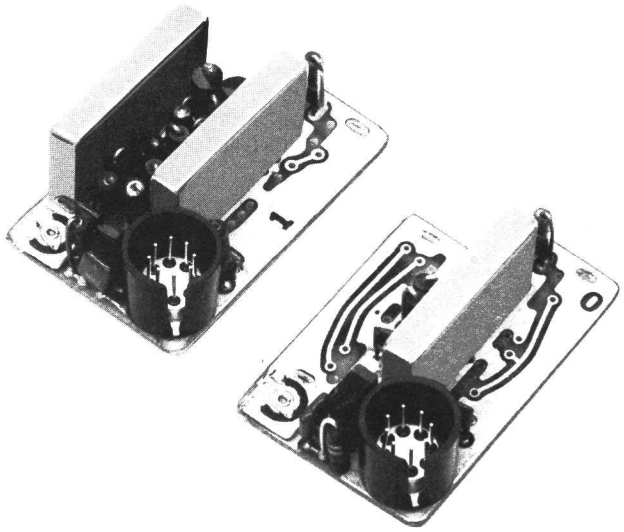
MOBILE RADIO

Porta-Mobile II™

TYPE 90
ENCODE/DECODE MODEL 4EK18A12, ENCODER MODEL 4EH20A14 & 15, ENCODE/DECODE KIT 19A130970G1 & ENCODE KIT 19A130969G1, G2 & G3



SPECIFICATIONS *

USED WITH:	PMII
Tone Frequencies	1050 Hz to 3000 Hz
Frequency Stability	±0.3%
Transmit Drain	3.6 Milliamperes
Temperature Range	-30°C to +60°C (-22°F to +140°F)
Nominal Input Voltage Requirements	+7.5 VDC

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

GENERAL ELECTRIC

Maintenance Manual LBI 30458 A
DATAFILE FOLDER - DF5044

ENCODE/DECODE MODEL 4EK18A12, ENCODER MODEL 4EH20A14 & 15, ENCODE/DECODE KIT 19A130970G1 & ENCODE KIT 19A130969G1, G2, G3

TABLE OF CONTENTS

NOTE

Although the highest DC voltage in PORTA-MOBIL II™ Equipment is supplied by a portable or vehicular 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

TYPE 90 ENCODER/DECODER

Type 90 Encoder/Decoder Model 4EK18A12 is a pulsed tone encoder/decoder assembly for operating on standard Type 90 tone frequencies of 1000 to 3000 Hz. The assembly uses three Intergrated Circuit modules consisting of Input Amplifier A601, Limiter-Switch A602, and Selective Amplifier A603. A typical diagram of the Limiter Switch is shown in Figure 1 and a typical diagram of the Input Amplifier is shown in Figure 2.

The Type 90 Encode/Decode circuit is controlled by three-position switch S1301 labeled M (monitor) - N (normal) - R (reset). Switch S1301 must be in the Monitor position to transmit the encoder tone or to monitor the channel. The switch must be placed in the Reset and then the Normal position for the decoder to operate.

TYPE 90 ENCODER

Type 90 Encoder Models 4EH20A14 (one-tone) and 4EH20A15 (two-tone) are pulsed tone encoders for operating on two tone frequencies in the 1000 to 3000 Hz range. The assembly consists of Limiter A601 and Selective Amplifiers A602 and A603. The single-tone encoder consists of the Limiter and a single selective Amplifier module. The Limiter module contains a Tone burst Timer circuit and a limiter circuit for each Selective Amplifier module. The limiter circuit keeps the input to the selective Amplifier modules constant to maintain the required frequency and level stability.

The Type 90 Encode Circuit is controlled by two-position switch S1302 labeled ON - OFF for one tone operation or by three - position switch S1302 labeled A-O (OFF) -B for two tone operation.

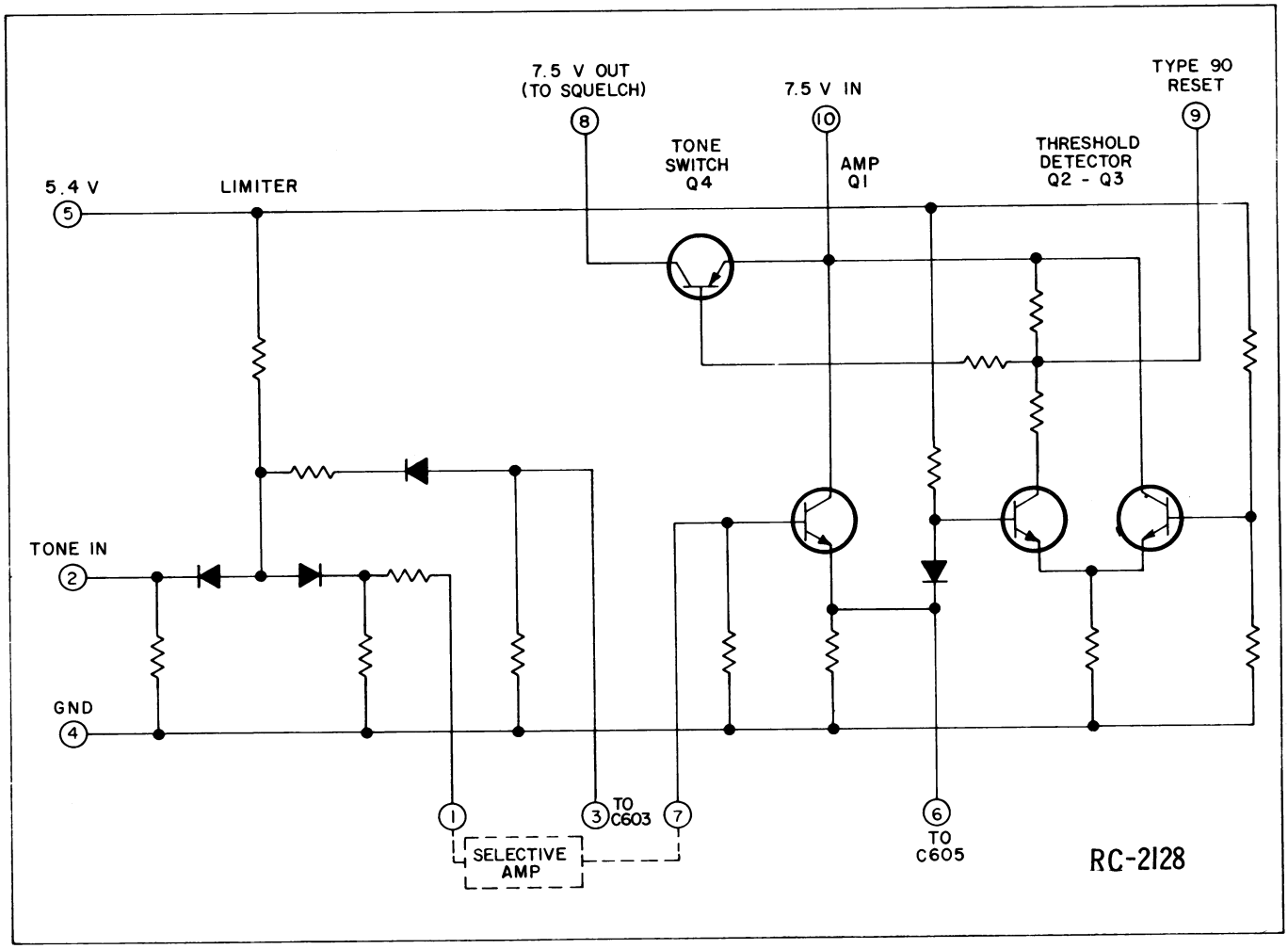


Figure 1 - Typical Limiter Switch Circuit

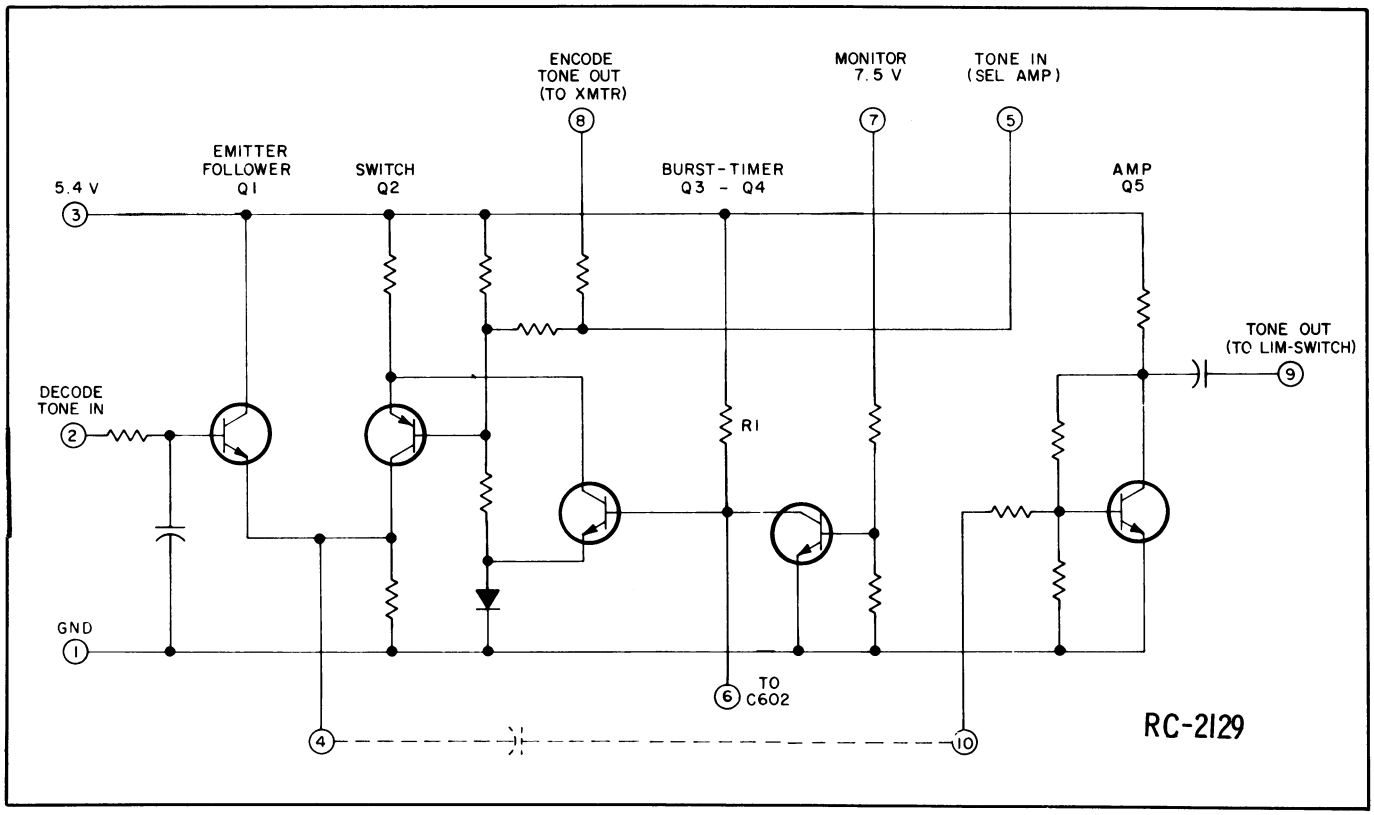


Figure 2 - Typical Input Amplifier Circuit

CIRCUIT ANALYSIS

TYPE 90 ENCODER/DECODER

Placing S1301 in the Monitor position applies 7.5 Volts to Pin 7 of the Input Amplifier module. This turns on Q4 in the burst-timer circuit, turning off Q3. This removes the ground on the emitter of Q2, allowing Q2 to turn on. Tone from the Selective Amplifier module is applied to Pin 5 of the Input Amplifier and is coupled through Q2 to Pin 4 where it is capacity coupled through C601 to amplifier Q5. The amplifier output is applied to Pin 2 of the Limited-Switch module where it activates the tone switch (Q4), allowing the receiver to operate on noise squelch.

Keying the transmitter removes the 7.5 Volts at Pin 7 of the Input Amplifier module, turning off Q4 in the burst-timer circuit. Capacitor C602 is kept discharged while Q4 is conducting. When Q4 turns off, Q3 also remains off until C602 charges through R1. While C602 is charging, Q2 operates and completes the feedback path for the Selective Amplifier, causing it to oscillate on the encode frequency. Tone is coupled through Encode Tone Adjust potentiometer R605 and applied to the Audio-Limiter module on the System Board. R605 is set for a tone output of ±3 kHz.

When C602 charges up, Q3 turns on which turns Q2 off, removing the tone to the transmitter. The burst-timer circuitry provides a pulsed tone output of approximately one second.

When the switch is in the Normal position, the burst-timer circuit is disabled. Audio from R701-3 (Volume Hi) is applied to the base of emitter-follower Q1 on the Input Amplifier module. The output of Q1 is capacity-coupled to the base of amplifier Q5. The amplifier output is applied to the limiter circuit on the Limiter-Switch module.

Any tone present in the signal is limited by diodes CR1 and CR2, and the output applied through Pin 1 to the selective Amplifier module. If the incoming tone is of the proper frequency, the output of the Selective Amplifier will be just sufficient to operate the detector circuit (Q1 thru Q3).

The positive half cycles of the Selective Amplifier output turns on Q1, which over-rides the diode and turns on Q2. Turning on Q2 causes its collector to drop to ground potential, turning on the PNP tone switch Q4. When conducting, the 7.5 Volts at the collector of Q4 is applied to the squelch switch on the receiver squelch module. The voltage is connected through the squelch switching transistor to the Audio PA module. The receiver now operates on

noise squelch so that all calls on the channel can be monitored.

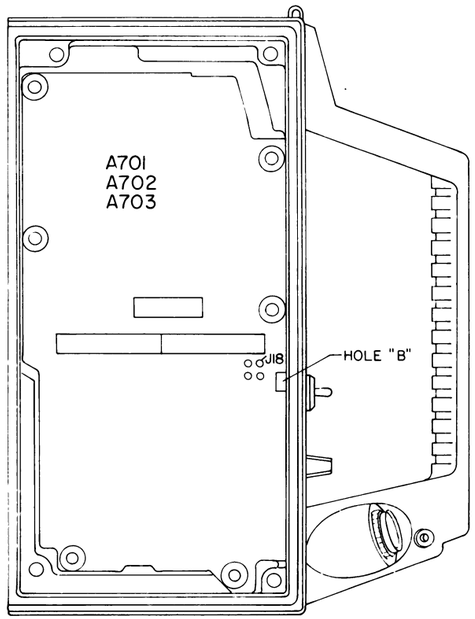
TYPE 90 ENCODER

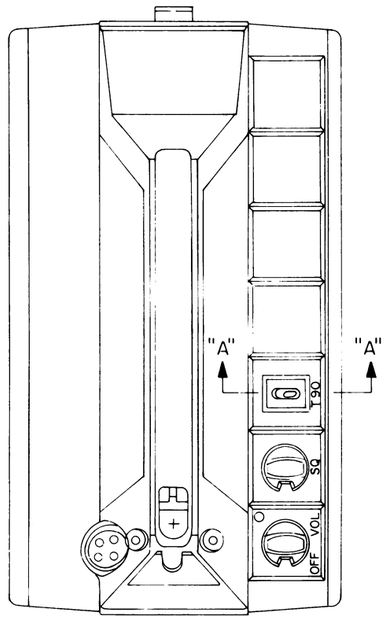
The Encoder is controlled by a two or a three-position switch on the Control Panel. Placing the switch in the OFF position removes the 5.4-Volt supply voltage and disables the Encoder. With the switch in the Tone A, Tone B or ON position, keying the transmitter applies 5.4 Volts to the Limiter module and to the selected Selective Amplifier module.

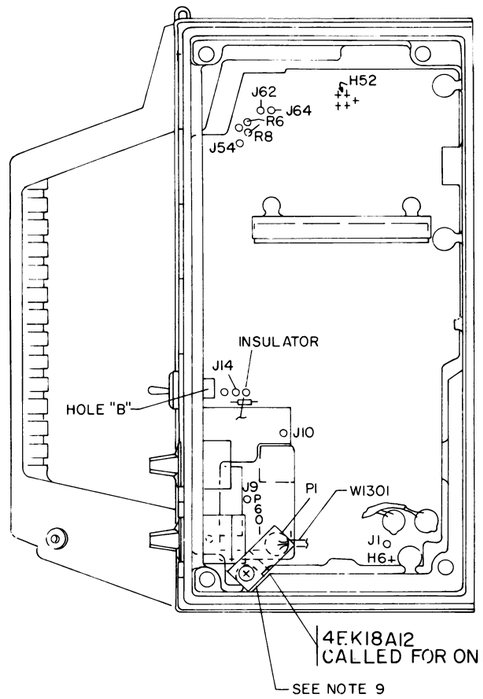
Applying power to the modules causes the Selective Amplifier to start oscillating at the desired tone frequency, and also start the tone burst timer circuit. The burst timer provides a tone output for approximately one second. The encode tone is coupled through Encode Tone Adjust R603 to the transmitter audio module on the System Board. R603 is set for ±3 kHz deviation.

Tone Control consists of diodes CR1301 through CR1313 mounted on the system board.

Placing multi-frequency switch S704 on a channel with Type 90 Tone applies 5.4 Volts to the tone circuit board. For example, placing S704 on Channel (1) frequency forward biases CR1301 and applies supply voltage to the Input Amplifier and the selective amplifier for B Tone operation. If diode CR1302 had been used instead of CR1301, placing S701 in Channel (1) would initiate Tone A operation. Each frequency channel can be programmed to use either A Tone or B Tone. Refer to the Table of Contents for installation instruction of Encode with tone control.





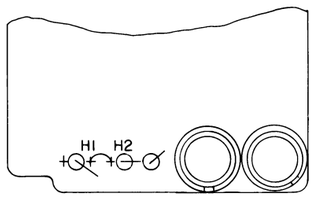


THESE INSTRUCTIONS COVER THE INSTALLATION OF OPTION PL19A130970G1 TYPE 90 ENC/DEC

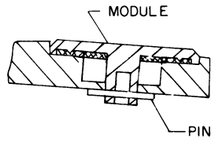
PL19A130970G1

CONNECTIONS CHART				
FROM		TO	WIRE - COLOR	
S1301-2		A701, A702, A703-H6	T28 · W-R	
W1301	P1-1	A701, A702, A703-H52	- R	
●	P2	A701, A702, A703-J62	- O	
●●	P1-2	A701, A702, A703-H72	- O	CLIP P2
	P1-3	S1301-2 ✳ ✳	- W-R	
	P1-4	S1301-1 ✳ ✳	- W-GA	
	P3	A701, A702, A703-J54	- BL	
	P1-6	S1301-3 ✳ ✳	- GA	
	P4	A701, A702, A703-J14	- G	
	P5	A701, A702, A703-J18	T28-W-V	✳

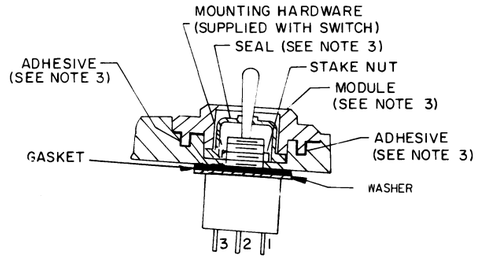
✳ ROUTE THRU HOLE "B".
● ASM TO J62 WHEN ANDGATE IS NOT USED
●● ASM IN H72 WHEN ANDGATE IS USED.
✳ ✳ SLEEVE WIRES AT S1301 USING 19C301208 SLEEVING.



RCVR BD



SECTION A-A
BEFORE SWITCH ASM
(PARTIAL)



SECTION "A-A"
AFTER ASM OF S1301
(PARTIAL)

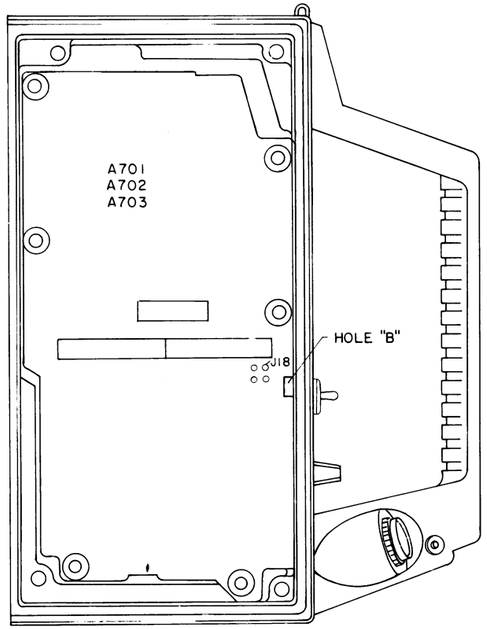
(1) INSTRUCTIONS:

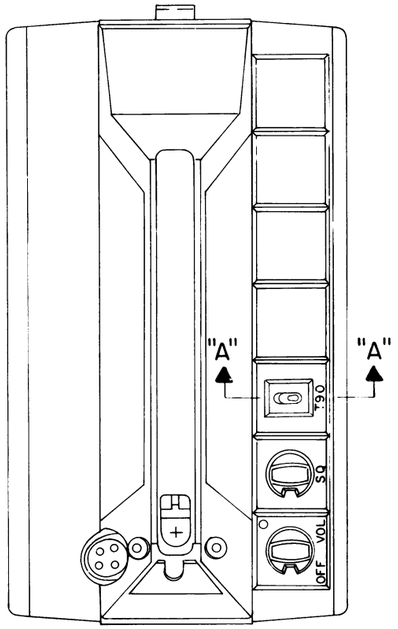
1. REMOVE FRONT AND BACK COVERS IF PRESENT.
2. REMOVE PIN, GASKET AND DUMMY MODULE AT POSITION SHOWN AND DISCARD.
3. ASSEMBLE WASHER AND GASKET TO S1301 SEAL AND MODULE, PART OF KIT PL19A130970G1 IN POSITION SHOWN. FILL KEYING SLOT IN THREADED SWITCH BUSHING WITH RTV PER P15F-EA106P1 OR P2. DISCARD LOCKING RING THAT IS PART OF SWITCH. APPLY ADHESIVE PER CPD PROCESS P15F-EA106P4 TO CAVITIES AS SHOWN, AND ASSEMBLE MODULE TO CASE. OVERFLOW OF ADHESIVE BETWEEN MODULE AND CASE SURFACES IS PERMISSIBLE. CLAMP MODULE DURING CURING CYCLE.
4. ASSEMBLE INSULATOR PART OF KIT PL19A130970G1 AS SHOWN.
5. ASSEMBLE TYPE 90 ENC/DEC 4EK18A12 AS SHOWN. PLUG P601 TO J9 OF SYSTEM BD. PLUG P1 OF W1301 TO J601 OF ENC/DEC BD.
6. CLIP JUMPER BETWEEN H1 & H2 ON RECEIVER BOARD AS SHOWN.
7. MAKE CONNECTIONS PER ABOVE CHART.
8. SOLDER ALL ELECTRICAL CONNECTIONS.
9. ASSEMBLE SCREW AND MODULE CLAMP AS SHOWN, AFTER FIRST ATTACHING PRESSURE SENSITIVE TAPE TO UNDERSIDE OF CLAMP WHERE IT COMES INTO CONTACT WITH MODULE SOCKET. (ALL PART OF KIT PL19A130970).
10. ASSEMBLE FRONT AND REAR COVERS IF REQUIRED.
11. FOR CONTROL WIRE CLAMPING INFORMATION REFER TO DRAWING 19D423115 NOTE 7.
12. CLIP AND DISCARD J10 ON SYSTEM BOARD.

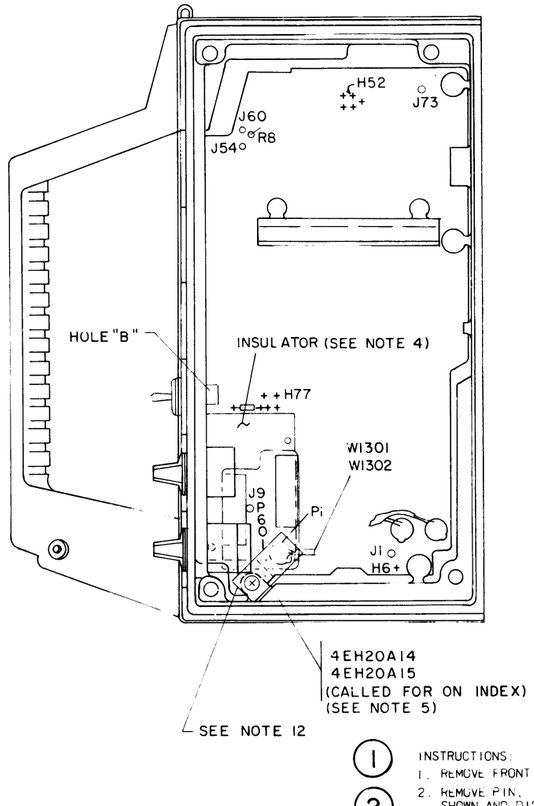
INSTALLATION INSTRUCTIONS

TYPE 90 ENCODE/DECODE
19A130970G1

(19D423751, Rev. 10)







THESE INSTRUCTIONS COVER THE INSTALLATION OF OPTION PL19A130969G1 TYPE 90 (1 TONE) & PL19A130969G2 TYPE 90 (2 TONE)

PL19A130969G1

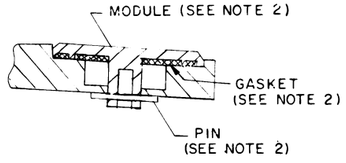
CONNECTIONS CHART			
FROM		TO	WIRE - COLOR
S1301-P1		A701,A702,A703-J73	T28-WBL
W1301	P2	A701,A702,A703-J54	- BL
	P1-3	A701,A702,A703-H77	- BK
	P1-4	A701,A702,A703-H6	- WR
	P1-5	S1301-1	- WG
	P3	A701,A702,A703-J18	- WV
	P1-8	A701,A702,A703-H52	T28 - R

PL19A130969G2

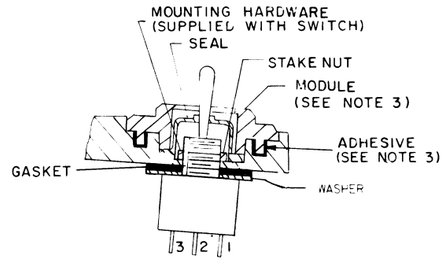
CONNECTIONS CHART			
FROM		TO	WIRE - COLOR
S1302-P1		A701,A702,A703-J73	T28-WBL
W1302	P1-1	S1302-3	- G
	P2	A701,A702,A703-J54	-BL
	P1-3	A701,A702,A703-H77	-BK
	P1-4	A701,A702,A703-H6	-WR
	P1-5	S1302-1	-WG
	P3	A701,A702,A703-J18	-WV
	P1-8	A701,A702,A703-H52	T28 - R

* ROUTE WIRE THRU HOLE "B"

** SLEEVE WIRES AT S1301 & S1302 USING 19C301208 SLEEVING.



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



SECTION "A-A"
AFTER ASM OF S1301 OR S1302
(PARTIAL, SEE NOTE 3)

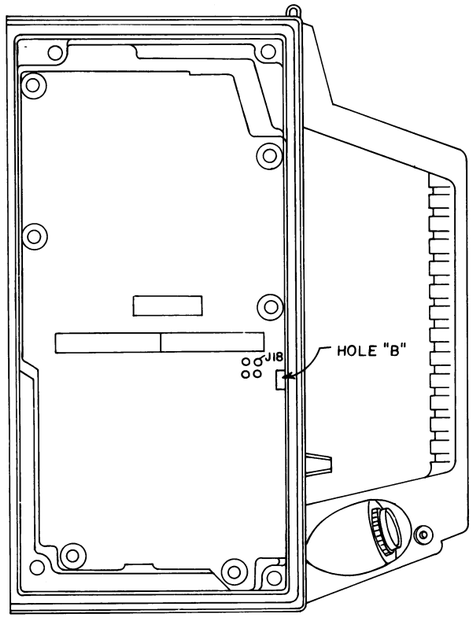
(19D423750, Sh. 1, Rev. 8)

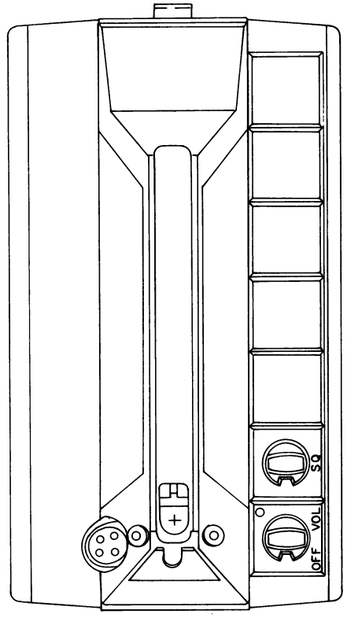
INSTRUCTIONS:

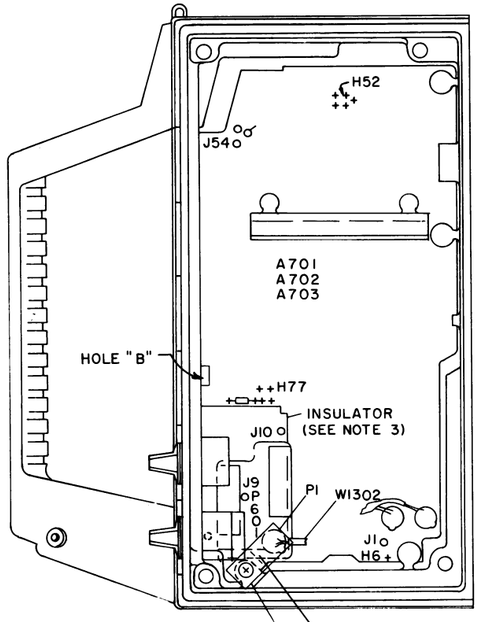
1. REMOVE FRONT AND BACK COVERS IF PRESENT.
2. REMOVE PIN, GASKET AND DUMMY MODULE AT POSITION SHOWN AND DISCARD.
3. ASSEMBLE WASHER AND GASKET TO S1301 OR S1302, SEAL AND MODULE, (PART OF KIT PL19A130969G1 OR G2) IN POSITION SHOWN. FILL KEYING SLOT IN THREADED SWITCH BUSHING WITH RTV PER P15F-EA106P1 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 SURFACES IS PERMISSIBLE. CLAMP MODULE DURING CURING CYCLE.
4. ASSEMBLE INSULATOR (PART OF KIT PL19A130969G1 OR G2) AS SHOWN.
5. ASSEMBLE TYPE 90 ENCODER 4EH20A14, 4EH20A15 AS SHOWN PLUG P601 ON ENCODER TO J9 OF SYSTEMS BOARD. PLUG P1 OF W1301, W1302 TO J601 ON ENCODER BOARD.
6. MAKE CONNECTION PER CHART ABOVE.
7. SOLDER ALL ELECTRICAL CONNECTIONS.
8. ASSEMBLE FRONT AND REAR COVERS, IF REQUIRED.
9. CLIP AND DISCARD J10 ON SYSTEM BOARD.
10. FOR CONTROL WIRE CLAMPING INFORMATION REFER TO DRAWING 19D423115 NOTE 7.
11. ASSEMBLE SCREW AND MODULE CLAMP AS SHOWN, AFTER FIRST ATTACHING PRESSURE SENSITIVE TAPE TO UNDERSIDE OF CLAMP WHERE IT COMES INTO CONTACT WITH MODULE SOCKET (ALL PART OF KIT PL19A130969G1 & G2).

INSTALLATION INSTRUCTIONS

TYPE 90 ENCODE
19A130969G1 (1 TONE)
19A130969G2 (2 TONE)



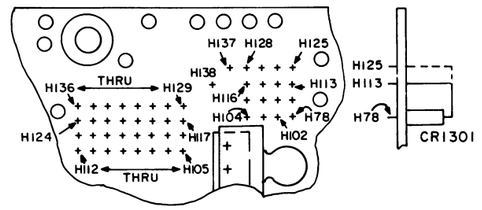




PL19A130696G3

CONNECTIONS CHART			
	FROM	TO	WIRE - COLOR
W1302	P1 - 1	A701,A702,A703-H137	T28 - G
	P2	A701,A702,A703-J54	- BL
	P1 - 3	A701,A702,A703-H77	- BK
	P1 - 4	A701,A702,A703-H6	- WR
	P1 - 5	A701,A702,A703-H138	- WG
	P3	A701,A702,A703-J18	- WV *
	P1 - 8	A701,A702,A703-H52	T28 - R

* ROUTE WIRES THRU HOLE "B"



SYSTEMS BOARD
(TYP ASM FOR CR1301-CR1312)

TRANSMITTER CONTROL

	CR1301	CR1302	CR1303	CR1304	CR1305	CR1306	CR1307	CR1308	CR1309	CR1310	CR1311	CR1312	
	OSC 1 H78	OSC 2 H102	OSC 3 H105	OSC 4 H106	OSC 5 H107	OSC 6 H108	OSC 7 H112	OSC 8 H111	OSC 9 H109	OSC 10 H110	OSC 11 H104	OSC 12 H103	
H113	A												H125
H114		B	A										H126
H117			B	A									H129
H118				B	A								H130
H119					B	A							H131
H120						B	A						H132
H124							B	A					H136
H123								B	A				H135
H121									B	A			H133
H122										B	A		H134
H116											B	A	H128
H115												B	H127
	A	B	A	B	A	B	A	B	A	B	A	B	

TONE CONTROL

USE THE ABOVE CHART FOR ASSEMBLING DIODES ON SYSTEMS BOARD FOR SELECTING TONE CHANNEL WITH FREQ. SELECTOR SWITCH.

SAMPLE: IF TONE 'B' IS TO BE USED ON OSC 3, THEN FIND OSC 3 ON CHART. GO DOWN COLUMN UNTIL YOU FIND A DIODE. THE DIODE IN COLUMN 'B' GIVES THE HOLE NUMBER & DIRECTION THE DIODE SHOULD BE ASSEMBLED. DIODE IN SAMPLE IS CONNECTED FROM H105 TO H129

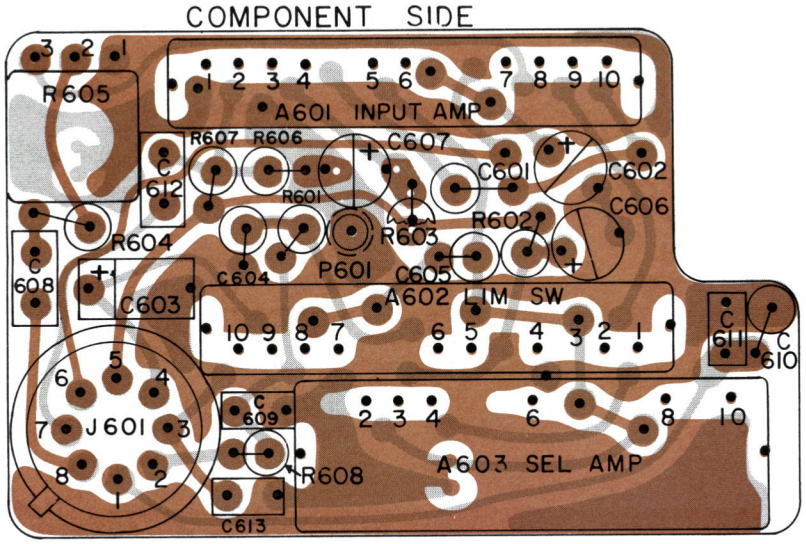
(3) INSTRUCTIONS:

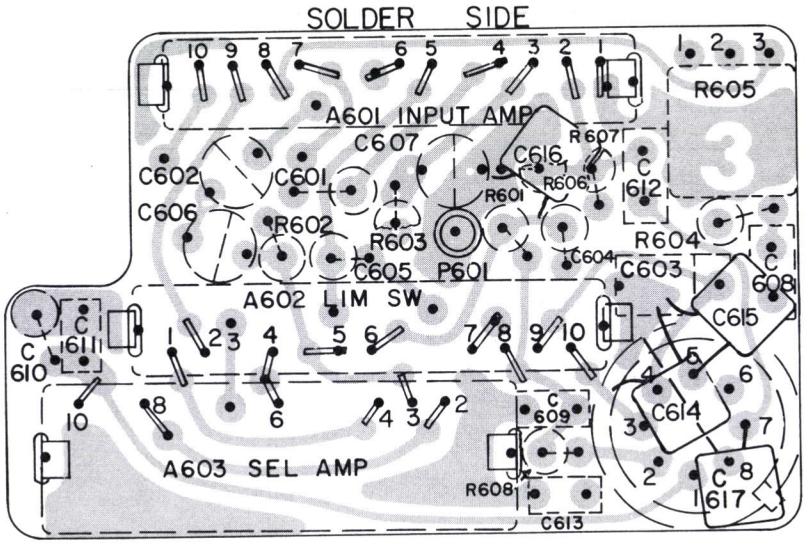
1. REMOVE FRONT AND BACK COVERS IF PRESENT.
2. ASSEMBLE DIODES (PART OF KIT PL19A130969G3) TO SYSTEMS BOARD PER CHART.
3. ASSEMBLE INSULATOR (PART OF KIT PL19A130969G3) AS SHOWN.
4. ASSEMBLE TYPE 90 ENCODER 4EH20A14, 4EH20A15 AS SHOWN. PLUG P601 ON ENCODER TO J9 OF SYSTEMS BOARD. PLUG P1 OF W1301, W1302 TO J601 ON ENCODER BOARD.
5. MAKE CONNECTION PER CHART ABOVE.
6. SOLDER ALL ELECTRICAL CONNECTIONS.
7. ASSEMBLE FRONT AND REAR COVERS, IF REQUIRED.
8. CLIP AND DISCARD J10 ON SYSTEM BOARD.
9. FOR CONTROL WIRE CLAMPING INFORMATION REFER TO DRAWING 19D423115 NOTE 7.
10. ASSEMBLE SCREW AND MODULE CLAMP AS SHOWN. AFTER FIRST ATTACHING PRESSURE SENSITIVE TAPE TO UNDERSIDE OF CLAMP WHERE IT COMES INTO CONTACT WITH MODULE SOCKET (ALL PART OF KIT PL19A130969G3).

(19D423750, Sh. 2, Rev. 4)

INSTALLATION INSTRUCTIONS

TYPE 90 ENCODE 19A130969G3
1 OR 2 TONE WITH TONE CONTROL

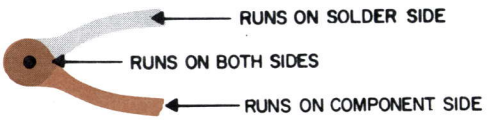


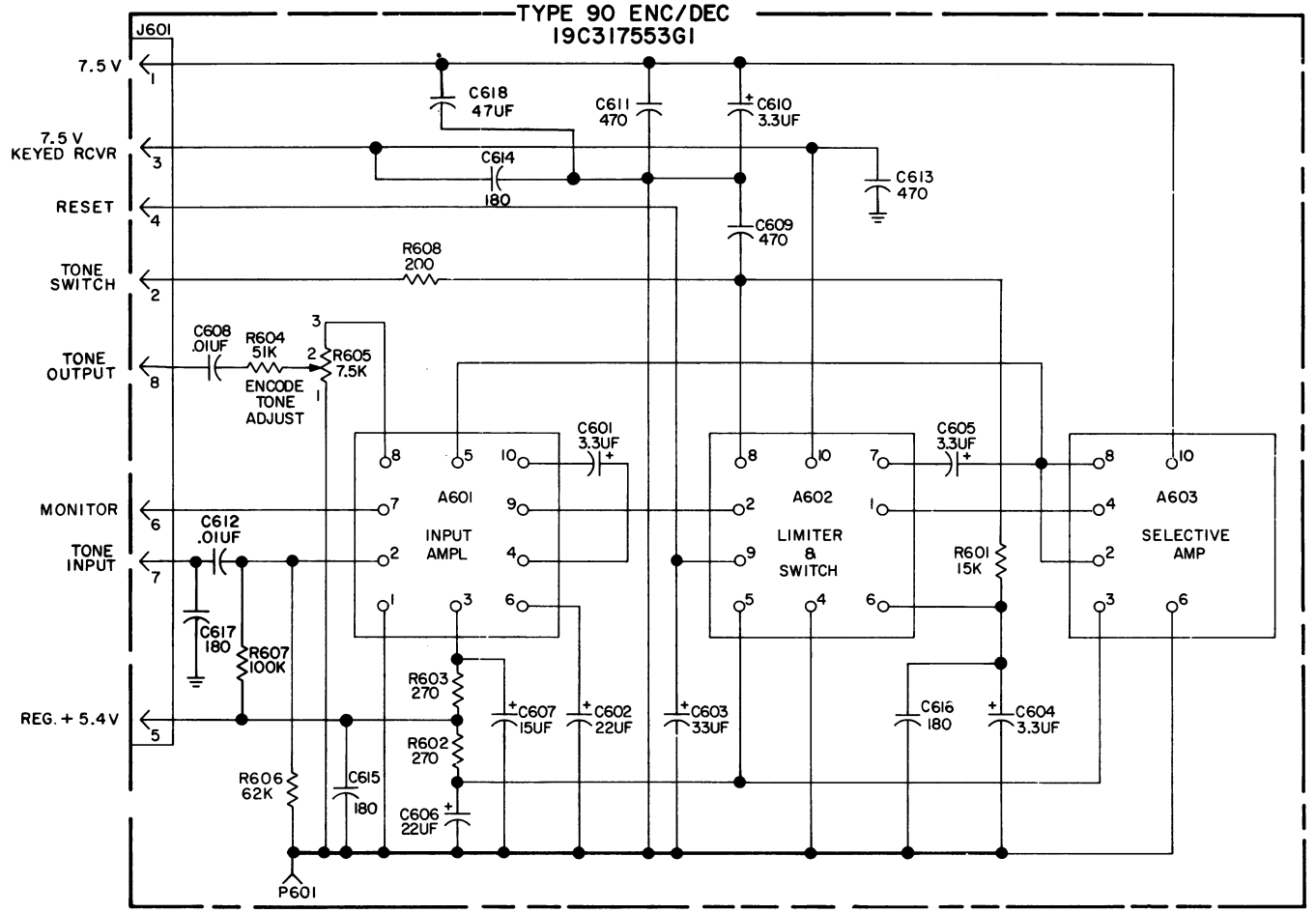


(19C317940, Rev. 2)
(19B219040, Sh. 1, Rev. 3)
(19B219040, Sh. 2, Rev. 3)

OUTLINE DIAGRAM

TYPE 90 ENCODER/DECODER
MODEL 4EK18A12





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.

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
4EK18A12	

(19C327066, Rev. 1)

SCHEMATIC DIAGRAM

TYPE 90 ENCODER/DECODER MODEL 4EK18A12

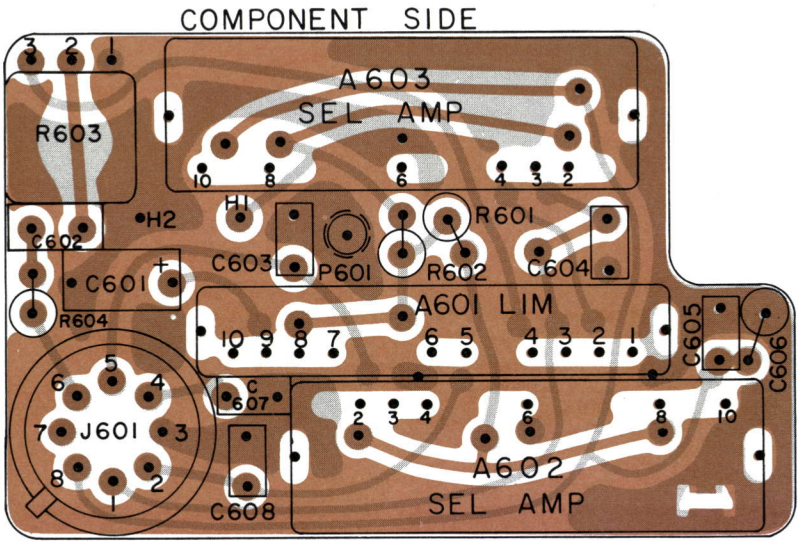
PARTS LIST

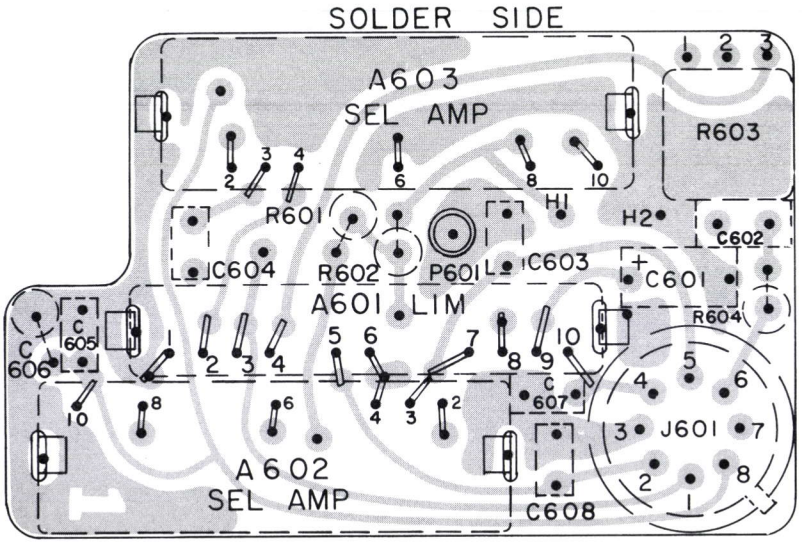
LBI-30474

TYPE 90 ENCODER/DECODER
MODEL 4EK18A12

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C618	19A116114P2053	Ceramic: 47 pf ±5%, 100 VDCW; temp coef -80 PPM.
A601	19C317061G2	Input Amplifier.
A602	19C317014G2	Limiter and Switch.
		NOTE: When reordering A603 give GE Part Number and specify exact frequency needed.
A603	19D413245G4	Selective Amplifier. 1050-3000 Hz.
		- - - - - - - - - CAPACITORS - - - - - - - - -
C601	5491674P36	Tantalum: 3.3 µf ±20%, 10 VDCW; sim to Sprague Type 162D.
C602	19C307102P15	Tantalum: 22 µf ±20%, 6 VDCW; sim to Component Inc G226R.
C603	19C307102P4	Tantalum: 33 µf ±20%, 10 VDCW; sim to Component Inc S336R.
C604 and C605	5491674P36	Tantalum: 3.3 µf ±20%, 10 VDCW; sim to Sprague Type 162D.
C606	19C307102P15	Tantalum: 22 µf ±20%, 6 VDCW; sim to Component Inc G226R.
C607	19C307102P14	Tantalum: 15 µf ±20%, 10 VDCW; sim to Component Inc G156R.
C608	19A116192P1	Ceramic: 0.01 µf ±20%, 50 VDCW; sim to Erie 8121 SPECIAL.
C609	19A116192P2	Ceramic: 470 pf ±20%, 50 VDCW; sim to Erie 8111-050-W5R.
C610	5491674P36	Tantalum: 3.3 µf ±20%, 10 VDCW; sim to Sprague Type 162D.
C611	19A116192P2	Ceramic: 470 pf ±20%, 50 VDCW; sim to Erie 8111-050-W5R.
C612	19A116192P1	Ceramic: 0.01 µf ±20%, 50 VDCW; sim to Erie 8121 SPECIAL.
C613	19A116192P2	Ceramic: 470 pf ±20%, 50 VDCW; sim to Erie 8111-050-W5R.
C614 thru C617	19A116114P10073	Ceramic: 180 pf ±10%, 100 VDCW; temp coef -3300 PPM.
		- - - - - - - JACKS AND RECEPTACLES - - - - - -
J601	19A116122P1	Terminal, feed-thru: sim to Warren Co 1-B-2994-4.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P601	19A115834P4	Contact, electrical: sim to Amp 2-332070-9.
		- - - - - - - - - - RESISTORS - - - - - - - - -
R601	3R152P153K	Composition: 15,000 ohms ±10%, 1/4 w.
R602 and R603	3R152P271K	Composition: 270 ohms ±10%, 1/4 w.
R604	3R152P513J	Composition: 51,000 ohms ±5%, 1/4 w.
R605	19A116093P1	Variable, carbon film: 7500 ohms ±20%, 0.20 w; sim to Centralab Series 3 Type 620-1.
R606	3R152P623J	Composition: 62,000 ohms ±5%, 1/4 w.
R607	3R152P104K	Composition: 100,000 ohms ±10%, 1/4 w.
R608	3R152P201J	Composition: 200 ohms ±5%, 1/4 w.
		- - - - - - - - MISCELLANEOUS - - - - - - - -
	19B216316P1	Insulator. (Used with J601).

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

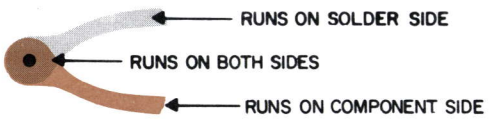


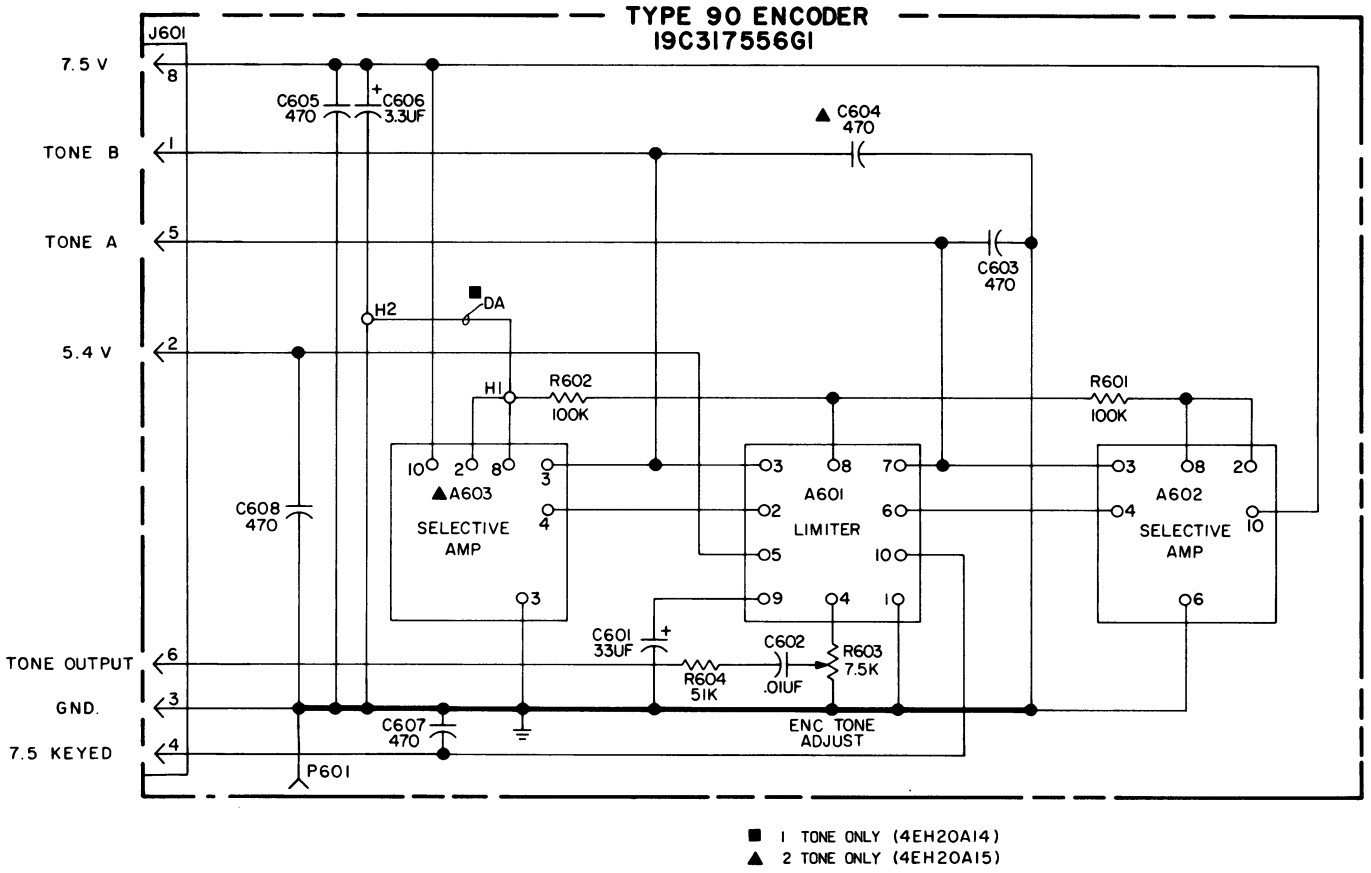


(19C317933, Rev. 0)
(19B219043, Sh. 1, Rev. 1)
(19B219043, Sh. 2, Rev. 1)

OUTLINE DIAGRAM

TYPE 90 ENCODER
MODEL 4EH20A14 & 15





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.

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
4EH20A14	
4EH20A15	

(19C327035, Rev. 0)

SCHEMATIC DIAGRAM

TYPE 90 ENCODER
MODEL 4EH20A14 & 15

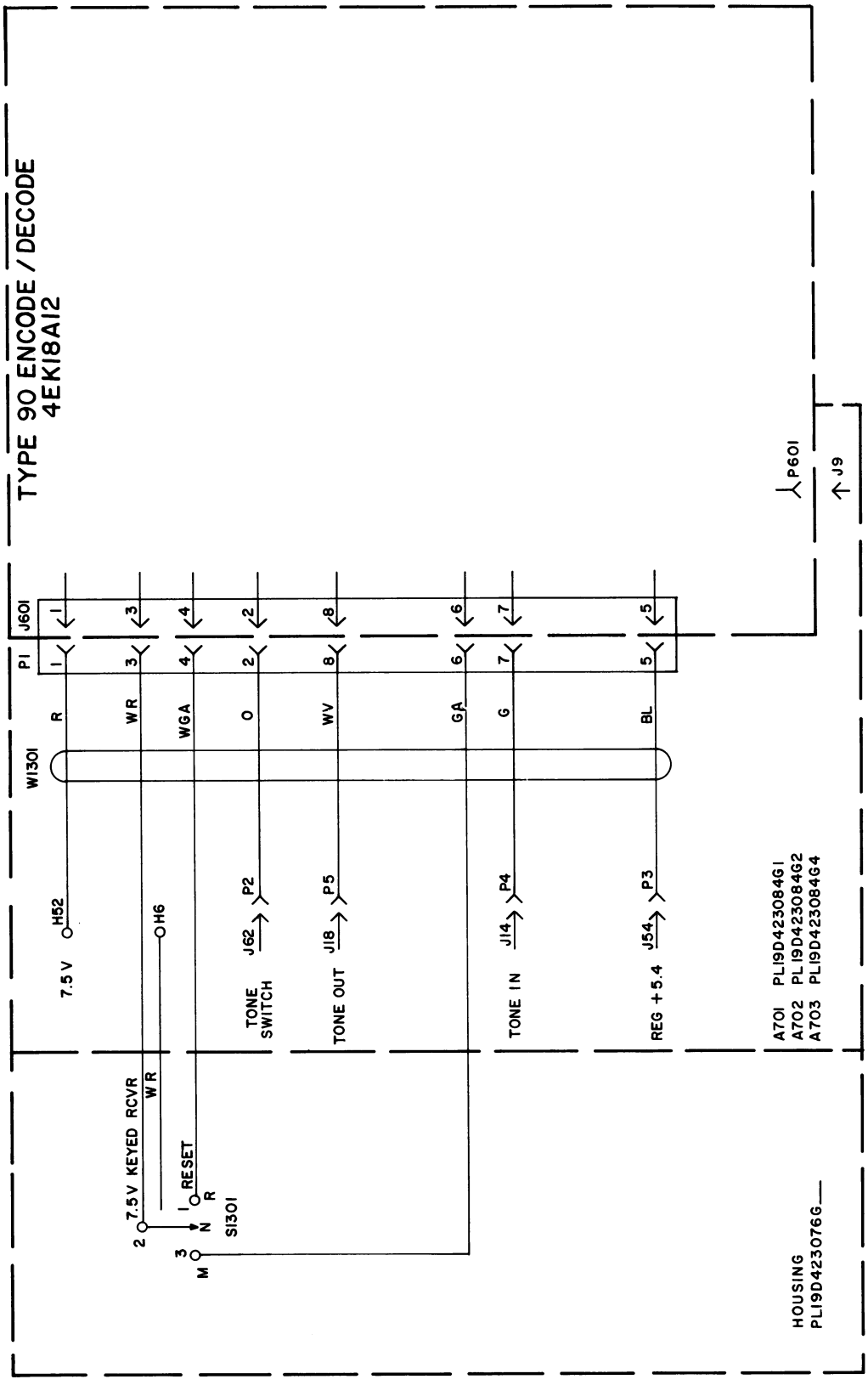
PARTS LIST

LBI-30473

TYPE 90 ENCODER
MODEL 4EH20A14 1 TONE
MODEL 4EH20A15 2 TONE

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C604	19A116192P2	Ceramic: 470 pf ±20%, 50 VDCW; sim to Erie 8111-A050-W5R-471M.
		- - - - - - - - - - - - PLUGS - - - - - - - - - -
P1	19B219051G1	Socket, crystal: 8 contacts.
		TYPE 90 ENCODER BOARD 19C317556G1
A601	19C317037G2	Limiter.
		NOTE: When reordering A602 and A603 give GE Part Number and specify exact frequency needed.
A602 and A603	19D413245G4	Selective Amplifier. 1050-3000 Hz.
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C601	19C307102P4	Tantalum: 33 µf ±20%, 10 VDCW; sim to Component Inc S336R.
C602	19A116192P1	Ceramic: 0.01 µf ±20%, 50 VDCW; sim to Erie 8121 SPECIAL.
C603	19A116192P2	Ceramic: 470 pf ±20%, 50 VDCW; sim to Erie 8111-A050-W5R-471M.
C605	19A116192P2	Ceramic: 470 pf ±20%, 50 VDCW; sim to Erie 8111-A050-W5R-471M.
C606	5491674P36	Tantalum: 3.3 µf ±20%, 10 VDCW; sim to Sprague Type 162D.
C607 and C608	19A116192P2	Ceramic: 470 pf ±20%, 50 VDCW; sim to Erie 8111-050-W5R-471M.
		- - - - - - - JACKS AND RECEPTACLES - - - - - -
J601	19A116122P1	Terminal, feed-thru: sim to Warren Co 1-B-2994-4.
		- - - - - - - - - - - PLUGS - - - - - - - - - -
P601	19A115834P4	Contact, electrical: sim to Amp 2-332070-9.
		- - - - - - - - - - RESISTORS - - - - - - - -
R601 and R602	3R152P104K	Composition: 0.10 megohm ±10%, 1/4 w.
R603	19A116093P1	Variable, carbon film: 7500 ohms ±20%, 0.20 w; sim to Centralab Series 3 Type 620-1.
R604	3R152P513J	Composition: 51,000 ohms ±5%, 1/4 w.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.



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.

(19C321580, Rev. 1)

INTERCONNECTION DIAGRAM

TYPE 90 ENCODE/DECODE
19A130970G1

PARTS LIST

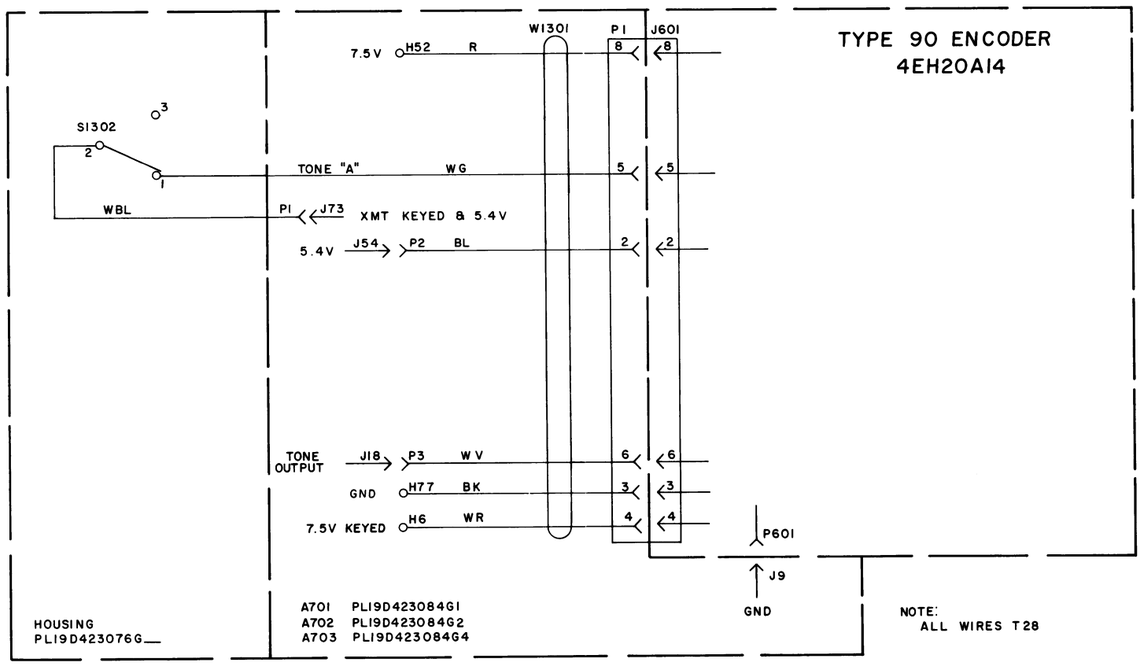
LBI-30457

TYPE 90 ENCODE/DECODE KIT
19A130970G1

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - - SWITCHES - - - - - - - - - - -
S1301	19B226809G7	Toggle: SPDT; sim to C and K Component 7107SDG.
		- - - - - - - - - - - - CABLES - - - - - - - - - -
W1301		CABLE, RELAY ASSEMBLY 19B226806G4
		- - - - - - - - - - - - PLUGS - - - - - - - - - -
P1	19A127569G1	Plug: 8 contacts.
P2 thru P5	19A115834P4	Contact, electrical: sim to AMP 2-332070-9.
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19C320975P1	Seal.
	19A137058P1	Clamp.
	19A130466P1	Insulator.
	N136P504C	Tap screw: No. 2-32 x 1/4.
	19B226358G3	Faceplate. (Includes NP276504P3 nameplate).

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.

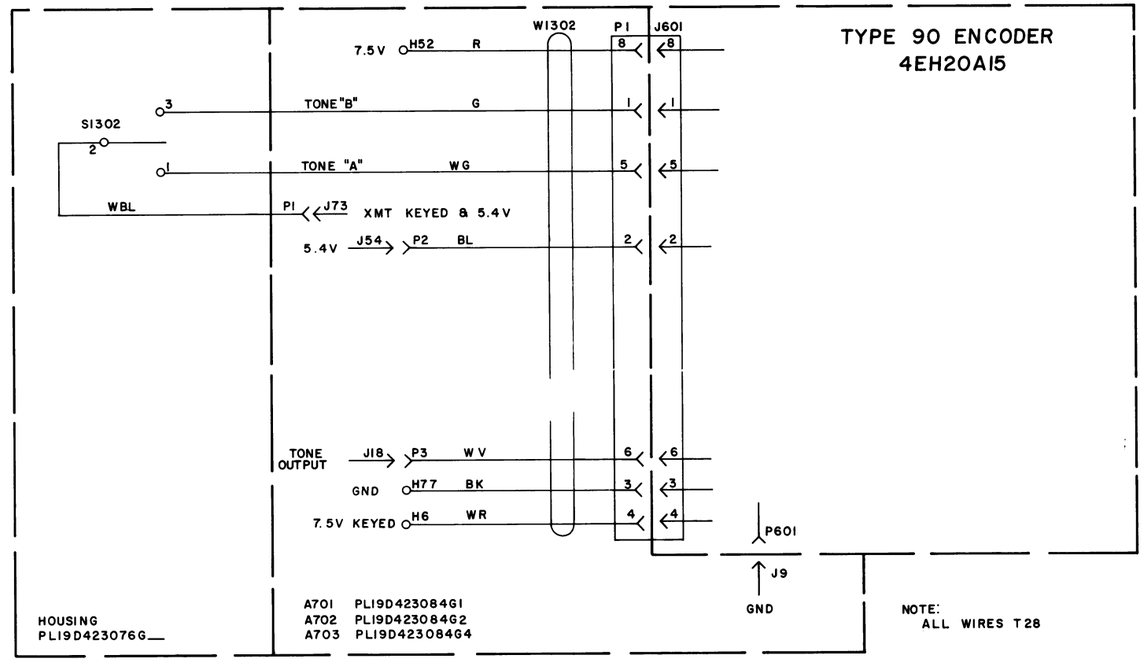
1 TONE



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.

(19C321559, Rev. 1)

2 TONE

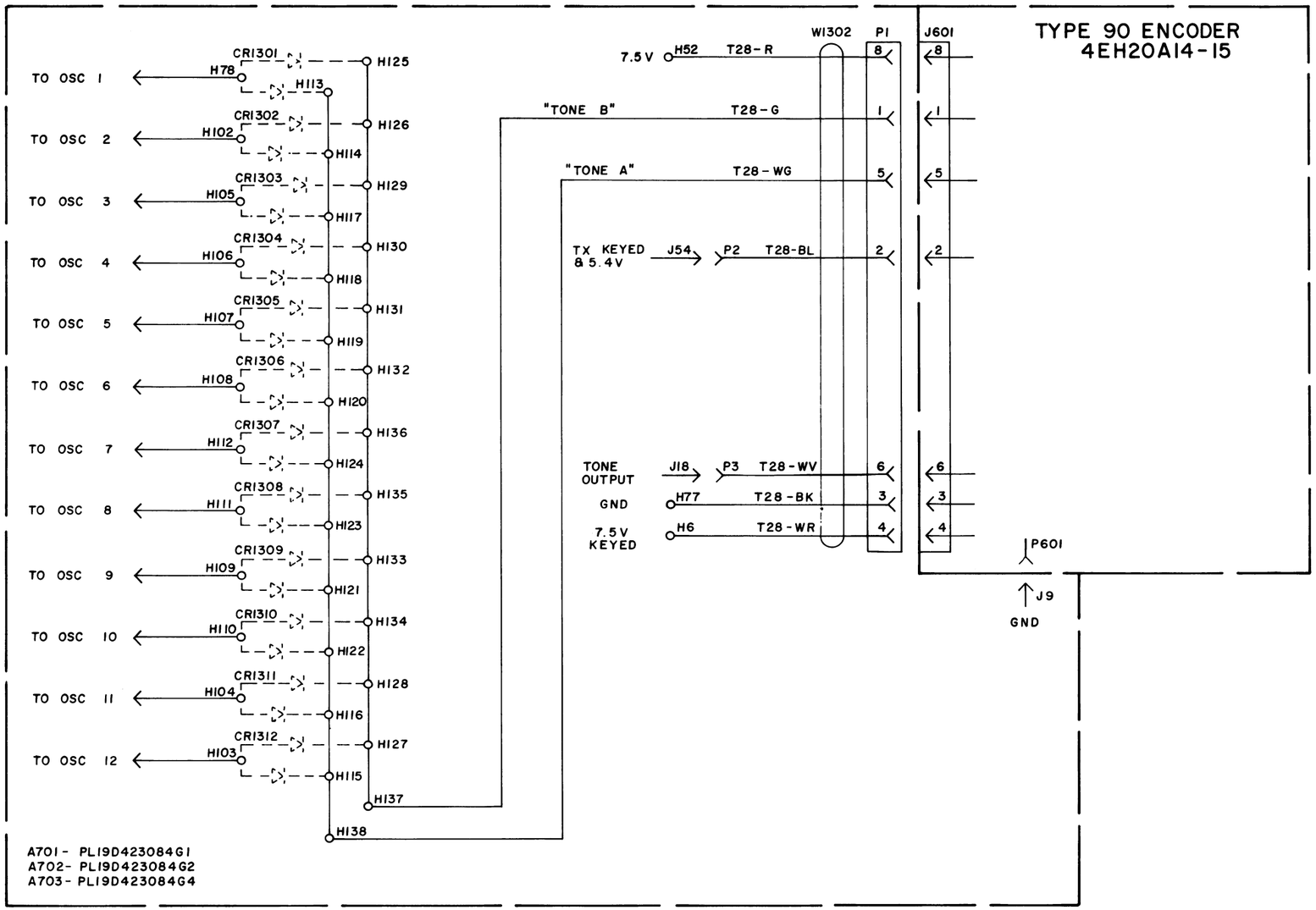


IN ORDER TO RETAIN RATED EQUIPMENT PERFORMANCE, REPLACEMENT OF ANY SERVICE PART SHOULD BE MADE ONLY WITH A COMPONENT HAVING THE SPECIFICATIONS SHOWN ON THE PARTS LIST FOR THAT PART.

(19C321560, Rev. 1)

INTERCONNECTION DIAGRAM

TYPE 90 ENCODE
19A130969G1 (1 TONE)
19A130969G2 (2 TONE)



NOTE:
CONNECTIONS FOR CR1301 - CR1312 TO BE DETERMINED BY INSTRUCTIONS ON 19D423750

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.

THIS ELEM DIAG APPLIES TO	
MODEL NO	REV LETTER

INTERCONNECTION DIAGRAM

TYPE 90 ENCODE
19A130969G3 TONE CONTROL

(19D423251, Rev. 1)

PARTS LIST

LBI-30456

TYPE 90 ENCODE KIT
19A130969G1 1 TONE
19A130969G2 2 TONE
19A130969G3 TONE CONTROL

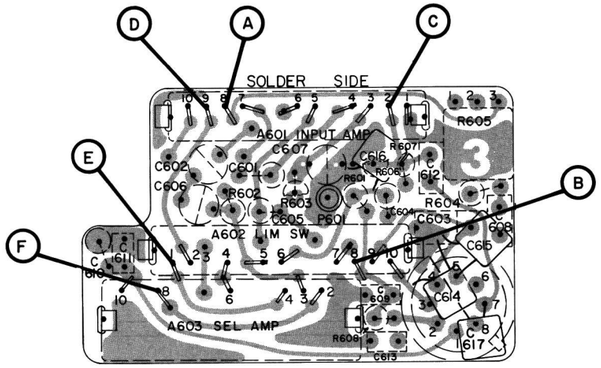
SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - DIODES AND RECTIFIERS - - - - - -
CR1301 thru CR1312	19A115100P1	Silicon; sim to Type 1N458A.
		- - - - - - - - - - SWITCHES - - - - - - - - - -
S1301	19B226809G5	Toggle: SPDT; sim to C and K Component 7107SDG.
S1302	19B226809G6	Toggle: SPDT; sim to C and K Component 7103SDG.
		- - - - - - - - - - - CABLES - - - - - - - - - -
W1301		CABLE, RELAY ASSEMBLY 19B226806G2
		- - - - - - - - - - - PLUGS - - - - - - - - - -
P1	19A127569G1	Plug: 8 contacts.
P2 and P3	19A115834P4	Contact, electrical: sim to AMP 2-332070-9.
W1302		CABLE, RELAY ASSEMBLY 19B226806G3
		- - - - - - - - - - - PLUGS - - - - - - - - - -
P1	19A127569G1	Plug: 8 contacts.
P2 and P3	19A115834P4	Contact, electrical: sim to AMP 2-332070-9.
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19C320975P1	Seal.
	19A137058P1	Clamp.
	19A130466P1	Insulator.
	N136P504C	Tap screw: No. 2-32 x 1/4.
	19B226358G17	Faceplate. (Includes NP276504P14 nameplate).
	19B226358G4	Faceplate. (Includes NP276504P4 nameplate).

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

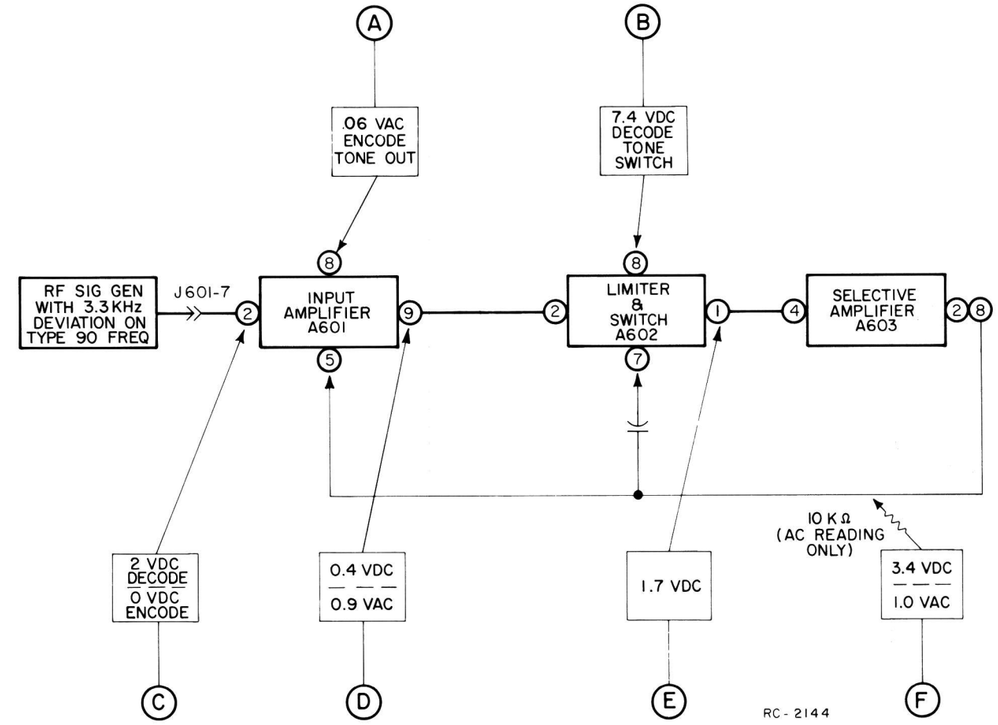
TROUBLESHOOTING

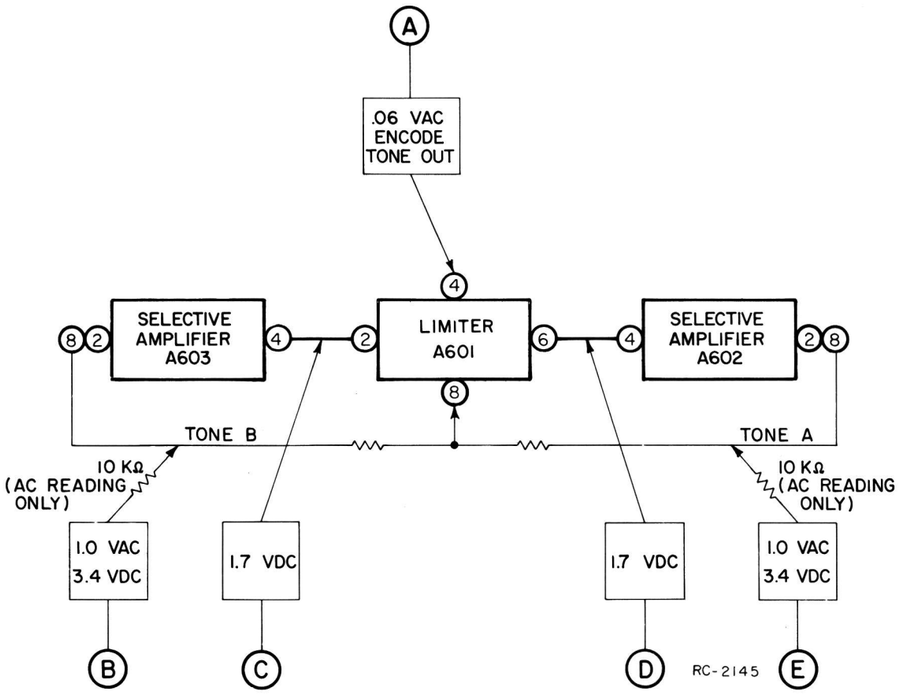
Always connect the board to ground (G11) when removed from the radio for troubleshooting.

SYMPTOM	PROCEDURE
Unit won't encode	1. Place Type 90 switch S1301 in the Monitor (encode) position, and check for .06 volts RMS at position (A). Key the transmitter and check for the reading at (A) to drop to zero in approximately one second (pulsed tone). 2. If these readings are correct, check the transmitter audio circuit and modulation setting. 3. If the readings are not correct, isolate the defective module by checking readings (C) through (F).
- CAUTION - Do not ground Pins 2 or 8 on Selective Amplifier A603, or Pin 5 on input amplifier A601. To do so will destroy the Selective Amplifier module.	
Unit won't decode	1. Place Type 90 switch S1301 in the Reset and then in the Monitor position and check for proper operation of the receiver. 2. If the receiver operates properly, place the switch in the Reset and then the Normal position. Apply the proper Type 90 tone to the radio and check for 7.4 volts DC at position (B). Place the switch in the Reset and then the Normal position and check for zero volts at (B). 3. If the readings are not correct, isolate the defective module by checking readings (C) through (F).

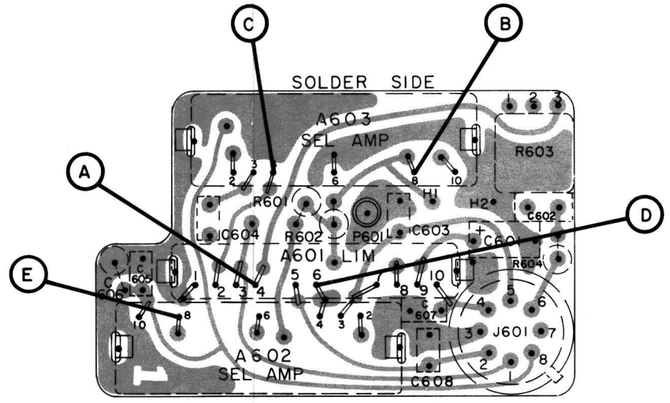


(RC-2144)
(19C317940, Rev. 2)
(19B219040, Sh. 2, Rev. 3)





RC-2145



(RC-2145)
(19C317933, Rev. 0)
(19B219043, Sh. 2, Rev. 1)

TROUBLESHOOTING

Always connect the board to ground when removed from the radio for troubleshooting.

1. Place Type 90 switch S1302 in the Tone "A" or "B" position and check for .06 volts RMS at position (A). Next, key the transmitter and check for the reading at (A) to drop to zero in approximately one second (pulsed tone).
2. If these readings are correct, then check the transmitter audio circuit and modulation setting.
3. If the readings are not correct, isolate the defective module by checking readings (B) through (E).

- CAUTION -

Do not ground Pins 2 or 8 of Selective Amplifiers A602 and A603, or Pin 8 of limiter A601. To do so will destroy the Selective Amplifier.

TROUBLESHOOTING PROCEDURE

TYPE 90 ENCODER
MODELS 4EH20A14 & 15