

# LABORATORY REFERENCE SERIES

## 5F70

### REALTIME PROCESSED DC TONE CONTROL AMPLIFIER

A major breakthrough in amplifier technology ... a new series of amplifiers incorporating total DC design ..... ensuring the most faithful sound reproduction with lowest phase and transient distortion.

LUX CORPORATION, JAPAN

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



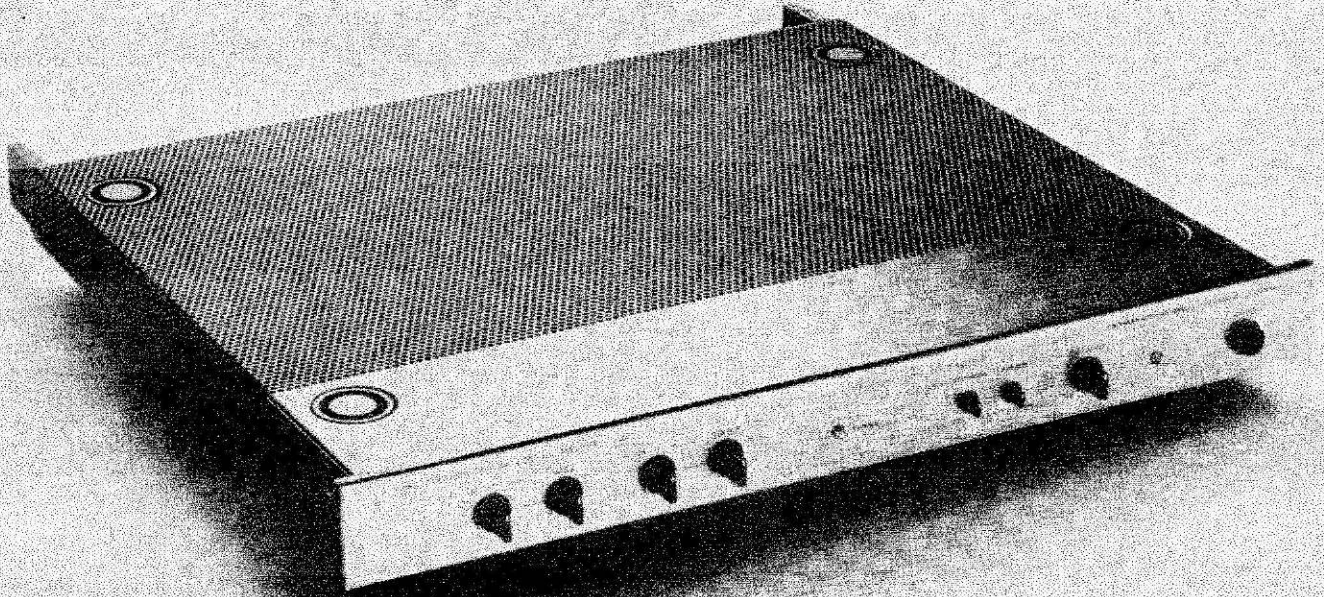
## Thank you for purchasing our 5F70

Actually, it is rather hard to control tonal quality without deteriorating the original sound quality, and almost the same level of circuit as that of pre-amplifier is necessary when satisfactory control facility is desired. Such massive circuitry cannot be included in pre-amplifier. This is the biggest reason why we have planned an independent tone control amplifier in the Laboratory Reference Series.

The 5F70 is of the ideal DC-amp configuration, which prevents deterioration in distortion characteristic or S/N ratio even if various functions are operated to realize the desired tonal compensation. The entire circuitry is mainly divided into two sections; the tone control circuit and the acoustic control circuit, to which perfect counter-measures are provided against DC drift, the only weak point of DC amplifier.

For the tone control circuit, adopted is a new system exclusively developed for the 5F70, and this realizes quite smooth response, which is indispensable to the desired tonal compensation. For the turnover frequency selector, 4 positions are provided both for treble and bass, thus realizing fine and minute tone control operation. The acoustic control circuit removes harmful standing waves which are possible in the listening room. To strengthen the effect, all functions (the Dip Frequency Control, the Attenuation Control, and the Bandwidth Control) are continuously variable. Furthermore, the Bypass Switch is provided to confirm the effect of the controlled sound.

We recommend that you choose with care other Hi-Fi Components for optimum operation in combination with the 5F70, and go through the contents of this owner's manual to make the most of the potential of this tone control amplifier.





# SWITCHES & CONTROLS

## 1. Bass Level Control

This is a level control to vary the bass frequency response. A clockwise turn continuously boosts the bass frequency range, while a counter-clockwise turn rolls it off. Its maximum variable amount is  $\pm 12\text{dB}$ . At the center rotation angle a click point is provided, where the tone control circuitry is isolated and perfect flat frequency response is obtained. This level control functions on both right and left channels at the same time.

The bass turnover (roll-off) frequency, from where the frequency variation starts, can be selected by means of the Bass Turnover (Roll-off) Selector (2) among 4 points, namely, 125Hz, 250Hz, 500Hz and 1kHz.

For further details refer to the section "Operation of Tone Control".

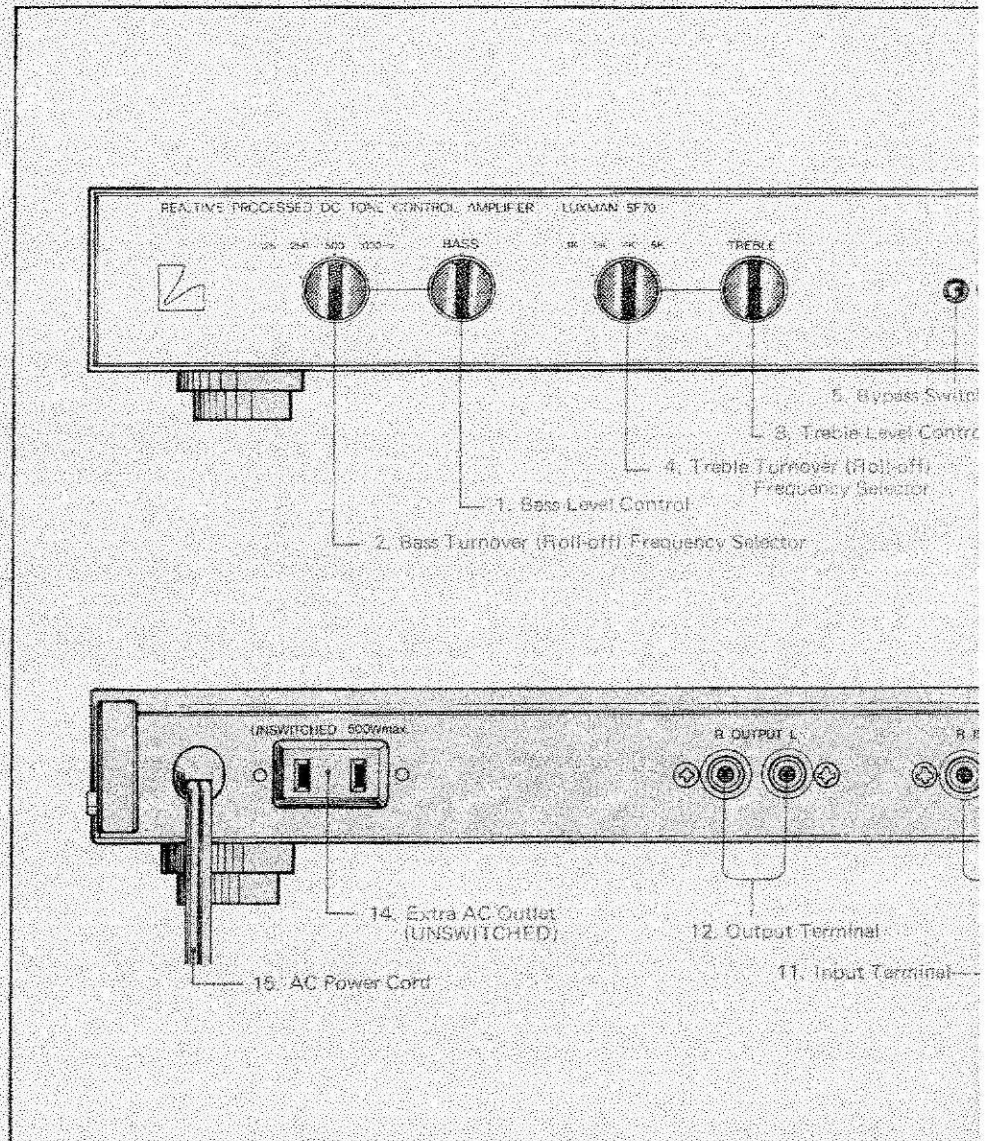
## 2. Bass Turnover (Roll-off) Frequency Selector

This is a switch to select the bass turnover (roll-off) frequency, from which point the bass range starts to change. The turnover (roll-off) point can be chosen among 125Hz, 250Hz, 500Hz and 1kHz, and you can freely make tone control on the bass frequency range below the selected frequency.

For further details refer to the section "Operation of Tone Control".

## 3. Treble Level Control

The treble frequency response can be adjusted by this control. Turning this in the clockwise direction reinforces the treble range, while a counter-clockwise rotation attenuates it, within the maximum variable range of





$\pm 12$ dB above the frequency pre-set by the Treble Turnover (Roll-off) Selector (4).

This control is so designed as to offer a flat frequency response at the center click point. Both right and left channels are controlled simultaneously and continuously.

For further details refer to the section "Operation of Tone Control".

#### 4. Treble Turnover (Roll-off) Frequency Selector

This switch offers selection of the turnover (roll-off) frequency from which point the Treble Level Control starts to function. Tone control is possible in the treble range in case you select either of 4 points (1kHz, 2kHz, 4kHz, 8kHz).

For further details refer to the section "Operation of Tone Control".

#### 5. Bypass Switch

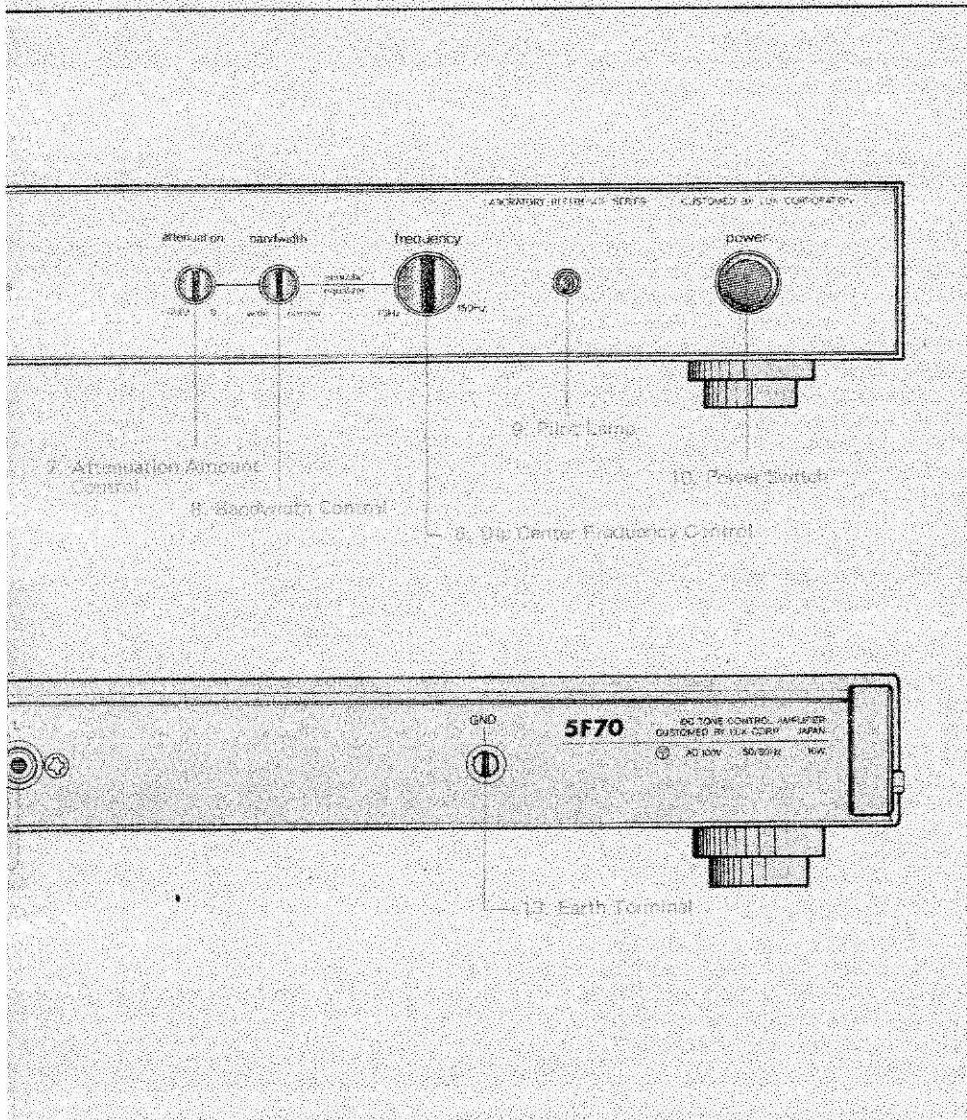
This is provided to defeat the entire tone control function (1)(2)(3)(4), and the "Acoustic Equalizer" function (6)(7)(8), if necessary.

When this switch is kept unpressed the tone control is put into operation, and you can create your favorite sounds by means of the tone controls (1)(2)(3)(4) and the Acoustic Control function. If you depress the knob, the entire tone control circuitry and the Acoustic Equalizer circuit are bypassed to provide a flat frequency response.

For further details refer to the section "Operation of Tone Control".

#### 6. Dip Center Frequency Control

In conjunction with those knobs (7) and (8), this control is effective in





removing harmful standing waves which are liable to take place in the listening room.

You can continuously vary the dip center frequency in the range from 75Hz to 150Hz. The dip center frequency has to be selected according to the standing wave in your listening room.

For further details refer to the section "Operation of Acoustic Equalizer".

### **7. Attenuation Amount Control**

The dip amount can be controlled with the center frequency selected by the Center Frequency Control. The maximum variable amount is -12dB.

The endmost clockwise position of this knob means "flat" position, and perfectly flat frequency response is obtained irrespective of the position of the Dip Center Frequency Control (6). As the knob is turned in a counter-clockwise direction, the amount of attenuation gradually increases until it reaches -12dB at the ultimate counter-clockwise position.

For further details refer to the section "Operation of Acoustic Equalizer".

### **8. Bandwidth Control**

The peak bandwidth of the standing wave in the listening room is not uniform even if the Dip Center Frequency Control (6) is set at an appropriate position. Therefore this Bandwidth Control is provided to create a dip bandwidth corresponding to the peak bandwidth of the standing wave.

At the endmost clockwise position of this knob, Q becomes about 20 and a sharp attenuation characteristic is obtained. While at the utmost counter-clockwise position Q is about 1 and a gentle curve is yielded. Q can be adjusted between 1-20.

For further details refer to "Operation of Acoustic Equalizer".

### **9. Pilot Lamp**

When the Power Switch (10) is pressed in, this lamp lights up to confirm that electric current is fed to the unit.

### **10. Power Switch**

Repeated press of this switch ensures switch on-off alternately.

### **11. Input Terminal**

The output of the pre-amp is fed to this terminal. The input impedance is so designed as to be high enough (at about 100k ohms) to avoid possible influence on the performance of pre-amp.

### **12. Output Terminal**

The output of this unit is taken from this terminal, to which the input terminal of power amp has to be connected. The output impedance is kept sufficiently low (at about 500 ohms), and you need not worry about possible treble attenuation triggered by pin plug cords for connection.

### **13. Earth Terminal**

This terminal can be used to ground pre-amp etc. Especially at the time of comparison test of various amps, common grounding is effective as a counter-measure against shock noise.

### **14. Extra AC Outlet (UNSWITCHED)**

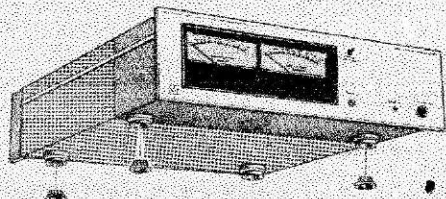
Electric power can be supplied to tuner, turntable or tape deck. The socket is not coupled with the Power Switch of this unit, and AC power is always available. The maximum rated capacity is 500W.

Note that in some countries this outlet is not allowed by law and that it is not provided.

### **15. AC Power Cord**

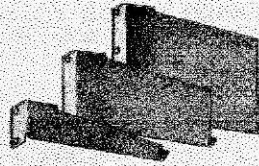
The AC plug attached to this cord should be connected either to the AC outlet of other audio components or to the AC power socket in your listening room.





**Attached leg caps**

The illustration is of the 5M21 power amplifier, but all the models of Laboratory Reference Series adopt the same construction to install them.



**Rack-Mount Adapters**

# LEGS RACK-MOUNTING BLOCK DIAGRAM

## About Legs

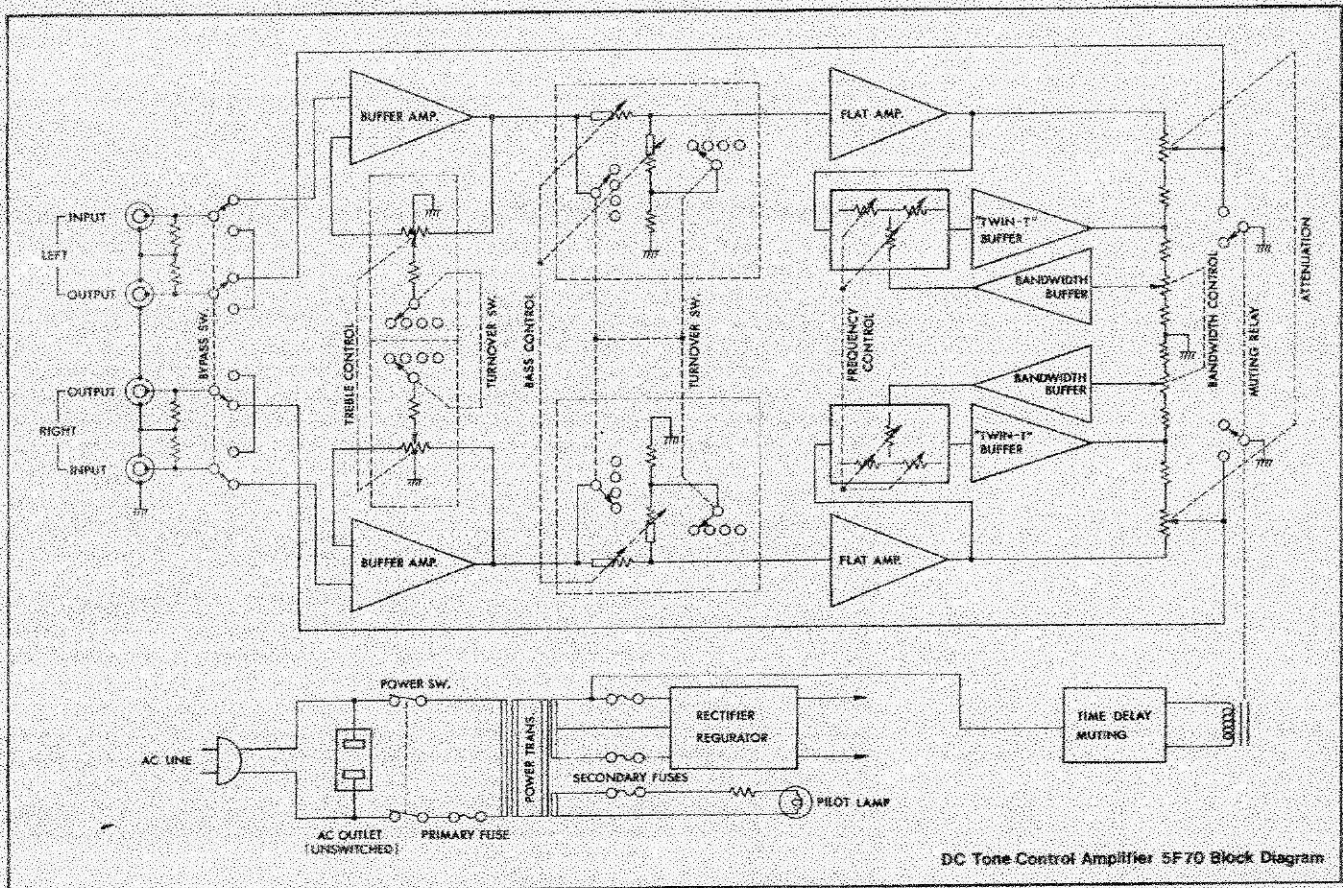
All the components in our Laboratory Reference Series are provided with the legs at the bottom and the metallic receptacles on the top, and metallic support is placed between the leg and its receptacle. Thus you need not worry about breakage caused by an accumulated weight even when they are stacked one by one, as the total weight is given to the legs of the very unit placed at the bottom of such stack. Perfect fit between the legs and receptacles prevents each component unit from falling or sliding.

However if the unit is placed on the furniture or other kind of wooden

cases, with these legs as they are, it is possible to cause a slip or scratch. To prevent this, 4 leg caps of synthetic resin are provided as accessories. When some of the components in our Laboratory Reference Series are stacked, the leg caps should be attached to the legs of the last unit placed at the bottom of such stack. To fix them refer to the drawing.

## About Rack-Mounting

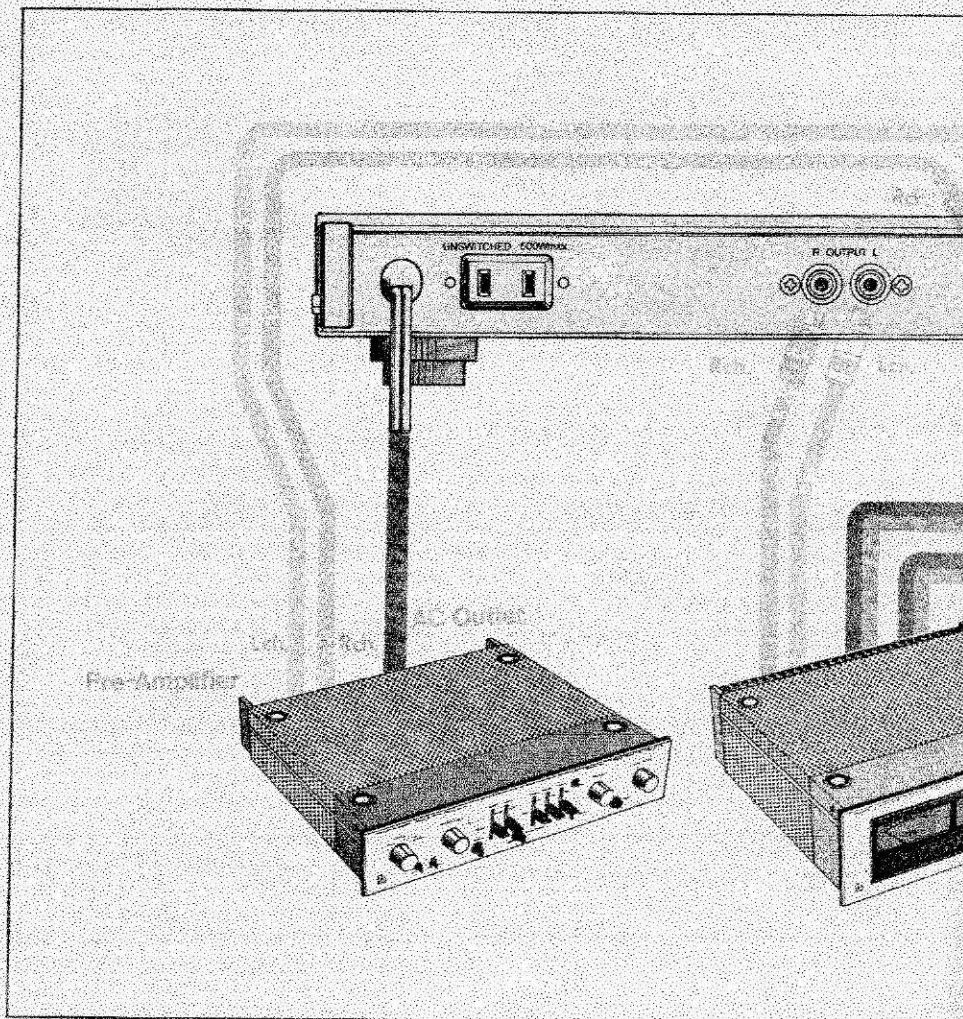
In order to mount the 5F70 to the rack of EIA standard, adapters are available on request. Note that the size of the adapter differs from product to product in our LRS family.



DC Tone Control Amplifier 5F70 Block Diagram



# CONNECTION PROCEDURE



## Connection of Input Terminal

The output of your pre-amplifier should be connected to this terminal. If an integrated amplifier to be used together with this unit is divided into 2 sections, i.e., main amp and pre-amp section, remove the coupling jumper metal and connect the output of pre. out terminal by means of pin jack cord. In case your integrated amp is not provided with the "pre. out" terminal, use the "REC. OUT" Terminal for this purpose. Be careful about connection of the right and left channels.

## Connection of Output Terminal

The output terminal of this unit should be connected to the input terminal of your power amp. In the case of an integrated amplifier, with separate pre and main sections, the output should be fed to the "main-in" terminal. Should your integrated amp not be provided with the separate "main-in" terminal, you may connect to the "Monitor" or tape-play terminal.

See to it that the right channel output is firmly connected to the right channel input and the left to the left.

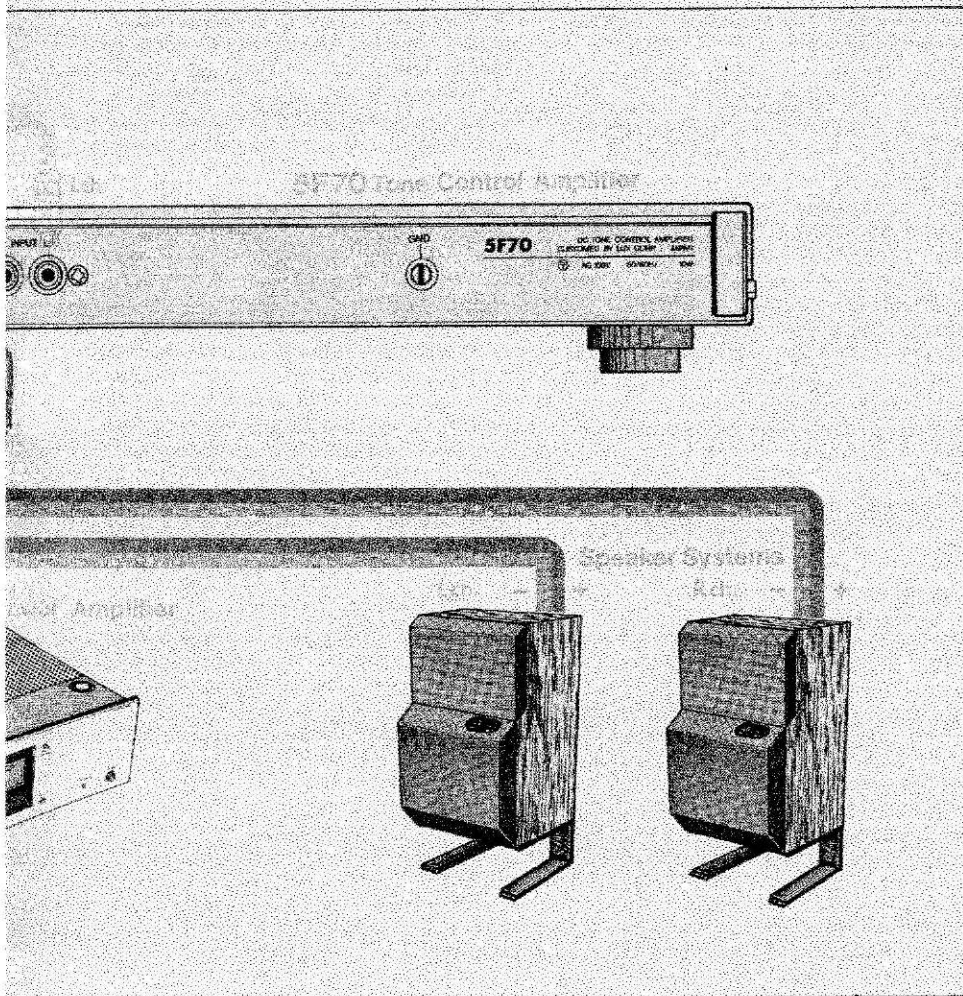
## Connection of AC Power Supply Source

Connect the AC plug to the AC power supply source of your listening room or to the extra AC outlet of other audio components of your system. Turn on the power switch and the pilot lamp lights up. The unit is put into operational condition in about 5-10 seconds.

## Connection of Earth (Grounding Terminal)

An earth terminal is provided at the rear panel of this unit, to which you can ground your pre amp, etc. A common grounding of 2 amps to this terminal removes shock noises at the time of switching for comparison test etc. Grounding is not always necessary when you do not use multiple amplifiers.





### Connection Cable (Cord Wire)

To hook up this unit with pre-amp and power amp, shielded audio cables are used for protection from external noises and inductance noises. Normally, this shield wire has the capacitance of 200pF per meter, and even with so-called low capacitance shield wire the capacitance of 35 ~ 100pF/M exists. That is to say, the use of connection cable gives the same effect as that of insertion of a capacitor in parallel with input sources or output loads, which composes a kind of high cut filter causing an undesired attenuation of high frequency range.

LUX's pre-amp and this tone control amplifier are so designed as to have sufficiently low impedance so that it does not matter if a long cable is used, but choice of good quality cable of minimum required length is recommended.



# OPERATION OF CONTROLS

## Before operating the Control Functions

The Control Function of the 5F70 includes the "Tone Control Function" and the "Acoustic Equalizer Function". When you operate these functions to compensate the acoustic characteristics of the listening room or to obtain your favorite tonal quality, confirm that the Bypass Switch (5) is set to the "protruded" position.

When the Bypass Switch is depressed, both of the tone control circuit and the acoustic equalizer circuit are completely bypassed to realize flat frequency response. In this case these controls (1)(2)(3)(4)(6)(7)(8) do not operate.

Therefore utilization of the Bypass Switch (5) makes it easy to compare controlled sound and untailed sound.

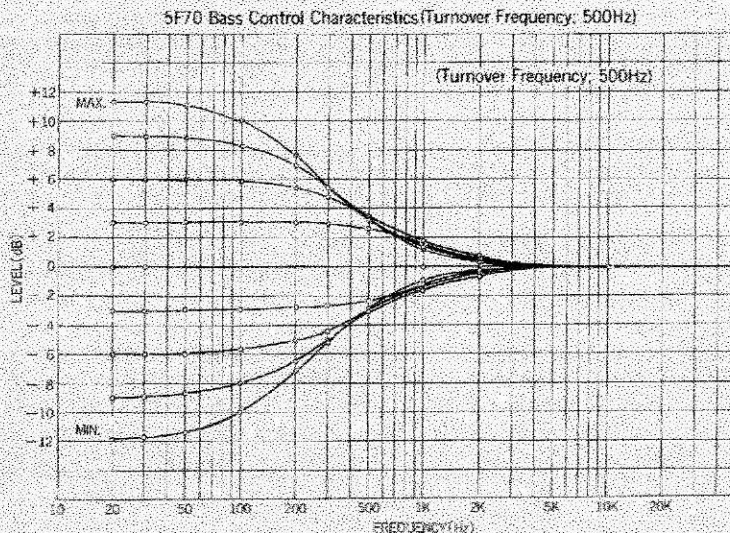
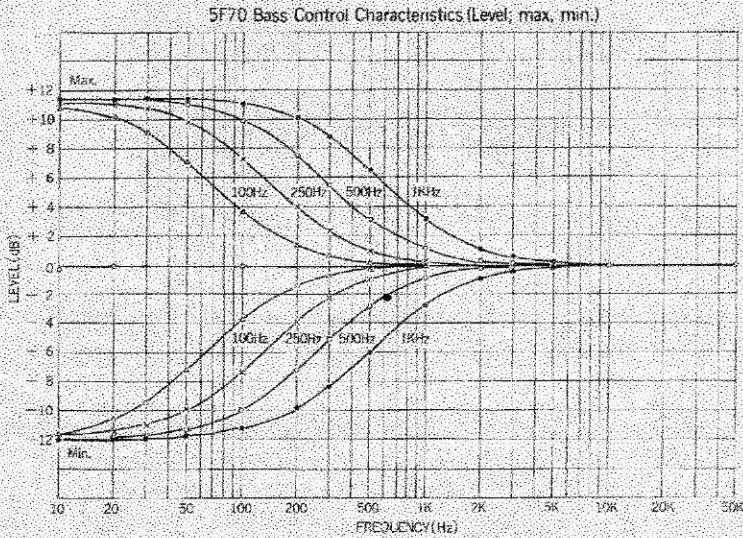
## Operation of Tone Control

While the tone control function is

indispensable to the tonal compensation of an entire audio system, desired tonal adjustment can not be achieved, if its variation characteristics are irregular. The tone control circuitry of this unit, though different from LUX's current NF type, offers smooth variation characteristics by means of special circuit devices. Also at the amplifier circuitry a DC configuration is employed to realize unsurpassed performance in every respect, to say nothing of the tonal quality, which literally deserves the name of Laboratory Reference Series. This unit is really an ideal tone control amplifier beyond such criticism that "tone control impairs tonal quality".

The Bass Level Control (1), Bass Turnover (Roll-off) Frequency Selector (2), Treble Level Control (3) and Treble Turnover (Roll-off) Frequency Selector (4) are generically called tone control function.

The Bass Turnover (Roll-off) Fre-

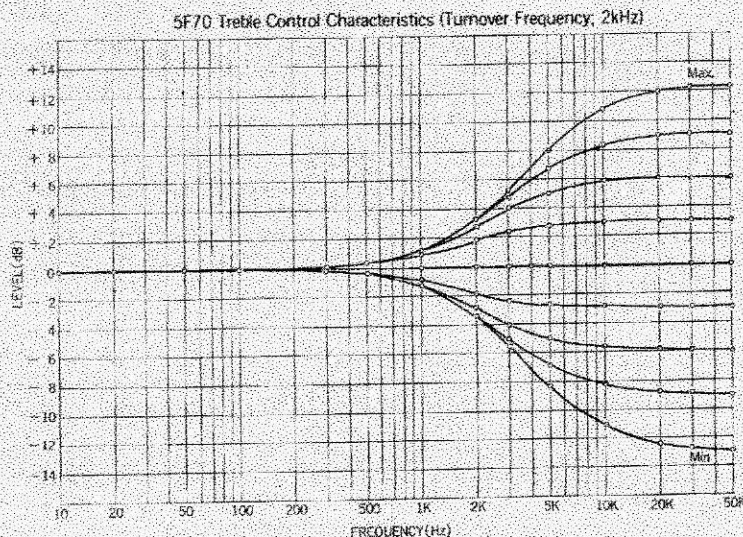
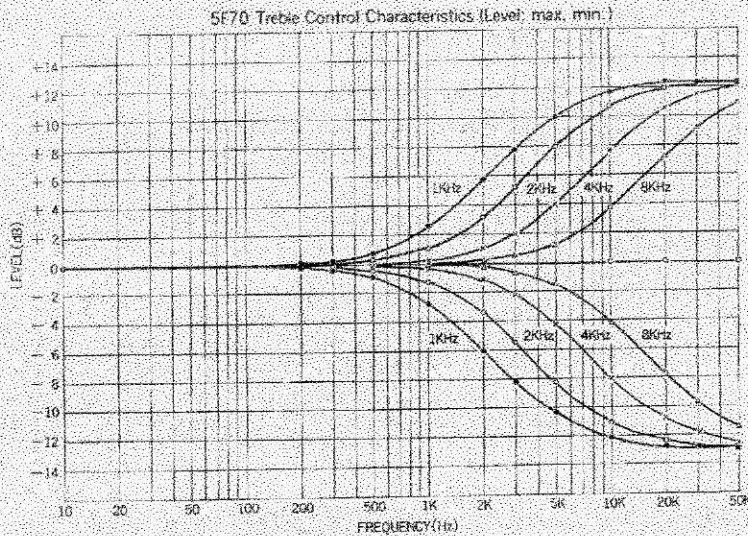




quency Selector (2) has 4 points, namely, 125Hz, 250Hz, 500Hz and 1kHz, and the Bass Level Control (1) boosts or rolls off the bass range below the frequency selected by the turnover selector. The higher the selected frequency, the wider the adjustable range and naturally the effect of tone control is strengthened. The Bass Level Control (1) that functions together with the Bass Turnover (Roll-off) Frequency Selector (2) is to vary the bass frequency response, and at the center click point the CR components for tone control function are completely separated and flat frequency response is yielded. When the knob is turned in the clockwise direction from this point, the bass range is boosted, while when it is turned counter-clockwise, attenuation takes place.

In respect to the Treble Turnover (Roll-off) Frequency Selector (4) to decide the frequency above which

the Treble Level Control (3) starts to function, 4 points are provided, namely, 1kHz, 2kHz, 4kHz and 8kHz. The controllable range becomes wider in the order of 8kHz, 4kHz, 2kHz and 1kHz. The Treble Level Control (3) works in conjunction with the Treble Turnover (Roll-off) Frequency Selector (4) to vary the treble frequency response, and like the Bass Level Control (1) flat frequency response is obtained at the center click point. A clockwise turn reinforces the treble and a counter-clockwise turn attenuates it.





### Operation of the Acoustic Equalizer

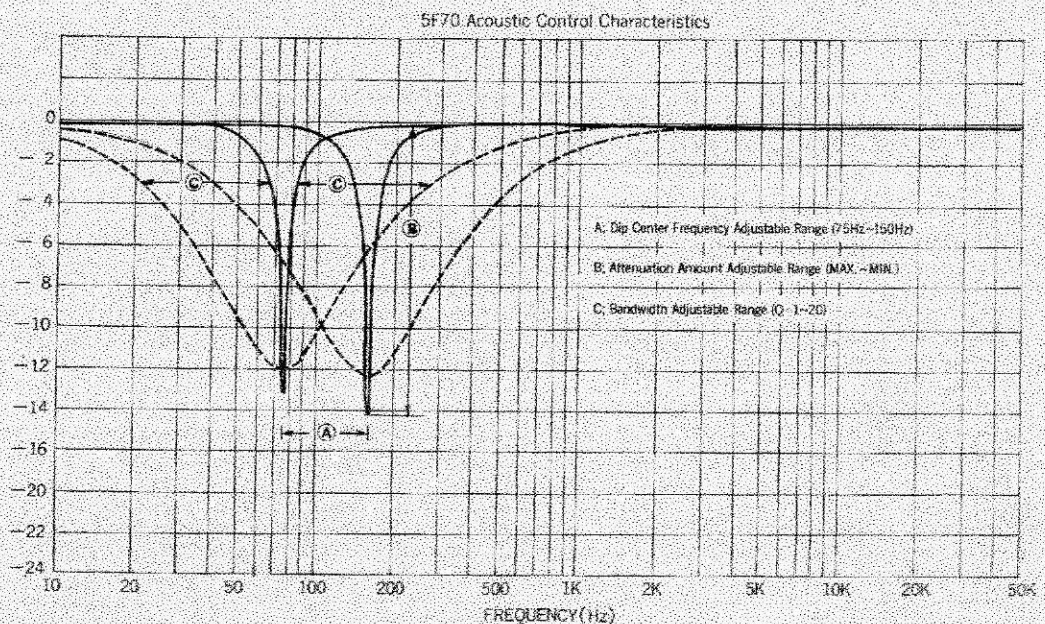
In a home listening room standing waves are apt to take place with their center frequency in the range between 75Hz - 150Hz, which are detrimental to the reproduced sound. Its effective removal ensures clean sound to augment your listening pleasure. For this purpose, this unit features a control function called an Acoustic Equalizer.

This Acoustic Equalizer comprises the Dip Center Frequency Control (6), Attenuation Amount Control (7), and Bandwidth Control (8). Mutual correlation among those controls makes it possible to create an effective acoustic condition.

The Dip Center Frequency Control (6) can be freely set in the range of from 75Hz - 150Hz, and an appropriate position has to be selected to suit the standing wave in your listening room. Now the dip center frequency is decided. But if the Attenuation Amount Control (7) is set at the utmost clockwise position the frequency response is kept perfectly flat, and therefore it is necessary to obtain an adequate amount of attenuation by turning the knob in the counter-clockwise direction. Continuous variation is possible down to the maximum -12dB.

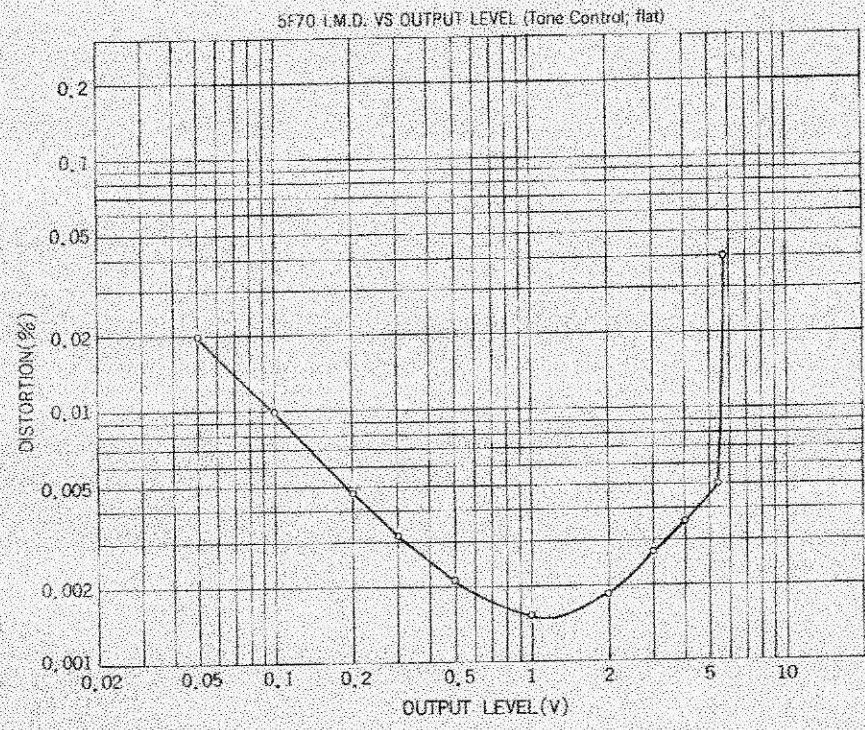
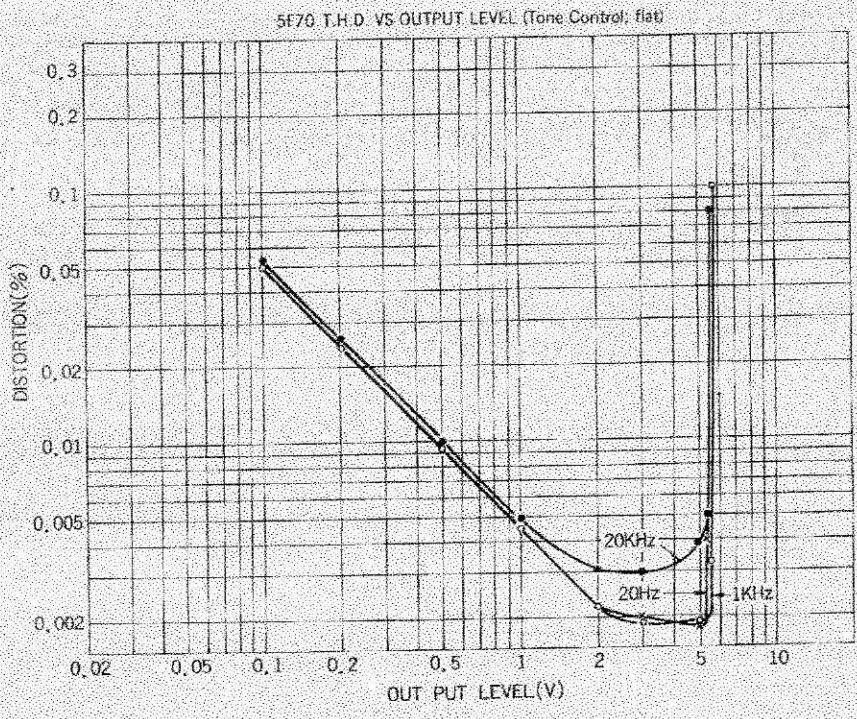
Now again reproduce the sound, and give an appropriate compensation to the standing wave by repeated operation of the Center Frequency Control (6) and Attenuation Control (7).

But compensation is still imperfect. As the peak bandwidth of the standing wave in all rooms is not identical, it is necessary to create the dip bandwidth corresponding to the peak bandwidth peculiar to the standing wave in your listening room. You can adjust this to obtain the necessary Q ranging from about 1 to 20, which permits you to create whatever dip characteristics you desire - from a mild curve to a steep one. For the Attenuation Amount and the Dip Bandwidth, refer to the characteristic curve illustrated in the following chart. Now that an optimum dip characteristic is obtained, all the operations are completed.





# STANDARD CURVES





## SPECIFICATIONS

Output Voltage:	typical 1V, max. more than 4.5V
Output Impedance:	500 ohms
Total Harmonic Distortion:	no more than 0.005% (output 2V, 20 - 20kHz)
Rated T.M.:	no more than 0.005% (output 2V, 60Hz - 7kHz=4 : 1)
Input Sensitivity:	1V
Input Impedance:	100k ohms
Frequency Response:	10Hz - 100,000Hz (within -1dB)
Gain:	0dB
S/N Ratio:	better than 104dB (IHF-A weighted, input short-circuited)
Level Control:	max. $\pm 12$ dB (variable, at each turnover point)
Turnover Frequencies:	bass: 125Hz, 250Hz, 500Hz, 1kHz treble: 1kHz, 2 kHz, 4kHz, 8kHz
Acoustic Control:	Dip Frequency, 75Hz - 150Hz (variable) Attenuation, 0dB - -12dB (variable) Bandwidth (Q), approx. 1 - approx. 20 (variable)
Crosstalk:	no more than -80dB
Residual Noise:	no more than 0.045mV
Additional Features:	Acoustic Control, Tone Defeat Switch etc.
Power Consumption:	10W
Dimensions:	442(W) x 400(D) x 57(H) mm (17 13/32 x 15 3/4 x 2 1/4")
Weight:	Net 5.1kgs (11.2 lbs.) Gross 6.6kgs (14.5 lbs.)

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



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