WATT'S THE LOAD

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Here is a quick and handy way to measure an amplifier's total connected speaker wattage load, with a reasonable degree of accuracy. Such a measurement would benefit, for example, the interconnect or sound/security contractor who wants to add speakers to an existing 25 or 70 volt paging system, but doesn't know what wattage taps were used; and it's inconvenient or impossible to physically look at every speaker.

Equipment Needed:

Two pieces of equipment are necessary: an audio tone generator that can put out a 1 KHZ constant tone and a Digital Multi-Meter (DMM) that has AC voltage and amperage reading capability.

The Method (for a 70 volt system):

1. Connect the tone generator to the amplifier's AUX (auxiliary) input, and select the 1 KHZ tone.

2. Turn the amplifier's volume control down to its minimum position, and turn on the tone generator.

3. With the 70 volt speaker line connected, set the digital multi-meter on AC volts and put the leads directly on the amplifier's 70V and COM (common) output terminals, as shown in diagram #1.
DIAGRAM # 1
METER CONNECTIONS FOR AC VOLTAGE

AUDIO TONE GENERATOR
(SET FOR 1KHZ TONE)

"AUX." INPUT 25/70V OUTPUT
PAGING AMPLIFIER

25/70 VOLT LINE TO SPEAKERS

DIAGRAM # 2
METER CONNECTIONS FOR AC AMPERAGE

AUDIO TONE GENERATOR
(SET FOR 1KHZ TONE)

"AUX." INPUT 25/70V OUTPUT
PAGING AMPLIFIER

25/70V

25/70 VOLT LINE TO SPEAKERS
4. Slowly turn the amplifier's volume control up until the meter reads 23.3 volts (1/3 voltage). A 23.3 volt output is used instead of 70 volts for some good reasons; mainly because pushing the system to its upper limits could damage aging components or human hearing should anyone be near the speakers! This tone will be penetrating. It may be wise to make arrangements to do this after regular business hours.

5. Without disturbing its controls, turn off the amplifier (or disconnect the AC line cord).

6. Referring to diagram #2, disconnect the 70V speaker lead and attach one test from the meter directly onto the unattached speaker lead. Put the other meter lead directly onto the amplifier's 70V terminal.

7. Set the meter to read AC amperes. Turn the amplifier back on, (or connect the AC line cord), pause a moment or two to allow the system to stabilize, and now read the current draw, in amperes, of the working system.

8. Calculate total system load as follows:

\[
\text{POWER (WATTS)} = \text{VOLTAGE} \times \text{AMPERAGE}
\]

HOWEVER, since the system was run up to only 1/3 voltage or 23.3 volts, both voltage and amperage readings must first be multiplied by 3 before multiplying by each other. The actual formula becomes:

\[
\text{POWER (WATTS)} = 3\times \text{V} \times 3\times \text{A}
\]

9. Now let's look at an example:

With system voltage set at 23.3 volts, the current draw reading on the meter is 80 milliamps (0.08 amperes). So . . . . . .

Multiply 23.3V x 3 to get 69.9V and . . .
Multiply 0.08A x 3 to get 0.24A amps

Then: \( \text{POWER} = 69.9V \times 0.24A \)
Thus \( \text{POWER} = 16.8 \text{ Watts} \)

The connected load is therefore 16.8 Watts!

In the above example, if the installation has a 35 watt amplifier and the total connected load is only 16.8 watts, then obviously there is ample reserve power for additional speakers.
25 Volt Systems

For 25 volt speaker systems, use 8.3 volts for the test (1/3 voltage), and the speaker load calculation remains as outlined above;

\[
\text{POWER (WATTS)} = 3V \times 3A
\]

Where the power, in watts, is once again the product of the voltage multiplied by the amperage, after first multiplying each by 3.