

SENSORS

MANUAL - VERTICAL COMPONENT ANEMOMETER P/N M102236 Rev -

1.0 INTRODUCTION

The Vertical Component Anemometer, P/N 102236, is designed to provide low starting threshold, wide dynamic response and high accuracy over a wide range of wind speeds and a variety of environmental conditions.

1.1 SPECIFICATIONS

Accuracy: $\pm 1.0\%$

Threshold:

102236-G0: 0.5 mph

102236-G1: 0.3 mph

Distance Constant:

102236-G0: 6.9 ft. (2.1 m)

102236-G1: 3.2 ft. (1.0 m)

Operating Range:

102236-G0: 110 mph (49 m/s)

102236-G1: 70 mph (31 m/s)

Operating Temp: -20° to 60°C (-4° to 140°F)

Power Requirement: $+12 \pm 3\text{Vdc}$ @ 6.0 mA

Analog Output: ± 500 mV corresponding to ± 1800 RPM

Frequency Output (Optional): 90 Hz corresponding to 1800 RPM

Dimensions (Sensor):

Diameter: 1 inch tapering to 3/8 inch

Height: 30 inches (76.2 cm)

Weight: less than 1 lb. (0.45 kg)

Propeller Transfer Functions:

$\text{m/s} = 0.00625 \times \text{RPM}$ (Vertical Mode)

$\text{mph} = 0.01398 \times \text{RPM}$ (Vertical Mode)

2.0 INSTALLATION

The sensor can be ordered with P/N 102234 mount, which allows mounting to a 3/4", 1", or 1-1/4" vertical pipe. Be sure the sensor is located in a clear, unobstructed area to minimize any turbulent effects caused by obstructions (e.g., trees, buildings, etc.)

The sensor's connector screws into the mount, secure the sensor by turning the connector until it bottoms (putting some silicone grease on the connector threads will facilitate disassembly should it become necessary). Install propeller so that the propeller serial number faces away from the sensor.

3.0 INPUT/OUTPUT CONNECTIONS

<u>PIN</u>	<u>FUNCTION</u>
A	V_{OUT}
B	Signal Ground
C	Frequency 1(Optional)
D	Frequency 2(Optional)
E	+12V
F	Power Ground

4.0 USER DEFINED OPTIONS

The sensor can be configured with the following propellers:

102236-G0 08254 Carbon Fiber Thermoplastic

102236-G1 08274 Expanded Polystyrene

The sensor mount (P/N 102234) can be configured as follows:

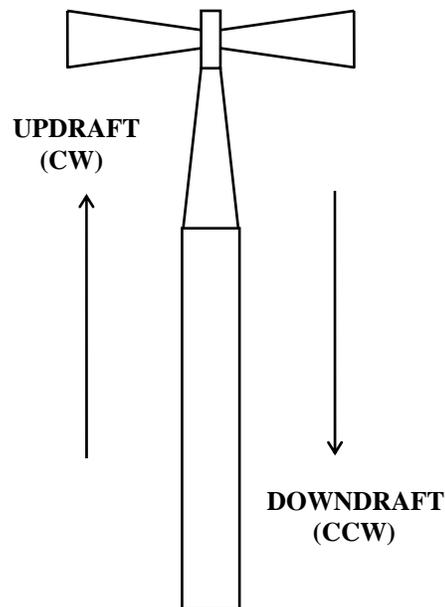
102234-G0 - Designed to mount on 3/4" pipe

102234-G1 - Designed to mount on 1" pipe

102234-G2 - Designed to mount on 1-1/4" pipe

5.0 USER INTERFACE

The wind component anemometer is configured so that updrafts cause a clockwise rotation of the propeller which produces a positive voltage. Conversely, a downdraft causes counter-clockwise rotation of the propeller which produces a negative voltage.



6.0 THEORY OF OPERATION

Please refer to schematic 401389 for this section. U1 accepts the nominal +12V input and converts it to a +5V level. U2 generates a -5V supply from the +5V supply. U3 and its associated components generate a frequency which is used to pulse power to the LED's CR2 and CR3. As the propeller spins, and the shutter blocks the light of the LED, Q3 through Q6 in conjunction with the phototransistors (Q7 and Q8) generate a data signal for U4. U5 and its associated RC network generate a nominal 1 μ s width pulse when the device is clocked. This pulse is then averaged by two RC networks before being amplified by U6. The resultant analog output is ± 500 mV corresponding to ± 1800 RPM.

7.0 CALIBRATION

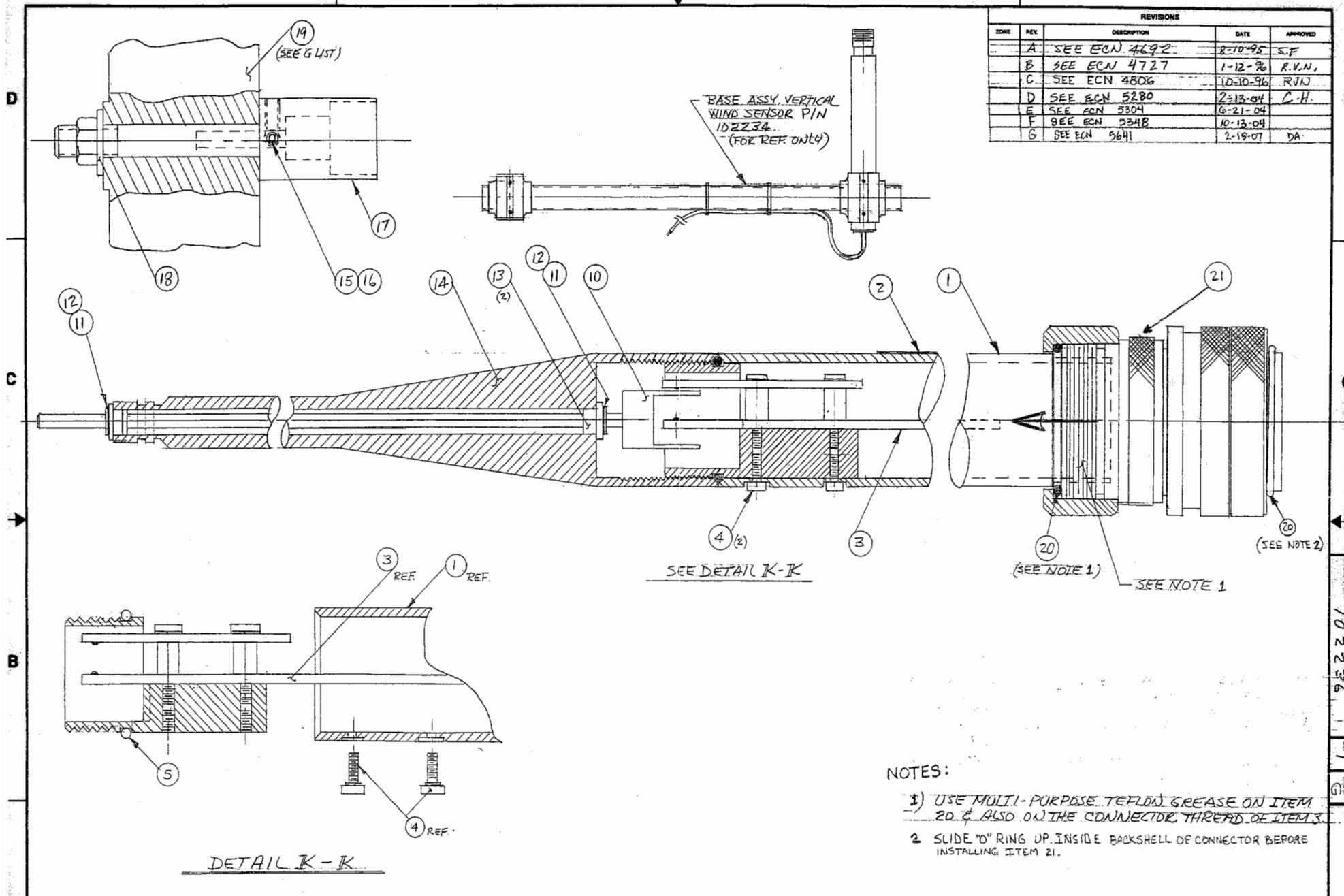
The sensor by itself does not require calibration. However, Climatronics can provide NIST traceable calibration in our wind tunnel for your sensor and propeller assembly combination. Please contact the factory for further details.

8.0 MAINTENANCE

The only required periodic maintenance for the wind component anemometer, is to check to see that the shaft is free to rotate in its bearings. A visual inspection of the anemometer should be performed every six months, if bearing wear is suspected, check the anemometer with a torque disk. In the event bearing replacement becomes necessary (if torque spec exceeds 0.3 gm-cm), refer to assembly drawing 102236 and proceed as follows:

1. Unscrew the column (Item 14) from the support assembly (item 1).
2. Loosen the two set screws (Item 16) in the hub (Item 17) and remove the hub. (Replace set screws that show signs of wear or compression, set screws must be coated with anti-seize compound).
3. Remove the retainer ring (Item 12) and spacers (Item 11) at the top of the column. Reassemble with a new retaining ring.
4. Slide the shaft assembly (Item 10) out of the bearings, and replace bearings (Item 13).
5. Reassemble in the opposite order, making sure to replace spacers in the same place from which they were removed. The shaft must have .008" to .020" axial play.

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	A	SEE ECN 4692	8-10-96	S.F.
	B	SEE ECN 4727	1-12-96	R.V.N.
	C	SEE ECN 4806	10-10-96	R.V.N.
	D	SEE ECN 5280	2-13-04	C.H.
	E	SEE ECN 5304	6-21-04	
	F	SEE ECN 2348	10-12-04	
	G	SEE ECN 5641	2-19-07	DA



- NOTES:
- 1) USE MULTI-PURPOSE TEFLON GREASE ON ITEM 20 & ALSO ON THE CONNECTOR THREAD OF ITEM 1.
 - 2) SLIDE "O" RING UP INSIDE BACKSHELL OF CONNECTOR BEFORE INSTALLING ITEM 21.

DETAIL K-K

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS DECIMALS ANGLES ± .005 ± .001 ± .005		CONTRACT NO.		Cumtastic	
MATERIAL		APPROVALS	DATE	VERTICAL WIND SENSOR ASSY.	
FINISH		5. FRANCO	9-1-94	SIZE	FSCM NO.
NEXT ASST	USED ON	CHECKED	10-20-94	C	52332
APPLICATION		ISSUED	11/14/95	SIZE	FSCM NO.
DO NOT SCALE DRAWING				DWG. NO.	102236
				REV.	6
				SCALE 2:1	SHEET 1 OF 2

DWG. NO. 102236

VERTICAL WIND SENSOR ASSY.
P/N 102236 Rev G
PARTS LIST
Sheet 2 of 2

ITEM	SYM. NO	QTY	PART NO.	DESCRIPTION
1		1.0	102237	SUPPORT ASSY, VERTICAL SENSOR
2		1.0	500827	LABEL, SERIAL NO/PART NO
3		1.0	102232	PC BOARD ASSY, VERT. WIND SEN.
4		2.0	MS3212-1	SCREW, SEAL 4-40 x 1/4
5		1.0	2-018-70SL	O-RING, SILICONE, 70 DUROMETER
10		1.0	102233	SHAFT ASSY, VERTICAL SENSOR
11		2.0	SS1-11	SPACER .010
12		2.0	Q1-12	RING RETAINER
13		2.0	ULKZ4008X-48-6/12	BEARING
14		1.0	501424	COLUMN, VERTICAL WIND SENSOR
15		0.0	76764	ANTI-SEIZE, LUBRICANT, 767
16		2.0	SC8-5	SET SCREW 4-40 x 5/32
17		1.0	500604	HUB, PROPELLER
18		1.0	LN2520-X	LOCK NUT 1/4-20 NYLON
19		0.0	102236G	PROPELLER, G LISTING
20		2.0	2-022-70SL	O-RING, SILICONE, 70 DUROMETER
21		0.0	058-0452-050	CONNECTOR, COUPLER

Notes: ITEM 15 IS TO BE USED AS REQUIRED
ITEM 21 SHOWN FOR REFERENCE ONLY.
ITEMS 6-9 NOT USED.

PROPELLER, G LISTING
P/N 102236G Rev
PARTS LIST
Sheet 1 of 1

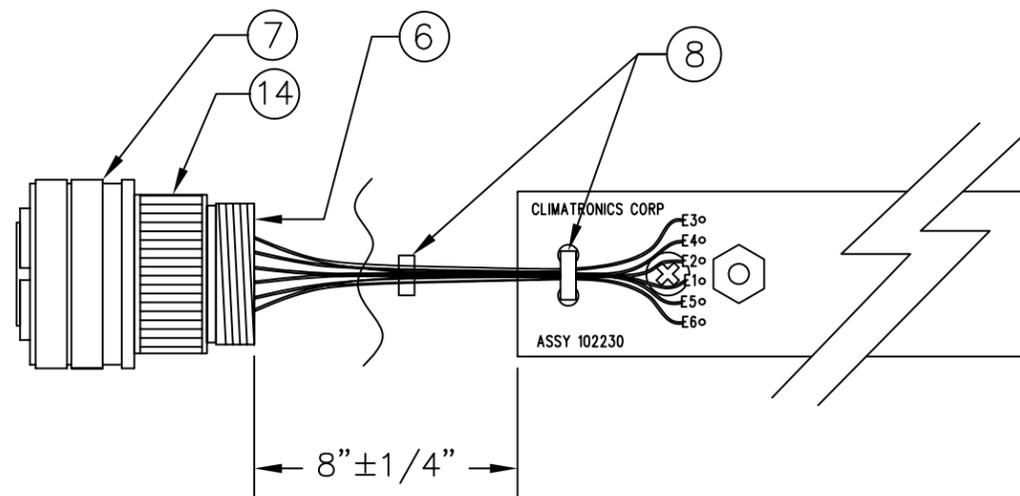
ITEM	SYM. NO	QTY	PART NO.	DESCRIPTION
G0		1.0	08254	GILL PROPELLER (20cm x 30cm)
G1		1.0	08274	GILL PROPELLER (22cm x 30cm)

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
A	SEE ECN 4650	2/21/95	S.F.
B	SEE ECN 5348	10/13/04	
C	SEE ECN 5356	11/02/04	
D	SEE ECN 5426	4/7/05	
E	SEE ECN 5641	2/15/07	DA

SEE NOTE 1 AND DETAIL A



SEE NOTE 6

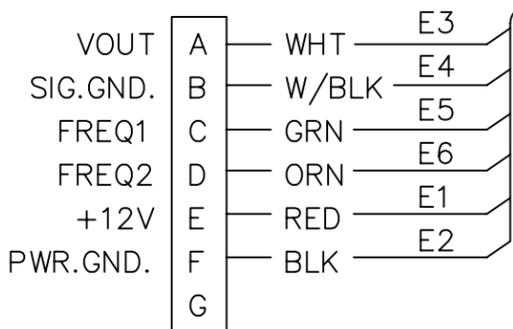
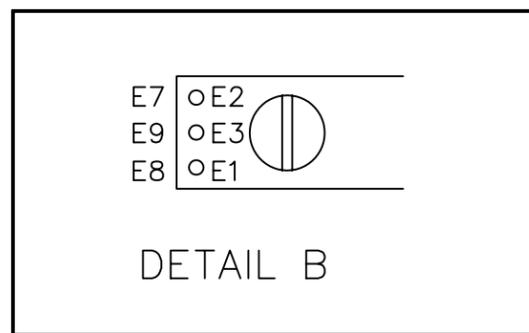
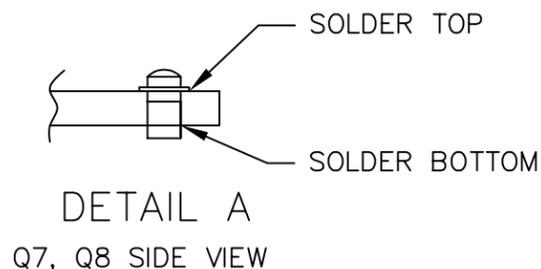


SEE NOTE 4 AND DETAIL B

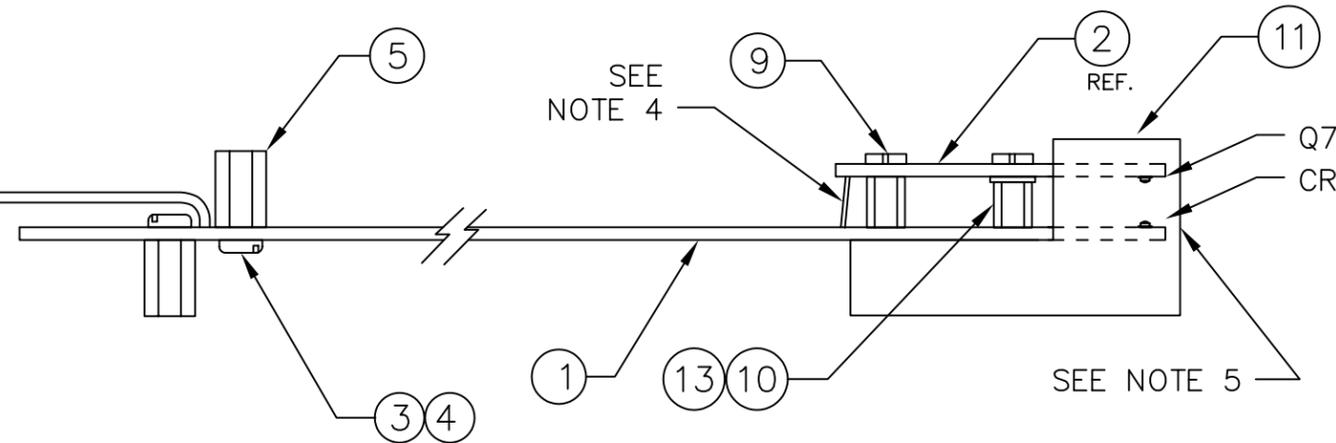


B

B



SEE NOTE 4



SEE NOTE 5

A

A

NOTES:

- 1) INSTALL Q7 AND Q8 FROM TOP SIDE (SILKSCREENED SIDE) OF ITEM 2 AS SHOWN. SOLDER BOTH TOP AND BOTTOM SIDES OF BOARD.
- 2) ALL WIRING TO BE 24 AWG UNLESS NOTED OTHERWISE.
- 3) REMOVE AND REINSTALL CONNECTOR BACKSHELL AFTER WIRING.
- 4) INSTALL 22 AWG BUSS WIRE TO E7, E9 AND E8 ON ITEM 1. CONNECT TO E2, E3 AND E1 RESPECTIVELY ON ITEM 2 AS SHOWN.
- 5) LED AND PHOTO TRANSISTOR MUST FACE EACH OTHER.
- 6) APPLY SILICONE CONFORMAL COATING (MS-460) ON CONNECTOR WIRING AREA.

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES, TOLERANCES ARE:

FRACTIONS	DECIMALS	ANGLES
± 1/64	.XX ± .010	± 1°
	.XXX ± .005	

CONTRACT NO.	102236	USED ON	
MATERIAL	NOT APPLICABLE	FINISH	NOT APPLICABLE
APPLICATION	DO NOT SCALE DRAWING		

APPROVALS	DATE	SIZE B FSCM NO. 52332 DWG. NO. 102232 REV. E
DRAWN S.FRANCIS	10/4/94	
CHECKED JCS	10/20/94	
ISSUED T.J.S.	1/15/95	
SCALE: NONE	P: \Drawings\Assembly\102232E.dwg	

CLIMATRONICS
 140 Wilbur Place
 Airport International Plaza
 Bohemia, NY 11716
 USA
 FAX (631)567-7585 Phone (631)567-7300

PC BOARD ASSEMBLY,
 VERTICAL WIND SENSOR

PC BOARD ASSY, VERT. WIND SEN.
P/N 102232 Rev E
PARTS LIST
Sheet 2 of 2

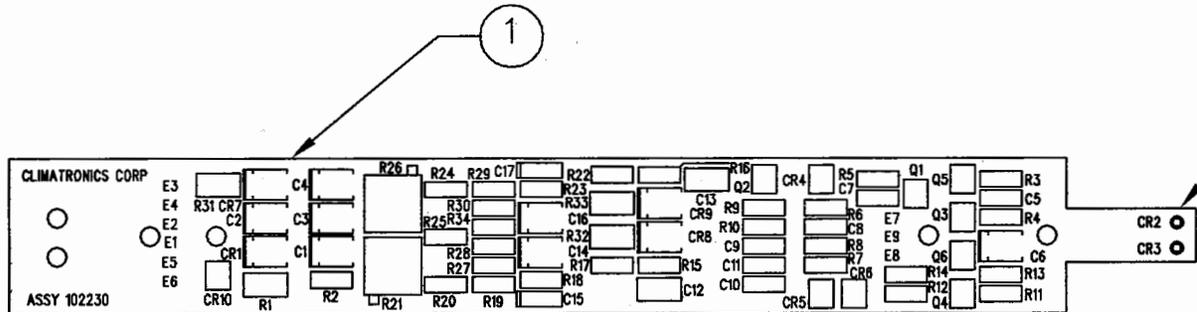
ITEM	SYM. NO	QTY	PART NO.	DESCRIPTION
1		1.0	102230	PC BOARD COMPONENT ASSY
2		1.0	401387	BOARD, PRINTED CIRCUIT
3		4.0	MS35338-135	WASHER, LOCK SPLIT #4
4		4.0	MS51957-13	SCREW 4-40 x 1/4 PH
5		2.0	B213-N-0440	STANDOFF, 4-40 X 3/8 NYLON
6		0.0	MS-460	SILICON RESIN COATING
7		1.0	MS3106A20-15P	CONNECTOR, COUPLING
8		6.0	PLT1M	TIE WRAP, SMALL
9		2.0	4C25MXPB	SCREW, NYLON 4-40 x 1/4 PH
10		2.0	9724-N-0440	STANDOFF 4-40x1/4 M/F 3/16 HEX
11		1.0	501423	SUPPORT LED BOARD
12		2.0	OP643SL	PHOTOTRANSISTOR IR NPN PILL
13		1.0	MS15795-803	WASHER FLAT #4
14		1.0	058-0452-050	CONNECTOR, COUPLER

2

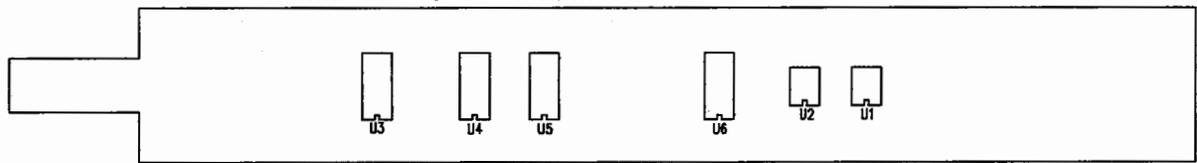
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DWG. NO. 102230

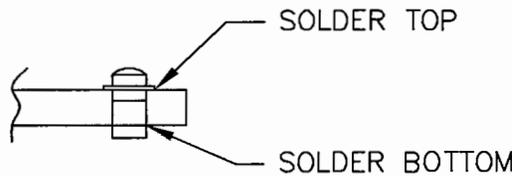
REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
B	SEE ECN 5346	10/12/04	



TOP VIEW



BOTTOM VIEW



DETAIL A
CR2, CR3 SIDE VIEW

SEE DETAIL 'A'
AND NOTES

NOTES:

INSTALL CR2 AND CR3 FROM
TOPSIDE OF BOARD, SOLDER
BOTH TOP AND BOTTOM SIDES
OF BOARD.

UNLESS OTHERWISE SPECIFIED DIMENSIONS
ARE IN INCHES. TOLERANCES ARE:
FRACTIONS DECIMALS ANGLES
± 1/64 .XX ± .010 ± 1°
.XXX ± .005

CONTRACT NO.	
APPROVALS	DATE
DRAWN C.HAPP	10/12/04
CHECKED D.ADAMS	10/12/04
ISSUED	

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VERTICAL COMPONENT
PC BOARD ASSEMBLY

102232	102236
NEXT ASSY	USED ON
APPLICATION	

MATERIAL NOT APPLICABLE
FINISH NOT APPLICABLE
DO NOT SCALE DRAWING

SIZE A	FSCM NO. 52332	DWG. NO. 102230	REV. B
SCALE: FULL		P: \Drawings\Assembly\102230B.dwg	SHEET 1 OF 3

2

1

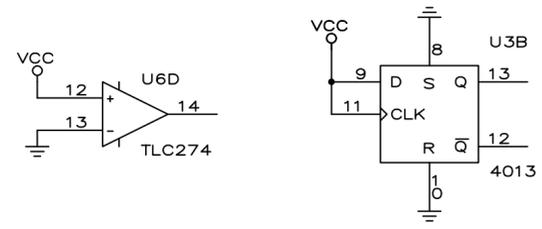
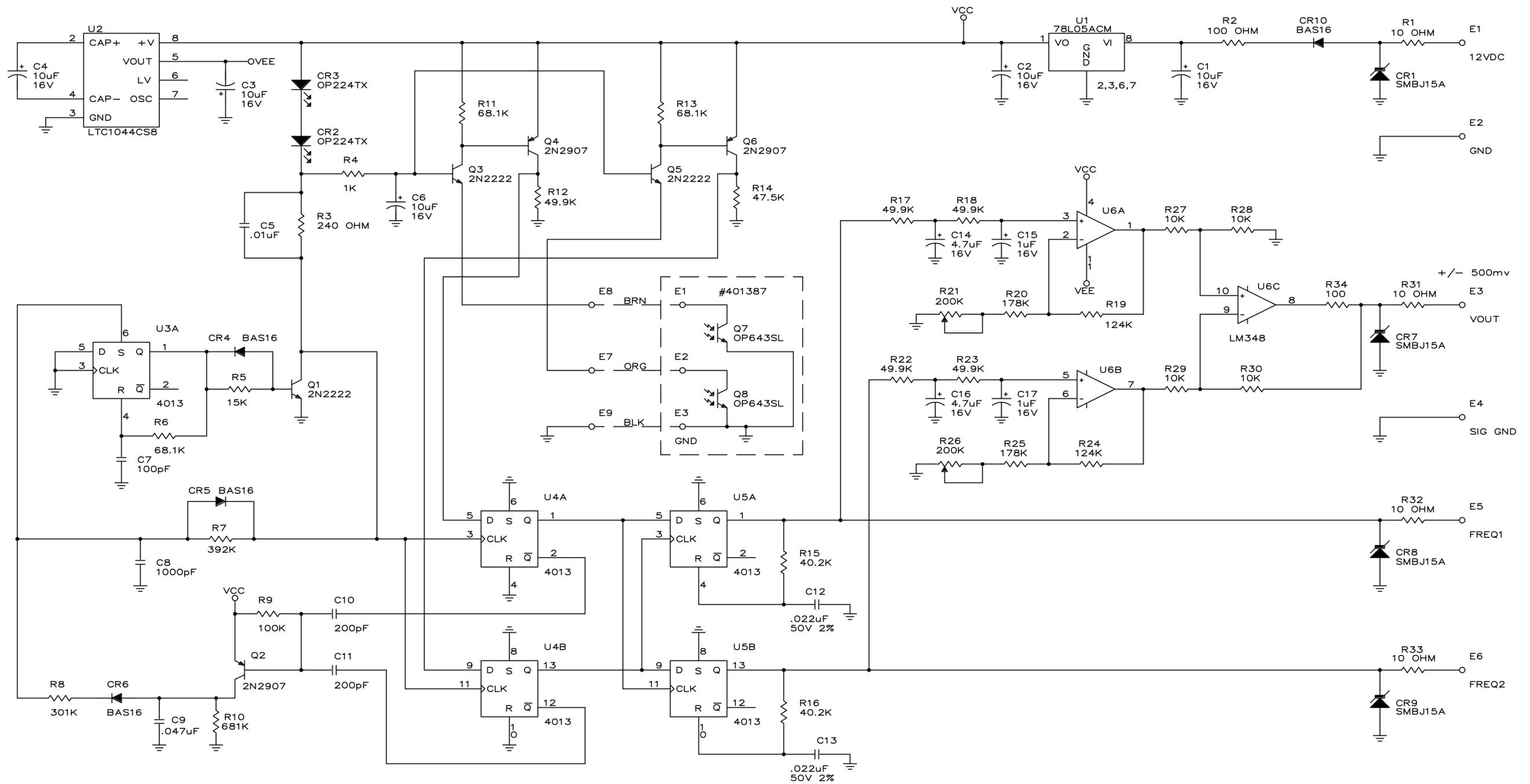
PC BOARD COMPONENT ASSY
P/N 102230 Rev B
PARTS LIST
Sheet 2 of 3

ITEM	SYM.NO	QTY	PART NO.	DESCRIPTION
1		1.0	401388	BOARD, PRINTED CIRCUIT
	C1-C4,C6	5.0	SMCB16106M	CAP SMT 10uF TANT 16V 20%
	C5	1.0	SMC120650103K	CAP SMT .01uF 50V 10%
	C7	1.0	SMC120650101J	CAP SMT 100pF 50V 5%
	C8	1.0	SMC120650102J	CAP SMT 1000pF 50V 5%
	C9	1.0	SMC120650473K	CAP SMT .047uF 50V 10%
	C10,C11	2.0	SMC120650201J	CAP SMT 200pF 50V 5%
	C12,C13	2.0	SMC121050223G	CAP SMT .022uF 50V 2%
	C14,C16	2.0	49MC475B016K0AS	CAP SMT 4.7 UF 16V
	C15,C17	2.0	SMCA16105K	CAP SMT TANT 1uF 16V
	CR1,CR7-CR9	4.0	SMBJ15A-LM	TRANSZORB, 15V 600W SMT
	CR2,CR3	2.0	OP224TX	LED IR PILL
	CR4-CR6,CR10	4.0	BAS16-7	DIODE SMT 75V 200mA
	Q1,Q3,Q5	3.0	MMBT2222A-7	TRANSISTOR SMT NPN 40V GP
	Q2,Q4,Q6	3.0	MMBT2907A-7	TRANSISTOR SMT PNP 60V GP
	R1,R31-R33	4.0	MCR25JW100	RES SMT 10 OHM 1/4W 1210 5%
	R2,R34	2.0	SMR12061000F	RES SMT 100 OHM 1%
	R3	1.0	SMR12062430F	RES SMT 243 OHM 1%
	R4	1.0	SMR12061001F	RES SMT 1K 1%
	R5	1.0	SMR12061502F	RES SMT 15K 1%
	R6,R11,R13	3.0	SMR12066812F	RES SMT 68.1K 1%
	R7	1.0	SMR12063923F	RES SMT 392K 1%
	R8	1.0	SMR12063013F	RES SMT 301K 1%
	R9	1.0	SMR12061003F	RES SMT 100K 1%
	R10	1.0	SMR12066813F	RES SMT 681K 1%

PC BOARD COMPONENT ASSY
 P/N 102230 Rev B
 PARTS LIST
 Sheet 3 of 3

ITEM	SYM.NO	QTY	PART NO.	DESCRIPTION
	R12,R14,R17, R18,R22,R23	6.0	SMR12064992F	RES SMT 49.9K 1%
	R15,R16	2.0	SMR12064022F	RES SMT 40.2K 1%
	R19,R24	2.0	SMR12061243F	RES SMT 124K 1%
	R20,R25	2.0	SMR12061783F	RES SMT 178K 1%
	R21,R26	2.0	3262P-1-204	POT 200K 10%
	R27-R30	4.0	SMR12061002F	RES SMT 10K 1%
	U1	1.0	LM78L05ACM	5V REGULATOR SMT SO-8
	U2	1.0	LTC1044CS8	VOLTAGE CONVERTER IC SMT SO-8
	U3-U5	3.0	MC14013BD	D FLIP-FLOP, SMT SO-14
	U6	1.0	LM348M	QUAD OP AMP IC SMT SO-14
		0.0	401389	SCHEMATIC VERTICAL SENSOR

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
A	ECN 4709	10/16/95	
B	ECN 5346	10/13/04	
C	ECN 5639	1/23/07	



IC	VCC	GND
U3	14	7
U4	14	7
U5	14	7

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCES ARE:		CONTRACT NO.	
FRACTIONS	DECIMALS	APPROVALS	DATE
± 1/64	.XX ± .010		09/94
	.XXX ± .005	DRAWN	RVN
		CHECKED	JCS
		ISSUED	TJS
102232	102236		
NEXT ASSY	USED ON		
APPLICATION		SCALE: NONE	

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SCHEMATIC, VERTICAL WIND COMPONENT

SIZE C FSCM NO. 52332 DWG. NO. 401389 REV. C
 401389C.DXF SHEET 1 OF 1

DRAWING NO. 401389 SHEET 1 REV. C