INSTRUCTIONS
FOR
TRANSMITTER CONTROL BOARDS 19D416660G1-G8

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DESCRIPTION

The 19D416660 Transmitter Control Board is provided in eight different groups for performing the different transmit functions in MASTR II® Tone Control Base Stations. The 19D416660G1 or G5 Board is used in single frequency transmit applications. The 19D416660G2 or G6 Board is required for two frequency transmit applications and, along with the 19D429082G1 Transmitter Control Board, in three and four frequency transmit applications. The 19D416660G3 or G7 Board is used in two frequency transmit with Channel Guard monitor applications and, along with the 19D429082G1 Transmit Control Board, in three or four frequency transmit with Channel Guard monitor applications. The 19D416660G4 or G8 Board is used in single frequency transmit with Channel Guard monitor applications.

CIRCUIT ANALYSIS

All groups contain the RCVR NOTCH FILTER and the TX NOTCH FILTER for removing the 2175 Hz Secur-it tone from the audio path. The receive audio path is connected from the Audio Board via RCVR NOTCH FILTER OUTPUT lead D14 to the Transmitter Control Board. The filter is composed of series resonant shunts L6-C10 and L4-C7 along with parallel resonant trap C9-L5. The filter notches out the 2175 Hz components from the receiver audio and returns the audio via RX NOTCH OUT lead D13 to the Audio Board.

The 2175 Hz tone is notched from the transmit audio path by the TX NOTCH FILTER, composed of series resonant shunts L7-C11 and L9-C14 together with parallel resonant trap L8-C13. The transmit audio is connected to the filter via LINE AUDIO path A8 and returned to the Audio Board via NOTCHED AUDIO path A9.

Single Frequency Transmit

In single frequency transmit applications, a function tone frequency of 1950 Hz is applied to the audio pair at the remote control console. This tone is connected to the 19D416660G1 or G5 Transmitter Control Board on the LIMITED AUDIO lead A10. An LC filter, composed of L1-C1 tuned to the 1950 Hz function tone, turns off diode CR1 on the positive peaks and allows Q1 to turn on through R2. Conduction of Q1 applies a low to the input of gate U1-D.

The grounded Secur-it DET lead D7 is connected to inverter U3-C, applying a high to the input of U1-A. The low output of U1-A is connected back to U1-D, latching the flip-flop. The low output of U1-A is also inverted by U1-C and applied to NAND gate U1-B. The inverted high Secur-it DET lead is also connected to the input of U1-B. The resultant output of U1-B is inverted by U3-B and the high turns on Q3. Conduction of Q3 grounds the PTT path to key the station transmitter. The high output of U1-C turns on Q15, grounding the LIMITED AUDIO path in the G1-G4 boards as long as the flip-flop remains latched. In the G5-G8 boards, conduction of Q15 resets the WINDOW ONE SHOT after the transmit function tone is detected. This disables the LIMITED AUDIO path long before voice audio is present. Unkeying the transmitter removes the ground from the DET lead D7, applying a low to pin 2 of U1-A. This unlatches the flip-flop. Operating the XMIT DISABLE switch S2 to the DISABLE position opens the PTT path and applies

ground to the XMIT DISABLE Indicator LED CR11, turning on the light.

Two, Three or Four Frequency Transmit

Transmit Control Board 19D416660G2 or G6 is required for two frequency and three or four frequency transmit applications. The 1950 Hz tone frequency detector operates in the same manner as described for the G1 or G5 Board. The PTT path is connected in the same configuration.

When TX F2 tone (1850 Hz) is selected at the remote control console, the tone is detected at the F2 filter (L2-C3), back biasing CR6 and turning on Q6. This latches flip-flop U2-A, U2-D, applying a low to gate U1-C. The transmitter is keyed as previously described. The high output of U2-D turns on Q8 which, in turn, grounds the XMIT F2 lead A2 to select the transmit F2 oscillator and operates Q9. Conduction of Q9 applies a high to TX F2 INTERCONNECT lead D11.

If the TX F1 tone is selected, the high output from U1-D turns on Q4 and Q5, applying high to TX F1 INTERCONNECT lead D10 and applying ground to XMIT F1 lead A5 to select the transmit F1 oscillator.

When TX F2 is selected, the high from the output of U2-D also turns on Q7, applying ground to XMIT F2 Indicator LED CR9 to turn on the light.

In local PTT operation, with no function tone present on the LIMITED AUDIO path, the Secur-it DET lead D7 is high. Grounding the PTT lead D6 with the local PTT microphone turns on Q13 which, in turn, operates Q14 and forward biases CR3. The low input to U2-C is inverted and applied to NAND gate U2-D. The GT DET lead, which is high, is also connected to NAND gate U2-C. The resulting low output keys the transmitter through F1-F2 service switch S1. The position of S2 determines which transmitter oscillator is keyed in local PTT operation.

Channel Guard Disable

The Channel Guard Disable function requires the use of Transmitter Control Board 19D416660G4 or G8 in single frequency transmit systems and 19D416660G3 or G7 in two, three and four frequency transmit systems.

The single frequency and two frequency detection circuits function as described for the G1, G2, G5 or G6 boards. The Channel Guard Disable detector circuit (2050 Hz) consists of the filter (L3-C5) which, when it detects the presence of 2050 Hz back biases CR7 and turns on Q10. Flip-flop U3-A, U3-D is latched and turns off Q11. The high at the collector of Q11 turns Q16 on, applying ground to the CG DISABLE lead A7 to disable Channel Guard.

Whenever the station transmitter is keyed, Q13 and Q14 conduct, forward biasing CR4 and unlatching the flip-flop. Q11 is turned on, turning off Q16 and enabling Channel Guard. The CG MON-XMIT DISABLE service switch S2 applies a ground to the input of the flip-flop at U3-D pin 13 when placed in the MON position. This ground operates the disable circuit as described previously.

The high output of U3-D (when Channel Guard disable is selected) will turn on Q12, applying ground to CG MON Indicator LED CR10 and turning on the light.

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TRANSMITTER CONTROL BOARD
19D416660G1, G5

SYMBOL	PART NO.	DESCRIPTION
		---------- CAPACITORS ----------
C1	19C307114P1302G	Polystyrene: 13,000 pF ±2%, 100 VDCW, temp coef -120+30 PPM.
C2	19A116080P110	Polyester: 0.33 µF ±10%, 50 VDCW.
C7	19C307114P6801G	Polystyrene: 6800 pF ±2%, 100 VDCW, temp coef -120+30 PPM.
C8	5496267P19	Tantalum: 22 µF ± 20%, 35 VDCW; sim to Sprague Type 150D.
C9	19C307114P1002G	Polystyrene: 10,000 pF ±2%, 100 VDCW, temp coef -120+30 PPM.
C10 and C11	19C307114P6801G	Polystyrene: 6800 pF ±2%, 100 VDCW, temp coef -120+30 PPM.
C12	5496267P19	Tantalum: 22 µF ± 20%, 35 VDCW; sim to Sprague Type 150D.
C13	19C307114P1002G	Polystyrene: 10,000 pF ±2%, 100 VDCW, temp coef -120+30 PPM.
C14	19C307114P6801G	Polystyrene: 6800 pF ±2%, 100 VDCW, temp coef -120+30 PPM.
C16	5496267P2	Tantalum: 47 µF ± 20%, 6 VDCW; sim to Sprague Type 150D.
C17	19A700233P7	Ceramic: 1000 pF ± 20%, 50 VDCW.
C18*	7491827P102	Ceramic: 0.01 µF -30 +80%, 50 VDCW, sim to Sprague 19C180.
		---------- DIODES ----------
CR1	19A115250P1	Silicon, fast recovery, 225 mA, 50 PIV.
CR11	162B3011P0002	Light Emitting Diode: Red; sim to GE 22L-2.
CR12	T324ADP1041	Silicon: Rectifier; sim to 1N4004.
		---------- INDUCTORS ----------
L1	19B205354G6	Coil.
L4	19B205354G5	Coil.
L5	19B205354G4	Coil.
L6 and L7	19B205354G5	Coil.
L8	19B205354G4	Coil.
L9	19B205354G5	Coil.
		---------- PLUGS ----------
P9		Part of printed wire board.
		---------- TRANSISTORS ----------
Q1 and Q2	19A700023P1	Silicon, NPN: sim to 2N3904.
Q3	19A115300P4	Silicon, NPN.
Q15	19A116774P1	Silicon, NPN; sim to Type 2N5210.
		---------- RESISTORS ----------
R1	19A700106P103	Composition: 47K ohms ± 5%, 1/4 w.
R2	3R152P913J	Composition: 91K ohms ± 5%, 1/4 w.
R3	19A700106P87	Composition: 10K ohms ± 5%, 1/4 w.
R4	19A700106P39	Composition: 100 ohms ± 5%, 1/4 w.
R5	19A700106P87	Composition: 10K ohms ± 5%, 1/4 w.
R6	3R152P202J	Composition: 2K ohms ± 5%, 1/4 w.
R7	3R152P511J	Composition: 510 ohms ± 5%, 1/4 w.
R27 and R28	3R152P202J	Composition: 2K ohms ± 5%, 1/4 w.
R34	19A700106P67	Composition: 1.5K ohms ± 5%, 1/4 w.
R35	3R152P202J	Composition: 2K ohms ± 5%, 1/4 w.
R36	19A700106P63	Composition: 1K ohms ± 5%, 1/4 w.
R38	3R152P203J	Composition: 20K ohms ± 5%, 1/4 w.
R40*	3R152P512J	Composition: 5.1K ohms ± 5%, 1/4 w. (Added for tone repeater applications. (Added by Rev. B).
R41*	3R152P202J	Composition: 2K ohms ± 5%, 1/4 w.
		---------- SWITCHES ----------
S2	19B209261P17	Slide: 2 PTT, sim. to Switchcraft 46313-TD4.
		---------- TEST POINTS ----------
TP1 thru TP3	19B211379P1	Spring (Test Point).
TP5	19B211379P1	Spring (Test Point).
		-------- INTEGRATED CIRCUITS -------
U1	19A700037P301	Digital: Quad 2-Input NAND gate; sim to 74LS00.
U3	19A700037P301	Digital: Quad 2-Input NAND gate; sim to 74LS00.
		--------- MISCELLANEOUS ---------
	19A701332P4	Insulator, washer: nylon. (Used with Q3).
	19B219690G1	Handle assembly.
	19B219702P2	Panel.
	4032480P1	Nut, sheet spring: sim to Vector Electronic Co. No. 440.
	19B201074P204	Tap screw, phillips POZIDRIV: No. 4-40 x 1/4.
	N404P11B6	Lockwasher, internal tooth, No. 4. (Used in G5).
	N80P9003B6	Machine screw, panhead: No. 4-40 x 3/16. (Used in G5).
26	7141225P2	Nut, Hex: 4-40. (Used in G5).

*COMPONENTS, ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

PRODUCTION CHANGES

Changes in the equipment to improve perforamnce or to simplify circuits are identified by a "Revision Letter," which is stamped after the model number of the unit. The revision stamped on the unit includes all previous revisions. Refer to the Parts List for descriptions of parts affected by these revisions.

REV. A & B - 19D416660G1
Incorporated into initial shipment.

REV. C - Replaced DTL Integrated Circuits U1 and U3 (19A115913P7) with LS-TTL ICs (19A700037P1).

REV. A - 19D416660G5
Replaced DTL Integrated Circuits U1 and U3 (19A115913P7) with LS-TTL ICs (19A700037P1).

REV. B - To increase the reliability of the TX board by providing current limiting on the remote PTT key logic; moved R7 between U3-B Pin 6 and the base of Q3.

TRANSMITTER CONTROL BOARD
19D416660G2, G6

SYMBOL	PART NO.	DESCRIPTION
		---------- CAPACITORS ----------
C1	19C307114P1302G	Polystyrene: 13,000 pF ±2%, 100 VDCW, temp coef -120+30 PPM.
C2	19A116080P110	Polyester: 0.33 µF ±10%, 50 VDCW.
C3	19C307114P1402G	Polystyrene: 14,000 pF ±2%, 100 VDCW, temp coef -120+30 PPM.
C4	19A116080P110	Polyester: 0.33 µF ±10%, 50 VDCW.
C7	19C307114P6801G	Polystyrene: 6800 pF ±2%, 100 VDCW, temp coef -120+30 PPM.
C8	5496267P19	Tantalum: 22 µF ± 20%, 35 VDCW; sim to Sprague Type 150D.
C9	19C307114P1002G	Polystyrene: 10,000 pF ±2%, 100 VDCW, temp coef -120+30 PPM.
C10 and C11	19C307114P6801G	Polystyrene: 6800 pF ±2%, 100 VDCW, temp coef -120+30 PPM.
C12	5496267P19	Tantalum: 22 µF ± 20%, 35 VDCW; sim to Sprague Type 150D.
C13	19C307114P1002G	Polystyrene: 10,000 pF ±2%, 100 VDCW, temp coef -120+30 PPM.
C14	19C307114P6801G	Polystyrene: 6800 pF ±2%, 100 VDCW, temp coef -120+30 PPM.
C16		5496267P2
		Tantalum: 47 µF ± 20%, 6 VDCW; sim to Sprague Type 150D.
C17	19A700233P7	Ceramic: 1000 pF ± 20%, 50 VDCW.
C18	7491827P102	Ceramic: 0.01 µF -30 +80%, 50 VDCW, sim to Sprague 19C180.
C19	5496267P17	Tantalum: 1.0 µF ± 20%, 35 VDCW; sim to Sprague Type 150D.
		---------- DIODES ----------
CR1 thru CR3	19A115250P1	Silicon, fast recovery, 225 mA, 50 PIV.
CR6	19A115250P1	Silicon, fast recovery, 225 mA, 50 PIV.
CR8	19A115250P1	Silicon, fast recovery, 225 mA, 50 PIV.
CR9	162B3011P0002	Light Emitting Diode: Red; sim to GE 22L-2.
CR11	162B3011P0002	Light Emitting Diode: Red; sim to GE 22L-2.
CR12	T324ADP1041	Silicon: Rectifier; sim to 1N4004.
CR13 thru CR17	19A115250P1	Silicon, fast recovery, 225 mA, 50 PIV.
CR19	19A115250P1	Silicon, fast recovery, 225 mA, 50 PIV.
		---------- INDUCTORS ----------
L1 and L2	19B205354G6	Coil.
	19B205354G6	Coil.
L4	19B205354G5	Coil.
L5	19B205354G4	Coil.
L6 and L7	19B205354G5	Coil.
L8	19B205354G4	Coil.
L9	19B205354G5	Coil.
		---------- PLUGS ----------
P9		Part of printed wire board.

*COMPONENTS, ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

SYMBOL	PART NO.	DESCRIPTION
		---------- TRANSISTORS ----------
Q1 and Q2	19A700023P1	Silicon, NPN: sim to 2N3904.
Q3	19A115300P4	Silicon, NPN.
Q4	19A700023P1	Silicon, NPN: sim to 2N3904.
Q5	19A700022P1	Silicon, PNP: sim to 2N3906.
Q6 thru Q8	19A700023P1	Silicon, NPN: sim to 2N3904.
Q9	19A700022P1	Silicon, PNP: sim to 2N3906.
Q13	19A115768P1	Silicon, PNP: sim to 2N3702.
Q14	19A700023P1	Silicon, NPN: sim to 2N3904.
Q15	19A116774P1	Silicon, NPN; sim to Type 2N5210.
Q17	19A700023P1	Silicon, NPN: sim to 2N3904.
		---------- RESISTORS ----------
R1	19A700106P103	Composition: 47K ohms ± 5%, 1/4 w.
R2	3R152P913J	Composition: 91K ohms ± 5%, 1/4 w.
R3	19A700106P87	Composition: 10K ohms ± 5%, 1/4 w.
R4	19A700106P39	Composition: 100 ohms ± 5%, 1/4 w.
R5	19A700106P87	Composition: 10K ohms ± 5%, 1/4 w.
R6	3R152P202J	Composition: 2K ohms ± 5%, 1/4 w.
R7	3R152P511J	Composition: 510 ohms ± 5%, 1/4 w.
R8	3R152P133J	Composition: 13K ohms ±5%, 1/4 w.
R9	3R152P302J	Composition: 3K ohms ± 5%, 1/4 w.
R10	19A700106P63	Composition: 1K ohms ± 5%, 1/4 w.
R11	19A700106P71	Composition: 2.2K ohms ±5%, 1/4 w.
R12 and R13	19A700106P83	Composition: 6.8K ohms ± 5%, 1/4 w.
R14	19A700106P63	Composition: 1K ohms ± 5%, 1/4 w.
R15	3R152P433J	Composition: 43K ohms ±5%, 1/4 w.
R16	3R152P913J	Composition: 91K ohms ± 5%, 1/4 w.
R17	19A700106P87	Composition: 10K ohms ± 5%, 1/4 w.
R18	3R152P302J	Composition: 3K ohms ± 5%, 1/4 w.
R19	19A700106P71	Composition: 2.2K ohms ±5%, 1/4 w.
R20	19A700106P63	Composition: 1K ohms ± 5%, 1/4 w.
R27 and R28	3R152P202J	Composition: 2K ohms ± 5%, 1/4 w.
R29	3R152P303J	Composition: 30K ohms ± 5%, 1/4 w.
R30	19A700106P111	Composition: 100K ohms ± 5%, 1/4 w.
R31	19A700106P87	Composition: 10K ohms ± 5%, 1/4 w.
R32	19A700106P111	Composition: 100K ohms ± 5%, 1/4 w.
R33	19A700106P87	Composition: 10K ohms ± 5%, 1/4 w.
R34	19A700106P67	Composition: 1.5K ohms ± 5%, 1/4 w.
R35	3R152P202J	Composition: 2K ohms ± 5%, 1/4 w.
R36	19A700106P63	Composition: 1K ohms ± 5%, 1/4 w.
R38	3R152P203J	Composition: 20K ohms ± 5%, 1/4 w.
R40	3R152512J	Composition: 5.1K ohms ± 5%, 1/4 w. (Added for tone repeater applications. (Added by Rev. B).
R41	3R152P202J	Composition: 2K ohms ± 5%, 1/4 w.
R42	19A700106P71	Composition: 2.2K ohms ±5%, 1/4 w.
R43	19A700106P87	Composition: 10K ohms ± 5%, 1/4 w.

SYMBOL	PART NO.	DESCRIPTION
		---------- SWITCHES ---------
S1	19B209261P26	Slide: 2PTT, sim. to Switchcraft 46313LDH.
S2	19B209261P17	Slide: 2 PTT, sim. to Switchcraft 46313-TD4.
		---------- TEST POINTS ---------
TP1 thru TP6	19B211379P1	Spring (Test Point).
		-------- INTEGRATED CIRCUITS -------
U1 thru U3	19A700037P301	Digital: Quad 2-Input NAND gate; sim to 74LS00.
		--------- MISCELLANEOUS ---------
3	19A701332P4	Insulator, washer: nylon. (Used with Q3).
4	19B219690G1	Handle assembly.
6	19B219702P4	Panel
9	4032480P1	Nut, sheet spring: sim to Vector Electronic Co. No. 440.
20	19B201074P204	Tap screw, phillips POZIDRIV: No. 4-40 x 1/4.
24	N404P11B6	Lockwasher, internal tooth, No. 4. (Used in G6).
25	N80P9003B6	Machine screw, panhead: No. 4-40 x 3/16. (Used in G6).
26	7141225P2	Nut, Hex: 4-40. (Used in G6).

PRODUCTION CHANGES

Changes in the equipment to improve perforamnce or to simplify circuits are identified by a "Revision Letter," which is stamped after the model number of the unit. The revision stamped on the unit includes all previous revisions. Refer to the Parts List for descriptions of parts affected by these revisions.

REV. A - 19D416660G2
Incorporated into initial shipment.

REV. B - To prevent retransmission of function tone by remote/repeat stations. Added C18, R40 and R41.

REV. C - To increase the saturation of Q14. Changed R29.

REV. D - To prevent intermittent erroneous receiver selection. Deleted C15. Added C19, CR15 thru CR18, Q17, R42 and R43.

REV. E - Changed board to facilitate manufacturing.

REV. F - To enable use of board in 4-frequency control systems. Changed S1.

REV. G - Replaced DTL Integrated Circuits U1-U3 (19A115913P7) with LS-TTL ICs (19A700037P1).

REV. A - 19D416660G6
Replaced DTL Integrated Circuits U1-U3 (19A115913P7) with LS-TTl ICs (19A700037P1).

REV. B - To increase the reliability of the TX board by providing current limiting on the remote PTT key logic; moved R7 between U3-B Pin 6 and the base of Q3.

TRANSMITTER CONTROL BOARD
19D416660G3, G7

SYMBOL	PART NO.	DESCRIPTION
		----------CAPACITORS----------
C1	19C307114P1302G	Polystyrene: 13,000 pF ±2%, 100 VDCW, temp coef -120+30 PPM.
C2	19A116080P110	Polyester: 0.33 µF ±10%, 50 VDCW.
C3	19C307114P1402G	Polystyrene: 14,000 pF ±2%, 100 VDCW, temp coef -120+30 PPM.
C4	19A116080P110	Polyester: 0.33 µF ±10%, 50 VDCW.
C5	19C307114P1102G	Polystyrene: 11,000 pF ±2%, 100 VDCW, temp coef -120+30 PPM.
C6	19A116080P110	Polyester: 0.33 µF ±10%, 50 VDCW.
C7	19C307114P6801G	Polystyrene: 6800 pF ±2%, 100 VDCW, temp coef -120+30 PPM.
C8	5496267P19	Tantalum: 22 µF ± 20%, 35 VDCW; sim to Sprague Type 150D.
C9	19C307114P1002G	Polystyrene: 10,000 pF ±2%, 100 VDCW, temp coef -120+30 PPM.
C10 and C11	19C307114P6801G	Polystyrene: 6800 pF ±2%, 100 VDCW, temp coef -120+30 PPM.
C12	5496267P19	Tantalum: 22 µF ± 20%, 35 VDCW; sim to Sprague Type 150D.
C13	19C307114P1002G	Polystyrene: 10,000 pF ±2%, 100 VDCW, temp coef -120+30 PPM.
C14	19C307114P6801G	Polystyrene: 6800 pF ±2%, 100 VDCW, temp coef -120+30 PPM.
C16	5496267P2	Tantalum: 47 µF ± 20%, 6 VDCW; sim to Sprague Type 150D.
C17	19A700233P7	Ceramic: 1000 pF ± 20%, 50 VDCW.
C18	7491827P102	Ceramic: 0.01 µF -30 +80%, 50 VDCW, sim to Sprague 19C180.
C19	5496267P17	Tantalum: 1.0 µF ± 20%, 35 VDCW; sim to Sprague Type 150D.
		----------DIODES----------
CR1 thru CR4	19A115250P1	Silicon, fast recovery, 225 mA, 50 PIV.
CR6 thru CR8	19A115250P1	Silicon, fast recovery, 225 mA, 50 PIV.
CR9 thru CR11	162B3011P0002	Light Emitting Diode: Red; sim to GE 22L-2.
CR12	T324ADP1041	Silicon: Rectifier; sim to 1N4004.
CR13 thru CR17	19A115250P1	Silicon, fast recovery, 225 mA, 50 PIV.
CR19	19A115250P1	Silicon, fast recovery, 225 mA, 50 PIV.
		----------INDUCTORS----------
L1 thru L3	19B205354G6	Coil.
L4	19B205354G5	Coil.
L5	19B205354G4	Coil.
L6 and L7	19B205354G5	Coil.
L8	19B205354G4	Coil.
L9	19B205354G5	Coil.

*COMPONENTS, ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

SYMBOL	PART NO.	DESCRIPTION
		----------PLUGS----------
P9		Part of printed wire board.
		----------TRANSISTORS----------
Q1 and Q2	19A700023P1	Silicon, NPN: sim to 2N3904.
Q3	19A115300P4	Silicon, NPN.
Q4	19A700023P1	Silicon, NPN: sim to 2N3904.
Q5	19A700022P1	Silicon, PNP: sim to 2N3906.
Q6 thru Q8	19A700023P1	Silicon, NPN: sim to 2N3904.
Q9	19A700022P1	Silicon, PNP: sim to 2N3906.
Q10 thru Q12	19A700023P1	Silicon, NPN: sim to 2N3904.
Q13	19A115768P1	Silicon, PNP: sim to 2N3702.
Q14	19A700023P1	Silicon, NPN: sim to 2N3904.
Q15	19A116774P1	Silicon, NPN; sim to Type 2N5210.
Q16 and Q17	19A700023P1	Silicon, NPN: sim to 2N3904.
		----------RESISTORS----------
R1	19A700106P103	Composition: 47K ohms ± 5%, 1/4 w.
R2	3R152P913J	Composition: 91K ohms ± 5%, 1/4 w.
R3	19A700106P87	Composition: 10K ohms ± 5%, 1/4 w.
R4	19A700106P39	Composition: 100 ohms ± 5%, 1/4 w.
R5	19A700106P87	Composition: 10K ohms ± 5%, 1/4 w.
R6	3R152P202J	Composition: 2K ohms ± 5%, 1/4 w.
R7	3R152P511J	Composition: 510 ohms ± 5%, 1/4 w.
R8	3R152P133J	Composition: 13K ohms ±5%, 1/4 w.
R9	3R152P302J	Composition: 3K ohms ± 5%, 1/4 w.
R10	19A700106P63	Composition: 1K ohms ± 5%, 1/4 w.
R11	19A700106P71	Composition: 2.2K ohms ±5%, 1/4 w.
R12 and R13	19A700106P83	Composition: 6.8K ohms ± 5%, 1/4 w.
R14	19A700106P63	Composition: 1K ohms ± 5%, 1/4 w.
R15	3R152P433J	Composition: 43K ohms ±5%, 1/4 w.
R16	3R152P913J	Composition: 91K ohms ± 5%, 1/4 w.
R17	19A700106P87	Composition: 10K ohms ± 5%, 1/4 w.
R18	3R152P302J	Composition: 3K ohms ± 5%, 1/4 w.
R19	19A700106P71	Composition: 2.2K ohms ±5%, 1/4 w.
R20	19A700106P63	Composition: 1K ohms ± 5%, 1/4 w.
R21	3R152P513J	Composition: 5IK ohms ± 5%, 1/4 w. (Used in G3).
R22	3R152P913J	Composition: 91K ohms ± 5%, 1/4 w.
R23	19A700106P87	Composition: 10K ohms ± 5%, 1/4 w.
R24 and R25	3R152P133J	Composition: 13K ohms ±5%, 1/4 w.
R26	19A700106P63	Composition: 1K ohms ± 5%, 1/4 w.
R27 and R28	3R152P202J	Composition: 2K ohms ± 5%, 1/4 w.
R29	3R152P303J	Composition: 30K ohms ± 5%, 1/4 w.
R30	19A700106P111	Composition: 100K ohms ± 5%, 1/4 w.
R31	19A700106P87	Composition: 10K ohms ± 5%, 1/4 w.
R32	19A700106P111	Composition: 100K ohms ± 5%, 1/4 w.

SYMBOL	PART NO.	DESCRIPTION
R33	19A700106P87	Composition: 10K ohms ± 5%, 1/4 w.
R34	19A700106P67	Composition: 1.5K ohms ± 5%, 1/4 w.
R35	3R152P202J	Composition: 2K ohms ± 5%, 1/4 w.
R36	19A700106P63	Composition: 1K ohms ± 5%, 1/4 w.
R37 thru R39	3R152P203J	Composition: 20K ohms ± 5%, 1/4 w.
R40		Composition: 5.1K ohms ± 5%, 1/4 w. (Added for tone repeater applications. (Added by Rev. B).
R41	3R152P202J	Composition: 2K ohms ± 5%, 1/4 w.
R42	19A700106P71	Composition: 2.2K ohms ±5%, 1/4 w.
R43	19A700106P87	Composition: 10K ohms ± 5%, 1/4 w.
R44	3R152P623J	Composition: 62K ohms ± 5%, 1/4 w. (Used in G7).
		---------- SWITCHES ---------
S1	19B209261P26	Slide: 2PTT, sim. to Switchcraft 46313LDH.
S2	19B209261P17	Slide: 2 PTT, sim. to Switchcraft 46313-TD4.
		---------- TEST POINTS ---------
TP1 thru TP7	19B211379P1	Spring (Test Point).
		-------- INTEGRATED CIRCUITS -------
U1 thru U3	19A700037P301	Digital: Quad 2-Input NAND gate; sim to 74LS00.
		--------- MISCELLANEOUS ---------
	19A701332P4	Insulator, washer: nylon. (Used with Q3).
	19B219690G1	Handle assembly.
6	19B219702P4	Panel.
	4032480P1	Nut, sheet spring: sim to Vector Electronic Co. No. 440.
	19B201074P204	Tap screw, phillips POZIDRIV: No. 4-40 x 1/4.
	N404P11B6	Lockwasher, internal tooth, No. 4. (Used in G7).
	7141225P2	Nut, Hex: 4-40. (Used in G7).

PRODUCTION CHANGES

Changes in the equipment to improve perforamnce or to simplify circuits are identified by a "Revision Letter," which is stamped after the model number of the unit. The revision stamped on the unit includes all previous revisions. Refer to the Parts List for descriptions of parts affected by these revisions.

REV. A - 19D416660G3
Incorporated into initial shipment.

REV. B - To prevent retransmission of function tone by remote/repeat stations. Added C18, R40 and R41.

REV. C - To increase the saturation of Q14. Changed R29.

REV. D - To prevent intermittent erroneous receiver selection. Deleted C15. Added C19, CR15 thru CR18, Q17, R42 and R43.

REV. E - Board changed to accommodate EACOM Control Board..

REV. F - Changed board to facilitate manufacturing.

REV. G - To enable use of board in 4-frequency control systems. Changed S1.

REV. H - Replaced DTL Integrated Circuits U1 thru U3 (19A115913P7) with LS-TTL ICs (19A700037P1).

REV. A - 19D416660G7
To stop the transmitter F1 function from falsing the Channel Guard Disable function. Deleted R21 and added R44.

REV. B - Replaced DTL Integrated Circuits U1 thru U3 (19A115913P7) with LS-TTL, ICs (19A700037P1).

REV. C - To increase the reliability of the TX board by providing current limiting on the remote PTT key logic; moved R7 between U3-8 Pin 6 and the base ob Q3.

TRANSMITTER CONTROL BOARD
19D416660G4, G8

SYMBOL	PART NO.	DESCRIPTION
		---------- CAPACITORS ---------
C1	19C307114P1302G	Polystyrene: 13,000 pF ±2%, 100 VDCW, temp coef -120+30 PPM.
C2	19A116080P110	Polyester: 0.33 µF ±10%, 50 VDCW.
C5	19C307114P1102G	Polystyrene: 11,000 pF ±2%, 100 VDCW, temp coef -120+30 PPM.
C6	19A116080P110	Polyester: 0.33 µF ±10%, 50 VDCW.
C7	19C307114P6801G	Polystyrene: 6800 pF ±2%, 100 VDCW, temp coef -120+30 PPM.
C8	5496267P19	Tantalum: 22 µF ± 20%, 35 VDCW; sim to Sprague Type 150D.
C9	19C307114P1002G	Polystyrene: 10,000 pF ±2%, 100 VDCW, temp coef -120+30 PPM.
C10 and C11	19C307114P6801G	Polystyrene: 6800 pF ±2%, 100 VDCW, temp coef -120+30 PPM.
C12	5496267P19	Tantalum: 22 µF ± 20%, 35 VDCW; sim to Sprague Type 150D.
C13	19C307114P1002G	Polystyrene: 10,000 pF ±2%, 100 VDCW, temp coef -120+30 PPM.
C14	19C307114P6801G	Polystyrene: 6800 pF ±2%, 100 VDCW, temp coef -120+30 PPM.
C16	5496267P2	Tantalum: 47 µF ± 20%, 6 VDCW; sim to Sprague Type 150D.
C17	19A700233P7	Ceramic: 1000 pF ± 20%, 50 VDCW.
C18	7491827P102	Ceramic: 0.01 µF -30 +80%, 50 VDCW, sim to Sprague 19C180.
		---------- DIODES ----------
CR1	19A115250P1	Silicon, fast recovery, 225 mA, 50 PIV.
CR4	19A115250P1	Silicon, fast recovery, 225 mA, 50 PIV.
CR7	19A115250P1	Silicon, fast recovery, 225 mA, 50 PIV.
CR10 and CR11	162B3011P0002	Light Emitting Diode: Red; sim to GE 22L-2.
CR12	T324ADP1041	Silicon: Rectifier; sim to 1N4004.
CR13 and CR14	19A115250P1	Silicon, fast recovery, 225 mA, 50 PIV.
		---------- INDUCTORS ----------
L1	19B205354G6	Coil.
L3	19B205354G6	Coil.
L4	19B205354G5	Coil.
L5	19B205354G4	Coil.
L6 and L7	19B205354G5	Coil.
L8	19B205354G4	Coil.
L9	19B205354G5	Coil.
		---------- PLUGS ----------
P9		Part of printed wire board.
		---------- TRANSISTORS ---------
Q1 and Q2	19A700023P1	Silicon, NPN: sim to 2N3904.
Q3	19A115300P4	Silicon, NPN.
Q10 thru Q12	19A700023P1	Silicon, NPN: sim to 2N3904.
Q13	19A115768P1	Silicon, PNP: sim to 2N3702.
Q14	19A700023P1	Silicon, NPN: sim to 2N3904.
Q15	19A116774P1	Silicon, NPN; sim to Type 2N5210.
Q16	19A700023P1	Silicon, NPN: sim to 2N3904.
		---------- RESISTORS ----------
R1	19A700106P103	Composition: 47K ohms ± 5%, 1/4 w.
R2	3R152P913J	Composition: 91K ohms ± 5%, 1/4 w.
R3	19A700106P87	Composition: 10K ohms ± 5%, 1/4 w.
R4	19A700106P39	Composition: 100 ohms ± 5%, 1/4 w.
R5	19A700106P87	Composition: 10K ohms ± 5%, 1/4 w.
R6	3R152P202J	Composition: 2K ohms ± 5%, 1/4 w.
R7	3R152P511J	Composition: 510 ohms ± 5%, 1/4 w.
R21	3R152P513J	Composition: 5IK ohms ± 5%, 1/4 w. (Used in G4 and G4).
R22	3R152P913J	Composition: 91K ohms ± 5%, 1/4 w.
R23	19A700106P87	Composition: 10K ohms ± 5%, 1/4 w.
R24 and R25	3R152P133J	Composition: 13K ohms ±5%, 1/4 w.
R26	19A700106P63	Composition: 1K ohms ± 5%, 1/4 w.
R27 and R28	3R152P202J	Composition: 2K ohms ± 5%, 1/4 w.
R29	3R152P303J	Composition: 30K ohms ± 5%, 1/4 w.
R30	19A700106P111	Composition: 100K ohms ± 5%, 1/4 w.
R31	19A700106P87	Composition: 10K ohms ± 5%, 1/4 w.
R32	19A700106P111	Composition: 100K ohms ± 5%, 1/4 w.
R33	19A700106P87	Composition: 10K ohms ± 5%, 1/4 w.
R34	19A700106P67	Composition: 1.5K ohms ± 5%, 1/4 w.
R35	3R152P202J	Composition: 2K ohms ± 5%, 1/4 w.
R36	19A700106P63	Composition: 1K ohms ± 5%, 1/4 w.
R37 thru R39	3R152P203J	Composition: 20K ohms ± 5%, 1/4 w.
R40	3R152P512J	Composition: 5.1K ohms ± 5%, 1/4 w. (Added for tone repeater applications. (Added by Rev. B).
R41	3R152P202J	Composition: 2K ohms ± 5%, 1/4 w.
R44	3R152P623J	Composition: 62K ohms ± 5%, 1/4 w. (Used in G8 and G8).
		---------- SWITCHES ---------
S2	19B209261P17	Slide: 2 PTT, sim. to Switchcraft 46313-TD4.
		---------- TEST POINTS ---------
TP1 thru TP3	19B211379P1	Spring (Test Point).
TP5	19B211379P1	Spring (Test Point).
TP7	19B211379P1	Spring (Test Point).
		-------- INTEGRATED CIRCUITS -------
U1	19A700037P301	Digital: Quad 2-Input NAND gate; sim to 74LS00.
U3	19A700037P301	Digital: Quad 2-Input NAND gate; sim to 74LS00.

*COMPONENTS, ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

SYMBOL	PART NO.	DESCRIPTION
		--------- MISCELLANEOUS ---------
3	19A701332P4	Insulator, washer: nylon. (Used with Q3).
4	19B219690G1	Handle assembly.
5	19B219702P2	Panel.
9	4032480P1	Nut, sheet spring: sim to Vector Electronic Co. No. 440.
20	19B201074P204	Tap screw, phillips POZIDRIV: No. 4-40 x 1/4.
24	N404P11B6	Lockwasher, internal tooth, No. 4. (Used in G4 and G8).
25	N80P9003B6	Machine screw, panhead: No. 4-40 x 3/16. (Used in G4 and G8).
26	7141225P2	Nut, Hex: 4-40. (Used in G4 and G8).

PRODUCTION CHANGES

Changes in the equipment to improve perforamnce or to simplify circuits are identified by a "Revision Letter," which is stamped after the model number of the unit. The revision stamped on the unit includes all previous revisions. Refer to the Parts List for descriptions of parts affected by these revisions.

REV. A -19D416660G4
Incorporated into initial shipment.

REV. B - To prevent retransmission of function tone by remote/repeat stations. Added C18, R40 and R41.

REV. C - To increase the saturation of Q14. Changed R29.

REV. D - Board changed to accommodate to EACOM Control Board.

REV. E - Changed board to facilitate manufacturing.

REV. F - Replaced DTL Integrated Circuits U1 and U3 (19A115913P7) with LS-TTL ICs (19A700037P1).

REV. A - 19D416660G6
To stop the transmitter F1 function from falsing the Channel Guard Disable function. Deleted R21 and added R44.

REV. B - Replaced DTL Integrated Circuits U1 and U3 (19A115913P7) with LS-TTL ICs (19A700037Pl).

REV. C - To increase the reliability of the TX board by providing current limiting on the remote PTT key logic; moved R7 between U3-8 Pin 6 and the base of Q3.

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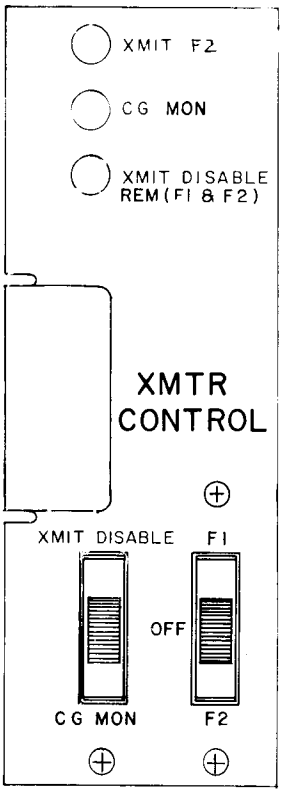
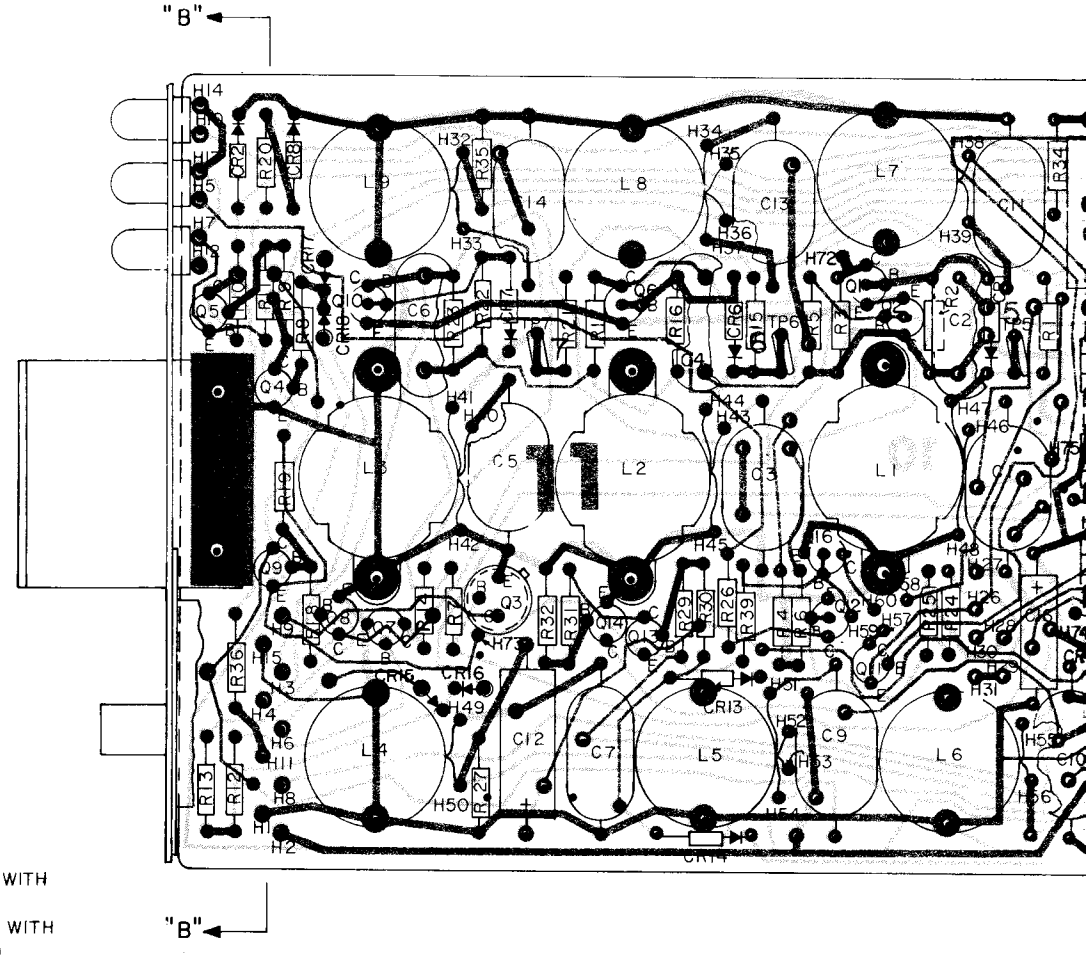
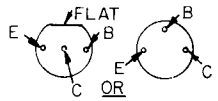


FRONT PANEL: 19B219702P4 (USED WITH 19D416660G2 & G3)
19B219702P2 (USED WITH 19D416660G1 & G4)
HANDLE: 19B219690G1

FRONT PANEL SUPPLIED WITHOUT ELECTRICAL COMPONENTS OR LABELS

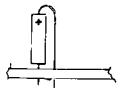


LEAD IDENTIFICATION FOR Q13



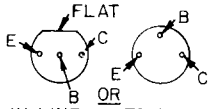
IN-LINE TRIANGULAR
VIEW FROM LEAD END

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



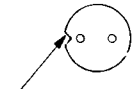
MTG FOR C19

LEAD IDENTIFICATION FOR Q1-Q6, Q8-Q10, Q15-Q17

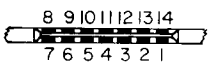


IN-LINE TRIANGULAR
VIEW FROM LEAD FND

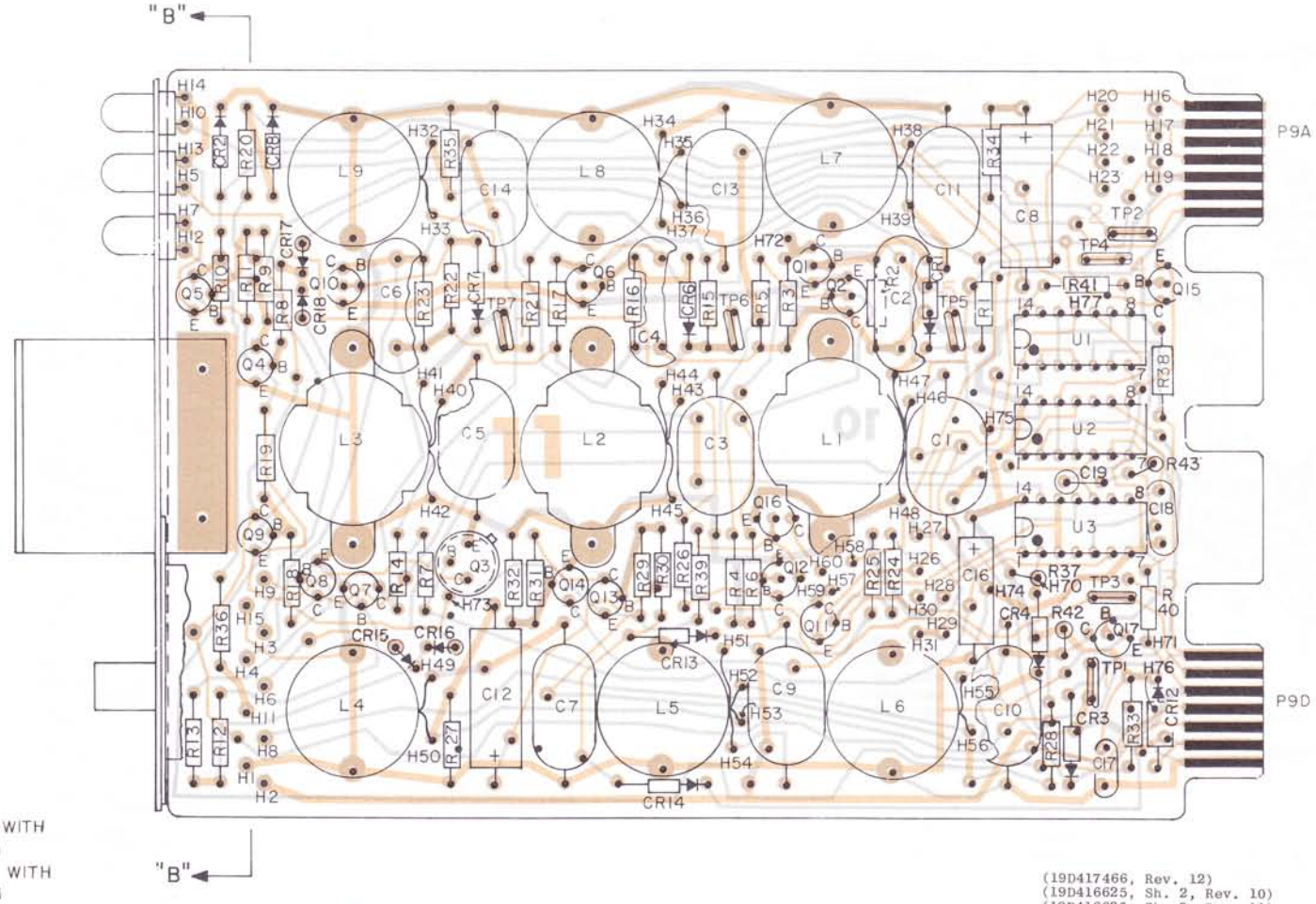
LEAD IDENTIFICATION FOR CR9 - CR11



NOTCH OR FLAT IN FLANGE TO DENOTE CATHODE (NEG.) LEAD.



TYP. NUMBERING OF CONT. FINGERS

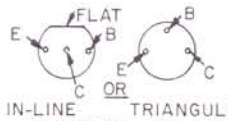


(19D417466, Rev. 12)
(19D416625, Sh. 2, Rev. 10)
(19D416625, Sh. 3. Rev. 11)

USED WITH
8 G3)
USED WITH
8 G4)

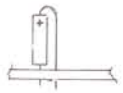
HOUT
LABELS

LEAD IDENTIFICATION
FOR Q13



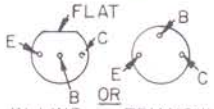
IN-LINE TRIANGULAR
VIEW FROM LEAD END

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



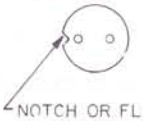
MTG FOR
C19

LEAD IDENTIFICATION
FOR Q1-Q6, Q8-Q10, Q15-Q17

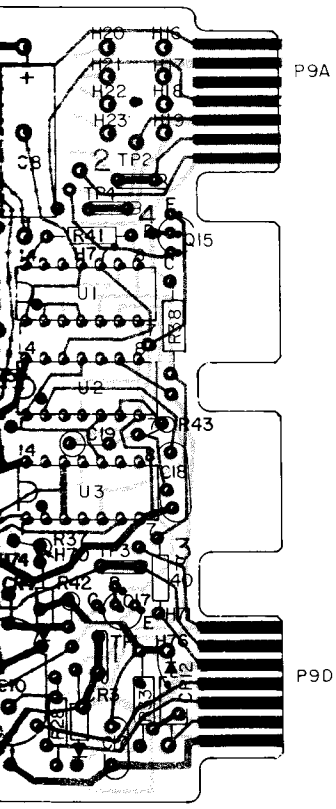


IN-LINE TRIANGULAR
VIEW FROM LEAD END

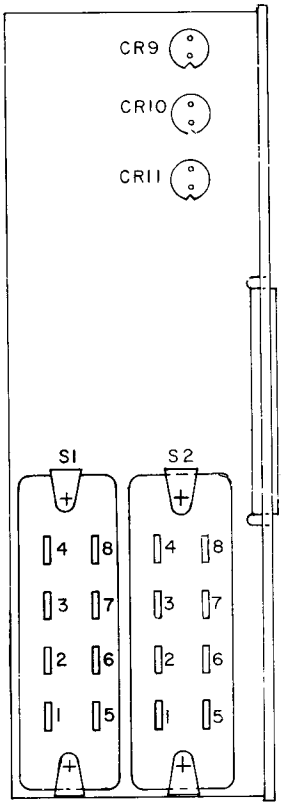
LEAD IDENTIFICATION
FOR CR9-CR11



NOTCH OR FLAT IN FLANGE TO DENOTE CATHODE (NEG.) LEAD.

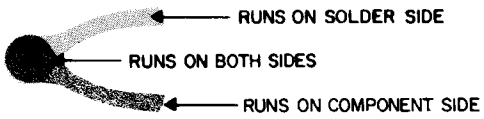


(19D417466, Rev. 12)
(19D416625, Sh. 2, Rev. 10)
(19D416625, Sh. 3. Rev. 11)

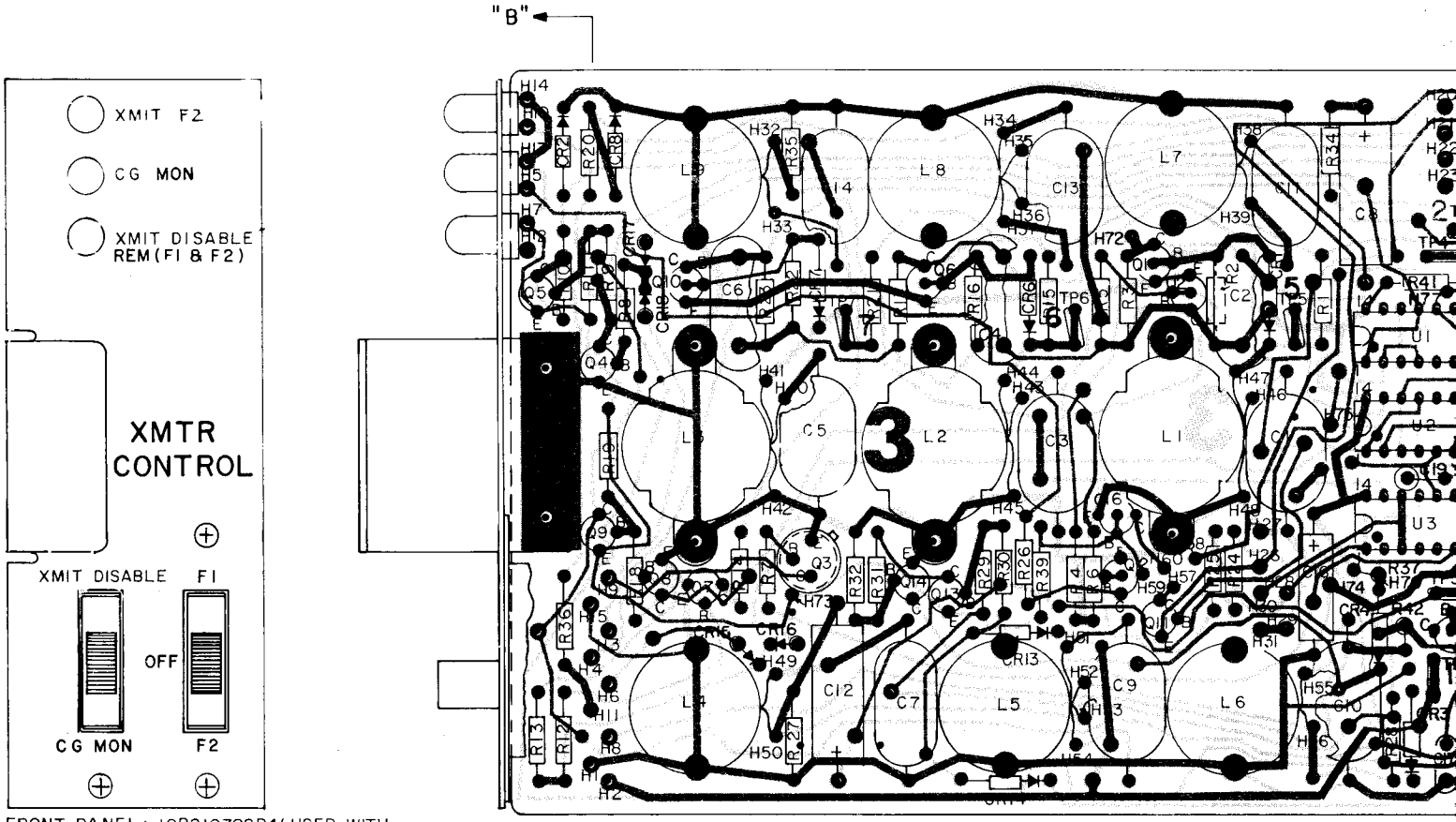


SECTION "B-B"

REFER TO WIRING DIAGRAM FOR THE FOLLOWING CONNECTIONS:					
FROM	TO	GP. 1	GP. 2	GP. 3	GP. 4
H17	H21		X	X	
H19	H23		X	X	
H26	H27			X	X
H58	H60			X	X
H30	H31			X	X
L1-Y	H46	X	X	X	X
L1-GY OR R	H47	X	X	X	X
L1-BK	H48	X	X	X	X
L2-Y	H43		X	X	
L2-GY OR R	H44		X	X	
L2-BK	H45		X	X	
L3-Y	H40			X	X
L3-GY OR R	H41			X	X
L3-BK	H42			X	X
L4-BK	H49	X	X	X	X
L4-Y	H50	X	X	X	X
L5-BK	H51	X	X	X	X
L5-NO COLOR	H52	X	X	X	X
L5-GY OR R	H53	X	X	X	X
L5-Y	H54	X	X	X	X
L6-BK	H55	X	X	X	X
L6-Y	H56	X	X	X	X
L7-Y	H38	X	X	X	X
L7-BK	H39	X	X	X	X
L8-Y	H34	X	X	X	X
L8-GY OR R	H35	X	X	X	X
L8-NO COLOR	H36	X	X	X	X
L8-BK	H37	X	X	X	X
L9-Y	H32	X	X	X	X
L9-BK	H33	X	X	X	X
CR9-ANODE	H14		X	X	
CR9-CATHODE	H10		X	X	
CR10-ANODE	H13			X	X
CR10-CATHODE	H5			X	X
CR11-ANODE	H7	X	X	X	X
CR11-CATHODE	H12	X	X	X	X
S1-4	H3		X	X	
S1-2	H8		X	X	
S1-1	H6		X	X	
S2-1	H4			X	X
S2-2	S2-3			X	X
S2-3	H15	X	X	X	X
S2-4	H11	X	X	X	X
S2-5	S2-7	X	X	X	X
S2-5	H9	X	X	X	X
S2-6	H2	X	X	X	X
H57	H59			X	X
S1-2	S1-3		X	X	
H77	H76	GP5	GP6	GP7	GP8



TRANSMITTER CONTROL BOARDS
19D416660G1-G4

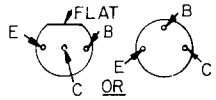


FRONT PANEL: 19B219702P4 (USED WITH 19D416660G2 & G3)
19B219702P2 (USED WITH 19D416660G1 & G4)
HANDLE: 19B219690G1

FRONT PANEL SUPPLIED WITHOUT ELECTRICAL COMPONENTS OR LABELS

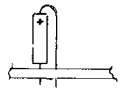
(19D41746
(19D42973
(19D42973

LEAD IDENTIFICATION FOR Q13



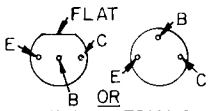
IN-LINE TRIANGULAR
VIEW FROM LEAD END

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



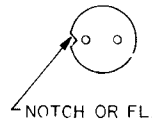
MTG FOR C19

LEAD IDENTIFICATION FOR Q1-Q6, Q8-Q10, Q15-Q17

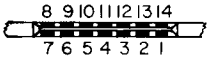


IN-LINE TRIANGULAR
VIEW FROM LEAD END

LEAD IDENTIFICATION FOR CR9 - CR11



NOTCH OR FLAT IN FLANGE TO DENOTE CATHODE (NEG.) LEAD.

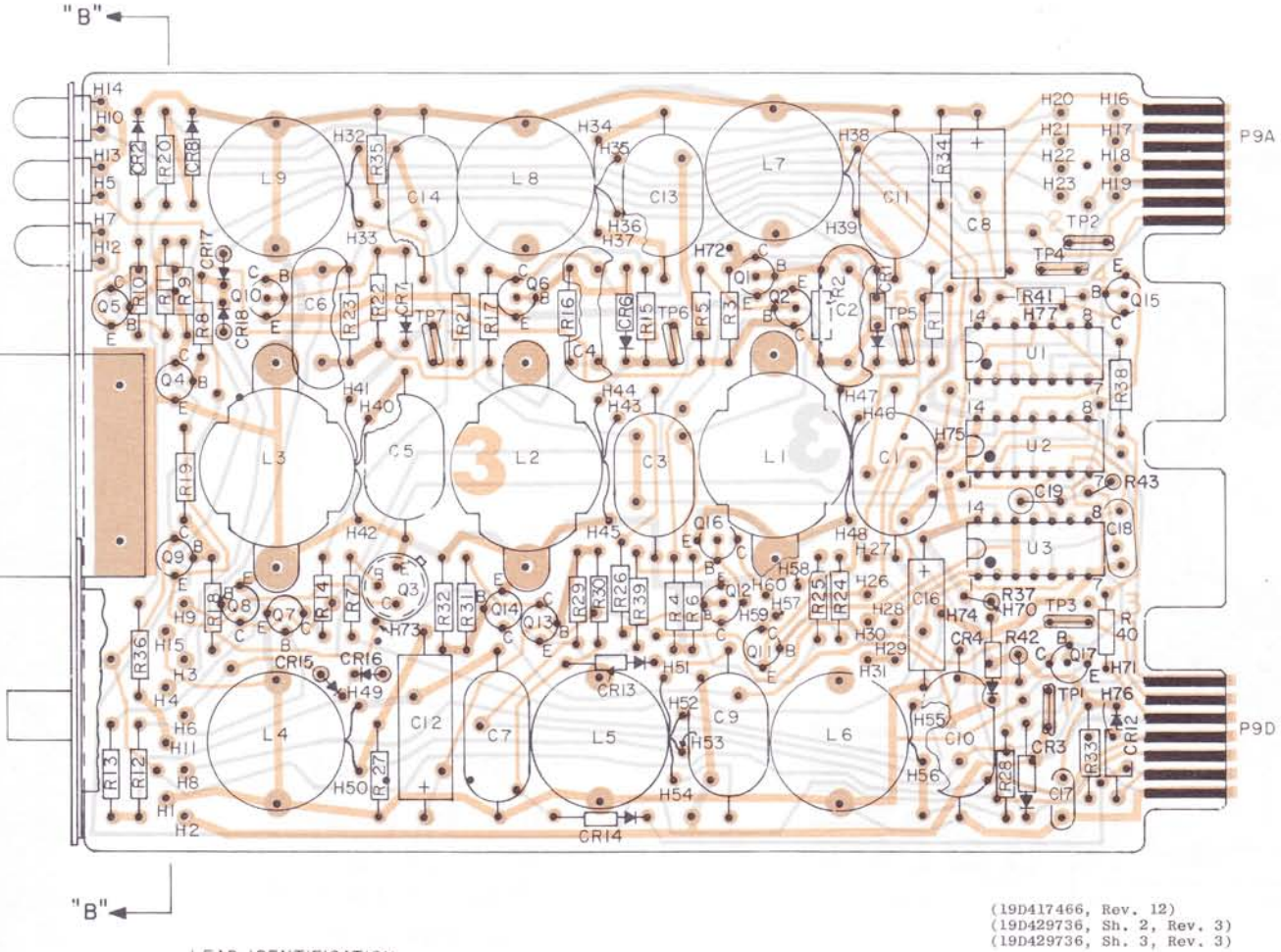


TYP. NUMBERING OF CONT. FINGERS

TRANSMITTER CONTROL BOARDS

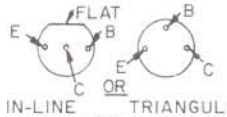
19D416660G5-G8

OUTLINE DIAGRAM

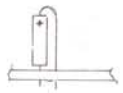


(19D417466, Rev. 12)
(19D429736, Sh. 2, Rev. 3)
(19D429736, Sh. 3, Rev. 3)

LEAD IDENTIFICATION
FOR Q13

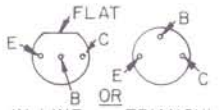


NOTE: LEAD ARRANGEMENT, AND NOT CASE SHAPE IS DETERMINING FACTOR FOR LEAD IDENTIFICATION.



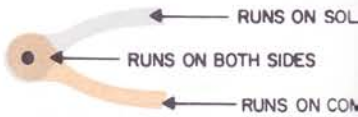
MTG FOR
C19

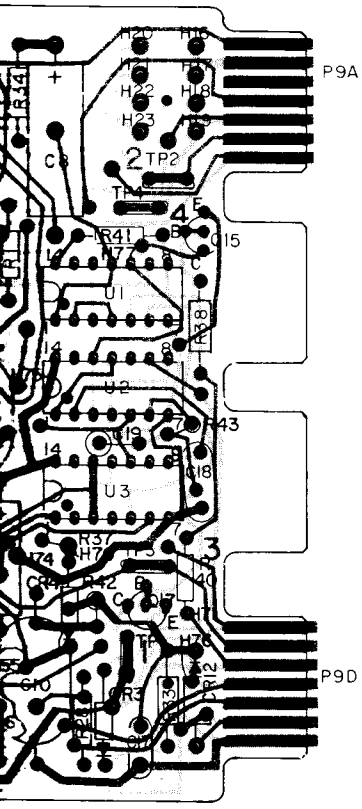
LEAD IDENTIFICATION
FOR Q1-Q6, Q8-Q10, Q15-Q17



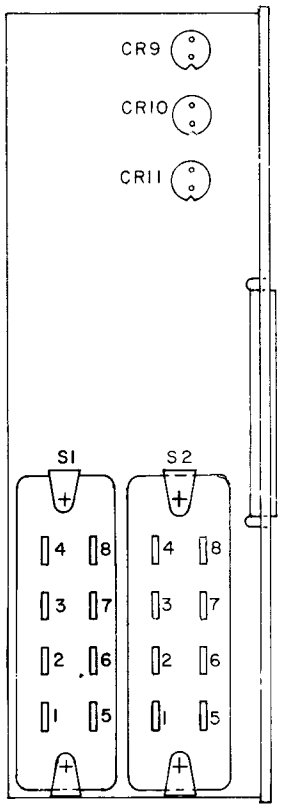
LEAD IDENTIFICATION
FOR CR9 - CR11

NOTCH OR FLAT IN FLANGE TO DENOTE CATHODE (NEG.) LEAD.



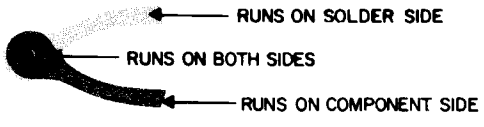


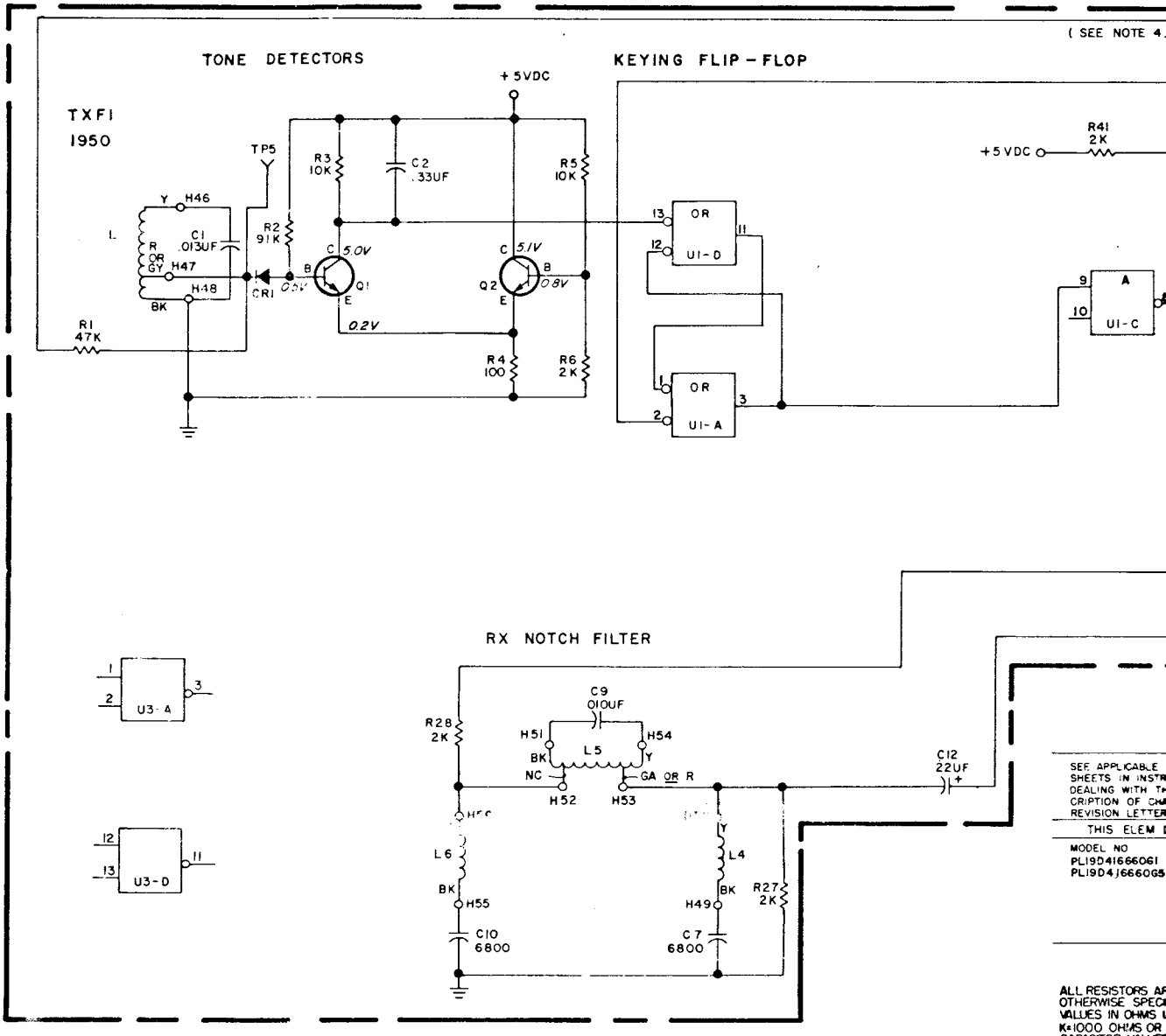
(19D417466, Rev. 12)
(19D429736, Sh. 2, Rev. 3)
(19D429736, Sh. 3, Rev. 3)

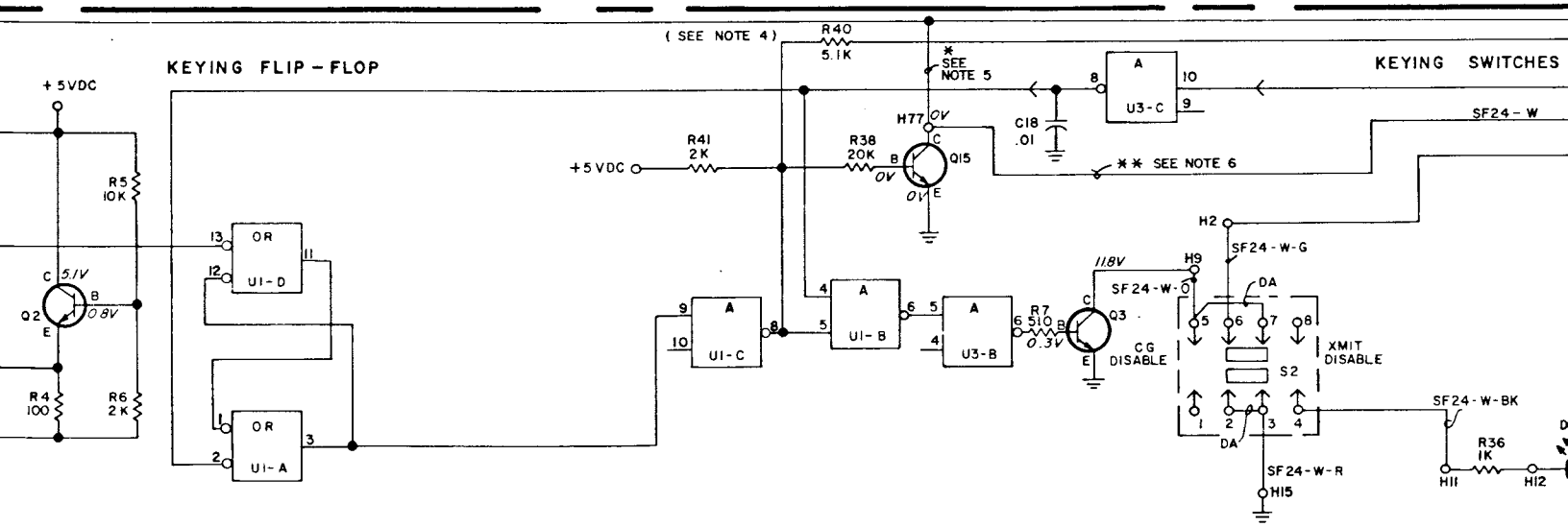


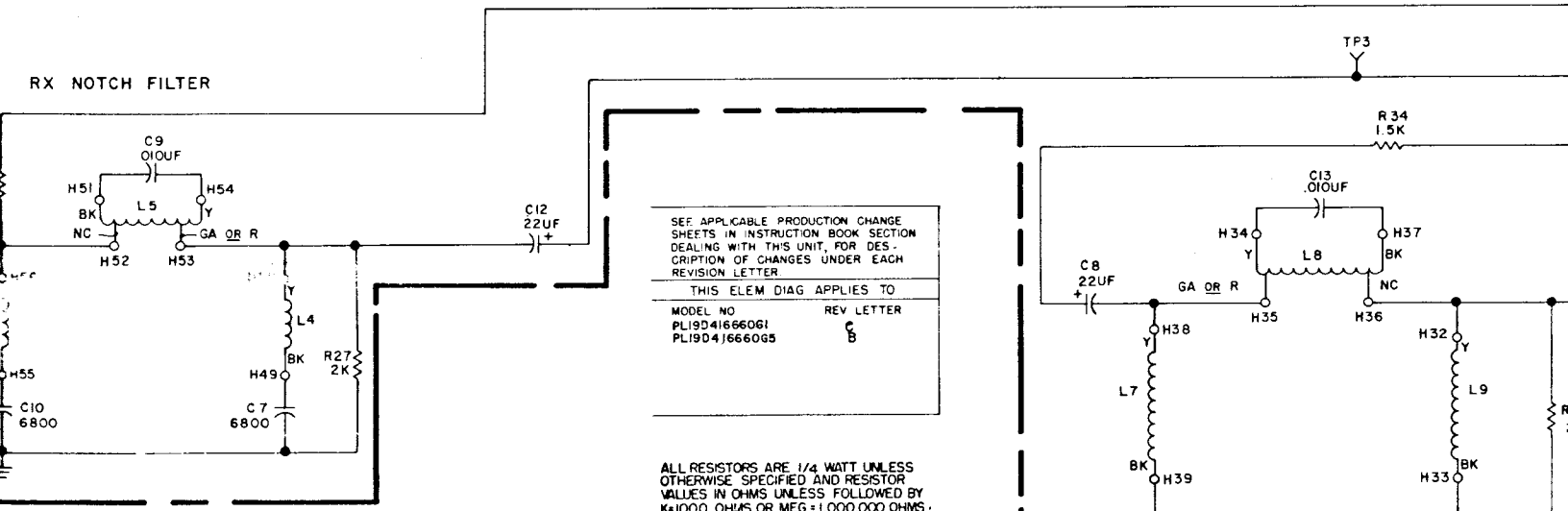
SECTION "B-B"

REFER TO WIRING DIAGRAM FOR THE FOLLOWING CONNECTIONS:					
FROM	TO	GP. 1	GP. 2	GP. 3	GP. 4
H17	H21		X	X	
H19	H23		X	X	
H26	H27			X	X
H58	H60			X	X
H30	H31			X	X
L1-Y	H46	X	X	X	X
L1-GY OR R	H47	X	X	X	X
L1-BK	H48	X	X	X	X
L2-Y	H43		X	X	
L2-GY OR R	H44		X	X	
L2-BK	H45		X	X	
L3-Y	H40			X	X
L3-GY OR R	H41			X	X
L3-BK	H42			X	X
L4-BK	H49	X	X	X	X
L4-Y	H50	X	X	X	X
L5-BK	H51	X	X	X	X
L5-NO COLOR	H52	X	X	X	X
L5-GY OR R	H53	X	X	X	X
L5-Y	H54	X	X	X	X
L6-BK	H55	X	X	X	X
L6-Y	H56	X	X	X	X
L7-Y	H38	X	X	X	X
L7-BK	H39	X	X	X	X
L8-Y	H34	X	X	X	X
L8-GY OR R	H35	X	X	X	X
L8-NO COLOR	H36	X	X	X	X
L8-BK	H37	X	X	X	X
L9-Y	H32	X	X	X	X
L9-BK	H33	X	X	X	X
CR9-ANODE	H14		X	X	
CR9-CATHODE	H10		X	X	
CR10-ANODE	H13			X	X
CR10-CATHODE	H5			X	X
CR11-ANODE	H7	X	X	X	X
CR11-CATHODE	H12	X	X	X	X
S1-4	H3		X	X	
S1-2	H8		X	X	
S1-1	H6		X	X	
S2-1	H4			X	X
S2-2	S2-3			X	X
S2-3	H15	X	X	X	X
S2-4	H11	X	X	X	X
S2-5	S2-7	X	X	X	X
S2-5	H9	X	X	X	X
S2-6	H2	X	X	X	X
H57	H59			X	X
S1-2	S1-3		X	X	
H77	H76	GP5	GP6	GP7	GP8




(SEE NOTE 4.
TONE DETECTORS
KEYING FLIP - FLOP
+5VDC
TXFI
1950
TP5
R3
10K
C2
.33UF
R5
10K
Y H46
L
R OR GY H47
BK H48
C1
.013UF
R2
91K
CR1
C 5.0V
B
Q1
E
0.2V
C 5.1V
Q2
E
0.8V
R1
47K
R4
100
R6
2K
13 OR
12 U1-D
11
1 OR
2 U1-A
3
R41
2K
+5VDC
9 A
10 U1-C
RX NOTCH FILTER
1
2 U3-A
3
12
13 U3-D
11
C9
.010UF
R28
2K
H51
BK
L5
Y
H54
NC
GA OR R
H52
H53
C12
22UF
+
L6
BK
H55
C10
6800
Y
L4
BK
H49
C7
6800
R27
2K
SEE APPLICABLE
SHEETS IN INSTR
DEALING WITH T
CRIPTION OF CH
REVISION LETTER
THIS ELEM
MODEL NO
PL19D41666061
PL19D4J666065
ALL RESISTORS AR
OTHERWISE SPECI
VALUES IN OHMS
K=1000 OHMS OR
CAPACITOR VALUES
TO MICROMICROFA
BY UF= MICROFARA
IN MICROHENRYS
MH= MILLIHENRYS
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 PIN 7 OF ALL IC'S ARE
PIN 14 OF ALL IC'S ARE
2 JUMPERS SHOWN ON DI
PRO 72 OPERATION.
3 ALL VOLTAGE READINGS
SECUR-IT TONE UNDE
4 R40 USED ONLY IN TON





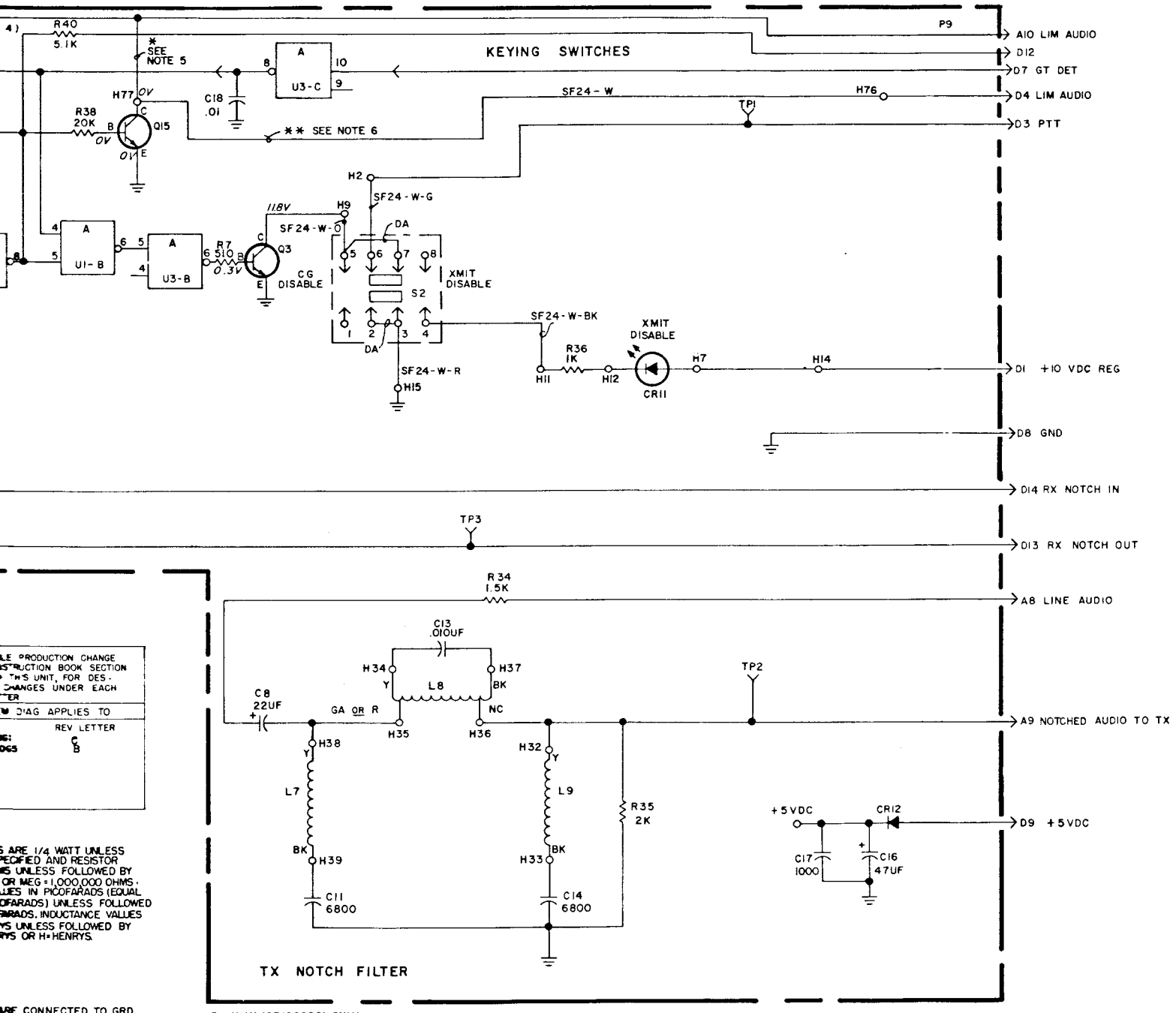
SEE APPLICABLE PRODUCTION CHANGE SHEETS IN INSTRUCTION BOOK SECTION DEALING WITH THIS UNIT, FOR DESCRIPTION OF CHANGES UNDER EACH REVISION LETTER.

THIS ELEM DIAG APPLIES TO	
MODEL NO	REV LETTER
PLI9D4166606I	C
PLI9D4166606S	B

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. PIN 7 OF ALL IC'S ARE CONNECTED TO GRD. PIN 14 OF ALL IC'S ARE CONNECTED TO +5VDC.
2. JUMPERS SHOWN ON DIAGRAM FOR MASTR PRO 72 OPERATION.
3. ALL VOLTAGE READINGS MEASURED WITH SECUR-IT TONE UNDETECTED.
4. R40 USED ONLY IN TONE REMOTE/REPEAT OPERATION.
5. * IN I9D16660GI ONLY.
6. ** IN I9D4166606S ONLY.

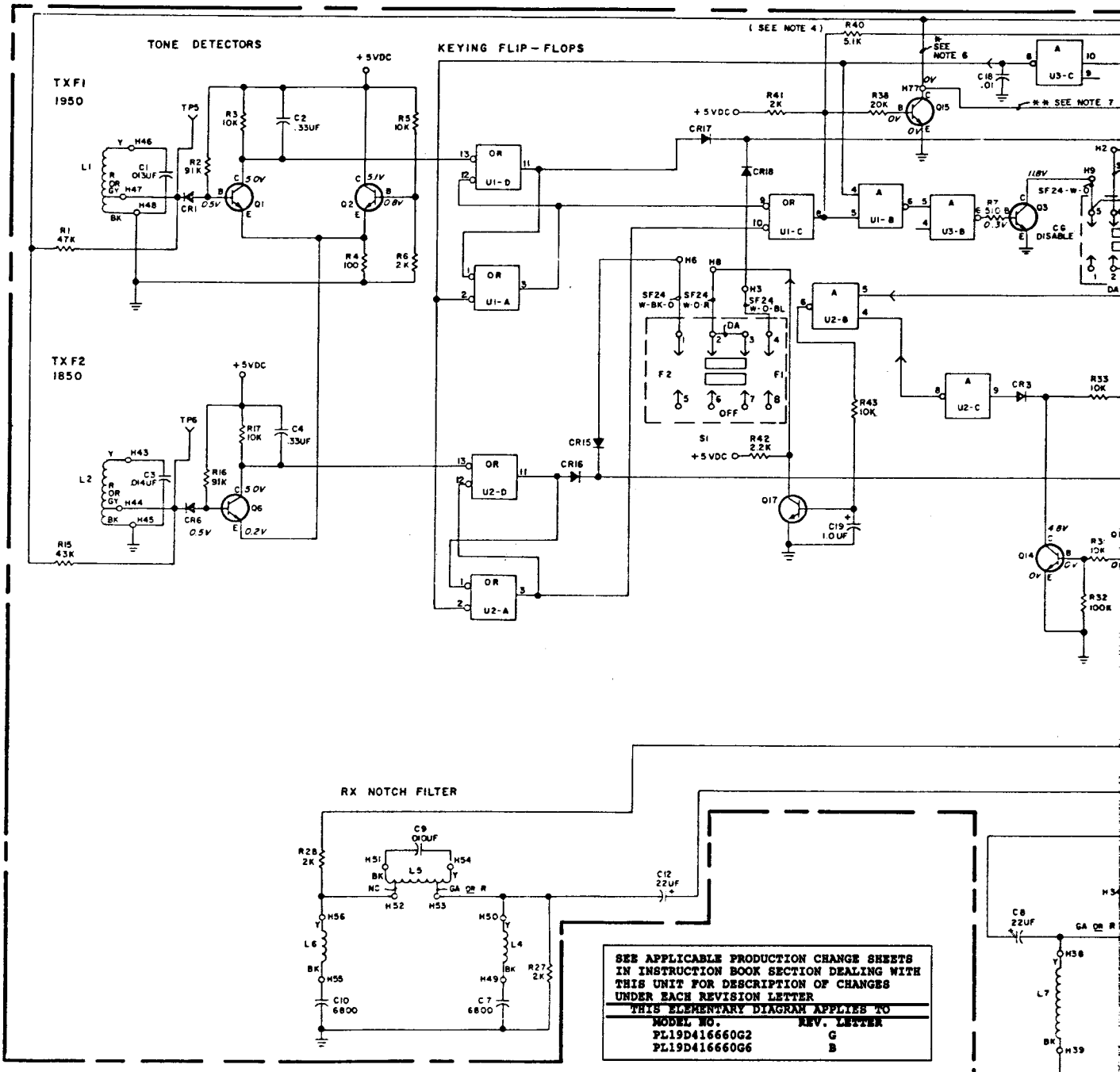


5. * IN 19D416660G1 ONLY.
6. ** IN 19D416660G5 ONLY.

TRANSMITTER CONTROL BOARDS

19D416660G1 & G5

(19R621870, Rev. 8)



SEE APPLICABLE PRODUCTION CHANGE SHEETS IN INSTRUCTION BOOK SECTION DEALING WITH THIS UNIT FOR DESCRIPTION OF CHANGES UNDER EACH REVISION LETTER

THIS ELEMENTARY DIAGRAM APPLIES TO	
MODEL NO.	REV. LETTER
PL19D416660G2	G
PL19D416660G6	B

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.

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

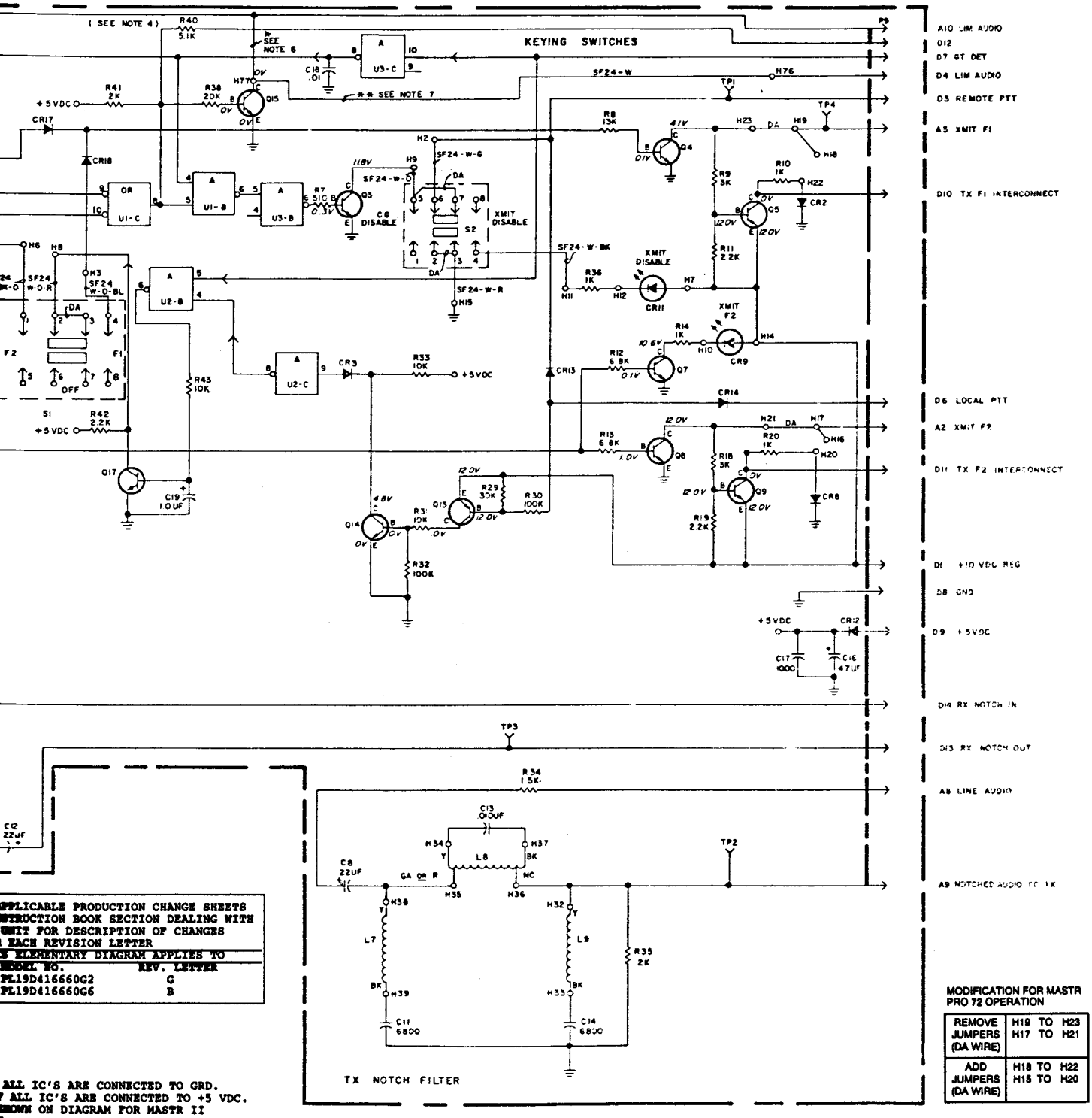
NOTES

1. PIN 7 OF ALL IC'S ARE CONNECTED TO GRD. PIN 14 OF ALL IC'S ARE CONNECTED TO +5 VDC.
2. JUMPERS SHOWN ON DIAGRAM FOR MASTR II OPERATION.
3. ALL VOLTAGE READINGS MEASURED WITH SECUR-IT TONE UNDETECTED.
4. R40 USED ONLY IN TONE REMOTE/REPEAT OPERATION.
5. CR14 USED ONLY IN MASTR II OPERATION.
6. * IN 19D416660G2 ONLY.
7. ** IN 19D416660G6 ONLY.

TRANSMITTER CONTROL BOARDS

19D416660G2 & G6

(19E501107, Rev. 13)

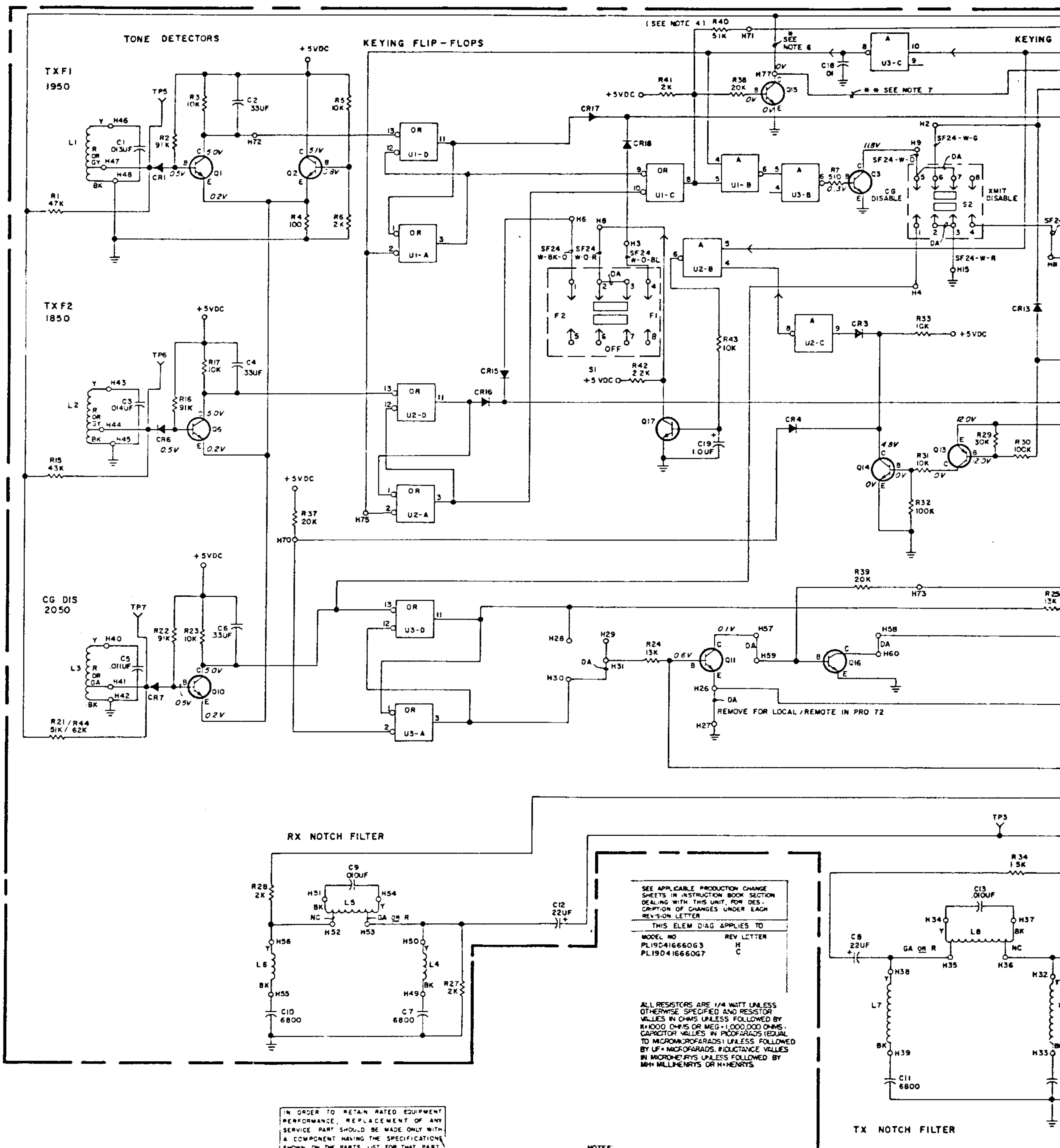


PPLICABLE PRODUCTION CHANGE SHEETS NSTRUCTION BOOK SECTION DEALING WITH UNIT FOR DESCRIPTION OF CHANGES EACH REVISION LETTER	
S ELEMENTARY DIAGRAM APPLIES TO	
MODEL NO.	REV. LETTER
PL19D416660G2	G
PL19D416660G6	B

ALL IC'S ARE CONNECTED TO GRD.
ALL IC'S ARE CONNECTED TO +5 VDC.
SHOWN ON DIAGRAM FOR MASTR II
.
AGE READINGS MEASURED WITH SECUR-IT
NECTED.
ONLY IN TONE REMOTE/REPEAT OPERATION.
ONLY IN MASTR II OPERATION.
416660G2 ONLY.
M416660G6 ONLY.

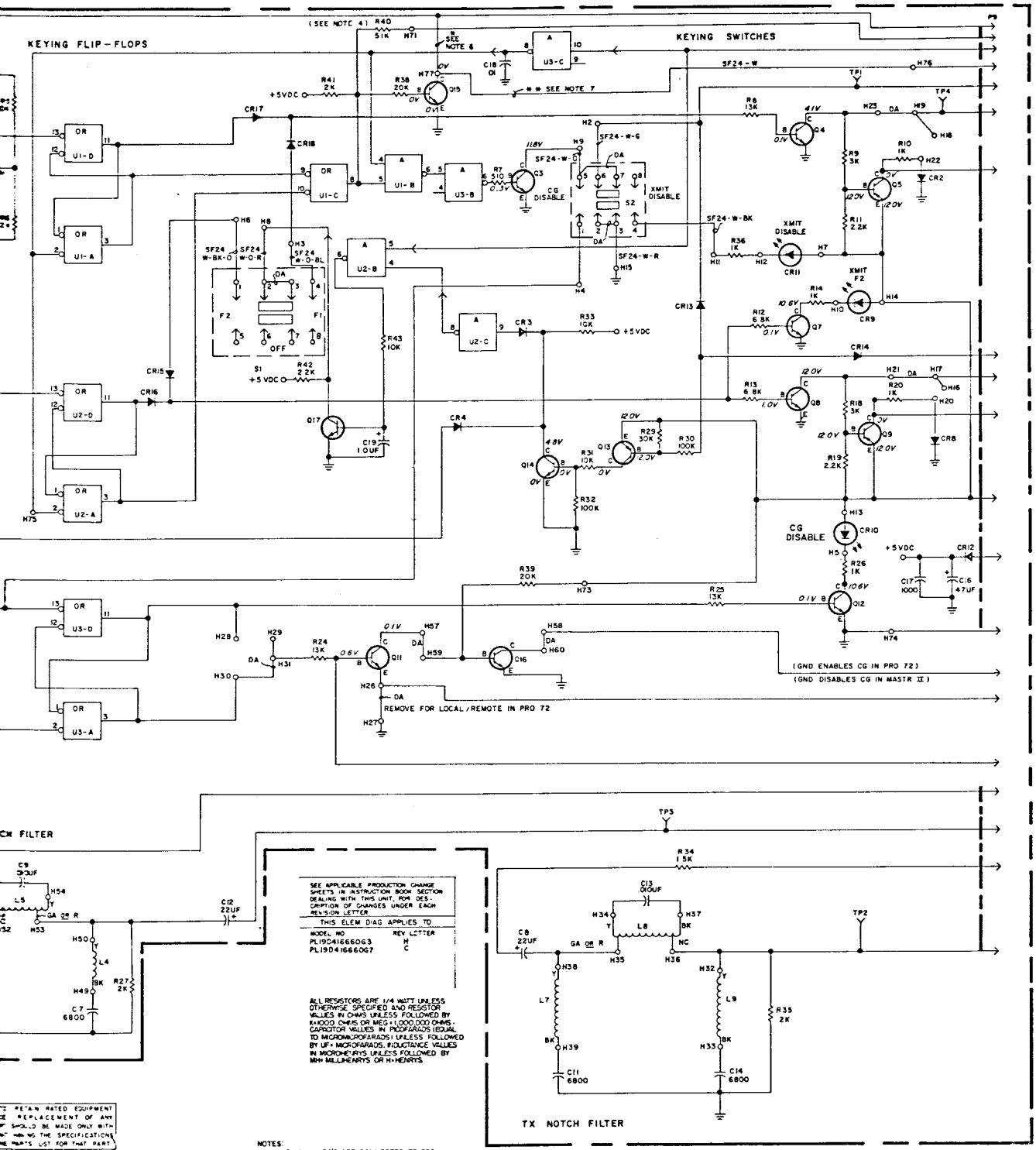
MODIFICATION FOR MASTR PRO 72 OPERATION

REMOVE JUMPERS (DA WIRE)	H19 TO H23 H17 TO H21
ADD JUMPERS (DA WIRE)	H18 TO H22 H15 TO H20



NOTES:

1. PIN 7 OF ALL IC'S ARE CONNECTED TO GRD. PIN 14 OF ALL IC'S ARE CONNECTED TO +5VDC.
2. JUMPERS SHOWN ON DIAGRAM FOR MASTR II OPERATION
3. ALL VOLTAGE READINGS MEASURED WITH SECUR-IT TONE UNDETECTED
4. R40 USED ONLY IN TONE REMOTE/REPEAT OPERATION.
5. CR14 USED ONLY IN MASTR II OPERATION.
6. * IN 19D416660G3 ONLY.
7. ** IN 19D416660G7 ONLY.



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
PLI9D416660G3	H
PLI9D416660G7	C

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.

MODIFICATION FOR MASTR PRO 72 OPERATION:

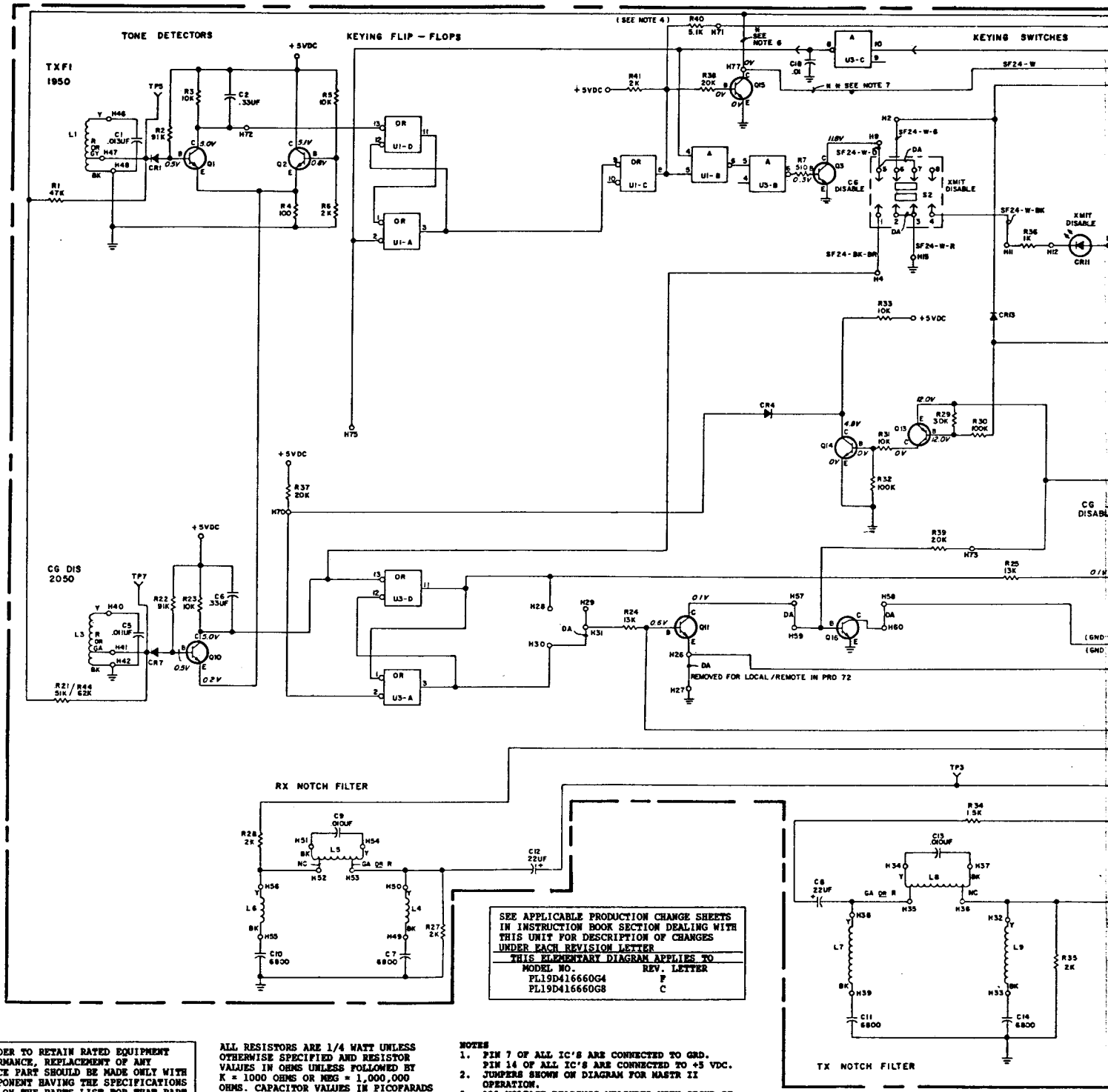
REMOVE JUMPERS (DA WIRE)	H57 TO H59 H58 TO H60 H19 TO H23 H17 TO H21
ADD JUMPERS (DA WIRE)	H16 TO H20 H18 TO H22 H57 TO H58

NOTES:
1. PIN 7 OF ALL IC'S ARE CONNECTED TO GRD. PIN 14 OF ALL IC'S ARE CONNECTED TO +5VDC.
2. JUMPERS SHOWN ON DIAGRAM FOR MASTR II OPERATION.
3. ALL VOLTAGE READINGS MEASURED WITH SECUR-IT TONE UNDETECTED.
4. R40 USED ONLY IN TONE REMOTE/REPEAT OPERATION.
5. CR14 USED ONLY IN MASTR II OPERATION.
6. * IN 19D416660G3 ONLY.
7. ** IN 19D416660G7 ONLY.

TRANSMITTER CONTROL BOARDS

19D416660G3 & G7

(19E501112, Rev. 16)



SEE APPLICABLE PRODUCTION CHANGE SHEETS IN INSTRUCTION BOOK SECTION DEALING WITH THIS UNIT FOR DESCRIPTION OF CHANGES UNDER EACH REVISION LETTER

THIS ELEMENTARY DIAGRAM APPLIES TO

MODEL NO.	REV. LETTER
PL19D416660G4	F
PL19D416660G8	C

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.

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

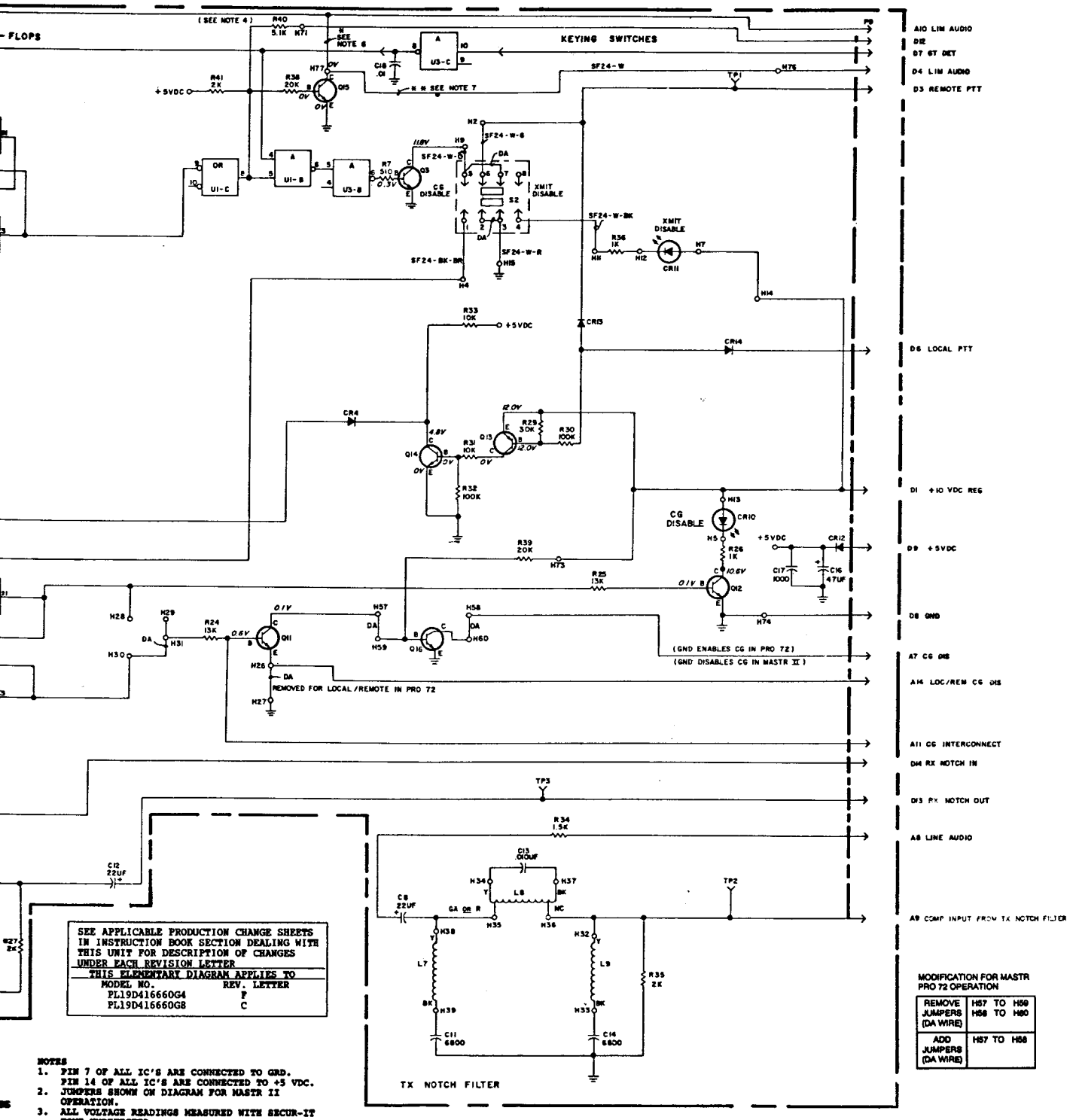
NOTES
1. PIN 7 OF ALL IC'S ARE CONNECTED TO GRD. PIN 14 OF ALL IC'S ARE CONNECTED TO +5 VDC.
2. JUMPERS SHOWN ON DIAGRAM FOR MASTR II OPERATION.
3. ALL VOLTAGE READINGS MEASURED WITH SECUR-IT TONE UNDETECTED.
4. R40 USED ONLY IN TONE REMOTE/REPEAT OPERATION.
5. CR14 USED ONLY IN MASTR II OPERATION.
6. * IN 19D416660G2 ONLY.
7. ** IN 19D416660G6 ONLY.

TRANSMITTER CONTROL BOARDS

19D416660G4 & G8

(19E501106, Rev. 15)

ATIC DIAGRAM



SEE APPLICABLE PRODUCTION CHANGE SHEETS IN INSTRUCTION BOOK SECTION DEALING WITH THIS UNIT FOR DESCRIPTION OF CHANGES UNDER EACH REVISION LETTER	
THIS ELEMENTARY DIAGRAM APPLIES TO	
MODEL NO.	REV. LETTER
PL19D416660G4	F
PL19D416660G8	C

MODIFICATION FOR MASTR PRO 72 OPERATION

REMOVE JUMPERS (DA WIRE)	H57 TO H59 H58 TO H60
ADD JUMPERS (DA WIRE)	H57 TO H58

NOTES
1. PIN 7 OF ALL IC'S ARE CONNECTED TO GRD. PIN 14 OF ALL IC'S ARE CONNECTED TO +5 VDC.
2. JUMPERS SHOWN ON DIAGRAM FOR MASTR II OPERATION.
3. ALL VOLTAGE READINGS MEASURED WITH SECUR-IT TONE UNDETECTED.
4. R40 USED ONLY IN TONE REMOTE/REPEAT OPERATION.
5. CR14 USED ONLY IN MASTR II OPERATION.
6. * IN 19D416660G2 ONLY.
7. ** IN 19D416660G6 ONLY.