

# Gassmann Studio Tutorial

This document discusses some scenarios for using the Gassmann Studio successfully, and some troubleshooting tips for when things are not so successful. This document has no table of contents or index; it's meant to be read online, reading straight through, or using the "Find..." command to find the needed topics.

## I. Policies

Read the document titled "[Gassmann Studio Policies](#)". One point in that document bears repeating here. **DON'T UNPLUG ANYTHING!!** All AC power cables, analog audio cables, digital audio cables, computer cables, and any other sort of cables are already plugged in where they are supposed to be. Don't change them, even if you think you know what you're doing. This can cause major malfunctions and loss of much time tracking down the problem. There is no reason to change any of the cables. The only place you should do any plugging or unplugging is at the analog audio patch bay, or at one of a very few other breakout points (e.g., the audio and MIDI breakout jacks on the equipment rack).

## II. Analog and Digital Audio

Audio signal can be transmitted in two ways: as an electrical signal "analog" of the sound itself or as a "digital" encoding of a binary representation of the sound. Nearly all the audio devices in the studio have analog sound output, and many have digital output as well.

To record sound, the analog signal from a microphone must be converted to a digital signal. To hear sound, the digital signal must be converted back to an analog signal. In general, your sound quality will be highest if you keep the sound in digital form (except for listening to it, of course). See below for a list of devices that have digital inputs and outputs.

### A. Analog signal

The analog inputs and outputs of every device in the studio are wired to the analog patch bay. If you want to route an analog audio signal from one device to another, you simply need to connect the output of one device to the input of another using the colored "bantam" patch cords.

*Important Note:* The analog patch bay jacks are for "bantam" plugs such as those on the colored patch cords. They are NOT 1/4" phone jacks such as are found on most audio equipment. DO NOT plug anything into the patch bay jacks except the colored bantam patch cords. Do not plug headphones directly into the patch bay, and do not plug any 1/4" phone plugs (guitar or instrument cables) directly into the patch bay.

If you have a piece of personal equipment you have brought into the studio, and you want to plug it into the studio, use the jacks that have been provided in the breakout panel just below the analog patch bay. There are 4 XLR jacks, 4 1/4" phone jacks, and 4 RCA jacks. These three sets of 4 jacks are each wired to the patch points labeled "Ext 1-4". So, for example, if you wish to plug in a pair of RCA plugs, plug them into the two leftmost RCA jacks in the breakout panel, and the signal will then appear at Ext 1 and Ext 2 on the patch bay, and you can then patch those to whatever other device you want in the patch bay.

In the patch bay there are two rows of patch points. Each of the patch points along the top of the patch bay represents the audio output of a device, and each of the patch points along the bottom of the patch bay represents the audio input of a device. So, for example in the top row of patch points, the first two jacks are the main left and right outputs of the Digi 192 audio interface, and the two patch points just below that are the inputs 1 and 2 of the Ramsa DA-7 mixer.

The patch bays are *normalled*. This means that each output jack is internally connected to the input jack just below it. When there are no patch cords in a particular jack, the signal flows directly from output to input without a patch cord being needed. When a patch cord is inserted, that normal connection is disconnected. So, using the prior example, the main outputs of the Digi 192 are already connected to the inputs 1 and 2 of the DA-7 mixer, so you don't need to make that connection explicitly with patch cords.

### **III. Recording**

#### **A. Hard disk recording**

For most recording, the Pro Tools application might be thought of as the "normal" recording method. Audio will go into the application via the Digi 192 audio interface, usually coming from a microphone or from another sound-generating device such as a synthesizer.

#### **B. Microphones**

There are two dynamic microphones (AKG D2002), two mic clips, two mic stands, and two mic cables supplied in the studio. These mics are decent cardioid dynamic mics, but not of exceptional quality. They're OK for recording voices and instruments that provide a strong source signal without sudden dynamic plosives. For better quality mics, you can check out two AKG C1000S condenser mics from the Arts Media Center. The Arts Media Center also possesses other high quality microphones. If you think you need a special application mic, consult with AMC director Ross Whitney. The studio also contains a plosive screen for voice recording and a pair of headphones for monitoring.

Using that equipment, it's possible to record right in the Gassmann Studio. Alternatively, you can record elsewhere—in another studio or using portable recording equipment checked out from the AMC—and then bring the audio files from that recording session into this studio and place them in a Pro Tools session.

### C. Recording procedure

To make a standard stereo recording, here is the recommended procedure:

1) Set up two microphones in the desired location. Plug them into the first two XLR jacks on the breakout panel underneath the analog audio patch bay.

2) The microphone signals going into the first two XLR jacks appear in the patch bay as the first two external jacks, labeled “Ext 1” and “Ext 2”. Note that those jacks are normalled to the t.c. electronic Gold Channel microphone pre-amplifier. This means that the audio signals from your two mics will go straight to the Gold Channel by default. (Handy, no?) The Gold Channel has the best quality preamplification and analog-to-digital conversion in the studio, so this is usually the best way to go. The alternative is to plug your microphone signal to one of the channels 5-8 of the DA-7 mixer, which also has high quality preamplification and conversion.

3) On the Gold Channel, make sure the Input for each of the two channels is set to “Mic” (rather than “Line” or “Digital”). If you are using condenser microphones (such as the AKG C1000S), turn 48v phantom power on for each channel. If you are using dynamic microphones (such as the AKG D2002), turn 48v phantom power off. Test the input levels by having the artist(s) play their loudest sounds into the microphones. Adjust the level using the Pad switches (to adjust the level in large 20 dB increments) and the level knobs and (for finer adjustments) until the loudest source sounds show just under 0 dB (maximum) on the input monitor LEDs. (Make sure the monitor LEDs are set to show the input signal, not the output signal.) The different Gold Channel presets have particular settings for equalization and compression of the incoming signal. Read the manual for more information on compression, EQ, and presets. Select the preset you want, or design your own and store it.

4) Now you will want to route that signal to the Pro Tools application on the computer. (Technically what you'll be doing is routing it to the Digidesign 192 I/O interface, which is the hardware device that interfaces to the Pro Tools software.) There are two ways you might transmit the audio from the Gold Channel to Pro Tools: analog or digital. If you plan to use the analog signal, continue reading here; if you plan to route the digital signal from the Gold Channel, read item 5 instead. To pass the analog signal from the Gold Channel to Pro Tools, you will need to find the output jacks labeled Gold Channel Out L and R (since it's an output, it will necessarily be the upper row of jacks in the patch bay) and the input jacks labeled Digi 192 In 1 & 2. Oh, what do you know? The outputs of the Gold Channel are already normalled to the inputs 1 & 2 of the Digi 192.

No patch cords needed for that connection. If you wanted to route the microphone signal elsewhere for some reason, you'd use two patch cords to patch the Gold Channel outputs to the desired inputs.

5) [Note: As of January 1, 2017, the digital audio connections have not been fully connected. Use analog audio connections for now.] Since the signal has been converted to 24-bit digital form by the Gold Channel, you can pass the digital signal from one device to another. To do that, you need to route the digital signal to the proper locations using the Z-Sys RouterControl software. A detailed explanation of how to do this merits a tutorial of its own, so see the section below on Digital Audio Routing. For now we will assume that you have read that. Open the RouterControl application from the Dock (or from the "Applications" folder). This will open the RouterControl software, a virtual audio patchbay. In the RouterControl application, choose Open... from the File menu, and open the "DigitalAudioSetup" file in the /Users/Shared/ folder. In the router matrix, assign the source Gold Channel to the destination ProTools 1&2, and also assign it to channels DA7 25&26 of the mixer so you can hear the output of the Gold Channel directly. Assign source ProTools 1&2 to destination DA7 17&18, ProTools 3&4 to DA7 19&20, and so on, so you can hear the output of ProTools. After you have made those connections in the software, send the configuration to the Router (command-R), then quit the application.

6) Open the Pro Tools application (from the Dock). Create a new stereo audio track (or two new mono audio tracks, if you prefer). By default, Pro Tools should be set up so that the track(s) will receive the input from channels 1 and 2 of the 192 and will send their output to channels 1 and 2 of the 192. (If you're recording a digital signal, choose the Hardware... command from the Setups menu and ensure that the input preference for channels 1 & 2 is set to "Digital", not analog, and that the clock source is set to "Internal". This will cause it to get its signal in digital form, and slave itself to the Word clock generator. If the digital outputs of ProTools are set to 9-16, which is the default, you will want to change the output bus of your audio tracks 1 and 2 to go to outs 9-10.) Now click on the red "record enable" button in the audio track(s). If all is correct, you should see the signal in the virtual LEDs identical to the output signal of the Gold Channel.

7) You should see analog signal from the Digi 192 interface coming in on channels 1 and 2 of the DA-7 mixer. You should also see digital signal coming in on channels 17&18 from Pro Tools. Route whatever channels you want to hear to the L&R bus of the mixer, route the L&R bus to Monitor A, and turn up the Monitor A pot to hear the sound. (If you're in doubt how to do any of that, read the DA-7 manual.) In this case, the signal is in digital form before it even gets to the DA-7, so for best results the DA-7 should be slaved to the clock of the incoming digital signal. So, press the Dig I/O button on the DA-7 to call up the clock source window. The clock source should be set to "44.1 Internal".

*Troubleshooting:* If you're trying to route the signal digitally and you're not getting signal where you're supposed to be getting it—that is, if steps 5, 6, and 7 above are not working because the signal is not arriving where it should—here are some things you can try.

- a) Redo step 6 above, and make sure you have routed the digital signals correctly.
- b) On the Gold Channel, make sure that the digital signal format is set to “AES/EBU” (not S/PDIF”).
- c) On the Gold Channel, make sure that the preset you are using has the Aux Send/Return set to “None”.
- d) Review the instructions in steps 6-8 to ensure that you've followed them correctly.

10) Once you have set the levels the way you want, click on the record and start buttons in Pro Tools and cue the artist to begin. When the recording is finished, stop ProTools) and listen to the results to ensure that no unwanted noise is included in the recording.

#### D. Digital Audio Routing

All equipment that sends or receive digital audio signal does so via the Z-Sys 32-32r digital audio router. The Z-Sys performs the needed format conversions between S/PDIF and AES/EBU formats, but you still might need to know what format each individual device uses, just to ensure that the device itself is set to send and receive digital audio in the correct format. Here is a chart of digital audio devices and their digital formats used in the studio. (Note that the order of devices in this list corresponds to the order in which they are patched to the Z-Sys ports, just for convenience of reference.)

<u>Device</u>	<u>Format</u>
Pro Tools 1&2*	AES/EBU
Pro Tools 3&4*	AES/EBU
Pro Tools 5&6*	AES/EBU
Pro Tools 7&8*	AES/EBU
DA-88 1&2*	AES/EBU
DA-88 3&4*	AES/EBU
DA-88 5&6*	AES/EBU
DA-88 7&8*	AES/EBU
DA-7 17&18 (Slot 1 1&2)**	AES/EBU
DA-7 19&20 (Slot 1 3&4)**	AES/EBU
DA-7 21&22 (Slot 1 5&6)**	AES/EBU
DA-7 23&24 (Slot 1 7&8)**	AES/EBU
DA-7 25&26 (Slot 2 1&2)**	AES/EBU
DA-7 27&28 (Slot 2 3&4)**	AES/EBU
DA-7 29&30 (Slot 2 5&6)**	AES/EBU
DA-7 31&32 (Slot 2 7&8)**	AES/EBU
DA-7 Main Out L&R (Rec In L&R)	AES/EBU



17&18 of the DA7 mixer.”

2) Open the RouterControl application from the Dock (or from the “Applications (Mac OS 9)” folder). This will open the Router software, a virtual audio patchbay. (Since it’s an OS 9 application, the Classic mode will begin to run.) In the RouterControl application, choose Open... from the File menu, and open the “DigitalAudioSetup “ file in the /Users/Shared/ folder.

3) In the router software, assign the sources to the proper destinations. To do this, you click on a source, click on a destination, and type command-M to make the connection. Do this for as many sources and destinations as you want to connect. If you wanted to do the routings described in Step 1, you might make the following connections: Motif8 >> PCM80, PCM80 >> ProTools 1&2, ProTools 1&2 >> DA7 17&18 (Slot 1 1&2). Note: In this example we have assigned the output of ProTools to the mixer in order to hear the sound once it has been recorded. If you’re routing the digital output of ProTools to an input of the DA-7, then you must be sure that in the mixer window for those channels you don’t route that sound to some outputs of the mixer that you’re sending to ProTools while you have record enabled in ProTools!

4) Once you have made the source-destination connections you want, type command-R to send the configuration to the router. If the connections show up with black dots in them in the software, that means the router has received and implemented those connections. Quit the application.

5) Now you must also be sure you’re routing the signal correctly within the DA-7 mixer. This is done by selecting the destinations you want in the mixer window for each channel you’re using. In channels 17 and 18 of the mixer (where ProTools is coming in) you should set the destination as L&R, with channel 17 panned full left and channel 18 panned full right.

• • •

Here are some other topics that should be covered in future tutorials. If you think you understand the topic well, you’re invited to create a Tutorial document of your own to explain the topic, and put that document in the Users:gassmann:Documents folder.

- playing back a notated score
- recording a MIDI sequence
- adding reverb to a recording
- transferring sound another source to a computer file, and ultimately to a CD

- why can't I hear a sound?