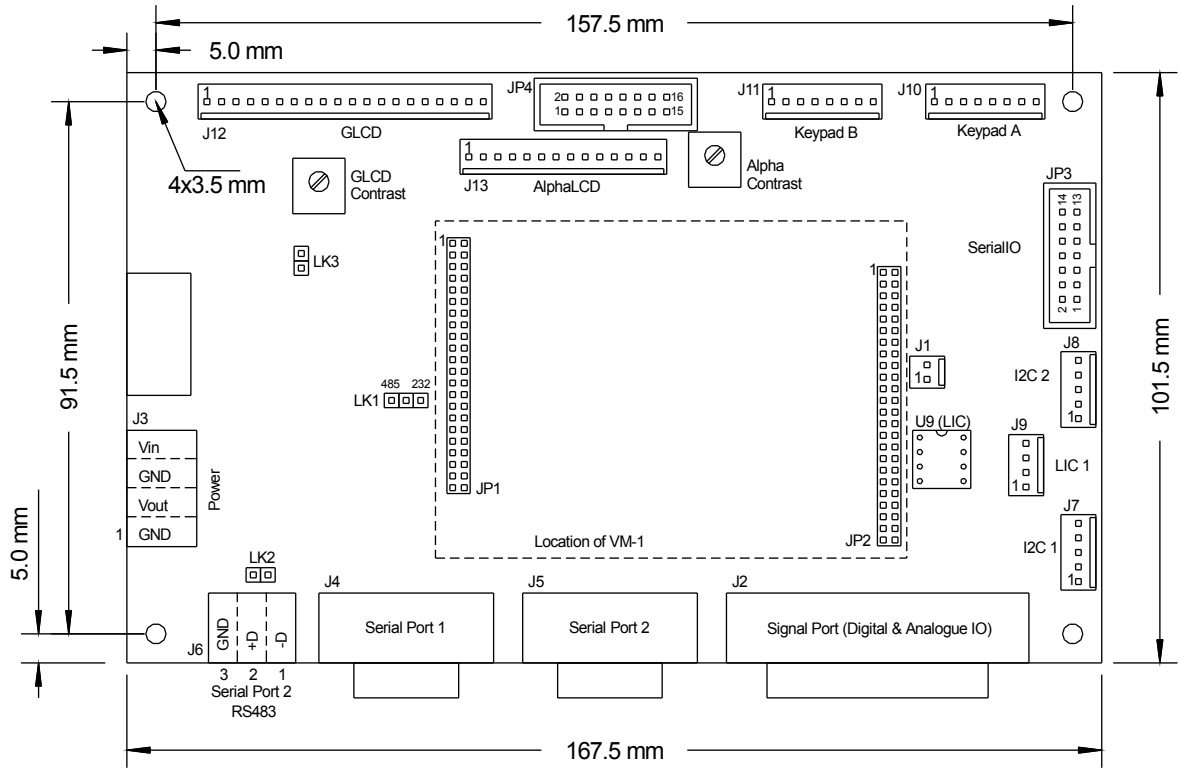
VM-1 Application Board 1 Datasheet

Introduction

The 5802 is an application board for the VM-1 Controller. The Application Board provides access to RS232 and RS485 serial ports; various analogue, digital and pulse IO; keyboard and display interfaces, including both graphic and alphanumeric displays; two I²C busses (plus an optional long I²C); Microwire®/SPI®; an EEPROM and a regulated 5VDC supply output.



Unpacking

You should have:
5802 Application Board
Power Connector
These instructions

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What you will need

To start using the application board you will also need:
VM-1 Control Module (5800) with language ROM (5803).
8 to 30V, 300mA, unregulated DC power supply.
An RS232 serial lead to connect the 5802 to your host computer. Use a lead that would be used to connect two PC's together (a 'Null Modem').
A PC running terminal emulation (communication) software (for example, Hyper Terminal).
The VM-1 and Venom-SC Manual set.

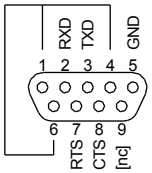
WARNING: This is essentially a 5V-only board. You may only apply signal levels outside 0-5VDC to the power inlet terminal, and the RS232 and RS485 connectors.
Also, be aware that the Graphics LCD connector has up to –15VDC on two of its pins.

Serial Ports

Serial Port 1 RS232

Pinout

Connector: J4



9 way D plug: View of plug

Pins 1, 4 and 6 are connected to each other on the 5802.

Configuration

Serial port 1 is configured in the default startup procedure with the line:

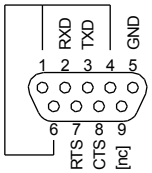
```
MAKE serial AsynchronousSerial(38400,1,1)
```

Serial Port 2 RS232 / 485

Serial port 2 can be either RS232 or RS485, depending on link LK1. LK1 selects which interface to *receive* data from – transmit data goes to both.
When link LK2 is made the RS485 line is terminated on the board with 120R in series with 100nF. The RS485 bus should run point-to-point between each device on the bus and should have no spurs. The two ends should be terminated.

RS232 Pinout

Connector: J5

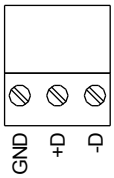


9 way D plug: View of plug

Pins 1, 4 and 6 are connected to each other on the 5802.

RS485 Pinout

Connector: J6 - Plug not provided



3-way pluggable screw terminal

Configuration

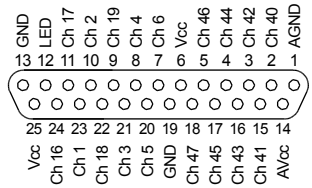
```
MAKE serial2 AsynchronousSerial(38400, 2, 1)    ;232 with hardware handshake
MAKE serial2 AsynchronousSerial(38400, 2)       ;485 with direction control.
MAKE direction Digital(26)
```

The direction of the RS485 interface is set by channel 26, which also doubles as the handshake output when used with the RS232 interface. A low level on channel 26 makes the interface an output, thus after a reset, the interface will be an input.

Signal Port

The signal port gives access to the analogue, digital, and pulse I/O signals, and also the LED signal.

Connector: J2



25 way D socket: View of sockets

Analogue IO

There are eight channels of 10-bit analogue input (Ch 40 – 47). Two of these channels (Ch 46 & 47) can also be used for 8-bit analogue output. All the analogue IO has a 0-5V range.
The VM-1 is factory-supplied with the analogue ground and analogue reference connected to the digital ground and 5V. If you wish to disconnect these, cut the track below LK4 and LK5 on the VM-1. See VM-1 datasheet for more details.
1 KΩ series resistors are advised during development when there are voltages beyond 0-5V present, as they can provide some protection against over-voltage at the analogue inputs.

Configuration

```
MAKE a Analogue(40)      ; Or 41, 42, … Etc.
```

Digital IO

There are ten digital IO channels. Some of these may only be used for input when they are made as a digital. Some may be used for pulse IO. See the VM-1 datasheet.

Configuration

```
MAKE d Digital(6)        ; Or 16, 17, … Etc.
```

Other

Both Analogue and Digital power rails are available at this connector.
The onboard LED drive (channel 15) is available as a digital output on pin 12.

I²C Busses

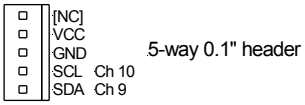
There are three I²C bus connectors. I²C bus 1, I²C bus 2 and a long I²C connector.

I²C Ports 1 and 2

There are two independent I²C ports. The first port is intended for input/output functions, and the second for keypads and so on, though you don't need to stick to this convention.

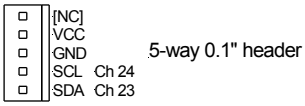
Pinout I²C Port 1

Connector: J7



Pinout I²C Port 2

Connector: J8



Configuration

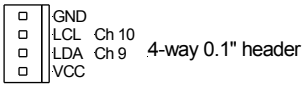
```
MAKE net I2CBus          ;creates the first bus
MAKE net I2CBus(1)       ;[does same as above]
MAKE net2 I2CBus(2)      ;creates the second bus
```

Long Distance I²C Port

The long I²C port is optional. To use it you will need to fit an 82B715 device in socket U9. The long I²C bus extends I²C bus 1 up to 20 metres. An 82B715 is needed at the remote end of the bus to transform it back to the normal I²C impedance levels. See the 82B715 datasheet. 510R pull-ups are used on the extended I²C signals.

Pinout

Connector: J9



Configuration

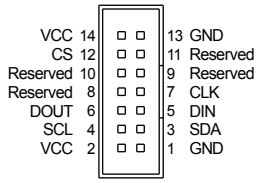
No extra software configuration necessary.

Serial IO

The serial IO port connects to Microwire and SPI compatible devices.
It also brings out the first I²C bus for convenience.

Pinout

Connector: JP3



14-way DIL boxed header

Configuration

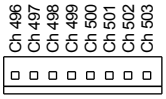
```
MAKE s SerialIO(nbits)  ; See Object Reference for more details.
```

Keypad / Digital IO Connectors

Two PCF8574A ICs on the second I²C bus provide two ports of eight digital IO each.
They can be used for Digital IO or Keypads. If used for digital I/O they will sink ~10mA and source ~50uA.
See the PCF8574 Datasheet for full details.

Pinout Keypad A

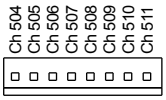
Connector: J10



8-way SIL 0.1" pitch

Pinout Keypad B

Connector: J11



8-way SIL 0.1" pitch

Configuration

```
MAKE kpd Keypad(0,496)          ;4x4 Keypad on J10
MAKE kpd Keypad(0,504)          ;4x4 Keypad on J11
MAKE kpd Keypad(1, 496,504)     ;8x8 Keypad on J10 & 11
MAKE d1 digital(496)            ;a single digital.
```

Display Connectors

Alphanumeric LCD

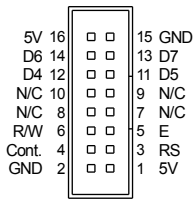
There are two connectors on board for direct connection of Hitachi and Hitachi-compatible alphanumeric LCD's. One for SIL and the other a *reverse* DIL connector. The reverse DIL connector allows a transition connector to be used on the *back* of LCD's with DIL connections.

Note that only one Alphanumeric LCD may be attached, using either one or the other connector. Also, you cannot use the Alphanumeric LCD if you are using a Graphics LCD.

The display connectors are connected to the expansion bus (Location 0), see *configuration* below.

DIL Pinout

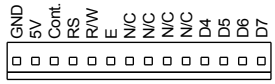
Connector: JP4



16-way DIL boxed header

SIL Pinout

Connector: J13



14-way SIL 0.1" pitch

Configuration

```
MAKE lcd AlphaLCD(16, 2, 0)    ;16 char x 2 line
MAKE lcd AlphaLCD(20, 4, 0)    ;20 char x 4 line
```

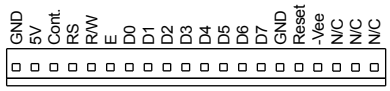
Graphic

Many of the Graphic LCD's supported by the Venom-SC language can be connected directly using a simple lead. The negative supply voltage is factory set to the most negative voltage, -15 volts. In order to set any other value it is necessary to remove the link LK3, fit U12 (LM337LZ) and resistors R16-18. The contrast for the LCD is set using the pot labelled R22. Note that the Graphics LCD should not be connected via cables of more than 1 metre in length. It should not be taken outside the enclosure in which the 5802 is housed.

Note that you cannot use the Graphics LCD if you are using an Alphanumeric LCD.

Pinout

Connector: J12



20-way SIL 0.1" pitch

Configuration

```
MAKE glcd GraphicsLCD(4)       ;Hitachi Display 240x128
```

Program Mode

Pinout

Connector: J1 – 2-way SIL 0.1" pitch
If this connector is shorted it forces the controller into Program Mode.

EEPROM

A 24C02, 2K-bit Serial I²C Bus EEPROM is included on the board. It provides 256 x 8 bits of non-volatile storage, and is connected to the ***second*** I²C bus.
The Venom-SC object *SafeData* allows simple access to this device. Note you have to specify I²C Bus ***2***.

Configuration

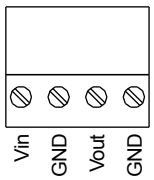
```
MAKE s SafeData(0, 2, 162) ; EEPROM driver object, bus #2, address 162.
```

Power Supply

The 5802 may be powered from a supply voltage range of 8 to 30 volts unregulated DC. The current consumption depends upon what is attached to the unit and whether the processor is idle, but is usually around 80 - 130mA.
There is also a regulated 5V output for powering external circuits. If you draw much current from this, or you use a high input voltage you will increase the thermal dissipation at the heat sink. If you need more heat sinking, it is possible to screw the regulator tab and heat sink on the board to an external sink.

Pinout

Connector: J3 - Plug provided.



4-way pluggable screw terminal