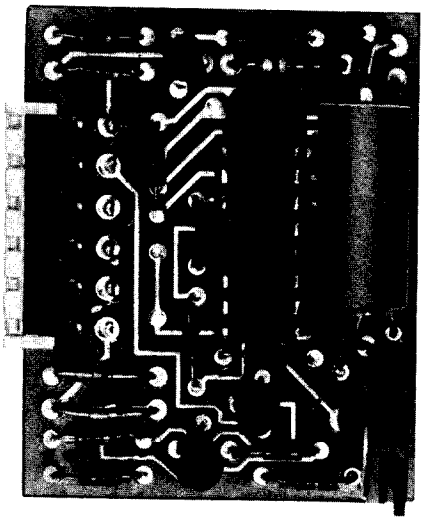
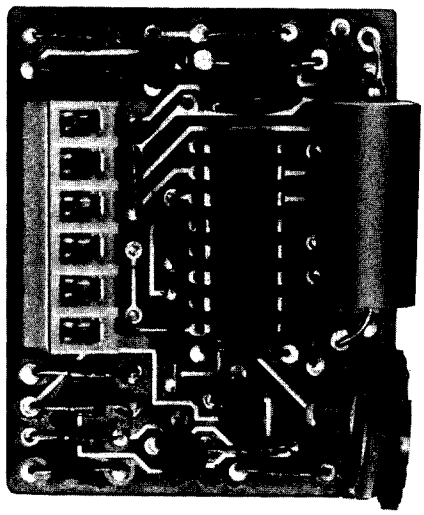
MOBILE RADIO

MAINTENANCE MANUAL

CARRIER CONTROL TIMER BOARD 19B226617G1,2



19B226617G1



19B226617G2

SPECIFICATIONS *

TIMING CYCLE:

- Factory Adjusted for approximately 1 minute
- Adjustable from approximately 45 seconds to 2.5 minutes

INPUT:	10 Volts @ 20 mA Maximum
AUDIO OUTPUT:	1000 ±200 Hz at 3.0V P-P (minimum)
INTEGRATED CIRCUITS:	1
DIMENSIONS (L X W X D):	1 7/8" x 1 5/8" x 1 13/16"

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

CARRIER CONTROL TIMER 19B226617G1,G2

GENERAL ELECTRIC

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WARNING

Although the highest DC voltage applied to the radio is +12VDC, high currents 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 Amplified assembly can cause RF burns upon contact. KEEP AWAY FROM THESE CIRCUITS WHEN THE TRANSMITTER IS ENERGIZED!

DESCRIPTION

General Electric Carrier Control Timer (CCT) turns off the transmitter carrier after the timing cycle, and alerts the operator that the transmitter is off by means of an alert tone from the speaker. The level of the alert tone is controlled by the volume control.

The transmitter can be turned on again by releasing and rekeying the push-to-talk switch on the microphone. The potentiometer provided allows the timing cycle (transmitter keyed time) to be adjusted from 45 seconds to 2.5 minutes.

The Carrier Control Timer is a plug-in board assembly and can be used with all MASTR® II and MASTR® Executive II mobile and station combinations. Two groups are provided.

The 19B226617G1 CCT is used with MASTR II combinations and the 19B226617G2 CCT is used with MASTR Executive II combinations. The electronic circuits in both groups are identical, the only difference (mechanical) is in the interface connector J1907 and J1908. The following chart provides the application dates for both groups.

Equipment	Carrier Control Timer	OPTION	
		Mobile	Station
MASTR II	19B226617G1	9002	9542
MASTR Executive II	19B226617G2	1701	9909

INSTALLATION

MASTR II MOBILE AND STATION

The CCT plugs into P907 on the system board in mobile and station applications.

To install the CCT in MASTR II mobile radios, pull the locking handle down, lift up the top cover at the front notch and remove the cover. Plug the Carrier Control Timer Assembly into P907 of the system board and reassemble the radio. Refer to the System Board manual for plug location.

In Station applications simply open the front panel and plug the CCT into P907. Refer to the Station Combination manual for plug location.

MASTR Executive II MOBILE AND STATION

The CCT plugs into P908 on the System-Audio-Squelch board (SAS) in both mobile and station applications. Refer to the Disassembly procedures in the appropriate Combinations manual to gain access to the SAS board and to locate P908. Plug the CCT into P908.

NOTE

The CCT is factory preset for a timing cycle of approximately 1 minute. If a change in the duration of the timing cycle is required, refer to the Adjustment Procedures and adjust accordingly.

Reassemble the mobile radio or station.

CIRCUIT ANALYSIS

The Carrier Control Timer consists of Integrated Circuit U1901, a time delay network (C1902 and R1904), PTT Switch Q1901, DC Switch Q1902, and Alert Tone Control Switch Q1903. U1901 contains the alert tone oscillator, and timer reset control circuits.

PTT AND TIME DELAY

Operating the PTT switch starts the carrier control timer. When the PTT switch is pressed A- is applied to the base of PTT Switch Q1901, turning it off. With Q1901 off timing capacitor C1902 starts charging through R1903 and R1904. The timing cycle (transmitter keyed time) is determined by the charging time established by C1902, R1903, and R1904 and the setting of timer adjust control R1906.

Timer adjust control R1906 provides a timing cycle range from approximately 45 seconds to 2.5 minutes by controlling the bias on base 1 of programmable unijunction transistor IC-U1901-Q1. The voltage level at base 1 determines the voltage level required at base 2 to forward bias U1901-Q1.

The charge on timing capacitor C1902 provides the base 2 voltage for U1901-Q1. When the charge on C1902 rises approximately 0.5 Volt higher than the base 1 voltage, U1901-Q1 becomes forward biased, the unijunction conducts and fires U1901-Q2, an SCR. The SCR applies the bias voltage to DC Switch Q1902, turning it on.

When the PTT Switch is released, A- is removed from the base of PTT Switch Q1901 allowing it to turn on. (The positive voltage required to turn on Q1901 is provided by the PTT circuit). A- is then applied through Q1901 and CR1901 to timing capacitor C1902, discharging C1902. At the same time, A- is applied to the anode of the SCR, turning it off. This completes the timer reset function in preparation for the next transmission.

DC SWITCH

DC Switch Q1902 is turned on by the conduction of U1901-Q2. The DC Switch when conducting applies A- through diodes CR1902 and CR1903 to J1907-1 (Tx Disable) and J1907-2 (Sq. Disable) respectively.

A- on the Tx DISABLE control line is applied to the transmitter keying and delay circuitry on the System Board. This removes the transmitter oscillator control voltage which then unkeys the transmitter.

A- on the Sq. DISABLE control line disables the receiver squelch circuits, thereby enabling the receiver audio circuitry.

ALERT TONE OSCILLATOR, & ALERT TONE CONTROL SWITCH

Simultaneously, when Q1902 turns ON, the emitter circuit of U1901-Q5 is returned to A- allowing the Alert Tone Oscillator U1901-Q4, Q5 to operate. The oscillator provides a tone frequency of 1000 ±200 Hz. The oscillator frequency is determined primarily by the value of C1903. The base resistor, R1915, of alert tone control switch Q1903 is also returned to A- when Q1902 conducts. This turns Q1903 ON, allowing the alert tone and DC voltage (coupled through emitter follower U1901-Q3 to be applied to J1907-5 (VOL/SQ HI). J1907-5 is connected to the HI side of the VOLUME and SQUELCH controls. The DC voltage is used to back bias the audio pre-amplifier in the receiver, which shuts off all receiver noise ahead of this point.

Since the alert tone is applied ahead of the reciever volume control, the audible level of the tone will be approximately the listening level that the operator has selected through adjustment of the volume control.

When the PTT Switch is released and U1901-Q2 is reset, DC Switch Q1902 is turned off. A- is then removed from the base resistor of Q1903 and the emitter of alert tone oscillator transistor U1901-Q5, turning off the alert tone control switch Q1903 and the alert tone oscillator U1901-Q4 and Q5.

MAINTENANCE

ADJUSTMENT

The Timing Cycle (Transmitter Keyed Time) is adjustable from approximately 45 seconds to 2.5 minutes, and is achieved by adjusting potentiometer R1906.

1. Key the transmitter into a 50-ohm load. Keep the transmitter keyed until the Carrier Control Timer times out, disabling the transmitter and allowing the alert tone to be heard in the speaker.

2. The Carrier Control Timer is factory adjusted for a timing cycle of approximately 1-minute. If a longer timing cycle is desired, adjust potentiometer R1906 clockwise for an increase in resistance, or counterclockwise for a decrease in resistance for a shorter timing cycle.

TROUBLESHOOTING

Typical voltage reading are provided on the Schematic Diagram. All voltages are measured with a 20,000 ohms/volt meter and to ground. Peak-to-peak voltages were measured with an oscilloscope.

GENERAL ELECTRIC COMPANY • MOBILE COMMUNICATIONS DIVISION
WORLD HEADQUARTERS • LYNCHBURG, VIRGINIA 24502 U.S.A.

GENERAL ELECTRIC*
U.S.A.

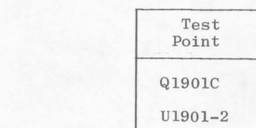
TYPICAL VOLTAGE READINGS
(With R1906 Adjusted for 4 V at U1901-1)

Test Point	Static	Transmitter Keyed	Timed Out
Q1901C	0.1 VDC	10 VDC	1.5 VDC
U1901-2		1-4.5 V *	
U1901-6	10 VDC	10 VDC	9.5 VDC
U1901-15	4.0 VDC	4.0 VDC	4.0 VDC
U1901-16	10 VDC	10 VDC	3.8 VDC
Q1902C	11 VDC	10 VDC	0.2 VDC
J1907-6	13.6 VDC	0.1 VDC	
J1907-5	4.5 VDC	4.5 VDC	6.0 VDC (3.5 VP-P) Tone
J1907-2	10 VDC	10 VDC	0.7 VDC
J1907-1	11.5 VDC	2 VDC	0.7 VDC

* Timing capacitor C1902 charging voltage

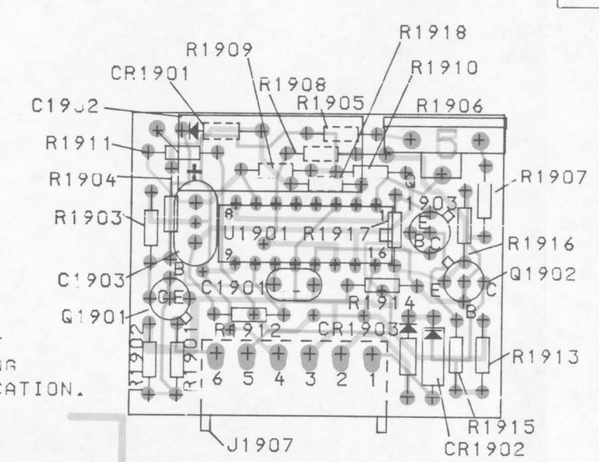
OUTLINE DIAGRAM

LEAD IDENTIFICATION
FOR Q1901 - Q1903

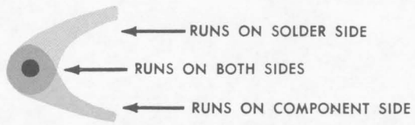


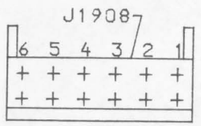
TOP VIEW

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



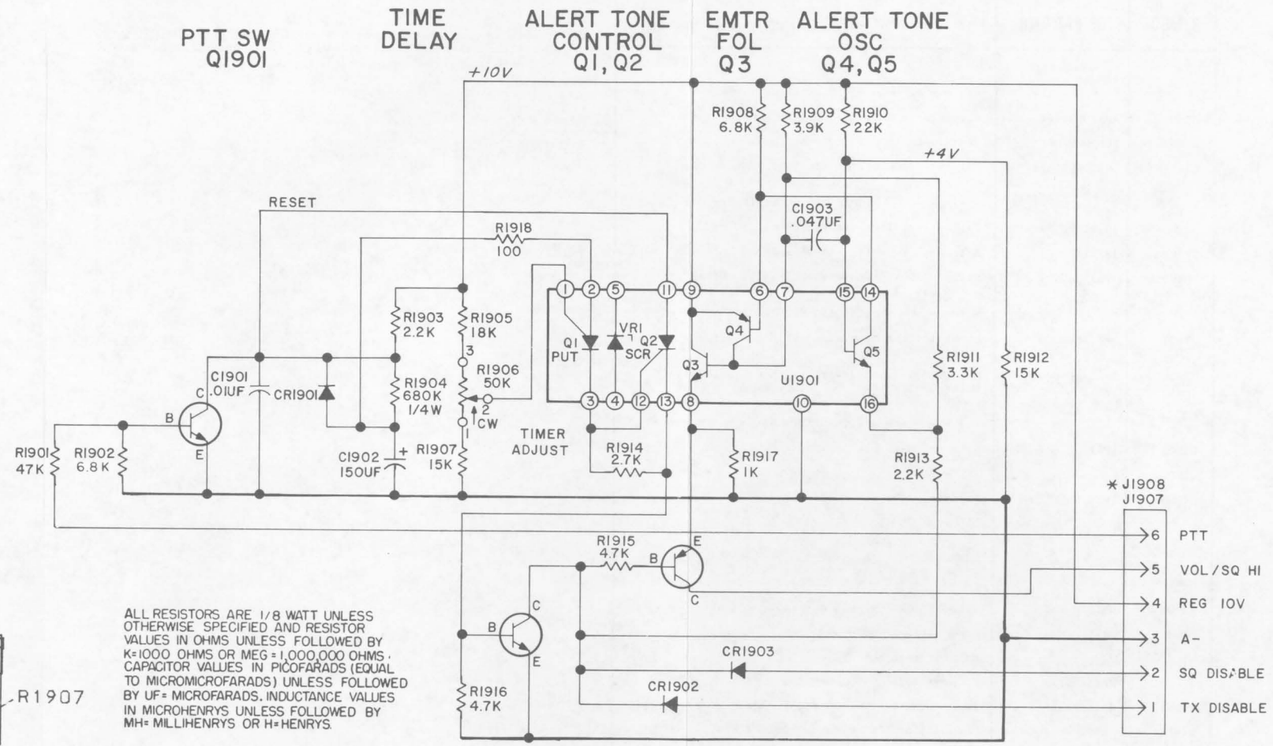
(19B227235, Rev. 3)
(19A130353, Sh. 1, Rev. 5)
(19A130353, Sh. 2, Rev. 5)





JACK IDENTIFICATION
FOR GROUP 2

SCHEMATIC DIAGRAM



ALL RESISTORS ARE 1/8 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
PLI9B226617G1	C
PLI9B226617G2	C

* APPLIES TO GROUP 2 ONLY.
(19C321299, Rev. 6)

OUTLINE & SCHEMATIC DIAGRAM

CARRIER CONTROL TIMER BOARD
19B226617G1 & G2

Issue 4

PARTS LIST

LBI-4988B

CARRIER CONTROL TIMER
19B226617G1, G2

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1901	19A700234P7	Polyester: 0.01 µf ±10%, 50 VDCW.
C1902	19B200240P8	Tantalum: 150 µf ±10%, 15 VDCW.
C1903	19A700234P11	Polyester: 0.047 µf ±10%, 50 VDCW.
		- - - - - - - - DIODES AND RECTIFIERS - - - - - -
CR1901	19A115250P1	Silicon, fast recovery, 225 mA, 50 PIV.
CR1902	19A115100P1	Silicon, 125 PIV, sim to IN458A.
CR1903	19A115250P1	Silicon, fast recovery, 225 mA, 50 PIV.
		- - - - - - - - JACKS AND RECEPTACLES - - - - - - - -
J1907	19A116659P6	Connector, printed wiring: 6 contacts; sim to Molex 09-52-3061.
J1908	19A116659P4	Connector, printed wiring: 6 contacts; sim to Molex 09-52-3062.
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q1901 and Q1902	19A115910P1	Silicon, NPN; sim to Type 2N3904.
Q1903	19A115852P1	Silicon, PNP; sim to Type 2N3906.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1901	3R151P473J	Composition: 47,000 ohms ±5%, 1/8 w.
R1902*	3R151P682J	Composition: 6800 ohms ±5%, 1/8 w.
		Earlier than REV A:
	3R151P472J	Composition: 4700 ohms ±5%, 1/8 w.
R1903	3R151P222J	Composition: 2200 ohms ±5%, 1/8 w.
R1904	3R151P684J	Composition: 0.68 megohm ±5%, 1/8 w.
R1905	3R151P183J	Composition: 18,000 ohms ±5%, 1/8 w.
R1906	19B209358P108	Variable, carbon film: approx 2000 to 50,000 ohms ±10%, 0.25 w; sim to CTS Type X-201.
R1907	3R151P153J	Composition: 15,000 ohms ±5%, 1/8 w.
R1908	3R151P682J	Composition: 6800 ohms ±5%, 1/8 w.
R1909	3R151P392J	Composition: 3900 ohms ±5%, 1/8 w.
R1910	3R151P223J	Composition: 22,000 ohms ±5%, 1/8 w.
R1911	3R151P332J	Composition: 3300 ohms ±5%, 1/8 w.
R1912	3R151P153J	Composition: 15,000 ohms ±5%, 1/8 w.
R1913	3R151P222J	Composition: 2200 ohms ±5%, 1/8 w.
R1914	3R151P272J	Composition: 2700 ohms ±5%, 1/8 w.
R1915 and R1916	3R151P472J	Composition: 4700 ohms ±5%, 1/8 w.
R1917	3R151P102J	Composition: 1000 ohms ±5%, 1/8 w.
R1918	3R151P101J	Composition: 100 ohms ±5%, 1/8 w.
		- - - - - - - - INTEGRATED CIRCUITS - - - - - -
U1901	19A134148P1	Linear, Programmable Unijunction Transistor, SCR and Transistor Array: sim to RCA CA 3097E.

*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 improve performance under low line voltage condition. Changed R1902.

REV. B - To improve operation of U1901. Added R1918.

REV. C - To improve operation in UHF applications by assuring the transmitter will unkey when CCT times out. Changed CR1902.
CR1902 was: 19A115250P1, Silicon.