

Red-Eye Serial. Serial to IR interface for Digital Cable and Sky Digital Set-top boxes

For the latest info, please check www.redremote.co.uk/serial

V1.30, Firmware rev. D.. (Rev. A firmware requires 400ms delay between setting RTS to sending commands, Rev B onwards reduces this to 20ms, Rev.C fixed bug in Sky mode, rev. D adds new C,#,~ commands)

Red-Eye Serial allows Pace (NTL and Telewest) digital cable and Sky Digital set-top boxes (STBs), to be controlled from an RS-232 port, e.g. on a PC or home automation system (AMX,Crestron etc.)

Hardware information

Table 1 – Red-Eye Serial connections

Name	Pin	Function
Power	4	Power supply. +5 to 26VDC. Current requirement 2mA. For PC use, this line is connected to RTS to take power from the PC serial - RTS must be held permanently high by the controlling software.
Ground	5	Signal and power ground.
Data	3	Serial data input. Input threshold is +0.8/+2V relative to ground, and will tolerate inputs to +/-20V. RS232 polarity may be true or inverted, with RS232 (+/-12V) or TTL (0/+5V) levels.

The serial data interface is one-way, 9600 baud, 8 bits, 1 stop bit. To cater for both true RS-232 and TTL type serial interfaces, the input will accept a wide input voltage range, and will automatically detect data polarity.

For PC operation, the RTS line must be set high to provide power. Commands must not be sent for a period of 20mS after RTS changes from low to high. For use with home automation systems with terminal blocks or other types of connector, a cable needs to be made with a 9 way D male to connect to Red-Eye Serial's D9F connector.

Fitting to STB

For Pace IRDA STBs (10x0,2000,4000) and Telwest Scientific Atlanta STBs, Red-Eye Serial needs to be placed on the left-hand side of the display (pictured below left) and for RC-5 boxes (4001), it needs to go on the right, between the display digits and the LEDs. (pictured below right). it is recommended that the cable is passed underneath the box to keep it out of the way. For Sky receivers, you will need to place the emitter near wherever the receiver's IR detector is located – you may need to experiment to find the best position. **Users of the Telewest Explorer 4000DVB from Scientific Atlanta will need to change the IRDA repeat setting for reliable operation – see www.redremote.co.uk/serial for details.**



Software information

Red-Eye Serial understands a number of single-byte commands, most of which correspond to single keys on the original remote control. Additional commands are provided to add delays between commands. Table 2 shows the commands available.

Commands represented by letters A-Z may be sent as upper or lower case.

When *Red-Eye Serial* receives a serial command character, it waits for up to 70mS to see if any further command bytes follow it, and then executes the command(s). This timeout system allows multi-byte commands (in particular groups of digits for channel number selection) to be sent all at once, without any need for the host to implement delays or handshaking - *Red-Eye Serial* will ensure the correct delays occur between IR commands sent to the STB. To reduce latency when user-interactive operation is required, it is possible to send an 'end of commands' control code at the end of a command or sequence of commands to terminate the timeout, and execute the commands immediately.

IRDA/RC5/SKY compatibility

Red-Eye serial supports all models of NTL/Telewest Digital cable STBs, as well as Sky Digital STBs. There are two different remote control protocols in use on the Pace Cable STBs : IRDA (based on the computer Infrared Data Association protocol) used by the 1000,1010,2000,4000 and Scientific Atlanta boxes, and RC-5 (an industry standard consumer IR protocol), used by the NTL 4001,4010 and Samsung boxes.

Red-Eye serial can be set to use any of these 3 protocols with a serial command (see table 2), and the setting is held in nonvolatile memory, so once configured it will always use the same protocol unless explicitly reconfigured. The default setting when shipped is IRDA. On power-up (RTS going high), the LED will flash to indicate the configured mode (see below) The Reddemo utility (available in the downloads section of www.redremote.co.uk/serial) can be used to configure the unit.

LED

The LED will light very dimly while *Red-Eye Serial* is waiting for a serial command.

The LED will flash briefly once as each command is sent to the STB. This can be helpful to verify that the required delays are being inserted.

Up to 31 command bytes may be sent at a time – if more are sent, an error will be indicated by a long LED flash, and all the commands will be ignored.

On power-up (RTS going high), the LED flashes once if configured in IRDA mode, twice for RC-5, or 3 times for Sky mode.

If a command is received during this flash sequence, the flashing will be aborted and the command executed. (Rev.B firmware only)

Table 2: Red-Eye Serial commands Codes separated by commas indicate alternatives. All other codes are ignored.

Code (ASCII)	Code (Hex)	IRDA mode	RC5 mode	SKY Mode
0..9	30..39	Digits 0..9	Digits 0..9	Digits 0..9
R,r	52 or 72	Red	Red	Red
G,g	47 or 67	Green	Green	Green
Y,y	59 or 79	Yellow	Yellow	Yellow
B,b	42 or 62	Blue	Blue	Blue
O,o	4F or 6F	OK	Select	Select
U,u	55 or 75	Up	Up	Up
D,d	44 or 64	Down	Down	Down
L,l	4C or 6C	Left	Left	Left
H,h	48 or 68	rigHt	rigHt	Right
T,t	54 or 74	TV	TV	Sky
+	2B	Chan+	Chan+	Chan+
- (minus)	2D	Chan-	Chan-	Chan-
)	29	Page up	Page up	
(28	Page down	Page down	
V,v	56 or 76	tV Guide	guide	TV Guide
I,I	49 or 69	Info	Internet	i
K,k	4B or 6B	bacK	bacK	Back Up
S,s	53 or 73	Skip	Audio	
P,p	50 or 70	Power	Power	Power
M,m	4D or 6D	Mute	Mute	
N,n	4E or 6E	iNteractive	iNteractive	Interactive
F,f	46 or 66	Favorites	Browse	Services
J,j	4A or 6A	TVOD	On Demand	Box Office
E,e	45 or 65	hElp	hElp	Help
X,x	58 or 78	teXt	Email	Text
<	3C	Volume Down	Volume Down	
>	3E	Volume up	Volume up	
Z,z	5A or 7A	Guide (Telewest Silver)		
W,w	57 or 77	Home (Telewest Silver)	Menu (od NTL)	
C,c (rev D+ Only)	43 or 63	Settings (New NTL)	Settings (New NTL)	
# (rev D+ Only)	23	# (New NTL)	# (New NTL)	
~ (rev D+ Only)	7E	Sets IRDA repeat value to preceding digit. Used in IRDA mode only *see below		
&	26	Configure to use Pace RC-5 mode. *see below		
%	25	Configure to use Pace IRDA mode (factory default) *see below		
\$	24	Configure to use Sky mode *see below		
, (comma)	2C	Delay 20mS		
. (full stop)	2E	Delay 100mS		
!	21	Delay 250mS		
=	3D	Disable the 280ms delay for the next digit commad. This command must immediately precede each digit, and has no effect if the following command is not a digit.		
<CR> , <LF> , *	0D or 0A or 2A	End of Command. Preceding commands are executed immediately instead of waiting for 70mS timeout		

* IRDA/RC-5/Sky mode and IRDA repeat are nonvolatile settings, and so preserved after powerdown.

To avoid accidental reconfiguration, these commands will only work if fewer than 7 commands have been received since the last power-up. If these commands occur after more than 7 previous commands they will be ignored. After an %, \$, & or ~ command, *Red-Eye Serial* will restart, and any following commands in the input queue will be lost. No further commands should be sent for 500ms after these commands. IRDA repeat value is number of IRDA keydown codes sent per digit – increasing may improve reliability. Range of values is 0..7. e.g. sending “2~” sets 2 repeats, i.e. 3 keydowns for every digit sent.

Timings

For digit keys 0..9, a 280ms delay is added before each digit to ensure reliable channel selection. On cable STBs, reliability may be improved by disabling the ‘Now and Next’ display, which can sometimes introduce unpredictable sluggishness to the STB’s response to keypresses. Other keys are sent with an inter-key delay of about 60ms (IRDA mode), 150ms (RC5 mode) or 100ms (Sky mode), and in some cases, additional delays may be required for reliable operation – the need for this will be dependent on the application, and possibly the STB version and internal software. *Red-Eye Serial* will ignore any commands sent while it is busy sending commands to the STB. Commands must not be sent for a period of 20mS after RTS changes from low to high.

Driver developer guidelines

To ensure maximum compatibility, so that drivers are useful to as many users as possible, it is strongly advised that you use only the standard operating system APIs to access the serial port, as opposed to accessing the serial port hardware directly. This will ensure that your driver is likely to work with alternative configurations, for example via a USB-serial adapter or an unusual serial card, e.g. one with more than the normal number of ports.

As *Red-Eye Serial* handles the critical signal timing, the timing constraints on the serial communications are minimal, and there should not normally be any reason to access the port hardware directly. On PC based systems, your driver should at the very least support COM1 to COM4, ideally any named port, to allow for systems with many serial ports, and USB to serial adapters.

For the latest drivers for PC PVR software etc., please see www.redremote.co.uk/serial