Appendix 2.

Field Report

Antarctic Automatic Weather Stations

November - December 1981

Michael L. Savage
Charles R. Stearns

University of Wisconsin-Madison

January 1982

Table of Contents

1. Summary of Field Work

1. 4 new stations were deployed and are operating properly:

8909	Siple	
8910	Laurie	8 miles east of Cape Crozier on the Ice Shelf
8911	Jimmy	2 miles north of McMurdo near Arrival Heights
8913	Whitlock	120 miles north of McMurdo on Franklin Island

2. 5 of the existing stations (8903, 8904, 8905, 8906, 8908) were visited. Aerovanes were replaced and calibration readings obtained.

3. An ARGOS test set was used to obtain ground truth calibration readings. Temperature, pressure and wind direction data were found to be accurate, but the AWS have been overstating the wind speed by about 15% since the beginning of the program.

4. The wind direction wiring at Asgard (8908) was reversed last year. We remedied the problem and will correct last year's data.

5. Asgard was blown over last year. We reinstalled the station using longer and heavier anchor lines.

6. We found that the 2 aerovane wind speed sensors that had failed last year (8906 and 8908) did so as the result of a poor solder joint. We reworked all the aerovanes to prevent any more failures.

7. We were unable to find the 2 stations (8907 and 8915) that were deployed on the ice shelf last year.

8. New ROMs were installed in the TIP decoder at McMurdo in order to correct a software error that was causing inaccurate pressure calculations.

9. Figures 1 and 2 and Tables 1 and 2 summarize the AWS deployments.

TABLE 1

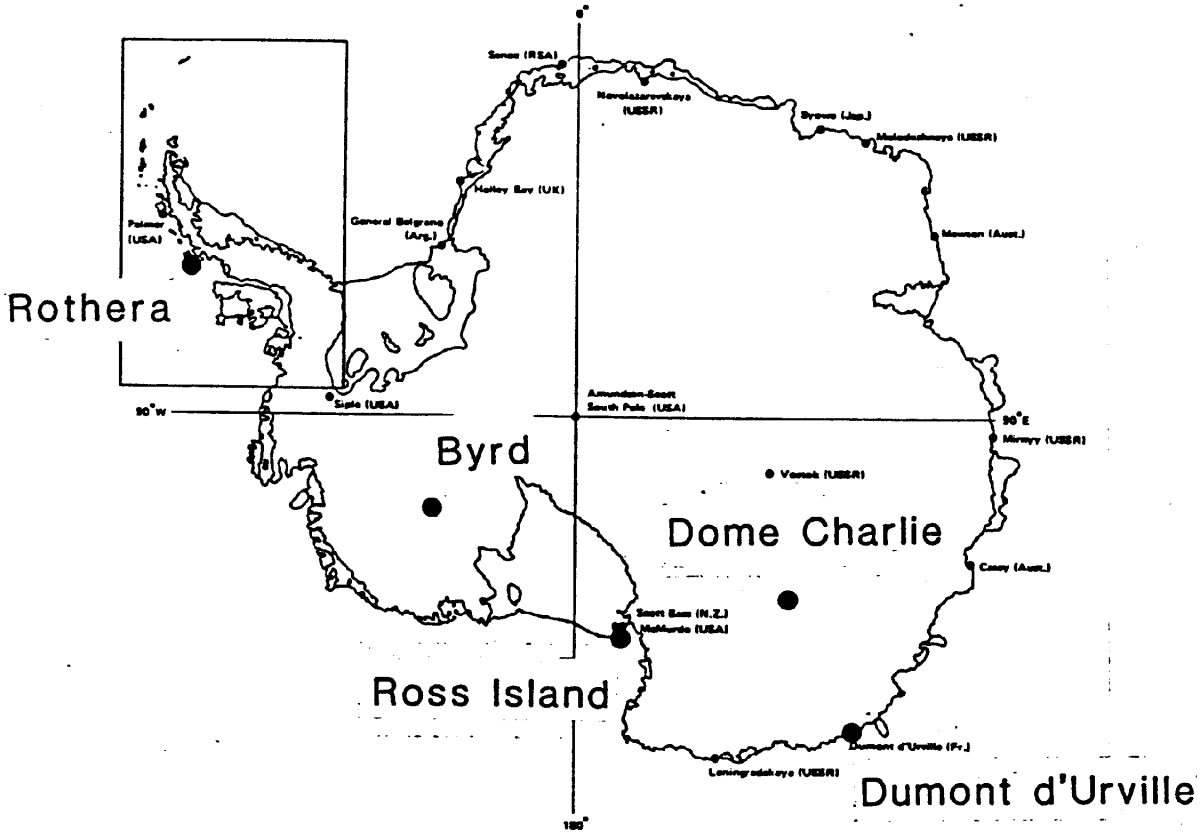
CURRENT AWS DEPLOYMENT

Name	ID #	Location	Elevation	Began	Comments
Marble Point	8906	77°26'S, 163°45'E	120 m	Feb 80	wind speed sensor failed May 81; replaced Nov 81
Asgard	8908	77°36'S, 161°04'E	1750 m	Feb 80	wind speed sensor failed June 81; replaced Nov 81
Manning	8905	78°46'S, 166°56'E	60 m	Nov 80	wind speed sensor suspect; replaced Dec 81
Meeley	8915	78°31'S, 170°11'E	20 m	Dec 80	no problems
Ferrell	8907	78°01'S, 170°48'E	20 m	Dec 80	no problems
Laurie	8910	77°33'S, 169°54'E	20 m	Dec 81	no problems
Jimmy	8911	77°48'S 166°42'E	200 m	Dec 81	no problems
Whitlock	8913	76°05'S 168°20'E	~~300 m~~ 212 m	Jan 82	no problems
D-10	8901	66°42'S, 139°50'E	267 m	Jan 80	failed May 81
D-17	8900	66°44'S, 139°42'E	438 m	Jan 80	failed June 80
D-57	8916	68°11'S, 137°31'E	2064 m	Jan 81	erratic transmissions
Dome Charlie	8904	74°30'S, 123°00'E	3280 m	Feb 80	no problems
Byrd	8903	80°00'S, 120°00'W	1530 m	Feb 80	no problems
Siple	8909	75°54'S, 84°18'W	900 m	Dec 81	no problems

TABLE 2

PROPOSED AWS DEPLOYMENTS

Name	Location	Elevation	Deployment Date	Comments
Ice Rise	66°57'S, 60°36'W	50 m	Dec 82	Antarctic Peninsula
Spine	67°36'S, 66°00'W	1540 m	Jun 82	Antarctic Peninsula
Fossil Bluff	71°20'S, 68°17'W	70 m	Dec 82	Antarctic Peninsula
Butler Island	72°04'S, 60°21'W	130 m	Dec 82	Antarctic Peninsula
D-47	67°24'S,138°43'E	1554 m	Feb 82	South of Dumont d'Urville



ANTARCTICA

Figure 1.

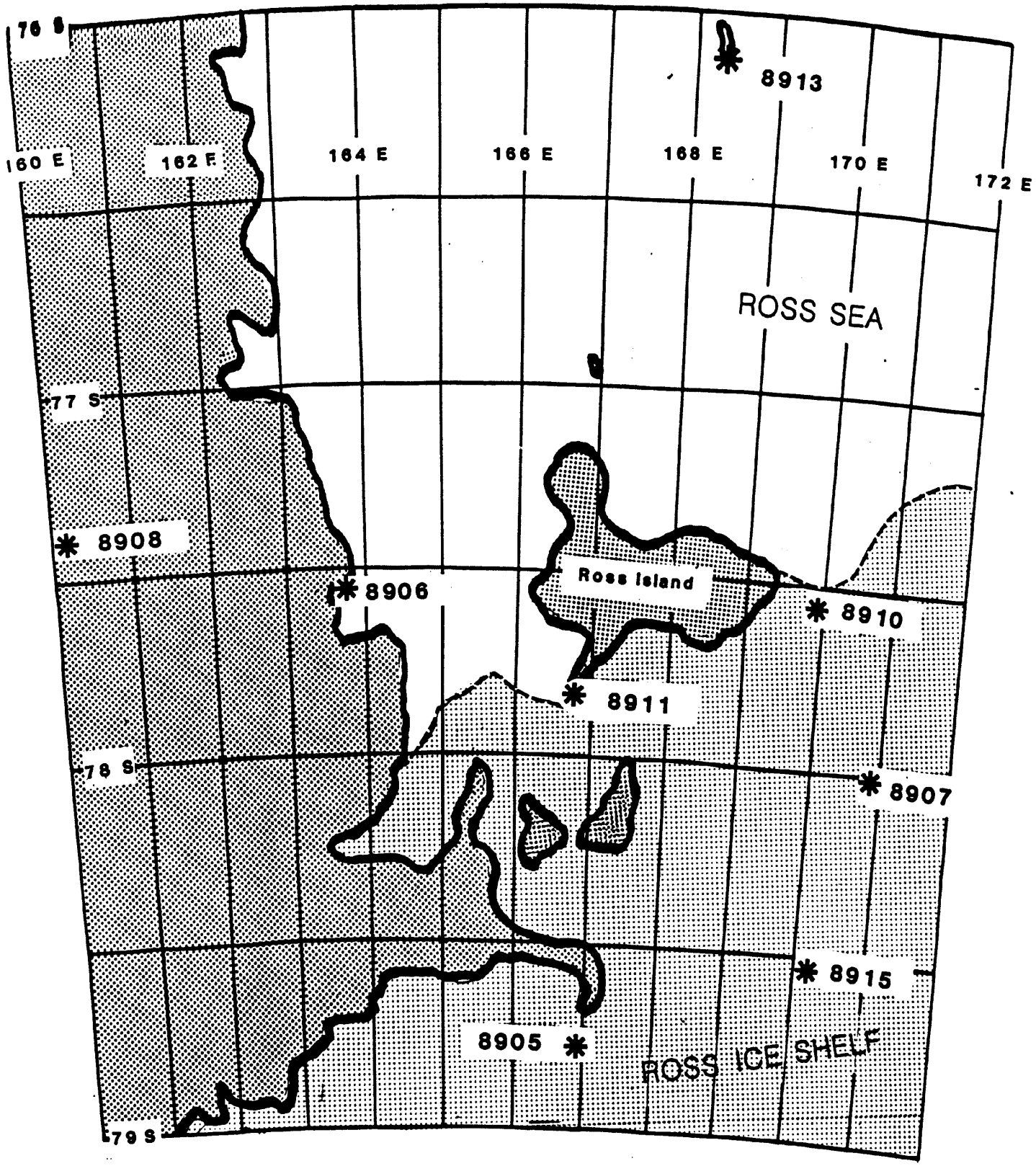

76 S
160 E
162 E
164 E
166 E
168 E
170 E
172 E
8913
ROSS SEA
77 S
8908
8906
Ross Island
8910
8911
78 S
8907
8915
8905
ROSS ICE SHELF
79 S

Figure 2.

2. Calibration

The National Data Buoy Office lent us their ARGOS test set for use in Antarctica. The test set receives and decodes transmissions from the AWS and therefore allows calibration of the units by noting the AWS output under known conditions.

Temperature and pressure calibrations were obtained by using mercury-in-glass thermometers and aneroid barometers to determine ground truth and observing the AWS output. As can be seen in the individual station reports, we found that the AWS measured temperature very accurately. In most cases the AWS also measured pressure very accurately, but at 8903, 8908, and 8911 there are significant discrepancies. It is unclear whether these discrepancies are the result of erroneous measurement by the AWS or of the inaccuracy of the aneroid barometer.

Wind direction data from the AWS is also in very good agreement with observations. However, we found that at all stations the AWS overstated the wind speed by about 15%. This was determined by using a test tachometer to spin the aerovane and observing the AWS output. The aerovane manufacturer supplies a calibration coefficient of .2362 volts/meter per second and indicates that at 1800 rpm the output voltage should be 9.2 VDC; therefore 1800 rpm corresponds to a wind speed of 38.9 m/s. When the aerovanes were tested by spinning them at 1800 (and 900) rpm we found that the AWS reported wind speeds of about 45 m/s, (22 m/s). For field calibration of the wind speed we used a known voltage input to simulate the aerovane generator and again found that the AWS overstated the wind speed by about 15%.

3. Aerovanes

The 2 aerovanes that failed during 1981 (at 8906 and at 8908) were examined in McMurdo and both were found to have a broken wire at the soldered connection on the slip ring. This was the cause of the loss of wind speed signal that occurred at these stations.

These aerovanes were repaired. All other aerovanes except the 2 new aerovanes that had just been installed at 8908 and 8906 were disassembled and the joint in question was resoldered. Additionally, new vertical bearings and new generator brushes were installed, and the generators were tested for proper voltage output. All generators were found to be within specifications.

Aerovane	From	To	Repaired Slip Ring	Replaced Bearings	Replaced Brushes
11-80-07	new	8906			
11-80-11	new	8908			
3-78-010	8906	8905	X	X	X
12-78-016	8908	(a)	X	X	X
3-78-014	8903	(a)	X	X	X
00-00-01	8905	8903	X	X	X
3-78-012	?	8909	X	X	X
3-78-005	?	8904	X	X	X
3-78-009	?	8911	X	X	X
12-78-09	?	8910	X	X	X
00-00-00	?	8913	X	X	X
1544	8904	(b)			
12-78-10	8915	(c)			
?	8907	(c)			

(a) available for installation (8915 and 8907)
(b) needs slip ring repair, brushes and bearings
(c) station not visited so aerovane still in place

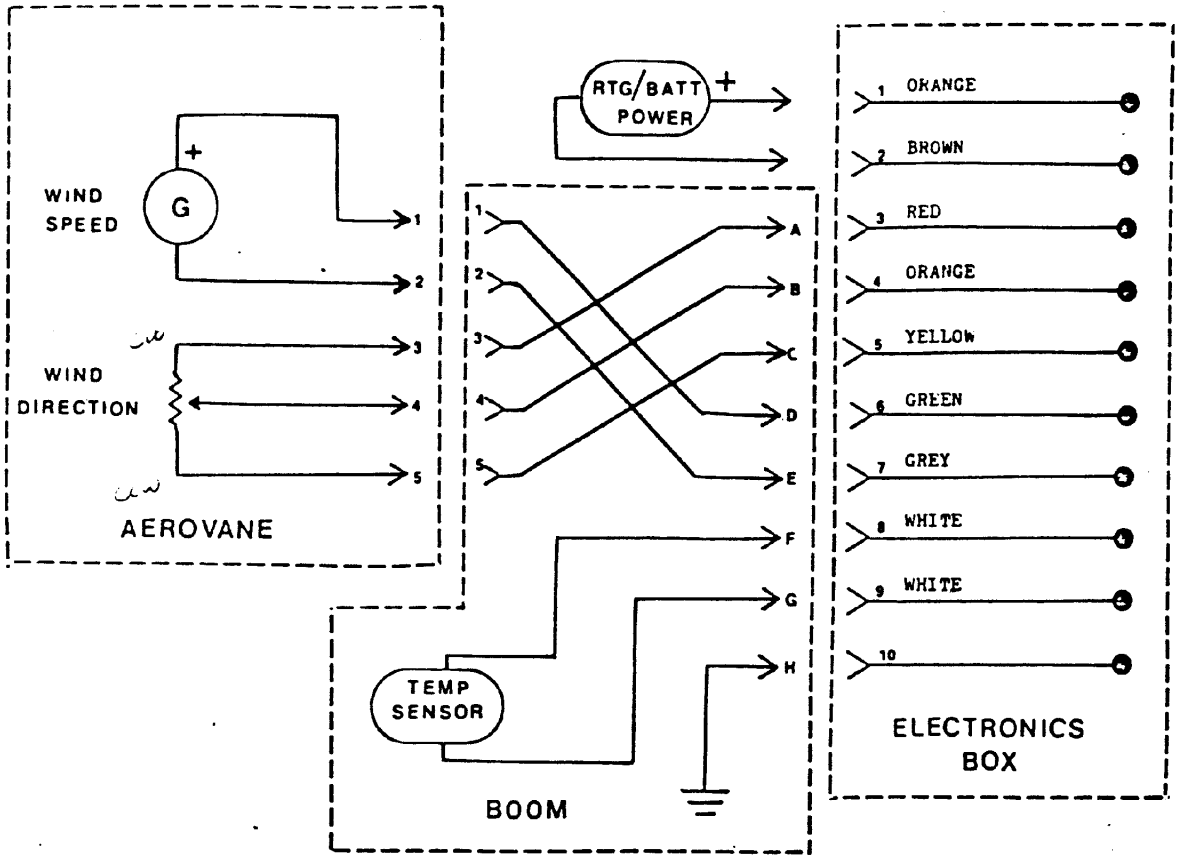
4. Aerovane Wiring Convention

There has been considerable confusion concerning the wiring convention for the aerovanes. At Rothera, Dumont d'Urville and McMurdo there have been occurrences of the aerovane wind direction polarity being reversed. Therefore we restate the wiring convention and include Figure 3 from last year's AWS report:

THE RESISTANCE SHOULD INCREASE FOR A N-E-S-W ROTATION OF THE AEROVANE WHEN MEASURED AT TERMINALS 4 AND 5.

Procedure for verifying aerovane wiring

1. Disconnect power to AWS.
2. Install aerovane on boom. All measurements are made at the terminal strip inside the AWS box.
3. To check the aerovane generator (wind speed sensor) connect a voltmeter between terminals 6 and 7. Spin the prop counterclockwise as viewed from the front (the way it would turn if the wind were blowing). You should observe a positive voltage of a few volts. If the voltage is negative then reverse the wires to terminals 6 and 7.
4. To check the wind direction terminals 3, 4, and 5 are checked. Disconnect the incoming wire going to terminal 4. Set the ohmmeter to the 10,000 ohm scale or greater and connect it between the wire that was just removed from terminal 4 and terminal 5. Rotate the aerovane from north to east to south to west to north (clockwise as viewed from above). During the rotation you should observe the resistance to increase from 0 to 10,000 ohms and then drop to 0 as the aerovane is rotated through north. If the resistance is observed to decrease then exchange the wires from terminals 3 and 5 and recheck.
5. Reconnect wire to terminal 4 and connect power.
6. Remember that the aerovane is pointing north when it points at the antenna.



1. All booms and aerovanes at the AWS sites and in McMurdo were checked and if necessary adjusted to conform with this wiring configuration.

2. Wind direction check: There should be a constant 10,000 ohm resistance between pins 3 and 5 on the aerovane. The resistance should increase from 0 to 10,000 ohms for a clockwise rotation of the aerovane (as viewed from above) when an ohmmeter is connected to pins 4 and 5 on the aerovane.

3. Wind speed check: Pin 1 should be positive with respect to pin 2 of the aerovane for a counterclockwise rotation of the prop as viewed from the front.

Figure 4. Wiring Convention

5. Ice Shelf Station Locations

AWS 8907 and 8915 were installed on the Ross Ice Shelf in December 1981 by Mike Savage, Lt. Cmmdr. Smith and Lt. Evans. The locations of the stations were determined by the intersections of lines-of-position obtained from theodolite bearings to known landmarks (Mt. Erebus, Mt. Discovery, Mt. Terror, and Mt. Heine). These locations were later verified by the doppler positioning system available from Service ARGOS.

Station	from Willy Field distance	bearing	position from theodolite	position from ARGOS
8907	48.01 nm	101°57'	78°01'26"S,170°48'25"E	78°01'55"S,170°47'30"E
8915	54.04 nm	135°42'	78°30'40"S,170°11'28"E	78°30'28"S,170°10'24"E

Note that the difference between the position of the stations as determined by theodolite and the position of the stations as determined by Service ARGOS is small: for 8907 the difference is 0.12 nautical miles (nm) and for 8915 the difference is 0.29 nm. This indicates that we know quite accurately where the stations are.

The trouble is finding them. We failed to find these stations in two attempts. On one of these trips we had a radio direction finder designed to locate ARGOS platforms, but we did not receive any signals, possibly because we were not close enough to the stations.

The prospects for finding the stations next year is even worse since another year's snow accumulation will have reduced the boom's height above ground to only a few feet or perhaps even have buried it. Also, the batteries that power 8915 will probably be exhausted this winter thereby eliminating the possibility of locating the station using an RDF. 8907 is powered by an RTG and therefore should still be transmitting.

The suggested procedure for finding the stations is as follows:

8907: Pass over Willy Field and continue along 102 degrees true for 48.01 nm. We think that this corresponds to 248 degrees on the Willy Field radar. This should be checked. The helo pilot should keep in contact with Willy Field so that he may be vectored along the proper bearing. After traveling for 48 nm, land and scan the horizon for the tower. If not found then execute an expanding-square search pattern. The station should lie along a line connecting the southernmost tip of White Island and the peak of Mt. Discovery.

Another option is to land and use the theodolite to calculate your current position and then determine the distance and bearing to the station. This can be done in about 15 minutes using the HP-67 calculator for the computations.

8915: Proceed in a manner similar to above using a bearing of 136° true and a distance of 54 nm. This station should lie along a line connecting the northernmost tip of White Island and Observation Hill.

8910: This station was installed in December 1981. It should not be as difficult as the others to find due to its proximity to Ross Island.

distance from Willy Field:	41.66 nm
bearing from Willy Field:	62° 38' true
latitude :	77° 32' 57" S
longitude:	169° 53' 37" E
distance from Mt. Terror:	17.64 nm
bearing to Mt. Terror:	276° 58' true

The station lies along a line connecting Observation Hill and Cape McKay.

8905: We were able to find this station without difficulty due to its proximity to Minna Bluff. Suggestions for finding this station are in last year's report.

Suggestions for next season:

1. New 10 foot tower sections should be installed at all the ice shelf stations in order to keep them above the rapidly accumulating snow. This will require extra power cable as well.

2. The RTGs at 8905 and 8907 should be dug out and repositioned. It would be advisable to construct wooden platforms to support the RTGs above the snow (see Byrd photo). The RTG lifting bar is necessary for the helicopter to lift the RTG.

3. A new set of batteries and a solar panel should be installed at 8915.

6. Inventory

I. Remaining at McMurdo

1 12-volt gel cell
2 props
1 12-volt battery charger
1 24-volt to 12-volt battery charger designed to charge batteries from 24 volt RTG
1 aerovane connector assembly
2 6-volt battery chargers (8 amp-hours)
3 reflective temperature probe shrouds
5 white temperature probe shrouds
3 grey temperature probe shrouds
1 antenna cable
1 moisture meter
2 weed temperature probes
1 cup for anemometer
3 spools #22 teflon wire
2 200 feet #14 neoprene 2-conductor wire
1 180 feet RG-8A/U coax cable
2 U brackets for solar panels
3 insulating bushings for temp probe
3 AWS power plugs
2 #14 power cable with plug
2 U brackets for AWS boxes
1 tripod
8 new pots for aerovanes
1 box spare parts for aerovanes

II. On loan to Lt. Whitlock

1 Simpson meter
1 digital VOM meter
1 HP-67 calculator and battery pack
1 theodolite (from Berg Field Center)
1 box of tools
1 hand held receiver
2 pressure gauges
1 instrument case

III. In transit from McMurdo to UW

1 box of tools
rocks from Dry Valleys

7. Station Reports

Travel to the stations was via C-130 aircraft (Byrd, Siple, Dome C) and UH-1N Helicopters. Last year's report contains a detailed listing of equipment requirements and weights. Additional requirements this season included the ARGOS test set (47 lbs), a portable generator for the test set (50 lbs) and the radio direction finder (75 lbs).

Visits to Byrd, Siple, and Dome C are considerably easier if prior arrangements are made with the station crews for transportation from the runway to the AWS site.

8903 - Byrd

Location: 80°S, 120°W. Elevation 1530 meters.

Hex id: 8B1DC

Power: 6 VDC supplied by RTG

Aerovane: Old was 3-78-014. Wind direction polarity verified before removal. New is 00-00-01.

Deployed: 5 February 1980 by Stanford.

Field Calibration: 8 December 81 0400 Z by Savage and Lt. Whitlock

Parameter	Input	Test Set Output	Difference
temperature	-12.8 C	-12.9 C	+0.1 C
pressure	814.5 mb (Paulin)	811.4 mb	-4.1 mb
	812.4 mb (Byrd obs)	811.4 mb	-1.0 mb
inst wind speed	36.1 m/s *	43.2 m/s	+19%
inst wind direction	N	0 deg	-------
mean wind speed	1-2 m/s	1.1 m/s	?
mean wind direction	N	0 deg	-------
voltage	6.4 volts	5.9 volts	-0.5 volts

* wind speed simulated by calibration voltage

Modifications:

1. Minimum thermometer installed
2. Reflective temperature probe shroud and insulating bushing installed.
3. Aerovane replaced

Comments:

1. Pressure of 815.5 mb was obtained from the Paulin microbarometer carried with us from McMurdo. Pressure value of 812.4 mb was obtained from the Byrd Surface Camp microbarograph, and this should be a less accurate reading.

8904 - Dome Charlie

Location: 74°30'S, 123°00'E Elevation 3280 meters.

Hex id: 8B208

Power: 6 VDC supplied by RTG.

Aerovane: Old aerovane was 1544. New aerovane is 3-78-005.

Deployed: 4 February 1980 by Stanford University.

Modifications: 17 December 81 0200 Z by Thompson and Lt. Whitlock.

1. Reflective temperature probe shroud and insulating bushing installed.
2. Aerovane replaced.

Comments:

1. No calibration readings taken.
2. We assume that this AWS also overestimates the wind speed by about 15%.

8905 - Manning

Location: 78°46'S, 161°04'E. 11 nm south of Minna Bluff on the Ross Ice Shelf at an elevation of 60 meters.

Hex id: 8B25B

Power: 6 VDC supplied by RTG.

Aerovane: Old was 00-00-01. Wind direction polarity verified before removal. Aerovane was missing the top washer which lowered the slip ring contacts and this may be significant since this station produced erratic wind speed data last year. New aerovane is 3-78-10, which was reworked after being removed from Marble Point the previous week.

Deployed: 25 November 80 by Savage, Paschal, Lt. Evans, and Lt. Cmmdr. Smith

Field Calibration: 1 December 1981 0400 Z by Stearns, Savage, Thompson and Lt. Whitlock.

Parameter	Input	Test Set Output	Difference
temperature	-4.4 C	-3.8 C	+0.6 C
pressure	977.2 mb	977.7 mb	+0.5 mb
inst wind speed	38.5 m/s *	43.5 m/s	+13%
inst wind direction	WNW	314 deg	-----
mean wind speed	1-3 m/s	3.0 m/s	?
mean wind direction	WNW	309 deg	-----
RTG voltage	6.3 VDC	5.1 VDC	-1.2 VDC

*Wind speed simulated by calibration voltage

Modifications:

1. Minimum thermometer installed.
2. Reflective temperature probe shroud and insulating bushing installed.
3. Aerovane replaced.

Comments:

1. Orientation of aerovane verified using theodolite to take sun sight and determine true north.

8906 - Marble Point

Location: 77°26'S, 163°45'E at an elevation of 120 meters (not 40 meters as previously believed).

Hex id: 8B2AE

Power: 6 VDC supplied by RTG

Aerovane: Old was 3-78-10. Wind direction polarity verified before removal. Wind speed generator had failed due to broken wires. New aerovane is 11-80-07 which is one of the 2 new aerovanes purchased in 1981. Note that this aerovane has not had slip ring solder joint reworked (we only discovered the problem with the slip ring after our return from Marble Point and Asgard).

Deployed: 5 February 1980 by Stanford University

Field Calibration: 27 November 81 2330Z by Stearns, Savage, Thompson and Lt. Whitlock.

Parameter	Input	TIP Output	Difference
temperature	-2.5 C	-3.0 C	-0.5 C
pressure	968.1 mb	967.6 mb	-0.5 mb
inst wind speed	2-4 m/s	3.5 m/s	?
inst wind direction	S	167 deg	-------
mean wind speed	2-4 m/s	3.0 m/s	?
mean wind direction	S	180 deg	-------
RTG voltage	5.0 VDC	4.8 VDC	-0.2 VDC

Modifications:

1. Reflective temperature probe shroud and insulating bushing installed.
2. Minimum thermometer installed.
3. Aerovane replaced.

Comments:

1. ARGOS Test Set did not function due to low battery power and lack of external power source. As a result it was not possible to determine the wind speed accuracy as was done at other stations. We suspect that this station reports winds 10 - 20% too high as is the case with all other stations that have been checked with ARGOS Test Set.

8908 - Asgard

Location: 77°36'S, 161°04'E at an elevation of 1750 meters.

Hex id: 8B317

Power: 6 VDC supplied by RTG

Aerovane: Old was 12-78-16. Wind direction polarity checked before removal and found to be reversed. Therefore all wind direction data since 9 December 1980 needs to be corrected. Wind speed generator had failed due to broken wire on slip ring just like at Marble Point. New aerovane is 11-80-11 which is one of the new ones. Note that this aerovane has not had slip ring solder joint reworked.

Deployed: 5 February 1980 by Stanford University.

Field Calibration: 28 November 1981 0400 Z by Stearns, Savage, Thompson and Lt. Whitlock

Parameter	Input	TIP Output	Difference
temperature	-12.8 C	-12.7 C	+0.1 C
pressure	800.6 mb	794.4 mb	-6.2 mb
inst wind speed	2-4 m/s	3.9 m/s	?
inst wind direction	S	181 deg	------
mean wind speed	2-4 m/s	3.5 m/s	?
RTG voltage	6.4 VDC	5.0 VDC	-1.4 VDC

Modfications:

1. Minimum thermometer installed.
2. Reflective temperature probe shroud and insulating bushing installed.
3. Aerovane replaced.

Comments:

1. ARGOS Test Set did not function due to low battery voltage and lack of external power source. As a result it was not possible to determine the wind speed accuracy as was done at the other stations, but we suspect that this station reports winds 10-20% too high as is the case with all the other stations that were checked with the ARGOS Test Set.
2. The tower had blown over during the past winter. We reinstalled the tower using heavier ropes and chain. A theodolite was used to determine true north from a sun sight in order to correctly orient the aerovane.
3. The correction for wind direction from 9 December 1980 until 28 November 1981 is:

correct wind direction (deg) = 360 - old wind direction (deg)

8909 - Siple

Location: 75°56'S, 84°15'W. Elevation approximately 900 meters.

Hex id: 8B344

Power: 6 VDC from power supply run off station power.

Aerovane: 11-80-11 used for testing. 3-78-12 deployed.

Deployed: 31 December 1981 by Siple crew.

Calibration: 25 November 81 0400 Z at McMurdo lab.

Parameter	Input	Test Set Output	Difference
inst wind speed	38.9 m/s *	44.6 m/s	+15%
	19.5 m/s *	22.3 m/s	+15%
inst wind direction	000 degrees	358 degrees	-----
mean wind speed	19.5 m/s *	22.3 m/s	+15%
mean wind direction	000 degrees	000 degrees	-----
anemometer	.50 volts (1800 rpm)	131 bits	

*Wind speed simulated with calibration instrument

Modifications:

1. RTG regulator diode removed.
2. Heater circuit and diode removed.
3. Low-output generator anemometer installed. Voltage appears in frame 7 word 1.
4. Reflective temperature probe shroud and insulating bushing installed.
5. Minimum thermometer installed.

Comments:

1. Power consumption is 135 mA at idle; 1.5 A at transmit.
2. Antenna used was the one returned from Asgard. This antenna may have been damaged last season and should be replaced.
3. Temperature and pressure input/output was measured and found to be in very good agreement, but numbers were not written down.
4. 40 PS-6200 6-volt gel cell batteries, 8 2.5 watt solar panels and a shunt regulator should be sent down to Siple early next season so that the AWS may continue to operate after closing.

8910 - Laurie

Location: 77°33'S, 169°54'E. 8 miles east-southeast of Cape Crozier on the Ross Ice Shelf at an elevation of approximately 20 meters.

Hex id: 8B3B1

Power: 36 6-volt PS-6200 gel cell batteries. Eight 2.5 watt solar panels and a shunt regulator are used for recharging.

Aerovane: 12-78-09 installed.

Deployed: 15 December 81 by Stearns and Savage.

Calibration: 27 November 81 0400 Z at McMurdo lab.

Parameter	Input	Test Set Output	Difference
temperature	14.4 C	15.3 C	+ .9 C
pressure	978.7 mb	978.6 mb	- .1 mb
inst wind speed	38.9 m/s *	43.2 m/s	+ 11%
	19.5 m/s *	20.9 m/s	+ 7%
inst wind direction	0 deg	0 deg	-------
mean wind speed	19.5 m/s *	20.9 m/s	+ 7%
mean wind direction	0 deg	0 deg	-------
anemometer	.50 volts (1800 rpm)	132 bits	
	.25 volts (900 rpm)	65 bits	

*wind speed simulated with calibration instrument

Field Calibration: 15 December 1981 at time of installation

Parameter	Input	TIP output	Difference
temperature	-1.7 C	-2.5 C	+ 0.8 C
pressure	976.6 mb	983.6 mb	+ 7.0 mb
inst wind speed	15-20 kt	16 kt	--------
inst wind direction	NNW	329 deg	--------
mean wind speed	15-20 kt	16 kt	--------
mean wind direction	NNW	309 deg	--------
battery voltage	6.33 volts	5.4 volts	- 0.9 v

Modifications:

1. RTG regulator diode removed.
2. Heater circuit and diode removed.
3. Low output generator anemometer installed. Voltage appears in frame 7 word 1.
4. Minimum thermometer installed.
5. Reflective temperature probe shroud and insulating bushing installed.

Comments:

1. Power consumption is 135 MA at idle; 1.5 A at transmit.

2. The ARGOS test set was not taken to the installation site due to helicopter load limits.

3. Discrepancy in pressure between measured value in field and value delivered by TIP is large. The December data tape confirms the TIP reading, and the calibration coefficients for the pressure sensor has been checked and are correct. On the previous day the barometers were used at 8911 and agreed very well with the pressure reading from that AWS. Also, 2 barometers were used and several readings were taken with each over a period of an hour. Therefore it appears that the pressure sensor in the AWS has drifted and is now reporting pressures that are 7 mb too high.

8911 - Jimmy

Location: 77°48'S, 166°43'E. The AWS is located near Arrival Heights about 2.5 nm north-northeast of McMurdo. Elevation approximately 200 meters.

Hex id: 8B3E2

Power: 6 VDC from 18 PS-6200 6 volt gel cell batteries. Nine 12 volt gel cells and one 10 watt solar panel are used with a shunt regulator to recharge the batteries. This configuration was necessary when we discovered that the AWS drew more power than expected and there were not enough 6 volt batteries available to power both this station and 8910 through the winter.

Aerovane: 3-78-009 installed.

Deployed: Initial deployment on 5 Dec. 81 by Stearns, Savage, Thompson, and Lt. Whitlock. We returned on 7 December 81 in order to strengthen the supporting structure and take readings with ARGOS Test Set. Batteries were not buried due to the very hard ice covering the area.

Calibration: 1 December 81 2300 Z at McMurdo Lab.

Parameter	Input	Test Set Output	Difference
temperature	8.8 C	9.3 C	+ .5 C
	9.0 C	9.4 C	+ .4 C
	8.3 C	9.5 C	+1.2 C
	8.9 C	9.0 C	+ .1 C
pressure	981.8 mb	982.1 mb	+ .3 mb
	981.4 mb	981.9 mb	+ .5 mb
	981.3 mb	981.8 mb	+ .6 mb
	980.9 mb	981.3 mb	+ .4 mb
inst wind speed	38.9 m/s *	45.1 m/s	+ 16%
	19.5 m/s *	22.4 m/s	+ 15%
inst wind direction	270 deg	269 deg	----
mean wind speed	19.5 m/s *	22.0	+ 13%
mean wind direction	270 deg	270 deg	----
anemometer	2.39 volts (1800 rpm)	81 bits	
	1.19 volts (900 rpm)	41 bits	
voltage	7.2 volts	6.3 volts	-.9 volts

*Wind speed simulated with calibration instrument

Field Calibration: 7 December 81 0300 Z by Savage, Stearns and Thompson

Parameter	Input	Test Set Output	Difference
temperature	1.7 C	1.1 C	-0.6 C
pressure	962.4 mb	962.3	-0.1 mb
inst wind speed	36.7 m/s *	42.7 m/s	+ 16%
inst wind direction	ENE	56°	-----
mean wind speed	36.7 m/s *	42.7 m/s	+ 16%
mean wind direction	ENE	45°	-----
anemometer	1.56 volts	49 bits	
battery voltage	6.2 volts	5.2 volts	-1.0 volts

*Wind speed simulated by calibration voltage

Modifications:

1. High output generator anemometer installed. Voltage appears in frame 7 word 1.
2. RTG regulator diode removed.
3. Heater circuit and diode removed.
4. Reflective temperature probe shroud and insulating bushing installed.
5. Minimum thermometer installed.

Comments:

1. Power consumption 135 mA at idle; 1.5 A at transmit.
2. 22 more 6-volt batteries and 20 watts of 6-volt solar cells should be added next season.

8913 - Whitlock

Location: 76°05'S, 168°20'E on Franklin Island.
Elevation approximately 300 meters.

Hex id: 8B44A

Power: 12 VDC supplied by 9 PS-12360 gel cell batteries in parallel. One 10 watt solar panel used for recharging batteries. Shunt regulator used to prevent overcharging.

Aerovane: 3-78-012 used for testing. 00-00-00 deployed.

Deployed: 23 January 1982 by Lt. John Whitlock, NSFA. Transportation to the island was via the Coast Guard icebreaker Glacier and shipboard helicoptor.

Calibration: 27 November 1981 at McMurdo lab.

Parameter	Input	Test Set Output	Difference
temperature	17 C	17.1 C	-----
pressure	978.9 mb	978.7 mb	- 0.2 mb
inst wind speed	38.9 m/s *	45.7 m/s	+ 17%
	19.5 m/s *	22.8 m/s	+ 17%
inst wind direction	60 deg	58 deg	-----
	360 deg	359 deg	-----
mean wind speed	38.9 m/s *	45.4 m/s	+ 17%
mean wind direction	60 deg	45 deg	- 15 deg
anemometer	.50 volts (1800 rpm)	141 bits	
	.25 volts (900 rpm)	68 bits	

*wind speed simulated with calibration instrument

Modifications:

1. Reflective temperature probe shroud and insulating bushing installed.
2. Low output generator anemometer installed. Voltage appears in frame 7 word 1.
3. Minimum thermometer installed.

Comments:

1. Power consumption 12 mA at idle; about 1 A at transmit.

8. Suggestions for Next Season

1. Replace wind direction pots on all aerovanes.
2. Batteries and solar panels to Siple, Jimmy, and Laurie.
3. New tower sections to all Ice Shelf stations and to Siple.
4. Platforms for RTG's on Ice Shelf.
5. Generator anemometers for those stations not currently equipped.

9. Acknowledgements

We would like to express our appreciation to the many people who helped make for a successful field season: Bill Thompson of the Naval Postgraduate School and Lt. John Whitlock of the Naval Support Force Antarctica assisted in the preparation, calibration, and deployment of the stations. Bill Trabuko and the crew at Siple Station installed the AWS there; Lt. Cmmdr. Steve Foster and Lt. Dave Fleming of NSFA were of great assistance in providing accurate weather forecasts. The C-130 and helicopter pilots provided us with excellent and professional service; Eric Baker of the Navy's communication department was very helpful in supplying needed technical assistance; Dr. Friedmann and his group working in the Dry Valleys helped out with the work at Asgard; and the NSF Representatives and their staffs and the ITT Antarctic Services people made for a pleasant and productive stay in McMurdo.

We also would like to recognize the excellent work done by the members of the Radioscience lab at Stanford University under the direction of Dr. Allen Peterson. Without the superb design and engineering of the AWS by Frank Orabona, Cal Teague, Kok Chen, Bill Crosby and others in the group there would be no automatic weather stations program in Antarctica.

Appendix 4.

RECIPIENTS OF AWS DATA

Name	Affiliation	Data	Plots	Tapes
Dr. Ben Fogle	National Science Foundation	all	all	
Dr. Gerd Wendler	University of Alaska	all	all	0,1,14, 16,18
Dr. Robert Renard	Naval Postgraduate School	all		3,4,5,6, 7,8,9,10, 11,13,15
Dr. Lawrence Scott	University of Arizona	Ross	Ross	10,11
Lt.Commander Foster	Naval Support Force Antarctica	all	all	
Dr. Imre Friedmann	Florida State University	8	8	
Mr. David Limbert	British Antarctic Survey	all	all	
Dr. A. Poggi	Expeditions Polaries Francaises	all		
Mr. John LeMarshall	Australian Bureau of Meteorology	all		
Dr. John Katsufrakis	Stanford University	9	9	
Dr. Elmer Robinson	Washington State University	Ross		
Dr. Chris McKay	Ames Research Center	8	8	
Dr. Tom Parish	University of Wyoming	all		
Dr. Dave Bromwhich	Institute of Polar Studies	all		
Dr. Kristina Ahlnaes	University of Alaska	Ross		
Dr. Cal Teague	Stanford University	all		
Mr. Frank Orabona	Metra Instruments	all		
Dr. Heinz Lettau	University of Wisconsin	all	all	
Dr. W. Schwerdtfeger	University of Wisconsin	all	all	
Dr. Frank Sechrist	University of Wisconsin	all	all	
Dr. Charles Bentley	University of Wisconsin	4	4	

otes: AWS 8901 = "1" etc

: "Ross" = 8905,8906,8907,8908,8910,8911,8913,8915