



## ADDENDUM TO IB-8027118-1 \*

**150 MHz Band Receiver**

**Low IF and Audio Board**

**\*Replaces IB-8027118-1D**

### GENERAL

This addendum provides coverage of a new Low IF and Audio board (3720963-501 and 3720963-502). The -501 version is for use in standard systems while the -502 is for use in systems that require specialized audio and control circuitry such as in repeating stations. Separate coverage is provided for each of the boards which includes "pathfinder" circuit board views, replacement parts lists, and schematic diagrams.

### IDENTIFICATION

The newer board may be distinguished from the earlier one by the following:

The earlier board is identified by the number 3457493-501 on the component side of the board and has a 1" by 1" metal plate on the copper side of the board beneath transistor Q1.

The later board is identified by the number 3720963-501 or 3720963-502 on the component side of the board and does not have a metal plate on the copper side.

### CIRCUIT DESCRIPTION

#### 3720963-501 Board

Q1 and Q2 are wideband Class A 455 kHz IF amplifiers which supply a high-level signal to Limiter/Driver U1. Q2 is protected from RF overload on strong signals by diode CR2. The diode's conductivity increases in proportion to the voltage across it, shunting a portion of the signal to ground.

Coil L1 in Q2 collector circuit limits the IF bandwidth to around 100 kHz.

Limiter/Driver U1 serves as a limiter for the IF signal and as a driver for the discriminator diodes CR4 and CR5.

In radios without Quiet Channel, speech audio is routed through 6 dB/octave de-emphasis network R31-C63 to Q4. If the radio is equipped with Quiet Channel, R31 is removed and discriminator audio is applied, via pin 24, to the Tone Reject Filter in the Quiet Channel. This filter separates the low frequency encoding tone from the speech audio. The tone is directed to the Quiet Channel circuitry for processing



while the speech audio is routed back to the Low IF and Audio board on pin 25. The de-emphasis function of R31-C63 is duplicated in the Quiet Channel unit.

Transistors Q4 and Q5 form a direct coupled audio amplifier. The output of Q5 is coupled to the volume control through the "blk", "red", and "shld" pins. The audio signal undergoes further de-emphasis in network R43-C44. CR8 provides temperature compensation for Q7 bias circuit.

Transistor Q8 serves as a driver for the Audio PA. Transistor Q9 provides an auxiliary audio output which may be used in special applications.

### Noise Operated Squelch

Transistors Q10, Q11, Q12, and Q13 comprise the noise operated squelch circuit. Q10 amplifies the wide band noise supplied from the discriminator. The output of Q10 is rectified by Q11. Components L6 and C62 peak the response to noise around 14 kHz thus avoiding response to speech audio. Q11 output serves as a noise derived control voltage for Schmitt Trigger Q12 and Q13. When noise is present (no signal), Q11 emitter voltage rises, Q12 emitter voltage rises, and Q7 is biased off, muting receiver audio. When a signal of adequate strength is received, discriminator noise is greatly reduced. Under this condition, virtually no noise is present at Q10 or Q11. Q11 emitter voltage drops, Q12 emitter voltage drops, and Q7 is biased on, permitting Q7 to amplify speech audio.

### Receiver Disable (Muting)

When a disable (keying) voltage is applied to pins 18 or 32, transistor Q16 is biased into conduction. Diode CR13 clamps the trigger voltage at nine volts to provide a constant reference for Q16, regardless of variations in the keying voltage. The positive voltage at Q16 emitter triggers squelch gate Q12/Q13 into the tight squelch mode disabling the receiver. This disables; audio output to audio PA at pin 2, repeat audio output at pin 38 (group 502), and keying output to COS or DCM at pin 28. When the disable voltage is removed, the charge on capacitors C42 and C50 hold Q16 "on" for an instant. This allows sufficient time for the receiver noise-squelch circuitry to mute the receiver eliminating the "squelch tail".

Jumper JU1 is provided to isolate the receiver disable circuit from the keying voltage during transmit. This feature is necessary to permit the receiver to operate during transmit in a duplex repeater station. The receiver may still be muted with a disable voltage applied to pin 18.

### 3720963-502 Board

The preceding description of the -501 module also applies to the -502 version. The following additional information describes the operation of the added circuitry on the -502 board.

### Special Metering/Control Output

Part of Q1's output is rectified by CR1, and delivered to pins 39 and 40 as a DC voltage. The output of Q1 is linear and is significant only on stronger signals. This output can be used for specialized metering or control applications.



### Discriminator Audio Output

Some applications require discriminator grade audio. Part of the discriminator output is fed, via R25 and C34, to Q3, which provides a low impedance output. Q17 is used to switch this output on or off. Q17 is normally non-conducting and allows normal passage of the audio signal. When a control voltage (+12 V) is applied to pin 36 or by way of JU3, Q17 provides a low impedance path for the audio signal to ground, disabling the output of Q3.

### Squelch Disable (Receiver Test)

A+ applied at pin 82 biases Q15 on, dropping its collector voltage and disabling the squelch gate, turning on the receiver audio.

### Repeat Audio Output

For repeater applications, a frequency contoured, 600 ohm output is provided. Q5 output is buffered by Q6 and supplied at pin 38. Q14 (part of the squelch circuit) switches this output by switching Q4-Q5 on or off.

### OPTIONS AND MODIFICATIONS

When field installing options, certain modifications must be made to the Low IF board.

1. Carrier Operated Switch (COS): On Low IF board, add jumper JU4 between the two holes marked "JU4".
2. Dual Channel Monitor: On Low IF board, add jumper JU4 between the two holes marked "JU4".
3. Quiet Channel (QC): Remove R31. Also remove jumper between pins 18 and 20.

Any of the optional circuits appearing on the 3720963-502 board can be added to the 3720963-501 board by the field technician. All of the parts used in these circuits are shown on the schematic and parts list for the -502. The location of the parts can be determined from the "pathfinder" illustration or from the stenciling on the board.

### TUNING CHANGES

In the "Receiver Alignment" table in the Receiver Instruction Book, make the following changes for tuning the newer Low IF board:

1. Delete Step 2.
2. In Step 3, change "14Z2" to read "14L2".
3. In Step 4, change "14Z3" to read "14L3".

Note that these changes apply only to the 3720963-501 and -502 Low IF boards.

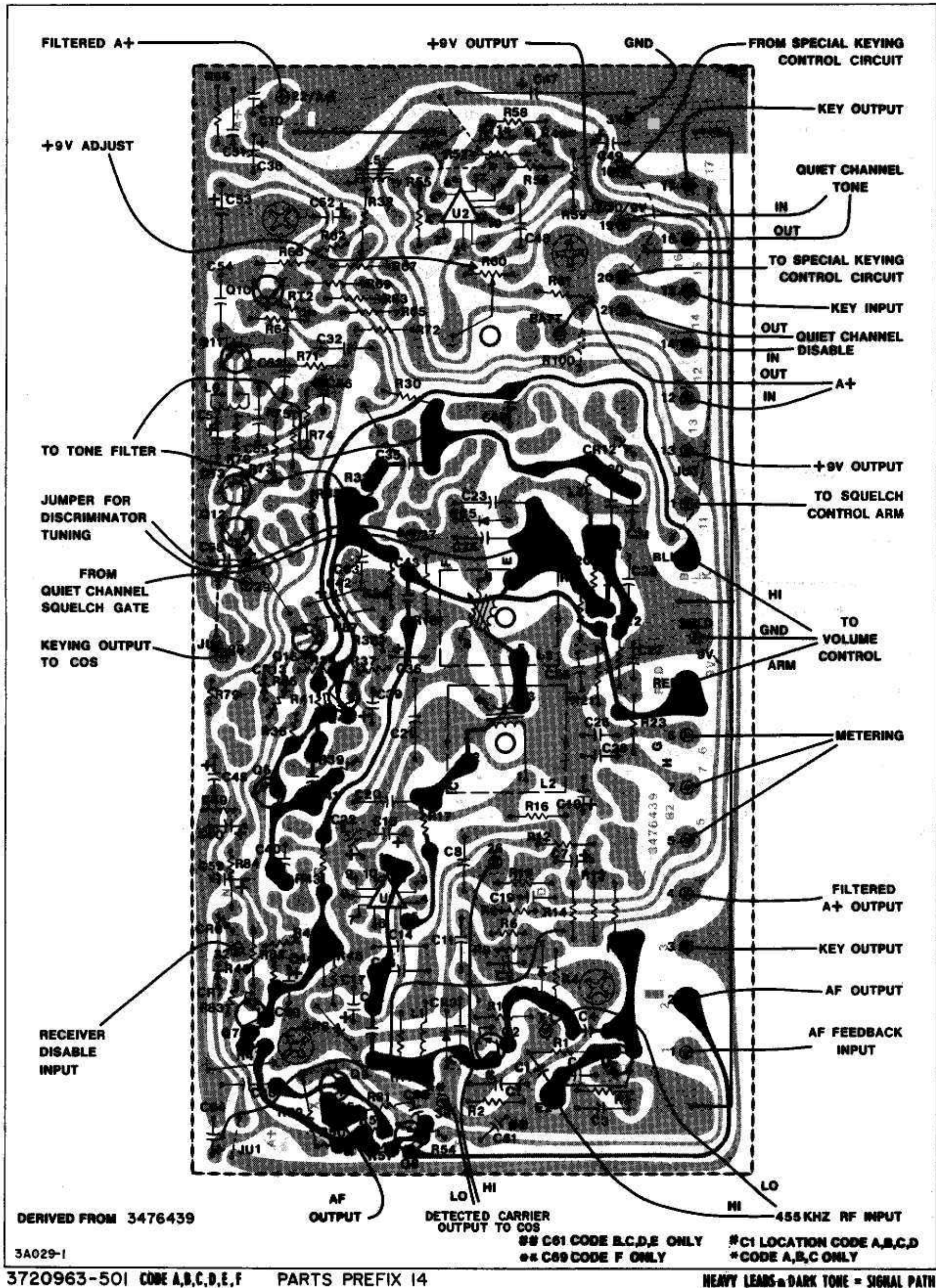
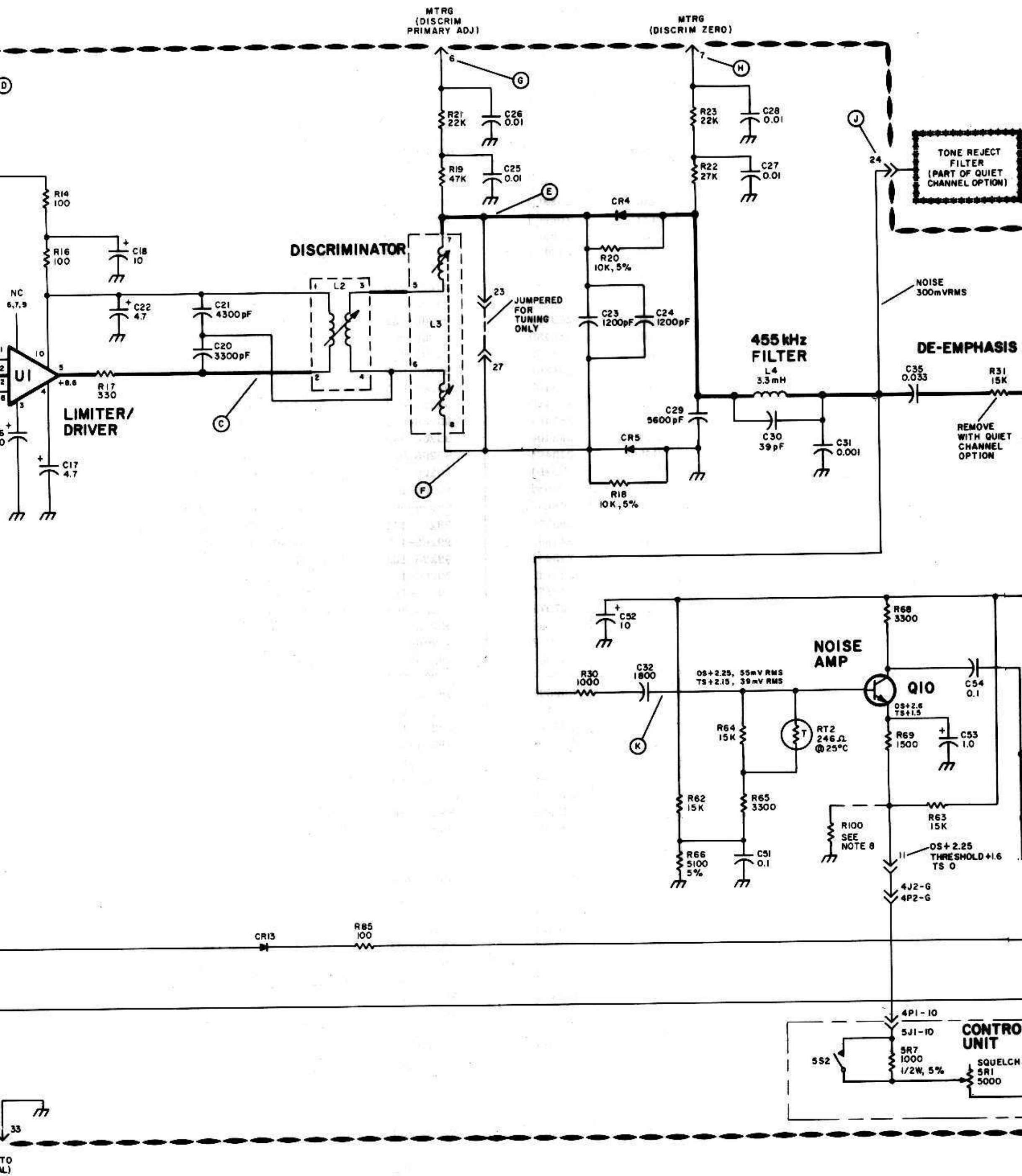


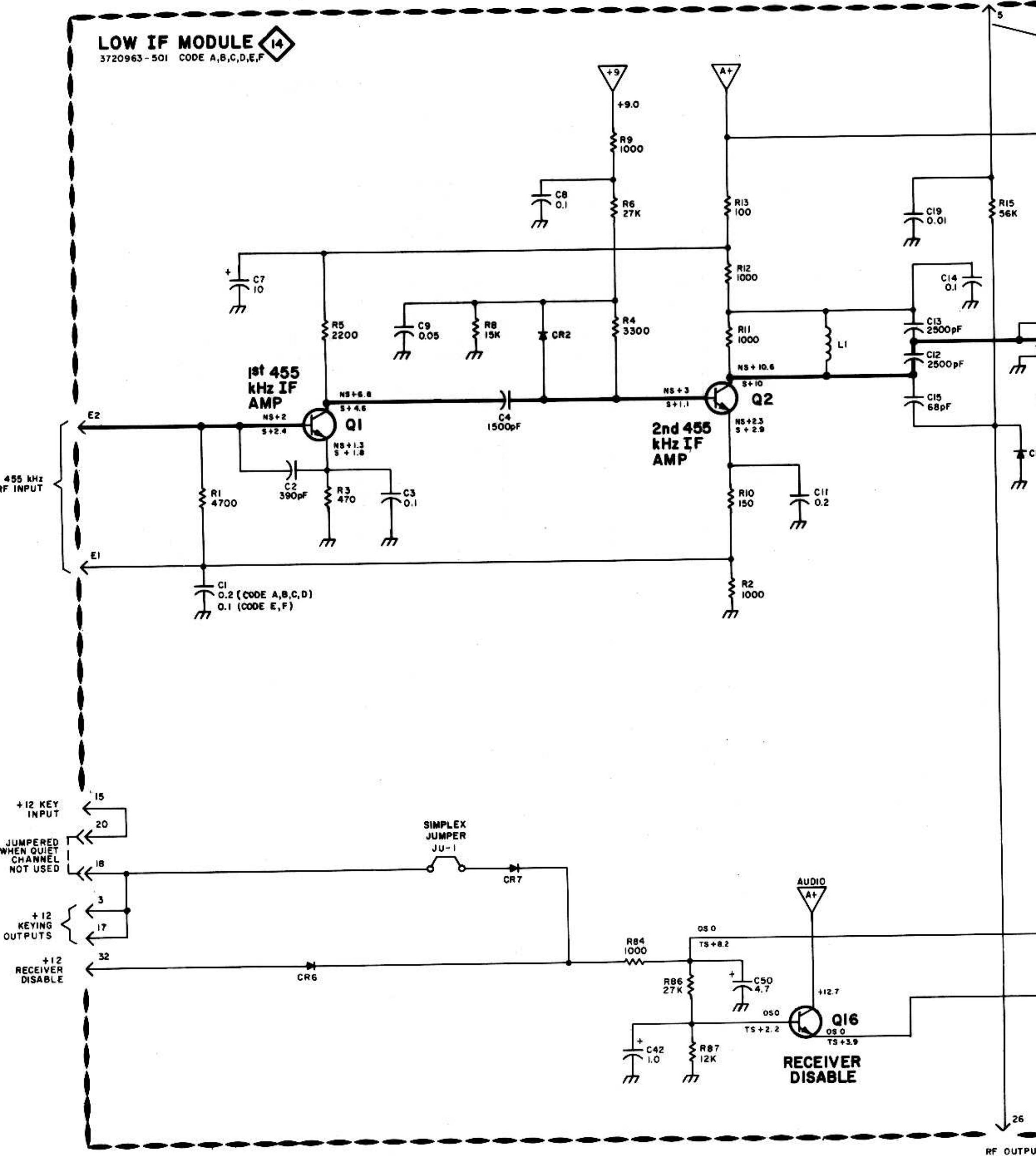
Figure 1. Low IF and Audio Board  
3720963-501





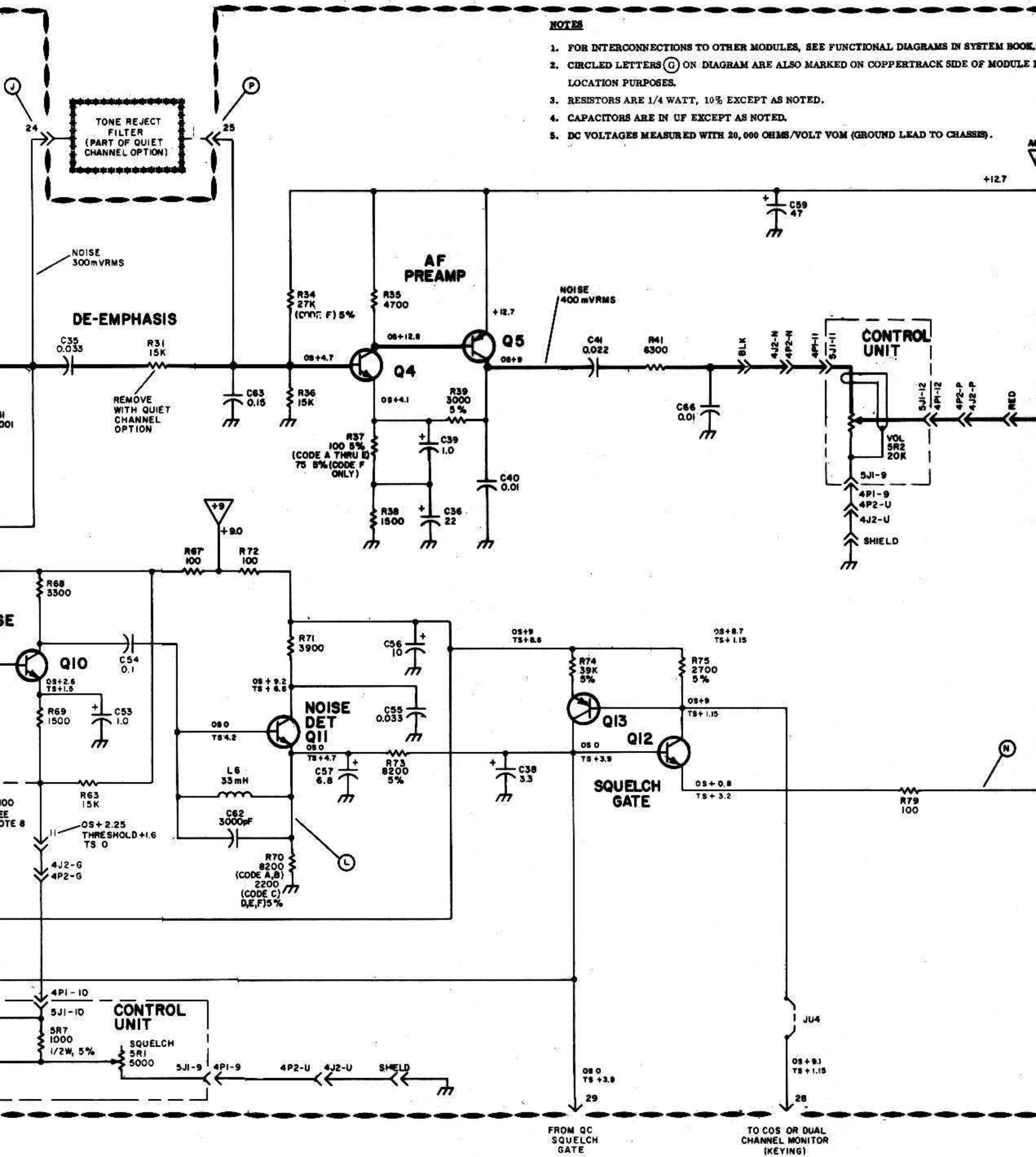
# LOW IF MODULE 14

3720963-501 CODE A,B,C,D,E,F



**NOTES**

1. FOR INTERCONNECTIONS TO OTHER MODULES, SEE FUNCTIONAL DIAGRAMS IN SYSTEM BOOK.
2. CIRCLED LETTERS (G) ON DIAGRAM ARE ALSO MARKED ON COPPERTRACK SIDE OF MODULE FOR LOCATION PURPOSES.
3. RESISTORS ARE 1/4 WATT, 10% EXCEPT AS NOTED.
4. CAPACITORS ARE IN UF EXCEPT AS NOTED.
5. DC VOLTAGES MEASURED WITH 20,000 OHMS/VOLT VOM (GROUND LEAD TO CHASSIS).



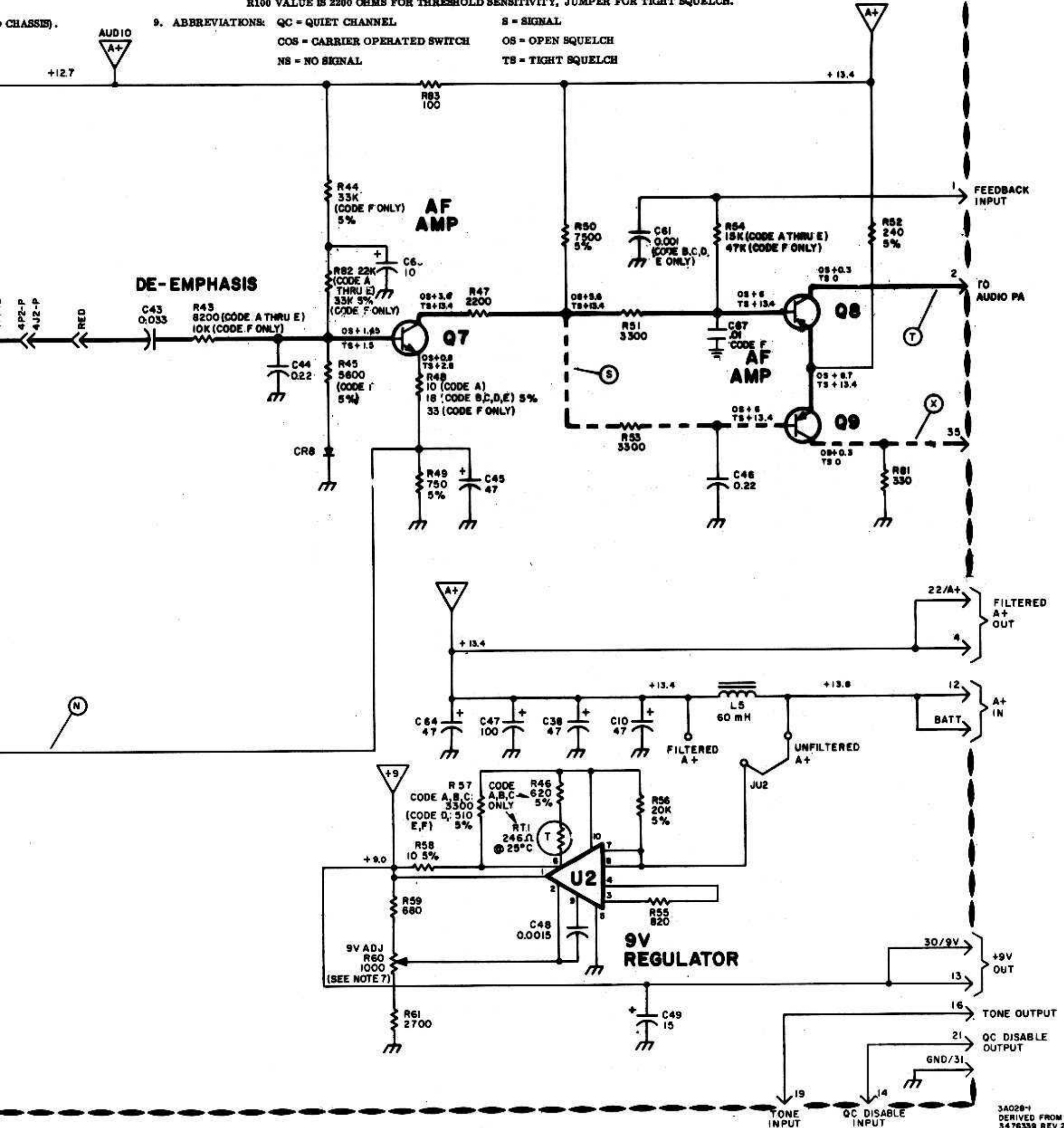
## REPLACEMENT PARTS

Symbol	Stock No.	Drawing No.	Description
			LOW IF AND AUDIO BOARD D/L 3720963-501 REV 12 CODE A, B, C, D, E, F
	420080	3720963-501	CIRCUIT BOARD ASSY
C1	227445	3460490-013	CERAMIC, 0.2 UF +80-20% 20 VDC CODE A, B, C, D
C1	227444	3460490-002	CERAMIC, 0.1 UF +80-20% 25 VDC CODE E, F
C2	105310	1510003-220	390PF 10% 500 VDC
C3	227444	3460490-012	CERAMIC, 0.1 UF +80-20% 25 VDC
C4	234011	1510003-227	1500 PF 10% 500 VDC
C7	243581	3457537-013	TANTALUM, 10UF 20% 20 VDC
C8	227444	3460490-012	CERAMIC, 0.1 UF +80-20% 25VDC
C9	228168	3460490-011	CERAMIC, .05 UF +80-20% 25 VDC
C10	420073	3457537-230	TANTALUM, 47 UF 10% 20 VDC
C11	227445	3460490-013	CERAMIC, 0.2 UF +80-20% 25 VDC
C12	420076	3457081-272	MYLAR, 2500 PF 5% 100 VDC
C13	420076	3457081-272	MYLAR, 2500 PF 5% 100 VDC
C14	227444	3460490-012	CERAMIC, 0.1 UF +80-20 % 25 VDC
C15	244528	3460723-331	CERAMIC, 68 PF 5% 100 VDC
C16	242034	3457537-015	TANTALUM, 1.0 UF 35 VDC
C17	243600	3457537-012	TANTALUM, 4.7 UF 20 VDC
C18	243581	3457537-013	TANTALUM, 10 UF 20% 20 VDC
C19	234543	3463453-117	DISC, .01 UF +80-20 % 25 VDC
C20	421902	3457967-613	POLY, 3300 PF 5% 100 VDC
C21	421903	3457967-616	POLY, 4300 PF 5% 100 VDC
C22	243600	3457537-012	TANTALUM, 4.7 UF 20 VDC
C23	421901	3457967-603	POLY, 1200 PF 5% 100 VDC
C24	218969	8924416-212	1200 PF 2% 500 VDC
C25	234543	3463453-117	DISC, .01 UF +80-20 % 25 VDC
C26	"	"	"
C27	"	"	"
C28	"	"	"
C29	420075	3457081-121	MYLAR, 5600 PF 10% 100 VDC
C30	232073	3460723-325	CERAMIC, 39PF 5% 100 VDC
C31	112660	1510003-225	.001 UF 10%
C32	248284	3457081-108	MYLAR, 1800 PF 10% 100 VDC
C35	242742	3457081-139	MYLAR, .033 UF 100 VDC
C36	243582	3457537-014	TANTALUM, 22UF 20% 25 VDC
C38	420073	3457537-120	TANTALUM, 47 UF 10 % 20 VDC
C39	242034	3457537-015	TANTALUM, 1.0 UF 20 % 50 VDC
C40	234543	3463453-117	DISC, .01 UF +80-20 % 25 VDC
C41	242741	3457081-135	MYLAR, .022 UF 10% 100 VDC
C42	300653	3457716-104	TANTALUM, 1.0 UF 10% 35 VDC
C43	242742	3457081-139	MYLAR, .033 UF 10% 100 VDC
C44	242748	3457081-160	MYLAR, .22 UF 10% 100 VDC
C45	420073	3457537-120	TANTALUM, 47 UF 10% 100 VDC
C46	242748	3457081-160	MYLAR, .22 UF 10% 100 VDC
C47	231027	3453563-113	DISC, 100UF 15 VDC
C48	234011	1510003-227	.0015 UF 10% 500VDC
C49	420084	3457537-245	TANTALUM, 15UF 10% 35VDC
C50	420083	3457537-129	TANTALUM, 4.7 UF 10% 35 VDC
C51	227444	3460490-012	0.1 UF +80-20 % 25 VDC
C52	420072	3457537-118	TANTALUM, 10 UF 10% 15 VDC
C53	300653	3457716-104	TANTALUM, 1.0 UF 10% 35 VDC
C54	242746	3457081-152	MYLAR, 0.1 UF 10% 100 VDC
C55	242742	3457081-139	MYLAR, .033 UF 10% 100 VDC
C56	420081	3457537-123	TANTALUM, 10 UF 10% 25 VDC
C57	420074	3457537-117	TANTALUM, 6.8 UF 10% 20 VDC
C58	420082	3457537-128	TANTALUM, 3.3 UF 10% 50 VDC
C59	420073	3457537-230	TANTALUM, 47 UF 10% 20 VDC
C60	420072	3457537-118	TANTALUM, 10UF 10% 15 VDC
C61	112660	1510003-225	.001 UF 10% CODE B, C, D, E,



IN SYSTEM BOOK.  
SIDE OF MODULE FOR  
CHASSIS).

6. AC RMS VOLTAGES MEASURED WITH LOW-CAPACITY, HIGH IMPEDANCE INPUT AC VOLTMETER.
7. ADJUSTMENT PROCEDURE FOR R60: CONNECT VOM BETWEEN PIN 30/9V (+) AND CHASSIS (-). WITH NORMAL LOAD AND IN RECEIVE MODE, ADJUST R60 FOR +9.0 V.
8. FOR FIXED SQUELCH: PULL LEAD FROM PIN 11 AND ADD R100 TO BOARD (SEE DIAGRAM FOR LOCATION). R100 VALUE IS 2200 OHMS FOR THRESHOLD SENSITIVITY, JUMPER FOR TIGHT SQUELCH.
9. ABBREVIATIONS: QC = QUIET CHANNEL      S = SIGNAL  
COS = CARRIER OPERATED SWITCH      OS = OPEN SQUELCH  
NS = NO SIGNAL      TS = TIGHT SQUELCH



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Figure 2. Schematic Diagram, Low IF and Audio Board, 3720963-501.

## REPLACEMENT PARTS

Symbol	Stock No.	Drawing No.	Description
C62	242749	3457081-214	MYLAR, 3000 PF 5% 100 VDC
C63	421904	3457081-173	MYLAR, 0.15 UF 10% 100 VDC
C64	420073	3457537-120	TANTALUM, 47UF 10% 20 VDC
C66	234543	3463453-117	.01 UF +80-20% 25 VDC
C67	234543	3463453-117	.01 UF +80-20% 25 VDC CODE F
CR1	242248	3467116-002	DIODE
CR2	242522	3464611-001	DIODE
CR3	242248	3467116-002	DIODE
CR4	227448	3460543-001	DIODE
CR5	227448	3460543-001	DIODE
CR6	242522	3464611-001	DIODE
CR7	"	"	"
CR8	"	"	"
CR13	242522	3464611-001	DIODE
L1	420079	3722327-008	COIL
L2	242762	3472417-002	COIL
L3	242763	3472417-003	COIL
L4	420078	3472327-201	CHOKER, 3.3 MH
L5	242854	3464596-001	CHOKER, 60 MH FILTER
L6	231887	3462272-002	CHOKER, 33 MH
Q1	242759	3468182-002	TRANSISTOR
Q2	242759	3468182-002	TRANSISTOR
Q4	242758	3468182-001	TRANSISTOR
Q5	242760	3468183-001	TRANSISTOR
Q7	242758	3468182-001	TRANSISTOR
Q8	421905	3731418-003	TRANSISTOR
Q9	421905	3731418-003	TRANSISTOR
Q10	242758	3468182-001	TRANSISTOR
Q11	"	"	"
Q12	"	"	"
Q13	242760	3468183-001	TRANSISTOR
Q16	242758	3468182-001	TRANSISTOR
R1	300739	99206-070	4700 OHMS 10% 1/4 W
R2	108865	99206-062	1000 OHMS 10% 1/4 W
R3	108864	99206-058	470 OHMS 10% 1/4 W
R4	107972	99206-068	3300 OHMS 10% 1/4 W
R5	108866	99206-066	2200 OHMS 10% 1/4 W
R6	219467	99206-079	27K OHMS 10% 1/4 W
R8	108869	99206-076	15K OHMS 10% 1/4 W
R10	227744	99206-052	150 OHMS 10% 1/4 W
R11	108865	99206-062	1000 OHMS 10% 1/4 W
R12	108865	99206-062	1000 OHMS 10% 1/4 W
R13	108861	99206-050	100 OHMS 10% 1/4 W
R14	108861	99206-050	100 OHMS 10% 1/4 W
R15	300649	99206-083	56K OHMS 10% 1/4 W
R16	108861	99206-050	100 OHMS 10% 1/4 W
R17	228879	99206-056	330 OHMS 10% 1/4 W
R18	218499	99206-183	10 K OHMS 5% 1/4 W
R19	108871	99206-082	47K OHMS 10% 1/4 W
R20	218499	99206-183	10K OHMS 5% 1/4 W
R21	285421	99206-078	22K OHMS 10% 1/4 W
R22	219467	99206-079	27 K OHMS 10% 1/4 W
R23	285421	99206-078	22K OHMS 10% 1/4 W



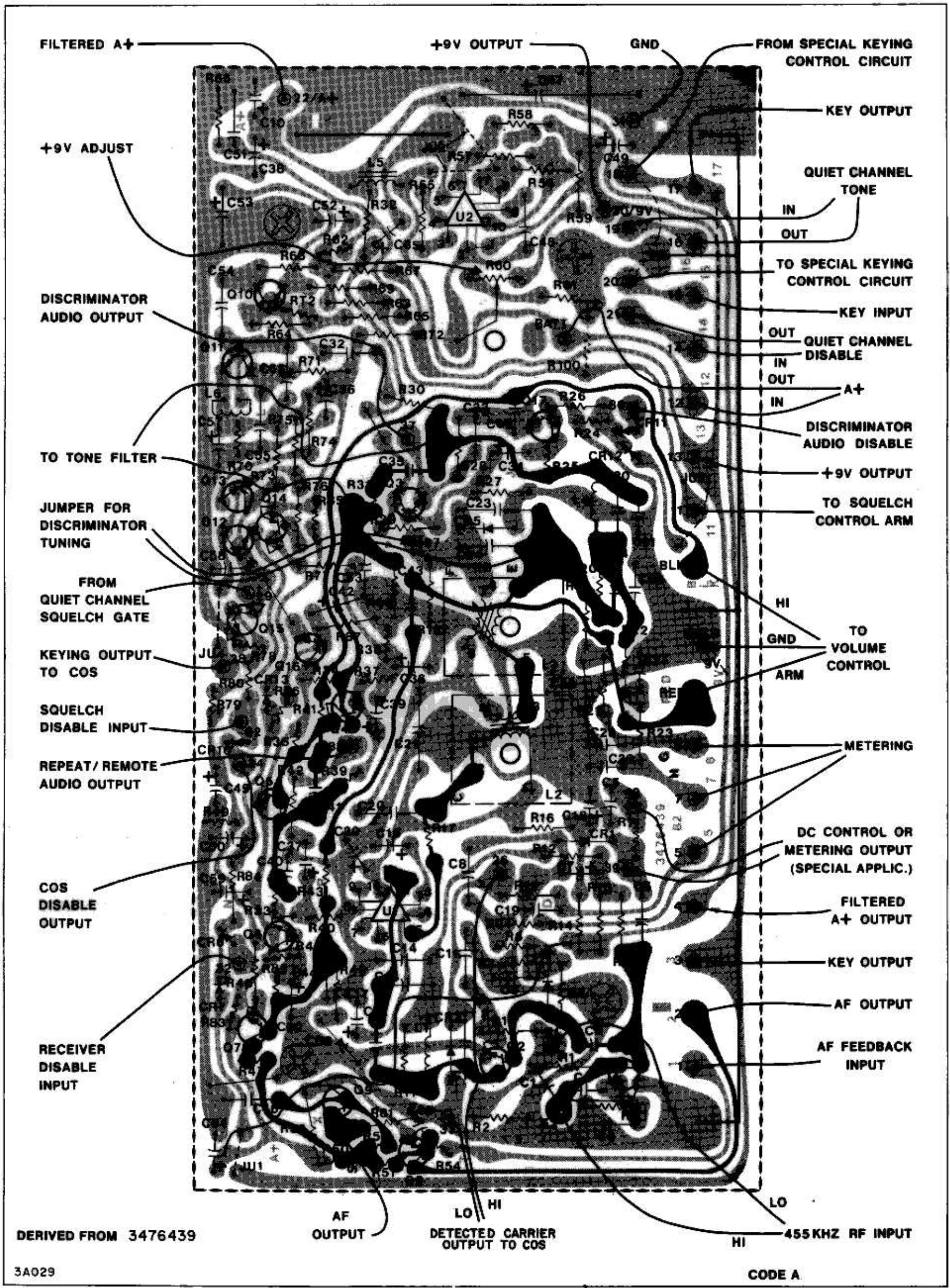
## REPLACEMENT PARTS

Symbol	Stock No.	Drawing No.	Description
R30	108865	99206-062	1000 OHMS 10% 1/4 W
R31	108869	99206-076	15K OHMS 10% 1/4 W
R34	219467	99206-079	27 K OHMS 10% 1/4 W CODE A, B, C, D, E
R34	219467	99206-193	27 K OHMS 5% 1/4 W CODE F
R35	300739	99206-070	4700 OHMS 10 % 1/4 W
R36	108869	99206-076	15K OHMS 10 % 1/4 W
R37	108861	99206-135	100 OHMS 5% 1/4 W CODE A, B, C, D, E
R37	269898	99206-132	75 OHMS 5% 1/4 W CODE F
R38	219459	99206-064	1500 OHMS 10% 1/4 W
R39	219462	99206-170	3000 OHMS 5% 1/4 W
R41	108867	99206-072	6800 OHMS 10% 1/4 W
R43	219465	99206-073	8200 OHMS 10% 1/4 W CODE A, B, C, D, E
R43	218499	99206-074	10K OHMS 10% 1/4 W CODE F
R44	285404	99206-080	33K OHMS 10% 1/4 W CODE A, B, C, D, E
R44	285404	99206-195	33K OHMS 5% 1/4 W CODE F
R45	219464	99206-071	5600 OHMS 10% 1/4 W CODE A, B, C, D, E
R45	219464	99206-177	5600 OHMS 5% 1/4 W CODE F
R46	300689	99206-154	620 OHMS 5% 1/4 W CODE A, B, C ONLY
R47	108866	99206-066	2200 OHMS 10% 1/4 W
R48	285573	99206-111	10 OHMS 5% 1/4 W CODE A
R48	241660	99206-117	18 OHMS 5% 1/4 W CODE B, C, D, E
R48	233931	99206-123	33 OHMS 5% 1/4 W CODE F
R49	227742	99206-156	750 OHMS 5% 1/4 W
R50	218760	99206-180	7500 OHMS 5% 1/4 W
R51	107972	99206-068	3300 OHMS 10% 1/4 W
R52	922904	99206-144	240 OHMS 5% 1/4 W
R53	107972	99206-068	3300 OHMS 10% 1/4 W
R54	108869	99206-076	15K OHMS 10% 1/4 W CODE A, B, C, D, E
R54	108871	99206-082	47 K OHMS 10% 1/4 W CODE F
R55	300690	99206-061	820 OHMS 10% 1/4 W
R56	219466	99206-190	20 K OHMS 5% 1/4 W
R57	107972	99206-171	3300 OHMS 5% 1/4 W CODE A, B, C,
R57	300688	99206-152	510 OHMS 5% 1/4 W CODE D, E, F
R58	285573	99206-111	10 OHMS 5% 1/4 W
R59	285442	99206-060	680 OHMS 10% 1/4 W
R60	236640	3463187-008	VAR. 1000 OHMS 10% 1/4 W
R61	113524	99206-067	2700 OHMS 10% 1/4 W
R62	108869	99206-076	15 K OHMS 10% 1/4 W
R63	"	"	"
R64	"	"	"
R65	107972	99206-068	3300 OHMS 10% 1/4 W
R66	300596	99206-176	5100 OHMS 5% 1/4 W
R67	108861	99206-050	100 OHMS 10% 1/4 W
R68	107972	99206-068	3300 OHMS 10% 1/4 W
R69	219459	99206-064	1500 OHMS 10% 1/4 W
R70	219465	99206-181	8200 OHMS 5% 1/4 W CODE A, B
R70	108866	99206-167	2200 OHMS 5% 1/4 W CODE C, D, E, F
R71	285405	99206-069	3900 OHMS 10% 1/4 W
R72	108861	99206-050	100 OHMS 10% 1/4 W
R73	219465	99206-181	8200 OHMS 5% 1/4 W
R74	218500	99206-197	39K OHMS 5% 1/4 W
R75	113524	99206-169	2700 OHMS 5% 1/4 W
R79	108861	99206-050	100 OHMS 10% 1/4 W
R81	219458	99206-056	330 OHMS 10% 1/4 W
R82	285421	99206-078	22K OHMS 10% 1/4 W CODE A, B, C, D, E
R82	285404	99206-195	33K OHMS 5% 1/4 W CODE F

## REPLACEMENT PARTS

<i>Symbol</i>	<i>Stock No.</i>	<i>Drawing No.</i>	<i>Description</i>
R83	108861	99206-050	100 OHMS 10% 1/4 W
R84	108865	99206-062	1000 OHMS 10% 1/4 W
R85	108861	99206-050	100 OHMS 10% 1/4 W
R86	219467	99206-079	27 K OHMS 10% 1/4 W
R87	108868	99206-075	12 K OHMS 10% 1/4 W
RT1	242712	3731172-001	THERMISTOR CODE A, B, C ONLY
RT2	242712	3731172-001	THERMISTOR
U1	243929	3457697-001	INTEGRATED CIRCUIT
U2	240077	3720968-002	INTEGRATED CIRCUIT





3720963-502

PARTS PREFIX 14

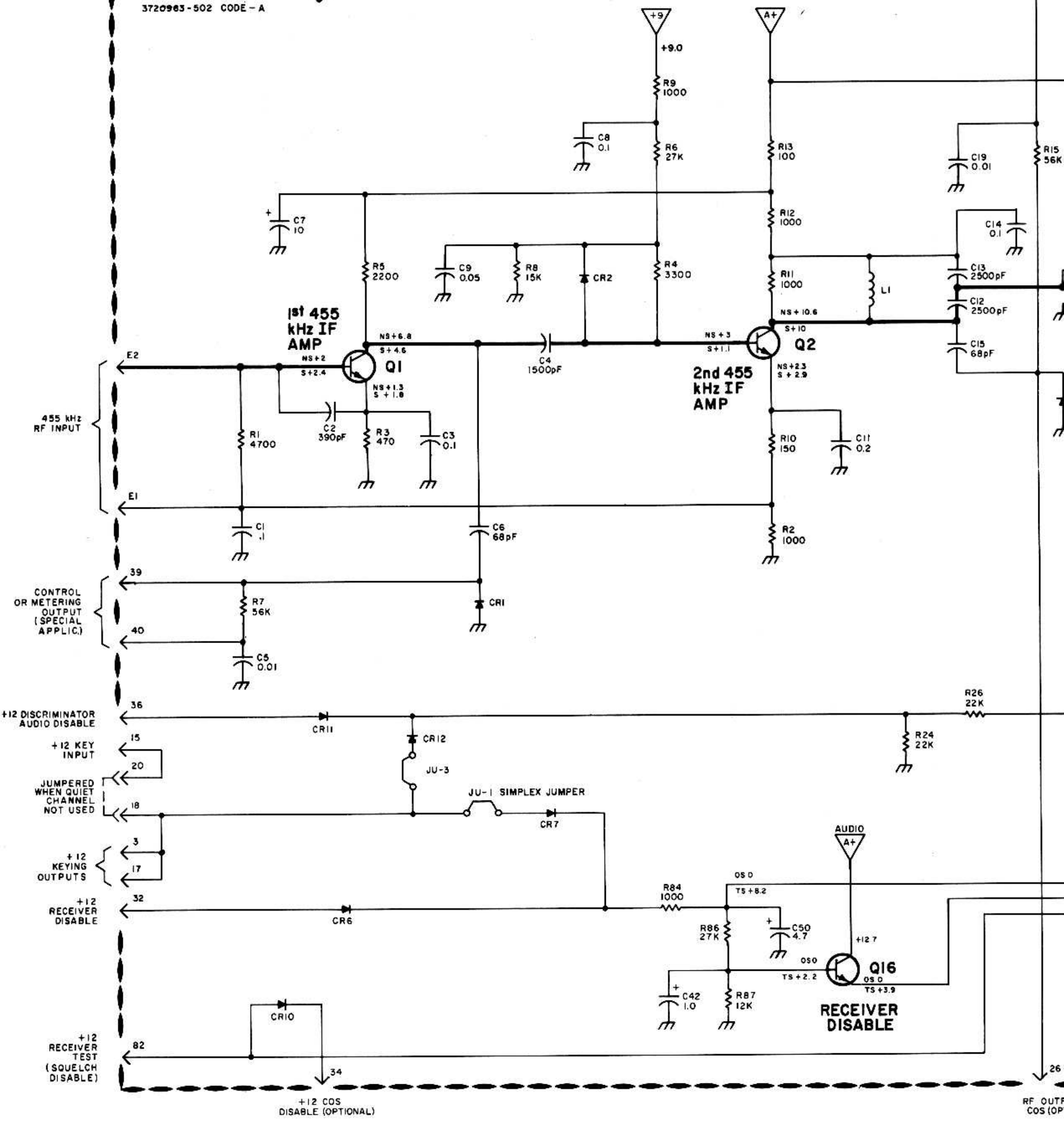
HEAVY LEADS & DARK TONE = SIGNAL PATH

Figure 4. Low IF and Audio Board  
3720963-502

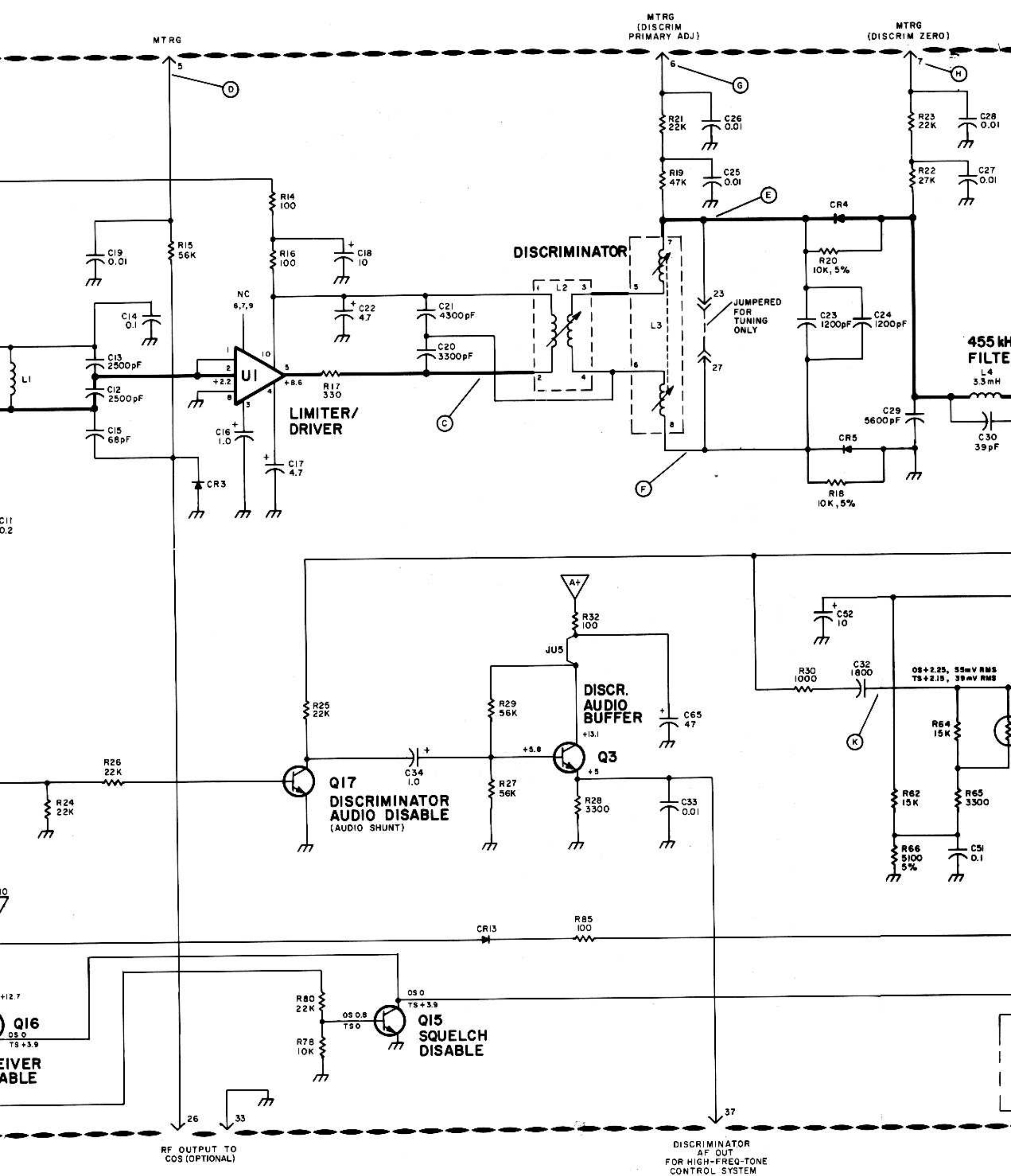
# LOW IF MODULE

14

3720963-502 CODE - A

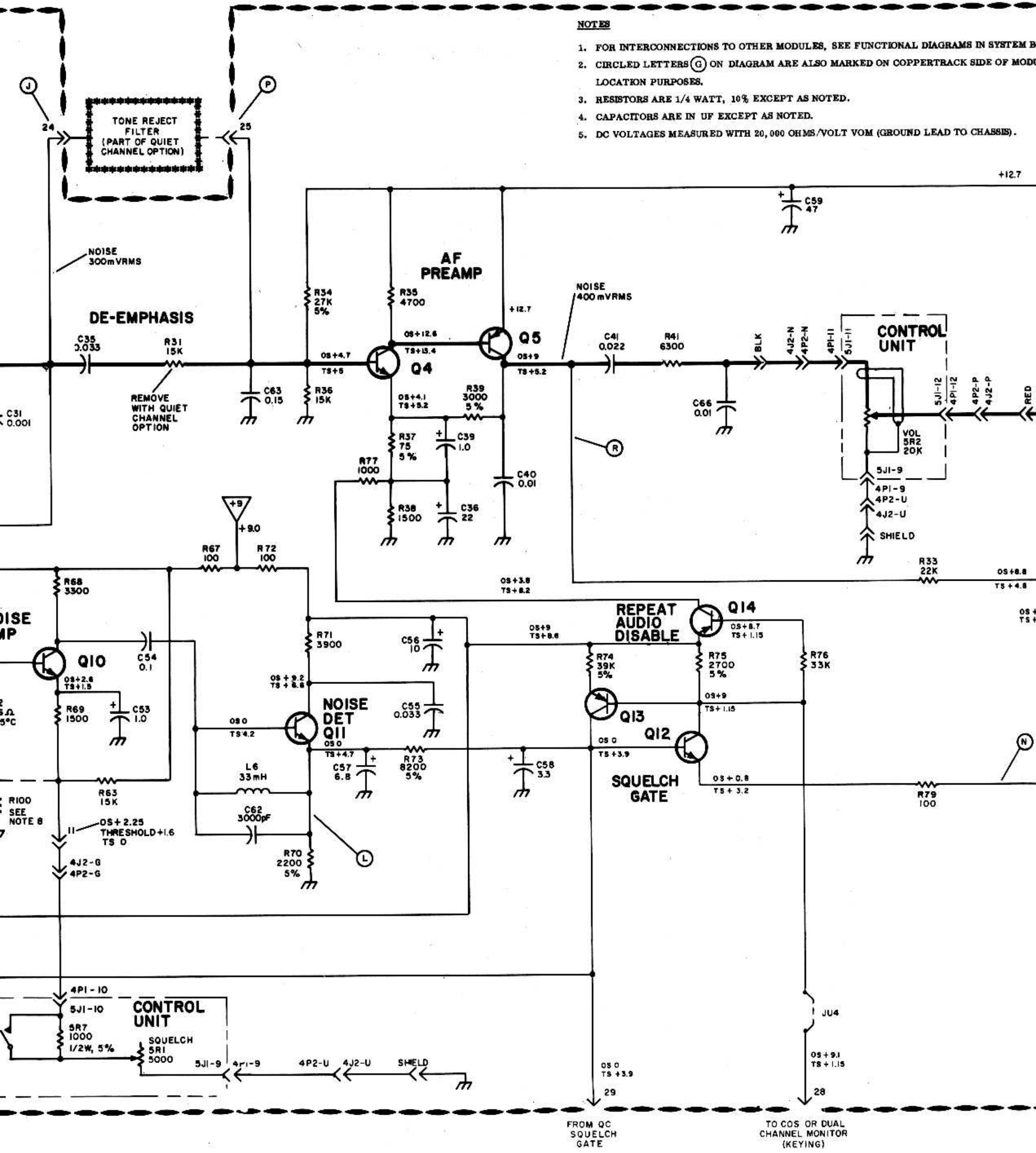






**NOTES**

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GRAMS IN SYSTEM BOOK.  
TRACK SIDE OF MODULE FOR  
AD TO CHASSIS).

6. AC RMS VOLTAGES MEASURED WITH LOW-CAPACITY, HIGH IMPEDANCE INPUT AC VOLTMETER.
7. ADJUSTMENT PROCEDURE FOR R60: CONNECT VOM BETWEEN PIN 30/9V (+) AND CHASSIS (-). WITH NORMAL LOAD AND IN RECEIVE MODE, ADJUST R60 FOR +9.0 V.
8. FOR FIXED SQUELCH: PULL LEAD FROM PIN 11 AND ADD R100 TO BOARD (SEE DIAGRAM FOR LOCATION).  
R100 VALUE IS 2200 OHMS FOR THRESHOLD SENSITIVITY, JUMPER FOR TIGHT SQUELCH.
9. ABBREVIATIONS: QC = QUIET CHANNEL S = SIGNAL  
COS = CARRIER OPERATED SWITCH OS = OPEN SQUELCH  
NS = NO SIGNAL TS = TIGHT SQUELCH

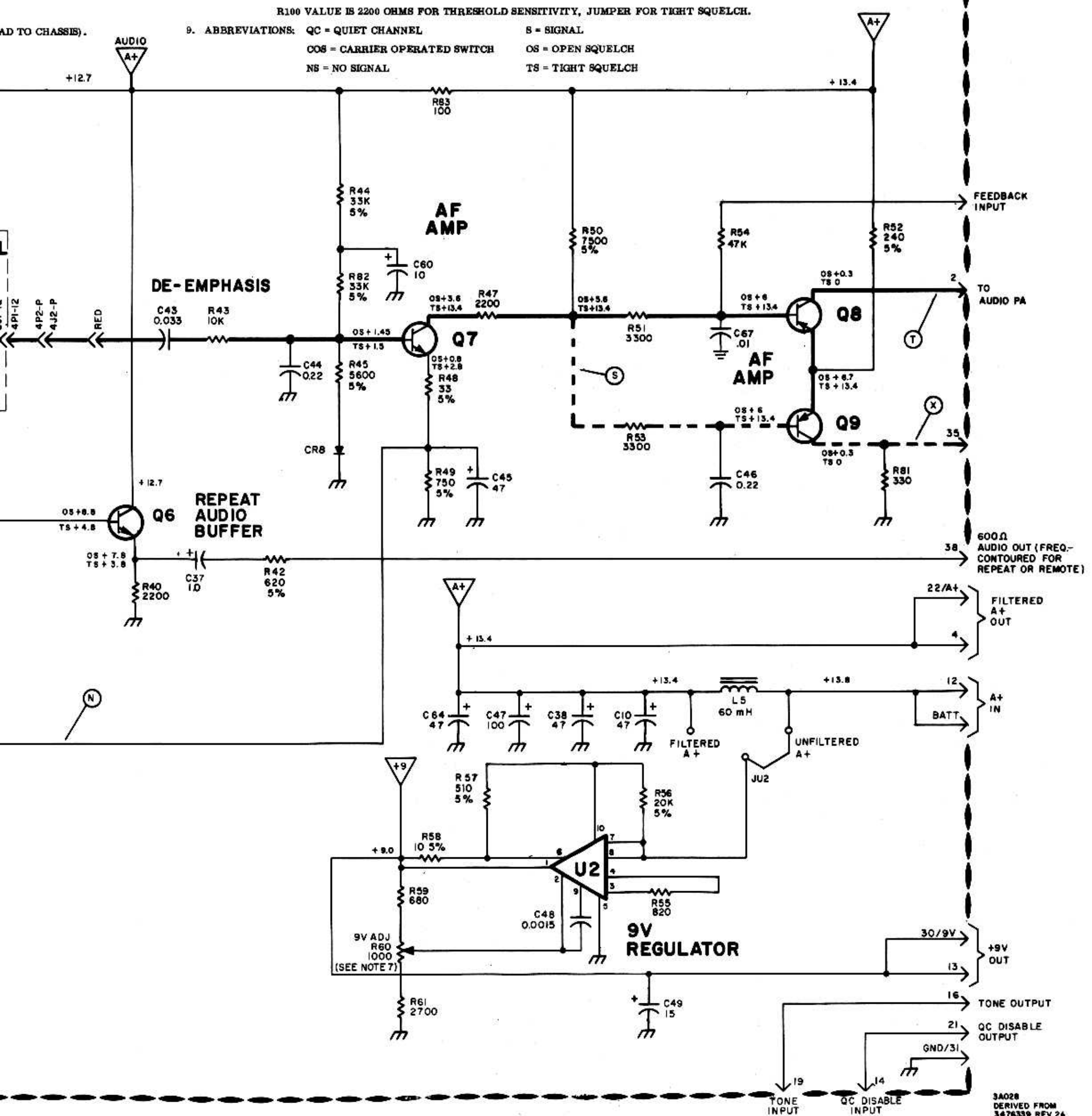


Figure 3. Schematic Diagram, Low IF and Audio Board, 3720963-502.

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## REPLACEMENT PARTS

Symbol	Stock No.	Drawing No.	Description
			LOW IF AND AUDIO BOARD D/L 3720963-502 REV 12 CODE A
		3720963-502	CIRCUIT BOARD ASSY
C1	227444	3460490-002	CERAMIC, 0.1 UF +80-20% 25 VDC
C2	105310	1510003-220	390PF 10% 500 VDC
C3	227444	3460490-012	CERAMIC, 0.1 UF +80-20% 25 VDC
C4	234011	1510003-227	1500 PF 10% 500 VDC
C5	234543	3463453-117	DISC, .01 UF +80-20% 25 VDC
C6	244528	3460723-331	CERAMIC, 68 PF NPO 5% 100 VDC
C7	243581	3457537-013	TANTALUM, 10UF 20% 20 VDC
C8	227444	3460490-012	CERAMIC, 0.1 UF +80-20% 25VDC
C9	228168	3460490-011	CERAMIC, .05 UF +80-20% 25 VDC
C10	420073	3457537-230	TANTALUM, 47 UF 10% 20 VDC
C11	227445	3460490-013	CERAMIC, 0.2 UF +80-20% 25 VDC
C12	420076	3457081-272	MYLAR, 2500 PF 5% 100 VDC
C13	420076	3457081-272	MYLAR, 2500 PF 5% 100 VDC
C14	227444	3460490-012	CERAMIC, 0.1 UF +80-20 % 25 VDC
C15	244528	3460723-331	CERAMIC, 68 PF 5% 100 VDC
C16	242034	3457537-015	TANTALUM, 1.0 UF 35 VDC
C17	243600	3457537-012	TANTALUM, 4.7 UF 20 VDC
C18	243581	3457537-013	TANTALUM, 10 UF 20% 20 VDC
C19	234543	3463453-117	DISC, .01 UF +80-20 % 25 VDC
C20	421902	3457967-613	POLY, 3300 PF 5% 100 VDC
C21	421903	3457967-616	POLY, 4300 PF 5% 100 VDC
C22	243600	3457537-012	TANTALUM, 4.7 UF 20 VDC
C23	421901	3457967-603	POLY, 1200 PF 5% 100 VDC
C24	218969	8924416-212	1200 PF 2% 500 VDC
C25	234543	3463453-117	DISC , .01 UF +80-20 % 25 VDC
C26	"	"	"
C27	"	"	"
C28	"	"	"
C29	420075	3457081-121	MYLAR, 5600 PF 10% 100 VDC
C30	232073	3460723-325	CERAMIC, 39PF 5% 100 VDC
C31	112660	1510003-225	.001 UF 10%
C32	248284	3457081-108	MYLAR, 1800 PF 10% 100 VDC
C33	234543	3463453-117	DISC, .01 UF +80-20 % 25 VDC
C34	242034	3457537-015	TANTALUM, 1.0 UF 35 VDC
C35	242742	3457081-139	MYLAR, .033 UF 100 VDC
C36	243582	3457537-014	TANTALUM, 22UF 20% 25 VDC
C37	242034	3457537-125	TANTALUM, 1.0 UF 100 VDC
C38	420073	3457537-120	TANTALUM, 47 UF 10 % 20 VDC
C39	242034	3457537-015	TANTALUM, 1.0 UF 20 % 50 VDC
C40	234543	3463453-117	DISC, .01 UF +80-20 % 25 VDC
C41	242741	3457081-135	MYLAR, .022 UF 10% 100 VDC
C42	300653	3457716-104	TANTALUM, 1.0 UF 10% 35 VDC
C43	242742	3457081-139	MYLAR, .033 UF 10% 100 VDC
C44	242748	3457081-160	MYLAR, .22 UF 10% 100 VDC
C45	420073	3457537-120	TANTALUM, 47 UF 10% 100 VDC
C46	242748	3457081-160	MYLAR, .22 UF 10% 100 VDC
C47	231027	3453563-113	DISC, 100UF 15 VDC
C48	234011	1510003-227	.0015 UF 10% 500VDC
C49	420084	3457537-245	TANTALUM, 15UF 10% 35VDC
C50	420083	3457537-129	TANTALUM, 4.7 UF 10% 35 VDC
C51	227444	3460490-012	0.1 UF +80-20 % 25 VDC
C52	420072	3457537-118	TANTALUM, 10 UF 10% 15 VDC
C53	300653	3457716-104	TANTALUM, 1.0 UF 10% 35 VDC
C54	242746	3457081-152	MYLAR, 0.1 UF 10% 100 VDC
C55	242742	3457081-139	MYLAR, .033 UF 10% 100 VDC
C56	420081	3457537-123	TANTALUM, 10 UF 10% 25 VDC



## REPLACEMENT PARTS

Symbol	Stock No.	Drawing No.	Description
C57	420074	3457537-117	TANTALUM, 6.8 UF 10% 20 VDC
C58	420082	3457537-128	TANTALUM, 3.3 UF 10% 50 VDC
C59	420073	3457537-230	TANTALUM, 47 UF 10% 20 VDC
C60	420072	3457537-118	TANTALUM, 10UF 10% 15 VDC
C62	242749	3457081-214	MYLAR, 3000 PF 5% 100 VDC
C63	421904	3457081-173	MYLAR, 0.15 UF 10% 100 VDC
C64	420073	3457537-120	TANTALUM, 47UF 10% 20 VDC
C65	420073	3457537-120	TANTALUM, 47UF 10% 20 VDC
C66	234543	3463453-117	.01 UF +80-20% 25 VDC
C67	234543	3463453-117	.01 UF +80-20% 25 VDC
CR1	242248	3467116-002	DIODE
CR2	242522	3464611-001	DIODE
CR3	242248	3467116-002	DIODE
CR4	227448	3460543-001	DIODE
CR5	227448	3460543-001	DIODE
CR6	242522	3464611-001	DIODE
CR7	"	"	"
CR8	"	"	"
CR10	242522	3464611-001	DIODE
CR11	242522	3464611-001	DIODE
CR12	242522	3464611-001	DIODE
CR13	242522	3464611-001	DIODE
L1	420079	3722327-008	COIL
L2	242762	3472417-002	COIL
L3	242763	3472417-003	COIL
L4	420078	3472327-201	CHOKER, 3.3 MH
L5	242854	3464596-001	CHOKER, 60 MH FILTER
L6	231887	3462272-002	CHOKER, 33 MH
Q1	242759	3468182-002	TRANSISTOR
Q2	242759	3468182-002	TRANSISTOR
Q3	242758	3468182-001	TRANSISTOR
Q4	242758	3468182-001	TRANSISTOR
Q5	242760	3468183-001	TRANSISTOR
Q6	242758	3468182-001	TRANSISTOR
Q7	242758	3468182-001	TRANSISTOR
Q8	421905	3731418-003	TRANSISTOR
Q9	421905	3731418-003	TRANSISTOR
Q10	242758	3468182-001	TRANSISTOR
Q11	"	"	"
Q12	"	"	"
Q13	242760	3468183-001	TRANSISTOR
Q14	242760	3468183-001	TRANSISTOR
Q15	242758	3468182-001	TRANSISTOR
Q16	242758	3468182-001	TRANSISTOR
Q17	242758	3468182-001	TRANSISTOR
R1	300739	99206-070	4700 OHMS 10% 1/4 W
R2	108865	99206-062	1000 OHMS 10% 1/4 W
R3	108864	99206-058	470 OHMS 10% 1/4 W
R4	107972	99206-068	3300 OHMS 10% 1/4 W
R5	108866	99206-066	2200 OHMS 10% 1/4 W
R6	219467	99206-079	27K OHMS 10% 1/4 W
R7	300649	99206-083	56K OHMS 10% 1/4 W
R8	108869	99206-076	15K OHMS 10% 1/4 W

## REPLACEMENT PARTS

<i>Symbol</i>	<i>Stock No.</i>	<i>Drawing No.</i>	<i>Description</i>
R9	108865	99206-062	1000 OHMS 10% 1/4 W
R10	227744	99206-052	150 OHMS 10% 1/4 W
R11	108865	99206-062	1000 OHMS 10% 1/4 W
R12	108865	99206-062	1000 OHMS 10% 1/4 W
R13	108861	99206-050	100 OHMS 10% 1/4 W
R14	108861	99206-050	100 OHMS 10% 1/4 W
R15	300649	99206-083	56K OHMS 10% 1/4 W
R16	108861	99206-050	100 OHMS 10% 1/4 W
R17	228879	99206-056	330 OHMS 10% 1/4 W
R18	218499	99206-183	10 K OHMS 5% 1/4 W
R19	108871	99206-082	47K OHMS 10% 1/4 W
R20	218499	99206-183	10K OHMS 5% 1/4 W
R21	285421	99206-078	22K OHMS 10% 1/4 W
R22	219467	99206-079	27 K OHMS 10% 1/4 W
R23	285421	99206-078	22K OHMS 10% 1/4 W
R24	285421	99206-078	22K OHMS 10% 1/4 W
R25	"	"	"
R26	"	"	"
R27	300649	99206-083	56 K OHMS 10% 1/4 W
R28	107972	99206-068	3300 OHMS 10% 1/4 W
R29	300649	99206-083	56K OHMS 10% 1/4 W
R30	108865	99206-062	1000 OHMS 10% 1/4 W
R31	108869	99206-076	15K OHMS 10% 1/4 W
R32	108861	99206-050	100 OHMS 10% 1/4 W
R33	285421	99206-078	22K OHMS 10% 1/4 W
R34	219467	99206-193	27K OHMS 5% 1/4 W
R35	300739	99206-070	4700 OHMS 10% 1/4 W
R36	108869	99206-076	15K OHMS 10% 1/4 W
R37	269898	99206-132	75 OHMS 5% 1/4 W
R38	219459	99206-064	1500 OHMS 10% 1/4 W
R39	219462	99206-170	3000 OHMS 5% 1/4 W
R40	108866	99206-066	2200 OHMS 10% 1/4 W
R41	108867	99206-072	6800 OHMS 10% 1/4 W
R42	300689	99206-154	620 OHMS 10% 1/4 W
R43	218499	99206-074	10K OHMS 10% 1/4 W
R44	285404	99206-195	33K OHMS 5% 1/4 W
R45	219464	99206-177	5600 OHMS 5% 1/4 W
R47	108866	99206-066	2200 OHMS 10% 1/4 W
R48	233931	99206-123	33 OHMS 5% 1/4 W
R49	227742	99206-156	750 OHMS 5% 1/4 W
R50	218760	99206-180	7500 OHMS 5% 1/4 W
R51	107972	99206-068	3300 OHMS 10% 1/4 W
R52	922904	99206-144	240 OHMS 5% 1/4 W
R53	107972	99206-068	3300 OHMS 10% 1/4 W
R54	108871	99206-082	47K OHMS 10% 1/4 W
R55	300690	99206-061	820 OHMS 10% 1/4 W
R56	219466	99206-190	20K OHMS 5% 1/4 W
R57	300688	99206-152	510 OHMS 5% 1/4 W
R58	285573	99206-111	10 OHMS 5% 1/4 W
R59	285442	99206-060	680 OHMS 10% 1/4 W
R60	236640	3463187-008	VAR. 1000 OHMS 10% 1/4 W
R61	113524	99206-067	2700 OHMS 10% 1/4 W
R62	108869	99206-076	15K OHMS 10% 1/4 W
R63	"	"	"
R64	"	"	"
R65	107972	99206-068	3300 OHMS 10% 1/4 W
R66	300596	99206-176	5100 OHMS 5% 1/4 W
R67	108861	99206-050	100 OHMS 10% 1/4 W
R68	107972	99206-068	3300 OHMS 10% 1/4 W
R69	219459	99206-064	1500 OHMS 10% 1/4 W



## REPLACEMENT PARTS

<i>Symbol</i>	<i>Stock No.</i>	<i>Drawing No.</i>	<i>Description</i>
R70	108866	99206-167	2200 OHMS 5% 1/4 W
R71	285405	99206-069	3900 OHMS 10% 1/4 W
R72	108861	99206-050	100 OHMS 10% 1/4 W
R73	219465	99206-181	8200 OHMS 5% 1/4 W
R74	218500	99206-197	39K OHMS 5% 1/4 W
R75	113524	99206-169	2700 OHMS 5% 1/4 W
R76	285404	99206-080	33K OHMS 10% 1/4 W
R77	108865	99206-062	1000 OHMS 10% 1/4 W
R78	218499	99206-074	10K OHMS 10% 1/4 W
R79	108861	99206-050	100 OHMS 10% 1/4 W
R80	285421	99206-078	22K OHMS 10% 1/4 W
R81	219458	99206-056	330 OHMS 10% 1/4 W
R82	285404	99206-195	33K OHMS 5 % 1/4 W
R83	108861	99206-050	100 OHMS 10% 1/4 W
R84	108865	99206-062	1000 OHMS 10% 1/4 W
R85	108861	99206-050	100 OHMS 10% 1/4 W
R86	219467	99206-079	27 K OHMS 10% 1/4 W
R87	108868	99206-075	12 K OHMS 10% 1/4 W
RT2	242712	3731172-001	THERMISTOR
U1	243929	3457697-001	INTEGRATED CIRCUIT
U2	240077	3720968-002	INTEGRATED CIRCUIT