SYSTEM 500M Installation Manual - Rev. 4.1

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General

This manual contains a complete description of installation instructions for the SYSTEM 500M. For operation and programming of the system please refer to the relevant manuals.
The Series SYSTEM 500M must be used with a three wire mains connection and an earthed power outlet.

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 SYSTEM 500M are tested and fulfils the following EMC standards:

EN 50081-1 (Emission, residential, commercial, light industrial environment)
EN 50082-2 (Immunity, industrial environment)

The Series SYSTEM 500M fulfils the following safety standards:

EN 60065
IEC 950.

Unpacking the system

After unpacking the system, carefully check for any signs of damage. Any such damage should be reported to your supplier, or to Ernitec A/S directly, before installation.

Check that the system packing carton contains the following items:

- 1 SYSTEM 500M
- 1 SYSTEM 500M Installation Manual (this manual)
- 1 SYSTEM 500M User Manual
- 1 SYSTEM 500M Programming Manual
- 2 3½" floppy disc's with a demo version of the *SYSTEM 500M Setup* program
- 1 Connector kit
- 2 pcs. 19" mounting brackets
- 4 bolts and washers for 19" rack mounting

Mounting the system

The system is housed in a 19" x 2Hu chassis designed to be mounted in a 19" rack. Screws and washers are provided. The rack mounting brackets can be unscrewed if free standing operation is required.

As with any electronic equipment, to ensure long term reliability, it is advisable to:

- mount the system clear of other equipment which may dissipate large amounts of heat, and make sure that the ambient temperature does not exceed 50º.
- if several systems are stacked, please provide space for sufficient ventilation between the rack frames.

System connections

The typical system connections are shown in figure 1 and figure 3.

#	Description
1-01	BNC connectors for video input. The number of connectors depends on the type of system: [1] 50X = 8 BNC connectors 51X = 16 BNC connectors
1-02	BNC connectors for video output. The number of connectors depends on the type of system: [2] 5X4 = 4 BNC connectors 5X8 = 8 BNC connectors
1-03	Serial port 1 (SIO 1) with selectable RS-485 or RS-232 interface.
1-04	Serial port 2 (SIO 2) with selectable RS-485 or RS-232 interface.
1-05	Line termination switch for RS-485 lines.
1-07	I/O connector, used for alarms and VCR control.
1-08	Mains cable.
1-09	Type and serial number.

#	Description
1-10	Keyboard 150XM, Power supply connector
1-12	RS-485/RS-232 connector used for system connection and alarm printer.

[1]: X = 4 or 8 representing monitor output numbers

[2]: X = 0 or 1 representing camera input numbers

SYSTEM 500M power requirements

Make sure that the SYSTEM 500M is delivered to the correct mains voltage, by checking the label next to the mains cable on the rear panel (refer to Figure 1-09). If it is different to your local supply voltage, contact your supplier or Ernitec A/S direct, before power is applied.

See *Specifications* for the full specification of the mains supply.

Power connection

Mount a mains connector on the mains cable (Refer to figure 1, 1-08)
- Blue = Neutral
- Brown = Live
- Green/Yellow = Earth

Connect the mains connector. Always connect the earth wire.

Video Input Connection

Suitable video sources for use with the system generate a 1.0 volt peak to peak composite video signal to the required standard when terminated with a 75 ohm load.

A Video Input of the system is normally connected to the video output of a camera. Up to 32 video sources (depending on the type of system) may be connected through the female BNC sockets on the rear panel, refer to figure 1-01 for connection.

Note: The system needs at least one video signal connected in order to start up.

Video Input Requirements

In order for the system to correctly synchronise to the incoming video and for high quality images, the following conditions must be met:

- the synchronisation pulse amplitude at each video input must be within the range of 0.22 to 0.4 volts, and
- the peak video amplitude with reference to the black level (i.e. not including the synchronisation pulses) at each Video Input must be within the range of 0.5 V to 1.0 volt.

If the video level is low, cable compensators or video line drivers should be installed at the video source. They should be adjusted to boost the video signal to within the voltage limits given above. To meet the specifications given for this system it is important that the incoming video is according to the CCIR/PAL or RS-170/NTSC standard that means 0.3 V synchronisation pulse and 0.7 V video.

Note: It is possible to adjust the on-screen text insertion circuits to the actual video standard, either CCIR/PAL or RS-170/NTSC; please refer to the *Jumper Settings* section.

Video Output

The Video Output of the system is normally connected to a monitor capable of receiving composite video signals to the required T.V. Standard; either CCIR/PAL or RS170/NTSC. The Video Output is designed to drive a 75 ohm load.

BNC socket's are used on the rear panel of the system, refer to figure 1-02 for connection.

I/O connection - alarm inputs

The system has 32 digital Inputs (TTL level) which can be used as alarm inputs connected to potential free contacts, 1 Relay output and 1 Open Collector output used for control of a VCR or other equipment.

Refer to figure 1-07 for connection.

Some of the digital inputs can also be programmed for outputs and used for integrating a time lapse video recorder into the system in order to have multiple cameras recorded using video sequences. For further information on this subject, please refer to the *SYSTEM 500M Programming Manual, Monitor Setup* section.

Serial connection

Each system is equipped with two serial ports, with programmable interface between RS-485 and RS-232.

The two serial ports can, depending on the interface, be connected to the following types of equipment:

- Keyboards, Camera Stations for PTZ control, ICU's, Main SYSTEM 1000M, serial printer for alarm logging, PC, Adpro VST 10CA*plus* Fast Scan and VMD equipment, and third party equipment (e.g. a PC) for control, alarms, set-up, etc., using the *Ernitec Protocol.*

Warning: Please note that the RS-232 and the RS-485 interface on the same serial port cannot be used at the same time.

The following notation is used when referring to pin numbers on connectors:

	SYSTEM 500M socket A-BB	
	Pin	**Description**
	6 + 8	Signal X
	7 + 9	Signal Y
	1 + 4 + 5	Signal Z

The "+"-symbol does not indicate that the conductors must be connected to all the pins stated; it simply means that the signal is present on all the pins. This is very convenient in daisy chain or drop line configurations where the signal is looped from unit to unit.

RS-485 interface

Communication interface used for connecting keyboards, Camera Stations/ICU's for camera control, or to control Adpro Equipment i.e. the *VST 10CAplus Colour & Audio Fast Scan* and the *Video Movement Detection* rack frame or main 1000M. It is not possible to control different types of equipment, e.g. keyboards and camera stations, on the same RS-485 line since different communication formats, protocols, are used. If several units are controlled via the serial port the units are connected in a daisy chain or a drop line, depending on the equipment type.

When connecting to keyboards the maximum total cable length is 1200 metres and the RS-485 line must be terminated at both ends. Refer to figure 1-20 for termination instructions.

When connecting to Camera Stations/ICU's, the maximum cable length depends on the type of equipment, refer to figure 1a. BDR-55X/BDR-51X needs <u>no</u> cable termination. BDR-575/ICU needs cable termination at both ends.

When connecting to Adpro Equipment the recommended maximum total cable length is 100 metres. The RS-485 line must be terminated at both ends. Refer to figure 4-05 for termination instructions and figure 4-09 for interconnection instructions of several *VMD-10*'s.

When connecting to a main SYSTEM 1000M the maximum total cable length is 1200 metres and the RS-485 line must be terminated at both ends. Refer to figure 1-20 or the example on figure 6 for termination instructions.

Camera control connection on RS-485

Connect the camera control twisted pair line to the 9-pole D-SUB socket 1-03 or 1-04:

SYSTEM 500M		BDR-550/551		BDR-510/514		BDR-511/512/513		ICU (BDR-575)	
Pin	Desc.	Pin	Desc.	Pin	Desc.	Pin	Desc.	Pin	Desc.
6 + 8	Positive	*X5-	PCM IN -	X1 +	PCM IN +	X12 +	PCM IN +	1 (PL1-1)	RS485+
7 + 9	Negative	*X5+	PCM IN +	X1 -	PCM IN -	X12 -	PCM IN -	2 (PL1-2)	RS485-
1 + 4 + 5	GND (screen)	**Do NOT connect!**		**Do NOT connect!**		**Do NOT connect!**		**Do NOT connect!**	

Details on how to inter-connect the various types of Camera Stations can be found on figure 1a:

BDR-51X: Figure 1a-1.
BDR-55X: Figure 1a-2.
BDR-575: Figure 1a-3.
ICU-PTZ: Figure 1a-4.

The different types of Camera Stations can also be mixed on the same control line, refer to figure 1a for examples on different combinations.

Also remember that each Camera Station/ICU must have an unique address, use the corresponding address when programming the matrix.

To use the camera control output, program the serial port in accordance with its use.

For further information refer to the *SYSTEM 500M Programming Manual* and the *Installation Instruction* for the Camera Stations, and/or the ICU.

Warning: The camera stations Series BDR-51X/55X, will terminate the RS-485 line properly by themselves; therefore do NOT set the termination slide switch 1-05 to the ON position.
Warning: Do NOT connect the cable screen, if any, to the Camera Station/ICU.
*: Note, that the control signal wires must be reversed when connected to the first BDR-55X.
Camera Stations/ICU's are connected in daisy chain; if a star configuration is needed a BED-108 Control Signal Distributor must be inserted.

Keyboard connection RS-485

Connect the keyboard twisted pair line to the socket 1-03 or 1-04 (up to 4 keyboards can be connected on a drop line to the RS-485 line):

	SYSTEM 500M socket 1-03/1-04		Keyboard 150XM socket 1-12	
	Pin	Description	Pin	Description
	6 + 8	Positive signal	6 + 8	Positive signal
	7 + 9	Negative signal	7 + 9	Negative signal
	1 + 4 + 5	GND (Connect to cable screen)	1 + 4 + 5	GND (Connect to cable screen)

Remember to terminate the RS-485 line in both ends. This is done by setting the belonging small slide switches 1-05 to the ON/120 ê position. Make sure, that only the first and the last physical unit on the cable is terminated. Refer to figure 1-20 for termination instructions.

Maximum total cable length is 1200 metres.

Also note, that if several keyboards are connected onto a common RS-485 line each keyboard must have an unique address; refer to the *Installation and Setup Instruction for Keyboard Series 1500M.*

Adpro equipment connection RS-485

Connect the twisted pair line to/from the Adpro equipment to the socket 1-03 or 1-04 on SYSTEM 500M; refer to figure 4-08 for pin connections on the Adpro equipment:

SYSTEM 500M 1-03/1-04		VMD (VM20) socket 4-02/4-03		VST 10CA*plus* socket 4-10	
Pin	Description	Pin	Description	Pin	Description
6 + 8	Positive signal	2	Positive signal	2	Positive signal
7 + 9	Negative signal	1	Negative signal	3	Negative signal
1 + 4 + 5	GND (cable screen)	3	GND (cable screen)	5	GND (cable screen)

If several units are connected on the RS-485 line, each unit must have a unique chassis number, refer to the *Adpro Integration* section later in this manual.

When connecting to Adpro Equipment the recommended maximum total cable length is 100 metres, but this distance might be increased if only a few units are connected to the RS-485 line.

The RS-485 line must be terminated at both ends. Make sure, that only the first and the last physical unit on the cable is terminated. Refer to figure 4-05 for termination instructions. For interconnection of several *VMD-10* rack frames refer to figure 4-09 and figure 5.

The number of Adpro units on one RS-485 line are limited to total 50 units. In this connexion *units* means *VST 10CAplus Fast Scan's* and *VM12/VM14 Video Movement Detection* modules, *VM30 Frame Store* modules and *VM41 Fast Scan* modules fitted in the *VMD* rack frames. It is possible to install a combination of *VST 10CAplus Fast Scan's* and *VMD* rack frames fitted with *VM12/14*'s, *VM30*'s and *VM41's* on the same RS-485 line. Additional 50 units can be controlled if a RS-485 repeater is inserted. Simultaneously the total cable length is doubled.

Also note, that although 50 units are allowed the number of *VST 10CAplus Fast Scan's* are limited to 14 pieces and the number of *VMD* rack frames are limited to 14 pieces also. These figures can not be increased by installing a RS-485 repeater.

Each Adpro unit on a common RS-485 must have a unique address; the chassis number.

For further information refer to the *Adpro Integration* section later in this manual.

Main SYSTEM 1000M connection RS-485

Connect the twisted pair line to/from the main SYSTEM 1000M to the socket 1-03 or 1-04 on SYSTEM 500M:

	SYSTEM 500M socket 1-03/1-04		SYSTEM 1000M socket 1-03/1-04	
	Pin	Description	Pin	Description
	6 + 8	Positive signal	6 + 8	Positive signal
	7 + 9	Negative signal	7 + 9	Negative signal
	1 + 4 + 5	GND (optional cable shield)	1 + 4 + 5	GND (optional cable shield)

Up to the maximum allowed 9 pieces of remote systems can be connected onto the RS-485 line in a daisy-chain. Remember to terminate the RS-485 line in both ends. This is done by setting the belonging small slide switches 1-05 to the ON position. Make sure, that only the first and the last physical unit on the cable is terminated. Refer to figure 1-20 for termination instructions. Maximum total cable length is 1200 metres.

Each remote system must have a unique REMOTE SYSTEM ID. Also the video lines interconnecting the remote system(s) and the main system must be established. For further information refer to *Remote Systems* section later in this manual.

Note: When using remote system(s) on the RS-485 interface it is **not** possible to transmit the alarm inputs on the remote system(s) to the `MAIN` system for a centralised alarm handling. The remote alarm inputs can be used locally only on the remote system(s).

Warning: The RS-485 interface is not galvanic separated meaning that the communication signal in ground loop situations might be suppressed. This problem can be solved by inserting a suitable galvanic separation unit designed for duplex communication in the RS-485 line, e.g. a signal transformer.

RS-232 interface

The RS-232 interface is used for keyboards Series 1500M, SYSTEM 2000M keyboard type 28XXM, main SYSTEM 1000M, or a personal computer (PC) with the *SYSTEM 500M Setup* program.

It is also possible to connect camera stations/ICU's to the RS-232 interface, directly or via modems.

To use the RS-232 interface, remember to set the software accordingly. Maximum recommended cable length is 50 metres.

Keyboard type 150XM connection to RS-232

Connect the RS-232 cable to the 9-pole D-SUB socket 1-03 or 1-04:

	SYSTEM 500M socket 1-03/1-04		Keyboard 150XM socket 1-12	
	Pin	Description	Pin	Description
	3	Transmit	2	Receive
	2	Receive	3	Transmit
	1 + 4 + 5	Ground (To cable screen also)	1 + 4 + 5	Ground (To cable screen also)

SYSTEM 2000M Keyboard connection on RS-232

It is possible to connect a SYSTEM 2000M keyboard type 28XXM to the RS-232 port. Connect the RS-232 cable to the 9-pole D-SUB socket 1-03 or 1-04:

SYSTEM 500M		SYSTEM 2000M Keyboard PSU	
Pin	**Description** (9 pole D-SUB)	Pin	**Description** (25 pole D-SUB)
3	Transmit	3	Receive
2	Receive	2	Transmit
1 + 4 + 5	Ground (To cable screen also)	7	Ground (To cable screen also)

Please note, that the keyboard must be equipped with software version V.7.0. The software version is displayed in the keyboard display during the power up self test phase.

Main SYSTEM 1000M connection on RS-232

Connect the twisted pair line to/from the main SYSTEM 1000M to the socket 1-03 or 1-04:

	SYSTEM 500M socket 1-03/1-04		SYSTEM 1000M socket 1-03/1-04	
	Pin	Description	Pin	Description
	3	Transmit	2	Receive
	2	Receive	3	Transmit
	1 + 4 + 5	GND (To optional cable shield also)	1 + 4 + 5	GND (To optional cable shield also)

Maximum recommended cable length is 50 metres.

Remember to program the REMOTE SYSTEM ID. Also the video lines interconnecting the main system and the remote system must be established. For further information refer to *Remote Systems* section later in this manual.

Personal Computer connection to RS-232

Connect the RS-232 cable to the 9-pole D-SUB socket 1-03 or 1-04:

SYSTEM 500M 1-03/1-04		PC COM-port 9 pole D-SUB		PC COM-port 25 pole D-SUB	
Pin	Description	Pin	Description	Pin	Description
3	Transmit	2	Receive	3	Receive
2	Receive	3	Transmit	2	Transmit
1 + 4 + 5	GND (cable screen)	5	GND (cable screen)	1 + 7	GND (cable screen)

Remember to use the same baud rate on both the PC and the SYSTEM 500M.

Video standard selection & Reset to Default Jumper Settings

On the rear side of the I/O module which carries the two D-SUB connectors for SIO 1, SIO 2 are two jumpers W1 and W2 located. Refer to the figure shown below.
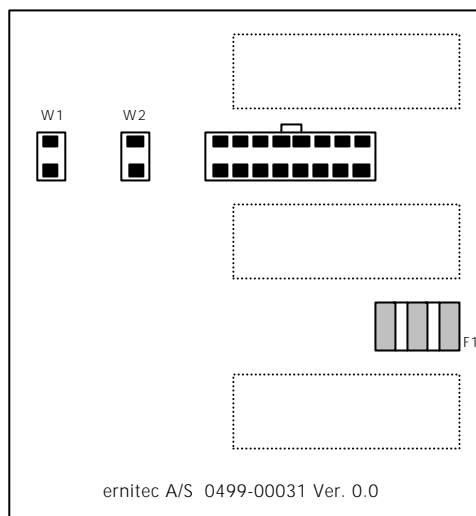
Communication I/O module, rear side.
In order to access these jumpers the top plate must be removed.

- **Jumper W1:**
  Is used to select the desired video standard; either PAL/CCIR or NTSC/RS-170.
- **Jumper W2:**
  Is used to reset all user programmed settings to their default value, including the password.
  This jumper is used in case the system is re-located to a new site, or the password has been forgotten.

Jumper W1 Video standard selection		Jumper W2 Reset to default	
ON	**OFF**	**ON**	**OFF**
NTSC / RS-170	PAL / CCIR (factory setting)	Reset all user programmed settings to the default values.	N/A (factory setting)

Note: The jumpers W1 and W2 are only read during the start-up phase, therefore the unit must be rebooted, either by powering the system off and on again or via the SYSTEM 500M SETUP, SYSTEM SETUP, ***REBOOT SYSTEM**.

Adpro integration

Introduction

This section describes the principles, features and limitations in the integration of SYSTEM 500M units and Adpro Equipment. The compatible Adpro Equipment types are described and listed.

Furthermore some practical matters related to the installation of Adpro Equipment are described such as switch- and jumper settings and certain pin connections.

More general installation instructions can be found in the *RS-485 interface* section and further on.

A practical example are gone over in order to link all the below mentioned aspects together.

Features

The *Adpro Integration* will allow compatible Adpro Equipment to be operated and programmed from the SYSTEM 500M keyboards type 1502M, and 1503M; as easy as if they were any other part of the matrix system. The need for specific keyboards for each type of equipment is thereby eliminated.

Furthermore it is possible to operate camera stations connected to the VST 10CA*plus* at the transmitter site.

Compatible Adpro equipment

The following Adpro equipment types can be controlled from the SYSTEM 1000M:

- VST 10CA*plus* Colour & Audio Fast Scan('s) with software version 1.0, or later.
- VMD rackframe(s) fitted with VM12(software version V.3.0 or later), or VM14 Video Motion Detection module(s) , an optional VM30 Frame Store module (software version V.1.5 or later), an optional VM41 Fast Scan Transmitter module and two VM20 I/O-modules.

The Adpro Equipment at the receiver site and optional camera stations connected to the VST 10CA*plus*/VM41 at the transmitter site can be controlled from external 1502M/1503M keyboards only.

Hardware limitations/possibilities

- Adpro equipment can only be controlled from 1502M/1503M keyboards.
- It is possible to have a mixture of VST10 CA*plus* stand alone Fast Scan's and Video Motion Detector rack frames on the same line.
- The maximum number of units on **one** RS-485 line is:

14 pcs. VST 10CA*plus* stand alone Fast Scan's **and:**

14 pcs. Video Motion Detector rack frames; **but:**

The maximum number of VST 10CA*plus* and VM12, VM14, VM30 and VM41 modules fitted in the VMD rackframe(s) can of course not exceed the number of available camera inputs on the actual SYSTEM 500M type.

- Total recommended cable length is maximum 100 meters.
- At each VST10 CA*plus* transmitter maximum 10 pcs. camera stations can be connected. It is also possible to connect camera stations to the VM41 Fast Scan module fitted in a VMD-10 rack frame.

Control limitations

All compatible equipment connected locally, i.e. directly to a SYSTEM 500M serial port with RS-485 interface, can be fully operated and programmed except basic setup such as selecting the VST 10CA*plus* as transmitter or receiver etc. which must be done locally by using e.g. a VMD programmer keypad. Camera stations connected remotely i.e. at the VST 10CA*plus* transmitter can also be operated and programmed just as if they were connected directly to the matrix.

Video motion detection equipment connected remotely, i.e. a VMD rack frame with a VM41 Fast Scan transmitter module fitted, can be programmed from the VST 10CA*plus* receiver using the `VMD CONTROL` option located in the VST10 CA*plus* setup system.

Adpro hardware settings and software setup

In this section is described only the settings relevant in connection with the Adpro integration.

VST 10CA*plus* switch settings

A number of switches should be set, refer to figure 4-06 for locations.

- **RS-232/RS-485 Configuration switches:**
  These switches should be set according to the drawings of figure 4-06, in order to enable the RS485-1 port for control.
- **RS-485 Line Termination:**
  When this switch is in the ON position, the RS-485 line is properly terminated. The line should be terminated only if the actual unit is placed on one of the outer ends of the cable, i.e. as the first or last unit on the cable. If the unit is located elsewhere on the cable the switch should be set to the OFF position. Refer to figure 4-05 for termination instructions.
- **Chassis number selection switch:**
  If several VST 10CA*plus* Fast Scan receivers (max. 14 pcs.) are connected on the same line each VST 10CA*plus* must have a unique ID number in the range from 0 to 13, the Chassis number. The Chassis number is selected on a hex-switch according to the cross reference table shown below:

Chassis number:	0	1	2	3	4	5	6	7	8	9	10	11	12	13
Switch position:	0	1	2	3	4	5	6	7	8	9	A	B	C	D

Warning: Do NOT use switch positions E and F - they are reserved for internal use only!

Warning: When the Chassis number is set to a non zero value, the VST 10CA*plus* front panel and Programmer keys are disabled. Make sure all necessary setup is done prior to changing the Chassis number.

VST 10CA*plus* receiver settings

In order to enable the remote control from SYSTEM 500M certain communication parameters must be set locally using e.g. a VMD programmer keypad:

Enter the **PTZ SETUP** menu which is located as a submenu under the **GENERAL SETUP** field.
Set the **SELECTED BY** field to **IEC** .
Set the **PTZ HOLD TIME** field to the desired value in seconds.
Enter the **PRINTER SETUP** menu which is located as a submenu under the **GENERAL SETUP** field.
Set the **BAUD RATE** field to the desired speed - note that if VMD rack frame(s) are present on the same RS-485 line the **BAUD RATE** must be set to **19200** baud.
Set the **DATA BITS** field to **8**.
Set the **PARITY** field to **NONE**.
Set the **STOP BITS** field to **1**.
The **FLOW CTRL** field setting is not relevant.
Warning: When the Chassis number is set to a non zero value, the Programmer keys are disabled. Make sure all necessary setup is done prior to changing the Chassis number.

VMD switch- and jumper settings

One hex-switch and up to three jumpers should be checked or adjusted. In order to access these adjustments modules must be removed from the rack frame; if uncertain of this procedure refer to the VMD manual. Before removing modules disconnect the unit from mains supply.

- *RS-485 Line Termination jumper LK1:*
  This jumper is located on the VM-20 I/O-modules. Note that two VM-20's are present in each rack frame, I/O SLOT 1 and 2, refer to figure 4-01. Remove the modules and locate the jumper with the designator **LK1** on the PCB close to the RS-485 connector; refer to figure 4-07.
  When this jumper is placed over both pins the RS-485 line is properly terminated. The line should be terminated only if the actual module is placed on one of the outer ends of the cables, i.e. as the first or last module on the cable. If the module is located elsewhere on the cable the jumper should be placed on one pin only (or removed totally). Refer to figure 4-05 for termination instructions.
- *RS-485 Bias Resistor jumpers LK2/3 (optional, not present on all VM-20's):*
  These jumpers are located on the VM-20 I/O-modules. Note that two VM-20's are present in each rack frame, I/O SLOT 1 and 2, refer to figure 4-01. Remove the modules and locate the jumpers with the designators **LK2** and **LK3** on the PCB close to the RS-485 connector; refer to figure 4-07.
  The purpose of the bias resistors these jumpers can enable is to ensure the transmission line is in a defined state when idle.
  These bias resistors should only be enabled on one module - the VM-20 module closest to the SYSTEM 500M. In order to enable the bias resistors place the jumpers over both pins; otherwise place the jumpers on one pin only.

- *Chassis number selection switch:*

  If several VMD rack frames (max. 14 pcs.) are connected on the same line each VMD rack must have a unique ID number in the range from 0 to 13 - the Chassis number. In order to access the chassis number selection switch remove the modules or blank panels from video slot positions 4-9; refer to figure 4-01. Locate the chassis number switch inside the VMD rack frame on the top centre of the backplane PCB.

  The Chassis number is selected on a hex-switch according to the cross reference table shown below:

Chassis number:	0	1	2	3	4	5	6	7	8	9	10	11	12	13
Switch position:	0	1	2	3	4	5	6	7	8	9	A	B	C	D

Warning: Do NOT use switch positions E and F - they are reserved for internal use only!

Warning: When the Chassis number is set to a non zero value, the Programmer keys are disabled. Make sure all necessary setup is done prior to changing the Chassis number. Note, that it is possible to have a VMD rack frame and a VST 10CA*plus* Fast Scan with the same chassis number on the same RS-485 line since the protocol also distinguishes on the device type.

Remote Camera Stations at the VST 10CA*plus*/VM41 transmitter

It is possible to connect up to ten Camera Stations to the RS-485-2/RS232 port of the VST 10CA*plus*/VM41Fast Scan transmitter (use a RS232/485 converter for VM41). Camera Stations connected remotely i.e. at the VST 10CA*plus* transmitter can be operated and programmed just as if they were connected directly to the matrix.

Camera station connection to VST 10CA*plus*/VM41

Connect the camera control cable to the RS485-2/RS232, 9 pin D-SUB socket 4-04:

VST 10CA*plus* (VM41)		BDR-550/551		BDR-510/514		BDR-511/512/513	
Pin	Description	Pin	Description	Pin	Description	Pin	Description
2 (3)	+ (Transmit)	X5-	PCM IN -	X1 +	PCM IN +	X12 +	PCM IN +
3 (5)	- (GND)	X5+	PCM IN +	X1 -	PCM IN -	X12 -	PCM IN -
5	Screen	**Do NOT connect!**		**Do NOT connect!**		**Do NOT connect!**	

Each camera station on the line must have an unique address in the range from address number "0" to address number "9"; refer to the camera station manual for information about this subject. The RS485-2/RS232 interface does not need to be terminated, the termination switch should be set to OFF, ref. figure 4-06.

VST 10CA*plus*/VM41 transmitter settings

In order to enable the remote control of camera stations from SYSTEM 500M certain parameters must be set in the VST 10CA*plus*/VM41 setup:
Enter the `PTZ SETUP` menu which is located as a submenu under the `GENERAL SETUP` field.
Set the `CAMERA STATION` field to `ERNITEC`.
Set the `PORT` field to `RS485-2`(VST 10CA*plus*), or `RS232`(VM41).

Example of Adpro and SYSTEM 500M integration

In this example the Adpro equipment is controlled from a SYSTEM 1000M matrix, but the installation is of course similar when SYSTEM 500M is used.

The three SYSTEM 1208M's on figure 5-01 forms a 96 input/8 output video matrix with totally six serial ports and 96 alarm inputs. The keyboards which are needed to control the Adpro equipment can be connected to the ARC-net and/or serial ports 1 and 2 of `RACK NO.1`, which is the master rack. It is not possible to connect keyboards to systems with a rack number higher than 1.

The RS-485 line from the Adpro equipment is in this example connected to serial port 2 of `RACK NO.5`, the SIO 52, but any or several serial port(s) can be used. Since the cable physically is ending here, the line termination resistor is enabled as indicated on figure 5-01.

Note, that each Adpro unit connected onto this common line has a unique address, a chassis number.

On the first VM20 module located on I/O SLOT 1 in the VMD-10 rack figure 5-02 the RS-485 line bias resistors are enabled by LK2 and LK3 jumpers, since this module are closest to the SYSTEM 1000M. From the first VM20 module the RS-485 line is internally fed to the second VM20 module located in I/O SLOT 2. Neither the line termination resistor, nor the line bias resistors are enabled on the second VM20 module. The Chassis number switch is set to 0.

The RS-485 line is now continued from the VM20 in I/O SLOT 2 on figure 5-02 to the VM20 in I/O SLOT 2 also on next VMD-10 rack; figure 5-03. From the second VM20 module the RS-485 line is internally fed to the first VM20 module located in I/O SLOT 1. Neither the line termination resistor, nor the line bias resistors are enabled on the VM20 modules on figure 5-03. Note, that the Chassis number switch now is set to 1.

From the second VMD-10 rack the RS-485 line in connected to the first VST 10CA*plus* Fast Scan receiver on figure 5-04. Chassis number is set to 0, line termination is OFF.

Finally the RS-485 line is continued to the last unit on the line; the second VST 10CA*plus* figure 5-05. Since this unit is the last on the RS-485 line the line termination is ON. Chassis number is set to 1 in order to distinguish from the first VST 10CA*plus*.

Two possible configurations are shown at the remote site:

- The VST 10CA*plus* Fast Scan transmitter shown at figure 5-06 is connected to 10 camera stations series BDR-500. Although the VST 10CA*plus* is located as the first unit on the RS-485 line note that the line termination is OFF, since the camera stations will terminate the line properly by themselves. Also note, that each camera station must have an unique address in the range of 0 to 9; refer to the camera station manual.
- The second remote site configuration is a VMD-10 rack fitted with the VM41 Fast Scan module. With this configuration it is possible to remotely program the VMD channels of the VMD-10, for remote programming select the VMD Control option in the VST 10CA*plus* receivers Setup. Camera Stations can be connected to the RS232 interface of the VM41 by using a RS232/485 converter. No switch/jumper settings are required on the VM41 module. If only one VMD-10 rack is used, only the Chassis ID switch needs to be checked.

In general remember to program baud-rates, serial ports etc. in accordance with the equipment connected, please refer to the *SYSTEM 1000M Programming Manual.*

Remote Systems

There are two main purposes for using the remote systems:

To emulate very large matrix systems with more than 160 cameras,
and/or
To build de-centralised matrix systems for e.g. reducing the installation costs.
The basic idea is to place the remote system close to the cameras, connect one or several monitor outputs from the remote system to the camera inputs of the main system and finally establish a serial communication line between the main system and the remote system.

Features

- Up to 9 remote systems each consisting of up to 160 cameras can be connected to a single main system, both the SYSTEM 500M and the SYSTEM 1000M can be utilised as remote systems. Only SYSTEM 1000M can be used as main system.
- The remote systems can communicate with the main system using a daisy chain configuration on RS-485 or using a star configuration on RS-232.
- It is possible from the main system to operate PTZ-cameras connected to the remote systems.
- Alarms connected to the remote systems can be processed centrally by the main system.
- Local keyboards can be connected to the remote systems.

Limitations

- The number of different remote cameras that simultaneously can be displayed at the main system is limited to the number of video connections established between the remote system and the main system. If e.g. three monitor outputs from the remote system is connected to three camera inputs on the main system it is possible to display three different remote cameras simultaneously only at the main system.
- It is not possible from the main system to operate Adpro equipment connected to the remote systems.
- Alarms connected to the remote systems can be handled by the main system only when the remote systems are connected via the RS-232 interface.
- It is not possible to have the remote alarms processed centrally by the main systems and locally by the remote systems simultaneously. From the operator keyboards it is possible to switch between central and local alarm handling.
- Using remote systems will increase the number of cameras only - it is not possible to increase the number of monitors.
- SYSTEM 500M units can be used as remote systems only, not as main systems.

Example on how to install Remote Systems

The practical example illustrated on figure 6 are gone over below.

The two SYSTEM 1208M's forms a 64 input/8 output matrix with in total four serial ports and 64 alarm inputs.

From the first serial port of `RACK NO. 5`, the `SIO 51`, a serial line connects two remote SYSTEM 1208M in a daisy chain. Since more than one system is connected onto the line the RS-485 interface is selected. If the alarm inputs on the remote systems must be handled by the main system two serial ports with the RS-232 interface selected must be used, one to each remote system.

The RS-485 line is connected to the `SIO 1` on both remote systems. Note the termination of the RS-485 line.

Two monitor outputs from each remote system are connected to the main system; thereby decreasing the number of available camera inputs from 64 to 60. If the cable distance exceeds more than 100-200 meters twisted pair equipment must be used for the video transmission.

The basic programming for the complete installation is shown on the figure. If remote alarms should be handled by the main system further programming must done and RS-232 communication must be used. For a detailed explanation please refer to the *SYSTEM 1000M Programming Manual.*

Also note, that the first digit of the camera ID number indicate the remote system number; calling e.g. camera number 3 on remote system 2 from the main system keyboards should be keyed in as 2003. For further information refer to the the *SYSTEM 1000M User Manual.*

Cable specifications

The cables are an important part of the installation - malfunction, damage or decreased performance can occur if the cable specifications are not properly considered.

Mains

- 3 wires (live, neutral, earth), 0,75 mm^2 min.

Warning: The SYSTEM 500M must be used with a 3 wire mains connection and an earthed power outlet. The earth connection is of outmost importance in order to obtain the specified EMC and Safety levels.

Video input and output

- Coaxial cable with 75 ohm characteristic impedance.

RS-485 cable

Standard low capacity telephone cable might be suitable; however it is recommended to use twisted pair cable designed for data transmission, with a characteristic impedance of approx. 120 ohm. The cable can be shielded or unshielded, and should fulfil at least the highlighted specifications (bold), in the table below:

Conductor diameter (mm)	0,6	0,8	0,9
Max. capacity (nF/Km)	90	90	90
Max. loop resistance (ohm/Km)	130	73	57
Min. isolation resistance (Mohm)	500	500	500
Max. capacity unbalanced (pF/Km)	800	800	800
Characteristic impedance (ohm)	**120**	**120**	**120**
Max. induction (mH/Km)	0,7	0,7	0,7
Attenuation at 5 MHz (dB/100 m)	3,3	2,4	2,2
Min. number of twists per meter	**5**	**5**	**5**

- **Transmission distance:**
  Keyboards, total cable length: Max. 1200 meters @ 0,6 mm cable.
  BDR-55X, cable length to the first unit: Max. 1200 meters @ 0,6 mm cable.
  BDR-51X, cable length to the first unit: Max. 1200 meters @ 0,6 mm cable.
  BDR-575, total cable length: Max. 1200 meters @ 0,6 mm cable.
  ICU, total cable length: Max. 1200 meters @ 0,6 mm cable.
  Adpro Equipment on RS-485 (shielded): Max. 100 meters

RS-232 cable

- Three conductors; 0,6 mm each; unshielded or shielded.
- Length: Max. 50 meters using shielded cable.