

NTTDS Sound Equipment Instructions

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1 Overview

The sound system provides two separate outputs for the same set of inputs: the main speaker outputs which provide the sound for the dancers, and the monitor speaker outputs which provide the sound for the musicians. Separate outputs are needed because the main speakers are in front of and pointed away from the musicians, making it difficult for them to hear their own playing. The main and monitor outputs each have their own volume control, and the mix of the instruments in each output can be adjusted separately. The musicians only want to hear themselves, not the caller, so the caller is never included in the monitor output.

2 Components

The sound equipment we normally use consists of a big suitcase which holds all the cables and microphones, a mixer/amplifier (in its own black case), two big black trapezoidal Main speakers, four black monitor speakers, two black speaker stands in black nylon bags, a wireless microphone in its own box, and several microphone stands.

3 Microphone Stands

We have several types of microphone stands. Some have a solid round base, with either a straight shaft or a shaft with a gooseneck. Those are best used for the caller.

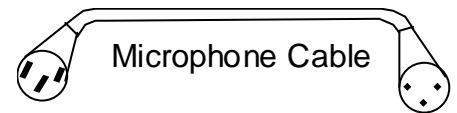
Some have a large tripod base, a vertical shaft about 3 feet high, and a horizontal “boom” attached to the vertical shaft. These are normally used for instruments fairly high off the floor, like fiddles, wind instruments, hammer dulcimer, etc.

There is a pair of stands that have a small tripod base, a short vertical shaft (just a few inches), and a horizontal “boom” attached to the vertical shaft. These are best used for instruments fairly low to the floor, like banjo, guitar, and mandolin. The tripod base is quite small, so the stand is unstable when the boom is extended. In the suitcase there are two black socks filled with rice that are meant to be used as weights on these narrow tripod bases to help stabilize the stands. Position the stand so one of the tripod legs is pointing in the opposite direction as the boom is extending, and lay a sock on that tripod leg.

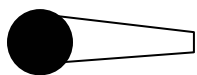
4 Microphone Setup

The microphones have a 3-pin connector which is called an XLR connector.

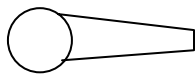
The microphone has a recessed male connector, and the amplifier microphone input has a female connector. The microphone cables have a male connector at one end and a female connector at the other, so can only be plugged in one way. To make a connection, simply push the two mating connectors together. The connection to the microphone has a built-in locking mechanism to prevent the cable from coming loose. To disconnect the microphone from the cable, press the small tab on the side of the cable connector before pulling apart. To disconnect the microphone cable from the amplifier, simply pull. We have several lengths of cables (30 ft, 25 ft, 20 ft, 12 ft, etc.). The length of each cable is marked on the connector at each end. Use the longer cables for the musicians farthest from the amplifier, and the shorter cables for the musicians closer to the amplifier.



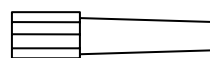
Microphone cables are fragile. Try not to step on them or toss them too hard. Treat them gently.



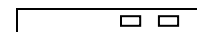
Caller's Mic
(V-Tech VT-1040)



Old Instrument Mic
(Shure Prologue 14L)



New Instrument Mic
(Shure SM57)



Condenser Mic
(CAD-1000)

Caller's Microphone - There is a special “vocal” microphone for the caller. It has a black ball head. Install it on a straight vertical or gooseneck microphone stand, and connect it to a microphone input on the front of the amplifier. It is convenient to use Input 12 for the caller, so the special “Music Break” pushbutton switch can be used to silence the band while the caller is teaching. Otherwise, Input 1 is traditionally used for the caller. Use the longest cables (30 ft or 25 ft) for the caller, to provide them the maximum freedom of movement.

Instrument Microphones - Our new instrument microphones are slim with a flat head (not a ball), located in black zippered pouches. Use any appropriate microphone stand to position the microphone close to the instrument. Our older instrument microphones have a silver ball head and an on/off switch on the side, and are kept in drawstring pouches. Use these only after all the new instrument microphones are in use. Be sure the old instrument microphones are switched ON.

Condenser Microphone - We have one condenser microphone, a CAD-1000. It has two switches, one for low-frequency rolloff, and one for sensitivity. These settings generally do not need to be changed. This microphone has better high frequency response than the other microphones. It is best used for the caller to improve clarity, or for instruments with a lot of high frequency content, like mandolin or fiddle. Because of its sensitivity it might be more likely to cause feedback, so use with caution. It has a foam windscreen, which should always be used.

Instruments with their own microphones -Some musicians have a microphone mounted on their instrument, so a separate microphone and stand is not needed. Plug the cable from their microphone into an amplifier input. Some of their cables use a standard microphone connector, but many use the same type of connector as we use for the speakers. For those instruments, use the thin cables with gold connectors that have a tape label saying they are for instruments, not speakers. Each amplifier input has both types of connectors, but **USE ONLY ONE CONNECTOR PER INPUT. NEVER USE BOTH CONNECTORS INTO THE SAME INPUT AT THE SAME TIME.**

Any microphone can be connected to any amplifier input, but it is most convenient for microphones to be plugged into the amplifier inputs in the same left-to-right order as the physical placement of the instruments on the stage (after connecting the caller's microphone to input 12 or 1). This makes it easier for the person adjusting the sound levels to figure out which mixer input channel is used for each instrument.

To minimize feedback, position the microphones and monitor speakers so that the microphones are pointing AWAY from the speakers, and keep the microphones as close to the instruments and as far from the speakers as possible.

5 Wireless Microphone

The club has a wireless microphone, in its own box. It can be used as desired. It is composed of several pieces.

The transmitter is about the size of a pack of cigarettes and has a belt clip to mount on the caller's belt or other convenient place. It requires two AA batteries. It is best to use fresh batteries, so the sound person might want to bring some batteries, in case the caller wants to use the wireless microphone. The batteries and On/Off switch are behind a hinged door on the front of the unit. Press the two tabs on the side to release the door so it hinges open. A quick press of the On/Off switch turns it On. Press and hold for several seconds to turn it Off. There is a small MUTE slide switch on the top. This will disable the sound temporarily in case the caller needs to talk off-microphone, or sneeze, or whatever.

The headset has a cable that plugs into the transmitter, with a screw locking ring to hold it place. The headset fits on the caller's head, going over the ears and around the back of the head, with the microphone on the right side. The best position for the microphone seems to be about 1 inch away from the right corner of the mouth. Do NOT position the microphone directly in front of the mouth, or it will pick up too much breath noise (popping P's, etc.).

The receiver is a metal box that connects to the amplifier. It has two small antenna that must be connected to the back of the unit and extended. It also has a power supply that must be plugged into an electrical outlet and plugged into the back of the unit. The rear of the receiver has two connectors for its output, a standard 3-pin

microphone connector and a 1/4 inch phone jack. Either can be used, but the microphone connector is preferred. Use any microphone cable to connect the receiver to any amplifier input.

The wireless microphone has hundreds of built-in channels it can use. The receiver and transmitter must be set to the same channel for the system to work. When the transmitter and receiver are turned on, they display the frequency of their current channel setting. If both numbers are the same, no further tuning is needed. If the numbers are different, the Bank and Channel must be set the same on both units.

Both the Transmitter and Receiver have similar controls for setting their configurations: a Setup button (in the battery compartment on the Transmitter), and Up-Arrow and Down-Arrow buttons. The Setup button cycles through the various configuration options. Within each option, the Arrow buttons select the possible values. Press Setup until the desired option is displayed, then press the Arrow buttons to select the desired value for the option, then press the Setup button to save the value. Press Setup again to go to the next option.

The system works fine in our area with the default Bank 1 and Channel 1. If the transmitter and receiver do not have the same frequency, use the Setup buttons to select Bank 1 and Channel 1 on both transmitter and receiver.

Both the transmitter and receiver have horizontal level meters on their displays for the Audio (or AF) level, and an option to set the level to several values. Watch the AF level on the transmitter when caller speaks into the microphone. The level meter should register something, but should not reach the maximum level, except maybe on occasional loud words. If this needs to be adjusted, use the transmitter's Setup to change its Sensitivity.

On the receiver, level of the output to the amplifier can be set via a Setup option. If the level setting of the amplifier must be set too high or too low for the wireless input, use the receiver's Setup option to change its Output level to match the amplifier input better.

6 Amplifier Setup (Carvin RX1200)

The amplifier is housed in its own "road warrior" case. Loosen the "clamps" on the side panels to release the front and rear covers of the case. Remove the covers to reveal the amplifier front and rear panels which contain the inputs, controls, and outputs.

The power cord should be in the case with the amplifier. Plug one end into the power connector on the back of the amplifier and the other end into an extension cord or power strip which is plugged into a wall outlet. The power switch is a rocker switch on the back panel. Leave it OFF until all microphones and speakers are connected.

The amplifier has FOUR separate channels, each with its own graphic equalizer: Main Left, Main Right, Monitor 1, and Monitor 2. We do not normally use the Monitor 2 channel.

The amplifier front panel has many knobs. There are controls for 12 input channels and four output channels (Left Main, Right Main, Monitor 1, Monitor 2).

6.1 Amplifier Inputs

Each amplifier input has a number of knobs, which are described below.

The mixer/amplifier input signals can be classified as one of two general types:

Low-level balanced signals (uses a 3-pin microphone connector)

High-level unbalanced signals (uses a 1/4 in phone plug connector, same as the speakers)

Our amplifier has a separate connector for each type of signal for each input. Either connector can be used, but **ONLY ONE AT A TIME FOR EACH INPUT**. Never try to use both connectors in the same input channel at the same time.

Low-level balanced signals are connected to the amplifier via the 3-pin microphone (XLR) input connector. The signal is actually delivered on two wires, with the third wire being connected to a shield inside the cable, which "shields" it from interference (such as from local radio stations). The amplifier actually compares the signals on the two wires and just amplifies the difference between them. This makes the signal even more resistant to interference, since interference imposed upon both wires at the same time will be cancelled out when the amplifier takes the difference between them. These signals need all this interference protection because they are generally very small or weak. This is the type of signal that normal microphones create. Some of the microphones that some musicians have on their instruments also generate this type of signal. Some of those instrument microphones also have a "pre-amplifier" which boosts the signal to a higher level before sending it to the mixer/amplifier.

High-level unbalanced signals are connected to the amplifier via the 1/4-inch phone plug input connector (same connector that the speakers use), using the thin cables marked as instrument cables. These signals are much larger or stronger than the microphone signals, but still much smaller than the signal sent to the speakers. The signal is carried on a single wire, so is more prone to interference (especially from local radio stations), despite its higher level and despite shielding. Some built-in instrument microphones with a pre-amplifier deliver signals of this type. To handle these larger signals, our amplifier first reduces its level by a fixed amount, then treats it the same as a microphone input. Since it ultimately goes through the microphone input, all the input channel knobs effect both types of inputs equally.

NOTE: We have two types of cables with 1/4 inch phone plug connectors: speaker cables and instrument cables. The speaker cables are not shielded, but the instrument cables are. Always use the instrument cables for connecting instruments to the amplifier inputs. These cables have a tape label on them indicating they are for use by instruments, not for speakers. Most of them have gold connectors with a spring strain relief. The speaker cables are larger, with silver connectors and no spring strain reliefs.

Our amplifier handles both weak and strong signals via use of the "Gain" knob in each input. This is an extra "volume" control ahead of the Main and Monitor level controls. There is a "PK" peak indicator lamp next to the "Gain" knob. To adjust the "Gain" to the optimum setting, have the musician play their instrument, and increase the "Gain" until the "PK" lamp lights. Then reduce the "Gain" until the lamp is stays off. Try to have the musician play at the full level/intensity they will use during the dance. Musicians typically get excited during a dance and play harder than during the sound setup. Watch this lamp occasionally during the night, and turn the "Gain" down a little if the light flickers. This controls the overall level of the signal in both Main and Monitor outputs, so if you adjust it after initial setup, you might have to adjust the Main and Monitor levels also.

Always be sure the amplifier is OFF before connecting or disconnecting any cables.

6.1.1 Phantom Power

Some microphones (but not any of ours) require electrical power to operate. Some musicians have a small microphone mounted on their instrument, and a small pre-amplifier to boost the signal. This pre-amplifier needs power. The microphone or pre-amp power can come from a battery, or from an external source. There is a special way in which the mixer/amplifier can provide power to a microphone or pre-amp through a normal microphone cable, so no battery is needed. This power supplied by the mixer/amp is called Phantom Power. Our amplifier has this feature, controlled by a push-button switch on the lower right corner of the front panel (see picture in the Amplifier Front Panel Output section below). When it is pressed in (indicated by a light next to the switch), the amplifier provides power to the microphone inputs. This is an all-or-nothing situation: The power is provided to ALL microphone inputs. It is not selectable for each input channel. Our microphones do

not need power. However, some musicians might need it, so ask them. If they do, make sure the Phantom Power button is pressed in. Otherwise, it can be "pressed" out.



HI (Treble), MID, LOW (Bass), - tone controls for this input

Start at **0** (centered), adjust as needed.

For the caller, typically set the **LOW** to -3, and the **Hi** to + 3 to make the caller's voice clearer.

MON 1 - Volume of this input in the Monitor 1 output. Typically set around 2 to 4, except the caller's input must be set to 0.

MON 2 - Volume of this input in the Monitor 2 output. Not normally used, set to 0.

NOTE: Be sure both **MON** controls are set to **0** for **ALL UNUSED INPUTS!!!**

EFF 1, EFF 2 - special effects volume. Not normally used, set to 0.

PAN - Left/Right balance. Set to **0** (centered) for equal level in both Left/Right channels

GAIN knob and **PK** light. Input volume that is ahead of the **MON** and **LEVEL** controls, so effects both of them. Turn **GAIN** up until the **PK** light flashes, then turn **GAIN** down until the light stays off, even when the musician is playing hard.

LEVEL - Volume of this input in the Main L/R outputs. Typically set around 2 to 4.

NOTE: Be sure **LEVEL** control is set to **0** for **ALL UNUSED INPUTS!!!**

3-pin microphone input (XLR)

1/4 inch phone plug input for high-level instruments like keyboard, guitar, etc.

Line/Ins switch. - ALWAYS pressed **OUT**.

6.1.2 Monitor 2 Channel

We don't normally use the second monitor channel. Some bands, like a famous national band playing for our yearly dance weekend, might request two monitor channels. This allows two sets of musicians to hear different sounds. They will have to specify which musicians are in each "set", but typically the piano player might have a separate monitor from the rest of the band. Plug monitor speakers into both monitor outputs (Amplifier 3 and 4), and place the speakers for each output near the musicians wanting the respective monitor sound. Use the **MON 1** and **MON 2** control for each input to adjust the volume of each instrument in the respective monitor output, and use the overall **MON 1** and **MON 2** level controls in the Outputs section of the front panel (see picture below) to set the overall volume of each output. The band will specify which instruments they want and don't want in each monitor output, and the level for each.

If the band does not use two monitor channels, the second monitor channel can be used for the caller so he or she can hear himself or herself better. Place an extra monitor speaker in front of the caller and connect it to the Monitor 2 output (Amplifier 4). Set the **MON 2** control for ALL inputs to 0, except for the caller. Adjust the

MON 2 level for the caller input and the overall **MON 2** output level to give the desired volume for the caller. Be careful not to make it too loud, or it might cause feedback.

There is other possible use for the Monitor 2 Amplifier (Amplifier 4). If only one monitor signal is needed, but it is desired to have more monitor speakers than is safe to drive with one amplifier output (e.g. more than 4 of the black “barrel” speakers), it is possible to use the Monitor 2 amplifier channel to drive additional speakers with the same signal. To do this, use an instrument cable with gold 1/4 inch phone plug connectors to connect the MON 1 output on the lower right of the FRONT panel to the Amplifier 4 INPUT on the upper right of the REAR panel of the Amplifier. This will feed the Monitor 1 signal to the Monitor 2 power amplifier. You can then connect additional monitor speakers to the Monitor 2 amplifier output (Amplifier 4), and all monitor speakers will have the same signal. The Monitor 2 amplifier output will not be as loud, so the speakers might need to be placed closer to the musicians.

6.1.3 Special Effects and Effects Channels

We don't normally use the Special Effects or the Effects channels, but there are a couple of uses for them. The mixer has a number of special effects built in, such as Echo, Reverb, Chorus, and Flanging, that can be applied to any or all of the input channels. There are actually two effects channels, so two different effects can be used at the same time. The Select knob (see picture of the Outputs section of the Front Panel below) is used to select the desired special effect. The Parameter knob is used to control the amount of the effect applied to the signal. The Parameter knob controls different aspects of the sound for each effect, as listed on the front panel. For example, for the Echo effect, the Parameter controls the Time between the echoes. The amount of the effect fed to the Main and Monitor outputs is controlled by the Main and Monitor knobs in the Special Effects section.

To apply a special effect to an instrument, first decide on which Effects channel to use, and Select an effect. Turn up the EFF 1 or EFF 2 knob in the instrument's input channel (depending on which Effects channel is being used). Turn up the Main and/or Monitor Level controls in the Special Effects section until you can hear the signal. Adjust the Parameter for the amount of the desired effect.

The Special Effects section has a PK indicator lamp for each Effects channel to indicate when signal is too strong. If this light flashes, turn down EFF level for the input channels to lower the signal being fed to the Effects section. Alternately adjust the EFF level in the input channels and the Main and/or Monitor Level in the Special Effects section until the PK indicator stays off, and there is special effect is loud enough to be heard.

There is another possible use for the Effects channels. They can be used as additional Monitor channels with an external amplifier. The EFF 1 and EFF 2 level controls for each input can be treated the same as the MON 1 and MON 2 level controls, and considered to be Monitor channels 3 and 4. On the lower right of the front panel are 1/4 inch phone jacks for EFF1 Send and EFF 2 Send. These can be fed to external power amplifiers to drive additional monitor speakers. Using the Effects channels this way, it is possible to have as many as four different Monitor mixes. For this use, make sure the Main and Monitor Level controls in the Special Effects section are all turned all the way down.

6.1.4 Input Channel Labels

It is nice to have some sort of labels on the input channels to make it easier to know which knob to turn to make adjustments during the evening. The amplifier front or back cover sits nicely on top of the unit, providing a surface about 2 inches high to hold labels. For each input, write the name of the person or instrument on a piece of tape and stick the tape on the cover on top of the unit so it is above that input channel's column of knobs.

6.2 Amplifier Output Controls (Front Panel)

The amplifier output controls are on the right part of the front panel. They are described below.



Graphic Equalizer for each output

See Tweaking section for recommendations.

MUSIC BREAK - When pressed in, feeds Channel 12 input to Main outputs and disables all other inputs and the monitor outputs. Meant to be used to supply recorded music during a break when the band is not playing. Can be used for the caller microphone to silence band while caller is teaching.

MONITOR 1 - overall volume for the Monitor 1 output. Typically set about 3 or 4.

MONITOR 2 - overall volume for the Monitor 2 output. Set to 0 when not used.

Digital Effects, Tape In, Tape Out - not normally used, set to 0.

MAIN L/R - overall volume for Main output. Typically set about 3 or 4.

Phantom Power - normally Out (Off), unless a musician needs it.

Power - indicates when power is on.

Protect - indicates a problem.

Amp Clip - indicates volume is too loud

MONITOR 1 AND 2 - monitor outputs to feed external amplifiers (post EQ)

EFF 1 and EFF 2 SND - effects channel outputs to feed external amplifiers

Left and Right XLR - Left and Right Main channel outputs to feed external devices (AFTER the 7-band EQ)

Tape Out RCA Jacks and knob - Main Left and Right signals to external devices. These signals are BEFORE the Main Left/Right level controls and 7-band EQ, so are not effected by those controls.

Tape In RCA Jacks and knob - Main Left and Right signals from external devices, mixed in with the other 12 inputs via the Tape In knob. Signals are fed to Main volume controls and 7-band EQ.

6.2.1 Front Panel Warning Lights

There is a **PROTECT** light and four **AMP CLIP** lights on the lower right of the amplifier front panel that should be watched.

The **PROTECT** light indicates a serious problem, such overheating or a short circuit in the output cables. If the light comes on, the amplifier will probably shut itself down. Make sure the amplifier has plenty of ventilation, and check the output cables. Turn the amplifier off, wait a few seconds or minutes, and turn it back on. If the

problem persists, try power-cycling the amp again, disconnecting the output cables one at a time while the amp is off to try to isolate the problem.

The four **AMP CLIP** lights on the lower right of the front panel indicate the amplifier is being overdriven (being asked to put out more power than it is capable of). If any of these lights flashes or stays on, try lowering the overall output level for the Main and/or Monitor channel, or the level of one or more inputs, or make sure the Graphic Equalizer controls are not boosted too much.

6.3 Amplifier Outputs (Rear Panel)

The rear panel of the amplifier contains the speaker connection jacks, and a set of input jacks (see diagram in the section on Speaker Wiring):

Across the bottom are the outputs for the speaker connections. Each amplifier has two output jacks. One is a standard 1/4 inch jack; the other is a special "SpeakOn" jack. We only use the 1/4 inch jacks.

Amplifier 1 = Main Left speaker, Amplifier 2 = Main Right speaker,

Amplifier 3 = Monitor 1 speakers, Amplifier 4 = Monitor 2 speakers (not normally used).

At the upper right are inputs for each of the power amplifiers (not normally used). Plugging a 1/4 inch phone plug into one of these inputs replaces the signal coming from the mixer with the signal being supplied by the cable being plugged in. This signal is fed directly to the power amplifier, after all tone and volume controls, so there should be some external way to control the level of the signal being plugged in.

Always be sure the amplifier is OFF before connecting or disconnecting any cables.

6.4 Speakers and Amplifier Loading

The amplifier is designed to drive a minimum speaker impedance of 4 ohms. The main speakers are 8 ohms each. The new EV ZX1-90 monitor speakers are also 8 ohms each. When multiple speakers are connected to an amplifier output, either directly or in a "daisy chain" configuration, they are connected in parallel. When speakers are connected in parallel, the total impedance is the impedance of one speaker divided by the number of speakers. Thus two 8-ohm speakers in parallel have a total impedance of $8/2 = 4$ ohms.

When speakers are connected in series, the total impedance is the SUM of the impedances of each speaker.

Thus two 8-ohm speakers in series have a total impedance of $8+8 = 16$ ohms. But it takes special wiring to connect speakers in series. There are two special junction boxes for use with the monitor speakers which connects one pair of speakers in series. When two junction boxes are used to connect 4 monitor speakers to one amp channel the total impedance is $16/2 = 8$ ohms, which is quite safe for the amplifier.

This means our amplifier can drive a maximum of two main speakers or 2 monitor speakers on EACH output channel, when connected in the usual parallel or daisy chain configuration. Do NOT try to use all 4 monitor speakers on one Monitor output channel without using the junction boxes.

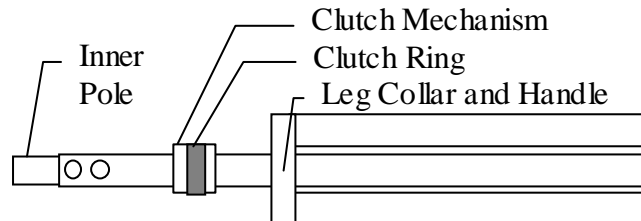
7 Speaker Setup

7.1 Main Speakers Setup (Electrovoice SX-300P)

The main speakers are placed on stands, one each at the left and right front edges of the stage.

7.1.1 Speaker Stands (Ultimate TS90B)

Each speaker stand is kept in its own black nylon carrying bag. Each stand consists of a center pole, a collar with 3 legs attached to it, and a clutch mechanism that looks like "blob" around the center pole.



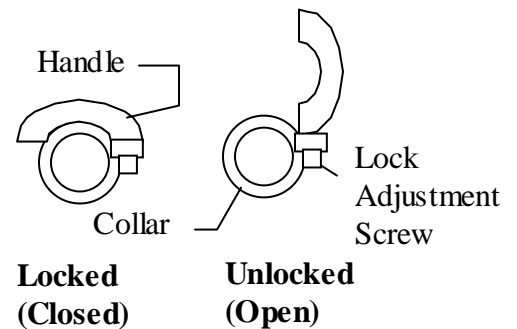
Main Speaker Stand

7.1.1.1 Setting the Pole Diameter

There are two common speaker pole diameters in use: 1 3/8 and 1 1/2 inch. The stand provides both diameters. The black center pole is the larger diameter. Nestled inside the upper end of the black pole is a 6-inch section of smaller-diameter silver pole. This can be raised to extend beyond the black pole or lowered to be entirely within the black pole. It is held in either position by spring-loaded buttons that extend through holes in the black pole. Our speakers use the smaller-diameter silver pole, so press the buttons on the sides of the black pole and pull the inner silver pole up until the buttons lock into place in their upper holes.

7.1.1.2 Spreading the Stand Legs

Before attempting to spread the speaker stand legs, the center post lock must be released. There is a "collar" around the center post just above the "joint" where all the legs connect. There is a semi-circular "handle" that wraps around the collar, extending half way around the post. The "handle" pulls straight out so it extends about 90 degrees from the post. When the "handle" is wrapped around the post, the collar is locked, preventing the legs from moving. When the "handle" is "open", the collar is unlocked, permitting the legs to move. Be sure to "open" the "handle" all the way.



Leg Collar and Handle

Once the collar is unlocked, the legs can be extended. The legs do not extend straight out. Instead, they rotate at an angle. A human body analogy will clarify this. Hold your right arm straight down by the side of your body. Your body represents the center post of the stand and your arm represents a leg of the stand. Swing your stiff right arm straight back a few inches. THAT is the way the stand's legs move. They rotate clockwise instead of swinging straight out.

The directions recommend turning the stand upside down so the legs are straight up. Looking down towards the bottom ends of the legs, carefully push each leg slightly to the left (or counter-clockwise in the circle made by the 3 leg tips). Repeat a few times, pushing each leg in turn. After a few pushes, the legs should move freely by several inches. At that point, you can turn the stand over to be upright. Or you can leave the stand upright, and just rotate each leg clockwise a little at a time until they start moving easily.

Once the legs are loose, the spread of the legs is set by moving the center pole up and down as collar is held in place (or vice versa: move the collar up and down the center pole). The wider the legs are spread, the taller the

center pole gets. **It is best to spread the legs to their maximum width.** Once the legs are spread to the desired width, lock them in place by "closing" the "handle" so it wraps around the collar.

To make sure the pole is locked securely in place, grab the center pole below the clutch mechanism and try to push it straight down towards the floor. It should not move. If it does move, the lock is loose. The handle is attached to the collar by a screw. The tightness of the lock is controlled by this screw. To tighten the lock, first "open" the handle, then tighten the screw, then "close" the handle. Try to push the pole down again to test the lock. Repeat as necessary until the lock is tight enough to keep the pole from being moved. If you get it too tight, you won't be able to fully "close" the handle.

NOTE: As you wiggle the stand trying to move the legs, and then turn the stand right-side-up, the position of the "handle" on the collar can change, maybe into a position that locks the collar. If the legs don't seem to move, check the position of the "handle" and make sure it is fully "open".

7.1.1.3 Placing The Speaker On The Stand

The clutch mechanism for raising and lowering the pole (and speaker) is a big round "blob" surrounding the center pole. It is somewhat reminiscent of a hornet's nest built around the pole. The clutch mechanism limits the movement of the center pole, and has 3 positions:

The "Lock" position prevents the center pole from moving up or down.

The "Raise" position allows the center pole to be raised, but does NOT allow it to lower.

This is a wonderful safety feature.

The "Lower" position allows the pole to be lowered, at a controlled rate. Another safety feature.

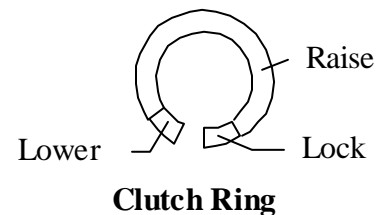
At the vertical center of the "blob" is a textured ring that rotates in a horizontal plane. The ring has an arrow, and there are markings on the "blob" above the ring that the arrow points to as the ring is rotated.

The markings indicate the 3 clutch positions (Lock, Raise, Lower), but they are not really in the right places.

Position yourself so that the "Lock" marking is right in front of you.

Consider the ring to be the outer edge of the face of a clock, looking down from the top. The "Lock" position is 6 o'clock. The "Raise" mark is at about 5 o'clock, and the "Lower" mark is at about 4 o'clock. All the way around at about 9 o'clock is another marking that says something like "Stand clear while lowering".

The "Raise" functionality actually extends from about 5 o'clock to about 8 o'clock, and the "Lower" functionality does not start until about 8 o'clock.



Before trying to place the speaker on the stand, make sure the pole is at its lowest position. The stands are normally left in this position. If you are not sure, rotate the ring to the extreme counter-clockwise "Lower" position, push the pole straight down, then return the ring to the extreme clockwise "Lock" position.

Each speaker's pole socket has a locking screw to lock the speaker to the pole. Make sure each screw is loosened enough that it does not intrude into the socket and prevent the pole from being inserted.

Carefully lift the speaker and place it on the stand, so the pole goes into the socket or hole on the bottom of the speaker as deep as it can.. **THIS IS BEST DONE BY TWO PEOPLE**, although one reasonably strong person can do it alone. You might not be able to reach the plug on the back of the speaker when the speaker is fully raised, so plug the wire(s) into the speaker now, before raising it.

7.1.1.4 Raising The Speaker

Next the speaker must be raised above ear level. The stands make this safe and easy to do. Rotate the clutch ring to anywhere between the 5 o'clock "Raise" mark and the 9 o'clock "Stand Clear" mark. If two people are raising the speaker, one should hold the legs of the stand to keep them on the floor while the speaker is raised. If only one person is doing this, s/he can GENTLY place one foot on one of the braces for the legs to keep the stand on the floor. Once the legs are securely held on the floor, grab the center pole above the clutch

mechanism and lift it a few inches. Don't worry about it lowering on you. It cannot. In the "Raise" position, the clutch mechanism will only allow the pole to move in the upward direction. Continue raising it a few inches at a time until the desired height is reached.. **It is recommended to raise the speakers all the way to the maximum height**, so the speakers do not blast people right in their ears when they get close to the speakers. When the speaker is fully raised, rotate the clutch ring to its extreme counter-clockwise "Lock" position. The speakers can rotate horizontally on the pole. Adjust them so they are turned in slightly, pointing towards the center point of the back wall of the dance floor. If desired, the locking screw in the speaker's pole socket can be screwed in to lock the speaker to the pole so it won't rotate or fall off. This is entirely optional, as the speaker is very unlikely to change position or fall off the pole.

7.2 Monitor Speakers Setup (Electrovoice ZX1-90)

These speakers have an 8-inch woofer and a horn tweeter. The horn disperses the sound 90 degrees in the horizontal direction and 50 degrees in the vertical direction. Therefore, **the speakers should be placed upright on the floor or in chairs in front of the band to provide the best coverage.**

One special feature of these speakers is the horn tweeter can be rotated 90 degrees. This allows the 90 degrees of dispersion to remain horizontal when the speakers are positioned "sideways" or on their side. However, it is quite a bit of work to rotate the tweeters, so it is not something to do frequently. First the front grill must be removed by carefully prying it loose with a screwdriver. Then a screwdriver is used to remove the tweeter mounting screws. Rotate the tweeter 90 degrees, reinstall the mounting screws, and carefully press the grill back into place.

7.3 Speaker Wiring



The speakers cables are heavy black cables with a silver "phone plug" on each end. There is a label on each phone plug indicating the cable's length. In the main and auxiliary suitcase there is one cable about 89 feet, one about 62 feet, a few 33 feet, a few 25 feet, and a few that are 5 to 6 feet. The 33 foot ones are sufficient for the main speakers. A 25 foot one is good for the first monitor speaker.

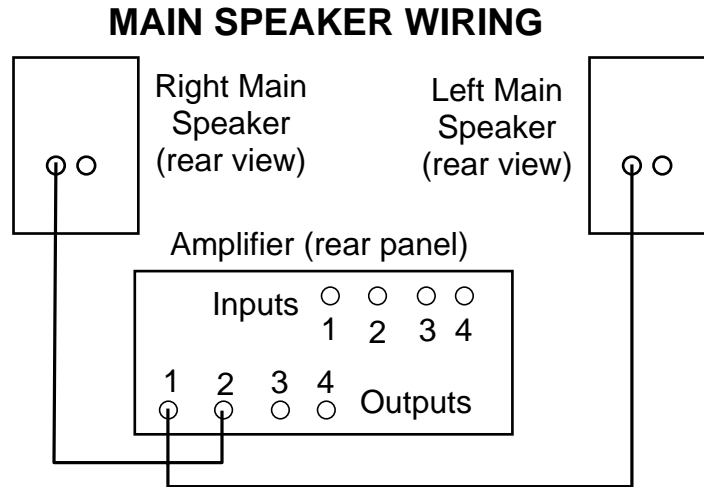
NOTE: There are similar-looking cables that are thinner and more flexible, with a gold "phone plug" and spring strain relief on each end. These cables have a label indicating they are instrument cables, NOT speaker cables. These cables should be used for connecting instruments such as electronic keyboards and guitars to the amplifier inputs. Do NOT use these for speaker cables.

NOTE: The cables look sturdy, but are subject to damage. Try not to step on the cables, and try not to toss them too hard. Treat them gently to help them last as long as possible.

Always be sure the amplifier is OFF before connecting or disconnecting any cables.

7.3.1 Main Speaker Wiring

Connect the left main speaker to the Amplifier 1 output in the back panel of the amplifier. Each speaker has two jacks on the back. It does not matter which one you plug the cable into. Connect the right main speaker to the Amplifier 2 output. See diagram below.



7.3.2 Monitor Speaker Wiring

The speakers use a special “speakon” connector instead of the usual 1/4 inch phone jacks. We have adaptors with a “speakon” plug on one end and the usual 1/4 in phone jack on the other end. The adapter plugs into the back of the speaker, then rotates about 90 degrees to lock into place. Our normal speaker cables plug into the adapters. The speakers have two connectors on the back. It does not matter which one you use for any connection. Leave the adapters attached to the speakers, and just plug and unplug the cables from the adapters.

The speakers have an impedance of 8 ohms each. Our amp is rated to drive a minimum load of 4 ohms. That means one channel of the amp can drive a maximum of 2 speakers when connected in the usual parallel or daisy chain configuration. In order to drive 4 speakers from one amp channel, there are two special junction boxes, each of which connects two speakers in series. Two speakers in series results in a load of 16 ohms. Connecting two of those in parallel results in a total load of 8 ohms, which is safe for the amplifier.

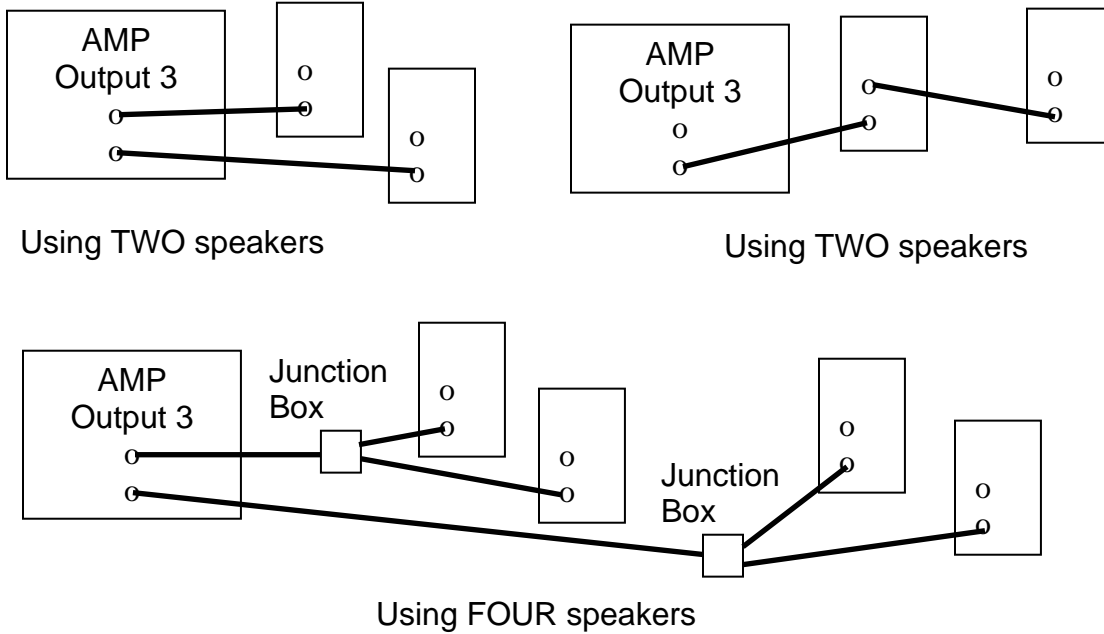
If using only TWO of the speakers, connect them to the amp in the usual way (see below). You can run a long cable from each of the two amp outputs to a speaker, or use one long cable to one speaker and another cable to “daisy chain” to the other speaker.

If using all FOUR speakers, they should NOT be connected directly to the amp. Instead, they should be connected in pairs through the small junction boxes (see below). Connect a long cable from the amp to the side of a junction box with only one connector. Connect two speakers to the other side of the junction box, using “short” cables. Connect two pairs of speakers this way.

Use either TWO or FOUR speakers. Trying to use THREE speakers will not work well, because they will have different volume levels.

If the band can get by with only three monitors, the fourth one can be placed near and facing the mixer/amp to provide the sound technician an easy way to hear and adjust the monitor sound.

MONITOR SPEAKER WIRING



8 Tweaking The Sound

The goal is to make every instrument about equally loud, and the caller easily heard above the music.

8.1 Main Hall Sound

The overall volume is set by the **Main L/R** knob on the right side of the amplifier front panel. The level of each instrument is adjusted by its **Level** knob. Have the band play while you walk around the hall and listen to the sound. Listen to how well you can hear each instrument. If there is an instrument you cannot hear or is much softer than the others, increase its **Level**. Similarly, if one instrument sounds much louder than the others, lower its **Level**. The amplifier controls are quite sensitive, so make adjustments in small steps.

8.2 Monitor Sound

The musicians hear themselves through the monitor speakers, not the main speakers. The **Monitor 1** knob on the right side of the amplifier front panel controls the overall level of the monitor speakers. Each input channel has a separate **Mon 1** level adjustment. Ask the musicians for how they want things adjusted. They will tell you whether to make the overall volume louder or softer, and which instrument's **Mon 1** level needs to be higher or lower. **NOTE:** The caller should **NEVER** be heard through the monitor speakers. Make sure the caller's **Mon 1** and **Mon 2** level is set to **0**.

8.3 Tone Controls

Each input has separate bass (**Low**), midrange (**Mid**), and treble (**Hi**) controls, which effect the Main and the Monitor outputs. Always start with them centered. The caller typically sounds best with the bass cut a little (-3) and the treble boosted a little (+3). The controls for each instrument can be adjusted as desired by the sound person or by request of the musicians, but should not be adjusted too far from center, or the sound may be distorted.

8.4 Graphic Equalizer

A Graphic Equalizer is a glorified tone control. It divides the sound into several frequency bands, and provides a control to boost or cut (or "equalize") each frequency band. The controls are sliders that move up and down in linear fashion, as opposed to the usual round knobs that rotate. The position of the slider provides a "graphical" indication of its setting, thus the name "Graphic Equalizer". The Main and Monitor channels each have their own Graphic Equalizer, on the upper right of the amplifier front panel. Thus the sound of the Main and Monitor channels can be adjusted separately, so what the musicians hear can sound very different from what the dancers hear.

The graphic equalizer should be used sparingly for two reasons:

The electrical circuitry actually distorts the signal for large amounts of boost or cut.

It takes a good ear and certain amount of experience and skill to use the controls effectively.

For our current speakers and our current dance hall, use these settings as the starting point, where the setting numbers represent the number of lines above or below the flat setting:

Equalizer settings for both Main channels:

All set to the middle (flat) position, except: 160 = -1, 400 = -1, 2K = + 1/2, 6K = -1

Equalizer settings for both Monitor channels:

All set to the middle (flat) position, except: 160 = -1, 400 = -1, 6k = -1

Only deviate from these settings if the sound is really strange, or the band requests adjustment of the Monitor output, or as needed to minimize feedback (see the section on feedback below).

8.5 Feedback

Feedback is caused by a microphone picking up the output of a speaker, causing that to be amplified, until the signal "overloads", producing a squeal. To kill feedback after it has started, turn down the **Main** and/or **Monitor** level controls on the right side of the amplifier front panel (make a quick note of the level BEFORE you turn it down).

To reduce the chance of feedback from the Main speakers, they should be positioned well in front of the band and caller. Remind the caller to stay behind and well away from the Main speakers.

Most of the time, the feedback comes from the monitor speakers when an instrument microphone picks up the output of a monitor speaker.

To determine which instrument microphone is causing the feedback, note the overall Monitor level setting, then turn it down all the way (if you've already done this to stop the feedback, just guess at the normal level). Note the first instrument microphone's **Mon** level and turn it down all the way. Slowly turn up the overall Monitor level to its normal setting or until the feedback starts (whichever is lower). If the feedback is still there, that microphone is not the problem. Turn down the overall Monitor level and set the microphone's **Mon** level back to its original setting. Repeat this sequence for each instrument microphone until you find one that does NOT produce the feedback when it is turned down and the overall Monitor level is turned up. Apply one or more of the following feedback remedies, concentrating on the microphone which is causing the feedback:

Re-arrange the stage so that the microphones are pointing away from the monitor speakers (the microphones are directional, so don't pick up sound from behind them very well)

Move the microphones farther away from the monitor speakers and closer to the instruments

Move the monitor speakers farther from the musicians

Lower the MON level of the individual microphone input channel that is causing the feedback

Lower the overall monitor speaker level

As a last resort, try to guess the offending feedback frequency and use the graphic equalizer to cut its level.

Note the Main and Monitor channels each have their own graphic equalizer, so be sure to use the right one (Amplifier 3 for the normal Monitor 1 channel).

Of course, changing any of these things might change the output sound of the monitor speakers, possibly in a way the musicians may not like. Things will have to be adjusted until a satisfactory balance is achieved.

8.6 Hall Resonances

Sound travels in "waves". The length of a sound's wave is related to its frequency:

$$\text{Wavelength (in feet)} = 1100 / \text{Frequency (in hertz)}.$$

The frequency of the musical tone "middle C" is about 262 hertz, so its wavelength is about 4.2 feet.

Every room has a set of "resonant" frequencies. These are the frequencies for which a room dimension is an integral multiple of the frequency's wavelength. Thus a room with a 10-foot ceiling resonates at frequencies whose wavelength is 10 feet, 5 feet, 2.5 feet, etc. Sounds at the room's resonant frequencies are naturally boosted by the room resonance, causing an imbalance in the overall sound, and making those frequencies more prone to feedback. If a room resonance is particularly strong, the graphic equalizer can be used to try to cut the resonant frequency's level to improve the sound. This may not work as well as hoped because the graphic equalizer frequency bands are quite broad, but room resonances are typically quite narrow frequency bands, which results in reducing the level of more frequencies than is needed, possibly effecting the sound adversely.

8.7 Fine Points

If the guitar sounds too "boomy", try moving the microphone away from the sound hole, up the neck a few inches. You can also reduce the **Low** control of its amplifier input.

If the fiddle sounds too "screechy", try reducing its **Hi** control.

Sometimes you might find that you are not hearing an instrument which has a built-in microphone with a battery-powered pre-amplifier, no matter what you do with the Level control. You will need to talk to the musician about this to make sure the pre-amplifier is turned on (they sometimes forget), to check the battery, etc. The various things that they will try to solve the problem can cause major clicks, pops, and feedback, which will annoy everyone. Before talking to the musician make a note of their channel's Main and Mon levels, then **TURN THEIR MAIN AND MONITOR INPUT LEVELS DOWN TO ZERO**. Each time they try something different (e.g., turn it on, change battery, etc.) slowly turn the input channel levels back up and see if the problem is solved. If not, turn the levels back to zero before they try something else to solve the problem.

9 Equipment Disassembly

>>>>> **Be sure to turn OFF the Amplifier before disconnecting any cables !** <<<<<

Microphones: Disconnect the cable from microphone by pressing the tab on the side of the cable connector and pulling. The new instrument microphones (slim with flat head) go into the black zippered pouches. The old instrument microphones (silver ball head) go into the black drawstring pouches.

Cables: Roll each cable up and secure with whatever mechanism is attached (either a velcro strip or an elastic band). Place each cable in a separate plastic bag, if possible. For the microphone cables, plug the two ends together to help protect them from damage and from getting tangled. **CABLES ARE DELICATE AND EASILY DAMAGED. TRY NOT TO STEP ON THEM OR TOSS THEM TOO HARD. TREAT THEM GENTLY.**

Amplifier: Place its power cord in the area behind the back panel, and re-attach both the covers for both the front and back panels. Remove any tape used to label the input channels.

Monitor Speakers: Unplug the cables from the "speakon" adapters, leaving the adapters attached to the speakers.

Main Speakers: To lower the speaker, rotate the clutch ring counter-clockwise from the 6 o'clock "Lock" position past the 9 o'clock "Stand Clear" marking. The ring rotates very easily until about 8 o'clock. Then as you continue rotating it counter-clockwise, it offers some resistance to moving. Gently rotate it farther as the resistance increases. As the resistance increases, the speaker will start lowering. You can rotate the ring back in

the clockwise direction to stop the lowering. By carefully rotating the ring back and forth slightly around the 8 o'clock position, you can gently lower the speaker a few inches at a time. When the speaker is lowered all the way, rotate the ring back to the 6 o'clock "Lock" position. Unplug the speaker wire(s). **Note that one of the speakers has a red tab at the top edge of each input jack, which locks the plug in place. To unplug the wire, press and hold the red tab to release the lock while pulling the wire plug out of the jack.** **The speaker's pole socket has a locking screw. Make sure it is loosened, then lift the speaker off the pole.**

Press the buttons on the sides of the top of the center post and press the silver center post extension back down into the black part of the center post, until it locks in place at the lower level.

Before the stand's legs can be retracted, the collar lock must be released. "Open" or "extend" the "handle" of the collar to release the lock. Once the lock is released, pushing the center post down should pull the legs in most of the way. Turn the stand upside down and finish rotating the legs into the fully closed position. Then "close" the "handle" on the collar to lock the legs into position. Put the closed stand in its black carrying bag, preferably bottom first.

10 Extra Equipment

We have some extra equipment that is not normally used. It is available if needed for special situations.

Extra Cables: There is a smaller black suitcase which contains extra cables, including longer speaker cables.

Extra Amplifier (Peavey Series 300): This amplifier can be used to drive extra speakers for either the Main or Monitor outputs. When driving extra Main speakers, connect the Tape Out jack in the main amplifier front panel to the input of this extra amplifier, using a RCA to Phone Plug adapter and a shielded instrument cable. When driving extra Monitor speakers, connect the Monitor output jack on the amplifier front panel to the input of this amplifier using a shielded instrument cable. The amplifier has two input jacks and two output jacks. It does not matter which input or output is used. Adjust its graphic equalizer as needed.

Extra Mixer (Peavey Unity 1002-8?): If more than 12 inputs are needed, plug some microphones into the extra mixer, then plug the extra mixer's output into one input of the main amplifier mixer (using a shielded instrument cable with 1/4 inch plugs). That main amp input control will adjust the level of ALL mics plugged into the extra mixer.

Extra Speakers (Peavey Mini Monitor II): These monitor speakers are the black plastic things that look somewhat like a small barrel with a handle on top. Each barrel is two speakers clamped together. Pull up to open the clamps on opposite sides of the barrel to separate the two speakers. Place them on the floor in front of and facing the band, on their horizontal "sides". There are two "sides" at different angles, so the angle at which the speaker faces the musicians can be changed by flipping it over. Another option is to place the speakers on chairs facing the musicians, typically in a vertical position.

The amplifier can only safely drive 4 of these speakers at a time, so don't try to use more than 4 of them unless the second monitor output is used to drive some of the speakers, as described in the Monitor 2 Channel section.

Small Mixer-Amp (Peavey ???): Black cube about 15 inches on each side. Contains an amplifier and speaker. Has at least two inputs with separate level controls. Useful as a self-contained sound system for small areas, with a caller and either one musician or a tape or CD player.

Cassette Recorder/Player (Marantz ???) - In its original box, stored in another small suitcase, possibly in the closet above the 2nd balcony. Very nice unit, with variable speed playback.

Old Mixer/Amp (Carvin CX1272): Has 12 input channels and two power amplifier outputs, but the Left (Main) output amplifier is bad. The mixer section can be used to provide extra inputs, by connecting the Tape Out to an input of the regular mixer. The Right (Monitor) amplifier can be used as an external amplifier.

11 References

Here are a few references about live sound.

A contra dance musician named Bob Mills has written an excellent booklet called “All Mixed Up” about doing sound for contra dances. CDSS sells it for around \$5, but it is also available for free, along with extra material, from the web site <http://www.bobmills.org/amu.html>. This is HIGHLY recommended.

The ProSound web site has a lot of information about live sound reinforcement:
<http://www.prosoundweb.com/>

The ProSound web site has a Forum (aka Live Audio Board) where people can discuss sound reinforcement issues: <http://srforums.prosoundweb.com/>
Anyone can search the site and read the messages, but you have to join (for free) to post messages.

There is a Yahoo group called “Contra Sound Forum” or “contrasf” that is dedicated to Contra Dance Sound:
<http://groups.yahoo.com/group/contrasf/>

It has over 150 members. You have to join (for free) to be able participate or even to read the message archive in the web site. Usage is sporadic. Sometimes there are no messages for several days (or weeks), then when someone asks a new questions there is a flurry of answers.

12 Quick Reference

Always turn the amplifier OFF before connecting or disconnecting any cables.

12.1 Main Speakers

- ❑ Setup at left and right front corners of the stage.
- ❑ Set speaker stand clutch ring to center Raise position to raise speakers safely.
- ❑ Set speaker stand clutch ring to leftmost Lock position to lock in place.
- ❑ Connect left speaker to Amp 1 output, and Right speaker to Amp 2 output.

12.2 Monitor Speakers

- ❑ Connect two directly to Amp 3 output, or all four to Amp 3 output using 2 junction boxes.
- ❑ Leave “speakon” connector adapters plugged into speakers.

12.3 Microphones

- ❑ Caller’s microphone has black ball head (use tall vertical stand). Use amplifier input 12 or 1.
- ❑ New instrument microphones (slim with flat head) are in zippered pouches [use first].
- ❑ Old instrument microphones (silver ball head, with switch) are in draw-string pouches [use last].
- ❑ Place instrument microphones pointing away from monitor speakers, and close to instruments.
- ❑ Plug microphones into amplifier in same left-to-right order as physical placement on stage.

12.4 Mixer/Amplifier

- ❑ Adjust **GAIN** for each input so the **PK** light is not on.
- ❑ Set **MON 1** and **MON 2** levels to **0** for the Caller’s input and ALL UNUSED inputs.
- ❑ Set Caller’s **LOW** to **-3**, **MID** to **0**, **HI** to **+3** (typical).
- ❑ Set other instrument **LOW**, **MID**, **HI** to **0**, adjust during sound check as desired.
- ❑ Set each instrument’s **PAN** to **0** (centered), and **EFF** to **0**
- ❑ Set the **LEVEL** of ALL UNUSED inputs to **0**.
- ❑ **Graphic Equalizer for Main Amp 1 and 2: 160 = -1 line, 400 = -1, 2K = + 1/2, 6K = -1, rest = 0**
- ❑ **Graphic Equalizer for Monitor Amp 3: 160 = -1 line, 400 = -1, 6k = -1, rest = 0**
- ❑ Set **Digital Effects** controls to **0**.
- ❑ Set **Phantom Power** to OFF (pressed **OUT**), unless a musician needs it.

12.5 Sound Tweaking

- ❑ Adjust each instrument **Level** so all are about equally loud on dance floor.
- ❑ Ask band about overall **Monitor** level and **Mon** level of each instrument.

12.6 FEEDBACK

- ❑ Point instrument microphones away from monitor speakers.
- ❑ Move instrument microphones farther from monitor speakers, closer to instruments.
- ❑ Reduce overall **Monitor** level, and/or reduce **Mon** level of one or more instruments.

12.7 Disassembly

- ❑ New instrument microphones go in zippered pouches, then into suitcase.
- ❑ Old instrument microphones go in drawstring pouches, then into suitcase.
- ❑ Coil each cable separately, fasten with velcro or elastic, put in plastic bag, then in suit case (CABLES ARE DELICATE, PLEASE BE GENTLE)
- ❑ Put Amp power cord next to back panel, attach front and back panel covers.
- ❑ Unplug cables from monitor speakers, leaving adapters plugged into speakers.
- ❑ Set main speaker stand clutch ring to rightmost position to lower speakers (carefully).
- ❑ Lower silver speaker center post extension.
- ❑ Speaker stands go into black nylon carrying bags (bottom end first).