



ultimate user guide

Congratulations on purchasing Aerotech Projects' ULTIMATE. You have embraced a technological revolution, be prepared to stun your audiences.

By controlling the brightness levels of the three primary colours Red, Green, Blue (RGB) it is possible to create a palette of 16 million colours. Each colour of the RGB is independently programmed to run a sequence of timed events to change intensity (brightness) levels. It is possible to create a dazzling light show which can then be synchronized with other Ultimate products.

A sequence is created using a simple line of code written within a standard text editor. The file is then downloaded to the equipment using a USB connection. The ULTIMATE uses USB to charge, synchronise a start sequence or download new data.

state of the art, programable juggling equipment

Contents

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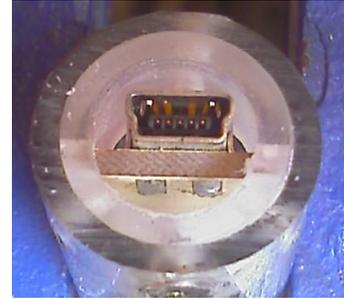
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1. Quick Start (Not synchronized)

An ultimate may run its programmed sequence, simply by using the reset shown below.

Location of software reset

Looking down the socket end shows the USB socket mounted on the printed circuit board. On the other side of the board you can find two solder pads. To activate the reset you need an electrical conduction object small enough to fit across the pads to touch the two pads together. (Hardware reset see section 6 extra info)



2. Computer start (Synchronised)

Using the 'Sequence Downloader' program is the most versatile way to start your Ultimates, allowing you to pre-test them before an important synchronised start.

If more than one ultimate requires to be triggered together, then leads must be attached to each Ultimate.



Computer Requirements

To communicate with and program the ULTIMATE, the following hardware and software requirements must be met:

- Internet connection
- Windows 32 or 64 bit to program and start / stop the code.
- Linux 32, Mac 64 or Android to start / stop the code.
- At least one free USB port

Install Aerotech Files

Please download the Plug and Play Sequencer 'P&P sequencer' from <http://aerotechprojects.com/4-downloads.htm> and unzip. Create a folder called Aerotech.

Connecting an Ultimate

Installation for Microsoft Windows

After the USB cable is connected, the 'Found New Hardware Wizard' dialog appears. (If not check the end of this section) Select 'No, not this time'. Click Next. The 'Found New Hardware Wizard' dialog appears



Select the "Install from a list of specific locations" option. Click Next.

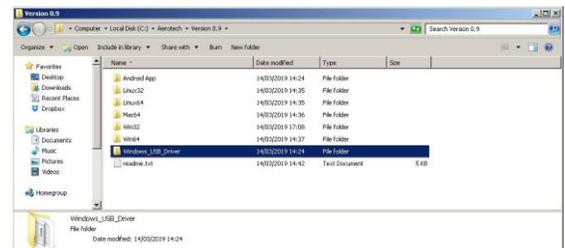


The 'Search and Installation Options' dialog appears

Select the "Include this location..." option. Click the Browse button to open the Windows Browse for Folder dialog. Navigate to the directory C:\Aerotech\Version xx\Windows_USB_Driver Click OK to accept the location. Click Next.



Click 'Continue Anyway' at the Windows verify dialog. The system will copy and install the driver files, and indicate when the process is finished. The final dialog will indicate that the driver has been successfully installed. Click Finish.



Manual Installation maybe required for later versions of windows

Manual Installation maybe required for later versions of windows as Aerotech are not registered as a signed driver.

With an Ultimate inserted in a USB socket.

Goto 'Device Manager'

To install com driver, right click Aerotech Projects listed under 'Other Devices'

Click 'Update driver software'

Click 'Browse my computer for driver software'

Point to Aerotech\Version xx\Windows_USB_Driver

Finished.

If windows is not allowing a third part driver to be installed, please youtube on how to do this.

You may now start Sequence downloader. Unplug and re-insert Ultimate for it to show on the sequencer. If it shows failed to communicate, apply softstart to Ultimate as shown above.

Starting and Stopping a sequence

Tick the equipment you wish to communicate with and press 'Start', the Ultimate will run the preloaded sequence.

Pressing stop will stop the sequence.

You can right click anywhere on the Ultimate description and rename and add to a group.



Colour Palette

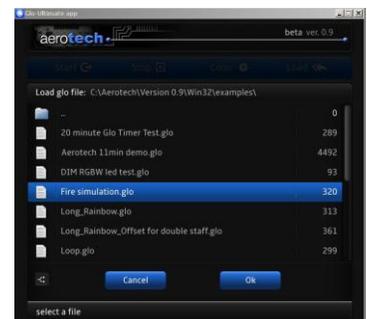
Select the Ultimates on which you want to see the colour. Clicking 'Colour' on the 'Sequence Downloader' will show a colour palette. Change the colour by either tapping on the round colour chart or adjust the values of R,G and B. When your satisfied with the colour, note the number values of the RGB to be used in writing a .glo file for a sequence.

Note Ver 0.9 and greater does not require the use of the 'Set' button anymore.



File Selection

Selecting 'Load' from the main screen will take you to a file selection screen, you can navigate to your .glo file or you can place your saved .glo files in the Aerotech examples folder.



3. Writing a new sequence

There are several example files included in the Aerotech installation. The example .glo files can be opened using notebook or other editors. We recommend Notepad++ and is free to download.

The sequence layout is comprised of 2 colour commands and 5 control commands:

Colour commands

Colour commands allow you to select the colour of your Ultimate props. You have a choice of setting the individual colour components or setting them all at once.

Individual colour commands

The R, G and B commands are followed by a brightness value directly, and set the brightness of the red, green and blue colour components directly. The brightness can range from 255 (full brightness) to zero (off).

R, 10 ; Set Red brightness (Intensity) to 10
G, 20 ; Set Green brightness (Intensity) to 20
B, 30 ; Set Blue brightness to (Intensity) to 30

Please note the semicolon ';' is only used to separate commands from description

Save your sequence as a .glo file

All colours command

If you want to set all the colour components, then the Colour command, C, can simplify this job. It takes 3 brightness parameters for Red, Green and Blue. The following example does the same as job as the preceding example, but uses just one line instead of 3.

C, 10, 20, 30 ; Set Red to 10, Green to 20 and Blue to 30

Delay

Once you have chosen a colour, you will probably want to display it for a while before changing it. To do this, use the delay command, D. The command is followed by a value which specifies the time to delay in one-hundredths of a second. The value can range from 1 (one hundredth of a second) to 65535 (655.35 seconds i.e. 10 minutes 55.35 seconds). Here are some example delay commands.

D, 1 ; One hundredth of a second
D, 10 ; One tenth of a second
D, 100 ; 1 second
D, 1000 ; 10 seconds

Loops

The loop command, L, can be used to repeat some commands a number of times. The loop command is followed by the number of times to loop (1 to 255). The end of the loop command is E.

Here's a simple example of a sequence where a loop repeats the sequence Red Green 10 times:

```
...
L, 10                ; Loop 10 times
C, 255, 0, 0        ; Red full brightness
D, 100              ; Pause 1 second
C, 0, 255, 0        ; Green full brightness (red off)
D, 100              ; Pause 1 second
E                    ; End loop
...
```

Loops can contain other loops. Here's an example where the inner blue flashing is done 100 times (10 x 10) and the outer red flash is done only 10 times (once for each 10 blue flashes):

```
...
L, 10                ; Loop 10 times
C, 255, 0, 0        ; Red full brightness
D, 100              ; Pause 1 second
L, 10                ; Loop 10 times
C, 0, 0, 255        ; Blue full brightness (red off)
D, 10               ; Pause 0.1 seconds
C, 0, 0, 0          ; Blue off
D, 10               ; Pause 0.1 seconds
E                    ; End 2nd loop
E                    ; End 1st loop
...
```

End Command

All sequences must end their main sequence with an END command. The main sequence starts at the beginning of the file and needs to be terminated with an end command to allow the sub-sequences to be defined (see below). The following example shows a simple main sequence that turns the prop red, waits for one second and then finishes.

```
R, 255              ; Red full brightness
D, 100             ; Wait one second
END                 ; End main sequence
```

Sub-sequences

Sub-sequences hold parts of sequences that are repeated. Using sub-sequence can make a sequence much shorter and easier to manage, and can allow longer sequences to be used on the Ultimate props. Clever use of sub-sequence can be used to produce effects like a strobe that can be used throughout your sequence.

Sub-sequences are defined with the DEFSUB command, ended with the ENDSUB command and called using the SUB command. Here is a simple sequence which turns the prop red, then uses a sub-sequence to flash green, turns the prop blue and then re-uses the sub-sequence to flash it green again.

```
R, 255          ; Red full brightness
D, 100         ; Pause 1 second
R, 0          ; Red off
SUB, flashGreen ; Call 'flashGreen' sub-sequence
B, 255         ; Blue full brightness
D, 100         ; Pause 1 second
B, 0          ; Blue off
SUB, flashGreen ; Call 'flashGreen' sub-sequence again
END           ; End of main sequence
```

```
DEFSUB, flashGreen ; Start defining sub-sequence 'flashGreen'
L, 10              ; Loop 10 times
G, 255            ; Green full brightness
D, 10             ; Delay one tenth of a second
G, 0              ; Green off
D, 10             ; Delay one tenth of a second
E                 ; End loop
ENDSUB           ; End sub-sequence 'flashGreen'
```

Sub-sequence can call other sub-sequences and sub-sequences can contain loops. Here's a sequence that uses a red blue strobe effect to build up 2 other strobe effects of differing lengths.

```
SUB, strobeRedBlue10Seconds ; Call 'strobeRedBlue10Seconds'
C, 0, 255, 0                ; Green full brightness
D, 100                      ; Pause 1 second
SUB, strobeRedBlue30Seconds ; Call 'strobeRedBlue30Seconds'
C, 0, 255, 0                ; Green full brightness
D, 100                      ; Pause 1 second
SUB, strobeRedBlue10Seconds ; Call 'strobeRedBlue10Seconds'
C, 0, 255, 0                ; Green full brightness
D, 100                      ; Pause 1 second
END                          ; End main sequence
```

```
DEFSUB, strobeRedBlue10Seconds ; Define 'strobeRedBlue10Seconds' sub-sequence
L, 50                          ; Loop 50 times (50 x 0.2 sec = 10 sec)
SUB, strobeRedBlue             ; Call strobeRedBlue sub-sequence
E                               ; End loop
ENDSUB                        ; End sub-sequence 'strobeRedBlue10Seconds'
```

```
DEFSUB, strobeRedBlue30Seconds ; Define 'strobeRedBlue30Seconds' sub-sequence
L, 150                         ; Loop 150 times (150 x 0.2 sec = 30 sec)
SUB, strobeRedBlue             ; Call 'strobeRedBlue' sub-sequence
E                               ; End loop
ENDSUB                        ; End sub-sequence 'strobeRedBlue30Seconds'
```

```
DEFSUB, strobeRedBlue      ; Define 'strobeRedBlue' sub-sequence which takes 0.2
second                    ;
C, 255, 0, 0              ; Red full brightness
D, 10                     ; Pause one-tenth of a second
C, 0, 0, 255              ; Blue full brightness (red off)
D, 10                     ; Pause one-tenth of a second
ENDSUB                    ; End sub-sequence 'strobeRedBlue'
```

Ramp

The ramp command allows the currently displaying colour to be smoothly blended into a new colour. The command has the format: RAMP, R, G, B, delay. The delay takes a parameter in one-hundredths of a second, like the delay command, and can be from 1 (1 hundredth of a second) – to 65535 (655.35 seconds).

4. Charging

The Ultimate will sleep automatically when not running a sequence. Once plugged into the USB the battery will start charging.

By using full powered USB hubs the glo-equipment fast charges from empty to 80% charged in 2 hours.

Hubs purchased from Aerotech do not require an initial connection to a computer to commence charging.

Note some hubs require computer connection first, before it will supply power to the ports, once power has been established then the computer may be turned off again. If the power is interrupted to the HUB the fast charge will stop.

If you are not using an Aerotech Hub please check that your hub is a full powered hub. Each port must be able to deliver 0.3A (300mA) per port. You can check this by looking at the power shown on the external power supply that plugs into the hub.

If it is a 5 port hub it should show at approximately 1.5A (5x 0.3A).

If it is a 7 port hub it should show approximately 2.1A (7x 0.3A).

The hubs which have no power supply are not recommended for Ultimates, but can be used for communication still when no power is available.

Note: Lower power hubs will charge but at a reduced rate.

5. Extra Information

Hardware Reset

Hardware resets are only available on ultimate balls and post 2012 clubs and staffs (ie single board equipment). Hardware resets should be very rare but may be caused by a communications break or very low battery etc.

To operate please use the second set of solder tabs behind the first set shown in the software reset.

The balls silicon socket protection can be removed for better access.

Tips

Notepad++ gives line numbers and extras that notepad lacks. <http://sourceforge.net>

Audacity a music audio editor, can detect base timings for easy code writing.

Ultimate versions.

Version 1 : Clubs and staffs used Lithium Ion cylindrical batteries

Version 2 : Clubs and Staffs had more powerfull LEDs.

Version 3 : Balls and latest equipment use Lithium Polymer, have hardware reset and clubs and staffs are made with a single circuit board.

FAQ. Frequently asked questions.

If the Ultimate is not functioning or has missing colours then try a reset, if you have a ball or ultimate 3 and above try a hardware reset.

If ultimate is not functioning but flashes red/blue when plugged in, then the battery needs replacing. Please contact Aerotech for new batteries or battery replacement service.

If ultimate is not functioning but when plugged in, after a few seconds start glowing a dull red, normally means that the ultimate has been in storage for a while but was placed there in a battery flat condition. If ultimate versions 1&2 then replace battery, if ultimate 3 then leaving charging for 2 hours (leds may flash iratically?) take cable out try software and or hardware reset, then plug in again immediately and charge again for another 2 hours.

Pre 2014 clubs (version 2) can be upgraded to Version 3 so that it can be used with the Plug & Play Sequencer, Please contact Aerotech for upgrade price.