LUX CORPORATION, JAPAN

REALTIME PROCESSED DC PREAMPLIFIER

Laboratory Standard Series

C-12

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 your purchasing the C-12

The model C-12 is a stereo preamplifier that the DC-amp configuration is adopted in all stages. The reason why we at Lux decided to adopt a DC configuration is to eliminate only harmonic distortion that appears in the form of a written specification but also phase or transient distortion that cannot be rated by specification but still has a vital influence on tonal quality. As a matter of course, to ensure faithful amplification of music signals of random nature, the input stages of an amp are of great importance, and DC amplification is featured in all stages including equalizer and flat amp.

In the equalizer stage, our exclusive DML-IC's (where the 1st stage FET differential amp and its supporting cascode, current mirror and constant current circuits are effectively put into a block) are combined with a constant current cascode circuit and output circuit of class "A" SEPP operation. Similarly, in the flat amp section, the same DML-IC's are arranged with an output circuit of constant current emitter-follower.

To eliminate the DC drift — an inherent drawback to DC amp — our DML-IC is ideal in that it is perfectly shielded from external ambient fluctuation, and truly unconditional stability is ensured.

Thorough study was undertaken to improve various characteristics. Carefully arranged layout of chassis eliminates most of the shielded wires in the signal path, and input circuits are wired at the shortest distance. Such basic circuits as equalizer and flat amp are arranged in a single piece of large circuit board, and perfectly separate wiring is rendered between right and left channels. All of these structures contribute much to the total dependability of the DC amplifier ensuring superb frequency response and signal-to-noise ratio not to mention of unparalleled low channel separation.

Functionwise, Lux's exclusive Linear Equalizer is featured to allow accurate compensation of frequency response on disc and prerecorded tape. To remove harmful ultra low frequency noises, a twin T filter is provided which is composed of capacitors and resistors without active components. A new type of volume control of high precision is provided that offers not only continuous variation of volume level but virtually no gang-error between the right and left channels. Also meticulous care is paid to the selection of all components used, such as resistors, variable resistors and capacitors.

We recommend that you choose with care other Hi-Fi components for optimum operation in combination with the C-12, and go through the contents of this owner's manual to make the most of the potential of the preamplifier.

Switches & Terminals

1. Input Selector

This switch permits you to select desired program source. Either of 5 positions (aux-1, tuner, phono-1, phono-2, aux-2) can be selected.

2. Recording Output Off Switch

This switch shuts off the recording output signals when depressed. In the "protruded" position, signals are available at the two REC. OUT terminals (22)(25), that is to say, the program source selected by the Input Selector Switch(1) can be recorded on the TAPE-1 and the TAPE-2 decks. When it is depressed, recording is impossible.

Note the tape dubbing operation is feasible irrespective of this switch.

3. Mode Selector Switch

This switch allows selection of reproduction mode among 3 positions (rev., stereo, mono). For normal stereophonic playback set the Switch to the "stereo" position. For further details refer to Mode Selector.

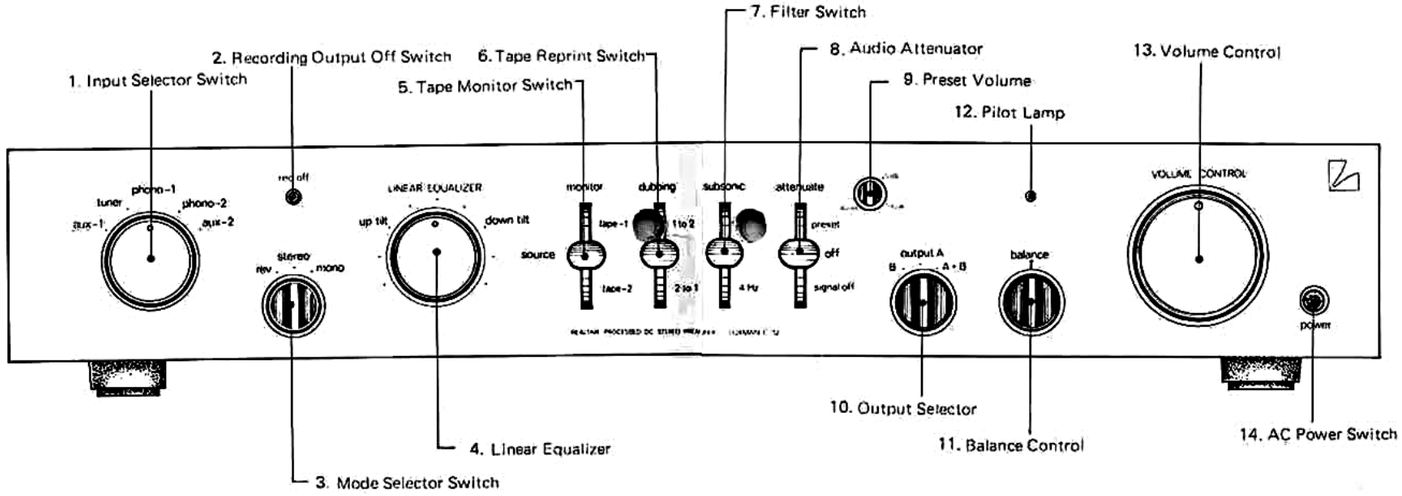
4. Linear Equalizer

This is a new tone control which provides a tonal compensation of linear nature for subtle reinforcement of frequency response. With the control in its midposition flat frequency response is obtained. When switched to either of the 4 "up-tilt" positions, the entire response curve is slightly rotated so as to linearly increase treble response while simultaneously decreasing bass response. Conversely selection of a "down-tilt" position rotates the response curve in a clockwise direction and provides a gradual decrease of treble and a simultaneous increase of bass.

This Equalizer is inserted at the flat amplifier section and is effective on all the program sources. For further details refer to Operation of Linear Equalizer.

5. Tape Monitor Switch

This 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 tape deck



is feasible either from the TAPE-1 MONITOR Terminal(23) or from the TAPE-1 TAPE CONNECTOR (24) if provided. Likewise the "tape-2" position permits reproduction from the TAPE-2 MONITOR Terminal(26).

6. Tape Reprint Switch (Dubbing)

Tape dubbing is possible with this switch. When the lever is set to the "1 to 2" position, the playback signals of the TAPE-1 MONITOR Terminal(23) can be copied on to TAPE-2, and vice versa in the "2 to 1" position. While in the dubbing process it is possible to monitor with the Tape Monitor Switch(5).

This reprinting circuit is independent and reproduction of other sources such as record or tuner is possible during the tape dubbing process.

7. Filter Switch

This switch functions to remove ultra low frequency noises quite effectively. When the lever is set at the upper position the filter circuit is put into operation with the dipping center frequency at 7Hz, while the lower position causes the filter circuit to operate at 4Hz. In the center "off" position the filter circuit is completely bypassed.

For further details refer to Operation of Filter and Characteristic Curve.

8. Audio Attenuator

Occasionally, during late night listening (or in case an over-rated input is connected to the input terminals) it is difficult to render fine adjustment of volume only with the Volume Control(13). In such cases this Attenuator makes it easy. First lift up the lever to the "preset" position, and then set the Preset Volume(9) to an appropriate position. When the lever is pressed down to the "signal off" position, the audio signals are blocked here and no reproduction is feasible. This is convenient for momentary stoppage of operation, (e.g., while replacing cartridges etc.)

9. Preset Volume

When the Attenuator Switch(8) is lifted up to the "preset" position, this volume starts to function. At the endmost clockwise position of this knob the volume level is attenuated by 15dB, and as the knob is turned in the counter-clockwise direction the amount of attenuation increases to 40dB at the ultimate counter-clockwise position. In other words attenuation level can be freely adjusted in the range of 15dB—40dB.

10. Output Selector

This unit is provided with 2 pairs of output terminal, therefore if the power amplifiers are connected to the Terminal A(27) and Terminal B(28), a power amplifier can be selected by this selector.

When the selector is set to the "A" position, output of the preamplifier is available at the Output Terminal A(27). Likewise, in the "B" position, the output is available at the Terminal B(28), while in the "A+B" position, the output is available both at the Terminal A(27) and the Terminal B(28).

11. Balance Control

The volume balance between the right and left channels can be adjusted by this control. Turn it clockwise, and the volume level of the left channel 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.

12. Pilot Lamp

Pressing the AC Power Switch causes this lamp to light, which shows that AC power is on.

13. Volume Control

A new and ideal volume control is adopted, which realizes the least gang-error and the continuous variation response at the same time. Therefore, smooth and accurate control of volume is feasible. A clockwise turn of the knob increases volume, while counter-clockwise turn decreases and finally cuts off volume.

Note that a time-delay muting circuit is incorporated in the output stage, which isolates the output stage for several 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 because of operation of the time-delay circuit, and it is recommended that you set the volume control at the counter-clockwise position before operating this unit.

14. AC Power Switch

Press in the switch and the Pilot Lamp(12) lights up. The next push shuts off the AC power.

15. Earth Terminal (GND)

Connect the earth lead wire of 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 to remove shock noises at the time of switching.

16. Input Impedance Adjuster for PHONO-1

The desired impedance for the MM (Moving Magnet) cartridge can be obtained by this Adjuster between 30K ohms – 100K ohms. Turn the knob to obtain the optimum load resistance of your cartridge. A click stopper is provided at the "50K" position. For further details refer to Input Impedance Adjuster.

17. PHONO-1 Terminal

Output of magnetic cartridges (MM, MI type) can be reproduced via these terminals. Input sensitivity is 2.3mV. Input impedance can be adjusted between 30K ohms and 100K ohms by the Input Impedance Adjuster(16).

18. PHONO-2 Terminal

This functions in the same way as the PHONO-1 Terminal. The input impedance is fixed in 50K ohms.

19. AUX-1 Terminal

This is an auxiliary input terminal for playback of flat frequency response program souces such as AM/FM turner, line output of tape recorder, or audio output of TV receiver. Input sensitivity is 150mV and input impedance is 50K ohms.

20. AUX-2 Terminal

This terminal functions in the same way as the AUX-1 Terminal (19).

21. Tuner Terminal

This is for playback of a tuner (AM/FM/LW/SW). Input sensitivity is 150mV and input impedance is 50K ohms.

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 Reprint Switch is set to the "2 to 1" position, recording signals come from the TAPE-2 Monitor Terminal.

23. TAPE-1 MONITOR Terminal

The line output of tape recorder is reproduced via this Terminal. This is put into operation when the Monitor Switch(5) is set to the "tape-1" position. The use of a 3-head tape deck permits simultaneous playback monitoring while recording. The input sensitivity is 150mV and the input impedance is 60K ohms.

24. Tape Connector for TAPE-1

This connector is of DIN standard. With the recording output terminal (REC. OUT) and the tape monitor terminal in it, connection for recording and playback is feasible with a single patch cord with DIN plug provided that the tape recorder has the same connector. For playback through this connector, the Monitor Switch(5) has to be set at the "tape-1" position and the Tape Reprint Switch(6) has to be at the center position. Output signal for recording is always available except when the Reprint Switch is set to the "2 to 1" position.

Note that this connector is not provided with the model for U.S.A. and CANADA.

25. TAPE-2 REC. OUT Terminal

This offers the same function as the TAPE-1 REC. OUT Terminal (22). In case the Tape Reprint Switch is set to the "1 to 2" position, signal from TAPE-1 Terminal is available.

26. TAPE-2 MONITOR Terminal

This terminal functions in the same way as the TAPE-1 Monitor Terminal. It is put into operation when the Monitor Switch is set at the "tape-2" position. The input sensitivity is 150mV and the input impedance is 60K ohms.

27. Output Terminal A

The output of this amplifier can be taken from this Terminal. Output is available when the output Selector (10) is set either to the "A" position or the "A+B" position.

28. Output Terminal B

Also the output of this amplifier can be taken from this terminal. Output is available when the Output Selector (10) is set either to the "B" position or the "A+B" position.

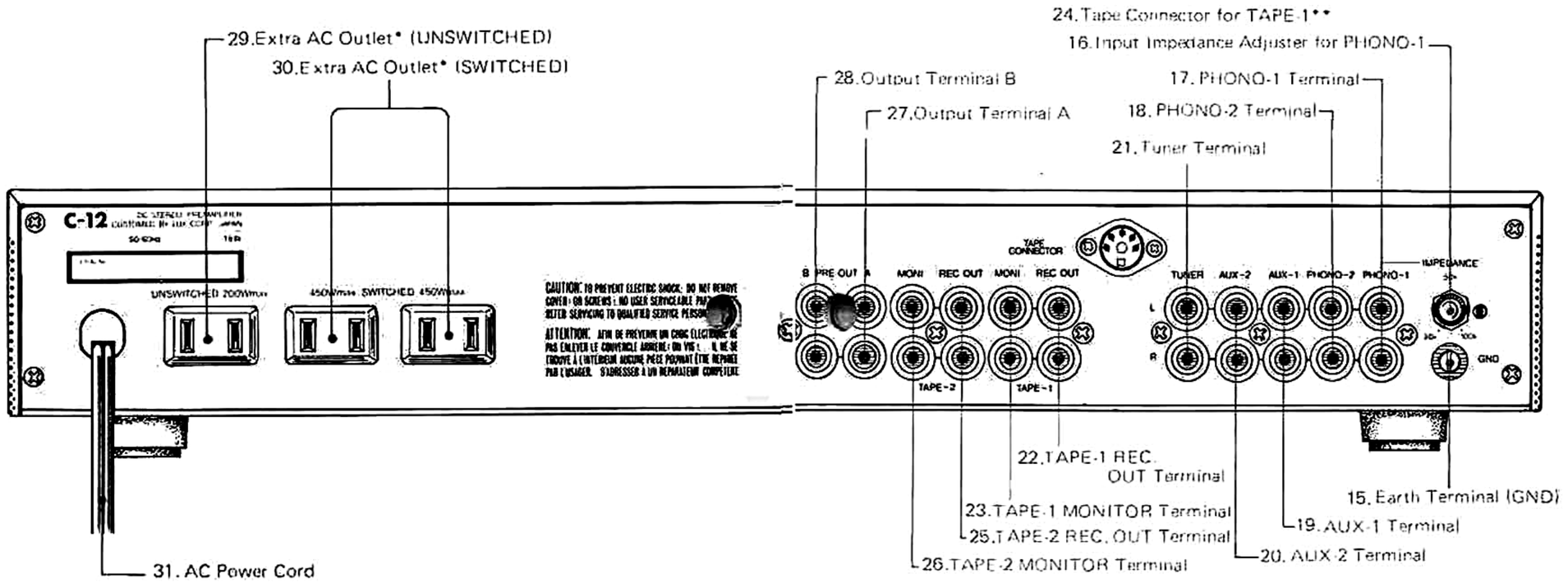
29, 30. Extra AC Outlet

You can supply AC power to other audio equipments through these outlets. The terminal(29 UNSWITCHED) is independent of the AC power switch of this amplifier, while the others (30 SWITCHED) are coupled to the power switch. The total capacity for the UNSWITCHED is 200W, while the rated capacity for the SWITCHED is 450W respectively.

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

31. AC Power Cord

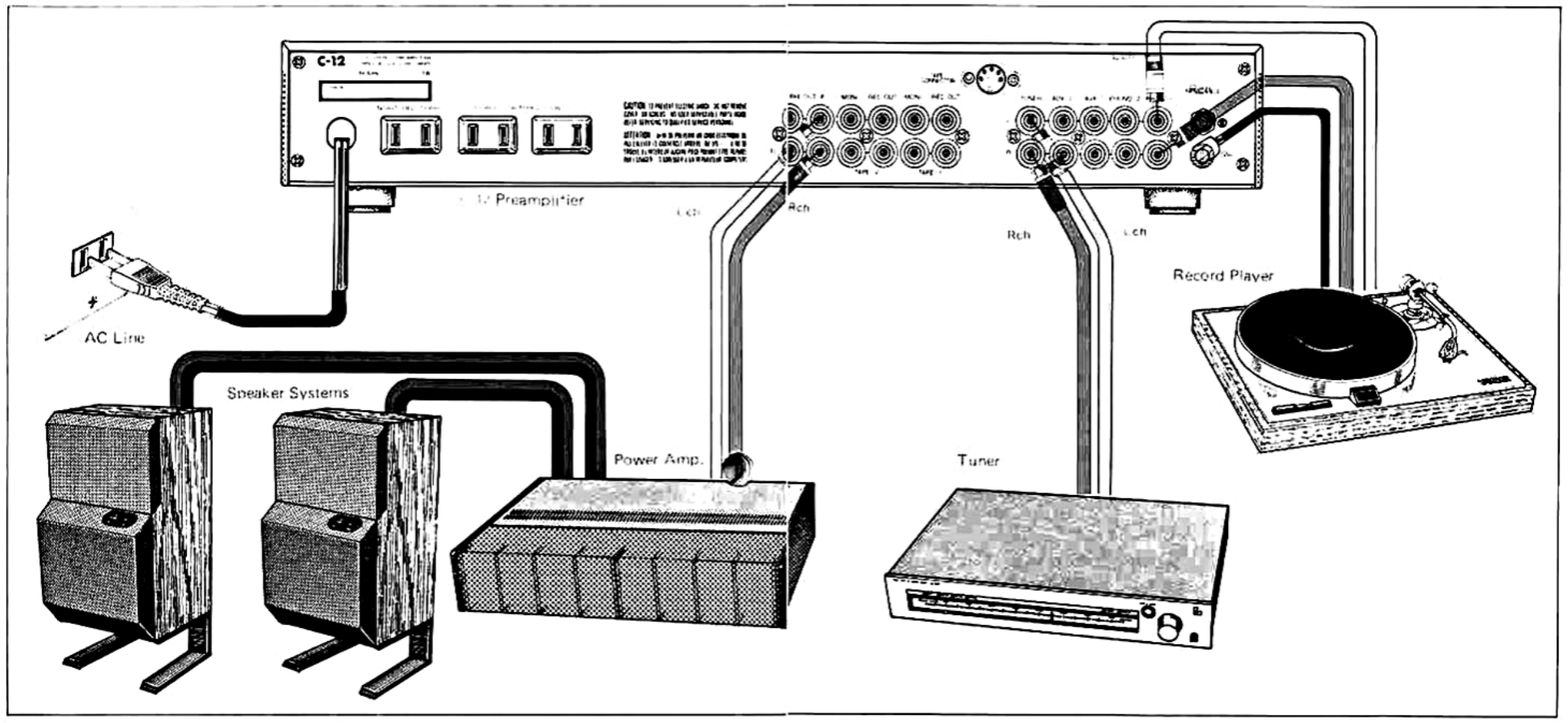
Plug in the end of this cord to the power supply socket in your listening room.



* In some countries these terminals are not provided, since it is prohibited by law.

** This connector is not available on the model for U.S.A. and CANADA.

Connection Procedure



Connection of Input Terminal

The output of a turntable, FM/AM tuner or tape deck should be connected to the corresponding input terminal of this pre amp. For further details refer to "Reproduction of Program Sources".

Connection of Power Amplifier

This unit is provided with 2 pairs of output terminal, either of which can be connected to the input terminal of your power amplifier. Check carefully that both right and left channels are correctly hooked up. To avoid mis-connection it is recommended to use 2 pin jack cords of different colour.

Connection of Speakers to Power Amplifier

Stereophonic playback is realized with a pair of speaker systems for right and left channels. The right speaker system (viewed from the listener's position) has to be hooked up at the right output terminal of the power amp., while the left speaker should be connected to the left terminal.

Note that perfect sound reproduction cannot be expected if the phase is not matched in both channels. To match the phase, connect the (+) terminal of the right speaker to the (+) terminal (red cap) in the right channel of the power amp., and the (−) terminal to the (−) one (black cap). Do the same with the left speaker system.

If mismatched for some reason (e.g., mis-connection of speakers), the low frequency range is subdued and stable playback cannot be realized. To hook up the speaker systems, it is recommended that you use heavy gauge cord of good quality, and as short as possible.

Special speaker cables are available from LUX as optional accessories; for general use WA103 (3m), WA105 (5m) and WA110 (10m), while for high outpout use WB103 (3m), WB105 (5m) and EB110 (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.

Connection of AC Power Supply Source:

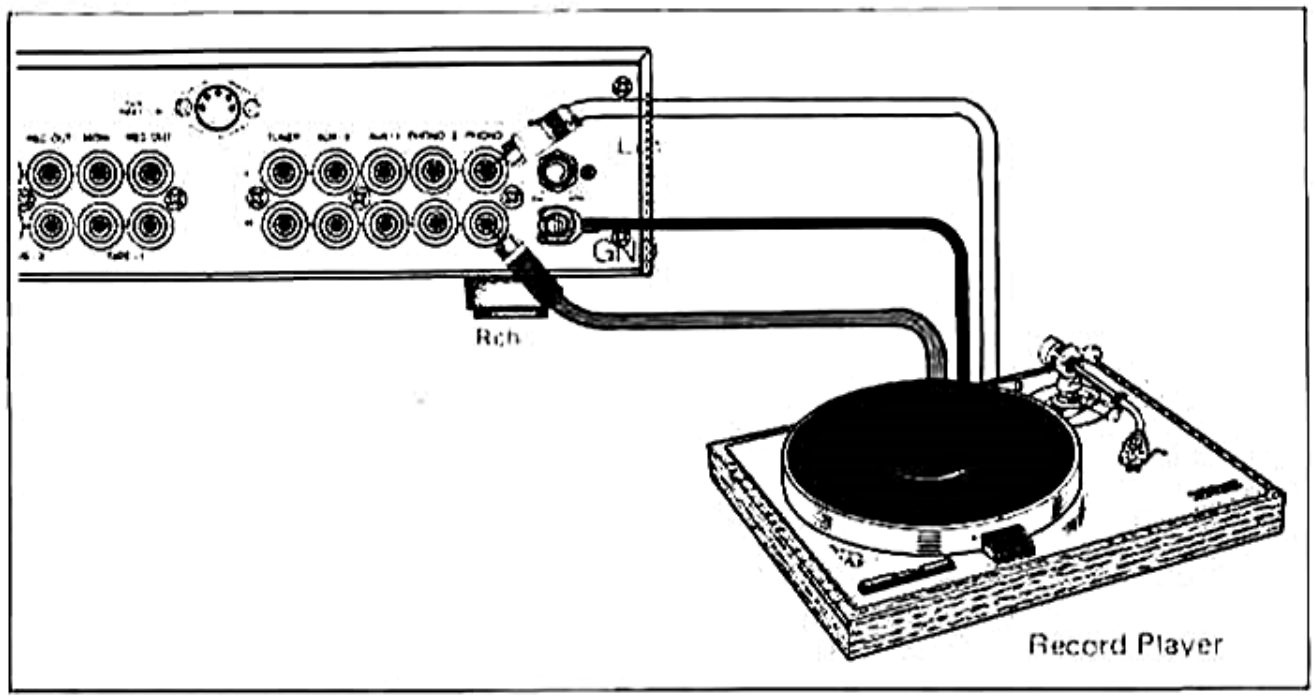
As the final step of preparation, connect the amplifier to the AC power supply source. Connect the AC Cord(31) to the power supply outlet. Then press the AC Switch (14), and the pilot lamp lights up. Approximately 5 seconds later, the time delay muting circuit is ON, when the amplifier is put into operational condition.

Pin-Plug Cord for Connection

For connection of the record-player, tuner, and tape-recorder, shield wire is advisable to be used for protection from external noise or inductance noise. Usually, this Shield wire has a capacitance of approx. 200pF/m, and even so called low capacitance shield wire has 35 – 100pF/m, i.e., the adoption of a connection cable gives the same effect as that of the insertion of a capacitor in parallel with input sources or output load equipment (which composes a kind of high-cut filter circuit).

All of LUXMAN products are so designed as to be low in output impedance and high in input impedance, which prevents such effect. But it is advisable to choose a shield wire of good quality and use it as short as possible for connection of this amplifier (at PHONO, AUX, Tape-monitor etc.) with the high impedance equipment.

Playback from Record Disc



Connections:

The player has 2 cords with pin plug at their ends for both right and left channels. Connect the pin plugs to the input terminals of this amplifier [PHONO-1(17)] or [PHONO-2(18)]. When you use low output (0.01 – 0.1mV) MC type cartridge, it is necessary to boost the output up to the level of Input Sensitivity of the PHONO terminals by use of a head amplifier or a step-up transformer.

Signal Paths:

Put the disc on the turntable, 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 is set to the "source" position, the signals are sent to the mode selector switch, balance and volume controls, but if in the "tape-1" or "tape-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 the signals are sent to the volume control through the mode selector and balance control. 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.

Next, signals are fed to the flat-amp section to be voltage-amplified. Such controls in this section as Linear Equalizer, subsonic filter, etc. are for flexible and diversified adjustment of playback sound and do not block the signals completely. signals completely.

The next stage is the Audio Attenuator. When the switch is set to the "off" position, signals go forward, while in the "signal off" position, signals are stopped here. At the "preset" position, signals are attenuated.

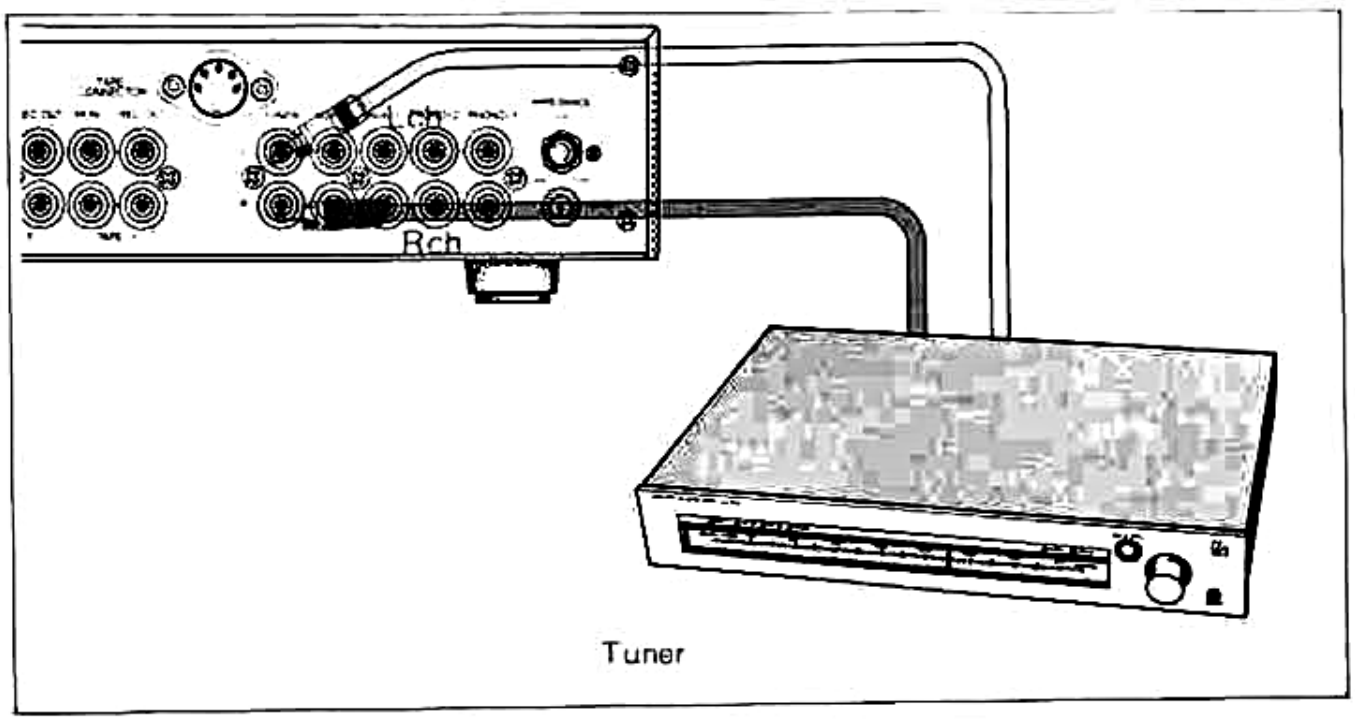
The last stage is the Output Selector. Signals proceeds to the corresponding output terminal selected by the Output Selector. For instance, if the power amplifier is connected to the Output Terminal A, the selector should be in the "A" or the "A+B" position.

Sound reproduction of a record disc is thus realized from speaker systems. For your pleasant command of this amplifier, we recommend that you bear the block diagram 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, 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



Tuner

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.

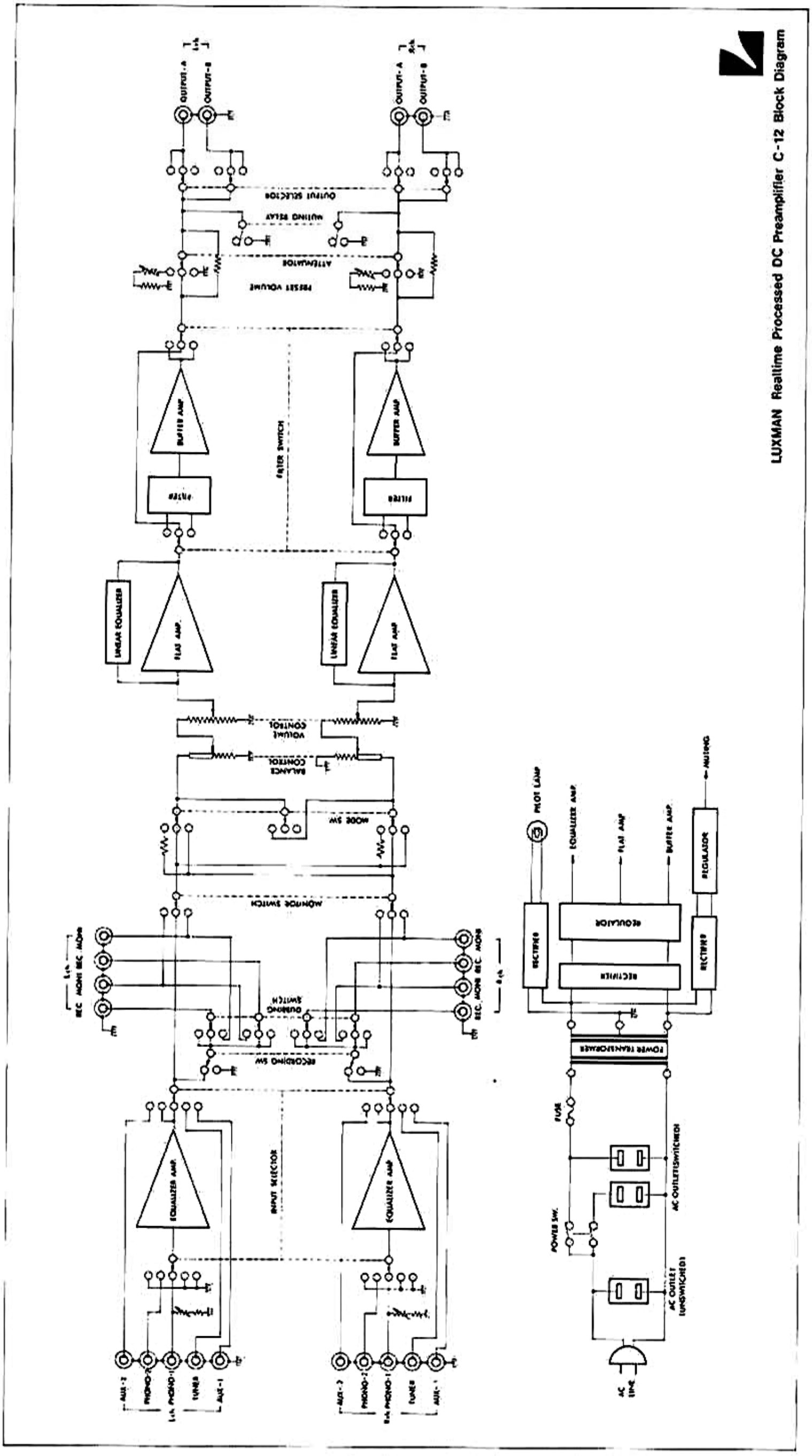
The Input Selector Switch must be set at the corresponding position. As shown in the block diagram, the input signals from the tuner are fed directly to the input selector circuit. Afterwards, the signals trace the same blocks as are explained in the RECORD DISCS section and are reproduced from the speaker 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 AUX Terminals:

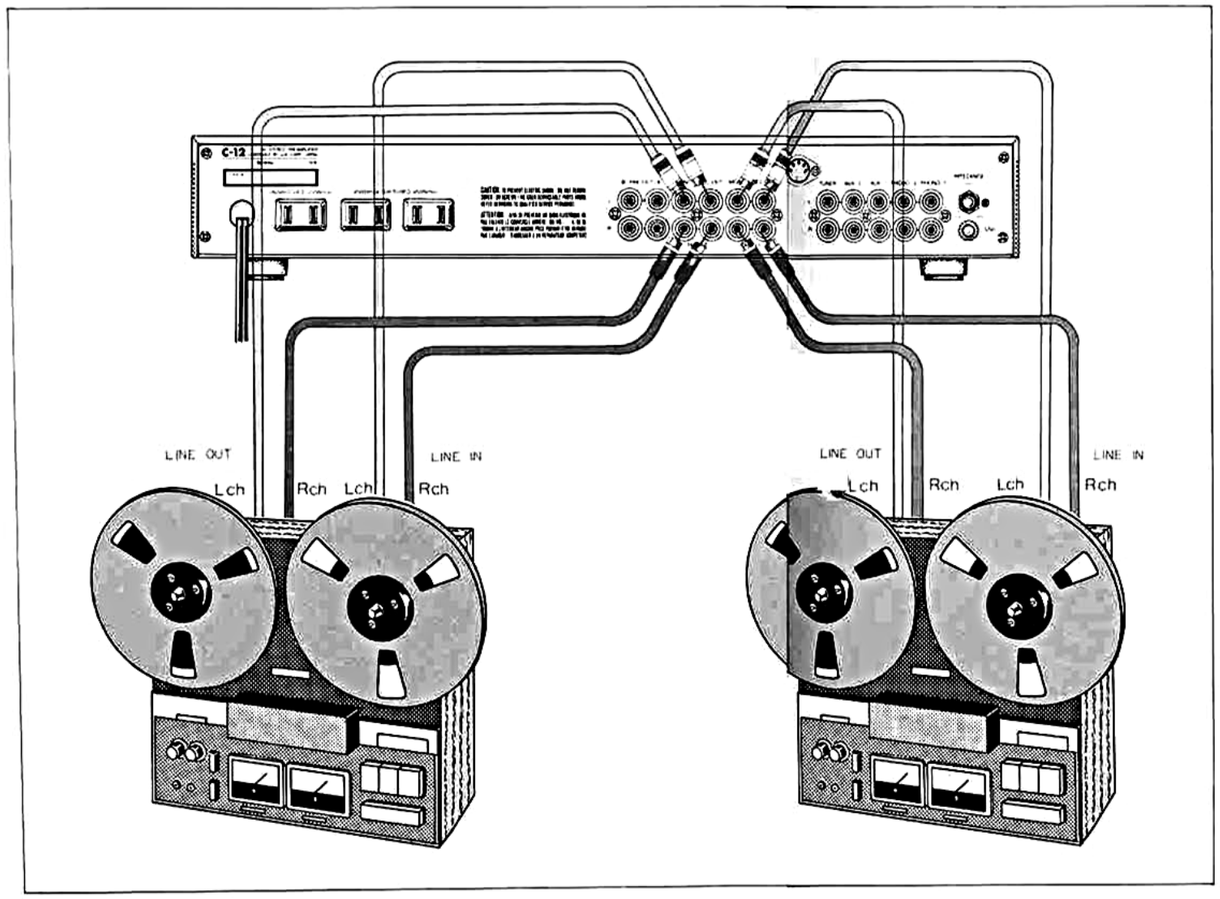
Playback of tape is possible if the line output of the tape-recorder or tape-deck is connected to the AUX terminals of this amplifier by use of a pin-jack cord, and the Input Selector Switch is set to the position corresponding to the AUX terminals. All operations in this case are the same as those for 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.

BLOCK DIAGRAM



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(23) or(26). 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(23) and (26), selection of either unit is possible by the Tape Monitor Switch(5).

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.

Note that a normal function cannot be expected if 2 sets of tape-recorders for playback are connected to the terminals of TAPE-1 and Tape Connector (24, if provided) at the same time, since these two are coupled in the inside circuit and affect each other. Therefore, if the Tape Monitor terminals and the Tape Connector are used, the tape-recorders should be connected to the terminals of TAPE-2 Monitor Terminal and the Tape Connector.

Playback from Tape Connector:

This is a DIN connector and is convenient for simple connection with a patch cord between the tape-recorder and recording/playback connectors of this amplifier. Playback from the Tape Connector is possible if the Monitor Switch set at the "tape-1" position.

Note that the Tape Connector is not available on the model for U.S.A. and CANADA.

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 and the Tape Connector (if provided).

By connecting these terminals to the input terminals (AUX or LINE IN) of the tape-recorder, you can enjoy simultaneous recording and playback. (It iserecommended that the Dubbing Switch be kept at the "source" position.) These recording signals are taken out before the tape monitoring stage, and there is no influence of the Filters, Volume control, etc. as far as the quality of the recorded signal is concerned.

In case the Recording Output Off Switch is depressed, reproduction of the program sources are possible, however, recording of them is impossible since their signals are not available at the two REC. OUT terminals.

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.

Dubbing is now possible by use of the Dubbing Switch. In the "1 to 2" position, the signals of TAPE-1 can be reprinted on the tape of the TAPE-2 terminals, and vice versa in the "2 to 1" position. In this way, repetition of switching between "source" and "1 to 2" or "2 to 1" makes it possible to compare the master tape and the reprinted tape.

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 are 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 playback monitoring can be made through the Tape Connector as well if it is provided. A single piece of DIN cord ensures connection for recording and playback on the Tape Connector, and simple operation of the Tape Monitor Switch switching between "source" and "tape-1" is sufficient.

Simultaneous Recording:

This amplifier is provided with 2 sets of Recording Output terminals (22), (25) enabling to record simultaneously on 2 tape recorders. When the same connection as that of "TAPE DUBBING" is done and the Dubbing Switch is set to 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.

Operation of Controls

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. This switch has 3 positions, namely, stereo, mono, and rev. Select an appropriate position.

Stereophonic Playback

When this switch is set to the "stereo" position the two amplifier channels function independently to ensure normal streophonic 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 2 amplifier channels are mixed together to effect monaural reproduction. This position is useful when both right and left channels are being fed monaural signals, 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 to 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 "rev." 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.

Volume Control

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.

However, it may not easy to make a fine-tune control in case of the late-night listening at low level or over-rated input at input terminal. In that event, first set the Attenuator(8) at the "preset" position and make a fine-tune control with the Preset Volume(9).

This unit is provided with the time-delay muting circuit to isolate the output circuit for about 5 seconds until the entire circuitry is put into operational condition. Therefore if the main Volume Control(13) is set at a high level before operation, loud sound comes out all of a sudden. Set the main volume to a low level before operation, and obtain an appropriate level after sounds come out.

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(11). 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(3) in the "mono" position seems to come from the center between right and left channels. At the mid 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.

Linear Equalizer

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 variations 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.

The Linear Equalizer control provides a new form of tonal compensation especially intended for this sort of tendency. With the control in its mid-position, flat frequency response is achieved. Switched to either of 4 "up-tilt" positions, the entire response curve is rotated on a 1KHz axis so as to linearly increase treble response while simultaneously decreasing bass response. Conversely, selection of one of the "down-tilt" positions rotates the response curve in a clockwise direction, providing a gradual decrease of treble response and simultaneous increase of bass response. Degree of slope for either positive or negative settings has been carefully preset, and the overall response maintains complete linearity from 50Hz to above 10KHz, unlike the curvature in response normally associated with ordinary tone controls.

Specifically, when the control is turned to the 4th "up-tilt" positon (max.), it will decrease bass and increase treble by 2dB at 100Hz and 10KHz respectively. Selection of the 4th "down-tilt" position (max.) will decrease treble and increase bass by 2dB at the same reference frequencies. At the center of rotation, components which consist the Linear Equalizer are all bypassed to realize flat frequency response.

This control is inserted in the flat amp circuit and is effective on all program sources. It introduces no increase of harmonic distortion in any of its settings because of the inherently linear nature of this circuit.

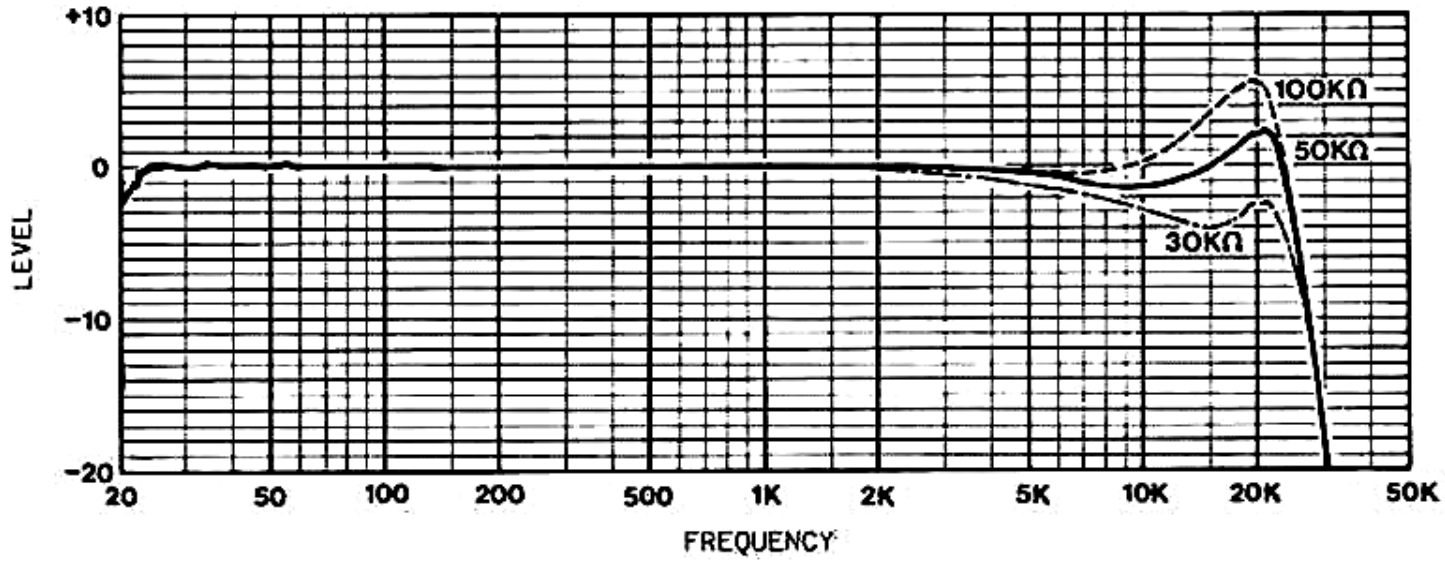
Operation of Filter

Ultra low frequency noises (5—50Hz) caused by record warps, tonearm'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 our original Subsonic Filter.

Normally to eliminate this kind of ultra low frequency noises an NF type filter with active components can be considered which offers sharp cut-off characteristics. With this unit, however, active components should be avoided in view of the DC amplifier configuration, and the twin-T filter consisting of capacitors and resistors is combined with a 1-stage CR filter to offer an effective subsonic filter in the total characteristics.

Two positions are provided to select the dip center frequency (4Hz and 7Hz). When the switch is set to the "7Hz" position, the filter circuit whose dip center frequency is 7Hz starts to function, while in the "4Hz" position the circuit whose dip center frequency

Effect of the Load Impedance on the frequency response on a typical cartridge.



is 4Hz starts to function. Select an appropriate position. The attenuation characteristics of the filter is listed in the "Standard Curves" section.

In the "off" position the entire circuit of the filter is bypassed and signals receive no influence from this circuit.

Input Impedance Adjustment

Almost all of the currently marketed cartridges of MM type specify recommended optimum load impedance of about 50K ohms. It is known that variation of load impedance affects the frequency response to a great extent.

Generally speaking, a low load impedance attenuates treble response, while a high impedance causes a peak in the treble range. The variation of such effect depends on the cartridge you possess, but generally a cartridge with higher inner resistance tends to be more delicately influenced. It is, therefore, necessary that selection of a proper impedance should be made with this adjustor.

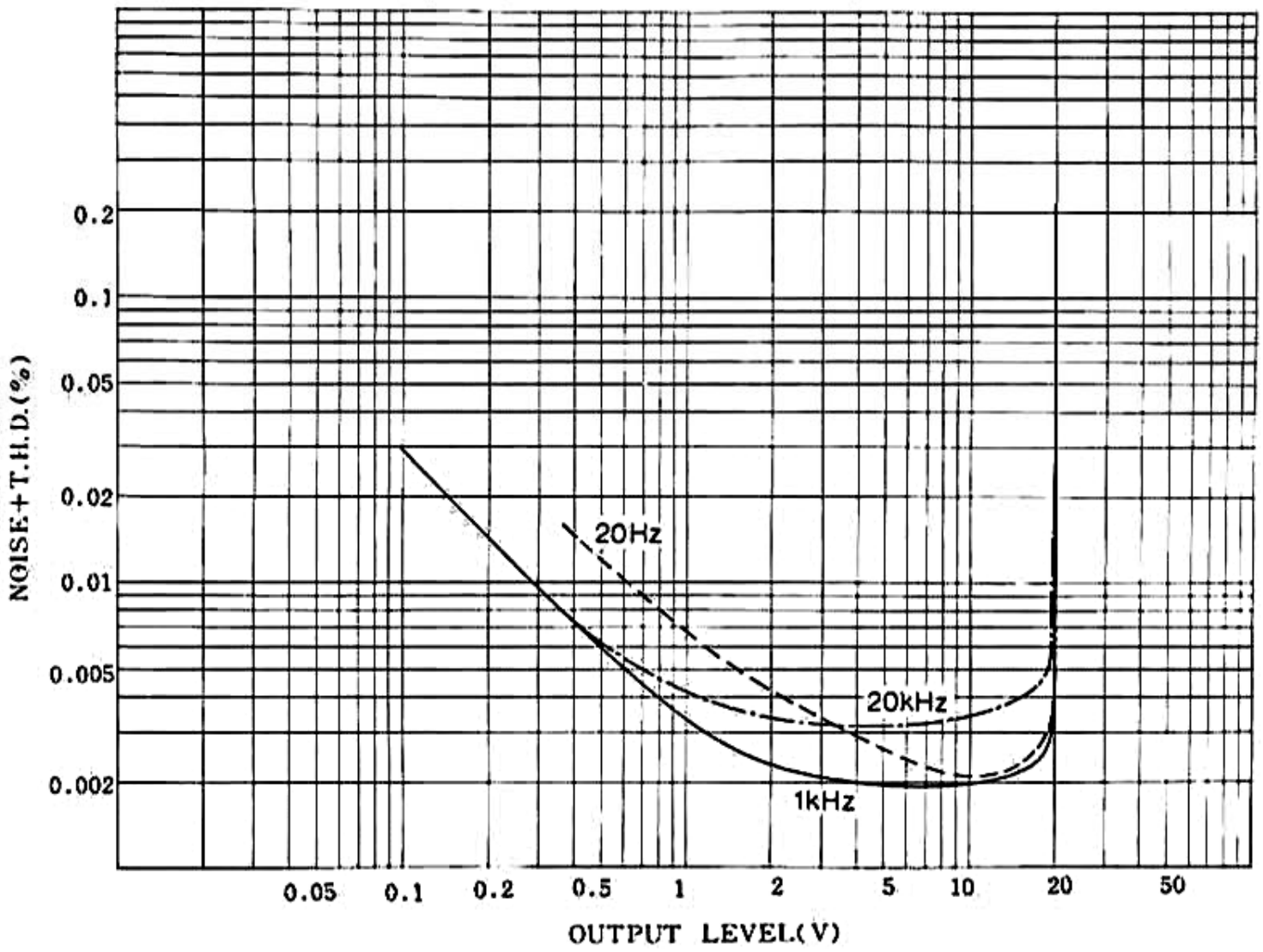
This unit is provided with 2 sets of PHONO Terminal. And the load impedance of the PHONO-1 terminal can be freely adjusted between 30K ohms—100K ohms.

The input impedance becomes 100 K ohms in the most clockwise position of the adjustor, while the extreme counter-clockwise position offers 30K ohms. In the center click point impedance is 50K ohms. Obtain the proper input impedance matching with your cartridge, as you can easily read the impedance value by the indicator on the knob.

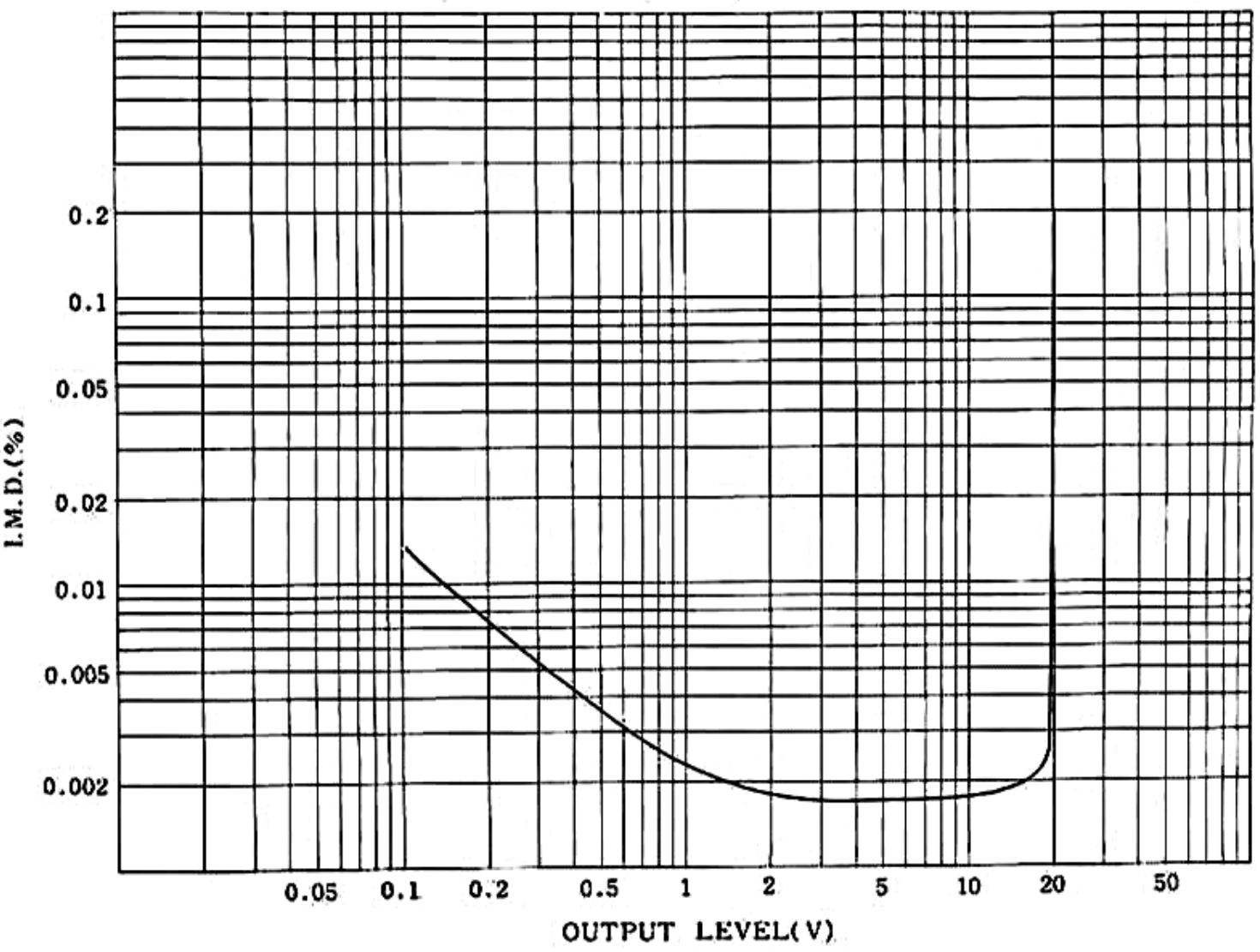
The chart below shows the effect of load impedance on the frequency response with a typical MM cartridge.

Standard Curves

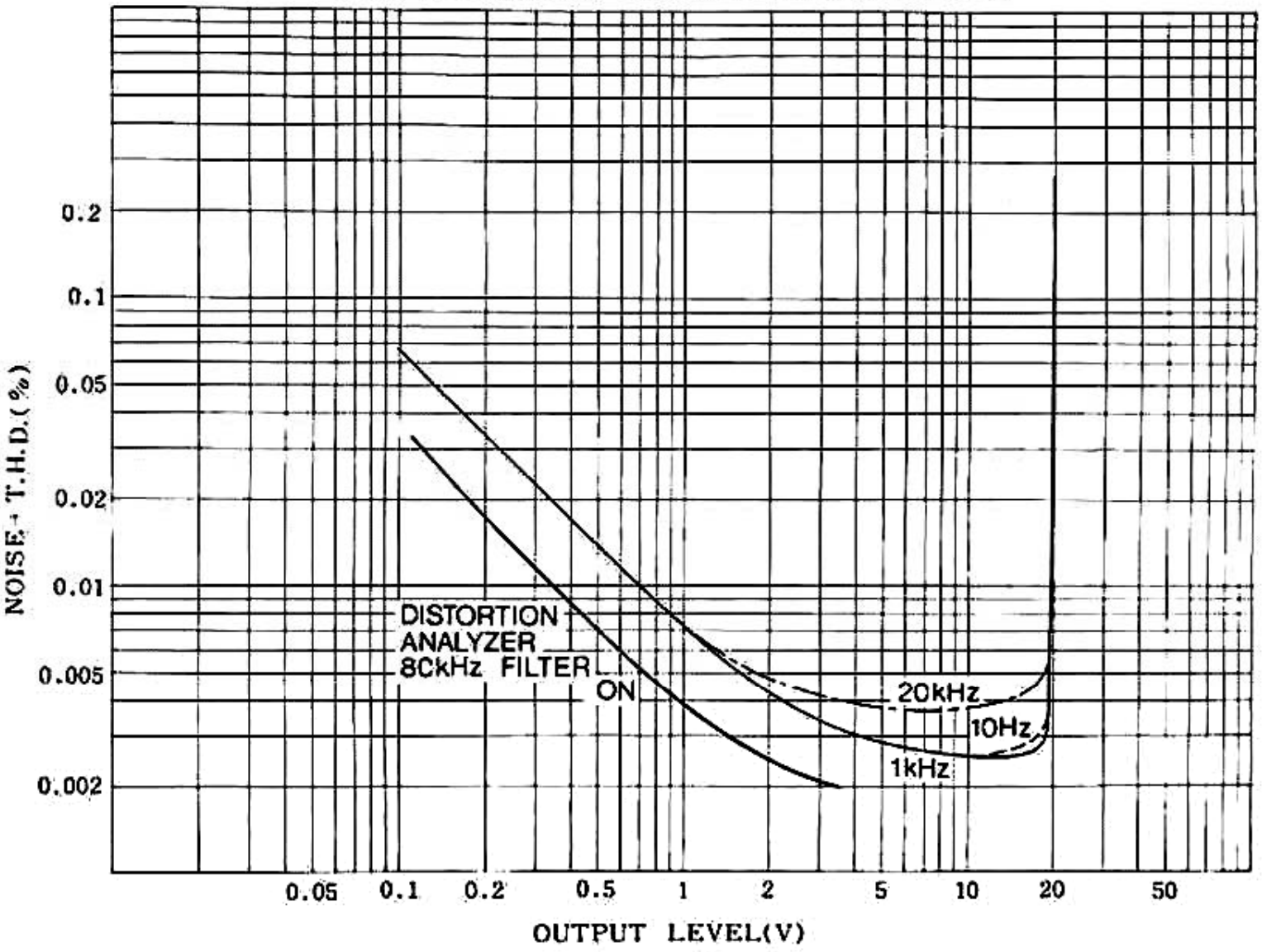
PHONO T.H.D. vs. OUTPUT LEVEL (Output; REC. OUT)



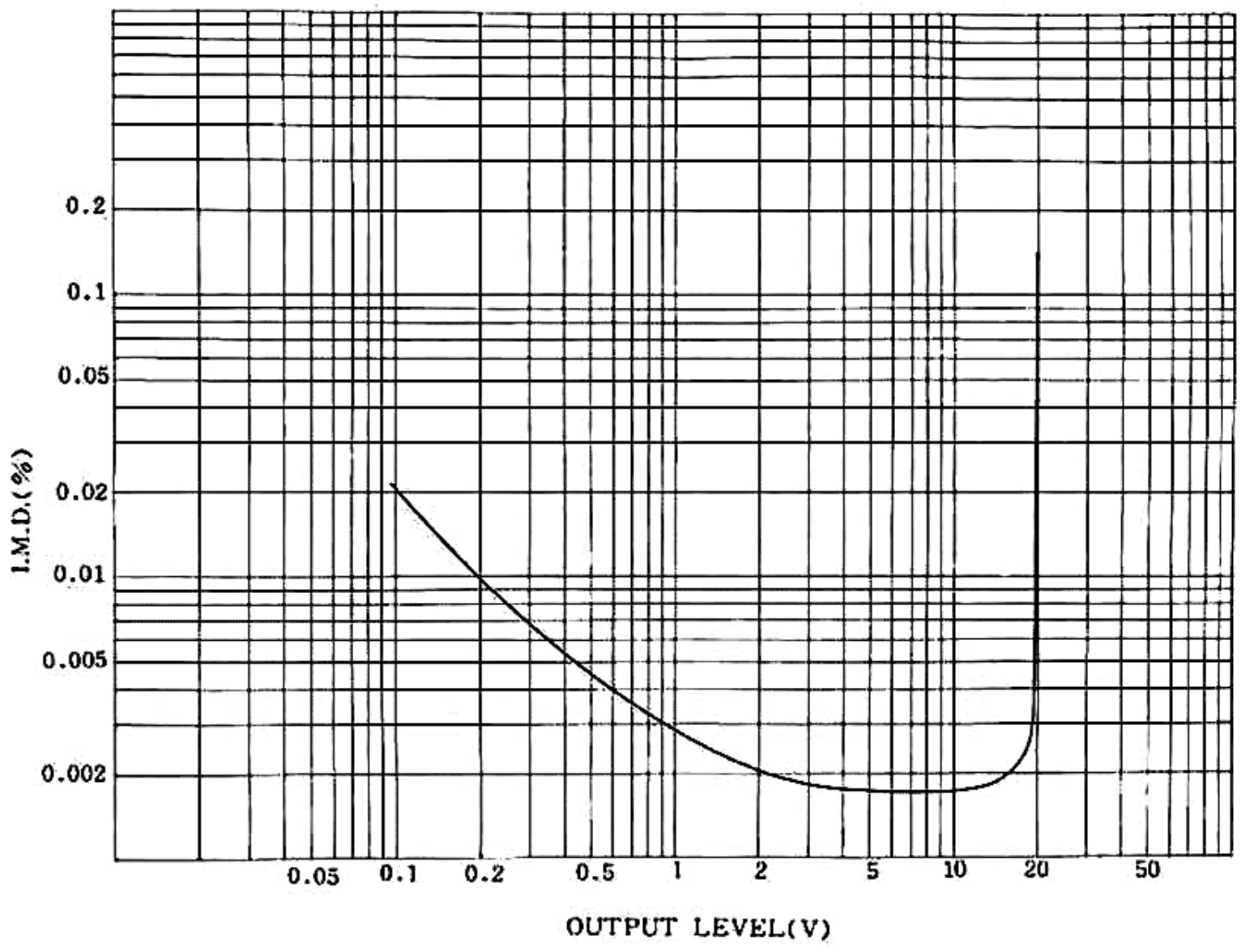
PHONO I.M.D. vs. OUTPUT LEVEL (Output; REC. OUT, 60Hz : 7kHz = 4 : 1)



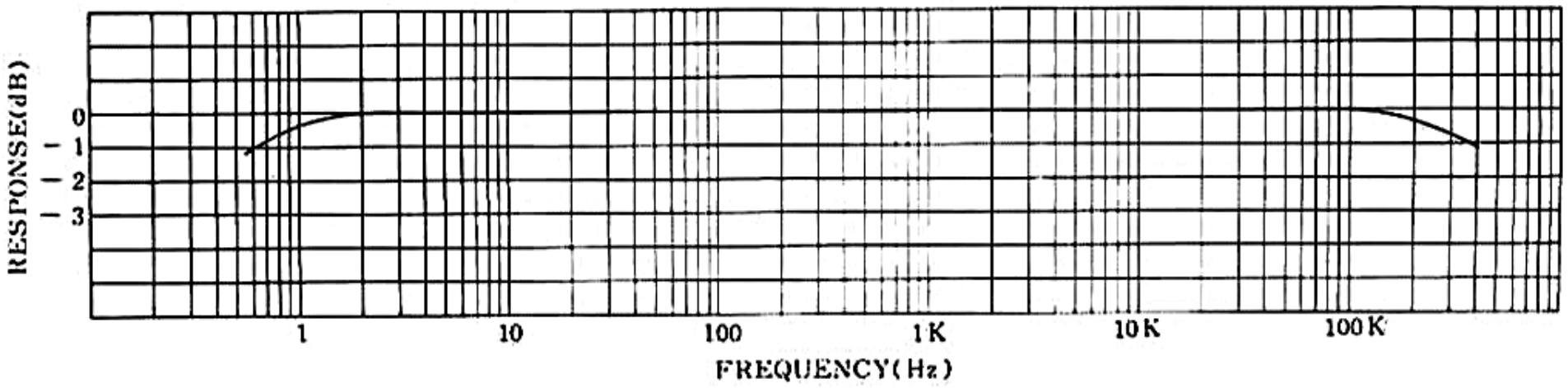
AUX. T.H.D. vs. OUTPUT LEVEL (Output; PRE. OUT)



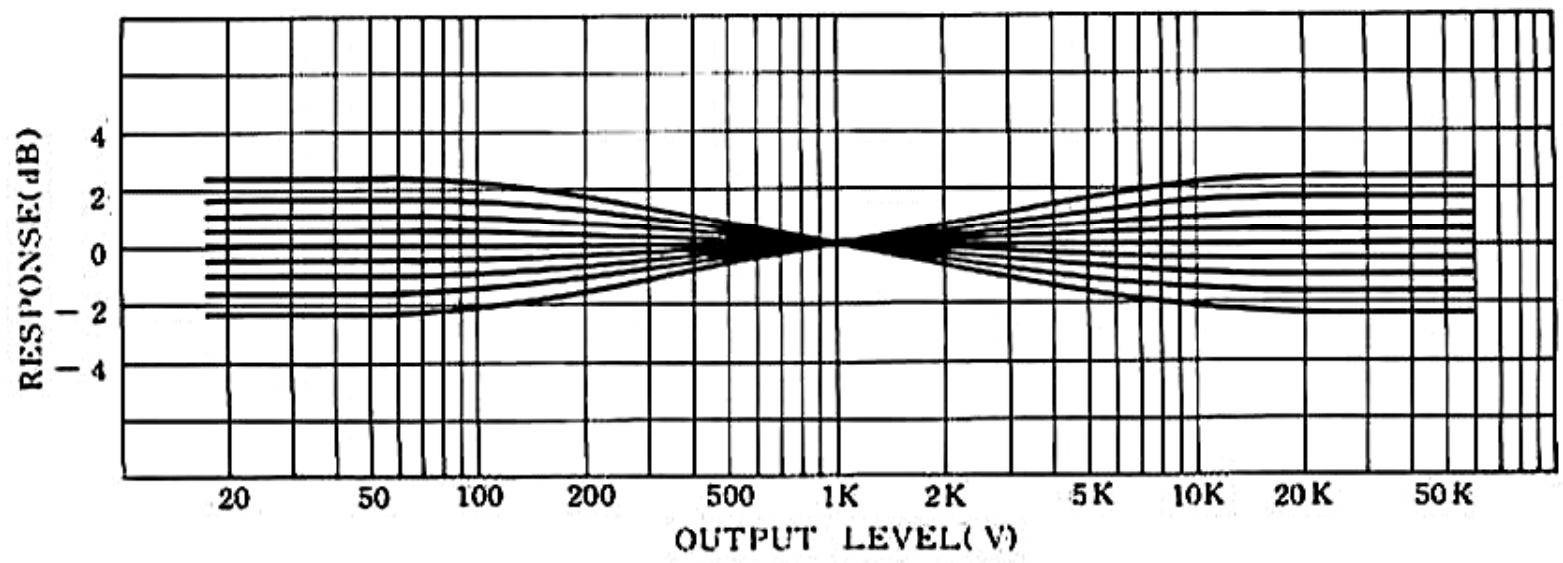
AUX. I.M.D. vs. OUTPUT LEVEL (Output; PRE. OUT,, 60Hz : 7kHz = 4 : 1)



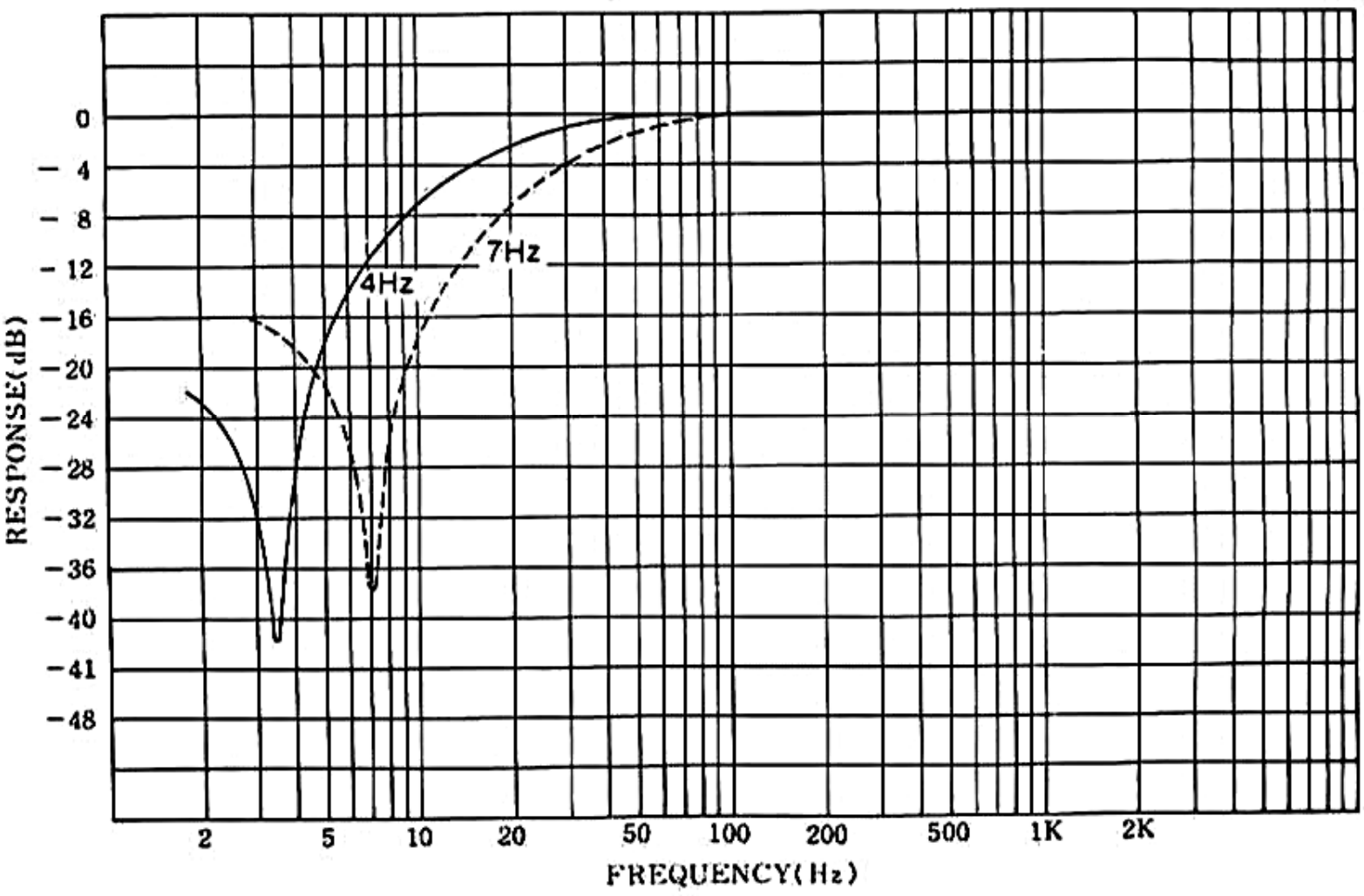
FREQUENCY RESPONSE (Output; PRE. OUT)



LINEAR EQUALIZER (Output; PRE. OUT)



FILTER CHARACTERISTIC (Output; PRE. OUT)



Specifications

Output Voltage:	pre. out; typical 1V, max. 18V rec. out; typical 150mV, max. 18V (distortion no more than 0.005%)
Output Impedance:	pre. out; 100 ohms rec. out; 100 ohms
Total Harmonic Distortion:	no more than 0.005% (phono, rec. out 2V, 20 – 20kHz) no more than 0.005% (tuner, aux, monitor, pre. out 2V, 20–20kHz)
Rated I.M.:	no more than 0.002% (phono rec. out 2V, 60Hz:7kHz = 4:1) no more than 0.002% (tuner, aux, monitor, pre. out 2V, 60Hz : 7kHz = 4 : 1)
Frequency Response:	20Hz - 20,000Hz (within ±0.2dB) (phono-1/2) 1Hz – 200,000Hz (within –0.5dB) (tuner, aux-1/2, monitor-1/2)
Input Sensitivity: (pre. out 1V)	2.3mV (phono-1/2) 150mV (tuner, aux-1/2, monitor-1/2)
Input Impedance:	30k – 50k – 100k ohms (variable) (phono-1) 50k ohms (phono-2) 50k ohms (tuner, aux-1/2) 60k ohms (monitor-1/2)
Signal-to-Noise Ratio:	better than 96dB (phono-1/2, IHF-A weighted, 10mV, input short-circuited) better than 100dB (tuner, aux-1/2, monitor-1/2, IHF-A weighted, input short-circuited)
Input Equivalent Noise:	no more than –135dB/V (phono-1/2, IHF-A weighted, input short-circuited) no more than –117dB/V (tuner, aux-1/2, IHF-A weighted, input short-circuited) no more than –117 dB/V (monitor-1/2, IHF-A weighted, input short-circuited)
Phono Overload Voltage:	no less than 300mV (1kHz, R.M.S.)
Channel Separation:	better than 85dB (phono-1/2, 1kHz) better than 95dB (tuner, aux-1/2, monitor-1/2, 1kHz)
Additional Features:	Linear Equalizer, Subsonic Filter, Input Impedance Adjuster, Tape Monitor, Tape Dubbing, Rec. Off Switch, Audio Attenuator (with preset position), Extra AC Outlet (SWITCHED x 2, UNSWITCHED x 1)
Power Consumption:	15W
Dimensions:	438(W) x 363(D) x 78(H) mm (17-1/4" x 14'-5/16" x 3-1/16")
Weight:	Net 6.5kgs (14.3 lbs.) Gross 8.0kgs (17.6 lbs.)

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

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