# PRO-NOTE

# Professional Equipment News

8-71

JBL Professional Series

1. **2356 Horns**

These units are now being delivered in small quantities. Larger quantities (more than eight units) will require some advance notice. The price includes the single, two inch entry throat. For those installations requiring a double entry, the 2329 throat must be substituted. Orders for this configuration should contain specific instructions. Much confusion has arisen around the misprint on the product sheet under the dimension data. For the 2356, the width and depth were mistakenly interchanged. Also, the overall depth is wrong. The data should read; 33W x 16 1/2H x 48 3/4L. Please correct your sheets accordingly.

2. Another printing oversight on the PPB - 2300R sheet (radial horns) is the omission of the driver type from each horn curve. The same is true of the lens sheet. For your information, here is a list of drivers for all HF horn data.

| | | |
|---|---|---|
| 2340/2410 | 2355/2440 | 2390/2440 |
| 2345/2410 | 2356/2480 | 2391/2420 |
| 2350/2420 | 2305/2410 | 2395/2440 |

The reason for the scramble is that the driver we considered most typical for general usage on that particular horn was used in the data sheet.

3. **Horn Hardware**

We are still having difficulty deciding what hardware to pack with which device. Your Applications Engineer spent some difficult minutes at the last AES Convention trying to assemble his speaker systems. It seems we will have to pack hardware with the 2327 to cover some applications. We have provided minimal "box-top" mounting hardware with the larger HF horns. Drop us a short note with any additional suggestions for nuts, bolts and gaskets.

4. **Speaker Matching Transformers**

At present we have only two of these products in the mill. The 9308, an eight watt transformer similar to the Altec 15065, is presently in stock under the old JBL number 7008. New units are in the process of procurement.

A 100 watt autoformer, similar but superior to the Altec 15067, will be available in the next 45 days. The model number is 9375. The 9308 is $10.00 D.N. and the 9375 is $20.00 D.N. We are contemplating 30-and 50-watt transformers for wide-band usage (similar to the Altec 15066) and would like some input as to how badly you need such a transformer.

5. **Multicells**

We have a small stock of the multicells in the following configurations:

1 x 3, 2 x 3, 2 x 4, 2 x 5, 3 x 6

Since these are vendor supplied items and are usually purchased by contractors to meet specifications written by others, we will never have a large inventory. Allow 60 days lead time on these items.

6. **New 5306 Mixer - Six Microphone,** Two program.

A mechanical model of the new mixer was shown at the recent AES Convention. The final pre-production run is nearing completion and delivery is expected sometime in September. Although this product will be the subject of a separate bulletin, here are some outstanding features of the present design:

A. Six milivolts of total noise across the 600 ohm output with one microphone channel and master gain full. This is roughly equivalent to -127 dBm referred to the input with 85 dB of amplification. The noise is down to less than 100 microvolts with the master gain off.

B. All transformers are an integral part of the mixer except the program inputs which accept a 5195 when required.

C. The microphone amplifiers will accept -20 dBm across 150 ohms before clipping. This is equivalent to 124 dB SPL at the diaphragm of an average dynamic microphone. An overdrive indicator and 20 dB pad is used on each microphone channel. A flashing of the indicator shows the operator that the additional pad is required.

D. The tone controls are stepped equalizers having plus and minus 15 dB in 3 dB steps. The controls can be defeated by wiring change for Boner type jobs. However, their "O" position gives flat response.

E. Provisions have been made for a future eight channel expander which will carry the 5308 model number.

F. Distortion and bandwidth are limited only by our choice of transformers. At present the bandwidth is -1 dB 20 - 20000 Hz. The distortion is less than .15% at +18 dBm at these extremes.

Naturally, all this performance is expensive. The dealer net should run between $425 and $450. A fully equipped Langevin AM1-A runs about $415 and this was our target. More later, on this first "new generation" product.

7. We have had some reports of difficulty with the 2220 speaker when mounted in the 4550 and 4560. In some units the surround strikes the mounting baffle. We have 1/4" spacer rings made up for those of you who need them. They can be ordered by description since we did not assign a model number to the spacer. We are modifying the mounting board to provide this clearance. In the meantime, spacer rings will be shipped with the present production bass horns.

8. Also from field complaints, we find there is a problem with the 2470 when used on bi-amp systems. From our investigations here, it appears that these drivers are getting too much low frequency energy below 500 Hz. Since we don't have any data on the low level crossover designs being used, it would be difficult to assess the actual problem. Spectra Sonics dividing networks are the only ones I am familiar with and they should perform satisfactorily. However, other problems arise in this application having to do with program power density and amplifier overload characteristics. For instance, the power rating of the 2470 is 60 Watts of average program material. We developed this power rating after extended testing of the device. Our usual procedure is to determine the sine-wave power the driver will withstand when loaded with a terminated tube. This test is similar to testing an amplifier with a resistive load. The test signal is derived by sweeping a sine-wave oscillator from 500 to 2500 Hz at about a 5 Hz rate. This test is started at half-power and increased in half-hour increments until destruction of the device. From this data we derive the maximum continuous sine-wave power of the device for a one hour period. This power input, calculated from the average current and impedance levels during the test, is multiplied by a factor of two to arrive at what we call "continuous program power".

The reason this rating method was developed was to attempt to relate amplifier power ratings. We felt that if the 2470 was attached to a 60 Watt amplifier through a crossover network, the driver should give continuous service on average program material. For many of you, this term "average" might seem rather ambiguous. However, in the film, recording and broadcast industries, this term had a definite implication. First of all, the most important assumption we made was that our mechanisms would not be used in systems that would tolerate high distortion levels. Therefore, a 2:1 peak-to-average ratio would be conservative from the heat build-up standpoint if a reasonable attempt was made by the system designer or operator to avoid excessive clipping of the 60 Watt amplifier. Most modern amplifiers use large amounts of degenerative feedback. This means that up to the rated power level, the distortion is very low and actually inaudible for a sine-wave signal. However, once the amplifier reaches its power supply limit, it goes into hard clipping. This action is typical of all modern solid state amplifiers. Whether or not this clipping is audible depends upon the duration of the clipped portion of the wave and the symmetry of clipping. Once it becomes audible, however, the shape of the clipped wave has become quite square. Now, if the high frequency driver is subjected to this type of distorted program material, its power rating has been effectively reduced to a level equal to or less than the original sine-wave power rating. The average power of a clipped sine-wave is greater than that for a normal wave shape. When these clipped waves crowd together (as is the case in dense program material associated with high level entertainment) the power capacity of the high frequency driver is sharply reduced. A secondary effect is that the rise time of these wave shapes is becoming shorter and exerting higher acceleration forces on the diaphram. Actually, the average power capacity of the driver remains constant but the dynamic monitoring devices for the sound system (V.U. meters, scopes, etc.) give erroneous readings in regard to the peak-to-average composition of the program material. While peak limiters or compressors are very often employed to protect the HF drivers, they sometimes have the opposite effect. Consider the fact that while the peak limiter may prevent extreme excursion of the diaphram, it does not change the average power of the signal in any appreciable amount. The compressor would modify the average program power for a given input. However, once these devices have been installed, the operator feels he has more freedom with the level controls and promptly increases the drive to the compressor to get more loudness. Obviously, more loudness means more average power and the whole affair is back where it started with one important difference. The electronic system now has more average power capability before audible distortion occurs and the diaphrams are placed in more jeopardy than ever before even though they are protected from heavy transients.

In bi-amplified systems, the direct connection between amplifier output and HF transducer produces some additional problems. In the first instance, the lack of low frequency protection normally afforded by the network allows turn-on thumps, D.C. shifts and AC line transients to be passed on to the driver. This may account for broken leads on the phenolic diaphrams and stretched surrounds on aluminum diaphrams. These non-fatigue type failures are easily identifiable at the factory. Secondly, some amplification systems may provide considerably more average power when used only from 500 Hz up. Also the monitoring of program material before the low level dividing network will not properly indicate the power being fed to the HF unit. The net result may be excessive input to the HF units in a system without the operators knowledge. While we have not been able to verify this second condition in the field, we have had to allow the possibility that such a condition can exist. Therefore, if factory inspection of diaphrams indicates fatigue or overheating, we have to inform the user that he is overdriving the unit. What we really mean is that he is using too much average power. When used with a JBL network, the HF units can only be damaged by overdriving.

The only safe statement one can make to users who intend to run maximum power is to warn them about the true sine-wave power rating. Proper horn use is assumed, of course, for whatever crossover point the user selects.

In the case of the 2470 and 2480, we are working on improved diaphram designs which should make them relatively "foolproof". Aluminum diaphrams will continue to be delicate devices to be applied and used with care.

I hope this long article will give you some guidance in the use of HF drivers in general.