Video

Controls

Limited

Details of Video Telemetry Protocol

(Data in video, communications from telemetry controller to the receiver)

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1.0 Introduction

Video telemetry allows the user to control a receiver via the video cable. This reduces the need for a separate cable for control signals.

1.1 Data Timing and Voltages

Data in the video is sent in the blank picture lines that occur between the frame-sync and the first line of picture information. The transmitter superimposes the serial telemetry data onto the black signal level that is generated by the camera. Using the pedestal-level (black) as a reference, the white-level would be 0.7V. The telemetry data is nominally logic 0 when the video signal is black and logic 1 when the video signal is white. The receiver will interpret voltages greater than 270mV as logic 1 to allow for loss of amplitude in the coax and to improve noise immunity and reliability. The first bit of the telemetry data occurs after the colour burst. A period of at least 11μs from the falling edge of the line sync pulse should be made before inserting any telemetry data. The width of a telemetry data bit should ideally be 5.859μs, telemetry data is sent with the most significant bit first (bit 5), see Figure 1.3.3 Video Telemetry In Video Signal.

A delay occurs as the data travels along the coax from the transmitter to the receiver, causing the time between the parity bit and the next line sync to reduce. If the coax cable length is too long (greater than 1000m), then the data will interfere with the next line sync causing picture defects and unreliable telemetry operation. For this reason the coax length should be kept below 1000m.

Depending on whether PAL or NTSC receivers are being used then the number of video lines will differ slightly

1.1.1 PAL

For PAL there will be three leading blank lines of video starting on line 6 (video field I) or line 319 (video field II), followed by 10 blank lines of video which contain the telemetry data, there will then follow 2 blank lines of video, see Figure 1.3.1 Video Telemetry for PAL Video Signal.

1.1.2 NTSC

For NTSC there will be no leading video lines, video telemetry will start on line 10 (video field I) or line 273 (video field II) followed by 10 blank lines of video which will contain the telemetry data, see Figure 1.3.2 Video Telemetry for NTSC Video Signal.

1.2 Updates

For reliable communication the telemetry data is repeated for the first four video fields every second. This is referred to as ‘one second updates’. Sending updates prevents a time-out error from occurring in the receiver. A time-out error will cancel any active momentary commands, e.g. if the receiver is panning left and the video cable is disconnected or damaged, then ‘left-stop will be generated by the receiver to stop it continuously panning

1.3 Simplex Communication

All commands are single direction from the transmitter to the receiver. No data is sent from the receiver to the transmitter.

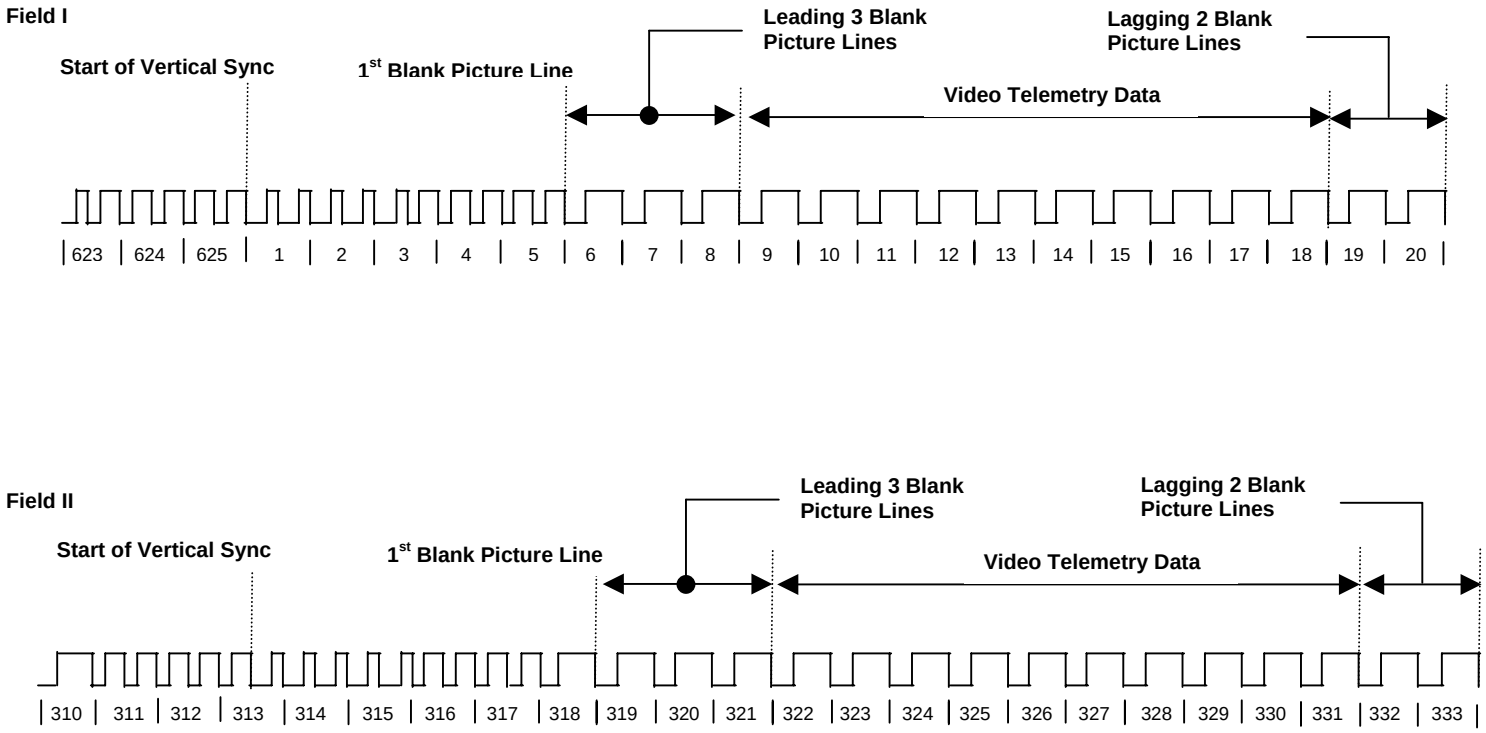

Figure 1.3.1 Video Telemetry for PAL Video Signal

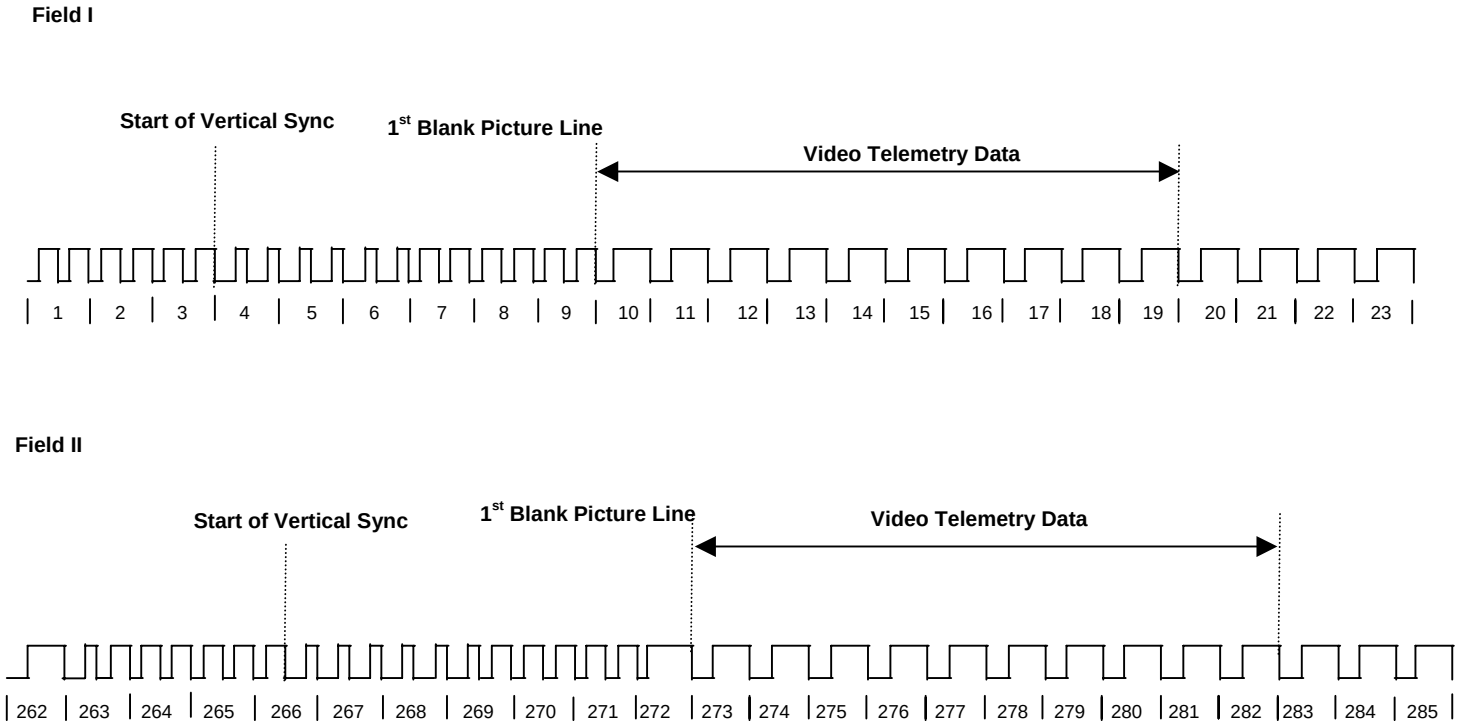

Figure 1.3.2 Video Telemetry for NTSC Video Signal

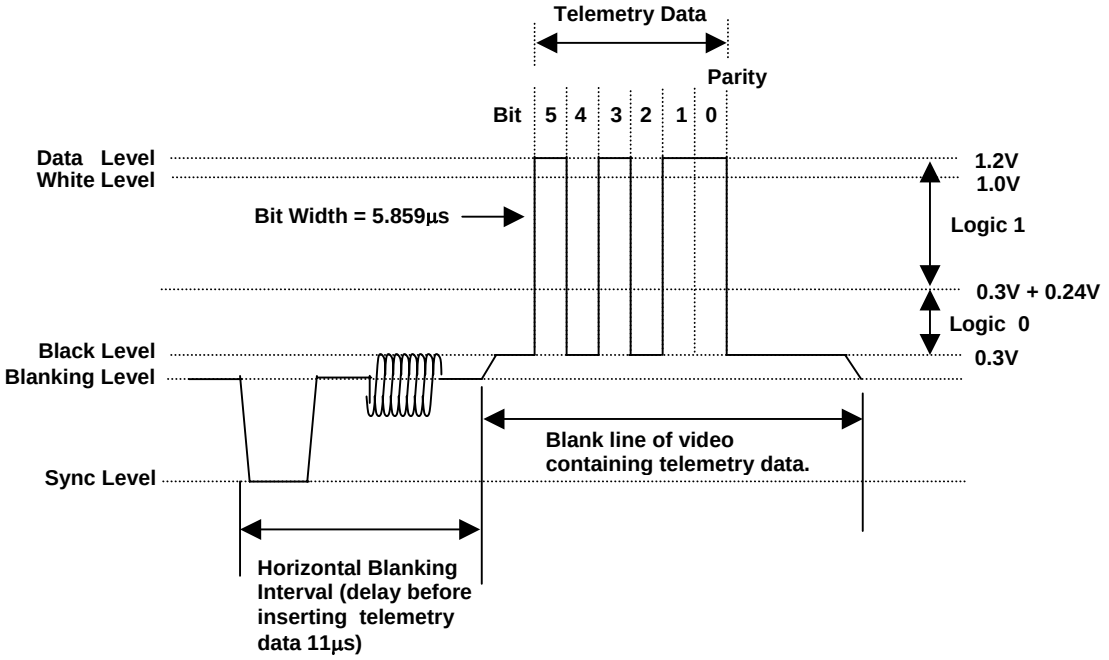

Figure 1.3.3 Video Telemetry In Video Signal

1.4 Supported Commands

The currently supported commands are shown in Table 1.4.1 Supported Commands In Video Telemetry below.

	Command
Standard Telemetry	Pan
	Tilt
	Zoom
	Iris Auto/Open/Close
	Focus Auto/Near/Far
	Wash
	Wipe
	Lamp
	Aux
Features	Seek Preset
	Program a Preset
	Preset Tours
	Mimic Tours
	Privacy Zones
	180 Degree Turn
	Alarm Mode On/Off
	Change Over (IR mode)
	Remote Reset
	Change Over'AUX' key
	Camera Alarms/Relay(s)
	Home Function
	Camera Set Up

Table 1.4.1 Supported Commands In Video Telemetry

1.5 Bit Definitions

LINE 0 and LINE 9 are special start/end codes with even parity. The lines containing the data use odd parity. The parity bits are used by the receiver to frame the data and ignore erroneous data. If any of the parity bits are wrong, then the entire ten lines of data are discarded.

1.6 Standard Telemetry Frame and Feature Command Frame Data

There are two types of data that can be sent via the Video Telemetry Protocol, these are Standard Telemetry command data and Feature Command data. Each type of data is sent separately in its own 40 bit Frame as shown in tables Table 1.6.1 Standard Telemetry Frame and Table 1.6.2.1 Feature Command Frame.

1.6.1 Standard Telemetry Frame

The Standard Telemetry Frame contains all the regularly used commands e.g. pan and tilt, zoom and focus etc. To use these commands then PRESETDEF on Line 8, Bit 1 must be set to 0 (PRESETDEF = 0).

	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1	BIT 0
LINE 0:	1	0	0	0	0	1
LINE 1:	**NOT USED**	UP	DOWN	LEFT	RIGHT	PARITY
LINE 2:	ZOOM IN	ZOOM OUT	FOCUS NEAR	FOCUS FAR	IRIS OPEN	PARITY
LINE 3:	IRIS CLOSE	AUX	WASH	LAMPS	WIPE	PARITY
LINE 4:	PAN SPEED BIT 6	PAN SPEED BIT 5	PAN SPEED BIT 4	PAN SPEED BIT 3	PAN SPEED BIT 2	PARITY
LINE 5:	PAN SPEED BIT 1	PAN SPEED BIT 0	TILT SPEED BIT 6	TILT SPEED BIT 5	TILT SPEED BIT 4	PARITY
LINE 6:	TILT SPEED BIT 3	TILT SPEED BIT 2	TILT SPEED BIT 1	TILT SPEED BIT 0	**NOT USED**	PARITY
LINE 7:	**NOT USED**	**NOT USED**	**NOT USED**	**NOT USED**	**NOT USED**	PARITY
LINE 8:	**NOT USED**	**NOT USED**	AUTO FOCUS	AUTO IRIS	PRESET-DEF	PARITY
LINE 9:	1	0	0	0	0	1
	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1	BIT 0

Table 1.6.1 Standard Telemetry Frame

1.6.1.1 'LEFT', 'RIGHT', 'UP' AND 'DOWN'

The commands: 'UP', 'DOWN', 'LEFT' AND 'RIGHT' are defined as individual bits at the following locations in the Standard Telemetry Frame...

'TILT UP'	Line 1, Bit 4 = 1
'TILT UP STOP'	Line 1, Bit 4 = 0
'TILT DOWN'	Line 1, Bit 3 = 1
'TILT DOWN STOP'	Line 1, Bit 3 = 0
'PAN LEFT'	Line 1, Bit 2 = 1
'PAN LEFT STOP'	Line 1, Bit 2 = 0
'PAN RIGHT'	Line 1, Bit 1 = 1
'PAN RIGHT STOP'	Line 1, Bit 1 = 0

When a bit is set (Bit = 1), then the command is active, otherwise if the bit is cleared (Bit = 0), then the command is in active.

Note: The parameter TILTSPEED for 'UP' and 'DOWN' and PANSPEED for 'LEFT' and 'RIGHT' is the speed sent from the transmitter and consists of 7 bits, 01H represents the slowest speed, 7FH represents the fastest speed, a value of 00H is invalid.

Parameter Value	Speed (degrees/second)	Receiver Speed
0	-	Invalid
1	0.2	0.2 degrees/second increase for each increment of speed parameter
…	…	
50	10	
51	11	1.0 degrees/second increase for each increment of speed parameter
…	…	
100	60	
101	62	1.75 degrees/second increase for each increment of speed parameter
…	…	
127	108	

Table 1.6.1.1.1 Speed Parameter Details

The pan/tilt commands are dependent on a speed value, these values are located at the following locations within the Standard Telemetry Frame as shown below. The speed value byte is mapped to the Standard Telemetry Frame's lines, bits as shown below. The Speed that the parameter represents is shown in Table 1.6.1.1.1 Speed Parameter Details above.

PAN SPEED: Line 4: bits 1..5, Line 5: bits 4 and 5.

Frame	Line 4, Bit 5	Line 4, Bit 4	Line 4, Bit 3	Line 4, Bit 2	Line 4, Bit 1	Line 5, Bit 5	Line 5, Bit 4
Speed value byte	b6	b5	b4	b3	b2	b1	b0

TILT SPEED: Line 5: bits 1..3, Line 6: bits 2..5.

Frame	Line 5, Bit 3	Line 5, Bit 2	Line 5, Bit 1	Line 6, Bit 5	Line 6, Bit 4	Line 6, Bit 3	Line 6, Bit 2
Speed value byte	b6	b5	b4	b3	b2	b1	b0

1.6.1.2 'ZOOM IN', 'ZOOM OUT'

The commands: 'ZOOM IN' and 'ZOOM OUT' are defined as individual bits at the following locations in the Standard Telemetry Frame...

'ZOOM IN'	Line 2, Bit 5 = 1
'ZOOM IN STOP'	Line 2, Bit 5 = 0
'ZOOM OUT'	Line 2, Bit 4 = 1
'ZOOM OUT STOP'	Line 2, Bit 4 = 0

Fast Zoom lens with intelligent control.
When zooming in, the zoom will stop when the end of the optical zoom is reached.
When the user stops zooming ('ZOOM IN STOP') then zooms in again ('ZOOM IN'), the camera will zoom in using digital zoom providing that the digital zoom feature has not been disabled (see camera set up command). The speed of zoom is slower in digital than in optical to make it easier to adjust.
When zooming out, the zoom will speed up to optical zoom speed at the transition from digital to optical zoom. Zooming out will not stop at the end of digital zoom.
The speed of pan and tilt are adjusted as described later to allow even finer control when the lens is zoomed in.

1.6.1.3 'FOCUS NEAR','FOCUS FAR' and 'AUTO FOCUS'

The commands: 'FOCUS NEAR' , 'FOCUS FAR' and 'AUTO FOCUS' are defined as individual bits at the following locations in the Standard Telemetry Frame...

'FOCUS NEAR'	Line 2, Bit 3 = 1
'FOCUS NEAR STOP'	Line 2, Bit 3 = 0
'FOCUS FAR'	Line 2, Bit 2 = 1
'FOCUS FAR STOP'	Line 2, Bit 2 = 0
'AUTO FOCUS ON'	Line 8, Bit 3 = 1
'AUTO FOCUS OFF'	Line 8, Bit 3 = 0

If the receiver is set to 'AUTO FOCUS ON', the camera will automatically select 'AUTO FOCUS OFF' when 'FOCUS NEAR', 'FOCUS FAR' and 'AUTO FOCUS OFF' are received.

1.6.1.4 'IRIS OPEN', 'IRIS CLOSE' and 'AUTO IRIS'

The commands: 'IRIS OPEN' , 'IRIS CLOSE' and 'AUTO IRIS' are defined as individual bits at the following locations in the Standard Telemetry Frame...

'IRIS OPEN'	Line 2, Bit 1 = 1
'IRIS OPEN STOP'	Line 2, Bit 1 = 0
'IRIS CLOSE'	Line 3, Bit 5 = 1
'IRIS CLOSE STOP'	Line 3, Bit 5 = 0
'AUTO IRIS ON'	Line 8, Bit 2 = 1
'AUTO IRIS OFF'	Line 8, Bit 2 = 0

If the camera is set to 'AUTO IRIS ON', the camera will automatically SELECT 'AUTO IRIS OFF' when 'IRIS OPEN', 'IRIS CLOSE' AND 'AUTO IRIS OFF' are received.
Use of manual iris commands with changeover camera.
If the camera is set to manual iris and 'TOGGLE MONO/COLOUR' OR 'AUTOMATIC MONO/COLOUR' is received, the camera will select auto iris, then action the command.

1.6.1.5 'WASH'

The command 'WIPE' is defined as an individual bit at the following location in the Standard Telemetry Frame...

'WASH ON'	Line 3, Bit 3 = 1
'WASH OFF'	Line 3, Bit 3 = 0

1.6.1.6 'WIPE'

The command 'WIPE' is defined as an individual bit at the following location in the Standard Telemetry Frame...

'WIPE ON'	Line 3, Bit 1 = 1
'WIPE OFF'	Line 3, Bit 1 = 0

1.6.1.7 'LAMPS'

The command: 'LAMPS' is defined as an individual bit at the following location in the Standard Telemetry Frame...

'LAMPS ON'	Line 3, Bit 2 = 1
'LAMPS OFF'	Line 3, Bit 2 = 0

1.6.1.8 'AUX'

The command: 'AUX' is defined as an individual bit at the following location in the Standard Telemetry Frame...

'AUX ON'	Line 3, Bit 4 = 1
'AUX OFF'	Line 3, Bit 4 = 0

The 'AUX ON' and 'AUX OFF' command will control relay 2 of a 'Orbiter Gold' or 'Jupiter' Note that Relay 2 can also be controlled by 'CAMERA NUMBERED AUX' commands.

1.6.1.9 Standard Telemetry Frame Command Example

The following example shows how to set up the 'UP' Command and 'UP STOP' command ('DOWN', 'LEFT' and 'RIGHT' are similar)

The 'UP' command has the 'UP' command bit (line 1, bit 4) set to 1. The speed is selected by setting Tilt Speed 6..0 (line 5, bits 3,2,1 and line 6, bits 5,4,3,2) in the range of 01H, the slowest speed to 7FH, the fastest speed. In the example below if the TILT SPEED were required to be 30 (1EH) then the following data would be sent.

The 'UP' command with speed 30 (1EH).

	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1	BIT 0
LINE 0:	1	0	0	0	0	1
LINE 1:	0	1 (UP)	0	0	0	0
LINE 2:	0	0	0	0	0	1
LINE 3:	0	0	0	0	0	1
LINE 4:	0	0	0	0	0	1
LINE 5:	0	0	0 TILT SPEED BIT 6	0 TILT SPEED BIT 5	1 TILT SPEED BIT 4	0
LINE 6:	1 TILT SPEED BIT 3	1 TILT SPEED BIT 2	1 TILT SPEED BIT 1	0 TILT SPEED BIT 0	0	0
LINE 7:	0	0	0	0	0	1
LINE 8:	0	0	0	0	0 PRESET-DEF	1
LINE 9:	1	0	0	0	0	1
	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1	BIT 0

The 'UP STOP' command

The 'UP' command is cancelled by setting the 'UP' bit (line 1, bit 4) to 0, this represents the 'UP STOP' command.

1.6.2 Feature Command Frame

The Feature Command Frame does not have any specific bits related to a particular purpose, instead a group of bits represent a 'byte' that can contain either command or parameter data. A byte in this instance is defined as 7 bits (bit 0 to bit 6). To use the Feature Command Frame PRESETDEF must be set to 1, (PRESETDEF = 1). The layout of the bytes is shown in Table 1.6.2.1 Feature Command Frame. A list of the current commands is shown in Table 1.6.2.1.1 Available Feature Commands.

	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1	BIT 0
LINE 0:	1	0	0	0	0	1
LINE 1:	Data 'Byte' 1 Bit 6	Data 'Byte' 1 bit 5	Data 'Byte' 1 bit 4	Data 'Byte' 1 bit 3	Data 'Byte' 1 bit 2	Parity
LINE 2:	Data 'Byte'1 bit 1	Data 'Byte' 1 bit 0	Data 'Byte' 2 bit 6	Data 'Byte' 2 bit 5	Data 'Byte' 2 bit 4	Parity
LINE 3:	Data 'Byte' 2 bit 3	Data 'Byte' 2 bit 2	Data 'Byte' 2 bit 1	Data 'Byte' 2 bit 0	Data 'Byte' 3 bit 6	Parity
LINE 4:	Data 'Byte' 3 bit 5	Data 'Byte' 3 bit 4	Data 'Byte' 3 bit 3	Data 'Byte' 3 bit 2	Data 'Byte' 3 bit 1	Parity
LINE 5:	Data 'Byte' 3 bit 0	Data 'Byte' 4 bit 6	Data 'Byte' 4 bit 5	Data 'Byte' 4 bit 4	Data 'Byte' 4 bit 3	Parity
LINE 6:	Data 'Byte' 4 bit 2	Data 'Byte' 4 bit 1	Data 'Byte' 4 bit 0	Data 'Byte' 5 bit 6	Data 'Byte' 5 bit 5	Parity
LINE 7:	Data 'Byte' 5 bit 4	Data 'Byte' 5 bit 3	Data 'Byte' 5 bit 2	Data 'Byte' 5 bit 1	Data 'Byte' 5 bit 0	Parity
LINE 8:	NEWCMDAT	**NOT USED**	**NOT USED**	**NOT USED**	PRESETDEF	Parity
LINE 9:	1	0	0	0	0	1
	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1	BIT 0

Table 1.6.2.1 Feature Command Frame

NEWCMDAT
Whenever a new telemetry command, which has PRESETDEF = 1 is required the transmitter toggles the NEWCMDAT bit. The receiver will then take action on a new command even if the data for the new command is the same as the previous command.

Multiple commands can be sent in one Feature Command Frame up to a maximum of 5 'Bytes', for example, the following commands could all be included in one Feature Command Frame …
Data 'Byte' 1 Alarm Mode On
Data 'Byte' 2 Seek Preset
Data 'Byte' 3 Parameter 1 (Preset Number)
Data 'Byte' 4 Alarm Mode Off
Data 'Byte' 5 180 Degree Turn

After all of the bytes have been used, all remaining bytes are left as 0s. Commands cannot be split across Feature Command Frame, for example, the Tour Point Data command could not be started on Data 'Byte' 5 of one Feature Command Frame and completed in the following Feature Command Frame.

1.6.2.1 Available Feature Commands

HEX	ASC	Command	Parameter 1	Parameter 2	Parameter 3	Parameter 4
42H	'B'	Seek Preset	Preset Number (00H – 7FH)	N/A	N/A	N/A
47H	'G'	Program Preset	Preset Number (00H – 7FH)	N/A	N/A	N/A
50H	'P'	Define Tour Start	Tour Number (01 - 04) Preset Tours (05 - 08) Mimic Tours	N/A	N/A	N/A
74H	't'	Tour Point Data	Preset Number (00H-7FH)	Speed (00H – 7FH)	Dwell (00H-7FH)	N/A
70H	'p'	Define Tour Stop	N/A	N/A	N/A	N/A
5EH	'^'	Start/Resume Tour	Tour Number (01 - 04) Preset Tours (05 - 08) Mimic Tours 00H Resume Tour	N/A	N/A	N/A
7EH	'~'	Tour Off	N/A	N/A	N/A	N/A
54H	'T'	180 Degree Turn	N/A	N/A	N/A	N/A
53H	'S'	Alarm Mode On	N/A	N/A	N/A	N/A
73H	's'	Alarm Mode Off	N/A	N/A	N/A	N/A
48H	'H'	Toggle Mono/Colour	N/A	N/A	N/A	N/A
68H	'h'	Automatic Mono/Colour	N/A	N/A	N/A	N/A
66H	'f'	Define Home Function	See notes.			
67H	'g'	Privacy Zone Set Up	Privacy Zone (64H - 7FH)	On/Off (00H – 01H)	N/A	N/A
4AH	'J'	Camera Numbered Aux On	(00H – 7FH)	N/A	N/A	N/A
6AH	'j'	Camera Numbered Aux Off	(00H – 7FH)	N/A	N/A	N/A
6BH	'k'	Remote Reset	(00H – 01H)	N/A	N/A	N/A

Table 1.6.2.1.1 Available Feature Commands

N/A indicates no available parameter.
All Command and parameter data are 7 bits as this allows for a maximum of 5 'bytes' per frame.
The Data 'Byte' 1 data is put into bits 6..0 on lines 1 and 2.
The Data 'Byte' 2 data is put into bits 6..0 on lines 2 and 3.
The Data 'Byte' 3 data is put into bits 6..0 on lines 3,4 and 5.
The Data 'Byte' 4 data is put into bits 6..0 on lines 5 and 6.
The Data 'Byte' 5 data is put into bits 6..0 on lines 6 and 7.

This is shown in Table 1.6.2.1 Feature Command Frame.

1.6.2.2 'PRIVACY ZONE SET UP'

The command: 'PRIVACY ZONE SET UP' is a three-byte command.
The Data 'Byte' 1 is the command. The Data 'Byte' 2 is the preset number (in the range 100 to 127(64H – 7FH)). The Data 'Byte' 3 indicates whether the preset is a privacy zone or simply a preset.
The receiver will blank out the part of the view that would be seen if 'preset seek' occurred for this preset. The size and position of the blanked part of the screen will be automatically adjusted to blank part or all of the current view from the camera. The maximum number of presets that can be defined as privacy zones is 28.

Example: Define preset 100 as a privacy zone.
Data 'Byte' 1 67H (privacy zone set up).
Data 'Byte' 2 64H (preset number 100)
Data 'Byte' 3 01H (Indicates that this preset is now a privacy zone)
Preset 100 will be set to be a privacy zone. Note that this command simply sets the 'privacy zone flag' it does not redefine the pan, tilt, or lens functions. The preset position can be defined before or after using the 'privacy zone set up' command.

Example: Define preset 100 as not a privacy zone.

Data 'Byte' 1 67H (privacy zone set up).
Data 'Byte' 2 64H (preset number 100)
Data 'Byte' 3 00H (indicates that this preset is not a privacy zone)
Preset 100 will be not be a privacy zone after this command.

1.6.2.3 'HOME FUNCTION'

The command: 'HOME FUNCTION' is a four byte command.
The first byte is the command. The second byte is either 'start tour' or 'seek preset' command. The third byte (Data 'Byte' 3) is the tour number (in the range of 01H to 08H – see definition of 'start tour' command) or preset number (in the range of 00H to 7FH i.e. preset 0 to 127). The fourth byte (Data 'Byte' 4) is the time out in minutes (in the range of 00H to 7FH i.e. 1 to 127 minutes). Time out 0 is used to indicate that the homing function is disabled.
Typically preset 0 or tour 1 are used for the 'HOME FUNCTION' command, to ensure compatibility will all versions of Microspheres. If any parameter is illegal for the version of Microsphere that receives the command, then the command will be ignored.

Example: Define preset 0 as the homing position with a time out of 10 minutes.
Data 'Byte' 1 66H (define homing position).
Data 'Byte' 2 42H (seek preset)
Data 'Byte' 3 00H (preset number)
Data 'Byte' 4 0AH (10 minutes)

Example: Define tour 1 as the homing position with a time out of 10 minutes.
Data 'Byte' 1 66H (define homing position).
Data 'Byte' 2 5EH (start tour)
Data 'Byte' 3 01H (tour number)
Data 'Byte' 4 0AH (10 minutes)

Example: Disable the homing function.
Data 'Byte' 1 66H (define homing position).
Data 'Byte' 2 00H, 42h or 5Eh (seek preset or start tour)
Data 'Byte' 3 01H (tour number)
Data 'Byte' 4 00H (0 indicates disable homing function)

1.6.2.4 'REMOTE RESET'

The command: **'**REMOTE RESET' is a two byte command.
The first byte is the command. The second byte is type of reset. (Type 0 is the 'power on reset' and is equivalent function to turning the power OFF then ON. Type 1 is the 'factory' reset, which clears all stored parameters i.e. sets the receiver to the factory defaults.

Example: To execute a power up reset.
Data 'Byte' 1 6BH (remote reset).
Data 'Byte' 2 00H (power up reset)

Example: 'remote factory reset'
Data 'Byte' 1 6BH (remote reset).
Data 'Byte' 2 01H (clear all stored parameters)

The 'power on reset' is used to prevent the need for physically turning OFF the power supply after malfunctions caused by extraordinary events (excessive or unusual power supply fluctuations etc.) The Receiver and camera will perform the initialisation sequence. The 'factory' reset is used to clear out any stored parameters that may have been programmed by the installation/commissioning engineer that are not required after testing is complete. This command should be used with caution, as all the stored parameters will be cleared.

1.6.2.5 'CAMERA SET UP' (IRFLAG, AUTO180 and DIGITAL ZOOM)

The 'camera set up' command can have different quantities of bytes depending upon the required function.
It can have a reply under some circumstances.

Data 'Byte' 1 46H (camera set up)
Data 'Byte' 2 Parameter

Data 'Byte' 2

6	5	4	3	2	1	0
Sync later	Sync earlier	NOT USED	NOT USED	DIGITAL ZOOM	AUTO180	IRFLAG

Bit 0 – 'IRFLAG'.
2nd byte bit 0 = 1
Sets 'IRFLAG'. Camera will be in IR mode.

2nd byte bit 0 = 0
Clears 'IRFLAG'. Camera will not be in IR mode.

Bit 1 –'AUTO180'.
2nd byte bit 1 = 0
Clears 'AUTO180 flag. Camera will not turn 180 when tilt down limit reached.

2nd byte bit 1 = 1
Sets 'AUTO180' flag. Camera will turn 180 when tilt down limit reached.

When 'AUTO180' flag is set the receiver will perform a 180 degree turn when the down limit is reached. *'DOWN STOP'* must be received to allow a further *'DOWN'* command to cause another 180 degree turn.

Bit 2 – 'DIGITAL ZOOM'.
2nd byte bit 1 = 0
Disables 'DIGITAL ZOOM'. When zooming in, zooming will stop at the end of optical zoom. Subsequent 'ZOOM IN' commands will be ignored.

2nd byte bit 1 = 1
Enables 'DIGITAL ZOOM'. When zooming in, zooming will stop at the end of optical zoom. Subsequent 'ZOOM IN' commands will cause the camera to zoom in using 'DIGITAL ZOOM'.

Dependent on the type of receiver used, this command has the effect of causing the DIL switch selection of digital zoom on or off to be ignored, so that it is now under programmable control.

If the 'Sync earlier' or 'Sync later' bit is set then the 'DIGITAL ZOOM', 'AUTO180' and 'IRFLAG' bits are ignored.
If none of the bits 'Sync earlier', 'Sync later', bits are set then the three bits 'DIGITAL ZOOM', 'AUTO180' and 'IRFLAG' are used.

Example: Use 'CAMERA SET UP' command to set 'DIGITAL ZOOM' to 0, 'AUTO180' to 0 and 'IRFLAG' to 1.
Data 'Byte' 1 46H (camera set up)
Data 'Byte' 2 01H (parameter)

Example: Use 'CAMERA SET UP' command to set 'DIGITAL ZOOM' to 0, 'AUTO180' to 1 and 'IRFLAG' to 0.
Data 'Byte' 1 46H (camera set up)
Data 'Byte' 2 02H (parameter)

1.6.2.6 'PROGRAM A PRESET'

The parameters for 'program a preset' is the preset number and consists of one 'byte'.
Data 'Byte' 1 47H program a preset.
Data 'Byte' 2 one 'byte' in the range of 00H to 7FH (the 'preset' number)

There are 128 presets available on the Orbiter and Orbiter Gold Microspheres, (00h to 7Fh). 64 presets are available on the Jupiter and Orbiter Lite, (00h to 3Fh).
When the 'program a preset' command is received, the current pan, tilt, zoom, focus and iris position is defined as a 'preset'.

1.6.2.7 'SEEK A PRESET'

The parameters for 'preset' is the preset number and consists of one 'byte'.
Data 'Byte' 1 42H Seek a Preset
Data 'Byte' 2 one 'byte' in the range 00h to 7Fh (the 'preset' number)

When 'seek a preset' is received the camera will seek the 'preset'. If the 'preset has never been defined, the pan, tilt iris, and lens functions will not alter.

1.6.2.8 'TURN 180 DEGREES'

The command: 'turn 180 degrees' is a one byte command and has no parameters.
Data 'Byte' 1 54H Turn
When 'turn 180 degrees' is received the camera will pan 180 degrees.

1.6.2.9 'ALARM MODE ON'

The command: 'alarm mode on' is a one byte command and has no parameters.
Data 'Byte' 1 53H alarm mode on
When 'ALARM MODE ON' is received the current position is saved as a preset.

1.6.2.10 'ALARM MODE OFF'

The command: 'ALARM MODE OFF' is a one byte command and has no parameters.
Data 'Byte' 1 73H alarm mode off
When 'ALARM MODE OFF' is received the camera will seek the preset saved by the 'ALARM MODE ON' command.

1.6.2.11 'START TOUR (RESUME) OR AUTO PAN ON'

The parameters for 'START TOUR' is the tour number and consists of one 'byte'.
Data 'Byte' 1 5EH Auto Pan On
Data 'Byte' 2 one 'byte' in the range of 00H to 08H

When 'START TOUR' is received the camera will start (or re-start) tour nn, where nn is the tour number 1 to 8. If the parameter is 00h the last used tour (01h to 04h) which was previously interrupted or stopped, will resume from the point it was last travelling to. If the last used tour (05h to 08h) was Mimic then it will restart from the beginning. If the parameter is 00h and a tour is currently in progress, the start tour (resume) will be ignored.
The Orbiter Gold Microsphere have four tours (numbered 1, 2, 3, 4) and four Mimic Tours (numbered 5, 6, 7, 8). The older Orbiter Microsphere did not have the Mimic feature.

Jupiter Microspheres have three 'tours' (numbered 1, 2, 3) and no Mimics.
Orbiter Lite Microspheres have one tour (numbered 1) and one 'Mimic (numbered 5).
If the power is turned off while a tour is in progress, then depending on the tour type the following will happen…
Preset Tour : Will continue from last tour point before power loss.
Mimic Tour : Will restart the tour from the beginning.

1.6.2.12 'STOP TOUR OR AUTO PAN OFF'

The command: 'AUTOPAN OFF' is a one byte command, it has no parameters.
Data 'Byte' 1 7EH Auto Pan Off

When 'STOP TOUR' is received the current tour will stop.
Alternatively if any telemetry command is received the tour will be interrupted. If the new telemetry command is valid, it will be actioned (not ignored).
If the 'STOP TOUR' command is received when there is no tour in progress, it will be ignored.

1.6.2.13 'TOGGLE MONO/COLOUR'

Data 'Byte' 1 48H Toggle Mono/Colour

If the camera is set to manual iris and 'TOGGLE MONO/COLOUR' or 'automatic mono/colour' is received, the camera will select auto iris, then action the command.

Characteristics of the 'mono/colour changeover camera' and the 'integrating camera'.

General description

This colour-integrating camera is available in 'changeover' and 'non changeover' versions. Mono mode is responsive to IR illumination. It has very good sensitivity with low levels of illumination.

Colour mode has very good sensitivity with low levels of illumination. It is slightly more responsive to IR and sodium lighting than normal colour cameras.

The characteristics of the camera can be selected using the 'camera set up' command, to be suitable for normal illumination ('IRFLAG'=0) or IR illumination ('IRFLAG'=1). (The camera may change back due to lighting conditions.)

Operation of camera ('IRFLAG' = 1)

When 'IRFLAG'=1, the camera is being used in a system that has IR lights that are controlled manually or by light sensors. The camera will auto change to mono when a colour integration picture is being displayed. As the illumination is increased, and the mono picture starts to white-out the camera will 'autochangeover' to colour.

Mono/colour mode can be toggled using the 'toggle mono/colour' or 'automatic mono/colour' commands.

When 'IRFLAG'=1, the camera will have the following characteristics:

Colour

In bright light, the camera will display a colour picture.

When the illumination is reduced, changeover and integration are automatically selected.

If the illumination increases again, the camera will select non-integration, then colour.

Mono

If the mono picture starts to white out because the illumination has increased again, the camera will auto change over to colour.

Operation of camera ('IRFLAG' = 0)

When 'IRFLAG'=0, the camera is being used in a system that has no IR lights near this camera.

Mono/colour mode can be toggled using the 'toggle mono/colour' or 'automatic mono/colour' commands.

When 'IRFLAG'=0 is sent, the camera will have the following characteristics.

Colour

When the illumination is reduced, colour integration is automatically selected. At very low light levels the camera will auto changeover to mono.

If the illumination increases again, the camera will select colour then non-integration.

Mono

If a mono picture has been selected, integration mode will be used automatically. If the picture starts to 'white out' because the illumination is too great, the camera will auto-change over to colour.

Mono or colour changeover

The 'toggle mono/colour' command can be used to toggle the picture from mono to colour or colour to mono. The camera will automatically change to colour/mono, if illumination is too bright in mono' or too dark in colour.

The 'AUTOMATIC MONO/COLOUR' command is used to cancel THE 'TOGGLE MONO/COLOUR' command. If the camera has been toggled and has not automatically switched to mono/colour, this command will toggle mono/colour.

1.6.2.14 'DEFINE TOUR START'

Data 'Byte' 1 50H define tour start
Data 'Byte' 2 one 'byte' in the range 01H to 04H

The above 2 bytes are followed by further groups of four bytes as follows.
Data 'Byte' 1 74H tour point data
Data 'Byte' 2 preset number (00H-7FH)
Data 'Byte' 3 speed (00H-7FH)
Data 'Byte' 4 dwell time (00H-7FH)

Note speed = 00H = fast as possible The speed parameter is defined in terms of 'joystick speed' as shown in the earlier Table 1.6.1.1.1 Speed Parameter Details. The speed in the tour is not 'scaled' by the 'zoom range'
Dwell time is 2 x received parameter (seconds) e.g. received time parameter 4 represents 8 seconds.
Dwell time = 00H represents minimum dwell (e.g. 1 second)
When 'define tour start' and a valid group of five bytes is received, the existing tour data table is cleared, and the data is used to make the new table. If the parameter is illegal the define tour start will be ignored.
After an entire group of four bytes has been received, it will be stored. (The receiver will not store incomplete groups).
The maximum no of groups of four bytes is 128, If too much data is received, the define-tour-start will terminate.
Alternatively the definition terminates when 'define tour stop' is received.
The camera will become stationary during the definition of the tour.
The receiver will store the preset number (not the position data), for each preset. If the preset has not yet been defined, or is redefined in the future, the data stored in the definition of the tour will be the same. If a preset is redefined, the tour of presets will use the newly defined position.

1.6.2.15 'DEFINE TOUR STOP'

The command: 'DEFINE TOUR STOP' is a one byte command and has no parameters .
Data 'Byte' 1 70H 'define tour stop'
The current define tour will stop being defined.
If the 'DEFINE TOUR STOP' command is received when there is no define tour in progress, it will be ignored. (The definition will stop only when the valid 'DEFINE TOUR STOP' is received. A telemetry command for this or another camera will not stop the definition of the tour.)

1.6.2.16 Mimic Feature

The ‘Mimic’ command allows the receiver to learn sequences of commands. The sequences are stored as tours.
There are four ‘Mimic’ available on the new Orbiter and Orbiter Gold Microspheres, numbered 5, 6, 7, 8.
The ‘Mimic’ feature is not available on the Jupiter.
One ‘Mimic’ is available on the Orbiter Lite, numbered 5.
The transmitter will send
Data ‘Byte’ 1 50H define tour start
Data ‘Byte’ 2 one 'byte' in the range 05H to 08H (the ‘Mimic’ number)

The above 2 bytes are followed by further conventional telemetry commands, which can include: pan, tilt, zoom, focus, iris, preset seek, 180 degree turns.
All the camera controls from the keyboard and the positions and settings of the camera, including the elapsed time will be remembered by the Microsphere.
The Microsphere can store approximately 3600 commands for the ‘Mimic’ feature. This number of commands is subject to change in the future. If the limit is exceeded then any extra commands will be lost.

1.6.2.17 ‘MIMIC STOP’

The command: ' MIMIC STOP’ is the same as ‘DEFINE TOUR STOP' is a one byte command and has no parameters.
Data ‘Byte’ 1 70H ‘Mimic stop'
The current ‘Mimic' will stop being defined.

1.6.2.18 'CAMERA NUMBERED AUX ON' and 'CAMERA NUMBERED AUX OFF'

The commands: 'CAMERA NUMBERED AUX ON' and 'CAMERA NUMBERED AUX OFF' are two byte commands and have a one byte parameter where bits 0–6 represent relays 1-7. Currently only bits 0 and 1 are used.
Only relays 1 and 2 are used at present and are represented using binary parameter 01H for relay 1 and 02H for relay 2 and 03H for relays 1 and 2.
If the parameter for 'CAMERA NUMBERED AUX ON' or 'CAMERA NUMBERED AUX OFF' is 7FH then the command will control all relays.
On some products relays are controlled by e.g. alarms. The state of the relay can be overridden by this command.
Examples.
'CAMERA-NUMBERED-AUX-ON', number 1 relay (turn on relay 1).

Data 'Byte' 1	4AH	(Camera numbered aux on)
Data 'Byte' 2	01H	Parameter 01H for relay 1.

'CAMERA-NUMBERED-AUX-OFF', number 1 relay (turn off relay 1).

Data 'Byte' 1	6AH	(Camera numbered aux off)
Data 'Byte' 2	01H	Parameter 01H for relay 1.

1.7 Action on alarms (when DIL switch is set to 'auto seek'.)

When an alarm goes active, the 'top board' will send 'ALARM MODE ON' to the 'main board' and restart the timer.
The alarms are not prioritised, the receiver will be in the state defined by the latest alarm activation.
Alarms 1 to 8 will activate presets 1 to 8 on the main board.
When the timer expires the receiver will be set to 'alarm mode off'.
If 'ALARM MODE ON' is received from the transmitter, the 'Orbiter Gold', 'Orbiter Lite' or 'Jupiter' will disable it's timer and will not automatically select 'ALARM MODE OFF'. (as this is now being controlled by the transmitter.) But the relays will continue to operate as defined below.
When an alarm becomes active the timer will start. Relay 1 will be activated and will remain in the active state until the timer expires. The timer can be extended by subsequent alarm activations.
If a 'CAMERA-NUMBERED-AUX-On or OFF' command is then received the relay will be activated or deactivated but any subsequent alarm activation or timer expiry can alter the state of the relay 1.

1.8 Action on alarms (when DIL switch is set to 'not auto seek'.)

The 'Orbiter Gold', 'Orbiter Lite' or 'Jupiter' will not automatically send 'ALARM MODE ON' to the 'main board' or auto seek presets as a result of alarm activations.
The timer is not used in 'not auto seek' mode.
If 'ALARM-MODE-ON' is received from the transmitter, it will be sent to the 'main board'.
If a 'CAMERA-NUMBERED-AUX-ON or OFF' command is received it will activate or deactivate the relevant relay.

'Orbiter Gold', 'Orbiter Lite' or 'Jupiter' 'auto seek' alarms when used with old transmitters.

If automatic video switching is required when a Jupiter is in 'auto seek' alarm mode then the 'relay 1' contact of the 'Orbiter Gold', 'Orbiter Lite' or 'Jupiter' should be wired to one of the alarm inputs of the transmitter. The transmitters alarm input can then be programmed to select the video input connected to the 'Orbiter Gold', 'Orbiter Lite' or 'Jupiter' and the pre-set number to seek for this alarm should be set to '0' if the 'Orbiter Gold', 'Orbiter Lite' or 'Jupiter' 'auto seek' position is required.