

Universal Slave Driver™

Addendum for Pro Tools

Version 4.3

Digidesign Inc.

3401-A Hillview Avenue
Palo Alto, CA 94304
tel: 650-842-7900
fax: 650-842-7999

Technical Support (USA)

650-842-6699
650-856-4275

Product Information

650-842-6602
800-333-2137

Fax on Demand

1-888-USE-DIGI (873-3444)

World Wide Web

www.digidesign.com

Digidesign FTP Site

[ftp.digidesign.com](ftp://ftp.digidesign.com)

digidesign

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Pro Tools Team

Pro Tools Software

- Application: Dave Conry, Eamonn Fay, Paul Greyson, Sandeep Gupta, Mark Jeffery, Mike Rockwell, Pete Wilcox
- DAE: Toby Dunn, Joe Fontana, Kenn LeGault, Fritz Mueller, Bob Nagy, Peter Richert, Chris Roberts, Joe Saracino, Doug Tissier
- DSP Plug-Ins: Paul Neyrinck, Frederick Umminger

Pro Tools Hardware:

- Hardware Engineering: Scott Bittle, Gary Isobe, Jim Jasmin, Ken Lee, Andra Mitchell, Kent Shephard
- Design: Joe Javier, Rene Pulido, Doug Tornio
- Purchasing: Cathy Heerema, Tanya Krupsky
- Manufacturing Engineering: Pierre Chan, Tom Hua, Sam LaMacchia, Rick Nunes, Kerwin Yuen
- Doc Control: Ed Rios

Engineering Test Services

William Bembo, Kim Brown, Mark Camp, Thomas Dimuzio, Andrew Fleig, Costa Gavrilov, Jim Gross, Robert Jasman, Kenneth Platt, Steve Rosenthal, Glenn Schoonmaker, George Schweizer, Larry Thrasher, Kevin Turner, Tim van den Berg, Tim Walters, Jon Weber, Akil Wemusa, Seth Worden, Andrew Yarborough

Program Management

Jan Biles, Mike Cummings, Charles Weidmann

Product Management

Wendy Abowd, Robert Campbell, Andy Cook, Dave Lebolt, Colin Weir, Doug Wood

Sustaining Engineering

Sal D'Amato, Bobby Lombardi, Chris Now, Demetri Patukas, Jim Terry, Dimitri Vandellos

Manufacturing

Linda Chan, Vicky Fontes, Brandon Frederick, Terry Lean, Donna Mathis, Des Medeiros, Vicky Moreno, Lupe Portugal, Dennis Prater, John Spangler, Jenny Wan, and the entire 980 crew

Design

Van Chuchom, Suzanne Ricca

Marketing Communications

Nick Benz, Martin Berneburg, Kristine Day, Heidi Elgaard, Chris Gill, Brian Hageman, Sirpa King, Mark Kirchner, Karen Moreland, Karen Robb, Alison Smith, Paul Smith, Brad Vosburg, Jean Williams, Kelly Williamson

Developer Relations

Ed Gray, Jake Thorne

Technical Publications

Tom Dambly, Mike Freitas, Mark Wilcox

Customer Support

Michael Abowd, Brian Carter, Beto Carvalho, Jon Connolly, Mike Cuddy, Ian Duncan, Bradley Doran, Frank Finelli, Cristian Flores, Pascal Florik, Guiseppa Frison, Jeff Gedert, Adrian Haselhuber, Arndt Hufenbach, Tae Kang, Sue Kasper, Michael Kutulas, Alberto La Valle, Bob Langlie, Scot Larsen, Bill Latham, Jennifer MacKnight, Mari Matsuo, Kevin Miller, Tammi Miller, Bryan Myers, Pam Nunn, Simon Price, Tony Puig, Florian Reiterer, Jake Schaefer, Noah Thorp, Sander van der Reijken, Jeffro™, Siebo

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Addendum For USD Users - Pro Tools 4.3

This is an Addendum to the Universal Slave Driver User's Guide. If you use a USD in your Pro Tools system, please read the following sections.

Using the DigiSerial Port for Universal Slave Driver Connections

Pro Tools 24 MIX and Pro Tools 24 Audio Cards feature a DigiSerial Port. Though this port is identical in appearance to the serial ports on your CPU, it is designed to only be used by either

- the Universal Slave Driver's proprietary serial connection
 - or –
- a serial-to-9-pin cable in combination with the MachineControl™ option for Pro Tools. This should only be connected to the DigiSerial Port when there is no Universal Slave Driver present in the system.

▲ The DigiSerial Port should NOT be used for connecting MIDI Interfaces or any other serial device.

If you are using a Universal Slave Driver, it should always be connected to the DigiSerial Port.

If you are using MachineControl without a USD, then the DigiSerial Port can be used for MachineControl 9-pin.

Rules for using the DigiSerial Port in Expanded Pro Tools systems

Only one DigiSerial Port can be used at once in expanded Pro Tools systems. This should always be the bus master card of your system (i.e., the primary Audio Card). Here are some example setups to further explain how this works:

- If your system includes one or more Pro Tools 24 audio cards, connect your USD (or MachineControl cable, if no USD) to the DigiSerial Port on the first Pro Tools 24 MIX or d24 card (i.e., the bus master card).
- If you have a combination of Pro Tools 24 MIX and Pro Tools d24 cards, use the DigiSerial Port on the first Pro Tools 24 MIX card.
- If you have more than one d24 card, use the DigiSerial Port on the first d24 card in your system.
- If you are using a USD, MachineControl and a Mackie HUI, connect the USD to

the DigiSerial Port, the MachineControl cable to your Macintosh CPU's Printer port, and connect the HUI/MIDI Interface to the Modem port (Digidesign recommends always using the Modem port for MIDI communication).

Configuring Pro Tools for the DigiSerial Port

To properly configure Pro Tools and your USD or MachineControl connections to the DigiSerial Port, simply choose "DigiSerial Port" in the appropriate popup menus in the Peripherals dialog windows. This choice will appear right alongside the Modem and Printer port options.

New Feature: Fader Start Trigger (GPI)

The USD provides 6 GPI outputs in total, 2 TTL-level and 4 relays. In versions prior to 4.3, the 2 TTL-level GPI outputs reflected whether Pro Tools was currently in fast-forward or rewind. Beginning in 4.3, these 2 GPI outputs are dedicated to a new "fader-start" feature.

The "fader-start" feature is used to control external devices based on the position of select faders in Pro Tools. In a typical scenario, the fader-start feature controls playback of a CD player. The CD player's outputs are routed into a Pro Tools' stereo aux return. As the aux return's fader is moved above -120dB, playback of the CD player is automatically started. Likewise, as the fader is moved below -120dB, playback is automatically stopped. This behavior relieves you of having to manually start

playback of the CD and simultaneously move the fader up.

To implement fader-start, Pro Tools maps the first two visible auxiliary input channels in a session to GPI TTL-level outputs 0 & 1 (first being left-to-right in the Mix window, top-to-bottom in the Edit window). When the first visible aux track in a Pro Tools session is above -120dB, GPI TTL-level output 0 will be enabled; otherwise, it will be disabled.

Likewise, when the second visible aux track in a Pro Tools session is above -120dB, GPI TTL-level output 1 will be enabled; otherwise, it will be disabled.

As you create/delete/reorder tracks in a session, which particular auxiliary tracks are the first "visible" may change. As they do, the two GPI outputs will update dynamically to reflect the current state.

▲ Note: The aux tracks must be in a Show state (i.e., not hidden) for this functionality to be available.

For more information on GPI with the Universal Slave Driver, see *GPI Triggers* later in this Addendum.

USD User's Guide Errata/Clarifications

The following sections contain new and clarified information not found in your Universal Slave Driver's User's Guide.

Bi-phase/Tach Wiring

When making connections for Tach or Bi-Phase, the OPTRETURN signal (Pin 11 of GPI port) must always be connected to something.

Pin 11 should be connected to Pin 14 (GROUND) in cases where ground isolation is not necessary. This is probably the most common scenario.

For isolated ground applications, Pin 11 should be taken directly to the ground of the bi-phase/tach encoder device.

Consult the manual for the device that is generating the Tach or Bi-Phase signal before making this connection. See the USD manual's Appendices for details on connecting the BIPHA_I and the BIPHB_I signals. These connections should be made by a qualified technician.

You can find a wiring schematic for these connections at the end of this Addendum.

Important: Bi-phase voltage

The opto-isolators inside your USD which receive the signals from your bi-phase/tach encoder require at least 3.0 volts and no more than 5.5 volts for correct operation. The Universal Slave Driver provides a 5v at 1A DC supply (Pin 25) which you can use to power your bi-phase/tach encoder. Note, some encoders may have voltage or current requirements which are higher than what the USD can provide. In addition, some encoders may not provide enough voltage and/or current at their outputs to meet the 3.0-5.5V specification (see the USD User's Guide for these voltage/current specifications.

If this is the case and you are powering your encoder from the 5v supplied from the USD, you might instead need to use a separate external DC power supply to power your encoder, (12V for example). Note that many cameras and some projectors including all Arri gear require special jumper settings to power their outputs.

One note of caution: Always be sure to check the maximum voltage requirements specified by your encoder manufacturer. Exceeding these or improperly wiring the interface could cause damage to your encoder.

Important: About Bi-phase pulse

Many cameras only have one pulse a frame. The USD requires a minimum of 2 pulses a frame. Many people don't notice until they start to hook it up and are down for another couple of days until a pulse doubler comes in. Be sure to check your camera equipment's pulse before leaving to location where most cameras are one pulse per frame.

GPI TTL Wiring

The Universal Slave Driver provides two TTL-level GPI outputs, on pins 1 and 2 of the DB25 connector (see the circuit diagram *GPI (TTL)/MTC Outputs* at the end of this document). The circuit employs a 74FCT541T device to drive each output. Note that some USDs may employ a 74HC541 instead, which has similar drive characteristics.

The two GPI TTL outputs were intended to drive TTL loads only. In Appendix I of the *Universal Slave Driver 3.0 User's Guide*, the

technical specifications section entitled “GPI Out (TTL)” should read “Loading: can drive a minimum of 5 TTL loads.”

The circuit can drive approximately 2 mA through a load of 1.6K and maintain a logic high level of 3.3V. In an application where the equipment being controlled has more demanding power requirements, an external buffer or relay circuit must be used. This would typically be constructed as part of a custom electrical interface.

Each GPI TTL output is fully short-circuit protected via a 220-ohm series resistor. In Appendix I of the *Universal Slave Driver 3.0 User's Guide*, the technical specifications section entitled “GPI Out (TTL) Current:” should read “15 mA max (short-circuit)” instead of simply “15 mA.”

▲ Before attempting to wire any type of custom interface, always check the electrical specifications provided by the equipment manufacturer, including voltage levels, current, loading and polarity. Incorrect wiring may damage your equipment, your USD or cause personal injury.

GPI Triggers

GPI output signals information:

- 0 = stop
- 1 = play
- 2 = record enable (armed)
- 3 = record (place device into record mode)
- 4 = fader start #1
- 5 = fader start #2

Logical GPI numbers 0 through 3 are associated with GPI relay outputs 0 through 3 (pins 3 through 10). GPI numbers 4 and 5 are associated with GPI TTL outputs 0 and 1 (pins 1 and 2).

9-Pin Pass-Through Ports

The 9-Pin ports were intended to be “pass-through” ports to allow the DAW software to send commands to the external device through the USD. This eliminates the need for a dedicated machine control serial port.

The DigiSerial Port found on all Pro Tools 24 MIX and Pro Tools 24 audio cards provides the extra serial port required to operate the Universal Slave Driver in tandem with a MachineControl (9-pin) device and MIDI devices. Refer to the section Using the DigiSerial Port for details and guidelines for utilizing the DigiSerial Port in lieu of the 9-pin pass-through ports of the USD.

Variable Speed Override - VSO

On page 42 of the Universal Slave Driver™ User's Guide, it states that “The varispeed rate is available only in Remote Control mode from the host CPU, and when the Positional Reference is set to Generate”. Varispeed is actually available at any Positional Reference setting provided that the Clock Reference is set to “Internal/VSO”.

Generating 24 FPS With The Universal Slave Driver

If you are using a Digidesign Universal Slave Driver (USD) with Pro Tools, note that the Universal Slave Driver cannot gen-

erate the 24 FPS time code format while it is locked to a video clock signal. (The USD can, however, generate 24 FPS time code using any of the other clock references available to your Pro Tools system, including the Internal clock setting.)

If you attempt to configure Pro Tools' Session Setup to generate 24 FPS time code while the Universal Slave Driver is locked to a video clock signal, the USD will actually generate 29.97 Non-Drop Frame time code.

This only applies to Generate mode. While the USD is reading time code, the LTC and MTC Out connectors are active and do output the correct time code.

Disabling “Active in Background”

If you are using Digidesign's Universal Slave Driver and intend to switch back and forth between the Universal Slave Driver Setup software application and Pro Tools, disable Pro Tools' Active in Background option.

If you do not do this, both Pro Tools and the Universal Slave Driver Setup software will attempt to communicate with the Universal Slave Driver at the same time and your system may behave unpredictably.

We recommend that you use the Universal Slave Driver Setup software to configure the Universal Slave Driver as you wish, then quit the Setup software before opening Pro Tools. Once saved to disk, your sessions will retain the USD parameters you have chosen in the Pro Tools Session Setup window.

“Chase Mode” and the Universal Slave Driver

In rare instances, record/playback may temporarily stop in Pro Tools systems with a Universal Slave Driver. If you encounter this problem, simply change any parameter on the Universal Slave Driver (such as frame rate type), then switch the parameter back to the correct setting. Chase record/playback will then function correctly.

For updates to the Universal Slave Driver firmware and the USD Setup software, check Digidesign's website or contact your local Digidesign office.

Operational Recommendations

When used with Pro Tools 4.1 (or greater), USD firmware version 3.1 provides near-sample accurate lock to time code using the serial connection to the computer. Previous to Pro Tools 4.1 and this f/w version, a MIDI interface was required to convert LTC or MTC into serial time code for Pro Tools. Please update your USD firmware immediately to insure proper functionality with Pro Tools. You can still use a MIDI interface to send time code to Pro Tools. Some users may decide to do this if one port is needed for both MTC and MIDI communication to other devices (keyboards, controllers, etc.), but it is not necessary.

Do Not Use Other Serial Cables

Digidesign does not support off-the-shelf serial cables or cables provided with products from other manufacturers. Use the high-quality serial cables provided with your USD to ensure correct operation.

Using the USD Setup App with Pro Tools

Pro Tools defaults to having “Active in the Background” enabled when you first launch it. Switching out of Pro Tools into the USD Setup App with “Active In the Background” turned on can cause unexpected behavior as the MacOS attempts to allow both applications access to the same serial port. There is a bug in the MacOS which prevents us from fixing this problem at this time. The most frequently-used USD parameters are accessible in Pro Tool 4.1 (or greater.) However, some USD parameters such as window burn placement, and NTSC vs. PAL video frequencies are only accessible from the front panel of the USD, or from the USD Setup App. Turn “Active in the Background” off in Pro Tools when switching between these two applications.

Firmware Update

To update the firmware in your USD:

- 1 Make sure you connect the USD to one of your CPU serial ports. (At the present time, USD Setup cannot yet communicate with the USD directly through the DigiSerial Port. A future release of USD Setup will allow this.)

- 1 Launch the USD Setup App.

- 2 Select “USD Setup Preferences” under the Preferences menu.

- 3 Click on “Firmware Update” and follow the on-screen directions.

Framing and Servos

Some VTRs have the ability to turn on or off the framing parameters for the servo. When “Color Framing” is turned on, the VTR will adjust it’s playback speed to line up the frames (4 frames for NTSC, 8 frames for PAL) for editing purposes. However, during this process, Pro Tools may attempt to lock to the time code while the VTR is stabilizing. Depending on the extent of the framing, problems can occur if Pro Tools is attempting to read the incoming time code while the device is stabilizing. Full color frame alignment using the servo is not needed for audio post purposes. If you are experiencing time code chase problems, turn off framing (at least turn off color framing) to determine if this will improve your time code chase performance with Pro Tools.

Unstable Video Sources

This version of USD firmware is configured for high-stability video sources. When the Clock Reference is set to either of the video inputs, USD expects to see high-quality jitter-free video. This can be obtained by connecting a black-burst generator to the video deck’s “video reference input” and the USD’s “video ref.” connector, or from some VCR incorporating a timebase corrector (TBC) on its video output.

VCRs without a reference input for black burst or a VCR not incorporating a TBC

can be used with the USD, but may result in a loss of sample accuracy when compared against off-tape LTC or VITC. An upcoming update to USD firmware will allow lock to relatively unstable video sources, such as an ordinary VCR, with no loss of resolver accuracy.

Video Sync and DVD Playback

Video output from a consumer DVD player playing copy-protected DVD disks is unsuitable as a sync source for the USD. Use of a timebase corrector (TBC) will be required in this case. Alternatively, use of an industrial or broadcast-quality player with vertical interval blanking is required.

VITC Insertion

The USD will not insert new VITC while reading VITC from an external source. This is a safety feature to prevent the loss of existing VITC in the video stream. Thus, VITC is never inserted when the Positional Reference is set to “VITC” or “LTC/VITC Auto-Switch”.

Video Tape Recorder Considerations while using VITC

If you are experiencing trouble reading VITC (Vertical Interval Time Code) from your videotape recorder (VTR) this could be caused by a configuration setting with your VTR. If your VTR employs an internal (or external) time base corrector (TBC), it may need to be configured to allow VITC to be passed to its video output. If your VTR doesn't contain a TBC, or its TBC is set

to “bypass” mode, then you should not have any difficulty reading VITC.

Most VTRs record VITC with no problem whatsoever, but playback could pose a problem if your VTR employs a TBC. You'll need to make sure that the TBC does not “blank” the lines onto which you have recorded VITC. This is a simple configuration issue on most TBCs. Your TBC might employ DIP-switches for this purpose, or have a menu set-up item on its front panel. You'll usually have the choice to “blank” or “un-blank” individual lines in the vertical interval (lines between 8 through 22). You need to make sure that the lines onto which you've recorded VITC (for example 14 and 16) are “un-blanked” in the TBC set-up. For best performance during fast-wind operations, it's advisable to un-blank all available lines.

Opcode Studio 4™ Owners

If your Macintosh serial port is configured (using OMS) for a Studio 4, do not select this port for USD serial communication. After selecting this port with the USD Setup Application (even after quitting the Setup app,) OMS can encounter a problem communicating with the Studio 4. If you experience this problem, simply recycle the power to your Studio 4. This should eliminate the problem. Since the USD defaults to using the printer port, you may experience this problem the first time you launch the USD Setup Application if you have the printer port configured for your Studio 4 and OMS.

USD Setup Application Parameters

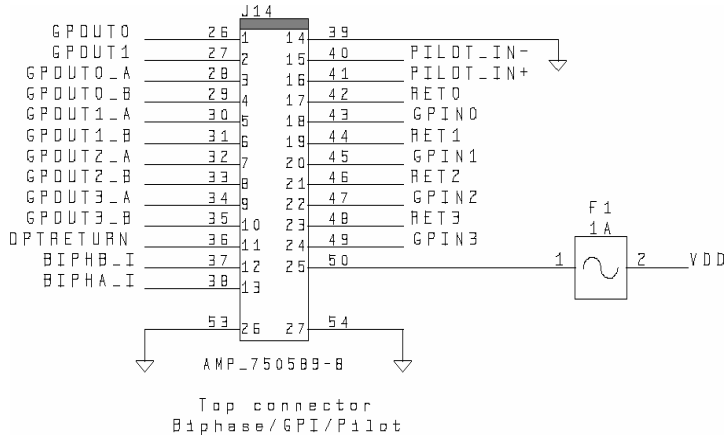
When the Setup Application is not communicating with the USD, i.e. you have switched to the Finder or the serial cable is unplugged, the parameters return to the “top most” selections in the pop up menus. Do not be alarmed by this. The Setup Application always gets its parameter settings from the USD when active. The USD remembers its settings when powered down. Because of this, you do not need to launch the Setup Application every time to configure the USD for your particular parameter settings.

Restoring Factory Settings

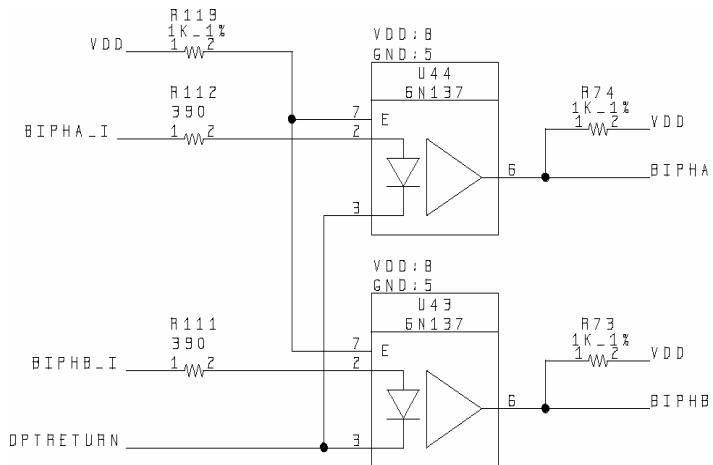
You can restore the factory settings of all of USD's operational modes and options by holding down the “Up” and “Down” front-panel switches as USD is powered on. Keep holding until the display reads “FAC-CFG”, then release.

Wiring Diagrams

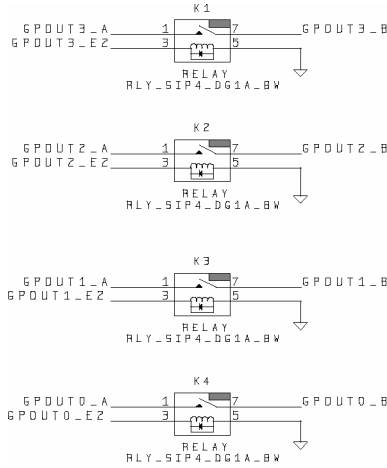
BiPhase/GPI/Pilot connector



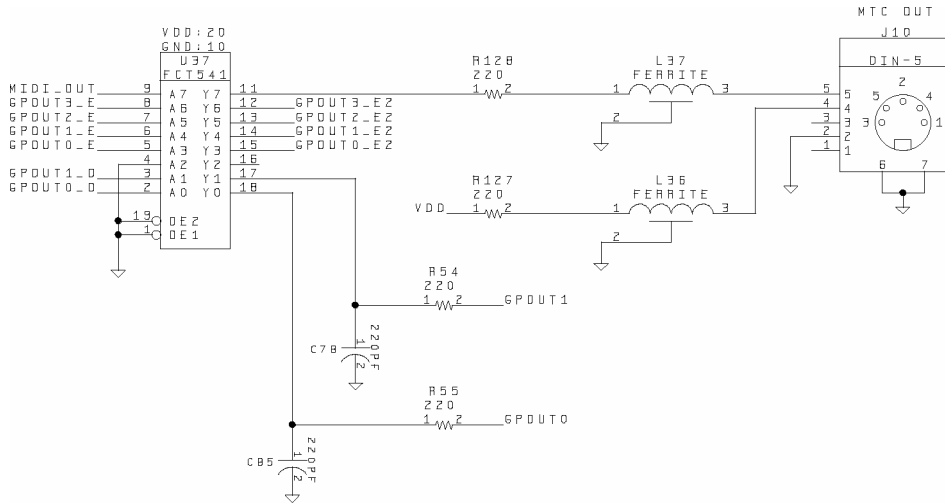
Bi-phase/Tach Inputs



GPI Relay Outputs



GPI (TTL)/MTC Outputs



GPI (opto) Inputs

