BOSE®
Better sound through research®

Service Manual

Contents

SAFETY INFORMATION

1. Parts that have special safety characteristics are identified by the  symbol on schematics or by special notes on the parts list. Use only replacement parts that have critical characteristics recommended by the manufacturer.

2. Make leakage current or resistance measurements to determine that exposed parts are acceptably insulated from the supply circuit before returning the unit to the customer. Use the following checks to perform these measurements:

   A. **Leakage Current Hot Check**-With the unit completely reassembled, plug the AC line cord directly into a 120V AC outlet. (Do not use an isolation transformer during this test.) Use a leakage current tester or a metering system that complies with American National Standards Institute (ANSI) C101.1 “Leakage Current for Appliances” and Underwriters Laboratories (UL) 1492 (71). With the unit AC switch first in the ON position, then in the OFF position, measure from a known earth ground (metal water pipe, conduit, etc.) to all exposed metal parts of the unit (antennas, handle bracket, metal cabinet, screw heads, metallic overlays, control shafts, etc.), especially any exposed metal parts that offer an electrical return path to the chassis. Any current measured must not exceed 0.5 milliamp. Reverse the unit power cord plug in the outlet and repeat test. ANY MEASUREMENTS NOT WITHIN THE LIMITS SPECIFIED HEREIN INDICATE A POTENTIAL SHOCK HAZARD THAT MUST BE ELIMINATED BEFORE RETURNING THE UNIT TO THE CUSTOMER.

   B. **Insulation Resistance Test Cold Check**-(1) Unplug the power supply and connect a jumper wire between the two prongs of the plug. (2) Turn on the power switch of the unit. (3) Measure the resistance with an ohmmeter between the jumpered AC plug and each exposed metallic cabinet part on the unit. When the exposed metallic part has a return path to the chassis, the reading should be between 1 and 5.2 Megohms. When there is no return path to the chassis, the reading must be “infinite”. If it is not within the limits specified, there is the possibility of a shock hazard, and the unit must be repaired and rechecked before it is returned to the customer.

CAUTION: THE BOSE® 901 I and II EQUALIZERS CONTAIN NO USER-SERVICEABLE PARTS. TO PREVENT WARRANTY INFRACTIONS, REFER SERVICE TO WARRANTY SERVICE STATIONS OR FACTORY SERVICE.

SPECIFICATIONS

901 Series I and II Speaker

Dimensions:	20-9/16" W x 12-3/4" H x 12-7/8" D
Weight:	33 lbs
Nominal Impedance:	8 ohms

Percentages of Direct and Reflected Sound Radiation

Power radiated by reflection:	89%
Power radiated directly:	11%

Power Handling:

Continuous sine wave @ any frequency:	50 Watts
Minimum amplifier power:	25 Watts
Peak power (less than 5 seconds):	400 Watts
Maximum amplifier power:	270 Watts rms @8 ohms

Damping Factor: Any amplifier with a damping factor of 40 or higher (must follow the speaker wire recommendation in the Owner's Guide)

Driver Complement:

Nominal driver diameter:	4-1/2"
Maximum driver excursion:	± 1/4"
Nominal driver impedance:	8 ohms
Weight of each ceramic magnet:	9.6 ounces

901 Active Equalizer

Dimensions:	2-13/16" H x 9-1/4" W x 6-3/4" D
Input Impedance:	150k ohms
Output Impedance:	Less than 100 ohms
Minimum Load Impedance:	5k ohms
Maximum Output Voltage:	4.0 Volts
Maximum Gain:	18 dB @ 35 Hz

TECHNICAL DESCRIPTION

The Bose® 901 speakers represent a fundamental advance in realistic home music reproduction. The unique acoustic design of the speakers provide sound distribution in accurate simulation of live sound. The Active Equalizer provides unprecedented accuracy and control of frequency response characteristics.

Each speaker contains nine high compliance, full range speakers with high energy magnets to allow large excursions without audible distortion on any program material. The speakers are acoustically coupled to eliminate audible resonances.

The 901 speakers can be used with any high quality amplifier. Its efficiency enables operation with moderately powered amplifiers, yet it can be used with the highest powered amplifiers to reproduce undistorted orchestral peaks at high volume levels.

The Bose 901 Active Equalizer is a highly sophisticated electronic console containing ten transistors and more than a hundred components to equalize accurately the stereo response for the effects of radiation impedances, speaker characteristics, enclosure dimensions and even for the presence of the fashion fabric grille cloth. This equalization to flat power radiation is achieved with absolutely no audible distortion of any music or speech signals.

Active equalization of the signal before the power amplifier is far superior to passive equalization after the amplifier because it avoids the need to handle high power and does not require the iron-core inductors that introduce distortion in passive equalizers. In addition, it is feasible to use many more elements in an active network to provide much greater accuracy in equalization than is practical in the passive network.

The Active Equalizer does much more than just equalize. In addition to providing the flat acoustic output of the Bose 901, the Active Equalizer offers the choice of nineteen additional contours that can be selected from the front panel. This gives the listener the flexibility to exercise his own taste in compensating for recording techniques, listening room characteristics and the other variables described above. As an example of what is possible through active equalization, the equalizer panel contains a switch marked "BELOW 40", which reduces turntable rumble and other low frequency disturbances through a unique filter design that provides a uniform attenuation below 40 Hz while causing no audible deviations above 50 Hz. The rumble is removed without removing the life of the bass along with it.

TECHNICAL DESCRIPTION

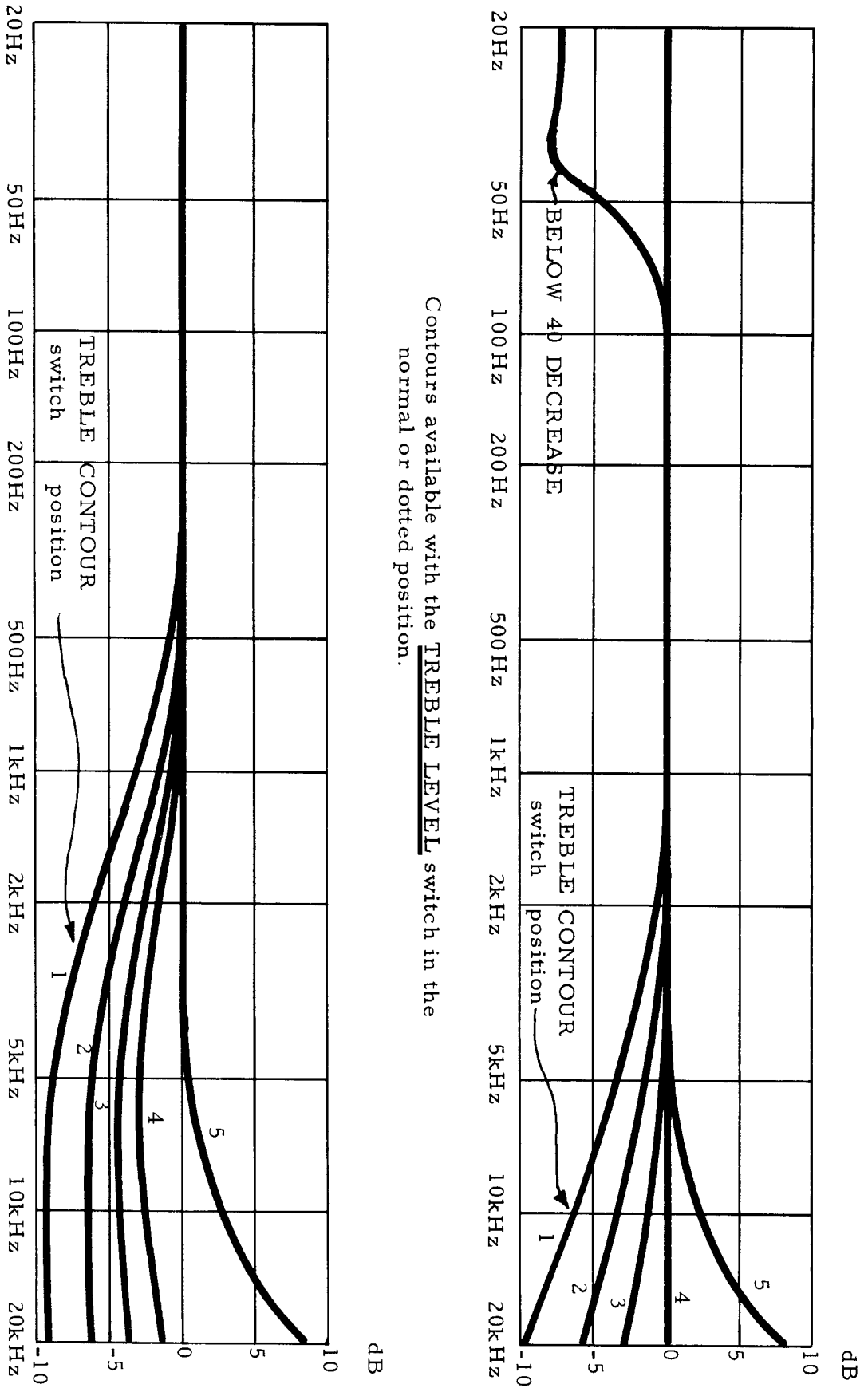


Figure 1. Equalizer Controls Response Charts

DISASSEMBLE/ASSEMBLY PROCEDURE

901 Speaker Disassembly/Assembly

1. Grille Removal

1.1 Locate the staples that secure the front or rear grille assembly. Refer to Figures 2 and 3 for the staple placement and tool for removing the staples.

1.2 When removing the front grille assembly, note the placement of the cut out in the grille backing.

2. Grille Replacement

2.1 Place the front grille assembly over the front of the speaker. Note the cut out in the grille backing, be sure to align the cut out with the driver (on late versions the front grille assembly had two cut outs so the grille placement would not be a factor when reassembling the speaker). Secure using new staples or small finishing nails.

2.2 Place the rear grille assembly on to the speaker and secure using new staples or small finishing nails.

3. Driver Removal

3.1 Perform procedure 1.

3.2 Remove the screws that secure the defective driver.

3.3 Lift the driver out of the cabinet and cut the speaker wire as close to the driver terminals as possible.

4. Driver Replacement

4.1 Connect the speaker wires to the new driver. Refer to Figure 4 for the wire diagram.

4.2 Place the new driver and gasket into the cabinet and secure it in place.

4.3 Perform procedure 2.

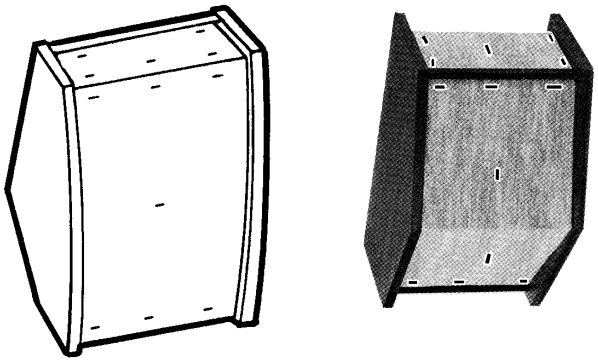


Figure 2. Staple Location

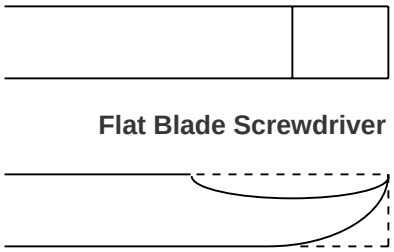


Figure 3. Staple Removal Tool

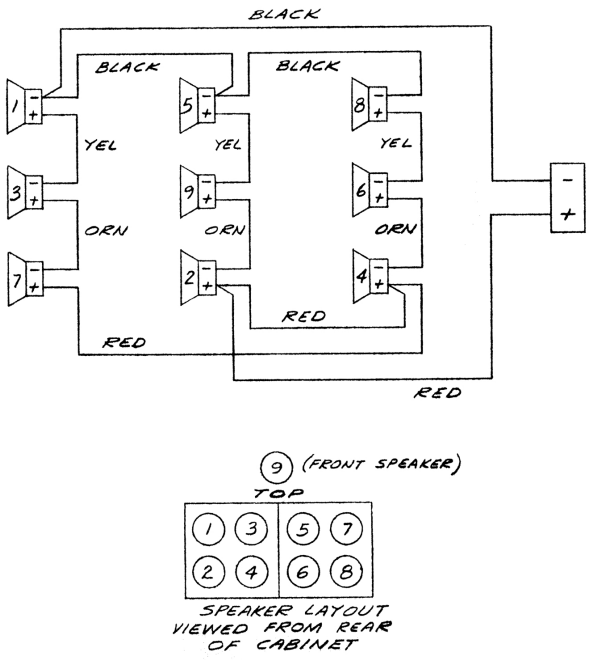


Figure 4. Wiring Diagram

DISASSEMBLE/ASSEMBLY PROCEDURE

901 EQ Disassembly/Assembly

Note: Refer to figures 5 and 6 for the following procedures.

1. Top Cover Removal

1.1 Turn the unit over (top down) and remove the four screws located at each of the corners.

1.2 Flip the unit back over and remove the top cover.

2. Top Cover Replacement

2.1 Align the top cover with the front panel (there is a groove in the top cover for the front panel to slide into).

2.2 Flip the unit over and secure the top cover using the screws that had been removed.

3. Front Panel Removal

Note: The series II EQ has a red indicator lens. Refer to Figure 7. for removal.

3.1 Perform procedure 1.

3.2 Remove the treble control knob using an Allen Wrench to loosen the set screw.

3.3 Remove the nut holding the treble control to the chassis.

3.4 Remove the small nut on the inside of the chassis that secures the front panel to the chassis.

4. Front Panel Replacement

4.1 Align the front panel screw with the chassis.

4.2 Secure the front panel to the chassis.

4.3 Secure the treble control to the chassis and replace the control knob.

4.4 Perform procedure 2.

5. PCB Removal

5.1 Perform procedure 1.

5.2 Remove the four screws that secure the PCB to the chassis and lift the PCB out.

6. PCB Replacement

6.1 Place the PCB into the chassis and secure it to the chassis.

6.2 Perform procedure 2.

7. Treble Control Removal

7.1 Perform procedure 3.

7.2 Remove the wires form the control, make note of the placement of the wires.

8. Treble Control Replacement

8.1 Solder the wires onto the control.

8.2 Place the control into the chassis and secure it in place.

8.3 Perform procedure 4.

9. Switch Removal

9.1 Perform procedure 3.

9.2 Remove the wires from the switch, make note of the placement of the wires.

9.3 Remove the rivets that secure the switch to the chassis, using a drill.

10. Switch Replacement

10.1 Secure the new switch to the chassis using rivets or screws.

10.2 Solder the wires to the switch.

10.3 Perform procedure 4.

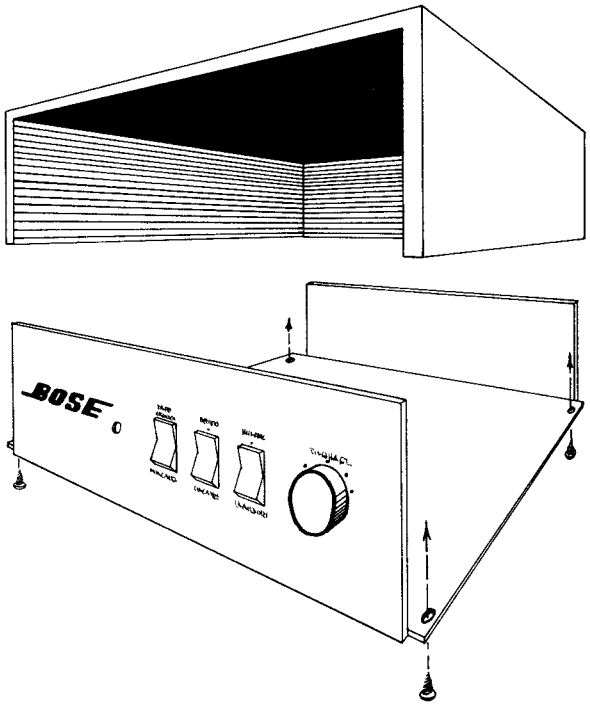


Figure 5. Top Cover

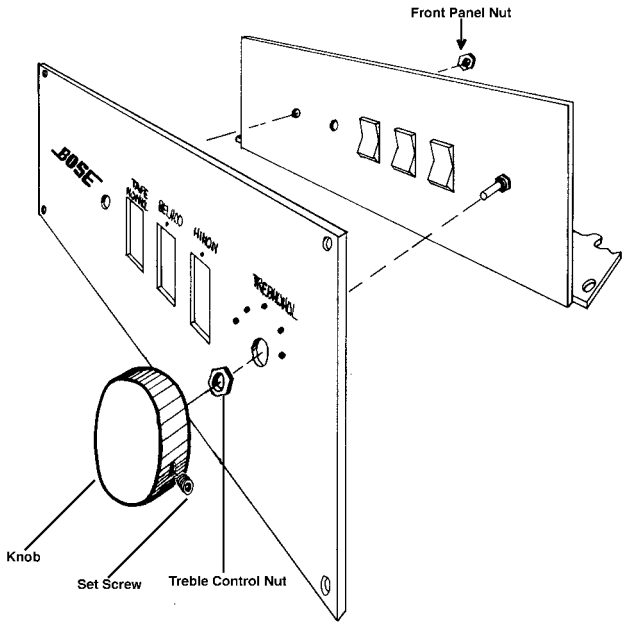


Figure 6. Front Panel Assembly

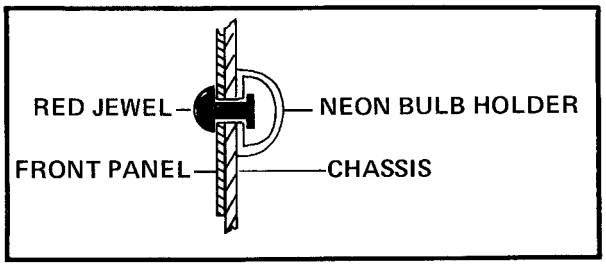
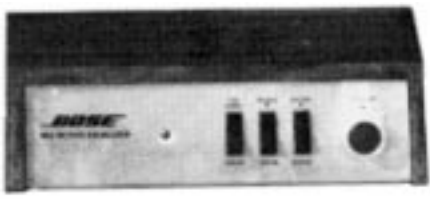


Figure 7. Indicator Lens Assembly

901 I EQ



901 II EQ

TEST PROCEDURE

901 I and II speaker Test

1. Rub and Tick Test

1.1 Apply a 10 Hz, 25 Volts rms signal (with the use of an amplifier) to the speaker terminals. Refer to Figure 8. No extraneous noises such as rubbing, scraping, or ticking should be heard.

2. Sweep Test

2.1 Apply a 25 Volt signal, and slowly sweep the oscillator from 10 Hz to 75 Hz. There should be no loud extraneous noises. If there are any loud buzzes or distortion, replace any defective driver.

2.2 Reduce the amplifier output to 10 Volts and continue sweeping the signal from 75 Hz to 15 kHz. Listen for any buzzes, rattles, and other extraneous noises. Dress any wires that might be the cause of the noise.

3. Phase Test

3.1 Using a 6 to 12 Volt dc supply. Connect the positive (+) wire to the positive terminal and the negative (-) wire to the negative terminal on the speaker. Check that all drives are in phase, all drivers should move outward. If one or more drivers move inward the wiring should be checked. Refer to Figure 4.

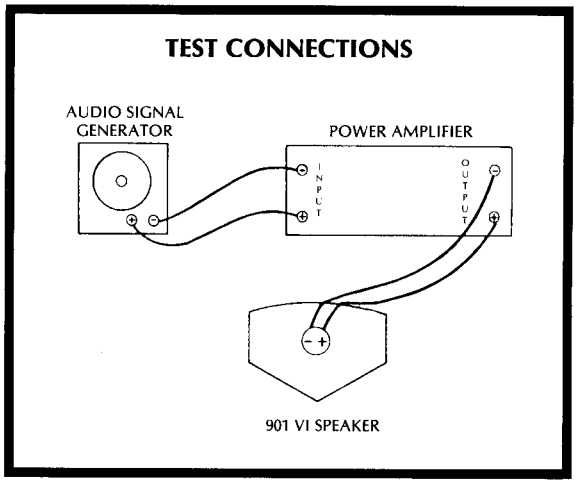


Figure 8. Test Set-Up

901 I and II Equalizer Test

1. Gain Test

Note: The switches should be pushed in at the top and the treble contour rotary switch should be on the dot.

1.1 Apply a 200 Hz, 500 mV signal to the input.

1.2 Reference a dB meter to the input signal applied.

1.3 Increase the input voltage to 4.25 Volts for the series I EQ and 5 Volts for the series II. The response should be 18 dB for the series I, and 19 dB for the series II ±3 dB.

2. Frequency Response Test

2.1 Apply a 200 Hz, 500 mV signal to the input.

2.2 Reference a dB meter to the output.

2.3 Refer to the frequency response table on the following page for the response test.

TEST PROCEDURE

Frequency Response Table

Frequency	Below 40 Switch	Treble Decrease Switch	Treble Contour	Response dB 901 I	Response dB 901 II	Tolerance dB
20 Hz	OFF	OFF	normal (dot)	14.8 dB	19 dB	±3 dB
20 Hz	ON	OFF	normal (dot)	9 dB	9.5 dB	±3 dB
60 Hz	OFF	OFF	normal (dot)	9.2 dB	9.4 dB	±3 dB
60 Hz	ON	OFF	normal (dot)	8 dB	7.8 dB	±3 dB
1 kHz	OFF	OFF	normal (dot)	.2 dB	.1 dB	±3 dB
5 kHz	OFF	OFF	normal (dot)	2.2 dB	4 dB	±3 dB
12 kHz	OFF	OFF	normal (dot)	9 dB	12.3 dB	±3 dB
12 kHz	OFF	ON	normal (dot)	6.9 dB	8.1 dB	±3 dB
12 kHz	OFF	OFF	number 1	2.7 dB	7 dB	±3 dB
12 kHz	OFF	OFF	number 2	3.2 dB	7.8 dB	±3 dB
12 kHz	OFF	OFF	number 3	7.3 dB	---	±3 dB
12 kHz	OFF	OFF	number 4	---	15.6 dB	±3 dB
12 kHz	OFF	OFF	number 5	12.4 dB	18.5 dB	±3 dB
20 kHz	OFF	OFF	normal (dot)	12.9 dB	13.8 dB	±3 dB

PART LIST

901 Speaker Part List

Item Number	Description	Part Number	Note
---	Driver	103342	4
---	Grille, Front	103514-03	4
---	Grille, Rear	103512-03	4
---	Grille, Front , Ebony	103514-02	4
---	Knurled Nut	100424-1	
---	Fuse Kit (External)	108938-3	

901 EQ Part List

Reference Designator	Description	Part Number	Note
T1	Transformer 110V, 220V	100099	3 ⚠
S5	Power Switch	100399	3 ⚠
S1, 3, 4	Rocker Switch	100400	
S2	Rotary Switch	100420	
---	Lens Housing, 110V	116327	3 ⚠
---	Indicator Lens	103460	
---	Front Panel	100416-1	Series II
---	Line Cord, 110V	111672	3 ⚠
---	Line Cord, 220V	113608	3 ⚠
---	Knob, Treble Contuor	103457	
R1	10k ohm Resistor	102537	for 220V
Q1-5, Q51-57	Transistor	102437-2	
D1, 2	Diode	100259-1	

PART LIST NOTES

1. This part is not normally available from Customer Service. Approval from the Field Service Manager is required before ordering.

2. The individual parts located on the PCB are listed in the Electrical Part List.

3. ⚠ This part is critical for safety purposes. Failure to use a substitute replacement with the same safety characteristics as the recommended replacement part might create shock, fire, and or other hazards.

4. These parts are no longer available.

901 I SERIES EQUALIZER SCHEMATIC

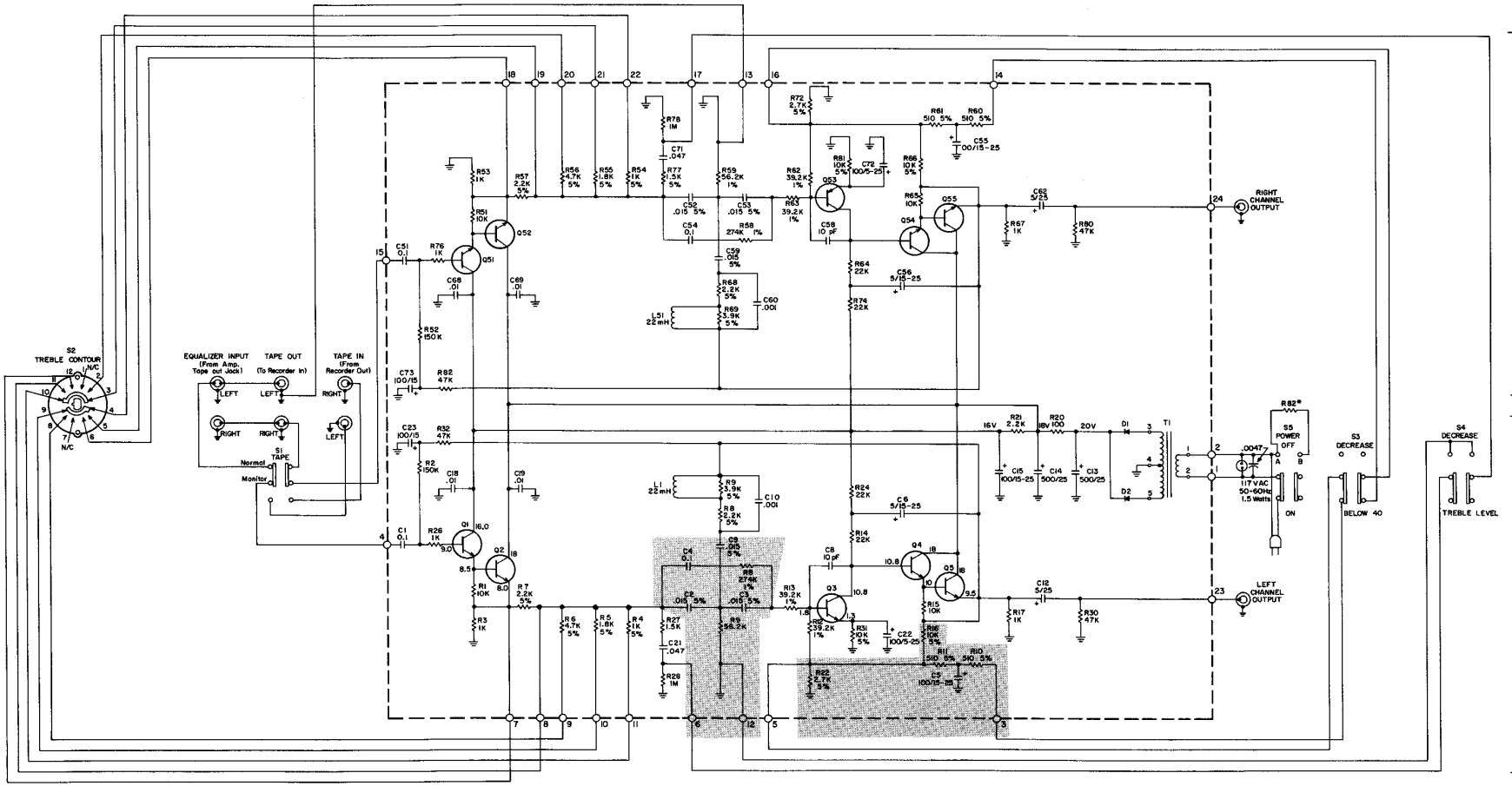


Figure 9. 901 I Schematic Diagram

Notes:

1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IN OHMS, 1/2 W, ±10%.
   b) CAPACITANCE IN MFD's.
2. ALL SLIDE SWITCHES SHOWN IN "NORMAL" POSITION.
3. DC VOLTAGES SHOWN FOR LEFT CHANNEL ONLY.
4. ROTARY SWITCH SHOWN IN POSITION 1.
5. 220V CONVERSION:
   A. CONNECT A 10K, 5W RESISTOR (R82)* BETWEEN LUG A AND LUG B OF ON/OFF SWITCH.
   B. MOVE POWER CORD WIRE FROM LUG A TO LUG B.
   *R82 USED ON 220V UNITS ONLY.

LEGEND:

INDICATES HIGH FREQUENCY CIRCUITRY.

INDICATES LOW FREQUENCY CIRCUITRY.

Figure 10. 901 II Schematic Diagram

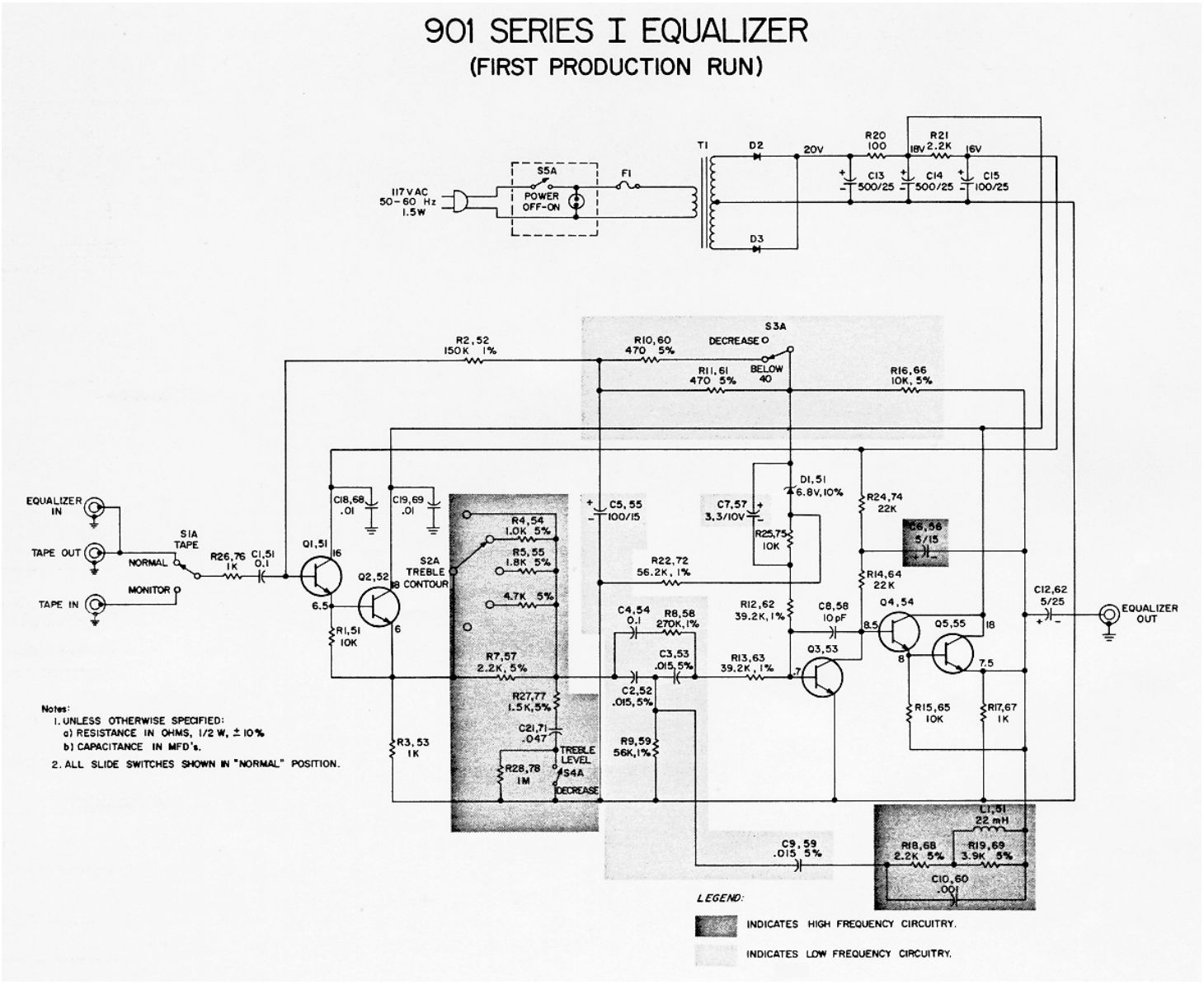


Figure 11. 901 Schematic Diagram (first production run)