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a*FLAT*-Series

CRT*to*LCD-2

	Technical Manual
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1.0	Warranty

Each board is carefully and thoroughly tested before being shipped. If, however, problems should occur during the operation, please check your user specific settings of all boards included in your system. This is often the source of the fault. If a board is defective, it can be sent to your supplier for repair. Please take care of the following steps:

- The board returned should correspond to the factory default settings since a test is only possible under this settings.
- In order to repair your board as fast as possible , we require some additional information from you. Please fill out the attached Repair Form and include it with the defective board.
- If possible, the board will be upgraded to the latest version without additional cost.
- Upon receipt of the board, please be aware that your user specific settings were changes during the test.

Within the guarantee, the repair is free as long as the guarantee conditions were kept. If no fault has been found, you will be charged with the test cost due to the high test expenditure. Repairs outside of the guarantee will be charged.
This Kontron Hamburg product is warranted against defects in material and workmanship for our guaranteed warranty period from the date of shipment. During the warranty period, Kontron Hamburg will, at its option, either repair or replace products which prove to be defective.
For warranty service or repair, the product must be returned to a service facility designated by Kontron Hamburg.
The foregoing warranty shall not apply to defects resulting from improper or inadequate maintenance or handling by buyer, unauthorized modification or misuse, operation outside of the environmental specifications for the product, or improper installation or maintenance.
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1.1 Introduction

The CRT*to*LCD-2 is a highly integrated TFT panel interface controller, which allows an easy adaptation of standard video input sources like S-video, composite video, DVI or analog RGB to a digital TFT panel. The CRT*to*LCD-2 needs only one single 12V power supply and incorporates all needed functionality to build up a full featured TFT monitor. The card generates the necessary power sequencing for the flat screen. The highly flexible architecture of the CRT*to*LCD-2 panel interface allows adapting nearly any available TFT panel. Therefore a variety of panel adapters and programming are available on request.

1.2 Technical Information Summary

Features
- Zoom and shrink scaling (all resolutions from VGA to SXGA)
- Frame rate conversion
- Integrated 8-bit triple-channel ADC / PLL
- Integrated Ultra-Reliable DVI™ receiver
- Integrated High-bandwidth Digital Content Protection (HDCP)
- On-chip versatile OSD engine
- All system clocks synthesized from a single external crystal
- Programmable gamma correction (CLUT)
- RealColor™ technology provides flesh tone adjustment

Analog RGB Input Port
– Supports up to SXGA at 85Hz
– Support for Sync-on-Green (SOG)

Ultra-Reliable DVI™ Receiver
– Single link on-chip TMDS Rx up to 160 MHz operation
– Direct connect to all DVI compliant TMDS transmitters
– Optional High-bandwidth Digital Content Protection (HDCP)

NTSC,PAL or SECAM input
- video decoder with s-video or composite video input capabilities

Output Format
- Support for 8 or 6-bit panels (with high quality dithering)
- One or two pixel output format

Auto-Configuration / Auto-Detection
– Phase and image positioning
– Input format detection
– Compatibility with all graphic cards and standard VESA modes

Frame Store Interface
- 1.5 MB SDRAM Frame buffer

On-chip OSD Controller
– Bit-mapped OSD capability - 256 24-bit colors
– Horizontal and vertical stretch of OSD images

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1.2 Technical Information Summary

RealColor™ Technology
- Color filtering in YUV domain
- Digital brightness, contrast, hue and saturation control for analog, digital and video inputs
- Proprietary flesh tone adjustment

Operating Modes
- Frame rate conversion and scaling of images
- Bypass mode with no filtering and/or frame buffering
- 1:1 centering
- De-interlaced zoom
- Frame Sync and Free Run display synchronization modes

High-Quality Advanced Scaling
- Fully programmable zoom/shrink ratios
- Independent horizontal / vertical zoom and shrink
- Variable sharpness control
- Moire cancellation
- Adjustable scaling algorithms

Display Interface Features :
- Control signal generation for backlight inverter
- backlight dimming support
- voltage generation and power sequence control for panel
- Flat screens can be used with either 3.3V, 5V or 12V.
- JIPA (Digital RGB) panel interface up to 36-Bit
- JILI (LVDS) panel interface (one and double port up to 24 Bit)

Operating Features :
- 4 button user interface
- On Screen Display (OSD) control for all features
- Full multi sync capable
- VESA DPMS and DDC2B support
- Single voltage supply (+12V DC)
- Dynamic Power Management for minimal power consumption via DPMS
- No software drivers needed!

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1.3.0				Configuration			
				OFF	**ON**	**Description**	**Delivery Default**
OFF	=>	ON	**1**	Normal operation	Firmware update	Update firmware via serial port CN101	SW1-1 **OFF**
	=>		**2**	DE	/DE	inverts DE-signal	SW1-2 **OFF**
	=>		**3**	SINGCLK	DUALCLK	for doublepixel (ODD/EVEN)	SW1-3 **OFF**
	=>		**4**	R_FB	/R_FB	Reserved	SW1-4 **OFF**
	=>		**5**	Use ID	Use Table	JIPA ID	SW1-5 **OFF**
	=>		**6**	Reserved	Reserved	Reserved	SW1-6 **OFF**
	=>		**7**	See Table	See Table	Panel ID1	SW1-7 **OFF**
	=>		**8**	See Table	See Table	Panel ID0	SW1-8 **OFF**
SW1							

1.3.0	Configuring the JIPA-Interface The JIPA-Interface detects automatically the attached flatpanel through the JIPA-ID on the connected cable adapter, if SW1-5 is in OFF-position. To override the JIPA-ID detection and to install customer specific timings, SW1-5 must be in ON-position.

SW1-5	**SW1-6**	**SW1-7**	**SW1-8**	**JIPA-ID**	**Resolution**	**Interface**	**Data width**	**Panel manufacturer**
OFF	X	X	X	5	640x480	Digital	18-Bit	NEC 6448AC33-18
OFF	X	X	X	7	800 x 600	Digital	18-Bit	LG Philips LB121S1
OFF	X	X	X	6	1024 x 768	Digital	2x18-Bit	Sharp LQ150X1DG11
ON	X	OFF	OFF	X	640x480	Digital	18-Bit	NEC 6448AC33-18
ON	X	OFF	ON	X	800 x 600	Digital	18-Bit	LG Philips LB121S1
ON	X	ON	OFF	X	1024x768	Digital	2x18-Bit	Sharp LQ150X1DG11

X = don’t care

Reserved for update = These combination of switch settings is reserved for updating the board with specific panel files via the serial OSD feature. The panel files are distributed via the internet database www.kontron-hh.com. If connector X4 is used, SW1-5 must be in ON-position and the resolution must be selected with SW1-7 to SW1-8.

Notice : If using X4 please check carefully panel voltage supply and adjust JP16 equal to flat panel requirements.

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1.3.0 Configuring the JILI-Interface

The JILI and JILI40-Interface must be configured with SW1. In the future the JILI-Interface detects automatically the attached flatpanel through the EEPROM on the cable adapter.

SW1-5	SW1-6	SW1-7	SW1-8	JILI-ID	Resolution	Interface	Data width	Panel manufacturer
ON	X	OFF	OFF	X	640x480	Digital	18-Bit	NEC NL6448AC33-18
ON	X	OFF	ON	X	800 x 600	Digital	18-Bit	LG Philips LB121S1
ON	X	ON	OFF	X	1024 x 768	Digital	2 x 18-Bit	Sharp LQ150X1DG11
ON	X	ON	ON	X	1280x1024	LVDS	2 x 24-Bit	LG LM181E1

X = don't care

Reserved for update = These combination of switch settings is reserved for updating the board with specific panel files via the serial OSD feature. The panel files are distributed via the internet database www.kontron-hh.com.

Notice : If using X1 please check carefully panel voltage supply and adjust JP16 equal to flat panel requirements.

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1.4.7	VGA/SVGA TFT Interface	X4
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1.4.9	DC Power supply	CN200, CN201
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1.4.11	Backlight control configuration	JP15
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1.4.13	Composite video input	CN13
1.4.14	DVI input connector	CN6
1.4.15	YUV video input port	CN15,CN16

1.4.1 RGB analog input X300

High Density Sub-D-Connector 15 Contacts, Receptacle
Case/Size : Right Angle, Through Hole

	Name	Pin		Description
	RED	1	O	analog input red
	GREEN	2	O	analog input green
	BLUE	3	O	analog input blue
	ID2	4	O	Not connected
	GND	5	O	Analog Ground
	GND	6	O	Analog Ground red
	GND	7	O	Analog Ground green
	GND	8	O	Analog Ground blue
	DDC_5V	9	O	+5V supply from video card
	GND	10	O	Analog Ground
	ID0	11	O	Not connected
	DDC_SDA	12	O	DDC serial data
	HSYNC	13	O	Horizontal sync input
	VSYNC	14	O	Vertical sync input
	DDC_SCL	15	O	DDC serial clock

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1.4.2 OSD keypad connector CN102

14 Contacts IDC Connector, Gold plated, double row, vertical mount, through hole

Description	Name	Pin		Pin	Name	Description
+5V DC Power	VCC	1	O O	2	L_ENA	LED Enable (Operating)
Confirm Key (TTL)	MFB3	3	O O	4	MFB1	OSD Menu key (TTL)
Down Key (TTL)	MFB4	5	O O	6	MFB0	Up Key (TTL)
Serial Transmit (TTL)	TXD	7	O O	8	RXD	Serial Receive (TTL)
Switch LED (TTL)	MFB11	9	O O	10	MFB2	ON/OFF Key (TTL)
Low active Reset (TTL)	/RESET	11	O O	12	+12V	+12 V DC Power
Power Ground	GND	13	O O	14	GND	Power Ground

1.4.3 Backlight Connector X100

Apply operating voltage for backlight inverter using connector X100

Connector Single Row, 7 Contacts, Case/Size : Right Angle, 1,25mm Pitch

		Pin	Name	Description
X100	O	1	NC	Not connected
	O	2	Backlight dimming control	(analog signal 0V to 4.9V)
	O	3	GND	Power Ground
	O	4	Backlight power supply	5 / 12 V DC (switched) see JP16
	O	5	Backlight power supply	5 / 12 V DC (switched) see JP16
	O	6	GND	Power Ground
	O	7	BLON	Backlight control signal (TTL) Polarity settings see JP15

1.4.4 Serial OSD connector CN101

The OSD (On Screen Display) can be controlled either trough the keypad or the serial connector CN101 for configuration purposes or mass production. See also chapter 1.5 and chapter 1.9 for detailed description.

Caution ! The transmit and receive signals have RS232C level and are crossed!

10 Contacts IDC Connector, Gold plated, double row, vertical mount, through hole

Description	Name	Pin		Pin	Name	Description
Not connected	NC	1	O O	2	NC	Not connected
Transmit signal	COM_TXD	3	O O	4	NC	Not connected
Receive signal	COM_RXD	5	O O	6	NC	Not connected
Not connected	NC	7	O O	8	NC	Not connected
Power Ground	GND	9	O O	10	+5V	+5V DC Power

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1.4.5 JIPA-Interface X3

All JIPA (**J**UMP*tec* **I**ntelligent **P**anel **A**daptation) signals are LVTTL compatible (3.3V)

72 Contact SODIMM-ML Connector with Metallic Locks
Manufacturer : AMP

Description	Name	Pin			Pin	Name	Description
First Line Marker	FLM	1	O	O	2	LP	Latch pulse
Power Ground	GND	3	O	O	4	GND	Power Ground
Data clock	SCLK	5	O	O	6	GND	Power Ground
Power Ground	GND	7	O	O	8	MOD (DE)	Data Enable
Panel Data EG6/G6	PD10	9	O	O	10	PD11	Panel Data EG7/G7
Panel Data OB4	PD32	11	O	O	12	PD33	Panel Data OB5
Panel Data EB2/B2	PD12	13	O	O	14	PD13	Panel Data EB3/B3
Panel Data EB2/EB4	MAP0	15	O	O	16	MAP1	Panel Data EB3/EB5
Panel Data EG2/OB6	MAP2	17	O	O	18	MAP3	Panel Data EG3/OB7
Panel Data ER2/OG2	MAP4	19	O	O	20	MAP5	Panel Data ER3/OG3
Panel Data EB4/EB6	MAP6	21	O	O	22	MAP7	Panel Data EB5/EB7
Panel Data EB6/OB2	MAP8	23	O	O	24	MAP9	Panel Data EB7/OB3
Panel Data EG4/EG2	MAP10	25	O	O	26	MAP11	Panel Data EG5/EG3
Panel Data EG6/EG4	MAP12	27	O	O	28	MAP13	Panel Data EG7/EG5
Panel Data ER4/OG4	MAP14	29	O	O	30	MAP15	Panel Data ER5/OG5
Panel Data ER6/OG6	MAP16	31	O	O	32	MAP17	Panel Data ER7/OG7
Power Ground	GND	33	O	O	34	PD0	Panel Data ER2/R2
Panel Data ER3/R3	PD1	35	O	O	36	PD2	Panel Data ER4/R4
Panel ID 0	PID0	37	O	O	38	PID1	Panel ID 1
Panel ID 2	PID2	39	O	O	40	PID3	Panel ID 3
	Reserved	41	O	O	42	GND	Power Ground
	Reserved	43	O	O	44	Reserved	
Panel Data ER5/R5	PD3	45	O	O	46	PD4	Panel Data ER6/R6
Panel Data ER7/R7	PD5	47	O	O	48	PD18	Panel Data OR2
Panel Data OR3	PD19	49	O	O	50	GND	Power Ground
+5V DC Power	VCC	51	O	O	52	Reserved	
Panel Data OR4	PD20	53	O	O	54	PD21	Panel Data OR5
	Reserved	55	O	O	56	Reserved	
	Reserved	57	O	O	58	Reserved	
	Reserved	59	O	O	60	Reserved	
Enables Backlight	SW_BACK	61	O	O	62	Reserved	
	Reserved	63	O	O	64	+3.3V	+3.3V DC Power
+12V DC Power	+12V	65	O	O	66	+12V	+12V DC Power
+5V DC Power	VCC	67	O	O	68	Reserved	
Panel Data OR6	PD22	69	O	O	70	PD23	Panel Data OR7
Enables Backlight	ENAVEE	71	O	O	72	SW_VDD	Enable Panel Power

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1.4.6 JILI-Interface X2

All JILI (**J**UMP*tec* **I**ntelligent **L**VDS **I**nterface) signals are LVDS compatible.

Flatfoil Connector 40 Contacts, Right Angle, Bottom Contact
Case/Size : 0.5mm Pitch, Series : 6210 / ZIF

Description	Name	Pin		Pin	Name	Description
Not connected	LTGIO0	1	O O	2	FTX0-	Odd Receiver Signal(-) (R1IN 0-)
Odd Receiver Signal(+) (R1IN 0+)	FTX0+	3	O O	4	DIGON	Controls Panel Digital Power
Odd Receiver Signal(-) (R1IN 1-)	FTX1-	5	O O	6	FTX1+	Odd Receiver Signal(+) (R1IN 1+)
Not connected	BIASON	7	O O	8	FTX2-	Odd Receiver Signal(-) (R1IN 2-)
Odd Receiver Signal(+) (R1IN 2+)	FTX2+	9	O O	10	GND	Power Ground
Odd Clock Signal(-) (CK1IN -)	FTXC-	11	O O	12	FTXC+	Odd Clock Signal(+) (CK1IN +)
Power Ground	GND	13	O O	14	FTX3-	Odd Receiver Signal(-) (R1IN 3-)
Odd Receiver Signal(+) (R1IN 3+)	FTX3+	15	O O	16	DDCSDA	I²C Data
Even Receiver Signal(-) (R2IN 0-)	STX0-	17	O O	18	STX0+	Even Receiver Signal(+) (R2IN 0+)
I²C Clock	DDCSDA	19	O O	20	STX1-	Even Receiver Signal(-) (R2IN 1-)
Even Receiver Signal(+) (R2IN 1+)	STX1+	21	O O	22	GND	Power Ground
Even Receiver Signal(-) (R2IN 2-)	STX2-	23	O O	24	STX2+	Even Receiver Signal(+) (R2IN 2+)
Power Ground	GND	25	O O	26	STXC-	Even Clock Signal(-) (CK2IN -)
Even Clock Signal(+) (CK2IN +)	STXC+	27	O O	28	GND	Power Ground
Even Receiver Signal(-) (R2IN 3-)	STX3-	29	O O	30	STX3+	Even Receiver Signal(+) (R2IN 3+)
+5.0V DC Power	Vcc_F	31	O O	32	Vcc_F	+5.0V DC Power
+5.0V DC Power	Vcc_F	33	O O	34	Vcc_F	+5.0V DC Power
Enables Backlight	BLON#	35	O O	36	GND	Power Ground
Power Ground	GND	37	O O	38	+12V_F	+12V DC Power
+12V DC Power	+12V_F	39	O O	40	+12V_F	+12V DC Power

1.4.7 VGA/SVGA TFT-Interface X4

This connector directly matches through an interface cable for 31/41 pin VGA/SVGA TFT interface. All flat screen signals are LVTTL compatible (3.3V)

Flatfoil Connector 32 Contacts, Right Angle, Bottom Contact
Case/Size : 0,5mm Pitch, Series : 6210 / ZIF

Description	Name	Pin		Pin	Name	Description
Power Ground	GND	1	O O	2	SCLK	Data clock
Latch pulse	LP	3	O O	4	FLM	First Line Marker
Power Ground	GND	5	O O	6	P0	Panel Data R0
Panel Data R1	P1	7	O O	8	P2	Panel Data R2
Panel Data R3	P3	9	O O	10	P4	Panel Data R4
Panel Data R5	P5	11	O O	12	GND	Power Ground
Panel Data G0	P6	13	O O	14	P7	Panel Data G1
Panel Data G2	P8	15	O O	16	P9	Panel Data G3
Panel Data G4	P10	17	O O	18	P11	Panel Data G5
Power Ground	GND	19	O O	20	P12	Panel Data B0
Panel Data B1	P13	21	O O	22	P14	Panel Data B2
Panel Data B3	P15	23	O O	24	P16	Panel Data B4
Panel Data B5	P17	25	O O	26	GND	Power Ground
Data Enable	MOD (DE)	27	O O	28	PANEL_VCC	Panel Power
Panel Power	PANEL_VCC	29	O O	30	R/L	Right/Left
Up/Down rotate	U/D	31	O O	32	NC	Not connected

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1.4.8 JILI40-Interface X1

All flat screen signals are LVDS compatible

Connector Double Row 2mm, 40 Contacts, Gold plated
Case/Size : Vertical, Through Hole

Description	Name	Pin		Pin	Name	Description
Enables Backlight (see X100)	BLON#	1	O O	2	BLON#	Enables Backlight (see X100)
Backlight Adjust (see X100)	BLADJ	3	O O	4	STX3+	Even Receiver Signal(+) (R2IN 3+)
Even Receiver Signal(-) (R2IN 3-)	STX3-	5	O O	6	+12V_F	+12V (behind Fuse)
Even Clock Signal(+) (CK2IN +)	STXC+	7	O O	8	STXC-	Even Clock Signal(-) (CK2IN -)
+12V (behind Fuse)	+12V_F	9	O O	10	STX2+	Even Receiver Signal(+) (R2IN 2+)
Even Receiver Signal(-) (R2IN 2-)	STX2-	11	O O	12	+12V_F	+12V (behind Fuse)
Even Receiver Signal(+) (R2IN 1+)	STX1+	13	O O	14	STX1-	Even Receiver Signal(-) (R2IN 1-)
+12V (behind Fuse)	+12V_F	15	O O	16	STX0+	Even Receiver Signal(+) (R2IN 0+)
Even Receiver Signal(-) (R2IN 0-)	STX0-	17	O O	18	+12V_F	+12V (behind Fuse)
Odd Receiver Signal(+) (R1IN 3+)	FTX3+	19	O O	20	FTX3-	Odd Receiver Signal(-) (R1IN 3-)
Power Ground	GND	21	O O	22	GND	Power Ground
I^2C clock	DDCSCL	23	O O	24	DDCSDA	I^2C Data
Power Ground	GND	25	O O	26	FTXC+	Odd Clock Signal(+) (CK1IN +)
Odd Clock Signal(-) (CK1IN -)	FTXC-	27	O O	28	GND	Power Ground
Odd Receiver Signal(+) (R1IN 2+)	FTX2+	29	O O	30	FTX2-	Odd Receiver Signal(-) (R1IN 2-)
Power Ground	GND	31	O O	32	FTX1+	Odd Receiver Signal(+) (R1IN 1+)
Odd Receiver Signal(-) (R1IN 1-)	FTX1-	33	O O	34	GND	Power Ground
Odd Receiver Signal(+) (R1IN 0+)	FTX0+	35	O O	36	FTX0-	Odd Receiver Signal(-) (R1IN 0-)
Power Ground	GND	37	O O	38	GND	Power Ground
Panel VCC (switched) see JP16	Vcc_P	39	O O	40	Vcc_P	Panel VCC (switched) see JP16

1.4.9 DC power supply CN200

Apply operating voltage using connector CN200 .

4 Contact Connector, Single Row, Right Angle, Polarization, through hole

		Pin	Name	Description
CN200	O O O O	1 2 3 4	NC GND GND +12V	Not connected Power Ground Power Ground +12 V DC Power

1.4.9 DC power supply CN201

Apply operating voltage using connector CN201.

DC POWER JACK, Case/Size : PCB-Mount 2mm Pin Diameter

		Pin	Name	Description
CN201	O O	1 2	+12V GND	+12 V DC Power Power Ground

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1.4.10 Backlight and flatpanel power configuration JP16

This configuration is only valid for X1, X4 and X100.
Short pins 1-2 or 3-4 or 5-6 or 7-8 or 9-10 to choose required voltage supply.
Caution ! Only one configuration for backlight and flatpanel is allowed, otherwise the board is permanently damaged.

Connector Double Row 2,54 mm, 10 Contacts, Gold plated
Case/Size : Vertical, Through Hole

	Pin		Pin	Name	Description	Delivery Default
JP16	**1**	**O O**	**2**	+3.3V	+ 3.3V DC Power for flatpanel power	**Open**
	3	**O O**	**4**	+12V	+ 12V DC Power for flatpanel power	**Open**
	5	**O O**	**6**	VCC	+ 5V DC Power for flatpanel power	**5-6 closed**
	7	**O O**	**8**	VCC	+ 5V DC Power for backlight power	**Open**
	9	**O O**	**10**	+12V	+ 12V DC Power for backlight power	**9-10 closed**

1.4.11 Backlight control configuration JP15

Use JP15 to control polarity of backlight control signal of X1, X2 and X100.

Connector Double Row 2,54 mm, 3 Contacts, Gold plated
Case/Size : Vertical, Through Hole

	1 2 3 Pin	2-3	1-2	Delivery Default
JP15	**O O O**	/BLON **Never unplug/replug this while in use!**	BLON	**1-2 closed**

1.4.12 SVHS video input CN12

This input converts NTSC, PAL or SECAM in S-video to digitized component video.

4 Contact Connector, Single Row, Right Angle, Polarization, through hole

		Pin	Name	Description
CN12	**O** **O** **O** **O**	**1**	GND	Power Ground
		2	GND	Power Ground
		3	Y	Y component of video signal
		4	C	C component of video signal

1.4.13 Composite video input CN13

This input converts NTSC, PAL or SECAM in composite video to digitized component video.

4 Contact Connector, Single Row, Right Angle, Polarization, through hole

		Pin	Name	Description
CN13	**O** **O**	**1**	GND	Power Ground
		2	CVBS	CVBS video signal

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1.4.14 DVI input connector CN6

This input supports the connection of DVI capable video cards and supports resolutions from 640x480 up to 1280x1024.

Connector Double Row 2,54 mm, 10 Contacts, Gold plated
Case/Size : Vertical, Through Hole

Description	Name	Pin		Pin	Name	Description
Receiver Signal(-) (RX2-)	RX2-	1	O O	2	RX2+	Receiver Signal(+) (RX2+)
Power Ground	GND	3	O O	4	NC	Not connected
Not connected	NC	5	O O	6	SCL_IN	I^2C clock
I^2C Data	SDA_IN	7	O O	8	VS	
Receiver Signal(-) (RX1-)	RX1-	9	O O	10	RX1+	Receiver Signal(+) (RX1+)
Power Ground	GND	11	O O	12	NC	Not connected
Not connected	NC	13	O O	14	+5V	+5V DC from DVI video card
Power Ground	GND	15	O O	16	HP	Hot Plug
Receiver Signal(-) (RX0-)	RX0-	17	O O	18	RX0+	Receiver Signal(+) (RX0+)
Power Ground	GND	19	O O	20	NC	Not connected
Not connected	NC	21	O O	22	GND	Power Ground
Clock Signal(+) (RXC+)	RXC+	23	O O	24	RXC-	Clock Signal(-) (RXC-)
Analog red video data	RED	C1	O O	C2	GREEN	Analog green video data
Analog blue video data	BLUE	C3	O O	C4	HSYNC	Horizontal Sync
Analog Power Ground	AGND	C5	O O	C5 _1	AGND	Analog Power Ground

1.4.15 YUV video input connector CN15,CN16

These input connectors can only be used if the video option of the board is not assembled. CN15 is used for 8-bit ITU-R BT656 video data. At CN16 the three analog video inputs, the I²C bus and the power supply is connected. These connectors will be used for future video input cards.

10 Contacts IDC Connector, Gold plated, double row, vertical mount, through hole

Description	Name	Pin		Pin	Name	Description
	Y1	1	O O	2	Y0	
	Y3	3	O O	4	Y2	
	Y5	5	O O	6	Y4	
	Y7	7	O O	8	Y6	
Power Ground	GND	9	O O	10	RVCLK	Video decoder clock

CN15

Description	Name	Pin		Pin	Name	Description
	AY0	1	O O	2	AY2	
	AC1	3	O O	4	/RESET	Low active Reset (TTL)
Power Ground	GND	5	O O	6	+5V DEC	+5V DC Power
I²C Bus clock	DDC_SCL	7	O O	8	+5V DEC	+5V DC Power
I²C Bus data	DDC_SDA	9	O O	10	GND	Power Ground

CN16

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1.5	On Screen Display
	With the OSD (On Screen Display) you can modify the settings and control the special features of the CRT*to*LCD-2. The OSD uses a number of menus for making changes and turning the special features on or off. The configuration can be done via the OSD-keypad (OSD-Panel-Kit) or the serial port (see chapter 1.9 for more details). To start the OSD press the “OSD” button on the keypad, after switching the power supply on. If a valid flat panel configuration is installed the OSD Main Menu will be displayed.

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1.6 Technical Specification

These values were measured with OSD-Panel attached and without flatpanel and backlight inverter.

- Supply voltage at 25˚C :

Minimum supply voltage : + 7,0 V DC
Typical supply voltage : + 12,0 V DC
Maximum supply voltage : + 14.4 V DC

- Typical Input current at 25˚C :

CRT*to*LCD-2-JIPA with Video & OSD-keypad, input signal (XGA) : 435 mA
CRT*to*LCD-2-JIPA with Video & OSD-keypad, powerdown : 320 mA
CRT*to*LCD-2-JIPA with Video & OSD-keypad, no input signal : 420 mA

CRT*to*LCD-2-JIPA w/o Video & OSD-keypad, input signal (XGA) : 285 mA
CRT*to*LCD-2-JIPA w/o Video & OSD-keypad, powerdown : 120 mA
CRT*to*LCD-2-JIPA w/o Video & OSD-keypad, no input signal : 250 mA

CRT*to*LCD-2-JILI with Video & OSD-keypad, input signal (SXGA) : 460 mA
CRT*to*LCD-2-JILI with Video & OSD-keypad, powerdown : 340 mA
CRT*to*LCD-2-JILI with Video & OSD-keypad, no input signal : 430 mA

CRT*to*LCD-2-JILI w/o Video & OSD-keypad, input signal (SXGA) : 300 mA
CRT*to*LCD-2-JILI w/o Video & OSD-keypad, powerdown : 138 mA
CRT*to*LCD-2-JILI w/o Video & OSD-keypad, no input signal : 280 mA

- Supply voltage ripple : 100 mV peak to peak 0 – 20 MHz

- Current Rating of the output circuits :

VCC (12V, 5V or 3.3V) : 2A
BACKLIGHT (5V or 12V) : 2A
Digital Outputs for Flatpanel-Interface : 2 up to 20mA (default 6 mA)

VGA connector signals :
Sync input voltage low : 0.8 V
Sync input voltage high : 2.4 V
RGB input voltage : 0 – 0.7 V with 75 Ohm external termination
RGB input current : 0 – 5 mA

- Temperature : operating : 0˚ C – 60˚ C (*1)
Non operating : - 10˚ C – 85˚ C
(*1) The maximum operating temperature is the maximum measurable temperature on any spot on the module surface. It is the user responsibility to keep this temperature within the above specification.

- Thermal gradient : operating : 25˚ C per hour
non-operating : 40˚ C per hour

- Relative Humidity : operating : 10% - 90 % RH non-condensing
non operating : 5% - 95% RH non-condensing

- Mechanical : Shock : 50G/20ms square wave maximum
Vibration : 1G/0-600Hz, dwell not to exceed

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1.6 Technical Specification

- Altitude : operating : 0 – 3000 m
non-operating : 0 – 5000 m

- Dimensions of the printed circuit board :

Width : 114.31 mm
Length : 179.07 mm
Thickness : 1.50 mm

- Dimensions of the module :

Width : 119.50 mm*
Length : 179.07 mm
Height : 16.50 mm

*Note : This dimension can change if JIPA or JILI-adapter are plugged in!

1.7 Supported Video Modes

Generally all VESA compatible video modes are supported. If modes are not supported the controller displays " Invalid Mode" on the flat panel. In this case use the Flat Panel Editor, available on our website, to add this special mode to the supported mode table.

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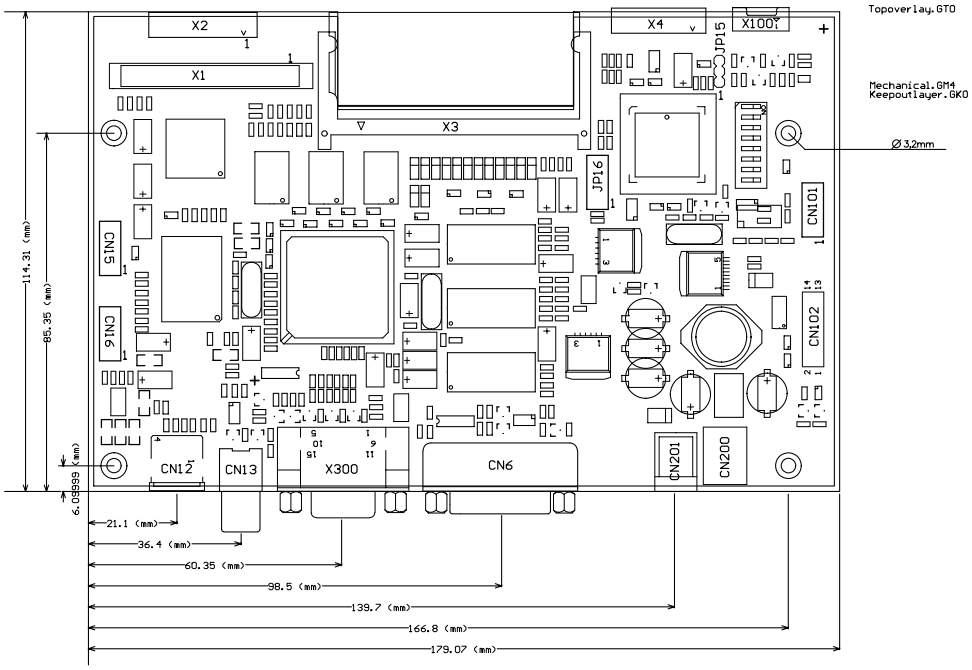
1.8 Layout/Schematics



CRT*to*LCD-2

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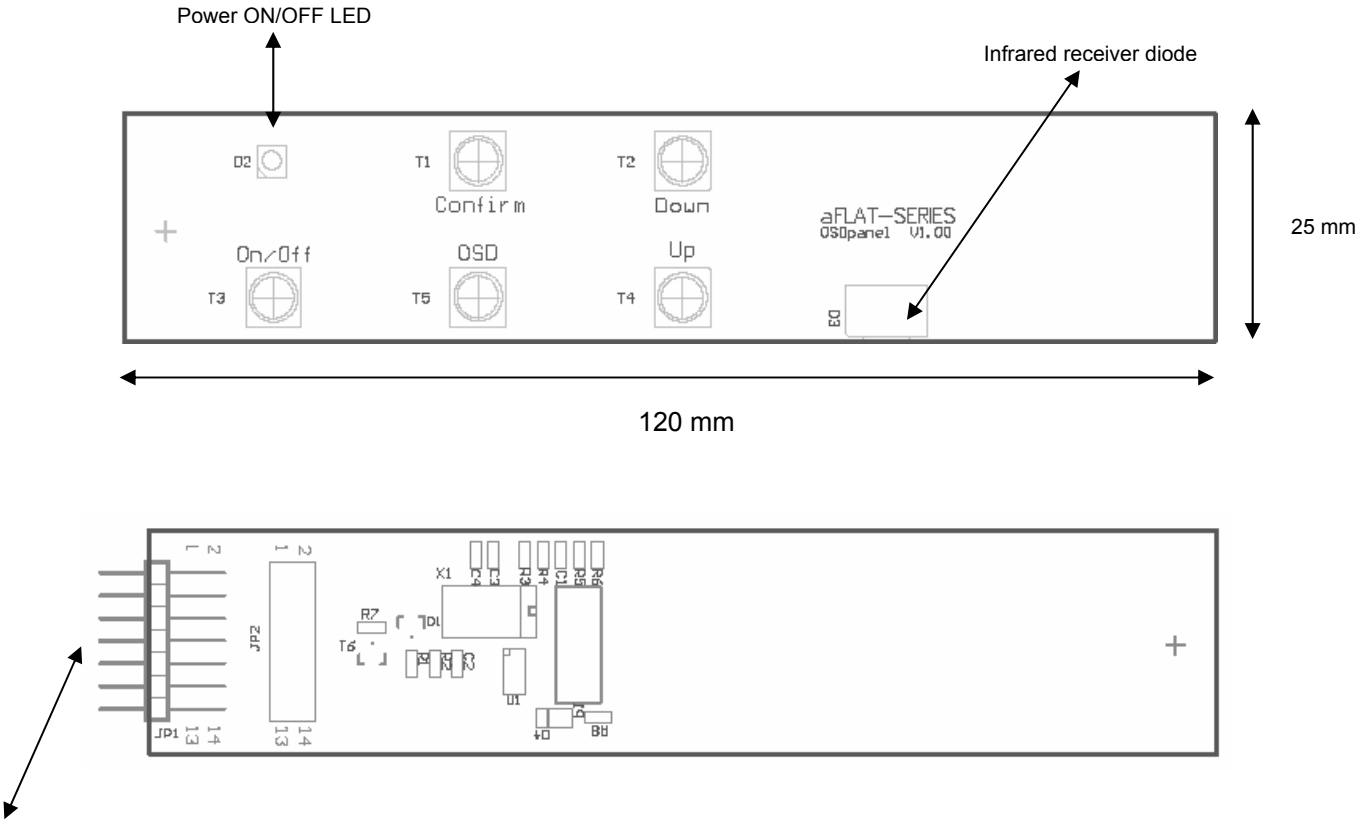
1.8 Layout/Schematics

OSD-Keypad “OSD-Panel“



Keypad JP1 connected to CN102 of CRTtoLCD-2!

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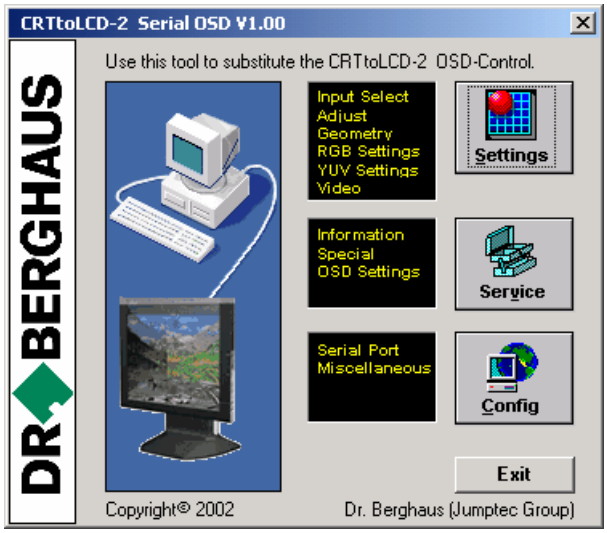
1.9	Serial OSD
	The Serial OSD feature, allows the user to configure the CRTtoLCD-2 via the serial port. The program offers a lot of pages, as shown in the following sections:
	Main menu for configuration and adjustments. 
	Settings – Allows the configuration of the display settings. **Service –** Configuration of OSD Settings and information of panel type. **Config –** Change COM port settings.

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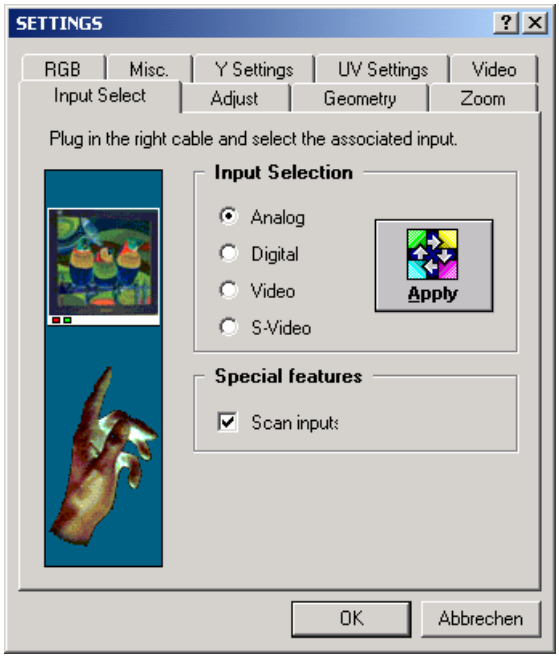
1.9	Input Select Menu
	Configuration menu for video inputs. 
	Input Selection – Choose which video input is used**.**
	Special Features – Automatically scan all inputs for valid video sources.

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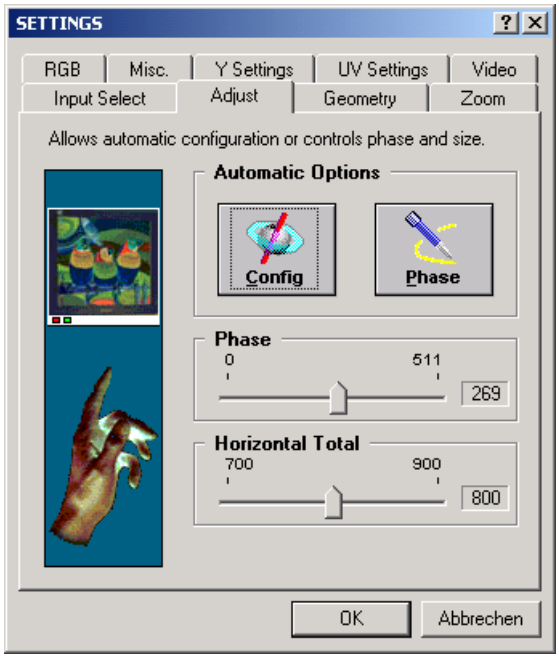
1.9	Adjust Menu
	Configuration menu for phase and horizontal adjustments.



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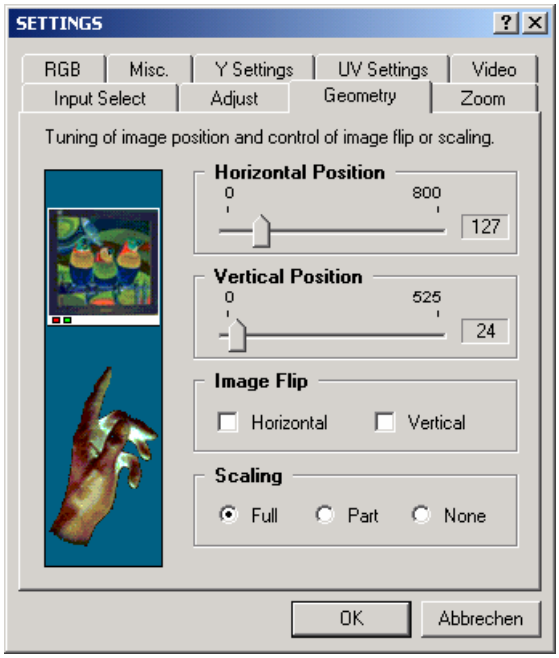
1.9	Geometry Menu
	Configuration menu for horizontal and vertical position of the image.



Horizontal Position – Move the image position horizontally.

Vertical Position – Move the image position vertically.

Image Flip – Rotation of the picture horizontal or vertical in 90 degree steps.

Scaling – Choose full, partial or no scaling of the image.

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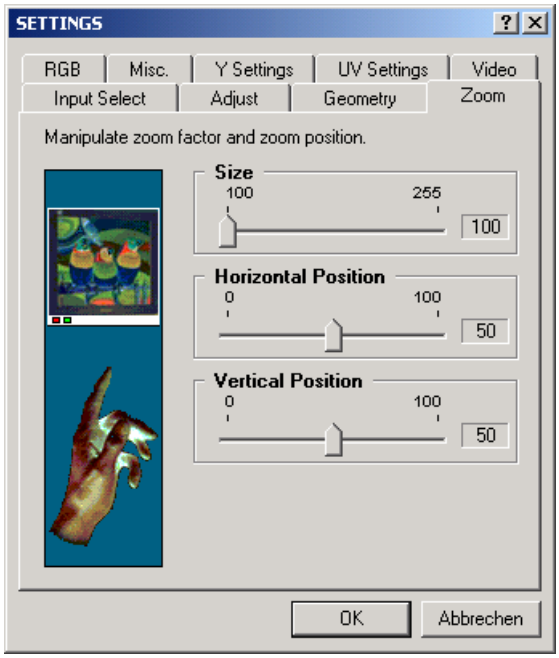
1.9	Zoom Menu
	Configuration menu for image zoom features. 
	Size – Zoom image from 100% up to 255%. **Horizontal Position –** Choose horizontal position of image. **Vertical Position –** Choose vertical position of the image.

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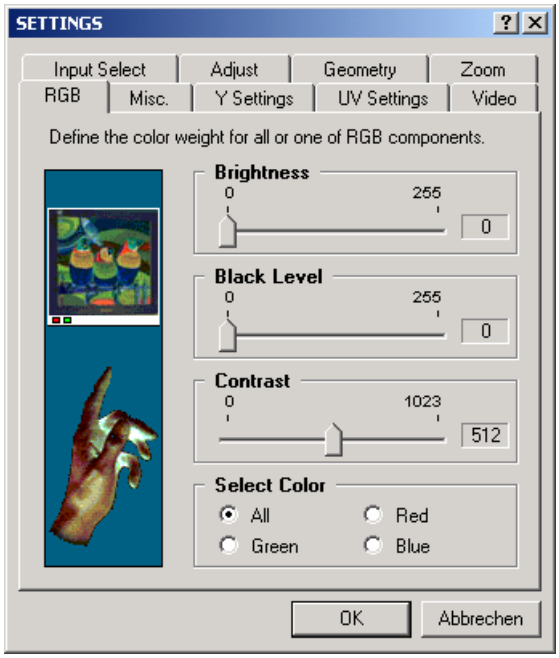
1.9	Brightness / Contrast Menu
	Configuration menu for NVRAM settings. 
	Brightness – Change brightness of Red, Green or Blue color. **Black level –** Change black level of Red, Green or Blue color. **Contrast –** Change contrast of Red, Green or Blue color.

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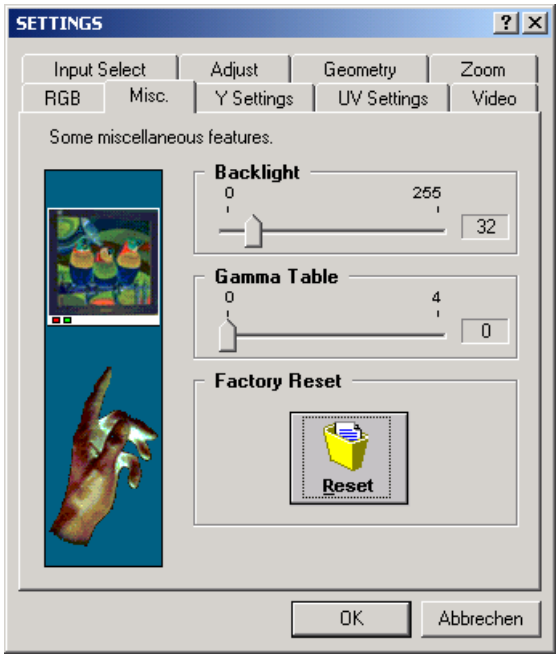
1.9	Misc. Menu
	Configuration menu for panel types. 
	Backlight – Adjust backlight voltage. Range (0V to 4.9V). **Gamma Table –** Choose one out of four gamme tabele values. **Factory Reset –** Reset all settings to factory defaults.

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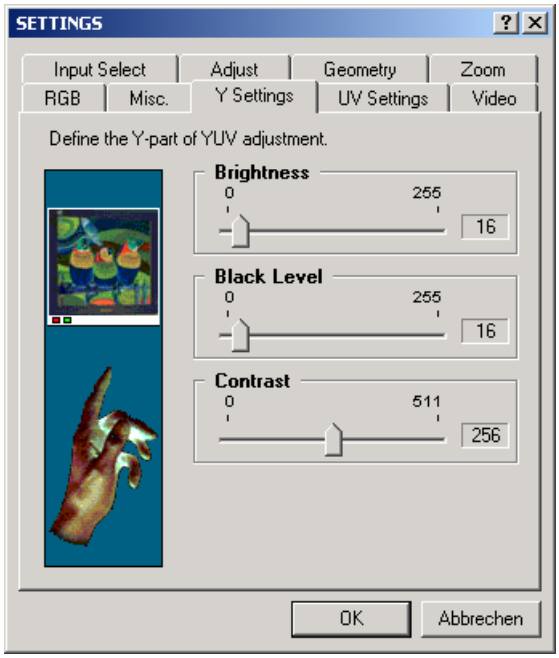
1.9	YUV Menu
	Configuration menu for YUV settings for video input.



Brightness / Black Level / Contrast – Select color levels for the composite or S-VHS video inputs.

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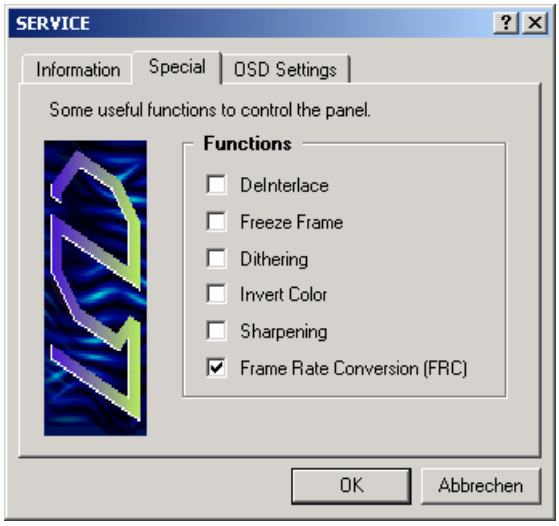
1.9	Special Menu
	Configuration menu for special features. 
	Deinterlace – Activate frame buffering in memory for interlaced video sources. **Freeze Frame –** Stores the actual frame and image in memory. **Dithering –** Use dithering algorithm to increase colors. **Sharpening –** Creates shaper pixels. **Frame Rate Conversion –** Input and output frequencies can be different with this option.

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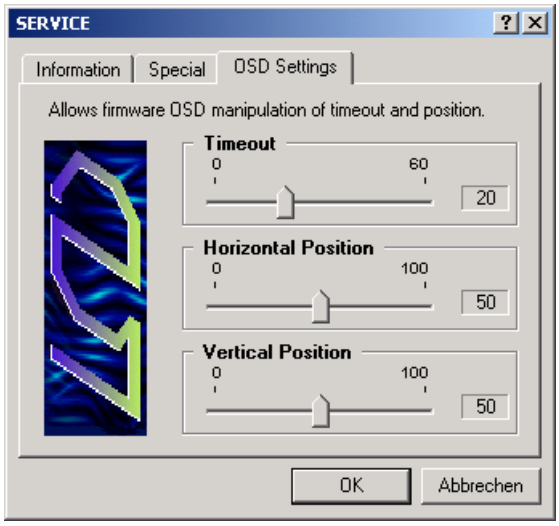
1.9	OSD Menu
	Configuration menu for OSD settings.



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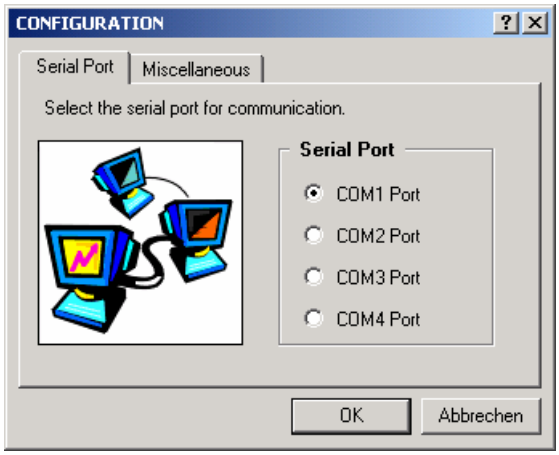
1.9	Serial Port Menu
	Configuration menu for the serial port.  **Serial Port –** Select the COM port for the communication with the controller.

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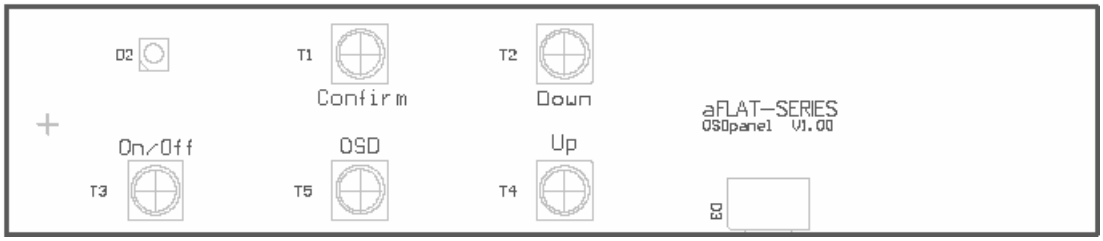
2.0	OSD Options & Adjustments



All settings are adjusted using the OSD-keypad if supplied with the shipment.
Connect the keypad to the CRTtoLCD board, see chapter 1.8.
There are five keys:

On/Off	Switches the CRTtoLCD board ON and OFF.
Confirm	Toggles between yes and no options
OSD	This key opens the Main menu and exits from all menus.
Up and Down	Move up and down in menus or increase and reduce numeric values.

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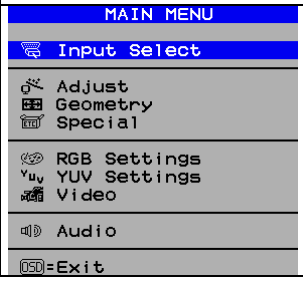
2.1 Main Menu

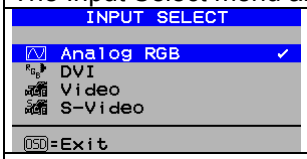
The Main Menu allows access to all sub-menus.



The Main menu allows selection of the 2nd layer menus

2.1.1 Selecting the Input Channel

The Input Select menu allows selecting the signal input channel.



Input Select Options	
Analog RGB	Selects the analog RGB input connector
DVI	Selects the DVI connector
Video	Selects the video connector
S-Video	Selects the S-Video connector
Scan Inputs	Selects the reaction to the event ‘no signal found’. If ScanInputs is ON, all input channels are polled automatically for input signals. If ScanInputs is OFF, only the selected input channel is polled.
Exit	Returns to the Main Menu

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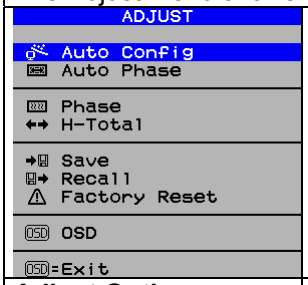
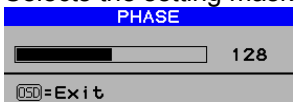
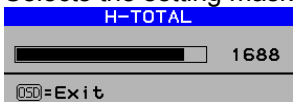
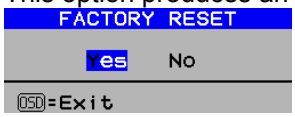
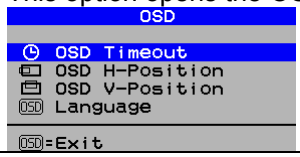
2.1.2 Adjust Menu

The Adjust menu allows access to all adjustments.



Adjust Options	
Auto Config	Selects automatic configuration of all adjustments.
Auto Phase	Selects automatic configuration of phase settings.
Phase	Selects the setting mask for phase:  Adjust the phase and then exit.
H-Total	Selects the setting mask for the number of horizontal pixels.  Adjust the setting and then exit.
Save	Selects the save operation. All settings of this menu are saved to EEprom.
Recall	All changes of settings affected in the current session are cancelled.
Factory reset	This option produces an affirmation screen:  Select Yes and exit. This resets all settings to the factory default values. Selection No prevents from resetting.
OSD	This option opens the OSD menu for the OSD settings 

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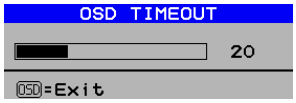
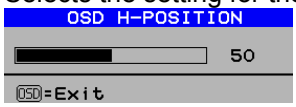
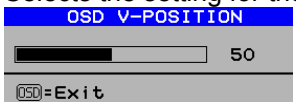
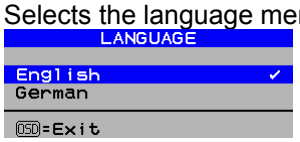
2.1.2	Adjust Menu	
		OSD Options
	OSD Timeout	Selects the timeout for the OSD.  Adjust the setting and then exit.
	OSD H-Position	Selects the setting for the horizontal position of the OSD Screen  Adjust the setting and then exit.
	OSD V-Position	Selects the setting for the horizontal position of the OSD Screen  Adjust the setting and then exit.
	Language	Selects the language menu.  Select the language and then exit. The picture may vary depending on the implementation of further languages.
	Exit	Closes the OSD Menu.
	Exit	Exit the Adjust menu.

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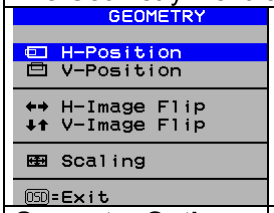
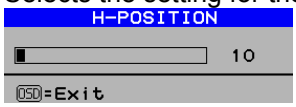
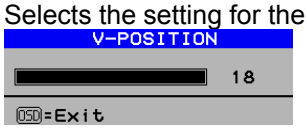
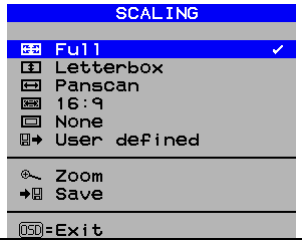
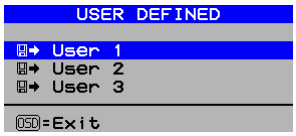
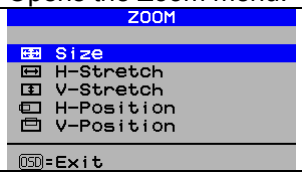
2.1.3 Geometry Menu

The Geometry menu allows access to the geometry settings.



Geometry Options

H-Position	Selects the setting for the horizontal position  Adjust the setting and then exit
V-Position	Selects the setting for the vertical position  Adjust the setting and then exit.
H-Image Flip	Flips the representation of the screen image horizontally.
V-Image Flip	Flips the representation of the screen image vertically
Scaling	Selects the menu for the scaling options 
	Scaling Options
Full	Enlarges the picture to the full screen, regardless of proportions
Letterbox	Enlarges the picture to maximum size fitting the screen, keeping the proportions.
Panscan	Enlarges the picture to use all of the screen, keeping proportions.
16:9	Select this option if you are using a 16:9 video input signal
None	No scaling.
User defined	Opens the menu for selecting one of 3 profiles named user 1, 2, and 3.  Select the profile you wish to work at and exit.
Zoom	Opens the Zoom menu.
	

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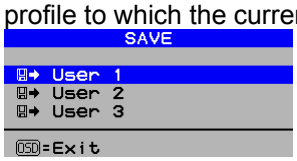
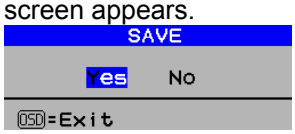
2.1.3	Geometry Menu	
		Zoom Options
	Size	Selects the manual size adjustment.
	H-Stretch	Selects the setting for the horizontal stretch factor. Adjust the setting and then exit.
	V-Stretch	Selects the setting for the vertical stretch factor. Adjust the setting and then exit.
	H-Position	Selects the setting for the horizontal position. Adjust the setting and then exit.
	V-Position	Selects the setting for the vertical position. Adjust the setting and then exit.
	Save	This option is positioned below the Zoom option and saves the Zoom settings to EEprom. Before saving, you may specify the profile to which the current settings are saved.  Select the profile you wish to save to and exit. The confirmation screen appears.  Select **Yes** and exit. Current settings are saved to the specified profile. Selection **No** keeps the current settings but does not save to EEprom

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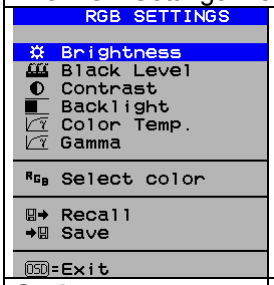
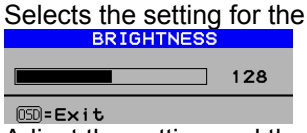
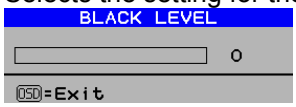
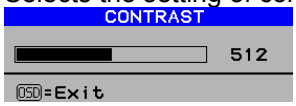
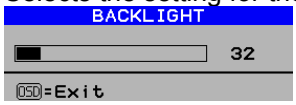
2.1.4	Special Menu	
	The Special Menu gives access to a number of special toggle settings.	
		
	Options	
	DeInterlace	Sets static mesh de-interlace mode.
	FreezeFrame	Fixing the existing screen as is. No signal processing.
	Dithering	Optimizing color resolution.
	Invert color	Inverts all colors to their opposite.
	Sharpening	Optimizing the sharpness of the picture by adjusting the processing of signals to the ratio of input/output signals.
	Screen info	Displays the resolution of the incoming signal.
	Version	Displays the version identification.

2.1.5	RGB Settings Menu	
	The RGB Settings menu gives access to color rendition specifications	
		
	Options	
	Brightness	Selects the setting for the brightness of the rendition.  Adjust the setting and then exit.
	Black Level	Selects the setting for the blackness of the color black.  Adjust the setting and then exit.
	Contrast	Selects the setting of contrast.  Adjust the setting and then exit.
	Backlight	Selects the setting for the brightness of the backlight lamp  Adjust the setting and then exit.

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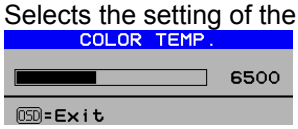
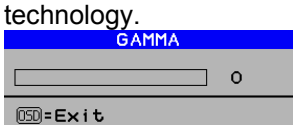
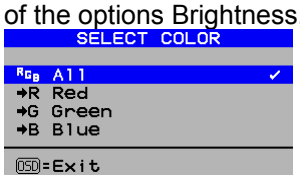
2.1.5	RGB Settings Menu	
	Color Temp.	Selects the setting of the color temperature in °Kelvin  Adjust the setting and then exit.
	Gamma	Selects the setting for the brightness of the rendition in gamma technology.  Adjust the setting and then exit.
	Select Color	Gives Access to the selection of the color(s) to which the settings of the options Brightness, Black Level and Contrast pertain.  Select one or more colors, or all, then exit.
	Recall	Cancel all changes in settings during the current session.
	Save	Save the current settings of this menu to EEprom.

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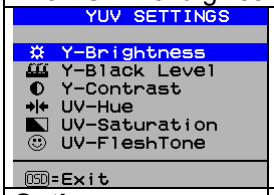
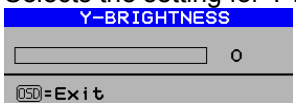
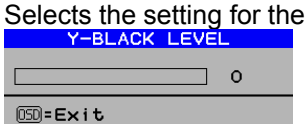
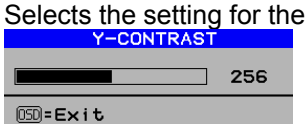
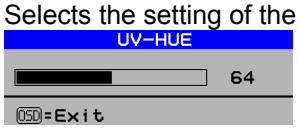
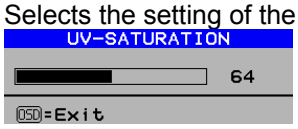
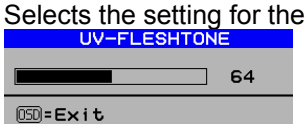
2.1.6	YUV Setting Menu	
	The YUV menu gives access to settings concerning color rendition in YUV technology.	
		
	Options	
	Y-Brightness	Selects the setting for Y brightness.  Adjust the setting and then exit.
	Y-Black Level	Selects the setting for the blackness of black on the screen.  Adjust the setting and then exit.
	Y-Contrast	Selects the setting for the Y contrast.  Adjust the setting and then exit.
	UV-Hue	Selects the setting of the UV Hue  Adjust the setting and then exit.
	UV-Saturation	Selects the setting of the UV color saturation.  Adjust the setting and then exit.
	UV-Fleshtone	Selects the setting for the saturation of fleshtone colors  Adjust the setting and then exit.

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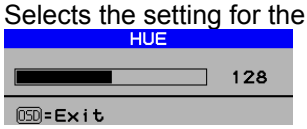
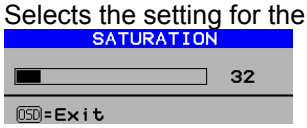
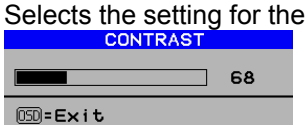
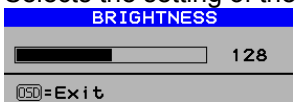
2.1.7	Video Menu	
	This menu gives access to settings concerning color rendition for video input. Settings pertain to signals received via the Video input channel only.	
		
	Options	
	Hue	Selects the setting for the Video hue.  Adjust the setting and then exit.
	Saturation	Selects the setting for the color saturation in Video rendition.  Adjust the setting and then exit.
	Contrast	Selects the setting for the contrast in Video rendition.  Adjust the setting and then exit.
	Brightness	Selects the setting of the Brightness for Video rendition.  Adjust the setting and then exit.

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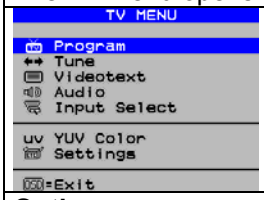
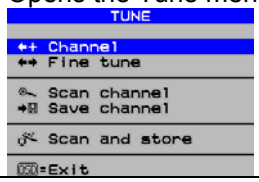
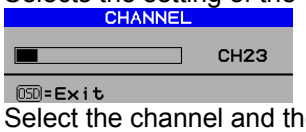
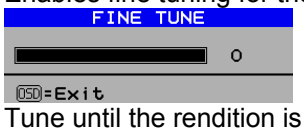
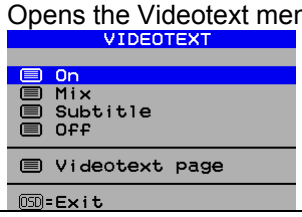
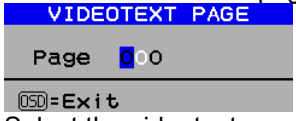
2.2 Additional features of OSD with TV-Tuner

If your CRTtoLCD board is shipped with a TV-tuner, there are additional features in the programming menu.
The TV menu opens all settings pertaining to signals received via the TV input channel.



Options	
Program	Selects the preset TV station. Select the station and then exit.
Tune	Opens the Tune menu 
	Tune Options
Channel	Selects the setting of the Station's channel  Select the channel and then exit.
Fine tune	Enables fine tuning for the Station.  Tune until the rendition is satisfactory and the exit.
Scan channel	Search next station.
Save channel	Save tuned Station to current program place.
Scan and store	Starts the Station detection. All stations found are automatically stored to individual program places.
Exit	Exit the Tune menu.
Videotext	Opens the Videotext menu. 
	Videotext Options
On	Display Videotext only
Mix	Overlay Videotext over TV Signal
Subtitle	Display subtitles as subtitles
Off	Videotext off
Videotext page	Selects the videotext page selection  Select the videotext page and exit.
Exit	Exit the videotext menu

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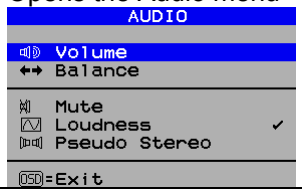
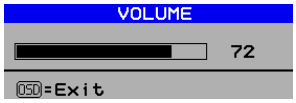
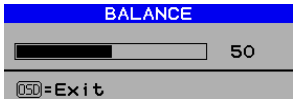
2.2	Additional features of OSD with TV-Tuner	
	Audio	Opens the Audio menu 
		Audio Options
	Volume	Selects the Volume setting  Set the volume and exit.
	Balance	Selects the stereo balance setting  Set the balance and exit.
	Mute	Switch off the loudspeaker.
	Loudness	Toggle between loudness on and off
	Pseudo Stereo	Toggle between Pseudo Stereo on and off. Pseudo Stereo is a sound enhancing technique.
	Exit	Exit the Audio menu.
	Input Select	Opens the Input Select menu
	YUV Color	Opens the YUV menu
	Settings	Opens the Main menu
	Exit	Exit the TV menu.

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2.3 Technical Support

Please report any errors or problems to this email address: sales_graphic@kontron.com.
Normally, there is no telephone support. In your email message, please include the following information :

Company Name
Your Name
Address
Email
Telephone/Fax
Exact description of the hardware, etc.
Exact description of the software in used (for example: Win 95 with driver XYZ)
Exact description of the error.

2.4 Revision History

Date	Author	Version	Description
23.02.2002	D.Finstel	1.0	Initial Release
26.06.2002	D.Finstel	1.1	Updated Specs
26.06.2002	D.Finstel	1.2	Updated Specs
08.03.2004	M. Schulze	1.3	Updated Specs
21.01.2005	D.Finstel	1.4	Update OSD Options