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DIGITALVIEW®

ANALOG INTERFACE CONTROLLER
FOR XGA, SVGA, VGA RESOLUTION TFT LCD

Model: ACG-1024

(Part number for XGA panel support : 4167200-2X or up)
(Part number for SVGA panel support : 4167201-2X or up)
(Part number for VGA panels support : 4167202-2X or up)

INSTRUCTIONS

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It is essential that the sections on Assembly Notes and Connectors, Pinouts & Jumpers is read and understood before connecting or powering up this controller.

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INTRODUCTION

Designed for LCD monitor and other flat panel display applications, the ACG-1024 controller provides easy to use interface controller for:

- **TFT (active matrix) LCDs of 1024x768, 800x600, 640x480 resolution;**
- **Computer video signals of XGA, SVGA, VGA standard**
- **BIOS need to change to fit for XGA, SVGA, VGA panel respectively.**
  (Part number for XGA panel support : 4167200-2X or up)
  (Part number for SVGA panel support : 4167201-2X or up)
  (Part number for VGA panels support : 4167202-2X or up)

HOW TO PROCEED

- Ensure you have all parts and that they are correct, refer to:
  - Connection diagram (separate document for each panel)
  - Connector reference (in following section)
  - Assembly notes
- Check controller switch and jumper settings (errors may damage the panel)
- Prepare the PC
- Connect the parts
- Understand the operation and functions (in following section)

IMPORTANT USAGE NOTE

This product is for use by system developers and integrators, the manufacturer accepts no liability for damage or injury caused by the use of this product. It is the responsibility of the developer, integrators or other user of this product to:

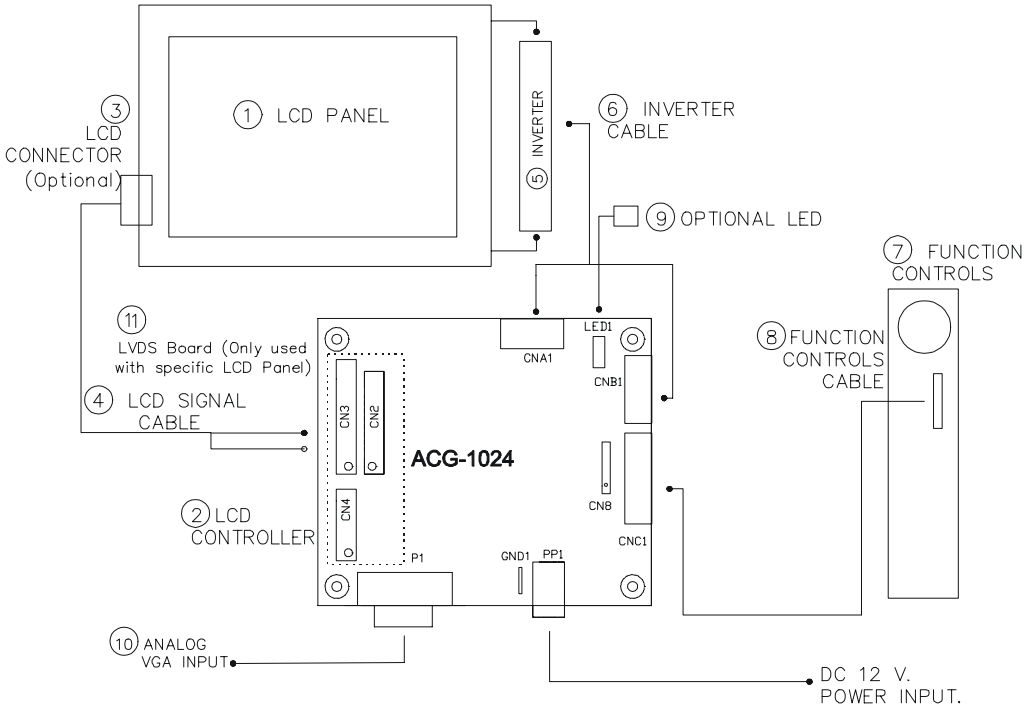
- Ensure that all necessary and appropriate safety measures are taken.
- Obtain suitable regulatory approvals as may be required.
- Check power settings to all component parts before connection.
- Understand the operation and connectivity requirements of this controller.

DISCLAIMER

There is no implied or expressed warranty regarding this material.

SYSTEM DESIGN

A typical LCD based display system is likely to comprise the following:



Summary:

1. LCD panel
2. LCD controller card, ACG-1024
3. LCD connector board (if necessary)
4. LCD signal cables
5. Inverter for CCFT backlight (if not built into LCD)
6. Inverter cable
7. Function controls
8. Function controls cable
9. Status LED
10. PC VGA (analog) in
11. LVDS Board (Only use with specific LCD Panel)

Digital View offers a range of accessories such as listed above, to make up complete display solution.

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ASSEMBLY NOTES

This controller is designed for monitor and custom display projects using 1024x768, 800x600, 640x480 resolution TFT LCD's support. The BIOS need to change to fit for XGA, SVGA, VGA panel respectively. TFT panels with a XGA, SVGA, VGA signal input. The following provides some guidelines for installation and preparation of finished display solution.

- **Preparation**: Before proceeding it is important to familiarize yourself with the parts making up a system and the various connectors, mounting holes and general layout of the controller. As much as possible connectors have been labeled. Guides to connectors and mounting holes are shown in the following relevant sections.

- **1. LCD Panel**: This controller is designed for typical TFT panels with 5V or 3.3V TTL or LVDS interface. For LVDS interface panel a separate add-on board is required. Due to the variation between manufacturers of signal timing and other panel characteristics factory setup and confirmation should be obtained before connecting to a panel. **(NOTE: Check panel power jumper settings before connection)**

  NOTE: This controller supports up to 8-bit per colour, for panels of lower bits (eg 3 x 3 bit, 3 x 4 bit etc), connection of the panel signal high value should correspond to the controllers highest bit. For example for a 3 x 3 bit panel R2 on the panel should connect to R7 on the controller, in this case R0~4 on the controller will not be connected. For a 3 x 6 bit panel R5 on the panel should be connected to R7 on the controller. For a 3 x 8 bit panel R7 on the panel should be connected to R7 on the controller. Same for G & B.

- **2. Controller card:** Handle the controller card with care as static charge may damage electronic components.

- **3. LCD connector board**: Different makes and models of LCD panel require different panel signal connectors and different pin assignments. The connector board may not necessary for some Digital View cables that direct plug to the LCD panel.

- **4. LCD signal cable**: In order to provide a clean signal it is recommended that LCD signal cables are no longer than 33cm (13 inches). If loose wire cabling is utilized these can be made into a harness with cable ties. Care should be taken when placing the cables to avoid signal interference. Additionally it may be necessary in some systems to add ferrite cores to the cables to minimize signal noise.

- **5. Inverter**: This will be required for the backlight of an LCD, some LCD panels have an inverter built in. As panels may have 1 or more backlight tubes and the power requirements for different panel models backlights may vary it is important to match the inverter in order to obtain optimum performance. See Application notes for more information on connection.

- **6. Inverter Cables**: Different inverter models require different cables and different pin assignment. Make sure correct cable pin out to match the inverter. Using wrong cable pin out may damage the inverter.

- **7. Function Controls**: The following section 'Operation' discusses the controls required and the section 'Connectors, jumpers & pinouts' provides the detail. The controls are minimal for ease of use: On/Off, Brightness (depends on inverter), OSD (4 momentary buttons).

- **8. Function controls cable**: The cables to the function switches should be of suitable quality and length so that impedance does not affect performance. Generally lengths up to 1 metre (3 feet) should be acceptable.

- **9. Status LED:** The pin direction of the LED should be corrected for right colour indication. Red colour stands for standby. Green colour stands for signal on. It is an optional part only, can be unconnected.

- **10. Analog VGA Input Cable**: As this may affect regulatory emission test results and the quality of the signal to the controller, a suitably shielded cable should be utilized.

- **Power Input**: 12V DC is required, this should be a regulated supply. Although the controller provides power regulation for the LCD power this does not relate to the power supplied to the backlight inverter. If an unregulated power supply is provided to an inverter any fluctuations in power may affect operation, performance and lifetime of the inverter and or backlight tubes.

- **Power Safety**: Note that although only 12VDC is supplied as 'power-in' a backlight inverter for panel backlighting produces significantly higher voltages (the inverter does not connect to the ground plane). We strongly advise appropriate insulation for all circuitry.

- **EMI**: Shielding will be required for passing certain regulatory emissions tests. Also the choice of external Controller to PC signal cable and power supply can affect the result.

- **Ground**: The various PCB mounting holes are connected to the ground plane.

- **Servicing**: The controller is not user serviceable or repairable. Warranty does not cover user error in connecting up to the controller and is invalidated by unauthorized modification or repairs.

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- **Controller Mounting**: It is recommended that a clearance of at least 10mm is provided above and 5mm below the controller when mounted. Additionally consideration should be given to:
  - Electrical insulation
  - Grounding.
  - EMI shielding.
  - Cable management. **Note:** It is important to keep panel signal cables apart from the inverter & backlight cables to prevent signal interface.
  - Heat & ventilation: Heat generated from other sources, for example the backlight of a very high brightness panel may generate significant heat which could adversely affect the controller.
  - Other issues that may affect safety or performance.

- **PC Graphics Output**: A few guidelines:
  - Signal quality is very important, if there is noise or instability in the PC graphics output this may result in visible noise on the display.
  - Vertical refresh rate should be set to 60Hz preferable.
  - Non-interlaced is required.

IMPORTANT: Please read the Application Notes section for more information.

CONNECTION & OPERATION

CAUTION: Never connect or disconnect parts of the display system when the system is powered up as this may cause serious damage.

CONNECTION

Connection and usage is quite straight forward (it is useful to have the relevant connection diagram available at this time):

1. **LCD panel & Inverter:** Connect the inverter (if it is not built-in the panel) to the CCFT lead connector of the LCD panel.
2. **TTL type panels:** Plug the signal cables direct to CN2, CN3 and CN4 (necessary for 8-bit panel only) on the controller board. Plug the other end of cables to the LCD connector board (if connector board is required, otherwise the signal can be direct plug to the LCD panel connector). Then plug the board connector to the LCD panel connector.
   LVDS/PanelLink type panels: A LVDS/PanelLink transmitter board is required. Plug the transmitter board to CN2, CN3 and CN4 (necessary for 8-bit panel only). Then insert the LCD signal cable with controller end to the connector on the transmitter board. Insert the panel end of the cable the LCD panel connector.
3. **Inverter & Controller:** Plug the inverter cable to CNB1 and CNA1 (if necessary). Plug another end to the connector on the inverter.
4. **Function switch & Controller:** Plug the OSD switch mount cable to CNC1 on the controller board and another to the OSD switch mount.
5. **LED & Controller:** Plug in a 3-way with dual colour LED to connector LED1 on the controller board.
6. **Jumpers :** Check all jumpers are set correctly. Details referring the connection diagram (a separate document) or the jumpers setting table (in the following section).
7. **Jumpers & Inverter & Panel voltage:** Particularly pay attention to the settings of JA3, JB2, JB3, JA5. JB2 & JB3 are used for inverter control (read inverter specification and information on the jumper table to define the correct settings). JA3 & JA5 are used for panel voltage input (read panel specification and information on the jumper table to define the correct settings).
8. **VGA cable & Controller:** Plug the VGA cable to the connector P1 on the controller board.
9. **Power supply & Controller:** Plug the DC 12V power in to the connector PP1.
10. **Power on:** Switch on the controller board and panel by using the OSD switch mount.

The red LED will light up when power on with the presence of input signal. The LED will change to green.

General:

- If you are using supplied cables & connectors, ensure they are correct for the model of panel and controller.
- If you are making your own cables & connectors refer carefully to both the panel & inverter specifications and the section in this manual, “Connector, Pinouts & Jumpers” to ensure the correct pin to pin wiring.

PC SETTINGS

The controller has been designed to take a very wide range of input signals however to optimize the PC’s graphics performance we recommend choosing 60Hz vertical refresh rate – this will not cause screen flicker.

OPERATION

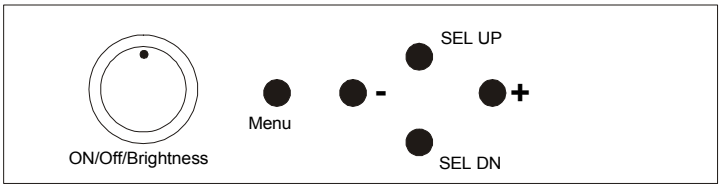
Once the system has been connected and switched on there are a number of functions available to adjust the display image as summarized in the following sections. The settings chosen will be saved for each mode independently.

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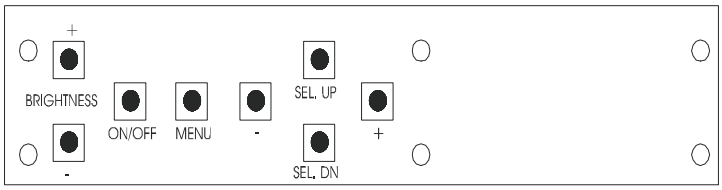
LCD DISPLAY SYSTEM SETTINGS

NOTE: By way of explanation the following refers to a set of sample buttons that may be obtained as an option. In addition to power on/off and connection for backlight brightness the controller provides an On Screen Display of certain functions which are controlled by 5 momentary type buttons (analog VR type) or 8 momentary type buttons (digital type):

Controls	Analog VR type	Digital type
On/Off – turns controller board power on	VR toggle switch	On/Off button
Brightness – controls backlight brightness	Rotary VR	Brightness +/- buttons
Menu – turns OSD menu On or Off (it will auto time off)	Menu button	Menu button
Select – Select function / Save setting	SEL DN	SEL DN
+ – increase the setting / moves the selector to the next function	+	+
- - decrease the setting / moves the selector to the previous function	-	-



Analog VR type



Digital type

OSD Functions

	Brightness	Increase/decrease brightness level. Press – or + (- [■■■■■□□□□□] + nn), Range : 0 – 63
	Contrast	Increase/decrease panel contrast level. Press – or + (- [■■■■■□□□□□] + nnn), range: 0 to 200
	Color ▸	Turn on color sub-menu
	Position ▸	Turn on position sub-menu
	Image ▸	Turn on image sub-menu
	Auto Setup	Auto setting the display, e.g. positions, image size, tuning, etc. Yes/No
	Miscellaneous ▸	Turn on miscellaneous submenu
	DOS text/ Graphics	Select the DOS text or graphic mode (Only display on connecting with XGA, SVGA panels)
	System Info	Show board, BIOS, panel and input source information
	Language	Select the OSD display language Press + or – to select English / French.

Items marked ▸ have sub menus.
Press SELECT to save the setting chosen

Color – submenu

Auto Balance	Auto RGB calibration
RGB ▸	Turn on the RGB submenu
Color temperature	Adjust color temperature 5000K/6000K/7000K/8000K/9000K/10000K

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Position – submenu

Image Horizontal Position	Move the image position horizontally Press – or + (- [redacted] + nnn), range: 6 to 301
Image Vertical Position	Move the image position vertically Press – or + (- [redacted] + nn), range: 1 to 36
Auto Center	Set the screen to center Yes/No

Image – submenu

Phase	Adjust the phase on the screen Press – or + (- [redacted] + nn), range: 0 to 61
Horizontal size	Adjust the image size Press – or + (- [redacted] + nnnn), range: 1264-1392
Auto phase	Auto adjust the phase Yes/No

Miscellaneous – submenu

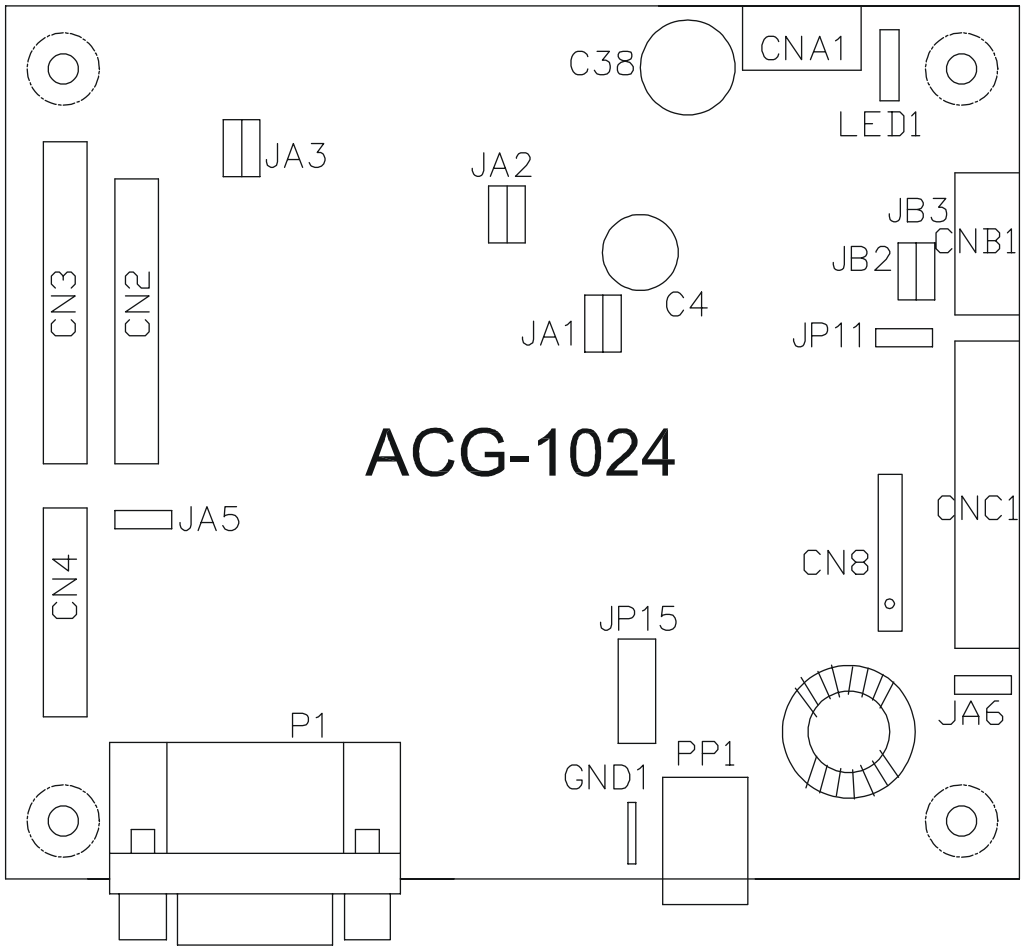
Load Default	Initialize the setting stored in non-volatile memory
OSD Timeout	Set menu time-out period Press – or + (15/30/45/60) sec
OSD position	H-Position : Move OSD position horizontally Press – or + (- [redacted] + nn), range: 0 to 98 V-Position : Move OSD position vertically Press – or + (- [redacted] + nn), range: 1 to 89

RGB -submenu

Red	Adjust red color level Press – or + (- [redacted] + nnn), range: 0 to 127
Green	Adjust green color level Press – or + (- [redacted] + nnn), range: 0 to 127
Blue	Adjust blue color level Press – or + (- [redacted] + nnn), range: 0 to 127

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CONNECTORS, PINOUTS & JUMPERS



The various connectors are:

Summary: Connectors

Ref	Purpose	Description
CN2	Panel signal	Hirose 28-pin, DF11-28DP-2DSA (Mating type : DF11-28DS-2C)
CN3	Panel signal	Hirose 32-pin, DF11-32DP-2DSA (Mating type : DF11-32DS-2C)
CN4	Panel signal	Hirose 20-pin, DF11-20DP-2DSA (Mating type : DF11-20DS-2C)
CN8	Serial control	Pin Header 6x1 (Reserved for factory use)
CNA1	Auxiliary power output	JST 4-way, B4B-XH-A (Mating type : XHP-4)
CNB1	Backlight inverter	JST 5-way, B5B-XH-A (Mating type : XHP-5)
CNC1	Function controls	JST 12-way, B12B-XH-A (Mating type : XHP-12)
LED1	Dual color LED connector	Pin Header pin 3x1
P1	VGA analog input	DB15-way DDC version (blue colour)
PP1	DC power in	DC power jack, 2.5mm contact pin diameter positive

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Summary: Jumpers setting

Ref	Purpose	Note
JA1	On board +5V logic power enable	1-3 & 2-4 closed, factory set, do not remove
JA2	On board +3.3V Logic supply enable	1-3, 2-4 closed, factory set, do not remove
JA3	Panel power voltage select	1-3 & 2-4 = +3.3V panel voltage supply 3-5 & 4-6 = +5V panel voltage supply **CAUTION:** Incorrect setting will cause panel damage
JA5	+12V Panel power voltage select	Open = Disable +12V panel power Enable = +12V safe panel power on CN3 pin 3 **CAUTION:** Incorrect setting will cause panel damage
JA6	Input power control	Short = External switch control Open = Switch mount control
JB2	Backlight inverter on/off control – signal level	1-2 = On/Off control signal 'High' = +12V 2-3 = On/Off control signal 'High' = +5V Open = On/Off control signal 'High' = Open collector **CAUTION**: Incorrect setting can damage inverter.
JB3	Backlight inverter on/off control – polarity	1-2 = control signal 'high' = CCFT ON 2-3 = control signal 'low' = CCFT ON
JP15	Panel selection	1-2, 9-10, 11-12 = Panel selection (Please refer to connection diagram at http://www.digitalview.com/controllers/csg.php) 3-4 = Short : Single Pixel Panel Open : Double Pixel Panel 5-6 = Clock phase change, Change this to obtain best image quality 7-8 = Short : 6 bit panel Open : 8 bit panel

PINOUTS

CNA1 - Auxiliary power output, JST B4B-XH-A

PIN	SYMBOL	DESCRIPTION
1	AUX_12V	+12V DC, 500mA max.
2	AUX_GND	Ground
3	AUX_GND	Ground
4	AUX_Vcc	+5V DC, 500mA max

CN2 – Panel connector: HIROSE DF11-28DP-2DSA

PIN	SYMBOL	DESCRIPTION
1	GND	Ground
2	GND	Ground
3	P_ER2	Even data bit R2
4	P_OR2	Odd data bit R2
5	P_ER3	Even data bit R3
6	P_OR3	Odd data bit R3
7	P_ER4	Even data bit R4
8	P_OR4	Odd data bit R4
9	P_ER5	Even data bit R5
10	P_OR5	Odd data bit R5
11	P_EG2	Even data bit G2
12	P_OG2	Odd data bit G2
13	P_EG3	Even data bit G3
14	P_OG3	Odd data bit G3
15	P_EG4	Even data bit G4
16	P_OG4	Odd data bit G4
17	P_EG5	Even data bit G5
18	P_OG5	Odd data bit G5
19	P_EB2	Even data bit B2
20	P_OB2	Odd data bit B2
21	P_EB3	Even data bit B3
22	P_OB3	Odd data bit B3
23	P_EB4	Even data bit B4
24	P_OB4	Odd data bit B4
25	P_EB5	Even data bit B5
26	P_OB5	Odd data bit B5
27	GND	Ground
28	GND	Ground

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CN3 – Panel connector: HIROSE DF11-32DP-2DSA

PIN	SYMBOL	DESCRIPTION
1	+12V	DC +12V, reserved & not normally used
2	+12V	DC +12V, reserved & not normally used
3	NC/VLCD12	No connection or 12V VLCD
4	NC	No connection
5	GND	Ground
6	GND	Ground
7	P_ER6	Even data bit R6
8	P_OR6	Odd data bit R6
9	P_ER7	Even data bit R7 (MSB of lower colour bit panels)
10	P_OR7	Odd data bit R7 (MSB of lower colour bit panels)
11	P_EG6	Even data bit G6
12	P_OG6	Odd data bit G6
13	P_EG7	Even data bit G7 (MSB of lower colour bit panels)
14	P_OG7	Odd data bit G7 (MSB of lower colour bit panels)
15	P_EB6	Even data bit B6
16	P_OB6	Odd data bit B6
17	P_EB7	Even data bit B7 (MSB of lower colour bit panels)
18	P_OB7	Odd data bit B7 (MSB of lower colour bit panels)
19	GND	Ground
20	GND	Ground
21	Vcc	DC +5v, reserved & not normally used
22	Vcc	DC +5v, reserved & not normally used
23	P_/VS	Vertical sync
24	/PwrDn	Power down control signal (5V TTL)
25	P_/HS	Horizontal sync
26	P_DE	Display enable
27	P_VLCD	Panel supply (switched)
28	P_VLCD	Panel supply (switched)
29	P_CLK	Even dot clock (shift clock)
30	P_CLK	Odd dot clock (shift clock)
31	GND	Ground
32	GND	Ground

CN4 – Panel connector: HIROSE DF11-20DF-2DSA

PIN	SYMBOL	DESCRIPTION
1	GND	Ground
2	GND	Ground
3	NC	No connection
4	NC	No connection
5	P_ER0	Even data bit R0 (LSB)
6	P_OR0	Odd data bit R0 (LSB)
7	P_ER1	Even data bit R1
8	P_OR1	Odd data bit R1
9	P_EG0	Even data bit G0 (LSB)
10	P_OG0	Odd data bit G0 (LSB)
11	P_EG1	Even data bit G1
12	P_OG1	Odd data bit G1
13	P_EB0	Even data bit B0 (LSB)
14	P_OB0	Odd data bit B0 (LSB)
15	P_EB1	Even data bit B1
16	P_OB1	Odd data bit B1
17	NC	No connection
18	NC	No connection
19	GND	Ground
20	GND	Ground

CN8 – Serial Control In, 6x1 Pin Header (Reserved for factory use)

PIN	SYMBOL	DESCRIPTION
1	SDATA	Reserved
2	SCLK	Reserved
3	Vcc	+5V
4	TXD	RS-232 Tx Data (9600 baud)
5	GND	Ground
7	RXD	RS-232 Rx Data (9600 baud)

CNB1 - To backlight inverter, JST B5B-XH-A

PIN	SYMBOL	DESCRIPTION
1	GND	Ground
2	VBKL	Backlight power supply, +12VDC (switched)
3	BLCTRL	Backlight On/Off control signal (refer to JB2 & JB3)
4	BVR_WIP	Backlight brightness VR pin WIP
5	BVR_A	Backlight brightness VR pin A

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CNC1 – Control switch, JST B12B-XH-A

PIN	SYMBOL	DESCRIPTION
1	PSWIN	Power button A
2	SW_ON	Power button B
3	BVR_A	Backlight Brightness VR pin A
4	BVR_WIP	Backlight Brightness R pin WIP
5	BVR_B	Backlight Brightness VR pin B (470 ohm resistor to +5V Vcc)
6	GND	Ground
7	MENU	OSD menu
8	-/LEFT	OSD -/Left
9	+/RIGHT	OSD +/Right
10	SEL_DN	OSD Select down
11	SEL_UP	OSD Select up
12	NC	No connection

LED1 – Status LED connector: 3-pin header

PIN	DESCRIPTION
1	Green LED pin (anode)
2	LED pin common (cathode)
3	Red LED pin (anode)

P1 - ANALOG VGA INPUT - 15 way connector

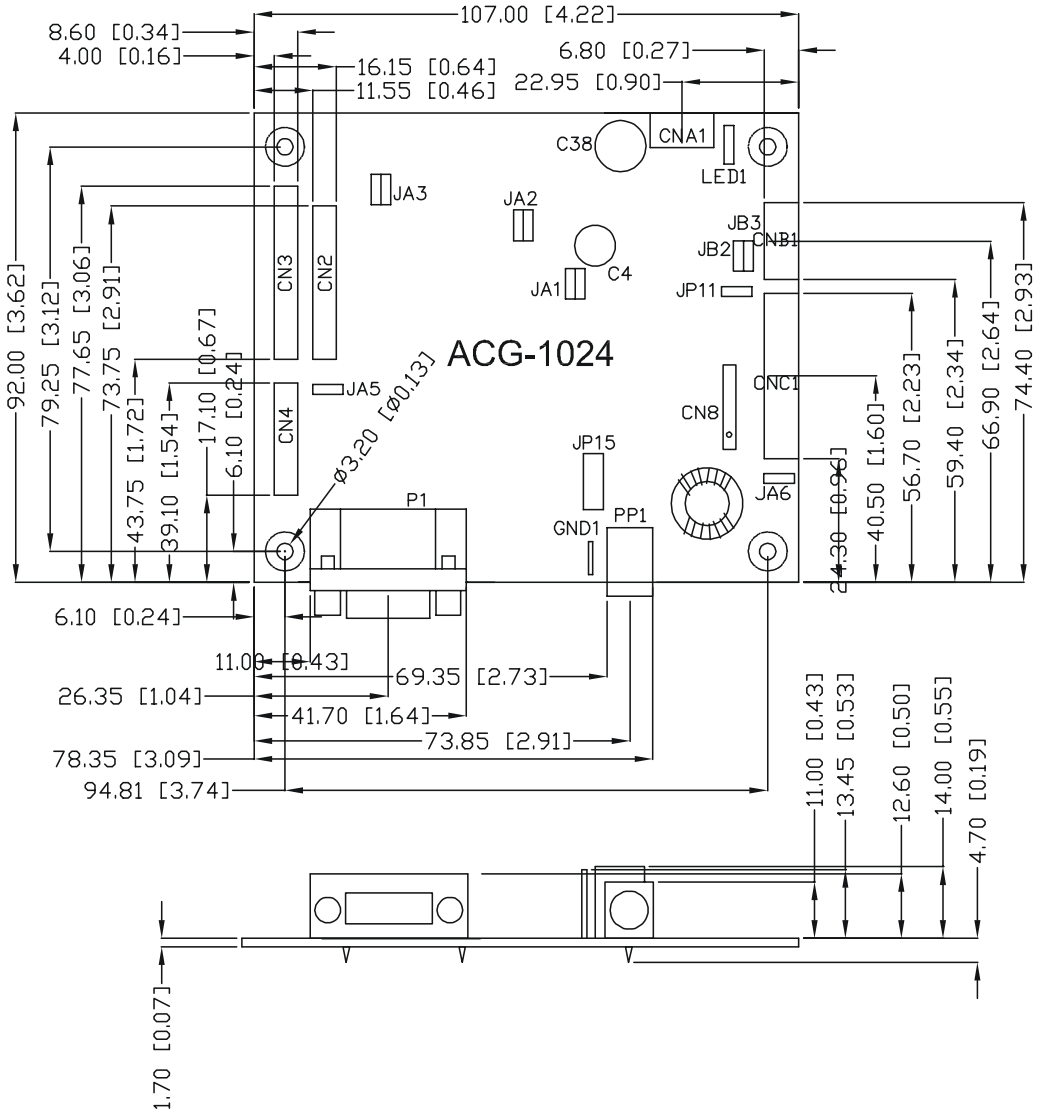
PIN	SYMBOL	DESCRIPTION
1	PCR	Red, analog
2	PCG	Green, analog
3	PCB	Blue analog
4	ID2	Reserved for monitor ID bit 2 (grounded)
5	AGND	Analog ground
6	AGND	Analog ground red
7	AGND	Analog ground green
8	AGND	Analog ground blue
9	DDC_5V	+5V power supply for DDC (optional)
10	AGND	Analog ground
11	ID0	Reserved for monitor ID bit 0 (grounded)
12	DDC_SDA	DDC serial data
13	CS/HS_IN	Horizontal sync input
14	VS_IN	Vertical sync, input
15	DDC_SCL	DDC serial clock

PP1 - 12VDC power supply - input

PIN	DESCRIPTION
1	+12VDC in center pin
2	Ground

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CONTROLLER DIMENSIONS



The maximum thickness of the controller is 16 mm (measured from bottom of PCB to top of components, including any underside components & leads). We recommend clearances of:

- 5mm from bottom of PCB - if mounting on a metal plate we also recommend a layer of suitable insulation material is added to the mounting plate surface.
- 10mm above the components
- 3~5mm around the edges

Any of the holes shown above can be used for mounting the PCB, they are 3.2mm in diameter. Other holes are used for mounting inverters supplied as fitted options.

CAUTION: Ensure adequate insulation is provided for all areas of the PCB with special attention to high voltage parts such as the inverter.

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APPLICATION NOTES

USING THE CONTROLLER WITHOUT SWITCHES ATTACHED

This is very straightforward:

- With controls attached and display system active make any settings for colour and image position as required then switch everything off.
- Remove the control switches, the 12 way (CNC1) cables.
- Use a jumper or similar to connect pins 1 & 2 on CNC1, this will fix the board On.
- Refer to inverter specifications for details as to fixing brightness to a desired level, this may require a resistor, an open circuit or closed circuit depending on inverter.

Summary: On CNC1 the only functions that are used are for On/Off and Brightness (if controller mounted inverter is used). On CNC1 the pins are for momentary buttons so it doesn't matter that no buttons are attached.

INVERTER CONNECTION

There are potentially 3 issues to consider with inverter connection:

1. Power
2. Enable
3. Brightness

Please read the following sections for a guide to these issues.

Inverter Power: As per the table for CNB1 pin 1 is ground and pin 2 provides 12V DC. This should be matched with the inverter specification: see table.

CNB1

PIN	DESCRIPTION
1	ground
2	+12VDC

Enable: This is a pin provided on some inverters for On/Off function and is used by this panel controller for VESA DPMS compliance. If the inverter does not have an enable pin or the enable pin is not used then DPMS will not be operational. Pin 3 should be matched to the inverters specification for the 'enable' or 'disable' pin.

CNB1

PIN	DESCRIPTION
3	enable

Further, jumpers JB2 & JB3 should be set to match the inverters specification for the enable pin power and High or Low setting: see table.

Ref	Purpose	Note
JB2	inverter enable voltage	1-2 H=12V, 2-3 H=5V (Vcc), OPEN H=open collector
JB3	inverter control	1-2 H=On, 2-3 L=On

Brightness: There are various methods for brightness control and it is important to consider the specifications for the inverter to be used. Generally the situation is:

1. Brightness can controlled by using a VR.
2. Brightness controlled adding a circuit such as PWM (Pulse Width Modulation).
3. No adjustment of brightness is possible.

CNB1 pins 4 & 5 are available for connecting to an inverter or circuit where VR control is supported.

CNB1

PIN	DESCRIPTION
4	VR WIP
5	VR A

This can then be matched with function controls connected to CNB1 pins 3 & 4: see table.

CNB1

PIN	DESCRIPTION
3	VR A
4	VR WIP

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TROUBLESHOOTING

General
A general guide to troubleshooting a flat panel display system it is worth considering the system as separate elements, such as:
- Controller (jumpers, PC settings)
- Panel (controller, cabling, connection, PC settings)
- Backlight (inverter, cabling, backlight tubes)
- Cabling
- Computer system (display settings, operating system)

Through step by step cross checking with instruction manuals and a process of elimination to isolate the problem it is usually possible to clearly identify the problem area.

No image:
- If the panel backlight is not working it may still be possible to just see some image on the display.
- A lack of image is most likely to be caused by incorrect connection, lack of power, failure to provide a signal or incorrect graphic card settings.

Image position:
- If it is impossible to position the image correctly, ie the image adjustment controls will not move the image far enough, then test using another graphics card. This situation can occur with a custom graphics card that is not close to standard timings or if something is in the graphics line that may be affecting the signal such as a signal splitter (please note that normally a signal splitter will not have any bad effect).

Image appearance:
- A faulty panel can have blank lines, failed sections, flickering or flashing display
- Incorrect graphics card refresh rate, resolution or interlaced mode will probably cause the image to be the wrong size, to scroll, flicker badly or possibly even no image.
- Incorrect jumper settings on the controller may cause everything from total failure to incorrect image. CAUTION: Do not set the panel power input incorrectly.
- Sparkling on the display: faulty panel signal cable.

Backlight:
Items to check include: Power input, Controls, Inverter and Tubes generally in this order. If half the screen is dimmer than the other half:
- Check cabling for the inverter.
- For a specific backlight tube check the AC pins orientation (CAUTION: never reverse any DC power pins).

Also:
- If adjusting brightness control has no effect the chances are that the VR rating or method of adjusting brightness is not compatible or correctly connected to the inverter.
- If system does not power down when there is a loss of signal.

Continued failure:
- If unit after unit keeps failing consider and investigate whether you are short circuiting the equipment or doing something else seriously wrong.

Generally after common sense issues have been resolved we recommend step by step substitution of known working parts to isolate the problem.

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SPECIFICATIONS

Panel compatibility	1024 x 768, 800x600, 640x480 TFT LCD's support. BIOS need to change to fit for XGA, SVGA, VGA panel respectively. (Part number for XGA panel support : 4167200-2X or up) (Part number for SVGA panel support : 4167201-2X or up) (Part number for VGA panels support : 4167202-2X or up)
No. of colours	Up to 3 x 8 bit providing 16.7 million colours.
Vertical refresh rate	XGA resolution up to 75Hz, SVGA resolution up to 75Hz. VGA resolution up to 75Hz
Dot clock (pixel clock) maximum	68MHz
Graphics formats	Standard XGA,SVGA,VGA
Standard input at source	VGA analog (15-pin) standard
Controls available	- On/Off - Brightness (inverter) - OSD menu, - OSD select - OSD setting + - OSD setting -
Control interface	- Buttons
Settings memory	Settings are stored in non volatile memory
Language OSD support	2 languages (English, French)
VESA DPMS implementation	Yes
Plug & Play	VESA DDC 1, 2/b compatible
Voltage output for LCD	+3.3V DC, +5V DC (No fuse installed)
Input voltage	12VDC
Controller power consumption	Approx 4W (controller logic only, no panel and inverter are involved)
Controller dimensions	107mm x 92mm x 21mm
Storage temperature limits	-40°C to +70°C
Operating temperature limits	0°C to +60°C

NOTES
Please note the following:

- For specific panel setup a sample of an LCD may be required (this will be returned) and a copy of the full technical specifications for the panel from the manufacturer.
- Relayout and custom development services are available.

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Graphic Mode Support Table

Mode	Resolution	Clk [MHz]	Horizontal freq [KHz]	Vertical freq [Hz]	Sync Mode
E1_70	640x350 70Hz	25.175	31.469	70.087	Digital Separate Sync
E2_70	640x400 70Hz	25.175	31.469	70.087	Digital Separate Sync
T_70	720x400 70Hz	28.322	31.469	70.087	Digital Separate Sync
V_60	640x480 60Hz	25.175	31.469	59.940	Digital Separate Sync
V_72	640x480 72Hz	31.500	37.861	72.809	Digital Separate Sync
V_75	640x480 75Hz	31.500	37.500	75.000	Digital Separate Sync
SV_56	800x600 56Hz	36.000	35.156	56.250	Digital Separate Sync
SV_60	800x600 60Hz	40.000	37.879	60.317	Digital Separate Sync
SV_72	800x600 72Hz	50.000	48.077	72.188	Digital Separate Sync
SV_75	800x600 75Hz	49.500	46.875	75.000	Digital Separate Sync
X_60	1024x768 60Hz	65.000	48.363	60.004	Digital Separate Sync
X_70	1024x768 70Hz	75.000	56.476	70.069	Digital Separate Sync
X_75	1024x768 75Hz	78.750	60.023	75.029	Digital Separate Sync

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WARRANTY

The products are warranted against defects in workmanship and material for a period of one (1) year from the date of purchase provided no modifications are made to it and it is operated under normal conditions and in compliance with the instruction manual.

The warranty does not apply to:

- Product that has been installed incorrectly, this specifically includes but is not limited to cases where electrical short circuit is caused.
- Product that has been altered or repaired except by the manufacturer (or with the manufacturer's consent).
- Product that has subjected to misuse, accidents, abuse, negligence or unusual stress whether physical or electrical.
- Ordinary wear and tear.

Except for the above express warranties, the manufacturer disclaims all warranties on products furnished hereunder, including all implied warranties of merchantability and fitness for a particular application or purpose. The stated express warranties are in lieu of all obligations or liabilities on the part of the manufacturer for damages, including but not limited to special, indirect consequential damages arising out of or in connection with the use of or performance of the products.

CAUTION

Whilst care has been taken to provide as much detail as possible for use of this product these instructions cannot be relied upon as an exhaustive source of information. This product is for use by suitably qualified persons who understand the nature of the work they are doing and are able to take suitable precautions and design and produce a product that is safe and meets regulatory requirements.

LIMITATION OF LIABILITY

The manufacturer's liability for damages to customer or others resulting from the use of any product supplied hereunder shall in no event exceed the purchase price of said product.

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