

Sherwood

MODEL S-9500b ALL-SILICON SOLID-STATE STEREO AMPLIFIER SERVICE MANUAL

Serial No's. T704104 TO T704604

Function Switch. Controls stereo or mono operation.

Selector Switch. Chooses phono, tuner, or auxiliary inputs.

Preamp Level. Controls preamp level only.

Tape Monitor Switch. Normally set to left. will connect in tape monitor jacks on rear if depressed right.

Hi Filter. Depress right for 12db/octave attenuation of undesired tones such as record "scratch".

Tone controls for both channels. Adjustment of the Bass or Treble control knob will vary the tone of both channels simultaneously.

Main control for Power on-off and Loudness of both channels. Automatically boosts bass at low levels (if switch below at "Loudness In").

Controls left-to-right stereo balance.

Stereo head-phone jack.

Pilot Light

Remote Speaker Set On-off Switch. Will disconnect this speaker set when depressed right.

Main Speaker Set On-off Switch. Will disconnect this speaker set when depressed right.

Loudness Compensation Switch. Normally set to left, will remove circuit which boosts bass at low settings of Loudness control if depressed right.

MODEL S-9500b STEREO AMPLIFIER SPECIFICATIONS *

INPUTS: 6 high level (2 tape monitor), 2 (RIAA) Phono-preamp.

POWER OUTPUT: music power: (4Ω) 80 watts, (8Ω) 50 watts; continuous power each channel: (4Ω) 30 watts, (8Ω) 20 watts at 1.0% distortion.

OUTPUTS: 4 to 16-ohm left and right spkr. main and remote; mono speaker, stereo headphone and record output.

INVERSE FEEDBACK: 35db.

DAMPING FACTOR: 30:1 at 8 ohms.

FREQUENCY RESPONSE: (20w) 20Hz to 20KHz ± 1 db.

TONE CONTROL RESPONSE: Flat setting, 20Hz to 20KHz ± 1 db.

TONE CONTROL RANGE: 15KHz, 15db. boost or cut 40Hz 20db. boost or cut.

PREAMP. EQUALIZER CURVES: AES/RIAA phono.

SENSITIVITY: Radio - 0.20v Phono - 1.6mv. (PH Input is adjustable with Preamp Level control).

MAX. INPUT CAPABILITY: Phono: 160mv. for less than 1% dist. Radio: 2.8v. for less than 1% dist.

MAX. HUM and NOISE: Vol. control min., 90db (weighted) below rated output. Tuner input (controls max.), 80db. (weighted) below rated output. Phono input (controls flat), 60db. below rated output.

INTERCHANNEL CROSSTALK: Less than -45db. at 1KHz.

POWER CONSUMPTION: 115-125v, 60Hz; 10 to 120 watts fused.

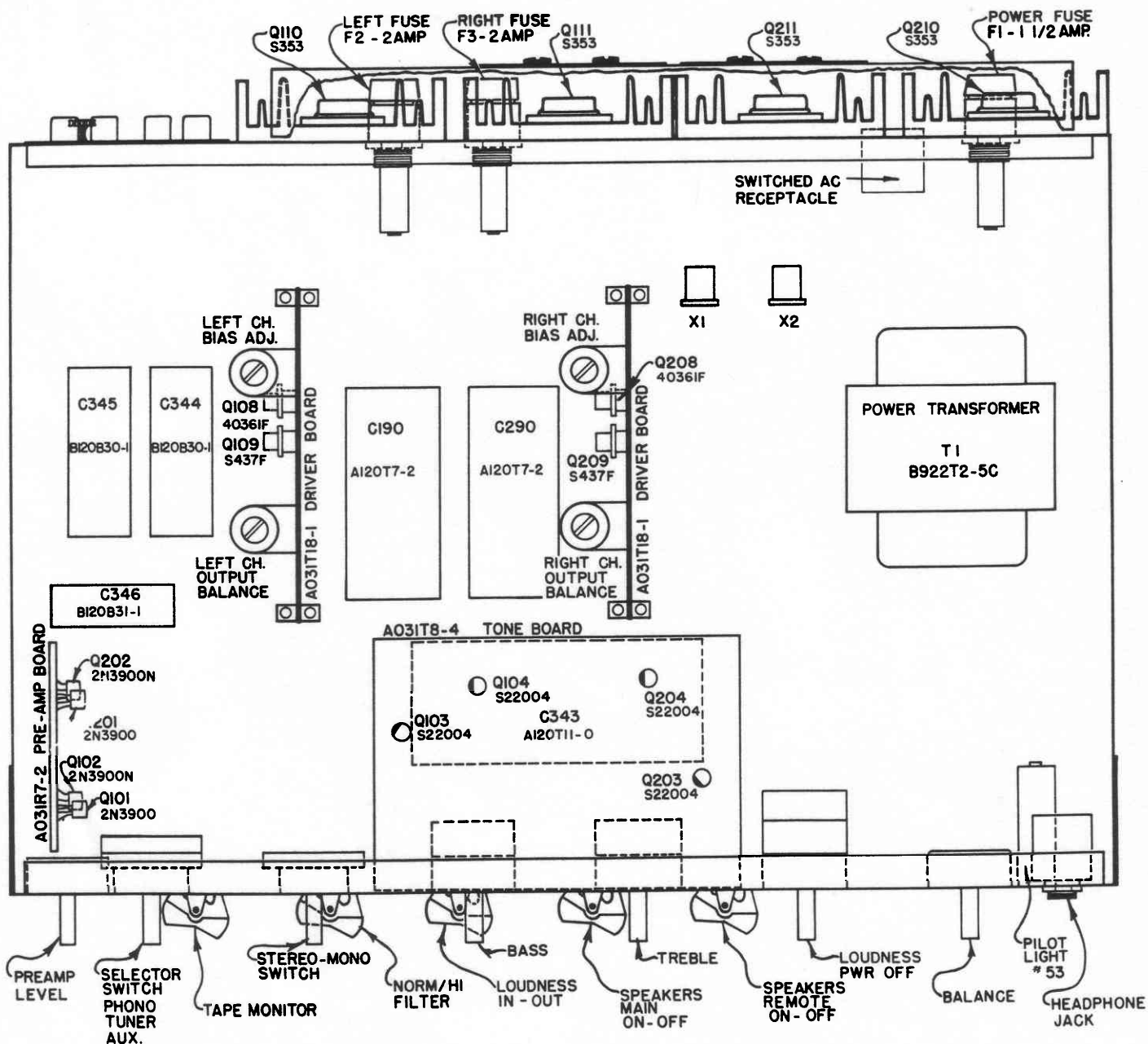
TRANSISTOR COMPLEMENT: 22 silicon transistors, 2 silicon rectifiers.

SIZE: 14 x 10-1/2 x 4 in. high.

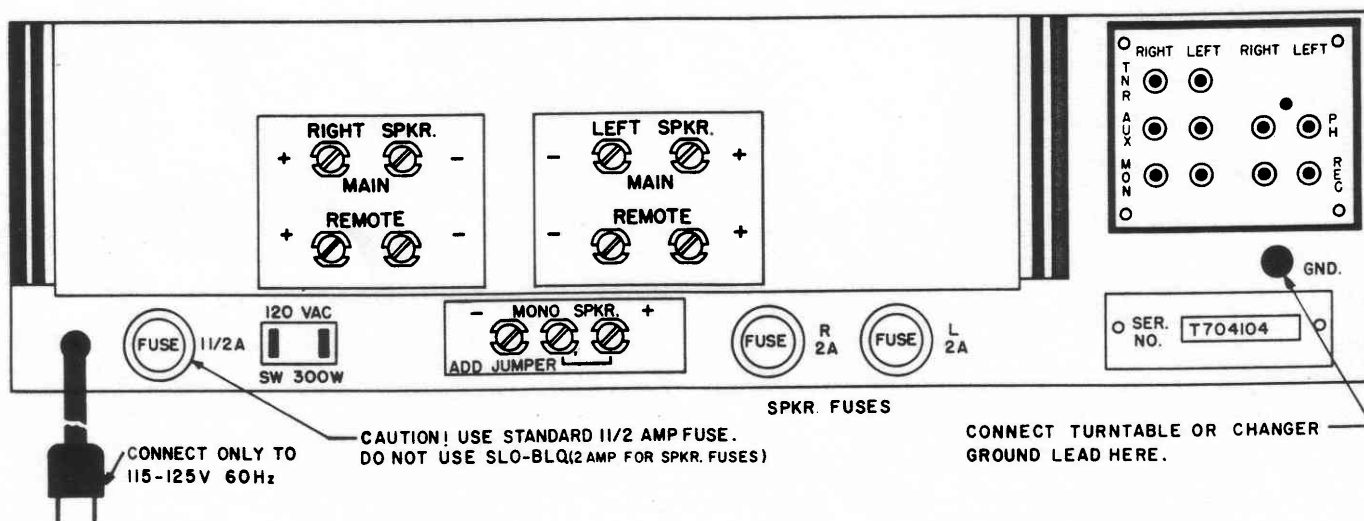
SHIPPING WEIGHT: 22 lbs.

*All specifications taken with 120V line.





All power fuses on export models using 230V for power, will require 50% less current rating than the comparable domestic unit. Voltage rating will remain the same.



SERVICING

VOLTAGE CHECKS

Preliminary checks of the D.C. voltages present at various points in the S-9500b can prove useful in locating defective components. They are inconclusive, however, in determining if transistors are operating properly in all aspects. They can only indicate whether the transistor is open, shorted or functioning, not how well the transistor is functioning.

IN GENERAL:

Correct voltages indicate a functioning transistor.

The same voltage at the collector and emitter indicates a shorted transistor.

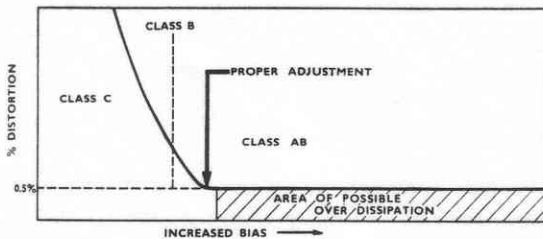
Full supply voltage on the collector and no voltage on the emitter indicates an open transistor.

OUTPUT TRANSISTOR BIAS

Of all the specifications which require checking to ascertain correct performance of the S-9500b, proper output transistor operation is the most important and critical. Adjustment of the output transistor bias is necessary if output transistors are replaced*, or the amplifier exhibits one or more of the following symptoms:

1. Overheating of the output transistors under normal operating conditions.
2. Excessive low level Intermodulation Distortion—more than 0.5% at 2.0 volts across 8 ohms (0.8 watts, IM power).

Adjustment of output transistor bias should then proceed as follows:



1. Turn amplifier off.
2. Set output balance pots (left and right channels) to mechanical center and bias pots fully counter-clockwise.

*It is extremely important that the mica insulating washers used to separate the output transistors from their heat sinks be unbroken and installed properly with silicon grease liberally applied to all surfaces in contact with each other. Make certain the emitter and base pins of the output transistors do not contact any part of the heat sinks.

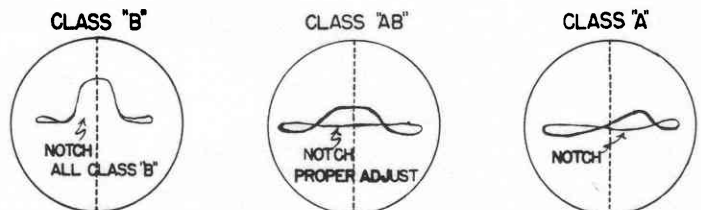
NOTE: Refer to speaker load connections on schematic, being careful to observe ground-connections.

3. Connect D.C. voltmeter of at least 3% known accuracy to transistor side of appropriate channel's output terminals.
4. Turn amp. on and adjust output balance pot for that channel so that approx. $1/2B+$ voltage is on the output capacitor.
5. Connect an Intermodulation Distortion analyzer to the amplifier TP. MON. (aux.) input, turn volume control to maximum and adjust the analyzer output for an amplifier output of 2.0V across 8 ohms. (Because the output stages have been set into heavy class "B" operation by the "pre-setting" in Step 2, a class "B" notch in the distortion waveform will be obvious.) NOTE: When adjusting bias for class "AB", adjust until class "B" notch is almost eliminated. Class "A" begins beyond this point, and notch shifts to right.
6. Increase analyzer output until clipping can be observed. Fine adjust output balance pot so that clipping is symmetrical.

IMPORTANT: Misadjustment of the bias pot can cause heavy class "A" operation of the output transistors, causing them to overheat.

The following performance indicates a properly operating output stage with 8 ohm load.

- Less than 0.5% IM distortion at 2.0V.
- Typically 0.6% IM distortion at 10 Volts.
- 18 watts of power per channel at clipping.



1. **AMPLIFIER/PREAMP STAGE ISOLATION:** Evaluate whether both channels are inoperative. If thus, B+ supply should be suspected for malfunction. If one channel only, evaluate with test signal whether signal feeds properly through phono preamp, auxiliary high-level input, or into volume control at high side (this isolates power amplifier section from tone amplifier section).

2. **FAULT ISOLATED TO POWER AMPLIFIER:** With DC voltmeter, verify accuracy of all power supply voltages, collector, emitter, and base voltages of transistors on the driver-circuit boards and of output transistors in the faulty power amplifier channel. The voltages should be verified against those shown on the schematic for 120V power line and also against those in the 2nd channel (assumed to be operating correctly). Note that output electrolytic coupling capacitor DC voltage (on transistor feed side) should read approx. 1/2 of B+ supply voltage. Note in most cases of a defective driver or output transistor, the fuse will open and prevent the taking of a usable center-point voltage reading. Therefore, it is valuable to operate the amplifier with a variable voltage power line (Variac) equipped with a line wattmeter (or ammeter) to identify abnormal power consumption.

With the Variac, reduce the power line voltage to zero, replace fuse, and slowly increase power line voltage upward while observing wattmeter. (The power consumption should not exceed 10-15 watts as the voltage is increased up to rated 120 volts. If power consumption reading begins to exceed 15 watts, starting from zero voltage, do not increase power line voltage further.) Now verify center-point voltage for half-voltage reading.

If center-point voltage reads extremely low, suspect defective output or driver transistors on low side (schematic shows these as bottom devices in each channel). If center-point voltage reads extremely high, suspect defective high-side output or driver transistors.

Remove both driver transistors from their sockets. If power consumption drops considerably, then faulty driver transistors should be suspected. If power consumption remains unusually high, then faulty output transistors should be suspected. If not, suspect pre-driver or bias-regulator transistor or associated components.

If all above seems not to be at fault, then verify that output coupling electrolytic capacitor is not shorted, other capacitors are not shorted, circuit board contains

no solder or etching shorts, open resistors, or poor solder connections. (Note: a small error voltage at pre-driver base and/or emitter will disrupt grossly the operation of the driver and output transistors.)

If center-point voltage reads approximately 1/2 voltage in accordance with above check, apply audio signal to channel being investigated and measure distortion as per service instruction manual. Distortion which exceeds amplifier ratings might be due to one of the following:

1. Output transistors do not have matched beta.
2. Output bias requires readjustment.
3. Driver transistor has low beta.

3. **FAULT ISOLATED TO TONE CONTROL**

AMPLIFIER: Check DC voltages at transistor collector, emitter, and base on tone circuit board and compare with schematic and with good channel. Feed 1KC audio signal to input connection to tone circuit board. Compare output voltage to input voltage which should have a gain ratio of about 6db (2X).

Isolate inoperative stage by checking signal at input of treble control. Compare this voltage to input voltage which should result in 1st stage gain - approximately 6db (2X).

Evaluate distortion in conjunction with power amplifier. Verify bass and treble frequency response with bass and treble boost and cut characteristic curves shown in service manual on Page 8.

4. **FAULT ISOLATED TO PREAMP:** Check DC voltages at transistor collector, emitter, and base on preamp. circuit board and compare with schematic and with good channel. Feed 1KC audio signal to phono input jack. Compare output voltage at input of tone circuit board to input voltage. The resulting calculated gain ratio should be approximately 40db (100X) with preamp. gain (phono level) control at maximum gain. Isolate the inoperative stage by checking signal voltage at collector of 1st stage. Verify frequency response with phono and tape equalization curves shown in service manual on Page 8.

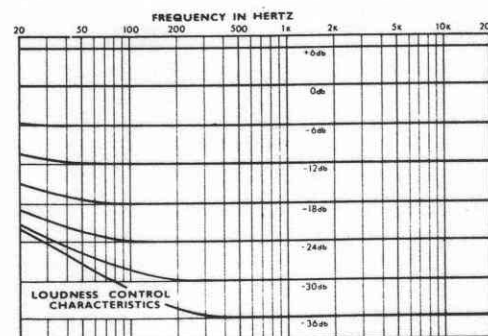
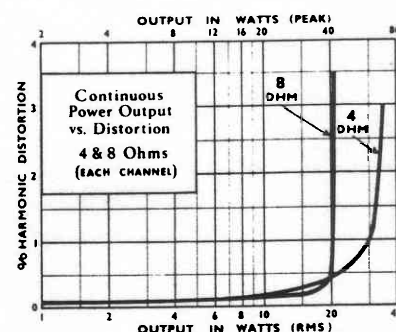
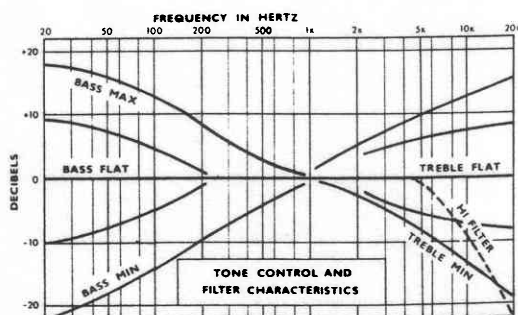
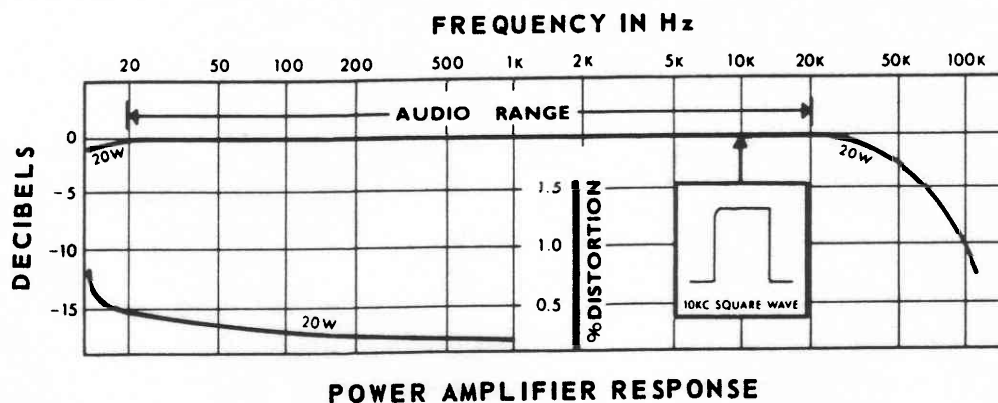
5. **FAULT ISOLATED TO POWER SUPPLY:** Check DC voltages at input, mid-point, and output filter capacitor sections and compare with those shown on schematic. If a voltage measures low, remove leads to amplifier or receiver loads to isolate possibility of leaky or shorted electrolytic capacitor section.

PARTS LIST

TRANSISTORS (All are silicon)	PART NO.	PRICE
Audio, Low signal-no dot (Hi beta), (Q101, 105, 201, 205)	2N3900	\$1.04
	S22004	0.63
	SPS41	0.81
Audio, Low signal-Green dot (Low Noise), (Q102, 202)	2N3900N	1.14
	S22004N	0.73
	SPS41N	0.91
Audio, Low signal -no dot (Hi beta), (Q103, 104, 107, 203, 204, 207)	S22004	0.63
	SPS41	0.81
Pre-Driver, NPN (Q106, 206)	16E1330	1.26
Driver, NPN, (Q108, 208)	40361F	2.92
Driver, PNP, (Q109, 209)	S437F	3.36
Output, NPN, (Q110, 111, 210, 211)	S353	2.84

You will note that all transistors used in the S-7800 are color-coded with a dot or mark of some color prominently located on the top of their case. (Some transistors have no mark, but this also is identification.) When ordering replacement transistors, it is imperative that you indicate not only its part no., but the color dot on the transistor body: red, yellow, none, (1, -2, - or -3). This is particularly important when replacing output transistors.

DESCRIPTION	PART NO.	PRICE
1500 μ f, 45V (C190, 290)	A120T7-2	\$2.70
2500 μ f, 80V (342)	A120T11	3.80
0.5 μ f, 50V (C170, 172, 270, 272)	B120X3	0.59
5 μ f, 5V (C136, 236)	B120X4	0.63
5 μ f, 20V, (C143, 243)	B120X6	0.59
1 μ f, 25V, (C111, 132, 211, 232)	B120X7	0.59
20 μ f, 5V (C160, 260)	B120X12	0.63
100 μ f, 3V (C100, 102, 200, 203)	B120X24	0.53
1 μ f, 15V (C150, 250)	B120X75	0.59
20 μ f, 50V (C171, 271)	B120B14	0.36
500 μ f, 50V (C343, 344)	B120B30	1.48
500 μ f, 25V (C345)	B120B31	0.99
Insulator, Thermo-Film, (T03)	A021R1-0	0.05
Fuse, 2 AMP, 3AG (F2, 3)	312002.	0.15
Fuse, 1-1/2 AMP, 3AG (F1)	31201.5	0.15
Knobs, Medium (w/indicator)	B467X4	2.43
Knob, Small Plastic, Unmarked, Phono Level	460AB5	0.15
Light Bulb, Pilot #53	630B53	0.15
Control, 50K ohm Dual, w/AC Sw. (R150A, B, S4)	A671T1-6	4.28
Control, Bass, 1M ohm Dual (R134A, B)	A670T5-3	2.84
Control, Treble, 250K ohm Dual (R140A, B)	A670T6-3	2.84
Control, Balance, 100K ohm (R153)	A670T7-3	1.04
Control, Phono Level, 1.5K ohm (R120A, B)	A670T11-1	1.89
Pot., P. C., 500 ohm Bias (R184, 284)	A675T1-0A	0.90
Pot., P. C., 250K ohm Output Bal. (R170, 270)	A675T9-0A	0.45
Rectifier, Silicon (X1, 2)	A692T3-0	1.26
Socket, Driver Transistor	A790T4M-1	0.23
Socket, Output Transistor	A790T7-0	0.18
Stereo Headphone Jack	A795L1-0	1.08
Fuse Post	A796X2-1A	0.95
Switch, Selector, 3 Pos. (S1A, B)	A860T6-0	3.47
Switch, Function, 5 Pos. (S2)	A860K5-3	2.25
Switch, Rocker, (Non-shorting), DPDT (S3AB)	A864T22-5	0.86
Switch, Rocker, (Shorting) DPDT, (S4A; 5A, B; 6A, B; 7A, B; 8A, B)	A864T23-5	0.86
Transformer, Power, 60 Hz Domestic (T1)	B922T2-5C	17.10
Transformer, Power, 50-60 Hz Export (T1)	2B922T2-5CX	32.85



CLEANING ESCUTCHEON FACE PLATE: The beige es-cutcheon on your Sherwood equipment has been finished with a durable baked enamel. To clean, wipe with a chamois or cloth dampened with a water solution of liquid detergent. Do not use an abrasive scouring powder.

EXPORT MODELS ARE AVAILABLE WITH SPECIAL TRANSFORMERS FOR 50-60 CYCLE POWER AT 120V OR 240V AND ARE MARKED THUS ON THE REAR OF THE CHASSIS. THESE SPECIAL MODELS HAVE ALSO BEEN TREATED WITH FUNGICIDE AND ANTI-CORONA MATERIALS FOR ADDED PROTECTION IN HUMID CLIMATES.

Sherwood

ELECTRONIC LABORATORIES, INC.

4300 NORTH CALIFORNIA AVENUE, CHICAGO, ILLINOIS 60618 IRVING 8-7300

REC.
MON.
PHONO
AUX
TUNER

SIB

SIA

SELECTOR SWITCH POSITIONS	SENSITIVITY FOR RATED OUTPUT
1 PHONO	1.6 MV
2 TUNER	190MV
3 AUX	190MV

RIGHT CHANNEL

REC.
MON.
PHONO
AUX
TUNER

SIB

SIA

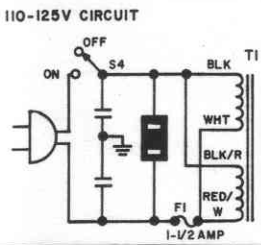
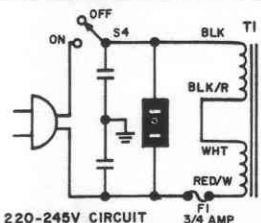
PRE-AMPLIFIER

A031R7-2

FUNCTION SWITCH S2

PHONO LEVEL

ALTERNATE PRIMARY CIRCUITS FOR EXPORT MODELS



SHERWOOD S-9500b
80 WATT STEREO AMPLIFIER
SERIAL NO. T704104 TO T704604

