Multi Media Interfaceboard MMIB1E MMIB

DATA SHEET

MMIB1E
Multi Media Interface Board

The products and specifications are subject to change without notice.
Please ask for the latest releases to guarantee the satisfaction of your product requirements.

Imm und Bühler Elektronik
Maybachstrasse 10
D-76227 Karlsruhe

Multi Media Interfaceboard MMIB1E MMIB

Contents

Multi Media Interfaceboard MMIB1E MMIB

1. Features

The MMIB1 interface board is designed for controlling Flat–Panel-Displays. The unit provides analog video and VGA(PC) signals to TFT/LCD- and Plasma Displays.

VGA input (PC signals):
- Input connector: 15pol HD SubD receptacle (R/G/B/Hsync/Vsync)
- VGA to SXGA/WXGA and an nearly unlimited range of user resolutions
- Up to 140Mhz sample rate
- „Autoadjust“ function
- Multisync capability, due to frame rate conversion, independent from type of connected display

Video input:
- Input connectors: 2x Cinch (FBAS), 1x Mini Din 4pol (SVHS Y/C)
- PAL-System with automatic recognition of 4:3, various letterboxes and 16:9 formats
- NTSC and SECAM coming soon
- 4H comp filter
- temporal deinterlacing and noise reduction (‚Movie‘ mode)
- spatial deinterlaceing (‚Sport‘ mode)
- Horizontal anarmophic scaling/zoom (Panorama View / Waterglass View)

Digital input:
- 24 bit RGB or 16bit YCrCb (4:2:2,4:1:1)
- and control signals

High-Performance-Scaling
- Full screen support for all input resolutions independent of display resolution, achieved by horizontal and vertical independent magnification or downscaling in real-time

Frame-memory
- Any input frame rate can be converted to the desired output frame rate which is recommended by the display manufacturer

Display output:
- Single and dual pixel port output (18/24, 36/48 bit) applied on 3.3V or 5V high level
- Up to 100Mhz pixel-rate
- Panel Vcc(depends on adapter) 3,3/5/12 V
- Asynchronous output timing in VGA mode, optimized on Panel requirements
- Synchronous output timing on video mode (50/60Hz), to avoid movement artifacts
- Controlsignals for backlight, PLE, H/V reverse, etc... (depends on display features)

Universal:
- The MMIB1 interface-board is build for running with all displays
- Since the display-adapter (see below) decides which display is connected the MMIB could shipped without knowing the destination display.
- Recognition of the connected display is done automatically

Other features:
- Control of brightness, contrast, sharpness
- advanced on screen display (Windows „look and feel“)
- Help function
- Adjustable gammacorrection (in 10 steps between 0.. 2.5)
- Keyboard with 5 keys, can be mounted horizontal or vertical, includes IR receiver for remote control
- Timer (especially for backlight MTBF)

Signal Managment and Autodetection
- Input search at No Signal
- Autodetection of New Signals at any input
- Power On: Input selection.

Advanced Key features
- Input selection over several keys (toggling or direct)
- User definable Hotkeys (Function-list)

2. OSD menu and user controls

All the functions of the interface board are selected and adjusted using an advanced on screen display (OSD) and a keyboard or a IR-remote control. The OSD includes an online help window to explain the functionality of the menu items.

The OSD menu of the MMIB is controlled via a 5 key (Up, Down, Left, Right and Ok) keyboard or Remote.

Since we try to meet a lot of customer requirements there are a lot of ways to configure the keyboard behavior while the OSD is closed.

Functionality while OSD is closed (Default):

Key	Function	Remark
UP	Opens the SOURCE menu.	
LEFT	Opens the INFO menu	
RIGHT	Opens the GEOMETRY menu	
DOWN	Toggles through the inputs	Between which input the key toggles can be selected (See OTHER->KEYBOARD OPTIONS->DOWN)
OK	Opens the MAIN menu.	

Functionality while OSD is closed (User adjustable):

Key	Function	Remark
UP	Activate the 2nd functionlist.	see also description for menu item functionlist II
	No function	
LEFT	Activate the 1st functionlist	see also description for menu item functionlist I
	Toggles through the inputs	Between which input the key toggles can be selected
	No function	
RIGHT	Activate the 1st functionlist	see also description for menu item functionlist I
	Toggles through the inputs	Between which input the key toggles can be selected
	No function	
DOWN	Activate the 1st functionlist	see also description for menu item functionlist I
OK	No function	

All user adjustments for the keyboard are available in OTHER->KEYBOARD OPTIONS

Functionality while OSD is open.

Key	Function	Remark
UP	Select the previous menu item. Wrap around is provided at the first item of a menu.	
LEFT	Decrease the actual selected value. Toggle ON/OFF buttons. Select an OPTION button.	
RIGHT	Increase the actual selected value. Toggle ON/OFF buttons. Select an OPTION button.	
DOWN	Select the next menu item. Wrap around is provided at the last item of a menu.	
OK	Close the active menu an return to the previous.	

2. OSD menu and user controls (continue)

Note: Most adjustments are only possible while an input signal is applied.

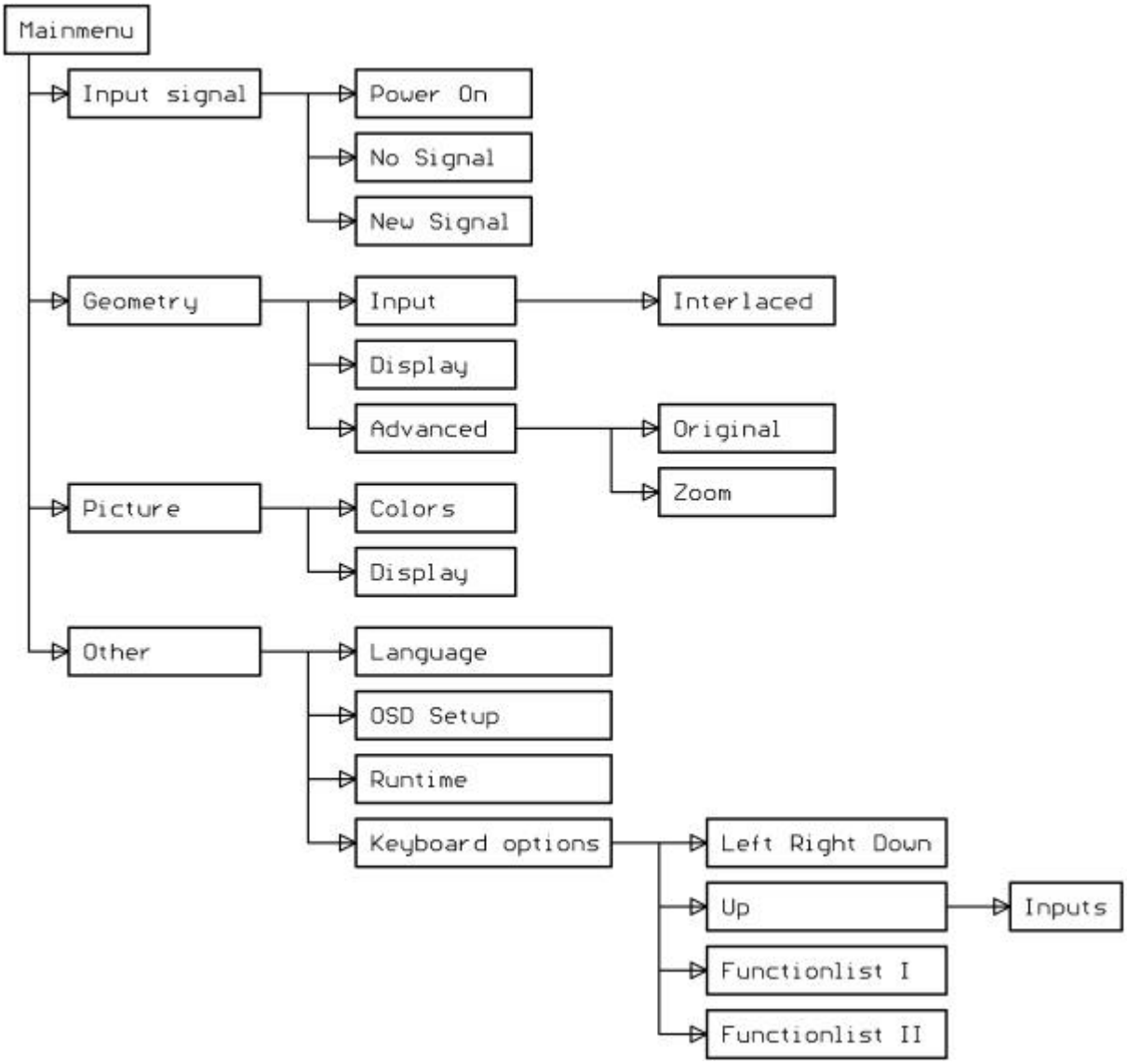
Adjusted menu items will be saved if
- the sub menu is closed
- an other input format is detected

Since we try to support the customer with all the features possible by the hardware and of lot of special requirements the OSD structure have become really large. So we have designed the OSD structure straight in order of the logical appearance of a desired function.

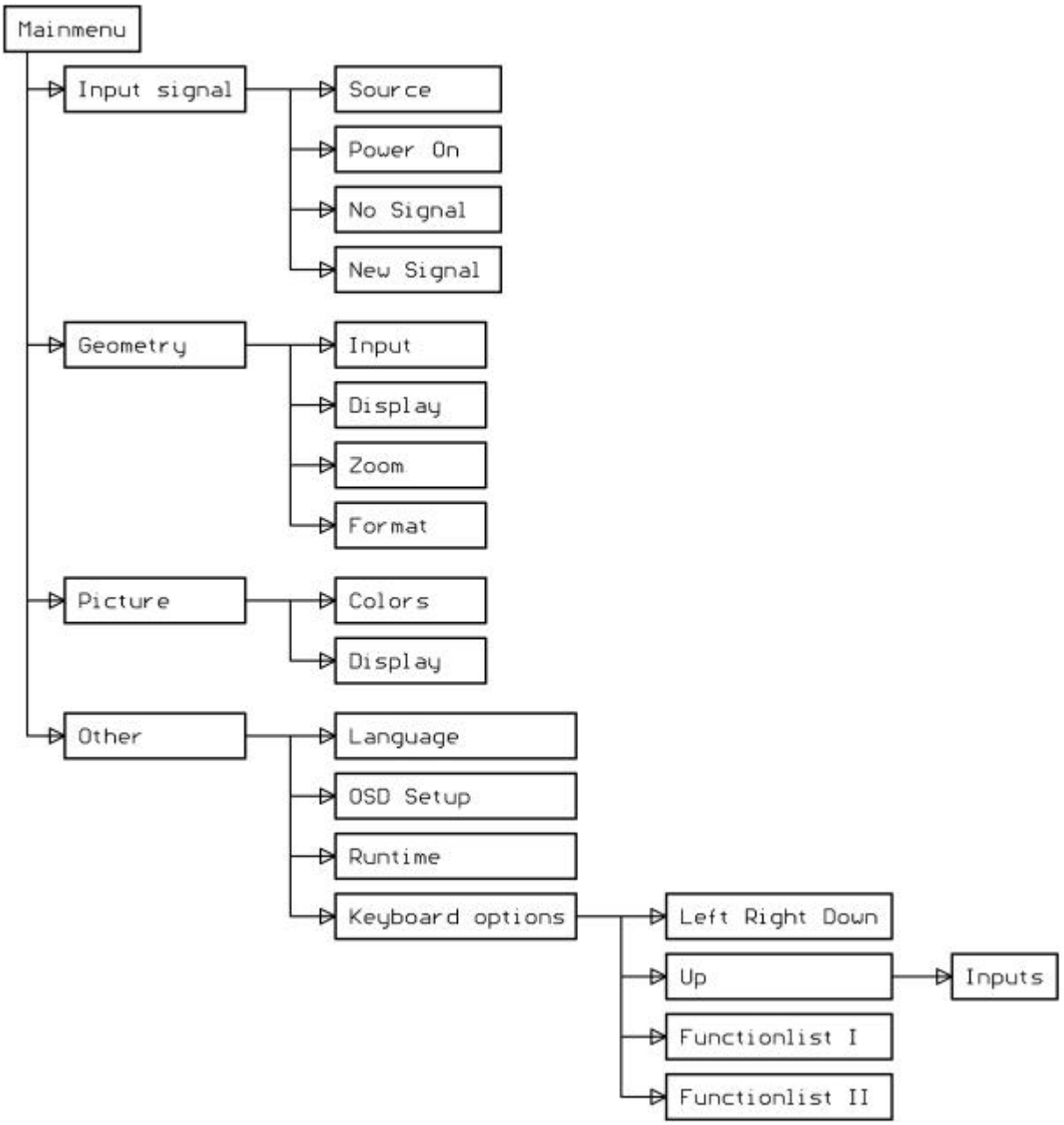
Therefore always search a desired function in the logical orders:

MAIN->INPUT SIGNAL: Anything according to the input signal. Like selecting a input source, no signal, newsignal settings.
MAIN->GEOMETRY. Anything according to the position and size (geometry). Also the geometry is well structured:
MAIN->GEOMETRY->INPUT: Any parameter to descripe the incoming signal.
MAIN->GEOMETRY->DISPLAY: Additional parameters to descripe the actual display.
MAIN->GEOMETRY->ADVANCED: How to handle the incoming signal.
MAIN->PICTURE: All the paramters like contrast, brightness, colors and so on.
MAIN->OTHER: System settings like language, OSD position, keyboard options and so on.

2.1 Hierarchical overview in VGA mode



2.2 Hierarchical overview in video mode



2.3 Rough overview

Function	Menu(s)	Remark
Selecting an input signal the video source and norm	main->input signal main->input signal-sources UP-KEY	VGA, Composite input, s-video input terrestrical, satellite, vcr, PAL, NTSC, SECAM
What happens if no signal is applied on the actual selected input	main->input signal->No Signal	Background Color Text Search another input
What happens on power up	main->input signal->Power On	
While watching video a PC signal is applied	main->input signal->Auto	Supervision of none selected inputs is possible.
Picture position is wrong adjusted	main->geometry	Phaseshift Samplerate Position Resolution Interlaced
The picture looks like lines are displayed in an wrong order	main->geometry main->geometry->interlaced	ODD / EVEN spartial deinterlacing temporal deinterlacing static mesh
The picture look dark	main->picture	brightness, contrast, R G B, backlight dimming
OSD language	main->other->language	
OSD style and position	main->other->OSD setup	cascade, transparent, position, color
How long is the display running	main->other->runtime info->maintanance	
Whats about hot-keys ?	main->other->keyboard options main->other->keyboard options->funtionlist I main->other->keyboard options->funtionlist II	
Not everyone should have access to the OSD menu.	main->other->keyboard options	LEFT RIGHT DOWN UP OK

2.4 Detailed OSD description

1. Mainmenu		
Item		**Function**
Input	1.1	Choose the input signal out of VGA, 2X Composite and SVHS Video connectors.
Geometry	1.2 1.3	Adjust frame offset, output format and zoom function.
Picture	1.4	Adjust brightness, contrast, sharpness, colors.
Other	1.5	Change language and OSD adjustments.

The main menu is selected by pressing the ‚OK' key on the keyboard or on the remote control while the OSD is off.

1.1 Input source		
Item		**Function**
VGA		Show VGA input signal, the resolution and the H and V frequency of the input signal are displayed
Comp 1	1.1.2	Show 1st composite input signal
Comp 2	1.1.3	Show 2nd composite input signal
S-video	1.1.4	Show SVHS input signal
Power On	1.1.5	Which input is select at power up.
No Signal	1.1.6	Several options to define behavior at loss of signal.
Auto	1.1.7	Supervision of none selected inputs.

1.1.2 Source (1.1.3, 1.1.4)	
Item	**Function**
Satellite	Optimized color recovery for satellite TV and Camera applications
Terrestrical	Optimized color recovery for terrestrical TV
Video recorder	Optimized color recovery for VCR
Norm	Select Video norm, if AUTO is selected the incoming video norm is automatically detected.

Every video source has a delay between the luminance and chrominance information in the video signal. Select the desired source for optimized color recovery. Also the video norm can be selected out of PAL, NTSC and SECAM color standards (and their sub-standards).

2.4 Detailed OSD description (continue)

1.1.5 Power On	
Item	**Function**
Default	At power up the last active input will be selected.
VGA	At power up always the VGA input will be selected.
COMP1	At power up always the 1st composite input will be selected.
COMP2	At power up always the 2nd composite input will be selected.
S-video	At power up always the s-video input will be selected.

1.1.6 No Signal		
Item		**Function**
Search	1.1.6.1	If no signal is applied on the actual input. All out of the four available inputs can separately enabled for signal searching.
Blue		if no signal is applied a blue background is displayed.
Black		if no signal is applied a blue background is displayed.
User	1.1.6.2	if no signal is applied a color adjustable by the user is displayed.
Text		Enables or disables the “No signal on...” messange.

1.1.6.1 Search	
Item	**Function**
VGA	Allows signal searching on this input.
COMP 1	Allows signal searching on this input.
COMP 2	Allows signal searching on this input.
S-video	Allows signal searching on this input.
Delay	Delay time between changing to another input
Text	Enables or disables the “Search for signal on...” message.

2.4 Detailed OSD description (continue)

1.1.6.2 User color	
Item	**Function**
Red	Red color component for no signal background color.
Green	Green color component for no signal background color.
Blue	Blue color component for no signal background color.

1.1.7 Auto	
Item	**Function**
VGA	Show VGA input signal, the resolution and the H and V frequency of the input signal are displayed
Comp 1	Show 1st composite input signal
Comp 2	Show 2nd composite input signal
S-video	Show SVHS input signal
Back	Supervision of none selected inputs.

Supervision for a new signal at an none selected input Each input can separately enabled or disabled.
Note: While one of the video inputs is active, supervision works only for the VGA input. While the VGA input is active supervision works for every video input (if enabled).

2.4 Detailed OSD description (continue)

1.2 Frame geometry for VGA		
Item		**Function**
Input	1.2.1	All parameters which defines the input format.
Display	1.2.2	Active display area definition
Advanced	1.2.3	Choose display modes: *standard, original, zoom*

1.2.1 Input geometry	
Item	**Function**
Pixelrate	Adjust pixelrate until the whole frame appears the same. **Hint** : Use windows Shut Down Picture for adjustment.
Phaseshift	Adjust phaseshift to get best picture quality.
X-position	Adjust horizontal frame offset
Y-position	Adjust vertical frame offset.
Pixel	Number of active pixels of the incoming PC signal. e.g. SXGA: 1280.
Lines	Number of active lines of the incoming PC signal. e.g. SXGA: 1024.
Interlaced 1.2.1.1	Some adjustments for interlaced input signals
Auto	Automatic adjustment of the geometry parameters.

This menu can be selected directly by pressing the right key on the keyboard or on the remote control while the OSD is off.

Note for interlaced signals: The most critical function is the synchronization to the desired field (odd or even). Therefore the right field should be selected (see next menu).

1.2.1.1 Interlaced	
Item	**Function**
Non-Interlaced	Selection for non-interlaced input formats
Interlaced-Odd	Interlaced input format selection. Sampling starts with the odd frame.
Interlaced-Even	Interlaced input format selection. Sampling start with the even frame.
HV-Phase	Adjust counting delay for field detection. In some cases this item should be enabled for a correct field detection.
PC	Optimized de-interlacing for PC-Signals (static mesh). Field-synchronization is done one time if the actual (interlaced) format is attached and on every key stroke.
Sport	Optimized de-interlacing for fast moving RGB video signals (temporal de-interlacing). Field-synchronization is done continuously (about 10 fields).
Movie	Optimized de-interlacing for less moving RGB video signals (spatial de-interlacing). Field-synchronization is done continuously (about 10 fields).

2.4 Detailed OSD description (continue)

1.2.2 Display	
Item	**Function**
Pixel	Number of active display pixel per line. Maximum possible value is the true display resolution.
Lines	Number of active display lines. Maximum possible value is the true display resolution.
X-offset	Output: if active display area is chosen smaller than its real resolution, the horizontal position can be adjusted.
Y-offset	Output: if active display area is chosen smaller than its real resolution, the vertical position can be adjusted.

2.4 Detailed OSD description (continue)

1.2.3 Advanced		
Item		**Function**
Standard		In every case the input signal will be displayed on the whole display.
Original	1.2.3.1	The input frame will be displayed 1:1. If the input resolution is larger than the display resolution, only a part of the picture is displayed. If the input resolution is smaller than the display resolution, a window is placed in the display.
Zoom	1.2.3.2	Magnification of the input frame, especially useful for display walls.

1.2.3.1 Original (VGA)	
Item	**Function**
X-Offset	Adjust X-position of the displayed window.
Y-Offset	Adjust Y-position of the displayed window.

1.2.3.2 Zoom (VGA)	
Item	**Function**
X-Offset	Adjust X-position of the displayed window.
Y-Offset	Adjust Y-position of the displayed window.
X-Factor	Magnification factor in X-direction
Y-Factor	Magnification factor in Y-direction

2.4 Detailed OSD description (continue)

1.3 Frame geometry (video)	
Item	**Function**
Standard	Normal display of video input.
Zoom 1	Slightly zoomed picture to reduce black lines at the borders.
Zoom 2	As zoom 1, but more zoomed.
User Format 1.3.1	Manual adjustments for the picture geometry, only for special purposes.
Sport	Selects **de-interlacing** with reduced moving artifacts.
Film	Selects **de-interlacing** with reduced noise.

This menu can be selected directly by pressing the right key on the keyboard or on the remote control while the OSD is off.

1.3.1 User format (video)		
Item		**Function**
Input	1.3.1.1	Adjust position width., etc.
Display	1.3.1.2	Definition of the active display area
Zoom	1.3.1.3	Input frame magnification
Format	1.3.1.4	Adjust the frame format correction factors

1.3.1.1 Input (video)	
Item	**Function**
Pixel	Number of pixel of the incoming video signal.
Lines	Number of lines of the incoming video signal.
X-position	Adjust horizontal frame offset
Y-position	Adjust vertical frame offset

2.4 Detailed OSD description (continue)

1.3.1.2 Display (video)	
Item	**Function**
Pixel	Number of active display pixel per line. Maximum possible value is the true display resolution.
Lines	Number of active display lines. Maximum possible value is the true display resolution.
X-offset	Output: if active display area is chosen smaller than its real resolution, the horizontal position can be adjusted.
Y-offset	Output: if active display area is chosen smaller than its real resolution, the vertical position can be adjusted.

1.3.1.3 Zoom (video)	
Item	**Function**
X-Offset	Adjust X-position of the displayed window.
Y-Offset	Adjust Y-position of the displayed window.
X-Factor	Magnification factor in X-direction
Y-Factor	Magnification factor in Y-direction

1.3.1.4 Format (video)	
Item	**Function**
Auto adjustment	Automatically recognition of PAL, PAL +, 4:3 or letterbox pictures.
Parameter 1	Format correction achieved by adding black lines or columns.
Parameter 2	Format correction achieved by cropping lines or columns.
Parameter 3	Format correction achieved by panorama or waterglass view.

2.4 Detailed OSD description (continue)

1.4 Picture		
Item		**Function**
Brightness		Brightness of the displayed Picture, Default is 32
Contrast		Contrast of the displayed Picture, Default is 32
Gamma-correction		Compensation of the color difference from TFT to CRT displays. *Remark:* the default value is about 8.
Sharpness		Adjust sharpness enhancement in Video mode (Vertical peaking). Adjust scaling algorithm for upscaling in VGA mode
Colors	1.4.1	Select color temperature by adjusting red, green and blue RGB offsets.
Display	1.4.2	Adjust backlight brightness and display specific features.

1.4.1 Colors	
Item	**Function**
Red	Color offset for red channel
Green	Color offset for green channel
Blue	Color offset for blue channel
Bandwidth	Input bandwidth selection to reduce noise (video mode only)
Compensation	Color carrier bandwidth compensation (video mode only)

1.4.2 Display	
Item	**Function**
Backlight	Adjust backlight brightness
Dithering	Color depth enhancement for 6 Bit Displays
L/R	Picture is mirrored left/right
U/D	Picture is mirrored up/down

The items of this menu depend on the connected Display. Normally all functionality the displays provides are supported in this menu.

2.4 Detailed OSD description (continue)

1.5 Others		
Item		**Function**
Language	1.5.1	Select OSD language
OSD Setup	1.5.2	Select OSD settings
Freeze mode		Generate still picture
Help		Switch OSD help function on/off
Runtime	1.5.3	Show runtime of display and backlight. Remark: the runtime of the backlight can be reset in the MTBFs menu.
Keyboard options	1.5.4	Several options for the key functionality while the OSD is off.

In keyboard option there are a lot of possibilities like:

- Enable or disable specific keys
- Create functionlists for most needed menu items.
- Input selection can be enabled for several keys.

1.5.1 Language	
Item	**Function**
English	Select English language for OSD
Deutsch	Select German language for OSD

1.5.2 OSD setup	
Item	**Function**
Cascade Menus	Select cascaded menus
Transparency	Select transparent OSD
Standard colors	Select between two OSD color settings
X-position	Horizontal placement of OSD
Y-position	Vertical placement of OSD

1.5.4 Keyboard options		
Item		**Function**
Up	1.5.4.1	Options for the UP key
Left Right	1.5.4.2	Options for the Left and Right key
Down	1.5.4.3	Options for the Down key
OK disabled		Disabled the OK key if selected
Functionlist I	1.5.4.4	Create or Delete the first functionlist
Functionlist II	1.5.4.5	Create or Delete the second functionlist

Note: it is possible to define a condition where the OSD is not longer accessable by the keys. In this case the OSD can be reached only once more with the IR-Remote. So ensure that the OK key always is enabled if this condition is not desired.

2.4 Detailed OSD description (continue)

1.5.4.1 Options for the UP key	
Item	**Function**
Default	The default function open the INPUT SOURCE menu when the UP key is pressed
Functionlist II	If selected the UP key activates the 2nd functionlist.
Disabled	No functionality while the OSD is closed.

Refer also FUNCTIONLIST II how to create a functionlist.

1.5.4.2 Options for the Left and Right key 1.5.4.3 Options for the Down key	
Item	**Function**
Default	LEFT: Open the menu INFO RIGHT: Open the menu GEOMETRY DOWN: Toggles through the inputs.
Functionlist I	If selected the key activates the 1st functionlist,
Disabled	No functionality while the OSD is closed.
Inputs	Also this keys can select or toggle through the input signals. Enable or disable the desired inputs. There are two input sets which can separately selected. One for the DOWN key and one for the Left and Right Keys

Refer also FUNCTIONLIST I how to create a functionlist.

1.5.4.4 Functionlist I 1.5.4.5 Functionlist II	
Item	**Function**
Create	Press left or right to enter the create mode. The OSD automatically restart with the main menu. Now you can move through the whole OSD menu structure as in normal operation. Select the item you want to add to the function list and press left. A short message give you the acknowledge that the item is added to the function-list. In this way you can add up to seven items to the functionlist. To quit the create mode close the OSD menu.
Delete	Deletes the function-list.

After creating a function-list you must connect the function-list to the desired key (see submenus 1.5.4.1 – 1.5.4.3).
Please note: Depending if a video or an VGA input is selected there are a lot of different function. So the function-lists for video and VGA are different. This means there existing four lists:

- FUNCTIONLIST I (VGA mode)
- FUNCTIONLIST I (Video mode)

- FUNCTIONLIST II (VGA mode)
- FUNCTIONLIST II (Video mode)

2.4 Detailed OSD description (continue)

2. Info		
Item		**Function**
Infos	2.1	Show information's
MTBFs	2.2	Adjust/reset backlight MTBF

This menu is selected by pressing the left key on the keyboard or on the remote control while the OSD is off.

2.1 Infos	
Item	**Function**
Interfaceboard	Show current version of the interface-board
Paneladapter	Show current version of the paneladapter
Software Rev	Show software release number
Panelclock	Show panelclock frequency
Panel H	Show horizontal frequency of the display
Panel V	Show vertical frequency of the display
Colors	Show maximum displayable colors
Panelmode	Show single/double pixel mode

2.2 MTBFs	
Item	**Function**
Backlight MTBF	Adjust MTBF of the backlight. Not functional, only to remember.
Backlight reset	Set the backlight runtime to 0

3. How to select your desired Display

The digital output of the MMIB very flexible due to free selection of:
- Timing (H / V / DE / polarities)
- Resolution
- Port width (18 / 24 / 36 / 48 Bit)
- Additional control signals are supported by the microcontroller unit.
- Analog voltage for Backlight adjustment.

To satisfy the requirements of the various available Displays we support various adapter-boards for a wide range of Displays. These adapter-boards placed on the top of the MMIB board. Additionally every adapter-board has a DIL-switch which allows to select one out of fifeteen Displays. At power on, the MMIB automatically recognize:
- which adapter-board is connected
- the desired display via the number selected by the DIL-switch.

At first please refer to the order information (INFO-MMIB1E) document. There you get an overview over all actual adapted Displays. Refer **Adapterset overview** table.

Select via the display model number:
- Adapterset No. (ASxx-xx)
- Display No. (This number has to select with the DIL-Switch on each adapter-board)

Display No	**DIP-SWITCH**			
	1	2	3	4
00	OFF	OFF	OFF	OFF
01	ON	OFF	OFF	OFF
02	OFF	ON	OFF	OFF
03	ON	ON	OFF	OFF
04	OFF	OFF	ON	OFF
05	ON	OFF	ON	OFF
06	OFF	ON	ON	OFF
07	ON	ON	ON	OFF
08	OFF	OFF	OFF	ON
09	ON	OFF	OFF	ON
10	OFF	ON	OFF	ON
11	ON	ON	OFF	ON
12	OFF	OFF	ON	ON
13	ON	OFF	ON	ON
14	OFF	ON	ON	ON
15	ON	ON	ON	ON

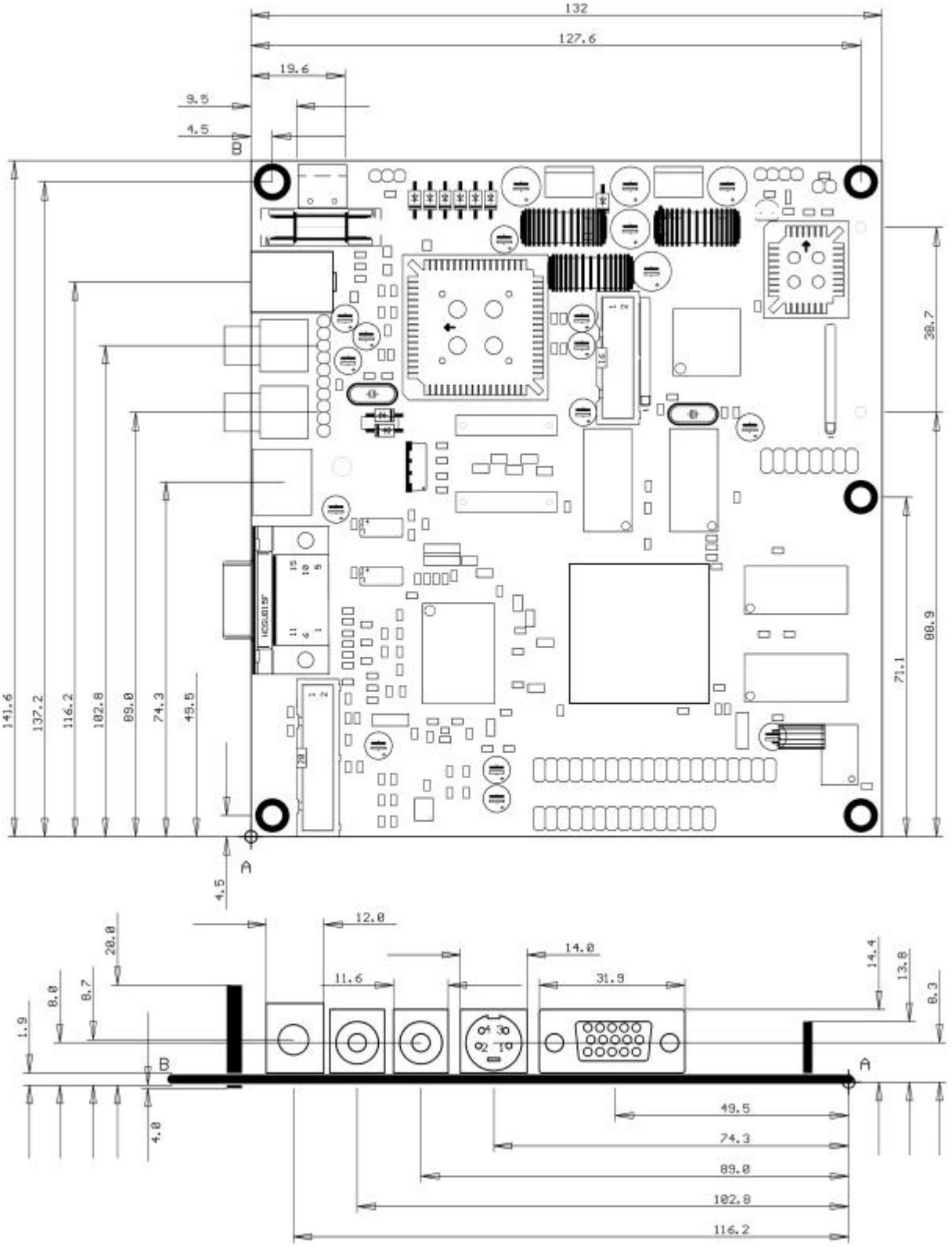
4. Characteristics

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
VCC	supply voltage		9	12	15	V
Ivcc	supply current (without display and backlight)	@12V		400		mA
Vin_video (p-p)	input video signal voltage (peak to peak)			1		V
Vin_vga (p-p)	input video signal voltage (peak to peak)			0.7		V
Visync	input sync signal voltage, for VGA signals		3.3		5	V
Ri	input signal termination			75		Ohm
Fclk	sampling rate for VGA signals		140			Mhz
B	analog bandwidth for VGA signals	3dB		400		Mhz
Tcom	commercial operating temperature		-10		65	°C
Tind	industrial operating temperature		-40		80	°C
L	Length			132		mm
W	Width			142		mm
H	Height			20		mm
Hadp	Mounting height for adapter boards			13.8		mm
Hmo	Mounting height for MMIB above mounting plane		4			mm
Ifuse	Fuse.			1.25		A

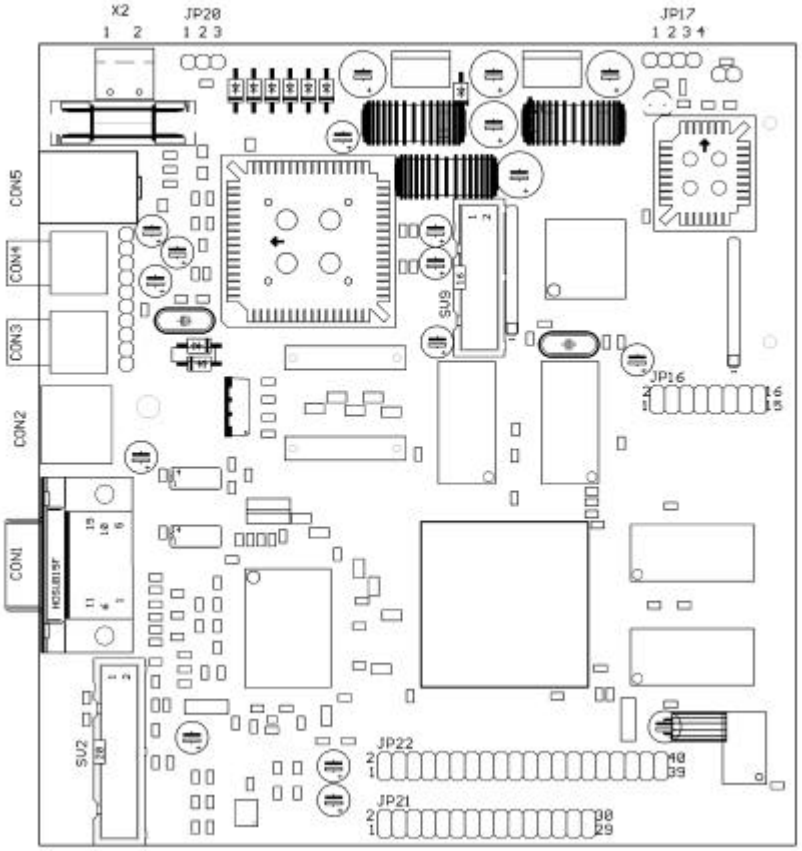
Proper ESD precautions are recommended to avoid performance degradation or loss of functionality.

Multi Media Interfaceboard MMIB1E MMIB

5. Mechanical drawings



6. Connectors



Symbol	Type	Description	Remark
CON1	HDSUB15 receptacle	PC signal input	
CON2	4-pin S-video (Mini Din)	S-video (Y/C) input	
CON3	Chinch receptacle	1st Composite input	
CON4	Chinch receptacle	2nd Composite input	
CON5		power supply	
X2		power supply	
JP20	Pin header 3pins, single row	3rd Composite input, active video output (composite)	not used
JP17	Pin header 4pins, single row	Serial input (RS232)	see ADP232P00
SV9	Box type pin header 16pins	Keyboard	
SV2	Box type pin header 20pins	VGA input extension	e.g for Composite Board
JP1	Pin header 2pins, single row	Flash Chip Select	**must always be closed**
JP16	Pin header 16 pins, double row	Display and backlight control	connector for display specific adapter board
JP21	Pin header 30 pins, double row	Digital Output PORTB	connector for display specific adapter board
JP22	Pin header 40 pins, double row	Digital Output PORTA	connector for display specific adapter board
CON7	DF9-31S	1st Digital input	reserved for further use
CON8	DF9-31S	2nd Digital input	reserved for further use

6.1 Supply connectors

CON5 – Supply voltage

Pin No.	Symbol	Description	Level
1(center)	VCC	Supply voltage	9..15V
2(outer)	GND	Ground	

X2 – Supply voltage

Pin No.	Symbol	Description	Level
1	GND	Ground	
2	VCC	Supply voltage	9..15V

Note: X2 and CON5 are parallel to each other.

6.2 Input signal connectors

CON1 – Analog VGA input

Pin No.	Symbol	Description	Level
1	R	Red video signal	0.7V(p-p)
2	G	Green video signal	0.7V(p-p)
3	B	Blue video signal	0.7V(p-p)
4	N.C.		
5	N.C.		
6	R gnd	Ground for red	
7	G gnd	Ground for green	
8	B gnd	Ground for blue	
9	N.C.		
10	GND	Common ground	
11	reserved	reserved for DDC	
12	N.C.		
13	H sync	Horizontal sync signal	LVTTL/TTL
14	V sync	Vertical sync signal	LVTTL/TTL
15	reserved	reserved for DDC	

CON2 – Svideo (SVHS/YC) input

Pin No.	Symbol	Description	Level
1	GND	Ground	
2	GND	Ground	
3	Y	Luminance	1V(p-p)
4	C	Chrominance	0.3V(p-p)

CON3, CON4 – Composite video input

Pin No.	Symbol	Description	Level
1(center)	Composite	Composite video input	1V(p-p)
2	GND	Ground	

6.2 Input signal connectors (continue)

JP20 3rd Composite input, active video output

Pin No.	Symbol	Description	Level
1	Vin4	3rd Video input (not implemented in software)	1V(p-p)
2	GND	ground	
3	Cout1	Active video output (external buffer needed)	1V(p-p)

6.3. Peripheral connectors

SV9 Keyboard

Pin No.	Symbol	Description	Level
1	TIIO2	must be left open	TTL
2	GND	Ground	
3	TIIO1	Green LED, (LED is driven to GND)	TTL
4	TIO0	I/O (for special customer requirements)	TTL
5	TIIO0	Red LED, (LED is driven to GND)	TTL
6	TIN4	Input „OK“ key	TTL
7	AD1	Analog to Digital Converter Input (for special customer requirements)	0-5V
8	TIN3	Input for „Right“ key	TTL
9	AD0	Analog to Digital Converter Input (for special customer requirements).	0-5V
10	TIN2	Input for „Left“ key	TTL
11	SCL	Clock line for I2C-bus	TTL
12	TIN1	Input for „Down“ key	TTL
13	SDA	Data line for I2C-bus	TTL
14	TIN0	Input for „Up“ key	TTL
15	U5	5V supply voltage	
16	IRREC	Input for infrared receiver diode	TTL

Note: All key inputs are pulled up to VCC over 10k.

JP17 serial input (RS232)

Since Tx and Rx voltages are only on TTL level on this connector, JP17 should only used with the ADP232Pxx RS232 adapter board.

Pin No.	Symbol	Description	Level
1	RXD0	Receive data line	TTL
2	TXD0	Transmit data line	TTL
3	U5	5V supply voltage for external adapter	
4	GND	Ground	

See also chapter 8: RS232 communication

6.4. Display connectors

Since the MMIB is recommended for use with display specific adapter boards, display and backlight should not connected directly without advice from Imm & Bühler Elektronik.

JP16 Display and backlight control

Pin No.	Symbol	Description	Level
1	DA3	Analog output	0..5V
2	DOUT0	Output	TTL
3	SCL	Clock line for I2C	TTL
4	DOUT1	Output	TTL
5	SDA	Data line for I2C	TTL
6	DOUT2	Output	TTL
7	DINT0	Input	TTL
8	TIO0	I/O	TTL
9	DIN2	Input	TTL
10	DIO2	I/O	TTL
11	AD2	Analog input	0..5V
12	DIO3	I/O	TTL
13	AD3	Analog input	0..5V
14	DIN0	Input	TTL
15	GND	Ground	
16	DIN1	Input	TTL

JP21 – Digital output PORTB

Pin No.	Symbol	Description	Level
1	U5	5V supply voltage	
2	GND	Ground	
3..10	PBR7..0	Port B Red Data 7..0	3.3V CMOS
11	U3	3.3V supply voltage	
12	GND	Ground	
13..20	PBG7..0	Port B Green Data 7..0	3.3V CMOS
21	U5	5V supply voltage	
22	GND	Ground	
23..30	PBB7..0	Port B Blue Data 7..0	3.3V CMOS

Attention: For pin numbers refer to drawing above. Numbering is inverse to box-type pin headers.

6.4. Display connectors (continue)

JP22 – Digital output PORTA

Pin No.	Symbol	Description	Level
1	U3	3.3V supply voltage	
2	GND	Ground	
3..10	PAR7..0	Port A Red Data 7..0	3.3V CMOS
11	U5	5V supply voltage	
12	GND	Ground	
13..20	PAG7..0	Port A Green Data 7..0	3.3V CMOS
21	U3	3.3V supply voltage	
22	GND	Ground	
23..30	PAB7..0	Port A Blue Data 7..0	3.3V CMOS
31	U12	12V supply voltage (directly form input)	
32	GND	Ground	
33	DIO0	I/O	TTL
34	DA1	Analog output	
35	DIO1	I/O	TTL
36	DA2	Analog output	
37	PCLK	Display Clock	3.3V CMOS
38	PDE	Data Enable	3.3V CMOS
39	PVS	Vertical sync signal	3.3V CMOS
40	PHS	Horizontal sync signal	3.3V CMOS

Attention: For pin numbers refer to drawing above. Numbering is inverse to box-type pin headers.

7. Special Version

For critical applications I&B provides a special version of the Multi Media Interface Board.

The main differences are:

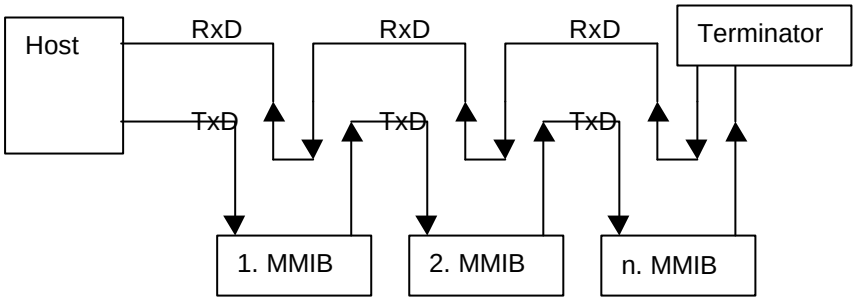
- All sockets are removed.
- Fuse is replaced.
- All connections be done by soldering.
- All parts are coated.
- Temperature is proved between –40°C to 80°C.
- Coils are additionally clued.

This allows to use the MMIB on heavy duty environment like
- helicopters
- aeroplanes
- tanks
- marine and submarine vehicles

Please connect the input signals to the pin headers as follows:

8. RS232 communication

The RS232 communication offers an additional way to adjust an control the OSD settings.
Therefore a simple RS232 protocol is used. Each data stream has a fixed length of 10 bytes.
To allow to connect more than one MMIB to the RS232 port of an host (e.g. personal computer) an RS232 „ring“ technique is to use. Since RS232 is not recommended for more the two terminals each client must repeat the incoming messages for the next client.



For such applications Imm und Bühler Elektronik provides two type of RS232 adapters
ADP232P00: One SubD9 receptacle, provides up to 4 MMIBs. The Ring is done at the TTL side. Termination can be done per jumper
ADP232P10: Like ADP232P00, but with two SubD9 receptacles. The ring can be build with standard RS232 cable.

Recommended COM port settings	
Baud-rate	9600
Parity	Even
Data-bits	8
Stop-bits	1

Note: if you build up a session in a ring you should perform a “PING” command at first, to ensure that all MMIB’s have a unique number.

8.1. Hardware connection

The connector JP17 has the following signals:

PIN	Signal
1	RX (TTL-Level)
2	TX (TTL-Level)
3	+5V (for external line driver)
4	GND

8.2. RS232 protocol

Standard read / write protocol:

<STARTC>	<MMIB-NO>	<CMD+ITEM>	<VALUE>	<CKS>	<STOPC>
2 bytes	1 byte	2 bytes	2bytes	1byte	2 bytes

Communication lost or timeout

<STARTC>	<MMIB-NO>	<0xAAAA>	<0x5555>	<0xAA>	<0x0055>
2 bytes	1 byte	2 bytes	2bytes	1byte	2 bytes

protocol item	value/range		description	treated as
<STARTC>	0x55AA		start condition	
<MMIB-NO>	0x00		broadcast; transmission to all MMIBs in the RS232 ring	unsigned char
	0x01 .. 0xFF		transmission to the specific MMIB	
<CMD+ITEM>	0x0 .. 0xF	Bit 15 .. 12	command (see table 8.1)	unsigned char
	0x0 .. 0xFFF	Bit 11 .. 0	item to read/write (see table 8.3) or keycode (see table 8.2) or transmission not for filesystem access	signed integer
<VALUE>	0x0000 .. 0xFFFF		value to be set / read	signed integer
	0x0000	for items which enable or disable a function	function will be / is disabled	boolean
	0x0001 .. 0xFFFF		function will be / is enabled	
<CKS>	0x00 .. 0xFF		checksum	unsigned char
	= (<MMIB-NO> + LOBYTE(<CMD+ITEM>) + HIBYTE(<CMD+ITEM>)+ LOBYTE(<VALUE>)+ HIBYTE(<VALUE>)) AND 0xFF			
<STOPC>	0x00FF		stop condition from HOST	
	0x00FE		ACK stop condition form CLIENT	
	0x0055		NACK stop condition from CLIENT; communication was lost or timeout has occurred	

Table 8.1: commands

code	description
0x0	read, from client (MMIB) (see also CMD 0x4)
0x1	write, to client (MMIB) (see also CMD 0x4)
0x2	key, simulate keystroke on client (MMIB)
0x3	repeated key, simulate repeated keystroke on client (MMIB) (steps will be greater)
0x4	Save, necessary if items adjusted over CMD 0x0 and 0x1
0x5	ping, automatically numbering all clients (MMIB) in the RS232 ring (in physical order)
0xA	NACK (read only)

Table 8.2: keycodes

code	description	function while OSD is off
0x0B6	left	OSD starts with “input geometry” menu
0x08B	up	OSD starts with “source menu”
0x0B7	right	OSD starts with “input geometry” menu
0x08D	down	OSD starts with customer menu (if required)
0x08C	ok	OSD starts with “main menu”

8.3. Protocol examples

Note: Lo Bytes should transmit/received first.

Example 1: Set Item 3 of MMIB 1 to a value of 0xFF

HOST:

<START> <MMIB-No> <CMD+ITEM> <VALUE> <CKS> <STOP>

0x55AA 0x01 0x1003 0x00FF 0x13 0x00FF

at line: 0xAA 0x55 0x01 0x03 0x10 0xFF 0x00 0x13 0xFF 0x00

CLIENT: (returns)

<START> <MMIB-No> <CMD+ITEM> <VALUE> <CKS> <STOP>

0x55AA 0x01 0x1003 0x00FF 0x13 0x00FE

at line: 0xAA 0x55 0x01 0x03 0x10 0xFF 0x00 0x13 0xFE 0x00

Example 2: Read value of Item 4 form MMIB 2

HOST:

<START> <MMIB-No> <CMD+ITEM> <VALUE> <CKS> <STOP>

0x55AA 0x02 0x0004 0x0000 0x06 0x00FF

Note: at read commands value should always be zero (0x0000)

CLIENT:

<START> <MMIB-No> <CMD+ITEM> <VALUE> <CKS> <STOP>

0x55AA 0x02 0x0004 0x0500 0x0B 0x00FE

8.3. Protocol examples (continue)

Example 3: Press OK at MMIB 1

HOST:

<START>	<MMIB-No>	<CMD+ITEM>	<VALUE>	<CKS>	<STOP>
0x55AA	0x01	0x208C	0x0000	0xAD	0x00FF

CLIENT: (if key has no effect to any value)

<START>	<MMIB-No>	<CMD+ITEM>	<VALUE>	<CKS>	<STOP>
0x55AA	0x01	0x208C	0x0000	0xAD	0x00FE

CLIENT: (if key has effected a value, the new value will be returned)

<START>	<MMIB-No>	<CMD+ITEM>	<VALUE>	<CKS>	<STOP>
0x55AA	0x01	0x208C	0x0500	0xB2	0x00FE

Example 4: Ping

Pinging allows numbering and counting of all MMIB's available in the RS232 Ring

HOST:

<START>	<MMIB-No>	<CMD+ITEM>	<VALUE>	<CKS>	<STOP>
0x55AA	0x00	0x5000	0x5500	0xA5	0x00FF

Note: at pinging <MMIB-No> as no affect, <VALUE> must be set to 0x5500

CLIENT1:

<START>	<MMIB-No>	<CMD+ITEM>	<VALUE>	<CKS>	<STOP>
0x55AA	0x00	0x5000	0x5501	0xA6	0x00FE

Note: Low Byte of value returns the (new) number of the MMIB in the RS232 Ring.

CLIENT2:

<START>	<MMIB-No>	<CMD+ITEM>	<VALUE>	<CKS>	<STOP>
0x55AA	0x00	0x5000	0x5502	0xA7	0x00FE

Note: Low Byte of value returns the (new) number of the MMIB in the RS232 Ring.

8.4. Item Numbers

Table 8.3: item numbers

itemno	Menu	Item	description
004h	Source	VGA	Show VGA input signal.
005h	Source	COMP 1	Show 1st composite input signal.
006h	Source	COMP 2	Show 2nd composite input signal.
007h	Source	SVHS YC	Show SVHS input signal.
00Dh	Input	Pixelrate	adjust pixelrate until the whole frame appeares the same. {Hint}: Use Windows Shut Down Picture for adjustment.
00Eh	Input	Pixel	Number of pixel of the incoming PC signal. For e.g. SXGA: 1280.
00Fh	Input	Lines	Number of lines of the incoming PC signal. For e.g. SXGA: 1024. Press OK to switch between {interlaced} and {non-interlaced}.
010h	Input	X-Position	Horizontal frame offset.
011h	Input	Y-Position	Vertical frame offset
012h	Input	Phaseshift	Adjust phaseshift to get best picture quality.
014h	Display	Pixel	Number of active display pixel per line.
015h	Display	Lines	Number of active display lines.
016h	Display	X-Offset	Output: if active display area is choosen smaller than its real resolution, the horizontal position can be adjusted.
017h	Display	Y-Offset	Output: if active display area is choosen smaller than its real resolution, the vertical position can be adjusted.
018h	Advanced	Standart	In every case the input signal will be displayed on the whole display.
019h	Advanced	Original	The Input Frame will be displayed 1:1.
01Ah	Advanced	Zoom	Magnification of the input frame.
021h	Picture	Brightness	
022h	Picture	Contrast	
023h	Picture	Gammacorrection	Compensation of the color difference from TFT to CRT displays. {Remark:} the default value is about 8.
029h	Picture	Sharpness	
02Ah	Input signal	H	
02Bh	Input signal	V	
02Ch	Original	X-Position	Horizontal position for scanning the input frame.
02Dh	Original	Y-Position	Vertical position for scanning the input frame.
02Eh	Zoom	X-Position	Horizontal positon for the magnified input frame.
02Fh	Zoom	Y-Position	Vertical positon for the magnified input frame.
030h	Zoom	X-Factor	Horizontal magnification factor.
031h	Zoom	Y-Factor	Vertical magnification factor.
03Ah	Language	Deutsch	
03Bh	Language	English	
045h	Source	Satellite	optimized color recovery for satellite TV.
046h	Source	Terrestrical	optimized color recovery for terrestrical TV.
047h	Source	Videorecorder	optimized color recovery for VCR.
048h	Source	Satellite	optimized color recovery for satellite TV.
049h	Source	Terrestrical	optimized color recovery for terrestrical TV.
04Ah	Source	Videorecorder	optimized color recovery for VCR.
04Bh	Source	Satellite	optimized color recovery for satellite TV.

04Ch	Source	Terrestrical	optimized color recovery for terrestrical TV.
04Dh	Source	Videorecorder	optimized color recovery for VCR.
04Eh	Geometry	Standart	
04Fh	Geometry	Zoom 1	
050h	Geometry	Zoom 2	
052h	Geometry	Sports	Optimized picture for fast moving frames.
053h	Geometry	Movie	Optimized picture for less moving frames.
058h	Input	Pixel	
059h	Input	Lines	
05Ah	Input	X-Position	
05Bh	Input	Y-Position	
05Ch	Display	Pixel	
05Dh	Display	Lines	
05Eh	Display	X-Position	
05Fh	Display	Y-Position	
062h	Format	Auto adjustment	Automatical recognition of Pal, Pal+, 4:3 or Letterbox Pictures.
063h	Format	Parameter 1	Format correction achieved by adding black lines or columns.
064h	Format	Parameter 2	Format correction achieved by cropping lines or columns.
065h	Format	Parameter 3	Format correction achieved by panorama or waterglass view.
067h	Display	LCD-Backlight	
06Ah	Zoom	X-Position	
06Bh	Zoom	Y-Position	
06Ch	Zoom	X-Factor	
06Dh	Zoom	Y-Factor	
06Eh	Geometry	User Format	define your own frame format. {Only for special purposes.}
084h	Zoom	Zoom	
08Bh	Colors	Red	
08Ch	Colors	Green	
08Dh	Colors	Blue	
09Dh	Display	Dithering	
09Fh	OSD Setup	Cascade Menus	
0A0h	OSD Setup	X-Position	
0A1h	OSD Setup	Y-Position	
0B3h	OSD Setup	Transparency	
0B4h	OSD Setup	Standart-colors	
0B6h	Other	Freeze mode	{Remark:} Adjustments in geometry or picture parameter will clear freeze mode.
0B7h	Other	Help	Use{ up}, {down} to select an menu item. Use {left}, {right} to change the value or to reach the next submenu. Use {ok} to go back to the previous menu or to close the OSD.
0BBh	Display	Horizontal reverse	
0BCh	Display	Vertical reverse	
0BDh	Display	Backlight	
0BEh	Display	Colorenhancment	
0BFh	Display	Horizontal	

		reverse	
0C0h	Display	View angle I	
0C1h	Display	View angle II	
0C2h	Display	Brightness	
0C3h	Display	Colorenhancment	
0C4h	Display	PLE Brightness	
0CFh	Display	Backlight	
0D0h	Display	Dithering	
0D5h	Maintenance	Backlight MTBF	Main time between failure for the backlight.
0DBh	Display	Backlight	
0DCh	Display	Dithering	
0DDh	Display	Rotate	
0E2h	Source	Norm	
0E3h	Source	Norm	
0E4h	Source	Norm	
0EEh	Colors	Bandwidth	
0EFh	Colors	Compensation	
0F8h	Response time	Response time	Response time for flicker reduction (manual)
0FEh	D1040	Backlight	Backlight-brightness
0FFh	D1040	Night - OSD	Enables dark colors for OSD
104h	Picture	Backlight	Adjust backlight brightness
1EAh	Display	Backlight	
1EBh	Display	H reverse	
1ECh	Picture	Rotate	
1F5h	Input signal	PC	Optimized picture for interlaced PC signals.
1F6h	Input signal	Sport	Optimized picture for fast moving frames.
1F7h	Input signal	Movie	Optimized picture for less moving frames.
2F1h	Display	Odd-Even	Time (in minutes) for switching between Odd and Even output lines. Value of {zero} means {interlaced} output.
2F6h	Reduction	Temperature	
2F8h	Reduction	1st responce time	System-temperature which will switch to the 1st response time.
2F9h	Reduction	2nd responce time	System-temperature which will switch to the 2nd response time. {Note:} For low temperatures a high response time should be selected.
2FAh	Reduction	3rd responce time	System-temperature which will switch to the 3rd response time. {Note:} For temperatures below the actual value the 4th response time will be activated.
2FBh	D1040	Off	No flicker reduction will be performed!
2FCh	D1040	Manual	Flicker reduction {on}. The behavior can be adjusted manually.
2FDh	D1040	Automatic	Flicker reduction {on}. The response time for the reduction is depends on system-temperature.
2FFh	D1040	Static mode	{0:} automatic recognition of the input timing. {1..15: Static mode:} Predefined geometry and picture parameters. {Note:} If an {static mode} is active adjustments will {not} be saved automatically. Therefore use {save as static mode}
300h	D1040	Save	Save adjustments at the actual selected {static mode}.

Note: Some items (like input source selectors) can not be disabled directly. They will be disabled by enabling an other item in the same option group. See table 8.5 for such items.

Table 8.4: additional item numbers

itemno		Item	description
800h	High-word	System time	Read only System running time Unit: 16 seconds
801h	Low-word		
802h	High-word	Backlight time base	Read only Counter state of system time when backlight time was reset last. Backlight time = system time – backlight time base Unit: 16 seconds
803h	Low-word		
804h		Reset Backlight	Write only Value: A55Ah -> reset backlight running time, all other values are ignored

All other values are reserved for further use.

Table 8.5: item groups

Group	itemno	Menu	Item
Input signal	004h	Source	VGA
	005h	Source	COMP 1
	006h	Source	COMP 2
	007h	Source	SVHS YC
VGA – format	018h	Advanced	Standart
	019h	Advanced	Original
	01Ah	Advanced	Zoom
Language	03Ah	Language	Deutsch
	03Bh	Language	English
Signal type at COMP 1 input	045h	Source	Satellite
	046h	Source	Terrestrical
	047h	Source	Videorecorder
Signal type at COMP 2 input	048h	Source	Satellite
	049h	Source	Terrestrical
	04Ah	Source	Videorecorder
Signal type at s-video input	04Bh	Source	Satellite
	04Ch	Source	Terrestrical
	04Dh	Source	Videorecorder
Video – format	04Eh	Geometry	Standart
	04Fh	Geometry	Zoom 1
	050h	Geometry	Zoom 2
	06Eh	Geometry	User Format
Video – de-interlacing mode	052h	Geometry	Sports
	053h	Geometry	Movie
Flicker – reduction	2FBh	D1040	Off
	2FCh	D1040	Manual
	2FDh	D1040	Automatic

9. Software Revision History

Rev Nr	Date	Remark	Check
2.014 014	02.Feb.2001	Left/Right additional key option: select inputs Down: additional key option: select inputs 1st Hotkeylist: Left/Right changes value immediately	Key options
2.013	24.Jan.2001	Video Letterbox formats displayed always correct VGA input lines or vertical position: maximum position is ok. (former: frames not locked)	V-Position Input Lines
2.012	22.Jan.2001	New version of scaling Chip adapted SAA6721E V2 Introducing of 2. for V2 boards. Note: 2.012 and 012 Software has the same functionality but is not compatible.	
011	18.Jan.2001	customer specific version	
010	05.Jan.2001	Some internal changes on system level regardless for customers purposes	
009	05.Dec.2000	No Signal features added: Background color, text enable/disable, search other inputs for active signal New Signal features added: Supervision of inactive inputs	INPUT SIGNAL ->NO SIGNAL ->POWER ON ->AUTO
008	13.Sep.2000	Output: dithering disabled Some incorrect scaling factors removed Introducing of public revision documentation	

10. Warrenty

I&B Elektronik gurantees a warranty of 6 months starting at shipment.

11. Special applications

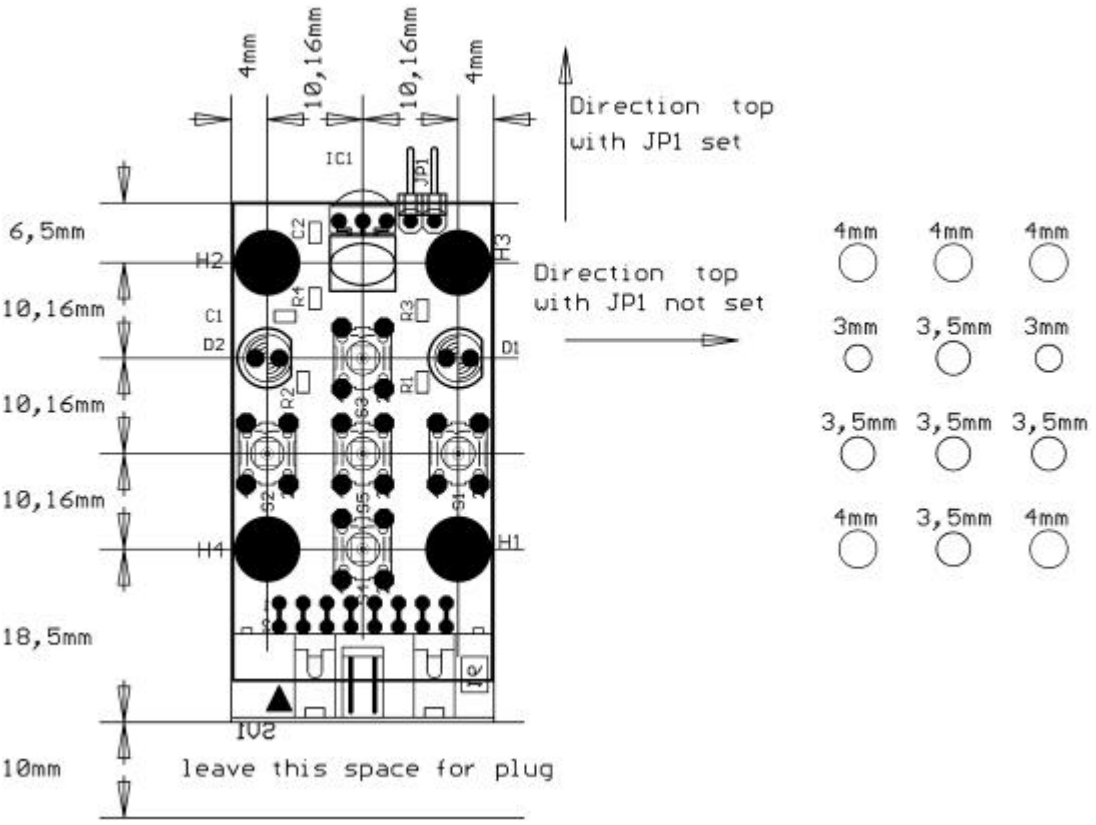
CAUTION: customers considering the use of our products in special applications where failure or abnormal operation may directly affect human lives or cause physical injury or property damage, or where extremely high levels of reliability are demanded (such as aerospace systems, atomic energy controls, sea floor repeaters, vehicle operating controls, medical devices for life support, etc.) are requested to consult with Imm und Bühler Elektronik before such use.

The company will not be responsible for damages arising from use of their products.

Like any other technical device our products has an inherent chance of failure. You must protect against injury, damage or loss from such failures by incorporating safety design measures into your facility and equipment such as redundancy, fire protection, and prevention over-current levels and other abnormal operating conditions.

Multi Media Interfaceboard MMIB1E MMIB

Appendix I: Keyboard and IR-Remote



Ref	Description	Remark
JP1	Assembly direction	closed: horizontal open: vertical
D1	LED red	Key-pressed feedback
D2	LED green	Power On
S1..S5		Left Right Up Down Ok
H1..H4	Assembly holes	M3 screws recommended
SV1	Box Type pin header, 16pin	for 2,54mm flat ribbon cable

IR-Remote Control IR06:
Supply 2x1,5 micro AA cells

After exchanging the cells the IR06 needs to be programmed to the MMIB specific device code (166).
Therefore press [P] and [OK] together until the red LED (H1) is permanent on. Then press in following order:
1x [-]
6x [Up]
6x [+]
To quit the programming mode press [OK].

Note: [P] has no function in normal operation.