

Ebenezer Sound System Cables and Connectors

Here is some basic information about the cables and connectors used for connecting the various pieces of equipment.

Balanced cables

Two microphone leads, *hot* and *cold*, run within an earthed screening sheath. The hot and cold leads are twisted together: the result is that magnetic interference is reduced and electrical interference is received equally strongly in both leads. A *differential* amplifier on the mixer input, an amplifier in which voltages common to both leads (noise) are not amplified as greatly as signals that differ (signal) ensures good rejection of electrical noise. Balanced cables effectively allow long runs of microphone cable without significant noise pickup. All of the microphone cables in Ebenezer are balanced and terminated in three-pin **XLR** connectors. Balanced cables can also be terminated with 6.3mm **TRS** (**T**ip, **R**ing, **S**creen) jack plugs. These look like stereo jacks, but are wired as follows: Tip – hot, Ring – cold, Screen – cable screen.

You can safely use mono, **TS** (Tip, Screen), jacks in balanced TRS sockets, but the connection is no longer balanced. All of the Soundcraft EPM 8 mixer TRS jack sockets are balanced mono connectors, with the exception of the stereo headphone socket and the Insert sockets (See below). Each of the two stereo input channels has a pair of mono balanced TRS sockets, one for the left channel and the other for the right.

Unbalanced cables

This is the type of cable that you will find on your home stereo system. A single (mono) or double (stereo) signal lead is surrounded by an earthed screen that also carries the return signal. These are not suitable for long run, low voltage microphone cables, as they have much less noise rejection capability.

Mixer Input sockets

The mixer has 8 mono microphone input channels and 2 stereo inputs. The three pin XLR sockets are designed for microphone level (millivolt) inputs; the 6.3mm TRS sockets are designed for line level (around 1 volt) inputs. The fixed microphone cables, e.g. pulpit and table, are terminated with XLR plugs. The cables from the radio microphone receivers and the computer interface are terminated with jack plugs (TRS or TS). All plugs are labelled, as are the channels of the mixer.

Insert Sockets

Each of the mono **Input** channels, and the two **Main Mix** output channels, has an **Insert** socket. These allow you to take a signal out of the mixer, apply some form of signal processing, and then return the processed signal to the same channel. The sockets take a TRS jack that is wired as follows: Tip – hot signal to processor; Ring – processed hot signal to mixer; and Screen – cable screen and cold signal. The use of insert points enables you move your processor from channel to channel.

Main Mix Outputs

These are recessed XLR plugs

- The left main mix output is connected by balanced (XLRf-XLRm) cable to the left side of the compressor. This in turn is connected by balanced (XLRf-XLRm) cable to the equalizer. The equalizer is connected by unbalanced (XLRf-TS) to the line input socket of the Inkel PA4000 power amplifier.
- The right main mix output is connected by balanced cable (XLRf-TRS) to the line input socket of the hearing aid loop amplifier.

Auxiliary Outputs

There are two auxiliary outputs, which can be used to drive other devices such as audio loop amplifiers and recorders. Each input channel has its own **Aux1** and **Aux2** gain control. There are two switches close to the signal level bargraphs that determine whether these auxiliary signals are taken pre- or post-fader. These channels have line level outputs from balanced TRS sockets, **Aux1** and **Aux2**.

Power Amplifier

- The Inkel PA4000 amplifier is used only to drive the loudspeaker circuits. The preamplifier stages are not used, and (as far as I can tell) the equalizer is inactive.
- The 100V speaker circuits provide a flexible way of powering several loudspeakers with one amplifier. With a 100V system you can add or remove loudspeakers as needed. Each loudspeaker has a selector to determine the maximum power it can receive. When installing such a system you need to ensure that the total of the loads selected are within the maximum load capacity of the amplifier. As an aside, the choice of amplifier and loudspeakers does not deliver high quality sound.
- There are four separate 100V loudspeaker circuits (annex, chapel, library and kitchen) each with its own selector switch. There are labels on the amplifier to show which switch controls each circuit. The speaker cables are labelled.

Ampetronic Loop Amplifier

- This takes a line level input via a balanced TRS socket. At present it is connected to the right main mix channel of the mixer (XLRf-TRS).
- The output of the amplifier is to a single wire that runs around the chapel, lobby, annex and library just above floor level. The current flow creates an audio frequency magnetic field which can be picked up by hearing aids set to "telecoil".

Other Audio Connections:

- **Computer Audio Input**
 - There are two Behringer UCA202 audio/USB adapters. These contain an A/D (Analogue to Digital) converter and a D/A (Digital to Analogue) converter. These take a line level signal and convert it to 16 bit digital audio for recording on the laptop and iMac computers. For audio output from the computer the D/A component of the USB adapter converts digital audio to line level analogue audio.

- The left **Monitor** output of the mixer is connected with a balanced cable (TRS-TRS) to the right side of the compressor.
 - There is an unbalanced cable (TS to phono x2) connecting the right side of the compressor to the left (mono) channel of the A/D converters.
- **Computer Audio Output** - The left output channel of the laptop's USB adapter connects (phono plugs x2 to TS jack plug) to the left channel of the **Stereo 1** channel of the mixer.
- **DVD/CD Player** – The audio output lead is connected (phono x2 - TS x2) to the **Stereo 2** channel. (See "*Projector Hints.pdf*" for hints on connecting the DVD player to the projector.)