

XTBA Dali Watch

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Software 1.1 R463 or later
If in a rush see Quick Set Up on page 28

XTBA

Unit 2 The Old Curatage
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Introduction

Welcome to the world of DALI. The protocol can be complicated as well as confusing - and sometimes just plain bizarre. To add to the 'gaiety' there are a lot of 'reserved' commands and a bunch of 'application extended commands' resulting in not enough command space to fit into 8 bits so 'special' or high commands are needed. They tend to work in a completely different way to other 'low' commands and to each other. There is a full list of commands and responses at the end of this manual. Please note some of the screen illustrations upper and lower case type in this manual might be incorrect. This is not because I can't tell the difference but Microsoft Word likes to change them all on its own between printing!

The terminology has been kept as close to the DALI standard as possible and where it can be ambiguous explanations provided.

To simplify the commands, commands OFF (command 0) to APPLICATION EXTENDED COMMANDS (command 255) are referred to low commands. Commands from TERMINATE (command 256) to ENABLE DEVICE TYPE (command 272) are referred to high commands.

DALI also helpfully? (as it uses less bits) has a channel/address range from 0 to 63 rather than 1 to 64 and in order to keep as close as possible to the DALI standard the Watch sticks to this format. To simplify in day to day use the default address loaded on a functions entry is 1 rather than 0, so you can get to zero (if the mood takes you) by pressing the Down or Left key depending on function type.

DALI again triumphs? when it comes to levels. The allowable range is 0 to 254, not 255 so in displays that show levels 'max' is displayed when the level is = 254.

The XTBA DALI Watch tester is designed to hopefully simplify DALI commissioning or testing, identify faults, monitor commands and make life a little simpler. So if none of the above makes any sense don't panic the Watch will help you through muddy waters of DALI – its not 'Rocket Surgery'.

DALI Data Polarity

Dali receivers will work out their own polarity – so you can attach the two cables either way.

Advanced Menus

There is a lot the Watch can do and a lot you might never want to know about. So in user options you can select Advanced Menus on or off. With this set off some of the more esoteric functions are switched off in the menu system to keep them out of the way.

Power Options

DALI Buss Power

Unlike most other protocols the DALI line is continually powered from a D.C. power supply 9 to 22volts (normally 15volts) called 'DALI buss power' across the data pair. The controller sends information by switching the positive line low - effectively shorting out the line. The receivers monitor the line for the data and where required will send information back to the controller by the same method. No power supply no communications!

Watch Power – from an existing DALI Buss Power Supply

The DALI Watch can be powered from an external PSU (via the power input socket) or directly from the DALI Buss power – if available.

If the Watch is powered from the DALI Buss (not from its own supply) there is nothing more you need to do. If it finds DALI Buss Power it will turn on, if not it won't - isn't technology a wonderful thing!

The Watch takes about 35ma @15V from the DALI Buss (as you asked) or with its external supply connected it will draw nothing from the DALI Buss.

DALI Buss Power from the Watch

When powered from the Watches' external PSU you can add DALI Buss Power if not available. So devices can be simply bench tested, installations half completed or sections of an installation can be tested without the need to find another power supply.

How can you tell:

First connect the Watch to the DALI data pair. When connected to the DALI system (and in the main menu loop) if the blue led is off the system already has DALI Buss Power connected. So you can now use the Watch.

If the blue led is flashing quickly there is no DALI Buss Power available so you will need to add power to the Buss.

When you enter any of the menus and there is no buss power you will be prompted with the following:

```
N O B U S S P O W E R
y e s = e n a b l e f u n = e s c
```

Pressing the Yes button will turn on Local DALI Buss Power, the blue led will stop flashing the display will change to tell you what the line voltage is, so you should be ready to go. Pressing Function will take you back to the main menu loop.

```
R U N N I N G O N L O C A L P S U
L I N E V O L T A G E @ 1 3 . 6 V
```

What you need to avoid is turning on Local Buss Power and then connecting to the data pair. As you might end up having two Buss Power supplies on at the

same time. This probably won't do much harm as the Watch will simply reset back to the main menu with the Local Buss Power disconnected.

Watch Button Control

The DALI Watch has five buttons to control its functions as follows:

Function: Next main menu or if in a sub menu will always take you back to the top of that sub menu. If in the top menu pressing Yes will go back one main menu.

Menu / Left: Sub menus or left scroll in receive and transmit

Yes / Right: Enter selected menu or right scroll in receive and transmit

Up: Command scroll or level/value up

Down: Command scroll or level/value down

Data Led:

If the Watch is receiving DALI e.g. 'receive dali' or other functions that question or down load data from the installation the blue led will be lit.

If the Watch is in channel transmit menus the blue led will slowly flash.

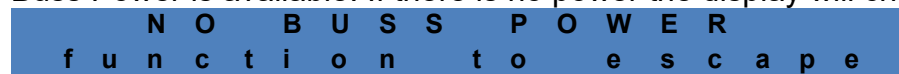
If the blue led flashes quickly there is an error e.g. No Buss Power.

Shortcuts: When in any of the top menus pressing both the Up and Down buttons will switch the display between decimal or percent. This setting is not stored so the Watch will go back to the setting in user options on next power up.

In menus where the Left/Right buttons are used pressing both will set the value to 1. In menus where the Up/Down buttons are used for levels pressing both together will set the value to 50%

DALI Buss Power Alert:

On entry to functions (except User Options) the Watch will check that DALI Buss Power is available. If there is no power the display will change to:



NO BUSS POWER
function to escape

Main Menu Loop

Receive DALI → Transmit DALI → Setup Devices → Query Devices → DALI Parameters → User options → Back Up Functions → Development Tools ↑

Pressing Menu when the main menu is displayed will take you into that functions sub menu. Pressing the Menu button again will then take you around the sub menu loop. Pressing Yes will then enter that function.

Pressing the function button when in a sub menu will take you back to the top of that submenu. So with Receive Levels displayed pressing Menu button will take you into the Receive menu loop. Pressing the Menu button again will take you around the receive loop.

Receive Menu Loop

Receive Levels → View Commands Live → View Command History → View Raw Data → Command Compare → Receive Group Levels → Flicker Finder
↑

Receive Levels: Pressing the Yes button will enter the receive function. This allows you to view any DALI levels (arc power commands). Group level commands are ignored as they have their own menu below. If there is no DALI being received the Watch will let you know with the message 'NO DALI INPUT'.

```
C H :          1          2          3          4
R X %          0          0          0          0
```

The upper line shows the channel number and the lower the level received. Next to the RX is a % symbol if the unit is set for percent or D if set for decimal (see user options). The RX tells you that you are in receive as the transmission display looks the same but with a TX. If a command is received the 'RX%' will briefly change to COM to warn you that commands are also being received.

Use the Left and Right buttons to scroll through the DALI channels.

View Commands Live: (see user options for arc power / level blocking and repeat command blocking)

The unit will monitor the data line and will display commands received. If level blocking is enabled only non level commands will be received - the units default.

Multiple identical commands can be blocked by setting 'block repeat data' in user options. In this mode only new commands will be displayed live and in history.

Pressing the Yes button with the View Commands Live menu displayed the display might look like this once a command has been received.

```
Command Number          address, group or broadcast
C O M N o 0 @ S . A D D 0
O F F
```

Command Description

On entry any existing command history will be cleared. The top line tells you the command number and if it is a short address, group or broadcast. If it receives a group command the top right will change to GROUP with the group value and if broadcast the top right will change to ALL.

With commands that do not have a short address/group or/broadcast e.g. some high commands such as Terminate the top right will be blank.

The second line gives the command description. The display will update as any new commands are received.

View Command History: Command history will allow you to view the last 250 command pairs received. It can be used in two ways. When in 'View Commands Live' pressing the Menu button will enter the history display. Pressing the menu button again will take you back to 'View Commands Live.' So you switch between the two. If entered from the main menu it will display the last 250 commands received.

The COM in the top left of the display is replaced with the slot value and the Up and Down keys can be used to scroll through the history.

```
History Slot          address, group or broadcast
  5 N o 0 @ S . A D D 0
  O F F
```

Command Description

If the slot has no command data e.g. beyond the command history the display will show 'EMPTY SLOT'.

View Raw Data: The received data is displayed as follows:

```
S . A D D 0 C O m N o
0 0 0 0 0 0 1 0 0 0 0 0 0 0
```

=Short address 0 with command 0 (OFF):

The upper line displays the short address, group or ALL for a broadcast command.

Note bit 0 is set for 1 (the command bit) as OFF is a command, the address is contained in bits 1 through 6.

If level blocking is turned off and a level is being received the display should look something like this:

```
S . A D D 0 L e v N o
0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

= Short address 0 at level zero

If the unit is receiving a high command the top left will change to HICOM as follows:

```
H I C O M L e v N o
1 0 1 0 0 0 1 0 0 0 0 0 0 0
```

= Terminate

Some high commands use the low byte for level/address information, in this case 'Terminate' does not. In either case the second byte is labelled LevNo in high commands.

Pressing and holding the Yes button when in view raw data will freeze the display to give you a chance to see what is going on with fast data.

Command Compare:

This function allows a command with either a short address, group or broadcast to be set up or high commands with or without data in the second byte. The Watch will then wait for reception of this exact command and let you know it has been received.

So if you are wondering why your system does not respond to a particular command you can find out if it has ever been sent. Or for commands that need to be received twice to activate a device (Commands 32-128, Initialise, Randomise) you can see if they were sent twice, or you could use Command History.

Pressing the Yes button from Command Compare the display will change to:

```
C O M P A R E   U S I N G   S . A D D
m e n u   o r   y e s   T o   e n t e r
```

Pressing the Menu button again will loop through the short address (S.ADD) Group or broadcast (B.CAST). In this way any command can be set up to be compared.

Pressing Yes will take you into the compare display.

```
> O F F
  A D D R E S S   0
```

Pressing the Menu button will toggle the left side arrow > to the upper or lower line. With the arrow in the upper line pressing the Up/Down buttons will change the command to be compared. With the arrow on the lower line the address or group (if set on entry) can be altered.

If the command has no address, group or broadcast e.g. high commands the display will change. If the command has a value e.g. load DTR then the display will change and the lower line is then used to set a value.

Pressing the Yes button will take you into the compare display as follows:

```
> O F F
  A D D R E S S   0           1 :   1 4 3
```

= 1 command found equal to OFF at address 0 in 143 commands received.

The figure on the left of the semi colon is the number of equal commands received. The right hand figure is the number of commands received the range of both is 0 to 255.

Receive Group Levels

This functions as in Receive Levels except arc power levels are ignored and group levels displayed. Pressing the Yes button will take you into the Group Level display as follows:

```
G R P :      1      2      3      4
R X %      m a x      0      0      0
```

In this case group 1 is at full. Pressing the Left/Right buttons will scroll through the groups 0 to 15.

Flicker Finder:

This function is used to establish if there are any errors in transmission or intermittent problems and is most usefully used with level commands.

Pressing Yes from the flicker finder menu the display will ask you to 'TAKE SNAPSHOT'. Pressing Yes will store the existing data frame on the line and the display will change to COMPARING DATA.

Incoming address and command or level information is now compared with the internal memory and if any differences detected the first error detected will be displayed as follows:

```
C H A N      O R I G      N E W
          0          3 1 %      2 6 %
```

In this case address 0 has moved from 31% to 26% during the sample time.

Transmit Menu Loop

Adjust single levels → Adjust One → Level Adjust All Levels → Global all Levels → Adjust Group Levels ↑

DATA CONFLICT ALERT

The DALI Watch is designed to be both a DALI programmer/tester and a DALI monitor. In an installation it is possible that there is another transmitting device in use so if you try to transmit the Watch will warn you that there is already something transmitting as follows:

```
D A T A C O N F L I C T A L E R T
f u n c t i o n o r Y e s = s e n d
```

Pressing Yes will start the transmission but the data may be corrupted e.g. drink too much and try to bribe public officials. Pressing Function will escape to the main menu loop.

Adjust single levels: Pressing the Yes button will enter the function and the display will change to: This allows you to alter any DALI level.

```
C H :      1      2      3      4
T X %      0      0      0      0
```

The upper line shows the channel number and the lower the level transmitted. Next to the TX is a % symbol if the unit is set for percent or D if set for decimal (see user options). The TX tells you that you are in receive as the receive display looks the same but with a RX.

Use the Left and Right buttons to scroll through the DALI channels.

The first channel on the left is the channel that you have command of. Pressing the Up/Down buttons will alter the level at that channel number. So by using the Left/Right Up Down you can control all 64 channels. Note in this mode the Watch transmits all 64 channels and as DALI is not a quick protocol (not even close) there will be a delay from the display and the device getting to that level.

Adjust One Level: Pressing the Yes button will enter the function and the display will change to: This allows you to alter all DALI levels to quickly find a device.

```
A D D R E S S      1      T O      0 %  
L / R =      A D D      U / D =      L E V E L
```

Pressing the Left/Right buttons will alter the address setting and the Up/Down the level.

Adjust All Levels: Pressing the Yes button will enter the function and the display will change to: This allows you to alter all DALI levels (arc power commands).

```
A L L      L E V E L S      T O      0 %  
f u n c t i o n      t o      e s c a p e
```

Pressing the Up/Down buttons will alter 64 channels.

Global All Levels: Pressing the Yes button will enter the function and the display will change to: This allows you to alter all DALI levels (arc power commands) ignoring any short addresses using the broadcast all address.

```
G L O B A L      L E V E L S      T O      0 %  
f u n c t i o n      t o      e s c a p e
```

Pressing the Up/Down buttons will alter 64 channels using the broadcast command. This might be useful if a device seems not to respond to short addressing. If it responds to Global Level then it is connected but not short addressed.

Adjust Group Levels Pressing the Yes button will enter the function and the display will change to: This allows you to alter all DALI levels of all 16 groups.

```
G R P :      1      2      3      4  
T X %      0      0      0      0
```

The upper line shows the group number and the lower the level transmitted. Next to the TX is a % symbol if the unit is set for percent or D if set for decimal. Use the Left and Right buttons to scroll through the DALI groups.

The first group on the left is the group that you have command of. Pressing the Up/Down buttons will alter the level of that group. So by using the Left/Right Up Down you can control all 16 groups.

Note: The Watch will only transmit groups with an active level. So if no group levels are set nothing will be transmitted. This screen allows multiple groups to be controlled at the same time.

Setting levels in a fixture with more than one group will cause the fixture to switch between all the levels set in sequence – probably too fast to see and create a ‘mush’.

Set Up Devices Loop

Quick Set Up Devices → Group Scene + All → Discover/Program All → Discover/Program New → Patch Devices → Remove Short Address → Check Devices → Single Program ↑

Quick Set Up – sets up max/min etc. and Scene Levels

In order to set up a DALI device values need to be transferred to the data transfer register before the set up command transfers the value to the relevant device slot and all commands sent twice in less than 100ms. This would take some speedy finger action so the Watch deals with all of this for you so you don't need to bother.

Pressing the Yes button the display will change to:

```
S E T   U P   A T   S H O R T   A D D R
m e n u   o r   Y e s   T o   e n t e r
```

Pressing the Menu button again will loop through short address (S.ADD) Group or broadcast (B.CAST). This allows all types of set up. If broadcast is selected the Watch will display ? SET UP ALL DEVICES? To warn you that you are about to globally change all connected devices.

Pressing Yes will take you into set up display.

```
> S E T   M A X I M U M   L E V E L
A D D R E S S   -   0   @   0 %
```

With the arrow > on the upper left of the display the Up/Down buttons control which command to be sent. Commands available are: Set Maximum Level, Set Minimum Level, Set Failure Level, Set Power On Level, Fade Time, Fade Rate. Set levels in Scenes 0 to 15.

Pressing the Menu button will move the arrow to the lower left. This allows the Up/Down buttons to control the address or group. (If in broadcast the address will be ALL so the arrow will move directly to the level setting). Pressing the Menu button again will move the arrow next to the @. The Up/Down buttons can now be used to set the level to be sent.

Once you have set up the command, address and level press the Yes button and the command will be sent. The display will show ‘CONFIGURATION SENT’ before returning back to the quick set up display.

Group Scene + All – Set up scenes and groups and all DALI commands

Pressing the Yes button the display will change to:

```
S E T   U P   A T   S H O R T   A D D R
m e n u   o r   y e s   T o   e n t e r
```

Pressing the Menu button again will loop through short address (S.ADD) Group or broadcast (B.CAST). This allows all types of set up. If broadcast is selected the Watch will display ?SET UP ALL DEVICES? To warn you that you are about to globally change all connected devices.

Pressing Yes will take you into the advanced set up display

```
> A D D   T O   G R O U P   0
  A D D R E S S       1
```

Advanced Set Up lets you control the DALI installation directly. A lot of the commands you will probably never directly use as the Watch will use them in other functions but add or remove from group and remove from scene are controlled here.

For this reason the Watch will enter the entire DALI command list at 'add to group 0'. Pressing the up key will scroll through the group commands add group and then remove group commands and on up through the command list. Pressing the down key from the entry point will get to remove from scene15 and then down through the commands.

Pressing the Menu button will move the arrow to the lower left. The Up/Down buttons can now be used to alter the address or group to be sent to or in the case of some high commands alter the value or address.

All of the DALI commands are available but you will need a working knowledge of DALI to get the most out of Advanced Set Up. To help the Watch will send all double commands automatically (see below). Pressing the Up/Down buttons together will jump to command 257 Load Value to the DTR. Remember to Initialise if using commands 259 to 270!

The DALI commands have different possible functions. Commands 0 to 128 simply use the address and do not expect and answer. The other low commands use the address/group/broadcast but can ask for status, group. Yes/No answers, value or level. All the 'reserved' commands and the 'application extended commands' are missed out.

As the command list is scrolled through the display will show which type of command and the expected answer (if there is one) for example:

```
> Q U E R Y   P O W E R   F A I L U R E
  A D D R E S S       1       Y / N
```

= Query Power Failure at address 1 with a YES/NO answer.

Once you have set up the command, address and level press the Yes button and you will be prompted to send the command. Pressing the Yes button again and the command will be sent. The display will then show 'CONFIGURATION SENT' before returning back to the quick set up display. Once the command has been sent the answer (if there is one) is displayed on the lower right of the display, formatted to that answers type. Levels can be displayed as decimal or percent, values 0 – 255, short address 0 – 63 etc.

If the command expects an answer the answer type is indicated by the lower right of the display as follows:

Y/N	YES or NO request
STA	Status request
GRP	Group requested
S.A.	Short Address requested
FAD	Fade time/rate
VAL	Value requested
LEV	Level requested

The DALI protocol does not differentiate between data types returned it is just an single byte of data. But in order to make the information clearer the Watch will show which type of data requested is returned. For example if Query Max Level is set the answer will be displayed as LEV as it is a level. If Query Random address the answer will be displayed as VAL as it is a value.

YES/NO Beware the YES/No requests. If a YES/NO request is sent and the answer is YES the device will return 0xFF/d'255'. If the answer is NO nothing happens. So a request for Query Lamp Failure with the answer NO tells you that there is no problem at that address or alternatively that address does not exist.

Initialise Command

The initialise command uses the full address range 0 to 63 but in addition has two additional address functions. The Watch places these two functions above address 63 as below. So to get to the these two possible initialise parameters press the Up button.

NSA = (no short address) devices without a short address will be initialised.

ALL = All devices will be initialised.

Double send commands:

Configuration Commands 32 to 128 and Initialise or Randomise are required by the DALI standard to be sent twice to be executed by the receiving device. The Watch automatically sends these commands twice when the command is sent unless disabled in Development Options.

Discover/Program All

Before a DALI installation can be fully used the devices need to have their short address set, (but you knew that). DALI devices do not have address switches

so the only way to set the address is using a programmer. Fortunately you have one.

Pressing yes with the display in Discover/Program All the display will change to:

```
      E R A S E      A L L      D A T A ?  
m e n u = n o      y e s = e r a s e
```

This is warning you that you are about to do something drastic. If you press No the existing max, min etc. data will be retained, only the short address will be altered.

If you press Yes all connected devices will be reset and any existing short address removed. The display will show 'ERASING DEVICES' and count up from 0 to 63 the display will then briefly change to LOADING DEFAULTS where all devices are programmed as follows: Power On Level = 1, Minimum Level = 1, System Failure Level = 0, Max Level = 254. Following discovery you can change these settings in Quick Set Up if needed.

Once the defaults are set the display will change to:

```
      S E A R C H I N G      D E V I C E S  
      2 5 4      1 2 3      0 2 1
```

On the lower line you will see the search address being scanned through. In reality this tells you next to nothing but at least you can see something is going on and is fun to watch? Once a device has been discovered that device will light to the 'display find' value (set in user options- default 50%) so you can see which it is and the display will change to:

```
      S . A D D R E S S      =      1  
m e n u = r e j e c t      y e s = s e n d
```

If you are not sure what address to program pressing Menu will remove the device from the discovery process and not program the address. You can then run Discover New at a later time to assign that device's address.

Or:

Using the Up/Down keys the device's address can now be assigned. Pressing Yes will program that device to the short address selected and will display PROGRAMED AND VERIFIED if successful.

Following this the Watch will now search for the next unassigned device to program. Once the device has been identified and lit it can now have its short address assigned using the Up/Down keys. If a device has already been assigned a short address USED will appear on the to right of the display to warn you that you are about to assign another device to an address that is already in use.

Once all connected devices have had their short address set the display will change to:

```
      C O M P L E T E      1 0      F O U N D  
      f u n c t i o n      t o      e x i t
```

In this case 10 devices have been discovered and programmed successfully. Pressing the Function will escape back to the main menu loop and terminate the discovery process.

Use of address zero

In order display the device that you are about to program, the Watch temporarily uses address zero to light up that device before you assign it to its new address. If when programming you set an address to zero it will be lit along with the next discovered address, which might get confusing.

To get around this when a device appears that needs to set to address zero simply press the Menu button. That device will be turned off and removed from the discovery process. Once all other addresses have been set (address 1 through 63) run Discover New. The remaining devices will be discovered and as they are the only ones remaining can all be programmed to zero.

Discover/Program New

If new devices are added to an existing system their short address can be assigned without the need to go through the entire discovery process.

Pressing Yes when the Discover/Program New is displayed will enter new device search. If new devices are found the Watch will switch into program mode (as in Discover/Program All) and the new devices short address can be programmed.

Existing programmed devices will be ignored except the USED display will still show if the short address is already in use.

The Discover/Program New looks for devices without a short address. So if the new device added already has a short address the display will show NO DEVICES FOUND. In this case you will need to use remove the short address to clear that address and then run Discover/Program New again or use the patch.

Note: Discover New does not automatically set the device's defaults (unlike discover all) so following discovery you will need to use Quick Set Up to load the default values.

Patch Devices

This function allows the short address to be altered once set. The Watch will tell you which devices are in use and which short address is free. Pressing Yes with the Patch Devices displayed the display will change to:

```
> D E V I C E      @      1  A C T I V E
   T O S . A D D      3      U S E D
```

The top line displays the device to be changed. The lower line displays which short address it is to be changed to. In this case the device with short address 1 is to be changed to short address 3.

The right side of the display shows if the device you are attempting to patch is Active (e.g. connected) the lower line shows if the short address you are going to change it to is in use. The right hand side of the display will be blank if the device is not active or the address is not in use. Pressing the Menu button will toggle the left hand side arrow to the top/bottom line of the display. With the line on the top or bottom of the display the short address can be altered by use of the Up/Down buttons.

With the arrow on the lower line pressing the Yes button will send the patch change to the addressed device and SENT will appear in the lower right of the display.

Any active device will be lit to the 'display find' value (set in user options) when the arrow > is toggled. On the upper line the address of the device to be changed will be lit and when the arrow moves to the lower line the address to be change to will be lit – if connected.

Remove Short Address

If there are two devices on an address that need to be on different addresses this function allows the address to be removed, as there is no other way to separate the devices. Following the addresses removal Discover New can be run and the discovered devices (now with no address) programed. Pressing the Yes button the display will change to.

```
R E M O V E   S . A D D   @   1  
y e s   t o   s e n d ,   u p / D o w n
```

Using the Up/Down buttons the short address to be removed can be altered. The device at that address will be lit to the 'display find' value (set in user options). Pressing the Yes button will send out the command and the display will show 'Configuration Sent'. Once removed the device will be reset to its internal default settings.

Check Devices

This function is a quick check if the device's defaults on systems where all the defaults are supposed to be the same. On pressing the Yes button the display will change to:

```
S . A D D   0   N A
```

And the address will begin to count up. If no address is found the display will show 'NA'. If found the display will show 'OK'.

The Watch scans the device list and looks for the first valid address. It then records the Max Level, Min Level, Power On Level I and System Failure Levels and compares the values against any other available devices. If it sees a difference the display might change to:

```
S . A D D   5   M A X   L E V E L
```

y e s t o c o n T i n u e

In this case address 5 has a different max level. Pressing the Yes button will continue the search.

At the end of the search the display will change to:

8 D E V I C E S F O U N D
f u n c t i o n t o e s c A p e

This will display the number of valid addresses found

So you can tell how many active devices are on the system and if they are set up to the same defaults. If any differences are found you can use Quick Set Up in broadcast to ensure they all have the same defaults.

Single Program

Single program allows for fast single fixture programming of the short address. Pressing Yes the display will change to will warn you that this is for single fixtures only. Pressing Yes again will prompt turning on of the power supply (if off) and the display will change to:

S H O R T A D D R E S S = 0 1
y e s = p r o g r a m f u n = e s C

The Up/Down buttons can be used to set the address 0 to 63. Pressing Yes will send the information to the fixture and report it sent. If the Watch reports NO DEVICES FOUND following pressing Yes you forgot to connect the fixture or it is not powered.

Query Devices

Pressing Menu when Query Devices is displayed will take you into the main display. This is quick method of finding settings at an address. Alternatively you can use Advanced Set Up to do much the same thing but this groups the common commands into a simple menu loop. See also YES/NO note in advanced.

? M A X L E V @ 1 9 9 %
m e n u = l a s t y E s = n e x t

The Up/Down keys can be used to alter the short address. The Menu and Yes buttons will take you to the last/next query function. Functions as follows:

Max Level → Min Level → Power On Level → Fail Level → Ballast →
Failure → Lamp Power → Limit Error → Reset State → Version Number →
DTR Level → Device Type → Power Fail → Actual Level ↑

Once selected the Watch will continually send the query command and the answer will be displayed in the top right. Answers will be Yes and No, levels will be displayed with 'D' or % and values. If a level or value is expected 'NA' will be displayed if there is no answer.

DALI Parameters

Available if DALI being received

DALI Bit Time/Word Time → Interbyte Time → DALI Word Range → Frame Time C1 to C1 → Framing Errors → DALI Input Voltage ↑

Available if DALI is not being received

Device Response Time

The DALI Parameters can display numerous timings of the DALI being received. Pressing the Yes button with bit time displayed the display might look like this:

Bit and Word Time

```
B I T   T I M E           W O R D   T I M E
8 4 0 m s   O K           1 4 . 0 m s   O K
```

On the right of the value will be OK if the time is in range or ERR if out of the DALI specification. On detection of an error the screen will freeze. Pressing the Yes button will clear the error and continue checking.

Bit Time

The DALI protocol uses bi phase encoding so it is difficult to measure the full bit length in a data stream. The Watch measures the half bit time and presumes that the second half of the bit is the same time as the first. One can only hope. Range is 750us to 916us (833us +/- 10%).

Word Time

The word time is calculated from the falling edge of the start bit of the word pair (address and command byte) to the rising edge of the first stop bit, 17 bits in total.

The stop bits are not counted as part of the word as you can't count what doesn't change. So the range is 12.7ms to 15.5ms (17 x 833us +/- 10%)

When in a Parameters pressing the Menu button will take you to the next function.

Interbyte Time in ms:

```
D A L I   I N T E R   B Y T E   T I M E
           1 2 . 6   M s
```

Word Range is the number of DALI words being received

```
D A L I   W O R D   R A N G E
L =      0   H =      6 3   N U M =      6 4
```

L = Lowest address received. H = Highest address received and NUM = total number of different addresses received.

Frame Time C1 to C1 is the time between channel one being received again e.g. the total frame length in seconds.

```
F R A M E   T I M E   C 1   t O   C 1
                1 . 7 0   s e C o n d s
```

Maximum time displayed is 9.99 seconds – but if you see 9.99 you might as well send the data by post.

Framing Errors is the number of incorrectly formatted DALI words – hopefully none. Pressing the Yes button from the 'Framing Errors' menu and the display will look like this:

```
F R A M E   C O U N T           1 1 7 5 0
F R A M E   E R R O R S           0
```

The Upper line shows the number a DALI byte pairs counted the second line shows the number of errors detected. The maximum frame count is 99999 (which is approximately 45 mins) and the maximum errors is 255.

Input Voltage

The DALI buss power is monitored during the interbyte time to give the high value and during a low bit to give the low value. The high value should be between 9.5 to 22 volts and the low value should be between 0 and 6.5 volts.

```
D A L I   I N P U T   V O L T A G E
L O W           0 . 0 V   H I G H   1 5 . 1 V
```

Device Response Time

With no DALI being received entering parameters will prompt you to enter the device response time, ' menu for response'.

```
R E S P O N S E   @   S . A D D           1
W A I T I N G   F O R   R E S P O N S E
```

Using the up/down keys to change the address setting if a response is received at an address the blue led will flash and the display will change to:

```
R E S P O N S E   @   S . A D D           1
                6 . 1 m s   I N   R A N G E
```

The Watch sends 'query ballast' to the address and monitors the response time. If the response is started less than 2.9ms or greater than 9.2ms the display will show ERROR. If between 2.9ms and 9.2ms 'IN RANGE'. If no response found (e.g. no device found) the display will show 'WAITING FOR RESPONSE.'

The response is timed from the end of the second stop bit sent to the falling edge of the response's start bit.

User Options

Display in Percent → Level Commands → Block Repeat Data → Display Find → Advanced Menus → Check For Device ↑

Pressing the Menu button will take you through the Options loop. User options are stored by the watch on exit of the User Option Menu.

Display in Percent: Pressing the Yes key toggles between the decimal display values (0 to 253, max) or percent values (0 to 98,max).

Level Commands: Pressing the Yes key toggles between on or off. If level commands are set off the Watch will ignore any level (arc power) commands in View Commands Live, Command History, Raw Data.

This filters out the level commands so if configuration commands are interleaved with level commands they can be detected more simply and device history will not be filled with a load of short addressed level commands.

Block Repeat Data: Pressing the Yes key toggles between on or off.

If set 'on' when in advanced commands only new data will be stored into memory.

Display Find: Sets the level the device will be lit to in discovery, patch, remove address etc. – range 0 to 100%.

Advanced Menus: Pressing the Yes key toggles between on or off.

With Advanced Menus set to off some of less used DALI functions are removed from the DALI menu loops.

Check for Device: In transmit functions the Watch will normally check to see if there is a device connected by transmitting 'broadcast query ballast' and report if nothing found. Pressing the Yes key toggles between on and off.

Back Up Functions

The DALI Watch has the ability to down load and restore an entire installation's data. It will capture and store the following parameters for each address found: Device Address, Max Level, Min Level, Power On Level, System Failure Level, Fade Time/Fade Rate, Scenes 0 – 15, Groups 0 – 15.

With existing data captured the settings can be modified. Addresses changed, groups and scenes reassigned etc. If you don't like the changes you can restore the system back to where you started. By using the verify command you can also check the system is how you left it.

Back Up Menu Loop

Back Up Installation → Verify Installation → Restore Installation ↑

Back Up Installation

Pressing the Yes button with Back Up Installation shown the display will change to:

```
B A C K I N G   U P   @   1 / 1
A D D R E S S E S   F O U N D   1
```

The upper line shows first the address of the device being stored and the second figure the address being looked for. The lower line tells you how many devices have been backed up so far. Each device will take roughly 1.5 seconds to collect the information so with a full 64 address installation the down load this

will take about a 90 seconds. Once the down load is completed the display will let you know and prompt you to return to the Back Up top menu.

Verify Installation

Pressing the Yes button with Verify Installation shown the display will change to:

```
L O A D I N G   D A T A       1 /   1  
A D D R E S S E S   F O U N D       1
```

The Watch will down load the installation's data (as in back up above) and once completed will then compare it against its stored data.

If there is a difference in any data words the Watch will display in which parameter the difference occurs, the address of the device, the expected value and the received value.

```
?   M A X   L E V E L   @   6  
E X P T   2 5 4       R E C   1 2 8
```

In this case the Watch is telling you that the maximum level in device six has been changed from decimal 254 to decimal 128. If a device address has been removed or can not be found (because it is disconnected) the display will tell you which address is missing.

Pressing the Yes button will continue the verification process and display any further errors. At the end of verify the display will show ' Verification Complete'. Pressing function at any time will take you back to the top of the Back Up menu.

Restore Installation

Pressing the Yes button with Restore Installation shown the display will change to

' WILL OVER WRITE DATA' to warn you. Pressing the Yes button the display will change to:

```
R E S T O R I N G       1 /   1  
D E V I C E S   R E S T O R E D       1
```

The upper line shows first the address of the device being restored and the second figure the address being looked for. The lower line tells you how many devices have been restored.

This process might take a while (as we know) DALI is not a swift protocol and there is a lot of data to shift, so if all 64 addresses are being restored it will take roughly five minutes.

Note : In order for the down load to work correctly each device must have its own short address. Multiple devices on a single address will not be stored correctly. The installation can only be restored if discovery has not been run or a reset command sent since the system was backed up.

Development Tools

The development are designed to check devices to their limits or in some cases persuade devices that will not communicate to do so. Pressing the menu button will take you through the development tools menu.

Double Send Commands → Retime Transmit → Discovery Basher → Device Emulation ↑

Double Send Comms: Pressing the Yes key toggles between on or off. The DALI standard requires that commands 32 to 128, randomise and initialise need to be sent twice within 100ms. So this should normally be set for ON and the Watch will send them out as required. Turning them off allows for testing of devices to ensure they do not respond to single commands.

Retime Transmit

Both the bit and inter byte time can be altered for all DALI transmission functions.

On entering this menu the standard Watch timers are replaced with variable timers. This change is temporary and the Watch will switch back to its standard timers on next power up.

Pressing the Yes button the display will change to:

```
> B I T T I M E      8 3 3 u s      O K
  I B T I M E      1 2 . 0 m s      O K
```

Using the menu key to toggle the left arrow to the upper or lower line the value can be changed by using the up/down buttons.

The right of the display will display 'OK' if within the DALI parameters or 'OUT' if greater or lower as the value is changed. All DALI transmit functions will now use these timings.

Bit Time in us

The DALI standard bit time is 833us +/- 10% (750us – 916us) The Watch range is 700us to 954us. The bit time only alters the 16 data bits of the DALI word it does not alter the two stop bits as this would confuse the inter byte time below.

Inter Byte time in ms

The DALI standard specifies two stop bits at the end of the DALI data packet and a minimum of 9.2ms inter byte time between packets after the stop bits. In effect the two stop bits are part of the inter byte time so the Watch displays the inter byte time as from the last edge of the last data bit. So it will display OUT if below 10.9ms

(9.2ms required time + 2 stop bits at 1.6ms).

So you will need to factor in the two stop bits into the inter byte time. e.g. subtract 1.77ms (833us x 2). Slightly confusing but it makes sense? There is no upper time limit in DALI but the Watch's bit range is 5ms to 25ms.

Note if the bit time is set outside the DALI range the Watch may report 'no devices found' as any devices are now not responding.

Pressing the function button will escape to the top menu so any of the transmission functions can now be used with the new timings. The timings are reset back to normal on next power up.

Discovery Basher

This function is designed for single devices connected to the Watch. Using the Basher the connected device can be given 'a good kicking' to find out if how well it responds to the discovery process. By using the Retime Transmit menu + the Basher the timings can be altered to find the limits of the connected device.

The Basher will set a new random address to the device and then try to discover it. Once found it will set the short address and then verify that address. It will then repeat the process.

Pressing the Yes button with Discovery Basher shown the display look something like this:

```
1 3 6    2 0 7    0 3 2    1    O K
1 3 6    2 0 7    0 3 0    1
```

One the upper line of the display the first three blocks of numbers are the devices' unique address (uid). The lower three numbers are the Watch's search address which will hunt for that address until equal.

In the top right of the display is the number of passes the basher has completed with OK if all is well. This number will roll over to 1 after 255. The lower number is the short address being programmed which will increment every pass and will roll over to 0 after 63.

If an error is detected the display will look something like this:

```
1 3 6    2 0 7    0 3 2    P    3    E R R
1 3 6    2 0 7    0 3 0    S A    2    1
```

Once a verify error has been detected ERR will be displayed and the number of errors shown below.

Pressing escape will get you back to the Development Tools menu.

Device Emulation

The DALI Watch can be used as a standalone device and will act exactly like a single DALI fixture. You can view all the DALI parameters (short address, group, scene etc.) live so you can check the installation and the controller is doing what you think it should be doing. The Watch can be discovered and all

parameters altered and the results viewed. The emulation parameters are retained by the Watch on power off.

On entering Device Emulation you are asked if you wish to load XTBA defaults, factory defaults or simply leave it as it was last programmed . Pressing Yes will load the XTBA default (see below), pressing Menu will ask if you wish to Reset emulation data or leave it as it was. Pressing Yes will reset the emulation data to DALI factory reset. Pressing Menu will leave it as it was last used.

XTBA Default:

Short Address = 1, maximum level 50%, minlevel 10%, power on level 10%, system failure level 10%, actual level 10%, group 1 and 8 set, no scenes. DTR 0%.

Device Emulation has five screens. Pressing Yes will loop through the screens. Pressing Function will escape to the menu.

Screen 1

```
S A = 1 D T R = 0 L = 1 0 %  
G P = 0 0 0 0 0 0 0 1 0 0 0 0 0 0 1
```

The top line shows the short address (SA), the value held in the DTR in decimal and the actual level (L). The lower line shows what groups the Watch is in, starting from group zero on the left.

Screen 2

```
S C E N E 0 = N O  
u p / d o w n t o s e a r c h
```

Use the up and down buttons to see if the Watch is in any scenes.

Screen 3

```
M A X L = 5 0 % M I N L = 1 0 %  
P O N L = 1 0 % S Y S F = 1 0 %
```

Maximum level, Minimum level, Power on level and System failure level.

Screen 4

```
7 6 5 4 3 2 1 0 B I T  
1 1 1 0 0 1 0 0 S T A
```

Status Bits - Command 144

Screen 5

```
A L L Y e s / N o Y E S  
Q U E R Y B A L L A S T
```

Screen five shows live commands as they are received by the Watch and what response (if any) is expected.

If you try to set any of the parameters at any address other than the Watch's short address you will see the following and a basket of kittens will be left out in the cold all night – how cruel can you get?

Y o u t a l k i n g t o m e ?
n o t m y s h o r t a d d r e s s

----- END -----

DALI can be a complex protocol (in its simplicity) and there is a lot of code in the DALI watch and a lot of DALI permutations possible. Hopefully most of the major bugs have been found and swatted.

However if you find a problem with the unit or a 'trpo' in the manual or we have misunderstood a DALI command, or a function you would like to see please let us know.

CE Declaration of conformity
XTBA declares that the following equipment meets the requirements of the
EMC Directive 89/366/EEC. WEE/FC2753ZS



XTBA DALI WATCH - DALI COMMANDS
PAGE 1

Command Number	Command Bytes	Command Name	Expected Response
0	s.add/grp/all 00000000	OFF	NONE
1	s.add/grp/all 00000001	UP	NONE
2	s.add/grp/all 00000010	DOWN	NONE
3	s.add/grp/all 00000011	STEP UP	NONE
4	s.add /grp/all 00000100	STEP DOWN	NONE
5	s.add/grp/all 00000101	RECALL MAX LEVEL	NONE
6	s.add/grp/all 00000110	RECALL MIN LEVEL	NONE
7	s.add/grp/all 00000111	STEP DOWN AND OFF	NONE
8	s.add/grp/all 00001000	STEP UP AND ON	NONE
9 -15	s.add/grp/all 00001????	RESERVED	N/A
16-31	s.add/grp/all 0001????	GO TO SCENE	NONE
32 send twice	s.add/grp/all 00100000	RESET	NONE
33 send twice	s.add/grp/all 00100001	STORE ACTUAL LEVEL IN DTR	NONE
34-41	s.add/grp/all 0010????	RESERVED	N/A
42 send twice	s.add/grp/all 00101010	STORE DTR AS MAX LEVEL	NONE
43 send twice	s.add/grp/all 00101011	STORE DTR AS MIN LEVEL	NONE
44 send twice	s.add/grp/all 00101100	DTR AS SYSTEM FALIURE	NONE
45 send twice	s.add/grp/all 00101101	DTR AS POWER ON LEVEL	NONE
46 send twice	s.add/grp/all 00101110	DTR AS FADE TIME	NONE
47 send twice	s.add/grp/all 00101111	DTR AS FADE RATE	NONE
48-63 send twice	s.add/grp/all 0010????	RESERVED	N/A
64-79 send twice	s.add/grp/all 0100????	DTR AS SCENE ??	NONE
80-95 send twice	s.add/grp/all 0101????	REMOVE FROM SCEND ??	NONE
96-111 send twice	s.add/grp/all 0110????	ADD TO GROUP ??	NONE
112-127 send twice	s.add/grp/all 0111????	REMOVE FROM GROUP ??	NONE
128	s.add/grp/all 10000000	STORE DTR AS S.ADDRESS	NONE
129-143	s.add/grp/all 1000????	RESERVED	N/A
144	s.add/grp/all 10010000	QUERY STATUS	Byte returned
145	s.add/grp/all 10010001	QUERY BALLAST	Yes/No
146	s.add/grp/all 10010010	QUERY LAMP FAILURE	Yes/No
147	s.add/grp/all 10010011	QUERY LAMP POWER ON	Yes/No
148	s.add/grp/all 10010100	QUERY LIMIT ERROR	Yes/No
149	s.add/grp/all 10010101	QUERY RESET STATE	Yes/No
150	s.add/grp/all 10010110	QUERY MISSING S.ADDRESS	Yes/No

XTBA DALI WATCH - DALI COMMANDS
PAGE 2

Command Number	Command Bytes	Command Name	Expected Response
151	s.add/grp/all 10010111	QUERY VERSION NUMBER	Byte returned
152	s.add/grp/all 10011000	QUERY DTR CONTENT	Byte returned
153	s.add/grp/all 10011001	QUERY DEVICE TYPE	Byte returned
154	s.add/grp/all 10011010	PHYSICAL MINIMUM LEVEL	Byte returned
155	s.add/grp/all 10011011	QUERY POWER FAILURE	Yes/No
156-159	s.add/grp/all 100111??	RESERVED	N/A
160	s.add/grp/all 10100000	QUERY ACTUAL LEVEL	Byte returned
161	s.add/grp/all 10100001	QUERY MAXIMUM LEVEL	Byte returned
162	s.add/grp/all 10100010	QUERY MIMIMUM LEVEL	Byte returned
163	s.add/grp/all 10100011	QUERY POWER ON LEVEL	Byte returned
164	s.add/grp/all 10100100	QUERY SYSTEM FAIL LEVEL	Byte returned
165	s.add/grp/all 10100101	QUERY FADE TIME/RATE	Byte returned
166-175	s.add/grp/all 1010????	RESERVED	
176-191	s.add/grp/all 1010????	QUERY SCENE LEVEL 0-15	Byte returned
192	s.add/grp/all 11000000	QUERY GROUPS 0-7	0 or 1 returned
193	s.add/grp/all 11000001	QUERY FROUPS 8-15	0 or 1 returned
194	s.add/grp/all 11000010	QUERY RANDOM ADD HIGH	Byte returned
195	s.add/grp/all 11000011	QUERY RANDOM ADD MID	Byte returned
196	s.add/grp/all 11000100	QUERY RANDOM ADD LOW	Byte returned
197-223	s.add/grp/all 110?????	RESERVED	N/A
224-255	s.add/grp/all 11??????	APLICATION EXTENSION	N/A
HIGH COMMANDS	NO S.ADD,GRP OR B.CAST	SEND TO ALL	
256	10100001 00000000	TERMINATE	NONE
257	10100011 00000000	STORE DATA AS DTR	NONE
258 send twice	10101001 ???????? ALL DEVICES 10101001 = 00000000 ADDRESS,GRP,B.CAST 10101001 = 0AAAAAA1 WITHOUT S.ADD 10101001 = 11111111	INITIALISE Commands 259 through 270 are only processed following this command.	NONE
259 send twice	10100111 00000000	RANDOMISE	NONE
260	10101001 00000000	COMPARE	Yes/No
261	10101011 00000000	WITHDRAW	NONE
262	10101101 00000000	RESERVED	N/A
263	10101111 00000000	RESERVED	N/A

264	10110001 ?????????	SEARCH ADDRESS HIGH	NONE
265	10110011 ?????????	SEARCH ADDRESS MID	NONE
266	10110101 ?????????	SEARCH ADDRESS LOW	NONE
267	10110111 s.add	PROGRAM S.ADDRESS	NONE
268	10111001 s.add	VERIFY S.ADDRESS	Yes/No
269	10111011 00000000	QUERY S.ADDRESS	Byte DALI format
270	10111101 00000000	PHYSICAL SELECTION	NONE
271	10111111 ?????????	RESERVED	N/A
272	11000001 ?????????	ENABLE TYPE X	NONE

QUICK SET UP GUIDE

If you have just walked into an installation, you are in a hurry and the client is in the corner sharpening and axe the following might be useful to save you reading through the delights (?) of the entire manual.

Installation installed and connected but not set up or much else

1 - Plug in the mains adaptor first and then connect the DALI watch to any point of the DALI cable.

2 – Press the function key until:

```
S E T U P D E V I C E S
y e s t o e n t e r o r M e n u
```

3 – Press the Menu key until:

```
D I S C O V E R P R O G R A M A L L
y e s t o e n t e r o r m e n u
```

4 – If you see the following press the Yes button

```
N O B U S S P O W E R
y e s = e n a b l e f u n = e s c
```

5 – Press the yes button so data is erased

```
E R A S E A L L D A T A ?
m e n u = n o y e s = e r a s e
```

6 – The Watch will erase all data and discover the first device, at the end of the search to the device to be programmed will be lit to 50% and the display will go to:

```
S . A D D R E S S = 1
m e n u = r e j e c t y e s = s e n d
```

Using the up/down keys set the address you would like the device to be and then press Yes. The Watch will verify that address and then continue discovery.

7 – Repeat step 6 until COMPLETE (number of devices) FOUND displays.

8 – The devices will have had their defaults set in discovery as follows: Power On Level = 1, Minimum Level = 1, System Failure Level = 0, Max Level = 254. Following discovery you can change these settings in Quick Set Up if needed.

Check it all worked

9 – Press the Function button until TRANSMIT DALI and press Menu, press Menu until ADJUST ONE LEVEL appears then press Yes and the display will change to:

```
A D D R E S S 1 T O 0 %
L / R = A D D U / D = L E V E L
```

Use the up/down buttons to alter the level and the left/right buttons to alter the address. You should now have a working system?

10 – If it all worked retire to the bar, if not blame the contractor.

XTBA

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