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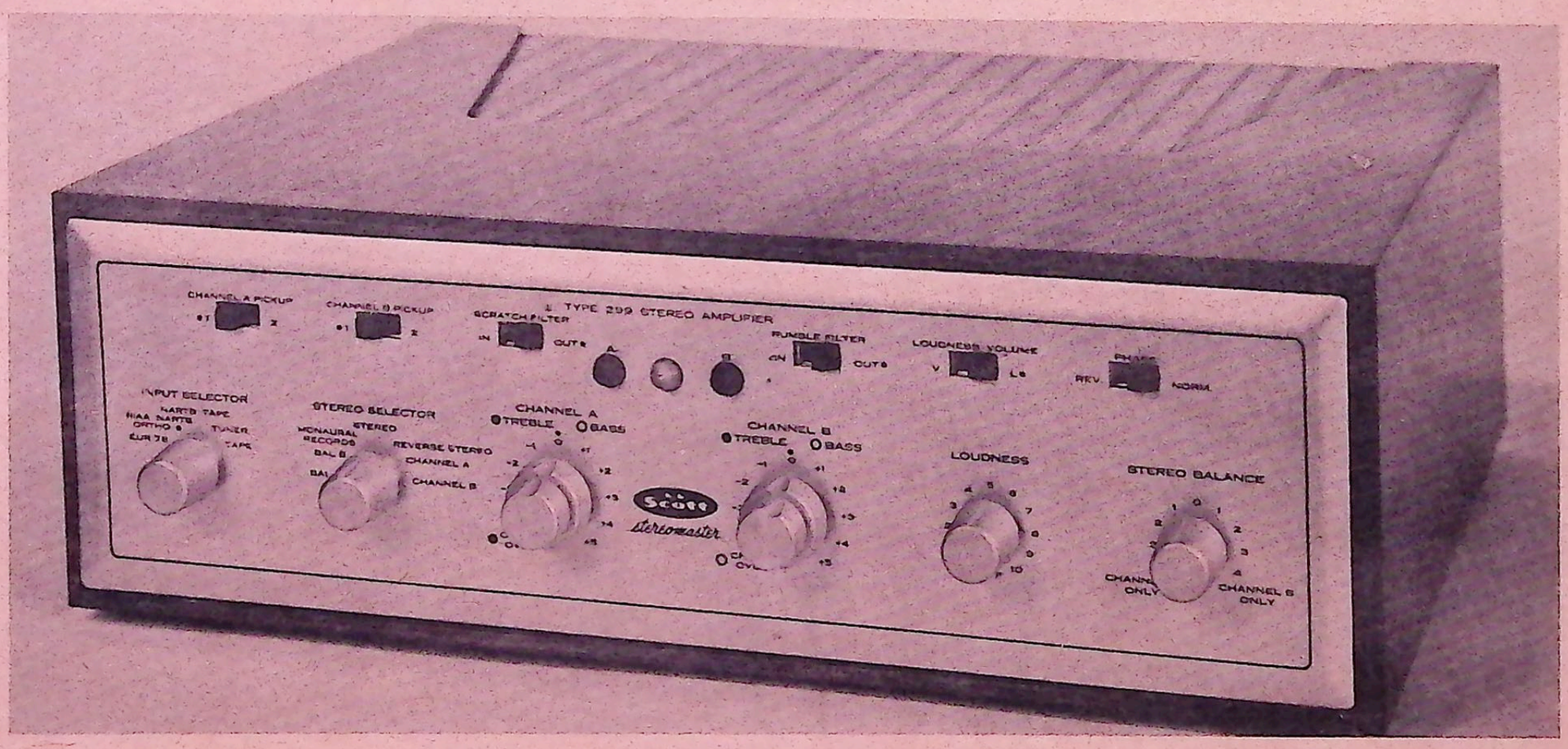
OPERATING MANUAL

Type 299

40 Watt Complete Stereophonic Amplifier



h.h. Scott

111 POWDER MILL ROAD - MAYNARD, MASSACHUSETTS

Hermon Hosmer Scott, Inc.
111 Powder Mill Road
Maynard, Mass.

OPERATION MANUAL FOR THE TYPE 299 COMPLETE STEREOPHONIC AMPLIFIER

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Description

The 299 is a complete two-channel stereo amplifier consisting of dual power amplifiers and dual preamplifiers on a single chassis. It has two low level stereo inputs and two high level stereo inputs. It has also stereo outputs for a tape recorder as well as provisions for 4, 8 and 16 ohm outputs for both speakers. Two accessory outlets are controlled by the OFF-ON switch in the amplifier.

The 299 Stereo Complete Amplifier has the following characteristics:

Maximum Power Output Each Channel on Music Waveforms	20 watts
Maximum Steady State Power Rating for Each Channel	17 watts
Frequency Response at Rated Output	20 to 30,000 cps
Maximum Harmonic Distortion at Rated Output	0.8%
First-Order Difference Tone Intermodulation Distortion	0.3%
Signal for Rated Output - NARTB Tape at 1,000 cps	3.0 millivolts
Signal for Rated Output - RIAA equalization at 1,000 cps	3.0 millivolts (MAG 1 and MAG 2 LOW)
Signal for Rated Output - RIAA equalization at 1,000 cps	9.0 millivolts (MAG 2 HIGH)
Signal for Rated Output - TUNER and TAPE inputs	0.45 volts
Hum and Noise - TUNER and TAPE inputs	80 db below rated power
Hum and Noise - low level inputs	Equivalent to 10 microvolts
Sharp Cutoff Rumble Filter	12 db/octave below 20 cps
Rumble Filter	Cutoff frequency 100 cps
Scratch Filter	Cutoff frequency 5,000 cps
Treble Boost - 10,000 cps	15 db ± 2 db
Treble Cut - 10,000 cps	15 db ± 2 db
Bass Boost - 50 cps	15 db ± 2 db
Bass Cut - 50 cps	15 db ± 2 db

(These characteristics are measured at a line voltage of 117 volts rms and a line frequency of 60 cycles per second. No significant changes of characteristics should be experienced for normal variations of line voltages or a line frequency of 50 cycles per second.)

Input Impedance - Low Level Inputs (MAG 1 and MAG 2 LOW)	47,000 ohms
Input Impedance - Low Level Input (MAG 2 HIGH)	150,000 ohms
Input Impedance - High Level Inputs	500,000 ohms
Minimum recommended load resistance on tape outputs	200,000 ohms
Maximum recommended cable capacitance on tape outputs	200 mmfds
Maximum recommended length of main output cables	6 ft.
Range of line voltage and frequency	105-125 volts, 50-60 cps
Power consumption - 117 volts at 60 cps	170 watts

NOTE: THIS IS A TRANSFORMER OPERATED DEVICE. DO NOT ATTEMPT TO OPERATE ON DIRECT CURRENT.

UNPACKING

Carefully remove the amplifier from its carton. Do not force any of the packing material or tube breakage may result.

If there is any damage to the amplifier, report it to your dealer immediately. If your dealer shipped the amplifier to you, report the damage to the shipping company as soon as possible. Failure to report the damage immediately may void any claim against the shipping company. Remember that the warranty covers only defects due to faulty workmanship or components. Shipping damage is not covered in the warranty.

Make sure the following accessories have been included in the carton: Panel Mounting Template, Package of Mounting Hardware, Warranty Card, and Connecting Cable. Be sure to send the warranty card to H. H. Scott, Inc. so that your instrument may be registered in our warranty files.

INSTALLATION

1. Ventilation and Mounting

NOTE: FAILURE TO PROVIDE PROPER VENTILATION WILL SHORTEN THE LIFE OF THE AMPLIFIER.

If the amplifier is to be mounted in the metal or wood accessory case designed for it, be sure to leave a space of at least 2 inches from any vertical surface such as a wall. The ventilating louvres or grille must not be covered, and it is desirable to allow a space of 4 inches between the top of the amplifier and any shelf or horizontal surface over it.

If the amplifier is to be panel-mounted or installed in custom cabinetry, be sure to leave one side or the back of the cabinet open for adequate ventilation. In this case as well, be sure to leave a clearance of at least 4 inches above the amplifier to any horizontal surface. Due to the heat produced, tuners will drift if they are mounted above the amplifier. It is recommended that the tuner be mounted below or beside the amplifier.

Vertical mounting of this amplifier is not recommended. However, if the amplifier must be mounted vertically, it may be done providing blowers are used on the output and rectifier tubes with proper escape for the air stream. At no time should the temperature on the chassis exceed 125 degrees F.

In order to make a panel mounting in a custom installation, apply the following procedure:

A. Locate a supporting shelf in a cabinet at the height at which the amplifier is to be positioned, and mark the edge at which the upper surface of the supporting shelf meets the panel.

B. Using this line as a guide, place the mounting template so that the lower edge of the cutout coincides with this line.

C. Mark the size of the cutout and carefully cut the opening as indicated on the template.

D. Slide the amplifier in from the front so that it rests on a shelf. The front panel should completely cover the opening.

E. Fasten the 299 to the cabinet using the method described on the mounting template.

NOTE: THE AMPLIFIER MUST BE SUPPORTED BY A SHELF. IT SHOULD NEVER BE SUPPORTED BY THE FRONT PANEL ALONE EITHER IN THE VERTICAL OR HORIZONTAL POSITIONS.

2. Electrical Connections

A. Connections for Phonograph Pickups:

The two channels of all stereophonic magnetic, variable reluctance and moving coil pickups should be connected to the "MAG 1" or "MAG 2" inputs at the rear of the amplifier. Be sure not to cross-connect the magnetic inputs, that is do not connect to "MAG 1" Channel A and "MAG 2" Channel B, for instance. Be sure also to use both magnetic inputs, Channel A and B, of the stereophonic pickup.

Monaural magnetic, variable reluctance and moving coil pickups are also connected to the "MAG 1" or "MAG 2" inputs. In order to drive both left and right speakers of the stereophonic speaker system the "STEREO SELECTOR" switch is set to "CHANNEL A" or "CHANNEL B", whichever input is used.

Ceramic and crystal phonograph pickups that have a high voltage output automatically compensate for the RIAA recording characteristic, and they should be connected to one of the high level jacks such as the "TUNER" or "TAPE" jacks at the rear of the amplifier. In order to make use of the cartridge, the "INPUT SELECTOR" switch is turned to the position of the jack to which the cartridge is connected. For example, if the cartridge is connected to the "TAPE" jack the "INPUT SELECTOR" switch must be turned to "TAPE" to play records.

Certain ceramic cartridges will work when connected directly to the low level magnetic inputs. If there is insufficient volume with the ceramic cartridge connected to a high level input, connect the cartridge to either the "MAG 2 LOW" or "MAG 2 HIGH" inputs. Most cartridges of this type so connected will work properly with the equalization controls.

In the case of low level stereophonic cartridges and tape heads, it is desirable to twist the two shielded leads about each other to minimize hum pickup. It is also desirable not to ground the two outer shields of the conductor together at any point along their length. In the case of three terminal stereophonic cartridges, both shields will have to be grounded to the center connection of the cartridge; but in the case of four terminal stereophonic cartridges, it is desirable that the ground be made through the internal connections of the amplifier which are automatically provided.

NOTE: SHIELDED CABLE MUST BE USED ON ALL INPUT CONNECTIONS, AND THE SHIELD MUST BE CAREFULLY SOLDERED TO THE COLLAR OF THE PLUGS THAT ARE CONNECTED TO THE AMPLIFIER. IF ANY HUM DEVELOPS IN THE PHONOGRAPH PICKUP SYSTEM, SEE THE APPENDIX ON PICKUP INSTALLATION. IT IS ABSOLUTELY NECESSARY TO TWIST ALL PAIRED SHIELDED LEADS TO PREVENT MAGNETIC HUM PICKUP.

B. Connections for Tape Heads:

Connect the two channels of stereo playback tape heads of the tape deck (having no tape preamplifier) to either of the two pair of jacks marked "MAG 1" or

"MAG 2". The "PICKUP" selector switches should be placed on either "MAG 1" or "MAG 2" to play back from tape depending upon which connection is made on the back of the amplifier. The "INPUT SELECTOR" switch is then turned to the "NARTB TAPE" position. The tape deck can then be heard through the amplifier.

When tape heads are used with the amplifier in this configuration, the connecting cables from the tape heads must be no longer than 6 ft. in length or treble rolloff may result.

C. Connections for Stereophonic Tape Recorders Having Dual Preamplifiers:

The outputs from a stereophonic tape recorder having dual preamplifiers should be connected to the "TAPE" inputs at the rear of the preamplifier. The tape recorder may then be heard through the amplifier when the "INPUT SELECTOR" switch is placed in the "TAPE" position. If it is desired to record with a tape recorder, connect the appropriate inputs of the tape recorder to the "RECORDER OUTPUT" of the amplifier. A signal will be available at these outputs for any type of program material used in the amplifier.

NOTE: WHEN THE "INPUT SELECTOR" SWITCH IS NOT IN THE "TAPE" POSITION, THE "TAPE" INPUTS ARE SHORTED TO GROUND.

D. Output Connections for Stereophonic Sound:

Four output connections have been provided in the 299 Amplifier. They are the "RECORDER OUTPUTS" and the two speaker terminal strips. The two loudspeakers are connected to the terminal strips labeled "CHANNEL A" and "CHANNEL B" at the rear of the amplifier. Connect the speakers to the two terminals labeled "O" and "HIGH". Two jumper wires are to be connected to the numbered terminal on the strips adjacent to them. To determine which terminals to use, obtain the value of the loudspeaker impedance from your dealer or the speaker manufacturer. Connect the jumper wire to the terminal whose number is closest to the value of the speaker impedance. For example, if the speaker has an impedance of 12 ohms, connect the jumper to the terminal numbered "16".

The speaker to the right of the listener is connected only to the "O" and "HIGH" terminals of the strip marked "CHANNEL B". The speaker to the left of the listener is connected only to the "O" and "HIGH" terminals of the strip marked "CHANNEL A".

Be careful not to cross-connect the speaker leads or the amplifier will not operate. Be sure, also, that no bare speaker wires touch the chassis of the amplifier. Another important matter is the cross-sectional size of the wire. It should be large enough so that the wire resistance is low or power loss in the speaker line will occur. No. 20 wire or larger is required. Ordinary lamp cord is satisfactory.

If two loudspeakers are of different types with different efficiencies, connect the jumper lead of the loudspeaker with the lower efficiency (the one with the lower sound output) to the terminals determined by its impedance. The jumper lead of the louder speaker is connected to a terminal whose value is lower than the nominal impedance. Choose the value such that both speakers are equally loud when the "STEREO BALANCE" control is nearly centered. For this reason it is usually wise to match speaker types. In extreme cases of mismatch it will be necessary to place an attenuator pad in the circuit of the higher efficiency speaker.

NOTE - IF THE JUMPERS ARE NOT CONNECTED TO A NUMBERED TERMINAL ON THE TERMINAL STRIPS, THE SPEAKERS WILL NOT OPERATE.

E. Using the 299 as an Electronic Crossover:

If it is desired to use the amplifier as an electronic crossover rather than a stereophonic amplifier, the "SPEAKER A" jacks should be connected to the low frequency speaker or woofer. The "SPEAKER B" terminals should be connected to the high frequency speaker or tweeter. The tone controls are then placed in the crossover position, and the stereo balance control is used to adjust the relative levels of the high frequency speaker to the low frequency speaker. The Channel A bass control and the Channel B treble control are then used to adjust the treble and bass of the entire system. The crossover frequency of the Type 299 Amplifier is 800 cycles. Some variation is permissible, but it is best to use two speakers which will permit a crossover between 600 and 1000 cps.

F. Power Connections:

The amplifier may be plugged into any 110 to 120 volt, 50 to 60 cycle, AC source. One accessory outlet has been provided at the rear of the amplifier to permit the control of other equipment from the power switch. No more than a total of 300 watts may be obtained from this outlet. To find the total wattage of the accessory equipment, just add the wattage consumed by each unit. For instance, a tuner of 65 watts, a turntable of 50 watts, and a tape deck of 75 watts will give a total of 190 watts which may be controlled by the preamplifier. Three-way outlets may be used to increase the number of controlled power inputs.

DESCRIPTION OF CONTROLS

A. Input Selector Control:

The first two positions of this control ("EUROPEAN 78's" and "RIAA, NARTB ORTHO") provide compensation for the most common recording curves. Certain technical characteristics of the recording process require that the bass frequencies be artificially reduced and the treble frequencies boosted by the recording engineers. For the original sound to be reproduced properly when a recording is played back, just the opposite must be done in the amplifier through which the recording is played. For long play recordings previous to 1955, different manufacturers used slightly different recording curves. To compensate for this, a slight adjustment of the tone controls with the "INPUT SELECTOR" switch in the "RIAA, NARTB, ORTHO" position will provide for this. The tone controls should be adjusted for best sound in this position. Beginning in 1955, most companies standardized on the "RIAA-NARTB" curve, and new recordings should require no adjustment of the tone controls if the speaker systems are properly balanced with respect to treble and bass. All 45-45 stereo recordings use the "RIAA-NARTB" recording characteristics.

For old 78 rpm recordings, the "INPUT SELECTOR" switch should be placed in the "RIAA" position for those of American manufacture and in the "EUR 78" position for those of European manufacture. For all records manufactured before 1935 use the "EUR 78" position.

The other stereo inputs to the 299 such as "TUNER" or "TAPE" are also connected to the amplifier through the "INPUT SELECTOR" switch. For example, when the switch is set to the "TUNER" position, the stereo tuner input jacks at the rear of the amplifier will be connected to the circuit.

B. Stereo Selector Switch:

The "STEREO SELECTOR" switch permits the amplifier to be operated through seven different modes. This switch also changes the front panel light pattern that was incorporated into the Type 299 Amplifier for the purpose of identifying the setting of this control at a distance. The seven modes are:

(1) Balance A - This setting permits program material coming from both A and B channel inputs to drive the A channel speaker only. This position is necessary for balancing the loudspeakers. See the section on the "STEREO BALANCE" control for details.

(2) Balance B - This permits program material from both A and B channel inputs to drive the B Channel speaker. This position is necessary for balancing the loudspeakers. See the section on the "STEREO BALANCE" control for details.

(3) Monaural Records - This permits playback of monaural records with a stereophonic cartridge through both channels and speaker. This particular setting will permit playback of standard laterally modulated records. Be sure to keep the "PHASE" switch in the "NORMAL" position for all normal (lateral) monaural records.

(4) Stereo - This setting permits stereophonic program material to be amplified so that Channel A input is heard through the Channel A speaker and the Channel B input is heard through the Channel B speaker.

(5) Reverse Stereo - This setting cross-connects the outputs so that the Channel A input is heard through the Channel B speaker and Channel B input is heard through the Channel A speaker.

(6) Channel A - This setting permits monaural program material coming into Channel A to operate both Channel A and Channel B speakers. It also permits the amplifier to be operated as an electronic crossover for monaural program material on Channel A when the treble and bass controls are placed in the crossover position.

(7) Channel B - This setting permits monaural program material coming into Channel B to operate both Channel A and B speakers. It also permits the amplifier to be operated as an electronic crossover for monaural program material on Channel B when the treble and bass controls are in their crossover position.

C. Treble and Bass Controls:

These are tone controls which allow compensation for room acoustics, differences in speakers and pickups, and personal preferences. When set in the plus positions the bass and treble frequencies are boosted. When set in the minus positions, the bass and treble frequencies are attenuated. The controls should be adjusted until the music sounds best. This is the most important factor in music listening.

These tone controls are provided for each channel in case the speakers for each channel are of different manufacture or when the room placement causes two matched speakers to assume different sound properties.

These controls also have calibrated points for use when the amplifier is used as an electronic crossover. In these calibrated positions, Channel A becomes the low frequency channel and Channel B becomes the high frequency channel.

D. The Stereo Balance Control:

This control is used in conjunction with the "BAL A" and the "BAL B" positions of the "STEREO SELECTOR" switch. The "STEREO SELECTOR" switch is repeatedly moved from "BAL A" to "BAL B" and the "STEREO BALANCE" control and the tone controls should be adjusted so that the sound output from both speakers is identical.

The "STEREO BALANCE" control adjusts the relative levels of output from the two stereophonic channels. If the control is in its extreme counter-clockwise position, output will be available from Channel A only; and if the control is in its extreme clockwise position, output will be available only from the Channel B speaker. This control was provided to balance stereophonic sound from two dissimilar speakers. For two speakers of the same type, the control will normally be in the zero position providing that the stereophonic program material is properly balanced with respect to relative levels at the input. If one speaker sounds unduly loud, the controls should be moved away from the channel that the speaker occupies and moved nearer the channel of the other speaker until the sound from both speakers is properly balanced. This control may have to be readjusted for different program material because of changed recording balance. See also section on output connections so that the "STEREO BALANCE" control is operated mostly in the center position.

E. The Loudness Control and the Loudness-Volume Switch:

The volume is adjusted with this control. When the "LOUDNESS-VOLUME" switch on the front panel is set to "LOUDNESS", special compensation is given to music. The need for this is explained as follows:

The human ear is insensitive to extremes of treble and bass frequencies at low volume levels. To compensate for this, the control progressively boosts the treble and bass frequency as the volume is turned lower. Therefore, the control maintains the proper balance of bass and treble with the middle ranges of reproduced music at all volume levels. This compensation may be removed by setting the "LOUDNESS-VOLUME" switch to the "VOLUME" position.

F. The Pickup Selector Switches:

These switches permit selection of either of two magnetic cartridges or of one magnetic cartridge and one tape head. When the switches are placed on the control dot setting, the pair of inputs labeled "MAG 1" are connected to the amplifier. The "MAG 2" positions are connected when these switches are set to the "2" position.

G. Rumble and Scratch Filters:

The "SCRATCH" and the "RUMBLE" filters have been incorporated in the amplifier to reduce noise due to these causes. These are not only operative on recordings only, they can also be used to reduce similar noises on the "TUNER" and "TAPE" inputs.

If the record has an undesirable amount of very low frequency noise, place the "RUMBLE FILTER" switch on the "IN" position to reduce this effect. If this condition is permanent, check for acoustic feedback from the speaker to the turntable as described in the section on Installation of Pickups in the Appendix. If this is not the cause of the difficulty, check for malfunction of the turntable. If a record is worn and exhibits scratch or a tape has noticeable hiss, turn the "SCRATCH FILTER" to the "ON" position. These controls operate on all positions of the "INPUT SELECTOR" switch.

I. The Phase Switch:

The "PHASE SWITCH" is provided so that the phase relationships of two stereo channels may be reversed. This feature permits both speakers to be driven in such a manner that their sound reinforces at low frequencies rather than cancels out. If very low frequency sounds tend to disappear, reverse the phase switch. This is equivalent to reversing the leads of one speaker. Occasionally it will be necessary to put this control in the "REVERSE" position when the program material has been improperly phased. See

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— CAUTION —

BEFORE PLACING THIS UNIT INTO OPERATION, MAKE SURE ALL TUBES ARE FIRMLY SEATED IN SOCKETS.

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OPERATION

Before attempting to operate the amplifier, read the description of each control carefully and make sure all the proper connections have been made. The amplifier will suffer no damage due to incorrect control settings or connections, but it is entirely possible that it will not operate with certain settings or connections.

NOTE: IMPROPER SETTINGS OF THE "PICKUP", " STEREO SELECTOR" and "INPUT SELECTOR" CONTROLS WILL PREVENT THE SIGNAL FROM GOING THROUGH THE AMPLIFIER. IF NO SIGNAL CAN BE HEARD, MAKE SURE THAT THE SWITCHES ARE CORRECTLY SET.

A. Operation with Stereo Program Material:

The amplifier is turned on by rotating the "LOUDNESS" control clockwise. The "INPUT SELECTOR" switch is turned to the inputs from which the program material will come. In the case of the low level inputs, the "PICKUP" switches are turned to either "1" or "2" according to whether the input to be used will be "MAG 1" or "MAG 2".

If the record has an undesirable amount of very low frequency noise, place the "RUMBLE FILTER" switch on the "IN" position to reduce this effect. If this condition is permanent, check for acoustic feedback from the speaker to the turntable as described in the section on Installation of Pickups in the Appendix. If this is not the cause of the difficulty, check for malfunction of the turntable. If a record is worn and exhibits scratch or a tape has noticeable hiss, turn the "SCRATCH FILTER" to the "ON" position. These controls operate on all positions of the "INPUT SELECTOR" switch.

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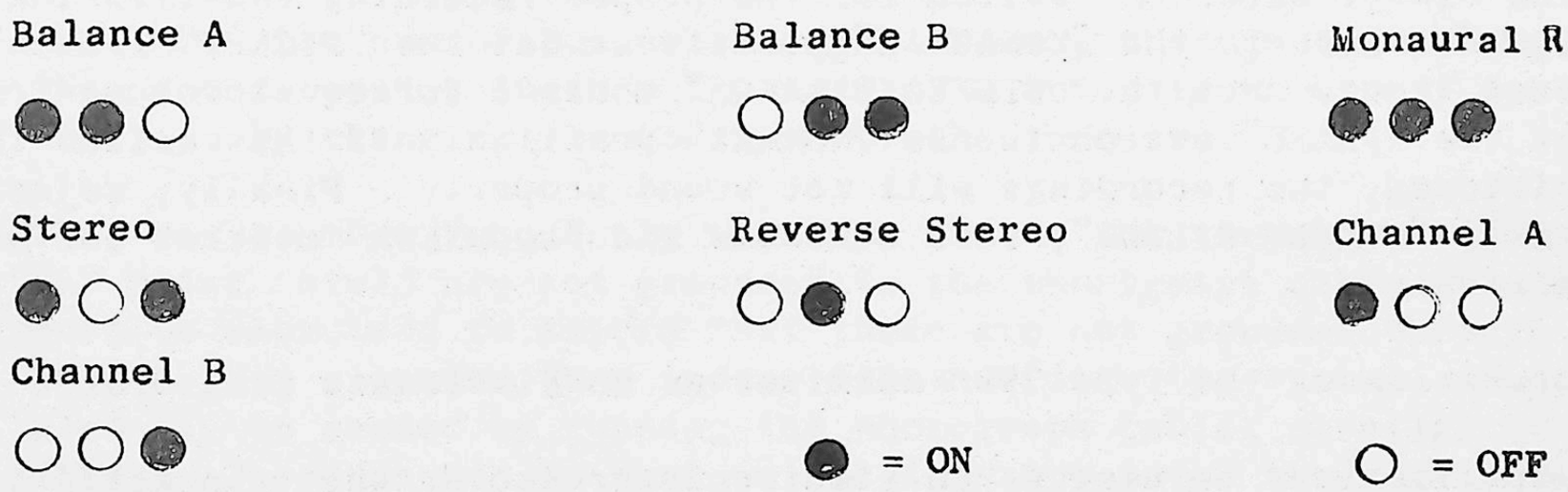
J. The Front Panel Indicator Lights:

These lights are used in conjunction with the settings of the "STEREO SELECTOR" switch and permit identification of the setting of this control at a considerable distance from the amplifier. The light patterns are as follows:



OPERATION

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NOTE: IMPROPER SETTINGS OF THE "PICKUP", " STEREO SELECTOR" and "INPUT SELECTOR" CONTROLS WILL PREVENT THE SIGNAL FROM GOING THROUGH THE AMPLIFIER. IF NO SIGNAL CAN BE HEARD, MAKE SURE THAT THE SWITCHES ARE CORRECTLY SET.

A. Operation with Stereo Program Material:

The amplifier is turned on by rotating the "LOUDNESS" control clockwise. The "INPUT SELECTOR" switch is turned to the inputs from which the program material will come. In the case of the low level inputs, the "PICKUP" switches are turned to either "1" or "2" according to whether the input to be used will be "MAG 1" or "MAG 2".

In the case of a tape recorder playing through dual tape preamplifiers, the "INPUT SELECTOR" switch is turned to the "TAPE" position.

The "STEREO SELECTOR" switch is then turned to the "BAL A" position, and moved back and forth between "BAL A" and "BAL B" positions. The "STEREO BALANCE" control is adjusted until the loudness from both speakers is equalized. The "STEREO SELECTOR" switch is then turned to the "STEREO" position. If the very low bass notes seem attenuated, reverse the "PHASE" switch and see if this improves the bass response. If the stereophonic sound is reversed (as in the case of the orchestral first violins being to the listener's right as he is facing the speakers), change the "STEREO SELECTOR" switch to the "REVERSE STEREO" position.

B. Operating the Preamplifier with Monaural Program Material Other Than Records:

See the "INPUT SELECTOR" switch for the input from which the program material will come. Set the "STEREO SELECTOR" switch to either "CHANNEL A" or "CHANNEL B" positions according to the channel from which the monaural sound is coming. Adjust the "STEREO BALANCE" control for equal volume for both speakers, and make sure that the "PHASE" switch is in the normal position. Adjust the tone controls and loudness controls for comfortable listening.

C. Using the Amplifier for Monaural Recordings with the Stereophonic Pickup:

Set the "INPUT SELECTOR" switch for the proper recording equalization. Set the "STEREO SELECTOR" switch to the "MONAURAL" position. Set the "PICKUP" switch for the proper low level input. Set the "STEREO BALANCE" control for equal volume from both speakers. Set the "PHASE" switch to the "NORMAL" position. If this switch is not correctly positioned, the recordings will not sound properly. Finally, adjust the "SCRATCH FILTER", "RUMBLE FILTER", tone controls and "LOUDNESS" control for most comfortable listening.

D. Operation of the Type 299 Amplifier as an Electronic Crossover:

The amplifier may be used as an electronic crossover when connected with two speakers, a high frequency speaker or tweeter and a low frequency speaker or woofer, housed in the same cabinet. The high frequency speaker is connected into the appropriate output of the B channel and the low frequency speaker is connected to the appropriate output of the A channel. See the section on the connection of outputs for this information. The controls are then set in the same manner as they would be for monaural program material except that the "CHANNEL A TREBLE CONTROL" and the "CHANNEL B BASS CONTROL" are put in the crossover position. The "STEREO BALANCE" control is then used to balance the relative speaker outputs and the "CHANNEL A BASS" and the "CHANNEL B TREBLE" controls are used to adjust the tone.

NOTE: IMPROPER SETTING OF THE "PICKUP", "STEREO SELECTOR" AND "INPUT SELECTOR CONTROLS WILL PREVENT THE SIGNAL FROM GOING THROUGH THE AMPLIFIER. IF NO SIGNAL CAN BE HEARD, MAKE SURE THAT THE SWITCHES ARE CORRECTLY SET.

APPENDIX

1. INSTALLATION OF PICKUPS

The manufacturer's directions should be followed carefully in all cases. We are listing some precautions and suggestions here to aid the user when such instructions are absent or incomplete.

A. The cable lengths on phonograph cartridges should be kept as short as possible to minimize shunt capacity which may cause high frequency peaks or roll-off and also minimize hum and noise pickup. At the same time, low capacity shielded cable should be used to reduce shunt capacitance. It is usually not wise to extend the total length of cable from the phonograph pickup to the amplifier more than six feet.

B. There are several causes of hum and noise pickup. These can be isolated by the process outlined below.

(1) SYMPTOM - Loud hum and no signal from the phonograph cable when plugged into the amplifier; no hum when the cable is removed from the amplifier.

This is usually due to a poor connection, broken solder joint, broken lead or frayed wire. Check the phonograph cable's and pickup's leads and connections.

(2) SYMPTOM - Low hum or buzz with signal coming through the phonograph lead. This sound remains whether the turntable motor is on or off and is not modified by changing the position of the tone arm.

This occurs most frequently when the arm or the turntable metal parts and motor shield are not grounded to the phonograph cable shield. Care must be exercised to insure that these are not grounded through two distant points lest a ground loop induce more hum into the system. This symptom also may be caused by running the phonograph cables parallel to power lines. These should be kept as far from low level leads as possible; and if it is necessary for power lines to cross the low level leads, cross them at right angles. This system may also occur in stereophonic cartridges with a common ground terminal. If this is the case, insert the plug of one of the stereophonic cartridges in such a manner that its collar does not touch the collar connection on the preamplifier. It is also desirable to twist the two cables coming from a stereophonic cartridge about each other so that no hum is induced because of magnetic pickup.

(3) SYMPTOM - Low hum or buzz present when the turntable is rotating and absent when it is turned off. Hum varies in intensity when the pickup is moved about the turntable. This is usually caused by magnetic pick-up from the field of the turntable motor. It can be controlled by increasing the shielding of the motor. Different pickups have different magnetic pickup characteristics. In some cases, therefore, it is necessary to change the phonograph cartridge to a different type or make to improve upon the hum level.

(4) SYMPTOM - Low hum or buzz present when the turntable is both on and off. Hum varies in intensity when the cartridge is moved about. This may be caused by magnetic fields from power transformers. Changing the posi-

tion of the amplifiers or tuners with respect to the phonograph solves this problem. Never mount an amplifier or tuner immediately above or below a turntable if it can be avoided.

C. It is a good idea to keep the phonograph and amplifier as far away from the speaker as feasible. In some cases, air-borne vibrations are fed back from the speaker to the phonograph cartridge with the result that squeals or howls occur when the amplifier "LOUDNESS" control is turned above a certain setting. Usually this is an indication that the turntable is too close to the speaker. The problem can be solved by moving the phonograph and amplifier away from the speaker and, in some cases, by enclosing them.

D. Often sound energy is propagated through walls or floors with the result that the very low bass is increased greatly or the phonograph system develops excessive rumble even though all the components of the system are performing properly by themselves. In order to prevent this, isolate the speaker and the phonograph from the floor by means of felt, foam rubber or plastic. This will stop low frequency vibrations from being transmitted from the loudspeaker to the record changer or turntable. If the loudspeaker system is a corner horn that utilizes the wall to direct sound energy, be careful of mounting the phonograph in wall brackets or built-in bookcases. The phonograph and amplifier should be mounted on a wall opposite to one of the two walls proximate to the speaker in this case. Mounting the loudspeaker on the same shelf as the phonograph and amplifier or in the bookcase is not recommended.

2. PHASING OF THE LOUDSPEAKERS

Proper phasing of both left and right loudspeakers is necessary to stereophonic installations in order that low frequency sounds are not cancelled out by speakers that are working in opposition to each other. When these speakers are out of phase, the very low notes are apt to be severely attenuated. Use the following procedure to make this adjustment:

A. Put a monaural signal of very low frequency (between 30 and 70 cycles) into the amplifier and set the "STEREO SELECTOR" switch to "CHANNEL A", "CHANNEL B" or "MONAURAL RECORDS" according to the placement of the input, and set the "PHASE" switch to the "NORMAL" position.

B. Adjust the two-speaker systems for equal output.

C. Place your head exactly between both speaker systems and listen to the intensity of the sound.

D. Change the "PHASE SWITCH" to the "REVERSED" position. Once again, place your head exactly between the two speakers and note the intensity of the sound. If the sound is more intense in the "NORMAL" position of the "PHASE" switch, the speakers are correctly phased. If, on the other hand, the sound is more intense when the "PHASE" switch is in the "REVERSED" position, the speakers are incorrectly phased. If the speakers are incorrectly phased, reverse the leads of one of the speakers and try again.

E. This completes the phasing adjustment. Check this adjustment at various other frequencies to insure that it is correct.

F. The foregoing adjustments can also be made with music. Here, the volume of the very low bass notes should be used as indication of proper phasing.

3. SERVICE OF THE 299

All electrical equipment requires maintenance. The 299 was designed to operate trouble-free for many years. Certain checks done at the end of every year, however, will help to keep the amplifier in good condition.

A. Check the tubes, particularly those in the power output stage and the rectifier every year. If the tubes are outside the manufacturer's ratings or show gas, they should be replaced. Gassy tubes may damage other components of the circuit.

B. When the amplifier is being checked yearly, clean the tubes of dust so that they may radiate their heat more effectively.

C. If at any time the hum or noise increases noticeably, check the power tubes. This symptom is often an indication of gassy tubes. If both tubes check properly and the amplifier is without hum when the amplifier is disconnected, then check the amplifier. If the hum continues, have a service man check the amplifier.

NOTE: DO NOT USE TUBES OTHER THAN THOSE SPECIFIED FOR THIS AMPLIFIER, THE INTRODUCTION OF ANY UNSPECIFIED PART VOIDS YOUR WARRANTY.

D. If the amplifier blows fuses frequently, have a service man check the amplifier. If no trouble is apparent, check the line voltage. Should the line voltage rise above 125 volts, drop the line voltage by means of an autotransformer or place a voltage regulation transformer between the amplifier and the line.

NOTE: DO NOT USE FUSE SIZES OTHER THAN THE FUSE SIZE SPECIFIED. TO DO OTHERWISE MAY RESULT IN PERMANENT AND COSTLY DAMAGE TO THE AMPLIFIER IF THE FUSE IS TOO LARGE AND WILL REQUIRE FREQUENT REPLACEMENT OF FUSES IF THE FUSE SIZE IS TOO SMALL.

E. Power Tube Bias Control:

This control is located on the rear apron of the amplifier. To adjust the control, uncover the bottom plate of the amplifier; place a DC Voltmeter across filter resistors R209 and R210, two 330 ohm 10 watt wire wound resistors connected in parallel; and adjust the control until the voltage across the resistors is 24.5.

F. DC Balance Controls:

These controls should be adjusted when the power tubes age or are replaced. Their locations are between the power tubes on the top of the 299 chassis. To set these controls use the following procedure:

(1) Connect a DC voltmeter whose minimum range is 1 volt full scale between both plates of the power stages.

(2) Adjust the DC Balance Potentiometers for minimum reading on the DC voltmeter.

G. AC Balance Controls:

These controls should be adjusted when the power and phase inverter tubes age or are replaced. They are located to the rear of each phase inverter tube on the top of the 299 chassis. To adjust them, use the following procedures:

Two methods for setting the control will be described. The first method, which makes use of tools that are available to the ordinary service man, is less accurate than the second method, which makes use of equipment that is found only in complete electronics laboratories. The difference in accuracy between the two methods is very small, but it may be significant for some laboratory measurements.

FIRST METHOD

A. Equipment Necessary

1. Low distortion audio oscillator, sine-wave. Note: Many oscillator kits are apt to have high distortion.

2. Resistive load of proper value (for instance, 16 ohms for the 16 ohm tap) and wattage. Note: Many commercial wirewound resistors have considerable residual inductance; care must be taken to avoid these.

3. Oscilloscope. Note: Many oscilloscope kits have nonlinear sweep circuits and are apt to give distorted displays.

B. Procedure

1. Connect audio oscillator to proper input jack. On the complete amplifiers a high level input is normally used. There are two reasons for this: First, the frequency dependent of the recording equalizer circuits are avoided; second, better distortion measurements can be made with the lower noise level available. Connect audio oscillator to the 0.5 volt input in the power amplifiers.

2. Adjust all tone controls to their FLAT position; all rumble and scratch filters, including the dynaural, OFF; and the loudness volume control to VOLUME.

3. Turn the loudness control on complete amplifiers or the level control on power amplifiers to their maximum position.

4. Turn dynamic power monitor (where included) to OFF, and set damping control (where provided) to normal operating position.

5. Connect resistive load to proper output terminals, and connect the oscilloscope input in parallel. Note: Make sure the oscilloscope ground is properly oriented. (See Figure 5.)

6. Turn all equipment on.

7. Set audio oscillator to frequency desired if the amplifier is to be used at a fixed frequency. Otherwise, set the audio oscillator to 1000 CPS.

8. Increase the output of the oscillator until the sine-wave just begins to clip. (See Figure 6.) With screwdriver, adjust balance control

until clipping is symmetrical; that is when equal amounts are clipped off the top and bottom of the wave peaks. It may be necessary to increase the output slightly as the balance control is adjusted. Note: Do not overdrive the amplifier so that it clips most of the sine-wave; this adjustment should be done with the barest amount of slipping.

9. This completes the adjustment. If the clipping cannot be made symmetrical,check the output tubes in a transconductance tube tester. They may be seriously unmatched.

SECOND METHOD

A. Equipment Necessary

1. Low distortion audio oscillator, sine-wave, whose distortion characteristics are at least five times better than the distortion level being measured. 1/20 per-cent distortion or better is required.

2. Resistive load of proper value (for instance, 16 ohms on the 16 ohm tap) and wattage. Note: Many commercial wirewound resistors have considerable residual inductance.

3. Wave analyzer whose characteristics are at least five times better than the distortion level being measured. 1/20 per-cent distortion or better is required.

B. Procedure

1. Connect audio oscillator to proper input jack. On the complete amplifiers, a high level input is normally used. There are two reasons for this: First, the frequency dependent of the recording equalizer are avoided; second, better distortion measurements can be made with the lower noise level available. Connect to the 0.5 volt input in the power amplifiers.

2. Adjust all tone controls to their FLAT position; all rumble and scratch filters, including the dynaural, OFF; and the loudness-volume control to VOLUME.

3. Turn the loudness control on the complete amplifiers or the level control on power amplifiers to their maximum position.

4. Turn the dynamic power monitor (where included) to OFF, and set damping control (where included) to normal operating position.

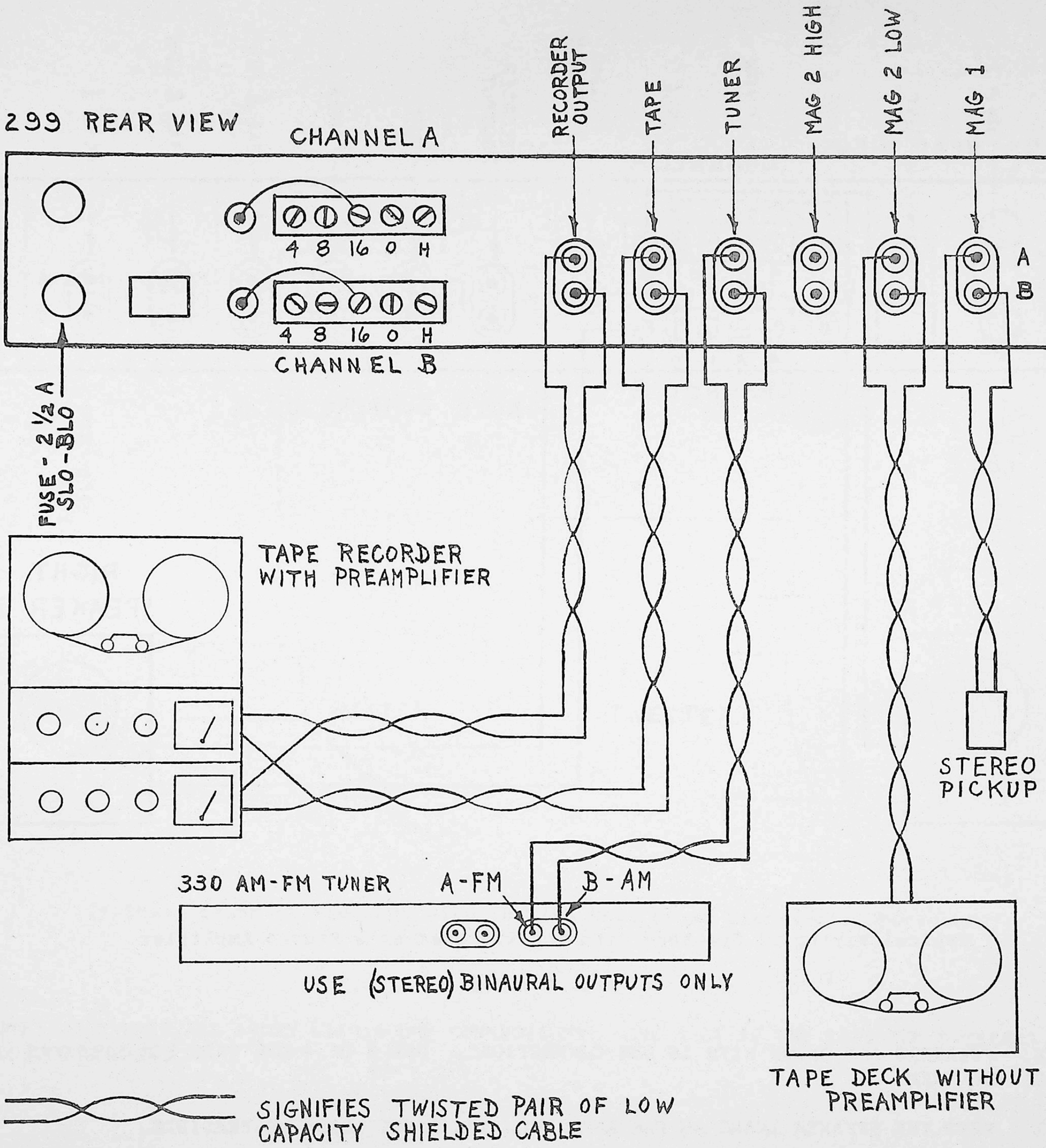
5. Connect resistive load to proper output terminals, and connect wave analyzer in parallel. Note: Make sure the distortion meter ground is properly oriented.

6. Turn all equipment on.

7. Set audio oscillator to frequency desired.

8. Set output of audio oscillator for power level desired from amplifier taking care that the amplifier is neither overloaded nor is the signal level so low that the noise interferes with the measurements. Adjust the balance control for lowest second harmonic indicated on the wave analyzer. Best power rating for adjustment is usually about three quarters of rated power.

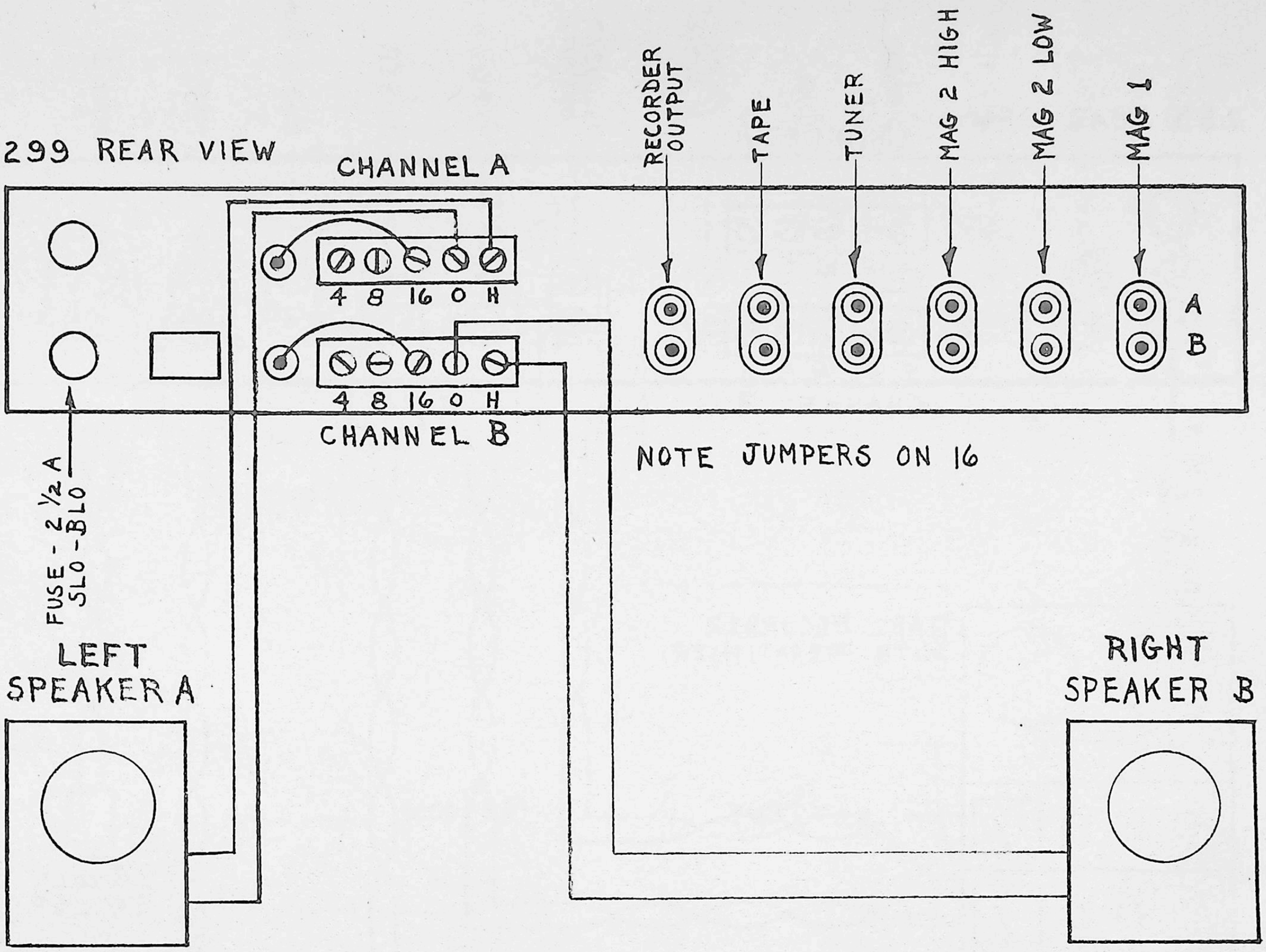
Figure 1



Typical Wiring of Inputs of the Type 299 Complete Stereo Amplifier

NOTE: WIRE CHANNEL A OUTPUTS OF SUBSIDIARY COMPONENTS TO THE CHANNEL A (TOP) INPUTS OF THE AMPLIFIER AND CHANNEL B OUTPUTS TO THE CHANNEL B (BOTTOM) INPUTS.

Figure 2



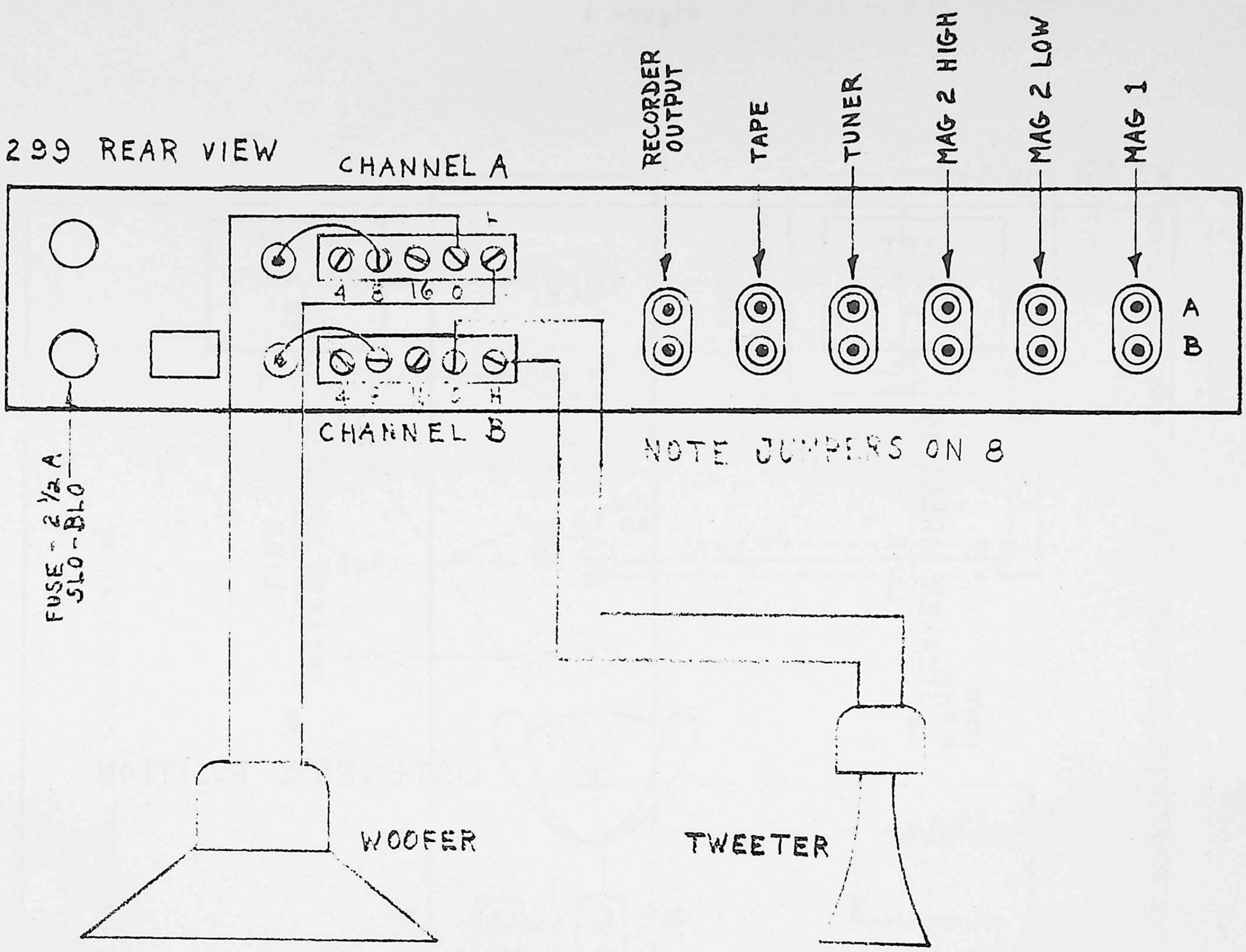
Typical Wiring of Speakers with the 299 Used as a Stereo Amplifier

NOTE: SPEAKERS ARE SHOWN WITH 16 OHM CONNECTIONS. USE 8 OR 4 OHM TAPS FOR SPEAKERS REQUIRING THEM.

NOTE: KEEP THE SPEAKER LEADS AS FAR AWAY FROM THE INPUT LEADS AS FEASIBLE.

NOTE: DO NOT PERMIT BARE SPEAKER LEADS TO TOUCH CHASSIS.

Figure 3



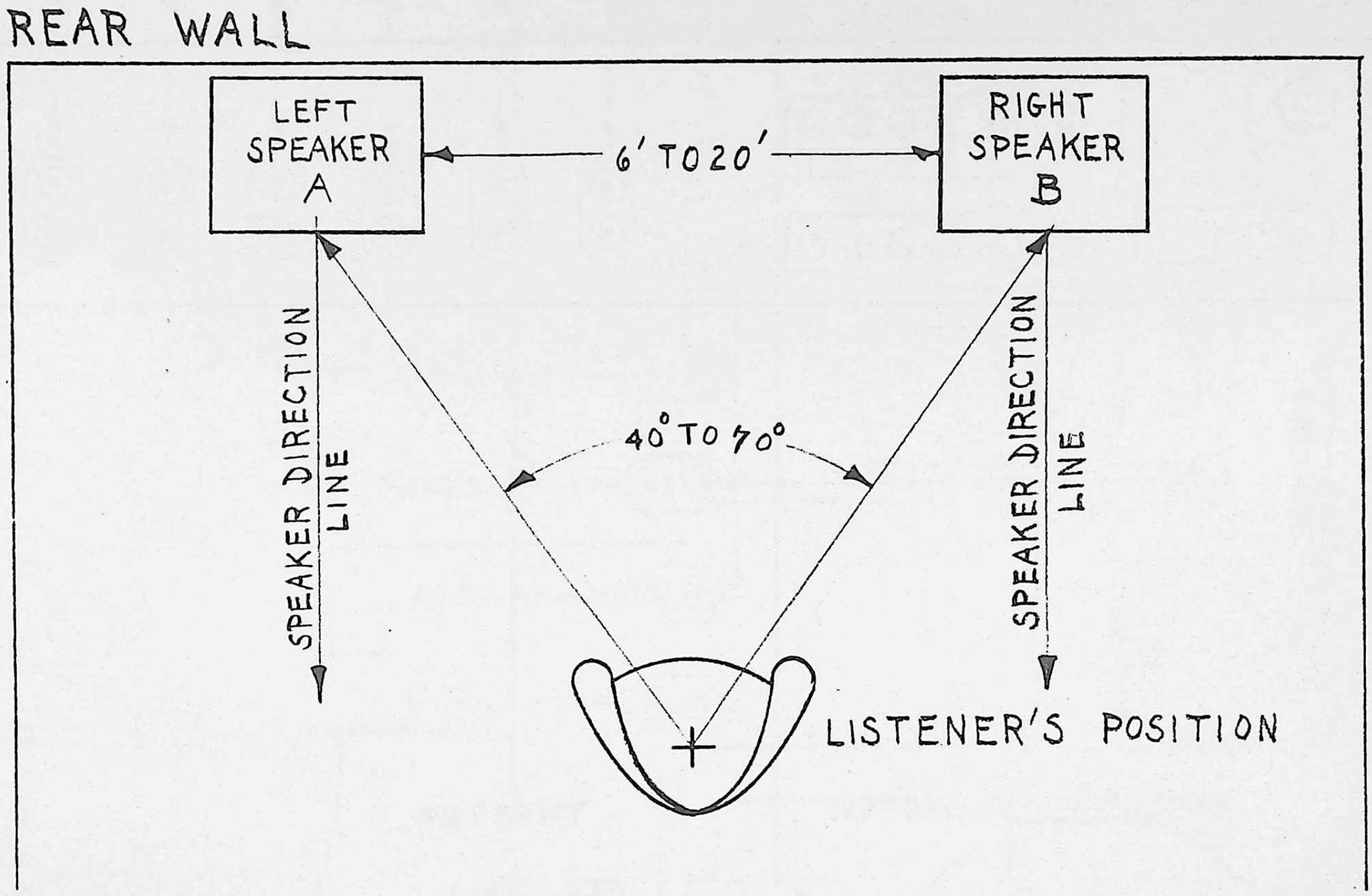
Typical Wiring of Speakers with the 299 Used as an Electronic Crossover

NOTE: SPEAKERS ARE SHOWN WITH 8 OHM CONNECTIONS. USE 4 OR 16 OHM TAPS FOR SPEAKERS REQUIRING THEM.

NOTE: KEEP THE SPEAKER LEADS AS FAR AWAY FROM THE INPUT LEADS AS FEASIBLE.

NOTE: DO NOT PERMIT BARE SPEAKER LEADS TO TOUCH CHASSIS.

Figure 4



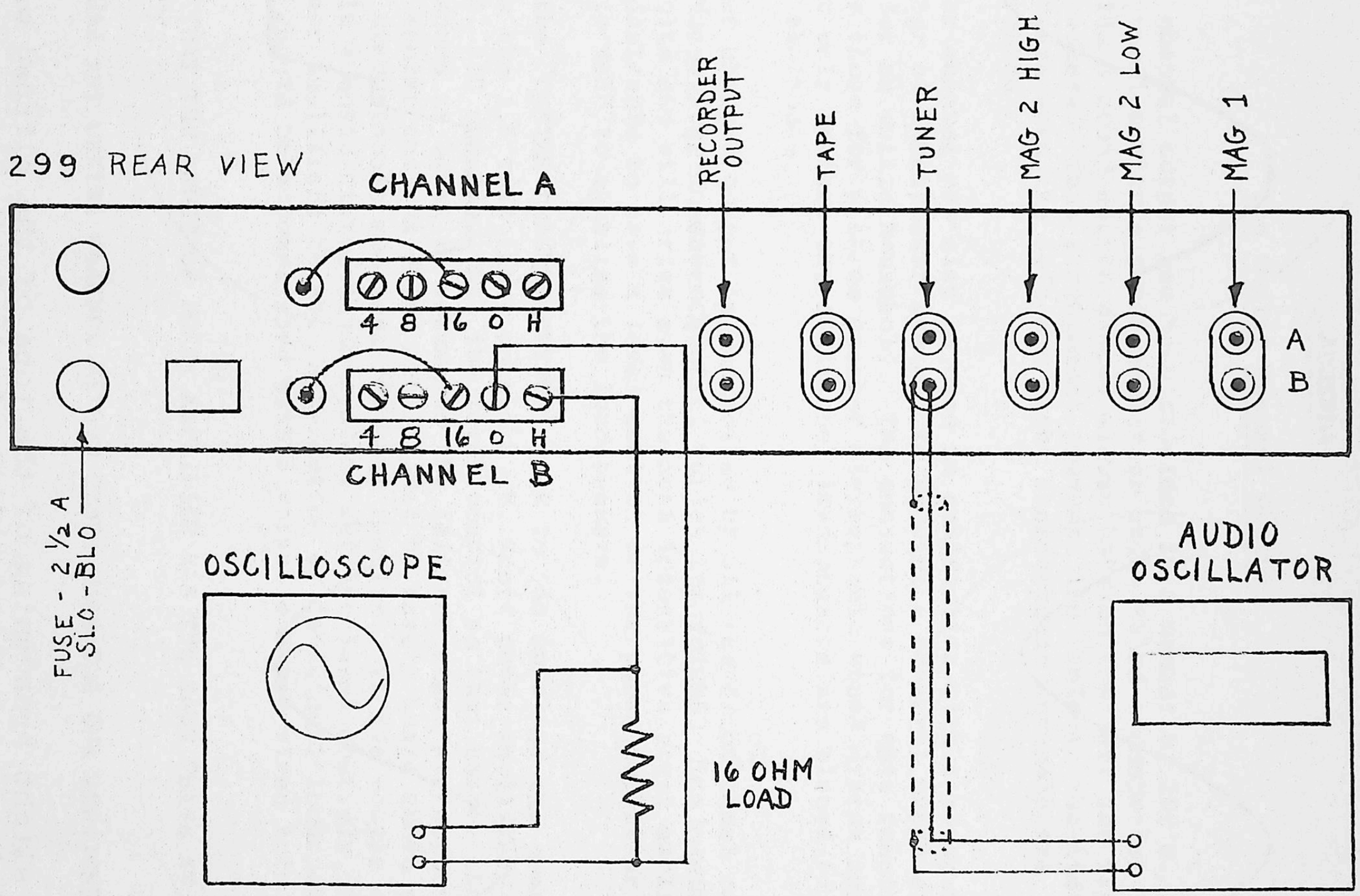
Typical Placement of Loudspeakers - Top View

NOTE: IT IS DESIRABLE NOT TO HAVE BUILT-IN BOOKSHELVES OR OPENINGS IN THE REAR WALL.

NOTE: THE LOUDSPEAKERS SHOULD BE LOCATED IN SUCH A MANNER THAT THEIR AXIS IS AT RIGHT ANGLES TO THE REAR WALL.

Figure 5

Connections for Adjusting AC Balance Control

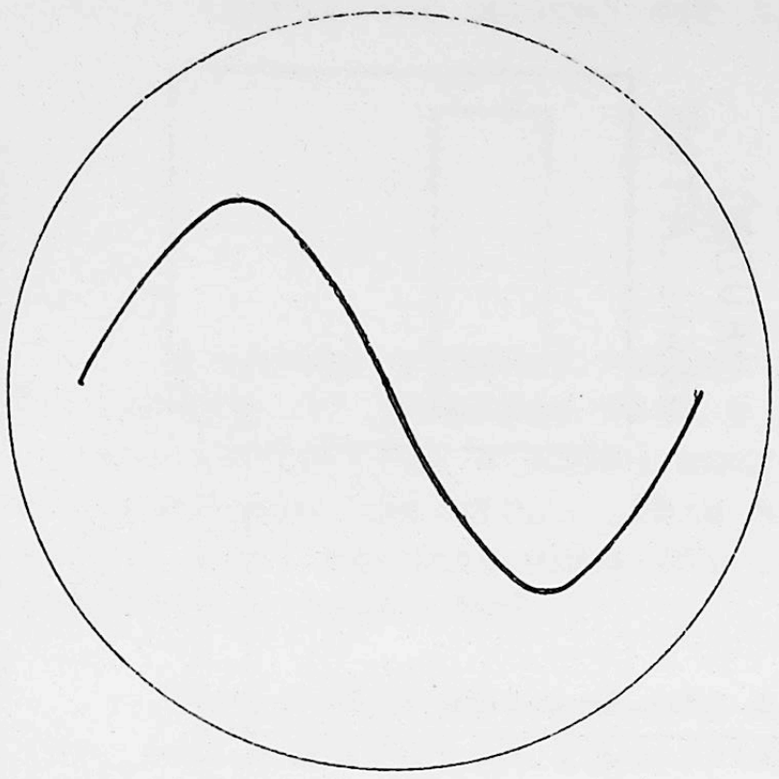


NOTE: MAKE SURE BOTH CHANNEL A AND B ARE ADJUSTED. THE CONNECTIONS FOR B ONLY IS SHOWN.

Oscilloscope Patterns

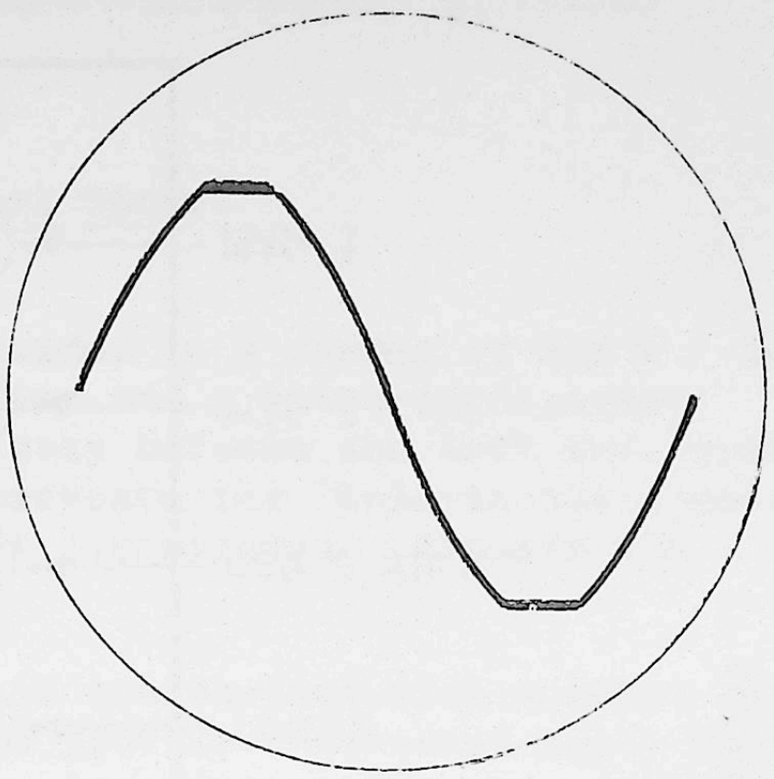
A

No Clipping



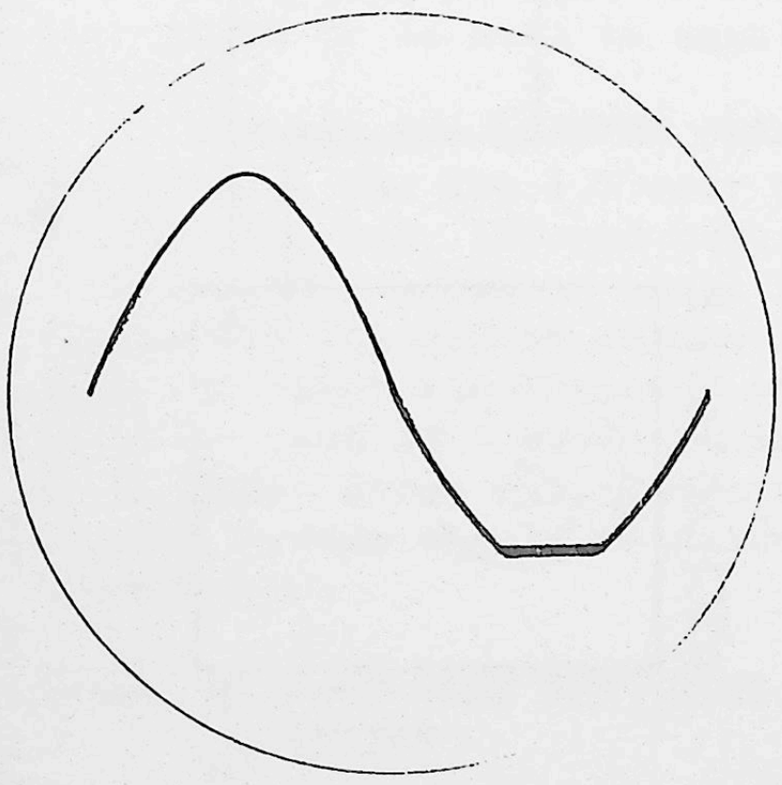
B

Symetrical Clipping



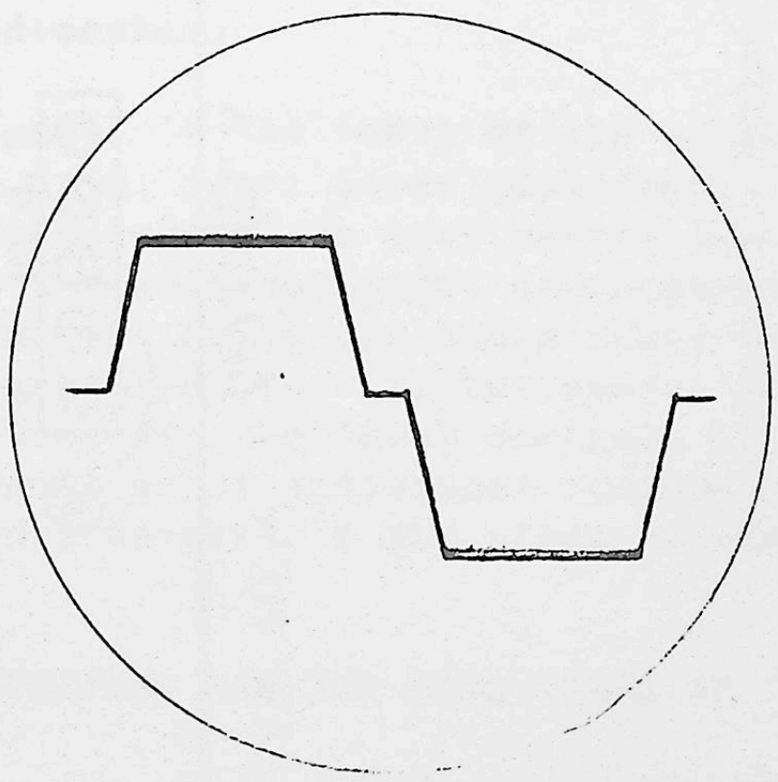
C

Assymetrical Clipping



D

Excessively Overdriven



Note: A slight broadening of the tops of the clipped waveforms is normal. It is due to the residual ripple in the power supply.

Figure 6

H. H. Scott, Inc.
111 Powder Mill Road
Maynard, Mass.

Operation Manual for the 299 Complete Stereophonic Amplifier

ADDENDA

The Center Channel Output

A center channel output has been provided in a number of 299's. It is used in cc junction with a power amplifier and a third loudspeaker system to provide a sound source placed midway between the left and right stereophonic speakers. This arrangement prevents the "hole-in-the-middle" effect that appears when the left and right stereophonic channels are completely separated.

The center channel may also be used in conjunction with a power amplifier and a number of loudspeaker systems to provide a monaural music distribution system for an entire household. The connections for this function are the same as those for a three speaker stereophonic sound system and differs from it only in that the additional loudspeakers are placed in other rooms of the house.

The center channel output is controlled by all the front panel controls; for instance, the loudness control varies its volume. Its maximum level is 2.5 volts and will drive even the most insensitive power amplifiers. It is desirable to have a level control on the power amplifier with which it is used to equalize the loudspeakers.

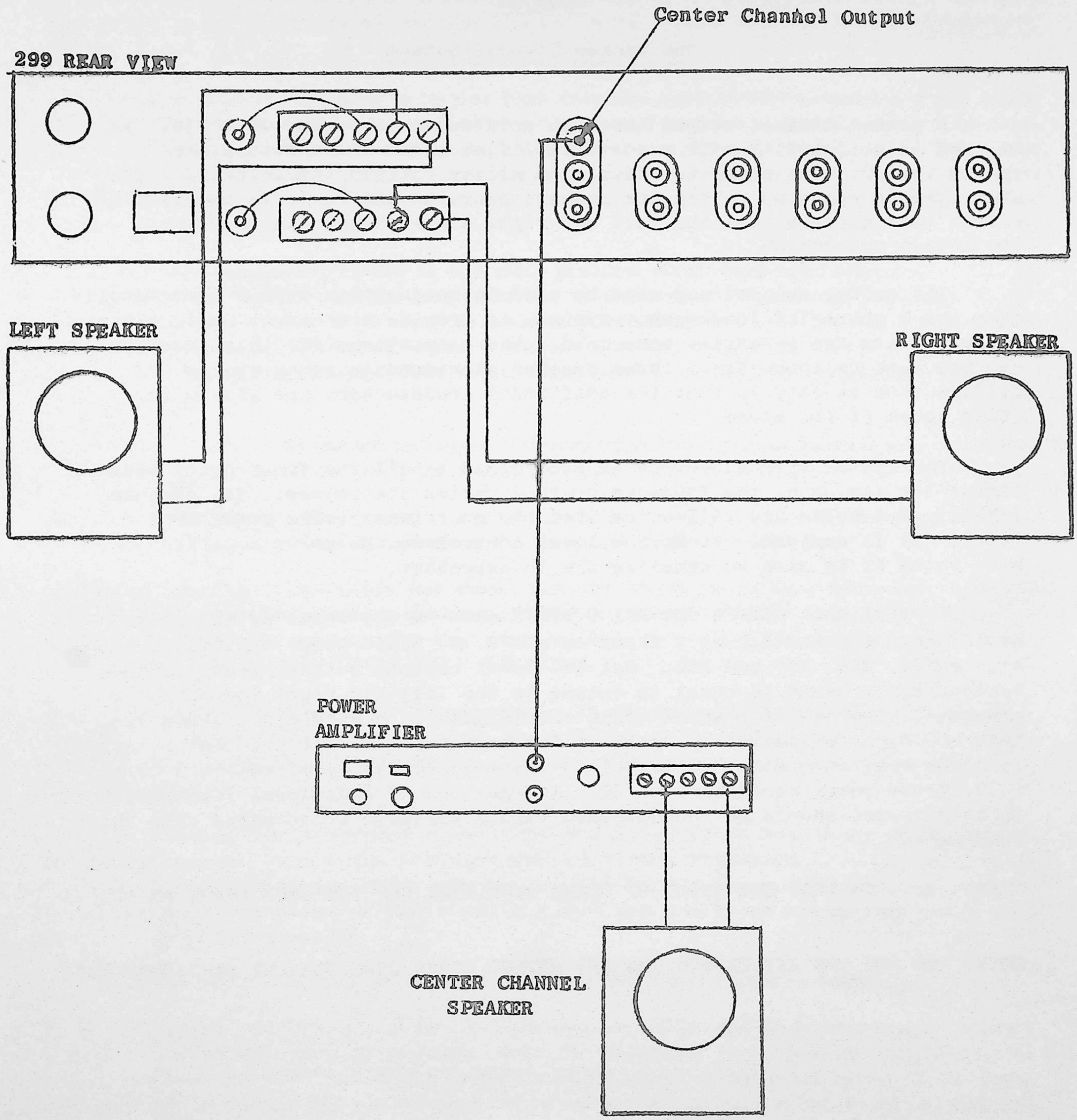
Connect the "CENTER CHANNEL OUTPUT" jack to the input of the power amplifier. Use the 1.5 volt input on all H. H. Scott power amplifiers such as the 232, 240, 250 and 280. Set the level control so that center channel loudspeaker's sound is equal in volume to the left and right stereophonic speakers. The center channel sound should just be barely heard above the left and right stereophonic speakers for best results. If the center channel is to be used in a music distribution system, set the level controls of all H. H. Scott power amplifiers to 60. Attenuation of individual loudspeakers in this system should be accomplished with a variable T pad wired into the loudspeaker.

NOTE: BE SURE THAT THE INPUT OF POWER AMPLIFIER HAS THE SAME PHASE AS ITS OUTPUT.

NOTE: DO NOT USE ANY CENTER CHANNEL METHOD OTHER THAN THE ONE MENTIONED HERE.

ADDENDA - 2

Typical Wiring of 3 Speaker System



WARRANTY

We are interested in your instrument. Equipment is no better than the manufacturer standing behind it. If you have difficulty, we would appreciate the opportunity to help you obtain the sort of superior performance which you have every right to expect. If trouble ever develops with your unit, please do not hesitate to ask our advice or assistance. Please write to: Service Department, Hermon Hosmer Scott, Inc., 111 Powder Mill Road, Maynard, Mass.

This equipment is warranted to be free from defective material and workmanship and repair or replacement will be made of any part which under normal installation, use and service, discloses defect, provided the unit is delivered by the owner to the manufacturer or through the authorized dealer from whom purchased, intact, for examination, with all transportation charges prepaid to the factory within 90 days, and provided that such examination discloses in the manufacturer's judgment that it is thus defective.

This warranty does not extend to any radio products which have been subjected to misuse, neglect, accident, improper installation, or to use in violation of instructions furnished by the manufacturer, nor extend to units which have been repaired or altered outside of the factory except by authorized service agencies, nor to cases where the serial number had been removed, defaced or changed. The guarantee does not extend to fuses, batteries, tubes, phonograph styli and piezo-electric crystals.

In case of older instruments, no longer within the guarantee period, nominal service charges will be made at our actual cost for labor and at distributors net prices for parts.

Registering Guarantee: The guarantee tag attached to the instrument must be returned to us within one week of purchase in order for the guarantee to become effective.

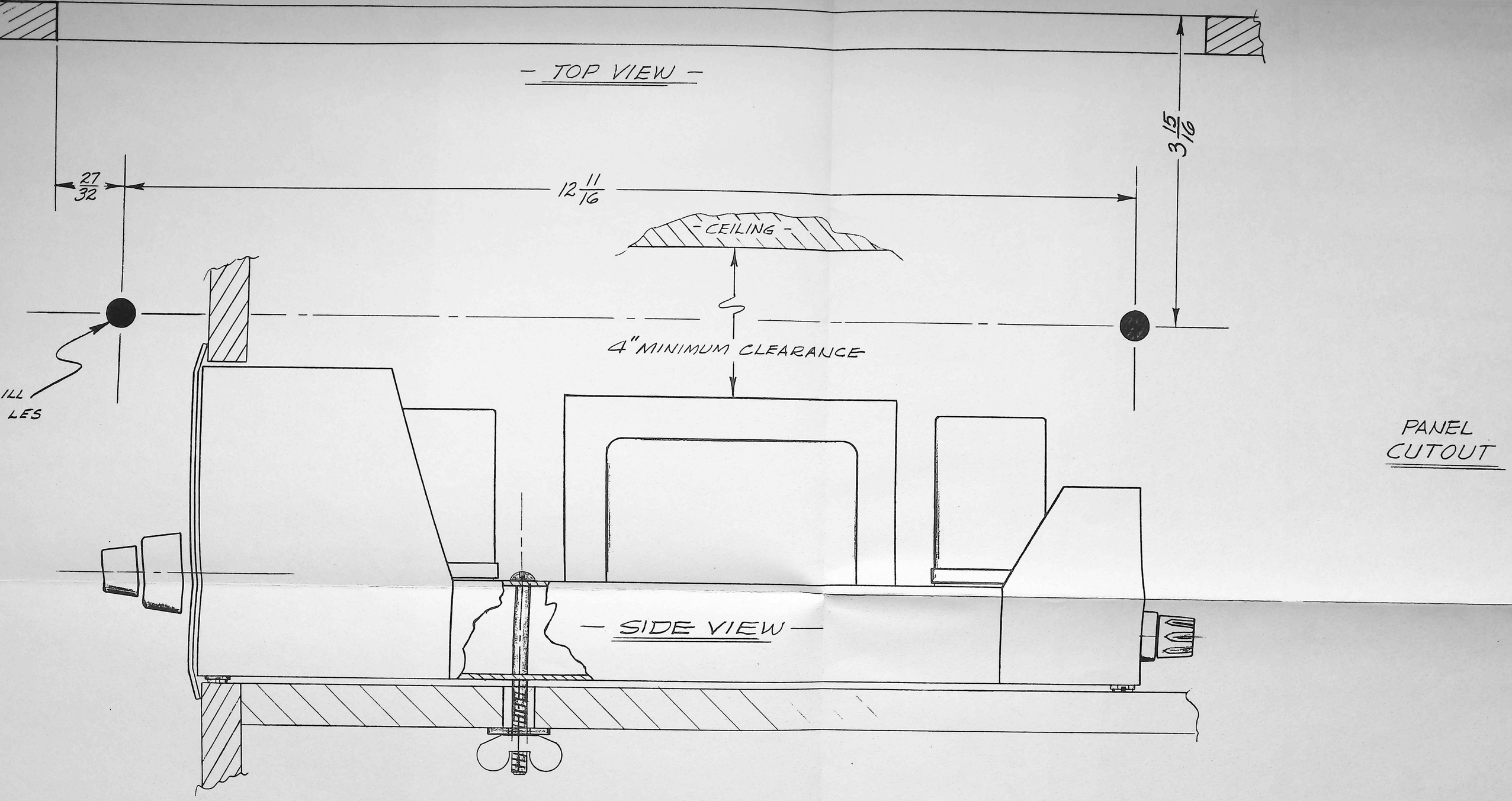
If Trouble Develops: Experience has shown that the procedure outlined below can save you needless shipping expense and/or unnecessary delay in service of your instrument. Please co-operate with us so that we may give you better service. Follow the instructions below. Unless this is done, THE GUARANTEE WILL BE VOID.

BEFORE RETURNING THE UNIT notify us, giving type and serial number of your instrument. Completely describe the defective operation. Describe the effects each operating control has upon the symptoms of trouble. Include details on electrical connections to associated equipment and list such equipment.

Upon receiving this information we will send you service information if the trouble may be simple, such as a bad vacuum tube, or if the trouble seems to be in connections or associated equipment. If the trouble requires factory servicing, we shall forward to you the name and address of one of our authorized service stations, if one is located near you, or we will instruct you to send your instrument to the factory.

When you receive shipping information, please follow the instructions below.

HOW TO SHIP: CAUTION — Take particular care to cushion and pack your instrument well, or serious damage may occur in shipment. Send the instrument to us by fully insured, prepaid railway express. DO NOT SHIP VIA PARCEL POST unless so instructed by us. Your instrument will receive prompt and careful attention in our service laboratory, and it will be returned by express collect.



DIRECTIONS FOR PANEL MOUNTING THE 299

1. Locate the supporting shelf at the height you wish the 299 positioned. The unit must rest on a shelf.

2. Using the full scale "Cutout Template" make a 4-1/16" x 14-3/8" cutout in the cabinet panel. The bottom of the cutout should be flush with the top of the supporting shelf as shown in the "Side View".

3. The amplifier is held in place by two bolts that go up through the shelf. Two holes must be made in the shelf to correspond with the holes in the amplifier. Use the "Top View" template to locate these holes on the supporting shelf.

4. The holes should be made 3/8" in diameter or larger so that with the bolts in place, but not tightened, the amplifier may be moved on the shelf into exact position.

5. Thread the bolts up through the chassis and the shelf. A large metal washer should be placed on the bolt.

STEREO SELECTOR SWITCH
POSITION FUNCTION
1 BALANCE A
2 BALANCE B
3 MONAURAL RECORDS
4 STEREO
5 REVERSE STEREO
6 CHANNEL A
7 CHANNEL B
INPUT SELECTOR SWITCH
POSITION FUNCTION
1 EUR 78
2 RIAA, NARTB, ORTHO
3 NARTB TAPE
4 TUNER
5 TAPE
DECK 2 FRONT
DECK 2 REAR
DECK 1 FRONT
DECK 1 REAR
PICKUP A
PICKUP B
MAG 1
MAG 2 HIGH
MAG 2 LOW
TAPE A
TUNER A
TAPE B
TUNER B
RECORDER OUTPUT A
RECORDER OUTPUT B
CHANNEL A
CHANNEL B
RUMBLE
SCRATCH
BASS
TREBLE
LOUDNESS-VOLUME
LOUDNESS
AC BAL
DC BAL.
V1-A ½ 12AX7
V1-B ½ 12AX7
V2-A ½ 12AX7
V2-B ½ 12AX7
V3-A ½ 6BL8
V3-B ½ 6BL8
V4 7189
V5 7189
V101-A ½ 12AX7
V101-B ½ 12AX7
V102-A ½ 12AX7
V102-B ½ 12AX7
V103-A ½ 6BL8
V103-B ½ 6BL8
V104 7189
V105 7189
V201 5AR4
T1
T2
T3
SPKR A
SPKR B
HIGH
CONNECT CABLES TO PROPER SPEAKER IMPEDANCES.
PHASE
NORM.
REV
STEREO BALANCE
CENTER CHANNEL OUTPUT
2½A SLO-BLO
105-125V 50-60~ 160-170W @117V
NE-2

THE FOLLOWING CONTROLS IN CHANNEL "A" ARE MECHANICALLY GANGED WITH IDENTICAL CONTROLS IN CHANNEL "B".

1. INPUT SELECTOR
2. SCRATCH FILTER
3. RUMBLE FILTER
4. LOUDNESS-VOLUME
5. LOUDNESS

TYPE 299 STEREO AMPLIFIER

1. VOLTAGES MEASURED WITH V.T.V.M.
2. NO INPUT SIGNAL & 117 V. LINE
3. SWITCHES SHOWN IN MAX. C.C.W. POSITION

REVISIONS

SCALE: NONE	26 SEPT. 1958
299 CIRCUIT DIAGRAM	
H. H. SCOTT, INC. MAYNARD, MASS., U.S.A.	
DR: DYSZCZYK	ENG: JWC
CH: R. P. Dooling	PROD:
DWG. NO. D-299-C1	SUB 6

R 50 150 227
C 33 133 215