

JVC D-ILA[®] Projector

RS-232C, LAN

and Infrared

Remote Control Guide

FOR MODELS:

DLA-HD350 · DLA-HD750
DLA-HD550 · DLA-HD950 · DLA-HD990
DLA-X3 · DLA-X7 · DLA-X9
DLA-X30 · DLA-X70R · DLA-X90R

DLA-RS10 · DLA-RS20
DLA-RS15 · DLA-RS25 · DLA-RS35
DLA-RS40 · DLA-RS50 · DLA-RS60
DLA-RS45 · DLA-RS55 · DLA-RS65

Version 1.4

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Introduction

This guide provides all of the information required to enable Remote Control of JVC D-ILA projectors, either by RS-232C connection, Infrared Remote Control, or LAN. This will enable Custom Installers or users to remotely control almost every function on these projectors.

The RS-232C control codes shown in this guide will control all recent JVC D-ILA projectors via an RS-232C connection. The commands in this guide are in raw hexadecimal format and may require conversion to work with proprietary control systems. See page 14 for some examples of how to convert them. Please note that some commands work only with specific projector models and this is indicated where applicable. Full details of the RS-232C interface and the command format are shown on pages 19-20 if required.

The Infrared Remote Control Codes shown in this guide will control all recent JVC D-ILA projectors via Infrared emulation. Some controllers will also generate Infrared commands from the RS-232C control codes.

The LAN Remote Control Protocol and Codes shown in this guide will control the DLA-X7, DLA-X9, DLA-X30, DLA-X70, DLA-X90, DLA-RS50, DLA-RS60, DLA-RS45, DLA-RS55 and DLA-RS65 over a LAN via a TCP/IP Network Connection.

RS-232C/LAN Command Types

There are two basic types of RS-232C/LAN commands. These are:

1. Direct Commands (see page 3)
2. Remote Control Emulation Commands (see pages 7-13).

Direct Commands, as their name suggests, directly control the projector. Remote Control Emulation Commands achieve the same result, but they do it by emulating the functionality of the Remote Control Commands. The general rule is to use a Direct Command if one is available, otherwise use a Remote Control Emulation Command. One other difference between them is that Direct Commands will generally display fewer on-screen confirmation messages when the projector responds to them.

Some commands are duplicated as both a Direct Command and a Remote Control Emulation Command. For these, the Direct Command should be used in preference to the Remote Control Emulation Command unless any additional on-screen confirmation messages provided by the Remote Control Emulation Command are required. Most of the commands in the Remote Control Emulation list do not actually appear on the Remote Control Handset, but they are all available if you wish to control those functions on the projector, either by RS-232C connection, LAN (on LAN-enabled models only), or by Infrared Remote Control.

In addition to the commands sent from the PC or controller to the projector, there are two types of Acknowledgement Response Return Codes returned by the projector to the PC or controller. When used with appropriate control equipment, these can be used to further customise the installation. Details of the Acknowledgement Response Return Codes and how to use them are on pages 15-18.

The following 11 pages contain a list of all Direct and Remote Control Emulation Commands. Where a command is specific to an individual model or a range of models, the applicable model(s) are shown in brackets. If no model is shown, then that command works with all models.

Direct Commands:

POWER	
Command	Hex Code
Power - Off	21 89 01 50 57 30 0A
Power - On	21 89 01 50 57 31 0A

INPUT SWITCHING	
Command	Hex Code
Input - HDMI 1	21 89 01 49 50 36 0A
Input - HDMI 2	21 89 01 49 50 37 0A
Input - Component	21 89 01 49 50 32 0A
Input - S-Video	21 89 01 49 50 30 0A
Input - Video	21 89 01 49 50 31 0A
Input - PC (HD750/950/990/X7/X9/X70/X90/ RS20/25/35/50/60/55/65)	21 89 01 49 50 33 0A
Input + (Go to next highest input)	21 89 01 49 50 2B 0A
Input - (Go to next lowest input)	21 89 01 49 50 2D 0A

TEST PATTERNS (HD350/550/750/950/990/RS10/15/20/25/35)	
Command	Hex Code
Test Pattern - Off	21 89 01 54 53 30 0A
Test Pattern - Colour Bars	21 89 01 54 53 31 0A
Test Pattern - Stair step (black and white)	21 89 01 54 53 36 0A
Test Pattern - Stair step (red)	21 89 01 54 53 37 0A
Test Pattern - Stair step (green)	21 89 01 54 53 38 0A
Test Pattern - Stair step (blue)	21 89 01 54 53 39 0A
Test Pattern - Crosshatch (green)	21 89 01 54 53 41 0A

GAMMA	
Command	Hex Code
Gamma - Normal	21 89 01 47 54 30 0A
Gamma - A	21 89 01 47 54 31 0A
Gamma - B	21 89 01 47 54 32 0A
Gamma - C	21 89 01 47 54 33 0A
Gamma - D (HD550/950/990/X3/X7/X9/X30/ X70/X90/RS15/25/35/40/50/60/45/55/65)	21 89 01 47 54 37 0A
Gamma - Custom 1	21 89 01 47 54 34 0A
Gamma - Custom 2	21 89 01 47 54 35 0A
Gamma - Custom 3	21 89 01 47 54 36 0A

GAMMA VALUE	
Command	Hex Code
Gamma Correction Value - 1.8	21 89 01 47 50 30 0A
Gamma Correction Value - 1.9	21 89 01 47 50 31 0A
Gamma Correction Value - 2.0	21 89 01 47 50 32 0A
Gamma Correction Value - 2.1	21 89 01 47 50 33 0A
Gamma Correction Value - 2.2 (Default)	21 89 01 47 50 34 0A
Gamma Correction Value - 2.3	21 89 01 47 50 35 0A
Gamma Correction Value - 2.4	21 89 01 47 50 36 0A
Gamma Correction Value - 2.5	21 89 01 47 50 37 0A
Gamma Correction Value - 2.6	21 89 01 47 50 38 0A

OFF TIMER (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65)	
Command	Hex Code
Off Timer - Off	21 89 01 46 55 4F 54 30 0A
Off Timer - Set 1 Hour	21 89 01 46 55 4F 54 31 0A
Off Timer - Set 2 Hours	21 89 01 46 55 4F 54 32 0A
Off Timer - Set 3 Hours	21 89 01 46 55 4F 54 33 0A
Off Timer - Set 4 Hours	21 89 01 46 55 4F 54 34 0A

LAMP POWER (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65)	
Command	Hex Code
Lamp Power - Normal	21 89 01 50 4D 4C 50 30 0A
Lamp Power - High	21 89 01 50 4D 4C 50 31 0A

INFRARED REMOTE CODE (see page 24) (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65)	
Command	Hex Code
Remote Code A - hex code 73	21 89 01 53 55 52 43 30 0A
Remote Code B - hex code 63	21 89 01 53 55 52 43 31 0A

TRIGGER OUTPUT SET (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65)	
Command	Hex Code
Trigger - Off	21 89 01 46 55 54 52 30 0A
Trigger - On (Power)	21 89 01 46 55 54 52 31 0A
Trigger - On (Anamorphic)	21 89 01 46 55 54 52 32 0A

CLEAR MOTION DRIVE (CMD Models)	
Command	Hex Code
Clear Motion Drive - Off	21 89 01 50 4D 43 4D 30 0A
Clear Motion Drive - Mode 1 (Low - HD550/950/990)	21 89 01 50 4D 43 4D 31 0A
Clear Motion Drive - Mode 2 (High - HD550/950/990)	21 89 01 50 4D 43 4D 32 0A
Clear Motion Drive - Mode 3 (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65)	21 89 01 50 4D 43 4D 33 0A
Clear Motion Drive - Mode 4 (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65)	21 89 01 50 4D 43 4D 34 0A
Clear Motion Drive - Inverse Telecine (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65)	21 89 01 50 4D 43 4D 35 0A

ANAMORPHIC (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65)	
Command	Hex Code
Anamorphic - Off	21 89 01 49 4E 56 53 30 0A
Anamorphic - A	21 89 01 49 4E 56 53 31 0A
Anamorphic - B	21 89 01 49 4E 56 53 32 0A

PICTURE MODE (X30/X70/X90/RS45/55/65)	
Command	Hex Code
Picture Mode - Film	21 89 01 50 4D 50 4D 30 30 0A
Picture Mode - Cinema	21 89 01 50 4D 50 4D 30 31 0A
Picture Mode - Animation	21 89 01 50 4D 50 4D 30 32 0A
Picture Mode - Natural	21 89 01 50 4D 50 4D 30 33 0A
Picture Mode - Stage	21 89 01 50 4D 50 4D 30 34 0A
Picture Mode - THX (X70/X90/RS55/65)	21 89 01 50 4D 50 4D 30 36 0A
Picture Mode - 3D	21 89 01 50 4D 50 4D 30 42 0A
Picture Mode - User 1	21 89 01 50 4D 50 4D 30 43 0A
Picture Mode - User 2	21 89 01 50 4D 50 4D 30 44 0A
Picture Mode - User 3	21 89 01 50 4D 50 4D 30 45 0A
Picture Mode - User 4	21 89 01 50 4D 50 4D 30 46 0A
Picture Mode - User 5	21 89 01 50 4D 50 4D 31 30 0A

PICTURE MODE (X3/X7/X9/RS40/50/60)	
Command	Hex Code
Picture Mode - Film	21 89 01 50 4D 50 4D 30 0A
Picture Mode - Cinema	21 89 01 50 4D 50 4D 31 0A
Picture Mode - Animation	21 89 01 50 4D 50 4D 32 0A
Picture Mode - Natural	21 89 01 50 4D 50 4D 33 0A
Picture Mode - Stage	21 89 01 50 4D 50 4D 34 0A
Picture Mode - 3D	21 89 01 50 4D 50 4D 45 0A
Picture Mode - User 1	21 89 01 50 4D 50 4D 36 0A
Picture Mode - User 2	21 89 01 50 4D 50 4D 37 0A
Picture Mode - THX (X7/X9/RS50/60)	21 89 01 50 4D 50 4D 39 0A

PICTURE MODE (HD350/750/550/950/990/RS10/20/15/25/35)	
Command	Hex Code
Picture Mode - Cinema 1	21 89 01 50 4D 50 4D 30 0A
Picture Mode - Cinema 2	21 89 01 50 4D 50 4D 31 0A
Picture Mode - Cinema 3	21 89 01 50 4D 50 4D 32 0A
Picture Mode - Natural	21 89 01 50 4D 50 4D 33 0A
Picture Mode - Stage	21 89 01 50 4D 50 4D 34 0A
Picture Mode - Dynamic	21 89 01 50 4D 50 4D 35 0A
Picture Mode - User 1	21 89 01 50 4D 50 4D 36 0A
Picture Mode - User 2	21 89 01 50 4D 50 4D 37 0A
Picture Mode - THX (HD750/950/990/RS20/25/35)	21 89 01 50 4D 50 4D 39 0A

COLOUR PROFILE (X30/X70/X90/RS45/55/65)	
Command	Hex Code
Colour Profile - Off	21 89 01 50 4D 50 52 30 30 0A
Colour Profile - Film 1 (in Film mode)	21 89 01 50 4D 50 52 30 31 0A
Colour Profile - Film 2 (in Film mode)	21 89 01 50 4D 50 52 30 32 0A
Colour Profile - Standard (in Cinema, Natural, Stage & 3D modes)	21 89 01 50 4D 50 52 30 33 0A
Colour Profile - Cinema 1 (in Cinema mode)	21 89 01 50 4D 50 52 30 34 0A
Colour Profile - Cinema 2 (in Cinema mode)	21 89 01 50 4D 50 52 30 35 0A
Colour Profile - Anime 1 (in Animation mode)	21 89 01 50 4D 50 52 30 36 0A
Colour Profile - Anime 2 (in Animation mode)	21 89 01 50 4D 50 52 30 37 0A
Colour Profile - Video (in Natural mode)	21 89 01 50 4D 50 52 30 38 0A
Colour Profile - Vivid (in Natural & 3D modes)	21 89 01 50 4D 50 52 30 39 0A
Colour Profile - Adobe (in Natural mode)	21 89 01 50 4D 50 52 30 41 0A
Colour Profile - Stage (in Stage mode)	21 89 01 50 4D 50 52 30 42 0A
Colour Profile - 3D (in 3D mode)	21 89 01 50 4D 50 52 30 43 0A
Colour Profile - THX (in THX mode)	21 89 01 50 4D 50 52 30 44 0A

3D FORMAT (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65)	
Command	Hex Code
3D Format - Off (2D)	21 89 01 49 53 33 44 30 0A
3D Format - Auto	21 89 01 49 53 33 44 31 0A
3D Format - Frame Packing	21 89 01 49 53 33 44 32 0A
3D Format - Side by Side	21 89 01 49 53 33 44 33 0A
3D Format - Top and Bottom	21 89 01 49 53 33 44 34 0A

2D to 3D CONVERSION (X30/X70/X90/RS45/55/65)	
Command	Hex Code
2D to 3D Conversion - Off	21 89 01 49 53 33 43 30 0A
2D to 3D Conversion - On	21 89 01 49 53 33 43 31 0A

3D SUBTITLE CORRECTION (X30/X70/X90/RS45/55/65)	
Command	Hex Code
3D Subtitle Correction - Off	21 89 01 49 53 33 54 31 0A
3D Subtitle Correction - On	21 89 01 49 53 33 54 30 0A

LENS MEMORY (X30/X70/X90/RS45/55/65)	
Command	Hex Code
Lens Memory Save - Memory 1	21 89 01 49 4E 4D 53 30 0A
Lens Memory Save - Memory 2	21 89 01 49 4E 4D 53 31 0A
Lens Memory Save - Memory 3	21 89 01 49 4E 4D 53 32 0A
Lens Memory Select - Memory 1	21 89 01 49 4E 4D 4C 30 0A
Lens Memory Select - Memory 2	21 89 01 49 4E 4D 4C 31 0A
Lens Memory Select - Memory 3	21 89 01 49 4E 4D 4C 32 0A

TEST COMMAND (see page 15)	
Command	Hex Code
Null Command (to check communication)	21 89 01 00 00 0A

Remote Control Emulation Commands

Command	Hex Code	ASCII
3D Setting - Direct access to 3D Setting menu (X30/X70/X90/RS45/55/65)	21 89 01 52 43 37 33 44 35 0A	D5
3D Format - Cycles through all available 3D formats (X30/X70/X90/RS45/55/65)	21 89 01 52 43 37 33 44 36 0A	D6
Advanced - Direct access to Picture Adjust > Advanced menu (HD550/950/990/X3/X7/X9/X30/X70/X90/RS15/25/35/40/50/60/45/55/65)	21 89 01 52 43 37 33 37 33 0A	73
Anamorphic - Off (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65) Vertical Stretch - Off (HD350/750/950/990/RS10/20/25/35)	21 89 01 52 43 37 33 32 34 0A	24
Anamorphic - A (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65) Vertical Stretch - On (HD350/750/950/990/RS10/20/25/35)	21 89 01 52 43 37 33 32 33 0A	23
Anamorphic - B (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65)	21 89 01 52 43 37 33 32 42 0A	2B
Anamorphic - Cycles through Off/A/B (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65)	21 89 01 52 43 37 33 43 35 0A	C5
Aspect - 16:9	21 89 01 52 43 37 33 32 36 0A	26
Aspect - 4:3	21 89 01 52 43 37 33 32 35 0A	25
Aspect - Zoom	21 89 01 52 43 37 33 32 37 0A	27
Aspect (PC) - Auto (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65)	21 89 01 52 43 37 33 41 45 0A	AE
Aspect (PC) - Full (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65)	21 89 01 52 43 37 33 42 30 0A	B0
Aspect (PC) - Just (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65)	21 89 01 52 43 37 33 41 46 0A	AF
Aspect + (cycles through all available modes)	21 89 01 52 43 37 33 37 37 0A	77
Auto Align (PC input on HD750/950/990/X7/X9/X70/X90/RS20/25/35/50/60/55/65)	21 89 01 52 43 37 33 31 33 0A	13
Auto Lens Centre (X3/X7/X9/X70/X90/RS50/60/45/55/65)	21 89 01 52 43 37 33 43 39 0A	C9
Back - Steps backwards through menus and removes any OSD messages	21 89 01 52 43 37 33 30 33 0A	03
BNR (Block Noise Reduction) - Off	21 89 01 52 43 37 33 31 30 0A	10
BNR (Block Noise Reduction) - On	21 89 01 52 43 37 33 30 46 0A	0F
Bright Level - (X7/X9/X70/X90/RS50/60/55/65)	21 89 01 52 43 37 33 41 33 0A	A3
Bright Level + (X7/X9/X70/X90/RS50/60/55/65)	21 89 01 52 43 37 33 41 32 0A	A2
Brightness -	21 89 01 52 43 37 33 37 42 0A	7B
Brightness +	21 89 01 52 43 37 33 37 41 0A	7A
Brightness Adj. (Adjustment Bar On/Off toggle)	21 89 01 52 43 37 33 30 39 0A	09
CEC - Off	21 89 01 52 43 37 33 35 37 0A	57
CEC - On	21 89 01 52 43 37 33 35 36 0A	56
Clear Motion Drive - Cycles through: Off/ Mode 1/Mode 2/Mode 3/Mode 4/Inverse Telecine (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65)	21 89 01 52 43 37 33 38 41 0A	8A
Clear Motion Drive - Off (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65)	21 89 01 52 43 37 33 34 37 0A	47
Clear Motion Drive - Mode 1 (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65)	21 89 01 52 43 37 33 43 45 0A	CE

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Command	Hex Code	ASCII
Clear Motion Drive - Mode 2 (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65)	21 89 01 52 43 37 33 43 46 0A	CF
Clear Motion Drive - Mode 3 (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65)	21 89 01 52 43 37 33 34 38 0A	48
Clear Motion Drive - Mode 4 (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65)	21 89 01 52 43 37 33 34 39 0A	49
Clear Motion Drive - Inverse Telecine (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65)	21 89 01 52 43 37 33 34 41 0A	4A
Colour -	21 89 01 52 43 37 33 37 44 0A	7D
Colour +	21 89 01 52 43 37 33 37 43 0A	7C
Colour Adj. (Adjustment Bar On/Off toggle)	21 89 01 52 43 37 33 31 35 0A	15
Colour Management - Off (HD750/950/990/ X7/X9/RS20/25/35/50/60/55/65)	21 89 01 52 43 37 33 36 30 0A	60
Colour Management - Custom 1 (HD750/950/ 990/X7/X9/RS20/25/35/50/60/55/65)	21 89 01 52 43 37 33 36 31 0A	61
Colour Management - Custom 2 (HD750/950/ 990/X7/X9/RS20/25/35/50/60/55/65)	21 89 01 52 43 37 33 36 32 0A	62
Colour Management - Custom 3 (HD750/950/ 990/X7/X9/RS20/25/35/50/60/55/65)	21 89 01 52 43 37 33 36 33 0A	63
Colour Management - Cycles through: Off/ Custom 1/Custom 2/Custom 3 (X7/X9/X70/X90/RS50/60/55/65)	21 89 01 52 43 37 33 38 39 0A	89
Colour Profile - Cycles through all available Colour Profiles (X7/X9/X79/X90/RS50/60/55/65)	21 89 01 52 43 37 33 38 38 0A	88
Colour Space - Cycles through Standard/ Wide 1/Wide 2 (X3/X30/RS40/RS45)	21 89 01 52 43 37 33 43 44 0A	CD
Colour Temp. - 5800K (HD350/550/750/950/990/RS10/15/20/25/35)	21 89 01 52 43 37 33 34 45 0A	4E
Colour Temp. - 6500K	21 89 01 52 43 37 33 34 46 0A	4F
Colour Temp. - 7500K (HD350/550/750/950/990/RS10/15/20/25/35)	21 89 01 52 43 37 33 35 30 0A	50
Colour Temp. - 9300K (HD350/550/750/950/990/RS10/15/20/25/35)	21 89 01 52 43 37 33 35 31 0A	51
Colour Temp. - Custom 1	21 89 01 52 43 37 33 35 33 0A	53
Colour Temp. - Custom 2	21 89 01 52 43 37 33 35 34 0A	54
Colour Temp. - Custom 3	21 89 01 52 43 37 33 35 35 0A	55
Colour Temp. - High Bright (HD350/550/750/ 950/990/X3/X30/RS10/15/20/25/35/40/45)	21 89 01 52 43 37 33 35 32 0A	52
Colour Temp. + (cycles through all options)	21 89 01 52 43 37 33 37 36 0A	76
Colour Temperature Gain Blue - (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65)	21 89 01 52 43 37 33 39 31 0A	91
Colour Temperature Gain Blue + (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65)	21 89 01 52 43 37 33 39 30 0A	90
Colour Temperature Gain Green - (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65)	21 89 01 52 43 37 33 38 46 0A	8F
Colour Temperature Gain Green + (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65)	21 89 01 52 43 37 33 38 45 0A	8E
Colour Temperature Gain Red - (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65)	21 89 01 52 43 37 33 38 44 0A	8D
Colour Temperature Gain Red + (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65)	21 89 01 52 43 37 33 38 43 0A	8C

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Command	Hex Code	ASCII
Colour Temperature Offset Blue – (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65)	21 89 01 52 43 37 33 39 37 0A	97
Colour Temperature Offset Blue + (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65)	21 89 01 52 43 37 33 39 36 0A	96
Colour Temperature Offset Green – (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65)	21 89 01 52 43 37 33 39 35 0A	95
Colour Temperature Offset Green + (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65)	21 89 01 52 43 37 33 39 34 0A	94
Colour Temperature Offset Red – (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65)	21 89 01 52 43 37 33 39 33 0A	93
Colour Temperature Offset Red + (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65)	21 89 01 52 43 37 33 39 32 0A	92
Contrast –	21 89 01 52 43 37 33 37 39 0A	79
Contrast +	21 89 01 52 43 37 33 37 38 0A	78
Contrast Adj. (Adjustment Bar On/Off toggle)	21 89 01 52 43 37 33 30 41 0A	0A
CTI (Colour Transient Improvement) - Off (HD350/550/750/950/990/RS10/15/20/25/35)	21 89 01 52 43 37 33 35 43 0A	5C
CTI (Colour Transient Improvement) - Low (HD350/550/750/950/990/RS10/15/20/25/35)	21 89 01 52 43 37 33 35 44 0A	5D
CTI (Colour Transient Improvement) - Middle (HD350/550/750/950/990/RS10/15/20/25/35)	21 89 01 52 43 37 33 35 45 0A	5E
CTI (Colour Transient improvement) - High (HD350/550/750/950/990/RS10/15/20/25/35)	21 89 01 52 43 37 33 35 46 0A	5F
Cursor Down ▼	21 89 01 52 43 37 33 30 32 0A	02
Cursor Left ◀	21 89 01 52 43 37 33 33 36 0A	36
Cursor Right ▶	21 89 01 52 43 37 33 33 34 0A	34
Cursor Up ▲	21 89 01 52 43 37 33 30 31 0A	01
Dark Level – (X7/X9/X70/X90/RS50/60/55/65)	21 89 01 52 43 37 33 41 35 0A	A5
Dark Level + (X7/X9/X70/X90/RS50/60/55/65)	21 89 01 52 43 37 33 41 34 0A	A4
Detail Enhance –	21 89 01 52 43 37 33 31 32 0A	12
Detail Enhance +	21 89 01 52 43 37 33 31 31 0A	11
Picture Tone Blue – (X7/X9/RS50/60 - Film Mode Only) (X70/X90/RS55/65 - All Modes)	21 89 01 52 43 37 33 41 31 0A	A1
Picture Tone Blue + (X7/X9/RS50/60 - Film Mode Only) (X70/X90/RS55/65 - All Modes)	21 89 01 52 43 37 33 41 30 0A	A0
Picture Tone Green – (X7/X9/RS50/60 - Film Mode Only) (X70/X90/RS55/65 - All Modes)	21 89 01 52 43 37 33 39 46 0A	9F
Picture Tone Green + (X7/X9/RS50/60 - Film Mode Only) (X70/X90/RS55/65 - All Modes)	21 89 01 52 43 37 33 39 45 0A	9E
Picture Tone Red – (X7/X9/RS50/60 - Film Mode Only) (X70/X90/RS55/65 - All Modes)	21 89 01 52 43 37 33 39 44 0A	9D
Picture Tone Red + (X7/X9/RS50/60 - Film Mode Only) (X70/X90/RS55/65 - All Modes)	21 89 01 52 43 37 33 39 43 0A	9C
Picture Tone White – (X7/X9/RS50/60 - Film Mode Only) (X70/X90/RS55/65 - All Modes)	21 89 01 52 43 37 33 39 42 0A	9B
Picture Tone White + (X7/X9/RS50/60 - Film Mode Only) (X70/X90/RS55/65 - All Modes)	21 89 01 52 43 37 33 39 41 0A	9A
Gamma - A	21 89 01 52 43 37 33 33 39 0A	39
Gamma - B	21 89 01 52 43 37 33 33 41 0A	3A
Gamma - C	21 89 01 52 43 37 33 33 42 0A	3B
Gamma - Custom 1	21 89 01 52 43 37 33 33 43 0A	3C
Gamma - Custom 2	21 89 01 52 43 37 33 33 44 0A	3D
Gamma - Custom 3	21 89 01 52 43 37 33 33 45 0A	3E

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Command	Hex Code	ASCII
Gamma - D (HD550/950/990/X3/X7/X9/ X30/X70/X90/RS15/25/35/40/50/60/45/55/65)	21 89 01 52 43 37 33 33 46 0A	3F
Gamma - Normal	21 89 01 52 43 37 33 33 38 0A	38
Gamma + (cycles through all options)	21 89 01 52 43 37 33 37 35 0A	75
Hide - Off (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65)	21 89 01 52 43 37 33 44 31 0A	D1
Hide - On (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65)	21 89 01 52 43 37 33 44 30 0A	D0
Hide (On/Off toggle)	21 89 01 52 43 37 33 31 44 0A	1D
Horizontal Position – (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65)	21 89 01 52 43 37 33 41 42 0A	AB
Horizontal Position + (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65)	21 89 01 52 43 37 33 41 41 0A	AA
Information (displays Information tab of menu)	21 89 01 52 43 37 33 37 34 0A	74
Input - Component	21 89 01 52 43 37 33 34 44 0A	4D
Input - HDMI 1	21 89 01 52 43 37 33 37 30 0A	70
Input - HDMI 2	21 89 01 52 43 37 33 37 31 0A	71
Input - PC (HD750/950/990/X7/X9/X70/X90 RS20/25/35/50/60/55/65)	21 89 01 52 43 37 33 34 36 0A	46
Input - S-Video (HD350/550/750/950/990)	21 89 01 52 43 37 33 34 43 0A	4C
Input - Video (HD350/550/750/950/990)	21 89 01 52 43 37 33 34 42 0A	4B
Input + (cycles through all available inputs)	21 89 01 52 43 37 33 30 38 0A	08
ISF - Day (X7/X9/X70/X90/RS50/60/55/65)	21 89 01 52 43 37 33 36 34 0A	64
ISF - Night (X7/X9/X70/X90/RS50/60/55/65)	21 89 01 52 43 37 33 36 35 0A	65
ISF - Off (HD950/990/X7/X9/X70/X90/ RS25/35/50/60/55/65)	21 89 01 52 43 37 33 35 41 0A	5A
ISF - On (HD950/990/X7/X9/X70/X90/ RS25/35/50/60/55/65)	21 89 01 52 43 37 33 35 42 0A	5B
Keystone Correction Horizontal –	21 89 01 52 43 37 33 34 31 0A	41
Keystone Correction Horizontal +	21 89 01 52 43 37 33 34 30 0A	40
Keystone Correction Vertical –	21 89 01 52 43 37 33 31 43 0A	1C
Keystone Correction Vertical +	21 89 01 52 43 37 33 31 42 0A	1B
Lens Aperture - 1 (HD350/HD550)	21 89 01 52 43 37 33 32 38 0A	28
Lens Aperture - 2 (HD350/HD550)	21 89 01 52 43 37 33 32 39 0A	29
Lens Aperture - 3 (HD350/HD550)	21 89 01 52 43 37 33 32 41 0A	2A
Lens Aperture – If Lens Aperture Gauge is not displayed - displays gauge. If Lens Aperture Gauge is already displayed - Lens Aperture is decreased (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65)	21 89 01 52 43 37 33 31 46 0A	1F
Lens Aperture + If Lens Aperture Gauge is not displayed - displays gauge. If Lens Aperture Gauge is already displayed - Lens Aperture is increased (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65)	21 89 01 52 43 37 33 31 45 0A	1E
Lens Aperture Adj. (HD350/750/950/990/ RS10/20/25/35 - Adjustment Bar On/Off toggle) (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65 - Displays Adjustment Bar) (HD550/RS15 - Cycles through all options)	21 89 01 52 43 37 33 32 30 0A	20
Lens Control (cycles through all options)	21 89 01 52 43 37 33 33 30 0A	30
Lens Focus –	21 89 01 52 43 37 33 33 32 0A	32
Lens Focus +	21 89 01 52 43 37 33 33 31 0A	31

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Command	Hex Code	ASCII
Lens Memory - Cycles through Lens Memory Pages: Select/Save/Name Edit (X30/X70/X90/RS45/55/65)	21 89 01 52 43 37 33 44 34 0A	D4
Lens Memory 1 (X30/X70/X90/RS45/55/65)	21 89 01 52 43 37 33 44 38 0A	D8
Lens Memory 2 (X30/X70/X90/RS45/55/65)	21 89 01 52 43 37 33 44 39 0A	D9
Lens Memory 3 (X30/X70/X90/RS45/55/65)	21 89 01 52 43 37 33 44 41 0A	DA
Lens Shift - Down	21 89 01 52 43 37 33 32 32 0A	22
Lens Shift - Left	21 89 01 52 43 37 33 34 34 0A	44
Lens Shift - Right	21 89 01 52 43 37 33 34 33 0A	43
Lens Shift - Up	21 89 01 52 43 37 33 32 31 0A	21
Lens Zoom - In	21 89 01 52 43 37 33 33 35 0A	35
Lens Zoom - Out	21 89 01 52 43 37 33 33 37 0A	37
Mask Bottom - (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65)	21 89 01 52 43 37 33 42 38 0A	B8
Mask Bottom + (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65)	21 89 01 52 43 37 33 42 37 0A	B7
Mask Left - (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65)	21 89 01 52 43 37 33 42 32 0A	B2
Mask Left + (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65)	21 89 01 52 43 37 33 42 31 0A	B1
Mask Right - (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65)	21 89 01 52 43 37 33 42 34 0A	B4
Mask Right + (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65)	21 89 01 52 43 37 33 42 33 0A	B3
Mask Top - (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65)	21 89 01 52 43 37 33 42 36 0A	B6
Mask Top + (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65)	21 89 01 52 43 37 33 42 35 0A	B5
Menu (On/Off toggle)	21 89 01 52 43 37 33 32 45 0A	2E
Menu Position (HD550/950/990/X3/X7/X9/X30/X70/X90/RS15/25/35/40/50/60/45/55/65)	21 89 01 52 43 37 33 34 32 0A	42
MNR (Mosquito Noise Reduction) -	21 89 01 52 43 37 33 30 45 0A	0E
MNR (Mosquito Noise Reduction) +	21 89 01 52 43 37 33 30 44 0A	0D
NR (toggles display of RNR/MNR) (HD350/550/750/950/990/RS10/15/20/25/35)	21 89 01 52 43 37 33 31 38 0A	18
OK (to accept currently selected option)	21 89 01 52 43 37 33 32 46 0A	2F
Phase (PC Input) - (X7/X9/X70/X90/RS50/60/55/65)	21 89 01 52 43 37 33 41 39 0A	A9
Phase (PC Input) + (X7/X9/X70/X90/RS50/60/55/65)	21 89 01 52 43 37 33 41 38 0A	A8
Picture Adjust (HD550/750/990/X3/X7/X9/X30/X70/X90/RS15/25/35/40/50/60/45/55/65)	21 89 01 52 43 37 33 37 32 0A	72
Picture Mode - 3D (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65)	21 89 01 52 43 37 33 38 37 0A	87
Picture Mode - Cinema 1 (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65 - Film Mode)	21 89 01 52 43 37 33 36 39 0A	69
Picture Mode - Cinema 2 (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65 - Cinema Mode)	21 89 01 52 43 37 33 36 38 0A	68
Picture Mode - Cinema 3 (HD550/750/990/RS15/25/35) (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65 - Animation Mode)	21 89 01 52 43 37 33 36 36 0A	66
Picture Mode - Dynamic (HD350/550/750/950/990)	21 89 01 52 43 37 33 36 42 0A	6B

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Command	Hex Code	ASCII
Picture Mode - Natural	21 89 01 52 43 37 33 36 41 0A	6A
Picture Mode - Stage	21 89 01 52 43 37 33 36 37 0A	67
Picture Mode - THX (HD750/950/990/X7/X9/ X70/X90/RS20/25/35/50/60/55/65)	21 89 01 52 43 37 33 36 46 0A	6F
Picture Mode - User 1	21 89 01 52 43 37 33 36 43 0A	6C
Picture Mode - User 2	21 89 01 52 43 37 33 36 44 0A	6D
Picture Mode - User 3 (HD550/750/950/990/ X3/X30/RS20/25/35/40/45)	21 89 01 52 43 37 33 36 45 0A	6E
Picture Mode - User 4 (X30/X70/X90/RS45/55/65)	21 89 01 52 43 37 33 43 41 0A	CA
Picture Mode - User 5 (X30/X70/X90/RS45/55/65)	21 89 01 52 43 37 33 43 42 0A	CB
Pixel Shift - Horizontal Blue – (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65)	21 89 01 52 43 37 33 42 45 0A	BE
Pixel Shift - Horizontal Blue + (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65)	21 89 01 52 43 37 33 42 44 0A	BD
Pixel Shift - Horizontal Green – (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65)	21 89 01 52 43 37 33 42 43 0A	BC
Pixel Shift - Horizontal Green + (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65)	21 89 01 52 43 37 33 42 42 0A	BB
Pixel Shift - Horizontal Red – (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65)	21 89 01 52 43 37 33 42 41 0A	BA
Pixel Shift - Horizontal Red + (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65)	21 89 01 52 43 37 33 42 39 0A	B9
Pixel Shift - Vertical Blue – (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65)	21 89 01 52 43 37 33 43 34 0A	C4
Pixel Shift - Vertical Blue + (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65)	21 89 01 52 43 37 33 43 33 0A	C3
Pixel Shift - Vertical Green – (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65)	21 89 01 52 43 37 33 43 32 0A	C2
Pixel Shift - Vertical Green + (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65)	21 89 01 52 43 37 33 43 31 0A	C1
Pixel Shift - Vertical Red – (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65)	21 89 01 52 43 37 33 43 30 0A	C0
Pixel Shift - Vertical Red + (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65)	21 89 01 52 43 37 33 42 46 0A	BF
Power - Off (send twice with short delay between to switch off)	21 89 01 52 43 37 33 30 36 0A	06
Power - On	21 89 01 52 43 37 33 30 35 0A	05
RNR (Random Noise Reduction) –	21 89 01 52 43 37 33 30 43 0A	0C
RNR (Random Noise Reduction) +	21 89 01 52 43 37 33 30 42 0A	0B
Screen Adjust - Off (X3/X30/RS40/45)	21 89 01 52 43 37 33 38 30 0A	80
Screen Adjust - A (X3/X30/RS40/45)	21 89 01 52 43 37 33 38 31 0A	81
Screen Adjust - B (X3/X30/RS40/45)	21 89 01 52 43 37 33 38 32 0A	82
Screen Adjust - C (X3/X30/RS40/45)	21 89 01 52 43 37 33 38 33 0A	83
Sharpness –	21 89 01 52 43 37 33 37 46 0A	7F
Sharpness +	21 89 01 52 43 37 33 37 45 0A	7E
Sharpness Adj. (Adjustment Bar On/Off toggle)	21 89 01 52 43 37 33 31 34 0A	14
Shutter - Close (HD550/950/990/X3/X7/X9/ X30/X70/X90/RS15/25/35/40/50/60/45/55/65)	21 89 01 52 43 37 33 31 39 0A	19
Shutter - Open (HD550/950/990/X3/X7/X9/ X30/X70/X90/RS15/25/35/40/50/60/45/55/65)	21 89 01 52 43 37 33 31 41 0A	1A

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Command	Hex Code	ASCII
Shutter - Off - Un-synchronises shutter with "Hide" function (HD550/950/990/X3/X7/X9/X30/X70/X90/RS15/25/35/40/50/60/45/55/65)	21 89 01 52 43 37 33 32 44 0A	2D
Shutter - On - Synchronises shutter with "Hide" function (HD550/950/990/X3/X7/X9/X30/X70/X90/RS15/25/35/40/50/60/45/55/65)	21 89 01 52 43 37 33 32 43 0A	2C
Test Pattern (cycles through all patterns) (HD350/550/750/950/990/RS10/15/20/25/35)	21 89 01 52 43 37 33 35 39 0A	59
THX - Bright (X7/X9/X70/X90/RS50/60/55/65)	21 89 01 52 43 37 33 38 35 0A	85
THX - Dark (X7/X9/X70/X90/RS50/60/55/65)	21 89 01 52 43 37 33 38 36 0A	86
THX - Off (X7/X9/X70/X90/RS50/60/55/65)	21 89 01 52 43 37 33 43 37 0A	C7
THX - On (X7/X9/X70/X90/RS50/60/55/65)	21 89 01 52 43 37 33 43 38 0A	C8
Tint - (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65)	21 89 01 52 43 37 33 39 39 0A	99
Tint + (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65)	21 89 01 52 43 37 33 39 38 0A	98
Tint Adj. (Adjustment Bar On/Off toggle)	21 89 01 52 43 37 33 31 36 0A	16
Tracking - (PC Input) (X7/X9/X70/X90/RS50/60/55/65)	21 89 01 52 43 37 33 41 37 0A	A7
Tracking + (PC Input) (X7/X9/X70/X90/RS50/60/55/65)	21 89 01 52 43 37 33 41 36 0A	A6
User - Cycles through User 1 - User 5 Picture Modes (X30/X70/X90/RS45/55/65)	21 89 01 52 43 37 33 44 37 0A	D7
Vertical Position - (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65)	21 89 01 52 43 37 33 41 44 0A	AD
Vertical Position + (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65)	21 89 01 52 43 37 33 41 43 0A	AC
Vertical Stretch - Off (HD350/550/750/950/990/RS10/15/20/25/35) Anamorphic - Off (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65)	21 89 01 52 43 37 33 32 34 0A	24
Vertical Stretch - On (HD350/550/750/950/990/RS10/15/20/25/35) Anamorphic - A (X3/X7/X9/X30/X70/X90/RS40/50/60/45/55/65)	21 89 01 52 43 37 33 32 33 0A	23

Converting & Testing Codes

The codes shown on pages 3-13 are raw hex codes and must be converted to the appropriate format in order to work with proprietary controllers such as those from Crestron or AMX. To help with the conversion, here are two sample strings for those brands:

The Power On Command (from page 3) is: 21 89 01 50 57 31 0A

Crestron controller - Power On Command:

```
\x21\x89\x01\x50\x57\x31\x0A\r
```

AMX controller - Power On Command:

```
SEND_STRING dvProj, "$21, $89, $01, $50, $57, $31, $0A"
```

You can see from these examples that it is easy to convert any of the RS-232C codes in this guide into the equivalent Crestron or AMX control strings. This should also be the case for most other controllers that allow transmission of hex data.

In order to test these commands, it is useful to have a program that can send raw hex codes directly to the Serial Port on a PC. There are many programs that can do this, but here are a few that are useful for test purposes:

RS232 Hex Com Tool - 30-Day Evaluation Version available from <http://www.rs232pro.com>

This is a very simple to use program that lets you send any hex command and see the response from the projector. The Evaluation Version times out every five minutes, but it can be instantly restarted and is very simple to use.

Hercules Setup Utility - Free from:

http://www.hw-group.com/products/hercules/index_en.html

This is an excellent and slightly more complex program that can do far more than just send hex commands. Use the "Serial" tab to send commands direct to the serial port. This program is recommended if you are a more experienced PC user. It is also useful for testing the LAN Control functions on the DLA-X7, DLA-X9, DLA-X30, DLA-X70, DLA-X90, DLA-RS50, DLA-RS60, DLA-RS45, DLA-RS55 and DLA-RS65 (see pages 21 & 22).

Docklight - Evaluation version available from: <http://www.docklight.de>

Another more advanced program. This one is particularly good for checking the Acknowledgement Response Return Codes.

AccessPort - Free from: <http://www.sudt.com/en/ap/index.html>

This is an intermediate level program. Not as easy to use as some of the others, but free.

Eltima Software Advanced Serial Port Terminal - 14-Day Evaluation Version available from:

<http://www.eltima.com/products/serial-port-terminal/>

This is a very good intermediate level program. It allows the commands to be sent in loops for repeated testing. It also shows the return codes in both hex and ASCII formats.

If you want to use just one program from those above for general RS-232C or LAN setup and testing, we recommend the Hercules Setup Utility.

All of the above programs will accept the hex codes exactly as shown in this guide. They can simply be copied and pasted into the programs and then sent to the projector. Most of the programs require the user to switch to hex mode before sending hex codes.

Please note that you must use a cross-connected serial cable (sometimes called a null-modem or DTE/DTE cable) if you wish to connect the projector to a PC for testing.

Acknowledgement Response Return Codes - Basic

In most installations, it will normally be sufficient just to send a command to the projector and assume that the projector will carry it out requested. In some installations, there may be a requirement to confirm that the projector has carried out the command before continuing. This is particularly important when sending multiple commands. It is possible to check if the projector has carried out a command by monitoring the Acknowledgement Response Return Code returned by the projector. The projector will return an Acknowledgement Response Return Code for any valid command that it receives.

The general format of the Acknowledgement Response returned from the projector is:

06 89 01 CC CC 0A - Where CC CC is the first 2 bytes of the command that was originally sent to the projector (not including the 21 89 01).

Taking the Power On command from page 3 as an example, to switch the projector power on, send to the projector:

21 89 01 50 57 31 0A

If the Power On Command completes successfully, the projector will return:

06 89 01 50 57 0A

This Acknowledgement Response format is the same for all of the commands listed above.

The Acknowledgement Response Return Codes for all of the commands listed on pages 3-13 (assuming the command is successful) are as follows:

Function	Acknowledgement Response
Power On/Off	06 89 01 50 57 0A
Input Changed	06 89 01 49 50 0A
Test Pattern On/Off	06 89 01 54 53 0A
Gamma Table Changed	06 89 01 47 54 0A
Gamma Value Changed	06 89 01 47 50 0A
Remote Control Emulation Command (all commands)	06 89 01 52 43 0A
Test (Null Command - to check communication)	06 89 01 00 00 0A

The list above includes a Test (null) response. This doesn't actually do anything, but it is useful to check that the controller is communicating with the projector before sending any real commands. This should be used with the Test Command shown on page 6.

To use the test command, send to the projector:

21 89 01 00 00 0A

Assuming the projector is connected to the PC or controller correctly, it will respond with:

06 89 01 00 00 0A

The projector will respond whether it is in Standby or Powered On.

Acknowledgement Response Return Codes - Advanced

For some functions, it is possible to obtain a more detailed response from the projector. This is useful where different actions are required depending on the current projector settings or status. To request the detailed response, taking the above example of the Power Command, send to the projector:

3F 89 01 50 57 0A

If the projector receives the enquiry command, as a confirmation that it has received the command, it will first respond with exactly the same information as that returned by the basic Acknowledgement Return Code shown on page 15:

06 89 01 50 57 0A

Next, the projector will send the detailed response. It will send:

40 89 01 50 57 **RR** 0A - Where RR is the Detailed Response Return Code.

For clarity, the two returned responses are separated here. In practice, they are returned from the projector as one continuous string.

For the Power Status Enquiry, the possible values for the Detailed Response Return Code status (RR) are:

- 30 - Standby
- 31 - Power On
- 32 - Cooling
- 34 - Emergency

So, as a full worked example, if we send to the projector:

3F 89 01 50 57 0A

If the projector were currently cooling down after being switched to Standby, it would return:

06 89 01 50 57 0A 40 89 01 50 57 32 0A

If the projector were on Standby, it would return:

06 89 01 50 57 0A 40 89 01 50 57 30 0A

A list of all of the useful enquiry codes, together with all possible detailed responses is below:

Power Status (to confirm the current Power Status)

Enquiry Command (to projector)	3F 89 01 50 57 0A
Response (from projector)	06 89 01 50 57 0A 40 89 01 50 57 RR 0A

Response (RR)	Meaning
30	Standby
31	Power On
32	Cooling
34	Emergency

Input Status (to confirm the current Video Input)

Enquiry Command (to projector)	3F 89 01 49 50 0A
Response (from projector)	06 89 01 49 50 0A 40 89 01 49 50 RR 0A

Response (RR)	Meaning
30	S-Video
31	Video
32	Component
33	PC (HD750/950/990/X7/X9/X70/X90/ RS20/25/35/50/60/55/65)
36	HDMI 1
37	HDMI 2

Gamma Table (to confirm the current Gamma Table)

Enquiry Command (to projector)	3F 89 01 47 54 0A
Response (from projector)	06 89 01 47 54 0A 40 89 01 47 54 RR 0A

Response (RR)	Meaning
30	Gamma - Normal
31	Gamma - A
32	Gamma - B
33	Gamma - C
34	Gamma - Custom1
35	Gamma - Custom2
36	Gamma - Custom3

Gamma Value (to confirm the current Gamma Value)

Enquiry Command (to projector)	3F 89 01 47 50 0A
Response (from projector)	06 89 01 47 50 0A 40 89 01 47 50 RR 0A

Response (RR)	Meaning
30	Gamma Correction Value - 1.8
31	Gamma Correction Value - 1.9
32	Gamma Correction Value - 2.0
33	Gamma Correction Value - 2.1
34	Gamma Correction Value - 2.2
35	Gamma Correction Value - 2.3
36	Gamma Correction Value - 2.4
37	Gamma Correction Value - 2.5
38	Gamma Correction Value - 2.6

Source Status (to confirm the current Video Source Status)

Enquiry Command (to projector)	3F 89 01 53 43 0A
Response (from projector)	06 89 01 53 43 0A 40 89 01 53 43 RR 0A

Response (RR)	Meaning
00	JVC Logo displayed
30	No signal or signal out of range
31	Signal input correctly

There is one enquiry command that has a different response from the projector to those listed above. This is the Model Status enquiry. When this enquiry sent to the projector, the projector will respond with a 14-byte string that identifies the model number(s) of the projector.

Details are as follows:

Model Status (to confirm the current Projector Model)

Enquiry Command (to projector)	3F 89 01 4D 44 0A
Response (from projector)	06 89 01 4D 44 0A 40 89 01 4D 44 RR 0A

Response (RR)	Meaning
49 4C 41 46 50 4A 20 2D 2D 20 2D 58 48 34	DLA-HD350
49 4C 41 46 50 4A 20 2D 2D 20 2D 58 48 37	DLA-RS10
49 4C 41 46 50 4A 20 2D 2D 20 2D 58 48 35	DLA-HD750 & DLA-RS20
49 4C 41 46 50 4A 20 2D 2D 20 2D 58 48 38	DLA-HD550
49 4C 41 46 50 4A 20 2D 2D 20 2D 58 48 41	DLA-RS15
49 4C 41 46 50 4A 20 2D 2D 20 2D 58 48 39	DLA-HD950/HD990/DLA-RS25/RS35
49 4C 41 46 50 4A 20 2D 2D 20 2D 58 48 42	DLA-X3 & DLA-RS40
49 4C 41 46 50 4A 20 2D 2D 20 2D 58 48 43	DLA-X7/X9 & DLA-RS50/60
49 4C 41 46 50 4A 20 2D 2D 20 2D 58 48 45	DLA-X30 & DLA-RS45
49 4C 41 46 50 4A 20 2D 2D 20 2D 58 48 46	DLA-X70R/X90R & DLA-RS55/65

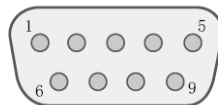
RS-232C Interface Details

The RS-232C interface on the projector is a standard 9 pin D-Sub male socket. The pin connections for the projector are as follows:

Pin No.	Signal	Function	Signal Direction
2	Rx Data	Receive Data	Computer/Controller to Projector
3	Tx Data	Transmit Data	Projector to Computer/Controller
5	Ground	Signal ground	-
1, 4 & 6-9	No Connection	-	-

Connector

Looking at the connector on the projector, the pins are as follows:

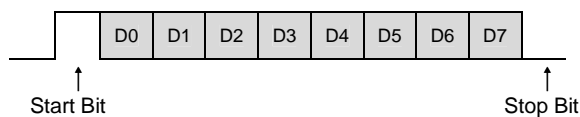


Communication Parameters

The communication parameters for the projector are as follows:

Parameter	Value
Interface	RS-232C
Mode	Asynchronous
Data Rate	19200bps (19.2kbps)
Character Length	8 Bit
Parity	None
Start Bit	1
Stop Bit	1
Flow Control	None
Data Format	Binary

Diagram of Data Format:



Set both send and receive modes to Hex in control software.

Command Format

The RS-232C commands are bidirectional and consist of a variable number of hexadecimal numbers. All of the commands sent to the projector shown in this guide are either 7 bytes or 10 bytes long. The Acknowledgement Response Return Codes returned from the projector can be between 6 and 14 bytes long. The basic format of the commands is as follows:

Section	Size	Comments
Header	1 byte	Can be one of four possible values - see below
Unit ID	2 bytes	Fixed - always 89 01
Command	2 bytes	See below
Data	Variable	Length varies depending on command - see below
End	1 byte.	Fixed - always 0A

Taking each of these sections in turn:

Header

The header can be one of 4 possible values. These are:
 21 - Operating Command (from PC/controller to projector)
 3F - Acknowledgement Response Return Code Request (from PC/controller to projector)
 06 - Acknowledgement Response Return Code - Basic (from projector to PC/controller)
 40 - Acknowledgement Response Return Code - Detailed (from projector to PC/controller)

Unit ID

This is fixed at 89 01 for all models.

Command

This is the command sent to/from the projector and varies depending on the command. As an example, the Power Command is 50 57. The other commands can be worked out from the tables on pages 3-13.

Data

This is the value to apply to the command. Using the Power example above, the data value for Off is 30 and the data value for On is 31.

End

This signifies the end of the command and is fixed at 0A for all models.

Putting all of this together, a typical command (Power On) to the projector would therefore be:

Header	Unit ID		Command		Data	End
21	89	01	50	57	31	0A

Error Handling

The projector will ignore any commands that it cannot recognise, e.g. Unit ID does not match, parity error detected, invalid command, etc. It will also ignore any inappropriate commands, e.g. Power On when in cooling mode.

The projector will discard any commands received if there is a break of 50ms or longer in the incoming data.

If consecutive commands are used, it is assumed that any external controller will not transmit a command until it has received an appropriate Acknowledgement Response Return Code to confirm that the projector is ready to accept the next command (see page 15 for details).

Local Area Network (LAN) Control (DLA-X7, DLA-X9, DLA-X30, DLA-X70, DLA-X90, DLA-RS50, DLA-RS60, DLA-RS45, DLA-RS55, DLA-RS65)

In addition to RS-232C and Infrared Remote Control, the above models also support Local Area Network (LAN) Control. Full instructions on how to use this are below. These instructions assume a knowledge of TCP/IP networking hardware & protocols.

Hardware

The LAN control enabled projectors are equipped with a standard RJ45 connection. They can be connected to a LAN, a PC or a controller either directly or via a router, hub or switch using a standard patch cable in the same way as any other standard network device.

Projector Setup

In order to use LAN Control, the projector must be switched from RS-232C to LAN Control mode. Depending on the particular network configuration, some basic network settings may have to be changed in the projector's network menu, though this is unlikely.

To set the projector to LAN Control Mode, go to the "Function" menu on the projector, then scroll down to "Communication Terminal" and change this from "RS-232C" (the default) to "LAN". This will set the projector to LAN Control Mode. It will also enable the "Network" option further down in the same menu. Scroll down to the "Network" option and press "OK". This will show the projector's network settings. These should be familiar to anyone with knowledge of TCP/IP networks, but a basic explanation of them is as follows:

DHCP Client - (Available Options Off/On). When set to "Off", the projector's IP Address, Subnet Mask and Default Gateway values must be set manually, however the default values will be suitable for most installations. When set to "On", these values will be obtained automatically from a Dynamic Host Configuration Protocol (DHCP) server on the LAN. Please note that if DHCP is set to "On", there must be a DHCP server running and reachable on the LAN, otherwise network communication will not work. The default setting is "Off"

IP Address - Sets the IP (Internet Protocol) address of the projector. As with all IP networks, each device on the LAN *must* have a unique IP address. Duplicate IP addresses on a LAN will cause unpredictable results. The default value is *192.168.0.2*.

Subnet Mask - Sets the Subnet Mask of the projector. In most cases the default value will be suitable. The default value is *255.255.255.0*.

Default Gateway - Sets the Default IP Gateway of the projector. This is usually used only on larger LANs with multiple sites. In virtually all installations, the default value will be suitable. The default value is *192.168.0.254*.

MAC Address - A 6 byte hex number that uniquely identifies the projector on the LAN. The value is unique to each individual projector.

A detailed explanation of the above settings and general LAN setup is beyond the scope of this guide, but the following Wikipedia links may be useful if further information is required:

- Dynamic Host Configuration Protocol..... <http://en.wikipedia.org/wiki/Dhcp>
- IP Address http://en.wikipedia.org/wiki/Ip_address
- Subnet Mask http://en.wikipedia.org/wiki/Subnet_mask
- Default Gateway http://en.wikipedia.org/wiki/Default_gateway
- MAC Address..... http://en.wikipedia.org/wiki/Mac_address

Making And Testing The Connection

When the projector is first connected to the LAN, you should test the connection between the PC or controller and the projector to make sure that communication is OK before attempting to send any commands. You can use the standard ICMP “Ping” command for this.

Control Software

Most LAN compatible Custom Install Control systems that can send hex data should work with the LAN-enabled projectors, though some customisation of the control protocol will probably be required (see below for details). For initial testing with a PC, any basic TCP/IP network communication software that supports Port Selection can be used. The Hercules Setup Utility, which was suggested on page 14 for RS-232C testing, also supports TCP/IP network connections and this works well, although due to the 5-second network timeout (see below for details) you have to be quick with the mouse when controlling the projector. The “TCP Client” tab of the Hercules Setup Utility also has a Ping facility that can be used to test communication with the projector, and either this tab or the “Test Mode” tab can be used to communicate with the projector.

Control Protocol

In order to control the projector, we must first establish a network connection with the projector and then send the command. The control protocol sequence to do this is as follows:

1. The PC or Controller should first request a TCP/IP connection using the standard TCP/IP Three-Way Handshake to the projector on Port 20554. The port number is very important, as it is the only port on which the projector will communicate.
2. When a network connection request is received, the projector will respond immediately with “PJ_OK” to confirm that it is available.
3. In order to maintain the network connection, the external controller must then respond to the projector within 5 seconds with “PJREQ”.
4. The projector will then respond immediately with “PJACK” to acknowledge that it is ready to accept a command.
5. The command can now be sent. This command can be any of the hex commands shown on pages 3-13 or any of the Acknowledgement Response Requests on pages 15-18. The command must be sent within 5 seconds of receiving “PJACK” from the projector, otherwise the projector will close the network connection.

Looking at this as a timeline, using the same numbered steps as above, the sequence is:

	Step 1	Step 2	Step 3	Step 4	Step 5
Controller to Projector	Request Connection		<i>max</i> 5 sec > PJREQ		<i>max</i> 5 sec > Command
Projector to Controller		PJ_OK		PJACK	

Assuming the steps shown above are carried out correctly, the projector will respond to the command. It will then close the network connection after 5 seconds. If you wish to send more than one command, each individual command must be preceded by the connection establishment procedure shown above.

If the controller does not respond to the projector within 5 seconds in steps 3 and 5 above, the projector will close the network connection.

Infrared Control

It is also possible to control JVC D-ILA projectors via Infrared Remote Control Signal Emulation, though this is sometimes slightly more difficult to achieve than RS-232C control due to the differences in Infrared emulation methods between the various equipment manufacturers.

To send an Infrared command to the projector, the required format is 73 in hex, followed by the ASCII value, also in hex, of the command required. The hex ASCII values for all of the Remote Control Emulation Commands are shown in the right hand column of the Remote Control Emulation Command tables on pages 7-13.

As an example, to send the Power On command, send: **73 05**

It is unlikely that these raw commands will work with proprietary Infrared controllers and they must be converted to the appropriate format before use. For the most common Infrared control system, the Philips Pronto, the widely available and free "MakeHex" program will convert the codes in this guide into the "Long hex" format used by Pronto and other similar systems. Full details of how to carry out the conversion are included with the MakeHex program, but here is some basic information that may help with the process. This information assumes a basic knowledge of MakeHex and the DOS commands required to use it.

When using MakeHex, remember that it uses decimal numbers in its .irp input file. The numbers given in this guide are all in hex. You will therefore have to convert them to decimal to use with MakeHex. The Calculator program supplied with most versions of Microsoft Windows can be used to convert from hex to decimal and from decimal to hex.

As a full worked example, using the Menu Command (which toggles the Menu On/Off), looking at page 8, we can see that the hex ASCII code for this is 2E. This gives a complete hex command of **73 2E**. Converting these two numbers to decimal gives **115 46**.

Putting these two numbers into the JVC .irp input file supplied with MakeHex gives the following first two lines for the .irp input file:

```
Device=115  
Function=46
```

Running MakeHex with these parameters will generate the following output file:

```
Device Code: 115 Function: 46  
0000 006D 0001 0011 0141 00A0 0014 003C 0014 003C 0014 0014 0014 0014 003C  
0014 003C 0014 003C 0014 0014 0014 0014 0014 003C 0014 003C 0014 003C 0014 0014  
0014 003C 0014 0014 0014 0014 0014 02E6
```

This can be used in any Remote Control system that uses Pronto style Long hex commands.

There is however a way to make this process slightly easier and this is to run MakeHex with the -B command line option. This will generate the hex as well as the decimal numbers for the required commands. Running MakeHex -B on the .irp file shown above will generate the following output file:

```
Device Code: 115 (0x73) Function: 46 (0x2E)  
0000 006D 0001 0011 0141 00A0 0014 003C 0014 003C 0014 0014 0014 0014 0014 003C  
0014 003C 0014 003C 0014 0014 0014 0014 0014 003C 0014 003C 0014 003C 0014 0014  
0014 003C 0014 0014 0014 0014 0014 02E6
```

This shows both the decimal (115 and 46) as well as the hex (73 and 2E) command numbers and makes it easier to confirm that the correct command has been generated.

Using the method above, it is possible to generate any Pronto style Long hex command.

MakeHex can also generate a range of commands. As an example, the following entries in the .irp file would generate all commands from 22 to 45 (16 to 2D in hex).

```
Device=115  
Function=22..45
```

If all of this sounds a little too involved, we have produced a ready-made Long hex file. This includes all commands from 0 to 255, with both decimal and hex command numbers. This is available from:

http://uk.jvc-service.net/public/document.cfm?prog=docu.cfm&Model=DLA-HD350&SGK=0&SGT=0&MLDC_id=6918

Any required commands can be copied from this file.

Some controllers are able to create Infrared Commands from the RS-232C Remote Control Emulation Codes on pages 7-13. Where this is possible, it is a matter of personal preference as to which of them should be used.

Multiple Projector Infrared Control

The DLA-X3, DLA-X7, DLA-X9, DLA-X30, DLA-X70, DLA-X90, DLA-RS40, DLA-RS50, DLA-RS60, DLA-RS45, DLA-RS55 and DLA-RS65 can be set to use either hex code 73 (also known as Code A - the code used in all of the above Infrared code examples) or hex code 63 (also known as Code B) to control them. This allows two projectors located in the same room to be controlled independently from one Infrared source without interference between them. There are two ways to switch the projector between Code A and Code B.

1. Use the "Infrared Remote Code" command shown on Page 4.
2. On the DLA-X3, DLA-X7, DLA-X9, DLA-RS40, DLA-RS50, and DLA-RS60, Go into the Service Menu, choose "Option", and then scroll down to "IR Code" and press "OK". In the "Code Select" option screen, move the highlighted cursor from "A" to "B" and then press "OK". On the DLA-X30, DLA-X70, DLA-X90, DLA-RS45, DLA-RS55 and DLA-RS65, this option is in the "Function" menu.

If the projector is switched to Code B, it will then respond only to Code B (hex code 63). You should then substitute the default hex code of 73 (115 in decimal) with the new hex code of 63 (99 in decimal) in all Infrared commands to control that particular projector.

It is also possible to program the Remote Control to switch between the A and B codes. To switch between the codes, press *and hold* the "Menu" and "Back" buttons on the Remote Control for three seconds or more. All of the buttons on the remote control will flash. The buttons will flash twice to indicate that the Remote Control has switched to Code B, and three times to indicate that the Remote Control has switched to Code A. Each time you press and hold the "Menu" and "Back" buttons, the Remote Control will toggle between Code A and Code B.

If you have any problems controlling the projector using the Remote Control after changing the remote code, use the buttons on the rear of the projector to access the relevant menu, or change the code using the "Infrared Remote Code" command shown on Page 4

Document Version History:

Version	Release Date	Details
1.0	01/06/2009	First Version - for DLA-H350/DLA-HD750/DLA-RS10/DLA-RS20.
1.1	21/09/2009	Added new codes for DLA-HD550/DLA-HD950/DLA-HD990/DLA-RS15/DLA-RS25/DLA-RS35. Added RS-232C Interface Details. Added additional Video Source Status Response. Other minor corrections and amendments.
1.2	15/02/2010	Expanded Infrared Control information. Other minor corrections and amendments.
1.3	01/12/2010	Added new codes, LAN control information and multiple projector control information for DLA-X3/DLA-X7/DLA-X9/DLA-RS40/DLA-RS50/DLA-RS60. Other minor corrections and amendments.
1.4	07/11/2011	Added new codes for DLA-X30/DLA-X70R/DLA-X90R/DLA-RS45/DLA-RS55/DLA-RS65. Added new RS-232C and LAN codes for 3D Format Switching. Added additional direct commands. Added Remote Control switching Information. Other minor corrections and amendments.

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Version 1.4 - 07/11/2011 - E&OE

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Please email any corrections, suggestions or requests for more information for the attention of Gary Broadbent at: info@jvc.co.uk

This document may be updated from time to time, usually when new models are launched. To download the most recent version, please go to:

http://uk.jvc-service.net/public/document.cfm?prog=docu.cfm&Model=DLA-HD350&SGK=0&SGT=0&MLDC_id=6776