R. M. Young Model 05103 Wind Monitor

Introduction
The R. M. Young model 05103 Wind monitor measures horizontal wind speed and direction. The wind speed is detected via a propeller produces an AC sine wave signal with frequency proportional to wind speed.

The wind direction is via a weather vane whose position is transmitted by a precision potentiometer. With a constant voltage applied to the potentiometer, the output signal is an analog voltage directly proportional to wind direction angle.

Requirements
DT80 Range Series 2 *dataTaker* data logger.
R. M. Young Model 05103 Wind monitor.
Wiring.

Wind speed
The wind speed output is a Hall Effect out put with 6 pulses per revolution. This type of output can be fed directly into high speed counters 1C or 2C as they have low threshold capability. A polynomial is an easy method to scale the pulses to velocity. The first term of the polynomial being 0 and the second term the supplies calibration factor.

Wind direction
The wind direction output is a 10 kOhm continuous turn potentiometer. R. M. Young recommends this is powered with Voltage excitation and read as a Voltage. The *dataTaker* can supply a Voltage of approximately 4 VDC to excite the potentiometer using the V channel option. For best accuracy the *dataTaker* measures the potentiometer excitation Voltage, then the potentiometer output Voltage. The ratio of the two is then used to calculate the wind direction.
Because the supply Voltage of 4 VDC exceeds the normal input range of the ***DT80*** range the High Voltage (HV) channel type must be used to avoid over ranging the input.
It should be noted that while the vane can rotate through 360 degrees the output has a dead band of 5 degrees so the physical output is a maximum of 355 degrees.

Sensor Notes

Physical Connections:

Junction box	*DT80* range logger
Shield	DGnd.
Earth Ground	DGnd.
WS REF	DGnd.
WD REF	Analog #
WD SIG	Analog -
WD EXC	Analog * with link to +
WS SIG	1C or 2C (High speed counters)

Note: *The Jumper for common reference, J1, must be removed. This jumper physically links the Analog and Digital grounds thus breaking the isolation of the DT80 Analog sub-section and the Digital sub-section. If left connected may cause noise and ground loop problems. Please refer page 5 of the R.M. Young 05103 manual for further details on removing this link.*

Programming;

WIND SPEED vs OUTPUT FREQUENCY
m/s = 0.0980 x Hz
knots = 0.1904 x Hz
mph = 0.2192 x Hz
km/h = 0.3528 x Hz

Example code;

DeTransfer or web UI

```
BEGIN
'=============================================================
'
'          DT80 Code to read R. M. Young Model 05103 Wind monitor.
'
'                         dataTaker Tech Support 21 Oct 2008
'
'=============================================================

Y1=0,0.098"m/s"                    'Scaling from frequency to m/s

RA1S
      1HSC(LT,R,RS,Y1)        'Read frequency in Hz and scale to m/s
      1+HV(V,=1CV,W)          'Read excitation Voltage
      1-HV(V,=2CV,W)          'Read output Voltage
      3CV(ff2,S2)=(2CV/1CV)*360   'Calculate wind direction.
END
```


DeLogger5

Configuring Wind speed

In the *DT80* program builder click on scaling tab and enter the wind speed conversion factor as the first two terms of a polynomial. (Fig 1.)

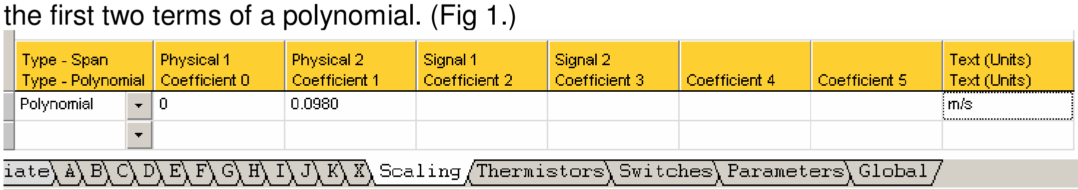

Fig 1. Defining the wind speed scaling.

In the schedule where the data is to be reported select;

Signal; Counter
Type; High Speed Counter
Wiring; High speed counter number
Resetting counter
Low threshold

This will create the channel definition as per Fig.2

Signal	Type	Wiring
Counter	HSC	1HSC(R,LT)

Fig.2. Channel type configuration for wind speed.

Channel options required to complete the configuration select;

Scaling; Polynomial created in Fig. 1
Data manipulation: RS.

This will create the channel options as per Fig.3.

Scaling	Destination	Alarm	Statistical	Variables	Data Manipulation
Y1					RS

Fig. 3. Channel options required for wind speed.

Configuring Wind Direction

The wind direction requires us to read two High Voltage channel types and read the values into a channel variable. The ratio of the output to input is then calculated and scaled to degrees.

To read sensor excitation Voltage select (Fig.4.);

Signal; Voltage
Type: High Voltage.
Wiring; Channel Number
Shared input between + and # terminals

Signal	Type	Wiring
Counter	HSC	1HSC(R,LT)
Voltage	HV	1+HV

Fig. 4. Wind direction excitation Channel Type.

Channel options required to complete the configuration select;

Destination; W (Working channel)
Variables: =nCV.
CV Number: 1

This will create the channel options as per Fig. 5.

Factor	Scaling	Destination	Alarm	Statistical	Variables	D
	Y1		...	...	...	RS
		W	...	...	=1CV ...	

Fig.5. Sensor excitation channel option.

To read sensor output Voltage select (Fig. 6.);

Signal; Voltage
Type: High Voltage.
Wiring; Channel Number
Shared input between - and # terminals

Signal	Type	Wiring	L
Counter	HSC	1HSC(R,LT) ...	
Voltage	HV	1+HV ...	
Voltage	HV	1-HV ...	

Fig. 6. Sensor excitation channel options

Channel options required to complete the configuration select;

Destination; W (Working channel)
Variables: =nCV.
CV Number: 2.

This will create the channel options as per Fig. 7.

Scaling	Destination	Alarm	Statistical	Variables
Y1		...	...	...
	W	...	...	=1CV ...
	W	...	...	=2CV ...

Fig. 7. Sensor output channel options.

To calculate the Wind Direction select (Fig. 8.);

Signal; Channel Variable

Type; CV

Signal	Type	Wiring
Counter	HSC	1HSC(R,LT)
Voltage	HV	1+HV
Voltage	HV	1-HV
Channel Variable	CV	1CV

Fig. 8. Wind Direction calculated channel

Then click on Wiring and enter (2CV/1CV)*360 in the formula window and select the output Channel Number (Channel Variable number) (Fig. 9.)

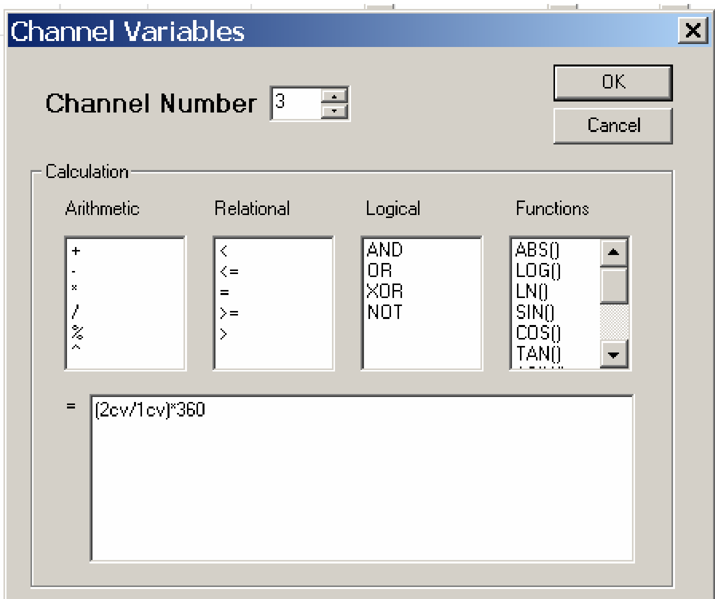

Fig. 9. Calculation of wind direction normalized for excitation Voltage

The final *DeLogger* screen will look similar to Fig. 10.

Signal	Type	Wiring	Label	Factor	Scaling	Destination	Alarm	Statistical	Variables	Data Mar
Counter	HSC	1HSC(R,LT)	Wind speed		Y1					RS
Voltage	HV	1+HV				W			=1CV	
Voltage	HV	1-HV				W			=2CV	
Channel Variable	CV	3CV=(2cv/1...	Wind direction							

Fig. 10. *DeLogger DT80* program builder configuration.

Sensor Notes