

### XMODEM Data Transfers

In addition to the standard commands above, the Computer Interface will output logged data using the XMODEM protocol with either CRC or checksum, as requested by the host software. The final XMODEM data block will be padded with ASCII NUL characters (hex value zero) if necessary. The XMODEM output does not require the initial colon attention character. If an XMODEM transfer is in progress, send two consecutive colon characters to terminate the transfer. The data retrieved via XMODEM is in the same format as described for the :O command above, except that each data line does not have the checksum field, as the XMODEM protocol includes error checking.

## MKIIICC Computer Interface Instruction Manual



### 1. Assembling the computer interface

#### Connecting the receiver.

The black box housing the receiver is connected to the interface by means of a 5-foot cable with telephone jacks on either end. Plug one end into the computer interface and the other into the black box.

#### Connecting power.

The 9 volts DC wall-transformer is connected to the black box receiver. On power up the LED will flash once and will remain off until a packet of information is received. The LED will then flash every 2 seconds until the next packet is due to be received. When the packet is received the LED will stay on for 1 second to indicate that a packet was received. If the unit does not receive a packet the LED will remain off.

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### **Connecting to a computer.**

The MKIIICC is connected to the computer using the serial cable provided. Connect one end into the computer interface and the other into a free serial port on the computer.

### **Battery backup.**

You should install 6 AA NICAD batteries in the MKIIICC. This will keep the CC running for 6-8 hours when power is lost. The batteries will also prevent logged data from being lost during a power outage. **DO NOT USE ALKALINE OR NiMH BATTERIES.**

Remove the cover of the CC by unscrewing the 2 screws to get access to the battery holders. Failure to install batteries will result in lost data during and after a power outage.

### **RAM Capacity:**

The Computer Interface has a 32K RAM for data logging. However, since the data is stored internally in a compressed format, the system will output more than 200K of data if the RAM is full. When the RAM is full, the oldest item is deleted each time a new item is logged; therefore, the RAM always has the most recent data available.

The 32K data RAM holds approximately 2450 items. The recording period before the RAM fills is dependent on the Logging Interval, as one item is stored each recording interval. In addition, five items are stored daily at midnight. At the default 20 minute recording interval, the Computer Interface will record for 31 days before the RAM fills. Thus, if the data is transferred to the PC at least once per month, a complete weather record will be obtained. If the data will be uploaded more frequently, the Computer Interface can be set to log more often. At the one minute interval, the RAM will fill in 1.5 days. Conversely, at the 60 minute interval, the RAM will fill in 93 days.

### **Software.**

The computer interface is shipped with two software programs WeatherView32 and WeatherLab. Both are basic packages suitable for data logging and viewing of weather information. Upgrades are available for both, refer to their respective web sites.

<http://www.weatherview32.com>

<http://www.ambientweather.com>

*For users of Weatherview32 and Weatherlab this is as far as you need go in this manual. Refer to the programs instruction manuals.*

**Q** Query RAM: The Computer Interface outputs the number of items logged.

**R** Rainfall output. The logger outputs all three rainfall counters: the daily total, monthly total, and total rainfall, and the time that the total was reset.

Sample Output (1.35 inches of rain today, 1.44 inches for the current month, and 16.58 inches total since Aug 3):

1.35, 1.44, 16.58, 08/03, 16:52, !174

**S** Reset daily and monthly rainfall to zero. The Computer Interface responds "OK"

**T** Reset Total rainfall to zero. The Computer Interface responds "OK"

**U** Set the output error detection to 16 bit CCITT-CRC or checksum. Each time this command is issued the computer interface will toggle modes and output either **CRC** or **SUM** with CRLF. By default the unit is set to checksum for backwards compatibility. When CRC is enabled each line of the data dump will include a CRC. The CRC is calculated from the first character up until (not including) the '!'. The CRC is formatted in 5 digit ASCII.

**V** Version Number. The Computer Interface responds with the EPROM revision code for itself and for the sensor package.

Sample Output:

Version 418:42 Sensors: 21

**W** Reset high wind speed. The high wind speed, which is output with the :D command, is reset to the current wind speed.

**Y** RAM Test and clear. The RAM is tested. This test clears all system data. This command must be entered twice to confirm the test. If the test succeeds, the system responds "OK". Otherwise an error message is output. Contact RainWise in this case.

**Z** Clear all logged data. The system responds "OK".

*Continued on the next page...*

**K** Set Computer Interface's clock: After the K, the host sends the date and time to the logger as MMDDhhmmss<cr>. For example, :K0603153456<Enter> sets the logger's clock for June 3, at 3:34:56 PM. The logger will respond "OK" if it receives a valid time after the K, or "Clock not set." if any other character is received. Use the :D command to verify that the time and date were set properly.

**L** Logging interval: The Computer Interface outputs the current data logging interval, in minutes. Sensor data is logged to RAM at each multiple of the logging interval. For example, if the interval is 20 minutes, data is logged on the hour and at 20 and 40 minutes past the hour.

**M** Min/Max data: The logger responds with a tag character of "M" and the daily minimum value, time of occurrence, daily maximum value, and time of occurrence, for each sensor. The output is one long line. The sensor order is as in the Data Format list. If there is no data from the Sensor unit, each item will show "NO DATA"

Sample Output (this is output as one long line):

```
43,09:53, 50,04:35, 93,00:00,
95,03:05,29.68,11:04,29.85,00:00, 0,00:00,
23,08:50, 23,08:50, 50,04:35,!151
```

**N** Reset min/max data: All minimum and maximum sensor values are set to the current sensor values and the current time. Note that the minimum and maximum values are automatically logged to RAM and reset daily at midnight.

**O** Output logged data: The Computer Interface outputs a text header, followed by one line of data for each logging interval, and several lines of daily min/max data logged at midnight. Each normal data item has a tag character of "D", and each midnight data item has a tag of "M". The system also writes special messages when the clock is reset or the data RAM is cleared. These messages have a tag of "E". The data order on each normal record is as shown in the Output Data Format section. The Wind speed item is the average for the recording interval period. The High wind speed is the highest for the recording interval.

Sample Output (with only one record logged):

```
>H, DATE, TIME, TEMP, HUM, BARO, WDIR, WSPD, WSHI,
RF_DAY, BATT, CHILL
D,12/07,10:25, 43, 93,29.70,067, 3, 10, 1.32,
6.51, 42
OK
```

## 2. Connecting to a modem

Rainwise offers a **Remote Access Kit**. This kit includes a pre-configured modem with all necessary cables. This kit allows you to just plug in the modem and you are done.

*Should you wish to use your own modem please read the following instructions.*

To make an external modem function with a weather station, it is necessary to configure the modem so that it will automatically answer the telephone and connect. The computer will use its modem to call the weather station modem, and establish a serial link with the weather station. The WeatherView32 and WeatherLab software may be configured to automatically connect to the Computer Interface via modem, or, you may use a simple terminal program such as HyperTerminal to dial the weather station and view the weather data

### Modem Requirements

1. The modem must be external and 14.4 Kb or higher.
2. The modem must have an RS232 port.
3. Serial cable with a DB-9 female connector.
4. The modem must have non-volatile memory ( many new cheap modems don't have this ).

To setup the weather station modem, plug it into the PC's serial port using the cable that came with the modem. Use a communications program to send commands to the modem. Set the communications program baud rate to match the weather station's baud rate. For the WS-2000 Computer Interface, set the communication software to 9600 baud, N,8,1. Note: If the PC has an internal modem, be sure to select the correct port to access the external modem rather than the internal modem. The following commands should configure most modems as required. Enter each command as shown in the table, and press <Enter>. The modem should respond as shown.

Command	Response	Action
AT&F	OK	Reset modem to factory default settings.
ATE0	OK	Echo OFF. (With echo on, text may appear doubled, i.e. AATTEE00)
ATM0	OK	Modem speaker OFF. This command is optional. With speaker on, you will hear the modem answering the telephone and receiving calls.
AT&C1	OK	Modem sets CD pin to show presence of carrier.If necessary, enter the command to set the modem's "host communication rate" to the rate required for the weather station. See below.

<b>ATS0=1</b>	OK	Modem will answer call after one ring. (Enter higher numbers to answer after more rings, e.g. send the command "ATS0=4" to answer after four rings.)
<b>AT+MS=V32,0</b>	OK	Set modem to V.32, essential when using a 56K V.92 modem.
<b>ATQ1</b>	(none)	Modem responses disabled. The modem will not output "OK" or "0"
<b>AT&amp;W</b>	(none)	Store current settings to the modem's non-volatile memory.

### MKIIICC Modem Cable

The computer interface can be connected to the modem using a standard straight through modem cable ( the one that you use to connect to a PC ). The cable supplied with the MKIIICC is for use with a computer only.

### Modem "Host Connection" Baud Rates

The weather station serial port always operates at a specific baud rate. The modem connected to the weather station must communicate with the station at this rate, or else the data will be garbled. Low speed modems transfer data to the host device (in this case, the weather station) at whatever baud rate is used for the modem-to-modem telephone connection. For example, if a low speed modem is called from a remote modem at 2400 baud, it will communicate with its host weather station at 2400 baud; if it is called at 9600 baud, it will communicate with its weather station at 9600 baud. Thus, with such a modem, it is necessary that the remote PC establish the telephone connection at the necessary baud rate for the weather station. However, high speed modems will communicate with their local host at a different rate than the modem-to-modem data rate. Therefore, special care is necessary to assure that the weather station modem will always output data to the station at the proper baud rate. Some modems reset their host connection rate to the maximum every time the modem is turned on, and use an "AT" command to synchronize the baud rate with the host. However, when such a modem answers a call, the station does not send any "AT" command. Therefore, there will be a baud rate mismatch, and the weather station will not receive the data. The modem will answer and connect, but the weather station will not respond. With many modems, it is possible to specify the default host connection baud rate with an "AT" command. However, the required command is not part of the original "AT" command set, and therefore the command sequence varies from modem to modem. Consult the modem documentation for details.

## 3. Interface Configuration

### Interface Configuration:

Interface: RS-232  
 Baud Rate: 9600  
 Data Bits: 8  
 Parity: none  
 Stop Bits: 1  
 Handshaking: none

## 4. Command Format

All standard commands to the Computer Interface begin with a colon character, (:). This serves as the attention signal to the system. The Computer Interface will respond with a greater-than character (>). After the greater-than prompt is received, the host sends a single letter command from the list below. The Computer Interface will respond with one or more lines of data or messages. If an unknown command letter is received after the colon, the Computer Interface will respond with a question-mark character (?).

**A** Automatic output: The Computer Interface responds "OK", and then will output one line of data each time it is received from the WS-2000 or WT-2000 Sensor package. Each line has the same format as in the Current Data command (:D) below. To end the automatic output, send a : character to the Computer Interface. This command may be used to verify the signal received from the sensor package. In normal operation, the Computer Interface should output data every two seconds. If the received signal is weak, data will be output less frequently or not at all.

**B** Barometer altitude correction (418 MHz systems only): After the B, the host sends the adjusted pressure as four digits with no period, followed by a carriage return. (The pressure is in inches of mercury). For example, :B2985<Enter> sets the pressure to 29.85 inches Hg. The Computer Interface will respond with "OK" if the adjusted pressure is within the valid range, otherwise it will respond "Input too small" or "Input too big". The valid adjustment range is 16.00 to 33.00 inches of mercury.

To remove the offset adjustment, enter a pressure of zero, for example, :B0<Enter>. After this command, the computer interface will report the absolute pressure.

(NOTE: If you are using the WeatherView32 software, you may use the Weather Station Properties dialog to offset the pressure.)

**D** Current Data output: The Computer Interface responds with a single line of sensor data, as a comma-separated list in the order shown in the Output Data Format section. For normal data, the tag character will be "D". The Wind speed field is the current speed. The High wind speed is the maximum recorded since this item was reset with the :W command. The Rainfall field is the daily total for the current day. If the Computer Interface has not received data from the Sensor package, the tag character will be "E", followed by the text "No Data Received"

### Sample Output:

```
D,12/07,10:28:12, 43, 93,29.70,135, 0, 50, 1.32, 6.51, 43,!197
```

**I** Increment logging interval: The Computer Interface switches to the next logging interval, and outputs the new value: 1, 2, 5, 10, 15, 20, 30, or 60 minutes. See also the :L command, below.