JERROLD®

INSTRUCTION SHEET

435-536.1

SERIAL # 7511

SOLID-STATE

VHF BROADBAND AMPLIFIER MODEL 3660

Fig. 1. Model 3660.

DESCRIPTION

Model 3660 is a solid-state vhf t-v and f-m amplifier for MATV distribution systems. Switchable dual input circuitry permits connection of a lowband and f-m signal source only, or a highband source only, of separate low and highband sources, or a single broadband input. Input and output terminal impedance is 75 ohms. Separate gain controls are provided for the lowband and the highband range. The unit has a built-in regulated 30 VDC power supply and a line cord and plug for connection to a three-wire 117 VAC source. A slo-blo fuse protects the unit against prolonged overload. All controls and cable connection fittings are mounted on the front panel; the chassis is extended into brackets suitable for mounting the amplifier on a standard 19" relay rack or on any flat surface. Three F-59A connectors for RG-59/U cable and four screws for rack-mounting are shipped with the amplifier.

AMPLIFIER FOR "E" WING 9-13-71
INSTALLED IN TUNNEL "E" ROOM

SPECIFICATIONS

FREQUENCY RANGE	54 to 108 MHz, 174 to 216 MHz.
MINIMUM GAIN	Lowband: 40 dB Highband: 40 dB
FLATNESS	1.5 dB p/v maximum
GAIN CONTROL RANGE	10 dB minimum, each band.
NOISE FIGURE	Lowband: 13 dB Highband: 9 dB
OUTPUT CAPABILITY	0.310 V (49 dBmV) per channel for 7-channel operation at maximum input.
MAXIMUM RECOMMENDED INPUT LEVEL	10 dBmV per channel, for 7-channel operation at full gain.
DISTORTION	0.5% (—46 dB) cross-modulation at max. input.
TERMINAL MATCH	Input (both terminals): VSWR 1.5:1 (14 dB minimum return loss) at 75 ohms, from 54 to 88 MHz and 174 to 216 MHz. Output: VSWR 1.92:1 (10 dB minimum return loss) at 75 ohms, from 54 to 108 MHz and 174 to 216 MHz.
POWER REQUIREMENT	16 W, at 140 mA from 117 VAC source.
FUSING	0.25 A, slo-blo
MAX. AMBIENT OPERATING TEMPERATURE	75° C (167° F)

INSTALLATION

1.0 GENERAL

1.1 Where antenna signal levels exceed the recommended maximum input level, a Jerrold in-line attenuation pad Model PDL-* is required.
Where a broadband antenna is used, insert the pad in the input cable before connecting it to the INPUT HIGHBAND OR BROADBAND terminal on the 3660.
Where separate lowband and highband antennas are used, insert the pad in either input cable, as required.
Where single-channel antennas are used, insert the pad in the cable between the antenna affected and the mixing network.

1.2 In areas where local f-m stations broadcast strong signals, it is recommended to attenuate the f-m signals to a level 10 dB below the levels of the t-v signals.

1.3 The use of RG-59/U coaxial cable is assumed; for other types of cable, appropriate connectors or adapters may have to be used instead of the F-59A type shipped with the amplifier.

2.0 INSTALLATION OF THE AMPLIFIER

2.1 Mount the amplifier on a standard 19" relay rack with the four mounting screws supplied, or use wood screws for mounting on a flat surface.

2.2 For separate lowband and highband antenna input cables connected to the amplifier, set the input switch to SEPARATE position. For a single broadband antenna input cable, set the switch to BROADBAND position (there is no need for terminating the LOWBAND AND FM input terminal).

2.3 Prepare the end(s) of the input cable(s) and install one (two) of the three F-59A connectors supplied; consult Fig. 2.

2.4 Connect the cable(s) to the appropriate input terminal(s) on the amplifier; hand-tighten, then wrench-tighten the connector(s) not more than 1/6 of a turn.

2.5 Prepare the distribution cable, install the third F-59A connector, and connect it to the amplifier output terminal in the same manner as described for the input cable.

2.6 Check the fuse holder; it should have a 0.25 ampere fuse.

2.7 Plug the line cord of the amplifier into a 3-wire 117 VAC outlet and set the power switch to energize the unit.

3.0 GAIN CONTROL SETTINGS

3.1 Adjust the gain controls to obtain adequate signal levels at the last taps in the distribution network. Check by measuring the signal levels with a field strength meter or by observing the picture quality on a monitoring receiver at these points.

AMPLIFIER CIRCUITRY

The solid-state circuitry occupies two interconnected printed circuit boards; one board accommodates the input circuit, the lowband and f-m amplifier, and the highband amplifier with their gain control circuits. The second board accommodates the broadband output circuit stage and the regulated power supply.

Both lowband and highband amplifiers consist of an input bandpass filter network, a neturalized common-emitter amplifier, an output bandpass filter network, an equalizer stage, a bridged-"T" attenuation network, and one half of a low-high splitter.

CAUTION: Heat sinks in the driver and output stages are at r-f potential; they must not be shorted to ground or touched while the amplifier is in operation.

MAINTENANCE

GENERAL

This equipment will not require maintenance beyond routine system checks on signal levels and intactness of cable connections.

In case of equipment failure, the schematic diagram and parts list given here will permit trouble-shooting and repair of the equipment. Where a transistor has to be replaced, it may become necessary to realign the equipment. A complete alignment procedure is given here.

Both repair and realignment should be carried out by personnel familiar with solid-state circuitry and equipped with the proper instruments.

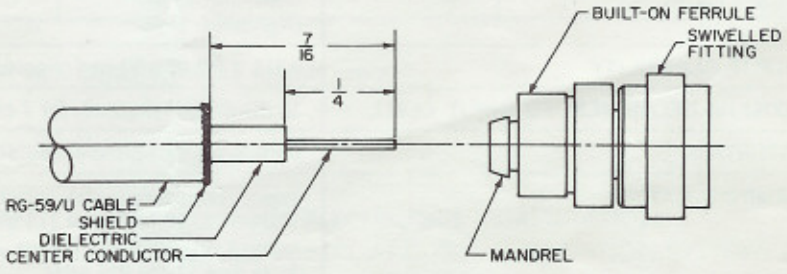
a. Remove 7/16" of the outer jacket.

b. Fan the shield back over the jacket, then trim the shield close to the edge of the jacket.

c. Remove ¼" of the dielectric; do not nick the center conductor.

d. Scrape off any fuzz from the surface of the center conductor and file off any burrs from its end.

e. Push the F-59A mandrel between the cable dielectric and shield until built-on ferrule is positioned entirely over the outer jacket.



f. Use a Jerrold crimping tool Model PL-602 for crimping the ferrule tight.

Fig. 2. Preparation of RG-59/U Cable and Installation of F-59A Connector.

ALIGNMENT

1.0 EQUIPMENT REQUIRED

1.1 Sweep Generator, Jerrold Model 900A or B (equipped with a Model D-75 r-f detector) or equivalent.

1.2 Marker Generators (2), RCA Model WR-99A or equivalent.

1.3 Coaxial Switch, Jerrold Model FD-30 or equivalent.

1.4 Oscilloscope.

1.5 75-Ohm r-f Bridge, Jerrold Model KSB-75F or equivalent.

1.6 Broadband Post Amplifier, Jerrold Model SCA-213 or equivalent.

1.7 Minimum-Loss Pad (50/75 ohms), Jerrold Model MLP 50/75 or equivalent.

1.8 75-Ohm Variable Attenuators (2), Jerrold Model AV-75 or equivalent.

1.9 75-Ohm, 3-dB Pads (2).

1.10 75-Ohm, 20-dB Pad

1.11 75-Ohm Terminators (2), Jerrold Model TR-72F or equivalent.

1.12 Alignment Cover (see Fig. 3).

1.13 Test Fixture (See Fig. 4).

2.0 INPUT BOARD ALIGNMENT

2.1 Remove the ten screws holding the chassis cover and remove the cover.

2.2 Disconnect the 0.02 uF capacitor (C202) interconnecting the two circuit boards.

2.3 Fasten the test fixture (Fig. 4) under the three screws holding the circuit boards near the HIGHBAND GAIN control and connect the fixture to the output terminal of the input board.

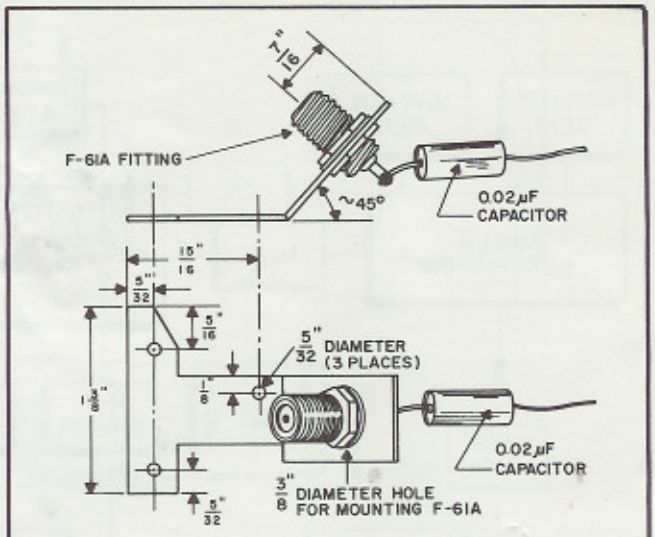


Fig. 4. Test Fixture.

2.4 Install the alignment cover (Fig. 3) on the unit.

2.5 Switch on the unit and allow 20 minutes for warm-up.

2.6 Connect equipment as shown in Fig. 5. Connect the r-f bridge to the HIGHBAND OR BROADBAND terminal, and terminate the LOWBAND AND FM fitting and the test fixture with TR-72F's.

2.7 Set the 3660 input switch to BROADBAND position.

2.8 Turn both GAIN controls fully counterclockwise (minimum gain position).

2.9 Set markers at 54, 88, 174, and 216 MHz.

2.10 Adjust L2 and L4 for an input match of 14 dB or better over the low band (Fig. 6).

2.11 Turn the LOWBAND GAIN control through its range and check that the match remains at least 14 dB; return the control to the full ccw position.

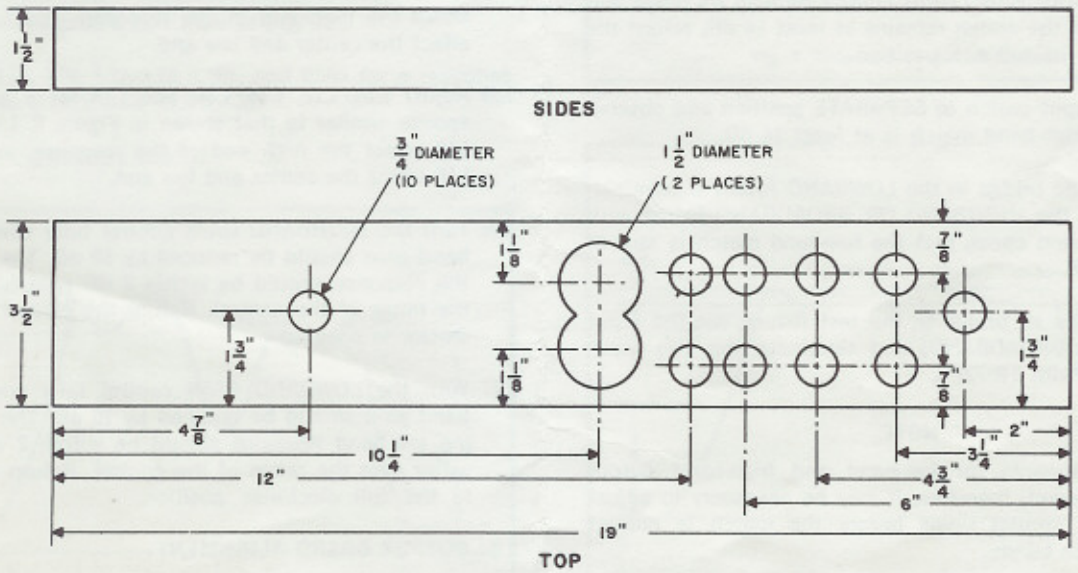


Fig. 3. Alignment Cover.

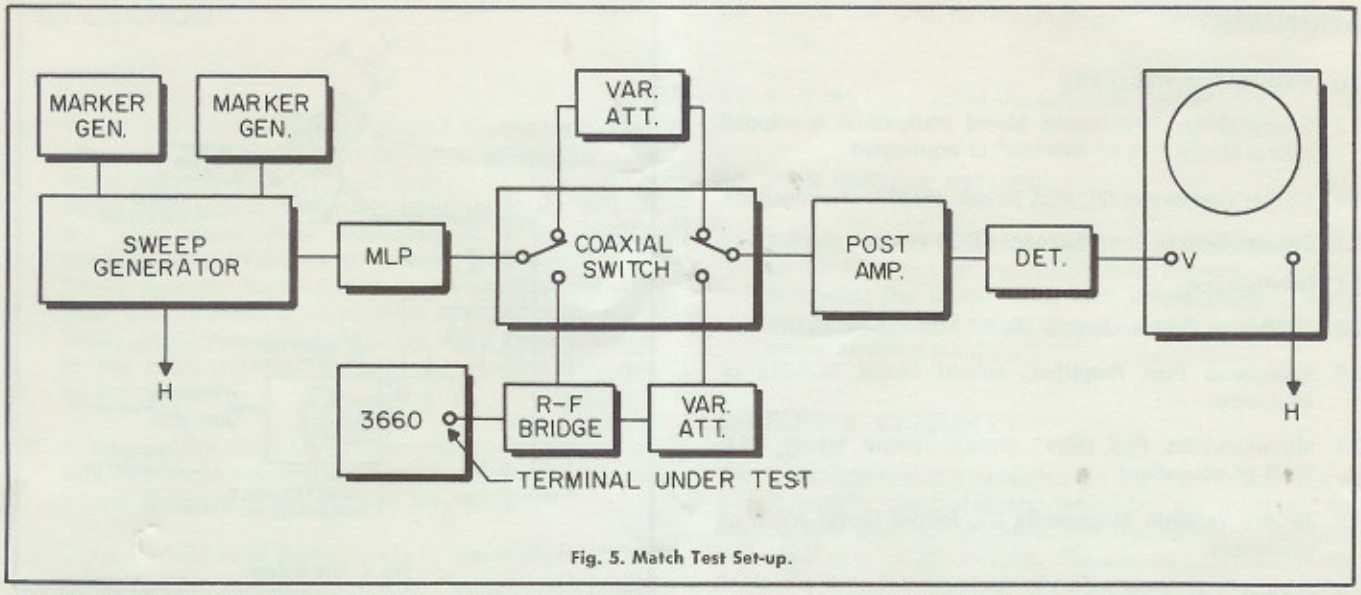


Fig. 5. Match Test Set-up.

2.12 Adjust L1, L3, and L5 for an input match of 14 dB or better over the high band (Fig. 6).

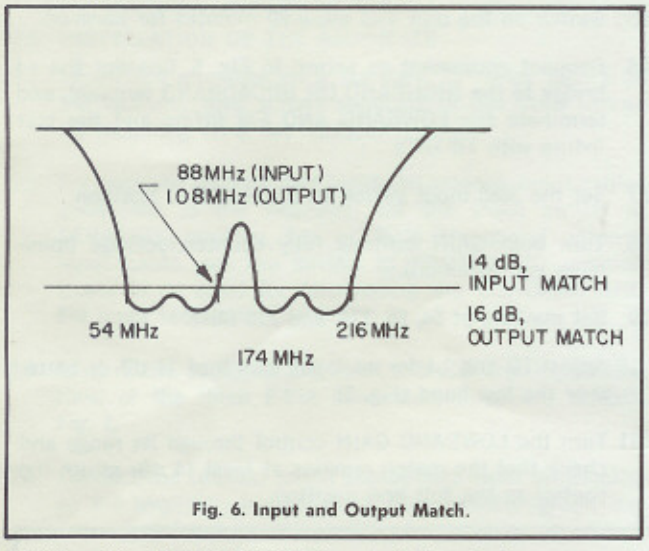


Fig. 6. Input and Output Match.

2.13 Turn the HIGHBAND GAIN control through its range and check that the match remains at least 14 dB; return the control to its full ccw position.

2.14 Set the input switch to SEPARATE position and observe that the high-band match is at least 14 dB.

2.15 Connect the bridge to the LOWBAND AND FM terminal; terminate the HIGHBAND OR BROADBAND fitting with a TR-72F, and check that the low-band match is still at least 14 dB.

2.16 Connect the r-f bridge to the test fixture, set the input switch to BROADBAND, and terminate the two input terminals with TR-72F's.

NOTE

The adjustments for low-band and high-band output match interact; therefore, it may be necessary to adjust both sets several times before the match is correct across both bands.

2.17 Adjust L20, L21, and L23 for an output match of 16 dB or better over the low band (Fig. 6).

2.18 Turn the LOWBAND GAIN control through its range and check that the match does not deteriorate to less than 6 dB; return the control to the full ccw position.

2.19 Adjust L19 and L22 for an output match of 16 dB or better over the high band (Fig. 6).

2.20 Turn the HIGHBAND GAIN control through its range and check that the match does not deteriorate to less than 6 dB.

2.21 Recheck the input match as in steps 3 and 7 thru 14. Since the input and output match adjustments interact, it may be necessary to adjust both sets several times before the match is correct at both ends.

2.22 Connect equipment as shown in Fig. 7a.

2.23 Turn both GAIN controls fully clockwise (maximum gain position).

2.24 Adjust L9, L11, L13, L15, and L17 for a high-band response similar to that shown in Fig. 8. L9, L13, and L17 affect the high end of the response, and L11 and L15 affect the center and low end.

2.25 Adjust L10, L12, L14, L16, and L18 for a low-band response similar to that shown in Figure 8. L10, L14, and L18 affect the high end of the response, and L12 and L16 affect the center and low end.

2.26 Turn the HIGHBAND GAIN control fully ccw; the high-band gain should be reduced by 10 dB. The flatness of the response should be within 2 dB peak-to-valley over the range of the control. Return the control to the full clockwise position.

2.27 Turn the LOWBAND GAIN control fully ccw; the low-band gain should be reduced by 10 dB. The flatness of the low-band response should be within 2 dB peak-to-valley over the range of the control. Return the control to the full clockwise position.

3.0 OUTPUT BOARD ALIGNMENT

3.1 Connect the test fixture to the input terminal of the output board.

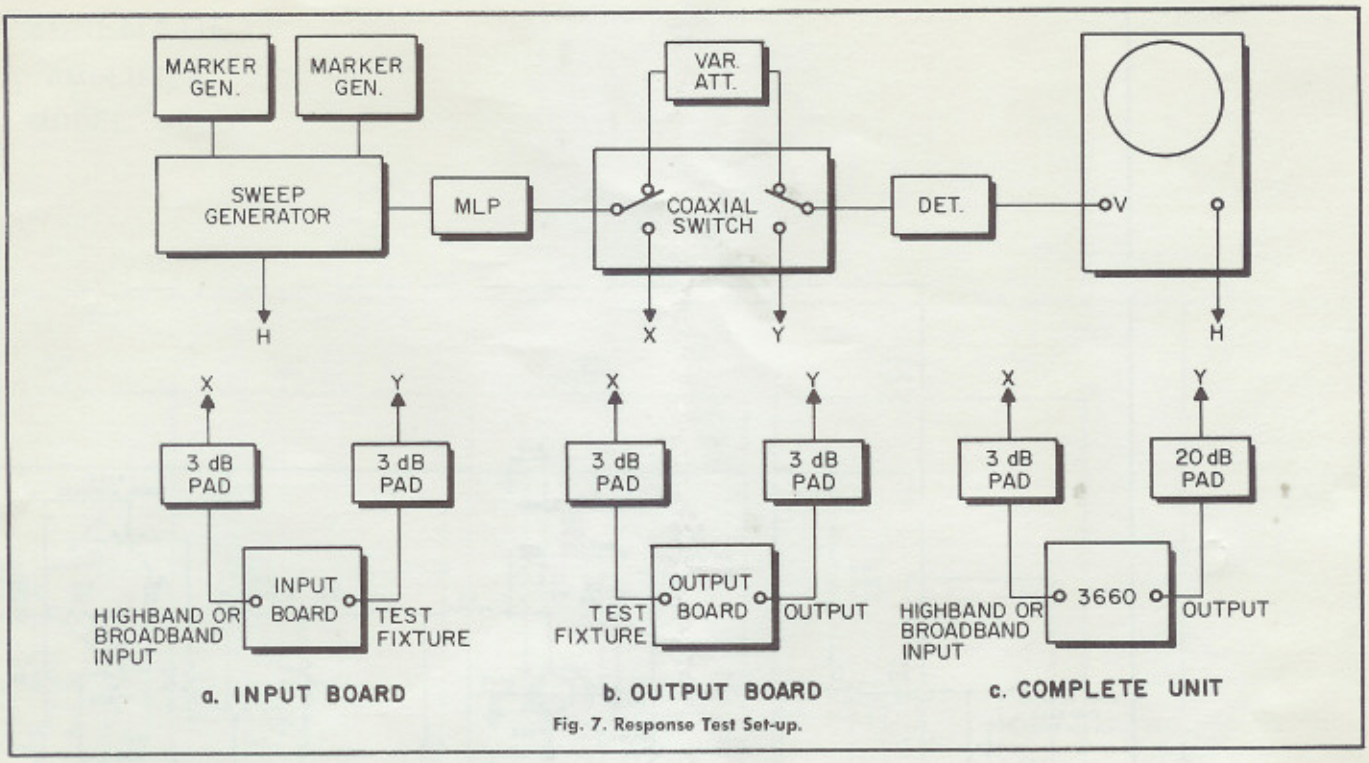


Fig. 7. Response Test Set-up.

3.2 Connect equipment as shown in Fig. 7b.

3.3 Adjust C103 and L101 for a response similar to that shown in Fig. 9.

3.4 Connect equipment as shown in Fig. 5. Connect the r-f bridge to the 3660 OUTPUT terminal and terminate the test fitting.

3.5 Adjust L104 for best match at the high-frequency end.

3.6 Remove the test fixture and replace the 0.02 uF capacitor (C202).

4.0 **FINAL ALIGNMENT**

4.1 Connect equipment as shown in Fig. 7c.

4.2 Adjust L15, L16, L17, L18, L101, and C103 for a response similar to that shown in Fig. 10.

4.3 Replace the chassis cover.

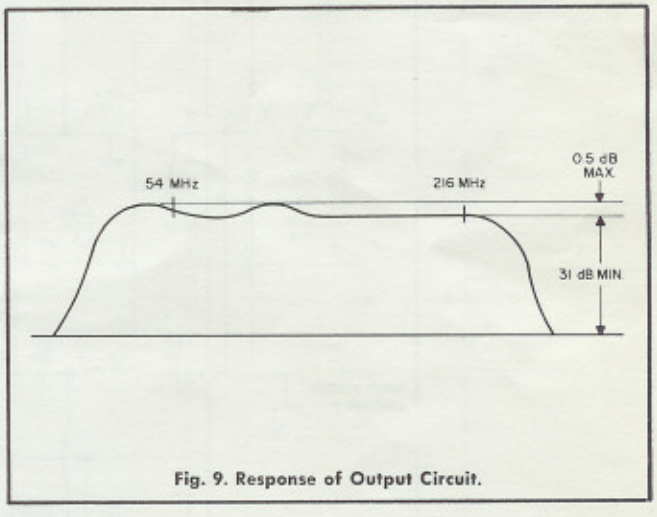


Fig. 9. Response of Output Circuit.

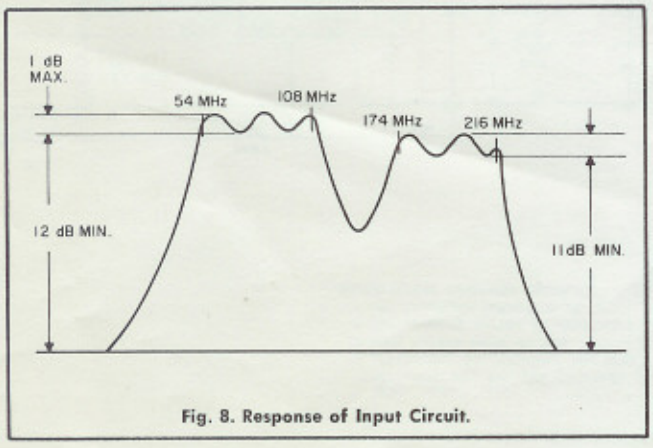


Fig. 8. Response of Input Circuit.

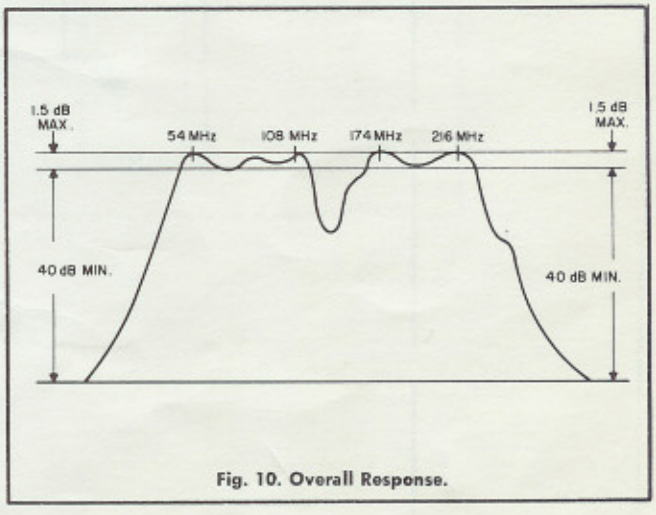
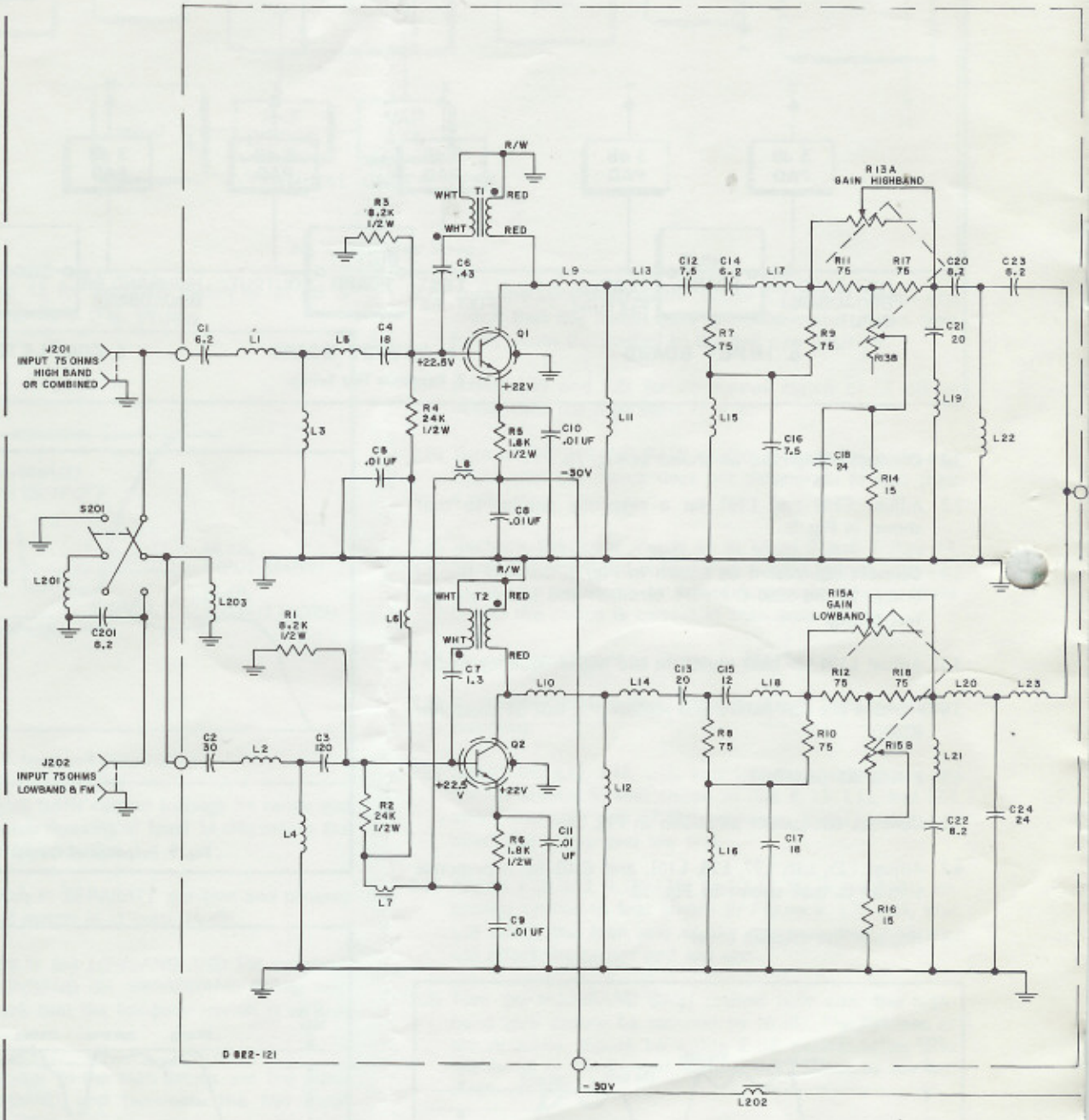


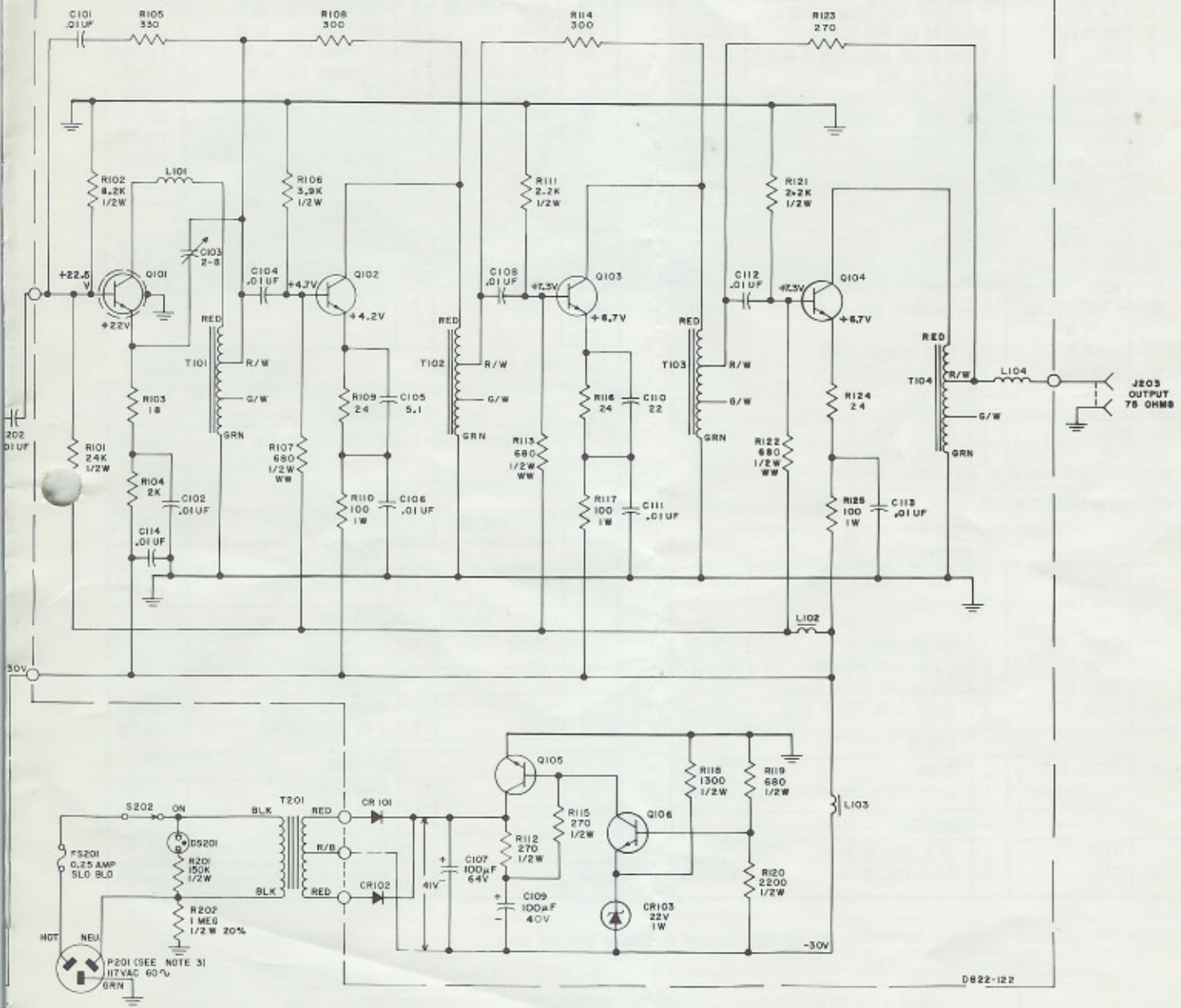
Fig. 10. Overall Response.


R/W
T1
WHT
RED
R3
8.2K
1/2W
C6
.43
R13A
GAIN HIGHBAND
L9
L13
C12
7.5
C14
6.2
L17
R11
75
R17
75
C20
8.2
C23
8.2
J201
INPUT 75 OHMS
HIGH BAND
OR COMBINED
C1
6.2
L1
L5
C4
18
+22.5V
Q1
+22V
R7
75
R9
75
R13B
C21
20
L19
R4
24K
1/2W
R5
1.8K
1/2W
C10
.01 UF
L11
L15
C16
7.5
C18
24
R14
15
L22
L3
C5
.01 UF
L8
-30V
C8
.01 UF
S201
L201
C201
6.2
L203
R/W
T2
WHT
RED
R1
8.2K
1/2W
L6
C7
1.3
R15A
GAIN
LOWBAND
L10
L14
C13
20
C15
12
L18
R12
75
R18
75
L20
L23
C2
30
L2
C3
120
J202
INPUT 75 OHMS
LOWBAND & FM
Q2
+22.5
V
+22V
R8
75
R10
75
R15B
L21
L12
R2
24K
1/2W
L4
L7
R6
1.8K
1/2W
C11
.01
UF
L16
C17
18
C22
8.2
C24
24
C9
.01 UF
R16
15
D 882-121
-30V
L202

SCHEMATIC

AMPLIFIER

MODEL 3660



NOTES: UNLESS OTHERWISE SPECIFIED

1. ALL CAPACITOR VALUES IN PF.
2. ALL RESISTOR VALUES IN OHMS, 1/4W AND 5%.
3. PLUG VIEWED FROM PIN SIDE.
4. TRANSISTORS Q103, Q104, Q105 HAVE HEAT SINKS
5. ALL BASE AND EMITTER VOLTAGES READ FROM -30V.

E861-874-D

REPLACEMENT PARTS LIST

ASSEMBLY: INPUT BOARD			Ref. Dwg. No.: 861-874	
ITEM	SCHEMATIC DESIGNATION	QTY.	DESCRIPTION	JERROLD PART NO.
			CAPACITORS	
1	C1, 14	2	6.2 pF, 500 V, disc. NPO	124-139
2	C2	1	30 pF, 5%, 500 V, disc, NPO	124-121
3	C3	1	120 pF, 10%, 600 V, disc	124-053
4	C4, 17	2	18 pF, 5%, 1000 V, disc, NPO	124-123
5	C5, 8-11	5	0.01 uF, 600 V, Type S	124-134
6	C6	1	0.43 pF, 10%, 500 V, Gim.	122-001
7	C7	1	1.3 pF, TCZ	121-062
8	C12, 16	2	7.5 pF, 5%, 500 V, disc, NPO	124-072
9	C13, 21	2	20 pF, 5%, 500 V, disc, NPO	124-119
10	C15	1	12 pF, 5%, 600 V, disc, NPO	124-135
11	C18, 24	2	24 pF, 5%, 500 V, disc, NPO	124-104
12	C20, 22, 23	3	8.2 pF, 500 V, disc, NPO	124-103
			RESISTORS	
13	R1, 3	2	8.2 k, 5%, ½ W	112-476
14	R2, 4	2	24 k, 5%, ½ W	112-536
15	R5, 6	2	1.8 k, 5%, ½ W	112-392
16	R7-12, 17, 18	8	75 ohms, 5%, ¼ W	112-954
17	R13A, B			
	R15A, B	2	Dual potentiometer	B118-166
18	R14, 16	2	15 ohms, 5%, ¼ W	112-973
			TRANSISTORS	
19	Q1	1	36479, RCA	130-138
20	Q2	1	A-415, Amperex	130-167

ASSEMBLY: OUTPUT BOARD			Ref. Dwg. No.: 861-874	
			CAPACITORS	
1	C101, 102, 104, 106, 108, 111-114	9	0.01 uF, 600 V, Type S	124-134
2	C103	1	2-8 pF, trimmer	128-564
3	C105	1	5.1 pF, 500 V, NPO	124-127
4	C107, 109	2	250 uF, 64 V, electrolytic	127-113
5	C110	1	22 pF, 10%, 500 V, NPO	124-105
			DIODES	
6	CR101, 102	2	Diode	137-685
7	CR103	1	Zener, 22 V, 5%, 1 W	137-500
			RESISTORS	
8	R101	1	24 k, 5%, ½ W	112-536
9	R102	1	8.2 k, 5%, ½ W	112-476

ASSEMBLY: OUTPUT BOARD continued				
ITEM	SCHEMATIC DESIGNATION	QTY.	DESCRIPTION	JERROLD PART NO.
10	R103	1	18 ohms, 5%, ¼ W	112-082
11	R104	1	2 k, 5%, ½ W	112-398
12	R105	1	330 ohms, 5%, ¼ W	112-097
13	R106	1	3.9 k, 5%, ½ W	112-434
14	R107, 113, 122	3	680 ohms, 5%, ½ W, w.w.	113-092
15	R108, 114	2	300 ohms, 5%, ¼ W	112-096
16	R109, 116, 124	3	24 ohms, 5%, ¼ W	112-985
17	R110, 117, 125	3	100 ohms, 5%, 1 W	112-234
18	R111, 120, 121	3	2.2 k, 5%, ½ W	112-401
19	R112, 115	2	270 ohms, 5%, ½ W	112-287
20	R118	1	1.3 k, 5%, ½ W	112-377
21	R119	1	680 ohms, 5%, ½ W	112-338
22	R123	1	270 ohms, 5%, ¼ W	112-993
			TRANSISTORS	
23	Q101	1	36479, RCA	130-138
24	Q102, 103, 104	3	Selected	S130-144-1
25	Q105	1	40250, RCA	130-135
26	Q106	1	2N8392, GE	130-166

ASSEMBLY: MAIN CHASSIS			Ref. Dwg. No.: 861-874	
			CAPACITORS	
1	C201	1	8.2 pF, 500 V, disc, NPO	124-103
2	C202	1	0.01 uF, 600 V, Type S	124-134
			CONNECTORS	
3	J201, 202, 203	3	F-61A	C821-155
			FUSE	
4	FS201	1	3AG, 0.25A, slo-blo	101-327
			PILOT LIGHT	
5	DS201	1	Lamp, neon	102-514
			RESISTORS	
6	R201	1	150 k, 10%, ½ W	112-635
7	R202	1	1 M, 20%, ½ W	112-743
			SWITCHES	
8	S201	1	Dpdt, slide	162-003
9	S202	1	Spdt, slide	162-002
			TRANSFORMER	
10	T201	1	Power transformer	B141-243

ALL DATA SUBJECT TO CHANGE WITHOUT NOTICE.

WARRANTY

Each unit of Jerrold Equipment is warranted for 90 days against original factory imperfections in material and workmanship.

In the event any unit of equipment should fail in service during this period, pack the complete defective unit carefully, attach a letter stating the reasons the unit was believed to be defective, and return it to our Service Department, Jerrold Electronics Corp., 15th Street and Lehigh Avenue, Phila., Pa. 19132, prepaying transportation charges. It shall be repaired or replaced at no charge.

Such service or repairs as may be necessary as the result of abuse or accident are not included in the warranty. In the event of any service breakdowns after the warranty period, this unit may be returned for repairs at a nominal charge.

JERROLD ELECTRONICS CORPORATION
EDUCATIONAL AND COMMUNICATION SYSTEMS DIVISION
Philadelphia, Pa. 19105

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