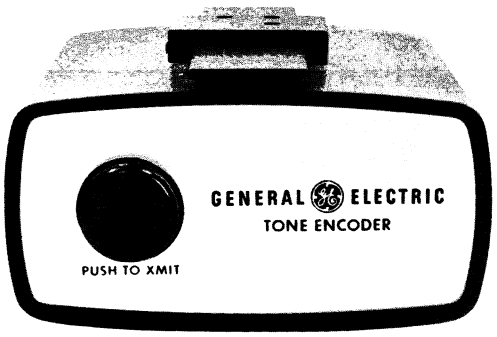
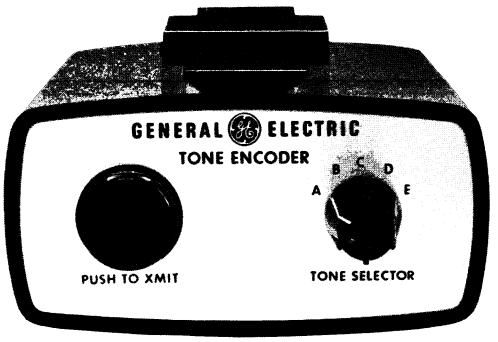
MOBILE RADIO

MASTR® II MAINTENANCE MANUAL

TYPE 90 TONE ENCODER
MODELS 4EH14B10 thru 12





SPECIFICATIONS *

Tone Frequencies	1050 to 2400 Hz
Channel Spacing	150 cycles
Frequency Stability	±0.7%
Tone Pulse Length	Manually controlled
Transmit Drain	10 milliamperes @ 13.6 Volts DC
Frequency Adjustment Range	±1%
Output Voltage	1.3 Volts RMS into open circuit
Temperature Range	-30°C to +60°C (-22°F to +140°F)

1st Digit	2nd Digit	3rd Digit	4th Digit
B Pulse Tone Encoder	**1** 12-Volt Mobile	**1** Single Tone	**M** MASTR II
		2 5-Tone (Low Range)	
		3 5-Tone (Hi-Range)	

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

EH-14-B

GENERAL ELECTRIC

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PARTS LIST 6

WARNING

Although the highest DC voltage in the radio is supplied by the vehicle battery, high current may be drawn under short circuit conditions. These currents can possibly heat metal objects such as tools, rings, watchbands, etc. enough to cause burns. Be careful when working near energized circuits!

High-level RF energy in the transmitter Power Amplifier assembly can cause RF burns. KEEP AWAY FROM THESE CIRCUITS when the transmitter is energized!

DESCRIPTION

General Electric Type 90 Pulse Tone Encoder Models 4EH14B10 through 'B12 are fully transistorized pulse tone generators for modulating a mobile MASTR® II transmitter with one or one out of five pulse tones. The tone frequencies are controlled by frequency networks that are made with precision components for excellent stability and reliability. No electromechanical devices are used in the encoder.

The Type 90 Pulse Tone Encoders are designed to operate from a 12 VDC source with either a positive or negative ground.

The model numbers and operating characteristics of the encoders are shown in the following chart.

MODEL NUMBER	POWER SOURCE	NO. OF TONES	FREQUENCY RANGE
4EH14B10	+12 VDC	1	1050-2400 Hz
4EH14B11	+12 VDC	5	1050-1650 Hz
4EH14B12	+12 VDC	5	1800-2400 Hz

Pressing the red PUSH-TO-XMIT button on the front of the encoder keys the transmitter and modulates the carrier with the tone frequency. For 5-tone encoders, a five-position switch marked "A" through "E" is used to select the desired frequency before transmitting. Figure 1 is a Tone Correlation Chart identifying each tone frequency with the associated switch position and Model number.

An Automatic Tone Burst Circuit (Option 4098) is available for use with Type 90 Tone Encoder Models 4EH14B10-12. The option automatically provides a timed burst of tone each time the transmitter is keyed, eliminating the need for pressing the PUSH-TO-XMIT button on the encoder.

INSTALLATION

TYPE 90 MOBILE ENCODER

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

Use the mounting bracket as a template, and drill pilot holes with a #36 (7/64 inch) drill. Attach the bracket to the mounting surface with the three #6 self-tapping screws and Speed Nuts® provided.

Connect the encoder cable (19B219778G1) from the control unit to P1301 on the encoder. Refer to LBI4705 for cable installation instructions.

CIRCUIT ANALYSIS

The encoder consists of a tone network, an oscillator and emitter-follower.

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. In the 5-tone encoder, frequency selection is obtained by switching capacitors across the tone network. The network is set on center frequency by trimmer capacitor C1 (and C1301, C1302 on 5-tone encoders).

EMITTER-FOLLOWER

The emitter-follower stage (Q2) provides buffering between the oscillator output and the transmitter input. The output of Q2 is coupled through tone level control R7 and P1301-J. With R7 set for maximum the output voltage is approximately 1.8 Vrms into a 3400 ohm load.

AUTOMATIC TONE BURST (OPTION 4098)

The Automatic Tone Burst Control Circuit (A1302) consists of transistorized timer Q1 and transistorized switch Q2. Both transistors are turned off until the transmitter is keyed.

Keying the transmitter grounds A1302-J4 and makes the base of Q2 negative. This allows Q2 to conduct and connects +13 volts to the tone oscillator, starting the tone pulse.

Timer Q1 determines the duration of the tone pulse. When A1302-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.

ADJUSTMENT

TONE LEVEL ADJUSTMENT

Tone level control R7 can be adjusted through the hole provided in the back plate of the encoder. To set the tone level control:

1. Connect a Deviation Monitor to the transmitter output.
2. For 5-tone encoders, set S1302 on position "E".
3. Press the PUSH-TO-XMIT button and adjust R7 for ±3 kHz deviation.

TRIMMER ADJUSTMENT

To obtain maximum system performance, trimmers have been provided for ease of 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. First, remove the chassis from the encoder housing (refer to Disassembly Procedure). Next, connect a Frequency Counter between H2 (tone output) and H3 (ground) on Component Board A1301. Make adjustments as outlined below.

For Single-Tone Encoders, press the PUSH-TO-XMIT button and adjust trimmer C1 for the correct tone frequency.

For 5-Tone Encoders, the 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).

1. Set the frequency-selector switch (S1302) on position "A". Press the PUSH-TO-XMIT button and adjust trimmer C1 for 1650-Hz (low range) or 2400-Hz (high range).
2. For low range encoders, set the selector switch on position "D". Press the XMIT button and adjust trimmer C1301 for 1200-Hz.
3. Set the selector switch on position "E". Press the XMIT button and adjust trimmer C1302 for 1050-Hz (low range) or 1800-Hz (high range).

MAINTENANCE

DISASSEMBLY

Remove the two screws in the bottom of the encoder housing and slide the chassis out for servicing.

TROUBLESHOOTING PROCEDURE

The following procedure provides a simple method checking the encoder with a AC-VTVM. First, connect the AC-VTVM between H2 (tone output) and H3 (ground). Set the tone level control (R7) fully clockwise.

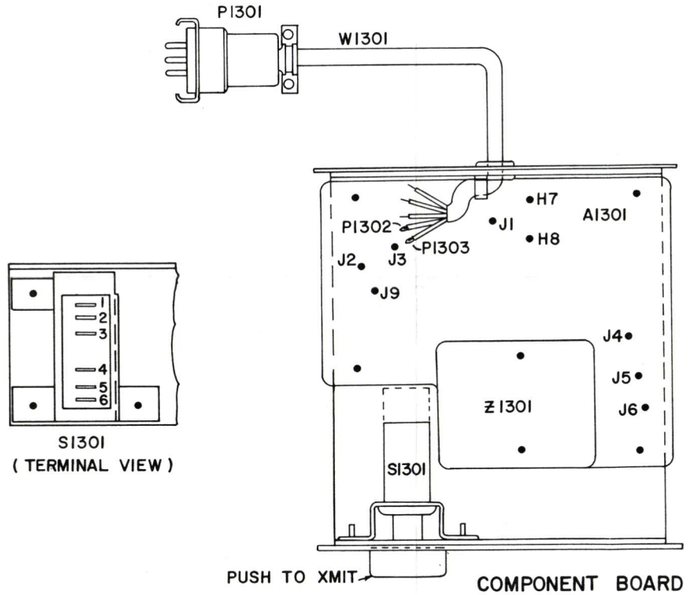
For Single-Tone Encoders, press the PUSH-TO-XMIT button and check for a minimum open circuit meter reading of 1.3 Vrms.

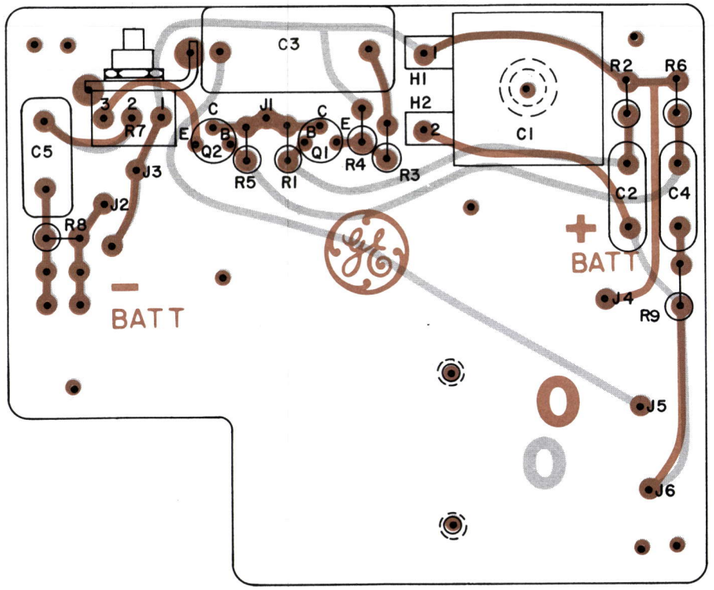
For 5-Tone Encoders, press the PUSH-TO-XMIT button and turn the frequency-selector switch through positions "A" to "E". Check each tone position for a minimum meter reading of 1.3 Vrms open circuit.

SWITCH POSITION	TONE FREQUENCY (Hz)	
	4EH14B10	4EH14B11
A	1650	2400
B	1500	2250
C	1350	2100
D	1200	1950
E	1050	1800

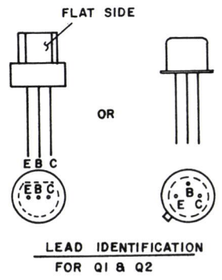
Figure 1 - Tone Correlation Chart

MODEL 4EH14B10



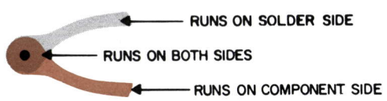


(19C321562, Rev. 0)
(19C320860, Sh. 2, Rev. 0)
(19C320860, Sh. 3, Rev. 0)

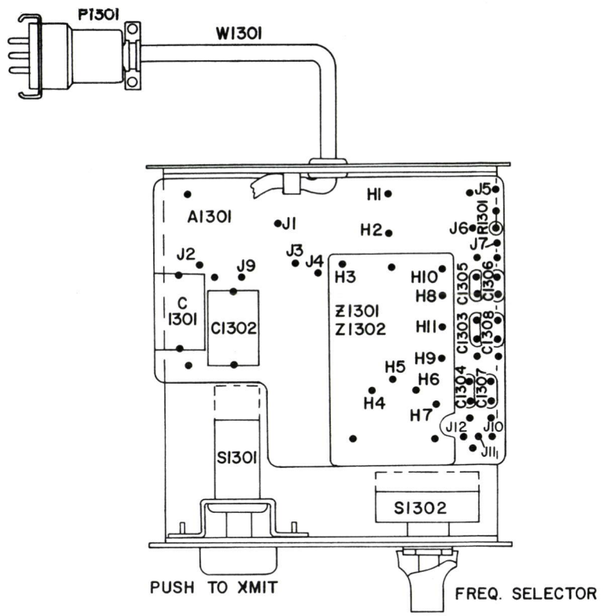


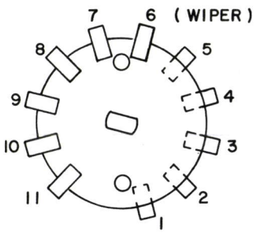
OUTLINE DIAGRAM

TYPE 90 TONE ENCODER
MODELS 4EH14B10 — B12

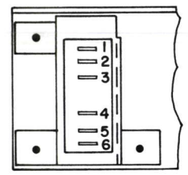


MODELS 4EH14B11 & B12



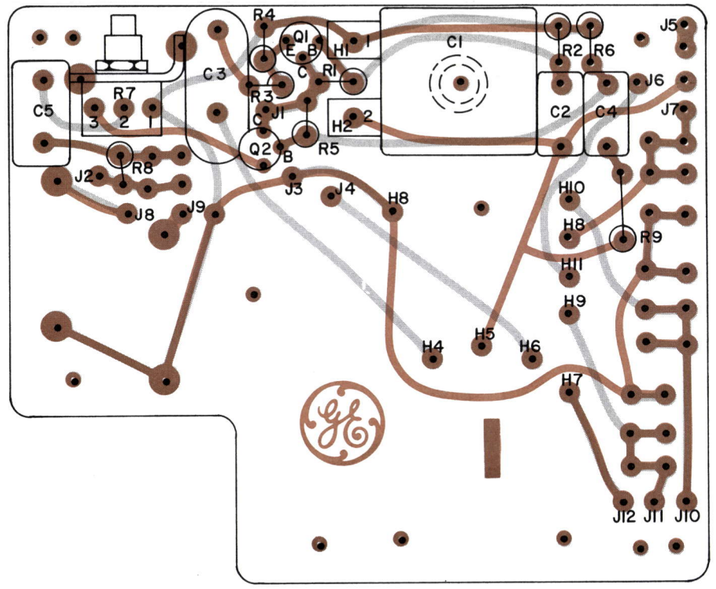


S1302
TERMINAL VIEW

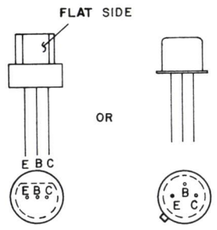


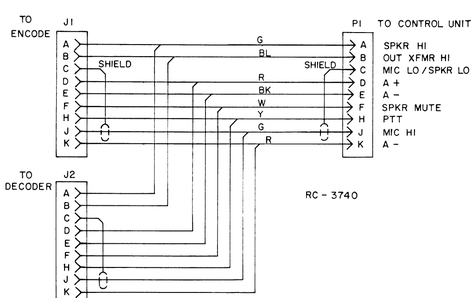
S1301
TERMINAL VIEW

COMPONENT BOARD A1301



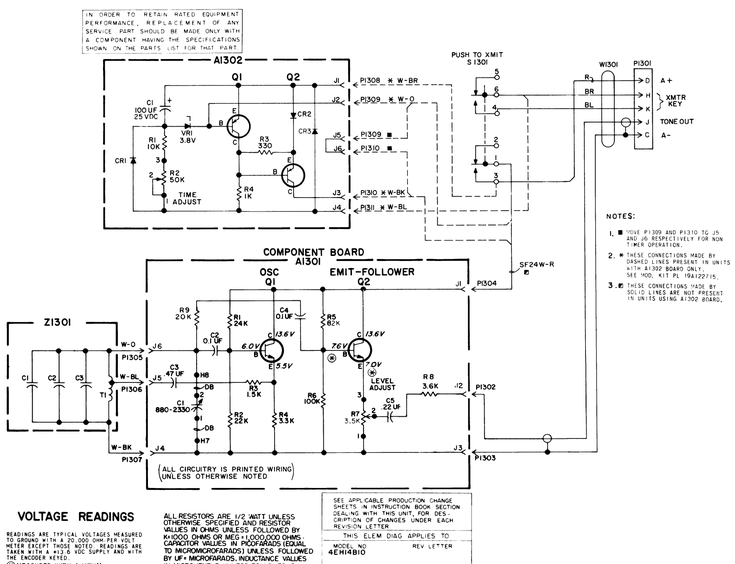
(19C321561, Rev. 0)
(19C320852, Sh. 2, Rev. 1)
(19C320852, Sh. 3, Rev. 1)





OPTION 7468
EXTERNAL ENCODER/DECODER
CABLE ASSEMBLY (19D417126)

MODEL 4EH14B10



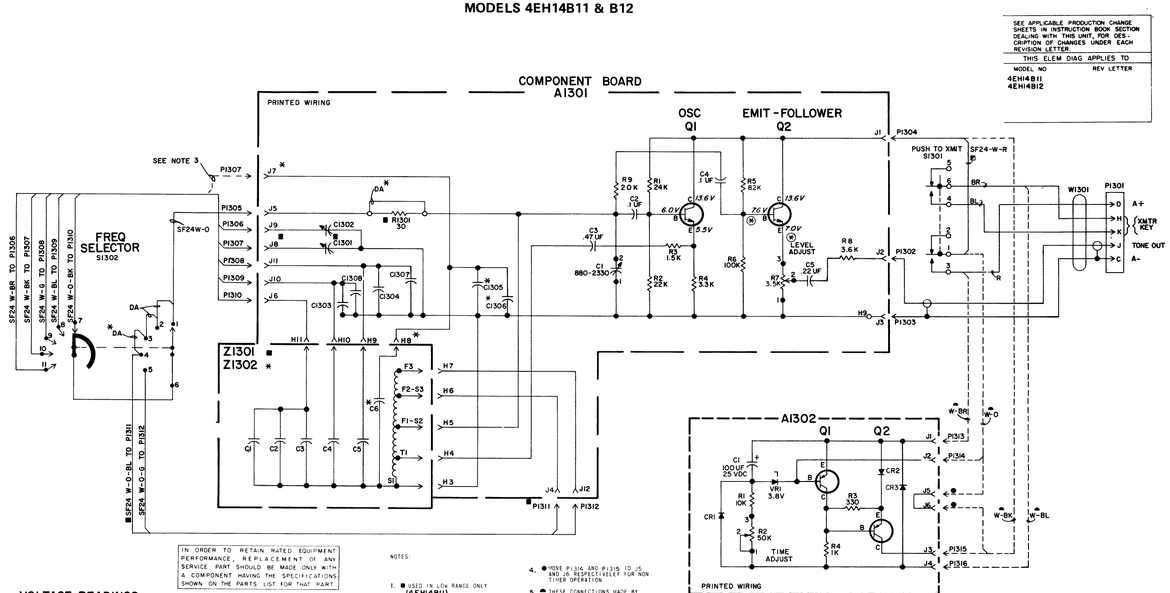
VOLTAGE READINGS

READINGS ARE TYPICAL VOLTAGES MEASURED TO GROUND WITH A 20,000 OHM-PER-VOLT METER EXCEPT THOSE NOTED. READINGS ARE TAKEN WITH A +13.6 VDC SUPPLY AND WITH THE ENCODER KEYED.
(M) MEASURED WITH A 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.

(19C320840, Rev. 3)

MODELS 4EH14B11 & B12



VOLTAGE READINGS

READINGS ARE TYPICAL VOLTAGES MEASURED TO GROUND WITH A 20,000 OHM-PER-VOLT METER EXCEPT THOSE NOTED. READINGS ARE TAKEN WITH A +13.6 VDC SUPPLY AND WITH THE ENCODER KEYED.
(M) MEASURED WITH A 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.

(19D417436, Rev. 3)

SCHEMATIC DIAGRAM

TYPE 90 TONE ENCODER
MODELS 4EH14B10 — B12

PARTS LIST

LBI-4836B

TYPE 90
PULSE TONE ENCODER (SINGLE TONE)
MODEL 4EH14B10
19C320846G1

SYMBOL	GE PART NO.	DESCRIPTION
A1301		SINGLE TONE ENCODER 19C320845G1
		- - - - - - - - - CAPACITORS - - - - - - - - -
C1	712130097	Variable, mica: approx 880-2330 pf, 250 VDCW; sim to El Menco Type 30.
C2	19A116080P7	Polyester: 0.1 µf ±20%, 50 VDCW.
C3	19A115028P19	Polyester: 0.47 µf ±20%, 100 VDCW.
C4	19A116080P7	Polyester: 0.1 µf ±20%, 50 VDCW.
C5	19A116080P9	Polyester: 0.22 µf ±20%, 50 VDCW.
		- - - - - - - JACKS AND RECEPACLES - - - - - -
J1 thru J6		(Part of component board 19B205485G2).
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q1	19A115910P1	Silicon, NPN: sim to Type 2N3904.
Q2	19A116774P1	Silicon, NPN: sim to Type 2N5210.
		- - - - - - - - - RESISTORS - - - - - - - - -
R1	3R77P243J	Composition: 24K ohms ±5%, 1/2 w.
R2	3R77P223K	Composition: 22K ohms ±10%, 1/2 w.
R3	3R77P153J	Composition: 1.5K ohms ±5%, 1/2 w.
R4	3R77P332K	Composition: 3.3K ohms ±10%, 1/2 w.
R5	3R77P823J	Composition: 82K ohms ±5%, 1/2 w.
R6	3R77P104K	Composition: 100K ohms ±10%, 1/2 w.
R7	19C300124P9	Variable, carbon film: 3.5K ohms ±20%, 1/8 w; sim to P8 Mallory MLC.
R8	3R77P362K	Composition: 3.6K ohms ±10%, 1/2 w.
R9	3R77P203K	Composition: 20K ohms ±10%, 1/2 w.
		- - - - - - - - - PLUGS - - - - - - - - -
P1304	4036634P1	Contact, electrical: sim to AMP 42428-2.
		- - - - - - - - - SWITCHES - - - - - - - - -
S1301	19B209292P1	Pushbutton: DPDT, 10 amps at 125/250 VAC: sim to Micro Switch 14GM1-82.
		- - - - - - - - - CABLES - - - - - - - - -
W1301		POWER CABLE 19B226162G1
		- - - - - - - - - PLUGS - - - - - - - - -
P1301	7489183P10	Plug: 9 contacts; sim to Winchester M9P-LS-H19C.
P1302 and P1303	4036634P1	Contact, electrical; sim to AMP 42428-2.
		- - - - - - - - - NETWORKS - - - - - - - - -
Z1301		TONE NETWORK 19C303746G

G1 2400 Hz
G2 2250 Hz
G3 2100 Hz
G4 1950 Hz
G5 1800 Hz
G6 1650 Hz
G7 1500 Hz
G8 1350 Hz
G9 1200 Hz
G10 1050 Hz

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

SYMBOL	GE PART NO.	DESCRIPTION
		INSTALLATION KIT 19A129985G1
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	4035674P3	Mounting support.
	B114P1308C6	Tap screw: No. 6-32 x 1/2.
	B231P1P	Nut, sheet spring.
	19A115423P7	Set screw, self-locking: No. 6-32 x 5/16.
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19B205043G1	Chassis.
	B9248802	Nameplate.
	7763541P3	Retaining strap. (Used with W1301).
	5490407P29	Grommet: neoprene; 5/8 inch OD. (Used with W1301).

PARTS LIST

LBI-3888B

TONE BURST CONTROL CIRCUIT - A1302
19B205821G1

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - CAPACITORS - - - - - - - - -
C1	19A115680P5	Electrolytic: 100 µf +150%-10%, 25 VDCW; sim to Mallory Type TT.
		- - - - - - - DIODES AND RECTIFIERS - - - - - -
CR1 and CR2	19A115250P1	Silicon.
CR3	4037822P1	Silicon.
		- - - - - - - JACKS AND RECEPTACLES - - - - - -
J1 thru J5	4033513P15	Contact, electrical: sim to Bead Chain 840-1A.
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q1 and Q2	19A115768P1	Silicon, PNP; sim to Type 2N3702.
		- - - - - - - - - RESISTORS - - - - - - - - -
R1	3R77P103K	Composition: 10,000 ohms ±10%, 1/2 w.
R2	19B209336P8	Variable, carbon film: approx 100 to 50,000 ohms ±20%, 0.25 w; sim to CTS Type U-201.
R3	3R77P331K	Composition: 330 ohms ±10%, 1/2 w.
R4	3R77P102K	Composition: 1000 ohms ±10%, 1/2 w.
		- - - - - - - - VOLTAGE REGULATORS - - - - - -
VR1	4036887P3	Silicon, Zener.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

PARTS LIST

LBI-4837A

TYPE 90
PULSE TONE ENCODER - 5 TONE
MODELS 4EH14B11,12
19C320844G1, G2

SYMBOL	GE PART NO.	DESCRIPTION
A1301		5-TONE ENCODER 19C320843G1
		- - - - - - - - - CAPACITORS - - - - - - - - -
C1	712130097	Variable, mica: approx 880-2330 pf, 250 VDCW; sim to El Menco Type 30.
C2	19A116080P7	Polyester: 0.1 µf ±20%, 50 VDCW.
C3	19A116080P111	Polyester: 0.47 µf ±10%, 50 VDCW.
C4	19A116080P7	Polyester: 0.1 µf ±20%, 50 VDCW.
C5	19A116080P9	Polyester: 0.22 µf ±20%, 50 VDCW.
		- - - - - - - JACKS AND RECEPTACLES - - - - - -
J1 thru J12		(Part of component board 19B205486G2).
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q1	19A115910P1	Silicon, NPN: sim to Type 2N3904.
Q2	19A116774P1	Silicon, NPN: sim to Type 2N5210.
		- - - - - - - - - RESISTORS - - - - - - - - -
R1	3R77P243J	Composition: 24,000 ohms ±5%, 1/2 w.
R2	3R77P223J	Composition: 22,000 ohms ±5%, 1/2 w.
R3	3R77P152J	Composition: 1500 ohms ±5%, 1/2 w.
R4	3R77P332J	Composition: 3300 ohms ±5%, 1/2 w.
R5	3R77P823J	Composition: 82,000 ohms ±5%, 1/2 w.
R6	3R77P104E	Composition: 0.1 megohm ±10%, 1/2 w.
R7	19C300124P9	Variable, carbon film: 3500 ohms ±20%, 1/8 w; sim to P8 Mallory MLC.
R8	3R77P362E	Composition: 3600 ohms ±10%, 1/2 w.
R9	3R77P203K	Composition: 20,000 ohms ±10%, 1/2 w.
		- - - - - - - - - CAPACITORS - - - - - - - - -
		NOTE THE VALUES OF CAPACITORS C1303-C1305 MUST BE OBTAINED FROM THE COMPONENT. THUS FIND CORRESPONDING VALUE IN PARTS LIST FOR THE CORRECT PART NUMBER.
C1301 and C1302	19B200116P20	Variable mica: 170-730 pf; sim to Electro Motive Type PC46W.
C1303A	7489162P15	Silver mica: 33 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1303B	7489162P21	Silver mica: 56 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1303C	7489162P24	Silver mica: 75 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1303D	7489162P27	Silver mica: 100 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1303E	7489162P29	Silver mica: 120 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1303F	7489162P31	Silver mica: 150 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1303G	7489162P33	Silver mica: 180 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1303H	7489162P35	Silver mica: 220 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

SYMBOL	GE PART NO.	DESCRIPTION
C1303J	7489162P37	Silver mica: 270 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1303K	7489162P39	Silver mica: 330 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1303L	7489162P41	Silver mica: 390 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1303M	7489162P43	Silver mica: 470 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1303N	7489162P44	Silver mica: 510 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1303P	7147203P2	Silver mica: 560 pf ±5%, 500 VDCW; sim to Electro Motive Type DM20.
C1303R	7147203P3	Silver mica: 620 pf ±5%, 500 VDCW; sim to Electro Motive Type DM20.
C1303S	7147203P4	Silver mica: 680 pf ±5%, 500 VDCW; sim to Electro Motive Type DM20.
C1303T	7147203P5	Silver mica: 750 pf ±5%, 500 VDCW; sim to Electro Motive Type DM20.
C1303U	7147203P6	Silver mica: 820 pf ±5%, 500 VDCW; sim to Electro Motive Type DM20.
C1303V	7147203P7	Silver mica: 910 pf ±5%, 500 VDCW; sim to Electro Motive Type DM20.
C1303W	7147203P8	Silver mica: 1000 pf ±5%, 500 VDCW; sim to Electro Motive Type DM20.
C1304A	7489162P15	Silver mica: 33 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1304B	7489162P21	Silver mica: 56 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1304C	7489162P24	Silver mica: 75 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1304D	7489162P27	Silver mica: 100 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1304E	7489162P29	Silver mica: 120 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1304F	7489162P31	Silver mica: 150 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1304G	7489162P33	Silver mica: 180 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1304H	7489162P35	Silver mica: 220 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1304J	7489162P37	Silver mica: 270 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1304K	7489162P39	Silver mica: 330 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1304L	7489162P41	Silver mica: 390 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1304M	7489162P43	Silver mica: 470 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1304N	7489162P44	Silver mica: 510 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1304P	7147203P2	Silver mica: 560 pf ±5%, 500 VDCW; sim to Electro Motive Type DM20.
C1304R	7147203P3	Silver mica: 620 pf ±5%, 500 VDCW; sim to Electro Motive Type DM20.
C1304S	7147203P4	Silver mica: 680 pf ±5%, 500 VDCW; sim to Electro Motive Type DM20.
C1304T	7147203P5	Silver mica: 750 pf ±5%, 500 VDCW; sim to Electro Motive Type DM20.
C1304U	7147203P6	Silver mica: 820 pf ±5%, 500 VDCW; sim to Electro Motive Type DM20.
C1304V	7147203P7	Silver mica: 910 pf ±5%, 500 VDCW; sim to Electro Motive Type DM20.
C1304W	7147203P8	Silver mica: 1000 pf ±5%, 500 VDCW; sim to Electro Motive Type DM20.
C1304X	7147203P9	Silver mica: 1100 pf ±5%, 500 VDCW; sim to Electro Motive Type DM20.
C1304Y	7147203P10	Silver mica: 1200 pf ±5%, 500 VDCW; sim to Electro Motive Type DM20.
C1304Z	7147203P11	Silver mica: 1300 pf ±5%, 500 VDCW; sim to Electro Motive Type DM20.

SYMBOL	GE PART NO.	DESCRIPTION
C1304AA	7147203P12	Silver mica: 1500 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-20.
C1304AB	7147203P13	Silver mica: 1600 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-20.
C1304AC	7147203P14	Silver mica: 1800 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-20.
C1305A	7489162P15	Silver mica: 33 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1305B	7489162P21	Silver mica: 56 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1305C	7489162P24	Silver mica: 75 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1305D	7489162P27	Silver mica: 100 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1305E	7489162P29	Silver mica: 120 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1305F	7489162P31	Silver mica: 150 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1305G	7489162P33	Silver mica: 180 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1305H	7489162P35	Silver mica: 220 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1305J	7489162P37	Silver mica: 270 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1305K	7489162P39	Silver mica: 330 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1305L	7489162P41	Silver mica: 390 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1305M	7489162P43	Silver mica: 470 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1305N	7489162P44	Silver mica: 510 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C1305P	7147203P2	Silver mica: 560 pf ±5%, 500 VDCW; sim to Electro Motive Type DM20.
C1305R	7147203P3	Silver mica: 620 pf ±5%, 500 VDCW; sim to Electro Motive Type DM20.
C1305S	7147203P4	Silver mica: 680 pf ±5%, 500 VDCW; sim to Electro Motive Type DM20.
C1305T	7147203P5	Silver mica: 750 pf ±5%, 500 VDCW; sim to Electro Motive Type DM20.
C1305U	7147203P6	Silver mica: 820 pf ±5%, 500 VDCW; sim to Electro Motive Type DM20.
C1305V	7147203P7	Silver mica: 910 pf ±5%, 500 VDCW; sim to Electro Motive Type DM20.
C1305W	7147203P8	Silver mica: 1000 pf ±5%, 500 VDCW; sim to Electro Motive Type DM20.
C1306 thru C1308	7489162P17	Silver mica: 30 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
		- - - - - - - - - PLUGS - - - - - - - - -
P1304 thru P1312	4036634P1	Contact, electrical: sim to AMP 42428-2.
		- - - - - - - - - RESISTORS - - - - - - - - -
R1301	3R77P300J	Composition: 30 ohms ±5%, 1/2 w.
		- - - - - - - - - SWITCHES - - - - - - - - -
S1301	19B209292P1	Pushbutton: DPDT, 10 amps at 250 VAC; sim to Micro Switch 14GM1-82.
S1302	5493227P37	Rotary: 1 section, 2 poles, 5 positions, 2 amps at 28 VDC, or 1 amp at 110 VAC; sim to OAK Type F.
		- - - - - - - - - CABLES - - - - - - - - -
W1301		POWER CABLE 19B226162G1
		- - - - - - - - - PLUGS - - - - - - - - -
P1301	7489183P10	Plug: 9 contacts; sim to Winchester M9P-LS-H19C.
P1302 and P1303	4036634P1	Contact, electrical; sim to AMP 42428-2.

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - NETWORKS - - - - - - - - -
Z1301	19C303709G1	Frequency network.
Z1302	19C303709G2	Frequency network.
		INSTALLATION KIT 19A129985G1
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	4035674P3	Mounting support.
	B114P1308C6	Tap screw: No. 6-32 x 1/2,
	B231P1P	Nut, sheet spring.
	19A115423P7	Set screw, self-locking: No. 6-32 x 5/16.
		MISCELLANEOUS
	19B205043G1	Chassis.
	B9276435	Nameplate, faceplate.
	7763541P3	Retaining strap. (Used with W1301).
	5490407P29	Grommet: 5/8 inch OD. (Used with W1301).
	19A129110G3	Knob: (Used in S1302).
	19C303755G3	Housing.