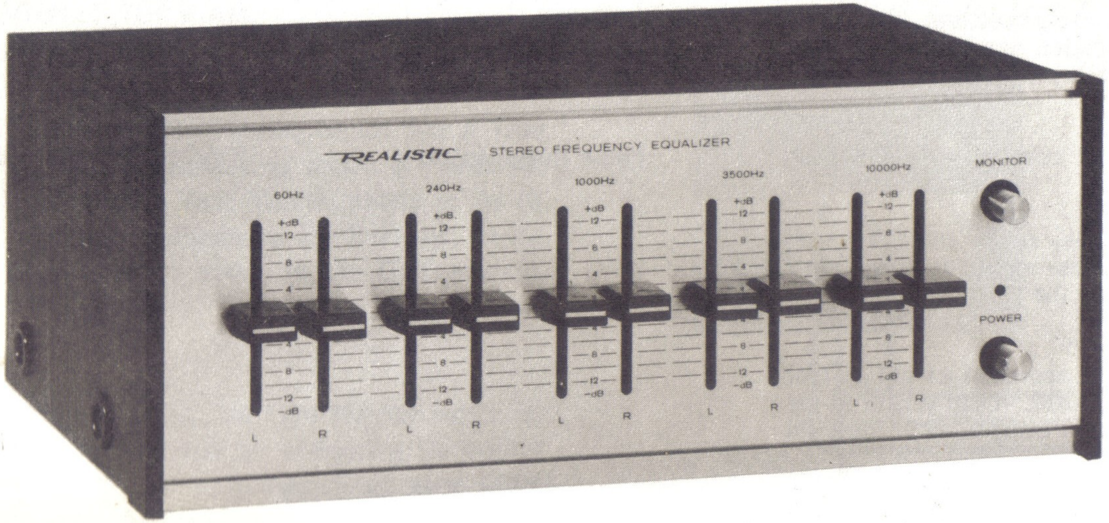
STEREO FREQUENCY EQUALIZER
EQUALIZER DE FREQUENCES STEREO
STEREO MULTIKLANGREGLER



OWNER'S MANUAL

REALISTIC®

Cat. N° 31-1987

CUSTOM MANUFACTURED FOR TANDY CORPORATION

The **REALISTIC Stereo Frequency Equalizer** is designed to tailor the frequency response of your stereo system. Since it has separate controls for each channel, it gives you an almost infinite combination of control variations. The controls each have a range of approximately 24 dB (± 12 dB) and are marked in 4 dB increments.

There are many reasons why you need such a specialized component. The speakers, the room, your ears and your personal preferences vary greatly. For example, if a speaker is simply moved 6 to 8" (15 to 20cm) away from the wall, the bass response at 50 Hz could drop as much as 8 to 10 dB.

The furnishings in the room, such as stuffed chairs, draperies and floor covering can affect the high and middle frequency response very dramatically.

It is a known fact that our hearing changes with age and varies greatly from person to person or if the sound pressure or volume is decreased. The ear's low frequency response at low volume can drop as much as 15 dB at normal conversational levels.

Normal Tone Controls vary too much of the audio spectrum. If we want to increase the low bass, we also increase the middle bass which very often muddies up the whole bottom end. The same is true with the treble control.

We cannot boost or cut the midrange without affecting the entire high frequency response.

The Frequency Equalizer with its five frequency ranges can give almost an infinite number of possible frequency response variations. It will allow you to match your speakers to your room and the music to your ears – without adding distortion, hum or hiss.

The Equalizer can also be used when making recordings of old LP's or 78's without losing the main portion of the music. It can get rid of the scratchy top, add a little needed bass...and really bring some of those old 78's alive again.

The circuit of the Equalizer is a new type of tone control circuit which yields extremely low distortion. The components used are of the highest quality and we wish you many years of good sound.

SPECIFICATIONS

Number of Channels :	Two (Left & Right), with separate controls for each
Frequency Response (flat setting) :	5 to 100,000 Hz +0.5 dB – 1.0 dB
Tone Control Range :	± 12 dB @60, 240, 1000, 3500 and 10,000 Hz
Intermodulation Distortion :	0.02 % @ 0.775 volts output
Harmonic Distortion :	0.02 % @ 0.775 volts output (20–20,000 Hz)
Hum and Noise (shorted input) :	80 dB (2.45 volt input)
Dynamic Range (flat setting) :	Up to 10 volts RMS
Total Gain (flat setting) :	0 dB
Input Impedance :	75 K ohm
Output Impedance :	10 ohm
Inputs :	MAIN IN, TAPE MONitor
Outputs :	MAIN OUT, TAPE OUT
Controls :	Power Switch (indicated with L.E.D.), 10 Linear Sliding Frequency Controls (5 each channel), Tape Monitor Switch
Power Requirements :	220/240 volt AC, 50 Hz, 10 watts

CONNECTIONS

With an Amplifier/Receiver Incorporating "PRE OUT" and "MAIN IN" Jacks or with Separate Preamp and Basic Amplifier

If your audio system has a Pre-amplifier separate from the Power Amplifier, connect the Frequency Equalizer between the two, observing the correct channel notations. The Equalizer tape **MONITOR** switch must be in the "out" position (button extended). Make connections as shown in Figure 1A.

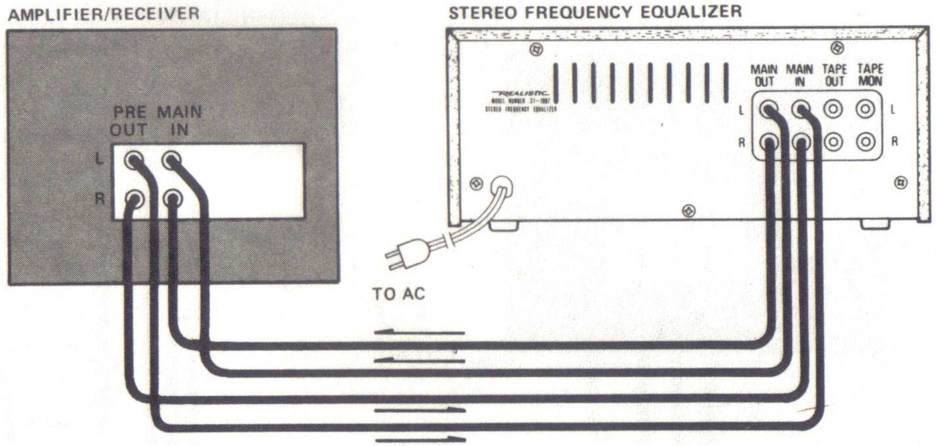


Figure 1A

With an Amplifier/Receiver Incorporating a Tape Monitor Switch

With an integrated Amplifier/Receiver which has a Tape Monitor Switch, make connections as shown in Figure 1B. Set the Amplifier/Receiver's Tape Monitor switch to the IN or MONITOR position. To disconnect the Equalizer, set the Amplifier/Receiver's Monitor switch to the OUT position.

NOTE : With this connection, the Tape Monitor switch on the Amplifier/Receiver will not be performing its original function (to "monitor" tape recordings). Thus, we've added a Monitor function to the Equalizer (with switch and jacks).

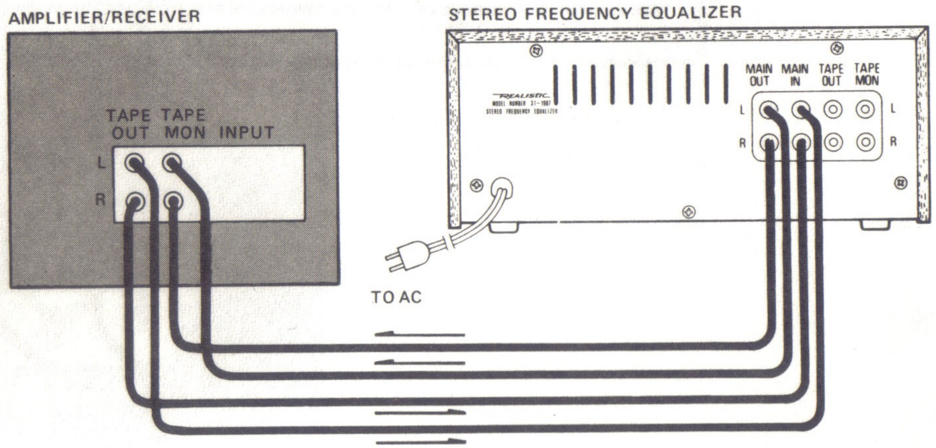


Figure 1B

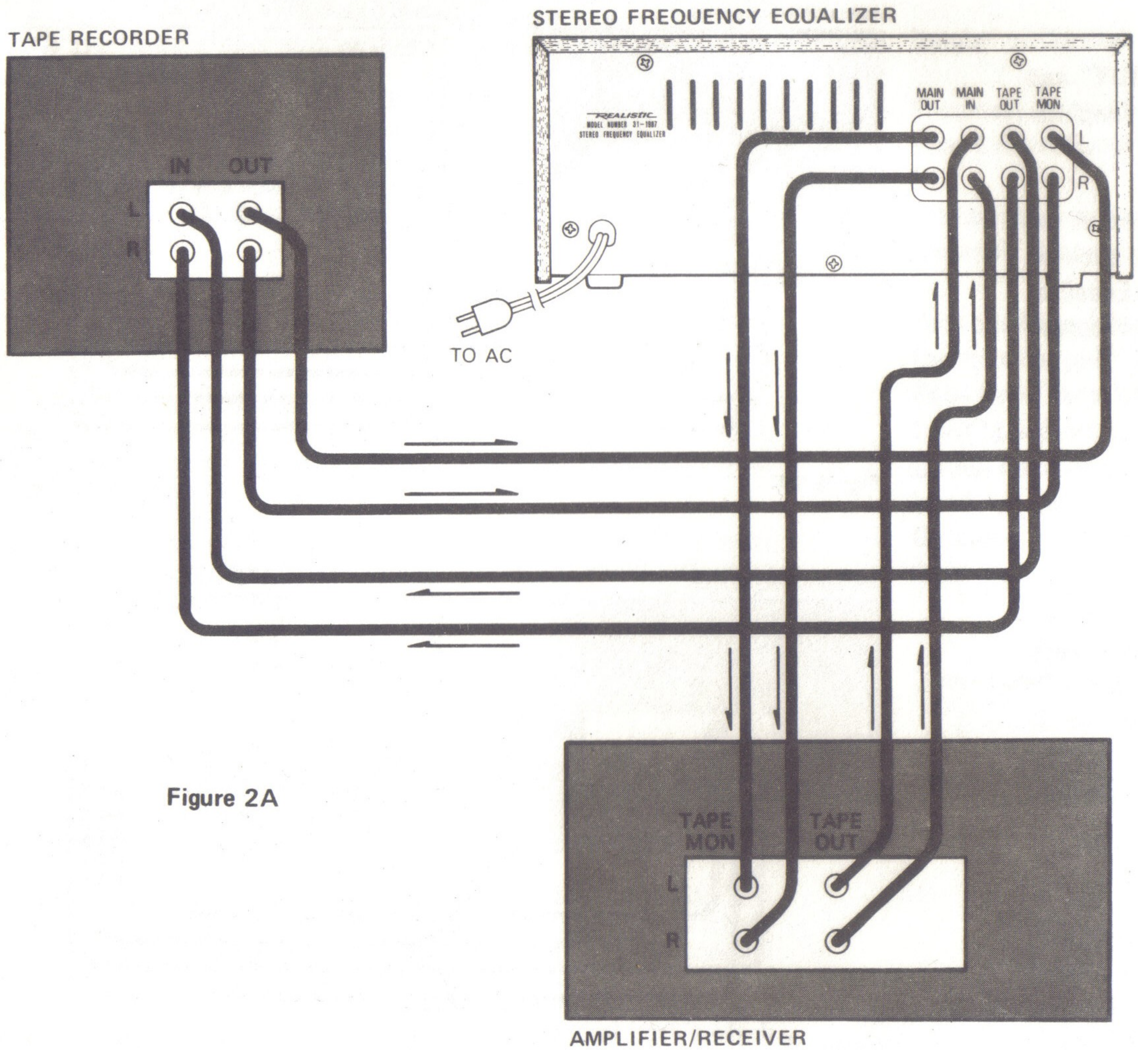


Figure 2A

To incorporate the Tape Monitor feature with wiring as shown in Figure 1B, change connections to be as shown in Figure 2A. If your Tape Recorder has monitor function (a 3-head deck), press the Equalizer's **MONITOR** button to hear the recording after it has been made (also, for normal Playback of tape from your Recorder).

For Monitoring, both the Amplifier/Reciever's Monitor and the Equalizer's **MONITOR** switch must be "in". If you don't need "monitoring", the Equalizer's **MONITOR** switch can be set to either position. If you want to process the "source" signal through the Equalizer, leave Amplifier/Receiver's Monitor switch "in".

IMPORTANT NOTE : When you are using connections as illustrated in Figure 2A, when you "monitor" the recording, it will have been processed by the Equalizer – and thus will not be an accurate "monitor" signal. For accurate monitoring under these conditions, you must set the Equalizer's sliding frequency controls to the center "0" position.

The Equalizer is equipped with both DIN sockets and PHONO Sockets.

Depending on your Amplifier/Receiver you may use either the DIN type or the PHONO type but never try to use both at the same time. If you connect a Tape Recorder to the Equalizer you must use the same type connections as used to connect the Equalizer to the Amplifier/Receiver. If the Equalizer-to-Amplifier/Receiver connection is DIN, the Tape Recorder-to-Equalizer connection must be DIN also (or both connections must be PHONO only).

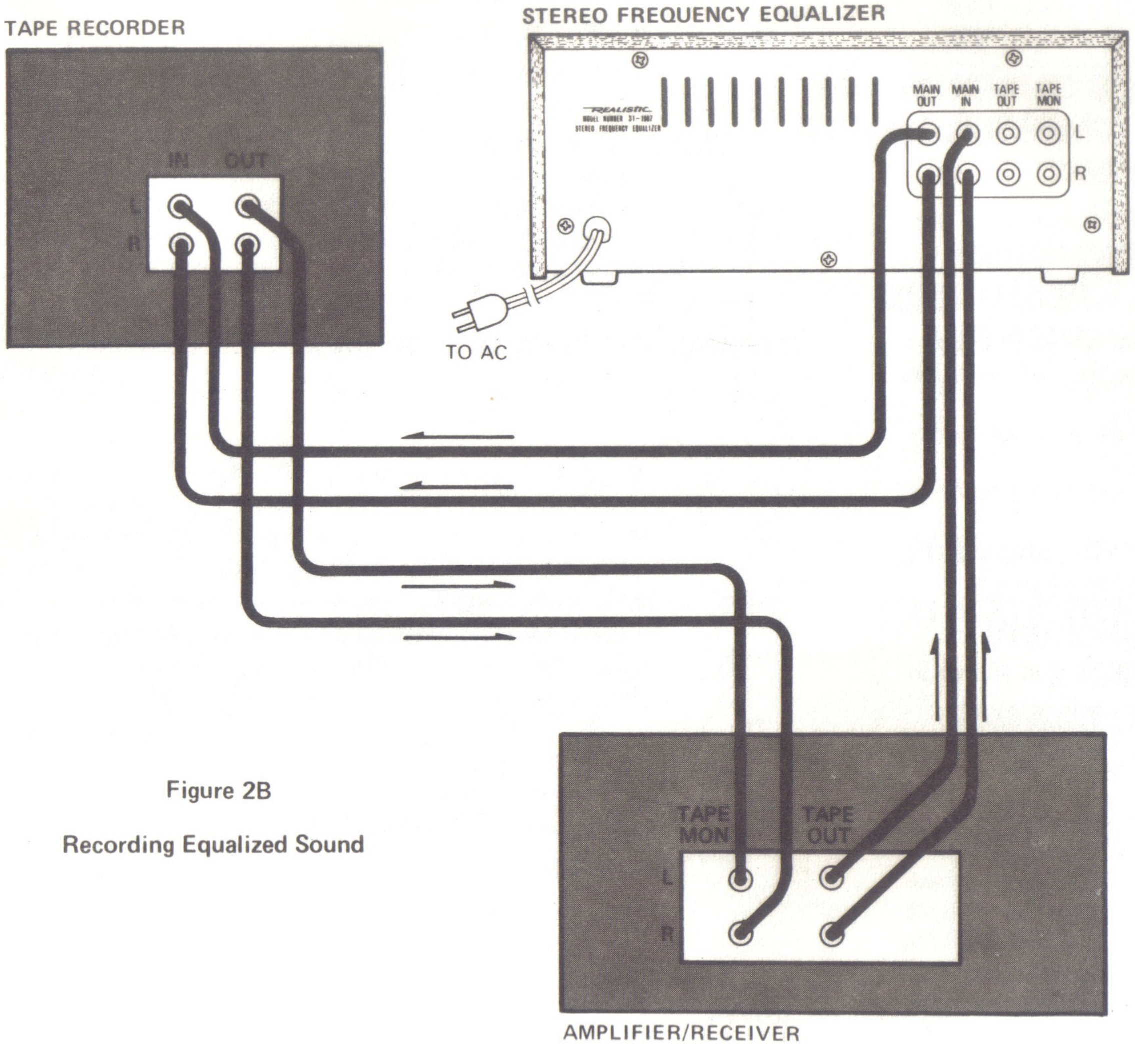


Figure 2B

Recording Equalized Sound

When you make connections as shown in Figure 2A, the signal **to the Recorder** does **not** go through the Equalizer. If you'd like to control the recording through the Equalizer, you can make connections as shown in Figure 2B and leave the Equalizer's **MONITOR** switch in the "out" position. You should realize that this type of connection will result in other than ordinary recordings, but you may want to experiment with this approach.

With connections made according to Figure 2B, you can monitor the recording (assuming your Tape Recorder has 3 heads) by using the Amplifier/Receiver's Monitor switch. With these connections, the "source" signal will not be processed by the Equalizer.

OPERATING CONTROLS

Before applying power to the Receiver or Amplifier

- Check Volume control – set it to Minimum
- Make connections as shown in Figure 1A, 1B, 2A or 2B

When Connected Between PRE OUT and MAIN IN jacks :

1. Press in **POWER** switch.
2. Select the signal source you want to play through your Amplifier/Receiver.
3. Adjust sliding frequency controls for the desired sound tailoring.

When Connected To The Tape Monitor Jacks of an Amplifier/Receiver :

1. Set Amplifier/Receiver's Tape Monitor switch to the "in" position.
2. Press in Equalizer's **POWER** switch.
3. Select the signal source you want to play through your Amplifier/Receiver.
4. Adjust the sliding frequency controls for the desired sound tailoring.
5. If you are using a Tape Recorder –
   A. To playback tapes, connect as shown in Figure 2A and press in the Equalizer's **MONITOR** switch.
   B. To monitor the recording, use the connection shown in Figure 2A and turn "on" the Equalizer's **MONITOR** switch.
   C. To record through the Equalizer, make connections as shown in Figure 2B.

Frequency Slide Controls

Each control varies the level of a narrow band of frequencies centered around the frequency noted above the control – variation is + or – 12 dB. In order to provide smooth frequency control, the effect of these controls must overlap slightly; thus, the 1000 Hz control has a slight effect on the range of frequencies covered by both the 240 and 3500 Hz controls. The net effect of the controls is all in the same direction – to emphasize (+) or cut (–) : refer to Figure 3. Figure 4 illustrates a typical frequency response setting and Figure 5 shows the overall effect of all the controls.

TYPICAL FREQUENCY RESPONSE CURVES

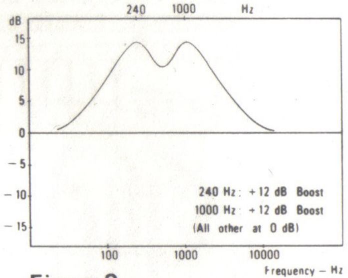


Figure 3

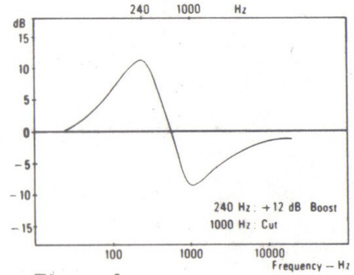


Figure 4

TYPICAL FREQUENCY RESPONSE PER CHANNEL

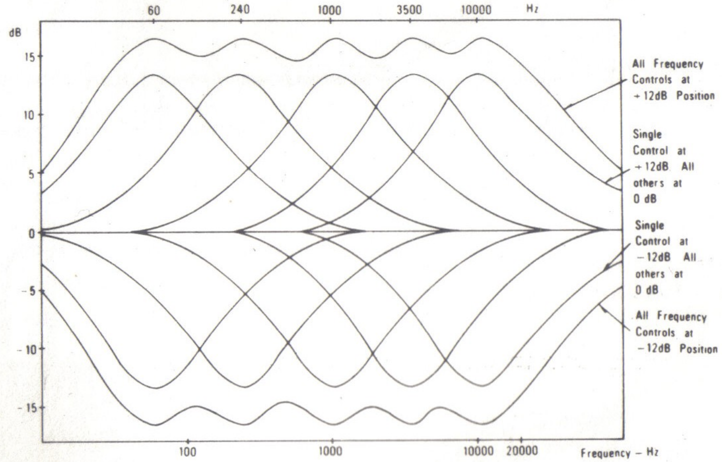


Figure 5

NOTES :

1. Set the Amplifier/Receiver's tone controls to their "flat" position (or use "Tone Flat" switch if you have such a switch).
2. Depending on the location of the Equalizer, you may notice some hum pickup (this would be from magnetic lines of flux from nearby power transformers). If this happens, try repositioning the Equalizer – as far away as possible from such sources of magnetism.

THE MUSICAL SPECTRUM

This chart correlates familiar musical instruments with the numerical frequencies that they produce. Given the often talked about musical range of 20 to 20,000 Hz, it is surprising to see how low musical fundamentals actually are. (Almost all are under 3500 Hz.) It should be understood however that if all instruments were perceived only by their fundamental frequency output (Black areas), they would all sound alike. It is the harmonics or overtones (Shaded areas) that give each individual instrument its character or timbre and set it apart from the rest.

Interestingly enough, the human ear is more sensitive to certain octaves in the musical spectrum than to others. Whoever designed this engineering marvel deemed it necessary to tune the ear more toward the midrange frequencies where speech and voice communication occur, than to the outer octaves of low bass and high musical overtones. As a result, very small energy changes here will cause a more drastic psychoacoustic effect than larger changes would at the frequency extremes.

In order to discuss the qualitative effects of adjustment in tonal balance, it is best to arbitrarily divide the musical spectrum into five ranges :

Approximate Frequency Ranges for Musical Instruments and Voice

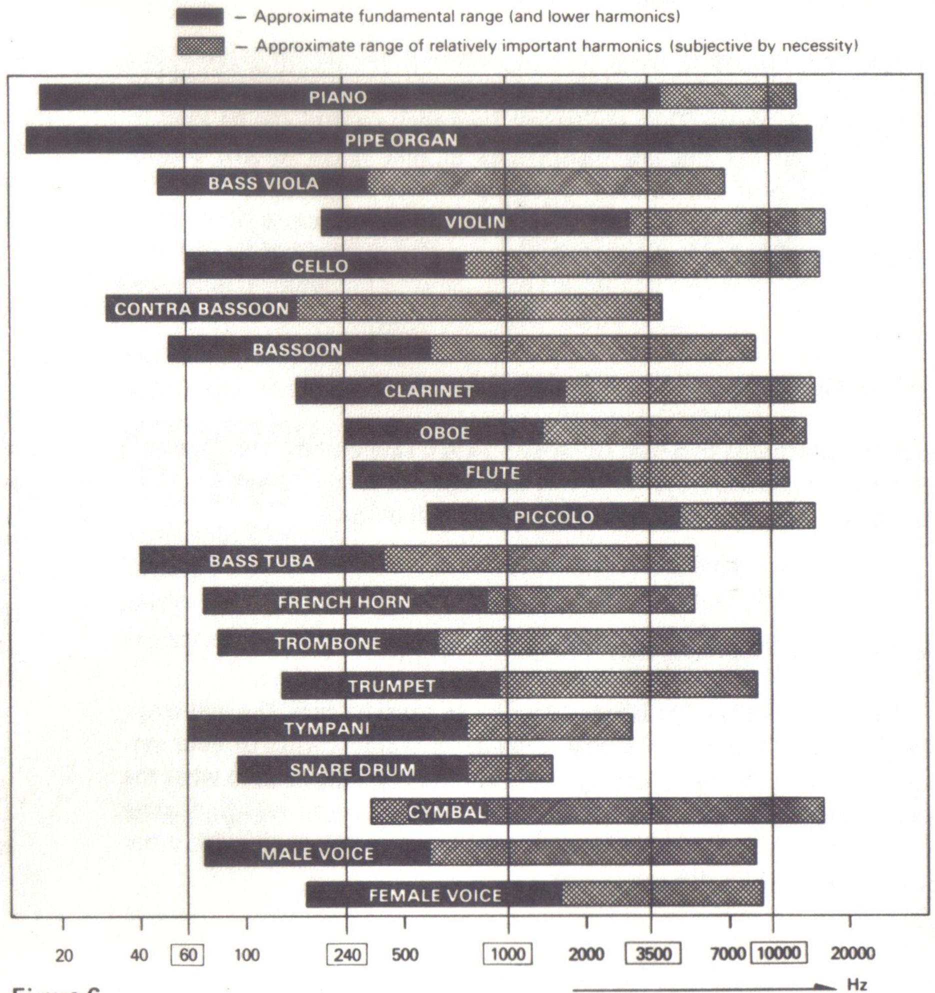


Figure 6

□ = FREQUENCY EQUALIZER CONTROLS

The Bass (approximately 20–140 Hz).

There is little musical material with fundamental frequencies below about 60 Hz, and what is normally perceived as low bass material is actually in the 60–140 Hz range. The very lowest frequency control can be used to enhance output for the few instruments in that range (organ, contra-bassoon, etc.) or it can be used to reduce rumble, acoustic feedback and other low frequency aberrations. The 60 Hz control will cause the greatest perceptible changes in "bass response".

The Mid-Bass (approximately 140–400 Hz).

An over-accentuated mid-bass region will yield a very muddy and "boomy" quality to the music. A system shy of mid-bass will sound hollow and thin. The 240 Hz control is important for good overall balance.

The Mid-Range (approximately 400–2600 Hz).

As the area where the ear is most sensitive to tonal balance, the mid-range is important in adjusting the qualitative sonic characteristics of your system. There is controversy among engineers and audiophiles as to what the proper balance should be in this range. Moreover, you will find some 1000 Hz control settings optimum for certain types of music with other settings just right for different types.

The Upper Mid-Range (approximately 2600–5200 Hz).

Speaker designers often boost output in this range to effect a quality of "presence" to the music. Too much energy, on the other hand, sounds overbearingly harsh and strident. A good balance should be achieved between this and a more muffled sound. Use the 3500 Hz control for this effect.

The High End (approximately 5200–20,000 Hz).

The region up to only about 12,000 Hz or so is what is normally perceived as high frequencies. Adjustment in this range affects the brilliance of music with too much boost in energy yielding an unpleasant and piercing quality.

The last 8000 Hz contains very little musical material. And most adults have hearing which rolls off rapidly above 13,000 to 15,000 Hz. As a consequence, the 10,000 Hz control will have a very subtle effect. It can be used to add a little more dimension to the sound or as a very high frequency noise filter.

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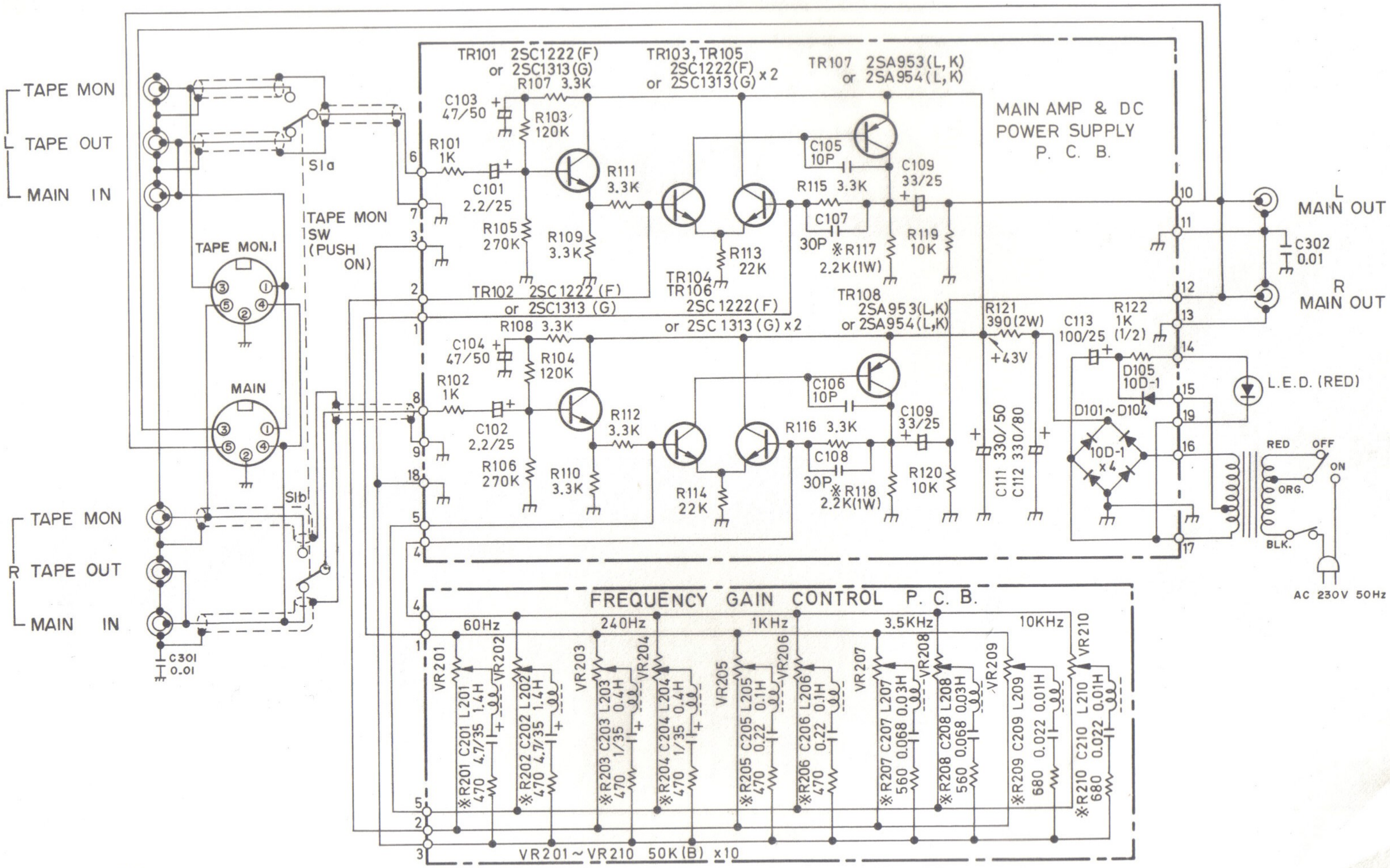

NOTE

(1) ALL RESISTANCE VALUES ARE INDICATED IN "OHM" ($K = 10^3$ OHM)

(2) ALL CAPACITANCE VALUES ARE INDICATED IN "μF" ($P = 10^{-6} \mu F$)

(3) ※ R117, R118 RESISTANCE VALUES ARE SELECTED FOR 9 VOLT NONCLIPPING INTO 10K OHM OUTPUT LOAD.

(4) ※ R201~R210 RESISTANCE VALUES ARE SELECTED FOR EQUALIZER RANGE AT ±12 dB

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