

**M4000-S1 Data Acquisition Recorder
User Guide
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Introduction

The M4000 is a generic Data Acquisition Recorder. The dedicated configuration for your application is designated M4000-S1 and all the diagrams and descriptions in this User Guide refer to the specific configuration for your applications

NOTE: Issue 03 applies to M4000-S1, Mod2

This Handbook is designed to allow an untrained user to become conversant with the M4000-S1 Data Acquisition Recorder and provide the regular user with a reference source. **It is assumed that any user will be familiar with the Microsoft Windows Operating System and has some knowledge of the signals to be measured and the type of testing required.** This handbook does not provide detailed instruction on the Snapmaster Acquisition software or Servicing. This is provided in separate handbooks. For user convenience ALL Handbooks and User Guides are included on the hard drive the M4000-S1 in the directory *C:\Manuals*. They are in .pdf format and Adobe Acrobat Reader 6 is also included to enable the display and printing if required.

Section 1. Provides a system description with pictures showing where to find the user required connections and controls.

Section 2. Provides a description of the application-defined hardware fitted to the M4000-S1. The hardware modules are described and specified with connection details.

Section 3. Provides a basic description of the Snapmaster Acquisition and Analysis software plus other user accessible software included in the recorder

Section 4. Provides a detailed description of the operation of the equipment for the various user defined applications

PRODUCT SAFETY

This product is designed for use under cover, that is inside buildings or vehicles. The equipment is constructed so that the operator has easy access to all the required controls without the use of special tools. The equipment does not require internal access. Servicing and maintenance which requires internal access should only be carried out by qualified personnel.

The equipment is powered from a mains supply voltage of 85 to 264 volts ac and 40Hz to 66 Hz. The equipment must be connected to the mains using a mains lead that complies with IEC and care taken to ensure that a proper earth exists at the source supply for correct operation and operator safety. The equipment must be used as defined in the relevant sections of this handbook.

Section 1. Physical Layout

The M4000-S1 is housed in a rugged metal outer case which incorporates a carrying handle. The internal structure comprises box construction with a top and bottom cover plate. All internal parts are mounted onto the box frame. The box is constructed from aluminium sheet and forms the structural strength of the equipment. Signal connectors and inputs are mounted on the rear panel and the viewing screen is mounted on a panel which is hinged in the lid of the box frame. Raising the hinged lid reveals the viewing screen and a secondary panel which supports the keyboard, pointing device and equipment controls. Removal of the top and bottom metal covers of the base box provides complete access to all internal parts.



Figure 1: Picture of M4000-S1 with lid open

1.1 System Structure

The M4000-S1 is an integrated Data Acquisition Recorder which includes not only the Data Acquisition but also the storage, signal conditioning and processing of signals in a single package.

The basic unit consists of a Pentium Single Board Computer running Windows XP. A passive PCI backplane allows for the connection of industry standard configurable components of which a 16 Channel, 12 bit fast data acquisition card is a standard fitment. Software control of the acquisition, display, analysis and storage of signals is via Snapmaster, a commercially available, industry standard software suite. Specific signal conditioning and function modules can be added to the basic unit to enable specific applications to be addressed.

The overview functional block diagram is shown below:

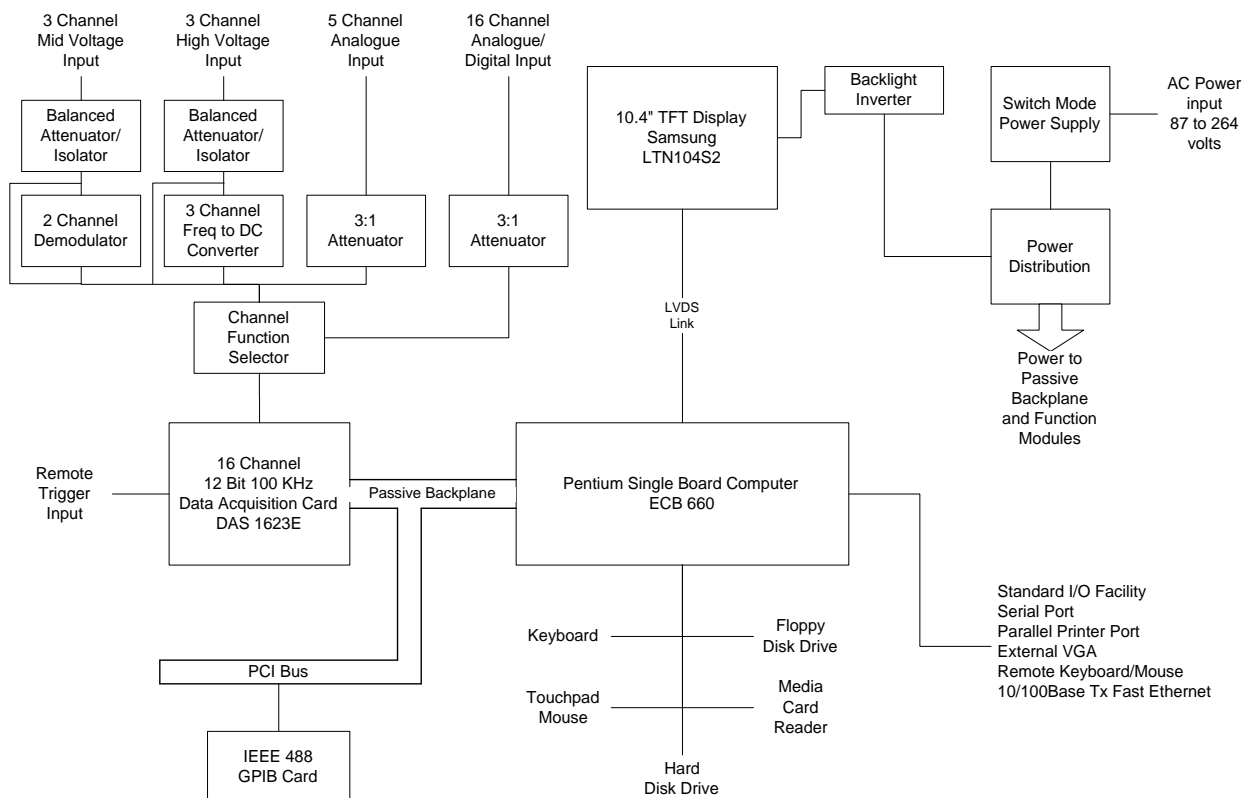


Figure 2. Functional Block Schematic, M4000-S1

Signal inputs can be accepted into several different Signal Conditioning modules. The basic input is a 5 channel ± 30 volts range. Additional modules provide for 3 channel ± 200 volts range which also feeds an internal dual channel demodulator and 3 channel ± 1000 volt range which also feeds an internal 3 channel Frequency to DC converter. The input voltages specified for these modules are DC but the modules will accept AC voltages, provided the peak value does not exceed the DC range. Further details are shown in Sections 2 and 4.

Front panel adjustments are provided for trimming Zero and Span for the dual channel demodulator but otherwise all channels have a fixed Zero and Span. A front panel switch is

provided to switch the measuring from the primary 16 channels described above to a secondary input of 16 analogue/digital inputs. This is explained in more detail in Sections 2 and 4.

Whichever of the analogue signals is selected for measurement, the Signal Conditioning ensures that at maximum range, ± 10 volts signals are presented to the inputs of the 16 channel Data Acquisition card. This is then controlled by the Snapmaster software suite, which manages the sample rate, channel selection and scaling, analysis (if required), the data presentation on screen and streaming and storage to Hard Disk. Test set-ups are configured in software by the construction of Virtual Instruments. Details on this are in Section 3 of this handbook and the Snapmaster Software Users Guide, which also includes training tutorials on all aspects of the software.

An IEEE 488 interface card is fitted to the M4000-S1 to enable GPIB interface to other equipment. No specific application software is provided for this but all common driver interfaces are provided as well as a generic control program.

1.2 Front Panel Controls

This section shows the positions and functions of all items available on the top panel of the M4000-S1, once the screen lid has been raised.

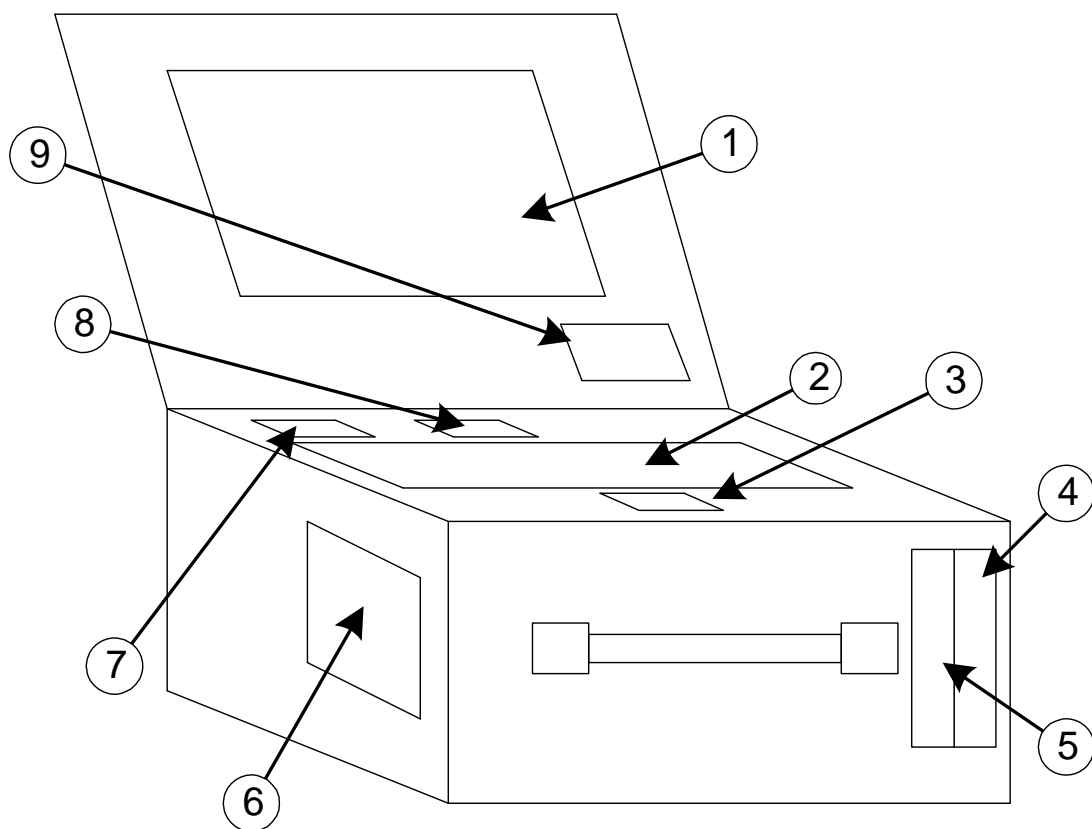


Figure 3. Front view of the M4000-S1

Front panel items:

1. 10.4" TFT colour screen with antiglare scratch resistant protective cover.
2. Keyboard

3. Mouse

4. Memory Card reader appears on the Windows Operating System as additional disk drives and accepts:

- 3.3v SmartMedia Card
- IBM Microdrive Card
- Type I/II Compact Flash Card
- Memory Stick Card
- Multimedia Card
- Secure Digital Card

5. Floppy Disk Drive, accepts 1.44Mbyte floppy disks

6. Computer Interface connectors. See Section 2 for further details

7. Function Switch. Selection of F1 position routes the Normal Rear Panel inputs and the internally generated functions to the data acquisition card. Selection of F2 position routes the Secondary 16 Channel Analogue/Digital Inputs to the data acquisition card. For a fuller explanation see Section 2.

8. Span and Zero controls (screwdriver adjust) for trimming the offset and gain of the Dual Channel Demodulator. See Sections 2 and 4 for further information.

9. Microsoft Windows XP Certificate of Authenticity (COA). Do not remove this label, it contains information about the Product Key (License Number) of the Windows XP License that is installed on each M4000-S1. In the unlikely event that it becomes necessary to restore the Hard Drive from the Recovery Disk, this Product Key will be needed as part of the recovery process and is unique to each M4000-S1.

1.3 Rear Panel Components

The rear panel contains all the input connections for the function modules and Signal Conditioning modules fitted to the M4000-S1.

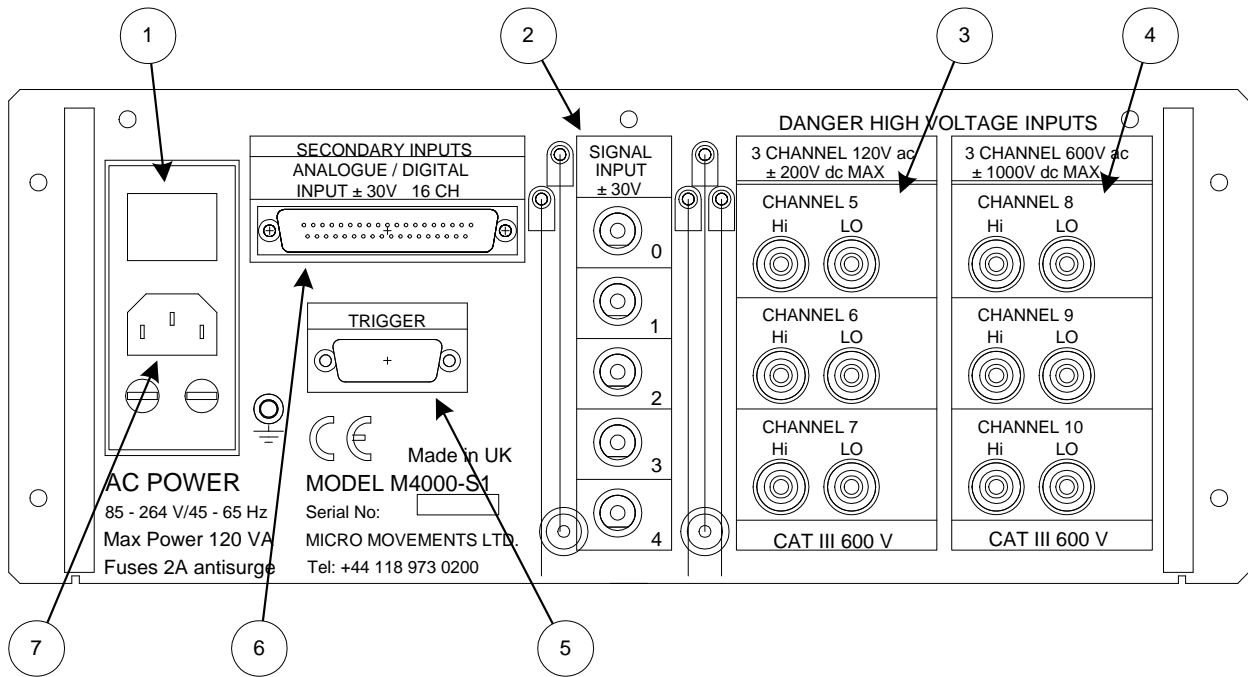


Figure 4. Rear view of the M4000-S1

Figure 4 above shows rear panel layout and marking. Details of the various items is as follows:

1. Main equipment ON/OFF switch.
2. 5 Channel Voltage Input Module. This accepts DC signals up to ± 30 volts or AC signals up to ± 30 volts peak to peak, on BNC connectors.
3. 3 Channel Mid Voltage Input Module for voltages up to 120 Volts RMS AC or ± 200 Volts DC maximum. For connection details refer to Section 2 and for application details, refer to Section 4.
4. 3 Channel High Voltage Input for voltages up to 600 Volts RMS AC or ± 1000 Volts DC maximum. For connection details refer to Section 2 and for application details, refer to Section 4.
5. Remote Trigger Input. For connection and application details refer to Section 2.
6. 16 Channel, Secondary Input for analogue/digital signals with ± 30 v range. For connection details, refer to Section 2 and for application details refer to Section 4.

7. IEC input socket for mains cable. The connector incorporates the mains fuses.

Section 2. Hardware Configuration

This section covers the application specific modules fitted to the M4000-S1 as well as controls and general computer interfaces.

2.1 5 Channel Voltage Input Module.

This module is factory fitted internally to the M4000-S1 and the input connector panel, shown below, is located on the rear panel as indicated by item 2 on Figure 4.

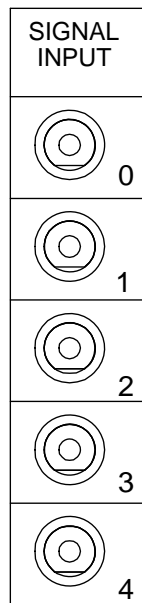


Figure 5. 5 Channel Voltage Module Input Panel

This module is designed to accept general purpose voltage inputs up to ± 30 Volts maximum. The inputs are true differential Instrumentation Amplifier, with high common mode performance for low noise operation. The inputs are DC coupled and will accept DC or AC signals and can be accessed via an individual BNC connector for each channel.

Specification

Input:	Volts up to ± 30 Volts maximum, dc coupled
CMRR:	90 dB
Zero Offset:	< 1% FSR
Accuracy:	< 1% FSR
Noise:	< 3 mV rms.

Input Connectors

1. Panel mounted isolated BNC. Inner = Input High, Outer = Input Low

2.2 3 Channel Medium Voltage Input Module.

This module is factory fitted internally to the M4000-S1 and the input connector panel, shown below, is located on the rear panel as indicated by item 4 on Figure 4.

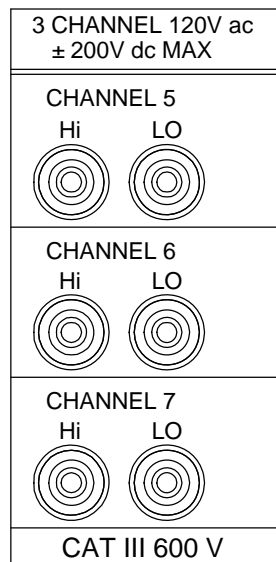


Figure 6. Three Channel Medium Voltage Signal Input Panel

This module is designed to accept general purpose voltage inputs up to ± 200 Volts maximum (120 volts ac rms.) and performs two functions. One as a voltage input module, described in this Section and two, as a Dual Demodulator Input, described in Section 2.4.

The inputs are isolated true differential Instrumentation Amplifier, with high common mode performance for low noise operation. The inputs are DC coupled and will accept DC or AC signals and can be accessed via individual safety shrouded 4mm connectors as shown in Figure 7., for each channel.

Specification

Input:	Voltages up to ± 200 Volts maximum (dc or peak)
CMRR:	90 dB
Zero Offset:	< 1% FSR
Accuracy:	< 1% FSR
Noise:	< 15 mV rms.
Isolation:	> 8000 volts to earth and > 8000 volts to other channels.

2.3 3 Channel High Voltage Input Module

This module is factory fitted internally to the M4000-S1 and the input connector panel, shown below, is located on the rear panel as indicated by item 5 on Figure 4.

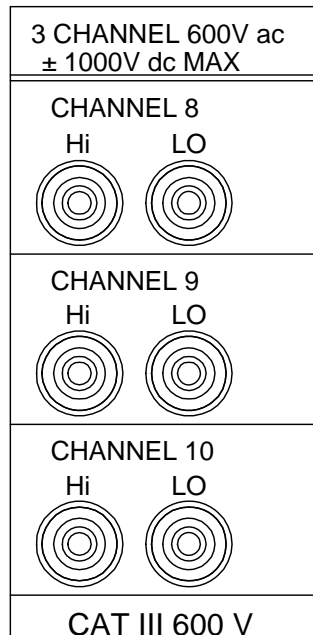


Figure 7. Three Channel High Voltage Signal Input Panel

This module is designed to accept general purpose voltage inputs up to ± 1000 Volts maximum (600 volts ac rms.) and performs two functions. One as a voltage input module, described in this Section and two, as a Frequency to DC Converter Input, described in Section 2.5.

The inputs are isolated true differential Instrumentation Amplifier, with high common mode performance for low noise operation. The inputs are DC coupled and will accept DC or AC signals and can be accessed via individual safety shrouded 4mm connectors as shown in Figure 7, for each channel.

Specification

Input:	Voltages up to ± 1000 Volts maximum (dc or peak)
CMRR:	90 dB
Zero Offset:	$< 1\%$ FSR
Accuracy:	$< 1\%$ FSR
Noise:	< 40 mV rms.
Isolation:	> 8000 volts to earth and > 8000 volts to other channels.

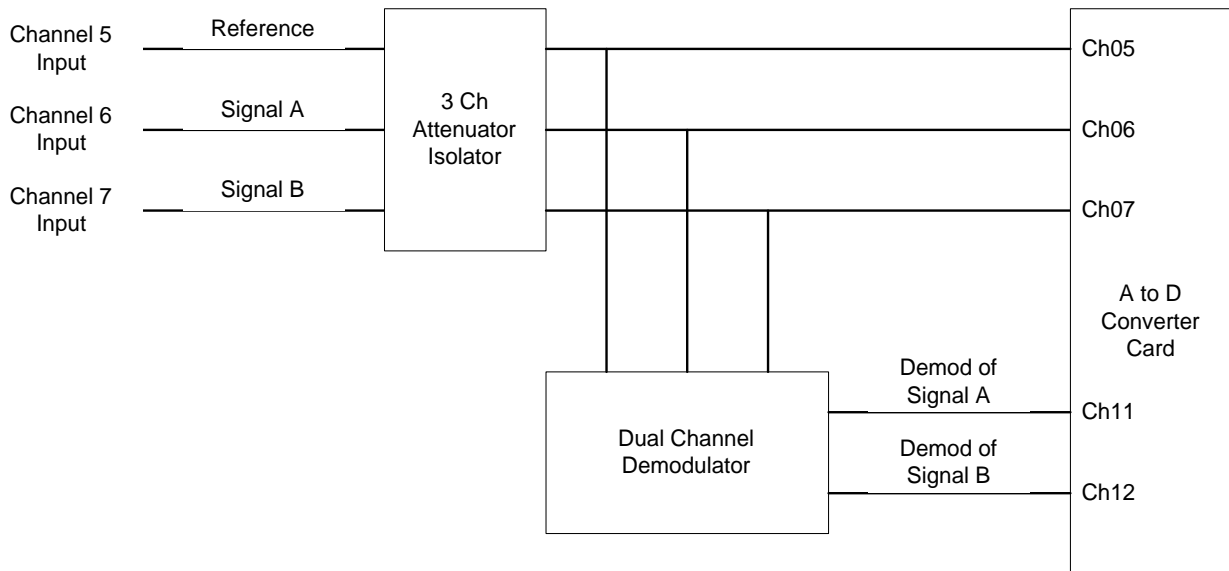
2.4 2 Channel Demodulator.

This module is factory fitted internally to the M4000-S1 and takes its inputs from signals applied to the 3 Channel Medium Voltage Input Module described in Section 2.2. The input connector panel, is shown in Section 2.2 and is located on the rear panel as indicated by item 3 on Figure 4. The input configuration for the use of the Dual Channel Demodulator is shown below.

This module accepts inputs from an alternating sinusoidal Reference source, for example 115 V ac 400Hz and Signal Inputs from modulated sources, such as Tachogenerators (Tacho's) or Synchro's. The signals are fed to a dual balanced demodulator circuit which compares the Signal Inputs against the Reference Input. This is a dedicated function module and will not accept general purpose signals, it is specific to alternating modulated signals and will not function unless a reference input is provided. The circuit removes the reference frequency carrier from the modulated signal, rectifies, filters and provides an Error Signal proportional to the running peak value of the input signal. The sign of the Error signal is dependent on the phase relationship with the Reference. For an In-phase signal, the Error Signal is positive and for an Out-of-phase signal, the Error Signal is negative. This functionality applies to both of the input signals, providing two Error Signals that are fed to the Data Acquisition Card.

The inputs are isolated from ground and are differential input to provide low noise and no interference with ship systems.

To use the Dual Channel Demodulator, connect the Reference Input (115 v ac 400Hz) to Channel 5 Input Connector. Then connect the Tacho/Synchro signals to Channel 6 and/or 7 Input Connectors. The system configuration is shown below.



The controls for this module are factory fitted to the front panel of the M4000-S1 and are located as indicated by item 8 on Figure 3.

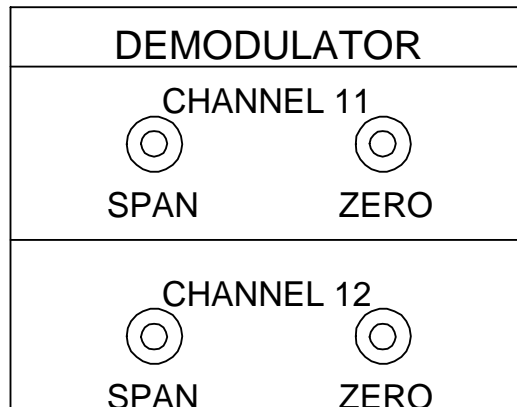


Figure 8. Two Channel Servo/Tacho Module Front Panel Controls

Details for trimming are part of a specific application requirement. See Section 4.

Specification:

Reference input: (Input Ch 5)	90 to 130 volts ac 300 to 500 Hz Isolated differential, DC coupled
Tacho/Synchro Input A (Input Ch 6)	0 to 80 volts ac. (reference frequency carrier) Isolated differential, DC coupled
Tacho/Synchro Input B (Input Ch 7)	0 to 80 volts ac. (reference frequency carrier) Isolated differential, DC coupled
Demodulator Output A	Channel 11
Demodulator Output B	Channel 12
Output Filter	4 th order Low Pass 40 Hz.
Output Range	Nominal 80 volts Front Panel Gain adjustable
Output Zero Offset	Front Panel Zero adjustable
Polarity	In-phase = +ve, Anti-phase = -ve

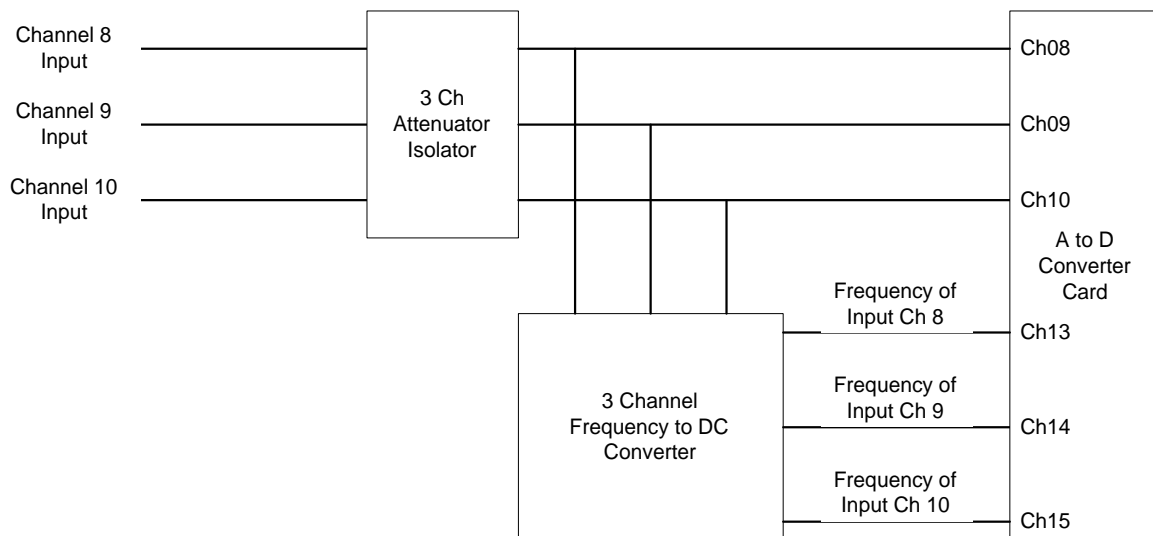
2.5 3 Channel Frequency to DC Converter Module

This module is factory fitted and is accessible from the three High Voltage Inputs described in Section 2.3. As can be seen below from the system configuration schematic, the input frequency of signals applied to Channels 8, 9 and 10, will be converted to DC and appear on internal Channels 13, 14 and 15 respectively. This internal function module is intended for the measurement of AC Supply frequencies on Single Phase AC or 3 Phase AC with voltages ranging anywhere between 60 volts ac and 600 volts ac. The frequency to DC conversion linearity is optimized between 50 Hz and 400 Hz.

To use the Frequency to DC converter module: (See Section 2.4 for Input connection details)

For Single Phase, connect the signal for measurement to the Input Channel 8 and the resultant Frequency will be available on internal Channel 13. This enables the user to monitor the RMS voltage at the same time as the Frequency.

For Three Phase, connect the signals for measurement to the Input Channels 8, 9 and 10 and the resultant Frequencies will be available on internal Channels 13, 14 and 15 respectively. This enables the user to monitor the RMS voltages at the same time as the Frequencies.



Specification

Inputs:	Isolated differential, dc coupled
Input Sensitivity:	> 50 volts rms ac
Range:	0 to 500 Hz
Linear range	50 to 400 Hz

2.6 16 Channel Analogue/Digital Input

This module is factory fitted and is accessible via a 37 way 'D' type connector. The connections to the input are:

37 way 'D' Type, Panel mounted Male.

Pin Number	Function	Pin Number	Function
1	Channel 0 Input High	20	Channel 0 Input Low
2	Channel 1 Input High	21	Channel 1 Input Low
3	Channel 2 Input High	22	Channel 2 Input Low
4	Channel 3 Input High	23	Channel 3 Input Low
5	Channel 4 Input High	24	Channel 4 Input Low
6	Channel 5 Input High	25	Channel 5 Input Low
7	Channel 6 Input High	26	Channel 6 Input Low
8	Channel 7 Input High	27	Channel 7 Input Low
9	Channel 8 Input High	28	Channel 8 Input Low
10	Channel 9 Input High	29	Channel 9 Input Low
11	Channel 10 Input High	30	Channel 10 Input Low
12	Channel 11 Input High	31	Channel 11 Input Low
13	Channel 12 Input High	32	Channel 12 Input Low
14	Channel 13 Input High	33	Channel 13 Input Low
15	Channel 14 Input High	34	Channel 14 Input Low
16	Channel 15 Input High	35	Channel 15 Input Low
17	+ 5 V	36	0 V
18	NC	37	0 V
19	NC	--	

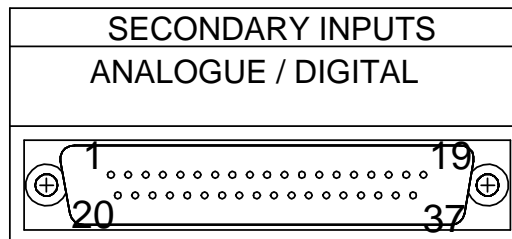


Figure 9: Secondary Input (16 Channel Analogue/Digital) Connection Details

This input can be used to measure analogue or digital voltages in the range ± 30 volts. It is thus suitable for measuring 24 volt relay switching. Note that the inputs are NOT floating. The Input Low's are common and connected to Earth. Check your system for suitability before making any connection. The availability of a +5 volt supplementary supply provides the facility for connecting to voltage free contacts such as Relay Contacts, Switches or Push Buttons.

2.7 External Trigger Input

This module is factory fitted internally to the M4000-S1 and the input connector panel, shown below, is located on the rear panel as indicated by item 5 on Figure 4.

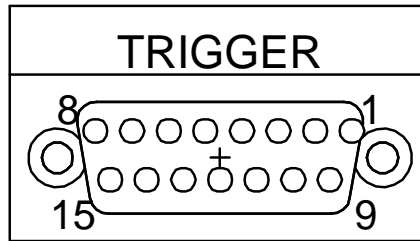


Figure 10. External Trigger Input Connector

The external trigger input enables several alternative methods of triggering the acquisition of data. An external signal in the form of a voltage level or a contact closure can be detected by the software and be used to initiate the gathering of data.

The internal circuitry and connection details of the trigger input are shown below:

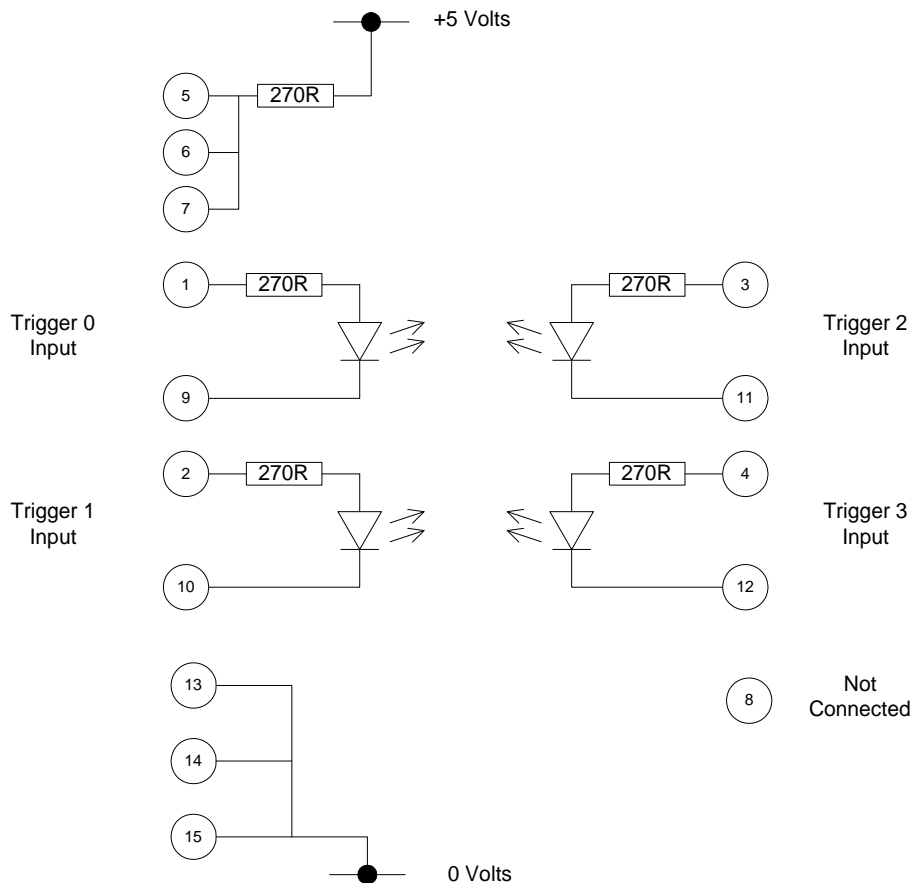


Figure 11. Internal Trigger Circuit and Connection Detail

Trigger 0 input is used as an example but these circuits are equally applicable to Trigger inputs 1, 2 and 3. Any number or combination may be used

As can be seen in figure 11, a voltage connection between pins 1 and 2 feeds an opto-isolator, thus ensuring that any voltage signals used for triggering remain isolated. Alternative connection methods and connection details are shown below in Figures 12 and 13.

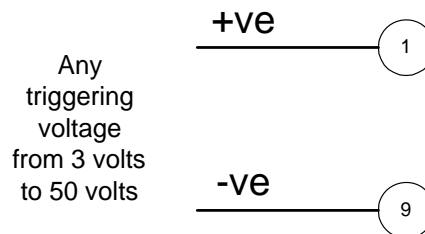


Figure 12. Connections for Triggering from a Remote Voltage source (example Trigger 0)

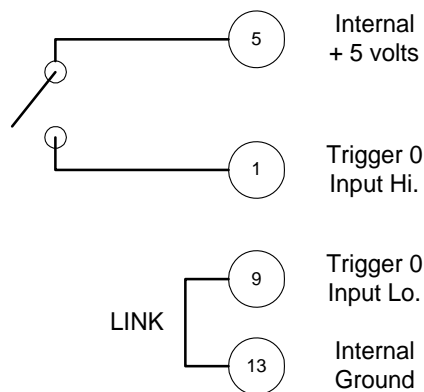


Figure 13. Connections for Triggering from a remote voltage free Contact Closure

General specification

Input type 1. (Fig 12)	Voltage level change, opto-isolated Levels: Low < 0.5 volts, High > 3 volts, < 55 volts
Input type 2. (Fig 13)	Voltage free contact closure or push button.

* Note: Input type 1 will directly accept, TTL inputs, CMOS inputs or 24V relay switching voltage without the need for any other components.

In the Snapmaster software, the trigger inputs are accessed via the 'Digital Input' element, where combinations of trigger conditions can be set. See Section 4 for an example.

It is also possible to 'trigger' off ANY signal, analogue or digital, that is sampled by the system. Refer to the Snapmaster User Guide for further details.

2.8 Computer Interface

These modules are factory fitted internally to the M4000-S1 and the input connector panel, shown below, is located on the left-hand side panel as indicated by item 6 on Figure 3.

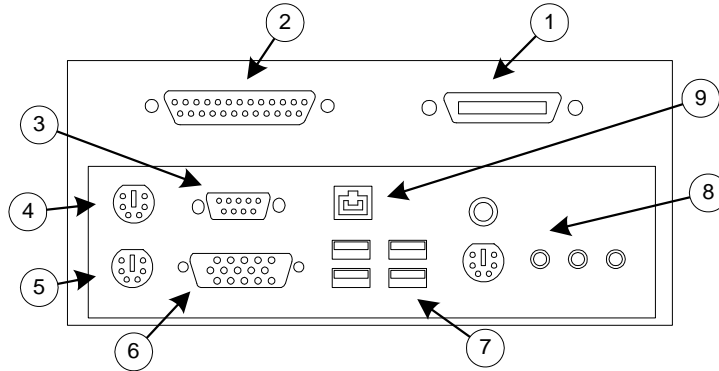


Figure 13. Computer Interface Connectors

The computer interface panel shown above in Figure 13, contains all the computer interface functions, which are as follows:

1. IEEE 488 Interface
2. Parallel Printer Port
3. RS232 Serial Port
4. External PS2 Mouse Port
5. External PS2 Keyboard Port
6. External VGA connector
7. 4 off USB 2.0 Ports
8. Audio and Video Ports
9. RJ-45 10/100Base-Tx Ethernet network connector

Connection details are not shown for the above as they are all International Standard connections which utilise International Standard interface cables.

2.9 Measurement Function Selection

This module is factory fitted internally to the M4000-S1 and the control panel, shown below, is located on the keyboard panel as indicated by item 7 on Figure 3.

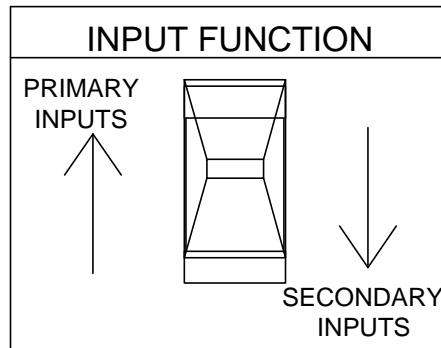


Figure 14. Measurement Function Selector Switch

The measurement function switch is a facility that allows multiple functionality on the M4000-S1 with dedicated inputs selected and directed to the data acquisition card, ensuring flexibility. The Function selection will be application dependent but below is shown the signal routing for the two different switch selection positions:

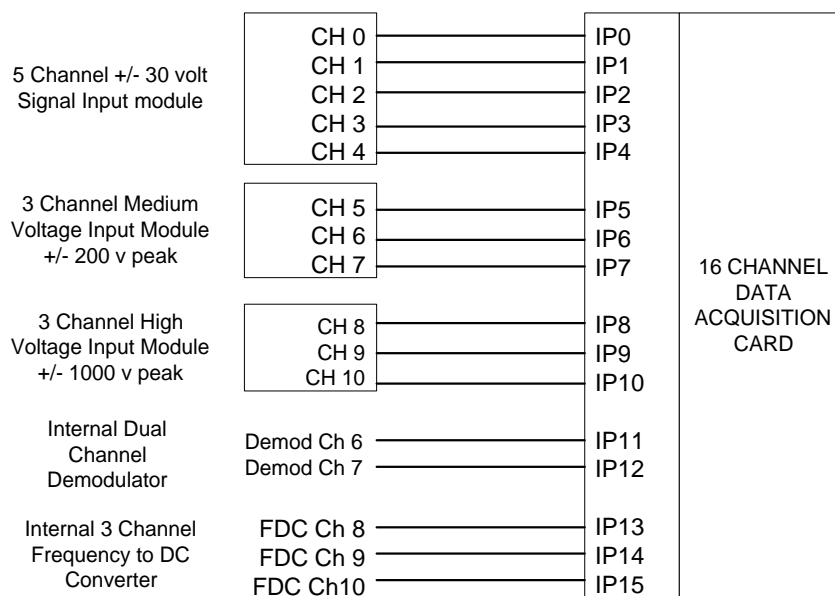


Figure 15. Signal Routing: Function Switch Position "Primary Inputs"

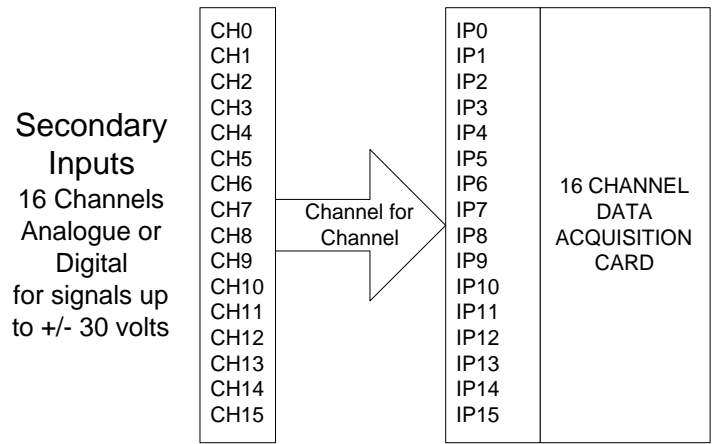


Figure 16. Signal Routing: Function Switch Position "Secondary Inputs"

Section 3. Software

The M4000-S1 runs the Windows XP operating system. It is assumed that the user is familiar with Windows and is conversant with the use of a mouse, keyboard and the basic manipulation of files. The main application software is a commercially available stand-alone package called Snapmaster. A full license for this is installed on the M4000-S1, complete with all the necessary drivers to interface with the data acquisition hardware.

When the M4000-S1 is connected to a mains power supply and switched ON, the system will perform self checking and boot up into Windows XP. Once this is completed the standard Windows Screen will be visible. To initiate the Snapmaster software, double click on the Snapmaster Icon in the Windows screen. Snapmaster will load to provide an opening screen. Mouse select File, Open and select the Virtual Instrument that is required. Application specific Virtual Instruments are in the directory *C:/Instruments*. These Virtual Instruments are defined and described in Section 4. In the directory *C:/SM/Defuser*, will be found a selection of example Virtual Instruments.

Once a Virtual Instrument is selected and opened, the screen will appear. A typical example is shown below.

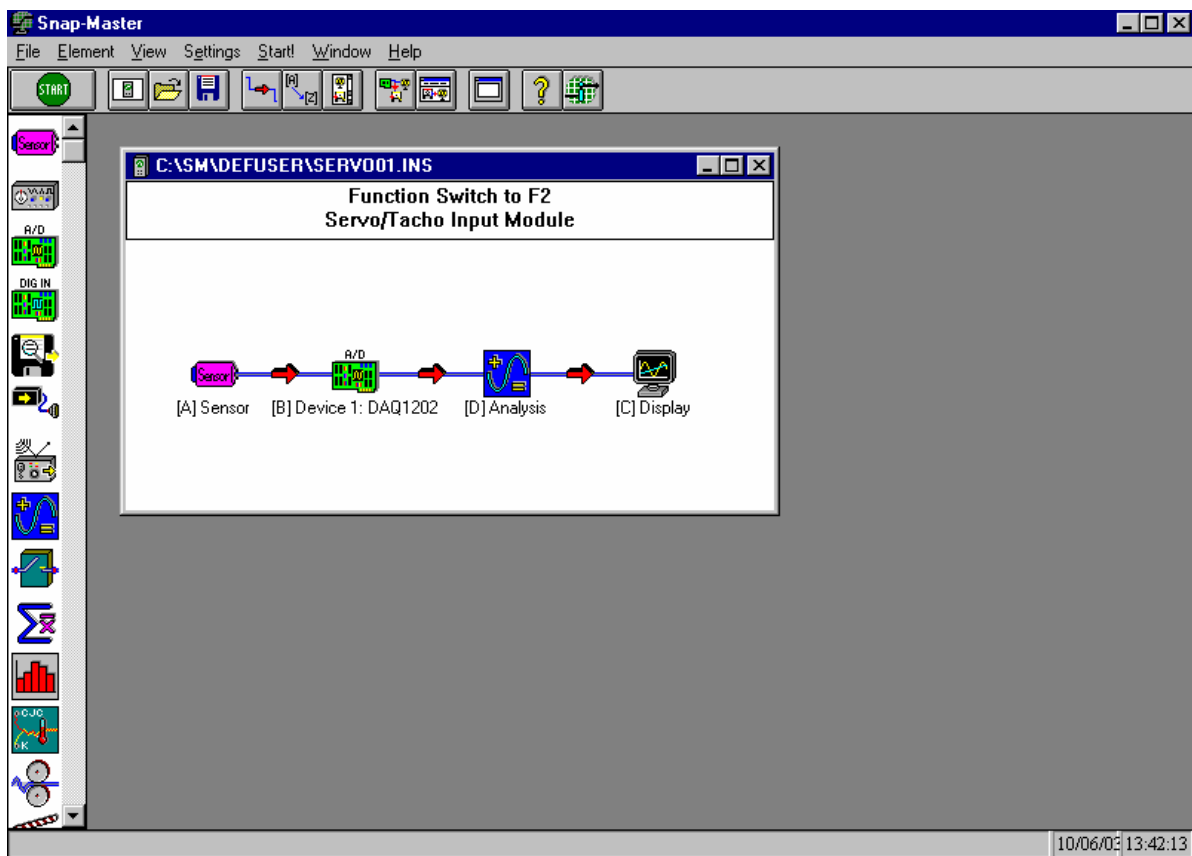


Figure 17. Snapmaster with an opened Virtual Instrument on Screen

To begin collecting data, it is only necessary to select the START button with the mouse. The default display page will open and data will be gathered. If it is required to select the display page first, then using the mouse, point at the 'display' icon in the Virtual Instrument box and double click. The display page will then open. Examples of this are shown in Figures 18 and 19. By reference to the applications in Section 4, select the page required for display. Then mouse click on the START button to begin gathering data.

It is recommended that the user refers to the Snapmaster User Guide which is supplied with the M4000-S1, to familiarise with the concepts and construction. This guide includes tutorials on all aspects of constructing Virtual Instruments. The M4000-S1 is supplied with a selection of dedicated Virtual Instruments for specific applications, these are described in Section 4.

By reference to the Snapmaster User guide and utilising the application specific Virtual Instruments and the sample Instruments already constructed, it is straightforward to construct any additional Virtual Instrument that may be required.

The Snapmaster User Guide is available on screen at any time by accessing the 'Help' item on the Snapmaster screen top menu bar.

Section 4. Operation

This section contains the necessary information for specific dedicated applications. It shows which input module to use, defines the connections and shows and describes the operation of the Snapmaster Virtual Instrument that is relevant. The pre-loaded Application Examples explained in this Section have the Virtual Instruments located in the directory *C:\Instruments*.

4.1 General Purpose Analogue/Digital Signals. 16 channels, secondary Input Function

This utilizes the 16 channel analogue/digital input module described in Section 2.6. Inputs can be made via the 37way 'D' type connector. The preset Virtual Instrument is *16ana01.ins*. The displays are set simply to show all 16 channels in the various graphical formats shown below. Connect the required signals in accordance with the connection details shown in Section 2.6 and ensure that the Front Panel Function switch is set to Secondary Inputs. Double click on the Display Icon, select the page required and press the start button.

Display Page: 1 All 16 channels shown as individual y-t graphs

Display Page: 2 All 16 channels shown as Digital Values

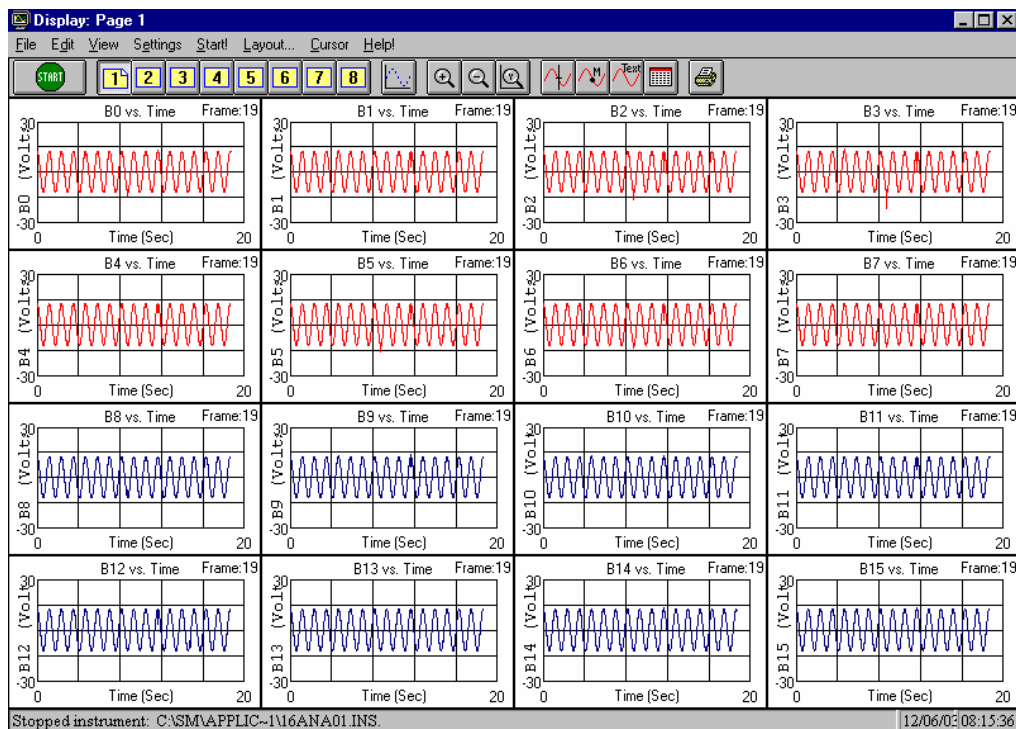


Figure 18. Example, Display Page 1 of Virtual Instrument, *16ana01.ins*

4.2 Gun Velocity Measurements.

This utilizes the Dual Channel Demodulator Internally connected to the 3 Channel +/- 200 volt Input module described in Sections 2.2 and 2.4.

Connections are:

Reference: Connect to Input Channel 5

Misalignment signal: Connect to Input Channel 6

The preset Virtual Instrument is *GUN01.ins*. Connect the reference signal and the Tachogenerator/Synchro signals as above. Ensure that the Front Panel Function switch is set to "Primary Inputs". These signals are conditioned and demodulated as described in section 2.4 and a 'Misalignment' signals generated, this fed to the Data Acquisition Card on Internal channel 11.

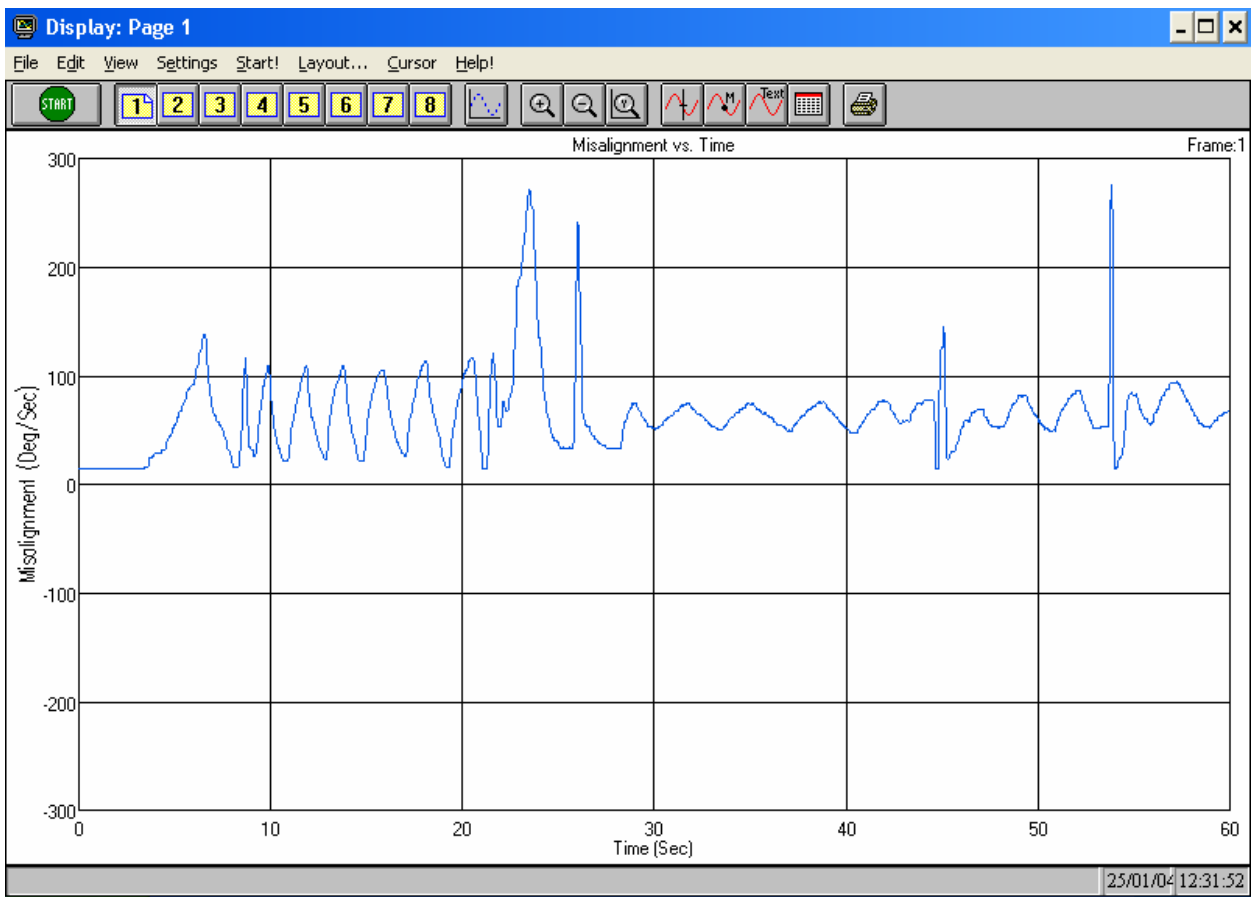


Figure 19. Example, Display Page 1 of Virtual Instrument, *servo01.ins*

Display Page 1: Displays Misalignment signal, scaled in units of Degrees/Second.

Select the Display page and press the Start button.

4.3 Radar Movement Measurements.

This utilizes the Dual Channel Demodulator Internally connected to the 3 Channel +/- 200 volt Input module described in Sections 2.2 and 2.4.

Connections are:

Reference: Connect to Input Channel 5

Training signal: Connect to Input Channel 6 (view demodulated signal on Ch 11)

Elevation signal: Connect to Input Channel 7 (view demodulated signal on Ch 12)

The preset Virtual Instrument is *RADAR01.ins*. Connect the reference signal and the Tachogenerator/Synchro signals as above. Ensure that the Front Panel Function switch is set to "Primary Inputs". These signals are conditioned and demodulated as described in section 2.4 and 'Error' signals generated, these are fed to the Data Acquisition Card on Internal channels 11 and 12 respectively.

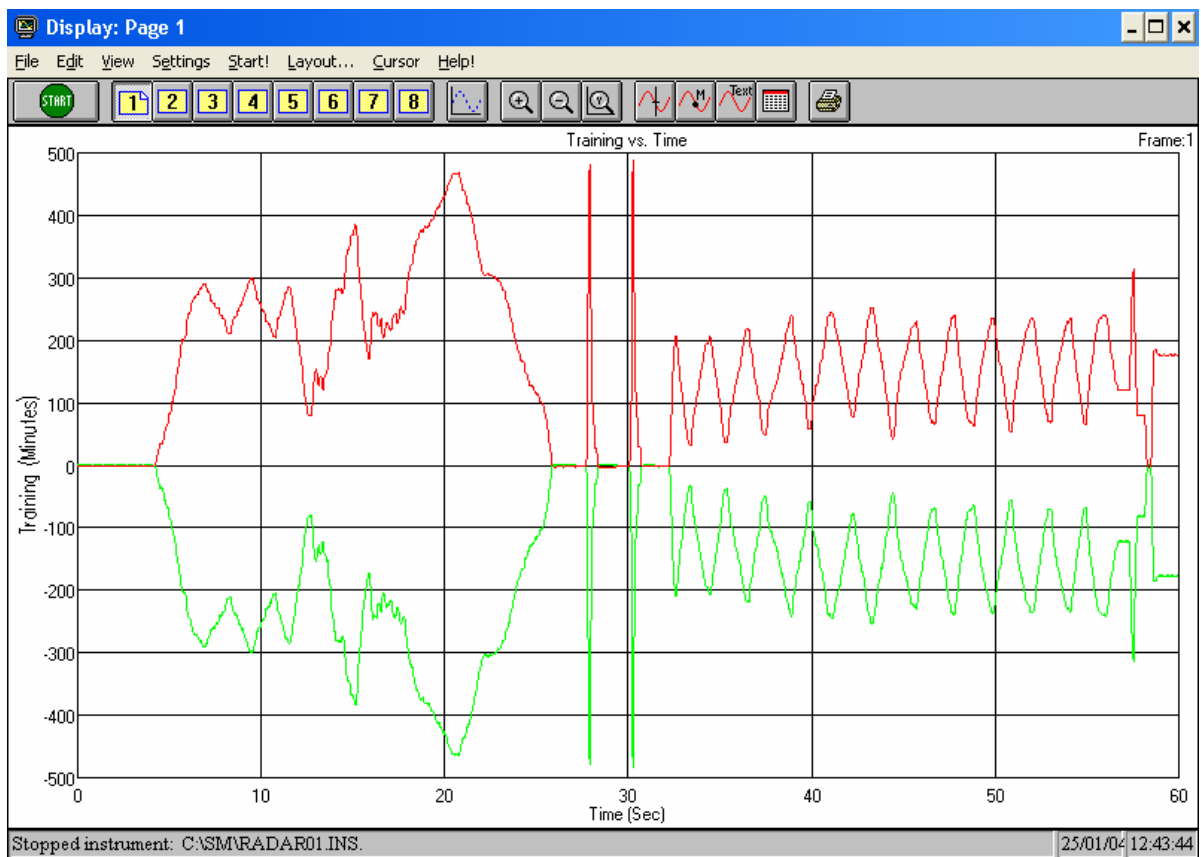


Figure 20. Example, Display Page 1 of Virtual Instrument, *GUN01.ins*

Display Page 1: Displays Error signals, scaled in units of Minutes.

Select the Display page and press the Start button.

4.4 3 Phase AC Signals

This utilizes the 3 Channel High Voltage Input Module described in Section 2.4. It also makes use of the Frequency to DC Converter described in Section 2.5. Inputs must be made using the cables provided with the instrument to ensure compliance with IEC 61010 Cat.3 600v. Connections for Star and Delta configurations are shown below.

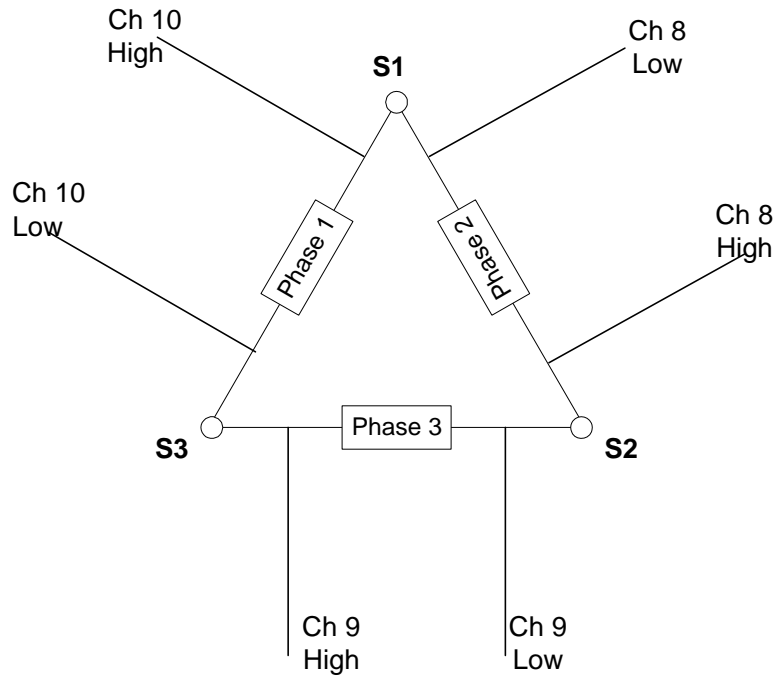


Figure 21. Delta System Connections

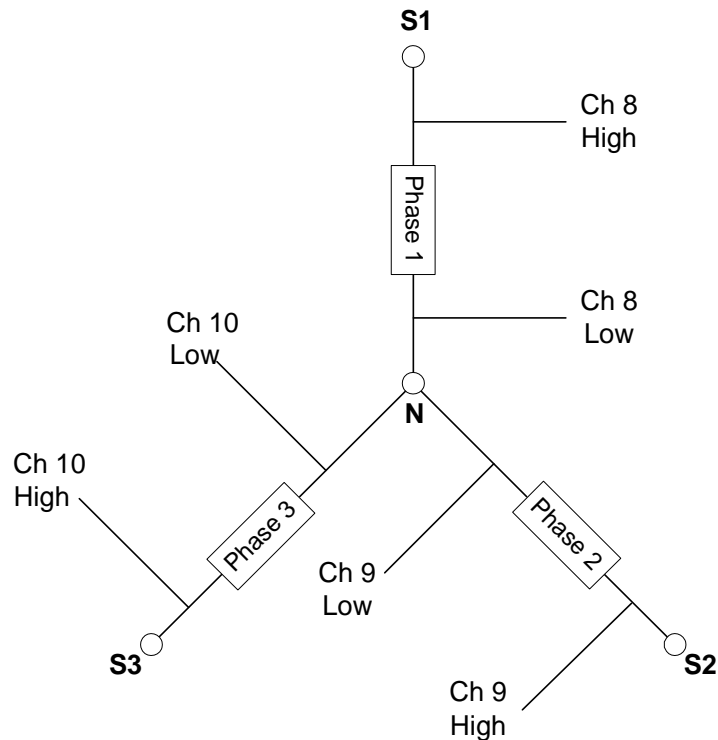


Figure 22. Star System Connections

The preset Virtual Instrument for this application is *3PH01.ins*. Connect the signals as required and ensure the Front Panel Function Select switch is set to “Primary Inputs”. The Display pages are set for the following:

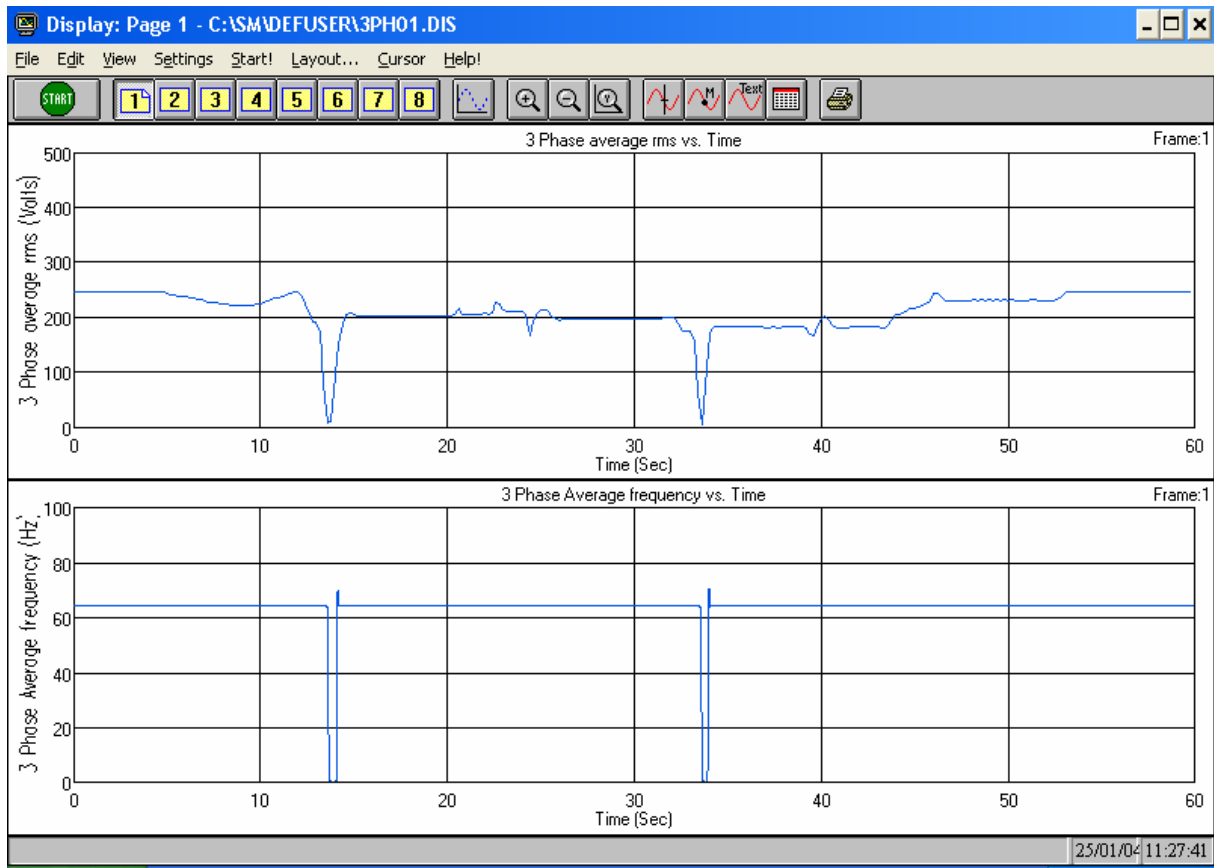


Figure 23. Example, Display Page 1 of Virtual Instrument, 3PH01.ins

Display Page 1. Two y-t graphs. The upper graph shows the running average RMS voltage of the three phases. The lower graph shows the running average of the Frequency of the three phases.

Display Page 2. All three channels' RMS voltages are shown on a single y-t graph. Below this, a digital instantaneous value of each of the RMS voltages.

Display Page 3. All three channels' Frequencies are shown on a single y-t graph. Below this, a digital instantaneous value of each of the Frequencies.

Select the Display page and press the Start button.

4.5 Using the Remote Trigger Input

This example shows how to set up a virtual instrument to use the external Trigger Input (see also Section 2.7)

Open the file *Trig01.ins*.

This requires a signal input to be measured on Channel 0 and a remote trigger input on Trigger 0.

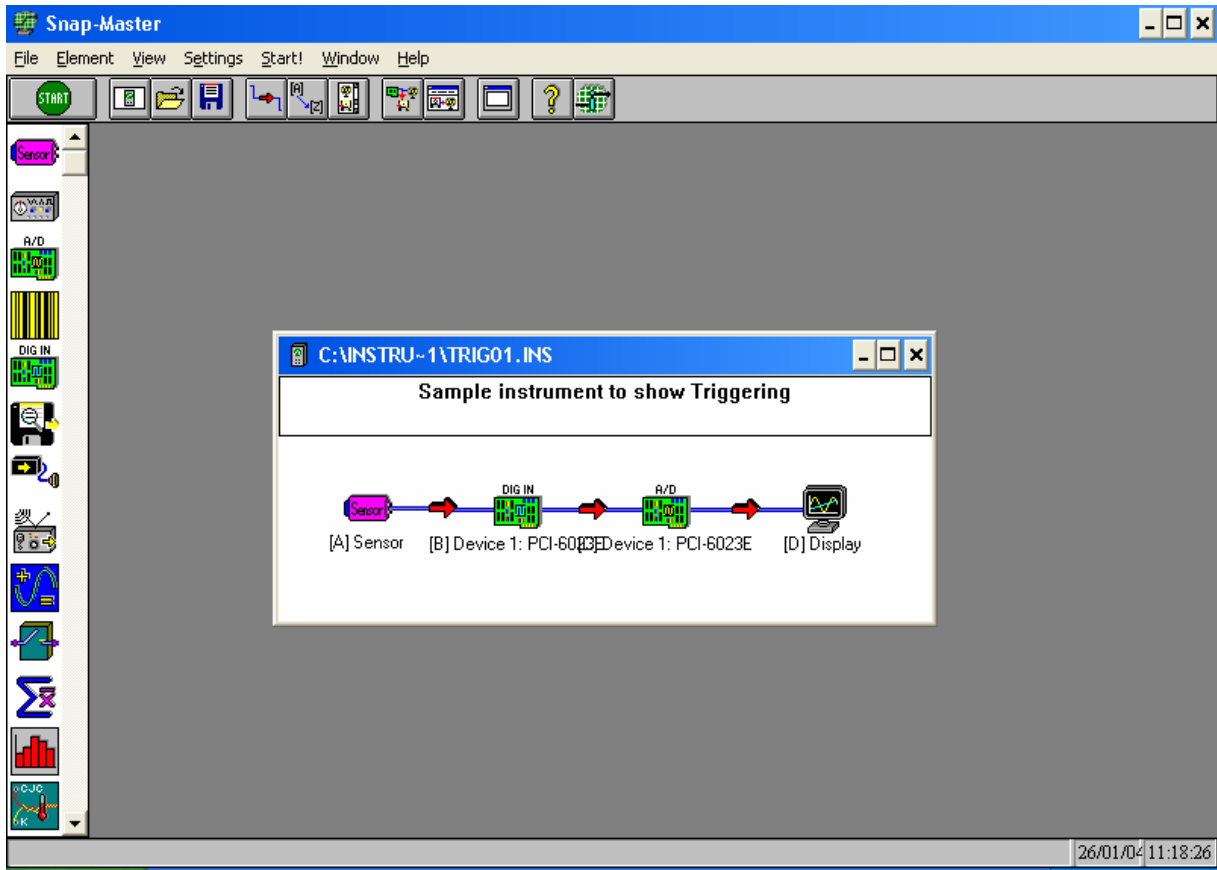


Figure 24. Example of remote triggering, *Trig01.ins*

The display Page 1 is a y-t graph of Channel 0 and Trigger 0.

Pressing the start button will activate the instrument which will wait for the trigger to occur on Trigger 0. The graphs will begin to show and log data as soon as the trigger occurs, until then, the instrument sit in a monitoring wait state.

4.6 Storing Data to the Hard Drive

All the previous example application instruments are 'screen display' only and are provided as samples to ease user development of applications. This means that they do not store data to the hard drive but allow the user to experiment without loading the hard drive with unwanted data. To convert any of the example instruments to allow storage of data to the hard drive do the following:

From the extreme right hand side of the Snapmaster screen, select the 'Disk Out' element and drag it into the Virtual Instrument box. Now using the 'connection tool' selected from the top line of the Snapmaster screen, connect the Display element to the Disk Out element and return the 'connection tool'. Double click on the disk out element and define where the data is to be stored and allocate a method of file naming.

Now when the Instrument is started, the data will be streamed to the hard drive at the same time as it is displayed. When the instrument has stopped there will now be a complete data file in the directory defined above.

4.7 Replaying Stored Data

The Virtual Instrument for this is *replay.ins* and will replay any data stored on hard disk. The virtual instrument is located in the *C:\SM\Defuser* directory

4.8 Other Applications

By reference to this User Guide and the Snapmaster User and Tutorial Guide, any user application can be implemented. The Snapmaster User Guide and Tutorials are available On-screen when Snapmaster is live.

4.9 Accessories

The following accessories are available to interface with various ship applications.

Test Lead Set, Part No: MML 5238. NSN: 6625 99 1318293

Three Phase Interface Box, Part No: MML 5263. NSN: 7025 99 6663758

Cable Assembly, Power, Electrical, Branched, Part No: MML 5297. NSN: 6150 99 2129043

The above accessories are available from Micro Movements Ltd.

