Radiance Tech Tip 11
RS232 Command Interface

Serial RS232 Command Interface

Usage

The RS232 serial interface can be used to control the operation of the Radiance or allow the Radiance to do some simple control of another device. To connect the Radiance to a PC, or another device, use a standard RS232 null modem cable.

NOTE: Some commands require an ASCII carriage return character, which is shown as "<cr>". However, many do not need, and should not have, a <cr> character and if one is sent it will bring up the Info Page. If the Info Page is coming up when commands are sent either eliminate the unnecessary <cr> characters or disable this feature by entering "MENU 0927" and doing a "Save".

The commands that require a carriage return are listed with a "<CR>" at the end of the command. You can use a carriage return or "{" as a command terminator. Any character outside the legal range for characters, Hex 20 to Hex 7A will act as a terminator. Characters above Hex 7F are masked off with "0x7F".

All commands to query the status of the Radiance begin with "ZQ", followed by another character (currently 'I','S','O'), followed by a two-digit decimal code. No terminating characters are used with the query commands

The query response always begins with '!' followed by the last 3 characters of the query request, followed by the data for the query using commas to separate, followed by "<CR><LF>".

The Ack/Nack response (!Y or !N) is terminated with LF,CR (xa,xd) rather than CR,LF which terminates the ZQI query responses.

All commands listed in this document are implemented in Software Rev 081616 and later. Some older commands that have been superceded are shown grayed out.

Port Settings

- 9600 Baud
- 8 data bits
- No parity bit
- One stop bit
- No flow control

Connections

- Pin 2 – Receive
- Pin 3 – Transmit
- Pin 5 and connector shell – Ground

RS-232 Power OnMessage/OffMessage

Power On/Off Message that can be used to control another device. Can be used to send an ASCII string out the RS-232 port to turn on or off a display. NOTE: Turning "On" RS-232 power OnMessage/OffMessage in the Radiance menu, turns off echoing of the original query command. The query response will still be sent. The command is:

MENU → Other → OnOff Setup→ (On Message, Off Message)

Message Control

Set baud rate, parity and gap for the Power On/Off Message. The command is:

MENU → Other → OnOff Setup→ Message Ctl

On Screen Display Message

Turn On/Off the input display window that is shown at the bottom of the screen when you change inputs. If you use a control system to change inputs on the Radiance you can set OSD enable to "Off". The command is:

MENU → Other → Menu Control→ OSD enable

Echo command

When Echo is set to "Off", the Radiance will only send a message at power on/off.

When Echo is set to "Off with Status", the status for power or input changes are in the same format as the response to status query commands ZQS02 or ZQI00.

When Echo is set to "On", the Radiance will echo all characters sent to it.

Also see the "ZE" command.

The command is:

MENU → Other → I/O Setup→ RS-232 Setup→ Echo→ (Off, Off with Status, On)

Optional start/end delimiters for RS232 commands

When Delimiters is set to "On" or "On with Ack/Nack", the Radiance accepts RS232 commands in the format "#<command><CR>". Start is '#'. End is <CR> or a terminator. Any character outside the legal range for characters, Hex 20 to Hex 7A will act as a terminator. Characters above Hex 7F are masked off with "x7F". Commands that already end with a <CR> do not need a second <CR>.

When Delimiters is set to "On with Ack/Nack", an ack or nack will be given per command. Ack = "!Y", Nack="!N". An ack is given when a '#',<CR> pair is seen with at least one character in between. A nack is generated if unmatched start/end delimiters are seen or if a '#',<CR> pair is sent with nothing in between. The ack does not indicate whether the character(s) in between '#',<CR> represented a valid command.

The Ack/Nack response (!Y or !N) is terminated with LF,CR (xa,xd) rather than CR,LF which terminates the ZQI query responses.

When Delimiters is set to "On with Csum & Ack/Nack" the Radiance accepts commands in the format:"#NcommandCC<CR>", where N is a command count from 0-9 (10 just wraps back to 0), and CC is an 8 bit checksum of the previous chars in the command (.ie "#0ZQS008E<CR>" is a correctly formatted command with a valid checksum). Acks ("!Y") are sent by the Radiance only when commands are received with matching checksums in this mode. The command count is included in the checksum but is not verified to be incrementing so it can be left unchanged from one command to the next if desired. The command is:

MENU → Other → I/O Setup→ RS-232 Setup→ Delimiters→ (Off, On, On with Ack/Nack)

RS232 reporting of output mode changes

You can enable rs232 reporting of Radiance output mode changes. This is useful for control systems that need to take other actions when an output mode changes occur. When enabled and an output mode change occurs, the Radiance will send a string reporting the new mode information as if the rs232 mode inquiry command "ZQI18" had been issued to the Radiance. The command is:

MENU → Other → I/O Setup→ RS-232 Setup→Report mode changes→ (Off, On)

ASCII Command List

Remote	RS232-ASCII	Description
ON	%	Power on
STBY	$	Power to standby
MENU	M	Activate menu
EXIT	X	Exit. Often acts as a cancel key
HELP	U	Displays on-screen help for highlighted menu item.
CLR	!	Force menu off (i.e. can use to assure menu is off for input selection)
INPUT	i	Choose input (i.e. i2 for input 2 and i+2 for input 12)
ZONE	L	Output zone select
ALT	#	Alternate
PREV	P	Display previous input
PIP-OFF	e	PIP off
PIP-SEL	p	PIP select
PIP-SWAP	r	PIP swap
PIP-MODE	m	PIP mode
OK	k	Accept command
OK	<enter>	Accept command (uses the PC "ENTER" keycode)
<	<	Left arrow ("less-than" key on keyboard)
>	>	Right arrow ("greater-than" key on keyboard)
v	v	Down arrow (lower-case v, as in "vote")
^	^	Up arrow (shift 6 key on keyboard)
0	0	Enter the digit 0
1	1	Enter the digit 1
2	2	Enter the digit 2
3	3	Enter the digit 3
4	4	Enter the digit 4
5	5	Enter the digit 5
6	6	Enter the digit 6
7	7	Enter the digit 7
8	8	Enter the digit 8
9	9	Enter the digit 9
+10	+	Add 10 to the next digit entered
NLS	N	Non Lineal Scaling
4:3	n	Input is 4:3 format. Use previous zoom setting.
4:3NZ	[	Input is 4:3 format. No zoom.
LBOX	l	Input is 4:3 letterbox format. Use previous zoom setting.
LBOXNZ	]	Input is 4:3 letterbox format. No zoom
16:9	w	Enhanced for 16:9 televisions format. Use previous zoom setting.
16:9NZ	*	Enhanced for 16:9 televisions format. No zoom.
1.85	j	Input is 1.85 format. Use previous zoom setting.
1.85NZ	/	Input is 1.85 format. No zoom.
2.35	W	Input is 2.35 format. Use previous zoom setting.
2.35NZ	K	Input is 2.35 format. No zoom.

Remote	RS232-ASCII	Description
MEMA	a	Select MEMA
MEMB	b	Select MEMB
MEMC	c	Select MEMC
MEMD	d	Select MEMD
	g	Onscreen messages on
	s	Onscreen messages off
FREEZE	z	Freeze-frame-- Any other character resumes
480P	A	Select Vertical Resolution = 480p
540P	B	Select Vertical Resolution = 540p
600P	C	Select Vertical Resolution = 600p
720P	D	Select Vertical Resolution = 720p
768P	E	Select Vertical Resolution = 768p
840P	F	Select Vertical Resolution = 840p
1080P	G	Select Vertical Resolution = 1080p
1080I	I	Select Vertical Resolution = 1080I
ASPECT	=	Set Output aspect ratio-- i.e. =178 <enter>, for 16:9 displays
	_ (underscore)	Underscore is defined as a no-op character and is ignored even between or inside commands.
	tXMM *use ZY7T instead*	Test Pattern command-- X is a letter 'a'-'p' corresponding to the 16 available test patterns. MM: 0-10 corresponds to 10%-100% stepping by 10%. MM: 11-20 corresponds to 5%-95% stepping by 10%. Sending 'X" will exit. "TaMM"=Crosshatch "TbMM"= Overscan (always displayed as 100 IRE) "TcMM"= Contrast (always displayed as 100 IRE) "TdMM"= Every other Hline (always displayed as 100 IRE) "TeMM"= Every other Vline (always displayed as 100 IRE) "TfMM"= Ramp (always displayed as 100 IRE) "TgMM"= White Window "ThMM"= White Solid "TiMM"= 75% Colorbars (always displayed as 75 IRE) "TjMM"= Red Solid "TkMM"= Green Solid "TlMM"= Blue Solid "TmMM"= Yellow Solid "TnMM"=Cyan Solid "ToMM"= Magenta Solid "TpMM"= Contrast2 (always displayed as 100 IRE) "TqMM"= Red Window "TrMM"= Green Window "TsMM"= Blue Window "TtMM"= Yellow Window "TuMM"= Cyan Window "TvMM"= Magenta Window
	tA *-also see: tR, ZY7T*	Set Adjustable test pattern mode-- Test patterns are then affected by output CMS settings to calibrate video with the Radiance.
	tR *-also see: tA, ZY7T*	Set Reference test pattern mode-- Test patterns only affected by output PC/Video setting allowing to calibrate picture with the displays controls.
	ZB<X> *-also see: ZC,ZT*	Define Block character-- The character X will be displayed as a solid block "▀" in on-screen messages. Can be used to display control settings (.ie volume control)
	ZC *-also see: ZT, ZB*	Clear-- Clear any onscreen message
	ZD<0,1,2,3>	Set Delimiters-- 0=off, 1=on, 2=on with ack/nack, 3=on with checksum and ack/nack.

Remote	RS232-ASCII	Description
	ZE<0,1,2> *-See page 2: "Echo command".*	Set Echo-- 0=echo off, 1=echo on (default), 2=echo off with status.
	ZQI00	Basic input info-- returns (logical input#1-18, input memory a-d, physical input #1-18). Example response: "!I00,1,A,1<CR><LF>" for logical input 1, MemA, physical input 1
	ZQI01	Input video-- returns (0=none,1=video active,2=testpat active}, vert rate *100, horiz res, vert res, interlaced, (0=off, 2=frame packed, 4=top-bottom, 8=side-by-side), input 3D type ((0=off, 2=frame packed, 4=top-bottom, 8=side-by-side)). Example response: "!I01,1,5992,720,480,1,0 <CR><LF>" for active 480i video 3D off.
	ZQI02 *also see: ZY7T*	Input pattern info-- returns ({On=1,Off=0}, pattern group 'a'-'o', sub pattern #, IRE level 0-100, A/R for adjustable or reference patterns). Example response: "!I02,1,a,1,100,R<CR><LF>" for overscan test pattern on and set to overscan at 100 IRE and reference levels. Note: the letters returned by the newer "ZQ102" query command don't match the letters used in the older "TxMM" test pattern rendering command. "a,0"=Crosshatch, "a,1"=Overscan, "a,2"=AspectSquares, "b,0"=Contrast1, "b,2"=Contrast2, "b,3"=BlkRamp, "b,4"=LowClip, "b,5"=WhtRamp, "b,6"=HiClip, "b,7"=Targets, "b,8"=Check, "b,9"=Icheck, "b,10"=VidBlack, "b,11"=VidWhite "c,0"=HLines, "c,1"=VlLines, "d,0"=Ramp, "e,0"=GrayWindowMed, "e,1"=GrayWindowSm, "e,2"=GraySolid, "f,0"=100%ColorBars, "f,1"=75%ColorBars, "g,0"=RedWindowMed, "g,1"=RedWindowSm, "g,2"=RedSolid, "h,0"=GrnWindowMed, "h,1"=GrnWindowSm, "h,2"=GrnSolid, "i,0"=BluWindowMed, "i,1"=BluWindowSm, "i,2"=BluSolid, "j,0"=YelWindowMed, "j,1"=YelWindowSm, "j,2"=YelSolid, "k,0"=CynWindowMed, "k,1"=CynWindowSm, "k,2"=CynSolid, "l,0"=MagWindowMed, "l,1"=MagWindowSm, "l,2"=MagSolid. "m,0"=DesaturatdRedWinMed, "m,1"=DesaturatedRedWinSm, "m,2"=DesaturatedRedWinSolid Note: not in menu, control via RS232. "n,0"=DesaturatedGrnWinMed, "n,1"=DesaturatedGrnWinSm, "n,2"=DesaturatedGrnWinSolid Note: not in menu, control via RS232. "o,0"=DesaturatedBluWinMed, "o,1"=DesaturatedBluWinSm, "o,2"=DesaturatedBluWinSolid Note: not in menu, control via RS232.
	ZQI03 *use ZQI18 instead*	Output1 and Output2 config select for current input memory--[Replaced by ZQI18 due to changes in the output config memory structure in SW Rev 102910] returns (Output1<0,1> disabled=0 enabled=1, Output2<0,1>, config select<0-7>) Example response: "!I03,1,0,3" would mean out1 is enabled, out2 is disabled, using output config3.
	ZQI04	Current input audio select-- returns (XX=0-5 HDMI, 6-11coax, 12-13 optical, 14-17 stereo)
	ZQI05 *	Current input black level-- returns (-64 to 64)
	ZQI06 *	Current input contrast level-- returns (–127 to 127)
	ZQI07 *	Current input color format-- returns (0=auto, 1=Bt.601, 2=Bt.709)
	ZQI08 *	Current input color offset-- returns (–127 to 127)
	ZQI09 *	Current input color red offset-- returns (–127 to 127)
	ZQI10 *	Current input color grn offset-- returns (–127 to 127)
	ZQI11 *	Current input hue offset-- returns (–127 to 127)
	ZQI12 *	Current input hue red offset-- returns (–127 to 127)
	ZQI13 *	Current input hue grn offset-- returns (–127 to 127)
	ZQI14 *	Current input YC delay-- returns(cr,cb) (-31 to 31) multiply by 1/16pixel
	ZQI15	Current input deinterlacing mode-- returns (0 for "auto", 1 for "film", 2 for "video")

Remote	RS232-ASCII	Description
	ZQI16	Current input vertical shift--returns (index,value). Index=0 is off, Index=1-15 is the index of current setting being used and value is the amount (-511-511).
	ZQI17	Current input reinterlacing status--returns (!I17X,Y,Z) where X = 1/0 (enable/off) , Y = 1/0 (allow/disallow) <,> key control, Z= 1/0 (reinterlacing currently active / not active).
	ZQI18	Current output configuration selected by current input resolution and user memory-- returns out1 on/off status (1/0), out2 on/off status (1/0), output mode selected (C<0-7> for one of eight output configurations or D<mode_name> for a directly selected standard mode), output 3D type (0=off, f=auto, 1=frm seq, 2=frm packed, 4=top-btm, 8=side-by-side), CMS <0-7>, Style <0-7>.
	ZQI19	Current input aspect--returns 0-9. 0=4:3 1=lbox 2=1.78 3=1.85 4=2.35, 5=4:3 nls, 6=lbox nls, 7=1.78 nls, 8=1.85 nls 9=2.35 nls
	ZQI20	Full information query command-- Updated version of ZQI18 input aspect query. Response= "!I20,XY"; "X"= {0,1,2,3,4,5,6,7,8,9} corresponding to remote input aspect selections {4:3,lbox,16:9,1.85, 2.35,rsvd,rsvd,rsvd,alt-1.85,alt-2.35}, (alt-2.35 is 2.40), (alt-1.85 is 1.85 letterboxed in 1.78), "Y"= 'N' for nls or '-' if nls not enabled
	ZQI21	RS232 full inforamtion query- Response= "!I21,M,RRR,VVVV,D,X, AAA,SSS,Y,C,B,PPP,QQQQ,ZZZ"; M = 0-2 0=no src, 1=active video, 2=internal pattern, RRR = 3 digit src vertical rate info, .ie 059, VVVV = 4 digit src vertical res info, .ie 1080 for 1080p src, D = is 8,4,2,1 or 0 for 3d mode, X=input config (always 0 for non-Pro), AAA is raster aspect (.ie lbox is 133 raster aspect), SSS is source aspect (.ie lbox is 178 source aspect), Y = 'N' for nls or '-', T = output 3d mode (0,1,2,4,8), WWWW = 16 bit hex value, b0=1/0 for out1 on/off, b1-15 for out 2-out15, C = output cms selected 0-7, B = output style selected 0-7, PPP = output vertical rate, .ie 059, QQQQ = output vertical res, .ie 1080 for 1080p, ZZZ is output aspect, .ie 178 for 16:9
	ZQI22	Radiance Pro only. RS232 full information query: Response is same as ZQI21, but with the addition of fields at the end. Response= "!I21,M,RRR,VVVV,D,X, AAA,SSS,Y,T,WWWW,C,B,PPP,QQQQ, ZZZ,E,F,G,H". M = 0-2 0=no src, 1=active video, 2=internal pattern, RRR = 3 digit src vertical rate info, .ie 059, VVVV = 4 digit src vertical res info, .ie 1080 for 1080p src, D = is 8,4,2,1 or 0 for 3d mode, X=input config (always 0 for non-Pro), AAA is raster aspect (.ie lbox is 133 raster aspect), SSS is source aspect (.ie lbox is 178 source aspect), Y = 'N' for nls or '-', T = output 3d mode (0,1,2,4,8), WWWW = 16 bit hex value, b0=1/0 for out1 on/off, b1-15 for out 2- out15, C = output cms selected 0-7, B = output style selected 0-7, PPP = output vertical rate, .ie 059, QQQQ = output vertical res, .ie 1080 for 1080p, ZZZ is output aspect, .ie 178 for 16:9. E=0,1,2 for 601,709,2020 out. F=0,1 for SDR,HDR out. G = "i","p" or "-" for input interlaced/progressive/not detected. H = "I" or "P" for output Interlaced/Progressive. See ZQI21 for definition of other fields. **NOTICE:** When writing a parser for this command allow for future comma delimited fields being added at the end of the response.
	ZQI50	Radiance Pro only. Query for Rec2020 support on the display connected to the main video output—Output 4 on the 44XX and Output 2 on the 42XX. Replies with 'Y' or 'N'
	ZQI51	Radiance Pro only. Query HDR test pattern Info Frame data (returns set values even if not activated by ZY547). Response is !I51, P0X, P0Y,P1X,P1Y,P2X,P2Y,WPX,WPY,MAX,MIN,CLL,FALL where P0,1,2 are the display primary points, WP is the white point, MAX & MIN are max and min mastering luminance values, CLL is the max content light level, FALL is the max frame average light level. See ZY540-ZY546 for setting values. Also see CEA 861.3 for definition of values.
	ZQO00	Basic output info-- returns (current output config 0-7, video on for out1, video on for out2, audio on for out1, audio on for out2). Example response: "!O00,1,1,0,1,1<CR><LF>" output cfg = 1, video out1 is on, video out2 is off, audio out1 is on, audio out2 is on.
	ZQO01	Output mode-- returns (vertical rate * 100, horiz res, vert res, interlaced, (0=off, 1=frame seq, 2=frame packed, 4=top-bottom, 8=side-by-side)). Example response: "!O01,5994,1920,1080,0,0<CR><LF>" for a default

Remote	RS232-ASCII	Description
		1080p 3D off output mode.
	ZQO02	Output aspect-- returns (current output aspect, followed by 5 output aspects for input aspects 4:3,Letterbox,16:9,1.85,2.35) 110-250 corresponds to 1.10 - 2.50
	ZQO03	Output shrink-- returns (top,left,bottom,right) 000-255 pixels
	ZQO04 *also see: ZY40*	Output gamma-- returns current gamma (80-140) corresponding to .80 - 1.40.
	ZQO05 *also see: ZY412*	Output color gamut enabled-- returns (1 if enabled, 0 if disabled)
	ZQO06 *use ZQO30 instead*	Output color gamut AddR values-- returns (r,g,b,yellow,cyan,magenta,white) values are 0-1024
	ZQO07 *use ZQO30 instead*	Output color gamut AddG values-- returns (r,g,b,yellow,cyan,magenta,white) values are 0-1024
	ZQO08 *use ZQO30 instead*	Output color gamut AddB values-- returns (r,g,b,yellow,cyan,magenta,white) values are 0-1024
	ZQO09 *also see: ZQO89*	Output color temp-- returns (IRE points 0-10) the 11 values are in range 0-1000, corresponding to 0-100.0 (ZQO89 returns pts 11-20)
	ZQO10 *also see: ZQO90*	Output color temp-- returns (R points 0-10) the 11 values are in range 0-1000, corresponding to 0-100.0 (ZQO90 returns pts 11-20)
	ZQO11 *also see: ZQO91*	Output color temp-- returns (G points 0-10) the 11 values are in range 0-1000, corresponding to 0-100.0 (ZQO91 returns pts 11-20)
	ZQO12 *also see: ZQO92*	Output color temp-- returns (B points 0-10) the 11 values are in range 0-1000, corresponding to 0-100.0 (ZQO92 returns pts 11-20)
	ZQO13	Output color settings-- returns (color,color red, color grn) values are in range -127 to 127
	ZQO14	Output hue settings-- returns (hue,hue red, hue grn) values are in range -127 to 127
	ZQO15	Output black and contrast-- returns (black,contrast), black is -64 to 64, contrast is -127 to 127
	ZQO16	Output mode name-- Names are same as seen in the menu under Output:Configs:ConfigX:Select Mode. Corresponds to the “ZY44” set output mode by name command.
	ZQO17	Output ctemp points-- returns number of ctemp points (2, 5, 11, 12, 21)
	ZQO20 *-added 090512* *-also see: ZQO30, ZY415*	3D LUT capability-- Returns the maximum dimensions of the LUT. Example response is !O20,NN,PP where NN is the dimension of the LUT. For the RadianceXS this is "05" for a 5x5x5 LUT. PP is the length of the LUT color values in bits, for the Radiance this is "10" bits. Maximum values are PP bits + 1. So for 10 bit values the maximum value is 1024 (0x400). The default values at the black corner (address 0,0,0) are 64,64,64 and for the white corner 940,940,940.
	ZQO21 *-added 081413* *-also see: ZQO20, ZY416*	Current 3D LUT size-- Returns “01”, “05”, "09" or “17” corresponding to 8 pt, 5x5x5, 9x9x9 or 17x17x17 gamut sizes. Example response is !O21,NN where NN is the current dimension of the LUT.
	ZQO30XXYYZZ *-added 090512* *-also see:ZQO20, ZY415*	3D LUT value-- XX,YY,ZZ are addresses in the 3D cube. XX is along the red axis, YY the green axis and ZZ the blue axis. Range for the device corresponds to the currently selected LUT size. If the LUT size is 5 the range for the address is 00-04, corresponding to 0,25,50,75, 100% of the video range. If the LUT size is 9x9x9 the range is 00-08. Command returns: !O30,rrrr,ggg,bbbb where rrrr,gggg,bbbb are the red,green blue hex values at the location. For 10 bit values this is a range of x0000-x0400.
	ZQO89 *also see: ZQO09*	Output color temp-- if using 12 pt returns (IRE point 12), If using 21 pt returns (IRE points 11-20), the value is in range 0-1000, corresponding to 0-100.0 (ZQO09 returns pts 0-10)
	ZQO90 *also see: ZQO10*	Output color temp-- if using 12 pt returns (R point 12), If using 21 pt returns (R points 11-20), the value is in range 0-1000, corresponding to 0-100.0 (ZQO10 returns pts 0-10)
	ZQO91	Output color temp-- if using 12 pt returns (G point 12), If using 21 pt

Remote	RS232-ASCII	Description
	also see: ZQO11	returns (G points 11-20), the value is in range 0-1000, corresponding to 0-100.0 (ZQO11 returns pts 0-10)
	ZQO92 *also see: ZQO12*	Output color temp-- if using 12 pt returns (B point 12), If using 21 pt returns (B points 11-20), the value is in range 0-1000, corresponding to 0-100.0 (ZQO12 returns pts 0-10)
	ZQS00	Alive-- returns ("!S00,Ok<CR><LF>") if working
	ZQS01	Id-- returns (model name, software revision, model#, serial #) Example response: "!S01,RadianceXD,102308,1009,745<CR><LF>". Radiance XD model number is 1009, XE will be 1010
	ZQS02	Power-- returns (Off="!S02,0<CR><LF>" ,On="!S02,1<CR><LF>")
	ZQS03	Zoom step%-- returns (current zoom step) values are 5,15
	ZQS04	Output trigger status for triggers 1 and 2-- returns (0 for low, 1 for high) Note: Only available on units with output triggers
	ZTMxxxx<CR> *-also see: ZB,ZC*	Print message on the screen-- M = '0' to '9'... '9' leaves message until "ZC" sent. 2 lines, 30 characters per line, legal characters " through 'z' (0x20 - 0x7a in hex), a carriage return or '{' can be used to terminate message. ASCII extended characters set solid block for use as a volume bar.
	ZWxxx<CR>	Delay rs232 command processing-- The delay xxx, in milliseconds, can be up to 30000 for a 30 sec delay. For example you can send the power on command, wait 5 seconds, then put up a message.
	ZYSX<CR> *-115-460kb added 081514*	Set rs232 baud rate-- X='D', 'M', 'F', '1', '2', '3' for default 9.6k, 28.8k, 57.6k, 115.2k, 230.4k, 460.8k baud. Baud rate should be returned to the default 9.6k before attempting to use any Lumagen utilities.
	ZY0M<CR>	Set zoom factor to M-- Where M can be 0-2 (or 0-7 if zoom is set for 5% steps)
	ZY1MMM<CR> *-also see: ZY45*	Set output aspect ratio to MMM for all input aspects--. Where the valid range is 110-250 which corresponds to 1.10 to 2.50.
	ZY2MMMNNNOOOPPP<CR>	Set output shrink parameters-- Where MMM=top, NNN=left, OOO=bottom, PPP=right edge. Range is 0-255 for each.
	ZY3<1,2><H,L><CR>	Sets trigger-- 1 or 2 either H=on or L=off. For RS-232 control of the trigger set the trigger setting in the Radiance menu to one of the RS232 control enabling options. (Trigger menu found under Other: I/O Setup: Trigger Out). Note: Only available on units with output triggers.
	ZY40XXX<CR> *also see: ZQO04*	Set output color mgmt gamma-- XXX =080-140 which corresponds to 0.80 to 1.40
	ZY410CRXXXX<CR> *use ZY415 instead*	Set output color mgmt color gamut matrix--C=Column 0-6 corresponds to R,G,B,Y,C,M,W. R= Row=0-2 corresponds to AddR,AddG,AddB, XXXX is the value =0000-1024 (use leading 0's to always be 4 chars long).
	ZY411<CR>	Set output color mgmt-- reset color gamut of currently selected CMS to default values and 8 point mode.
	ZY412<0,1> <CR>	Set output color mgmt-- 3D color gamut enable, 0=disable, 1=enable
	ZY413XX<CR>	Set output color mgmt-- set number of points for 2D LUT (aka grayscale), XX=11, 12, 21. This affects allowable range for <PP> in ZY42 commands. Changing number of pts resets all pts to default value. 11pt=0,10…90,100 12pt=0,5,10,20…90,100 21pt=0,5…95,100 (IRE)
	ZY415XXYYZZCVVVV<CR> *-added 090512* *-also see: ZQO20,ZQO30*	Set output color mgmt--Set 3D LUT value where XX,YY,ZZ are addresses in the cube. XX is along the red axis, YY the green axis and ZZ the blue axis. Range for the Radiance is 00-04, 00-08, 00-16 for the 5x5x5, 9x9x9, or 17x17x17 gamut mode. C is 0,1,2 indicating that we're writing the red, green or blue component at this location. VVVV is the hex value for the color component at the addressed location. For the Radiance 10 bit LUT the range is x0000-x0400. When this command is executed the Radiance will be set into the 125 point mode if it was in the 8 point mode.

Remote	RS232-ASCII	Description
	ZY416XX<CR> ZY416XXM<CR> *-x17 support added 081514* -Pro support added 101416	Select gamut size—Command only available & necessary if LUT capability is greater than 5x5x5. Set XX to 05, 09, 17 for 5x5x5, 9x9x9, or 17x17x17 gamut mode. 8 point mode is only selectable in the menu. If the Radiance firmware only supports up to 5x5x5 gamut, the gamut size will be set to 5x5x5 when any values are written to the LUT via RS232 commands. RadiancePro only- added optional 'M' field with values of 'S' for source gamma or 'L' for linear gamma. Source gamma is now the recommended setting if calibration software is up to date with this mode of operation.
	ZY417XXXXXG<CR>	Set output HDR intensity mapping for current CMS-- For XXXXX, 00000=disable, 00050-10000 enables and sets display max level to XXXXX. These setting also in menu under Output: CMS's: CMSX: HDR Mapping. G can be 'A','H' or 'S' and is the setting for gamma into the 3D LUT, and should be 'A' for auto, 'H' for HDR gamma, 'S' for SDR gamma.
	ZYGXYZRRRGGGBBB<CR> *-added 081513* *-also see: ZQO20,ZQO30*	Shorter version of ZY415 command for writing values to the LUT-- X,Y,Z are addresses on red, green, blue axes. Range is 0-4, 0-8, 0-16 depending on selected gamut size. Since LUT address is a single character, 10-16 are represented by the characters :;<=>?@ respectively. RRRGGGBBB is the hex value for red, green, blue value at the point. Range is 0x000 - 0x400. Command will set Radiance into 125 point mode if it was in 8 pt mode.
	ZY42APPRRRRGGGGBBBB<CR>	Set output red, grn, blu for ctemp point PP-- (ZY413 setting affects the allowed range) 11pt PP=0-10, 12pt PP=0-11, 21pt PP=0-20, RRRR,GGGG,BBBB= value 0000-1000 corresponds to 000.0-100.0.
	ZY42BPPXXXX<CR>	Set output blu for ctemp point PP-- (ZY413 setting affects the allowed range) 11pt PP=0-10, 12pt PP=0-11, 21pt PP=0-20, XXXX=value 0000-1000 corresponds to 000.0-100.0
	ZY42DPP<CR>	Set output default for ctemp point PP-- (ZY413 setting affects the allowed range) 11pt PP=0-10, 12pt PP=0-11, 21pt PP=0-20
	ZY42GPPXXXX <CR>	Set output grn for ctemp point PP-- (ZY413 setting affects the allowed range) 11pt PP=0-10, 12pt PP=0-11, 21pt PP=0-20, XXXX=value 0000-1000 corresponds to 000.0-100.0
	ZY42IPPXXXX<CR>	Set output IRE for ctemp point PP--(ZY413 setting affects the allowed range) 11pt PP=0-10, 12pt PP=0-11, 21pt PP=0-20, XXXX=value 0000-1000 corresponds to 000.0-100.0
	ZY42RPPXXXX<CR>	Set output red for ctemp point P-- (ZY413 setting affects the allowed range) 11pt PP=0-10, 12pt PP=0-11, 21pt PP=0-20, XXXX=value 0000-1000 corresponds to 000.0-100.0
	ZY43CCSVVV<CR> *	Set out color-- S=sign<+,->, VVV = value<000-127>
	ZY43CRSVVV<CR> *	Set out color red-- S=sign<+,->, VVV = value<000-127>
	ZY43CGSVVV<CR> *	Set out color grn-- S=sign<+,->, VVV = value<000-127>
	ZY43HHSVVV<CR> *	Set out hue-- S=sign<+,->, VVV = value<000-127>
	ZY43HRSVVV<CR> *	Set out hue red-- S=sign<+,->, VVV = value<000-127>
	ZY43HGSVVV<CR> *	Set out hue grn-- S=sign<+,->, VVV = value<000-127>
	ZY43BLSVVV<CR> *	Set out black-- S=sign<+,->, VVV = value<000-064>
	ZY43COSVVV<CR> *	Set out contrast-- S=sign<+,->, VVV = value<000-127>
	ZY44<ModeName><CR>	Sets up the output mode by name-- Names are same as seen in the menu under Output:Configs:ConfigX:Select Mode. Corresponds to the "ZQO16" output mode name command.
	ZY45XMMM<CR> *-also see: ZY1*	Set output aspect to MMM for input aspect X-- X(0=4:3, 1=Lbox, 2=16:9, 3=1.85, 4=2.35) MMM<110-250> which corresponds to 1.10 to 2.50.
	ZY46F<CR>	Set output format-- F=0-3 (0=YCbCr422, 1=YCbCr444, 2=RGB-PC, 3=RGB-Vid).
	ZY46FC<CR>	Expanded set output format command -- F=0-9 (0=YCbCr422, 1=YCbCr444, 2=RGB-PC, 3=RGB-Vid, 8=automax, 9=auto9).C=0-3 (0=Auto,1=601, 2=709, 3=2020, 4=SDR2020).

Remote	RS232-ASCII	Description
	ZY47X<CR>	Set 3D output for left, right or both eyes-- X (L=Left, R=Right, B=Both)
	ZY48X<CR>	Set 3D eyeglass polarity--X <-,+>
	ZY503XYZ<CR> *-use ZY530 instead*	Set input memories output config select-- Enable Output1 X<0,1> disable=0 enable=1, Enable Output2 Y<0,1>, Output Config Z<0-7>. When output is disabled it outputs 1080i blank video.
	ZY506SVVV<CR> *	Set input contrast level-- S=sign<+,-> VVV=value <000-127>
	ZY507X<CR> *	Set input color format-- 0=auto, 1=Bt.601, 2=Bt.709. SD inputs are fixed to Bt.601 and a setting of auto or Bt.709 is ignored.
	ZY508SVVV<CR> *	Set input color offset-- S=sign<+,-> VVV=value <000-127>
	ZY509SVVV<CR> *	Set input color red offset-- S=sign<+,-> VVV=value <000-127>
	ZY510SVVV<CR> *	Set input color grn offset-- S=sign<+,-> VVV=value <000-127>
	ZY511SVVV<CR> *	Set input hue offset-- S=sign<+,-> VVV=value <000-127>
	ZY512SVVV<CR> *	Set input hue red offset-- S =sign<+,-> VVV=value <000-127>
	ZY513SVVV<CR> *	Set input hue grn offset-- S=sign<+,-> VVV=value <000-127>
	ZY514SXXSYY<CR> *	Set input YC Delay-- S=Sign<+,->,XX=Cr delay <00-31> in 1/16 of a pixel, S=Sign<+,->, YY=Cb delay <00-31>
	ZY515X<CR>	Set input deinterlacing mode-- 0="auto", 1="film", 2="video"
	ZY5160XX<CR> ZY5161XXSVVV<CR>	Set input vertical shift-- Can just switch which vertical shift setting is being used with "ZY5160XX" where XX=0-15 (0 is off, 1-15 would be a vertical shift setting). With "ZY5161XXSVVV" you select which shift setting to use (XX) and also set the value (S=sign<+,->,VVV=value <-511,511>)
	ZY517GGGME<CR>	Darbee enhancement control-- GGG= gain with range of 000-120 or "KKK" to keep current value. Also GGG can be "+01" to "+99" or "-01" to "-99" for making relative changes. M= the mode and can be 'P'/'G'/'H' or 'K' which correspond to Pop/Game/HD modes or Keep current setting. E= enable with legal values being '0'/'1'/'K' for off/on or Keep current setting.
	ZY518PRRSCTGGBB<CR>	Set HDR mapping settings for current input memory- There are two groups of settings: "Source Max Light 2000" nits. 'P' selects which setting group to load, 0:load settings for SrcMax 2000. RR=display ratio adjust, RR range is 32-96 which corresponds to onscreen adjustment of -32 to +32, S=shape parameter, 0-7. C=clip parameter, 0-7. T=transition parameter, 0-7. GG=gamma adjust with range of 8-24, corresponding to onscreen adjustment of -8 to +8 (each step adjusts gamma by .02). BB= black adjust with range of 1-15, corresponding to onscreen adjustment of -7 to + 7.
	ZY520X<CR>	Toggle HDMI Hotplug-- useful to get sources to re-read EDID information and possibly change audio or video output formats. X =0-5 corresponds to HDMI input 1-6, 7 corresponds to all HDMI inputs.
	ZY523X<CR>	Use remote right and left arrow buttons for reinterlace control-- X='0' disallows, X='1' allows, X='2' allows with onscreen messages.
	ZY530MCS<CR> ZY530MCDS<CR>	Set Output Mode: CMS and Style—M (K=keep current mode, 0-7 to select Output Mode 0-7), C (K=keep current CMS, 0-7 to select Output CMS 0-7) for non Rec2020, D (K=keep current CMS, 0-7 to select Output CMS 0-7) for Rec2020/HDR, S (K=Keep current Style, 0-7 to select Output Style 0-7). The RadiancePro (fw >= 071616) adds the ZY530MCDS command. It is not in the older Radiance models. Two CMS memories are selected by this version of the command. The first (C) is for non-Rec 2020 color modes (such as Rec 709), and the second (D) is for Rec 2020/HDR. The Radiance Pro uses the input HDMI Info Frames to determine if the color format is Rec 2020 and if so selects the CMS "D."
	ZY532CSDM<CR>	Test pattern output mode-- Sets up a mode that will be switched to when a test pattern command is executed with the character 'm' appended to it (ie "ZY7T….m"). In this ZY532CSDM command, the 'C' is defined to select the CMS to be used and can be '0'-'7' or 'K' for keep current. 'S' is the selected style to be used and is also '0'-'7' or 'K'. D is

Remote	RS232-ASCII	Description
		the 3d mode selection and can be '0', '1', '2', '4', '8' or 'K' corresponding to off (so a 2d mode), frame sequential, frame packed, top-bottom, side-by-side, or keep current. 'M' is the crt mode and can be the name of any of the predefined modes (.ie 480p, 720p60, etc), "C0"-"C7" for the user defined custom modes, or 'K' for keep current crt mode.
	ZY533ICSDM<CR>	Test pattern output mode—Updated command ZY532 for the RadiancePro. The 'I' field is the input colorspace with legal values of 1 or 2 corresponding to Rec709 or Rec2020 (for further information on the other fields in this command see the ZY532 command)
	ZY540XXXXYYYY<CR>	Radiance Pro only- Set Test Pattern (only) HDR Info Frame Primary Display Point x[0],y[0]: XXXX and YYYY are 4 digit hex values. See CEA 861.3 for definition. NOTE: Not active until ZY547 received.
	ZY541XXXXYYYY<CR>	Radiance Pro only- Set Test Pattern (only) HDR Info Frame Primary Display Point x[1],y[1]: XXXX and YYYY are 4 digit hex values. See CEA 861.3 for definition. NOTE: Not active until ZY547 received.
	ZY542XXXXYYYY<CR>	Radiance Pro only- Set Test Pattern (only) HDR Info Frame Primary Display Point x[2],y[2]: XXXX and YYYY are 4 digit hex values. See CEA 861.3 for definition. NOTE: Not active until ZY547 received.
	ZY543XXXXYYYY<CR>	Radiance Pro only- Set Test Pattern (only) HDR Info Frame White Point: XXXX and YYYY are 4 digit hex values. See CEA 861.3 for definition. NOTE: Not active until ZY547 received.
	ZY544XXXXYYYY<CR>	Radiance Pro only- Set Test Pattern (only) HDR Info Frame Display Mastering Luminance max (XXXX) and min (YYYY): XXXX and YYYY are 4 digit hex values. See CEA 861.3 for definition. NOTE: Not active until ZY547 received.
	ZY545XXXXYYYY<CR>	Radiance Pro only- Set Test Pattern (only) HDR Info Frame Max Content Light Level (XXXX) and Maximum Frame Average Light Level (YYYY XXXX and YYYY are 4 digit hex values. See CEA 861.3 for definition. NOTE: Not active until ZY547 received.
	ZY546<CR>	Radiance Pro only- Set Test Pattern (only) HDR Info Frame to Radiance Pro default. Values TBD. NOTE: Not active until ZY547 received.
	ZY547<CR>	Radiance Pro only- Activate parameters set using ZY540 to ZY546. In test pattern mode with HDR enabled the latest values sent with ZY540-5 will be activated in the HDR output.
	ZY548X<CR> -added 081516	HDR pass through- (X = 'P' or 'T') command to choose HDR pass through (P) or (T) for the HDR info programmed with ZY540-5 to be used with active or test pattern video. (Firmware >=081516)
	ZY550<CR>	Reset automatic aspect detection-- resets and reinitiates auto aspect detection if enabled in menu.
	ZY6SAVECONFIG<CR>	Save configuration to flash-- Exit any onscreen test patterns prior to performing a save.
	ZY7M<0,1><CR>	Menu position-- 0=default menu, 1=menu at top
	ZY7TGSIII<CR> *-also see: ZQI02,tA,tR*	Test pattern command-- G=test pattern group 'a'-'r', S=subpattern number, 0-n. Number of subpatterns depends on the group,III = IRE, 000-100. Will round to nearest step of 5. This command matches the format of the test pattern status command and should be used instead of the old “tXMM” command. The test pattern command can also have an optional ‘m’ appended in order to switch to the test pattern mode that was previously defined using the ZY532CSDM command. “a,0”=Crosshatch, “a,1”=Overscan, “a,2”=AspectSquares, “b,0”=Contrast1, “b,2”=Contrast2, “b,3”=BlkRamp, “b,4”=LowClip, “b,5”=WhtRamp, “b,6”=HiClip, “b,7”=Targets, “b,8”=Check, “b,9”=Icheck, “b,10”=VidBlack, “b,11”=VidWhite “c,0”=HLines, “c,1”=VlLines, “d,0”=Ramp, “e,0”=GrayWindowMed, “e,1”=GrayWindowSm, “e,2”=GraySolid, “f,0”=100%ColorBars, “f,1”=75%ColorBars, “g,0”=RedWindowMed, “g,1”=RedWindowSm, “g,2”=RedSolid, “h,0”=GrnWindowMed, “h,1”=GrnWindowSm, “h,2”=GrnSolid, “i,0”=BluWindowMed, “i,1”=BluWindowSm, “i,2”=BluSolid, “j,0”=YelWindowMed, “j,1”=YelWindowSm, “j,2”=YelSolid, “k,0”=CynWindowMed, “k,1”=CynWindowSm, “k,2”=CynSolid, “l,0”=MagWindowMed, “l,1”=MagWindowSm, “l,2”=MagSolid. “m,0”=DesaturatdRedWinMed, “m,1”=DesaturatedRedWinSm,

Remote	RS232-ASCII	Description
		”m,2”=DesaturatedRedWinSolid Note: not in menu, control via RS232. “n,0”=DesaturatedGrnWinMed, “n,1”=DesaturatedGrnWinSm, ”n,2”=DesaturatedGrnWinSolid Note: not in menu, control via RS232.. “o,0”=DesaturatedBluWinMed, “o,1”=DesaturatedBluWinSm, ”o,2”=DesaturatedBluWinSolid Note: not in menu, control via RS232.. “p,0”=DesaturatdYelWinMed, “m,1”=DesaturatedYelWinSm, ”m,2”=DesaturatedYelWinSolid Note: not in menu, control via RS232. “q,0”=DesaturatedCynWinMed, “n,1”=DesaturatedCynWinSm, ”n,2”=DesaturatedCynWinSolid Note: not in menu, control via RS232. “r,0”=DesaturatedMagWinMed, “o,1”=DesaturatedMagWinSm, ”o,2”=DesaturatedMagWinSolid Note: not in menu, control via RS232
	ZY7TsSRRRGGGBBB<CR> *-added 102913*	User defined size pattern-- The pattern is specified with 's', '*S*'=0-2 for medium, small, full field size. *'RRRGGGBBB'* is the 3 digit rgb color values= 0-255. Example: rs232 command for a medium, red window would be "ZY7Ts0255000000".
	ZY7TsSSSAAARRRGGGBBB<CR> *-added 102913*	User defined size + APL pattern-- The pattern is specified with 's', ‘SSS’=000-999 for 0-99.9% area of screen. ‘AAA’=000-100 for 0-100% APL. *'RRRGGGBBB'* is the 3 digit rgb color values= 0-255.

* The current input setting is combined with the current output setting. The final value is limited to the maximum range of the register.