Interfacing To Climatronics Tacmet II Sonic Weather Station

1.0 General

The CPP-3794 provides an interface with the Climatronics Tacmet II Sonic Weather Station. The basic unit provides horizontal wind speed and horizontal wind direction readings. In addition, temperature, relative humidity, and barometric pressure sensors can be added to the package to provide a complete weather station. The CPP can be configured to collect any or all of these parameters from the Tacmet II.

The Tacmet II broadcasts readings every second. At initialization, the CPP recognizes the Climatronics name and automatically configures itself to capture and process the broadcast data. The standard factory default for the Tacmet II is 19.2K Baud, although some are delivered as 9600 Baud units. The channels set up in the CPP to collect data from the Tacmet II should be configured for 19.2K baud, unless the Baud rate in the Tacmet II has been changed. Then the CPP should be configured to correspond to the Tacmet II.

2.0 Connections

Because the Tacmet II operates in the broadcast mode, it must be connected to an independent comm port on the CPP. The comm port can not be shared with other instrumentation or even another Tacmet II unit. The Tacmet II is provided with a serial RS-232 cable that normally terminates in a 9 pin female connector. To connect the Tacmet II to the CPP requires that pins 2 & 3 in the cable be reversed and the gender of the connector be changed to a male. There are industry standard components that can be purchased and used to accomplish this, or part number 9M9MTW can be ordered from H2NS, which will provide all of the necessary changes. In some cases, Climatronics has delivered the Tacmet II with a 9 pin male connector. This still requires that pins 2 & 3 in the cable be reversed. The part number from H2NS is 9F9MTW.

After the cable changes are made, connect the Tacmet II to any of the CPP's comm port number three's or to comm port #2.

The comm ports in both the CPP and the Tacmet II can be setup for either RS-232 or RS-485 communications. Both should be set to the same mode. Presented below are the pin connections for either configuration.

The CPP also provides a rear panel connection to provide power to the Tacmet II units. The red wire from the Tacmet II should be connected to the positive terminal on the CPP back panel and the black wire should be connected to the negative terminal. The CPP can provide power for four Tacmet II units.

The Tacmet II defaults to 19.2K Baud operation. This can be changed. It is only important that the Baud rate in both the CPP and the Tacmet II be the same. In actual practice, using the manufacturer defaults eliminates a source of potential error. The Tacmet II RS-232 word length should always be set for 8 bits, no parity, and one stop bit.

Rear Panel Connectors

H2NS installs a 6 pin, RJ11, connector into the CPP rear panel. The majority of applications only use four of the 6 pins, which are pins 2,3,4,5. A null modem can be readily implemented by either twisting or not twisting the cable, which is readily detectable because the cable is color-coded. **Standard, purchased telephone cables are twisted.** Presented below are the pin assignments set up by H2NS for the RJ11 connector.

1 2 3 4 5 6
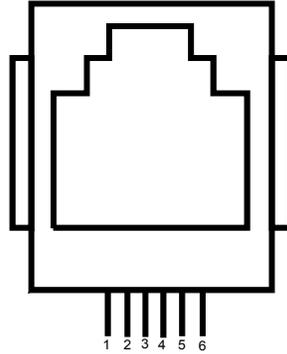
1	RTS Output
2	TX+ Output of CPP
3	Gnd (TX- in RS-422/485)
4	Gnd (RX- in RS-422/485)
5	RX+ Input to CPP
6	CD Input
7	

H2NS can also provide RS-232 connectors that are terminated in an RJ11 connector. One of the RS-232 connectors can be connected to an instrument and then connected with an RJ11 cable to the CPP. The wire colors for the 9 pin, DB male and female connectors are given below

Pin	9 Pin Male	9 Pin Female
1	Blu	Wht
2	Yel	Blk
3	Grn	Red
4	Red	Grn
5	Blk	Yel
6	Wht	Blu

DB9 Pin Connectors on CPP Rear Panel

Several communication ports on the CPP also have female DB9 pin connectors. The pin assignments are given below.

DB9		Signal
1	CGD	Chassis ground
2	TXD	RS-232 serial out

3	RXD	RS-232 serial in
4	TX-	RS-422/485
5	GND	Ground
6	RX+	RS-422/485
7	RX-	RS-422/485
8	RTS	Request To Send RS-232/422/485
9	TX+	RS-422/485

If the Tacmet is being connected into a CPP comm port that only has an RJ-11 connector, a DB9 to RJ-11 connector should be used. The Tacmet plugs into the DB9 and the telephone line pigtail plus into the CPP. The type of connector depends on the mating connector installed on the Tacmet cable.

3.0 Initialization
The CPP is initialized via the operator port, comm port #4. This can also be done over comm port #1, by entering SETQ, which switches comm port #1 to comm port #4. Entering an **I<cr>** brings up the Main Menu. Selecting the channel initialization results in the CPP asking a series of questions as presented below. Operator responses are in **bold**, and **<cr>** means a carriage return. The numbers 1.), 2.) and so forth are used for discussion purposes only and are not printed in an actual system initialization. In the Main Menu there is a Met Set Up option. To collect wind speed and wind direction data, they must be set up in this selection. Reference section 5.0 below.

1.)   Channel # = **1<cr>**
2.)   Name = NAME **WD<cr>**
3.)   Units = UNITS **DEG<cr>**
4.)   Full Scale = 100.0 **360.0<cr>**
5.)   Zero = 0.0 **0.0<cr>**

6.)   Instrument Manufacturer
        00 =   Other
        01 =   API
        02 =   CLI
        03 =   Thermo
7.)   Setting = 01 **02<cr>**

8.)   CLI MODEL #
        01 =   WS-TMII
        02 =   WD-TMII
        03 =   TMP-TMII
        04 =   RH-TMII
        05 =   BP-TMII
9.)   Setting = 01 **2<cr>**

10.) Half Dpx(H), or Full Dpx(F) = **F <cr>**
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11.)   Comm Port (3-00 Thru 3-08) = 3-01 3- **2<cr>**

12.)   Baud Rate
        1 = 300, 2 = 1200, 3 = 2400, 4 = 4800, 5 = 9600, 6 = 19.2K, 7 = 38.4K = 5 **6<cr>**

13.)   Instrument ID = 0000 **<cr>**
14.)   IMD Installed = 00 **<cr>**
15.)   # Points For Interim Avg = 01 **04<cr>**
16.)   # Points For Final Avg = 01 **9<cr>**
17.)   Unip(U)/BIP(B) = U**<cr>**
18.)   Unip(U)/Bip(B) Cals = B**<cr>**
19.)   Channel # = **<cr>**

Line one simply asks which channel is to be initialized. A carriage return here exits back to the Main Menu. In other steps, a carriage return input leaves the setting unchanged and the CPP goes to the next question. In cases where the operator must provide an input, the CPP asks the same question again.

Lines 2 through 5 request information that is not required for proper operation when interfaced to an instrument over the serial port. It is, however, good operating procedures to set these inputs to match those in the instrument. The correct full scale and zero values are required if data stored in the CPP is being output to some other device (for example, Odessa Engineering's Envicom program) in a binary format. This is also true of channels set up as ADC input channels.

Channel names and the units can be up to six characters in length. The full scale and zero values can be four digits in length and the number of digits after the decimal point (if a decimal point is used) must be the same in the full scale and zero inputs. The inputs can also have a minus sign.

Line 6 lists all of the manufacturer drivers that are resident in this software version. In the example, three manufacturers are presented.   As the manufacturers are alphabetized, the numbers delineating the various manufacturers will change depending on how many drivers are installed.

In Line 7 of our example, the operator selected Climatronics as the manufacturer. The CPP then prints a list of the model numbers that are supported for the Climatronics instrument line.

In Line 8 & 9, the operator input a **2** which selects the wind direction parameter.

Line 10 is asking if the units are connected in a half of full duplex configuration. Almost all instruments operate in a full duplex mode, which is the most straightforward method. Half-duplex operation is not supported with the Climatronics instrumentation.

In Line 11 the CPP asks to which comm port this analyzer is going to be connected. This is the connector on the CPP into which the cable from the instrument is plugged. The allowable inputs are 0-8. In addition, comm port #2 can be used to accept a broadcast input. If using comm port #2, the correct input is **C2**. In our example the operator selected comm port 3-**2**. The comm port nomenclature should not be made

overly complicated or confusing. Although comm Ports 3-0 through 3-8 are independent serial ports, internally the comm port 3 designation references interfacing to the instrumentation. Comm port 3-0 addresses comm port #3 physically located on the CPP printed circuit board and labeled comm #3 on the CPP back panel. Comm ports 3-1 through 3-8 address comm ports physically located on the expansion printed circuit board and are labeled comm 3-1 through comm 3-8 on the CPP back panel.

In line 12, the CPP is asking what Baud rate should be used to communicate with this instrument. This setting must be the same as that set up in the instrument.

Line 13 asks if an instrument ID is required. No instrument ID's are required with the Tacmet II.

Line 14 is asking if an IMD (Intelligent Multidrop Device) is installed in this comm port cabling. The IMD, manufactured by H2NS, allows a number of different instruments to be connected to a single comm cable. The instruments can have different protocols and even different Baud rates. This is very useful when a collection of instrumentation is located remotely from the CPP. The IMD allows only one cable to be run between the CPP and the instruments, with the IMD providing the instrument multiplexing locally at the instruments. The IMD supports addresses from 01 through 60. An address of 00 indicates that an IMD is not installed in this comm cabling.

Instruments that broadcast, such as the Climatronics Tacmet II can not have an IMD installed.

Lines 15 & 16 are questions regarding data validity qualifiers. The first (line 15) asks how many valid one minute samples the CPP must have to qualify the interim average as valid. Question 16 asks the same in regards to the final average. Reference the CPP manual for a more detailed discussion of status.

Lines 17 & 18 do not really apply to meteorological signals. It allows negative data values to be set to zero.

4.0 Error Log
The CPP maintains a running error log that lets the user determine if communications are occurring properly.   After connecting instrumentation clear the error log by inputting an **EC<cr>**. After some period of time (two to three minutes) check the error log (**E<cr>**) for errors.   In proper operation, there should be no errors. The Error Log lists the following.

No Response   - No response from the instrument to an interrogation
Response Error   - CPP received response but detected an error in the data field
Unknown Response   - CPP received a response but could not decode the response
Model # Error   - CPP received a response but not from the type of
                             instrument it is configured to interrogate on this channel

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Note: The error log will not flag a no response error from instrumentation

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> that broadcasts. If a response is being received, then all other types of errors will be detected and logged. The minute averages (**PM**) should be printed out to ensure proper data collection.

The three most common causes of errors are, the cable does or does not need a null modem, or the cable is connected to the wrong comm port on the CPP, or the Baud rate set in the CPP does not match that set in the instrument. One error possibility with the Tacmet II is setting up the CPP to collect parameters from the Tacmet II, such as barometric pressure, and that particular Tacmet II unit does not have the sensor installed. In such cases, the CPP flags the data as missing and the error log would be accumulating Model # Errors.

5.0 Met Set Up
The above procedure set up the CPP to receive data strings from the Tacmet sensor. Each minute, the CPP will also take a sample of each parameter and store it in the one minute register. For wind speed and wind direction parameters, this is not normally adequate. The WS/WD needs to be properly averaged and stored. This is done by selecting the Met Set Up option from the Main Menu. This set up procedure is covered in the CPP manual.

The CPP supports Vector or Scalar averaging of wind speed and wind direction. The unit also supports two types of sigma theta calculations. The standard uses one-second samples over the entire final averaging interval to form the sigma theta. The revised calculation uses the variance calculated for each fifteen-minute period to calculate the final sigma theta. A discussion of the meteorological calculations and the equations employed are presented in Tech Note 09.

Reference the CPP manual to set up the meteorological parameters.