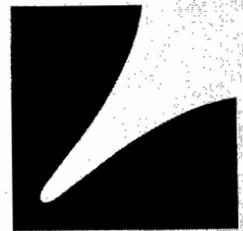


LUX CORPORATION, JAPAN



REALTIME PROCESSED
DC INTEGRATED AMPLIFIER

Laboratory Standard Series

L-10

OWNER'S MANUAL

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WARNING: TO PREVENT FIRE OR SHOCK HAZARD
DO NOT EXPOSE THIS APPLIANCE TO
RAIN OR MOISTURE.

Thank you for purchasing the L-10

DC amplifiers in the Laboratory Reference Series were born in the strict pursuit of performances, aiming to realize ideal wave-form and elimination of distortion caused by time factor. The L-10 is a stereo integrated amplifier of DC configuration developed by utilizing know-how obtained in the Series. Usually, for integrated amplifiers, DC-amp configuration has been adopted only for the power amplifier section, but this is unfair. For our L-10, DC amp configuration is adopted in the pre-amplifier section, to say nothing of power amplifier section, thus realizing fidelity reaction to music signals which vary from instant to instant.

Even such an excellent DC-amp configuration cannot eliminate notching distortion in the power amplifier section. Additional measures are necessary. For the L-10, we used selected transistors of high switching time at the output stage. Further these output transistors are driven in push-pull parallel. Thus, despite the

use of class "AB" operation, we realized a low notching distortion level that equals that of class "A" operation.

Also, quite stable power is supplied to all the circuits thanks to huge quality capacitors and two toroidal power transformers which are visible through the bonnet. Excellent channel separation characteristic is realized by skilful wiring at the output circuit where large current is always available.

Functionally, a Tone Compensator is provided which compensates for the recording characteristics of program sources positively and a subsonic filter to remove harmful ultra low frequency noises etc., thus realizing versatile operation.

As you proceed to connect the amplifier, may we suggest that you read all the instructions carefully before turning the unit on? A few moments invested now can eliminate doubts or delays later. If you have any question, please do not hesitate to consult your dealer.

Here's to good listening.



Switches & Terminals

1. Volume Control

Adopted is a newly developed volume control, which offers a continuously variable characteristic with the least gang error between the channels. Therefore, smooth and precise adjustment is feasible.

A clockwise turn of the knob increases volume, while counter-clockwise rotation decreases and finally cuts off volume.

Note that a time-delay muting circuit is incorporated in the output stage, which isolates the output for 5 – 10 seconds after the power is turned on, so as to eliminate shock noises or thumps at the time of on/off operation of the power switch.

Therefore if the volume control is left increased, loud sound may suddenly appear when power is turned on because of operation of the time-delay circuit, and it is recommended that you set the volume control to the counter-clockwise position before operating this unit.

For details refer to the "Operation of Controls" on P.

2. Balance Control

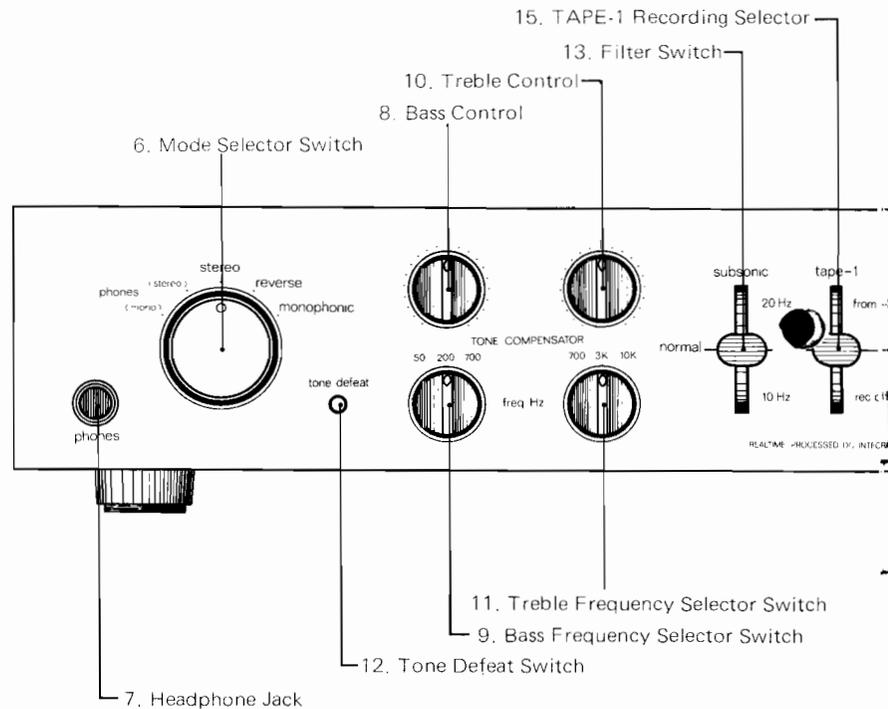
The volume balance between right and left channels can be adjusted by this control. Turn it clockwise from the center click stop position, and the volume level of the left channels is reduced. Conversely, a counter-clockwise turn causes decrease of volume at the right channel. When the volume of both channels is balanced, monaural playback sound comes from the center of both right and left speakers. Usually this point is obtained at the center click position.

3. Input Selector Switch

This switch allows you to select desired programme source: you may select either of 4 positions (tuner, phono, aux-1 and aux-2). Each position corresponds to "TUNER" terminals (17), "PHONO" terminals (18), "AUX-1" terminals (19) and "AUX-2" terminals (20) respectively.

4. AC Switch (power)

Press alternately to switch on and



off. First the pilot lamp lights up when the switch is depressed, and then the time delay muting circuit is turned on after 5 to 10 seconds, when the amplifier is put into perfect operational condition.

5. Pilot Lamp

Press in the AC switch (4) and this lamp lights up, which shows that the electric current is on.

6. Mode Selector Switch

Reproduction mode and headphone can be selected by this switch. Five positions are provided: stereo, reverse, mono, phones (stereo) and phones (mono). The former three modes are for reproduction via speaker systems and the latter two are for headphone listening.

For further details, refer to the "Selection of Mode" on P.

7. Headphone Jack

Private listening by use of stereo headphone is feasible when a head-

phone plug is inserted into this jack and the Mode Switch is set to the "phones (stereo)" position or the "phones (mono)" position.

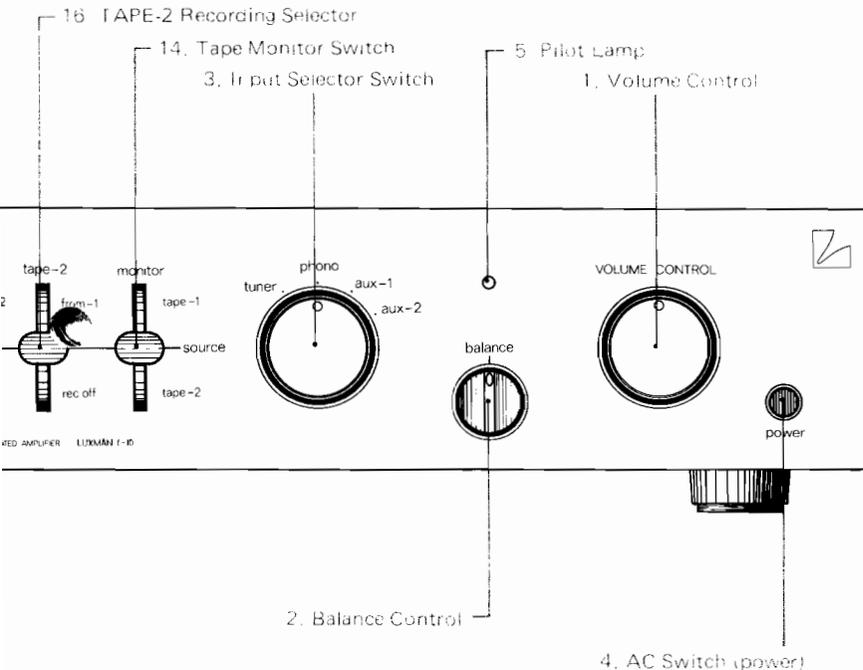
8. Bass Control

A clockwise turn of the control boosts the bass response, and a counter-clockwise turn decreases and cuts the bass. Unlike the conventional tone control, the maximum variation range is limited to +2dB, -2.5dB, which is extremely small. Flat frequency characteristic is obtained at the center of rotation angle. The turnover frequencies can be selected among 50Hz, 200Hz and 700Hz by the Selector Switch (9).

For further details, refer to the "Operation of Tone Compensator" on P.

9. Bass Frequency Selector Switch

Bass turnover frequencies are selected with this switch. When the desired frequency (50Hz, 200Hz or 700Hz) is set by this switch, lower frequencies than the selected fre-



quency can be controlled by the Bass Control (8).

10. Treble Control

A clockwise turn of this knob boosts the treble response, while a counter-clockwise turn decreases the treble. The maximum variation range is also limited to +2dB and -2.5dB. Flat frequency characteristic is obtained at the center of rotation angle. The turnover frequencies can be selected among 700Hz, 3kHz, and 10kHz by the Selector Switch (11).

11. Treble Frequency Selector Switch

Treble turnover frequencies are selected with this switch. When the desired frequency (700Hz, 3kHz or 10kHz) is set by this switch, lower frequencies than the selected frequency can be controlled by the Treble Control (10).

12. Tone Defeat Switch

This switch is provided to cut off the tone compensator functions (8)

(9) (10) (11) when they are not necessary. Press alternately to switch on and off. The tone compensator function operates when the knob is set to the "protruded" position, while it is bypassed when the knob is depressed.

For further details, refer to the "Operation of Tone Compensator" on P.

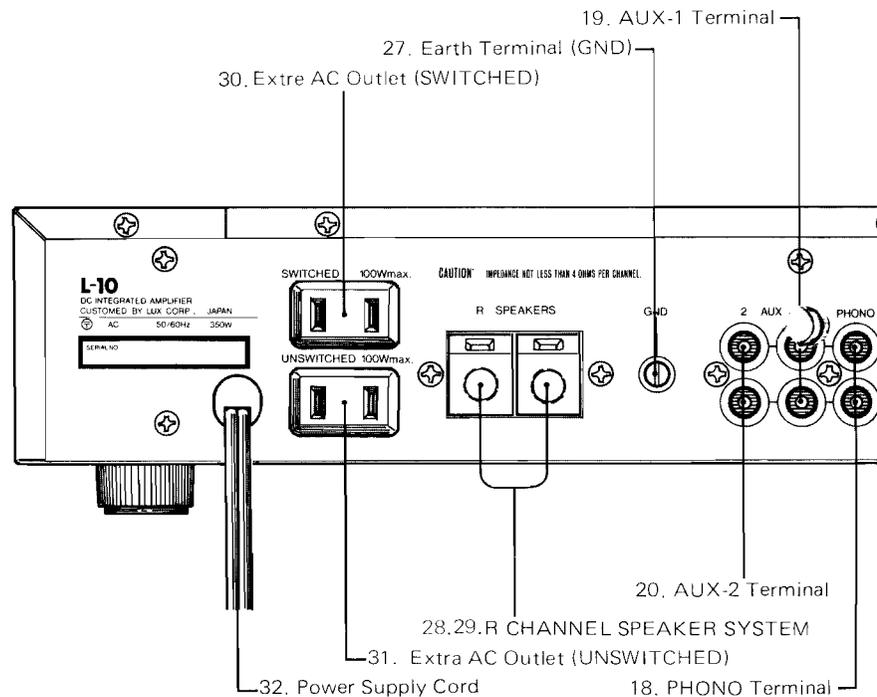
13. Filter Switch

This switch operates a subsonic filter to remove ultra low frequency noises (below 20Hz). When the lever is lifted up to the "20Hz" position noises below 20Hz are cut off, when it is pressed down to the "10Hz" position, noises below 10Hz are cut off.

For further details, refer to the "Operation of Filters" on P.

14. Tape Monitor Switch

This switch allows you to select reproduction through Tape Monitor terminals. This switch divides the amplifier into 2 sections: one from each input terminal to the REC. OUT



terminal and the other from the Monitor terminal to the PRE. OUT terminal.

In the "tape-1" position reproduction of a tape deck is feasible from TAPE-1 MONITOR terminal (21). Likewise the "tape-2" position permits reproduction from the TAPE-2 MONITOR terminal (23).

Note that when the Tape Monitor Switch is set either at the "deck-1" or the "deck-2" position, playback is not possible from other sources than tape recorder. Therefore, set the Tape Monitor switch to the "source" position for all other listening.

15. TAPE-1 Recording Selector

This switch selects the recording mode of the tape deck connected to the TAPE-1 REC. OUT terminal (22). When the lever is in the "source" position, signals applied to the input terminals PHONO, TUNER or AUX are always available at the REC. OUT terminal (22). This is the normal recording mode.

When the lever is set to the "from-

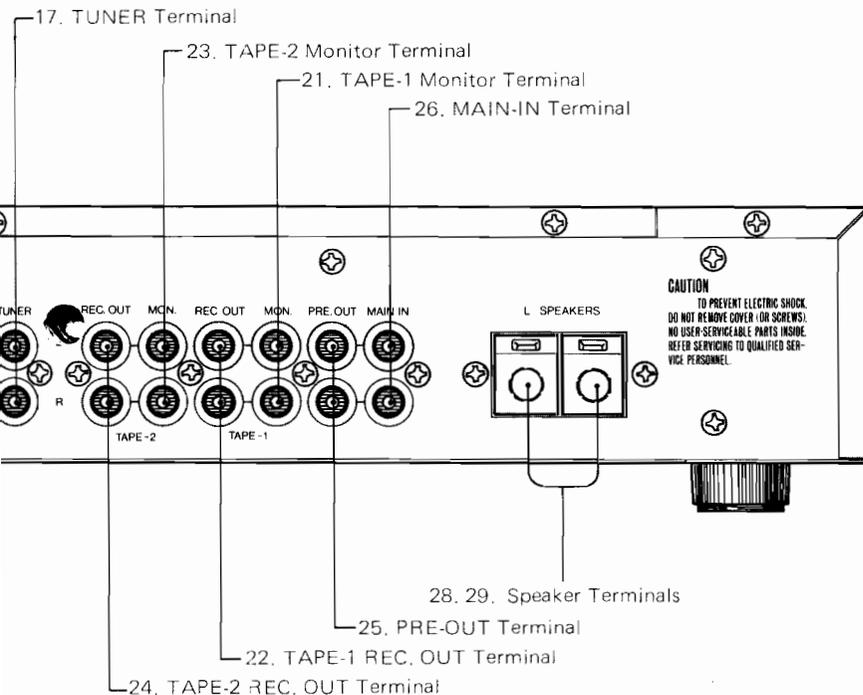
2" position, the TAPE-1 REC. OUT terminal (22) is connected to the TAPE-2 MONITOR terminal (23), and the programme source reproduced by the tapedeck-2 can be recorded on tapedeck-1. That is, tape dubbing (reprinting) is possible from tapedeck-2 to tapedeck-1.

When it is set to the "rec. off" position, the TAPE-1 REC. OUT terminal (22) is completely isolated from the amplifier.

NOTE: When the switch is set to the "from-2" position, and then the TAPE-2 Recording Selector (16) is set to the "from-1" position at the same time, there may be possible oscillation due to the loop made through tapedeck. Therefore, to prevent this, priority is given to the TAPE-1 Recording Selector.

16. TAPE-2 Recording Selector

This switch selects the recording mode of the tapedeck connected to the TAPE-2 REC. OUT terminal (24).



Functionally, this is the same as that of Selector (15).

In the "source" position, signals applied to each input terminal can be recorded on tapedeck-2. In the "from-1" position, tape dubbing is possible from tapedeck-1 to tapedeck-2.

In the "rec. off" position, the TAPE-2 REC. OUT terminal (24) is also completely isolated from the amplifier.

17. TUNER Terminal

This terminal is for playback of a tuner (AM/FM/LW/SW). Input sensitivity is 300mV.

18. PHONO Terminal

Output of magnetic cartridges (MM, MI type) can be reproduced through this terminal. Input sensitivity is 3mV. Input impedance is 50k ohms.

19. AUX-1 Terminal

This terminal is an auxiliary input terminal for playback of flat frequency response program sources such as AM/FM tuner, line output of tape recorder, or audio output of TV receiver. Input sensitivity is 300mV.

20. AUX-2 Terminal

This terminal functions in the same way as the AUX-1 terminal (19). Input sensitivity is 300mV.

21. TAPE-1 Monitor Terminal

The line output of a tape recorder is reproduced via this terminal. This is put into operation when the Monitor Switch (14) is set to the "tape-1" position. The use of a 3-head tape deck permits simultaneous playback monitoring while recording. Input sensitivity is 300mV.

22. TAPE-1 REC. OUT Terminal

A recording signal is taken out from this terminal, which is always available when an input signal is applied to either of the input terminals. In case the TAPE-1 Recording Selector is set to the "from-2" position, this terminal is connected to the TAPE-2 MONITOR terminal (23) inside the amplifier, and the recording output signals of programme source is switched to that from TAPE-2. In the "rec. off" position, this terminal is completely cut off from the amplifier.

23. TAPE-2 Monitor Terminal

This terminal functions in the same way as the TAPE-1 Monitor Terminal (21). It is put into operation when the Monitor Switch is set at the "tape-2" position. Input sensitivity is 300mV.

24. TAPE-2 REC. OUT Terminal

This terminal offers the same

function as the TAPE-1 REC. OUT terminal (22). In case the TAPE-2 Recording Selector (16) is set to the "from-1" position, the recording output signals of programme source is switched to that from TAPE-1. In the "rec. off" position, this terminal is completely cut off from the amplifier.

25. PRE-OUT Terminal

The output of the preamplifier section can be taken from these terminals. This is useful for connecting such audio equipments as Tone Control Amp, Graphic Frequency Equalizer etc. not to mention other power amplifier Output voltage is 300mV.

Normally this terminal is connected to the MAIN-IN terminal by use of jumper pins, and it is necessary to remove these pins before using this terminal.

26. MAIN-IN Terminal

When you want to use only the power amplifier section of the L-10, outputs of another control amplifiers such as Tone Control Amplifier, Graphic Frequency Equalizer etc. can be connected to these terminals.

The input sensitivity of the terminal is 300mV.

28. 29. Speaker Terminals

Connect speaker system to these terminals. The terminal (28) is for the left channel, and the terminal (29) is for the right channel. The red terminal is for the (+), while the black one is for the (-).

27. Earth Terminal (GND)

Connect the earth (ground) lead wire of a record player (from motor or pick-up arm) or graphic equalizer. Especially when A/B listening test is conducted with many amplifiers, common grounding is effective in removing shock noises at the time of switching. Further, in case it is possible to ground-earth this terminal, the signal-to-noise ratio can be improved.

30. 31. Extra AC Outlet

AC power supply to other audio equipment can be made through these outlets. The terminal (31 UN-SWITCHED) is independent of the AC power switch of this amplifier, while the other (30 SWITCHED) is coupled to the power switch. The maximum capacity for the two outlets is 100W respectively.

Note that in some countries these outlets are not allowed by law and that they are not provided.

32. Power Supply Cord

Plug in the end of this cord into the power supply socket in your listening room. The power consumption of the L-10 is 230W (8 ohms, maximum output).

Operating Precautions

Placement of Amplifier

The L-10 is a high power output amplifier of DC-amp configuration, adopting basic class "AB" operation in the output stage. Therefore, it is necessary to choose such location that effective heat-radiation is possible.

In the case of transistorized power amplifier most of electric power is consumed in power transistors and the heat-sink contributes to radiate heat. The heat-sink of the L-10 is placed at the right and left sides of the chassis, where good ventilation is indispensable, otherwise temperature inside of the unit increases to give decisive damage to the components.

Ideally the both sides should be thoroughly free, and at least be careful so that heat-radiation is done smoothly.

Overcurrent Protection Circuit

In the event speaker terminals of this amplifier, or speaker leads are short circuited, an overcurrent flows back to the power transistors resulting in their break-down.

This fuse will blow when short circuiting occurs to protect the power transistors.

When sound is suddenly interrupted at either of the channels, the cause will be, in most of the cases, the opening of this fuse. But never try to replace it by yourself. Consult the nearest dealer at your place.

Jumper Pins

The "REC. OUT" terminal and the "MAIN IN" terminal are provided so that other audio equipments such as tone control amplifier or graphic frequency equalizer can be connected. Of course the preamplifier section and the power amplifier section can be used independently.

Usually, these two terminals are connected by the Jumper Pins. And it is necessary to remove these jumper pins when you want to use these terminals separately.

Note that the power switch should be turned off when you connect or disconnect these jumper pins.

Connection of Speaker Cords

Full attention should be paid not to cause short-circuit between (+) and (-) of the speaker cord.

In case signals are applied when it is short-circuited, the Over Current Protection fuse will be blown and possibly it may cause troubles.

Connection of Input Equipments

When such input equipments as record player, tuner or tape deck etc., never forget to turn off the power switch. Also connection of pin-plugs

to every input terminal should be made firmly. When the earth-side connection is not sufficient, hum noises will be reproduced.

Time Delay muting

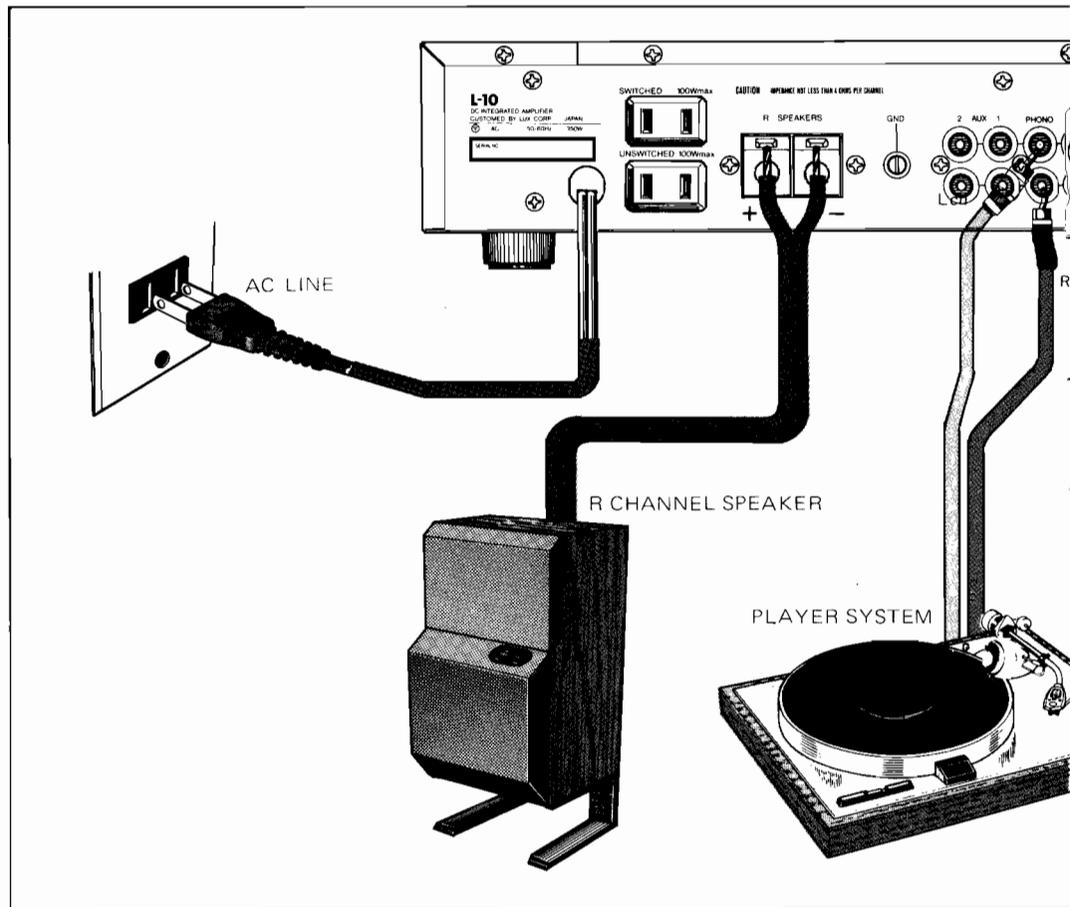
A time delay muting circuit is provided to disconnect the output circuit until the amplifier is put into perfect operational condition for 5 – 10 seconds after turning the power switch on. Therefore sound reproduction is not possible right after the power switch is turned on.

Speaker Protection Circuit by Sensing DC Ingredients

In case DC voltage exceeding $\pm 2.5V$ is sensed at the output caused by such DC ingredients that applied to the input terminals and amplified, or caused by abnormal operation of the amplifier itself, the protection circuit operates to disconnect the speaker systems from the amplifier.

When the protection circuit operates only when the input selector is set to the "tuner" or the "aux" position, it may be possible that DC voltage is at the output terminal of such input equipment as tuner etc. In this case the coupling capacitors etc. of each input equipment should be suspect. While when the protection circuit is always ON irrespective of the position of the input selector switch, the amplifier itself may be defective. Therefore turn the power switch off immediately and consult your nearest dealer.

Connection Procedure



Basic Connection

This amplifier is composed of an equalizer section, and a power amplifier section, which amplifies the signal to the extent that it drives the speaker systems. It functions as the stereophonic reproduction system when the player, tuner, etc. are connected to the input terminals and the speakers or headphone to the output terminals. Thus it is basically necessary to connect this amplifier with the input source, output loads and naturally, the AC current.

But please note that the AC power switch should be turned off in every case of connecting the input and the output equipments.

Connection to Input Terminals

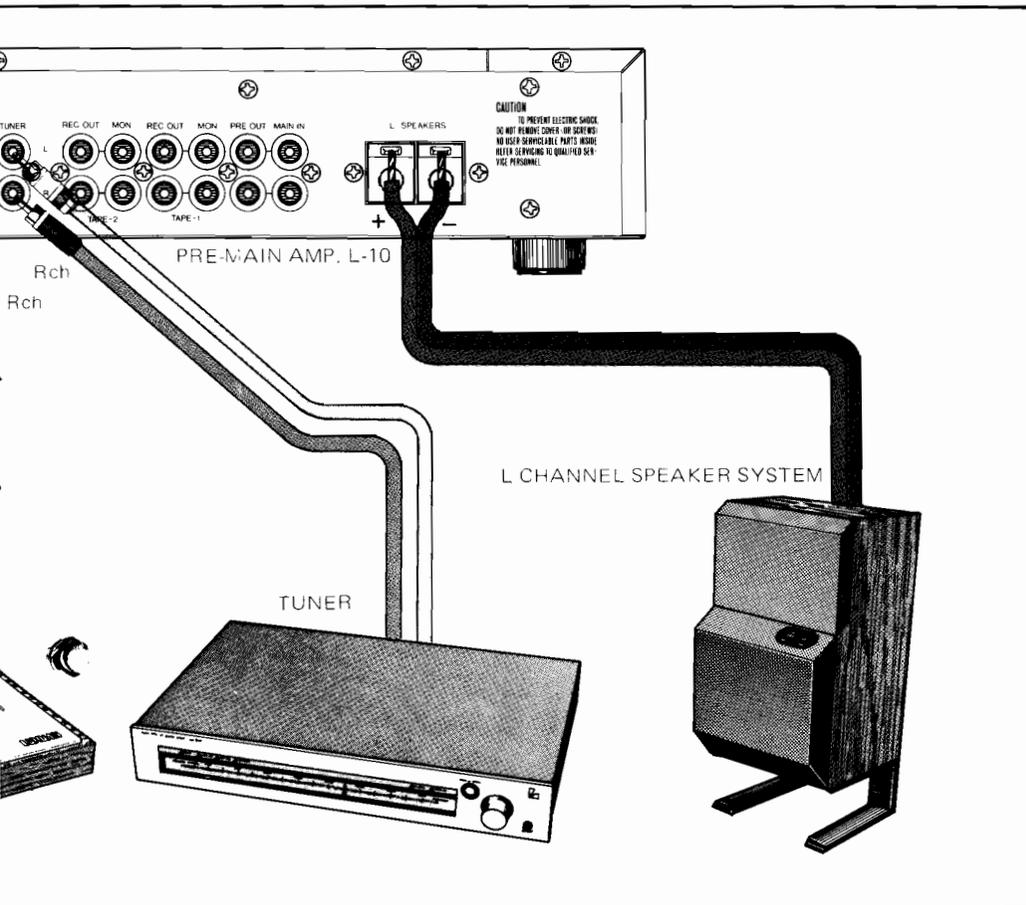
Connect the outputs of player, tuner, or tape-recorder to the relevant input terminals of this amplifier. As to the details, see the sections on Playback of Disc, Tuner and Tape-Recorder.

Connection of Speakers

Stereophonic sound playback is made by a pair of speaker systems for the right and left channels. The left-hand side speaker system from the listening site must be connected to

the left channel output terminals and the righthand side speaker system to the right channel output terminals. If correct phase matching in the speaker connection is not established, phases of sound waves coming from the two speakers are deviated and normal stereo playback is not possible. The "correct phase matching" of the right and left channel speakers is connection of the (+) output terminals with the (+) speaker terminals and the (-) output terminals with the (-) speaker terminals. When the connection is reversely made between the two speakers, phases of sound waves of the two speakers are reversed resulting in abnormal sound waves of the two speakers (such as subdued bass frequency range, unstable sound, etc.)

To connect the speaker cables to these terminals, observe the following procedure so that the leads may not be short-circuited: Strip off the PVC shield at the end of the cable for approximately 10mm (1/3") to expose the core leads. Twist the leads. Caution is necessary not to break the leads during this practice. Then turn the knobs on the output terminals counter-clockwise to loosen the terminal holes. Insert the (+) and the (-) leads into the corresponding terminal holes. Then turn the knobs clockwise to clamp the leads.



Speaker cord is not supplied with the L-10. However, special speaker cables are available from LUX as optional accessories. Six variations are available in LUXMAN speaker cable; for general use WA103 (3m), WA105 (5m) and WA110 (10m), while for high output use WB103 (3m), WB105 (5m) and WB110 (10m). Coaxial type which suppresses the amplitude distortion caused by the surface effect and the inductance of cable itself, of course each type is of low impedance type and accepts large current drive.

It is advisable to use speaker cords of big and good quality and make them short as possible even in case you use other speaker cords.

Connection of AC Power Supply Source

Plug the AC cord of this unit into the power supply source in your listening room. Then press in the power switch and the pilot lamp lights up. After 5 - 10 seconds the time-delay muting circuit is turned on and the entire circuitry is on operational condition.

The power for other audio equipment used in combination with this amplifier can be obtained from the extra AC outlet (SWITCHED) of

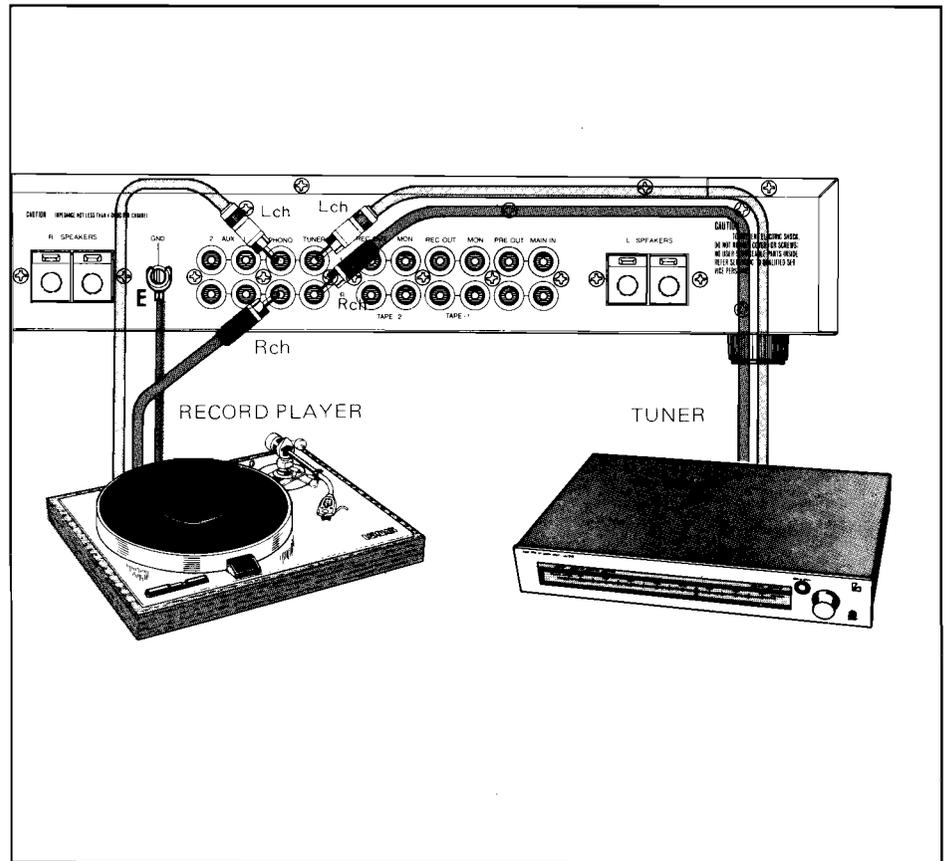
the L-10. In this case, on/off switching of the amplifier is common to other annexed audio equipments, i.e., if the power switch of the amplifier is switched on, the power switch of the other audio unit works simultaneously.

Connection Cable <Pin-plug Cord>

For connection of record players, tuners and tape recorders, shielded wires are used to avoid possible influence from external noise or inductance noise. Usually, the shielded wire has capacitance of approximately 200pF per meter (3.3 feet) or has 35 ~ 100pF capacitance per meter at low level.

Adoption of a connection cord gives the same effect as that of insertion of a capacitor in parallel with input sources or output load equipment, which composes a kind of high cut filter circuit and causes an unnecessary attenuation of high frequency range. Of late output impedance for tuner/tape recorder has been so designed as to be sufficiently low, and there is almost no problem as in this case parallel composite impedance becomes lower and cut-off frequency will be shifted out of audible range. In the case of record player, however, output impedance value of popular MM type cartridge is approx. 10k ohms at 10kHz in general. Therefore choose a shield wire of good quality and use it as short as possible for connection of the amplifier.

Playback from Record Disc



Connections:

The player has 2 cords with pin plugs at their ends for both right and left channels. Connect the pin plugs to the input terminals of this amplifier [PHONO (18)]. The player's earth lead can be connected to the GND terminal (27). The player's power cord can be connected to the extra AC outlet (30, 31) of the amplifier, if available.

Signal Paths:

Put the disc on the turn-table, switch on the phono motor, and set the stylus on the groove of the disc. Then recorded signals begin to be fed to the amplifier. First, the signals fed to the amplifier through PHONO terminals are brought to the equalizer section, where recorded signals are restored to the original frequency curve. Incidentally, this equalizer curve has been standardized to the RIAA curve. The equalized signals are then fed to the input selector switch (function switch). If this switch is not set at the "phono" position, the signals are blocked here and no amplification is possible.

After the input selector switch one line goes to the REC. OUT terminal,

and the other to the tape monitor switch. If the Tape Monitor Switch (6) is set at the "source" position, the signals are sent to the mode selector switch, balance and volume controls via tone compensator but if at the "deck-1" or "deck-2" position, the signals are stopped at the tape monitor terminals.

Except during tape playback, the monitor switch must be kept at the "source" position. But when the input signals are fed to PHONO or AUX terminals, recording output is always obtainable regardless of the position of the monitor switch.

Then signals passed through the tape monitor switch are sent to the mode selector which selects the reproduction mode. The mode selector switch includes the headphone switch, and in case the switch is set to the "phones (stereo)" or the "phones (mono)" position, reproduction from speaker systems is not possible. Therefore, select either the "stereo", "reverse" or "mono" position when you wish to reproduce from speaker systems.

After the mode selector, signals proceed to volume control through balance control and tone compensator. In case the volume control is turned to the most counter-clockwise position

signals are blocked here, therefore it is necessary to set it to an appropriate sound level.

The signals are thus fed to the power amplifier section from the pre-amplifier section, in between these two sections provided is the PRE. OUT Terminal (25) and the MAIN. IN Terminal (26) to connect such audio equipments as tone control amp or graphic frequency equalizer etc. In the factory these two are connected by use of the jumper-pins to allow signals to be fed to the power amplifier section, and excellent reproduction of record disc is realized by the speaker systems connected to the Speaker Terminal (28) (29).

For your pleasant command of this amplifier, we recommend that you bear the blockdiagram in your mind.

Playback:

Put a disc on the turntable for playback. As the volume control is turned clockwise, playback sound comes from the speakers. As explained above, playback is possible regardless of the position of the Mode Selector, etc. Such controls as Input Selector Switch, Tape Monitor Switch, Pre-Main Jumper Pins and Volume Control should be set at the correct positions. After all preparations are completed check if the volume levels on both right and left speakers are identical. If different, adjust them with the Balance Control. For stereophonic playback, set the Mode Selector Switch to the "stereo" position.

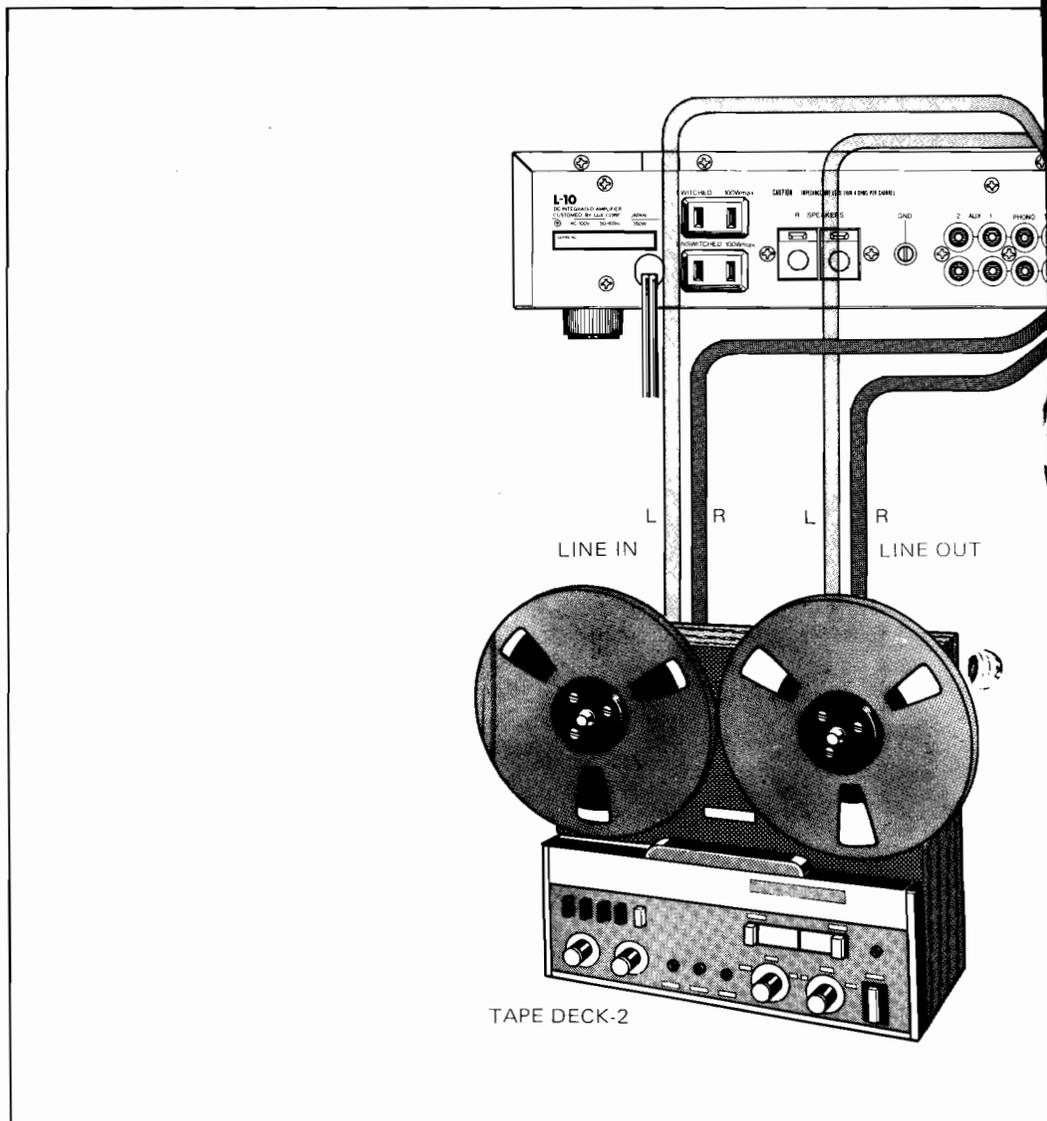
Playback from Tuner:

Connect the tuner's output terminals (left and right) to either of the amplifier's AUX terminals or to the Tuner terminals.

The Input Selector Switch must be set at the corresponding position. As shown in the block diagram, the input signals from the tuner are fed directly to the input selector circuit. Afterwards, the signals trace the same blocks as are explained in the TAPE DECK section and are reproduced from the speaker systems. Both for FM stereophonic and monaural broadcasting, the Mode Selector Switch should be set at the STEREO position, for such accommodation to the input source can be made in the tuner. Modulation hum in the AM program can be eliminated by varying the distance and angle of these components.

Playback from Tuner

Playback from Tape



Playback from Tape Monitor Terminals:

Almost all tape-recorders and tape decks currently marketed include an equalizer amplifier in their circuitry, and some tape-players are made exclusively for playback.

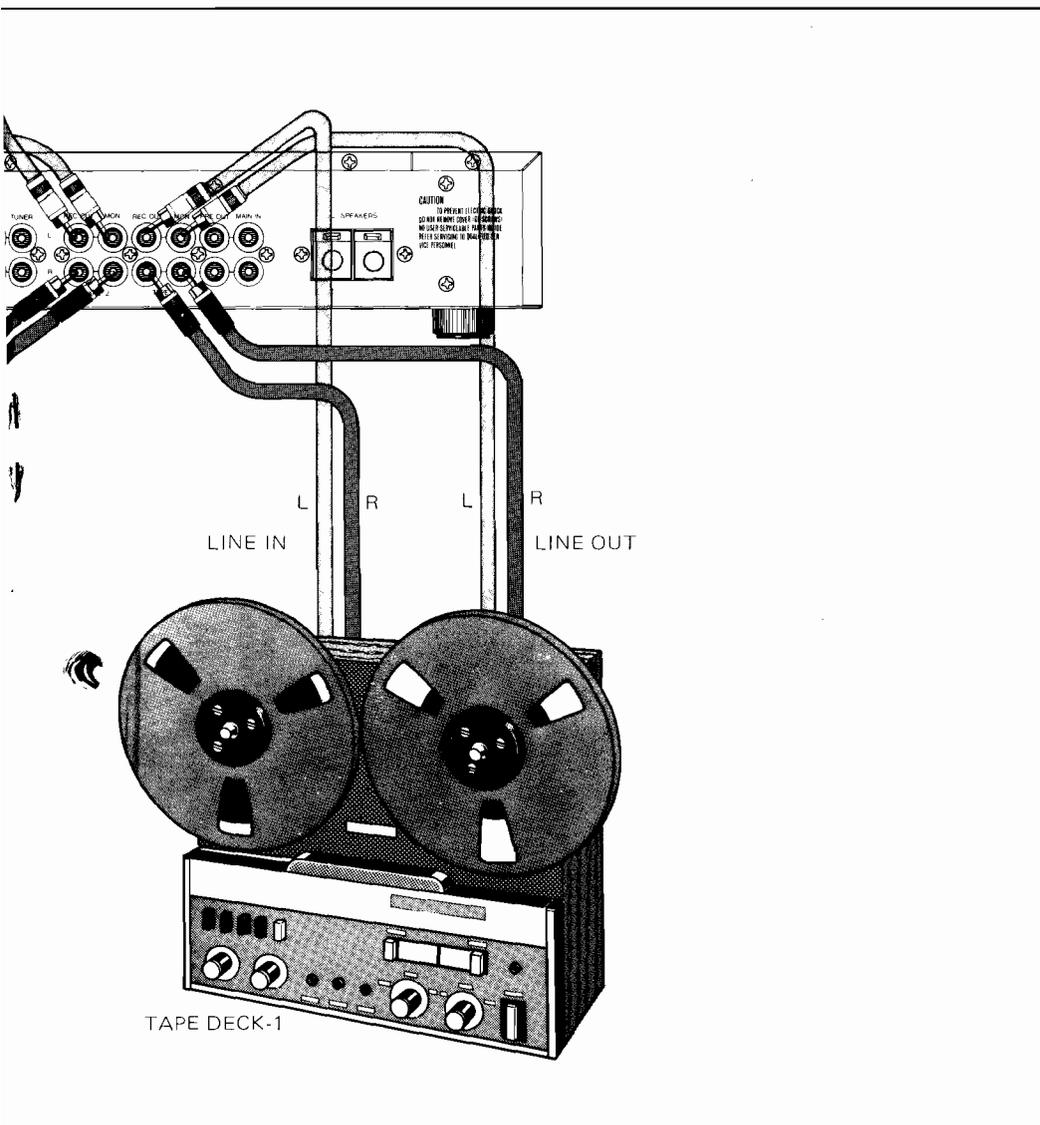
Connect the output terminal (LINE OUT) to the Tape Monitor terminals (21) or (23). Then set the Monitor Switch at the corresponding position to which the tape-recorder is connected. If two tape-recorders are connected to the terminals (21) and (23), selection between two units is possible by the Tape Monitor Switch (14).

This amplifier can be divided into two sections: one before the Recording Output terminals (REC. OUT) and the other after the Tape Monitor Switch. A 3-head tape-recorder makes it feasible to make recordings with the former section and simultaneously make playback with the latter section.

Playback from AUX Terminals:

Playback of tape is possible if one line output of the tape-recorder or tape-deck is connected to the AUX terminals of this amplifier by use of a pin-jack lead, and the Input Selector Switch is set at the position corresponding to the AUX terminals. All operations in this case are the same as those for the playback from tuner (Page 11).

Note that when tape playback is made through the AUX terminals, the line input or AUX input terminals of the tape-deck should be kept free. If connected to the Recording Output terminals (REC. OUT) of the amplifier, there will be possible oscillation by feed-back of signals.



Recording on Tape:

In the case of playback of various program sources through input terminals of this amplifier, the same signals as those reproduced in the speakers are always available at the REC. OUT terminals (22) (23).

But note that signals are not available on a certain REC. OUT terminals according to the selected position of the TAPE-1 Recording Selector (15) or the TAPE-2 Recording Selector (16). For instance, signals are not available at the REC. OUT terminals (22) in case the TAPE-1 Recording Selector (15) is set to the "rec. off" position or to the "from-2" position. The same can be applied to the TAPE-2 Recording Selector (16); in this case signals are not available on the REC. OUT terminal (24).

By connecting these terminals to the input terminals (AUX or LINE IN) of the tape-recorder, you can enjoy simultaneous recording and playback.

These recording signals are taken out before the tape monitoring stage, and there is no influence from the Filters, Volume control, etc. as far as the quality of the recorded signal is concerned.

Recording on Tape

Tape Dubbing (REPRINTING):

With this amplifier, it is possible to reprint from one tape-recorder to another. Connect the line output terminals and the line input (or AUX) terminals of one tape-recorder to the TAPE-1 Monitor and REC. OUT terminals of the amplifier respectively. Likewise, connect the line input and output of the other tape-recorder to the TAPE-2 Terminals.

For reprinting from tapedeck-1 to tapedeck-2, set the DECK-2 Recording Selector (16) to the "from-1", while for that from tapedeck-2 to tapedeck-1, the TAPE-1 Recording Selector (15) to the "from-2". At this time, switching of tape monitor switch (14) between "tape-1" and "tape-2" makes it possible to compare the master tape and the reprinted tape recording.

Note that in case the TAPE-1 Recording Selector (15) is set to the "from-2" position, and TAPE-2 Recording Selector (15) is set to the "from-1", the signal loop is organized through tapedeck. To avoid this, we have given priority to the TAPE-1 Recording Selector (15). That is to say, in this case, dubbing determined as from tape-2 to tape-1.

The dubbing circuit is independent of the main signal paths, and disc or tuner reproduction is feasible in the course of tape dubbing operation when the Tape Monitor Switch is in the "source" position.

Simultaneous Playback Monitoring and Recording:

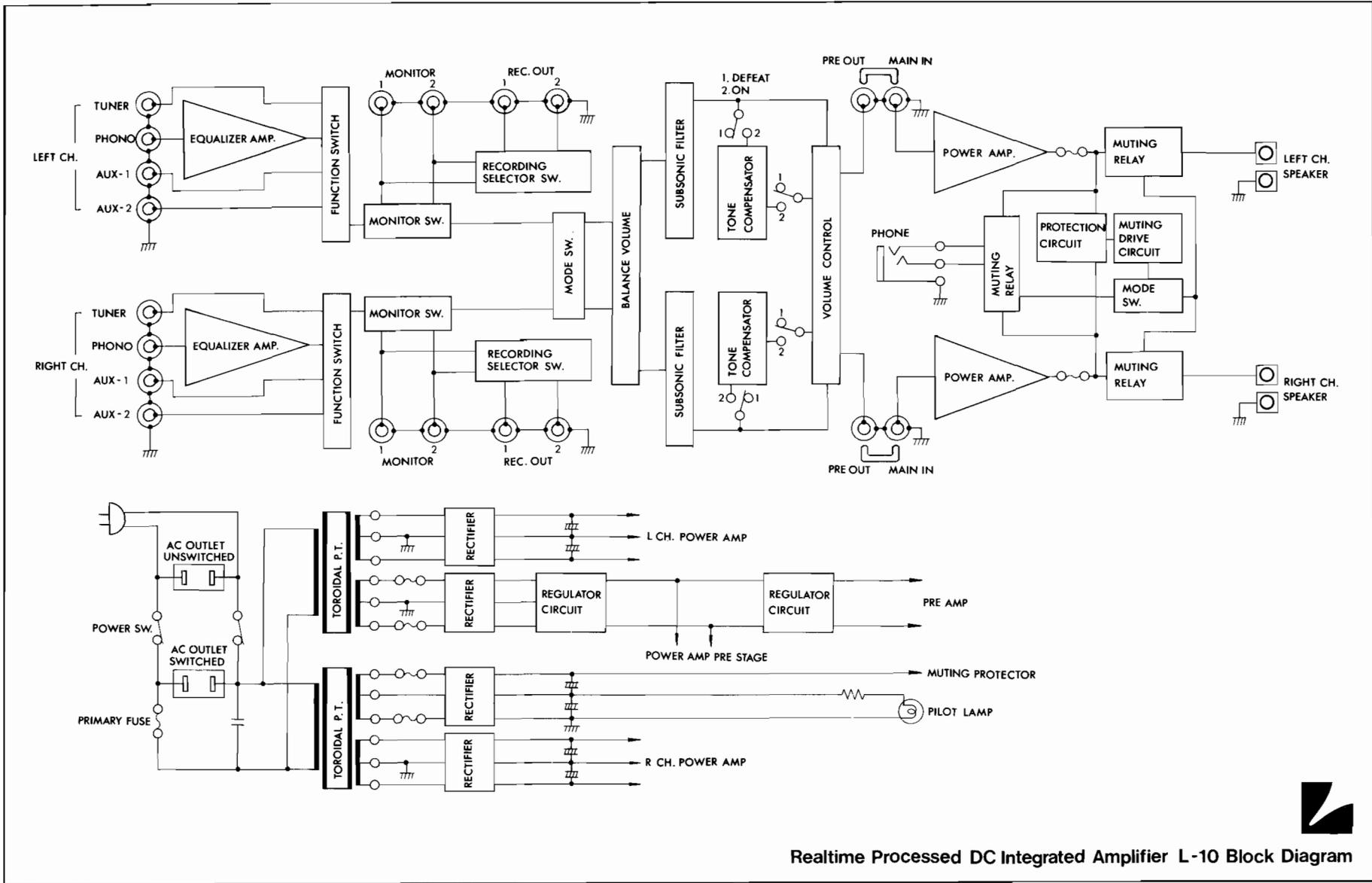
A 3-head tape-recorder ensures simultaneous playback monitoring and recording. In this case, recording on tape and playback of the recorded sound is done at the same time, and connections must be made for both functions. It is necessary to connect the REC. OUT terminals to the line input terminals of the tape-recorder, and the Tape Monitor terminals to the output terminals (LINE OUT) of the tape-recorder.

When the Tape Monitor Switch is set at the position corresponding to the terminals to which the tape-recorder is connected, repetition of switching between "source" and "tape-1" or "tape-2" allows a comparison between the original and the recorded sound. Possible recording errors can thus be prevented. Incidentally, note that reproduction of recorded sound becomes a little delayed as compared with that of the original sound since there is a gap between the recording head and the playback head.

Simultaneous Recording:

This amplifier is provided with 2 sets of Recording Output terminals (22, 24), enabling to record simultaneously on 2 tape-recorders. When the same connection as that of "TAPE DUBBING" is done and the Recording Selector (15) (16) are set at the "source" position, repetition of switching of the Monitor Switch among those positions "tape-1", "source" and "tape-2" allows to compare the original sound with 2 recorded ones during simultaneous recording. When the decks are of 3-head type.





Realtime Processed DC Integrated Amplifier L-10 Block Diagram

Operation of Controls

Volume Control

Fundamentally, the volume control should provide smooth and continuous variation of sound level. But conventional volume controls offer large gang-error and lack of precision, and these days it provides the least gang-error and precision feeling.

Even this detent-type one, however, has such demerits that sound level varies step-by-step increment and it is rather hard to control at low level reproduction.

The volume control adopted with the L-10 is a new and ideal volume control that is completely free from the defects peculiar to conventional ones. That is to say this volume control has realized the least gang-error between the channels. The features of this new type volume control are: (1) The A-type curve is obtained by varying the pattern of resistor material which is made uniform. Thus the linearity of the resistor itself has been much improved comparing with that of conventional volume control. Also gang-error is equivalent to that of detent-type. (2) The contact lead has been made large and divided into pieces to realize quite low contact-resistance against the resistor material and to stabilize it, thus eliminating non-linear distortion. (3) Variation response can be continuous, and not step-by-step increments. Therefore smooth and accurate control of volume is feasible.

Obtain an adequate volume level with this control. A clockwise turn increases the volume level, while a counter-clockwise turn decreases and finally cuts it completely.

The variable resistor of this control has a logarithmic curve. In the attenuation characteristics of so called "A" type, the turning angle is proportionate to the attenuation degree (dB), and the dB value and the volume audible to human ears are in the proportional relation. In other words, the rotation of the control is in proportion to the sound volume sensed by human ears. Thus, the increase of volume seems quite natural as the control is turned in the clockwise direction.

This unit is provided with the time-delay muting circuit to isolate the output circuit for about 5 - 10 seconds until the entire circuitry is put into operational condition. Therefore if the main Volume Control (1) is set at a high level before operation, loud sound comes out all of a sudden. Set the main volume at a low level before operation, to obtain an appropriate level after sounds begin.

Balance Control

In case a difference is detected

between the volume levels of right and left channels, adjust the unbalanced volume level with this Control (2). A complete turn of the Control to either the clockwise or counter-clockwise direction causes a cut-off of the volume of the other speaker. The volume balance of both channels can be adjusted so that monaural reproduction by means of the Mode Selector (6) in the "mono" position seems to come from the center of right and left channels. In the mid click position the volume of both channels can be adjusted at the same level. If a program source established throughout all playback stages is unbalanced for some reasons (or the speakers are placed in an oblique position), establish the correct balance with this control.

Mode Selector

This amplifier is for stereophonic reproduction and incorporates independent amplifiers for 2 channels (right & left). The Mode Selector is placed between the two amplifier channels to change the playback mode. Selection between speakers and headphone can be made with this selector. This switch has 5 positions, namely, stereo, reverse, Select an appropriate position mono, phones (stereo) and phones (mono).

<Stereophonic Playback>

When this switch is set at the "stereo" position the two amplifier channels function independently to ensure normal stereophonic reproduction, i.e., the signals fed to the right input terminal are reproduced at the right channel speaker and the input into the left channel is realized for reproduction at the left channel speaker.

<Monaural Playback>

With the switch at the "mono" position the signals of the two amplifier channels are mixed together to effect monaural reproduction. This position is useful when monaural signals are fed to both right and left channels, or when stereophonic signals are to be reproduced in the monaural mode (e.g. to check the volume balance between the right and left channels). In this position you may use either of the right and left channel inputs.

Occasionally you may want to playback a monaural disc. In that case you need not take the trouble to use a monaural cartridge. With a stereophonic cartridge, if the Mode Selector is set at the "mono" position, unpleasant noises are cancelled and better performance will be obtained.

In the case of FM playback switching to stereo or mono is performed inside the tuner, and you can

keep the Mode Selector at the "stereo" position at all times.

<Stereophonic Reverse Playback>

In the "reverse" position the output channels are reversed in relation to the input, that is to say, the input into the right channel is reproduced from the left channel speaker, and vice versa. This position can be used to correct a reversed input of program source.

Tone Compensator

All the program sources available in the marketplace are not always perfect. Record discs and tapes which are most frequently used as a program source are liable to have a slight frequency deviation of linear nature depending on the manufacturers.

For example, all recordings are equalized in accordance with RIAA standard, but it is quite common to encounter variation in overall tonal balance from one recording to the other. Also, differences in listening environment and room acoustics often require a subtle degree of tonal compensation that conventional tone controls cannot correct because of their wide range and overlapping characteristics. Therefore our original Linear Equalizer function has been developed to make accurate compensation of recording characteristics in the reproduction equipment.

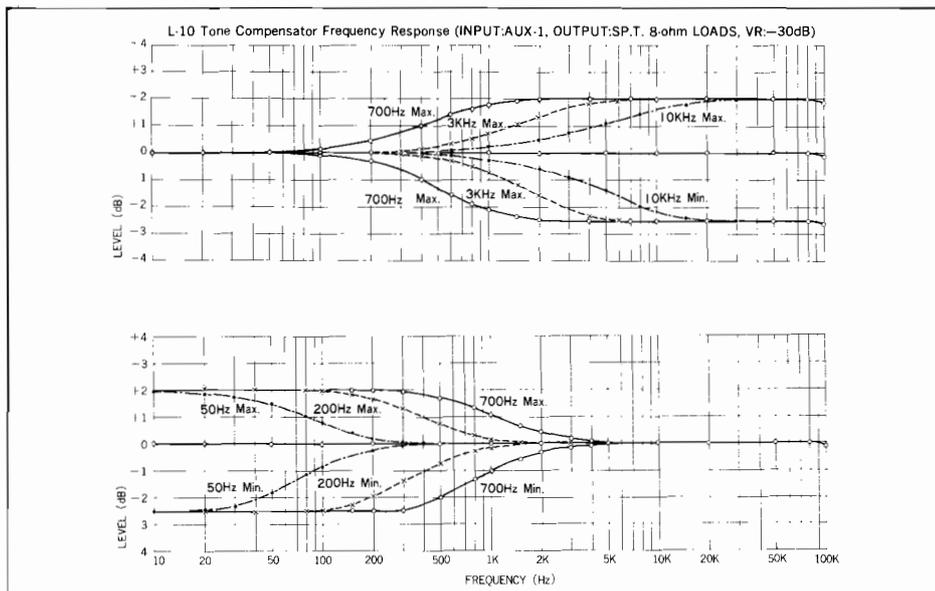
Our new function Tone Compensator compensates the critical recording characteristics of discs or recorded tapes, and the basic concept is similar to that of Linear Equalizer. However, the tone compensator functions not only to compensate the recording characteristics accurately but to create program sources according to one's taste. Thus this function provides a more positive compensation of program sources.

The maximum variation range of this tone compensator function is +2dB, -2.5dB. And the rotation angle is equivalent to that of conventional tone control, therefore very fine and minute control is feasible. Three positions are provided with the turnover frequency selector switch both for low and high frequency range, thus realizing minute compensation of program sources. In order not to deteriorate the tonal quality by inserting the tone compensator function, we constructed the circuit without introducing additional active components. According to the characteristic of ears, it is frequent to compensate especially at the time of low level reproduction. Therefore, we designed the circuit to obtain the specified response curve below -6dB, which is nearly the full volume level of A-type curve volume control. Further, the capacitors adopted here to produce the response curve is the selected film-type, which suppresses the deterioration of tonal quality down to the minimum. Thus, you can use the tone compensator function free from care.

The Tone Compensator includes Bass Control (8), Bass Turnover Selector Switch (9), Treble Control (10), Treble Turnover Selector Switch (11) and Tone Defeat Switch (12).

When the Tone Defeat Switch (12) is depressed, the frequency characteristic is completely flat irrespective of the position of Bass or Treble Control and Turnover Selector Switch. That is to say, it is necessary to set the knob in the "protruded" position when the function is operated.

The Bass Turnover Selector Switch (1) has three positions: 50Hz, 200Hz and 700Hz. From the position selected, Bass Control begins to function. In other words, turnover of a lower frequency range below the selected



frequency can be controlled by the Bass Control. The controllable range is wider by 150Hz, 300Hz and 600Hz respectively.

The Bass Control, which functions in conjunction with the Bass Turnover Selector, varies the low frequency characteristic in the range of +2dB, -2.5dB. In the center position, flat frequency response is obtained. A clockwise turn intensifies the low frequency range, while a counter-clockwise turn yields attenuation.

These same descriptions are applicable to the Treble Control (10) and the Treble Turnover Selector has 3 positions: 700Hz, 3kHz and 10kHz. The controllable range is wider in this respective order. Treble Control begins to function from the position that is selected. A clockwise turn boosts the high frequency range, while a counter-clockwise turn yields attenuation.

Remember that the Tone Compensator function is designed to compensate program sources, therefore it is impossible to make such large compensation that is required for room

acoustic compensation of listening room, speaker systems or cartridges.

Operation of Subsonic Filter

Ultra low frequency noises (5 – 50Hz) caused by record warps, tone-arm's resonance, phono-motor's rumble and acoustic feedback etc., are harmful in reproduction even if they are out of audible range (below 20Hz) as they produce inter-modulation distortion by vibrating the cones of loudspeakers.

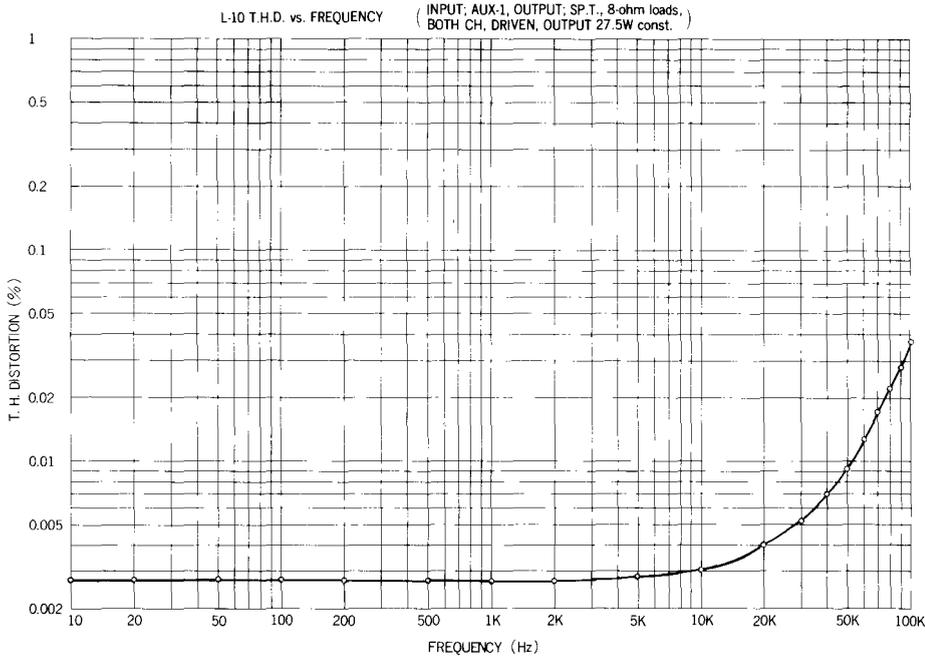
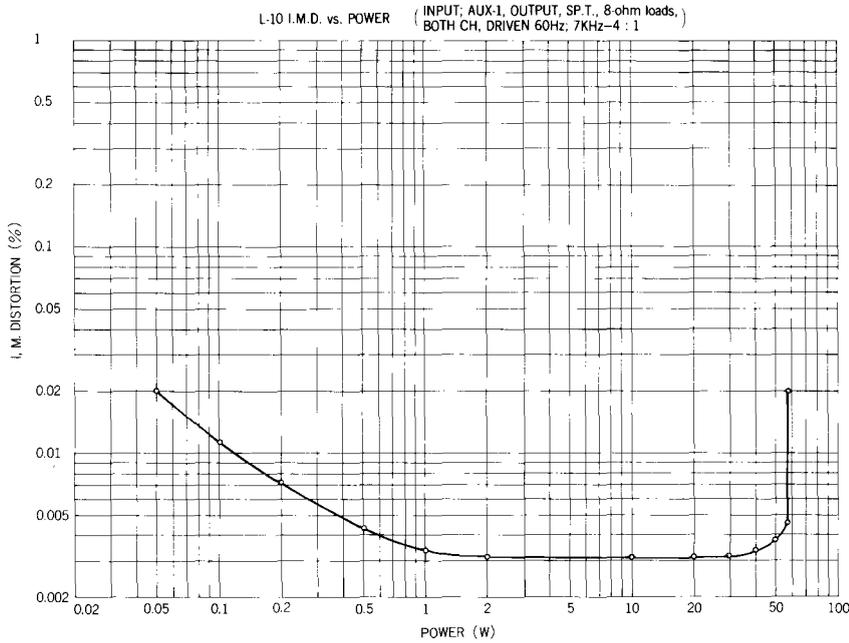
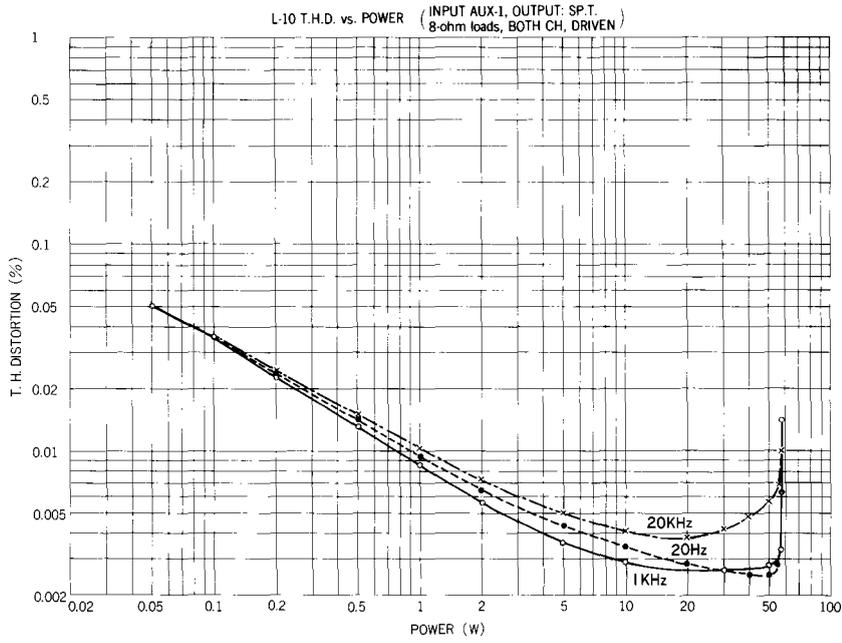
To remove such harmful ultra low frequency noises with the least effect on the audible frequency range, this unit is provided with the Subsonic Filter.

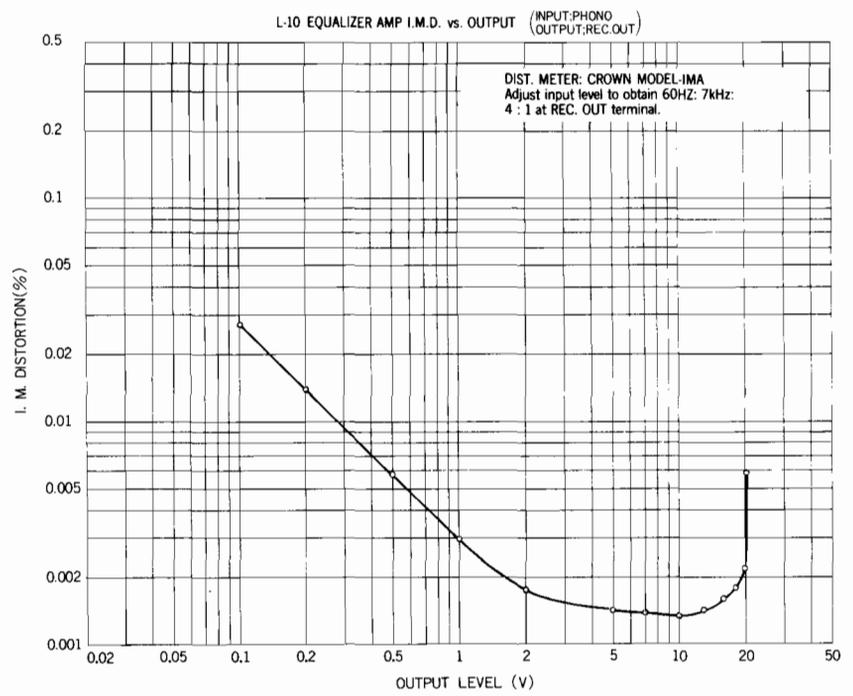
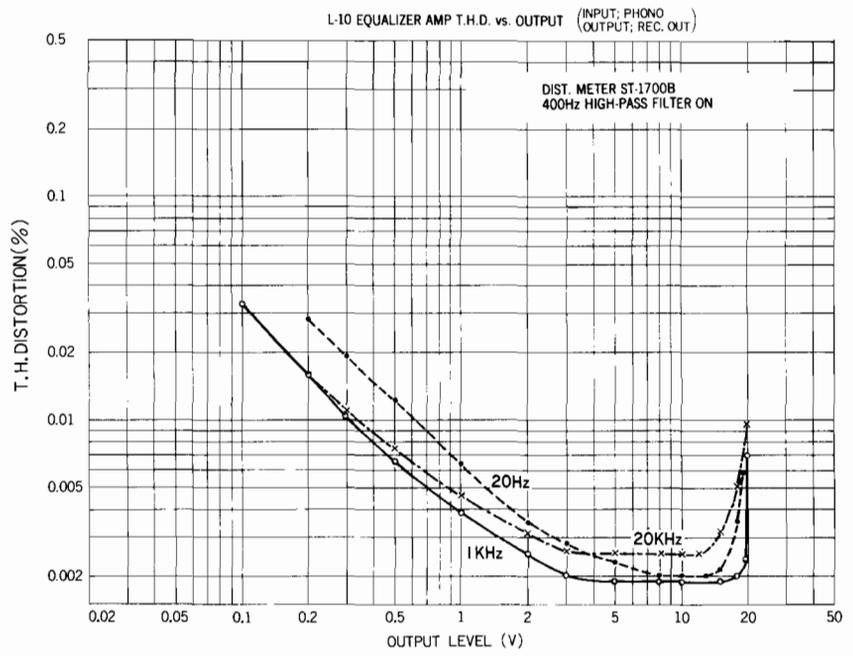
When the switch (13) is set to the "20Hz" position, noises below 20Hz are reduced, while in the "10Hz" position, noises below 10Hz are reduced. This filter lowers the frequency responses below audible frequencies, therefore it does not affect the balance of program sources.

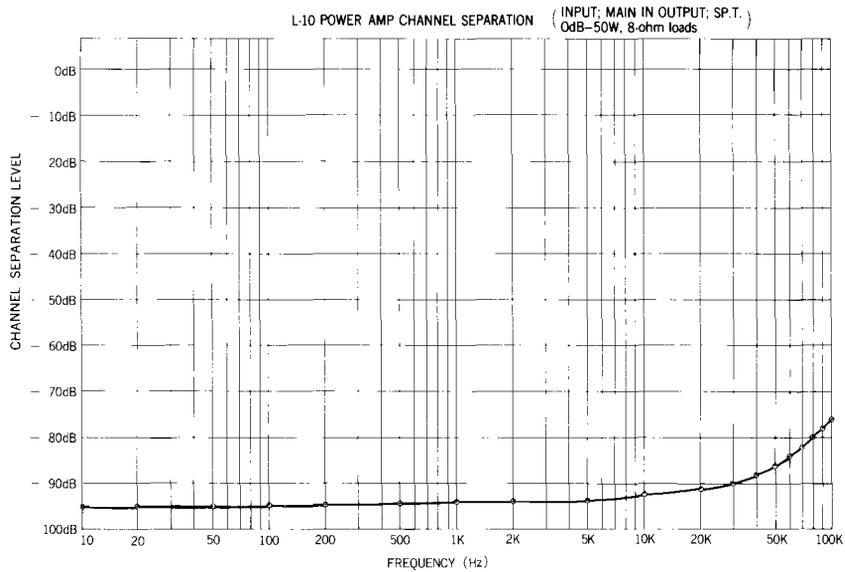
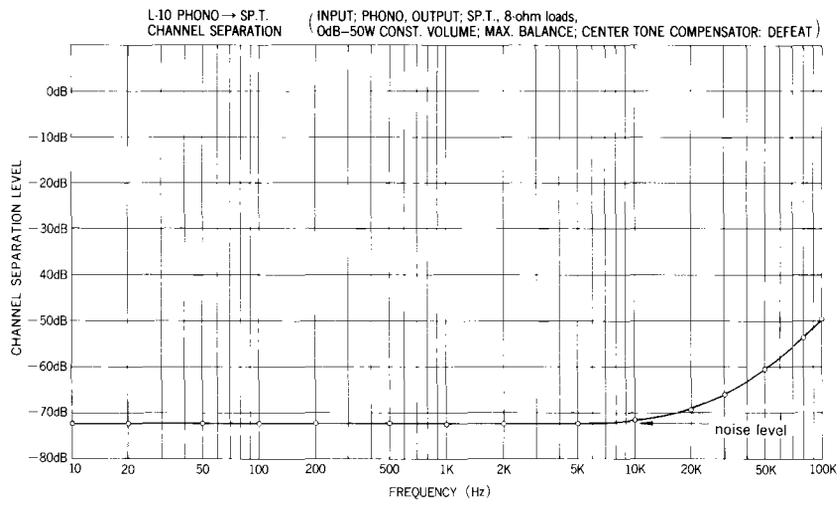
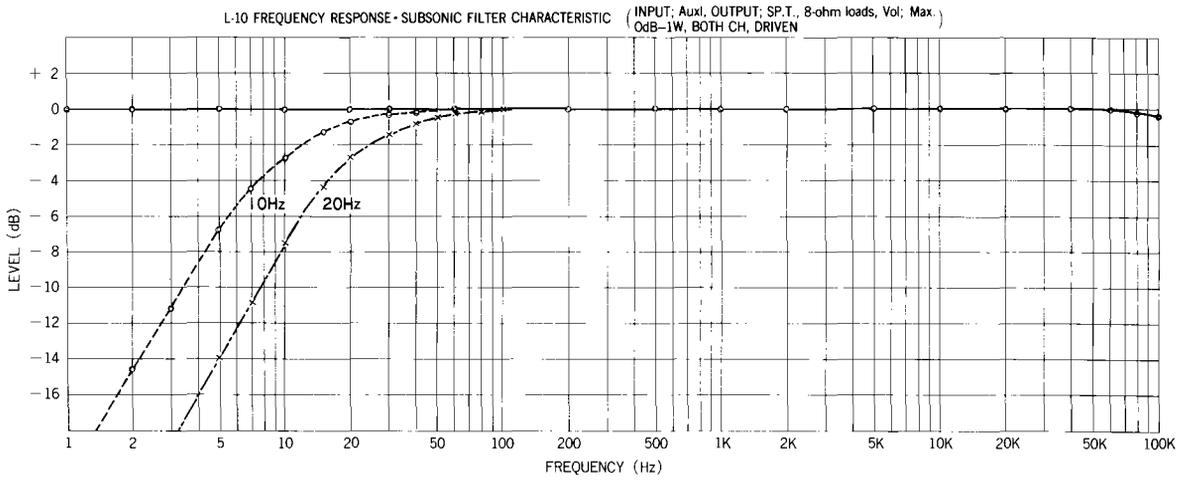
In the "normal" position, the filter is bypassed to realize flat frequency response.



Standard Curves







Specifications

Power Output:	55 watts minimum continuous per channel into 8 ohms load, both channels driven, at any frequency from 20Hz to 20,000Hz with no more than 0.015% total harmonic distortion.
Rated I.M.:	no more than 0.015% (8 ohms, 55W, 60Hz : 7kHz = 4 : 1)
Damping Factor:	80 (8 ohms 1kHz)
Input Sensitivity:	phono; 3mV, tuner, aux.; 300mV main in; 300mV
Signal-to-Noise Ratio:	phono; no less than 90dB (IHF-A weighted, input 10mV) tuner, aux.; no less than 100dB (IHF-A weighted, input short-circuited) main in; no less than 100dB (IHF-A weighted, input short-circuited)
Input-Equivalent Noise:	phono; no more than -131dBV (IHF-A weighted, input short-circuited) tuner; no more than -111dBV (IHF-A weighted, input short-circuited) main in; no more than -111dBV (IHF-A weighted, input short-circuited)
Frequency Response:	phono; 20Hz - 20,000Hz (± 1 dB) tuner, aux; DC - 100,000Hz (-1dB) main in; DC - 100,000Hz (-1dB)
Pre Amp Output Voltage:	pre. out: typical 300mV, max 18V rec. out: typical 300mV, max 18V
Tone Compensator:	variable range; +2dB, -2.5dB maximum (continuously variable) Bass Turnover Frequency: 50Hz, 200Hz, 700Hz Treble Turnover Frequency: 700Hz, 3kHz, 10kHz
Protection Circuit:	Speaker Protection circuit by sensing DC voltage Excessive Current Protection Circuit
Other Features:	Subsonic Filter (10Hz, normal, 20Hz), TAPE-1 Recording Selector (from-1, source, rec. off), TAPE-2 Recording Selector (from-2, source, rec. off), Tape Monitor Switch (tape-1, source, tape-2), Headphone Jack, Extra AC Outlets (SWITCHED, UNSWITCHED)
Power Consumption:	230W (8 ohms, maximum output) 230W (CSA rated)
Dimensions:	438(W) x 363(D) x 78(H) mm (17-1/4" x 14-19/64" x 3-5/64")
Weight:	Net 10.5 kgs (23.1 lbs.) Gross 12.0 kgs (26.4 lbs.)

* Specifications and appearance design are subject to possible change without notice.

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