

## Cable Solutions 7x2 Automatic Digital Audio Switcher Item#: DAS-001



### Specs/Features:

- Optical/SPDIF Audio Switch with automatic input detection
- 4 optical inputs and 3 SPDIF inputs (RCA plugs)
- Optical and/or SPDIF (RCA) outputs
- Optical output will switch off if there is no signal on any input (so a receiver can switch on/off automatically based on the signal here)
- 2 color status LED for every input
- Manual override input selection button
- High quality Wolfson audio processor with 7 inputs to de-jitter and refine the signal (not just a simple digital switch!)
- Full support up to 192kHz/24Bit audio
- Power supply via Mini USB cable (can be connected to a TV USB port for example, so it switches on and off with the TV)
- Possibility to make software updates via USB on a computer (in case there might be updates)

### Automatic Input Detection / Switching Logic

Basically, all inputs have priorities (OPT1 has highest priority, RCA1 second priority, OPT2 third ...). If a signal comes up on an input with higher priority the switch will jump to this input immediately. If there are active signals on multiple inputs, the switch will stay on the current input as long as there is a valid signal - if the signal is invalid for some seconds, it will check the next active input if the signal there is valid - if the signal there is also not valid it will go on to the next and so on.

### Automatic Switching

Mainly the switcher looks for the presence of any signal (for optical this means if there is light in the cable or not). In most cases, if there are multiple active sources on the inputs, the left input always has priority over the right input.

The switcher also has the ability to analyze the signal on the current active input, however, and checks if there is no audio (all bits in the S/PDIF packet zero) or if the packets are marked as invalid (Windows computers typically transmit invalid packets when there is no audio). If there is no valid audio for some seconds (10 seconds per default – may be changed via software) and there is a signal on a lower prioritized input, the switch will mark the current active input as invalid and fall back to the next lower prioritized input. In this case it will stay on the lower prioritized input as long as the signal is lost on this lower prioritized input or until a signal on a higher prioritized input pops up (also when the signal on the input which is marked as invalid is lost and pops up again).

It is also possible to disable the zero and inactive packets detection via software to treat the signal always as valid signal, also when zero or invalid packets are transmitted for some time. The exact behavior depends upon the connected devices, on how your devices behave, so please take time to read the use case examples to understand the behavior of the switcher. Many devices also have a “keep-alive” option that can be switched on or off – to work well with the switcher it is always good to disable the “keep-alive” option, so that the signal is fully stopped when there is no audio.

## Typical Use Case Examples

### Use Case with RaspberryPi, PlayStation and TV

Input 1: Raspberry Pi (switches the S/PDIF signal off when there is no audio)

Input 2: PlayStation (switches the S/PDIF signal off when switched off)

Input 4: TV (always transmits a valid audio signal when switched on)

As the TV always transmits a valid signal, it will always switch to the TV when the other two devices are off (a device that always transmits a valid signal only works correctly when plugged into lowest priority).

When the PlayStation is on the switch will switch to it and fall back to the TV when it is off again.

When the Raspberry Pi is on (no matter if the PlayStation is on) the switch will switch to it and fall back to the PlayStation it is on or to the TV if the PlayStation is off. page 3/7

### Use Case with 2 Windows Computers

Input 1: Raspberry Pi (switches the S/PDIF signal off when there is no audio)

Input 3: Windows computer 1 (always transmits a signal, but invalid packets when no audio)

Input 4: Windows computer 2 (always transmits a signal, but invalid packets when no audio)

Let's assume the Raspberry Pi is off, both computers transmit valid audio and computer 1 is currently the active input.

The switch will stay on computer 1 as long as there is a valid signal.

If there is no valid signal for some seconds (10 seconds per default – may be changed via software) the switch will mark the input as invalid and move on to computer 2 (it will not know when the signal of computer 1 gets valid again).

It will then stay on computer 2 as long as there is a valid audio signal here.

When the signal of computer 2 also gets invalid, it will also mark this input as invalid and move on again to computer 1.

It will wait again for some seconds for a valid signal and if there is no valid signal it will move on again to computer 2.

If both computers stop playing audio the switch will toggle between the two inputs with the defined timeout until there is again a valid signal on one of the inputs – it will then stay on this input as long as there is a valid signal here or until a signal on a higher prioritized input pops up.

When the Raspberry Pi finally starts to transmit a signal, it will always override the two toggling computers because of the higher priority and the switch will switch to it. When the Raspberry Pi stops transmitting the switch will fall back again to the two toggling computers.

### Use Case with a TV and a Windows Computer (this example that can be problematic)

Input 3: Windows computer (always transmits a signal, but invalid packets when no audio)

Input 4: TV (always transmits a valid audio signal when switched on)

When the TV is on and the computer is off, the switch will switch to the TV.

When the computer is on and transmits audio the switch will switch to the computer.

However, when the audio from the computer stops and the computer transmits invalid packets for some seconds the switch will mark the input as invalid and fall back to the TV.

As the TV always transmits a valid signal it will always stay here and never go back to the computer (only when the signal of the computer fully stops and pops up again – for example upon reboot).

The only thing that could be done here is to disable the zero and invalid packets detection. The switch will then switch to the computer and always stay on the input of the computer as long as there is any signal (no matter if valid or not) and only fall back to the TV again when the computer is fully switched off again.

### Status LEDs

Each input of the switch has a 2-color status LED (red/green).

Current active input: solid

Inactive inputs: blinking

No signal available: red

Signal available: green

Signal available, but invalid or zero: orange (red+green)

solid red: current active input without signal

solid green: current active input with active signal

solid orange: current active input with signal that is invalid or zero

blinking red: inactive input without signal

blinking green: inactive input with signal available

blinking orange: inactive input where the last signal state was invalid or zero

### Alternative LED Mode

The switcher also has an alternative LED mode that can be activated with a command over the virtual COM port via USB (or of course with the “Config” button in the client tool).

	<b>Current Active Input</b>	<b>Inactive Input</b>
No signal available	blinking red	LEDs off
Signal available	solid red	solid green
Signal available, but invalid or zero	blinking orange	solid orange

### USB Connection

When the switcher is plugged to a computer, it will register as a virtual COM port.

This is confirmed working on Windows and Linux. It should also on a Mac, although this is currently untested.

A client tool is available for Windows (the client tool will ask for admin rights when it is started – unfortunately this is needed to find the correct COM port automatically based on the USB VID/PID).

If Windows doesn't recognize the switch automatically as COM port the download package also contains a .inf driver file that can be selected as driver to point Windows to the correct internal driver to use (the driver itself is part of Windows).

The screenshot shows the 'Audio Switch Client - v0.5' application window. At the top, there is a port selection dropdown set to 'COM66', a search field, and a 'disconnect' button. On the right side of the header, there are buttons for 'Clear Window', 'Config', 'Check FW Version' (which is highlighted with a blue border), 'Start FW Update Mode', and 'Update FW'. The main area of the window is titled 'Received Data:' and contains a text area with the following log output:

```
Interrupt Status: 0x2 (INVALID)
S/PDIF Status: 0x20 (48kHz/44.1kHz)
Flags: (ZERO)

Interrupt Status: 0x2 (INVALID)
S/PDIF Status: 0x20 (48kHz/44.1kHz)
Flags: (ZERO)

Interrupt Status: 0x2 (INVALID)
S/PDIF Status: 0x20 (48kHz/44.1kHz)
Flags: (ZERO)

FW Version: v1.1.2
PCB Version: 5
Config: OPTICAL_IN RCA/OPT_IN AUDIO_DAC
Settings: INVALID_PAKETS_DETECTION ZERO_PAKETS_DETECTION

Interrupt Status: 0x2 (INVALID)
S/PDIF Status: 0x20 (48kHz/44.1kHz)
Flags: (ZERO)

No Audio Timeout!

Checking next active input (3)

Interrupt Status: 0x2 (INVALID)
S/PDIF Status: 0x20 (48kHz/44.1kHz)
Flags: (ZERO)

Switch to Input: (3)

Interrupt Status: 0x2 (INVALID)
S/PDIF Status: 0x20 (48kHz/44.1kHz)
Flags: (ZERO)

Interrupt Status: 0x2 (INVALID)
S/PDIF Status: 0x20 (48kHz/44.1kHz)
Flags: (ZERO)
```

The switch will send status messages every 2 seconds that show the status of the current active input (it is not possible for the audio processor to monitor another input at the same time).

- UNLOCK: The S/PDIF receiver cannot lock onto the data stream
- INVALID: Received packets are marked as INVALID (no audio)
- ZERO: All bits in the received packets are ZERO (no audio)

## Commands

It is possible to control some functions or change some settings of the switch by sending commands to it.

All commands start with a '\$' and end with a CR or LF ('\r' or '\n').

Command	Description
\$FWV\r\n	Check the current firmware version and configuration
\$FWU\r\n	Start firmware update mode (Atmel bootloader)
\$CLA0\r\n	Disable LEDs on current active input (solid LED)
\$CLA1\r\n	Enable LEDs on current active input (solid LED)
\$CLI0\r\n	Disable LEDs on inactive inputs (blinking LEDs)
\$CLI1\r\n	Enable LEDs on inactive inputs (blinking LEDs)
\$CLR0\r\n	Disable LEDs on inactive inputs without signal (only blinking red LEDs)
\$CLR1\r\n	Enable LEDs on inactive inputs without signal (only blinking red LEDs)
\$CLM0\r\n	Enable Alternative LED Mode
\$CLM1\r\n	Disable Alternative LED Mode
\$CIO\r\n	Disable invalid packets detection ("I" = big "i" and not a small "L")
\$CI1\r\n	Enable invalid packets detection ("I" = big "i" and not a small "L")
\$CZ0\r\n	Disable zero packets detection
\$CZ1\r\n	Enable zero packets detection
\$CT*\r\n	Configure timeout to fall back to a lower prioritized input when invalid or zero packets are received.  The byte "*" will be interpreted as number between 51 and 250 which results in a timeout between 1 and 200. For example when "*" is "A" (\$CTA\r\n) the number (ASCII) is 66, so the timeout that will be set is 16 seconds.
\$I*\r\n	Switch to a specific input ("I" = big "i" and not a small "L") "*" is the number of the input as character. For example when "*" is "2" (\$I2\r\n) the switch will switch to input 2. The input numbers are an internal numbering scheme of the switch. For a 4 input switch the inputs are 1-2-3-4 For a 7 input switch the inputs are 1-5-2-6-3-7-4 (when looking onto the switch from the front)

## **Firmware Update**

To avoid unnecessary problems a firmware update is recommended only if you need a special feature of a newer firmware.

### **Install Atmel Flip**

To update the firmware of the switch “Atmel Flip” must be installed (requires also Java).

It is highly recommended to restart the computer after installing “Atmel Flip” (otherwise there are often issues with Java).

This should be done before putting the switch into firmware update mode (otherwise the driver for the bootloader will not be installed automatically).

### **Bring switch into update mode**

Start the client tool and connect to the switch (upper left corner of the client tool).

(The client tool will ask for admin rights when it is started – unfortunately this is needed to find the correct COM port automatically based on the USB VID/PID).

Click “Start FW Update Mode” (upper right corner of the client tool).

The switch will disconnect from the Client tool and start in a special firmware update mode.

### **Run firmware update**

Click “Update FW” in the client tool (upper right corner of the client tool).

(COM port of the switch is not available at this time and the client tool can't connect!)

Select the firmware file - a console window will pop up and run the update.

When the update is finished, the switch will restart normally.

Sometimes the switch is not recognized after this restart – in this case just unplug it from the computer and plug it in again and the COM port should be available again.

## **Download Package**

The firmware update package contains the following files:

- Installer for Atmel Flip
- .inf Driver File
- Client tool
- Newest firmware file

(contact Cable Solutions to obtain the current files)