

10 An Audio System for CW Testing

In addition to the VEWD program described previously, a separate effort to develop an audio testing system for use at the 1993 ARRL New England convention was undertaken by Glenn E. Cabana, WA1HMF, and Charles F. Hunt, KC1OX. While independent of the VEWD program, the audio bar they developed is very useful, and sometimes essential part of the examination process.

10.1 Goals

There are several considerations in the design and implementation of an audio distribution system that are often overlooked. Sometimes overly complex approaches are taken to solve some simple basic problems. The primary design goal was reliability above all else. Its debut was intended to be the 1993 ARRL convention. Eight CW sessions of up to 15 candidates each were planned. The next goal was to use off the shelf parts, readily available to anyone wishing to undertake the task. Another consideration was the availability of individualized volume control for each candidate. By far, this is the most appreciated feature of the design. The least of the concerns was cost.

10.2 Implementation

The heart of the design is a totally passive distribution network that protects against shorts, provides near constant impedance regardless of using none, one or all 16 audio positions, and high frequency noise roll off. When combined with an off the shelf 20 Watt Public Address amplifier the package provided a simple, self contained amplifier and distribution system that met all of our goals.

Figure 10-1 is a schematic diagram of 4 of the 16 positions. As mentioned, the design utilized a 20 watt PA amplifier into which a small distribution circuit had been integrated. Two rows of eight holes are drilled through the cover of the amplifier for mounting the audio jacks. The jacks are uniformly spaced and serve as the base for the physical mounting of all components. Two buses mounted on standoffs, a ground and an audio input bus, formed an inner and an outer loop around the audio jacks.

In the following discussion audio jack J1 will be used as a reference. The remaining positions (J2 to J16) are identical. The design provides a 68 ohm isolation resistor, R4, that is always in the circuit. This provides protection from dead shorts on the output, a guaranteed session and amplifier killer.

A 1.0 microfarad capacitor, C1, serves to roll off high end noise. This is a definite need in some test environments. Another 68 ohm resistor, R3, provides a minimum load when no headphones are attached to the position. This resistor is switched in and out as headphones are plugged into the distribution panel.

Two ballast resistors, R1 and R2, provide the overwhelming impedance determining factor. The amplifier load will vary between 4 and 8 ohms depending upon the number of headphones connected and volume at each position.

Each audio position used requires a 20 foot extension cable, a 1 foot cable with volume control, and 1 set of headphones. With the addition of a cassette tape player the system provides a total of 16 positions, allowing 15 candidates to test and one VE to monitor the audio output.

Table 10-1 provides a parts list and approximate cost in 1995 dollars. The total cost for the system was spread over three VE teams in the Southern New Hampshire area. It has performed flawlessly at over 25 sessions and has greatly simplified the logistics of running the code examinations. At all three sites the code exams are given at the same time, and in the same room, as the written exams.

Table 10-1 Audio Bar Parts List

Qty	Description	Part Number	Unit Cost	Cost
1	Audio Cassette Player	Radio Shack 14-1150	\$29.99	\$29.99
1	20 watt Audio PA Amplifier	Radio Shack 32-2034	\$79.99	\$79.99
16	Closed 1/8" 3 conductor mini-jacks	Radio Shack 274-246	\$1.59/2	\$12.72
32	Resistor, 68 ohms, 1/2 watt	Radio Shack 271-1106	\$0.49/5	\$3.43
16	1.0 microfarad capacitor	Radio Shack 272-996	\$0.99	\$15.84
2	Resistor, 20 ohms, 5 watts	Mouser 28PR004-20	\$0.39	\$0.78
16	20 foot extension cables,	Radio Shack 42-2462	\$6.39	\$102.24
16	1 foot cables with volume controls	Radio Shack 42-2459	\$4.99	\$79.84
16	Nova-35 headphones	Radio Shack 33-1100.	\$5.99	\$95.84
		Total Cost (1995 prices)		\$ 420.67

Figure 10-1 Audio Bar Schematic



