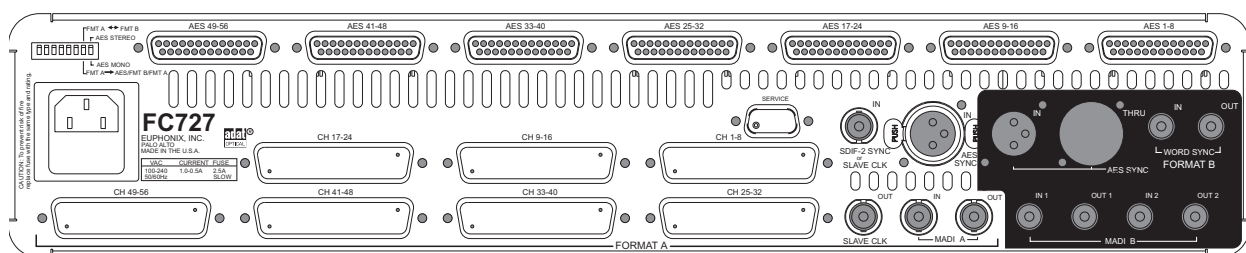# Euphonix FC727/726

Digital Audio Format Converter

Operation Manual

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In the interest of continued product development, Euphonix reserves the right to make improvements in this manual and the product it describes at any time, without notice or obligation.

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Manual design by Rob Wenig.

Manual written by Jon Harris and Rob Wenig.

IMPORTANT SAFETY INSTRUCTIONS

The lighting flash with arrowhead symbol within an equilateral triangle, is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electrical shock to persons.

The exclamation point within an equilateral triangle, is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the product.

1) Read these instructions.

2) Keep these instructions.

3) Heed all warnings.

4) Follow all instructions.

5) Do not use this apparatus near water.

6) Clean only with a dry cloth.

7) Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.

8) Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.

9) Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wider blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.

10) Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.

11) Only use attachments/accessories specified by the manufacturer.

12) Use only with the cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.

13) Unplug this apparatus during lightning storms or when unused for long periods of time.

14) Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

15) **WARNING** – TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, DO NOT EXPOSE THIS APPARATUS TO RAIN OR MOISTURE.

16) Do not expose this equipment to dripping or splashing and ensure that no objects filled with liquids, such as vases, are placed on the equipment.

17) To completely disconnect this equipment from the AC Mains, disconnect the power supply cord plug from the AC receptacle.

18) The mains plug of the power supply cord shall remain readily operable.

19) This unit is provided with a power supply cord set suitable for 120V AC input only (for U.S.A. and Canada). For other than U.S.A. and Canada, a qualified person must provide for use with this unit, an appropriate, approved power supply cord set which is in compliance with the end use country requirements and has a minimum cross-sectional area of $1.0mm^2$.

20) For units with more than one power cord:

    Caution: This unit has more than one power supply cord. Disconnect two power supply cords before servicing to avoid electrical shock.

    Attention: Cet appareil comporte plus d'un cordon d'alimentation. Afin de prévenir les chocs électriques, débrancher les deux cordons d'alimentation avant de faire le dépannage.

21) Operator Accessible Fuse:

    Caution: For continued protection against risk of fire, replace only with same type and rating of fuse.

    Attention: Pour ne pas compromettre la protection contre les risques d'incendie, remplacer par un fusible de même type et de même caractéristiques nominales.

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Chapter 1: Introduction and Interface

The Euphonix FC727/726 is a compact, 2U, digital-audio format converter that translates back and forth between MADI (**M**ultichannel **A**udio **D**igital **I**nterface) and the digital audio formats listed in Table 1-1. AES/EBU outputs are always available, regardless of the formats being translated. The FC727/726 performs the highest quality sample-rate conversion (SRC) on all channels that require it.

The FC727/726 sets a new standard for format conversion devices with the following features:

- Can apply different format conversion and/or SRC to each bank of eight channels.

- Automatically applies SRC when necessary but can be manually disabled.

- Performs format conversion and SRC on more channels (56) than other devices.

- Each of the 56 channels is bidirectional.

- Supports 24-bit audio at a 96 kHz sample rate.

- Maintains compatibility with older devices by offering 16- or 20-bit dithering and supporting 96 kHz legacy standards.

Table 1-1 Digital audio formats supported by the FC727/726

Company/ Organization	Format Name	Equipment Using Format	Transmission Medium
Audio Engineers Society	MADI	Euphonix R-1, S-5, Sony 3348, many large format digital consoles	BNC cable
	AES/EBU (AES-3)	Sony PCM-800, most DAT machines and stereo D/A devices, sound cards, effects processors	Two balanced XLR cables
Tascam	TDIF-1 (**T**eac **D**igital **I**nterface **F**ormat)	Tascam DA-88, DA-98, small format digital consoles and workstations	25-pin cable
Mitsubishi	ProDigi	Otari and Mitsubishi digital multitracks	Two 50-pin cables
Sony	SDIF-2	Sony 3324 and 3348	Two 50-pin cables
Alesis	ADAT Optical	Alesis ADAT (type I and II), many small format digital consoles and workstations	Two fiber optic cables
Digidesign (FC727 Only)	Pro Tools	Pro Tools systems	50-pin cable

The utility and power of the FC727/726 is exhibited by transferring digital audio between incompatible devices:

- Mixdown on a Euphonix System 5 digital console at 24-bit 96 kHz with source material from a ProDigi or Sony tape machine at 48 kHz (automatic SRC).

- Mixdown on a Euphonix System 5 digital console from a ProTools workstation.

- Transfer tracks from a Tascam DA-88, Sony 3348, or Alesis ADAT to a Euphonix R-1.

The audio remains entirely in the digital domain so it suffers no degradation due to D/A and A/D conversion.

1.1   Basic Concepts

1.1.1   Channels and Banks

The FC727/726 can convert 56 digital audio channels in two directions simultaneously (*simultaneous bidirectional conversion*) with any of the supported devices. The 56 channels are divided into seven banks, each with eight channels. Each bank may be connected to a different third-party device running at a different sample rate (i.e., Tascam DA-88 on channels 1–8, ADAT on 9–16, and Pro Tools on 40–48).

1.1.2   Signal Flow

Since 56 channels can be converted bidirectionally, signal routing can become confusing. These simple rules should help clarify the signal flow:

- Audio arriving at the **MADI B Input** is sent out the **Format A Output**.

- Audio arriving at the **Format A** connectors is sent out the **MADI B Output**.

- The AES outputs always mirror the **Format A Output**.

1.1.3   Format A Inputs

Three connectors can be used by third-party inputs: the common **DB-50** connectors, the **MADI A Inputs**, and the **DB-25 AES** connectors. The appropriate signal is chosen according to the following rules:

• If the MADI switch is *ON*, the MADI input is used for all 56 channels.

• If the MADI switch is *OFF*, either the common DB-50 or AES signals are used in eight-channel banks.

   If only one connector is in use, that format is selected.

   If both are connected, the common DB-50 signal takes precedence.

Format A Adapters

To create a compact 2U device with maximum flexibility, the FC727/726 uses a common DB-50 connector for all third-party formats. An adapter is required to convert from the DB-50 connector to the company's own connector. The adapter is not intended to be the connecting cable; it simply adapts the common DB-50 connector so it behaves like the rear panel of the third-party device. These adapters are available separately from Euphonix. In most cases, another cable is required to connect the adapter to the third-party device. For example, a cable is required to connect the FC727 to a Pro Tools computer just as it would be to connect to an 888-24 I/O unit. See Appendix A: *Pinout and Cable Specifications* for detailed information.

1.1.4   Sample Rate Conversion

Digital audio devices have previously been required to use the same sample rate to operate correctly together. The FC727/726 removes this limitation by allowing many sample rates simultaneously. For example, by using the common DB-50 connectors, each eight-channel bank can operate at its own sample rate. Furthermore, the FC727/726 detects different sample rates and automatically activates SRC.

Although the FC727/726's SRC is the highest quality available, some users may still require an unaltered, bit-for-bit copy of the data. In this case, connected devices can be slaved to the same sample clock, which disables SRC automatically (you can also disable SRC manually).

1.2   Front Panel

The FC727/726's front panel is shown in Figure 1-1. Enlarged sections of the front panel are shown in Figure 1-2 and Figure 1-3; the numbers in the figures correspond to the numbered items below describing that feature.
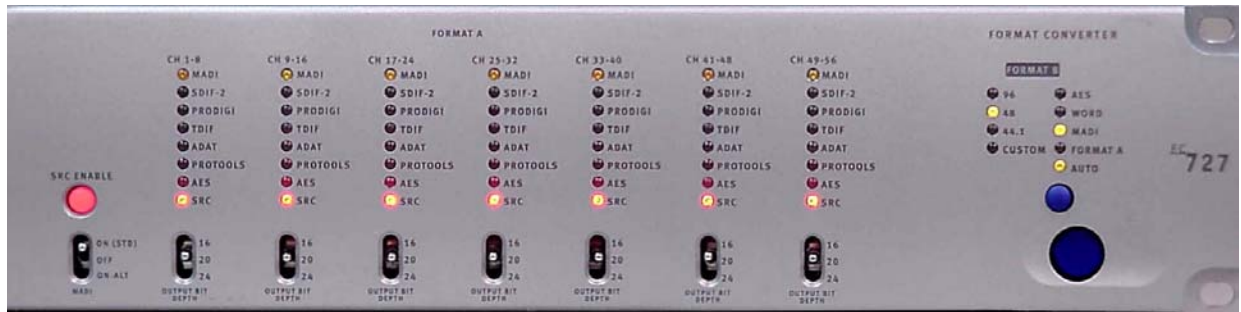
Figure 1-1 FC727/726 front panel
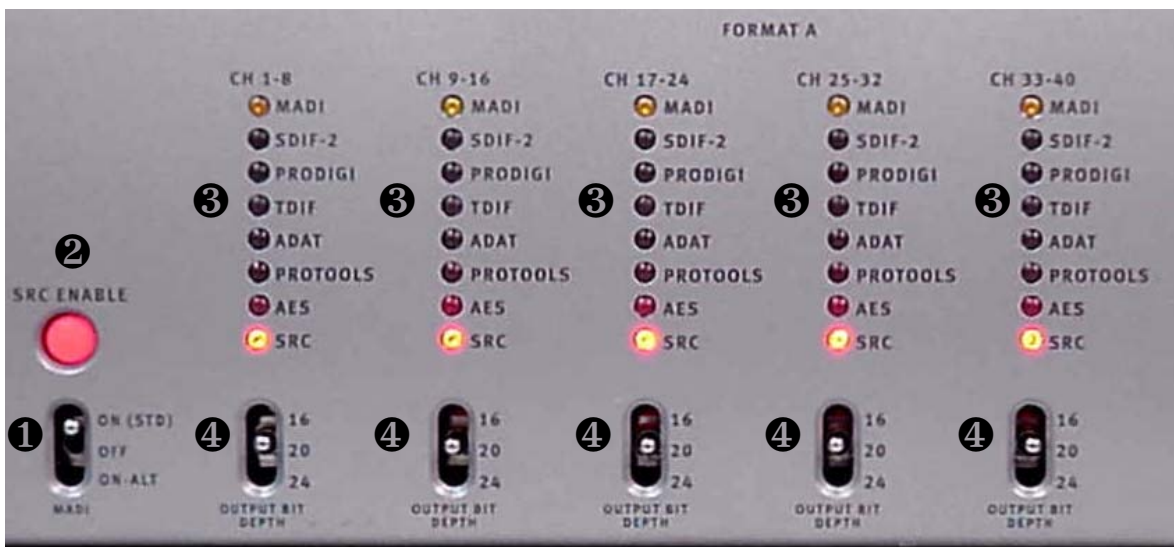
Figure 1-2 FC727/726 front panel (left)

1. **MADI Switch**

   This three-position switch selects whether MADI is used for the **Format A Input** and the characteristics of the MADI signal.

   ON-STD: Selects the standard MADI settings used by Euphonix (sample rate = frame rate).

   OFF: Selects the common DB-50 connectors and ignores the **Format A MADI** inputs. Use this setting with SDIF, TDIF, ProDigi, Pro Tools, ADAT, or AES devices.

   ON-ALT: Selects MADI running at sample rate = 96 kHz, frame rate = 48 kHz.

2. **SRC ENABLE Button**

   This button lights when the FC727/726 detects different sample rates on the A and B formats and SRC is being used. Press the button when lit to turn off SRC. The button flashes if SRC is needed but has been disabled by the user. Press the button again to reset the FC727/726's automatic SRC detection circuitry.

   When a device first locks to the FC727/726, the button may occasionally light to indicate SRC is necessary when it is not. Press the button twice to reset the FC727/726's automatic SRC detection circuitry. SRC is not needed if the button does not light.

3. **FORMAT A Input Indicator LEDs**

   Each eight-channel bank has seven LEDs to indicate the format attached to the **Format A Input**; only one of these LEDs can be lit at a time. The LED lights dimly yellow if an adapter is attached but the FC727/726 has not locked; the LED lights bright yellow when the FC727/726 locks to the device.

   The bottom **SRC** LED functions independently of the first seven. It lights red if the FC727/726 has detected that SRC is required on that bank; it flashes red if SRC is required but has been disabled by the user.

4. **OUTPUT BIT DEPTH Select Switch**

   For each eight-channel bank, this switch sets the bit depth for the signal output to the Format A device. When set to 24, all 24 bits are transferred from the MADI input to the Format A output device without dithering. When set to 20 or 16, the signal is dithered to the selected number of bits before being output to the Format A device.

NOTE: *This switch affects the **Format A** output only; it has no effect on the **Format B MADI** audio output.*
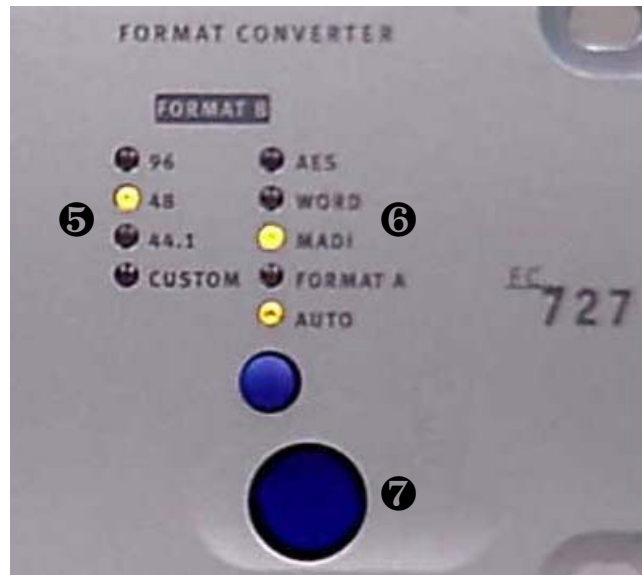
Figure 1-3 FC727/726 front panel (right)

5. **FORMAT B Sample Rate LEDs**

   These LEDs indicate the Format B sample rate. If the rate is not 44.1, 48, or 96 kHz (±3%), the **CUSTOM** LED lights. Since the FC727/726 supports SRC, Format A may operate at several sample rates that are not indicated by individual LEDs.

6. **FORMAT B Sync Source LEDs**

   These LEDs shows Format B's sync source. The blue button below the **AUTO** LED manually toggles the sync source sequentially from **AUTO** to **AES**, **WORD**, **MADI**, and **FORMAT A**. When set to **AUTO**, the FC727/726 accepts the first sync signal detected with the following priority: **AES**, **WORD**, **MADI**, and **FORMAT A**. For example, if MADI and Format A sync are both present, the selected source will be MADI because it is higher in the priority list.

7. **Power Switch**

   This switch turns power to the FC727/726 on or off.

1.3   Rear Panel

The FC727/726's rear panel is shown in Figure 1-4. Enlarged sections of the rear panel are shown in Figure 1-5 and Figure 1-6; the numbers in the figures correspond to the numbered items below describing that feature.
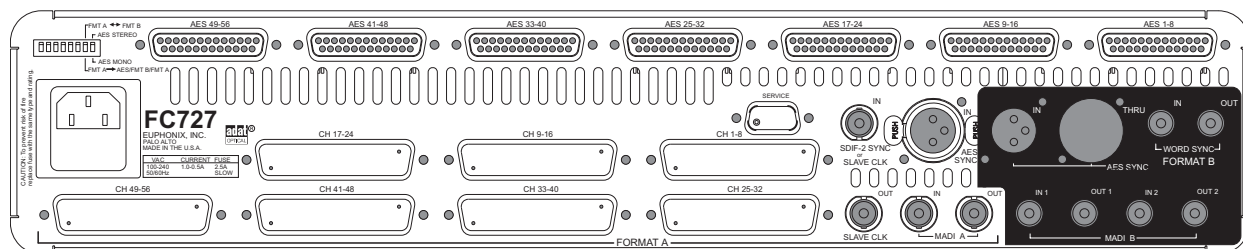

Figure 1-4 FC727/726 rear panel
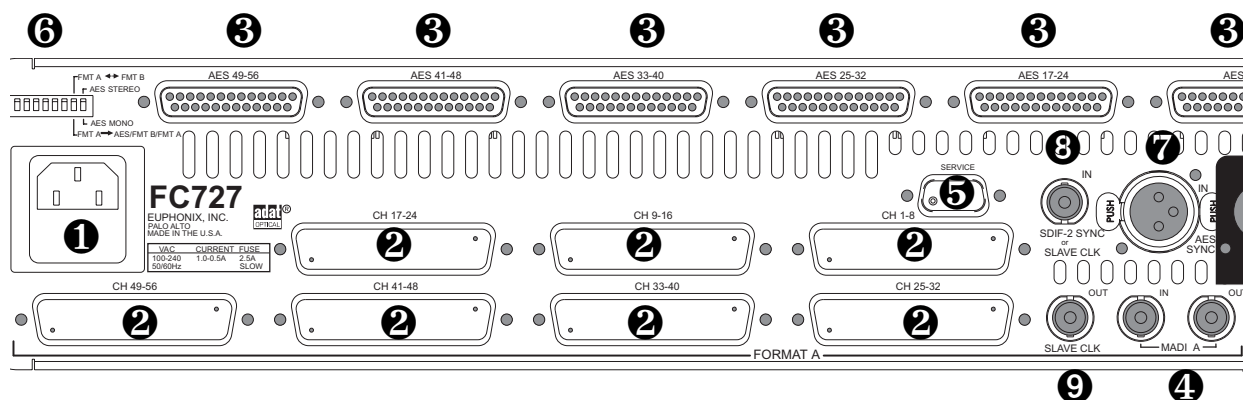
Figure 1-5 FC727/726 rear panel (left)

1.   **AC Power Input**

    Connect the power cable shipped with the FC727/726 to its AC input and an AC mains power source.

2.   **Format A Common DB-50 Connectors**

    Seven common DB-50 connectors connect third-party devices to the FC727/ 726. Each connector provides eight bidirectional audio channels. You must use the appropriate adapters for each format to connect the third-party devices. See *Format A Adapters* on page 11.

3.   Format A AES Connectors

Seven DB-25 connectors connect AES devices to the FC727/726. Each connector provides eight bidirectional channels (four AES pairs). To connect to the third-party devices, use the DB-25-to-XLR breakout cable available from Euphonix.

NOTE: *Do not use DB-25-to-XLR breakout cables made by other companies because the pin numbering may be incompatible! See **Appendix A: Pinout and Cable Specifications** for specific cable information.*

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4.   Format A MADI IN and MADI OUT

The **Format A MADI In** and **MADI Out** BNC connectors interface with non-Euphonix MADI devices. At 48 kHz, MADI A provides 24-bit audio on 56 channels. At 96 kHz, only 28 24-bit audio channels (1–28) are available.

NOTE: *Unlike MADI B, which has a second set of I/O connectors, MADI A provides only 28 channels at 96 kHz.*

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5.   Service DB-9 Jack

This jack connects to a PC's serial port to upgrade the FC727/726 firmware.

CAUTION: *Do not connect anything to the **Service DB-9** jack unless instructed to do so by Euphonix technical support.*

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6.   DIP Switches

These eight DIP switches (numbered 1–8 from left to right) set various modes on the FC727/726. Switches 3–5 and 7 are not currently implemented.

Switch #1 Bidirectional mode

Flip this switch when converting between third-party formats using one FC727/726 (see page 25).

Switch #2 MADI MERGE

When set to MADI MERGE (down), Format B MADI Input 1 channels 1–24 are merged with Format B MADI Input 2 channels 1–28 and Format B MADI Input 1 channels 25–28 to form a single 56-channel input stream. Format B MADI Output 1 sends channels 1–56 and Format B MADI Output 2 sends channels 25–56 followed by 1–24 from the third-party inputs.

Switch #6 AES MASTER/SLAVE

When set to SLAVE (up), the Format A AES outputs lock to their corresponding AES inputs. Within each bank, all AES outputs operate at the sample rate of the lowest-numbered, locked AES input. For example, if the first bank (channels 1–8) has a 44.1 kHz AES signal connected to inputs 1/2 and a 48 kHz input connected to inputs 5/6, then AES output channels 1–8 will all run at 44.1 kHz. If AES inputs are not present on a bank, Format A will get sample clock from the Format B Sync input. If sync is not present, Format A will then lock to the Format B Sync Input.

When set to MASTER (down), Format A's AES outputs get sample clock from the Format A Sync input. If Format A sync is not present, Format A's AES outputs will then lock to the Format B Sync Input.

Switch #8 AES STEREO/AES MONO

Set this switch to AES Stereo (up) for the normal configuration where each AES signal contains two discreet channels. If the sample rate is above 52 kHz (i.e., 96 or 88.2 kHz), and the AES signal connected to the FC727/726 implements two-wire AES (also referred to as mono mode AES), set the switch to AES Mono (down). This setting treats each AES signal as a single channel with a frame rate running at half its sample rate. For example, a 96 kHz two-wire AES signal runs at 48 kHz by using the left channel for the even samples and the right channel for the odd samples. This switch affects both the AES inputs and outputs.

7. **Format A AES Sync In**

   Connect an AES sync signal to this XLR connector to synchronize the **Format A MADI** signal. According to the AES specification, the AES sync signal must use the same sample rate as the incoming MADI signal to operate correctly.

NOTE: *It is possible, but not recommended, to connect a MADI signal without using a corresponding sync signal. Providing an AES or Word sync results in lower jitter and should be used whenever possible.*

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8. **SDIF-2 or SLAVE CLK IN**

   This connector can receive either an SDIF or slave clock sync signal. The FC727/726 automatically detects which signal type has been connected.

   An SDIF device must send a word sync signal to this connector to properly connect to the FC727/726.

A slave clock is a sync signal that runs at 256 times the sample rate. This is most commonly implemented in Pro Tools systems and is also referred to as a *super-clock*. Pro Tools users may optionally connect the slave clock output from another Digidesign Audio Interface or Synchronization unit (i.e., 888-24) to the **Slave Clk In** connector to synchronize both devices.

9.   SLAVE CLK OUT

Pro Tools users may optionally connect the **Slave Clk Out** to another Digidesign Audio Interface or Synchronization unit (i.e., 888-24) to synchronize both devices. This allows both a Digidesign I/O unit and the FC727 to be connected to the same Pro Tools computer.

If **Slave Clk In** has a valid sync signal, it is passed through to **Slave Clk Out**. If **Slave Clk In** does not have a valid sync signal, the lowest numbered bank that is locked and in use is selected as the clock source.
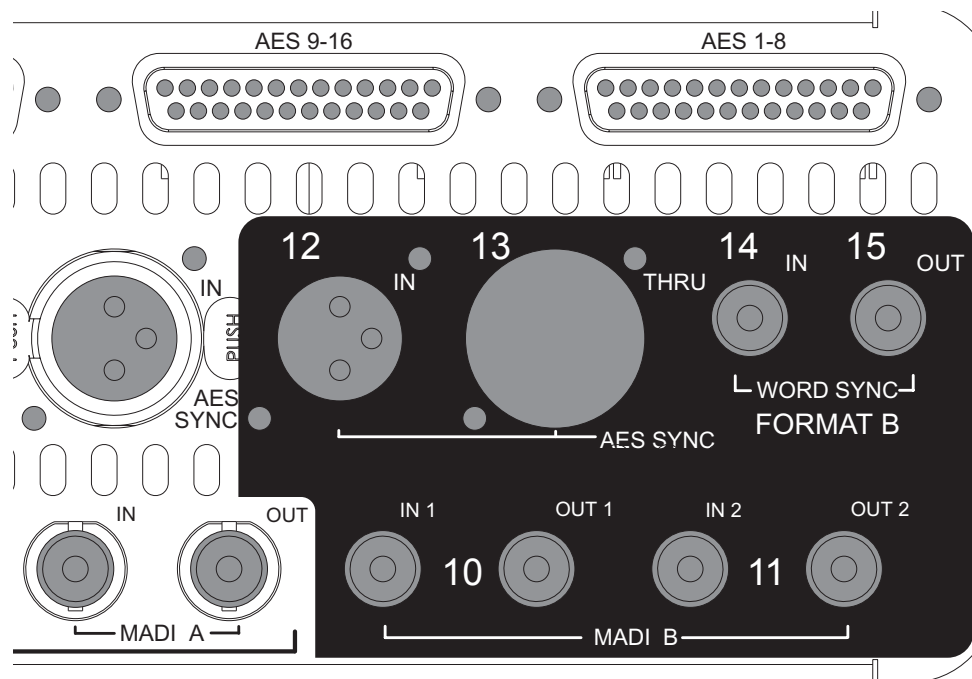
Figure 1-6 FC727/726 rear panel (right)

10.   Format B MADI IN 1 and MADI OUT 1

These BNC connectors are used to interface with a MADI device. (Euphonix users can connect these to a Studio Hub, MA703, or AM713) At 48 kHz, the **Format B MADI In 1 and MADI Out1** connectors provide 56 24-bit audio channels. At 96 kHz, they provide 28 24-bit audio channels (channels 1–28).

11. **Format B MADI IN 2 and MADI OUT 2**

   At 96 kHz, the **Format B MADI In 2and Out 2** connectors provide 28 additional 24-bit audio channels (29–56).

   At 48 kHz, **Format B MADI In 2** is ignored and **Format B MADI Out 2** carries the same audio as **Format B MADI Out 1** but with the channel numbering reversed: **Format A** channels 29–56 are output on **Format B MADI Out 2** channels 1–28; **Format A** channels 1–28 are output on **Format B MADI Out 2** channels 29–56.

12. **Format B AES SYNC IN**

   Connect an AES sync signal to this XLR connector to synchronize the **Format B MADI** signal. According to the AES specification, the AES sync signal must use the same sample rate as the incoming MADI signal to operate correctly.

NOTE: *It is possible, but not recommended, to connect a MADI signal without using a corresponding sync signal. Providing an AES or Word sync results in lower jitter and should be used whenever possible.*

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13. **Format B AES SYNC THRU**

   This connector outputs a copy of the **Format B AES Sync In** signal.

14. **Format B WORD SYNC IN**

   Connect a word sync signal to this BNC connector to synchronize the **Format B MADI** signal. According to the AES specification, the word sync signal must use the same sample rate as the incoming MADI signal to operate correctly.

NOTE: *It is possible, but not recommended, to connect a MADI signal without using a corresponding sync signal. Providing an AES or Word sync results in lower jitter and should be used whenever possible.*

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15. **Format B WORD SYNC OUT**

   This connector outputs a copy of the **Format B Word Sync In** signal. However, this output generates a word sync signal at the **Format B** sample rate *even if nothing is connected* to **Format B Word Sync In**. Note this important difference in behavior from **Format B AES Sync Thru**.

Chapter 2: Operating Instructions

This chapter provides operating instructions to connect third-party devices supported by the FC727/726.

2.1   Pro Tools

1.   Shut down the computer running Pro Tools and the FC727.

2.   Attach the Pro Tools adapters to the DB-50 connectors on the rear panel of the FC727 for the desired channels.

3.   Connect the Euphonix device, such as the System 5 or R-1, to the **FORMAT B** BNC jacks using the MADI and AES sync cables.

4.   Connect the Pro Tools computer to the FC727 with the cables that came with Pro Tools just as you would an 888-24 or other Digidesign I/O unit.

5.   Turn the **MADI** switch on the FC727 front panel to *OFF* (center position).

6.   Apply power to the FC727 and verify that the **PRO TOOLS** LED is dimly lit on the FC727's front panel.

7.   Turn on the Pro Tools computer and launch Pro Tools.

8.   From Pro Tools, choose **Setups->Hardware**.

     The **Hardware Setup** dialog box opens.

9.   Set the **Interface** to **888-24 I/O unit** because the FC727 emulates the Digidesign 888-24.

10.   Press the **Other Options** button to open a dialog to set the FC727's sample rate.

11.   Select **Digital** from the **Sync Mode** popup.

     For normal operation, slave the Pro Tools computer to the Euphonix MADI format to prevent sample rate conversion.

     For Pro Tools to use a different clock source than the Euphonix format (i.e., Euphonix runs at 96 kHz, which Pro Tools does not support), set the **Sync Mode** to **Internal** and the **Sample Rate** popup to either **44.1** or **48 kHz**.

12. Press the **Recalibrate Inputs** button in the **Hardware Setup** dialog.

   After making *any* changes in the **Hardware Setup** dialog, you must press the **Recalibrate Inputs** button.

13. Press **OK** and you are ready to begin.

You should now be able to make bidirectional transfers from a MADI device to Pro Tools. The **Format B MADI** audio input is transferred to the Pro Tools workstation. The audio from the Pro Tools workstation leaves the FC727 on the **Format B MADI** output. See your Pro Tools documentation for more information on Pro Tools set-up.

2.2   SDIF-2

SDIF-2 is a 24-channel format with inputs and outputs on separate DB-50 connectors. The FC727/726 SDIF-2 adapter has three DB-50 connectors, one for each eight-channel bank (labeled 1–8, 9–16, 17–24) but they may be connected to any FC727/726 bank. This allows routing the channels in eight-channel groups.

The SDIF-2 format requires connecting an external word clock on a BNC cable from the SDIF device to the FC727/726's **SDIF-2 Sync** input or the FC727/726 will not lock. Turn the MADI switch on the FC727/726 front panel to *OFF* (center position).

2.3   TDIF

1. Connect the TDIF adapter to the DB-50 connector(s) on the FC727/726's rear panel.

2. Turn the MADI switch on the FC727/726 front panel to *OFF* (center position).

3. To avoid SRC, either lock the TDIF device to the MADI B device, or lock the MADI B device to the TDIF device.

   To lock the TDIF device to the MADI B device (i.e, Euphonix System 5 or R-1), connect a word clock from the MADI device to the TDIF device's **Word Sync In**. The **Format B Word Sync Out** on the FC727/726 may be used if no other word clock output is available. Set the TDIF device to slave to its word clock input.

   To lock the MADI B device to the TDIF device, connect the TDIF device's **Word Sync Out** to the MADI B device's word clock input (i.e, on the Euphonix Studio Hub). Set the MADI B device to slave to its word clock input.

4. SRC is required if the MADI B device runs at 96 kHz and the TDIF device at 48 kHz. The TDIF and MADI B devices can each run on their own internal sample clocks without additional sync signals.

2.4   ADAT

1.   Connect the ADAT adapter to the DB-50 ports on the FC727/726 rear panel.

2.   Connect the ADAT optical cables to the ADAT rear panel and to the adapter's optical input and output.

3.   Turn the MADI switch on the FC727/726 front panel to *OFF* (center position).

4.   Set the ADAT adapter switch to the same setting used on the ADAT front panel.

   If multiple slaved ADATs are connected, this switch should match the setting of the first (master) ADAT. Always use the ADAT INT setting to perform SRC.

The switch on the ADAT adapter has two settings to tell the FC727/726 how to synchronize to the ADAT optical device(s). Its setting depends on whether the connected ADAT optical device slaves to the FC727/726 or runs on its own internal clock:

   ADAT INT: The ADAT runs on its own internal clock (INT refers to *internal*).

   ADAT DIG: The ADAT slaves to its optical (digital) inputs (DIG refers to *digital*). Since the optical input comes from the FC727/726, this setting slaves the ADAT to the FC727/726.

2.5   ProDigi

ProDigi (PD) is a 16-channel format with inputs and outputs on separate DB-50 connectors. The FC727/726 PD adapter has two DB-50 connectors, one for each eight-channel bank (labeled 1–8 and 9–16). They may be connected to any bank on the FC727/726 with one restriction: the connector labeled 1–8 must be connected to a lower-numbered bank than the 9–16 connector. This allows the channels to be routed in eight-channel groups. Turn the MADI switch on the FC727/726 front panel to *OFF* (center position).

2.6   AES

Each of the 28 AES inputs can run at a different sample rate. The following rules clarify how the sample rate of the AES output signal is derived:

- Within each bank, all AES outputs operate at the sample rate of the lowest-numbered AES input that is locked. For example, if the first bank (channels 1–8) has a 44.1 kHz AES signal connected to inputs 1/2 and a 48 kHz input connected to inputs 5/6, then AES output channels 1–8 all run at 44.1 kHz.

- If AES inputs are not present on a bank, but another Format A device (i.e., TDIF) is connected and locked, the AES outputs run at the Format A sample rate for that bank.

- If a bank has neither AES inputs nor a third-party device, the AES outputs run at the Format B sample rate.

- If the MADI switch is *On*, the AES outputs run at the Format A MADI sample rate.

Furthermore, these rules can be modified by DIP switch #6: **AES Master/Slave** (see *DIP Switches* on page 16).

- If the switch is set to **Master** (up; the default position), the rules stated above apply.

- If the switch is set to **Slave (**down), the AES outputs never run at the AES input sample rate. Instead, they follow the rules above assuming an AES input is *not* present. This mode should be used to lock the connected AES device to the AES output of the FC727/726.

2.7   Converting Between Third-Party Formats

2.7.1   Using Two Units (56 Bidirectional Channels)

1. Connect Format B MADI Input of the first FC727/726 to the Format B MADI Output of the second FC727/726.

2. Connect Format B MADI Input of the second FC727/726 to the Format B MADI Output of the first FC727/726.

3. At 48 kHz, use the In1 and Out1 connectors; at 96 kHz, use In1 and Out1 and In2 and Out2 connectors.

4. Connect the third-party devices as described in their sections of this chapter.

5. Connect a common sync source to both FC727/726s and all attached third-party devices.

NOTE: *Do not allow both FC727/726s to attempt to lock to each other's MADI input.*

2.7.2   Using One Unit (24 Bidirectional Channels)

1.   Move dip switch #1 to the down position.

2.   Loop Format B MADI Out 2 to Format B MADI In 1.

3.   If there is no sync on Format B, select Format A as the sync source from the front panel.

4.   Connect the third-party I/O devices.

The conversion is from third-party I/O channels 1–24 to channels 25–48. As always, all third-party inputs are still converted to Format B MADI Out 1.

For example, to convert 24 channels of Pro Tools to 24 channels TDIF (DA88), connect Pro Tools to third-party channels 1–24, connect the three DA88s to channels 25–48 and follow the steps above.

- If you want to run the Precools sync in Digital Mode, make sure to connect a sync source to the Format B Sync input.

- To run Precools in Internal Mode, sync on Format B is not necessary. If all the units are not synchronized sample-rate conversion will engage.

2.8   Specifications

FC727/FC726 Performance Specifications	
Sync Sources	AES, word clock, MADI, Format A
Sync Outputs	AES thru and word clock out
Sync Detection	Auto or switched
Format A Audio Inputs	56 digital AES (DB25), transformer isolated, 110 Ω Third-Party I/O (DB50) MADI (BNC), 75 Ω
Format A Audio Outputs	56 digital AES (DB25), transformer isolated, 110 Ω Third-Party I/O (DB50) MADI (BNC), 75 Ω
Signal-to-Noise Ratio	144 dB (unweighted) 120 dB (unweighted) with SRC engaged
Group Delay	SRC Off - 4 F_s SRC On - 4 F_s + ms delay ($43/F_{s\ input}$ + $45/F_{s\ output}$)
Format B MADI Inputs	BNC 75 Ω 56 channels at 44.1/48 kHz 28 channels at 88.2/96 kHz
Format B MADI Output	BNC 75 Ω 56 channels at 44.1/48 kHz 28 channels at 88.2/96 kHz

FC727/FC726 Technical Specifications	
Power Requirements	110–240 VAC; 50 or 60 Hz (Auto-ranging)
Power Consumption	50 W
Temperature of Operation	5–35°C
Dimensions	Height: 3.5 in (89 mm); Width: 19 in (483 mm); Depth: 18.25 in (470 mm) Weight: 13.5 lb (6 kg)

Appendix A: Pinout and Cable Specifications

This appendix provides detailed information about the FC727/726's connectors for those who wish to create or repair their own cables. Contact Euphonix for a list of the adapters and cables available for third-party devices.

NOTE: *The ADAT requires an adapter that contains active electronics with a DB-50 connector on one end and an ADAT optical connector on the other. This adapter cannot be constructed using the information presented in this appendix; contact Euphonix for this adapter.*

A.1   AES/EBU DB-25

Figure A-1 shows the cable diagram. Table A-1 shows the pinout for the FC727/726's AES/EBU DB-25 connector.

Figure A-1 AES DB-25 breakout cable assembly diagram

Table A-1 AES/EBU DB-25 connector pinout

Pin	Description
Pin 1	N/C
Pin 2	Channel 1 / 2 In (COLD)
Pin 3	Channel 3 / 4 In (GND)
Pin 4	Channel 3 / 4 In (HOT)
Pin 5	Channel 5 / 6 In (COLD)
Pin 6	Channel 7 / 8 In (GND)
Pin 7	Channel 7 / 8 In (HOT)
Pin 8	Channel 1 / 2 Out (COLD)
Pin 9	Channel 3 / 4 Out (GND)
Pin 10	Channel 3 / 4 Out (HOT)
Pin 11	Channel 5 / 6 Out (COLD)
Pin 12	Channel 7 / 8 Out (GND)
Pin 13	Channel 7 / 8 Out (HOT)
Pin 14	Channel 1 / 2 In (GND)
Pin 15	Channel 1 / 2 In (HOT)
Pin 16	Channel 3/ 4 In (COLD)
Pin 17	Channel 5 / 6 In (GND)
Pin 18	Channel 5 / 6 In (HOT)
Pin 19	Channel 7 / 8 In (COLD)
Pin 20	Channel 1 / 2 Out (GND)
Pin 21	Channel 1 / 2 Out (HOT)
Pin 22	Channel 3 / 4 Out (COLD)
Pin 23	Channel 5 / 6 Out (GND)
Pin 24	Channel 5 / 6 Out (HOT)
Pin 25	Channel 7 / 8 Out (COLD)

NOTE: *In and Out are from the FC727/726's perspective.*

A.2   Third-Party Devices

Table A-2 Common DB-50 connector pinout and usage with third party devices

Pin #	Common Connector (DB50 Female)	SDIF usage	TDIF usage	ProDigi usage	ADAT usage	ProTools
1	In 1+	In 1+	NC	In 1+	In 1/2	In 1/2+
2	In 1-	In 1-	In 1/2	In 1-	NC	In 1/2-
3	In 2+	In 3+	NC	In 3+	In 3/4	In 3/4+
4	In 2-	In 3-	In 3/4	In 3-	NC	In 3/4-
5	In 3+	In 5+	NC	In 5+	In 5/6	In 5/6+
6	In 3-	In 5-	In 5/6	In 5-	NC	In 5/6-
7	In 4+	In 7+	NC	In 7+	In 7/8	In 7/8+
8	In 4-	In 7-	In 7/8	In 7-	NC	In 7/8-
9	GND	GND	GND	GND	GND	GND
10	In 5+/GP In A	In 2+	NC	In 2+	Error In	ICR_WC+
11	In 5-	In 2-	NC	In 2-	NC	ICR_WC-
12	In 6+/GP In B	In 4+	NC	In 4+	User0 In	ICR_BC+
13	In 6-	In 4-	NC	In 4-	NC	ICR_BC-
14	In 7+/GP In C	In 6+	NC	In 6+	User1 In	ICR_SD+
15	In 7-	In 6-	NC	In 6-	NC	ICR_SD-
16	In 8+/GP In D	In 8+	NC	In 8+	Mstr/Slv IN	ICR_AD+
17	In 8-	In 8-	NC	In 8-	NC	ICR_AD-
18	Cable ID2	0 (tie to pin 23)	0 (tie to pin 23)	0 (tie to pin 23)	1 (NC)	1 (NC)
19	Cable ID1	0 (tie to pin 23)	1 (NC)	1 (NC)	0 (tie to pin 23)	0 (tie to pin 23)
20	Cable ID0	1 (NC)	0 (tie to pin 23)	1 (NC)	0 (tie to pin 23)	1
21	Bit Clk In+	NC	NC	Bit Clk In+	Bit Clk In	Bit Clk In+
22	Bit Clk In-	NC	NC	Bit Clk In-	NC	Bit Clk In-
23	GND	GND	GND	GND	GND	GND
24	Word Clk In+	NC	In LR Clk	Word Clk In+	Word Clk In	Word Clk In+
25	Word Clk In-	NC	NC	Word Clk In-	GND	Word Clk In-
26	Out 1+	Out 1+	NC	Out 1+	Out 1/2	Out 1/2+
27	Out 1-	Out 1-	Out 1/2	Out 1-	NC	Out 1/2-
28	Out 2+	Out 3+	NC	Out 3+	Out 3/4	Out 3/4+
29	Out 2-	Out 3-	Out 3/4	Out 3-	NC	Out 3/4-
30	Out 3+	Out 5+	NC	Out 5+	Out 5/6	Out 5/6+
31	Out 3-	Out 5-	Out 5/6	Out 5-	NC	Out 5/6-
32	Out 4+	Out 7+	NC	Out 7+	Out 7/8	Out 7/8+
33	Out 4-	Out 7-	Out 7/8	Out 7-	NC	Out 7/8-
34	Out 5+/GP Out A	Out 2+	FS0 out	Out 2+	Mute Out	NC
35	Out 5-	Out 2-	NC	Out 2-	NC	NC
36	Out 6+/GP Out B	Out 4+	FS1 out	Out 4+	NC	NC
37	Out 6-	Out 4-	NC	Out 4-	NC	NC
38	Out 7+/GP Out C	Out 6+	Emph Out	Out 6+	NC	NC
39	Out 7-	Out 6-	NC	Out 6-	NC	NC
40	Out 8+/GP Out D	Out 8+	NC	Out 8+	NC	NC
41	Out 8-	Out 8-	NC	Out 8-	NC	NC
42	Bit Clk Out+	NC	NC	Bit Clk Out+	Bit Clk Out	Bit Clk Out+
43	Bit Clk Out-	NC	NC	Bit Clk Out-	GND	Bit Clk Out-
44	GND	GND	GND	GND	GND	GND
45	Word Clk Out+	NC	Out LR Clk	Word Clk Out+	Word Clk Out	NC
46	Word Clk Out-	NC	NC	Word Clk Out-	GND	NC
47	Extra In/GP In E+	NC	NC	NC	DVCO In	NC
48	Extra In/GP In E-	NC	NC	NC	NC	NC
49	NC	NC	NC	NC	Vcc	NC
50	GND	GND	GND	GND	GND	GND

NOTE: In and Out are from the FC727/726's perspective.

A.2.1   TDIF

Figure A-2 shows the cable diagram. Table A-3 shows the pinout for the FC727/726's TDIF connector.
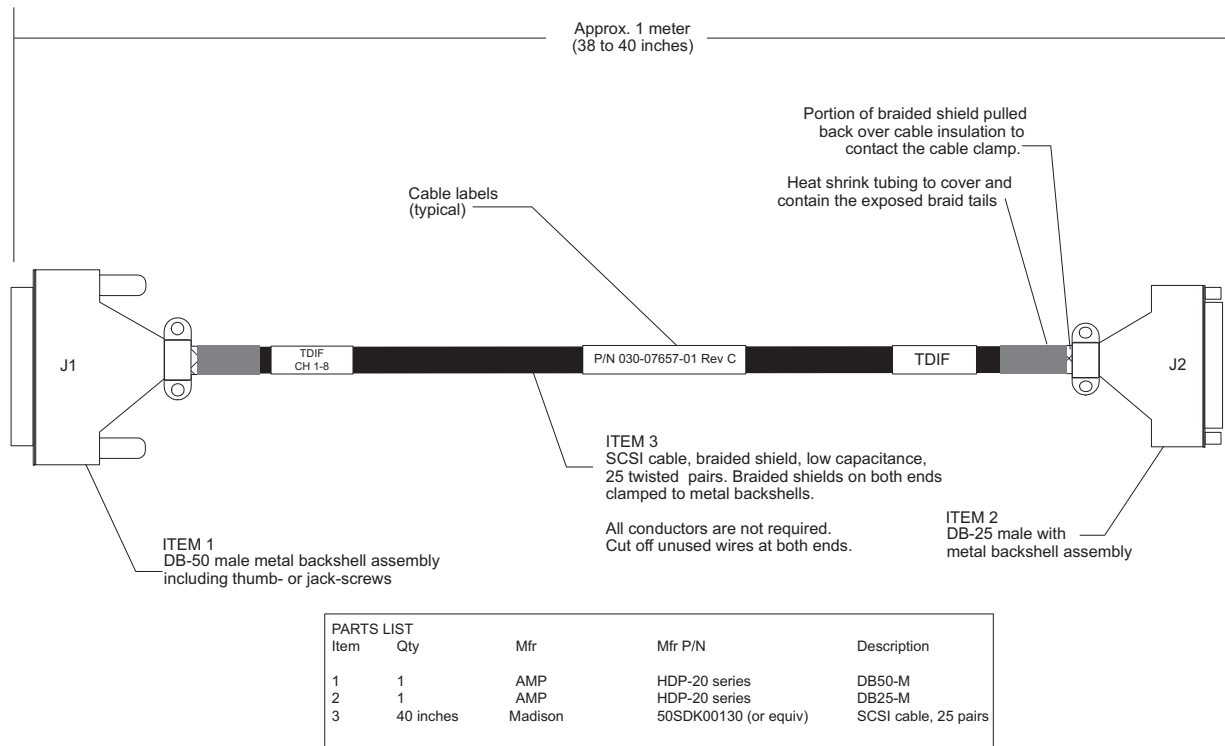
Figure A-2 DB-50-to-DB-25 TDIF cable assembly diagram

Table A-3 FC727/726 TDIF cable wiring specification

Connector	Pin	Connection	Description
J1	1	NC	
J1	2	J2-1	In 1/2
J1	3	NC	
J1	4	J2-2	In 3/4
J1	5	NC	
J1	6	J2-3	In 5/6
J1	7	NC	
J1	8	J2-4	In 7/8
J1	9	J2-7,24,25	GND
J1	10	NC	
J1	11	NC	
J1	12	NC	
J1	13	NC	
J1	14	NC	
J1	15	NC	
J1	16	NC	
J1	17	NC	
J1	18	J1-23	Cable ID
J1	19	NC	Cable ID
J1	20	J1-23	Cable ID
J1	21	NC	
J1	22	NC	
J1	23	J2-17,J1-18,J1-20	GND
J1	24	J2-5	Word Clock In
J1	25	NC	
J1	26	NC	
J1	27	J2-13	Out 1/2
J1	28	NC	
J1	29	J2-12	Out 3/4
J1	30	NC	
J1	31	J2-11	Out 5/6
J1	32	NC	
J1	33	J2-10	Out 7/8
J1	34	J2-8	FS0 Out
J1	35	NC	
J1	36	J2-20	FS1 Out
J1	37	NC	
J1	38	J2-21	Emph Out
J1	39	NC	
J1	40	NC	
J1	41	NC	
J1	42	NC	
J1	43	NC	
J1	44	J2-22,23	GND
J1	45	J2-9	Word Clock Out
J1	46	NC	
J1	47	NC	
J1	48	NC	
J1	49	NC	
J1	50	J2-14,15,16	GND

Notes:
J1 = DB-50 male
J2 = DB-25 male

Twisted pairs:
J2-1/14
J2-2/15
J2-3/16
J2-4/17
J2-5/7
J2-9/22
J2-11/23
J2-12/24
J2-13/25
The rest don't matter

In and Out are from the FC727's perspective.

A.2.2   Pro Tools

Figure A-3 shows the cable diagram. Table A-4 shows the pinout for the FC727's Pro Tools connector.
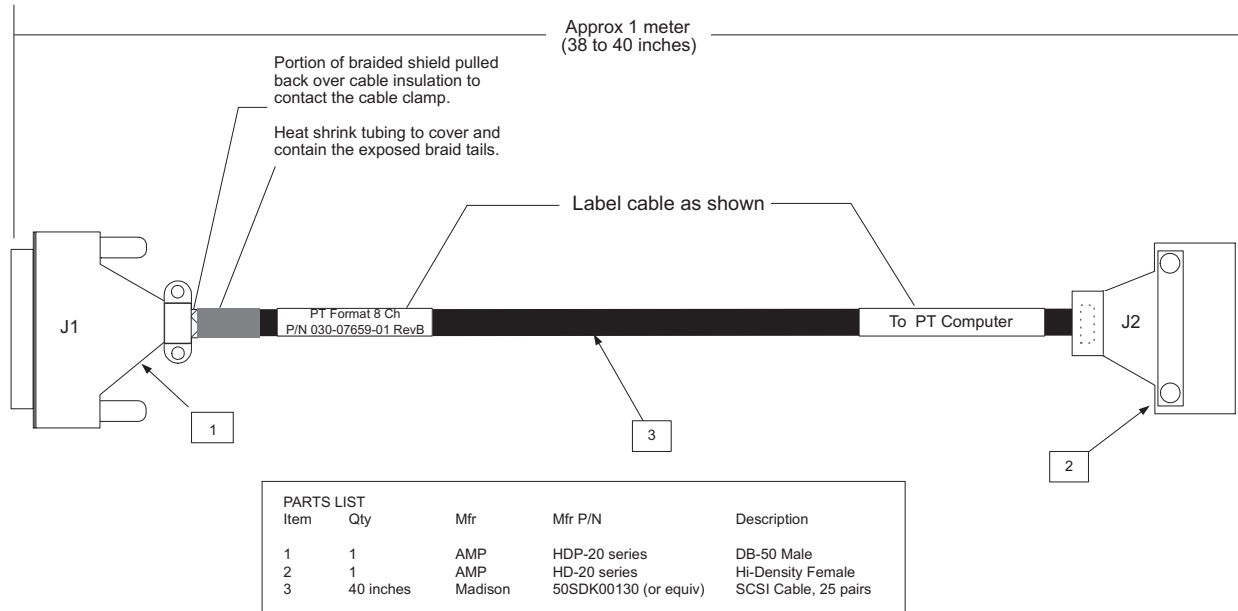
Figure A-3 DB-50-to-Hi-Dens 50 Pro Tools cable assembly diagram

Table A-4 FC727 Pro Tools cable wiring specification

Connector	Pin	Connection	Description
J1	1	J2-17	In 1/2+
J1	2	J2-42	In 1/2-
J1	3	J2-16	In 3/4+
J1	4	J2-41	In 3/4-
J1	5	J2-1	In 5/6+
J1	6	J2-26	In 5/6-
J1	7	J2-18	In 7/8+
J1	8	J2-43	In 7/8-
J1	9	J2-2	GND
J1	10	J2-5	ICR_WC+
J1	11	J2-30	ICR_WC-
J1	12	J2-3	ICR_BC+
J1	13	J2-28	ICR_BC-
J1	14	J2-21	ICR_SD+
J1	15	J2-46	ICR_SD-
J1	16	J2-23	ICR_AD+
J1	17	J2-48	ICR_AD-
J1	18	NC	Cable ID
J1	19	J1-23	Cable ID
J1	20	NC	Cable ID
J1	21	J2-19	Bit Clk In+
J1	22	J2-44	Bit Clk In-
J1	23	J1-19,J2-13	GND
J1	24	J2-11	Word Clk In+
J1	25	J2-36	Word Clk In-
J1	26	J2-7	Out 1/2+
J1	27	J2-32	Out 1/2-
J1	28	J2-8	Out 3/4+
J1	29	J2-33	Out 3/4-
J1	30	J2-25	Out 5/6+
J1	31	J2-50	Out 5/6-
J1	32	J2-24	Out 7/8+
J1	33	J2-49	Out 7/8-
J1	34	NC	
J1	35	NC	
J1	36	NC	
J1	37	NC	
J1	38	NC	
J1	39	NC	
J1	40	NC	
J1	41	NC	
J1	42	J2-9	Bit Clk Out+
J1	43	J2-34	Bit Clk Out-
J1	44	J2-38	GND
J1	45	NC	
J1	46	NC	
J1	47	NC	
J1	48	NC	
J1	49	NC	
J1	50	J2-27	GND

Notes:

J1 = DB-50 male

J2 = 50-pin high density SCSI-2-style female

Jx-x	
Jx-x	*denotes twisted pair*

In and Out are from the FC727's perspective.

A.2.3   SDIF

Figure A-4 shows the cable diagram. Table A-5 shows the pinout for the FC727/726's SDIF connector.
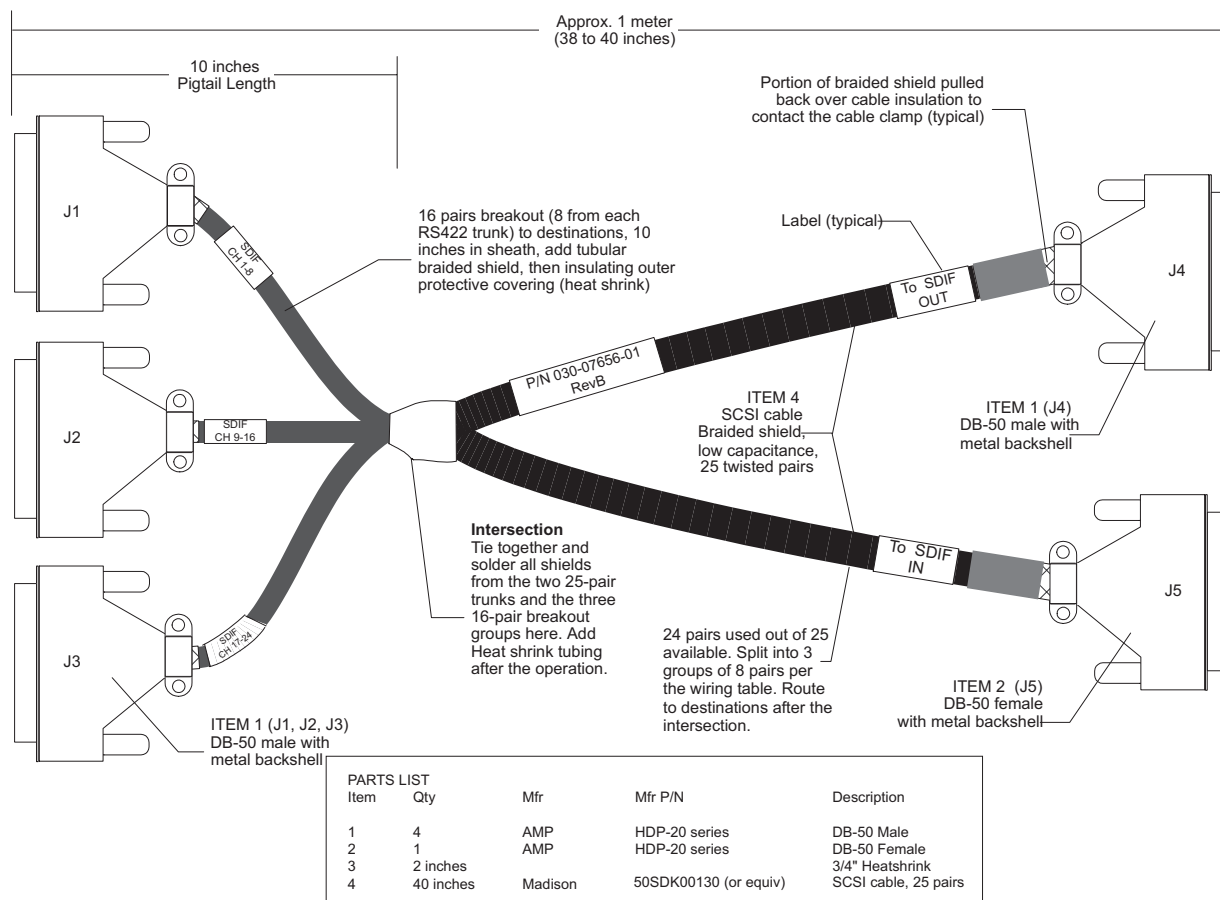
Figure A-4 DB-50 MX3-to-DB-50 Male/Female SDIF cable assembly diagram

Table A-5 FC727/726 SDIF cable wiring specification

Connector	Pin	Connection	Description
J1	1	J4-2	In 1+
J1	2	J4-1	In 1-
J1	3	J4-6	In 3+
J1	4	J4-5	In 3-
J1	5	J4-10	In 5+
J1	6	J4-9	In 5-
J1	7	J4-14	In 7+
J1	8	J4-13	In 7-
J1	9	NC (GND)	
J1	10	J4-4	In 2+
J1	11	J4-3	In 2-
J1	12	J4-8	In 4+
J1	13	J4-7	In 4-
J1	14	J4-12	In 6+
J1	15	J4-11	In 6-
J1	16	J4-16	In 8+
J1	17	J4-15	In 8-
J1	18	J1-23	Cable ID
J1	19	J1-23	Cable ID
J1	20	NC	Cable ID
J1	21	NC	
J1	22	NC	
J1	23	J1-18,19	GND
J1	24	NC	
J1	25	NC	
J1	26	J5-2	Out 1+
J1	27	J5-1	Out 1-
J1	28	J5-6	Out 3+
J1	29	J5-5	Out 3-
J1	30	J5-10	Out 5+
J1	31	J5-9	Out 5-
J1	32	J5-14	Out 7+
J1	33	J5-13	Out 7-
J1	34	J5-4	Out 2+
J1	35	J5-3	Out 2-
J1	36	J5-8	Out 4+
J1	37	J5-7	Out 4-
J1	38	J5-12	Out 6+
J1	39	J5-11	Out 6-
J1	40	J5-16	Out 8+
J1	41	J5-15	Out 8-
J1	42	NC	
J1	43	NC	
J1	44	NC	
J1	45	NC	
J1	46	NC	
J1	47	NC	
J1	48	NC	
J1	49	NC	
J1	50	NC	

Notes:

J1,J2,J3 = DB-50 male

J4 = DB-50 male

J5 = DB-50 female

Jx-x	
Jx-x	denotes twisted pair

In and Out are from the FC727's perspective.

Table A-5 FC727/726 SDIF cable wiring specification continued

Connector	Pin	Connection	Description
J2	1	J4-18	In 9+
J2	2	J4-17	In 9-
J2	3	J4-22	In 11+
J2	4	J4-21	In 11-
J2	5	J4-26	In 13+
J2	6	J4-25	In 13-
J2	7	J4-30	In 15+
J2	8	J4-29	In 15-
J2	9	NC	
J2	10	J4-20	In 10+
J2	11	J4-19	In 10-
J2	12	J4-24	In 12+
J2	13	J4-23	In 12-
J2	14	J4-28	In 14+
J2	15	J4-27	In 14-
J2	16	J4-32	In 16+
J2	17	J4-31	In 16-
J2	18	J2-23	Cable ID
J2	19	J2-23	Cable ID
J2	20	NC	Cable ID
J2	21	NC	
J2	22	NC	
J2	23	J2-18,19	GND
J2	24	NC	
J2	25	NC	
J2	26	J5-18	Out 9+
J2	27	J5-17	Out 9-
J2	28	J5-22	Out 11+
J2	29	J5-21	Out 11-
J2	30	J5-26	Out 13+
J2	31	J5-25	Out 13-
J2	32	J5-30	Out 15+
J2	33	J5-29	Out 15-
J2	34	J5-20	Out 10+
J2	35	J5-19	Out 10-
J2	36	J5-24	Out 12+
J2	37	J5-23	Out 12-
J2	38	J5-28	Out 14+
J2	39	J5-27	Out 14-
J2	40	J5-32	Out 16+
J2	41	J5-31	Out 16-
J2	42	NC	
J2	43	NC	
J2	44	NC	
J2	45	NC	
J2	46	NC	
J2	47	NC	
J2	48	NC	
J2	49	NC	
J2	50	NC	

Table A-5 FC727/726 SDIF cable wiring specification continued

Connector	Pin	Connection	Description
J3	1	J4-34	In 17+
J3	2	J4-33	In 17-
J3	3	J4-38	In 19+
J3	4	J4-37	In 19-
J3	5	J4-42	In 21+
J3	6	J4-41	In 21-
J3	7	J4-46	In 23+
J3	8	J4-45	In 23-
J3	9	NC	
J3	10	J4-36	In 18+
J3	11	J4-35	In 18-
J3	12	J4-40	In 20+
J3	13	J4-39	In 20-
J3	14	J4-44	In 22+
J3	15	J4-43	In 22-
J3	16	J4-48	In 24+
J3	17	J4-47	In 24-
J3	18	J3-23	Cable ID
J3	19	J3-23	Cable ID
J3	20	NC	Cable ID
J3	21	NC	
J3	22	NC	
J3	23	J3-18,19	GND
J3	24	NC	
J3	25	NC	
J3	26	J5-34	Out 17+
J3	27	J5-33	Out 17-
J3	28	J5-38	Out 19+
J3	29	J5-37	Out 19-
J3	30	J5-42	Out 21+
J3	31	J5-41	Out 21-
J3	32	J5-46	Out 23+
J3	33	J5-45	Out 23-
J3	34	J5-36	Out 18+
J3	35	J5-35	Out 18-
J3	36	J5-40	Out 20+
J3	37	J5-39	Out 20-
J3	38	J5-44	Out 22+
J3	39	J5-43	Out 22-
J3	40	J5-48	Out 24+
J3	41	J5-47	Out 24-
J3	42	NC	
J3	43	NC	
J3	44	NC	
J3	45	NC	
J3	46	NC	
J3	47	NC	
J3	48	NC	
J3	49	NC	
J3	50	NC	

A.2.4   ProDigi

Figure A-5 shows the cable diagram. Table A-6 shows the pinout for the FC727/726's ProDigi connector.
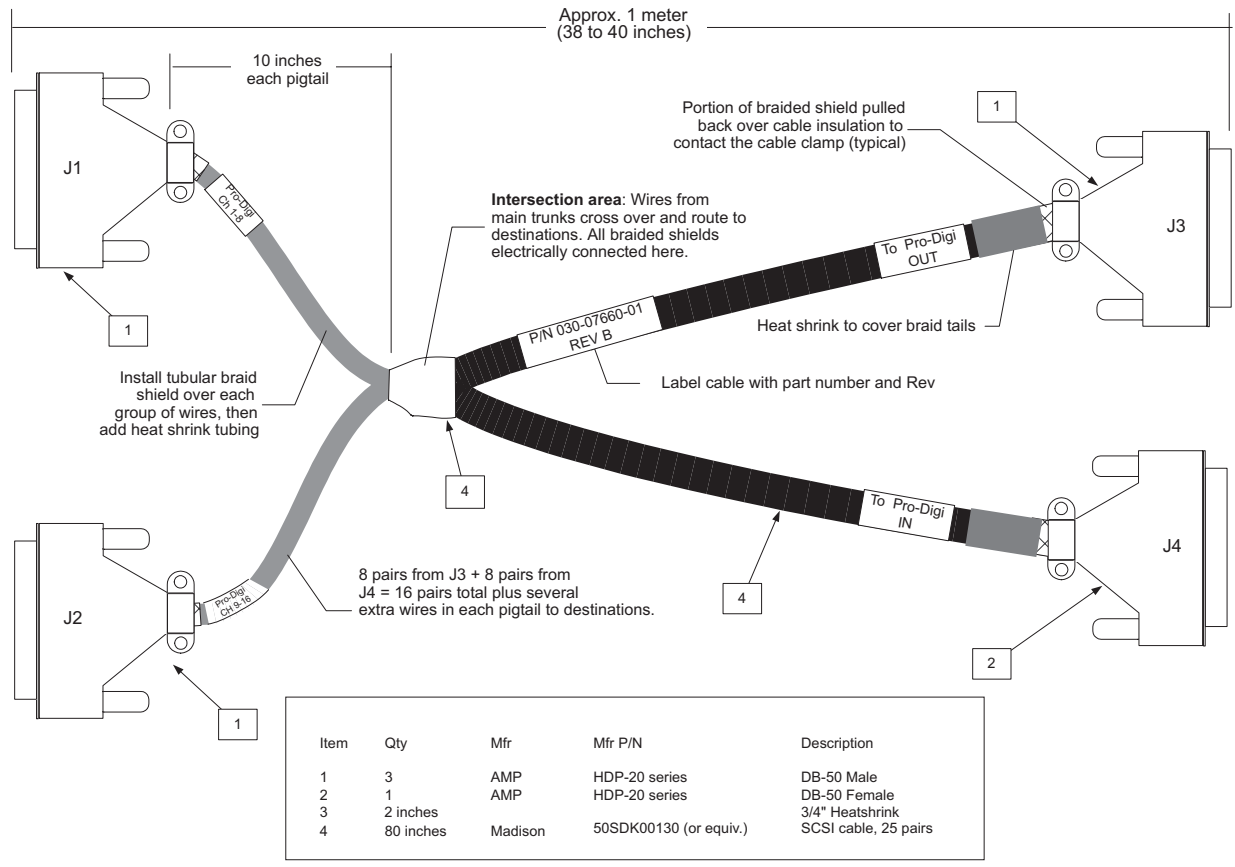

Figure A-5 DB-50 Male/Male-to-DB-50 Male/Female ProDigi cable assembly diagram

Table A-6 FC727/726 ProDigi cable wiring specification

Connector	Pin	Connection	Description
J1	1	J3-1	In 1+
J1	2	J3-18	In 1-
J1	3	J3-3	In 3+
J1	4	J3-20	In 3-
J1	5	J3-5	In 5+
J1	6	J3-22	In 5-
J1	7	J3-7	In 7+
J1	8	J3-24	In 7-
J1	9	J3-17	GND
J1	10	J3-2	In 2+
J1	11	J3-19	In 2-
J1	12	J3-4	In 4+
J1	13	J3-21	In 4-
J1	14	J3-6	In 6+
J1	15	J3-23	In 6-
J1	16	J3-8	In 8+
J1	17	J3-25	In 8-
J1	18	J1-23	Cable ID
J1	19	NC	Cable ID
J1	20	NC	Cable ID
J1	21	J3-34	Bit Clk In+
J1	22	J3-35	Bit Clk In-
J1	23	J1-18	GND
J1	24	J3-36	Word Clk In+
J1	25	J3-37	Word Clk In-
J1	26	J4-1	Out 1+
J1	27	J4-18	Out 1-
J1	28	J4-3	Out 3+
J1	29	J4-20	Out 3-
J1	30	J4-5	Out 5+
J1	31	J4-22	Out 5-
J1	32	J4-7	Out 7+
J1	33	J4-24	Out 7-
J1	34	J4-2	Out 2+
J1	35	J4-19	Out 2-
J1	36	J4-4	Out 4+
J1	37	J4-21	Out 4-
J1	38	J4-6	Out 6+
J1	39	J4-23	Out 6-
J1	40	J4-8	Out 8+
J1	41	J4-25	Out 8-
J1	42	J4-34	Bit Clk Out+
J1	43	J4-35	Bit Clk Out-
J1	44	NC	
J1	45	J4-36	Word Clk Out+
J1	46	J4-37	Word Clk Out-
J1	47	NC	
J1	48	NC	
J1	49	NC	
J1	50	J3-50	GND

Notes:

J1,J2,J3 = DB-50 male

J4 = DB-50 female

| Jx-x | | *denotes* |
| Jx-x | | twisted pair |

In and Out are from the FC727's perspective.

Table A-6 FC727/726 ProDigi cable wiring specification continued

Connector	Pin	Connection	Description
J2	1	J3-9	In 9+
J2	2	J3-26	In 9-
J2	3	J3-11	In 11+
J2	4	J3-28	In 11-
J2	5	J3-13	In 13+
J2	6	J3-30	In 13-
J2	7	J3-15	In 15+
J2	8	J3-32	In 15-
J2	9	J4-17	GND
J2	10	J3-10	In 10+
J2	11	J3-27	In 10-
J2	12	J3-12	In 12+
J2	13	J3-29	In 12-
J2	14	J3-14	In 14+
J2	15	J3-31	In 14-
J2	16	J3-16	In 16+
J2	17	J3-33	In 16-
J2	18	J2-23	Cable ID
J2	19	NC	Cable ID
J2	20	NC	Cable ID
J2	21	NC	
J2	22	NC	
J2	23	J2-18	GND
J2	24	NC	
J2	25	NC	
J2	26	J4-9	Out 9+
J2	27	J4-26	Out 9-
J2	28	J4-11	Out 11+
J2	29	J4-28	Out 11-
J2	30	J4-13	Out 13+
J2	31	J4-30	Out 13-
J2	32	J4-15	Out 15+
J2	33	J4-32	Out 15-
J2	34	J4-10	Out 10+
J2	35	J4-27	Out 10-
J2	36	J4-12	Out 12+
J2	37	J4-29	Out 12-
J2	38	J4-14	Out 14+
J2	39	J4-31	Out 14-
J2	40	J4-16	Out 16+
J2	41	J4-33	Out 16-
J2	42	NC	
J2	43	NC	
J2	44	NC	
J2	45	NC	
J2	46	NC	
J2	47	NC	
J2	48	NC	
J2	49	NC	
J2	50	J4-50	