

APACHE

User's Guide

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≡ Introduction ≡

Apache™ is a 12-port optical patchbay that can send and receive signals in either ADAT™ (8-channel) or TOSLINK™ (2-channel) format. Each of Apache's 12 optical inputs can be patched independently to one or more of its 12 optical outputs, so you can patch a signal from one device to another, or distribute a signal to multiple devices.



The patching options can be controlled from Apache's front panel or from a computer that's connected to the Apache MIDI IN port. Sets of patches can be stored as presets which can then be recalled, allowing you to quickly reconfigure your entire studio. Using presets, you can completely repatch your optical signals with only two button presses.

— TERMINOLOGY —

Patch: A logical connection from an optical input to an optical output. An Apache input can be patched to zero, one, several, or all Apache outputs.

Preset: A set of patches that is stored in Apache's memory, and can be recalled at any time.

About the Company

Frontier Design Group develops, manufactures and sells digital audio hardware and software. Our goal is to provide high-quality, high-value tools to help our customers be more creative and productive.

We're always interested in receiving your feedback on our products, as well as your ideas for improvements and new products. You can send email to feedback@frontierdesign.com or write to us at the address shown on the inside cover of this User's Guide.

Technical Support

If you have any problems or questions that aren't addressed in this guide, there are three ways to get more help:

- Refer to our web site (www.frontierdesign.com) for information on current revisions, answers to frequently asked questions, troubleshooting procedures, and additional documentation. The web site is available every day, 24 hours a day.
- Send specific questions via email to support@frontierdesign.com. We'll respond promptly (usually within one business day).
- You can call Frontier Design Group with your questions, at 1-800-928-3236 (outside the USA, call 603-448-6283). Phone support is normally provided weekdays from 9:30 a.m. to 5:30 p.m. EST.

Safety Precautions



WARNINGS



- Do NOT plug in, turn on or attempt to operate a unit that is damaged.
- There are NO user-serviceable parts inside the unit. NEVER remove the top cover or front panel. All servicing is to be done ONLY by qualified service personnel at Frontier Design Group.
- To prevent electrical shock, this unit MUST be connected to a properly-grounded AC power outlet. Do not remove or alter the grounding prong of the power cable. If you're not sure that your power outlet is properly grounded, have it checked by a qualified electrician.
- Before connecting the power cable, make sure the voltage selection switch (on the side panel) is set properly for your power source.
- Do not permit fingers to touch the terminals of plugs when installing or removing the power cable from the AC outlet.
- To reduce the risk of fire or electrical shock, do not expose this unit to rain or other moisture.
- Do not handle the power cable with wet hands.
- Do not pull on the power cable when disconnecting it from an AC outlet. Grasp the plug casing rather than the cable.



ADVERTENCIAS



- NO lo enchufe, encienda o intente operar una unidad que esté dañada o averiada.
- NO hay piezas que puedan ser reparadas por el usuario dentro de la unidad. NUNCA quite la tapa superior o panel frontal. Todo servicio debe ser hecho SOLAMENTE por personal de servicio capacitado de Frontier Design Group.
- Para evitar electrochoque o descarga eléctrica, esta unidad DEBE estar conectada a un receptáculo de potencia CA con buena conexión a tierra. No quite o altere la púa de conexión a tierra en el cable de potencia. Si no está seguro de que su receptáculo esté adecuadamente conectado a tierra, haga que verifique esto un electricista capacitado.
- Antes de conectar al cable de potencia, asegúrese que el interruptor de selección de voltaje (en el panel lateral) esté fijado al voltaje apropiado para su fuente de poder.
- No permita que dedos toquen las púas de los enchufes cuando esté instalando o quitando el cable de potencia de la salida de energía CA.
- Para reducir el riesgo de incendio o electrochoque, no exponga esta unidad a la lluvia u otro tipo de humedad.
- No manipule el cable de potencia con manos mojadas.
- No tire el cable de potencia para desconectarlo del receptáculo CA. Agarre el enchufe en vez del cable.



AVERTISSEMENTS



- Ne PAS brancher, mettre en marche ni essayer de faire fonctionner un dispositif endommagé.
- AUCUNE pièce à l'intérieur de ce dispositif ne peut être réparée ou entretenue par l'utilisateur. Ne JAMAIS déposer le capot ou le panneau avant. L'entretien ou les réparations NE doivent être effectués QUE par le personnel d'entretien qualifié du groupe Frontier Design.
- Afin d'éviter les chocs électriques, ce dispositif DOIT être connecté à une prise de courant c.a. bien mise à la terre. Ne pas enlever ou modifier la broche de terre du câble d'alimentation. Si l'on n'est pas sûr que la prise d'alimentation est bien mise à la terre, la faire vérifier par un électricien qualifié.
- Avant de connecter le câble d'alimentation, s'assurer que le sélecteur de tensio (sur le panneau latéral) est bien réglé pour la source de courant.
- Ne pas toucher avec les doigts les broches des fiches, quand on connecte ou déconnecte le câble d'alimentation de la prise c.a.
- Pour réduire le risque d'incendie ou d'électrocution, ne pas exposer le dispositif à la pluie ou à l'humidité.
- Ne pas manipuler le câble d'alimentation les mains mouillées.
- Ne pas tirer sur le câble d'alimentation quand on le déconnecte de la prise c.a. Saisir la fiche plutôt que le câble.



WARNUNG



- Beschädigte Geräte NICHT anschließen, NICHT einschalten und NICHT den Versuch unternehmen, sie zu betreiben.
- Im Gerät befinden sich KEINE Teile, die vom Benutzer gewartet werden können. Abdeckung und Frontplatte dürfen NIEMALS entfernt werden. Jegliche Wartungen dürfen NUR von qualifiziertem Servicepersonal der Frontier Design Group durchgeführt werden.
- Zur Verhinderung von elektrischen Schlägen MUSS dieses Gerät an einer ordnungsgemäß geerdeten Wechselstrom-Steckdose angeschlossen werden. Die Erdungsklemme des Netzkabels darf nicht entfernt oder verändert werden. Sollte Ungewissheit darüber bestehen, ob die Steckdose ordnungsgemäß geerdet ist, muss diese von einem qualifizierten Elektriker überprüft werden.
- Vor Anschluss des Netzkabels ist sicherzustellen, dass der Spannungswahlschalter (an der Seitenwand) korrekt auf Ihre Stromversorgung eingestellt ist.
- Die Finger dürfen bei Verbinden bzw. Trennen des Netzkabels von der Wechselstrom-Steckdose die Anschlusspole des Steckers nicht berühren.
- Zur Verringerung des Risikos von Feuer oder elektrischem Schlag darf diese Einheit weder Regen noch sonstiger Feuchtigkeit ausgesetzt werden.
- Netzkabel nicht mit nassen Händen berühren.
- Beim Trennen des Netzkabels von der Wechselstrom-Steckdose nicht am Netzkabel selbst, sondern am Stecker ziehen.

Maintenance and Protection

Read instructions — Before using your Apache, please make sure you've read all safety and operating instructions.

Retain instructions — Keep the User's Guide and safety instructions for future reference. If you ever have questions about Apache, send them by email to support@frontierdesign.com.

Heed warnings and instructions — Follow all safety and operating instructions carefully.

Protective plugs — To prevent dust from accumulating in the connectors, keep the protective plastic plug inserted in each optical port that is not currently in use.

Cleaning — Turn off and disconnect Apache before cleaning it. For cleaning, use a damp cloth. Do not use liquid or aerosol cleaners.


Power cord protection — Arrange all power cords so that they're not likely to be walked on or pinched by items placed on or against them.

Lightning — For added protection during lightning storms or power surges, unplug Apache from the power outlet.

Damage requiring service by qualified technician:

- if the power supply cord or plug has been damaged
- if liquid has been spilled or objects have fallen into the unit
- if the unit has been exposed to rain or other liquid
- if the unit has been dropped or its metal enclosure has been damaged
- if the unit does not operate as described in the User's Guide
- if the unit exhibits a change in performance

≡ Installation ≡

WARNING!

Never remove Apache's top cover or front panel. It has dangerous voltages inside. If your Apache doesn't function properly, refer to the troubleshooting section later in this User's Guide or contact Frontier Design Group for help.

Setting Up

Apache is designed for mounting in a standard 19" rack. You can start by mounting Apache in your rack and then connecting cables to it, but it may be easier to pull your cables through an empty rack space and connect them to Apache before you mount it in the rack.

All Apache cables connect to the back panel, shown here:



Most, but not all, lightpipe devices have an equal number of optical inputs and outputs. It's often convenient to use the same Apache input and output numbers for each device, although it's certainly not required.

For example, if you have a 4-port computer interface (such as the Dakota/Montana cards from Frontier Design Group), you could connect the optical outputs from the cards to Apache inputs 1, 2, 3, 4, and connect Apache outputs 1, 2, 3, 4 to the optical inputs on the cards.



WARNING!



Before connecting a power cable to Apache, make sure the voltage selection switch is set properly for your power source.

1. Look at the voltage selection switch (on the Apache side panel), and verify that it is set correctly for your power source.
2. On the Apache front panel, make sure the power switch is off (press “O”) and then connect an IEC power cord to the Power input on the Apache back panel. Connect the other end of the power cord to the appropriate power source.
3. On the Apache back panel, remove the protective plug from each optical port you intend to use. Keep the plugs for later use (to prevent dust from accumulating in any unused optical connectors).
4. Connect the desired optical cables to Apache’s optical inputs and optical outputs. Be sure that you connect the outputs from other devices to the Apache inputs, and that you connect the Apache outputs to the inputs of other devices.

Note: The direction of an optical signal is easy to verify because optical outputs emit red light. If an optical cable is emitting red light, the cable is coming from an active output. The outputs use light-emitting diodes (LEDs), not laser light, so their light is not dangerous.

5. If you intend to control Apache from a computer via MIDI, you must also connect a MIDI cable from the computer’s MIDI OUT port to Apache’s MIDI IN port. With this connection, you can control Apache from the computer via MIDI System Exclusive messages. See “Remote Control” later in this guide for more details.
6. If you want to use two or more Apaches at once, you need to decide which Apache will be the master, and then connect the appropriate MIDI ports to create a chain of Apaches. See “Cascading Apaches” later in this guide for more details.

Apache Basics

An Apache input can be patched to any combination of Apache outputs (all, some, one, or none of the outputs). An Apache output can be patched from one input or from none of the inputs (in which case, the output is inactive). You cannot patch multiple inputs to a single output.

Whenever Apache is powered up, a light on the front panel indicates its current mode — Store, Recall, MIDI, Patch, or Status. Only one mode is active at a time. Pressing a mode button activates the mode. You can leave the current mode at any time by pressing a different mode button.

The buttons on Apache's front panel provide quick access to all the Apache functions. These examples demonstrate Apache's four basic functions.

To create a patch from input 5 to output 2:

- Press the **Patch** button.
- Press Input button 5.
- Press Output button 2.

To see what input is patched to output 7:

- Press the **Status** button.
- Press Output button 7.

To save the current set of patches as preset 10:

- Press the **Store** button.
- Press Input button 10.

To recall the set of patches previously stored as preset 3:

- Press the **Recall** button.
- Press Input button 3.

Status Modes

There are two status modes — Scanning Status and Activity Status. You can toggle between the two modes by pressing the Status button while the Status light is on.

— Scanning Status —

In Scanning Status mode, Apache repeatedly scans through the inputs from left to right (1, 2, 3, . . . , 11, 12, 1, 2, 3, . . .), lighting one input at a time while also lighting all the outputs that are currently patched from that input.

While scanning through the inputs, Apache also provides information about the input signal. If there's no signal present at the input connector, then the input light is dim in Scanning Status mode. If the input signal is active, then the input light is bright. If the input signal is in ADAT format, then the ADAT Optical light is also on.

You can temporarily pause Scanning Status mode by pressing an input or output button to display its current patching (if any).

- Pressing an input button lights the input, and lights all outputs that are patched from that input. If an input is not currently patched, pressing the input button lights only that input (no outputs light).
- If the output is currently patched, pressing an output button lights the output and its input, and lights all other outputs that are also patched from that input. If the output is not currently patched, pressing an output button lights only that output (no inputs or other outputs light).

After displaying the selected patch for a few seconds, Apache automatically begins scanning again.

— Activity Status —

In this mode, the Apache input and output lights provide information about signals on the corresponding optical input and output connectors.

Activity Status mode indicates which connectors are in use, and which ADAT connectors are being used for active audio. The input lights are in one of three states:

off	Indicates that there's no signal present. Either nothing is connected to the input, or the input is connected to an inactive optical source.
on (dim)	Indicates that a signal is present. It can be an 8-channel ADAT-format signal whose audio channels are all quiet, or a 2-channel TOSLINK-format signal.
on (bright)	Indicates that an 8-channel ADAT-format signal is present, with active audio (above -48dBFS) on some channel(s).

Each output light simply shows the same information as the input from which it is patched. If an output is not patched from any input, the output light is off.

In Activity Status mode, you can press an input or output button to display its current patching (if any).

- Pressing an input button lights the input, and lights all outputs that are patched from that input. If an input is not currently patched, pressing the input button lights only that input (no outputs light).
- If the output is currently patched, pressing an output button lights the output and its input, and lights all other outputs that are also patched from that input. If the output is not currently patched, pressing an output button lights only that output (no inputs or other outputs light).

After displaying the selected patch for a few seconds, Apache automatically returns to indicating the activity for all inputs and outputs again.

Patch Modes

Pressing the Patch button initiates Patch mode. You can leave Patch mode at any time by pressing a different mode button (Status, for example). When you press the Patch button, all the input and output lights blink slowly, and you can then press an input or output button to display its current patching (if any).

Pressing Patch and then an input button activates Input Patch mode. Pressing Patch and then an output button activates Output Patch mode. These two modes are useful for different purposes. You can change Patch modes by pressing the Patch button again to restart Patch mode selection.

— Input Patch —

In this mode, you press an input button to select the corresponding input source, and then press output buttons to change which outputs are patched from that input.

1. Press Patch and then the input you want to select. If you change your mind, you can just press another input button to select a different input.

The selected input blinks slowly, and Apache lights all outputs that are currently patched from that input.

2. Press any output button to toggle its patch from the selected input on/off. While the same input is selected, you can toggle any or all of the outputs.

continued →

If you patch an input to an output that was originally patched from another input, the new patch overwrites the original patch. Here are two examples:

- Suppose input 1 is patched to output 4. If you then patch input 2 to output 4, the patch from input 1 to output 4 is automatically disconnected.
- Suppose input 1 is patched to outputs 4, 5, 6, 9. If you then patch input 3 to output 5, the patch from input 1 to output 5 is automatically disconnected, and the patches from input 1 to outputs 4, 6, 9 remain intact.

If you don't want to overwrite an existing patch, or any part of an existing group of patches, you can save those patches as a preset before you define any new patches. See "Store Mode" later in this guide for more details about saving a preset.

— Output Patch —

In this mode, you press an output button to select it, and then press an input button to change which input is patched to that output, or to disconnect its patch.

1. Press Patch and then the output you want to select. If you change your mind, you can just press another output button to select a different output.

The selected output blinks slowly, and Apache lights the input (if any) that is currently patched to that output. Apache also lights all other outputs that are patched from that input.

2. To change which input is patched to the selected output, press an unlit input button. Or, if you want to disconnect the patch, press the lit input button to toggle it off.

Store Mode

Apache has 12 presets, which are saved sets of patches that you can recall and change at any time. Apache comes preloaded with 12 default presets, but it's easy to make your own presets to fit your studio setup. To create a new preset:

1. Use Patch mode to create the set of patches that you want to save as a preset.
2. Press the Store button.
The 12 input lights blink slowly, representing the 12 presets.
3. Press an input button to save all the current patches in that preset, overwriting the set of patches previously stored in that preset.
The input button blinks briefly to indicate that the new preset is stored. Then Apache automatically returns to the mode it was in before you selected Store mode.

Note: If you mistakenly enter Store mode and don't want to overwrite any presets, you can leave the mode by pressing a different mode button (Status or Patch, for example).

In addition to the 12 presets on Apache, you can save an unlimited number of presets on your computer. See "Remote Control" later in this guide for more details.

The 12 default presets are listed on the following pages. Here are three examples to illustrate how the default presets could be used —

Example 1: Suppose you have four 24-channel devices:

- 02R mixer connected to Apache ports 1–3
- computer interface connected to Apache ports 4–6
- hard disk recorder connected to Apache ports 7–9
- three ADAT decks connected to Apache ports 10–12

Default preset 3 sends output from the hard disk recorder to all three of the other devices, so you could mix it on the 02R, and/or record it on the computer, and/or back it up on a set of ADAT tapes. Similarly, default preset 2 sends output from the computer to the 02R, and the hard disk recorder, and the ADAT decks.

Example 2: Suppose you have the same setup as in Example 1.

Default preset 9 lets you transfer audio between the computer and the ADAT decks (Apache ports 4–6 and 10–12) while also mixing hard disk material on the O2R (Apache ports 7–9 and 1–3). It's like setting up your studio to be two separate mini-studios for a while. Similarly, using the same setup, default presets 8 and 10 create other pairs of mini-studios:

- default preset 8: O2R ↔ computer, and hard disk ↔ ADAT decks
- default preset 9: O2R ↔ hard disk, and computer ↔ ADAT decks
- default preset 10: O2R ↔ ADAT decks, and computer ↔ hard disk

Example 3: Now suppose you have three 32-channel devices:

- Dakota/Montana PCI cards connected to Apache ports 1–4
- four Tango24 converters connected to Apache ports 5–8
- four ADAT decks connected to Apache ports 9–12

Default preset 12 sends output from the ADAT decks to Dakota/Montana, and from Dakota/Montana to the Tango24 converters, and from the Tango24 converters to the ADAT decks. Default preset 6 sends output from the Tango24 converters to Dakota/Montana and to the ADAT decks.

— Default presets —

preset 1	1	2	3	1	2	3	1	2	3	1	2	3
	1	2	3	4	5	6	7	8	9	10	11	12

default preset 1 distributes first set of 24 channels (inputs 1–3 across all outputs)

preset 2	4	5	6	4	5	6	4	5	6	4	5	6
	1	2	3	4	5	6	7	8	9	10	11	12

default preset 2 distributes second set of 24 channels (inputs 4–6 across all outputs)

preset 3	7	8	9	7	8	9	7	8	9	7	8	9
	1	2	3	4	5	6	7	8	9	10	11	12

default preset 3 distributes third set of 24 channels (inputs 7–9 across all outputs)

preset 4	10	11	12	10	11	12	10	11	12	10	11	12
	1	2	3	4	5	6	7	8	9	10	11	12

default preset 4 distributes fourth set of 24 channels (inputs 10–12 across all outputs)

preset 5	1	2	3	4	1	2	3	4	1	2	3	4
	1	2	3	4	5	6	7	8	9	10	11	12

default preset 5 distributes first set of 32 channels (inputs 1–4 across all outputs)

preset 6	5	6	7	8	5	6	7	8	5	6	7	8
	1	2	3	4	5	6	7	8	9	10	11	12

default preset 6 distributes second set of 32 channels (inputs 5–8 across all outputs)

preset 7	9	10	11	12	9	10	11	12	9	10	11	12
	1	2	3	4	5	6	7	8	9	10	11	12

default preset 7 distributes third set of 32 channels (inputs 9–12 across all outputs)

preset 8	4	5	6	1	2	3	10	11	12	7	8	9
	1	2	3	4	5	6	7	8	9	10	11	12

default preset 8 swaps sets of 24 channels (1–3 with 4–6, and 7–9 with 10–12)

preset 9	7	8	9	10	11	12	1	2	3	4	5	6
	1	2	3	4	5	6	7	8	9	10	11	12

default preset 9 swaps sets of 24 channels (1–3 with 7–9, and 4–6 with 10–12)

preset 10	10	11	12	7	8	9	4	5	6	1	2	3
	1	2	3	4	5	6	7	8	9	10	11	12

default preset 10 swaps sets of 24 channels (1–3 with 10–12, and 4–6 with 7–9)

preset 11	5	6	7	8	9	10	11	12	1	2	3	4
	1	2	3	4	5	6	7	8	9	10	11	12

default preset 11 routes sets of 32 channels

preset 12	9	10	11	12	1	2	3	4	5	6	7	8
	1	2	3	4	5	6	7	8	9	10	11	12

default preset 12 routes sets of 32 channels

Recall Mode

Any stored preset can be recalled at any time. When you recall a preset, its set of patches becomes the current set of patches, replacing any patches that were in effect.

To recall a preset:

1. Press the Recall button.
The 12 input lights blink slowly, representing the 12 presets.
2. Press an input button to recall the desired preset.
The input button blinks briefly to indicate that the preset is recalled. Then Apache automatically returns to the mode you were in before Store mode.

Note: If you mistakenly enter Recall mode and don't want to recall a preset, you can leave the mode by pressing a different mode button (Status or Patch, for example).

MIDI Mode

The MIDI IN and MIDI OUT ports on Apache can be used for either or both of these two purposes —

- remote control of Apache via MIDI System Exclusive (SysEx) messages from a computer
- connecting multiple Apaches in a cascade configuration (to expand your patchbay beyond 12 pairs of optical ports)

Regardless of whether you're using remote control or a cascade configuration (or both), pressing the MIDI mode button on any Apache lets you see the current MIDI device ID for that Apache and whether the Apache is receiving MIDI messages.

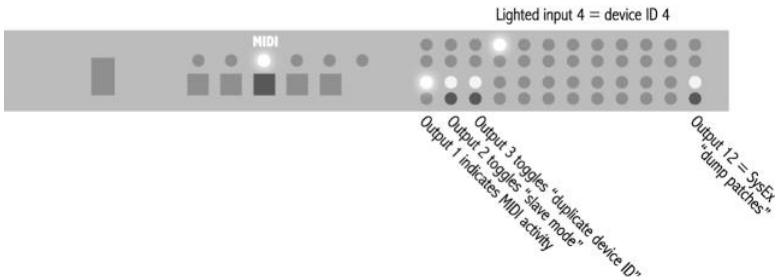
When MIDI mode is selected on any Apache, its MIDI device ID is indicated by its lit input. For example, the illustration below shows an Apache with input 4 lit (in MIDI mode), indicating that the Apache is currently set to device ID 4.

In MIDI mode, the output 1 light on each Apache indicates whether that Apache is receiving any MIDI messages. The output 1 light can be off, dim, or bright —

off	Apache currently is not receiving MIDI messages
on (dim)	Apache detects MIDI active sensing
on (bright)	Apache currently is receiving MIDI messages

For example, if you’re using remote control and you send a SysEx message from the computer to an Apache, output 1 lights to indicate that the Apache is receiving MIDI from the computer.

In MIDI mode, output buttons 2 and 3 let you specify settings for Apaches in a cascaded configuration. For more details about those settings (“slave mode” and “duplicate device ID”), refer to “Cascading Apaches” later in this guide. If you’re using remote control, output button 12 lets you manually send the current patches from Apache to the computer (see “Remote Control” for details).



Remote Control

You can remotely control Apache by sending MIDI System Exclusive (SysEx) messages to it from a computer.

Apache can also send its current patch settings (equivalent to a preset) to the computer as a SysEx message, where it can be saved as a file and later sent back to Apache to restore those patches.

— Setting up —

If you want to remotely control Apache from a computer:

1. Connect a standard MIDI cable from the computer's MIDI OUT port to the Apache's MIDI IN port.
2. If you also want the ability to store patch settings on the computer, then connect another MIDI cable from the Apache's MIDI OUT port to the computer's MIDI IN port (or if you're using multiple Apaches in a cascade configuration, then connect the MIDI OUT port of the last slave Apache to the computer's MIDI IN port).

Apache does not have a MIDI THRU port, but it does automatically pass MIDI data from its MIDI IN port to its MIDI OUT port, with only minimal delay (0.6–1.0 msec).

— Remote front panel —

Any of the Apache front panel buttons can be remotely activated by sending a SysEx message from the computer to the Apache. The message must contain 7 bytes if it is intended for all the Apaches that are connected to the computer, or 8 bytes if it is intended only for Apaches with a particular device ID.

These messages, listed as hexadecimal bytes, are:

FO 00 01 40 00 bb F7	remotely press button “bb” on all Apaches
FO 00 01 40 00 id bb F7	remotely press button “bb” on Apaches with device ID set to “id” (00=ID1, 01=ID2, ...)

The possible “bb” values are:

40	Store
41	Recall
42	MIDI
43	Patch
44	Status
45	Activity Status
46	Scanning Status

20	Input 1
21	Input 2
22	Input 3
23	Input 4
24	Input 5
25	Input 6
26	Input 7
27	Input 8
28	Input 9
29	Input 10
2A	Input 11
2B	Input 12

10	Output 1
11	Output 2
12	Output 3
13	Output 4
14	Output 5
15	Output 6
16	Output 7
17	Output 8
18	Output 9
19	Output 10
1A	Output 11
1B	Output 12

30	dump the current patches from Apache to the computer
31	receive these patches
32	restart scanning

For example, sending “FO 00 01 40 00 44 F7” is equivalent to pressing the Status button on all Apaches connected to the computer; sending “FO 00 01 40 00 08 45 F7” is equivalent to setting only the Apaches with device ID 9 to Activity Status mode.

— Dumping patches —

You can remotely or manually command an Apache to dump its current patch settings, sending them in a SysEx message to the computer. The SysEx message can be saved in a file on the computer, and then can be sent back to Apache when you want to use those patches again. Using this process, you can save an unlimited number of Apache presets on the computer.

To remotely command Apache to dump its current patches to the computer, send one of these two SysEx messages:

FO 00 01 40 00 30 F7	if you're using a single (non-cascaded) Apache
FO 00 01 40 00 id 30 F7	to restrict the command to an Apache whose device ID is set to "id"

To manually command Apache to dump its current patches to the computer, select MIDI mode on that Apache and then press its output button 12. The output 12 light will blink for a few seconds to indicate that the SysEx message is being sent to the computer.

Regardless of whether you've remotely or manually commanded Apache to dump its current patches to the computer, Apache will send a SysEx message (20 bytes) that includes its device ID and a list of its current patches. For example, the message could look like this:

```
FO 00 01 40 00 05 31 01 06 00 02 02 0F 0B 0A 01 04 0F 02 F7
```

Similarly, if you want to remotely define patches on one or more Apaches, you can send a SysEx message with the 20-byte format from the computer to the Apache(s). In this case, the "device ID" byte is optional — if you omit the device ID byte, all Apaches will respond to the command (updating their patches); if you include the device ID byte, only Apaches with matching device IDs will respond. For example, the message could look like this:

```
FO 00 01 40 00 02 31 05 03 00 01 04 09 0A 0A 0A 0B 0F 0F F7
```


Here's a description of each byte in the message:

F0 00 01 40 00 02 31 05 03 00 01 04 09 0A 0A 0A 0B 0F 0F F7
manufacturer's ID list of patches (1 byte for each of the 12 outputs)

F0	Begin MIDI SysEx message
00	1st byte of Frontier Design Group manufacturer's ID
01	2nd byte of Frontier Design Group manufacturer's ID
40	3rd byte of Frontier Design Group manufacturer's ID
00	Apache product ID
02	Device ID (02 = Apache ID 3)
31	Command to receive these patches
05	Output 1 comes from Input 6 (05 = input 6)
03	Output 2 comes from Input 4 (03 = input 4)
00	Output 3 comes from Input 1 (00 = input 1)
01	Output 4 comes from Input 2 (01 = input 2)
04	Output 5 comes from Input 5 (04 = input 5)
09	Output 6 comes from Input 10 (09 = input 10)
0A	Output 7 comes from Input 11 (0A = input 11)
0A	Output 8 comes from Input 11 (0A = input 11)
0A	Output 9 comes from Input 11 (0A = input 11)
0B	Output 10 comes from Input 12 (0B = input 12)
0F	Output 11 is not patched from any input (0F = no patch)
0F	Output 12 is not patched from any input (0F = no patch)
F7	End MIDI SysEx message

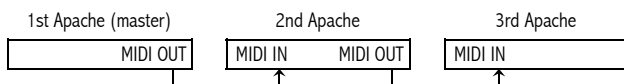
Cascading Apaches

If you need more than 12 pairs of optical ports to connect all of your gear, you can expand your digital patchbay by using the MIDI ports to connect a “chain” of Apaches.

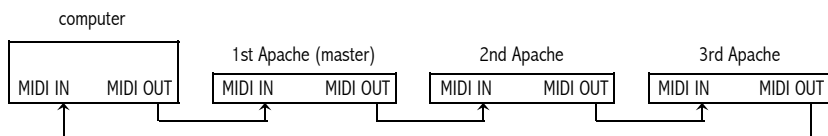
When you connect the MIDI OUT port of one Apache to the MIDI IN port of another Apache, you are cascading the Apaches. There are two useful cascade styles (both are described more completely later in this guide) —

- each Apache in the chain has a unique device ID
- all Apaches in the chain have the same device ID

The first Apache in the chain is called the master Apache. You can cascade any number of Apaches to that master.



Also, if you have properly connected all the MIDI cables, you can remotely control any or all of the Apaches in a cascaded system, by using SysEx messages from a computer. For more details about sending and receiving SysEx messages, refer to “Remote Control” earlier in this guide.



— Setting up —

1. Decide which Apache you want to designate as the master, and connect its MIDI OUT port to the MIDI IN port of another Apache.
2. If you want to cascade additional Apaches, then connect the MIDI OUT port of that second Apache to the MIDI IN port of a third Apache. Continue connecting the MIDI OUT port of each Apache to the MIDI IN port of the next Apache, for all the Apaches you want to cascade.

Once you've cascaded the Apaches via MIDI, pressing any mode button on the master Apache automatically selects the same mode on all the cascaded Apaches.

3. (Optional) If you also want to remotely control the Apaches, connect the computer's MIDI OUT port to the master Apache's MIDI IN port. If you also want the ability to send MIDI messages from any of the Apaches to the computer, connect the MIDI OUT port of the last Apache in the chain to the MIDI IN port of the computer.
4. Press the master Apache's MIDI mode button to display the device ID for all Apaches in the chain.

The device ID for each Apache is indicated by its lighted input button. By default, the device ID for each Apache is set to 1. To change the device ID for any Apache in MIDI mode, simply press the desired input button (1 through 12) on that Apache.

The cascade examples included later in this chapter provide more details about setting the appropriate device IDs. Regardless of the cascade style, you can always press the MIDI mode button on any Apache to display (and change) its current MIDI device ID.

Note: If any of the Apaches are in Scanning Status mode, their scanning positions may be temporarily unsynchronized (for example, the master Apache may be scanning through inputs 7, 8, 9 while a cascaded Apache is scanning through inputs 2, 3, 4). But as soon as the master Apache restarts scanning at input 1, it will automatically synchronize the scanning positions of all the cascaded Apaches.

— Cascading with unique MIDI device IDs —

Use this cascade style when you want to have multiple Apaches with independent patch configurations, but with presets that are unified across the set of Apaches.

When the Apaches have unique device IDs, the optical signals can be patched within each Apache or between Apaches (if there are optical cables connected between the Apaches). For example, with the proper cabling and settings, you can patch input 5 of one Apache to output 8 of another Apache.

Figure 1 illustrates a scenario in which patches remain local within each Apache. Figures 2, 3, and 4 illustrate three scenarios in which patches can be made between Apaches.

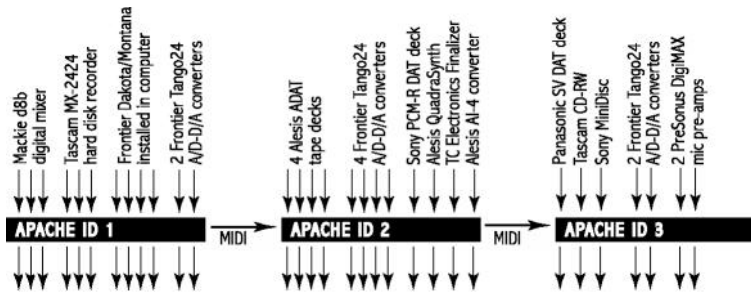


Figure 1. Each Apache has a unique device ID, and all patches remain local within each Apache. For example, any device connected to Apache ID 1 can be patched to any other device connected to Apache ID 1, but cannot be patched to any device connected to Apache ID 2 or 3 (because there are no optical connections between the Apaches).

Although the patches remain local within each Apache, storing (or recalling) any preset on the master Apache will automatically store (or recall) the patches for all of the cascaded Apaches too. For example, you can define some patches on Apache ID 1, some patches on Apache ID 2, and some patches on Apache ID 3, and then store all of those patches by storing a preset on the master Apache (ID 1 in this illustration). If you later recall that preset on the master Apache, the patches on all three Apaches will be recalled.

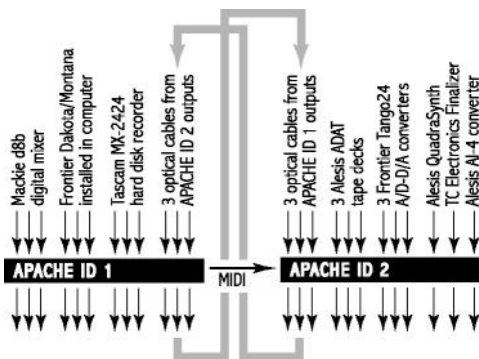


Figure 2. Each Apache has a unique device ID, and patches can extend across different Apaches (for example, a device connected to Apache ID 1 can be patched to a device connected to Apache ID 2 because there are optical outputs from Apache ID 1 connected to optical inputs of Apache ID 2).

In the scenario illustrated in Figure 2, if you wanted to patch 24 channels of output from the Mackie d8b mixer to the three ADAT tape decks, you'd patch inputs 1, 2, 3 on Apache ID 1 to outputs 10, 11, 12 on Apache ID 1, and also patch inputs 1, 2, 3 on Apache ID 2 to outputs 4, 5, 6 on Apache ID 2. These patches can be stored as a unified preset, as described in Figure 1.

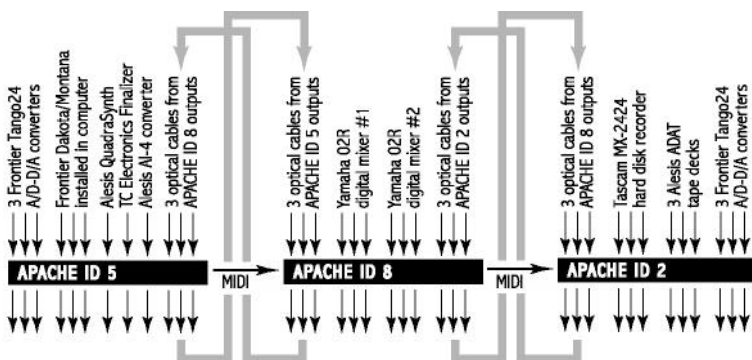


Figure 3. Each Apache has a unique device ID, and patches can extend across different Apaches (for example, a device connected to Apache ID 2 can be patched to a device connected to Apache ID 5 because there are optical outputs from Apache ID 2 connected to optical inputs of Apache ID 8, and there are optical outputs from Apache ID 8 connected to optical inputs of Apache ID 5).

In the scenario illustrated in Figure 3, if you wanted to patch 24 channels of output from the three ADAT tape decks to Dakota/Montana in the computer, you'd patch inputs 7, 8, 9 on Apache ID 2 to outputs 1, 2, 3 on Apache ID 2, and also patch inputs 10, 11, 12 on Apache ID 8 to outputs 1, 2, 3 on Apache ID 8, and also patch inputs 10, 11, 12 on Apache ID 5 to outputs 4, 5, 6 on Apache ID 5. These patches can be stored as a unified preset, as described in Figure 1.

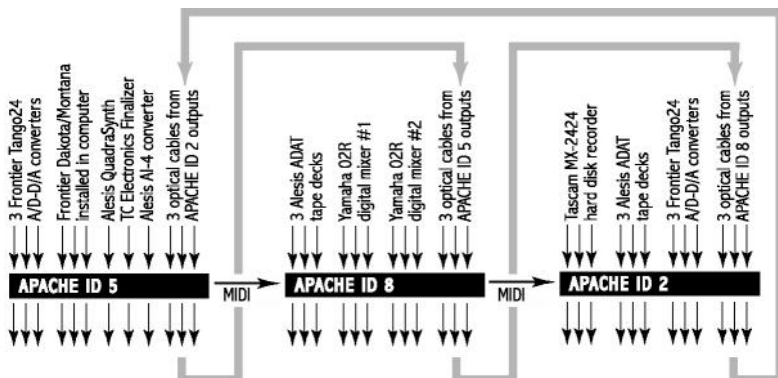


Figure 4. Each Apache has a unique device ID, and patches can extend across different Apaches (for example, a device connected to Apache ID 2 can be patched to a device connected to Apache ID 8 because there are optical outputs from Apache ID 2 connected to optical inputs of Apache ID 5, and there are optical outputs from Apache ID 5 connected to optical inputs of Apache ID 8).

In the scenario illustrated in Figure 4, if you wanted to patch 24 channels of output from the MX-2424 hard disk recorder to the O2R mixer #1, you'd patch inputs 1, 2, 3 on Apache ID 2 to outputs 10, 11, 12 on Apache ID 2, and also patch inputs 10, 11, 12 on Apache ID 5 to outputs 10, 11, 12 on Apache ID 5, and also patch inputs 10, 11, 12 on Apache ID 8 to outputs 4, 5, 6 on Apache ID 8. These patches can be stored as a unified preset, as described in Figure 1.

To set up multiple Apaches with unique device IDs:

1. Press the MIDI mode button on the master Apache. The current MIDI device ID for each Apache is indicated by its lighted input.
2. Press the appropriate Input button on each Apache to make sure that different input numbers are lighted on the master and on each cascaded Apache. For example, you could press Input 1 on the master Apache to assign it device ID 1, Input 2 on the next Apache to assign it device ID 2, Input 3 on the next Apache to assign it device ID 3, and so on for all the cascaded Apaches.
3. Make sure MIDI mode is selected, and then on each cascaded Apache (but not on the master), press Output button 2 to enable “slave mode” (so that only the master Apache’s mode buttons will control the mode selection for the cascaded Apaches).

When Output 2 is lit on all the slave Apaches, only the master Apache’s mode buttons (Patch, Status, Store, Recall) are functional. The MIDI mode button remains functional on all Apaches at all times.

In Patch mode, you can still press the Input and Output buttons on any Apache to independently define patches for that Apache. In Status mode, you can still press the Input and Output buttons on any Apache to check individual patches. If you store (or recall) a preset on the master Apache, then the corresponding preset is automatically stored (or recalled) on all the slave Apaches too.

Unless you’re controlling the Apaches from a computer, do not enable Output 2 (“slave mode”) on the master Apache. Although it is possible to press the button and turn on the light, all the Apaches would then be defined as slaves — a configuration that’s not useful.

— Cascading with the same MIDI device IDs —

Use this cascade style when you want to have multiple Apaches that function as if they were one “wider” Apache in which each input and output accommodates 16 or 24 channels rather than 8 channels. For example, you could distribute several 24-channel devices across three Apaches, by connecting 8 channels from each device to the same optical input on all three Apaches.

Figure 5 illustrates one possible scenario, with:

All three Apaches set to the same device ID,

02R #1 channels 1–8 connected to input 1 on the master Apache,
02R #1 channels 9–16 connected to input 1 on the second Apache,
02R #1 channels 17–24 connected to input 1 on the third Apache;

02R #2 channels 1–8 connected to input 2 on the master Apache,
02R #2 channels 9–16 connected to input 2 on the second Apache,
02R #2 channels 17–24 connected to input 2 on the third Apache;

Dakota/Montana channels 1–8 connected to input 3 on the master Apache,
Dakota/Montana channels 9–16 connected to input 3 on the second Apache,
Dakota/Montana channels 17–24 connected to input 3 on the third Apache;

and so on for other 24-channel devices. Other 8-channel devices (such as a Tango24) can also be connected, as shown in Figure 5.

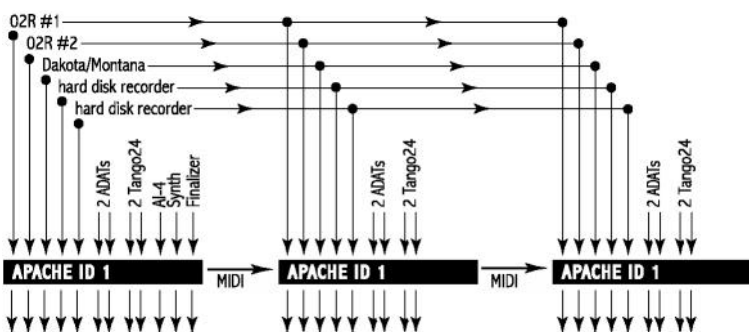


Figure 5. Each Apache has the same device ID (in this example, ID 1).

To set up multiple Apaches with the same device ID:

1. Press the MIDI mode button on the master Apache. The current MIDI device ID for each Apache is indicated by its lighted Input.
2. If necessary, press the appropriate Input button on each Apache to make sure that the same Input number is lighted on the master and all cascaded Apaches. For example, you could press Input 5 on the master Apache and on each cascaded Apache to assign MIDI device ID 5 to all of them.
3. Make sure MIDI mode is selected, and then on each cascaded Apache (but not on the master), press Output button 2 to enable “slave mode” (so that only the master Apache’s mode buttons will control the mode selection for the cascaded Apaches).
4. On each slave Apache, also press Output button 3 to enable “duplicate device ID.” When Output 3 is lit, you can only define patches and presets by pressing buttons on the master Apache, and any settings on the master Apache are automatically duplicated on each slave Apache.

Unless you’re controlling the Apaches from a computer, do not enable Outputs 2 and 3 (“slave mode” and “duplicate device ID”) on the master Apache. Although it is possible to press those buttons and turn on those lights, all the Apaches would then be defined as slaves — a configuration that’s not useful.

Now that you’ve enabled slave mode and duplicate device ID on each cascaded Apache, you can use the buttons on the master Apache to simultaneously control the settings of the master and all the slave Apaches.

For example, if you patch input 6 to outputs 8 and 9 on the master Apache, then input 6 will automatically be patched to outputs 8 and 9 on all the slave Apaches too. And if you store (or recall) preset 3 on the master Apache, then preset 3 is automatically stored (or recalled) on all the slave Apaches too.

Frequently Asked Questions (FAQ)

Questions	Answers
If I patch an input to several outputs, does the signal become degraded or distorted?	No. Whether the input is patched to one output or to all 12, the same clean signal is delivered through each output.
Can Apache route several inputs to a single output?	No. Combining multiple inputs is a mixing function. Apache doesn't mix or alter the optical signals.
How do I select an Apache input to serve as the clock master for the Apache outputs?	You don't! Each Apache input is separately re-clocked and transmitted to its patched outputs. In effect, whatever is the clock source of the Apache input becomes the clock source of its patched outputs. In terms of clocking, Apache acts just like a set of optical cables.
Can Apache convert between ADAT and TOSLINK signals?	No. Apache is only for routing signals, not for converting signal formats.
Can I use multiple Apaches together?	Yes. You can cascade any number of Apaches and use them together. See "Cascading Apaches" earlier in this guide for details.
What's the longest optical cable that can be used with Apache?	Apache has been tested successfully with many devices, using optical cables up to 10 meters (33 feet) long.
Can Apache send and receive S/MUX, MR-X, PAQRAT, or other variations of ADAT optical signals?	Yes. Apache recognizes, re-clocks, and faithfully passes any information that is encoded in an ADAT optical signal, including these alternative formats.
Can I save more than 12 presets?	Yes. Apache's remote control feature lets you save an unlimited number of presets on the computer. See "Remote Control" earlier in this guide for details.

Optical Signals

Optical devices commonly transmit audio signals with either of these two different formats: ADAT or TOSLINK.

The ADAT optical format was pioneered by Alesis for the original ADAT digital audio tape machine. This format supports 8 channels of 24-bit data at 44.1 or 48 kHz. Other manufacturers have used ADAT-formatted signals to transmit other audio formats, such as 4 channels of 24-bit audio data at 96 kHz.

The TOSLINK format is the optical equivalent of SPDIF. It transmits 2 channels of 24-bit audio data, usually at 44.1 or 48 kHz.

ADAT and TOSLINK signals use exactly the same LED transmitters, optical receivers, and plastic fiber optical cables. There is no way to know which kind of signal is being transmitted by an optical cable just by looking at it.

The plastic optical cables (also called lightpipes) are remarkably durable. However, here are some recommendations for optimum performance:

- Optical cables are flexible, so you can bend them gently, but do not bend them sharply.
- Use the shortest optical cable that will work for each connection, to minimize the optical pulse distortion that occurs in all plastic fiber optical cables.
- Be careful not to scratch the polished tips of the optical cables, especially when inserting them into an optical port.
- Dust can accumulate in any open, unused optical port, causing it to malfunction. To prevent dust from accumulating in the connectors, keep the protective plastic plug inserted in each optical port that is not currently in use.

Troubleshooting



WARNING!



Never remove Apache's top cover or front panel. If your Apache does not power up correctly, contact Frontier Design Group for assistance.

Problem	Solutions
No lights are lit when I turn on the Apache power switch.	<ul style="list-style-type: none">• Make sure the Apache power cable is securely connected to an appropriate power source and to the Apache power input.• Verify that the Apache power switch is on (press “ ”).
I'm not getting any audio from Apache.	<ul style="list-style-type: none">• Verify that the source device is sending audio, and that the source and destination devices are using the same optical signal format (either ADAT or TOSLINK).• Use Apache's Status button to select Activity Status mode. Then press the input button that corresponds to the source device, and verify that it is patched to the intended output.• In Activity Status mode, verify that Apache's input and output lights correspond to the signal you're trying to transmit. The Apache lights should be on (dim) if transmitting a TOSLINK-format signal, or on (bright) if transmitting an ADAT-format signal.• Temporarily connect an optical cable from the source device directly to the destination device, bypassing the Apache. If the problem still exists, it is caused by something other than Apache.

Problem	Solutions
<p>I'm getting clicks and pops on signals going through Apache.</p>	<ul style="list-style-type: none"> • Check the source device and the destination device for each optical signal, and make sure that there's exactly one audio clock master (set to Internal) in the system. • Temporarily connect an optical cable from the source device directly to the destination device, bypassing the Apache. If the problem still exists, it is caused by something other than Apache.
<p>A destination device is indicating errors when receiving a signal from Apache.</p>	<ul style="list-style-type: none"> • Verify that the source device is sending audio, and that the source and destination devices are using the same optical signal format (either ADAT or TOSLINK). • Use Apache's Status button to select Activity Status mode. Then press the input button that corresponds to the source device, and verify that it is patched to the intended output. • In Activity Status mode, verify that Apache's input and output lights correspond to the signal you're trying to transmit. The Apache lights should be on (dim) if transmitting a TOSLINK-format signal, or on (bright) if transmitting an ADAT-format signal. • Temporarily connect an optical cable from the source device directly to the destination device, bypassing the Apache. If the problem still exists, it is caused by something other than Apache.
<p>I have two Apaches, but I can't get one of them to control the other.</p>	<ul style="list-style-type: none"> • Verify that a known-good MIDI cable is connected from the master Apache's MIDI OUT port to the slave Apache's MIDI IN port. • Refer to "Cascading Apaches" earlier in this guide to verify that all of the settings on both Apaches are correct.

continued →

Problem	Solutions
<p>Apache is not responding properly to MIDI messages from my computer.</p>	<ul style="list-style-type: none"> • Verify that a known-good MIDI cable is connected from the correct MIDI OUT port of the computer to the MIDI IN port on Apache. • Send a MIDI message from the computer, and verify that Apache's MIDI indicator lights (press the MIDI mode button and look at the output 1 light when sending a SysEx message from the computer). • Compare the bytes in the SysEx message to the information provided in "Remote Control" (earlier in this guide) to make sure that you're sending a valid SysEx message. • If the MIDI message includes the device ID byte, make sure that byte corresponds to the actual device ID of the Apache you're trying to use (and remember that SysEx messages use hexadecimal numbers: 00 = ID1, 01 = ID2, . . . , 09 = ID10, 0A = ID11, 0B = ID12)

— Apache Specifications —

These specifications are subject to revision without notice.

Optical inputs and outputs	12 inputs and 12 outputs supporting both ADAT and TOSLINK (optical SPDIF) digital audio signals on standard optical connectors
MIDI	1 MIDI input and 1 MIDI output
Patch presets	12 presets within Apache unit; unlimited number of presets when using computer-based MIDI control
Power	120V~0.2A 60Hz
	230V~0.1A 50Hz
Dimensions	19" x 4.8" x 1.75" (1U rackmount enclosure)
	48.7 cm x 12.1 cm x 4.5 cm
Weight	4.5 lbs (2.1 kg)

Limited Warranty

Frontier Design Group, LLC ("FRONTIER") warrants this product to be free of defects in material and workmanship for a period of one (1) year from the date of original retail purchase. This warranty is enforceable only by the original retail purchaser. Any written or oral information or advice given by FRONTIER dealers, distributors, agents, or employees will in no way increase the scope of this warranty. FRONTIER's entire liability and your sole and exclusive remedy for any breach of the foregoing limited warranty will be, at FRONTIER's sole and absolute option, either refund of the purchase price or repair or replacement of any product that proves to be defective on inspection by FRONTIER or its authorized service representative.

This warranty does not cover claims for damage due to abuse, neglect, alteration or attempted repair by unauthorized personnel, and is limited to failures arising during normal use that are due to defects in material or workmanship in the product.

THIS LIMITED WARRANTY IS THE ONLY WARRANTY PROVIDED BY FRONTIER. YOU EXPRESSLY DISCLAIM ALL OTHER WARRANTIES, EITHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE WITH REGARD TO THE PRODUCT AND ACCOMPANYING WRITTEN MATERIALS. Because some jurisdictions do not allow the exclusion or limitation of implied warranties, the above limitation may not apply to you.

In no event will FRONTIER or any of the members, directors, officers, employees, or affiliates be liable to you for any consequential, incidental, indirect, or special damages whatsoever (including, without limitation, damages for loss of business profits, business interruption, loss of business information and the like), whether foreseeable or unforeseeable, arising out of the use of or inability to use the Product or accompanying written materials, regardless of the basis of the claim and even if FRONTIER or a FRONTIER representative has been advised of the possibility of such damage. FRONTIER's liability to you for direct damages for any cause whatsoever, and regardless of the form of the action, will be limited to the greater of \$500 or the money paid for the Product that causes the damages. THIS LIMITATION WILL NOT APPLY IN CASE OF PERSONAL INJURY ONLY WHERE AND TO THE EXTENT THAT APPLICABLE LAW REQUIRES SUCH LIABILITY. Because some jurisdictions do not allow the exclusion or limitation of liability for consequential or incidental damages, the above limitation may not apply to you.

This warranty only applies to products sold in the United States of America or Canada. The terms of this warranty and any obligations of FRONTIER under this warranty shall apply only within the country of sale. This warranty will be construed under the laws of the State of New Hampshire, except for that body of law dealing with conflicts of law. If any provision of this warranty shall be held by a court of competent jurisdiction to be contrary to law, that provision will be enforced to the maximum extent permissible, and the remaining provisions of this warranty will remain in full force and effect.



Compliance 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 User's Guide, 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 try to correct the interference by one or more of the following measures:

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

The user is cautioned that changes and modifications made to the equipment without the approval of manufacturer could void the user's authority to operate this equipment.



Declaration of Conformity

Frontier Design Group, LLC declares that the multiport optical patchbay called Apache conforms to the following Directives and Standards:

Council Directives: 89/336/EEC, 73/23/EEC

Conformance Standards: EN55022 Class B, EN50082-1

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