

Installation Instruction

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Introduction

A Digital Camera Station forms the receiver end of a digital remote control system. A digital remote control system is used to control camera functions such as pan, tilt, zoom, focus and iris, light on / off and open / close gates etc..

A digital remote control system has the advantage of long transmission distance and low cable installation cost due to the fact that a standard 2 x 0.6 mm twisted pair cable may be used for the control of up to 16 functions.

The Digital Camera Stations BDR-550 and BDR-551 is a new series of advanced camera stations from Ernitec. This new series has been designed with special attention to transmission safety and stability.

The BDR-550 and BDR-551 camera stations are addressable which means that up to 255 units can be controlled via one twisted pair line.

The BDR-550 and BDR-551 are delivered as self-contained units with power supplies, in a weather proof box and can be used in connection with SYSTEM 500M and SYSTEM 1000M.

The BDR-550 and BDR-551 can also be controlled directly from the keyboards 1500M, 1501M, 1502M or 1503M.

ERNA Format:

The BDR-550 and BDR-551 are controlled via the new ERNA protocol (Ernitec Asynchronous Serial One-way Camera Control).

With this new camera control protocol it is possible to use standard modems between a system and a camera station if the distance is more than 1200 meter (between two BDR-5XX more than 3000 meter).

The new ERNA protocol can be generated from any serial port, which means that camera control can be made via the PC's RS-232-C port or a PLC.

The format of this new protocol is as follows (Version 2.0, Release 961016):

Physical format:

Baud rate = 2400
 Parity Bit = None
 Data Bit = 8
 Stop Bit = 1

Frame format:

Header	Address	Command	Data 1	Data 2	Checksum
STX	0-255	1-17	0-255	0-255	Sum of previous bytes
02 Hex	255=Broadcast				

Commands:

Command	Function	Data 1	Description	Data 2	Description	CS Type
1	Relays	0-255	Bit 0 Pan right 1 Pan left 2 Tilt up 3 Tilt down 4 Zoom wide 5 Zoom tele 6 Focus near 7 Focus far	0-255	Bit 0 Iris open 1 Iris close 2 AUX1 3 AUX2 4 AUX3 5 AUX4 6 AUX5 7 AUX6	ALL
2	Call preposition	1-128	Prepos number	----	Not used	BDR-55X/575
3	Start Sequence prepos	0		----	Not used	55x/575/ICU
4	Text on/off	0		----	Not used	BDR-55x
5	Save prepos	1-128	Prepos number	----	Not used	55x/575/ICU
6	Insert prepos in stack	1-128	Prepos number	----	Not used	55x/575/ICU
7	Delete prepos from stack	1-128	Prepos number	----	Not used	55x/575/ICU
8	Clear seq. stack	0		----	Not used	55x/575/ICU
9	Show seq. stack	0		----	Not used	BDR-55x
10	Latch AUX	0-255	Bit 2 AUX1 3 AUX 2 4 AUX 3 5 AUX 4 6 AUX 5 7 AUX 6 Low=Latch High=No latch	----	Not used	BDR-55x
11	Sequence dwelltime	0-255	Seconds	----	Not used	55x/575/ICU
12	Homepos	0-255	Prepos number 0=Disabled	0-255	10*1sec time-out	55x/575/ICU
13	AUX on/ off	1-8	Relay number	0-1	0=Off 1=On	55x/575/ICU
14	PT Speed	0-255	Pan Speed	0-255	Tilt Speed	BDR-575/ICU
15	Auto-paning	1	Speed	0-255		BDR-575/ICU
		2	Limits	1/2		
		3	Start	0		
16	Camera Set-up	1	Mode	0-255	Bit 0 Gain Ctrl. remote. 1 White bal. remote. 2 Contour corr. remote. 3 Shutter speed remote. 4 Gain auto. 5 White val. auto.	ICU
		2	Gain control.	0-255	0=low 255=high	
		3	White balance.	0-255	0=Warm 255=Cold	
		4	Contour corr.	0-255	0=Sharp 255=Soft	
		5	Shutter speed	0-255	0=Fast 255=Slow	
		6	Background comp.	0	Not used	

Command	Function	Data 1	Description	Data 2	Description	CS Type
17	Alarms	1	Configuration	0-255	Bit 0 Alarm 1 0=NC 1=NO 1 Alarm 2 0=NC 1=NO 2 Alarm 1 relay 0=Off 1=On 3 Alarm 2 0=Off 1=On 4 Alarm 1 priority 0=Low 1=High 5 Alarm 2 0=Low 1=High 6 Alarm 1 0=Disable 1=Enable 7 Alarm 2 0=Disable 1=Enable	ICU
		3	Alarm 1 Set-up	0-255	Bit 0-5 Preposition 6 Relay 1 0=Disable 1=Enable 7 Relay 2 0=Disable 1=Enable	
		2	Alarm 2 Set-up	0-255	Bit 0-5 Preposition 6 Relay 1 0=Disable 1=Enable 7 Relay 2 0=Disable 1=Enable	

Installation

Box Installation

The BDR-550 or BDR-551 should be mounted at a suitable location close to the video camera (max. 5 meter) where mains are available.

Refer to figure 1 for box layout.

The box should be mounted on a plain surface to avoid distortion resulting in possible leakage. Mount the box using the external lugs provided - do not drill additional hole as this may result in possible leakage.

If the box is mounted on a concrete surface or the like, use rawplugs and galvanised roundheaded screws $\varnothing 6 \times 35$ mm or similar.

If the box is mounted on a wooden surface, use galvanised roundheaded screws $\varnothing 6 \times 25$ mm or similar.

When mounted outside, the box should be fixed with the cable glands pointing downwards.

Mains Installation

Terminals marked with hazardous live symbol requires installation by an instructed person.

If permanently connected to mains, a readily accessible disconnect device shall be incorporated in the building installation wiring.

If pluggable connection to mains, the socket-outlet shall be installed near the equipment and shall be easily accessible.

Cable connections

It is of utmost importance that all cable connections are carried out, exactly as described, in order to avoid malfunction or damage to the camera station or the connected equipment.

All cables to and from the camera station are fed through the cable glands. Choose an appropriate size of gland for the actual cable and tighten the glands when all cables are connected. Refer to figure 2 for cable glands layout.

The choice of cable types is of importance for the optimal function of the camera station. The following table shows how the cable glands should be used:

No.	Size	Description
1	PG 11	Auxiliary connection cable
2	PG 11	Auxiliary connection cable
3	PG 11	Auxiliary connection cable
4	PG 13.5	Mains input cable
5	PG 11	Mains output cable
6	PG 11	Pan/tilt connection cable
7	PG 7	Pan/tilt feedback connection cable
8	PG 7	ERNA output cable
9	PG 7	Video output cable (Twisted Pair)
10	PG 9	Zoom lens control and feedback cable
11	PG 7	ERNA input cable
12	PG 9	Video input cable (Coax)
13	PG 9	Video output cable (Coax)

BDR-550 - BDR-551 Layout

The BDR-550 and BDR-551 have been designed for easy installation and set-up. Figure 3 shows the layout of the camera stations.

Description	
No.	BDR-550 / BDR-551
1	Mains connection
2	Mains fuse, 2 A slow
3	Mains switch
4	Fuse for mains output, 2 A slow
5	Mains output
6	Zoom lens connection incl. MAN/AUTO Iris switch
7	Feedback connection for Zoom, Focus, Pan and Tilt
8	ERNA in and output connection
9	Unbalanced video input
10	Balanced video output
11	Unbalanced video output
12	Balanced video output impedance setting
13	Video gain switch
14	Video Output (Service)
15	Service keyboard (OPTIONAL)
16	Power supply cable
17	Heater
18	Relay control flatcable
19	Terminal for connection of Auxiliary 5 function
20	Terminal for connection of Auxiliary 4 function
21	Terminal for connection of Auxiliary 3 function
22	Terminal for connection of Auxiliary 2 function
23	Terminal for connection of Auxiliary 1 function
24	Pan/Tilt connection terminal
25	Terminals for Pan/Tilt voltage
26	Screws holding keyboard cover
27	Screws holding Relay P.C.B cover
28	CCD Camera PSU (Max. 350 mA)

Mains connection

Connection of mains power is shown in figure 3 and 4:

- N = Neutral
- L1 = Live
- Ground is connected to the terminal marked with the ground sign.

Ensure that each terminal is connected to the corresponding terminal of the mains outlet (i.e. Phase to Phase, Neutral to Neutral and Ground to Ground). Otherwise malfunction or even damage to the camera station will occur.

For specification of mains, refer to *Specifications*

The BDR-550 - BDR 551 Digital Camera Stations must be used with a 3 wire mains connection and an earthed power outlet.

EMC (Electro Magnetic Compatibility)

All electronic equipment can emit or be sensitive to induced electromagnetic noise, which can be conducted by the connected wires or transmitted as electromagnetic fields.

Electromagnetic noise can cause malfunction or damage to the equipment.

The Series BDR-550 are tested and fulfils the following EMC standards:

- EN 50081-2 (Emmision)
- EN 50082-2 (Immunity)

These standards covers equipment placed in an industrial environment.

Safety

The Series BDR-550 fulfils the following safety standards:

- IEC 60950

Pan/Tilt connection

The Pan/Tilt is connected to the terminal block X1, refer to Figure 3 and Figure 5.

- L = Live (5)
- N = Neutral (6)
- PL = Pan Left (1)
- PR = Pan Right (2)
- TU = Tilt Up (3)
- TD = Tilt Down (4)
- Ground = Ground (7)

The numbers in () indicates the pin number of the MPT-1/10 pan/tilt. For further information, refer to the pan/tilt installation instruction.

Always connect the GROUND or EARTH wire.

Auxiliary connection

The auxiliary functions connected to terminal X2 to X6, allows control of mains supplied equipment or equipment supplied with an external voltage, such as 24 VDC etc. The auxiliary control is made with a normal open relay contact. Refer to figure 3 and figure 5.

Refer to *Specifications* for maximum load of the relay contacts.

When using high voltage auxiliary equipment, always connect the GROUND or EARTH wire.

If the auxiliary relays are used to control external powered equipment be careful not to exceed the maximum rating of the relays, refer to *Specifications* for maximum load of the relay contacts.

Motorised Lens connection

The Motorised lens is connected to terminal X3, refer to figure 3 and figure 6:

Terminal	Description	Mechatronics with Manual Iris		Mechatronics with Auto Iris	
		6 VDC	12 VDC	6 VDC	12 VDC
GND	Common	(7) Violet			
Z	Zoom	(8) Grey	(9) White	(8) Grey	(9) White
GND	Common	(10) Black			
F	Focus	(11) Brown	(12) Red	(11) Brown	(12) Red
GND	Common	(13) Orange		(14) Yellow	
I	Iris	(14) Yellow	(15) Green	(16) Blue	N/A
SW	Common	N/A		Connect to Common	
SW	Man./Auto select	N/A		(13) Orange	

The numbers in () indicate the wire number of the Mechatronics flatcable. For further information, refer to the Mechatronics installation instruction.

Feedback connection

The feedback signals from the Pan/Tilt and the Motorised Zoom Lens are connected to terminal X4, refer to figure 3 and 6.

Terminal	Description	Mechatronics Feedback	Pan/Tilt feedback
REF -	- Ref. Voltage	(3) Orange, (6) Blue	
REF -	- Ref. Voltage		Pin 2 on the feedback socket
REF +	+ Ref. Voltage	(1) Brown, (4) Yellow	
REF +	+ Ref. Voltage		Pin 1 on the feedback socket
Z	Zoom feedback	(5) Green	
P	Pan feedback		Pin 4 on the feedback socket
F	Focus feedback	(2) Red	
T	Tilt feedback		Pin 3 on the feedback socket

It is important that the feed-back signals are connected as shown above, otherwise it will not be possible for the Pan/tilt or lens to return to the programmed position.

ERNA input connection

The ERNA signal is connected to terminal X5, refer to figure 3 and 6.

It is important that the polarity of the connection is correct, otherwise it will not be possible to achieve control.

Note, the ERNA input is galvanic separated from the rest of the circuit in order to avoid ground loop problems.

DO NOT CONNECT THE SCREEN FROM THE CABLE TO THE CAMERA STATION CHASSIS.

ERNA output connection

The ERNA output signal is connected to terminal X6, refer to figure 3, 6 and 7.

In case of power failure the ERNA signal will be routed to the next camera station via a by-pass relay.

Video input connection

The unbalanced video from the camera is connected to terminal X7 marked VIDEO IN, refer to figure 3 and 6.

Balanced Video output connection

The BDR-550, BDR-551 provides two types of galvanic separated video outputs:

- Balanced, or
- Unbalanced

If the balanced output is used, then terminal X8 should be used, refer to figure 3 and 6.

The balanced video output is galvanic separated from the rest of the circuit in order to avoid ground loop problems.

DO NOT CONNECT THE SCREEN FROM THE CABLE TO THE CAMERA STATION CHASSIS.

Unbalanced Video output connection

If the unbalanced output is used, the terminal X9, marked VIDEO OUT should be used, refer to figure 3 and 6.

The unbalanced video output is galvanic separated from the rest of the circuit in order to avoid ground loop problems.

DO NOT CONNECT THE SCREEN FROM THE CABLE TO THE CAMERA STATION CHASSIS.

Adjustment and Settings

The BDR-550 series has been designed for easy installation and set-up. All adjustments and settings are made via switches or jumpers. Figure 8 shows where the different switches and jumpers are located.

Address settings (2)

With the BDR-550 series it is possible to address up to 255 units on one twisted pair line:

Description	Switch S1							
	1	2	3	4	5	6	7	8
Address number "0" = Camera number 01	ON	ON	ON	ON	ON	ON	ON	ON
Address number "1" = Camera number 02	ON	ON	ON	ON	ON	ON	ON	OFF
Address number "2" = Camera number 03	ON	ON	ON	ON	ON	ON	OFF	ON
Address number "3" = Camera number 04	ON	ON	ON	ON	ON	ON	OFF	OFF
Address number "4" = Camera number 05	ON	ON	ON	ON	ON	OFF	ON	ON
Address number "5" = Camera number 06	ON	ON	ON	ON	ON	OFF	ON	OFF
Address number "6" = Camera number 07	ON	ON	ON	ON	ON	OFF	OFF	ON
Address number "7" = Camera number 08	ON	ON	ON	ON	ON	OFF	OFF	OFF
Address number "8" = Camera number 09	ON	ON	ON	ON	OFF	ON	ON	ON
Address number "9" = Camera number 10	ON	ON	ON	ON	OFF	ON	ON	OFF
Address number "10" = Camera number 11	ON	ON	ON	ON	OFF	ON	OFF	ON
Address number "11" = Camera number 12	ON	ON	ON	ON	OFF	ON	OFF	OFF
Address number "12" = Camera number 13	ON	ON	ON	ON	OFF	OFF	ON	ON
Address number "13" = Camera number 14	ON	ON	ON	ON	OFF	OFF	ON	OFF
Address number "14" = Camera number 15	ON	ON	ON	ON	OFF	OFF	OFF	ON
Address number "15" = Camera number 16	ON	ON	ON	ON	OFF	OFF	OFF	OFF
Address number "16" = Camera number 17	ON	ON	ON	OFF	ON	ON	ON	ON
Address number "17" = Camera number 18	ON	ON	ON	OFF	ON	ON	ON	OFF
Address number "18" = Camera number 19	ON	ON	ON	OFF	ON	ON	OFF	ON
Address number "19" = Camera number 20	ON	ON	ON	OFF	ON	ON	OFF	OFF
Address number "20" = Camera number 21	ON	ON	ON	OFF	ON	OFF	ON	ON
Address number "21" = Camera number 22	ON	ON	ON	OFF	ON	OFF	ON	OFF
Address number "22" = Camera number 23	ON	ON	ON	OFF	ON	OFF	OFF	ON
Address number "23" = Camera number 24	ON	ON	ON	OFF	ON	OFF	OFF	OFF
Address number "24" = Camera number 25	ON	ON	ON	OFF	OFF	ON	ON	ON
Address number "25" = Camera number 26	ON	ON	ON	OFF	OFF	ON	ON	OFF
Address number "26" = Camera number 27	ON	ON	ON	OFF	OFF	ON	OFF	ON
Address number "27" = Camera number 28	ON	ON	ON	OFF	OFF	ON	OFF	OFF
Address number "28" = Camera number 29	ON	ON	ON	OFF	OFF	OFF	ON	ON
Address number "29" = Camera number 30	ON	ON	ON	OFF	OFF	OFF	ON	OFF
Address number "30" = Camera number 31	ON	ON	ON	OFF	OFF	OFF	OFF	ON
Address number "31" = Camera number 32	ON	ON	ON	OFF	OFF	OFF	OFF	OFF
....								
Address number "254"	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON

Address number '255' is the broadcast address which all units will respond to.

SEQUENCE DWELL TIME

The sequence dwell time is programmed via SYSTEM 500M or SYSTEM 1000M.

Latch of Auxiliary functions

The latch functions are programmed via SYSTEM 500M or SYSTEM 1000M.

12 V or 6V Lens voltage (3)

The voltage to the Motorised Zoom Lens can be set with Jumper W1.

- Jumper on Pin 1 and 2 = 12 VDC
- Jumper on Pin 2 and 3 = 6 VDC

High speed option (1)

With switch S5 it is possible to set the relay AUX. 5 to operate as a high speed option. This option is used in connection with dual speed pan/tilts. If this option is used the pan/tilt will go in to full speed every time a pre-position is called.

Description	Switch S5							
	1	2	3	4	5	6	7	8
High speed option	N/A	N/A	ON	N/A	N/A	N/A	N/A	N/A
Normal AUX. operation	N/A	N/A	OFF	N/A	N/A	N/A	N/A	N/A

Position reached (1)

With switch S5 it is possible to set the relay AUX. 6 to operate as a position reached option. If this option is used this relay will be activated for 1.2 sec. every time a position has been reached.

Description	Switch S5							
	1	2	3	4	5	6	7	8
Position reached option (1.2 sec. pulse)	N/A	ON	N/A	N/A	N/A	N/A	N/A	N/A
Normal AUX. operation	N/A	OFF	N/A	N/A	N/A	N/A	N/A	N/A

Enable / Disable A/D converter (4)

With switch S4 it is possible to Enable or Disable the A/D converter. This option should be used if not all the feedback inputs are used. Disabling of an feedback input prevents malfunctions due to conducted noise on the unused inputs.

Description	Switch S4		
	Pos.	ON	OFF
Focus Feedback	1	Disabled	Enabled
Zoom Feedback	2	Disabled	Enabled
Tilt Feedback	3	Disabled	Enabled
Pan Feedback	4	Disabled	Enabled

Video gain settings (5)

With switch S3 it is possible to gain / boost the video signal according to the following:

Switch S3					
			Balanced Video	Unbalanced Video	
1	2	3	Video out at $V_{in} = 1 V_{pp}$		
OFF	OFF	OFF	2,0 V_{pp}	1,0 V_{pp}	
ON	OFF	OFF	3,0 V_{pp}	1,5 V_{pp}	
OFF	ON	OFF	4,0 V_{pp}	2,0 V_{pp}	
ON	ON	OFF	5,0 V_{pp}	2,5 V_{pp}	
OFF	OFF	ON	>+ 3 dB at 5 MHz		

Video Output Impedance (6)

The output impedance for the balanced video output can be set to match different types of twisted pair cables via the switch S2:

- Position 1 = 124 ohm (normal twisted pair cable)

- Position 2 = 60 ohm (quad cable)

Set-up

Programming of prepositions and preposition sequence are carried out from a keyboard. This keyboard could be:

- The internal keyboard on SYSTEM 500M, SYSTEM 1000M
- The external keyboards 150XM.
- The service keyboard of the camera station
- Another ERNA-source

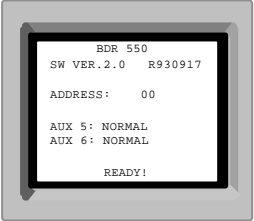
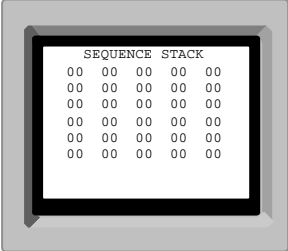




On the service keyboard, the camera is moved to the desired view using the pan/tilt- and zoom/focus keys. Then the pre-position number is entered followed by the MAN-key, and the pre-position will be stored. To recall a pre-position, enter the preposition number followed by the POS-key.

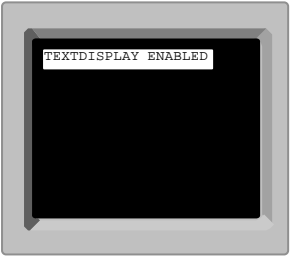
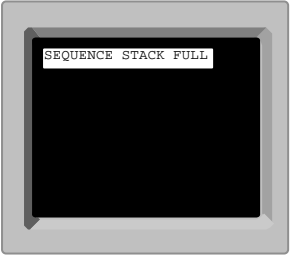
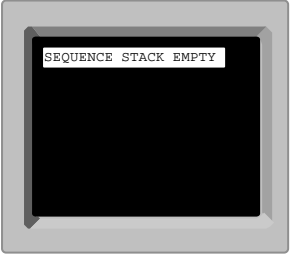
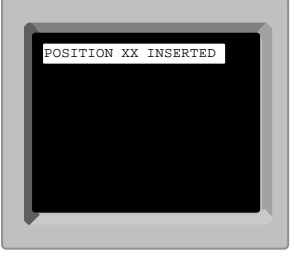


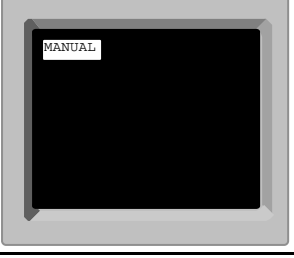
For further programming, please refer to the SYSTEM 500M and SYSTEM 1000M Programming Manuals or installation manual for the 150XM keyboards.

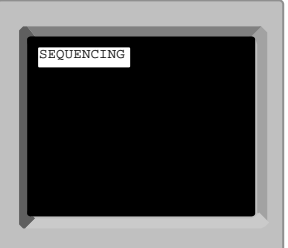
BDR-550 & BDR-551 Messages

In order to keep the operator informed of the state of the camera station, a number of messages will be displayed on the monitor screen during programming and normal operation.

The messages are as follows:

Message	Description
	<p><i>Start-up menu. This menu will be displayed when the camera station is switched on. This menu informs about:</i></p> <ul style="list-style-type: none"> - The software version - The address of the camera station - The status of auxiliary relays 5 and 6. <p><i>This menu will automatically be removed when the camera station receives the first command.</i></p>
	<p><i>Sequence stack menu.</i></p> <p><i>This menu displays all the pre-positions programmed into the sequence.</i></p>
	<p><i>This text string indicates that position XX has been saved.</i></p> <p><i>XX can be any number between 1 and 30</i></p>
	<p><i>This text string indicates that the position you try to call has not been programmed.</i></p> <p><i>Program this position if needed.</i></p>
	<p><i>This text string indicates that the camera station is searching for position number XX</i></p> <p><i>XX can be any number between 1 and 30</i></p>
	<p><i>This text string indicates that the camera station has reached position XX</i></p> <p><i>XX can be any number between 1 and 30</i></p>

Message	Description
	<p>This text string indicates that text insertion in the camera station is enabled.</p>
	<p>This text string indicates that the pre-position sequence is full. There is no more rooms for pre-positions.</p> <p>You can maximum have 30 pre-positions in a pre-position sequence.</p>
	<p>This text string indicates that you have tried to call a pre-position sequence which does not contain any pre-positions.</p> <p>Program the pre-position sequence</p>
	<p>This text string indicates that position number XX has been inserted in the preposition sequence.</p> <p>XX can be any number between 1 and 30</p>
	<p>This text string indicates that position number XX has been deleted from the preposition sequence.</p> <p>XX can be any number between 1 and 30</p>
	<p>This text string indicates that you have tried to delete a preposition from the preposition sequence, which does not exists in this sequence.</p>
	<p>This text string indicates that the camera station is in manual mode.</p>

<i>Message</i>	<i>Description</i>
	<p><i>This text string indicates that the camera station is in sequence mode.</i></p> <p><i>In order to get manual control, press any one of the control keys.</i></p>