

Lucent



BOGEN[®]

PAGING SOLUTIONS

Technician Installation Tips

Revision 1

3-02-2000

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1 – Wiring Tips

The following wiring tips pertain to general information that will make your paging installation activities simpler. A vast majority of problems encountered during and after the paging installs are the direct results of some basic wiring principals. This document will address some of those issues and should be read prior to the installation of any permanent paging speaker wire and/or the ordering of speaker wire.

1. Review the 70-volt speaker wire limitations chart (provided) to determine the maximum wire lengths as related to the total wattages of each wire run.

How to use the Wiring Chart:

- Add up the total speaker taps of all the speakers to be placed on a wire run.
 - Find this number at the bottom of the chart and read straight up to the wire gauge line(s).
 - At the point it crossed the gauge of the wire being used, read leftward to the maximum length of wire. (Examples normally sent with design(s) would read; “Do not exceed 30 watts speaker tap per 650’ length of 22 Gauge. Shielded wire.” Having done this, follow those rules for your own project.
2. Before connecting any speaker wire to the paging system, test each speaker run for overload problems, reversal, shorts, crosses, etc. All speakers must be wired with the same polarity. Take a Multi-meter or Impedance meter and measure an “open” between Tip and Ring of each wire run. Now measure across Tip and Ring. This should not be a “short.” If you have a Impedance Bridge/Watt meter, measure and tag each wire run with its wattage.
 3. We recommend that minimum of 22 gauge shielded twisted pair wire to be provided. Ordering information: is:

	PVC	Plenum
PEC Code:	2734-SPK	2734-SKP
Com Code:	401882956	408335628
 4. Never mix speaker types on any speaker wire run. I.e., standard horns and radial horns, cone type speakers and horns, EZ Install™ and standard indoor speakers, etc.
 5. Ground the shield at the Amp or control unit only and continue the shield through the wire run. Wire nut through the run and DO NOT terminate on the speaker or horn..

6. Never wire 70-volt (or 25-volt) speakers in telephone cables, including house cable. This will result in cross-talk and noise over the customer's in-house telephones and/or paging system.
7. In most situations it's best to limit the amount of speakers per wire run to 10 speakers or 5 horns. Verify load limitations by following the wire limitation chart. Multiple wire runs can be bridged together on a connector block or terminated on the amplifier or controller.
8. It is *not* necessary to bid a separate wire run for each speaker unless it is to be isolated for some purpose of zoning or talkback. The quantity of speakers per wire run will likely need to be adjusted to the site situation, i.e., six (6) ceiling speakers in a room can be on the same wire run, not limited to 4. The purpose of placing a quantity number is merely to establish the technical limits to be observed.
9. When placing wire to horn speakers, remember the possibility the speakers may be tapped at a higher level some time in the future (if dB levels are raised); therefore, it is always wise to provide sufficient wire gauge and length to permit this increase. Each tap setting on a horn speaker *doubles* the setting before it. All wire runs involving horn speakers should be engineered to accommodate a doubling of speaker tap without overloading the wire.
10. If the customer wants to reuse their wire and or speakers, be sure to properly survey the compatibility, including the wattage and voltage of existing speakers. Use a Load Meter to properly read the load.
11. Technicians installing overhead paging systems should have a digital multi-meter for measuring resistance. Fluke, Craftsman and Micronics all manufacture this type of meter. In addition, each work center should obtain a Gold-line ZM-1L impedance/watt meter. The Gold-line meter is available from the Technician Catalog at <http://www.carlton-bates.com>.

2 – Tech Tips for Installation and Maintenance

Avaya Technologies recommends that all technicians responsible for the installation and maintenance of our customer's paging products first review the manual for proper installation methods.

The following are some basic "tech tips" which will help the technician identify and isolate paging issues during the installation and/or maintenance functions:

1. Verify that a minimum of a 4-inch clearance is provided that separates each Paging component, i.e., TPU Amplifier, PCM 200 System, Feedback Eliminator, etc.
2. Before terminating any wire, power up the equipment and verify that the power LED are on. If not, power down and verify good electrical outlets. Try again.
- 3a. Installation functions: before terminating speakers or speaker runs, verify that the wire is clear of shorts, opens, cross wires, and/or Tip/Ring to ground. Use a Multi-meter to perform these tests (see last Section).
- 3b. Repair functions: before replacing any equipment verify, speaker runs are clear of short, opens, cross wires and/or Tip/Ring to ground problems (see last Section). Verify all connections between the equipment.
4. When testing of speakers runs are completed, connect a speaker to the 70V Output of the Amplifier or a zone on the PCM System. Use the *Night Bell Contact Closure* and place a short on them. Verify ring on the speaker(s). If there is no ring, check speaker wire runs or connections between the Amplifier and the PCM system.
- 5a. Single Zone System: Follow the owner's manuals to connect the Amplifier to the page port or a UPAM. If a page port, complete a test page. If no page, check connections and volume controls. If using a UPAM, configure for Loop Start and connect your test set to Tip and Ring. Go off hook to complete a test page. If no page, check connections and volume controls. Power down UPAM and configure for your phone switch.
- 5b. Multi Zone System: With no power on the unit, add all PCM Zone(s) and PCM Add(s) to the system. Configure for Loop Start. Power up the PCM 2000 system. Verify all modules have power LEDs on. Place you test set into the Operator Override and go off hook. . This will give you a test page. If no page, check connections and volume controls.

Now place your test set into Tel Line. From here you will do all of the programming. Remember to slide the switch in program on the CPU module. Follow all programming codes by a #. To dial zones is 01 to 99 for each zone, 00 for an All Page. When you are done with the programming, hang up and power down. Configure the PCM 2000 System for your phone switch. Power back up and connect to the switch.

If there are any questions, call your appropriated Technical Support line for assistance: NSC: 800-552-3293, TSC: S00-94S-1234

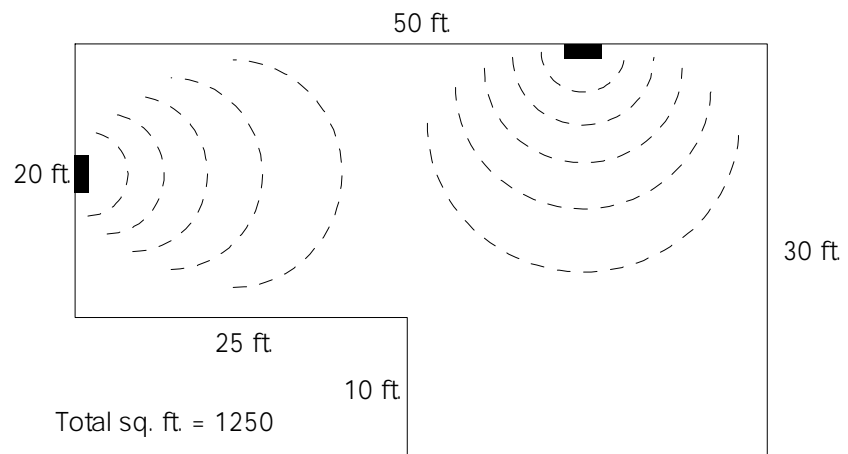
3 – General Installation Principles

Universal Cabinet Speakers

The universal cabinet speaker is used when recessed ceiling mounting is not possible or desirable. The universal cabinet speaker serves both as a wall-mounted speaker and a bi-directional corridor speaker. Mounting height is normally 8 to 15 feet above the floor and individual speakers are spaced no more than 15 to 20 feet apart when wall-mounted, or 40 feet apart when used as bi-directional corridor speakers. Generally, two speakers should not be mounted directly opposite each other on opposing walls. This is especially true when the paging system features “talk-back” (see Figure 7-1).

Figure 3-1

Correct Placement of Universal Cabinet Speakers



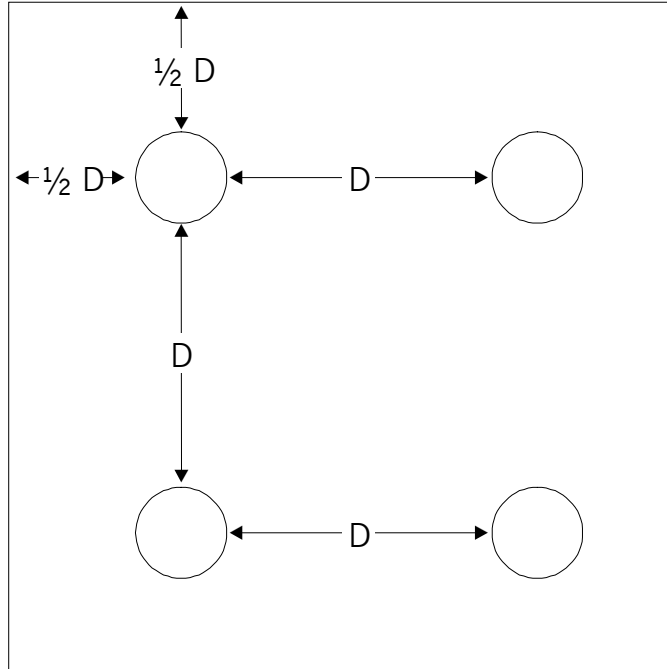
Recessed or Surface-Mounted Ceiling Speakers

In a recessed ceiling installation, speakers are mounted above the ceiling with only the baffle visible. In a surface-mounted ceiling installation, they are mounted on the ceiling. In either case, they should be positioned in staggered rows, if possible (see Figure 7-2). The distance between speakers is determined by the ceiling height (see Table 7-1). The total number of speakers required in a room should be calculated as part of the overall paging system layout.

Figure 3-2

Correct Placement of Recessed and Surface-Mounted Ceiling Speakers

NOTE: The layout shown in Figure 6 is applicable for recessed and surface-mounted speakers.



Distance of D is determined by ceiling height

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Table 3-1

Recessed and Surface-Mounted Speaker Spacing

Ceiling Height (Feet)	Speaker Spacing (Dist. D.)
8 – 11	25
12 – 15	30
16 – 19	35
20 – more	40

Paging System Layout

Generally, the paging system will have been laid out prior to speaker installation. This layout plan should include the type of speakers, speaker placement and power settings.

Some considerations that may affect system design, due to changes in the situation or customer preference, are listed below:

Room Acoustics — Rooms with hard surfaces (bare walls, floors and ceilings) and little furniture are classified as “LIVE” and require lower power settings. Locate the speakers near the listener. This reduces distortion caused by sound bouncing in the room. Rooms with soft surfaces (drapes, wall hangings, carpet, acoustic tile, large pieces of stuffed furniture, etc.) are classified as “DEAD” and may require additional speakers placed more closely together.

Distances — Distances between speakers and listeners or between speakers and telephones may have changed since the system was designed. Speakers that are located closer than 10 feet to telephones used for paging may experience feedback. If feedback occurs, either speaker or telephone will have to be relocated. A speaker located too close to an individual's workstation may have to be set at such a low power setting that it cannot cover its complete area.

Speaker Wiring Methods

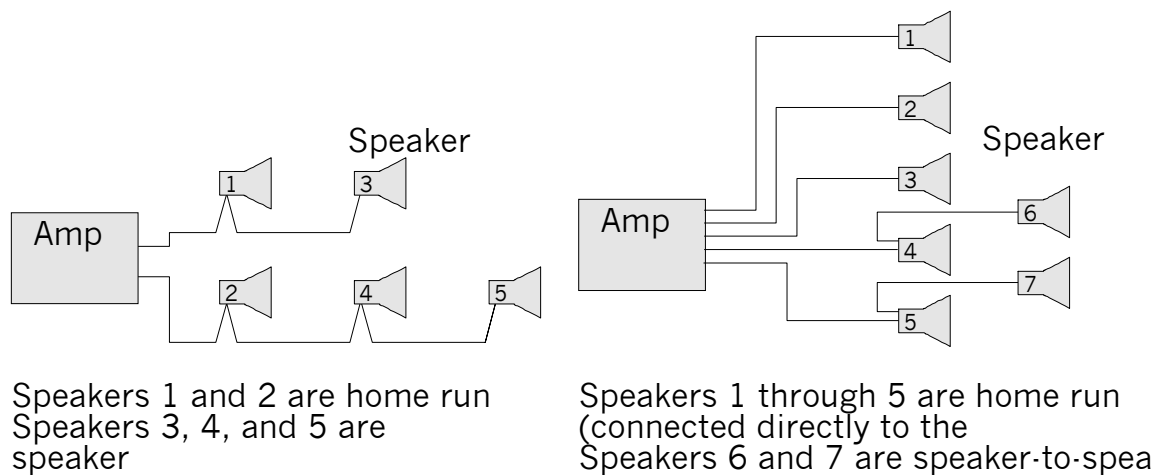
There are two methods of wiring speakers:

Home Run Method — Each speaker is connected directly to the amplifier or PagePac (see Figure 7-3).

Speaker-To-Speaker Method — Speakers are reconnected to each other, with the first speaker in the run being connected to the amplifier or PagePac. The Speaker-to-Speaker method is preferred when more than two or three speakers are required (see Figure 7-3).

Figure 3-3

Home Run and Speaker-to-Speaker Wiring Methods

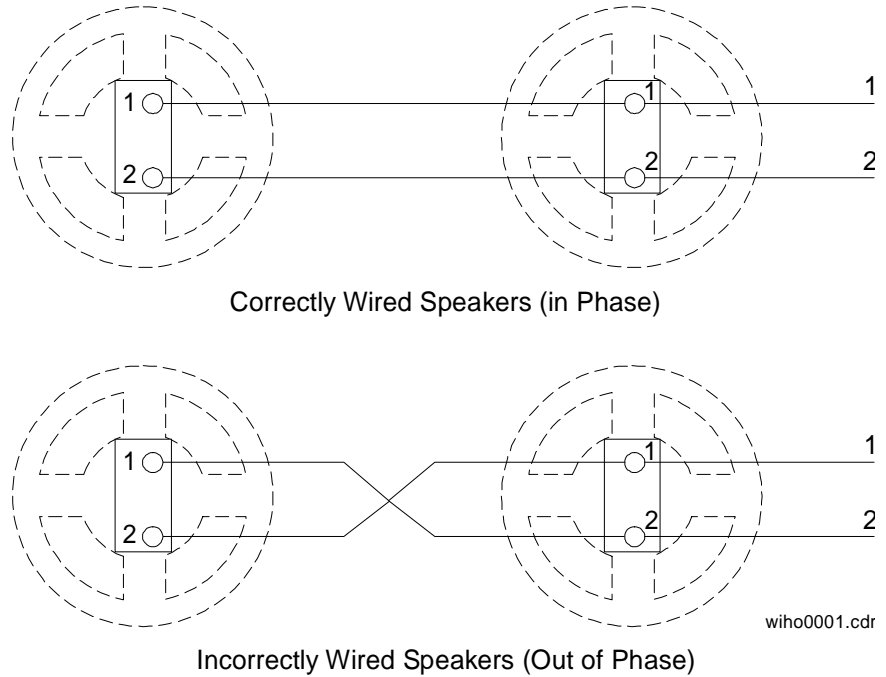


Speaker Phasing

When the Speaker-to-speaker method of wiring is used, speakers must be kept in phase. Connecting all number 1 terminal together and all number 2 terminals do this together (see Figure 7-4).

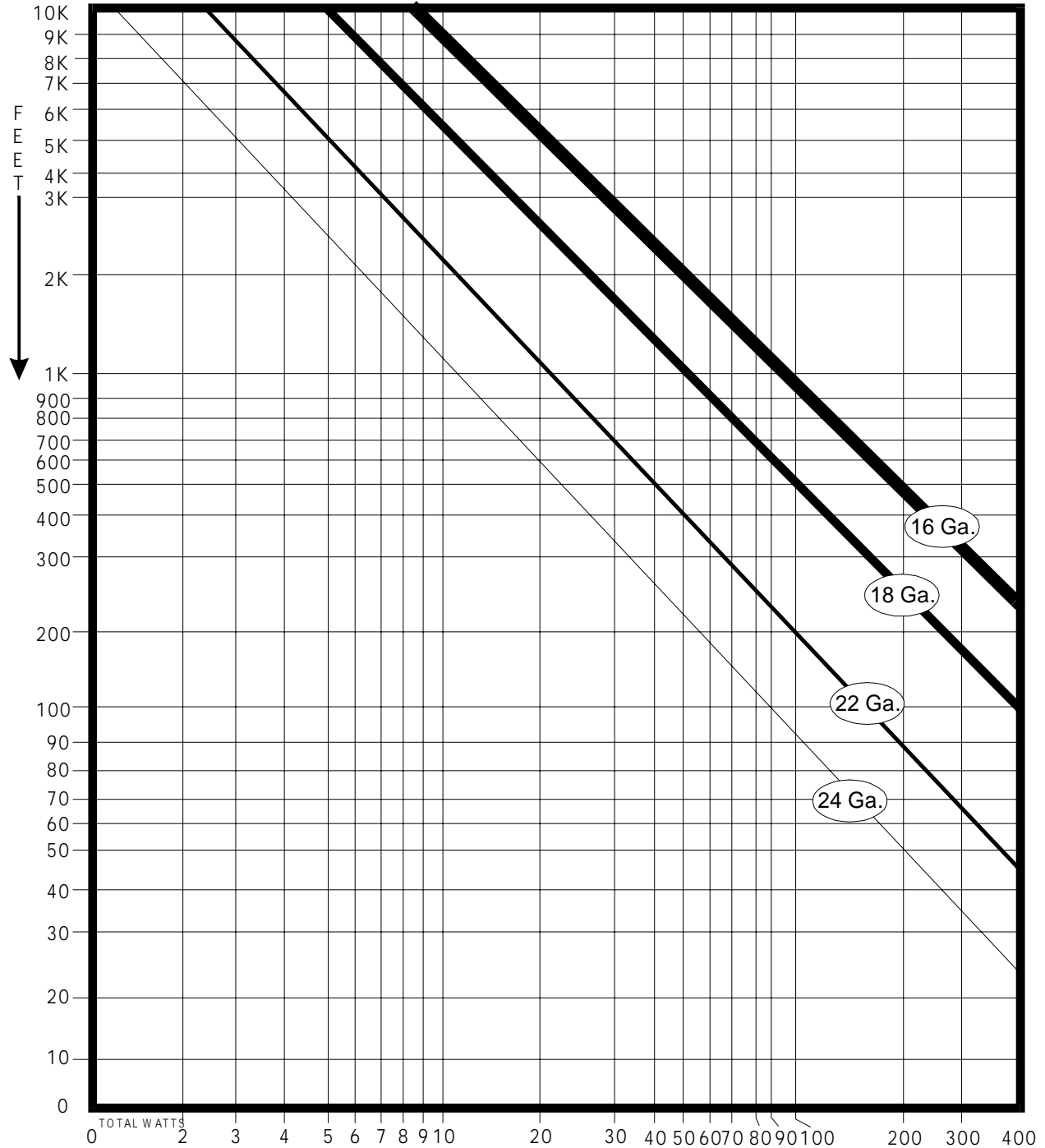
Figure 3-4

Correct and Incorrect Speaker Phasing



4 – 70-volt Speaker Wiring Limitations Chart

Instructions: Determine the combined output in watts for ad speakers on a line. Find that value at the bottom of the chart. Follow the nearest vertical line up to its intersection with a diagonal wire size line. Follow the horizontal line nearest the intersection to the left side of chart. Read the maximum length in feet from the feet line.



Add the Total Watts of All Speakers on a Wire Run.

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Use shielded wire on all 70-volt speaker runs.