NCAR-TN-38

Superpressure Balloon Flights from Christchurch, New Zealand August 1967 - June 1968

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FOREWORD

This report presents a compilation of flight summaries and an analysis of flight results for the Phase II GHOST balloon flights from Christchurch, New Zealand, from August 1967 to June 1968. During this period 61 flights were made under the auspices of the New Zealand Meteorological Service, the Environmental Science Services Administration, and the National Science Foundation. The flight program was conducted by the National Center for Atmospheric Research.

The results of the first series of flights between March 1966 and March 1967 are described in NCAR-TN-28, *Superpressure Balloons for Horizontal Soundings of the Atmosphere*, June 1967. In addition to flight summaries, TN-28 provides a status report on superpressure balloon technology. COSPAR Document j-17, "The Use of the Superpressure (GHOST) Balloon for the GARP Experiments," a more recent report on superpressure balloon technology, was presented in May 1968 at the XIth Assembly of COSPAR. Both documents may be obtained by writing to the National Center for Atmospheric Research, Boulder, Colorado, 80302.

We gratefully acknowledge the continuing assistance of the volunteer tracking stations in the southern hemisphere during the second year of GHOST flights; without their assistance our flight program would not have been possible. We also thank the meteorological services, government agencies and volunteer trackers who operated the stations at Luanda, Angola; McMurdo Station, Antarctica; Buenos Aires, Argentina; Melbourne, Australia; Rio de Janeiro Brazil; San Rafael, California; Plaisance, Mauritius; Huancayo, Peru; Pretoria, South Africa; and Broken Hill, Zambia.

The analysis of trajectory data for these and previous GHOST flights is being performed by Samuel B. Solot and Aubrey Schumann at the National Center for Atmospheric Research.

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ANALYSIS OF FLIGHT RESULTS

1. FLIGHTS AT 30 km (10 mb)

Two flights were made at 24 km using polyethylene balloons. Both balloons failed. A third failure during the third phase of flights in October 1968 has caused a temporary halt in testing of large polyethylene spheres. A successful flight with a Mylar sphere from Cardington, England, demonstrates that modest payloads can be carried without difficulty at this altitude. We have no satisfactory explanation at this time for the failure of polyethylene spheres in the superpressure application.

2. FLIGHTS AT 24 km (30 mb)

No flights were made at this altitude from Christchurch during the Phase II operation. However, four carry-over flights from Phase I are included in the summary. Flight durations were 30, 41, 49, and 116 days. The 30 and 49 day flights moved into the Antarctic night and were not heard again. These 1.0 mil balloons were probably damaged during ascent.

Six flights were made during this period from Ascension Island using 1.5 mil balloons which should have been less vulnerable to damage. Longest duration in this group of flights was ten days. Clear evidence was obtained that the balloons were damaged during ascent. It is not known whether damage was due to high ascent rate (up to 9 m/sec) or to the cold tropopause temperatures (-80°C).

Techniques have been developed to reduce ascent rate and new materials are being tested to overcome temperature problems.

3. FLIGHTS AT 16 km (100 mb)

Fifteen flights were made at 100 mb. One balloon was damaged at launch and flew for one day. Five balloons were equipped with a new type of inflation fitting which later tests showed to be defective. These balloons averaged 23 days duration. Of the remaining nine balloons, three are still flying -- one for over one year. *Average flight duration for these nine balloons exceeds 160 days.* In spite of this excellent performance, it is now clear that these balloons of 1.5 mil thickness are subject to pinholes in packing, shipping and handling. Only four of the fifteen were free of defects when tested at Christchurch. A total of 37 pinholes were detected and repaired. Improved materials are needed to eliminate preflight testing. If we are to account for the variability in balloon life for balloons which are launched without defect, we must assume that additional pinhole formation occurs in the majority of balloons during ascent. Of the nine sound balloons, four flew for less than three months and four flew for more than six months.

In order to achieve average life in excess of one year at this altitude, a laminate must be used which is less susceptible to pinhole formation than 1.5 mil bilaminated Mylar.

4. FLIGHTS AT 12 km (200 mb)

Four flights were made at 200 mb with clear 2.0 mil bilaminated Mylar balloons. Average life was 90 days. This is equivalent to the average life of tested balloons flown at this altitude during the Phase I program. On one flight equipped with strain gauge, clear evidence was provided that the balloon accumulated ice and was forced down.

Ten flights were made with metallized cap balloons; five are still flying after four months. It appears that the metal cap, which prevents frost formation under clear skies, improves flight duration at 200 mb although it does not eliminate the weather problem. Average life in mid-latitudes with metallized cap balloons is now estimated at five to six months. Expected duration will be less for balloons launched in tropical latitudes.

There appears to be no problem in handling and packing 2.0 mil balloons for 200 mb flight. Only one of the 14 balloons tested had a detectable leak during preflight check.

No further development appears necessary for balloons at this altitude. Present manufacturing techniques are adequate for production of reliable pinhole free materials. The weather problem is not completely solved with the metallized cap; but, since economic life has been achieved, more complex systems are not needed.

5. FLIGHTS AT 9 km (300 mb)

Six flights were made at 300 mb with metallized cap balloons. Average flight duration was 38 days, with the longest flight lasting 89 days. This is a significant improvement over the average duration of 12 days for uncapped balloons. Since the metallized cap is only effective in preventing frost formation with clear sky above, the evidence from these flights indicates that frost formation rather than accumulation of supercooled water in clouds is the principal mechanism of failure.

Two of the six balloons had pinhole leaks in spite of careful packing. It was not expected that 3.0 mil balloons would pose any problem in shipping and handling. Further testing is required to determine whether thick-walled balloons can be flown without preflight tests.

6. FLIGHTS AT 5.5 km (500 mb)

Four flights were made at 500 mb with waxed balloons equipped with a metallized cap. Flight durations were 1, 14, 16, and 21 days. The 14 day flight moved into the Antarctic night; the 21 day flight reached the Andes and failed to cross. This average of 13 days for four flights is a substantial improvement over the 7 day average for 23 previous flights with uncapped balloons. Although the sample is too small for firm conclusions to be drawn, the results appear significant.

In accordance with GARP objectives, major effort during Phase III will be the flight of metallized cap balloons at 7 km (400 mb).

7. FLIGHTS AT 3 km (700 mb)

Three flights were made at 700 mb with waxed ellipsoid balloons. Flight durations were 9, 14, and 21 days. These results were most encouraging. It appears that 700 mb is a more friendly altitude for balloons than 500 mb.

8. FLIGHTS AT 1 km (900 mb)

Nine flights were made at this level with cylinder balloons. The balloons were not waxed. The longest flight was five days. Fully instrumented flights will be made during Phase III with waxed balloons to determine the mechanism of failure and to bring the average life up to our design goal of one week.

GHOST BALLOON FLIGHT SUMMARY - NOTES

Balloon # nnn pp f M (Note A)

Frequency __________ MHz

Method of leak test (Note B)

Test results __________

____

____

Mfr. balloon # __________

Balloon mass __________ gm

Balloon volume __________ m^3

Balloon diameter __________ m

Film thickness (Note C) mil

Electronics mass __________ gm

Ballast __________ gm

Gross weight less helium __________ gm

Free lift __________ gm

Launch site __________ S

Launch time __________ UT

Ascent rate

0 - 5,000 m __________ m/sec

5,000 - 10,000 m __________ m/sec

Float altitude (Note D) m

Radar (Note E)

Computed (Note F)

Telemetry

Code	Sensor
____	__________
____	__________
____	__________
____	__________

Surface winds ° __________ m/sec

Cloud cover __________

Flight duration __________ days

Number of orbits __________

Position last heard __________

Probable cause of failure:

____

Note A: nnn = flight number; pp = pressure altitude in tens of millibars; f = frequency = 15.02f MHz; M = balloon code letters.

Note B: Freon test - complete survey of balloon using G.E. halogen detector; balloon overpressurized with air and Freon.

Tent test - balloon pressurized with air and Freon and left under canopy for 24 hr. Canopy tested with halogen detector for escaped gas.

Water test - balloon pressurized with air and placed in wading pool filled with water; leak detected from bubbles.

Note C: 1 mil = 0.001 in. = 25 μ.

Note D: Balloon floats at a constant density surface; expressed in kg/m^3, the number would not be meaningful. "Density altitude" is altitude in *U.S. Standard Atmosphere, 1962*, corresponding to the computed or measured density level at float altitude.

Note E: Altitude is measured float altitude from radar, corrected to "density altitude."

Note F: "Density altitude" in meters, computed from balloon volume and gross mass.

GHOST BALLOON FLIGHT SUMMARY

Balloon # 60203 TA

Frequency 15.023 MHz

Method of leak test not tested

Test results

Mfr. balloon # Schjeldahl 19

Balloon mass 1397 gm

Balloon volume 6.06 m^3

Balloon diameter 2.26 m

Film thickness 2.0 mil

Electronics mass 200 gm

Ballast 83 gm

Gross weight less helium 1680 gm

Free lift 300 gm

Launch site $166^{\circ}7'$E, $77^{\circ}8'$S

Launch time 14/11/66 2225 UT

Ascent rate

0 - 5,000 m 1.6 m/sec

5,000 - 10,000 m 2.0 m/sec

Float altitude 11,784 m

Radar

Computed x

Telemetry

Code	Sensor
TA	Sun angle

Surface winds ° 4 m/sec

Cloud cover

Flight duration 314 days

Number of orbits 22

Position last heard 74835 (23/09/67)

Probable cause of failure:

Gas leakage

Remarks: This balloon was equipped with solar cell side panels for low sun angle transmission.

It was launched from McMurdo Station.

GHOST BALLOON FLIGHT SUMMARY

Balloon # 70201 K

Frequency 15.021 MHz

Method of leak test not tested

Test results

Mfr. balloon # Schjeldahl 20

Balloon mass 1453 gm

Balloon volume 6.06 m^3

Balloon diameter 2.26 m

Film thickness 2.0 mil

Electronics mass 157 gm

Ballast 70 gm

Gross weight less helium 1680 gm

Free lift 300 gm

Launch site $172^{\circ}32'$E, $43^{\circ}29'$S

Launch time 17/01/67 2057 UT

Ascent rate

0 - 5,000 m 1.6 m/sec

5,000 - 10,000 m 2.0 m/sec

Float altitude 11,784 m

Radar

Computed x

Telemetry

Code	Sensor
K	Sun angle

Surface winds 0 m/sec

Cloud cover

Flight duration 351 days

Number of orbits 32

Position last heard 63038 (02/01/67)

Probable cause of failure:

Gas leakage

Remarks: This balloon had a Uvinol coating to protect the film from ultraviolet exposure.

GHOST BALLOON FLIGHT SUMMARY

Balloon # 79202 R

Frequency 15.022 MHz

Method of leak test tent test

Test results no leaks detected

Mfr. balloon # Schjeldahl 16

Balloon mass 1440 gm

Balloon volume 6.06 m^3

Balloon diameter 2.26 m

Film thickness 2.0 mil

Electronics mass 127 gm

Ballast 113 gm

Gross weight less helium 1680 gm

Free lift 300 gm

Launch site $172^\circ 32'$E, $43^\circ 29'$S

Launch time 15/02/67 2205 UT

Ascent rate

0 - 5,000 m 1.6 m/sec

5,000 - 10,000 m 2.0 m/sec

Float altitude 11,784 m

Radar

Computed x

Telemetry

Code	Sensor
R	Sun angle

Surface winds 0 m/sec

Cloud cover

Flight duration 101 days

Number of orbits 8

Position last heard 54185 (26/05/67)

Probable cause of failure:

Icing or gas leakage

Remarks:

GHOST BALLOON FLIGHT SUMMARY

Balloon # 86025 C

Frequency 15.025 MHz

Method of leak test water test at factory

Test results no leaks detected

Mfr. balloon # Raven 104

Balloon mass 6690 gm

Balloon volume 216 m^3

Balloon diameter 7.4 m

Film thickness 1.0 mil

Electronics mass 169 gm

Ballast 54 gm

Gross weight less helium 6913 gm

Free lift 1244 gm

Launch site 172°32'E, 43°29'S

Launch time 13/03/67 1945 UT

Ascent rate

0 - 10,000 m 2.0 m/sec

10,000 - 25,000 m 2.5 m/sec

Float altitude 25,500 m

Radar

Computed x

Telemetry

Code	Sensor
C	Sun angle

Surface winds 0 calm m/sec

Cloud cover high Ci

Flight duration 116 days

Number of orbits

Position last heard 54488 (06/07/67)

Probable cause of failure:

Gas leakage

Remarks: This balloon was launched with 600 gm dry ice ballast to reduce ascent rate.

GHOST BALLOON FLIGHT SUMMARY

Balloon # 87023 J 87025 P

Frequency 15.023 15.025 MHz

Method of leak test water test at factory

Test results no leaks detected

Mfr. balloon # Raven 103

Balloon mass 5897 gm

Balloon volume 216 m^3

Balloon diameter 7.4 m

Film thickness 1.0 mil

Electronics mass 325 gm

Ballast 276 gm

Gross weight less helium 6500 gm

Free lift 1200 gm

Launch site $172^{\circ}32'$E, $43^{\circ}29'$S

Launch time 16/03/67 1955 UT

Ascent rate

0 - 10,000 m 2.0 m/sec

10,000 - 25,000 m 2.5 m/sec

Float altitude 25,800 m

Radar

Computed x

Telemetry

Code	Sensor
J	Sun angle
P	Strain on balloon film

Surface winds ° calm m/sec

Cloud cover

Flight duration 49 days

Number of orbits 2

Position last heard 76089 (28/04/67)

Probable cause of failure:

Gas leakage

Remarks: This balloon was launched with 600 gm dry ice ballast to reduce ascent rate.

The strain data showed a very slow leak with balloon life estimated to be 4-6 months. On 28/04/67 the balloon moved into the Antarctic night and was not heard again.

GHOST BALLOON FLIGHT SUMMARY

Balloon # 90027 0 90026 A

Frequency 15.027 15.026 MHz

Method of leak test water test at factory

Test results no leaks detected

Mfr. balloon # Raven 106

Balloon mass 5886 gm

Balloon volume 216 m^3

Balloon diameter 7.4 m

Film thickness 1.0 mil

Electronics mass 350 gm

Ballast 264 gm

Gross weight less helium 6500 gm

Free lift 1200 gm

Launch site $172^{\circ}32'$E, $43^{\circ}29'$S

Launch time 25/03/67 1950 UT

Ascent rate

0 - 10,000 m 2.0 m/sec

10,000 - 25,000 m 2.5 m/sec

Float altitude 25,800 m

Radar

Computed x

Telemetry

Code	Sensor
0	Sun angle
A	Strain on balloon film

Surface winds ° calm m/sec

Cloud cover

Flight duration 30 days

Number of orbits 1

Position last heard 56220 (23/04/67)

Probable cause of failure:

Gas leakage

Remarks: This balloon was launched with 600 gm of methyl alchol, used as a dribble ballast to reduce ascent rate.

The balloon had a slow leak as indicated by decreasing strain during flight. Lifetime was estimated to be 2-3 months. It moved into the Antarctic night on 23/04/67 and was not heard again.

GHOST BALLOON FLIGHT SUMMARY

Balloon # 91022 D

Frequency 15.022 MHz

Method of leak test water test at factory

Test results no leaks detected

Mfr. balloon # Raven 102

Balloon mass 5897 gm

Balloon volume 216 m^3

Balloon diameter 7.4 m

Film thickness 1.0 mil

Electronics mass 160 gm

Ballast 443 gm

Gross weight less helium 6500 gm

Free lift 1200 gm

Launch site 172°32'E, 43°29'S

Launch time 26/03/67 1950 UT

Ascent rate

0.- 10,000 m 4.0 m/sec

10,000 - 25,000 m 5.0 m/sec

Float altitude 25,800 m

Radar

Computed x

Telemetry

Code	Sensor
D	Sun angle

Surface winds ° calm m/sec

Cloud cover

Flight duration 41 days

Number of orbits 1

Position last heard 55610 (05/05/67)

Probable cause of failure:

Gas leakage

Remarks: This balloon moved into the Antarctic night on 05/05/67 and was not heard again.

GHOST BALLOON FLIGHT SUMMARY

Balloon # 92206 X

Frequency 15.026 MHz

Method of leak test tent test

Test results no leaks detected

Mfr. balloon # Schjeldahl 7

Balloon mass 1504 gm

Balloon volume 6.06 m^3

Balloon diameter 2.26 m

Film thickness 2.0 mil

Electronics mass 147 gm

Ballast 29 gm

Gross weight less helium 1680 gm

Free lift 300 gm

Launch site 172°32'E, 43°29'S

Launch time 16/08/67 2023 UT

Ascent rate

0 - 5,000 m 1.6 m/sec

5,000 - 10,000 m 2.0 m/sec

Float altitude 11,784 m

Radar

Computed x

Telemetry

Code	Sensor
X	Sun angle

Surface winds ° calm m/sec

Cloud cover 1/8 Sc at 1000 m

Flight duration 120 days

Number of orbits 9

Position last heard 53381 (13/12/67)

Probable cause of failure:

Gas leakage

Remarks: This balloon was coated with Uvinol to protect the balloon film from ultraviolet radiation.

The balloon was recovered in Argentina several months after it came down. This is the only balloon recovered after a long flight during the GHOST program.

GHOST BALLOON FLIGHT SUMMARY

Balloon # 93205 Z

Frequency 15.025 MHz

Method of leak test Freon test

Test results no leaks detected

Mfr. balloon # Schjeldahl 8

Balloon mass 1520 gm

Balloon volume 6.06 m^3

Balloon diameter 2.26 m

Film thickness 2.0 mil

Electronics mass 147 gm

Ballast 13 gm

Gross weight less helium 1680 gm

Free lift 300 gm

Launch site 172°32'E, 43°29'S

Launch time 08/17/67 2043 UT

Ascent rate

0 - 5,000 m 1.6 m/sec

5,000 - 10,000 m 2.0 m/sec

Float altitude 11,784 m

Radar

Computed x

Telemetry

Code	Sensor
Z	Sun angle

Surface winds o calm m/sec

Cloud cover sctd St at 250 m; 1/8 Sc at 1050 m

Flight duration 19 days

Number of orbits 1

Position last heard 54904 (04/09/67)

Probable cause of failure:

Icing or gas leakage

Remarks: This balloon was coated with Uvinol to protect the film from ultraviolet radiation.

GHOST BALLOON FLIGHT SUMMARY

Balloon # 94101 G

Frequency 15.021 MHz

Method of leak test Freon test

Test results no leaks detected

Mfr. balloon # Raven 10

Balloon mass 2045 gm

Balloon volume 14.82 m^3

Balloon diameter 3.05 m

Film thickness 1.5 mil

Electronics mass 146 gm

Ballast 19 gm

Gross weight less helium 2210 gm

Free lift 400 gm

Launch site 172°32'E, 43°29'S

Launch time 27/08/67 2037 UT

Ascent rate

0 - 5,000 m 2.5 m/sec

5,000 - 10,000 m ___ m/sec

Float altitude 15,700 m

Radar ___

Computed x

Telemetry

Code	Sensor
G	Sun angle

Surface winds 030° 4.6 m/sec

Cloud cover 1/8 Sc at 900 m

Flight duration 1 days

Number of orbits ___

Position last heard ___

Probable cause of failure:

Balloon damaged during launch.

Remarks:

GHOST BALLOON FLIGHT SUMMARY

Balloon # 95108 F

Frequency 15.029 MHz

Method of leak test Freon test

Test results leak at inflation fitting detected and repaired

Mfr. balloon # Raven 9

Balloon mass 2004 gm

Balloon volume 14.82 m^3

Balloon diameter 3.05 m

Film thickness 1.5 mil

Electronics mass 149 gm

Ballast 20 gm

Gross weight less helium 2173 gm

Free lift 400 gm

Launch site 172°32'E, 43°29'S

Launch time 16/09/67 2103 UT

Ascent rate

0 - 5,000 m 2.5 m/sec

5,000 - 10,000 m ____ m/sec

Float altitude 15,900 m

Radar x

Computed ____

Telemetry

Code	Sensor
F	Sun angle

Surface winds ° calm m/sec

Cloud cover 1/8 Sc at 1200 m; 1/2 Ci at 9000 m

Flight duration 81 days

Number of orbits 7

Position last heard 43310 (05/12/67)

Probable cause of failure:

Gas leakage

Remarks:

GHOST BALLOON FLIGHT SUMMARY

Balloon # 96104 W

Frequency 15.024 MHz

Method of leak test Freon test

Test results one pinhole and multiple fine cracks repaired with 3M tape

Mfr. balloon # Raven 6

Balloon mass 2064 gm

Balloon volume 14.82 m^3

Balloon diameter 3.05 m

Film thickness 1.5 mil

Electronics mass 161 gm

Ballast 19 gm

Gross weight less helium 2244 gm

Free lift 400 gm

Launch site $172^{\circ}32'$E, $43^{\circ}29'$S

Launch time 18/09/67 1950 UT

Ascent rate

0 - 5,000 m 2.3 m/sec

5,000 - 10,000 m ____ m/sec

Float altitude 15,630 m

Radar ____

Computed x

Telemetry

Code	Sensor
W	Sun angle

Surface winds 060° 1.5 m/sec

Cloud cover 1/4 Ac at 3800 m

Flight duration 52 days

Number of orbits 2

Position last heard 76813 (04/11/67)

Probable cause of failure:

Gas leakage

Remarks:

GHOST BALLOON FLIGHT SUMMARY

Balloon # 97105 V

Frequency 15.025 MHz

Method of leak test Freon test

Test results no leaks detected

Mfr. balloon # Raven 8

Balloon mass 2044 gm

Balloon volume 14.82 m^3

Balloon diameter 3.05 m

Film thickness 1.5 mil

Electronics mass 164 gm

Ballast 20 gm

Gross weight less helium 2228 gm

Free lift 400 gm

Launch site 172°32'E, 43°29'S

Launch time 19/09/67 2300 UT

Ascent rate

0 - 5,000 m 2.3 m/sec

5,000 - 10,000 m m/sec

Float altitude 15,650 m

Radar

Computed x

Telemetry

Code	Sensor
V	Sun angle

Surface winds 180° 1.5 m/sec

Cloud cover 1/4 Cc at 9000 m

Flight duration 72 days

Number of orbits 1

Position last heard 55067 (29/11/67)

Probable cause of failure:

Gas leakage

Remarks:

GHOST BALLOON FLIGHT SUMMARY

Balloon # 98104 Q

Frequency 15.024 MHz

Method of leak test Freon test

Test results leak at inflation fitting detected and repaired

Mfr. balloon # Raven 3

Balloon mass 1996 gm

Balloon volume 14.82 m^3

Balloon diameter 3.05 m

Film thickness 1.5 mil

Electronics mass 160 gm

Ballast 20 gm

Gross weight less helium 2176 gm

Free lift 400 gm

Launch site $172^\circ 32'$E, $43^\circ 29'$S

Launch time 29/09/67 2118 UT

Ascent rate

0 - 5,000 m 2.3 m/sec

5,000 - 10,000 m ______ m/sec

Float altitude 15,800 m

Radar ______

Computed x

Telemetry

Code	Sensor
Q	Sun angle

Surface winds 060° 3.6 m/sec

Cloud cover 1/4 Ac at 5500 m

Flight duration ______ days

Number of orbits ______

Position last heard ______

Probable cause of failure:

Remarks: This balloon is still flying after more than one year aloft.

GHOST BALLOON FLIGHT SUMMARY

Balloon # 99102 L

Frequency 15.022 MHz

Method of leak test Freon test

Test results two pinholes and one hairline crack detected and repaired

Mfr. balloon # Raven 2

Balloon mass 2064 gm

Balloon volume 14.82 m^3

Balloon diameter 3.05 m

Film thickness 1.5 mil

Electronics mass 163 gm

Ballast 20 gm

Gross weight less helium 2247 gm

Free lift 400 gm

Launch site 172°32'E, 43°29'S

Launch time 03/10/67 1959 UT

Ascent rate

0 - 5,000 m 2.3 m/sec

5,000 - 10,000 m ___ m/sec

Float altitude 15,600 m

Radar ___

Computed x

Telemetry

Code	Sensor
L	Sun angle

Surface winds ° calm m/sec

Cloud cover clear

Flight duration 114 days

Number of orbits 7

Position last heard 55836 (24/01/68)

Probable cause of failure:

Gas leakage

Remarks:

GHOST BALLOON FLIGHT SUMMARY

Balloon # 100104 N

Frequency 15.024 MHz

Method of leak test Freon test

Test results leak at inflation fitting and one pinhole repaired

Mfr. balloon # Raven 4

Balloon mass 2042 gm

Balloon volume 14.82 m^3

Balloon diameter 3.05 m

Film thickness 1.5 mil

Electronics mass 152 gm

Ballast 20 gm

Gross weight less helium 2214 gm

Free lift 400 gm

Launch site 172°32'E, 43°29'S

Launch time 28/09/67 2220 UT

Ascent rate

0 - 5,000 m 2.3 m/sec

5,000 - 10,000 m ______ m/sec

Float altitude 15,700 m

Radar ______

Computed x

Telemetry

Code	Sensor
N	Sun angle

Surface winds 220° 4 m/sec

Cloud cover ______

Flight duration 335 days

Number of orbits 14

Position last heard 75955 (27/08/68)

Probable cause of failure:

Gas leakage

Remarks: Suspension wires tangled at launch in gusty wind, shorting out solar cell panel. The balloon did not transmit for five days. The wire untangled itself and transmission began on the sixth day.

GHOST BALLOON FLIGHT SUMMARY

Balloon # 101107 H

Frequency 15.027 MHz

Method of leak test Freon test

Test results leak at inflation fitting and a cluster of small leaks near top polar cap were repaired

Mfr. balloon # Raven 1

Balloon mass 2087 gm

Balloon volume 14.82 m^3

Balloon diameter 3.05 m

Film thickness 1.5 mil

Electronics mass 164 gm

Ballast 30 gm

Gross weight less helium 2301 gm

Free lift 400 gm

Launch site $172^{\circ}32'$E, $43^{\circ}29'$S

Launch time 10/10/67 2047 UT

Ascent rate

0 - 5,000 m 2.0 m/sec

5,000 - 10,000 m 2.1 m/sec

Float altitude 15,460 m

Radar

Computed x

Telemetry

Code	Sensor
H	Sun angle

Surface winds variable 1.5 m/sec

Cloud cover 1/8 Cu at 550 m

Flight duration 54 days

Number of orbits 3

Position last heard 85515 (02/12/67)

Probable cause of failure:

Gas leakage

Remarks:

GHOST BALLOON FLIGHT SUMMARY

Balloon # 102104 AB

Frequency 15.024 MHz

Method of leak test Freon test

Test results eight leaks repaired

Mfr. balloon # Schjeldahl 10

Balloon mass 2106 gm

Balloon volume 14.82 m^3

Balloon diameter 3.05 m

Film thickness 1.5 mil

Electronics mass 148 gm

Ballast 68 gm

Gross weight less helium 2322 gm

Free lift 400 gm

Launch site 172°32'E, 43°29'S

Launch time 24/10/67 2031 UT

Ascent rate

0 - 5,000 m 2.0 m/sec

5,000 - 10,000 m 2.2 m/sec

Float altitude 15,400 m

Radar

Computed x

Telemetry

Code	Sensor
A	Sun angle
B	Strain gauge

Surface winds 030° 3.1 m/sec

Cloud cover 3/4 Ci at 10,000 m

Flight duration 23 days

Number of orbits

Position last heard 55974 (15/11/67)

Probable cause of failure:

Electronic failure

Balloon lost 0.5% gas per day during its flight.

Remarks: Radar tracked this balloon for 20 min at altitude; float altitude was indicated to be 15,300 m (geometric).

Electronics operated intermittently.

Maximum strain: 0.60%

Maximum daytime variation: 0.1%

GHOST BALLOON FLIGHT SUMMARY

Balloon # 103106 AC

Frequency 15.026 MHz

Method of leak test Freon test

Test results three leaks repaired; cracks on transition section of inflation tube repaired

Mfr. balloon # Schjeldahl 8

Balloon mass 2135 gm

Balloon volume 14.82 m^3

Balloon diameter 3.05 m

Film thickness 1.5 mil

Electronics mass 176 gm

Ballast 32 gm

Gross weight less helium 2343 gm

Free lift 400 gm

Launch site 172°32'E, 43°29'S

Launch time 27/10/67 1803 UT

Ascent rate

0 - 5,000 m 2.0 m/sec

5,000 - 10,000 m 2.2 m/sec

Float altitude 15,350 m

Radar

Computed x

Telemetry

Code	Sensor
A	Sun angle
C	Strain gauge

Surface winds ° calm m/sec

Cloud cover clear

Flight duration 21 days

Number of orbits 1

Position last heard 83984 (16/11/67)

Probable cause of failure:

Electronic failure

Remarks: This balloon coded erratically during its third flight week.

Maximum strain: 0.63%

Minimum strain: 0.24%

Maximum daytime variation: 0.12%

GHOST BALLOON FLIGHT SUMMARY

Balloon # 104103 PR

Frequency 15.023 MHz

Method of leak test Freon test

Test results three leaks repaired

Mfr. balloon # Schjeldahl 6

Balloon mass 2048 gm

Balloon volume 14.82 m^3

Balloon diameter 3.05 m

Film thickness 1.5 mil

Electronics mass 176 gm

Ballast 37 gm

Gross weight less helium 2261 gm

Free lift 452 gm

Launch site 172°32'E, 43°29'S

Launch time 06/11/67 1729 UT

Ascent rate

0 - 5,000 m 1.9 m/sec

5,000 - 10,000 m 2.5 m/sec

Float altitude 15,550 m

Radar

Computed x

Telemetry

Code	Sensor
P	Sun angle
R	Strain gauge

Surface winds 130° 1.5 m/sec

Cloud cover 1/8 Cu

Flight duration 40 days

Number of orbits 21

Position last heard 86213 (15/12/67)

Probable cause of failure:

Unknown: either catastrophic electronics failure or catastrophic failure on inflation fitting.

Remarks: This balloon held pressure during the entire flight and transmitted reliably.

Maximum strain: 0.71%

Minimum strain: 0.24%

Maximum daytime variation: 0.20%

GHOST BALLOON FLIGHT SUMMARY

Balloon # 105013 G 105016 U

Frequency 15.023 15.026 MHz

Method of leak test factory test

Test results inflated at hippodrome in Minneapolis to check integrity

Mfr. balloon # Winzen StratoFilm

Balloon mass 65,000 gm

Balloon volume 152,255 m^3

Balloon diameter 66.8 m

Film thickness 2.0 mil

Electronics mass 460 gm

Ballast 2940 gm

Gross weight less helium 68,400 gm

Free lift ______ gm

Launch site 172°32'E, 43°29'S

Launch time 12/11/67 1255 UT

Ascent rate

0 - 5,000 m ______ m/sec

5,000 - 10,000 m ______ m/sec

Float altitude ______ m

Radar ______

Computed ______

Telemetry

Code	Sensor
G	Sun angle
U	Gas temperature

Surface winds 0 calm m/sec

Cloud cover 1/8 Ac at 4600 m

Flight duration 1 days

Number of orbits ______

Position last heard ______

Probable cause of failure:

Tear in balloon as balloon overpressured

Remarks: This was a polyethylene balloon designed for superpresssure flight.

GHOST BALLOON FLIGHT SUMMARY

Balloon # 106108 YU

Frequency 15.028 MHz

Method of leak test Freon test

Test results four leaks detected and repaired

Mfr. balloon # Schjeldahl 1

Balloon mass 2193 gm

Balloon volume 14.82 m^3

Balloon diameter 3.0 m

Film thickness 1.5 mil

Electronics mass 169 gm

Ballast 38 gm

Gross weight less helium 2400 gm

Free lift 504 gm

Launch site 172°32'E, 43°29'S

Launch time 14/11/67 1735 UT

Ascent rate

0 - 5,000 m 1.9 m/sec

5,000 - 10,000 m 2.5 m/sec

Float altitude 15,200 m

Radar

Computed x

Telemetry

Code	Sensor
Y	Sun angle
U	Strain gauge

Surface winds 090° 5 m/sec

Cloud cover 1/4 Ci at 14,000 m

Flight duration 5 days

Number of orbits

Position last heard 55254 (18/11/67)

Probable cause of failure:

Gas leakage from defective inflation fitting

Remarks: This balloon lost 5% of its gas during each day of flight.

GHOST BALLOON FLIGHT SUMMARY

Balloon # 107307 JN

Frequency 15.027 MHz

Method of leak test Freon test

Test results one pinhole detected and repaired

Mfr. balloon # Schjeldahl 4

Balloon mass 2250 gm

Balloon volume 6.06 m^3

Balloon diameter 2.26 m

Film thickness 3.0 mil

Electronics mass 163 gm

Ballast 14 gm

Gross weight less helium 2427 gm

Free lift 340 gm

Launch site $172^{\circ}32'$E, $43^{\circ}29'$S

Launch time 19/11/67 1734 UT

Ascent rate

Q - 5,000 m 2.1 m/sec

5,000 - 10,000 m 2.0 m/sec

Float altitude 9030 m

Radar

Computed x

Telemetry

Code	Sensor
J	Sun angle
N	Strain gauge

Surface winds $^{\circ}$ calm m/sec

Cloud cover 1/8 Cu at 750 m

Flight duration 89 days

Number of orbits 4

Position last heard 82311 (15/02/68)

Probable cause of failure:

Gas leakage or icing

Remarks: This balloon was equipped with an aluminized cap on top, covering one third of its total surface area.

The strain gauge open-circuited at launch; no strain data were obtained.

GHOST BALLOON FLIGHT SUMMARY

Balloon # 108304 KS

Frequency 15.024 MHz

Method of leak test Freon test

Test results no leaks detected

Mfr. balloon # Schjeldahl 5

Balloon mass 2257 gm

Balloon volume 6.06 m^3

Balloon diameter 2.26 m

Film thickness 3.0 mil

Electronics mass 151 gm

Ballast 4 gm

Gross weight less helium 2412 gm

Free lift 338 gm

Launch site $172^\circ 32'$E, $43^\circ 29'$S

Launch time 19/11/67 1831 UT

Ascent rate

0 - 5,000 m 2.1 m/sec

5,000 - 10,000 m 1.9 m/sec

Float altitude 9030 m

Radar

Computed x

Telemetry

Code	Sensor
K	Sun angle
S	Strain gauge

Surface winds ° calm m/sec

Cloud cover 1/8 Cu at 750 m; 3/8 As at 300 m

Flight duration 53 days

Number of orbits 4

Position last heard 76896 (10/01/68)

Probable cause of failure:

Icing

Remarks: The top third of this balloon was covered with an aluminized cap.

The balloon held overpressure during entire flight.

Maximum strain: 0.90%

Minimum strain: 0.53%

Maximum daytime variation: 0.23%

GHOST BALLOON FLIGHT SUMMARY

Balloon # 109305 QW

Frequency 15.025 MHz

Method of leak test Freon test

Test results no leaks detected

Mfr. balloon # Schjeldahl 6

Balloon mass 2267 gm

Balloon volume 6.06 m^3

Balloon diameter 2.26 m

Film thickness 3.0 mil

Electronics mass 155 gm

Ballast 13 gm

Gross weight less helium 2435 gm

Free lift 390 gm

Launch site $172^{\circ}32'$E, $43^{\circ}29'$S

Launch time 20/11/67 1735 UT

Ascent rate

0 - 5,000 m 2.3 m/sec

5,000 - 10,000 m 1.8 m/sec

Float altitude 9000 m

Radar

Computed x

Telemetry

Code	Sensor
Q	Sun angle
W	Strain gauge

Surface winds 0 calm m/sec

Cloud cover 1/8 Cu at 1500 m

Flight duration 11 days

Number of orbits

Position last heard 85050 (30/11/67)

Probable cause of failure:

Icing

Remarks: The top third of this balloon was covered with an aluminized cap.

The balloon maintained overpressure during its entire flight.

Maximum strain: 0.91%

Minimum strain: 0.67%

Maximum daytime variation: 0.18%

GHOST BALLOON FLIGHT SUMMARY

Balloon # 110306 VL

Frequency 15.026 MHz

Method of leak test Freon test

Test results no leaks detected

Mfr. balloon # Schjeldahl 2

Balloon mass 2252 gm

Balloon volume 6.06 m^3

Balloon diameter 2.26 m

Film thickness 3.0 mil

Electronics mass 152 gm

Ballast 14 gm

Gross weight less helium 2418 gm

Free lift 436 gm

Launch site $172^{\circ}32'$E, $43^{\circ}29'$S

Launch time 21/11/67 2233 UT

Ascent rate

0 - 5,000 m 2.1 m/sec

5,000 - 10,000 m 2.3 m/sec

Float altitude 9030 m

Radar

Computed x

Telemetry

Code	Sensor
V	Sun angle
L	Strain gauge

Surface winds 270° 3.1 m/sec

Cloud cover 1/8 Cu at 600 m; trace Ac and Ci

Flight duration 45 days

Number of orbits 3

Position last heard 74646 (04/01/68)

Probable cause of failure:

Gas leakage

Remarks: The top third of this balloon was covered with an aluminized cap.

The balloon lost 0.4% overpressure per day during flight.

Maximum strain: 0.87%

Minimum strain: 0

Maximum daytime variation: 0.28%

GHOST BALLOON FLIGHT SUMMARY

Balloon # 111306 DK

Frequency 15.026 MHz

Method of leak test Freon test

Test results no leaks detected

Mfr. balloon # Schjeldahl 1

Balloon mass 2269 gm

Balloon volume 6.06 m^3

Balloon diameter 2.26 m

Film thickness 3.0 mil

Electronics mass 148 gm

Ballast 14 gm

Gross weight less helium 2431 gm

Free lift 486 gm

Launch site 172°32'E, 43°29'S

Launch time 06/12/67 1746 UT

Ascent rate

0 - 5,000 m 2.1 m/sec

5,000 - 10,000 m 2.0 m/sec

Float altitude 9000 m

Radar

Computed x

Telemetry

Code	Sensor
D	Sun angle
K	Strain gauge

Surface winds 0 calm m/sec

Cloud cover 1/8 St at 250 m; 1/4 Ci at 9000 m

Flight duration 22 days

Number of orbits

Position last heard

Probable cause of failure:

Icing

Remarks: The top third of this balloon was covered with an aluminized cap.

This balloon transmitted for four days and appeared to be tight. More than two weeks later, on 27/12/67, it was heard faintly by a California listener. It is believed that this balloon moved into the tropics and was in clouds from the 5th to the 22nd day.

GHOST BALLOON FLIGHT SUMMARY

Balloon # 112203 LB

Frequency 15.023 MHz

Method of leak test Freon test

Test results no leaks detected

Mfr. balloon # Schjeldahl 6

Balloon mass 1531 gm

Balloon volume 6.06 m^3

Balloon diameter 2.26 m

Film thickness 2.0 mil

Electronics mass 148 gm

Ballast 39 gm

Gross weight less helium 1710 gm

Free lift 307 gm

Launch site $172^o32'E$, $43^o29'S$

Launch time 14/12/67 1721 UT

Ascent rate

0 - 5,000 m 1.9 m/sec

5,000 - 10,000 m 2.0 m/sec

Float altitude 11,670 m

Radar

Computed x

Telemetry

Code	Sensor
L	Sun angle
B	Strain gauge

Surface winds ^{o} calm m/sec

Cloud cover 1/4 Sc at 900 m

Flight duration 67 days

Number of orbits 1

Position last heard 32367 (18/02/68)

Probable cause of failure:

Icing

Remarks: There was no measurable gas leakage during the entire flight.

The balloon iced up, descended and returned to altitude on 03/01/68.

This balloon crossed the equator and was last heard in the South China Sea.

Maximum strain: 0.78%

Minimum strain: 0%

Maximum daytime variation: 0.27%

GHOST BALLOON FLIGHT SUMMARY

Balloon # 113202 Y 113207 U

Frequency 15.022 15.027 MHz

Method of leak test Freon test

Test results no leaks detected

Mfr. balloon # Schjeldahl 10

Balloon mass 1542 gm

Balloon volume 6.06 m^3

Balloon diameter 2.26 m

Film thickness 2.0 mil

Electronics mass 238 gm

Ballast 53 gm

Gross weight less helium 1833 gm

Free lift 330 gm

Launch site $172^{\circ}32'$E, $43^{\circ}29'$S

Launch time 17/12/67 1655 UT

Ascent rate

0 - 5,000 m 1.9 m/sec

5,000 - 10,000 m 2.0 m/sec

Float altitude 11,250 m

Radar

Computed x

Telemetry

Code	Sensor
Y	Sun angle
U	Monitor of output of cadmium sulfide solar cell panel

Surface winds 0 calm m/sec

Cloud cover 3/4 St at 400 m

Flight duration 152 days

Number of orbits 11

Position last heard 57125 (17/05/68)

Probable cause of failure:

Gas leakage or icing

Remarks: This balloon had a Uvinol coating on the film for ultraviolet resistance.

The Clevite cadmium sulfide panel operated well during entire flight.

GHOST BALLOON FLIGHT SUMMARY

Balloon # 114100 NU

Frequency 15.018 MHz

Method of leak test not tested

Test results balloon prestressed at factory

Mfr. balloon # Delacoste 160

Balloon mass 3867 gm

Balloon volume 33.95 m^3

Balloon diameter 4.0 m

Film thickness 2.0 mil

Electronics mass 280 gm

Ballast 338 gm

Gross weight less helium 4485 gm

Free lift 810 gm

Launch site 172°32'E, 43°29'S

Launch time 19/12/67 1149 UT

Ascent rate *

0 - 5,000 m 2.8 m/sec

5,000 - 10,000 m 2.7 m/sec

Float altitude 16,500 m

Radar

Computed x

Telemetry

Code	Sensor
N	Sun angle
U	Cosmic radiation

Surface winds 040° 2.1 m/sec

Cloud cover clear

Flight duration 7 days

Number of orbits

Position last heard 64114 (25/12/67)

Probable cause of failure:

Balloon damaged during ascent

Remarks: EOLE flight.

* Ascent rate increased to 4.5 m/sec at 14,000 m.

GHOST BALLOON FLIGHT SUMMARY

Balloon # 115106 PM

Frequency 15.026 MHz

Method of leak test not tested

Test results

Mfr. balloon # Delacoste 157

Balloon mass 3867 gm

Balloon volume 33.95 m^3

Balloon diameter 4.0 m

Film thickness 2.0 mil

Electronics mass 280 gm

Ballast 404 gm

Gross weight less helium 4550 gm

Free lift 977 gm

Launch site 172°32'E, 43°29'S

Launch time 22/12/67 0815 UT

Ascent rate*

0 - 5,000 m 2.8 m/sec

5,000 - 10,000 m 3.0 m/sec

Float altitude 16,400 m

Radar

Computed x

Telemetry

Code	Sensor
P	Sun angle
M	Cosmic radiation

Surface winds 090° 7 m/sec

Cloud cover

Flight duration 2 days

Number of orbits

Position last heard 74571 (23/12/67)

Probable cause of failure:

Balloon damaged during ascent

Remarks: EOLE flight.

* Ascent rate increased to 4.0 m/sec at 14,000 m.

GHOST BALLOON FLIGHT SUMMARY

Balloon # 116100 KN

Frequency 15.020 MHz

Method of leak test none

Test results balloon prestressed at factory

Mfr. balloon # Delacoste 156

Balloon mass 3869 gm

Balloon volume 33.95 m^3

Balloon diameter 4.0 m

Film thickness 2.0 mil

Electronics mass 280 gm

Ballast 338 gm

Gross weight less helium 4487 gm

Free lift 810 gm

Launch site 172°32'E, 43°29'S

Launch time 25/12/67 0925 UT

Ascent rate*

0 - 5,000 m 3.0 m/sec

5,000 - 10,000 m 2.8 m/sec

Float altitude 16,500 m

Radar

Computed x

Telemetry

Code	Sensor
K	Sun angle
N	Cosmic radiation

Surface winds 200° 3.6 m/sec

Cloud cover 3/8 Cu at 550 m; 3/4 Sc at 900 m

Flight duration 6 days

Number of orbits

Position last heard

Probable cause of failure:

Balloon damaged during ascent

Remarks: EOLE flight.

* Ascent rate increased to 4.3 m/sec at 14,000 m.

GHOST BALLOON FLIGHT SUMMARY

Balloon # 117103 CM

Frequency 15.023 MHz

Method of leak test not tested

Test results balloon prestressed at factory

Mfr. balloon # Delacoste 158

Balloon mass 3879 gm

Balloon volume 33.95 m^3

Balloon diameter 4.0 m

Film thickness 2.0 mil

Electronics mass 300 gm

Ballast 406 gm

Gross weight less helium 4575 gm

Free lift 822 gm

Launch site 172°32'E, 43°29'S

Launch time 26/12/67 0806 UT

Ascent rate

0 - 5,000 m 2.5 m/sec

5,000 - 10,000 m 2.8 m/sec

Float altitude 16,300 m

Radar

Computed x

Telemetry

Code	Sensor
C	Sun angle
M	Cosmic radiation

Surface winds 070° 4.1 m/sec

Cloud cover 3/8 Cu at 600 m

Flight duration 3 days

Number of orbits

Position last heard

Probable cause of failure:

Balloon damaged during ascent

Remarks: EOLE flight.

GHOST BALLOON FLIGHT SUMMARY

Balloon # 118106 XM

Frequency 15.026 MHz

Method of leak test not tested

Test results

Mfr. balloon # Delacoste 159

Balloon mass 3849 gm

Balloon volume 33.95 m^3

Balloon diameter 4.0 m

Film thickness 2.0 mil

Electronics mass 300 gm

Ballast 414 gm

Gross weight less helium 4563 gm

Free lift 820 gm

Launch site $172^\circ 32'$E, $43^\circ 29'$S

Launch time 28/12/67 0818 UT

Ascent rate

0 - 5,000 m 2.2 m/sec

5,000 - 10,000 m 2.6 m/sec

Float altitude 16,400 m

Radar

Computed x

Telemetry

Code	Sensor
X	Sun angle
M	Cosmic radiation

Surface winds 080° 3.1 m/sec

Cloud cover 1/8 Sc at 450 m

Flight duration 1 days

Number of orbits

Position last heard

Probable cause of failure:

Balloon damaged during ascent

Remarks: EOLE flight.

GHOST BALLOON FLIGHT SUMMARY

Balloon # 119103 SX

Frequency 15.023 MHz

Method of leak test Freon test

Test results six leaks detected and repaired

Mfr. balloon # Schjeldahl 2

Balloon mass 2135 gm

Balloon volume 14.82 m^3

Balloon diameter 3.05 m

Film thickness 1.5 mil

Electronics mass 151 gm

Ballast 37 gm

Gross weight less helium 2323 gm

Free lift 464 gm

Launch site $172^\circ 32'$E, $43^\circ 29'$S

Launch time 22/01/68 1744 UT

Ascent rate

0 - 5,000 m 2.1 m/sec

5,000 - 10,000 m 2.1 m/sec

Float altitude 15,400 m

Radar

Computed x

Telemetry

Code	Sensor
S	Sun angle
X	Strain gauge

Surface winds ° calm m/sec

Cloud cover 1/4 St

Flight duration 25 days

Number of orbits 1

Position last heard 63623 (15/02/68)

Probable cause of failure:

Catastrophic failure of inflation tube or electronics failure

Remarks: This balloon showed no measurable gas loss during the entire flight.

Maximum strain: 0.68%

Minimum strain: 0.24%

Maximum daytime variation: 0.20%

GHOST BALLOON FLIGHT SUMMARY

Balloon # 120707 GL

Frequency 15.027 MHz

Method of leak test Freon test

Test results small leaks around inflation fitting

Mfr. balloon # Raven 101

Balloon mass 1183 gm

Balloon volume 1.58 m^3

Balloon diameter 1 m

Film thickness 1 x 1 x 1 mil

Electronics mass 151 gm

Ballast 37 gm

Gross weight less helium 1371 gm

Free lift 274 gm

Launch site $172^{o}32'$E, $43^{o}29'$S

Launch time 30/01/68 1821 UT

Ascent rate

0 - 1,600 m 2.6 m/sec

Float altitude 1900 m

Radar x

Computed 1979

Telemetry

Code	Sensor
G	Sun angle
L	Air temperature

Surface winds 240^{o} 2.6 m/sec

Cloud cover 1/8 Sc at 1200 m; 3/4 Ac at 3000 m

Flight duration 9 days

Number of orbits

Position last heard 66022 (07/02/68)

Probable cause of failure:

Icing or rain storm

Remarks: This balloon was an ellipsoid 1 x 3 m. It was waxed and reinforced with glass tape in the equatorial area.

The balloon flew at a density altitude equivalent to 797 mb.

GHOST BALLOON FLIGHT SUMMARY

Balloon # 121503 FG

Frequency 15.023 MHz

Method of leak test Freon test

Test results no leaks detected

Mfr. balloon # Schjeldahl

Balloon mass 938 gm

Balloon volume 1.853 m^3

Balloon diameter 1.524 m

Film thickness 2.5 mil

Electronics mass 150 gm

Ballast 36 gm

Gross weight less helium 1124 gm

Free lift 100 gm

Launch site $172^{\circ}32$'E, $43^{\circ}29$'S

Launch time 30/01/68 2049 UT

Ascent rate

0 - 5,000 m 1.6 m/sec

Float altitude 5420 m

Radar

Computed x

Telemetry

Code	Sensor
F	Sun angle
G	Air temperature

Surface winds 210° 2.6 m/sec

Cloud cover 1/8 Cu at 550 m; 1/2 As at 5500 m

Flight duration 1 day

Number of orbits

Position last heard 64076 (30/01/68)

Probable cause of failure:

Icing

Remarks: The top third of this balloon was covered with an aluminized cap.

The balloon was waxed to promote water shedding.

The balloon was in clouds during entire day.

Air temperature: -18.5°C

GHOST BALLOON FLIGHT SUMMARY

Balloon # 122506 BY

Frequency 15.026 MHz

Method of leak test Freon test

Test results twenty leaks detected and repaired

Mfr. balloon # Raven 102

Balloon mass 3042 gm

Balloon volume 7.82 m^3

Balloon diameter 1.97 x 3.94 m

Film thickness 1.5 mil

Electronics mass 147 gm

Ballast 1461 gm

Gross weight less helium 4650 gm

Free lift 930 gm

Launch site 172°32'E, 43°29'S

Launch time 08/02/68 1747 UT

Ascent rate

0 - 5,000 m 3.6 m/sec

Float altitude 5800 m

Radar x

Computed

Telemetry

Code	Sensor
B	Sun angle
Y	Air temperature

Surface winds 030° 2.3 m/sec

Cloud cover 1/8 Cu at 1400 m; 3/8 Ac at 4600 m

Flight duration 2 days

Number of orbits

Position last heard

Probable cause of failure:

Gas leakage through holes produced by glass filament winding

Remarks: This balloon was a filament-wound "hyperpressure" ellipsoid. The filament-windings produced many holes during testing.

This method of producing a balloon to withstand large overpressures was a complete failure.

GHOST BALLOON FLIGHT SUMMARY

Balloon # 123302 AB 123306 FJ

Frequency 15.022 15.026 MHz

Method of leak test Freon test

Test results two leaks detected and repaired

Mfr. balloon # Schjeldahl 12

Balloon mass 1728 gm

Balloon volume 6.06 m^3

Balloon diameter 2.26 m

Film thickness 2.0 mil

Electronics mass 408 gm

Ballast 102 gm

Gross weight less helium 2238 gm

Free lift 334 gm

Launch site $172^{\circ}32'$E, $43^{\circ}29'$S

Launch time 09/02/68 1734-38 UT

Ascent rate

0 - 5,000 m 1.6 m/sec

5,000 - 10,000 m 1.8 m/sec

Float altitude 9700 m

Radar

Computed x

Telemetry

Code	Sensor
A	Wind shear speed
B	Wind shear direction
F	Sun angle
J	Sun angle

Surface winds $^{\circ}$ calm m/sec

Cloud cover none

Flight duration 9 days

Number of orbits

Position last heard

Probable cause of failure:

Icing

Remarks: This complex flight attempted to measure wind shear at float altitude by two techniques:
1) A package was suspended 610 m below the balloon with an anemometer. The anemometer determined the switching rate for code A. The ratio of time on for A and B provided the direction of the wind shear with respect to the sun.
2) The balloon itself acted as a separate wind shear sensor, since it was equipped with "ears" which caused it to spin at a rate determined by shear over the 610 m line. Light shears and recording difficulties made it impossible to analyze the shear data.

GHOST BALLOON FLIGHT SUMMARY

Balloon # 124707 CK

Frequency 15.027 MHz

Method of leak test Freon test

Test results no leaks detected

Mfr. balloon # Raven 104

Balloon mass 1076 gm

Balloon volume 1.58 m^3

Balloon diameter 1 x 3 m

Film thickness 1 x 1 x 1 mil

Electronics mass 155 gm

Ballast 36 gm

Gross weight less helium 1267 gm

Free lift 177 gm

Launch site $172^{\circ}32'$E, $43^{\circ}29'$S

Launch time 21/02/68 1731 UT

Ascent rate

0 - 5,000 m 2.2 m/sec

5,000 - 10,000 m ____ m/sec

Float altitude 2740 m

Radar 1840

Computed x

Telemetry

Code	Sensor
C	Sun angle
K	Air temperature

Surface winds 0 calm m/sec

Cloud cover clear

Flight duration 14 days

Number of orbits ____

Position last heard 64995 (05/03/68)

Probable cause of failure:

Remarks: Ellipsoid balloon, waxed to promote water shedding.

GHOST BALLOON FLIGHT SUMMARY

Balloon # 125505 RV

Frequency 15.025 MHz

Method of leak test Freon test

Test results three leaks detected

Mfr. balloon # Schjeldahl 8

Balloon mass 952 gm

Balloon volume 1.853 m^3

Balloon diameter 1.524 m

Film thickness 2.5 mil

Electronics mass 148 gm

Ballast 68 gm

Gross weight less helium 1168 gm

Free lift 120 gm

Launch site 172°32'E, 43°29'S

Launch time 21/02/68 1757 UT

Ascent rate

0 - 5,000 m 1.5 m/sec

5,000 - 10,000 m ____ m/sec

Float altitude 5230 m

Radar 4850

Computed x

Telemetry

Code	Sensor
R	Sun angle
V	Air temperature

Surface winds ° calm m/sec

Cloud cover clear

Flight duration 21 days

Number of orbits ____

Position last heard 53470 (12/03/68)

Probable cause of failure:

Balloon failed as it crossed the Andes

Remarks: Top third of this balloon was covered with an aluminized cap.

The balloon was waxed to improve water shedding.

Air temperature varied from -2 to -4°C during the first week. No data on air temperature were transmitted during second two weeks.

GHOST BALLOON FLIGHT SUMMARY

Balloon # 126505 HN

Frequency 15.025 MHz

Method of leak test Freon test

Test results three leaks detected and repaired

Mfr. balloon # Schjeldahl

Balloon mass 957 gm

Balloon volume 1.853 m^3

Balloon diameter 1.524 m

Film thickness 2.5 mil

Electronics mass 150 gm

Ballast 18 gm

Gross weight less helium 1125 gm

Free lift 140 gm

Launch site $172^{\circ}32'$E, $43^{\circ}29'$S

Launch time 25/02/68 2223 UT

Ascent rate

0 - 5,000 m 1.8 m/sec

5,000 - 10,000 m ____ m/sec

Float altitude 5420 m

Radar ____

Computed x

Telemetry

Code	Sensor
H	Sun angle
N	Air temperature

Surface winds 060° 3 m/sec

Cloud cover 1/8 Ac at 5500 m

Flight duration 14 days

Number of orbits ____

Position last heard 55167 (09/03/68)

Probable cause of failure:

Icing

Remarks: The top third of this balloon was covered with an aluminized cap.

The balloon was waxed to improve water shedding.

Air temperature decreased from -4°C on the first day to -10°C on the sixth day and to -14°C on the 10th day as balloon moved to the south. The balloon moved into the Antarctic on the 14th day and was not heard again.

GHOST BALLOON FLIGHT SUMMARY

Balloon # 127703 NKNC

Frequency 15.023 MHz

Method of leak test Freon test

Test results small leaks around inflation fitting repaired

Mfr. balloon # Raven 102

Balloon mass 1073 gm

Balloon volume 1.58 m^3

Balloon diameter 1 x 3 m

Film thickness 1 x 1 x 1 mil

Electronics mass 160 gm

Ballast 37 gm

Gross weight less helium 1270 gm

Free lift 178 gm

Launch site $172^{\circ}32'$E, $43^{\circ}29'$S

Launch time 29/02/68 2144 UT

Ascent rate

0 - altitude 2.4 m/sec

Float altitude 2750 m

Radar

Computed x

Telemetry

Code	Sensor
N	Sun angle
K	Electronics temperature
C	Air temperature

Surface winds $^{\circ}$ calm m/sec

Cloud cover 1/4 Ac at 5500 m

Flight duration 21 days

Number of orbits

Position last heard 71767 (20/03/68)

Probable cause of failure:

Balloon damaged in tropical storm on third day

Remarks: This was an ellipsoidal balloon, waxed to improve water shedding.

GHOST BALLOON FLIGHT SUMMARY

Balloon # 128172 S

Frequency 15.022 MHz

Method of leak test none

Test results

Mfr. balloon # Schjeldahl 1

Balloon mass 7553 gm

Balloon volume 36.48 m^3

Balloon diameter 2.26 m

Film thickness see remarks mil

Electronics mass 158 gm

Ballast 66 gm

Gross weight less helium 7777 gm

Free lift 778 gm

Launch site $172^{\circ}32'$E, $43^{\circ}29'$S

Launch time 16/04/68 1902 UT

Ascent rate

0 - 5,000 m 2.0 m/sec

5,000 - 10,000 m 2.3 m/sec

Float altitude 13,400 m

Radar

Computed x

Telemetry

Code	Sensor
S	Sun angle

Surface winds 290° 4.1 m/sec

Cloud cover 1/8 Cu

Flight duration 84 days

Number of orbits 6

Position last heard 84705 (08/07/68)

Probable cause of failure:

Gas leakage

Remarks: This was a double-walled balloon. The inner balloon consisted of 1/2 mil Saran and the outer balloon of 3 mil Mylar. There were holes in both balloons purposely produced by rough handling.

GHOST BALLOON FLIGHT SUMMARY

Balloon # 129905 A

Frequency 15.025 MHz

Method of leak test Freon test

Test results small leaks around inflation fitting

Mfr. balloon # Raven 103

Balloon mass 1181 gm

Balloon volume 1.58 m^3

Balloon diameter 1 x 3 m

Film thickness 1 x 1 x 1 mil

Electronics mass 311 gm

Ballast 36 gm

Gross weight less helium 1528 gm

Free lift 215 gm

Launch site 172°44'E, 43°32'S

Launch time 17/04/68 0900 UT

Ascent rate

0 - altitude 1.7 m/sec

Float altitude 915 m

Radar

Computed x

Telemetry

Code	Sensor
A	Sun angle

Surface winds 190° 4.6 m/sec

Cloud cover 1/8 St; 3/8 As

Flight duration 1 days

Number of orbits

Position last heard

Probable cause of failure:

Balloon came back over land on afternoon of launch day and was destroyed when it hit ground

Remarks: This was an ellipsoid balloon.

GHOST BALLOON FLIGHT SUMMARY

Balloon # 130101 XZ

Frequency 15.021 MHz

Method of leak test Freon test

Test results five leaks detected and repaired

Mfr. balloon # Schjeldahl 3

Balloon mass 2106 gm

Balloon volume 14.74 m^3

Balloon diameter 3.04 m

Film thickness 1.5 mil

Electronics mass 148 gm

Ballast 35 gm

Gross weight less helium 2289 gm

Free lift 456 gm

Launch site 172°32'E, 43°29'S

Launch time 21/04/68 1930 UT

Ascent rate

0 - 5,000 m 2.1 m/sec

5,000 - 10,000 m 2.1 m/sec

Float altitude 13,900* m

Radar x

Computed

Telemetry

Code	Sensor
X	Sun angle
Z	Strain gauge

Surface winds ° calm m/sec

Cloud cover 1/4 Sc; 1/2 Ac

Flight duration days

Number of orbits

Position last heard

Probable cause of failure:

Remarks: This balloon has lost two-thirds of its overpressure during the first five months of flight.

Maximum strain: 0.46%

Minimum strain: 0.08%

Maximum daytime variation: 0.20%

This balloon was still flying 12/12/68.

*Design altitude was 15,500 m. After inflation, the defective inflation tube was cut out and replaced by a patch. Apparently 0.3 m^3 of air was sucked into the balloon during the repair operation. This provided a 300 gm increase in effective ballast.

GHOST BALLOON FLIGHT SUMMARY

Balloon # 131906 L

Frequency 15.026 MHz

Method of leak test Freon test

Test results leaks around inflation fitting

Mfr. balloon # Raven 106

Balloon mass 4868 gm

Balloon volume 5.79 m^3

Balloon diameter 1 x 6.7 m

Film thickness 5 mil

Electronics mass 324 gm

Ballast 488 gm

Gross weight less helium 5680 gm

Free lift 970 gm

Launch site $172^{o}44'E$, $43^{o}32'S$

Launch time 22/04/68 0320 UT

Ascent rate

0 - 5,000 m ____ m/sec

5,000 - 10,000 m ____ m/sec

Float altitude 760 m

Radar ____

Computed x

Telemetry

Code	Sensor
L	Air temperature

Surface winds 080^{o} 5 m/sec

Cloud cover 3/8 Ac

Flight duration 3 days

Number of orbits ____

Position last heard ____

Probable cause of failure:

Unknown

Remarks: This was a 3 mil cylinder balloon, with 2 mil sleeve and hemisphere end caps.

The balloon was launched from the beach.

Air temperature:

First day: $+13^{o}C$

Second day: $+11^{o}C$

GHOST BALLOON FLIGHT SUMMARY

Balloon # 132502 MV

Frequency 15.022 MHz

Method of leak test Freon test

Test results two leaks detected and repaired

Mfr. balloon # Schjeldahl 10

Balloon mass 1158 gm

Balloon volume 1.853 m^3

Balloon diameter 1.524 m

Film thickness 2.5 mil

Electronics mass 153 gm

Ballast 10 gm

Gross weight less helium 1323 gm

Free lift 331 gm

Launch site 172°32'E, 43°29'S

Launch time 29/04/68 2037 UT

Ascent rate

0 - 5,000 m 1.8 m/sec

5,000 - 10,000 m ___ m/sec

Float altitude 3900 m

Radar ___

Computed x

Telemetry Code	Sensor
M	Sun angle
V	Air temperature

Surface winds ° calm m/sec

Cloud cover Trace Ci

Flight duration 16 days

Number of orbits ___

Position last heard ___

Probable cause of failure:

Icing

Remarks: The top third of this balloon was covered with an aluminized cap.

The balloon was reinforced with glass filament tape, and waxed to improve water shedding.

Air temperature varied from -8°C on first day to -5°C on seventh day. Temperatures were very uniform during the entire flight.

GHOST BALLOON FLIGHT SUMMARY

Balloon # 133307 PU

Frequency 15.027 MHz

Method of leak test Freon test

Test results ten leaks detected and repaired

Mfr. balloon # Schjeldahl 3

Balloon mass 2247 gm

Balloon volume 6.0 m^3

Balloon diameter 2.25 m

Film thickness 3 mil

Electronics mass 341 gm

Ballast 47 gm

Gross weight less helium 2635 gm

Free lift 520 gm

Launch site 172°32'E, 43°29'S

Launch time 04/05/68 1518 UT

Ascent rate

0 - 5,000 m 2.2 m/sec

5,000 - altitude 2.4 m/sec

Float altitude 8330 m

Radar

Computed x

Telemetry

Code	Sensor
P	Sun angle
U	Strain gauge

Surface winds ° calm m/sec

Cloud cover clear

Flight duration 6 days

Number of orbits

Position last heard

Probable cause of failure:

Icing

Remarks: This balloon was equipped with a battery charged by solar cell panel to permit measurement of nighttime strain.

Average nighttime strain: 0.41%

Average daytime strain: 0.60%

Maximum daytime strain: 0.77%

Minimum nighttime strain: 0.30%

GHOST BALLOON FLIGHT SUMMARY

Balloon # 134904 V

Frequency 15.024 MHz

Method of leak test not tested

Test results

Mfr. balloon # Raven 107

Balloon mass 4858 gm

Balloon volume 5.79 m^3

Balloon diameter 1 x 6.7 m

Film thickness 5 mil

Electronics mass 323 gm

Ballast 359 gm

Gross weight less helium 5540 gm

Free lift 554 gm

Launch site 172°43'E, 43°17'S

Launch time 12/05/68 2303 UT

Ascent rate

0 - 5,000 m ______ m/sec

5,000 - 10,000 m ______ m/sec

Float altitude 970 m

Radar ______

Computed x

Telemetry

Code	Sensor
V	Air temperature

Surface winds ° calm m/sec

Cloud cover 5/8 Cs

Flight duration 4 days

Number of orbits

Position last heard

Probable cause of failure:

Balloon moved south into colder air mass, iced up and descended

Remarks: This was a cylinder balloon.

Air temperature:

First day: +14°C

Second day: +10°C

Third day: -10°C

GHOST BALLOON FLIGHT SUMMARY

Balloon # 135907 H

Frequency 15.027 MHz

Method of leak test not tested

Test results

Mfr. balloon # Raven 109

Balloon mass 4861 gm

Balloon volume 5.79 m^3

Balloon diameter 1 x 6.7 m

Film thickness 5 mil

Electronics mass 344 gm

Ballast 335 gm

Gross weight less helium 5540 gm

Free lift 470 gm

Launch site $172^{\circ}43'$E, $43^{\circ}17'$S

Launch time 13/05/68 2243 UT

Ascent rate

0 - 5,000 m m/sec

5,000 - 10,000 m m/sec

Float altitude 970 m

Radar

Computed x

Telemetry

Code	Sensor
H	Air temperature

Surface winds o light m/sec

Cloud cover 1/8 Cu; 6/8 Ac

Flight duration 3 days

Number of orbits

Position last heard

Probable cause of failure:

Unknown

Remarks: This was a cylinder balloon.

Air temperature:

First day: $+12.5^{\circ}$C

Second day: $+4.0^{\circ}$C

GHOST BALLOON FLIGHT SUMMARY

Balloon # 136903 B

Frequency 15.023 MHz

Method of leak test not tested

Test results

Mfr. balloon # Raven 108

Balloon mass 4858 gm

Balloon volume 5.79 m^3

Balloon diameter 1 x 6.7 m

Film thickness 5 mil

Electronics mass 347 gm

Ballast 335 gm

Gross weight less helium 5540 gm

Free lift 468 gm

Launch site $172^{\circ}44'$E, $43^{\circ}32'$S

Launch time 21/05/68 2229 UT

Ascent rate

0 - 5,000 m m/sec

5,000 - 10,000 m m/sec

Float altitude 970 m

Radar

Computed x

Telemetry

Code	Sensor
B	Air temperature

Surface winds 0 m/sec

Cloud cover

Flight duration 2 days

Number of orbits

Position last heard

Probable cause of failure:

Unknown

Remarks: This was a cylinder balloon.

Air temperature: $+2.0^{\circ}$C

GHOST BALLOON FLIGHT SUMMARY

Balloon # 137905 W

Frequency 15.025 MHz

Method of leak test not tested

Test results

Mfr. balloon # Raven 110

Balloon mass 4856 gm

Balloon volume 5.79 m^3

Balloon diameter 1 x 6.7 m

Film thickness 5 mil

Electronics mass 330 gm

Ballast 354 gm

Gross weight less helium 5540 gm

Free lift 701 gm

Launch site $172^{\circ}44'$E, $43^{\circ}32'$S

Launch time 22/05/68 2210 UT

Ascent rate

0 - 5,000 m m/sec

5,000 - 10,000 m m/sec

Float altitude 970 m

Radar

Computed x

Telemetry

Code	Sensor
W	Air temperature

Surface winds 0 calm m/sec

Cloud cover

Flight duration 5 days

Number of orbits

Position last heard

Probable cause of failure:

Balloon moved into colder air mass and possibly iced up in sub-freezing temperatures

Remarks: This was a cylinder balloon.

Air temperature:

First day: $+4.0^{\circ}C$

Second day: $+4.0^{\circ}C$

Third day: $+3.0^{\circ}C$

Fourth day: $-5.0^{\circ}C$

GHOST BALLOON FLIGHT SUMMARY

Balloon # 138013 U

Frequency 15.023 MHz

Method of leak test not tested

Test results

Mfr. balloon # Winzen 3

Balloon mass 68,946 gm

Balloon volume 4,417 m^3

Balloon diameter 20.37 m

Film thickness 2 mil

Electronics mass 145 gm

Ballast 2801 gm

Gross weight less helium 71,892 gm

Free lift 3,595 gm

Launch site $172^\circ 32'E$, $43^\circ 29'S$

Launch time 01/06/68 1738 UT

Ascent rate

0 - 5,000 m 2.2 m/sec

5,000 - 10,000 m 2.3 m/sec

Float altitude 29,500 m

Radar

Computed x

Telemetry

Code	Sensor
U	Sun angle

Surface winds 250° 2 m/sec

Cloud cover 3/8 Sc

Flight duration 3 days

Number of orbits

Position last heard

Probable cause of failure:

Gas leakage through large tear

Remarks: This was a StratoFilm polyethylene balloon.

Prior to launch a wind shift caused the bottom of the balloon to touch ground momentarily at lift-off, and the balloon may have been damaged.

GHOST BALLOON FLIGHT SUMMARY

Balloon # 139207 F

Frequency 15.027 MHz

Method of leak test Freon test

Test results no leaks detected

Mfr. balloon # Raven 106

Balloon mass 1735 gm

Balloon volume 7.037 m^3

Balloon diameter 2.38 m

Film thickness 2 mil

Electronics mass 139 gm

Ballast 76 gm

Gross weight less helium 1950 gm

Free lift 195 gm

Launch site $172^\circ 32'$E, $43^\circ 29'$S

Launch time 09/06/68 2057 UT

Ascent rate

0 - 5,000 m 1.7 m/sec

5,000 - 10,000 m 2.0 m/sec

Float altitude 11,784 m

Radar

Computed x

Telemetry

Code	Sensor
F	Sun angle

Surface winds ° calm m/sec

Cloud cover clear

Flight duration 173 days

Number of orbits 12

Position last heard 56251 (28/11/68)

Probable cause of failure:

Icing

Remarks: The top third of this balloon was covered with an aluminized cap.

GHOST BALLOON FLIGHT SUMMARY

Balloon # 140206 L

Frequency 15.026 MHz

Method of leak test Freon test

Test results no leaks detected

Mfr. balloon # Raven 109

Balloon mass 1737 gm

Balloon volume 7.037 m^3

Balloon diameter 2.38 m

Film thickness 2 mil

Electronics mass 149 gm

Ballast 64 gm

Gross weight less helium 1950 gm

Free lift 195 gm

Launch site 172°32'E, 43°29'S

Launch time 09/06/68 2059 UT

Ascent rate

0 - 5,000 m 1.7 m/sec

5,000 - 10,000 m 2.0 m/sec

Float altitude 11,784 m

Radar

Computed x

Telemetry

Code	Sensor
L	Sun angle

Surface winds ° calm m/sec

Cloud cover clear

Flight duration 34 days

Number of orbits 2

Position last heard 83575 (12/07/68)

Probable cause of failure:

Gas leakage or icing

Remarks: The top third of this balloon was covered with an aluminized cap.

GHOST BALLOON FLIGHT SUMMARY

Balloon # 141202 R

Frequency 15.022 MHz

Method of leak test Freon test

Test results no leaks detected

Mfr. balloon # Raven 107

Balloon mass 1753 gm

Balloon volume 7,037 m^3

Balloon diameter 2.38 m

Film thickness 2 mil

Electronics mass 125 gm

Ballast 72 gm

Gross weight less helium 1950 gm

Free lift 195 gm

Launch site 172°32'E, 43°29'S

Launch time 09/06/68 2101 UT

Ascent rate

0 - 5,000 m 1.7 m/sec

5,000 - 10,000 m 2.0 m/sec

Float altitude 11,784 m

Radar

Computed x

Telemetry

Code	Sensor
R	Sun angle

Surface winds ° calm m/sec

Cloud cover clear

Flight duration 176 days

Number of orbits 18

Position last heard (01/12/68) vicinity of New Zealand

Probable cause of failure:

Icing

Remarks: The top third of this balloon was covered with an aluminized cap.

This balloon was equipped with Cosmos electronics.

GHOST BALLOON FLIGHT SUMMARY

Balloon # 142908 C

Frequency 15.028 MHz

Method of leak test not tested

Test results

Mfr. balloon # Raven 101

Balloon mass 4868 gm

Balloon volume 5.79 m^3

Balloon diameter 1 x 6.7 m

Film thickness 5 mil

Electronics mass 349 gm

Ballast 323 gm

Gross weight less helium 5540 gm

Free lift 665 gm

Launch site $172^{\circ}44'$E, $43^{\circ}22'$S

Launch time 10/06/68 0042 UT

Ascent rate

0 - 5,000 m m/sec

5,000 - 10,000 m m/sec

Float altitude 970 m

Radar

Computed x

Telemetry

Code	Sensor
C	Air temperature

Surface winds ° calm m/sec

Cloud cover clear

Flight duration 1 days

Number of orbits

Position last heard

Probable cause of failure:

Icing

Remarks: This was a cylinder balloon.

Air temperature: $+2.0^{\circ}$C

GHOST BALLOON FLIGHT SUMMARY

Balloon # 143902 D

Frequency 15.022 MHz

Method of leak test not tested

Test results

Mfr. balloon # Raven 104

Balloon mass 4862 gm

Balloon volume 5.79 m^3

Balloon diameter 1 m

Film thickness 1 x 1 x 1 mil

Electronics mass 325 gm

Ballast 353 gm

Gross weight less helium 5540 gm

Free lift 665 gm

Launch site $172^{\circ}44'$E, $43^{\circ}32'$S

Launch time 10/06/68 2217 UT

Ascent rate

0 - 5,000 m ____ m/sec

5,000 - 10,000 m ____ m/sec

Float altitude 970 m

Radar ____

Computed x

Telemetry

Code	Sensor
D	Air temperature

Surface winds $^{\circ}$ calm m/sec

Cloud cover clear

Flight duration 3 days

Number of orbits

Position last heard

Probable cause of failure:

Icing

Remarks: This was a cylinder balloon.

Air temperature:

First day: $+8.0^{\circ}C$

GHOST BALLOON FLIGHT SUMMARY

Balloon # 144206 D

Frequency 15.026 MHz

Method of leak test Freon test

Test results one leak detected and repaired

Mfr. balloon # Raven 103

Balloon mass 1732 gm

Balloon volume 7.037 m^3

Balloon diameter 2.38 m

Film thickness 2 mil

Electronics mass 137 gm

Ballast 81 gm

Gross weight less helium 1950 gm

Free lift 195 gm

Launch site 172°32'E, 43°29'S

Launch time 13/06/68 2118 UT

Ascent rate

0 - 5,000 m 1.6 m/sec

5,000 - 10,000 m 2.1 m/sec

Float altitude 11,784 m

Radar

Computed x

Telemetry

Code	Sensor
D	Sun angle

Surface winds ° calm m/sec

Cloud cover 3/8 Ac

Flight duration 97 days

Number of orbits 6

Position last heard 55634 (17/09/68)

Probable cause of failure:

Icing

Remarks: The top third of this balloon was covered with an aluminized cap.

GHOST BALLOON FLIGHT SUMMARY

Balloon # 145200 J

Frequency 15.020 MHz

Method of leak test Freon test

Test results one leak around inflation fitting detected and repaired

Mfr. balloon # Raven 101

Balloon mass 1728 gm

Balloon volume 7.037 m^3

Balloon diameter 2.38 m

Film thickness 2 mil

Electronics mass 142 gm

Ballast 80 gm

Gross weight less helium 1950 gm

Free lift 195 gm

Launch site 172°32'E, 43°29'S

Launch time 13/06/68 2120 UT

Ascent rate

0 - 5,000 m 1.6 m/sec

5,000 - 10,000 m 2.1 m/sec

Float altitude 11,784 m

Radar ______

Computed x

Telemetry

Code	Sensor
J	Sun angle

Surface winds ° calm m/sec

Cloud cover 3/8 Ac

Flight duration ______ days

Number of orbits ______

Position last heard ______

Probable cause of failure:

Remarks: The top third of this balloon was covered with an aluminized cap.

The balloon was still flying on 14/12/68.

GHOST BALLOON FLIGHT SUMMARY

Balloon # 146208 U

Frequency 15.028 MHz

Method of leak test Freon test

Test results one leak detected and repaired

Mfr. balloon # Raven 108

Balloon mass 1740 gm

Balloon volume 7.037 m^3

Balloon diameter 2.38 m

Film thickness 2 mil

Electronics mass 119 gm

Ballast 91 gm

Gross weight less helium 1950 gm

Free lift 195 gm

Launch site 172°32'E, 43°29'S

Launch time 13/06/68 2122 UT

Ascent rate

0 - 5,000 m 1.6 m/sec

5,000 - 10,000 m 2.1 m/sec

Float altitude 11,784 m

Radar

Computed x

Telemetry

Code	Sensor
U	Sun angle

Surface winds ° calm m/sec

Cloud cover 3/8 Ac

Flight duration 40 days

Number of orbits 1

Position last heard 63948 (22/07/68)

Probable cause of failure:

Electronics failure

Remarks: The top third of this balloon was covered with an aluminized cap.

This balloon was equipped with Cosmos electronics which operated erratically during the entire flight.

GHOST BALLOON FLIGHT SUMMARY

Balloon # 147207 Y

Frequency 15.027 MHz

Method of leak test Freon test

Test results no leaks detected

Mfr. balloon # Raven 104

Balloon mass 1739 gm

Balloon volume 7.037 m^3

Balloon diameter 2.38 m

Film thickness 2 mil

Electronics mass 123 gm

Ballast 98 gm

Gross weight less helium 1950 gm

Free lift 195 gm

Launch site 172°32'E, 43°29'S

Launch time 18/06/68 2058 UT

Ascent rate

0 - 5,000 m 1.5 m/sec

5,000 - 10,000 m 1.8 m/sec

Float altitude 11,784 m

Radar

Computed x

Telemetry

Code	Sensor
Y	Sun angle

Surface winds gusty° 4 m/sec

Cloud cover 1/4 Sc

Flight duration 41 days

Number of orbits 1

Position last heard 82609 (28/07/68)

Probable cause of failure:

Electronics failure

Remarks: The top third of this balloon was covered with an aluminized cap.

This balloon was equipped with Cosmos electronics which operated erratically during the entire flight.

GHOST BALLOON FLIGHT SUMMARY

Balloon # 148203 G

Frequency 15.023 MHz

Method of leak test Freon test

Test results no leaks detected

Mfr. balloon # Raven 105

Balloon mass 1732 gm

Balloon volume 7.037 m^3

Balloon diameter 2.38 m

Film thickness 2 mil

Electronics mass 135 gm

Ballast 83 gm

Gross weight less helium 1950 gm

Free lift 195 gm

Launch site 172°32'E, 43°29'S

Launch time 18/06/68 2100 UT

Ascent rate

0 - 5,000 m 1.5 m/sec

5,000 - 10,000 m 1.8 m/sec

Float altitude 11,784 m

Radar

Computed x

Telemetry

Code	Sensor
G	Sun angle

Surface winds gusty ° 4 m/sec

Cloud cover 1/4 Sc

Flight duration days

Number of orbits

Position last heard

Probable cause of failure:

Remarks: The top third of this balloon was covered with an aluminized cap.

This balloon was still flying on 16/12/68.

GHOST BALLOON FLIGHT SUMMARY

Balloon # 149204 Z

Frequency 15.024 MHz

Method of leak test Freon test

Test results no leaks detected

Mfr. balloon # Raven 110

Balloon mass 1716 gm

Balloon volume 7.037 m^3

Balloon diameter 2.38 m

Film thickness 2 mil

Electronics mass 138 gm

Ballast 77 gm

Gross weight less helium 1950 gm

Free lift 195 gm

Launch site 172°32'E, 43°29'S

Launch time 18/06/68 2102 UT

Ascent rate

0 - 5,000 m 1.5 m/sec

5,000 - 10,000 m 1.8 m/sec

Float altitude 11,784 m

Radar

Computed x

Telemetry

Code	Sensor
Z	Sun angle

Surface winds gusty° 4 m/sec

Cloud cover 1/4 Sc

Flight duration days

Number of orbits

Position last heard

Probable cause of failure:

Remarks: The top third of this balloon was covered with an aluminized cap.

This balloon was still flying on 16/12/68.

GHOST BALLOON FLIGHT SUMMARY

Balloon # 150208 Q 150205 C

Frequency 15.028 15.025 MHz

Method of leak test Freon test

Test results no leaks detected

Mfr. balloon # Raven 102

Balloon mass 1725 gm

Balloon volume 7.037 m^3

Balloon diameter 2.38 m

Film thickness 2 mil

Electronics mass 278 gm

Ballast 30 gm

Gross weight less helium 2033 gm

Free lift 203 gm

Launch site 172°32'E, 43°29'S

Launch time 19/06/68 2048 UT

Ascent rate

0 - 5,000 m 1.5 m/sec

5,000 - 10,000 m 1.9 m/sec

Float altitude 11,530 m

Radar

Computed x

Telemetry

Code	Sensor
Q	Sun angle
C	Strain gauge

Surface winds 030° 2 m/sec

Cloud cover clear

Flight duration 46 days

Number of orbits 1

Position last heard 73561 (03/08/68)

Probable cause of failure:

Icing

Remarks: The top third of this balloon was covered with an aluminized cap.

The balloon showed no measurable gas loss during its life.

Q coder: Cosmos electronics

C coder: Conventional electronics

Maximum strain: 0.79%

Minimum strain: 0.53%

Maximum daytime variation: 0.16%

GHOST BALLOON FLIGHT SUMMARY

Balloon # 151100 RD

Frequency 15.020 MHz

Method of leak test Freon test

Test results two leaks detected and repaired

Mfr. balloon # Schjeldahl 5

Balloon mass 2106 gm

Balloon volume 14.74 m^3

Balloon diameter 3.04 m

Film thickness 1.5 mil

Electronics mass 174 gm

Ballast 34 gm

Gross weight less helium 2314 gm

Free lift 463 gm

Launch site 172°32'E, 43°29'S

Launch time 27/06/68 2041 UT

Ascent rate

0 - 5,000 m 2.2 m/sec

5,000 - 10,000 m 2.3 m/sec

Float altitude 15,400* m

Radar

Computed x

Telemetry

Code	Sensor
R	Sun angle
D	Strain gauge

Surface winds 060° 2.5 m/sec

Cloud cover clear

Flight duration 123 days

Number of orbits 12

Position last heard 52250 (27/10/68)

Probable cause of failure:

Icing

Remarks: This balloon shows no gas loss in the first 3 months of flight.

Maximum strain: 0.59%

Minimum strain: 0.23%

Maximum daytime variation: 0.27%

* This balloon was repaired prior launch in the same manner as 130101 XZ. Since radar data on 130101 XZ indicated air had been introduced into the balloon during repair, it is likely that this balloon also has air mixed with helium, and may be flying as low as 14,000 m.

GHOST BALLOON FLIGHT SUMMARY

Balloon # 152906 R

Frequency 15.026 MHz

Method of leak test not tested

Test results

Mfr. balloon # Raven 103

Balloon mass 4851 gm

Balloon volume 5.79 m^3

Balloon diameter 1 m

Film thickness 5 mil

Electronics mass 332 gm

Ballast 357 gm

Gross weight less helium 5540 gm

Free lift 665 gm

Launch site 172°43'E, 43°17'S

Launch time 27/06/68 2325 UT

Ascent rate

0 - 5,000 m ____ m/sec

5,000 - 10,000 m ____ m/sec

Float altitude 970 m

Radar ____

Computed x

Telemetry

Code	Sensor
R	Air temperature

Surface winds 0 m/sec

Cloud cover

Flight duration 1 days

Number of orbits

Position last heard

Probable cause of failure:

Unknown

Remarks: This was a cylinder balloon. The thermistor broke at launch.