

192 I/O Calibration Mode Instructions

Before you use the 192 I/O audio interface, you may want to calibrate its input and output levels to the level of your mixing console.

The 192 I/O has +4 dBu and –10 dBV inputs, and +4 dBu outputs, each with their own trim pots for proper calibration.

The 192 I/O is factory-calibrated so that its +4 dBu input operating level is set for 18 dB headroom above +4 dBu (maximum input/output +22 dBu).

If you do need to recalibrate your 192 I/O or other components of your studio, you can use the alignment procedure described in this chapter.

About Calibration

Calibrating levels on a digital recording device is different from calibrating levels on an analog recording device. Unlike analog devices, most digital devices do not have a standard “0 VU” level setting that corresponds to nominal input and output levels. Instead, with an interface such as the 192 I/O, the meters are calibrated in *decibels below peak* or dBFS (dB full scale)—digital clipping level.

Headroom

The concept of headroom is slightly different for analog and digital devices.

Analog Most analog devices allow for a certain amount of headroom above 0 VU. If you send a signal above 0 VU to an analog recorder, you still have a margin of headroom, and if tape saturation occurs, it does so fairly gracefully, giving the audio a compressed sound that some find desirable.

Digital Digital devices, on the other hand, do not allow for signals that exceed the dynamic range of the input or dBFS (dB full scale). When a signal exceeds the maximum input level for a digital device, clipping occurs, causing digital distortion, which is harsh and usually undesirable.

The Calibration Process

Analog To calibrate the input level of an analog device to a mixing console’s output level, you would typically send a 1 kHz tone at 0 VU from the console to the analog deck and align the recording deck’s meters to read 0 VU.

Digital With a digital recording device such as the 192 I/O, in order to allow for headroom, you must align a 0 VU tone from the console to a value less than zero (or below dB full scale [-x dBFS]) on the 192 I/O, by exactly the amount of headroom that you want.

For example, to have 12 dB of headroom above 0 VU with the 192 I/O, you must align the incoming 0 VU 1kHz tone to a level of -12 dBFS. For 18 dB of headroom, you would align it to -18 dBFS. (Since it is assumed that you are using the 192 I/O with a +4 dBu device or console, a 0 VU signal level coming out of the device or console is actually equivalent to a nominal +4 dBu level signal.)

Calibrating the I/O

To calibrate the Digidesign I/O you will put Pro Tools in a special operating mode called *Calibration mode*, then use the Signal Generator plug-in to generate a test tone for alignment.

The Pro Tools installer includes a standard 8-channel calibration session for the 192 I/O. You can use this session as is and change the input and output assignments for more 192 I/O channels or use it as a base to make your own calibration template.

The following instructions show how the calibration session was created. You can create a session from scratch or open the calibration template and walk through these instructions. The calibration template is located in Digidesign/Pro Tools/Utilities.

⚠ *Turn down your monitoring system before beginning calibration! The Signal Generator plug-in emits a continuous signal when inserted on a track.*

To calibrate the I/O:

- 1 Launch Pro Tools by opening the Digidesign folder, then the Pro Tools folder, and double-clicking Pro Tools.
- 2 In Pro Tools, create a new session by choosing File > New Session.
- 3 Choose Setups > Preferences and click Operations.
- 4 Enter the desired Calibration Reference Level value in dB. A level of -18 dB is typical. (It isn't necessary to type a minus sign here.)
- 5 Click Done.
- 6 Create a new mono audio track by choosing File > New Track.
- 7 Insert the Signal Generator TDM plug-in on the track.
- 8 Set Signal Generator's output level. This should be the same value you entered as the Calibration Reference Level.
- 9 Set Signal Generator's frequency to 1000 Hz. 1000 Hz is typical, but any frequency will work. Other typical values are 250 Hz and 500 Hz.
- 10 Set Signal Generator's signal waveform to Sine.
- 11 Route the track's output to Bus 1. In the calibration template, Bus 1 has been renamed to "1k Tone."
- 12 Create a mono Auxiliary Input track for each I/O output you want to calibrate. Set the output assignment for each of these Auxiliary Inputs to its respective I/O output.
- 13 Set the input of each Auxiliary Input track to Bus 1, or 1k Tone for the template session.

14 Create an additional mono Auxiliary Input track for each I/O input you want to calibrate. Set the input assignment for each of these Auxiliary Inputs to its respective I/O input. Then set the output of each of these Auxiliary Inputs to an unused bus pair (for example Bus 3–4—in the template session the bus names are Null and Out) so that feedback doesn't occur when monitoring main outputs 1–2.

15 Connect an external VU meter to each of the I/O outputs in turn. (One at a time as you calibrate.)

16 Set all Pro Tools track faders to their default of 0 dB by Shift-Option-clicking any fader in the session.

17 The trim pots are located at the rear of the unit, underneath the DB-25 connector. The default trim assignment is "A." If you wish to calibrate both the A and B trims, select the active trim in the Analog Output tab in the Hardware Setup dialog.

18 Adjust the I/O output level trim pot with a small, flat-head screwdriver to align the outputs to read "0 VU" on the external VU meter. We recommend using a *tweaker* tool with a recessed flat-head surrounded by a plastic tube to hold the trim pot. Tweakers can usually be found at electronic supply stores.

19 As the inputs and outputs are DB-25 connectors, either use a DB-25 to DB-25 straight through cable or simply interconnect the XLR male and female connectors together. A DB-25 to DB-25 DigiSnake cable configuration is available at your Digidesign dealer.

20 In Pro Tools, select Operations > Calibration Mode.

The names of all uncalibrated tracks begin to flash. In addition, the track volume indicator of each Auxiliary Input track receiving an external input signal now displays the reference level coming from the calibrated output (default is –18 dB).

21 Adjust the I/O input level trim pots with the same small flat-head screwdriver or tweaker. It is best to calibrate the inputs with the rear of the 192 I/O facing you and the Pro Tools screen well in sight. If you cannot see the Pro Tools screen, consider asking another person to assist you with the input calibration. When the level is properly matched, the track name will stop flashing and the peak volume indicator will indicate your headroom value (the default is "–18.0").

The Automatch indicator arrows on each track show the direction of adjustment required for alignment:

- ◆ When the incoming level is higher than the reference level, the down arrow will appear lit (blue). In this case, trim the I/O input level down.
- ◆ When the incoming level is lower than the reference level the up arrow will appear lit (red). In this case, trim the I/O input level up.

When you have properly aligned the incoming peak signal levels to match the calibration reference level, both Automatch indicator arrows will light: the up arrow red and the down arrow blue.

Above the fader is a peak volume indicator. This indicator will show the dB level above and below your chosen headroom value. If the peak indicator is showing –19.1, you are –1.1 dB below a headroom value of –18 dB. If the display is showing –16.5, you are +2.5 dB above your headroom value of –18 dB.

22 When you have finished, deselect Operations > Calibration Mode.

Calibrating a System with Both 192 I/O and 96 I/O Audio Interfaces

The “A” trim on the 192 I/O is factory preset with 18 dB of headroom in its +4 dB line level operating mode. The 96 I/O, however, is fixed at 14 dB of headroom and its inputs are not adjustable.

When setting up an 96 I/O (particularly in systems using a combination of the 192 I/O and 96 I/Os), it may make sense to calibrate all I/Os for -14 dB headroom. This helps ensure that recorded audio files have the same relative levels regardless of which interface they user for recording.

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