

controls must be adjusted together without disturbing their relative positions to each other, and with the indicator markings on the concentric controls kept lined up.

4. The REAR SPKRS LEVEL switch can be set to the "B" position if you wish to reduce the volume from the rear speakers. Generally, the best effect is produced when the rear speaker sound is just perceptible at the listening position, so that the main source of sound is maintained at the front. Some experimentation will be necessary before the proper rear speaker level is found.

In a system which uses four identical speakers, the rear sound level will be slightly lower than that produced at the front, even with the rear level switch set at maximum [position A]. However, it is not this characteristic which provides the 4-Dimensional stereo effect, but the fact that the rear speaker sound contains reflected sound or "ambience" that has actually been extracted from the conventional stereo program material, [the amount produced will depend on the stereo program material used]. You will also notice that there is channel separation at the rear, with the left and right speakers producing different information [assuming such separation is present in the stereo program source itself].

In order to obtain the most effective results, the sound output from the "Rear" speakers must not be too high nor too low when heard from the normal listening position. The two-position Rear Speaker "Level" switch at the rear of the unit will permit a slight adjustment of the rear speaker volume when necessary. However, it cannot compensate for an extremely high or an extremely low output level at the rear. Neither of these extreme conditions will occur when all four speakers [front and rear] are of identical model, or when all four speakers are of equal efficiency [efficiency relates to the amount of power that must be fed to a speaker in order for it to produce a particular amount of sound output, and does not have any bearing on the quality of the sound produced by any speaker]. For best results, therefore, both Front and Rear speakers should have an impedance rating of 8 ohms [all Lafayette speaker systems are of this impedance], and should be of the same model. However, it is possible to use rear speakers that are of lesser quality with only a small loss in effectiveness.

When deciding to use different speakers for the rear locations, you should remember the following:

1. They should have an impedance rating of 8 ohms.
2. Their efficiency should be as high, or higher, than the front speakers. If the efficiency of the rear speakers is low, the sound output from the front speakers will be much higher than from the rear speakers, even with Rear Speaker Level switch in the "A" position [maximum rear speaker volume position].
3. The pair of speakers that are of higher quality should always be used as the front speakers.



## SPEAKER PHASING

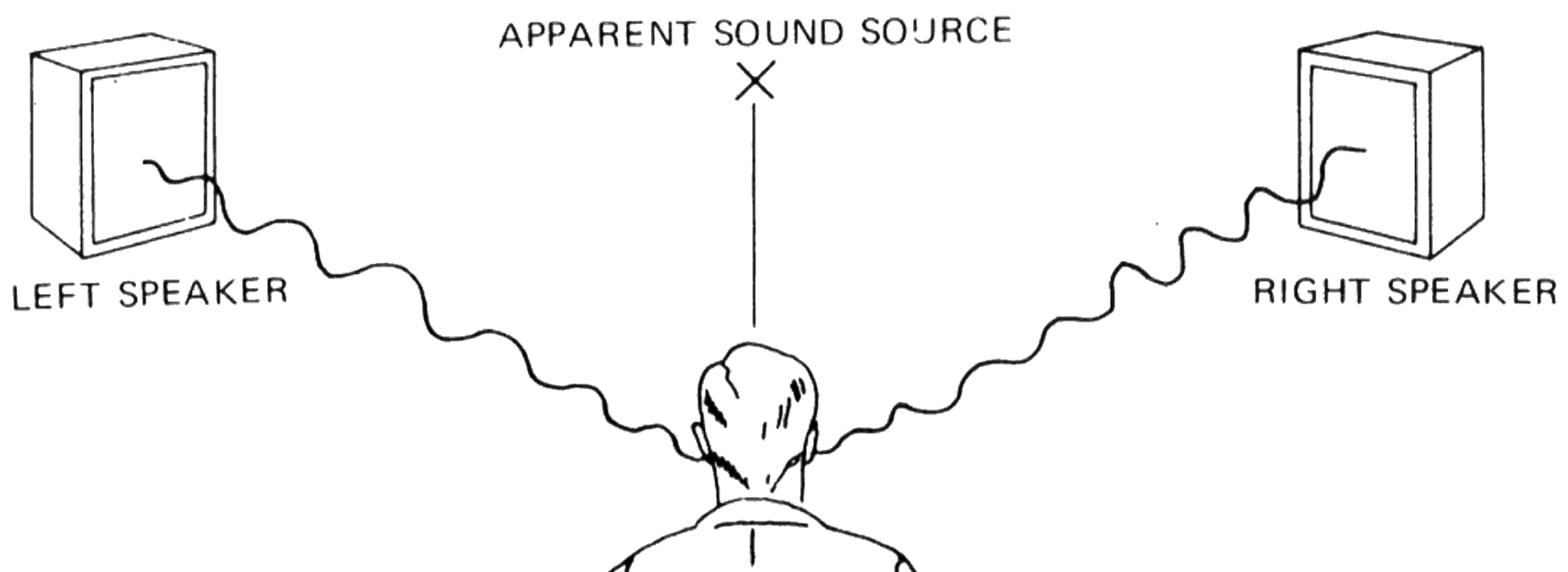
In order for any stereo or 4-Dimensional system to be effective, it is important that all speakers be operated in the proper phase [speakers are in phase if all speaker cones move in the same direction when an identical signal is applied to them].

If all speakers used were equipped with coded terminals and if you made all connections correctly when wiring them to the unit [as indicated in the section dealing with speaker connections], you can assume that all speakers are in proper phase. However, if you have any doubts, you can use the following detailed procedure for checking the phase of the speakers in the system. These checks consist of a listening test carried out on two speakers at a time -- front left and front right, front right and rear right, and rear right and rear left. If you are using only two speakers for conventional stereo, simply follow the procedure for checking the front left and front right speakers and disregard the checks for rear speakers.

## PRELIMINARY SET-UP

1. This test may be conducted with any program source. However, try to use a program with a voice content. If you are using a record, select one with a vocalist -- on FM a newscast or discussion is ideal.
2. Set all controls and switches as prescribed in the stereo operating chart for the particular program source you intend to use, but set the MODE Switch to the "2 CH - MONO" position.

The listening tests that follow are based on the fact that when two speakers produce the same "in phase" sound, the sound will appear to come from between the speakers. If the sound is out-of-phase, the sound will not appear to come from any definite location and will be dispersed over an area across both speakers. When carrying out a listening test on any two speakers, they should be separated by a distance of approximately 6-10 feet and turned in at an angle to face the listener who should stand about 6-10 feet in front of them, as shown in the diagram below.





For these listening tests, the help of another person may be required [to adjust controls on the equipment, reverse wires at each speaker, etc.].

#### PHASE CHECK 1 - Front Left and Front Right Speakers

1. Position yourself midway between the front left and right speakers as shown in the diagram.
2. Depress the MAIN Speaker Mode button only [REM and 4 CH buttons should be released]. Sound should emanate from the left and right front speakers only. Adjust the VOLUME/BALANCE controls for a proper listening level. Listen carefully, and try to determine the area from which the sound appears to be coming. If the speakers are "in phase", the sound will seem to come from between the speakers.
3. Have someone reverse the connections at the rear of the right front speaker. Listen carefully to the sound output again as the wires are switched. Repeat this procedure a few times.

**CAUTION:** Use extreme care when reversing wires to the speaker terminals -- make sure the wires are not inadvertently shorted together.

When you have the correct or "in phase" connections, you will notice that the sound seems to come from an area somewhere between the speakers. If the speakers are not "in phase", however, the sound will not seem to come from any clearly defined area and will appear to be dispersed. When you have determined that the speakers are "in phase", permanently connect the right front speaker wires in the positions that produced it.

#### PHASE CHECK 2 - Front Right and Rear Right Speakers

1. Depress the "MAIN and REM" buttons. Turn down the left channel volume [VOLUME/BALANCE control closest to front panel], setting the right channel volume [outer control] for a normal listening level from the front right speaker and from the rear right speaker.
2. At this point, the only active speakers should be those at the front right and rear right.
3. Position yourself between these speakers and check for an "in phase" condition, as in Phase Check 1. In this case, reverse the wires connected to the rear right speaker if the two speakers appear to be out of phase.

#### PHASE CHECK 3 - Rear Right and Rear Left Speakers

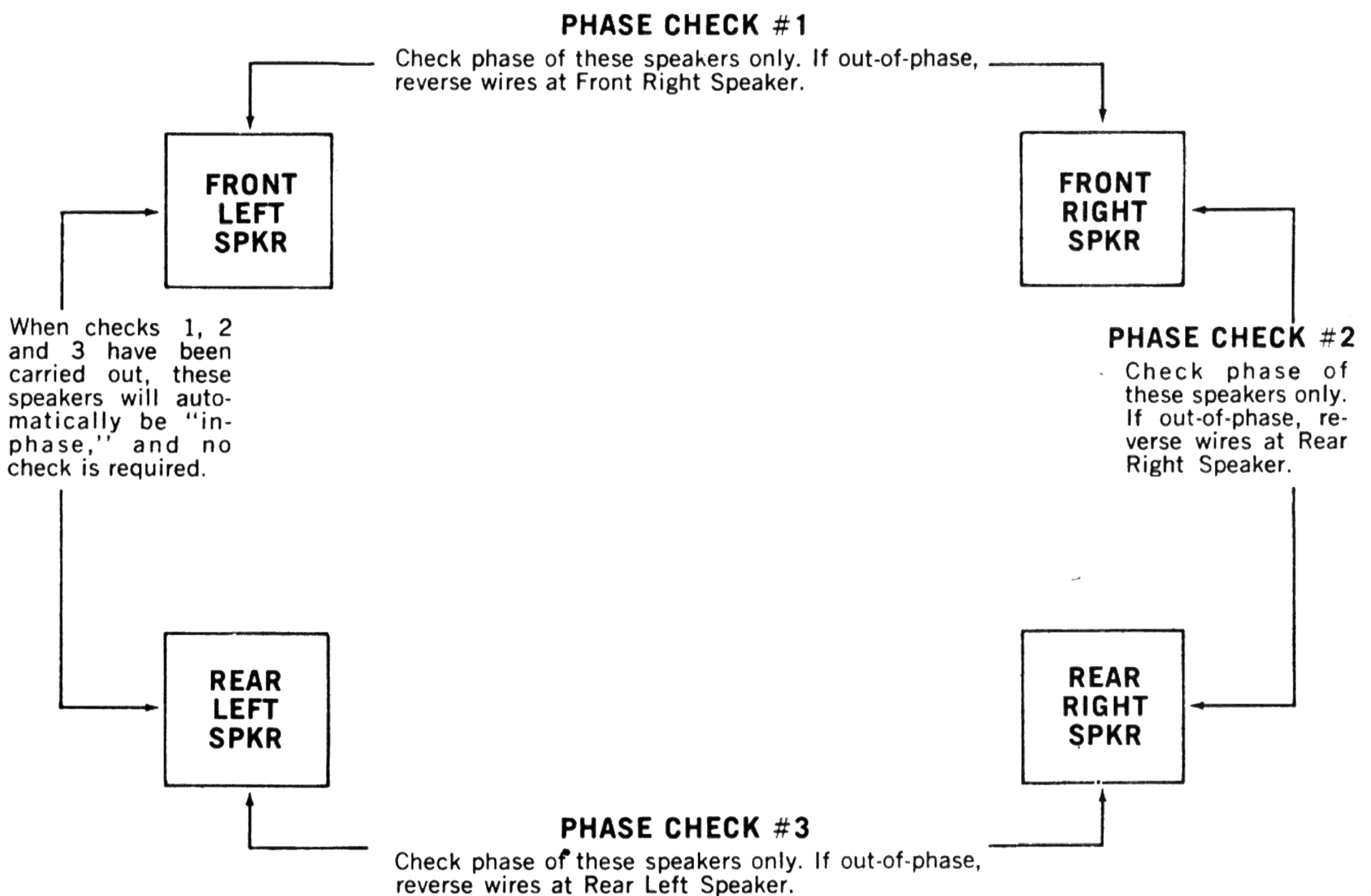
1. Depress the REM Speaker Mode button only so that the front speakers are silent.



2. Increase the left channel volume to the same listening level as the right channel. The only active speakers should now be those at the rear.
3. Position yourself between these speakers and check for an "in phase" condition as in Phase Check 1. In this case, reverse the wires connected to the rear left speaker if the two speakers appear to be out of phase.

This completes the phase check of all speakers in the system. It is unnecessary to check the phase of the left rear and left front speakers since these two will automatically be "in phase" if all the other speakers are properly phased.

You can now return the MODE Switch to 2 CH - STEREO, and depress all three Speaker Mode buttons [MAIN, REM and 4 CH] for 4-Dimensional Stereo operation.



CHECKING SPEAKER PHASE FOR A 4-DIMENSIONAL STEREO SYSTEM.



## STEREO AMPLIFIER MAINTENANCE

**WARNING:** Do not attempt to remove the cover -- there are no user serviceable parts inside this unit. Refer servicing only to a qualified personnel. [See "Returning For Service"].

### REPLACING THE AC POWER FUSE

If the pilot light fails to come on and the amplifier is completely inoperative when the power button is depressed, make sure first the AC power cord is plugged into an electrical outlet supplying 105 - 120 volts, 50/60 Hz AC. If this is not the problem, the AC power fuse located on the rear panel of the amplifier may have failed. To check the fuse, switch the unit off and disconnect the AC power cord from the outlet. Unscrew the AC power fuse cap, and remove the fuse. The small thin fuse wire within the cartridge should be intact. If it is not, replace the fuse with one of the same rating [1.5 AMP 3 AG type], and re-insert into the unit.

**WARNING:** DO NOT USE A FUSE OF A HIGHER VALUE THAN THE ONE SPECIFIED. ALSO, IF A REPLACEMENT FUSE FAILS AGAIN AFTER INSERTION, RETURN THE AMPLIFIER FOR SERVICE.

Replacement 1 1/2 ampere, 3 AG fuses are available under Lafayette Stock Number 13-10143.

### REPLACING SPEAKER FUSES

The amplifier is equipped with two speaker fuses [1.5 AMP, 3AG type] on the back panel that offer protection against damage to the output transistors due to a short-circuit or an overload in the speaker lines. Failure of a fuse will cause the channel in which it is located to become inoperative.

To check a fuse, switch the unit off, unscrew the fuse cap and examine the fuse itself. The thin fuse wire within the cartridge should be intact. If it is not, replace the fuse [replacements are supplied initially with the amplifier, but are also available under Lafayette Stock No. 13-10143]. You should also check for a possible short-circuit in the speaker wiring or for any condition that may have caused an overload [if you have connected Main and Remote speakers to each rear channel be sure that all speakers have a rated impedance of at least 8 ohms.



## RETURNING THE UNIT FOR SERVICE

In the event that repair is necessary [either in or out of warranty], we recommend that you return the unit to the store from which it was purchased. In most cases, this will be your fastest and most efficient method of obtaining service.

If you wish to ship the unit to our main service center, please read the instructions which follow.

### SHIPPING INSTRUCTIONS

Pack the unit very carefully to avoid damage in transit, preferably in its original carton. If the original carton is not available, use a sturdy carton with at least 3 inches of shredded paper or excelsior around the unit. In the latter case, wrap the unit in paper first to avoid particles of packing material getting into it. If this unit is being returned under warranty, it must be accompanied by a copy of the original sales ticket or shipping documents to establish date of purchase. Also, include with the unit a letter explaining exactly what difficulties you have encountered [remember to add extra First Class postage and indicate on the outside of the carton that First Class Mail is enclosed]. Ship by prepaid express if possible and mark ELECTRONIC EQUIPMENT...FRAGILE. Clearly address the carton as follows:

SERVICE DIVISION  
LAFAYETTE RADIO ELECTRONICS CORP.  
150 Engineers Road  
Hauppauge, L. I., N. Y. 11787

SPECIFICATIONS

Except where otherwise indicated, specifications apply to 2-channel mode of operation.

MUSIC POWER ±1db . . . . . 130 watts.

IHF POWER . . . . . 104 watts.

RMS POWER . . . . . 66 watts [33 x 2].

All Power ratings above at 1 KHz, 4 ohms.

POWER BANDWIDTH . . . . . 20-35,000 Hz.

FREQUENCY BANDWIDTH . . . . . 20-20,000 Hz ±1db [at 1 watt].

TOTAL HARMONIC DISTORTION . . . . . 1% or less at rated output [1 KHz].

CHANNEL SEPARATION . . . . . 65db at 1 KHz.

HUM AND NOISE . . . . . -75db [High Level Inputs].  
-60db [Low Level Inputs].

INPUT SENSITIVITY . . . . . MAG PHONO: 4.5mV  
[for rated output power, CER PHONO: 135mV  
Master Vol. at 12 o'clock, TUNER: 500mV  
VOL/BAL at max] SOURCE: 500mV  
AUX: 250mV

INPUT SENSITIVITY . . . . . DISCRETE: 125mV  
[4 CH Mode] SOURCE: 125mV  
TAPE MON: 125mV

Figures above are for 0.5 volts output at FRONT OUTPUT jacks,  
with Master and VOL/BAL controls at max.

SIGNAL-TO-NOISE-RATIO . . . . . -65db [min].  
[at rated input sensitivity  
at Source jacks, 4 CH Mode].

OUTPUTS . . . . . FRONT OUTPUT: 0.5 volts for  
rated input sensitivity at Source  
and Discrete jacks in 4 CH Mode.



OUTPUTS [Cont]	4 CH REC OUT: 125mV output for rated input at Discrete and Source jacks in 4 CH Mode.  2 CH TAPE REC: 0.5 volts for rated input sensitivity in 2 CH stereo mode.
SPEAKER OUTPUTS	FRONT/MAIN - Left and Right. REAR/REMOTE - Left and Right. All 4 and 8 ohms impedance.
HIGH FREQUENCY FILTER	-9db at 10 KHz.
LOUDNESS SWITCH	+10db at 50 Hz. +3db at 10 KHz.
TONE CONTROL RANGE	BASS: ±12db at 50 Hz. TREBLE: ±10db at 10 KHz.
4 CH DECODER CIRCUITS	1. SQ matrix decoder with automatically controlled, full-time front/back electronic logic circuits. 2. COMPOSER A [matrix]. 3. COMPOSER B [matrix].
4 CH ADAPTER CIRCUIT [used in 2 CH Mode of operation only]	Resistive matrix in speaker outputs for 4-Dimensional Stereo with 2 additional "rear" speakers.
OPERATING POWER	105 - 120 volts, 50/60 Hz AC.
PROTECTIVE FUSES	1.5 Amp AC Power Fuse [1]. 1.5 Amp Speaker Fuse [2].
DIMENSIONS.	13 1/16"W x 4 3/8"H x 11"D [overall, inc. knobs].
NET WEIGHT	12½ lbs.

BECAUSE ITS PRODUCTS ARE SUBJECT TO CONTINUOUS IMPROVEMENT. THE LAFAYETTE RADIO ELECTRONICS CORPORATION RESERVES THE RIGHT TO MAKE DESIGN CHANGES OR MODIFICATIONS AT ANY TIME WITHOUT INCURRING ANY OBLIGATION TO INCORPORATE THEM IN PRODUCTS PREVIOUSLY SOLD.



# A GUIDE TO OPERATING THE UNIT AS A STEREO AMPLIFIER

(See Figure 8 For Connections)

		AMPLIFIER SETTINGS										
FUNCTION		SELECTOR	MODE	HI-FIL	LOUD	MON	SPKR MODE	BASS	TREBLE	MASTER	VOLUME BALANCE	POWER
STEREO WITH A RECORD PLAYER	Play any stereo record	MAG or CER <sup>1</sup>	2 CH-STEREO	OFF	OFF	OFF	MAIN button	12 o'clock positions	12 o'clock positions	12 o'clock permanently <sup>2</sup>	9 o'clock positions initially <sup>2</sup>	ON
4-DIMENSIONAL STEREO WITH A RECORD PLAYER <sup>3</sup>	Same as above	Same as above	Same as above	Same as above	Same as above	Same as above	MAIN REM 4 CH buttons <sup>4</sup>	Same as above	Same as above	Same as above	Same as above	ON
STEREO FM	Tune to FM stereo station on FM stereo tuner if connected to amplifier	TUNER	Same as above	Same as above	Same as above	Same as above	MAIN button	Same as above	Same as above	Same as above	Same as above	ON
4-DIMENSIONAL STEREO FM <sup>3</sup>	Same as above	TUNER	Same as above	Same as above	Same as above	Same as above	MAIN REM 4 CH buttons <sup>4</sup>	Same as above	Same as above	Same as above	Same as above	ON
STEREO WITH A TAPE PLAYER OR RECORDER	Play stereo tape on player recorder if connected to amplifier	AUX	Same as above	Same as above	Same as above	Same as above	MAIN button	Same as above	Same as above	Same as above	Same as above	ON
4-DIMENSIONAL STEREO WITH A TAPE PLAYER OR RECORDER <sup>3</sup>	Same as above	Same as above	Same as above	Same as above	Same as above	Same as above	MAIN REM 4 CH buttons <sup>4</sup>	Same as above	Same as above	Same as above	Same as above	ON

<sup>1</sup>Set according to type of cartridge used in record player.

<sup>2</sup>VOLUME/BALANCE controls are used for all volume adjustments and MASTER volume is set permanently to 12 o'clock.

<sup>3</sup>4-Dimensional Stereo possible only when two extra "rear" speakers are connected to Remote jacks (see fig. 8).

<sup>4</sup>All three SPKR MODE buttons must be depressed for 4-Dimensional Stereo.

**Model LA-975**  
(Stock No. 99-02859W)

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# A GUIDE TO OPERATING THE ENTIRE 4-CHANNEL STEREO SYSTEM

## [4-CHANNEL DISCRETE OR SQ]

FUNCTION		SQ DECODER/AMPLIFIER SETTINGS											EXISTING STEREO UNIT (Set Power switch on)
		SELECTOR	MODE	HI-FIL	LOUD	MON	SPKR MODE	BASS	TREBLE	MASTER	VOLUME BALANCE	POWER	
4-CHANNEL SQ STEREO WITH A RECORD PLAYER	Use "SQ" 4- Channel Record	SOURCE	SQ	OFF	OFF	OFF	MAIN <sup>1</sup>	12 o'clock positions	12 o'clock positions	9 o'clock position initially <sup>2</sup>	9 o'clock positions initially	Depressed (ON)	A. Set Tape Monitor Switch on. B. Select Stereo Phono operation. C. Volume at 12 o'clock position initially. <sup>3</sup>
DERIVED 4-CH STEREO WITH A RECORD PLAYER	Use any standard Stereo Record	Same as above	COMPOS- ER A or B <sup>4</sup>	Same as above	OFF	OFF	SAME AS ABOVE			Same as above	Same as above	Same as above	Same as above.
DISCRETE 4-CH STEREO TAPE (with 4-ch tape player or recorder)	Use 4-Channel Stereo Tape	—	DISCRETE <sup>5</sup>	Same as above	OFF	OFF <sup>5</sup>				Same as above	Same as above	Same as above	A. Set Tape Monitor Switch on. B. Volume at 12 o'clock position initially. <sup>3</sup> C. Program Selector Switch in AUX position. <sup>6</sup>
DERIVED 4-CH STEREO TAPE (with 4 CH tape unit)	Use 2-Channel Stereo Tape	SOURCE	COMPOS- ER A or B <sup>4</sup>	Same as above	OFF	OFF				12 o'clock position <sup>7</sup>	Same as above	Same as above	A. Volume at 9 o'clock position. <sup>7</sup> B. Set Tape Monitor switch off. C. Program Selector Switch in AUX position. <sup>8</sup>
4-CHANNEL FM STEREO (SQ)	Tune to FM broadcast of SQ record on FM tuner or re- ceiver, if part of system	SOURCE	SQ	Same as above	OFF	OFF				9 o'clock position initially <sup>2</sup>	Same as above	Same as above	A. Set Tape Monitor Switch on. B. Select FM tuner operation. C. Volume at 12 o'clock position initially. <sup>3</sup>
DERIVED 4-CHANNEL FM STEREO	Tune to any FM stereo broadcast on FM tuner or receiver, if part of system	SOURCE	COMPOS- ER A or B <sup>4</sup>	Same as above	OFF	OFF				Same as above	Same as above	Same as above	Same as above.
DERIVED 4-CH STEREO WITH A STANDARD STEREO TAPE RECORDER	Play any Stereo Tape	SOURCE	COMPOS- ER A or B <sup>4</sup>	Same as above	OFF	OFF				Same as above	Same as above	Same as above	A. Set Tape Monitor Switch on. B. Volume at 12 o'clock position initially. <sup>3</sup> C. Program Selector Switch in AUX position. <sup>9</sup>

<sup>1</sup>Assuming rear speakers are connected to "Main" output terminals on the decoder/amplifier.

<sup>2</sup>The MASTER control subsequently adjusted for desired sound level from the four speakers.

<sup>3</sup>Volume controls may have to be increased subsequently (see text).

<sup>4</sup>Both circuits will provide "derived" 4-channel stereo — use the position of your preference.

<sup>5</sup>If outputs of 4-channel tape recorder are connected to TAPE MON inputs, depress MON button.

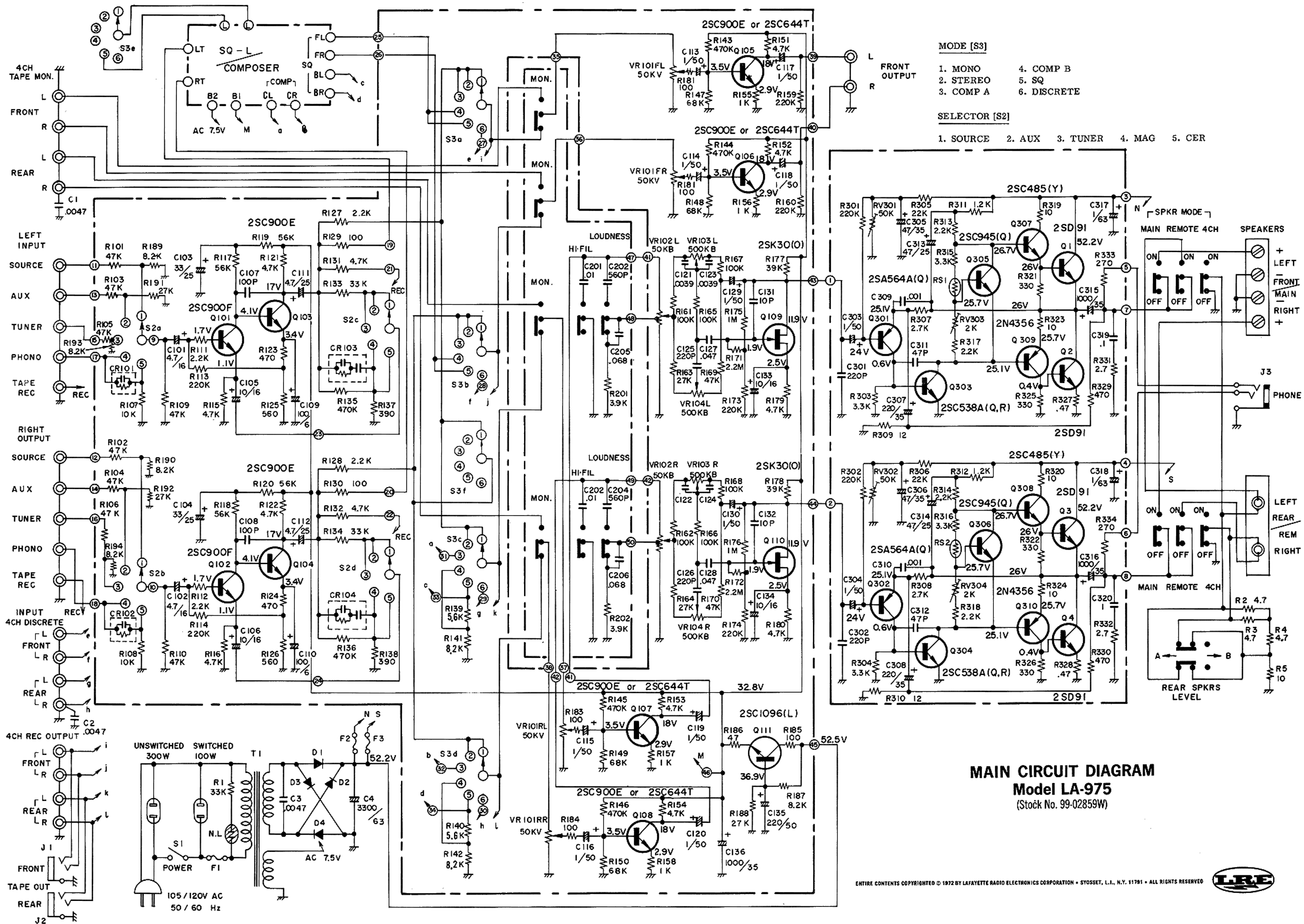
<sup>6</sup>If the 4 CH tape unit is being used with "Y" connectors as shown in Figures 1 and 3, placing the Program Selector in any position other than AUX may short out the "front" outputs of the tape player, depending on the design of the existing stereo unit.

<sup>7</sup>With this type of operation, the MASTER control is set to 12 o'clock permanently; use decoder/amplifier VOLUME/BALANCE controls to adjust the volume of the rear speakers, and the existing stereo unit volume controls to adjust the volume of the front speakers.

<sup>8</sup>Assuming "Y" connectors have been used with the tape unit to connect the "front" outputs to the AUX inputs on the existing stereo unit.

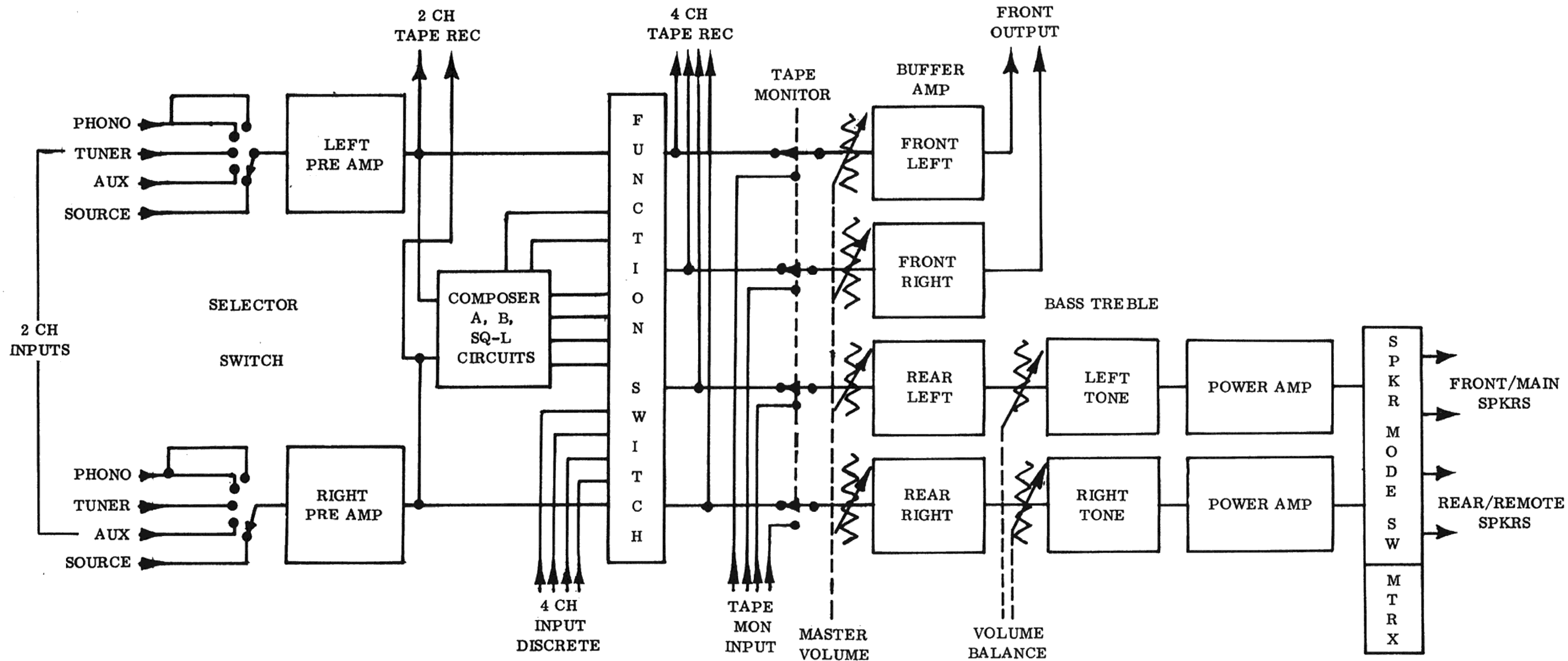
<sup>9</sup>Assuming that the output of the standard stereo tape recorder is connected to the AUX inputs on the existing stereo unit.





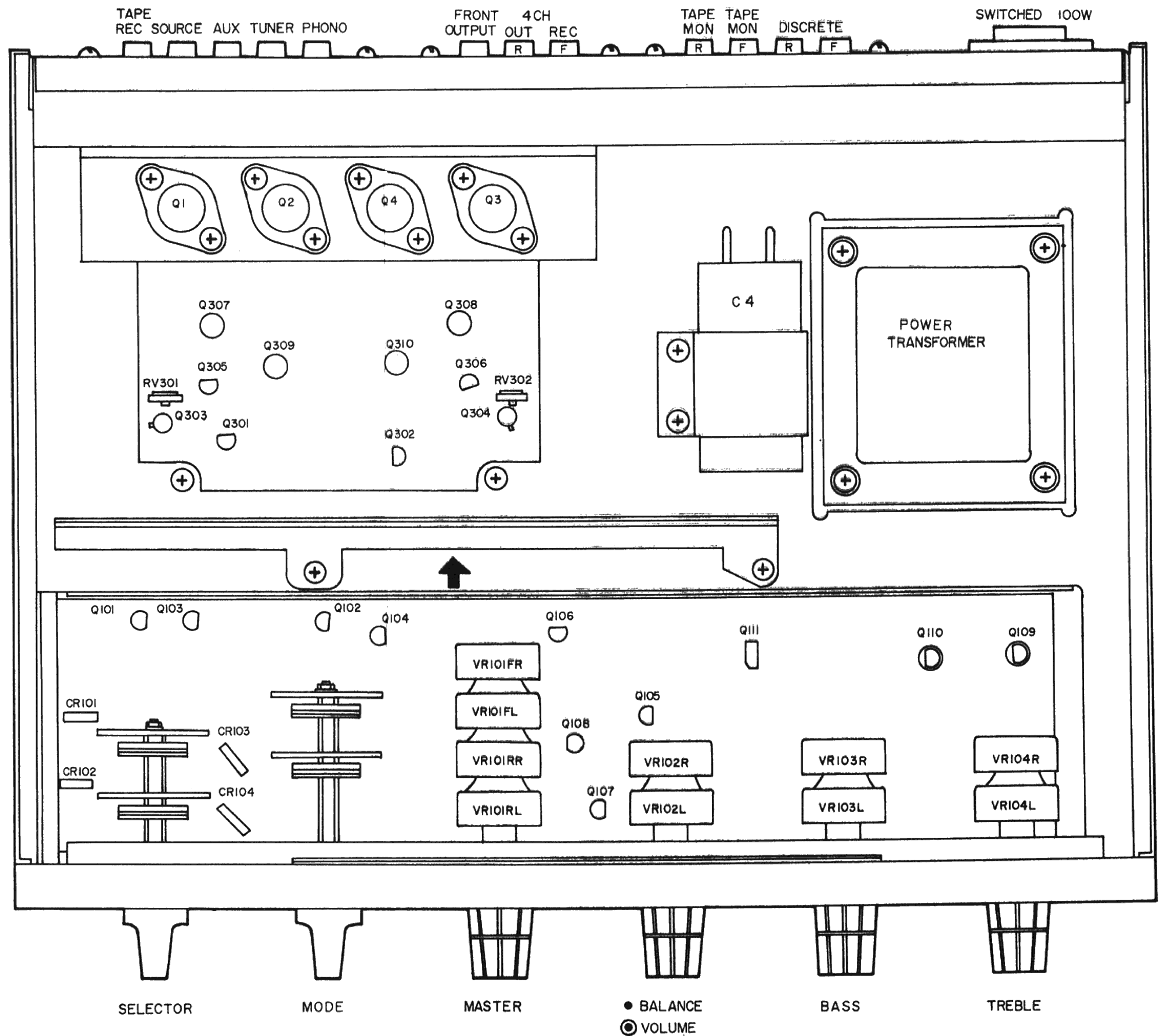
**MAIN CIRCUIT DIAGRAM**  
**Model LA-975**  
 (Stock No. 99-02859W)





**BLOCK DIAGRAM**





# PARTS LOCATION



# AMPLIFIER ALIGNMENT PROCEDURE

## 1. Alignment of Main Amplifier

### a. Bias alignment

This alignment should be performed with the power transformer in cold state, room temperature.

1. Before turning the power on, be sure the trimming resistor, RV301 (left channel) and RV302 (right channel) are in their maximum position.
2. Temporary connect a DC voltmeter to 52.2 V DC power supply line. Note its voltage value.
3. Remove the voltmeter and connect it between the collector of Q2 (left channel) and ground chassis or Q4 (right channel) and ground chassis.
4. Adjust RV301 (left channel) to give half value of the voltage read on Power supply line. If the power supply line was 52.2 volts, adjust for 26.1 volts. Adjust RV302 (right channel) to give half value of the voltage read on Power supply line. If the power supply line was 52.2 volts, adjust for 26.1 volts.
5. Remove fuse F2 from the fuse holder and connect an ammeter instead of a fuse. Adjust RV303 (left channel) for 30mA current reading on the meter. Remove fuse F3 from the fuse holder and connect an ammeter instead of a fuse. Adjust RV304 (right channel) for 30mA current reading on the meter.



## **b. Balance Alignment**

1. Connect an audio generator to the tape play jack and set the TAPE MONITOR "ON". Connect an 8 ohm resistive dummy load to the appropriate SPKR terminals. Also connect an oscilloscope across the 8 ohm dummy resistor.
2. Increase the audio signal generator output level (1 KHz) until the clipping is just visible in the upper and lower corner of the display.
3. Adjust RV301 (left channel) for equal and symmetrical clipping.
4. Adjust RV302 (right channel) for equal and symmetrical clipping.

## **2. Pre-Amplifier Alignment (Balance Alignment)**

1. Connect an audio generator to the AUX jack and an oscilloscope to the TAPE OUT jack.
2. Increase audio generator output to about 3 to 5 volts, 1KHz until the clipping is just visible in the upper and lower corner of the display.
3. Adjust RV101RL (left channel) for equal and symmetrical clipping. Adjust RV101RR (right channel) for equal and symmetrical clipping. **NOTE:** Set VOLUME/BAL knob at minimum and MODE switch in STEREO position during this alignment.



# The Care and Feeding of Tone Controls

## TONE CONTROLS

The most common tone control that the average user is familiar with is the single knob of the usual radio, TV or console. This type of tone control functions by reducing the volume of the high frequencies (treble range) and in so doing altering the tonal balance so as to create the illusion of a corresponding increase in the volume of the low frequencies (bass range).

Stereo Hi-Fi components, designed to provide substantially more life-like sound reproduction, feature far more flexible tone control arrangements, which, initially may seem more confusing but which are perfectly simple and also logical in operation.

In components, there are normally separate controls for both the bass and treble ranges. They can be best visualized in the following manner: The volume control adjusts the overall loudness level while the bass and treble controls function, in effect, as volume controls for their specific tonal ranges.

In addition to being able to reduce the volume of high frequencies, as in the simplest equipment, the tone controls of Stereo Hi-Fi components enable you to either increase or decrease the volume of the bass and/or the treble ranges, either separately or simultaneously, from the so-called "flat" position, the tone control setting (at 12 o'clock, usually indicated by a dot) at which point, they do not affect the tonal balance.

Tone controls of this type have a tremendous range of variation built-in, enough in effect, to enable you to so emphasize the various tonal ranges as to alter the configuration of an orchestra. In effect, you are able to put the kettle drum in your lap or so far away as to be inaudible, or to move the violins from their normal positions to your elbow or off into the wings at either side of the stage.

All of this may seem like fun for a short period of time, but setting the controls at their extreme positions so distorts the balance as to twist the tonal shape of the music until it is almost unrecognizable. The extremes of the tone control ranges are designed for just that purpose, to enable the listener to adjust for extreme needs, which occur very rarely indeed. Most commonly, tone controls should be used with discretion, to achieve not the widest variation but the optimum tonal variation to compensate for: (1) Variations in the music being reproduced because of deficiencies in the recording, or poor broadcast and so on. (2) The aural peculiarities of your listening room. (3) Your personal preferences.

The only warning about the use of tone controls is a fairly new development resulting from the vast increase in power output of transistorized equipment. Turn the bass control all the way to maximum with the power output of a modern amplifier or receiver and you can drive the speakers into producing vast amounts of distortion and which may even result in damaging the speakers themselves. Again tone controls should be used with discretion.

## LOUDNESS CONTROLS

When listening to music on Stereo Hi-Fi components, seriously (i. e. listening seriously but not necessarily to serious music) as opposed to music as a back drop for conversation and or any other domestic activity, you will find a volume level setting at which the sound seems to fill the



room from corner to corner (but not enough to rupture eardrums), a volume level at which the dominant element in the room is music. At this substantial yet not uncomfortable volume setting, the volume relationship of the level of the low frequencies, to the volume level of the mid-frequencies and to the volume level of the high frequencies approximates the tonal balance of the original performance. However, when you lower the volume level to something more appropriate at say 11 P. M., you will find that the tonal balance changes. Specifically at lower listening levels the volume of the low frequencies and to a lesser extent, the volume of the high frequencies, seem to drop in relationship to the volume of the mid-frequencies. This is not a result of equipment deficiencies but of the deficiencies of the human ear. The human ear at low listening levels is not as sensitive as it is at higher levels. (This has been an area of extensive research, both in the U. S. and elsewhere - - Ref. Fletcher-Munson Curves).

In order to compensate for this hearing deficiency, most amplifiers & receivers include "loudness" controls, circuits actuated by a front panel switch usually marked with the word "loudness". When the volume is set at a lower listening level, the loudness control switch is pushed on and the circuit is actuated. As the volume control is turned down, the bass is boosted and to a lesser extent, the "highs", in a predetermined manner to compensate for this low level hearing deficiency. A unique device of great value at low listening levels (at higher levels, the "loudness" control should not be used, as you will introduce unnecessary and unwanted tonal balance changes).

In some equipment, the loudness control is not included, and in these cases, the tone controls should be used to accomplish the loudness control effect; specifically by boosting the bass and by boosting the treble to a lesser extent.

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