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TECHNICAL LETTER NO. 203

MEASUREMENT OF NOMINAL SENSITIVITY RATINGS FOR HORN-DRIVER COMBINATIONS COMMONLY USED IN ACOUSTA-VOICING®

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In design work for Acusta-Voicing sound systems, measurements of sensitivity ratings that can be duplicated in the field are essential.

The following procedure for measuring nominal horn-driver sensitivity ratings has been adapted at the ALTEC Engineering Laboratory.

1. Inputs

The input signal is a band of 'pink' noise generated by filtering the output of a GR 1382A Random Noise Generator through an ALTEC 9067B Band Pass Filter, properly terminated with 600 ohms and set to pass frequencies ranging from 500 Hz to 3000 Hz.

The input power is defined to be one watt delivered to the nominal driver impedance; i.e., 4.00 volts RMS for 16-ohm drivers, 2.83 volts RMS for 8-ohm drivers and 2.00 volts RMS for 4-ohm drivers.

Since the 500-3000 Hz 'pink' noise level will fluctuate, a long-time-constant ac VTVM will be more convenient to obtain these input measurements.

2. Test Setup (see Figure 1)

The sound pressure level (SPL) is measured four feet from the mouth of the specified horn, and on its principal axis. If the SPL is measured with a sound level meter (SLM), it will be convenient to use the 'RMS' slow position to average the fluctuations. If an anechoic environment is not available, measurements should be made outdoors.

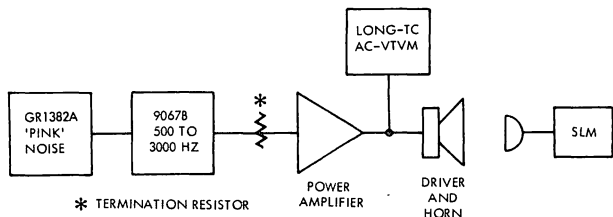


Figure 1. Block Diagram of Test Setup

3. Calculating the Sensitivities

If a SLM is used, the '1 watt nominal sensitivity' will be read directly. This reading can be extrapolated to any power level or distance by the following equation:

$$SPL_{x,p} = S_o + 10 \log P - 20 \log \left(\frac{D_x}{4} \right)$$

where

- SPL_{x,p} is the SPL at distance 'x' in feet and with 'p' watts power input
- S_o is the one watt at four feet value
- P is the power level in the field application
- D_x is the distance to the driver in the field

The SPLs shown in Table I have been extrapolated for the common horn-driver combinations and are given for 10' and 30' at the full power ratings for the various drivers.

The 730C driver unit has been included in Table I for convenience. The sensitivity of this unit compares favorably with the 290 throughout the 500-3000 Hz range but since its high sensitivity is achieved at the expense of bandwidth, it is recommended only for speech reinforcement applications.

The 288-series drivers are assumed to have a power handling capacity of 20 watts, resulting in a SPL rating 3 dB lower than obtained for each of the full-power SPL ratings in the 291-16-series drivers. The 1-watt sensitivity measurements for the 288-series drivers are the same as those obtained for the 291-16-series drivers.

This data should be considered as tentative and subject to an error of ±1 dB due to variances in driver elements and extrapolations from anechoic measurements.

Table I. Field Sensitivity Measurements

Driver	Horn	Electrical Input Power	SPL at 30 Ft	SPL at 10 Ft	SPL at 4 Ft
291-16 291-16	203B 203B	40 watts 1 watt	110.0 dB 94.0 dB	119.5 dB 103.5 dB	127.5 dB 111.5 dB
290E 290E	203B 203B	100 watts 1 watt	110.5 dB 90.5 dB	120.0 dB 100.0 dB	128.0 dB 108.0 dB
730C 730C	203B 203B	75 watts 1 watt	110.5 dB 92.0 dB	120.0 dB 101.5 dB	128.0 dB 109.5 dB
291-16 291-16	803B 803B	40 watts 1 watt	109.0 dB 92.5 dB	118.5 dB 102.0 dB	126.5 dB 110.0 dB
290E 290E	803B 803B	100 watts 1 watt	109.0 dB 89.0 dB	118.5 dB 98.5 dB	126.5 dB 106.5 dB
730C 730C	803B 803B	75 watts 1 watt	109.0 dB 90.5 dB	118.5 dB 100.0 dB	126.5 dB 108.0 dB
291-16 291-16	1003B 1003B	40 watts 1 watt	106.5 dB 90.5 dB	116.0 dB 100.0 dB	124.0 dB 108.0 dB
290E 290E	1003B 1003B	100 watts 1 watt	107.0 dB 87.0 dB	116.5 dB 96.5 dB	124.5 dB 104.5 dB
730C 730C	1003B 1003B	75 watts 1 watt	107.0 dB 88.5 dB	116.5 dB 98.0 dB	124.5 dB 106.0 dB
291-16 291-16	1203B 1203B	40 watts 1 watt	103.5 dB 88.0 dB	113.0 dB 97.5 dB	121.5 dB 105.5 dB
290E 290E	1203B 1203B	100 watts 1 watt	104.5 dB 84.5 dB	114.0 dB 94.0 dB	122.0 dB 102.0 dB
730C 730C	1203B 1203B	75 watts 1 watt	104.5 dB 86.0 dB	114.0 dB 95.5 dB	122.0 dB 103.5 dB
291-16 291-16	311-60 311-60	40 watts 1 watt	110.0 dB 94.0 dB	119.5 dB 103.5 dB	127.0 dB 111.5 dB
290E 290E	311-60 311-60	100 watts 1 watt	110.5 dB 90.5 dB	120.0 dB 100.0 dB	128.0 dB 108.0 dB
730C 730C	311-60 311-60	75 watts 1 watt	110.5 dB 92.0 dB	120.0 dB 101.5 dB	128.0 dB 109.5 dB
291-16 291-16	311-90 311-90	40 watts 1 watt	106.5 dB 90.5 dB	116.0 dB 100.0 dB	124.0 dB 108.0 dB
290E 290E	311-90 311-90	100 watts 1 watt	107.0 dB 87.0 dB	116.5 dB 96.5 dB	124.5 dB 104.5 dB
730C 730C	311-90 311-90	75 watts 1 watt	107.0 dB 88.5 dB	116.5 dB 98.0 dB	124.5 dB 106.0 dB