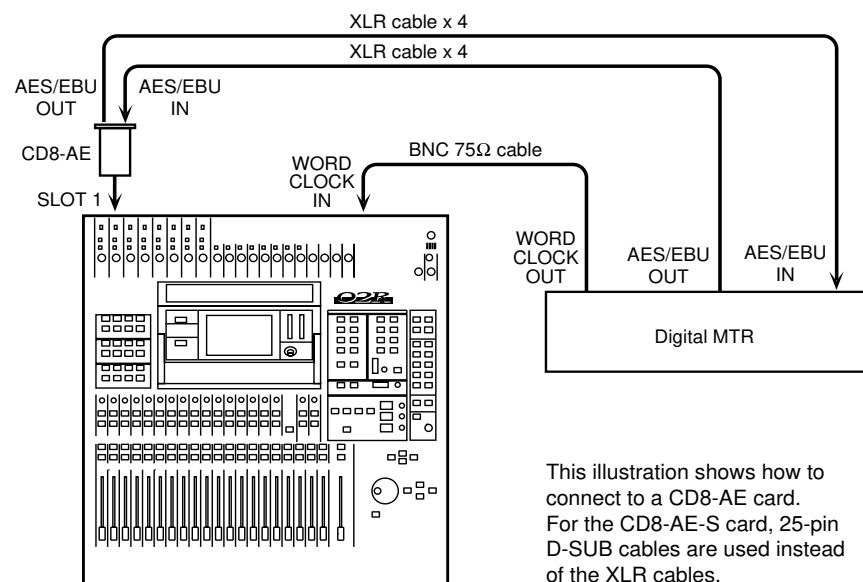# Digital I/O Card – **AES/EBU (CD8-AE/CD8-AE-S)**

The AES/EBU digital I/O cards (CD8-AE/CD8-AE-S) are used to connect AES/EBU compatible multitrack digital recorders or other similar digital devices to the 02R.

Installing the CD8-AE/CD8-AE-S

The CD8-AE card is a double slot card (see "Double Slot Cards" on page 176). The CD8-AE-S card is a single slot card (see "Single Slot Cards" on page 175).

1. **Connect the AES/EBU compatible multitrack digital recorder to the 02R using the appropriate connectors.**

This illustration shows how to connect to a CD8-AE card.
For the CD8-AE-S card, 25-pin D-SUB cables are used instead of the XLR cables.

   Use high quality 110Ω digital connecting cables to connect to the CD8-AE card. Use 25-pin D-SUB cables that are suitable for digital audio use to connect to the CD8-AE-S card.

2. **If your AES/EBU compatible multitrack digital recorder has a dedicated wordclock output connector, plug it into the WORD CLOCK – IN connector on the back of the 02R and turn the 75Ω terminator switch on.**

   If there is no dedicated wordclock output, you can obtain the wordclock signal required from one of the digital interconnect lines.

   Note: *A dedicated wordclock line will give you the best wordclock synchronization results.*

Wordclock Selection

1. **Power on your AES/EBU compatible multitrack digital recorder and then the 02R.**

   It is always important to observe the correct order for powering up equipment in a studio. Start with the AES/EBU compatible multitrack and mastering recorders and the signal processors, then the 02R, and finally the monitoring amplifiers and other downstream gear.

2. **Press the (DIGITAL I/O) button until the "Word Clock Select" screen appears.**
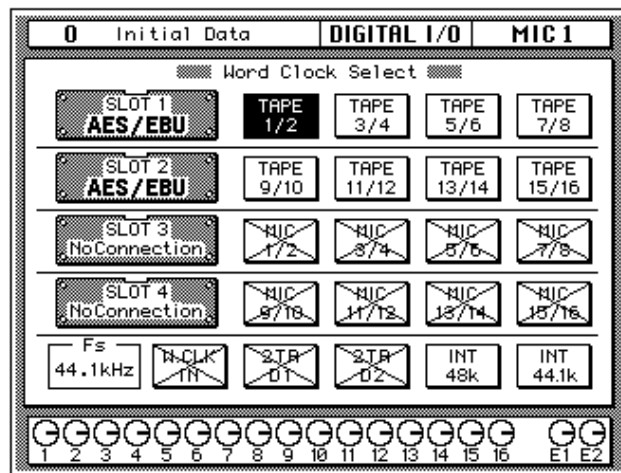
   If the card was installed properly, the system software should correctly identify it in the appropriate slot.

3. **Use the CURSOR buttons to select the wordclock source.**

   If your AES/EBU compatible multitrack digital recorder has a dedicated wordclock output connector, use the CURSOR buttons to select the W.CLK IN box and press the [ENTER] button. If the multitrack digital recorder does not have a dedicated wordclock output, select the TAPE 1/2 box – the first box in the SLOT1 row – and press the [ENTER] button.

4. **When you select the wordclock source, the appropriate icon should be inverted in reverse video.**

   See "Word Clock Select" on page 154 of the *User's Guide* for further details.

Word Clock Select

1. **Press the (DIGITAL I/O) button.**

   DIGITAL
   I/O

   A DIGITAL I/O display function appears. The "Word Clock Select" screen is the first of many screens in this function.

   Note: *The 02R always recalls the last function visited (and the screen of that function) even after you turn the power off and back on again.*

   You may have to press the (DIGITAL I/O) button repeatedly to get to the "Word Clock Select" screen.

2. **Use the CURSOR buttons to select a wordclock source and press the (ENTER) button.**

The Digital Recording Console 02R processes audio data at 44.1 kHz or 48 kHz using its internal clock, and can run at any frequency from 32 kHz –6% to 48 kHz +6% when an external wordclock is applied.

Wordclock

When you connect a number of digital audio devices together, all the devices should synchronize to one device – the wordclock master. The wordclock master generates a sync pulse which allows the other devices connected to it to determine where the start of each digital word is. Although most digital interconnect protocols are self-clocking, it is more reliable to use a dedicated line for your wordclock signal. This is especially important in a multitrack environment where up to eight channels of digital data may be multiplexed on one cable.

When you are using a digital device – such as a DAT mastering recorder or a modular digital multitrack recorder – connected to the 02R, all the digital devices in the system, including the 02R, should synchronize the wordclock being supplied by one master device. If any device does not synchronize to the system wordclock, dropout and/or other noise may occur.

In Section 13, "Installing Options" on page 171 of the *User's Guide*, there are examples of connecting external digital devices to the 02R and setting the appropriate wordclock selection. Refer to this section for details for each of the optional digital I/O cards.

Note: *Wordclock is not required if you use the analog I/O card (CD8-AD) to connect to an analog multitrack recorder.*

Display Screen

Shown below is the first DIGITAL I/O display function – the Word Clock Select screen:
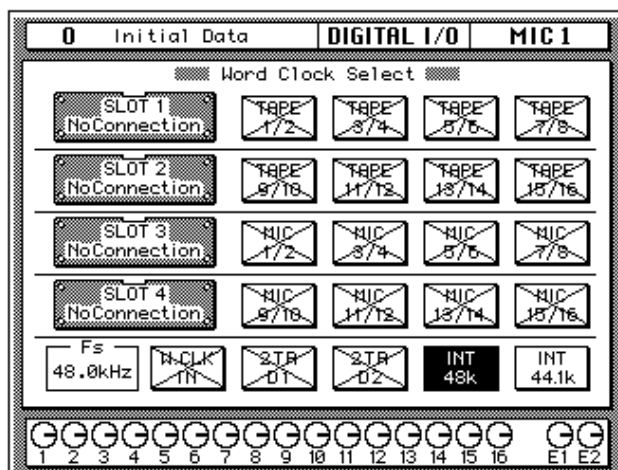
The left side of the display is a list of the cards in the four option slots of the 02R. The indication varies depending on the type of optional card being used:

- Cascade (CD8-CS)

- ADAT (CD8-AT)

- TDIF-1 (CD8-TDII)

- AES/EBU (CD8-AE/CD8-AE-S)

- YAMAHA (CD8-Y)

- Analog AD/DA (CD8-AD)

- No Connection

Beside each optional slot indicator is a row of four boxes defining the connections to the card inserted in the corresponding slot.

Note: *When a cascade card is inserted in any slot, the boxes defining the connections remain on the screen. However, you cannot select any of these items.*

Across the bottom of the display are boxes for the external wordclock (W.CLK IN), the digital inputs (2TR D1 and 2TR D2), and the internal wordclock (INT 48k and INT 44.1k). To the left of the boxes are the wordclock indicators.

There is also an indicator – inside the "Fs" box – that shows the current wordclock frequency or status.

Wordclock indicators

No wordclock input.

Wordclock input. However, the input wordclock frequency is different from that of the selected wordclock.

Wordclock input. No discrepancy between the input and selected wordclock frequencies.

Wordclock input is selected. The 02R is synchronized to the input wordclock frequency.

The wordclock input is selected, but the wordclock signal is inappropriate.

02R with Pro Tools for Music Recording

This application shows how the 02R can be used with a Pro Tools system. The eight digital tape returns and 24 Mic/Line inputs provide up to 40 inputs at mixdown. In addition, the 02R's built-in automation and scene memory systems provide both dynamic and static mix automation referenced to MIDI timecode.

A Digidesign 888 I/O Audio Interface connects the 02R to the Pro Tools system, with a special 50-pin Pro Tools cable between the computer card and 888. The 25-pin connector on the CD8-AE-S card connects to a patchbox, which provides eight AES/EBU inputs (four XLRs) and eight AES/EBU outputs (four XLRs).

Pro Tools can be controlled remotely from the 02R V2 using the Pro Tools template of the MIDI Remote function. The 02R's built-in automation is referenced to MTC coming from the Pro Tools system. A MOTU MIDI Timepiece (or Opcode Studio 4) is used as a MIDI interface and connects to the computer's Modem port.

Connections

- The AES/EBU (CD8-AE-S) card must be screwed securely in place. Do not leave the screws out after installation as the card will not be grounded correctly.

- The Digital In/Out connectors on the 02R and patchbox are connected together using a 25-pin D-sub cable.

- The patchbox is connected to the 888 I/O Audio Interface using AES/EBU-compatible XLR cables.

- The 888 I/O Audio Interface connects to the audio card using a special 50-pin Pro Tools cable.

- The Pro Tools system is connected to Slot [1] of the 02R and the tape inputs correspond to tracks one through eight.

02R Wordclock Setup

The 02R works as a wordclock slave. On the DIGITAL I/O menu, set the wordclock source to TAPE 1/2 (i.e., AES/EBU 1/2).

Pro Tools Wordclock Setup

The Pro Tools system should be configured as wordclock master.

Note

- The D-sub <–> XLR box (or D-sub to XLR break-out cable) is not available from Yamaha, and should be custom made.

Macintosh computer
with Pro Tools audio card

Modem port

50-pin Pro Tools cable

888 I/O Audio Interface

Power Amp

XLR<–>D-sub box

DAT Recorder

MIDI interface

25-pin D-sub cable

CD8-AE-S
Interface
Card

1

Break-out cable
alternative

C-R Out

2TR IN
DIGITAL

MTC

MIDI IN

YAMAHA

02R

STEREO OUT
DIGITAL

MIDI OUT

Effects processor

AUX SEND

INPUT 17-24

Headphones

MIC/LINE Inputs 1–24

MIDI Sampler

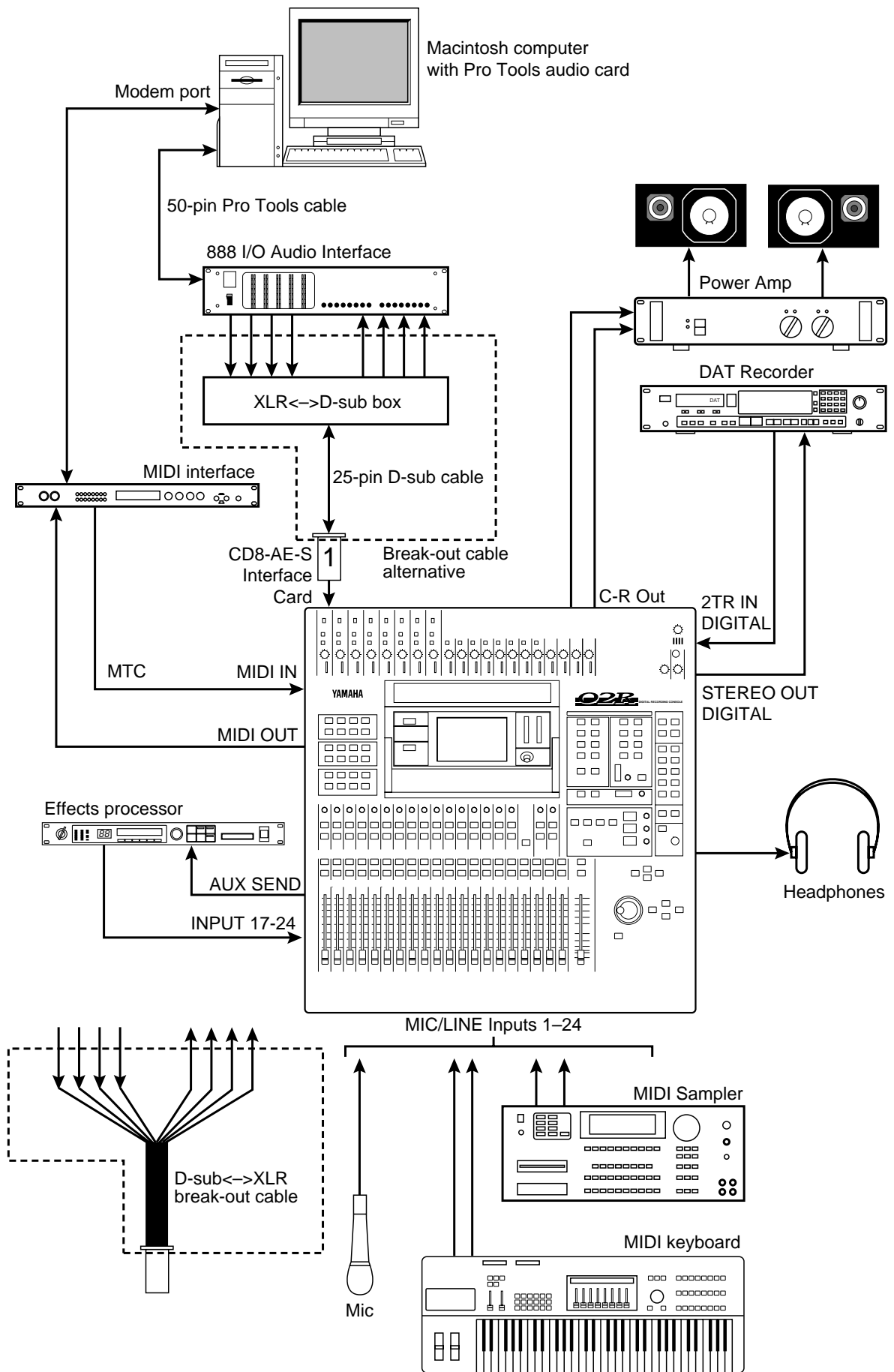D-sub<–>XLR
break-out cable

MIDI keyboard

Mic

Figure 20 02R with Pro Tools for Music Recording

02R with Pro Tools for Video Post

This application shows how the 02R can be used with a video machine and Pro Tools system for audio post-production and audio sweetening. The 16 digital tape returns and 24 Mic/Line inputs provide up to 40 inputs. In addition, the 02R's built-in automation and scene memory systems provide both dynamic and static mix automation referenced to SMPTE or MIDI timecode.

Two Digidesign 888 I/O Audio Interfaces connect the 02R to the Pro Tools system, with special 50-pin Pro Tools cables between the computer cards and each 888. Two custom-made D-sub to XLR break-out cables are used to connect the 25-pin connectors on the CD8-AE-S cards to the 888s.

Pro Tools can be controlled remotely from the 02R V2 using the Pro Tools template of the MIDI Remote function.

Connections

- The AES/EBU (CD8-AE-S) cards must be screwed securely in place. Do not leave the screws out after installation as the cards will not be grounded correctly.

- The Digital In/Out connectors on the 02Rs and 888s are connected together using custom-made D-sub to XLR cables.

- The Pro Tools system is connected to 02R Slot $\boxed{1}$ (tape inputs 1 through 8) and Slot $\boxed{2}$ (tape inputs 9 through 16).

02R Wordclock Setup

The 02R works as a wordclock slave. On the DIGITAL I/O menu, set the wordclock source to TAPE 1/2 (i.e., AES/EBU 1/2).

Pro Tools Wordclock Setup

The Pro Tools system should be configured as wordclock master.

Notes

- The D-sub <–> XLR break-out cable is not available from Yamaha, and should be custom made.

- The slave clock (Super Clock) signal connected between Digidesign products is an exclusive clock, with a sampling rate of Fs x 256.

Video machine

House video sync

TC OUT

TV Monitor

Macintosh computer
with Pro Tools audio card

Modem port

Digidesign VSD
(Video Slave Driver)

Wordclock
Out

Slave
Clock
Out

50-pin Pro Tools cable

50-pin Pro Tools cable

Slave clock (BNC)

888 I/O Audio Interface

888 I/O Audio Interface

Digidesign SSD
(SMPTE Slave Driver)

Slave Clock Out

D-sub<–>XLR
break-out cables

CD8-AE-S
Interface
Card

1

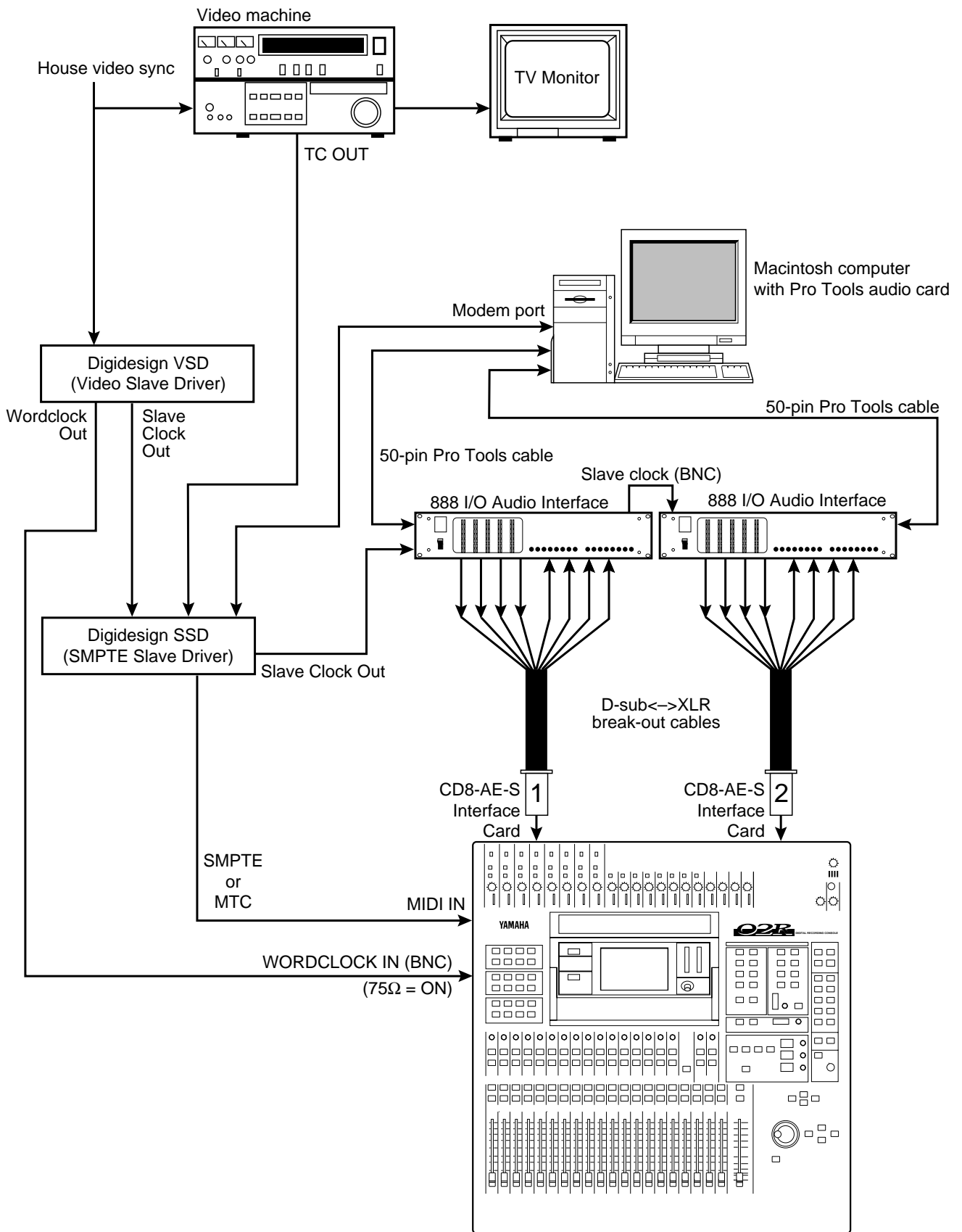CD8-AE-S
Interface
Card

2

SMPTE
or
MTC

MIDI IN

YAMAHA

O2R

WORDCLOCK IN (BNC)
(75Ω = ON)

Figure 21 02R with Pro Tools for Video Post