Product Manual

Sensor

P2546A and P2546C

Anemometers

Rev: 10/18

RELIABLE SINCE 1974 MONITORING

CAMPBELL SCIENTIFIC

Limited Warranty

"Products manufactured by CSI are warranted by CSI to be free from defects in materials and workmanship under normal use and service for twelve months from the date of shipment unless otherwise specified in the corresponding product manual. (Product manuals are available for review online at *www.campbellsci.com*.) Products not manufactured by CSI, but that are resold by CSI, are warranted only to the limits extended by the original manufacturer. Batteries, fine-wire thermocouples, desiccant, and other consumables have no warranty. CSI's obligation under this warranty is limited to repairing or replacing (at CSI's option) defective Products, which shall be the sole and exclusive remedy under this warranty. The Customer assumes all costs of removing, reinstalling, and shipping defective Products to CSI. CSI will return such Products by surface carrier prepaid within the continental United States of America. To all other locations, CSI will return such Products best way CIP (port of entry) per Incoterms ® 2010. This warranty shall not apply to any Products which have been subjected to modification, misuse, neglect, improper service, accidents of nature, or shipping damage. This warranty is in lieu of all other warranties, expressed or implied. The warranty for installation services performed by CSI such as programming to customer specifications, electrical connections to Products manufactured by CSI, and Product specific training, is part of CSI's product warranty. **CSI EXPRESSLY DISCLAIMS AND EXCLUDES ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE**. **CSI hereby disclaims, to the fullest extent allowed by applicable law, any and all warranties and conditions with respect to the Products, whether express, implied or statutory, other than those expressly provided herein.**"

Assistance

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To obtain a Returned Materials Authorization (RMA) number, contact CAMPBELL SCIENTIFIC, INC., phone (435) 227-9000. Please write the issued RMA number clearly on the outside of the shipping container. Campbell Scientific's shipping address is:

CAMPBELL SCIENTIFIC, INC.
RMA#_____
815 West 1800 North
Logan, Utah 84321-1784

For all returns, the customer must fill out a "Statement of Product Cleanliness and Decontamination" form and comply with the requirements specified in it. The form is available from our website at *www.campbellsci.com/repair*. A completed form must be either emailed to *repair@campbellsci.com* or faxed to (435) 227-9106. Campbell Scientific is unable to process any returns until we receive this form. If the form is not received within three days of product receipt or is incomplete, the product will be returned to the customer at the customer's expense. Campbell Scientific reserves the right to refuse service on products that were exposed to contaminants that may cause health or safety concerns for our employees.

Safety

DANGER — MANY HAZARDS ARE ASSOCIATED WITH INSTALLING, USING, MAINTAINING, AND WORKING ON OR AROUND **TRIPODS, TOWERS, AND ANY ATTACHMENTS TO TRIPODS AND TOWERS SUCH AS SENSORS, CROSSARMS, ENCLOSURES, ANTENNAS, ETC**. FAILURE TO PROPERLY AND COMPLETELY ASSEMBLE, INSTALL, OPERATE, USE, AND MAINTAIN TRIPODS, TOWERS, AND ATTACHMENTS, AND FAILURE TO HEED WARNINGS, INCREASES THE RISK OF DEATH, ACCIDENT, SERIOUS INJURY, PROPERTY DAMAGE, AND PRODUCT FAILURE. TAKE ALL REASONABLE PRECAUTIONS TO AVOID THESE HAZARDS. CHECK WITH YOUR ORGANIZATION'S SAFETY COORDINATOR (OR POLICY) FOR PROCEDURES AND REQUIRED PROTECTIVE EQUIPMENT PRIOR TO PERFORMING ANY WORK.

Use tripods, towers, and attachments to tripods and towers only for purposes for which they are designed. Do not exceed design limits. Be familiar and comply with all instructions provided in product manuals. Manuals are available at www.campbellsci.com or by telephoning (435) 227-9000 (USA). You are responsible for conformance with governing codes and regulations, including safety regulations, and the integrity and location of structures or land to which towers, tripods, and any attachments are attached. Installation sites should be evaluated and approved by a qualified engineer. If questions or concerns arise regarding installation, use, or maintenance of tripods, towers, attachments, or electrical connections, consult with a licensed and qualified engineer or electrician.

General

- Prior to performing site or installation work, obtain required approvals and permits. Comply with all governing structure-height regulations, such as those of the FAA in the USA.
- Use only qualified personnel for installation, use, and maintenance of tripods and towers, and any attachments to tripods and towers. The use of licensed and qualified contractors is highly recommended.
- Read all applicable instructions carefully and understand procedures thoroughly before beginning work.
- Wear a **hardhat** and **eye protection**, and take **other appropriate safety precautions** while working on or around tripods and towers.
- **Do not climb** tripods or towers at any time, and prohibit climbing by other persons. Take reasonable precautions to secure tripod and tower sites from trespassers.
- Use only manufacturer recommended parts, materials, and tools.

Utility and Electrical

- **You can be killed** or sustain serious bodily injury if the tripod, tower, or attachments you are installing, constructing, using, or maintaining, or a tool, stake, or anchor, come in **contact with overhead or underground utility lines**.
- Maintain a distance of at least one-and-one-half times structure height, 20 feet, or the distance required by applicable law, **whichever is greater**, between overhead utility lines and the structure (tripod, tower, attachments, or tools).
- Prior to performing site or installation work, inform all utility companies and have all underground utilities marked.
- Comply with all electrical codes. Electrical equipment and related grounding devices should be installed by a licensed and qualified electrician.

Elevated Work and Weather

- Exercise extreme caution when performing elevated work.
- Use appropriate equipment and safety practices.
- During installation and maintenance, keep tower and tripod sites clear of un-trained or non-essential personnel. Take precautions to prevent elevated tools and objects from dropping.
- Do not perform any work in inclement weather, including wind, rain, snow, lightning, etc.

Maintenance

- Periodically (at least yearly) check for wear and damage, including corrosion, stress cracks, frayed cables, loose cable clamps, cable tightness, etc. and take necessary corrective actions.
- Periodically (at least yearly) check electrical ground connections.

WHILE EVERY ATTEMPT IS MADE TO EMBODY THE HIGHEST DEGREE OF SAFETY IN ALL CAMPBELL SCIENTIFIC PRODUCTS, THE CUSTOMER ASSUMES ALL RISK FROM ANY INJURY RESULTING FROM IMPROPER INSTALLATION, USE, OR MAINTENANCE OF TRIPODS, TOWERS, OR ATTACHMENTS TO TRIPODS AND TOWERS SUCH AS SENSORS, CROSSARMS, ENCLOSURES, ANTENNAS, ETC.

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P2546A and P2546C Anemometers

1. Introduction

The P2546A and P2546C are Class 1 anemometers often used for wind speed resource assessment and wind turbine power performance monitoring. The P2546A includes a reed switch that produces a switch closure output signal. The P2546C contains a coil that produces a low-level ac output signal. Our data loggers measure the output signal and convert the signal to engineering units (mph, m/s, knots).

NOTE This manual provides information only for CRBasic data loggers. For retired Edlog data logger support of the P2546A, see an older manual at *www.campbellsci.com/old-manuals*.

2. Precautions

- READ AND UNDERSTAND the *Safety* section at the front of this manual.
- The anemometers are precision instruments. Please handle them with care.
- Danger — Use extreme care when working near overhead electrical wires. Check for overhead wires before mounting the anemometer or before raising a tower.

3. Initial Inspection

- Upon receipt of the anemometer, inspect the packaging and contents for damage. File damage claims with the shipping company. Immediately check package contents against the shipping documentation. Contact Campbell Scientific about any discrepancies.
- The model number and cable length are printed on a label at the connection end of the cable. Check this information against the shipping documents to ensure the expected product and cable length are received.
- Each anemometer is shipped with a MEASNET calibration certificate that contains information concerning where the anemometer was calibrated, the calibration procedure used, the calibration equation obtained, and the serial number of the anemometer. Cross check the serial number in the calibration certificate against the serial number on the anemometer to ensure that the given sensitivity value corresponds to your sensor.

4. QuickStart

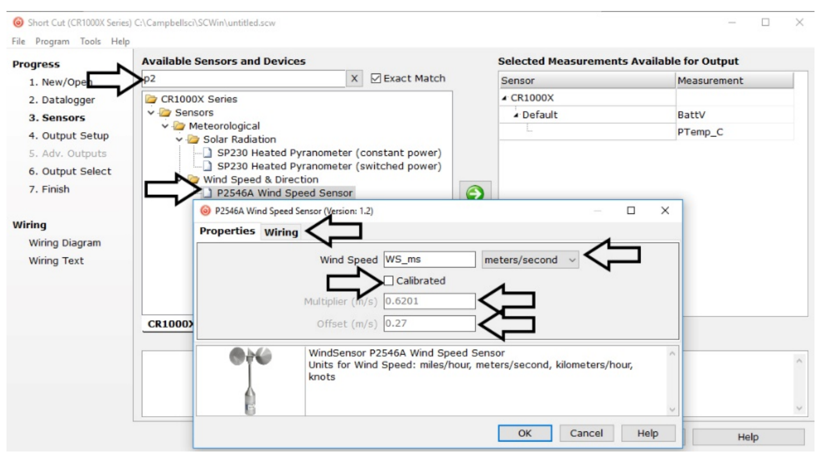
A video that describes data logger programming using *Short Cut* is available at: *www.campbellsci.com/videos/cr1000x-datalogger-getting-started-program-part-3*. *Short Cut* is an easy way to program your data logger to measure this sensor and assign data logger wiring terminals. *Short Cut* is available as a download on *www.campbellsci.com*. It is included in installations of *LoggerNet*, *PC200W*, *PC400*, or *RTDAQ*. The following procedure also describes programming with *Short Cut*.

NOTE The P2546C is currently not in *Short Cut*. Therefore, it must be programmed using CRBasic (Section 7.4, *Programming* *(p. 9)*, Appendix B.2, *P2546C Programs* *(p. B-3)*).

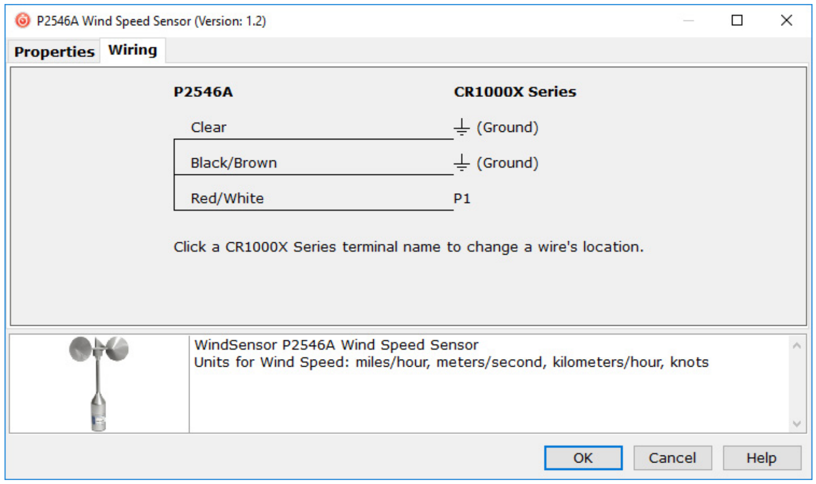
1. Open *Short Cut* and create a new program.

2. Double-click the data logger model.

3. In the **Available Sensors and Devices** box, type P2546 or find the sensor in the **Sensors | Meteorological | Wind Speed & Direction** folder. Double-click **P2546A Wind Speed Sensor**. The wind speed defaults to meters/second. This can be changed by clicking the **Wind Speed** box and selecting one of the other options. If you want to use the MEASNET calibration, select the **Calibrated** check box, and enter the multiplier and offset provided on the *MEASNET Calibration Certificate* shipped with your sensor.

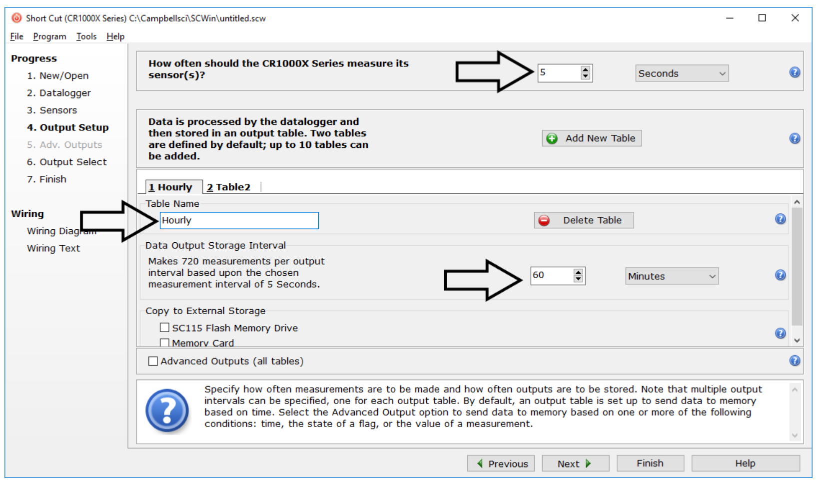


4. Click on the **Wiring** tab to see how the sensor is to be wired to the data logger. Click **OK** after wiring the sensor.

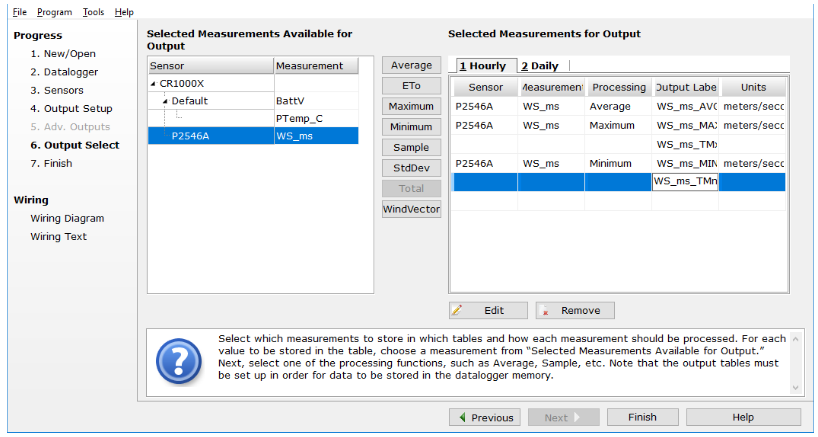


5. Repeat steps three and four for other sensors. Click **Next**.

6. In **Output Setup**, type the scan rate, meaningful table names, and **Data Output Storage Interval**.



7. Select the output options.



8. Click **Finish** and save the program. Send the program to the data logger if the data logger is connected to the computer.

9. If the sensor is connected to the data logger, as shown in the wiring diagram, check the output of the sensor in the data display in *LoggerNet*, *PC400*, *RTDAQ*, or *PC200W* to make sure it is making reasonable measurements.

5. Overview

The P2546A cup anemometer is a sturdy device that senses wind speed with a three-cup rotor assembly (see FIGURE 5-1). Permanent magnets mounted on the shaft cause a switch to close and open two times per revolution. The switch has no bounce, and is equipped with a special mechanism that reduces the variation in operating time over the frequency range. This feature facilitates obtaining instantaneous wind speed by measuring the time interval of each revolution.

The P2546C also has a three-cup rotor assembly (see FIGURE 5-1) and magnets mounted on the shaft. The magnets induce a sine wave voltage inside a coil that produces an output signal with frequency proportional to wind speed.

FIGURE 5-1. P2546A/P2546C Anemometer

The P2546A and P2546C anemometers are manufactured by Windsensor and cabled by Campbell Scientific.

6. Specifications

Features:

- Calibration — Each anemometer is shipped with a MEASNET certificate containing information about where the anemometer was calibrated, the calibration procedure used, the calibration equation obtained, and the serial number of the anemometer.
- Quality — Made entirely of durable materials such as anodized aluminum and stainless steel.
- Compatible with Campbell Scientific CRBasic data loggers: CR200(X) series, CR300 series, CR6 series, CR800 series, CR1000, CR1000X series, CR3000, and CR5000

NOTE Specifications are based on 80 wind tunnel calibrations performed according to the Measnet Cup Anemometer Calibration Procedure. The specified offset and gain are the mean values of these calibrations. Variation is calculated from the straight line of the mean values. All units were tested for 225 hours at 9 m/s, to reduce the initial bearing friction to a level close to the steady state value. Afterwards, bearing friction was tested at –15 °C and at room temperature. The allowed limits for this test assures that the temperature influence on the calibration is within the specified limit.

Starting Threshold:	< 0.4 m/s
Resolution:	0.001 m/s @ 10-minute average mode
Range:	0 to 75 m/s
Distance Constant:	$\lambda_0 = 1.81 \pm 0.04$ m

6.1 Calibration

Standard:	$U=A_0+B_0\times f$ Where: U=Wind speed in m/s f = Output frequency in Hz A_0 = 0.27 m/s B_0 = 0.620 m
Calibration:	Each anemometer individually calibrated compliant with IEC 61400-12-1
Calibration Mean Value:	U = 0.620 x f + 0.217 [m/s]
Variation of Calibrations:	σ = 0.015 m/s @ 10 m/s

6.2 Output Signal

6.2.1 P2546A Switching Characteristics

Signal Type:	Potential free contact closure
Duty Cycle:	40% to 60%
Maximum Switching Voltage:	30 V
Maximum Recommended Switching Current:	10 mA
Series Resistance:	330 Ω, 1 W

6.2.2 P2546C Output Signal

Signal Type:	Low-level AC sine wave
Output Voltage:	25 mV peak, minimum (@ 0.4 m/s); 14 V peak, typical (@ 75 m/s)
Output Resistance:	650 ± 50 Ω

6.3 Environmental

Operating Temperature:	–35 to 60 °C
Operating Humidity Range:	0 to 100% RH
EMC Compliance:	EN61326-1 Class A

6.4 Physical

Exterior Materials:	Anodized aluminum, stainless steel and GRP
Overall Height:	28.2 cm (11.1 in)
Swept Diameter of Rotor:	18.8 cm (7.4 in)
Weight:	0.40 kg (14.1 oz)

7. Installation

If you are programming your data logger with *Short Cut*, skip Section 7.3, *Wiring* *(p. 8)*, and Section 7.4, *Programming* *(p. 9)*,. Short Cut does this work for you. See Section 4, *QuickStart* *(p. 2)*, for a tutorial.

7.1 Siting

Locate the wind sensor away from obstructions, such as trees or buildings. The horizontal distance should be at least ten times the height of the obstruction between the wind sensor and obstruction. If mounting the sensor on a roof, the height of the sensor above the roof should be at least 1.5 times the height of the building. See Section 9, *References* *(p. 10)*, for a list of references that discuss siting wind speed and direction sensors. For power performance applications, refer to IEC 61400-12-1, which specifies the mounting and location of anemometers.

7.2 Mount the Sensor

1. Mount a crossarm to a tripod or tower.

2. If a pyranometer is also being mounted on the crossarm, orient the crossarm north-south, with the CM220 Right-Angle Mounting Kit on the end farthest from the equator. Otherwise, the crossarm may be oriented north-south, east-west, or any other angle desired.

3. Place the 30-inch mounting pipe in the bottom of the anemometer and secure the pipe to the anemometer using the set screws and Allen wrench (shipped with the anemometer).

4. Place the bottom of the mounting pipe in the CM220 U-bolt and tighten the nuts (FIGURE 7-1).

5. Use a bubble level to ensure that the anemometer is level.

6. Route the sensor cable along the underside of the crossarm to the tripod or tower, and to the instrument enclosure.

7. Secure the cable to the mounting pipe, crossarm, and tripod or tower using cable ties.

FIGURE 7-1. Mounting Pipe secured to a crossarm using the CM220 Right-Angle Mounting Kit

7.3 Wiring

P2546A connections to Campbell Scientific data loggers are given in TABLE 7-1. P2546C connections to Campbell Scientific data loggers are given in TABLE 7-2.

TABLE 7-1. P2546A Wire Color, Wire Function, and Data Logger Connection

Wire Color	Wire Function	Data Logger Connections Using a Pulse Terminal	Data Logger Connections Using a Control Terminal
White or Red	Signal	**U** configured for pulse input[1], **P** (pulse input), or **P_SW** (pulse, switch closure input)	**C** (control terminal)
Black or Brown	Signal Reference	⏚	**5V**
Clear	Shield	⏚ (analog ground)	⏚ (analog ground)

[1]**U** terminals are automatically configured by the measurement instruction.

TABLE 7-2. P2546C Wire Color, Wire Function, and Data Logger Connection

Wire Color	Wire Function	Data Logger Connection Terminal
White	Signal	**U** configured for pulse input[1], **P** (pulse input), or **P_LL** (pulse, low-level ac input)
Black	Signal Reference	⏚
Clear	Shield	⏚ (analog ground)

[1]**U** terminals are automatically configured by the measurement instruction.

7.4 Programming

Short Cut is the best source for up-to-date data logger programming code for the P2546A; the P2546C is currently not in *Short Cut*.

If your data acquisition requirements are simple and you are connecting the sensor to a pulse terminal, you can probably create and maintain a data logger program exclusively with *Short Cut*. If your data acquisition needs are more complex, the files that *Short Cut* creates are a great source for programming code to start a new program or add to an existing custom program.

NOTE *Short Cut* cannot edit programs after they are imported and edited in *CRBasic Editor*.

A *Short Cut* tutorial is available in Section 4, *QuickStart* *(p. 2)*. If you wish to import *Short Cut* code into *CRBasic Editor* to create or add to a customized program, follow the procedure in Appendix A, *Importing Short Cut Code Into CRBasic Editor* *(p. A-1)*. Programming basics for CRBasic data loggers are provided in this section. Complete P2546A and P2546C program examples for select CRBasic data loggers can be found in Appendix B, *Example Programs* *(p. B-1)*. Programming basics and programming examples for Edlog data loggers are provided at *www.campbellsci.com\old-manuals*.

Wind speed is measured by using the **PulseCount()** instruction. Syntax of the the **PulseCount()** instruction is:

```
PulseCount(Dest, Reps, PChan, PConfig, POption, Mult, Offset)
```

For the P2546A, set the *PConfig* parameter to switch closure (switch closure with pull up in the CR6 and CR1000X). For the P2546C, set the *PConfig* parameter to Low Level AC. Configure both anemometers to output the results in Hertz (Hz).

For both anemometers, the expression for wind speed (U) is:

$$U = MX + B$$

where

M = multiplier
X = number of pulses per second (Hertz)
B = offset

TABLE 7-3 lists the multiplier and offset to obtain meters per second (m/s) when the **PulseCount()** instruction is configured to output the result in Hz.

TABLE 7-3. Wind Speed Multiplier and Offset (measurements in m/s)

Calibration	Multiplier	Offset
Standard	0.620	0.27
MEASNET	Values listed on the MEASNET calibration sheet included with each sensor	

8. Troubleshooting and Maintenance

8.1 Troubleshooting

Symptom: No wind speed

1. Check that the sensor is wired to the pulse terminal specified by the **PulseCount()** instruction.

2. Verify that the *Configuration Code*, and *Multiplier* and *Offset* parameters for the **PulseCount()** instruction are correct for the data logger type.

8.2 Maintenance

Every month do a visual/audio inspection of the anemometer at low wind speeds. Verify that the anemometer bearings rotate freely. Inspect the sensor for physical damage. Replace the anemometer bearings when they become noisy, or the wind speed threshold increases above an acceptable level.

CAUTION Disassembling an anemometer to change the bearings will invalidate the MEASNET calibration.

MEASNET calibrations are normally valid for 12 months in the field (assuming the anemometer is installed within 6 months of the calibration test). In high-accuracy applications, Campbell Scientific recommends that the anemometer be returned to us for maintenance/overhaul between deployments; we can arrange for a new MEASNET calibration after maintenance/overhaul where required.

Before the anemometer is sent to Campbell Scientific, the customer must get an RMA (returned material authorization) and fill out the Declaration of Hazardous Material and Decontamination form. Refer to the *Assistance* page for more information.

9. References

IEC 61400 Part 12-1, "Wind turbine generator systems Part 12: Wind Turbine Power Performance Testing".

The following references give detailed information on siting wind speed and wind direction sensors.

EPA, 1989: *Quality Assurance Handbook for Air Pollution Measurements System*, Office of Research and Development, Research Triangle Park, NC, 27711.

EPA, 1987: *On-Site Meteorological Program Guidance for Regulatory Modeling Applications,* EPA-450/4-87-013, Office of Air Quality Planning and Standards, Research Triangle Park, NC 27711.

The State Climatologist, 1985: *Publication of the American Association of State Climatologists: Height and Exposure Standards*, for Sensors on Automated Weather Stations, vol. 9, No. 4.

WMO, 1983: *Guide to Meteorological Instruments and Methods of Observation,* World Meteorological Organization, No. 8, 5th edition, Geneva, Switzerland.

Appendix A. Importing Short Cut Code Into CRBasic Editor

This tutorial shows:

- Importing a *Short Cut* program into a program editor for additional refinement

- Importing a wiring diagram from *Short Cut* into the comments of a custom program

Short Cut creates files, which can be imported into *CRBasic Editor*. Assuming defaults were used when *Short Cut* was installed, these files reside in the C:\campbellsci\SCWin folder:

- .DEF (wiring and memory usage information)
- .CR2 (CR200(X)-series datalogger code)
- .CR300 (CR300-series datalogger code)
- .CR6 (CR6-series datalogger code)
- .CR8 (CR800-series datalogger code)
- .CR1 (CR1000 datalogger code)
- .CR1X (CR1000X-series datalogger code)
- .CR3 (CR3000 datalogger code)
- .CR5 (CR5000 datalogger code)

Import *Short Cut* code and wiring diagram into *CRBasic Editor*:

1. Create the *Short Cut* program following the procedure in Section 4, *QuickStart* *(p. 2)*. Finish the program. On the **Advanced** tab, click the **CRBasic Editor** button. The program opens in CRBasic with the name **noname.CR_**. Provide a name and save the program.

NOTE Once the file is edited with *CRBasic Editor*, *Short Cut* can no longer be used to edit the program it created.

2. The program can now be edited, saved, and sent to the data logger.

3. Import wiring information to the program by opening the associated .DEF file. By default, it is saved in the c:\campbellsci\SCWin folder. Copy and paste the section beginning with heading “–Wiring for CRXXX–” into the CRBasic program, usually at the head of the file. After pasting, edit the information such that an apostrophe (**'**) begins each line. This character instructs the data logger compiler to ignore the line when compiling. You can highlight several lines of CRBasic code then right-click and select **Comment Block**. (This feature is demonstrated at about 5:10 in the *CRBasic | Features* video.)

Appendix B. Example Programs

B.1 P2546A Programs

CRBasic Example B-1 is a CR6 program that uses universal terminal 1 configured as a pulse terminal to measure the P2546A every 5 seconds. The program stores the mean, maximum, minimum, and standard deviation of the measured wind speed over a 60-minute interval.

CRBasic Example B-1. CR6 Program Measuring the P2546A

```
'CR6 Series

'Declare Variables and Units
Public BattV
Public PTemp_C
Public WS_ms

Units BattV=Volts
Units PTemp_C=Deg C
Units WS_ms=meters/second

'Define Data Tables
DataTable(Hourly,True,-1)
  DataInterval(0,60,Min,10)
  Sample(1,PTemp_C,FP2)
  Average(1,WS_ms,FP2,False)
  Maximum(1,WS_ms,FP2,False,False)
  Minimum(1,WS_ms,FP2,False,False)
  Minimum(1,BattV,FP2,False,False)
  StdDev(1,WS_ms,FP2,False)
EndTable

DataTable(Daily,True,-1)
  DataInterval(0,1440,Min,10)
  Minimum(1,BattV,FP2,False,False)
EndTable

'Main Program
BeginProg
  'Main Scan
  Scan(5,Sec,1,0)
    'Default Data Logger Battery Voltage measurement 'BattV'
    Battery(BattV)
    'Default Wiring Panel Temperature measurement 'PTemp_C'
    PanelTemp(PTemp_C,60)
    'P2546A Wind Speed Sensor measurement 'WS_ms'
    PulseCount(WS_ms,1,U1,1,1,0.62,0.27)
    If WS_ms<=0.27 Then WS_ms=0
    'Call Data Tables and Store Data
    CallTable Hourly
    CallTable Daily
  NextScan
EndProg
```

CRBasic Example B-2 is a CR1000X program that uses pulse terminal 1 (P1) to measure the P2546A once a second. The program stores the mean, maximum, minimum, and standard deviation of the measured wind speed over a 10-minute interval.

CRBasic Example B-2. CR1000X Program Measuring the P2546A

```
'Pulse Port Example

'CR1000X Series Datalogger
'Program to measure P2546A and store ten minute averages

Const P2546A_mult = .62
Const p2546a_offset = .27

Public PTemp, batt_volt
Public P2546A

'Define Data Tables
DataTable (TenMin,True,-1)
  DataInterval (0,10,Min,10)
  Minimum (1,batt_volt,FP2,0,False)
  Sample (1,PTemp,FP2)
  Average (1,P2546A,FP2,False)
  Maximum (1,P2546A,FP2,False,False)
  Minimum (1,P2546A,FP2,False,False)
  StdDev (1,P2546A,FP2,False)
EndTable

'Main Program

BeginProg
  Scan (1,Sec,0,0)
    PanelTemp (PTemp,250)
    Battery (batt_volt)

    'Measure P2546A and correct measurement if wind speed is zero
    PulseCount (P2546A,1,P1,1,1,P2546A_mult,p2546a_offset)
    If P2546A <= p2546a_offset Then P2546A = 0

    'Call data tables
    CallTable TenMin

  NextScan
EndProg
```

B.2 P2546C Programs

CRBasic Example B-3 is a CR6 program that uses universal terminal 2 to measure the P2546C every 5 seconds. The program stores the mean, maximum, minimum, and standard deviation of the measured wind speed over a 60-minute interval.

CRBasic Example B-3. CR6 Program Measuring the P2546C

```
'CR6 Series
'Declare Variables and Units
Public BattV
Public PTemp_C
Public WS_ms
Units BattV=Volts
Units PTemp_C=Deg C
Units WS_ms=meters/second
'Define Data Tables
DataTable(Hourly,True,-1)
  DataInterval(0,60,Min,10)
  Sample(1,PTemp_C,FP2)
  Average(1,WS_ms,FP2,False)
  Maximum(1,WS_ms,FP2,False,False)
  Minimum(1,WS_ms,FP2,False,False)
  Minimum(1,BattV,FP2,False,False)
  StdDev(1,WS_ms,FP2,False)
EndTable
DataTable(Daily,True,-1)
  DataInterval(0,1440,Min,10)
  Minimum(1,BattV,FP2,False,False)
EndTable

'Main Program
BeginProg
  'Main Scan
  Scan(5,Sec,1,0)
    'Default Data Logger Battery Voltage measurement 'BattV'
    Battery(BattV)
    'Default Wiring Panel Temperature measurement 'PTemp_C'
    PanelTemp(PTemp_C,60)
    'P2546C Wind Speed Sensor measurement 'WS_ms'
    PulseCount (WS_ms,1,U2,5,1,0.62,0.27)
        If WS_ms<=0.27 Then WS_ms=0
    'Call Data Tables and Store Data
    CallTable Hourly
    CallTable Daily
  NextScan
EndProg
```

CRBasic Example B-4 is a CR1000X program that uses pulse terminal 1 (P1) to measure the P2546C once a second. The program stores the mean, maximum, minimum, and standard deviation of the measured wind speed over a 10-minute interval.

CRBasic Example B-4. CR1000X Program Measuring the P2546C

```
'CR1000X Series Datalogger
'Program to measure P2546C and store ten minute averages
Const P2546C_mult = .62
Const p2546c_offset = .27
Public PTemp, batt_volt
Public P2546C
'Define Data Tables
DataTable (TenMin,True,-1)
  DataInterval (0,10,Min,10)
  Minimum (1,batt_volt,FP2,0,False)
  Sample (1,PTemp,FP2)
  Average (1,P2546C,FP2,False)
  Maximum (1,P2546C,FP2,False,False)
  Minimum (1,P2546C,FP2,False,False)
  StdDev (1,P2546C,FP2,False)
EndTable

'Main Program
BeginProg
  Scan (1,Sec,0,0)
    PanelTemp (PTemp,250)
    Battery (batt_volt)
    'Measure P2546C and correct measurement if wind speed is zero
    PulseCount (P2546C,1,P1 ,5,1,P2546C_mult,p2546c_offset)
        If P2546C <= p2546c_offset Then P2546C = 0
    'Call data tables
    CallTable TenMin
  NextScan
EndProg
```