

FEASA DISPLAY ANALYSER FUNCTIONAL VERSION



User Manual for Display Analyser



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FEASA DISPLAY ANALYSER FUNCTIONAL VERSION



About this Manual

Feasa operates a policy of continuous development. Feasa reserves the right to make changes and improvements to any of the products described in this document without prior notice.

Feasa reserves the right to revise this document or withdraw it at any time without prior notice.

This manual is written for all the models of Feasa Display Analysers. The model numbers are Feasa 3D, 6D and 10D.

The Feasa 10D model is a 10 channel unit which can accommodate up to 10 Luminance Heads while the Feasa 3D is a 3 channel unit with up to 3 Luminance heads.

The interface on these Analysers is USB or Serial.

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Introduction

The Feasa Display Analyser is an instrument that tests the Color and Intensity of Displays that are back lit with LEDs. It has been specifically designed to test for Luminance, Contrast Ratio and Homogeneity of the Display.

Emitted Light from the Display is collected using Luminance Heads and is guided through Fiber-Optic Light Light Guides to the Analyser where the Color, Luminance and Contrast ratio are tested. The test results can then read out of the Analyser through the Serial or USB Interfaces.

The USB Interface is 2.0 compatible and the Serial Interface is RS-232 compatible.

The measurement results are output as ASCII strings through the USB and Serial Interfaces.

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Physical Layout

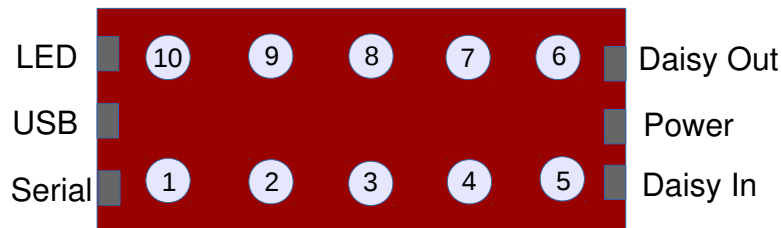


Figure 6

The physical layout of the Feasa 10D Analyser is shown in Figure 6.

The fiber Patch Cord connectors are labeled 1-10. Options include Feasa 3D, Feasa 6D and Feasa 10D.

These Analysers are enclosed in an Aluminium box. The Serial port comprises a 3 pin connector and the USB connector is the mini usb type. All cables are supplied with the Analyser.

Please refer to the fixturing Guidelines Manual for connector pin-out details.

USB Port Control

Connect the LED Analyser to the PC using the supplied USB cable.

Power is supplied through the USB Cable so there is no need to plug in the Power cable.

The installed Software Driver will configure the USB Port automatically.

The USB Port is configured as a Virtual Com Port and will be designated a name such as COM5, COM6, etc.

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Serial Port Control

For serial communications the LED Analyser must be connected from the 3-pin Serial Connector to the PC or Controller using the supplied serial cable.

5V DC @ 180mA must be supplied to the 2-pin Power Connector using the Power Cable provided. The Green LED should turn on to indicate the Analyser is ready for use.

The default serial communications settings are **57,600 Baud, 8 Data bits, 1 Stop bit and No Parity**.

The baud rate can be changed to any of the following:- 9600, 19200, 38400, 57600, 115200. These can be selected using the [setbaud](#) command.

Serial Connector (RS232C)

Pin	Signal	Pin on 9-Pin D-type
1	Tx from LED Analyser	2
2	Rx from LED Analyser	3
3	GND	5

Power Connector

Pin No	Signal
1	Power (5V DC)
2	GND

Figure 7.

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Capture Commands

The Capture commands are used to capture the parameters (colour, intensity, xy, uv, wavelength, cct) of the Display to be tested and store the results in the memory of the Analyser.

These results can be read out later using the **GET DATA** commands.

Commands are transmitted and received using ASCII characters and are **NOT case-sensitive**. All commands must be terminated with a **<CR>** or **<LF>** character.

The Terminal Program supplied on the CD is used to send/receive commands to/from the Analyser.

The **Feasa Display Analyser User** Program is a graphical tool that can be used to send commands and receive results from the Analyser. The responses from the Analyser can be observed in the Window.

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Capture Mode

CaptureDark - Store Dark Level

Transmit	Receive
capturedark	OK

Description

This command instructs the Display Analyser to capture and store the ambient Dark Level of the Display positioned in front of the Luminance Heads. The Display must be powered off before the **capturedark** command is executed. This command allows the Analyser to measure the ambient light and subtract this value from Display measurements.

This command should be executed if the ambient light changes. If the Display and Luminance Heads are enclosed in a dark chamber then this command need only be executed one time.

In the case of a 10 channel unit the data for all 10 channels is captured simultaneously and stored in internal memory of the Display Analyser. The data is stored until the power is removed or another **capturedark** command is issued. When completed the Analyser will transmit the character **OK** on the receive line to the transmitting device (i.e. the PC).

Example:

The PC transmits **capturedark** to the Display Analyser and the Analyser sends **OK** to the PC to acknowledge that the command is completed.

Capturedark

OK

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FEASA DISPLAY ANALYSER FUNCTIONAL VERSION



Capture Mode

CaptureDark## - Store Dark Level

Transmit	Receive
capturedark##	OK

Where:

represents the Channels 01 – 10.

Description

This command instructs the Display Analyser to capture and store the ambient Dark Level of the Display positioned in front of one Luminance Head. The Display must be powered off before the **capturedark##** command is executed.

This command allows the Analyser to measure the ambient light and subtract this value from Display measurements.

This command should be executed if the ambient light changes. If the Display and Luminance Head(s) are enclosed in a dark chamber then this command need only be executed one time.

The data is stored until the power is removed or another **capturedark##** command is issued. When completed the Analyser will transmit the character **OK** on the receive line to the transmitting device (i.e. the PC).

Example:

The PC transmits **capturedark##** to the Display Analyser and the Analyser sends **OK** to the PC to acknowledge that the command is completed.

Capturedark01

OK

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Capture Mode

Capture - Store Display Data

Transmit	Receive
capture	OK

Description

This command instructs the Display Analyser to capture and store the Color and Intensity of the Display positioned in front of the Luminance Heads. The Analyser automatically determines the correct settings to capture the Display data. In the case of a 10 channel Analyser the data for all 10 channels is captured simultaneously and stored in internal memory of the Display Analyser. The data is stored until the power is removed or another **capture** command is issued. When completed the Analyser will transmit the character **OK** on the receive line to the transmitting device (i.e. the PC).

This command uses a wide Intensity range to be able to test dim and bright areas simultaneously. However, if the Displays to be tested are of similar Intensity then better results may be obtained by using the [Capture#](#) command described on the next page.

Example:

The PC transmits **capture** to the Display Analyser and the Analyser sends **OK** to the PC to acknowledge that the command is completed.

Capture

or

c

OK

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FEASA DISPLAY ANALYSER FUNCTIONAL VERSION



Capture Mode

Capture# - Store Display Data

Transmit	Receive
capture#	OK

Where:

represents the ranges 1, 2, 3, 4, 5.

The Display brightness level for each range is as follows:-

Range 1 = Low
Range 2 = Medium
Range 3 = High
Range 4 = Super
Range 5 = Ultra

Description

This command uses a pre-selected exposure time designated Range1, Range2 etc. For low light or dim Display's use Range 1 and for brighter Display's use higher ranges. The higher ranges lead to faster test times because the exposure time is shorter.

This command instructs the Display Analyser to read and store the Color and Intensity of all the Display's positioned under the fibers using a fixed range.

The range setting must be specified. The data is stored until the power is removed or another **capture** command is issued. When completed the Analyser will transmit the character **OK** on the receive line to the transmitting device (i.e. the PC).

Example:

The PC transmits **capture** to the Display Analyser and the Display Analyser sends **OK** to the PC to acknowledge that the command is completed.

Capture2

or

c2

OK

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Capture Mode

CaptureContrastHigh - Store High Contrast Data

Transmit	Receive
capturecontrasthigh	OK

Description

This command is used to record the high contrast value of the Display. The Display should be set to maximum brightness before this command is issued. The command is used with the **CaptureContrastLow** to determine the Contrast Ratio of the Display.

Example:

The PC transmits **capturecontrasthigh** to the Display Analyser and the Display Analyser sends **OK** to the PC to acknowledge that the command is completed.

capturecontrasthigh

OK

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FEASA DISPLAY ANALYSER FUNCTIONAL VERSION



Capture Mode

CaptureContrastLow - Store Low Contrast Data

Transmit	Receive
capturecontrastLow	OK

Description

This command is used to record the low contrast value of the Display. The Display should be set to minimum brightness before this command is issued.

This command is used with the **CaptureContrastHigh** to determine the Contrast Ratio of the Display.

Example:

The PC transmits **capturecontrastlow** to the Display Analyser and the Display Analyser sends **OK** to the PC to acknowledge that the command is completed.

capturecontrastlow

OK

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Capture Mode

Get Data Commands

The *get data* commands are used to read out the Color, Saturation and Intensity data stored by the *capture* commands.

The data from the last *capture* command remains in memory until a new *capture* command is issued or the power is removed from the Analyser.

Commands are transmitted and received using ASCII characters and are **NOT case-sensitive**. All commands must be terminated with a **<CR>** or **<LF>** character.

Under Range Condition

An under range condition will occur when insufficient light from the LED reaches the sensor for the range selected. This will be indicated by **000 000 000 00000** for **RGBI** and **0.0000 0.0000** for xy and uv.

If this condition occurs select the next **lower** range and test again.

Over Range Condition

An over range condition will occur when too much light from the LED reaches the sensor for the range selected by the switch. This will be indicated by **255 255 99999** for **RGBI** and **0.0000 0.0000** for xy and uv.

If this condition occurs select the next **higher** range and test again.

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Get Data Mode

GetAverage - *Get the number of Captures to Average*

Transmit	Receive
getaverage	##

Where:

represents the number of Captures that are averaged and is a number in the range 01 – 15.

Description

This command returns the number of Captures that are averaged. The minimum value is 01 and the maximum value is 15. A Capture command must be executed after the Average value has been changed.

These values are stored permanently in memory and can only be changed by using the [setAverage](#) command.

Example:

Get the number of Captures that are averaged.

getaverage
05

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Get Data Mode

GetChannelStatus - Get the status of connected Channels

Transmit	Receive
getchannelstatus	Channel Listing

Description

This command returns the Serial Number of the Analyser, the number of Channels used and the Serial Numbers of installed Fiber Patch Cords and Luminance Heads.

This is to ensure that if the Display Analyser is disassembled it can be assembled correctly. The installed Display Luminance Heads and Patch Cords have been calibrated to specific channels and must be used with these channels to ensure correct measurements.

Example:

Get the channel status.

getchannelstatus

Feasa Display Tester

Unit Serial number: D003

Channel Fiber serial Head serial:

01	FP02C011	DL070001
02	FP02C012	DL070002
03	FP02C013	DL070003
04	FP02C014	DL070004
05	FP02C005	DL070005
06	FP02C016	DL070006
07	FP02C017	DL070007
08	FP02C018	DL070008
09	FP02C019	DL070009

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Get Data Mode

GetLuminance## - Get the Luminance value for a Channel

Transmit	Receive
getluminance##	&.&&&&e+&& or &&&.&&&&

Where:

represents the Channel Number and is a number in the range 01 - 10.

&.&&&&e+&& represents the data in Scientific format.

&&&.&&&& represents the data in Engineering format.

Description

This command returns the Luminance value present on fiber number **##**. The data is returned in either scientific or engineering formats. The format of the data is set by the **SetScientificFormat** or **SetEngineeringFormat** commands.

These values are stored permanently in memory until power is removed or the *getLuminance* command is issued again.

Example:

Get the the Luminance of a channel 01.

getluminance01
096.1245 CD/M²

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Get Data Mode

GetLuminanceAll - Get the Luminance of all Fibers

Transmit	Receive
getLuminanceAll	&.&&&&e+&& or &&&.&&&&

Where:

&.&&&&e+&& represents the data in Scientific format.

&&&.&&&& represents the data in Engineering format.

Description

This command returns the Luminance value present on all channels. The data is returned in either scientific or engineering formats. The format of the data is set by the **SetScientificFormat** or **SetEngineeringFormat** commands.

These values are stored permanently in memory until power is removed or the *getLuminanceall* command is issued again.

Example:

Get the Luminance of all channels.

```
getluminanceall
096.1245 CD/M2
084.6245 CD/M2
094.8245 CD/M2
088.1125 CD/M2
086.1675 CD/M2
```

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Get Data Mode

GetContrastRatio## - Get the Contrast Ratio for a Channel

Transmit	Receive
getcontrastratio##	&.&&&&e+&& or &&&.&&&&

Where:

represents the Channel Number and is a number in the range 01 – 10.

&.&&&&e+&& represents the data in Scientific format.

&&&.&&&& represents the data in Engineering format.

Description

This command returns the Contrast Ratio for channel number **##**.

Example:

Get the Contrast ratio for channel 01.

getcontrastratio01

00312.00 : 1

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getxy## - Return the xy Chromaticity values

Transmit	Receive
getxy##	0.xxxx 0.yyyy

Where:

represents the Channel Number and is a number in the range 01 - 10.

0.xxxx represents the x Chromaticity value.

0.yyyy represents the y Chromaticity value.

Description

This command is used to return the xy Chromaticity value for the Display in front of the channel number **##**. This command should be preceded by a **capture** command to ensure valid data is stored in the memory of the Display Analyser. The data for each Channel can be read out one-at-the-time, in any order.

Note: it is important for the PC to use 01, 02, 03, etc to indicate channels 1, 2 and 3, etc.

Example:

The PC transmits **getxy01** to the Display Analyser to instruct it to send the stored xy Chromaticity data for the Display positioned in front of channel No 1. The Display Analyser will return a string **0.xxxx 0.yyyy** to the PC.

getxy01
0.6461 0.3436

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Get Data Mode

getxoffset## - Return the x Chromaticity offset

Transmit	Receive
getxoffset##	±0.xxx

Where:

represents the Channel Number and is a number in the range 01 - 10.
±0.xxx represents the x Chromaticity offset.

Description

This command is used to return the x Chromaticity offset for the Display in front of channel number **##**. The value of this offset must be set by the [setxoffset##](#) command. The default value is 0.000.

Example:

The PC transmits **getxoffset01** to the Display Analyser to instruct it to send the stored x Chromaticity offset for the Display positioned in front of channel No 1. The Display Analyser will return a string **±0.xxx** to the PC.

getxoffset01
+0.155

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Get Data Mode

getyoffset## - Return the y Chromaticity offset

Transmit	Receive
getyoffset##	±0.yyy

Where:

represents the Channel Number and is a number in the range 01 - 10.
±0.yyy represents the y Chromaticity offset

Description

This command is used to return the y Chromaticity offset for the Display in front of channel number **##**. The value of this offset must be set by the [setyoffset##](#) command. The default value is 0.000.

Example:

The PC transmits **getyoffset01** to the Display Analyser to instruct it to send the stored y Chromaticity offset for the Display positioned in front of channel No 1. The Display Analyser will return a string **±0.yyy** to the PC.

getyoffset01
-0.025

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Get Data Mode

getuv## - Return the u'v' Chromaticity values

Transmit	Receive
getuv##	0.uuuu 0.vvvv

Where:

represents the Channel Number and is a number in the range 01 - 10.
0.uuuu represents the u' Chromaticity value.
0.vvvv represents the v' Chromaticity value.

Description

This command is used to return the u'v' Chromaticity value for the Display in front of channel number ##.

The u'v' values are derived from the xy Chromaticity co-ordinates including any xy offsets that may be applied.

This command should be preceded by a **capture** command to ensure valid data is stored in the memory of the Display Analyser. The data for each channel can be read out one-at-the-time, in any order. Note: it is important for the PC to use 01, 02, 03, etc to indicate channels 1, 2 and 3, etc.

Example:

The PC transmits **getuv01** to the Display Analyser to instruct it to send the stored XY Chromaticity data for the Display positioned in front of Fiber No 1. The Display Analyser will return a string **0.1809 0.4414** to the PC.

getuv01
0.1809 0.4414

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Get Data Mode

getWavelength## - Get the Dominant Wavelength

Transmit	Receive
getwavelength##	XXX

Where:

represents the Channel Number and is a number in the range 1 - 10.
xxx represents the dominant wavelength of the LED in nanometers.

Description

This command is used to get the value of the Dominant Wavelength for the Display positioned in front of Channel number ##.

This command should be preceded by the **Capture C** command to ensure valid data is stored in the memory of the Display Analyser. The data for each Display Channel can only be read out one-at-the-time, in any order.

Example:

The PC transmits **getwavelength01** to the Display Analyser to instruct it to send the stored dominant wavelength for the Display positioned in front of Channel No 1. The Display Analyser will return a string **xxx** to the PC.

getwavelength01
513

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Get Data Mode

getWavelengthOffset## - Get the Dominant Wavelength Offset

Transmit	Receive
getwavelengthoffset##	+/-XX

Where:

represents the Channel Number and is a number in the range 1 – 10.

+/- xx represents the wavelength offset in nanometers.

Description

This command is used to get the value of the Dominant Wavelength Offset set for Channel number **##**.

The range of value that can be programmed is +/-99, however setting a value of greater than +/-10 would probably indicate an error in your measurement setup.

Example:

The PC transmits **getwavelengthoffset01** to the Display Analyser to instruct it to send the programmed dominant wavelength offset for Channel No 1. The Display Analyser will return a string **+/- xx** to the PC.

getwavelengthoffset01
+07

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Get Data Mode

getAbsInt## *Get the Absolute Intensity Value of the Display under test.*

Transmit	Receive
getABSINT##	#.####e±##

Where:

represents the Channel No in the range 01 – 10.

#.####e±## represents the data in Scientific format.

Description:

This command will instruct the Display Analyser to return the Absolute Intensity value for the Display positioned in front of Channel##.

Absolute Intensity values must first be measured with the Feasa LED Spectrometer. The Display Analyser must then be calibrated with these values using the programs supplied with the Spectrometer.

This command should be preceded by a **Capture** command to ensure valid data is stored in the memory of the Display Analyser. The data for each Channel can be read out one-at-the-time, in any order. Note: it is important for the PC to use 01, 02, 03, etc to indicate Fibers 1, 2 and 3, etc.

Example:

The PC transmits **getabsint01** to the Display Analyser to instruct it to send the stored absolute Intensity data for the Display positioned in front of Channel No 1. The Display Analyser will return a string in the format **#.####e±##** to the PC.

getabsint01
2.5000e-02

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Get Data Mode

getFactor - ***Get the exposure Factor***

Transmit	Receive
getfactor	xx

Where:

xx represents the exposure factor value. The default value is 01.

Description

This command is used to get the exposure factor value for all Channels. The default value set at the factory are 01. The values can be adjusted by the [SetFactor](#) command.

Example:

The PC transmits **getfactor** to the Display Analyser to instruct it to send the stored exposure factor for all Channels. The default value is 01.

getfactor
01

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Get Data Mode

getFormat - *Get the format of the data*

Transmit	Receive
getformat	Keyword

Where:

Keyword is **Scientific** or **Engineering**

Description

This command is used to get the format of the data that is returned from the Analyser.

Two formats are supported :- Scientific or Engineering. If Scientific format is set then the Luminance data will be in the form $\#.####e\pm##\text{cd/m}^2$.

If Engineering format is set the data will be in the form $###.####(\text{k})(\text{m})\text{cd/m}^2$.

The format is set by the commands **SetEngineeringFormat** and **SetScientificFormat**.

Example:

The PC transmits **getformat** to the Display Analyser to instruct it to send the stored format.

getfactor
scientific

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Get Data Mode

getCCT - Get Correlated Color temperature

Transmit	Receive
getcct##	xxxxx +/-0.yyyy

Where:

represents the Channel Number in the range 01 - 10.
xxxxx represents the Correlated Color Temperature of the Display.
+/- 0.yyyy represents the distance the CCT is from the Plankian locus (Delta E)

Description

This command is used to get the Correlated Color Temperature (cct) for each Channel **##**.

The command must be preceded by a **Capture C** command to ensure valid data is stored in the memory of the Display Analyser. The maximum value allowed for Delta E is +/- 0.0500.

Example:

The PC transmits **getcct01** to the Display Analyser to instruct it to send the stored CCT data for Channel No 1.

getcct01
04621 +0.0340

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Get Data Mode

getxxxALL *Get the data for ALL Channels on the Analyser*

getLuminanceall	Get the Luminance for all Channels.
getXYall	Get the x,y for all Channels
getUVall	Get the u'v' for all Channels
getWAVELENGTHall	Get the Dominant Wavelength for all Channels
getCCTall	Get the CCT for for all Channels

Description:

This command will allow the user to get the data stored on the Analyser from the last capture for all the Channels simultaneously. For example when using a Feasa 10D the getxxxALL command will report 10 results and for a Feasa 3D the getxxxALL command will return 3 results.

Example:

Using a Feasa 3D testing 3 Channels.

The PC transmits **getluminanceall** to the Display Analyser to instruct it to send the stored Luminance data for all Channels. The Display Analyser will return a string **LLLLL.LLL** to the PC for all three fibers (Fiber No., Hue, Saturation, Intensity)

getluminanceall

01 00123.478
02 00121.563
03 00124.383

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Set Commands

The *Set* commands are used to adjust various settings in the LED Analyser such as Intensity and Exposure.

These settings remain programmed in the Analyser even when the power is removed.

Commands are transmitted and received using ASCII characters and are **NOT case-sensitive**. All commands must be terminated with a **<CR>** or **<LF>** character.

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Set Data Mode

SetAVERAGE - Set the number of Captures to Average

Transmit	Receive
Setaverage##	OK

Where:

represents the number of Captures to average and is a number in the range 01 - 15.

Description

This command allows the user set the number of Captures to execute and calculate the Average value. The minimum value is 01 and the maximum value is 15. A Capture command must be executed after the Average value has been changed.

These values are stored permanently in memory and can only be changed by using the *setAverage* command again.

The command [getAverage](#) will display the current stored setting.

Example:

Set the number of Captures to Average to 05.

setaverage05
OK

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FEASA DISPLAY ANALYSER FUNCTIONAL VERSION



Set Data Mode

SetEngineeringFormat - Set the Data format to Engineering

Transmit	Receive
SetEngineeringFormat	OK

Description

This command instructs the Analyser to output Luminance data in Engineering format.

This setting is stored permanently in the Analyser and can only be changed by the **SetScientificFormat** command.

Example:

Set Engineering format.

setengineeringformat
OK

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FEASA DISPLAY ANALYSER FUNCTIONAL VERSION



Set Data Mode

SetScientificFormat - Set the Data format to Scientific

Transmit	Receive
SetScientificFormat	OK

Description

This command instructs the Analyser to output Luminance data in Engineering format.

This setting is stored permanently in the Analyser and can only be changed by the **SetScientificFormat** command.

Example:

Set Engineering format.

setengineeringformat
OK

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FEASA DISPLAY ANALYSER FUNCTIONAL VERSION



Set Data Mode

SetFACTOR## - Set the Exposure Factor

Transmit	Receive
Setfactor##	OK

Where:

represents the Factor Number and is in the range 01 – 15 (default 01).

Description

This command allows the user to adjust the *Exposure Factor* for **all** Fibers. This is useful when it is required to test very dim LED's. The Factory default setting is 01. The value can be adjusted from 01 to 15. The exposure time will be increased when the factor is increased which will lead to longer test times i.e. Factor 02 will double the test time, factor 03 will treble the test time etc.

Try the low range(*capture1*) first before adjusting the Exposure Factor.

These values are stored permanently in memory and can only be changed by using the *setFactor* command again, power on/off will NOT effect the set Factor.

The current value can be read out using the [getfactor](#) command.

Example:

Set the Factor Number for all Fibers to 05.

setfactor05
OK

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FEASA DISPLAY ANALYSER FUNCTIONAL VERSION



Set Data Mode

setXOFFSET##0.xxx - Set the x Chromaticity Offset

Transmit	Receive
Setxoffset##±0.xxx	OK

Where:

represents the Fiber Number and is a number in the range 01 – 20.
0.xxx represents the x Chromaticity offset value ± (0.000 to 0.300).

Description

This command is used to set an offset to the displayed x Chromaticity value. The limit of the offset is ±0.300 which means values must be in the range -0.300 to 0.000 to 0.300. This command is useful when the user wishes to set the x Chromaticity to be the same as that specified by the LED Manufacturer. The default value of the offset is 0.000. The offset is stored in non-volatile memory and will remain at the programmed setting until changed by a new *Setxoffset* command.

Example:

The PC transmits **setxoffset01+0.050** to the LED Analyser to instruct it to set the X offset on Fiber 1 to +0.050.

setxoffset01+0.050
OK

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FEASA DISPLAY ANALYSER FUNCTIONAL VERSION



Set Data Mode

setYOFFSET##0.yyy - Set the y Chromaticity Offset

Transmit	Receive
Setyoffset##±0.yyy	OK

Where:

represents the Fiber Number and is a number in the range 01 – 20.
0.yyy represents the y Chromaticity offset value $\pm(0.000 - 0.300)$.

Description

This command is used to set an offset to the displayed y Chromaticity value. The limit of the offset is ± 0.300 which means values must be in the range -0.300 to 0.000 to 0.300. This command is useful when the user wishes to set the y Chromaticity to be the same as that specified by the LED Manufacturer. The default value of the offset is 0.000. The offset is stored in non-volatile memory and will remain at the programmed setting until changed by a new *Setyoffset* command.

Example:

The PC transmits **setyoffset01-0.050** to the LED Analyser to instruct it to set the y offset on Fiber 01 to -0.050.

setyoffset01-0.050
OK

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FEASA DISPLAY ANALYSER FUNCTIONAL VERSION



Set Data Mode

setWAVELENGTHOFFSET@@±## - Set the wavelength Offset

Transmit	Receive
setwavelengthoffset##±xx	OK

Where:

@@ represents the Fiber Number and is a number in the range 01 - 20.
xx represents the wavelength offset value (±99).

Description

This command is used to set an offset to the wavelength value. The limit of the offset is ±99. This command is useful when the user wishes to set the wavelength to be the same as that specified by the LED Manufacturer. The default value of the offset is 00. The offset is stored in non-volatile memory and will remain at the programmed setting until changed by a new *setwavelengthoffset* command.

Example:

The PC transmits **setwavelengthoffset01-05** to the LED Analyser to instruct it to set the wavelength offset on Fiber 01 to -05.

setwavelengthoffset01-05
OK

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FEASA DISPLAY ANALYSER FUNCTIONAL VERSION



User Calibration

The Display Analyser must be calibrated with a known measured Display to obtain the best results from the Analyser.

It is recommended to measure the Luminance of the Display with the Feasa LED Spectrometer fitted with the Luminance Head.

The Display Luminance should be measured at the same points that will be measured with the Display Analyser because the Luminance of the Display can vary across the surface.

It is also advised to let the Display warm up until the Luminance stabilizes. This can be monitored with the Spectrometer and Luminance head.

Calibration of the Display is carried out using the Feasa UserCal program which is supplied on the accompanying CD.

Up to 10 calibration sets can be stored in the Analyser in addition to the Factory default setting. This allows up to 10 different Displays to be tested.

The following commands allow the User to select different Calibration sets.

FEASA DISPLAY ANALYSER FUNCTIONAL VERSION



setCalibration# - Set the Calibration to a particular Set

Transmit	Receive
setcalibration#	OK

Where:

represents the Calibration Set to be selected in the range 0 – 9.

Description

This command is used to select a Calibration set which has been previously recorded using the Feasa UserCal program. Only one calibration set is required per Display type. The Factory default set will be programmed into all sets 0 – 9 when shipped from the factory.

Example:

The PC transmits **setcalibration1** to the LED Analyser to instruct it to use the values stored in Set1 for measurement. The current set can be determined by transmitting the command *getcalibration* to the Analyser.

setcalibration1
OK

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FEASA DISPLAY ANALYSER FUNCTIONAL VERSION



getCalibration - Returns the Calibration Set Number

Transmit	Receive
getcalibration	#

Where:

represents the Calibration Set Number in the range 0 - 9.

Description

This command is used to return the Calibration Set Number currently active. Only one Calibration Set is active at any time.

Example:

The PC transmits **getcalibration** to the LED Analyser to instruct it to return the Number of the active Set.

setcalibration

1

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FEASA DISPLAY ANALYSER FUNCTIONAL VERSION



setCalRGBM - Copy the Factory Set to the Current Set

Transmit	Receive
setcalrgbm	OK

Description

This command is used to copy the Factory default Calibration Settings to the currently active set. Only one calibration set is required per Display type. The settings in the currently active set will be overwritten with the Factory settings.

Example:

The PC transmits **setcalibration1** to the LED Analyser to instruct it to make Set 1 the active Calibration Set. The command **setcalrgbm** will copy the Factory Settings to Set1.

setcalibration1

OK

setcalrgbm

OK

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FEASA DISPLAY ANALYSER FUNCTIONAL VERSION



Daisy Chain Mode

Daisy Chain USB Method

The Daisy chain is a method used to communicate with multiple Display Analyser units to save connections and simplify the wiring.

The 1st Display Analyser in the chain is connected to the computer using the USB cable supplied. The remaining Display Analysers are interconnected in a Daisy Chain Bus using the cables provided. The Daisy Chain OUT connector on Display Analyser No1 is connected to the Daisy Chain IN Connector on Display Analyser No2 and so on.(See Fig 9a below). Each Analyser except for No1 must be powered to 5V @180mA. This completes your wiring requirements.

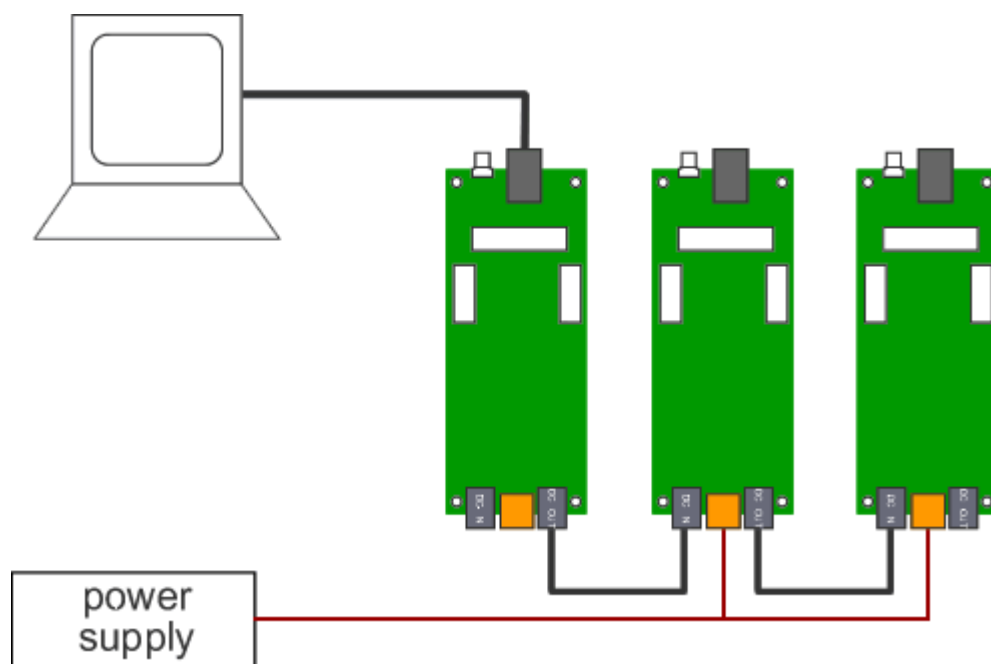


Figure 9a USB Setup

FEASA DISPLAY ANALYSER FUNCTIONAL VERSION



Daisy Chain Mode

Daisy Chain SERIAL Method

The Daisy chain is a method used to communicate with multiple Display Analyser units to save connections and simplify the wiring.

The 1st Display analyser in the chain is connected to the computer using the Serial cable supplied. The remaining Display Analysers are interconnected in a Daisy Chain Bus using the cables provided. The Daisy Chain OUT connector on Display Analyser No1 is connected to the Daisy Chain IN Connector on Display Analyser No2 and so on.(See Fig 9b below). Each Analyser must be powered to 5V @180mA. This completes your wiring requirements.

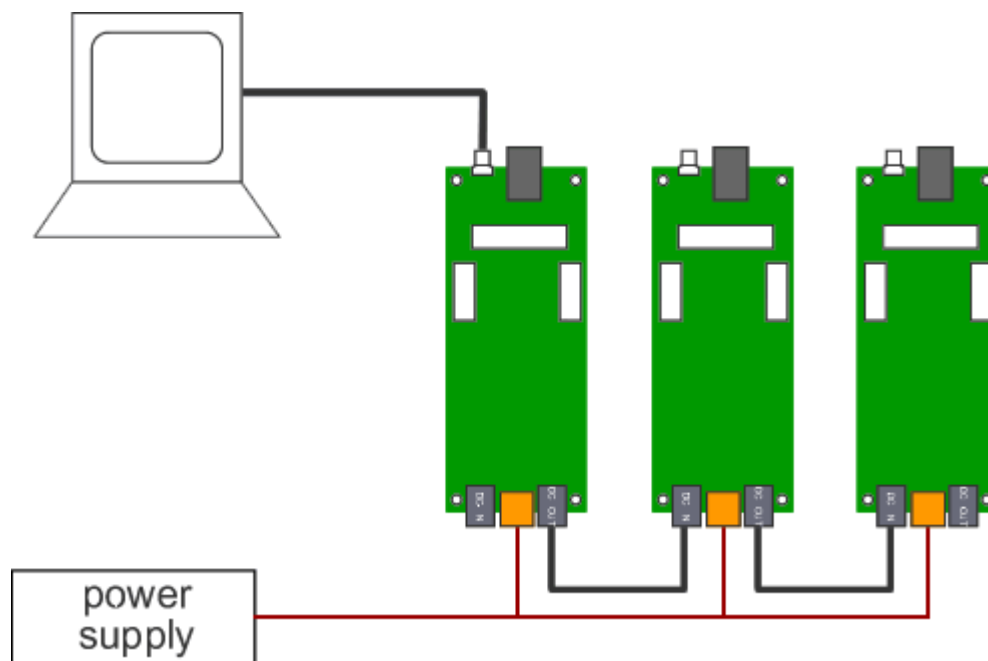


Figure 9b Serial Setup

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FEASA DISPLAY ANALYSER FUNCTIONAL VERSION



Daisy Chain Mode

The Display Analyser connected to the computer receives a command and this command is received by all the other Display Analysers through the Daisy Chain Bus. All Analysers in the chain are active but only the selected Display Analyser is active to give result Data. All responses received by the Computer will be from this active Display Analyser.

Each Display Analyser is identified using a unique 4-character *Serial Number*. This *Serial Number* is fixed to each Analyser or can be read out using the [getSerial](#) command.

Feasa provides a **Terminal Program** on the CD for the customers use. When you connect your 1st analyser the terminal program will detect which port you are connected to. At this time you have the option of connecting to the Standalone option or the Daisy Chain option from the drop down box. If you select the Daisy Chain option you will be asked for the serial Number of the 1st analyser in your chain.

There are a number of commands which are used to control the Analysers in the Daisy Chain. These commands are described on the following pages.

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FEASA DISPLAY ANALYSER FUNCTIONAL VERSION



Daisy Chain Mode

BusFree - Deactivate any active Analysers

Transmit	Receive
busfree	OK

Description

This command is used to deactivate any active Analysers on the Daisy Chain Bus. This will free the Bus to allow an Analyser to be made active. This command should be issued at the start of a sequence. It is the responsibility of the Controlling Computer to issue commands and monitor the responses. If an Analyser does not respond within 500mSec then the Controlling Computer should issue a new BusFree command and report an error.

The Analyser connected to the computer will operate as a standalone unit after the command is issued.

Example:

The PC transmits **busfree** to free up the Daisy Chain Bus.

busfree
OK

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FEASA DISPLAY ANALYSER FUNCTIONAL VERSION



Daisy Chain Mode

BusGet#### - Activate a Display Analyser

Transmit	Receive
busget####	OK

Where:

represents the Serial Number of the Analyser.

Description

This command will activate the Display Analyser with the specified Serial Number.

This command should be preceded by a *BusFree* command. All the *Capture*, *Set*, *Get*, etc commands can now be used with the active Analyser in the chain.

It is the responsibility of the Controlling Computer to issue commands and monitor the responses. If an Analyser does not respond within 500mSec then the Controlling Computer should issue a new *BusFree* command and report an error.

Example:

The PC transmits **BusGet####** to the Master Display Analyser to instruct it to activate the Display Analyser with Serial Number **####**.

busgetF044
OK

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FEASA DISPLAY ANALYSER FUNCTIONAL VERSION



Daisy Chain Mode

BusC - Initiate Capture for all Display Analyser's

Transmit	Receive
busc	OK

Description

This command will cause all Display Analysers in the Daisy Chain to initiate a capture sequence using the Automatic Range Mode. To specify a Range manually see the command *BusC#* on the next page.

After the capture cycle use the the command [BusGet####](#) to activate a specific Display Analyser. All the standard commands can then be used to read back the Display Test data.

Example:

The PC transmits **busc** to instruct all Display Analysers in the Daisy Chain to initiate a Capture cycle.

busc
OK

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FEASA DISPLAY ANALYSER FUNCTIONAL VERSION



Daisy Chain Mode

BusC# - Initiate Capture for all Display Analyser's

Transmit	Receive
busc#	OK

Where:

represents the ranges 1, 2, 3, 4, 5.

The Display brightness level for each range is as follows:-

Range 1 = Low
Range 2 = Medium
Range 3 = High
Range 4 = Super
Range 5 = Ultra

Description

This command uses a pre-selected exposure time designated Range1, Range2 etc. For low light or dim Display's use Range 1 and for brighter Display's use higher ranges. The higher ranges lead to faster test times because the exposure time is shorter.

This command should be preceded by a [BusFree](#) command.

This command instructs all Display Analyser's in the Daisy Chain to capture and store the Color and Intensity of all the Display's positioned under the fibers using a fixed range.

The range setting must be specified. The data is stored until the power is removed or another capture command is issued. When completed the Analyser will transmit the character OK on the receive line to the transmitting device (i.e. the PC). Example:

The PC transmits **busc#** to instruct all Display Analysers in the Daisy Chain to initiate a Capture cycle.

busc2
OK

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FEASA DISPLAY ANALYSER FUNCTIONAL VERSION



Daisy Chain Mode

BusCE#### - Poll each Display Analyser to verify a capture is complete

Transmit	Receive
busce####	0 or 1

Where:

represents the Serial Number of the Display Analyser.

If reply is 1 Then Capture is complete

If reply is 0 No Capture

No reply Display Analyser is busy - Timeout 10mS

Description

This command is used to verify that after a [busc](#) (global capture) each Analyser in the chain has complete its capture.

The PC transmits **busce####** to chech each Display Analysers in the Daisy Chain has complete a Capture cycle.

BusceF123 (Where F123 is the s/n of the Analyser)
1

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Daisy Chain Mode

Ports Description and Wiring.



Figure 10

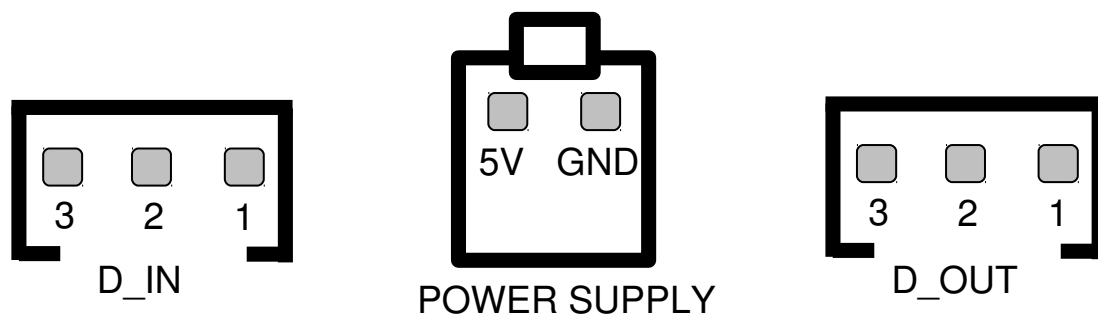
The Daisy Chain Connectors are shown on the right-hand side of figure 10. The D_OUT connector is connected to the D_IN connector of the next Analyser in the chain.

The Power Connector is used to supply +5V DC to each Analyser in the chain. Allow 180mA @5V for each Analyser and ensure the wiring is adequate to supply the current without incurring large voltage drops. **For reliable operation it is necessary to have 5V at the Power Connector of each Analyser.**

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Daisy Chain Mode

Daisy Chain Pinout



PIN	D_IN	D_OUT
1	RX_in	RX_out
2	TX_out	TX_in
3	GND	GND

Figure 11

Figure 11 shows the layout of the Connectors viewed from the edge of the board.

The *GND* line of *D_OUT* is connected with the *GND* line of *D_IN*, the *RX_out* of *D_OUT* is connected to *RX_in* of *D_IN* and the line *TX_in* of *D_OUT* is connected to the line *TX_out* of *D_IN*.

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FEASA DISPLAY ANALYSER FUNCTIONAL VERSION



Daisy Chain Mode

Step-by-Step method for Daisy Chaining

To successfully implement Daisy chaining the following steps are recommended:-

1. Decide how many Analysers are to be daisy chained.
2. Make a list of the Serial Numbers of the Analysers and note the order in which they will be interconnected. For example we have 4 analysers as follows:

Chain Order	Serial No	Comments
1	K304	Tests D40 - D59 Connected to PC
2	K461	Tests D60 - D69
3	K201	Tests Display01-Display10 All White
4	K006	Tests Display11 - Display20 All Red

3. Locate the Daisy Chain cables and connect the **Daisy_Out** of s/n **K304** to the **Daisy_In** of s/n **K461**. Connect **Daisy_Out** of s/n **K461** to **Daisy_In** of s/n **K201**. Connect **Daisy_Out** of s/n **K201** to **Daisy_In** of s/n **K006**.
4. Next locate the 2-pin Power cable supplied to s/n **K461**, s/n **K201** and s/n **K006** Analysers. It is necessary to apply 5V @ 80mA to each of these Analysers in the chain. The Green Power Display should be visible on these 3 analysers.
5. Connect s/n **K304** to the PC using the usb cable. The Green Power LED should come on. If you do not have a USB port available but only a Serial port, connect the s/n **K304** to the PC using the Serial Cable provided **AND** connect the 2 pin power connector to the 5V 80mA supply.
6. The supplied Terminal Program can be used to verify the operation of the Daisy Chain. Connect to the port on which the 1st Analyser is installed. See [USB Port Control](#).
7. Send **capture** to verify the communications with the 1st Analyser. The response should be **OK**.
8. Send **getserial** and the response should be **K304**.

FEASA DISPLAY ANALYSER FUNCTIONAL VERSION



Daisy Chain Mode

9. To connect to Analyser 2 (s/n K461) send:-

busfree

OK

Response from the Analyser

busgetK461

OK

Response from the Analyser

The host computer is now connected to Analyser 2 (s/n K461).
This can be verified by requesting the Serial Number:-

getserial

K461

Response from the Analyser

All the Display Analyser commands can now be directed to Analyser 2.

10. To connect to Analyser 3 (s/n K201) send the following:-

busfree

OK

Response from the Analyser

busgetK201

OK

Response from the Analyser

11. It is possible to instruct all Analysers in the chain to capture Display data simultaneously. This makes programming easier and saves time. There are six capture commands in total but only one can be used at a time. The commands are **busc**, **busc1**, **busc2**, **busc3**, **busc4** and **busc5**. **Busc** uses the automatic capture range whereas **busc1 - busc5** use pre-selected manual ranges.

12. If you are have difficulty reading from Analysers at the end of your chain please verify your voltage to each of these units is 5V.

FEASA DISPLAY ANALYSER FUNCTIONAL VERSION



Daisy Chain Mode

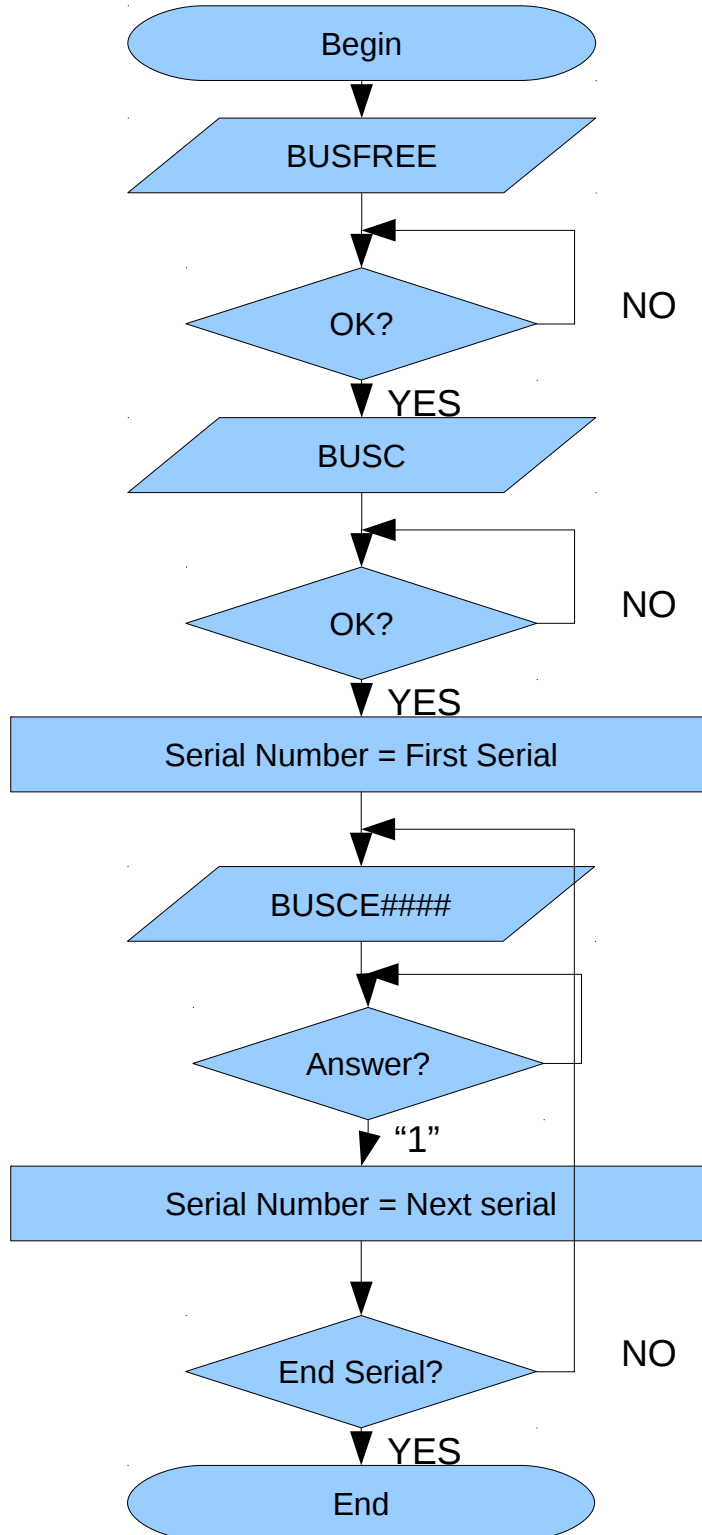
Example

Busfree	'free the bus
OK	
busc3	'All Analysers capture using range 3 High
OK	
busceK304	'poll the analyser K304
1	
busgetK304	'Connect to the Analyser K304
OK	
getserial	'Confirm s/n of the Analyser
K304	
gethsi01	'Get the Data for Fiber 01
000.51 100 36491	
gethsi02	
.	
.	
gethsi10	
120.51 100 66542	'Data for Fiber 10
busfree	
OK	
busceK461	
1	
busgetK461	'Connect to the next Analyser K461
OK	
getserial	'Confirm to Analyser
K461	
gethsi01	'Get the Data for Fiber 01
000.51 100 36491	
gethsi02	
.	
.	
gethsi10	'Get the Data for Fiber 10

Repeat this sequence for all Analysers in the chain.

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FEASA DISPLAY ANALYSER FUNCTIONAL VERSION



FEASA DISPLAY ANALYSER FUNCTIONAL VERSION



General Commands

GetSERIAL - *Get the Serial Number of the Analyser*

Transmit	Receive
getserial	xxxx

Where: xxxx is an alphanumeric value.

Description

This command will return the Serial Number of the Analyser. This is a unique number and is useful if multiple Display Analysers are used in a System. The Controlling Software can query each Display Analyser for it's Serial Number to ensure the correct Analyser is being controlled.

Example:

The PC transmits **getserial** to the Display Analyser an it will return **xxxx** to the PC.

getserial
F5A6

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FEASA DISPLAY ANALYSER FUNCTIONAL VERSION



General Commands

getVERSION - Get the Firmware Version

Transmit	Receive
getversion	xxxx

Where: xxxx is an alphanumeric value.

Description

This command will return the Version Number of the firmware in the Analyser.

Example:

The PC transmits **getversion** to the Display Analyser and it will return **xxxx** to the PC.

getversion
K002

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FEASA DISPLAY ANALYSER FUNCTIONAL VERSION



General Commands

getHW - *Get the Hardware Version*

Transmit	Receive
gethw	xxxxxxxxxx

Where: xxxxxxxxxxxx is an alphanumeric value.

Description

This command will return the hardware version of the Analyser.

Example:

The PC transmits **gethw** to the Display Analyser and it will return **xxxxxxxxxx** to the PC.

gethw
Feasa 10-D

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FEASA DISPLAY ANALYSER FUNCTIONAL VERSION



General Commands

GetINFO - Get a summary of the Display Analyser details

Transmit	Receive
Getinfo	See details below

Information Received back from the Analyser:

Serial Number : Xyyy
Firmware Version : lyyy
Intensity Mode : Linear
Last Capture : Capture
Number of Fibers : XX
Exposure Factor : 001

Description

This command will return a summary of the Display Analyser details.

Example:

The PC transmits **getinfo** to the Display Analyser and it will return to the PC.

Serial Number : E123
Firmware Version : I116
Intensity Mode : Linear
Last Capture : Capture
Number of Fibers : 10
Exposure Factor : 001

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FEASA DISPLAY ANALYSER FUNCTIONAL VERSION



General Commands

SetBAUD- Change the baud rate

Transmit	Receive
SetbaudX	OK

Where: **X** = 9600,19200,38400,57600,115200,230400,460800

Description

This command will change the baud rate of the Serial and USB Port's in the Analyser.

The default Port settings of the Analyser are 57,600, 8 Data bits, 1 Stop bit and No Parity.

The maximum allowed baud rate for Serial Port is 115200 and the USB Port is 460800.

Example:

To change the baud rate to 9600 transmit the command **setbaud9600** to the Analyser .

Setbaud9600
OK

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FEASA DISPLAY ANALYSER FUNCTIONAL VERSION



General Commands

HELP - Command Summary Listing

Transmit	Receive
help	Command listing

Description

This command will generate a summary listing of all the Display Analyser commands. This is useful when using a terminal program such as HyperTerminal.

Example:

To generate the listing transmit **help** to the Analyser .

help

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FEASA DISPLAY ANALYSER FUNCTIONAL VERSION



Command Summary

COMMAND	DESCRIPTION
Busfree	Free the Daisy Chain Bus of the active Analyser
Busget####	Make Analyser #### active on the Daisy Chain Bus
BusC	All Analysers on the Daisy Chain to Auto Capture
BusC#	All Analysers on the Daisy Chain to Manual Capture
BusCE####	Poll each Display Analyser to verify capture is complete
Capture	Capture Display Data - Auto Range
Capture#	Capture Display Data - Manual Range
getaverage	Get the number of Captures to average
getxy##	Get the xy Chromaticity values
getxyall	Get the xy Chromaticity values for all Displays
getxoffset##	Get x chromaticity offset
getyoffset##	Get y chromaticity offset
getuv##	Get the u'v' Chromaticity values
getuvall	Get the u'v' Chromaticity values for all Displays
getwavelengthall	Get Dominant Wavelength for Display
getwavelengthoffset@@	Get Wavelength offset for Fiber
getabsint##	Get the Absolute Intensity for a Display
getCCT##	
getfactor	Get the Exposure Factor for all Fibers
getformat	Get the format of the Data output

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Command Summary

COMMAND	DESCRIPTION
getCCTall	Get Correlated Colour Temperature for all Displays
getVersion	Get the Firmware Revision of the Analyser
getSerial	Get the Serial Number of the Analyser
getHW	Get the Hardware Version of the Analyser
setAverage	Set the number of Captures to average
setEngineeringFormat	Set the Data Format to Engineering
setbaud	Set the baud rate of the Serial and USB Port
setScientificFormat	Set the Data Format to Scientific
setFactor	Set the Exposure Factor
setxoffset	Set x Chromaticity offset
setyoffset	Set y Chromaticity offset
setWavelengthoffset	Set the Dominant Wavelength offset

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FEASA LED ANALYSER FUNCTIONAL VERSION



Warranty

1. Feasa Enterprises Limited (herein referred to as Feasa) warrants Feasa hardware, accessories and supplies against defects in materials and workmanship for the period of one year. If Feasa receives notice of such defects during the warranty period, Feasa will, at its option, either repair or replace products which prove to be defective. Replacement products may be either new or like-new.
2. Feasa warrants that Feasa software will not fail to execute its programming instructions, for the period of one year, due to defects in material or workmanship when properly installed and used. If Feasa receives notice of defects during the warranty period, Feasa will replace software media which does not execute its programming instructions due to such defects.
3. Feasa does not warrant that the operation of Feasa products will be uninterrupted or error free. If Feasa is unable, within a reasonable time, to repair or replace any product to a condition as warranted, customer will be entitled to a refund of the purchase price upon prompt return of the product to Feasa.
4. Feasa products may contain re-manufactured parts equivalent to new in performance or may have been subject to incidental use
5. The warranty period begins on the date of deliver
6. Warranty does not apply to defects resulting from:
 - (a) improper or inadequate maintenance or calibration,
 - (b) software, interfacing, parts or supplies not supplied by Feasa,
 - (c) unauthorized modification or misuse,
 - (d) operation outside the published environmental specifications for the product, or
 - (e) improper site preparation or maintenance.
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