

**MODEL 013A  
WIND SPEED SENSOR  
OPERATION MANUAL**



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This equipment is warranted by CAMPBELL SCIENTIFIC (CANADA) CORP. ("CSC") to be free from defects in materials and workmanship under normal use and service for **twelve (12) months** from date of shipment unless specified otherwise. \*\*\*\*\* **Batteries are not warranted.** \*\*\*\*\* CSC's obligation under this warranty is limited to repairing or replacing (at CSC's option) defective products. The customer shall assume all costs of removing, reinstalling, and shipping defective products to CSC. CSC will return such products by surface carrier prepaid. This warranty shall not apply to any CSC products which have been subjected to modification, misuse, neglect, accidents of nature, or shipping damage. This warranty is in lieu of all other warranties, expressed or implied, including warranties of merchantability or fitness for a particular purpose. CSC is not liable for special, indirect, incidental, or consequential damages.

Products may not be returned without prior authorization. To obtain a Return Merchandise Authorization (RMA), contact CAMPBELL SCIENTIFIC (CANADA) CORP., at (780) 454-2505. An RMA number will be issued in order to facilitate Repair Personnel in identifying an instrument upon arrival. Please write this number clearly on the outside of the shipping container. Include description of symptoms and all pertinent details.

CAMPBELL SCIENTIFIC (CANADA) CORP. does not accept collect calls.

Non-warranty products returned for repair should be accompanied by a purchase order to cover repair costs.



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## 013A WIND SPEED SENSOR OPERATION MANUAL

### 1.0 GENERAL INFORMATION

- 1.1 The Met One Instruments 013A Wind Speed Sensor uses a highly ruggedized, anti-icing three-cup anemometer assembly and simple magnet-reed switch assembly to produce a series of contact closures whose frequency is proportional to wind speed.
- 1.2 The Sensor Cable has a quick-connect connector with vinyl-jacketed, shielded cable. Cable length is given in -XX feet on each cable part number. An 1805-XX cable is used with translators having terminal strip connectors, and an 1808-XX cable is used with translators having circular MS type connectors. Refer to drawing.

Table 1-1  
Model 013A Wind Speed Sensor Specifications

#### Performance Characteristics

Maximum Operating Range	0-60 meters/sec or 0-125 mph
Starting Speed	.5 meters/sec or 1 mph
Calibrated Range	0-50 meters/sec or 0-100 mph
Accuracy	±1.5% or 0.25 mph
Temperature Range	-50°C to +85 °C

#### Distance Constant\*

Standard 1908 Aluminum Cup Assembly	Less than 15 feet
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\*The distance traveled by the air after a sharp-edged gust has occurred for the anemometer rate to reach 63% of the new speed.

#### Electrical Characteristics

Output Signal	Contact closure at frequency $f = .5589 (V-1)$ (V = wind speed in mph)
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### Physical Characteristics

Weight	1.5 pounds
Finish	Black anodized
Mounting Fixtures	Use with 191 Crossarm
Cabling	Two-conductor Cable; XX is cable length in feet

## 2.0 INSTALLATION

### 2.1 013A Wind Speed Sensor Installation

- A. Check to see that the cup assembly rotates freely (threshold, bearing check).
- B. Install the sensor in the end of the 191 mounting arm (the end without the bushing).
- C. Apply a small amount of silicone grease to the set screws to prevent "freezing up" in corrosive environments. Tighten the locking set screws; do not over-tighten.
- D. Connect the cable assembly to the keyed sensor receptacle and tape it to the mounting arm.

### 2.2 Wiring

- A. The cable assembly contains two wires. Typical installation hookup is shown in Figure 2-1.

## 3.0 OPERATIONAL CHECK-OUT

### 3.1 013A Wind Speed Sensor Check-Out

- A. Slowly spinning the anemometer cup assembly will produce a series of pulses. To verify the sensor output, monitor this signal with either the 1680B Translator Module or an ohmmeter.
- B. Inspect the cup assembly for loose cup arms or other damage. The cup assembly cannot change calibration unless a mechanical part has come loose or has been broken.

#### 4.0 MAINTENANCE AND TROUBLESHOOTING

##### 4.1 General Maintenance Schedule\*

###### 6-12 Month Intervals:

- A. Inspect sensor for proper operation per Section 3.0.
- B. Replace the Wind Speed Sensor bearings in extremely adverse environments per Section 4.5.

###### 12-24 Month Intervals:

- A. Replacement of sensor bearings.

\*Schedule is based on average to adverse environments.

Table 4-1  
Troubleshooting Table

<u>Symptom</u>	<u>Probable Cause</u>	<u>Remedy</u>
No sensor output	Faulty reed switch	Replace reed switch
No sensor output below 2 mph	Faulty bearings	Replace bearings

##### 4.2 013A Wind Speed Sensor: 6-12 Month Periodic Service

- A. At the crossarm assembly, disconnect the Sensor Cable from the Sensor (leave the cable secured to the crossarm) and remove the Sensor from the crossarm assembly.
- B. Loosen the two set screws and remove the anemometer cup assembly.
- C. Visually inspect the anemometer cups for cracks and breaks and make sure that each is securely attached to the cup assembly hub.
- D. Inspect the Sensor for any signs of corrosion and dust buildup.
- E. Rotate the Sensor shaft hub assembly to make sure that it turns freely and that the Sensor bearings are not damaged. Make sure that the magnet assembly is not contacting the reed switch.

- F. A moisture vent is located on the base of the Sensor. Make sure that this vent is unobstructed.
- G. Re-install Sensor as per installation procedure (Section 2.0) and verify proper operation using procedures in Section 3.0.

#### 4.3 013A Wind Speed Sensor General Assembly (refer to 013A Assembly Drawing)

The following steps cover basic disassembly:

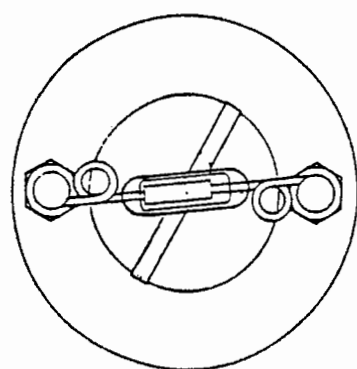
- A. At the crossarm assembly, disconnect the Sensor Cable from the Sensor (leave the cable secured to the crossarm) and remove the Sensor from the crossarm assembly.
- B. Loosen the two set screws and remove the anemometer cup assembly.
- C. Remove the three (3) flathead screws at the top of the Sensor and lift out the bearing mount assembly.

#### 4.4 Reed Switch Replacement Procedure

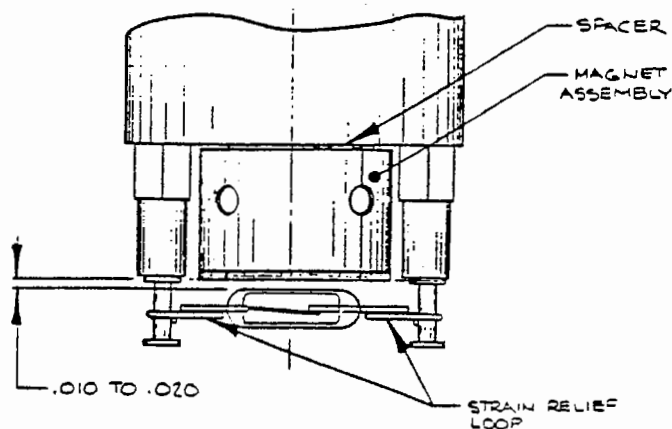
Use the following procedure to replace Sensor Reed Switch:

- A. Remove bearing mount assembly as per Section 4.3.
- B. Unsolder the 15-16 wires on the ends of the Reed Switch (10), un-solder, and remove the switch from the two mounting terminals (13).
- C. Solder the new switch onto the sides on the switch mounting terminals, taking care not to stress the point where the leads enter the glass reed switch body. Measure the distance between the bottom of the rotating magnet and the top of the switch envelope, as shown in Figure 4 -1. The spacing should measure between .010 and .020 of an inch.
- D. Spin the shaft and verify switch operation by listening for faint sound of switch closures. Monitor the output on the translator module and spin shaft for an upscale indication. If switch seems to falter, adjust switch slightly closer to magnet.
- E. If possible, connect the shaft to an 1800 RPM motor, use flexible coupling, and verify an output of 108 mph with a 50% duty cycle.
- F. Reassemble Sensor by reversing procedure.

FIGURE 4-1: REED SWITCH INSTALLATION



VIEW OF REED SWITCH FROM BOTTOM,  
MOUNT SWITCH AS SHOWN.



#### 4.5 Bearing Replacement Procedures

The bearings used in 013A Sensor are special stainless steel ball bearings with a protective shield. Bearings are lubricated and sealed. Do not lubricate bearings as the lubrication will attract dust and will form an oil/dust glue. Use the following procedure for bearing replacement:

- A. Remove bearing mount assembly as per Section 4.3.
- B. Loosen set screws(21) in magnet assembly (4), lift shaft (7) and collar (3) up and out of bearing mount (2). Be sure to retain lower spacer. (19)
- C. Insert a right-angle type of tool, such as an allen wrench into bearing, cock it slightly to one side and remove bearing. Remove both bearings.
- D. Install new bearings. Be careful not to introduce dirt particles into bearings. CLEAN HANDS ONLY! DO NOT ADD LUBRICATION OF ANY KIND.
- E. Reassemble the Sensor in reverse order. Be sure to include spacers (19) over the bearings when replacing the shaft in the bearing mount. After the magnet assembly (4) has been tightened, a barely perceptible amount (.007) of endplay should be felt when the shaft is moved up and down.

#### 4.6 013A Wind Speed Sensor Repair and Recalibration Service

This service provided by the factory enables fast, economical service for the user. This repair and calibration service includes disassembly, inspection, calibration and re assembly. Service also includes replacement of bearings regardless of apparent condition. Service also includes replacement of the following items.

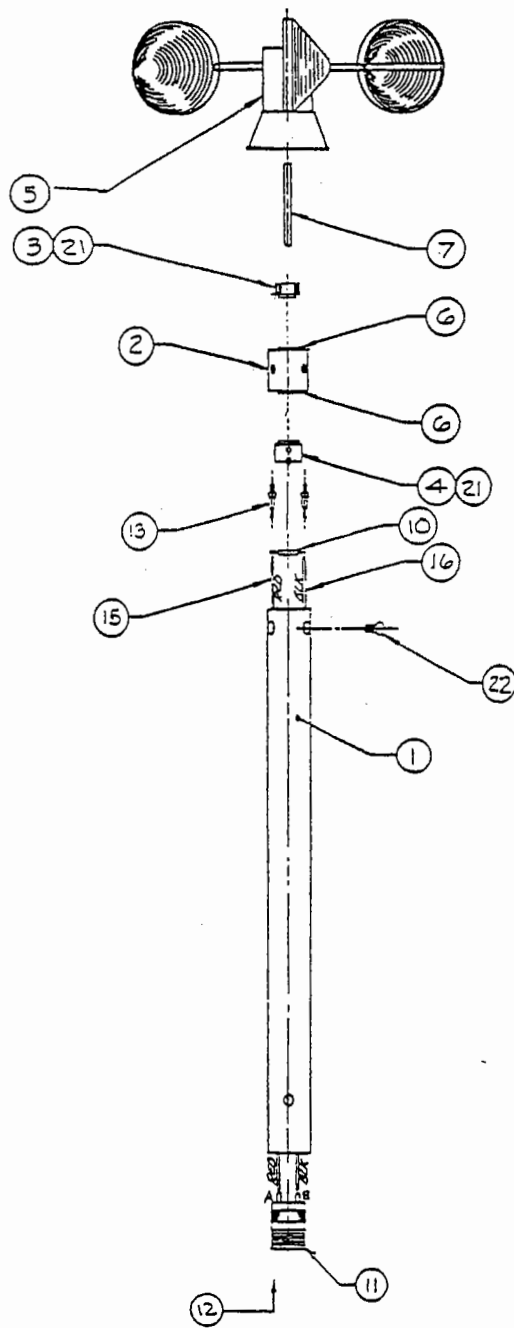
- A. Shaft
- B. Set screws.

Service also includes functional test of Sensor. Other components will be replaced as required. Additional charges for additional materials only will be added to the basic service charge.

Table 4 - 2  
REPLACEABLE PARTS LIST

<u>ITEM #</u>	<u>PART #</u>	<u>DESCRIPTION</u>
1	1685-2	WS SUPPORT
2	1685-4	BEARING MOUNT
3	1685-7	COLLAR
4	1715	MAGNET ASSY
5	1908	CUP ASSEMBLY (ALUM)
6	1898	BEARING
7	860001	SHAFT
10	880160	SWITCH REED
12	510020	CAP FOR CONNECTOR
13	970062	TERMINAL HH SMITH
19	860250	SPACER
21	601250	SET SCREW 4-40X 1/8
22	601230	FLAT HD. 4-40X 1/4 SCREW





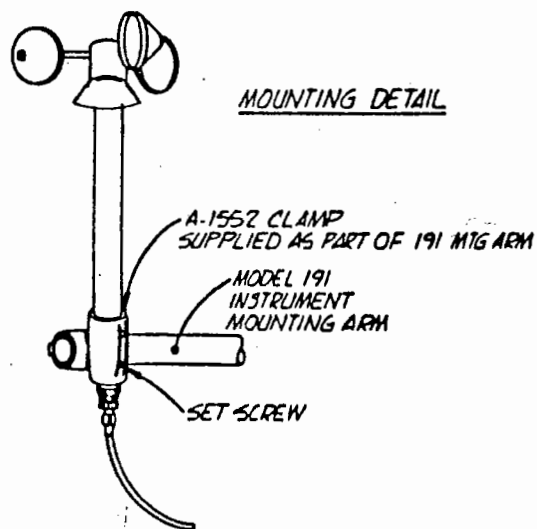
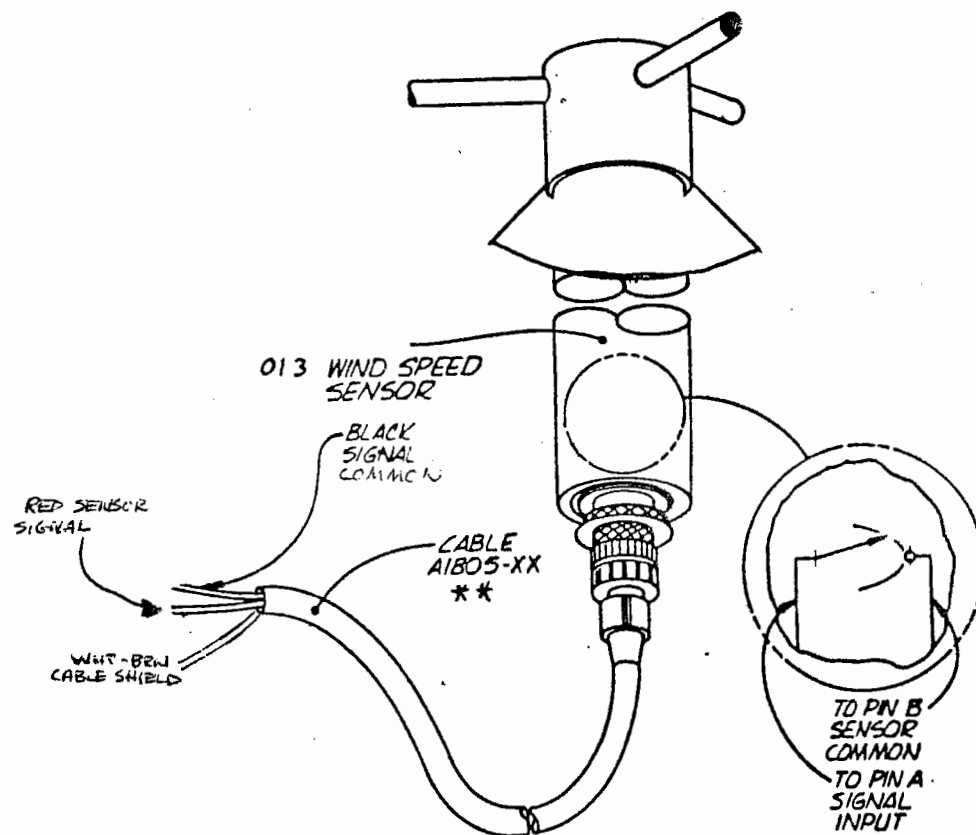


Figure 2-1  
Typical 013 Installation

Table 3-1

## Model 013 Wind Speed Sensor Calibration

## WIND VELOCITY VS OUTPUT FREQUENCY

Speed In Miles/Hr		
V mph	RPS	F hz
10	2.515	5.030
20	5.310	10.619
30	8.104	16.208
40	10.899	21.797
50	13.693	27.386
60	16.488	32.975
70	19.282	38.564
80	22.077	44.153
90	24.871	49.742
100	27.666	55.331
110	30.460	60.920
120	33.255	66.509

## SPEED IN METERS/SEC

V mps	RPS	F hz
2.5	1.284	2.567
5	2.846	5.693
7.5	4.409	8.819
10	5.972	11.945
12.5	7.535	15.071
15	9.098	18.197
17.5	10.661	21.323
20	12.224	24.449
22.5	13.787	27.575
25	15.350	30.701
27.5	16.913	33.827
30	18.476	36.953
32.5	20.039	40.079
35	21.602	43.205
37.5	23.165	46.331
40	24.728	49.457
42.5	26.291	52.583
45	27.854	55.709
47.5	29.417	58.835
50	30.980	61.961
52.5	32.543	65.087
55	34.106	68.212
57.5	35.669	71.338
60	37.232	74.464

## RPM VS WIND SPEED

RPM	MPS	MPH	F hz
100	3.113	6.964	3.333
200	5.779	12.928	6.667
*300	8.446	18.892	10.000
400	11.112	24.856	13.333
500	13.778	30.820	16.667
*600	16.444	36.785	20.000
700	19.110	42.749	23.333
800	21.777	48.713	26.667
900	24.443	54.670	30.000
1000	27.109	60.641	33.333
1100	29.775	66.605	36.667
1200	32.441	72.569	40.000
1300	35.108	78.533	43.333
1400	37.774	84.497	46.600
1500	40.440	90.461	50.000
1600	43.106	96.426	53.333
1700	45.772	102.390	56.667
*1800	48.438	108.354	60.000

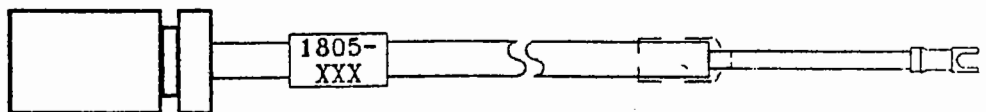
## \* STANDARD CALIBRATOR TEST POINTS

$$V \text{ mph} = \frac{\text{RPM}}{16.767} + 1$$

$$V \text{ mps} = \frac{\text{RPM}}{37.5067} + .44704$$

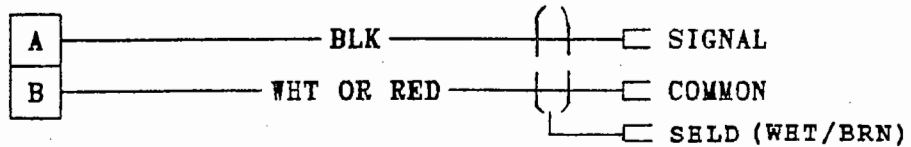
Based on equation  $f = .5589 (V-1)$   
 where  $f$  is the output frequency.  
 $V$  is wind speed miles per hour.  
 $\text{RPS} = \text{cup revolution per second.}$   
 $1 \text{ MPH} = 0.44707 \text{ meters/sec}$

# 1805 SENSOR CABLE - TERMINATES IN SPADE LUGS

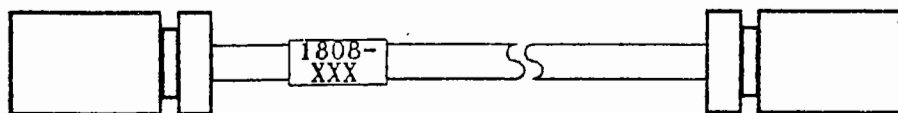


—XXX'— 6"

DASH NO. = LENGTH IN FEET

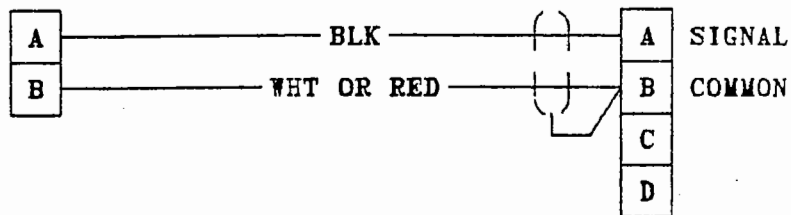


# 1808 SENSOR CABLE - USE WITH 110 WEATHERPROOF TRANSLATOR

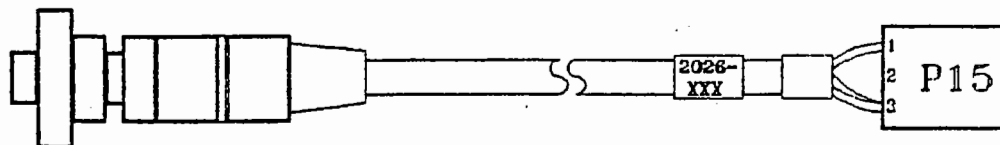


—XXX'—

DASH NO. = LENGTH IN FEET



# 2026 CABLE - USE WITH MET-SET 4B AND 4C



—XXX'—

DASH NO. = LENGTH IN FEET

