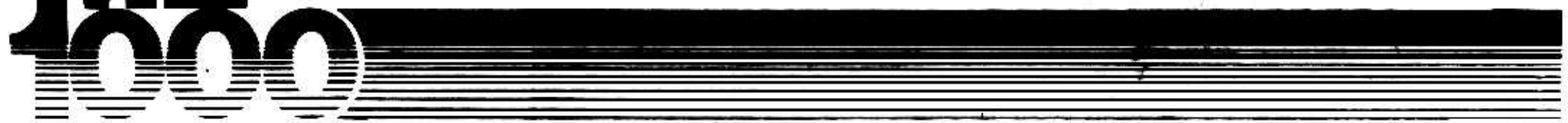


RCA

Mobile Communication Equipment

**ML
1000**



Servicing Information

Optional Modules

Transmitter-Receiver Systems

(Applicable also for Series 700/1000)

GENERAL INFORMATION

This instruction book contains servicing information for all optional modules used in Transmitter - Receiver Systems. A separate section for each module contains the following information.

1. Technical Data
2. Circuit description
3. Pathfinder Diagram
4. Schematic Diagram
5. Replacement Parts
6. Table of Emergency Substitutes for Solid State Devices
7. Table of Production Variations

To locate information for a specific module, use the quick reference edge-bar index on the following page.

CAUTION

Fluctuations of greater than 20% above specified input voltages can permanently damage solid-state devices used in this mobile radio equipment. Whenever possible, use the internal power supply of the radio system while servicing modules. A 12-volt storage battery and charger is the recommended power source for bench testing.

Many commercial regulated power supplies produce voltage transients when switched on or off. The regulator circuits may also be adversely effected by strong RF fields generated by the multiplier and power amplifier circuits of the transmitter.

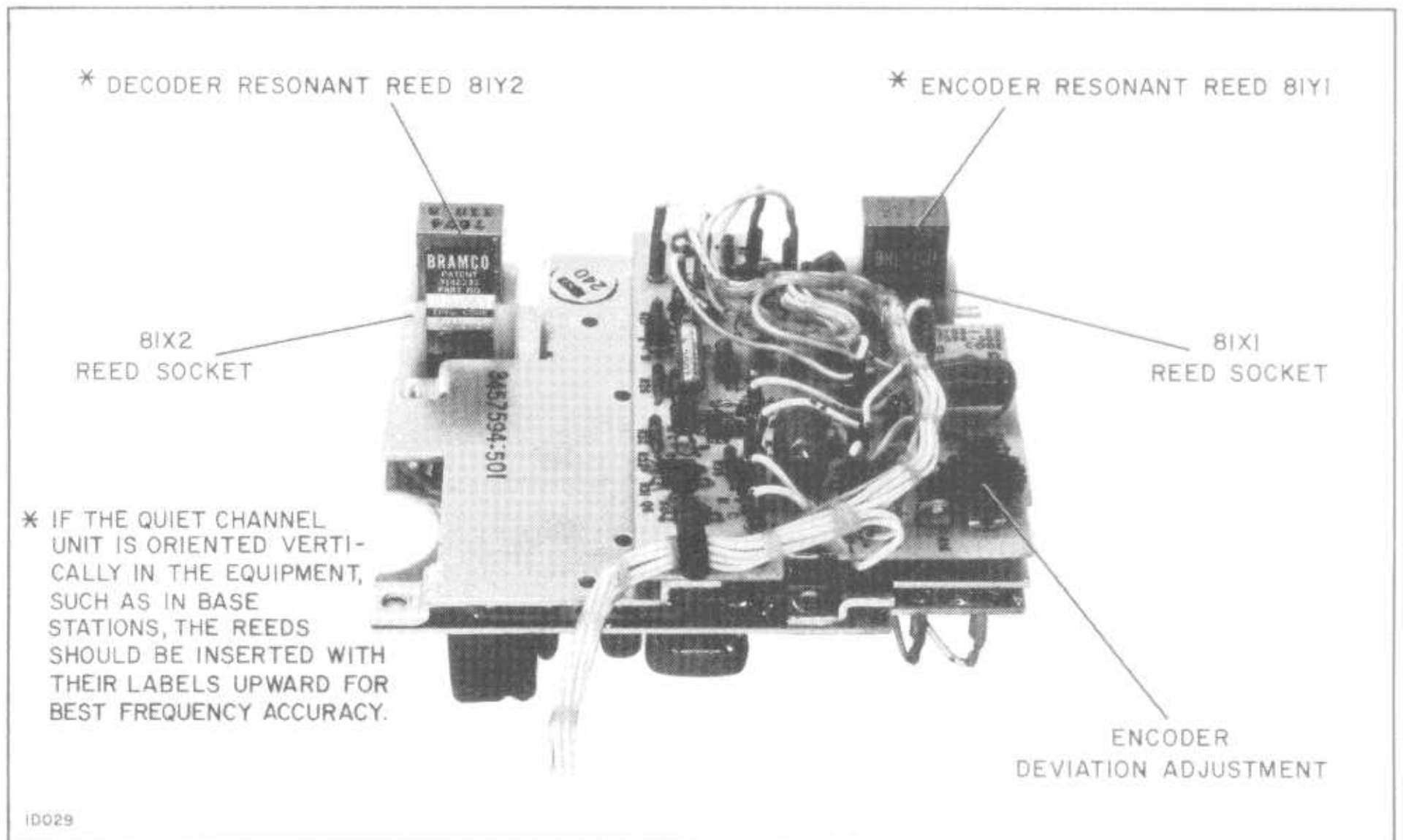
If a commercial regulated power supply must be used, make certain that it will not produce the undesirable conditions outlined above. As an added precaution, switch the power supply on and off at a reduced output voltage. Shielded leads and decoupling at the power supply terminals may be required to minimize the influence of RF fields.

WARNING

Isolated heat sink power semiconductors may contain Beryllium Oxide, a TOXIC substance. If the semiconductor encapsulation material is broken, crushed, opened, or abraded in any way, a dust may result. This dust is hazardous if inhaled. Care must be taken when handling, replacing, or disposing of this type of semiconductor.

INDEX

Quiet Channel Unit	MI-559227
Quiet Channel Encoder Module	3457594-502
Quiet Channel Decoder Module	3457594-503
Tone Operated Switch	MI-559273
TOS Module	3457875-501
Carrier Operated Switch	MI-559417
COS Module	3457926-501
Transmit Time Limiter	MI-559265
TTL Module	3457848-501
Dual Channel Monitor	MI-559298
DCM Module	3457944- 501
Noise Clipper Module	MI-559229-A
RF Preamplifiers	MI-559632 & MI-559632-A



3457594-501 Quiet Channel Unit (part of MI-559227)

TECHNICAL DATA

Power Required from Receiver 8.5 mA @ +12 standby 13.0 mA @ +12 transmit 1.6 mA @ +9 standby 2.0 mA @ +9 transmit	Tone Output Stability + 0.35% of desired tone frequency
Modulation Provided by Tone Output Adjustable from ± 1.0 kHz maximum deviation to +0.3 kHz minimum, per EIA specifications	Tone Output Distortion 1% maximum
Sensitivity Squelch Threshold (± 0.25 kHz deviation) 50 MHz Receiver: 0.15 microvolt 150 and 450 MHz Receivers: 0.25 microvolt	Operating Temperature Range -30°C to +65°C
	Tone Frequency Range 67 Hz to 179.9 Hz (Tones from 179.9 to 250 Hz require modification of the Decoder - see schematic diagram)

GENERAL DESCRIPTION

The Quiet Channel Unit is a continuous-tone coded squelch-control device which can be used in any system for selective calling.

The unit consists of 2 circuit boards, Encoder and Decoder, with a frequency-determining reed for each.

The Encoder adds a low-frequency tone to the transmitted signal; at the receive end, the Decoder senses the tone signal and opens the receiver squelch. Selective calling is possible because each mobile unit uses one specific tone frequency.

QUIET CHANNEL REEDS

Frequency	Stock No.	Early Production Drawing No.	Late Production Drawing No.	Frequency	Stock No.	Early Production Drawing No.	Late Production Drawing No.
67.0 Hz	640373	3457674-1	3723469-1	*146.2 Hz	640520	3457674-18	3723469-18
* 71.9 Hz	640382	3457674-2	3723469-2	*151.4 Hz	640381	3457674-19	3723469-19
* 77.0 Hz	640392	3457674-3	3723469-3	*156.7 Hz	640383	3457674-20	3723469-20
81.0 Hz	640393	3457674-34	3723469-34	*162.2 Hz	640384	3457674-21	3723469-21
* 82.5 Hz	640292	3457674-4	3723469-4	*167.9 Hz	640521	3457674-22	3723469-22
* 88.5 Hz	640293	3457674-5	3723469-5	169.0 Hz	640289	3457674-37	3723469-37
90.0 Hz	640394	3457674-35	3723469-35	*173.8 Hz	640385	3457674-23	3723469-23
* 94.8 Hz	640294	3457674-6	3723469-6	*179.9 Hz	640386	3457674-24	3723469-24
*100.0 Hz	640295	3457674-7	3723469-7	186.2 Hz	640387	3457674-25	3723469-25
*103.5 Hz	640296	3457674-8	3723469-8	188.0 Hz	640290	3457674-38	3723469-38
*107.2 Hz	640297	3457674-9	3723469-9	192.8 Hz	640388	3457674-26	3723469-26
*110.9 Hz	640374	3457674-10	3723469-10	203.5 Hz	640389	3457674-27	3723469-27
*114.8 Hz	640375	3457674-11	3723469-11	209.0 Hz	640291	3457674-39	3723469-39
*118.8 Hz	640376	3457674-12	3723469-12	210.7 Hz	640390	3457674-28	3723469-28
*123.0 Hz	640377	3457674-13	3723469-13	218.1 Hz	640391	3457674-29	3723469-29
124.0 Hz	640395	3457674-36	3723469-36	225.7 Hz	640522	3457674-30	3723469-30
*127.3 Hz	640378	3457674-14	3723469-14	233.6 Hz	640523	3457674-31	3723469-31
*131.8 Hz	640379	3457674-15	3723469-15	241.8 Hz	640524	3457674-32	3723469-32
*136.5 Hz	640380	3457674-16	3723469-16	250.3 Hz	640525	3457674-33	3723469-33
*141.3 Hz	640519	3457674-17	3723469-17				

*Preferred frequency. All other frequencies require special engineering for applications.

Early production reeds (3457674 series) and late production reeds (3723469 series) are interchangeable. The late production reeds have improved performance in mounting orientations other than vertical.

REPLACEMENT PARTS

Symbol	Stock No.	Drawing No.	Description
ITEM 1	640172	MI-559227	QUIET CHANNEL P/L MI-559227 REV 3
81X1	243587	3457594-501	Quiet Channel Unit P/L 3457594 REV 34
81X2	243587	3731182-001	Reed Socket
	243591	3457594-502	Reed Socket
	243592	3457594-503	Encoder Module - see separate listing
	228192	3450825-001	Decoder Module - see separate listing
	243538	3454702-001	Female Contact, package of 5 (32 used in cable assembly)
	103891	57435-104	Screw, taptite, cross recessed #6-32 x 0.25" (5 used)
ITEM 2	*	3457674-*	Hex nut, #6-32 (2 used)
ITEM 2	*	3723469-*	Resonant reeds (early production)
ITEM 3			Resonant reeds (late production)
	248538	3454702-001	Mounting Hardware:
	103891	57435-104	Screw, taptite, cross recessed, #6-32 x 0.25" (5 used)
	430173	3450823-001	Hex nut #6-32 (2 used)
			Mounting Bracket
			*quantity and frequency specified by user - see Quiet Channel Reeds table.

DESCRIPTION

GENERAL

The Quiet Channel Encoder module contains tone oscillator, tone amplifier, phase gate, and DC switching stages. Refer to the module schematic diagram while reading the following descriptions.

TONE OSCILLATOR - Q1/Q2/Y1

The tone oscillator circuit, comprised of transistors Q1 and Q2, resonant reed Y1, and associated components, generates a tone signal on the reed frequency as long as power is applied to the module. The major feedback loop is from the collector of Q2 to the base of Q1 through resistor R1. The output is taken either from the collector or the emitter of Q2, depending on whether CR1 or CR2 is conducting (see Phase gate discussion).

PHASE GATE - Q4

The phase gate circuit, consisting of transistor Q4 and associated components, controls the phase of the tone signal applied to Tone Amplifier Q3. With a keying signal applied to pin 20, Q4 conducts, forward biasing diode CR1, which in turn passes the tone signal from the

emitter of Q2 to the input of Tone Amplifier Q3. When the keying voltage is removed from pin 20, Q4 stops conducting, and CR2 is forward-biased, allowing the tone signal from the collector of Q2 (which is 180° out of phase with the signal on the emitter) to be passed to Tone Amplifier Q3.

TONE AMPLIFIER - Q3

Tone amplifier Q3 is a linear amplifier, with R16 adjusting the amount of signal applied to the base of the transistor.

DC SWITCHING - Q5/Q6/Q7

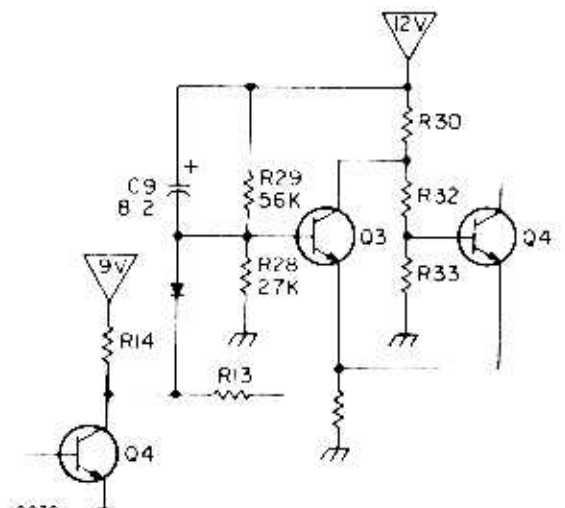
When keying voltage is applied to pin 20, Q5 conducts, causing Q7 to conduct and connect keying voltage to pin 18. To prevent erratic switching action, Q6 clamps Q5 emitter voltage. When the keying voltage is removed from pin 20, Q5 and Q7 are held on until C9 discharges (approximately 150 milliseconds). The transmitter remains keyed during this period, while it is being modulated by the reverse-phase tone. R30 and CR4 feed back output voltage, which clamps Q5 base. This feedback guarantees a sharp cut-off for Q5 when C9 discharges.

PRODUCTION VARIATIONS

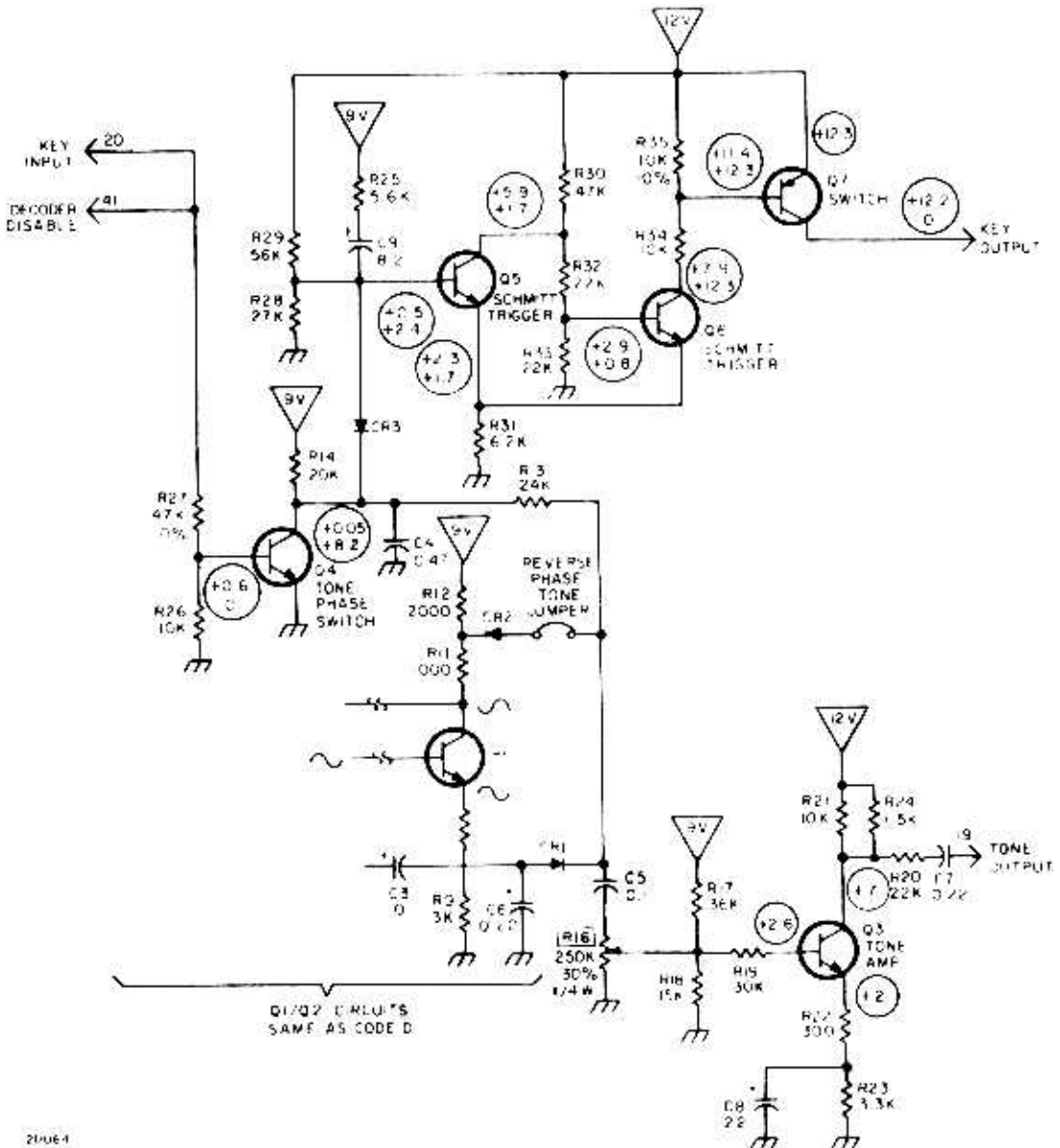
The production level of the module is indicated by a legend (example: CODE C) stamped on the module near the identifying drawing number. The following table lists the differences between the various production levels.

To determine the difference between a given production level and the CODE E level, note the differences tabulated for the desired level and all subsequent levels.

QUIET CHANNEL ENCODER MODULE
Current Version: 3457594-502 CODE E

Code Level Differences	Instruction Book Reference	Changes for Code Level Difference
A-B	Schematic and parts list	82R5 not used. Q5 base circuit is as shown on CODE A: 

PRODUCTION VARIATIONS (continued)

Code Level Differences	Instruction Book Reference	Changes for Code Level Difference				
B-C	Schematic and Parts List	R24 value on Code B				
		Symbol	Stock No.	Drawing No.	Description	
		82R24	108867	99206-179	6800 ohms, 5% 1/4 W	
C-D	Schematic					
		Parts List	Part Values on Code C are as shown:			
			Symbol	Stock No.	Drawing No.	Description
82R25	219464		99206-71	5.6K, 10%, 1/4 W		
82R28	219467	99206-193	27K, 5%, 1/4 W			
82R29	300649	99206-201	56K, 5%, 1/4 W			
82R31	226971	99206-178	6.2K, 5%, 1/4 W			
82R32	285421	99206-191	22K, 5%, 1/4 W			
82R33	285421	99206-191	22K, 5%, 1/4 W			
D-E	Parts List and Schematic	Part values are as shown on Code D:				
		Symbol	Stock No.	Drawing No.	Description	
		82R11	108865	99206-159	1K, 5%, 1/4 W	
		82R12	218498	99206-166	2K, 5%, 1/4 W	
82R36			NOT USED			

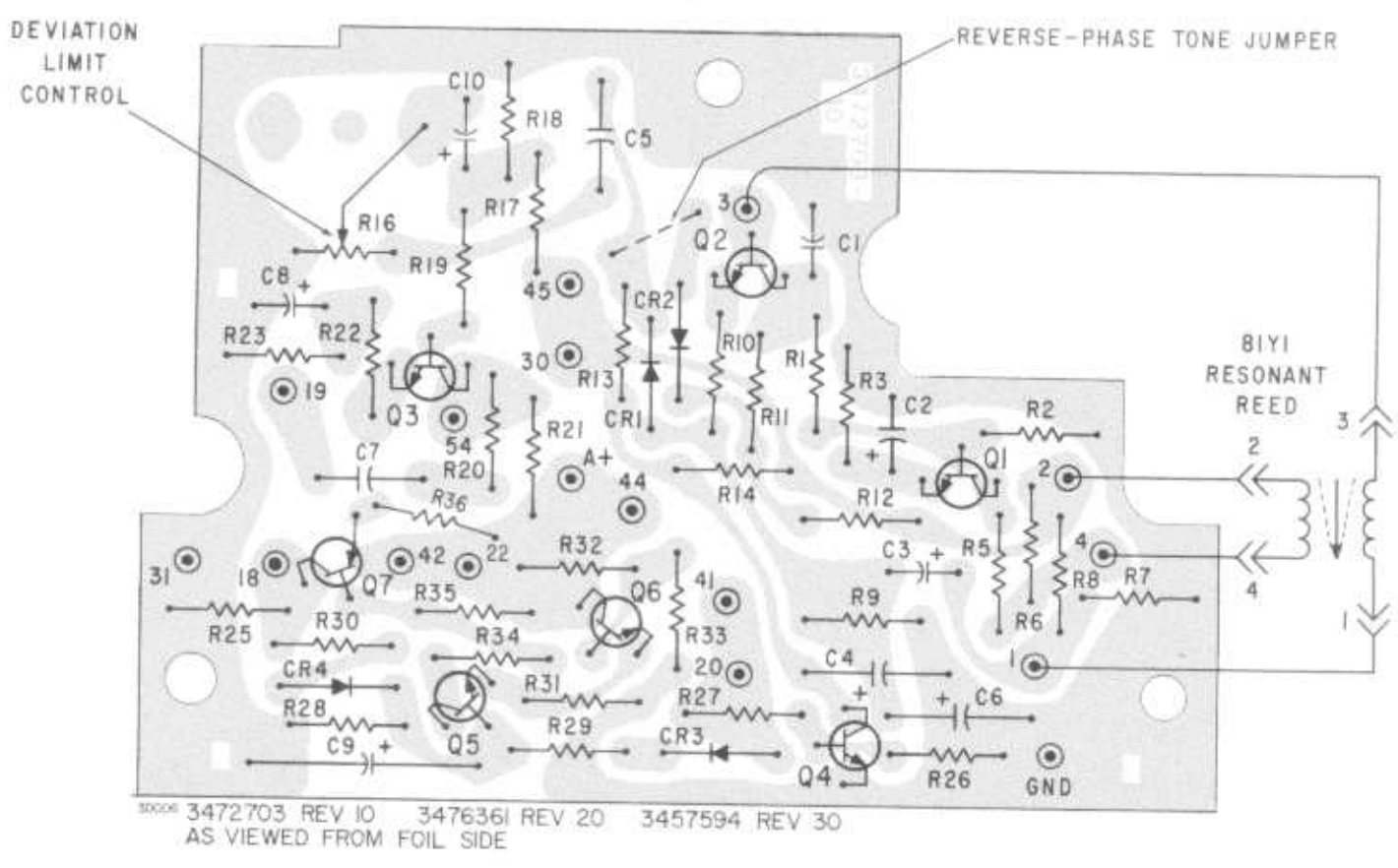
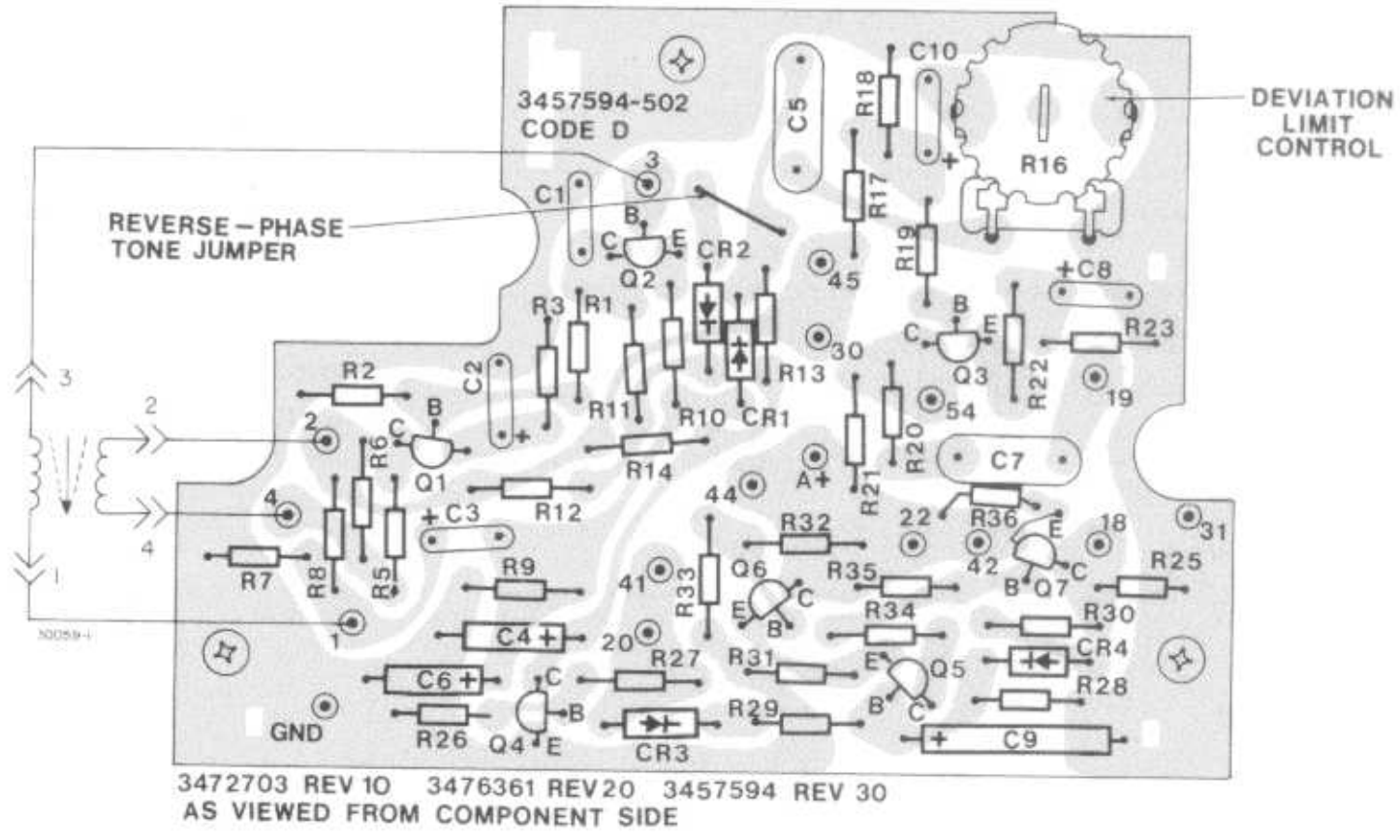


EMERGENCY SUBSTITUTES - SOLID STATE DEVICES

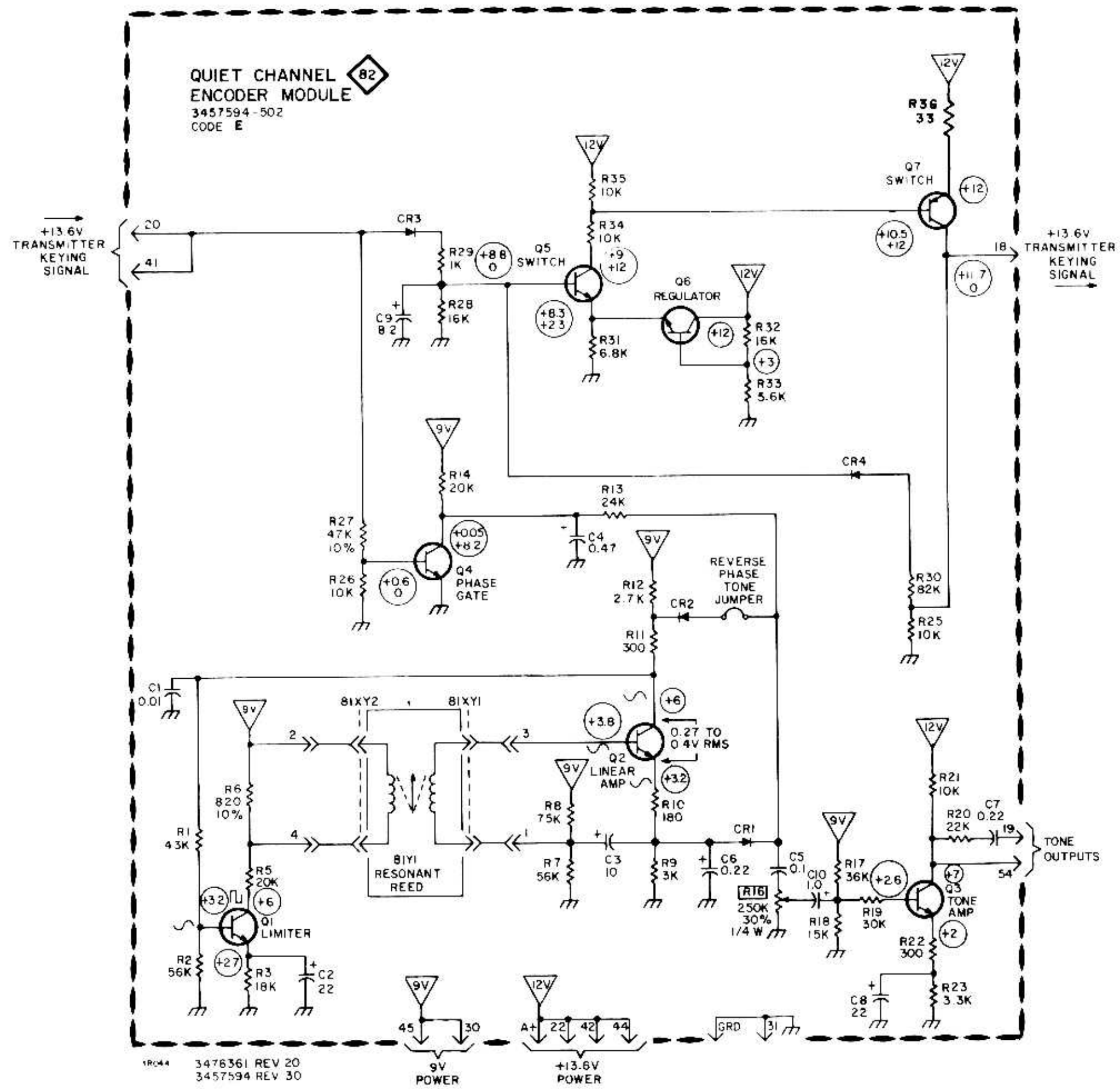
In the event of a semiconductor failure, the exact replacement found in the replacement parts list should be used. In an emergency, to minimize equipment down-

time, the following common semiconductor types may be temporarily used. However, use of these substitutes may result in degraded system performance.

Component Designation	Emergency Substitute	Component Designation	Emergency Substitute
82CR1	1N914	92Q2	2N5088
82CR2	1N914	82Q3	2N5088
82CR3	1N914	82Q4	2N4123
82CR4	1N914	82Q5	2N4123
		82Q6	2N4123
82Q1	2N5088	82Q7	2N4125



Pathfinder Diagram



- NOTES:
1. RESISTOR VALUES IN OHMS, 5%, 1/4 WATT, EXCEPT AS NOTED.
 2. CAPACITOR VALUES IN μ F, EXCEPT AS NOTED.
 3. DC VOLTAGES ARE TYPICAL, MEASURED TO CHASSIS WITH A 20,000 OHMS PER VOLT VOM. WHERE TWO VOLTAGES ARE SHOWN, UPPER VALUE IS WITH KEYING SIGNAL PRESENT AT PINS 20/41, LOWER VALUE IS WITH KEYING SIGNAL NOT PRESENT.
 4. AC RMS VOLTAGES ARE TYPICAL, MEASURED WITH 10 MEGOHM INPUT VTVM.
 5. TONE OSCILLATOR VOLTAGES WILL VARY SLIGHTLY WHEN KEYING SIGNAL IS PRESENT AT PINS 20/41.

Schematic Diagram

REPLACEMENT PARTS

Symbol	Stock No.	Drawing No.	Description
	243591	3457594-502	ENCODER MODULE P/L 3457594-502 REV 30 CODE E
82C1	234543	3463453-117	Ceramic, .01 MF 25 V DC
82C2	243582	3457537-014	Tantalum, 22 MF 20% 20 V DC
82C3	242735	3457537-008	Tantalum, 10 MF 20% 15 V DC
82C4	240655	3457333-191	Tantalum, 0.47 MF 20% 35 V DC
82C5	300669	3457081-052	Film, 0.1 MF 20% 100 V DC
82C6	263704	3457333-687	Tantalum, 0.22 MF 10% 35 V DC
82C7	300751	3457081-060	Film, 0.22 MF 20% 100 V DC
82C8	243582	3457537-014	Tantalum, 22 MF 20% 20 V DC
82C9	243599	3457334-653	Tantalum, 8.2 MF 10% 20 V DC
82C10	242034	3457537-015	Tantalum, 1.0 MF 20% 35 V DC
82CR1	242522	3464611-001	Diode
82CR2	242522	3464611-001	Diode
82CR3	242522	3464611-001	Diode
82CR4	242522	3464611-001	Diode
82Q1	243585	3468242-001	Transistor - AF, NPN
82Q2	243585	3468242-001	Transistor - AF, NPN
82Q3	243585	3468242-001	Transistor - AF, NPN
82Q4	242758	3468182-001	Transistor - SW, NPN
82Q5	242758	3468182-001	Transistor - SW, NPN
82Q6	242758	3468182-001	Transistor - SW, NPN
82Q7	242760	3468183-001	Transistor - SW, PNP
82R1	227743	99206-198	43,000 Ohms 5% 1/4 W
82R2	300649	99206-201	56,000 Ohms 5% 1/4 W
82R3	108870	99206-189	18,000 Ohms 5% 1/4 W
82R5	219466	99206-190	20,000 Ohms 5% 1/4 W
82R6	300690	99206-061	820 Ohms 10% 1/4 W
82R7	300649	99206-201	56,000 Ohms 5% 1/4 W
82R8	218761	99206-204	75,000 Ohms 5% 1/4 W
82R9	219462	99206-170	3000 Ohms 5% 1/4 W
82R10	108862	99206-141	180 Ohms 5% 1/4 W
82R11	228879	99206-146	300 Ohms 5% 1/4 W
82R12	113524	99206-169	2700 Ohms 5% 1/4 W
82R13	285401	99206-192	24,000 Ohms 5% 1/4 W
82R14	219466	99206-190	20,000 Ohms 5% 1/4 W
82R16	243602	3463187-012	Variable, 250,000 Ohms 30% 1/4 W
82R17	300742	99206-196	36,000 Ohms 5% 1/4 W
82R18	108869	99206-187	15,000 Ohms 5% 1/4 W
82R19	285402	99206-194	30,000 Ohms 5% 1/4 W
82R20	285421	99206-191	22,000 Ohms 5% 1/4 W
82R21	218499	99206-183	10,000 Ohms 5% 1/4 W
82R22	228879	99206-146	300 Ohms 5% 1/4 W
82R23	107972	99206-171	3300 Ohms 5% 1/4 W
82R25	218499	99206-183	10,000 Ohms 5% 1/4 W
82R26	218499	99206-183	10,000 Ohms 5% 1/4 W
82R27	108871	99206-082	47,000 Ohms 10% 1/4 W
82R28	300740	99206-188	16,000 Ohms 5% 1/4 W
82R29	108865	99206-159	1000 Ohms 5% 1/4 W
82R30	300648	99206-205	82,000 Ohms 5% 1/4 W
82R31	108867	99206-179	6800 Ohms 5% 1/4 W
82R32	300740	99206-188	16,000 Ohms 5% 1/4 W
82R33	219464	99206-177	5600 Ohms 5% 1/4 W
82R34	218499	99206-183	10,000 Ohms 5% 1/4 W
82R35	218499	99206-183	10,000 Ohms 5% 1/4 W
82R36	233931	99206-044	33 ohms 10% 1/4w
	228124	3450797-003	Contact - Pin (Package of 5)

CIRCUIT DESCRIPTION

The Decoder Module contains a Tone Reject Filter that is used to filter the Quiet Channel tone from the receiver audio stages, and a resonant reed and associated electronic circuitry that provide DC outputs when a tone signal of the reed frequency is received. These DC outputs are used to control the receiver squelch circuit and to control an external TOS module, as required. The decoder may be disabled by application of +13.6 volts to either pin 41 or pin 21.

The audio output from the receiver's discriminator is applied to pin 24 on the Decoder board, through a tone reject filter to pin 25, and back to the 1st audio amplifier on the Low-IF and Audio board. Resistor 14R24, on the 455 kHz IF/Audio board, is removed when the Quiet Channel unit is installed. The tone reject filter removes the received Quiet Channel tone from the speaker audio.

The discriminator audio output is also applied, through a low pass filter, to the base of Buffer Amplifier Q1. This low pass filter attenuates audio signals above 250 Hz. An additional low pass dual filter couples the output of Q1 to the base of amplifier Q2. These filters attenuate voice frequencies and allow only the tone signal to pass. A parallel circuit, R9, C11-C14, provides a noise signal to the base of Q2 which desensitizes the tone decoder when a carrier is not being received. Gated diode CR2 determines when this noise signal is applied. This noise injecting circuit enhances weak signal performance by providing increased gain when a carrier quiets the receiver noise.

The output of Q2 is applied to Driver/Limiter Q3. When the proper frequency tone is received, the resonant reed, in the output of Q3, will vibrate. An AC voltage (at the tone frequency) is induced in the reed's secondary coil. This signal is fed through Tone Amplifier Q4, threshold gate Q6, and to the base of Q7. In addition, a signal is taken from the output of Driver/Limiter Q3 and is applied to the base of Q8. Transistors Q7 and Q8 are in series and form a coincidence circuit, that is, two in-phase input signals are necessary to produce an output signal.

With both signals applied to the coincidence circuit Q7-Q8, an output signal is fed through Output Gate Q9, to Squelch Gate 14Q13 on the 455 kHz IF/Audio Board in the receiver. This unquieting signal, from the Quiet Channel unit, has priority over the noise operated squelch circuits in the receiver.

In stations including the automatic Quiet Channel disable feature, a positive DC voltage is applied, through CR6, to the base of Q9, when the microphone or handset is lifted from its holder. This voltage disables the Output Gate Q9 and prevents the Quiet Channel from controlling the receiver squelch. The receiver then reverts to noise operated squelch action.

The Quiet Channel unit is designed to respond to either of two methods of "squelch-tail" (noise burst at the end of a transmission) elimination. In the first method, the associated station continues to transmit for approximately 150 milliseconds after the P-T-T button has been released. During this time, the Quiet Channel tone is applied to the modulator, out of phase from the normal tone. This out of phase tone damps the oscillating of the resonant reed in the Decoder. Also, the phase difference between the residual output at the base of Q7 and the out of phase tone at the base of Q8, opens the circuit which, through the Output Gate Q9, squelches the receiver. This action occurs within 100 milliseconds, while the receiver is still being quieted by the received carrier. When the carrier stops, at 150 milliseconds, the receiver is already squelched and the "squelch tail" is eliminated.

The second method also requires that the associated transmitter continue to transmit for approximately 150 milliseconds after the P-T-T button has been released. But, the Quiet Channel tone is not transmitted after the P-T-T button is released. The lack of tone at the base of Q8 opens the coincidence circuit and, as in the first method, eliminates the "squelch tail" before the carrier stops.

The function of feedback amplifier Q5 is to assure positive elimination of squelch tails at the termination of a received message. At the end of a transmission, when the short burst of reverse phase QC tone is sent, the coincidence gate Q7 and Q8 opens, biasing Q5 on. The resulting negative-going collector voltage is passed through C24 to the base of Q4, biasing it to cutoff, thus insuring that the squelch gate will be closed before the carrier ceases 150 milliseconds after P-T-T release. A secondary function of the charging current through C24 is to damp out the reed vibrations so that they do not linger after the 150 milliseconds time period.

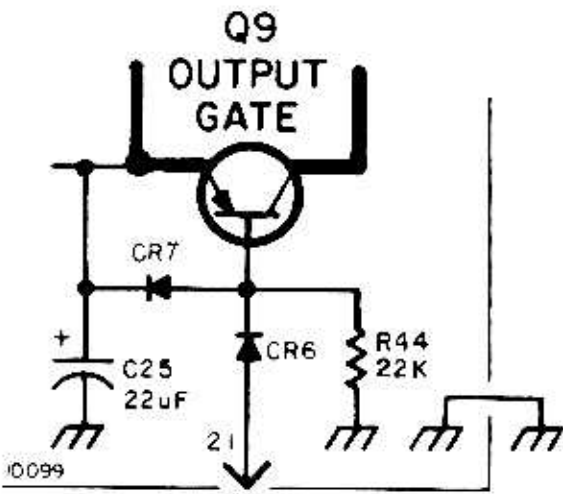
The Decoder portion of the Quiet Channel Unit is disabled during transmitting periods. 12 volts from the P-T-T switch is applied to pin 41 of the decoder board, through CR1, to the base of amplifier Q2. Q2 is biased to saturation; thus, the decoder is disabled.

PRODUCTION VARIATIONS

The production level of the module is indicated by a legend (example: CODE C) stamped on the module near the identifying drawing number. The following table lists the differences between the various production levels.

To determine the difference between a given production level and the CODE D level, note the differences tabulated for the desired level and all subsequent levels.

QUIET CHANNEL DECODER MODULE
Current Version: 3457594-503 CODE H

Code Level Difference	Instruction Book Reference	Changes for Code Level Difference																																																		
A-B	Pathfinder, parts list, and schematic	CR7 not used on Code A																																																		
B-C	Schematic	Circuit around Q9 is as follows on Code B: 																																																		
	Parts List	83R48 and 83R49 not used																																																		
C-D	Schematic and parts list	Component values are as follows on CODE C:																																																		
		<table border="1"> <thead> <tr> <th>Symbol</th> <th>Stock No.</th> <th>Drawing No.</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>83C24</td> <td>243584</td> <td>3457537-009</td> <td>Tantalum, 33 mF 20%, 15V</td> </tr> <tr> <td>83C26</td> <td>228168</td> <td>3460490-001</td> <td>Ceramic, 0.05 mF, 25 V</td> </tr> <tr> <td>83CR3</td> <td>242522</td> <td>3464611-001</td> <td>Diode</td> </tr> <tr> <td>83Q5</td> <td>242759</td> <td>3468182-002</td> <td>Transistor</td> </tr> <tr> <td>83R23</td> <td>108867</td> <td>99206-072</td> <td>6800 ohms 10% 1/4 W</td> </tr> <tr> <td>83R26</td> <td>227744</td> <td>99206-139</td> <td>150 ohms, 5%, 1/4 W</td> </tr> <tr> <td>83R28</td> <td>285405</td> <td>99206-069</td> <td>3900 ohms, 10%, 1/4 W</td> </tr> <tr> <td>83R29</td> <td>218499</td> <td>99206-183</td> <td>10,000 ohms, 5%, 1/4 W</td> </tr> <tr> <td>83R32</td> <td>219467</td> <td>99206-079</td> <td>27,000 ohms, 10%, 1/4 W</td> </tr> <tr> <td>83R34</td> <td>300597</td> <td>99206-168</td> <td>2400 ohms, 5%, 1/4 W</td> </tr> <tr> <td>83R37</td> <td>285404</td> <td>99206-195</td> <td>33,000 ohms, 5%, 1/4 W</td> </tr> <tr> <td>83R45</td> <td>285421</td> <td>99206-191</td> <td>22,000 ohms, 5%, 1/4 W</td> </tr> </tbody> </table>	Symbol	Stock No.	Drawing No.	Description	83C24	243584	3457537-009	Tantalum, 33 mF 20%, 15V	83C26	228168	3460490-001	Ceramic, 0.05 mF, 25 V	83CR3	242522	3464611-001	Diode	83Q5	242759	3468182-002	Transistor	83R23	108867	99206-072	6800 ohms 10% 1/4 W	83R26	227744	99206-139	150 ohms, 5%, 1/4 W	83R28	285405	99206-069	3900 ohms, 10%, 1/4 W	83R29	218499	99206-183	10,000 ohms, 5%, 1/4 W	83R32	219467	99206-079	27,000 ohms, 10%, 1/4 W	83R34	300597	99206-168	2400 ohms, 5%, 1/4 W	83R37	285404	99206-195	33,000 ohms, 5%, 1/4 W	83R45	285421
Symbol	Stock No.	Drawing No.	Description																																																	
83C24	243584	3457537-009	Tantalum, 33 mF 20%, 15V																																																	
83C26	228168	3460490-001	Ceramic, 0.05 mF, 25 V																																																	
83CR3	242522	3464611-001	Diode																																																	
83Q5	242759	3468182-002	Transistor																																																	
83R23	108867	99206-072	6800 ohms 10% 1/4 W																																																	
83R26	227744	99206-139	150 ohms, 5%, 1/4 W																																																	
83R28	285405	99206-069	3900 ohms, 10%, 1/4 W																																																	
83R29	218499	99206-183	10,000 ohms, 5%, 1/4 W																																																	
83R32	219467	99206-079	27,000 ohms, 10%, 1/4 W																																																	
83R34	300597	99206-168	2400 ohms, 5%, 1/4 W																																																	
83R37	285404	99206-195	33,000 ohms, 5%, 1/4 W																																																	
83R45	285421	99206-191	22,000 ohms, 5%, 1/4 W																																																	

PRODUCTION VARIATIONS (Continued)

Code Level Difference	Instruction Book Reference	Changes for Code Level Difference																																											
C-D	Schematic	<p>Circuit around Q4 is as follows on CODE C:</p> <p>D098</p>																																											
D-E	Parts list and Schematic	<table border="1"> <thead> <tr> <th>Symbol</th> <th>Stock No.</th> <th>Drawing No.</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>83C7</td> <td>243594</td> <td>3457081-260</td> <td>Film, 0.22 mF, 5%, 75V</td> </tr> <tr> <td>83C9</td> <td>243594</td> <td>3457081-260</td> <td>Film, 0.22 mF, 5%, 75V</td> </tr> <tr> <td>83C10</td> <td>243596</td> <td>3457081-239</td> <td>Film, 0.033 mF, 5%, 100V</td> </tr> <tr> <td>83C12</td> <td>243594</td> <td>3457081-260</td> <td>Film, 0.22 mF, 5%, 75V</td> </tr> <tr> <td>83R11</td> <td>113524</td> <td>99206-067</td> <td>2700 ohms, 10%, 1/4 W</td> </tr> <tr> <td>83R12</td> <td>108868</td> <td>99206-075</td> <td>12,000 ohms, 10%, 1/4 W</td> </tr> <tr> <td>83R22</td> <td>300690</td> <td>99206-061</td> <td>820 ohms, 10%, 1/4 W</td> </tr> <tr> <td>83R23</td> <td>108867</td> <td>99206-072</td> <td>6800 ohms, 10%, 1/4 W</td> </tr> <tr> <td>83R24</td> <td>219464</td> <td>99206-071</td> <td>5600 ohms, 10%, 1/4 W</td> </tr> </tbody> </table>	Symbol	Stock No.	Drawing No.	Description	83C7	243594	3457081-260	Film, 0.22 mF, 5%, 75V	83C9	243594	3457081-260	Film, 0.22 mF, 5%, 75V	83C10	243596	3457081-239	Film, 0.033 mF, 5%, 100V	83C12	243594	3457081-260	Film, 0.22 mF, 5%, 75V	83R11	113524	99206-067	2700 ohms, 10%, 1/4 W	83R12	108868	99206-075	12,000 ohms, 10%, 1/4 W	83R22	300690	99206-061	820 ohms, 10%, 1/4 W	83R23	108867	99206-072	6800 ohms, 10%, 1/4 W	83R24	219464	99206-071	5600 ohms, 10%, 1/4 W			
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83C10	243596	3457081-239	Film, 0.033 mF, 5%, 100V																																										
83C12	243594	3457081-260	Film, 0.22 mF, 5%, 75V																																										
83R11	113524	99206-067	2700 ohms, 10%, 1/4 W																																										
83R12	108868	99206-075	12,000 ohms, 10%, 1/4 W																																										
83R22	300690	99206-061	820 ohms, 10%, 1/4 W																																										
83R23	108867	99206-072	6800 ohms, 10%, 1/4 W																																										
83R24	219464	99206-071	5600 ohms, 10%, 1/4 W																																										
E-F		No electrical changes																																											
F-H	Replacement Parts List and Schematic	<p>83R34 not used on Code F 83CR4:</p> <table border="1"> <thead> <tr> <th>Symbol</th> <th>Stock No.</th> <th>Drawing No.</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>83CR4</td> <td>243586</td> <td>3731193-2</td> <td>Diode, 1N4829</td> </tr> </tbody> </table>				Symbol	Stock No.	Drawing No.	Description	83CR4	243586	3731193-2	Diode, 1N4829																																
Symbol	Stock No.	Drawing No.	Description																																										
83CR4	243586	3731193-2	Diode, 1N4829																																										
H-J	Replacement Parts List and Schematic	See separate Replacement Parts Lists and Schematic Diagrams for Code H and Code J models.																																											

EMERGENCY SUBSTITUTES - SOLID STATE DEVICES

In the event of a semiconductor failure, the exact replacement found in the replacement parts list should be used. In an emergency, to minimize equipment down-

time, the following common semiconductor types may be temporarily used. However, use of these substitutes may result in degraded system performance.

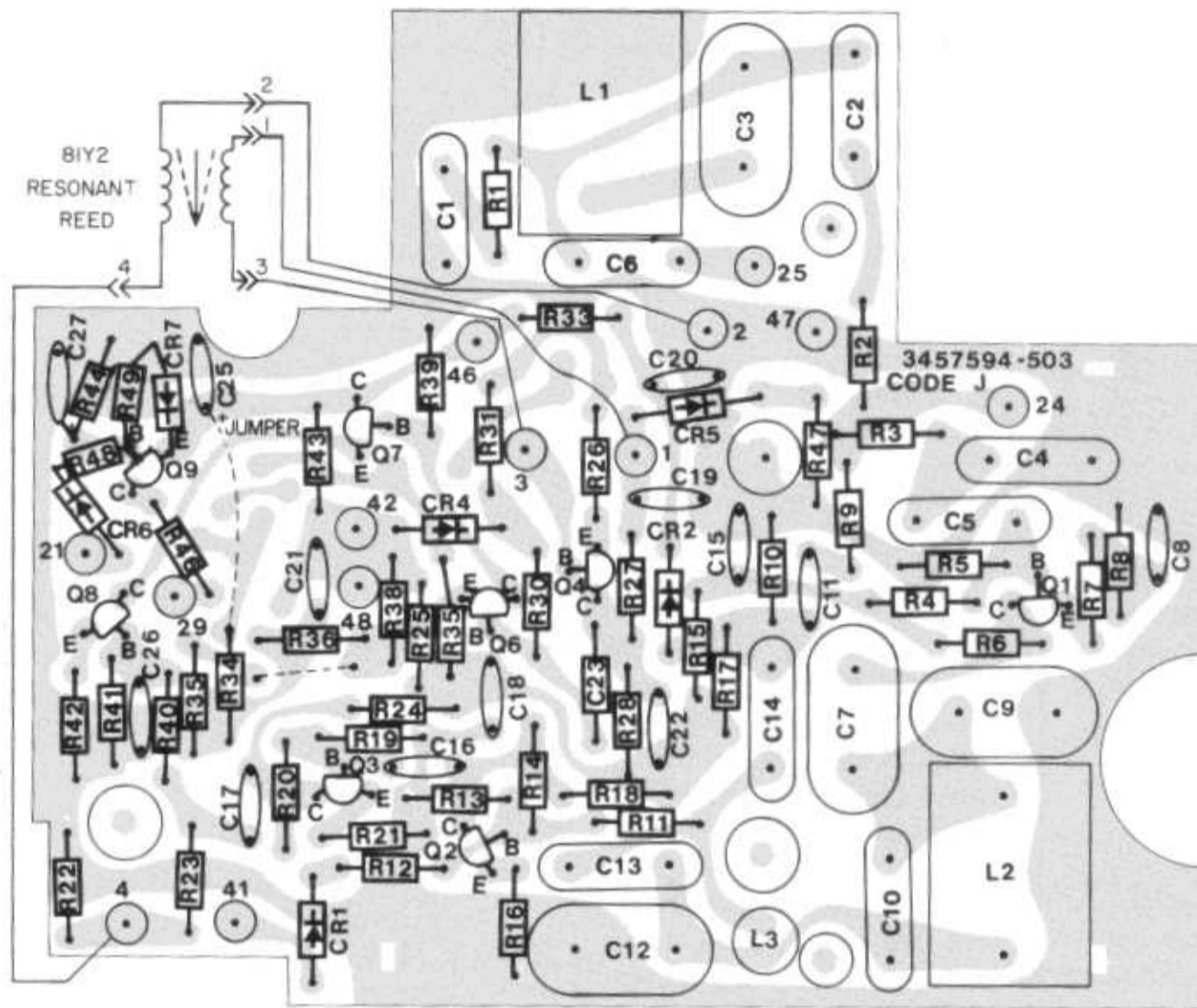
Component Designation	Emergency Substitute	Component Designation	Emergency Substitute
83CR1	1N914	83Q2	2N4123
83CR2	1N914	83Q3	2N5088
83CR3	1N914	83Q4	2N5088
83CR4	use exact replacement	83Q5	2N4124
83CR5	1N914	83Q6	2N4125
83CR6	1N914	83Q7	2N4123
83CR7	1N914	83Q8	2N4123
83Q1	2N5088	83Q9	2N4125

CODE H - REPLACEMENT PARTS

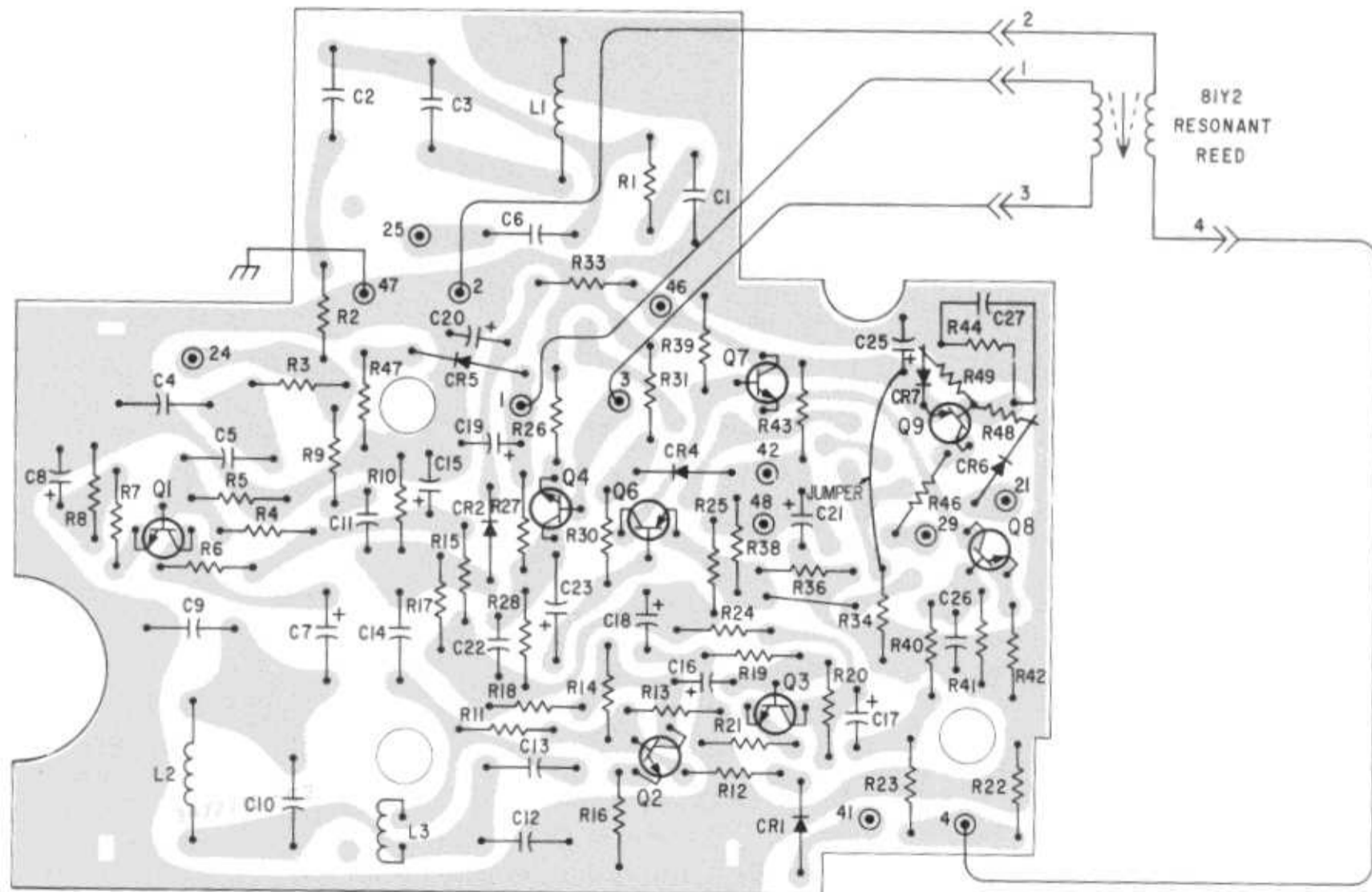
Symbol	Stock No.	Drawing No.	Description
	243592	3457594-503	DECODER MODULE P/L 3457594-503 REV 30 CODE H
83C1	243597	3457081-235	Film, .022 MF 5% 100 V DC
83C2	243597	3457081-235	Film, .022 MF 5% 100 V DC
83C3	243594	3457081-260	Film, 0.22 MF 5% 75 V DC
83C4	243597	3457081-235	Film, .022 MF 5% 100 V DC
83C5	243595	3457081-243	Film, .047 MF 5% 100 V DC
83C6	243595	3457081-243	Film, .047 MF 5% 100 V DC
83C7	231874	3453563-101	Tantalum 1.0 MF, .75-20% 15 V
83C8	243581	3457537-013	Tantalum, 10 MF 20% 20 V DC
83C9	425749	3457081-263	Film, 0.27 MF 5% 100 V DC
83C10	425748	3457081-245	Film, .056 MF 5% 100 V DC
83C11	112660	1510003-225	Ceramic, 1000 PF 10% 100 V DC
83C12	425749	3457081-263	Film, 0.27 MF 5% 100 V DC
83C13	243597	3457081-235	Film, .022 MF 5% 100 V DC
83C14	236032	3457081-143	Film, .047 MF 10% 100 V DC
83C15	243581	3457537-013	Tantalum, 10 MF 20% 20 V DC
83C16	242034	3457537-015	Tantalum, 1.0 MF 20% 35 V DC
83C17	243583	3457537-018	Tantalum, 3.3 MF 20% 35 V DC
83C18	243582	3457537-014	Tantalum, 22 MF 20% 20 V DC
83C19	243600	3457537-012	Tantalum, 4.7 MF 20% 20 V DC
83C20	243600	3457537-012	Tantalum, 4.7 MF 20% 20 V DC
83C21	243582	3457537-014	Tantalum, 22 MF 20% 20 V DC
83C22	234543	3463453-117	Ceramic, .01 MF 25 V DC
83C23	243598	3457334-238	Tantalum, 0.33 MF 20% 50 V DC
83C25	243582	3457537-014	Tantalum, 22 MF 20% 20 V DC
83C26	232752	3460490-015	Ceramic, 0.02 MF, 20% 25 V
83C27	243582	3457537-014	Tantalum, 22 MF 20% 20 V DC
83CR1 thru 83CR3	242522	3464611-001	Diode
83CR4	426587	3731193-005	Diode
83CR5	242522	3464611-001	Diode
83CR6	242522	3464611-001	Diode
83CR7	242522	3464611-001	Diode

CODE H - REPLACEMENT PARTS (Cont.)

Symbol	Stock No.	Drawing No.	Description
83L1	227825	3460656-001	Reactor - Choke, 3.3 H
83L2	227825	3460656-001	Reactor - Choke, 3.3 H
83L3	227824	3460678-001	Reactor - Choke, 10 MH
83Q1	243585	3468242-001	Transistor
83Q2	242758	3468182-001	Transistor
83Q3	243585	3468242-001	Transistor
83Q4	243585	3468242-001	Transistor
83Q6	242760	3468183-001	Transistor
83Q7	242758	3468182-001	Transistor
83Q8	242758	3468182-001	Transistor
83Q9	242760	3468183-001	Transistor
83R1	285421	99206-078	22,000 Ohms 10% 1/4 W
83R2	218499	99206-074	10,000 Ohms 10% 1/4 W
83R3	219467	99206-079	27,000 Ohms 10% 1/4 W
83R4	223769	99206-086	100,000 Ohms 10% 1/4 W
83R5	223769	99206-086	100,000 Ohms 10% 1/4 W
83R6	219464	99206-071	5600 Ohms 10% 1/4 W
83R7	108865	99206-062	1000 Ohms 10% 1/4 W
83R8	285258	99206-182	9100 Ohms 5% 1/4 W
83R9	218499	99206-074	10,000 Ohms 10% 1/4 W
83R10	219465	99206-073	8200 Ohms 10% 1/4 W
83R11	113524	99206-067	2700 Ohms 5% 1/4 W
83R12	108868	99206-075	12,000 Ohms 5% 1/4 W
83R13	285447	99206-084	68,000 Ohms 10% 1/4 W
83R14	227755	99206-090	220,000 Ohms 10% 1/4 W
83R15	108865	99206-062	1000 Ohms 10% 1/4 W
83R16	108861	99206-135	100 Ohms 5% 1/4 W
83R17	108871	99206-082	47,000 Ohms 10% 1/4 W
83R18	219464	99206-071	5600 Ohms 10% 1/4 W
83R19	285447	99206-084	68,000 Ohms 10% 1/4 W
83R20	229965	99206-087	120,000 Ohms 10% 1/4 W
83R21	108863	99206-145	270 Ohms 5% 1/4 W
83R22	300690	99206-157	820 Ohms 5% 1/4 W
83R23	300596	99206-176	5100 Ohms, 5%, 1/4W
83R24	219464	99206-177	5600 Ohms 5% 1/4 W
83R25	219458	99206-056	330 Ohms 10% 1/4 W
83R26	108863	99206-145	270 Ohms 5% 1/4 W
83R27	108871	99206-082	47,000 Ohms 10% 1/4 W
83R28	285258	99206-182	9100 Ohms 5% 1/4 W
83R30	285404	99206-080	33,000 Ohms 10% 1/4 W
83R31	285421	99206-191	22,000 Ohms 5% 1/4 W
83R33	107972	99206-068	3300 Ohms 10% 1/4 W
83R34	285401	99206-192	24,000 Ohms 5% 1/4 W
83R36	285258	99206-182	9100 Ohms 5% 1/4 W
83R38	108864	99206-151	470 Ohms 5% 1/4 W
83R39	108866	99206-066	2200 Ohms 10% 1/4 W
83R40	108868	99206-075	12,000 Ohms 10% 1/4 W
83R41	218500	99206-081	39,000 Ohms 10% 1/4 W
83R42	108861	99206-135	100 Ohms 5% 1/4 W
83R43	108868	99206-075	12,000 Ohms 10% 1/4 W
83R44	285421	99206-078	22,000 Ohms 10% 1/4 W
83R46	108866	99206-066	2200 Ohms 10% 1/4 W
83R47	108865	99206-062	1000 Ohms 10% 1/4 W
83R48	108865	99206-062	1000 Ohms 10% 1/4 W
83R49	219459	99206-064	1500 Ohms 10% 1/4 W
	228124	3450797-003	Contact - Pin (Package of 5)
	640632	MI-559410	SHIELD KIT (Shields 83L1 in base station applications) P/L MI-559410 REV 0

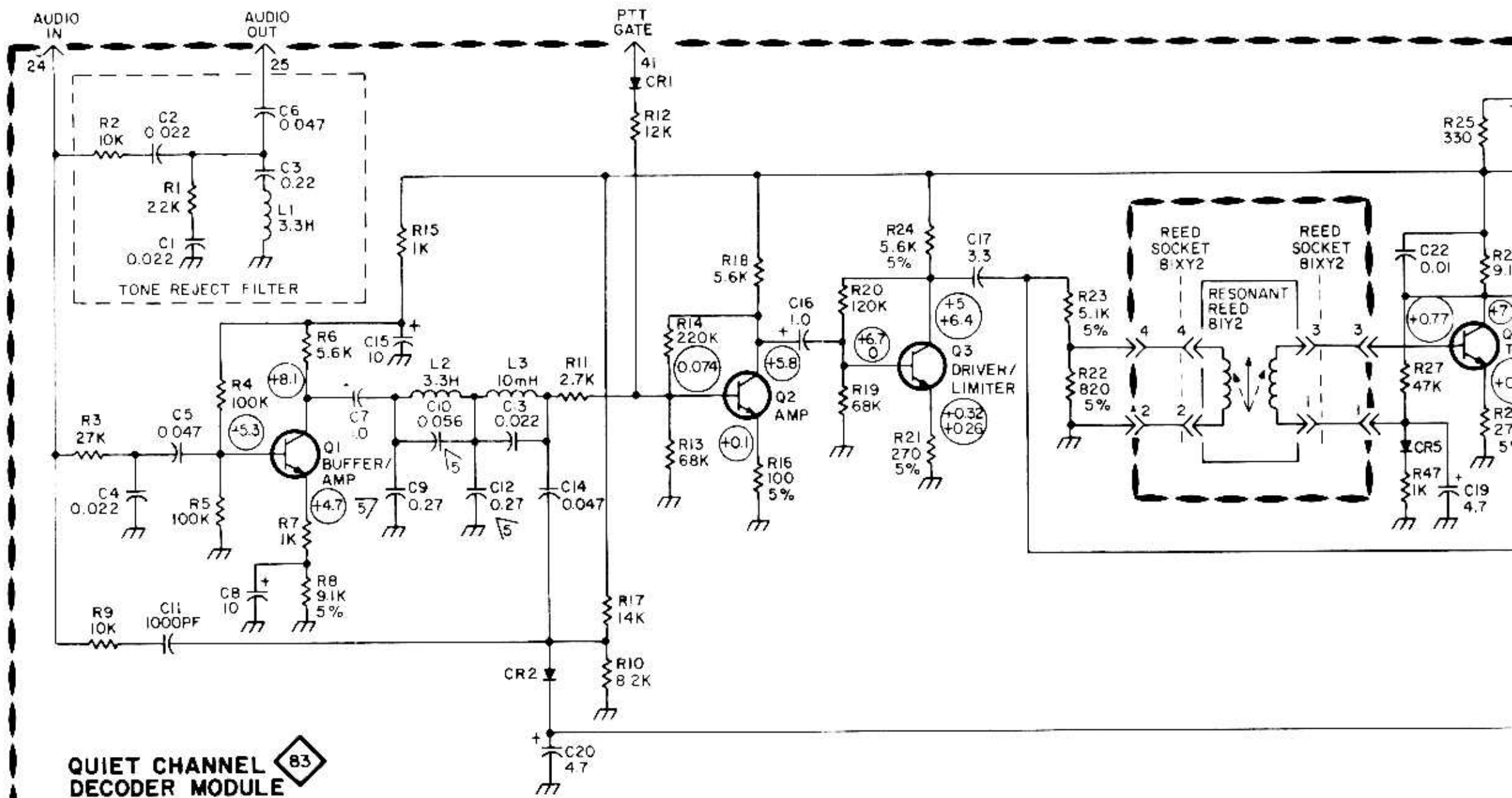


30054
 3472716 REV 4 3476361 REV 20 3457594 REV 30
 AS VIEWED FROM COMPONENT SIDE



30037
 3472716 REV 4 3476361 REV 22 3457594 REV 34
 AS VIEWED FROM FOIL SIDE

Pathfinder Diagram
CODE H
 N3LKL

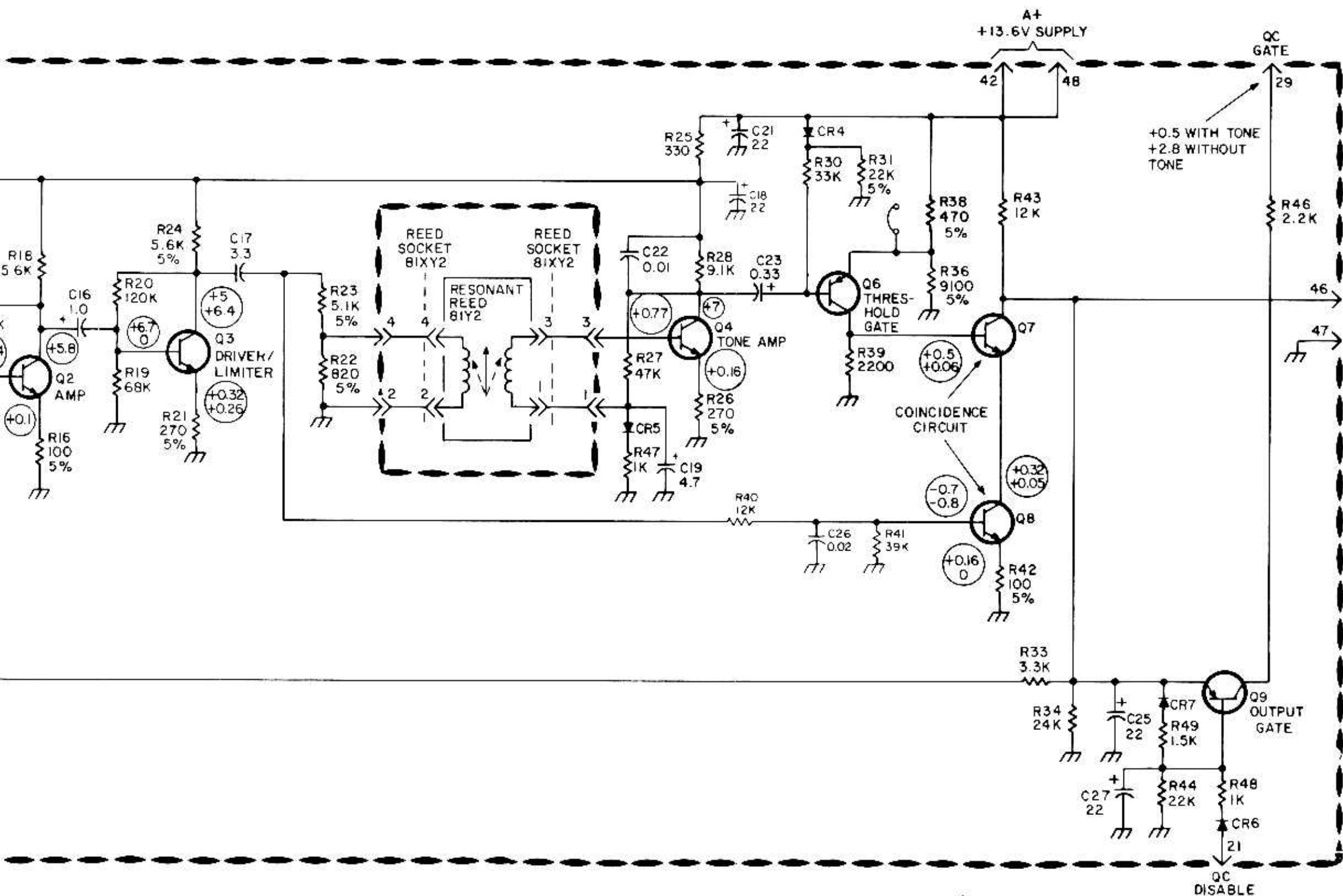


QUIET CHANNEL DECODER MODULE
 3457594-503
 CODE H

30045 3476361 REV 20 3457594 REV 30

NOTES

1. RESISTORS IN OHMS, 1/4W, 10% EXCEPT AS NOTED.
2. CAPACITORS IN μ F EXCEPT AS NOTED.
3. DC VOLTAGES ARE TYPICAL, MEASURED TO CHASSIS WITH 20,000 Ω/V VOM.
 UPPER VOLTAGE = SIGNAL LOWER VOLTAGE = NO SIGNAL
4. AC RMS VOLTAGES ARE TYPICAL, MEASURED TO CHASSIS WITH 10 MEGOHM INPUT VT



ARE TYPICAL, MEASURED TO CHASSIS WITH 20,000 Ω/V VOM.
 = SIGNAL LOWER VOLTAGE = NO SIGNAL

4. AC RMS VOLTAGES ARE TYPICAL, MEASURED TO CHASSIS WITH 10 MEGOHM INPUT VTVM.

FOR FREQUENCIES ABOVE 2107 HZ, C9 IS 0.22μF, C12 IS 0.22μF

Schematic Diagram
CODE H

CODE J - REPLACEMENT PARTS

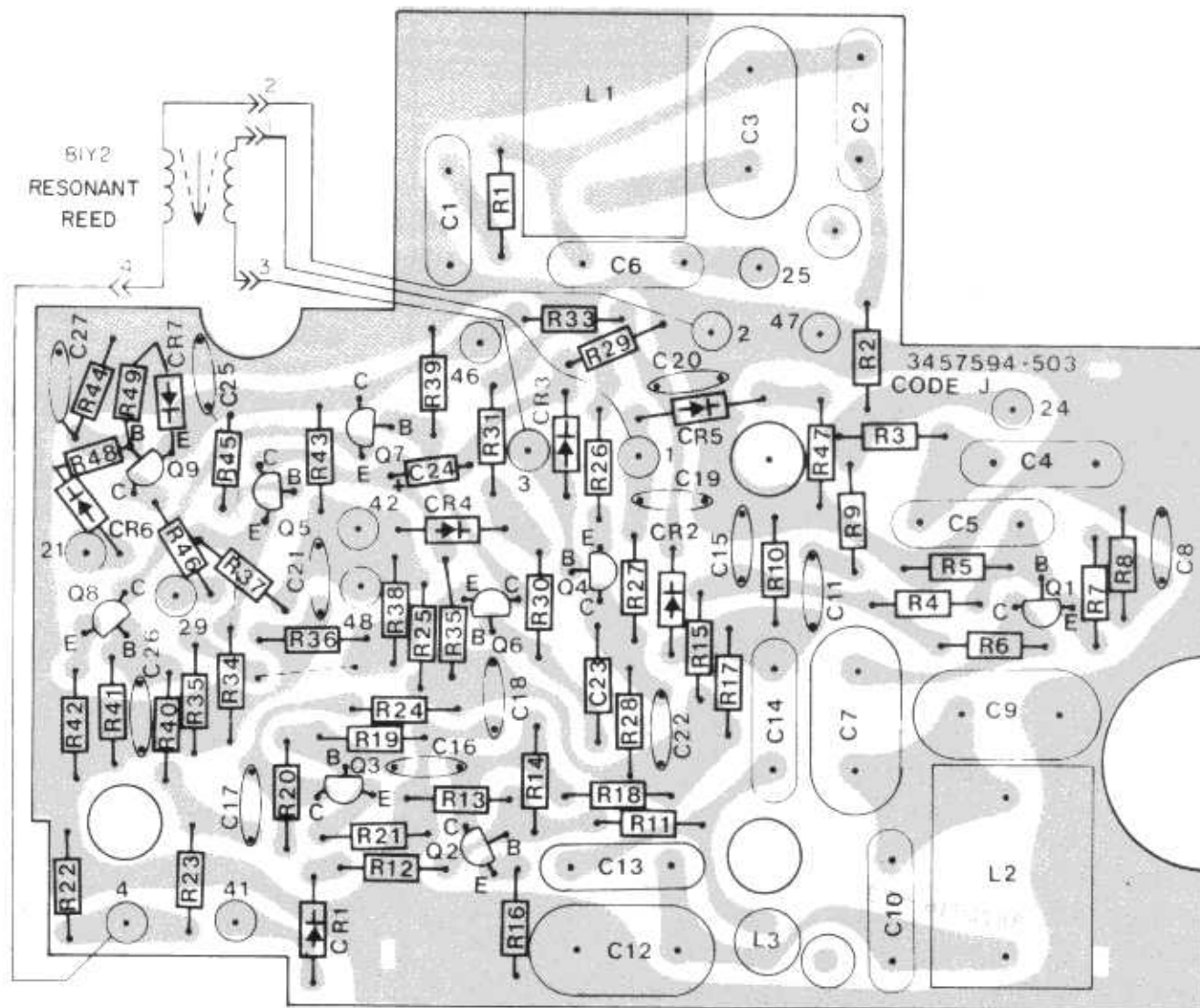
Symbol	Stock No.	Drawing No.	Description
	243592	3457594-503	DECODER MODULE P/L 3457594-503 REV 34 CODE J
83C1	243597	3457081-235	Film, .022 MF 5% 100 V DC
83C2	243597	3457081-235	Film, .022 MF 5% 100 V DC
83C3	243594	3457081-260	Film, 0.22 MF 5% 75 V DC
83C4	243597	3457081-235	Film, .022 MF 5% 100 V DC
83C5	243595	3457081-243	Film, .047 MF 5% 100 V DC
83C6	243595	3457081-243	Film, .047 MF 5% 100 V DC
83C7	231874	3453563-101	Tantalum 1.0 MF, +75-20% 15 V
83C8	243581	3457537-013	Tantalum, 10 MF 20% 20 V DC
83C9*	425749	3457081-263	Film, 0.27 MF 5% 100V DC
83C9**	243594	3457081-260	Film, 0.22 MF 5% 100V DC
83C10*	425748	3457081-245	Film, 0.056 MF 5% 100V DC
83C10**	243596	3457081-239	Film, 0.033 MF 5% 100V DC
83C11	112660	1510003-225	Ceramic, 1000 PF 10% 100 V DC
83C12*	425749	3457081-263	Film, 0.27 MF 5% 100V DC
83C12**	243594	3457081-260	Film, 0.22 MF 5% 100V DC
83C13	243597	3457081-235	Film, .022 MF 5% 100 V DC
83C14	236032	3457081-143	Film, .047 MF 10% 100 V DC
83C15	243581	3457537-013	Tantalum, 10 MF 20% 20 V DC
83C16	242034	3457537-015	Tantalum, 1.0 MF 20% 35 V DC
83C17	243583	3457537-018	Tantalum, 3.3 MF 20% 35 V DC
83C18	243582	3457537-014	Tantalum, 22 MF 20% 20 V DC
83C19	243600	3457537-012	Tantalum, 4.7 MF 20% 20 V DC
83C20	243600	3457537-012	Tantalum, 4.7 MF 20% 20 V DC
83C21	243582	3457537-014	Tantalum, 22 MF 20% 20 V DC
83C22	234543	3463453-117	Ceramic, .01 MF 25 V DC
83C23	243598	3457334-238	Tantalum, 0.33 MF 20% 50 V DC
83C24	243600	3457537-012	Tantalum, 4.7 uF 20% 20 VDC
83C25	242735	3457537-008	Tantalum, 10 uF 20% 15 VDC
83C26	243595	3457081-143	.047 uF 10% 100 VDC
83C27	243582	3457537-014	Tantalum, 22 MF 20% 20V DC
83CR1 thru 83CR3	242522	3464611-001	Diode
83CR2	242522	3464611-001	Diode
83CR4	426587	3731193-005	Diode
83CR5	242522	3464611-001	Diode
83CR6	242522	3464611-001	Diode
83CR7	242522	3464611-001	Diode
83L1	227825	3460656-001	Reactor - Choke, 3.3 H
83L2	227825	3460656-001	Reactor - Choke, 3.3 H
83L3	227824	3460678-001	Reactor - Choke, 10 MH
83Q1	243585	3468242-001	Transistor
83Q2	242758	3468182-001	Transistor
83Q3	243585	3468242-001	Transistor
83Q4	243585	3468242-001	Transistor
83Q5	242759	3468182-002	Transistor
83Q6	242760	3468183-001	Transistor
83Q7	242758	3468182-001	Transistor
83Q8	242758	3468182-001	Transistor
83Q9	242760	3468183-001	Transistor
83R1	285421	99206-078	22,000 Ohms 10% 1/4 W
83R2	218499	99206-074	10,000 Ohms 10% 1/4 W
83R3	219467	99206-079	27,000 Ohms 10% 1/4 W
83R4	223769	99206-086	100,000 Ohms 10% 1/4 W
83R5	223769	99206-086	100,000 Ohms 10% 1/4 W

* For use with tone frequencies of 179.9 Hz and below.

** For use with tone frequencies above 179.9 Hz.

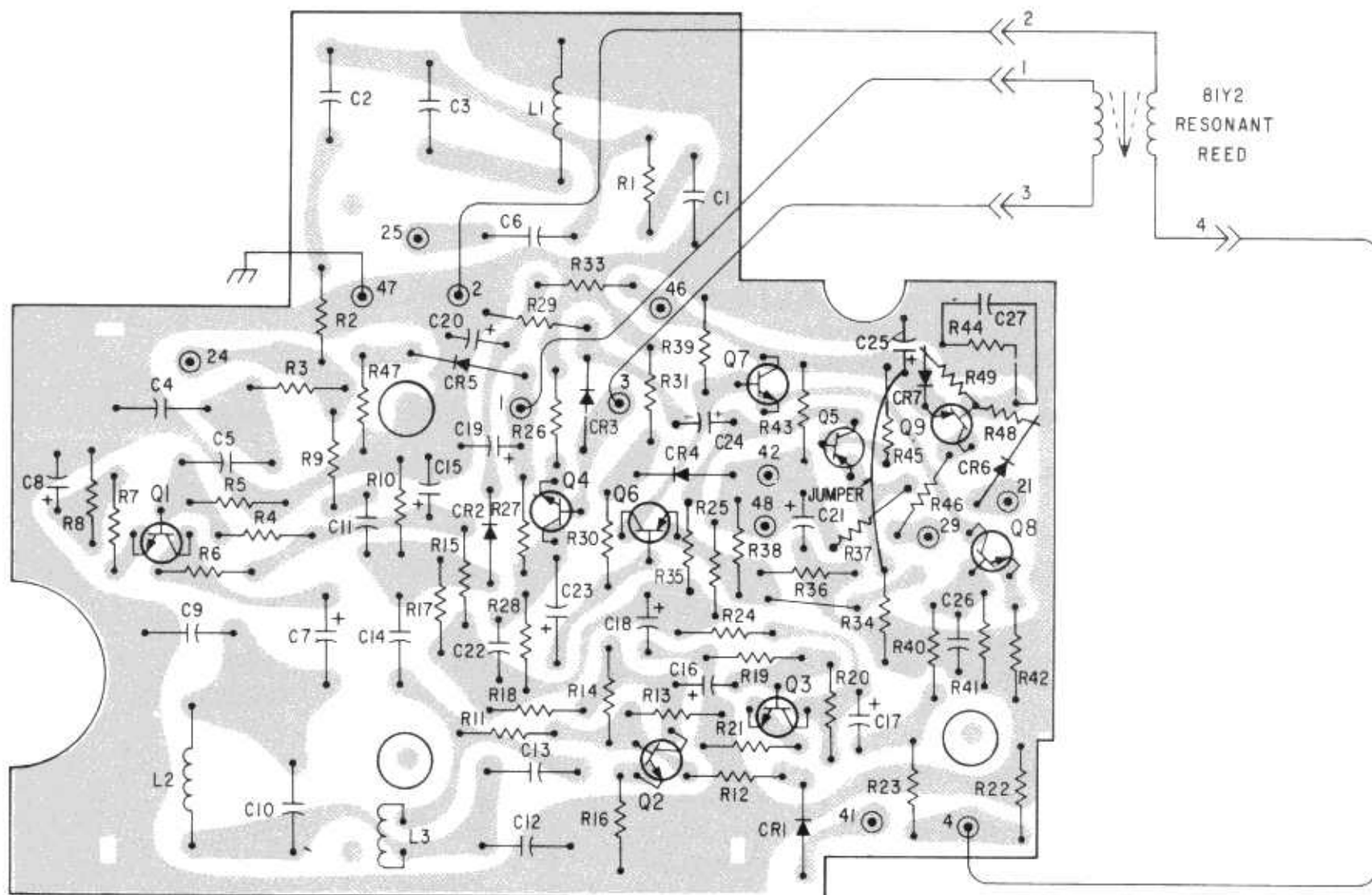
CODE J - REPLACEMENT PARTS (Cont.)

Symbol	Stock No.	Drawing No.	Description
83R6	219464	99206-071	5600 Ohms 10% 1/4 W
83R7	108865	99206-062	1000 Ohms 10% 1/4 W
83R8	285258	99206-182	9100 Ohms 5% 1/4 W
83R9	218499	99206-074	10,000 Ohms 10% 1/4 W
83R10	219465	99206-073	8200 Ohms 10% 1/4 W
83R11	113524	99206-067	2700 Ohms 5% 1/4 W
83R12	108868	99206-075	12,000 Ohms 5% 1/4 W
83R13	285447	99206 084	68,000 Ohms 10% 1/4 W
83R14	227755	99206-090	220,000 Ohms 10% 1/4 W
83R15	108865	99206-062	1000 Ohms 10% 1/4 W
83R16	108861	99206-135	100 Ohms 5% 1/4 W
83R17	108871	99206-082	47,000 Ohms 10% 1/4 W
83R18	219464	99206-071	5600 Ohms 10% 1/4 W
83R19	285447	99206-084	68,000 Ohms 10% 1/4 W
83R20	229965	99206-087	120,000 Ohms 10% 1/4 W
83R21	108863	99206-145	270 Ohms 5% 1/4 W
83R22	300690	99206-157	820 Ohms 5% 1/4 W
83R23	300596	99206-176	5100 Ohms, 5%, 1/4W
83R24	219464	99206-177	5600 Ohms 5% 1/4 W
83R25	219458	99206-056	330 Ohms 10% 1/4 W
83R26	108863	99206-145	270 Ohms 5% 1/4 W
83R27	108871	99206-082	47,000 Ohms 10% 1/4 W
83R28	285258	99206-182	9100 Ohms 5% 1/4 W
83R29	108871	99206-082	47,000 Ohms 10% 1/4W
83R30	285404	99206-080	33,000 Ohms 10% 1/4 W
83R31	285421	99206-191	22,000 Ohms 5% 1/4 W
83R32	219467	99206-079	27,000 Ohms 10% 1/4W
83R33	107972	99206-068	3300 Ohms 10% 1/4 W
83R34	426209	99206-168	2400 Ohms 5% 1/4 W
83R36	285258	99206-182	9100 Ohms 5% 1/4 W
83R37	219467	99206-193	27,000 Ohms 5% 1/4W
83R38	108864	99206-151	470 Ohms 5% 1/4 W
83R39	108866	99206-066	2200 Ohms 10% 1/4 W
83R40	108868	99206-075	12,000 Ohms 10% 1/4 W
83R41	218500	99206-081	39,000 Ohms 10% 1/4 W
83R42	108861	99206-135	100 Ohms 5% 1/4 W
83R43	108868	99206-075	12,000 Ohms 10% 1/4 W
83R44	285421	99206-078	22,000 Ohms 10% 1/4 W
83R45	416112	99206-191	22,000 Ohms 5% 1/4W
83R46	108866	99206-066	2200 Ohms 10% 1/4 W
83R47	108865	99206-062	1000 Ohms 10% 1/4 W
83R48	108865	99206-062	1000 Ohms 10% 1/4 W
83R49	219459	99206-064	1500 Ohms 10% 1/4 W
	228124	3450797-003	Contact - Pin (Package of 5)
	640632	MI-559410	SHIELD KIT (Shields 83L1 in base station applications) P/L MI-559410 REV 0



30054-1

3472716 REV 6 3476361 REV 22 3457594 REV 34
AS VIEWED FROM COMPONENT SIDE



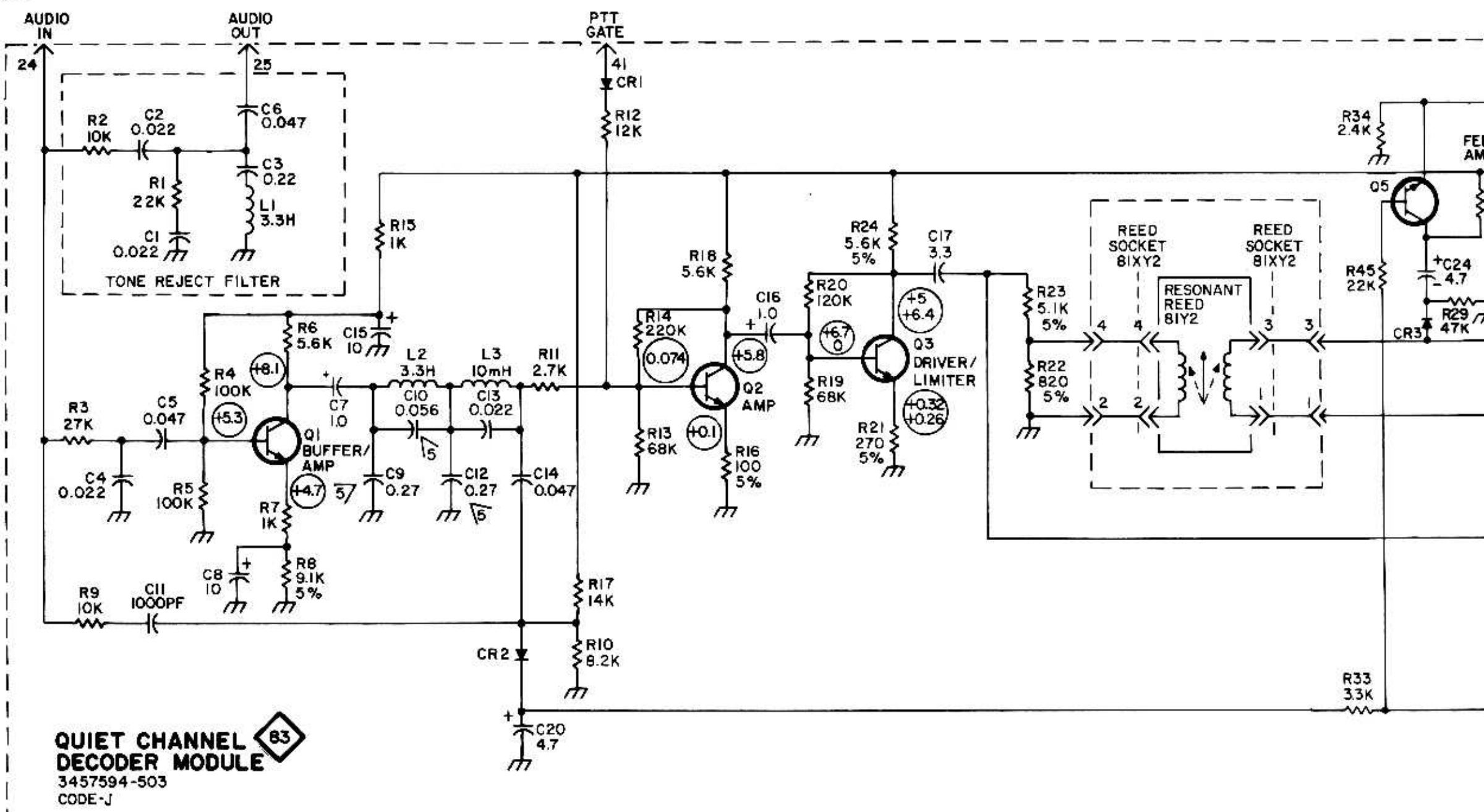
30037-1

3472716 REV 6 3476361 REV 22 3457594 REV 34

AS VIEWED FROM FOIL SIDE

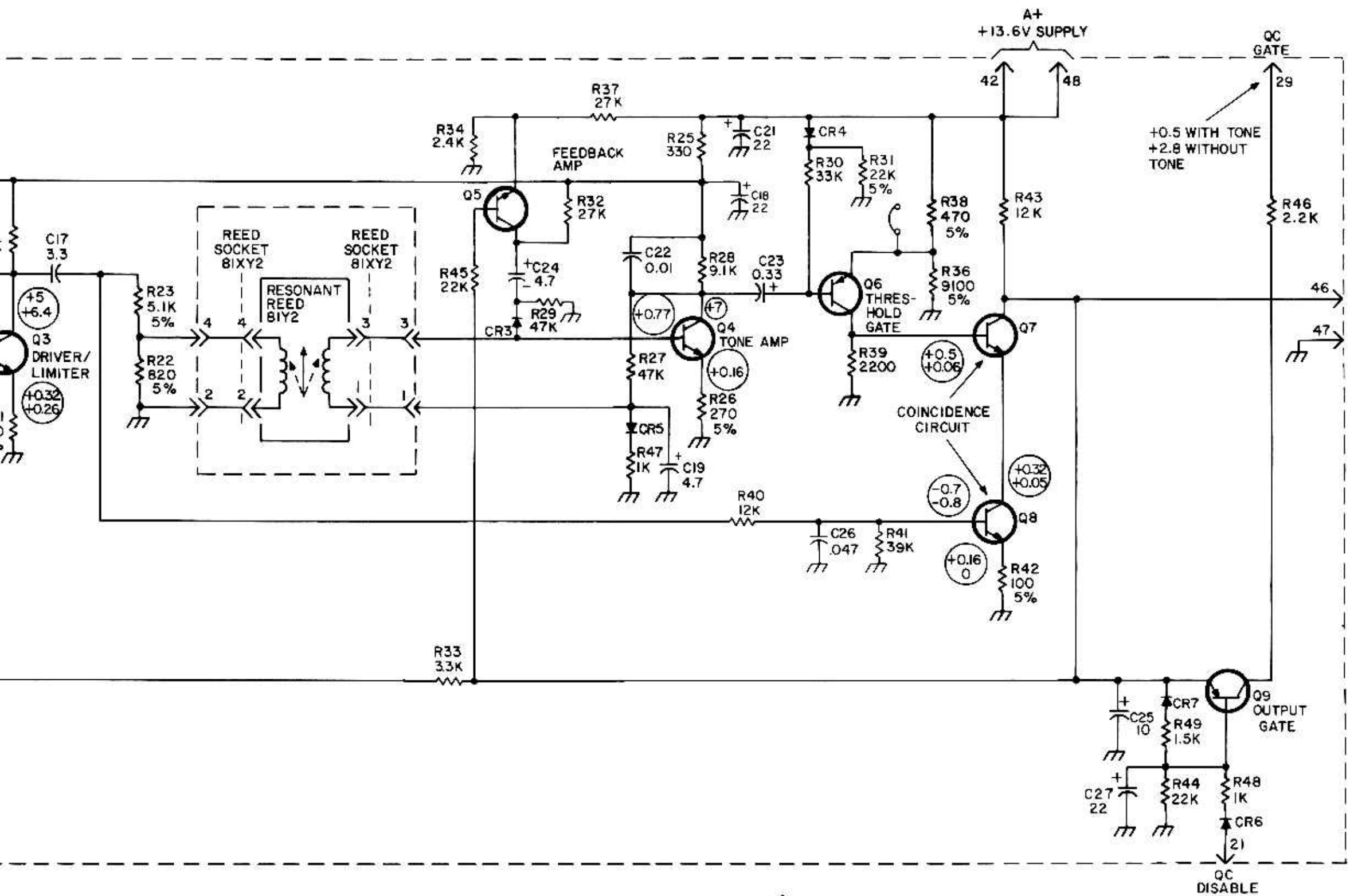
Pathfinder Diagram
CODE J

N3LKL



30045-1 3476361 REV 22 3457594 REV 34

- NOTES:
1. RESISTORS IN OHMS, 1/4W, 10% EXCEPT AS NOTED.
 2. CAPACITORS IN μ F EXCEPT AS NOTED.
 3. DC VOLTAGES ARE TYPICAL, MEASURED TO CHASSIS WITH 20,000 Ω /V VOM. UPPER VOLTAGE = SIGNAL LOWER VOLTAGE = NO SIGNAL.
 4. AC RMS VOLTAGES ARE TYPICAL WITH 10 MEGOHM INPUT VTVM.

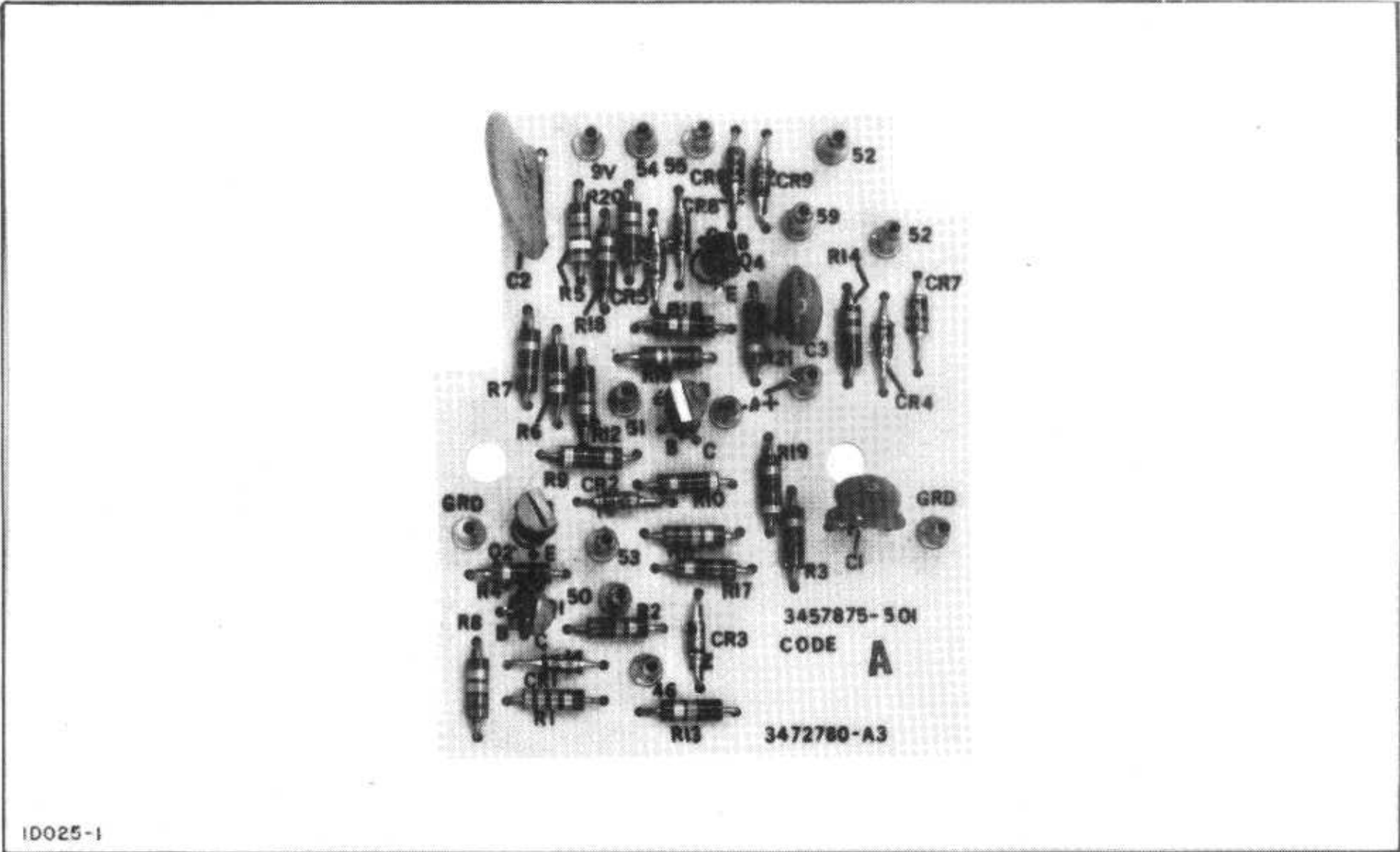


TO CHASSIS WITH 20,000 Ω/V VOM.
 SE = NO SIGNAL

4. AC RMS VOLTAGES ARE TYPICAL, MEASURED TO CHASSIS WITH 10 MEGOHM INPUT VTVM.

FOR FREQUENCIES ABOVE 179.9 Hz :
 C9 --- .22 mF
 C10 --- .033 mF
 C12 --- .22 mF

Schematic Diagram
CODE J



3457875-501 TOS Module (part of MI-559273)

TECHNICAL DATA

<p>Power Requirements</p> <p>+13.8 volts 3 mA Standby 8 mA Operate</p> <p>+9.5 volts 1.0 mA 75 mA lamp current when used in community repeater stations</p> <p>Operating Temperature Range -30°C to +65°C</p>	<p>Sensitivity</p> <p>TOS</p> <table border="0"> <tr> <td>Input (pin 46)</td> <td>Output (pin 52)</td> </tr> <tr> <td>≥ 4.0 V DC</td> <td>0 V DC</td> </tr> <tr> <td>< 1.0 V DC</td> <td>12 V DC (5 mA)</td> </tr> </table> <p>Tone Enable Gate</p> <table border="0"> <tr> <td>Input (pin 55)</td> <td>Output (pin 54)</td> </tr> <tr> <td>12 V DC</td> <td>≥ 9 V DC</td> </tr> <tr> <td>0 V DC</td> <td>≥ 6 V DC</td> </tr> </table>	Input (pin 46)	Output (pin 52)	≥ 4.0 V DC	0 V DC	< 1.0 V DC	12 V DC (5 mA)	Input (pin 55)	Output (pin 54)	12 V DC	≥ 9 V DC	0 V DC	≥ 6 V DC
Input (pin 46)	Output (pin 52)												
≥ 4.0 V DC	0 V DC												
< 1.0 V DC	12 V DC (5 mA)												
Input (pin 55)	Output (pin 54)												
12 V DC	≥ 9 V DC												
0 V DC	≥ 6 V DC												

REPLACEMENT PARTS

Symbol	Stock No.	Drawing No.	Description
	640193	MI-559273	TONE OPERATED SWITCHII P/L MI-559273 REV 2
ITEM 1	3457875-502		Tone Operated Switch Assembly
	242817	3457875-501	TOS Module - see separate listing
	241513	3464559-301	Socket pins for 1J5 and 1J6 (3 used) - package of 25
	228192	3450825-001	Female push-on connector (13 used) - package of 5
ITEM 2			Spacer, #6 x 1-1/8" long
ITEM 3			Screw - taptite, #6-32 x 1-3/8" long

CIRCUIT DESCRIPTION

GENERAL

The TOS module contains two separate circuits: the TOS (Q1/Q2/Q3), and the Tone Enable/Disable gate (Q4).

TOS – Q1/Q2/Q3

When no tone is received by the Quiet Channel Decoder, +4v DC or more is present at pin 46, which makes Q1 conduct, Q2 turns off, and Q3 remains off. No keying voltage appears at output pin 52. When a tone is received by the Quiet Channel Decoder, +1v DC or less is present at pin 46, which turns Q1 off, Q2 on, and Q3 on. Q3 conducts the keying voltage to output pin 52.

The TOS may be disabled by application of +12 volts to pin 50, which makes Q1 conduct, Q2 turn off, and Q3 turn off. No keying voltage appears at output pin 52.

Application of +12v to test enable pin 51 will turn on Q2 and Q3, producing a keying output at pin 52.

TONE ENABLE/DISABLE GATE – Q4

This portion of the TOS module functions to switch the tone oscillator of a Quiet Channel (CTCSS) encoder. The encoder tone oscillator operates continuously, providing a constant input to the exciter modulator. To disable this tone, the tone signal is conducted through forward biased diode CR5 and C3 to ground. CR5 is biased by the emitter voltage of Q4, which is conducting with +12v applied to pin 55.

Application of +12 V to pin 55 causes transistor Q4 to stop conducting. The emitter potential then rises, reverse-biasing CR5 and preventing the tone signal from reaching filter C3. With the +12V enable signal applied to pin 55, the encoder may be disabled by application of ground potential to pin 59, which forward biases CR9, lowering the base voltage of Q4 which causes it to conduct. Diode CR5 is then forward biased, and the encoder tone signal is passed through C3 to ground.

EMERGENCY SUBSTITUTES - SOLID STATE DEVICES

In the event of a semiconductor failure, the exact replacement found in the replacement parts list should be used. In an emergency, to minimize equipment down-

time, the following common semiconductor types may be temporarily used. However, use of these substitutes may result in degraded system performance.

Component Designation	Emergency Substitute	Component Designation	Emergency Substitute
63CR1	1N914	63CR8	1N914
63CR2	1N914	63CR9	1N914
63CR3	1N914		
63CR4	1N914	63Q1	2N4124
63CR5	1N914	63Q2	2N4124
63CR6	1N914	63Q3	2N4126
63CR7	1N914	63Q4	2N4126

PRODUCTION VARIATIONS

The production level of the module is indicated by a legend (example: CODE C) stamped on the module near the identifying drawing number. The following table lists the differences between the various production levels. To determine the difference between a given

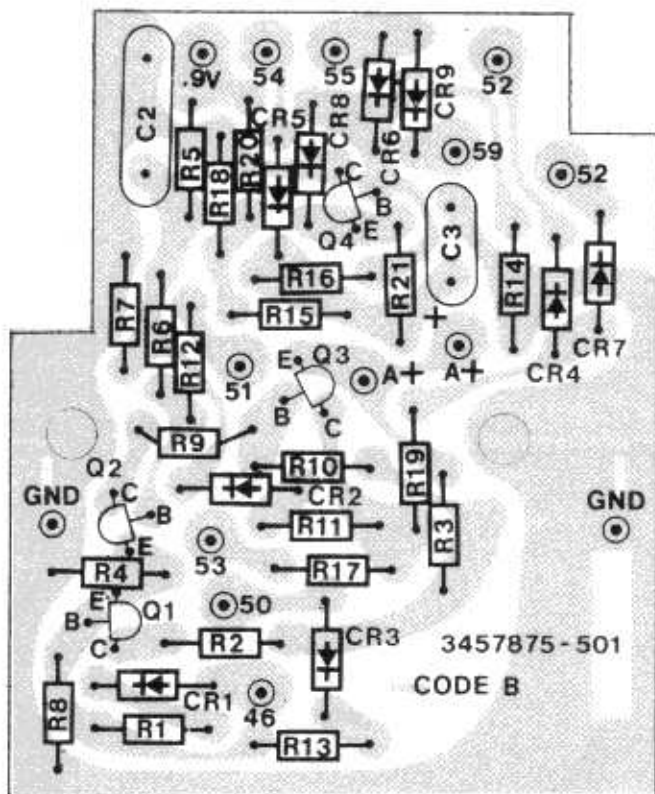
production level and the level shown on the pathfinder, schematic, and replacement parts list, note the differences tabulated for the desired level and all subsequent levels.

TONE OPERATED SWITCH MODULE Current version: 3457875-501 CODE B

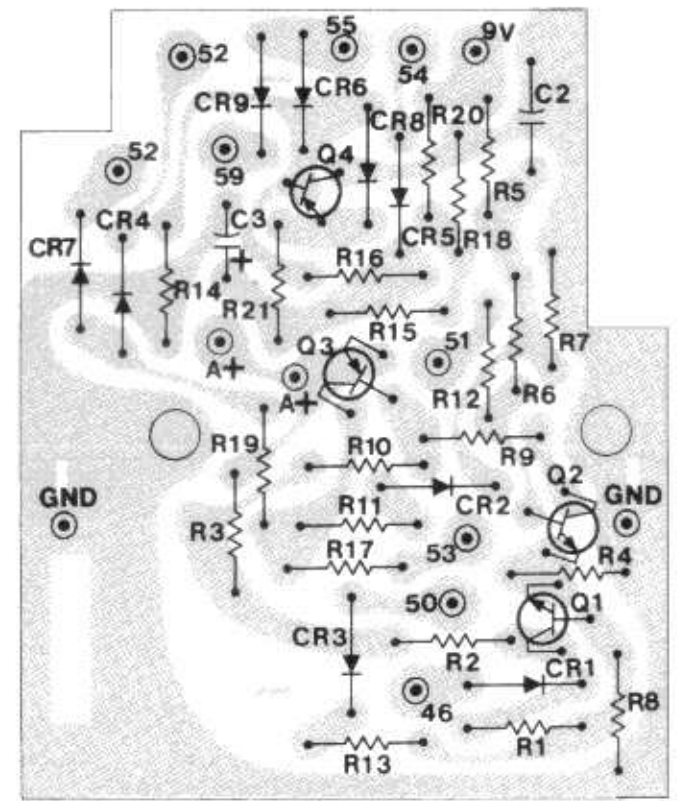
Code Level Difference	Instruction Book Reference	Changes for Code Level Differences		
A-B	Component Value	63R2 Value on Code A:		
		Stock No.	Drawing No.	Description
		218499	99206-74	10K, 10%, 1/4 W

REPLACEMENT PARTS

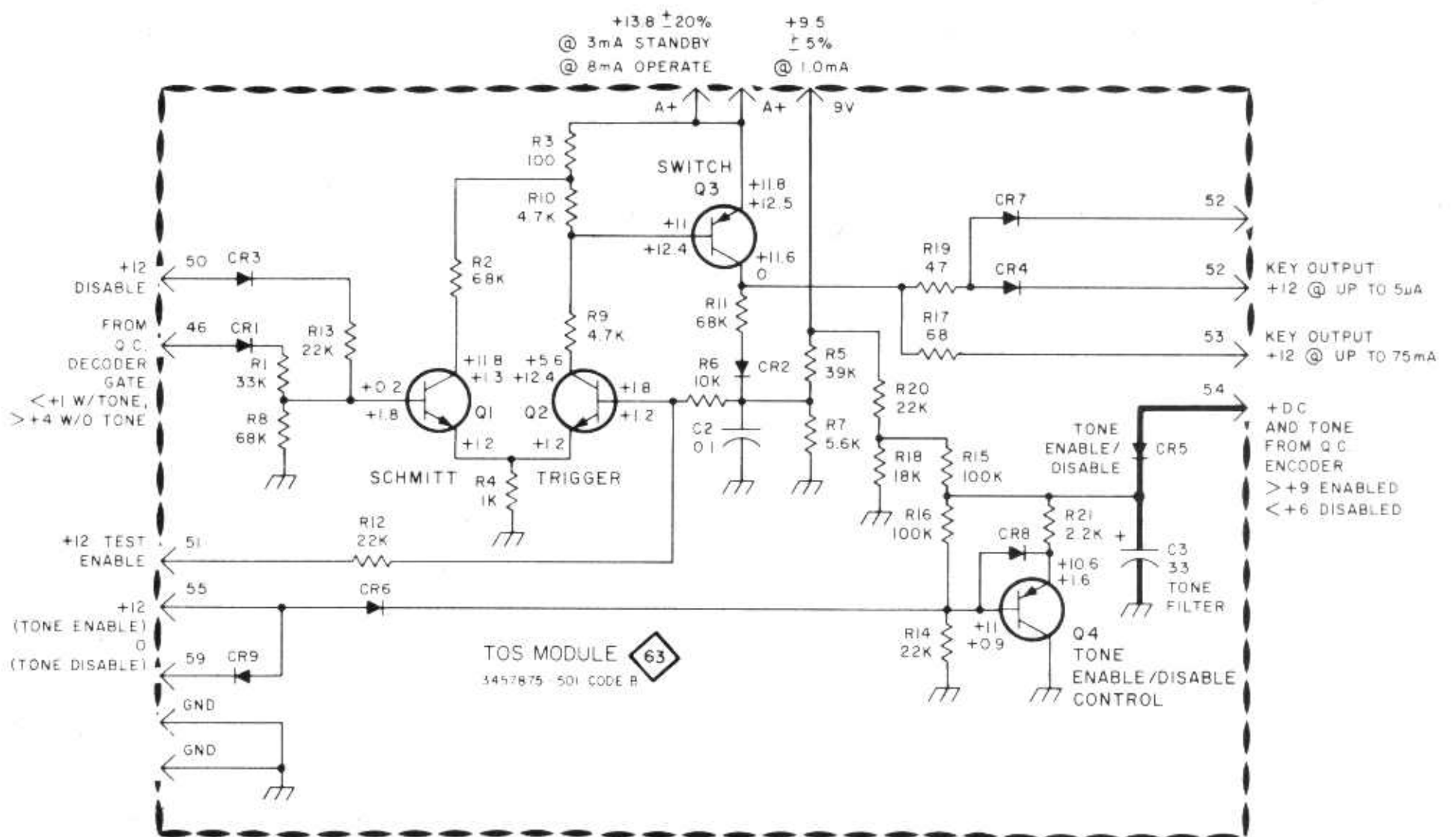
Symbol	Stock No.	Drawing No.	Description
	248217	3457875-501	TOS MODULE 63 P/L 3457875-501 REV 3 CODE B
63C2	227444	3463453-120	Ceramic, 0.1 mf, 25V
63C3	247833	3457537-029	Tantalum, 33 mf, 15V
63CR1 TO 63CR9	242522	3464611-001	Diode
63Q1	242759	3468182-002	Transistor
63Q2	242759	3468182-002	Transistor
63Q3	241884	3468183-002	Transistor
63Q4	241884	3468183-002	Transistor
63R1	285404	99206-080	33,000 ohms, 10%, 1/4W
63R2	108867	99206-072	6800 ohms, 10%, 1/4W
63R3	108861	99206-050	100 ohms, 10%, 1/4W
63R4	108865	99206-062	1000 ohms, 10%, 1/4W
63R5	218500	99206-081	39,000 ohms, 10%, 1/4W
63R6	218499	99206-074	10,000 ohms, 10%, 1/4W
63R7	219464	99206-071	5600 ohms, 10%, 1/4W
63R8	285447	99206-084	68,000 ohms, 10%, 1/4W
63R9	300739	99206-070	4700 ohms, 10%, 1/4W
63R10	300739	99206-070	4700 ohms, 10%, 1/4W
63R11	285447	99206-084	68,000 ohms, 10%, 1/4W
63R12	285421	99206-078	22,000 ohms, 10%, 1/4W
63R13	285421	99206-078	22,000 ohms, 10%, 1/4W
63R14	285421	99206-078	22,000 ohms, 10%, 1/4W
63R15	223769	99206-086	100,000 ohms, 10%, 1/4W
63R16	223769	99206-086	100,000 ohms, 10%, 1/4W
63R17	269897	99206-048	68 ohms, 10%, 1/4W
63R18	108870	99206-077	18,000 ohms, 10%, 1/4W
63R19	108860	99206-046	47 ohms, 10%, 1/4W
63R20	285421	99206-078	22,000 ohms, 10%, 1/4W
63R21	108866	99206-066	2200 ohms, 10%, 1/4W
	228124	3450797-003	Contact Pin (Package of 5)
	228192	3450825-001	Female contact for above (Package of 5)
	241513	3464559-301	Connector socket (base station panel jacks - package of 25)



3472780 REV 1 3472753 REV 2 3457875 REV 3
AS VIEWED FROM COMPONENT SIDE



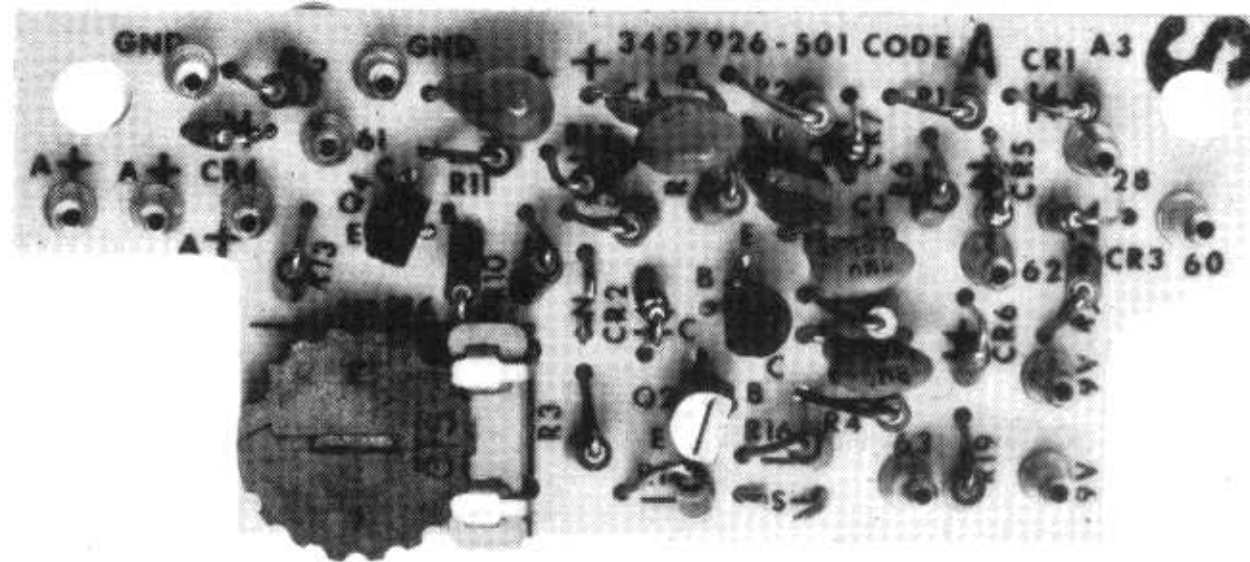
3472780 REV 1 3472753 REV 2 3457875 REV 3
AS VIEWED FROM FOIL SIDE



20022 3472753 REV 2 3457875 REV 3

NOTES

1. RESISTORS IN OHMS, 1/4 W, 5% EXCEPT AS NOTED.
2. CAPACITORS IN μ F EXCEPT AS NOTED.
3. DC VOLTAGES ARE TYPICAL, MEASURED TO CHASSIS WITH 20,000 Ω/V VOM
UPPER VOLTAGE = WITH TONE RECEIVED AT Q.C.
LOWER VOLTAGE = NO TONE RECEIVED AT Q.C.
4. IF EXTERNAL POWER SUPPLY IS USED WHEN TESTING THIS BOARD, SUPPLY SHOULD BE VOLTAGE-REGULATED AND CURRENT-LIMITED.



ID027-1

3457926-501 COS Module (part of MI-559417)

TECHNICAL DATA

Power Requirements

- 13.8V DC \pm 20% (pin A+)
- 3 mA Standby
- 15 mA operate
- 9.5V DC \pm 5% (pin 9V)
- 0.5 mA

Operating Temperature Range

-30°C to +65°C

Disable Voltage (pin 60)

- 12.0V DC
- 2 mA (maximum)

Output Voltage (pin 61)

- +13.8V
- 5 mA (maximum)

SENSITIVITY (signal input required to produce +13.8V @ pin 61)

Pin	Sensitivity Jumper Connected	Sensitivity Jumper Open	
		R14 CW	R14 CCW
63*	\leq 0.7V DC	\geq 0.8V DC	\leq 3.4V DC
28*	\leq 7.0V DC	\leq 7.0V DC	\leq 7.0V DC

* both signals must be present simultaneously

Voltage at pin 63	Receiver carrier/noise ratio	Test Meter reading**
\leq 0.7V DC	16 dB	\leq 4 μ A
\geq 0.8V DC	17 dB	\geq 5 μ A
\leq 3.4V DC	26 dB	\leq 20 μ A

** 50 μ A meter between receiver test socket pin 8 and chassis
10 dB carrier/noise ratio = 20 dB quieting

REPLACEMENT PARTS

Symbol	Stock No.	Drawing No.	Description
	640235	MI-559417	CARRIER OPERATED SWITCH P/L MI-559417 REV 1
ITEM 1		3457926-501	COS Module - see separate listing
ITEM 2			Adapter Plate Assembly
ITEM 3			Mounting Hardware
3A			spacer, #6 x .19" (2 used)
3B			screw, pan hd c.r. taptite #6-32 x 3/8" (3 used)
3C	248538	3454702-001	screw, pan hd c.r. taptite #6-32 x 1/4" (3 used) - package of 5
3D	419040	3454702-003	screw, pah hd c.r. taptite #6-32 x 1/2" (1 used)
3E			Bracket
3F	103891	57435-104	Nut, hex, #6-32 (1 used)

CIRCUIT DESCRIPTION

GENERAL

Refer to the COS Module schematic diagram while reading the following descriptions. Two modes of operation are possible: squelch-only operation (squelch jumper JU1 intact), and squelch + carrier operation (JU1 removed).

SQUELCH ONLY OPERATION

With jumper JU1 intact, Q2 is always forward biased (by the voltage divider formed by R3/R15) and ready to conduct. The only control signal required for COS keying is from the receiver squelch gate at pin 28. When a signal is being received, the voltage at pin 28 is approximately +9V DC, which causes switch transistor Q1 to conduct, causing the base voltage on Q3 to become less positive, which causes the transistor to conduct. When Q3 conducts, the base voltage on Q4

becomes less positive, causing Q4 to conduct and connect the supply voltage to the output (pin 61).

SQUELCH + CARRIER OPERATION

With jumper JU1 removed, both the squelch gate output (pin 28) and the detected carrier inputs (pin 63) are required to produce an output at pin 61.

CR8/R20/C5 form a detector circuit to provide a DC input at pin 63. With JU2 not installed, R14 has no effect. When the signal on pin 63 is sufficient to cause Q2 to be ready to conduct, the remainder of the circuit operates as in the squelch only mode. When Q4 conducts, R11/R17/CR2/R15 form a voltage divider that clamps the base of Q2 near the supply voltage. This keeps the COS output at +13.8V even if the signal level drops below the threshold set by R14. Complete loss of signal, however, will cause a loss of the receiver squelch voltage, which will cause Q1 to stop conducting, and the output voltage at pin 61 will be switched off.

EMERGENCY SUBSTITUTES - SOLID STATE DEVICES

In the event of a semiconductor failure, the exact replacement found in the replacement parts list should be used. In an emergency, to minimize equipment down-

time, the following common semiconductor types may be temporarily used. However, use of these substitutes may result in degraded system performance.

Component Designation	Emergency Substitute	Component Designation	Emergency Substitute
64CR1	1N914	64CR7	1N914
64CR2	1N914	64CR8	1N198A
64CR3	1N914	64Q1	2N4124
64CR4	1N914	64Q2	2N5088
64CR5	1N914	64Q3	2N4126
64CR6	1N914	64Q4	2N4126

PRODUCTION VARIATIONS

The production level of the module is indicated by a legend (example: CODE B) stamped on the module near

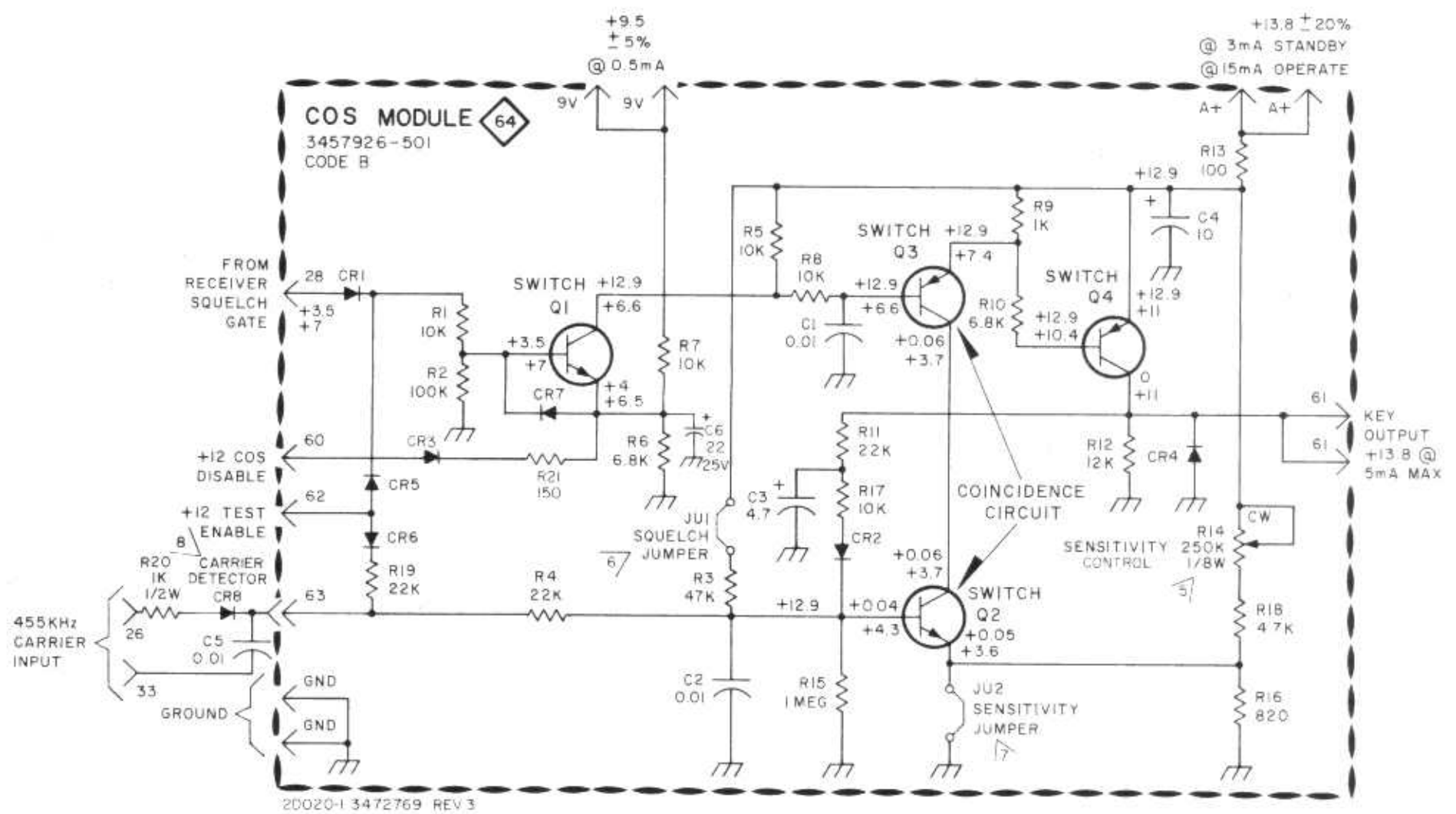
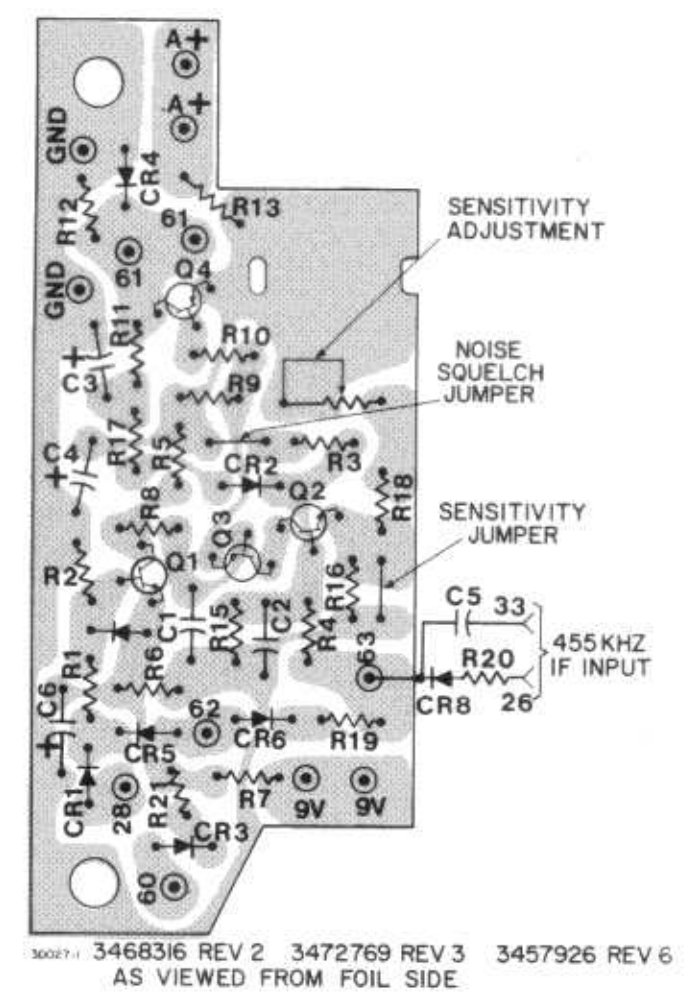
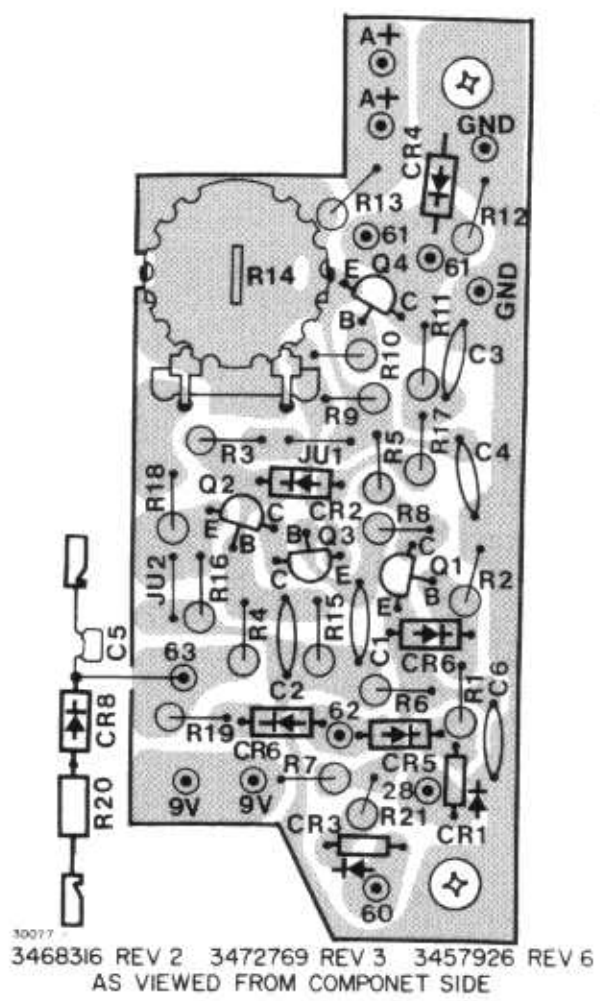
the identifying drawing number. The following table lists the differences between the various production levels.

CARRIER OPERATED SWITCH MODULE

Current version: 3457926-501 CODE C

Code Level Differences	Instruction Book References	Changes for Code Level Differences
A-B	Component Values	64C6 and 64R21 not used on CODE A
B-C	Component Values Schematic, Pathfinder	Same as Code C

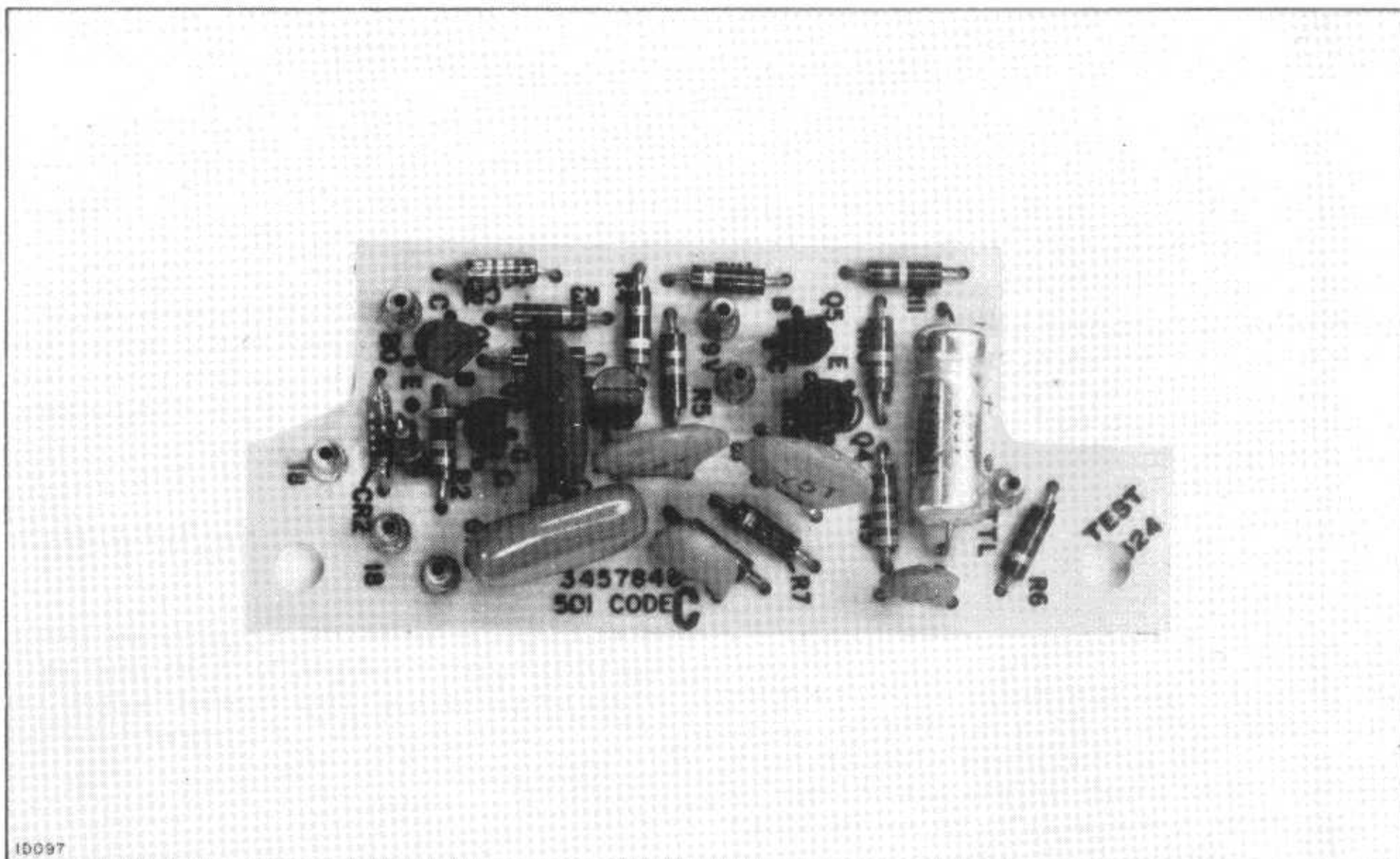
Symbol	Stock No.	Drawing No.	Description
		3457926-501	COS MODULE P/L 3457926-501 REV 5 CODE C
64C1	234543	3463453-117	Ceramic, .01 mf, 25V
64C2	234543	3463453-117	Ceramic, .01 mf, 25V
64C3	243600	3457537-012	Tantalum, 4.7 mf, 20V
64C4	243581	3457537-013	Tantalum, 10 mf, 20V
64C5	234543	3463453-017	Ceramic, .01 mf, 25V
64C6	243582	3457537-014	Tantalum, 22 uF, 25V
64CR1 TO			
64CR7	242522	3464611-001	Diode
64CR8	227448	3460543-001	Diode
64Q1	242759	3468182-002	Transistor
64Q2	243585	3468242-001	Transistor
64Q3	241884	3468183-002	Transistor
64Q4	241884	3468183-002	Transistor
64R1	218499	99206-074	10,000 ohms, 10%, 1/4W
64R2	223769	99206-086	100,000 ohms, 10%, 1/4W
64R3	108871	99206-082	47,000 ohms, 10%, 1/4W
64R4	285421	99206-078	22,000 ohms, 10%, 1/4W
64R5	218499	99206-074	10,000 ohms, 10%, 1/4W
64R6	108867	99206-072	6800 ohms, 10%, 1/4W
64R7	218499	99206-074	10,000 ohms, 10%, 1/4W
64R8	218499	99206-074	10,000 ohms, 10%, 1/4W
64R9	108865	99206-062	1000 ohms, 10%, 1/4W
64R10	108867	99206-072	6800 ohms, 10%, 1/4W
64R11	285421	99206-078	22,000 ohms, 10%, 1/4W
64R12	108868	99206-075	12,000 ohms, 10%, 1/4W
64R13	108861	99206-050	100 ohms, 10%, 1/4W
64R14	243602	3463187-012	Variable, 250,000 ohms, 30%, 1/8W
64R15	218762	99206-098	1 Megohm, 10%, 1/4W
64R16	300690	99206-061	820 ohms, 10%, 1/4W
64R17	218499	99206-074	10,000 ohms, 10%, 1/4W
64R18	300739	99206-070	4700 ohms, 10%, 1/4W
64R19	285421	99206-078	22,000 ohms, 10%, 1/4W
64R20	502210	82283-062	1000 ohms, 10%, 1/2W
64R21	227744	99206-052	150 ohms, 10%, 1/4W
	228124	3450797-003	Contact Pin (Package of 5)
	228192	3450825-001	Female Contact for above (Package of 5)
	241513	3464559-301	Connector Socket (base station panel jacks) - package of 25



1. RESISTORS IN OHMS, 1/4 W, 5% EXCEPT AS NOTED
2. CAPACITORS IN μ F EXCEPT AS NOTED
3. DC VOLTAGES ARE TYPICAL, MEASURED TO CHASSIS WITH 20,000 Ω/V VOM
UPPER VOLTAGE = NO SIGNAL
LOWER VOLTAGE = SIGNAL
4. IF EXTERNAL POWER SUPPLY IS USED WHEN TESTING THIS BOARD, SUPPLY SHOULD BE VOLTAGE REGULATED AND CURRENT LIMITED.

5. TYPICAL SETTING: MIDWAY, CLOCKWISE FOR GREATER SENSITIVITY
6. CONNECTED FOR SQUELCH-ONLY OPERATION, DISCONNECTED FOR SQUELCH-AND-SIGNAL-STRENGTH OPERATION.
7. SENSITIVITY JUMPER CONNECTED FOR MAXIMUM CARRIER SENSITIVITY.
8. CR8/R20/C5 ARE PART OF CABLE TO LOW IF MODULE

Pathfinder and Schematic Diagrams



3457848-501 TTL Module (part of MI-559265)

TECHNICAL DATA

<p>Power Requirements 13.6V \pm 20% from keying line (pin 20) 4 mA timing current 10 mA timed-out current +9.5V, (pin 9V)</p> <p>Timing Cycle 1 minute, +10-15 seconds</p> <p>Operating Temperature Range -30° to +65°C</p>	<p>Keying Output (pin 18) 13.6V \pm 20% (normal) 0.3V, Maximum (timed-out)</p> <p>Alert Tone Output 1.5 kHz \pm 20% 25 mV RMS \pm 20% into driver transformer with audio squelched</p>
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REPLACEMENT PARTS

Symbol	Stock No.	Drawing No.	Description
	640190	MI-559265	TRANSMIT TIME LIMITER P/L MI-559265 REV 0
ITEM 1		3457848-501	TTL Module (see separate listing)
ITEM 2			1/4" Spacer (2 supplied)
ITEM 3			#6-32 x 3/8" screw (2 supplied)



CIRCUIT DESCRIPTION

GENERAL

In the receive mode, there is no keying voltage applied to pin 20, transistor Q5 is cut off, and the entire circuit is inoperative. In the transmit mode, +13.6V is applied to pin 20, and the circuit operates as follows.

GATED DC AMPLIFIER – Q1

With the application of +13.6 volt keying voltage to pin 20, Gated DC Amplifier Q1 is turned on by the bias from voltage divider R2/R3, and keying voltage is applied to output pin 18.

TIMER CONTROL – Q5

The keying voltage at pin 20 also turns on Timer Control transistor Q5 by supplying forward bias through voltage divider R12/R13. When Q5 conducts, it connects voltage from the 9 volt power input to the timing circuitry composed of C2/R9/R10/R11/Q4.

TIME-OUT TRIGGER – Q4

Resistors R9/R10 supply a fixed bias voltage to the gate of Q4. Timing capacitor C2 begins to charge through resistor R11, causing the anode voltage of Q4 to rise. When the anode voltage exceeds the gate voltage (after approximately 60 seconds), Q4 conducts, dis-

charging C2 through cathode resistor R8. The voltage across R8 triggers SCR Q2 into conduction.

If the keying voltage is removed from pin 20, at any time before Q4 begins conducting, the removal of the gate voltage from Q4 will cause Q4 to conduct and discharge C2. Since the Tone Oscillator is powered by the keying voltage, the tone output is not present. This action provides the automatic reset feature.

TIME-OUT SWITCH – Q2

When C2 is discharged through R8 by Q4, the voltage across R8 triggers SCR Q2 into conduction. With the anode of Q2 at ground potential, the forward bias on the base of Q1 is removed, turning off Q1, and interrupting the keying voltage output at pin 18. Q2 also provides a ground return for Tone Oscillator Q3, which begins to oscillate, providing the tone output at pin TTL.

TONE OSCILLATOR – Q3

The tone oscillator is a relaxation type, using uni-junction transistor Q3. At the instant Q2 begins conducting, Q3 conducts due to the forward bias on the emitter (C1 is fully charged from the keying voltage input through R5). C1 immediately discharges through the low impedance emitter-to-base path of Q3 to ground (through Q2). The lowered bias on the emitter then turns off Q3. The emitter-base impedance rises, and C1 again charges through R5. The emitter voltage rises and again biases Q3 into conduction. This cycle repeats at a rate determined by the values of R5 and C1.

PRODUCTION VARIATIONS

The production level of the module is indicated by a legend (example: CODE C) stamped on the module near the identifying drawing number. The following table lists the differences between the various production levels.

To determine the difference between a given production level and the schematic pathfinder and parts list, note the differences tabulated for the desired level and all subsequent levels.

TTL MODULE
Current Version 3457848-501 CODE C

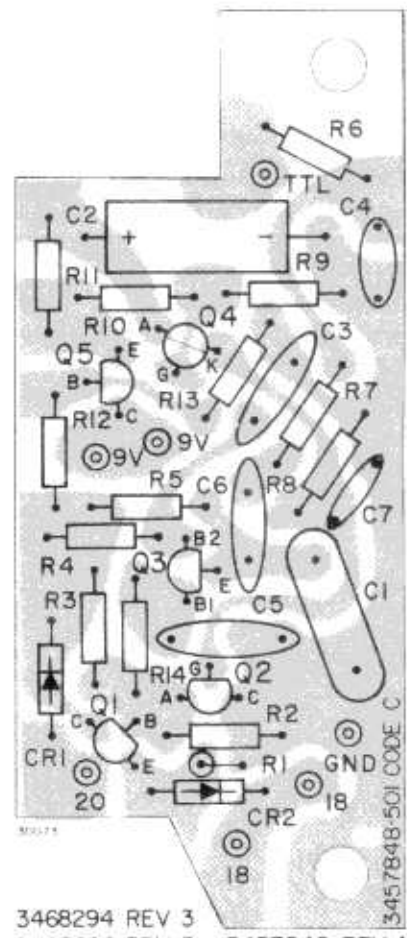
Code Level Difference	Instruction Book Reference	Changes for Code Level Differences			
		Symbol	Stock No.	Drawing No.	Description
A-B	Schematic and Parts List	81R8	108861	99206-050	100 ohms, 10%, 1/4 watt
		81C7 not used			
B-C	Schematic and Parts List	81C7 not used			

EMERGENCY SUBSTITUTES—SOLID STATE DEVICES

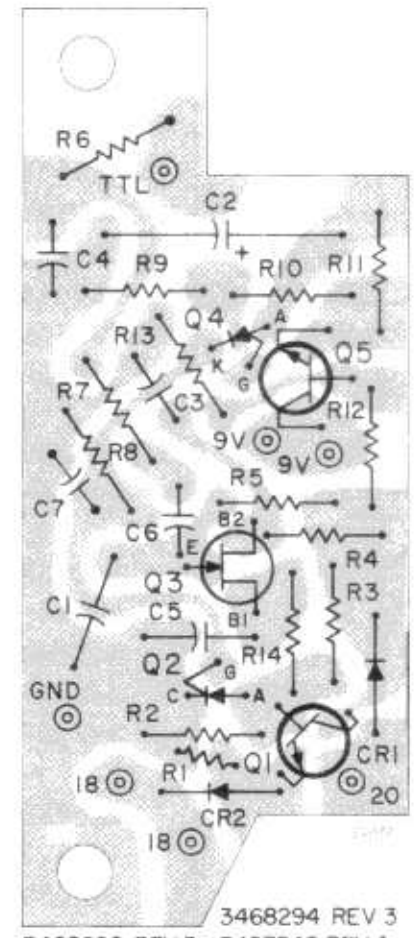
In the event of a semiconductor failure, the exact replacement found in the replacement parts list should be used. In an emergency, to minimize equipment down-

time, the following common semiconductor types may be temporarily used. However, use of these substitutes may result in degraded system performance.

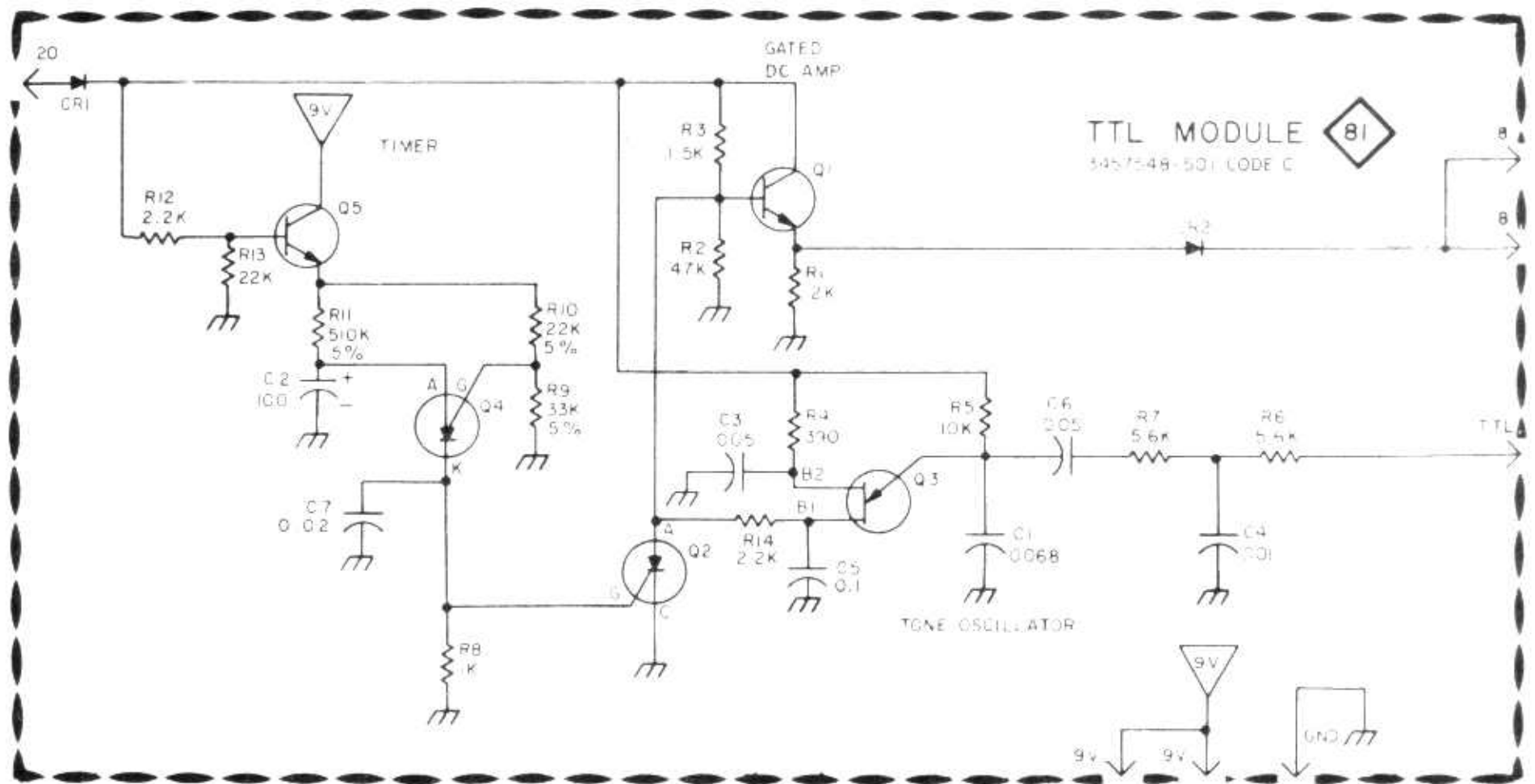
Component Designation	Emergency Substitute	Component Designation	Emergency Substitute
81CR1	1N909	81Q2	2N5060
81CR2	1N909	81Q3	2N4871
		81Q4	GE D13T2
81Q1	2N4124	81Q5	2N4124



3468294 REV 3
3468292 REV 3 3457848 REV 4
AS VIEWED FROM COMPONENT SIDE



3468294 REV 3
3468292 REV 3 3457848 REV 4
AS VIEWED FROM FOIL SIDE



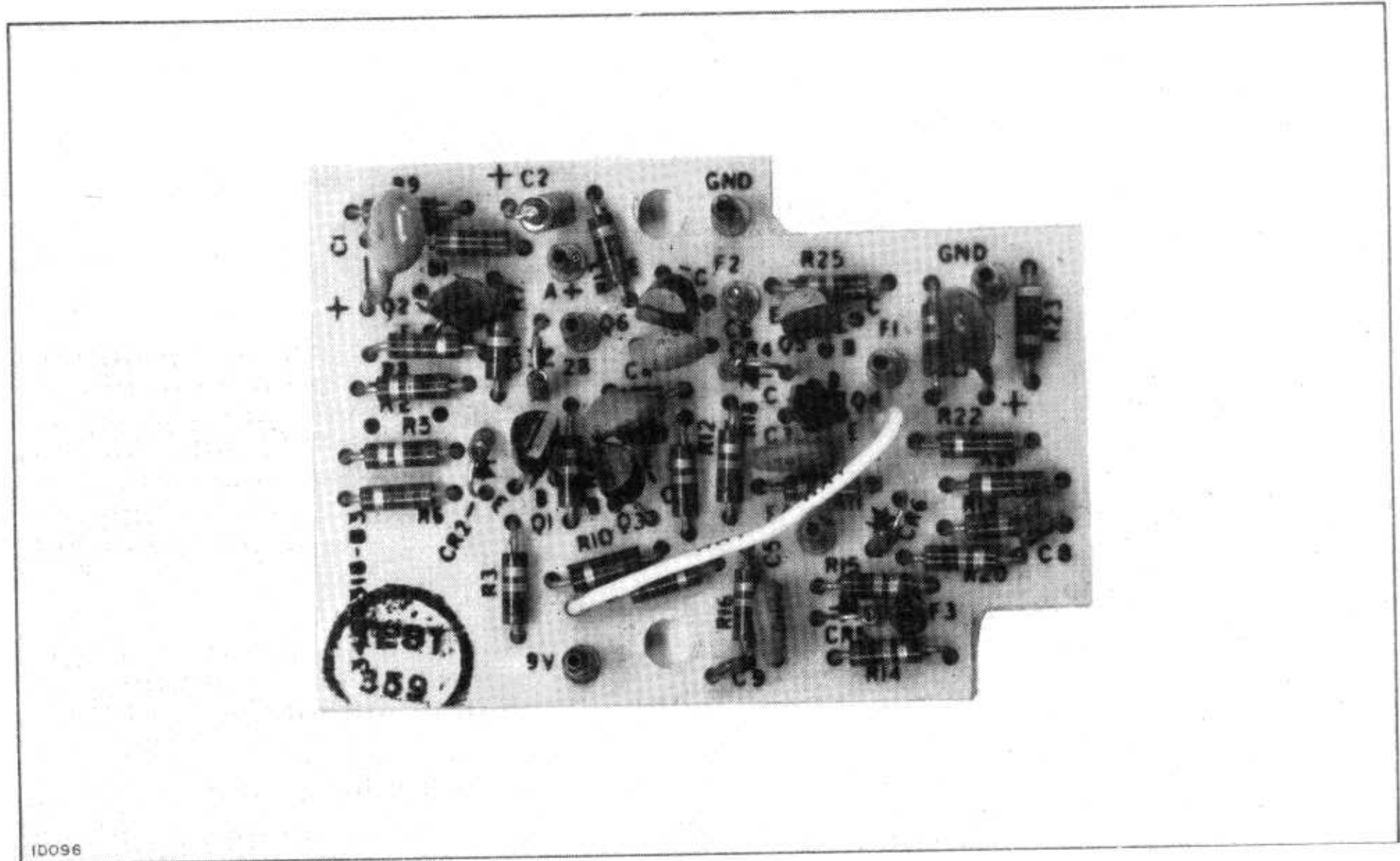
2D038 3468292 REV 3 3457848 REV 4

- NOTES
- 1 ALL RESISTANCES IN OHMS, 1/4W ±10%
 - 2 ALL CAPACITANCES IN UF

Pathfinder and Schematic Diagrams

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Symbol	Stock No.	Drawing No.	Description
		3457848-501	TTL MODULE P/L 3457848-501 REV 4 CODE C
81C1	242744	3457081-147	Film, .068 uF 10% 100 V
81C2	245045	3731243-106	Tantalum, 10 uF 15 V
81C3	228168	3463453-119	Ceramic, .05 uF
81C4	234543	3463453-117	Ceramic, .01 uF
81C5	227444	3460490-002	.1 uF 25 V
81C6	228168	3463453-119	Ceramic .05 uF
81C7	232752	3460490-005	.05 uF 25 V
81CR1	242248	3467116-002	Diode
81CR2	242248	3467116-002	Diode
81Q1	242759	3468182-002	Transistor
81Q2	245048	3457853-001	Transistor
81Q3	245046	3457851-002	Transistor
81Q4	245047	3457852-002	Transistor
81Q5	242759	3458182-002	Transistor
81R1	108868	99206-075	12 K 10% 1/4 W
81R2	108871	99206-082	47 K 10% 1/4 W
81R3	219459	99206-064	1.5 K 10% 1/4 W
81R4	300687	99206-057	390 10% 1/4 W
81R5	218499	99206-074	10 K 10% 1/4 W
81R6	219464	99206-071	5.6 K 10% 1/4 W
81R7	219464	99206-071	5.6 K 10% 1/4 W
81R8	108865	99206-062	1000 10% 1/4 W
81R9	285404	99206-195	33 K 5% 1/4 W
81R10	285421	99206-191	22 K 5% 1/4 W
81R11	231314	99206-224	510 K 5% 1/4 W
81R12	108866	99206-066	2.2 K 10% 1/4 W
81R13	285421	99206-078	22 K 10% 1/4 W
81R14	108866	99206-066	2.2 K 10% 1/4 W
	228124	3450797-003	Contact Pin (package of 5)
	228192	3450825-001	Female contact for above (package of 5)



3457944-501 Dual Channel Monitor Module (part of MI-559298)

TECHNICAL DATA

Power Requirements

+13.8 V DC \pm 20%
9.5 mA \pm 10%

+9.5 V DC \pm 10%
0.5 mA \pm 10%

Timing Cycle

3 cycles per second (on time of 333 MS) \pm 10%

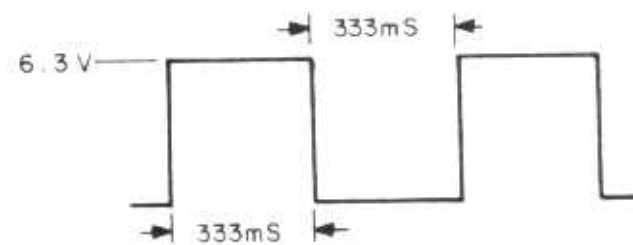
Operating Temperature Range

-30° C to +65° C

Switching Control Input (pin 28)

Searching mode, 4V DC (maximum)
Steady mode, 7V DC (minimum)

Switching Waveform



REPLACEMENT PARTS

Symbol	Stock No.	Drawing No.	Description
	640212	MI-559298	DUAL CHANNEL MONITOR P/L MI-559298 REV 5
ITEM 1		3457944-501	DCM Module - see separate listing
ITEM 2			Adapter plate assembly
ITEM 5			Mounting Hardware
5A	248538	3454702-001	Screw, taptite pan hdc.r. #6-32 x 1/4" (3 used) - package of 5
5B			Screw, taptite pan hdc.r. #6-32 x 3/8" (2 used)
5C	419040	3454702-003	Screw, taptite pan hdc.r. #6-32 x 1/2" (1 used)
5D			Screw, taptite pan hdc.r. #6-32 x 1-3/8" (2 used)
5E			Spacer, #6-.19" (2 used)
5F			Spacer, #6 x 1-1/8" (2 used)
5H			brass dowel pin (2 used)
5J	232821	2010969-124	heat shrinkable tubing, 1.31" long
5K	232821	2010969-124	heat shrinkable tubing, .66" long
5N			wire assembly
5P			wire assembly
5R			wire assembly
5S			wire assembly
5T			wire assembly
5U	242077	3463186-002	grommet
			terminal, used on items 5N, 5P, 5R, 5S, and 5T
	228192	3450825-001	terminal, used on items 5S and 5T - package of 5



DESCRIPTION

The DCM module is added to the station frequency selection circuit to provide the capability of monitoring two channels simultaneously. Refer to the module schematic diagram while reading the following description of circuit operation.

When a signal is not present on either of the two channels (receiver audio squelched), Gate Q1 is non-conducting, and has no effect on the circuits. RC oscillator Q2 provides the flip-flop circuit of Q3/Q4 with a switching waveform. This waveform causes alternate conduction by Q3 and Q4. The output gates (Q5 and Q6), directly follow the conduction states of Q3 and Q4.

Q5 conducts when Q4 conducts, connecting ground to the receiver F1 TCXO. Q6 connects the receiver F2 TCXO to ground when Q3 conducts.

When a signal is received by the receiver, the increase voltage at pin 28 biases Q1 into conduction. When Q1 conducts, Q2 is biased off, and the "searching" action stops.

The flip-flop may be preset (locked into one mode) by application of the following potentials to pins F3 and F4.

1. application of ground to pin F3 produces an F1 output.
2. application of +13.8V to pin F3 produces an F2 output
3. application of ground to pin F4 produces an F2 output
4. application of +13.8V to pin F4 produces an F1 output

PRODUCTION VARIATIONS

The production level of the module is indicated by a legend (example: CODE C) stamped on the module near

the identifying drawing number. The following table lists the differences between the various production levels.

DUAL CHANNEL MONITOR MODULE Current Version: 3457944-501 CODE B

Code Level Differences	Instruction Book Reference	Changes for Code Level Differences
A-B	Component Values	87C8 and 87C9 are not used on CODE A

EMERGENCY SUBSTITUTES - SOLID STATE DEVICES

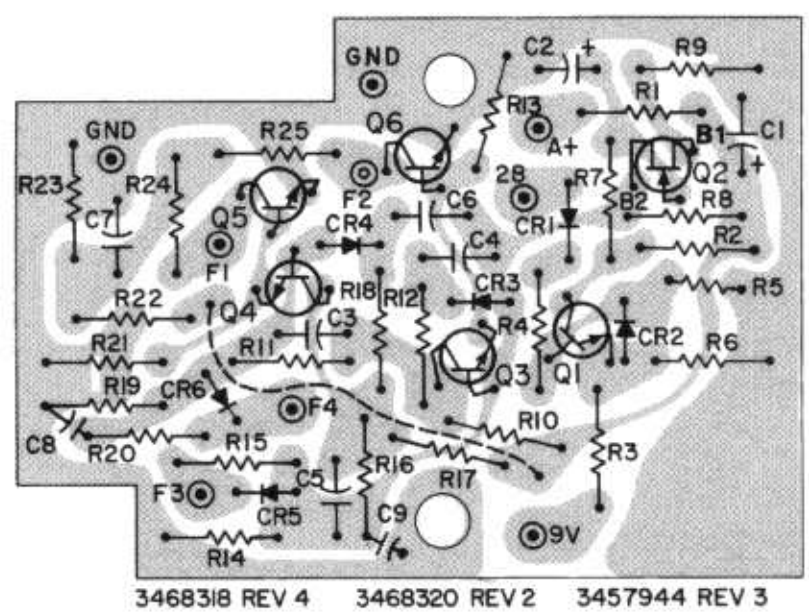
In the event of a semiconductor failure, the exact replacement found in the replacement parts list should be used. In an emergency, to minimize equipment down-

time, the following common semiconductor types may be temporarily used. However, use of these substitutes may result in degraded system performance.

Component Designation	Emergency Substitute	Component Designation	Emergency Substitute
87CR1	1N914	87Q1	2N4124
87CR2	1N914	87Q2	2N4871
87CR3	1N914	87Q3	2N4124
87CR4	1N914	87Q4	2N4124
87CR5	1N914	87Q5	2N4124
87CR6	1N914	87Q6	2N4124

REPLACEMENT PARTS

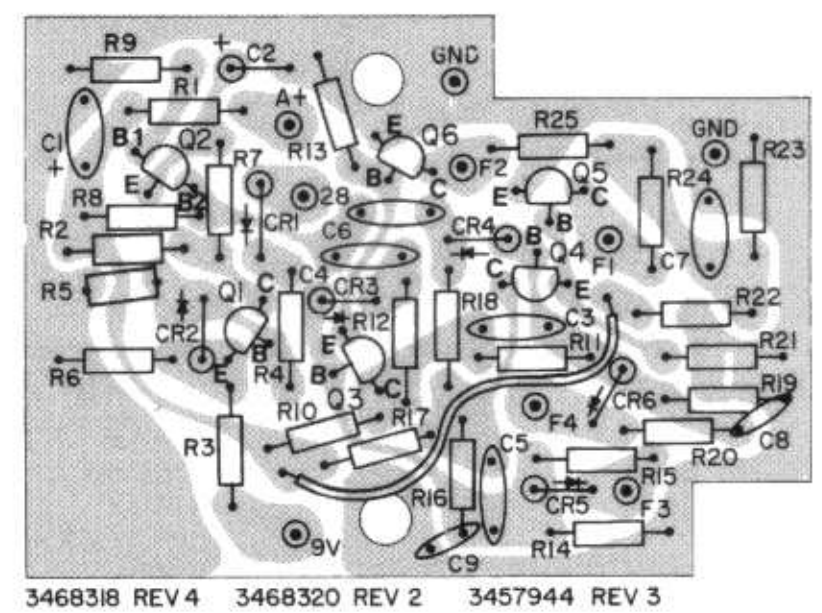
Symbol	Stock No.	Drawing No.	Description
			DCM MODULE P/L 3457944-501 REV 3 CODE B
87C1	243582	3457537-014	Tantalum, 22 mf, 20V
87C2	300653	3457716-104	Tantalum, 1 mf, 10%, 35V
87C3	103852	1510003-215	Ceramic, 150 pf, 10%, 500V
87C4	234543	3464453-117	Ceramic, .01 mf
87C5	103852	1510003-215	Ceramic, 150 pf, 10%, 500V
87C6	234543	3463453-117	Ceramic, .01 mf
87C7	243582	3457537-014	Tantalum, 22 mf, 20V
87C8	418648	3720744-128	3300 mmf, 20%, 50V
87C9	418648	3720744-128	3300 mmf, 20%, 50V
87CR1 TO			
87CR6	242522	3464611-001	Diode
87Q1	242759	3468182-002	Transistor
87Q2	245046	3457851-002	Transistor
87Q3 TO			
87Q6	242759	3468182-002	Transistor
87R1	108861	99206-050	100 ohms, 10%, 1/4W
87R2	218499	99206-074	10,000 ohms, 10%, 1/4W
87R3	218499	99206-074	10,000 ohms, 10%, 1/4W
87R4	218499	99206-074	10,000 ohms, 10%, 1/4W
87R5	223769	99206-086	100,000 ohms, 10%, 1/4W
87R6	108867	99206-072	6800 ohms, 5%, 1/4W
87R7	227755	99206-215	220,000 ohms, 5%, 1/4W
87R8	227741	99206-059	560 ohms, 10%, 1/4W
87R9	108861	99206-050	100 ohms, 10%, 1/4W
87R10	113524	99206-067	2700 ohms, 10%, 1/4W
87R11	108868	99206-075	12,000 ohms, 10%, 1/4W
87R12	285421	99206-078	22,000 ohms, 10%, 1/4W
87R13	108863	99206-055	270 ohms, 10%, 1/4W
87R14	218499	99206-074	10,000 ohms, 10%, 1/4W
87R15	218499	99206-074	10,000 ohms, 10%, 1/4W
87R16	108868	99206-075	12,000 ohms, 10%, 1/4W
87R17	113524	99206-067	2700 ohms, 10%, 1/4W
87R18	285421	99206-078	22,000 ohms, 10%, 1/4W
87R19	218499	99206-074	10,000 ohms, 10%, 1/4W
87R20	218499	99206-074	10,000 ohms, 10%, 1/4W
87R21	108863	99206-055	270 ohms, 10%, 1/4W
87R22	113524	99206-067	2700 ohms, 10%, 1/4W
87R23	300739	99206-070	4700 ohms, 10%, 1/4W
87R24	218499	99206-074	10,000 ohms, 10%, 1/4W
87R25	218499	99206-074	10,000 ohms, 10%, 1/4W
	338124	3450797-001	Contact Pin (Package of 5)
	228192	3450825-001	Female Contact for above (package of 5)



3468318 REV 4 3468320 REV 2 3457944 REV 3

30038

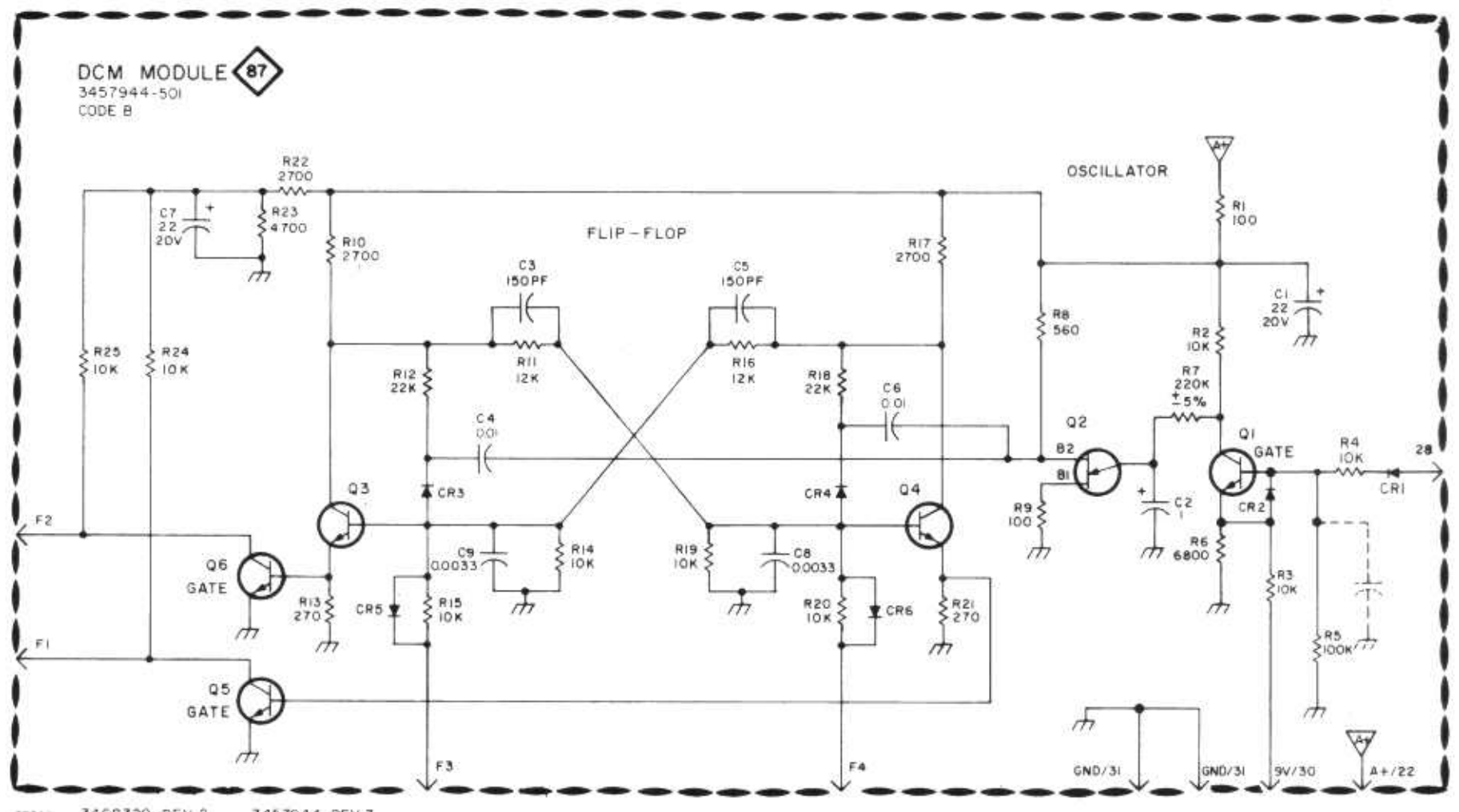
AS VIEWED FROM FOIL SIDE



3468318 REV 4 3468320 REV 2 3457944 REV 3

30058

AS VIEWED FROM COMPONENT SIDE

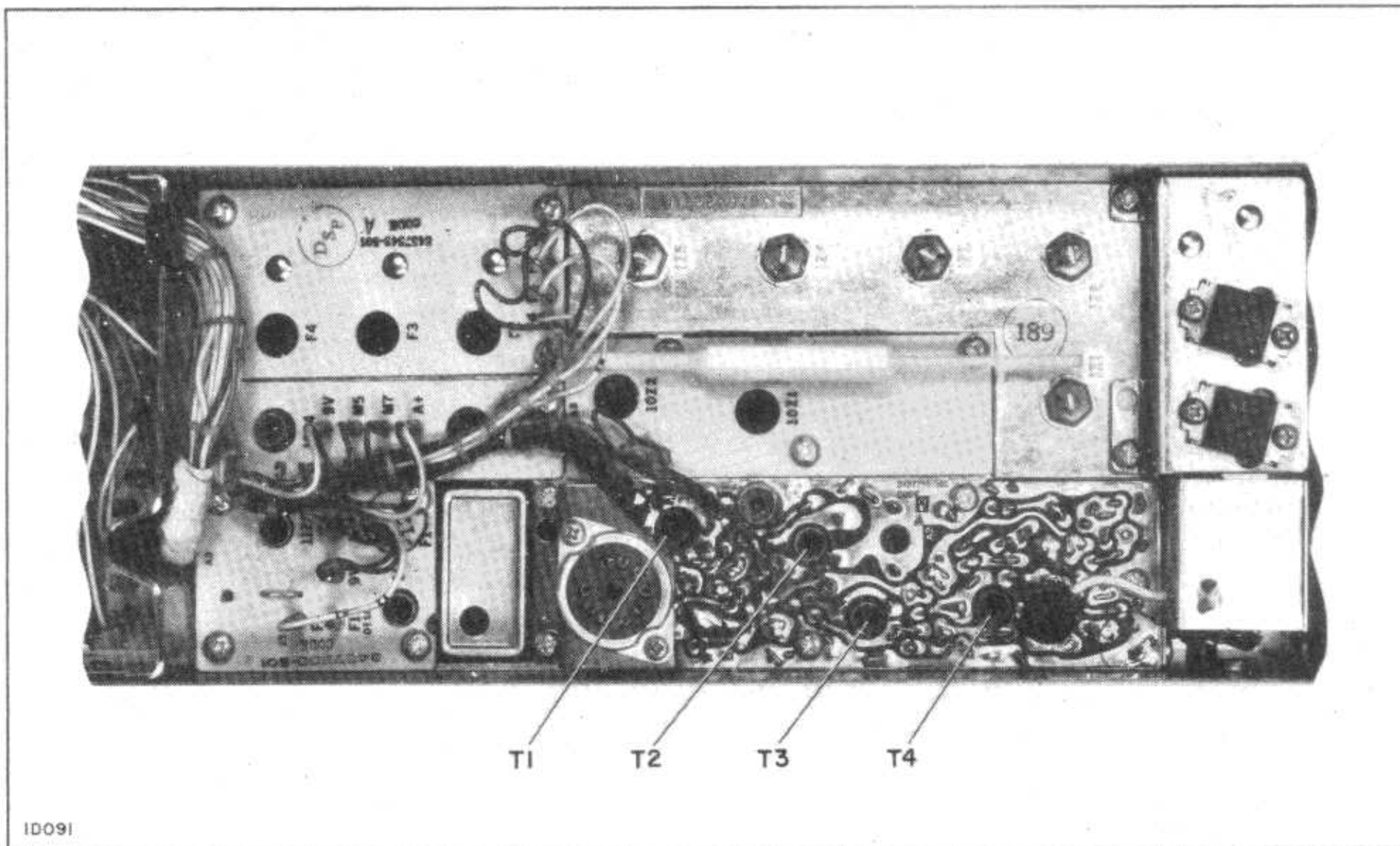


DCM MODULE 87
3457944-501
CODE B

3468320 REV 2 3457944 REV 3

NOTES

- 1. ALL RESISTANCE IN OHMS, 1/4 WATT, ±10%
- 2. ALL CAPACITANCES IN μF, EXCEPT AS NOTED



Noise Clipper Module – Shown Installed in a Typical Receiver

TECHNICAL DATA

Equipment Designation

MI-559299-A 6.7 MHz IF Noise Clipper

Application

50 MHz and 150 MHz RCA Series 500, Series 700, and Series 1000 receivers using 3457519-502 6.7 MHz IF Module

Impulse Triggering Level

35 dB, maximum

High Repetition Rate Limiting

10 KHz, maximum

Power Requirements ($\pm 20\%$)

+9.5V, regulated, @ 0.6 mA
+12.5V, @ 7.0 mA

Receiver Spurious Response Attenuation

90 dB, minimum

Receiver Intermodulation Distortion

-50 dB, minimum

Receiver 20 dB Quieting Sensitivity degradation Due to Impulse Noise

5 dB, maximum

Notes:

1. All other receiver specifications are the same as those for receivers without the Noise Clipper.
2. With the Noise Clipper disabled (DIS pin connected to A+) the receiver will meet all performance specifications for receivers without Noise Clipper, with the exception of spurious response attenuating of 90 dB, minimum at 227.5 KHz from carrier frequency (corresponding to 1/2 the Low IF).
3. All measurements made in accordance with EIA standard RS-204.

ADJUSTMENTS

RECOMMENDED TEST EQUIPMENT

The following equipment is required to accurately adjust the Noise Clipper for proper operation. Equipment equivalent to the indicated models may be used.

NOTE: Test equipment must be properly calibrated and adjusted as recommended by the equipment manufacturer prior to adjustment of the Noise Clipper.

Type	Designation
Impulse Noise Generator	Empire Devices, NF-105
Oscilloscope	Hewlett-Packard 175-A with Vertical Amplifier model 1755A and probe 10 pFD/10 M ohm.

PROCEDURE

Step	Description of Adjustment
1	Connect impulse noise generator to the receiver antenna input. Set level to 35 dB above 1uV/MHz, and repetition rate to 1000 counts per second.
2	Connect the oscilloscope to the BIAS point (junction of R28 and R31) on the Noise Clipper Module.
3	Adjust R2 on the Noise Clipper to maximum gain (fully CW). Negative pulse output should appear on the oscilloscope at 0.2V amplitude, approximately 30u sec duration.
4	Adjust R2 counterclockwise until the pulse just disappears. Check operation by increasing the generator level to 41 dB, which should result in a steady pulse output appearing on the oscilloscope.

CIRCUIT 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 unidirectional pulse. Diodes 16CR5 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.

EMERGENCY SUBSTITUTES—SOLID STATE DEVICES

In the event of a semiconductor failure, the exact replacement found in the replacement parts list should be used. In an emergency, to minimize equipment down-

time, the following common semiconductor types may be temporarily used. However, use of these substitutes may result in degraded system performance.

Component Designation	Emergency Substitute	Component Designation	Emergency Substitute
16CR1	1N909	16Q1	A415
16CR2	1N909	16Q2	A415
16CR3	1N909	16Q3	2N4125
16CR4	1N909	16Q4	2N4123
16CR5	1N914	16Q5	2N4123
16CR6	1N914	16Q6	2N4123
16CR7	1N914		

PRODUCTION VARIATIONS

The production level of the module is indicated by a legend (example: CODE C) stamped on the module near the identifying drawing number. The following table lists the differences between the various production levels.

To determine the difference between a given production level, and the level shown on the pathfinders, schematics, and parts list, note the differences tabulated for the desired level and all subsequent levels.

NOISE CLIPPER MODULE Current Version: 3457795-501 CODE E

Code Level Differences	Instruction Book Reference	Changes for Code Level Differences			
		Symbol	Stock No.	Drawing No.	Description
A-B	Component Values	16C16	242742	3457081-139	0.033uF, 10%, 100V
		16C21	242741	3457081-135	0.022uF, 10%, 100V
		16R28	218499	99206-074	10K, 10%, 1/4W
		16R29	218499	99206-074	10K, 10%, 1/4W
		16R30	107972	99206-068	3.3K, 10%, 1/4W
		16R31	300688	99206-152	510 Ohms, 10% 1/4W NOT USED

PRODUCTION VARIATIONS (continued)

Code Level Differences	Instruction Book References	Changes for Code Level Differences			
		Symbol	Stock No.	Drawing No.	Description
B-C	Component Values	16R23	227755	99206-090	220K, 10%, 1/4W
C-D	Component Values	C24, C25, C26 not used			
D-E	Component Values	C26 connected in parallel with C15			
		Symbol	Stock No.	Drawing No.	Description
		16C26	420075	3457081-121	0.0056uF, 10%, 100v

REPLACEMENT PARTS

Symbol	Stock No.	Drawing No.	Description
	640175	MI-559229-A	NOISE CLIPPER P/L 3457795-501 REV 10- CODE E
16C1	234543	3463453-017	Ceramic, 0.01 uF, 25V
16C2	245695	3460726-227	Ceramic, 47 pF, 5%, 100V, N750
16C3	227444	3460490-002	Ceramic, 0.1 uF, 25V
16C4	234543	3463453-017	Ceramic, 0.01 uF, 25V
16C5	245696	3464581-352	Mica, 560 pF, 10%, 200V
16C6	245697	3463041-220	Ceramic, 820 pF, 10%, 200V
16C7	234543	3463453-017	Ceramic, 0.01 uF, 25V
16C8	115660	3464581-242	Mica, 220 pF, 5%
16C9, C10	234543	3463453-017	Ceramic, 0.01 uF, 25V
16C11	231883	3464581-250	Mica, 470 pF, 5%, 100V
16C12	227480	3460723-218	Ceramic, 20 pF, 5%, 100V
16C13	115661	3464581-238	Mica, 150 pF, 5%, 100V
16C14	227444	3460490-002	Ceramic, 0.1 uF, 25V
16C15	427721	3457081-241	Film, 0.039 uF, 25V
16C16	115660	3464581-242	Mica, 220 pF, 5%, 100V
16C17 thru			
16C20	234543	3463453-017	Ceramic, 0.01 uF, 25V
16C21	243597	3457081-235	Film, 0.022 uF, 5%, 100V
16C22	115661	3464581-238	Mica, 150 pF, 5%, 100V
16C23	234543	3463453-017	Ceramic, 0.01 uF, 25V
16C24	105310	3463041-216	390 pF, 10%, 200V
16C25	242735	3457537-008	10 uF, 20%, 15V
16CR1	242248	3467116-002	Diode
16CR2	242248	3467116-002	Diode
16CR3	242248	3467116-002	Diode
16CR4	242248	3467116-002	Diode
16CR5	242252	3464611-001	Diode
16CR6	242252	3464611-001	Diode
16CR7	242252	3464611-001	Diode
16J1, J2	104039	8848262-002	Phono socket
16L1	245964	8723001-409	Choke, 3.3 mH, 5%
16Q1	241945	3731107-001	Transistor
16Q2	241945	3731107-001	Transistor
16Q3	242760	3468183-001	Transistor
16Q4 thru			
16Q6	242758	3468182-001	Transistor
16R1	218499	99206-074	10,000 ohms, 10%, 1/4W
16R2	301603	3464828-005	POTENTIOMETER, 10,000 ohms
16R3	285404	99206-080	33,000 ohms, 10%, 1/4W

REPLACEMENT PARTS (continued)

Symbol	Stock No.	Drawing No.	Description
16R4, R5	108866	99206-066	2,200 ohms, 10%, 1/4W
16R6	113524	99206-067	2,700 ohms, 10%, 1/4W
16R7	218499	99206-074	10,000 ohms, 10%, 1/4W
16R8	108866	99206-066	2,200 ohms, 10%, 1/4W
16R9	107972	99206-068	3,300 ohms, 10%, 1/4W
16R10	285421	99206-078	22,000 ohms, 10%, 1/4W
16R11	227755	99206-070	4,700 ohms, 10%, 1/4W
16R12	227755	99206-090	220,000 ohms, 10%, 1/4W
16R13	218499	99206-074	10,000 ohms, 10%, 1/4W
16R14	218758	99206-054	220 ohms, 10%, 1/4W
16R15	218499	99206-074	10,000 ohms, 10%, 1/4W
16R16	218758	99206-054	220 ohms, 10%, 1/4W
16R17	218599	99206-197	39,000 ohms, 5%, 1/4W
16R18	108866	99206-066	2,200 ohms, 10%, 1/4W
16R19	285403	99206-172	3,600 ohms, 5%, 1/4W
16R20	108867	99206-072	6,800 ohms, 10%, 1/4W
16R21	108865	99206-062	1,000 ohms, 10%, 1/4W
16R22	300739	99206-070	4,700 ohms, 10%, 1/4W
16R23	300739	99206-175	4,700 ohms, 5%, 1/4W
16R24	223769	99206-086	100,000 ohms, 10%, 1/4W
16R25	108870	99206-077	18,000 ohms, 10%, 1/4W
16R26	300739	99206-070	4,700 ohms, 10%, 1/4W
16R27	108871	99206-082	47,000 ohms, 10%, 1/4W
16R28, 29	218499	99206-183	10,000 ohms, 5%, 1/4W
16R30	219462	99206-170	3,000 ohms, 5%, 1/4W
16R31	227741	99206-153	560 ohms, 5%, 1/4W
16R32	218499	99206-074	10,000 ohms, 10%, 1/4W
16R33	108866	99206-066	2,200 ohms, 10%, 1/4W
16RT1	247362	3731172-002	Thermistor, 4,230 ohms, 10% @ 25°C
	228124	3450797-003	Contact Pin (Package of 5)
	228192	3450825-001	Female contact for above (Package of 5)
	229753	3453095-002	Solder pin (Package of 5)

MAINTENANCE

GENERAL

This section provides servicing information for the Noise Clipper module. Included is the schematic, pathfinders, and a listing of test waveforms.

RECOMMENDED TEST EQUIPMENT

The following equipment is required to obtain the test results in the following section. Equipment equivalent to the indicated models may be used.

NOTE: Test Equipment must be properly calibrated and adjusted as recommended by the equipment

manufacturer prior to servicing the Noise Clipper. Use of a noise generator with a narrower bandwidth will result in distortion of the test waveforms.

Type	Designation
Impulse Noise generator	Empire Devices, NF-105
RF Signal generator	Measurements FM 560
Oscilloscope	Hewlett-Packard 175A with vertical amplifier module 1755A and probe 10 pFD/10M ohm.
RF Voltmeter	Boonton 91H
DC Voltmeter	RCA Voltohmyst WV-98C

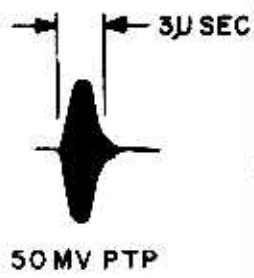
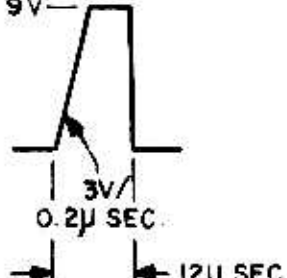
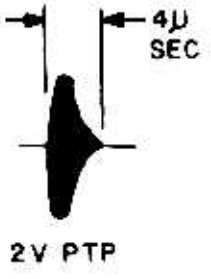
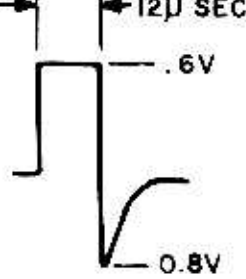
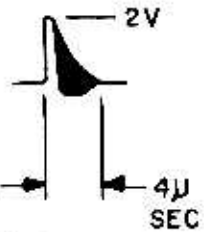
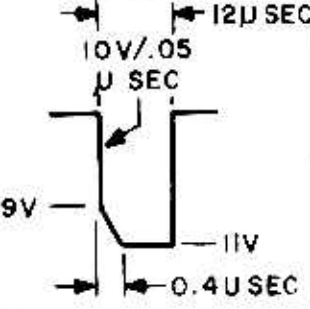
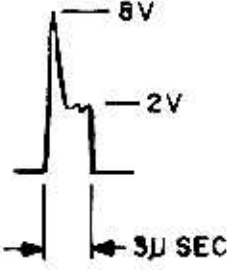
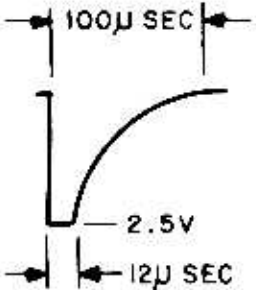
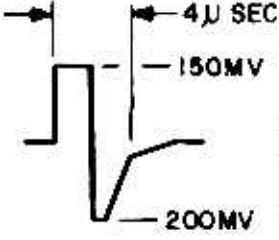
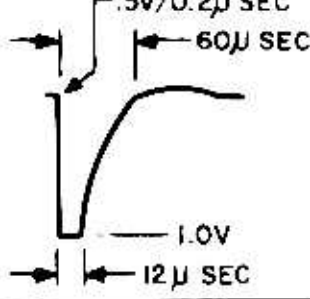
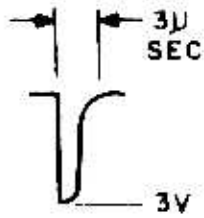
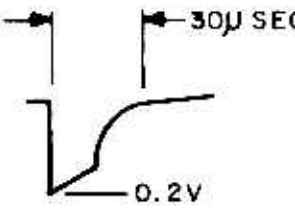
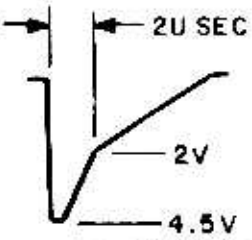
MAINTENANCE (continued)

TEST WAVEFORMS—NOISE CLIPPER OPERATIVE

The following test waveforms may be observed on the oscilloscope at the indicated test points with the following test set-up:

1. Connect impulse noise generator to receiver antenna input.

2. Set repetition rate to 1000 counts per second; level as shown in table:

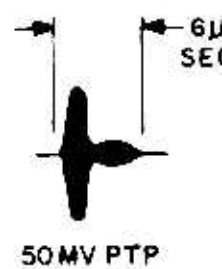
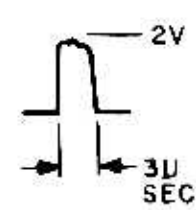

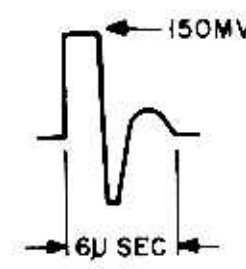
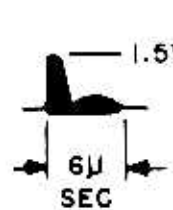
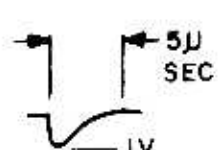
IMPULSE GENERATOR LEVEL	TEST POINT	WAVEFORM	IMPULSE GENERATOR LEVEL	TEST POINT	WAVEFORM
70dB	Q1 BASE	 3μ SEC 50MV PTP	40-90dB	Q5 COLLECTOR	 9V 3V/ 0.2μ SEC 12μ SEC
70dB	Q1 COLLECTOR	 4μ SEC 2V PTP	40-90dB	Q6 BASE	 12μ SEC 0.6V 0.8V
50dB	Q2 COLLECTOR	 2V 4μ SEC	40-90dB	Q6 COLLECTOR	 12μ SEC 10V/0.05 μ SEC 9V 11V 0.4μ SEC
50dB	Q3 COLLECTOR	 8V 2V 3μ SEC	40-90dB	CR2 ANODE	 100μ SEC 2.5V 12μ SEC
50dB	Q4 BASE	 4μ SEC 150MV 200MV	40-90dB	GATE PIN	 0.5V/0.2μ SEC 60μ SEC 1.0V 12μ SEC
50dB	Q4 COLLECTOR	 3μ SEC 3V	40-90dB	BIAS PIN	 30μ SEC 0.2V
40-90dB	Q5 BASE	 2μ SEC 2V 4.5V			

MAINTENANCE (Continued)

TEST WAVEFORMS—GATE DISABLED

The following test waveforms may be observed on the oscilloscope at the indicated test points with the following test set-up:

1. Base of Q5 shorted to ground
2. Impulse generator connected to receiver antenna input.
3. Set repetition rate to 1000 counts per second; level as shown in table.

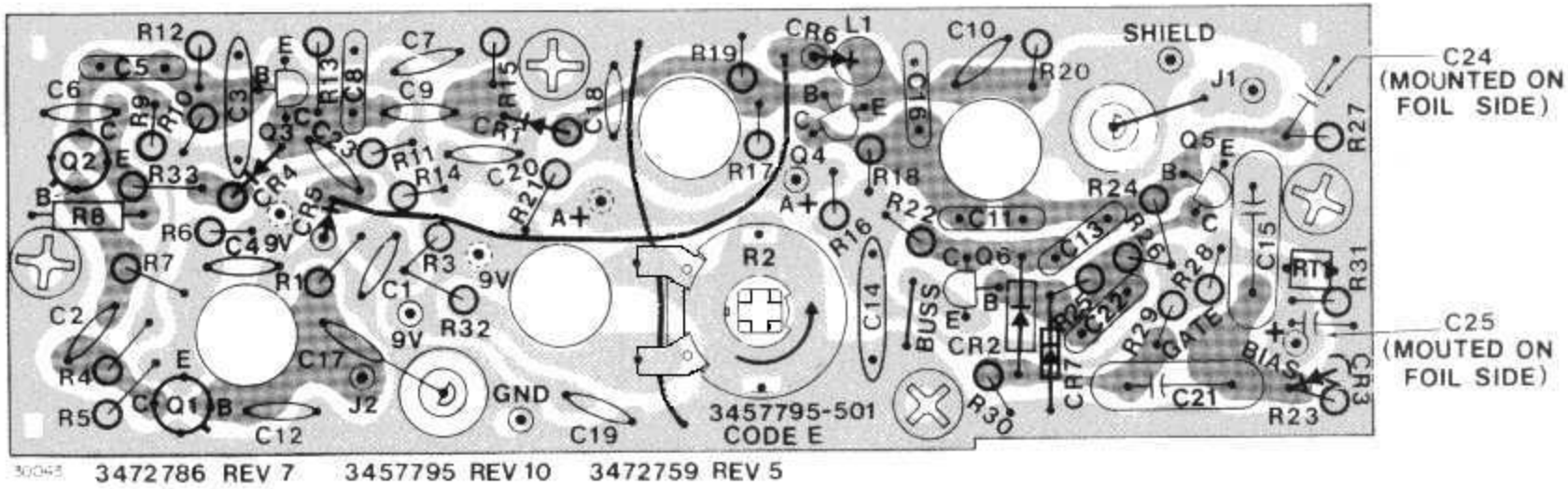
IMPULSE GENERATOR LEVEL	TEST POINT	WAVEFORM	IMPULSE GENERATOR LEVEL	TEST POINT	WAVEFORM
70dB	Q1 BASE	 50MV PTP 6µ SEC	50dB	Q3 COLLECTOR	 2V 3µ SEC
70dB	Q1 COLLECTOR	 2V PTP 6µ SEC	50dB	Q4 BASE	 150MV 6µ SEC
50dB	Q2 COLLECTOR	 1.5V 6µ SEC	50dB	Q4 COLLECTOR	 5µ SEC 1V

RF VOLTAGE READINGS

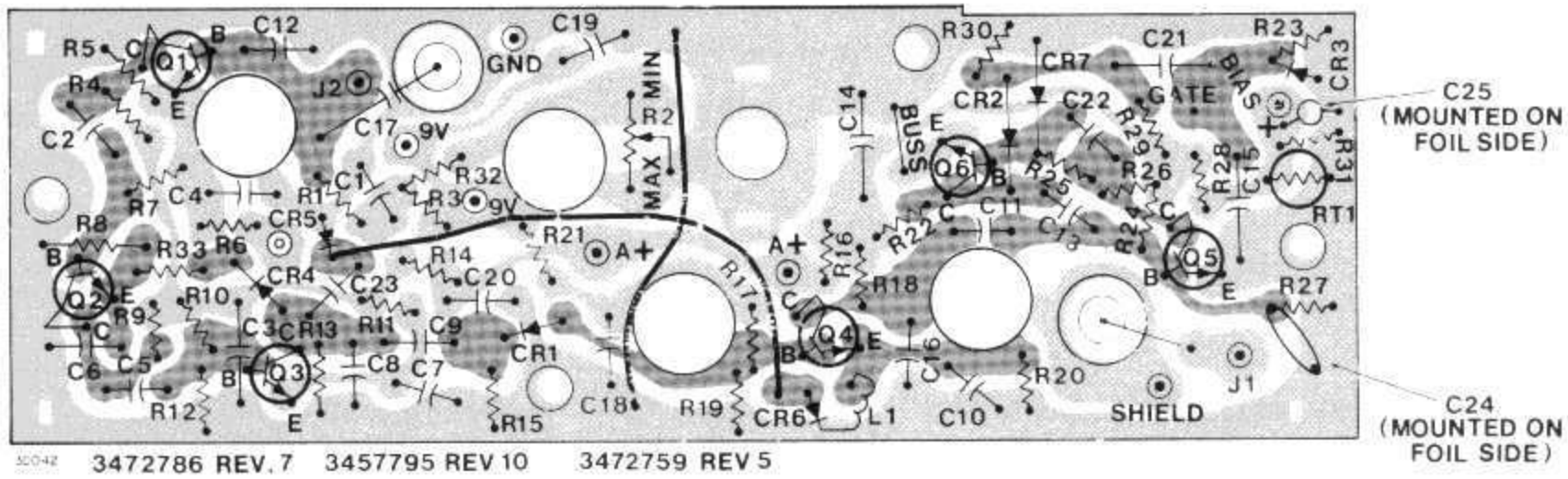
The following RF levels may be measured at the indicated test point with the following test set-up:

1. Connect RF signal generator to receiver antenna input.
2. Adjust generator to channel frequency; set output level to 100 µV.
3. The following measurements are made with the RF Voltmeter connected between the indicated test point and chassis common.

Test Point	Signal Level	
	minimum	maximum
Q1 Base	1.1 mV	1.3 mV
Q1 Collector	2.5 mV	35 mV
Q2 Collector	250 mV	600 mV
Q3 Collector	19 mV	500 mV
Q4 Base	15 mV	38 mV



AS VIEWED FROM COMPONENT SIDE
DARK TONE = SIGNAL PATH




AS VIEWED FROM FOIL SIDE
DARK TONE = SIGNAL PATH

Pathfinder Diagram

16 3457795-501
NOISE CLIPPER MODULE

NOTES:

 INDICATES +9V COMMON CONNECTION WITH IN A CIRCUIT BOARD

 INDICATES +13.8V COMMON CONNECTION WITHIN A CIRCUIT BOARD.

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

ALL CAPACITORS ARE IN μFD UNLESS OTHERWISE NOTED.

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.

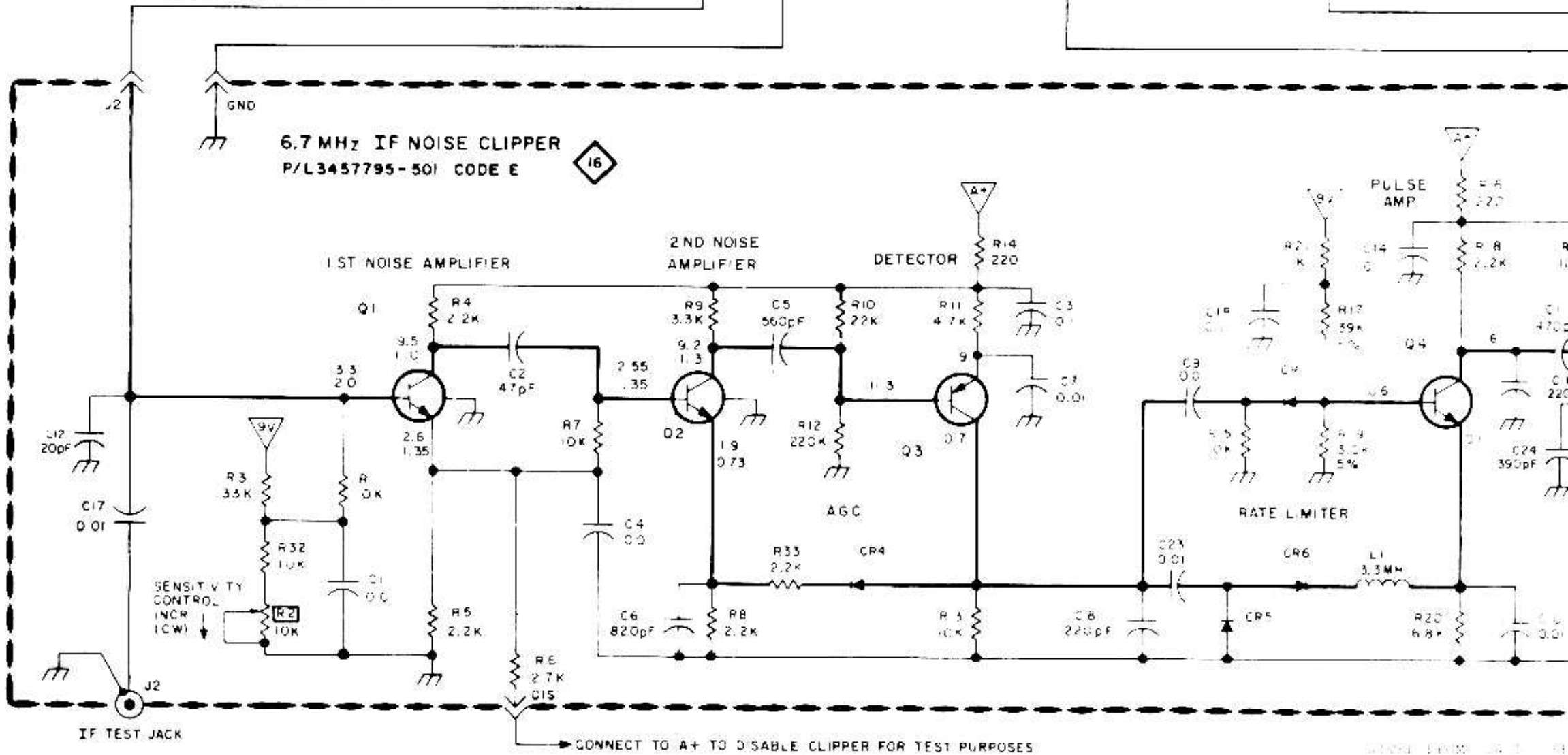
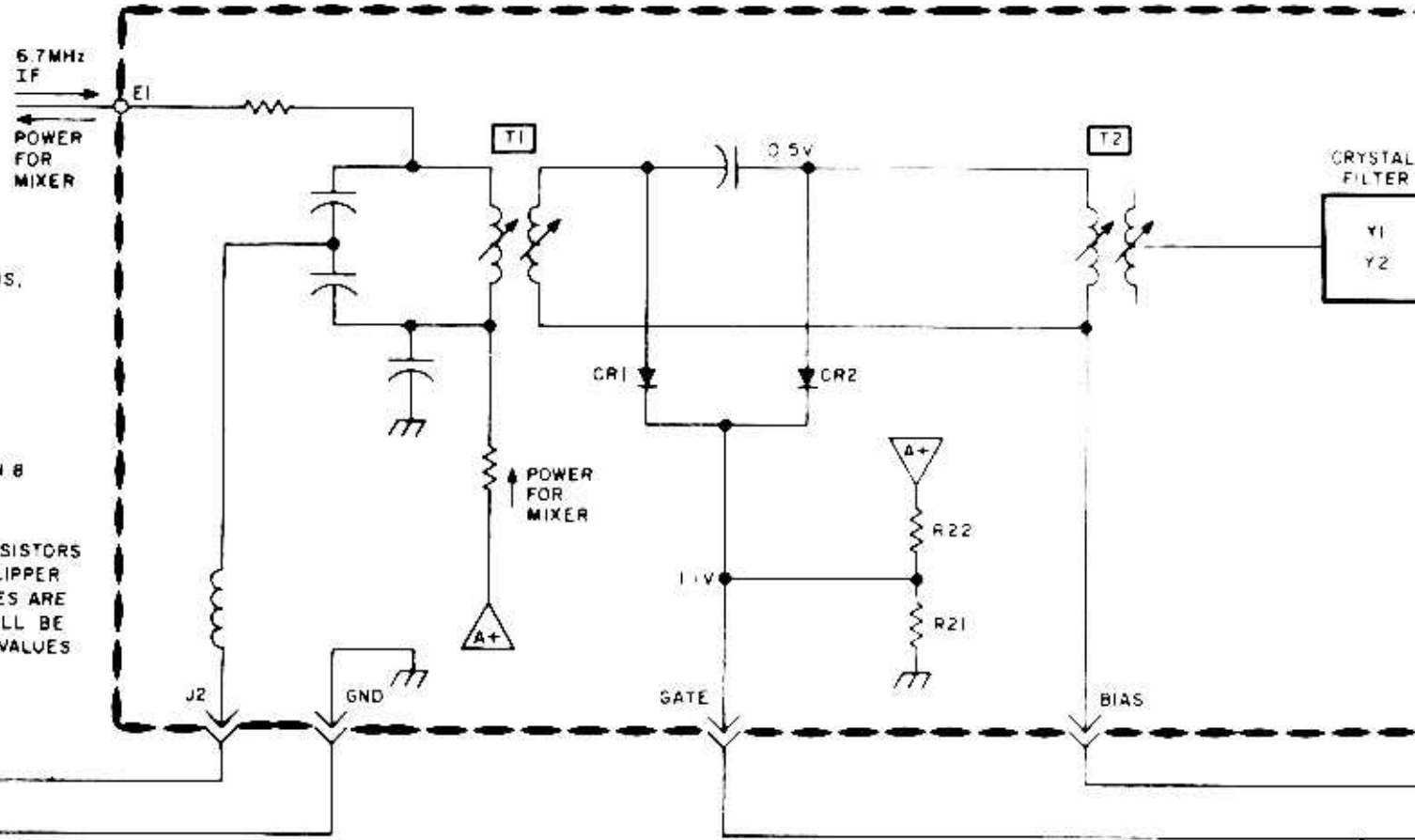
DC VOLTAGES SHOWN AS MEASURED WITH RESPECT TO CHASSIS, USING A 20,000 OHMS-PER-VOLT METER.

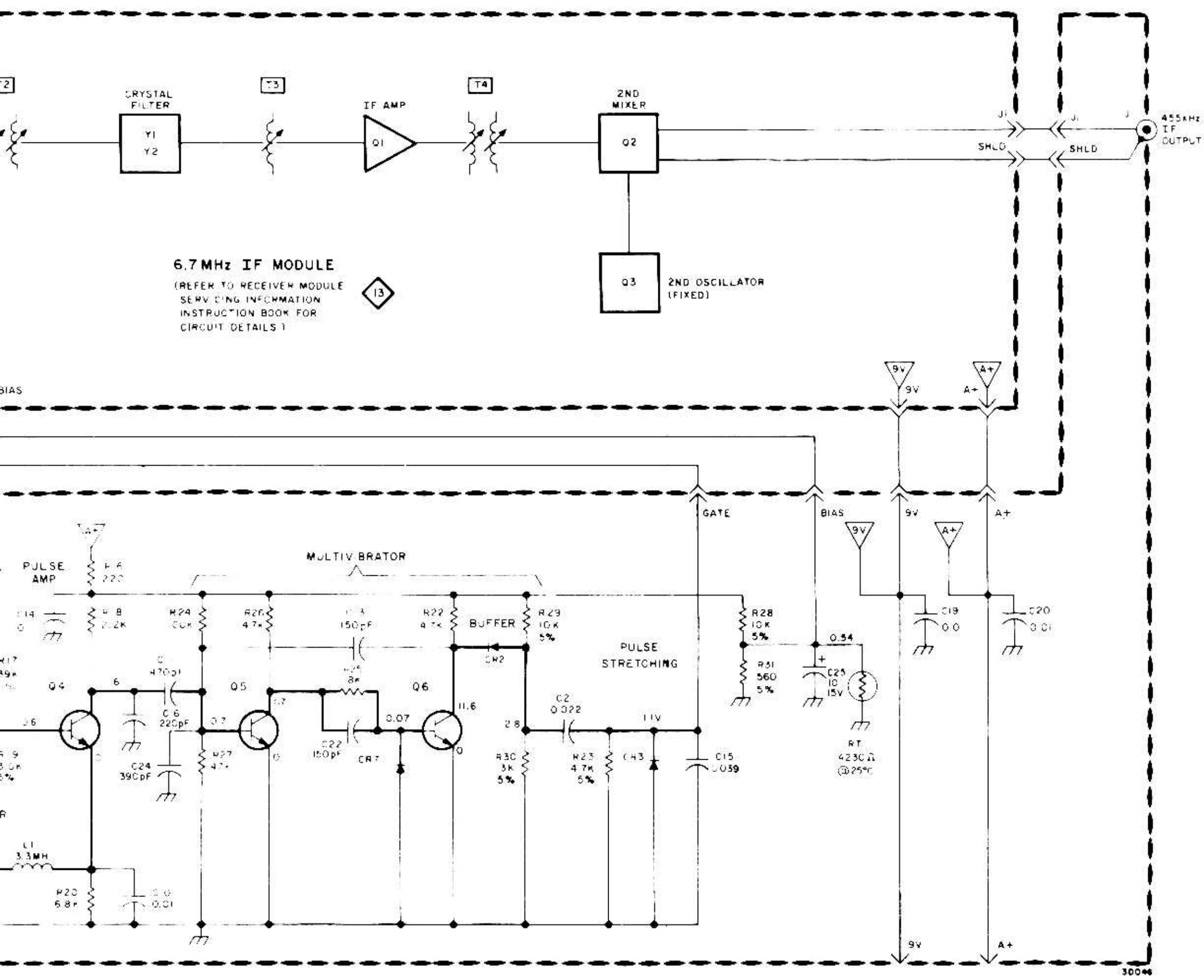
GAIN MEASUREMENTS

52μV (6.7MHz) AT J2 WILL PRODUCE 10μA AT J3 PIN 8 (RECEIVER TEST SOCKET)

CODE A VERSIONS OF THE 6.7MHz IF MODULE HAVE 47K RESISTORS FOR 13R21, 13R22 AND CODE C VERSIONS OF THE NOISE CLIPPER MODULE HAVE A 47K RESISTOR FOR 16R23. IF THESE MODULES ARE USED TOGETHER AN INCORRECT BIAS VOLTAGE OF 7VOLTS WILL BE DEVELOPED. CHANGE THESE RESISTORS TO THE FOLLOWING VALUES FOR PROPER OPERATION

13R21	220K	10%	1/4W
13R22	47K	10%	1/4W
16R23	47K	5%	1/4W





Schematic Diagram

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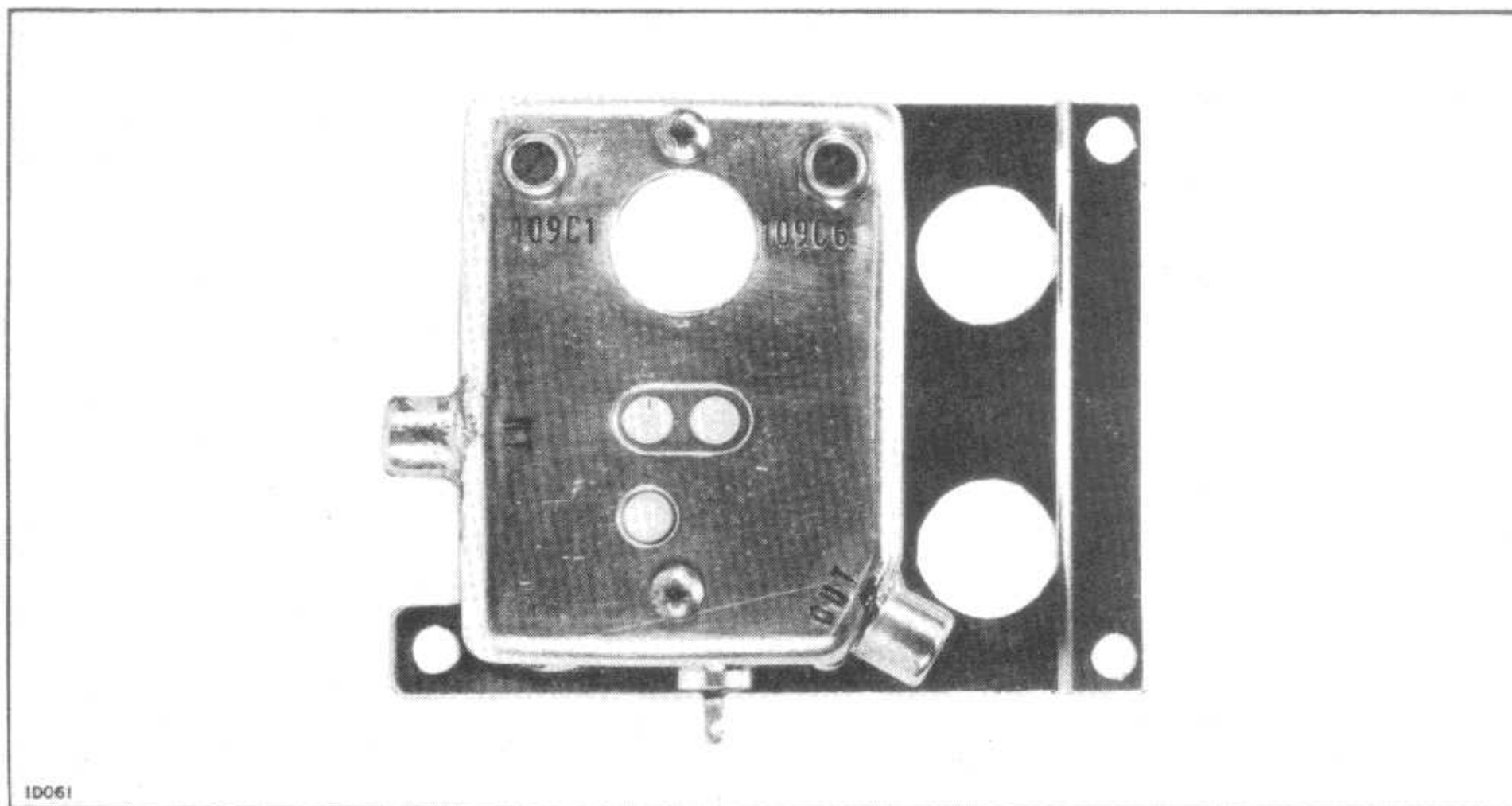


Figure 1. RF Preamplifier

TECHNICAL DATA

Power Required	
13.4 V DC \pm 20%	
6.0 mA \pm 2.0 mA	
Input and Output Impedance	
50 Ohms	
Gain	MI-559632
132-174 MHz	9.3 \pm 1.0 dB
Gain	MI-559632-A
406-435 MHz	9.0 \pm 1.0 dB
435-512 MHz	9.6 \pm 1.0 dB
Temperature Range	
-30° C to +65° C	

GENERAL

The purpose of the RF Preamplifiers is to provide increased sensitivity for 150 MHz and 450 MHz RCA receivers. The unit mounts to the receiver casting and is powered from the A+ (13.8V) line of the system. It connects between the antenna switching device and the receiver RF input. The sensitivity of the receiver is approximately doubled with the installation of the preamplifier.

The circuit consists of a single n-channel FET connected in a common gate configuration. Tuning adjustments at the input (C1) and output (C6) allow the unit to be tuned over the range of frequencies covered by the receiver.

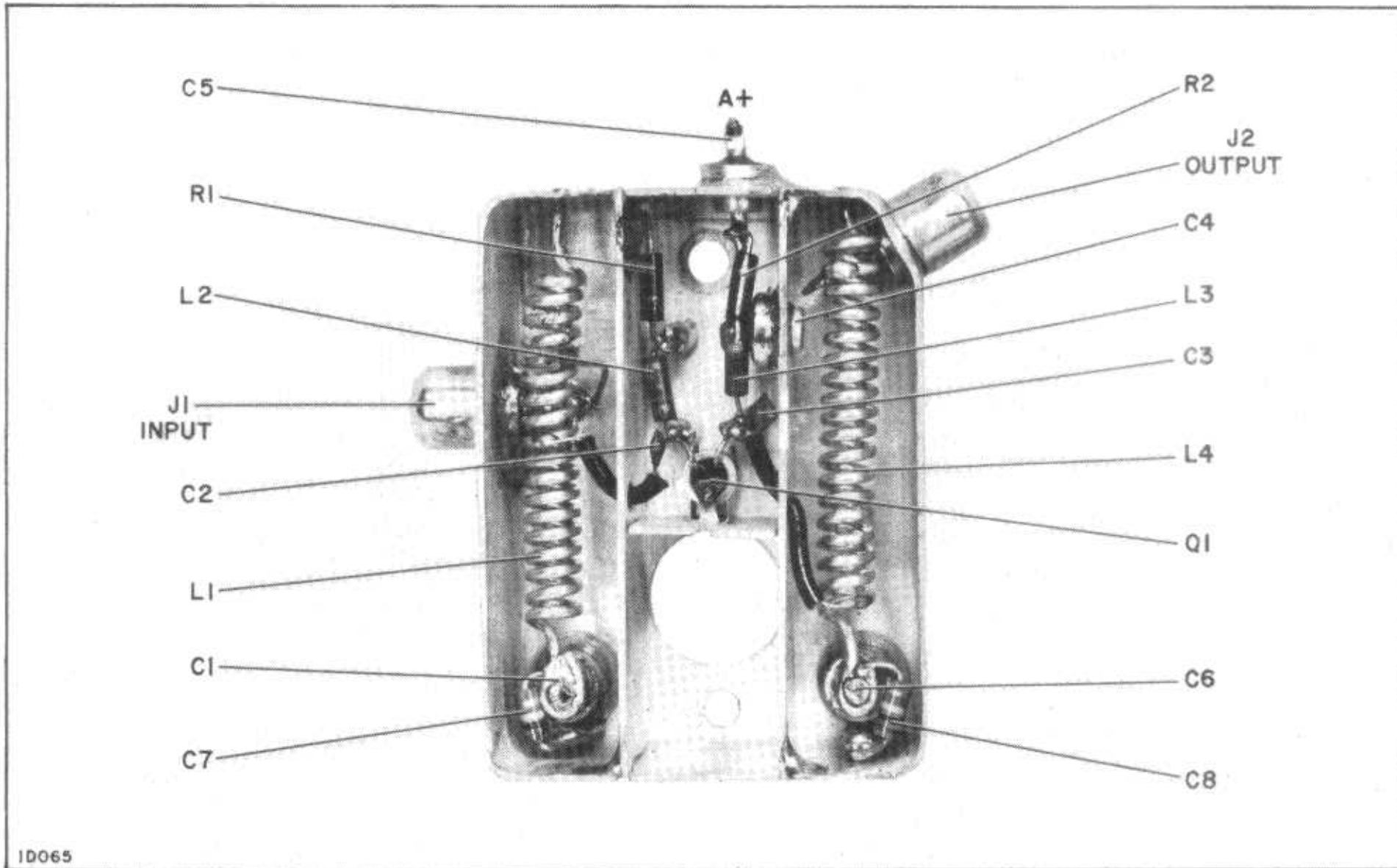
ALIGNMENT INSTRUCTIONS

Suggested Equipment:

- Signal Generator.....Measurements 560 or 803
- Test Meter..... RCA TM 868
- Audio Voltmeter..... Ballantine 300

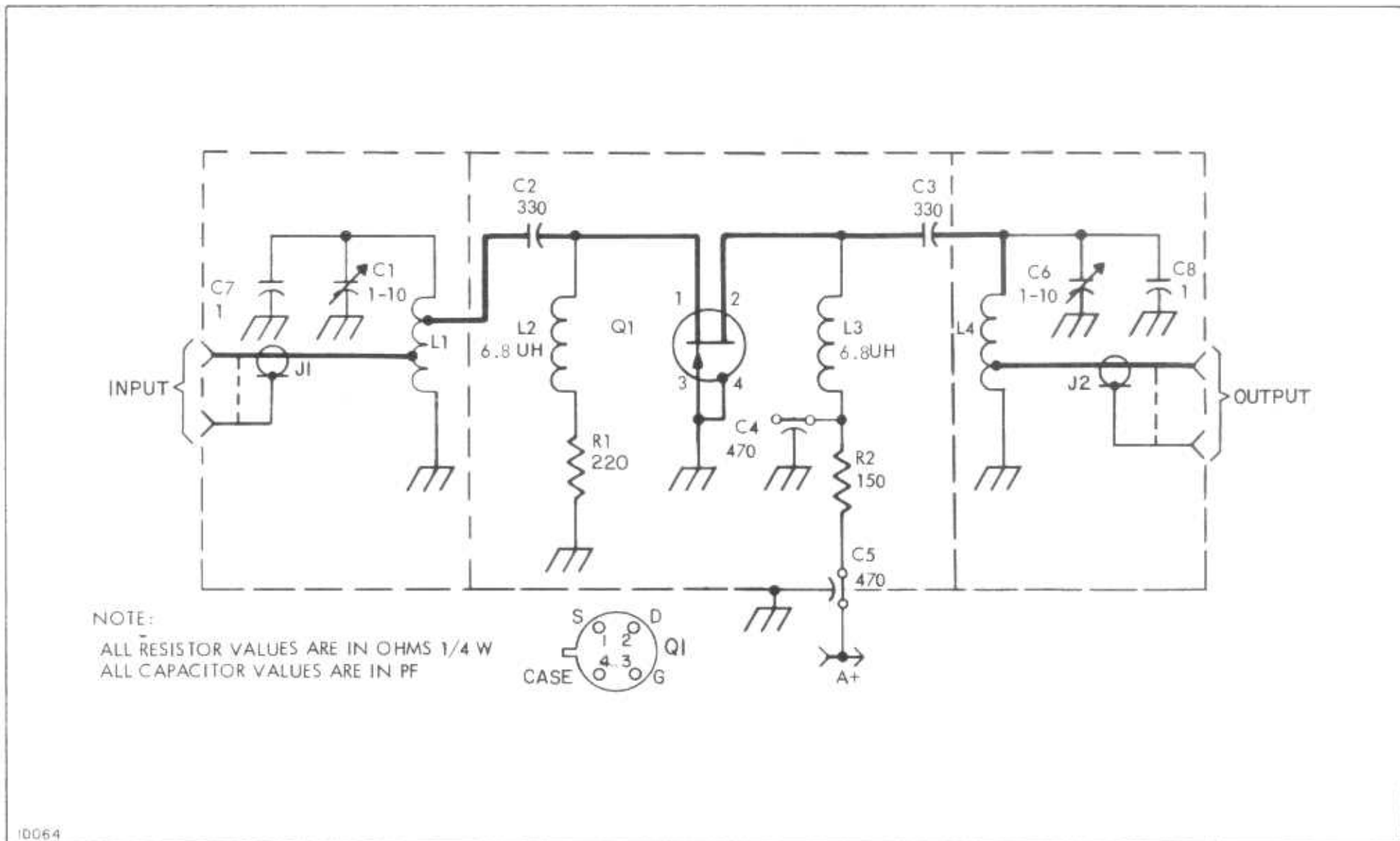
Procedure:

1. Feed a signal to T/R antenna jack and adjust frequency and output of signal generator for about 10uA of low-IF metering current (position 8 of TM-868). For multi-frequency receivers use a center channel.
2. Peak low-IF meter reading in this order, reducing signal generator output level to 10uA as circuits peak: 109C6, 1Z1, 1Z2, 109C1, 109C6. Repeat until maximum peaking is obtained.
3. With audio voltmeter on receiver output, adjust signal generator output for a 20 dB quieting level, maintaining "0" discriminator current (position 2+ or 2- of TM-868), adjust 109C1 for maximum quieting. This may differ somewhat from maximum gain.



1D065

Figure 2. MI-559632 Parts Location



1D064

Figure 3. MI-559632 Schematic Diagram

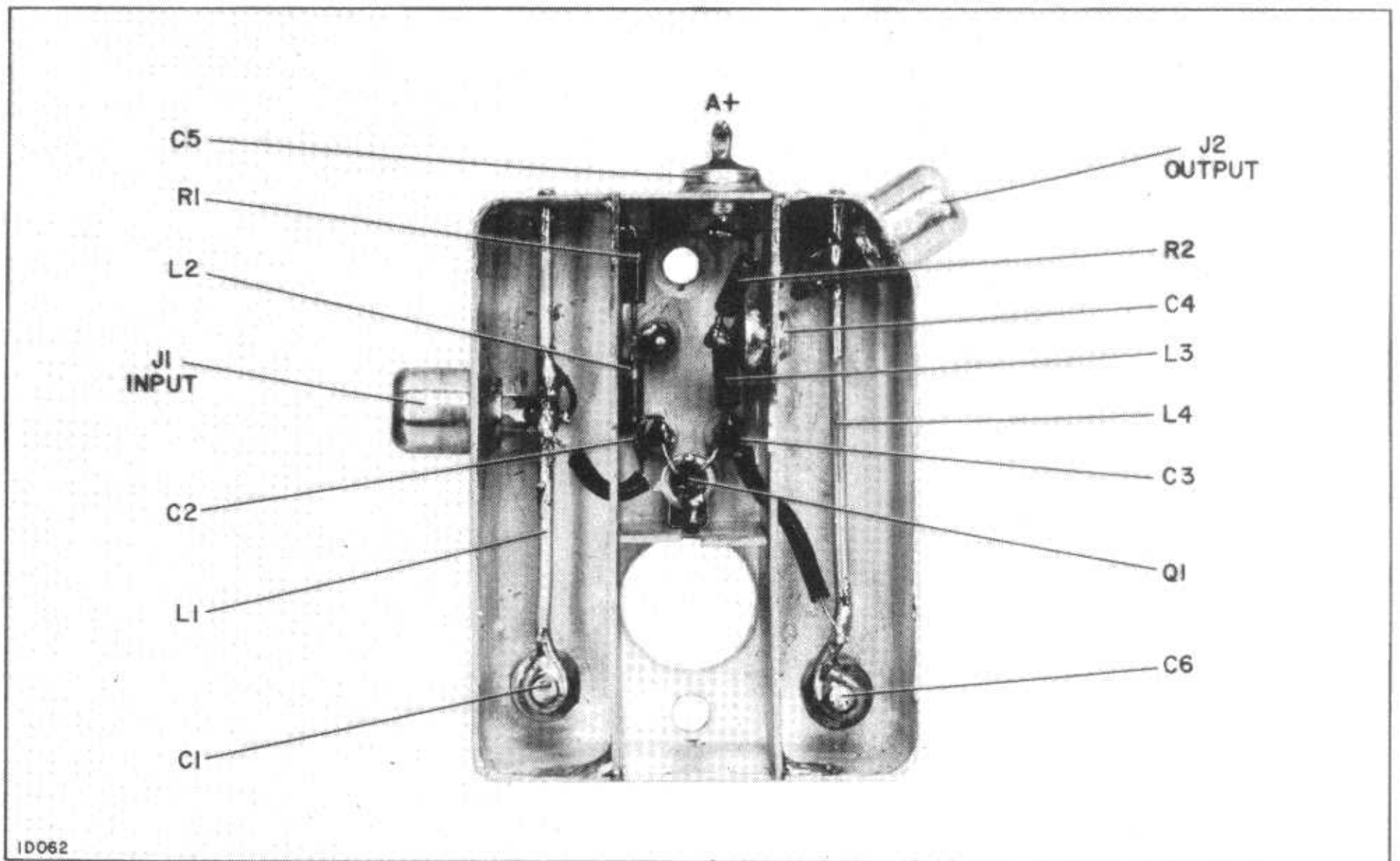


Figure 4. MI-559632-A Parts Location

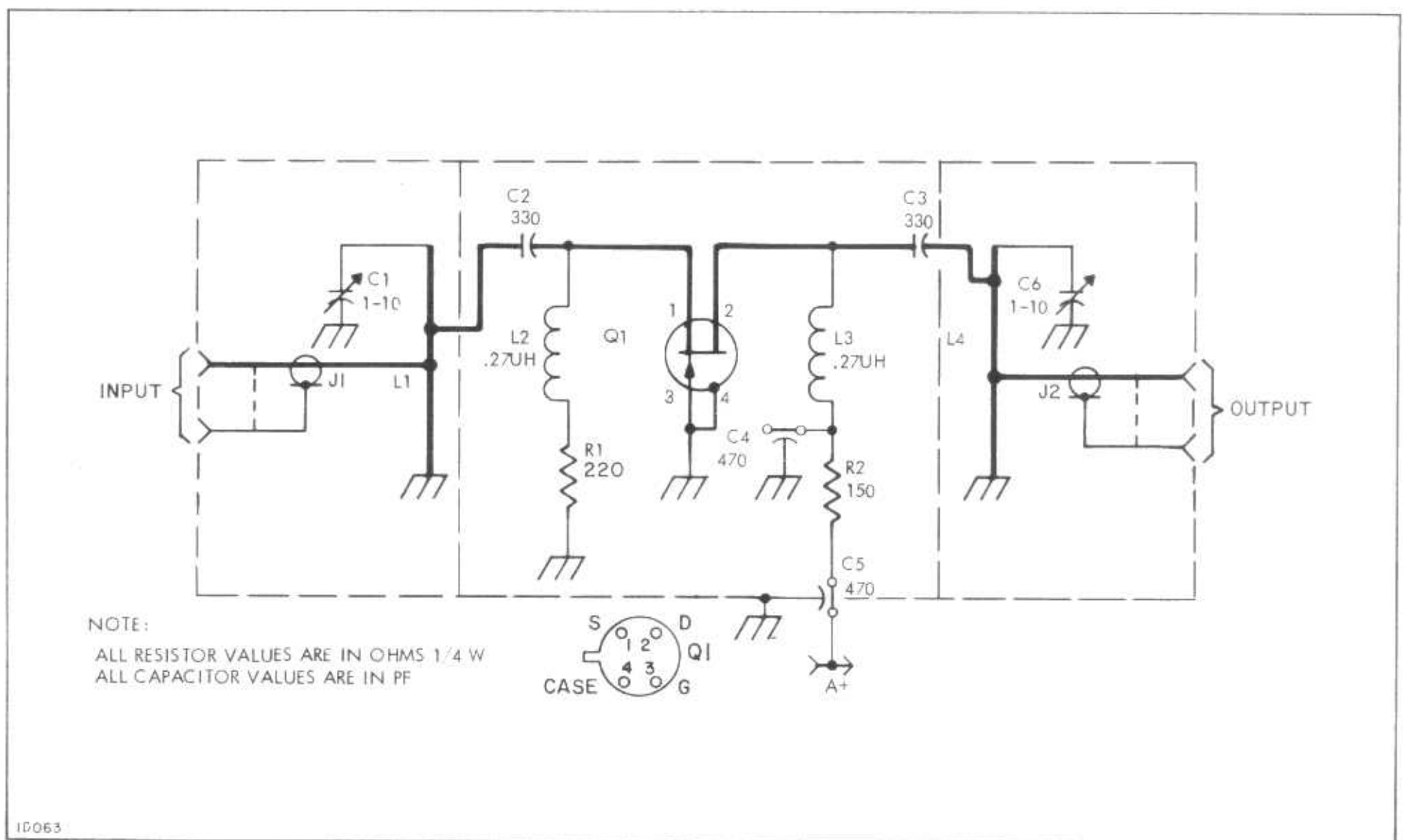


Figure 5. MI-559632-A Schematic Diagram

REPLACEMENT PARTS

Symbol	Stock No.	Drawing No.	Description
	640898		MI-559632 150 MHz PREAMPLIFIER 3723242-501
109C1	423915	3720050-006	VARIABLE, 1-10 PF
109C2	423916	3720541-106	330 PF 20%
109C3	423916	3720541-106	330 PF 20%
109C4	243256	3450092-201	STAND-OFF 470 PF 20%
109C5	239159	3450097-201	FEED-THRU 470 PF 20%
109C6	423915	3720050-006	VARIABLE, 1-10 PF
109C7	115666	3720699-075	1 PF 10%
109C8	115666	3720699-075	1 PF 10%
109J1	422896	3723009-001	JACK, PHONO
109J2	422896	3723009-001	JACK, PHONO
109L1	423913	3723313-001	CHOKE
109L2	423918	3463115-092	CHOKE, 6.8 UH 20%
109L3	423918	3463115-092	CHOKE, 6.8 UH 20%
109L4	423913	3723313-001	CHOKE
109Q1	423914	3723316-001	TRANSISTOR
109R1	218758	99206-054	220 OHMS 10% 1/4W
109R2	227744	99206-052	150 OHMS 10% 1/4W
	242161	3450797-002	CONNECTOR, BEAD CHAIN
	423920	3468006-532	CABLE ASSEMBLY
	423919	3468006-533	CABLE ASSEMBLY
	640897		MI-559632-A 450 MHz PREAMPLIFIER 3723242-502
109C1	423915	3720050-006	VARIABLE, 1-10 PF
109C2	423916	3720541-106	330 PF 20%
109C3	423916	3720541-106	330 PF 20%
109C4	243256	3450092-201	STAND-OFF, 470 PF 20%
109C5	239159	3450097-201	FEED-THRU, 470 PF 20%
109C6	423915	3720050-006	VARIABLE, 1-10 PF
109J1	422896	3723009-001	JACK, PHONO
109J2	422896	3723009-001	JACK, PHONO
109L1	423912	3723312-001	CHOKE
109L2	423917	3463115-024	CHOKE, 0.27 UH 20%
109L3	423917	3463115-024	CHOKE, 0.27 UH 20%
109L4	423912	3723312-001	CHOKE
109Q1	423914	3723316-001	TRANSISTOR
109R1	218758	99206-054	220 OHMS 10% 1/4W
109R2	227744	99206-052	150 OHMS 10% 1/4W
	423920	3468006-532	CABLE ASSY
	423919	3468006-533	CABLE ASSY
	242161	3450797-002	CONNECTOR, BEAD CHAIN