Confidential

ad notam®

ad notam Display Frame Unit (DFU)

RS-232 Protocol Description

VERSION 3.xx

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Document Revisions

Ver.	Date	Authors	Remarks
3.0	May 23, 2013	Dovi Engler	First Ver. 3.0 Release (For previous versions please see ver. 1.6 dated 15.03.2013)
3.1	November 20, 2013	Dovi Engler	Front page image and logo changed
3.2	November 22, 2013	Dovi Engler	Boot “Instant” option added

1 Introduction

The ad notam Display Frame Unit (DFU) can be controlled with RS232 commands from a host (a computer or similar device) or with IR commands from a remote control. This document describes the details of the two protocols.

2 RS232 Communication Protocol

This section describes the communication protocol to control the DFU remotely.

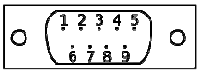
When the projects are connected to RS232 you can control the DFU through this ASCII based protocol.

Note: Some commands will generate OSD feedback.

2.1 Connect a Host to the DFU

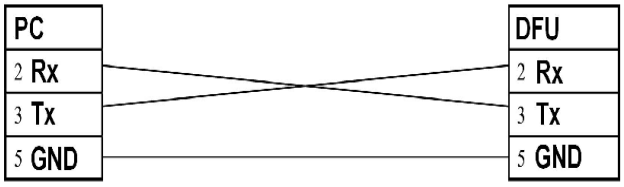
Connect the DFU and host using a crossed serial cable with 9-pin female to the host, and 9-pin male to the projector. Pin 2 connects to pin 3, pin 3 connects to pin 2 and pin 5 connects to pin 5.

Fig. 1 RS232 socket



9-pin D-subminiature socket (male) 2=RXD, 3=TXD, 5=GND

Fig. 2 Scheme of cross linked serial cable



2.2 RS232 Communication Parameters

Fig. 3 RS232 parameters

Parameter	Data
Baud Rate	9600, 19200, **38400**
Parity	N
Data Bits	8
Stop Bits	1
Flow Control (Handshake)	None

Baud rate is configurable from the OSD service menu. Default baud rate is 38400.

2.3 Timing

General timing constraints:

- Wait 10 seconds after power on before sending next command.
- Wait for response before sending next command.
- Minimum 2 seconds delay before resending if no response received.
- Minimum 500ms delay between commands.
- Minimum 5 seconds delay after sending 20 commands

2.4 ad notam RS232 Protocol

2.4.1 Command Structure

An ad notam RS232 command consists of a header, an identifier, an optional separator and value and a terminator.

A command accepts no spaces between fields.

A command always starts with an '&' (ampersand).

A command is always 9 bytes long including the carriage return. If the value field uses less than 3 bytes the missing characters will be filled with '*' (asterisk).

Fig. 4 Command structure

Field	Description	Length	Comment
Header	ASCII character '&' (ampersand)	1 byte	Required
Identifier	Key identifier, case sensitive	3 bytes	Required
Separator	Char symbol (: or ?)	1 byte	Optional
Value	Value	3 bytes	Optional
Terminator	CR carriage return (0x0D)	1 byte	Required

Examples for identifiers: PWR, BAS, SRC

Separators:

: (colon) Value change. Value given will replace existing value.
Example: &SRC:USB will change the units input to USB

? (question mark) Get current value

2.4.2 Acknowledgement Structure

The DFU shall confirm each command it receives with an acknowledgement automatically. Acknowledgement is ON by default. Acknowledge can be turned on and off with ECHO command.

An acknowledgement consists of a header, an identifier, a separator, a value and a terminator.

An acknowledgement always starts with a '%' (percent).

An acknowledgement is always 9 bytes long including the carriage return. If the value field uses less than 3 bytes the missing characters will be filled with '*' (asterisk).

Fig. 5 The acknowledgement structure

Field	Description	Length	Comment
Header	ASCII character '%' (percent)	1 byte	Required
Identifier	Key identifier, case sensitive	3 bytes	Required
Separator	ASCII character ':'	1 byte	Required
Value	Value	3 bytes	Required
Terminator	CR carriage return (0x0D)	1 byte	Required

Error Messages

Most acknowledgements return the actual value of the requested command. If the requested command is not valid an error message will be returned instead.

An error message always starts with an '!' (exclamation mark).

Fig. 6 Error codes

Code	Error Message	Description
!ERR:001	Access denied	Command disabled by Unit Settings.
		Example: trying to switch to USB input while this input is disabled in Service Settings.
!ERR:002	Not available	Command currently not available.
		Example: trying to change brightness while unit is in input scan mode
!ERR:003	Not implemented	Command not implemented in this model.
		Example: &SRC:VGA
!ERR:004	Value out of range	Value out of range
		Example: &SLP:080

2.5 RS232 Examples

'CR' ASCII value carriage return, hex value 0x0D.

Set Power ON								
&	P	W	R	:	O	N	*	<CR>

&PWR:ON*<CR>

Acknowledge Power ON								
%	P	W	R	:	O	N	*	<CR>

%PWR:ON*<CR>

Set Sleep Timer to 30 minutes								
&	S	L	P	:	0	3	0	<CR>

&SLP:030<CR>

Acknowledge Sleep Timer								
%	S	L	P	:	0	3	0	<CR>

%SLP:030<CR>

Increment Volume								
&	V	O	L	:	U	P	*	<CR>

&VOL:UP*<CR>

Acknowledge Volume								
%	V	O	L	:	0	6	3	<CR>

%VOL:063<CR>

Increment Balance to Left								
&	B	A	L	:	L	T	*	<CR>

&BAL:LT*<CR>

Acknowledge Balance								
%	B	A	L	:	-	0	1	<CR>

%BAL:-01<CR>

2.6 RS232 Commands and Acknowledgements

Fig. 7 RS232 command and acknowledgement list

Function	Command (Tx)	ACK (Rx)
Power Toggle	&PWR:TOG	%PWR: XXX [XXX]= [ON*] or [OFF]
Power ON	&PWR:ON*	%PWR:ON*
Power OFF	&PWR:OFF	%PWR:OFF
Get Power Status	&PWR?***	
OFF		%PWR:OFF
ON		%PWR:ON*
Boot set to ON	&BOT:ON*	%BOT:ON*
Boot set to Standby	&BOT:SBY	%BOT:SBY
Boot set to Last	&BOT:LST	%BOT:LST
Boot set to Instant	&BOT:INS	%BOT:INS
Get Boot Setup	&BOT?***	
ON		%BOT:ON*
Standby		%BOT:SBY
Last		%BOT:LST
Instant		%BOT:INS
Signal Loss 5Sec	&SLS:05s	%SLS:05s
Signal Loss 10Sec	&SLS:10s	%SLS:10s
Signal Loss 30Sec	&SLS:30s	%SLS:30s
Signal Loss 1min	&SLS:001	%SLS:001
Signal Loss 2min	&SLS:002	%SLS:002
Signal Loss OFF	&SLS:OFF	%SLS:OFF
Get Signal Loss Setup	&SLS?***	
5Sec		%SLS:05s
10Sec		%SLS:10s
30sec		%SLS:30s
1min		%SLS:001
2min		%SLS:002
OFF		%SLS:OFF
Sleep Timer 15min	&SLP:015	%SLP:015
Sleep Timer 30min	&SLP:030	%SLP:030
Sleep Timer 45min	&SLP:045	%SLP:045
Sleep Timer 60min	&SLP:060	%SLP:060
Sleep Timer 90min	&SLP:090	%SLP:090
Sleep Timer 120min	&SLP:120	%SLP:120
Sleep Timer OFF	&SLP:OFF	%SLP:OFF
Get Sleep Timer Status	&SLP?***	
15min		%SLP:015
30min		%SLP:030
45min		%SLP:045
60min		%SLP:060
90min		%SLP:090
120min		%SLP:120
OFF		%SLP:OFF
Digit 1	&NUM:001	%NUM:001
Digit 2	&NUM:002	%NUM:002
Digit 3	&NUM:003	%NUM:003
Digit 4	&NUM:004	%NUM:004

Function	Command (Tx)	ACK (Rx)
Digit 5	&NUM:005	%NUM:005
Digit 6	&NUM:006	%NUM:006
Digit 7	&NUM:007	%NUM:007
Digit 8	&NUM:008	%NUM:008
Digit 9	&NUM:009	%NUM:009
Digit 0	&NUM:000	%NUM:000
Ok	&CRS:OK*	%CRS:OK*
Up	&CRS:UP*	%CRS:UP*
Down	&CRS:DN*	%CRS:DN*
Left	&CRS:LT*	%CRS:LT*
Right	&CRS:RT*	%CRS:RT*
Volume +	&VOL:UP*	%VOL:XXX [XXX]= [000]-[100]
Volume -	&VOL:DN*	
Get Volume Level	&VOL?***	
Mute Toggle	&MUT:TOG	%MUT: XXX [XXX]= [ON*] or [OFF]
Mute On	&MUT:ON*	%MUT:ON*
Mute Off	&MUT:OFF	%MUT:OFF
Get Mute Status	&MUT?***	
ON		%MUT:ON*
OFF		%MUT:OFF
Play	&FNC:PLY	%FNC:PLY
Pause	&FNC:PSE	%FNC:PSE
Stop	&FNC:STP	%FNC:STP
Skip forward / Chapter +	&FNC:NXT	%FNC:NXT
Skip backwards / Chapter -	&FNC:PRV	%FNC:PRV
Fast Forward	&FNC:FWD	%FNC:FWD
Fast Backward	&FNC:RWD	%FNC:RWD
Exit	&EXT:***	%EXT:***
OSD Access ON	&OSA:ON*	%OSA:ON*
OSD Access OFF	&OSA:OFF	%OSA:OFF
Get OSD Access Status	&OSA?***	
Access ON		%OSA:ON*
Access OFF		%OSA:OFF
OSD Toggle (open/close)	&OSD:TOG	%OSD: XXX [XXX]= [ON*] or [OFF]
OSD ON (open)	&OSD:ON*	%OSD:ON*
OSD OFF(close)	&OSD:OFF	%OSD:OFF
Get OSD Status	&OSD?***	
ON		%OSD:ON*
OFF		%OSD:OFF
Input HDMI 1	&SRC:HD1	%SRC:HD1
Input HDMI 2	&SRC:HD2	%SRC:HD2
Input HDMI 3	&SRC:HD3	%SRC:HD3
Input Component	&SRC:RGB	%SRC:RGB
Input USB / DMP	&SRC:USB	%SRC:USB
Get Input Status	&SRC:?***	
Component		%SRC:RGB
HDMI 1		%SRC:HD1
HDMI 2		%SRC:HD2
HDMI 3		%SRC:HD3
USB / DMP		%SRC:USB
Function	**Command (Tx)**	**ACK (Rx)**

Aspect 16:9	&ASP:169	%ASP:169
Aspect 4:3	&ASP:043	%ASP:043
Zoom 1	&ASP:ZM1	%ASP:ZM1
Zoom 2	&ASP:ZM2	%ASP:ZM2
Get Aspect Status	&ASP?***	
16:09		%ASP:169
04:03		%ASP:043
Zoom 1		%ASP:ZM1
Zoom 2		%ASP:ZM2
Picture Mode Standard	&PCT:STD	%PCT:STD
Picture Mode User	&PCT:USR	%PCT:USR
Picture Mode Dynamic	&PCT:DYN	%PCT:DYN
Picture Mode Mild	&PCT:MLD	%PCT:MLD
Picture Temp Cool	&PCT:COL	%PCT:COL
Picture Temp Medium	&PCT:MED	&PCT:MED
Picture Temp Warm	&PCT:WRM	&PCT:WRM
Brightness +	&BRT:UP*	%BRT:XXX [XXX]= [000]-[100]
Brightness -	&BRT:DN*	
Get Brightness Level	&BRT?***	
Contrast +	&CON:UP*	%CON:XXX [XXX]= [000]-[100]
Contrast -	&CON:DN*	
Get Contrast Level	&CON?***	
Saturation +	&STR:UP*	%STR:XXX [XXX]= [000]-[100]
Saturation -	&STR:DN*	
Get Saturation Level	&STR?***	
Sharpness +	&SRP:UP*	%SRP:XXX [XXX]= [000]-[100]
Sharpness -	&SRP:DN*	
Get Sharpness Level	&SRP?***	
Backlight +	&BLT:UP*	%BLT:XXX [XXX]= [000]-[100]
Backlight -	&BLT:DN*	
Get Backlight Level	&BLT?***	
Audio Mode Standard	&AUD:STD	%AUD:STD
Audio Mode Music	&AUD:MUS	%AUD:MUS
Audio Mode Movie	&AUD:MOV	%AUD:MOV
Audio Mode Sports	&AUD:SPR	%AUD:SPR
Audio Mode Use	&AUD:USR	%AUD:USR
Bass +	&BAS:UP*	%BAS:XXX [XXX]= [000]-[100]
Bass -	&BAS:DN*	
Get Bass Level	&BAS?***	
Treble +	&TRB:UP*	%TRB:XXX [XXX]= [000]-[100]
Treble -	&TRB:DN*	
Get Treble Level	&TRB?***	
Balance Left	&BAL:LT*	%BAL:XXX [XXX]= [-50][000][+50]
Balance Right	&BAL:RT*	
Get Balance Level	&BAL?***	
Boot Volume Level +	&BVL:UP*	%BVL:XXX [XXX]= [000]-[100]
Boot Volume Level -	&BVL:DN*	
Get Boot Volume Level	&BVL?***	
Set RS232 Echo ON [*]	&ECO:ON*	%ECO:ON*
Set RS232 Echo OFF [*]	&ECO:OFF	%ECO:OFF

[*] Echo=ON enables, Echo=OFF disables RS232 ACK messages.