M4000-R Data Acqusition Recorder

Supplementary User Guide
Hardware Options

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INTRODUCTION.

This User Guide covers various hardware options that are available factory fitted on the M4000 Data Acquisition Recorder. Specifications and connection details are included and software setup explained. The individual options are only available on your M4000 if they were ordered at the time of supply.

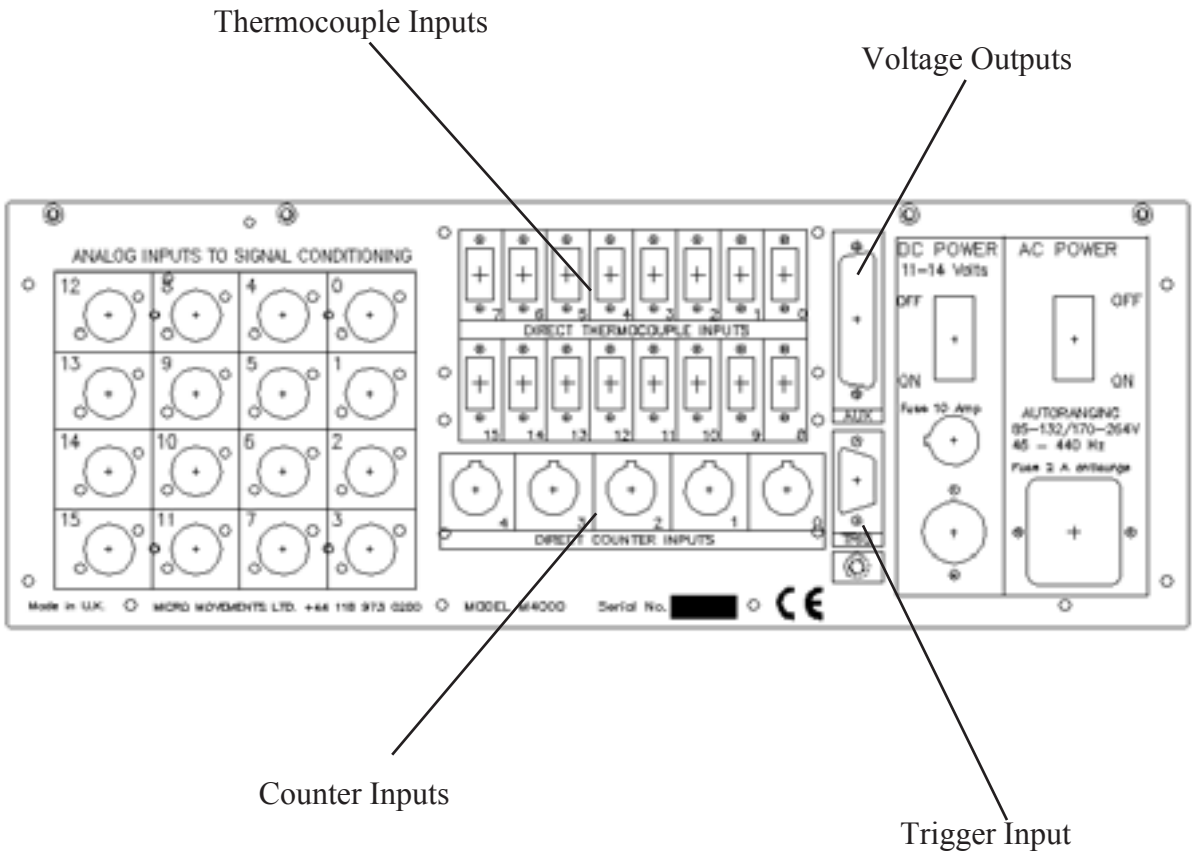

Figure 1. Rear View of M4000

Direct Thermocouple Inputs.

This option is supplied in two forms, M4000/TC08 and M4000/TC16. These are respectively 8 and 16 channel direct thermocouple input facilities. These options are self contained and are additional to the standard 16 channels of signal conditioning. The inputs are via standard sub-miniature 2 pin Thermocouple connectors which are mounted on the rear panel of the M4000 as shown in Figure 1.
When the option M4000/TC08 is fitted, the upper 8 inputs will be available and the lower 8 will be blanked off. When the option M4000/TC16 is fitted, all 16 inputs will be available. The standard fitting is for a type K thermocouple and the housing colour code new International standard is GREEN (previously YELLOW). The internal controls and software virtual instruments are identical for both the 8 and 16 channel versions.
For each individual channel, the input is high impedance ground reference and reference junction compensated. The signal is also linearised over the range -100^0C to $+900^0$C which is also the full range. Other special ranges are available on request.

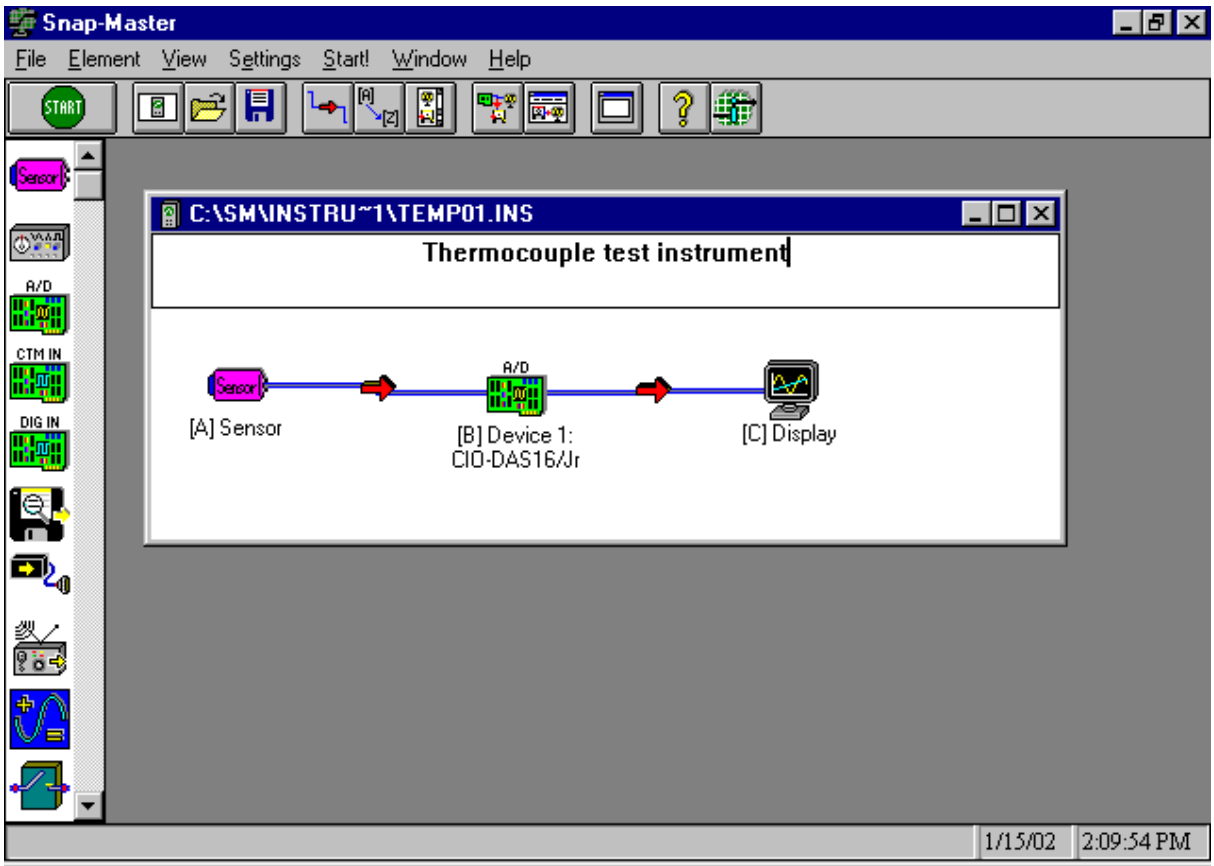

Figure 2

Specification.

No of channels	:	8 or 16
Input	:	High Impedance Differential
Compensation	:	Internal reference junction
Linearisation	:	-100^{0}C to +900^{0}C
Accuracy	:	< ± 1% fsr
Resolution	:	± 0.25^{0}C
Range	:	-100^{0}C to +900^{0}C
Type	:	K

Configuration.
Each channel is separately amplified, reference junction compensated and linearised optionally over the full range of –100^{0}C to +900^{0}C.
The 16 (or 8) outputs from the conditioning circuits are fed to a 16 channel 12 bit Analog to Digital converter which is configurable and controllable under SnapMaster. The Analog to Digital Converter card is designated CIO-DAS16/JR in the SnapMaster device library.

Software.
For setting up major applications, refer to the M4000 User Guide or the SnapMaster User Guide. To assist with setting up applications and for function testing purposes, a virtual instrument has been created that will operate up to 16 channels of Thermocouple measurement. To activate this, start SnapMaster and select OPEN. The virtual instrument is TEMP01 and resides in the directory C:\Sm\Instruments. Once opened it should appear as shown in Figure 2 . Connect your thermocouples as required and using the mouse, click on SnapMaster, START button. A display as shown in Figure 3 will appear and show the temperatures being measured on each of the channels.
This virtual instrument can be used for temperature measurement on its own. It is recommended that you save it under a different file name for your own application use, then the original will be available as a reference for other users.

Figure 3

Direct Counter Inputs

This option is supplied with the designation M4000/CT05. This option is self contained and is additional to the standard 16 channels of signal conditioning. The facility provides for up to 5 independent pulse inputs. Combined with the SnapMaster software can provide pulse counting. With the SnapMaster Waveform Analysis, speed or frequency measurement can be implemented and under most circumstances, acceleration can also be derived.
The inputs are via individual 7 pin DIN connectors as shown in Figure 1 .

The connection details are:

Pin 1 - +ve supply
Pin 2 - -ve supply
Pin 4 - Signal Input Low
Pin 5 - Signal Input High

The supply provided on Pins 1 and 2 is internally derived and will supply up to 100mA at +12 volts (+5v available by internal jumpers) and is designed to power external devices such as 5th wheels.

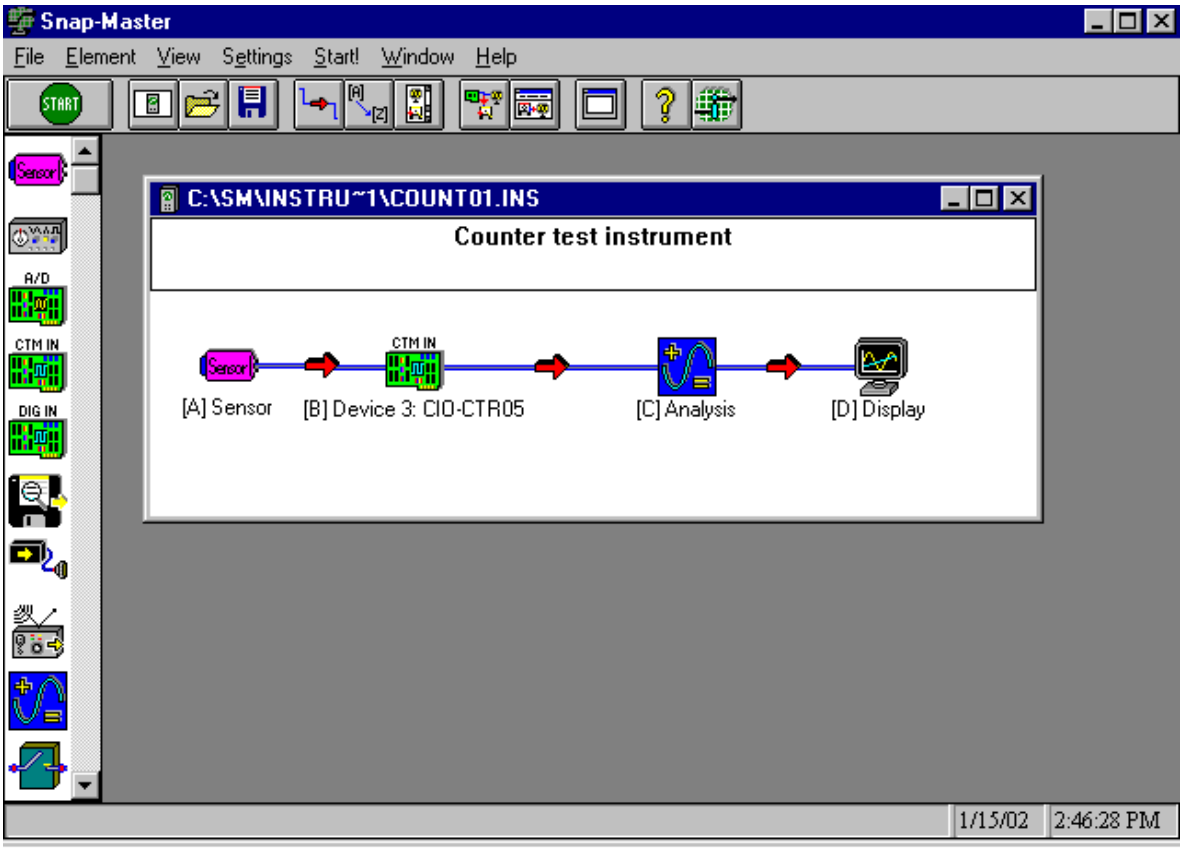

Figure 4

Specification.

No of channels	:	5
Transducer supply	:	+12v dc 100mA max (+5v by jumper select)
Input	:	High Impedance Differential AC coupled
Accuracy	:	± 1 count
Resolution	:	± 1 count
Input Signal	:	50 volts pk-pk maximum
Input Sensitivity	:	> 10mv rms
Input Frequency	:	20 KHz max

Configuration.

Each channel is separately signal shaped and conditioned and the signal fed to a 5 channel Timer Counter Card. This is scaleable and configurable under SnapMaster.
The Timer Counter Card is designated CTR-05 in the SnapMaster device library.

Software.

For setting up major applications refer to the SnapMaster User Guide. To assist with setting up and for function testing purposes a virtual instrument has been created that will count on all 5 channels and show rate on channel 1. To activate this start SnapMaster and select OPEN. The virtual instrument is COUNT01 and resides in directory C:\SM\Instruments. Once opened it should appear as shown in Figure 4. Connect a signal input as required and using the mouse, click on SnapMaster START button. A display as shown in Figure 5 will appear and show the pulse being counted.
This virtual instrument can be used for pulse count measurement on its own. It is recommended that you save it under a different file name for your own application use, then the original will be available as a reference for other users.

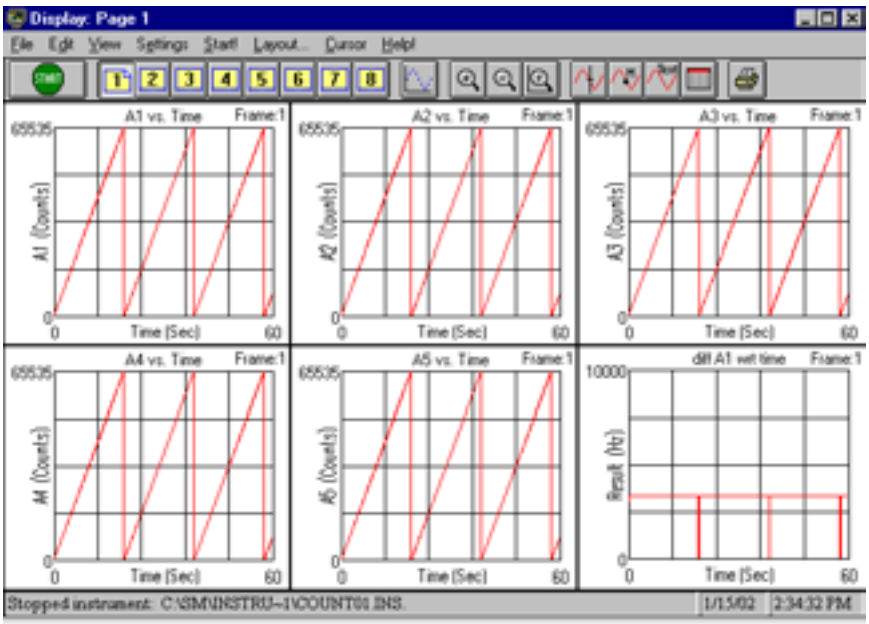

Figure 5

For further reference, the settings for the Counter card are shown below in Figure 6. To generate a RATE value from the count it is necessary to utilise the ANALYSIS element of SnapMaster. For full details refer to the SnapMaster software User Guide. For immediate reference the settings used in the COUNT01 virtual instrument are shown below in Figure 7.

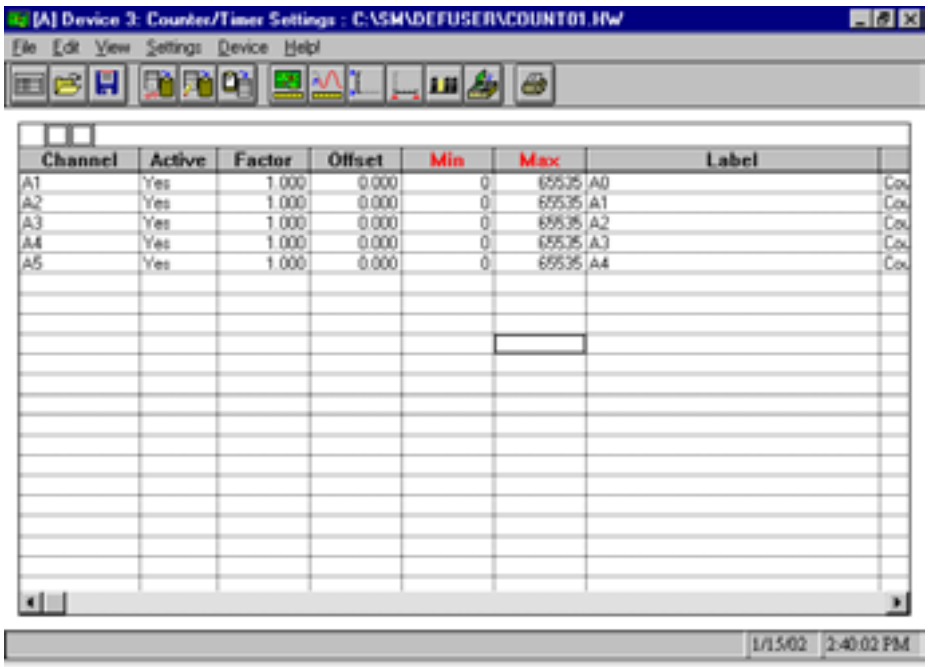

Figure 6

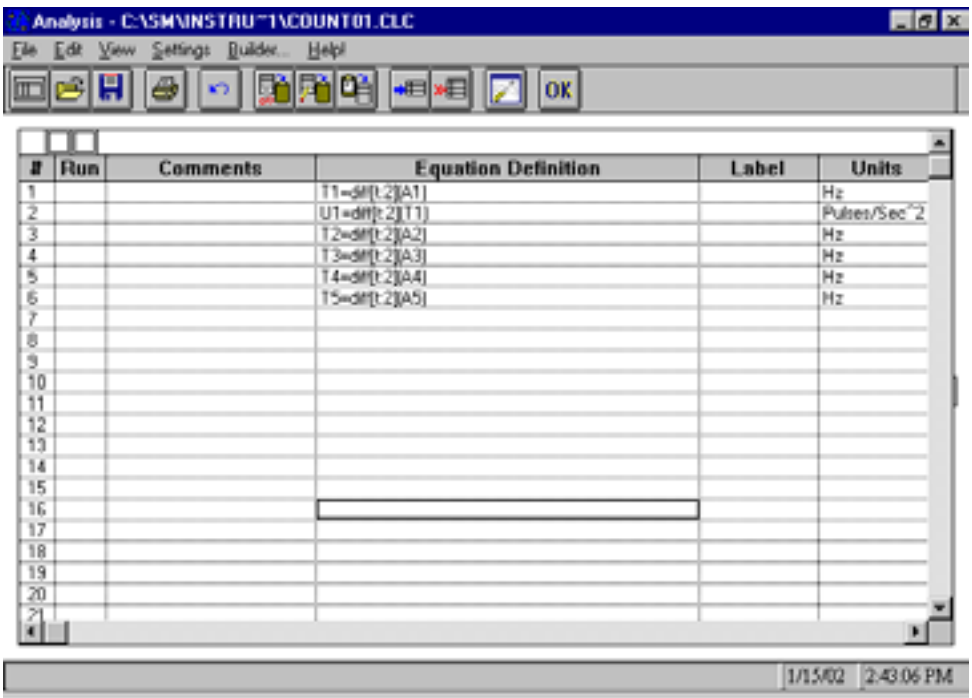

Figure 7

Voltage Outputs

The outputs from each of the Signal Conditioning Modules fitted in the front of the M4000 are available on this connector fitted to the rear panels as shown in Figure 1.

The connector is a 25 way D type whose connections are shown in Figure 8. These signals are also being monitored by the internal Analog to Digital converter in the M4000 and should not be subjected to high loads. The minimum input impedance of any device connected should be 10K ohms and the signal is nominally ± 10 volts maximum.

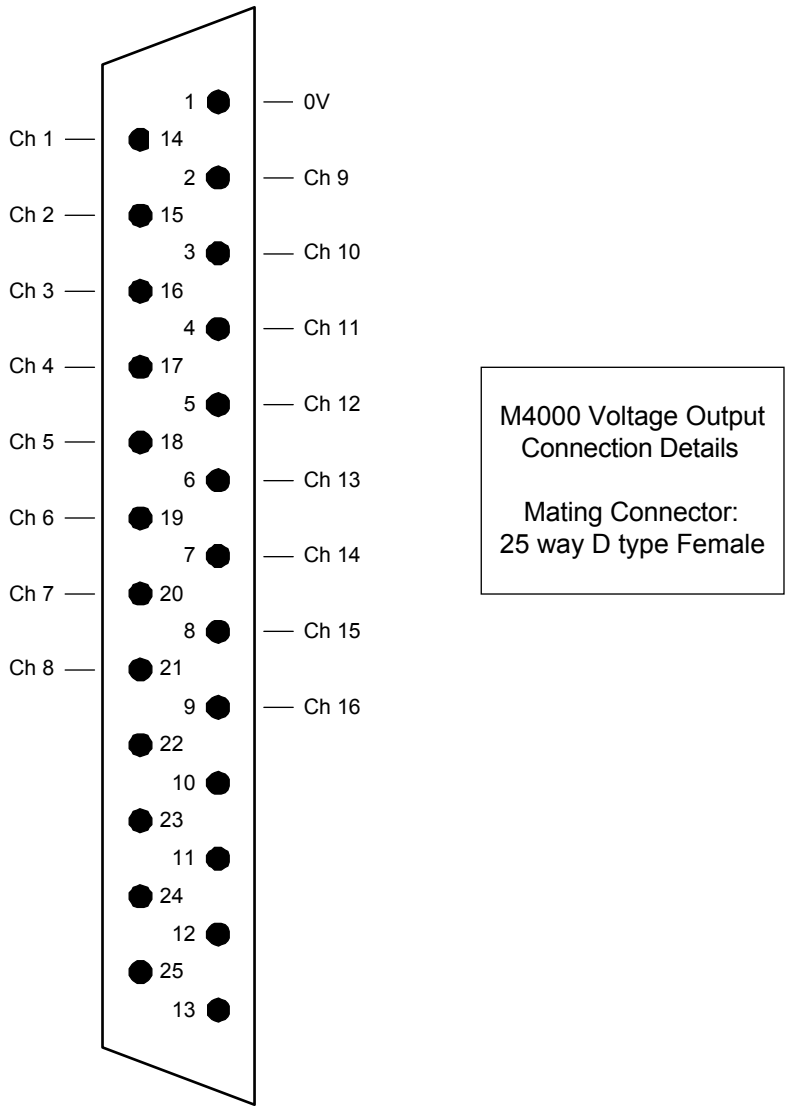

Figure 8

Trigger Input.

This input is available on the rear panel of the M4000 as shown in Figure1. The connections for this are shown in Figures 9 and 10. It is possible to configure up to 4 triggers as shown but normally only one on PAO would be used. Software set up is by virtual instrument and the Quatech Digital I/O element from the SnapMaster device library.

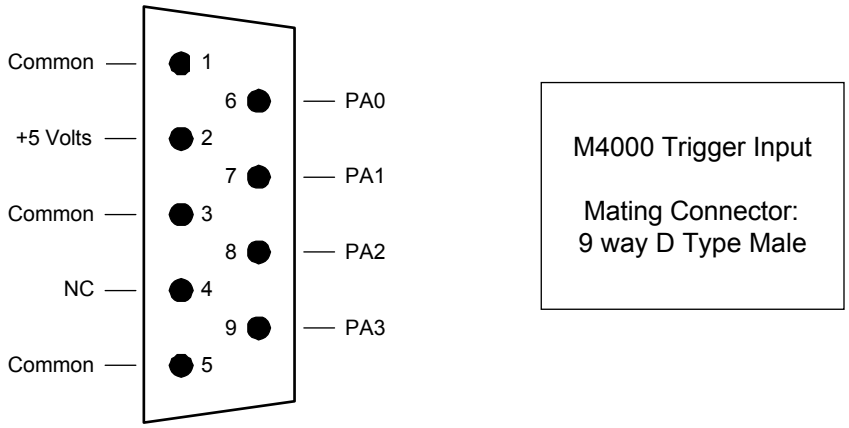

Figure 9

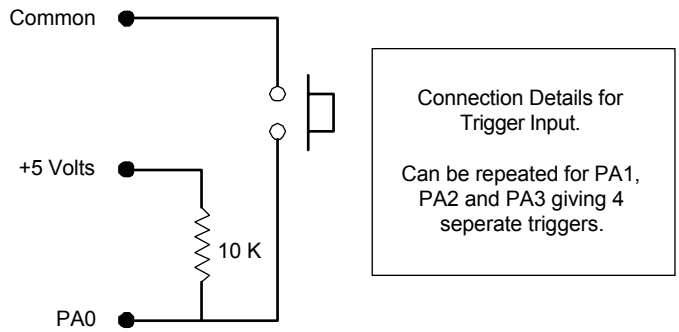

Figure 10