

**Model 2132
Combination
Wind Speed and
Wind Direction Sensor**



User's Manual





allweatherinc

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ECN 2409
November 1985

MANUAL
FOR
COMBINATION WIND SPEED AND WIND DIRECTION
SENSOR
MODEL 2132

TABLE OF CONTENTS

1.0	INTRODUCTION
2.0	SPECIFICATIONS
3.0	INSTALLATION
4.0	CIRCUIT DESCRIPTION
5.0	CALIBRATION
6.0	MAINTENANCE
7.0	SCHEMATIC & PARTS LIST
8.0	WARRANTY

MANUAL NO: 2132-001
DATE: AUG 1998
ECN: 4795

SENSOR
MODEL 2132

1.0 INTRODUCTION

1.1 The Model 2132 Combination Wind Speed and Wind Direction Sensor is a low cost, general purpose instrument for general survey of wind speed and direction when precision measurements are not required. The sensing elements are combined in a single, corrosion resistant housing with a single vertical, mounting fixture.

1.2 Wind speed measurements are accomplished by using a three-cup anemometer attached to a rotating magnet. The magnet produces an alternating current output which is calibrated to give an AC voltage proportional to the wind speed over a range of 0 to 100 miles per hour (0 to 45 meters per second).

1.3 Wind direction is measured by a rotating vane on a counter-weighted shaft. The shaft is connected to a potentiometer. The potentiometer gives an output voltage proportional to the wind direction when a DC excitation voltage is applied to the sensor.

1.4 A five conductor cable provides interconnection between the sensor and the indicator or recorder. Two of the cable wires are for the wind speed signal and the other three cable wires are for wind direction.

2.0 SPECIFICATIONS

2.1 Sensor..... 3 cup anemometer with
airfoil vane

Transducers:

Speed..... 0 to 10 VAC generator
2 coil with 4 pole magnet

Direction..... 0 to 500 ohms (conductive plastic potentiometer)

Sensor mounting..... 7/8" (22 mm) dia. collar

Cable.....five conductor, 22 AWG 50 ft

Size..... 6.25"H x 10.5" turning radius
(159 x 267 mm)

Weight/Shipping..... 1.5 lbs/4 lbs
(0.7 kg/1.8 kg)

3.0 INSTALLATION

- 3.1 This instrument is thoroughly tested and fully calibrated at the factory and is ready for installation. Please refer to the return authorization card included in the packing box if damage has occurred. Also, notify Qualimetrics, Inc.
- 3.2 Complete installation of a wind direction sensor requires alignment to True North in addition to mounting of the sensor on a mast. For non-critical installation, a sighting can be made of a nearby object which is known to be near True North. Align the vane of the sensor to the object, having the counter-weight of the vane pointing towards the object.
- 3.3 Critical alignment requires use of a compass or a transit and knowledge of the local magnetic declination. The sensor is aligned by sighting magnetic north with the compass or transit and aligning the sensor to the compass pointer or to the transit reticule. The Model 2132 does not require critical alignment.
- 3.4 The vane is aligned by loosening the mounting set screw on the lower portion of the mounting collar and placing the sensor onto the mast. The rib molded into the mounting collar must be in line with, and on the same side of the sensor as is the counter-weight pointer. Hold the sensor in place and verify alignment. Once the alignment is verified, secure the mast mounting set screw. Model 85007 is a mast adapter for use with the 2132. The adapter allows use of the sensor with a 1.5" O.D. mast (1-1/4" threaded pipe is best).
- 3.5 Using two or three people to align the sensor is very helpful. However, when situations do not allow the convenience of helpers, the sensor should be installed during calm or low winds and the vane taped in place while making the alignment sighting.
- 3.6 Check the sensor operation by attaching the cable to the indicator or recording instrument. Rotate the vane slowly and compare the relative vane position with the reading of the indicator. Refer to the indicator or recorder manual for wiring instructions.

4.0 CIRCUIT DESCRIPTION

- 4.1 The combination wind speed and direction sensor is a very simple anemometer/vane instrument. The design incorporates modern materials to provide reliable operation and techniques for easy assembly and repair.

4.2 The anemometer is a three cup type of instrument. The cups rotate on a stainless shaft supported by ball bearings. The rotation of the shaft drives a permanent magnet with 4 poles in a 2 coil field producing an AC voltage proportional to the wind speed. The generator frequency is 2 Hertz per revolution. The voltage versus wind speed is determined in a wind tunnel using precision standards. The wind speed sensor requires no external power sources for operation, however for most indicators and recorders, the signal must be rectified and filtered to a DC level.

4.3 The wind direction sensing vane is attached to a rotating collar on the lower portion of the sensor housing. Teflon thrust bearings provide smooth rotation of the vane. A counter-weight balances the sensor allowing the vane to swing freely. The counter-weight always points into the wind. The sensor output always indicates the direction from which the wind originates. The vane shaft is attached to a precision potentiometer. A fixed DC voltage, usually +5 VDC, applied across the potentiometer will produce a variable output DC voltage proportional to wind direction.

4.4 Signal connections are made through a five conductor, 22 gage cable. A fifty foot length of cable is supplied with the sensor. A maximum cable length of 500 feet is permissible before degradation of signal becomes critical.

5.0 CALIBRATION

5.1 The Model 2132 sensor is calibrated prior to shipment and is ready for immediate operation. Regular calibration checks should be made to insure reliable data.

5.2 Wind speed calibration can be checked by removing the cup assembly and by rotating the sensor shaft with a synchronous motor. Refer to the calibration data sheet (Figure 5.1) for RPM versus wind speed information. Typical output voltages are also given on the data sheet. For sensor deviation of more than 5% consult the service department.

5.3 Wind direction can be checked by measuring the sensor output resistance at relative positions. For non-linear response or improper operation of the potentiometer consult the service department.

6.0 MAINTENANCE

6.1 Maintenance should be conducted on a routine basis several times each year. Inspection of the sensor for worn bearings or damaged components must be made.

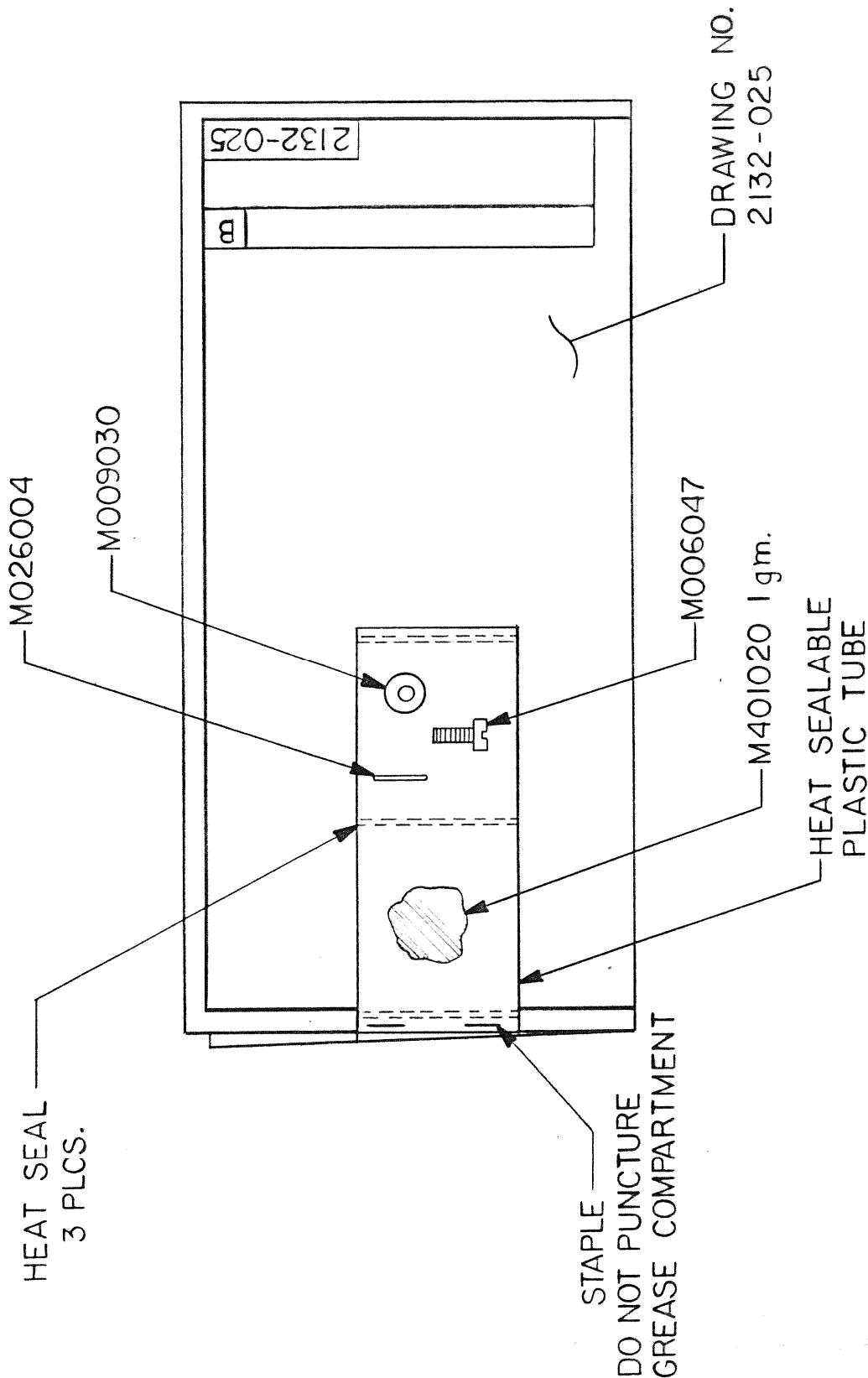
WIND SPEED CALIBRATION DATA
MODEL 2132

MARCH 31, 1983

<u>MPH</u>	<u>M/S</u>	<u>VAC UNLOADED</u>	<u>RPM</u>	<u>HZ</u>
5	2.2	.43		
10	4.5	.97		
10.5	4.7	1.04	180	6
15	6.7	1.51		
16.9	7.6	1.70	300	10
20	8.9	2.05		
20.3	9.1	2.10	360	12
25	11.2	2.59		
30	13.4	3.13		
33.4	14.9	3.49	600	20
35	15.6	3.67		
40	17.9	4.21		
45	20.1	4.75		
50	22.4	5.29		
51.4	23.0	5.44	900	30
55	24.6	5.82		
60	26.8	6.36		
65	29.1	6.90		
70	31.3	7.44		
75	33.5	7.98		
80	35.8	8.52		
85	38.0	9.06		
90	40.2	9.60		
95	42.5	10.14		
98.5	44.0	10.52	1800	60
100	44.7	10.70		

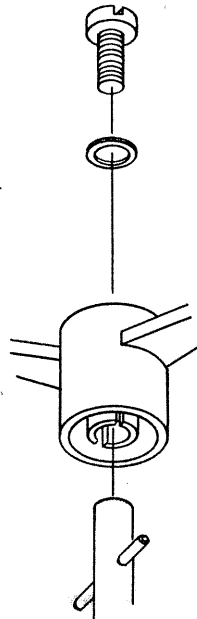
FIGURE 5.1

- 6.2 Replace the insulating grease under the cup assembly hub each time the cups are removed to prevent excessive moisture from entering the housing.
- 6.3 Inspect the cable regularly for signs of breakage or frayed edges due to "Whipping" by the wind. Secure the cable using plastic wire ties, tape or staples. Be sure to prevent staples from slicing into the cable and do not staple through any portion of cable.
- 6.4 Refer to the enclosed assembly drawings and parts lists for part locations and descriptions.
- 7.0 SCHEMATIC AND PARTS LIST
- 7.1 The following pages include schematics, assembly drawings, and parts list for this instrument. Please note that the parts lists are arranged in assembly/subassembly form. Each subassembly is on its own page. Subassemblies and parts are listed in the smallest economical size available from Qualimetrics.
- 8.0 WARRANTY
- 8.1 All instruments are warranted for one year, unless otherwise specified, against defects in material or workmanship. Should any instrument prove to be defective within the warranty period, upon written notice and return of the instrument freight prepaid, Qualimetrics will, at its option, repair or replace the defective unit and return it freight collect. Instruments abused, improperly used or installed, and modified or altered by others, may cancel warranty.

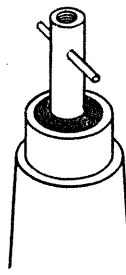


WeatherMeasure WEATHERtronics Division of QUALMETRICS, Inc.				A	
TOLERANCES UNLESS OTHERWISE NOTED: XXX = ± .005 XX = ± .010 FRACTIONS = ± .02 ANGLES ± 1/2° CONCENTRICITY = .003 TIR				NOMENCLATURE ASSEMBLY HARDWARE KIT, CUP ASSEMBLY	
MATL				MOD. USAGE	
FINISH				BY K. WEBER DT 4/7/86	
ENGR (R)				SCALE NONE	
APPRO				DWG. NO. M102035-003	
DT 4/7/86				SHEET 1 OF 1	

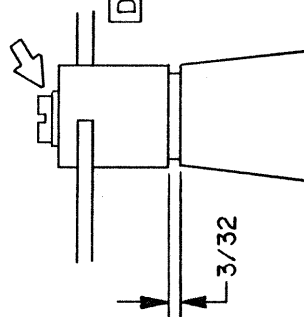
NOTE: WHEN GREASE IS IN PLACE DO NOT LAY ANEMOMETER ON ITS SIDE FOR MORE THAN 10 MINUTES.



C ALIGN THE SLOT WITHIN THE CUP HUB WITH THE PIN, AND SLIP THEM TOGETHER. MAKE SURE THE PIN ENTERS THE SLOT. IF IT DOES NOT, THE SCREW WILL NOT TIGHTEN.



B REMOVE THE WASHER, PIN AND SCREW FROM THE PACKET.
INSERT THE PIN INTO THE CROSS HOLE IN THE SHAFT END.
THE SHAFT MUST BE TURNED SO THAT THE PIN WILL
REMAIN IN PLACE, AS IT IS A LOOSE FIT.
NOTE: UNTIL THE CUPS ARE IN PLACE IT IS NORMAL
FOR THE SHAFT TO MOVE IN AND OUT.

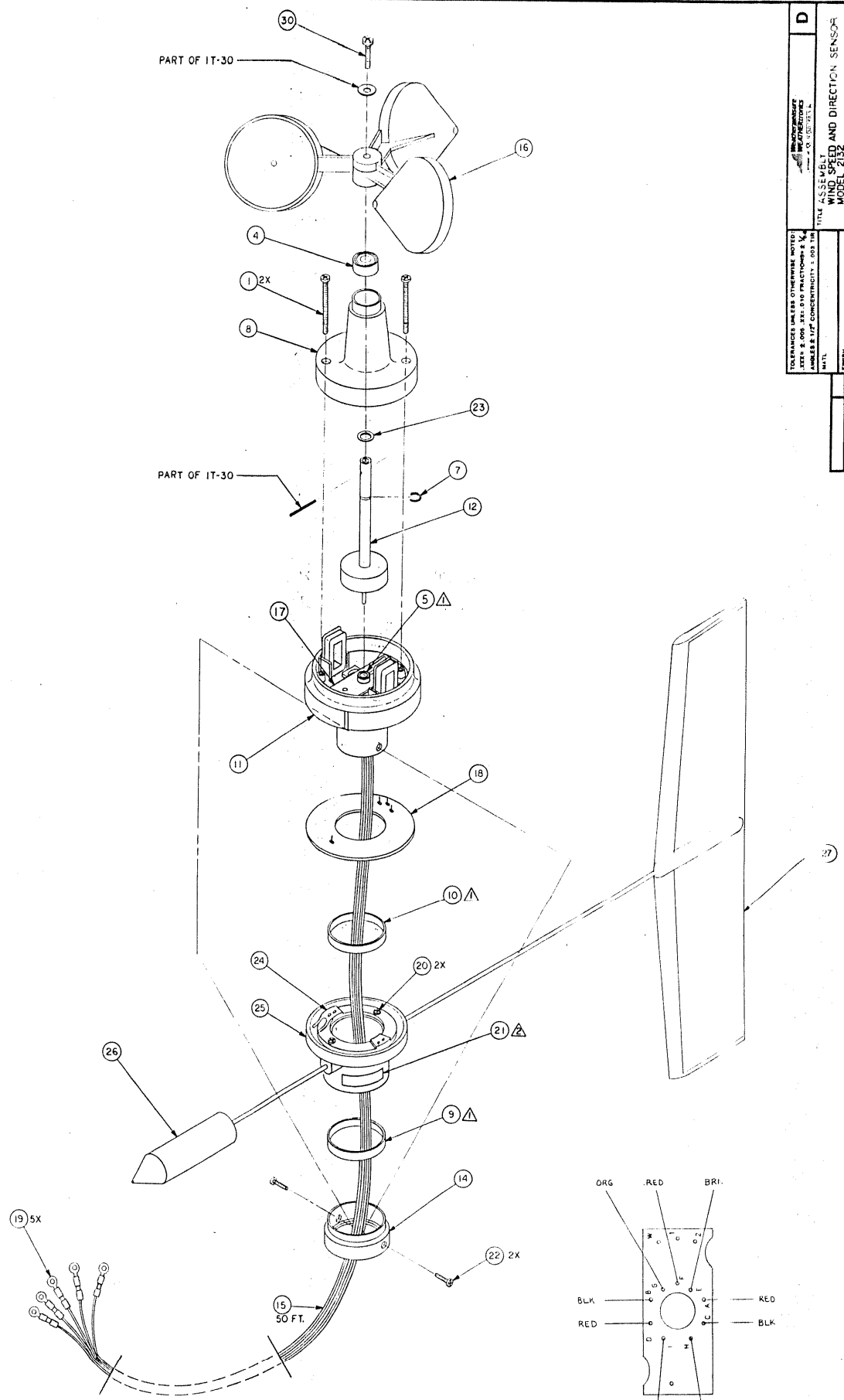


INSTALL THE WASHER AND SCREW.
TIGHTEN SNUGLY, BUT NOT FORCIBLY.
IF CUPS ARE CORRECTLY INSTALLED,
THE GAP WILL BE ABOUT 3/32", AND
CUPS WILL TURN WITH A SLIGHT
BREATH.

REV	ECN	DATED	QTY	NEXT	ASM
A	1269	11/77			
B	1360	6/78			
C	2468	3/86			
D	2530	4/86			
<p>TOLERANCES UNLESS OTHERWISE NOTED: XXX- ± .005 XX- ± .010 FRACTIONS- ± .02 ANGLES ± ½° CONCENTRICITY- .003 TIR</p>					
<p>MATL</p>					
<p>FINISH</p>					
<p>WATERMETER INSTALLATION</p>					
<p>CUP ASSEMBLY INSTRUCTIONS</p>					
<p>MOD. USAGE 2132 & 2612 SHEET 1 OF 1</p>					
<p>BY K. WEBER SCALE DWG. NO. 2132-025</p>					
<p>DT 4/7/86 NONE</p>					
<p>ENGR APPRO DT</p>					

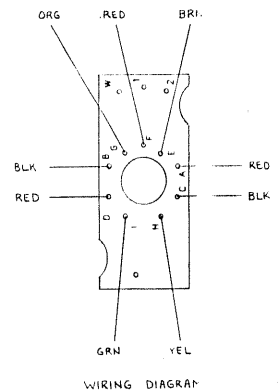
REDRAWN

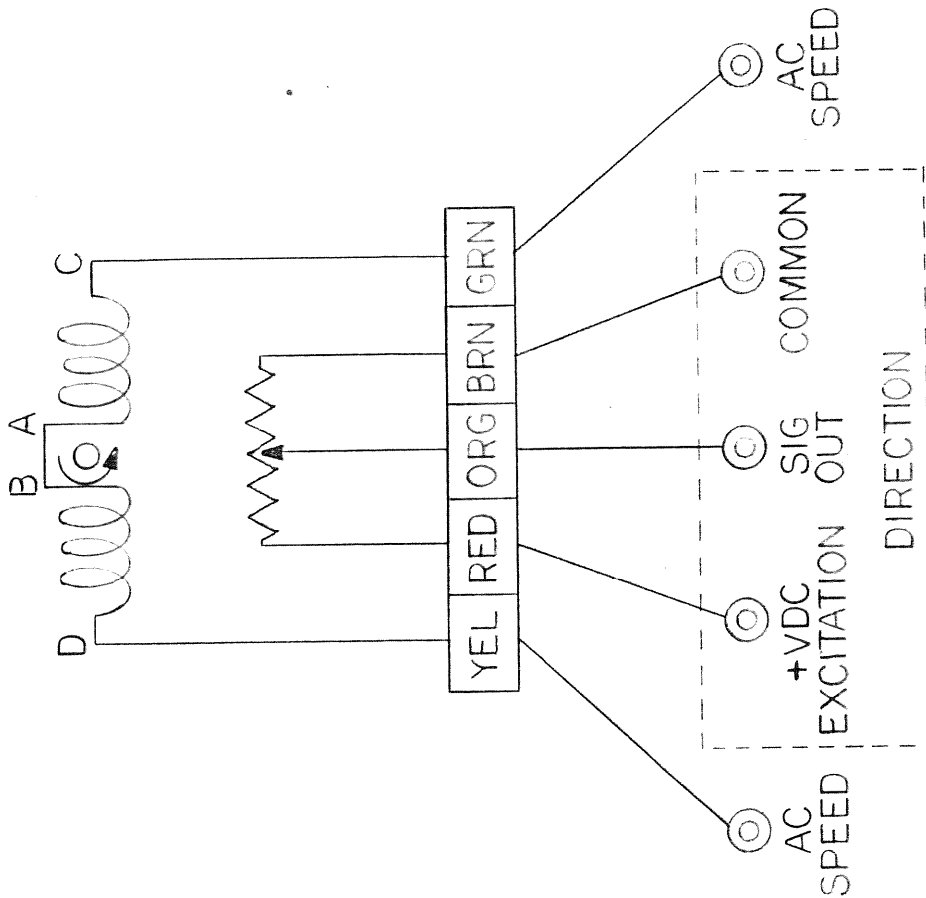
REV. NO.		REV. NO.	2132-003
REV.	DESCRIPTION	DATE	APPROVED
A	AS ISSUED	3/7/65	
B	ADD NOTES 1, 2 AND 4. R.N.S. DIAGRAM	8-10-68	



REV. NO.		REV. NO.	2132-003
REV.	DESCRIPTION	DATE	APPROVED
A	AS ISSUED	3/7/65	
B	ADD NOTES 1, 2 AND 4. R.N.S. DIAGRAM	8-10-68	

NOTES: UNLESS OTHERWISE SPECIFIED:
 ▲ APPLY A THIN FILM OF HIGH VACUUM GREASE
 ▲ PLACE SERIAL TAG, IT-21 MARKED WITH 2132 AND SERIAL NUMBER AS SHOWN





WEATHERMEASURE / WEATHERTRONICS
Instruments and Systems Division
3213 Orange Grove Avenue
Sacramento, California 95660 U.S.A.

QUALIMETRICS, Inc.

NOMENCLATURE
SCHEMATIC
WIND SYSTEM

MOD. USAGE 2132

SHEET 1 OF 1

TOLERANCES UNLESS OTHERWISE NOTED:

XXX = $\pm .005$ XX = $\pm .010$ FRACTIONS = $\pm .02$

ANGLES $\pm \frac{1}{2}^\circ$ CONCENTRICITY = .003 TIR

MATL

FINISH

REV	ECN	DATED	QTY	NEXT	ASM
	2239	11-84			

ENGR
APPRO

DT
DT

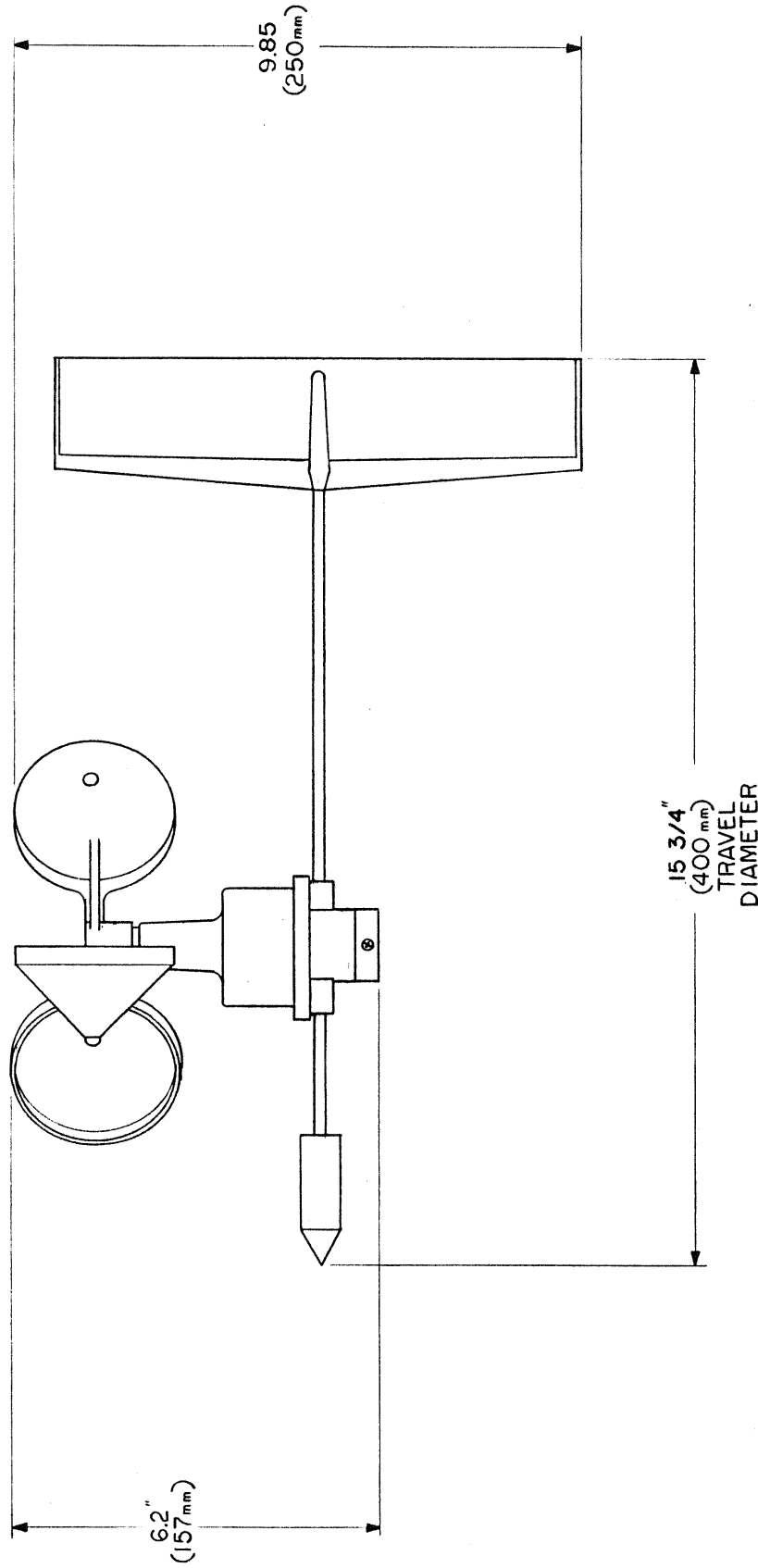
BY GT
DT 11-16-84

SCALE
Ø

DWG NO.

2132-004

A



REV	ECN	DATED	QTY	NEXT	ASM	TOLERANCES UNLESS OTHERWISE NOTED:
	2239	11-84				XXX- ± .005 XX- ± .010 FRACTIONS- ± .02
						ANGLES ± 1/2° CONCENTRICITY- .003 TIR
						MATL
						FINISH
						ENGR
						APPRO
						DT
						DT

QUALIMETRICS, Inc.

WEATHERMEASURE / WEATHERTRONICS
Instruments and Systems Division
3213 Orange Grove Avenue
Sacramento, California 95860 U.S.A.

NOMENCLATURE MODEL 2132

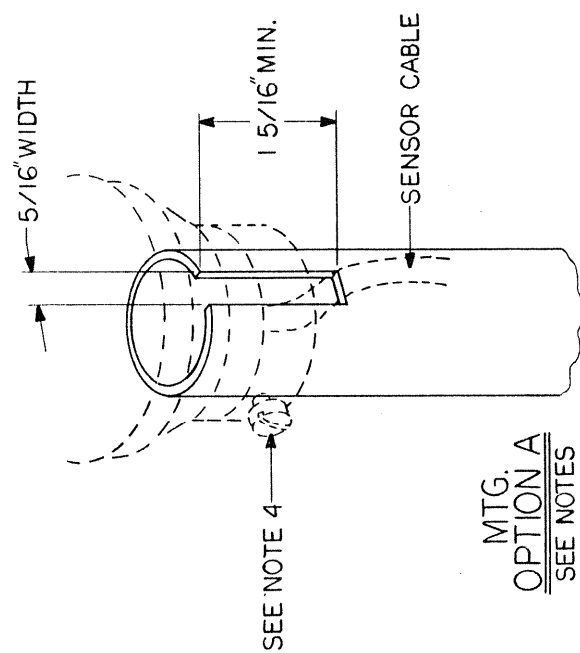
OUTLINE

WIND SPEED-DIRECTION SENSOR

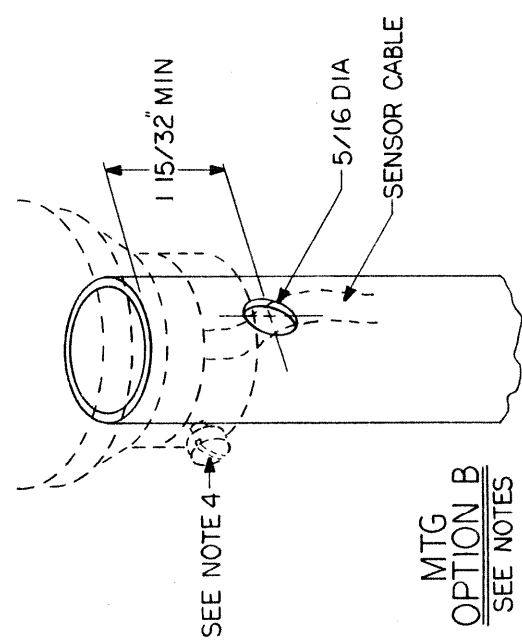
MOD. USAGE 2133, 2360 SHEET 1 OF 1

BY GT SCALE 1/2 DWG NO. 2132-005

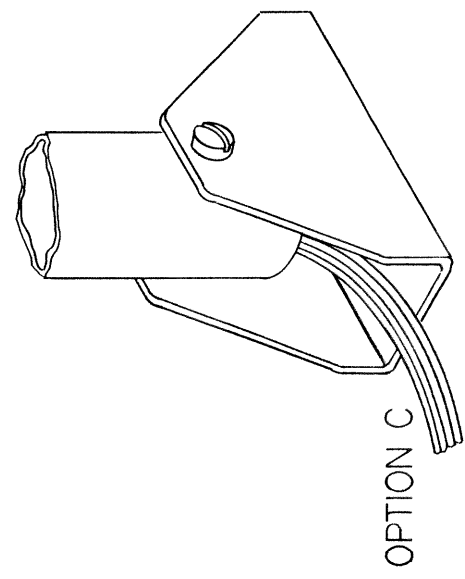
B



MTG.
OPTION A
SEE NOTES



MTG
OPTION B
SEE NOTES



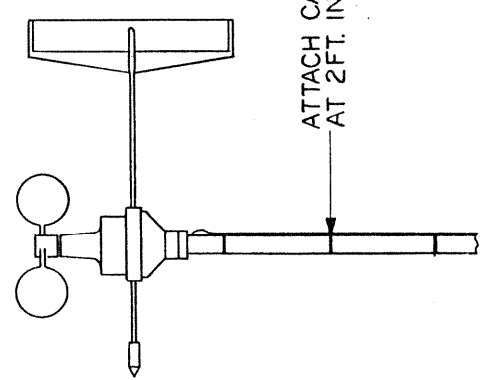
OPTION C

NOTES ON OPTIONS A, B.

- 1. USE STANDARD 1/2(.840 DIA) IRON PIPE OR .840 DIA ALUMINUM TUBING.
- 2. SLOT OR DRILL FOR SENSOR CABLE AS INDICATED.
- 3. OR USE MOD 85007 MAST ADAPTER.
- 4. SNUG SCREWS TO AVOID STRIPPING THREADS.
- 5. GUYING RECOMMENDED IF MAST IS OVER 10 FT IN HEIGHT.

NOTES ON OPTION C.

- 1. BY USING A STANDARD TV ANTENNA MAST MOUNTING FOOT, SENSOR CABLE MAY BE FED THRU TUBE THEREBY AVOIDING SLOTTING OR DRILLING TOP END.
- 2. GUYING REQUIRED WHEN USING THIS APPLICATION.



REV	ECN	DATED	QTY	NEXT	ASM	TOLERANCES UNLESS OTHERWISE NOTED: XXX= ± .005 XX= ± .010 FRACTIONS = ± .02 ANGLES ± 1/2° CONCENTRICITY = .003 TIR	WEATHERMEASURE / WEATHERTRONICS Instruments and Systems Division 3213 Orange Grove Avenue Sacramento, California 95860 U.S.A.
	2239	11-84				MATL	QUALIMETRICS, Inc.
						FINISH	WEATHERMEASURE / WEATHERTRONICS Instruments and Systems Division 3213 Orange Grove Avenue Sacramento, California 95860 U.S.A.
						ENGR	NOMENCLATURE
						APPRO	WIND SPEED-DIRECTION SERIES
						DT	MOD. USAGE 2132,2135,2612
						DT	BY GT SCALE DWG
						DT	DT 11-20-84
						DT	NO. 2132-006
						DT	SHEET 1 OF 1
						DT	B

09/09/98 35
4.28.3

** QUALIMETRICS, INC. **
BILL OF MATERIAL INQUIRY - 2132

09/09/98 PAGE 1
12:22 PM (R070IZ)

LINE NO	RUN/ SET UP	COMPONENT	QTY EACH	UOM
10		ASM ASSEMBLY DRAWING 2132-003	.0000	EA
20		ECN ENGR CHANGE NUMBER ECN 4795 LAST CHG AS OF 10AUG98	.0000	EA
30		2132-001 MANUAL USERS 2132	1.0000	EA
100		M033728 BAG OF SILICONE GREASE AS REQUIRED	.0000	ML
140		M102035 HARDWARE KIT CUP ASM IT-30	1.0000	EA
180		M434004 CABLE TIE 4.8X.19 (1.00 DIA)	1.0000	EA
190		M488064 SPARES KIT FOR CUP ASSEMBLY REFERENCE	.0000	KT
200		M910059 FOAM INSERT SET SHIPPING	1.0000	EA
210		M910060 CARTON SHIPPING TW 190 18 X 1	1.0000	EA
220		M004051 SCR 4-40 X1.000 PAN SS PHIL IT-1	2.0000	EA
230		M025050 BEARING BALL FLANGED SHIELDED IT-4	1.0000	EA
240		M025051 BEARING 125 ID X 250 OD X 3/ IT-5	1.0000	EA
250		M027505 RING RTNG .250 EXT C SS IT-7	1.0000	EA
260		M029513 SPACER .250 IDX.375 OD IT-23	1.0000	EA

09/09/98 35
4.28.3

** QUALIMETRICS, INC. **
BILL OF MATERIAL INQUIRY - 2132

09/09/98 PAGE 2
12:22 PM (R070IZ)

LINE NO	RUN/ SET UP	COMPONENT	QTY EACH	UOM
270		M101575 HOUSING UPPER 2ND OPER IT-8	1.0000	EA
280		M101829 ROTOR ASSEMBLY IT-12	1.0000	EA
300		M102220 CUPS 3PGF ANEMOMETER IT-16	1.0000	EA
310		M404238 PCB ASSY COIL AND CONNECT BD IT-17	1.0000	EA
320		M419002 LUG RING #6 22-18VYNL IT-19	5.0000	EA
330		T430043 SERIAL TAG 0.5X1.7 QUALIMETRI IT-21	1.0000	EA
340		T600806 CABLE FLAT 5 CND 22 GA COLOR IT-15	50.0000	FT
350		M004008 SCR 4-40 X .312 PAN SS PHIL IT-22	2.0000	EA
360		M007525 SCR SELF TAP 4-40 X .250 PAN IT-20	2.0000	EA
370		M101574 PIVOT TAIL VANE W200-SD IT-25	1.0000	EA
380		M101822 POINTER SHAFT W200-SD ASSY IT-26	1.0000	EA
390		M101827 BEARING THRUST 1.053 ID W200 IT-10	1.0000	EA
400		M101826 BEARING THRUST 1.038 ID W200 IT-9	1.0000	EA

(PART NO) =A4\$ OR A4\$(1,3) ="ALL"

09/09/98 35
4.28.3

** QUALIMETRICS, INC. **
BILL OF MATERIAL INQUIRY - 2132

09/09/98 PAGE 3
12:22 PM (R070IZ)

LINE NO	RUN/ SET UP	COMPONENT	QTY EACH	UOM
410		M101828 LOWER HSG 2ND OPER W200 SERIES IT-11	1.0000	EA
420		M102010 RETAINER 2ND OPERATION IT-14	1.0000	EA
430		M102088 TAIL VANE 2ND OPERATION W200 S IT-27	1.0000	EA
440		M409014 WIPER BRUSH ASSY RESIST. ELEME IT-24	1.0000	EA
450		M480049 POT ELEM PLT500.0 OHM W2 IT-18	1.0000	EA
9020	1.0000 .2000	MECHANICAL ASSEMBLY	5.0000	EA

09/08/98 35
4.28.3

** QUALIMETRICS, INC. **
BILL OF MATERIAL INQUIRY - M101829

09/08/98 PAGE 1
11:22 AM (R070IZ)

LINE NO	RUN/ SET UP	COMPONENT	QTY EACH	UOM
10		ECN ENGR CHANGE NUMBER ECN 1338	.0000	EA
20		M101823 ROTOR SHFT W200-SD W200-S	1.0000	EA
40		M401017 CEMENT CONTACT PERMABOND A1	.0000	EA
50		M408055 MAGNET W121-SD	1.0000	EA
9020	.0500 .1000	ELECTRONICS	10.0000	EA

09/08/98 35
4.28.3

** QUALIMETRICS, INC. **
BILL OF MATERIAL INQUIRY - M101822

09/08/98 PAGE 1
11:22 AM (R070IZ)

LINE NO	RUN/ SET UP	COMPONENT	QTY EACH	UOM
10		M101570 POINTER SHAFT W200 SERIES	1.0000	EA
20		M101836 COUNTERWEIGHT W200-SERIES	1.0000	EA
30		M401017 CEMENT CONTACT PERMABOND A1	.0000	EA
9020	.0500 .1000	ELECTRONICS	10.0000	EA