

Working in 189

Room 189 is the recording workshop. It is available for use by students who have completed the recording quarter of music 167.

Overview

There are two recording systems:

A 24 track system based on a Yamaha 02R96 mixing console and a Radar dedicated hard drive reorder. There 14 mic lines from room 191 to the console, and additional lines can be patched. This setup is similar to commercial studio installations (better than many) and will let you become familiar with traditional recording techniques. It will be the best choice for big sessions.

A Mac Pro based system based on a Digi 003R audio interface. This unit has 16 inputs (8 via the console), but the actual track count will depend on variable factors such as the amount of processing you specify. There are 8 mic lines from room 191. The Yamaha console can be used as a control surface for Pro Tools or Logic. This system is close to what is taught in the first year, and will be useful for quick projects.

Monitors

There are two sets of monitor speakers, Dynaudio BMT 15 and Yamaha HS80. The normal patch is from the Yamaha board to the Dynaudios, and no patch cords are required. To hear the Yamahas, patch from the jack labeled console mon to YAM. The Digi 003R analog monitor output is normalled to 2track A1 on the console. You will hear the Digi003 by pressing the 2TrA1 button on the monitor section

To monitor the Digi 003R without using the console, patch from the jacks labeled Pro Tools L-R to either input.

Mic Preamps

Aside from the preamps in the console and Digi 003, there is a set of 4 Universal Audio preamplifiers- these are top of the line devices.

Outboard Gear

Analog limiting and compression systems from Aphex, Summit Audio and Behringer compliment a full suite of plug-ins in the mixing console and computer. There are a pair of CD audio recorders for trial mixes and a reel to reel tape machine.

Power Switches

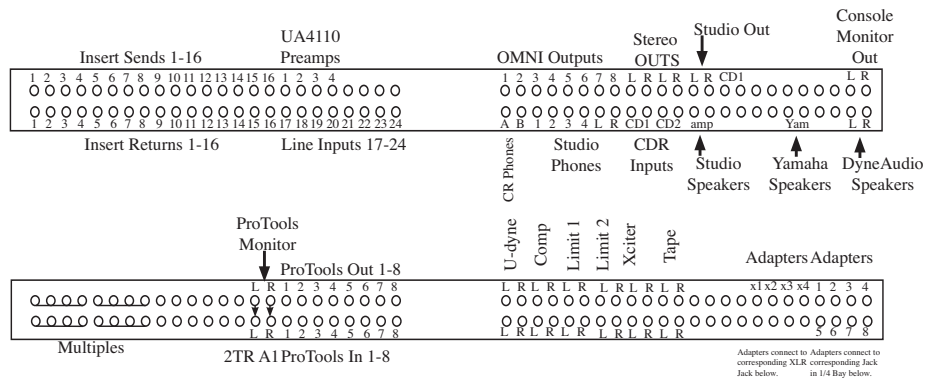
Main studio power is found on a switch at the bottom of the short rack. There are other power switches on the rack, for studio monitors (push button) and studio headphones. These should be left off unless needed. (The phones system hums a bit). The outboard equipment rack has its own power switch.

Making Connections

The patchbay is set up like those found in professional recording studios. The rationale is this: There is a typical (normal) way the equipment will be connected together. Analog connections are made by switches built in to the connectors of the patch bay; when you insert a plug, you are breaking the normal connection to do something else. Digital connections are handled by switches in the console. There is also a patchbay dedicated to microphone connections.

Patching In 189

The top bay is normalised, which means the signal is internally connected from top to bottom. Inserting a patch cord breaks the connection.



Digital Connections

Console 2tr digital 1 out to CDR-1 AES in
 Console 2tr digital 2 out to CDR-2 coax in
 CDR-1 out to Console 2TR D1 digital in
 CDR-2 out to Console 2TR D2 digital in
 Console 2 tr digital 3 out to Digi 002r in S/PDIF
 Digi 002r S/PDIF out to Console 2TR D3 digital in

Analog Connections

Outputs are above inputs.

Top Block Left:

Console insert¹ out 1-16 normalised to insert in 1-16

(These are unbalanced. Do not run them to other rooms.)

4110 Preamp out 1-4 normalised to console line inputs 17-20

Top Block Right

Omni out 1-2 are normalised to the Behringer headphone amp A B.

Omni out 3-6 normalised to headphone distribution 1-4

Omni out 7-8 normalised to headphone distribution L-R

¹ There are switches on the console to enable these. Leave them off if you are not using inserts.

Analog Stereo out not normalled to anything
Analog Stereo out not normalled to anything
Studio Mon (Studio Monitor) normalled to Studio Amp & speakers in 191
Analog out for CD1
Nothing is normalled to the Yamaha speakers (YAM)
Console main monitor out normalled to Dynaudio speakers.

Lower block There is little normaling here. Output are above inputs of each device

Left:

Multiples-- 0-0-0-0 These allow you to split a signal up to three ways.

Digi 003r Connections labeled L and R are the monitor output. These are normalled to the console 2TrA2. Jacks labeled 1-8 are analog outputs.

Right:

Udyne	Behringer Ultra Dyne processor
Comp	Summit Audio DCL-200 compressor
Limit 1	Aphex Dominator Limiter
Limit 2	Aphex Dominator Limiter
Xcitr	Aphex Aural Exciter
Tape	Otari MTR-10 reel to reel tape deck

Adapters- These jacks are wired to connectors in the lower panel to allow interface with outside equipment. Equipment with balanced outputs work best. Use a direct box to a Mic in for unbalanced signals. The jacks labeled X1 to X4 are wired to XLR connectors, the others are wired to 1/4" TRS phone jacks.

There is a 1/8th inch headphone cable loose to the left of the console. This connects to the console monitor as 2Tr A2. This may be used to listen to laptop outputs. Be careful of volume when connecting.

Digital Connections

The Radar multi-track recorder is digitally connected to the console. To send signal to the recorder, assign any input to Slot 1-1 to 1-16 or Slot 2-1 to 2-8. The tracks return on inputs 25 - 48.

The Digi003 computer interface is connected both ways to the console on Slot 2-9 through 2-16. These are labeled ADAT 1-8 or out 9-16 in Pro Tools. There is also a stereo SPDIF connection from the console to the SPDIF input.

There are three stereo digital connections on the console monitor section labeled 2tr D

- 2Tr D1 connects to the Tascam CD burner on the rack.
- 2Tr D2 connects to the HHB CD burner on the rack.
- 2Tr D3 is a SPDIF connection from the Digi 003. (17 and 18 in Pro Tools)

Mic Patching



There are 14 permanent mic connections from Room 191 to the console. These are on the mic panel directly below the window. All other mic lines need to be patched before they can be used. This is done via the XLR connectors in the rack below the Preamps and interface. Each connector has a number indicating its origin. Numbers 15- 24 originate on one of the two panels below the window in 191. Mic lines from other rooms are labeled with the room number and line number - for instance, 186-2 is line 2 from room 186.

There are 10 possible destinations for these lines:

Console channels 15 and 16

Digi003 (ProTools) 1-4 (do not push the DI button)

UA Preamps 1-4 . The outputs are labeled pre1-pre4 on the patch bay. They are normalled to console 17-24.

Monitoring in 189

We have two sets of monitor speakers:

- A pair of Dynaudio BMT15s like the ones in room 191 (less the subwoofers, which are not needed in a room this small).
- A pair of Yamaha HS80s-- a modern version of the legendary NS10s. These are similar in sound to typical home stereo speakers and should be used to check your masters before you send them out.

The speakers are self powered, and are connected to the patchbay. The Dynaudios are normalled to the console monitor output and ready to use. You must patch console monitor to Yams to use the Yamahas.

Volume Level

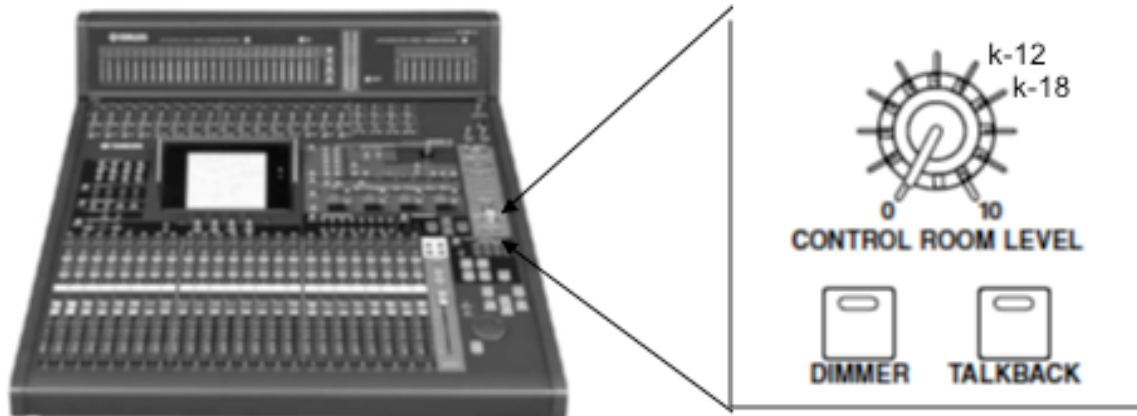


Figure 1.

Speaker volume is set by the control room level knob on the left end of the console. The speaker levels are calibrated according to the "k-system"², where the loudest sustained sound is set to 86 dB SPL. The k-system is proposed as a standard for mastering so that CDs and DVDs will play at consistent levels in the consumer's home. The definition of 86 dB as the loud level is taken from the motion picture industry standard for theater sound calibration. Of course the system must be capable of handling more than this for brief moments. The difference between the calibration point and the maximum level is called headroom or crest factor. It is common in movies and pop music to leave 12 dB for headroom, so levels should be adjusted to produce 86 dB from the speakers when the console meters read -12 dB³. There is a "k12" mark by the control room level knob showing this setting. Classical music requires more headroom, so there is an additional mark where -18 on the console provides 86 dB from the speakers (k18). Note that to produce a recording that is generally quieter, you turn the monitor volume up. Figure 2 Shows these relationships. You may prefer to work at quieter levels most of the time, but you should use the calibration marks when you are judging overall levels or bass balance.

² Invented by mastering engineer Bob Katz.

³ Remember that dB is a ratio related to a reference level. The level used for the speakers is the threshold of hearing, 0 dB SPL. The 0 level used in the console is the clipping point. Nothing can be stronger than this, so the console meter shows negative dB.

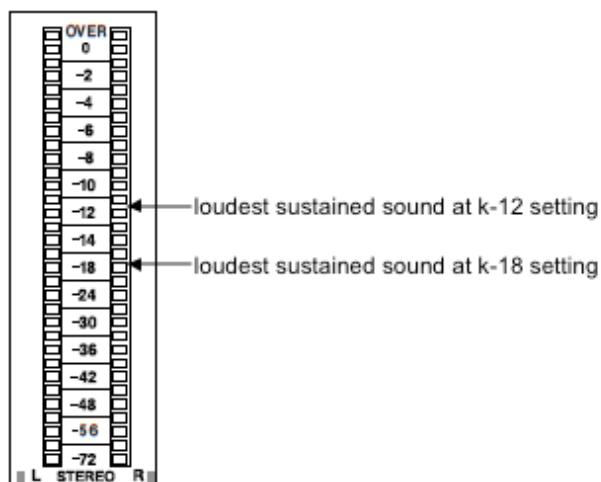


Figure 2.

The monitor level is also affected by the dimmer button shown in figure 1. When this button is engaged, the monitor volume is cut by a preset amount. The amount is adjustable on the Monitor Display⁴ and is usually -20 dB. Use the dimmer switch to temporarily reduce the monitor to background level.

Remember, as thrilling as it is to listen to music really, really loud you are endangering your hearing when you do so. If you have the volume above the marks and the meter is hitting the top you are doing damage.

Choose source to monitor

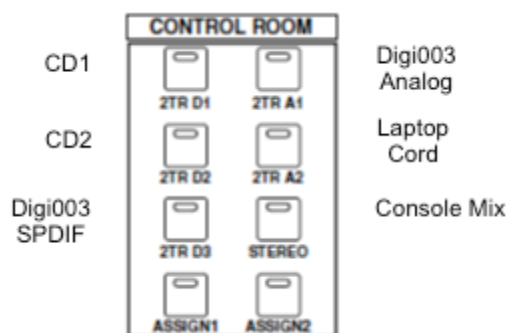
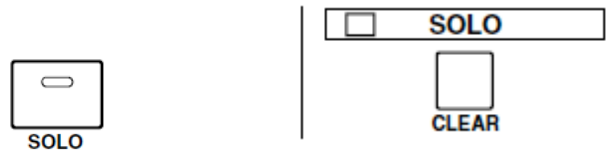


Figure 3.

The signals that are heard in the speakers are chosen with the buttons shown in figure 3. The stereo mix will be the one used most often. The buttons labeled 2TR select various other devices in the studio. You can monitor other sections of the console by setting up the assignable buttons in the monitor display. They can select any of the busses or aux mixes. Aux 7-8 is a handy source to monitor the headphone cue signal. Note that the Digi003 has both a digital and analog connection. The analog is most useful because that is controlled by the level and mute controls on the digi003 panel.

⁴ Press the diamond shaped button above the monitor section and choose the C-R tab.

Solos



Every channel has a solo button. This overrides the signal at the monitor so all you hear is the soloed channel. Note that if the soloed channel is quiet, nothing will be heard. As this may be on a hidden layer, there is a flashing solo light above the monitor switch to indicate any solo is selected. The clear button will turn all solos off and restore the normal monitor signal.

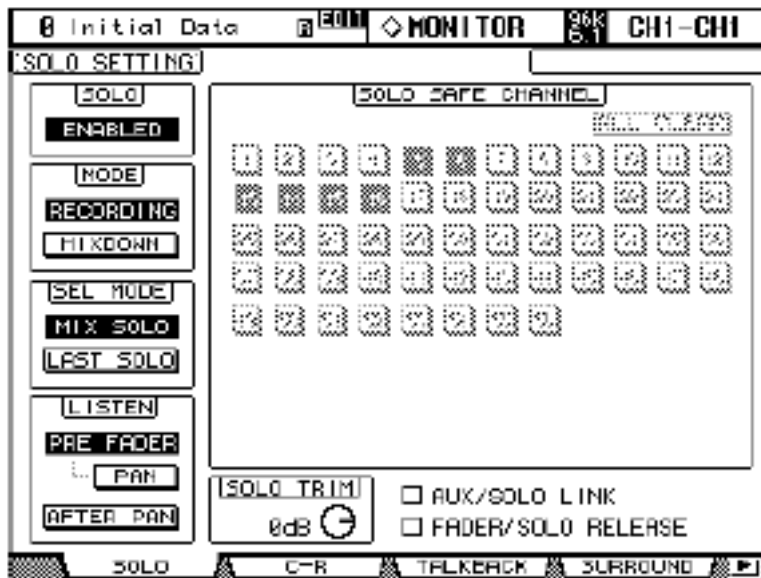


Figure 4.

The behavior of solo can be customized with the solo tab of the monitor display.

- Solo enabled means the selected channel can be soloed. I can't think of a reason to disable solo.
- Mode- in mixdown mode, solo is routed to the stereo mix instead of the monitors. Other channels are muted, unless they are marked as solo safe. Leave this in recording mode.
- Sel mode- Mix solo allows several channels to be soloed at the same time. Last solo means one at a time. Mix solo is usually best.
- Listen- Prefader mode solos the channel at full volume regardless of the fader setting. This is good for radio stations where you want to hear a channel that is turned off. (The original purpose was to cue a vinyl record). Fader solo release drops the channel from solo when it is turned on. After Pan is usually best for recording.

Synchronization in the Recording Workshop

Digital audio systems need perfect synchronization in order to pass data around. No clock circuit is accurate enough to keep two independent⁵ devices synchronized to 1/44100th of a second for very long. When the two devices drift apart, samples will be lost with an audible pop. Thus, one device in the studio is declared "Master" and all other devices are synchronized to the master's clock rate. There are two ways of transmitting synchronization signals:

- The digital data stream can be used, but this is often subject to slight irregularities called "jitter".
- Special cables labeled "wordclock" can be connected between the devices. This option is usually available on high end devices.

Very high end studios use a specialized master clock such as the Apogee Big Ben, but the most common approach is to sync everything to the console. You need to check sync settings before any session.

The Console is the Master

You shouldn't need to do anything on the console itself. If you are curious, open the DIO screen:



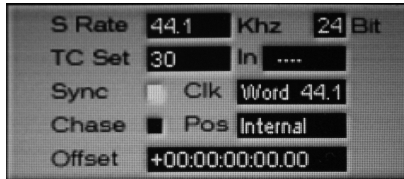
Master sample rate
Internal 44.1k

Figure 5.

⁵ AKA asynchronous.

The word clock setting is found on the Word Clock tab of the DIO screen. The clock source (at the lower left) must be set to INT 44.1k. The black box indicates the setting. (Boxes with no X are possible sources.) Please do not attempt to run the studio at other clock rates or other clock sources. Many projects will be screwed up.

Sync Radar to the Console



The Radar sync source is shown in the upper right of the display. The sync indicator should be green and the Clk source should be Word 44.1. (S Rate should also be 44.1. This is a choice you get when you create a project. If S Rate is 48, files will play at the wrong pitch when transferred to Pro Tools.)

If Radar is not synched, you will see error messages on the console:

Sync Error! (Slot 1)

Audio may play back but you will not be able to record.

To Set Sync:

Press Menu/Prev key

Use up or down arrow to select SYNC MENU and enter

Use up or down arrow to select SYNC REFERENCE and enter

Use up or down arrow to select WORDCLOCK 44.1 and enter

Back out with the Menu/Prev key

Sync Computer Interface to the Console

If the Digi003 is not synched, you will see a console error message:

Sync Error! (Slot 2)

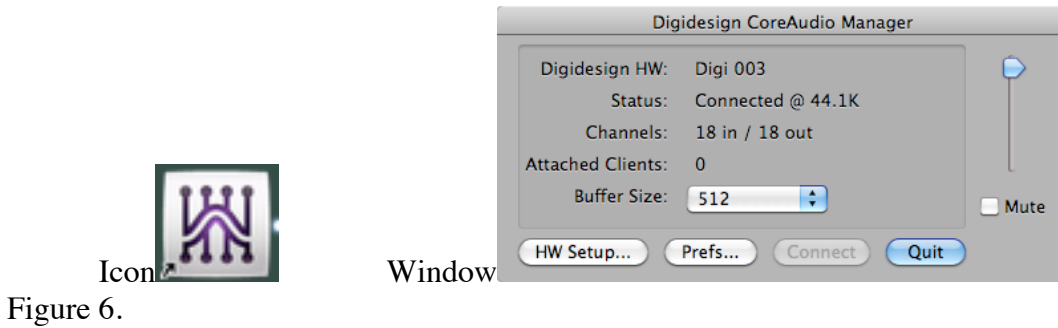
This will almost always happen if the Digi003 was turned on before the console. How you fix this depends on what program you are going to run.

Sync in Pro Tools

Under the setup menu, select Hardware and select **word clock** as clock source.

Sync in Other Programs

To synch other programs, launch the Digidesign CoreAudio application from the icon on the Dock. (This may launch automatically.)



Open HW Setup and choose **word clock** as the sync source.

Routing Audio to the Digi 003

Logic, Pro Tools and Peak can access the Digi 003 directly via their audio settings dialogs. For other programs such as iTunes, set up connections with Audio MIDI manager. If you boot up the computer before the Digi 003 (which is on studio main power) audio connections will revert to the speakers in the screen.

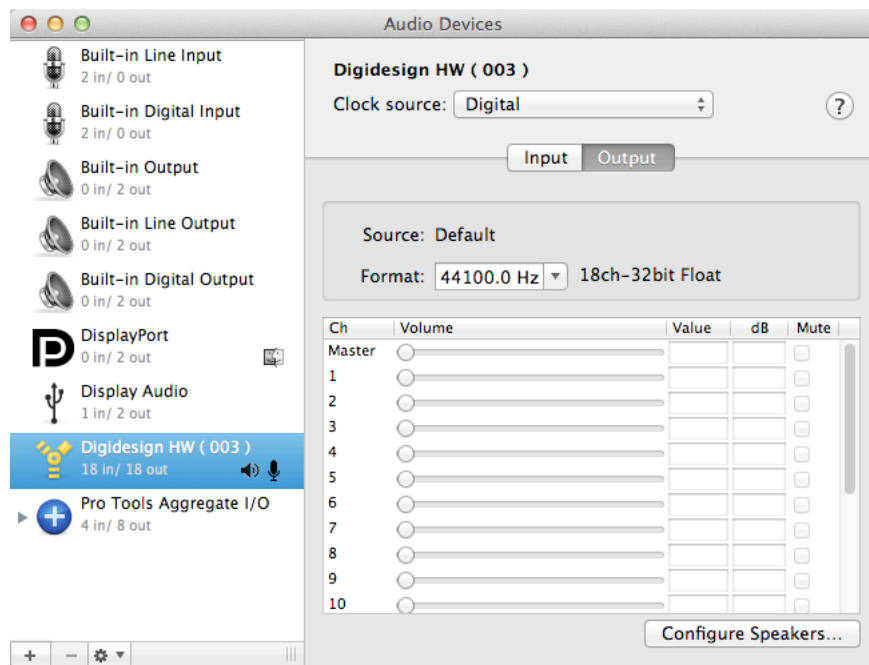
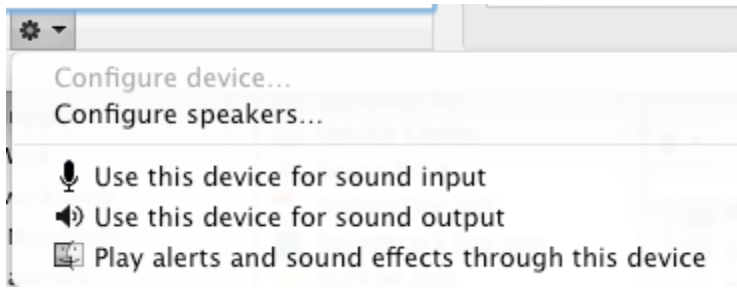


Figure 7. Note icons by DisplayPort and Digidesign HW.

The Audio devices window shows control panels for all possible audio sources in the system. Built-in output is a tiny speaker buried in the computer case or a headphone plugged into the front. Built-in inputs (line or digital) are not connected to anything.



Select an input or output and use this button to assign default connections.



The preferred settings are:

-  Sound Input: Digidesign HW
-  Sound Output: Digidesign HW
-  System alerts and sound effects: DisplayPort or Display Audio (they are the same).

You may have to launch the Digidesign CoreAudio application and close and re-open the audio window of Audio MIDI setup to make Digidesign HW appear.