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RS-232 to DMX512 Interface, 2nd Generation

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The second generation RS-232 to DMX512 interface has numerous features beyond the original device. The protocol described in this document supports the new features. The protocol described for the original RS-232 to DMX512 interface is not supported by this device. The changes required to move to the new interface are minimal and are described later in this document.

Connections

The RS-232 signals are available on the front panel DB-9M connector and on the 3 pin female XLR connector on the rear panel. Please connect to only one of these ports. You may not use the two ports simultaneously.

The front panel DB-9M connector pinout is:

Pin Number	Function
2	Receive data
3	Transmit data
5	Common

The rear panel 3 pin XLR connector pinout is:

Pin Number	Function
1	Common
2	Receive data
3	Transmit data

The male and female 5 pin XLR connectors are in parallel. When the interface is configured for mode zero (DMX output), only the female output connector should be used. When the interface is configured for mode one (DMX input), the external DMX source should be connected to the male input connector. The female output connector can be used to connect to other DMX devices. If the female output “thru” connection is not used, a 120 terminator should be connected.

The pinout for the 5 pin XLR connectors is:

Pin Number	Function
1	Common
2	DMX data minus
3	DMX data plus
4	connected from input to output only
5	connected from input to output only

Indicators

The red POWER LED will illuminate when the interface is powered.

The green MIMIC LED has no function at this time

The green SIGNAL LED will flash when an RS-232 command is received while in mode zero. While in mode one, the SIGNAL LED will turn on when DMX input is present.

Address switches

While in mode one, the address switches select a "channel of interest". The interface will report changes in level for the channel of interest in the standard level format described in the protocol below.

Communication port settings

The RS-232 port is configured with the following settings:

Baud	9600
Start bits	1
Data bits	8
Parity	None
Stop bits	1

No handshake signals are required or provided.

The RS-232 port is full duplex and the receiver has a 256 byte circular buffer.

If you are using a Windows computer, the comm port flow control must be set to None. The FIFO buffers should be disabled.

Protocol

All commands are sent in plain ASCII format. Each command is terminated with a carriage return <CR>. This is the character used by the interface to trigger any action. The hexadecimal value for the <CR> is 0x0d.

After receiving a carriage return, the interface will respond with the characters received followed by "OK" if the command was formatted and processed successfully. If there was any syntax problem, the interface will respond with the characters received including the error-causing character and "Error".

Spaces between commands are optional. All letters can be either upper or lower case. All channel numbers are in the range of 1-512. All channel levels are in decimal in the range of 0-255. All preset numbers are in the range of 1-20. All times are in the range of 0-999. Leading zeros are allowed and are optional. The total number of digits must not be more than is allowed for the given parameter. For example, sending a preset number as "005" will cause an error because only two digits are allowed in preset numbers. Sending "05" as a preset number is acceptable. Similarly, a channel number of "004" is OK while "0004" would cause an error.

One special command is executed immediately without the <CR> terminator. Sending the ASCII dollar sign character (\$) will cause the interface to immediately reset. This feature was added as a fallback in case the input buffer becomes overrun. Any pending actions are aborted when this character is received.

ASCII character	Command	Parameters
C	Channel number	1-3 digit number (range 1-512)
F	Fade time for a preset	1-3 digit number (range 0-999)
H	Heartbeat (on/off)	1 digit (range 0-1)
L	Channel level	1-3 digit number (range 0-255)
M	Mode (DMX input/output)	1 digit (range 0-1)
P	Play preset	1-2 digit number (range 1-20)
R	Record preset	1-2 digit number (range 1-20)
S	Slave support	1 digit (range 0-2)
T	Channel or preset fade time	1-3 digit number (range 0-999)
U	Update software	2 digit number (must be 42)
V	Version number	none
Z	Set all levels to zero	none
@	Channel level	1-3 digit number (range 0-255)
?	Query	1-3 digit number (range 0-512) or letter P
\$	Reset interface	none

Setting a channel level

Commands relating to setting a single channel can be send in a one packet with a single carriage return at the end. The format for setting a channel to a level is:

C ### L ### <CR> or: C ### @ ### <CR>

For example, setting a channel to a level could be sent as:

C 15 L 255 <CR>

In this example, channel 15 would be set to a level of 255.

A time may also be assigned to the movement of a single channel. The format is:

C ### L ### T ### <CR>

For example:

C 15 L 45 T 5 <CR>

In this example, channel 15 would fade from its current level to a level of 45 in 5 seconds.

Note that multiple channels may not be moved within a single command. The channel

command supports one channel move at a time.

The “@” character may be used instead of the “L” character to indicate the level for the channel. This allows for a command such as:

```
C 15 @ 45 <CR>
```

Recording a preset

The RS-232 to DMX512 interface can record 20 different presets. Once levels have been set using the channel command, those levels can be recorded in a preset for later recall. The format for this command is:

```
R ## <CR>
```

For example:

```
R 5 <CR>
```

In this example, the current output levels will be recorded into preset 5.

A default time of 5 seconds is recorded with each preset. The time recorded with the preset can be changed using the “F” (fade) command.

Note that a preset may be recorded from levels set by the interface while it is in mode 0. DMX levels from an outside source may be captured to a preset while the interface is set to mode 1.

Playing a preset

The 20 presets can be recalled using the play preset command. The interface uses a “radio button” action. When one preset is recalled, all output channels go to the recorded levels for the new preset. Thus, only one preset is active at a time. Once the preset is “live”, individual channels can be set to new levels to create new presets or to modify the existing look. The format for playing a preset is:

```
P ## <CR>
```

For example:

```
P 5 <CR>
```

In this example, preset 5 will be recalled. The output will fade to the levels in preset 5 in the fade time recorded with the preset.

The fade time for a preset can be temporarily overridden using the time parameter in the preset recall command using the format:

```
P ## T ### <CR>
```

For example:

```
P 10 T 8 <CR>
```

In this example, preset 10 will be recalled. The output will fade to the levels in preset

10 using an 8 second fade regardless of the fade time recorded with preset 10 originally. Note that this new fade time is temporary. To permanently change the fade time for the preset, you must recall the preset and then re-record it with the new fade time as shown in the “recording a preset” command.

Changing the fade time recorded with a preset

Each preset has a default fade time of 5 seconds. This is set when the preset is recorded. The fade time associated with each preset can be changed so that when the preset is played, its fade time is also recalled. The fade time command sets the time for the last preset recalled. To set the time of a particular preset, recall that preset using the play preset command and then set its time using the command format:

```
F ### <CR>
```

For example:

```
F 10 <CR>
```

In this example, the currently active preset’s fade time will be set to 10 seconds.

Clearing outgoing levels

The ‘Z’ (zero) command is used to set all DMX channels to 0. This is useful for clearing all levels as a starting point to build a new preset. The format for the command is:

```
Z <CR>
```

Entering this command will immediately set all channels to zero. No time parameter is allowed with this command.

Software version

The ‘V’ (version) command is used to view the installed software version number. The format for the command is:

```
V <CR>
```

There are no parameters allowed with this command.

Setting the mode

The ‘M’ (mode) command is used to select whether the DMX port is set to transmit or receive. While in transmit mode, the interface is the source of DMX like a console. While in receive mode, an external DMX source can be used to set up looks. The RS-232 to DMX interface can record those looks into its presets and queries can be used to retrieve the current incoming DMX levels. Mode 0 sets the interface to transmit DMX. Mode 1 sets the interface to receive DMX. The format for the mode command is:

```
M # <CR>
```

For example:

```
M 1 <CR>
```

In this example, the interface will be set to receive DMX.

The mode selection is stored in non-volatile memory and will be recalled on power up.

Query for information

The '?' (query) command is used to request status information from the interface. The current level of a specific channel can be requested. When the query number is in the range of 1-512, this command will be triggered. The command format is:

```
? ### <CR>
```

For example:

```
? 451 <CR>
```

In this example, the interface would return the current level of channel 451 in the format:

```
C451@??? <CR> (where ??? is the decimal level for the channel)
```

Sending a query for channel 0 will cause the interface to respond with the current levels for all 512 DMX channels. For example:

```
? 0 <CR>
```

In this example, the interface would return the values for all channels in the format:

```
C001@???<CR> (where ??? is the value for the channel)  
C002@???<CR>  
...  
...  
C512@???<CR>
```

Note that all channel level queries can be used to determine the level of DMX being sent by the interface in mode 0 or of incoming DMX levels while in mode 1.

Sending a query for 'P' will cause the interface to respond with the currently active preset. For example:

```
? P <CR>
```

Note that if a channel level has been changed after a preset has been recalled, the preset number reported will be preset 0. This indicates that the levels are not representative of any recorded preset.

In this example, the interface would return the number of the active preset in the format:

```
PRESET ## <CR>
```

Setting the heartbeat

The 'H' (heartbeat) command is used to select whether the heartbeat is on or off. When enabled, a period "." is sent from the interface every 1 second to allow a control system to detect that the interface is connected. Setting the heartbeat equal to 1 turns the feature on. Setting it to 0 (the default) turns the feature off. The format for this command is:

H # <CR>

For example:

H 1 <CR>

In this example, the interface will start sending heartbeat characters.

The heartbeat selection is stored in non-volatile memory and will be recalled on power up.

Setting the slave support mode

The 'S' (slave) command is used to select whether the interface will support a Preset 10 slave station on the DMX port. When enabled, alternate start code packets are sent from the interface and slave stations are allowed to reply to select presets. The default value for this feature is 0 (disabled). When set to 1, slave stations are enabled. The interface must be queried to determine the current active preset. When set to 2, slave stations are enabled and the interface will send a message when a slave station has changed the active preset. No query is needed to determine the current preset when this parameter is set to 2. The format for this command is:

S # <CR>

For example:

S1<CR>

In this example, the interface will set to support slave stations, but it must be queried to determine the current active preset.

The slave support value is stored in non-volatile memory and will be recalled on power up.

Resetting the interface

The '\$' command is used to reset the interface. This special command does not need the <CR> to be executed. As soon as the interface receives this character, it will reset the interface. This is equivalent to cycling the power to the interface.

Updating the software

The 'U' (update software) command is used to load new versions of the software into the interface through the RS-232 port. There is a separate document covering the details of this command. Do not invoke the software update command without reading that document.