

# SECTION 4 - SOUND SYSTEM MAINTENANCE

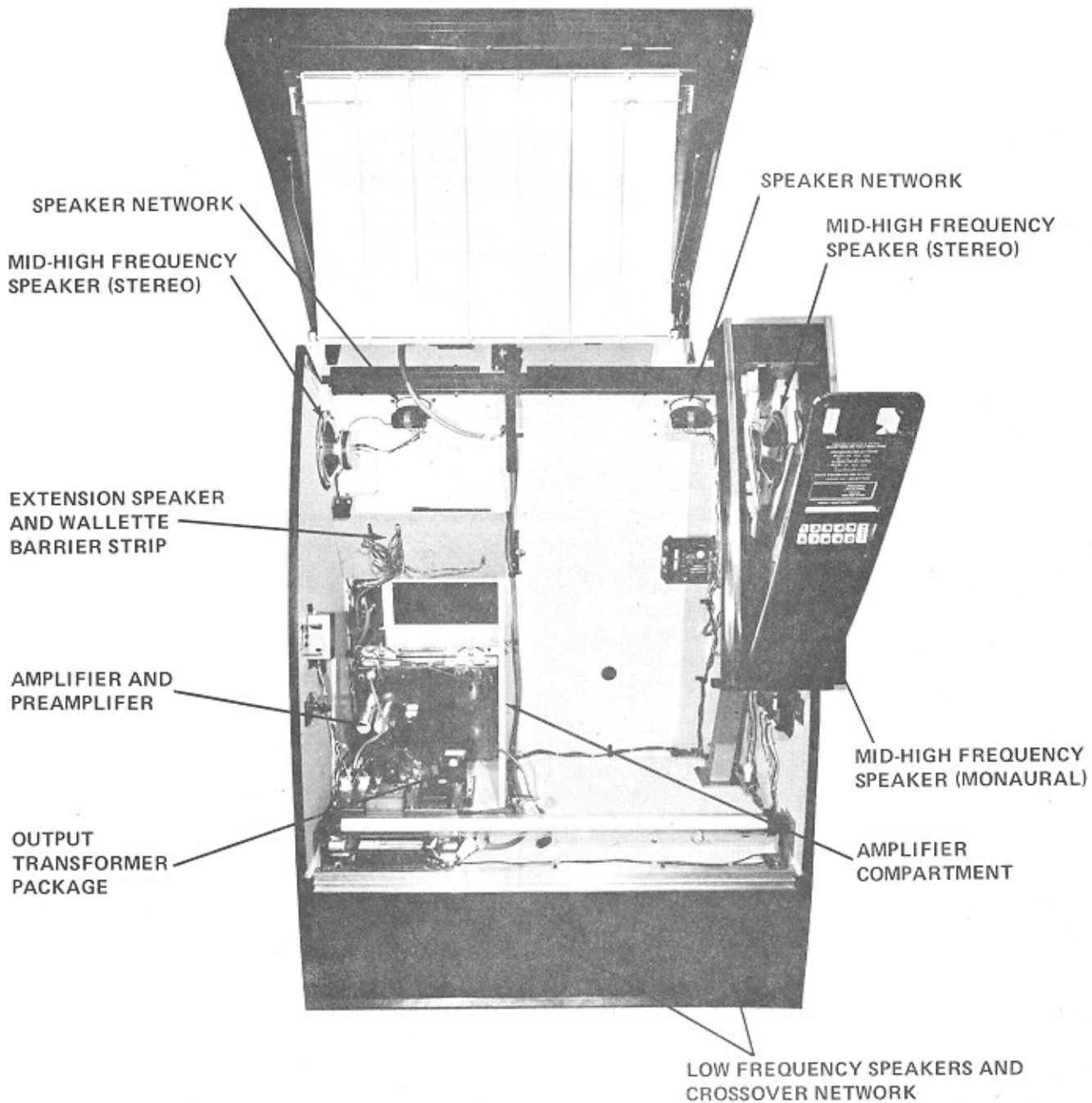


FIGURE 2-24. SOUND SYSTEM MAJOR COMPONENTS

## INTRODUCTION

This section contains explanations of, and connection charts for, extension speaker and Wallethe operation. Sound system troubleshooting is covered and principles of operation of the sound system is completely detailed.

## EXTENSION SPEAKER OPERATION

### 70-VOLT CONSTANT VOLTAGE EXTENSION SPEAKER OPERATION

Where sound coverage is required in rooms or areas not covered by the phonograph, extension speakers are required. Rowe recommends using the amplifier 70-volt output with 70-volt extension speakers to provide trouble-free operation. Each Rowe/AMI 70-volt speaker includes a matching transformer. The matching transformer has power taps so that power consumed by each speaker in the system can be adjusted. To obtain the total power required for the whole system, simply add the wattage settings of each extension speaker to the wattage setting of the phonograph speaker system. The total wattage must not exceed the rated wattage of the amplifier; otherwise the amplifier will be overloaded. Overloading the amplifier will result in distorted sound and reduced loudness. It is always advantageous to approximately match the total speaker power to the power rating of the amplifier because in low volume installations, the amplifier can be operated with a reduced volume control setting. This results in greater bass boost and a more pleasing tonal balance.

### CAUTION

PHONO JACKS, ADJACENT TO VOLUME CONTROL PLUG, ARE FOR BENCH TEST PURPOSES ONLY.

## NON-70-VOLT EXTENSION SPEAKER OPERATION

Though less desirable than 70-volt operation, speakers may be connected to impedance taps on the output transformer package. Speaker power ratings and impedance must be considered so that each speaker will get the proper proportion of power. Three requirements must be met:

1. The speakers must be wired so that the power consumed by the phonograph and extension speakers does not exceed the amplifier power rating.
2. Each speaker must receive the right amount of audio power to have equal loudness to the other speakers in the system or have higher or lower loudness as required.
3. All speakers must be connected with the proper polarity.

## REMOTE VOLUME AND CANCEL CONTROL

Connect the 301-06322 remote volume and cancel control to the Phonograph as shown below.

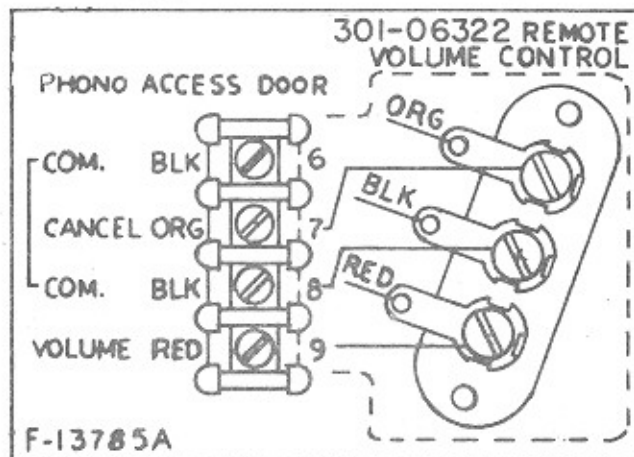


FIGURE 2-25. REMOTE VOLUME AND CANCEL CONTROL CONNECTIONS

## FULL COVERAGE SOUND SYSTEM CONNECTION CHART

See figure 2-26 on page 2-58 for Stereo Sound system connection chart. Observe the following notes when making connections:

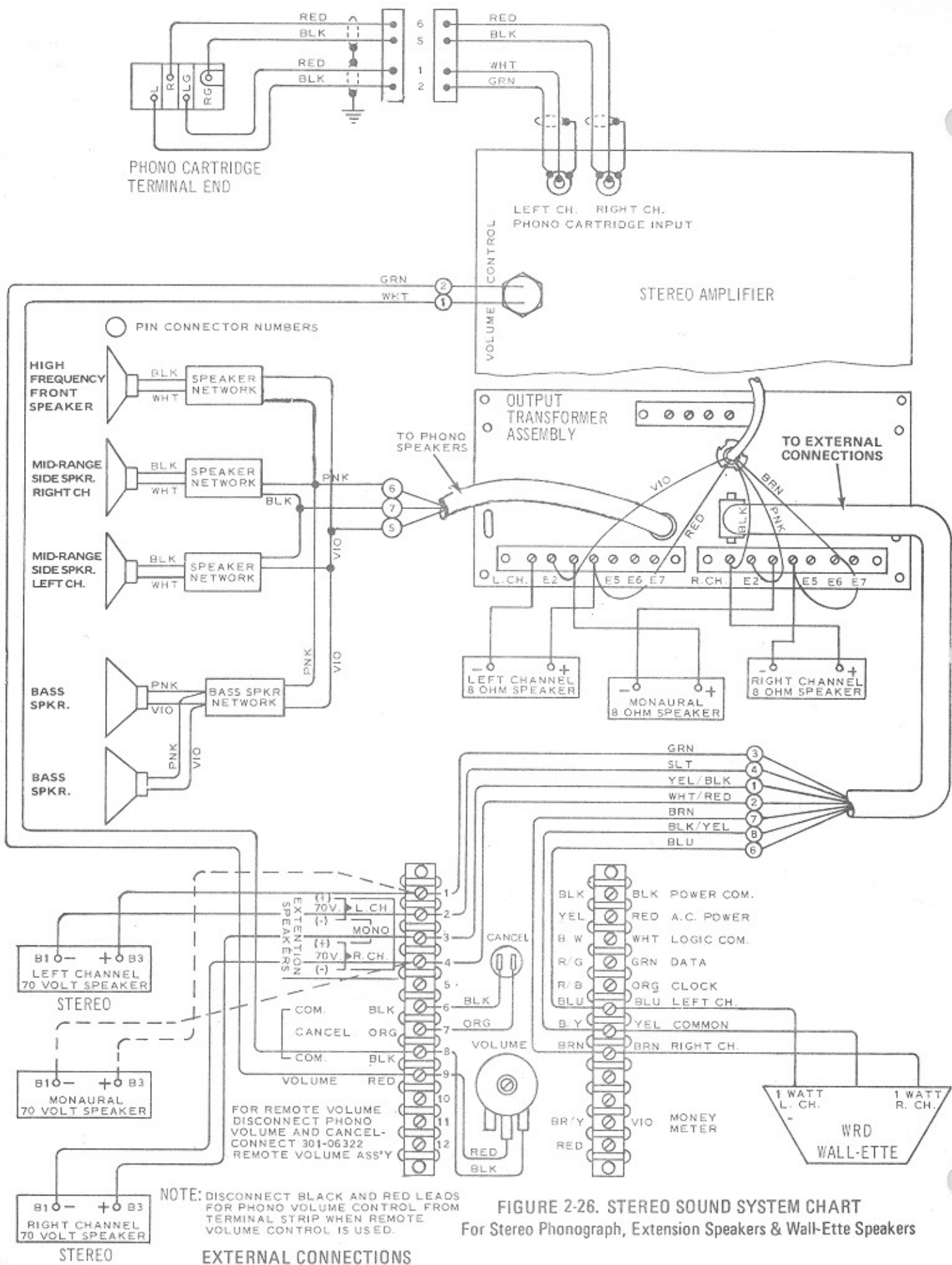
1. Connections shown for 70-volt extension speakers are for Models EX-201, EX-301, and EX-401.
2. Connections shown for 8-ohm extension speakers are for 8-watt level. See the table below for information on other power levels and for use of speakers having other impedances.

3. Polarity of connections between amplifier, wallbox speakers, and extension speakers must be observed for correct phasing of extension speakers, wallbox speakers, and Phonograph speakers.
4. Amplifier watts per channel for speakers connected across both channels (for monaural extension of sound) is one half watts per speaker power.
5. Allow 1.4 watt per channel for each Walleto wallbox connected (normal connection).
6. Connect remote volume control to barrier strip on top of amplifier compartment door.

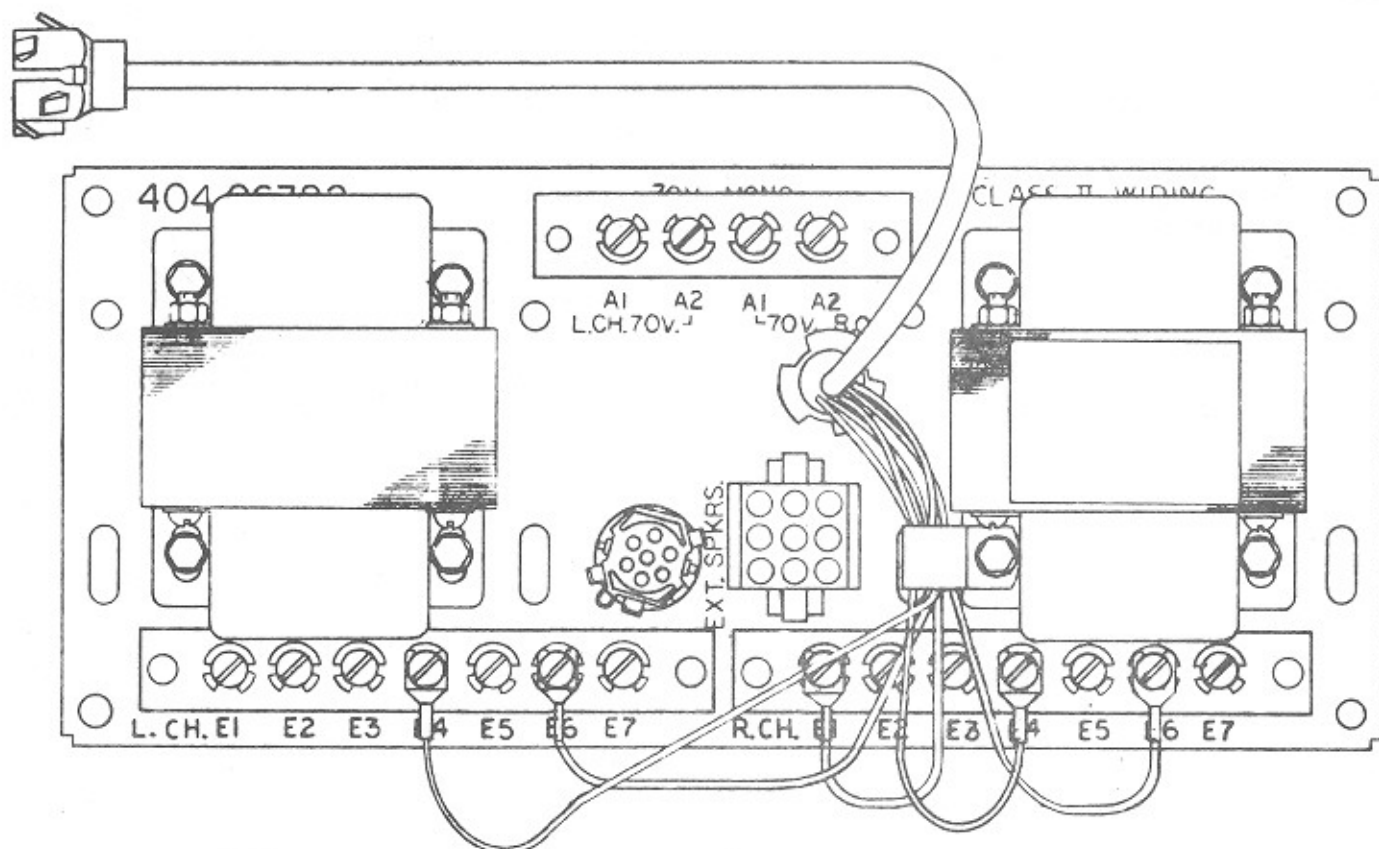
TABLE 2-7. SPEAKER CONNECTION CHART

CHART NO. 1 SPEAKERS CONNECTED TO EITHER LEFT CHANNEL OR RIGHT CHANNEL - USED IN PAIRS FOR STEREO EXTENSION OF SOUND			CHART NO. 2 SPEAKERS CONNECTED ACROSS BOTH CHANNELS - FOR MONAURAL EXTENSION OF SOUND		
	TERMINALS	WATTS PER SPEAKER		TERMINALS	WATTS PER SPEAKER
8 OHM SPEAKERS	E1 - E2	0.5	8 OHM SPEAKERS	E2 - E2	2
	E1 - E3	2		E3 - E3	8
	E2 - E4	4.5		E4 - E4	32
	E1 - E4	8	16 OHM SPEAKERS	E2 - E2	1
	E1 - E5	14		E3 - E3	4
	E2 - E6	24		E4 - E4	16
16 OHM SPEAKERS	E1 - E3	1	E5 - E5	28	
	E2 - E4	2.25	CONSTANT VOLTAGE SPEAKERS	A1 - A2 OR A2 - A1	DETERMINED BY POWER SETTING AT EXTENSION SPEAKER
	E1 - E4	4			
	E1 - E5	7			
	E2 - E6	12			
E1 - E6	16				
45 OHM WALL BOX SPEAKERS	E1 - E3	0.35	<b>AMPLIFIER FULL POWER OUTPUT VOLTAGES (PER CHANNEL)</b> 		
E1 - E4	1.4 (NORMAL)				
E1 - E5	5				
CONSTANT VOLTAGE SPEAKERS	A1 - A2	DETERMINED BY POWER SETTING AT EXTENSION SPEAKER			
<b>NOTE: WATTS PER CHANNEL FOR SPEAKERS CONNECTED ACROSS BOTH CHANNELS (FOR MONAURAL EXTENSION OF SOUND) IS ONE HALF OF "WATTS PER SPEAKER" INDICATED IN CHART 2.</b>					

The use of 301-65327 Amplifier Overload Tester is recommended to warn the installer if the extension speaker hookup causes an overload.



**FIGURE 2-26. STEREO SOUND SYSTEM CHART**  
For Stereo Phonograph, Extension Speakers & Wall-Ette Speakers



PHONO SPEAKER POWER LEVEL	PHONO SPEAKERS		POWER PER CHANNEL FOR EXT. SPEAKERS	
	L.CH. Violet Lead	R.CH. Pink Lead	64 Watt Amplifier	120 Watt Amplifier
64	E6	E6	0	28
28	E5	E5	18	46
16	E4	E4	24	52
4	E3	E3	30	58
1	E2	E2	32	60
Black lead to E1 (Common) for all above power levels		CAUTION: Total power rating of load must not exceed 32 watts per channel for the 64 watt ampli- fier and 60 watts per channel for the 120 watt amplifier.		

FIGURE 2-27. POWER LEVEL SETTINGS

### POWER LEVEL SETTINGS

Power level settings to the phonograph speaker system are adjustable by moving the speaker leads on the output transformer package terminal strip. When setting levels for extension speakers be sure not to exceed the extension speaker rating with the volume control set to maximum position. Speaker damage may result. Change the level as follows:

1. Make a selection. Refer to table 2-7 and check that speaker power ratings will not be exceeded. Set volume control to maximum position.
2. With a selection playing, refer to figure 2-27 and change wiring to increase power one level at a time. Do not exceed extension speaker power rating.
3. The desired loudness will usually fall between two adjacent power levels. Choose the higher of the two levels. Control the sound level with the volume control.

This procedure will result in a "normal" frequency response. Some locations may require more bass than is obtained with this procedure and a "max" bass boost setting. Additional bass response can be obtained by using a higher power level setting and lowering the volume control setting accordingly.

### WALLETTE SPEAKER POWER LEVELS

Wiring for Wallette speakers is normally connected to terminal E4 for a 1.4 watt power level per speaker. For higher or lower levels, change wiring as shown in table 2-8.

TABLE 2-8. ALTERNATE POWER LEVELS FOR WALLETTE SPEAKERS

Connections of Red Brown Leads at Terminal Strip	Watts Per Speaker
Terminal E3	0.35
Terminal E4(normal)	1.4
Terminal E5	5



## SOUND SYSTEM QUIK CHEK

Rowe/AMI solid state sound systems are service designed for easy, fast repair. The following check list will enable locating troubles on location with your finger, a paper clip or an inexpensive VOM. Be sure not to plug in or unplug circuit boards with power on. Checks should be made with the mechanism in the record playing position. Perform the checks in the order listed.

### NO SOUND - BOTH CHANNELS

1. ✓ **POWER - SECOND LEVEL** - Check that the amplifier is plugged in and is receiving power from the junction box. Mute relay must be de-energized. Application of power to the amplifier should result in an audible "thump" through the speaker system. Press the circuit breaker reset pushbutton on the amplifier chassis to make sure that it has not tripped.
2. ✓ **MUTE RELAY** - Mute relay must be energized. Unplug mute relay plug from amplifier chassis socket. If the contacts transfer, the relay is OK. If the contacts do not transfer, replace the relay. If a replacement relay is not available, manually transfer the contacts and leave the mute plug disconnected to get sound. Other mute circuit components and their operations are described in the service manual.
3. ✓ **VOLUME CONTROL** - Disconnect the volume control plug from the amplifier chassis and short out socket pins 2 and 6 with a paper clip. Full volume indicates an open volume control or line. If full volume at all times is the problem and disconnecting the volume control plug doesn't help, replace the preamp board.
4. ✓ **CARTRIDGE CONNECTIONS** - Make sure that the stylus is not bent or broken; replace if necessary. With a selection playing, unplug the round 7 pin tone arm plug from the left side of the mechanism. Press a finger against the plug pins and check for a hum in both sound channels. If hum is present, check cartridge wiring against the service manual; replace the cartridge if necessary.
5. ✓ **EXTENSION SPEAKERS** - To check if extension speakers are shorting out the amp, simply disconnect the extension speaker plug from the transformer package receptacle.
6. ✓ **OUTPUT DEVICES** - Visually inspect the driver board fuses for an open condition. If a fuse is open, replace the associated output device. The two devices used in each channel are not interchangeable; check the part number on the case and install an identical or equivalent replacement. Before mounting the device onto the heat sink, be sure that the heat sink surface is flat and that there are no burrs around the mounting holes to cause a short.
7. ✓ **REGULATOR** - Check for approximately 24 VDC at the voltage regulator as shown in the diagram. If voltage is not present, remove preamp board. If this does not re-

store voltage, disconnect the filter capacitor connected to the regulator - it may be shorted. If this does not restore the voltage, replace the regulator.

8. ✓ **FILTER CAPACITORS** - Check for 30VDC in the amplifier power supply. Connect the negative meter lead to ground and check the voltage at the terminals of the large electrolytic filter capacitors located on the amplifier chassis next to the power transformer. When taking readings on the capacitor with the outer shell isolated from chassis ground, move the negative meter lead from the chassis to one of the shell tabs. Check that the voltage on each capacitor terminal is the same. A lowered voltage at one of the capacitor pins indicates that the capacitor maybe defective and should be replaced. Another indication of defective filter capacitors is excessive hum in the sound output.
9. ✓ **PREAMP OUTPUT** - Set volume control to full volume position. With a selection playing, unplug the tone arm plug from the left side of the mechanism. Press a finger against the plug pins and check for approximately 1 VAC at the amplifier pin jacks marked "for test only". Replace preamp board if voltage is not present.
10. ✓ **DRIVER BOARD OUTPUT** - With the volume control set to full, a selection playing and one finger against the tone arm cable pins, check for 16 VAC between pins 9 or 10 of the driver board edge connector and ground. If 16 VAC is not present, replace driver board.

### NO SOUND, LOW SOUND OR DISTORTED SOUND RIGHT OR LEFT CHANNEL ONLY

1. ✓ **BALANCE CONTROL** - Adjust control for equal sound from each channel. Leave in mid position if adjustment is not possible.
2. ✓ **REVERSE CARTRIDGE LEADS** - With a selection playing, reverse tone arm cable connections to the amplifier. If the sound switches channels, check cartridge connections against the service manual. Replace the cartridge if connections are OK. Make sure that the stylus is not bent or broken; replace if necessary.
3. ✓ **EXTENSION SPEAKERS** - Disconnect extension speaker plug from transformer package to check for shorts. Exchange speaker connections between channels.
4. ✓ **OUTPUT DEVICES** - Visually inspect driver board fuses and replace output devices as described in step 6 of the previous procedure.
5. ✓ **PREAMP** - Check that the balance control is in center position. With a selection playing, unplug the tone arm cable from the mechanism and press a finger against the pins. Check that the AC voltage at each of the pin jacks marked "for test only" is approximately the same. Replace the preamplifier board if there is a wide variation in voltage.

6. ✓ **DRIVER BOARDS** - Check driver boards as directed in step 10 of the previous procedure. The AC voltage at pin 9 should be almost identical for each channel. Replace driver board if voltage is low. If the right channel driver board is defective, switch driver boards and use right channel only.

**CONSTANT HIGH VOLUME - CAN NOT BE ADJUSTED AT VOLUME CONTROL**

1. ✓ **VOLUME CONTROL** - Disconnect volume control plug from amplifier chassis. No sound indicates that there is a short in the volume control line.
2. ✓ **PREAMP** - If there is full volume with the volume control plug disconnected, replace the preamplifier board.

**EXCESSIVE RECORD SCRATCH**

1. ✓ **WORN RECORDS** - Replace worn records.
2. ✓ **DAMAGED STYLUS** - Make sure that the stylus is not worn or broken; replace if necessary. Check stylus force.
3. ✓ **TREBLE RANGE CONTROL TOO HIGH** - Reduce setting of control for worn or noisy records.

**EXCESSIVE HUM, LOW VOLUME**

1. ✓ **OPEN SHIELD** - Be sure that shield or wires are not broken between cartridge and the amplifier input plug.
2. ✓ **CARTRIDGE DEFECTIVE** - Substitute a good cartridge.

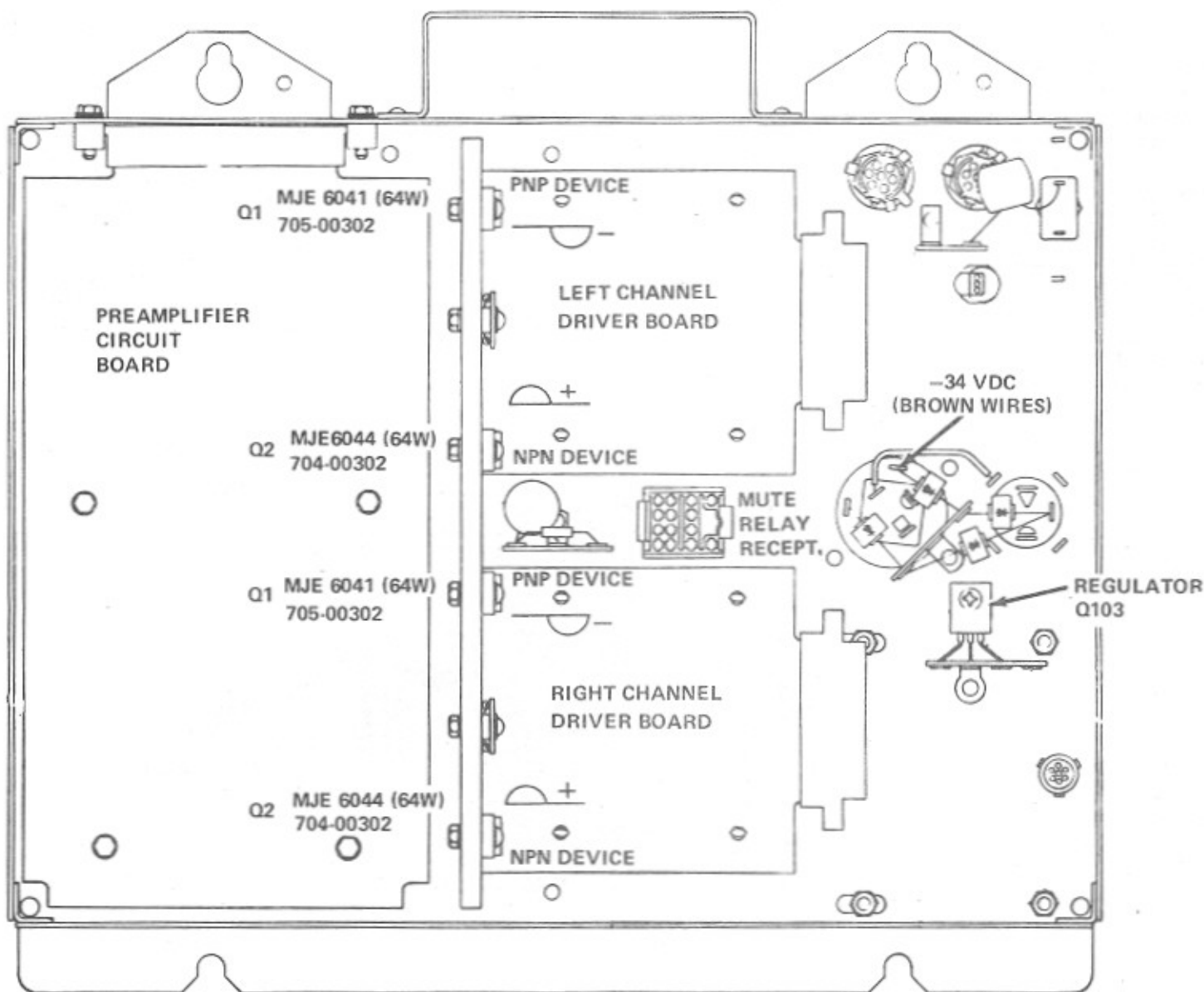


FIGURE 2-28. AMPLIFIER CHASSIS - BOTTOM VIEW

## SOUND SYSTEM PRINCIPLES OF OPERATION

The phonograph sound system translates stylus vibration into electrical voltage, amplifies the voltage and the speaker converts it into sound. The sound system consists of a stylus and cartridge, a stereo preamplifier and amplifier unit, a speaker system, a volume control and an output transformer package. Identification and location of each major component is shown in figure 2-24. The purpose and description of each major component is explained in the following paragraphs.

**Stylus and Cartridge** The stylus and cartridge convert mechanical movement into equivalent electrical voltage. The unit is mounted on the record changer tone arm. This output voltage is transmitted through shielded cable to the preamplifier.

**Preamplifier and Amplifier (see figure 2-29).** The preamplifier unit amplifies phonograph cartridge output and drive the speaker system. The latest concepts in silicon transistor circuitry are designed into the 64-watt stereo system. It delivers a full 32 watts rms power per channel. Its wide frequency response and low distortion assure good record reproduction. The unit incorporates automatic volume control (AVC) and automatic quality control (AQC).

The output stage is coupled to the speakers. Treble range and bass boost controls are provided on the preamplifier chassis to compensate for differences in room acoustics. A mute relay silences the amplifier while a record is being transferred to or from the turntable. Preamplifier circuitry is completely solid state for durability and long service life.

Protection is included for voltage transients, excessive heat and accidental shorting of speaker leads.

**Preamplifier (see figure 2-32).** The preamplifier amplifies the phonograph cartridge output to drive the power amplifier. The preamplifier circuit board is identical for both the 64 and 120 watt amplifiers. The components for both the right and left audio channels are contained in a single plug-in circuit board mounted under the amplifier chassis. Right channel component designations end in the letter 'R' while left channel components end in the letter 'L'. Because both channels are identical, only the left channel will be described.

Transistors Q1L and Q2L comprise the first amplifier stage. The cartridge output is applied through pin 9, R1L and C1L to the base of Q1L. The signal is amplified and passed through R7L, C4L, R10L and C5L to the base of Q3L.

The signal level at the junction of R10L and C5L is controlled by the automatic volume control at the junction of D7 and D8. Transistor Q3L, in an emitter follower circuit, does not provide amplification. The signal is coupled to the base of Q4L through C6L.

The amplification gain of transistor Q4L is determined by the setting of stereo balance control potentiometer R52. This control provides a means to equalize the gain in both channels. From the collector of Q4, a portion of the signal is coupled to the automatic volume control (AVC) circuit, Q10 and Q11. This signal arrives at the base of Q10 through C7L, R19L and D10. In addition to being coupled to the AVC circuit, the signal is also fed to the treble range control circuit through R17L and R20L.

The signal at the base of Q10 is amplified by the Q10 and Q11 stages and appears at the collector of Q11. The collector voltage charges C24 through D9 and R24. The voltage across C24 is proportional to the signal from the tone arm

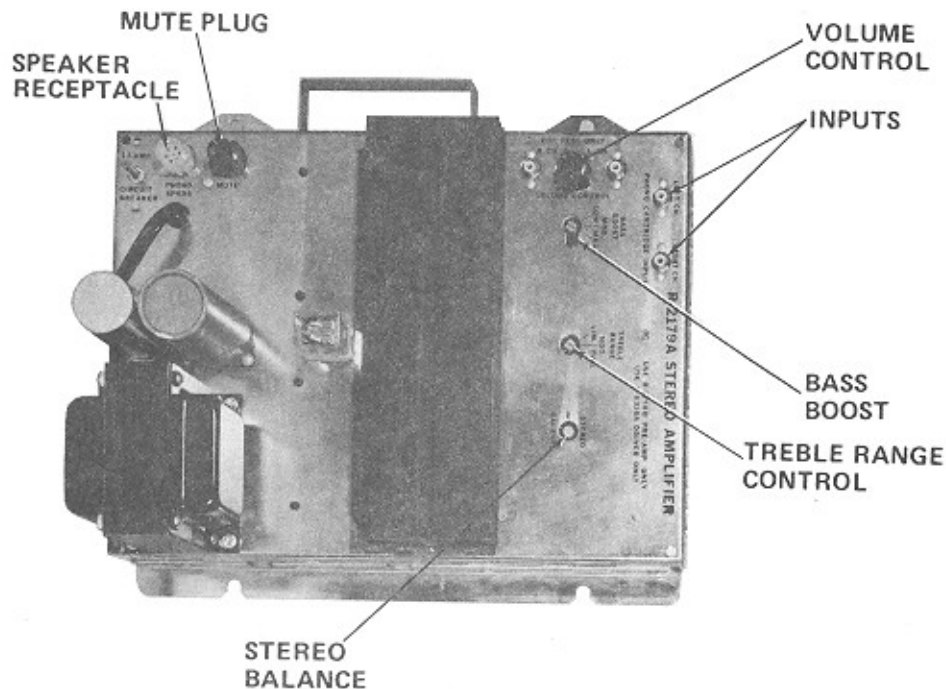


FIGURE 2-29. 64 WATT STEREO AMPLIFIER COMPONENTS



cartridge. The voltage at C24 is bled off through R43 developing a bias current for D7 and D8. The bias current is controlled by the volume control setting. This circuit is opened by the mute relay when the amplifier is in the muted mode. The volume control current is developed by D12 and D13.

From the treble range circuit, the signal is applied to the bass boost circuit consisting of Q5L, Q6L, Q7L, Q8L and Q9L. The signal at the junction of C13L and C14L is divided and controlled by the volume control potentiometer setting. The amount of signal is controlled by the current passing through D1L, D2L, D3L and D4L. The divided signal is coupled to the base of Q7L through C17L. Q5L, Q6L, and Q7L, Q8L are two identical amplifier stages. The collector output of Q6L and Q8L are joined together at the base of Q9L. The amount of bass boost is controlled by the setting of the bass switch at C19L, C20L or C21L. Potentiometer R41L is a factory-set clip adjustment.

**64 Watt Amplifier (See figure 2-31).** The 64 watt power amplifier features fully protected output stages. The two driver boards, one for each audio channel, plug in for ease of replacement and are completely interchangeable between channels or in other 64 watt amplifiers.

The preamplifier output arrives at pin 3 of the amplifier and is fed to the base of Q7 through R28, C18 and C17. Q7 has two collector outputs. The left side output, as viewed on the schematic, is amplified from the base to collector of Q8. The signal from the collector of Q8 is fed to output devices Q1 and Q2.

Q1 and Q2 are mounted on a heat sink under the chassis. These complementary darlington devices, although more reliable than conventional designs, are fused to prevent damage to driver board components. See page 2-1 for troubleshooting and replacement data on these devices.

Transistor Q4 is part of the positive clamp circuit. Output device Q1 draws current through resistor R2. Q4 drops the base of output device Q1 to below R2, limiting current to a safe value. Q3 acts on the negative signal component in the same manner as positive clamp Q4.

**Output Transformer Package (see figure 2-34).** The transformer package enables the amplifier to operate 70-volt lines for extension speakers. The package also provides terminal strips for obtaining several different power levels for both phonograph and extension speakers. The unit consists of two output transformers and associated parts mounted on a single chassis. The chassis is mounted to the floor of the cabinet to the left of the record changer mechanism.

The output transformer secondary connections are available at three terminal strips. Phonograph speaker power is selected by connecting the violet and pink leads according to figure 2-27. Extension speakers can be connected as directed in figure 2-26, speaker connection chart.

**Speaker System.** The speaker system consists of two 10-inch low frequency speakers, two 6-inch wide range speakers, and one front firing 5-1/4 inch speaker for mid and high frequencies.

The 10-inch, heavy duty speakers are mounted in a duct-tuned enclosure at the bottom of the cabinet. The 6-inch speakers are mounted at the sides of the cabinet. The 5-1/4 inch speaker is located on the selector panel.

**Two Wire Volume Control.** A Rowe/AMI exclusive, the two-wire volume control simplifies large, complex installations and saves costs. Redesigned preamplifier circuitry permits remote volume control operation using two unshielded wires. Any wires can be used - there are no special requirements for conductor size and shielding.

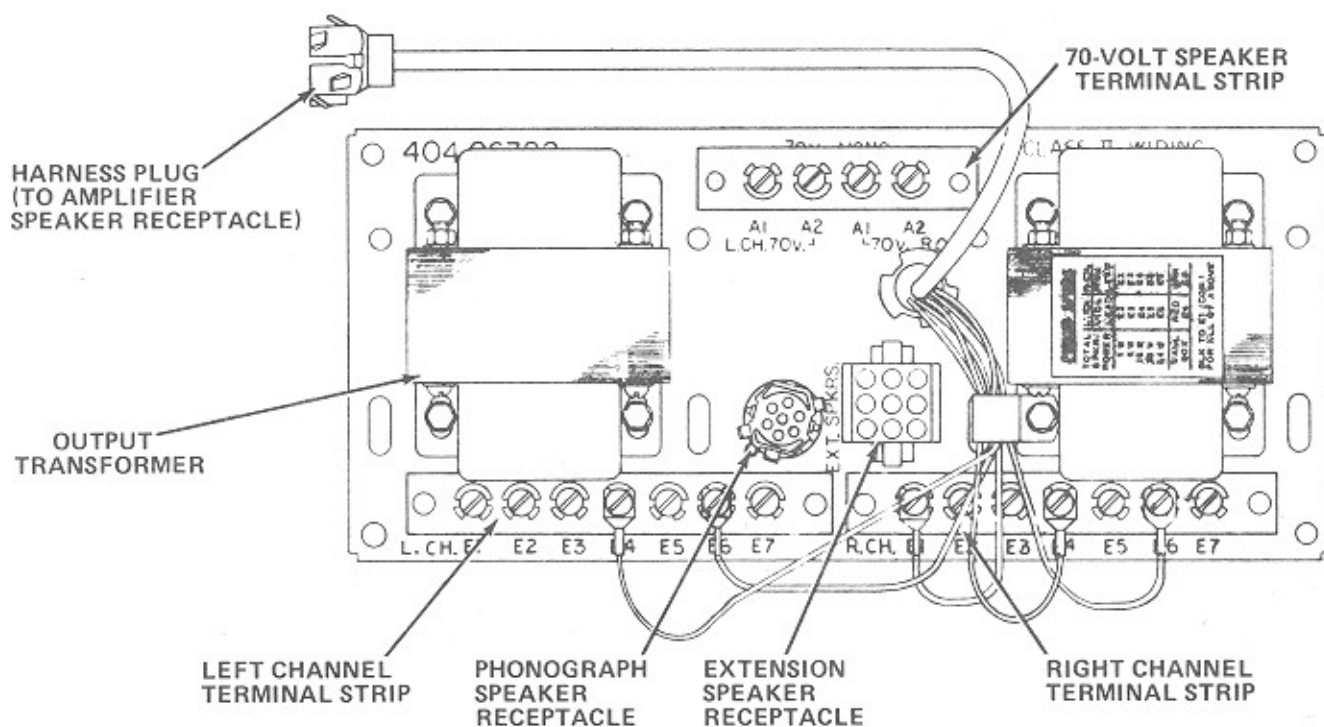
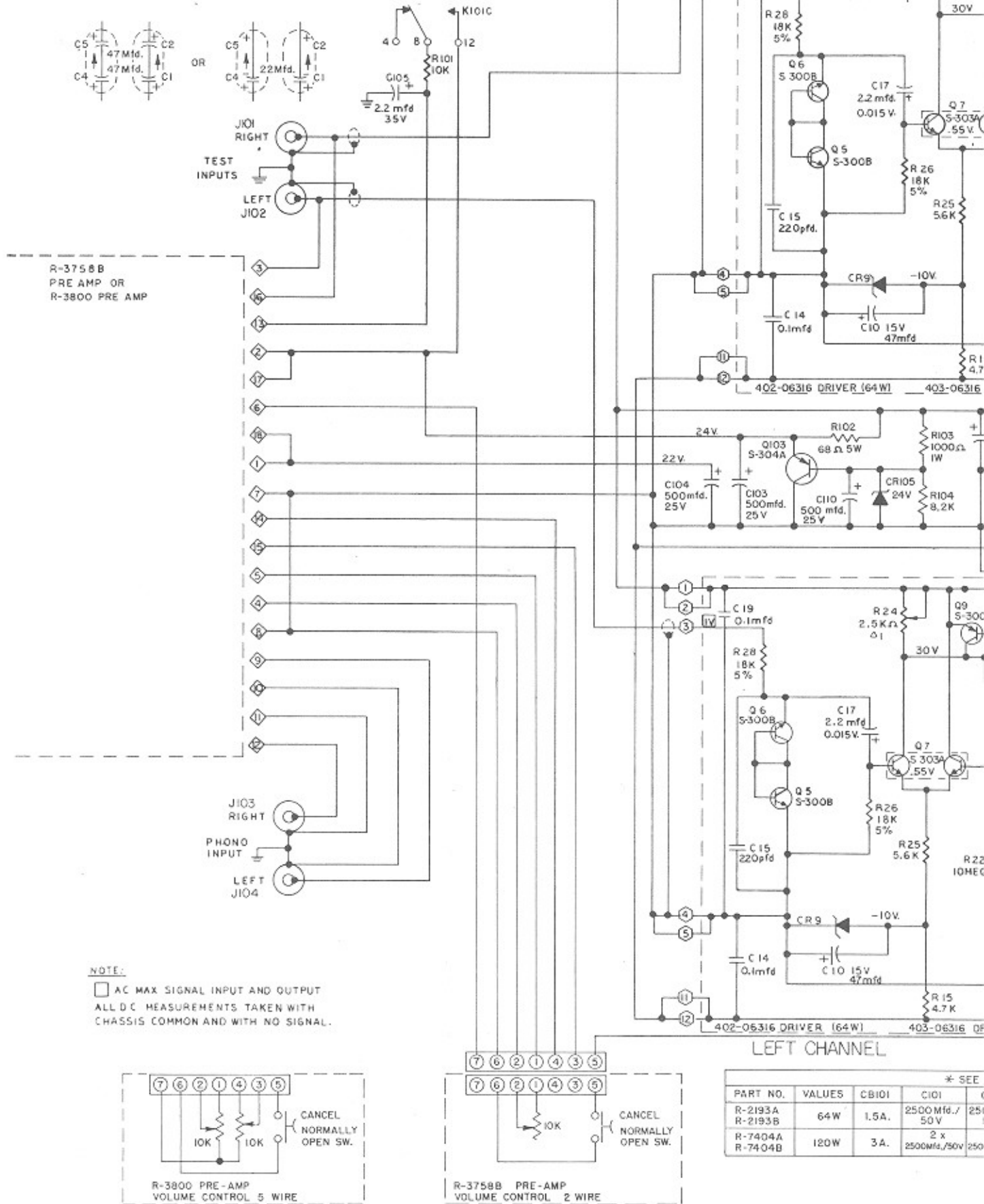


FIGURE 2-30. OUTPUT TRANSFORMER PACKAGE COMPONENTS

**FOR THIS SECTION, SELECT VIEW(TOP TOOL  
BAR),THEN CLICK ON PAGE LAYOUT,THEN  
FACING**



1. POTENTIOMETER SET FOR  $\pm 5$  MILLIVOLTS OFFSET VOLTAGE AT FACTORY. DO NOT ADJUST
2. CAPACITORS C1, C2 & C4, C5 MAY SHOW UP ON SOME 402-06316 BOARDS AS A SINGLE 22mfd/10V POLAR CAPACITOR.



**NOTE:**

□ AC MAX SIGNAL INPUT AND OUTPUT  
 ALL DC MEASUREMENTS TAKEN WITH  
 CHASSIS COMMON AND WITH NO SIGNAL.

PART NO.	VALUES	CB101	C101	* SEE
R-2193A	64W	1.5A.	2500Mfd./	25
R-2193B			50V	
R-7404A	120W	3A.	2 x	
R-7404B			2500Mfd./50V	250

FIGURE 2-31. 64 WATT AMPLIFIER SCHEMATIC DIAGRAM





# POWER AMPLIFIER

COMPONENT REF.

DESIGNATION

DESCRIPTION

ROWE  
PART NO.

601-2193  
602-2193  
64 Watt

601-7404  
602-7404  
120 Watt

C101, C102	Capacitor, Electrolytic, 2500 MFD, 50 V	201-15181	2	4
C103, C104,	Capacitor, Electrolytic, 500 MFD, 25 V	711-00233	3	3
C110				
C105	Capacitor, Tantalum, 2.2 MFD, 35 V	712-00251	1	1
C106	Capacitor, Mylar, 0.1 MFD, 400 V	701-00213	1	1
CB101	Circuit Breaker, 1.5 Amp	715-00733	1	
C	Circuit Breaker, 3 Amp	717-00733		1
CR101 to CR104	Diode, Silicon (Motorola No. MR 752)	710-00350	4	4
CR105	Diode, Zener, 24 V	712-00355	1	1
K101	Relay (Potter and Brumfield No. KH4487-1)	200-12751	1	1
Q1	Transistor, Darlington Amplifier, Silicon, PNP (Motorola No. MJE6041)	705-00302	2	
	Transistor, Darlington Amplifier, Silicon, PNP (Motorola No. MJ4031)	707-00302		2
Q2	Transistor, Darlington Amplifier, Silicon, NPN (Motorola No. MJE6044)	704-00302	2	
	Transistor, Darlington Amplifier, Silicon, NPN (Motorola No. MJ4034)	706-00302		2
Q103	Transistor, Silicon, PNP	701-00304	1	1
R101	Resistor, Carbon, 10 K, 1/2 W	713-00102	1	1
R102	Resistor, Wire Wound, 68 Ohm, 5 W	716-00110	1	1
R103	Resistor, Carbon, 1 K, 1 W	711-00103	1	1
R104	Resistor, Carbon, 8.2 K, 1/4 W	7-9900-822	1	1
T101	Transformer, Power	401-06317	1	
	Transformer, Power	401-06337		1

## MISCELLANEOUS PARTS

Cord and Plug Assembly	702-00502	1	1
Strain Relief	705-02322	1	1
Retaining Bracket (Pre-Amp Edge Connector)	200-09295	2	2
Heat Sink	401-06321	1	
Heat Sink	401-06338		1
Insulator, Mica	201-15196	4	
Insulator, Mica	201-12189		4
Washer, Torque	201-15197	4	
Eyelet,	207-03709	2	
Washer	720-01208	2	
Chassis Assembly with Lettering	601-02192	1	
Chassis Assembly with Lettering	601-07403		1
	602-07403		
Circuit Board Support	705-05000	8	8

## DRIVER BOARD ASSEMBLY (2 REQUIRED)

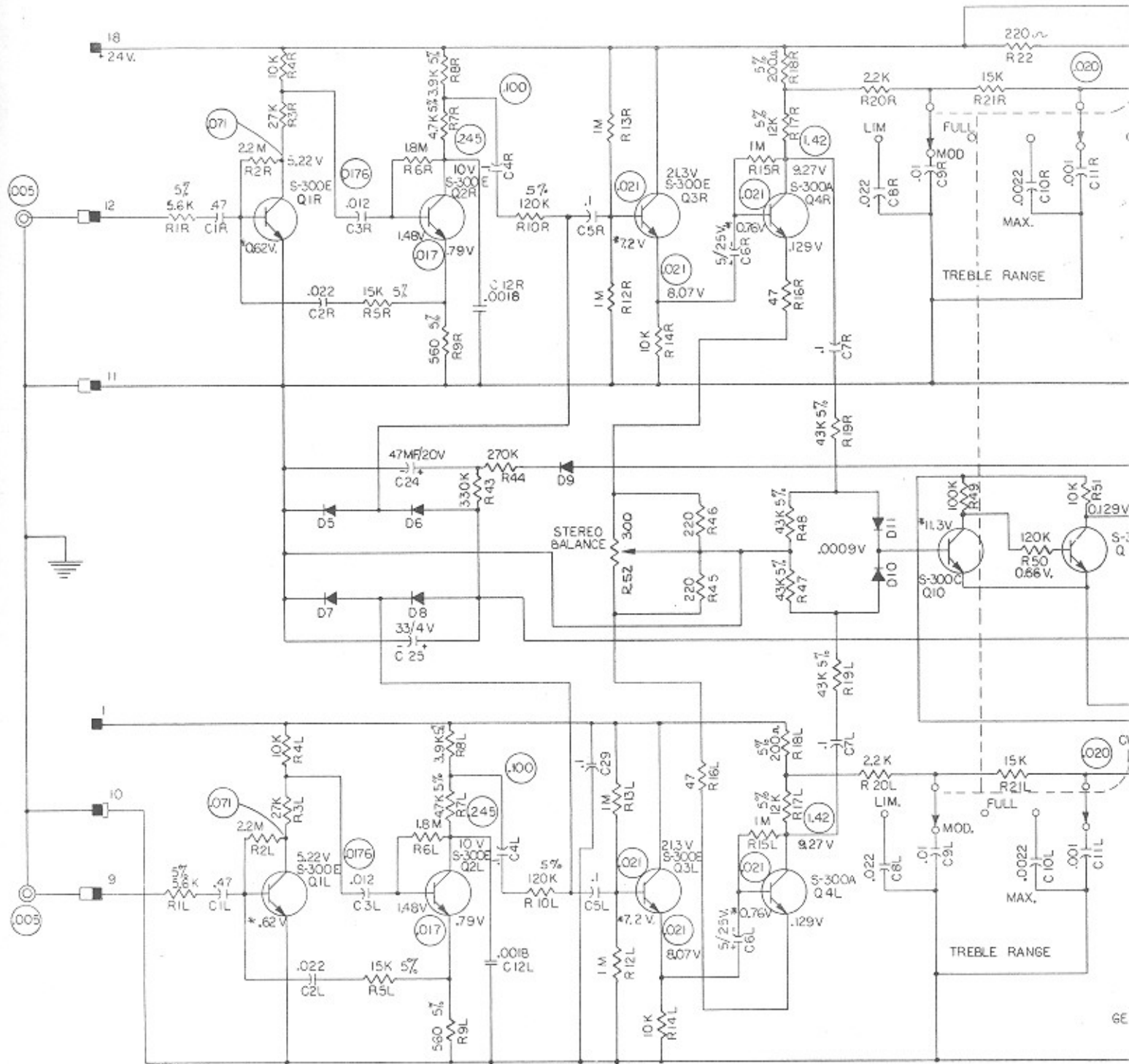
C1, C2	Capacitor, Tantalum, 47 MFD, 15 V	702-00251	2	2
C3	Capacitor, Mylar, 0.01 MFD, 100 V	707-00240	1	1
C4, C5	Capacitor, Tantalum, 47 MFD, 15 V	702-00251	2	2
C6	Capacitor, Ceramic Disc, 470 pFd, 100 V			
C7	Capacitor, Electrolytic, 100 MFD, 50 V	719-00233	1	1
C9	Capacitor, Ceramic Disc, 220 pFD, 100 V	706-00224	1	1
C10	Capacitor, Tantalum, 47 MFD, 15 V	702-00251	1	1
C11	Capacitor, Mylar, 0.01 MFD, 100 V	707-00240	1	1
C12	Capacitor, Mylar, 0.1 MFD, 100 V	702-00240	1	1
C13	Capacitor, Tantalum, 15 MFD, 15 V	705-00251	1	1
C14	Capacitor, Mylar, 0.1 MFD, 100 V	702-00240	1	1
C15	Capacitor, Ceramic Disc, 220 pFD, 100 V	706-00224	1	1
C16	Capacitor, Ceramic Disc, 100 pFD, 100 V	707-00224	1	1
C17	Capacitor, Tantalum, 2.2 MFD, 15 V	707-00251	1	1

COMPONENT REF. DESIGNATION	DESCRIPTION	ROWE PART NO.	601-2193 602-2193 64 Watt	601-7404 602-7404 120 Watt
C18	Wire Jumper	Spec. 5039	1	1
C19	Capacitor, Mylar, 0.1 MFD, 100 V	702-00240	1	1
CR1 to CR8	Diode, Silicon (1N4002)	702-00350	8	8
CR9	Diode, Zener (1N961B)	714-00355	1	1
F1, F2	Fuse, Cartridge, 3 Amp	701-00720	2	
	Fuse, Cartridge, 5 Amp	709-00720		2
Q3, Q8, Q9	Transistor, Silicon, PNP (MPS-A56)	704-00301	3	3
Q4	Transistor, Silicon, NPN (MPS-A06)	708-00300	1	1
Q5, Q6	Transistor, Silicon, NPN	702-00300	2	2
	Transistor, Silicon, Dual NPN (Motorola MD8002; 2N2919; Fairchild, Texas Instr. Nat'l Semi-Cond)	701-00303	1	1
		701-00303	1	1
R1, R2	Resistor, Wire Wound, 0.47 Ohm, 2 W	714-00113	2	
	Resistor, Wire Wound, 0.2 Ohm, 2 W	701-00126		2
R3	Resistor, Carbon, 180 Ohm, 1/4 W	7-9901-181	1	1
R4	Resistor, Carbon, 220 Ohm, 1/4 W	7-9901-221	1	1
R5, R6	Resistor, Carbon, 15 K, 1/4 W	7-9901-153	2	2
R7	Resistor, Carbon, 820 Ohm, 1/4 W	7-9901-821	1	1
R8	Resistor, Carbon, 2.2 K, 1/4 W	7-9901-222	1	1
R9	Resistor, Carbon, 470 Ohm, 1/4 W	7-9901-471	1	1
R10	Resistor, Carbon, 180 Ohm, 1/4 W	7-9901-181	1	1
R11	Resistor, Carbon, 390 Ohm, 1/4 W	7-9901-391	1	1
R12	Resistor, Carbon, 220 Ohm, 1/4 W	7-9901-221	1	1
R13	Resistor, Carbon, 2.7 K, 1/4 W	7-9901-272	1	1
R14	Resistor, Carbon, 2.2 K, 1/4 W	7-9901-222	1	1
R15	Resistor, Carbon, 4.7 K, 1/4 W	7-9901-472	1	1
R16	Resistor, Wire Wound, 0.27 Ohm, 2 W	718-00113	1	
	Resistor, Wire Wound, 0.1 Ohm, 2 W	702-00126		1
R17	Resistor, Carbon, 22 Ohm, 1 W	716-00108	1	1
R18	Resistor, Carbon, 470 Ohm, 1/4 W	7-9901-471	1	1
R19	Resistor, Carbon, 68 Ohm, 1/4 W	7-9901-680	1	
	Wire Jumper			1
R20	Resistor, Carbon, 15 K, 1/4 W	7-9901-153	1	1
R21	Wire Jumper	Spec. 5039	1	1
R22	Resistor, Carbon, 10 MEG, 1/4 W	7-9901-106	1	1
R23	Resistor, Carbon, 47 Ohm, 1/4 W	7-9901-470	1	1
R24	Linear Potentiometer, 2.5 K, 1/4 W	701-00400	1	1
R25	Resistor, Carbon, 5.6 K, 1/4 W	7-9901-562	1	1
R26	Resistor, Carbon, 18 K, 1/4 W	7-9901-183	1	1
R28	Resistor, Carbon, 18 K, 1/4 W	7-9901-183	1	1
Z1	Diode Assembly, Bias (Made up of Three 711-00350)	301-03693	1	1

#### MISCELLANEOUS PARTS

Transistor Socket (2 required)(Molex No. 09-52-3030)	201-15180	2	
Fuse Clip	200-50775	4	4
Driver Circuit Board	403-06315	1	1
Polarization Wafer	703-00750		1
Polarization Wafer	704-00750		1

ELECTRONIC PARTS LIST, 64 WATT AMPLIFIER



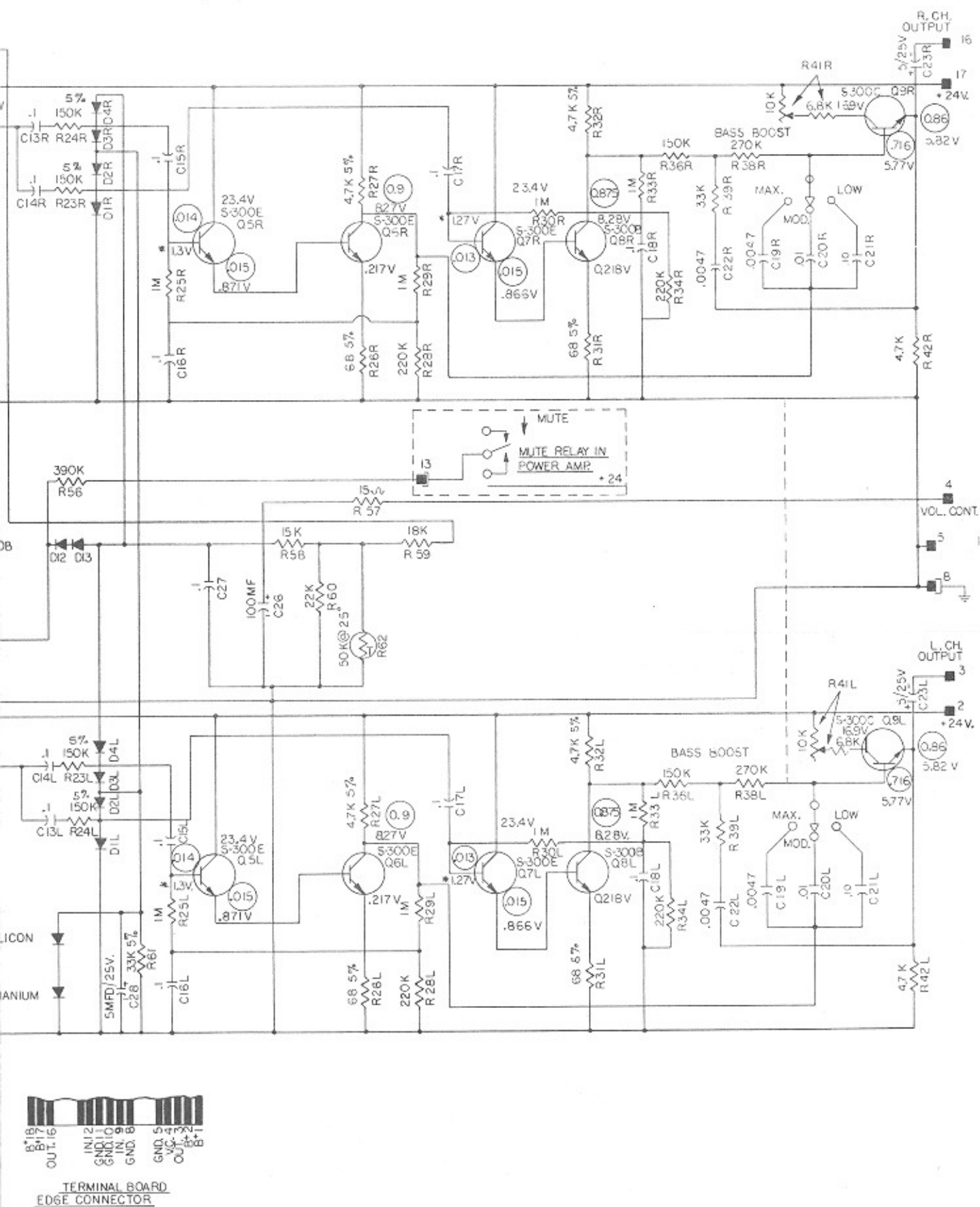


FIGURE 2-32. PREAMPLIFIER SCHEMATIC DIAGRAM

COMPONENT REF  
DESIGNATION

DESCRIPTION

ROWE  
PART NO.

PRE-AMPLIFIER ASSEMBLY (2 WIRE VOLUME CONTROL) 602-03758

C1R, C1L	Capacitor, Mylar, 0.47 MFD, 100V (Paktron FM 11000; Electromotive P94741-1)	701-00240
C2R, C2L	Capacitor, Mylar, 0.022 MFD 400V (Paktron FM 720; Sprague 225P)	702-00241
C3R, C3L	Capacitor, Mylar, 0.012 MFD, 100V (Paktron FM 590; Sprague 225P)	703-00241
C4R, C4L	Capacitor, Mylar, 0.1 MFD, 100V (Paktron FM 720; Sprague 225P)	702-00240
C5R, C5L	Capacitor, Mylar, 0.1 MFD, 100V (Same as C4)	702-00240
C6R, C6L	Capacitor, Electrolytic, 5 MFD, 25V (Sprague 30D; G.E. 76F; Mallory TT)	702-00233
C7R, C7L	Capacitor, Mylar, 0.1 MFD, 100V (Same As C4)	702-00240
C8R, C8L	Capacitor, Mylar, 0.022 MFD, 100V (Sprague 225P; Paktron FM720; G.E. 75 FIRA)	704-00240
C9R, C9L	Capacitor, Mylar, 0.01 MFD, 100V (Sprague 225P; Paktron FM720; Electromotive P91031-1)	707-00240
C10R, C10L	Capacitor, Ceramic Disc, 0.0022 MFD, 100V	703-00224
C11R, C11L	Capacitor, Ceramic Disc, 0.001 MFD, 100V	702-00224
C12R, C12L	Capacitor, Ceramic Disc, 0.0018 MFD, 100V	712-00224
C13R, C13L	Capacitor, Mylar, 0.1 MFD, 100V (Same as C4)	702-00240
C14R, C14L	Capacitor, Mylar, 0.1 MFD, 100V (Same as C4)	702-00240
C15R, C15L	Capacitor, Mylar, 0.1 MFD, 100V (Same as C4)	702-00240
C16R, C16L	Capacitor, Mylar, 0.1 MFD, 100V (Same as C4)	702-00240
C17R, C17L	Capacitor, Mylar, 0.1 MFD, 100V (Same as C4)	702-00240
C18R, C18L	Capacitor, Mylar, 0.1 MFD, 100V (Same as C4)	702-00240
C19R, C19L	Capacitor, Mylar, 0.0047 MFD, 100V (Same Type as C3)	716-00240
C20R, C20L	Capacitor, Mylar, 0.01 MFD, 100V (Same as C9)	707-00240
C21R, C21L	Capacitor, Mylar, 0.033 MFD, 100V (Same Type as C2)	710-00240
C22R, C22L	Capacitor, Ceramic Disc, 0.0047 MFD, 100V	716-00224
C23R, C23L	Capacitor, Electrolytic, 5 MFD, 25V (Same as C6)	702-00233
C24	Capacitor, Tantalum, 47 MFD, 15V (Sprague 196D; Mallory TDC; I.T.T. TAG, TAP)	702-00251
	Capacitor, Tantalum, 47 MFD, 20V (Sprague 164D; Components, INC. TE3)	Alternate 702-00250
C25	Capacitor, Tantalum, 33 MFD, 4V (Same Type as C24)	701-00251
	Capacitor, Tantalum 33 MFD, 20V (Same Type as Alternate C24)	Alternate 701-00250
C26	Capacitor, Electrolytic, 100 MFD, 6V (Sprague 30D, G.E. 76F; Mallory TT)	706-00233
C27	Capacitor, Mylar, 0.1 MFD (Same As C4)	702-00240
C28	Capacitor, Electrolytic, 5 MFD, 25V (Same As C6)	702-00233
C29	Capacitor, Mylar, 0.1 MFD, 100V (Same As C4)	702-00240
D1R, D1L	Diode, Silicon, (G.E. & ITT No. CD-8502)	707-00350
D2R, D2L	Diode, Silicon, (G.E. & ITT No. CD-8502)	707-00350
D3R, D3L	Diode, Silicon, (G.E. & ITT No. CD-8502)	707-00350
D4R, D4L	Diode, Silicon, (G.E. & ITT No. CD-8502)	707-00350
D5	Diode, Silicon, (G.E. & ITT No. CD-8502)	707-00350
D6	Diode, Silicon, (G.E. & ITT No. CD-8502)	707-00350
D7	Diode, Silicon, (G.E. & ITT No. CD-8502)	707-00350
D8	Diode, Silicon, (G.E. & ITT No. CD-8502)	707-00350
D9	Diode, Silicon, (G.E. & ITT No. CD-8502)	707-00350
D10	Diode, Silicon, (G.E. & ITT No. CD-8502)	707-00350
D11	Diode, Silicon, (G.E. & ITT No. CD-8502)	707-00350
D12	Diode, Silicon, (G.E. & ITT No. CD-8502)	707-00350
D13	Diode, Silicon, (G.E. & ITT No. CD-8502)	707-00350
D14	Diode, Silicon, (G.E. & ITT No. CD-8502)	707-00350
D15	Diode, Germanium, (1N191, ITT, Sylvania, Gen'l Instr.)	701-00351
R1R, R1L	Resistor, Carbon, 5.6K +5%, 1/2 W	718-00106
R2R, R2L	Resistor, Carbon, 2.2 Meg, 1/2 W	704-00102
R3R, R3L	Resistor, Carbon, 27 K 1/2 W	724-00104
R4R, R4L	Resistor, Carbon, 10 K, 1/2 W	713-00102
R5R, R5L	Resistor, Carbon, 15 K +5%, 1/2 W	716-00106
R6R, R6L	Resistor, Carbon, 1.8 Meg, 1/2 W	708-00121
R7R, R7L	Resistor, Carbon, 4.7K, +5%, 1/2 W	707-00107
R8R, R8L	Resistor, Carbon, 3.9K +5%, 1/2W	725-00104
R9R, R9L	Resistor, Carbon, 560 Ohm +5%, 1/2 W	703-00104
R10R, R10L	Resistor, Carbon, 120 K, +5%, 1/2 W	711-00121
R12R, R12L	Resistor, Carbon, 1 Meg, 1/2 W	706-00102
R13R, R13L	Resistor, Carbon, 1 Meg, 1/2 W	706-00102

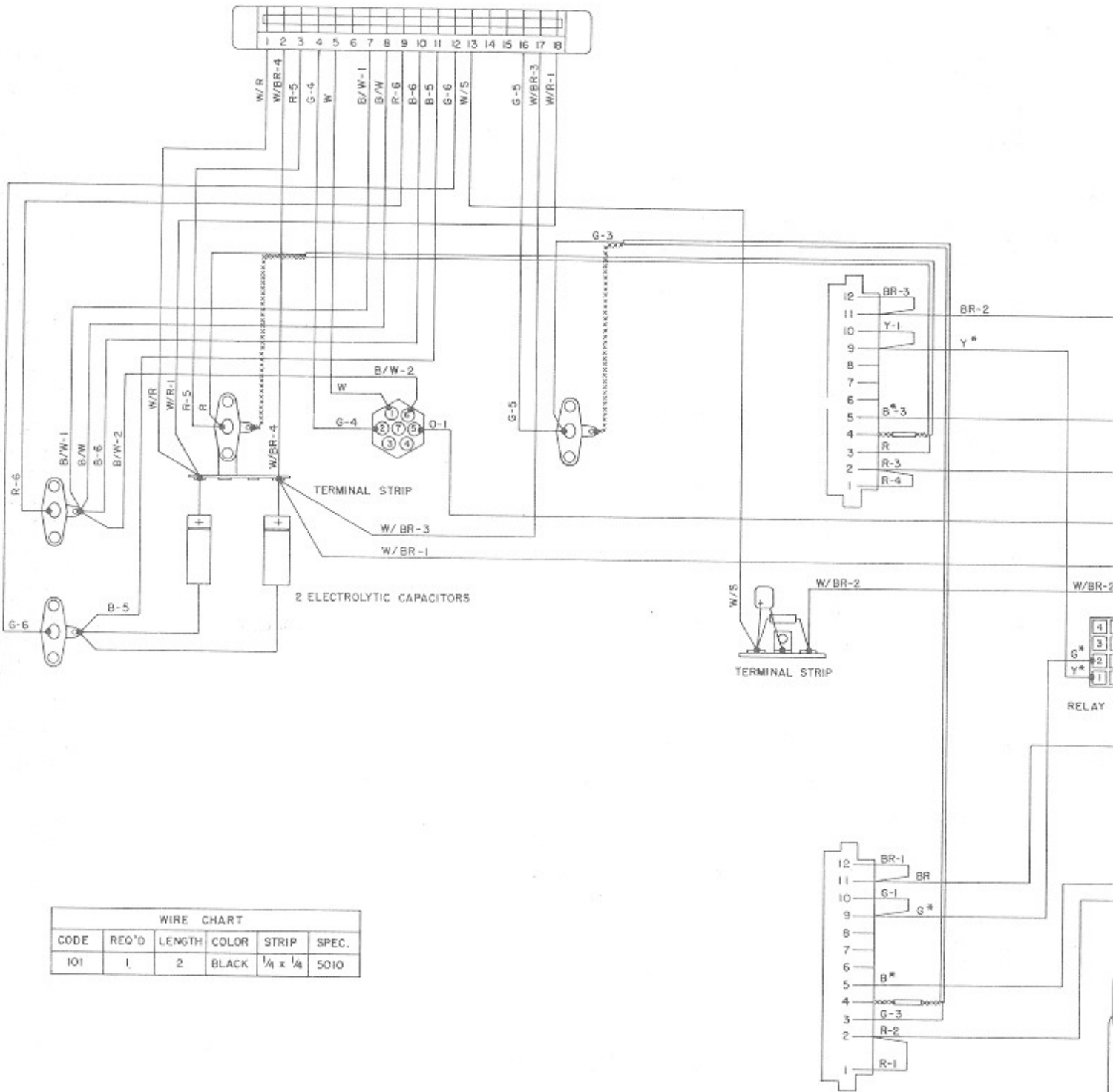


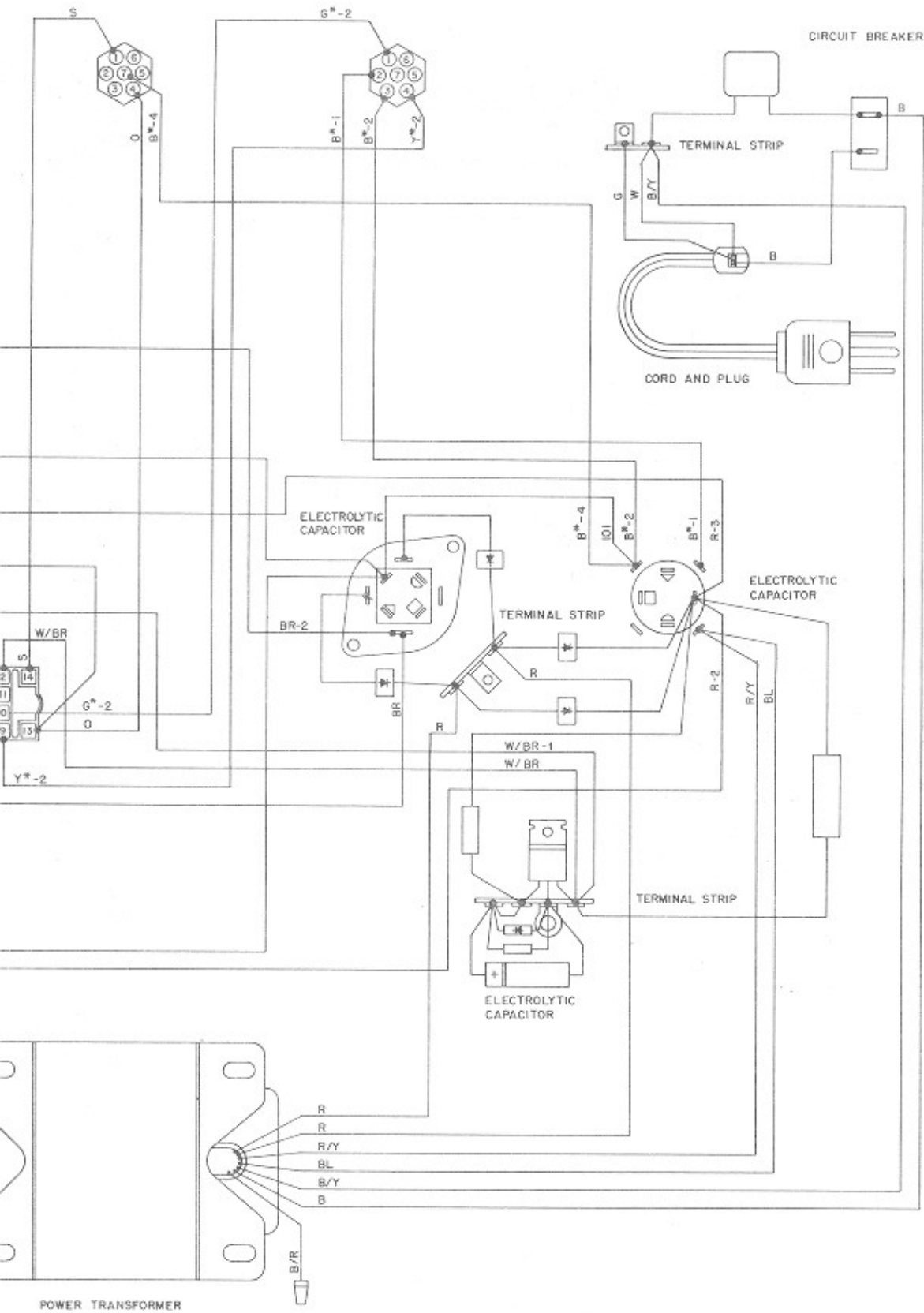
COMPONENT REF  
DESIGNATION

DESCRIPTION

ROWE  
PART NO.

R14R, R14L	Resistor, Carbon, 10 K, 1/2 W	713-00102
R15R, R15L	Resistor, Carbon, 1 Meg, 1/2 W	706-00102
R16R, R16L	Resistor, Carbon, 47 Ohm, 1/2 W	708-00120
R17R, R17L	Resistor, Carbon, 12 K 5%, 1/2 W	714-00107
R18R, R18L	Resistor, Carbon, 200 Ohm +5%, 1/2 W	701-00109
R19R, R19L	Resistor, Carbon, 43 K +5%, 1/2 W	722-00120
R20R, R20L	Resistor, Carbon, 2.2 K, 1/2 W	710-00102
R21R, R21L	Resistor, Carbon, 15 K, 1/2 W	708-00106
R22	Resistor, Carbon, 220 Ohm, 1/2 W	711-00106
R23R, R23L	Resistor, Carbon, 150 K +5%, 1/2 W	712-00121
R24R, R24L	Resistor, Carbon, 150 K +5%, 1/2 W	712-00121
R25R, R25L	Resistor, Carbon, 1 Meg, 1/2 W	706-00102
R26R, R26L	Resistor, Carbon, 68 Ohm, +5%, 1/2 W	705-00109
R27R, R27L	Resistor, Carbon, 4.7 K +5%, 1/2 W	707-00107
R28R, R28L	Resistor, Carbon, 220 K, 1/2 W	707-00102
R29R, R29L	Resistor, Carbon, 1 Meg, 1/2 W	706-00102
R30R, R30L	Resistor, Carbon, 1 Meg, 1/2 W	706-00102
R31R, R31L	Resistor, Carbon, 68 Ohm, +5%, 1/2 W	705-00109
R32R, R32L	Resistor, Carbon, 4.7 K, +5%, 1/2 W	707-00107
R33R, R33L	Resistor, Carbon, 1 Meg, 1/2 W	706-00102
R34R, R34L	Resistor, Carbon, 220K, 1/2 W	707-00102
R36R, R36L	Resistor, Carbon, 150 K, 1/2 W	702-00102
R38R, R38L	Resistor, Carbon, 270 K, 1/2 W	704-00107
R39R, R39L	Resistor, Carbon, 33K, 1/2 W	707-00106
R41R, R41L	Potentiometer, Linear, 10 K (Stackpole No. 20C; CTS No. X-201) with Resistor, Carbon, 6.8 K, 1/2 W	705-00400 718-00104
R42R, R42L	Resistor, Carbon, 4.7K 1/2 W	708-00104
R43	Resistor, Carbon, 330 K, 1/2 W	712-00102
R44	Resistor, Carbon, 270 K, 1/2 W	704-00107
R45, R46	Resistor, Carbon, 220 Ohm, 1/2 W	711-00106
R47, R48	Resistor, Carbon, 43 K +5%, 1/2 W	722-00120
R49	Resistor, Carbon, 100 K, 1/2 W	718-00102
R50	Resistor, Carbon, 120 K, 1/2 W	703-00106
R51	Resistor, Carbon, 10 K, 1/2 W	713-00102
R52	Potentiometer, Linear, 300 Ohm	200-13023
R56	Resistor, Carbon, 390 K, 1/2 W	722-00106
R57	Resistor, Carbon, 15 Ohm, 1/2 W	702-00120
R58	Resistor, Carbon, 15 K 1/2 W	708-00106
R59	Resistor, Carbon, 18 K, 1/2 W	708-00102
R60	Resistor, Carbon, 22 K, 1/2 W	711-00104
R61	Resistor, Carbon, 33 K, +5%, 1/2 W	714-00106
R62	Thermistor, 51 K @ 25°C (Keystone Carbon Co. No. RL2006-26900-150-S2)	701-00370
Q1R, Q1L	Transistor, Silicon, NPN (Sprague Elec. TZ-1205; Motorola SPS 1481; G.E. X32B4683)	705-00300
Q2R, Q2L	Transistor, Silicon, NPN (Sprague Elec. TZ-1205; Motorola SPS 1481; G.E. X32B4683)	705-00300
Q3R, Q3L	Transistor, Silicon, NPN (Sprague Elec. TZ-1205; Motorola SPS 1481; G.E. X32B4683)	705-00300
Q4R, Q4L	Transistor, Silicon, NPN (G.E. X32B4680; Motorola SPS6978)	701-00300
Q5R, Q5L	Transistor, Silicon, NPN (G.E. X32B4680; Motorola SPS6978)	701-00300
Q6R, Q6L	Transistor, Silicon, NPN (See Q1R)	705-00300
Q7R, Q7L	Transistor, Silicon, NPN (See Q1R)	705-00300
Q8R, Q8L	Transistor, Silicon, NPN (G.E. X32B4682; Motorola SPS6979)	702-00300
Q9R, Q9L	Transistor, Silicon, NPN (G.E. X32B4686; Motorola SPS6980)	703-00300
Q10	Transistor, Silicon, NPN (G.E. X32B4686; Motorola SPS6980)	703-00300
Q11	Transistor, Silicon, NPN (See Q8R)	702-00300
<b>MISCELLANEOUS PARTS</b>		
	Switch, Rotary, 4 Pole, 3 Position, Non-Shorting (Treble Range Control)	200-13024
	Switch, Rotary, 2 Pole, 3 Position, Non-Shorting, (Stereo Balance)	200-13025
	Circuit Board, Pre-Amplifier	602-03788

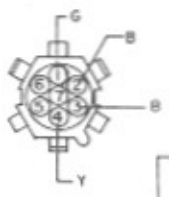
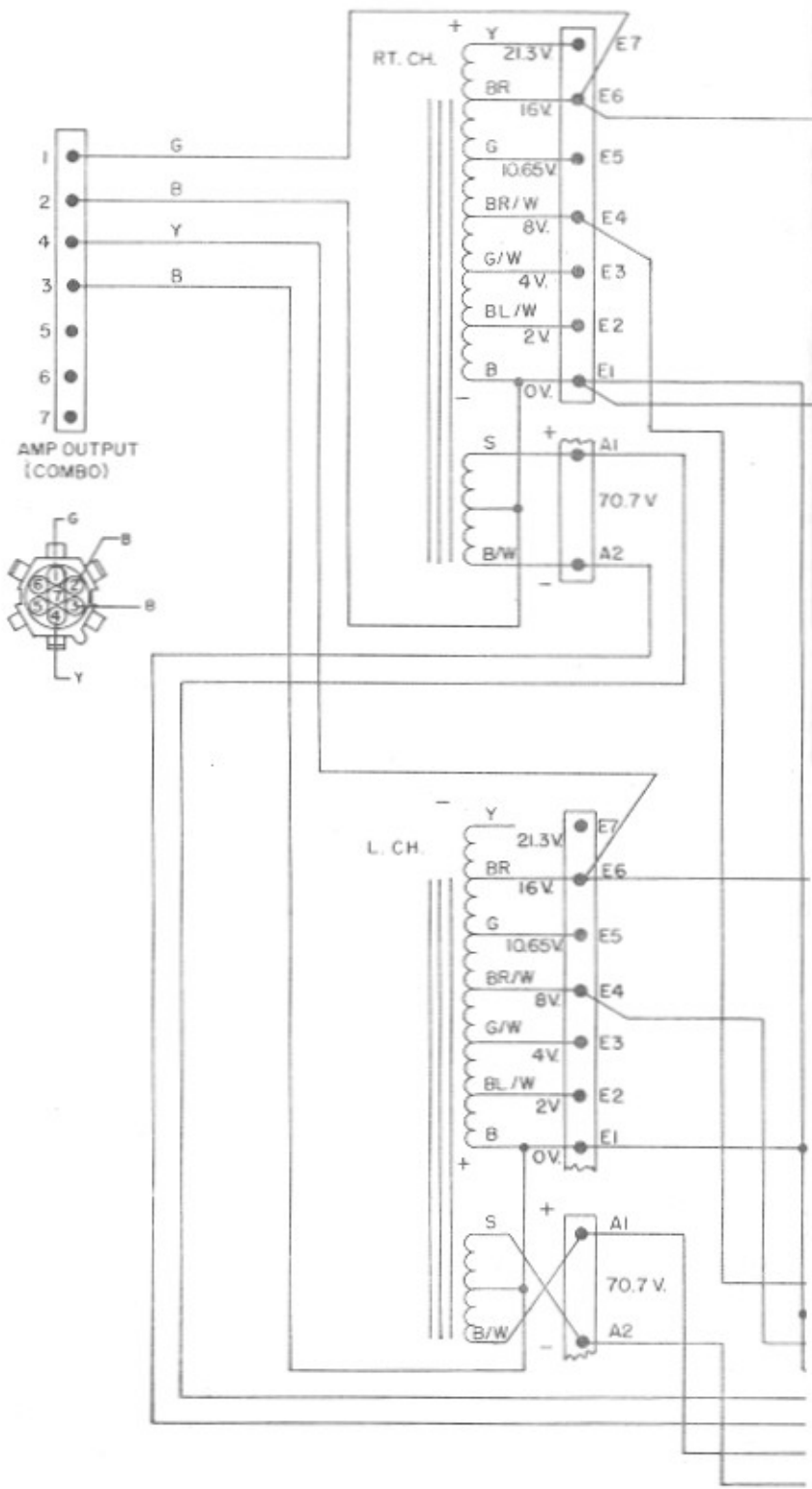




WIRING DIAGRAM - POWER AMP. (64 W)  
 EQUIV. ENG. DWG. R-2193A-Q-1 [K]

201-17246

FIGURE 2-33. AMPLIFIER WIRING DIAGRAM



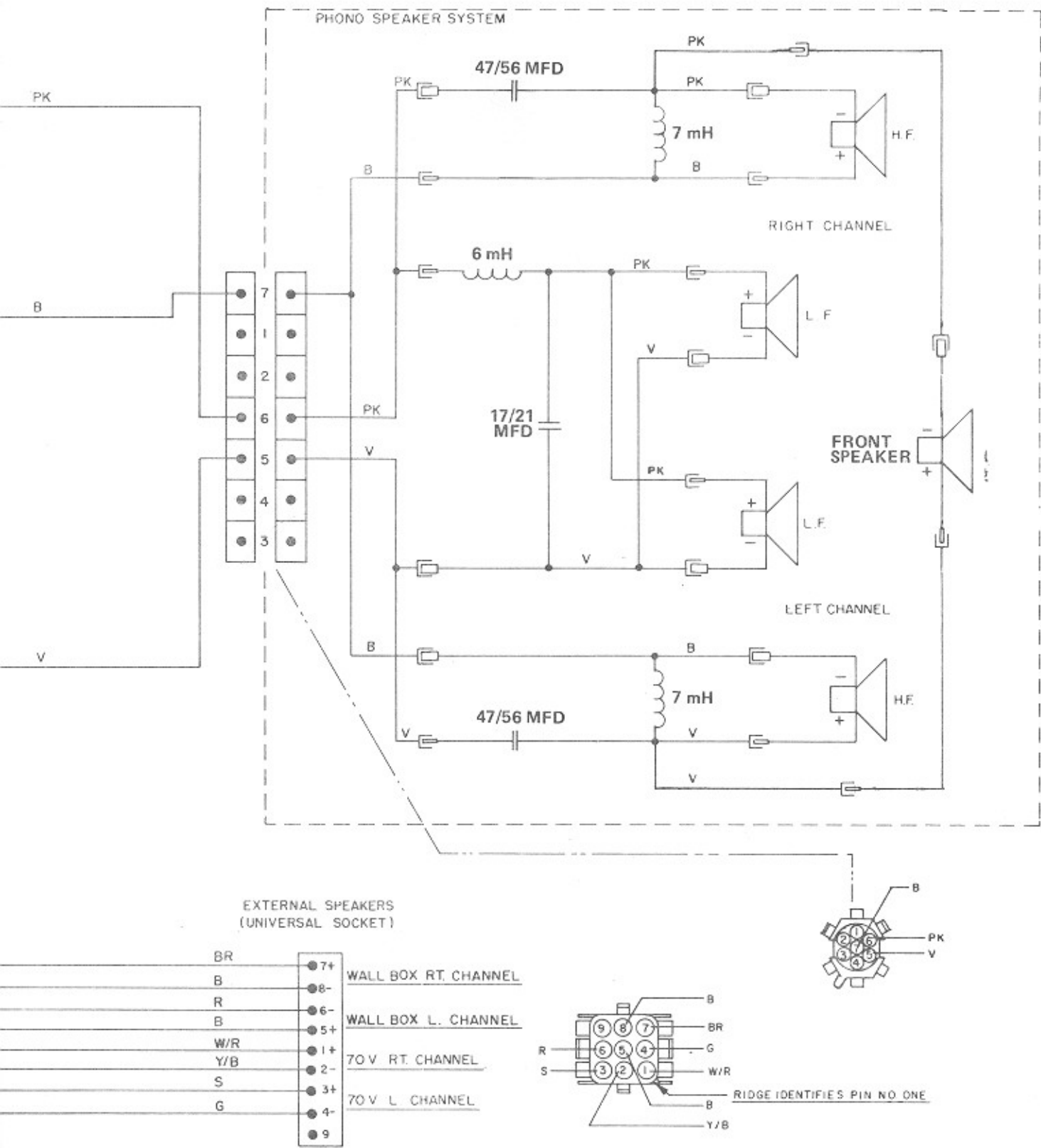
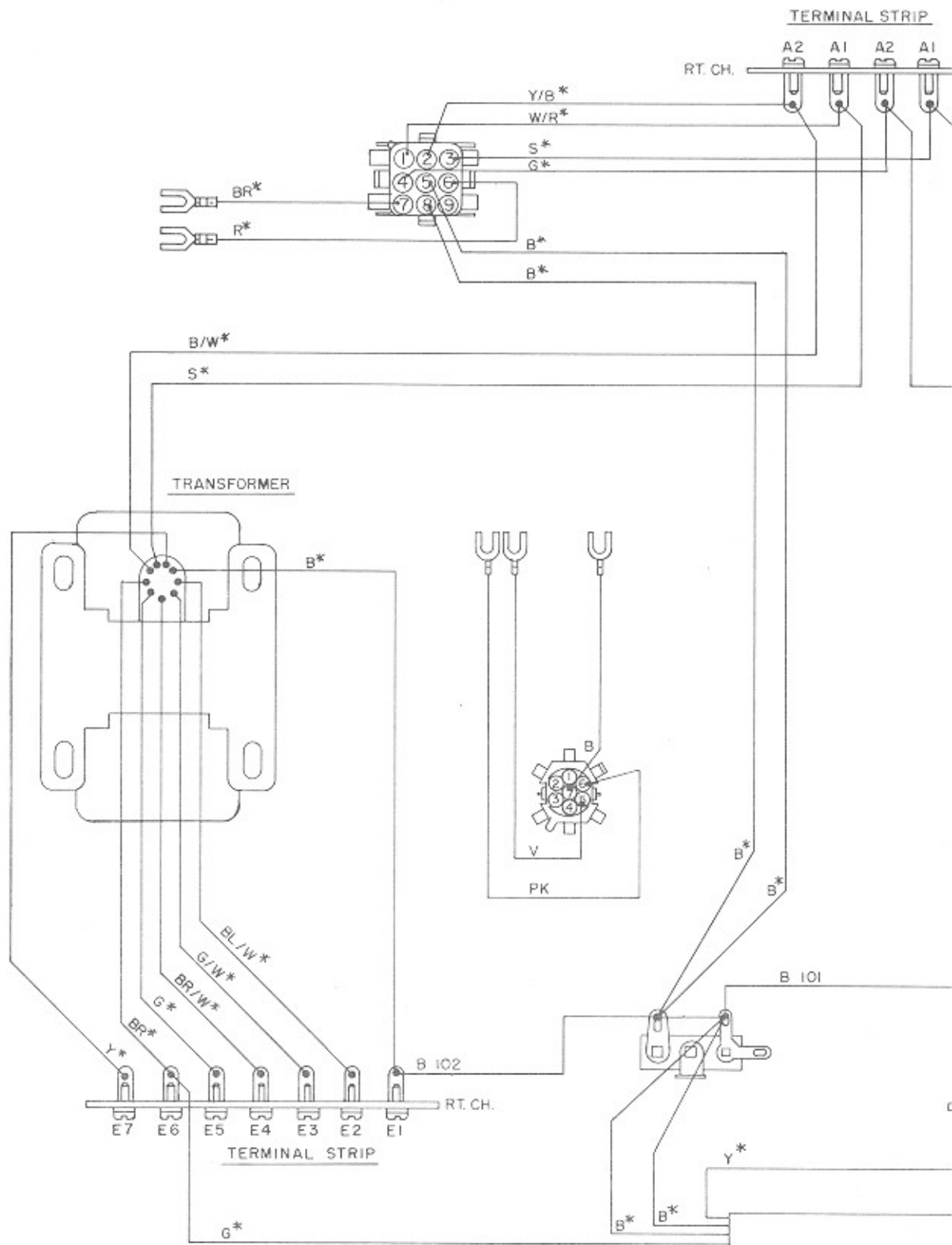


FIGURE 2-34. TRANSFORMER PACKAGE SCHEMATIC DIAGRAM





CODE	REQD	LENGTH	STRIP	COLOR	SPEC
101	1	4	7/32 X 1	BLACK	5038
102	1	4	7/32 X 7/32	BLACK	5038

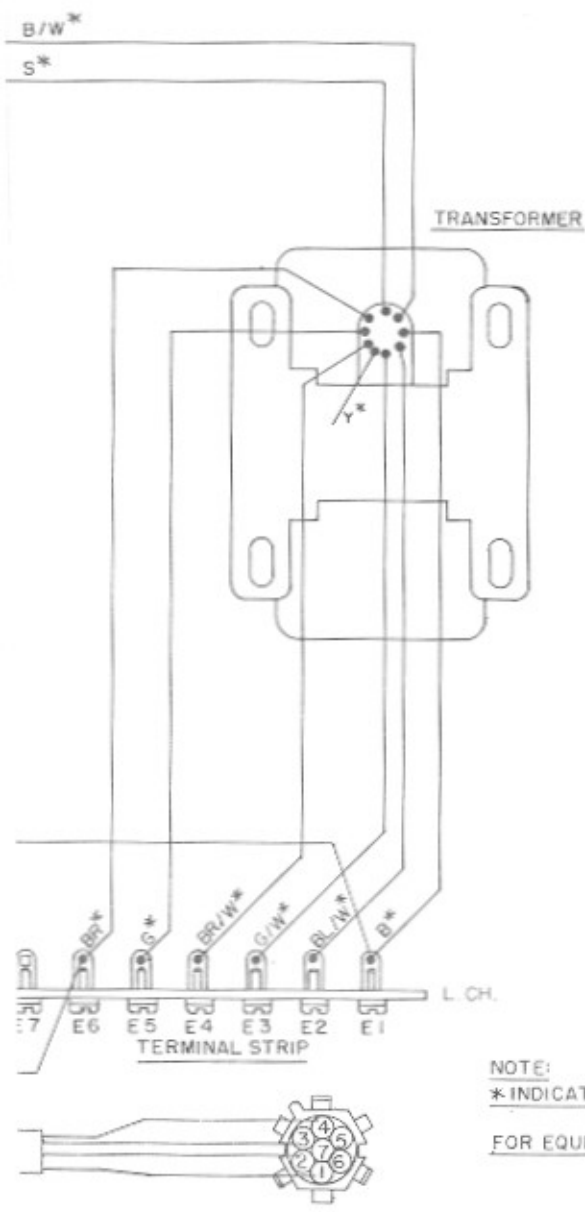


FIGURE 2-35. TRANSFORMER PACKAGE WIRING DIAGRAM