

Technical Manual

Step-by-step Assembly Instructions

Model AQ1002K

50 Watt Stereo Amplifier Kit

Antique Sound USA

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Introduction

Before you get started assembling your kit, it is recommended you carefully unpack all of the parts to verify that all items are in good condition and are all accounted for. Place the parts not immediately used for assembly in a safe place so they don't get damaged or scratched. Try to identify the parts and separate them, so that you can find them quickly when needed for your next assembly.

The vacuum tubes are the last parts to be installed in your kit assembly, leave them packed in their original cartons until you are all done with your kit building. The chassis has a high polish chrome plate finish, be careful not to scratch it, scratches are nearly impossible to remove. Only good grade solder with 60/40 resin core should be used. In no way should you use acid base solder, it could cause permanent damage to some parts.

Parts Substitution

Due to occasional parts shortages beyond our control, it sometimes becomes necessary to replace a standard original cataloged part with a similar replacement part. Although it may appear to the kit builder to be a wrong part, we guarantee all replacement parts to be electrically equal to the part listed in the kit manual.

Resistor Color Code

There are two different color codes being used for resistors these days, one is the standard three color USA color code, the other is used in Asia, it consists of four colors. There may be a combination of three and four color resistors used in you kit. You can read the three color resistor value as follows:

Three Colors plus Tolerance

Color	1 st Digit	2 nd Digit	Multiplier	Tolerance
Black	0	0	1	--
Brown	1	1	10	--
Red	2	2	100	--
Orange	3	3	1,000	--
Yellow	4	4	10,000	--
Green	5	5	100,000	--
Blue	6	6	1,000,000	--
Violet	7	7	10,000,000	--
Gray	8	8	100,000,000	--
White	9	9	-	--
Gold	-	-	.1	+/- 5%
Silver	-	-	-	+/- 10%
No Color	-	-	-	+/- 20%

Remember: If you read the color code from the “wrong” direction, you will not get the correct answer. Always have the GOLD or SILVER band (if there is one) on the extreme right hand side when you start reading colors from left to right.

Example: Let’s assume you resistor has the following color code: yellow-violet-red-gold. This means you have a 4700 Ohm 5% resistor (4-7-x100-5%).

Four Colors plus Tolerance

Color	1 st Digit	2 nd Digit	3 rd Digit	Multiplier	Tolerance
Black	0	0	0	1	-
Brown	1	1	1	10	-
Red	2	2	2	100	-
Orange	3	3	3	1,000	-
Yellow	4	4	4	10,000	-
Green	5	5	5	100,000	-
Blue	6	6	6	1,000,000	-
Violet	7	7	7	10,000,000	-
Gray	8	8	8	100,000,000	-
White	9	9	9	-	-
Gold	-	-	-	.1	+/-5%
Silver	-	-	-	-	+/-10%
No Color	-	-	-	-	+/-20%

Example: Let’s assume a resistor has the following colors: brown-black-black-red-gold. This would mean you have a 10,000 ohm (or 10K Ohm) 5% resistor. (1-0-0-x100).

Step-by-step Assembly Instructions Model AQ1002 Kit

Mechanical

- () Install eight (8) test point insulators retainer rings
- () Install the four (4) test point jacks, use silicon glue for strength (if available)
- () Install two (2) PC board spacers on the large PC board
- () Install four (4) spacers on the Bias PC board
- () Install PC mounting plate with ten (10) spacers
- () Install front panel using four (4) gold plated socket head screws
- () Install the AC power On/Off switch by pushing it in place from the front

- () Install two (2) RCA left & right input connectors with screw and ground lug
- () Install the fuse holder
- () Install the two (2) black speaker posts in their proper location
- () Install six (6) red speaker posts in their proper location
- () Mount the two (2) output transformers (middle and right side)
- () Mount the AC power transformer (left side on chassis)
- () Put this chassis assembly aside until later, be careful to protect it from scratches

Bias Board Assembly

- () Install R17, 1K 1/2W resistor (brown-black-black-brown)
- () Install R44, 22K 1/2W resistor (red-red-black-red)
- () Install R20, 20K 2W resistor (red-black-orange)
- () Install VR7, 20K potentiometer (small tan rectangular)
- () Install R13, 47K 2W resistor (yellow-violet-orange)
- () Install R52, 47K 1/2W resistor (yellow-violet-black-red)
- () Install R53, 1K 1W resistor (brown-black-black-brown)
- () Install R54, R55, 22K 1/2W resistor (2 pcs) (red-red-black-red)
- () Install R56, 47K 1/2W resistor (yellow-violet-black-brown)
- () Install C16, C18, .1uF 630V capacitor (2 pcs)
- () Install C21, 47pF mica capacitor
- () Install C4, 47uF 450VDC capacitor (observe correct polarity)
- () Install C9, 10, 15, 21, 100uF 160VDC capacitors (4 pcs) Note: C15 may have to be moved a bit from its present location to accommodate one of the speaker posts
- () Install D5 & D6, 1N4007 diode (2 pcs) (observe polarity)

- () Install D9, Zener diode 100 Volt observe polarity
- () Install D7, 8, Zener diode 18 Volt (2 pcs) observe polarity
- () Install large white resistor 10K 5W across terminals marked VBB-VDD
you may have to bend the leads to make the reach the two terminals
(this resistor replaces Q7 which is not used anymore)
- () Install Q5, Q10 , BUV46 (or MJE350) transistor (2 pcs) Caution Q10 located
next to R 52 may actually be marked Q9 in error. Observe polarity. The metal
part of the BUV46 or the silk screened part of the MJE350 faces the left side.
- () Install Q8, Q9, 2N5401 transistor. Caution the flat side of Q8 faces toward R17
- () Install ¾ inch bare copper jumper located next to C8

Note: Parts not used on this PC board are: Q7, Q6, C16, D13 thru D18

Main PC Board Assembly

- () Install R1,27, 470 Ohm 1/2W resistor (yellow-violet-black-black) (2 pcs)
- () Install R2,42, 56K 1/2W resistor (green-blue-black-red) (2 pcs)
- () Install R3,4,28,29, 120K 1/2W resistor (brown-red-black-orange) (4 pcs)
- () Install R5, 10K 1W resistor (brown-black-black-red)
- () Install R6,30, 24K 1W resistor (red-yellow-black-red) (2 pcs)
- () Install R7,8,31,32, 27K 1W resistor (red-violet-black-red) (4 pcs)
- () Install R9,10,33,34, 100K 1/2W resistor (brown-black-black-orange) (4 pcs)
- () Install R53,54,55,56, 100K 1/2W resistor (brown-black-yellow) (4 pcs)
- () Install R18,19, 470K 1/2W resistor yellow-violet-black-orange) (2 pcs)
- () Install R11,12,35,36, 1K 1/2W resistor (brown-black-black-brown) (4 pcs)
- () Install R14,41, 22K 1/2W resistor red-red-black-red) (2 pcs)
- () Install R15,16,37,38, 100 Ohm 1/2W resistor (brown-black-black-black) (4 pcs)

- () Install R43, 33 Ohm 20W power resistor (large white rectangular body)
- () Install R45 thru R48, 12K 1/2W resistor (brown-red-black-red) (4 pcs)
- () Install R51, 1.5K 5W resistor (brown-green-black-brown)
- () Install D1 thru D4, 1N4007 diode (FR107) 4 pieces (observe polarity)
- () Install Q1 thru Q4, 2N5401 transistor (observe polarity)
- () Install C1 thru C4, .22uF at 400VDC capacitor (4 pcs)
- () Install C14, 47uF 450VDC capacitor, observe polarity
- () Install C18,20, 47pF mica capacitor (2 pcs)
- () Install C3,7, 100pF mica capacitor (2 pcs)

The following parts are mounted on the other side of the PC board (on the copper side):

- () Install VR-1, VR-2, 1K potentiometer (2 pcs)
- () Install VR-3 thru VR-6, 20K potentiometer (4 pcs)
- () Install 4 pieces 9 pin tube sockets (make sure they are level before soldering)
- () Install 4 pieces 8 pin tube sockets

Install 14 jumpers using #22 hookup wires as follows:

- () VB1-4 to VB2-4 () VB1-9 to VB2-9 () VB2-4 to VB4-7
- () VB2-9 to VB4-2 () VB4-2 to VB3-2 () VB4-7 to VB3-2
- () VB6-4 to VB5-4 () VB6-9 to VB5-9 () VB5-4 to VB8-7
- () VB5-9 to VB8-2 () VB8-7 to VB7-7 () VB8-2 to VB7-2
- () GND next to R36 to GND next to C20
- () GND next to R23 to GND next to SG2

Final Assembly and Wiring

- () Cut out the small piece of the PC board (as indicated on the board) next to C12 to accommodate the AC switch
- () Mount the assembled main PC board
- () Connect jumper hookup wire from R25 (pin 8 VB3) to test point 1
- () Connect jumper hookup wire from R26 (pin 8 VB4) to test point 2
- () Connect jumper hookup wire from R39 (pin 8 VB7) to test point 3
- () Connect jumper hookup wire from R40 (pin 8 VB8) to test point 4
- () Connect the blue audio transformer wires to the 4 Ohm speaker posts
- () Connect the green audio transformer wires to the 8 Ohm speaker posts
- () Connect the yellow audio transformer wires to the 16 Ohm speaker posts
- () Connect red primary wire of audio transformer to VCC on large PC board
- () Connect orange primary wire to P1 on large PC board
- () Connect gray primary wire to SG1 on large PC board
- () Connect violet (purple) wire to P2 on large PC board
- () Connect white wire to SG2 on large PC board
- () Repeat the same for the other channel audio transformer primary wires
- () Twist and connect the two blue AC transformer wires to VB4-F & F
- () Twist and connect the two green AC transformer wires to VB7-F & F
- () Twist and connect the two purple AC transformer wires to 320V and 0V
- () Connect a hookup wire from the left 8 Ohm speaker post to left NF (PC board)
- () Connect a hookup wire from the right 8 Ohm speaker post to right NF (PC board)
- () Connect a hookup wire from the Ground speaker posts to GND on large PC board

- () Connect one shielded cable from L input connector to GND & IN on left PC side
- () Connect a 220 Ohm 1/2W resistor in series with one of the front panel LED wires and tape it's solder connection
- () Connect the two front panel LED wires across VB5 F & F (VB5 pins 4/5 and 9)
- () Connect the other shielded cable from R input connector to GND & IN on right
- () Mount the Bias (small) PC board using four (4) standoffs and nuts
- () Connect a hookup wire from the small PC board V- to the large PC board -BIAS
- () Connect a hookup wire from the small PC board -BIAS to the large PC board -V
- () Connect the two small gage red secondary winding wires from the AC power transformer to the small PC board 70V
- () Connect a jumper wire between the two PC boards GND to GND
- () Connect a wire from small PC board VDD to the large PC board VDD
- () Connect a wire from small PC VBB to large PC VBB
- () Connect a jumper from C12 negative and C13 negative to GND
- () Connect the two black speaker posts to GND

For 115VAC operation

- () Twist the two (2) red wires together and connect to one of the outside pins of the AC power connector
- () Connect a jumper wire from the fuse holder to the other pin of the AC connector
- () Connect the remaining fuse holder terminal to the AC switch (either terminal)
- () Connect the other switch terminal to the two white wires of the AC transformer
If the wires don't reach, use an extenuation piece of hookup wire and insulation tape
- () Connect the center pin of the AC power connector to a ground lug (#22 hookup)

For 230VAC Operation

- () Connect one red and one white wire of the AC transformer together
- () Connect the remaining white wire to the AC switch (either terminal)
- () Connect the remaining red wire to one of the outside pins of the AC connector
- () Connect a jumper wire (#22 hookup) to the side pin of the fuse holder
- () Connect the other fuse holder terminal to the remaining pin on the AC switch
- () Install C12,13, 220uF at 500VDC (2 pcs) by pushing them through the chassis into the PC board cutouts and solder in place (observe polarity)

Initial Testing

Caution: The amplifier you have just completed contains dangerous high voltages. Before connecting it to the AC power line, care should be taken by the person testing that he/she does not come into contact with these dangerous voltages. Testing and adjusting should be done by qualified personnel only. If you are not such a qualified person, please have your local radio repair service center help you with this part of your test and calibration procedure.

The test equipment required for this preliminary operational test are a DC Voltmeter capable of measuring up to 600VDC and up to 400VAC. A 10 ohm 2 watt resistor (included in the kit). One extra 5 amp AC fuse (included in your kit). One insulated alignment tool (included).

- () Before installing any of the vacuum tubes, connect the amplifier to the line voltage and have it positioned upside down in front of you.
- () Connect the AC line cord to the amplifier and insert a fuse.
- () Connect the line cord to the appropriate line voltage, turn on the AC power switch
- () The front panel LED lamp will illuminate
- () Connect the Voltmeter negative lead to chassis ground and the hot lead to VCC it should measure minimum +480VDC
- () Connect the Voltmeter to -V it should measure -60V minimum

- () Connect the Voltmeter to -Bias it should measure -100V minimum
- () Connect the Voltmeter between R17/D5 to ground, should measure -170V min.
- () Disconnect the AC line cord and install all vacuum tubes
- () Switch power on and observe all eight tube filaments illuminate
- () With the Voltmeter switched to 1 Volt full scale, measure the voltage at all four test point and if necessary adjust the appropriate bias adjust to read 500mV. It represents 50mA. All four power tubes should be adjusted to within 10mV of each other. After one hour of warm up, check adjustments again.
- () Connect the Voltmeter to 8 and alternately to pin 3 of VB1 a & b. The voltage measured should be approximately 4V. It is not really important what the exact voltage is, what is however important is that both pins 8 and 3 read the same. If not, adjust VR1 to accomplish this.
- () Do the same for VB5 a & b pins 8 and 3 by using VR2 adjustment. This completes the initial operational test. More precise tests and adjustments beyond the scope of this manual can be made by using an oscilloscope, AC voltmeter/milli-voltmeter, harmonic distortion analyzer, precision resistive load among other things.

Note: If the fuse blows when testing, you may have the two white wires reversed. Disconnect them, reverse them and reconnect. Before you assemble the bottom cover to the chassis, a few basic test should be performed.

Conclusion: This manual has been assembled with the help of various technical documents connected with the design of the product. Although every effort has been made to achieve a perfect error free manual, we in no way claim this to be the case. If you find an error has been made, please share it with the factory at the address below, so that we can update it and pass on the benefits of your feedback to our other customers.

Antique Sound USA

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Technical Specifications

Congratulations, you have just purchased one of the finest 50 Watt stereo amplifiers for the money anywhere. The model AQ1002 is a vacuum tube type ultra-linear audio amplifier, designed especially for the home-entertainment audio enthusiast. Its high quality components and technically sound circuitry make the AQ1002 stand tall against most competitive systems priced considerably higher.

The amplifier is extremely easy to operate, it's front panel has one AC on/off switch and LED power indicator, all connectors are located in the rear panel. There are two gold plated RCA input connectors (left and right channel), eight three-way gold plated speaker posts, ground, 4-8-16 Ohms each channel.

Less than 1 Volt RMS at the input will drive the amplifier to full output (50 Watts). The output level is controlled by the optional PA-1 Line preamplifier, or PP-1 Phono preamplifier for the desired listening comfort. Although the amplifier has been factory tested and adjusted, it is always a good idea to occasionally check the tube bias settings, due to tube aging. You will notice there are four test jacks located between each output tube and the output transformers, the bias adjustment is located closer to the front panel next to each tube. Insert the positive probe of a Voltmeter with a 1 VDC range into the appropriate test jack, the negative probe to ground. With NO signal at the input, turn the AC power switch to ON,. After five minutes of warm-up, if required, set each tube's recessed adjustment for a voltage reading of .550 Volt (it represents 55mA). Likewise, set all tube bias adjustments to read exactly the same. These settings could affect the amplifier's linearity and distortion performance.

Although you have purchased a kit, the following specifications should be easily met after your kit has been assembled, assuming it was done correctly:

Specifications & Features

Power Output *	: 50W RMS per channel
1dB Frequency Response at 50W	: 20-25,000Hz
1dB Frequency Response at 3W	: 12-30,000Hz
Harmonic Distortion *	: <1% (at 3W)
Signal to Noise Ratio *	: -78dB
Outputs (each channel)	: 4, 8, 16 Ohm
Construction	: Chrome plated chassis
Sockets	: Ceramic
Sensitivity *	: Full output for 1V input
Tube Matching	: Bias adjustable
Size WxDxH	: 15 x 11 x 8" (38 x 28 x 20 cm)
Weight	: 38 lbs (17kg)

*Note: All data taken at 1000Hz

Matching accessories available from Antique Sound USA

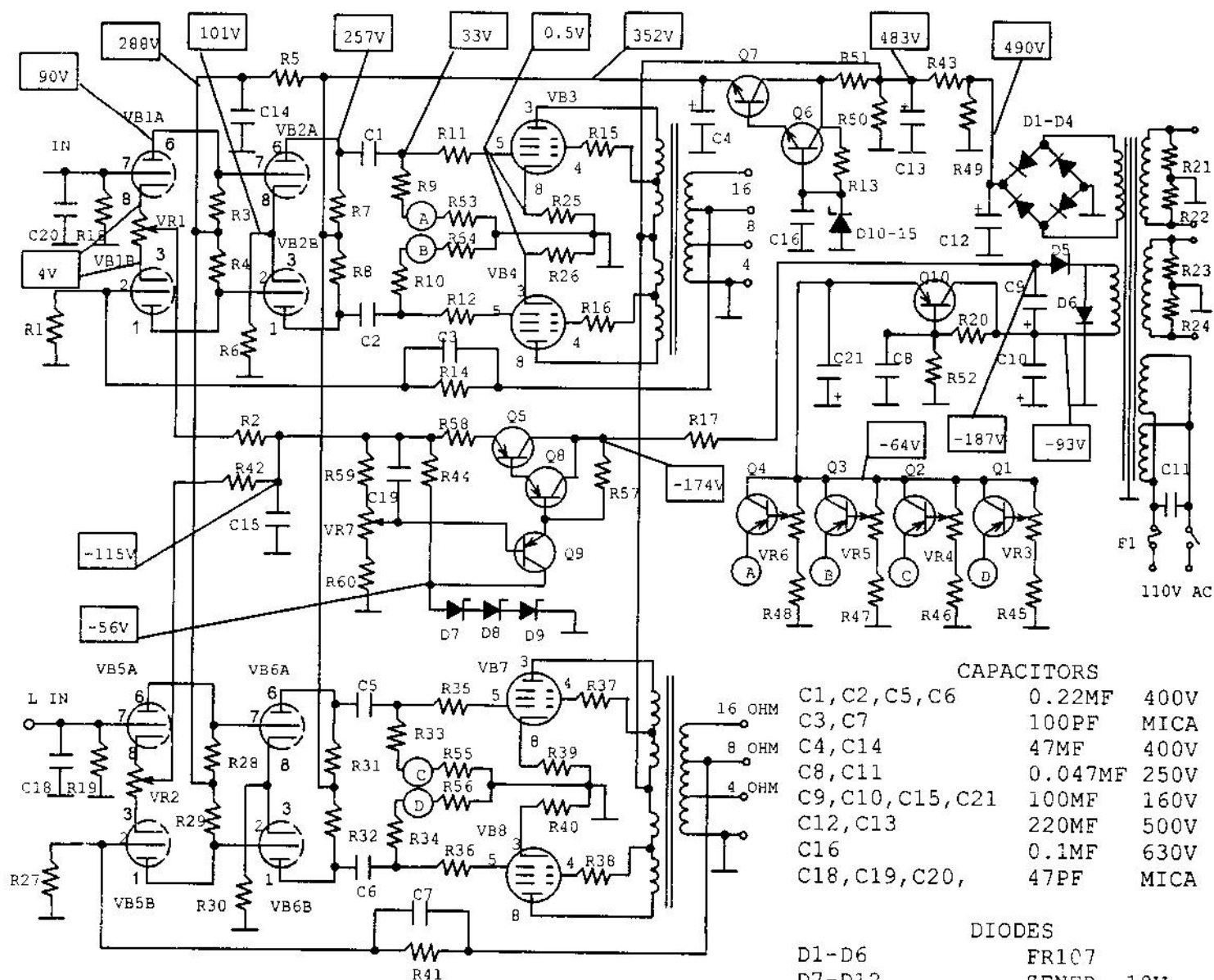
Model PP-1 Original sound three-tube Phono-preamplifier (Made in USA)

Model PA-1 Original sound four-tube Line-preamplifier (Made in USA)

Parts List Model AQ1002

Quantity	Description	Symbol
2	Resistor 470 Ohm 1/2W 5%	R1,27
2	Resistor 56K 1/2W 5%	R2,42
4	Resistor 120K 1/2W 5%	R3,4,28,29
1	Resistor 10K 1W 5%	R5
2	Resistor 24K 1W 5%	R6,30
4	Resistor 27K 1W 5%	R7,8,31,32
6	Resistor 100K 1/2W 5%	R9,10,33,34,53-56
2	Resistor 470K 1/2W 5%	R18,19
4	Resistor 1K 1/2W 5%	R11,12,35,36
1	Resistor 47K 2W 5%	R13
5	Resistor 22K 1/2W 5%	R14,41,44,54,55
4	Resistor 100 Ohm 1/2W 5%	R15,16,37,38
1	Resistor 20K 1/2W 5%	R20
4	Resistor 51 Ohm 1/2W 5%	R21-24
4	Resistor 10 Ohm 1/2W 5%	R25,26,39,40
1	Resistor 33 Ohm 20W 10%	R43
4	Resistor 12K 1/2W 5%	R45-48
2	Resistor 220K 1/2W 5%	R49,50
1	Resistor 1.5K 1W 5%	R51
1	Resistor 47K 1/2W 5%	R52
1	Resistor 1.5K 1/2W	R17
6	Diode 1N4007 or FR107	D1-D6
5	Diode Zener 18V	D7,8,10,11,12
4	Diode Zener 100V	D9,13,14,15
6	Transistor 2N5401	Q1-4,8,9
2	Transistor MJE350 or M9331	Q5,10
1	Transistor 2N5551	Q6
1	Transistor BUV46 (MJE13003)	Q7
4	Capacitor .22uF @ 400V	C1,2,5,6
2	Capacitor 100pF Mica	C3,7
2	Capacitor 47uF @ 400V	C4,14
2	Capacitor .047uF @ 250V	C8,11
4	Capacitor 100uF @ 160V	C9,10,15,21
2	Capacitor 220uF @ 500V	C12,13
1	Capacitor .1uF @ 630V	C16
2	Capacitor 47pF Mica	C18,19,20
4	Tube 12AU7 dual Triode	V1,2,5,6
4	Tube KT88/6550 Pentode	V3,4,7,8
2	Resistor Variable 1K	VR1,2
5	Resistor Variable 20K	VR3-7
1	Transformer AC Power	T1

Quantity	Description	Symbol
2	Transformer Audio Output	T2,3
1	PC Board AC Line Voltage	
1	PC Board Bias Regulator	
1	PC Board Main Tube Amp	
1	LED red (AC Power On)	
1	Front Panel Anodized	
1	Chassis Chrome Plated	
1	Cover Bottom Chrome Plated	
4	Brass feet, chassis mounted	
4	Brass feet, round wafer	
4	Screw mounting, brass feet	
16	Spacer PC mount .400"	
12	Screw Transformer mount .550"	
4	Screw Gold, front panel mount .550"	
4	Screw .320" with nut	
12	Screw .320" without nut	
3	Ground lug	
12	Flat washer	
4	Socket ceramic tube, octal PC	
4	Socket 9 pin PC	
12	Nylon cable ties	
1	Fuse Holder	F1
1	Fuse 5A	F1
1	Connector AC Line	
1	AC Line cord	
1	Switch AC On/Off	SW1
2	Gold 3-way binding post, black	Gnd
6	Gold 3-way binding post, red	4,8,16 Ohm
1	Gold RCA input connector, red	R in
1	Gold RCA input connector, black	L in
4	Test point Jack	TP1,2,3,4
8	Test point insulator	
10	Test point insulator retainer ring	
1	Technical Manual	



RESISTORS

R1, 27	470	1/2W
R2, 42	56K	1/2W
R3, 4, 28, 29	120K	1/2W
R5	10K	1W
R6, 30	24K	1W
R7, 8, 31, 32	27K	1W
R9, 10, 33, 34, 53-56	100K	1/2W
R11, 12, 35, 36	1K	1/2W
R13	47K	2W
R14, 41, 44, 57, 59	22K	1/2W
R15, 16, 37, 38	100	1/2W
R17	1.5K	1.2W
R18, 19	470K	1/2W
R20	20K	1/2W
R21-24	50	1/2W
R25, 26, 39, 40	10	1/2W
R43	33	20W
R44, 57, 59	22K	1/2W
R45-48	12K	1/2W
R49, 50	220K	1W
R51	1.5K	1W
R52	47K	1/2W
R58	2K	1/2W
R60	15K	1/2W

CAPACITORS

C1, C2, C5, C6	0.22MF	400V
C3, C7	100PF	MICA
C4, C14	47MF	400V
C8, C11	0.047MF	250V
C9, C10, C15, C21	100MF	160V
C12, C13	220MF	500V
C16	0.1MF	630V
C18, C19, C20,	47PF	MICA

DIODES

D1-D6	FR107
D7-D12	ZENER 18V
D13-D15	ZENER 100V

TRANSISTORS

Q1-Q4, Q8, Q9	2N5401
Q5, Q10	MJE350/ M9331/
Q6	2N5551
Q7	BUV46/ 13003

POTENTIOMETER

VR1, VR2	1K
VR3-VR7	20K

T1	AC TRANSFORMER
T2, T3	OUTPUT TRANSFORMER

TUBES

VB1, 2, 5, 6	12UA7
VB3, 4, 7, 8	6550/KT88/EL-34

MODEL AQ1002