

Micro-Scope 3c

User Guide



Artistic Licence Engineering Ltd

Firmware v1.7 User Guide v8.3

Introduction	7
DMX output / RDM Connection.....	7
DMX input	7
Power	7
9V PSU	7
Battery.....	8
Menu Navigation.....	8
Top Menu.....	9
DMX512 Menu	9
DMX - TRANSMIT Menu.....	9
DMX - TRANSMIT - CHANNEL Menu	10
DMX - TRANSMIT - RANGE Menu	10
DMX – TRANSMIT - SCENE Menu.....	11
DMX – TRANSMIT - SNAPSHOT Menu	12
DMX – TRANSMIT - CONFIG Menu	12
DMX - RECEIVE Menu.....	14
DMX – RECEIVE - STATUS Menu	14
DMX – RECEIVE - GRAPH Menu	15
Insight icon display.....	15
DMX – RECEIVE - DECIMAL Menu	16
DMX – RECEIVE - SINGLE Menu	16
DMX – RECEIVE – 16-BIT Menu.....	17
DMX – RECEIVE - FLICKER Menu	17
DMX – RECEIVE - STATS Menu	19
DMX - RDM Menu	20
DMX – RDM – DISCOVER Menu	20
DMX – RDM - PATCH Menu	21
Get the start address of the first root device	22
Get the start address of the second root device	22
Get the start address of the second device’s second sub-device.....	22
Set the start address of the first root device	22
DMX – RDM – AUTO-ADD Menu.....	23
DMX – RDM - MESSAGE Menu	23
Get the status messages from the first root device.....	24
DMX – RDM – GET+SET Menu	24
Get the start address of the first root device	25

Get the start address of the second root device	25
Get the footprint of the second device's second sub-device	26
Set the start address of the first root device	26
Set the names of both devices.....	26
RDM Feedback	27
DMX – RDM - SENSORS Menu	29
Get the first sensor from the first root device.....	29
DMX - ADVANCED Menu.....	31
DMX – ADVANCED - LOOP Menu.....	31
DMX – ADVANCED – FIX RX Menu	32
DMX – ADVANCED - NETWORK Menu	32
DMX – ADVANCED - BOBULATE Menu	34
DMX - CABLE Menu.....	37
DMX – CABLE - DOUBLE Menu.....	37
Good cable	37
Data cores swapped.....	37
Broken ground (screen)	37
DMX – CABLE - SINGLE Menu.....	37
Good cable	38
Data cores swapped.....	38
CALC Menu.....	38
UTILS Menu	39
UTILS - CONFIG Menu	39
UTILS - BACKLIGHT Menu.....	40
Glossary.....	41
Channel	41
Slot	41
Data slot	41
Footprint	41
Personality	41
RDM	41
Refresh rate.....	41
Get.....	41
Set	41
ISD	41
Warranty	42

Compliance 42
Waste Electrical & Electronic Equipment (WEEE)..... 42

Introduction

Micro-Scope 3c is a battery-powered, hand-held tool for transmitting and receiving DMX512, commissioning RDM devices and testing cables and DMX512 infrastructure.

If you have purchase the Micro-Scope 3c upgrade kit, please view this [video](#) for installation details.

DMX output / RDM Connection

The DMX output / RDM connection is made via the female XLR5 on the right panel.

Pin-out is as follows:

Pin	Function
Pin 1	Signal Common
Pin 2	DMX Transmit Signal-
Pin 3	DMX Transmit Signal+
Pin 4	Scope Trigger Output
Pin 5	Scope Trigger Ground

DMX input

The DMX input connection is made via the male XLR5 on the right panel.

Pin-out is as follows:

Pin	Function
Pin 1	Signal Common
Pin 2	DMX Receive Signal-
Pin 3	DMX Receive Signal+
Pin 4	
Pin 5	

Power

Micro-Scope 3c can be powered from two sources:

9V PSU

The supplied PSU is used for power and battery charging.

Pin-out is as follows:

Pin	Function
Centre	+9VDC 350mA

Skirt	Ground
-------	--------

Battery

Micro-Scope 3c is designed to run on battery power for extended periods using the internal NiCd battery pack. The power switch is used to switch off Micro-Scope 3c, battery charging will continue if the power connector is energised.

Start-up

Micro-Scope remembers the last used function on start-up. It also remembers the last scene number.

💡 *When would I use this?*

Apart from the feature simply being a time saver, it was the following interesting applications:

1. If you need a DMX transmitter that will always send the same data (for testing or a quick demo) use DMX-TRANSMIT-SCENE.
2. If you have a DMX compatibility issue, select DMX-ADVANCED-FIX and leave the Micro-Scope in-situ for the show. NB. Disable the standby timer and ensure it is connected to the charge.

Menu Navigation

Menu navigation is intuitive and will be familiar to users of other Artistic Licence products. At a given time, the product is either in menu-mode or run-mode. The MENU key switches between these modes. The figure below shows the top menu. The UP and DOWN keys scroll the menu up and down. The < and > icons indicate that the LEFT and RIGHT keys can be used to navigate through the menu. The [icon indicates that there is no LEFT function: i.e., you are at the top menu.

```
TOP  | [DMX512  >
MENU |  CALC
```

As shown in the figure below, the # icon indicates the option to run the selected function. In this example, the TRANSMIT -> CHANNEL function. To do so, press TOGGLE.

```
TX   | <CHANNEL #
MENU |  RANGE
```

Top Menu

The top menu provides access to numerous operational and configuration menus.

Keys operate as follows:

- LEFT** Navigates to higher level menu if it is available.
- RIGHT** Navigates to sub-menu if it is available.
- UP and DOWN** Select entry from the current menu.
- TOGGLE** Access the menu function if the  is displayed, otherwise it behaves as if RIGHT is pressed.

```
TOP | DMX512 >
MENU | CALC
```

DMX512 Menu

The DMX512 menu categorises all the available DMX512 and RDM functions as listed below. Use the RIGHT key to access the relevant sub-menus.

```
DMX | TRANSMIT >
MENU | RECEIVE
```

The DMX sub-menus are:

- TRANSMIT** Transmit test patterns of DMX to dimmers or fixtures.
- RECEIVE** Receive and view DMX levels plus analyse timing.
- RDM** Discover, configure and monitor RDM devices.
- ADVANCED** Test the DMX network, fix bad DMX and access our unique discombobulator.
- CABLE** Test connectivity of the three DMX conductors.

DMX - TRANSMIT Menu

The DMX-TRANSMIT menu provides five options. Use UP and DOWN to navigate and then press TOGGLE.

```
TX | CHANNEL 
MENU | RANGE
```

The sub-menus are:

- CHANNEL** Transmit a single channel at a level.
- RANGE** Transmit a range of channels at a level or changing levels.

- SCENE** Playback one of forty recorded scenes.
- SNAPSHOT** Snapshot (record from received DMX) into any of the forty scenes.
- FIXTURE** Transmit DMX to control intelligent fixtures based on a personality library.
- CONFIG** Setup numerous timing parameters for transmitted DMX.

DMX - TRANSMIT - CHANNEL Menu

This menu allows transmission of a single channel (aka data slot) of DMX at any level.

Keys operate as follows:

- LEFT and RIGHT** Navigate through the option fields. In the product, option fields are shown in UPPER CASE. In this guide, option fields are highlighted in red.
- UP and DOWN** Select the required value within an option field.
- TOGGLE** Toggle the level of the selected channel.

```
TX Channel: 001
@ level 255/255
```

 *When would I use this?*

This is the classic 'rig check' mode that allows you to cycle through all the channels checking the lighting rig lamp by lamp.

DMX - TRANSMIT - RANGE Menu

This menu allows transmission of a range of channels.

Keys operate as follows:

- LEFT and RIGHT** Navigate through the option fields. In the product, option fields are shown in UPPER CASE. In this guide, option fields are highlighted in red.
- UP and DOWN** Select the required value within an option field.
- TOGGLE** Toggle the level of the selected channel.

```
Tx Range 001-512
@ 255/255 WALK
```

The operating functions are:

- MAN** DMX transmitted to the range of channels at the selected level.
- SNAP** Snap between on and off every second.
- FADE** Slowly fades to full then back to zero.
- RAMP** Slowly fades to full and rolls over to zero.

- ALT** Odd channels fade up while even channels fade down.
- WALK** Each channel in the range is illuminated in sequence.
- RGB** Each group of three channels in the selected range is treated as RGB and cycled through primary and then secondary colour mixes.
- RGBW** Each group of four channels in the selected range is treated as RGBW and cycled through primary and then secondary colour mixes.

To change the operating function select the Func field and use the UP and DOWN keys.

 *When would I use this?*

If you need to go to the stage or outside a building to check lamps, this menu allows an automatically changing test pattern to be transmitted. Hint: Check the Standby Timer to ensure Micro-Scope 3c does not power down when you are away!

DMX – TRANSMIT - SCENE Menu

The DMX-TRANSMIT-SCENE menu is used to playback and edit any of the forty scenes. The scenes are saved in flash memory and so will be available between power cycles and even when batteries are removed.

Keys operate as follows:

- LEFT and RIGHT** Navigate through the option fields. In the product, option fields are shown in UPPER CASE. In this guide, option fields are highlighted in red.
- UP and DOWN** Select the required value within an option field.
- TOGGLE** Toggle the level of the selected channel.



The fields are:

- Scene** Select one of the forty scenes. Each scene contains a full 512 channel set of levels.
- Chan** The channel to be edited.
- At** Level of the selected channel to be set. TOGGLE is used to toggle the selected level.

 *When would I use this?*

As each scene holds individual levels for every channel, scenes are a great way to setup show specific test panels for lamp checking.

Additionally, Micro-Scope remembers the last menu and last scene when power cycled, so this is useful when you always want the same DMX output at boot.

DMX – TRANSMIT - SNAPSHOT Menu

The DMX-TRANSMIT-SNAPSHOT menu is used to snapshot (record) received DMX into one of the forty scenes. The scenes are saved in flash memory and so will be available between power cycles and even when batteries are removed.

Keys operate as follows:

LEFT and **RIGHT** Select the desired scene.

UP and **DOWN** Select the desired scene.

TOGGLE Record the snapshot. The snapshot process takes approximately 2 seconds and the backlight will blink to indicate that it has completed.

```
Snapshot receive
Scene: 39 Toggle
```

 *When would I use this?*

If you have some useful test patterns setup on the lighting console, use this menu to transfer them to Micro-Scope 3c.

DMX – TRANSMIT - CONFIG Menu

The DMX-TRANSMIT-CONFIG menu is used to set numerous DMX transmit parameters. This menu should be used with caution as it intentionally allows the user to set parameters which result in illegal DMX transmission. For this reason, the parameters are not saved across a power cycle. The values set in this menu will be used for DMX-TRANSMIT-CHANNEL, DMX-TRANSMIT-RANGE and DMX-TRANSMIT-SCENE.

Keys operate as follows:

LEFT and **RIGHT** Navigate through the option fields.

UP and **DOWN** Select the required value within an option field.

TOGGLE Not used.

```
Tx Config
Start Code 000
```

The parameters are:

Parameter	Description	Default Value	Min	Max	Legal Min	Legal Max
Start Code	The Start Code defines the meaning of the data in the DMX packet. The value zero means 'simple lighting channel' data.	0	0	255	0	255
Data Slots	The number of Data Slots is also called number of channels. It is the	512	0	512	24*1	512

Parameter	Description	Default Value	Min	Max	Legal Min	Legal Max
	number of bytes in addition to the Start Code that are contained in the DMX packet.					
Break	The Break is the synchronization that indicates the start of DMX packet.	200us	40us	20ms	92us* ²	1s* ³
MaB	The MaB or Mark after Break is the idle period between the end of Break and the Start Code.	20us	8us	20ms	12us* ⁴	1s* ³
ISD	The ISD is the inter-slot delay. This is the idle time between the slots in the DMX packet.	8us	0us	20ms	0us	1s* ³
MbB	The MbB or Mark before Break is the idle period between the end of the last data slot and the next packet's Break.	20us	0us	20ms	0us	1s* ³

*¹ This is a simplification that provides a good rule of thumb. In fact, any number of data slots below 24 can be used, subject to Packet Time $\geq 1204\mu\text{s}$.

*² In the earlier DMX512(1990) standard the minimum was 88us.

*³ The 1s maximum is actually for the entire packet.

*⁴ In the earlier DMX512(1990) standard the minimum was 8us.

 *When would I use this?*

These parameters are used when testing a DMX receiver that is suspected to be incompatible. If a receiver is suspected of being incapable of receiving fast DMX, set all the timing parameters to their lowest value in order to produce very fast DMX.

If a DMX receiver is suspected of flickering on RDM (Remote Device Management), try setting the Start Code to a non-zero value (204 is the RDM start code) and then use TRANSMIT-CHANNEL. The receiver should not respond to the data.

DMX - RECEIVE Menu

The DMX-RECEIVE menu provides eight options. Use UP and DOWN to navigate and then press TOGGLE.

```
RX   |<STATUS  ↵  
MENU | RECEIVE
```

The sub-menus are:

- | | |
|----------------|--|
| STATUS | Set receive Start-Code and view receive status. |
| GRAPH | Display a bargraph of the levels of up to 30 consecutive channels. |
| DECIMAL | Display the decimal levels of up to 6 consecutive channels. |
| COLOUR | Display a high-resolution bargraph of two consecutive channels while modulating the backlight with a red / green colour mix. |
| SINGLE | Display a decimal, hexadecimal and a high-resolution bargraph of a single channel. |
| 16-BIT | Display a decimal, hexadecimal and a high-resolution bargraph of two consecutive channels expressed as 16-bit (Big-Endian). |
| FLICKER | Display the decimal level of a single channel along with the maximum and minimum levels detected. |
| STATS | Display statistics and detailed timing for received DMX. |

DMX – RECEIVE - STATUS Menu

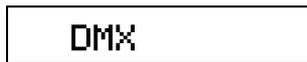
The DMX-RECEIVE-STATUS menu is used to display to total number of received DMX packets and compare to the number of packets received with a specific start code.

```
RDMX      SC:000  
Pck:      0/0
```

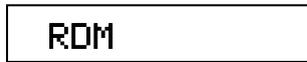
Keys operate as follows:

- | | |
|-----------------------|--|
| LEFT and RIGHT | Select the desired start code. |
| UP and DOWN | Select the desired start code. |
| TOGGLE | Resets counters to zero and cycle through three commonly used start codes: <ul style="list-style-type: none">• Standard lighting data (0).• RDM (204).• Test packets (85). |

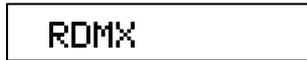
The top line provides an icon display that provides insight into the types of data being received:



Zero start code DMX is being received.



RDM (Remote Device Management) is being received.



Zero start code DMX and RDM is being received.



Non-Zero start code DMX is being received.



DMX with errors is being received.

 *When would I use this?*

When unsure of exactly what start codes the lighting console is sending, this is how you check.

DMX – RECEIVE - GRAPH Menu

The DMX-RECEIVE-GRAPH menu is used to display a bargraph of the levels of up to 24 consecutive channels.



Keys operate as follows:

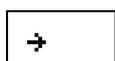
LEFT and RIGHT Select the required start address for the received DMX display. The display will change to show the first and last channel displayed.

UP and DOWN Select the required start address for the received DMX display. The display will change to show the first and last channel displayed.

TOGGLE Cycles through the GRAPH, DECIMAL, SINGLE, 16-BIT receive menus.

Insight icon display

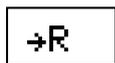
The bottom left 4 characters provide an icon display that provides insight into the types of data being received:



Zero start code DMX is being received.



RDM (Remote Device Management) is being received.



Zero start code DMX and RDM is being received.



Non-Zero start code DMX is being received.



DMX with errors is being received.

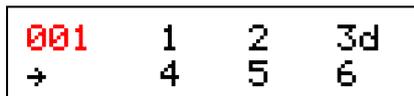
The display shows a low-resolution bargraph of the levels of 24 consecutive channels from the received DMX of the start code defined in DMX-RECEIVE-STATUS.

 *When would I use this?*

If you need to see the big picture rather than exact detail on channels levels. Also good for checking whether a lamp personality is operating as expected.

DMX – RECEIVE - DECIMAL Menu

The DMX-RECEIVE-DECIMAL menu is used to display decimal levels of up to 6 consecutive channels.



Keys operate as follows:

LEFT and RIGHT Select the required start address for the received DMX display. The display will change to show the first and last channel displayed.

UP and DOWN Select the required start address for the received DMX display. The display will change to show the first and last channel displayed.

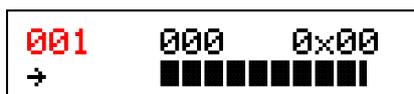
TOGGLE Cycles through the GRAPH, DECIMAL, SINGLE, 16-BIT receive menus.

The left of screen shows the DMX address, along with the *Insight icon display*.

The right of screen shows decimal (0-255) levels of 6 consecutive channels from the received DMX of the start code defined in DMX-RECEIVE-STATUS.

DMX – RECEIVE - SINGLE Menu

The DMX-RECEIVE-SINGLE menu is used to display hexadecimal, decimal and a high-resolution bargraph of a single channel.



Keys operate as follows:

LEFT and RIGHT Select the required start address for the received DMX display. The display will change to show the first and last channel displayed.

UP and DOWN Select the required start address for the received DMX display. The display will change to show the first and last channel displayed.

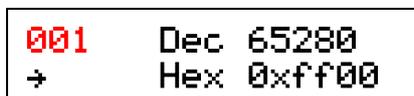
TOGGLE Cycles through the GRAPH, DECIMAL, SINGLE, 16-BIT receive menus.

The left of screen shows the DMX address, along with the *Insight icon display*.

The levels displayed are from the received DMX of the start code defined in DMX-RECEIVE-STATUS.

DMX – RECEIVE – 16-BIT Menu

The DMX-RECEIVE-16-BIT menu is used to display the hexadecimal and decimal of two consecutive channels interpreted as 16-bit data. The first channel is the most significant byte (big-endian). The example below shows the display when receiving channel 1 at full and channel 2 at zero.



```
001   Dec 65280
→     Hex 0xff00
```

Keys operate as follows:

LEFT and RIGHT Select the required start address for the received DMX display. The display will change to show the first and last channel displayed.

UP and DOWN Select the required start address for the received DMX display. The display will change to show the first and last channel displayed.

TOGGLE Cycles through the GRAPH, DECIMAL, SINGLE, 16-BIT receive menus.

The left of screen shows the DMX address, along with the *Insight icon display*.

The levels displayed are from the received DMX of the start code defined in DMX-RECEIVE-STATUS.

 *When would I use this?*

This display is particularly useful for interpreting high resolution data for moving lamps such as pan and tilt parameters.

DMX – RECEIVE - FLICKER Menu

The DMX-RECEIVE-FLICKER menu is used to display the decimal level of a single channel along with the maximum and minimum levels detected.



```
001   Now: 000
→     000 - 000
```

Keys operate as follows:

LEFT and RIGHT Select the required start address for the received DMX display. The display will change to show the first and last channel displayed.

- UP and DOWN** Select the required start address for the received DMX display. The display will change to show the first and last channel displayed.
- TOGGLE** Reset the minimum and maximum data (ellipsis will be displayed in each field).

In the example below, the min and max fields have been reset and no flicker has been detected. The current received level is 255:



In the example below, the level has changed to 253 and so the min – max range is now 253 – 255. The current received level is 253:



In the example below, the current received level is 253, but the min – max range is now 000-255 showing that flicker has been captured:



The left of screen shows the DMX address, along with the *Insight icon display*.

The levels displayed are from the received DMX of the start code defined in DMX-RECEIVE-STATUS.

 *When would I use this?*

Flickering can be caused by many conditions, but the first step is always to check whether the lighting console is actually outputting changing data on the channels that flickers. This function allows any channel flicker to be captured.

DMX – RECEIVE - STATS Menu

The DMX-RECEIVE-STATS menu is used to display numerous DMX receive parameters. The parameters displayed relate only to received DMX with start code defined in DMX-RECEIVE-STATUS.

Keys operate as follows:

LEFT and **RIGHT** Not used.

UP and **DOWN** Select the required parameter.

TOGGLE Clears previously captured data.

```
Refresh Hz :44
Lo: 43 Hi: 44
```

The parameters are:

Parameter	Description	Legal Min	Legal Max
Refresh	The Refresh Rate is expressed in Hz and represents the number of DMX frames per second.	1Hz	44Hz* ¹
Period	The time between two consecutive DMX packets (of the same start code).	1196us* ²	1s
Data Slots	The number of Data Slots is also called number of channels. It is the number of bytes in addition to the Start Code that are contained in the DMX packet.	0	512
Break	The Break is the synchronization that indicates the start of DMX packet.	88us	1s* ³
MaB	The MaB or Mark after Break is the idle period between the end of Break and the Start Code.	8us	1s* ³
ISD	The ISD is the inter-slot delay. This is the idle time between the slots in the DMX packet.	0us	1s* ³
MbB	The MbB or Mark before Break is the idle period between the end of the last data slot and the next packet's Break.	0us	1s* ³

*¹ This is the maximum refresh rate for packets containing a full 512 data slot payload.

*² This is allowed, but rarely seen. It can only be achieved with a packet containing 24 or less data slots.

*³ The 1s maximum is actually for the entire packet.

 *When would I use this?*

If a DMX transmitter is suspected of sending bad timing, this function allows you to capture and analyse that timing.

DMX - RDM Menu

The DMX-RDM menu provides six options. Use UP and DOWN to navigate and then press TOGGLE.

RDM is an abbreviation for Remote Device Management. It is the bi-directional protocol that works through DMX to allow the reading and writing of parameters (called get and set) along with reading sensors and other device status.

```
RDM | <DISCOVER#  
MENU | PATCH
```

The sub-menus are:

- DISCOVER** Searches the DMX network for RDM devices and enumerates them ready for configuration.
- PATCH** Quickly set the start address and personality of an RDM device or sub-device.
- AUTO-ADD** Automatically address all RDM devices.
- MESSAGES** Read status messages.
- GET+SET** Get & Set all RDM parameters.
- SENSORS** Read all device sensors.

DMX – RDM – DISCOVER Menu

RDM devices must be discovered before they can be controlled. This function is used to discover and enumerate all the connected RDM devices.

```
DISC: ADD ALL  
Toggle = Go
```

Keys operate as follows:

- LEFT** and **RIGHT** Not used.
- UP** and **DOWN** Select the required action.
- TOGGLE** Start discovery. Discovery can take a few seconds and will be longer when more devices are connected.

Available actions are:

- ADD ALL** Discards the previous list of discovered devices and executes a full discovery.
- ADD NEW** Searches for devices that have been recently connected.
- REMOVE ALL** Discards the list of discovered devices.

Press TOGGLE to start the process. During the discovery process the bottom line of the display counts the number of devices discovered.

```
DISC: ADD ALL
Search 6
```

Once discovery is completed, the bottom line shows the total number discovered and the backlight will blip green or red to indicate success or whether errors occurred.

```
DISC: ADD ALL
Done 6
```

 *When would I use this?*

You need to perform discovery once after powering on Micro-Scope 3c, and prior to using any other function in the DMX-RDM menu. You should also perform discovery if you add or remove any devices to the DMX cable.

DMX – RDM - PATCH Menu

DMX-RDM-PATCH is used to view an RDM device's name, footprint, number of sub-devices, number of personalities and to edit its start address and personality.

Keys operate as follows:

LEFT and **RIGHT** Navigate through the option fields.

LEFT + RIGHT Identify the selected device.

UP and **DOWN** Select the required value within an option field.

TOGGLE Sets or programmes the start address and personality into the selected device(s).

```
D: DEV-SUB    S: STA
NAME           P: PER
```

The option fields function as follows:

DEV Selects the RDM device. Devices are numbered from 1. A value of zero is displayed as ALL and indicates that all RDM devices are being controlled. This is a very powerful feature but should be treated with caution as it allows, for example, all start addresses to be set to the same value. NB. The device number is enumerated during discovery and numbers are allocated in the order in which devices are discovered. The order may change when discovery is next executed.

SUB Selects the sub-device. An RDM device may have a number of sub-devices and Micro-Scope 3c is able to access 999 sub-devices. There are two special cases of sub-device. Zero accesses the root device. ALL indicates that all sub-devices are being controlled.

NAME When an individual device or sub-device is addressed, the name of the device or sub-device is displayed here. If ALL devices and/or ALL sub-devices is selected, BROADCAST is displayed in order to emphasise that pressing TOGGLE will affect multiple entities.

STA The start address of the most recently selected device or sub-device.

PERS The personality of the most recently selected device or sub-device.

The following examples show how these option fields are used. In the examples we are connected to two Artistic Licence sunDial dimmers. These are 4-channels devices that have 5 personalities and 4 sub-devices. The sub-devices can accept individual start addresses and personality.

Get the start address of the first root device

```
D: 001-000 S:001
sunDial 1 P:001
```

Use the LEFT, RIGHT, UP, DOWN keys to set the device to 001, shown in green. This is the first sunDial.

Use the LEFT, RIGHT, UP, DOWN keys to set the sub-device to 000, shown in blue. This means the root device is being accessed.

The display updates to report that the device is called 'sunDial 1' and has a start address of 001 and personality of 001.

Get the start address of the second root device

```
D: 002-000 S:005
sunDial 2 P:001
```

Use the LEFT, RIGHT, UP, DOWN keys to set the device to 002, shown in green. This is the second sunDial.

Use the LEFT, RIGHT, UP, DOWN keys to set the sub-device to 000, shown in blue. This means the root device is being accessed.

The display updates to report that the device is called 'sunDial 2' and has a start address of 005 and a personality of 001.

Get the start address of the second device's second sub-device

```
D: 002-002 S:006
sunDial 2 P:001
```

Use the LEFT, RIGHT, UP, DOWN keys to set the device to 002, shown in green. This is the second sunDial.

Use the LEFT, RIGHT, UP, DOWN keys to set the sub-device to 002, shown in blue. This means the second sub-device is being accessed.

The display updates to report the settings. In this product, sub-devices are used to access individual dimmer channels.

Set the start address of the first root device

```
D: 001-000 S:001
sunDial 1 P:001
```

Use the LEFT, RIGHT, UP, DOWN keys to set the device to 001, shown in green. This is the first sunDial.

Use the LEFT, RIGHT, UP, DOWN keys to set the sub-device to 000, shown in blue. This means the root device is being accessed.

```
D: 001-000 S:001
sunDial 1 P:001
```

The display updates to report that the device is called 'sunDial 1' and has a start address of 001 and a personality set to 1.

```
D: 001-000 S:009
sunDial 1 P:001
```

Change the start address to the desired value (value 009 shown in green) and press TOGGLE.

Micro-Scope 3c will set the value and then immediately read back the result so you can be sure it was accepted.

```
D: 001-000 S:009
sunDial 1 P:001
```

Resulting in this display.

DMX – RDM – AUTO-ADD Menu

The DMX-RDM-AUTO-ADD menu is used to automatically and contiguously address all discovered RDM devices from a user specified start address. This is done by reading the footprint of every root device and using that as the start address offset for the next device.

```
Auto Start 001
Toggle = Go
```

Keys operate as follows:

- LEFT and RIGHT** Select desired start address.
- LEFT + RIGHT** Identify the selected device.
- UP and DOWN** Select desired start address.
- TOGGLE** Start auto-addressing. The backlight will blip green at the end of the process to confirm success.

Press TOGGLE to start the process. The bottom line of the display counts the number of devices that have been set.

```
Auto Start 001
Search 6
```

Once auto-addressing is completed, the bottom line shows the total number of programmed devices and the backlight will blip green or red to indicate success or whether errors occurred.

 *When would I use this?*

This is a quick and dirty way to ensure all devices have different and contiguous addresses. However, you have no control over which device gets which start address. In many situations this does not matter as the lighting console patch will make it irrelevant. If it does matter, then you need to use

DMX – RDM - PATCH Menu.

DMX – RDM - MESSAGE Menu

DMX-RDM-MESSAGE is used to view an RDM device’s status messages. Status messages provide a range of information from an advisory such as: “Smoke machine low on oil” to an emergency such as “Dimmer on fire”.

Micro-Scope 3c uses the red / green backlight to highlight the urgency of these messages.

Keys operate as follows:

- LEFT and RIGHT** Navigate through the option fields.

- LEFT + RIGHT** Identify the selected device.
- UP and DOWN** Select the required value within an option field.
- TOGGLE** Turns identify on or off for the selected devices.

```
D: DEV-SUB name
Message
```

The option fields function as follows:

- DEV** Selects the RDM device. Devices are numbered from 1. A value of zero is displayed as ALL and indicates that all RDM devices are being controlled. This is a very powerful feature but should be treated with caution as it allows, for example, all start addresses to be set to the same value. NB. The device number is enumerated during discovery and numbers are allocated in the order in which devices are discovered. The order may change when discovery is next executed.
- SUB** Selects the sub-device. An RDM device may have a number of sub-devices and Micro-Scope 3c is able to access 999 sub-devices. There are two special cases of sub-device. Zero accesses the root device. ALL indicates that all sub-devices are being controlled.
- NAME** When an individual device or sub-device is addressed, the name of the device or sub-device is displayed here. If ALL devices and/or ALL sub-devices is selected, BROADCAST is displayed.

The following example shows how this is used. We are connected to an Artistic Licence sunDial dimmer.

Get the status messages from the first root device

```
D:001-000 sunDia
Over Temp
```

Use the LEFT, RIGHT, UP, DOWN keys to set the device to 001.

In this example the device, a sunDial, has a critical Over Temperature message.

 *When would I use this?*

When a particular device is suspected of a fault, this allows you to continuously monitor for fault reports.

DMX – RDM – GET+SET Menu

DMX-RDM-GET+SET is used to get or set RDM parameters. It is only possible to get a parameter from a unique device or sub-device. However, any range of devices and sub-devices can have parameters set using broadcasting (as described below).

Keys operate as follows:

- LEFT and RIGHT** Navigate through the option fields.
- LEFT + RIGHT** Identify the selected device.
- UP and DOWN** Select the required value within an option field.

TOGGLE Sets or programmes the selected parameter.



The option fields function as follows:

DEV Selects the RDM device. Devices are numbered from 1. A value of zero is displayed as ALL and indicates that all RDM devices are being controlled. This is a very powerful feature but should be treated with caution as it allows, for example, all start addresses to be set to the same value. NB. The device number is enumerated during discovery and numbers are allocated in the order in which devices are discovered. The order may change when discovery is next executed.

SUB Selects the sub-device. An RDM device may have a number of sub-devices and Micro-Scope 3c is able to access 999 sub-devices. There are two special cases of sub-device. Zero accesses the root device. ALL indicates that all sub-devices are being controlled.

PARAM

The RDM standard publishes numerous possible parameters ranging from start address to pan/tilt invert. These parameters are often called PIDs. A given RDM device will typically support a subset of the available PIDs and indeed is allowed to support a different subset for its sub-devices. In addition, manufacturer specific PIDs are allowed where the RDM standard does not have a suitable definition. Micro-Scope 3c interrogates the selected device / sub-device combination and allows all supported PIDs to be accessed.

DATA The data that is read (get) or to be programmed (set) into a parameter.

NB. The first release firmware has limited support for manufacturer specific parameters as the RDM standard is currently under revision.

The following examples show how these option fields are used. In the examples we are connected to two Artistic Licence sunDial dimmers. These are 4-channels devices that have 5 personalities and 4 sub-devices. The sub-devices can accept individual start addresses and personality.

Get the start address of the first root device



Use the LEFT, RIGHT, UP, DOWN keys to set the device to 001 and sub-device to 000, shown in green. This is the first sunDial's root device.

Use the LEFT, RIGHT, UP, DOWN keys to set the PARAMETER to START ADDR.



Micro-Scope 3c gets the parameter and displays it in the DATA field. In this example a start address of 009.

Get the start address of the second root device



Use the LEFT, RIGHT, UP, DOWN keys to set the device to 002 and sub-device to 000, shown in green. This is the second sunDial's root device.

Use the LEFT, RIGHT, UP, DOWN keys to set the PARAMETER to START ADDR.

```
002-000 START AD
005
```

Micro-Scope 3c gets the parameter and displays it in the DATA field. In this example a start address of 005.

Get the footprint of the second device's second sub-device

```
002-002 FOOTPRIN
001
```

Use the LEFT, RIGHT, UP, DOWN keys to set the device to 002 and sub-device to 002, shown in green. This is the second sunDial's second sub-device.

Use the LEFT, RIGHT, UP, DOWN keys to set the PARAMETER to FOOTPRINT.

```
002-002 FOOTPRIN
001
```

Micro-Scope 3c gets the parameter and displays it in the DATA field. In this example a footprint is 001 as this is a sub-device controlling a single dimmer channel.

Set the start address of the first root device

```
001-000 START AD
005
```

Use the LEFT, RIGHT, UP, DOWN keys to set the device to 001, shown in green. This is the first sunDial.

Use the LEFT, RIGHT, UP, DOWN keys to set the sub-device to 000, shown in blue. This means the root device is being accessed.

```
001-000 START AD
050
```

Change the start address to the desired value (value 050 shown in green) and press TOGGLE.

```
001-000 START AD
050 -- ACK --
```

Micro-Scope 3c will set the value and briefly display the response from the device. This will either be an ACK which is good, or a NACK with additional information that explains the reason that the device could not accept the command.

```
001-000 START AD
050
```

Micro-Scope 3c will the query the parameter in order to confirm the current value.

Set the names of both devices

Setting text parameters can be laborious, but there is a trick that considerably speeds the process. Let's say you want to name the dimmers 'Dim 1' and 'Dim 2'. Use broadcast to set all dimmers to 'Dim ' and then edit each one to add the number:

```
ALL-000 LABEL
```

Use the LEFT, RIGHT, UP, DOWN keys to set the device to ALL and the sub-device to 000, shown in green. This addresses both sunDial.

```
ALL-000 LABEL
Dim
```

Change the label to 'Dim' and press TOGGLE. Both dimmers are now named 'Dim'.

```
001-000 LABEL
Dim
```

Change the device to 001, shown in green.

```
001-000 LABEL
Dim 1  -- ACK  --
```

Add the '1' to 'Dim', shown in green. Press TOGGLE. Micro-Scope 3c will briefly display the acknowledge from the device.

```
002-000 LABEL
Dim
```

Change the device to 002, shown in green.

```
002-000 LABEL
Dim 2  -- ACK  --
```

Add the '2' to 'Dim', shown in green. Press TOGGLE. Micro-Scope 3c will briefly display the acknowledge from the device.

RDM Feedback

DMX-RDM-GET+SET will briefly display the RDM feedback after a Set command is issued. Usually this will be `-- ACK --`, which indicates that the RDM device has accepted the command. If the RDM command cannot be accepted by the device, Micro-Scope 3c displays the Negative Acknowledge as detailed below. Further details available in the RDM standard E1.20 Table A-17.

LCD Display	Comment	Value
Unknown PID	The RDM device does not implement this parameter (PID).	0x0000
Format error	The RDM device believes the command sent by Micro-Scope 3c is badly formatted.	0x0001
Hardware fault	The RDM device cannot action the command due to a hardware fault.	0x0002
Proxy reject	The RDM device received a proxy failure.	0x0003
Write protected	The RDM device is write protected and so rejected the set command.	0x0004
Unsup cmd class	The RDM device reports an unsupported command class. This happens when a set command is issued for a PID where only get is supported.	0x0005
Data out of range	The RDM device is reporting that the data in the set command was outside of allowed values.	0x0006
Buffer full	The RDM device has a full RDM buffer and so rejected the command.	0x0007
Unsup pack size	The RDM device could not handle the command as the packet size exceeded its buffer.	0x0008
Sub out of range	The RDM device reports that the sub-device is either out-of-range or an unknown value.	0x0009

LCD Display	Comment	Value
Proxy buf full	The RDM device reports that its proxy buffer is full and can store no more messages.	0x000A
Not supported	The RDM device does not support the requested action.	0x000B
Endpoint invalid	The RDM device reports that the specified endpoint is invalid.	0x000C
Mode invalid	The RDM device reports that the specified endpoint is in an invalid mode for the requested action.	0x000D
Unknown UID	The RDM device does not support the UID.	0x000E
Unknown scope	The RDM device is not part of the specified scope.	0x000F
Invalid stat con	The RDM device reports that the static IP configuration type is invalid.	0x0010
Invalid IPv4	The RDM device reports that the requested IPv4 address is invalid.	0x0011
Invalid IPv6	The RDM device reports that the requested IPv6 address is invalid.	0x0012
Invalid port	The RDM device reports that the requested transport layer port is invalid.	0x0013
Device absent	The RDM device reports that the sub-device or sensor addressed in the command is absent. This is used on modular products where the sub-device or sensor can be physically disconnected.	0x0014
Sens out of range	The RDM device reports that the sensor is out of range.	0x0015
Sensor fault	The RDM device reports that the sensor is faulty.	0x0016
Packing not supp	The RDM device reports that the PID is not supported for packed messages.	0x0017
Pack list error	The RDM device reports that it encountered an error when attempting to action the packed list.	0x0018
Proxy drop	The RDM device reports that the response from a proxy was lost.	0x0019
Nack Reason 0x001a	Not implemented in current RDM standard.	0x001A
Nack Reason 0x001b	Not implemented in current RDM standard.	0x001B
Nack Reason 0x001c	Not implemented in current RDM standard.	0x001C
Nack Reason 0x001d	Not implemented in current RDM standard.	0x001D
Nack Reason 0x001e	Not implemented in current RDM standard.	0x001E
Nack Reason 0x001f	Not implemented in current RDM standard.	0x001F
Nack Unknown	Not implemented in current RDM standard or manufacturer specific.	

DMX – RDM - SENSORS Menu

DMX-RDM-SENSORS is used to view an RDM device's sensors. Sensors provide a range of information from internal voltages to critical errors such as over-temperature faults.

Micro-Scope 3c uses backlight intensity to highlight whether the sensor is outside acceptable limits.

Keys operate as follows:

LEFT and **RIGHT** Navigate through the option fields.

UP and **DOWN** Select the required value within an option field.

TOGGLE Cycle through all available sensors.

```
F: DEV-SUB  S: SEN
NAME      VALUE
```

The option fields function as follows:

DEV Selects the RDM device. Devices are numbered from 1. A value of zero is displayed as ALL and indicates that all RDM devices are being controlled. This is a very powerful feature but should be treated with caution as it allows, for example, all start addresses to be set to the same value. NB. The device number is enumerated during discovery and numbers are allocated in the order in which devices are discovered. The order may change when discovery is next executed.

SUB Selects the sub-device. An RDM device may have a number of sub-devices and Micro-Scope 3c is able to access 999 sub-devices. There are two special cases of sub-device. Zero accesses the root device. ALL indicates that all sub-devices are being controlled.

SEN The currently selected sensor. If the device has no sensors, this field will get set to zero.

NAME The name of the sensor. This will typically describe the purpose, such as 'LED Temperature' or 'Fan speed'.

VALUE The value of the sensor.

The following example shows how this is used. We are connected to an Artistic Licence sunDial dimmer.

Get the first sensor from the first root device

```
F: 001-000  S: 001
      NO DATA
```

Use the LEFT, RIGHT, UP, DOWN keys to set the device to 001 and the sub-device to 000 which represents the root device, shown in blue.

```
F: 001-000  S: 001
Temp      45°C
```

Use the LEFT, RIGHT, UP, DOWN keys to set the desired sensor to 001, shown in blue.

In this example the device, a sunDial, has a temperature sensor declared as sensor 1.

Micro-Scope 3c will continue to read this sensor and display results in real time.

💡 *When would I use this?*

When a particular device is suspected of a fault, this allows you to continuously monitor sensors.

DMX - ADVANCED Menu

The DMX-ADVANCED menu provides four options. Use UP and DOWN to navigate and then press TOGGLE. All the options are based on receiving DMX while transmitting.



The sub-menus are:

- LOOP** View received DMX while transmitting a range of channels.
- FIX-RX** Receive DMX, correct errors and re-transmit.
- NETWORK** Use DMX test packets to test DMX infrastructure such as splitters.
- BOBULATE** Discombobulate your receivers to test how they respond to unusual DMX data.

DMX – ADVANCED - LOOP Menu

This menu allows transmission of a range of channels while viewing received DMX.

Keys operate as follows:

- LEFT and RIGHT** Navigate through the option fields. In the product, option fields are shown in UPPER CASE. In this guide, option fields are highlighted in red.
- UP and DOWN** Select the required value within an option field.
- TOGGLE** Toggle the level of the selected channel.



The operating functions are:

- MAN** DMX transmitted to the range of channels at the selected level.
- SNAP** Snap between on and off every second.
- FADE** Slowly fades to full then back to zero.
- RAMP** Slowly fades to full and rolls over to zero.
- ALT** Odd channels fade up while even channels fade down.
- WALK** Each channel in the range is illuminated in sequence.
- RGB** Each group of three channels in the selected range is treated as RGB and cycled though primary and then secondary colour mixes.
- RGBW** Each group of four channels in the selected range is treated as RGBW and cycled through primary and then secondary colour mixes.

To change the operating function select the Func field and use the UP and DOWN keys.

💡 *When would I use this?*

If you suspect that something in the DMX infrastructure (Splitter, merger, cable) is causing interference with the data, this allows you to transmit a defined pattern while watching the output from the suspect equipment.

DMX – ADVANCED – FIX RX Menu

This function receives DMX512, strips out all non-zero start code packets, corrects timing errors, corrects formatting known to upset some manufacturers' products and retransmits it.

The display provides a mimic of the first 30 channels.

Keys operate as follows:

LEFT and **RIGHT** Not used.

UP and **DOWN** Not used.

TOGGLE Not used.



💡 *When would I use this?*

If you suspect incompatibility between the lighting console and the fixtures, connect Micro-Scope 3c between them using this function. If the problem was solved – you have your answer!

Additionally, Micro-Scope remembers the last menu when power cycled, so this is useful when you always want Micro-Scope to boot in Fix mode.

DMX – ADVANCED - NETWORK Menu

This function uses the DMX test packet to check for data loss in a DMX network. The output of Micro-Scope 3c should be connected to the primary input to your DMX network (i.e instead of the lighting console or ethernet gateway output). The Micro-Scope 3c input should be connected to the output of the splitter you wish to test.

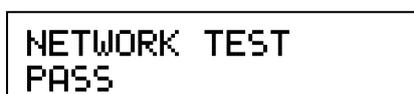
DMX test packets send maximum speed packets with a worst-case payload (alternating bit patterns which are designed to trigger any potential transmission faults).

Keys operate as follows:

LEFT and **RIGHT** Not used.

UP and **DOWN** Not used.

TOGGLE Not used.



The display shows a real-time analysis of the test.

The transmit DMX timing is:

Parameter	Value
Data Slots	512
Break	96us
MaB	12us
ISD	0us
MbB	16us

 *When would I use this?*

If you suspect that something in the DMX infrastructure (Splitter, cable) is causing interference with the data, this allows you to transmit high speed data packets and confirm they are received correctly.

NB. This test will almost certainly fail with mergers because they are designed to drop unexpected data packets. This is intended for splitters and cables.

DMX – ADVANCED - BOBULATE Menu

The DMX-TRANSMIT-BOBULATE menu is used to transmit DMX that is likely to discombobulate receivers that are borderline DMX compatible.

Keys operate as follows:

LEFT and **RIGHT** Not used.

UP and **DOWN** Select the required parameter.

TOGGLE Not used.

```

Discombobulator
All ch off
    
```

The parameters are:

Parameter	Description	Break	MaB	Start Code	ISD	Slots	Data Slots	Data Slot Value	MbB
All ch off	Micro-Scope 3c transmits good DMX with a 512 data slot payload and all levels at zero. All DMX receivers should accept this. Legal packet.	200uS	20us	0	0	513	512	0	16us
Test pack	Micro-Scope 3c transmits the special test packet with a very fast set of timing. Receivers that do not correctly reject non-zero start codes will sometimes flicker when receiving this. Legal packet.	96uS	12us	85	0	513	512	85	16us
Bad RDM	Micro-Scope 3c transmits RDM packets that have good timing but contain bad data. This can be used to check that an RDM device correctly rejects erroneous data. Illegal packet.	200us	20us	204	0	201	200	85	16us

Parameter	Description	Break	MaB	Start Code	ISD	Slots	Data Slots	Data Slot Value	MbB
Bad SIPs	Micro-Scope 3c transmits SIP packets that have good timing but contain bad data. This can be used to check that a DMX receiver correctly rejects non-zero start codes. Illegal packet.	200us	20us	207	0	201	200	85	16us
Break only	Micro-Scope 3c continuously sends a break with no slots. Some DMX responders can be upset by this. Legal packet.	200us	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Break+Strt	Micro-Scope 3c continuously sends a break and start code with no slots. Some DMX responders can be upset by this. Legal packet.	200us	20us	0	n/a	1	0	n/a	n/a
Long pack	Micro-Scope 3c sends packets with 1000 data slots. This is primarily useful for development testing. Illegal packet	200us	20us	0	0us	1001	1000	0	16us
Short pack	Micro-Scope 3c sends packets with 8 data slots but very fast timing and violates the standard. This is primarily useful for development testing. Illegal packet	200us	20us	0	0us	9	8	0	16us
Short Brk	Micro-Scope 3c sends packets with a short break. This is primarily useful for development testing. Illegal packet	72us	20us	0	0us	513	512	0	16us

Parameter	Description	Break	MaB	Start Code	ISD	Slots	Data Slots	Data Slot Value	MbB
Short MaB	Micro-Scope 3c sends packets with a short MaB. This is primarily useful for development testing. Illegal packet	200us	4us	0	0us	513	512	0	16us
One St-bit	Micro-Scope 3c sends packets with slots containing only one stop bit. This is primarily useful for development testing. Illegal packet	200us	20us	0	-4us	513	512	0	16us

As at firmware v1.3 the above table is still under verification and minor errors may exist.

 *When would I use this?*

A well-designed DMX or RDM receiver will reject bad DMX and continue to operate normally when it received good DMX. These functions allow you to force and analyse bad receiver behaviour.

DMX - CABLE Menu

The DMX-CABLE menu provides four options. Use UP and DOWN to navigate and then press TOGGLE. All the options allow cables to be tested.

```
CABLE | < DOUBLE  ↵  
MENU | SINGLE
```

The sub-menus are:

DOUBLE Double ended cable test for connectivity on ground, data- and data+.

SINGLE Single ended cable test.

DMX – CABLE - DOUBLE Menu

This menu allows cables to be tested when both ends are available.

Keys operate as follows:

LEFT and **RIGHT** Not used.

UP and **DOWN** Not used.

TOGGLE Not used.

To use the tester, connect the cable between the transmit and receive pins. Note that this is a continuity test and so cannot be used with any electronics – it only tests cable. The display shows connectivity between the three main circuits of ground, data- and data+. The display represents this with the XLR pin numbers of 1, 2, 3 respectively.

The test operates in real-time which allows intermittent connections to be identified.

Good cable

```
Double End 1=1..  
2=.2. PASS 3=..3
```

Data cores swapped

```
Double End 1=1..  
2=..3 FAIL 3=.2.
```

Broken ground (screen)

```
Double End 1=...  
2=.2. FAIL 3=..3
```

DMX – CABLE - SINGLE Menu

This menu allows cables to be tested when only one end is available.

Keys operate as follows:

LEFT and RIGHT Not used.

UP and DOWN Not used.

TOGGLE Not used.

To use the tester, connect the cable to the transmit port. Note that this is a continuity test and so cannot be used with any electronics – it only tests cable. The display shows connectivity between data- and data+. The display represents this with the XLR pin numbers of 2, 3 respectively.

The test operates in real-time which allows intermittent connections to be identified.

Good cable

Assuming the other end of the cable is disconnected, a good cable will report open circuit between pins 2&3 as shown below:



Single Ended
2&3 Open (GOOD)

Data cores swapped

If there is a low impedance path between pins 2&3 a fault is shown. Note that this will also detect a termination on the line.



Single Ended
2&3 Low Imp

CALC Menu

The CALC menu provides a simple decimal, hexadecimal, binary / dip-switch calculator.

Keys operate as follows:

LEFT and RIGHT Set the desired digital value.

UP and DOWN Set the desired digital value.

TOGGLE Toggle the digital value.



Cal 00003 0x0003
■■■■■■■■■■

The option fields function as follows:

DECIMAL TOGGLE a value in the range 0 - 65535.

HEXADECIMAL Displays the hexadecimal conversion.

BINARY / DIP Displays the binary or dip-switch conversion. This is a 10-bit field so decimal values from 0 – 1023 can be displayed.

UTILS Menu

The UTILS menu provides access to utility menus. Use the RIGHT key to access the relevant sub-menus.



```
UTIL | <CONFIG ↵
MENU | BACK LT
```

The UTILS sub-menus are:

CONFIG Configure and view product wide settings.

BACK LIGHT Set backlight intensity.

UTILS - CONFIG Menu

The UTILS-CONFIG menu is used to set numerous product settings. They are stored in flash memory and so will be retained between power cycles and when batteries are removed.

Keys operate as follows:

LEFT and **RIGHT** Navigate through the option fields.

UP and **DOWN** Select the required value within an option field.

TOGGLE Not used.



```
Conf: VERSION
U1.6
```

The option fields function as follows:

VERSION Firmware revision, read only.

BOOT COUNT Number of times the product has been booted.

USER NAME TOGGLE user / owner name of 10 characters. This will be displayed on boot splash screen. Warning: This field is only editable when the Boot Count is less than 50.

USER CO Enter user / owner company of 10 characters. This will be displayed on boot splash screen. Warning: This field is only editable when the Boot Count is less than 50.

ST'BY TIME The time in minutes, that Micro-Scope 3c will wait after any key press before entering power saving mode. The standby timer is inhibited when USB power is connected. Set a value of zero to disable the standby timer. Maximum value is 240 minutes. Default is 10 minutes. Press the MENU key to exit power saving mode.

PSU VOLTS When external power is disconnected, this field shows 'Off'. When connected it shows the PSU volage. A value of approximately 9V is normal.

UTILS - BACKLIGHT Menu

This menu is used to configure backlight brightness for different functions. Settings are stored in flash memory and so will be retained between power cycles and when batteries are removed.

Keys operate as follows:

LEFT and **RIGHT** Navigate through the option fields.

UP and **DOWN** Select the required value within an option field.

TOGGLE Not used.



The option fields function as follows:

NORMAL Intensity of backlight in normal menu operation.

VISUAL YES Some menus use visual feedback. This is the intensity for 'good' or 'yes'.

VISUAL NO Some menus use visual feedback. This is the intensity for 'bad' or 'no'.

Glossary

Channel

There are a maximum of 512 channels in a DMX packet. This term is identical to Data slot. Channels number from 1 – 512.

Slot

Slot refers to the 513 bytes that can be contained in a DMX frame. Slots number from 0 – 512, zero being the start code.

Data slot

Data slot is the formal name for Channel.

Footprint

The number of channels or data slots that a DMX receiver uses.

Personality

Personalities allow RDM devices to have different setups that can be selected via RDM.

RDM

Remote Device Management.

Refresh rate

This repeat rate of DMX512 data. The maximum refresh rate of DMX with a full 512 channel payload is 44Hz.

Get

The RDM term meaning to read a parameter.

Set

The RDM term meaning to programme a parameter.

ISD

The delay between DMX slots.

Warranty

All products are covered from date of purchase by a two-year return to base warranty.

By return to base, we mean that the customer is responsible for all costs of transport to and from Artistic Licence.

Returns will not be accepted without prior authorisation. In order to discuss a request to return goods, please email:

Sales@ArtisticLicence.com

No user serviceable parts inside.

Compliance

All Products manufactured or sold by Artistic Licence Engineering Ltd are fully compliant with the appropriate UKCA, CE and RoHS regulations. Product specific information is available on request.

Waste Electrical & Electronic Equipment (WEEE)

Artistic Licence is a member of a WEEE compliance scheme and will happily recycle any of our products that you, at your expense, return to us.

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