ENGINEERING CHANGE ORDER

		Number 03-	
Project Engineer	Stephen L. Robinson	Cross Ref. Doc. Type & Number	Page 1 of
Change Requested By	Stephen L. Robinson	None	1

Description of Change

Release of technical documentation for archive:

Baxall Simplex Telemetry, Issue 4.0, dated Sep. 22, 1997

Reason for Change None

Scope of Change

- ☐ Changes Form, Fit, or Function
- ☐ Other performance enhancement
- ☒ Internal

Type of Change

- ☐ New Product
- ☐ Error
- ☐ Design Improvement
- ☒ Additional Info
- ☐ Cost Reduction
- ☐ Conform to Present Practices

Material Disposition

- ☒ None
- ☐ Scrap
- ☐ Rework
  - ☐ Finished Goods
  - ☐ Work In Progress
  - ☐ Stock
- ☐ Running Change

Documentation Affected

Product Model Number: None

Drawing Number	Old Rev	New Rev
None		

Approvals	Engineering Signature		Date
	Materials Signature		Date
Cost Impact	0	New Comp. Cost	0
Obsol. Impact	0	New Comp. Lead Time	0

Manager's Initials in Appropriate Box

☐ EWS ☐ Hot ☒ Normal

Required Tasks (use attachments if necessary)	Initials	Date
Manufacturing None		
Production None		
Materials None		
Stock Room None		
Sales / Marketing None		
Repair None		
Quality Assurance None		
Other None		

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Baxall Simplex Telemetry

Issue 4.0

Date: 22 September 1997

Filename: coaxtel4.doc

	Name/Authority	Signature	Date
Approved By:	C.McKenzie		

Call later re: translator board...

VT Germany Protocol 422 in/out

1. Document History

Issue State	Date of Issue	Reason for Change	(Main) Author
Draft A	16/05/94	First Issue for Discussion	M.P
Draft B	26/05/94	Corrections To First Issue	M.P
Issue 1.0	27/05/94	Released	M.P
Issue 2.0	17/08/94	Change to 4.3 Function bit 3	M.P
Issue 3.0	23/10/96	Advanced features changed and clarification added to the general description	J.J.C
Issue 4.0	23/6/97	Includes frames 9,10 and further clarification added to the general description	C.McK

2. Introduction

2.1. General

Baxall simplex telemetry is used to control simple receivers where camera movement is required with a few Pre-sets and auxiliary outputs. The serial telemetry can be transmitted via a variety of paths, Coax, 20mA, are the most common but other transmission paths can be used such as RS485, RS232 or Fibre Optic.

2.2. Scope

The object of this document is to define the interface used by the Baxall Simplex Telemetry. This information relates to Baxall products and any related products that use this communication interface. Section 6 is for information only as it relates to special products no longer supported by standard telemetry systems.

2.3. Related Documents

None

3. BAXALL SYSTEM INTERFACE REQUIREMENTS

3.1. Physical Layer for 20mA Serial

- Data rate 1200bps or 300bps + 1% - 1%
- 20mA when idle
- <3mA = logic 1
- >10mA = logic 0
- One twisted pair cable
- Max. cable length dependant on cable but typically 2 Km
- Transmitter should be active and the receiver passive with its input optically isolated via a bridge rectifier.

3.2. Physical Layer Coax Transmission

Both Standard and Alternate forms of coax serial communications require that the edges of the telemetry pulses to be slightly rounded by passing them through an RC filter.

Note: Telemetry pulses over 50% of the sync pulse height may cause problems with digital equipment. The current telemetry level has been set at 130 mV.

3.2.1. Coax Serial Standard

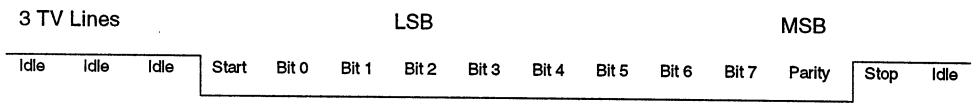
- Data rate 50u seconds per bit (20000bps) transmitted one bit per line after the Equalisation Pulses
- In Frame Signalling
- Logic 0 = 250kHz +/- 10Hz (1 Bit per line)
- Logic 1 = 222kHz +/- 10Hz (1 Bit per line)
- Coax Cable
- Max. cable length on URM70 1 Km. (range may be extended with higher quality cable)

3.2.2. Coax Serial Alternate

- Data rate 64u seconds per bit (20000bps) transmission gated with CCIR line Blank
- Phase critical after line blank pulse
- Logic 0 = 250kHz +/- 10Hz (1 Bit per line)
- Logic 1 = 222kHz +/- 10Hz (1 Bit per line)
- Coax Cable
- Max. cable length on URM70 1 Km. (range may be extended with higher quality cable)

3.2.3. Data Link Layer

- Asynchronous data transfer.
- Simplex
- 1 Word of data shall consist of:
- 1 Start bit (0)
- 8 Data bits
- 1 Parity bit (Even)
- 1 Stop bit (1)
- Even Parity
- Baud rate (Standard) of 50u seconds per bit. 11 bits per frame. 20ms per frame.
- Baud rate (Alternate) of 64u seconds per bit. 11 bits per frame. 20ms per frame.
- Start bit = binary 0 = Space state
- Stop bit = binary 1 = Mark state
- The least significant bit of the least significant byte shall be transmitted first
- Inter word gap (idle) = 20m seconds (CCIR)
- Inter word gap (idle) = 16.6m seconds (NTSC)



Bits shown in order transmitted
Figure 1: General Word Format

3.3. Telemetry Overview

The telemetry transmitters place control signals directly on the video coax, using a frequency-shifted burst of carrier lasting approximately 1 mS, during the vertical blanking interval. The ZT3, ZT4 and ZT5 transmitters will continuously send telemetry to the appropriate receiver. Later models of transmitter such as ZT53, ZT54 and ZT6 only transmit telemetry for an unspecified pre-determined period (usually about 90 seconds) after the last control function is released. This extended transmission was intended for receiver tuning.

Note: All new telemetry transmitters should have a tuning mode that will transmit telemetry for 10 seconds for receiver tuning.

Note: New telemetry transmitters should send telemetry for 30 seconds after the last control function is released.

The coded word appropriate to the state of the transmitter keyboard is assembled by the program and output in serial form to a programmable divider. An enable signal is also output to the divider and these are timed to appear after the end of the vertical sync pulse. The enable signal removes the reset from the divider and the flip-flop that follows thus enabling the divider to count down the 4 MHz system clock. The divider is pre-loaded with 8 or 7, depending on whether the telemetry data is required to be 0 or 1 respectively, and it therefore divides the clock by either 8 or 9. The output from the divider is then divided by 2 in the flip-flop to give an even mark/space ratio. The status of the telemetry signal thus determines what frequency appears at the flip-flop output, a logic 1 giving 222 kHz and 0 giving 250 kHz. The telemetry carrier is then injected onto the video signal at the input to the transmitter so that it has a direct path through to the associated receiver.

Twisted-pair telemetry operation is also possible with some transmitters, the same basic data format and command codes are used but the data signal is usually in the form of a 20mA current loop output. The transmitter data rate is selectable between 1200Bd and 300Bd. Other data formats E.g. RS232, RS485 Etc can be provided.

3.4. Command Updates

Any updates to commands should be sent to a telemetry receiver twice. This is done to give 2 chances of reception since no acknowledge is sent from the receiver, the receiver can respond to either of the signals and does not have to receive both. This new frame information should then be added to the refresh cycle. After the command update has been sent the transmitter should go into the refresh mode. When a momentary function is being held down, the refresh mode continues until the momentary command is released, where the command is again sent twice before returning to the refresh mode. When a latching function changes state, the new state is transmitted twice before returning to the refresh mode.

3.5. Refresh Mode

The transmitter should cycle through the telemetry frames 0 to 5 in sequence with all relevant bits set or cleared as indicated by previous commands relating to those frames.

Example:
Begin with pan command:
21 21
now begin refresh:
30 00 10 21 00 10 21 30 .... Etc
Release pan command
20 20
Now refresh again:

30 00 10 20 30 00 10 20 30.... Etc

(Most old transmitters will also include frames 4 and 5 in the refresh mode; some may have included frames 6 & 7.)

Note: All new transmitter designs shall only cycle through the telemetry frames 0 to 5 in sequence, any other frames shall only be refreshed when data in that frame changes state.

3.6. Video telemetry timings

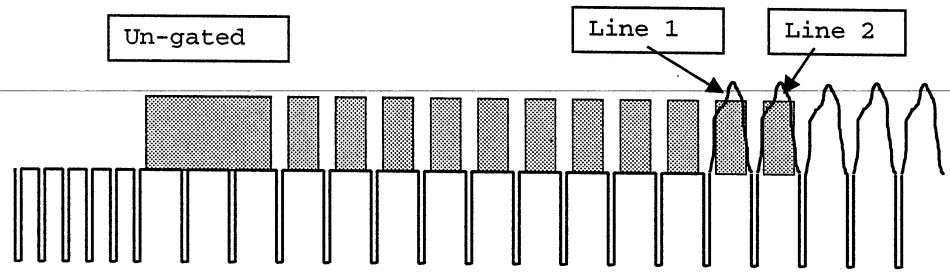
3.6.1. Asynchronous (Standard)

Data format as specified in the spec. but with an add preamble period to allow the PLL in the receiver to lock reliably.
Data bit width for all bits from the Start Bit to the Stop Bit is 50.5µS.
Pre-amble is three-bit widths wide (151.5µS) starting immediately after the equalisation pulses.
Synchronous ("Clean" / Alternate)
Data format as specified. but with an added preamble period to allow the PLL in the receiver to lock reliably.

Data bit width for each bit from the Start Bit to the Stop Bit is approximately the same length as video portion of the horizontal synch. pulse. The front and back porches of the video synch. pulse should be clear of any telemetry carrier, which should remain off until the video synch. pulse has passed.

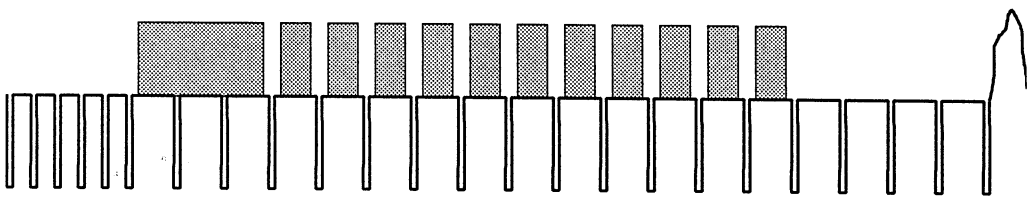
Pre-amble is a maximum of three widths wide starting immediately after the equalisation pulses. On some fields this will result in a two-and-half line preamble period. The preamble is switched off only at the synch. pulse prior to sending the Start Bit.

3.6.2. The Synchronous Telemetry Data is as below :



RS-170A
EIA NTSC

Preamble St D0 D1 D2 D3 D4 D5 D6 D7 P Stop



CCIR
/PAL

The solid signal burst at the start of the telemetry data is a carrier pre-amble. This is inserted to allow the PLL in the receiver sufficient time to stabilise and lock to the following data signal. This pre-amble is, therefore, required in the EIA mode to ensure reliable operation of the PLL. This is followed by the telemetry data start bit, the eight data bits with the least significant bit first, the parity bit set for even parity and finally the data stop bit. The entirety of this data stream is required for correct operation of the telemetry receivers.

Note : Synchronous telemetry may cause problems with the first 2 lines of a NTSC pictures.

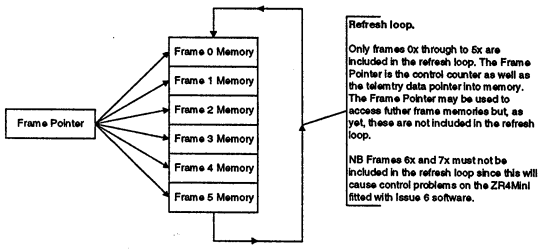
3.7. New Products

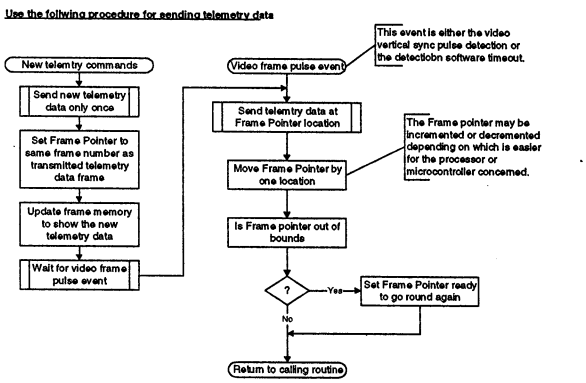
All new products should initialise unused frames and be able to support the Enhanced Pre-set Programming (Frame 7) command. The recommended command for recalling Pre-set positions is Frame 6 which is compatible with the ZR Mini series. The older ZR4 Receiver with Pre-sets only operates with Frames 4 and 5.

Telemetry Receivers supporting variable speed heads should respond to both Frame 2 and Frames 9 & 10. If only Frame 2 is received (i.e. a non variable speed, or an older transmitter is connected) the receiver should start at a slow speed which increases the longer the movement continues to be commanded in Frame 2. New transmitters should initialise Frames 9 and 10 to 0000B data if they do not support variable speed operation.

3.8. Frame Refresh should be in the form :

Baxall Telemetry Refresh Method





3.9. The following 'C' code further clarifies Refresh operation :

```
/*****************************************
 * Main program entry point
 *****************************************/
void main( void )
{
  .
  .
  while( TRUE )
  {
    .
    .
    if( do_keyboard() )       // If telem keypress found, Refresh_Ctr=new frame no.
      frame_update();         // Send it immediately, once only

    frame_refresh();          // Send refresh or repeat new commands
    .
    .
  }
}

.
.

/*****************************************
 * Update telemetry frames, new data
 *****************************************/
// Ensure Refresh_Ctr is set up prior to calling this function
void frame_update( void )
{
  Refresh_Ptr = Frame_Data + Refresh_Ctr;

  send_telem_data();                  // Uses Refresh pointer to collect data to be sending
}
// Upon returning from this function, the Refresh_Ctr has not been altered
.
.

/*****************************************
 * Send telemetry refresh data
 *****************************************/
void frame_refresh( void )
{
  frame_update();

  Refresh_Ctr++;

  if( Refresh_Ctr == 6 )      // Out of bounds?
    Refresh_Ctr = 0;
}
.
```

4. DATA WORD FORMAT

The upper four data bits are decoded to give a frame number and the lower four usually provide four function selections per frame, although not all possible frames are used. The codes and data format used are compatible with all Baxall telemetry receivers, the standard frames and their functions are listed below.

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Frame				Function			

Frame	Action		
0	Zoom and Focus		
1	Iris, Lights, Aux. 4		
2	Pan and Tilt		
3	Power, Auto Pan, Wipe, Wash		
4	Go to Pre-sets 1,2,3,4		
5	Go to Pre-sets 5,6,7,8		
6	Go to Pre-sets 1 - 15		
7	Store Pre-sets 1 - 15		
8	Auxiliary Control 7 - 15		
9	Pan Speed		
10	Tilt Speed		
11			
12			
13			
14			
15			

4.1. Frame 0

Frame	0
Function:	Zoom & Focus
Action:	In or Out Near or Far
History	

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	0	0	0	Function			

This frame controls the Zoom and the focus mechanism

Function Bit	State 0	State 1
0		Zoom
1	Out	In
2		Focus
3	Near	Far

Note : When Zoom or Focus movement has stopped the corresponding bits 1 or 3 MUST be reset to ZERO.

4.2. Frame 1

Frame	1
Function:	Iris, Lights & Aux4
Action:	Open or Close. On or Off
History	

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	0	0	1	Function			

This frame controls the Iris to open or close it. The Lights control is also switched as is Auxiliary 4

Function Bit	State 0	State 1
0		Iris
1	Open	Close
2	Lights Off	Lights On
3	Aux 4 Off	Aux 4 On

Note : When Iris movement is stopped both bits 1 and 0 MUST be reset to State ZERO

4.3. Frame 2

Frame	2
Function:	Pan & Tilt
Action:	Right or Left. Up or Down
History	

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	0	1	0	Function			

This frame controls a Pan and Tilt mechanism

Function Bit	State 0	State 1
0		Pan
1	Left	Right
2		Tilt
3	Up	Down

Note : When Pan or Tilt movement has stopped the corresponding bits 1 or 3 MUST be reset to ZERO.

4.4. Frame 3

Frame	3
Function:	Power, Auto Pan, Wipe & Wash
Action:	On or Off
History	

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	0	1	1	Function			

Each of the functions controlled by this frame are On or Off functions.

Function Bit	State 0	State 1
0	Power Off	Power On
1	Auto Pan Off	Auto Pan On
2	Wiper Off	Wiper On
3	Washer Off	Washer On

4.5. Frame 4

Frame	4
Function:	Used for Recalling Pre-set Positions (Previously used for Spares On/Off)
Action:	On or Off
History	

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	1	0	0	Function			

Function Bit	State 0	State 1
0	Off	Pre-set 1 On
1	Off	Pre-set 2 On
2	Off	Pre-set 3 On
3	Off	Pre-set 4 On

4.6. Frame 5

Frame	5
Function:	Used for Recalling Pre-set Positions (Previously used for Spares On/Off)
Action:	On or Off
History	

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	1	0	1	Function			

Function Bit	State 0	State 1
0	Off	Pre-set 5 On
1	Off	Pre-set 6 On
2	Off	Pre-set 7 On
3	Off	Pre-set 8 On

Note : Some transmitters leave more than one Pre-set bit in Frames 4 and 5 ON simultaneously. Receivers action the most recently set Pre-set Bit. Any new transmitters using these frames should only set one PRESET bit at a time.

4.7. Frame 6

Frame	6
Function:	Recall Pre-sets
Action:	
History	

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	1	1	0	Function			

Valid Function bits 0001 to 1000, corresponding to Pre-sets 1 to 8 respectively. Values 0000, and 1001 to 1111 reserved for future expansion

NOTE: Frame 6 has not been used up to now (Feb 97) in any transmitter. All ZR4-Mini receivers in the field will respond to this frame but only to recall pre-sets 1 - 8.

4.8. Frame 7

Frame	7
Function:	Store Pre-set - store the current Pan, Tilt, Zoom and Focus setting as Pre-set <n>.
Action:	
History	**All ZR4Mini receivers in the field (Feb 97) only respond to pre-sets 1 - 8.**

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	1	1	1	Function			

Valid Function bits 0001 to 1000, corresponding to Pre-sets 1 to 8 respectively. Values 0000, and 1001 to 1111 reserved for future expansion.

4.9. Frame 8

Frame	8
Function:	Auxiliary 7 to 14
Action:	
History	**Frame 8 has not been used up to now (Feb 97) in any transmitter or receiver.**

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
1	0	0	0	Function			

Bit 3	Action
0	Auxiliary Off
1	Auxiliary On

Bit 2	Bit 1	Bit 0	Function
0	0	0	Auxiliary 7
0	0	1	Auxiliary 8
0	1	0	Auxiliary 9
0	1	1	Auxiliary 10
1	0	0	Auxiliary 11
1	0	1	Auxiliary 12
1	1	0	Auxiliary 13
1	1	1	Auxiliary 14

4.10. Frame 9

Frame	9
Function:	Pan Speed
Action:	
History	**Frame 9 has not been used up to now (Feb 97) in any transmitter or receiver.**

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
1	0	0	1	Function			

Function values of 0001 to 1111 (1-15 decimal) represent increasing speed.
Keyboards without a joystick or speed varying mechanism send a magnitude of 0, i.e. 0 equates to default speed. This frame is used in conjunction with frame 2, and if used must be included in the frame refresh loop and sent as a new command when it's value changes.

Note To improve the speed of response, ZTX6, differentiates between DC and AC receiver by only sending magnitude information to receivers defined as DC receivers (set up in the menus).

4.11. Frame 10

Frame	10
Function:	Tilt Speed
Action:	
History	**Frame 10 has not been used up to now (Feb 97) in any transmitter or receiver.**

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
1	0	1	0	Function			

Function values of 0001 to 1111 (1-15 decimal) represent increasing speed. Keyboards without a joystick or speed varying mechanism send a magnitude of 0, i.e. 0 equates to default speed. This frame is used in conjunction with frame 2, and if used must be included in the frame refresh loop and sent as a new command when it's value changes.

Note To improve the speed of response, ZTX6, differentiates between DC and AC receiver by only sending magnitude information to receivers defined as DC receivers (set up in the menus).

5. Appendix

NOTE: USE OF THE FOLLOWING FRAME FUNCTIONALITY WILL NOT BE SUPPORTED FROM JANUARY 1996

The Following frames have been used is some special or low volume non-standard products:

5.1. Frame 6 Unsupported Use

Frame	6
Function:	Pan Speed, Standby, Auto Iris, Test Request
Action:	On or Off
History	FUNCTIONALITY WILL NOT BE SUPPORTED FROM JANUARY 1996

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	1	1	0	Function			

These functions have been used by special receivers.

Function Bit	State 0	State 1
0	Pan Speed Low	Pan Speed High
1	Out Standby	In Standby
2	Auto Iris (Window) Off	Auto Iris (Window) On
3		Test

5.2. Frame 9 Unsupported Use

Frame	9
Function:	Camera Functions
Action:	
History	FUNCTIONALITY WILL NOT BE SUPPORTED FROM JANUARY 1996

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
1	0	0	1	Function			

These functions have been used by special receivers. For camera functions

Function N°	Function
0	Display On
1	Display Off
2	Increment Beam
3	Decrement Beam
4	Increment Target Voltage, or Camera Auto Iris Level
5	Decrement Target Voltage, or Camera Auto Iris Level
6	Increment Electronic Focus
7	Decrement Electronic Focus
8	Increment Black Level
9	Decrement Black Level
A	Increment Auto Iris Level
B	Decrement Auto Iris Level
C	Increment Vertical Position of Caption
D	Decrement vertical position of Caption
E	Store in NVRam
F	Not Used

5.3. Frame 10 Unsupported Use

Frame	10
Function:	Two consecutive bytes used to pass data
Action:	First Byte is pointer
History	FUNCTIONALITY WILL NOT BE SUPPORTED FROM JANUARY 1996

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
1	0	1	0	Function			

These functions have been used by MASWEP.

Function N°	Second Pointer Operation
0	
1	Instruction for Long Data
2	Clear Line or Page
3	

Action: Second Byte is Data if Pointer is Instruction for Long Data

Function N°	Operation
0	- LSB Data -
1	- Data-
2	- Data-
3	- MSB Data-

Action: Second Byte is Data if Pointer is Clear Line or Page

Function N°	Operation
0	Clear Page i.e. Lines 1 to 8
1	Clear Line 1
2	Clear Line 2
3	Clear Line 3
4	Clear Line 4
5	Clear Line 5
6	Clear Line 6
7	Clear Line 7
8	Clear Line 8
9	Clear Line 9
A	Flash Current Lines
B	Not Used
C	Not Used
D	Not Used
E	Not Used
F	Not Used

5.4. Frame 11 Unsupported Use

Frame	11
Function:	Is Four Nibbles of information transferred in Four Bytes
Action:	
History	FUNCTIONALITY WILL NOT BE SUPPORTED FROM JANUARY 1996

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
1	0	1	1	Function			

These functions have been used by addressable receiver systems.

Pointer	Data MSB	Data LSB	Check-sum

Action: First byte

Function N°	Function:- Pointer Operation
0	
1	The Data Byte is to be used as Address
2	
3	

Action: Second byte

Function N°	Function:- Pointer Operation
0	- LSB Data -
1	- Data -
2	- Data -
3	- MSB Data-

Action: Third byte

Function N°	Function:- Pointer Operation
0	- LSB Data -
1	- Data -
2	- Data -
3	- MSB Data-

Action: Fourth byte

Function N°	Function:- Pointer Operation
0	- Checksum -
1	- Checksum -
2	- Checksum -
3	- Checksum -

The Checksum is based on the following: -

Checksum = □ (Transmitted data but not including the Pointer or the Checksum))

5.5. Frame 12 Unsupported Use

Frame	12
Function:	Is Eight Nibbles of information transferred in Eight Bytes
Action:	Is the same as Frame 11 but has Eight Nibbles
History	FUNCTIONALITY WILL NOT BE SUPPORTED FROM JANUARY 1996

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
1	1	0	0	Function			

These functions have not been used.

Pointer	Data 1 MSB	Data 1 LSB	Data 2 MSB	Data 2 LSB	Data 3 MSB	Data 4 LSB	Check-sum

The Checksum is the same as 5.6

5.6. Frame 13 Unsupported Use

Frame	13
Function:	Camera Functions
Action:	
History	FUNCTIONALITY WILL NOT BE SUPPORTED FROM JANUARY 1996

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
1	1	0	1	Function			

These functions have been used by MASWEP. For camera functions

Function N°	Function
0	Not Used
1	Camera Number 1
2	Camera Number 2
3	Camera Number 3
4	Camera Number 4
5	Camera Number 5
6	Camera Number 6
7	Camera Number 7
8	Camera Number 8 / CAMSEL
9	HELP
A	RQS:- Request for Service
B	PH:- Priority Hold
C	Not used
D	Not Used
E	Not Used
F	Not Used

CAMSEL Must be sent before a camera can be selected
Help Displays all Camera captions pertinent to the Operators Control Unit (OCU)
RQS OCU requesting access to a camera for control
PH OCU denying access to another OCU for Control

5.7. Frame 14 Unsupported Use

Frame	14
Function:	Loads data into DSP
Action:	
History	FUNCTIONALITY WILL NOT BE SUPPORTED FROM JANUARY 1996

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
1	1	1	0	Function			

These functions have been used by MASWEP.

Robinson, Stephen

From: Smith, Dave
Sent: Saturday, October 11, 1997 12:51 PM
To: Robinson, Stephen
Subject: FW: Baxall

Steve:
Welcome back! Could you please provide me with any questions that remain on your part. Cynthia believes that Gerrit has made it clear which of the protocols we would need to interface with, and that you have all necessary information. They have convinced me that this capability carries significant revenue and political benefits.

I would like to introduce this capability along with the other interface options (Burle and AD) in the Spectra '98 package. While the Engineering release of this is scheduled to be soon, the actual introduction will be delayed because we have four months worth of PMD chips. Could it be possible to mount a project to incorporate the Baxall protocol? I don't have any technical info. necessary to write the phase II requirements.

Please let me know the "Engineering side" of all this.

Wanting more as always,

Dave

-----Original Message-----
From: Tuttle, Cynthia
Sent: Friday, October 10, 1997 4:51 PM
To: Cooper, Cliff
Cc: Martin, David; Hurenkamp, Gerrit; Smith, Dave; Robinson, Stephen
Subject:

Hi Cliff,

Now that we have the Baxall protocol in-house (in Stephen Robinson's possession), we understand we need to provide estimated annual units/$ to help prioritize the project of having Spectra respond to Baxall commands.

If we had the capability today, we estimate annual unit sales at 1,000 and volume at $1.5M.

Stop reading here if you're happy with the present Product Development Process. Fill in the blanks on the form and send it off.
Proceed at your own risk if you choose to continue!

Today, of course, we have the best dome in the market. Just as we did when we introduced it at IFSEC in May of this year. Since that was six months ago, we could safely estimate having lost $750K in business since then.

If we linger on, and allow the competition to introduce like or better products, the estimation is significantly reduced for obvious reasons. But I'm not so sure they're obvious to everyone.

I'm still uncomfortable with how our present Product Development Process apparently prioritizes projects based on EAU's and volume only. While we're all fighting for limited resources reportedly booked through the year my seven-year-old graduates high school (college?), I simply must communicate the other, not-so-tangible benefits of having this project completed [before I have to go face customers, again, empty-handed, *next* May]:

a) the longer we go without this capability, the more entrenched our competitor's (Baxall speaking, but not-as-nice-as-Spectra) domes become. It will cost us more, and we will have to work harder to unseat them,

b) we are investing huge dollars right now, in developing Pelco's image in the European market. We don't intend to *own* the market, just demonstrate we are committed to, and understand the customers' needs there. Without the capability 90% of our competitors possess, we are just another ignorant American manufacturer trying to take

advantage of favorable trade and economic conditions the EU offers.

That about sums it up. About the only outstanding not-so-tangible benefit is related to point "b": above: it's really hard to explain to people why, as "technological leaders" of the industry, we cannot accomplish in *one year* what 90% of the rest of the suppliers provide to the market *built-in to their products upon introduction....*

but,

I guess that's why we've got sales guys. I can't explain it. I'm in Marketing. My job is to identify market requirements and implement programs to meet those needs at Pelco.....

Please don't hesitate to contact me with any questions you may have.

Kindest regards,
Cynthia

Robinson, Stephen

From: Robinson, Stephen
Sent: Monday, January 05, 1998 3:48 PM
To: Hurenkamp, Gerrit
Subject: Baxall Protocol

Gerrit:

I just got an e-mail from Peter Beare and he sounds encouraging about putting the translator into Spectra '98.

He said something interesting though and I thought I'd share it with you and maybe you can tell me what's going on?

He says:

"I am all for you building a dome translator into your dome. We would be interested in selling this as we will not be making domes. However, we have not implemented your protocols but could do with a months notice. Perhaps the best thing is for us to give you our circuit diagrams and a PIC code for the translations. If you have any other ideas..."

He makes it sound like they don't have a converter but are ready to help write one. I thought that it was already done and that all we needed to do was tweak it a little. Can you help clear this up for me?

Thanks,

Stephen L. Robinson

To: Stephen L. Robinson, [73203,3465]
From: Peter Beare, [100546,3673]
Date: 7/10/97, 3:29 PM
Re: Baxall protocol

Thank you for your mail. I will send you the protocols for the ZTX6 Baxnet, Down the co-ax and Pyramid sytems this next week.
The following is an overview of these systems.
Pyramid
Is an LON protocol and works on both RS485 and Echelons on Tranceiver FTT10 the transmision speeds of these is as follows:-

RS485 ...	78K	Manchester Encoded
RS485 ...	9K8	Manchester Encoded
FTT10	78K	Manchester Encoded
Fibre	78K	Manchester Encoded
Fibre	9K8	Manchester Encoded

Apart from the fibre the other two trancievers are twisted pair. The Echelon corp are an American company. Because no SNVTS are available for the CCTV industry we have defined a number of network variables, these are in a standard document.

ZTX6 ZMX (Baxnet)
This is a standard ACK NAK RS485 network with STX, ETX modifiers retry etc. This is very easy to implement and has been designed so to do. Again this is a standard document from us.

Down the co-ax
This uses the blanking period just after equalisation to send data. It is a uni-directional system. We have this as an in house technical document I will check on its last update. It is not easy to implement.

I look forward to hearing about your protocol and after we have both signed a bi-directional Non disclosure agreement then I guess these documents can be sent.

Best Regards

Peter Beare Development Director.

Stephen L. Robinson

From: Hurenkamp, Gerrit <GHurenka@firewall1.pelco.com>
To: slrob@lightspeed.net
Cc: wklampfl@ix.netcom.com; tcovacev@pelco.com; ctuttle@pelco.com
Subject: Baxall
Date: Friday, July 11, 1997 11:23 AM

Steve,

Here are the address details for Baxall (can be found on the Internet as well).

Baxall Security limited
Unit 1 Castle Hill Horsfield Way
Bredbury park Industrial Estate
Bredbury
Stockport Cheshire SK6 2SU
England

Contact: Peter Bear, Development director
John Morton, General Manager

Phone: 011 44 161 406 6611
Fax: 011 44 161 406 7677 (R&D)
011 44 161 406 8828 (General)

This should help getting in touch with them.

Gerrit

> -----Original Message-----
> From:wklampfl@ix.netcom.com [SMTP:wklampfl@ix.netcom.com]
> Sent: Friday, July 11, 1997 8:44 AM
> To: slrob@lightspeed.net
> Cc: tcovacev@pelco.com; intl@pelco.com; ghurenka@pelco.com;
> dsmith@pelco.com; Martin, David; cynthia@cybergate.com;
> ctuttle@pelco.com; 75102@ix.netcom.com; 2717@compuserve.com
> Subject: Fwd: VideoWise / Philtech / Baxall
>
> Steve,
>
> Regarding Baxall, Teri and/or Laura should be able to provide phone
> and fax contact numbers (from QANTEL). See 00NERON.
> Also, don't hesitate to contact Mike Cox directly in South Africa if
> you need additional help in getting information.
>
> Thanks,
> Werner
>
>
>

> ------Begin forward message----------
>
> Return-Path: <slrob@lightspeed.net>
> Received: from lsbsdi1.lightspeed.net (root@lsbsdi1.lightspeed.net
> [204.216.64.33]) by ixmail1.ix.netcom.com (8.7.5/SMI-
> 4.1/Netcom)
> id GAA15067; Thu, 10 Jul 1997 06:55:01 -0700 (PDT)
> Received: from slrob.lightspeed.net (fsn-ppp24.lightspeed.net
> [207.113.242.43])
> by lsbsdi1.lightspeed.net (8.8.6/8.8.6) with ESMTP id GAA04719;
> Thu, 10 Jul 1997 06:54:56 -0700 (PDT)
> Message-Id: <199707101354.GAA04719@lsbsdi1.lightspeed.net>
> From: "Stephen L. Robinson" <slrob@lightspeed.net>
> To: "Werner Klampfl" <wklampfl@ix.netcom.com>
> Cc: "Cynthia Tuttle" <ctuttle@pelco.com>
> Subject: VideoWise / Philtech / Baxall
> Date: Thu, 10 Jul 1997 06:55:00 -0700
> X-MSMail-Priority: Normal
> X-Priority: 3
> X-Mailer: Microsoft Internet Mail 4.70.1161
> MIME-Version: 1.0
> Content-Type: text/plain; charset=ISO-8859-1
> Content-Transfer-Encoding: 7bit
>
> Greetings;
>
> Just making sure everyone knows the status of these projects.
>
> 1) I've tried to get in touch with a Peter Baer at 100546,3673 at
> CompuServe but according to CompuServe there is no Peter Baer at that
> address. I fired off a message to that address anyway and (as
> expected)
> received no response. That means that, until we find a better way of
> contacting Baxall, the project is stuck.
>
> 2) I've been in contact with PhilTech and that contact passed me off
> to
> VideoWise. I told the guy at VideoWise that I had their "Abridged
> protocol
> reference Release 1.10 (97.03.18). He says that's definately not
> enough
> and that he'd be sending me more information soon. Nothing so far.
>
> As has been true all along... I need specifications, protocols, and
> reliable contacts. I will continue to pursue this as time permits but
> any
> help would be greatly appreciated.
>
> Thanks, SLR
>
> ------End forward message----------
>

Stephen L. Robinson

From: wklampfl@ix.netcom.com
To: slrob@lightspeed.net
Cc: tcovacev@pelco.com; intl@pelco.com; ghurenka@pelco.com; dsmith@pelco.com; dmartin@pelco.com; cynthia@cybergate.com; ctuttle@pelco.com; 75102@ix.netcom.com; 2717@compuserve.com
Subject: Fwd: VideoWise / Philtech / Baxall
Date: Friday, July 11, 1997 8:43 AM

Steve,

Regarding Baxall, Teri and/or Laura should be able to provide phone and fax contact numbers (from QANTEL). See 00NERON.
Also, don't hesitate to contact Mike Cox directly in South Africa if you need additional help in getting information.

Thanks,
Werner

------Begin forward message----------

Return-Path: <slrob@lightspeed.net>
Received: from lsbsdi1.lightspeed.net (root@lsbsdi1.lightspeed.net [204.216.64.33]) by ixmail1.ix.netcom.com (8.7.5/SMI-
4.1/Netcom)
id GAA15067; Thu, 10 Jul 1997 06:55:01 -0700 (PDT)
Received: from slrob.lightspeed.net (fsn-ppp24.lightspeed.net [207.113.242.43])
by lsbsdi1.lightspeed.net (8.8.6/8.8.6) with ESMTP id GAA04719;
Thu, 10 Jul 1997 06:54:56 -0700 (PDT)
Message-Id: <199707101354.GAA04719@lsbsdi1.lightspeed.net>
From: "Stephen L. Robinson" <slrob@lightspeed.net>
To: "Werner Klampfl" <wklampfl@ix.netcom.com>
Cc: "Cynthia Tuttle" <ctuttle@pelco.com>
Subject: VideoWise / Philtech / Baxall
Date: Thu, 10 Jul 1997 06:55:00 -0700
X-MSMail-Priority: Normal
X-Priority: 3
X-Mailer: Microsoft Internet Mail 4.70.1161
MIME-Version: 1.0
Content-Type: text/plain; charset=ISO-8859-1
Content-Transfer-Encoding: 7bit

Greetings;

Just making sure everyone knows the status of these projects.

1) I've tried to get in touch with a Peter Baer at 100546,3673 at CompuServe but according to CompuServe there is no Peter Baer at that address. I fired off a message to that address anyway and (as expected) received no response. That means that, until we find a better way of contacting Baxall, the project is stuck.

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As has been true all along... I need specifications, protocols, and reliable contacts. I will continue to pursue this as time permits but any help would be greatly appreciated.

Thanks, SLR

------End forward message----------

Robinson, Stephen

From: Hurenkamp, Gerrit
Sent: Friday, January 09, 1998 2:07 PM
To: Robinson, Stephen
Subject: RE: Baxall Protocol

Steve,

They have a universal translator, that converts any Baxall up-the-coax signal (multiple versions supported) into an RS-422 signal that controls a dome, pan & tilt or receiver. Multiple manufacturer protocols can be supported using a look-up table. The product can be loaded with such a table AFTER production. The commands are very basic (as is the Baxall protocol) and allow you to control movement of pan, tilt, zoom and focus. There is, due to the simplicity of the Baxall protocol, not a manufacturer specific implementation. The product is already available off the shelve for a number of protocols.

We have given Baxall an MPT9500TD-X and a Spectra for test purposes. They have been working with that unit. This is why they can tell you they could get you a production version within one month. At the moment, Baxall is not yet selling it's converter for Pelco domes, because they do not yet have a specific application. They have not carried out the required tests for that (Baxall is ISO9001 certified) but know from working with a prototype, that this is not a problem. The look-up table probably needs to be optimized.

From his email I read that he is confirming again that he is willing to just give you the circuit diagrams and code so you could optimize the look-up table yourself and build the unit into the next Spectra release as an translator card. In case you need a transmitter for that, Peter has already mentioned to me that he would be happy to send you one (with an accompanying receiver).

Conclusively, unlike the BBS translator, the Baxall unit is not yet in production with the Pelco protocol. I hope this clarifies the situation.

Regards,,

Gerrit

-----Original Message-----
From: Robinson, Stephen
Sent: Monday, January 05, 1998 3:49 PM
To: Hurenkamp, Gerrit
Subject: Baxall Protocol

Gerrit:

I just got an e-mail from Peter Beare and he sounds encouraging about putting the translator into Spectra '98.

He said something interesting though and I thought I'd share it with you and maybe you can tell me what's going on?

He says:

"I am all for you building a dome translator into your dome. We would be interested in selling this as we will not be making domes. However, we have not implemented your protocols but could do with a months notice. Perhaps the best thing is for us to give you our circuit diagrams and a PIC code for the translations. If you have any other ideas..."

He makes it sound like they don't have a converter but are ready to help write one. I thought that it was already done

and that all we needed to do was tweak it a little. Can you help clear this up for me?

Thanks,

Stephen L. Robinson

BAXALL SECURITY LTD
Unit 1 Castlehill, Horsfield Way, Bredbury Park Industrial Estate,Bredbury,
Stockport, Cheshire SK6 2SU.
Telephone +44 (0) 161 406 6611 **Fax** +44 (0) 161 406 8988

Baxall Simplex Telemetry

Issue 4.0

Date: 22 September 1997

Filename: coaxtel4.doc

	Name/Authority	Signature	Date
Approved By:			

1. Document History

Issue State	Date of Issue	Reason for Change	(Main) Author
Draft A	16/05/94	First Issue for Discussion	M.P
Draft B	26/05/94	Corrections To First Issue	M.P
Issue 1.0	27/05/94	Released	M.P
Issue 2.0	17/08/94	Change to 4.3 Function bit 3	M.P
Issue 3.0	23/10/96	Advanced features changed and clarification added to the general description	J.J.C
Issue 4.0	23/6/97	Includes frames 9,10 and further clarification added to the general description	C.McK

2. Introduction

2.1. General

Baxall simplex telemetry is used to control simple receivers where camera movement is required with a few Pre-sets and auxiliary outputs. The serial telemetry can be transmitted via a variety of paths, Coax, 20mA, are the most common but other transmission paths can be used such as RS485, RS232 or Fibre Optic.

2.2. Scope

The object of this document is to define the interface used by the Baxall Simplex Telemetry. This information relates to Baxall products and any related products that use this communication interface. Section 6 is for information only as it relates to special products no longer supported by standard telemetry systems.

2.3. Related Documents

None

3. BAXALL SYSTEM INTERFACE REQUIREMENTS

3.1. Physical Layer for 20mA Serial

- Data rate 1200bps or 300bps + 1% - 1%
- 20mA when idle
- <3mA = logic 1
- >10mA = logic 0
- One twisted pair cable
- Max. cable length dependant on cable but typically 2 Km
- Transmitter should be active and the receiver passive with its input optically isolated via a bridge rectifier.

3.2. Physical Layer Coax Transmission

Both Standard and Alternate forms of coax serial communications require that the edges of the telemetry pulses to be slightly rounded by passing them through an RC filter.

Note: Telemetry pulses over 50% of the sync pulse height may cause problems with digital equipment. The current telemetry level has been set at 130 mV.

3.2.1. Coax Serial Standard

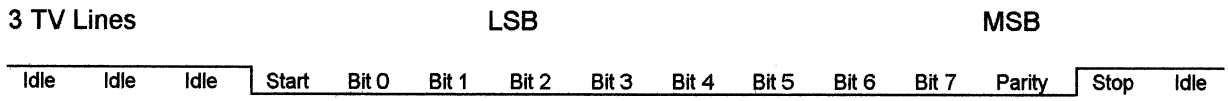
- Data rate 50u seconds per bit (20000bps) transmitted one bit per line after the Equalisation Pulses
- In Frame Signalling
- Logic 0 = 250kHz +/- 10Hz (1 Bit per line)
- Logic 1 = 222kHz +/- 10Hz (1 Bit per line)
- Coax Cable
- Max. cable length on URM70 1 Km. (range may be extended with higher quality cable)

3.2.2. Coax Serial Alternate

- Data rate 64u seconds per bit (20000bps) transmission gated with CCIR line Blank
- Phase critical after line blank pulse
- Logic 0 = 250kHz +/- 10Hz (1 Bit per line)
- Logic 1 = 222kHz +/- 10Hz (1 Bit per line)
- Coax Cable
- Max. cable length on URM70 1 Km. (range may be extended with higher quality cable)

3.2.3. Data Link Layer

- Asynchronous data transfer.
- Simplex
- 1 Word of data shall consist of:
- 1 Start bit (0)
- 8 Data bits
- 1 Parity bit (Even)
- 1 Stop bit (1)
- Even Parity
- Baud rate (Standard) of 50u seconds per bit. 11 bits per frame. 20ms per frame.
- Baud rate (Alternate) of 64u seconds per bit. 11 bits per frame. 20ms per frame.
- Start bit = binary 0 = Space state
- Stop bit = binary 1 = Mark state
- The least significant bit of the least significant byte shall be transmitted first
- Inter word gap (idle) = 20m seconds (CCIR)
- Inter word gap (idle) = 16.6m seconds (NTSC)



Bits shown in order transmitted
Figure 1: General Word Format

3.3. Telemetry Overview

The telemetry transmitters place control signals directly on the video coax, using a frequency-shifted burst of carrier lasting approximately 1 mS, during the vertical blanking interval. The ZT3, ZT4 and ZT5 transmitters will continuously send telemetry to the appropriate receiver. Later models of transmitter such as ZT53, ZT54 and ZT6 only transmit telemetry for an unspecified pre-determined period (usually about 90 seconds) after the last control function is released. This extended transmission was intended for receiver tuning.

Note: All new telemetry transmitters should have a tuning mode that will transmit telemetry for 10 seconds for receiver tuning.

Note: New telemetry transmitters should send telemetry for 30 seconds after the last control function is released.

The coded word appropriate to the state of the transmitter keyboard is assembled by the program and output in serial form to a programmable divider. An enable signal is also output to the divider and these are timed to appear after the end of the vertical sync pulse. The enable signal removes the reset from the divider and the flip-flop that follows thus enabling the divider to count down the 4 MHz system clock. The divider is pre-loaded with 8 or 7, depending on whether the telemetry data is required to be 0 or 1 respectively, and it therefore divides the clock by either 8 or 9. The output from the divider is then divided by 2 in the flip-flop to give an even mark/space ratio. The status of the telemetry signal thus determines what frequency appears at the flip-flop output, a logic 1 giving 222 kHz and 0 giving 250 kHz. The telemetry carrier is then injected onto the video signal at the input to the transmitter so that it has a direct path through to the associated receiver.

Twisted-pair telemetry operation is also possible with some transmitters, the same basic data format and command codes are used but the data signal is usually in the form of a 20mA current loop output. The transmitter data rate is selectable between 1200Bd and 300Bd. Other data formats E.g. RS232, RS485 Etc can be provided.

3.4. Command Updates

Any updates to commands should be sent to a telemetry receiver twice. This is done to give 2 chances of reception since no acknowledge is sent from the receiver, the receiver can respond to either of the signals and does not have to receive both. This new frame information should then be added to the refresh cycle. After the command update has been sent the transmitter should go into the refresh mode. When a momentary function is being held down, the refresh mode continues until the momentary command is released, where the command is again sent twice before returning to the refresh mode. When a latching function changes state, the new state is transmitted twice before returning to the refresh mode.

3.5. Refresh Mode

The transmitter should cycle through the telemetry frames 0 to 5 in sequence with all relevant bits set or cleared as indicated by previous commands relating to those frames.

Example:

Begin with pan command:
21 21
now begin refresh:
30 00 10 21 00 10 21 30 .... Etc
Release pan command
20 20
Now refresh again:
30 00 10 20 30 00 10 20 30.... Etc

(Most old transmitters will also include frames 4 and 5 in the refresh mode; some may have included frames 6 & 7.)

Note: All new transmitter designs shall only cycle through the telemetry frames 0 to 5 in sequence, any other frames shall only be refreshed when data in that frame changes state.

3.6. Video telemetry timings

3.6.1. Asynchronous (Standard)

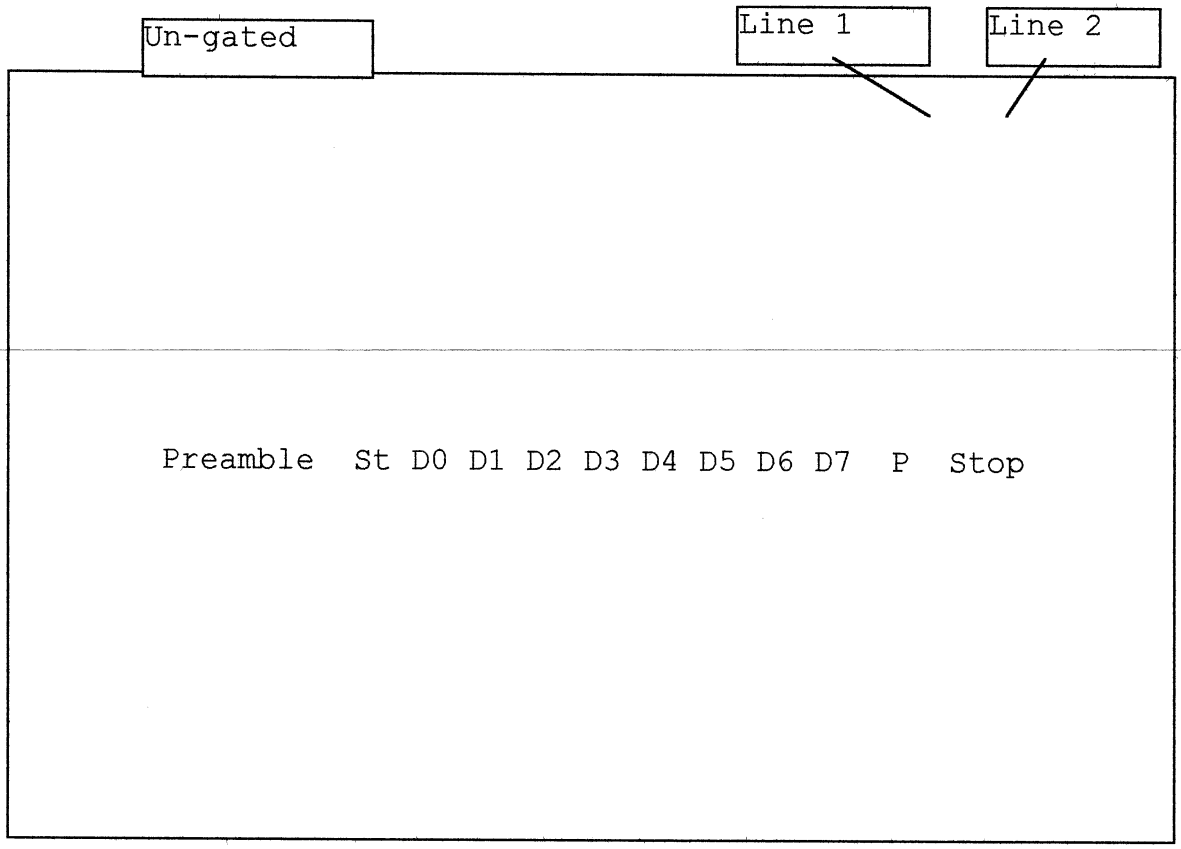
Data format as specified in the spec. but with an add preamble period to allow the PLL in the receiver to lock reliably.
Data bit width for all bits from the Start Bit to the Stop Bit is 50.5μS.
Pre-amble is three-bit widths wide (151.5μS) starting immediately after the equalisation pulses.
Synchronous ("Clean" / Alternate)

Data format as specified. but with an added preamble period to allow the PLL in the receiver to lock reliably.

Data bit width for each bit from the Start Bit to the Stop Bit is approximately the same length as video portion of the horizontal synch. pulse. The front and back porches of the video synch. pulse should be clear of any telemetry carrier, which should remain off until the video synch. pulse has passed.

Pre-amble is a maximum of three widths wide starting immediately after the equalisation pulses. On some fields this will result in a two-and-half line preamble period. The preamble is switched off only at the synch. pulse prior to sending the Start Bit.

3.6.2. The Synchronous Telemetry Data is as below :



The solid signal burst at the start of the telemetry data is a carrier pre-amble. This is inserted to allow the PLL in the receiver sufficient time to stabilise and lock to the following data signal. This pre-amble is, therefore, required in the EIA mode to ensure reliable operation of the PLL. This is followed by the telemetry data start bit, the eight data bits with the least significant bit first, the parity bit set for even parity and finally the data stop bit. The entirety of this data stream is required for correct operation of the telemetry receivers.

Note : Synchronous telemetry may cause problems with the first 2 lines of a NTSC pictures.

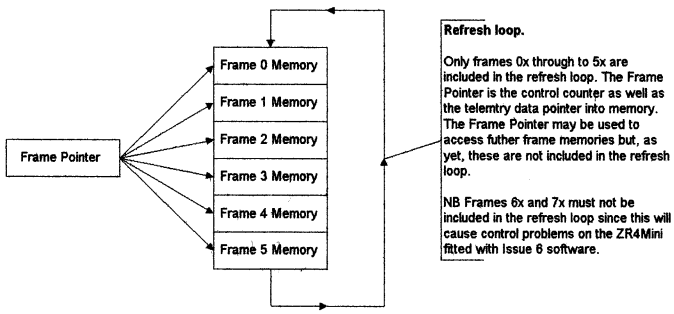
3.7. New Products

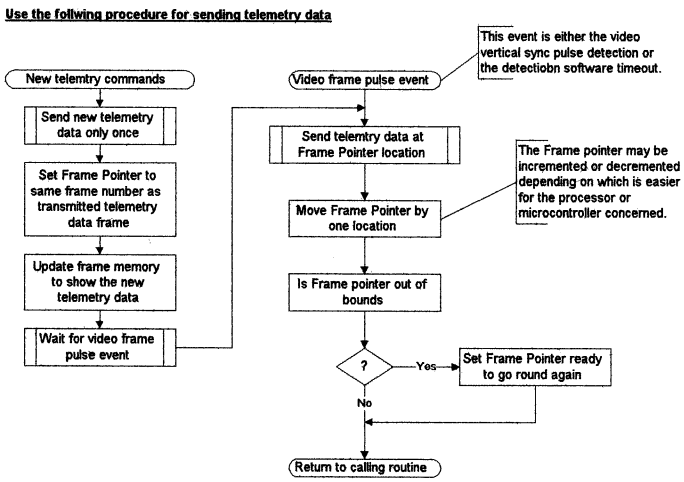
All new products should initialise unused frames and be able to support the Enhanced Pre-set Programming (Frame 7) command. The recommended command for recalling Pre-set positions is Frame 6 which is compatible with the ZR Mini series. The older ZR4 Receiver with Pre-sets only operates with Frames 4 and 5.

Telemetry Receivers supporting variable speed heads should respond to both Frame 2 and Frames 9 & 10. If only Frame 2 is received (i.e. a non variable speed, or an older transmitter is connected) the receiver should start at a slow speed which increases the longer the movement continues to be commanded in Frame 2. New transmitters should initialise Frames 9 and 10 to 0000B data if they do not support variable speed operation.

3.8. Frame Refresh should be in the form :

Baxall Telemetry Refresh Method





3.9. The following 'C' code further clarifies Refresh operation :

```
/*****************************************
 * Main program entry point
 *****************************************/
void main( void )
{
  .
  .
  while( TRUE )
  {
    .
    .
    if( do_keyboard() )        // If telem keypress found, Refresh_Ctr=new frame no.
      frame_update();          // Send it immediately, once only

    frame_refresh();           // Send refresh or repeat new commands
    .
    .
  }
}

.
.

/*****************************************
 * Update telemetry frames, new data
 *****************************************/
// Ensure Refresh_Ctr is set up prior to calling this function
void frame_update( void )
{
  Refresh_Ptr = Frame_Data + Refresh_Ctr;

  send_telem_data();                    // Uses Refresh pointer to collect data to be sending
}
// Upon returning from this function, the Refresh_Ctr has not been altered
.
.

/*****************************************
 * Send telemetry refresh data
 *****************************************/
void frame_refresh( void )
{
  frame_update();

  Refresh_Ctr++;

  if( Refresh_Ctr == 6 )       // Out of bounds?
    Refresh_Ctr = 0;
}
.
```

4. DATA WORD FORMAT

The upper four data bits are decoded to give a frame number and the lower four usually provide four function selections per frame, although not all possible frames are used. The codes and data format used are compatible with all Baxall telemetry receivers, the standard frames and their functions are listed below.

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Frame				Function			

Frame	Action		
0	Zoom and Focus		
1	Iris, Lights, Aux. 4		
2	Pan and Tilt		
3	Power, Auto Pan, Wipe, Wash		
4	Go to Pre-sets 1,2,3,4		
5	Go to Pre-sets 5,6,7,8		
6	Go to Pre-sets 1 - 15		
7	Store Pre-sets 1 - 15		
8	Auxiliary Control 7 - 15		
9	Pan Speed		
10	Tilt Speed		
11			
12			
13			
14			
15			

4.1. Frame 0

Frame	0
Function:	Zoom & Focus
Action:	In or Out Near or Far
History	

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	0	0	0	Function			

This frame controls the Zoom and the focus mechanism

Function Bit	State 0	State 1
0		Zoom
1	Out	In
2		Focus
3	Near	Far

Note : When Zoom or Focus movement has stopped the corresponding bits 1 or 3 MUST be reset to ZERO.

4.2. Frame 1

Frame	1
Function:	Iris, Lights & Aux4
Action:	Open or Close. On or Off
History	

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	0	0	1	Function			

This frame controls the Iris to open or close it. The Lights control is also switched as is Auxiliary 4

Function Bit	State 0	State 1
0		Iris
1	Open	Close
2	Lights Off	Lights On
3	Aux 4 Off	Aux 4 On

Note : When Iris movement is stopped both bits 1 and 0 MUST be reset to State ZERO

4.3. Frame 2

Frame	2
Function:	Pan & Tilt
Action:	Right or Left. Up or Down
History	

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	0	1	0	Function			

This frame controls a Pan and Tilt mechanism

Function Bit	State 0	State 1
0		Pan
1	Left	Right
2		Tilt
3	Up	Down

Note : When Pan or Tilt movement has stopped the corresponding bits 1 or 3 MUST be reset to ZERO.

4.4. Frame 3

Frame	3
Function:	Power, Auto Pan, Wipe & Wash
Action:	On or Off
History	

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	0	1	1	Function			

Each of the functions controlled by this frame are On or Off functions.

Function Bit	State 0	State 1
0	Power Off	Power On
1	Auto Pan Off	Auto Pan On
2	Wiper Off	Wiper On
3	Washer Off	Washer On

4.5. Frame 4

Frame	4
Function:	Used for Recalling Pre-set Positions (Previously used for Spares On/Off)
Action:	On or Off
History	

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	1	0	0	Function			

Function Bit	State 0	State 1
0	Off	Pre-set 1 On
1	Off	Pre-set 2 On
2	Off	Pre-set 3 On
3	Off	Pre-set 4 On

4.6. Frame 5

Frame	5
Function:	Used for Recalling Pre-set Positions (Previously used for Spares On/Off)
Action:	On or Off
History	

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	1	0	1	Function			

Function Bit	State 0	State 1
0	Off	Pre-set 5 On
1	Off	Pre-set 6 On
2	Off	Pre-set 7 On
3	Off	Pre-set 8 On

Note : Some transmitters leave more than one Pre-set bit in Frames 4 and 5 ON simultaneously. Receivers action the most recently set Pre-set Bit. Any new transmitters using these frames should only set one PRESET bit at a time.

4.7. Frame 6

Frame	6
Function:	Recall Pre-sets
Action:	
History	

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	1	1	0	Function			

Valid Function bits 0001 to 1000, corresponding to Pre-sets 1 to 8 respectively. Values 0000, and 1001 to 1111 reserved for future expansion

NOTE: Frame 6 has not been used up to now (Feb 97) in any transmitter. All ZR4-Mini receivers in the field will respond to this frame but only to recall pre-sets 1 - 8.

4.8. Frame 7

Frame	7
Function:	Store Pre-set - store the current Pan, Tilt, Zoom and Focus setting as Pre-set.
Action:	
History	**All ZR4Mini receivers in the field (Feb 97) only respond to pre-sets 1 - 8.**

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	1	1	1	Function			

Valid Function bits 0001 to 1000, corresponding to Pre-sets 1 to 8 respectively. Values 0000, and 1001 to 1111 reserved for future expansion.

4.9. Frame 8

Frame	8
Function:	Auxiliary 7 to 14
Action:	
History	**Frame 8 has not been used up to now (Feb 97) in any transmitter or receiver.**

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
1	0	0	0	Function			

Bit 3	Action
0	Auxiliary Off
1	Auxiliary On

Bit 2	Bit 1	Bit 0	Function
0	0	0	Auxiliary 7
0	0	1	Auxiliary 8
0	1	0	Auxiliary 9
0	1	1	Auxiliary 10
1	0	0	Auxiliary 11
1	0	1	Auxiliary 12
1	1	0	Auxiliary 13
1	1	1	Auxiliary 14

4.10. Frame 9

Frame	9
Function:	Pan Speed
Action:	
History	**Frame 9 has not been used up to now (Feb 97) in any transmitter or receiver.**

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
1	0	0	1	Function			

Function values of 0001 to 1111 (1-15 decimal) represent increasing speed.
Keyboards without a joystick or speed varying mechanism send a magnitude of 0, i.e. 0 equates to default speed. This frame is used in conjunction with frame 2, and if used must be included in the frame refresh loop and sent as a new command when it's value changes.

Note To improve the speed of response, ZTX6, differentiates between DC and AC receiver by only sending magnitude information to receivers defined as DC receivers (set up in the menus).

4.11. Frame 10

Frame	10
Function:	Tilt Speed
Action:	
History	**Frame 10 has not been used up to now (Feb 97) in any transmitter or receiver.**

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
1	0	1	0	Function			

Function values of 0001 to 1111 (1-15 decimal) represent increasing speed.
Keyboards without a joystick or speed varying mechanism send a magnitude of 0, i.e. 0 equates to default speed. This frame is used in conjunction with frame 2, and if used must be included in the frame refresh loop and sent as a new command when it's value changes.

Note To improve the speed of response, ZTX6, differentiates between DC and AC receiver by only sending magnitude information to receivers defined as DC receivers (set up in the menus).

5. Appendix

NOTE: USE OF THE FOLLOWING FRAME FUNCTIONALITY WILL NOT BE SUPPORTED FROM JANUARY 1996

The Following frames have been used is some special or low volume non-standard products:

5.1. Frame 6 Unsupported Use

Frame	6
Function:	Pan Speed, Standby, Auto Iris, Test Request
Action:	On or Off
History	FUNCTIONALITY WILL NOT BE SUPPORTED FROM JANUARY 1996

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	1	1	0	Function			

These functions have been used by special receivers.

Function Bit	State 0	State 1
0	Pan Speed Low	Pan Speed High
1	Out Standby	In Standby
2	Auto Iris (Window) Off	Auto Iris (Window) On
3		Test

5.2. Frame 9 Unsupported Use

Frame	9
Function:	Camera Functions
Action:	
History	FUNCTIONALITY WILL NOT BE SUPPORTED FROM JANUARY 1996

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
1	0	0	1	Function			

These functions have been used by special receivers. For camera functions

Function N°	Function
0	Display On
1	Display Off
2	Increment Beam
3	Decrement Beam
4	Increment Target Voltage, or Camera Auto Iris Level
5	Decrement Target Voltage, or Camera Auto Iris Level
6	Increment Electronic Focus
7	Decrement Electronic Focus
8	Increment Black Level
9	Decrement Black Level
A	Increment Auto Iris Level
B	Decrement Auto Iris Level
C	Increment Vertical Position of Caption
D	Decrement vertical position of Caption
E	Store in NVRam
F	Not Used

5.3. Frame 10 Unsupported Use

Frame	10
Function:	Two consecutive bytes used to pass data
Action:	First Byte is pointer
History	FUNCTIONALITY WILL NOT BE SUPPORTED FROM JANUARY 1996

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
1	0	1	0	Function			

These functions have been used by MASWEP.

Function N°	Second Pointer Operation
0	
1	Instruction for Long Data
2	Clear Line or Page
3	

Action: Second Byte is Data if Pointer is Instruction for Long Data

Function N°	Operation
0	- LSB Data -
1	- Data-
2	- Data-
3	- MSB Data-

Action: Second Byte is Data if Pointer is Clear Line or Page

Function N°	Operation
0	Clear Page i.e. Lines 1 to 8
1	Clear Line 1
2	Clear Line 2
3	Clear Line 3
4	Clear Line 4
5	Clear Line 5
6	Clear Line 6
7	Clear Line 7
8	Clear Line 8
9	Clear Line 9
A	Flash Current Lines
B	Not Used
C	Not Used
D	Not Used
E	Not Used
F	Not Used

5.4. Frame 11 Unsupported Use

Frame	11
Function:	Is Four Nibbles of information transferred in Four Bytes
Action:	
History	FUNCTIONALITY WILL NOT BE SUPPORTED FROM JANUARY 1996

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
1	0	1	1	Function			

These functions have been used by addressable receiver systems.

Pointer	Data MSB	Data LSB	Check-sum

Action: First byte

Function N°	Function:- Pointer Operation
0	
1	The Data Byte is to be used as Address
2	
3	

Action: Second byte

Function N°	Function:- Pointer Operation
0	- LSB Data -
1	- Data -
2	- Data -
3	- MSB Data-

Action: Third byte

Function N°	Function:- Pointer Operation
0	- LSB Data -
1	- Data -
2	- Data -
3	- MSB Data-

Action: Fourth byte

Function N°	Function:- Pointer Operation
0	- Checksum -
1	- Checksum -
2	- Checksum -
3	- Checksum -

The Checksum is based on the following: -

Checksum = ? (Transmitted data but not including the Pointer or the Checksum))

5.5. Frame 12 Unsupported Use

Frame	12
Function:	Is Eight Nibbles of information transferred in Eight Bytes
Action:	Is the same as Frame 11 but has Eight Nibbles
History	FUNCTIONALITY WILL NOT BE SUPPORTED FROM JANUARY 1996

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
1	1	0	0	Function			

These functions have not been used.

Pointer	Data 1 MSB	Data 1 LSB	Data 2 MSB	Data 2 LSB	Data 3 MSB	Data 4 LSB	Check -sum

The Checksum is the same as 5.6

5.6. Frame 13 Unsupported Use

Frame	13
Function:	Camera Functions
Action:	
History	FUNCTIONALITY WILL NOT BE SUPPORTED FROM JANUARY 1996

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
1	1	0	1	Function			

These functions have been used by MASWEP. For camera functions

Function N°	Function
0	Not Used
1	Camera Number 1
2	Camera Number 2
3	Camera Number 3
4	Camera Number 4
5	Camera Number 5
6	Camera Number 6
7	Camera Number 7
8	Camera Number 8 / CAMSEL
9	HELP
A	RQS:- Request for Service
B	PH:- Priority Hold
C	Not used
D	Not Used
E	Not Used
F	Not Used

CAMSEL Must be sent before a camera can be selected
Help Displays all Camera captions pertinent to the Operators Control Unit (OCU)
RQS OCU requesting access to a camera for control
PH OCU denying access to another OCU for Control

5.7. Frame 14 Unsupported Use

Frame	14
Function:	Loads data into DSP
Action:	
History	FUNCTIONALITY WILL NOT BE SUPPORTED FROM JANUARY 1996

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
1	1	1	0	Function			

These functions have been used by MASWEP.