Dveous CPL Interface

CPL Protocol Converter Description

The CPL protocol converter is a separate board that plugs into an input module slot on either a Dveous or a Brutus and provides an interface to a Tek/GVG Model 3000 or 4000 switcher.

CPL (Command Program Language) is a GVG protocol, but in addition to being a software only protocol, it has some stringent hardware requirements which are quite different from normal RS-422 (it's actually a 307.2 Kbaud HDLC signal). The protocol converter board converts this high speed signal to three 76.8 Kbaud RS-422 signals. You use all three for a Brutus, but only one for a Dveous.

(FYI.... we will publish the "converted" protocol so that other devices can control Dveous directly using the straight 76.8K RS-422 port)

There are four main areas of control with the protocol:

Aux Bus Control

Each Dveous channel will save both a Front and a Back crosspoint number per keyframe, with selections of crosspoint one to 64. This provides true on-edge switching of the Aux bus any time the transform engine is rotated around to show the opposite side. You can select crosspoints from either the switcher control panel OR from the Dveous control panel. They both reflect the changes that you do on the other.

Timeline run control

This is an enhancement over Peripheral bus, which just "triggers" the current DVE effect. The CPL timeline run is a field accurate control which allows you run, rewind, jog, and variable-speed play the Dveous effect from the switchers timeline.

Effect save and recall

When you save or recall an effect on the switcher, Dveous (or Brutus) will also save or recall the corresponding effect and will keep track of where it's mapped on the switcher.

Tallies

Each transform engine in Dveous provides a hardware based tally, which looks at the key signal to see if there is any bit of the picture showing on air. The tally information for each transform is sent to the switcher, which then looks at what source is being sent to the DVE, and whether the DVE is on air. The switcher then tallies the appropriate source through its main tally system.

Dveous software also has a "No Crosspoint" mode, which is a "Live" button on the control panel. When you turn this on, Dveous ignores ALL crosspoint recalls in the keyframes and allows the operator to call up crosspoints "hot".

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Introduction

This document describes the interface between the DVEOUS and the protocol converter board, or an external controller.

The protocol gives the ability to control 4 Aux Bus source selection from both the DVEOUS and the switcher. It also implements on edge switching. Also there is the ability to run the timeline.

The protocol is based on the GVG CPL protocol used for GVG3000/4000 to Krystal control.

Interface Specification

The interface is RS422 running at 76.8Kbaud, Odd parity. Data is delivered in variable sized messages.

Message Format

Byte Count	1 byte
Message Token	1 byte
Message Data	0-253 bytes
Checksum	1 byte
Byte Count	= Message Token + Message Data
Checksum	= Byte Count + Message Token + Message Data

Message Tokens

SPCL_SET	0x08
SPCL_ONLINE	0x03

General

Before any transaction can occur communication must be established between the DVEOUS and the external controller. This is done by the controller sending a SPCL_ONLINE message. If the DVEOUS is connected then it will immediately respond with an SPCL_ONLINE message.

Host	SPCL_ONLINE
DVEOUS	SPCL_ONLINE

Once communication has been established then the controller each field will send SPCL_ONLINE messages. DVEOUS at the beginning the of the next field will respond with an SPCL_SET command which will give the Aux Bus source, current effect, See SPCL_SET for more details. This will occur within the first 3mS of the field. This will continue until the controller stops sending SPCL_ONLINE messages. The SPCL_ONLINE messages from the controller should occur after the first 3mS.

Host	SPCL_ONLINE	SPCL_ONLINE
DVEOUS	SPCL_ONLINE	SPCL_SET	SPCL_SET

Also, once this communication has been established any Message token can be sent. These messages can be sent at anytime during the field, and processing of the message will begin on the next field.

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Message Format

1. **DVEOUS to External Host**

    1.1. **SPCL_ONLINE**

    This message is used to acknowledge the Host when connection is being established.

    0x01, SPCL_ONLINE, CheckSum

    1.2. SPCL_SET

    This message is a per field message which is issued once connection has been established between DVEOUS and the host.

    0x10, SPCL_SET, MD0…MD14, CheckSum

    The Message Data has the following format

Byte 0	Front Source for Aux Bus 1A
Byte 1	Back Source for Aux Bus 1A
Byte 2	Front Source for Aux Bus 1B
Byte 3	Back Source for Aux Bus 1B
Byte 4	Front Source for Aux Bus 2A
Byte 5	Back Source for Aux Bus 2A
Byte 6	Front Source for Aux Bus 2B
Byte 7	Back Source for Aux Bus 2B
Byte 8	0, Reserved
Byte 9	0, Reserved
Byte 10	On Air Aux Bus 1A
Byte 11	On Air Aux Bus 1B
Byte 12	On Air Aux Bus 2A
Byte 13	On Air Aux Bus 2B
Byte 14	Current Effect Loaded

    Crosspoint selection for any AUX BUS occurs on changes to the Front Source selection. It is required that the Source should switch on the next field boundary after receiving this message. Valid sources are 0 to 64.

    The Back Source information can be used for status information.

    On Air is a Boolean to indicate that the AUX BUS is contributing to the final output of the DVEOUS picture.

    Current Effect loaded is the last effect recalled into the DVEOUS workspace buffer. Valid range of numbers, -1 = No effect has been loaded, 0..99 is the effect number.

Dveous CPL Interface

2. External Host to DVEOUS

2.1. SPCL_SET

This message is used to deliver commands from the Host to DVEOUS and has sub messages.

Message Format

Byte Count	1 byte
Message Token	1 byte
0x1, Aux Bus 1	**1 byte**
0x2, Aux Bus 2	**1 byte**
MSB Sub Message Token	**1 byte**
LSB Sub Message Token	**1 byte**
Sub Message Data	**Byte Count - 5**
Check Sum	1 byte

Sub Message Tokens

PID_EFFECT_POSITION	0x036b	(875)
PID_A_SIDE_SOURCE	0x0A52	(2642)
PID_B_SIDE_SOURCE	0x0A53	(2643)
PID_LOAD_EFFECT	0x0376	(886)

2.2. PID_EFFECT_POSITION

This command sends a S15.16 frames value to set the current position of the effect. The effect position will be reached 7 fields after receiving the command. Note DVEOUS rounds to the nearest field value.

Sub Message Format

0x00	Reserved
0x00	Reserved
0x00	Reserved
0x00	Reserved
0x00	Reserved
0x00	Reserved
0xMSB	
0xLSB	S15.16 frames

2.3. PID_A_SIDE_SOURCE

This command sets the Source for the A side of either AUX BUS 1 or 2. The AUX BUS change will be sent back to the host via the SPCL_SET (5.1.1) in the next field.

Sub Message Data Format

0x00	Reserved
0x00	Reserved

0x00	Reserved
Aux Bus Number	0x01= Aux Bus 1, 0x2 = Aux Bus 2
0x00	Reserved
0x00	Reserved
0x00	Reserved
Source Number	0..64
0x00	Reserved
0x00	Reserved

2.4. **PID_BSIDE_SOURCE**

This command sets the Source for the B side of either AUX BUS 1 or 2. The AUX BUS change will be sent back to the host via the SPCL_SET (5.1.1) in the next field.

Sub Message Data Format

0x00	Reserved
0x00	Reserved
0x00	Reserved
Aux Bus Number	0x01= Aux Bus 1, 0x2 = Aux Bus 2
0x00	Reserved
0x00	Reserved
0x00	Reserved
Source Number	0..64
0x00	Reserved
0x00	Reversed

2.5. **PID_LOAD_EFFECT**

This command will cause DVEOUS to load an effect from the specified register.

Sub Message Format

0x00	Reserved
0x00	Reserved
0x00	Reserved
0x01	Enable Load
0xMSB	
0xLSB	Effect Number, -1 .. 99

2.6. **SPCL_ONLINE**

This message is used to establish communication with DVEOUS. Once the link has been established this message is sent every field to keep it alive. The host should expect a SPCL_SET from the DVEOUS on the next field boundary. If it isn't received it can be assumed that communication has been lost from the DVEOUS.