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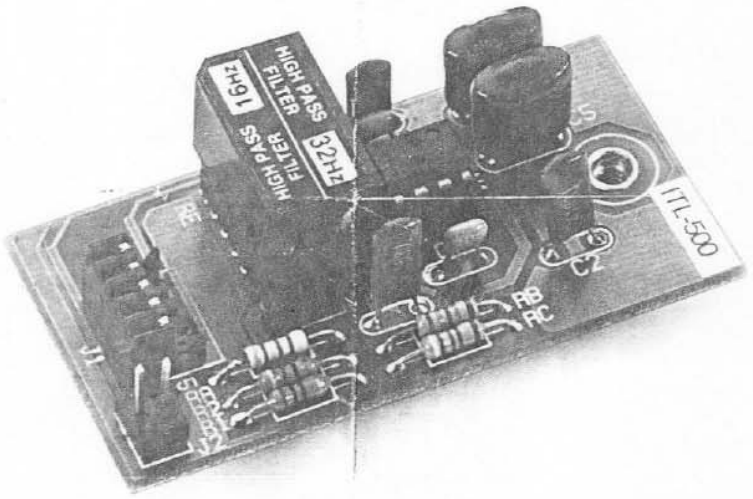
ITL Low Pass Filter/Equalizer PCB



DESCRIPTION

The InterActive Technology Model ITL is a fixed-frequency low pass filter and combination woofer/enclosure equalizer PCB.The PCB plugs directly into the 5 pin header of an IT compatible Input Module. When used with the ITH high pass filter PCB, they eliminate the need for rack mount electronic crossovers and offer the ability to individually equalize specific woofer/enclosure (or horn/driver) combinations.

The third-order Butterworth low pass filter has an 18 dB per octave (60 dB per decade) roll-off rate. The modules are available in the following standard ISO frequencies: 125 Hz (ITL-125), 500 Hz (ITL-500), 800 Hz (ITL-800), and 1250 Hz (ITL-1250).Simple equations are provided to calculate other frequencies for custom applications.

Each filter PCB is provided with a "flat" woofer/enclosure equalization submodule. The submodule provides a maximally flat response with a 12 dB/octave low frequency roll-off beginning at either 16 Hz or 32 Hz, depending on orientation. Other responses, including low frequency peaking, may be calculated from the simple equations provided to optimize a loudspeaker system.

The InterActive Technology Model ITL Low Pass Filter/Equalizer has the flexibility to meet or exceed the requirements for any job. Its ability to produce a flat power response for an individual loudspeaker system is not only useful but almost mandatory in today's professional installations.

INSTALLATION INSTRUCTIONS

1) Remove power and all input connections to the amplifier.
2) Remove the two screws securing the input module to the rearpanel of the amplifier and pull the Input Module out of the amplifier.
3) Remove (and save) the shorting jumper from J5 or J6.
4) Install the ITL Printed Circuit Board onto the 5-pin header.
5) Secure the ITL to the Input Module by using the screw provided through the bottom side of the Input Module into the threaded standoff of the ITL.
6) Install the Input Module back into the amplifier. Secure the Module to the back panel of the amplifier using the two screws removed in step 2
7) Reconnect the power and input signals to the amplifier

SPECIFICATIONS

Input Impedance:	15 kΩ unbalanced
Maximum Input Level:	+18 dBu (Ref. 0 dBu = 0.775 Vrms)
Output Type:	Unbalanced
Output Source Impedance:	<50Ω
Minimum Load Impedance:	2kΩ
Total Harmonic Distortion:	<0.01% at 0 dBu output over full bandwidth
Intermodulation Distortion (SMPTE):	<0.01% at 0 dBv output
Noise Floor:	< -90 dBu
Dynamic Range:	> 108 dB
Power Requirements:	±15 VDC
Dimensions:	2.6 in L x 1.35 in W
Low Pass Crossover Filter	
Type:	3rd order Butterworth
Slope:	18 dB/oct (60 dB/dec)
Low Frequency Equalizer	
Type:	2nd order underdamped filter
Slope:	12 dB/oct (40 dB/dec)

AVAILABLE MODELS

ITL - 125	125 Hz filter frequency
ITL - 500	500 Hz filter frequency
ITL - 800	800 Hz filter frequency
ITL - 1250	1250 Hz filter frequency
Included Accessories:	one "flat" submodule providing either a 16 Hz or a 32 Hz low frequency roll-off at the rate of 12 dB/oct (16 pin DIP plug)

OPTIONS

Woofer/Enclosur Equalization Submodule Accessories

EB or HP submodules:	Submodules for modified equalization.
9600A:	Blank submodule for custom equalization.

Custom Corner Frequency Component Values
A third-order Butterworth low pass filter performs the low pass function. The corner frequency is fixed in the module, but can be changed by substituting new values for resistors, RA, RB, and RC. If other corner frequencies are desired, the values for the three resistors may be calculated from the following equations:

$RA = (16.39 \times 10^6)/(f3 + 6)$ Ohms
$RB = (116.97 \times 10^6)/(f3 + 6)$ Ohms
$RC = (21.03 \times 10^6)/(f3 + 6)$ Ohms
where f3 = the desired corner frequency in Hz.

Low Frequency Equalization Submodules
The standard "flat" submodule assembly offers a choice of low end frequency response down to either 16 Hz or 32 Hz with a roll-off rate of 12 dB/oct. The factory setting of the submodule is for a 16 Hz corner frequency (pin 1 of the submodule to pin 1 of the socket). The corner frequency may be changed to 32 Hz by rotating the submodule 180° and re-installing it into the socket (pin 1 of submodule to pin 9 of socket).

Custom Low Frequency Equalization

The 9600A Blank Submodule Assembly is available to construct custom equalization modules. The resistor designations in the following instructions refer to the designations used in figure 1.

I. Calculating a New Low End Corner Frequency.

The low end corner frequency at which the 12 dB/oct roll-off begins may be changed by calculating new values for resistors RE1 and RE2 with the following equations:

$$RE2 = \frac{(1.06\times10^{13})}{(4.7\times10^6)(f3) - (2.25\times10^6)} \quad \text{Ohms}$$

$$RE1 = \frac{(4.7\times10^{13})}{2(RE2) + (9.4\times10^6)} \quad \text{Ohms}$$

where f3 is the new low end corner frequency.

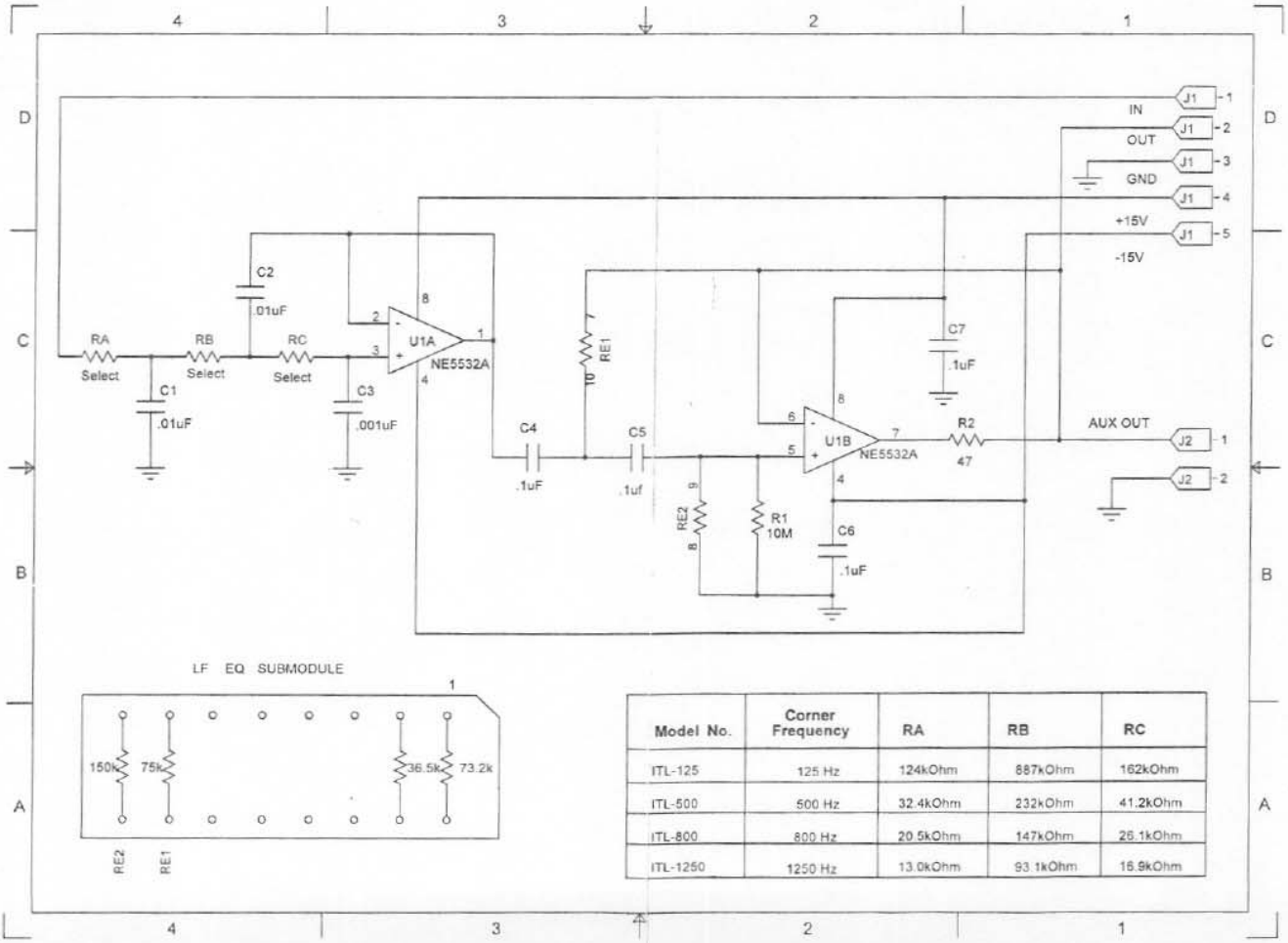
II. Extending the Low Frequency Response
The low end response of the ITL may be extended to approximately 5 Hz by omitting RE1 and replacing RE2 with a 1 Meg , 1/4 W, 5% resistor.

III. Producing a Peak in the Low Frequency Response
The proper selection of resistors RE1 and RE2 will produce a 6 dB boost in the low frequency response at frequency fpk. The values for the resistors may be calculated from the following equations

$$RE2 = \frac{(3.11\times10^{13})}{(4.7\times10^6)(f_{pk}) - (6.61\times10^6)} \quad \text{Ohms}$$

$$RE1 = \frac{(4.43\times10^5)}{f_{pk}} \quad \text{Ohms}$$

where f_{pk} is the frequency where the maximum boost occurs



Model No.	Corner Frequency	RA	RB	RC
ITL-125	125 Hz	124kOhm	887kOhm	162kOhm
ITL-500	500 Hz	32.4kOhm	232kOhm	41.2kOhm
ITL-800	800 Hz	20.5kOhm	147kOhm	26.1kOhm
ITL-1250	1250 Hz	13.0kOhm	93.1kOhm	16.9kOhm

Figure 1 Schematic of ITL

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