MOBILE RADIO

MAINTENANCE MANUAL

CARRIER CONTROL TIMER BOARD 19C327572G1
OPTION 1914

Maintenance Manual LBI 30407 A
DATAFILE FOLDER – DF 8408

CARRIER CONTROL TIMER
19C327572G1

SPECIFICATIONS *

USED WITH:	CUSTOM MVP TWO-WAY RADIOS
TIMING CYCLE:	Approximately 1 minute
INPUT:	10 Volts @ 20 mA Maximum
AUDIO OUTPUT:	1000 ±200 Hz at 3.0V P-P (minimum)
INTEGRATED CIRCUITS:	1

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

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WARNING

Although the highest DC voltage is supplied by the vehicle battery, 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 Amplifier assembly can cause RF burns upon contact. KEEP AWAY FROM THESE CIRCUITS WHEN THE TRANSMITTER IS ENERGIZED!

DESCRIPTION

General Electric Carrier Control Timer 19C327572G1 is used with Custom MVP two-way FM radios. The 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 re-keying the push-to-talk switch on the microphone. The timing cycle (transmitter keyed time) is one minute, but can be field modified to operate from 30 seconds to three minutes.

INSTALLATION

The CCT board mounts on the radio frame behind the System-Audio & Squelch (SAS) board. Six leads on the CCT board provide power and control connections to the SAS board. Refer to the Installation Instructions as listed in the Table of Contents for complete details.

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.

NOTE

The CCT is shipped from the factory with a timing cycle of approximately 1 minute. If a change in the duration of the timing cycle is desired, the value of R1907 can be changed. Refer to the Adjustment Procedure as listed in the Table of Contents.

Timing control resistor R1907 sets the timing cycle for approximately 1 minute by controlling the bias on base 1 of programmable unijunction transistor (PUT) 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 turns on SCR U1901-Q2. 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. When conducting, the DC Switch applies A- through diodes CR1902 and CR1903 to H5 (TX DISABLE) and H3 (SQ DISABLE) respectively. The TX DISABLE control line connects from H5 to U902-11 (10 Volt Regulator) on the System Board. A- applied to U902-11 disables the transmitter oscillator control voltage which turns the transmitter carrier OFF.

The SQ DISABLE control line connects from H3 to the squelch circuit on the SAS board. A- applied to this point disables the receiver squelch circuit, enabling the receiver audio circuits to operate.

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 U901-Q4 and Q5 to operate. The oscillator provides a tone frequency of 1000 ±200 Hz. The oscillator frequency is determined primarily by the value of C1903. 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 H6 (VOL/SQ HI). H6 is connected to the HI side of the VOLUME and SQUELCH controls. The DC voltage is used to back bias the audio preamplifier in the receiver which shuts off all receiver noise ahead of this point.

Since the alert tone is applied ahead of the receiver 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. This turns off alert tone control switch Q1903 and alert tone oscillator U1901-Q4 and Q5.

MAINTENANCE

ADJUSTMENT

The Timing Cycle (Transmitter Keyed Time) is adjustable from approximately 30 seconds to 3 minutes, and is achieved by changing the value of R1907.

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. If a different timing cycle is desired, refer to the timing chart on the Schematic Diagram for the proper value of R1907.

TROUBLESHOOTING

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

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TYPICAL VOLTAGE READINGS
(With R1907 selected for 4 V at U1901-1)

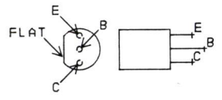
Test Point	Static	Transmitter Keyed	Timed Out
Q1901C	0.1 VDC	10 VDC	1.5 VDC
U1901-2		1-4.5 V*	
U1901-6	10 VDC	10 VDC	9.5 VDC
U1901-15	4 VDC	4 VDC	4 VDC
U1901-16	10 VDC	10 VDC	3.8 VDC
Q1902C	11 VDC	10 VDC	0.2 VDC
H7	13.6 VDC	0.1 VDC	
H6	4.5 VDC	4.5 VDC	6.0 VDC (3.5 VP-P Tone)
H3	10 VDC	10 VDC	0.7 VDC
H5	11.5 VDC	2 VDC	0.7 VDC

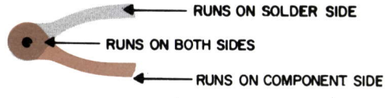
*Timing capacitor C1902 charging voltage

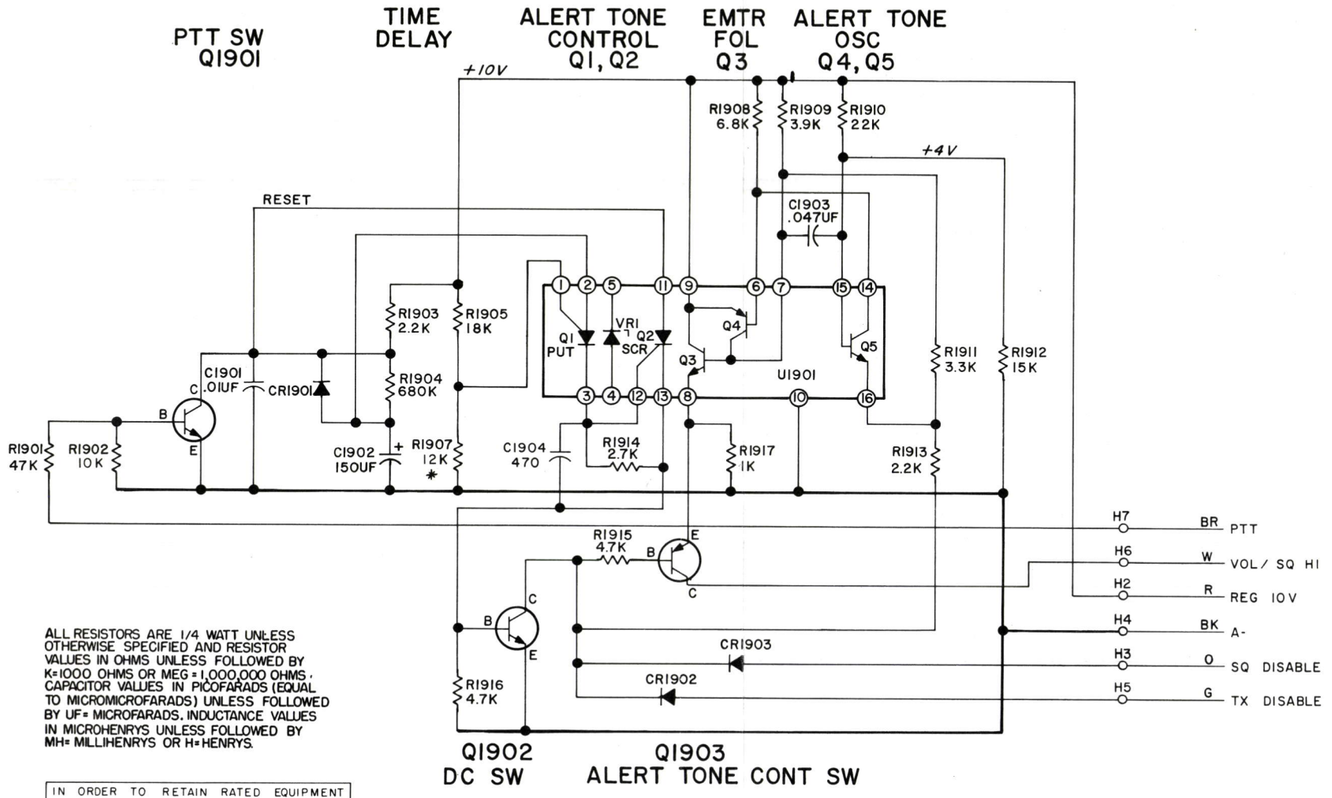
(19B227782, Rev. 0)
(19A136928, Sh. 1, Rev. 0)
(19A136928, Sh. 2, Rev. 0)

PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. FOR COMPLETE DESIGNATION PREFIX WITH 1900 SERIES. EXAMPLE C1=C1901, R1=R1901 ETC.

LEAD IDENTIFICATION FOR Q1 THRU Q3







ALL RESISTORS ARE 1/4 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.

NOTES:

1. ALL WIRES ARE SF-24.
2. * TO CHANGE "TIME-OUT" FROM STANDARD 60 SEC. CHANGE R1907 AS FOLOWS:

TIME	R1907 VALUE
30 SEC	5.6K
45 SEC	9.1K
60 SEC	12K (AS SHIPPED)
120 SEC	30K
180 SEC	56K

THIS ELEM DIAG APPLIES TO	
MODEL NO	REV LETTER
PL19C327572G1	

(19C327584, Rev. 0)

SCHEMATIC & OUTLINE DIAGRAM

CARRIER CONTROL TIMER BOARD 19C327572G1

Issue 1

PARTS LIST

LBI-30408

CARRIER CONTROL TIMER
19C327572G1

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1901	19A116192P1	Ceramic: 0.01 µf ±20%, 50 VDCW; sim to Erie 8121 SPECIAL.
C1902	19B200240P8	Tantalum: 150 µf ±10%, 15 VDCW.
C1903	19A116080P105	Polyester: 0.047 µf ±10%, 50 VDCW.
C1904	19A116192P2	Ceramic: 470 pf ±20%, 50 VDCW; sim to Erie 8111-A050-W5R-471M.
		- - - - - - - - DIODES AND RECTIFIERS - - - - - -
CR1901 thru CR1903	19A115250P1	Silicon.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q1901 and Q1902	19A115910P1	Silicon, NPN; sim to Type 2N3904.
Q1903	19A115852P1	Silicon, PNP; sim to Type 2N3906.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1901	3R152P473J	Composition: 47,000 ohms ±5%, 1/4 w.
R1902	3R152P103J	Composition: 10,000 ohms ±5%, 1/4 w.
R1903	3R152P222J	Composition: 2200 ohms ±5%, 1/4 w.
R1904	3R152P684K	Composition: 0.68 megohm ±10%, 1/4 w.
R1905	3R152P183J	Composition: 18,000 ohms ±5%, 1/4 w.
R1907	3R152P123J	Composition: 12,000 ohms ±5%, 1/4 w.
R1908	3R152P682J	Composition: 6800 ohms ±5%, 1/4 w.
R1909	3R152P392J	Composition: 3900 ohms ±5%, 1/4 w.
R1910	3R152P223J	Composition: 22,000 ohms ±5%, 1/4 w.
R1911	3R152P332J	Composition: 3300 ohms ±5%, 1/4 w.
R1912	3R152P153J	Composition: 15,000 ohms ±5%, 1/4 w.
R1913	3R152P222J	Composition: 2200 ohms ±5%, 1/4 w.
R1914	3R152P272J	Composition: 2700 ohms ±5%, 1/4 w.
R1915 and R1916	3R152P472J	Composition: 4700 ohms ±5%, 1/4 w.
R1917	3R152P102J	Composition: 1000 ohms ±5%, 1/4 w.
		- - - - - - - - INTEGRATED CIRCUITS - - - - - -
U1901	19A134148P1	Linear, Programmable Unijunction Transistor, SCR and Transistor Array: sim to RCA CA 3097E.
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - - -
	4037072P5	Plug button, insulator.
	19B227793G1	Plate. (Mounts Timer Board).
	7141225P2	Hexnut: No. 4-40. (Secures Timer Board to Plate).
	N404P11C6	Lockwasher, internal tooth: No. 4. (Secures Timer Board to Plate).

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

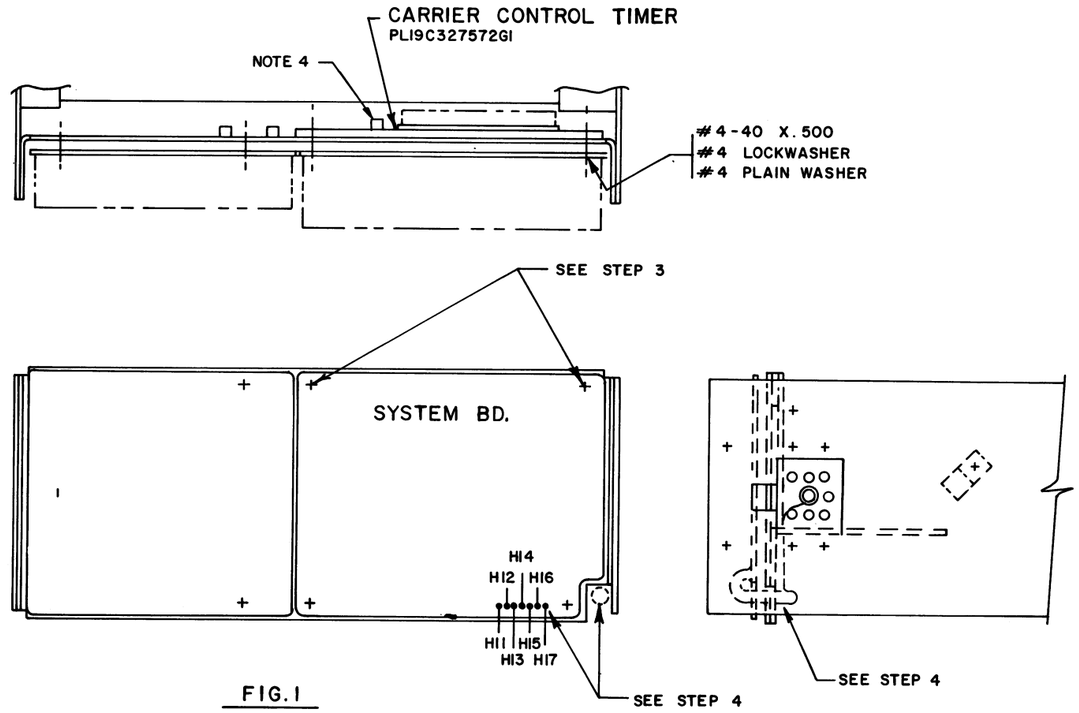


FIG.1

(19C327690, Rev. 2)

THESE INSTRUCTIONS COVER THE INSTALLATION OF MODIFICATION KIT PLI9AI37000GI FOR APPLICATION OF "CARRIER CONTROL TIMER" TO CUSTOM MVP MOBILE RADIO.

INSTRUCTIONS:

STEP 1: LOOSEN WING NUT AT REAR OF RADIO AND SLIDE COVER BACK TO EXPOSE FRONT PANEL MOUNTING SCREWS AT SIDES.

STEP 2: REMOVE THESE FOUR SCREWS AND SLIDE FRONT PANEL FROM INTERNAL FRAME. THIS EXPOSES SYSTEM AREA OF RADIO. (SEE FIG. 1).

STEP 3: REMOVE # 6-32 SCREWS SHOWN AND INSTALL CARRIER CONTROL TIMER BD (PLI9C327572GI.) USING # 4-40 HARDWARE PROVIDED WITH KIT (PLI9AI37000GI).

STEP 4: ROUTE HARNESS (SUPPLIED) THROUGH NOTCH AS SHOWN, ALONG SHIELD CAN OF I F DETECTOR BOARD AND SOLDER INTO SYSTEM BD AS FOLLOWS:

RED	WIRE TO HI2	GREEN WIRE TO HI5
ORANGE	WIRE TO HI3	WHITE WIRE TO HI6
BLACK	WIRE TO HI4	BROWN WIRE TO HI7

STEP 5: REASSEMBLE RADIO.

INSTALLATION DIAGRAM

CARRIER CONTROL TIMER BOARD

Issue 2