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DESCRIPTION

The 10-Volt Regulator/Control Board is used in the MASTR® II Base Station Control Shelf and consists of a 10-Volt, 1/2 Ampere regulator; a 10-Volt, 2 Ampere regulator; a 20-dB preamplifier for providing the proper audio level for the transmitter exciter when using a local microphone; a keying switch for sequencing the antenna relay and a receiver muting circuit.

CIRCUIT ANALYSIS

The 13.8 Volts DC from the station power supply low current filter is applied to terminal D5 of the regulator. This current is filtered by choke L1 and applied to the 10-Volt, 1/2 Amp hybrid regulator consisting of A1-Q1 and integrated circuit U1. This regulator feeds the receiver and transmitter oscillators, providing the close tolerance ($\pm 1\%$) required by these modules.

The 13.8 VDC input is also applied to the 10-Volt, 2 Amp regulator consisting of A3-Q1, Q3, Q4 and zener diode VR1. When the output of the regulator starts to increase, Q4 conducts harder. Q3 conducts less, causing A3-Q1 to conduct less. This increases the voltage drop across A3, Q1, keeping the output voltage constant. Potentiometer R4 is used to set the base voltage of Q4 for the desired 10-Volt output. This regulator supplies the station exciter, the receiver control circuits and the station accessories.

Diodes CR2-CR5 form a PTT OR gate. Applying a ground to any one of the PTT inputs forward biases the diode connected to that input, turning on Q5. Conduction of Q5 operates Q6, applying ground to the antenna relay lead A10. This ground is also applied to the cathode of the Light Emitting Diode (LED) CR15 (TX LIGHT), turning the light. Pin 8 on the regu-

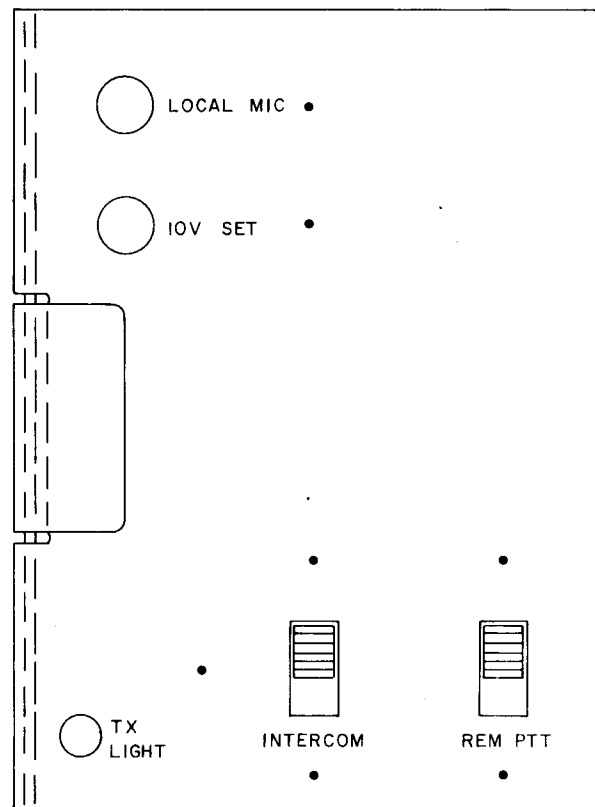
lator hybrid U1 is also grounded. Capacitor C1 starts to charge. In 15 milliseconds C1 is charged to a voltage high enough to allow the time delay switch in U1 to turn on.

Operation of the time delay switch causes the transmitter oscillator control switch in U1 to turn on. +10 Volts is applied via pin 14 of U1 to the transmitter. ICOM(s), keying the transmitter. The 15 millisecond delay in the transmitter oscillator keying circuit allows the antenna relay to energize before RF is applied to the relay. When the PTT is released, CR6 delays the antenna relay from de-energizing until the RF is removed from the contacts.

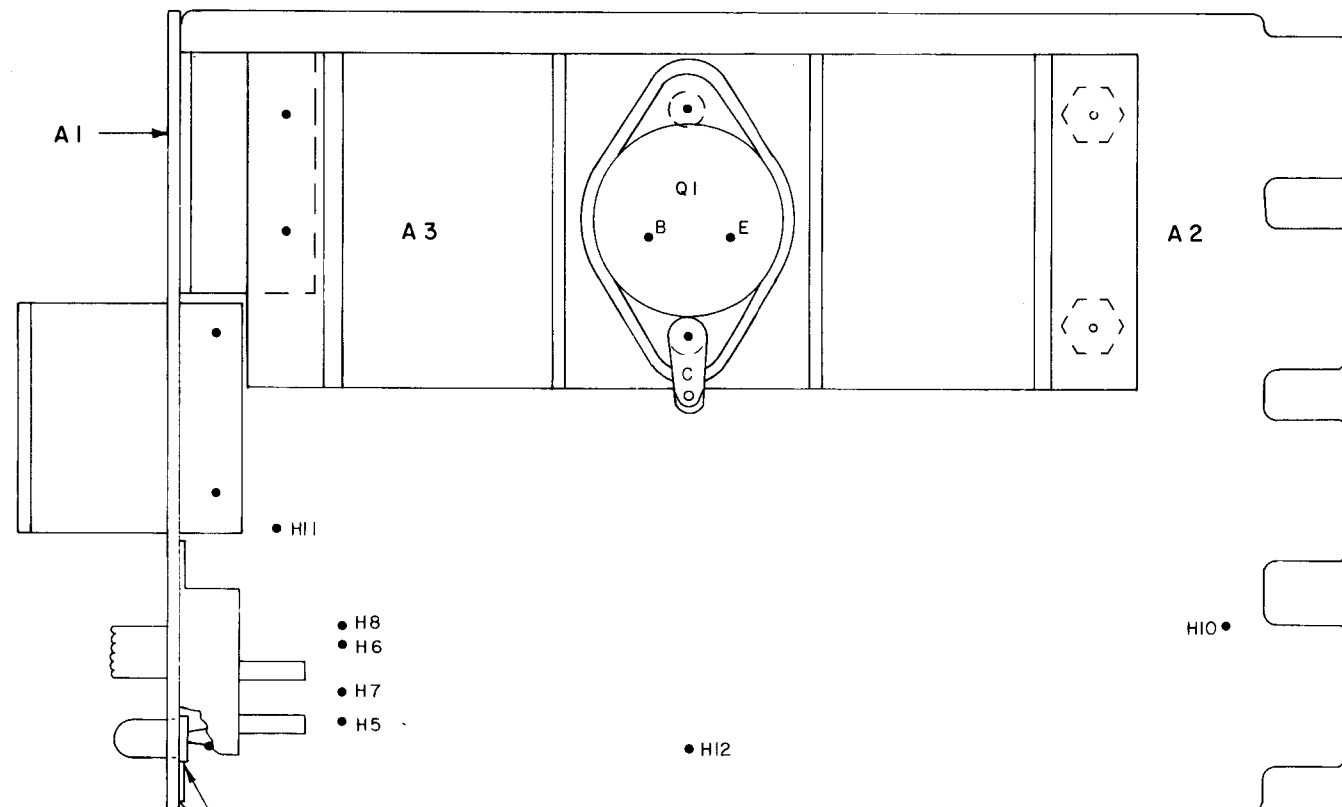
When one of the PTT input leads is grounded, CR8 is also forward biased, turning on Q11. Conduction of Q11 operates Q1 and Q12, applying ground to the RX 1 MUTE and RX 2 MUTE leads. If REPEATER PTT (D3) is grounded, CR9 is forward biased, preventing Q12 from conducting to allow the normal repeater system to function.

When a local microphone is used with the station, the microphone audio is connected via B1 to the input of the MIC PRE AMP, consisting of Q2, Q7, Q8 and Q9. The audio is amplified by Q7 and the amplified audio level is adjusted by MIC GAIN control R14. The audio is further amplified by Q2 and Q8 and applied to the source lead of FET Q9. Q10 is normally conducting, keeping the gate of Q9 grounded and preventing the audio from passing. When the LOCAL PTT switch is operated, CR7 is forward biased, turning off Q10. FET Q9 is now allowed to conduct, passing the local audio to the transmitter modulator.

Service switches provided on the Regulator include the TX DISABLE/INTERCOM switch S1 which ground the TX DISABLE path to permit the serviceman to use the intercom without keying the transmitter; the REMOTE PTT switch S2 which allows the adjustment of remote line levels by keying the remote PTT path in remote control systems.



FRONT PANEL (A1)

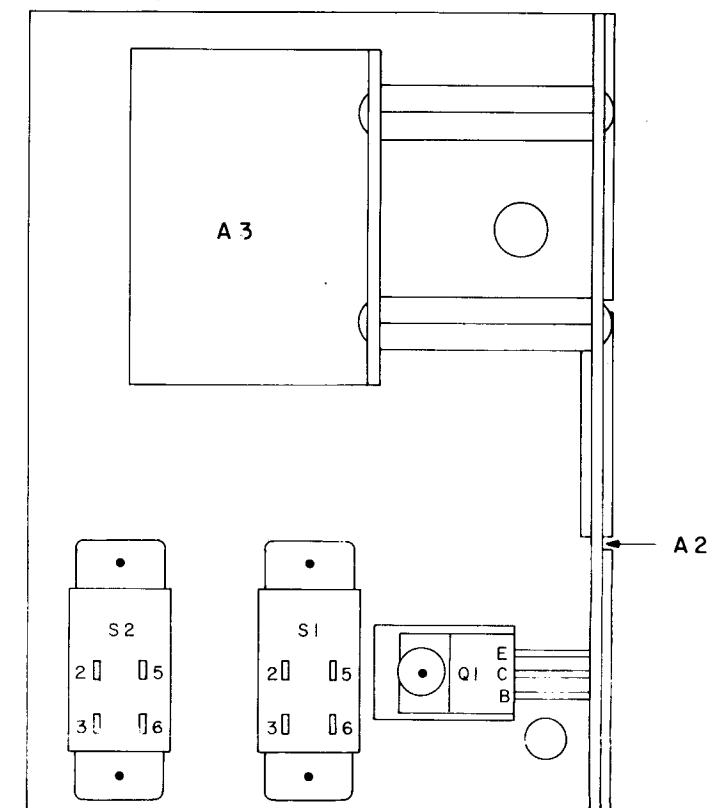


(19D423128, Rev. 0)

FLANGE OF DIODE MUST BE MOUNTED FLUSH AGAINST PANEL.

REFER TO WIRING DIAGRAM FOR THE FOLLOWING CONNECTIONS.

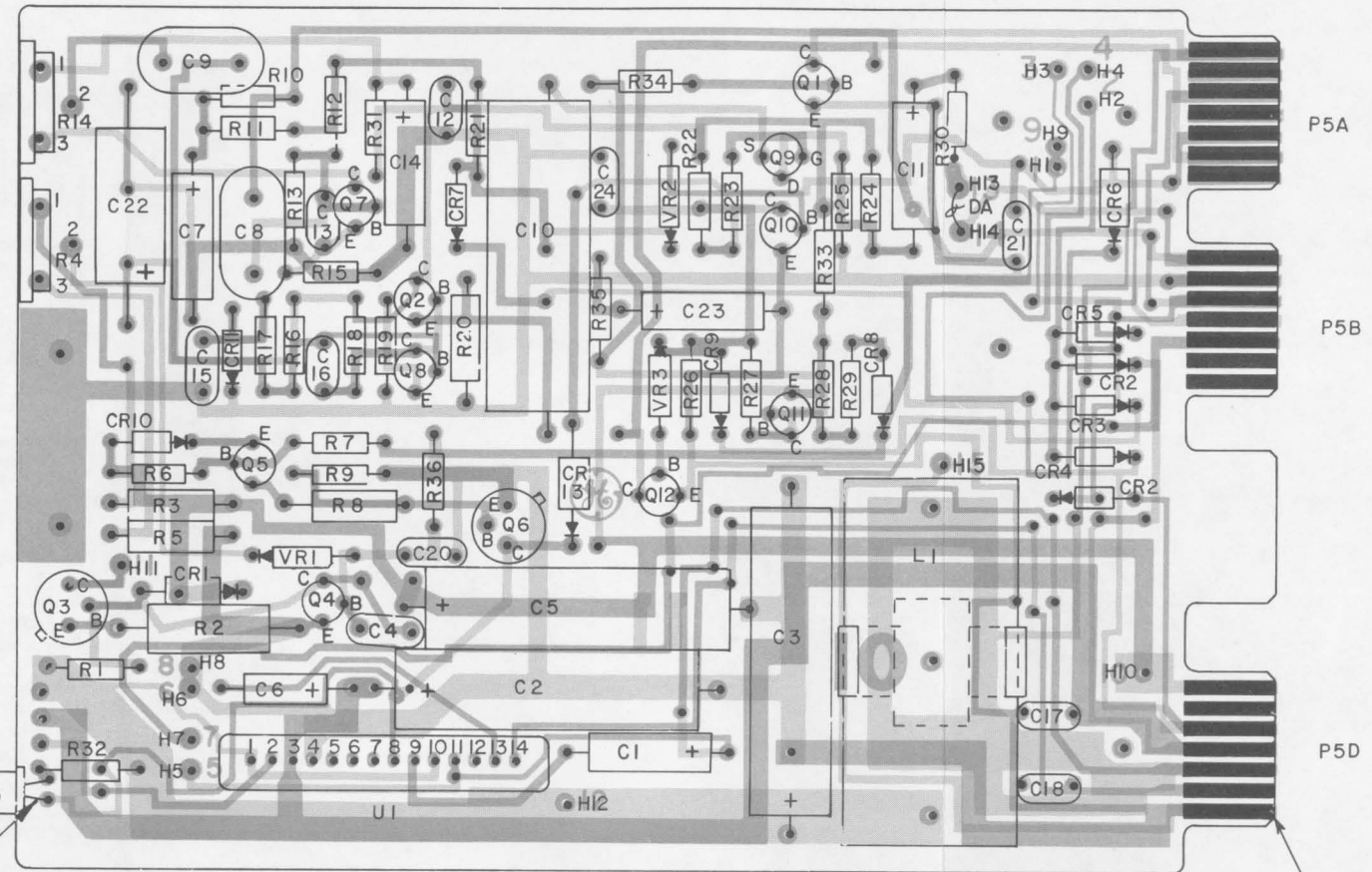
FROM	TO
A3-Q1-B	A2-H11
A3-Q1-C	A2-H10
A3-Q1-E	A2-H12
A1-S1-3	A2-H5
A1-S1-2	A2-H6
A1-S2-3	A2-H7
A1-S2-2	A2-H8



FRONT PANEL (A1)
REAR VIEW

OUTLINE DIAGRAM

10 VOLT REGULATOR/CONTROL BOARD
19D417401G1



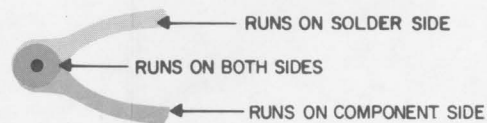
NOTCH OR FLAT
DENOTES CATHODE
LEAD

SEE DETAIL "A"

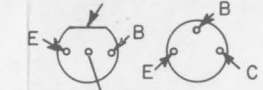
(19D423132, Rev. 7)
(19D417241, Sh. 2, Rev. 11)
(19D417241, Sh. 3, Rev. 10)

REFER TO WIRING DIAGRAM FOR THE FOLLOWING CONNECTIONS.

FROM	TO
H2	H1
H3	H9



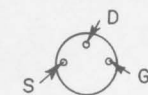
LEAD IDENTIFICATION
FOR Q1 - Q8,
Q10 - Q12
FLAT



IN-LINE OR TRIANGULAR
VIEW FROM LEAD END

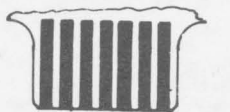
NOTE: LEAD ARRANGEMENT, AND NOT CASE SHAPE, IS DETERMINING FACTOR FOR LEAD IDENTIFICATION.

LEAD IDENTIFICATION
FOR Q9



TRIANGULAR
VIEW FROM LEAD END

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



OUTLINE DIAGRAM

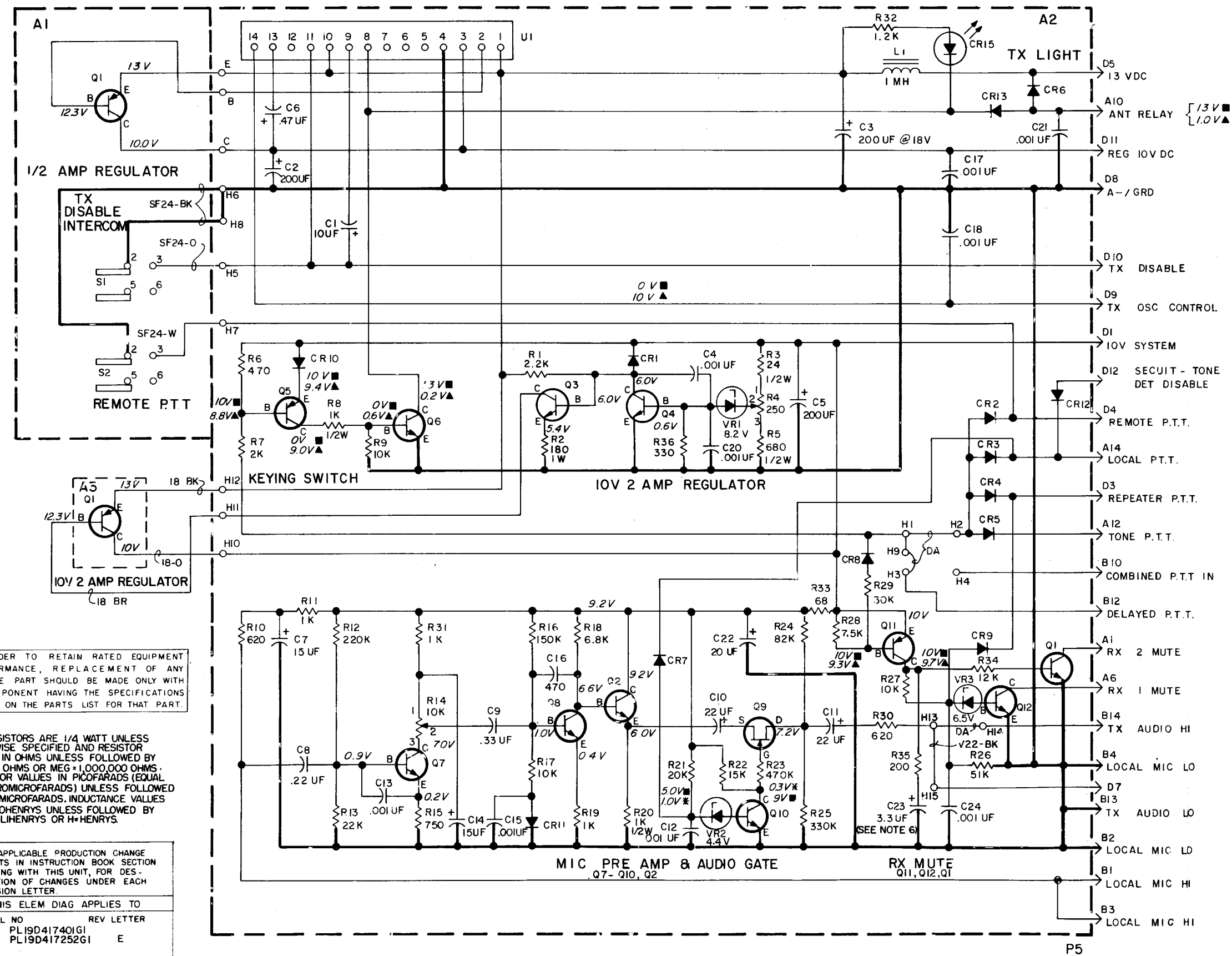
10 VOLT REGULATOR/CONTROL
COMPONENT BOARD A2

- NOTES:
- FOR CARRIER SQUELCH (NON-CHANNEL GUARD) STATIONS, JUMPER H1-H2 & H3-H9 ARE PRESENT.
 - FOR CHANNEL GUARD LOCAL, REMOTE OR LOCAL/REMOTE STATIONS JUMPER H9-H3 & H2-H4 ARE PRESENT.
 - FOR CHANNEL GUARD REPEATERS USING DECODE ONLY (NO ENCODE), JUMPER H1-H2 'S PRESENT.
FOR CHANNEL GUARD REPEATERS USING BOTH ENCODE AND DECODE, JUMPER H2-H4 AND H3-H9 ARE PRESENT.
 - FOR DUPLEX OPERATION OTHER THAN REPEATERS, Q12 IS NOT PRESENT.
 - WHEN SECOND RECEIVER MUTE ON TRANSMIT IS NOT DESIRED, CUT OUT Q1.
 - IN REPEAT, REMOTE/REPEAT AND LOCAL/REPEAT STATIONS, C23 IS NOT PRESENT.
 - WHEN OPTIONS 9555, 9556, AND 9589 (BACK TO BACK REPEATERS) ARE APPLIED, JUMPER FROM H13 TO H14 IS REMOVED AND A JUMPER FROM H13 TO H15 IS ADDED.

VOLTAGE READINGS

ALL READINGS MADE WITH 20,000 OHMS-PER-VOLT METER. ALL READINGS TYPICAL.

- ▲ TRANSMITTER KEYED
- TRANSMITTER UNKEYED
- x LPPT KEYED



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.

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
PL19D417401G1	
PL19D417252G1	E

(19D417270, Rev. 7)

SCHEMATIC DIAGRAM

10 VOLT REGULATOR/CONTROL BOARD
19D417401G1

PARTS LIST

LBI-4802E
10-VOLT REGULATOR/CONTROL
19D417401G1

SYMBOL	GE PART NO.	DESCRIPTION
A1		PANEL 19C320809G1
		----- TRANSISTORS -----
Q1	19A116375P1	Silicon, PNP.
		----- SWITCHES -----
S1 and S2	19B209261P11	Slide: 4PDT, 4 poles, 2 positions, .5 amp VDC or 3 amps VAC at 125 v; ; sim to Switchcraft XW-1712A.
A2		REGULATOR BOARD 19D417252G1
		----- CAPACITORS -----
C1	19B200240P10	Tantalum: 10 µf ±5%, 15 VDCW.
C2 and C3	19A115680P10	Electrolytic: 200 µf +150% -10%, 18 VDCW; sim to Mallory Type TTX.
C4	5494481P111	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C5	19A115680P10	Electrolytic: 200 µf +150% -10%, 18 VDCW; sim to Mallory Type TTX.
C6	5496267P28	Tantalum: 0.47 µf ±20%, 35 VDCW; sim to Sprague Type 150D.
C7	5496267P14	Tantalum: 15 µf ±20%, 20 VDCW; sim to Sprague Type 150D.
C8	19A116080P9	Polyester: 0.22 µf ±20%, 50 VDCW.
C9	19A116080P10	Polyester: 0.33 µf ±20%, 50 VDCW.
C10	19B209233P1	Electrolytic, non-polarized: 25 µf ±20%, 25 VDCW; sim to Sprague 41D.
C11	5496267P10	Tantalum: 22 µf ±20%, 15 VDCW; sim to Sprague Type 150D.
C12 and C13	5494481P111	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C14	5496267P14	Tantalum: 15 µf ±20%, 20 VDCW; sim to Sprague Type 150D.
C15	5494481P111	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C16	5494481P107	Ceramic disc: 470 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C17 and C18	5494481P111	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C19*	5494481P111	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap. Deleted by REV D.
C20 and C21	5494481P111	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C22	19A115680P3	Electrolytic: 20 µf +150% -10%, 25 VDCW; sim to Mallory Type TTX.
C23	5496267P209	Tantalum: 3.3 µf ±10%, 15 VDCW; sim to Sprague Type 150D.
C24	5494481P111	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
		----- DIODES AND RECTIFIERS -----
CR1	4037822P1	Silicon.
CR2 thru CR5	19A115250P1	Silicon.
CR6	4037822P1	Silicon.
CR7 thru CR12	19A115250P1	Silicon.

SYMBOL	GE PART NO.	DESCRIPTION
CR13	4037822P1	Silicon.
CR15	19A134146P4	Diode, optoelectronic: red; sim to Opcoa LM-6L.
		----- INDUCTORS -----
L1	19A115894P1	Audio freq: 1.0 mh ind., 0.35 ohms DC res.
		----- PLUGS -----
P5		(Part of printed board 19D417241P1).
		----- TRANSISTORS -----
Q1 and Q2	19A115889P1	Silicon, NPN.
Q3	19A115300P2	Silicon, NPN; sim to Type 2N3053.
Q4	19A115889P1	Silicon, NPN.
Q5	19A115768P1	Silicon, PNP; sim to Type 2N3702.
Q6	19A115300P2	Silicon, NPN; sim to Type 2N3053.
Q7 and Q8	19A116774P1	Silicon, NPN; sim to Type 2N5210.
Q9	19A134137P1	N Type, field effect; sim to Type 2N3458.
Q10	19A115889P1	Silicon, NPN.
Q11	19A115768P1	Silicon, PNP; sim to Type 2N3702.
Q12	19A115889P1	Silicon, NPN.
		----- RESISTORS -----
R1	3R152P222J	Composition: 2.2K ohms ±5%, 1/4 w.
R2*	3R78P181J	Composition: 180 ohms ±5%, 1 w. In REV A and earlier:
	3R77P301J	Composition: 300 ohms ±5%, 1/2 w.
R3*	3R77P240J	Composition: 24 ohms ±5%, 1/2 w. Earlier than REV A:
	3R77P101K	Composition: 100 ohms ±10%, 1/2 w.
R4	19B209358P101	Variable, carbon film: approx 25 to 250 ohms ±10%, 0.2 w; sim to CTS Type X-201.
R5	3R77P681K	Composition: 680 ohms ±10%, 1/2 w.
R6	3R152P471J	Composition: 470 ohms ±5%, 1/4 w.
R7	3R152P202J	Composition: 2K ohms ±5%, 1/4 w.
R8	3R77P102K	Composition: 1K ohms ±10%, 1/2 w.
R9	3R152P103J	Composition: 10K ohms ±5%, 1/4 w.
R10	3R152P621J	Composition: 620 ohms ±5%, 1/4 w.
R11	3R152P102J	Composition: 1K ohms ±5%, 1/4 w.
R12	3R152P224J	Composition: 220K ohms ±5%, 1/4 w.
R13	3R152P223J	Composition: 22K ohms ±5%, 1/4 w.
R14	19B209358P106	Variable, carbon film: approx 300 to 10K ohms ±10%, 0.25 w; sim to CTS Type X-201.
R15	3R152P751J	Composition: 750 ohms ±5%, 1/4 w.
R16	3R152P154J	Composition: 150K ohms ±5%, 1/4 w.
R17	3R152P103J	Composition: 10K ohms ±5%, 1/4 w.
R18	3R152P682J	Composition: 6.8K ohms ±5%, 1/4 w.
R19	3R152P102K	Composition: 1K ohms ±10%, 1/4 w.
R20	3R77P102K	Composition: 1K ohms ±10%, 1/2 w.
R21	3R152P203J	Composition: 20K ohms ±5%, 1/4 w.
R22	3R152P153J	Composition: 15K ohms ±5%, 1/4 w.
R23	3R152P474J	Composition: 470K ohms ±5%, 1/4 w.
R24	3R152P823J	Composition: 82K ohms ±5%, 1/4 w.
R25	3R152P334J	Composition: 330K ohms ±5%, 1/4 w.
R26	3R152P513J	Composition: 51K ohms ±5%, 1/4 w.

SYMBOL	GE PART NO.	DESCRIPTION
R27	3R152P103J	Composition: 10K ohms ±5%, 1/4 w.
R28	3R152P752J	Composition: 7.5K ohms ±5%, 1/4 w.
R29	3R152P303J	Composition: 30K ohms ±5%, 1/4 w.
R30	3R152P621J	Composition: 620 ohms ±5%, 1/4 w.
R31	3R152P102J	Composition: 1K ohms ±5%, 1/4 w.
R32	3R152P122J	Composition: 1.2K ohms ±5%, 1/4 w.
R33	3R152P680J	Composition: 68 ohms ±5%, 1/4 w.
R34	3R152P123J	Composition: 12K ohms ±5%, 1/4 w.
R35	3R152P201J	Composition: 200 ohms ±5%, 1/4 w.
R36*	3R152P331J	Composition: 330 ohms ±5%, 1/4 w. Added by REV A.
		----- INTEGRATED CIRCUITS -----
U1*	19D416564G4	10-Volt Regulator. In REV D and earlier:
	19D416564G3	10-Volt Regulator.
		----- VOLTAGE REGULATORS -----
VR1	4036887P40	Silicon, Zener.
VR2	4036887P4	Silicon, Zener.
VR3	4036887P6	Silicon, Zener.
A3		HEAT SINK ASSEMBLY 19B226114G2
		----- TRANSISTORS -----
Q1	19A116758P1	Silicon, PNP; sim to Type 2N4399.
		----- MISCELLANEOUS -----
	19B219690G1	Handle assembly.
	19A116023P1	Insulator, plate. (Used with Q1 on A1).
	19A134016P1	Insulator, bushing. (Used with Q1 on A1).
	4036555P1	Insulator, washer: nylon. (Used with Q3 and Q6 on A2).
	7118719P10	Clip, spring tension: sim to Prestole E-50019-003. (Used with L1 on A2).
	4029974P1	Insulator, plate. (Used with Q1 on A3).
	19A121882P1	Washer, shield. (Used with Q1 on A3).
	4036994P1	Terminal, solderless. (Used with Q1 on A3).
	19B226013P1	Heat sink. (Used with Q1 on A3).
	19A121175P11	Insulator. (Used with C10 on A2).

PRODUCTION CHANGES

Changes in the equipment to improve performance 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 - Regulator Board 19D417252G1

To correct noisy Regulator.
Changed R3 and added R36.

REV. B - To optimize the regulator bias.
Changed R2.

REV. C - To prevent local Mic audio from going to the wrong transmitter in back-to-back repeaters.
Added H13, H14, H15 and D7.

REV. D - To eliminate 150 MHz oscillation in Regulator.
Deleted C19.

REV. E - To prevent Regulator from sending transmit pulse during switch-off delay period. Changed V1.