



**UFC-24 Universal Format Converter  
Operation Manual**



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# Caution

To prevent fire or shock hazard:

Do not expose this unit to rain or moisture.

Do not remove panels (unless instructed to do so).

There are no user-serviceable parts inside.

Refer servicing to qualified service personnel.

**PLEASE READ THROUGH THE SAFETY INSTRUCTIONS ON THE NEXT PAGE.**

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## SAFETY INSTRUCTIONS

- 1. Read Instructions** All safety and operating instructions should be read before operation.
- 2. Retain Instructions** The safety and operating instructions should be retained for future reference.
- 3. Heed Warnings** All warnings on the device and in the operating instructions should be complied with.
- 4. Follow Instructions** All operating and use instructions should be followed.
- 5. Water and Moisture** The device should not be used near water - for example, near a bathtub, wash bowl, sink, laundry tub, in a wet basement, near a swimming pool, etc.
- 6. Carts and Stands** The device should be used only with a cart or stand that is recommended by the manufacturer.
- 7. Ventilation** The device should be situated so that its location or position does not interfere with its proper ventilation. For example, the device should not be situated on a bed, sofa, rug or similar surface that may block the ventilation openings; or, placed in a built-in installation, such as a bookcase or cabinet that may impede the flow of air through the ventilation openings.
- 8. Heat** The device should be situated away from heat sources such as a radiator, heat register, stove or other appliances (including amplifiers) that produce heat.
- 9. Power Sources** The device should be connected to a power supply only of the type described in the operating instructions or as marked on the device.
- 10. Grounding or Polarization** Precautions should be taken so that the grounding or polarization means of the device is not defeated.
- 11. Power Cord Protection** Power supply cords should be routed so that they are not likely to be walked on or pinched by items placed upon or against them, paying particular attention to cords at plugs, convenience receptacles and the point where they exit from the device.
- 12. Cleaning** The device should be cleaned only as recommended by the manufacturer.
- 13. Non-Use Periods** The power cord of the device should be unplugged from the outlet when left unused for a long period of time.

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**14. Object and Liquid Entry**

Care should be taken that objects do not enter and that liquids are not spilled into the enclosure through openings.

**15. Damage Requiring Service**

The device should be serviced by qualified service personnel when:

- A. The power supply cord or the plug has been damaged; or
- B. Objects have entered, or liquid has been spilled into the appliance; or
- C. The appliance has been exposed to rain; or
- D. The appliance does not appear to operate normally or exhibits a marked change in performance; or
- E. The appliance has been dropped, or the enclosure damaged.

**16. Servicing**

The user should not attempt to service the device beyond what is described in the operating . All other service should be referred to qualified personnel.

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# CERTIFICATIONS

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## FCC STATEMENT

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to correct the interference by one or more of the following measures.

- Re-orient or relocate the receiving antenna
- Increase the separation between the equipment and the receiver
- Connect the equipment into an outlet on a circuit different from that which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Shielded cables and I/O cords must be used with this equipment to comply with the relevant FCC regulations.

Changes or modifications not expressly approved in writing by iZ Corporation may void the user's authority to operate this equipment.

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## CANADIAN STANDARDS ASSOCIATION ASSOCIATION CANADIENNE DE NORMALISATION

This product has been found to comply with all applicable CSA standards.

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## UNDERWRITER'S LABORATORIES

This product has been found to comply with all applicable UL standards.

## **Limited Warranty**

**UFC-24 User Information**

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Company: \_\_\_\_\_

Contact: \_\_\_\_\_

Address: \_\_\_\_\_

City: \_\_\_\_\_ State & Zip \_\_\_\_\_

Phone: \_\_\_\_\_ Fax \_\_\_\_\_

Dealer: \_\_\_\_\_

Purchase Date: \_\_\_\_\_

UFC-24 S/N: \_\_\_\_\_

Type of Business:  
*(Please check all that apply)*

Music Recording     TV Production     Film Production  
 Broadcasting     Other \_\_\_\_\_  
\_\_\_\_\_





# TABLE OF CONTENTS

<b>1. WELCOME TO UFC-24</b>	<b>1</b>
1.1 Welcome	1
1.2 UFC-24 Features	1
1.3 Manual Overview	1
1.4 System Specifications	2
<b>2. GETTING STARTED</b>	<b>4</b>
2.1 Front Panel Controls	4
2.2 Rear Panel Connections	4
<b>3. SOURCE FORMAT SELECTION</b>	<b>6</b>
3.1 Selecting an Input Audio Format	6
3.2 EXT SYNC Button	6
<b>4. CHANNEL ROUTING FUNCTIONS</b>	<b>8</b>
4.1 ROUTING MAP Buttons (1 - 24)	8
4.2 ROUTING PRESET Buttons (1:1, 1 - 6)	9
<b>5. CONNECTING TO THE UFC-24</b>	<b>11</b>
5.1 ADAT as the Source Format	11
5.2 ADAT as the Destination Format	12
5.3 PD as the Source Format	12
5.4 PD as the Destination Format	13
5.5 SDIF-2 as the Source Format	13
5.6 SDIF-2 as the Destination Format	13
5.7 TDIF-1 as the Source Format	13
5.8 TDIF-1 as the Destination Format	14
<b>6. OUTPUT SETUP MODE</b>	<b>16</b>
6.1 Emphasis Selection	17
6.2 Sample Rate Selection	17
6.3 Multi-Format Converter Mode Selection	18
6.4 Audio Mute Control	18
6.5 Software Version	18
<b>7. MIDI SETUP MODE</b>	<b>19</b>
7.1 Patch Change	19
7.2 System Exclusive	20
7.3 MIDI SETUP Mode	20
<b>8. USING MULTIPLE UFC-24 UNITS</b>	<b>22</b>
8.1 Multi-UFC-24 Configuration	22
8.2 ADAT as the Source Format	22

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8.3 ADAT as the Destination Format	23
8.4 PD as the Source Format	23
8.5 PD as the Destination Format	23
8.6 SDIF-2 as the Source Format	23
8.7 SDIF-2 as the Destination Format	23
8.8 TDIF-1 as the Source Format	23
8.9 TDIF-1 as the Destination Format	23
<b>9. TROUBLESHOOTING</b>	<b>24</b>
9.1 LED Status Indications	24
9.2 No Digital Audio Received at Destination Machine	24
9.3 The UFC-24 is not Synchronizing to the Input Format	24
9.4 The Output Audio has Clicks or Distortion at the Destination Machine	25
9.5 Not Responding to MIDI Patch Change Messages	25
9.6 Not Responding to MIDI System Exclusive Messages	25
<b>10. HIDDEN PARAMETER MODE</b>	<b>36</b>
10.1 Hidden Page 1:1 Version Display	37
10.2 Hidden Page 1 ADAT Input Data and Clock Delay	38
10.3 Hidden Page 2 ADAT Input Pulse Width Adjustment	30
10.4 Hidden Page 3 ADAT Output Pulse Width Adjustment	31
10.5 Hidden Page 4 FR Control Register Adjustment	32
10.6 Hidden Page 5 Miscellaneous Control Adjustment	33
<b>11. RESETTING THE UFC-24 TO THE FACTORY DEFAULTS</b>	<b>35</b>
<b>12. MIDI SYSTEM EXCLUSIVE</b>	<b>37</b>

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# 1. WELCOME TO UFC-24

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## 1.1 Welcome

Congratulations on your purchase of the iZ UFC-24 Universal Format Converter. The UFC-24 has been designed to provide you with an elegant and reliable means of transferring digital audio to and from the most commonly used professional audio formats in use today. All of us at iZ hope that you enjoy your system and that the UFC-24 becomes an integral part of your day to day audio production needs.

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## 1.2 UFC-24 Features

The iZ Universal Format Converter (UFC-24) is a stand-alone unit that provides conversion between five digital audio formats. The following digital audio formats can be converted:

- ADAT
- PD
- SDIF-2
- TDIF-1
- AES/EBU

For each format type, there are connections for 24 input channels and 24 output channels. The source format is selected from the front panel and is converted and output to all five format types, simultaneously.

The UFC-24 can also perform channel rerouting. For every output channel, the user can specify which input channel will feed it.

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## 1.3 Manual Overview

This manual is organized as follows:

Section 1      Welcome to the UFC-24

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Section 2	Getting Started - includes front/rear panel switches/connections
Section 3	Selecting the Input Format
Section 4	Channel Routing Buttons and Routing Presets
Section 5	Making Connections to the UFC-24
Section 6	A Description of the Output Setup Mode
Section 7	A Description of the MIDI Setup Mode
Section 8	Using Multiple UFC-24 Units
Section 9	Troubleshooting
Section 10	Hidden Parameter Mode
Section 11	How to Reset the UFC-24 to the Factory Default Values
Section 12	MIDI System Exclusive Information

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## 1.4 System Specifications

<b>Digital Audio Formats</b>	ADAT PD SDIF-2 TDIF-1  AES/EBU
<b>Sampling Rates</b>	Variable from 32 - 48 kHz
<b>Inputs and Outputs</b>	3 pairs of optical transceivers for ADAT Input/Output  two-50-pin male D-sub for PD Input two 50-pin female D-sub for PD Output  one 50-pin male D-sub for SDIF-2 Input one 50-pin female D-sub for SDIF-2 Output one BNC, 75 ohms, TTL for SDIF-2 WCLK In / Multi-UFC-24 Sync In one BNC, 75 ohms, TTL for SDIF-2 WCLK Out  three 25-pin female D-sub for TDIF-1 Input/Output one BNC, 75 ohms, TTL for TDIF-1 WCLK Out three 25-pin female D-sub for AES input  three 25-pin male D-sub for AES output  one BNC, 75 ohms, TTL for Multi-UFC-24 Sync Out
<b>Dimensions (WxHxD)</b>	19" x 3.5" x 9.2"
<b>Weight</b>	11 lbs (5.5 kg)
<b>Power Requirements:</b>	
<b>USA/Canada</b>	115 Volts AC, 60 Hz (auto switching power supply)
<b>Europe</b>	220 Volts AC, 50 Hz (auto switching power supply)
<b>Power Consumption:</b>	
<b>Quiescent</b>	<b>17 watts</b>
<b>Maximum</b>	<b>40 watts</b>

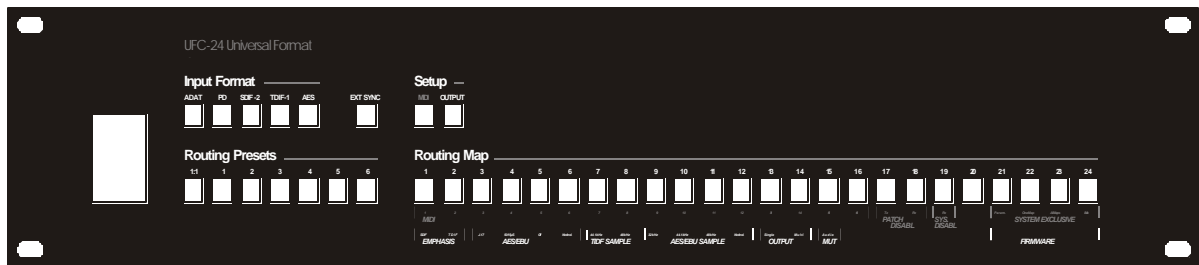
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**Standard Accessories**

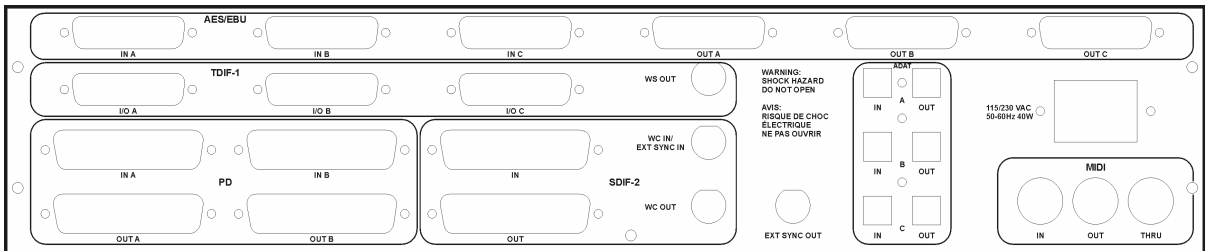
120V AC Power Cable  
User's Manual

## 2. GETTING STARTED

### 2.1 Front Panel Controls



### 2.2 Rear Panel Connections



#### Digital Audio Inputs and Outputs

The back panel has the following connectors for the four digital audio formats:

1. Three pairs of optical transceivers for ADAT Input/Output.
2. Two 50-pin male D-shell connectors for PD Input.
3. Two 50-pin female D-shell connectors for PD Output.
4. One 50-pin male D-shell connector for SDIF-2 Input.
5. One 50-pin female D-shell connector for SDIF-2 Output.

- 
6. One BNC connector for 75 ohm, TTL SDIF-2 Word Clock IN or External Sync IN.
  7. One BNC connector for 75 ohm, TTL SDIF-2 Word Clock Out.
  8. Three 25-pin female D-shell connectors for TDIF-1 Input/Output.
  9. One BNC connector for 75 ohm, TTL TDIF-1 Word Sync Out.
  10. One BNC connector for 75 ohm, TTL External Sync Out.
  11. Three 25-pin male D-shell connectors for AES Output.
  12. Three 25-pin female D-shell connectors for AES Input.

### **MIDI Connections**

The MIDI In jack receives patch change and system exclusive messages destined for the UFC-24. All MIDI data received at the MIDI In connector is replicated at the MIDI Thru jack. The MIDI Out jack is used to send patch changes and system exclusive messages from the UFC-24 to an external MIDI equipped device, such as a sequencer, computer or another UFC-24.

### **AC Power**

The UFC-24 has a universal power supply that can accommodate AC voltages and frequencies anywhere in the world. The standards used by different countries fall in either of two ranges: 100 to 120 volts at 60 Hz, or 220 volts at 50 Hz. The UFC-s internal power supply can automatically switch to use the supplied power.

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## 3. SOURCE FORMAT

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### 3.1 Selecting an Input Audio Format

The INPUT FORMAT buttons are used to select the source digital audio format. The five INPUT FORMAT buttons are labeled ADAT, PD, SDIF-2, TDIF-1, and AES/EBU. The selected source format is converted and output to *every* digital audio format.

Once a new INPUT FORMAT has been selected, the UFC-24 will attempt to synchronize with the input. If the UFC-24 is able to synchronize to the input, the selected INPUT FORMAT button will light steady.

**If the UFC-24 is unable to synchronize with the selected input, or if it falls out of synchronization at any time, the selected INPUT FORMAT LED will flash until synchronization is established.**

The last selected INPUT FORMAT on power down will be automatically selected on power up.

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### 3.2 EXT SYNC Button

The EXT SYNC button is used to instruct the format converter to read the word clock from the SDIF-2 WC IN / EXT SYNC IN connector rather than from the D-sub connectors which also carry the digital audio. There are only three situations that require the EXT SYNC button to be selected:

1. In a Multi-UFC-24 system, all slave format converters should have their EXT SYNC button ON. For more information, see Section 8.1.
2. When a PD machine is the source format, it is recommended that its WORDCLOCK OUT is fed to the format converter's EXT SYNC IN connector. The EXT SYNC button should be ON. For more information, see Section 5.3.
3. When a RADAR with ADATLINK is the source format, it is recommended that its SYNC REFERENCE OUT wordclock is fed to the format converter's EXT SYNC IN connector. The EXT SYNC button should be ON. For more information, see Section 5.1.



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In all other circumstances, it is recommended that EXT SYNC be OFF. Note that when you are using SDIF-2 as the source format, you do use the SDIF-2 WC IN / EXT SYNC IN connector, but you do not select EXT SYNC on the front panel of the UFC-24. For information on SDIF-2 as the source format, see Section 5.5.

Once EXT SYNC has been selected, the UFC-24 will attempt to synchronize with the EXT SYNC IN input. If the UFC-24 is able to synchronize to the input, both the selected INPUT FORMAT and the EXT SYNC buttons will light steady.

**If the UFC-24 is unable to synchronize with the selected input, or if it falls out of synchronization at any time, the selected INPUT FORMAT and EXT SYNC LEDs will flash until synchronization is established.**

The state of the EXT SYNC LED on power down will be automatically selected on power up.

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## 4. CHANNEL ROUTING FUNCTIONS

The UFC-24 has the capability of rerouting individual audio channels as they are converted from the source format to the destination format(s). For each of the 24 output channels, you can define which input channel will feed it. This rerouting information for the 24 channels is called a *routing map*.

Seven routing maps are saved in the UFC-24, and each one is identified with a different *ROUTING PRESET* number. *ROUTING PRESET* buttons 1 to 6 store user definable routing maps, while *ROUTING PRESET* button 1:1 is not user programmable.

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### 4.1 ROUTING MAP Buttons (1 - 24)

The 24 *ROUTING MAP* buttons are used to view and program routing maps. They are not functional, however, when *ROUTING PRESET* 1:1 is selected because this routing preset cannot be altered.

The *ROUTING MAP* button LEDs display different information depending on whether one of the *ROUTING MAP* buttons is being pressed or not.

1. **When there are no *ROUTING MAP* buttons being pressed, the LEDs indicate which channels are mapped 1:1 and which channels have been rerouted.** If a *ROUTING MAP* LED is not lit, it indicates that the output channel has not been rerouted. If a *ROUTING MAP* LED is lit, it indicates that the output channel is fed by a different input channel.
2. **When a *ROUTING MAP* button is pressed and held, the *ROUTING MAP* LED display indicates the routing details for the given output channel.** When a button is pressed and held, a single *ROUTING MAP* LED will light. This lit LED indicates the input channel number that feeds to the output channel number of the pressed button.

As an example, consider a *ROUTING MAP* LED display with *ROUTING MAP* button 8 unlit and button 9 lit when no *ROUTING MAP* buttons are pressed. This indicates that output channel 8 is mapped 1:1 -- output channel 8 is fed from input channel 8. It also indicates that output channel 9 is rerouted -- output channel 9 is fed from an input channel other than input channel 9. If button 9 is pressed and held, button 3 may light, indicating that input channel 3 feeds output channel 9. If button 8 is pressed and held, button 8 will light, confirming that the mapping is 1:1.

**To reroute a channel:**

1. Using the *ROUTING MAP* buttons, press and hold the number of the output channel that you want to reroute.
2. While still holding the *ROUTING MAP* button for the output channel, press the desired input channel using the *ROUTING MAP* buttons again. The selected input channel will then light. The output channel (the first button pressed) is fed from the new input channel (the second button pressed).

**To return a rerouted channel back to 1:1 routing:**

1. Using the *ROUTING MAP* buttons, press and hold the output channel number on which you want to remove the rerouting. The current input channel number will light.
2. While still holding the *ROUTING MAP* button for the output channel, press the input channel number which is lit. The LED for the rerouted input will immediately extinguish, and the channel will return to 1:1 routing. The input channel number is returned to the same number as the output channel.

Continuing from the previous example, output channel 9 can be sourced by input channel 9 by pressing and holding *ROUTING MAP* button 9, then pressing *ROUTING MAP* button 3, and finally releasing both buttons. If no buttons are being pressed, *ROUTING MAP* button 9 will no longer be lit, confirming that the routing is 1:1 for channel 9.

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## 4.2 *ROUTING PRESET* Buttons (1:1, 1 - 6)

The *ROUTING PRESET* buttons are used to select one of seven routing maps. Each of the seven routing presets stores one routing map. *ROUTING PRESET* 1:1 stores a 1:1 routing map that cannot be altered, while *ROUTING PRESET*s 1 to 6 each store a user programmable routing map.

- If *ROUTING PRESET* 1:1 is selected, then the 1:1 routing map will become active. The 1:1 routing map means input channel 1 feeds output channel 1, input channel 2 feeds output channel 2, and so on. Because *ROUTING PRESET* 1:1 cannot be reprogrammed, the *ROUTING MAP* buttons will not be functional.
- *ROUTING PRESET*s 1-6 are used to store user defined routing maps. When one of these user programmable routing presets is selected, its stored routing map is recalled and will become active immediately. The routing preset can be reprogrammed with the *ROUTING MAP* buttons (as discussed in the above section). Changing the routing map in any way will reprogram the map stored in the selected routing preset.

**To reset a Routing Preset to a 1:1 Routing Map:**

*Press and hold the user ROUTING PRESET 1 to 6 to be reset, and then press the ROUTING PRESET 1:1 button. The user routing preset will be reprogrammed to a 1:1 routing map.*

**To copy a Routing Map:**

*Press and hold the destination ROUTING PRESET 1 to 6, and then press the ROUTING PRESET to be copied. The destination routing preset will have its routing map reprogrammed.*

The seven routing maps are stored in memory and will be saved when the power is turned off. The last selected routing preset will be automatically selected on power up.

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## 5. CONNECTING TO THE UFC-24

This section explains how to connect up UFC-24 when you have only one UFC-24. Make sure you are in stand-alone mode: see Section 6.3 on how to do this.

Read the subsection for your source and destination formats. Please follow the instructions carefully because some formats have special requirements.

If you have more than one UFC-24, in addition to this section, you should read Section 8 for detailed information on how to use multiple UFC-24 units.

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### 5.1 ADAT Optical as the Source Format

The three ADAT IN optical connections on the UFC-24 each support 8 ADAT channels. ADAT IN A is assigned to UFC-24 input channels 1 to 8, ADAT IN B is assigned to input channels 9 to 16, and ADAT IN C is assigned to input channels 17 to 24.

#### One ADAT Format Machine

1. Run an optical cable from the output of the ADAT format machine to ADAT IN A of the format converter.
2. Select the ADAT Input Format button. The ADAT LED will light to indicate that the source format is ADAT. Do not select EXT SYNC.

#### Multiple ADAT Format Machines

1. The master ADAT format machine must be connected to the first ADAT IN connector on the UFC-24. Run optical cables from the optical output of the master ADAT machine to the format converter's ADAT IN A, from the first slaved ADAT machine to ADAT IN B, and from the second slaved ADAT machine to ADAT IN C.
2. Select the ADAT Input Format button. The ADAT LED will light to indicate that the source format is ADAT. Do not select EXT SYNC.

#### iZ RADAR with ADATLINK

1. If you are using an iZ RADAR with the ADATLINK option as the source, connect the optical cables from ADATLINK OUT A to UFC-24 ADAT IN A, OUT B to IN B, and OUT C to IN C.
2. Connect a coaxial cable from the SYNC REFERENCE OUT on RADAR to the EXT SYNC IN on the UFC-24 in order to provide the UFC-24 with the cleanest clock signal.

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3. Select ADAT and EXT SYNC from the UFC-24's Input Format buttons. Both buttons will light to indicate that the UFC-24's source format is ADAT and that the word clock is being read from the EXT SYNC IN connector.

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## 5.2 ADAT Optical as the Destination Format

The three ADAT OUT optical connections on the UFC-24 each support 8 ADAT channels. ADAT OUT A is assigned to UFC-24 output channels 1 to 8, ADAT OUT B is assigned to output channels 9 to 16, and ADAT OUT C is assigned to output channels 17 to 24.

### One ADAT Format Machine

1. Run an optical cable from ADAT OUT A of the UFC-24 to the digital IN on the ADAT machine.
2. Select DIGITAL IN on the ADAT machine.

### Multiple ADAT Format Machines

1. The first ADAT OUT connector on the UFC-24 must be connected to the *master* ADAT machine. Connect optical cables from the output of the format converter's ADAT OUT A to the digital IN on the master ADAT machine, from ADAT OUT B to the input on the first slaved ADAT machine, and from ADAT OUT C to the input on the second slaved ADAT unit.
2. Select DIGITAL IN on all three ADAT machines.

### iZ RADAR with ADATLINK

1. If you are using an iZ RADAR with the ADATLINK option as the destination, connect the optical cables from UFC-24's ADAT OUT A to the ADATLINK's IN A, ADAT OUT B to IN B, ADAT OUT C to IN C.

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## 5.3 PD as the Source Format

The two PD IN connections on the UFC-24 each support 16 channels. PD IN A is assigned to UFC-24 input channels 1 to 16, and PD IN B is assigned to input channels 17 to 24. Channels 25 to 32 on the PD IN B connector are ignored on a single UFC-24 unit.

1. Connect a cable from PD OUT A on the source machine to PD IN A on the UFC-24, and another from PD OUT B to PD IN B.
2. Connect a coaxial cable from the WORD CLOCK OUT on the source machine to the EXT SYNC IN connector on the UFC-24.
3. Select PD and EXT SYNC from the UFC-24's Input Format buttons. Both buttons will light to indicate that PD is the source format and that the word clock is being read from the EXT SYNC IN connector.

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## 5.4 PD as the Destination Format

The two PD OUT connections on the UFC-24 each support 16 channels. PD OUT A is assigned to UFC-24 output channels 1 to 16, and PD OUT B is assigned to output channels 17 to 24. Channels 25 to 32 on PD OUT B are not used.

1. Connect a cable from PD OUT A on the UFC-24 to PD IN A on the destination machine, and another from PD OUT B to PD IN B.
2. Connect a coaxial cable from EXT SYNC OUT on the UFC-24 to the WORD CLOCK IN on the destination machine.

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## 5.5 SDIF-2 as the Source Format

The single SDIF-2 IN connection on the UFC-24 supports all 24 input channels of SDIF-2.

1. Connect a cable from the SDIF-2 digital audio out on the source machine to SDIF-2 IN on the UFC-24.
2. Connect a coaxial cable from the SDIF-2 WC OUT on the source machine to the SDIF-2 WC IN on the UFC-24. However, do not select EXT SYNC on the UFC-24's front panel.
3. Select the SDIF-2 Input Format button on the UFC-24. The SDIF-2 LED will light to indicate that the source format is SDIF-2. Do not select EXT SYNC.

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## 5.6 SDIF-2 as the Destination Format

The single SDIF-2 OUT connection on the UFC-24 supports all 24 output channels of SDIF-2.

1. Connect a cable from SDIF-2 OUT on the UFC-24 to SDIF-2 IN on the destination machine.
2. Connect a coaxial cable from the UFC-24's SDIF-2 WC OUT to the SDIF-2 WC IN on the destination machine.
3. The SDIF-2 emphasis should be set on or off as required. This parameter is accessed using the OUTPUT SETUP Mode. See Section 6.1 for more information.

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## 5.7 TDIF-1 as the Source Format

The three TDIF-1 I/O connections on the UFC-24 each support 8 input channels and 8 output channels. The TDIF-1 I/O A connector carries input channels 1 to 8,

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TDIF-1 I/O B carries input channels 9 to 16, and TDIF-1 I/O C carries input channels 17 to 24.

#### One TDIF-1 Format Machine

1. Run a TDIF-1 cable from the TDIF-1 I/O connector on the TDIF-1 machine to the TDIF-1 I/O A on the format converter.
2. Select the TDIF-1 Input Format button. The TDIF-1 LED will light to indicate that the source format is TDIF-1. It is recommended that you do not use the WS OUT on the TDIF-1 machine and do not select EXT SYNC on the UFC-24.

#### Multiple TDIF-1 Format Machines

1. The master TDIF-1 machine must be connected to the *first* TDIF-1 I/O connector on the UFC-24. Run one TDIF-1 cable from the TDIF-1 I/O connector on the master TDIF-1 machine to the format converter's *TDIF-1 I/O A*, one from the first slaved TDIF-1 machine to *TDIF-1 I/O B*, and one from the second slaved TDIF-1 machine to *TDIF-1 I/O C*.
2. Select the TDIF-1 Input Format button on the UFC-24. The TDIF-1 LED will light to indicate that the source format is TDIF-1. You do not need to use the TDIF-1 machine's WS OUT to feed a word clock to the UFC-24 because it is fed to the format converter through the D-sub connectors; therefore, do not select EXT SYNC on the UFC-24.

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## 5.8 TDIF-1 as the Destination Format

The three TDIF-1 I/O connections on the UFC-24 each support 8 input channels and 8 output channels. The TDIF-1 I/O A connector carries output channels 1 to 8, TDIF-1 I/O B carries output channels 9 to 16, and TDIF-1 I/O C carries output channels 17 to 24.

#### One TDIF-1 Format Machine

1. Power down the TDIF machine.
2. Run a TDIF-1 cable from TDIF-1 I/O A of the UFC-24 to the TDIF-1 I/O on the TDIF-1 machine.
3. Run a coaxial cable from the UFC-24's TDIF-1 WS Out connector to the TDIF-1 machine's WS In connector.
4. **Once the UFC-24 is synchronized to the selected source format and all connections are made to the TDIF machine, you can turn on the power to the TDIF machine.**
5. Select WORD from CLOCK selection on the TDIF-1 machine's front panel.
6. Select DIGITAL IN on the TDIF-1 machine.
7. The TDIF-1 sample rate indication bit must be set to match the sample rate of the source format. This parameter is accessed using the OUTPUT SETUP Mode. See Section 6.2 for more information.



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8. The TDIF-1 emphasis should be set on or off as required. This parameter is accessed using the OUTPUT SETUP Mode. See Section 6.1 for more information.

### Multiple TDIF-1 Format Machines

1. Power down the TDIF machine.
2. The first TDIF-1 I/O connector on the UFC-24 must be connected to the *master* TDIF-1 machine. Run TDIF-1 cables from the format converter's TDIF-1 I/O A to the TDIF-1 I/O on the master TDIF-1 machine, from the UFC-24's TDIF-1 I/O B to the TDIF-1 I/O on the first slaved TDIF-1 machine, and from the UFC-24's TDIF-1 I/O C to the TDIF-1 I/O on the second slaved TDIF-1 machine.
3. Run a cable from the UFC-24's TDIF-1 WS OUT connector to the master TDIF-1 machine's WS IN connector.
4. **Once the UFC-24 is synchronized to the selected source format and all connections are made to the TDIF machine, you can turn on the power to the TDIF machine.**
5. Select WORD from the CLOCK selection on the master TDIF-1 machine's front panel.
6. Select DIGITAL IN on all three TDIF-1 machine's.
7. The TDIF-1 sample rate indication bit must be set to match the sample rate of the source format. This parameter is accessed using the OUTPUT SETUP Mode. See Section 6.2 for more information.
8. The TDIF-1 emphasis should be set on or off as required. This parameter is accessed using the OUTPUT SETUP Mode. See Section 6.1 for more information.

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## 5.9 AES as the Source Format

The three AES female D-sub connections on the UFC-24 each support 8 input channels. The AES input A connector carries input channels 1 to 8, AES input B carries input channels 9 to 16, and AES input C carries input channels 17 to 24.

### One AES Format Machine

1. Run an Multi AES cable from the Multi AES connector on the AES machine to the AES input A on the UFC-24.
2. Select the AES Input Format button. The AES LED will light to indicate that the source format is AES. It is recommended that you do not use the WDCLK OUT on the AES machine and do not select EXT SYNC on the UFC-24 unless you are experiencing lock problems (See section 9.4 ).

### Multiple AES Format Machines

1. The master AES machine must be connected to the *first* AES connector on the UFC-24. Run one Multi AES cable from the AES connector on the master AES machine to the format converter's *AES input A*, one from the first slaved AES machine to *AES input B*, and one from the second slaved AES machine to *AES input C*.
2. Select the AES Input Format button on the UFC-24. The AES LED will light to indicate that the source format is TDIF-1. You do not need to use the TDIF-1 machine's WS OUT to feed a word clock to the UFC-24 because it is fed to the format converter through the D-sub connectors; therefore, do not select EXT SYNC on the UFC-24.

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## 5.10 AES as the Destination Format

The three AES male D-sub connections on the UFC-24 each support 8 output channels. The AES output A connector carries output channels 1 to 8, AES output B carries output channels 9 to 16, and AES output C carries output channels 17 to 24.

### One AES Format Machine

1. Power down the AES machine.
2. Run a Multi AES cable from AES output A of the UFC-24 to the AES Multi in on the AES machine.
3. **Once the UFC-24 is synchronized to the selected source format and all connections are made to the AES machine, you can turn on the power to the AES machine.**
4. Select DIGITAL IN on the AES machine.
5. The AES sample rate indication bit must be set to match the sample rate of the source format. This parameter is accessed using the OUTPUT SETUP Mode. See Section 6.2 for more information.
6. The AES emphasis should be set on or off as required. This parameter is accessed using the OUTPUT SETUP Mode. See Section 6.1 for more information.

### Multiple AES Format Machines

1. Power down the AES machine.
2. The first AES connector on the UFC-24 must be connected to the master AES machine. Run Multi AES cables from the format converter's AES output A to the AES input on the master AES machine, from the UFC-24's AES output B to the AES input on the first slaved AES machine, and from the UFC-24's AES output C to the AES on the second slaved AES machine.
3. Run a cable from the UFC-24's Ext Sync Out connector to the master AES machine's WS IN connector.

- 
4. **Once the UFC-24 is synchronized to the selected source format and all connections are made to the AES machine, you can turn on the power to the AES machine.**
  5. Select DIGITAL IN on all three AES machine's.
  6. The AES sample rate indication bit must be set to match the sample rate of the source format. This parameter is accessed using the OUTPUT SETUP Mode. See Section 6.2 for more information.
  7. The AES emphasis should be set on or off as required. This parameter is accessed using the OUTPUT SETUP Mode. See Section 6.1 for more information.

## 6. OUTPUT SETUP MODE

The OUTPUT SETUP mode is used to control emphasis bits and sample rate indication bits, to select Standalone or Multi-UFC-24 mode, to mute the digital audio outs for every format, and to display the software version number.

**To enter OUTPUT SETUP MODE:**

*Press the OUTPUT SETUP button; the OUTPUT button will light to indicate that the UFC-24 is now in OUTPUT SETUP Mode.*

**To exit OUTPUT SETUP MODE:**

*Press the OUTPUT SETUP button again.*

While in OUTPUT SETUP Mode, the INPUT FORMAT and EXT SYNC buttons will still operate normally, but the ROUTING PRESET buttons will not be functional, and the ROUTING MAP buttons take on a new functionality. The ROUTING MAP buttons are now used to alter OUTPUT parameters and to display the software version. Their new functions are printed on the last line below the ROUTING MAP buttons. Any changes made to the OUTPUT SETUP parameters are stored in memory and will be retained on power down.

Table 6-1.OUTPUT SETUP Mode

ROUTING MAP Button		Description
1	On/off	SDIF-2 Emphasis
2	On/off	TDIF-1 Emphasis
3	CCITT J.17	AES Emphasis
4	50/15 $\mu$ s	
5	Off	
6	Not Indicated	
7	44.1 kHz	TDIF-1 Sample Rate
8	48 kHz	
9	44.1 kHz	AES Sample Rate
10	48 kHz	
11	Not Indicated	
12	Stand Alone	Multi-Format Converter Mode
13	Multi-UFC-24	
14	On/Off	Audio Mute
15		Not Used
16		
17		
18		
19		
20		
21	Software	Display Software Version
22	Version	
23	( READ	

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24 ONLY)
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## 6.1 Emphasis Selection

While in OUTPUT SETUP Mode, ROUTING MAP buttons 1 to 6 are used to select the emphasis bits on the output digital audio for SDIF-2, TDIF-1, and AES/EBU formats.

### SDIF-2 Emphasis

ROUTING MAP button 1 toggles the SDIF-2 emphasis on and off. When button 1 is lit, then the emphasis bit is set to 'on' for the SDIF-2 digital audio outputs, and when the button is unlit, the emphasis is 'off'. **This is set to the off position in the factory default setting.**

### TDIF-1 Emphasis

ROUTING MAP button 2 toggles the TDIF-1 emphasis on and off. When button 2 is lit, then the emphasis bit is set to 'on' for the TDIF-1 digital audio outputs, and when the button is unlit, the emphasis is 'off'. **This is set to the off position in the factory default setting.**

### AES/EBU Emphasis

The AES/EBU format has four possible emphasis status's. ROUTING MAP buttons 3 to 6 are used to select the emphasis for the AES/EBU digital audio outputs. The currently selected emphasis has its button lit. **This is set to the off position in the factory default setting.**

ROUTING MAP Button	
3	CCITT J.17. Receiver manual override is disabled.
4	50/15 $\mu$ s. Receiver manual override is disabled.
5	Off. Receiver manual override is disabled.
6	Not Indicated. Receiver defaults to no emphasis with manual override enabled.

## 6.2 Sample Rate Selection

While in OUTPUT SETUP Mode, ROUTING MAP buttons 7 to 11 are used to select the sample rate bits on the output digital audio for the TDIF-1 and AES formats. These buttons alter the Sample Rate Indication bits in the output data stream, but they **do not affect the UFC-24's output sample rate**. The actual output sample rate is the same as the input sample rate. For instance, if the source format has a 44.1 kHz sample rate, the output sample rate will be 44.1 kHz even if the Sample Rate Indication bit is set to 48 kHz. **The format converter does not perform sample rate conversion.**

### TDIF-1 Sample Rate

When TDIF-1 is the destination format, the UFC-24's Sample Rate Indication bit must be properly set to either 44.1 kHz or 48 kHz. You must match the TDIF-1 Sample Rate Indication bit to the source format's sample rate. TDIF-1 format

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machines also require that the tape that is inserted is formatted at the same rate as set in the Sample Rate Indication bit.

If the sample rate of the source format is not 44.1 kHz or 48 kHz, you could select the closest Sample Rate Indication bit and record to the TDIF-1 format machine. However, the resulting playback on the TDIF-1 format machine would be altered in pitch.

ROUTING MAP button 7 sets the TDIF-1 Sample Rate Indication bit to 44.1 kHz, and ROUTING MAP button 8 sets the TDIF-1 Sample Rate Indication bit to 48 kHz. The currently selected sample rate has its button lit. **This is set to 48 kHz in the factory default setting.**

#### **AES/EBU Sample Rate**

When AES/EBU is the destination format, the UFC-24's Sample Rate Indication bit must be properly set to either 44.1 kHz, 48 kHz, or 'Not Indicated'. You must match the UFC-24's AES/EBU Sample Rate Indication bits to the sample rate of the source format.

ROUTING MAP button 9 sets the AES/EBU Sample Rate Indication bits to 44.1 kHz, ROUTING MAP button 10 sets the AES/EBU Sample Rate Indication bits to 48 kHz, and ROUTING MAP button 11 sets the AES/EBU Sample Rate Indication bits to sample rate 'Not Indicated'. The selected sample rate will have its LED lit. **This is set to 48 kHz in the factory default setting.**

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### **6.3 Multi-Format Converter Mode Selection**

While in OUTPUT SETUP Mode, ROUTING MAP buttons 12 and 13 are used to select the single-UFC-24 or multiple-UFC-24 mode. Stand-alone mode should always be used if you have only one format converter. If you are using two or more format converters in parallel, you should set all format converters to multi-UFC-24 mode. See Section 8 for detailed information on how to use multiple UFC-24s in parallel.

ROUTING MAP button 12 sets the format converter into stand-alone UFC-24 mode. ROUTING MAP button 13 sets the format converter into multi-UFC-24 mode. The currently selected mode has its button lit.

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### **6.4 Audio Mute Control**

While in OUTPUT SETUP Mode, ROUTING MAP button 14 is used to toggle the audio muting function on and off. All digital audio outputs are muted when ROUTING MAP button 14 is lit.

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### **6.5 Software Version**

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ROUTING MAP buttons 21 to 24 display the current software version in the format converter.

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## 7. MIDI SETUP MODE

MIDI, the Musical Instrument Digital Interface, is a hardware and software specification designed to allow the exchange of information between different devices such as musical instruments, sequencers, and computers. MIDI-compatible devices communicate with each other by sending MIDI messages over any of sixteen channels.

The UFC-24 recognizes two types of MIDI messages: patch change messages and system exclusive messages. Both types of messages can be received and transmitted by the UFC-24. The MIDI SETUP Mode allows you to change the UFC-24's MIDI channel, disable the reception and transmission of MIDI data, and initiate system exclusive dumps.

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### 7.1 Patch Change

Patch change messages are typically used to change a MIDI instrument's sound preset or "patch". Because the UFC-24 is not a sound producing device, patch change messages are used instead to select the format converter's INPUT FORMAT, EXT SYNC status, and ROUTING PRESET number.

#### **Sending a Patch Change**

Patch change messages are transmitted through the UFC-24's MIDI OUT whenever you change INPUT FORMAT, EXT SYNC status, or ROUTING PRESET number with the front panel buttons. The messages are transmitted on the MIDI channel that is set in the MIDI SETUP Mode.

#### **Receiving a Patch Change**

Patch change messages received on the MIDI IN connector will only be recognized if their MIDI channel matches the UFC-24's MIDI channel. A recognized patch change message will immediately update the UFC-24's INPUT FORMAT, EXT SYNC status, and ROUTING PRESET number.

#### **Patch Change Map**

The following table shows the relationship between Patch Change Number and INPUT FORMAT / EXT SYNC status / ROUTING PRESET number.



Table 7-1. Patch Change Map

Input Format	Routing Preset						
	<i>1:1</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>
<i>ADAT (Ext Sync off)</i>	00	01	02	03	04	05	06
<i>PD (Ext Sync off)</i>	10	11	12	13	14	15	16
<i>SDIF-2 (Ext Sync off)</i>	20	21	22	23	24	25	26
<i>TDIF-1 (Ext Sync off)</i>	30	31	32	33	34	35	36
<i>AES (Ext Sync off)</i>	40	41	42	43	44	45	46
<i>ADAT (Ext Sync on)</i>	50	51	52	53	54	55	56
<i>PD (Ext Sync on)</i>	60	61	62	63	64	65	66
<i>SDIF-2 (Ext Sync on)</i>	70	71	72	73	74	75	76
<i>TDIF-1 (Ext Sync on)</i>	80	81	82	83	84	85	86
<i>AES (Ext Sync on)</i>	90	91	92	93	94	95	96

*Patch Change Numbers are shaded.*

*All unused patch change numbers are ignored.*

## 7.2 System Exclusive

The format converter uses system exclusive messages to send information about the UFC-24's parameters and routing maps. You can use system exclusive messages for saving ROUTING MAPS, OUTPUT and MIDI parameters in a sequencer or MIDI equipped computer. If you have a multi-UFC-24 configuration, you can send parameter settings or ROUTING MAPs from one UFC-24 to another.

## 7.3 MIDI SETUP Mode

The MIDI SETUP Mode allows you to change the UFC-24's MIDI channel, disable the reception and transmission of MIDI data, and initiate system exclusive dumps.

**To enter MIDI SETUP MODE:**

*Press the MIDI button; the MIDI button will light to indicate that the UFC-24 is now in MIDI SETUP Mode.*

**To exit MIDI SETUP MODE:**

*Press the MIDI SETUP button again.*

While in MIDI SETUP Mode, the INPUT FORMAT and EXT SYNC buttons will still operate normally, but the ROUTING PRESET buttons will not be functional, and the ROUTING MAP buttons will take on a new functionality. The ROUTING MAP buttons are now used to alter the MIDI parameters and to start system exclusive dumps. Their new functions are printed on the first line below the ROUTING MAP buttons.

Table 7-2. MIDI SETUP Mode

ROUTING MAP Button		Description
1	MIDI Channel 1	Select MIDI Basic Channel
2	MIDI Channel 2	
3	MIDI Channel 3	
4	MIDI Channel 4	
5	MIDI Channel 5	
6	MIDI Channel 6	
7	MIDI Channel 7	
8	MIDI Channel 8	
9	MIDI Channel 9	
10	MIDI Channel 10	
11	MIDI Channel 11	
12	MIDI Channel 12	
13	MIDI Channel 13	
14	MIDI Channel 14	
15	MIDI Channel 15	
16	MIDI Channel 16	
17	Disable / Enable	Patch Change Transmit
18	Disable / Enable	Patch Change Receive
19	Disable / Enable	System Exclusive Receive
20		Not Used
21	Initiate SysEx Dump	Initiate System Exclusive Dump: Output and MIDI
22	Initiate Sysx Dump	Initiate System Exclusive Dump: One Routing Map
23	Initiate SysEx Dump	Initiate System Exclusive Dump: All Routing Maps
24	Initiate SysEx Dump	Initiate System Exclusive Dump: Bulk Dump

### MIDI Channel

Use ROUTING MAP buttons 1 to 16 to select the UFC-24's MIDI channel. The MIDI channel applies to both the reception and transmission of patch change and system exclusive messages.

### Patch Change Transmit Disable:

When ROUTING MAP button 17 is lit, patch change messages are not sent over MIDI OUT when you change the INPUT FORMAT, EXT SYNC, or ROUTING PRESET number.

### Patch Change Receive Disable

When ROUTING MAP button 18 is lit, all patch change messages that are received on the UFC-24's MIDI IN connector are ignored.

### System Exclusive Receive Disable

When ROUTING MAP button 19 is lit, all system exclusive messages that are received on the UFC-24's MIDI IN connector are ignored.

### Initiate System Exclusive Dump: Output Setup Parameters

To initiate a system exclusive dump of all OUTPUT SETUP parameters, press ROUTING MAP button 21.

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**Initiate System Exclusive Dump: One Routing Map**

To initiate a system exclusive dump of a single ROUTING MAP stored in a ROUTING PRESET, press ROUTING MAP button 22 and then press the desired ROUTING PRESET (1 to 6)

**Initiate System Exclusive Dump: All Routing Maps**

To initiate a system exclusive dump of all ROUTING MAPS, press ROUTING MAP button 23.

**Initiate System Exclusive Dump: Bulk Dump**

To initiate a system exclusive dump of the entire UFC-24 including all ROUTING MAPS and the MIDI SETUP, OUTPUT SETUP and HODDEN parameters, press ROUTING MAP button 24.

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## 8. MULTIPLE-UFC-24 SYSTEM

Two UFC-24s can work together in parallel for format conversion of 48 channels. The first format converter is designated as the "master" and the other units are designated as the "slave". To ensure that output data from all of the format converters is frame-aligned, the Multi-UFC-24 Configuration, explained in the first subsection, must be performed.

The master UFC-24 is assigned to I/O channels 1 to 24, while the slave UFC-24 is assigned to I/O channels 25 to 48. Note that the rerouting of channels cannot span across the master and slave format converters. For example, output channel 27 cannot be fed from input channel 21.

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### 8.1 Multi-UFC-24 Configuration

Whenever you are using multiple format converters, the following steps must be performed to ensure that the output data is frame-aligned across all UFC-24s.

1. On the master and all slave UFC-24s, select Multi-UFC-24 from the OUTPUT SETUP Mode. See Section 6.3.
2. Run a coaxial cable from the master format converter's EXT SYNC OUT connector to the SDIF-2 WC / EXT SYNC IN connector of the slave format converter.
3. On the SLAVE format converter, select EXT SYNC from the front panel. The status of the EXT SYNC on the master format converter depends on the source format selected.

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### 8.2 ADAT Optical as the Source Format

1. Complete the Multi-UFC-24 Configuration in Section 8.1.
2. Run an optical cable from the master ADAT format machine output to the ADAT IN A connector on the UFC-24. The outputs from the slave ADAT machines are connected, in sequence, to the remaining ADAT IN connectors on the master and slave UFC-24s.
3. Connect a coaxial cable from EXT SYNC OUT on the master ADAT format machine (or from the BRC if you are using Alesis ADAT machines) to the EXT SYNC IN connector on the master UFC-24.

- 
4. Select the ADAT Input Format button on both UFC-24s. The ADAT LEDs will light to indicate that the source format is ADAT optical.
  5. Select EXT SYNC on the slave UFC-24. Do not select EXT SYNC on the master UFC-24. On the slave UFC-24, the EXT SYNC button will light to indicate that it is synchronizing to the master format converter.

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### 8.3 ADAT as the Destination Format

1. Complete the Multi-UFC-24 Configuration in Section 8.1.
2. Connect ADAT OUT A on the master UFC to the input on the master ADAT format machine. In sequence, connect the remaining ADAT OUT connectors on the master and slave UFC's to the slave ADAT format machines.
3. Select DIGITAL IN on all ADAT's.

---

### 8.4 PD as the Source Format - Accessing all 32 Channels

Using two format converters, you can access all 32 channels from a single PD machine. The master UFC-24 will handle the first 16 channels and the slave UFC-24 will receive the next 16 channels. **This setup procedure is fairly complex, so please follow the instructions carefully.**

1. Complete the Multi-UFC-24 Configuration in Section 8.1
2. Run a 50-pin cable from the first 16 output channels of the PD machine to the PD IN A connector on the master UFC-24.
3. Run a second 50-pin cable from the second 16 output channels of the PD machine to the PD IN A connector on the slave UFC-24. (Channels 17 to 32 from the PD machine are assigned to channels 1 to 16 on the slave UFC-24)
4. Connect a coaxial cable from the EXT SYNC OUT on the UFC-24 to the EXT SYNC IN on the slave UFC-24.
5. On the master UFC-24:
  - Enter HIDDEN MODE (press OUTPUT SETUP, then press and hold ROUTING PRESET 1:1 and press OUTPUT SETUP again - see Section 10).
  - Enter HIDDEN PARAMETER PAGE 5 (press ROUTING PRESET 5 - see Section 10.6)
  - PDMUC (ROUTING MAP button button 7) must be off. If it is not off, then turn it off by pressing ROUTING MAP button 7.
  - Exit HIDDEN MODE by pressing OUTPUT SETUP.

- 
6. On the slave UFC-24:
    - Enter HIDDEN MODE (press OUTPUT SETUP, then press and hold ROUTING PRESET 1:1 and press OUTPUT SETUP again - see Section 10).
    - Enter HIDDEN PARAMETER PAGE 5 (press ROUTING PRESET 5 - see Section 10.6)
    - PDMUC (ROUTING MAP button button 7) must be on. If it is not on, then turn it on by pressing ROUTING MAP button 7.
    - Exit HIDDEN MODE by pressing OUTPUT SETUP.
  7. Select the PD input format button on the master UFC-24. The button will light to indicate that the source format is PD. Do not select EXT SYNC.  
  
Select the PD and EXT SYNC input format buttons on the slave UFC. These buttons will light to indicate that the source format is PD and that the slave UFC is synchronizing to the master UFC.

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## 8.5 PD as the Source Format - Multiple PD Machines

Using two format converters, you can access all 48 channels from two PD machines. The master UFC-24 will handle the first 24 channels on the master PD machine and the slave UFC-24 will receive the first 24 channels from the slave PD machine. **This setup procedure is fairly complex, so please follow the instructions carefully.**

1. Complete the Multi-UFC-24 Configuration in Section 8.1
2. Run a 50-pin cable from the first output connector of the master PD machine to the PD IN A connector on the master UFC-24.
3. Run another 50-pin cable from the second output connector on the master PD machine to PD IN B on the master UFC-24.
4. Run a third 50-pin cable from the first output connector of the slave PD machine to PD IN A on the slave UFC-24.
5. Run another 50-pin cable from the second output connector of the slave PD machine to PD IN B on the slave UFC-24.
6. Connect a coaxial cable from the EXT SYNC OUT on the master PD machine to the EXT SYNC IN on the master UFC-24.
7. Connect a coaxial cable from the EXT SYNC OUT on the master UFC-24 to the EXT SYNC IN on the slave UFC-24.
8. On the master UFC-24:
  - Enter HIDDEN MODE (press OUTPUT SETUP, then press and hold ROUTING PRESET 1:1 and press OUTPUT SETUP again - see Section 10).

- 
- Enter HIDDEN PARAMETER PAGE 5 (press ROUTING PRESET 5 - see Section 10.6)
  - PDMUC (ROUTING MAP button button 7) must be off. If it is not off, then turn it off by pressing ROUTING MAP button 7.
  - Exit HIDDEN MODE by pressing OUTPUT SETUP.
9. On the slave UFC-24:
- Enter HIDDEN MODE (press OUTPUT SETUP, then press and hold ROUTING PRESET 1:1 and press OUTPUT SETUP again - see Section 10).
  - Enter HIDDEN PARAMETER PAGE 5 (press ROUTING PRESET 5 - see Section 10.6)
  - PDMUC (ROUTING MAP button button 7) must be on. If it is not on, then turn it on by pressing ROUTING MAP button 7.
  - Exit HIDDEN MODE by pressing OUTPUT SETUP.
10. Select the PD and EXT SYNC input format buttons on both UFC's. These buttons will light to indicate that the source format is PD and that the master UFC is synchronizing to the master PD machine and the slave is synchronizing to the master UFC..

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## 8.6 PD as the Destination Format

1. Complete the Multi-UFC-24 Configuration in Section 8.1
2. Run a cable from PD OUT A of the master UFC to the first 16 input channels of the master PD machine. Run a cable from PD OUT B of the master UFC to the second 16 input channels of the master PD machine. (The UFC cannot access the upper 8 channels)
3. Connect a cable from PD OUT A of the slave UFC to the first 16 input channels of the slave PD machine. Connect a cable from PD OUT B of the slave UFC to the second 16 input channels of the slave PD machine. (The UFC cannot access the upper 8 channels)

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## 8.7 SDIF-2 as the Source Format

1. Complete the Multi-UFC-24 Configuration in Section 8.1
2. Run a cable from the first 24 output channels from the SDIF machine to the SDIF-2 IN connector on the master UFC-24. All additional outputs from the

- 
- SDIF machine are connected to the SDIF-2 IN connector on the slave UFC-24.
3. Connect a coaxial cable from the SDIF WC OUT on the master SDIF machine to the SDIF-2 WC IN on the master UFC. **However, do not select EXT SYNC on the master UFC's front panel.**
  4. Select the SDIF Input Format button on both UFC-24's. The SDIF LED's will light to indicate that the source format is SDIF-2.
  5. Select EXT SYNC on the slave UFC-24. **Do not select EXT SYNC on the master UFC-24.** On the slave UFC-24, the EXT SYNC button will light to indicate that it is synchronizing to the master format converter.

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## 8.8 SDIF-2 as the Destination Format

1. Complete the Multi-UFC-24 Configuration in Section 8.1.
2. Run a cable from the SDIF-2 OUT connector on the master UFC-24 to the first 24 input channels on the master SDIF machine. Connect the SDIF-2 OUT connector on the slave UFC-24 to the remaining input connector on the SDIF machine.
3. Connect a coaxial cable from the master UFC's SDIF-2 WC OUT to the SDIF WC IN on the master SDIF machine.
4. On both format converters, the SDIF emphasis should be set on or off as required. This parameter is accessed using the OUTPUT SETUP Mode. See Section 6.1 for more information.

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## 8.9 TDIF-1 as the Source Format

1. Complete the Multi-UFC-24 Configuration in Section 8.1.
2. Run a cable from the master TDIF machine's output to the TDIF I/O A connector on the master UFC-24. The outputs from the slave TDIF machines are connected, in sequence, to the remaining TDIF I/O connectors on the master and slave UFC-24's.
3. Select the TDIF Input Format button on both UFC-24's. The TDIF LED's will light to indicate that the source format is TDIF-1. **It is recommended that you do not use the TDIF machine's WS OUT and do not select EXT SYNC on the master UFC.**
4. Select EXT SYNC on the slave UFC-24. **Do not select EXT SYNC on the master UFC-24.** On the slave UFC-24, the EXT SYNC button will light to indicate that it is synchronizing to the master format converter.



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## 8.10 TDIF-1 as the Destination Format

1. Power down the TDIF machine.
2. Complete the Multi-UFC-24 Configuration in Section 8.1.
3. The TDIF I/O A on the master UFC must be connected to the master TDIF machine. In sequence, connect the remaining TDIF I/O connectors on the master and slave UFC's to the TDIF I/O connectors on the slave TDIF machines.
4. Run a coaxial cable from the master UFC's TDIF-1 WS OUT connector to the master TDIF machine's WS IN connector.
5. **Once the UFC-24 is synchronized to the selected source format and all connections are made to the TDIF machine, you can turn on the power to the TDIF machine.**
6. Select WORD from the CLOCK section on the master TDIF machine.
7. Select DIGITAL IN on all TDIF machines.
8. On both UFC's, the TDIF-1 sample rate indication bit must be set to match the sample rate of the source format. This parameter is accessed using the OUTPUT SETUP Mode. See Section 6.2 for more information.
9. On both UFC's, the TDIF-1 emphasis should be set on or off as required. This parameter is accessed using the OUTPUT SETUP Mode. See Section 6.1 for more information.

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## 8.11 AES as the Source Format

1. Complete the Multi-UFC-24 Configuration in Section 8.1.
2. Run an AES multi cable from the master AES machine's output to the AES input A connector on the master UFC-24. The outputs from the slave AES machines are connected, in sequence, to the remaining AES input connectors on the master and slave UFC-24's.
3. Select the AES Input Format button on both UFC-24's. The AES LED's will light to indicate that the source format is AES.
4. Select EXT SYNC on the slave UFC-24. **Do not select EXT SYNC on the master UFC-24.** On the slave UFC-24, the EXT SYNC button will light to indicate that it is synchronizing to the master format converter.

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## 8.12 AES as the Destination Format

1. Power down the AES machine.
2. Complete the Multi-UFC-24 Configuration in Section 8.1.
3. The AES output A on the master UFC must be connected to the master AES machine. In sequence, connect the remaining AES connectors on the master and slave UFC's to the AES input connectors on the slave AES machines.
4. **Once the UFC-24 is synchronized to the selected source format and all connections are made to the AES machine, you can turn on the power to the TDIF machine.**
5. Select DIGITAL IN on all AES machines.
6. On both UFC's, the AES sample rate indication bit must be set to match the sample rate of the source format. This parameter is accessed using the OUTPUT SETUP Mode. See Section 6.2 for more information.
7. On both UFC's, the AES emphasis should be set on or off as required. This parameter is accessed using the OUTPUT SETUP Mode. See Section 6.1 for more information.

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## 9. TROUBLESHOOTING

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### 9.1 LED Indications

- **Input Format blinking** (and EXT SYNC blinking) = UFC-24 is not synchronizing to the selected input format
- **MIDI blinking** = MIDI reception was aborted by the user, or there was a checksum error while receiving MIDI system exclusive
- **OUTPUT and ROUTING PRESET blinking** = currently in hidden parameter mode on the page shown by Routing Preset

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### 9.2 No Digital Audio Received at Destination Machine

- **Ensure that the format converter is synchronizing to the selected input format.** If the INPUT FORMAT buttons are blinking, then the UFC-24 is not synchronized to the selected format, and when the UFC-24 is not synchronized all of its outputs are automatically muted.
- **The Audio Mute must be off.** Enter OUTPUT SETUP mode and make sure that the Audio Mute button (ROUTING MAP 14) is not lit. See Section 6.4.
- **Use the UFC's test word** to check that the destination is correctly configured to receive digital audio from the format converter. See Section 10.6 for details on how to perform this.

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### 9.3 The UFC-24 is not Synchronizing to the Input Format

- **Ensure that the format converter is selected to the correct input format.** If the Format Converter does not receive the proper information or does not receive the information on the proper cable, the unit will react the same as having no cable connected.
- **Always use proper cable formats and lengths.** Improper cable lengths with properly wired cables will cause errors and the Format converter may not synchronize.

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## 9.4 The Output Audio has Clicks or Distortion at the Destination Machine

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- **If you are using only one format converter, ensure that the format converter is set to Stand-alone mode.** To set the UFC-24 to Stand-alone mode, enter OUTPUT SETUP Mode, and press ROUTING MAP 12. (If you are using more than one UFC, however, the format converter should be in Multi-UFC mode).
- **Try reversing the FR bit for the INPUT FORMAT and EXT SYNC mode that is selected.** See Section 10.5 for information on how to perform this.
- **If ADAT is the Source Format,** try adjusting the ADAT Input Data Delay, Input Clock Delay and Input Pulse Width under HIDDEN PARAMETER Page 1 and 2. See Sections 10.2 and 10.3 for details on how to perform this.
- n **If ADAT is the Destination Format,** try adjusting the ADAT Output Pulse Width under HIDDEN PARAMETER Page 3. See Section 10.4 for details on how to perform this.
- n **If an AES device is the Source Format,** try running a coaxial cable from the WORD CLOCK output to the format converters External Sync In.
- n **If an AES device is the Destination Format,** try running a coaxial cable from the Format Converter's Ext Sync Out to the AES device WORD CLOCK INPUT.

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## 9.5 Not Responding to MIDI Patch Change Messages

- **Patch Change Receive Disable must be off.** To check that the Patch Change Receive Disable to off, enter MIDI SETUP Mode and ensure that ROUTING MAP button 18 is off.
- **The UFC's MIDI channel must match the channel of the Patch Change message.** Use the MIDI SETUP Mode to change the UFC-24's MIDI channel if needed.
- **Some patch change numbers are ignored by the UFC-24.** Check that the patch change number is in the UFC-24's patch change map.

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## 9.6 Not Responding to MIDI System Exclusive Messages

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- **System Exclusive Receive Disable must be off.** To turn the System Exclusive Disable to off, enter MIDI SETUP Mode and ensure that ROUTING MAP button 19 is off.
  - **The UFC's MIDI channel must match the channel of the System Exclusive message.** Use the MIDI SETUP Mode to change the UFC-24's MIDI channel if needed.

## 10. HIDDEN PARAMETER MODE

### CAUTION!!! CAUTION!!! CAUTION!!! CAUTION!!!

**HIDDEN PARAMETER mode provides access to parameters that rarely need to be altered. All HIDDEN PARAMETERS have been optimized at iZ and should not be altered unless there are audio problems. See Section 9 - Troubleshooting before making any changes to these Hidden Pages.**

#### To enter HIDDEN PARAMETER MODE:

1. First, enter *OUTPUT SETUP Mode* by pressing the *OUTPUT* button; the *OUTPUT* button will light to indicate that the UFC-24 is now in *OUTPUT SETUP Mode*.
2. Enter *HIDDEN PARAMETER Mode* by pressing and holding the *ROUTING PRESET 1:1* button, and then pressing the *OUTPUT* button again. Release both buttons. The *OUTPUT* and *1:1* buttons will both blink to indicate that the UFC-24 is now in *HIDDEN PARAMETER Mode*.

#### To exit HIDDEN PARAMETER MODE:

Press the *OUTPUT SETUP* button.

#### To reset all HIDDEN PARAMETERS to Factory Defaults:

1. Power down the UFC-24.
2. With the power off, press and hold the *ADAT* and *ROUTING PRESET 1* buttons.
3. While continuing to hold the buttons, power on the UFC-24. The *Hidden*, *OUTPUT*, and *MIDI* Parameters will all be returned to their factory default settings.

While in *HIDDEN PARAMETER Mode*, the *INPUT FORMAT* and *EXT SYNC* buttons will still operate normally, but the *ROUTING PRESET* buttons and the *ROUTING MAP* buttons both take on a new functionality. The *ROUTING MAP* buttons are now used to alter the parameters and to display information. The new functions assigned to the *ROUTING MAP* buttons depends on which *Parameter Page* you are on. The *Parameter Page* is selected by using the *ROUTING PRESET* buttons 1:1 and 1 to 5.

- **Hidden Page 1:1** - software and hardware version number display

- **Hidden Page 1** - optimizes the input audio when ADAT is the source
- **Hidden Page 2** - optimizes the input audio when ADAT is the source
- **Hidden Page 3** - optimizes the output audio when ADAT is the destination
- **Hidden Page 4** - optimizes the audio when in Multi-UFC mode
- **Hidden Page 5** - data test word, PD wordclock options, AES/EBU enable, miscellaneous control adjustments

### 10.1 Hidden Page 1:1 Version Display

The Version Display page displays the software version number, and the version numbers for two hardware components. It also displays the most recently received ADAT Optical User data which is embedded in the ADAT format data stream.

Table 10-1. Hidden Page 1:1 Version Display

ROUTING MAP Button	Description
1 Software 2 Version 3 Read 4 Only	Display Software Version
5 FPGA2 6 Version 7 Read 8 Only	Display FPGA2 Version
9 FPGA1 10 Version 11 Read 12 Only	Display FPGA1 Version
13 ADAT User 14 Input Data 15 Read 16 Only	Display ADAT User Input Data
17 18 19 20 21 22 23 24	Not Used

**To enter HIDDEN PAGE 1:1:**

*Enter HIDDEN PARAMETER Mode and then press the ROUTING PRESET 1:1 button.*

## 10.2 Hidden Page 1 ADAT optical format Input Data and Clock Delay

HIDDEN PARAMETER Page 1 allows you to alter the ADAT format Input Data and ADAT format Input Clock Delay parameters, which both affect the input audio when an ADAT format machine is the source format. These two registers are adjusted to calibrate the UFC-24 to sample in the dead center of each data bit in the ADAT data stream.

Table 10-2. Hidden Page 1 ADAT Input Data and Clock Delay

ROUTING MAP Button	Description
1 No Delay 2 Delay by 1 3 Delay by 2 4 Delay by 3 5 Delay by 4 6 Delay by 5 7 Delay by 6 8 Delay by 7	ADAT Input Data Delay
9 10 11 12 13 14 15 16	Not Used
17 No Delay 18 Delay by 1 19 Delay by 2 20 Delay by 3 21 Delay by 4 22 Delay by 5 23 Delay by 6 24 Delay by 7	ADAT Input Clock Delay

1. **These parameters have been optimized at iZ and should only be altered if there are audio problems (such as clicks) when ADAT is the source format. Read Troubleshooting before making any changes to this page.**
2. If you are using only one UFC-24, ensure that the UFC-24 is in stand alone mode. See Section 6.3.
3. If you are using a Multi-UFC setup, then you should first try adjusting the ADAT FR Control Register on Hidden Page 4.
4. If there are still clicks in the output audio when ADAT is the source format, you may need to adjust the parameters on Hidden Page 1 and Hidden Page 2. Use the values for these two parameters that produce the best audio, then do the same for Hidden Page 2.

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**To enter HIDDEN PAGE 1: Enter HIDDEN PARAMETER Mode and then press the ROUTING PRESET 1 button.**

### 10.3 Hidden Page 2 ADAT Input Pulse Width Adjustment

HIDDEN PARAMETER Page 2 allows you to alter the ADAT Input Pulse Width parameter, which affects the input audio when ADAT is the source format. With this register, you can extend either the low or high pulse widths of the raw ADAT input data bits. This register is adjusted in order to compensate for rise-time errors that may be introduced by the optical receivers.

Table 10-3. Hidden Page 2 ADAT Input Pulse Width Adjustment

ROUTING MAP Button	Description
1 Extend low pulse by 10	ADAT Input Pulse Width Adjustment
2 Extend low pulse by 9	
3 Extend low pulse by 8	
4 Extend low pulse by 7	
5 Extend low pulse by 6	
6 Extend low pulse by 5	
7 Extend low pulse by 4	
8 Extend low pulse by 3	
9 Extend low pulse by 2	
10 Extend low pulse by 1	
11 No Change	
12 Extend high pulse by 1	
13 Extend high pulse by 2	
14 Extend high pulse by 3	
15 Extend high pulse by 4	
16 Extend high pulse by 5	
17 Extend high pulse by 6	
18 Extend high pulse by 7	
19 Extend high pulse by 8	
20 Extend high pulse by 9	
21 Extend high pulse by 10	
22	Not Used
23	
24	

- This parameter has been optimized at iZ and should only be altered if there are audio problems (such as clicks) when ADAT is the source format. Read Troubleshooting before making any changes to this Hidden Page.**
- If you are using only one UFC-24, ensure that the UFC-24 is in stand alone mode. See Section 6.3.
- If you are using a Multi-UFC setup, then you should first try adjusting the ADAT FR Control Register on Hidden Page 4.
- If there are still clicks in the output audio when ADAT is the source format, you may need to adjust the parameters on HIDDEN PAGE 1 and HIDDEN PAGE 2. On HIDDEN PAGE 1, use the values for the two parameters that produce the best audio, then do the same for HIDDEN PAGE 2.

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**To enter HIDDEN PAGE 2:**

*Enter HIDDEN PARAMETER Mode and then press the ROUTING PRESET 2 button.*

### 10.4 Hidden Page 3 ADAT Output Pulse Width Adjustment

HIDDEN PARAMETER Page 3 allows you to alter the ADAT Output Pulse Width parameter, which affects the output audio when ADAT is the destination format. With this register, you can extend either the low or high pulse widths of the raw ADAT output data bits before they are sent to the optical transmitters. This register is adjusted in order to compensate for rise-time errors that may be introduced by the optical transmitters.

Table 10-4. Hidden Page 3 ADAT Output Pulse Width Adjustment

ROUTING MAP Button	Description
1 Extend low pulse by 10	ADAT Output Pulse Width Adjustment
2 Extend low pulse by 9	
3 Extend low pulse by 8	
4 Extend low pulse by 7	
5 Extend low pulse by 6	
6 Extend low pulse by 5	
7 Extend low pulse by 4	
8 Extend low pulse by 3	
9 Extend low pulse by 2	
10 Extend low pulse by 1	
11 No Change	
12 Extend high pulse by 1	
13 Extend high pulse by 2	
14 Extend high pulse by 3	
15 Extend high pulse by 4	
16 Extend high pulse by 5	
17 Extend high pulse by 6	
18 Extend high pulse by 7	
19 Extend high pulse by 8	
20 Extend high pulse by 9	
21 Extend high pulse by 10	
22	Not Used
23	
24	

1. **This parameter has been optimized at iZ and should only be altered if there are audio problems (such as clicks) when ADAT is the destination format. Read Troubleshooting before making any changes to this Hidden Page.**
2. If you are using only one UFC-24, ensure that the UFC-24 is stand alone mode. See Section 6.3.
3. If there are still clicks in the output audio when ADAT is the destination format, you may need to adjust the ADAT Output Pulse Width parameter (in HIDDEN PAGE 3). Use the value for this parameter that produces the best audio results.

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**To enter HIDDEN PAGE 3:**

*Enter HIDDEN PARAMETER Mode and then press the ROUTING PRESET 3 button.*

### 10.5 Hidden Page 4 FR Control Register Adjustment

HIDDEN PARAMETER Page 4 allows you to alter the FR Control Register parameters, which affect the output audio only when there is a multiple format converter setup. This register controls whether the Word Clock Out generator uses the falling or rising edge of the bit clock when sampling for the frame start of the input format's word clock.

Table 10-5. Hidden Page 4 FR Control Register

ROUTING MAP Button	Description
1 ADAT (with Ext Sync off)	FR Control Register
2 ADAT (with Ext Sync on)	
3 PD (with Ext Sync off)	
4 PD (with Ext Sync on)	
5 SDIF-2 (with Ext Sync off)	
6 SDIF-2 (with Ext Sync on)	
7 TDIF-1 (with Ext Sync off)	
8 TDIF-1 (with Ext Sync on)	
9 AES (with Ext Sync off)	
10 AES (with Ext Sync on)	
11	Not Used
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	

1. **These parameters have been optimized at iZ and should only be altered if there are audio problems (such as clicks) when the format converter is in Multi-UFC-24 mode. Read Troubleshooting before making any changes to this Hidden Page.**
2. If you are using only one UFC-24, ensure that the UFC-24 is Stand-alone mode. See Section 6. If you are in Stand-alone mode, the parameters on Hidden Page 4 have no effect on the output audio.
3. If you are using more than one UFC-24, you should be in Multi-UFC mode. If there are clicks in the output audio, you can try toggling the FR Control Register (in HIDDEN PAGE 4) for your selected Input Format and EXT SYNC status.

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**To enter HIDDEN PAGE 4:** Enter *HIDDEN PARAMETER Mode* and then press the *ROUTING PRESET 4* button.

## 10.6 Hidden Page 5 Miscellaneous Control Adjustment

HIDDEN PARAMETER Page 5 allows you to adjust several miscellaneous control registers.

Table 10-6. Hidden Page 5 Miscellaneous Control Adjustment

ROUTING MAP Button	Description
1 Bit 3 2 Bit 2 3 Bit 1 4 Bit 0	Test Word Data
5 On/Off	Enable Test Word Output
6 1 / 0	PD Standalone
7 1 / 0	PD Multi-UFC
8 On/Off	Hardware Watchdog
9 Bit 3 10 Bit 2 11 Bit 1 12 Bit 0	ADAT User Bits
13 Bit 1 14 Bit 0	ADAT Frame Start Logic Level Control
15 On/Off	Enable AES/EBU Option
16 17 18 19 20 21 22 23 24	Not Used

### Test Word Data

ROUTING MAP buttons 1 to 5 are used to define the Test Word Data and enable the Test Word Data to be outputted. You can use the Data Test Word as a diagnostics tool to determine if the destination machine is connected properly to the format converter.

1. To enable the Test Word Output, ROUTING MAP 5 should be lit. When the Test Word Output is enabled, all of the UFC-24's outputs will contain the Test Word Data instead of the converted input audio.
2. If all of the connections are set up properly, you can alter the Test Word Data with ROUTING MAP buttons 1 to 4 and see that the destination's input meters vary in response. No sound will be audible from the destination machine because the data being fed to it is constant.

### AES/EBU Enable

ROUTING MAP button 15 is used to enable or disable the optional AES/EBU conversion board. When ROUTING MAP 15 is lit, then the optional AES/EBU conversion board can be used.

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**PD Wordclock Options**

ROUTING MAP buttons 6 should be off and ROUTING MAP 7 should be on.

**Hardware Watchdog**

ROUTING MAP button 8 toggles the Hardware Watchdog on and off. When ROUTING MAP 8 is lit, the Hardware Watchdog is enabled. The Hardware Watchdog should always be on.

**ADAT User Bits**

ROUTING MAP buttons 9 to 12 are used to define the user bits in the ADAT output data stream. This setting should not be altered unless recommended by iZ .

**ADAT Frame Start Logic Level Control**

ROUTING MAP buttons 13 and 14 control the frame start logic levels in the ADAT output data stream. This setting should not be altered unless recommended by iZ .

**To enter HIDDEN PAGE 5:**

*Enter HIDDEN PARAMETER Mode and then press the ROUTING  
PRESET 5 button.*

# 11. RESETTING THE UFC-24

There are several power-up options on the format converter that will allow you to reset parameters to their factory default values or restore all routing maps to 1:1. Table 11-1 describes what parameters will be reset if you hold particular buttons while powering up the format converter.

Table 11-1. Power-on Resets

To Reset:	Power-up while holding:
All Routing Presets to 1:1 Routing Map	Routing Preset 1:1 Button
Output Setup Parameters (under Output Setup button) to factory defaults	Output Setup Button
All Parameters (Hidden, Output Setup, & MIDI Setup parameters) to factory defaults	ADAT & Routing Preset 1 Buttons
All of the above (all parameters and all Routing Presets)	ADAT & Rtg Preset 1, and Rtg Preset 1:1 Buttons

Table 11-2 to Table 11-7 describe the factory default values for all UFC-24 parameters.

Table 11-2. Output Setup Factory Defaults

Description	Factory Default
SDIF-2 Emphasis	Off
TDIF-1 Emphasis	Off
AES Emphasis	Not Indicated
TDIF-1 Sample Rate	48 kHz
AES Sample Rate	48 kHz
Multi-Format Converter Mode	Stand-alone
Audio Mute	Off

Table 11-3. Hidden Page 1 Factory Defaults

Description	Factory Default
ADAT Input Data Delay	No delay
ADAT Input Clock Delay	No delay

Table 11-4. Hidden Page 2 Factory Defaults

Description	Factory Default
ADAT Input Pulse Width Adjustment	Extend high pulse by 2



Table: Hidden Page 3 Factory Defaults

Description	Factory Default
ADAT Output Pulse Width Adjustment	Extend high pulse by 5

Table 11-5. Hidden Page 4 Factory Defaults

Description	Factory Default
FR Control: ADAT (Ext Sync off)	On
FR Control: ADAT (Ext Sync on)	Off
FR Control: PD (Ext Sync off)	On
FR Control: PD (Ext Sync on)	Off
FR Control: SDIF-2 (Ext Sync off)	Off
FR Control: SDIF-2 (Ext Sync on)	Off
FR Control: TDIF-1 (Ext Sync off)	Off
FR Control: TDIF-1 (Ext Sync on)	Off

Table 11-6. Hidden Page 5 Factory Defaults

Description	Factory Default
Test Word Data	0000
Enable Test Word Output	Off
PD Standalone	Off
PD Multi-UFC-24	On
Hardware Watchdog	On
ADAT User Bits	0001
ADAT Frame Start Logic	00
Enable AES/EBU Option	Off

Table 11-7. MIDI Setup Factory Defaults

Description	Factory Default
MIDI Channel	1
Patch Change Transmit	Enable
Patch Change Receive	Enable
System Exclusive Receive	Enable

# 12. MIDI SYSTEM EXCLUSIVE

## MIDI System Exclusive Overview

The iZ UFC-24-24's MIDI system exclusive format is structured as follows:

Byte	Hex	Length in Bytes	Description
1	F0	1	System Exclusive Start
2	?	1	Manufacturer id
3	?	1	MIDI Channel
4	?	1	Device id
5	xx	1	Message #1 Type
6	xx	variable	Message #1 Data
	xx	1	Message #2 Type
	xx	variable	Message #2 Data
:	:	:	:
last	F7	1	System Exclusive End

1. The System Exclusive start byte, F0H, always signifies the first byte of a system exclusive block. All bytes between the System Exclusive start byte and the System Exclusive end byte should have a 0 in their most significant bit position (i.e. 0xxx xxxx binary).
2. The second byte identifies the device manufacturer that the system exclusive block is intended for. The manufacturer id for iZ is xxH.
3. The third byte identifies the MIDI channel for the device.
4. The fourth byte identifies the device that the system exclusive block is intended for. The device id for the iZ Universal Format Converter is xxH.
5. A single Message Type byte and 0 or more Message Data bytes (number of Message Data Bytes depends on the Message Type) make up a single message. A system exclusive block can contain any number of messages. Every UFC-24 parameter is accessible using these messages.
6. The System Exclusive end byte, F7H, signifies the last byte of a system exclusive block.

### Message Type Summary

There are four categories of message type bytes: hidden parameter, output setup parameter, routing map, and miscellaneous.

1. There are twelve different Message Type bytes in the hidden parameter category. These message types can access all parameters found in the hidden parameter pages, as well as all parameters found in the MIDI SETUP mode.
2. There are two different Message Type bytes in the output setup category. These message types can access all parameters found in the OUTPUT SETUP mode.
3. There are seven different Message Type bytes in the routing map category. These message types can access the user programmable ROUTING PRESETs 1 to 6. The other message type in this category is a zero pad.
4. There is one Message Type byte in the miscellaneous category. This message type is a checksum.

The following four tables summarize all of the Message Types available, as well as how many Message Data bytes are required for each Message Type. Where there is an 'n' in bit position 4 of the Message Type byte, the 'n' bit is considered to be an extra Message Data bit.

### A) Hidden Parameters

Msg Type (Binary)	# of Msg Data Bytes	Description
0010 0000	1	UFC-24 MIDI Channel
0010 0001	1	ADAT In Data Delay
0010 0010	1	ADAT In Extend Pulse Width
001n 0011	1	ADAT Out Extend PW / Out Data Stream
0010 0100	1	ADAT User Bits
0010 0101	1	ADAT Input Clock Delay
001n 0110	1	Data Test Word
0010 0111	1	Tst Wrđ / Enbl AES/PDSAC/PDMUC
001n 1000	1	Output Synchronization 1
0010 1001	1	Output Synchronization 2
0010 1010	1	Hardware Watchdog
001n 1100	1	MIDI Transmit and Receive Disables

### B) OUTPUT SETUP Parameters

Msg Type (Binary)	# of Msg Data Bytes	Description
010m 0000	1	Emphasis / Standalone, Multi / Mute
010m 0001	1	Sample Rates

**C) Routing Map**

Msg Type (Binary)	# of Msg Data Bytes	Description
0000 0000	0	zero padding
0000 0001	24	routing map for preset 1
0000 0010	24	routing map for preset 2
0000 0011	24	routing map for preset 3
0000 0100	24	routing map for preset 4
0000 0101	24	routing map for preset 5
0000 0110	24	routing map for preset 6

**D) Miscellaneous**

Msg Type (Binary)	# of Msg Data Bytes	Description
0111 1111	1	checksum

**A) Hidden Parameter Messages**

Each of the Message Types in the hidden parameter category has only one Message Data byte. The following tables describe the Message Data byte for every Message Type in the hidden parameter category.

**1. UFC-24 MIDI Channel**

Byte	Binary	Description
1	0010 0000	Message Type: UFC-24 MIDI Channel
2	0000 aaaa	Message Data: Byte 1
	aaaa	0-15: UFC-24's MIDI channel 1-16

**2. ADAT Input Data Delay**

Byte	Binary	Description
1	0010 0001	Message Type: ADAT Input Data Delay
2	0000 0aaa	Message Data: Byte 1
	aaa	000 No ADAT Input Data Delay
		001 Delay by 1
		010 Delay by 2

		011 Delay by 3
		100 Delay by 4
		101 Delay by 5
		110 Delay by 6
		111 Delay by 7

**3. ADAT Input Extend Pulse Width**

Byte	Binary	Description
1	0010 0010	Message Type: ADAT In Extend Pulse Width
2	00aa aaaa	Message Data: Byte 1
	aa aaaa	00 0000 No change in ADAT In Pulse Width
		10 0000 Extend low pulse by 1
		10 0100 Extend low pulse by 2
		10 1000 Extend low pulse by 3
		10 1001 Extend low pulse by 4
		10 1010 Extend low pulse by 5
		10 1011 Extend low pulse by 6
		10 1100 Extend low pulse by 7
		10 1101 Extend low pulse by 8
		10 1110 Extend low pulse by 9
		10 1111 Extend low pulse by 10
		11 0000 Extend high pulse by 1
		11 0100 Extend high pulse by 2
		11 1000 Extend high pulse by 3
		11 1001 Extend high pulse by 4
		11 1010 Extend high pulse by 5
		11 1011 Extend high pulse by 6
		11 1100 Extend high pulse by 7
		11 1101 Extend high pulse by 8
		11 1110 Extend high pulse by 9
		11 1111 Extend high pulse by 10

**4. ADAT Output Extend Pulse Width/Output Data Stream**

Byte	Binary	Description
1	001a 0011	Message Type: ADAT Output Extend PW / ADAT Output Data Stream
2	0bcc cccc	Message Data: Byte 1
	ab	00 ADAT output data stream is not altered
		01 ADAT output data stream is not altered
		10 Lowest-order bit of 8th channel is toggled
		11 Lowest-order bit of 8th chnl is held high
	cc cccc	00 0000 No change in Pulse Width
		10 0000 Extend low pulse by 1
		10 0100 Extend low pulse by 2
		10 1000 Extend low pulse by 3
		10 1001 Extend low pulse by 4
		10 1010 Extend low pulse by 5

- 10 1011 Extend low pulse by 6
- 10 1100 Extend low pulse by 7
- 10 1101 Extend low pulse by 8
- 10 1110 Extend low pulse by 9
- 10 1111 Extend low pulse by 10
- 11 0000 Extend high pulse by 1
- 11 0100 Extend high pulse by 2
- 11 1000 Extend high pulse by 3
- 11 1001 Extend high pulse by 4
- 11 1010 Extend high pulse by 5
- 11 1011 Extend high pulse by 6
- 11 1100 Extend high pulse by 7
- 11 1101 Extend high pulse by 8
- 11 1110 Extend high pulse by 9
- 11 1111 Extend high pulse by 10

**5. ADAT User Bits**

Byte	Binary	Description
1	0010 0100	Message Type: ADAT User Bits
2	0000 aaaa	Message Data: Byte 1
	aaaa	0-15: User nybble in ADAT output

**6. ADAT Input Clock Delay**

Byte	Binary	Description
1	0010 0101	Message Type: ADAT Input Clock Delay
2	0000 0aaa	Message Data: Byte 1
	aaa	000 No ADAT Input Clock Delay
		001 Delay by 1
		010 Delay by 2
		011 Delay by 3
		100 Delay by 4
		101 Delay by 5
		110 Delay by 6
		111 Delay by 7

**7. Data Test Word**

Byte	Binary	Description
1	001a 0110	Message Type: Data Test Word
2	bbb0 0000	Message Data: Byte 1
	abbb	0-15: Data Test Word

**8. Use Test Word/Enable AES/PDSAC/PDMUC**

Byte	Binary	Description
1	0010 0111	Message Type: Tst wrd/AES/PDSAC,MUC
2	0000 abcd	Message Data: Byte 1

- a 0: PDMUC=0 (use WCLK on 50-pin when in multi-UFC-24 mode)
- 1: PDMUC=1 (use WCLK on EXT SYNC when in multi-UFC-24 mode)
- b 0: PDSAC=0 (use WCLK on 50-pin when in stand alone mode)
- 1: PDSAC=1 (use WCLK on EXT SYNC when in stand alone mode)
- c 0: Disable AES Option Board
- 1: Enable AES Option Board
- d 0: Do not use data test word
- 1: Use data test word

**9. Output Synchronization 1**

Byte	Binary	Description
1	001a 1000	Message Type: Output Synchronization 1
2	0bcd efgH	Message Data: Byte 1
	a	TDIF-1 Ext Sync On
	b	TDIF-1 Ext Sync Off
	c	SDIF-2 Ext Sync On
	d	SDIF-2 Ext Sync Off
	e	PD Ext Sync On
	f	PD Ext Sync Off
	g	ADAT Ext Sync On
	h	ADAT Ext Sync Off

**10. Output Synchronization 2**

Byte	Binary	Description
1	0010 1001	Message Type: Output Synchronization 2
2	0000 00ab	Message Data: Byte 1
	a	AES Ext Sync On
	b	AES Ext Sync Off

**11. Hardware Watchdog**

Byte	Binary	Description
1	0010 1010	Message Type: Hardware Watchdog
2	0000 000a	Message Data: Byte 1
	a	0 Hardware Watchdog On
		1 Hardware Watchdog Off

**12. MIDI Receive and Transmit Disables**

Byte	Binary	Description
1	001a 1011	Message Type: MIDI Rx and Tx Disables
2	0b00 c000	Message Data: Byte 1
	a	0 Patch Change Transmit Enable 1 Patch Change Transmit Disable
	b	0 Patch Change Receive Enable 1 Patch Change Receive Disable
	c	0 System Exclusive Receive Enable 1 System Exclusive Receive Disable

**B) OUTPUT SETUP Parameter Messages**

Both of the Message Types in the OUTPUT SETUP Parameter category have only one Message Data byte. The following tables describe the Message Data bytes for the two Message Types in the OUTPUT SETUP Parameter category.

**13. Emphasis / Standalone, Multi-UFC-24 / Audio Mute**

Byte	Binary	Description
1	010a 0000	Message Type: Emph / Standalone / Mute
2	0bcd 00e0	Message Data: Byte 1
	a	0 TDIF-1 Emphasis Off 1 TDIF-1 Emphasis On
	bc	00 AES Emphasis CCITT J.17. Receiver manual override disabled. 01 AES Emphasis 50/15 uS Receiver manual override disabled. 10 AES Emphasis None. Receiver manual override disabled. 11 AES Emphasis Not Indicated. Receiver manual override enabled.
	d	0 SDIF-2 Emphasis Off 1 SDIF-2 Emphasis On
	e	0 Audio Mute On 1 Audio Mute Off

**14. AES and TDIF-1 Sample Rate Output Indication Bit**

Byte	Binary	Description
1	010a 0000	Message Type: Emph / Standalone / Mute

2	0bc0 0000	Message Data: Byte 1
	ab	01 AES Sample Rate Output 44.1kHz 10 AES Sample Rate Output 48 kHz 11 AES Sample Rate Output Not Indicated
	c	0 TDIF-1 Sample Rate Output 48 kHz 1 TDIF-1 Sample Rate Output 44.1 kHz

**C) Routing Map Message**

There are six different Routing Map message types, each one corresponding to one of the user programmable routing presets. A Routing Map message consists of 25 bytes. The first byte (Message Type byte) identifies the routing preset that the Message Data corresponds to. The 24 Message Data bytes describe the actual Routing Map.

**15. Routing Map**

Byte	Binary	Description
1	0000 0aaa	Message Type: Routing Map
2	000b bbbb	Message Data: Input Ch for Output Ch 1
3	000b bbbb	Message Data: Input Ch for Output Ch 2
4	000b bbbb	Message Data: Input Ch for Output Ch 3
5	000b bbbb	Message Data: Input Ch for Output Ch 4
6	000b bbbb	Message Data: Input Ch for Output Ch 5
7	000b bbbb	Message Data: Input Ch for Output Ch 6
8	000b bbbb	Message Data: Input Ch for Output Ch 7
9	000b bbbb	Message Data: Input Ch for Output Ch 8
10	000b bbbb	Message Data: Input Ch for Output Ch 9
11	000b bbbb	Message Data: Input Ch for Output Ch 10
12	000b bbbb	Message Data: Input Ch for Output Ch 11
13	000b bbbb	Message Data: Input Ch for Output Ch 12
14	000b bbbb	Message Data: Input Ch for Output Ch 13
15	000b bbbb	Message Data: Input Ch for Output Ch 14
16	000b bbbb	Message Data: Input Ch for Output Ch 15
17	000b bbbb	Message Data: Input Ch for Output Ch 16
18	000b bbbb	Message Data: Input Ch for Output Ch 17
19	000b bbbb	Message Data: Input Ch for Output Ch 18
20	000b bbbb	Message Data: Input Ch for Output Ch 19
21	000b bbbb	Message Data: Input Ch for Output Ch 20
22	000b bbbb	Message Data: Input Ch for Output Ch 21

23	000b bbbb	Message Data: Input Ch for Output Ch 22
24	000b bbbb	Message Data: Input Ch for Output Ch 23
25	000b bbbb	Message Data: Input Ch for Output Ch 24
	aaa	001 Routing Map for Routing Preset 1 010 Routing Map for Routing Preset 2 011 Routing Map for Routing Preset 3 100 Routing Map for Routing Preset 4 101 Routing Map for Routing Preset 5 110 Routing Map for Routing Preset 6
	b bbbb	0-23 Input Channel that feeds the Output Channel

checksum calculation. When a Checksum Message is received, the checksum register should be reset to zero again.

A single System Exclusive block can have any number of Checksum Messages. A Checksum Message should always be included after each Routing Map Message and also as the last message before the System Exclusive End byte.

**17. Checksum**

Byte	Binary	Description
1	0111 1111	Message Type: Checksum Type
2	0aaa aaaa aaa aaaa	Message Data: Checksum register Checksum register

The Zero Padding Message Type is also included in the Routing Map category because it must be included when transmitting a Routing Map message.

**16. Zero Padding**

Byte	Binary	Description
1	0000 0000	Message Type: Zero Padding

To be complete, a Routing Map message should also include a Checksum Message (described later), and it **MUST** include at least 450 bytes of zero padding. A complete Routing Map Message is structured as follows:

- a) **Routing Map Message: 25 bytes**
- b) **Checksum Message: 2 bytes (optional)**
- c) **Zero padding: 450 bytes**

**D) Miscellaneous Message**

There is one Message Type in the Miscellaneous Message category. The Checksum Message can be used anywhere in the Message section of the System Exclusive block. The checksum register is reset to zero at the start of every System Exclusive block, and every message byte is added to it, starting with the first Message Type byte.

When a Checksum message is received, the internal checksum register is compared to the received checksum and if there is a discrepancy, then all of the received message data is considered erroneous. If they match, then the data is considered to be correct. The Checksum Message itself is never included in the

# 13. SPECIFICATIONS

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<b>Digital Audio Formats</b>	ADAT PD SDIF-2-2 (DASH) TDIF-1-1
<b>Sampling Rates</b>	Variable from 32 - 54 kHz ??? to be confirmed experimentally in production units!!!
<b>Inputs and Outputs</b>	3 pairs of optical transceivers for ADAT Input/Output  two-50-pin male D-sub for PD Input two 50-pin female D-sub for PD Output  one 50-pin male D-sub for SDIF-2-2 Input one 50-pin female D-sub for SDIF-2-2 Output one BNC, 75 ohms, TTL for SDIF-2-2 WCLK In / Multi-UFC-24 Sync In one BNC, 75 ohms, TTL for SDIF-2-2 WCLK Out  three 24-pin female D-sub for TDIF-1 Input/Output one BNC, 75 ohms, TTL for TDIF-1 WCLK Out  one BNC, 75 ohms, TTL for Multi-UFC-24 Sync Out
<b>Dimensions (WxHxD)</b>	19" x 3.5" x 9.2" (48.26 mm x 8.89 mm x 23.37 mm)
<b>Weight</b>	11 lbs
<b>Power Consumption</b>	17 watts 40 watts max
<b>Power Requirements:</b>	
<b>USA/Canada</b>	115 Volts AC, 60 Hz (auto switching power supply)
<b>Europe</b>	220 Volts AC, 50 Hz (auto switching power supply)
<b>Standard Accessories</b>	120V AC Power Cable User's Manual