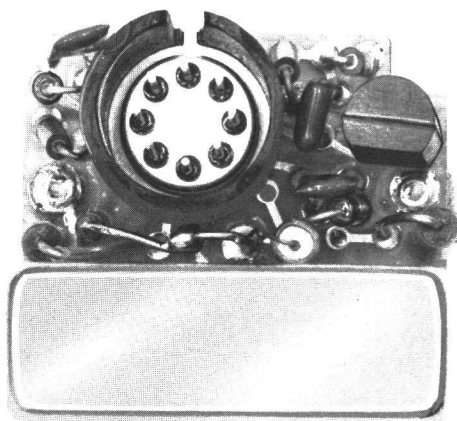


Porta-Mobile IITM

SEARCH LOCK MONITOR KIT 19A130974G1 & G2



SPECIFICATIONS *

CONTROLS	SLM (ON-OFF)
INDICATOR	1 (LED)
SEARCH RATE	3-7 Times Per Second
SENSITIVITY	0 to -6 dB Below Receiver Squelch Sensitivity
TEMPERATURE RANGE	-30°C to +60°C (-22°F to 140°F)
VOLTAGE	7.5 V
CURRENT DRAIN	
Search	1.9 mA (average)
Transmit	1.5 mA

*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

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 Kit 19A130974G1 & G2 for PMII provides the user with a means of monitoring any two of twelve receiver channels for an incoming message. Channel 1 is preset at the factory to be the "home" or favored channel; the second channel to be searched is selected by the user and is determined by the position of the multi-frequency switch.

The Search Lock Monitor (SLM) alternately searches both channels and locks onto the first channel receiving a message. Since the SLM operates off a standard noise squelch circuit, it stops searching each time a receive channel carrier is present and does not resume searching until the associated transmission is terminated. The SLM for PMII does not continue to search while receiving a message. It is possible, therefore, to miss a call on one channel while receiving, or transmitting on a second channel.

The Search Lock Monitor assembly shown in Figure 1 consists of a squelch control transistor, two integrated circuits (IC's), an LED and associated circuitry. The IC's are soldered directly to the printed wire board (PWB).

All system interconnections are made via a miniature eight-pin plug and socket. The cable can be unplugged from the PWB to facilitate maintenance.

OPERATION

Operation of the Search Lock Monitor

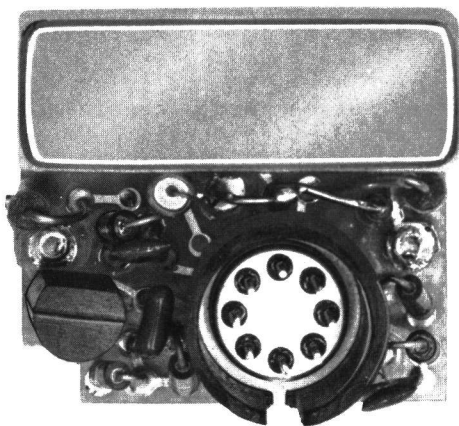


Figure 1 - SLM Module

is controlled by the SLM Control Module and multi-frequency switches mounted on the control panel. Status information is provided by the LED indicator on the control module and a simple SLM ON-OFF switch, also on the control module, permitting operation with or without the search lock function.

Operating the PTT switch disables the search lock function and activates the transmit revert circuit so that messages are always transmitted on the same channel regardless of the position of the multi-frequency switch. Normally this is Channel 1; however, circuit modifications can be made to allow the user to assign or select the "home" channel.

Operating status indicated by the LED is defined below.

Flashing - alternately searching both selected channels --
- no carrier present.

On (Steady) - Receiving carrier on home channel.

OFF (Steady) - Receiving carrier on selected channel.
- SLM switch in "off" position.

SLM operates only when the receiver is squelched. When the receiver is unsquelched, the SLM locks onto the active channel.

The squelch adjust control determines the operating threshold for the search lock function. Proceed as follows:

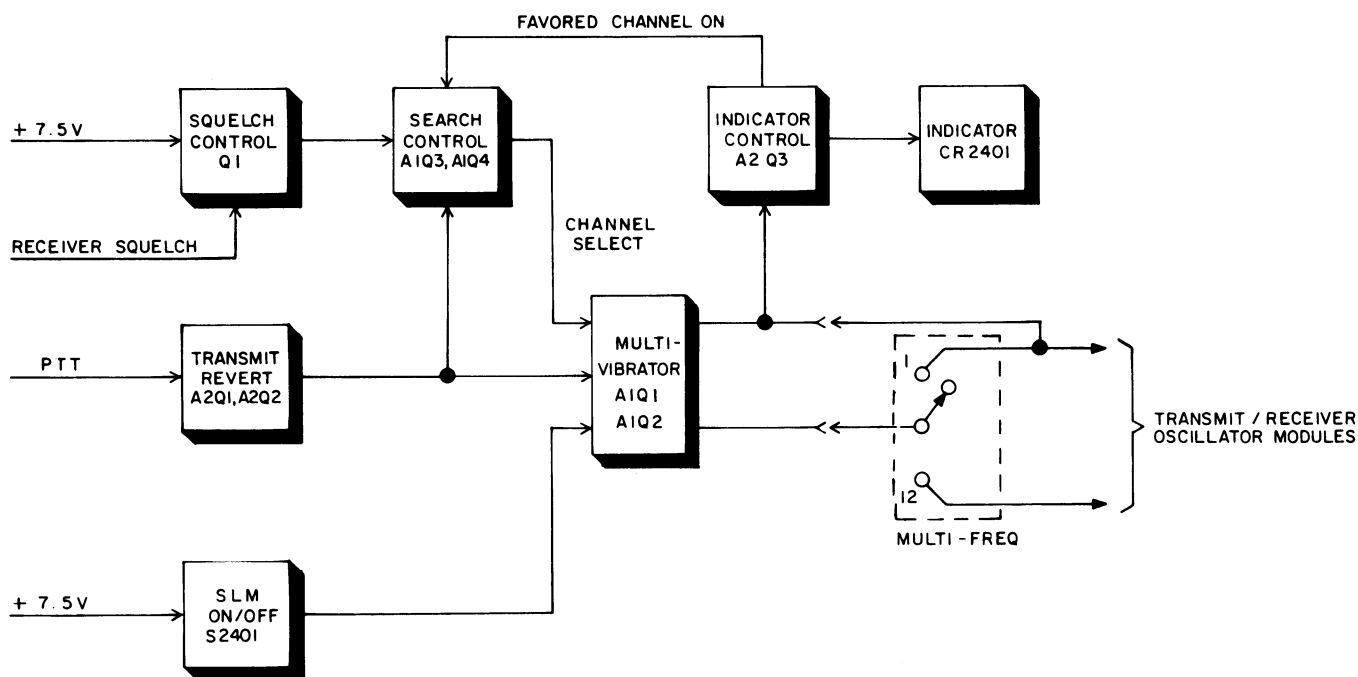
Turn the SLM Switch to the ON position. The status indicator should begin flashing within three seconds. If not, the squelch control should be reset (tightened) so that the LED begins flashing within three seconds.

NOTE

When the squelch delay is operational it may take up to three seconds for the search to resume after the squelch control was adjusted.

CIRCUIT ANALYSIS

The Search Lock Monitor (see Figure 2) utilizes a free running astable multi-vibrator to monitor alternately two receiver channels to determine if a carrier is present. One of these channels is fixed, the other is selected. In addition, when operating in the transmit mode the multi-vibrator keys the appropriate transmit oscillator.



RC-3207

Figure 2 - SLM Block Diagram

During normal operation the multivibrator is controlled by the search control and transmit revert circuits. These circuits when triggered convert the astable multivibrator to bistable operation allowing it to assume either of two stable states. When a carrier is detected the search control circuit stops the multivibrator on the channel receiving the message.

When the PTT switch is operated the transmit revert circuit causes the multivibrator to key the appropriate transmit oscillator. Depending on the transmit revert option employed the transmit oscillator keyed is either the home channel or a channel determined by the position of the multi-frequency switch.

References to symbol numbers mentioned in the following text may be found on the Simplified Diagram, Schematic Diagram, Outline Diagram or Parts List. Figure 3 is a Simplified Diagram of the Search Lock Monitor.

When the SLM switch is in the "off" position, the channel monitored is determined by the position of the multi-frequency switch; alternate channels are not searched. Likewise all messages are transmitted via the channel designated by the multi-frequency switch.

MODES OF OPERATION

Circuit analysis for the SLM is described for three operational modes:

- Search
- Receive
- Transmit Revert

Search Mode

Squelch control transistor Q1 monitors the receiver noise squelch line to determine whether a carrier is being received. Receipt of a carrier is indicated when the DC voltage at J1-8 falls to approximately 0.6 V below battery voltage.

In the "search" mode (receiver squelched -- no carrier) J1-8 is equal to or greater than the 7.5 V. This positive voltage at the base of Q1 prevents Q1 from turning on. With Q1 turned off, the search control circuits, consisting of A1-Q3 and A1-Q4, are also turned off and, therefore, do not exercise any control over the multivibrator. The voltage at the base of A1-Q4 (measured at A1-6) is less than 0.4 VDC when turned off.

The multivibrator is located on the A1 IC and consists of A1-Q1, A1-Q2 and

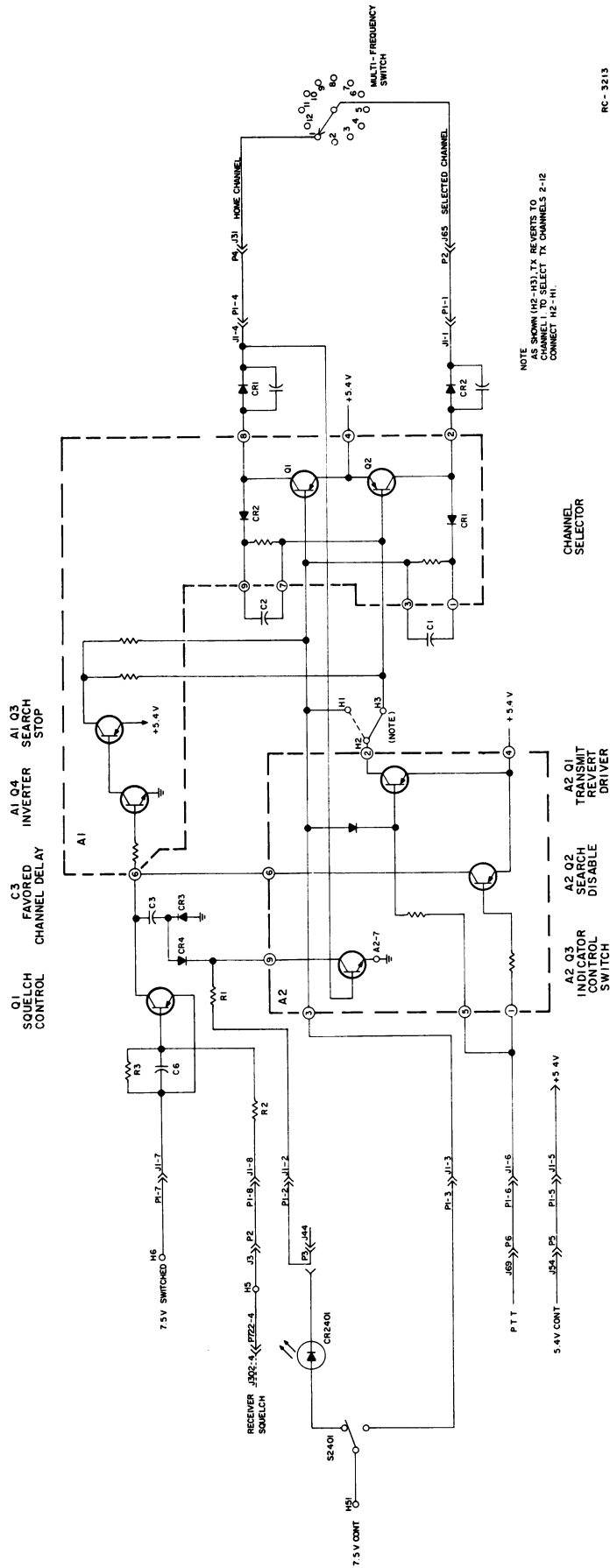


Figure 3 - Search Lock Monitor, Simplified Diagram

associated circuitry. It is a conventional free running multivibrator operating from +5.4 V source at a frequency determined by C1 and C2. Normal operating frequency is between 3 and 7 Hz.

Its operation is preempted by the search control circuits when a carrier is received or by the transmit revert circuit when a call is transmitted. Under these conditions it becomes bistable and may lock in either state.

The home channel controlled by A1-Q1 is fixed while the second or alternate channel is controlled by A1-Q2 and the position of the multi-frequency switch. As each side of the multivibrator turns on +5.0 V is applied to the associated receiver oscillator module, via J1-4 (home channel) and J1-1 (selected channel). This positive voltage turns on the associated receivers oscillators and allows the SLM search control circuits to monitor the receiver squelch output to determine if a carrier is present.

The indicator control circuit, consisting of A2-Q3 and CR2401, indicates the operating status of the SLM circuit. It operates from the collector of A1-Q1 which in the standard configuration is connected to Channel 1.

When Channel 1 is searched, indicator control transistor A2-Q3 conducts and completes the ground return path for the favored channel delay circuit and the status indicator. The status indicator CR2401 lights during the time Channel 1 is searched or receiving a carrier. It is out during the time the selected channel is searched or receiving a carrier. Positive voltage for CR2401 is provided direct from battery through the radio ON-OFF switch, SLM switch and H73, on the system board. The ground return may be checked at J1-2.

Receive Mode

Assume receipt of a receiver carrier on the home channel. Squelch control transistor Q1 detects the presence of a carrier on the receiver squelch line and turns on the search control circuit. A DC voltage approximately 0.6 V below battery voltage on the receiver squelch line indicates the presence of a carrier and turns Q1 on. Q1 applies +7.5 V (from radio ON-OFF switch, and contacts of relay K1) to the search control circuits via A1-6.

The search control circuit causes the multivibrator to assume a bistable state halting the search with A1-Q1 turned on. In this state, 5.4 volts at the emitter of A1-Q1 is applied to the transmitter and receiver home channel SICOM via the collector of A1-Q1 and J1-4. The receiver remains on until the transmission is completed and the receiver noise squelch line released.

In addition, with the home channel selected, a ground is supplied from the indicator control circuit to the LED through A2-9, R1 and J1-2, causing it to light. A ground is also applied through CR4 to C3. This allows C3 to charge through squelch control transistor Q1 to approximately 7.5 V. When the carrier drops out Q1 turns off and removes this voltage from C3. Search control transistors A1-Q3 and A1-Q4 are held for 3 to 5 seconds by C3. This prevents the multivibrator from searching until C3 discharges. When C3 discharges to a voltage level below the threshold of A1-Q4, it turns off and disables the search control circuits allowing the SLM to resume searching.

The delay is associated with the home channel only (unless modified) thus allowing the SLM to "favor" or linger on that channel. The favored channel feature prevents intermittent carrier interruptions from unlocking the search lock circuit and interfering with audio reception during momentary squelch fades or short breaks in transmission. Normally there is no delay on the selected or non-favored channel.

The favored channel circuit can be field modified to:

- 1) Permit the search circuit to linger on both channels.
- 2) Eliminate the delay so that neither channel is favored.
- 3) Select the favored channel via the multi-frequency switch.

Transmit Revert

The transmit revert circuit is activated when the PTT switch is operated. It stops search and reverts the multivibrator to bistable operation on the home channel for transmitting. When the PTT switch is pressed A- is applied to search disable transistor A2-Q2 and transmit revert driver A2-Q1 through J1-6, A2-1 and A2-5. This turns both transistors on. A2-Q2 applies +5.4 V to inverter A1-Q1 which turns on search stop transistor A1-Q3 and immediately stops the multivibrator from searching. A2-Q1 applies +5.4 V to the base of A1-Q2 through H2, H3 forcing A1-Q1 to conduct and key the transmitter associated with Channel 1. Should the user elect to have the capability of manually selecting the transmit channel, move the DA wire connected to H3 to H1.

MAINTENANCE

VOLTAGE READINGS

All voltage readings are DC readings measured with a 20,000 ohms per volt VOM with reference to battery negative. Battery voltage is 7.5 V. The readings are taken with the controls adjusted as follows:

SQUELCH	-	MAXIMUM
SLM	-	OFF/MON
MULTI-FREQ	-	CHANNEL 2 (NOT ON HOME CHANNEL)
TRANSMIT REVERT	-	H2 to H3

TEST POINT	VOLTAGE READING	TEST POINT	VOLTAGE READING
J1-1	5 V	A1-1	5.0
J1-2	0	A1-2	5.2
J1-3	7.5	A1-6	0.4 max.
J1-4	0	A1-7	4.8
J1-5	5.4	A1-8	0
J1-6	7.5	A1-9	0
J1-7	7.5		
J1-8	7.0 Volts min.		

Squelch Open

J1-8	7.0 V Max.
A1-6	7.0 V Min.

PTT Pressed

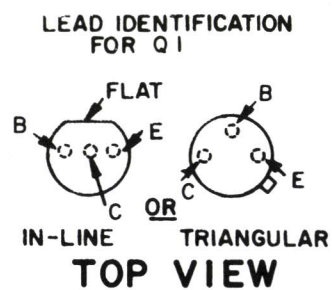
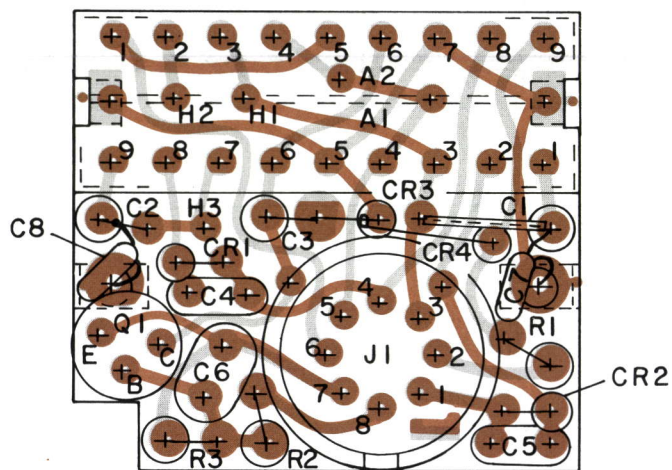
J1-6	0 Volts
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SLM-On Receiver-Unsquelched

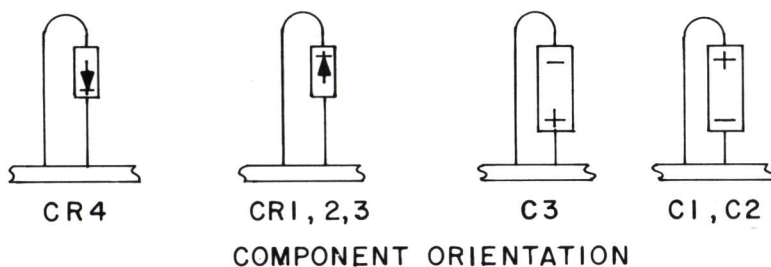
J1-1, 4	5 Volt Square wave (200 ms)
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TROUBLESHOOTING

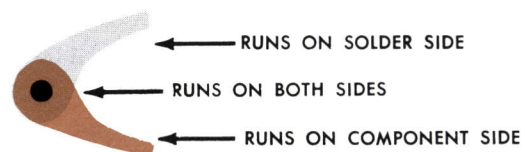
SYMPTOM	PROCEDURE
Continues Search when squelch is open.	Check voltages on J1-8 (7.0 V maximum) and A1-6 (7.0 V minimum)
Continues Search when PTT is pressed.	Check voltage on J1-6 (0 volts)
Does not revert to proper channel when PTT is pressed.	Check for correct strapping on bottom of PWB H2-H3 (Transmit Home Channel) H1-H2 (Transmit Selected Channel)



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



(19B232302, Rev. 0)
(19C320492, Sh. 2, Rev. 1)
(19C320492, Sh. 3, Rev. 1)



OUTLINE DIAGRAM

SEARCH LOCK MONITOR KIT
19A130974G1 AND G2

PARTS LIST

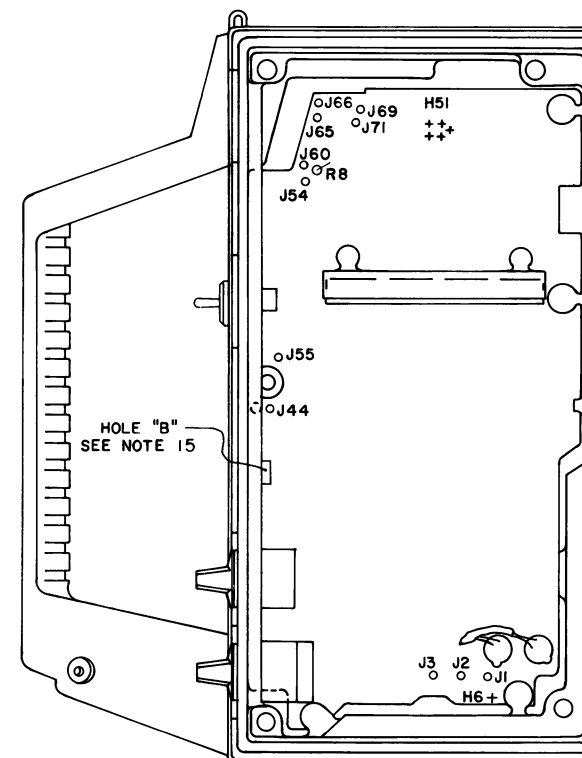
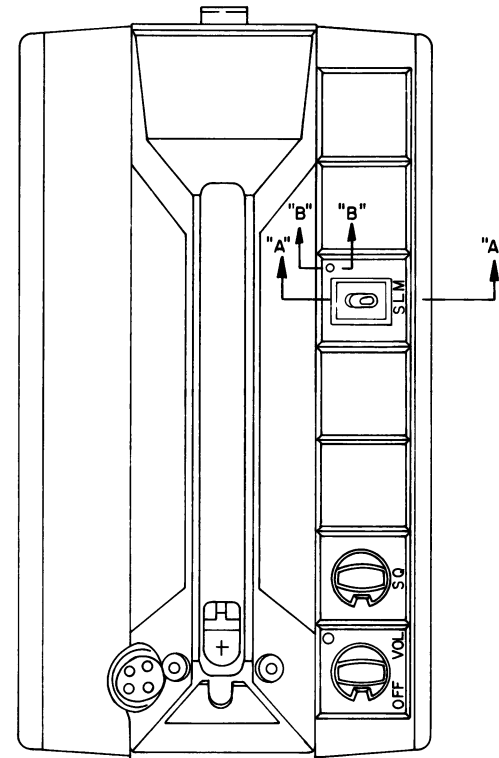
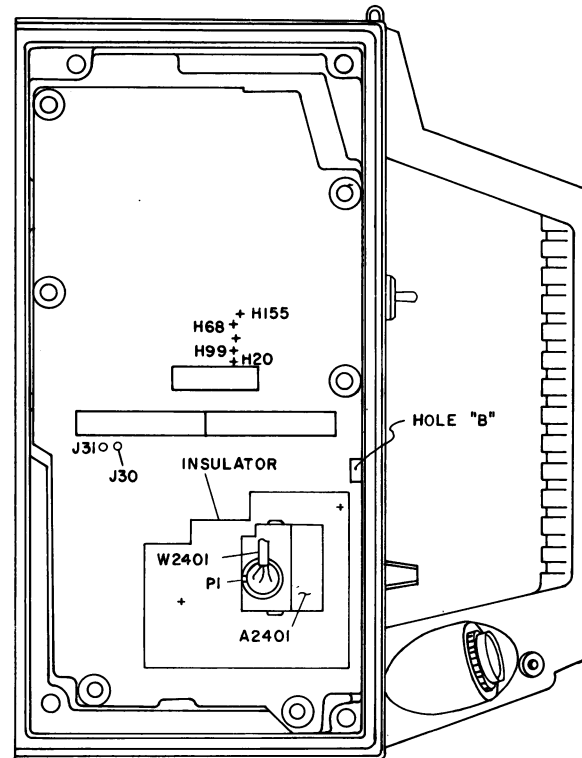
LBI-30539

SEARCH LOCK MONITOR MOD KIT
 19A130974G1 BACK MOUNT
 19A130974G2 FRONT MOUNT

SYMBOL	GE PART NO.	DESCRIPTION
A2401		SEARCH LOCK CONTROL 19B219901G1
A1	19C317060G2	Search Lock Monitor Module.
A2	19C320491G1	Search Control Module.
		----- CAPACITORS -----
C1 and C2	5491674P36	Tantalum: 3.3 μ f \pm 20%, 10 VDCW; sim to Sprague Type 162D.
C3	5491674P2	Tantalum: 10 μ f \pm 20%, 10 VDCW; sim to Sprague Type 162D.
C4 and C5	5495323P12	Ceramic: .001 μ f +100% -20%, 75 VDCW.
C6	19A116192P1	Ceramic: 0.01 μ f \pm 20%, 50 VDCW; sim to Erie 8121 SPECIAL.
C7 and C8	19A116114P7053	Ceramic: 47 pf \pm 5%, 100 VDCW; temp coef -750 PPM.
		----- DIODES AND RECTIFIERS -----
CR1 and CR2	19A116052P2	Silicon.
CR3 and CR4	19A115250P1	Silicon.
		----- JACKS AND RECEPTACLES -----
J1	19A116122P1	Terminal, feed-thru: sim to Warren Co. 1-B- 2994-4.
		----- TRANSISTORS -----
Q1	19A115768P3	Silicon, PNP; sim to Type 2N3702.
		----- RESISTORS -----
R1	3R151P302J	Composition: 3000 ohms \pm 5%, 1/8 w.
R2	3R151P273J	Composition: 27,000 ohms \pm 5%, 1/8 w.
R3	3R151P274J	Composition: 0.27 megohm \pm 5%, 1/8 w.
		----- DIODES AND RECTIFIERS -----
CR2401	19A130470G4	Diode, optoelectronic: sim to Opcoa LLL-7A.
		----- PLUGS -----
P2401	19A115834P4	Contact, electrical: sim to AMP 2-332070-9.
		----- SWITCHES -----
S2401	19B226809G11	Toggle: SPDT; sim to C and K Components 7101SDG.
		----- CABLES -----
W2401		SEARCH LOCK MONITOR 19B226806G6
		----- PLUGS -----
P1	19A127569G1	Plug: 8 contacts.
P2 thru P7	19A115834P4	Contact, electrical: sim to AMP 2-332070-9.

SYMBOL	GE PART NO.	DESCRIPTION
W2402		SEARCH LOCK MONITOR FRONT MOUNT 19B226806G13
		----- PLUGS -----
P1	19A127569G1	Plug: 8 contacts.
P2 thru P7	19A115834P4	Contact, electrical: sim to AMP 2-332070-9.
		----- MISCELLANEOUS -----
	19B226358G5	Faceplate. (Used with S2401).
	19B216316P1	Insulator.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES



THESE INSTRUCTIONS COVER THE INSTALLATION OF
OPTION PL19A130974G1 SEARCH LOCK MONITOR.

▲ SLEEVE WIRES AT S2401 USING 19C301208 SLEEVING.

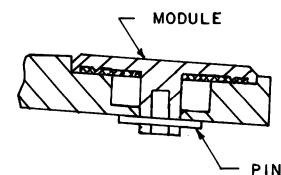
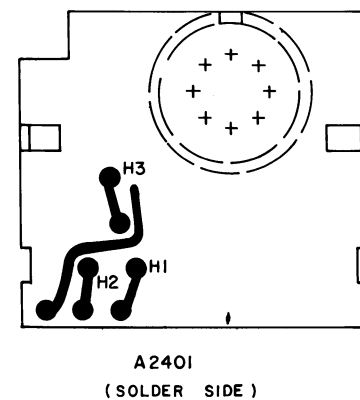
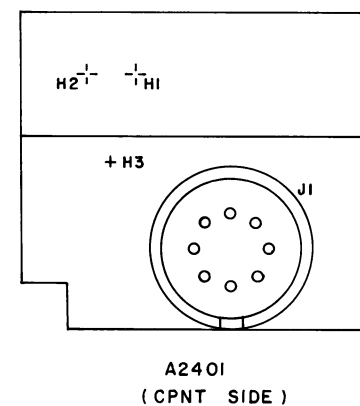
CONNECTIONS CHART				
FROM		TO	WIRE - COLOR	TERMINATE
W2401	P2	A701, A702, A703-J65	T28-BR	
	P3	A701, A702, A703-J44	T28-W GA	
	P1-3	S2401-3 ▲	T28-R	
	P4	A701, A702, A703-J31	T28-W BK	
	P5	A701, A702, A703-J54	T28-BL	
	P6	A701, A702, A703-J69	T28-G	
	P1-7	A701, A702, A703-H6	T28-O	
*	P7	A701, A702, A703-J3	T28-V	
**	P7	A2301-J2	T28-V	
CR2401		A701, A702, A703-J44	T28-W GA	P2401
CR2401		S2401-1 ▲	T28-V	
S2401-2		A701, A702, A703-H51	T28-R	

* ASSEMBLE LEAD HERE FOR UNITS WITHOUT CHAN GD BUSY LIGHT

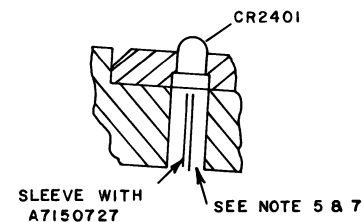
* * ASSEMBLE LEAD HERE FOR UNITS WITH CHAN GD BUSY LIGHT.

INSTRUCTIONS:

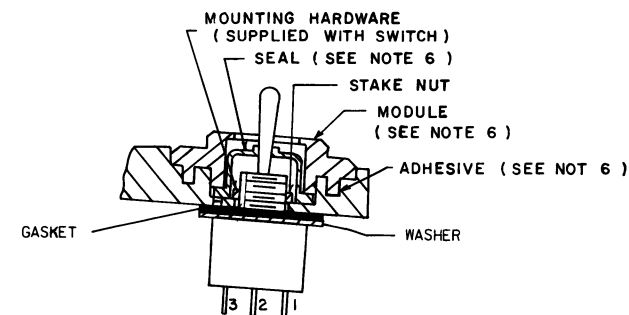
1. REMOVE FRONT AND BACK COVERS IF PRESENT.
2. REMOVE PIN, GASKET AND DUMMY MODULE AT POSITION SHOWN AND DISCARD.
3. TO CHANGE SEARCH LOCK MONITOR SO THAT THE TRANSMITTER WILL KEY ON THE SELECTED CHANNEL, REMOVE JUMPER FROM A2401-H3 TO H2 AND ADD A JUMPER FROM A2401-H2 TO H1.
4. ASSEMBLE INSULATOR (PART OF KIT PL19A130974G1) AND SEARCH LOCK MONITOR BD. (CALLED FOR ON INDEX) IN LOCATION SHOWN, BEND TABS OVER ON FAR SIDE OF SYSTEMS BD. AND SOLDER.
5. ASSEMBLE CR2401 TO MODULE AS SHOWN.
6. REMOVE SEALER FROM HOLE IN CASE THEN ASSEMBLE SWITCH S2401, WASHER, GASKET, SEAL & MODULE (PART OF KIT PL19A130974G1) AS SHOWN. FILL KEYING SLOT IN THREADED SWITCH BUSHING WITH RTV PER P15F-EA106P1 OR P2. DISCARD LOCKING RING THAT IS PART OF SWITCH. APPLY ADHESIVE TO CAVITIES AS SHOWN PER CPD PROCESS P15F-EA106P4 AND ASSEMBLE MODULE TO CASE, OVERFLOW OF ADHESIVE BETWEEN MODULE AND CASE SURFACE IS PERMISSIBLE. CLAMP MODULE DURING CURING CYCLE.
7. SLEEVE LEADS OF CR2401 AND RESEAL HOLE IN CASE AND OPEN END OF SLEEVEING THAT THE LEADS PASS THRU PER CPD PROCESS P7A-EA100P5 OR P15F-EA106P1 OR P2.
8. ASSEMBLE PL OF W2401(PART OF KIT PL19A130974G1) TO J1 ON A2401, SEARCH LOCK MONITOR BD.
10. MAKE THE FOLLOWING WIRING CHANGE WHEN APPLICABLE:
 - TWO FREQUENCY
UNPLUG S703-P2 (T28-W-R) FROM J66 AND PLUG ONTO J65
 - MULTI FREQUENCY
UNPLUG S704-P1 (T28-W-R) FROM J66 AND PLUG ONTO J65
 - 12 FREQ XMT/12 FREQ RCV
UNPLUG S705-P1 (T28-W-R) FROM J66 AND PLUG ONTO J65.
UNPLUG P4 FROM J31 AND CLIP P4. CONNECT W-BK WIRE TO H155.
11. SOLDER ALL ELECTRICAL CONNECTIONS.
12. ASSEMBLE FRONT AND REAR COVERS IF REQUIRED.
13. TO REASSIGN FAVORED CHANNEL UNPLUG P4 FROM J31 AND PLUG P4 ON JACK CORRESPONDING TO DESIRED CHANNEL.
14. FOR CONTROL WIRE CLAMPING INFORMATION REFER TO DRAWING 19U423115 NOTE 7.
15. WIRES JOINED BETWEEN EACH SIDE OF SYSTEMS BOARD TO BE ROUTED THRU HOLE "B"



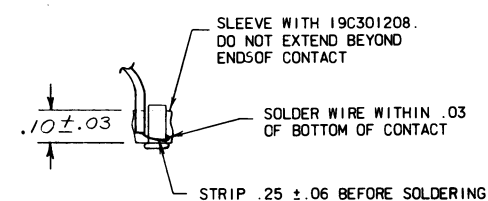
SECTION "A" - "A"
BEFORE SWITCH ASSY
(PARTIAL)



SECTION "B"-"B"
(ENLARGED)



SECTION "A" - "A"
AFTER ASSY OF S2401
(PARTIAL)

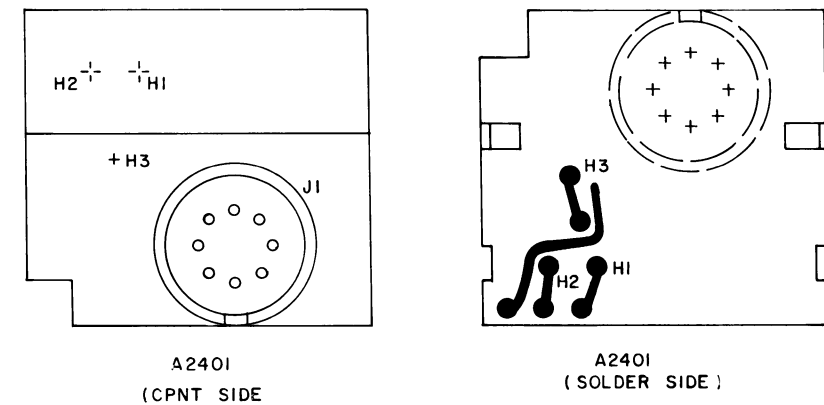


TERMINATION OF P240I

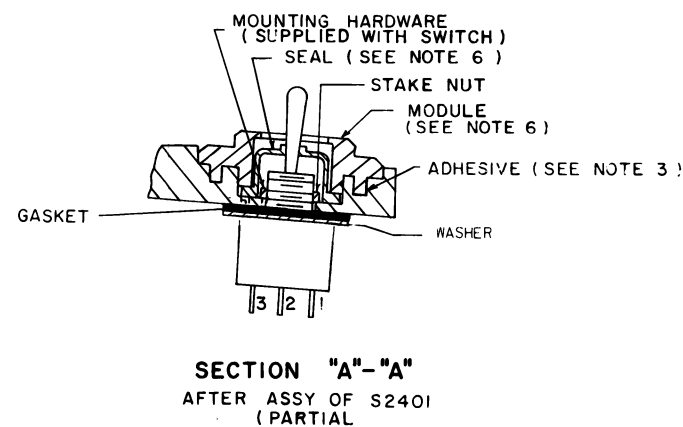
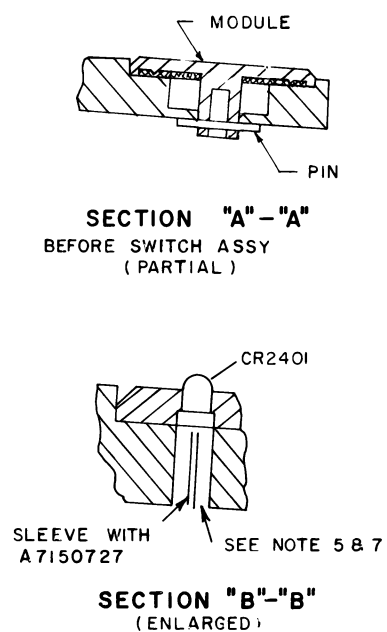
(19D423755, Sh. 1, Rev. 8)

INSTALLATION INSTRUCTIONS

SEARCH LOCK MONITOR KIT
19A130974G1 AND G2



SEARCH LOCK MONITOR KIT
19A130974G1 AND G2



- * ASSEMBLE LEAD HERE FOR UNITS WITHOUT CHAN GD BUSY LIGHT.
- * * ASSEMBLE LEAD HERE FOR UNITS WITH CHAN GD BUSY LIGHT.
- ▲ SLEEVE WIRES AT S2401 USING 19C301208 SLEEVING

1. REMOVE FRONT AND BACK COVERS IF PRESENT.

1. REMOVE PIN, GASKET, WASHER AND DUMMY MODULE AT POSITION SHOWN AND DISCARD.
2. TO CHANGE SEARCH LOCK MONITOR SC THAT THE TRANSMITTER WILL KEY ON THE SELECTED CHANNEL, REMOVE JUMPER FROM A2401-H3 TO H2 AND ADD A JUMPER FROM A2401-H2 TO H1.
3. ASSEMBLE INSULATOR (PART OF KIT PL19A130974G2) AND SEARCH LOCK MONITOR BD. (CALLED FOR ON INDEX) IN LOCATION SHOWN, BEND TABS OVER ON FAR SIDE OF SYSTEMS BD. AND SOLDER. CLIP JIG FLUSH WITH SYSTEM BOARD.
4. ASSEMBLE CR2401 TO MODULE AS SHOWN.
5. REMOVE SEALER FROM HOLE IN CASE THEN ASSEMBLE SWITCH S2401, WASHER, GASKET, SEAL AND MODULE (PART OF KIT PL19A130974G2) AS SHOWN. FILE KEYING SLCT IN THREADED SWITCH BUSHING WITH RTV PER P15F-EA106P1 OR P2. DISCARD LOCKING RING THAT IS PART OF SWITCH. APPLY ADHESIVE TO CAVITIES AS SHOWN. PER CPD PROCESS P15F-EA106P4 AND ASSEMBLE MODULE TO CASE. OVERFLOW OF ADHESIVE BETWEEN MODULE AND CASE SURFACES IS PERMISSIBLE. CLAMP MODULE DURING THE CURING CYCLE.
6. SLEEVE LEADS OF CR2401 AND RESEAL HOLE IN CASE AND OPEN END OF SLEEVING THAT THE LEADS PASS THRU PER CPD PROCESS P7A-EA109P5 OR P15F-EA106P1 OR P2.
7. ASSEMBLE P1 OF W2402 (PART OF KIT PL19A130974G2) TO J1 ON A2401, SEARCH LOCK MONITOR BD.
8. MAKE CONNECTIONS PER CHART ABOVE.
9. MAKE THE FOLLOWING WIRING CHANGE WHEN APPLICABLE:
 - TWO FREQUENCY
UNPLUG S703-P2 (T28-W-R) FROM J66 AND PLUG ONTO J65.
 - MULTI FREQUENCY
UNPLUG S704-P1 (T28-W-R) FROM J66 AND PLUG ONTO J65
12 FREQ XMT/12 FREQ RCV
UNPLUG S705-P1 (T28-W-R) FROM J66 AND PLUG ONTO J65.
UNPLUG P4 FROM J31 AND CLIP P4. CONNECT W-BK WIRE TO H155.
10. SOLDER ALL ELECTRICAL CONNECTIONS.
11. ASSEMBLE FRONT AND REAR COVERS IF REQUIRED.
12. TO REASSIGN FAVORED CHANNEL, UNPLUG P4 FROM J31 AND PLUG P4 ON JACK CORRESPONDING TO DESIRED CHANNEL.
13. FOR CONTROL WIRE CLAMPING INFORMATION REFER TO DRAWING 19D423115 NOTE 7.
14. WIRES JOINED BETWEEN EACH SIDE OF BOARD A701, A702, A703 TO BE ROUTED THRU HOLE "B".