PRO-NOTE

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Prepared by Walt Dick, Professional Applications Engineer.

New Products

1. We are in the process of making available an adjustable rear mount for HF horns. This device will attach at the four-bolt flange and have an "H" shape. A series of holes in the upper side rails will facilitate adjustment. It is now a standard part of the 2395 assembly and will be packaged separately under the number 2505. It probably will be available in 60 to 90 days. We haven't established a price as yet, but it should be about $12.00 D.N.

2. The 4500 series bass horns will be available in studio grey (like the 4320) on special order. The model designations and prices are shown below:

	D.N.
4520SF	$ 190.00
4530SF	$ 90.00
4550SF	$ 212.00
4560SF	$ 112.00

The standard black finish horns will now be designated with the "BK" suffix (i.e., 4520BK).

3. Way down the line, in about 18 months, is a program for several rack-mount accessory panels. In order to assign some priority to these devices, we would like your inputs on self-powered monitor panels with speakers, V U meters, switch panels, or related items of a similar nature.

4. We are in the process of stocking filter chassis and 1/3 octave band constant-K filters similar to RCA and Dukane units. Ours are more complex and expensive than those currently cataloged by Frazer. Here are part numbers and tentative prices:

		D.N.
3601-	Chassis drawer (3 strip capacity)	$ 38.00
3605-	Socket Strip (8 filters)	$ 18.00
3610-*	1/3 O.B. filters	$ 45.00 – $ 60.00 (depending on frequency)
3611-12-13-14-15	Broad band shelving filters	$ 45.00 – $ 67.00 (depending on configuration)

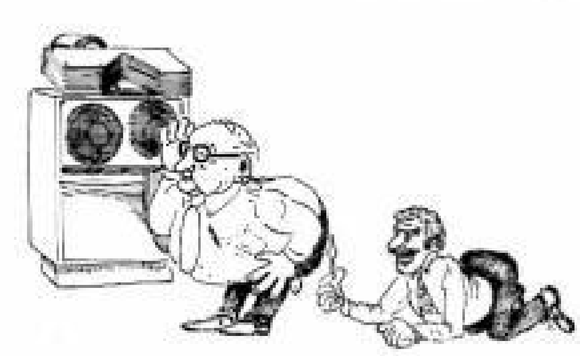
**Frequency of filter band.*

A complete set of 3600 filters is $1,275.00 D.N. We have a price list and submital material for those of you who are equipped and trained to properly utilize these devices, or those that bid to or use one of the equalizing consultants. This group of products are for use in 1/3 octave correction processes. We don't believe in using a 1/3 octave axe to hunt down a 1Hz feedback mode. It is best to hire a narrow-band practitioner if the job requires tuning beyond the broad-band process. Aside from the competitive aid that this product will give us, it also can be sold as a definite improvement to any properly designed sound system. The broad-band process should be considered not as a necessary evil but as a beneficial adjunct to any system. We will start a series on equalization theory and application in a future Newsletter.

5. A 2332 adaptor is available which will couple two one-inch compression drivers to a two-inch horn entry. D.N. is $27.00.

Application

This month's space will be devoted to a disertation on the use of our crossover networks. In all honesty, it must be admitted that our present group of networks are not designed to match the sensitivities of all the possible combinations of our transducers. (Sometimes we envy the Jolly Green Giant with his one LF driver, two HF drivers, and two styles of HF horns.)



"I think I hear a mis-match."

The problem is actually very simple: The sensitivity of a particular HF horn and LF array must be nearly matched acoustically at the crossover transition point. The information for HF horn sensitivity is available mainly on our tricky slide rules which everyone should have. We also have a tabulation on one sheet of paper which is available. The LF driver sensitivities are listed on the product sheets. The additional complication of LF driver sensitivity when mounted on horns will be treated in a later article.

Consider, as a first example, our 4320 studio monitor. The 2215 has a sensitivity rating of 44dB. (All our ratings are 30 ft., 1mw.) The 2391/2420 combination has a sensitivity rating of 59dB. This would lead one to surmise that the high-frequency port of the network should be attenuated by some 15dB. The network used with this system is the 3110. A quick look at the network product sheet shows that the 3110 has an HF attentuation of 6-8-10dB. Not too good you might say; we're short 5dB. In a separate two-way system, you would be right. However, in an integrated system like the 4320, the designer has taken some liberties. First of all, the 2391 is working somewhat lower than its 1200Hz rating (800Hz). The designer would note from the 2420/2391 raw curve that there is about a 3dB difference between 800 and 1200Hz. Also, our sensitivity figure for the 2391 was derived from a warble average of 1kHz to 5kHz. The raw curve shows a slight rise in the 5kHz region. Therefore, a 10dB attentuation of the HF channel results in a reasonably flat on-axis system curve for the 4320. All this is pretty complicated stuff for field use. Systems like the 4320 with closely spaced elements and intended for *near-field monitor usage,* may have a *different* balance requirement than that of *a far-field reinforcement speaker system.*

Now let's take some garden-variety reinforcement speaker systems and see what it takes to match this other type of arrangement. If we have a pair of 2205's in a 4520 and a 2395/2440 combination, we have a sensitivity differential of 12.5dB. The 2205 has a 100 to 500Hz warble average of 47dB and the 2395/2440 a 500-2500Hz rating of 59.5dB. Taking the two basic types of networks we can do the following: Either the 3150 or 3115 for a 500Hz crossover. The 3115 would provide 10dB of attenuation which would be close enough, but would be limited to a 100 Watt program rating. The 3150 would allow higher input power, but would have an attenuation of only 4dB. An outboard resistive pad would be necessary to bring the HF channel down far enough with the 3150. (One adjunct to our network information could be a chart showing the necessary pad configurations and values.) Perhaps a more straightforward solution would be to use a commercially available "L" pad to achieve a balance. However, most commercial "L" pads are only 5 Watt units. If the 4520 had been loaded with 2220's, the differential would have been 4.5dB which would have been within the range of the 3150.

Conversely, if the 2205 LF mechanisms had been used and a 2350 connected for the HF channel, the differential would be 15.5dB, at which point an additional autoformer would be a better solution. Usually, the 3110/3115 networks are the most useful unless maximum continuous power input is anticipated.

In all cases, the sensitivity as published must be the guide when using separate components to make an integrated loudspeaker system. Where additional attenuation is required to balance a network/mechanism combination, a resistive pad is permissible and certainly cheaper than a transformer. Where more than one HF horn is used, matching transformers are to be preferred in order to effect a balance between the HF units. A step attenuator of the type made by Clarostat, known as the CIB-15, with its 3dB of attenuation per step and 30 Watt rating, would be the most convenient. For a neat installation, the CIB-15 could be mounted inside the housing of the 3150 or 3180. The actual attenuation of the HF channel will depend upon the material to be reproduced and the acoustic environment. In most cases, field experience shows us that the HF unit usually runs at a higher level than the relative sensitivity ratings would dictate.

In larger speaker arrays where LF and HF units are not operated as matched pairs, it is customary to couple a bass horn with one or more long-throw HF horns. Then an HF-only short-throw tier of horns can be fed through lower powered networks and matching transformers. The LF channel would be a dummy loaded with 15 ohms. In very large systems, some designers use one amplifier for every LF unit and one amplifier for every two HF units. In each case, the network is dummy loaded on the unused port. This may be expensive and wastes some power but gives maximum facility for balancing the cluster and the HF horns have good protection. The amplifiers are driven from a common input which makes this type of system a quasi-bi-amp design.

In general, the 3100 series networks cannot be used successfully to match two cone speakers unless the LF unit is less efficient than the HF units. If one were to use the 2105 for a mid-frequency unit, its 46dB sensitivity would be usable with a 2215 (44dB) but perhaps not with a 2205 (47dB) and certainly not with a 2220 (52dB). (The 2150 is a special case again.) Probably the smoothest midrange unit would be the 2115, but its sensitivity of 43dB poses a difficult balance problem. The other difficulty, of course, is the lower power handling capability of the possible mid-range candidates; i.e., 2105, 2110, 2115. The 2120 makes a whopper of a midrange unit but is not very smooth above 1kHz. We know of some satisfactory music systems built from a 2215/2105 combination. An expensive 12dB/octave network is generally wasted when combining two cone speakers. The 4310, for instance, uses a simplified 6dB/octave network. So, except for the special purpose 3125, the networks are intended for combinations of mechanisms utilizing a horn-loaded HF unit.

We are including some illustrations to assist you in the use of passive networks. The impedance measuring scheme in Figure 1 is similar to the one used in the JBL lab. It is a very convenient way to measure impedance. Figure 2 shows an outboard pad for the 3150/3180 type networks. Figure 3 is a table of network configurations and factors for those of you who have reactance slide rules (Shure, etc.). Figure 3 is best employed in designing low-level crossover networks, since the losses in the reactances are not significant at the milliwatt level.

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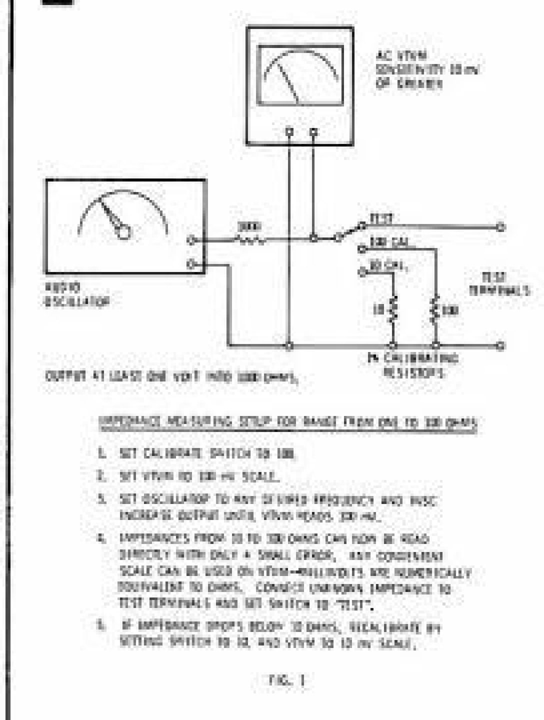

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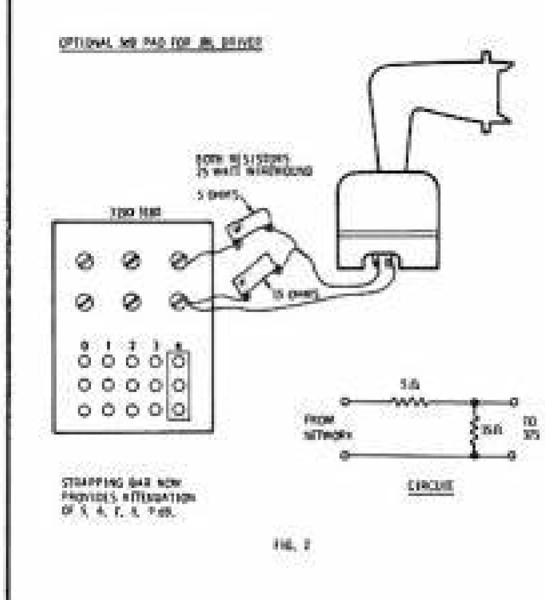

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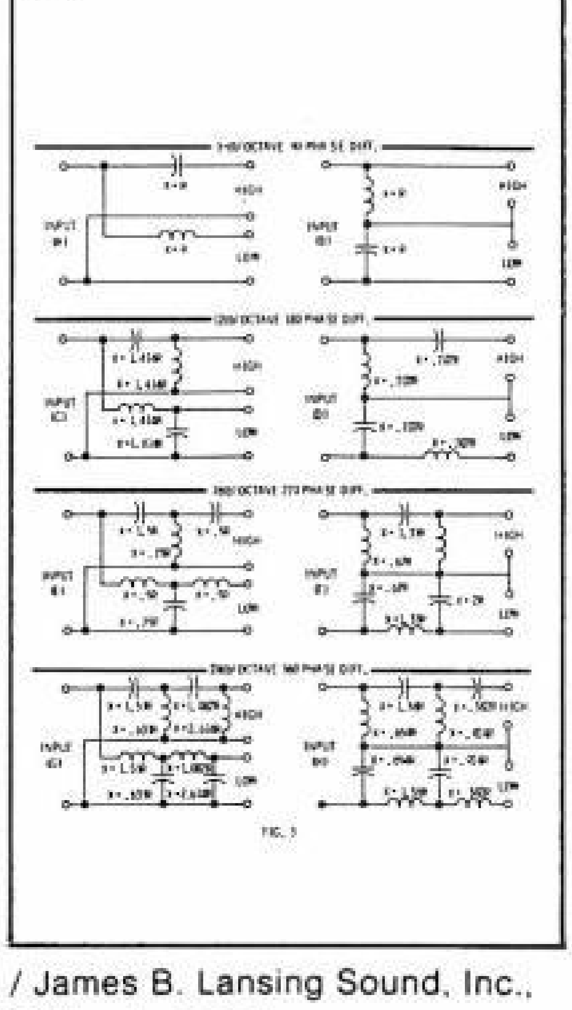

JBL

Professional Series

Professional Equipment Division / James B. Lansing Sound, Inc.,
3249 Casitas Ave., Los Angeles, California 90039