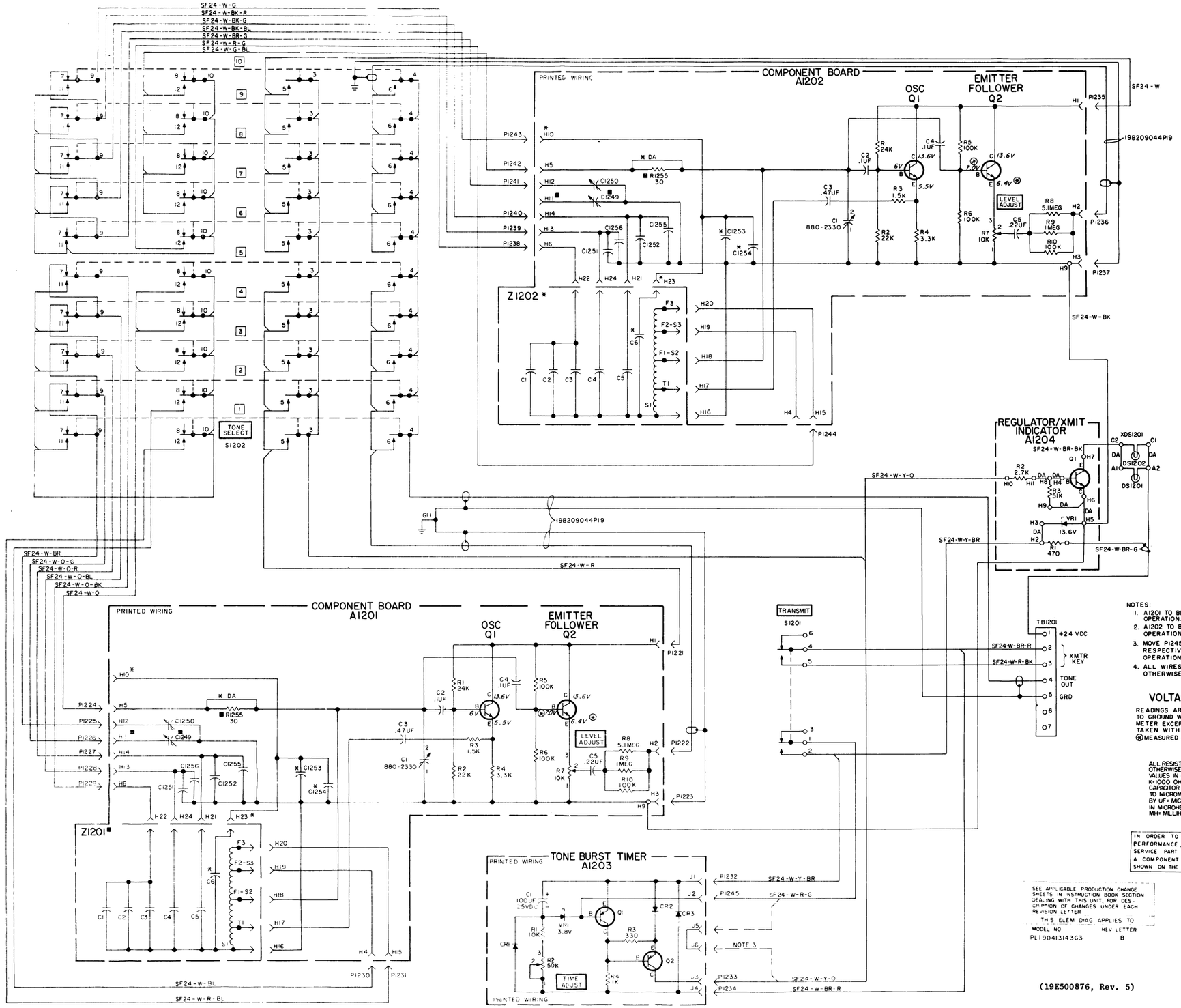
TYPE 90 TONE ENCODER PANEL
MODELS 4EH19B10 thru 18



(19E500874, Rev. 5)

WIRING DIAGRAM

TYPE 90 TONE ENCODER PANEL
MODELS 4EH19B10, 11, 13, 14, 16, 17



NOTES:
1. A1201 TO BE WIRED FOR LOW RANGE OPERATION.(■)
2. A1202 TO BE WIRED FOR HIGH RANGE OPERATION.(*)
3. MOVE P1245 & P1233 TO J5 & J6 RESPECTIVELY FOR NON-TIMER OPERATION.
4. ALL WIRES ON S1202 ARE DA UNLESS OTHERWISE NOTED

VOLTAGE READINGS

READINGS ARE TYPICAL VOLTAGES MEASURED TO GROUND WITH A 20,000 OHM-PER-VOLT METER EXCEPT THOSE NOTED. READINGS ARE TAKEN WITH THE ENCODER KEYED.
⊗MEASURED WITH VTVM

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
PLI9D413143G3	B

(19E500876, Rev. 5)

WIRING DIAGRAM

TYPE 90 TONE ENCODER PANEL
MODELS 4EH19B12, 15, 18

PARTS LIST

LBI-3989

TYPE 90 TONE ENCODER
MODEL 4EH19B10 19D413143-G1
MODEL 4EH19B11 19D413143-G2
MODEL 4EH19B12 19D413143-G3

SYMBOL	G-E PART NO.	DESCRIPTION
A1201 and A1202		5-TONE ENCODER 19C303778-G1
		---------- CAPACITORS ----------
C1	7121300-P7	Variable, mica: 880-2330 pf, 250 VDCW; sim to El Menco 30.
C2	19B209243-P7	Polyester: 0.1 µf ±20%, 50 VDCW.
C3	5491459-P112	Polyester: 0.47 µf ±10%, 50 VDCW.
C4	19B209243-P7	Polyester: 0.1 µf ±20%, 50 VDCW.
C5	19B209243-P17	Polyester: 0.22 µf ±20%, 50 VDCW.
		---------- TRANSISTORS ----------
Q1 and Q2	19A115123-P1	Silicon, NPN; sim to Type 2N2712.
		---------- RESISTORS ----------
R1	3R77-P243J	Composition: 24,000 ohms ±5%, 1/2 w.
R2	3R77-P223K	Composition: 22,000 ohms ±10%, 1/2 w.
R3	3R77-P152J	Composition: 1500 ohms ±5%, 1/2 w.
R4	3R77-P332K	Composition: 3300 ohms ±10%, 1/2 w.
R5 and R6	3R77-P104K	Composition: 0.1 megohm ±10%, 1/2 w.
R7	19C300124-P10	Variable, carbon film: 10,000 ohms ±20%, 1/8 w; sim to Mallory MLC.
R8	3R77-P515J	Composition: 5.1 megohms ±5%, 1/2 w.
R9	3R77-P105K	Composition: 1 megohm ±10%, 1/2 w.
R10	3R77-P104K	Composition: 0.1 megohm ±10%, 1/2 w.
A1203		COMPONENT BOARD 19B205821-G1
		---------- CAPACITORS ----------
C1	19A115680-P5	Electrolytic: 100 µf +150% -10%, 25 VDCW; sim to Mallory Type TT.
		---------- DIODES AND RECTIFIERS ----------
CR1 and CR2	19A115250-P1	Silicon.
		---------- JACKS AND RECTIFIERS ----------
J1 thru J6	4033513-P15	Contact, electrical: sim to Bead Chain B40-1A.
		---------- TRANSISTORS ----------
Q1 and Q2	19A115768-P1	Silicon, PNP; sim to Type 2N3702.
		---------- RESISTORS ----------
R1	3R77-P103K	Composition: 10,000 ohms ±10%, 1/2 w.
R2	19B209358-P8	Variable, carbon film: approx 100 to 50,000 ohms ±20%, 0.25 w; sim to CTS Type U-201.
R3	3R77-P331K	Composition: 330 ohms ±10%, 1/2 w.
R4	3R77-P102K	Composition: 1000 ohms ±10%, 1/2 w.
		---------- VOLTAGE REGULATORS ----------
VR1	4036887-P3	Silicon, Zener.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.

SYMBOL	G-E PART NO	DESCRIPTION
A1204		COMPONENT BOARD 19B216219-G1
		---------- TRANSISTORS ----------
Q1	19A115300-P1	Silicon, NPN; sim to Type 2N3053.
		---------- RESISTORS ----------
R1	3R77-P471K	Composition: 470 ohms ±10%, 1/2 w.
R2	3R77-P272K	Composition: 2700 ohms ±10%, 1/2 w.
R3	3R77-P513J	Composition: 51,000 ohms ±5%, 1/2 w.
		---------- VOLTAGE REGULATORS ----------
VR1	4036887-P10	Silicon, Zener.
		---------- CAPACITORS ----------
		NOTE: The values of capacitors C1251-C1253 must be obtained from the component, then find corresponding value in parts list for the correct part number.
C1249 and C1250	19B200116-P20	Variable mica: 170-730 pf; sim to Electro Motive Type PC46W.
C1251A	7489162-P15	Silver mica: 33 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1251B	7489162-P21	Silver mica: 56 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1251C	7489162-P24	Silver mica: 75 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1251D	7489162-P27	Silver mica: 100 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1251E	7489162-P29	Silver mica: 120 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1251F	7489162-P31	Silver mica: 150 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1251G	7489162-P33	Silver mica: 180 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1251H	7489162-P35	Silver mica: 220 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1251J	7489162-P37	Silver mica: 270 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1251K	7489162-P39	Silver mica: 330 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1251L	7489162-P41	Silver mica: 390 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1251M	7489162-P43	Silver mica: 470 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1251N	7489162-P44	Silver mica: 510 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1251P	7147203-P2	Silver mica: 510 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-20.
C1251R	7147203-P3	Silver mica: 620 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-20.
C1251S	7147203-P4	Silver mica: 680 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-20.
C1251T	7147203-P5	Silver mica: 750 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-20.
C1251U	7147203-P6	Silver mica: 820 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-20.
C1251V	7147203-P7	Silver mica: 910 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-20.
C1251W	7147203-P8	Silver mica: 1000 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-20.
C1252A	7489162-P15	Silver mica: 33 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1252B	7489162-P21	Silver mica: 56 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1252C	7489162-P24	Silver mica: 75 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1252D	7489162-P27	Silver mica: 100 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.

SYMBOL	G-E PART NO	DESCRIPTION
C1252E	7489162-P29	Silver mica: 120 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1252F	7489162-P31	Silver mica: 150 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1252G	7489162-P33	Silver mica: 180 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1252H	7489162-P35	Silver mica: 220 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1252J	7489162-P37	Silver mica: 270 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1252K	7489162-P39	Silver mica: 330 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1252L	7489162-P41	Silver mica: 390 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1252M	7489162-P43	Silver mica: 470 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1252N	7489162-P44	Silver mica: 510 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1252P	7147203-P2	Silver mica: 510 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-20.
C1252R	7147203-P3	Silver mica: 620 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-20.
C1252S	7147203-P4	Silver mica: 680 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-20.
C1252T	7147203-P5	Silver mica: 750 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-20.
C1252U	7147203-P6	Silver mica: 820 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-20.
C1252V	7147203-P7	Silver mica: 910 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-20.
C1252W	7147203-P8	Silver mica: 1000 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-20.
C1252X	7147203-P9	Silver mica: 1100 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-20.
C1252Y	7147203-P10	Silver mica: 1200 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-20.
C1252Z	7147203-P11	Silver mica: 1300 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-20.
C1253A	7489162-P15	Silver mica: 33 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1253B	7489162-P21	Silver mica: 56 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1253C	7489162-P24	Silver mica: 75 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1253D	7489162-P27	Silver mica: 100 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1253E	7489162-P29	Silver mica: 120 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1253F	7489162-P31	Silver mica: 150 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1253G	7489162-P33	Silver mica: 180 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1253H	7489162-P35	Silver mica: 220 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1253J	7489162-P37	Silver mica: 270 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1253K	7489162-P39	Silver mica: 330 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1253L	7489162-P41	Silver mica: 390 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1253M	7489162-P43	Silver mica: 470 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1253N	7489162-P44	Silver mica: 510 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1253P	7147203-P2	Silver mica: 510 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-20.
C1253R	7147203-P3	Silver mica: 620 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-20.
C1252S	7147203-P4	Silver mica: 680 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-20.
C1253T	7147203-P5	Silver mica: 750 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-20.

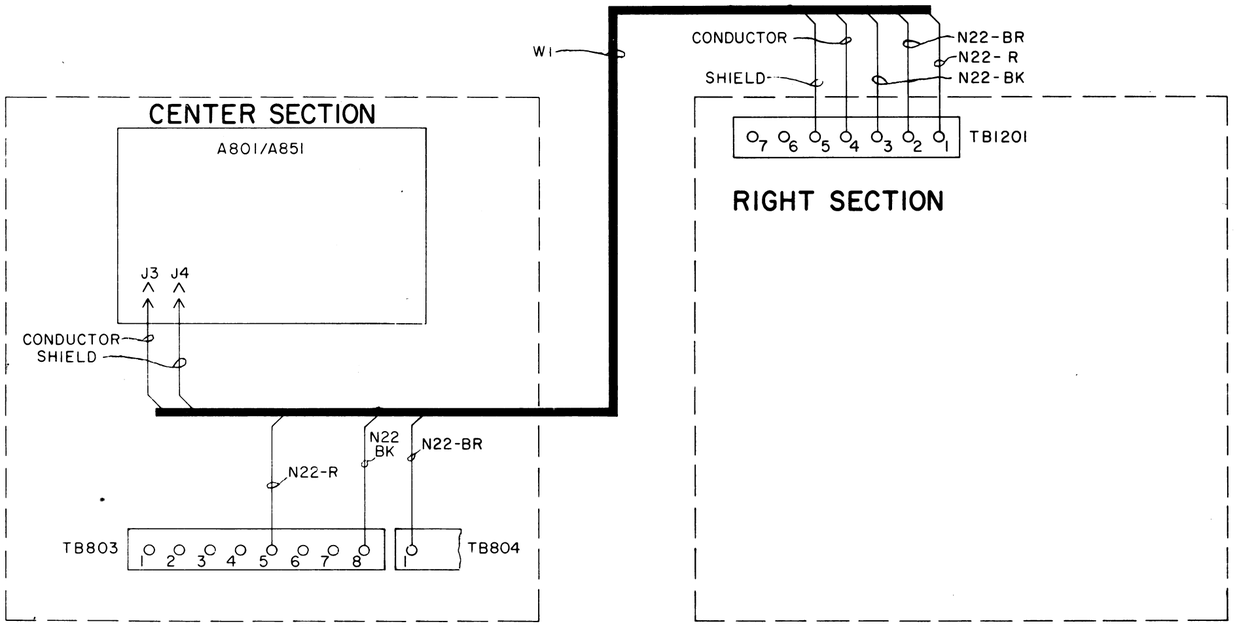
SYMBOL	G-E PART NO	DESCRIPTION
C1253U	7147203-P6	Silver mica: 820 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-20.
C1253Y	7147203-P7	Silver mica: 910 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-20.
C1253W	7147203-P8	Silver mica: 1000 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-20.
C1254 thru C1256	7489162-P17	Silver mica: 39 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-20.
		---------- INDICATING DEVICES ----------
DS1201 and DS1202	19C307037-P10	Lamp, incandescent: 28 v; sim to GE 327.
		---------- PLUGS ----------
P1221 thru P1245	4036634-P1	Contact, electrical; sim to Amp 42429.
		---------- RESISTORS ----------
R1301	3R77-P300J	Composition: 30 ohms ±5%, 1/2 w.
		---------- SWITCHES ----------
S1201	19C307029-P26	Push: lighted, 2 circuits, SPDT each, momentary action, 5 amps at 125 or 250 VAC.
S1202	7775759-P5	Push: 3 form A, 3form C non-shorting contacts each button, 10 buttons.
		---------- TERMINAL BOARDS ----------
TB1201	7117710-P7	Phen: 7 terminals; sim to Cinch 70.
		---------- SOCKETS ----------
XDS1201	19C307029-P16	Lamp, 2 sockets.
		---------- MISCELLANEOUS ----------
	19C307029-P3	Retainer, lampholder.
	19C307029-P10	Panel lens.
	NP249217-P5	Nameplate. (TRANSMIT)
	4039234-P2	Button. (TONE SELECT)
	7142162-P110	Spacer. (Used with A1203).

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 - Not Incorporated.

REV. B - Restored equipment to original configuration.



(19C311833, Rev. 2)

TERCONNECTION DIAGRAM

PE 90 TONE ENCODER PANEL
ight Section of Radio Control Console)

Issue 2

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-3985

DF-5038

MOBILE RADIO DEPARTMENT
GENERAL ELECTRIC COMPANY • LYNCHBURG, VIRGINIA 24502

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