

# Arcom SBC-MediaGX

## EBX Compatible

## Embedded Processor Card

### Technical Manual

## Product Information

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## Useful Contact Information

### Customer Support

Tel: +44 (0)1223 412 428  
 Fax: +44 (0)1223 403 409  
 E-mail: [support@arcom.co.uk](mailto:support@arcom.co.uk)

### Sales

Tel: +44 (0)1223 411 200  
 Fax: +44 (0)1223 410 457  
 E-mail: [sales@arcom.co.uk](mailto:sales@arcom.co.uk)

### or for the US: E-mail

[icpsales@arcomcontrols.com](mailto:icpsales@arcomcontrols.com)

### United Kingdom

Arcom Control Systems Ltd  
 Clifton Road  
 Cambridge CB1 7EA, UK  
 Tel: 01223 411 200  
 Fax: 01223 410 457  
 FoD: 01223 240 600

### United States

Arcom Control Systems Inc  
 13510 South Oak Street  
 Kansas City MO 64145 USA  
 Tel: 816 941 7025  
 Fax: 816 941 0343  
 FoD: 800 747 1097

### Belgium

Groen Nummer:  
 Tel: 0800 7 3192  
 Fax: 0800 7 3191

### France

Numero Verto  
 Tel: 0800 90 84 06  
 Fax: 0800 90 84 12  
 FoD: 0800 90 23 80

### Germany

Kostenlose Infoline:  
 Tel: 0130 824 511  
 Fax: 0130 824 512  
 FoD: 0130 860 449

### Netherlands

Gratis 0800 Nummer:  
 Tel: 0800 0221136  
 Fax: 0800 022114

### Italy

Número Verde:  
 Tel: 0800 790841  
 Fax: 0800 780841  
 FoD: 0800 873600

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This board contains CMOS devices that could be damaged in the event of static electricity discharged through them. At all times, please observe anti-static precautions when handling the board. This includes storing the board in appropriate anti-static packaging and wearing a wrist strap when handling the board.

## Battery

The board contains a Lithium non-rechargeable battery. Do not short circuit the battery or place on a metal surface where the battery terminals could be shorted. During shipment the battery is isolated from the boards circuitry and should be connected before using the board, please refer to the link section of this manual for details.

When disposing of the board or battery, take appropriate care. Do not incinerate, crush or otherwise damage the battery.

## Packaging

Please ensure that should a board need to be returned to Arcom Control Systems, it is adequately packed, preferably in the original packing material.

## Electromagnetic Compatibility (EMC)

The SBC-MediaGX is classified as a component with regard to the European Community EMC regulations and it is the users responsibility to ensure that systems using the board are compliant with the appropriate EMC standards.

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## Technical Support

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## Introduction

This manual describes the operation and use of Arcom Control Systems SBC-MediaGX single board computer. It has been designed to be used as a reference and user manual and includes information on using all aspects of the board.

This manual should have been supplied as part of an SBC-MediaGX development kit and you should have already read the 'Quickstart' manual supplied.

The SBC-MediaGX is a high-performance, high-functionality multimedia PC/AT compatible processor board designed to be embedded into OEM equipment. It contains all the standard features found in a PC/AT system with some embedded and multimedia additions. These include silicon disk drive, Ethernet, 16-bit SoundBlaster, PC/104-Plus expansion bus, MMX-enhanced CPU and high performance flat panel VGA controller.

Once you have completed development the board can be purchased in the following standard variants:-

SBC-MediaGX-233-M0-F0	233MHz CPU, No DRAM, No Flash
SBC-MediaGX-233-M0-F8	233MHz CPU, No DRAM, 8MB Flash
SBC-MediaGX-233-M32-F0	233MHz CPU, 32MB DRAM, No Flash
SBC-MediaGX-233-M32-F8	233MHz CPU, 32MB DRAM, 8MB Flash

Other memory and flash variants may be available including:-

F4 - 4MB Flash
F16 - 16MB Flash
M64 - 64MB DRAM
M128 - 128MB DRAM

Contact Arcom Control systems sales for pricing and availability.

## Revision History

Manual	PCB	Comments	
Issue A	V1 Iss3	990611	Initial Release
Issue B	V1 Iss3	990715	[ECO 2830]

## Features

- CPU:
  - ⇒ National/Cyrix MediaGX 233MHz MMX-enhanced processor
- Chipset:
  - ⇒ National/Cyrix CX5530 I/O Companion
- Cache:
  - ⇒ 16K L1 write-back cache
- BIOS
  - ⇒ Award Software PCI Plug and Play BIOS in Flash EPROM
  - ⇒ Intel/Chips & Technologies 69000 HiQVideo BIOS
  - ⇒ Onboard reprogramming
- System Memory:
  - ⇒ Up to 128MB Unbuffered 3.3V SDRAM
- Silicon Disk
  - ⇒ Up to 16MB Intel Strata Flash
  - ⇒ Datalight FlashFX Flash filling system.
- Video:
  - ⇒ Intel/Chips and Technologies 69000 HiQVideo Controller
  - ⇒ 2MB integrated SDRAM
  - ⇒ XVGA for CRT and Flat panel displays
  - ⇒ 32-bit PCI Local bus interface
  - ⇒ VGA BIOS integrated into system ROM
  - ⇒ Simultaneous CRT and Flat panel display
- Integrated I/O
  - ⇒ NS97317 with built in Real Time Clock and Keyboard controller.
- Audio
  - ⇒ Cyrix XpressAAUDIO 16-bit SoundBlaster compatible.
  - ⇒ National LM4548 CODEC.
  - ⇒ Line IN, Line OUT and Microphone
- Enhanced IDE
  - ⇒ Bus Mastering mode, up to two devices
  - ⇒ Supports PIO Mode 4 or Ultra DMA/33 Hard Disk and ATAPI CD-ROM
- FDD Interface
  - ⇒ Supports two floppy drives 360KB, 720KB, 1.2MB, 1.44MB, 2.88MB
- Parallel Port
  - ⇒ High speed parallel port SPP/EPP/ECP mode.
  - ⇒ BIOS Configurable
- Serial Ports
  - ⇒ Four 16C550 compatible high speed UART's
  - ⇒ 3 x RS232 and 1 x RS232/422/485 Interfaces

- USB Interface
  - ⇒ Two Universal Serial Bus (USB) interfaces
- Touchscreen
  - ⇒ 4 wire analogue resistive touchscreen controller
- Network support
  - ⇒ Realtek RTL8139A 10/100-BASET Ethernet controller
  - ⇒ 32-bit PCI interface
- Expansion
  - ⇒ PC/104-Plus expansion bus
  - ⇒ 8/16 bit ISA compatible interface
  - ⇒ 32-bit PCI compatible interface
- Software Compatibility
  - ⇒ Datalight ROM-DOS operating system license supplied with each board
  - ⇒ Windows 95/98/NT/CE, Linux, QNX
  - ⇒ Other 80x86 compatible software applications.
- Size
  - ⇒ EBX Compatible footprint 5.75" x 8.00" (146mm x 203mm)

## Getting Started

The development kit contains a "Quickstart" manual that has been designed to enable users to set-up and start using the board as soon as possible. You should read this manual and follow the steps defining how to set-up the board. Once you have completed this task you will have a working SBC-MediaGX system and can start adding other peripherals to enable you to start development.

The section below has been designed to guide you through setting up and using some of the features of the SBC-MediaGX. If you would like more detailed information on any aspect of the board refer to the "Detailed Hardware Description" section of this manual.

## Using the SBC-MediaGX

The SBC-MediaGX uses an Award Software PCI BIOS (Basic Input-Output System) to provide support for the board. The BIOS has a built-in setup program that allows users to modify the basic system configuration. The setup program can be invoked during the power on sequence by pressing the <DEL> key when prompted or by pressing <CTRL>, <ALT> and <ESC>. The setup parameters are stored in the CMOS RAM and will be retained when the power is switched off if the battery backup supply is connected (See 'link' section for details).

The BIOS defaults have been selected to enable the board to operate with a minimum of devices connected. If CMOS settings are lost the board will correctly power up and boot from the on-board flash disk, without any other peripherals connected.

### CPU Configuration

The SBC-MediaGX board has been specifically designed to support the National/Cyrix MediaGX MMX - Enhanced processor. The appropriate voltage and speed selections are configured during the assembly process, no user configuration is required. The board will be supplied with a device fitted into the CPU socket and will be 'Ready to Run'.

**Note:-** The CPU socket does not support any other type of processor available from alternative manufacturers. Do not attempt to replace the CPU as damage may occur during this process.

### Installing Memory

The SBC-MediaGX supports a single 168-pin DIMM (Dual In-line Memory Module). If your board was supplied without any memory fitted (M0 variant) or you wish to upgrade your memory, then you need to source a standard unbuffered 3.3V SDRAM module that conforms to the PC100 specification. The SBC-MediaGX supports 16MB, 32MB, 64MB and 128MB modules.

There are no link settings required to enable the board to support different memory sizes. The BIOS will automatically detect the memory and configure the board appropriately. Always ensure that the power is switched OFF before attempting to insert the memory module. The module should be inserted in the DIMM1 socket in an ESD safe area and you should be wearing an earth strap or touching a grounded surface to protect the device. The memory module is designed to ensure that it can only be plugged in with the correct orientation. Therefore if the module does not fit, check the key locations and ensure the memory is the correct type.

Once power is applied to the board the BIOS will automatically configure the memory, and during the memory check a message will be printed on the display to show the amount of DRAM found.



## Connecting a Floppy disk drive

The SBC-MediaGX supports up to two standard floppy disk drives. These can be connected to PL18 via a 34-way twisted ribbon cable. Both disk drives should be configured to use drive select 1, Drive A: should be connected via a twisted cable and DRIVE B: via a straight cable. The BIOS default configuration assumes that a 1.44MB floppy disk is connected as drive A:. If you require a different configuration you must configure the BIOS using the setup screen.

**Note:-** In order to support two floppy disk drives at the same time the 34-way cable should be fitted with three connectors. The board connector and one of the drive connectors should be fitted 1:1 and the third connector should have a twist in the cable which swaps pins 10 to 16 on this connector.

## Connecting a Hard disk drive

Up to two IDE hard disk drives can be supported by the SBC-MediaGX board. Both drives should be connected to PL22 via a 40-way 1:1 ribbon cable. The primary drive should be configured as a 'MASTER' and the secondary drive as a 'SLAVE'. The BIOS will automatically detect the hard disk drive during the POST process and configure the hardware correctly. The BIOS will attempt to load an operating system from the primary disk drive. This drive will become DRIVE C: once the operating system has loaded. If the board is fitted with flash memory and this has been formatted as a silicon disk drive then it will be allocated as DRIVE D:. The secondary drive will be allocated the next available drive letter.

## Connecting a CD-ROM (IDE Type)

If a CD-ROM drive is required in the system, it may be connected in place of the secondary drive detailed above. The CD-ROM should be configured as a 'SLAVE' device. Drivers will be required to support the drive under DOS. If a bootable CD is inserted in the drive the BIOS can be configured to automatically boot from this CD.

## Connecting a Mouse

A PS/2 mouse can be connected to PL7. A suitable mouse is supplied as part of the development kit. A driver has been included on the support CD-ROM to enable this mouse to be used under DOS. Windows 95/98 will provide mouse support via built in drivers.

## Using the Serial interfaces (RS232)

The four serial port interfaces on the SBC-MediaGX are fully PC compatible. They are decoded at standard PC address locations for COM1, COM2, COM3 and COM4. PC applications will be able to use these ports without any special configuration. COM3 and COM4 can use non-standard IRQ lines, which enables all four ports to have an individual IRQ assigned (See 'link' section for details).

Connection to the serial ports is via a 10-way boxed header. The pin assignment of these headers has been arranged to enable a 9-way IDC D-Type plug to be connected directly to pins 1-9 on the cable. The D-Type connector will be compatible with the standard 9-way connector on a desktop machine. A suitable cable is provided in the development kit.

The following table shows the connection details for this cable.

10 way Header	Signal Name	9-way D-Type Plug
1	Data Carrier Detect (DCD)	1
2	Data Set ready (DSR)	6
3	Receive Data (RX)	2
4	Request To Send (RTS)	7
5	Transmit Data (TX)	3
6	Clear To Send (CTS)	8
7	Data Terminal Ready (DTR)	4
8	Ring Indicator (RI)	9
9	Ground	5
10	No Connect	-

## Connecting a Printer

An enhanced printer port has been incorporated onto the SBC-MediaGX. This port can be used to support a 'CENTRONICS' compatible printer or ECP/EPP bi-directional device. The signals are routed to a 26-way boxed header and the pin assignment has been arranged to allow 1:1 connection with a 25-way IDC D-Type socket. This socket is compatible with a standard printer port connector on a desktop machine. The following table shows the connector details for this cable.

26 way Header	Signal Name	25 way D-Type Socket
1	STROBE	1
2	AUTOFEED	14
3	D0	2
4	ERROR	15
5	D1	3
6	INIT	16
7	D2	4
8	SELECT IN	17
9	D3	5
10	Ground	18
11	D4	6
12	Ground	19
13	D5	7
14	Ground	20
15	D6	8
16	Ground	21
17	D7	9
18	Ground	22
19	ACKNOWLEDGE	10
20	Ground	23
21	BUSY	11
22	Ground	24
23	PAPER EMPTY	12
24	Ground	25
25	SELECT	13
26	No Connect	-

## Using the Audio features

There are three Audio interfaces supported on the SBC-MediaGX Line IN, Line OUT and Microphone. The Line IN and Line OUT interfaces support stereo signals and the Microphone provides a mono input. Connections are routed to a 10 way boxed header PL27, the relevant signals for each interface are shown in the table below:-

Function	Pin No.	Signal
Microphone	2	MIC
	1	Audio ground reference.
Line IN	4	Line input LEFT
	6	Line input RIGHT
	5	Audio ground reference
Line OUT	8	Line output LEFT
	10	Line output RIGHT
	9	Audio ground reference

The standard connector for these signals is a 3.5mm Stereo jack.

The audio device is a 16-bit SoundBlaster compatible interface. The BIOS provides the user the ability to configure the I/O address, IRQ and DMA settings for this device. This enables it to be used with existing SoundBlaster-16 applications. The audio features are supported by installable device drivers under Windows 95/98 (See the 'Operating System driver' section for details).

The following settings are configured in the BIOS as default. These can be modified during POST by entering setup and selecting the 'Integrated Peripherals' screen.

Audio I/O Base Address	220H
MPU-401 I/O Base Address	330H
Audio IRQ Select	IRQ5
Audio Low DMA Select	DMA 1
Audio High DMA Select	DMA 5

As long as your software is compatible with the configuration detailed above running the application will cause the audio features to be accessed. If you are using Windows then you will need to install the audio drivers before these features can be used. The drivers will cause the standard Windows add on to access the SBC-MediaGX audio functions.

## Using the Flat Panel Interface

The Intel/Chips and Technologies 69000 VGA controller used on the SBC-MediaGX supports a wide range of flat panel displays as well as a conventional CRT monitor. Flat panel support can be configured by modifying the registers within the VGA device. The VGA BIOS sets up these registers during the POST process and can be modified to support various displays.

The default BIOS for the SBC-MediaGX sets the output to CRT if a monitor is detected when the board is switched ON, this ensures that you can plug in a standard PC style monitor and start using the board straight away. The default BIOS can be used to drive a 6.5" NEC TFT flat panel (Part number NL6448AC20-06). This panel is supplied in the Flat panel variant of the SBC-MediaGX development kit. The development kit also contains an SBC-MediaGX FPIF (Flat Panel Interface board), and associated cables to enable connection of the display. The FPIF board and connection details for this display are described in Appendix D.

If you wish to use this display then connect it to the SBC-MediaGX via the flat panel interface connector PL28, and FPIF board.

For details on other flat panels supported by the SBC-MediaGX contact Arcom Control System technical support.

## Using the PC/104-Plus expansion bus

PC/104 and PC/104-Plus modules can be used with the SBC-MediaGX to add extra functionality to the system. The PC/104-Plus interface is used to provide support for modules with 32-bit PCI devices on-board. The standard PC/104 interface supports 8/16 bit ISA bus style interfaces.

Arcom Control Systems have a wide range of PC/104 modules which are compatible with the SBC-MediaGX, these include modules for digital I/O, analogue I/O, motion control, video capture, CAN bus, serial interfaces etc. Please contact Arcom Controls Systems if a particular interface you require does not seem to be available as these modules are continually being developed. Other manufacturers boards can also be used with this interface if they conform to the PC/104 specification.

In order to use a PC/104 board with the SBC-MediaGX it should be plugged into PL23 for 8-bit cards and PL23/PL26 for 16-bit cards. Before powering up the system ensure that you have checked that the link settings on the card for I/O address, IRQ and DMA settings do not conflict with any devices on the SBC-MediaGX.

If you are using a PC/104 card that requires +5V, this will automatically be supplied via the PC/104 header. If you require +12V this will only be available if the +12V pin on the 'POWER' connector PL12 has been connected to a supply. If you require -12V or -5V these will need to be supplied directly to the PC/104 board.

## Using the USB Ports

The Universal Serial Bus (USB) controller will be disabled by default. To enable this feature you must enter the Setup program by pressing the <DEL> key during the POST routine. The USB function is enabled/disabled in the 'Chipset Features' menu. Once this device has been enabled the PCI Plug and Play BIOS will set up the control registers and the device will be available for use. The standard USB connector is a 4 way socket which provides power and data signals to the USB peripheral. The 10-way header PL8 has been designed to be compatible with PC expansion brackets which support two USB sockets (Refer to the USB section in this manual and Appendix A for more details).

The USB device will be supplied with a driver that must be installed to enable the device to be used (Refer to the documentation supplied with the device).

## Using the Ethernet Interface

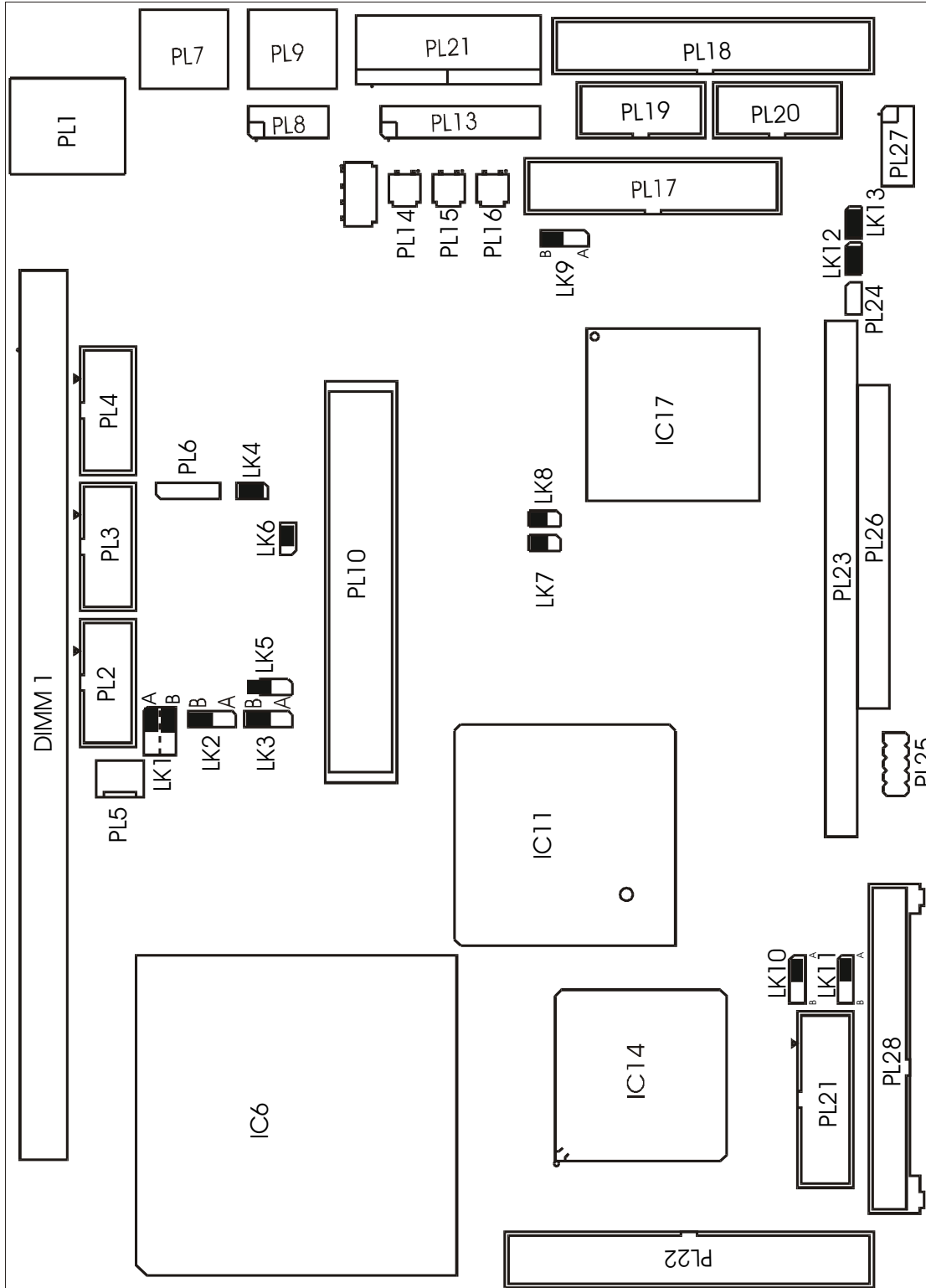
The Realtek RTL8139A Ethernet controller will be configured by the Award Plug and Play BIOS during the POST process. Drivers for various operating systems are supplied on the support CD-ROM, the appropriate driver must be loaded before the ethernet interface can be used.

Connection is made via the 8 way RJ45 connector PL1. A second connector PL6 provides outputs that can be used to control LED's for TX, RX and LINK status.

# Links and Connectors

## Links

There are thirteen user selectable links on the SBC-MediaGX. The following section provides details on these links. The '+' sign indicates the default position for each link.



**LK1 - COM3 Signal assignment.**

COM3 can be used to support either a standard RS232 serial interface or the onboard touchscreen controller interface. This link has been provided to select between these two functions.

LK1-1	LK1-2	Description
A+	A+	RS232 Interface selected
A	B	Not valid combination
B	A	Not valid combination
B	B	Touchscreen Controller Interface selected

**LK2 - COM3 IRQ routing**

This link is used to select which IRQ signal is connected to the COM3 serial port.

LK2	Description
A	IRQ4
B +	IRQ11

**LK3 - COM4 IRQ routing**

This link is used to select which IRQ signal is connected to the COM4 serial port.

LK2	Description
A	IRQ3
B +	IRQ10

**LK4, LK5 and LK6 - RS485/422 configuration**

These links are used to configure the RS485/422 serial interface. They can be used to enable/disable the RS485 receive buffer and RS485/422 line termination (See 'RS485/422' section for more details).

LK4	Description
Fit+	RS422 termination resistor connected
Omit	RS422 termination resistor disconnected

LK5	Description
Fit	RS485 Receiver enabled
Omit+	RS485 Receiver disabled

LK6	Description
Fit+	RS485 termination resistor connected
Omit	RS485 termination resistor disconnected

**LK7 - Watchdog Timer Enable**

This link has been provided to enable/disable the watchdog function. When the link is in the enable position the watchdog timer can be started by writing to I/O location 93H (See the 'Watchdog Timer' section for more details).

LK7	Description
Fit	Enabled
Omit+	Disabled

**LK8 - Watchdog Timer timeout selection**

The watchdog timer has two pre-configured timeout delays, these are either 2 or 8 seconds. This link can be used to select between the two timeout periods.

LK8	Description
Fit	2 second timeout
Omit+	8 second timeout

**LK9 - Clear CMOS/ Battery disable**

A battery link is fitted that is used to prevent drain on the battery during shipment. This link can also be used to clear the contents of the CMOS RAM.

LK1	Description
A	Battery Backup enabled
B +	Battery Backup Disabled (CMOS RAM cleared)

**LK10 - LCD Backlight Supply Voltage**

This link has been provided to enable selection of the LCD backlight supply voltage (BLKSAFE). Two options are available either +5V or +12V (Note:- If +12V is selected this voltage must be supplied from an external source via the power connector PL9).

LK10	Description
A+	+5V Backlight
B	+12V Backlight

**LK11 - LCD Panel power supply voltage**

This link has been provided to enable selection of the LCD panel supply voltage (VDDSAFE). Two options are available either +5V or +3.3V.

LK11	Description
A+	+5V Supply
B	+3.3V Supply



### LK12 & LK13 - User Links

These two links are user configuration links. They have no function on the SBC-MediaGX, but can be used by an application program to signify configuration setting. The position of these links can be read via the special function I/O register at address 259H (See the 'User Link' section for details).

LK12	Description
Fit+	Bit 1 of 259H 'Logic 1'
Omit	Bit 1 of 259H 'Logic 0'

LK13	Description
Fit+	Bit 2 of 259H 'Logic 1'
Omit	Bit 2 of 259H 'Logic 0'

### Connectors

There are twenty eight connectors on the SBC-MediaGX that allow you to connect external devices such as keyboard, floppy disk drives, hard disk drives, printers etc. Detailed pin assignments are shown in Appendix A.

Connector	Description
PL1	Ethernet Interface
PL2	COM3 RS232 Serial Port
PL3	COM4 RS232 Serial Port
PL4	COM4 RS422/485 Serial Port
PL5	CPU Fan Power
PL6	Ethernet Controller Status LED's
PL7	PS/2 Keyboard
PL8	USB Serial Port
PL9	PS/2 Mouse
PL10	PC/104-Plus Expansion
PL11	4-wire Analogue Resistive Touchscreen
PL12	EBX Power Supply Connector
PL13	General Purpose I/O
PL14	Reset Switch
PL15	Suspend/Resume Switch
PL16	PC Speaker
PL17	Parallel Port Interface
PL18	Floppy Disk Interface
PL19	COM2 RS232 Serial Port
PL20	COM1 RS232 Serial Port
PL21	VGA CRT Interface
PL22	IDE Interface
PL23	64-way PC/104 Expansion
PL24	Flash Access LED
PL25	In-System-Program header
PL26	40-way PC/104 Expansion
PL27	Audio Functions
PL28	VGA Flat Panel Interface

# AWARD BIOS SETUP

The Award BIOS ROM has a built-in Setup program that allows users to modify the basic system configuration. This type of information is stored in battery-packed RAM so that it retains the Setup information when the power is turned off.

## ENTERING SETUP

Power on the computer and press <Del> immediately will allow you to enter Setup. The other way to enter Setup is to power on the computer, when the below message appears briefly at the bottom of the screen during the POST (Power On Self Test), press <Del> key of simultaneously press <Ctrl>, <Alt>, and <Esc> keys.

### Press DEL to enter SETUP.

If the message disappears before you respond and you still wish to enter Setup, restart the system to try again by turning it OFF then ON or pressing the "RESET" button. You may also restart by simultaneously press <Ctrl>, <Alt> and <Del> keys.

### Control Keys

Up Arrow	Move to previous item
Down Arrow	Move to next item
Left Arrow	Move to the item in the left hand
Right Arrow	Move to the item in the right hand
Esc Key	Main Menu Quit and not to save changes to CMOS Status Page setup menu and Option Page Setup Menu Exit current page and return to Main Menu
PgUpKey	Increase the numeric value or make changes
PgDnKey	Decrease the numeric value or make changes
F1 Key	General help, only for Status Page Setup Menu and Option Setup Menu
F2 Key	Change colour from total 16 colours
F3 Key	Calendar, only for Status Page Setup Menu
F4 Key	Reserved
F5 Key	Restore the previous CMOS value from BIOS, only for Option Page Setup Menu
F6 Key	Load the default CMOS value from BIOS default table, only for Option Page Setup Menu
F7 Key	Load the default
F8 Key	Reserved
F9 Key	Reserved
F10 Key	Save all the CMOS changes, only for Main Menu

## **GETTING HELP**

### **MAIN MENU**

The on-line description of the highlighted setup function is displayed at the bottom of the screen.

### **Status Page Setup Menu/Option Page Setup Menu**

**Press F1 to pop up a small help window that describes the appropriate keys to use and the possible selections for the highlighted item. To exit the Help Window press <Esc>.**

## The Main Menu

Once you enter Award BIOS CMOS Setup Utility, the Main Menu will appear on the Screen. Use arrow keys to select among the items and press to accept or enter the **sub-menu**.

ROM PC/ISA BIOS (2A434001)  
CMOS SETUP UTILITY  
AWARD SOFTWARE, INC.

STANDARD CMOS SETUP	INTEGRATED PERIPHERALS
BIOS FEATURE SETUP	SUPERVISOR PASSWORD
CHIPSET FEATURES SETUP	USER PASSWORD
POWER MANAGEMENT SETUP	IDE HDD AUTO DETECTION
PNP/PCI CONFIGURATION	SAVE & EXIT SETUP
LOAD BIOS DEFAULTS	EXIT WITHOUT SAVING
LOAD SETUP DEFAULTS	
Esc : Quit	←↑↓→: Select Item
F10 : Save & Exit Setup	(Shift) F2: Change Colour

### STANDARD CMOS SETUP

This setup page includes all the items in a standard compatible BIOS.

### BIOS FEATURES SETUP

This setup page includes all the items of Award special enhanced features.

### CHIPSET FEATURES SETUP

This setup page includes all the items of chipset special features.

### POWER MANAGEMENT SETUP

This menu provides functions for Green products by allowing users to set the timeout value for monitor and HDD.

### PNP / PCI CONFIGURATION SETUP

This menu allows the user to modify PNP / PCI configuration function.

### LOAD BIOS DEFAULTS

BIOS defaults indicates the most appropriate value of the system parameter which the system would be in minimum performance.

### LOAD SETUP DEFAULTS

Chipset defaults indicates the values required by the system for the maximum performance.

### **INTEGRATED PERIPHERALS**

This section includes all the items of IDE hard drive and Programmed Input / Output features.

### **SUPERVISOR PASSWORD**

Change, set, or disable password. It allows you to limit access to the system and setup, or just to setup.

### **IDE HDD AUTO DETECTION**

Automatically configure hard disk parameters.

### **SAVE & EXIT SETUP**

Save CMOS value changes to CMOS and exit setup.

### **EXIT WITHOUT SAVING**

Abandon all CMOS value changes and exit setup.

## STANDARD CMOS SETUP

The items in the Standard CMOS Setup Menu are divided into several categories. Each category includes one or more than one setup item. Use the arrow keys to highlight the item then use the <PgUp> or <PgDn> keys to select the value you want in each item.

ROM PCI/ISA BIOS (2A434001)									
STANDARD CMOS SETUP									
AWARD SOFTWARE, INC.									
Date (mm:dd:yy) : Wed, Dec 28 1994									
Time (hh:mm:ss) : 12:35:50									
HARD DISKS									
	TYPE	SIZE	CYLS	HEAD	PRECOMP	LANDZ	SECTOR	MODE	
Primary Master :	Auto	0	0	0	0	0	0	-----	
Primary Slave :	Auto	0	0	0	0	0	0	-----	
Drive A	: 1.44M, 3.5in.								
Drive B	: None								
Video	: EGA/VGA								
Halt On	: No Errors								
						Base Memory	: 640K		
						Extended Memory	: 7168K		
						Other Memory	: 384K		
						Total Memory	: 8192K		
ESC	: Quit			←↑↓→	: Select Item			PU/PD/+/-:	Modify
F1	: Help			(Shift) F2	: Change Colour				

## BIOS Features Setup

ROM PCI/ISA BIOS (2A434001)  
 BIOS FEATURE SETUP  
 AWARD SOFTWARE, INC

Virus Warning	: Disabled	Video BIOS Shadow	: Enabled
CPU Internal Cache	: Enabled	C8000-CBFFF Shadow	: Disabled
External Cache	: Enabled	CC000-CFFFF Shadow	: Disabled
Quick Power On Self Test	: Enabled	D0000-D3FFF Shadow	: Disabled
Boot sequence	: A, C, SCSI	D4000-D7FFF Shadow	: Disabled
Swap Floppy Drive	: Disabled	D8000-DBFFF Shadow	: Disabled
Boot Up Floppy Seek:	: Disabled	DC000-DFFFF Shadow	: Disabled
Boot Up NumLock Status	: On		
Boot Up System Speed	: High		
Gate A20 Option	: Fast		
Memory Parity Check	: Enabled		
Typematic Rate Setting	: Disabled		
Typematic Rate (Chars/Sec)	: 6		
Typematic Delay (Msec)	: 250	Esc : Quit	←↑↓→ : Selection Item
Security Option	: Setup	F1 : Help	PU/PD/+/- : Modify
PCI/VGA Palette Snoop	: Disabled	F5 : Old Values	(Shift) F2 : Colour
OS Select for DRAM > 64MB	: Non-OS2	F6 : Load BIOS Default	
Report No FDD For WIN95	: Yes	F7 : Load Setup Default	

### Virus Warning

This category flashes on the screen. During and after system boots up, any attempt to write to the boot sector or partition table of the hard disk drive will halt the system and the following error message will appear, in the mean time you can run anti-virus programs to locate the problem.

**!WARNING!**  
**Disk boot sector is to be modified**  
**Type "Y" to accept write or "N" to abort write**  
**Award Software, Inc.**

- Enabled**      Activate automatically when the system boots up causing a warning message to appear when anything attempts to access the boot sector or hard disk partition table.
- Disabled**     No warning message to appear when anything attempt to access the boot sector or hard disk partition table.

### CPU Internal Cache/External Cache

These two categories speed up memory access. However, it depends on CPU/chipset design. The default value is Enabled.

- Enabled:**     Enabled cache
- Disabled:**    Disabled cache

### Quick Power On Self Test

This category speeds up Power On Self Test (POST) after you power on the computer. If it is set to Enable, BIOS will shorten or skip some check items during POST.

- Enabled:**     Enable quick POST
- Disabled:**    Normal POST

### Boot Sequence

This category determines which drive computer searches first for the hard disk operation system (i.e., DOS).

**A, C, SCSI :**    System will first search for floppy disk drive then second search hard disk driver, then SCSI driver.

#### **C, A, SCSI/D, A. SCSI/ E, A, SCSI/F, A, SCSI:**

System will first search for IDE hard disk driver (C: D: or E: or F:) then second search floppy disk driver then SCSI hard disk driver.

**SCSI, A, C:**    System will first search SCSI hard disk driver then second search for floppy disk driver then EDI hard disk driver.

**CDROM, C, A:** System will first search for the hard disk driver (If the CDROM has a bootable CD title.) and second search hard disk driver then floppy disk driver.

**CDROM, A:**    System will first search for the hard disk driver and second search for CDROM driver (If the CDROM has a bootable CD title,) then search floppy disk driver.

**LS120, C:**     System will first search LS120 disk driver and second search for IDE hard disk driver.

### Swap Floppy Drive

Users can enable this item so that BIOS will see the hardware "Drive A:" as "Drive B:", and hardware "Drive B:" as "Drive A:".



### Swap Floppy Drive

Users can enable this item so that BIOS will see the hardware "Drive A:" as "Drive B:", and hardware "Drive B:" as "Drive A:".

### Boot Up Floppy Seek

During POST, BIOS will determine if the Floppy disk drive installed is 40 or 80 tracks. 360K type is 40 tracks while 720K , 1.2M and 1.4M drive type as they are all 80 tracks.

**Enabled:** BIOS searches for floppy disk drive to determine if it is 40 or 80 tracks. Note that BIOS can not tell from 720K, 1.2M or 1.4M drive type as they are all 80 tracks.

**Disable:** BIOS will not search for the type of floppy disk drive by track number. Note that there will not be any warning messages if the drive installed is 360K.

### Boot Up NumLock Status

The default value is On.

**On:** Keypad is number keys.

**Off:** Keypad is arrow keys.

### Boot Up System Speed

It selects the default system speed - the speed that system will run at immediately after power up.

**High:** Set the speed high

**Low:** Set the speed low.

### Gate A20 Option

The Gate A20 Option default setting is fast.". This is the optimum setting for this motherboard.

### Typematic Rate Setting

This determines the typematic rate.

**Enabled:** Enable typematic rate

**Disabled:** Disable typematic rate

### Typematic Rate (Chars/Sec)

**6** : 6 characters per second  
**8** : 8 characters per second  
**10** : 10 characters per second  
**12** : 12 characters per second  
**15** : 15 characters per second  
**20** : 20 characters per second  
**24** : 24 characters per second  
**30** : 30 characters per second

**Typematic Delay (Msec)**

When holding the a key, the time between the first and second character will be displayed.

<b>250</b>	: 250 msec
<b>500</b>	: 500 msec
<b>750</b>	: 750 msec
<b>1000</b>	: 1000 msec

**Security Option**

This category allows you to limit access to the system and Setup, or just to Setup.

**System:** The system will not boot and access to Setup will be denied if the correct password is not entered at the prompt.

**Setup:** The system will boot, but access to Setup will be denied if the correct password is not entered at the prompt.

**Note:** *To disable security, select PASSWORD SETTING at Main Menu and then you will be asked to enter password. Do not type anything and just press <Enter>, it will disable security. Once the security is disabled, the system will boot and you can enter Setup freely.*

## Video BIOS Shadow

It determines whether video BIOS will be copied to RAM, however, it is optional from chipset design. Video shadow will increase the video speed.

**Enabled:** Video shadow is enabled

**Disabled:** Video shadow is disabled

## C8000-CBFFF Shadow/DC000-DFFFF Shadow

These categories determine whether optional ROM will be copied to RAM in 16K byte.

**Enabled:** Optional shadow is enabled

**Disabled:** Optional shadow is disabled



# Power Management

ROM PCI/ISA BIOS (2A434001)  
 POWER MANAGEMENT SETUP  
 AWARD SOFTWARE, INC.

Power Management	: Disabled	IRQ1 (Keyboard)	: ON
<b>**PM Timers**</b>		IRQ3 (COM2)	: OFF
Doze Mode	: Disabled	IRQ4 (COM1)	: OFF
Standby Mode	: Disabled	IRQ5 (LPT2)	: OFF
HDD Power Down	: Disabled	IRQ6 (Floppy Disk)	: OFF
MODEm Use IRQ	: NA	IRQ7 (LPT1)	: OFF
Throttle Duty Cycle	: 33.3%	IRQ9 (IRQ2 Redir)	: OFF
RING POWER ON Controller	: Disabled	IRQ10 (Reserved)	: OFF
Net POWER ON Controller	: Disabled	IRQ11 (Reserved)	: OFF
RTC Alarm Function	: Disabled	IRQ12 (PS/2 Mouse)	: OFF
		IRQ13 (Coprocessor)	: OFF
		IRQ14 (Hard Disk)	: OFF
		IRQ15 (Reserved)	: OFF
Soft-OFF by PWR-BTN	: Instant-OFF	Esc : Quit                    ←↑↓→ : Selection Item F1 : Help                    PU/PD/+/- : Modify F5 : Old Values            (Shift) F2 : Colour F6 : Load BIOS Default F7 : Load Setup Default	

This category determines the power consumption for the system after selecting below items. Default value is Disabled. The following pages tell you the options for each item & describe the meaning of each options.

**Note:**

Suspend function doesn't work if the Power Management item is set to disabled. Please enable the Power Management item before you can run the suspend mode.

Item	Options	Descriptions
A. Power Management	1. Disable	Global Power Management will be disabled
	2. User Define	Users can configure their own power management
	3. Min Saving	Pre-defined timer values are used such that all timers are in their MAX value
	4. Max Saving	Pre-defined timer values are used such that all timers are in their MIN value

Item	Options	Descriptions
A. HDD Power Down (#) Remark 2	1. Disable	HDD's motor will not turn off
	2.1. Min 2. Min 3. Min 4. Min 5. Min 6. Min 8. Min 10.Min 12. Min 15. Min 16. Min 20. Min 30. Min 40. Min 60. Min	Defines the continuous HDD idle time before the HDD entering power saving mode (motor off)
Note: - When HDD is in power saving mode , any access to the HDD will wake the HDD up		

# PNP / PCI Configuration Setup

ROM PCI / ISA BIOS (2A434001)  
 PNP / PCI CONFIGURATION  
 AWARD SOFTWARE, INC.

PNP OS Installed : No	PCI IRQ Activated By : Level
Resources Controlled By : Manual	Used MEM base addr : N/A
Reset Configuration Data : Disabled	
IRQ-3 assigned to : PCI/ISA PnP	
IRQ-4 assigned to : PCI/ISA PnP	
IRQ-5 assigned to : PCI/ISA PnP	
IRQ-7 assigned to : PCI/ISA PnP	
IRQ-9 assigned to : PCI/ISA PnP	
IRQ-10 assigned to : PCI/ISA PnP	
IRQ-11 assigned to : PCI/ISA PnP	
IRQ-12 assigned to : PCI/ISA PnP	
IRQ-14 assigned to : PCI/ISA PnP	
IRQ-15 assigned to : PCI/ISA PnP	
DMA-0 assigned to : PCI/ISA PnP	Esc : Quit ←↑↓→ : Selection Item
DMA-1 assigned to : PCI/ISA PnP	F1 : Help PU/PD/+/- : Modify
DMA-3 assigned to : PCI/ISA PnP	F5 : Old Values (Shift) F2 : Colour
DMA-5 assigned to : PCI/ISA PnP	F6 : Load BIOS Default
DMA-6 assigned to : PCI/ISA PnP	F7 : Load Setup Default
DMA-7 assigned to : PCI/ISA PnP	

This category determines the IRQ resources for the system. You can select the items according your system environment. Default value is "Resources Controlled By Auto".

# INTEGRATED PERIPHERALS

ROM PC/ISA BIOS (2A434001)  
INTEGRATED PERIPHERALS  
AWARD SOFTWARE, INC.

IDE HDD Block Mode	: Enabled	ECP mode User DMA	: 3
Primary IDE Channel	: Enabled	Build in CPU Audio	: Enabled
Master Driver PIO Mode	: Auto	Audi I/O Base Address	: 220H
Slave Driver PIO Mode	: Auto	MPU-401 I/O Base Address	: 330H
IDE Primary Master UDMA	: Auto	Audio IRQ Select	: IRQ 5
IDE Primary Slave UDMA	: Auto	Audio Low DMA Select	: DMA 1
KBC input clock	: 8 MHz	Audio High DMA Select	: DMA 5
Onboard FDC Controller	: Enabled		
Onboard Serial port 1	: AUTO		
Onboard Serial port 2	: 2F8/IRQ3		
Onboard Parallel Port	: 378/IRQ7	Esc : Quit	←↑↓→ : Selection Item
Parallel Port Mode	: ECP & EPP	F1 : Help	PU/PD/+/- : Modify
		F5 : Old Values	(Shift) F2 : Colour
		F6 : Load BIOS Default	
		F7 : Load Setup Default	



## Load BIOS Default

Load BIOS Default (Y/N) ?N

When you access "Load BIOS Default", the following message appears:

The BIOS Default values are the "worst case" default, and are the most stable values for the system. Use them if the system is performing erratically due to hardware problems. To load the BIOS Default values, press <Y> then <Enter>.

## Load Setup Default

Load Setup Default (Y/N) ?N

When you access "Load Setup Default", you are shown the following message:

The Setup Default values represent the "best case" default, and should provided optimum system performance. To load the Setup Default values, press <Y> then <Enter>.

## Supervisor / User Password Setting

ENTER PASSWORD

When you select this function, the following message will appear at the centre of the screen to assist you in creating a password.

Type the password, up to eight characters, and press <Enter>. The password typed now will clear any previously entered password from CMOS memory. You will be asked to confirm the password. Type the password again and press <Enter>. You may also press <Esc> to about the selection and not enter a password.

If you select System at Security Option of BIOS Features Setup Menu, you will be prompted for the password everytime the system is rebooted or anytime you try to enter Setup. If you select Setup at Security Option of BIOS Features Setup Menu, you will be prompted only when you try to enter Setup.

## IDE HDD Auto Detection

This feature allows you to check all the informations on your hard disk formation. When you access "IDE HDD Auto Detection", the system executes auto detection.

At the prompt, it represents all the informations on your HDD, and you are asked:

**Do you accept this drive C: (Y/N)?**

- 1 If you accept the test result, press [Y] then [Enter] and the result is saved, then the system continues to detect another HDD.
- 2 If not, press [N] then [Enter] and the system continues to detect another HDD.

## Software Support

The development kit contains a support CD-ROM that incorporates reference material and software utilities which can be used to support the SBC-MediaGX. The following sections describe the software support and provide guidelines for using the drivers supplied on the CD.

### Datalight ROM-DOS 6.22

The SBC-MediaGX board is supplied with a license for Datalights ROM-DOS 6.22 operating system. If the board has been supplied with flash memory then this operating system will be pre-installed on the flash drive. The support CD-ROM can be used to generate a bootable ROM-DOS floppy disk for non flash systems to enable users to configure a hard disk drive if required.

ROM-DOS is a Microsoft MS-DOS 'workalike' operating system which has been specifically designed for embedded systems. The system and command files are physically much smaller, but still provide full compatibility to allow standard DOS applications to run without modification. ROM-DOS supports all the standard utility files like SYS, PRINT, MODE, FDISK, FORMAT etc. These files are supplied on the support CD-ROM and can be used as required.

A full user manual for ROM-DOS is also supplied on the CD which provides detailed information on the operating system and supported interrupts and features.

### Datalight FlashFX Flash Filing System

The flash memory incorporated onto the SBC-MediaGX is configured as a silicon read/write disk drive. This disk is supported using Datalights FlashFX software. This software is designed to enable the disk to be accessed using standard DOS routines. The FlashFX software is installed during the POST process as a BIOS extension. This enables the flash disk to be used as a boot disk. This will be the default boot device if a hard disk drive is not present in the system. When shipped the flash memory will be formatted and configured as a ROM-DOS system disk.

The FlashFX software has been designed to incorporate wear levelling algorithms. The wear levelling ensures that the flash memory is used evenly and that no one sector is continually being written to. This enables the write performance of the flash device to be maximised.

The support CD-ROM contains utilities which can be used to ensure that the flash disk is configured correctly (See the README file in the FlashFX section of the support CD-ROM). If the flash disk gets corrupted for any reason these utilities can be used to reformat the flash. The 'Bootdisk' provides an automatic mechanism for reformatting the flash memory and copying the ROM-DOS operating system.

### AWDFLASH Utility

The AWDFLASH utility provides users with the ability to update the BIOS used on the board. This may be required if you experience any incompatibilities with the BIOS and a later version is available. The main reason for using this utility however is to allow the VGA BIOS to be configured for your particular choice of Flat panel display.

The VGA BIOS has been incorporated into the system BIOS flash device. The VGA BIOS is configured for a particular mode of operation and if this does not match your requirements the BIOS must be modified. The support CD-ROM contains pre-built BIOS images for flat panel displays that have been configured by Arcom Control Systems. The CD also contains connection details for each panel (Refer to the README file on the CD for the latest list of flat panel displays).

Each BIOS image is 256K bytes and contains the complete BIOS code. The AWDFLASH utility can be invoked from the DOS command line and should be supplied with the BIOS image file name required i.e. AWDFLASH BIOS1.BIN. The program will automatically load the file and prompt you to confirm that you want to reprogram the BIOS ROM. Once the device has been reprogrammed you should press F1 to reboot the system.

**Note:-** During this process it is important that you do not switch off the board as this may cause the BIOS ROM to be corrupted and this will stop the board from operating.

## Bootdisk

The CD-ROM contains a ROM-DOS bootdisk image. The image is stored in the BOOTDISK directory and can be loaded onto a blank floppy disk using the FLWRITE utility which is stored in this directory (Refer to the README file for the latest information). The floppy disk image is compatible with a 1.44MB floppy disk.

The bootdisk can be used to load the ROM-DOS operating system from a floppy disk drive. A menu is provided once the board has started to boot to allow you to perform some pre-defined operations. These include booting ROM-DOS, reprogramming the BIOS using AWDFLASH, installing the flash BIOS extension, reformatting the flash disk and copying the system files to the flash disk. Once the appropriate selection has been made the software will perform the operation automatically.

## Operating System Drivers

The support CD contains drivers for the Intel/Chips and technologies 69000 VGA controller, Realtek Ethernet controller, Cyrix/National XpressAUDIO device and Bus Mastering IDE controller. The next three sections provide details for installing these drivers for Windows 95/98 and NT 4.0. The CD also contains drivers for some other operating systems and users should refer to the documentation on the CD for more details.

**Note:-** D:\ is used in the following sections to represent the CD-ROM drive. Replace with the appropriate letter for your system.

### Windows 95 Driver Support

Install Windows 95 as detailed in the Windows documentation. When prompted do not select a network adapter, sound or video card driver. Once the operating system has completed installation follow the steps detailed below to install each driver:

#### Installing Cyrix MediaGX drivers

Using the Run command on the Start menu select the following file from the support CD-ROM

D:\Windows9x\Cyrix MediaGX Certified Win9x Drivers 4.0

The program will automatically prompt you for input and you will be requested for the Windows 95 CD when required. For the driver to be recognised correctly you must restart Windows after installation.

### Installing the Chips HiQ 69000 Video driver

Using the Run command on the Start menu select the following file from the support CD-ROM

D:\Windows9x\95 Display 5.0.0\w95500

Follow the prompts and restart Windows to enable the driver.

The driver detailed above is the standard Windows 95 driver an alternative driver which provides support for multiple orientations i.e. Portrait mode is also available. To use this driver:-

1. Select Windows 95 display properties from the system icon in 'Control Panel'.
2. Select 'Settings' -> 'Advanced'.
3. Click on Adapter type 'Change' and select 'Have disk'.
4. Enter the path D:\Windows9x\95 Portrait Display Beta 2.44.
5. Load the chips95.inf file.
6. Choose NOT to keep all files which are newer than those being installed.
7. Restart Windows

### Installing Realtek Ethernet drivers

Choose PCI Ethernet Controller from the system icon in 'Control Panel'. Select properties and driver. Select update driver. When the driver is not detected select 'Other location' insert the support CD in the drive and enter:-

D:\Ethernet\Win95

When prompted for the RealTek disk enter

D:\Ethernet\Win95

The Windows 95 installation CD may be required to complete installation.

The USB support in Windows 95 is first-generation and the drivers suffer from various limitations. Microsoft recommends only using Windows 98 and Windows 2000 if USB support is required. Most USB peripherals are only supplied with drivers for these operating systems.

### Windows 95 USB Support

### Windows 98 Driver Support

Before installing Windows 98 power up the board and enter Setup using the <DEL> key. In the 'BIOS Features' screen set boot sequence to CD-ROM, C, A and in the 'Chipset Features' screen enable USB support if required. Exit Setup and save changes.

Insert the Windows 98 CD into the drive and reboot the system.

A prompt will appear to enable you to start installing Windows 98. Complete installation as described in the Windows 98 user manual. After installation the following drivers can be installed.

**Installing Cyrix MediaGX drivers**

Using the Run command on the Start menu select the following file from the support CD-ROM

D:\Windows9x\Cyrix MediaGX Certified Win9x Drivers 4.0

You will be prompted for the Windows 98 CD when required.

If you are asked to insert the disk labelled 'XpressAUDIO™ driver disk' insert the support CD and supply the path:-

D:\Windows\Audio 5.05.00.1005

**Installing the Chips HiQ 69000 Video driver**

Restart Windows when prompted. The XpressAUDIO and PCI Bridge will be detected when the operating system loads.

Using the Run command on the Start menu select the following file from the support CD-ROM

D:\Windows9x\98 Display 6.0.0\w98600

Restart Windows when prompted to ensure the driver is detected.

**Installing RealTek Ethernet Drivers**

Choose PCI Ethernet Controller from the system icon in 'Control Panel'. Select 'Properties General' and select 'Reinstall Driver'. Select 'Search for a driver from specified location' and specify:-

D:\Ethernet\Win98

When prompted for the location of the .CAB file enter

D:\Ethernet\Win98

The Windows 98 installation CD may be required to complete installation. Restart Windows 98 when prompted.

**Windows NT4.0 Driver Support**

Before installing Windows NT 4.0 power up the board and enter Setup using the <DEL> key. In the 'BIOS Features' screen set boot sequence to CDROM, C, A .Exit Setup and save changes.

Insert the Windows NT 4.0 CD into the drive and reboot the system.

The CD-ROM will be detected as

IDE CD-ROM (ATAPI 1.2)/PCI IDE Controller

You do not need to select any additional SCSI adapters, CD-ROM drives or special disk controllers.

Install NT 4.0 on an NTFS partition. When prompted ,select 'Do not connect this computer to a network at this time' and leave the video controller configured as standard VGA. If you would like to install Windows NT 4.0 Service pack 4. Select the following file form the support CD-ROM once NT 4.0 has completed installation.

D\NT4SP4\SP4I386.EXE

### Installing Cyrix Audio drivers

Insert support CD-ROM in drive and from the Start menu select 'Control Panel' ->'Multimedia' and 'Devices'. Select 'Audio' and then 'Add' followed by 'Unlisted or Updated Driver'. Enter the following path:-

D:\Windows NT4\Audio 1.0

Select the 'XpressAUDIO™ Driver'. This driver does not autodetect the hardware, therefore the I/O, IRQ and DMA settings must be identical to those specific in the BIOS Setup screen. Default values are

Audio I/O Base Address	220H
MPU-401 I/O Base Address	330H
Audio IRQ Select	IRQ5
Audio Low DMA Select	DMA 1
Audio High DMA Select	DMA 5

### Installing Chips HiQ 69000 Video Drivers

Insert support CD-ROM in drive and from the Start menu select 'Control Panel' then select 'Display' ->'Settings' ->'Display Type' and 'Change'. Select 'Have Disk' and enter the following path:-

D:\Windows NT4\Display 1.2.9

Select the OEMSETUP>INF file, this will start installation of the Chips 69000 Video drivers. When prompted restart Windows NT.

### Install RealTek Ethernet Drivers

Create a new directory on your NT drive (i.e. C:\Ethernet)and copy the contents of the following directory on the support CD-ROM:-

D:\Ethernet\Winnt\\*.\*

From the Start menu select 'Control Panel' and 'Network'. Select 'Wired to the Network', choose 'Select from List' and 'Have Disk'.

Enter the path of your new directory.

Select 'The RTL8139 Fast Ethernet Adapter'. Select the protocols you require. When prompted insert the Windows NT installation CD-ROM into the drive. Complete installation as described in the Windows NT documentation.

## Other Software Support

The support CD-ROM also contains the following material:-

1. Microsoft Internet Explorer 5.0
2. Mitsumi Mouse Driver (For DOS)
3. Adobe Acrobat Reader 3.0
4. Example source code for:-
  - i) General purpose I/O.
  - ii) LM75 Temperature monitor.
  - iii) RS485/422 Serial Communications.
  - iv) Touchscreen Controller.

Please refer to the documentation on the CD-ROM for the latest information.

## Hardware Support Information

As the SBC-MediaGX is a fully compatible PC/AT processor board any standard PC reference guide will provide information on hardware aspects of the board. The following material has been included on the support CD-ROM as it relates to specific features of the board which may not be available from other sources. This information is stored in the REFERENCE directory:-

1. National /Cyrix MediaGX data sheet.
2. National / Cyrix CX5530 data sheet.
3. Intel/Chips and Technologies 69000 data sheet, OEM reference guide and application notes
4. National Semiconductor NS97317 Super I/O controller data Sheet
5. National Semiconductor LM4548 AC97 Audio CODEC data sheet.
6. National Semiconductor LM75 data sheet.
7. RealTek RTL8139A data sheet.
8. Intel Strata Flash Data Sheet.
9. PC/104 Specification.
10. PC/104-Plus Specification.
11. EBX Specification.

If you are trying to locate information on a specific function which is not included above then refer to Appendix E which contains references to some relevant internet sites.

Please refer to the documentation on the CD-ROM for the latest information.

## Detailed Hardware Description

The following section provides a detailed description of the functions provided by the SBC-MediaGX. This information may be required during development once you have started adding extra peripherals or are starting to use some of the embedded features.

### Processor

The National/Cyrix MediaGX processor is an MMX-Enhanced Pentium class processor. It has been designed to provide a low power, low cost fully integrated PC/AT compatible system. The MediaGX is a 64-bit x86 compatible device and has 16K L1 write-back cache integrated into the processor. The device also contains an integrated floating point unit. A 233MHz part is used on the SBC-MediaGX, this part is supplied with a 33MHz clock signal and multiplied within the device.

The processor has two supply rails the core is powered from a +2.9V source and the I/O is powered from +3.3V. These voltages are generated on the SBC-MediaGX from the main +5V supply input.

Along with the CX5530 I/O companion chip the MediaGX provides a Synchronous DRAM controller, VGA Video Controller, PCI 2.1 compatible bus controller, 32-bit IDE controller, SoundBlaster compatible audio device, PCI-ISA bus bridge, standard ISA bus motherboard peripherals and a dual USB controller.

The MediaGX processor is packaged in a standard Socket 7 compatible Pin Grid Array, but is not pin-pin compatible with any other Socket 7 device. Therefore this board will not support any other processor from an alternative manufacturer. The board will always be supplied with a processor and heatsink fitted to the board, and will be configured for the correct clock multiplier and voltage settings.

The MediaGX processor is a low power device, a passive heatsink has been used to support this device on the SBC-MediaGX. This heatsink provides the correct cooling to enable the processor to operate at ambient temperatures up to 60°C.

### Memory

The SBC-MediaGX supports three types of memory device, the system memory that is provided by a Synchronous DRAM module, the BIOS EPROM and the Flash EPROM array.

#### Synchronous DRAM Interface

A single 168-pin Dual-In-Line Memory Module (DIMM) socket is used to support up to 128M bytes of synchronous DRAM. This interface is designed to support 16MB, 32MB 64MB or 128MB modules which are 3.3V compatible and meet the PC100 timing specification. The DIMM socket is designed to ensure that only the correct type of memory is installed.

The Award BIOS will automatically detect the amount of memory inserted into this socket during the power up process and set the appropriate registers correctly with the MediaGX processor. The BIOS can also be configured to perform an exhaustive test on this memory during the POST process to ensure it is functioning correctly. This will cause the boot time to be increased and may be disabled if this is important.



**BIOS EPROM**

A 256K byte Flash EPROM device is used to store the BIOS code. This device can be reprogrammed in suit using the AWDFLASH utility supplied on the support CD-ROM (See the 'Software Support' section for details). The BIOS stored in this device is compressed to save space and is uncompressed during the power up process. The system BIOS is copied into shadow RAM between 0E0000H and 0FFFFFFH, and the VGA BIOS is copied to 0C0000H.

The flash device is a +5V only device and there are no link settings required to enable programming.

**Flash Memory/Silicon Disk**

The SBC-MediaGX board supports up to 16Mbytes of flash memory. This memory is configured to be a read/write silicon disk drive. The Datalight FlashFX flash filling system will automatically be loaded during the POST routine to enable the flash drive to be accessed. The flash drive uses a 16K memory window at 0DC000-0DFFFF to access the devices and two I/O address locations are used to select the appropriate flash area. The I/O registers are shown below for information, under normal circumstances the FlashFX driver should be used to access this memory. The FLASH status LED will illuminate whenever the Flash drive is accessed.

**258H I/O Write**

Bit No.	Paged Address Register 0
0	Address Bit A14
1	Address Bit A15
2	Address Bit A16
3	Address Bit A17
4	Address Bit A18
5	Address Bit A19
6	Address Bit A20
7	Address Bit A21

**259H I/O Write**

Bit No.	Paged Address Register 1
0	Address Bit A22
1	Address Bit A23
2	No function
3	No function
4	No function
5	No function
6	No function
7	Flash Reset/Power down Bit 7 0 = device is reset/powered down 1 = device is enabled

**259H I/O Read**

Bit No.	Paged Address Register 1
0	Flash Busy Signal (0 = BUSY)
1	User link 1 LK12 (0 = CLOSED, 1 = OPEN)
2	User link 2 LK13 (0 = CLOSED, 1 = OPEN)
3	No function
4	No function
5	No function
6	No function
7	No function

These two registers will be reset to 00h (write) on power up/reset. This ensures that the Register 1 Bit 7 is 0, i.e. Flash is disabled and write protected.

**Memory Map**

The following table shows the memory map for the SBC-MediaGX.

Address	Block Size	Description
0FFFC0000H	256K	System BIOS ROM
07FFFFFFFH	-	Extended memory limit (Depending on SDRAM fitted)
00100000H	127M	Extended memory
000E0000H	128K	System BIOS ROM and embedded SETUP
000DC000H	16K	FlashFX BIOS extension and Flash Disk Window
000CC000H	64K	Directed to PC/104 bus
000C0000H	48K	VGA BIOS extension
000A0000H	128K	Video RAM
00000000H	640K	System RAM

## I/O Map

The PC/AT I/O address map is limited to 1K addresses. This is because only the lower ten address lines were originally used to decode I/O devices. The remaining lines were treated as undefined. Therefore the usable address range is from 0-3FFH, above this range devices are imaged and will be accessed throughout the entire 64K I/O address range of the processor.

The following table shows the I/O address mapping for the SBC-MediaGX. If expansion boards are added via the PC/104 interface you should ensure that they are configured to be at a free address location. Otherwise they will not function correctly and may even cause the SBC-MediaGX board to stop operating.

Device	I/O Location (Hex)
DMA Controller 1	000-00F
Interrupt Controller 1	020-021
Timer/Counter	040-043
Keyboard/Mouse	060-064
Real Time Clock	070-071
DMA Page Registers	080-08F
Watchdog Timer	093
Interrupt Controller 2	0A0-0A1
DMA Controller 2	0C0-0DF
Audio	220-22F
Flash Paging Registers	258-259
RS232 Power-down Latch	260
COM4	2E8-2EF
COM2	2F8-2FF
MPU-401	330-33F
Parallel Port	378-37F
Video Controller	3B0-3BB, 3C0-3CF, 3D0-3DF
COM3	3E8-3EF
Floppy Disk	3F0-3F7
COM1	3F8-3FF

## Graphics Controller

An Intel/Chips and Technologies 69000 HiQVideo graphics controller is integrated onto the SBC-MediaGX. This device is used to provide a high performance flat panel/CRT video controller.

The flat panel display output can be used to support monochrome single scan STN, dual scan STN, TFT, EL and Plasma displays. The TFT output can be used to support up to 36 bit displays.

The 69000 contains 2M bytes of synchronous DRAM included within the device. This memory is used to support the standard VGA frame buffer and can be used to provided an extra buffer when driving a dual scan panel to synchronise the display data.

The following table shows the video resolutions supported by the 69000 with the corresponding number of bits per pixel.

Resolution	Bit Per Pixel
640 x 480	8/16/24
800 x 600	8/16/24
1024 x 768	8/16
1280 x 1024	8

The flat panel and CRT interface signals are routed to two separate connectors, both displays can be driven simultaneously. The ability to drive both displays is dependant on the particular timing parameters of the flat panel display. It is not always possible to select appropriate clock rates to achieve an output on the CRT and flat panel displays.

The CRT output signals are routed to a 16-way 0.1" boxed header PL21. These signals will normally be connected directly to a VGA compatible CRT monitor. A suitable cable is provided as part of the SBC-MediaGX development kit. The following table shows the connection details for this cable. The CRT signals may be affected by noise and therefore this cable should be keep as short as possible and should be routed away from other signals to stop any crosstalk.

PL21 Pin	Signal Name	15 way D-Type High Density
1	RED	1
2	Ground	6
3	GREEN	2
4	No Connection	4
5	BLUE	3
6	Ground	7
7	No Connection	9
8	No Connection	11
9	Ground	8
10	Ground	5
11	Ground	10
12	HSYNC	13
13	No Connection	12
14	VSYNC	14
15	No Connection	15
16	No Connection	-

The flat panel signals are routed to a 68 way Thomas & Betts SYSTEM311 high-density connector (PL28). These signals provide the flat panel data and control signals. The flat panel interface can be configured to drive various types of panel. Each interface redefines the function of the panel data lines.

The following table provides a cross reference between the flat panel output signals and their function when configured for different displays.

Pin Name	Mono SS	Mono DD	Mono DD	Colour TFT	Colour TFT	Colour TFT	Colour TFT-HR	Colour STN-SS	Colour STN-SS	Colour STN-DD	Colour STN-DD	Colour STN-DD
	8-Bit	8-Bit	16-Bit	9/12/16 Bit	18/24 Bit	36 Bit	18/24-Bit	8-Bit (4bp)	16-Bit (4bp)	8-Bit (4bp)	16-Bit (4bp)	24-Bit
P0	D0	UD3	UD7	B0	B0	FB0	FB0	R1	R1	UR1	UR0	UR0
P1	D1	UD2	UD6	B1	B1	FB1	FB1	B1	G1	UG1	UG0	UG0
P2	D2	UD1	UD5	B2	B2	FB2	FB2	G2	B1	UB1	UB0	UB0
P3	D3	UD0	UD4	B3	B3	FB3	FB3	R3	R2	UR2	UR1	LR0
P4	D4	LD3	UD3	B4	B4	FB4	SB0	B3	G2	LR1	LR0	LG0
P5	D5	LD2	UD2	G0	B5	FB5	SB1	G4	B2	LG1	LG0	LB0
P6	D6	LD1	UD1	G1	B6	SB0	SB2	R5	R3	LB1	LB0	UR1
P7	D7	LD0	UD0	G2	B7	SB1	SB3	B5	G3	LR2	LR1	UG1
P8			LD7	G3	G0	SB2	FG0		B3		UG1	UB1
P9			LD6	G4	G1	SB3	FG1		R4		UB1	LR1
P10			LD5	G5	G2	SB4	FG2		G4		UR2	LG1
P11			LD4	R0	G3	SB5	FG3		B4		UG2	LB1
P12			LD3	R1	G4	FG0	SG0		R5		LG1	UR2
P13			LD2	R2	G5	FG1	SG1		G5		LB1	UG2
P14			LD1	R3	G6	FG2	SG2		B5		LR2	UB2
P15			LD0	R4	G7	FG3	SG3		R6		LG2	LR2
P16					R0	FG4	FR0					LG2
P17					R1	FG5	FR1					LB2
P18					R2	SG0	FR2					UR2
P19					R3	SG1	FR3					UG3
P20					R4	SG2	SR0					UB3
P21					R5	SG3	SR1					LR3
P22					R6	SG4	SR2					LG3
P23					R7	SG5	SR3					LB3
P24						FR0						
P25						FR1						
P26						FR2						
P27						FR3						
P28						FR4						
P29						FR5						
P30						SR0						
P31						SR1						
P32						SR2						
P33						SR3						
P34						SR4						
P35						SR5						
SHF CLK	SHF CLK	SHF CLK	SHF CLK	SHF CLK	SHF CLK	SHF CLK	SHF CLK	SHF CLK	SHF CLK	SHF CLK	SHF CLK	SHF CLK
Pixels/ Clock	8	8	16	1	1	2	2	2-2/3	5-1/3	2-2/3	5/1/3	8

The display signals are +3.3V compatible and may be used to drive +5V panels, the input threshold level on the display should be verified to ensure it is compatible. If the display needs higher level signals then the panel data may be buffered off board by +3.3V to +5V translators.

The SBC-MediaGX contains power control circuitry for the flat panel and backlight controller supplies. The flat panel can be supplied with a switched +3.3V or 5V supply depending on the position of LK11, and the backlight controller can be supplied with either +5V or +12V depending on the position of LK10 (See the 'link' section for details).

The supply voltages are controlled by the 69000 during power up/down, to ensure that the panel is not damaged due to the input signals being incorrectly configured. The backlight can also be switched ON/OFF during normal operation to preserve the life of the tube.

The flat panel signals are configured by the VGA BIOS during the power up process. The default BIOS is designed to drive the 6.5" NEC TFT panel that is supplied as part of the flat panel development kit. If you are using a different type of panel then the BIOS will need to be modified to configure the device correctly. The support CD-ROM contains BIOS image files for flat panel displays that have been tested by Arcom Control Systems. These images can be programmed into the BIOS EPROM using the AWDFLASH utility (See the 'Software Support' section for details). The CD-ROM also contains connection information for each of these displays.

If the display you wish to use in your application is not listed on the CD-ROM, then contact Arcom Control Systems technical support at support@arcom.co.uk as the list of displays is continually updated.

The support CD-ROM contains drivers for Windows 3.11, Windows 95, Windows 98 and Windows NT 4.0. Other drivers may be available from the Intel internet site at [www.intel.com](http://www.intel.com). The drivers supplied can be used to support standard video orientation as well as portrait mode for some operating systems.

## Interrupt Assignments

The SBC-MediaGX233 contains two 8259 interrupt controllers, which are cascaded in the standard PC/AT compatible format. The table below shows the IRQ routing of the on-board devices.

IRQ	Usage
0	8254 Timer
1	Keyboard
2	Cascade
3	COM2/COM4
4	COM1/COM3
5	Audio Controller
6	Floppy Disk
7	Printer
8	Real Time Clock
9	Unassigned
10	Ethernet/COM4
11	69000 VGA/COM3
12	Mouse
13	Coprocessor
14	IDE
15	Universal Serial Bus (USB)

These IRQ signals are routed to the PC/104 interface as well as the onboard devices. PC/104 boards can only use these signals if they are unassigned or the onboard device is disabled. Some of the interrupt lines are connected to PCI devices on board these are the Ethernet controller, VGA controller and USB device. During the Plug and Play BIOS configuration these devices are configured to use an available IRQ line. The table shows the default IRQ routing for these devices. If the devices are disabled or an adapter card is plugged into the PC/104-Plus interface which requires an interrupt this routing may change.

Before using these interrupts check that the appropriate line is not already configured for another device. If you need to free up a particular interrupt it may be possible by setting the 'PNP/PCI Configuration' in the BIOS setup screen. If an interrupt line is selected to support 'Legacy ISA mode' it will not be used by the Plug and Play BIOS and will remain free for ISA bus use. This will normally only apply to IRQ lines that are greater than IRQ9 as the lower order interrupts are already assigned to ISA bus devices.

Care should be taken when configuring these interrupts as you may find that particular combinations do not provide a working solution. This may be due to two or more PCI devices being routed to the same IRQ line. Although this is allowable in the PCI specification, not all device drivers provide the ability to share the interrupts.

### DMA Controller

There are two 8237 DMA controllers on the SBC-MediaGX. These controllers are cascaded in a standard PC/AT style. DMA channels 0-3 are used to support 8-bit devices and DMA channels 4-7 support 16-bit devices. DMA channel 4 is used to provide cascading between the two controllers and therefore is unavailable for use. The table below shows the default assignment for the DMA channels on the SBC-MediaGX.

DMA	Usage
0	Unassigned
1	Audio Controller
2	Floppy Disk Interface
3	Parallel Port (ECP Mode)
4	Cascade
5	Audio Controller
6	Unassigned
7	Unassigned

The DMA signals are routed to the PC/104 interface as well as the onboard devices. They may only be used if they are unassigned or the onboard peripheral is disabled.

### IDE Interface

The SBC-MediaGX has a single Integrated Drive Electronics (IDE) controller that supports up to two hard disk drives. The disk drives are connected via a 1:1 40-way ribbon cable using PL22. One drive must be configured as a 'MASTER' and the other drive as a 'SLAVE'. An IDE compatible CD-ROM drive can also be used and should be configured as the 'SLAVE' device.

The BIOS will automatically detect which devices are connected via this interface and configure the controller correctly. The BIOS can be configured to make either the hard disk drive or CD-ROM the default boot device.

If a hard disk drive is attached to this interface the default configuration will cause the drive to be used as the standard boot device and the flash disk if present will become the next available drive.

The IDE controller is a 32-bit PCI device and supports Ultra DMA/33 mode of operation. The IDE controller also supports Bus Mastering mode and a suitable driver is supplied on the support CD-ROM. The 32-bit interface provides a much faster access speed than the original ISA style interface.

## Floppy Disk Controller

The floppy disk interface is designed to support up to two standard floppy disk drives. Connections are made via a 34-way 0.1" boxed header PL18 (See Appendix A for pin assignment details). All standard capacities including 360KB, 720KB, 1.2MB, 1.44MB and 2.88MB are supported. The BIOS must be configured appropriately for the desired format using the Setup program. The default BIOS configuration supports a single 1.44MB floppy disk drive configured as DRIVE A: and if this drive contains a bootable floppy when the board is powered up it will be used as the default boot device. If no drive is present the BIOS will continue to operate correctly.

The floppy disk drive cable should have three connectors, two which are connected directly 1:1 and one which has pins 10-16 twisted. If only one drive is required it should be connected via the twisted cable and the drive should be setup to use drive select 1. If two drives are required the second drive should also be configured for drive 1 but should be connected via the straight connector. This connection does not provide power and therefore a separate cable from the main supply should be used.

The floppy disk interface is decoded in I/O address space at 3F0-3F7H and uses IRQ6 and DMA channel 2.

## Real Time Clock (RTC)

The Real Time Clock (RTC) is fully compatible with the PC/AT standard clock device. The date and time functions are stored in the real time clock when the main power is removed if the battery backup supply is enabled (See LK3 description). As well as providing time and date information the Real Time Clock is used to store the BIOS settings. The RTC is decoded in I/O address space at 70-71H and is connected to IRQ8. The RTC registers are accessed via an indexed addressing mechanism. I/O location 70 is used to select the appropriate register and 71H is used to access the data.

The maximum rated current for the RTC is 2uA and the battery backup supply is provided by a Lithium coin cell with a capacity of 180mA. This battery will provide sufficient support for at least 10 years. The battery is disabled during shipment to prolong the useful life. If the board is going to be placed out of service for long periods of time then the battery should also be disabled. If the main supply is present on the board the battery automatically gets disconnected from the RTC circuitry.

The accuracy of the RTC is based on the operation of the 32.768KHz watch crystal. This will provide an accuracy of  $\pm 1$  minute per month if the board is in an ambient environment of +25°C. When the board is operated outside this temperature then the accuracy may be degraded.

## Keyboard/Mouse Controller

An 8042 compatible keyboard controller provides support for a standard PC/AT keyboard and mouse. Both interfaces use a 6-pin mini-DIN style connector, the keyboard is connected via PL7 and mouse via PL9. The keyboard controller is decoded at I/O address location 60-64H and uses IRQ1 for keyboard and IRQ12 for mouse support. Power for the keyboard and mouse is sourced from the +5V supply and a reset fuse protects the board if either interface is short circuited.



The development kit is supplied with a PS/2 to AT adapter cable that can be used to convert between the mini-DIN connector and the standard AT style connector. The development kit also contains a PS/2 mouse that will plug directly into PL9.

The Award BIOS will automatically detect the presence of the keyboard and mouse and provide support. If these devices are not plugged in the BIOS will continue to operate correctly.

## Ethernet Controller

A RealTek RTL8139A Ethernet controller provides 10/100-BASET interface. This is a 32-bit PCI device that is configured by the Plug and Play BIOS during power ON. The device provides compliance with IEEE802.3u 100BASE-T specification and IEEE 802.3x Full Duplex Flow Control.. A 93C46 EEPROM is used to store configuration data and ID information.

An 8-way RJ45 connector is used to provide signals (See Appendix A for pin assignment details).

A second connector PL6 also provides users with status signals that are designed to drive LED's. The status lines provide TX, RX and LINK status. The output lines sink current when switched ON therefore the anode of each device should be connector to PL6 pin 1 and the cathode to the appropriate status line.

The support CD-ROM contains drivers for most operating systems and network software. These are stored in the ETHERNET directory.

## 16-Bit SoundBlaster

The Audio support provided on the SBC-MediaGX is fully compatible with the 16-bit SoundBlaster interface. This device provides support for stereo Line IN and Line OUT and mono Microphone input. The SoundBlaster is supported via the Cyrix 'XpressAUDIO™' software which is built into the BIOS code.

A National Semiconductor LM4548 AC97 Audio CODEC is used to provide the output and mix signals from the input sources. The CODEC can be used to set the output level of each source and provide a composite signal. There is no amplifier onboard and the output must be connected to either active speakers or an amplifier module.

Connection is made via a 10-way 0.1" header PL27 (See Appendix A for pin assignments).

The Audio device is connected to the PCI bus and to ensure backward compatibility it must be setup to respond to standard audio I/O address mapping and IRQ, DMA signals. The BIOS can be configured to set the appropriate locations. The following settings are configured in the BIOS as default. These can be modified during POST by entering setup and selecting the 'Integrated Peripherals' screen.

Audio I/O Base Address	220H
MPU-401 I/O Base Address	330H
Audio IRQ Select	IRQ5
Audio Low DMA Select	DMA 1
Audio High DMA Select	DMA 5

Drivers are supplied on the support CD-ROM for Windows 95, Windows 98 and Windows NT 4.0.

## Watchdog Timer

The SBC-MediaGX contains a watchdog timer, which can be used to protect against erroneous software. There are two timeout periods available either 2 or 8 seconds depending on the position of LK8. The watchdog timer is disabled by a RESET and can be started by performing an I/O write to location 93H (Any value will cause the timer to start). If another I/O write to this location is not performed within the timeout period the board will be RESET. Writes must be continually performed to enable the board to function correctly, there is no software disable mechanism once the timer is started.

The watchdog timer can be disabled permanently by removing user link LK7. This feature may be useful during debug/development.

## User Links

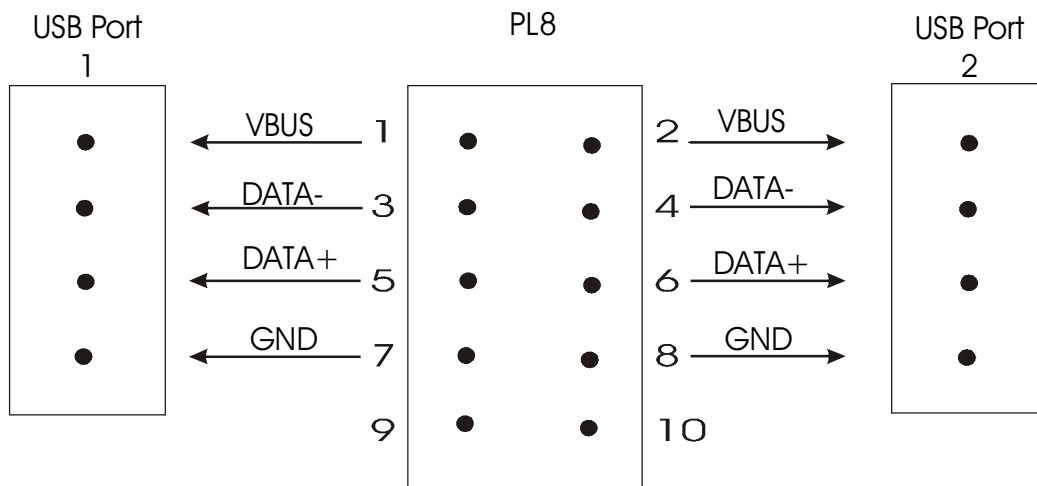
There are two user links on the SBC-MediaGX LK12 and LK13. The status of these user links can be read via I/O address 259H bits 1 and 2. If the link is made then the corresponding bit will be read as a logic '0' (See the link section for further details). These links do not have any defined function on the board, therefore can be used to select options in the application program.

## USB Interface

There are two Universal Serial Bus (USB) interfaces on the SBC-MediaGX. These interfaces have been designed to support the Open Host Controller Interface (OpenHCI).

There are four signal lines associated with each USB channel, VBUS, DATA+, DATA- and GND.

A USB power control switch is used to control the power and protect against short circuit conditions. This can be enabled/disabled by the processor and the USB function needs to be enabled in the BIOS to ensure that power is supplied to each device. The USB feature is controlled via the setup program and is displayed in the 'Chipset Features' screen.



If the USB voltage is short circuited or more than 500mA is drawn from either supply the switch will turn OFF the power supply and automatically protect the device and board. The VBUS signal is derived from the +5V supply via the SBC-MediaGX.

Windows 98 automatically supports the USB features and Windows 95 can be used if the appropriate service pack is installed. Drivers will be supplied for the various operating systems with each USB device.

The USB support in Windows 95 is first-generation and the drivers suffer from various limitations. Microsoft recommends only using Windows 98 and Windows 2000 if USB support is required. Most USB peripherals are only supplied with drivers for these operating systems.

If you are looking for details on the USB bus, or would like to determine whether particular peripherals are available then look at the following internet site [www.usb.org](http://www.usb.org).

## Touchscreen Controller

The four wire analogue resistive touchscreen interface can be used in place of the standard COM3 RS232 interface. A user link LK1 is used to select between the RS232 interface (Position 'A') or the touchscreen interface (Position 'B'), see link section for further details. A second user link LK2 can also be used to select which IRQ line is used to indicate that a touch has occurred.

The touchscreen controller contains an 8-bit analogue to digital converter and transmits a serialised bit stream corresponding to the A/D outputs. Each time the touch panel position is reported, the X co-ordinate value is transmitted as an unsigned 8-bit value followed by the Y co-ordinate value, which is also an unsigned 8 bit value. The Y co-ordinate value is then sent again to distinguish between X and Y values.

The serial data is transmitted in the following format:-

Baud:	4800
Parity:	None
Bits:	8
Stop bit:	1

The support CD contains some example source code that can be used as a basis for driver/application development for Windows 95/98/NT other operating systems.

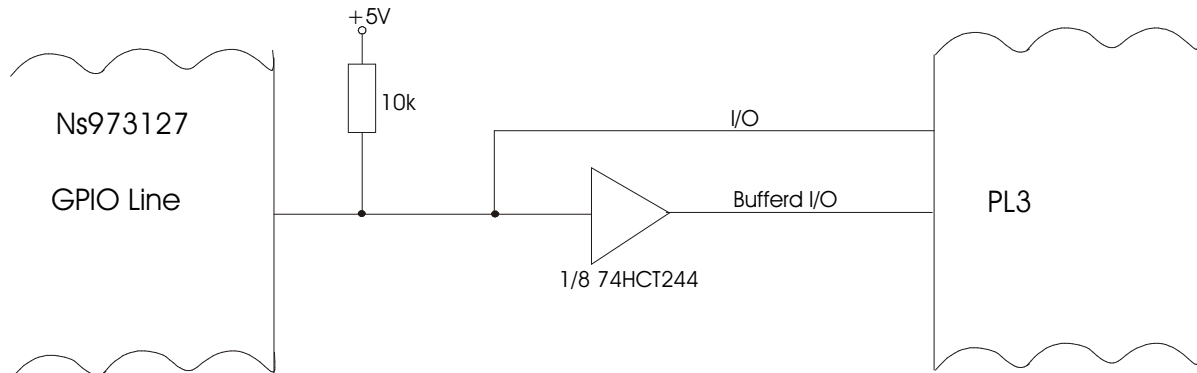
## General Purpose I/O

Eight general purpose I/O lines are provided on the SBC-MediaGX. These lines are routed to a 20 way 0.1" header PL13. The header provides unbuffered and buffered versions of the lines. The buffered version can be used to drive higher output current up to 24mA per output than the unbuffered version.

The I/O lines are connected to GPIO line from the NS97317 Super I/O controller. The table below shows the relationship between the GPIO lines on the super I/O device and the I/O lines on PL13.

NS97317 GPIO Line	PL13 GPIO Line
GPIO20	I/O0
GPIO21	I/O1
GPIO23	I/O2
GPIO24	I/O3
GPIO16	I/O4
GPIO37	I/O5
GPIO12	I/O6
GPIO17	I/O7

The following diagram shows the configuration of each I/O line



The NS97317 GPIO lines must be configured using the registers built into the device to ensure they function correctly. Various features can be programmed for each pin including direction control and pull up/down resistors. As the GPIO lines also share pins with dedicated functions these must be disabled if the line is to be used.

The support CD-ROM contains some example 'C' source code that can be used to configure the signals.

## CPU Temperature Sensor

An LM75 temperature monitor IC is located under the CPU socket on the SBC-MediaGX. This device can be used to monitor the ambient temperature and provide feedback if the temperature rises above a predefined level. The LM75 has an I<sup>2</sup>C bus interface and is connected to three I/O lines from the Super I/O controller. The following table shows the connection details:-

NS97317 Line	LM75 Signal Name
GPIO10	SDA
GPIO11	SCL
P12	OS

Data sheet's for the LM75 and NS97317 are supplied on the support CD-ROM. There is also an example program that shows how to configure the device and check the output level. The output from the LM75 will normally be high, but will go to logic '0' when the threshold level is reached. The output will stay at logic '0' until the temperature has fallen below the hysteresis level. This output can be used to slow down the CPU and provide user warning if the ambient temperature becomes excessive.

## PC/104-Plus Interface

The PC/104-Plus interface supports 8/16 bit ISA style PC/104 signals and 32-bit PCI style PC/104-Plus signals. Add on boards can be used to enhance the functionality of the main board. The PC/104 standard has been adopted by a wide range of companies and boards are available which support various types of interface. This bus can be used to add digital I/O, analogue I/O, serial ports, video capture devices, PC CARD interfaces etc.

Any board plugged into this interface will be accessed as if it were part of the main board, therefore it may conflict with I/O and memory devices onboard if it has not been correctly configured. Before using an expansion board you should check that it can be configured to work along side the peripherals already incorporated onboard.

The PC/104 bus signals are fully compatible with the ISA bus electrical timing definitions. Some IRQ and DMA signal lines may be associated with onboard devices and are therefore are not free to be used by add on boards.

The PC/104-Plus signals are PCI 2.1 compliant and can be used to interface to 32-bit 33MHz compatible PC/104-Plus modules. The PC/104-Plus bus supports a maximum of four add on cards and provides individual clock and some dedicated control signals for each card. Refer to the PC/104-Plus specification supplied on the support CD-ROM for further details.

## Serial Ports

There are four high speed 16550 serial UART's on the SBC-MediaGX. All four channels are fully software compatible with the 16550 and can be used as standard RS232 serial interfaces. The table below shows the configuration for each channel.

Port	I/O Address	IRQ	Connector	
			RS232	RS422/485
COM1	3F8-3FFH	IRQ4	PL20	N/A
COM2	2F8-2FFH	IRQ3	PL19	N/A
COM3	3E8-3EFH	IRQ4 (or IRQ11)	PL2	N/A
COM4	2E8-2EFH	IRQ3 (or IRQ10)	PL3	PL4

The RS232 signals are routed to 10 way 0.1" boxed header which are designed to provide direct connection to 9 way D-type plugs. The serial ports provide support for various baud rates up to a maximum of 115Kbaud. The Award BIOS will detect the serial ports during the POST process and configure the baud rate, data, stop bits etc.

The table above provides details of the IRQ signal associated with each channel. If the standard IRQ3 and IRQ4 assignments are used then only one of the channels can be configured to use each interrupt. If your system requires more than two interrupts then the other ports can be configured to use IRQ10 and IRQ11. These interrupts may be assigned to PCI devices during the Plug and Play BIOS initialisation. Therefore you should select 'Legacy ISA' for these interrupts in the 'PNP/PCI Configuration' setup screen.

**Note:-** COM3 can be used to support either the standard RS232 interface or if the Touchscreen interface is required then this is accessed via this port (Refer to the 'Touchscreen' section for details).

## RS422/485 Interfaces

The COM4 serial interface can be used to support RS232/RS422 and RS485 interfaces. The default configuration has been selected to enable RS232 operation.

### RS422

The RS422 interface provides full duplex communication. The signals available are TXA, TXB, RXA, RXB and Ground. The maximum cable length for an RS422 system is 4000ft and it supports 1 driver and up to 10 receivers. To enable RS422 operation LK5 should be

removed and the RTS line from COM4 should be at logic '0'. LK4 and LK6 should be made if the board is at the end of the network.

### **RS485**

This is a half-duplex interface that provides combined TX and RX signals. PL4 pin 5 provides TXB/RXB and pin 6 provides TXA/RXA. A ground connection is also required for this interface. The maximum cable length for this interface is the same as RS422(4000ft), but RS485 supports up to 32 transmitters and receivers on a single network. Only one transmitter should be switched on at a time. The SBC-MediaGX uses the RTS signal to control transmission, when this signal is at logic '1' the driver is switched OFF and data can be received from other devices. When the RTS line is at logic '0' the driver is ON. Any data which is transmitted from the SBC-MediaGX will be automatically echoed back to the receiver. This enables the serial communications software to detect that all data has been sent and disable the driver when required. LK5 should be made to the enable RS485 interface. LK4 and Lk6 should be made if the SBC-MediaGX is at the end of the network.

## **Parallel Port**

The parallel port is fully IEEE1284 compatible and provides Standard Parallel Port (SPP), Enhanced Parallel Port (EPP) and Extended Capabilities Ports (ECP) support. The parallel port is decoded at I/O address location 378-37FH (LTP1) and uses IRQ7. In ECP mode the BIOS can be used to select a appropriate DMA channel, the default channel is DMA 3.

The parallel port has built in protection circuitry to protect against powered devices being connected when the main supply is removed and damaging the device. Each data and control signal is designed to source/sink 14mA maximum.

The parallel port connector PL17 is a 26 way 0.1" boxed header. The pin assignment of this connector has been designed to provide 1:1 connection to an IDC 25-way D-Type socket (See Appendix A for details). The socket will be compatible with a standard PC parallel port connector.

The parallel port can be used to connect an external printer, tape drive, disk drive, scanner etc.

## **Power Supply**

The SBC-MediaGX is designed to operate from a single +5V +/- 5% (4.75V to +5.25V) supply.

The power connector PL12 has two +5V connection and three ground connections. These connections are communed on board. PL12 also has a +12V connection defined. This supply is not required for the SBC-MediaGX under normal operation, but may be used to supply +12V to the FAN connector, PC/104 stack and BIOS EPROM if required.

Two other supply voltages are present on the board these are +2.9V and +3.3V. These supplies are required for the CPU core and on board devices. The +3.3V supply is routed to the PC/104-Plus header to enable it to be used by additional cards, and can be used to power +3.3V flat panels via PL28.

The +5V supply is monitored automatically onboard and if this supply falls below 4.63V the board will be placed in RESET. When the power supply rises above this threshold voltage the board will start to operate again. This power supply monitor will ensure that the board does not hang if the supply voltage fails at any point.

The BIOS has built in power management which can be enabled by the Setup program during the POST process. Various aspects of the board can be controlled by the power management software. The board can be placed in a power down state and woken using external input from the mouse, keyboard, serial ports, real time clock etc. The power management software is designed to monitor activity and will start to slow down the CPU and switch OFF functions if

long periods of inactivity are detected.

The SBC-MediaGX has a dedicated I/O register that can be used to power down the RS232 serial buffers if they are not required. Each buffer has an individual control line therefore they can be switched ON and OFF in any combination. The default configuration for these buffers at power ON is to be enabled. This ensures that the board operates correctly when first powered. Once running the buffers can be disabled during periods of inactivity. The register is located at I/O address 260H and the bit definitions are shown in the table below:-

#### **I/O 260H Write**

Bit	Description	Operation
0	Shutdown COM1	0 = Enabled (Default) 1 = Disabled
1	Shutdown COM2	
2	Shutdown COM3	
3	Shutdown COM4	
4	No Function	
5	No Function	
6	No Function	
7	No Function	

## Status LED's

There are three status LED's on-board the following table describes their functions:-

LED	Colour	Name	Description
1	Red	Flash Access	Each time the flash array is accessed this LED will illuminate.
2	Green	Power	ON during normal operation.
3	Yellow	Suspend	ON during Suspend Mode, Power LED will extinguish.

## PC Speaker

An 8 ohm speaker may be connected to PL16. The speaker can be used to notify the user of an error condition during POST or normal operation. The speaker output is controller by counter 2 output of the 8254 counter/timer (Refer to PC software programming guides for more information).

The speaker output is also fed to the Audio CODEC and will be mixed with the standard audio output.

## Suspend/Resume Switch

If the power management features are enabled the processor will be switched into a suspend state after a defined period of inactivity. A momentary switch connected between pin 1 and 2 of PL15 will cause the board to return from this suspend state when pressed. Pressing this switch during normal operation will immediately cause the system to enter the suspend state.

During suspend all CPU operations will be halted and the board will be placed in a low power state. Once the board comes out of this state execution will continue from the point where it entered the suspend state.

## RESET Switch

A momentary switch may be connected between pin 1 and 2 of PL14. If the switch is pressed it will cause the board to be reset. All onboard devices will be reinitialised and the BIOS will start executing from the top of memory. This may be useful during development to restart the board after a software crash.

## CPU Fan Control

The CPU fan connector PL5 can be used to supply power to a +5V or +12V Fan. The centre pin of this connector is used to source power. The other two pins are connected to ground when the FAN is switched ON. The BIOS will switch the FAN OFF if the board enters the suspend mode. Selection between +5V and +12V is performed at assembly time. The default setting supports a +12V fan.

The SBC-MediaGX uses a passive heatsink as standard and therefore this connector is not normally used. If the board is going to be used in a particular environment where the ambient temperature may exceed the current limits a fan may be required. Please contact Arcom Control Systems technical support for further information.

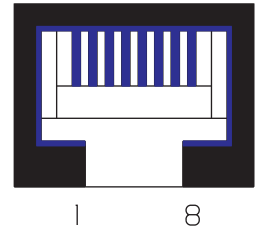


# Appendix A - Connector details

## PL1 - Ethernet RJ45

8 way RJ45

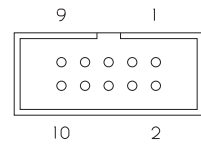
Pin	Signal Name
1	TX+
2	TX-
3	RX+
4	No Connect
5	No Connect
6	RX-
7	No Connect
8	No Connect



## PL2 - COM3 RS232 Serial Port

10 pin 0.1" boxed pin header.

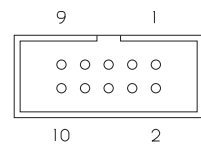
Pin	Signal Name	Pin	Signal Name
1	DCD	2	DSR
3	RXD	4	RTS
5	TXD	6	CTS
7	DTR	8	RI
9	GND	10	No Connect



## PL3 - COM4 RS232 Serial Port

10 pin 0.1" boxed pin header.

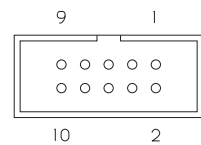
Pin	Signal Name	Pin	Signal Name
1	DCD	2	DSR
3	RXD	4	RTS
5	TXD	6	CTS
7	DTR	8	RI
9	GND	10	No Connect



## PL4 - COM4 RS485/422 Serial Port

10 pin 0.1" boxed pin header

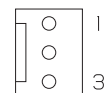
Pin	Signal Name	Pin	Signal Name
1	No Connect	2	No Connect
3	Ground	4	Ground
5	TXB/(RXB 485)	6	TXA/(RXA 485)
7	RXB	8	RXA
9	Ground	10	No Connect



## PL5 - CPU Fan

3 way 0.1" pin header

Pin	Signal Name
1	Ground
2	+12V
3	Ground

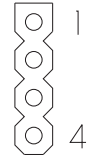


**Note:-** Pin 2 may be configured to provide +5V in place of +12V. This is an assembly option and cannot be configured by the user.

**PL6 - Ethernet Status LED's**

4 way 0.1" pin header

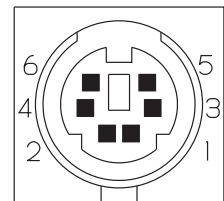
Pin	Signal Name
1	+5V
2	RX LED
3	Link LED
4	TX LED



**PL7- PS/2 Keyboard**

6-pin Mini-DIN

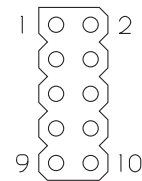
Pin	Signal Name
1	KB DATA
2	No Connect
3	Ground
4	+5V
5	KB CLOCK
6	No Connect



**PL8 - USB Ports**

10 way 0.1" pin header

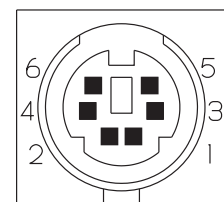
Pin	Signal Name	Pin	Signal Name
1	VBUS-1	2	VBUS-2
3	DNEG-1	4	DNEG-2
5	DPOS-1	6	DPOS-2
7	Ground	8	Ground
9	Ground	10	Ground



**PL9- PS/2 Mouse**

6-pin Mini-DIN

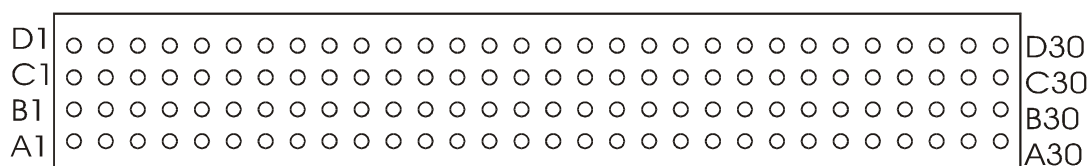
Pin	Signal Name
1	MS DATA
2	No Connect
3	Ground
4	+5V
5	MS CLOCK
6	No Connect



### PL10 - PC/104-Plus Connector

120-pin 2mm Non-Stackthrough PC/104-Plus compatible connector.

Pin	Row A	Row B	Row C	Row D
1	Ground/Key	Reserved	+5V	AD00
2	VI/O	AD02	AD01	+5V
3	AD05	Ground	AD04	AD03
4	/CBE0	AD07	Ground	AD06
5	Ground	AD09	AD08	Ground
6	AD11	VI/O	AD10	M66EN
7	AD14	AD13	Ground	AD12
8	+3.3V	/CBE1	AD15	+3.3V
9	/SERR	Ground	/SB0	PAR
10	Ground	/PERR	+3.3V	SDONE
11	/STOP	+3.3V	/LOCK	Ground
12	+3.3V	/TRDY	Ground	/DEVSEL
13	/FRAME	Ground	/IRDY	+3.3V
14	Ground	AD16	+3.3V	/CBE2
15	AD18	+3.3V	AD17	Ground
16	AD21	AD20	Ground	AD19
17	+3.3V	AD23	AD22	+3.3V
18	IDSEL0(AD20)	Ground	IDSEL1(AD21)	IDSEL2(AD22)
19	AD24	/CBE3	VI/O	IDSEL3(AD23)
20	Ground	AD26	AD25	Ground
21	AD29	+5V	AD28	AD27
22	+5V	AD30	Ground	AD31
23	/REQ0	Ground	/REQ1	VI/O
24	Ground	/REQ2	+5V	/GNT0
25	/GNT1	VI/O	/GNT2	Ground
26	+5V	CLK0	Ground	CLK1
27	CLK2	+5V	CLK3	Ground
28	Ground	/INTD	+5V	/RST
29	+12V	/INTA	INTB	/INTC
30	-12V	Reserved	Reserved	Ground/Key

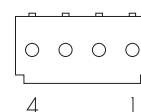


**Note:-** -12V connection is a no connect.

### PL11 - Touchscreen

4 way Dubox header

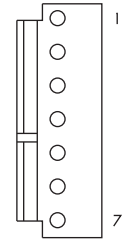
Pin	Signal Name
1	X+
2	X-
3	Y+
4	Y-



**PL12 - Power Connector**

7-pin locking power connector, Molex part number 26-60-4070.

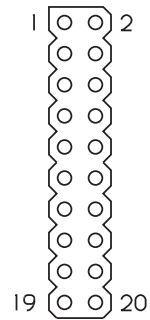
Pin	Signal Name
1	+5V
2	Ground
3	Ground
4	+12V
5	+3.3V (Not Used)
6	Ground
7	+5V



**PL13 - General Purpose I/O lines**

20 way 0.1" pin header

Pin	Signal Name	Pin	Signal Name
1	+5V	2	+5V
3	GPIO0	4	GPIO1
5	GPIO2	6	GPIO3
7	GPIO4	8	GPIO5
9	GPIO6	10	GPIO7
11	Ground	12	Ground
13	Buffered GPIO0	14	Buffered GPIO1
15	Buffered GPIO2	16	Buffered GPIO3
17	Buffered GPIO4	18	Buffered GPIO5
19	Buffered GPIO6	20	Buffered GPIO7



**PL14 - RESET Connector**

2 way Dubox header

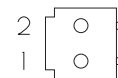
Pin	Signal Name
1	Reset Input
2	Ground



**PL15 - Suspend/Resume**

2 way Dubox header

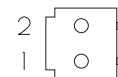
Pin	Signal Name
1	Suspend Signal
2	Ground



**PL16 - Speaker**

2 way Dubox header

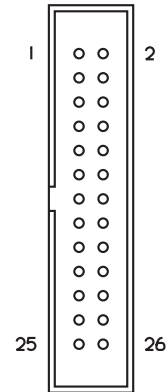
Pin	Signal Name
1	Positive
2	Negative



**PL17 - Printer Port (LTP1)**

26 way 0.1" boxed pin header

Pin	Signal Name	Pin	Signal Name
1	/STROBE	2	/AUTO
3	D0	4	/ERROR
5	D1	6	/INIT
7	D2	8	/SELECT
9	D3	10	Ground
11	D4	12	Ground
13	D5	14	Ground
15	D6	16	Ground
17	D7	18	Ground
19	/ACK	20	Ground
21	BUSY	22	Ground
23	PAPER END	24	Ground
25	SELECT	26	No Connect

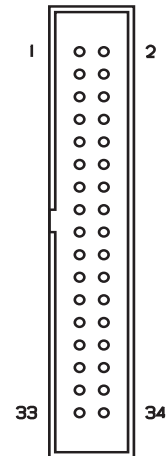


**Note:-** This pin-out is designed to provide a 1:1 connection to a 25 way IDC D-Type socket.

**PL18 - Floppy Disk Interface**

34 way 0.1" boxed pin header

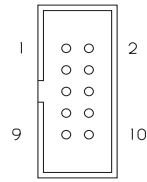
Pin	Signal Name	Pin	Signal Name
1	Ground	2	DENSEL
3	Ground	4	No connect
5	No connect	6	DRATE
7	Ground	8	/INDEX
9	Ground	10	/MTR0
11	Ground	12	/DRV1
13	Ground	14	/DRV0
15	Ground	16	/MTR1
17	Ground	18	DIR
19	Ground	20	/STEP
21	Ground	22	/WDATA
23	Ground	24	/WGATE
25	Ground	26	/TRK0
27	Ground	28	/WP
29	Ground	30	/RDATA
31	Ground	32	HDSEL
33	Ground	34	DSKCHG



**PL19 - COM2 RS232 Serial Port**

10 pin 0.1" boxed pin header.

Pin	Signal Name	Pin	Signal Name
1	DCD	2	DSR
3	RXD	4	RTS
5	TXD	6	CTS
7	DTR	8	RI
9	GND	10	No Connect

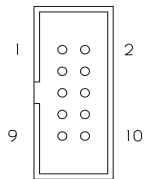


**Note:-** This pin-out is designed to provide a 1:1 connection to a 9 way IDC D-Type plug.

**PL20 - COM1 RS232 Serial Port**

10 pin 0.1" boxed pin header.

Pin	Signal Name	Pin	Signal Name
1	DCD	2	DSR
3	RXD	4	RTS
5	TXD	6	CTS
7	DTR	8	RI
9	GND	10	No Connect

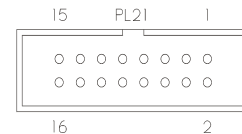


**Note:-** This pin-out is designed to provide a 1:1 connection to a 9 way IDC D-Type plug.

**PL21 -VGA CRT connector**

16 way 0.1" boxed pin header

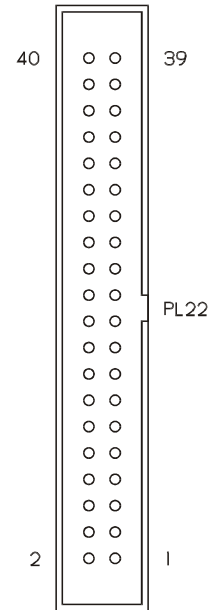
Pin	Signal Name	Pin	Signal Name
1	RED	2	Ground
3	GREEN	4	No Connect
5	BLUE	6	Ground
7	No Connect	8	No Connect
9	Ground	10	Ground
11	Ground	12	HSYNC
13	No Connect	14	VSYNC
15	No Connect	16	No Connect



**PL22 - IDE Disk Interface**

40 way 0.1" boxed pin header

Pin	Signal Name	Pin	Signal Name
1	/RESET	2	Ground
3	D7	4	D8
5	D6	6	D9
7	D5	8	D10
9	D4	10	D11
11	D3	12	D12
13	D2	14	D13
15	D1	16	D14
17	D0	18	D15
19	Ground	20	No Connect
21	DREQ	22	Ground
23	/IOW	24	Ground
25	/IOR	26	Ground
27	/IOCHRDY	28	Ground
29	DACK	30	Ground
31	INTR	32	/IOCS16
33	SA1	34	No Connect
35	SA0	36	SA2
37	/CS0	38	/CS1
39	LED	40	Ground



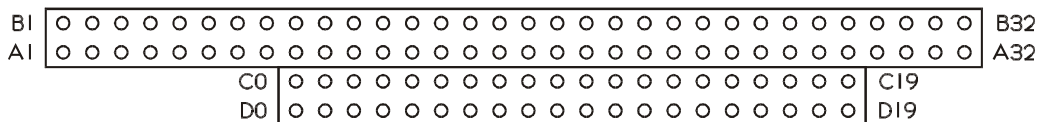
**PL23 & PL26 - PC/104 Connector**

Row A & B - 64 way 0.1" Non-Stackthrough PC/104 compatible connector

Row C & D - 40 way 0.1" Non-Stackthrough PC/104 compatible connector

Pin	Row A	Row B	Row C	Row D
0	-	-	Ground	Ground
1	/IOCHCK	Ground	/SBHE	/MEMCS16
2	D7	RSTD RV	LA23	/IOCS16
3	D6	+5V	LA22	IRQ10
4	D5	IRQ9	LA21	IRQ11
5	D4	-5V	LA20	IRQ12
6	D3	DRQ2	LA19	IRQ15
7	D2	-12V	LA18	IRQ14
8	D1	/ENDXFR	LA17	/DACK0
9	D0	+12V	/MEMR	DRQ0
10	IOCHRDY	KEY	/MEMW	/DACK5
11	AEN	/SMEMW	D8	DRQ5
12	A19	/SMEMR	D9	/DACK6
13	A18	/IOW	D10	DRQ6
14	A17	/IOR	D11	/DACK7
15	A16	/DACK3	D12	DRQ7
16	A15	DRQ3	D13	+5V
17	A14	DACK1	D14	MASTER
18	A13	DRQ1	D15	Ground
19	A12	/REFRESH	KEY	Ground
20	A11	SYSCLK	-	-
21	A10	IRQ7	-	-
22	A9	IRQ6	-	-
23	A8	IRQ5	-	-
24	A7	IRQ4	-	-
25	A6	IRQ3	-	-
26	A5	/DACK2	-	-
27	A4	TC	-	-
28	A3	BALE	-	-
29	A2	+5V	-	-
30	A1	OSC	-	-
31	A0	Ground	-	-
32	Ground	Ground	-	-

**Note:-** -5V and -12V connections are no connects.

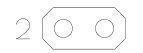




**PL24 - Flash Access LED**

2 way 0.1" pin header.

Pin	Signal Name
1	Anode
2	Cathode



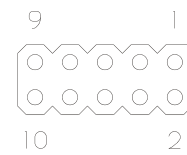
**PL25 - In-System-Programming header**

This connector is used at assembly time only.

**PL27 - 16-bit SoundBlaster**

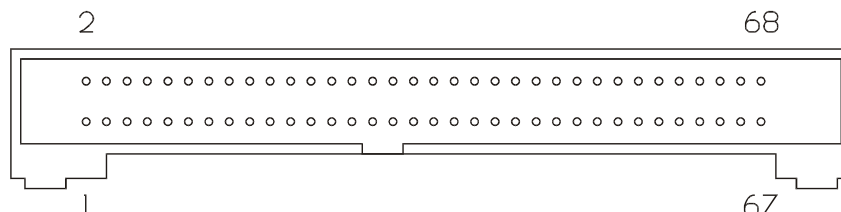
10 way 0.1" pin header

Pin	Signal Name	Pin	Signal Name
1	Ground	2	MIC IN
3	Ground	4	LEFT IN
5	Ground	6	RIGHT IN
7	Ground	8	LEFT OUT
9	Ground	10	RIGHT OUT



**PL28 - Flat Panel Interface Connector**  
 68 way Thomas & Betts SYSTEM 311 header

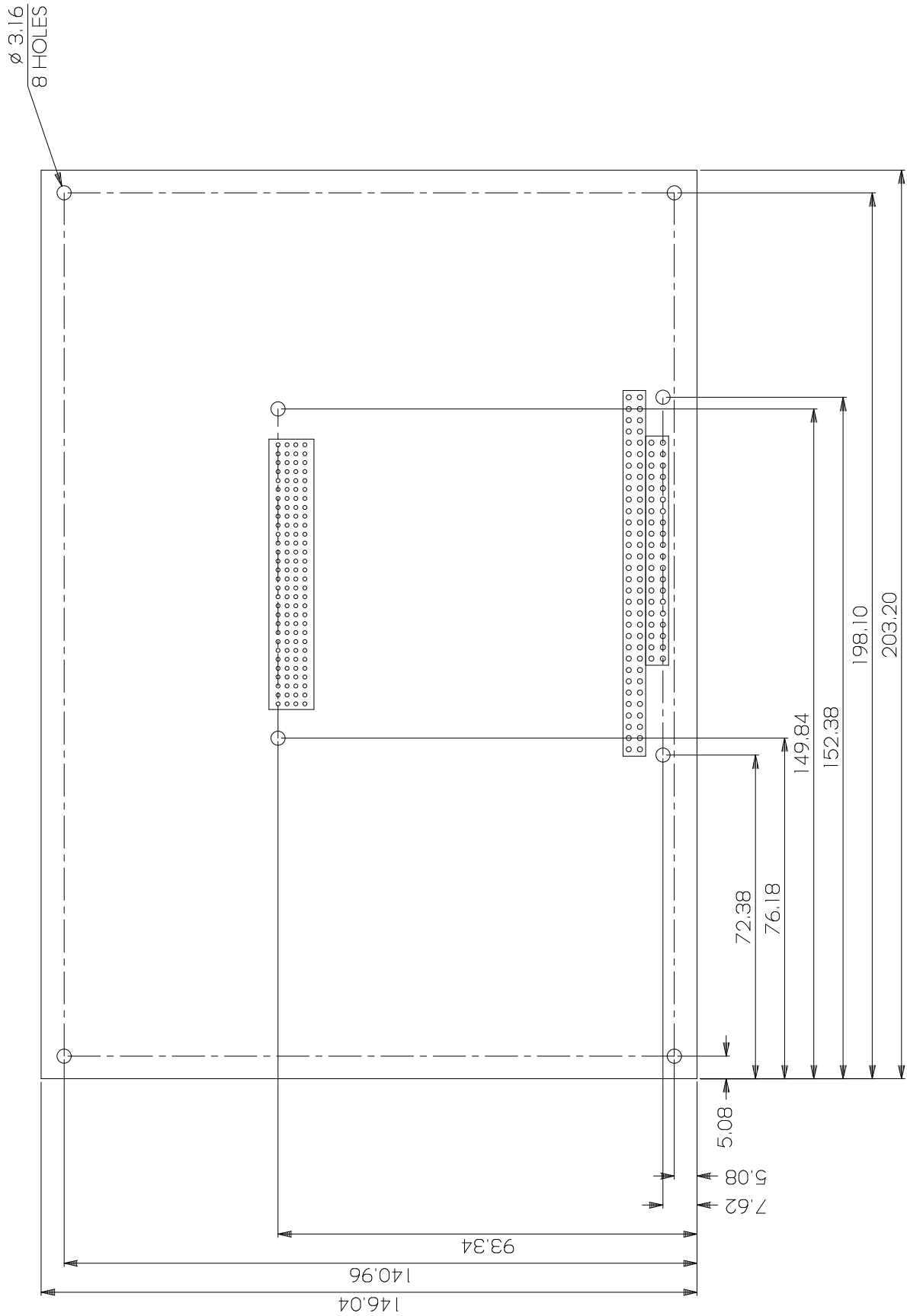
Pin	Signal Name	Pin	Signal Name
1	Ground	2	P0
3	P1	4	P2
5	Ground	6	P3
7	P4	8	P5
9	Ground	10	P6
11	P7	12	P8
13	Ground	14	P9
15	P10	16	P11
17	Ground	18	P12
19	P13	20	P14
21	Ground	22	P15
23	P16	24	P17
25	Ground	26	P18
27	P19	28	P20
29	Ground	30	P21
31	P22	32	P23
33	Ground	34	P24
35	P25	36	P26
37	Ground	38	P27
39	P28	40	P29
41	Ground	42	P30
43	P31	44	P32
45	Ground	46	P33
47	P34	48	P35
49	Ground	50	SHFCLK
51	Ground	52	LP
53	Ground	54	M
55	Ground	56	FLM
57	Ground	58	ENAVDD
59	Ground	60	Ground
61	VDDSAFE	62	BLKSAFE
63	Ground	64	Ground
65	ENABLK	66	ENAVEE
67	Ground	68	Ground



## Appendix B - Specification

<b>CPU</b>	National/Cyrix MediaGX MMX-enhanced processor	
<b>Memory</b>	16MB, 32MB, 64MB, 128MB 3.3V unbuffered SDRAM DIMM Module. 4M, 8M, 16M Intel Strata Flash 256K Flash BIOS EPROM	
<b>VGA Video</b>	Intel/Chips and Technologies 69000 HiQVideo 2M SDRAM Video Memory	
<b>Resolution</b>	640 x 480	8/16/24 bpp
	800 x 600	8/16/24 bpp
	1024 x 768	8/16 bpp
	1280 x 1024	8 bpp
<b>Peripherals</b>	Serial	COM1,COM2,COM3 RS232 COM4 RS232/422/485
	Parallel	SPP/EPP/ECP
	Keyboard	PS/2 Style
	Mouse	PS/2 Style
	Floppy	2 drives supported
	IDE	2 drives supported
	Audio	16-bit SoundBlaster compatible
	Touchscreen	4-wire analogue resistive
	USB	Dual channel support
<b>Expansion</b>	PC/104-Plus Interface	
<b>Temperature</b>	Operating	-20° to +60°C
	Storage	-40° to +85°C
<b>Humidity</b>	10% to 90% RH (Non-condensing)	
<b>Real Time Clock</b>	Accuracy +/- 1min/month	
<b>Software</b>	Datalight ROM-DOS operating system. Datalight FlashFX flash filing system	
<b>Power Requirements</b>	+5V +/- 5%	1.9A (typical), 3A (max)
<b>Battery</b>	3.0V Lithium	180mAH (CR2032 Coin Cell) Maximum discharge current 2uA
<b>Dimensions</b>	EBX Compatible Format 5.75" x 8.00" 146mm x 203mm	
<b>Weight</b>	400g	
<b>MTBF</b>	Based on MIL-SPEC-217F using generic failure rates.	

# Appendix C - SBC-MediaGX Mechanical Diagram



## Appendix D - SBC-MediaGX FPIF

The SBC-MediaGX development kit contains a small interface board for the flat panel signals. The flat panel connector on the SBC-MediaGX is a 68 way high density IDC style connector. When attaching flat panels during development it is difficult to connect to the ribbon cable. Therefore the Flat Panel Interface Board (FPIF) was developed to route the signals to more conventional style connectors.

The FPIF board has four connectors:-

PL1 is a 68 way SYSTEM311 IDC style connector which is pin-pin compatible with the flat panel connector on the SBC-MediaGX and is designed to be connected via a 1:1 ribbon cable.

PL2 is a 60 way 0.1' boxed header. This connector contains the panel data and control signals for the flat panel display. A suitable 'Crimp and Poke' style connector can be obtained from various sources for this connector and this allows easy connection to different styles of flat panel display. A suitable cable is supplied in the kit which interfaces to the NEC 6.5" flat panel.

PL3 is a 6 way Dubox style connector that is designed to interface to the backlight inverter.

PL4 is a 2 way Dubox header that can be used to add a CONTRAST potentiometer for the backlight brightness.

The following tables show the pin assignment for each connector.

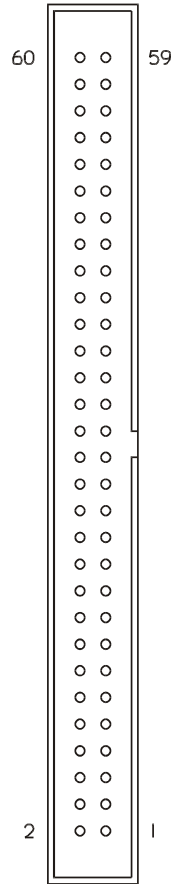
### **PL1 - SBC-MediaGX Interface Connector**

68 way SYSTEM311 header

See connection details for PL28 on SBC-MediaGX in Appendix A.

**PL2 - Flat Panel Interface Connector**  
**60 way 0.1" boxed header**

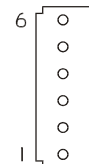
Pin	Signal Name	Pin	Signal Name
1	Ground	2	P0
3	P1	4	P2
5	Ground	6	P3
7	P4	8	P5
9	Ground	10	P6
11	P7	12	P8
13	Ground	14	P9
15	P10	16	P11
17	Ground	18	P12
19	P13	20	P14
21	Ground	22	P15
23	P16	24	P17
25	Ground	26	P18
27	P19	28	P20
29	Ground	30	P21
31	P22	32	P23
33	Ground	34	P24
35	P25	36	P26
37	Ground	38	P27
39	P28	40	P29
41	Ground	42	P30
43	P31	44	P32
45	Ground	46	P33
47	P34	48	P35
49	Ground	50	SHFCLK
51	Ground	52	LP
53	Ground	54	M
55	ENAVEE	56	FLM
57	Ground	58	Ground
59	Ground	60	VDDSAFE



**PL3 - Backlight Inverter**

6 way Dubox header

Pin	Signal Name
1	Ground
2	Ground
3	BLKSAFE
4	BLKSAFE
5	Brightness Control Low
6	Brightness Control High



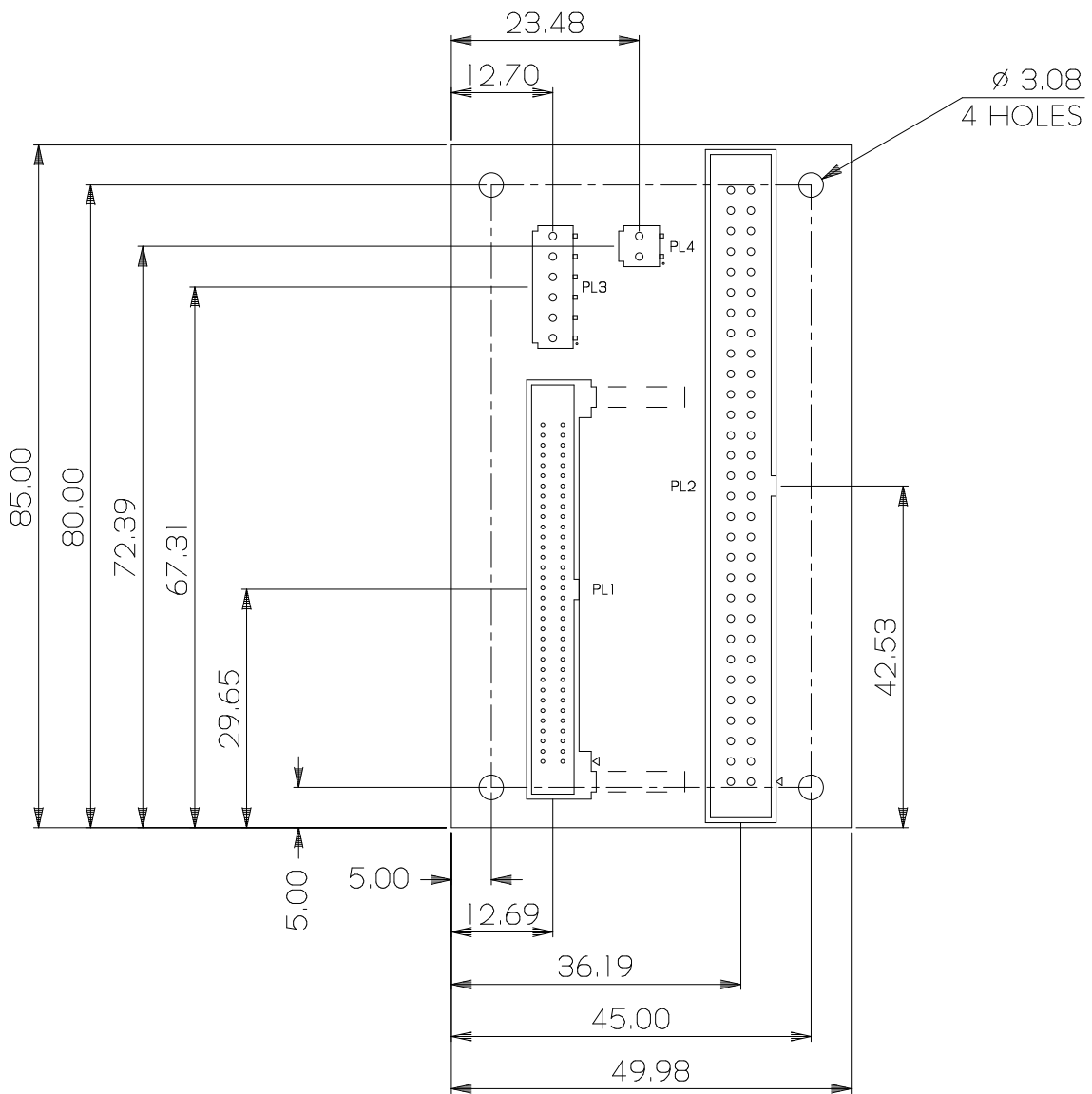
**PL4- Contrast Potentiometer**

2 way Dubox header

Pin	Signal Name
1	Brightness Control Low
2	Brightness Control High



# SBC-MediaGX FPIF Diagram



### Connection Details for 6.5" NEC display (NL6448AC20-06)

The following table provides connection details for the 6.5" NEC flat panel which is supplied as part of the flat panel development kit. The table shows connections for the FPIF board and also for the SBC-MediaGX directly.

Signal Name	SBC-MediaGX PL28	FPIF1 PL2	DF9M-31 D-type
VDD SAFE	61	60	28,29
M	54	54	27
FLM	56	56	4
LP	52	52	3
SHCLK	50	50	2
P3	6	6	21
P2	4	4	20
P5	8	8	23
P4	7	7	22
P7	11	11	25
P6	10	10	24
P10	15	15	13
P11	16	16	14
P13	19	19	16
P12	18	18	15
P15	22	22	18
P14	20	20	17
P19	27	27	7
P18	26	26	6
P21	30	30	9
P20	28	28	8
P23	32	32	11
P22	31	31	10
Ground	1,5,25,49,59	1,5,25,49,5 9	1,5,12,19,16



## Appendix E - Reference Information

### **Arcom Control Systems**

Product information, product notices, updated drivers and support material.

24hr-Online ordering System

[www.arcomcontrols.com](http://www.arcomcontrols.com)

### **PC/104 Consortium**

PC/104 and PC/104-Plus Specifications. Vendor information and available add on products.

[www.pc104.org](http://www.pc104.org)

### **USB Information**

Universal Serial Bus (USB) Specification and product information.

[www.usb.org](http://www.usb.org)

### **National Semiconductor**

National Cyrix MediaGX processor and Super I/O documentation

[www.natsemi.com](http://www.natsemi.com)

### **PCISIG PCI Special Interest Group**

PCI standard information

[www.pcisig.com](http://www.pcisig.com)

### **Intel/Chips and Technologies**

69000 VGA Controller Information and drivers available for download.

[www.intel.com](http://www.intel.com)

### **Datalight Inc.**

ROM-DOS and FlashFX information.

[www.datalight.com](http://www.datalight.com)

### **Realtek**

Ethernet controller drivers available for download.

[www.realtek.com.tw](http://www.realtek.com.tw)

### **Award Software**

BIOS documentation and support material.

[www.award.com](http://www.award.com)

## Appendix F - Troubleshooting

The SBC-MediaGX board is delivered 'Ready to Run' and will automatically start running and load an operating system. Either from flash memory or disk drive when power is applied. Once the board is running the information in this manual will provide you with guidelines and connection details for attaching peripherals and using the board.

If you are experiencing problems with a particular feature of the board, please refer to the relevant documentation to ensure that the board is configured correctly. If you are still experiencing problems then contact Arcom Control Systems technical support team who will be able to offer advice and investigate the problem.

If the board does not start running when power is applied, and the display remains blank, then there may be a problem with the system configuration. Follow the steps below to determine the cause of the problem:-

- 1) Switch OFF the SBC-MediaGX and disconnect from the power supply. Switch ON the supply and measure the output voltage with a digital voltmeter (DVM). This should be between +4.75V and +5.25V. If this is incorrect adjust and re-apply power to the board. If the board does not work go to step 2.
- 2) With the power supply connected and switched ON. Check the voltage at the power connector PL12 between pin 1 (+5V) and pin 2 (GND). If this voltage is outside the tolerance in step 1, adjust the main supply until it meets the specification. The board should automatically start running when the supply reaches the minimum voltage, but switch OFF and ON again to make sure that the board starts correctly. If the board does not work go to step 3.
- 3) With the power supply switched OFF remove the SDRAM module from the DIMM socket and re-insert. Ensure that the module is correctly aligned and the tabs are closed on the DIMM. Switch the power ON and check to see if the board powers up correctly, if the board is still not working go to step 4.
- 4) Remove any PC/104 adapter cards plugged into the SBC-MediaGX. Apply power and check to see if the board starts up. If the board starts working check the link settings on the PC/104 boards and adjust any settings that may conflict with the SBC-MediaGX. Once the settings have been checked then plug each board in on its own to isolate any particular board which is causing the problem. If the board does not work when the PC/104 boards are removed go to step 5.
- 5) Check all link settings are in the default location listed in the 'Links' section of the manual and remove all cables except the VGA Cable (or flat panel cable), keyboard cable and power supply cable. Apply power and check to see if the board starts up correctly.

If you have completed the tasks outlined above and the board still fails to operate, then it will need to be returned to Arcom Control Systems for repair. Please contact the technical support department for details on returning the board.