

*assembly-operating
manual for the*

P A C O

*40-watt stereophonic
preamplifier-amplifier
kit... model SA-40*



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manual... net price \$2.00

IMPORTANT NOTICE: You may turn to Page 11 of this Manual if you wish to begin immediate construction of your SA-40. After construction has been completed, you will use the descriptive information on Pages 2 through 10 to assist you in the set-up of your complete installation.

INTRODUCTION

The PACO Model SA-40 is a combination stereo preamplifier and power amplifier in one compact, self-contained package. Its output is rated at a full 20 watts steady-state per channel, or a total of 40 watts.

An examination of the SA-40 specifications immediately reveals the exceptional performance and flexibility of the SA-40 in any stereo system. It is the answer to the problem of selecting a top-quality stereo preamplifier-amplifier that will never become obsolete.

The styling of the PACO Model SA-40 harmonizes with the decor of almost any living room. The gold and satin black metallic finish blends with the variety of colors found in today's living room furniture and accessories.

SA-40 FEATURES AND SPECIFICATIONS

1. POWER OUTPUT:

A. Steady-State Power Output:
20 watts per channel; 40 watts total.

B. Music Waveform Power Output: 25 watts per channel, 50 watts total.

C. Peak Power Output (Steady State): 40 watts per channel, 80 watts total.

2. FREQUENCY RESPONSE:

± 1.0 db, 30 cps to 90 kc, measured at 1 watt steady-state output.

3. DISTORTION:

A. Harmonic: Less than 0.5% at an output of 20 watts per channel. Less than 0.2% at an output of up to 10 watts per channel.

B. Intermodulation (IM): Less than 2% at full-rated output.

4. SENSITIVITY FOR RATED OUTPUT:

Aux. Input: 0.75 volts

Tuner: 0.75 volt

Phono 1: 5 millivolts (magnetic)

Phono 2: 5 millivolts (magnetic)
0.3 volt (ceramic)

5. TRANSIENT CHARACTERISTICS:

No detectable ringing. Exceptionally stable, even with capacitive loads such as presented by electrostatic speakers.

6. INVERSE FEEDBACK:

25 db

7. DAMPING FACTOR:

22

8. HUM AND NOISE LEVEL:

High-level Input: 70 db below rated output.

Low-level Input: 60 db below rated output.

Tape Input: 60 db below rated output.

9. TONE-CONTROL RANGE:

Bass: ± 15 db at 50 cps

Treble: ± 15 db at 10 kc

10. RUMBLE FILTER:

6 db per octave below 50 cps.

11. EQUALIZATION:

Phono: RIAA, EUR

Tape: 7 1/2 and 3 3/4 ips, NARTB

12. TAPE OUTPUT LEVEL:

2 volts per channel, not affected by the setting of the Loudness and Tone controls.

13. SPEAKER CONNECTIONS:

4, 8, 16, and 32 ohms. (Permits use of 16-ohm speakers for strapped monophonic connection.)

14. POWER SUPPLY:

Low impedance; highly regulated for minimum distortion on extended high-level passages.

15. TUBES AND RECTIFIERS:

2 each, 12AX7/ECC83
1 each, 12AX7/7025
2 each, 7199
4 each, 7189
2 each, silicon power rectifiers
1 each, selenium bias rectifier

16. POWER REQUIREMENTS:

117 volts AC, 50-60 cps, 175 watts.

17. SIZE AND WEIGHT:

15 3/8 inches wide, 11 3/4 inches deep, 5 5/8 inches high; shipping weight, 25 lbs.

18. INPUTS:

14 — 3 dual high-level; 4 dual low-level.

19. OUTPUTS:

Dual tape
Separate preamp output
Standard dual-speaker outputs

20. FRONT-PANEL CONTROLS AND SWITCHES:

1. Two-position Equalization switch.
2. Mode selector: Balance Left, Balance Right, Monophonic, Stereo, Stereo Reverse, Channel Right, and Channel Left.
3. Rumble Filter switch.
4. Contour switch (compensates for Fletcher-Munson characteristic).
5. Two Speaker System Selector switches: Permit flexible control of remote stereo or monaural speaker systems.
6. Input Selector switch: Aux. 1, Aux. 2, Tuner, Phono 1, Phono 2, Tape Head, and Microphone. Tuner position automatically accepts multiplex connections from tuners or from multiplex adapters.
7. Calibrated Balance control.
8. Loudness (volume) control.
9. Separate Bass and Treble controls for each channel.

21. EXTERNAL DESIGN:

Gold and satin black hooded case with illuminated panel; satin gold panel for universal decor blend.

GENERAL INSTALLATION NOTES

Recommended Physical Placement

1. The SA-40 may be placed on an open equipment bench or stacked with a companion FM-AM tuner. However, do not mount a tuner on top of the SA-40 because heat dissipation from the output tubes will be blocked.

2. When the SA-40 is stacked, it should be the top unit of the stacked units.

3. When the SA-40 is installed in a custom-made cabinet, the complete unit should be mounted in the cabinet panel because the bottom of the metal case is also the bottom shield for the chassis. In addition, the decorative bezel improves the appearance of the installed amplifier. When the SA-40 is mounted in a custom panel, the panel should be carefully cut to the exact dimensions of the carrying case. See enclosed custom-installation template and instruction sheet.

Ventilation Notes

1. There should be sufficient clearance for air circulation in the custom installation, so that the heat generated by the power output tubes and transformers of the SA-40 can be dissipated.

CONNECTION OF CABLES AND LEADS TO THE SA-40

Standard Stereo Connections

1. For a standard stereo setup, the Separate-Parallel slide switch on the top of the SA-40 chassis must be in the Separate position. For a two-speaker stereo connection, see Fig. 1. If an additional pair of speakers is to be connected in another room, see Fig. 2.

2. The two cables from a turntable are connected to either the Phono 2 or the Phono 1 jacks. Turntables or changers with magnetic cartridges should be connected to the Phono 1 jacks. If an additional turntable or changer is to be connected to the SA-40, the two cables from this additional unit should be connected to the Phono 2 jacks. The amplifier wiring for installations in which the second phonograph contains a ceramic or magnetic cartridge is discussed under "Input Connections" on page 7.

3. The output from an FM tuner can be connected to either Tuner jack. If the tuner is the FM-AM simulcast type, its two cables should be connected to the two tuner jacks, the AM cable in the right, the FM cable in the left. If the Tuner is an FM type and is to be used with a multiplex adapter for multiplex FM reception, the output from the adapter should be connected to one of the Tuner jacks. In both instances, the main output of the tuner should be connected to one of the Tuner jacks.

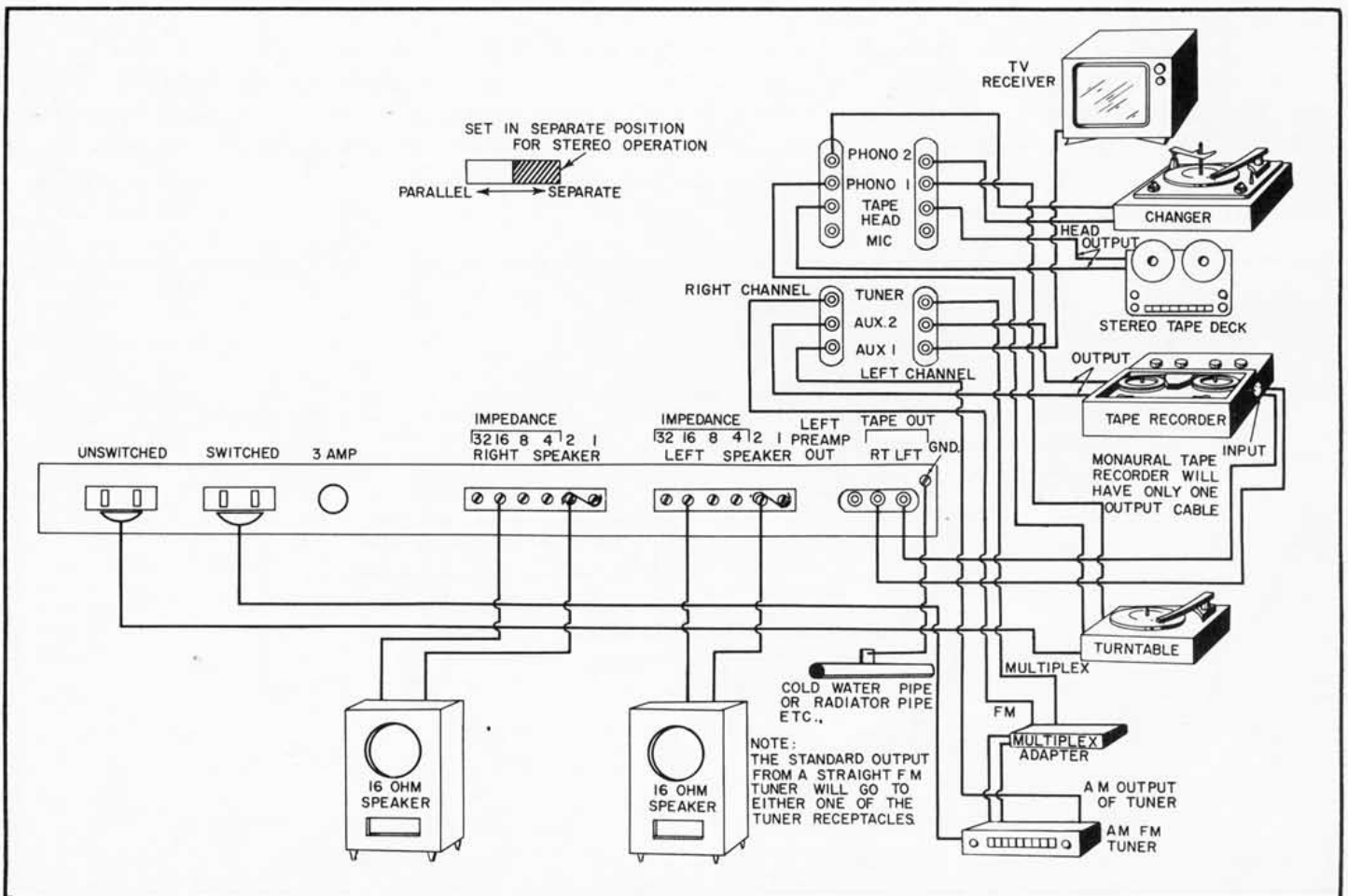


Fig. 1. Connection of Cables and Leads to the SA-40, and Speaker Connections for a Two-Speaker System.

4. If the output from the head of a tape deck or tape recorder is to be connected to the SA-40, the two jacks labeled Tape Head should be used. If one or two microphones are to be connected to the SA-40, the Mic jack should be used.

5. The Aux 2 and Aux 1 jacks are used to connect the output from a miscellaneous source, such as a TV receiver, or a tape recorder with its own built-in preamp.

6. One of the most annoying problems in a Hi-Fi system is hum due to improper grounding connections. The manufacturer of the record player or cartridge, for example, usually suggests the correct method for obtaining minimum hum, plus alternate methods for minimizing hum. To avoid hum pickup when the record player contains a magnetic cartridge, be sure there is a minimum of 12 inches between the cartridge and the power transformer on the SA-40. This rule also applies to other transformers and motors, such as the ones for tuners, tape recorders, etc. If the intergrounding of the equipment is not satisfactory, a wire from the ground screw on the SA-40 chassis to the nearest cold or hot water pipe will often further reduce residual hum. See Fig. 1.

Stereo Setup When a Separate Power Amplifier is Used for One of the Channels

All input connections, such as phono tuner, tape, etc., are the same as those for the standard stereo setup discussed previously. The only difference is in the connection of the speakers and in the use of the Left Preamp Out jack on the rear apron of the chassis.

1. If you already own a separate power amplifier and would like to use it to power one speaker system of the stereo setup, your SA-40 can be operated as a complete stereo preamp. Your own power amplifier can power one channel; and the two power amplifiers of the SA-40 can be "strapped," or connected together, to power the other channel. The two power amplifiers of the SA-40 will double the output and will permit continued use of the original power amplifier.

2. For this type of setup, the Parallel-Separate switch is set to the Parallel position. It will be necessary to parallel the appropriate speaker outputs on the rear apron of the SA-40. (See Fig. 3.) If 16-ohm speakers are used, the 32-ohm terminals must be connected together; if 8-ohm speakers are used, the 16-ohm terminals must be connected together. Then connect an output cable from the Left Preamp Out jack on the SA-40 chassis to the input of your separate power amplifier. (Also see Fig. 3.)

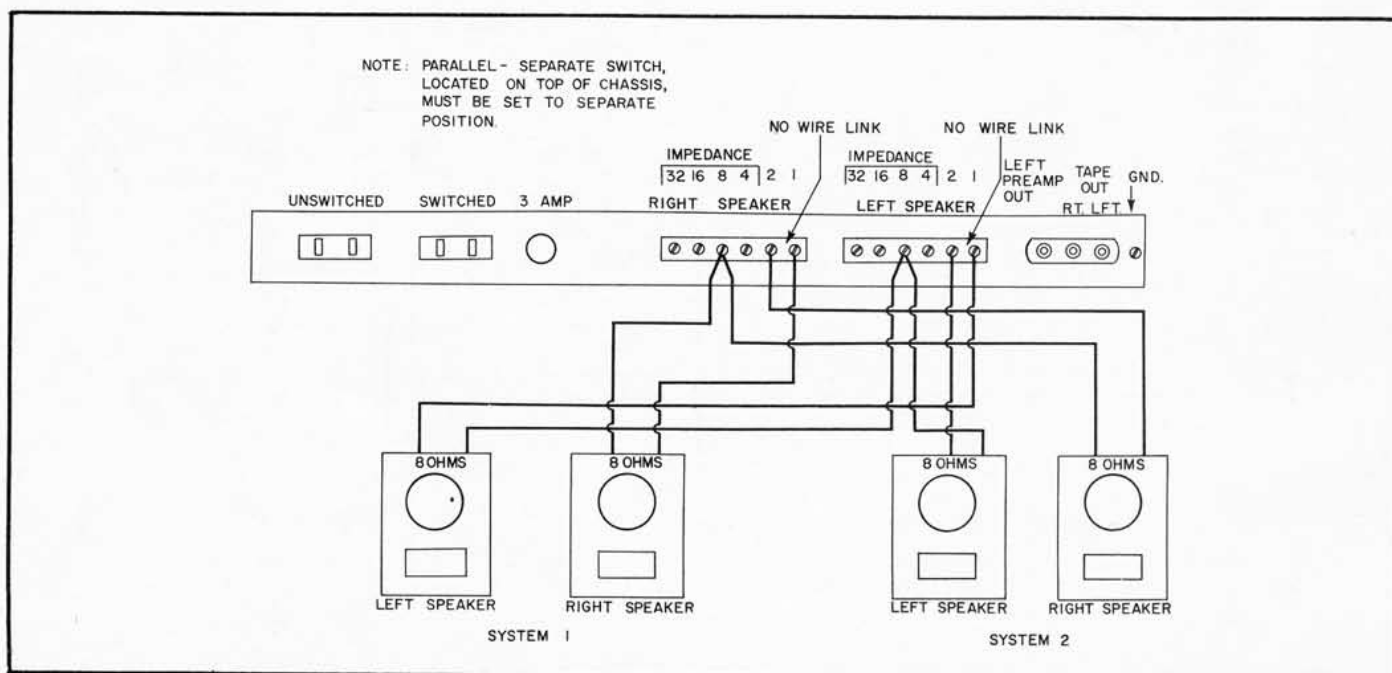


Fig. 2. Standard Stereo Setup Using Two Sets of Speaker Systems. (System 2 Can Be Used in a Remote Location.)

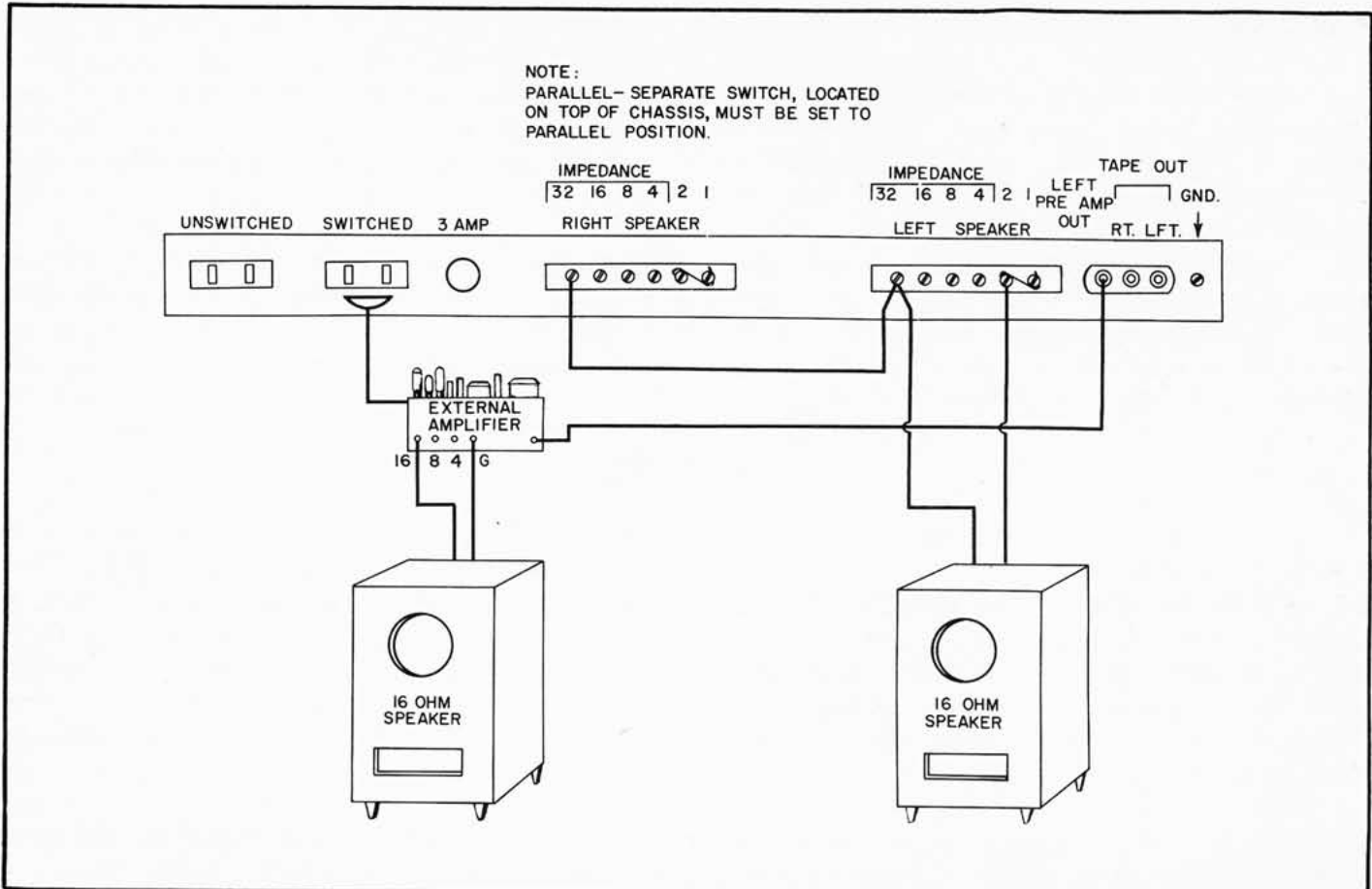


Fig. 3. Stereo Setup Using an External Power Amplifier for One Channel, with the SA-40 Used as a Double-Power Amplifier for the Other Channel.

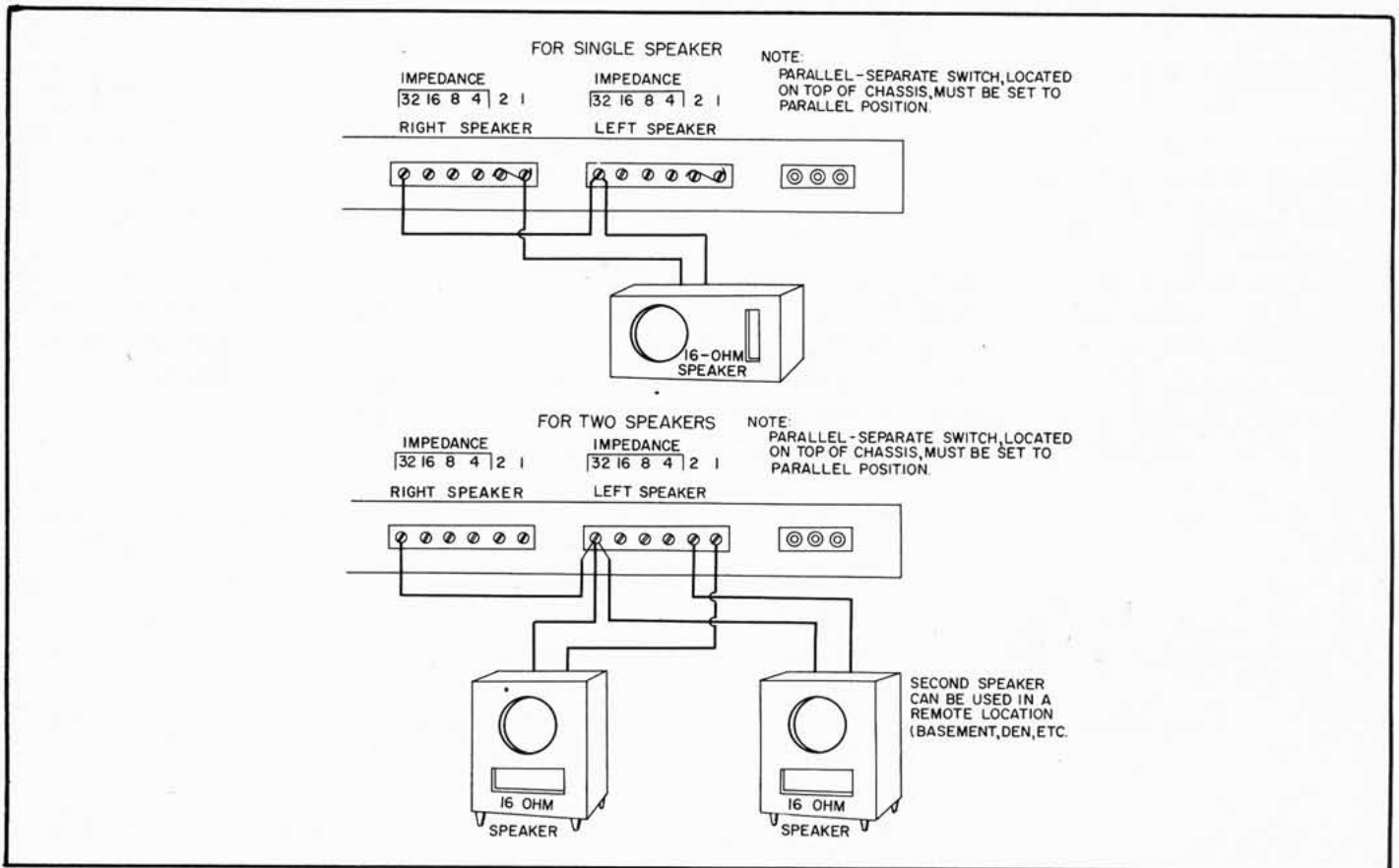


Fig. 4. Setup for Monophonic Operation.

Monophonic Connections

1. The Model SA-40 may be used as a high-power monophonic amplifier by merely setting the Parallel-Separate switch to the Parallel position and connecting the speaker or speakers as shown in Fig. 4. The phono, tuner, tape, etc., can be connected to the appropriate input jacks of the right channel only.

2. When monophonic records are played with a stereo cartridge the Mode switch should be set to Mono position. This position combines the right and left channels for optimum performance. If a monophonic cartridge is used, the Mode switch must be set to either Chan Right or Chan Left to activate the preamplifier for the desired channel. All other controls should be set as described under "Functions of Controls and Switches".

GENERAL USE

Your SA-40 may be used as a complete stereo amplifier, with 20 watts of audio in each channel; or it may be used as a 40-watt monophonic amplifier when the Separate-Parallel switch (located on the chassis) is in the Parallel position. When the SA-40 is used as a monophonic amplifier, the left preamplifier section is not used; however, its output is available at the rear apron, should you desire to drive an external 40- to 60-watt power amplifier when large areas must be filled with stereophonic sound. Whenever the Separate-Parallel switch is in the Parallel position, the appropriate speaker outputs must be paralleled, or connected together. This is illustrated in Fig. 3.

Many of the higher quality speaker systems are rated at 16-ohms impedance. For this reason the SA-40 is supplied with a 32-ohm tap on each of the output transformers. This tap permits the power amplifiers to be "strapped", or connected together, to provide 40 watts of output power. Before a 16-ohm speaker can be connected to two power amplifiers strapped together, a 32-ohm tap is required on each output transformer for a good match (a 32-ohm tap in parallel with another 32-ohm tap provides a normal 16-ohm connection for a 16-ohm speaker).

Using the SA-40 as a Complete Stereo Amplifier

Fig. 1 illustrates the input and output connections when your SA-40 is to be used as a complete stereo amplifier. It is extremely important that the Separate-Parallel switch be in the Separate position.

SPEAKER CONNECTIONS -- The Model SA-40 has a unique switching arrangement that enables you to operate two independent stereo speaker systems, even if they are located in different rooms. Either or both speaker systems can be controlled by means of the two speaker system selector switches on the front panel. For optimum stereo reproduction, the characteristics of the two speakers in a stereo system should be similar. Also, they should be spaced six to twelve feet apart and placed against one wall of the room.

When using only one stereo speaker system do not remove the wire links across terminals 1 and 2 of the right and left speaker output strips. Connect one lead from the left speaker to terminals 1 and 2 on the left speaker output strip, and connect the other lead to the terminal that matches the impedance of your speaker (32, 16, 8, or 4 ohms). Connect the right speaker leads to the right speaker output strip in the same manner. This connection is illustrated in Fig. 1.

NOTE: The two speaker system selector switches do not operate when only one stereo speaker system is used. Therefore, they can remain in any position.

To connect two speaker systems, remove the wire links from terminals 1 and 2 of both speaker output strips. (See Fig. 2.) Connect one lead from the left speaker of system 1 to terminal 1 on the left speaker output strip. Connect one lead from the left speaker of system 2 to terminal 2 on the left speaker output strip. The other two leads from these speakers should be connected, on the speaker output strip, to the terminal that matches the impedance of your

speakers. In a similar manner, connect the right speaker of system 1 and 2 to the right speaker output strip. The connections for two speaker systems with eight ohms impedance are illustrated in Fig. 2.

The Speaker Selector and System switches for this type of system operate as follows:

(a) Speaker system 1 operating -- Speaker Sel switch in "System 1" position. System switch in "One" position.

(b) Speaker system 2 operating -- Speaker Sel switch in "System 2" position. System switch in "One" position.

(c) Both speaker systems operating -- System switch in "Both" position. Speaker Sel switch in either position.

Input Connections

Before connecting any inputs to your SA-40, it is advisable to adjust the two Bias Balance controls and the Hum Balance control.

NOTE: Reversing the SA-40 line plug in your power line receptacle may make a difference in the hum level in your loudspeakers. Hum level improvement may also be noticed if you try reversing the line plug on all auxiliary equipment used with the amplifier (such as Tuner, Record Player, etc.).

Before adjusting these controls, set the front panel controls and switches as follows:

Equalization -- RIAA	Mode switch -- Stereo
Rumble switch -- Off	Balance control -- Center
Contour switch -- Off	Loudness control -- Minimum
Power switch -- Off	Bass control -- Center
Input switch -- Phono 1	Treble control -- Center

NOTE: If Bias Balance controls have been adjusted as described on page 78, then skip the following paragraph and proceed with adjustment of the Hum Balance control.

ADJUSTMENT OF BIAS BALANCE CONTROLS -- Remove one lead from the left-channel speaker. Turn the amplifier on, and allow it to warm up. Listen for a hum in the right-channel speaker. This hum will be quite low, so listen carefully. Adjust the right-channel Bias Balance control R6, located between the two right-channel output tubes V6 and V7, (7189's), for minimum hum. If the inherent hum level in your particular SA-40 is quite low, no minimum point may be found. If this is the case, merely set the control to its approximate mechanical mid-position. Replace the lead from the left-channel speaker, and remove one lead from the right-channel speaker. Repeat this procedure with R7, the left-channel Bias Balance control, located between the two left-channel output tubes V8 and V9 (7189's). Replace the lead from the right-channel speaker.

ADJUSTMENT OF THE HUM BALANCE CONTROL -- Place the amplifier on its side so that the hole in the bottom of the cabinet is accessible. Turn the Power switch on. After the tubes have warmed up, advance the Loudness control until a hum can just be heard in the loudspeakers. Through the hole in the bottom of the cabinet, adjust R5, the Hum Balance control, for minimum hum. Use a small screwdriver to make this adjustment. Listen carefully for the point where the hum disappears or drops to a lower level, because this adjustment is critical.

The SA-40 contains four low-level (high-gain) and three high-level (low-gain) pairs of inputs. Two of these inputs are for phono cartridges. Connect the right- and left-channel leads from your magnetic phono cartridges to the Phono 1 inputs. A ceramic stereo cartridge may be connected to the Phono 2 inputs (if this input has been wired as another magnetic input, an

auxiliary magnetic cartridge may be used. For details, see Step 281, page 68. The Input switch will select either of these two inputs. The equalization switch is effective in both positions.

You should ground your record player to the amplifier by connecting a separate wire lead to the grounding screw on the rear apron of the SA-40. Do not use the shielding from the phono cartridge, because an objectionable hum may result.

The motor of the record player should be plugged into the unswitched outlet on the SA-40. This will insure that the record player must be operated independently from the SA-40 and thus help prevent such troubles as flat spots on the idler wheel. Most record players have some provision -- manual or automatic -- for disengaging the idler wheel from the turntable whenever the record player is turned off. If the record player is plugged into the switched outlet of the SA-40, power to the record player will be removed whenever the SA-40 On-Off switch is turned off. In this way, it is possible to shut off the record player and leave the idler wheel engaged with the turntable -- the most frequent cause of flatted idler wheels.

TAPE HEAD INPUT -- A tape deck without its own preamplifiers should be connected to this input. A monophonic tape deck may be connected to either the right- or left-channel input. The Equalization switch selects either 7-1/2 or 3-3/4 ips NARTB equalization.

MIC INPUT -- A single microphone or a pair of microphones for stereo pickup can be connected to this input. If the mike cables are long, it may be necessary to ground the amplifier to a good outside ground (such as a cold-water pipe) to eliminate hum pickup.

TUNER INPUT -- The output from an FM tuner should be connected to the left-channel input jack, and the output from an AM tuner should be connected to the right-channel input jack. If an FM tuner with a multiplex output is available for reception of stereo FM broadcasts, the multiplex output should be connected to the right-channel input jack in place of the AM tuner output. The AM tuner output can then be connected to either the right- or left-channel input jacks of Aux. 2.

AUX 2 INPUT -- The sound take-off from a TV or radio receiver can be connected to either the right- or left-channel input jacks.

AUX 1 INPUT -- A stereo or monophonic tape deck with built-in preamplifiers may be connected to this input. Do not connect such a tape deck to the Tape Head inputs, because severe overloading and distortion will occur.

TAPE OUTPUT -- A stereo or monophonic tape recorder can be connected to these outputs. Connect the left input of your stereo tape recorder to Tape Output, Left jack. Connect the right input to Tape Output, Right jack. If the cable required to make these connections is more than several feet long, low-capacity cable should be used.

For a monophonic tape recorder, use either the right or left Tape Output jack, depending upon whether the unit from which you wish to record is plugged into the right- or left-channel input jacks.

In both stereo and monophonic recordings, the signal fed to the tape recorder is unaffected by the setting of the Loudness or Tone controls; consequently, it would be wise to monitor the program by ear during a recording.

Function of Controls and Switches

The controls of your SA-40 have been designed for simplicity of operation, without any sacrifice in versatility. The operation of these controls is the same whether the SA-40 is used as a complete stereo amplifier or to drive an additional power amplifier, as described on page 4.

INPUT SELECTOR SWITCH -- Selects the program source that is connected to the input jacks. The seven positions are labeled Aux 1, Aux 2, Tuner, Phono 1, Phono 2, Tape Head, and Mic.

MODE SWITCH -- The Mode switch determines the manner in which stereo or monophonic material is reproduced. This switch also has seven positions, labeled as follows: Bal Right, Bal Left, Mono, Stereo, Stereo-Reverse, Chan Right, and Chan Left. Normally, this switch will be used in only two positions, Mono and Stereo; however, the other five positions have definite functions. To aid you in their use, a detailed description of each position follows:

(a) **Bal Right** -- This setting allows program material coming from both right- and left-channel inputs to drive the right-channel power amplifier and right-speaker system only. (The left speaker is silent.) This position is useful for balancing the loudspeakers. The balancing procedure will be described when we come to the Balance control section.

(b) **Balance Left** -- This setting is the reverse of Bal Right. Program material coming from both left- and right-channel inputs drives only the left-channel power amplifier and left speaker system. (The right speaker is now silent.)

(c) **Mono** -- In this position, monophonic records can be played with a stereo cartridge. The music is reproduced through both channels and is heard from both speakers. The outputs of both the right and left preamplifiers are strapped together and thus cancel the vertical component of rumble that is reproduced when monophonic records are played.

(d) **Stereo** -- This position allows stereo program material to be reproduced. The right-channel input is heard through the right speaker, and the left-channel input is heard through the left speaker.

(e) **Stereo Reverse** -- This position is the reverse of the Stereo position. The right-channel input is heard through the left speaker, and the left-channel input is heard through the right speaker.

(f) **Chan Right** -- This position allows program material from the right-channel inputs to operate the right and left speakers simultaneously.

(g) **Chan Left** -- This position allows program material from the left-channel inputs to operate both speakers simultaneously.

BALANCE CONTROL -- This control is used with the Bal Right and Bal Left positions of the Mode switch. While listening to a stereo program, alternately switch the Mode switch from the Bal Right to the Bal Left positions. At the same time, rotate the Balance control to either the right or left of its normal center position until the sound output from both speakers is identical. If the speakers are similar, the Balance control setting should be near its center position.

The Balance control determines the volume in the left and right speakers. Rotating this control clockwise from its center position will gradually diminish the sound in the left speaker until no sound is heard at maximum rotation. Rotating this control counterclockwise from its center position will diminish the sound in the right speaker until no sound is heard at maximum rotation.

LOUDNESS CONTROL -- This control adjusts the volume of sound issuing from both the right and left speakers. For low-level listening, the Contour switch located above this control should be in the On position. This will boost the bass, which is lost more readily than the midrange and treble frequencies when the volume is low.

BASS CONTROL -- The dual concentric arrangement of this control provides individual control of the bass response in each channel. The large rear knob controls the right channel,

and the small front knob controls the left channel. The normal position of this control is in the center of its rotation. Turning the control clockwise from the center increases the bass response; turning it counterclockwise from center decreases the bass response. Both knobs may be turned together to simultaneously increase or decrease the bass response for both channels.

TREBLE CONTROL -- This control also provides a dual concentric arrangement for individual control of each channel. The large rear knob controls the right channel, and the small front knob controls the left channel. The normal position of this control is in the center of its rotation. Turning the control clockwise from center increases the treble response; turning it counterclockwise from center decreases the treble response. Both knobs may be turned together to simultaneously increase or decrease the treble response for both channels.

EQUALIZATION SWITCH -- When playing all stereo records and most monophonic LP records, this switch should be in the RIAA position. For the old LP and 78 records, this switch may be set to the EUR position. When the Tape Head position of the Input switch is used, the Equalization switch should be set to either the 7-1/2 or 3-3/4 ips positions, depending upon the tape speed.

RUMBLE SWITCH -- Excessive rumble can occasionally be heard in recorded program material. Setting this switch to the On position will attenuate most of this annoying condition. Of course, some of the low frequencies will also be attenuated.

SPEAKER SYSTEM SELECTOR SWITCHES -- The functions of these switches have been described on pages 6 and 7.

ON-OFF SWITCH -- This switch controls the power to the amplifier and to the Switched outlet on the rear apron of your SA-40. The On-Off switch of the SA-40 is a separate switch -- not combined with either the Tone or the Loudness control, as is customary on other amplifiers. Therefore, the amplifier can be turned on or off without disturbing the setting of the Tone or Loudness control.

PARTS LIST

CAPACITORS

Ref. No.	Part No.	Description
C1	P16-257	100 mfd@200V, Elect.
C2	P16-257	100 mfd@200V, Elect.
C3A	P16-256	80 mfd@300V, Elect. ▲
B		20 mfd@300V, Elect. ■
C		20 mfd@300V, Elect. ▲
D		20 mfd@250V, Elect. —
C4	P16-255	100 mfd@12V, Elect.
C5	P16-254	100 mfd@3V, Elect.
C6	P16-254	100 mfd@3V, Elect.
C7	P16-254	100 mfd@3V, Elect.
C8	P16-195	.047 mfd@400V, Molded Tubular
C9	P16-195	.047 mfd@400V, Molded Tubular
C10	P16-103	.1 mfd@400V, Molded Tubular
C11	P16-103	.1 mfd@400V, Molded Tubular
C12	P16-240-1	.015 mfd@200V, Molded Tubular
C13	P16-240-1	.015 mfd@200V, Molded Tubular
C14	P16-195	.047 mfd@400V, Molded Tubular
C15	P16-195	.047 mfd@400V, Molded Tubular
C16	P16-240-1	.015 mfd@200V, Molded Tubular
C17	P16-240-1	.015 mfd@200V, Molded Tubular
C18	P16-260	.033 mfd@400V, Molded Tubular
C19	P16-260	.033 mfd@400V, Molded Tubular
C20	P16-134	47 mmf, 500V, 20% Ceramic Disc
C21	P16-134	47mmf, 500V, 20% Ceramic Disc
C22	P16-103	.1 mfd@400V, Molded Tubular
C23	P16-103	.1 mfd@400V, Molded Tubular
C24	P16-103	.1 mfd@400V, Molded Tubular
C25	P16-103	.1 mfd@400V, Molded Tubular
C26	P16-174-1	68 mmf, 1000V, 20% Ceramic Tubular
C27	P16-174-1	68 mmf, 1000V, 20% Ceramic Tubular

CONTROLS

Ref. No.	Part No.	Description
R1	P17-232	Dual Section, Ganged, 250KΩ Balance Control
R2	P17-231	Dual Section, Ganged, 250KΩ tap@50KΩ, Loudness Control
R3	P17-229	Dual Concentric, 1-meg Bass Control Outer Shaft - Right Channel Inner Shaft - Left Channel
R4	P17-230	Dual Concentric, 500KΩ tap @250KΩ, Treble Control Outer Shaft - Right Channel Inner Shaft - Left Channel

CONTROLS (Continued)

Ref. No.	Part No.	Description
R5	P17-233	100Ω Hum Balance Control
R6	P17-233	100Ω Bias Balance Control, Right Channel
R7	P17-233	100Ω Bias Balance Control, Left Channel

RESISTORS

Ref. No.	Part No.	Description
R8	P15-658	1 meg, 1/2 Watt, 10% Carbon
R9	P15-658	1 meg, 1/2 Watt, 10% Carbon
R10	P15-731	100KΩ, 1/2 Watt, 10% Carbon
R11	P15-731	100KΩ, 1/2 Watt, 10% Carbon
R12	P15-652	47KΩ, 1/2 Watt, 10% Carbon
R13	P15-652	47KΩ, 1/2 Watt, 10% Carbon
R14	P15-738	560Ω, 1/2 Watt, 10% Carbon
R15	P15-980	100KΩ, 1/2 Watt, 10% Carbon Film
R16	P15-980	100KΩ, 1/2 Watt, 10% Carbon Film
R17	P15-866	270KΩ, 1/2 Watt, 10% Carbon
R18	P15-866	270KΩ, 1/2 Watt, 10% Carbon
R19	P15-866	270KΩ, 1/2 Watt, 10% Carbon
R20	P15-866	270KΩ, 1/2 Watt, 10% Carbon
R21	P15-658	1 meg, 1/2 Watt, 10% Carbon
R22	P15-658	1 meg, 1/2 Watt, 10% Carbon
R23	P15-738	560Ω, 1/2 Watt, 10% Carbon
R24	P15-968	82KΩ, 1/2 Watt, 10% Carbon
R25	P15-968	82KΩ, 1/2 Watt, 10% Carbon
R26	P15-581	33KΩ, 1/2 Watt, 10% Carbon
R27	P15-581	33KΩ, 1/2 Watt, 10% Carbon
R28	P15-738	560Ω, 1/2 Watt, 10% Carbon
R29	P15-968	82KΩ, 1/2 Watt, 10% Carbon
R30	P15-968	82KΩ, 1/2 Watt, 10% Carbon
R31	P15-654	15KΩ, 1/2 Watt, 10% Carbon
R32	P15-654	15KΩ, 1/2 Watt, 10% Carbon
R33	P15-982	1800Ω, 1/2 Watt, 5% Carbon
R34	P15-262	56Ω, 1/2 Watt, 10% Carbon
R35	P15-982	1800Ω, 1/2 Watt, 5% Carbon
R36	P15-262	56Ω, 1/2 Watt, 10% Carbon
R37	P15-973	1.5 meg, 1/2 Watt, 5% Carbon
R38	P15-973	1.5 meg, 1/2 Watt, 5% Carbon
R39	P15-981	360KΩ, 1/2 Watt, 5% Carbon
R40	P15-981	360KΩ, 1/2 Watt, 5% Carbon
R41	P15-654	15KΩ, 1/2 Watt, 10% Carbon
R42	P15-654	15KΩ, 1/2 Watt, 10% Carbon
R43	P15-983	27KΩ, 1/2 Watt, 5% Carbon
R44	P15-983	27KΩ, 1/2 Watt, 5% Carbon
R45	P15-983	27KΩ, 1/2 Watt, 5% Carbon
R46	P15-983	27KΩ, 1/2 Watt, 5% Carbon
R47	P15-694	220KΩ, 1/2 Watt, 10% Carbon
R48	P15-694	220KΩ, 1/2 Watt, 10% Carbon
R49	P15-694	220KΩ, 1/2 Watt, 10% Carbon
R50	P15-694	220KΩ, 1/2 Watt, 10% Carbon
R51	P15-629	2200Ω, 1/2 Watt, 10% Carbon
R52	P15-629	2200Ω, 1/2 Watt, 10% Carbon
R53	P15-531A	2000Ω, 7 Watt, Wirewound
R54	P15-724	3300Ω, 1/2 Watt, 10% Carbon
R55	P15-726	10KΩ, 1/2 Watt, 10% Carbon
R56	P15-793	22KΩ, 1/2 Watt, 10% Carbon
R57	P15-967	12KΩ, 10 Watt, Wirewound
R58	P15-726	10KΩ, 1/2 Watt, 10% Carbon

PARTS LIST (CON'T.)

RESISTOR - CAPACITOR PRINTED CIRCUIT UNITS

Ref. No.	Part No.	Description
PCA	P16-259	Right Channel Equalization, Printed-circuit Unit, Consists of one 47 mmf capacitor, one 68 mmf capacitor, one 390 mmf capacitor, one 220K Ω resistor, one 560K Ω resistor, and one 680K Ω resistor
PCB	P16-259	Left Channel Equalization, Printed-Circuit Unit, Consists of one 47 mmf capacitor, one 68 mmf capacitor, one 390 mmf capacitor, one 220K Ω resistor, one 560K Ω resistor, and one 680K Ω resistor.
PCC	P16-258	Right Channel Tone Control, Printed-Circuit Unit, Consists of one 100 mmf capacitor, two 4700 mmf capacitors, one 1000 Ω resistor, two 100K Ω resistors, and one 470K Ω resistor.
PCD	P16-258	Left Channel Tone Control, Printed-Circuit Unit, Consists of one 100 mmf capacitor, two 4700 mmf capacitors, one 1000 Ω resistor, two 100K Ω resistors, and one 470K Ω resistor.

TRANSFORMERS

T1	P18-188	Power Transformer
T2	P18-189	Right Channel Output Transformer
T3	P18-189	Left Channel Output Transformer

SWITCHES

SWA	P14-233	"Parallel-Separate" Switch, DPDT Slide Type
SWB	P14-256	"Power On-Off" Switch, SPST Slide Type
SWC	P14-233	"Speaker Selector" Switch, DPDT Slide Type
SWD	P14-257	"System" Switch, DPST Slide Type
SWE	P14-257	"Contour" Switch, DPST Slide Type
SWF	P14-233	"Rumble" Switch, DPDT Slide Type
SWG	P14-233	"Equalization" Switch, DPDT Slide Type
SWH	P14-253	"Mode" Switch, 1-Deck, 7-Position Rotary Type
SWJ	P14-254	"Input" Switch, 4-Deck, 7-Position Rotary Type

TUBES - RECTIFIERS

V1	P19-160-1	12AX7/ 7025, Right & Left Channel Pre-amplifiers
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TUBES - RECTIFIERS (Continued)

Ref. No.	Part No.	Description
V2	P19-160	ECC83/ 12AX7, Right & Left Channel Equalization Amplifiers
V3	P19-160	ECC83/ 12AX7, Right & Left Channel Tone Control Amplifiers
V4	P19-159	7199, Right Channel Driver & Phase Inverter
V5	P19-159	7199, Left Channel Driver & Phase Inverter
V6	P19-158	7189, Right Channel Output
V7	P19-158	7189, Right Channel Output
V8	P19-158	7189, Left Channel Output
V9	P19-158	7189, Left Channel Output
SR	P32-109	Selenium Rectifier
CRA	P32-122	Silicon Rectifier, 500 ma, 500 PIV, Pigtail Type
CRB	P32-122	Silicon Rectifier, 500 ma, 500 PIV, Pigtail Type

SOCKETS - TERMINAL STRIPS - BINDING POSTS - JACKS

Part No.	Description	Quantity
P20-192	9-Pin Miniature Tube Socket, Bottom Mount, Without Shield Base	4
P20-202	9-Pin Miniature Tube Socket, Top Mount, With Shield Base	5
P20-201-12	Pilot Light Socket Ass'y.	1
P20-201-22	Fiber Sleeve For Pilot Light Socket Assembly	1
P20-124	Fuse Holder	1
P23-221	1-Lug Terminal Strip	1
P23-178	2-Lug Terminal Strip	3
P23-220-1	2-Lug Terminal Strip	1
P23-177	3-Lug Terminal Strip	3
P23-279	4-Lug Terminal Strip	2
P23-261-1	6-Lug Terminal Strip	1
P20-205	6-Screw Binding Post Strip	2
P20-203-12	Triple Phono Jack Strip	3
P20-203-22	3-Hole Insulator Plate	3
P20-204-12	Quadruple Phono Jack Strip	2
P20-204-22	4-Hole Insulator Plate	2
P20-194	AC Receptacle	2
P20-206	Phono Plug	4

HARDWARE

P24-255	#4-40 x 5/16" Binding-Head Screw	59
P24-244	#6-32 x 5/16" Binding-Head Screw	11
P24-261	#6-32 x 1" Binding-Head Screw	1
P24-215	#6 x 3/8" Self-Tapping Screw	11
P24-267	#8-32 x 3/8" Binding-Head Screw	12

PARTS LIST (CON'T.)

HARDWARE (Continued)

Part No.	Description	Quantity
P24-158	#4-40 Hex Nut	59
P24-125	#6-32 Hex Nut	12
P24-134	#8-32 Hex Nut	16
P24-180	3/8" Control Hex Nut	12
P24-251	#1/2 - 24 Hex Nut	1
P24-253	#4 Lockwasher	57
P24-246	#6 Lockwasher	12
P24-247	#8 Lockwasher	16
P24-175	3/8" Control Lockwasher	5
P24-266	1/2" Lockwasher	1
P23-251	1/2" Rubber Washer	1
P23-267	#4 Locking-Type Solder Lug	2
P23-248-1	#6 Locking-Type Solder Lug	1
P23-257	3/8" Control Solder Lug	1
P29-132	3/8" Rubber Grommet	3

WIRE - SPAGHETTI

P21-186	Length, Single-Conductor Shielded Cable, Black	1
P21-186-1	Length, Single-Conductor Shielded Cable, Blue	1
P21-187	Length, 3-Conductor Shielded Cable	1
P21-188	Length, 4-Conductor Shielded Cable	1
P21-189	Length, 5-Conductor Unshielded Cable	1

* For Custom Installation

WIRE - SPAGHETTI (Continued)

Part No.	Description	Quantity
P21-148	Roll, Hook-up Wire, Red-Green-Yellow-Orange	1
P21-104	Length, #20 Bare Hook-Up Wire	1
P21-169	Length, Spaghetti, Medium	1
P21-170	Length, Spaghetti, Thin	1
P21-147-1	Line Cord	1

MISCELLANEOUS

P11-323	Chassis	1
P11-324	Subpanel	1
P13-397	Front Panel	1
P22-176	Outer Case	1
P10-484	Knob Without Metal Insert	4
P10-484-1	Knob With Metal Insert, For Bass & Treble Controls	2
P10-485	Ring Knob, Clear Plastic, For Bass & Treble Controls	2
P23-281-1	Plastic Foot	4
P11-327	Tube Shield	5
P19-147	Fuse, 3-Amp, 250 V	1
P19-161	#44 Pilot Light	1
P26-232	Instruction Manual	1
* P23-113	Large Metal Washer	2
* P24-282	#6 x 1-1/4" Self-Tapping Screw	2