

Notes on
Ascension Island - Oct 1971
Christchurch - Nov-Dec 1971

7530-286-6952
FEDERAL SUPPLY SERVICE

GPO:1970-O-410-338

Flight 60155 R

20 Oct 1971

Test Launch

250mb with 10% simulation

14.2 seconds to zip balloon
5.4 seconds to get balloon overhead.
3.6 secs to get 50' payload

Flight 58202 A - metal cap - 13% free lift. - 21 Oct. 0656

58

Flight 59206 C - no cap - 20% lift. 21 Oct. 0730?

	Start	Pull Sleeve	Balloon Out	Balloon Overhead	Payload Release (100')
58	0	13 secs.	22	25	50 secs
59	0	14			39 secs.

total length - parking area - 1900' (safe distance = 1600')
= 60secs for rough wind.

22 Oct.

Flight 60155 R - ^{metal} cap - 10% free lift R 71-4

Flight 61153 K - no cap - 17% free lift Sighe/dahl

Cosmos - D

(slow lift-off - possible overnight leak thru filler tube)

Flight 60155 R

Alt.	12 KM	13 KM	14 KM	14.2	14.4	14.6	14.8
231537	4.2	4.3 5.5	1.6	1.7	2.5	4.4	
271563	4.4	4.4 4.5	1.7	2.2	3.4	6.6	
60155R	5.2	5.2 6.0	1.7	2.2	4.2	11	

Flight 60155 R — Rose to 15,184 meters

Ballon volume = 22.52 m^3

Pressure	St. Alt.	St. Density	Real Temp	Real Density	Real Alt.
	216.6				
150	13608	<u>.2412</u>	206	.254	14,150
145			205		
140	14046	.2251	204	<u>.240</u>	14565
135.5		.218 .218			
135	14277	.217	203		
130	14516	.2090	202	.224	15005
128					
→ 126	14714	.2020	201	<u>.218</u>	15,189 ←
124	14816	.1994			
122	14919	.1962			
120	15024	.1930	200°		15475
100	16180	.1608	196°		16540

Design density = .2412

Actual = .218

$$\text{Volume Increase} = \frac{.241 - .218}{.241} = \frac{.023}{.241} = 9.5\%$$

Flight 62154H - no cap - 17% free lift. - launch 0700 -
25 Oct.
COSMOS pkg - balloon temp.

Flight 63157G - metal cap - 10% free lift - launch 0800
25 Oct.
COSMOS pkg - balloon temp -
failed after 1 hr.

Flight 64202J - launched with 30.6% free lift.
(1455-25 Oct) no cap $\frac{1}{2}$ (steere misble)

Flight 65206F - launched with 13% free lift
(1532-25 Oct) metal cap

0655-26 Oct. Flight 6620 B - 20% - no cap

0735-26 Oct. Flight 6720 N - 13% - metal cap

Flight 68158 Q - 17% - (6% heavy)

metal cap Flight 69153 L - 0% - (16% heavy)

Flight 70152 EF 17%

metal Flight 71156 P 10%

$$\rho = .2412 \times \frac{216.7}{T} \times \frac{P}{150} = \frac{.3485P}{T}$$

$$\rho = .3216 \times \frac{216.7}{T} \times \frac{P}{200} = \frac{.3485P}{T}$$

Computation of Density Altitude

standard temp = -56.5 = 216.7°K st. $\rho_{150} = .2412$ $\rho_{200} = .3216$

Flight No.	Alt. at z=0	Final Alt.	Pressure at Alt.	Temp at alt.	ρ	$\frac{\rho_{st.}}{\rho}$
* 60155 R	14,737	15184	136.2 126.2	203.4 201.2	^{.2412} .2334 .2186	1.033 1.103
61153 K	no track					
62154 H	15023	15095	129.6	201.9	^{0.78} ^{1.45} .2237	1.078
* 63157 G	15039	15091	129.2	201.8	.2231	1.081
64202 J	12337	12410	200.0	217.5	.3205	1.003
* 65206 F	12263	12322	199.202	218.2	.3226	.997
66203 B	12396	12513	198.6	217.2	.3187	1.009
* 67205 N	12464	12513	196.5	216.6	.3161	1.017
68157 Q	14,700	14954	131.0	202.3	.2360	$\rho_s = .2557$ 1.083
* 69154 L	14,593	14770	139.4	204.4	.2376 .2376	$\rho_s = .2798$ 1.18
70152 EF	15,112	15,242	127.6 127.6	201.6	.2206	1.093
* 71156 P	15,180	15318	126.3 126.3	201.3	.2186	1.103

136.2
5.3
15

73
59
117
62
201

* - capped

Calibration for Flights

681580 + 69154L

69154

68158

TA C.P.	T Temp.
12.26	+20.3
14.95	-4.8
17.60	-18.5
21.94	-29.4
27.37	-38.7
33.35	-47.3
39.18	-55.8
51.94	∞

CP	D Temp
31.0	-55.8
21.9	-46.1
14.9	-36.4
10.1	-26.6
7.2	-17.1
5.5	-7.5

Calibration for Flights

72153 EG + 73157 Z
A-11 - Code A
15.028

Code U-6
15.028

72 - clear
A-11 ZR-94

C.P.	ZR	R _t = ZR-94	Temp
26.06	229K	135K	-48.5
18.47	114.3K	20.3K	-18.6
12.57	59.77K	50.34	-33.7
8.54	32.64	23.24	-21.0
17.5	18.55	9.15	-0
18.8	10.92	1.52	-20
22.82	56K	46.6	-40
26.78	-9		-50
31.99			-60
37.35			-70
41.45			-80

73 - metal cap
U-6
thermistor - ZR-94

C.P.	ZR	resistance	Temp.
28.61	229K	219.6	-55.1
20.45	114.3	104.7	-44.8
14.03	59.77	50.34	-33.7
9.63	32.64	23.24	-21.0
6.94	18.55	9.15	-4.2
5.32	10.92	1.52	+34

114.3K
94
-03

229
94
-135

Flight logs 60-71

Floor No.	Cap	Hy	Initial Floor	Initial Floor P.	In. Flat Temp.	Design density	Floor Density	Percent High	Max. Superf.	Min. Superf.
60155R	✓ 10%	14737	136.2	203.4 ⁻⁶⁸⁸	.2412	.2334	3.3	-	-	-
61153K	17%	no track	-	-	.2412	-	-	-	-	-
62154H	17%	15023	129.6	201.9 ⁻⁷¹³	.2412	.2237	7.8	33°C	8°C	
63157G	✓ 10%	15039	129.2	201.8 ⁻⁷¹⁴	.2412	.2231	8.1	-	-	
64202 J	30%	12337	200.0	217.5 ⁻⁵⁵⁷	.3216	.3205	0.3	-	-	
65206F	✓ 13%	12263	202.0	218.2 ⁻⁵⁵⁰	.3216	.3226	-0.3	-	-	
66203B	20%	12396	198.6	217.2 ⁻⁵⁴⁰	.3216	.3187	0.9	-	-	
67205N	✓ 13%	12461	196.5	216.6 ⁻⁵⁶⁶	.3216	.3161	1.7	-	-	
68157A	17%	14700	137.0	202.3	.2557	.2360	8.3	38°	13°	
69154L	✓ 0%	14593	139.4	204.4	.2798	.2376	18.0	53°?	17°? (doubtful stability)	
70152 EF	17%	15112	127.6	201.6	.2412	.2206	9.3	-	-	
71156 P	✓ 10%	15180	126.3	201.3	.2412 ²⁴¹²	.2186	10.3	-	-	
72153EG	15%							33° (late)	9.5°	
73157 Z	✓ 7%							400 Tole	24°	
58202A	✓ 13%	no track	-	-	-	-	-	-	-	
59206C	20%	no track	-	-	-	-	-	-	-	

Tentative Conclusions - 150 mb

Altitude

G.T. Schjeldahl balloons are 8-10% too large based on initial float.

Balloon continues to climb 100 to 200 meters

Raven balloon (1 sample) is 3% too large - but climbed 450 meters making it 10% too large.

MS. Super temperature

* Daytime = 30 to 35°C on first test
· clear

35 to 40°C on second test

(this is 15 to 20% ^{o.p.} ~~stress~~)

· capped = 50 to 55°C on first test (25% ^{o.p.} ~~stress~~)

* Daytime diff. cap to no cap = 16°C (9°C on first test)

* Nighttime balloon runs 13° warm, without cap + 17° warm with cap.

Best bet appears clear

Drop cap free lift to 8%

Drop clear free lift to

$$\text{stress} = 87 \times \frac{11.5}{4} \times f \times 130 = 16,000 = 31\%$$

$$\text{max free lift} + \frac{\Delta T}{T} = .31$$

$$\text{clear free lift} = .31 - \frac{.15}{.20} = .11$$

$$.11 = 13\%$$

$$.16 = 19\%$$

$$\text{capped free lift} = .31 - .25 = .06$$

$$.06 = 7\%$$

drop clear o.p. to 15% → 14%

drop cap o.p. to 7%

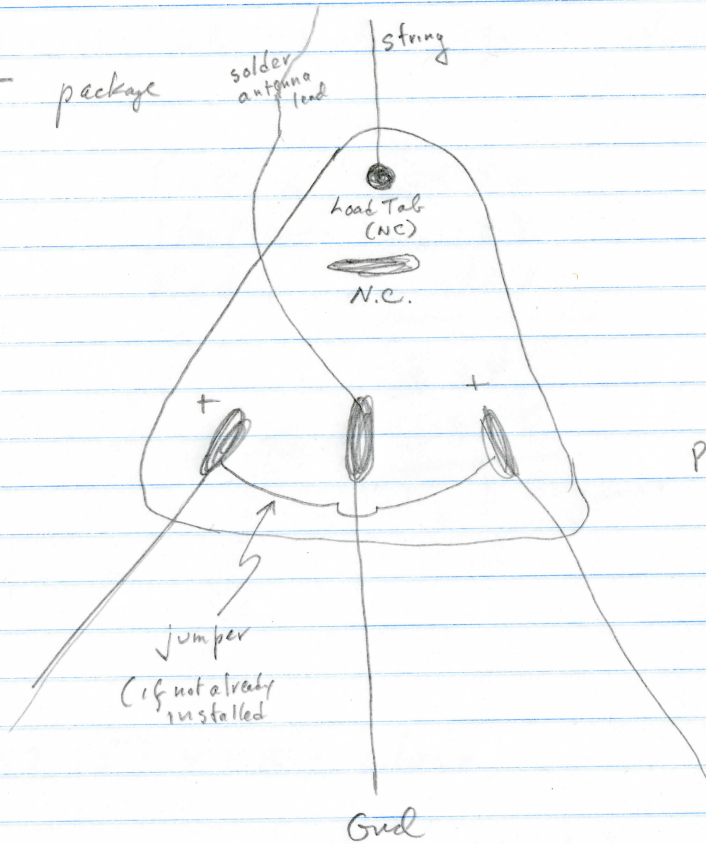
Christchurch instructions

metal caps ~ 7%
clear ~ 15%

Total load = 4680 grams.

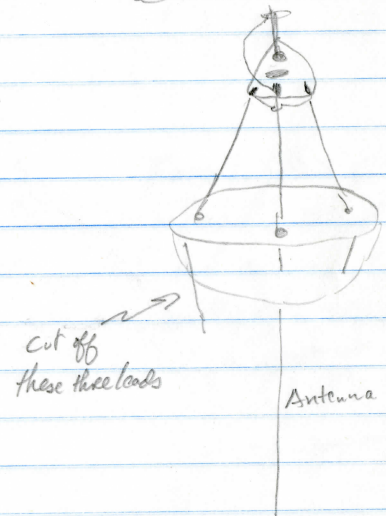
(A)

GHOST package



Plated Side

- ① Level leads
- ② Solder



(B)

Make volume measurement on Raven balloon.
(Also on Schjelball)

Christchurch - Fly occulting ambiguity device
from Chk

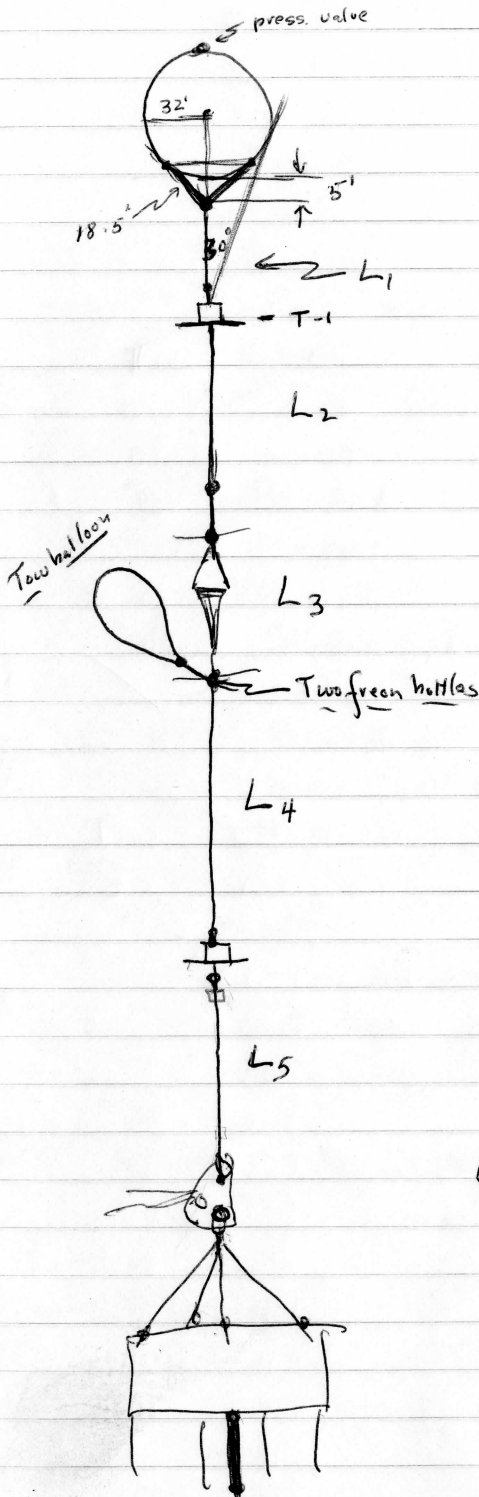
John Gabites - extension of agreement.

$$5.5 \times \frac{64}{71}$$

First Mother GHOST Flight - 26203

64' = 19.51 meters Balloon - Raven #102

91.186 grams - volume = 3887.16 M³



$$\tan 30^\circ = \frac{32}{32 + 5 + L_1} = .578$$

$$\frac{55.3}{37} = 1.49$$

$$37 \cdot .578 + .578 L_1 = 32$$

$$\frac{21.4}{.578} = 18.4 \text{ feet}$$

$$L_1 = 18.4 \text{ feet}$$

$$\text{strain gauge line} = 18.4 + 18.5 + 10' = 47 \text{ feet}$$

$$L_2 = 18.4 \text{ feet}$$

$$L_3 = 16 \text{ feet (parachute = 17') (1035 grams)}$$

$$T-1 = (772 \text{ grams})$$

$$T-2 = 816 \text{ grams}$$

$$L_4 = 25 \text{ feet}$$

$$L_5 = 18.4 \text{ feet}$$

$$L_6 = 1 \text{ Foot}$$