Technical Notes Vol. 1, No. 5

Field Network Modifications for Flat Power Response Applications

Introduction:

In order to facilitate the specification of JBL systems exhibiting flat power response, all JBL passive dividing networks have been redesigned to include HF power response correction. There will be a need for some time for sound contractors and audio specialists to modify the older 3152A passive network as well as construct a plug-in card for use in the 5234A active dividing network for use in flat power response systems. In this Technical Note, we will describe these modifications.

3152A Modification:

The 3152 network was designed a number of years ago for use with HF horns that beamed on axis and with LF horn-loaded reflex enclosures with sensitivities of the order of 103-to-107 dB, 1 watt at 1 meter. The network had sufficient HF attenuation to enable the HF section to be padded down to match the LF section, and of course the flat electrical HF response of the network was offset by the on-axis rise in directivity index of the older-style radial horns and lenses.

When used with Bi-Radial HF horns and direct radiator ported LF systems, this network needs about two dB more HF mid-band attenuation to enable the HF and LF sections to be properly matched, and of course the flat HF output of the network provides no compensation for the HF driver's natural roll-off above 3 kHz.

The modification we show here is simple and is done at the terminal board directly under the network's metal cover. Figure 1 shows the schematic of the 3152A network as it presently stands. Note that HF padding is accomplished through voltage division as well as through autotransformer action of the tapped inductor. A metal strap is placed across any of five sets of three terminals in order to set a particular HF attenuation. Figure 2A shows the form this circuit takes when the terminals are strapped as shown in Figure 2B. The components required for this are shown in the Figure, and they can easily fit into the space between the terminal board and the metal cover. Care should be taken that all leads are sleeved and all components wrapped in electrical tape. Good engineering practice calls for lugs to be soldered to the component leads to ensure snug and secure contacts.

Figure 3 shows the resulting response of the modified 3152A network. Note that there is an appropriate HF mid-band loss of 13 dB, providing a good match between the 4508 LF system (100 dB, 1W, 1m sensitivity) and the 2360 Bi-Radial (at 113 dB, 1W, 1m sensitivity). The rise in HF output above 3 kHz provides an excellent match for the HF roll-off of the 2445 compression driver, and the net result is flat power response as well as flat axial response.

5234A Modification:

Figure 4 shows details of how a blank 18-dB/octave card may be loaded to provide a 12-dB/octave plug-in card for either 500 or 800 Hz use. The 18-dB/octave card is required since it has the requisite number of spaces for the components.

Before wiring the 51-5130 blank card as indicated in Figure 4, the user should refer to the section in the Operating Instructions for the 5234A Active Dividing Network detailing the loading of these cards.

Figure 5 shows the response of the card loaded for 500 Hz crossover. Note that there is a mid-band difference of 15 dB. In actual application, this difference will be nearly offset by the mid-band difference in sensitivity between the HF and LF parts of the system, and it is not anticipated that there will be any problems in division of gains and losses in system operation. The only difference the user will note is that the HF level control on the 5234A will be operated nearly full on, as compared to normal use with stock crossover cards.

Finally, we present a simple circuit which may be used between the HF output of any electronic dividing network and the following HF power amplifier to correct HF power response. The circuit is shown in Figure 6A, and its response is shown at B. The assumption is made that the output impedance of the dividing network is suitably low, and that the input impedance of the power amplifier is approximately 20k ohms.

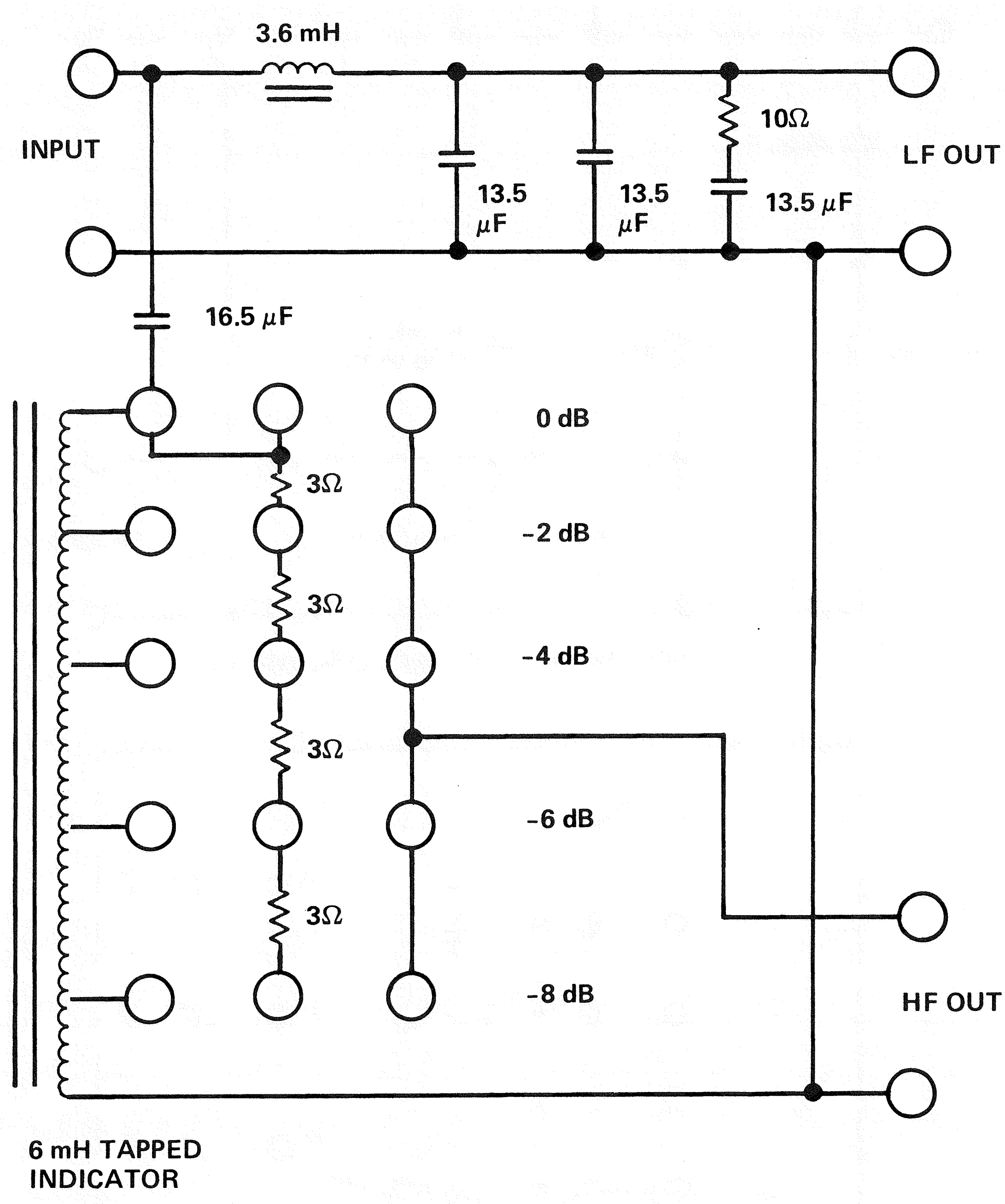
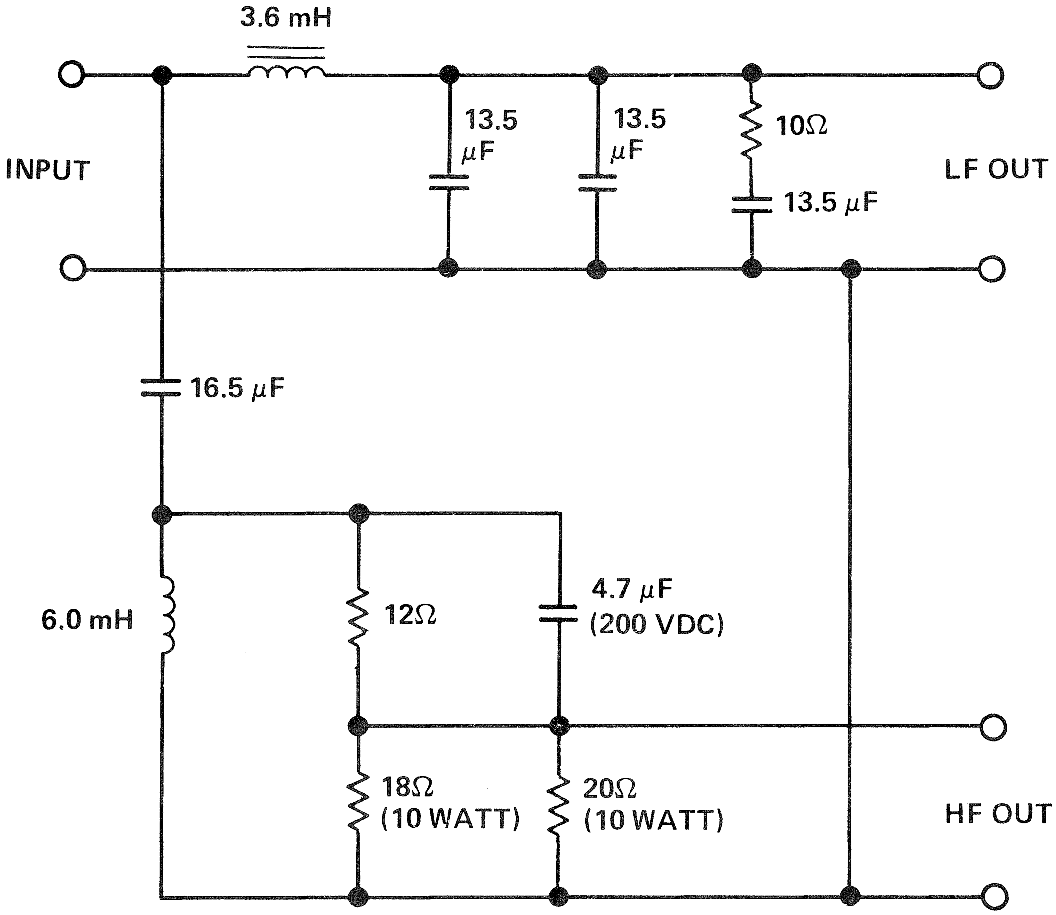
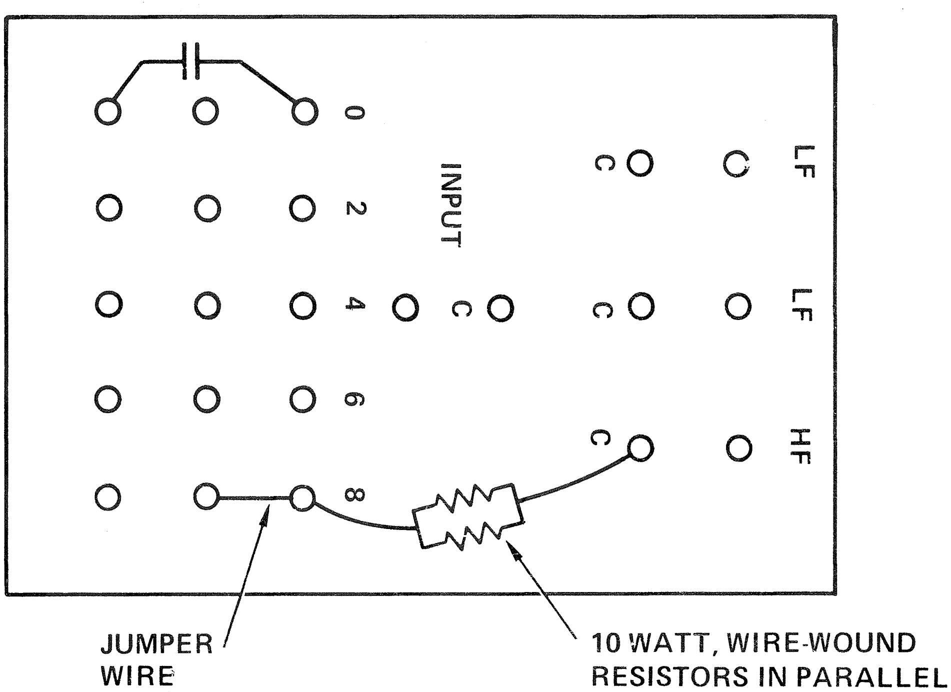


FIGURE 1. SCHEMATIC OF UNMODIFIED JBL 3152A NETWORK



A. SCHEMATIC OF MODIFIED NETWORK



B. VIEW WITH COVER REMOVED

FIGURE 2. MODIFIED 3152A NETWORK

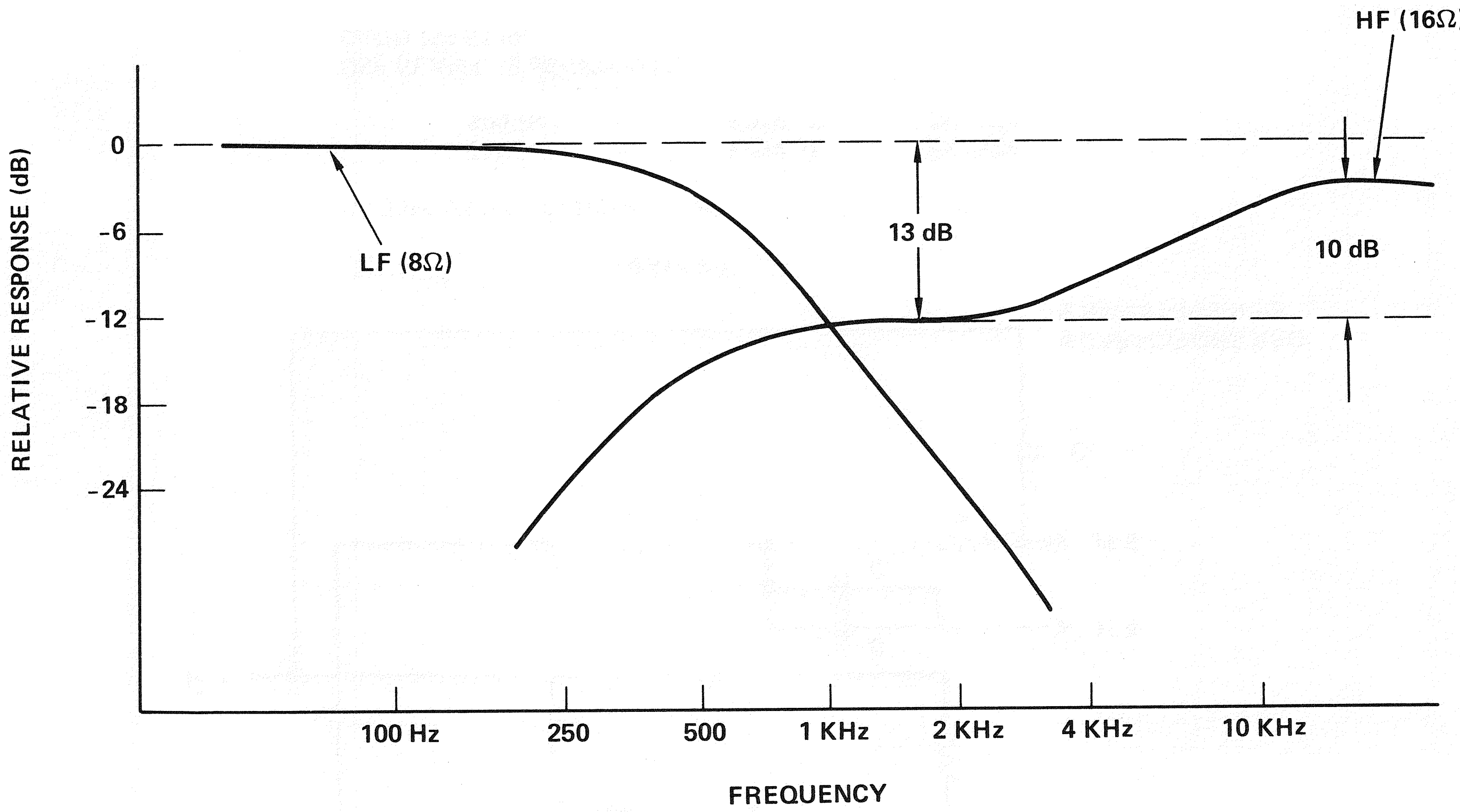
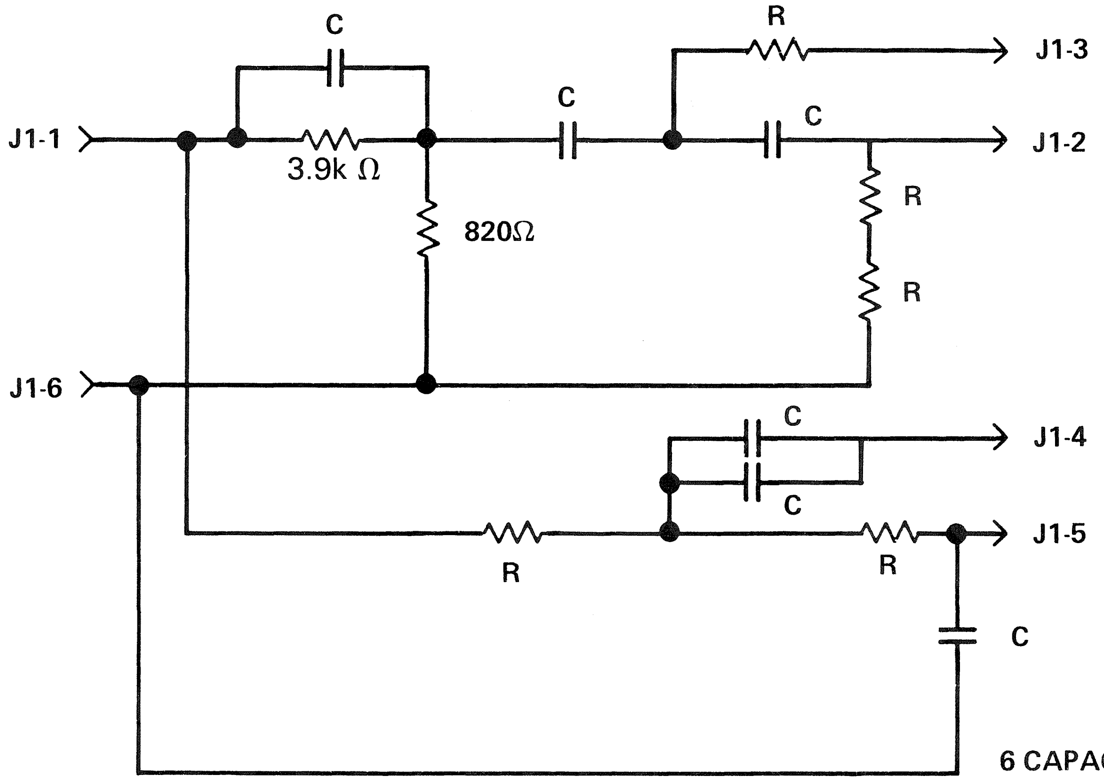


FIGURE 3. RESPONSE OF MODIFIED 3152A NETWORK



6 CAPACITORS REQ
5 RESISTORS REQ

VALUES

CROSSOVER FREQUENCY.	C.	R:
500 Hz	0.012 μF	18k (5%)
800 Hz	0.012 μF	15k (5%)

USE BLANK 18 dB/OCTAVE
CARD (51-5130)

FIGURE 4. POWER RESPONSE CORRECTION FOR 5234A

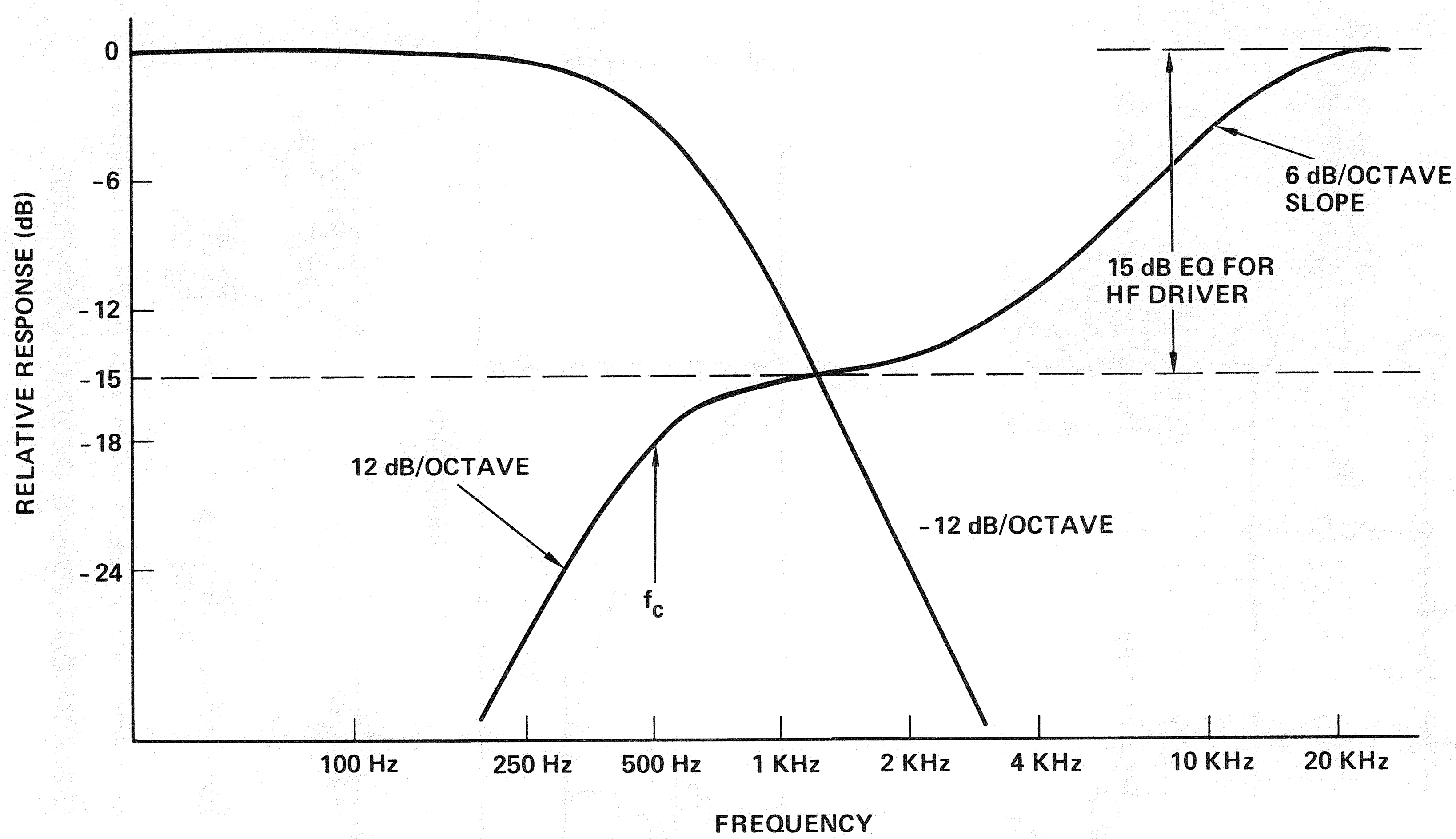
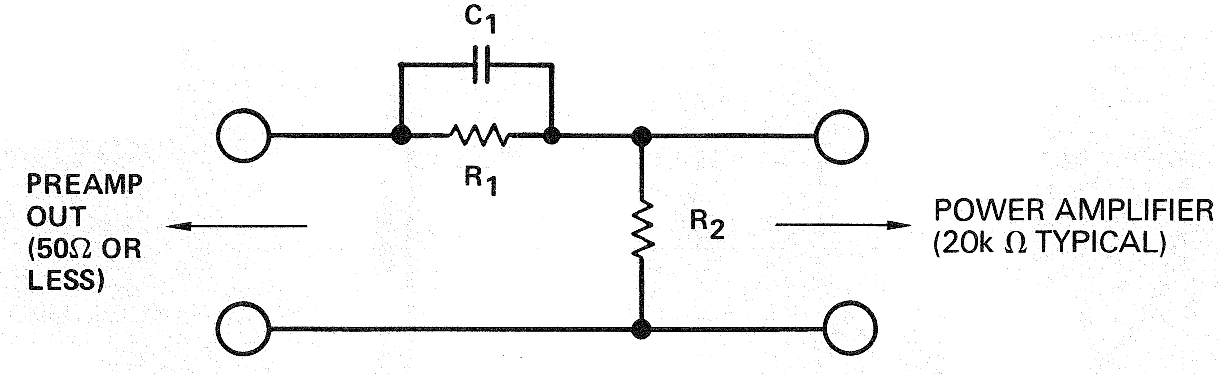


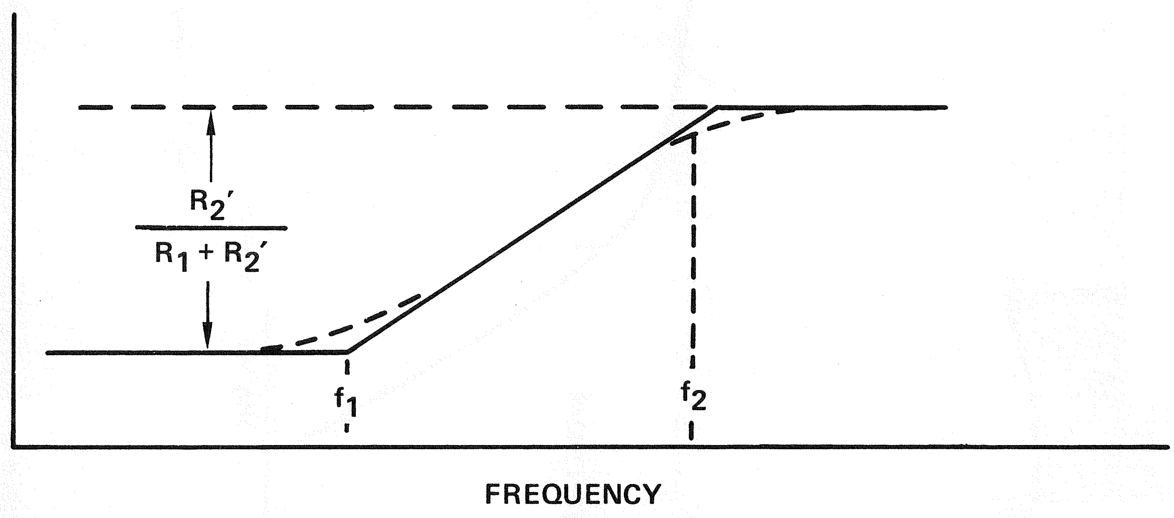
FIGURE 5. RESPONSE OF MODIFIED 51-5130 CARD (500 Hz CROSSOVER SHOWN)



$f_1 = 3.3$ kHz
$f_2 = 22.3$ kHz
MID-BAND LOSS = 16.6 dB
$C_1 = 0.0022\ \mu F$
$R_1 = 22k\ \Omega$
$R_2 = 4.7k\ \Omega$
($R_2' = 3.8k\ \Omega$)

$f_1 = 3.3$ kHz
$f_2 = 10.4$ kHz
MID-BAND LOSS = 10.0 dB
$C_1 = 0.0022\ \mu F$
$R_1 = 22k\ \Omega$
$R_2 = 8.2k\ \Omega$
($R_2' = 10.2k\ \Omega$)

A.



$$f_1 = \frac{1}{2\pi R_1 C_1}$$

$$f_2 = \frac{1}{2\pi \frac{R_1 R_2'}{R_1 + R_2'} C_1}$$

$$\text{MID-BAND LOSS} = 20 \log \frac{R_2'}{R_1 + R_2'} \text{ dB}$$

$$R_2' = \frac{R_2 \cdot 20k}{R_2 + 20k}$$

B.

FIGURE 6. A CIRCUIT FOR HF POWER CORRECTION

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