



Tx1000 RS232 Control Protocol V2.1



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Communications Protocol

Communications between the keypad and the base unit are RS232 8-data, no parity, 1 stop bit at a speed of 9600 baud. Character pacing of data to the base unit should be at least 20mS. Additionally, some commands require larger pacing delays, see further into document.

Direct cable links of up to 50 metres should function normally. Beyond this distance, any of the proprietary cable extenders may be used (e.g. DVST, modems, fibre optics, telephone/infra red/microwave links) without any difficulty. A BBV TxLD can be used to convert RS232 to RS485 allowing operation over upto 500M of twisted pair cable.

CABLE CONNECTIONS

Ground	Pin 5	White
Data to keypad	Pin 3	Green
Data from keypad	Pin 2	Blue
Power (optional)	Pin 1	Red

Data sent

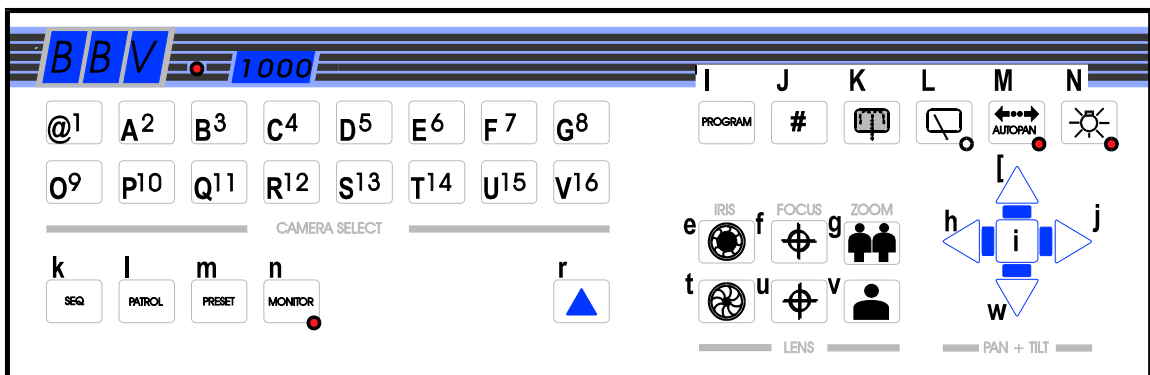
The keypad act as a dumb terminal, with all the intelligence contained within the main unit.

Each key press produces a single ascii code and the release of the key produces the same code with bit 7 set.

ie

Cam 2 pressed 0x41 = 'A'
Cam 2 released 0xc1 = 'A' + 0x80

See the diagram below



Key to ASCII character mapping

Extra commands to replace toggle keys

Data Byte	Action
0x78 'x'	Turn lamps on
0x79 'y'	Turn lamps off
0x7A 'z'	Turn wipers on
0x7B '{'	Turn wipers off
0x7C ' '	Select monitor channel 1
0x7D '}'	Select monitor channel 2
0x7E	reserved
0x7F	reserved
0x07 ^G	reset
0x6f o	start self test only available for first 5 seconds after reset on TX1000 MK2

OUTPUT TO KEYPAD

The main unit output to the keypad is straight ascii, what you see on the screen is what you get, with the exception of the LED command bytes which are as follows

<ESC> <[> <L> <BYTE1> <BYTE2> Hex values: **0x1B, 0x5B, 0x4C, XX, YY**

BYTE1 bit 7 (0x80) = LIGHTS
BYTE1 bit 6 (0x40) = AUTOPAN
BYTE1 bit 5 (0x20) = WIPER
BYTE2 bit 5 (0x20) = MONITOR

where bit = 1 led on
bit = 0 led off

Examples:

LIGHTS and MONITOR leds ON remainder OFF **0x1B, 0x5B, 0x4C, 0x80, 0x20**
LIGHTS and WIPER leds ON remainder OFF **0x1B, 0x5B, 0x4C, 0xC0, 0x00**

List of Video commands for Keypad

^M	0x0d	Carriage return
^J	0x0a	Line feed
^L	0x0c	cursor right one space
^H	0x08	cursor left one space
^K	0x0b	cursor up one line
^G	0x07	Squeaky bell
^X	0x18	Erase to end of line , leave cursor in place ****
^Z	0x1a	Clear screen, leave cursor in place ****
^^	0x1e	Clear screen , Home cursor ****
^B	0x02	No background
^A	0x01	Full background
^C	0x03	Fringe background
^[0x1b	Escape routines

**** Character padding required is required with the following commands.

EOL	1ms	approx 1 char
CLR	5ms	approx 5 char

Escape Commands

ESC [U		Restore cursor position
ESC [X		Turn off display
ESC [Y		Turn on display
ESC [R		Reset keypad, all processing stops while reset!!
ESC [C	0	Set screen brightness
	1	
	2	
	3	
	4	
	5	
	6	
	7	
ESC ["	0	Set character size
	1	
	2	
	3	
ESC [E	xx	Set erase character(any ASCII character)
ESC [[Start of direct write feature, end with 0xff
ESC [H	xx xx	xy addressing, Coordinate system from 1,1 to 12,24
ESC [L	xx yy	Led data
ESC [S		Save current cursor position
ESC [h	xx	alter horizontal picture offset (0x00 - 0x1f) masked by and instruction
ESC [v	xx	alter vertical picture offset (0x00 - 0x1f) masked by and instruction "" to 'Z'

KEY LAYOUT Including all unused missing keys – shown inverted!

```
@  A  B  C  D  E  F  G  H  I  J  K  L  M  N
O  P  Q  R  S  T  U  V  W  X  Y  Z    [
\  ]  ^  <  -  a  b  c  d  e  f  g  h  i  j
k  l  m  n          p  q  r  s  t  u  v          w
```

Variable speed control

Basic control is as described in the earlier pages. Variable speed control is achieved by emulating keypress **left**, **right**, **up** and **down** followed by a speed value. Issue a key release to stop movement.

PAN speed values: 0x30 (slowest) - 0x3F (fastest)

TILT speed values: 0xB0 (slowest) - 0xBF (fastest)

examples:

pan left at maximum speed:

0x68, 0x3F ('h' pressed speed=0x3f)

to stop panning issue the following:

0xE8 ('h' released)

pan right at slowest speed and tilt down at mid-speed:

0x6A, 0x30, 0x77, 0xB7 ('j' pressed speed=0x30 'w' pressed speed=0xb7)

to stop tilting:

0xF7 ('w' released)

then stop panning:

0xEA ('j' released)

If pan/tilt key press issued without specifying a speed, previous speed is used.

Control of multiple Tx1000 base units using a BBV EX-4/EX-8 keyboard expander.

Up to 64 or 128 cameras can be controlled with the use of an EX-4/EX-8 keyboard expander. The EX-4/EX-8 functions as a serial data/video switch allowing a single RS232 port to control up to four/eight base units.

The following keystrokes allow selection of a base unit.

Press '#', Press 'Cam 1-8', Release 'Cam 1-8', Release '#'.

RS232 string to achieve the above.

0x4A, 0x40, 0xc0, 0xCA Selects base unit 1.

Example:

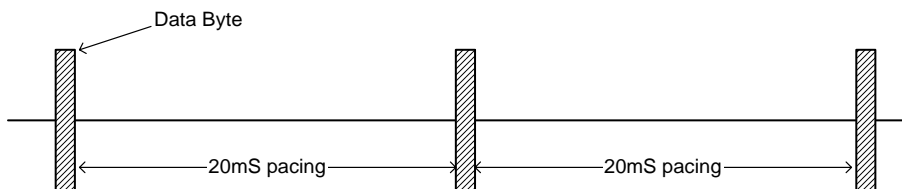
Assuming that four base units are in use to control 64 cameras, to select camera 19 which is camera 3 of base unit 2, the following command sequence is used.

0x4A, 0x41, 0xc1, 0xCA, 0x42 Select base unit 2 followed by camera 3.

Note: The character pacing should be at least 20mS.

Following a Program key press, a longer delay should be provided to allow menu text to be displayed.

RS232 Data showing character pacing



Example commands

Command	Bytes 0x = hex value (20mS between bytes unless specified)
Select Camera 1	0x40, 0xC0
Select Camera 2	0x41, 0xC1
Select Camera 3	0x42, 0xC2
Select Camera 4	0x43, 0xC3
Select Camera 5	0x44, 0xC4
Select Camera 6	0x45, 0xC5
Select Camera 7	0x46, 0xC6
Select Camera 8	0x47, 0xC7
Select Camera 9	0x4F, 0xCF
Select Camera 10	0x50, 0xD0
Select Camera 11	0x51, 0xD1
Select Camera 12	0x52, 0xD2
Select Camera 13	0x53, 0xD3
Select Camera 14	0x54, 0xD4
Select Camera 15	0x55, 0xD5
Select Camera 16	0x56, 0xD6
Pan Left	0x68, (SPEED 0x30 - 0x3f, 0x30 = slowest)
Stop Left	0xE8, 0x30
Pan Right	0x6A, (SPEED 0x30 - 0x3f, 0x30 = slowest)
Stop Right	0xEA, 0x30
Tilt Up	0x5B, (SPEED 0xB0 - 0xBf, 0xB0 = slowest)
Stop Up	0xDB, 0xB0
Tilt Down	0x77, (SPEED 0xB0 - 0xBf, 0xB0 = slowest)
Stop Down	0xF7, 0xB0
Zoom In	0x76
Stop Zoom In	0xF6
Zoom Out	0x67
Stop Zoom Out	0xE7
Focus Near	0x66
Stop Focus Near	0xE6
Focus Far	0x75
Stop Focus Far	0xF5
Iris Open	0x65
Stop Iris Open	0xE5
Iris Close	0x74
Stop Iris Close	0xF4
Wash On	0x4B
Wash Off	0xCB
Wipe On	0x7A
Wipe Off	0x7B
AutoPan On	0x4D
AutoPan Off	A SHORT PAN RIGHT OR LEFT COMMAND (Example 0x6A, 0xEA)
Lights On	0x78
Lights Off	0x79
Triangle relay on	0x72
Triangle relay off	0xF2
Select Monitor 1	0x7C
Select Monitor 2	0x7D

Goto preset 1	0x6D,0x40,0xC0,0xED
Goto preset 2	0x6D,0x41,0xC1,0xED
Goto preset 3	0x6D,0x42,0xC2,0xED
Goto preset 4	0x6D,0x43,0xC3,0xED
Goto preset 5	0x6D,0x44,0xC4,0xED
Goto preset 6	0x6D,0x45,0xC5,0xED
Goto preset 7	0x6D,0x46,0xC6,0xED
Goto preset 8	0x6D,0x47,0xC7,0xED
Goto preset 9	0x6D,0x4F,0xCF,0xED
Goto preset 10	0x6D,0x50,0xD0,0xED
Goto preset 11	0x6D,0x51,0xD1,0xED
Goto preset 12	0x6D,0x52,0xD2,0xED
Goto preset 13	0x6D,0x53,0xD3,0xED
Goto preset 14	0x6D,0x54,0xD4,0xED
Goto preset 15	0x6D,0x55,0xD5,0xED
Goto preset 16	0x6D,0x56,0xD6,0xED
Save preset 1	0x49,0xC9,(150ms delay),0x40,0xC0,0x40,0xC0
Save preset 2	0x49,0xC9,(150ms delay),0x40,0xC0,0x41,0xC1
Save preset 3	0x49,0xC9,(150ms delay),0x40,0xC0,0x42,0xC2
Save preset 4	0x49,0xC9,(150ms delay),0x40,0xC0,0x43,0xC3
Save preset 5	0x49,0xC9,(150ms delay),0x40,0xC0,0x44,0xC4
Save preset 6	0x49,0xC9,(150ms delay),0x40,0xC0,0x45,0xC5
Save preset 7	0x49,0xC9,(150ms delay),0x40,0xC0,0x46,0xC6
Save preset 8	0x49,0xC9,(150ms delay),0x40,0xC0,0x47,0xC7
Save preset 9	0x49,0xC9,(150ms delay),0x40,0xC0,0x4F,0xCF
Save preset 10	0x49,0xC9,(150ms delay),0x40,0xC0,0x50,0xD0
Save preset 11	0x49,0xC9,(150ms delay),0x40,0xC0,0x51,0xD1
Save preset 12	0x49,0xC9,(150ms delay),0x40,0xC0,0x52,0xD2
Save preset 13	0x49,0xC9,(150ms delay),0x40,0xC0,0x53,0xD3
Save preset 14	0x49,0xC9,(150ms delay),0x40,0xC0,0x54,0xD4
Save preset 15	0x49,0xC9,(150ms delay),0x40,0xC0,0x55,0xD5
Save preset 16	0x49,0xC9,(150ms delay),0x40,0xC0,0x56,0xD6
Start Patrol 1	0x6C,0x40,0xC0,0xEC
Start Patrol 2	0x6C,0x41,0xC1,0xEC
Stop Patrol	ANY SHORT PAN/TILT COMMAND (Example 0x6A,0xEA)
Start Sequence	0x6B,0xEB
Stop Sequence	ANY CAMERA SELECTION (Example 0x40,0xC0)
Function 1 (#WASH)	0x4A,0x4B,0xCB,0xCA (dome menu etc)
Function 2 (#WIPE)	0x4A,0x4C,0xCC,0xCA (dome menu etc)
Function 3 (#AP)	0x4A,0x4D,0xCD,0xCA (dome menu etc)
Function 4 (#LIGHTS)	0x4A,0x4E,0xCE,0xCA (dome menu etc)
Select Unit 1 (EX4/8)	0x4A,0x40,0xC0,0xCA (routes data to Tx1000 No 1)
Select Unit 2 (EX4/8)	0x4A,0x41,0xC1,0xCA (routes data to Tx1000 No 2)
Select Unit 3 (EX4/8)	0x4A,0x42,0xC2,0xCA (routes data to Tx1000 No 3)
Select Unit 4 (EX4/8)	0x4A,0x43,0xC3,0xCA (routes data to Tx1000 No 4)
Select Unit 5 (EX8)	0x4A,0x44,0xC4,0xCA (routes data to Tx1000 No 5)
Select Unit 6 (EX8)	0x4A,0x45,0xC5,0xCA (routes data to Tx1000 No 6)
Select Unit 7 (EX8)	0x4A,0x46,0xC6,0xCA (routes data to Tx1000 No 7)
Select Unit 8 (EX8)	0x4A,0x47,0xC7,0xCA (routes data to Tx1000 No 8)
Start self test	0x07, 0x6f, mk2 tx1000 only (reset, o)

Examples of camera selection when using multiple Tx1000 units or Tx1500 matrix.

Select Camera 1	0x4A, 0x40, 0xC0, 0xCA, 0x40, 0xC0
Select Camera 16	0x4A, 0x40, 0xC0, 0xCA, 0x56, 0xD6
Select Camera 17	0x4A, 0x41, 0xC1, 0xCA, 0x40, 0xC0
Select Camera 32	0x4A, 0x41, 0xC1, 0xCA, 0x56, 0xD6
Select Camera 33	0x4A, 0x42, 0xC2, 0xCA, 0x40, 0xC0
Select Camera 48	0x4A, 0x42, 0xC2, 0xCA, 0x56, 0xD6
Select Camera 49	0x4A, 0x43, 0xC3, 0xCA, 0x40, 0xC0
Select Camera 64	0x4A, 0x43, 0xC3, 0xCA, 0x56, 0xD6

Additional commands when driving TX1500 matrix via TX1500/RS232 PCIF card.

The TX1500 has 8 individual monitor outputs. Monitor outputs 1,2,3 & 4 also allow up-the-coax telemetry control of a selected camera. Monitor outputs 5,6,7 & 8 can be used to view any camera which can be controlled if connected via RS485.

Following a monitor select command, any subsequent camera select commands will relate to this monitor output. ie you do not need to send a monitor select before a camera select.

Select Monitor 1	0x21
Select Monitor 2	0x22
Select Monitor 3	0x23
Select Monitor 4	0x24
Select Monitor 5	0x25
Select Monitor 6	0x26
Select Monitor 7	0x27
Select Monitor 8	0x28

Version History

2.0 18 November 2004

Added amendments to cover TX1000 MK2 test mode

1.9 6 Sept 2002

Added support for Tx1500 monitor select commands

1.8 1 Aug 2002

Added timing diagram showing 20mS character pacing

1.7 30 July 2002

Corrected the following incorrect command strings

FOCUS FAR PRESSED was 0x77 now 0x75

FOCUS FAR RELEASED was 0xF7 now 0xF5

IRIS CLOSE PRESSED was 0x76 now 0x74

IRIS CLOSE RELEASED was 0xF6 now 0xF4

START PATROL 1 was 0x6C, 0xEC, 0x40, 0xC0 now 0x6C, 0x40, 0xC0, 0xEC

START PATROL 2 was 0x6C, 0xEC, 0x41, 0xC1 now 0x6C, 0x41, 0xC1, 0xEC

Added support for Tx1500 64 camera matrix. The Tx1500 uses the BBUS 4 wire RS485, polled control protocol. A separate RS232 – BBUS converter is used to allow remote control using the existing Tx1000 control protocol.

Other BBV products.

Product	Description
TX300	Single camera desktop telemetry transmitter with BBV up-the-coax & 20mA telemetry, Pan/Tilt/Lens & Lights
TX400	As TX300 inc Wash, Wipe, Autopan, 8 presets, preset patrol.
TX400DC	As TX400 including joystick for proportional Pan/Tilt control.
TX1000 MK2	8 or 16 camera, 2 monitor telemetry transmitter. Up to 2 keyboards. BBV up-the-coax and RS422 standard with options for alarm inputs and 20mA telemetry.
TX1500	Mid size matrix 16 – 96 camera, 8 monitor. Up to 4 control positions (keyboard & remote control) options for alarms, remote control, BBV up-the-coax and RS485 telemetry.
FBM range	Large size matrix. Configurable up to 4096 cameras and 64 monitor outputs. Up to 8 control positions (keyboard & remote control) options for alarms, remote control RS485 telemetry with various options. Please call to discuss requirements.
RX100	Dome Interface with options to drive a large library of dome cameras. BBV up-the-coax and 20mA telemetry.
RX200	AC receiver for Pan only heads or static cameras, Wash/Wipe/Lights. BBV up-the-coax and 20mA telemetry.
RX300	AC receiver for Pan/Tilt/Zoom/Focus/Iris Override and 1 Auxiliary output. BBV up-the-coax and 20mA telemetry.
RX400P	AC full function receiver. PTZFI 4 Auxiliary outputs, 16 presets. BBV up-the-coax and 20mA telemetry.
RX400DC	24Vdc high/variable speed receiver. 16 presets, 8 local alarm inputs, 3 Auxiliary outputs. BBV up-the-coax and 20mA telemetry.
RX45X (AC) RX55X (DC) Multi RS485 protocol and BBV up-the-coax telemetry receivers	Multiple RS485/422 and BBV up-the-coax controllable AC and DC receivers. These receivers are controlled from an expanding range of serial protocols as listed below. 110/230Vac supply. PTZFI, 64 presets, preset patrol, 8 local alarm inputs, 12V 500mA supply output. OSD for remote diagnostics. 3 Aux. outputs RX55X or 4 Aux. outputs RX45X. Optional Privacy board. BBV RS485, COAX & 20mA, BAXALL COAX, DENNARD RS485, MOLYNX PELCO P/D RS485, VCL/HONEYWELL RS485, PHILIPS/BOSCH RS485 (OPTIONAL BI-PHASE INPUT), SENSORMATIC/AD RS422 VICON RS422 CIRRUS AUDIO MONITORING
STARCARD STARCARD/CONVERTER	8 * RS485 output, 2 wire simplex RS422, 4 wire full-duplex RS422, 2 wire half-duplex RS485. Optional STARCARD/CONVERTER offering protocol conversion to drive an increasing range of 3 rd party protocols.
ACCESSORIES	CTI/16 16 camera, RS422 to up-the-coax converter TxLD (bidirectional RS422-RS232 converter) 98005 (bidirectional 20mA-RS232 converter) AD RS422 (American Dynamics) protocol converters