RCA

Mobile Communication Equipment

Series 700
Receiver

150 MHz Band

N3LKL

IB-8027266-P

TABLE 1. TECHNICAL DATA

Sensitivity
0.5 uV for 20dB quieting
0.35 uV for 12dB SINAD
0.25 uV - threshold squelch

Selectivity
20dB quieting-100dB down at ±15 kHz
EIA method-85dB down at adjacent channel (30kHz)

Spurious Response Attenuation
100dB minimum

Carrier Frequency Range
148-174 MHz - commercial frequencies
132-148 MHz - government frequencies (with optional modification)

Maximum Frequency Spacing (Multi-Frequency Stations)
0.3% of carrier frequency (maximum) wider separation results in degradation of sensitivity, 0.4% results in 2dB degradation.

Power Requirements @ 13.8 V DC
Squelched-240 to 370 mA
Unsquelched-660 to 800 mA
(5 watts output)

Oscillator Frequencies
15.7-18.9 MHz (TCXO)-1st Oscillator (Commercial Frequencies)
15.4-17.2 MHz (TCXO)-1st Oscillator (Government Frequencies)
7.155 MHz (fixed)-2nd Oscillator

Frequency Stability (-30°C to +60°C)
±0.0005% (5 PPM) - standard
±0.0002% (2 PPM) - optional

Crystal Frequency Multiplication
9 times (TCXO)
Final 1st Oscillator frequency is 6.7 MHz above carrier.

Intermediate Frequencies
6.7 MHz (High IF)
455 kHz (Low IF)

Audio Output (5% Distortion maximum)
5 Watts (8 ohm load)

CIRCUIT DESCRIPTION

FRONT END

Refer to Figure 11 while reading the following description. The receiver front end circuitry is located on the Helical Resonator assembly and three circuit boards: Mixer/Multiplier, Buffer/Multiplier, and Multiple Oscillator. The RF signal from the antenna is transferred to the receiver input (1J7 on the Helical Resonator assembly) by means of antenna switching (solid state in Super-Fleetfone-500, relay type in Super-Carfone-500).

1Z1-1Z5 are highly selective cast-in cavities with helical resonators. Cavity coupling is accomplished by electromagnetic transfer through the cavity apertures. The RF signal reaches the gate of the 1st Mixer, Q1, through 10Z1.

The 1st Oscillator signal is generated by the TCXO, tripled by 11Q2 on the Buffer/Multiplier board, tripled again by 10Q2 on the Mixer/Multiplier board, and applied to the drain of the 1st Mixer, 10Q1. The heterodyne action of the FET produces a 6.7 MHz IF signal that is applied to the 6.7 MHz IF Board.

The source load and power circuit for the 1st Mixer, 10Q1, is located on the 6.7 MHz IF circuit board.

Selection of operating frequency is accomplished by grounding pin 1 of the proper TCXO through the frequency selector on the Control Unit. On single frequency units, a jumper on the Buffer/Multiplier board grounds pin 1 of the F1 TCXO. The F1 TCXO socket is located on the Buffer/Multiplier board, while the F2, F3, and F4 TCXO sockets are located on the Multiple Oscillator board.

Buffer stage 11Q1 on the Buffer/Multiplier board provides isolation between the TCXO and trippler stages.

6.7 MHz IF AND 2ND MIXER-OSCILLATOR

Refer to Figure 16 while reading this description. The 6.7 MHz IF signal from the 1st Mixer is applied, through tuned circuits 13T1 primary, 13T1 secondary, 13T2, crystal filter 13Y1-13Y2, and tuned circuit 13T3 to the base of IF Amplifier 13Q1. 13T1, 13T2, and 13T3 are tuned to 6.708 MHz (8 kHz above IF) to correctly align the crystal filter network.

The output of 13Q1 is applied to the base of 2nd Mixer, 13Q2, through tuned circuit 13T4 (tuned to 6.7 MHz). The fixed frequency 2nd Oscillator output (at 7.155 MHz) is also applied to the base circuit of the 2nd Mixer. The heterodyne action of 13Q2 produces a 455 kHz IF output, which is applied to the scaled 455 kHz filter (14FL1) through phono jack 13J1 and plug 14P1. Phone jack 13J2 (TEST) is provided for service and maintenance.

Diodes 13CR1 and 13CR2 are gates for the Noise Clipper. A description of their function is included in the Noise Clipper discussion below.

NOISE CLIPPER (OPTIONAL)

Refer to Figure 16 while reading this description. Impulse noise appearing at the input of the 6.7 MHz IF board is applied to the base of the 1st Noise Amplifier, 16Q1 and amplified. The impulse noise is amplified again by the 2nd Noise Amplifier, 16Q2, then detected by Detector 16Q3. The lowest signal level at which the Clipper will operate is controlled by SENSITIVITY control R2, which sets the current bias for amplifiers 16Q1 and 16Q2. Diode 16CR4, connected in the feedback path between the Detector output (16Q3 collector) and the emitter of the 2nd Noise Amplifier, 16Q2, is normally non-conducting, and provides A.G.C. action. At high carrier (or interfering carrier) levels,

16Q3 acts as a rectifier for the carrier. High DC voltage is developed at the collector, causing 16CR4 to conduct and bias 16Q2 toward cutoff. At the same time, the forward biased diode permits detected impulse peaks to be applied to the partially by-passed emitter of 16Q2, causing a further reduction of 16Q2's gain for the pulse.

The detected pulse output of Detector 16Q3 is amplitude limited by forward biased diode 16CR1 and amplified by Pulse Amplifier 16Q4. 16Q4 is biased close to cutoff to maintain a unidirectional pulse. Diodes 16 CR5 and 16CR6, in the Rate Limiter circuit, act as a rectifier for the pulse output of the Detector, 16Q3. The positive output voltage of this rectifier feeds the emitter of 16Q4. At low repetition rates, no voltage is developed at the emitter of 16Q4, and the amplifier operates normally. At high repetition rates, sufficient voltage is developed to cut off the amplifier and make the Clipper inoperative.

The amplified output pulses of Pulse Amplifier 16Q4 trigger the Multivibrator circuit, 16Q5-16Q6. 16Q5 is biased to saturation, while 16Q6 is cut off. The negative pulses applied to the base of 16Q5 turn 16Q5 off, and, via amplifier action, turn 16Q6 on (to saturation). Feedback capacitor 16C13 determines the length of time the Multivibrator will remain in this condition.

The output at the collector of 16Q6 is a negative-going pulse, 12 usec. wide, regardless of the input level or duration. "Stretching" capacitors 16C15 and 16C21 increases the effective pulse width from 12 usec. to approximately 25 usec. Reverse-biased diode 16CR2 ensures a fast rise time of the multivibrator output pulse by acting as a buffer between the low impedance load of the "stretching" capacitors and the relatively high impedance of the multivibrator output circuit, at the beginning of switching action.

The output pulse is then applied to the 6.7 MHz IF circuit board, and used to blank the IF Amplifier over the duration of the noise impulse. In the receiver IF signal path, impulse noise appearing at the input of the 6.7 MHz IF circuit board is delayed in tuned circuits 13T1 primary, 13T1 secondary, and 13T2. It appears at the anodes of diodes 13CR1 and 13CR2 later than the start of the blanking pulse from the Noise Clipper board. The diodes are normally non-conducting, being reverse-biased by voltage divider 13R21-13R22. In this condition, they present a high impedance in parallel with tuned circuits 13T1 primary, 13T1 secondary, and 13T2, and do not affect their operation. When impulse noise appears, the negative-going gate pulse output of the Noise Clipper board causes the diodes to conduct over the duration of the pulse. This conduction heavily loads both 13T1 and 13T2, causing attenuation of the signal.

455 kHz IF AND DISCRIMINATOR

Refer to Figure 21 while reading this description. The 455 kHz IF signal, after being passed through the sealed filter (14FL1), is applied to the Low IF/Audio board. It is there amplified by 14Q1 and 14Q2, passed through the limiter stages (Integrated Circuit 14A1), and applied to the Discriminator.

The Discriminator audio output is applied to the 1st AF Amplifier, 14Q3, the Noise Amplifier, 14Q11 (in the Noise Operated Squelch circuit), and to the Quiet Channel Decoder in systems equipped with this option.

Metering of the Discriminator is available at pins 2 and 3 of the Receiver Test Socket, 1J3. Pin 2 is used for Discriminator zero; pin 3 is used for Discriminator transformer primary tuning.

AUDIO PROCESSING

Refer to Figure 21 while reading this description. When the optional Quiet Channel unit is used, resistor 14R24 is clipped out, and the discriminator audio passes through a Tone Reject Filter on the Quiet Channel Decoder board, to the 1st AF Amplifier. In systems without the Quiet Channel feature, the discriminator audio passes through C28 and R24 before being applied to the 1st AF Amplifier.

The output of the 1st AF Amplifier is applied to the Gated AF Amplifier through the VOLUME control on the Control Unit. This stage has a gating bias applied to the emitter circuit by the Squelch and Muting circuits (see discussions below). The Gated AF Amplifier output is applied to the Driver, 14Q5.

The Driver output, along with the tone output of the optional Transmit Time Limiter (when used), is applied to the primary of the driver transformer, 15T1, on the Audio Power Amplifier assembly. 15Q1 and 15Q2 form a push-pull audio power amplifier stage (each transistor biased in Class B). The secondary of autio output transformer 15T2 is an 8 ohm winding which drives the speaker in the Control Unit.

NOISE OPERATED SQUELCH

Refer to Figure 21 while reading this description. With no carrier present, noise is applied to Noise Amplifier 14Q11 through 14R53 and 14C45. The amplified noise is rectified by the base-emitter junction of 14Q12, and applied to the base of Squelch Gate 14Q13 as a DC control voltage. 14Q14 provides "toggle action" by regenerative feedback. The output of the Squelch Gate, 14Q13, reverse-biases the Gated AF Amplifier (14Q4) via the common emitter resistor 14R37, cutting it off and "squelching" the noise.

When a carrier quiets the discriminator, 14C49 (base circuit of 14Q13) rapidly discharges and biases 14Q13 off, removing the reverse bias from the Gated AF Amplifier, allowing it to conduct. The SQUELCH control (emitter circuit of 14Q11) determines the point at

which the noise squelch will function by varying the gain of Noise Amplifier 14Q11.

MUTING

Refer to Figure 21 while reading this description. Receiver muting is controlled by Muting Gate transistor 14Q6. With the PTT button depressed, +12v DC is applied to pins 3/15 of the Low IF/Audio board, and 14Q6 conducts. With 14Q6 conducting, the Gated AF Amplifier 14Q4 is cut off by the bias applied to the emitter, and the receiver is muted. 14CR9 clamps the junction of 14R41, 14R42, and 14C51 to approximately 9 volts when the PTT button is depressed. Releasing the PTT button removes the PTT voltage from the base circuit of 14Q6, causing it to stop conducting, and thereby allowing the Gated AF Amplifier to start conducting and passing audio.

POWER SUPPLY

Refer to Figure 21 while reading this description. Two source voltages are used by the various stages in the receiver: +13.8 (A+), and +9 (regulated).

Battery voltage (nominally 13.8v DC) is connected to pin 12 of the Low IF/Audio board. Diode 15CR1 on the Audio Power Amplifier assembly is electrically connected across the receiver power input, and provides reverse battery polarity protection. Choke 14L4 on the Low IF/Audio board provides filtering of the battery voltage. The A+ voltage (through filter 14L4) is distributed to the Low IF/Audio board (internally), the exciter board and various receiver boards (through pin 4), and to the accessories mounted beneath the exciter (through pin A+/22).

The +9v supply is regulated by 14Q7 and electronically fused by 14Q8 and 14Q9. 14Q7 is biased by current flow through 14R43; its base voltage is fixed by 14CR4 and 14CR5. If a short occurs on the +9v bus, 14Q8 and 14Q9 conduct and short 14Q7's bias supply to ground, cutting 14Q7 off.

The emitter of 14Q9 is biased by the voltage drop across 14R44 and 14R45 at half the A+ supply voltage. Its base is returned to the emitter of 14Q7, which is regulated to the +9v bus. Under normal conditions, 14Q9 is reverse biased, and, because it is DC coupled to 14Q8, holds 14Q8 in cutoff. When a short causes the voltage at the emitter of 14Q7 to drop below the voltage at the junction of 14R44-14R45, 14Q9 conducts and causes 14Q8 to conduct to saturation. This action shorts the base of Regulator 14Q7 to ground, reducing the voltage on the +9v bus to a fraction of a volt.

After the fault condition is corrected, the electronic fuse circuit must be reset. Momentarily turn the power switch on the Control Unit OFF and then ON to reset the circuit.

INITIAL ADJUSTMENTS

The receiver is accurately aligned at the factory to the frequency or frequencies specified by the customer. At the time of installation, the receiver antenna input coil (1Z1) should be peaked, and the TCXO frequency or frequencies should be adjusted to "net" with the system. See Table 2.

Either of the following metering devices may be used:

1. A VOM with a 50 uA scale; or,

2. A VOM with a 50 uA scale and an RCA CX-40 Test Adapter.

TABLE 2. INITIAL ADJUSTMENTS

Step	Type of Adjustment	CX-40 Test Adapter Position	50uA Test Meter J3 Pin Connections Pos.	Neg.	Input	Description of Adjustment
1	Antenna Peaking	8	8	9	Weak, on-frequency carrier	Peak 1Z1 for maximum reading. Do not adjust 1Z2 thru 1Z5.
2	Frequency	2(+) or (-)	2	9	On-Frequency carrier	Adjust TCXO frequency adjustment for zero reading. Repeat on other channels.

ALIGNMENT

GENERAL

Adjustment locations are placarded on the equipment, with the exception of the 6.7 MHz IF board adjustments in Code B receivers with Noise Clipper, and the adjustments on the Low IF/Audio board. The locations of these adjustments are shown in Figures 3 and 4.

EQUIPMENT REQUIRED

In addition to the metering device required for initial adjustments, the following test equipment is recommended for receiver alignment:

IF Signal Generator . . . . . Hewlett Packard 606A
RF Signal Generator . . . . . Measurements FM560
Jumper . . . . . 4" long
Alignment Tool . . . . . RCA stock #228788
(supplied with receiver)
Coax Adapter . . . . . signal generator output to phono plug with 10K resistor in series
20dB, 50 ohm attenuator . . . . . Measurements M342
(For maximum sensitivity adjustments-to avoid effects of generator leakage)

In addition, if the receiver has a Noise Clipper, the following equipment is helpful:

Impulse Noise Generator . . . . . Empire Devices, NF-105
Oscilloscope . . . . . RCA WO-91B
(calibrated for 1v peak-to-peak)

PROCEDURE

Use Table 3. The adjustment of the optional Noise Clipper is done after the receiver is properly aligned; the procedure is listed in step 16 of Table 4.

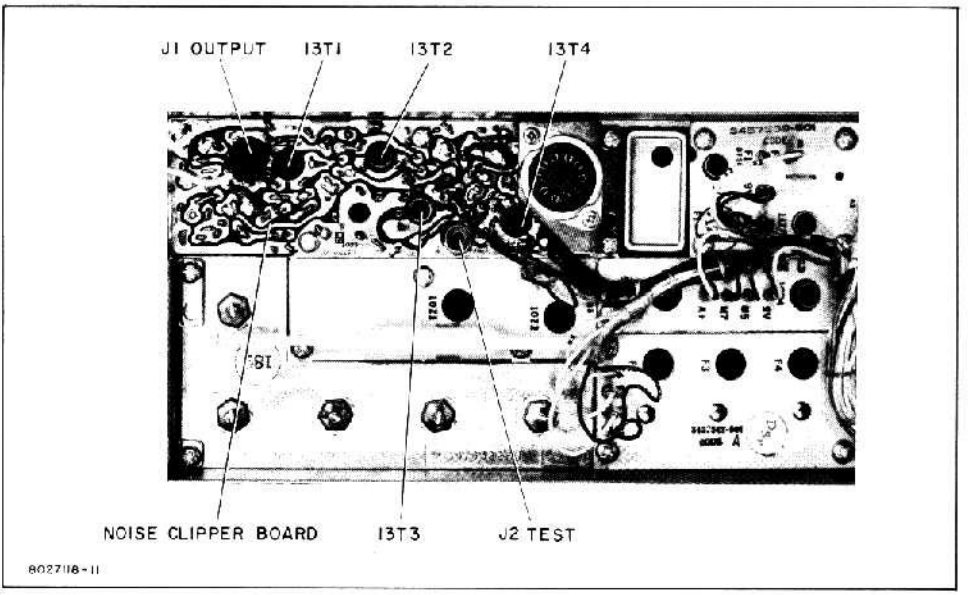


Figure 1. 6.7 MHz IF Adjustments – Receivers with Noise Clipper

TABLE 3. RECEIVER ALIGNMENT

Step	Adjustment	CX-40 Test Adapter Position	50 uA Test Meter 1J3 Pin Connections Pos.	Neg.	Signal Generator Frequency	Level	Description of Adjustment
1	Preliminary	8	8	9	455 kHz ±100 Hz	Adjust	Short pads E and F on the copper side of the Low IF/Audio board or swing board out and short pins 23 and 27. Remove 14P1 from 13J1. Connect high side of signal generator through 10K resistor to center pin of 14P1, low side to shell and ground. Set generator for meter reading of 10 uA.
2	Low IF	8	8	9	455 kHz ±100 Hz	Adjust	Adjust 14Z1 for maximum. Adjust generator for reading of 10 uA. Readjust 14Z1 for maximum. Reduce generator output to keep meter reading at 10 uA.
3	Discriminator	3	3	9	455 kHz ±100 Hz	As Adjusted	Adjust 14Z2 for maximum. Typical reading is 35 to 45 uA.
4	Discriminator	2+ or 2-	2	9	455 kHz ±100 Hz	As Adjusted	Remove short from pads E and F or pins 23 and 27. Adjust 14Z3 for 0 reading.
5	6.7 MHz IF	8	8	9	6.700 MHz	Adjust	Connect generator to 13J2. Adjust for meter reading less than 10 uA. Adjust 13T4 bottom core, 13T4 top core, 13T1 bottom core, and 13T1 top core for peak. Keep meter reading between 5 and 10 uA.
6	6.7 MHz IF	8	8	9	6.708 MHz	As Adjusted	Adjust 13T3 and 13T2 for maximum.
7	Buffer/ Multiplier	4	4	9			Ensure that TCXO is inserted and that frequency selector switch (multiple frequency units) is set to correct position. Adjust 11Z1 for maximum, 11Z2 for a dip and 10Z4 for a slight peak. Typical reading is 16 uA.
8	Buffer/ Multiplier	5	5	9	–	–	Re-adjust 11Z2 and 10Z4 for maximum. Adjust 10Z3 for dip and 10Z2 for slight peak. Typical reading is 32 uA.
9	Buffer/ Multiplier	7	7	9	–	–	Re-adjust 10Z3 and 10Z2 for maximum. If there is little or no peak, detune 10Z1 slightly and re-adjust 10Z3 and 10Z2. Typical reading is 14 uA.
10	RF	2+ or 2-	2	9	Carrier	100 mV	Connect generator to antenna input jack. Locate carrier frequency by adjusting generator for discriminator zero.
11	RF	8	8	9	Carrier	Adjust	Adjust 1Z1, 1Z2, 1Z3, 1Z4, 1Z5 and 10Z1 for maximum. Reduce generator output to keep meter reading below 10 uA.
12	RF	8	8	9	Carrier	As Adjusted	Insert 20dB, 50 ohm pad in RF input lead as close to antenna jack as possible. Re-adjust 1Z1, 1Z2, 1Z3, 1Z4, 1Z5 and 10Z1 for maximum. Keep meter reading below 10 uA.
13	6.7 MHz IF	8	8	9	Carrier	1-3mv	Connect generator to antenna jack. Adjust 13T4 top core for maximum.
14	Buffer/ Multiplier	7	7	9	–	–	Re-adjust 10Z3 and 10Z2 for maximum.
15	To complete receiver alignment, perform steps 1 and 2 in Table 2, INITIAL ADJUSTMENTS						
16	Noise Clipper (optional)	a. Connect impulse noise generator to antenna jack. Set level to 35 dB above 1 u volt/MHz. b. Connect oscilloscope to BIAS point (junction of R28, R31) on Noise Clipper Board. c. Adjust SENSITIVITY control on Noise Clipper to maximum gain (fully clockwise). Negative pulse output should appear on the scope 0.2V amplitude, 30 u sec. duration (approx.). d. Adjust SENSITIVITY control CCW until the pulse just disappears. e. Check operation by increasing generator level to 41 dB. A steady pulse output should appear on the oscilloscope.					

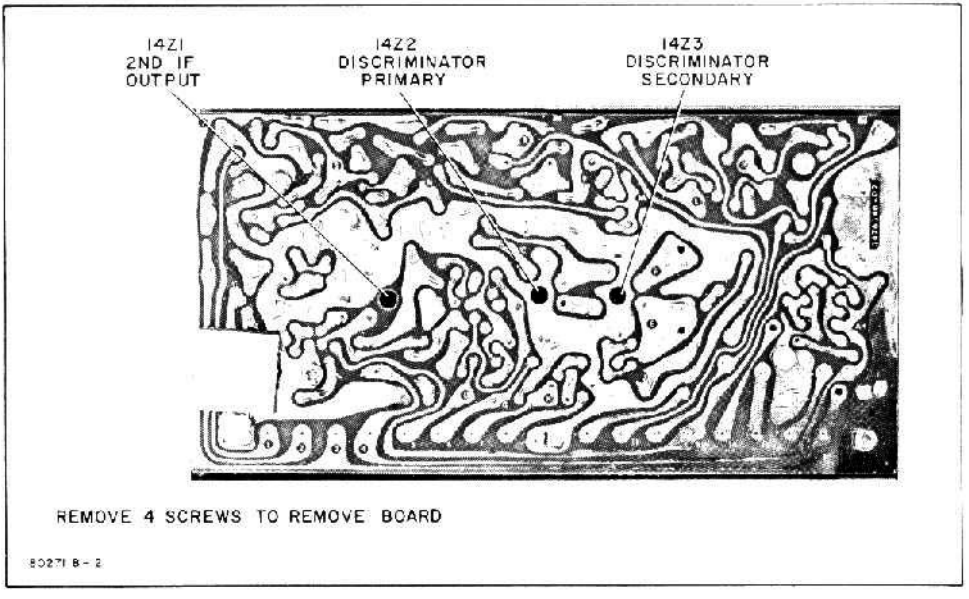


Figure 2. Low IF/Audio Board Adjustments

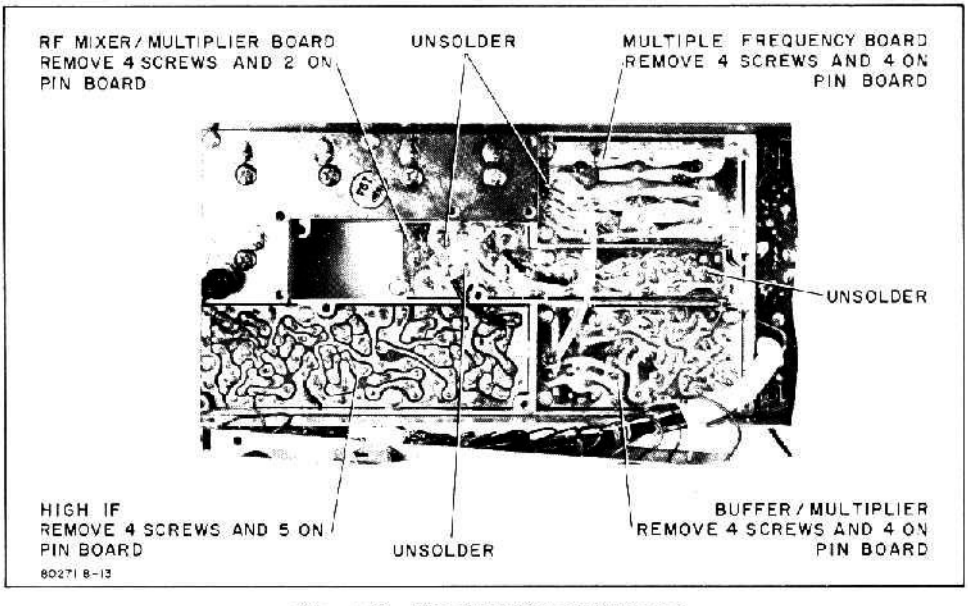


Figure 3. Receiver Board Removal

MAINTENANCE

GENERAL

Code designations, e.g., CODE A, CODE B, are marked on the receiver chassis, and on each circuit board and assembly within the receiver, for serialization purposes. For example, refer to Figure 8. In the event of circuit refinements, the code letter designation is correspondingly changed to facilitate identification.

Use a 12 volt battery for servicing the unit whenever possible. If an individual circuit board is to be tested outside the unit, be sure to use a power supply that is voltage regulated.

MEASUREMENTS

A 20,000 ohms-per-volt VOM (such as the RCA WV-38A) is adequate for power supply voltage measurements. An RCA WV-98C VTVM (with an RF probe) is recommended for signal tracing and troubleshooting in the signal carrying circuits. Metering of pertinent receiver circuits is provided at the Receiver Test Socket, 1J3. A VOM with a 5,000 ohm, 50 uA scale should be used in order to obtain the readings supplied with the alignment tables and on the schematic diagrams. Metering points are labeled M1, M2, M3, etc. on the schematics.

CIRCUIT BOARD REMOVAL PROCEDURE

1. Remove the Low IF/Audio board as shown in Figure 4.

2. Remove the individual circuit boards as shown in Figure 5. Note that the wires between the circuit boards and the pin boards are solder connected. The pin board must be removed along with the circuit board. Turn the pin board to a vertical position after removing the push-on connectors; then remove both pieces from the bottom of the receiver.

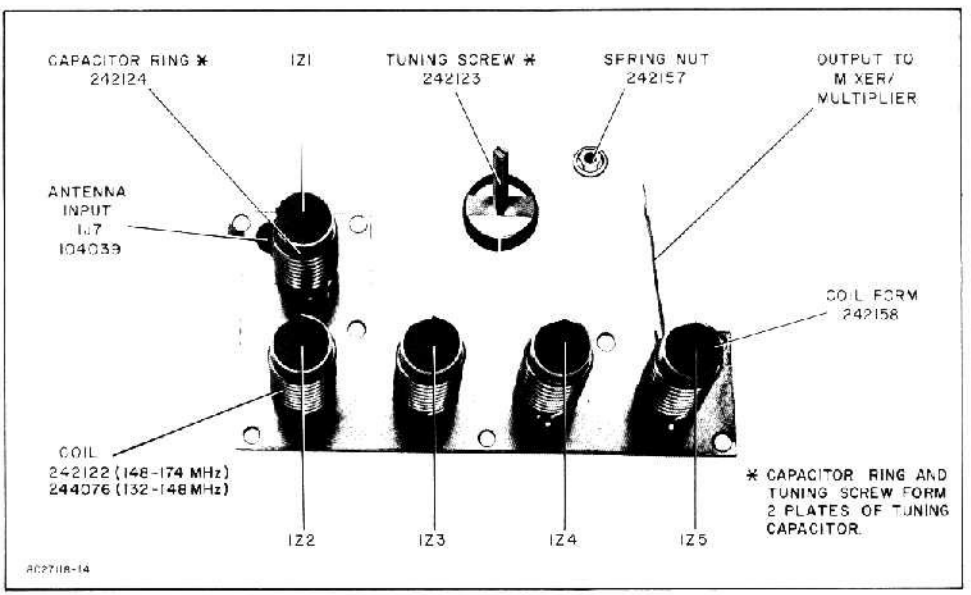
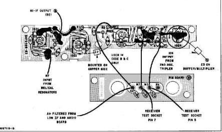


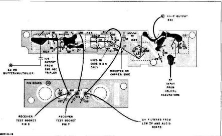
Figure 4. Helical Resonator Assembly



CODE A,B,C

DARK TONE - SIGNAL PATH

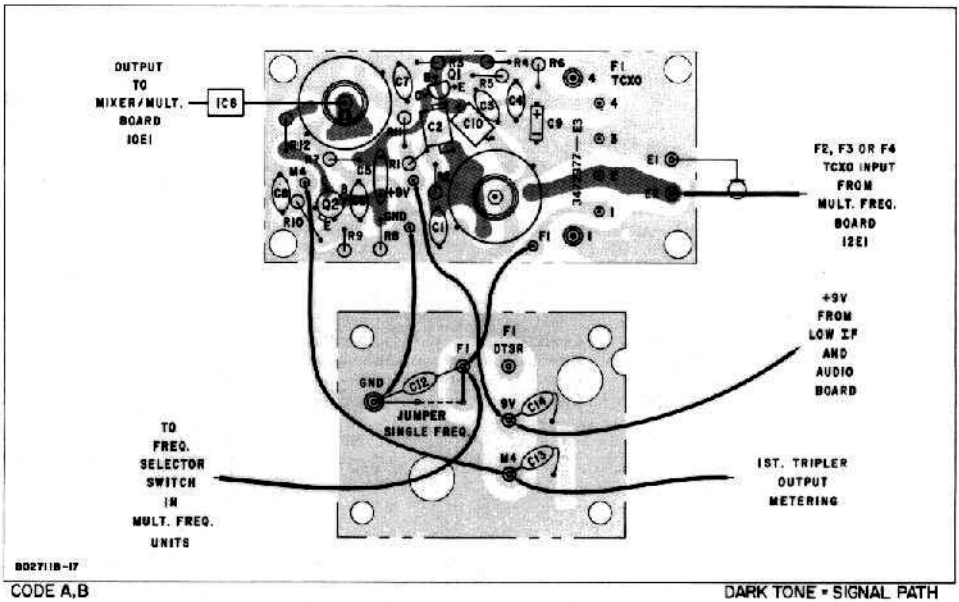
Figure 5. Mixer/Multiplier Board - Top View



CODE A,B,C

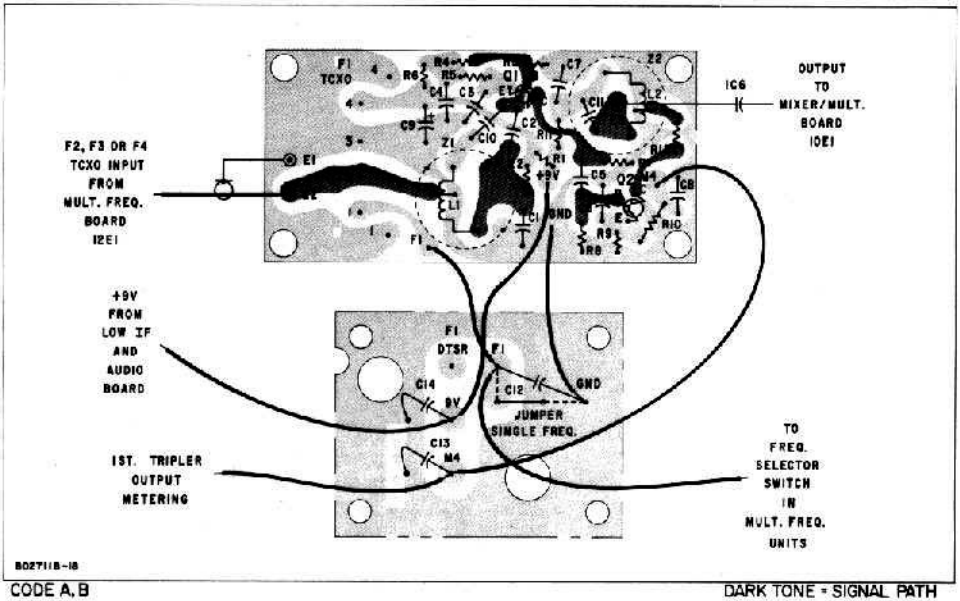
DARK TONE - SIGNAL PATH

Figure 6. Mixer/Multiplier Board - Bottom View



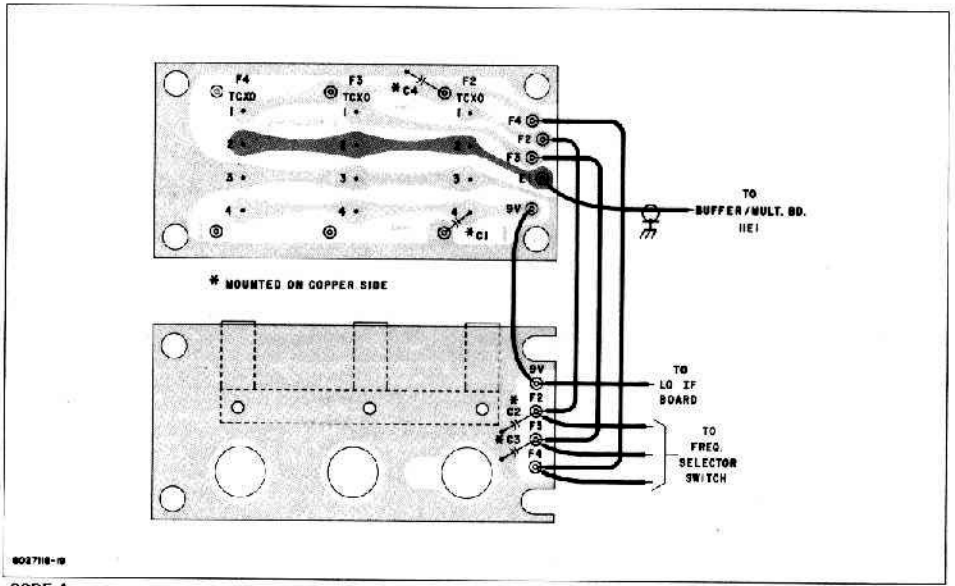
CODE A,B DARK TONE = SIGNAL PATH

Figure 7. Buffer/Multiplier Board - Top View



CODE A,B DARK TONE = SIGNAL PATH

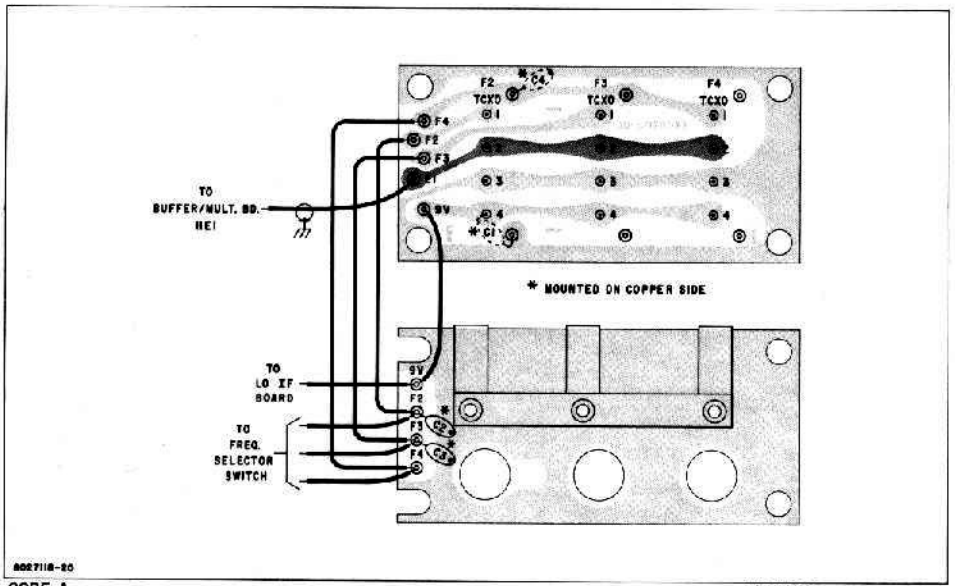
Figure 8. Buffer/Multiplier Board - Bottom View



CODE A

DARK TONE = SIGNAL PATH

Figure 9. Multiple Oscillator Board - Top View



CODE A

DARK TONE = SIGNAL PATH

Figure 10. Multiple Oscillator Board - Bottom View

NOTES :

1. INTERCONNECTIONS SHOWN SIMPLIFIED. REFER TO SYSTEM INSTRUCTION BOOK FOR DETAIL.
2. JUMPER REMOVED FOR MULTI-FREQUENCY OPERATION.
3. DC SUPPLY FOR MIXER IS THROUGH HIGH IF BOARD (13)
4.

FREQ BAND	11C2 & 11C10	11C11	1C6	10C14 & 15	10C7
132-148MHz	360pF	18pF	0.51pF	34pF	0.43pF
148-174MHz	300pF	15pF	0.47pF	31pF	0.39pF

5. GAIN MEASUREMENT
   3.0μV RF INPUT WILL PRODUCE 10μA AT 1J3 PIN 8.
   (RECEIVER TEST SOCKET)

9V INDICATES +9V COMMON CONNECTION WITHIN A CIRCUIT BOARD.

4+ INDICATES +12V (FILTERED BATTERY VOLTAGE) COMMON CONNECTION WITHIN A CIRCUIT BOARD.

ALL RESISTORS ARE IN OHMS, ±10% UNLESS OTHERWISE NOTED.

ALL CAPACITORS ARE IN μF UNLESS OTHERWISE NOTED.

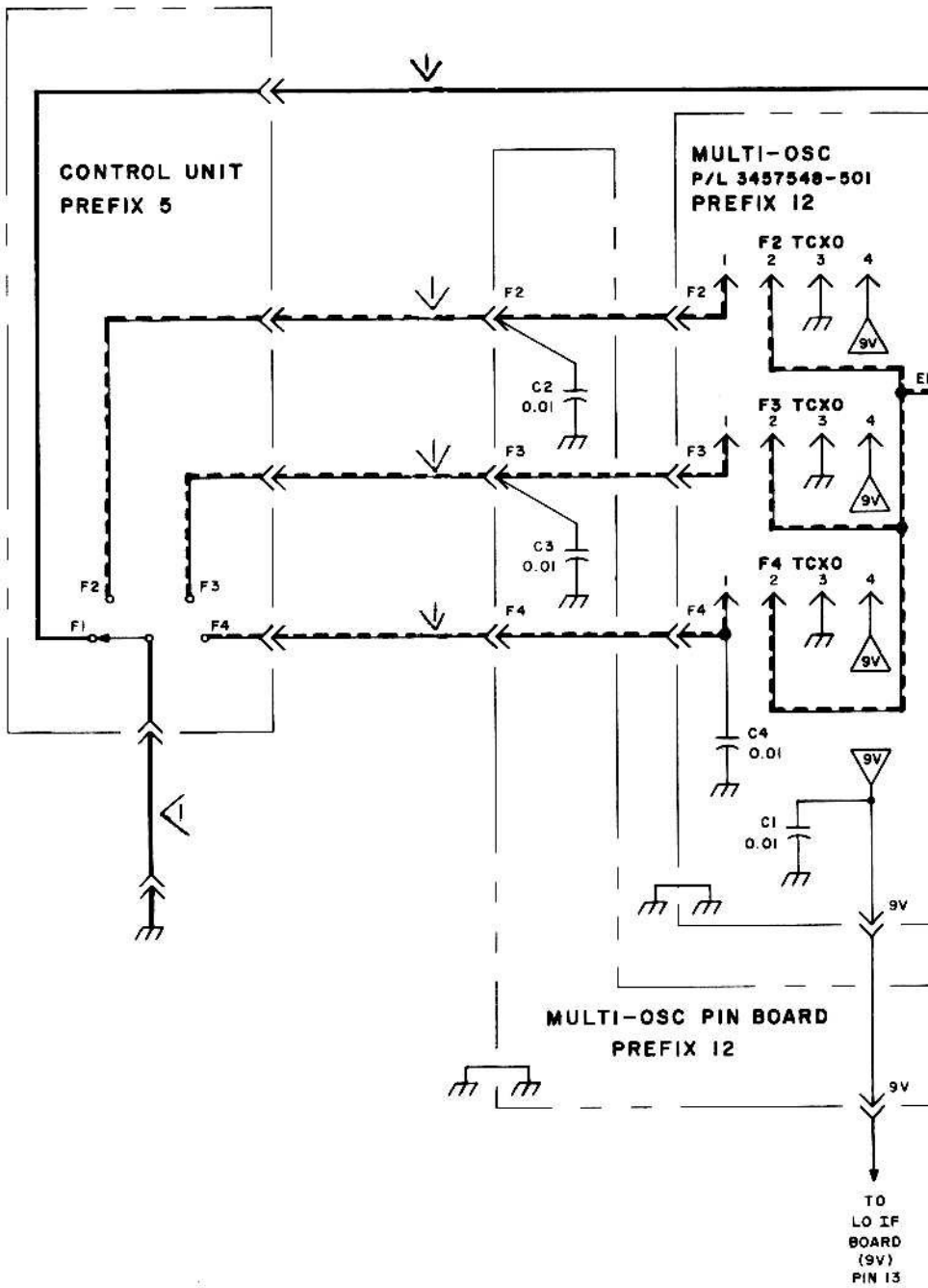
SEMICONDUCTOR TYPES SHOWN ARE FOR EMERGENCY USE ONLY. USING THESE MAY RESULT IN DEGRADED SYSTEM PERFORMANCE. ORDER EXACT REPLACEMENT FROM PARTS LIST.

VOLTAGES SHOWN AS MEASURED WITH RESPECT TO CHASSIS WITH A 20,000 OHMS-PER-VOLT METER.

O = SOLDER PIN

≪ = PUSH-ON CONNECTOR

DERIVED FROM 3476339 REV 13



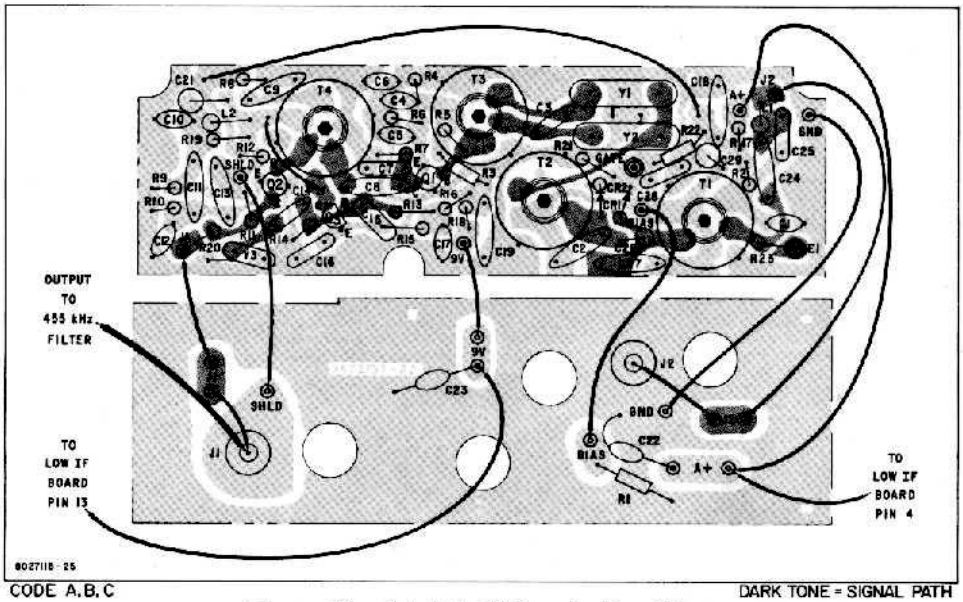


Figure 12. 6.7 MHz IF Board - Top View

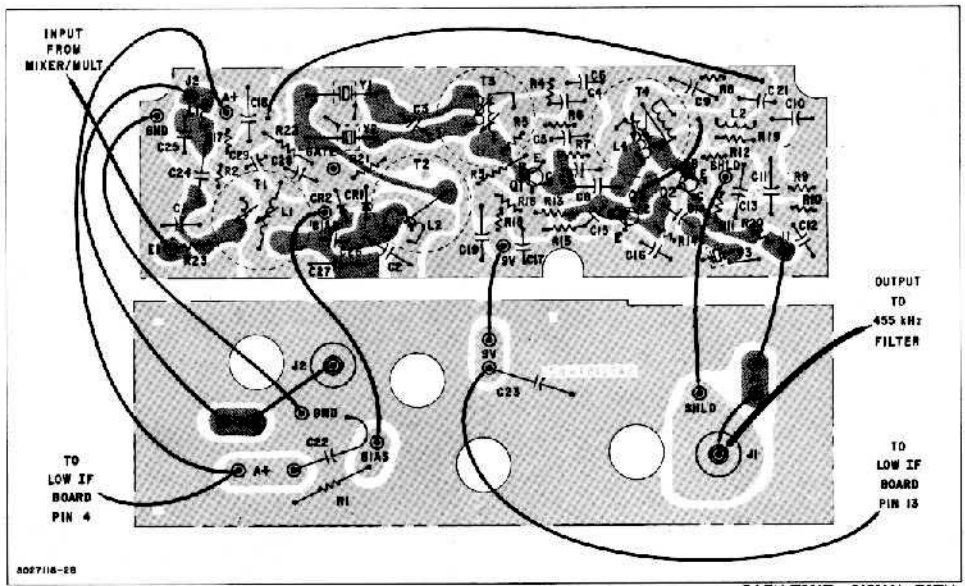
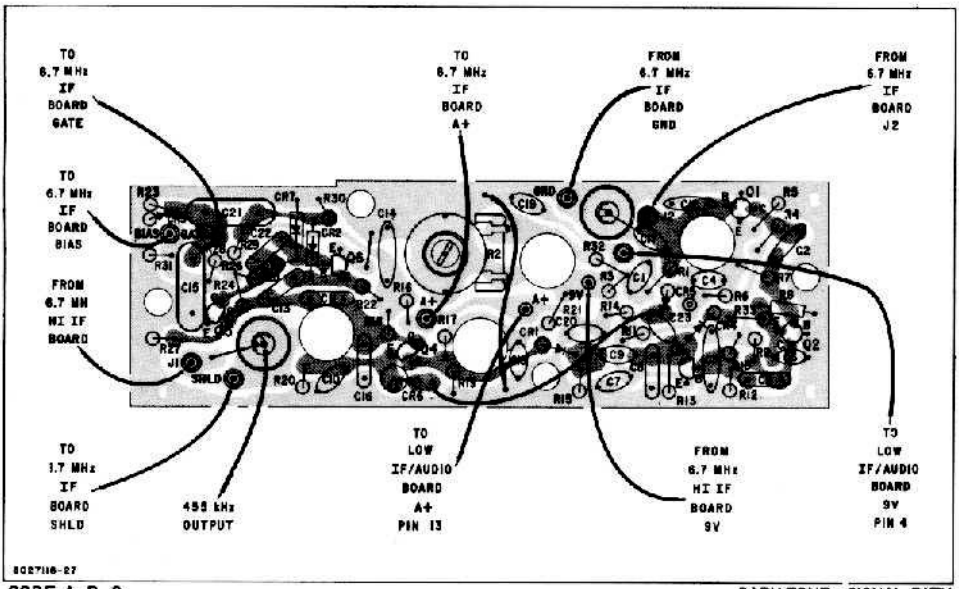
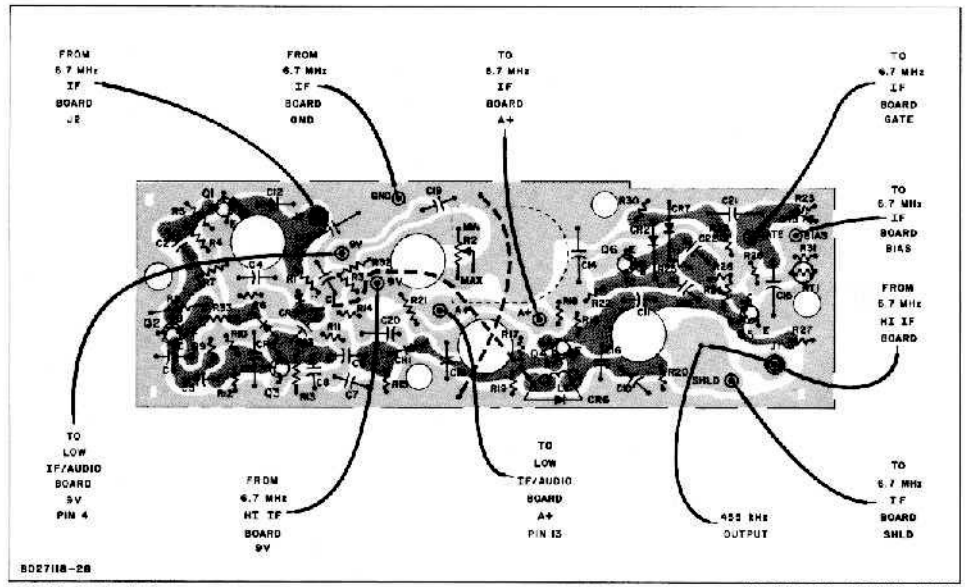


Figure 13. 6.7 MHz IF Board - Bottom View



CODE A, B, C DARK TONE = SIGNAL PATH

Figure 14. Noise Clipper Board - Top View



CODE A, B, C DARK TONE = SIGNAL PATH

Figure 15. Noise Clipper Board - Bottom View

NECTIONS SHOWN SIMPLIFIED. REFER TO
NSTRUCTION BOOK FOR DETAIL.

REMOVED FOR MULTI-FREQUENCY OPERATION.

Y FOR MIXER IS THROUGH HIGH IF BOARD (13)

ND	IIC2 & IIC10	IIC11	IC6	IOC14 & 15	IOC7
Hz	360pF	18pF	0.51pF	34pF	0.43pF
Hz	300pF	15pF	0.47pF	31pF	0.39pF

ASUREMENT
INPUT WILL PRODUCE 10μA AT IJ3 PIN 8.
R TEST SOCKET)

+9V COMMON CONNECTION WITHIN A
BOARD.

S +12V (FILTERED BATTERY VOLTAGE)
CONNECTION WITHIN A CIRCUIT BOARD.

STORS ARE IN OHMS, ±10% UNLESS
SE NOTED.

ACITORS ARE IN μF UNLESS OTHERWISE NOTED.

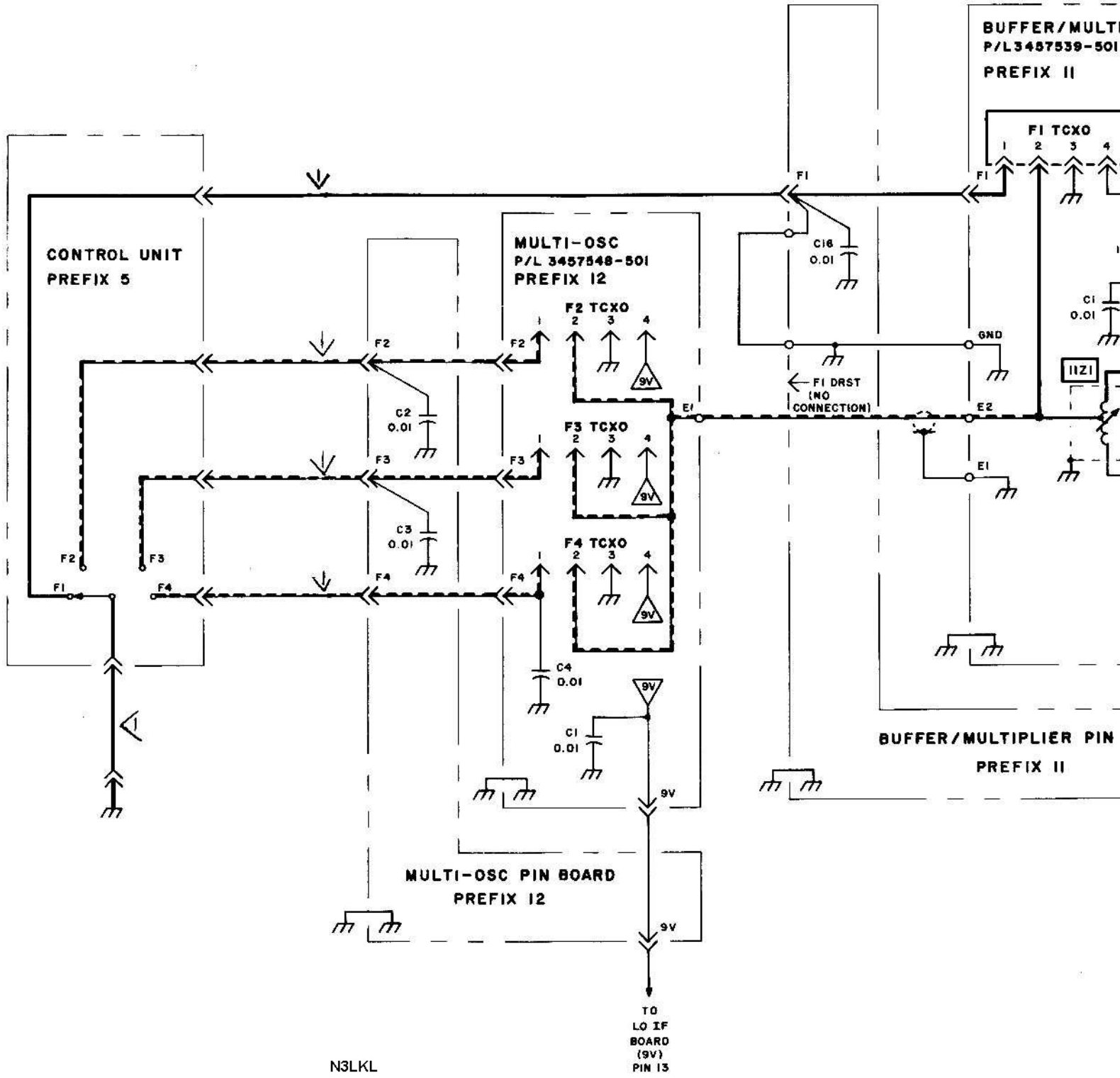
UCTOR TYPES SHOWN ARE FOR EMERGENCY
. USING THESE MAY RESULT IN DEGRADED
PERFORMANCE. ORDER EXACT REPLACEMENT
RTS LIST.

S SHOWN AS MEASURED WITH RESPECT
SIS WITH A 20,000 OHMS-PER-VOLT METER.

PIN

N CONNECTOR

FROM 3476339 REV 13



N3LKL

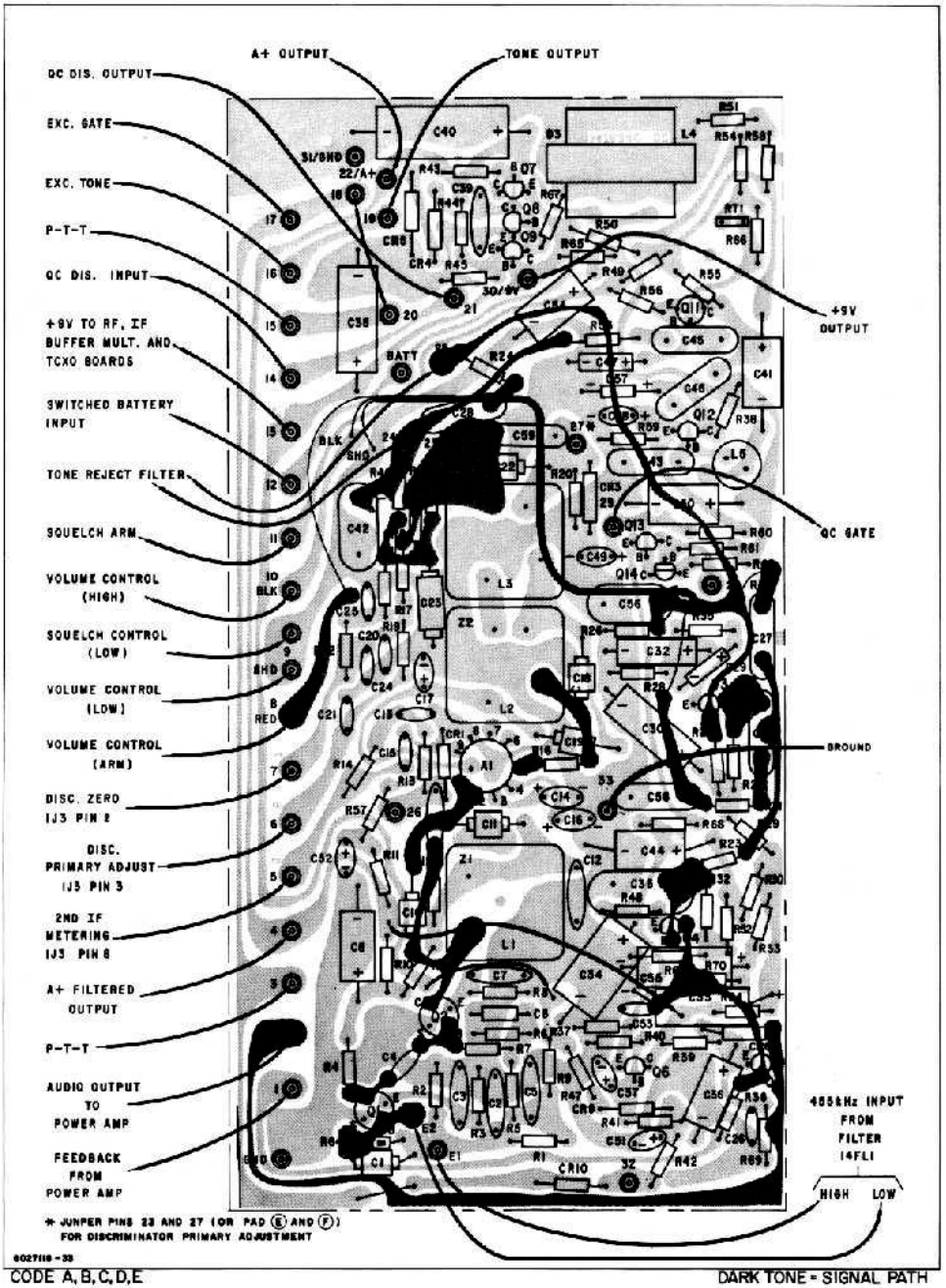


Figure 17. Low IF/Audio Board - Top View

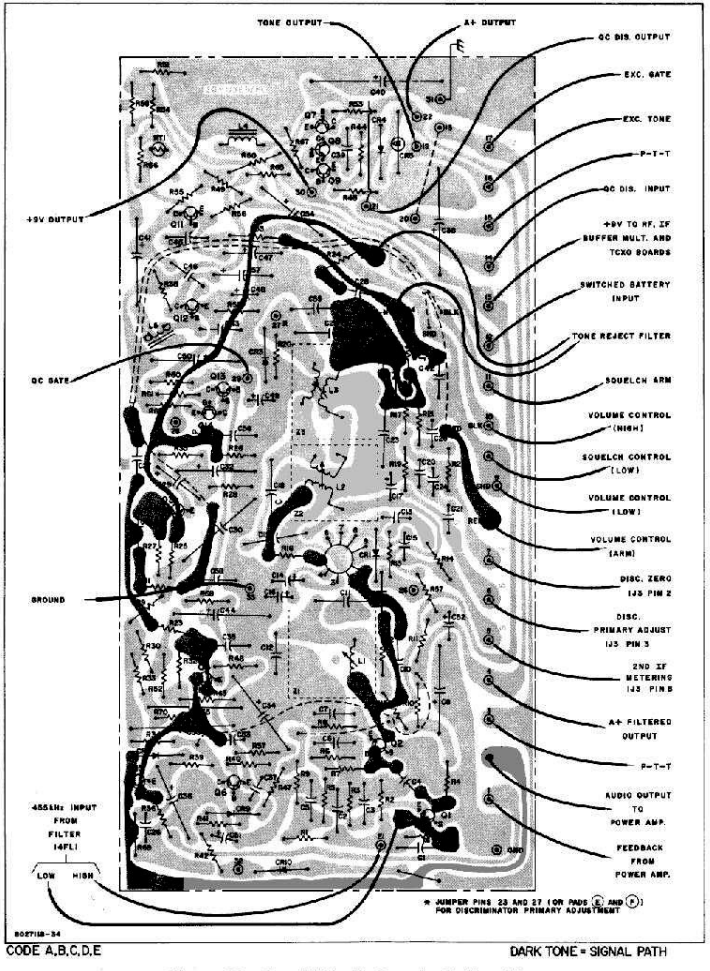
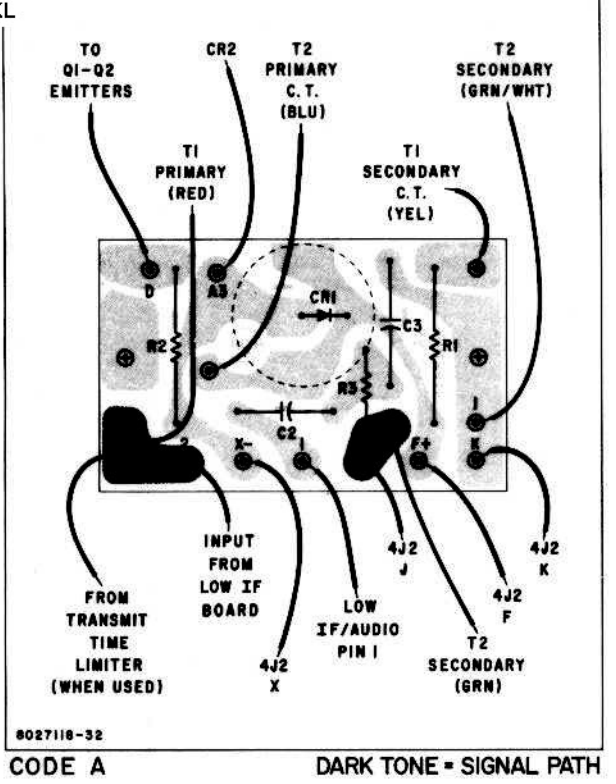
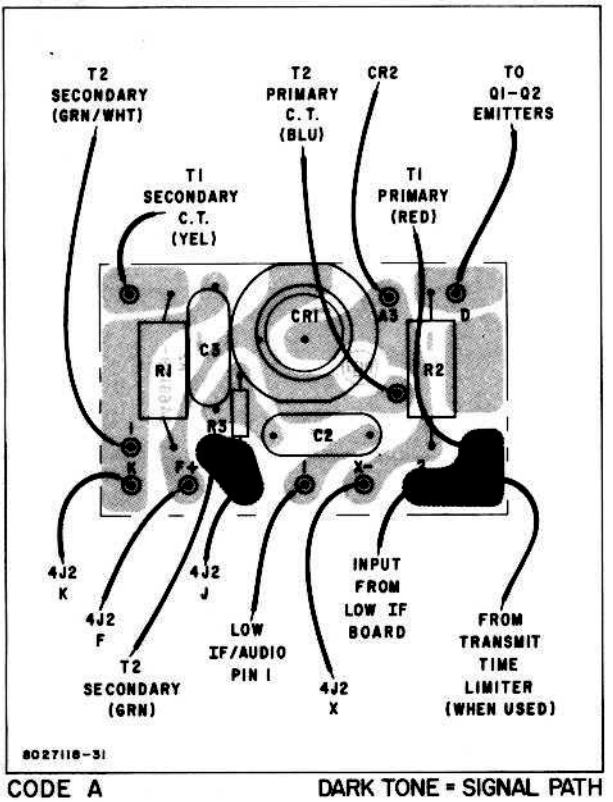


Figure 18. Low IF/Audio Board - Bottom View



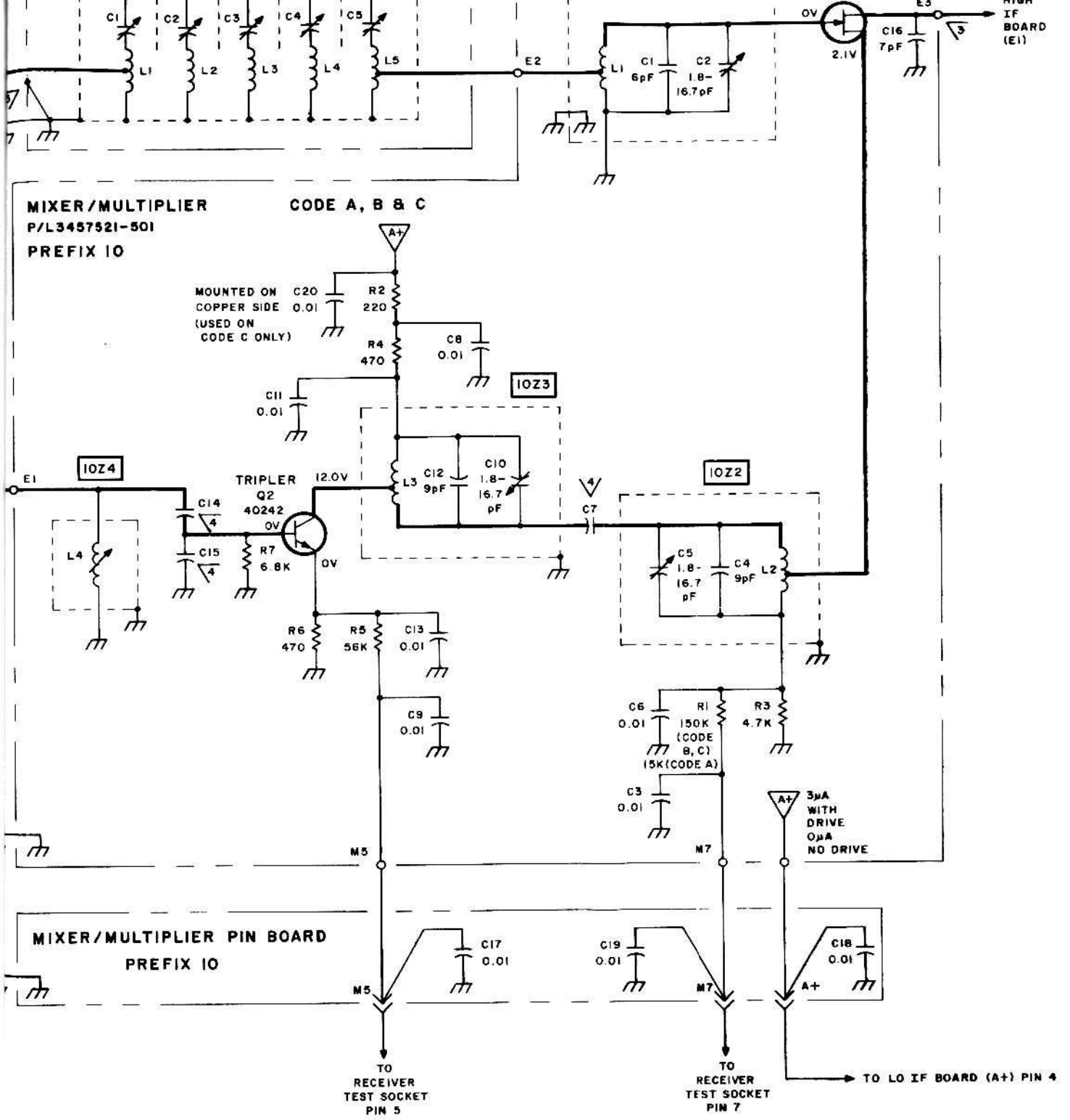
CODE A DARK TONE = SIGNAL PATH

Figure 19. Audio PA Board - Top View



CODE A DARK TONE = SIGNAL PATH

Figure 20. Audio PA Board - Bottom View



N3LKL

Figure 11. 150 MHz Receiver Front End Schematic

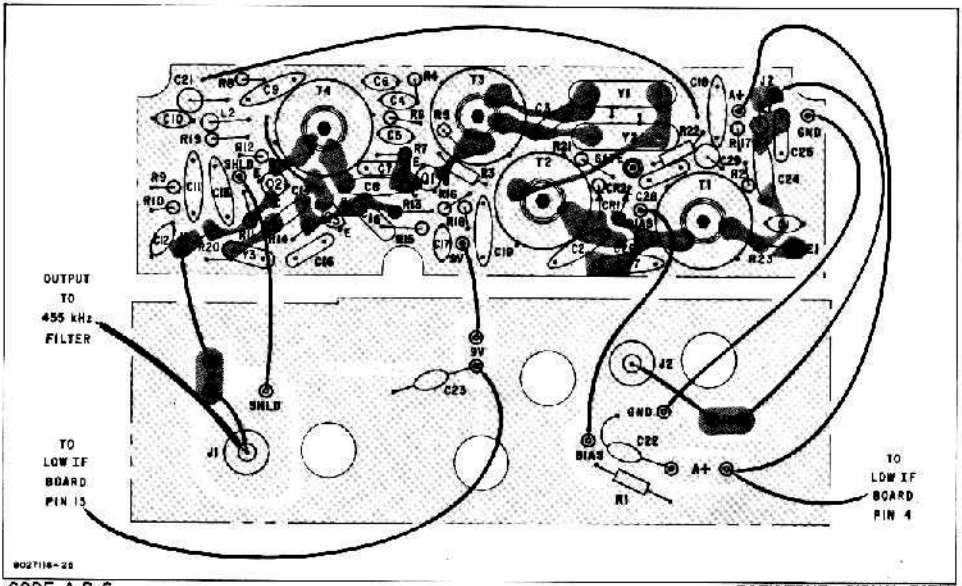


Figure 12. 6.7 MHz IF Board - Top View

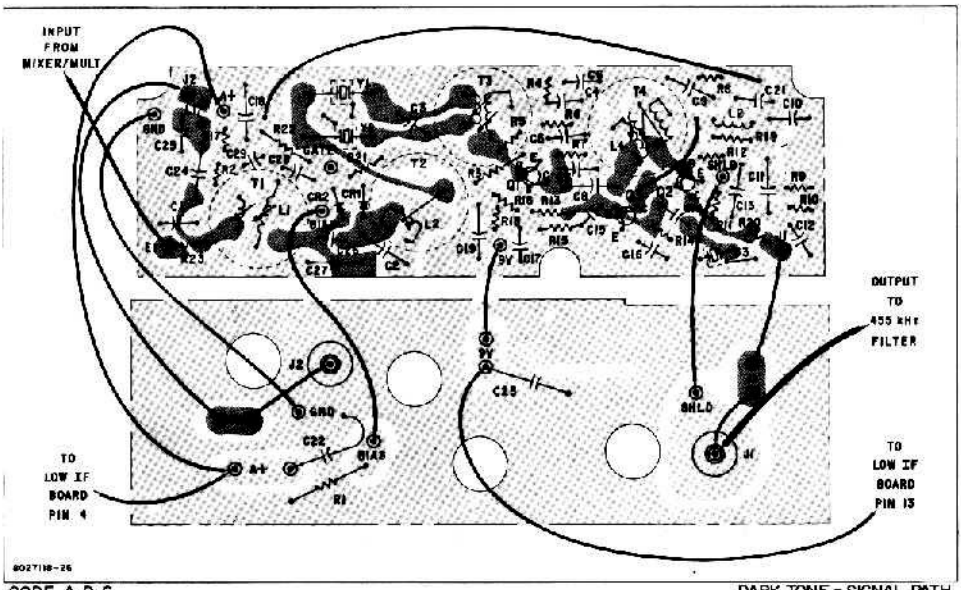
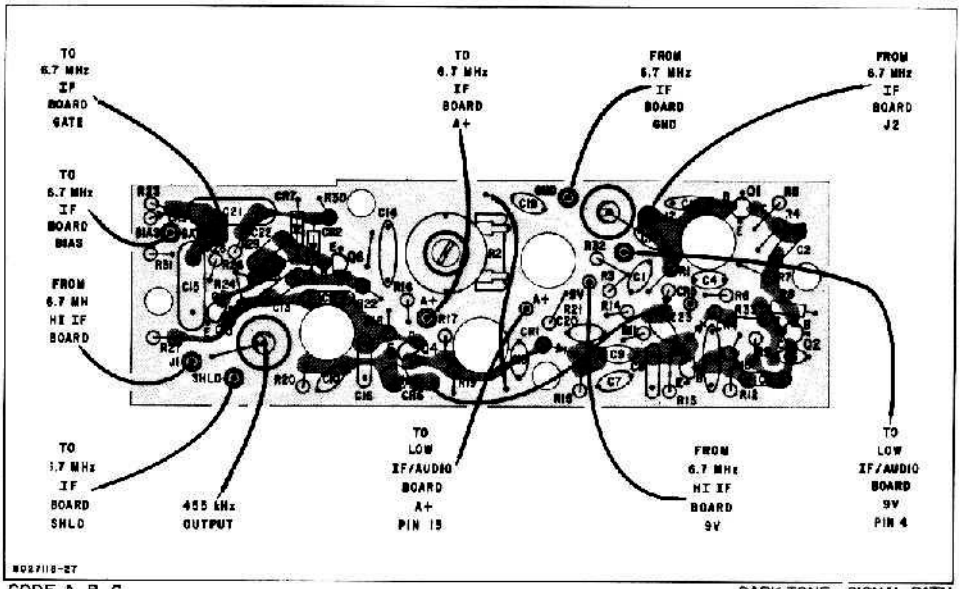


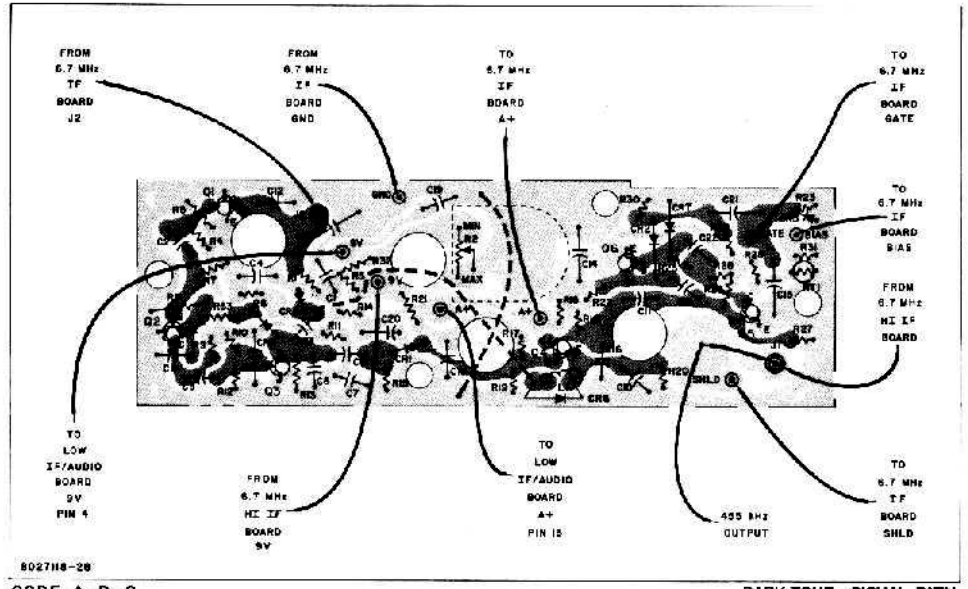
Figure 13. 6.7 MHz IF Board - Bottom View



CODE A, B, C

DARK TONE = SIGNAL PATH

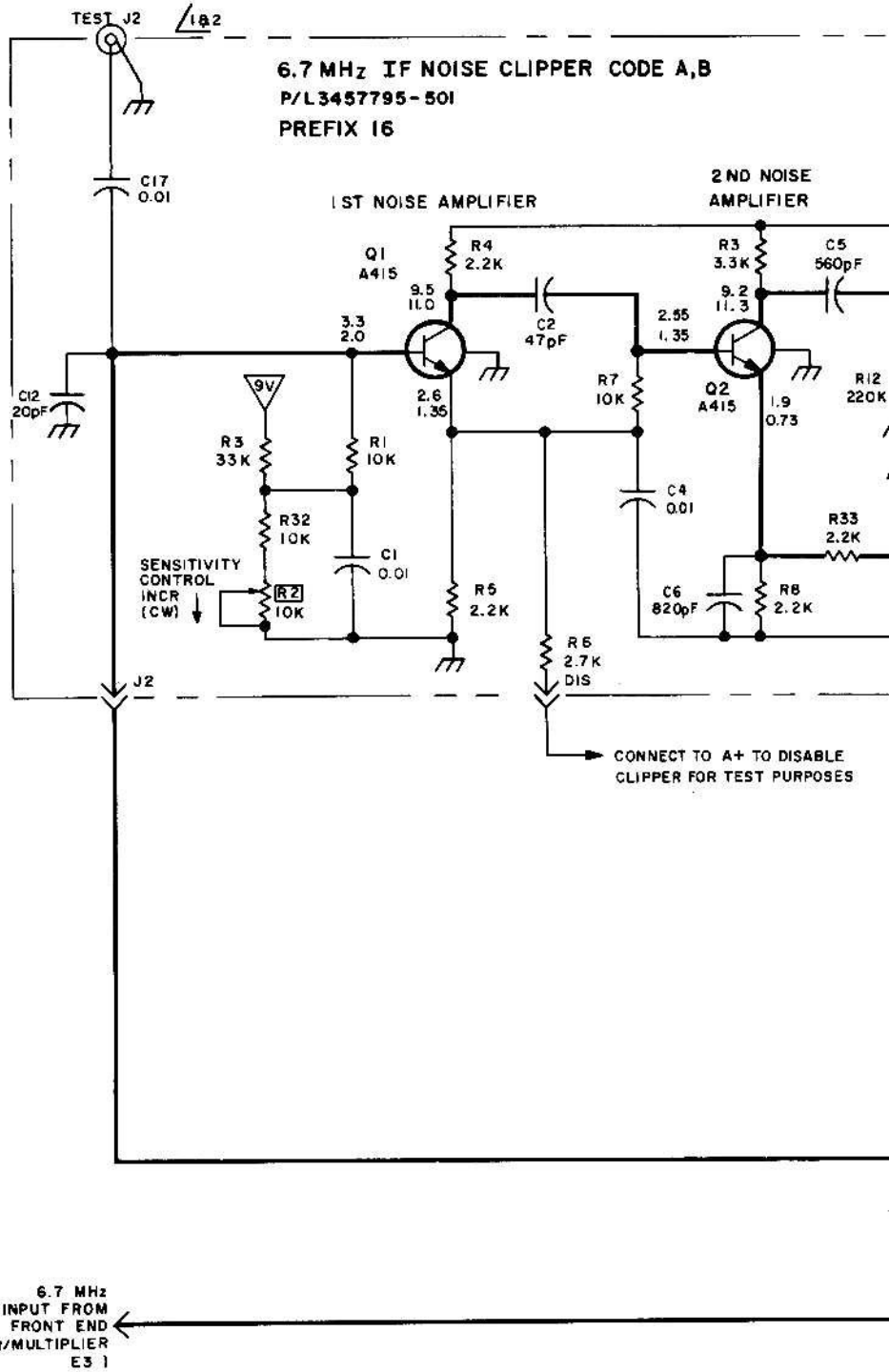
Figure 14. Noise Clipper Board - Top View



CODE A, B, C

DARK TONE = SIGNAL PATH

Figure 15. Noise Clipper Board - Bottom View



OTES:

9V INDICATES +9V COMMON CONNECTION WITHIN A CIRCUIT BOARD

A+ INDICATES + 12V (FILTERED BATTERY VOLTAGE) COMMON CONNECTION WITHIN A CIRCUIT BOARD.

ALL RESISTORS ARE IN OHMS, ± 10% UNLESS OTHERWISE NOTED.

ALL CAPACITORS ARE IN μFD UNLESS OTHERWISE NOTED.

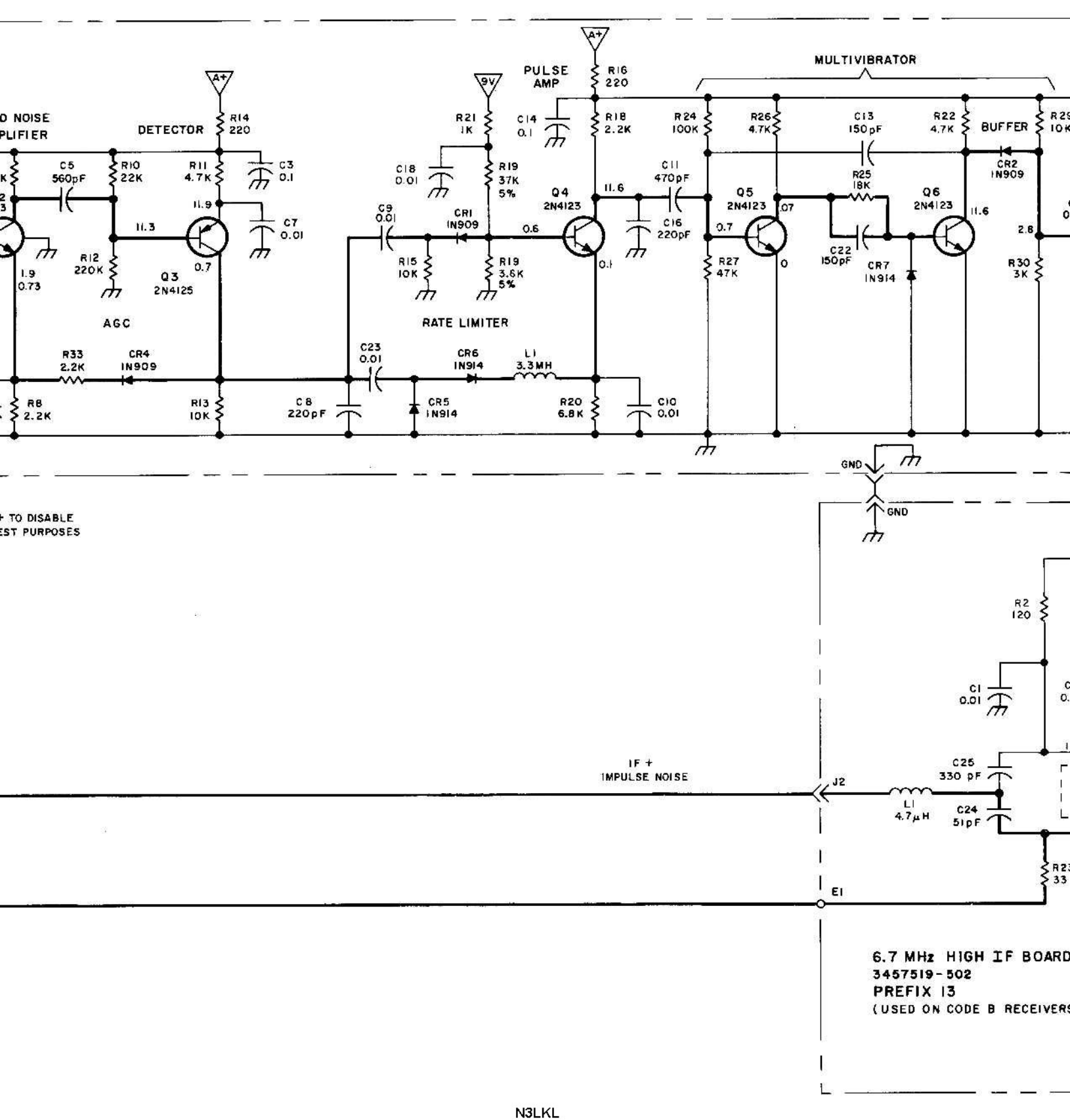
SEMICONDUCTOR TYPES SHOWN ARE FOR EMERGENCY USE ONLY. USING THESE MAY RESULT IN DEGRADED SYSTEM PERFORMANCE.

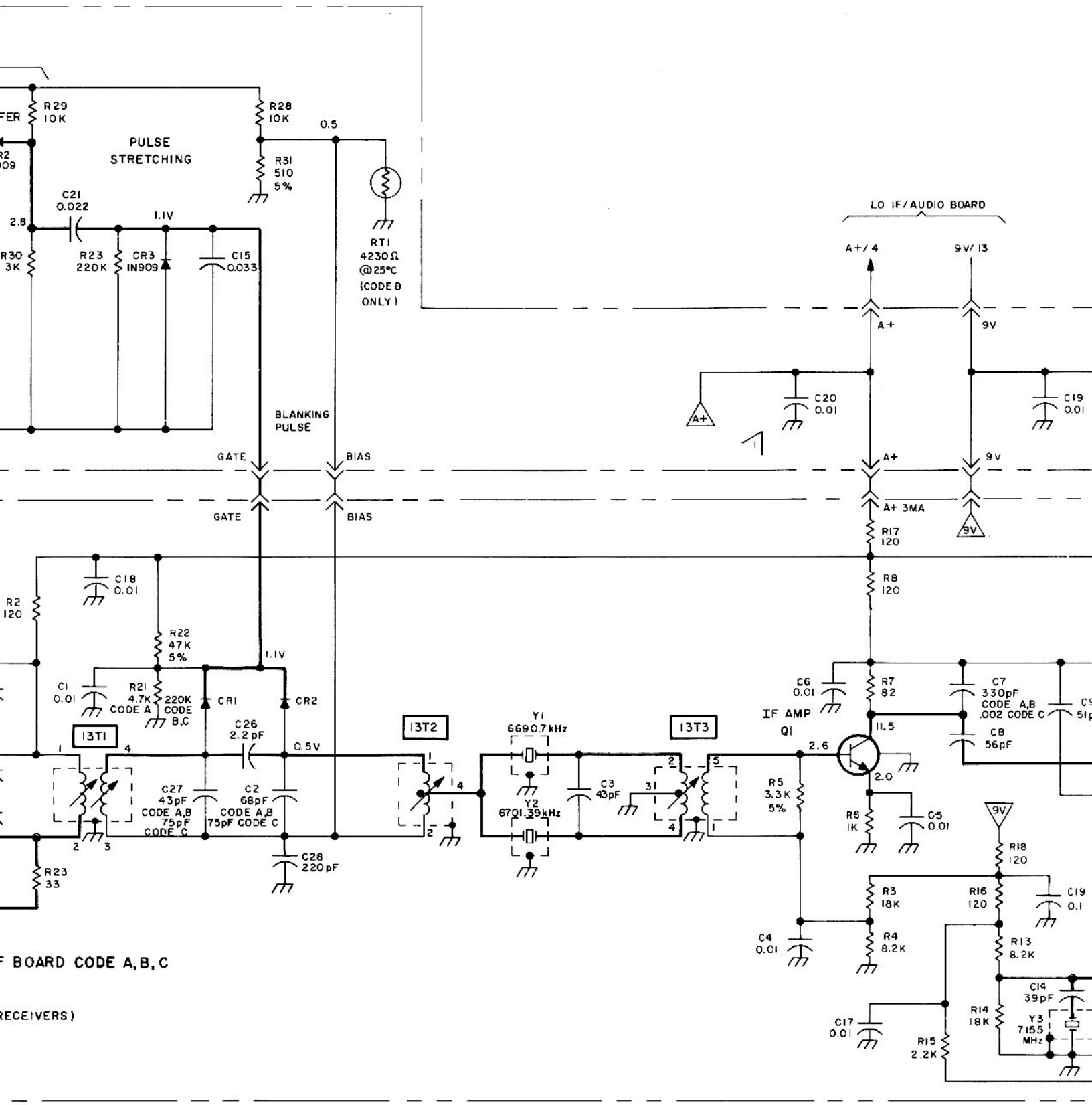
WHERE TWO VALUES ARE GIVEN FOR TRANSISTOR EMITTER, BASE, AND COLLECTOR DC VOLTAGES (ON NOISE CLIPPER), THE TOP READING IS WITH R2 FULLY CW, THE BOTTOM WITH R2 FULLY CCW.

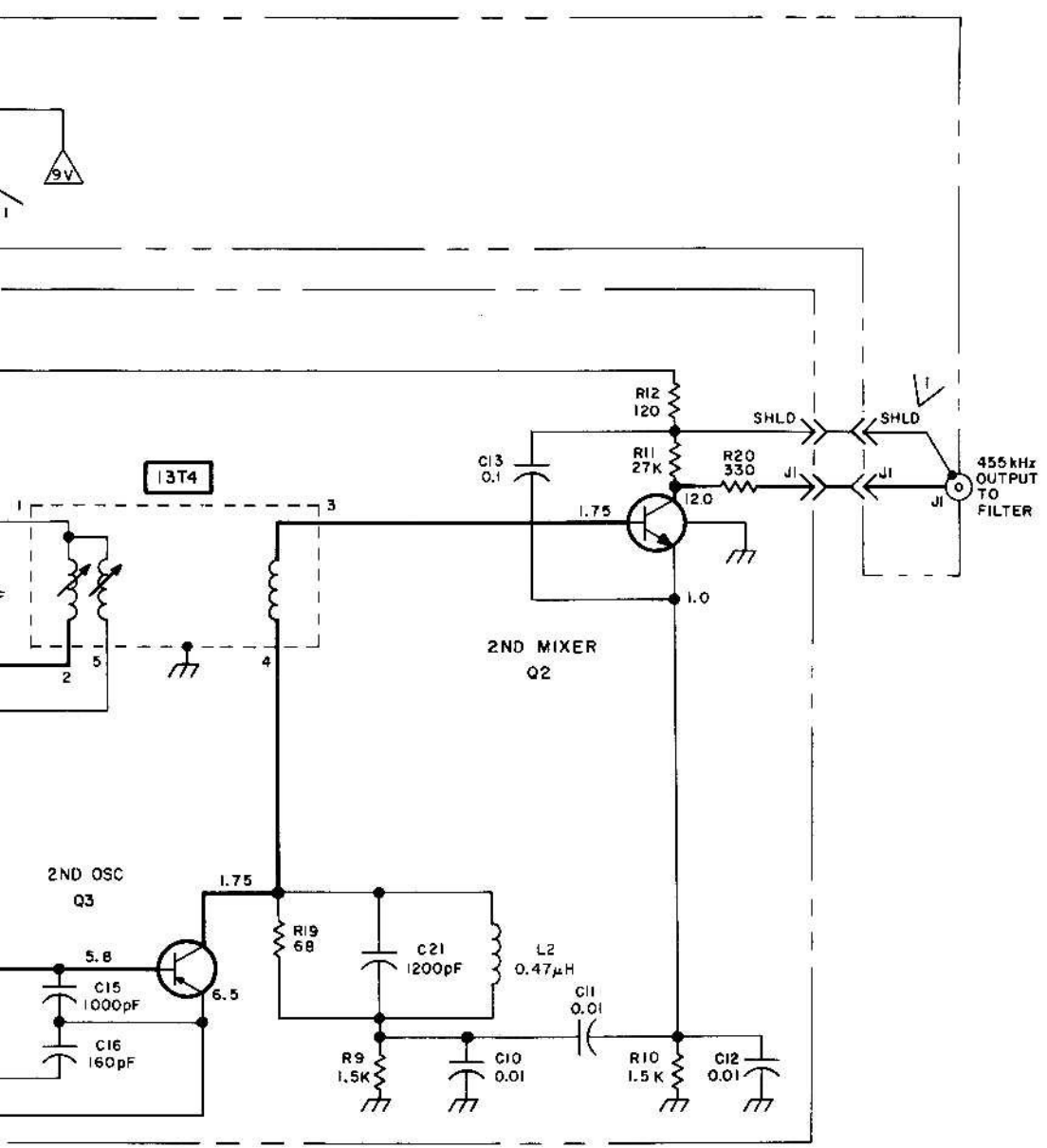
DC VOLTAGES SHOWN AS MEASURED WITH RESPECT TO CHASSIS, USING A 20,000 OHMS-PER-VOLT METER.

1 WHEN NOISE CLIPPER IS NOT USED, J1 & J2, BYPASS CAPACITORS, AND A+ & 9V CONNECTIONS ARE ON PIN BOARD.

2 GAIN MEASUREMENTS
52μV (6.7 MHz) AT 13J2 WILL PRODUCE 10μA AT 1J3 PIN 8 (RECEIVER TEST SOCKET)


D NOISE
PLIFIER
DETECTOR
A+
R14
220
C5
560pF
R10
22K
R11
4.7K
C3
0.1
C7
0.01
11.9
11.3
0.7
R12
220K
Q3
2N4125
1.9
0.73
AGC
R33
2.2K
CR4
IN909
R8
2.2K
R13
10K
C8
220pF
9V
R21
1K
C18
0.01
R19
37K
5%
C9
0.01
CR1
IN909
R15
10K
R19
3.6K
5%
RATE LIMITER
C23
0.01
CR6
IN914
L1
3.3MH
CR5
IN914
PULSE
AMP
R16
220
C14
0.1
R18
2.2K
Q4
2N4123
11.6
0.6
0.1
R20
6.8K
C10
0.01
C11
470pF
C16
220pF
MULTIVIBRATOR
R24
100K
R26
4.7K
C13
150pF
R22
4.7K
BUFFER
CR2
IN909
Q5
2N4123
0.7
0.7
0
R27
47K
R25
18K
C22
150pF
CR7
IN914
Q6
2N4123
11.6
2.8
R30
3K
GND
GND
+ TO DISABLE
EST PURPOSES
R2
120
C1
0.01
IF +
IMPULSE NOISE
J2
C25
330 pF
L1
4.7μH
C24
51pF
E1
6.7 MHz HIGH IF BOARD
3457519-502
PREFIX 13
(USED ON CODE B RECEIVERS


R29 10K
R28 10K
0.5
PULSE STRETCHING
R31 510 5%
C21 0.022
2.8
1.1V
R30 3K
R23 220K
CR3 IN909
C15 0.033
RT1 4230Ω @25°C (CODE B ONLY)
LO IF/AUDIO BOARD
A+/4
9V/13
A+
9V
C20 0.01
C19 0.01
BLANKING PULSE
GATE
BIAS
A+ 3MA
R17 120
R8 120
C18 0.01
R2 120
R22 47K 5%
C1 0.01
R21 4.7K CODE A 220K CODE B,C
CR1
CR2
C26 2.2 pF
0.5V
13T1
13T2
13T3
Y1 6690.7kHz
Y2 6701.39kHz
C3 43pF
C27 43pF CODE A,B 75pF CODE C
C2 68pF CODE A,B 75pF CODE C
C28 220pF
R23 33
IF AMP Q1
C6 0.01
R7 82
C7 330pF CODE A,B .002 CODE C
C8 56pF
11.5
2.6
2.0
R5 3.3K 5%
R6 1K
C5 0.01
R18 120
R3 18K
R16 120
C19 0.1
R4 8.2K
R13 8.2K
C4 0.01
C14 39pF
R14 18K
Y3 7.155 MHz
C17 0.01
R15 2.2K
F BOARD CODE A,B,C
RECEIVERS)



N3LKL

Figure 16. 6.7 MHz IF Circuit Schematic

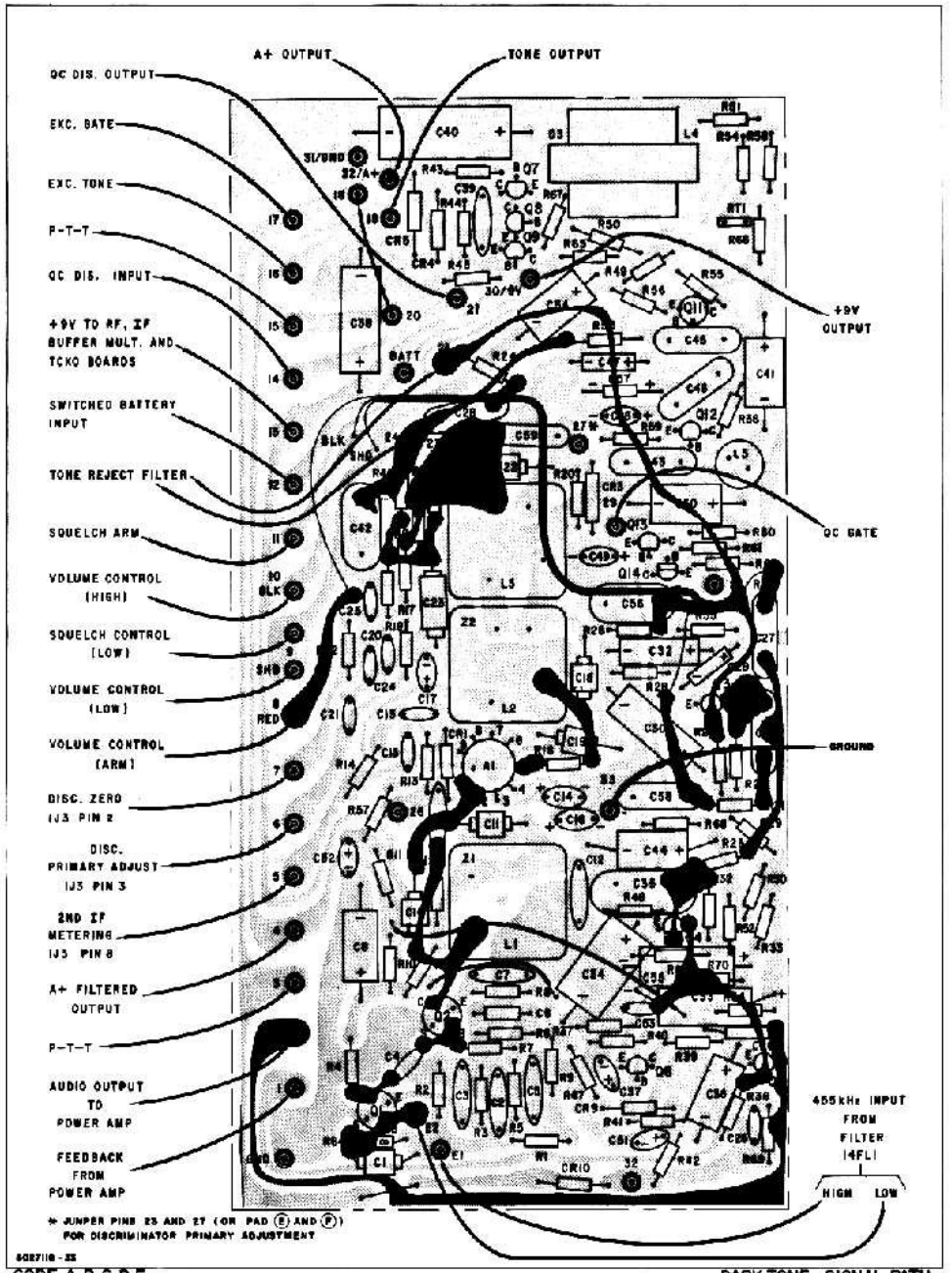


Figure 17. Low IF/Audio Board - Top View

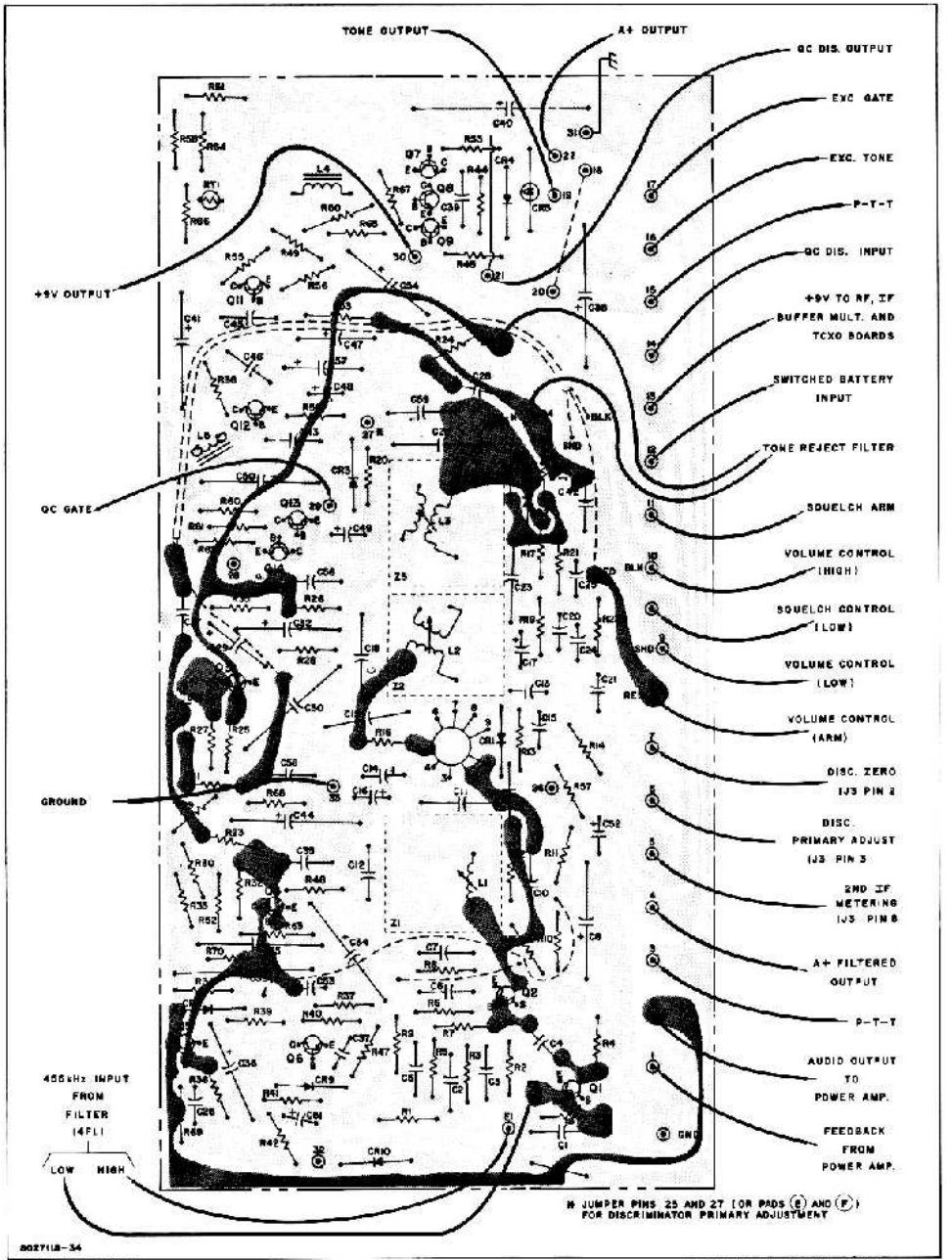
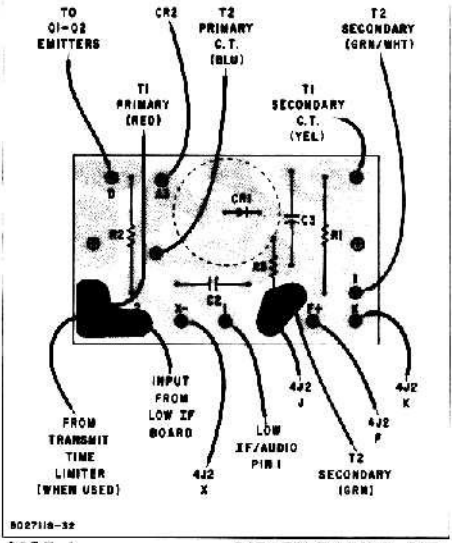
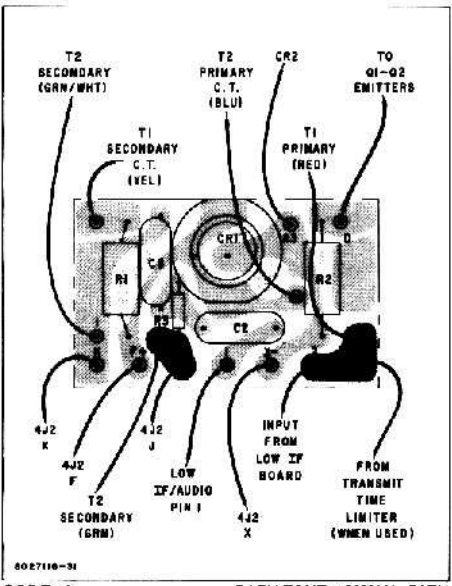


Figure 18. Low IF/Audio Board - Bottom View



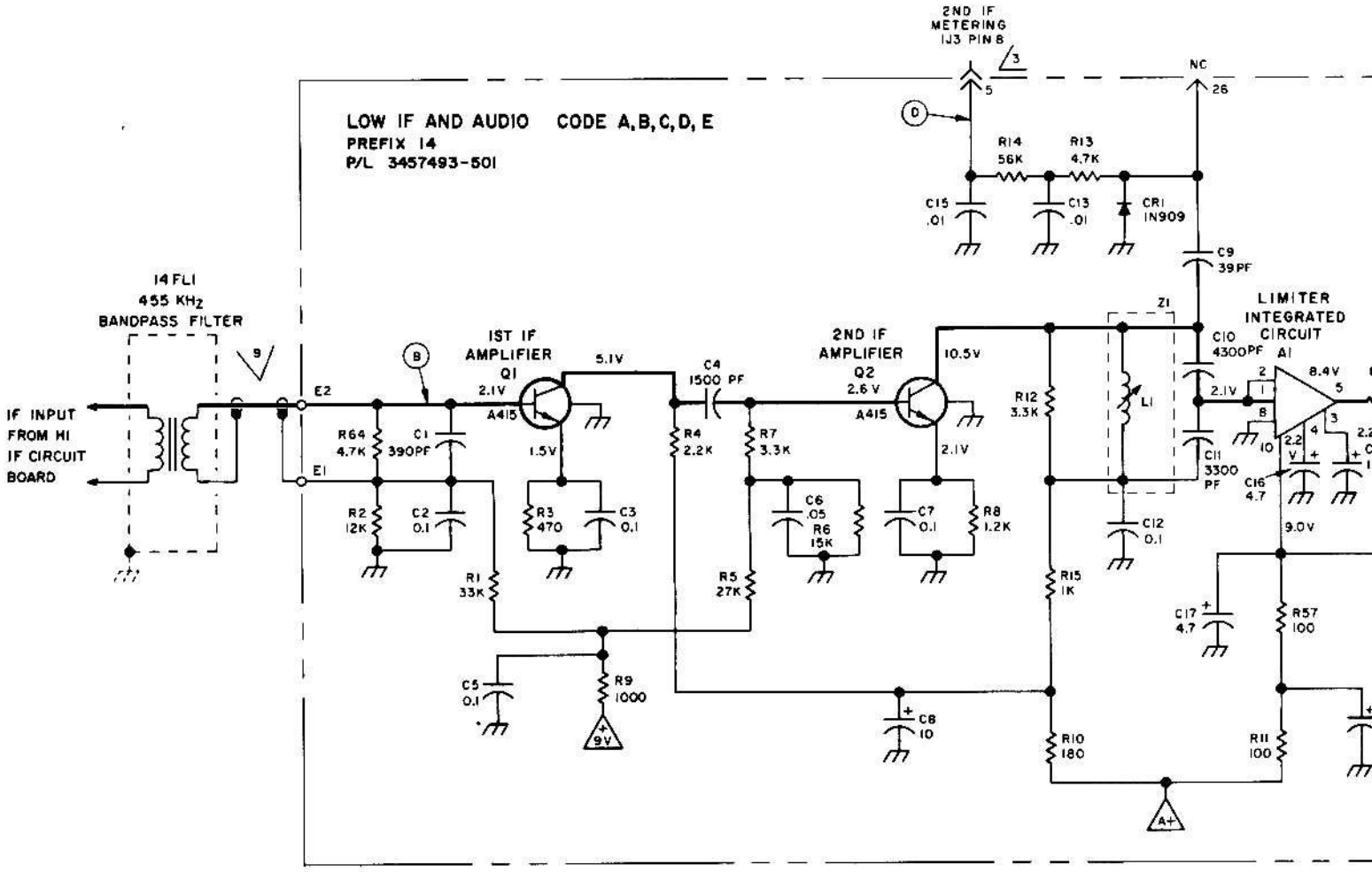
CODE A — DARK TONE = SIGNAL PATH

Figure 19. Audio PA Board - Top View



CODE A — DARK TONE = SIGNAL PATH

Figure 20. Audio PA Board - Bottom View



NOTES:

ALL RESISTOR VALUES IN OHMS (K=X1000), 1/4 WATTS, ±10% UNLESS OTHERWISE NOTED.

ALL CAPACITORS VALUES ARE MICROFARADS UNLESS OTHERWISE NOTED.

/1\ REFER TO SYSTEM INSTRUCTION BOOK FOR DETAILED INTERCONNECTION INFORMATION.

/2\ WHEN THE OPTIONAL QUIET CHANNEL UNIT IS USED, REMOVE 14R24 BY CLIPPING ONE OF THE LEADS. THE TONE REJECT FILTER (LOCATED ON THE QUIET CHANNEL DECODER BOARD) IS CONNECTED AS SHOWN.

/3\ METERING TERMINALS - CONNECTED TO RECEIVER TEST SOCKET PIN SHOWN.

/4\ JUMPER PINS 23 AND 27 OR PADS (E) & (F) FOR DISCRIMINATOR PRIMARY ADJUSTMENT.

5. /+9V\ INDICATES +9VDC COMMON CONNECTIONS.

6. /A+\ INDICATES A+ COMMON CONNECTIONS.

7. THE CIRCLED LETTERS ARE
IF AND AUDIO BOARD. EXA

8. DC VOLTAGES MEASURED TO
OR 20,000 OHMS/VOLTMET
VOLTMETER OR EQUIVALENT,
5 WATTS AUDIO OUTPUT.
TS = TIGHT SQUELCH
OS = OPEN SQUELCH

9. GAIN MEASUREMENT (SIGNA
12.2m VOLTS 455 KHz INP

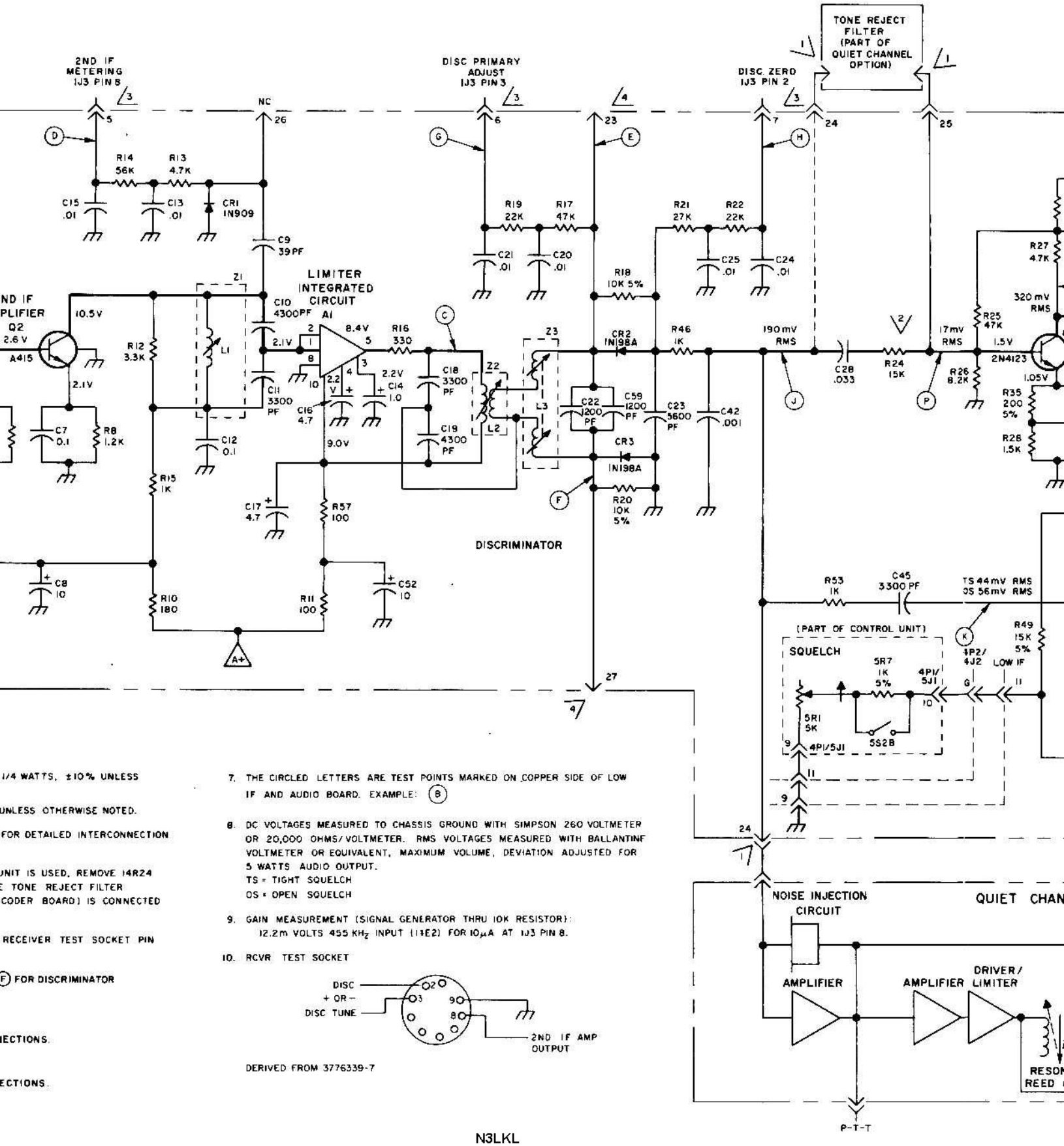
10. RCVR TEST SOCKET

DISC
+ OR -
DISC TUNE

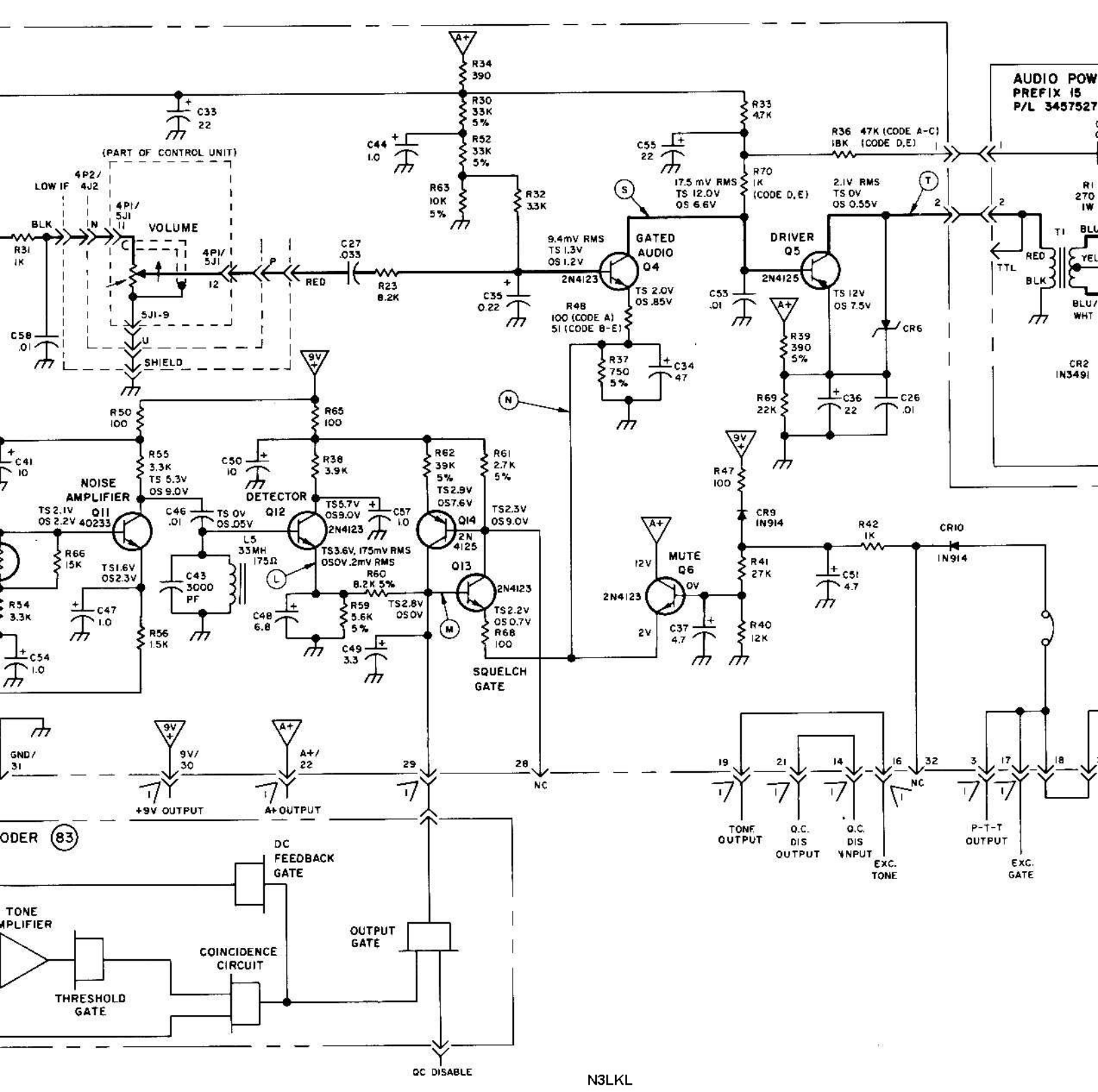
DERIVED FROM 3776339-7

DERIVED FROM 3476339-14 REV.14
8027118-35

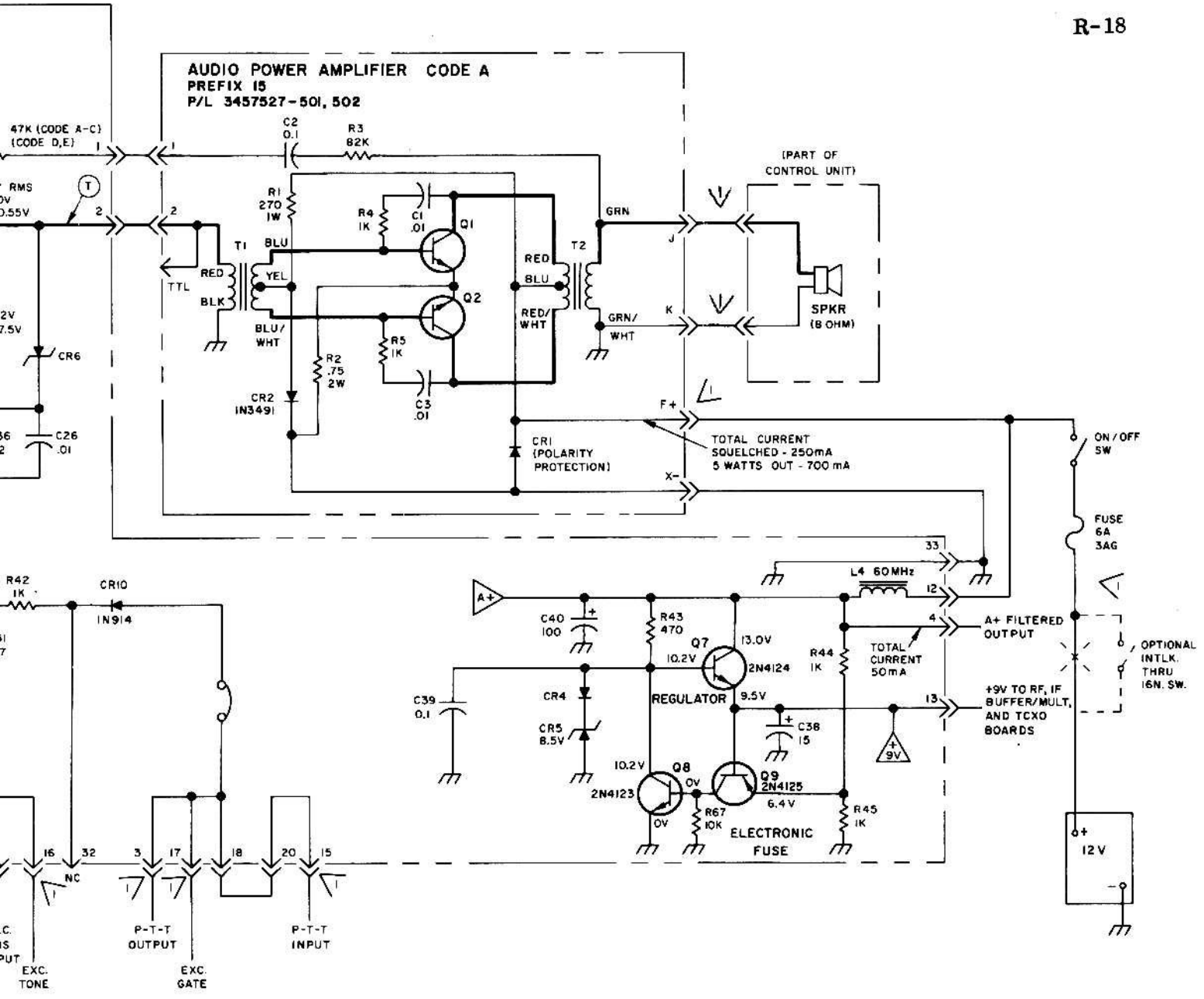
N3LKL


2ND IF METERING 1J3 PIN 8
DISC PRIMARY ADJUST 1J3 PIN 3
DISC. ZERO 1J3 PIN 2
TONE REJECT FILTER (PART OF QUIET CHANNEL OPTION)
LIMITER INTEGRATED CIRCUIT
DISCRIMINATOR
SQUELCH
(PART OF CONTROL UNIT)
NOISE INJECTION CIRCUIT
QUIET CHAN
AMPLIFIER
DRIVER/ LIMITER
P-T-T
R14 56K
R13 4.7K
C15 .01
C13 .01
CR1 IN909
C9 39PF
Z1
C10 4300PF
A1
C11 3300 PF
C12 0.1
C16 4.7
C17 4.7
R12 3.3K
L1
C7 0.1
R8 1.2K
R15 1K
R10 180
R11 100
R57 100
C8 10
C52 10
R16 330
C18 3300 PF
C19 4300 PF
C14 1.0
Z2
Z3
L2
L3
R19 22K
R17 47K
C21 .01
C20 .01
R18 10K 5%
R21 27K
R22 22K
C25 .01
C24 .01
CR2 IN198A
CR3 IN198A
R20 10K 5%
R46 1K
C22 1200 PF
C59 1200 PF
C23 5600 PF
C42 .001
C28 .033
R24 15K
R25 47K
R26 8.2K
R27 4.7K
R35 200 5%
R28 1.5K
2N4123
320 mV RMS
190 mV RMS
17 mV RMS
10.5V
2.1V
2.2V
8.4V
9.0V
1.05V
1.5V
R53 1K
C45 3300 PF
TS 44 mV RMS
OS 56 mV RMS
R49 15K 5%
5R7 1K 5%
5R1 5K
5S2B
4P1/5J1
4P2/4J2
LOW IF
NC
1/4 WATTS, ±10% UNLESS
UNLESS OTHERWISE NOTED.
FOR DETAILED INTERCONNECTION
UNIT IS USED, REMOVE 14R24
TONE REJECT FILTER
CODER BOARD) IS CONNECTED
RECEIVER TEST SOCKET PIN
(F) FOR DISCRIMINATOR
IECTIONS.
ECTIONS.
7. THE CIRCLED LETTERS ARE TEST POINTS MARKED ON COPPER SIDE OF LOW IF AND AUDIO BOARD. EXAMPLE: (B)
8. DC VOLTAGES MEASURED TO CHASSIS GROUND WITH SIMPSON 260 VOLTMETER OR 20,000 OHMS/VOLTMETER. RMS VOLTAGES MEASURED WITH BALLANTINF VOLTMETER OR EQUIVALENT, MAXIMUM VOLUME, DEVIATION ADJUSTED FOR 5 WATTS AUDIO OUTPUT.
TS = TIGHT SQUELCH
OS = OPEN SQUELCH
9. GAIN MEASUREMENT (SIGNAL GENERATOR THRU 10K RESISTOR): 12.2m VOLTS 455 KHz INPUT (113E2) FOR 10μA AT 1J3 PIN 8.
10. RCVR TEST SOCKET
DISC
+ OR −
DISC TUNE
2ND IF AMP OUTPUT
DERIVED FROM 3776339-7

N3LKL


AUDIO POW
PREFIX 15
P/L 3457527
(PART OF CONTROL UNIT)
LOW IF
4P2/ 4J2
4PI/ 5JI
VOLUME
BLK
R31 1K
C58 .01
5JI-9
SHIELD
C33 22
C44 1.0
R34 390
R30 33K 5%
R52 33K 5%
R63 10K 5%
R32 3.3K
C27 .033
R23 8.2K
RED
C35 0.22
9.4mV RMS
TS 1.3V
OS 1.2V
2N4123
GATED AUDIO Q4
TS 2.0V
OS .85V
R48 100 (CODE A) 51 (CODE B-E)
R37 750 5%
C34 47
R33 4.7K
C55 22
17.5 mV RMS
TS 12.0V
OS 6.6V
R70 1K (CODE D,E)
R36 47K (CODE A-C) 18K (CODE D,E)
2.1V RMS
TS 0V
OS 0.55V
DRIVER Q5
2N4125
TS 12V
OS 7.5V
C53 .01
CR6
R39 390 5%
R69 22K
C36 22
C26 .01
TTL
RED
BLK
T1
BLU/ WHT
CR2 IN3491
9V
R50 100
R65 100
C41 10
R55 3.3K
TS 5.3V
OS 9.0V
NOISE AMPLIFIER
Q11 40233
TS 2.1V
OS 2.2V
R66 15K
TS1.6V
OS2.3V
R54 3.3K
C47 1.0
R56 1.5K
C54 1.0
C50 10
R38 3.9K
DETECTOR Q12
TS5.7V
OS9.0V
2N4123
C46 .01
TS 0V
OS .05V
C57 1.0
L5 33MH 175Ω
TS3.6V, 175mV RMS
OSOV .2mV RMS
C43 3000 PF
R60 8.2K 5%
C48 6.8
R59 5.6K 5%
TS2.8V
OSOV
C49 3.3
R62 39K 5%
R61 2.7K 5%
TS2.8V
OS7.6V
Q14 2N 4125
TS2.3V
OS9.0V
Q13 2N4123
TS2.2V
OS 0.7V
R68 100
SQUELCH GATE
N
M
L
R47 100
CR9 IN914
R42 1K
CR10 IN914
A+
12V
MUTE Q6
2N4123
0V
2V
R41 27K
C51 4.7
C37 4.7
R40 12K
GND/ 31
9V/ 30
+9V OUTPUT
A+/ 22
A+ OUTPUT
29
28
NC
19
21
14
16
32
3
17
18
TONE OUTPUT
Q.C. DIS OUTPUT
Q.C. DIS INPUT
EXC. TONE
NC
P-T-T OUTPUT
EXC. GATE
ODER (83)
DC FEEDBACK GATE
TONE AMPLIFIER
COINCIDENCE CIRCUIT
OUTPUT GATE
THRESHOLD GATE
QC DISABLE

N3LKL



N3LKL

Figure 21. Low IF/Audio Circuit Schematic

ADDENDUM TO IB-8027266-P

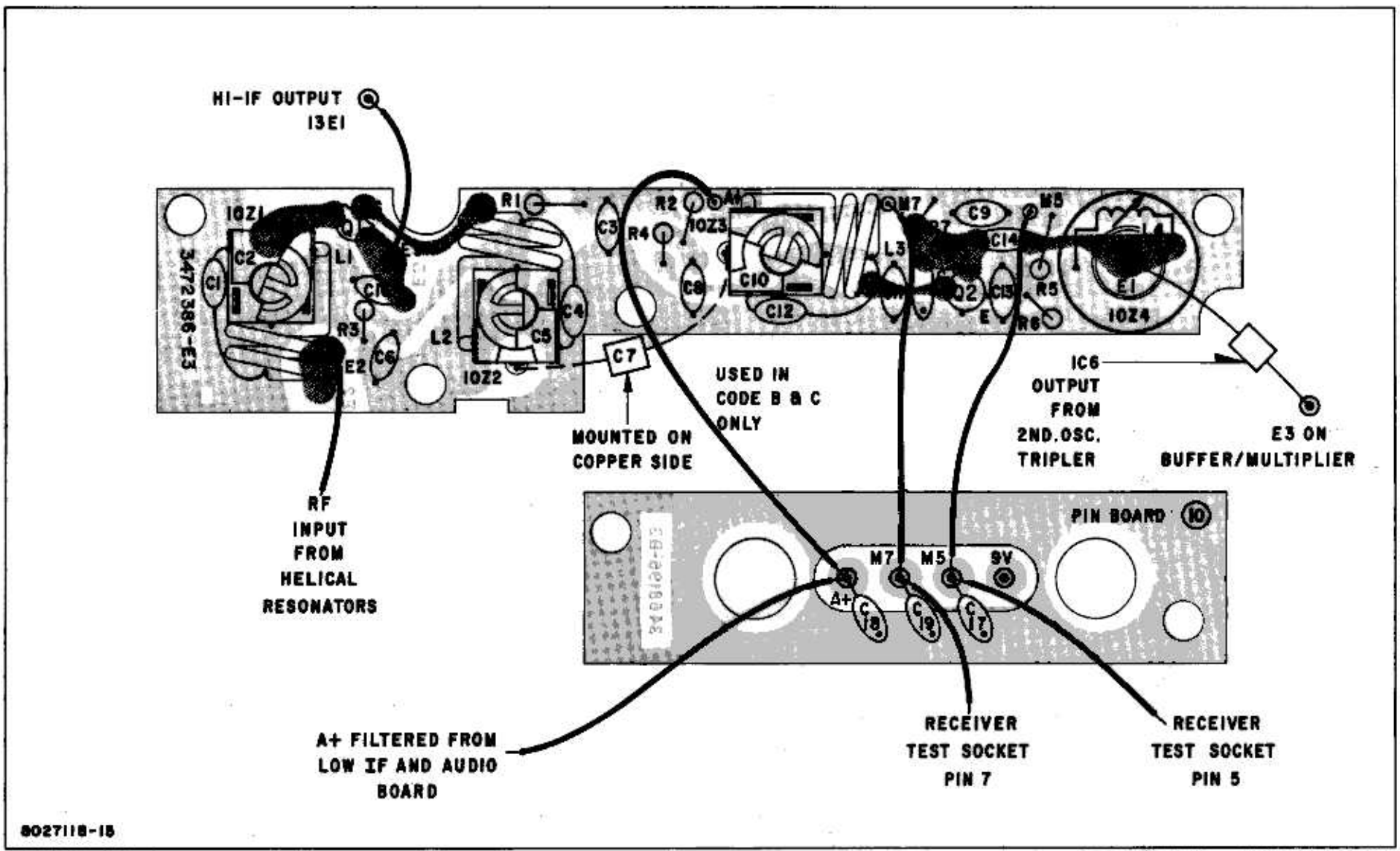
Series 700
Receiver
150 MHz

This document is published to point out a condition whereby damage to equipment could result.

The power ON/OFF switch controls the power to the station however, it does not remove all DC from the unit. When removing any module or component, the system plug (4P2, Trunk Mounted Units - 4P6, Dash Mounted Units) must be removed. Failure to pull the system plug before attempting to remove modules or components could result in damage to the equipment.

Commercial Electronic Systems Division
Front and Cooper Streets, Camden, New Jersey, U.S.A. 08102

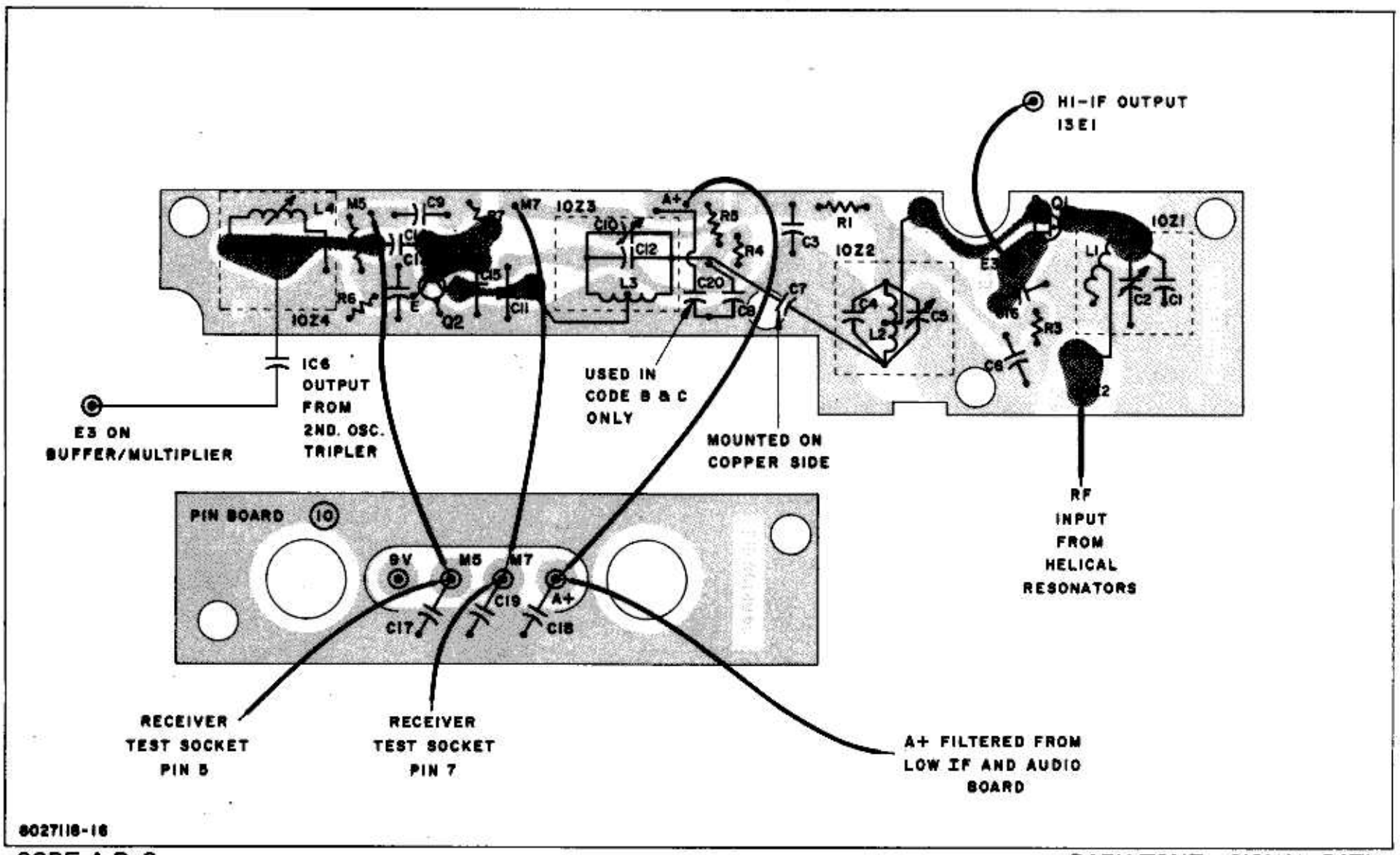
RCA Mobile Communications



CODE A,B,C

DARK TONE = SIGNAL PATH

Figure 5. Mixer/Multiplier Board - Top View



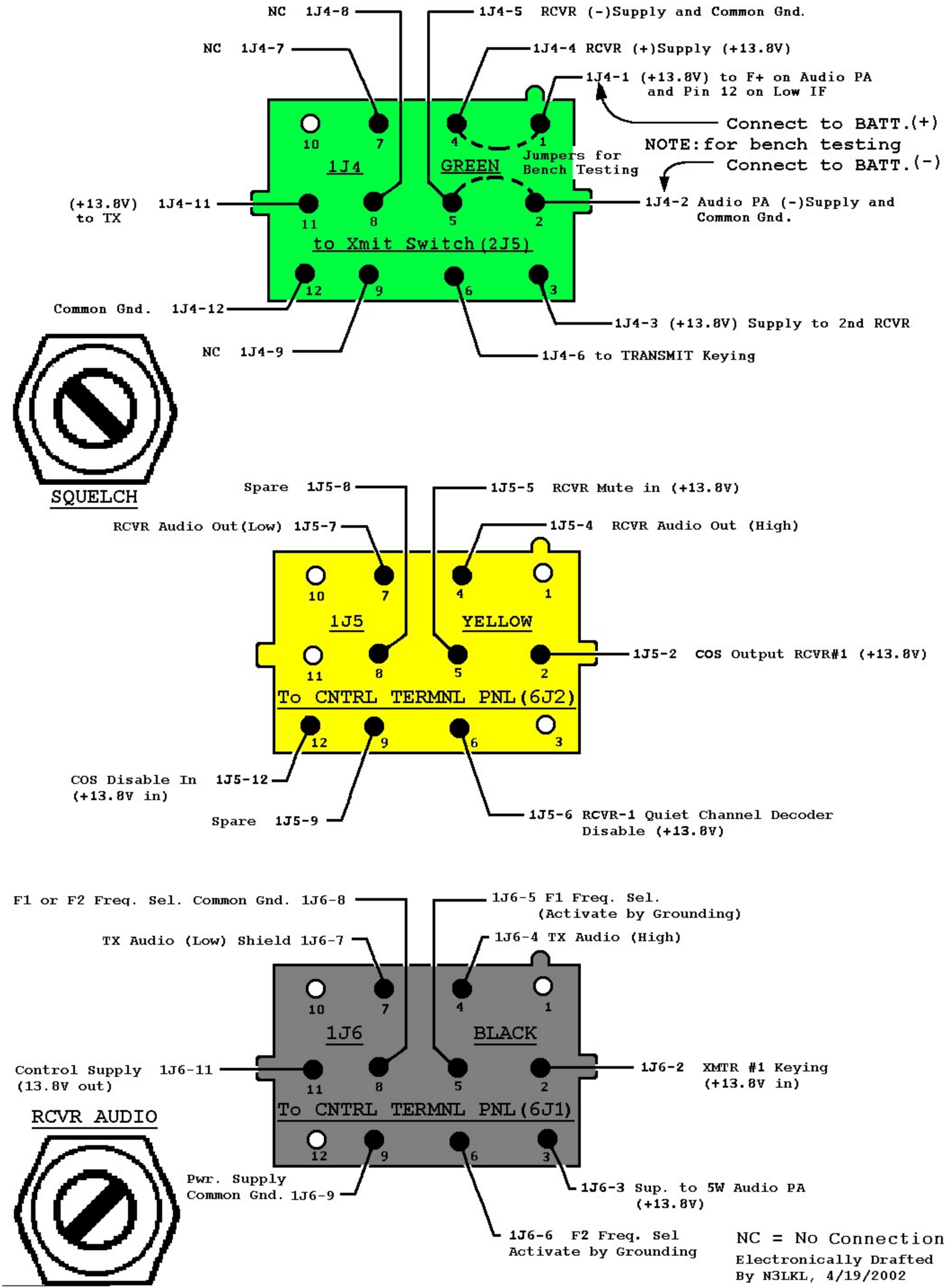
CODE A,B,C

DARK TONE = SIGNAL PATH

Figure 6. Mixer/Multiplier Board - Bottom View

RCA ML1000 Repeater Receiver Bench Test Setup Front Veiw

(Applies to 500 & 700 also)

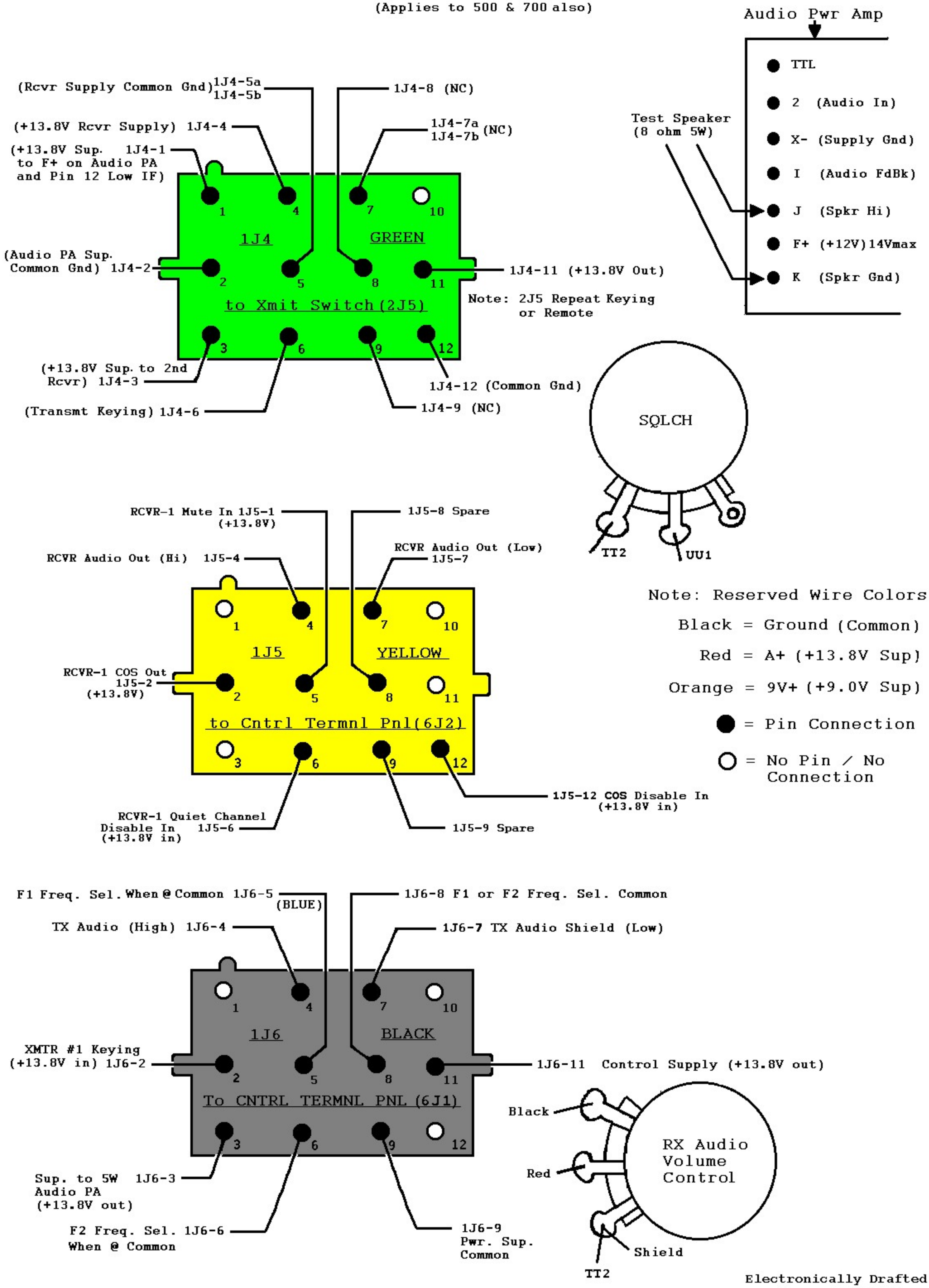


NC = No Connection

Electronically Drafted
By N3LKL, 4/19/2002

RCA ML1000 Repeater Receiver Bench Test Setup Rear View

(Applies to 500 & 700 also)



Electronically Drafted
By N3LKL, 4/19/2002