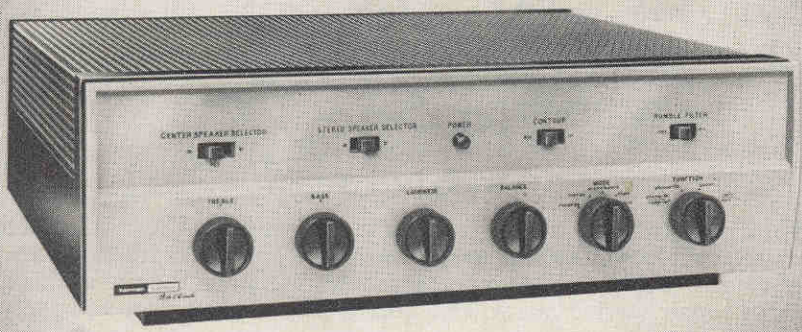
harman kardon



The Ballad

MODEL A230

STEREOPHONIC AMPLIFIER-PREAMPLIFIER

INSTRUCTION MANUAL

It is essential you read this instruction booklet carefully before installing your high fidelity system. You have invested in an extremely fine electronic instrument into which many excellent engineering developments have been incorporated, and each is important for the proper operation of your system. This booklet has been written in simple non-technical language and if you will take time to read it first before doing anything else, you will find it simple to obtain optimum performance from your Harman-Kardon Model A230 Stereophonic Amplifier.

Be sure to keep this booklet available at all times. It contains indispensable technical and service information.

This is the Harman-Kardon Stereo Symbol. It is your assurance of superb stereo performance.

FRT. COVER

A230 - 324 3664

UNPACKING

After unpacking the Model A230, inspect it carefully for signs of transit damage. The unit was subjected to many inspections and tests prior to final packing, and therefore should be in perfect condition. If damage is visible, notify your dealer at once. If the unit was shipped to you, notify the transportation company without delay.

Check the contents of the carton thoroughly and inspect the folds of the packing material before discarding it. Your package should contain the following items:

1 Model A230 Stereophonic Amplifier-Preamplifier.
1 Instruction Booklet
1 Warranty Card
1 Mounting Template.

WARRANTY POLICY

We urge you to fill in your warranty card and mail it to the factory without delay to protect your rights under warranty. The warranty cards are carefully filed for reference and should you require information on the use of this high fidelity unit, or repair service, we will be able to identify your set and reply quickly.

NOTE: It is necessary to receive factory authorization before returning a set for warranty repair to an authorized station. Repairs are to be returned on an Express Prepaid basis. A letter describing the exact difficulty must be enclosed with the unit together with your original sales slip.

WARRANTY

We warrant each Model A230 to be free from defects in material and workmanship under normal use and service, and in accordance with the conditions herein below set forth, for a period of 1 year from date of delivery to the original purchaser, and agree to replace or repair any part or parts, with the exception of tubes which are under the manufacturer's 90 day warranty, returned to us within said 1 year, with transportation prepaid and which our examination shall disclose to our satisfaction to have been thus defective. This warranty does not include free labor, nor is it applicable to any instrument which shall have been repaired or altered in any way so as in our judgment to affect its stability or reliability nor which has been subject to neglect, misuse, abuse, negligence or accident nor which has had the serial number altered, effaced, or removed. Neither shall this warranty apply to any instrument which has been connected otherwise than in accordance with instructions furnished by us.

This warranty is expressly in lieu of all other warranties, express or implied, and of all other obligations or liability on our part, and we neither assume nor authorize any representative or other person to assume for us any other liability in connection with the sale of this instrument.

INSTALLATION PROCEDURE

Ventilation:

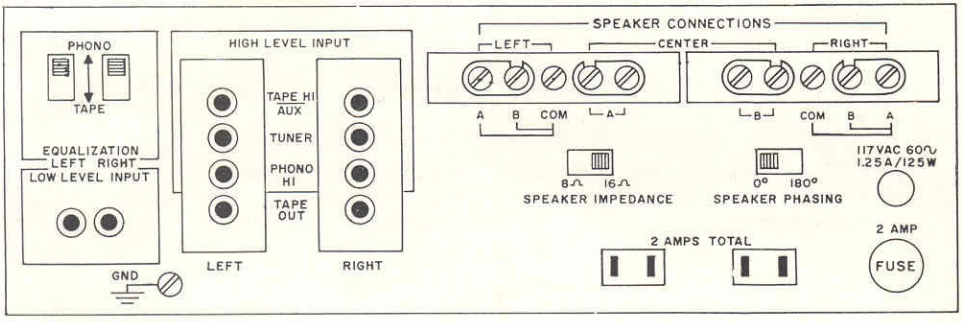
The Ballad is well ventilated in itself, but sufficient space must be allowed around it to permit proper air flow. The unit may be mounted vertically. Allow the rear of the equipment cabinet to remain open and if possible cut louvres on the wooden mounting panel for added ventilation. Reducing air flow will sharply reduce tube and component life. When installing the amplifier on a book shelf, do not place books or other objects on the cage or in the immediate vicinity of the instrument. Follow these mounting precautions carefully and your unit should continue to operate perfectly for many years.

Power Requirements:

Plug the AC line cord into any outlet furnishing 117 volts, 50 or 60 cycle AC current. The voltage may vary between 105 and 125 volts.

AC Convenience Outlets:

Two AC convenience receptacles are located on the rear panel of the A230. Auxiliary equipment (tape deck, record player, tuner) may be plugged into these outlets and will be controlled by the push-button power on/off switch located on the front panel.



REAR PANEL MODEL A230

Speaker Connections:

Your two speakers should be identical if possible to obtain optimum results. Experts agree that a perfectly matched system offers the best stereophonic reproduction. The speakers should be placed along the same wall approximately 8 to 15 feet apart depending upon room size and furniture placement. It may be necessary to experiment with the speakers until best results are obtained.

Use any type wire to connect your speakers to the amplifier. Lamp cord ("zip cord") is excellent and may be dressed easily around the molding for an inconspicuous and neat installation. Do not drive the staples or tacks through the center of the wire for this will short out the two sections and will decrease the overall volume or short out the speakers entirely. It is permissible to use approximately 100 feet of speaker connecting wire for each speaker without loss of volume.

The unique switching arrangement on the Model A230 enables you to connect your speakers in any of several ways. It is possible to have stereo in one room, while listening to monophonic reproduction in another portion of your home. If you prefer, you may add a third channel speaker for "fill" in your main listening room, or listen to monophonic reproduction in another location. The stereo speaker selector switches also enable you to listen to stereo in one room, or stereo in another portion of the house. You may also add third channel speakers to one or both rooms, also selectable by the front panel switches. Please follow the diagrams listed below for the installation best suited for your use.

Stereo In Room A. No Speakers In Room B:

Connect both leads from the left speaker in Room A to terminals A and COM on the LEFT SPEAKER OUTPUT strip. Connect both leads from the right speaker in Room A to terminals A and COM on the RIGHT SPEAKER OUTPUT strip. The shorting bars between all terminals on the SPEAKER OUTPUT strips must remain connected for this method of operation. Refer to Diagram 1.

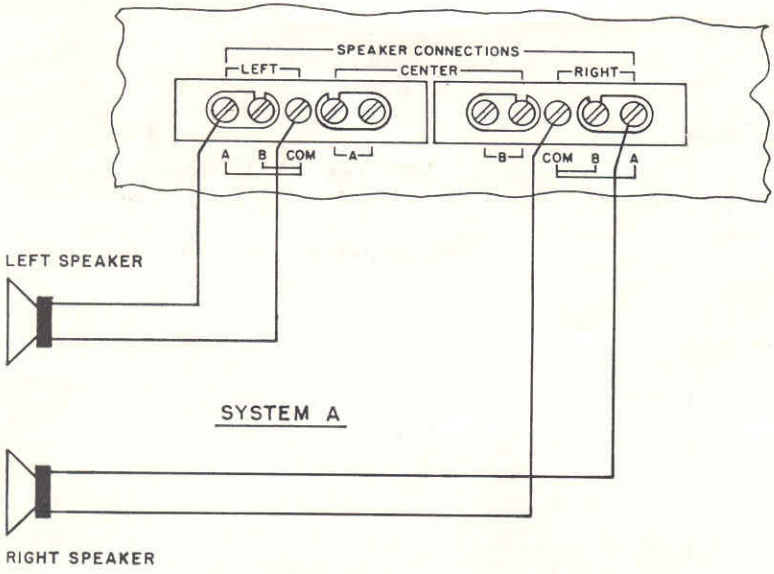


Diagram 1.

The IMPEDANCE SELECTOR switch located on the rear of the chassis should be placed in the 8 or 16 ohm position depending upon the nominal impedance rating of your speakers. If the speakers have an impedance of 4 to 12 ohms, throw the IMPEDANCE SELECTOR switch to 8 ohms. If the speakers are rated from 12 to 20 ohms, throw the IMPEDANCE SELECTOR switch to 16 ohms.

To operate, the CENTER SPEAKER switch and the STEREO SPEAKER SELECTOR switch located on the front panel may remain in any position since they are inoperative in this application.

Stereo In Room A. Stereo In Room B:

It is recommended you connect one stereo speaker system at a time.

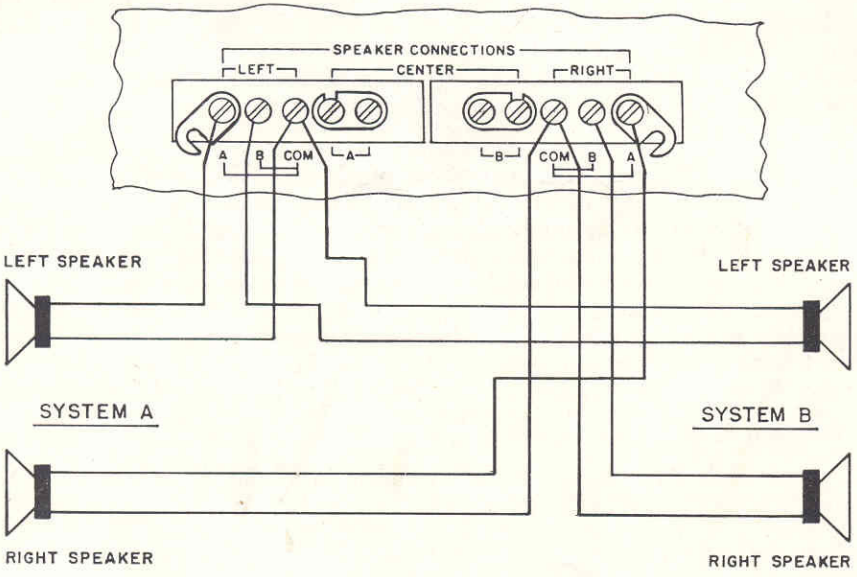


Diagram 2.

Remove the shorting bars between the A and B SPEAKER OUTPUT terminals on both the right and left output strips.

Connect both leads from the left speaker in Room A to terminals A and COM on the LEFT SPEAKER OUTPUT strip. Connect both leads from the right speaker in Room A to terminals A and COM on the RIGHT SPEAKER OUTPUT strip. Now connect the two leads from the left speaker in Room B to terminals B and COM on the LEFT SPEAKER OUTPUT strip, and two leads from the right speaker in Room B to terminals B and COM on the RIGHT SPEAKER OUTPUT strip.

The shorting bars on CENTER A and B must remain connected. Refer to Diagram 2.

The IMPEDANCE SELECTOR switch located on the rear of the chassis should be placed in the 8 or 16 ohm position depending upon the nominal impedance rating of your speakers. If the speakers have an impedance of 4 to 12 ohms, throw the IMPEDANCE SELECTOR switch to 8 ohms. If the speakers have an impedance of 12 to 20 ohms, throw the IMPEDANCE SELECTOR switch to 16 ohms.

To operate, the CENTER SPEAKER switch located on the front panel may remain in any position since it is inoperative in this application. To select stereo operation in Room A, place the front panel STEREO SPEAKER SELECTOR switch in the "A" position. To select Room B, place the STEREO SPEAKER SELECTOR switch in the "B" position.

Stereo In Room A. Single Monophonic Speaker in Room B:

Remove the shorting bars between A and B SPEAKER OUTPUT terminals on both the right and left output strips. Also remove the shorting bar on the CENTER B CHANNEL on the right SPEAKER OUTPUT strip. Connect a 4 ohm, 10 watt resistor to terminals B and COM on the LEFT SPEAKER OUTPUT strip, and also connect a 4 ohm, 10 watt resistor to terminals B and COM on the RIGHT SPEAKER OUTPUT strip.

Connect both leads from the left speaker in Room A to terminals A and COM on the LEFT SPEAKER OUTPUT strip. Connect both leads from the right speaker in Room A to terminals A and COM on the RIGHT SPEAKER OUTPUT strip. This completes the stereo speaker connections for Room A.

Connect both leads from your monophonic speaker in Room B to the two CENTER B terminals on the right SPEAKER OUTPUT strip. Note, the CENTER A terminals must remain strapped. Refer to Diagram 3.

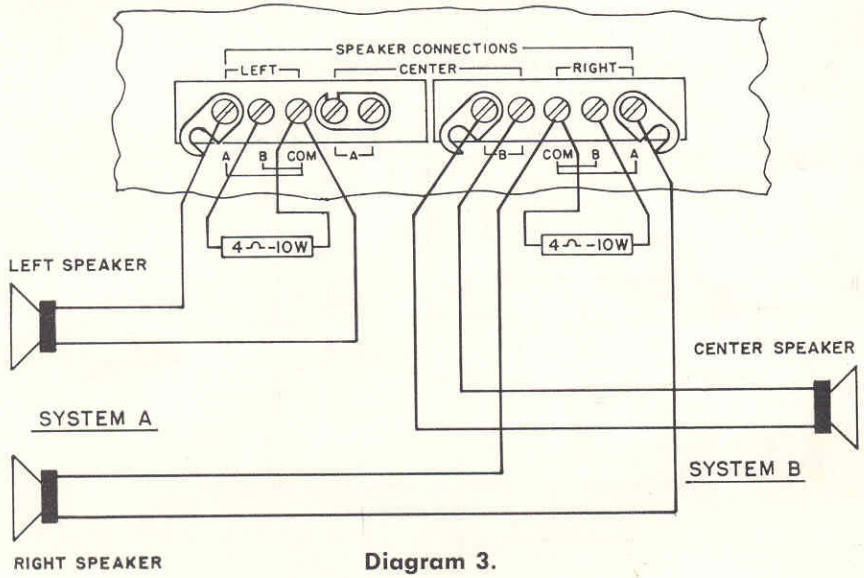


Diagram 3.

The IMPEDANCE SELECTOR switch located on the rear of the chassis should be placed in the 8 or 16 ohm position depending upon the nominal impedance rating of your speakers. If the speakers have an impedance of 4 to 12 ohms, throw the IMPEDANCE SELECTOR switch to 8 ohms. If the speakers have an impedance of 12 to 20 ohms, throw the IMPEDANCE SELECTOR switch to 16 ohms.

To operate, the front panel speaker switches must be set as follows:

1. To play stereo in Room A only without operating the monophonic speaker in Room B, throw the CENTER SPEAKER SELECTOR switch to "OFF" and the STEREO SPEAKER SELECTOR switch to "A".

2. To play stereo in Room A and monophonic in Room B, throw the CENTER SPEAKER SELECTOR switch to "B", and the STEREO SPEAKER SELECTOR switch to "A".

3. To play only the monophonic speaker in Room B, throw the STEREO SPEAKER SELECTOR switch and the CENTER SPEAKER SELECTOR switch to "B".

Stereo With Third Speaker In Room A. No Speakers In Room B:

Remove the shorting bar strapping the CENTER A terminals on the LEFT SPEAKER OUTPUT strip. The shorting bars strapping terminals A and B on both the right and left SPEAKER OUTPUT strips must remain connected.

Connect both leads from the left speaker in Room A to terminals A and COM on the LEFT SPEAKER OUTPUT strip. Connect both leads from the right speaker in Room A to terminals A and COM on the RIGHT SPEAKER OUTPUT strip. Connect the two leads from the center speaker to the two CENTER SPEAKER A terminals. The two CENTER B terminals on the SPEAKER OUTPUT strip must remain strapped. Refer to Diagram 4.

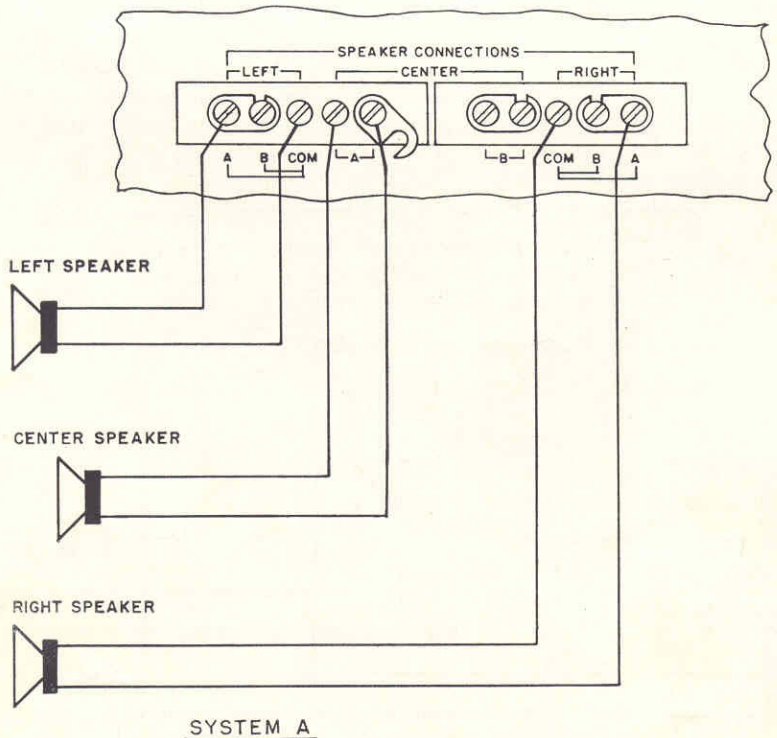


Diagram 4.

The IMPEDANCE SELECTOR switch located on the rear of the chassis should be placed in the 8 or 16 ohm position depending upon the nominal impedance rating of your speakers. If the speakers have an impedance of 4 to 12 ohms, throw the IMPEDANCE SELECTOR switch to 8 ohms. If the speakers have an impedance of 12 to 20 ohms, throw the IMPEDANCE SELECTOR to 16 ohms.

To operate, the front panel speaker switches must be set as follows:

1. To play stereo in Room A without the use of the center speaker, the STEREO SPEAKER SELECTOR switch may be set in either the "A" or "B" position as the switch is inoperative in this application. Set the CENTER SPEAKER SELECTOR switch to "OFF".

2. To play stereo in Room A with the use of the center speaker, the STEREO SPEAKER SELECTOR switch may be set in either the "A" or "B" position as this switch is inoperative in this application, and the CENTER SPEAKER SELECTOR switch must be set to "A" to activate the center channel.

Stereo With Third Speaker In Room A. Single Monophonic Speaker In Room B:

Remove all shorting bars located on the rear SPEAKER OUTPUT strip.

Connect both leads from the left speaker in Room A to terminals A and COM on the LEFT SPEAKER OUTPUT strip. Connect both leads from the right speaker in Room A to terminals A and COM on the RIGHT SPEAKER OUTPUT strip. Connect both leads from the center speaker in Room A to both A terminals on the CENTER SPEAKER OUTPUT strip. This completes the speaker installation for Room A.

Now connect both leads from the single monophonic speaker in Room B to both B terminals on the CENTER SPEAKER OUTPUT strip. Connect a 4 ohm, 10 watt resistor between terminals B and COM on the LEFT SPEAKER OUTPUT strip and similarly connect an additional 4 ohm, 10 watt resistor between terminals B and COM on the RIGHT SPEAKER OUTPUT strip. Refer to Diagram 5.

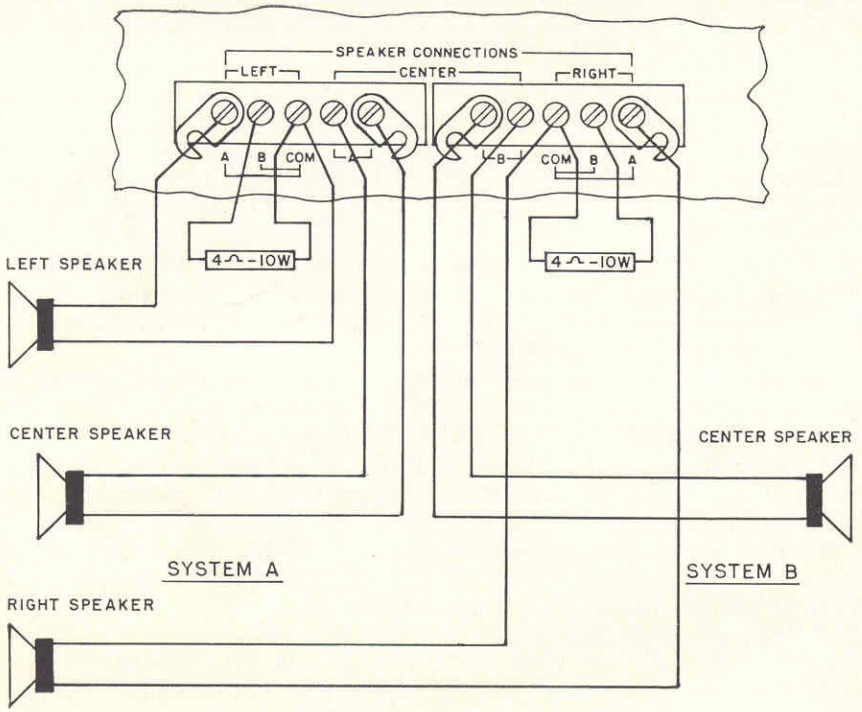


Diagram 5.

The IMPEDANCE SELECTOR switch located on the rear of the chassis should be placed in the 8 or 16 ohm position depending upon the nominal impedance rating of the speakers. If the speakers have an impedance of 4 to 12 ohms, throw the IMPEDANCE SELECTOR switch to 8 ohms. If the speakers have an impedance of 12 to 20 ohms, throw the IMPEDANCE SELECTOR switch to 16 ohms.

To operate, the front panel speaker switches must be set as follows:

1. To play two speaker stereo in Room A without operating the single monophonic speaker in Room B, set the CENTER SPEAKER SELECTOR switch to "OFF" and the STEREO SPEAKER SELCTOR switch to "A".

2. To play three speaker stereo in Room A without operating the single monophonic speaker in Room B, set the CENTER SPEAKER SELECTOR switch and the STEREO SPEAKER SELECTOR switch to "A".

3. To play only the monophonic speaker in Room B, throw the CENTER SPEAKER SELECTOR switch and the STEREO SPEAKER SELECTOR switch to "B".

4. To operate only the center speaker in Room A, set the CENTER SPEAKER SELECTOR switch to "A" and the STEREO SPEAKER SELECTOR to "B".

Stereo With Third Speaker In Room A. Stereo With Third Speaker In Room B:

Remove all shorting bars located on the rear SPEAKER OUTPUT strip.

Connect both leads from the left speaker in Room A to terminals A and COM on the LEFT SPEAKER OUTPUT strip. Connect both leads from the right speaker in Room A to terminals A and COM on the RIGHT SPEAKER OUTPUT strip. Connect both leads from the center speaker to the A terminals on the CENTER SPEAKER OUTPUT strip. This completes the speaker connections for Room A.

Connect both leads from the left speaker in Room B to terminals B and COM on the LEFT SPEAKER OUTPUT strip. Connect both leads from the right speaker in Room B to terminals B and COM on the RIGHT SPEAKER OUTPUT strip. Now connect the center speaker in Room B to the two B terminals on the CENTER SPEAKER OUTPUT strip. This completes the speaker connections for Room B. Refer to Diagram 6.

The SPEAKER IMPEDANCE switch located on the rear of the chassis should be placed in the 8 or 16 ohm position depending upon the nominal impedance rating of the speakers. If the speakers have an impedance of 4 to 12 ohms, throw the IMPEDANCE SELECTOR switch to 8 ohms. If the speakers have an impedance of 12 to 20 ohms, throw the IMPEDANCE SELECTOR switch to 16 ohms.

To operate, the front panel speaker switches must be set as follows:

1. To play two speaker stereo in Room A without operating any of the speakers in Room B, set the CENTER SPEAKER SELECTOR switch to "OFF" and the STEREO SPEAKER SELECTOR switch to "A".

2. To play two speaker stereo in Room B without operating any of the speakers in Room A, set up the CENTER SPEAKER SELECTOR switch to "OFF" and the STEREO SPEAKER SELECTOR switch to "B".

3. To play three speaker stereo in Room A without operating any of the speakers in Room B, set the CENTER SPEAKER SELECTOR switch and the STEREO SPEAKER SELECTOR switch to "A".

4. To play three speaker stereo in Room B without operating any of the speakers in Room A, set the CENTER SPEAKER SELECTOR switch and the STEREO SPEAKER SELECTOR switch to "B".

5. To play three speaker stereo in Room A or two speaker stereo in Room B, set the CENTER SPEAKER SELECTOR switch and the STEREO SPEAKER SELECTOR switch to "A". This enables you to listen to three speaker stereo in Room A. To play two stereo speakers in Room B, merely throw the STEREO

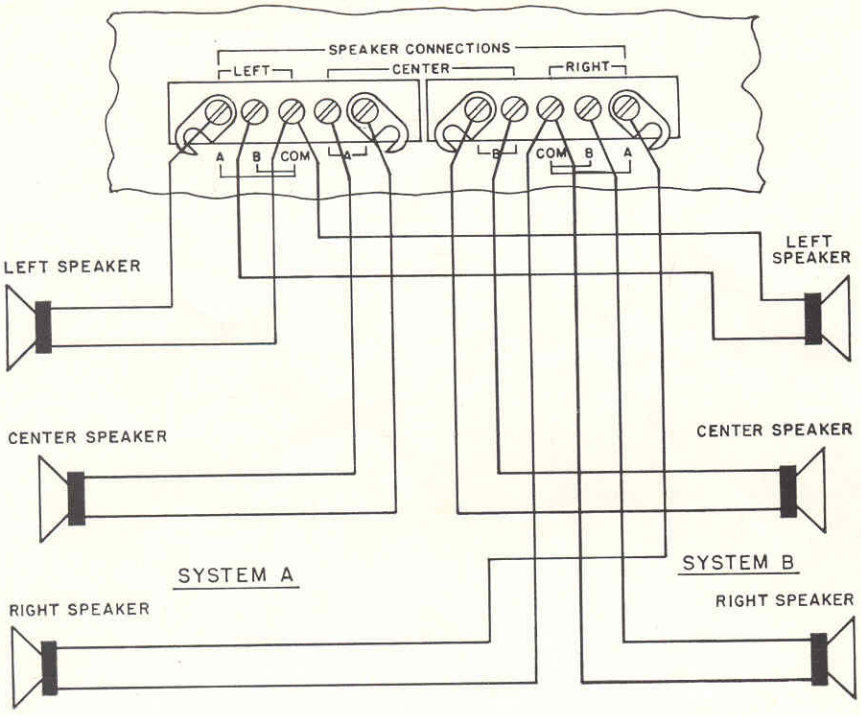


Diagram 6.

SPEAKER SELECTOR switch to "B" without touching the other controls. The reversal of this application is quite simple for if you desire to play two speaker stereo in Room A or three speaker stereo in Room B, set the CENTER SPEAKER switch and the STEREO SPEAKER SELECTOR switch to "B". This enables you to listen to three speaker stereo in Room B. To play the two stereo speakers in Room A, merely throw the STEREO SPEAKER SELECTOR switch to "A" without touching the other controls.

6. To play three speaker stereo in Room A or single speaker monophonic in Room B, set the CENTER SPEAKER SELECTOR switch and the STEREO SPEAKER SELECTOR switch to "A". To play only single speaker monophonic in Room B, throw the CENTER SPEAKER SELECTOR switch to "B" and allow the STEREO SPEAKER SELECTOR switch to remain in the "A" position. The reversal of this application applies to play a single monophonic speaker in Room A and three stereo speakers in Room B.

Single Monophonic Speaker In Room A. Single Monophonic Speaker In Room B:

Remove the shorting bars on the CENTER SPEAKER OUTPUT strip. Terminals A and B on the LEFT and RIGHT SPEAKER OUTPUT strips remain strapped for this type of application.

Connect both leads from the single monophonic speaker in Room A to both CENTER A terminals on the LEFT SPEAKER OUTPUT strip. Connect a 4 ohm, 10 watt resistor across terminals A and COM on the LEFT SPEAKER OUTPUT strip.

Connect both leads from the single monophonic speaker in Room B to both CENTER B terminals on the RIGHT SPEAKER OUTPUT strip. Connect a 4 ohm, 10 watt resistor across terminals A and COM on the RIGHT SPEAKER OUTPUT strip. Refer to Diagram 7.

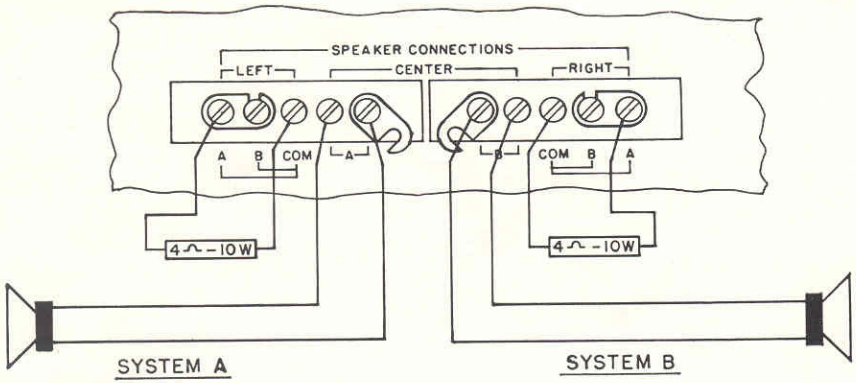


Diagram 7.

The SPEAKER IMPEDANCE switch located on the rear of the chassis should be placed in the 8 or 16 ohm position depending upon the nominal impedance rating of the speakers. If the speakers have an impedance of 4 to 12 ohms, throw the IMPEDANCE SELECTOR switch to 8 ohms. If the speakers have an impedance of 12 to 20 ohms, throw the IMPEDANCE SELECTOR switch to 16 ohms.

To operate, the front panel speaker switches must be set as follows:

1. To play the single monophonic speaker in Room A, set the CENTER SPEAKER SELECTOR switch to "A". The STEREO SPEAKER SELECTOR switch may remain in any position for in this application it is inoperative.

2. To play the single monophonic speaker in Room B, set the CENTER SPEAKER SELECTOR switch to "B". The STEREO SPEAKER SELECTOR switch may remain in any position for in this application it is inoperative.

Connecting Your Tuner:

The FM output of your Harman-Kardon stereo tuner should be connected to the LEFT TUNER HIGH LEVEL INPUT receptacle located on the rear panel of the amplifier. The AM output should be connected to the RIGHT TUNER HIGH LEVEL INPUT receptacle. The same method of installation applies if you are using a separate FM and AM tuner. If you are using a monophonic tuner in conjunction with the A230, connect the tuner output to either the LEFT or RIGHT HIGH LEVEL INPUT receptacle. Plug the tuner AC line cord into one of the AC convenience receptacles located on the rear panel.

Connecting Your Stereo Record Player:

A stereophonic cartridge uses two output connecting plugs. Provision has been made on the Model A230 to accommodate any of the three types of phonograph pickups available on the market.

MAGNETIC CARTRIDGE: The A230 has two LOW LEVEL INPUT receptacles located on the rear panel. Connect the two outputs of your stereo magnetic cartridge to these receptacles. The two PHONO/TAPE equalization switches must be placed in the "UP" or PHONO position.

CERAMIC CARTRIDGE: Connect the two outputs of your stereo ceramic cartridge to the two PHONO HI receptacles located on the rear panel. Equalization is automatically selected when connecting to this position and the FUNCTION SELECTOR switch is in the PHONO HI position.

CRYSTAL CARTRIDGE: Connect the two outputs of your stereo crystal cartridge to the two PHONO HI receptacles.

Connecting A Monophonic Record Player:

A monophonic record player uses only one connecting plug. If you are using a low output magnetic type cartridge, connect it to either of the LOW

LEVEL INPUT receptacles. If you are using a monophonic ceramic or crystal cartridge, connect it to either the LEFT or RIGHT PHONO HI input receptacle.

Connecting Your Stereo Tape Player:

A stereophonic tape deck utilizes two playback heads. Each head has its own output plug. Connect one plug to the LEFT LOW LEVEL INPUT receptacle located on the lower rear of the chassis, and the other output plug to the RIGHT LOW LEVEL INPUT receptacle. Place both PHONO/TAPE switches located directly above the LOW LEVEL INPUT jacks in the "DOWN" or TAPE position.

Since the Model A230 has only one pair of low level input receptacles for stereo use, either a magnetic cartridge or a tape head may be plugged in. If both types of program sources are desired, it is suggested a ceramic cartridge be used instead of a magnetic type. The tape head can then be plugged into the two LOW LEVEL INPUT jacks and the ceramic cartridge can be plugged into the two PHONO-HI jacks.

Connecting Your Stereo Tape Recorder:

Since most stereo tape recorders have their own preamplifiers, it is not desirable to plug the output of the recorder into the LOW LEVEL INPUT. This might cause overloading of the input stage. Connect one of the output plugs into the TAPE-HI/AUX jack on the RIGHT HIGH LEVEL INPUT strip and the other into the TAPE-HI/AUX jack on the LEFT HIGH LEVEL INPUT strip.

Connecting Your Tape Recorder To Make A Recording:

Provision is made on your Model A230 to permit the recording of any program material. Connect the left input of your stereo tape recorder to the receptacle marked LEFT TAPE OUT on the rear panel and the right input of your stereo tape recorder to the receptacle marked RIGHT TAPE OUT. To connect a monaural tape recorder, connect its input to either LEFT or RIGHT TAPE OUT receptacle. If the program source you desire to record is plugged into the left preamplifier channel, use the LEFT TAPE OUT jack, and if it is plugged into the right preamplifier channel, use the RIGHT TAPE OUT jack. This will enable you to make a recording with the proper recording equalization as determined by your recorder, while simultaneously monitoring the program with the proper tone control, contour and loudness setting.

OPERATING THE MODEL A230 AS AN INTEGRATED AMPLIFIER

Every control on a well designed and honestly considered high fidelity instrument has a specific useful function related to each of the other controls. A brief explanatory note on the relationship of the various front panel controls will doubtless prove useful in organizing and clarifying them for you.

Bass and Treble Tone Controls:

The BASS and TREBLE tone controls on the A230 provide the full range of tonal adjustment necessary for stereo high fidelity listening. The tone control range is considerable and can adequately adjust the low and high frequencies in accordance with your listening preference, speaker characteristics and room acoustics.

You will note that the BASS and TREBLE controls each have two knobs, one in front of the other. The front knob controls the right channel and the rear knob controls the left channel. The front and rear knobs are coupled with a new type friction-clutch, so that the BASS or TREBLE tone of both channels can be adjusted simultaneously by turning the front or main body of the knob. However, if the two channels require different tone control settings, due perhaps to differences in speakers or room acoustics, the two BASS knobs may be adjusted independently to balance the differences, and from then adjusted simultaneously for best overall tone quality. The two TREBLE knobs can be similarly adjusted.

To set the two knob-sections independently, hold one with your right hand while turning the other with your left hand.

To adjust the system set the MODE switch to MONOPHONIC and play a monophonic record or radio program. Set the two friction clutch tone controls in accordance with your speaker characteristics and room acoustics. The system will now be tonally balanced for monophonic and stereophonic listening.

Loudness Control:

The loudness control on the A230 is essentially two controls in one, mechanically tied together or ganged, to be operated by one knob. This control is used to adjust the volume level of any program material fed into the stereo system. Its effect can be modified by the operation of the CONTOUR switch.

Contour Switch:

One of the limitations of human hearing is its tendency to lose sensitivity to the very low pitched sounds as the program sound level is reduced. It is this characteristic (known as the Fletcher-Munson effect) which causes one to play music programs at high listening levels in order to experience the full rich tone available from fine modern recordings.

The Harman-Kardon CONTOUR switch compensates for this effect thus eliminating high listening levels as a requisite for full enjoyment of reproduced music. For warm, full-bodied reproduction at low listening levels, throw the CONTOUR switch to "ON". At high levels, the CONTOUR switch has no effect.

Balance Control:

The nature of stereophonic reproduction is such that it requires two identical channels to attain the highest degree of faithfulness and spatial distribution. Any variation in the efficiency of one channel as compared to the other will disturb this relationship. As there may be slight differences between the two speakers, tape heads, cartridge coils, etc., the A230 includes a special control to balance one channel against the other. Sufficient range is covered by this control to permit rebalancing of the overall system even in extreme cases where unbalance exists.

It must be noted that the BALANCE control may be set anywhere within its range of adjustment to attain system balance.

Mode Switch:

The MODE switch is incorporated to select between the various modes of operation which may be desired for monophonic and stereophonic reproduction. This switch offers FIVE positions of operation. REVERSE, STEREO, MONOPHONIC, RIGHT and LEFT.

At this writing, most newly recorded stereophonic discs follow the established industry standard, so that your left speaker will reproduce the program as picked up by the left recording microphone when the MODE switch is in the STEREO position. However, this is not necessarily so for older recordings. While one label may present the orchestra with the bass section on the right and the violins on the left, another recording company may reverse this procedure. Some of us prefer to listen to a symphony orchestra in the same relative orientation as in the concert hall. The REVERSE position on the MODE switch serves to reverse the apparent locations of instruments in an orchestra to duplicate the original setting where necessary.

For those who do not have matched speakers for stereophonic reproduction, the REVERSE position on the MODE switch serves an additional purpose. In "Ping-Pong" stereo recordings, the bass is sometimes favored on one side, while the higher frequencies may appear on the other channel. By experimenting with the MODE switch it is possible to channel the low frequencies through the speaker system having the best bass response. Merely throw the MODE switch back and forth between REVERSE and STEREO until the low frequencies are reproduced by the speaker system with the better low frequency response.

The STEREO position on the MODE switch maintains the Left-Right relationship for properly made records.

When you desire to play a monophonic record utilizing your stereo cartridge, the MODE switch should be set to the MONOPHONIC position. This position combines the left and right sections of the stereophonic cartridge and cancels vertical rumble and distortion.

Setting the MODE switch to RIGHT when the A230 is set for stereo reproduction allows any program material being fed into the right input receptacles to be reproduced by both speakers simultaneously. If you are listening to a stereo disc and the MODE switch is set to RIGHT, only the right channel of the recording will appear at the speakers. Setting the MODE switch to LEFT allows all program material being fed into the left input receptacle to be reproduced by both speakers simultaneously.

When using a monophonic cartridge with the A230, the MODE switch must be properly set to correspond with the input used. If your monophonic cartridge is connected to the LEFT LOW LEVEL or PHONO HI INPUT the MODE switch must be set to the LEFT position to activate the left preamplifier. Similarly if your monophonic cartridge is connected to the RIGHT LOW LEVEL or PHONO HI INPUT, the MODE switch must be set to the RIGHT position to activate the right preamplifier.

To play the AM or FM tuner monophonically, set the FUNCTION SELECTOR switch to the desired position and turn the MODE switch to MONOPHONIC. To play your stereo tuner set the FUNCTION SELECTOR switch to TUNER and turn the MODE switch to STEREO or REVERSE.

Function Selector Switch:

The FUNCTION SELECTOR switch selects the desired type of program source and has four switching positions. PHONO- LO/TAPE- LO: This position selects the LOW LEVEL INPUTS for operation. Be sure to properly set the two EQUALIZATION switches above the LOW LEVEL INPUTS to maintain proper tone balance.

PHONO-HI: This position selects the PHONO HIGH LEVEL INPUTS for operation.

TUNER: This position selects the two TUNER INPUT receptacles for operation.

AUX/TAPE- HI: This position selects the AUX/TAPE- HI receptacles for operation.

Power Switch:

The POWER on/off switch is located in the center of the front panel. Depress the red push-button to turn the set on. Depress the button again to turn the set off.

The push-button is illuminated and acts as the pilot light.

Rumble Filter:

At times, record changers, turntables, and even some FM stations produce an objectionable low frequency signal that is strong enough to be introduced into the playback system. This is known as rumble and can be eliminated by the special low freqency roll off switch on the front panel. Whenever rumble is encountered, throw the RUMBLE FILTER to "ON".

Speaker Selector Switches:

These switches allow the use of any combination of speakers in your installation.

The CENTER SPEAKER SELECTOR switch selects the third speaker in either Room A or Room B for operation. When placed in the "OFF" position the third speaker is inoperative.

The STEREO SPEAKER SELECTOR switch selects the two stereo speakers in either Room A or Room B for operation.

Complete instructions describing the operation of these switches can be found in the beginning of the book under SPEAKER CONNECTIONS.

Speaker Phasing Switch:

When more than one speaker is used in any music reproducing system they must be connected in a manner as to aid each other, rather than to work against one another. Since it is necessary to use two speakers for stereophonic reproduction, this caution applies. Checking for phase, and correcting if necessary, is quite simple.

Place the MODE switch in the MONOPHONIC position and play a monophonic record with readily apparent bass tones. Listen carefully to the strength and clarity of the bass while throwing the SPEAKER PHASING switch back and forth between 0° and 180°. Select the position which gives maximum bass reproduction. Once the phase is established the SPEAKER PHASING switch should not be manipulated again. It is also necessary to properly phase the center speakers when used in your stereo installation. Proceed in a similar manner as previously described. Listen carefully to the strength and clarity of the bass tones. Now reverse the connections of the center speaker. (Merely unfasten the wires from the CENTER SPEAKER OUTPUT terminals and reverse.) If the bass now sounds louder and clearer in the center speaker, it is in phase. If the bass seems weaker, the original connection was correct.

Improper phasing will decrease low frequency response and can also create a "hole in the middle" effect, or at times will actually shift or eliminate certain instruments from their proper perspective in the orchestra.

Speaker Impedance Selector Switch:

This switch must be set in accordance with the nominal impedance rating of your speakers. For speakers having a rating of 4 to 12 ohms, set the switch to 8 ohms. For speakers with a rating of 12 to 20 ohms, set the switch to 16 ohms. Once set, this switch need not be operated again unless the speakers are changed.

Grounding Terminal:

A special grounding screw terminal is located on the rear panel of the amplifier. Connect the ground lead from your record player, tape deck and other auxiliary equipment to this tie point.

Hum:

There has been some difficulty encountered when connecting a stereo record player to an amplifier. The conventional form of hookup usually results in one or more ground loops causing excessive hum. The following procedure will reduce hum pickup to a minimum.

A stereophonic record player may be subdivided into three electrically separate systems. These are: 1. The left pickup coil of the stereo cartridge, 2. The right pickup coil and 3. The turntable chassis in combination with the tone arm and motor.

The left pickup coil of the stereo cartridge has two output terminals. These terminals should be brought through a coaxial, shielded and insulated cable to the respective input receptacle on the stereo amplifier. Extreme caution must be exercised to make sure that the ground side of the shielded cable does not make contact with either the turntable chassis or the other pickup coil.

The right pickup coil should be brought to its respective amplifier input receptacle in a similar manner, again making sure it is completely isolated electrically from the left pickup coil and the turntable chassis. It may be advantageous to twist the two shielded cables to prevent hum pickup from a radiation source as a power transformer or turntable motor.

The turntable chassis is ordinarily connected through a flexible lead with the motor shell. However, the tone arm is usually NOT electrically connected to the turntable chassis other than through its bearings. Since this is an unreliable connection, it is suggested that a small hole be drilled into the tone arm (near the bearing) and a solder lug fastened with a sheet metal screw be driven into the hole. A flexible wire forming a loop should be connected from the tone arm

to the turntable chassis. If this does not appear practical, a second and less satisfactory method may be suggested. The lubricant should be removed from the tone arm bearings and replaced by graphite. After the turntable motor and tone arm have been electrically secured to the turntable chassis, a cable should be connected from the chassis to the amplifier ground.

This method applies to cartridges with four output terminals and in this manner the three systems are isolated from each other and all are returned to their proper ground. This will avoid hum caused by ground loops.

In cases of magnetic pickups carrying only three output terminals, and tone arms which are supplied with three-prong plugs, the following modifications of the procedure will have to be effected.

If the pickup is of the four terminal type, but is used in conjunction with a three-prong tone arm head, the two ground outputs of the pickup coils must be tied together.

The left pickup coil is then connected to a shielded lead with the ground side of the coil connected to the shield leading to the appropriate receptacle on the amplifier in the same manner as outlined in the above procedure. The "hot" output of the right pickup coil will be connected with another insulated shielded lead to its receptacle on the amplifier. However, the shield is to be grounded ONLY at the amplifier end, and left floating at the record player end. The record player chassis is treated in the identical manner as described in the previous paragraphs.

In any high fidelity system hum and noise may also be caused by other factors. A common cause of hum may be the interconnection of a record player, tuner and amplifier, as a result of the cables and different ground potentials. If hum is experienced and it cannot be traced to improper grounding of the phono cartridge or turntable, disconnect everything but the speakers from the A230. If hum persists, reverse the AC line cord in the socket. Also perform the hum balancing adjustment outlined in the next paragraph. Plug in the record player and if hum appears, reverse the record player AC line cord. Connect your other devices in a similar manner. CAUTION: Hum may be also induced by defective interconnecting cables or by running these cables too close to strong AC fields.

ADJUSTMENTS

Hum Adjustment:

One HUM ADJUST HIGH LEVEL control and one HUM ADJUST LOW LEVEL control are located on the upper portion of the chassis behind the electrolytic condenser and in front of the ECC83/12AU7 tube. Each operates simultaneously to adjust both left and right channels. To adjust for minimum hum. set the FUNCTION SELECTOR switch to TUNER (turn the tuner off if connected) and turn the LOUDNESS CONTROL to full volume. The balance control can remain in the center position. While listening to either speaker, adjust the HIGH LEVEL control for minimum hum. Now set the FUNCTION SELECTOR switch to PHONO-LO/TAPE-LO and set the LOW LEVEL hum control for minimum hum.

Output Balance:

Individual OUTPUT BALANCE controls for Left and Right channels are located between the EL 84 output tubes. These controls balance the two output tubes of each channel for lowest power hum and distortion. Adjustment is quite simple: With the amplifier turned on for a sufficient length of time to be thoroughly warmed up, turn the LOUDNESS control to minimum. Now, while listening carefully to the left speaker, adjust the LEFT OUTPUT BALANCE control for minimum hum. Then, while listening to the right speaker only, adjust the RIGHT OUTPUT BALANCE control for minimum hum. Due to the extremely low hum level of the A230, this is best done at a time when the room is

very quiet. The setting for minimum hum is attained only when the two power tubes have been exactly balanced, and this is the condition for absolute minimum distortion.

A more critical adjustment of this control can be made by a competant service man using an I.M. analyzer and oscilloscope.

MAINTENANCE AND REPAIRS

Fuse:

In the event of a potentially damaging failure of tubes or components, the Model A230 is protected by a 2 ampere, type 3AG fuse, located on the rear of the unit. If this fuse is blown, it should be replaced only with one of the same rating. Replacing with a fuse of higher rating will not protect the amplifier, and may result in severe damage, which will not be covered by the factory warranty.

Routine Maintenance:

Due to the conservative design and high quality components of the Model A230, no routine maintenance other than yearly tube checking is advised. Occasional resetting of the hum and output balance adjustments, following the procedure previously described, will keep the unit operating at peak efficiency. These adjustments should certainly be made after any tube replacement.

Repair:

Only the most qualified service technician should be employed, as special equipment and training is required to properly service a high fidelity amplifier. This manual contains information of great value to the repairman, and should be kept available.

Factory Warranty Stations are maintained in most major cities. For the address of the nearest one, or for any other information relating to your Harman-Kardon products, write to the attention of the Customer Service Department, Harman-Kardon, Inc., 520 Main St., Westbury, N. Y. Be sure to include the model and serial number of the set in question. A short description of your complete installation is often of help in answering your questions.

REPLACEMENT PARTS LIST FOR A230

Part No.	Description	Price
ESCOM2727	D.P.D.T. SLIDE SWITCH	.40
ES771372	S.P.D.T. SLIDE SWITCH	.45
FT3063460	OUTPUT TRANSFORMER	13.50
FT2362705	POWER TRANSFORMER	18.75
JE2202842	ELECTROLYTIC COND. 40 MFD/450V WDC. 50 MFD/350V WDC.	3.25
JE2362695	ELECTROLYTIC COND. 100/100 MFD 25 UWDC 40/40 MFD 300 VWDC	3.00
RV3063498	BALANCE CONTROL	2.00
RV3063499	BASS CONTROL	2.35
RV3063500	LOUDNESS CONTROL	2.75
RV3063499	TREBLE CONTROL	2.35
ER2363340	FUNCTION SWITCH	1.40
ER3063501	MODE SWITCH	1.40
RVCOM2569	BALANCE POT	.65
P3063502	ESCUTCHEON	15.35
PCOM3468	KNOB DUMMY CONCENTRIC	.25
PCOM3475	KNOB REAR CONCENTRIC	.30
PCOM3474	KNOB FRONT CONCENTRIC	.25

TECHNICAL SPECIFICATIONS

THE BALLAD, Model A230: Dual 15 watt amplifiers and dual preamplifiers in a magnificently styled instrument. *Friction-Clutch Tone Controls:* Bass and treble controls adjust separately for each channel. Once adjusted, the controls lock automatically to provide convenience of ganged operation. *Exclusive Third Channel Speaker Selector:* Remarkable new development permits addition and operation of a third channel speaker in local or remote stereo systems. Also permits simultaneous operation of virtually *any* combination of speakers—stereo and monaural—in local and remote installations. *Illuminated Push-Button On/Off Switch:* Wonderfully convenient device permits amplifier to be turned on and off without upsetting careful setting of controls. *Speakers Phasing Switch:* Corrects for improperly recorded program material. *Subsonic Filter:* Eliminates phonograph rumble.

AUDIO

Circuits:	Two EL84 output tubes per channel operated conservatively in Class AB¹, self bias, pentode connected. Special phase inverter designed for low distortion and high gain with minimum phase shift.
Output Level:	15 watts per channel, 30 watt peaks. Less than 1% harmonic distortion at maximum output.
Output Impedance:	8 and 16 ohms. Selectable by slide switch on rear panel.
Frequence Response:	± 1 db 15-70,000 cycles per second at normal listening level. Excellent listening characteristics achieved by use of special grain oriented high permeability cores in both output transformers for exceptionally wide frequency response and improved transients.
Channel Cross Talk:	Better than 50 db.
Minimum Volume Hum:	80 db below 15 watts.
High Level Hum:	70 db below 15 watts.
Low Level Phono Hum:	60 db below 15 watts.
Tape Head Input Hum:	55 db below 15 watts.
Tone Controls:	New friction-clutch type controls for separate or ganged action. Range of bass and treble is ± 12 db at 50 and 10,000 cycles per second.
Regulation:	Excellent B+ regulation is obtained by use of heavy duty GZ34 rectifier tube and special power transformer. This provides cleanly defined low frequency response and superb overload characteristics.
Rumble Filter:	Subsonic filter to eliminate record and phonograph rumble. 10 db per octave below 50 cycles per sec.
Input Levels:	High level inputs: 300 millivolts, 2 megohms, flat response. Low level phono: 3 millivolts at 1 KC. Will not overload with input level below 180 mv. Tape Hd: 1 millivolt at 250 cycles.
Tape Output Recording Level:	2 volts from each channel, unmodified by volume and tone controls for absolutely flat response.
Equalization:	Phono: RIAA Tape: NARTB

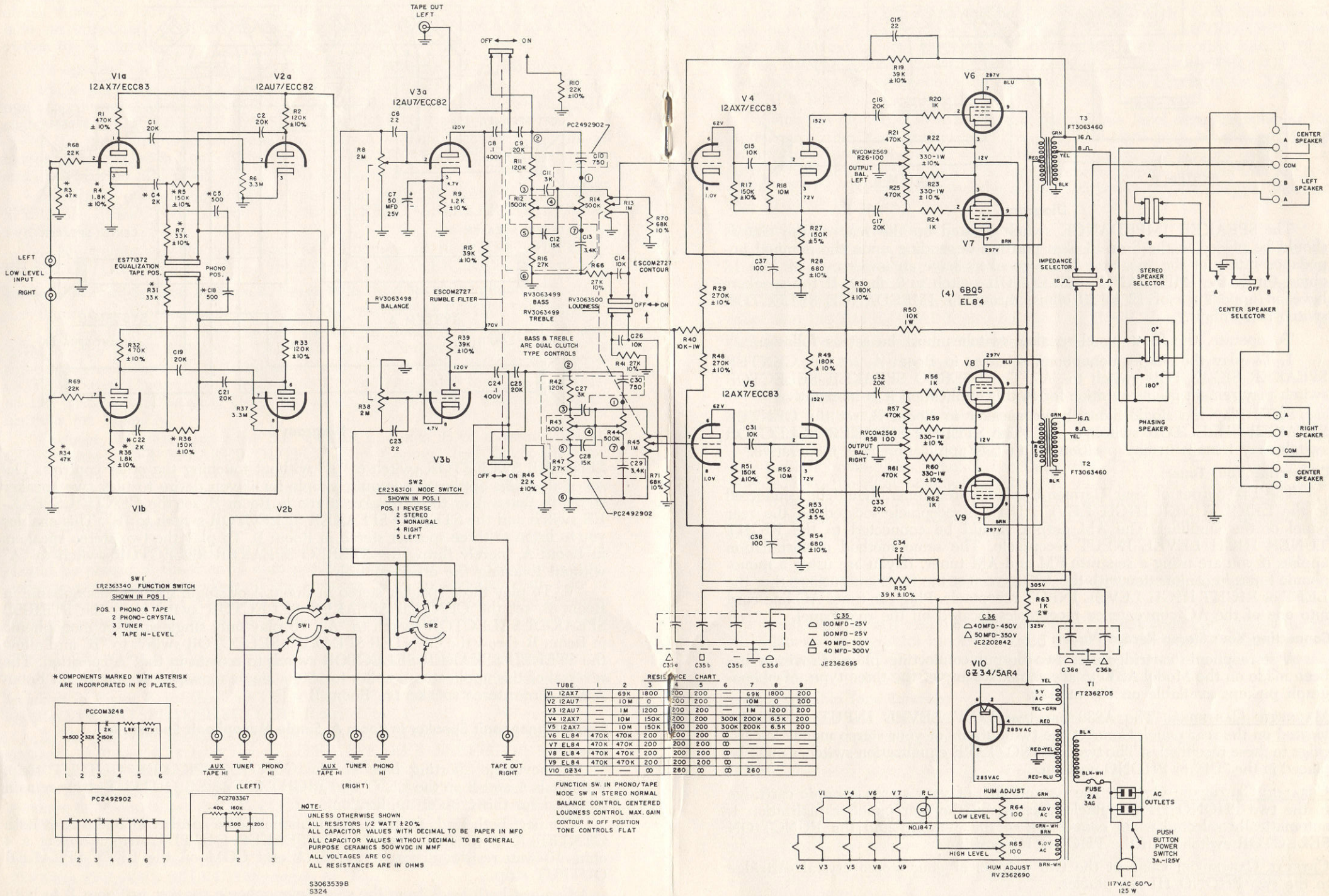
SPECIFICATIONS (Continued)

Special Features:	Illuminated push-button on/off switch. Exclusive Third Channel Speaker Selector Switches permit the operation of remote speakers in any of the following ways: 1. Stereo in one room. 2. Stereo in one room, monophonic in another. 3. Stereo with 3rd channel in one room, monophonic in another. 4. Stereo in one room, stereo in another. 5. Stereo with 3rd channel in one room, stereo in another. 6. Stereo with 3rd channel in one room, stereo with 3rd channel in another.
Construction:	The use of the finest components operated conservatively for long life and trouble free performance. Point to point wiring. Components are mounted by wrapping, crimping and then soldering to insure low noise and rigidity.

OVERALL SPECIFICATIONS

Front Panel Controls:	Treble (dual), Bass (dual), Loudness, Balance, Mode Selector (Stereo Reverse, Stereo Monophonic, Monophonic Right, Monophonic Left), Function Selector (Tape Lo/Phono-Lo, Phono-Hi, Tuner, Aux/Tape-Hi), Rumble Filter, Contour, 2 Speaker Selector Switches and Illuminated push-button on/off switch.
Chassis Controls:	Two output tube balance potentiometers for minimum IM distortion settings. Two hum controls.
Rear Panel Controls:	Phono/Tape Equalization Switches. Speaker Phasing Switch and Speaker Impedance Switch.
Rear Terminal Connections:	Speaker connections. Ground lug.
Convenience AC Receptacles:	Two, controlled by front panel push-button on/off switch.
Fuse:	Externally accessible. Fuses transformer primary.
Tube Complement:	(Total 10) 1-GZ34, 4-EL84, 2-ECC82/12AU7, 3-ECC83/12AX7.
Dimensions:	13-13/16″ wide x 4⅝″ high x 11½″ deep (excluding knobs).
Power Consumption:	125 watts.
Finish:	Copper escutcheon, silver grey cage.
Shipping Weight:	18 lbs.

REAR COVER



*COMPONENTS MARKED WITH ASTERISK ARE INCORPORATED IN PC PLATES.

PCCOM3248

PC2492902

PC2783367

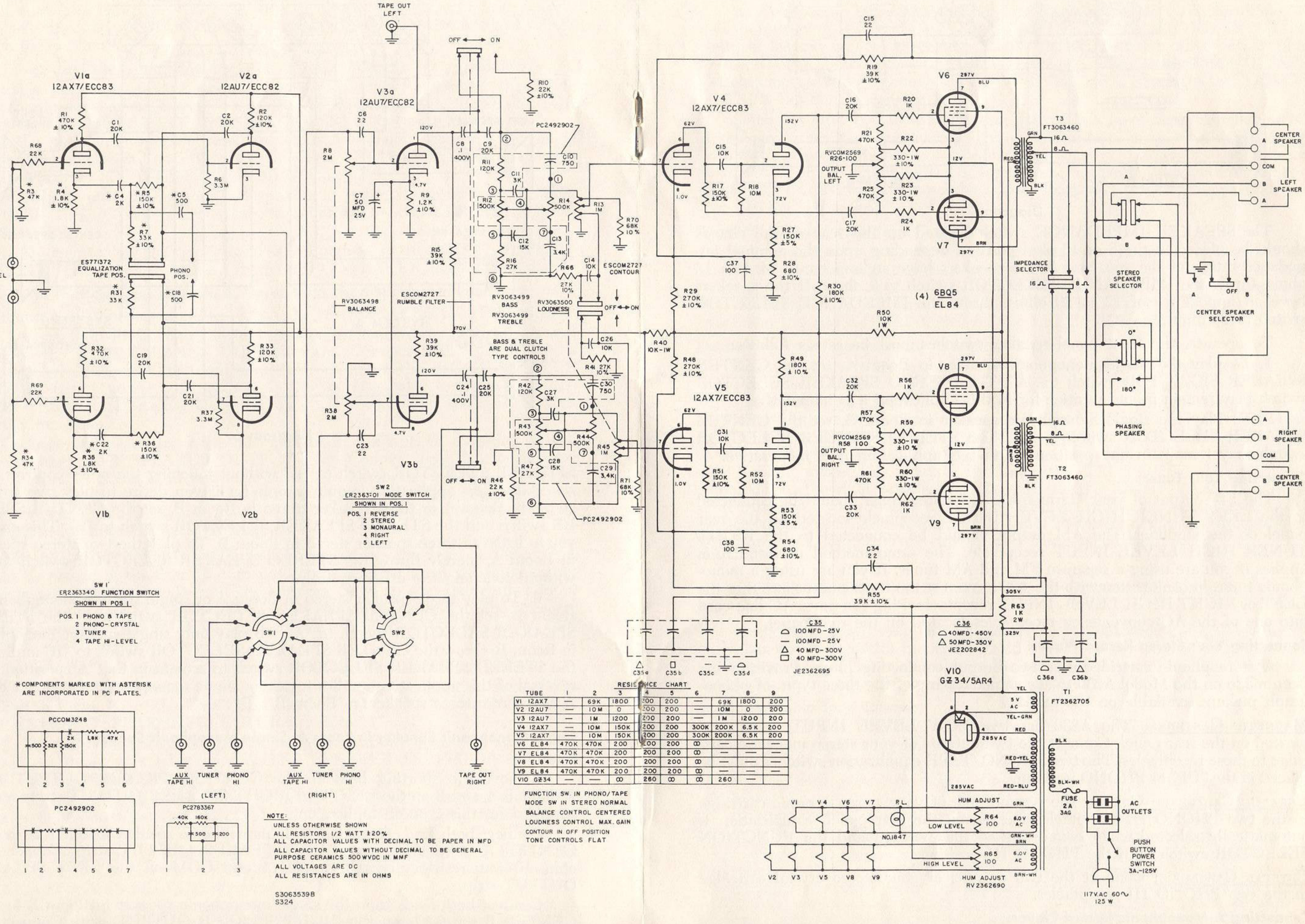
RESISTANCE CHART

TUBE	1	2	3	4	5	6	7	8	9
V1 12AX7	—	69K	1800	200	200	—	69K	1800	200
V2 12AU7	—	10M	0	200	200	—	10M	0	200
V3 12AU7	—	1M	1200	200	200	—	1M	1200	200
V4 12AX7	—	10M	150K	200	200	300K	200K	6.5K	200
V5 12AX7	—	10M	150K	200	200	300K	200K	6.5K	200
V6 EL84	470K	470K	200	200	200	∞	—	—	—
V7 EL84	470K	470K	200	200	200	∞	—	—	—
V8 EL84	470K	470K	200	200	200	∞	—	—	—
V9 EL84	470K	470K	200	200	200	∞	—	—	—
V10 GZ34	—	—	∞	260	∞	∞	260	—	—

FUNCTION SW. IN PHONO/TAPE
MODE SW IN STEREO NORMAL
BALANCE CONTROL CENTERED
LOUDNESS CONTROL MAX. GAIN
CONTOUR IN OFF POSITION
TONE CONTROLS FLAT

NOTE:
UNLESS OTHERWISE SHOWN
ALL RESISTORS 1/2 WATT ±20%
ALL CAPACITOR VALUES WITH DECIMAL TO BE PAPER IN MFD
ALL CAPACITOR VALUES WITHOUT DECIMAL TO BE GENERAL PURPOSE CERAMICS 500 WVDC IN MMF
ALL VOLTAGES ARE DC
ALL RESISTANCES ARE IN OHMS

S30635398
S324



RESISTANCE CHART

TUBE	1	2	3	4	5	6	7	8	9
V1 12AX7	—	69K	1800	200	200	—	69K	1800	200
V2 12AU7	—	10M	0	200	200	—	10M	0	200
V3 12AU7	—	1M	1200	200	200	—	1M	1200	200
V4 12AX7	—	10M	150K	200	200	300K	200K	6.5K	200
V5 12AX7	—	10M	150K	200	200	300K	200K	6.5K	200
V6 EL84	470K	470K	200	200	200	∞	—	—	—
V7 EL84	470K	470K	200	200	200	∞	—	—	—
V8 EL84	470K	470K	200	200	200	∞	—	—	—
V9 EL84	470K	470K	200	200	200	∞	—	—	—
V10 GZ34	—	—	∞	260	∞	∞	260	—	

FUNCTION SW. IN PHONO/TAPE
MODE SW IN STEREO NORMAL
BALANCE CONTROL CENTERED
LOUDNESS CONTROL MAX. GAIN
CONTOUR IN OFF POSITION
TONE CONTROLS FLAT

NOTE:
UNLESS OTHERWISE SHOWN
ALL RESISTORS 1/2 WATT ±20%
ALL CAPACITOR VALUES WITH DECIMAL TO BE PAPER IN MFD
ALL CAPACITOR VALUES WITHOUT DECIMAL TO BE GENERAL PURPOSE CERAMICS 500 WVDC IN MMF
ALL VOLTAGES ARE DC
ALL RESISTANCES ARE IN OHMS

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