DIGITAL AUDIO DENMARK

Control | Pack

User Guide

Preset Switching for Thunder | Core Products

NTP TECHNOLOGY

Contents

Company Address: NTP Technology A/S, Nybrovej 99, DK-2820 Gentofte, Denmark

E-mail: info@digitalaudio.dk, Web: www.digitalaudio.dk.

Doc No. ControlPack-8001-A-4

General Description

Control | Pack provides functionality for switching routing presets in the Thunder | Core products via commands or internal triggers. Up to 32 preset configurations can be active in a unit, each with up to four different input layers – called 'buckets' - switching up to 256 sources to 256 destinations simultaneously within the period of one sample.

All inputs channels in the Thunder | Cores products: AX64, AX Center and Core 256 has a dedicated signal detection system that can detect the integrity of the input signal and which can be configured as triggers for switching any of the buckets in a preset.

Furthermore, two signal generators are built into the hardware, a sine wave pilot tone and a digital pilot tone denominated 'AE6'. The signal can be routed to any of the output channels in a unit.

The routing presets are configured via the DADman software in a dedicated preset and switching settings window. Once a unit is configured, the configuration is activated in the Thunder | Core unit. Switching control can be done via the *Pres* window in DADman that appears once a preset is configured. The control can be made from multiple DADman applications and also via a dedicated hardware panel. The Hardware panel can control the Thunder | Core unit directly without being connected to DADman.

Features

- Control | Pack is included in DADman version 5.8 and Thunder | Core firmware version 1.1.0.3.
- Routing presets are defined via DADman and are loaded in the unit and activated as natively stored routing presets.
- A total of 32 presets with any configuration of inputs, outputs and number of channels can be defined.
- A preset can consist of up to 4 layers called buckets each with up to 256 sources mapped to up to 256 outputs.
- Switching buckets in a preset can be done via signal triggers within the Thunder | Core interface, manually from DADman or via a control panel.
- All input channels in the Thunder | Core unit have signal detectors for individual detection of the signal integrity. The signal trigger logic is configured in DADman.
- Signal detection on channels can be a pilot tone trigger or an AE6 digital trigger.
- Signal detection can also be on port level for Thunderbolt 3, MADI, DADlink, ADAT or AES3 if installed.
- Built-in signal generators for programmable sine wave or AE6 signals that can be routed to any one or more outputs.
- Switching time for a bucket is within one audio sample with logic-based switching.
- Switching time for a preset bucket = 0 audio samples with manual switching.
- Response time for signal detection/triggers and switching < 1ms.

Routing Preset

A routing preset in Control | Pack can be configured with up to 256 output channels. Each preset can hold up to 4 sets of inputs sources each with up to 256 channels in a bucket. The sources in each bucket can be configured freely from all of the available input channels in the Thunder | Core unit, and the sources can be allocated to more presets in parallel. The output channels can be configured to any of the available outputs in the Thunder | Core unit. Once outputs are allocated, they will be locked and no other sources can be connected via the DADman routing matrix or the monitor profile.

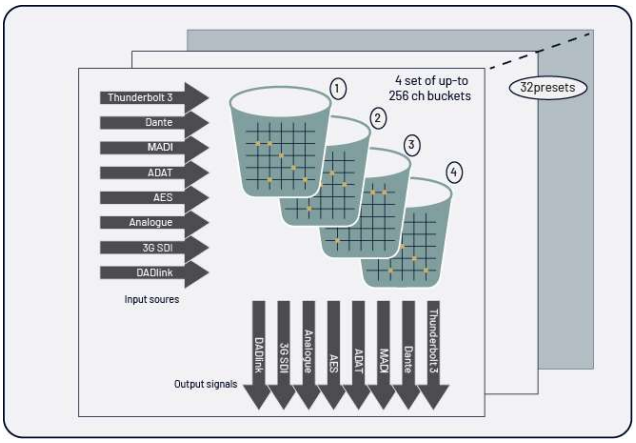

Figure 1, Routing presets and buckets

The routing presets are configured in the *Routing Preset* menu in DADman. It is possible to manage presets in different Thunder | Core devices in DADman. All preset configurations are stored in the Thunder | Core device. This allows the presets to also be controlled from an external control panel.

Preset Automation

On all input channels in the Thunder | Core units, signal detectors are implemented. For each input the PPM meter value is reported. In addition, in Control | Pack there are detectors for signal presence that can detect audio level with a threshold above -40dBfs within a 1-millisecond window. Also, there is a detector for the digital integrity signal, which is denominated AE6. Note that the AE6 detector is only relevant on the digital inputs, and the signal should not be processed.

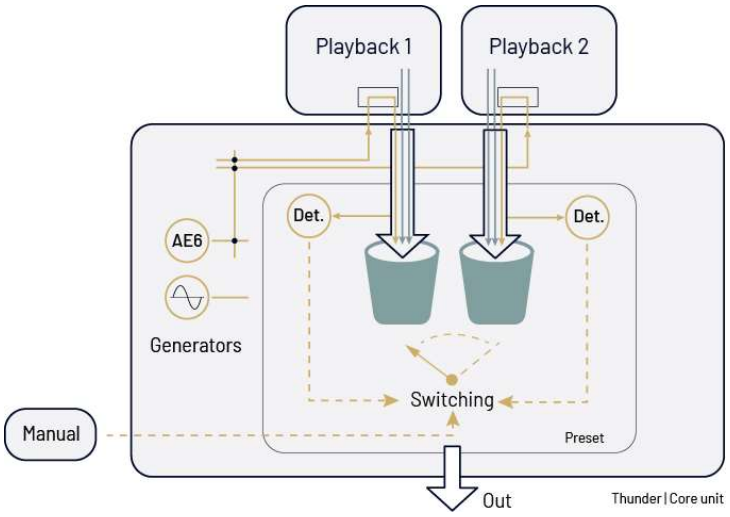

Figure 2, Detectors and automation example

The detectors can report their status to DADman, and when configured into a routing preset, the detectors can trigger switching of routing presets directly in the Thunder | Core unit. In a routing preset, up to 4 independent triggers can be configured from any input in the Thunder | Core unit. In figure 2, an example is shown for automated switching between two audio workstations based on the AE6 signal looped through the monitor path of the workstation software.

Signal Generators

On the hardware side of the Thunder | Core products, two signal generators are implemented. One is a sine wave pilot tone generator that can be set to a signal level between -60dB and 0dBFS and at a frequency between 20 Hz and 20 kHz. The other generator provides a binary, repetitive signal with the hexadecimal value 0xAE6.

The signal generators can be used as general sources in the internal matrix system of the Thunder | Core units and can as such be routed to any one or more outputs.

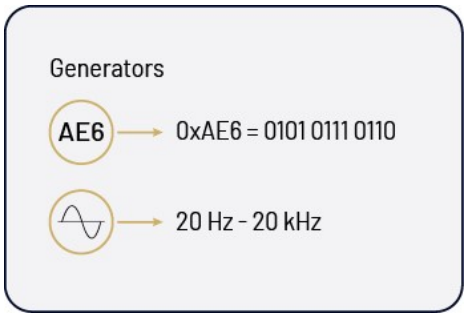

Figure 3, Signal generators

The characteristics of a digital integrity signal like AE6 makes it possible to detect if the signal is corrupted within one audio sample, however the signal must pass through a unity gain unprocessed signal chain to be properly detected. If it passes through a sample rate converter, an analogue interface or if just the level is modified, the signal pattern will be changed, and the signal cannot be recognized.

DADman Functionality

The configuration and control of the Control | Pack functionality is similar to the way the Pro | Mon monitor system works. However, with Control | Pack, more Thunder | Core units can be managed in DADman, whereas only one unit in a DADman view can work in a monitor controller configuration. The Control | Pack configuration is stored in the Thunder | Core unit. The configuration is also saved in the settings file.

Overview

Figure 4 shows the Control | Pack control strip. The controls will appear once they are configured as a horizontal view in the DADman window showing the enabled presets, indicators and controls.

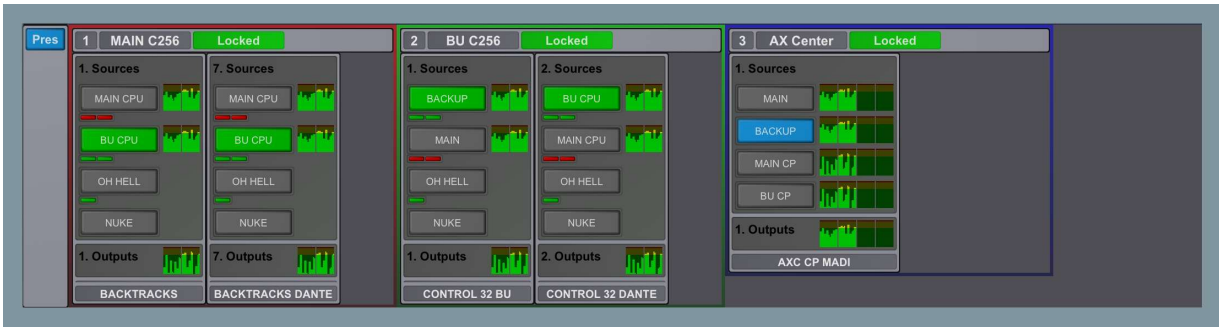

Figure 4, Control | Pack control strip

Figure 5 shows an overview of the DADman user interface with the Control | Pack functionality enabled. Note that the monitor control window and Pro | Mon can be enabled in addition to Control | Pack. This is however not shown in the below example.

The Control | Pack view has a section for each Thunder | Core unit where the functionality is enabled. In each section, the configured routing presets are shown with up to 4 bucket source selections that can be configured. A meter section is available for the sources and for the outputs. A status indication of the triggers configured for each bucket is also shown. Up to 32 presets can be configured for each unit. In the below example, two, two, and one preset have been enabled - each with four buckets.

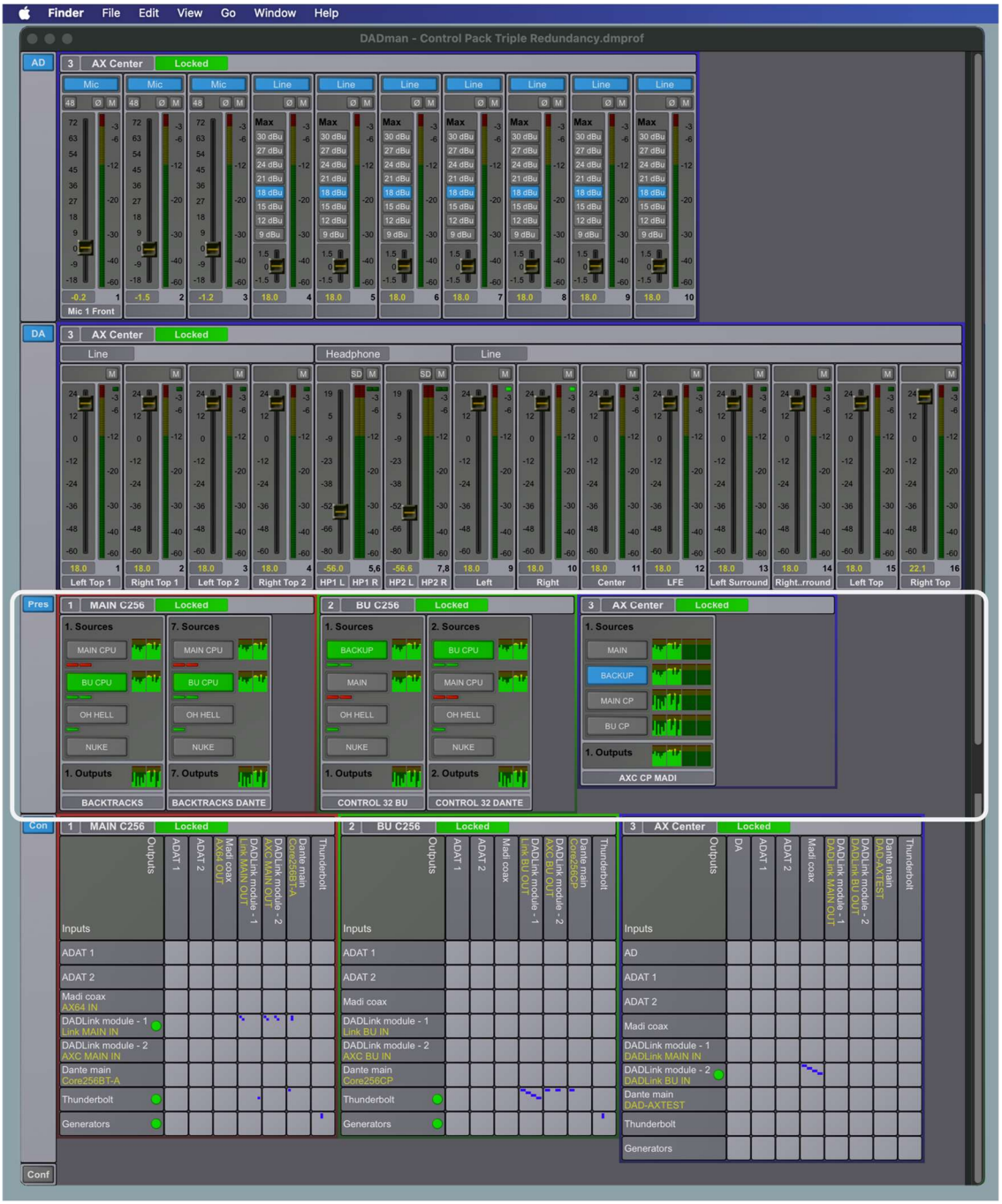

Figure 5, DADman overview with Control | Pack section

Configuration

The configuration of Control | Pack is made in the Routing Presets window, which can be accessed in the DADman settings menu. The created configuration is instantaneously loaded into the Thunder | Core unit and will be stored there. The configuration is also a part of the settings file, which can be saved on a computer.

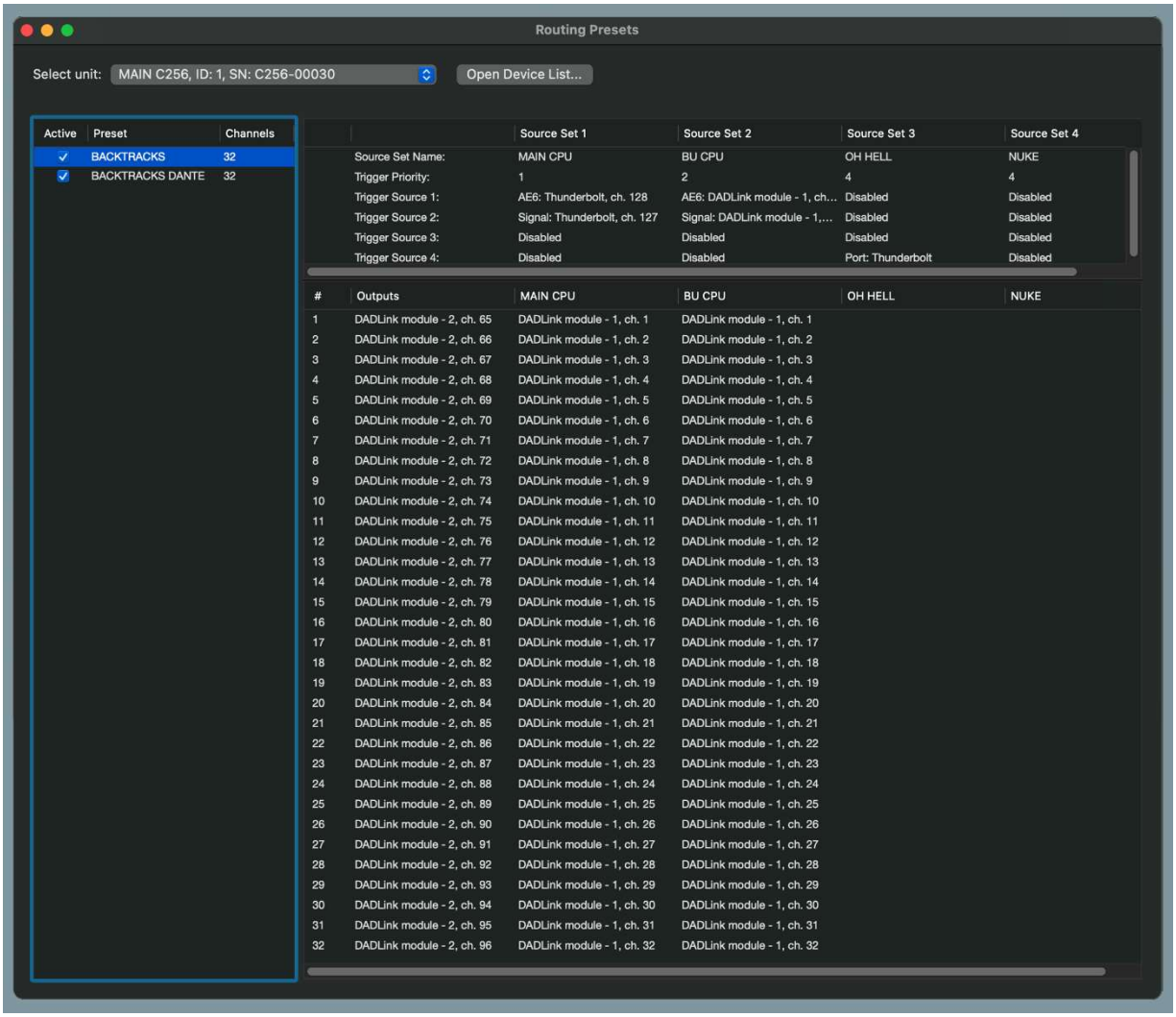

Figure 6, Configuration of Routing Presets

There are four elements in configuring Control | Pack

1. Selection of the Thunder | Core unit to be configured
2. Adding a Routing Preset
3. Setting up automation with triggers
4. Selection of input and output channels

The four areas in the configuration window are shown in figure 7.

Figure 7, Configuration of Control | Pack

1. Selection of the Thunder | Core unit to be configured

From this dropdown menu, select the Thunder | Core unit where the Control | Pack presets are applied. Note that the unit must be connected to DADman. If the unit is not connected, the device list can be opened directly via the *Open Device List* button the Routing Preset window.

2. Adding a Routing Preset

In the preset list window, the current preset is visible and new presets can be defined. In order to define a preset, right-click on the section and a dialogue appears where you can add a preset. Once the preset is added, it will have a default name. By right-clicking on the preset line, the name can be changed, and the number of output channels can be given. The preset is active when checked.

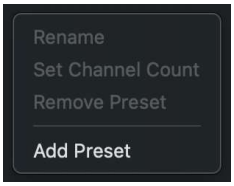

Figure 8, Preset dialogue

3. Setting up automation and triggers

In this section, the Source Set Name (bucket name), the trigger priority and the four possible trigger sources are defined for each bucket in the routing preset. When a new preset is defined, the following should be done for each of the buckets in use.

1. Right-click on the Source Set Name and enter the name.
2. Set the trigger priority for the bucket. Triggers will be discussed in the section below.
3. Select the trigger source. 1 – 4 sources can be defined.

Trigger sources can be selected from any of the available input sources in the Thunder | Core device.

A trigger source is defined by the type of trigger that should be used on the input and the actual input. There are three types of detectors that can be used as triggers:

- AES6: Digital pilot tone
- Signal Level: Pilot tone / signal
- Port: Thunderbolt 3, MADI, DADlink, ADAT or AES3 if installed

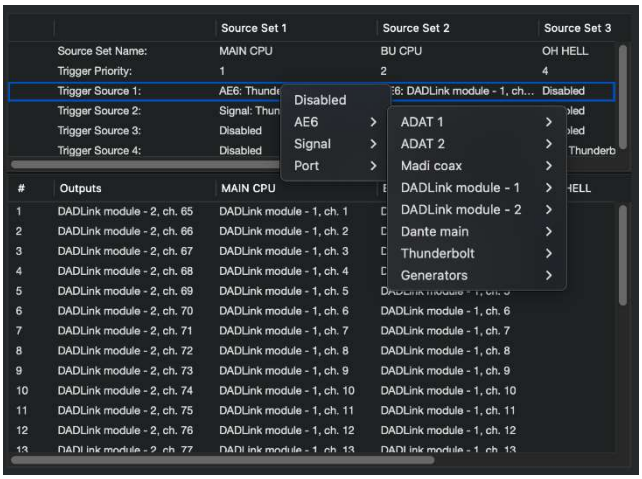

Figure 9, Trigger sources

Any input can be selected as a trigger source. An input selected for triggers can also be routed and used as any other audio input.

The criteria that define the automated switching or manual switching is defined by the combination of the priorities set for the bucket and the status of the detectors.

When the switching is automated, the sources with the highest priority where all detectors are OK is routed to the outputs. If a detector gives an error the input from the next priority level is routed.

If the priority level is the same for all buckets switching is done manually in the DADman GUI independently of the status of the detectors.

When the switching is automated, it can be manually overridden in the DADman GUI. Please refer to the description in the Operation section below.

4. Selection of input and output channels

Configuration of the channels can be done by right-clicking a channel column. In a blank preset, no output or input channels are configured. A number of lines will appear as set in the preset list window. When right-clicking on the output column, a list of available output channels in the unit will appear. When right-clicking on the following line, there is an option to select the next output channel available, to fill up all channels consecutively, or to select any other channel. The same mechanism applies to the sources configures into the input set buckets. The systems will allow any combination of inputs and outputs to be selected. For outputs, however, these can only be selected and allocated once.

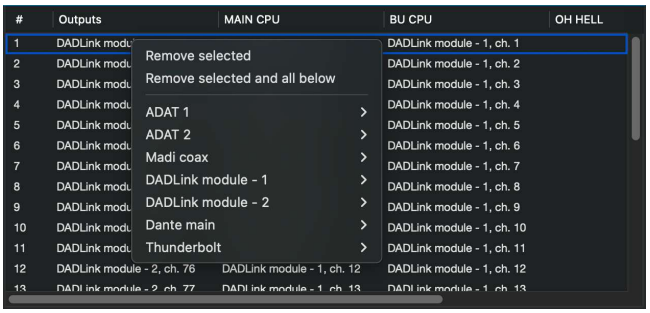

Figure 10, Input and output selection

Operation

Once Control | Pack is configured in the Routing Preset window, the controls appear in the DADman window. For each bucket, there are section buttons with the names defined in the Routing Preset configuration. Beside the buttons (1) and (2), there is a small real time PPM meter (4) that shows the level of all the channels in the bucket. Up to 256 channels can be shown in groups of 16. Below the button, there are status readout of the 0 – 4 signal detectors that can be assigned to the bucket.

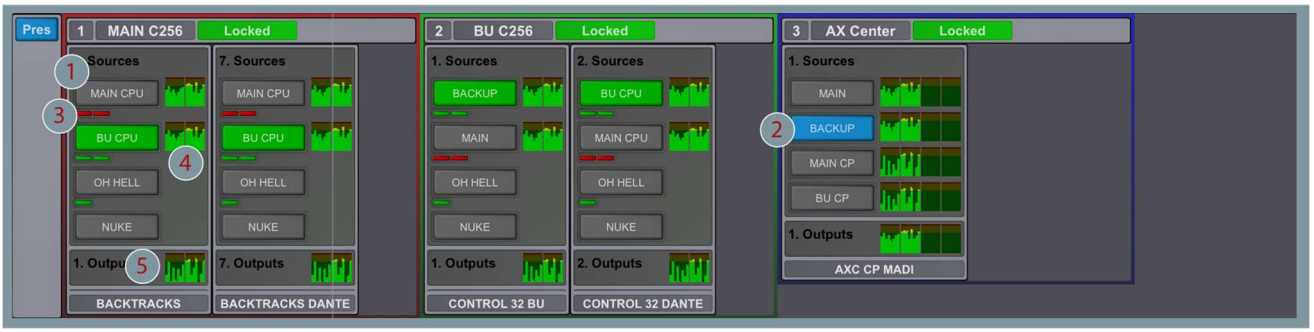

Figure 10, DADman Control | Pack window

When the switching is running under automation, the button related to the bucket that is routed will be green. If the buckets have equal priority, the switch will be manual (2). This is indicated by a blue button color when activated. If a Routing Preset is automated, it can be set to manually by double-clicking the button for the bucket, which turns the button blue. Automation can be enabled by double-clicking the button again and it will turn green, indicating it is ready to switch (armed). If the signal detectors have detected errors, the button will turn red.

For all buckets, there is a real-time PPM meter showing the output signal (5).