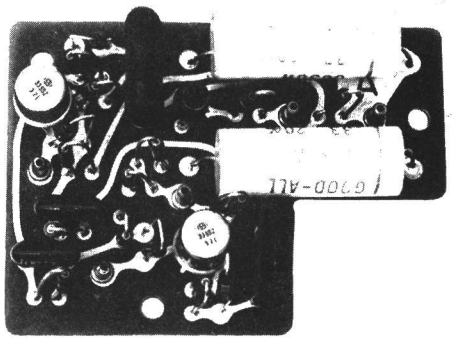
communications

MASTR Progress Line

SEARCH-LOCK MONITOR (Options 7001, 7601 & 7602)



SPECIFICATIONS *

SEARCH-LOCK MONITOR BOARD

For Mobile Combinations	19A121599-G1
For Station Combinations	19A121647-G1
SEARCH RATE (Receiver Squelched)	Samples each channel approximately 4 times per second
INPUT	.005 ma at +10 volts
DIMENSIONS (H x W x D)	2" x 2-3/4" x 3/4"
SILICON TRANSISTORS	3
TEMPERATURE RANGE	-30°C to +60°C

SEARCH-LOCK MONITOR

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

GENERAL ELECTRIC

TABLE OF CONTENTS

ILLUSTRATIONS

WARNING

No one should be permitted to handle any portion of the 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

The General Electric Search-Lock Monitor option was designed to provide two-frequency monitoring when used with MASTR Progress Line mobile or station combinations.

The unit provides two-channel monitoring by alternately sampling each of the two receiver frequencies at a nominal rate of four times per second. When a signal is received on either frequency, the Search-Lock Monitor "locks" on that frequency for the duration of the signal.

NOTE

The Search-Lock Monitor will operate only with the receiver squelched. When the receiver is unsquelched, the Search-Lock Monitor will "lock" on either F1 or F2.

The different option numbers for Search-Lock Monitor and combinations it is used with are shown in the following chart:

MASTR COMBINATION	SEARCH-LOCK MONITOR	OPTION NUMBER
Mobile	19A121599-G1	7001
Local and Local/ Remote Stations	19A121647-G1	7601
Remote Control Stations	19A121647-G1	7602

In mobile combinations, the Search-Lock Monitor (SLM) assembly is mounted on the system frame at the back of the receiver and is covered by the back cap.

In station combinations, the assembly is mounted on Transmitter-Receiver Power Supply Model 4EP38A10.

MOBILE AND LOCAL-LOCAL/REMOTE SWITCHING

In mobile combinations and local or local/remote station combinations, the SLM is controlled by a three-position switch marked F1, F1-F2, and F2 (see Figures 1 and 2).

Turning the switch to the F1 or F2 position applies +10 volts to the selected crystal-switching diode in the receiver oscillator and overrides the SLM. Switching to the F1 or F2 position also connects the crystal-switching diode of the transmitter oscillator to ground, so that the radio will operate on the frequency determined by the selected transmitter and receiver oscillator.

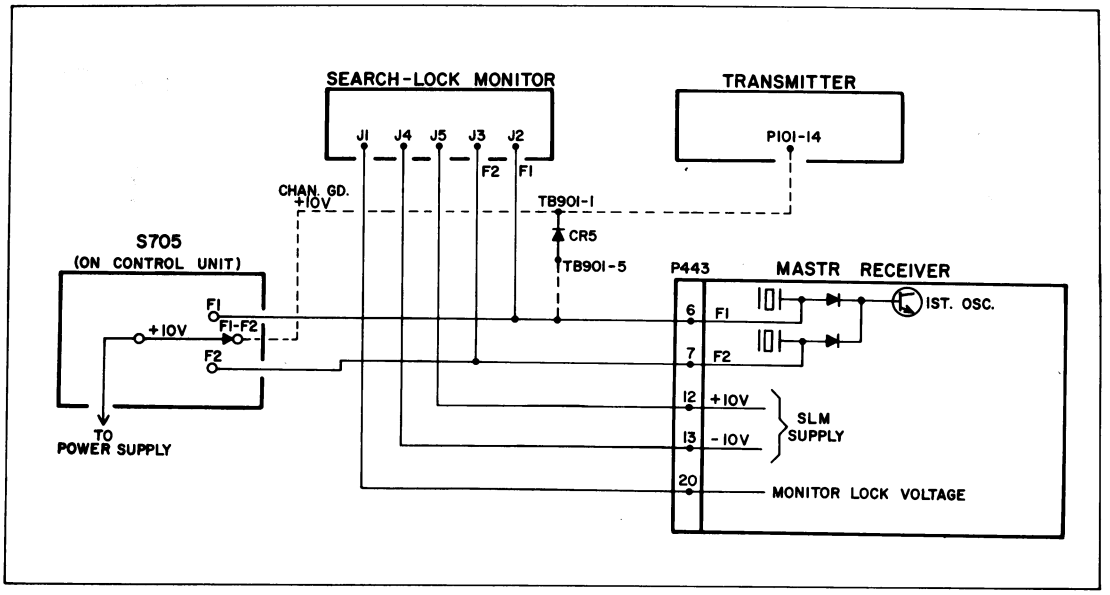


Figure 1 - Mobile Switching Diagram

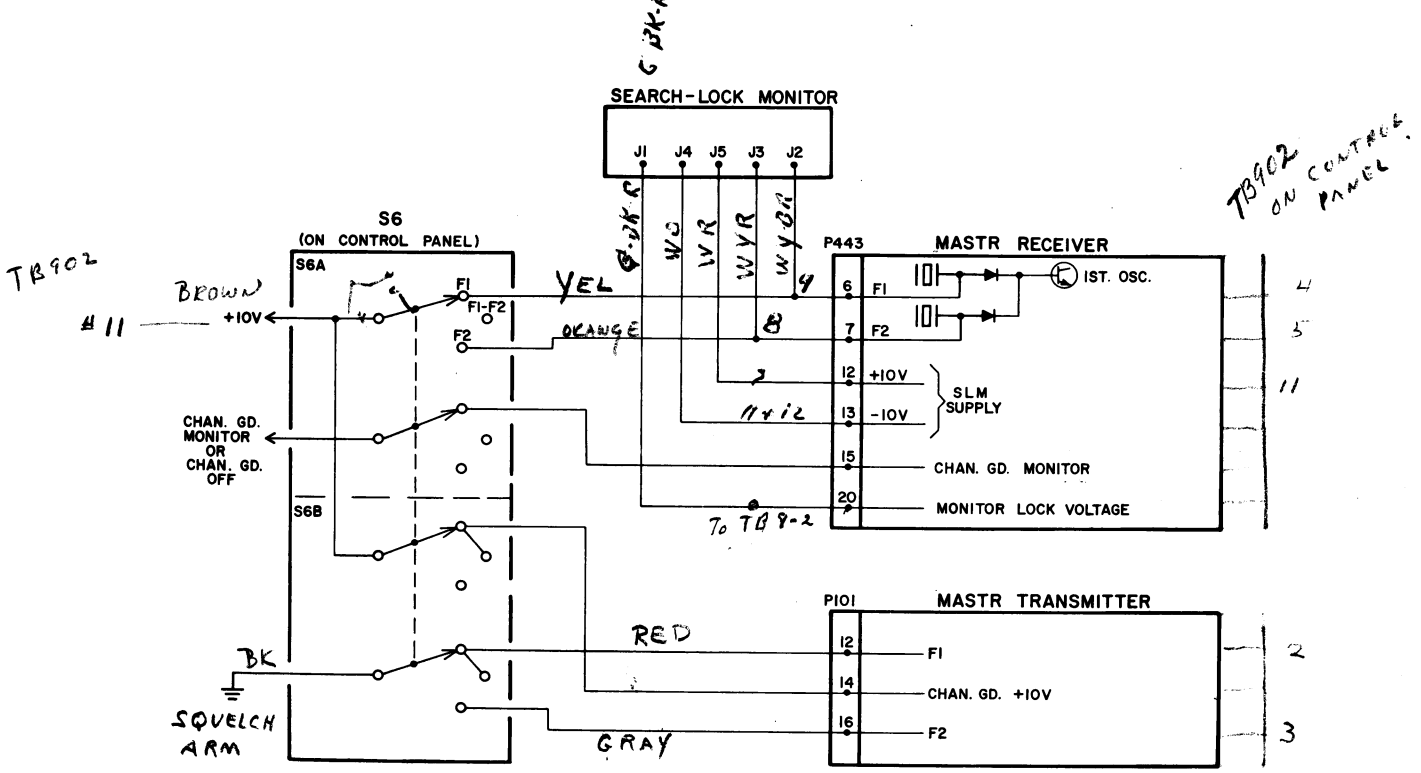


Figure 2 - Local & Local/Remote Station Switching Diagram

Turning switch to the F1-F2 position applies no voltage to either receiver crystal-switching diode, and the Search-Lock Monitor operates. The Search-Lock Monitor then provides two-channel monitoring by alternately switching +10 volts between the two receiver crystal-switching diodes at a rate of approximately four times per second per channel. When a signal is received on either channel, the SLM will "lock" on that frequency for the duration of the signal.

NOTE

With the switch in the F1-F2 position, the transmitter will operate on the F1 frequency only.

In radios equipped with Channel Guard, the receiver Channel Guard operates only in the F1 position. The transmitter Channel Guard operates in the F1 and F1-F2 position.

REMOTE SWITCHING

In remote control stations, two pushbuttons (R1 and R2) on the remote control console activate relays on the Remote Control Panel for switching the +10 volts to the selected receiver crystal-switching diode (Figure 3).

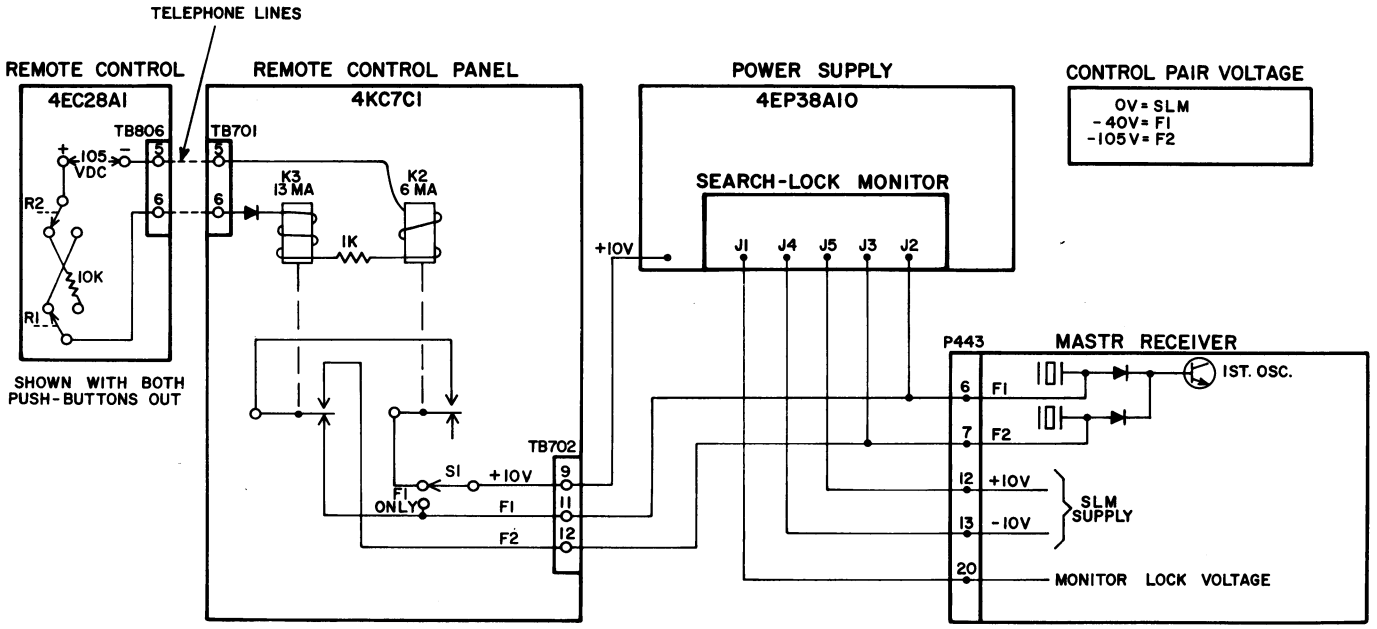


Figure 3 - Remote Control Station Switching Diagram

When pushbutton R1 is pushed in, 40 volts is applied to the relays on the Remote Control Panel, activating relay K2. This switches +10 volts to the F1 receiver oscillator and overrides the SLM. Pushing the R2 pushbutton in applies -105 volts to the control panel, activating both relays. This switches +10 volts to the F2 receiver oscillator.

When R1 and R2 are both pushed in (or both are out), no voltage is applied through the relays to the receiver switching diode, and the SLM operates. The SLM provides two-channel monitoring by alternately switching +10 volts between the two receiver crystal-switching diodes. When a signal is received on either channel, the SLM will "lock" on that frequency for the duration of the signal.

CIRCUIT ANALYSIS

The SLM circuit consists basically of a pulse generator (Q1) and a bi-stable multivibrator circuit (Q2 and Q3). The pulse generator operates at a nominal frequency of eight pulses per second.

When the receiver is squelched, 9 volts from the collector of the receiver DC amp (Q8) is fed through J1 and R2 on the SLM board to the base of pulse generator Q1. This voltage causes Q1 to operate, sending a series of pulses to the base of switching transistors Q2 and Q3. These pulses activate the multivibrator circuit, which alternately applies +10 volts to each receiver oscillator-switching diode at a rate of approximately four times per second.

When a signal is received, the receiver squelch opens; and the voltage at the base of Q1 drops almost to zero. This disables the pulse generator and switching circuit, and the +10 volt input from J5 is applied through R11 and Q2 or Q3 to the receiver oscillator. For example, if the first signal is received on F1, the +10 volts is applied to the F1 receiver oscillator through R11 and Q2, locking the receiver on F1 for the duration of the signal. Subsequent signals at F2 will not be accepted while the F1 signal is being received.

When the signal at F1 stops, the receiver squelches; and 9 volts is fed to the base of pulse generator Q1. Then Q2 and Q3 begin to switch back and forth until another signal is received.

Back bias is prevented from reaching the collectors of Q2 and Q3 by CR1 and CR2. CR4 biases Q3 off while Q2 is conducting, thereby preventing Q3 from conducting while Q2 is operating. The pulse generator circuit consists of R1, R2, R3, C1, C2 and Q1.

MAINTENANCE

DISASSEMBLY

To gain access to the SLM board, remove the four screws in the back cover and remove the cover.

TEST PROCEDURES

1. Turn the SLM switch to the F1-F2 (Search-Lock) position and make sure that the receiver is squelched.

2. Connect positive probe of multimeter to junction of R1 and CR1 (for F1) or R22 and CR2 (for F2) on the oscillator board. Connect negative probe to J442-8 (negative). If SLM is operating, meter should vary from zero to a positive voltage approximately two to four times per second.

3. Next, unsquelch the receiver. Meter reading should be less than one volt on OFF channel (not conducting) and 6.6 volts on ON channel (conducting).

4. Switch to the F1 position. Reading at junction of R1 and CR1 should be approximately 6.6 volts. Then switch to the F2 position. Reading at junction of R2 and CR2 should be approximately 6.6 volts.

PARTS LIST

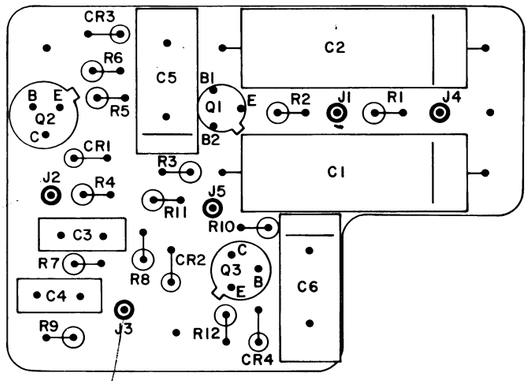
LBI-3626

SEARCH LOCK MONITOR KIT
PL-19A121599-G1 (Mobile)
PL-19A121647-G1 (Station)

SYMBOL	G-E PART NO.	DESCRIPTION
		- - - - - - - - - - DIODES - - - - - - - - - -
CR5	5494922-P1	Silicon; sim to Type 1N456. (used with 19A121599-G1 only).
		COMPONENT BOARD ASSEMBLY PL-19B204748-G1
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1 and C2	7491930-P11	Tubular, Mylar® dielectric: axial leads, 0.33 µf ±20%, 100 VDCW; sim to G-E Type 61F.
C3 and C4	5490008-P127	Silver mica, dipped phen: radial leads, 100 pf ±10%, 500 VDCW; sim to Electro Motive Type DM-15.
C5 and C6	19A115028-P107	Mylar® dielectric, dipped phen: radial leads, .01 µf ±20%, 200 VDCW.
		- - - - - - - DIODES AND RECTIFIERS - - - - - -
CR1 thru CR4	5494922-P1	Silicon; sim to Type 1N456.
		- - - - - - - JACKS AND RECEPTACLES - - - - - - -
J1 thru J5	4033513-P4	Contact, electrical: sim to Bead Chain L93-3.
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q1	19A115364-P1	Silicon, unijunction; sim to Type 2N2646.
Q2 and Q3	19A115247-P1	Silicon, PNP; sim to Type 2N1024.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R152-P101K	Fixed composition: 100 ohms ±10%, 1/4 w.
R2	3R152-P204J	Fixed composition: 0.2 megohm ±5%, 1/4 w.
R3	3R152-P511K	Fixed composition: 510 ohms ±10%, 1/4 w.
R4	3R152-P682J	Fixed composition: 6800 ohms ±5%, 1/4 w.
R5	3R152-P203K	Fixed composition: 20,000 ohms ±10%, 1/4 w.
R6 and R7	3R152-P103J	Fixed composition: 10,000 ohms ±5%, 1/4 w.
R8	3R152-P682J	Fixed composition: 6800 ohms ±5%, 1/4 w.
R9 and R10	3R152-P103J	Fixed composition: 10,000 ohms ±5%, 1/4 w.
R11	3R152-P101J	Fixed composition: 100 ohms ±5%, 1/4 w.
R12	3R152-P203K	Fixed composition: 20,000 ohms ±10%, 1/4 w.
		- - - - - - - - -MISCELLANEOUS - - - - - - - - -
	19A121648-G1	Station Support Assembly.
	19A121592-G1	Mobile support assembly.
		- - - - - - - - - - CABLES - - - - - - - - - - -
	19A121603-G1	Cable Assembly, 24" long. (Used with PL-PL-19A121592-G1 only).
	19B204903-G1	Cable Assembly, 23" long (Used with PL-19A121647-G1 only).

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.

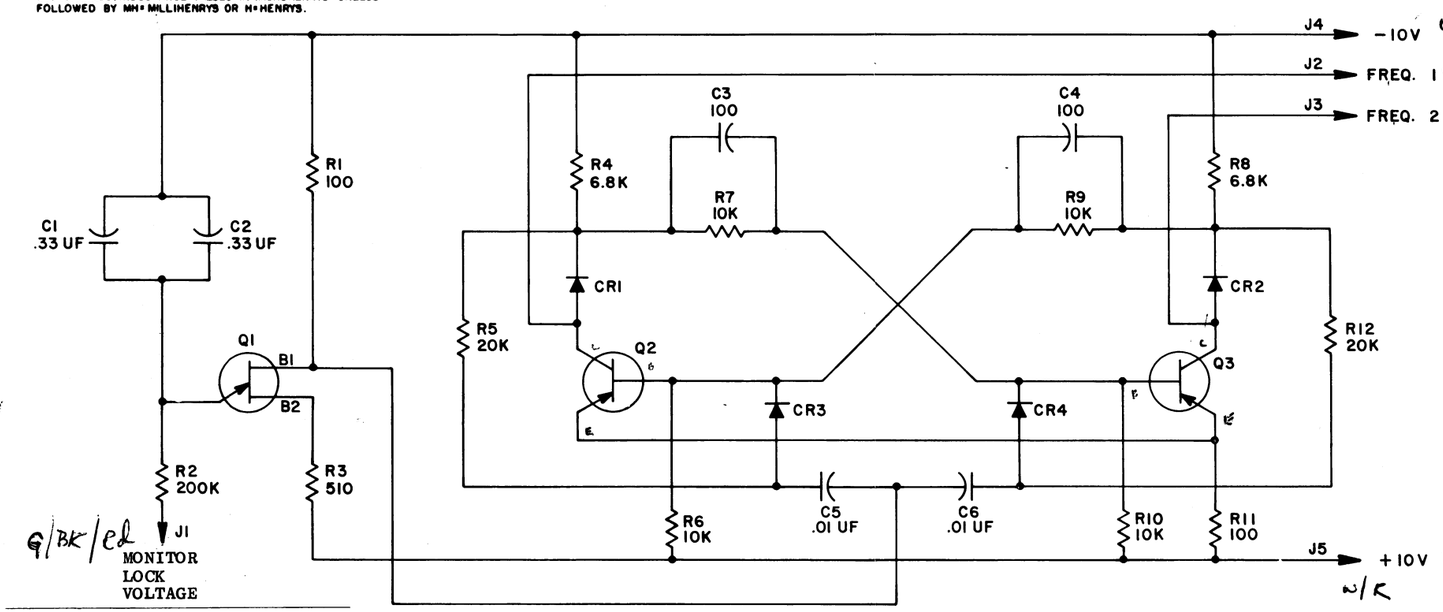
SEARCH - LOCK MONITOR BOARD



CONNECTIONS			
FROM		TO	
WIRE COLOR	SEARCH LOCK MONITOR BD.	MOBILE	STATION
G-BK-R	J1	P443-20	P443-20 (RECEIVER)
W-Y-BR	J2	P443-6	TB502-9 (EP-38-A)
W-Y-R	J3	P443-7	TB502-8 (EP-38-A)
W-O	J4	P443-13	TB501-12 (EP-38-A)
W-R	J5	P443-12	TB501-7 (EP-38-A)

(19C303818, Rev. 0)

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.



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

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.

(19B204847, Rev. 1)

VOLTAGE READINGS

ALL READINGS ARE TYPICAL VOLTAGES MADE WITH A 20,000 OHM-PER-VOLT METER, MEASURED TO J442-8 (NEGATIVE).

S = SQUELCH CONTROL FULLY COUNTERCLOCKWISE
US = SQUELCH CONTROL FULLY CLOCKWISE

SCHEMATIC & OUTLINE DIAGRAM

SEARCH-LOCK MONITOR
OPTIONS 7001, 7602 & 7602

Issue 1

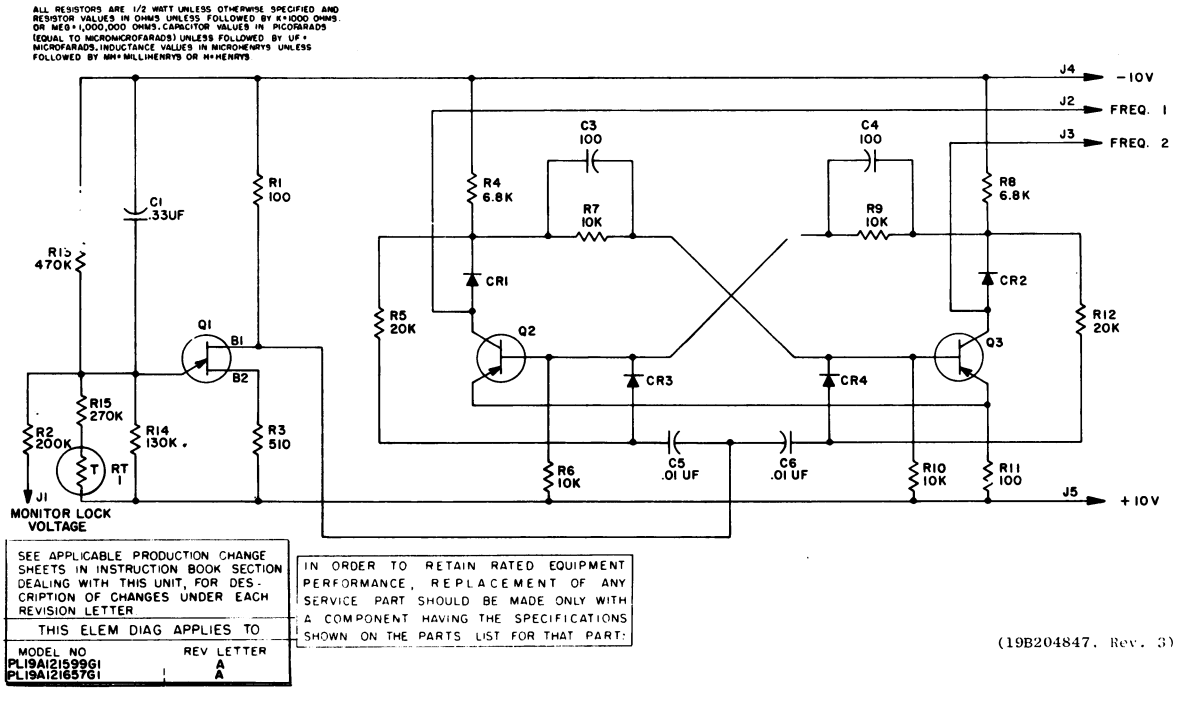
ADDENDUM TO LBI-3614

This addendum includes changes made to the Search Lock Monitor Board by revision letter.

REV. A - To increase search rate of the Search Lock Monitor circuit.

Part Symbol	Was	Changed To
C2	7491930-P11 (0.33 µf)	Deleted
R13	Added	3R152-P474J (474 K)
R14	Added	3R152-P134J (134 K)
R15	Added	3R152-P274J (274 K)
RT1	Added	5490828-P37

Schematic Diagram Changed To:



SPECIFICATION CHANGE (Cover)

SEARCH RATE (Receiver Squelched)	Samples each channel approximately 10 times per second.

TEST PROCEDURE CHANGE (Page 5)

1. Turn the SLM switch to the F1-F2 (Search-Lock) position and make sure that the receiver is squelched.

2. Connect positive probe of oscilloscope to junction of R1 and CR1 (for F1) or R2 and CR2 (for F2) on the receiver oscillator board. Connect negative probe to J442-8 (negative). If SLM is operating, the signal should vary from zero to a positive voltage approximately ten times per second.

3. Next, unsquelch the receiver. The Search-Lock circuit will lock on one of the channels. Oscilloscope reading should be less than one volt on OFF channel (not conducting) and 6.6 volts on ON channel (conducting).

4. Switch to the F1 position. Reading at junction of R1 and CR1 should be approximately 6.6 volts. Then switch to the F2 position. Reading at junction of R2 and CR2 should be approximately 6.6 volts.

COMMUNICATION PRODUCTS DEPARTMENT
GENERAL ELECTRIC COMPANY
LYNCHBURG, VIRGINIA

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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 G-E Part Number.

Service parts may be obtained from Authorized G-E Communication Equipment Service Stations or through any G-E Radio Communication Equipment Sales Office. When ordering a part, be sure to give:

1. G-E 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-3614

DF-8401

Progress Is Our Most Important Product

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