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Prepared by Pete Horsman, Professional Products Application Engineer. James B. Lansing Sound, Inc.

# PRO-NOTE

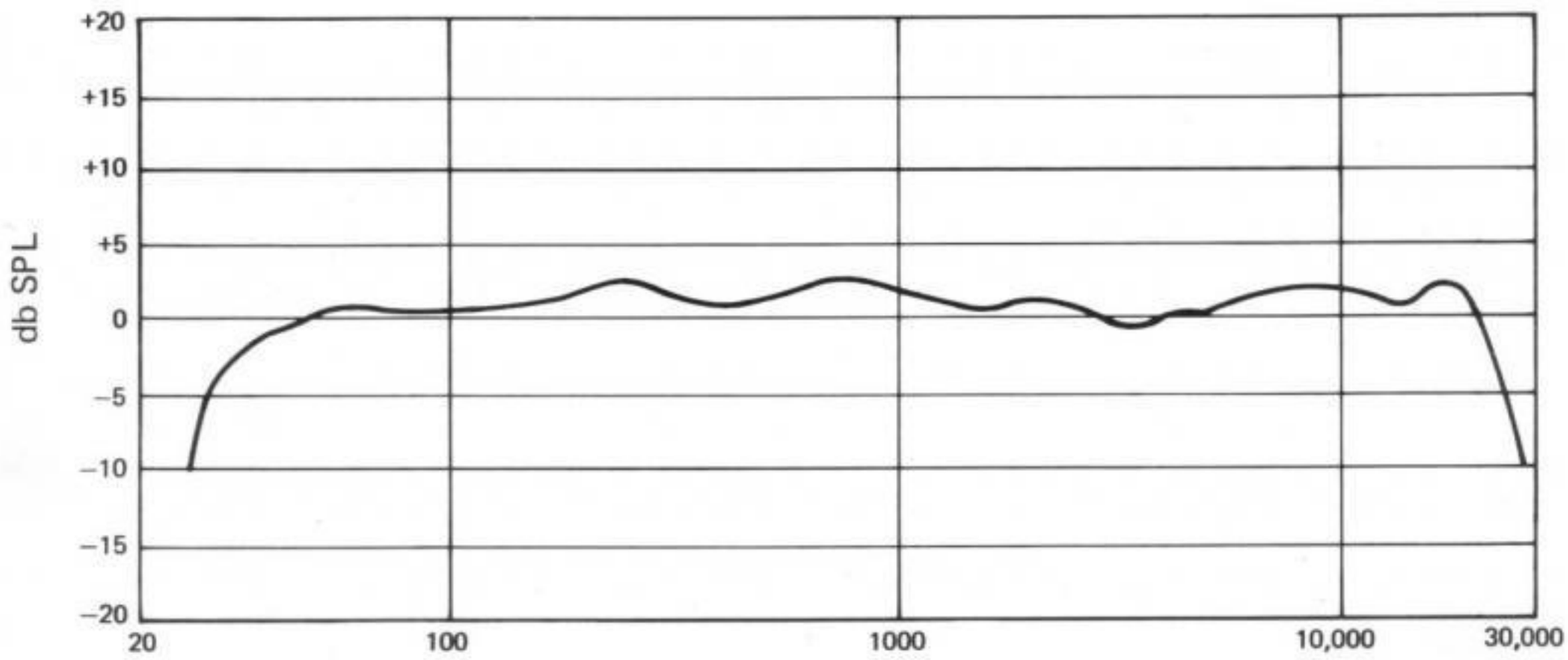
## New Monitor On The Way

Two prototypes of the new model 4350 Studio Monitors have completed the rounds of field testing and product release should take place any day now. Reaction from the studios who took part in the testing has been very good. The systems have been placed in a number of the well known studios in our area and with their help and contributions the 4350 has evolved into a product worthy of the JBL nameplate.

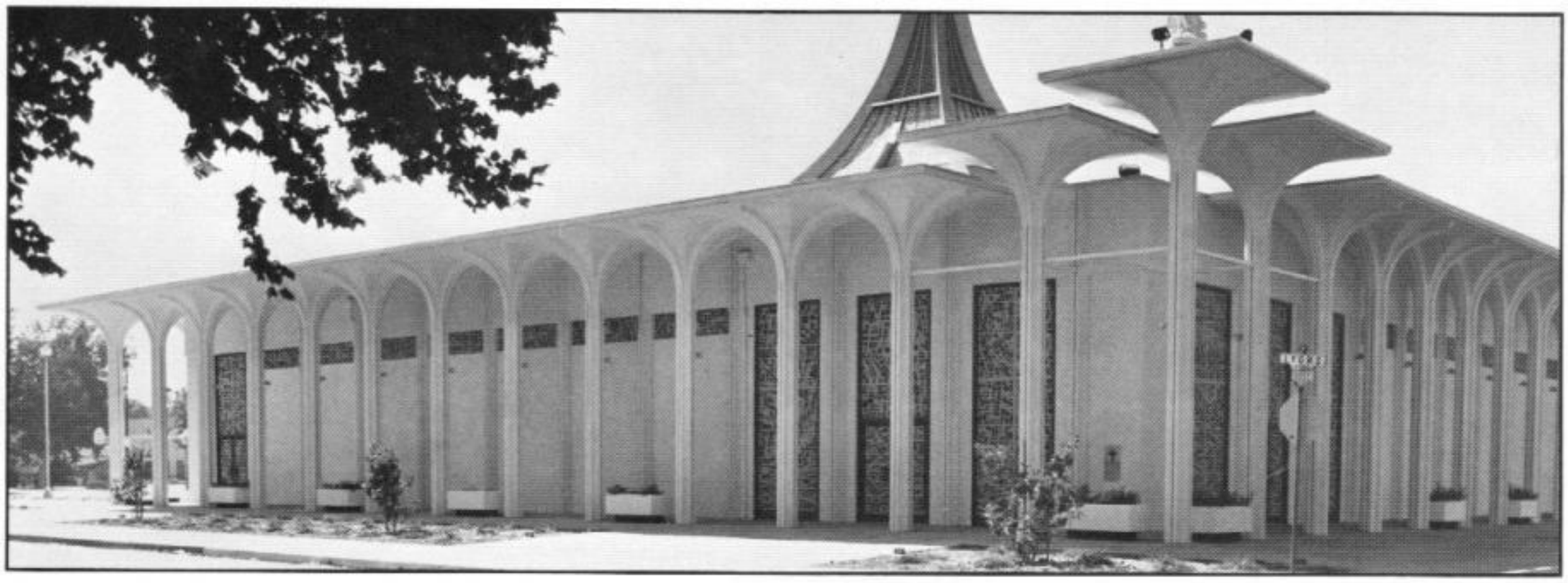
The system is designed to be bi-amped with a 250 Hz electronic crossover. Two 2230A transducers reproduce the frequencies below 250 Hz with outstanding clarity and power.

Above 250 Hz the system starts into a 2202A mounted in its own sealed sub-enclosure. A passive 1200-Hz crossover blends the 2202A into a 2240 compression driver with a 2392 horn/lens assembly. The 2440 is allowed to run out at its natural rate and a 2405 is brought in at 9500 Hz to extend the upper frequency range. The overall unequalized response is from 30 to 21,000 Hz ±3 dB. Equalization can further improve the 1/3-octave bandwidth response providing 25 to 20,000 Hz ±1 dB.

Maximum power handling capacity has not yet been determined by test, but levels of 120 dB SPL (20-20,000 Hz pink noise bandwidth) can be achieved at 6 feet with a 6010B amplifier for bass and a 6006B amplifier for high frequency. A difference of approximately 3 dB will give flattest response.




On-axis response curve of the 4350.



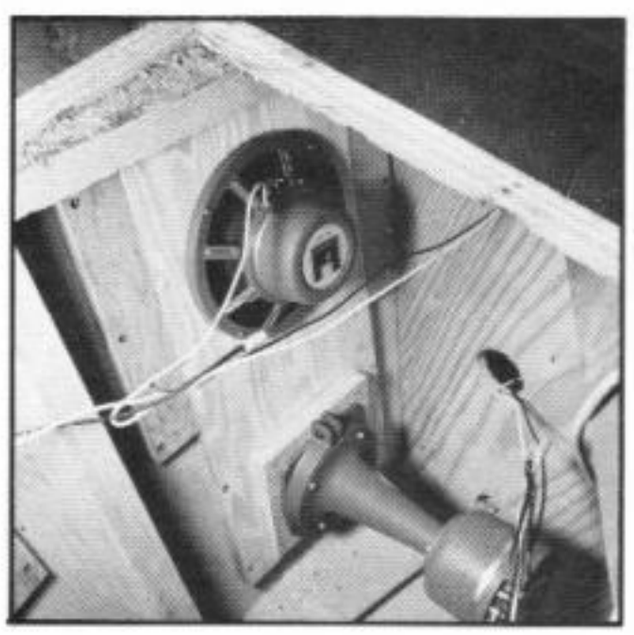
*The latest addition to our list of "Jobs Of Note By JBL Contractors, Using JBL Equipment" is the Sacred Heart Church in Turlock, California. Essentially completed almost a year ago, equalization of the sound system could not take place until July because the stained glass panels in the ceiling peak were not installed until then.*

*Features of the structure, designed by Gilbert W. Goulart, Architect, make it a truly outstanding building.*

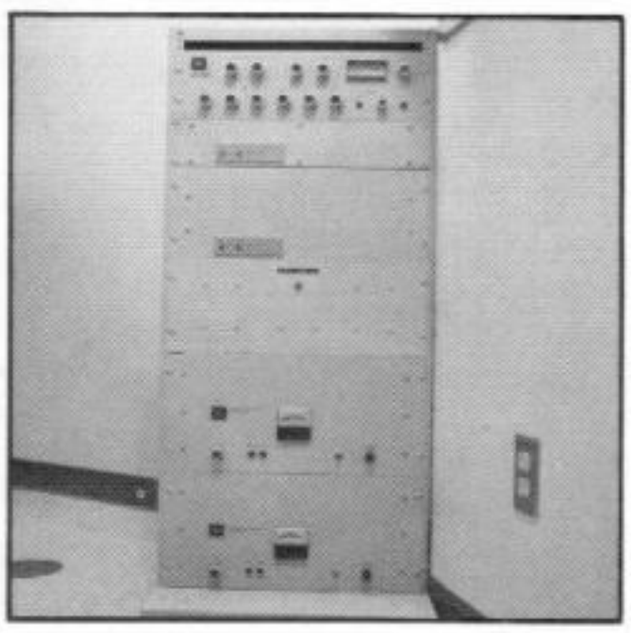
*Mr. Goulart and his Electrical Consultant, Maxon Sayre, personally reviewed sound system proposals submitted by various contractors until the optimum system/dollars proposal was selected. Worth noting is the fact that Justin Kramer, Inc., the successful designer/contractor, was not the low bidder.*

*George Augspurger, Perception Inc., pictured here performing the narrow band equalization for feedback and ring mode frequencies. A total of twelve narrow band filters had to be built on-site, in accordance with the "Boner Process," to achieve a level that would permit every member of the congregation to hear as though he was sitting in the first pew in front of the pulpit.*

*The main sanctuary is divided from the chapel by the glass wall seen on the left. The floors are carpeted, the ceiling is perforated metal acoustic-backed tile and the side walls are wood slat panels. The glass was the villian for most of the feedback problems.*



*Paired 2110 cone transducers and 2410 compression drivers with 2305 horn/lens assemblies, 14 pairs in all, are mounted around 210 degrees of the baldachin to generate the sound for the sanctuary. The flat response of the transducers and the JBL electronics contributed to the fact that only eight 1/3-octave filters were needed to flatten the system response.*



*JBL electronics all the way, (all dealers please note). A 5306 mixer with a 6010 for the bi-amped system and a 6006 for both high frequency reproduction and distribution, to the 2110 in the Pastors study and the two 2110's in the chapel.*

*Justin Kramer, Justin Kramer Inc., and George Augspurger, Perception Inc., attempting to isolate two ring modes found in the room. These ring modes were almost a classic example; when the noise generator was turned off the level would decay as expected in a reverbrant chamber, but, about 1/3 down an "Avon Lady" door chime sound could be clearly heard. The frequencies were isolated, neither frequency could be sustained for isolation by the more conventional "beat" method.*

## USE OF JBL SLIDE RULE

In our day-to-day audio system design and sales situations, we are often confronted with conditions that require us to make important decisions involving complex mathematical computations. Usually such decisions must be made with an eager-to-buy customer hanging over our shoulder.

The JBL Horn Performance/Ohms Law Slide Rule is the answer for those situations where instant design is a necessity. When presented with complicated data or comparative proposals, the ability to produce quick, irrefutable facts could mean that additional sale. From the efficiency chart on the front of the JBL slide rule, facts for a thumbnail design are readily at hand.

The following case history takes you step by step through just such a situation.

## HORN PERFORMANCE DATA

We have a large outdoor seating area to cover with voice announcements. The distance to the center of the area we want to cover is about 150 feet. We need at least 100 dB SPL, and we have determined graphically that our distribution segments will have to be approximately $20^{o} \times 40^{o}$.

1. Line the arrow up with the model number of each horn and read specifications of horn/driver combinations in the windows. The 2356 has the required pattern.

2. We elect to use the 2440 driver which, with the 2356, has an SPL of 69 dB (1 mw at 30 feet, EIA sensitivity).

## SOUND PRESSURE LEVEL

Knowing that 1 mw will produce 69 dB at 30 feet, we can determine the amount of power necessary for the 2440/2356 to project 100 dB at 150 feet.

1. Move the slide so that 30 on the DISTANCE scale is opposite .001 on the POWER scale.

2. Move the hairline to 69 on the SPL scale.

3. Without moving the hairline, move the slide so that 100 on the SPL scale (the required sound level in the problem) is under the hairline.

4. Locate the required distance projection, 150 feet, on the DISTANCE scale and read the necessary power on the POWER scale. The result is 30 Watts.

## OHMS LAW

We will now plan to connect the two horn/driver units to an amplifier with a known 70 V output with line matching transformers. We will determine the impedance tap for the necessary 30 Watts.

1. Move the slide so that 70 on the VOLTS scale is opposite 30 on the WATTS scale.

2. Read Impedance on the OHMS scale opposite the arrow — 165 ohms.

## PARALLEL RESISTANCE

We do not know the power rating of the amplifier, but we know that the impedance of the 70 V output is 65 ohms. We will check to be sure that our two transformers are not going to overload the system.

1. Move the slide so that 165 on the fixed scale is opposite 165 on the slide. Note: Match values on scale by color, i.e., red to red or black to black, and select values so that the result can be read at the EQUIVALENT RESISTANCE.

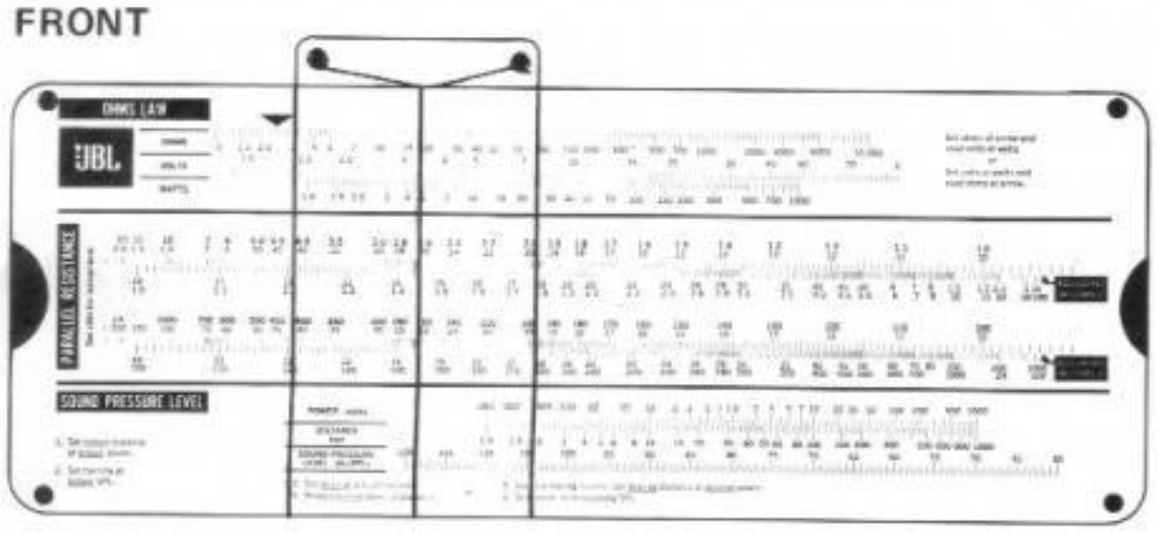
2. Read the resultant value at the arrow marked EQUIVALENT RESISTANCE — 82 ohms. The amplifier is not overloaded.

## SOUND PRESSURE LEVEL — COMPARATIVE DATA

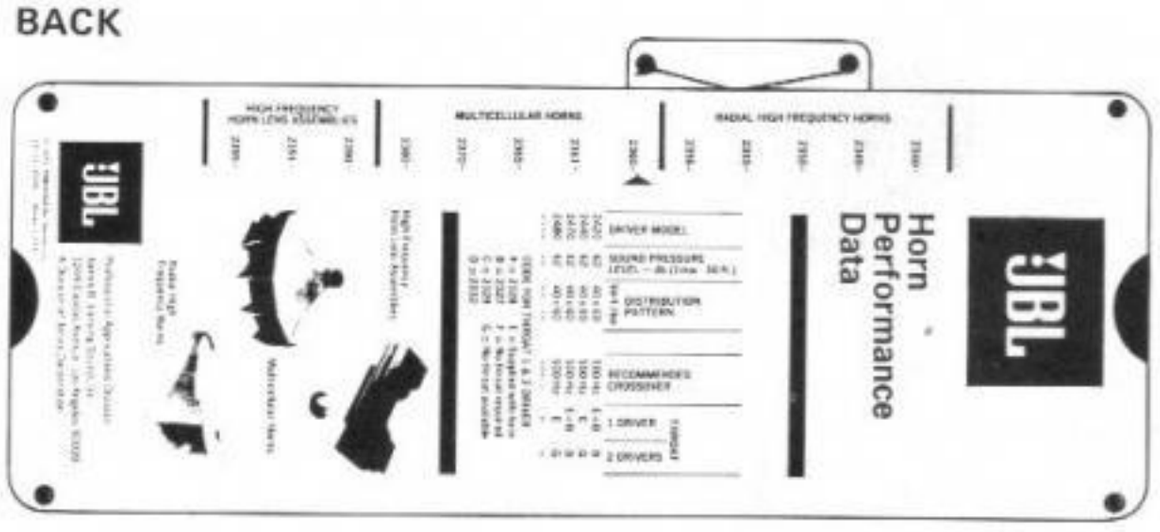
Our customer has presented us with a competitive proposal indicating that their product is more efficient, therefore more economical. The proposal data lists an efficiency of 110.5 dB at full power (100 W) at 30 feet with an equivalent horn, which appears to be more efficient than our proposal. We must convert the data to the same EIA standard for comparison.

1. Move the slide so that the given POWER, 100 Watts, is opposite the specified DISTANCE, 30 feet.
2. Move the hairline over the submitted efficiency, 110.5 dB.
3. Without moving the hairline, move the slide so the EIA standard relationship of .001 WATTS and 30 FEET are in line.
4. Read actual EIA sensitivity under the hairline. The result is 60.5 dB which is actually almost 9 dB down from the JBL proposal. The JBL offering therefore, is almost 9 $dB_{SPL}$ more efficient.

**FRONT**




**BACK**

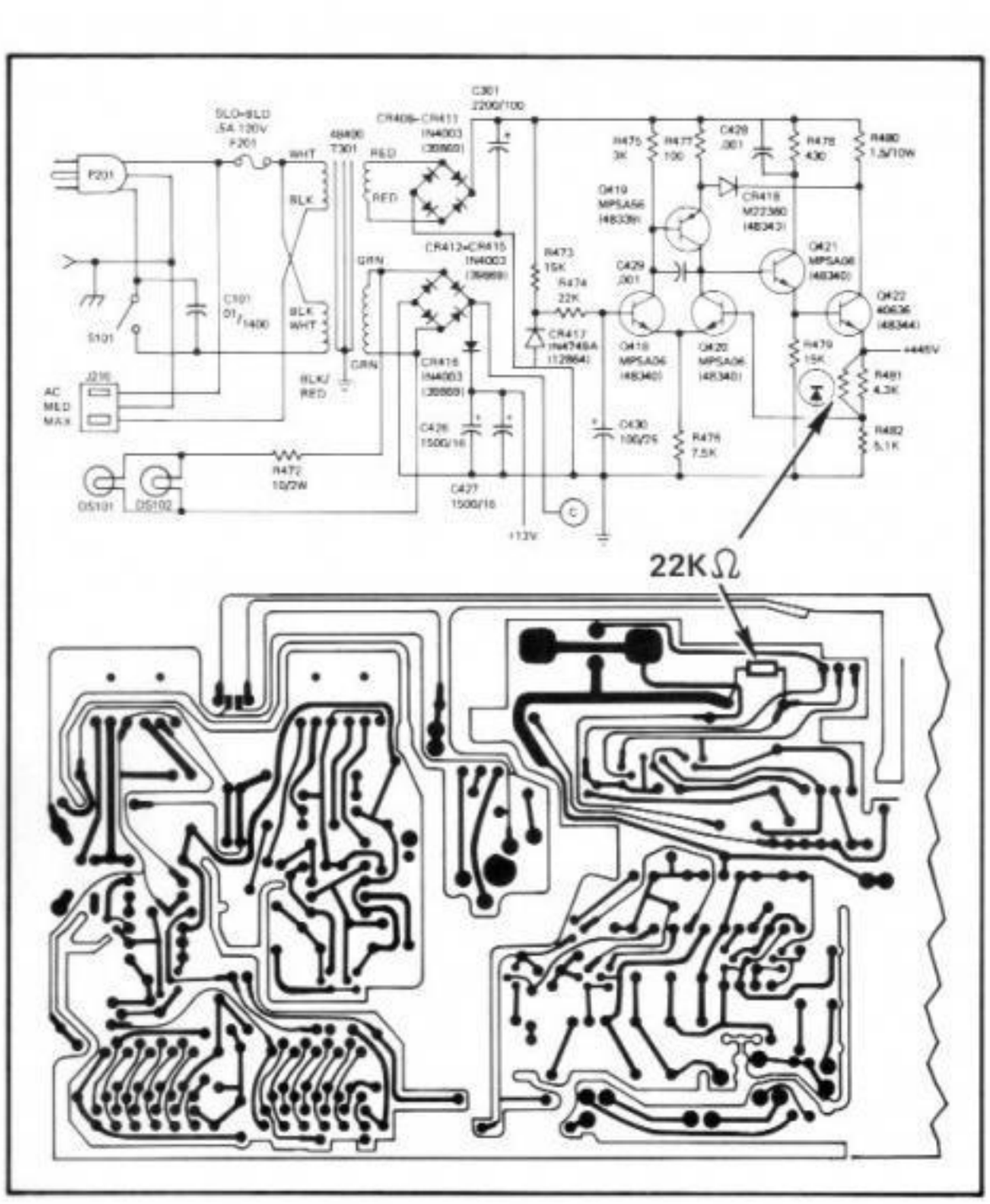


## 5308 Expander

Two 5308 Expanders can be connected into a 5306 Mixer with only a slight modification. The resulting system will provide 22 microphone inputs for fewer dollars per channel.

Addition of a 22K resistor across the existing 4.3K, R481 in the power supply circuit reduces the B+ supply voltage to 40 V without going out of regulation. The load of the second 5308 can then be accommodated and all specifications will hold with the exception of maximum output level. Maximum output capability will drop about 2 dB. (It's present capability is +24 dB).

Incidentally, this modification can also prove helpful in situations where the AC line voltage drops below 100 V. The 5306 power supply, without expanders, will normally go out of regulation if the AC line voltage drops below 97 V. If input levels are high and the line voltages drop even lower, oscillation can occur. This modification will minimize the oscillation tendency.




**MODIFICATION OF 5306 TO REDUCE B+ SUPPLY VOLTAGE.**

**Correction:**

A few small errors have been found in the printed material for the 5306. Reprints are under way, but for those who have the originals we list the errors here.

Page 4, left column line 14 erroneously indicates that the phono jacks are on the second program channel; they are on the first.

Page 4, left column, 11th line from the bottom, the jumper should be between pins 1 and 3 and not 1 and 2.

In the schematic, the lower right hand diode in each of the bridge rectifiers in the power supply section is shown backwards, and the designations for C505 and R511 are shown one device to the left of where they should be.

Major Parts List, the transformer numbers were reversed, T301 should be 48400 and T302 should be 47608. The numbers are shown correctly on the schematic.

## Consultants

The last issue of the PRO-NOTES listed consultants who could assist in design and equalization of sound systems. We would like to add a few more names to the list and invite more consultants to submit their names to us.

Lewis S. Goodfriend P.E.
140 Morris Street
Morristown, New Jersey 07960

Joiner-Pelton-Rose, Inc.
10110 Monroe Drive
Dallas, Texas 75229

KMK Associates
333 Old Terrytown Road
White Plains, New York 10603

Music and Sound, Ltd.
413 Johnson Street
Jenkintown, Pennsylvania 19046

Sprinkle & Associates
P.O. Box 10
Kensington, Maryland 20795