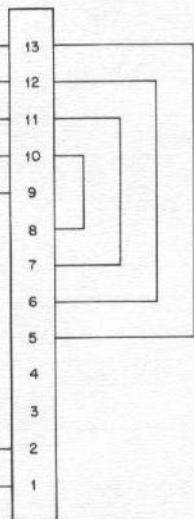
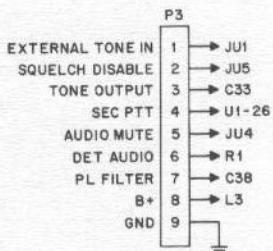


TONE "PRIVATE-LINE" ENCODER/DECODER

MODEL HLN4181A

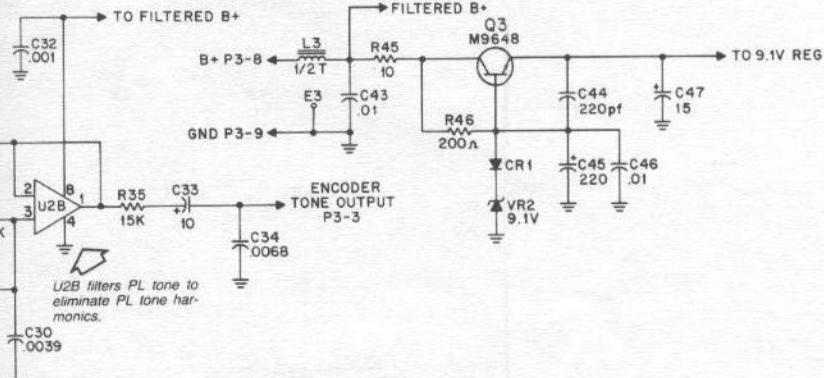


Code plug determines the PL frequency that is generated and decoded.

NOTES:

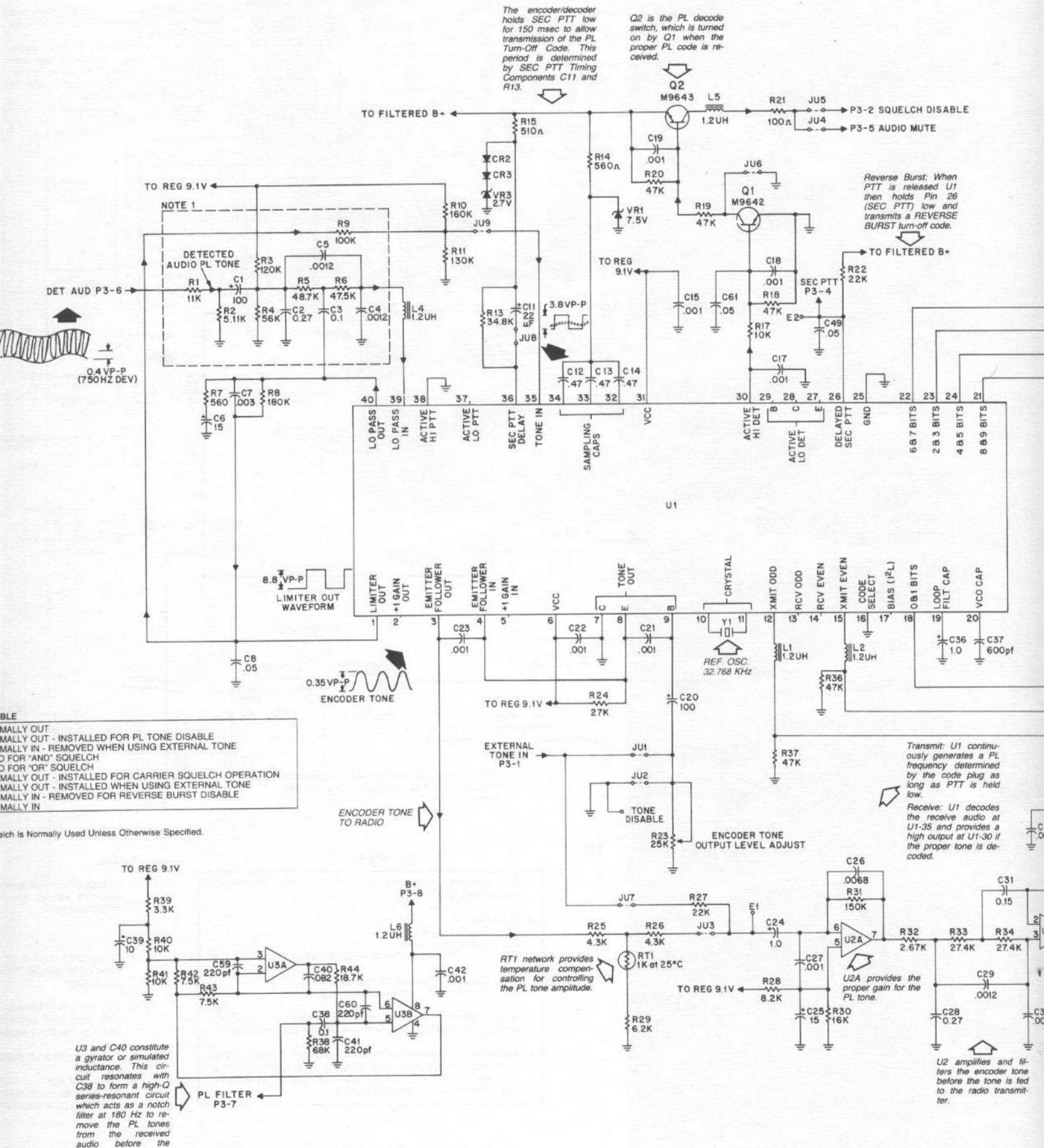
- Components within dashed area form an input filter for decode tone derived from detected audio.
 - All capacitor values are in μF unless otherwise stated.
 -  Theory information.
 -  Signal flow.

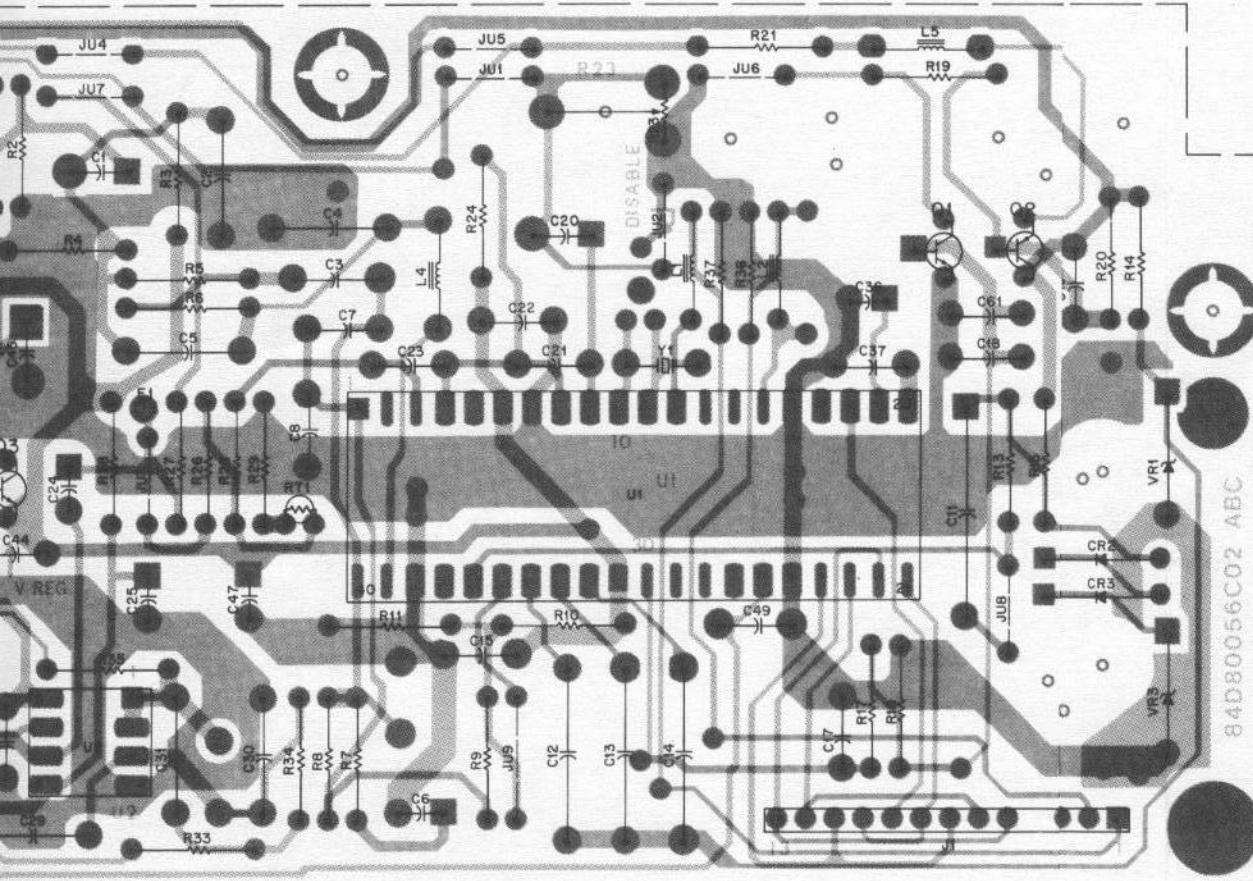
CAUTION
Make certain that NO power is supplied to the radio when inserting or removing the PLED circuit board. Damage to the PLED or external test equipment may result.



U2B filters PL tone to eliminate PL tone harmonics.

nd fil-
er tone
is fed
transmit-





SHOWN FROM SOLDER SIDE

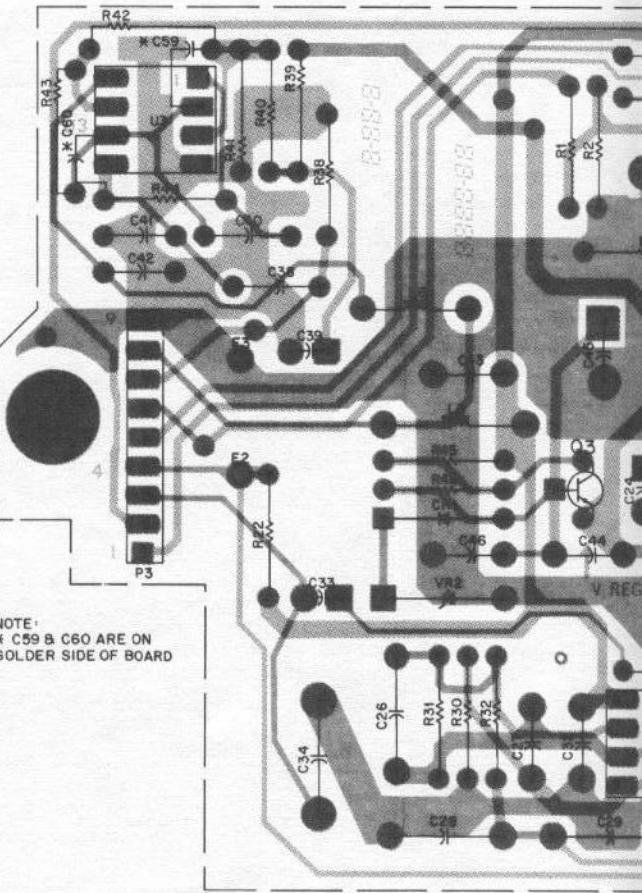
SOLDER SIDE

COMPONENT SIDE ● BD-DEPW-0107-0
 SOLDER SIDE ○ BD-DEPW-0108-0
 OL-DEPW-0109-0

JUMPER TABLE	
JU1	NORMALLY OUT -
JU2	NORMALLY OUT - IN
JU3	NORMALLY IN - REVERSE
JU4	USED FOR "AND" SQUELCH
JU5	USED FOR "OR" SQUELCH
JU6	NORMALLY OUT - IN
JU7	NORMALLY OUT - IN
JU8	NORMALLY IN - REVERSE
JU9	NORMALLY IN -

NOTE:
 "And" Squeilch is Normally

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
capacitor, fixed uF, ±5%, 100V (unless otherwise stated)		
C1	23-84665F03	100 +100, -10% 25V, electrolytic
C2	08-84637L15	.27
C3	08-84637L37	.1
C4,5	08-84637L03	.0012 630V
C6	23-84665F02	15 +100, -10% 25V, electrolytic
C7	21-82187B16	3000 pF ±10%
C8	21-82372C10	.05 +80, -20% 25V
C11	23-84762H16	22 ±10% 20V, tantalum
C12-14	08-84637L42	.47 ±10%
C15	21-82187B44	.0016 ±10%
C17-19	21-82187B44	.0016 ±10%
C20	23-84665F03	100 +100, -10% 25V, electrolytic
C21-23	21-82187B44	.0016 ±10%
C24	23-84665F04	1 +150, -10% 50V, electrolytic
C25	23-84665F02	15 +100, -10% 25V, electrolytic
C26	08-84637L06	.0068 630V
C27	21-82187B44	.0016 ±10%
C28	08-84637L15	.27
C29	08-84637L03	.0012 630V
C30	08-84637L05	.0039 630V
C31	08-84637L01	.15
C32	21-82187B44	.0016 ±10%
C33	23-84665F01	10 +100, -10% 25V, electrolytic
C34	08-83813H38	.006 ±10%
C36	23-84538G01	1 ±20% 35V, tantalum
C37	21-00851299	600 pF ±10% 600V
C38	08-84637L37	.1
C39	23-84665F01	10 +100, -10% 25V, electrolytic
C40	08-84637L36	.082
C41	21-83596E10	220 pF ±20% 500V
C42	21-82187B44	.0016 ±10%
C43	21-83596E36	.01 +60, -40% 250
C44	21-83596E10	220 pF ±20% 500V
C45	23-84665F14	220 16V, electrolytic
C46	21-83596E36	.01 +60, -40% 250
C47	23-84665F02	15 +100, -10% 25V, electrolytic
C49	21-82372C10	.05 +80, -20% 25V
C59,60	21-83596E10	220 pF ±20% 500V
C61	21-82372C10	.05 +80, -20% 25V
diode (see note)		
CR1	48-83654H01	silicon
CR2,3	48-83329G04	silicon
connector receptacle		
J1	09-82071K01	12 contact
J2	09-80269B04	socket dual
coil, rf		
L1,2	24-82723H27	1.2 uH, green
L3	24-80036A02	ferrite, 1/2 turn
L4-6	24-82723H27	1.2 uH, green
connector plug		
P3	28-80141H02	male
transistor (see note)		
Q1	48-00869642	NPN
Q2	48-00869643	PNP
Q3	48-00869648	NPN
thermistor		
RT1	06-83600K02	100 ±20% 2mW
resistor, fixed, ohm, ±5%, 1/4 watt (unless otherwise stated)		
R1	06-11009C74	11k
R2	06-10621C63	5.11k ±1%
R3	06-11009C99	120k
R4	06-11009C91	56k
R5	06-10621D58	48.7k ±1%
R6	06-10621D57	47.5k ±1%
R7	06-11009C43	560
R8	06-11009D04	180k
R9	06-11009C97	100k
R10	06-11009D03	160k
R11	06-11009D01	130k
R13	06-10621D44	34.8k
R14	06-11009C43	560
R15	06-11009C42	510
R17	06-11009C73	10k
R18-20	06-11009C89	47k
R21	06-11009C25	100
R22	06-11009C81	22k
R23	18-84944C02	25k ±20% .1 W
R24	06-11009C83	27k
R25,26	06-11009C64	4.3k
R27	06-11009C81	22k
R28	06-11009C71	8.2k
R29	06-11009C68	6.2k
R30	06-11009C78	16k
R31	06-10621E06	150k ±1%
R32	06-10621C36	2.67k ±1%
R33,34	06-10621D34	27.4k ±1%
R35	06-11009C77	15k
R36,37	06-11009C89	47k
R38	06-11009C83	68k
R39	06-11009C61	3.3k
R40,41	06-10621C91	10k ±1%



REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
R42,43	06-10621C79	7.5k ±1%
R44	06-10621D18	18.7k ±1%
R45	06-11009C01	10
R46	06-11009C32	200
Integrated circuit (see note)		
U1	51-83977M17	encoder/decoder
U2,3	51-80067C03	dual opamp
voltage regulator (see note)		
VR1	48-82256C44	7.5V, zener
VR2	48-82256C38	9.1V, zener
VR3	48-82256C33	2.7V, zener
crystal (see note)		
Y1	48-80055C01	32.768 kHz, tuning fork
mechanical parts		
03-10904A02	machine screw	
03-10904A15	machine screw, 3 used	
04-80149A01	locking washer, 4 used	

note: For best performance, order diodes, transistors, and integrated-circuit devices by Motorola part number.