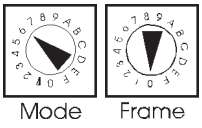
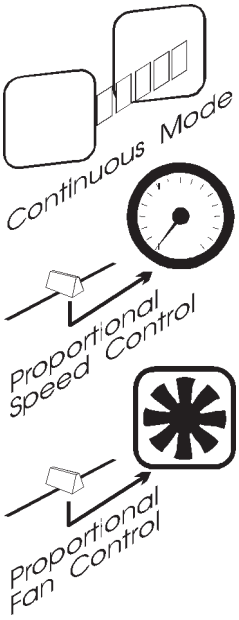
MODE 6 - '*FAST*' THREE CHANNEL OPERATION





Mode 6 - *'Fast'* Control of Position, Gel and Fan Speed

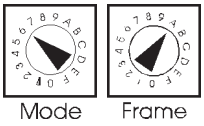
The fast control gives standard operation of the colour changer, but with the Gel speed controlled by DMX address 510 and the Fan speed controlled by DMX address 511. This is designed for where the lighting operator needs overall control of the fans and scrolls, but without the need to individually select each Colour Changer. For example, in rehearsal where the designer is moving quickly between states, the gel speed of the complete rig can be easily limited on a single fader to avoid all the scrollers jumping from state to state. In the same way, the fan speeds may be controlled for when total silence is required during a section of a show.

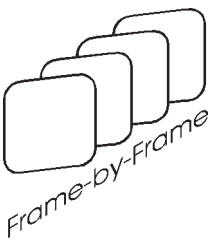
DMX Address 510 @ 00 Max Speed
FF Slowest Fade

DMX Address 511 @ 00 Fans Full On
FF Fans Off

The gel speed control follows an exponential curve, allowing fine tuning of cues at faster times, but allowing very long stepless cues to be executed.

For control consoles whose patch is limited to less than 512 dimmers, an internal jumper can be set such that the speed and fan addresses are 191 / 192.

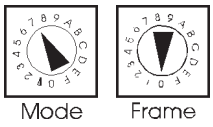


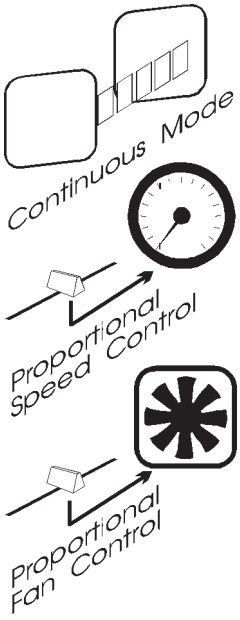


'*Fast*' Frame-by-Frame Control

Fast control setting can be used in frame-by-frame mode by setting the Frame selector to the number of frames in the gel string. Fan and Gel Speed control are as above.

MODE 7 - THREE CHANNEL CONTROL

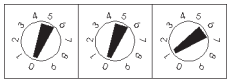




Mode 7 - Control of Position / Fan / Gel Speed

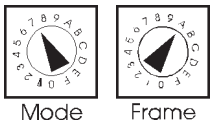
Where total flexibility is required, the Rainbow can be controlled using three control channels. Lighting cues can be plotted with colour information, limits on the maximum speed of gel movement and fan speeds. Each Rainbow uses three independent DMX addresses for control of these features:

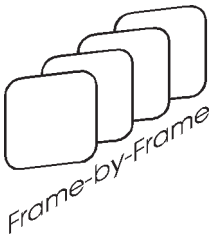
For example:


Address

Gel Position

Address	Position	Gel Speed	Fan speed
21	21	22	23
24	24	25	26
27	27	28	29

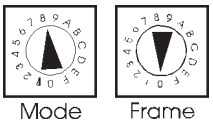


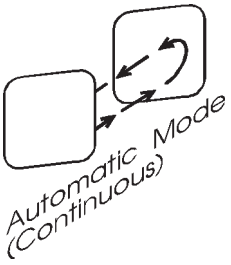


3 Channel Control with Frame-by-Frame operation

As with other modes, Frame by Frame operation is selected by setting the frame length (No. of Frames - 1) on the Frame switch on the rear of the Rainbow. All of the other features available with 3 Control are possible, with only full frames of colour displayed.

MODE 8 - CONTINUOUS OPERATION MODE





Mode 8 - Continous Fade Mode

In situations such as exhibitions, a continuously changing colour may be required. This has normally needed a control console to give constantly variable control input to the colour changer. This is a costly solution and also limits the resolution of the fade to the 8-bits of DMX. Mode 8 in the Pluscard allows the user to set up a smooth fade across the complete length of the Gel String, whilst the Rainbow is only supplied with 24 volt DC power.

To select this feature simply set the Mode Selector to 8.

TIMING OF AUTOMATIC FADES

The fade timing is controlled by the Frame switch. Set the Frame switch to 1 for the slowest fadetime, and F for the fastest fadetime. Setting the Frame switch to 0 stops the movement.

In order that many Rainbows may be synchronised to each other, the Pluscard will reset to zero on power-up. After a preset time (approx 25 seconds), the continuous operation will start with all colour changers synchronised together.

FAN CONTROL DURING AUTO OPERATION

When Mode 8 is selected, the internal fan on the 15" Plus is controlled from the Fan switch on the lower front panel.

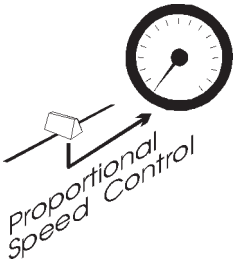
FAN CONTROL FROM DMX

With Modes 3-7, it is possible to control the fan from the DMX data input to the scroller. With '*Fast*' operation (Mode 6), all fans are controlled by DMX address 511. With 2 and 3 channel control, each fan has its own address.

Important points when using DMX fan control are:

- Once modes 3-7 are selected, the HI/LO fan switch on the Rainbow is disabled.
- Control is reverse-proportional such 00%=Full and FF=OFF. This can be reversed by a jumper setting on the pcb if needed. This is useful if fan levels are to be patched in with light intensity.
- A thermal sensor will override the fan control and bring the fans on to maintain an acceptable operating temperature on the pcbs.
- If no DMX data is present for the address selected, the fans will default to full speed.
- The selected fan speed is indicated on the data light on the base of the Colour changer. This can be disabled in software if required.
- Fan control can be changed from proportional control to externally controlled HI / LO selection via externally reprogrammable software.

SPEED CONTROL FROM DMX

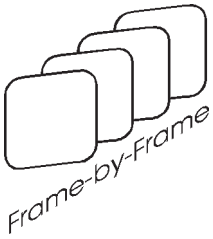


The ability to control the maximum gel speed is important for smooth scrolling between colours and consistently quiet colour changes irrespective of the limits of the incoming DMX control signal. Where required, the processor calculates fades using 12 bit levels which avoids the 'stepping' associated with 8-bit DMX signals. This is especially critical for slow fades on long gel strings and larger colour changers (15", 22", 26" etc)

When using speed control, the 12-bit fade resolution is only effective if the PlusCard fade time is **longer** than the control signal fade. Where speed control is required from the PlusCard, the best results will be achieved if the position channel changes with time 0 and the time information is sent on the separate channel.

If power is disconnected and reconnected to the Rainbow, the PlusCard will hold the last good DMX value. Once it receives a new valid level, it will fade at medium speed to achieve this level. When the gel position matches the input level, the PlusCard resumes normal operation. This prevents the colour changers racing to a level if the power or data is accidentally lost.

'FRAME BY FRAME' MODE



In all operating Modes (0-7), the PlusCard can be set to only display full frames of colours, stepping from colour to colour when the control input crosses standard threshold levels. This is called Frame-by-Frame mode and is controlled from the 'Frame' control on the rear of the PlusCard. The different profiles for an 11 colour scroll are shown below. The scrolling speed between full colours is set by the relevant mode selected: in modes 0 to 5, the gel moves at the preset speeds; for modes 6 and 7 the inter frame gel speed is controlled by a DMX address.

Selecting Frame-by-Frame Mode

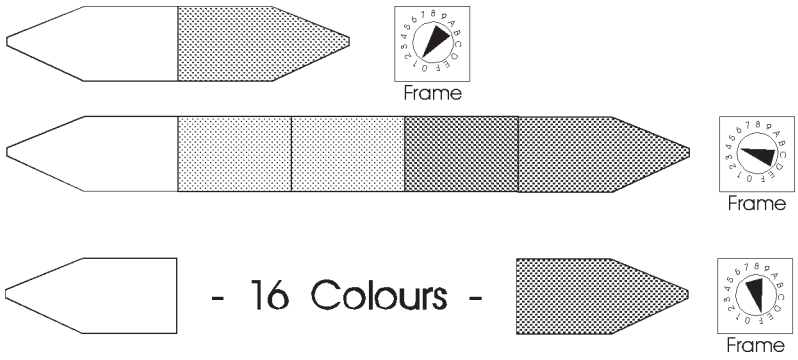
The 16 position 'Frame' select switch is labelled 0-9 and A-F where A=10, B=11 etc. Where proportional position control is required, select the switch to position 0 (Frame by Frame off). For Frame-by-Frame operation, select the number of frames after frame 0.

For example:

2 Colours
Frame=1

5 Colours
Frame=4

16 Colours
Frame=F



The Frame-by-Frame software has been designed to include hysteresis and 'dead bands' between colours (typically 4%). This avoids any unwanted repeated changes due to noisy analog signals.

MODES 9 TO F - RAINBOW SETUP / TEST MODES

The PlusCard is fitted with a suite of test routines and diagnostic systems in the software. This ensures that whether on the bench or in the rig, the status of the system can be checked and the performance tested by the user without the need for an external control system or expensive test equipment.

These tests are selected by setting the mode switch to the one of the following settings. When a test routine is selected, other attributes remain unchanged unless altered, but control from DMX is halted until an operating mode is selected.

Mode 9 - Fan Drive Test
The internal and external fan control can be tested by selecting fan levels on the Frames selector.

Mode A - Reserved for Future Development

Mode B - Self and Functional Tests
The PlusCard is fitted with full self testing for factory and service use which are summarised below. For a full description of the features, check the Pluscard technical manual.

Mode	Frame	Function Description
B	0	RAM Test
	1	Posn test - Fades Gel Position Up and Down
	2	Fan Test - Fades Int/Ext Fans Up and Down
	3	Switch Test #1 - Checks Sw 1,2,3,6 in Posn 9
	4	Switch Test #2 - Checks Sw 1,2,3,6 in Posn 6
	5	Jumper Check - Checks jumper settings externally
	6	DMX Signal Check
	7	Indicates Program Version in PROM
	8	Indicates Program Version in SRAM
	9	Indicates correct I^2C communication operation
	A	Download via PC-link has priority
	B	RHT Link has priority
	C to F	Reserved for future use.

RAINBOW SETUP / TEST MODES ...CONT

Mode C - Micro Set of Gel Position

This allows the setting of the gel position using 12 bit accuracy. This can be used to check the Frame tables or set accurate positioning. The 12 bit accuracy allows the scroll to be divided into 4096 steps. These levels are used to set frame by frame positions and for the ultra-smooth slow crossfades using on-board speed control. The filter movement is at a preset medium speed.

The levels are set in hexadecimal using the Address and Frames switches as follows:

Address (0 - 255_{DEC})= Most significant 8 bits of level = Coarse
Frame (0 - F_{HEX}) = Least significant 4 bits of level = Fine

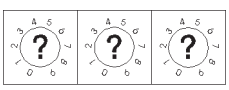
Selection of Position ADE_{HEX} (2782_{DEC})
Highest 8 bits = AD_{HEX} = 173_{DEC} = Address Setting
Lowest 4 bits = E_{HEX} = Frames

Mode D - 100% Output for Loading/Trimming

Fades the output level to 100% irrespective of control input. This can be used when loading and trimming the colour changers on the bench to avoid the need for a DMX controller. The speed of the fade is controlled by the Frames selector as follows:

Frame Selector:	Speed:
0 and 4-E	Stop
1	Slow
2 and F	Medium
3	Fast

Example: Slow fade to 100%



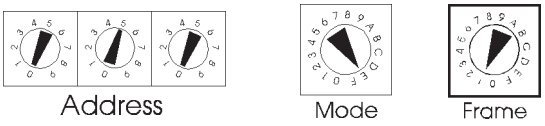
Mode E - Percentage Level Set using Address Selector

Selects an output level between 01 and 99% irrespective of the control input. This can be used to trim the scroll or to compare with a console output. The percentage level is selected on the Address Selectors and the speed is controlled from the Frame selector as follows:

Address	Level
01	01 %
nn	nn %
99	99 %

Frame Selector:	Speed:
0 and 4-E	Stop
1	Slow
2 and F	Medium
3	Fast

Example: Slow movement to 50%

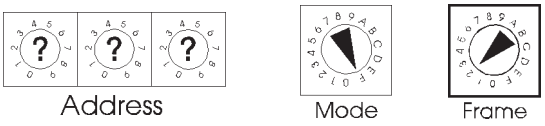


Mode F - 00% Output for Zero Set / Trimming

Fades the output level to 00% irrespective of control input. This can be used when loading filter in to the colour changer without the need for a control console. The Frame selector is used to control the speed of the crossfade as follows:

Frame Selector:	Speed:
0 and 4-E	Stop
1	Slow
2and F	Medium
3	Fast

Example: Medium fade to 00%



RAINBOW SETUP / TEST MODES ...CONT

NOTE: Gel Position after Exiting Test Modes

Upon exiting any of the test modes and selecting one of the operational modes between 0 and 7, the PlusCard will check for a valid DMX input. If none is detected, the gel position will remain at the last valid position before entering test mode. If a valid level is detected move the gel at medium speed until the position equals to the input position, from when it will track the input as per the mode, frame, and address settings. This will give a smooth crossfade to position avoiding any undue stress on the scrolls.

As the Rainbow Colour Changer also has a permanent memory, the position memory is retained on power down. On power up, the PlusCard will go to either the value on power down (No DMX input), or will move the gel at medium speed to the new DMX input value.

APPENDIX A - DIAGNOSTIC LEDS

The Plus Card is designed to use both the existing diagnostic leds on the base of the Rainbow and two rear mounted leds to give feedback as to the operational status of the PlusCard and the input signal.

In normal operation the diagnostic LEDs indicate the following:

DATA Led - Green (Base of Colour Changer)

Fan Speed

Off	No Valid Digital Data is being received
Proportional	Fan Speed Indication:
	2 Hz Slow Flash = Slow Fan Speed to
	Quick Flash = Fast Fan Speed
On	Fans Off (Modes 3-7)
	Fans not under control of PlusCard (Modes 0-2)

Out of Valid Address Range

Slow Flash (8 s on, 8s off) — Set address is outside range of 1-512 for DMX

Software / Parameter Download

When downloading via an RPC link, the 'DATA' led will flash to indicate correct data transfer to the PlusCard

DIAG Led - Red (Rear panel)

Processor Status - Normal Operation

1 Hz Flash	Healthy Processor Status
Other	Check processor performance / diagnostics

Program Version Check - Modes B.7 and B.8

No of flashes = Software version

EXT. Led - Yellow (Rear Panel)

Proportional to the voltage to the external fan - will be extinguished if there is a short circuit on the external fan port.

APPENDIX B - DOWSER (DIMMER SHUTTER) CONTROL

The PlusCard is designed with an external I^2C communications port to supply power and control signals to an external dowser. This is connected via the 6 way connector on the rear panel of the colour changer. When the dowser is connected, it is sensed via the port and an extra control channel is allocated for dowser drive. This means that all modes have one extra operating parameter as follows:

	DMX ADDRESS			
MODE	NNN	NNN+1	NNN+2	NNN+3
0	DOWSER	GEL POSITION		
1	DOWSER	GEL POSITION		
2	DOWSER	GEL POSITION		
3	DOWSER	GEL POSITION	FAN SPEED	
4	DOWSER	GEL POSITION	FAN SPEED	
5	DOWSER	GEL POSITION	FAN SPEED	
6 - FAST	DOWSER	GEL POSITION	**GEL SPEED = ADDRESS 510**	**FAN SPEED = ADDRESS 511**
7	DOWSER	GEL POSITION	GEL SPEED	FAN SPEED

The dowser can be set to default as the last control channel via a hardware jumper on the pcb (J23).

For furtherinformation on the control of dowsers and external devices with the Pluscard, please contact Rainbow Colour Changers.

rainbow™
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This manual is valid from the 1st of July 2007. All previous manuals are herewith not valid any longer.

All technical specifications are subject to change without notification.