How to Set Up a Public Address System

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Have you ever tried to hold a meeting in front of a large group of people only to be drowned out by the din around you? Do you wish that you could broadcast music or the soundtrack of a movie over a large space and still be able to hear it? Would you like to give a presentation in a noisy convention and be able to catch the attention of passersby? With the help of an appropriately powerful public address (PA) system, these problems and more will cease to be issues in your event planning needs!

This set of instructions will teach you how to acquire a PA system using the services provided to departments and organizations of Virginia Tech, assemble the component parts, and operate and troubleshoot the system. They make no assumptions about technical knowledge and only require access to an electrical outlet and the ability to transport and lift a 35-pound speaker. The only topic that these instructions do not cover is how to utilize your system once it is assembled!

It is recommended that these instructions be read completely through, in order to determine if the system is indeed suitable to your needs, before proceeding to reserve one. However, if your intended function would be helped by the system, these instructions will guide you through the setup process.

A Few Notes about Safety

Like most consumer electronics, the PA system used in these instructions has been constructed to withstand a good deal of punishment. However, common sense should be used in its implementation. For instance, the general precautions used for any electronic device are applicable here. That is, the system should not be used in a situation with obviously shoddy wiring or in moist conditions such as marine applications or outside in the rain.

Additionally, the main part of the system, the speaker, weighs around 35 pounds and will be supported on a stand 4-6 feet in the air. A firm, level location for should be selected the stand, and care should be taken during the erection process. The speaker itself is reinforced against shocks, but not a drop of several feet. Also, a falling object of this weight can do a lot of damage to any feet or other appendages in its way.

Equipment Needed

*All of these items are available to borrow from Virginia Tech's Classroom Audio/Visual Services (CAVS) as part of their PA System package (**Figure 1**), as described in the "Acquiring a System" section.*
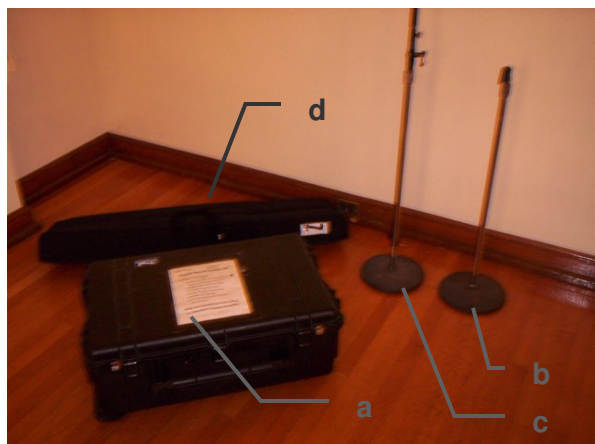

Figure 1: System Components

A. XTREME Sound System
   • Speaker, Anchor Audio model XTR-6000CU2
   • Wireless Handheld Microphone, Anchor Audio model WH-6000
   • Wireless Lapel Microphone, Anchor Audio model WB-6000
   • XLR Microphone (corded)
   • 25' Extension Cord
   • 6' TRS (also known as a "headphone jack") Cable
   • 1/4" Male – 1/8" Female TRS Adapter Jack
B. Conventional Microphone Stand
C. Boom Microphone Stand
D. Speaker Stand

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Acquiring a System

Audio/Visual equipment can be borrowed for free from Classroom Audio/Visual Services by Virginia Tech departments and organizations.

1. **Submit** a reservation request for a "PA System" to CAVS in 204 Saunders Hall. *This should be done in person 3-5 business days before the desired pick-up date, using the forms available at the front desk.*
2. **Pick up** the system on the day of your event. *It should come with all of the parts shown above; if not, tell one of the CAVS staff members.*
3. **Transport** the system to your event site, either by vehicle or using the convenient rolling case if within walking distance.

Erecting the Speaker

After transporting it to the location of your event, the speaker must be put on its stand and connected to a power supply.

1. **Remove** the stand from its bag (**Figure 2**).
2. **Erect** the stand as follows:
   a. **Loosen** the lower collar knob (**Figure 3a**).
   b. **Separate** the stand legs until the cross braces are parallel to the floor (**Figure 3b**).
   c. **Retighten** the lower collar knob.
3. **Remove** the speaker from its case (**Figure 4**) by undoing the seven latches (**Figure 5**).
4. **Place** the speaker on the stand (**Figure 6**). *This is done by placing the hole in the bottom of the speaker on top of the speaker stand. Be careful, the speaker is heavy.*
5. **Adjust** the speaker to the desired height using the upper collar knob (**Figure 3c**).

Figure 2: Stand and Case

Figure 3: Erected Stand

Figure 4: Speaker Case and Contents
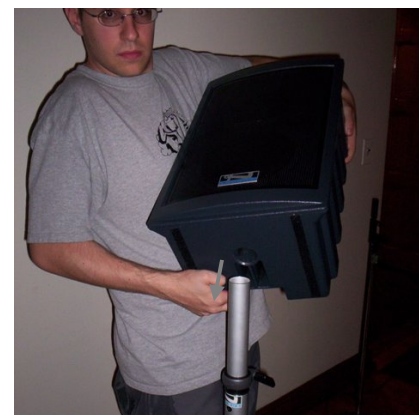

Figure 5: Latch Locations

Figure 6: Mounting the Speaker

*Move around to view the back of the speaker (**Figure 7**).*

6. **Connect** the speaker to a power outlet by unwrapping the power cord and plugging it in. *If the cord is not long enough, use the included extension cord for additional reach.*

Setting up the Audio Inputs

Depending on the specifics of your event, different audio inputs will be required. The system comes with the potential for four different types: both corded and wireless handheld microphones, a wireless lapel microphone, and an auxiliary headphone-style jack for connecting a CD player, computer, or other audio source. These devices can be used in any combination by using the appropriate instructions that follow.

LINE IN
(Auxiliary Input)

MIC IN
(Conventional
Microphone)

Power Switch

Power Cord

Figure 7: Erected Speaker

Handheld Wireless Microphone and Boom Stand

A handheld wireless microphone is a good choice for a town hall style meeting where a hands-free delivery is not required or a lectern-based presentation. It is the easiest microphone to set up.

1. **Remove** the handheld microphone (**Figure 8**) from the speaker case. *Note the on/standby/off switch noted in the figure.*
2. **Attach** the microphone to the clip on the boom stand (**Figure 9a**).
3. **Adjust** the boom stand to the desired configuration using the various adjustment knobs.
   - Lower collar knob (**Figure 9b**) – boom elevation
   - Pivot knob (**Figure 9c**) – boom pitch
   - Upper tightening knob (**Figure 9d**) – boom extension and rotation
   *Suggested configurations include up (**Figure 9**) for speaking or down (**Figure 10**) for instruments.*

off   on

standby

Figure 8: Wireless
Handheld Microphone

d   a

c

b

Figure 9: Boom Stand,
Up Position

Figure 10: Boom Stand,
Down Position

Lapel Microphone

A lapel microphone is a best suited for a situation where mobility and versatility is required.

1. **Remove** the lapel microphone (**Figure 11**) from the speaker case. *Note the on/off switch noted in the figure.*
2. **Affix** the battery pack to your waist (**Figure 12a**). *You can either clip this to your belt or place it in a pocket.*
3. **Attach** the microphone to your shirt (**Figure 12b**). *The microphone should be placed as close to your mouth as possible to pick up speech more easily while minimizing feedback.*
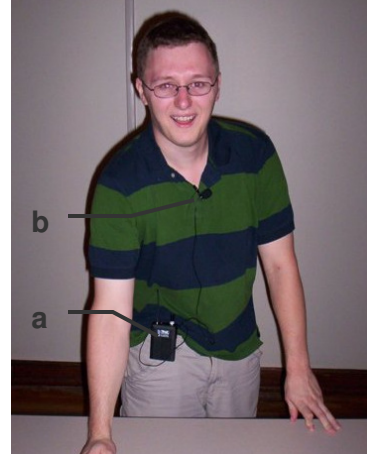
Figure 11: Lapel Microphone

Figure 12: Lapel Microphone in Use

Conventional Microphone and Conventional Stand

The conventional microphone included with this system is corded, meaning its range is limited by the length of the cable that must connect it to the speaker. It is good for a static application. In addition, it will always be broadcasting live as it does not have a built-in switch.

1. **Remove** the conventional microphone (**Figure 13**) from the speaker case.
2. **Plug** the microphone jack into the port labeled "MIC IN" on the back of the speaker (**Figure 14**).
3. **Attach** the microphone to the clip on the stand (**Figure 15**).
4. **Adjust** the stand to the desired configuration using the lower collar knob (**Figure 15a**) to control the elevation.

Figure 13: Conventional Corded XLR Microphone

Figure 14: Plugging the Conventional Microphone into the MIC IN Port

Figure 15: Conventional Microphone with Stand

Auxiliary (Headphone) Input

The auxiliary input can be used in any application where the audio device has a standard 1/8" headphone jack. It can be used to connect the speaker to things like a computer or CD player.

1. **Remove** the 6' TRS cable (**Figure 16a**) and 1/4" male – 1/8" female TRS adapter jack (**Figure 16b**) from the case. *TRS stands for "Tip-Ring-Sleeve," the names for the three metal contact points on a standard headphone jack.*
2. **Attach** the adapter to the cable as shown (**Figure 16**).
3. **Plug** the adapter-cable end into the port labeled "LINE IN" on the back of the speaker (**Figure 17**).
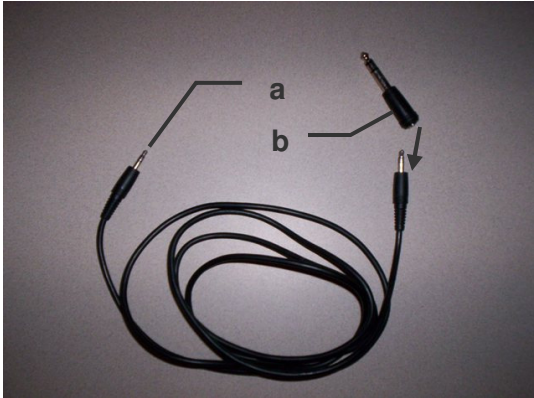4. **Plug** the free end into your audio device.

Figure 16: TRS Cable and Adapter Jack

Figure 17: Plugging the Auxiliary Input into the LINE IN Port

Operating the System

*After plugging in all of the aforementioned components, the speaker should look like **Figure 18**. It is recommended that a sound check be performed prior to your event to normalize the volumes and double check connections.*

Performing a Sound Check

To perform a sound check, you will need to test each audio device to be used and adjust the volume knob on the speaker to compensate for the difference in signal strength provided by the corresponding device. You will need an assistant to stand towards the back of your intended broadcast zone to listen to the output volume and give you recommendations regarding how to adjust the volume. Remember, depending on your event there may be a noisy crowd occupying the space.

b) UHF1: Lapel Microphone
c) UHF2: Wireless Microphone
d) LINE IN: Auxiliary Input
e) MIC IN: Conventional Microphone
a) Power Switch

Figure 18: Erected Speaker

1. **Turn** all of the volume knobs (**Figure 18b-18e**) to zero, the farthest position to the left. *This will prevent feedback, an unpleasantly loud sound caused by the microphones picking up too much sound emitted by the speaker, immediately after the speaker is turned on.*
2. **Switch on** the speaker at the power switch (**Figure 18a**). *An adjacent red light should begin to glow.*

If the wireless handheld microphone will be used:
3. **Switch on** the wireless microphone.
4. **Speak** into the wireless microphone.
5. **Adjust** the wireless microphone volume (**Figure 18c**, "UHF 2") as instructed by your assistant.

If the wireless lapel microphone will be used:
6. **Switch on** the lapel microphone's battery pack.
7. **Speak** normally. *The lapel microphone is designed to pick up your speech from the area around your collar, no adjustment in volume or the angle of your head is necessary.*
8. **Adjust** the lapel microphone volume (**Figure 18b**, "UHF 1") as instructed by your assistant.

If the conventional microphone will be used:
9. **Speak** into the microphone.
10. **Adjust** the microphone volume (**Figure 18e**, "MIC IN") as instructed by your assistant

If the auxiliary input will be used:
11. **Play** a representative sample of the audio to be used during your event.
12. **Adjust** the line in volume (**Figure 18d**, "LINE IN") as instructed by your assistant.

13. **Switch off** the speaker at the power switch when the sound check is complete.

Managing the Event Sound

Ideally, after completing the sound check, no further volume adjustments should be necessary. However, conditions may change. Therefore, it is best to stay near the speaker to adjust the volumes as needed. If you will be unavailable, someone should be designated to perform these duties.

1. **Switch on** the speaker. *This should be done only shortly before the event begins to lower energy usage and to prevent microphone gaffes.*
2. **Adjust** the volumes for the various audio inputs as necessitated by the ambient noise, speech volumes of the presenters, and other unforeseen causes. *Remember which knob controls which device:*
   - Wireless handheld microphone: UHF 2 (**Figure 18c**)
   - Wireless lapel microphone: UHF 1 (**Figure 18b**)
   - Conventional microphone: MIC IN (**Figure 18e**)
   - Auxiliary input: LINE IN (**Figure 18d**)
3. **Switch off** the speaker at the power switch when the event is complete.
4. **Pack up** the equipment by employing the "Setting up the Audio Inputs" and "Erecting the Speaker" steps in reverse. *Be sure that the wireless microphones are turned off before returning them to the case.*
5. **Return** the borrowed equipment to CAVS by the date specified on your check-out slip.

Good Luck!

Hopefully, this system will fit your needs and live up to your expectations. If you experience any troubles with your PA system, just check out the following handy troubleshooting guide. Keep in mind, the only limit to your event is your own creativity!

Troubleshooting

Condition	Possible Cause	Solution
No Sound (Power Light Off)	Speaker is turned off	Turn power switch (Figure 18a) on
	Speaker not plugged in	Insert plug into standard 120V/AC wall outlet
	Blown Fuse	Return system to CAVS for service
No Sound (Power Light On)	No audio input	Begin speaking or playing auxiliary audio
	Input volume(s) too low	Turn up appropriate volume knob, see "Performing a Sound Check"
- Wireless Microphone(s)	Microphone(s) turned off	Turn wireless microphone switch(es) to "on"
	Low batteries	Replace batteries using spares in speaker case, following instructions on the microphone
- Wired Input(s)	Cable(s) unplugged	Check connections
Distorted Audio	Loose connection(s)	Double check connection(s)
	Auxiliary Input signal too strong/too weak	Normalize signals by adjusting input signal to a middle setting then compensating with LINE IN volume
Feedback	Volume too loud for the selected space	Turn down volume until feedback stops
	Microphone pointing towards speaker	Move microphone away from the speaker