

ALTEC LANSING
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TECHNICAL LETTER NO. 197

CALCULATING THE MAXIMUM ELECTRICAL POWER REQUIRED

By Don Davis©

Calculation of the electrical power required (EPR) to achieve the calculated acoustic gain was demonstrated in Technical Letter No. 181, "Inverse Square Law Calculator". The Hewlett Packard Model 9100A Calculator enables use of a newer formula to more rapidly and easily calculate maximum EPR from standard ALTEC nomographs:
(eq 1)

$$[(T) SPL_{max} + 10] + \Delta [D_1 > D_c = D_c] - [(L) eff] - 12 \text{ dB} = \text{EPR in dB}$$

Where $[(T) SPL_{max} + 10]$ is the maximum sound pressure level (SPL) in dB, expected at the sound system microphone, plus a 10-dB peaking factor.

$\Delta [D_1 > D_c = D_c]$ is the distance from the microphone to the loudspeaker in dB. Δ is $20 \log_{10}$ and D_1 is limited by D_c .

$[(L) eff]$ is the loudspeaker's efficiency rating in dB-SPL at 4 feet with 1 watt of electric input power.

- 12 dB is the adjustment to compensate for the 4 foot measuring distance in front of the loudspeaker.

EPR in dB is electrical power required, referenced to 1 watt.

Use the nomograph of Figure 1 to convert EPR in dB to EPR in watts.

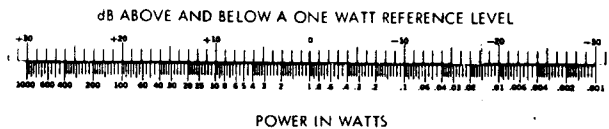


Figure 1. Power Conversion Scales

Two Examples

EXAMPLE 1

Assume the following conditions:

A performer delivering 100 dB-SPL to the sound system microphone.

An ALTEC 844A Loudspeaker System with an $[(L) eff]$ of 99 dB-SPL.

D_1 is 30 feet.

D_c is 20 feet.

Substituting these values in the new formula:
(eq 2)

$$(100 \text{ dB} + 10 \text{ dB}) + (26 \text{ dB}) - (99 \text{ dB}) - 12 \text{ dB} = 25 \text{ dB}$$

Then locating +25 dB on the upper scale of Figure 1, read 316 watts on the lower scale..... Back to the old drawing board!

EXAMPLE 2

Assume the conditions of example 1, except use ALTEC 288D Loudspeaker Drivers in a full-sized sound system with an [(L) eff] of 112 dB-SPL. Now obtain:

(eq 3)

$$(100 \text{ dB} + 10 \text{ dB}) + (26 \text{ dB}) - (112 \text{ dB}) - 12 \text{ dB} = 12 \text{ dB}$$

Then locating +12 dB on the upper scale of Figure 1, read 16 watts on the lower scale. This is the MAXIMUM POWER PER AREA COVERED and should be available to each driver covering a separate area.

Using your ALTEC Inverse Square Law Calculator

The following procedure can be used to substitute your ALTEC Inverse Square Law Calculator for the nomograph of Figure 1.

Place 100 in the window marked dB-SPL 1 WATT
4" RATING

Add positive dB numbers to 100 on the scale marked

dB-SPL dB-SPL

Subtract negative dB numbers from 100 on the scale marked

dB-SPL dB-SPL

Read watts below on the POWER scale.
WATTS

Conclusion

When turning in your completed ACOUSTA-VOICE* system report, it would be most helpful to us if you included your calculated total power requirements as well as your components list. Be sure to take advantage of this knowledge in writing your specifications.

* T.M. of LTV Ling Altec, Inc. - Patent Pending