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ONR PROJECT "EQUEX '57"

WINZEN PROJECT NA 418

GUAM EXPEDITION - 1957

CONTRACT NO. N0NR 1460(06)

REPORT NO. 1208-R

Prepared for: Office of Naval Reserve  
Department of the Navy  
Washington, D. C.

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Approved and  
submitted by: O. C. Winzen

Date: 1 April 1957

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CNR PROJECT "EQUEX '57"

WINZEN PROJECT NA 418

GUAM EXPEDITION - 1957

I. INTRODUCTION

The purpose of "Equex '57" was to launch, track, and recover a series of "SKYHOOK" balloon flights from Guam, Marianas Islands, during the month of January, 1957.

A series of seven flights was planned with a tentative starting date of 15 January 1957. Flights were to be launched from the Orote Airstrip (on the west side of island), tracked by P2V aircraft from VW-3 Squadron, and the loads retrieved by destroyer escort (USS Lewis or USS Moore) from Escort Squadron 9.

In addition to the "SKYHOOK" flights from the island, a series of four "ROCKOON" launches from the USS Cayuga County (LST-529) was also scheduled.

All personnel concerned--military, scientific, and technical--arrived on 7 January 1957. Five helium trailers (total 167,000 cubic feet) for the "SKYHOOK" flights and 100 bottles (20,000 cubic feet) for the "ROCKOON" flights had already arrived.

There was a deadline delivery date of 1 December at our plant and of 7 January at Guam on all equipment shipped for the expedition, and this equipment was loaded aboard ship by 15 December 1956. The ship did not leave its final U. S. port of call until 6 January 1957. It arrived in Guam on 20 January, and the expedition equipment was finally assembled in the assigned work area on 23 January.

## II. FACILITIES

Work and storage space was assigned in Building #37, an NSD warehouse (approximately 75' x 300') in the vicinity of Orote Air-strip. These facilities were entirely adequate.

Shop work, as needed, was accomplished in the Ship Repair Facilities work shops, and all work requested was accomplished with a minimum of delay.

The necessary vehicles (1 stake truck and 1 low-boy trailer with tractor) were furnished by the Public Works Center Motor Pool. In addition to these permanently assigned vehicles, a trailer-mounted gasoline generator equipped with four floodlights was made available for use at the launch site, as preliminary launch preparations had to be made before daylight. This unit was returned to the Motor Pool daily after the launch.

The assigned launch site at Orote airstrip was utilized for the first three launchings. Due to the exposed nature of the airstrip and the gusty surface wind conditions prevailing at this site, it was necessary to move to a more sheltered area.

Three suitable sites had been located previously, but two were disapproved because of their proximity to the landing pattern of Andersen AFB and Naval Air Station Agana. The third site--a valley oriented E-W and approximately 2000' long by 750' wide--required considerable preparation as it was overgrown with small trees and brush.

After the wind damage to the balloon in the third launch, it was deemed advisable to prepare the alternate site. The ONR Field Representative initiated the necessary action and the Naval Supply Depot, under whose jurisdiction the property lay, furnished heavy equipment and operators to clear and level the site. It was also necessary to haul in crushed coral for a solid footing for the trucks and trailers as the area was quite soft and damp.

Work was started on 2 February and the site was ready for use by the 5th, but due to rain and squally weather, the first inflation from the new site was not made until the 7th. It was then found that a wind screen would be desirable, and NSD erected one. It consisted of three 60' telephone poles set 20 feet apart in a NNW-SSE line. Heavy tarps were secured between the poles from the top to within 8' of the bottom, giving a very effective windbreak for any wind variations outside of extremely squally conditions. The geographical location of the site was  $13^{\circ} 26' N$   $144^{\circ} 42' E$ .

### III. WEATHER

Over a period of 27 days (from the date of readiness for launch to completion of series), there was a total of 15 days with unsuitable launch conditions due to weather.

Early morning showers and rain squalls were prevalent with accompanying fluctuations in wind direction and velocities. Observations at the Orte Airstrip showed that winds became gusty at 10 - 25 knots about five minutes before a shower and remained so until about twenty minutes after the shower had ceased. On moonlit mornings it was possible to see showers and squalls approaching. The frequency of the showers was a major factor in determining whether or not to proceed with the inflation.

Wind direction and velocity at altitude often varied radically from day to day, making recovery planning virtually impossible. As a result of high winds at ceiling and the necessity of ships to effect recovery during daylight, it was necessary to terminate all except one flight by radio control. Portable WRI radio control was carried in the tracking plane. Radio control termination was successful in each instance.

IV. OPERATIONAL SUMMARY

A. Balloons

For the primary "SKYHOOK" operation two types of balloons were used. Seven 172.6 foot diameter balloons (volume 2,000,000 cubic feet) of five different material thicknesses were used: one was of .75 mil material, one of 1 mil, three of 1.2 mil, one of 1.5 mil, and one of 2 mil (the 2 mil, incidentally, was originally built for the CWR "STRATOLAB" project). Three balloons were of 120.8 foot diameter (volume 711,000 cubic feet), one of 1 mil, and two of 1.2 mil material. One of the 45 foot diameter "ROCKOON" balloons (volume 49,000 cubic feet) was used carrying NYU equipment.

All balloons for the "SKYHOOK" operation were of Winzen Research Inc. "FIST" construction, using heat-sealed load bands integral with the seams as load bearing members. Design was based on the U/M natural shape formula. All balloons except the 45' used the Winzen Research Inc. bicornuate ducting system. Balloon performance was excellent. With the exception of one balloon damaged by strong, gusty winds in the launch platform (flight only reached an altitude of 15,500 feet) and one balloon destroyed by gusts of 20 knots in the platform, there were no balloon failures.

On Flight No. 740 (Equex #4) a 2,000,000 cubic foot balloon constructed of .00075 gauge polyethylene was successfully launched and flown. This was the first time a large balloon of

this new, thin material had been utilized on an OMR contract. The flight data for Flight #740 shows an average rate of ascent of 972 feet per minute and a tropopause temperature of minus 86.5°C. (16.5° below the cold brittleness temperature of the material) at 59,200 feet. Despite the fast rise and the extreme cold temperature, the flight levelled at 116,000 feet and maintained this altitude for one hour and eighteen minutes before being cut down by radio control because the high wind speed at that level was carrying it beyond reasonable range of the recovery vessel. As a matter of fact, the equipment was in the water for seven hours and ten minutes from impact to recovery in spite of the early release.

B. General Operational Summary

The preparation of the scientific and balloon flight control instruments was seriously hampered by the excessive humidity found in the tropical climate on Guam. Winzen flight instrumentation was packaged in polyethylene interior liners and was dehumidified with desiccants. Instruments were opened only on the night before the flight and recalibrated and adjusted. Thus, it was possible to overcome the rigors of the climate which normally resulted in rusting and deterioration at an alarming rate.

The Naval Air Station made available an air-conditioned trailer for the preparation of the University of Minnesota and other scientific gear, but these facilities were inadequate for handling all scientific gear. The scientists were plagued

throughout the series with the problem of obtaining satisfactory performance in view of the climatic conditions, by the combination of high humidity, 35° temperature, saturation of the atmosphere with salinity from sea water, and the dust raised by the continuously blowing trade winds.

Recovery of the loads was aided by excellent operation of the beacons which emitted their signals even during the parachute descent. In addition, all flights were tracked visually from cut-down until impact in the ocean. During all flights there were conditions of scattered to broken cumulus clouds, with their base at approximately 4000 feet and tops at approximately 600 to 8000 feet except during rain storms when cloudiness extended to somewhat higher levels. In every instance, the aircraft was able to fly above the top of the cloud deck, affording excellent visibility for recovery.

The colorful appearance of the red and white parachutes, the bright colors of the individual load items, and particularly the dye markers used on all flights, aided substantially in locating the loads after they floated in the Pacific.

As the destroyer approached the load to effect recovery, the tracking airplane would drop flares into the water to assist the ships in locating the load in the cresting seas typical of the ocean's surface in that area.

The launchings of the load required exceptional experience on the part of the Winzen Research Inc. launching crew because of the weather conditions reported previously. Contributing to the critical nature of the launchings was the fact that flights carried a multitude of scientific loads often of a very delicate nature and sometimes of high weight and considerable bulk. It was necessary, of course, to group instrumentation in such a way that the expedition could be accomplished with a minimum number of flights. The load lines for the flights and the arrangements for the individual flights were changed a number of times in order to satisfy last minute requirements and changes on the part of participating scientists.

C. Instrumentation

In view of the fact that the load recovery for these flights was to be accomplished with surface vessels having an average speed of approximately seventeen knots, it was deemed advisable by WRI to equip all flights with a radio control cut-down system in addition to the telemetering beacon and altitude transducer. This proved to be a very propitious decision since by the time actual flight operations could be initiated, only one surface vessel was available for recovery operations, and anticipating the wind velocity and direction in the upper atmosphere over Guam proved to be extremely difficult. Judicious use of this radio control system, in addition to its faultless performance, resulted in a 100 per cent recovery of the loads for these flights.

1. Radio Control System (Reference Winzen Technical Publication No. 3A)

The radio control system chosen for these flights was the standard Winzen Research single-channel control system. A "Channel" in this case applies to operational channels; i.e., the 10 channel control provided for the control of 10 separate functions. This equipment operates in the 6 mc region, and the frequency available for these flights was 6700.5 kc.

The system consisted of a small radio control package (See W-1970), the radio control receiver, decoder, back-up timer and squib-cutter, all of which weighed only fourteen

pounds and could be located at the point of severance. A small control box (See W-1996) was also provided which could be plugged into the microphone jack of the controlling transmitter. The controlling transmitters, in this case, were the ART-13 transmitters in the tracking aircraft and a 5000 watt transmitter at the Rescue Control Center located at the Naval Air Station in Agana which was named as the flight communications center.

This system features precision control and freedom from accidental triggering due to noise or interfering signals. This is accomplished through the use of two audio frequencies modulating the controlling transmitter. One audio frequency is used to "open the gate" and the second, when applied in sequence, operates the control. The first tone must be applied for a sufficient length of time to operate the "gate". In the event that a second tone is received while the first is still operating, the "gate" will automatically close. This successfully avoided the problem of random noise and heterodyning signals. The second tone must be applied immediately after the first tone is released, thus providing the key for its operation. The sequence of these tones is automatically accomplished with a simple transfer switch on the controlling oscillator box.

Precision control is accomplished by opening the "gate" with the first audio tone prior to the anticipated cut-down

time and transferring to the second tone precisely at the cut-down time desired. This is extremely beneficial to the observers as they then know definitely when to expect the load to be cut away.

A Macnic timer switch was included in the radio control package, and this was set for the anticipated cut-down time. However, the flights were terminated by radio control, providing observers with a more accurate cut-down time.

## 2. Altitude Telemetering Beacon

A light-weight telemetering beacon operating on the frequency of 1724 KC was flown to provide telemetered altitude information and to serve as a marker signal for the ADF equipment in the tracking planes. The complete package weighed only twelve pounds and was flown at the center of a center-fed dipole antenna suspended at the bottom of the load line. It provided an easy-to-monitor transmission with the low power of 0.8 watts. Data was received without difficulty at both the ground receiving stations on Guam, the second station being the WRI copy center at the work room.

The altitude transducer used in this package was the new Winzen Research double code-drum pressure transducer (See W-1946 reference WRI Technical Publication No. 1A). This unit is actually two altitude transducers in one with

a common motor drive. The low altitude bellows with its associated drum is used for altitudes up to 70,000 feet, and the high altitude bellows and its associated drum covers the range from 70,000 to 130,000 feet. The need for automatically transferring from the low altitude unit to the high altitude unit has been eliminated simply by prefixing the low altitude readings with the letter "W". The unit then transmits a five-letter code group with a "W" prefix, followed by two code letters for the low altitude and two code letters for the high altitude readings.

Over the useful range of the low altitude bellows (0 to 70,000 feet) the increments of altitude per change in code group are less than 500 feet. The same increment per change in code group is experienced with the high altitude bellows in the range from 85,000 feet to 90,000 feet, gradually increasing to 1,000 feet at the upper limit of the range. There were no beacon failures during the entire series.

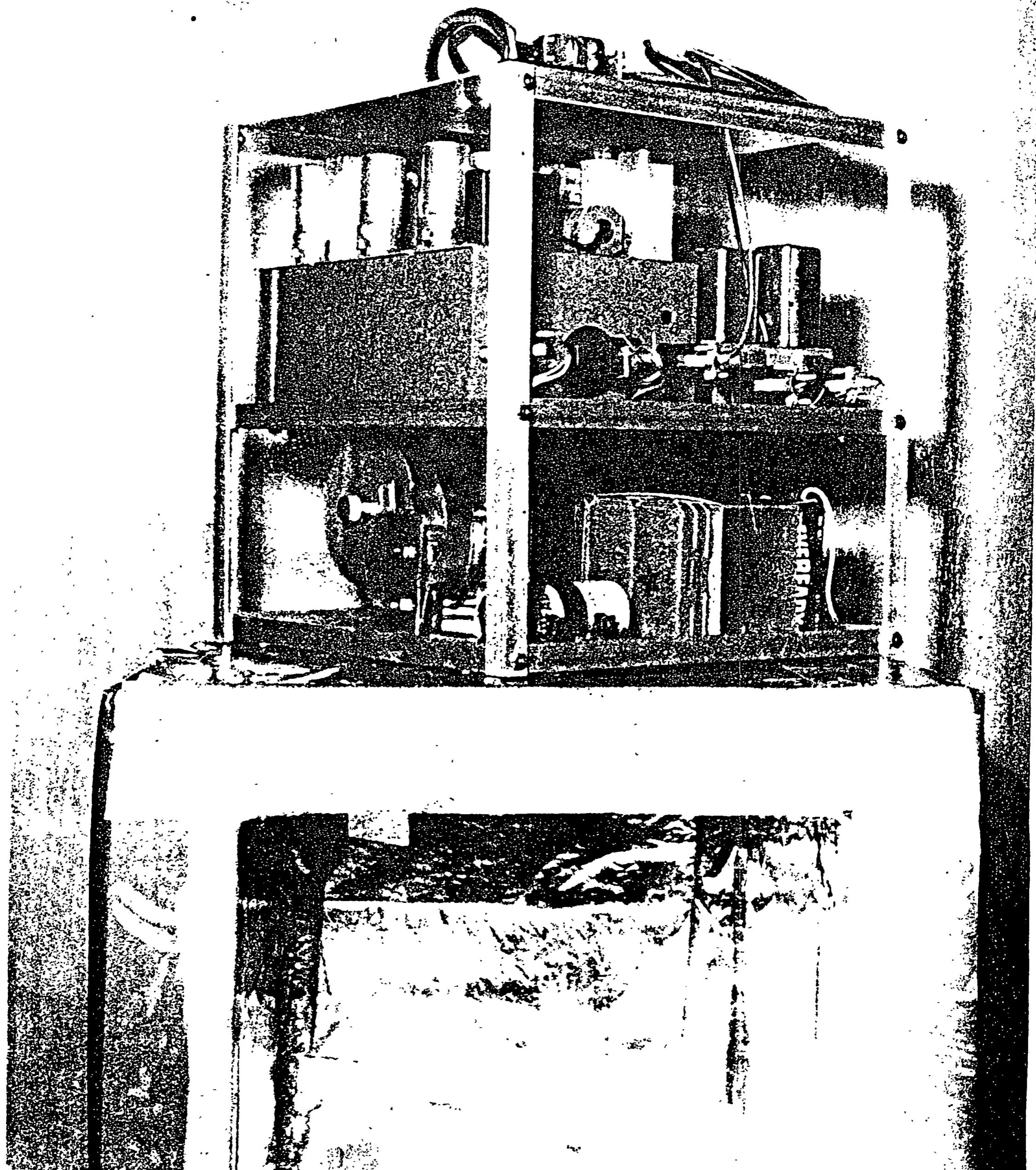
### 3. Aircraft Instrumentation

As mentioned above, the radio control unit was used with the existing radio equipment in the tracking aircraft. The ART 13 transmitters in the planes to be used were preset for a frequency of 6700.5 KC. The gain control on

the radio control unit was adjusted to give a modulation of slightly less than 100 per cent. This adjustment was usually made during the interval of time while the "gate" was held open with the first audio tone. In every instance, the radio control released the balloon load immediately on application of the second tone.

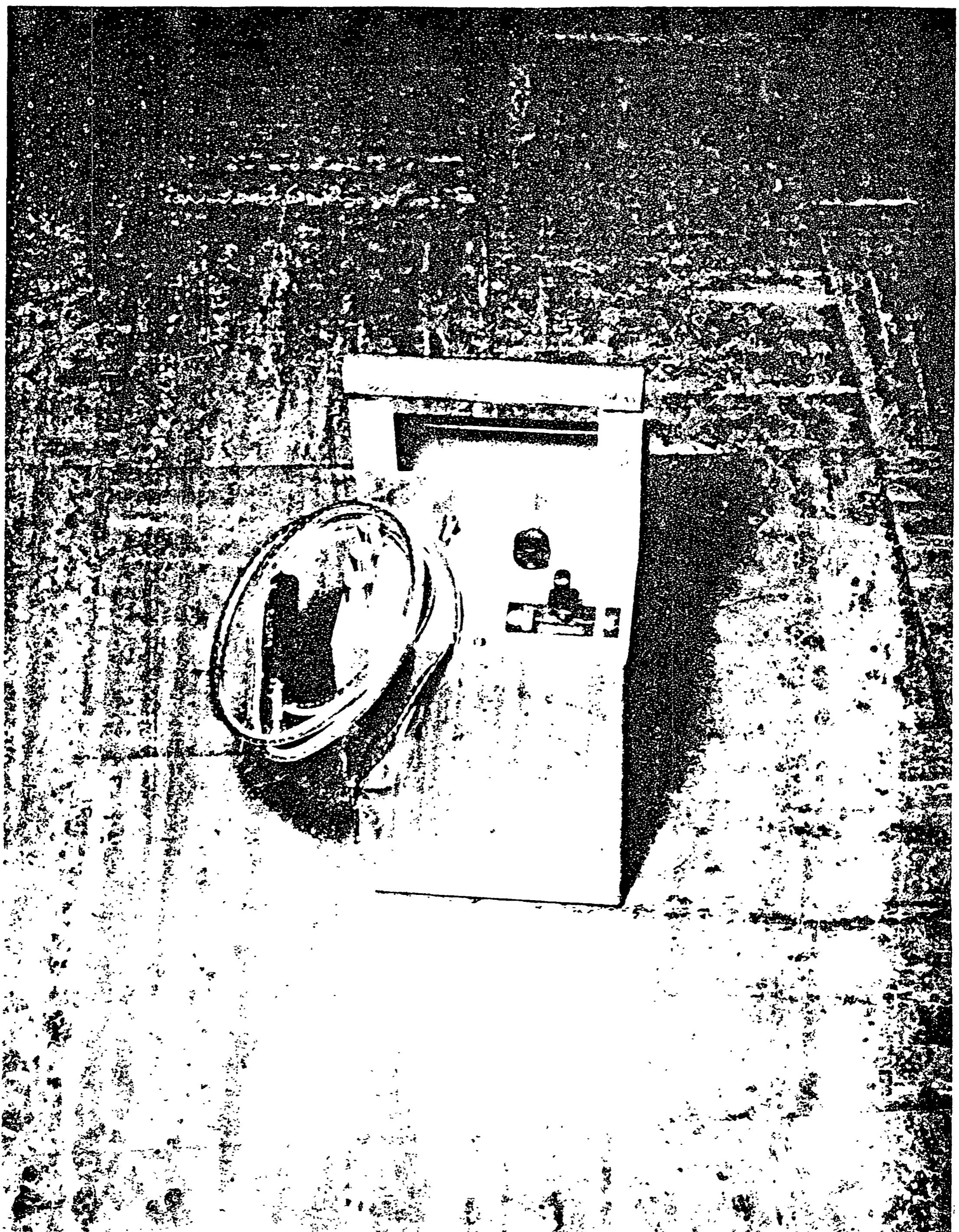
The aircraft ADF equipment was used to track the balloon on a frequency of 1724 KC, and these receivers, as well as other auxiliary receivers, were used to copy the telemetered altitude information.

The performance of the WRI balloons and their flight instrumentation attest to the high degree of reliability achieved by the company in its balloon operations by a policy of continuous company-sponsored research and development.



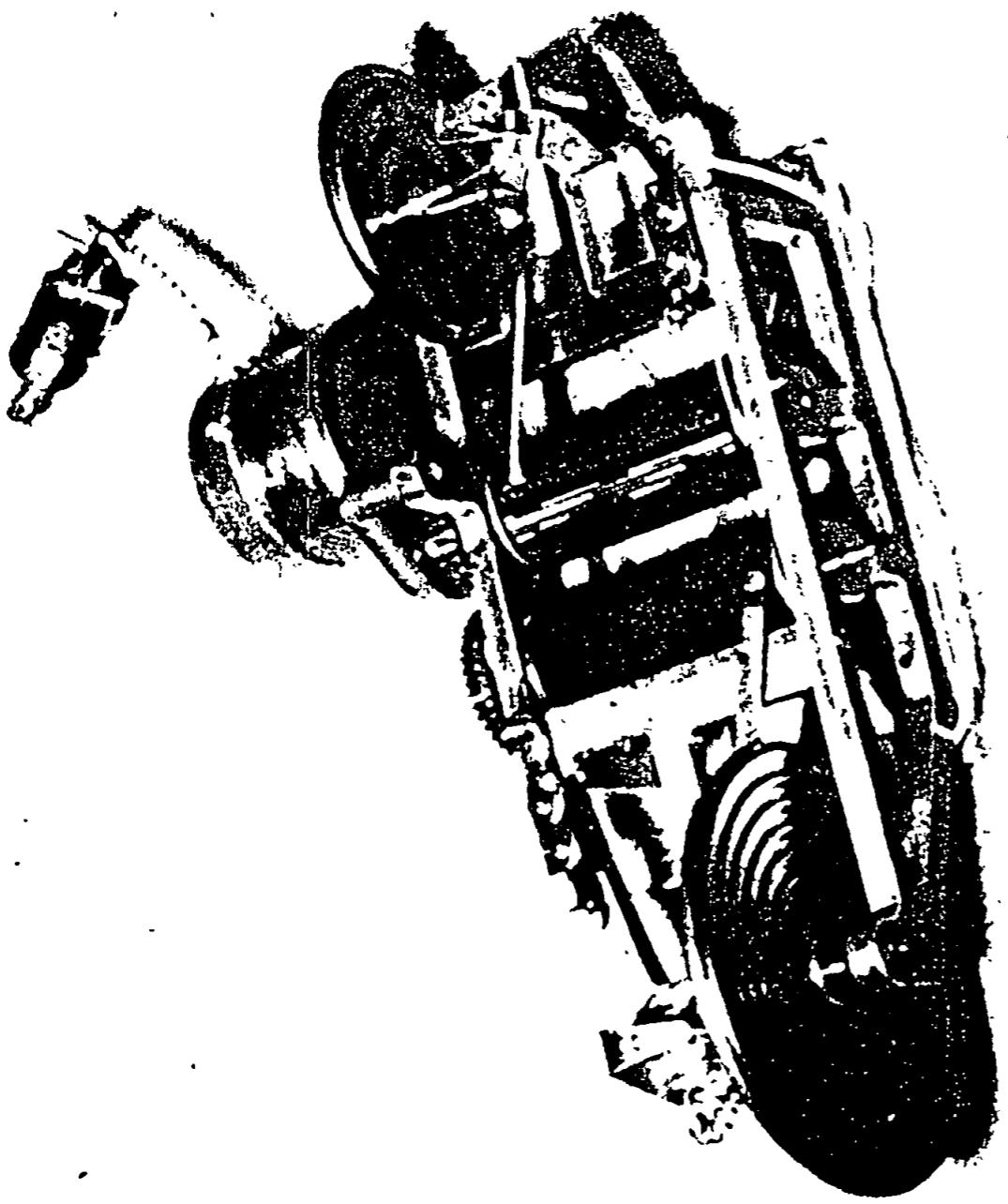
**W-1970 Radio Control and Timer Flight Termination Equipment**

The upper shelf contains the radio control receiver and command circuit. The lower shelf contains the Mac-Nick timer and battery supply. The insulated container



**W-1996 Radio Control Ground Equipment:**

This instrument package plugs into the microphone plug of any ground or airborne transmitter to operate the radio control circuit.



W -1946

**Double Drum Transducer**

This pressure transducer is used to telemeter pressure information over the pressure range 1000 mb to 2 mb. The smaller or Ny-Span bellows covers the range 1000 to 40 mb and the larger or copper beryllium bellows covers the range 100 to 2 mb. The code drum has 200 individual code groups over the indicated pressure ranges. The drums key the transmitter alternately and are driven by a 6 volt timing motor.

V. ROCKOON

It was planned, as an adjunct to "Equex 57", to launch four ROCKOON flights for the State University of Iowa. These flights consisted of a "Loki" rocket suspended from a 45' diameter balloon.

The USS Cayuga County (LST 529) was made available for the ROCKOON launchings. Due to an engine breakdown at sea which slowed its speed to 5 knots, there were no launches made at sea. One ROCKOON flight was launched from Site #2 in a 2 ~ 3 knot wind.

## VI. CONCLUSIONS AND RECOMMENDATIONS

For future expeditions, it is recommended that, if at all possible, flights be made from an aircraft carrier, preferably one leaving the U. S. for the general area of the desired operations. This would eliminate both the problems of supply and delays due to unfavorable winds, as well as the recovery problem either by the carrier itself or a carrier-based helicopter.

Personnel and supplies could be loaded aboard before the ships' departure from the U. S., thus eliminating any possibility of a recurrence of the delivery problems with which "Equex '57" was plagued.

As for wind, the relatively high speeds of even the "jeep" type carrier gives them the ability to create a "no wind" condition over the flight deck (except in extreme conditions). This ability would eliminate the cancellation of flights due to marginal wind conditions and subsequent lengthening of the flight schedule. At sea the frequency of showers is also greatly reduced. Rain squalls on Guam were of the orographic type.

For loads with special flight requirements, such as the University of Minnesota equipment on this trip, advance notice to the contractor of the requirements is a necessity for adequate planning. Air-conditioned laboratory space for storage and preparation of flight instrumentation would be highly desirable.

VII. LIST OF PERSONNEL PARTICIPATING IN "EQUEX '57" EXPEDITION

OF THE CNR AIR BRANCH

A. CNR Personnel

Commander R. C. Cochran, CNR Minneapolis

Lt. Commander Scott Daubin, CNR, Washington, D. C.

B. Participating Scientists

University of Minnesota

Dr. John Winckler

Mr. L. E. Peterson

Mr. R. I. Danielsca

University of Iowa

Dr. Frank McDonald

Dr. K. A. Anderson

Mr. W. R. Webber

Mr. L. Cahill

Mr. R. C. Johnson

University of Chicago

Dr. Marcel Schein

Mr. David Haskins

New York University

Mr. R. C. Haymes

Mr. H. M. Blum

Naval Research Laboratory

Mr. O'Dell

C. Winzen Research Inc.

Otto C. Winzen

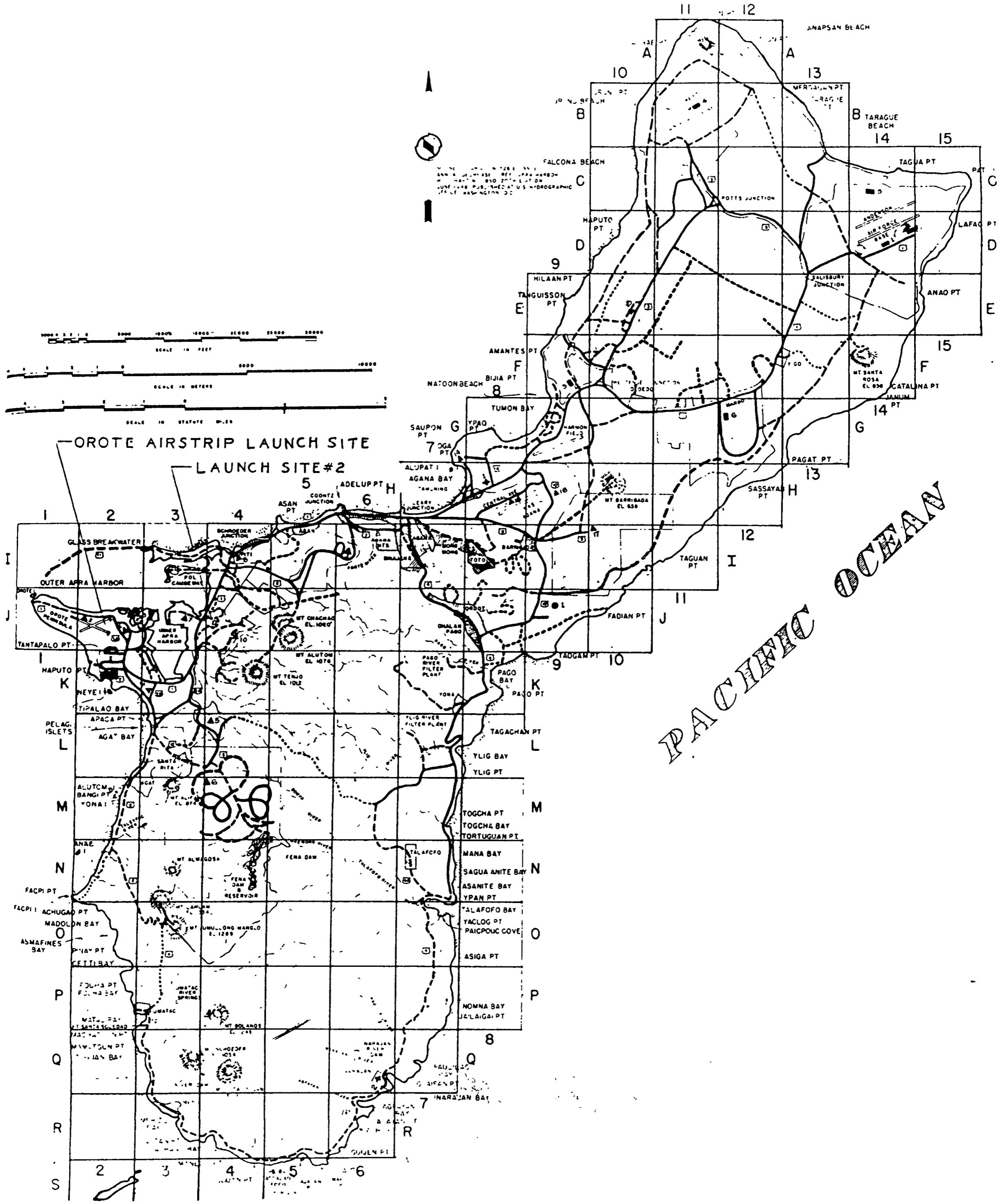
E. F. Lewis

V. E. Baumgartner

Herbert Ballman

Paul Petersen

Kline Bower



## WINZEN RESEARCH INC.

8401 LYNDALE AVE. SO.

MINNEAPOLIS, MINNESOTA

## BALLOON FLIGHT REPORT

Flight No. 731 Date: 28 January 1957 Time: 0659 K  
 Project No. NA-418 Flight For: CWR (Equinox '57)  
 Scientific Payload: Various units Weight: 372  
 Scientific Purpose: High altitude exposure to radiation  
 Scientific Success:

## BALLOON DATA

Manufacturer: WRI Size: 172.6' x .0015 Serial No.: 172.6-150-Y-26  
 Type: "FIST" construction, biconvex duets, 140# load bands, (80) Weight: 621

## LAUNCHING DATA

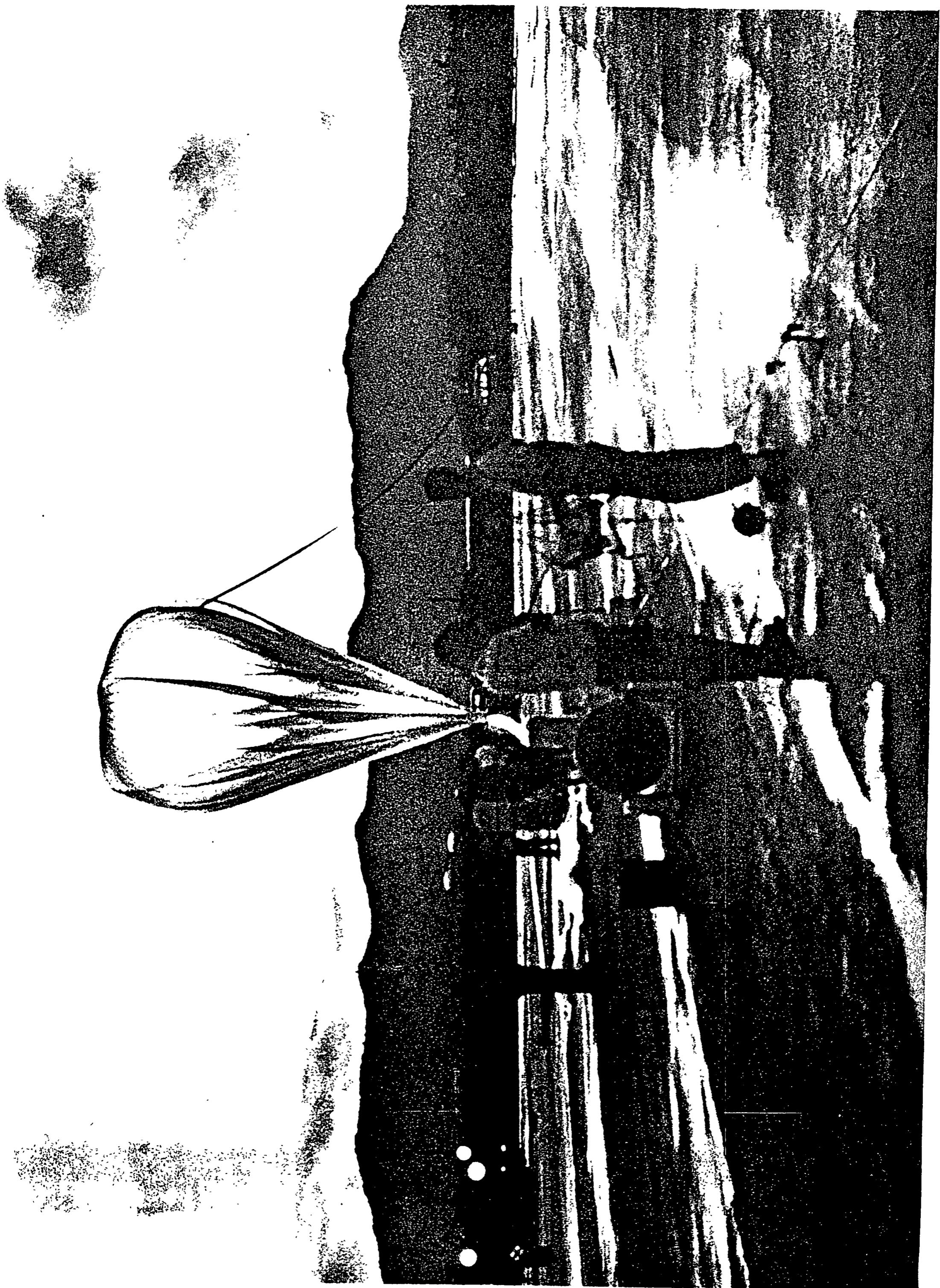
Launching Site:	Orote Airstrip, Guam, M. I.	Launching Method:	Roller platform
Wind:	E 8	Sky:	8/10 cumulus
Total Payload:	482	# Free Lift	15 %
			Gross Inflation: 1238

## FLIGHT DATA

Max. Altitude:	108,200	Theoretical Altitude:	110,500'
Flight Duration:	6 hrs., 1 min.	Altitude Maintenance:	Very good
Ballast:	None	Rate of Ascent:	672 FPM
Landing Site:	15°34'N 142°47'E	Recovery Time:	1630K
Balloon Performance:	Excellent	Balloon Landing Site:	Near lead

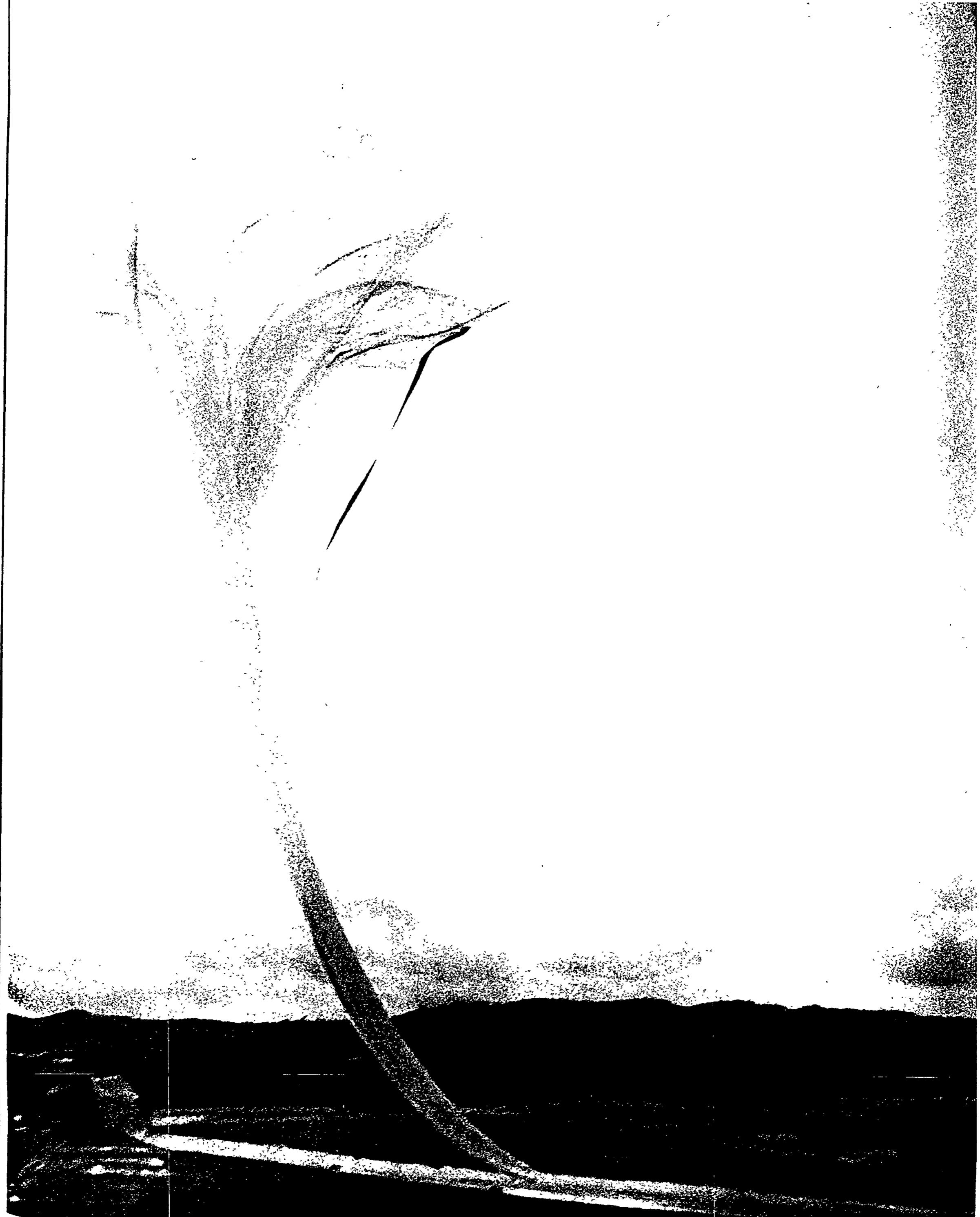
## FLIGHT RESUME

Smooth launch. Load line and parachute wet from showers and condensation.  
 Balloon wet.



FLIGHT 731-1 FIRST "SKYHOOK" BALLOON SHOWN HERE SHORTLY BEFORE IT WAS LAUNCHED FROM OROTE AIRFIELD, GUAM. THE RUNWAY IS STILL WET FROM FREQUENT RAIN STORMS WHICH HAMPERED FLIGHT SCHEDULES.

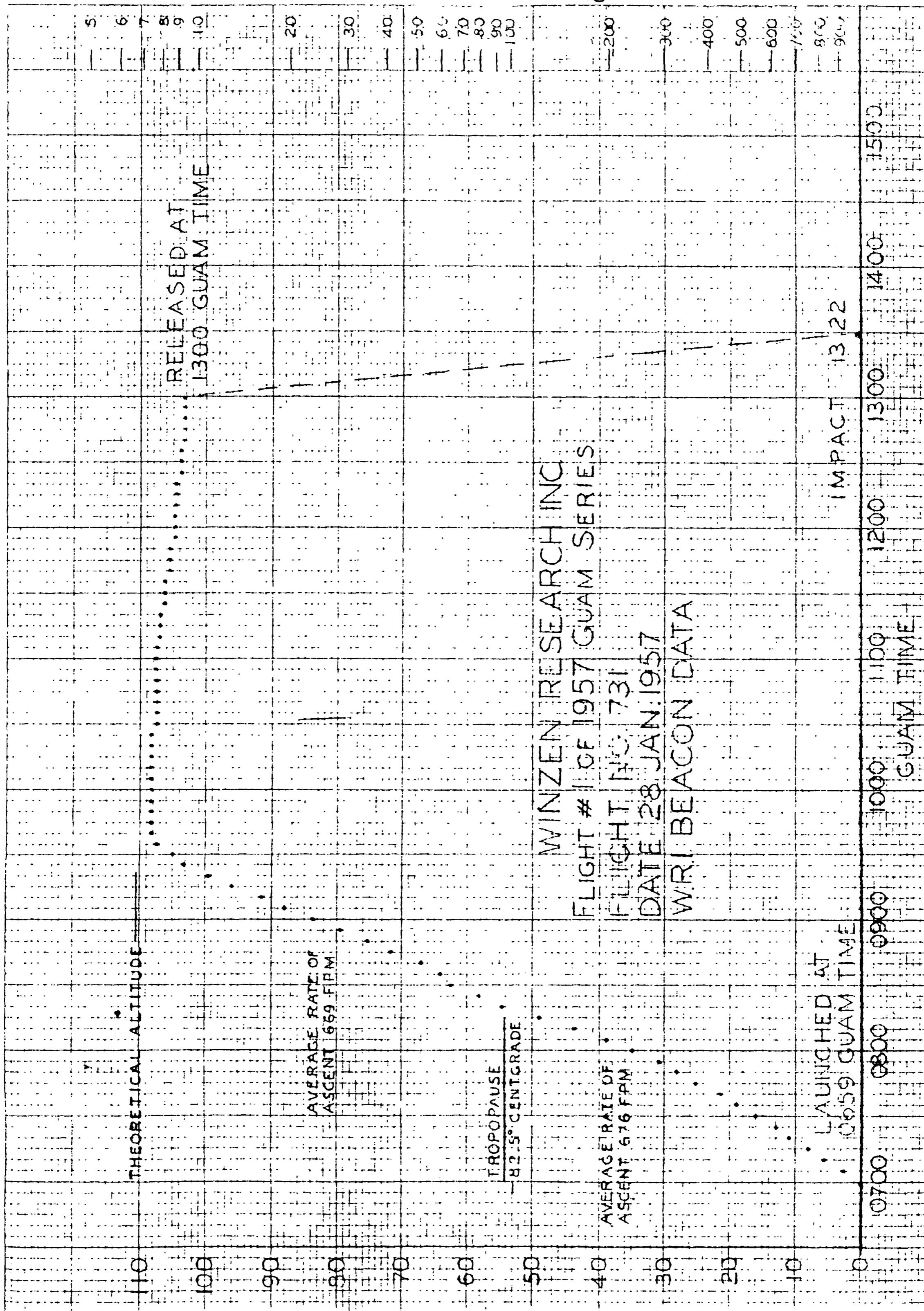
Official U.S. Navy Photo



IGHT 731-2

"EQUEX '57 FLIGHT # 731 PICTURED A MOMENT AFTER LAUNCHING LEVERS  
RELEASED. INFLATION TUBE IS VISIBLE DANGLING FROM RIGHT SIDE OF  
BALLOON. THIS PICTURE WAS MADE FROM GUAM'S OROTE ATRFTELD.

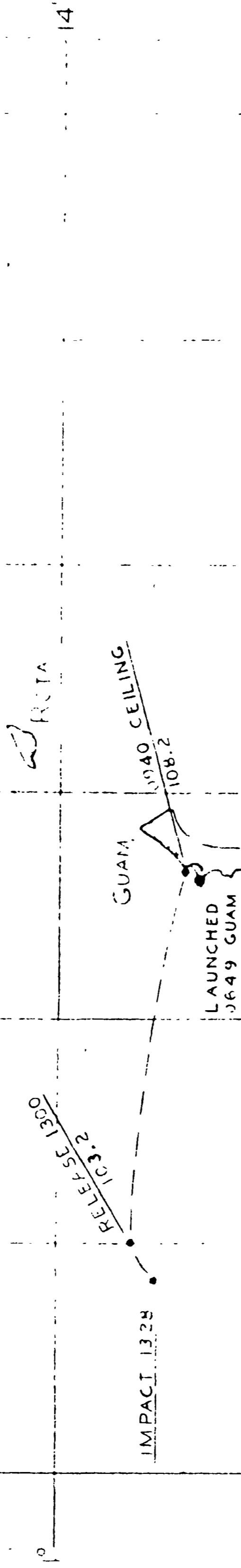
## PRESSURE III MILLIBARS



142° 143° 144° 145° 146° 147° 148°

GUAM

TINIAN



WINZEN RESEARCH INC.

TRACTOR #1 OF 1957 GLAM SERIES  
FLIGHT NO 731 DATE 28 JAN 1957

ALL ALTITUDE X 1000 FT  
• SURPLANE FIX

• SURPLANE FIX

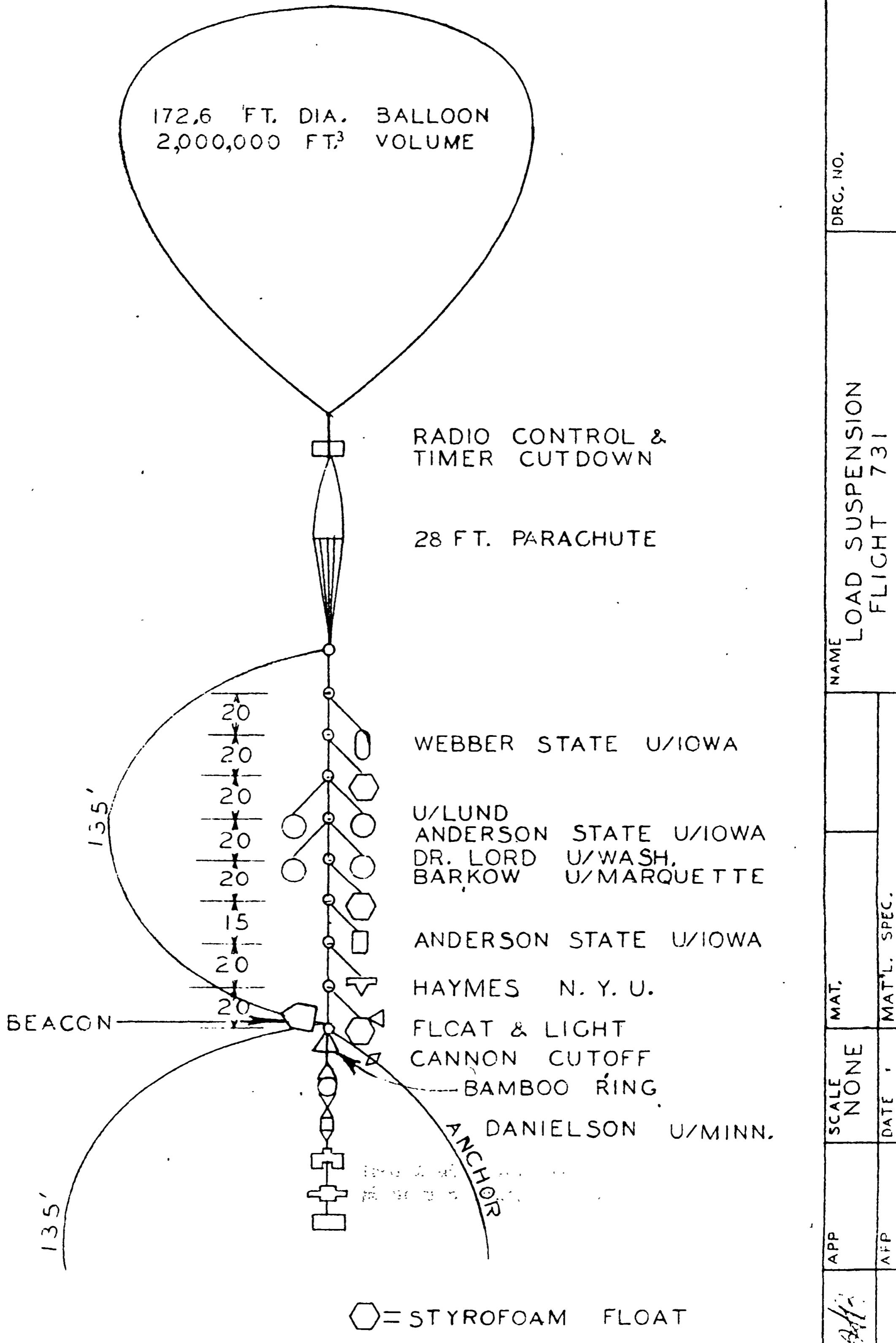
NO. 15 MARCH 1957

142°

143°

144°

145°



# WINZEN RESEARCH INC.

8401 LYNDALE AVE. SO.  
MINNEAPOLIS, MINNESOTA

## BALLOON FLIGHT REPORT

Flight No. 732

Date: 30 January 1957

Time: 0639K

Project No.: MA-418

Flight For CNR (Equex '57)

Scientific Payload: Cosmic Ray Measurement Equipment

Weight 329

Scientific Purpose: High altitude exposure

Scientific Success: Partial

### BALLOON DATA

Manufacturer: WRI

Size: 172.6' x .001"

Serial No.: 172.6-100-V-31

Type: "FIST" construction, biconvolute ducts, 140# load bands  
(68)

Weight: 438

### LAUNCHING DATA

Launching Site: Orrote Airstrip, Guam, M. I.

Launching Method: Roller platform

Wind: ENE 5

Sky: 5/10 cumulus

Temperature 80

Total Payload 381

# Free Lift 15

%

# Gross Inflation.

956

### FLIGHT DATA

Max. Altitude 115,700

Theoretical Altitude: 118,500

Flight Duration 7 hrs., 51 min.

Altitude Maintenance: Excellent

Ballast: None

Rate of Ascent:

Landing Site: 12°16'N 146°21'E

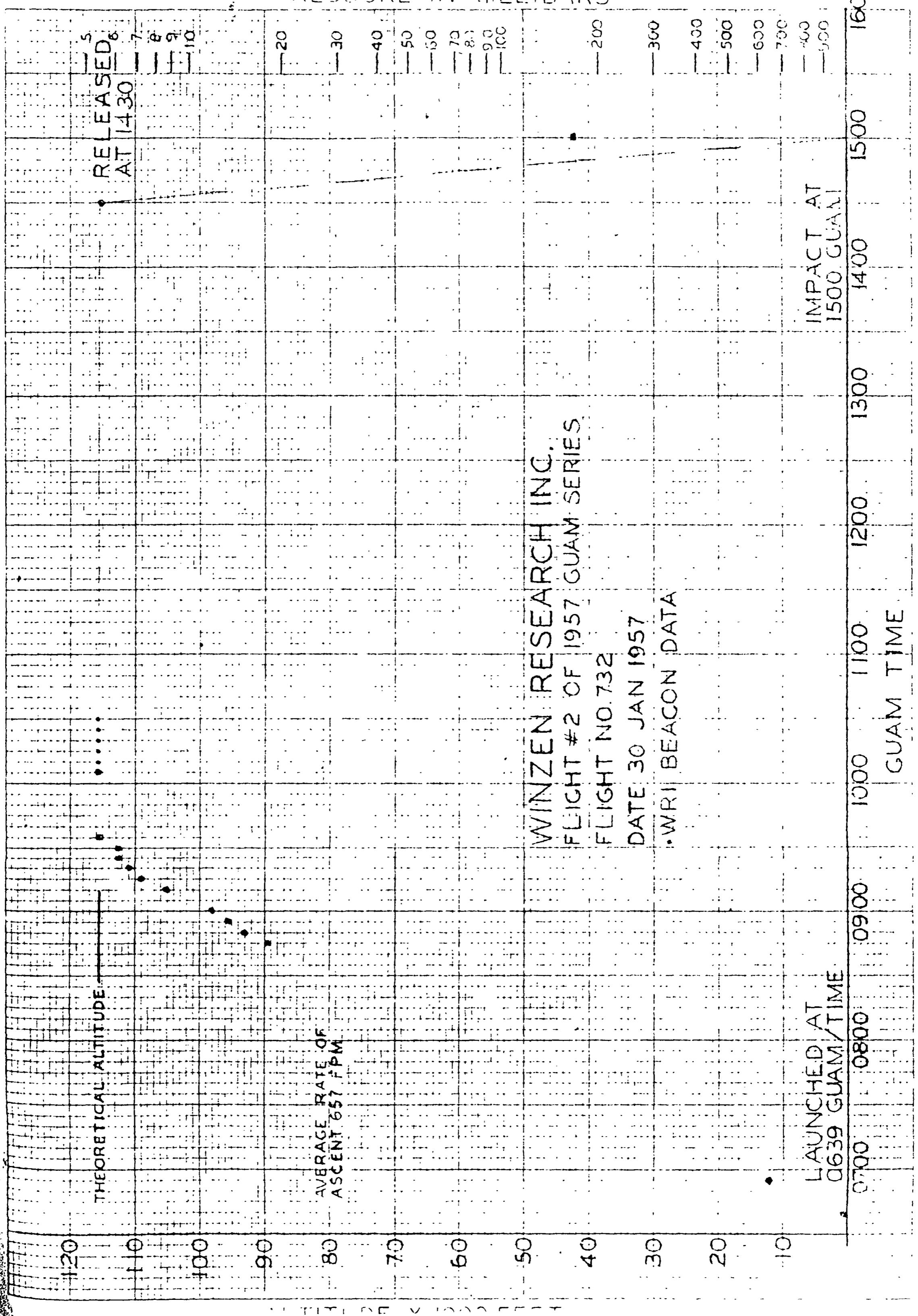
Recovery Time: 1½ hrs. after impact

Balloon Performance: Excellent

Balloon Landing Site: Near load

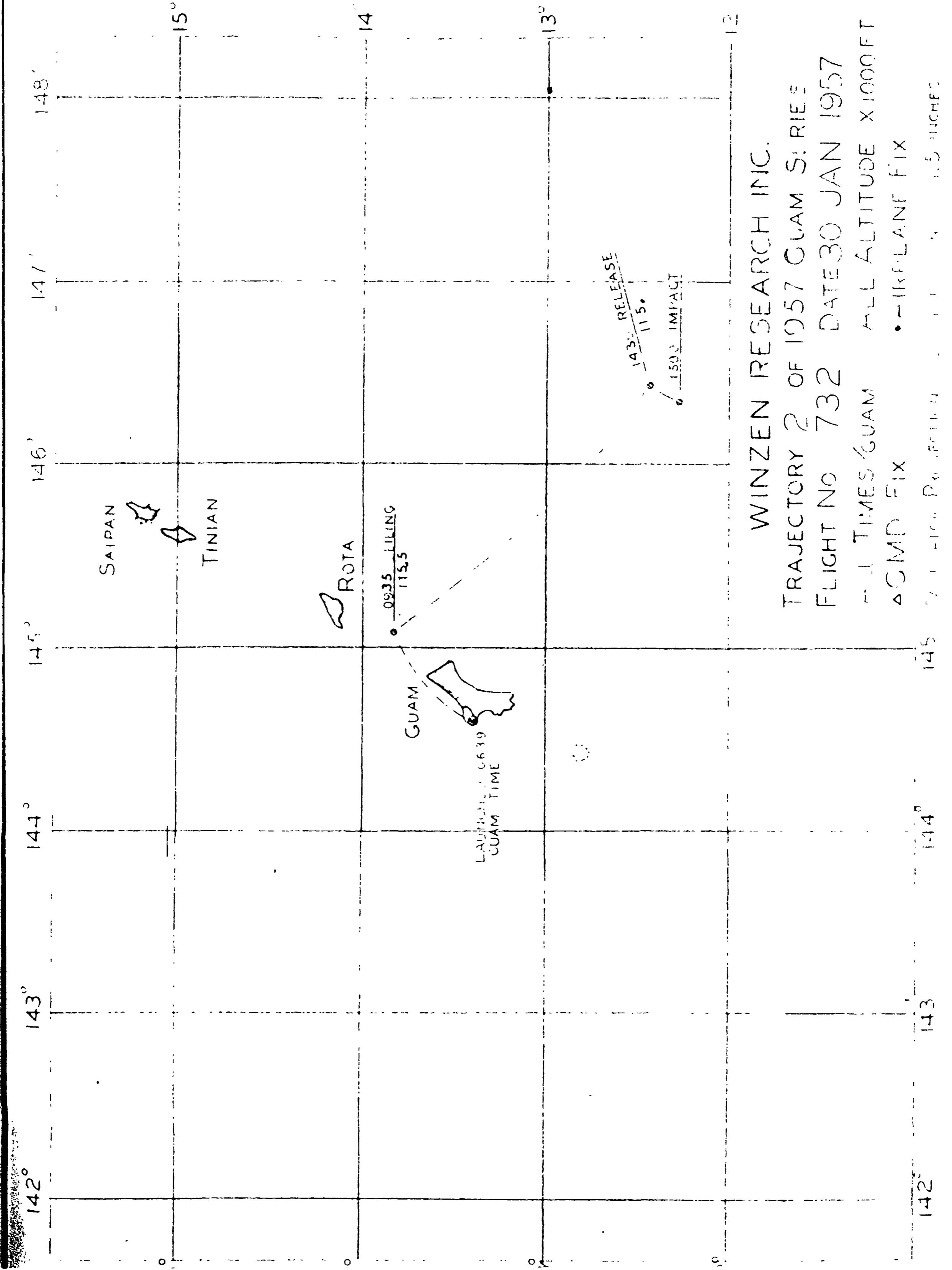
### FLIGHT RESUME

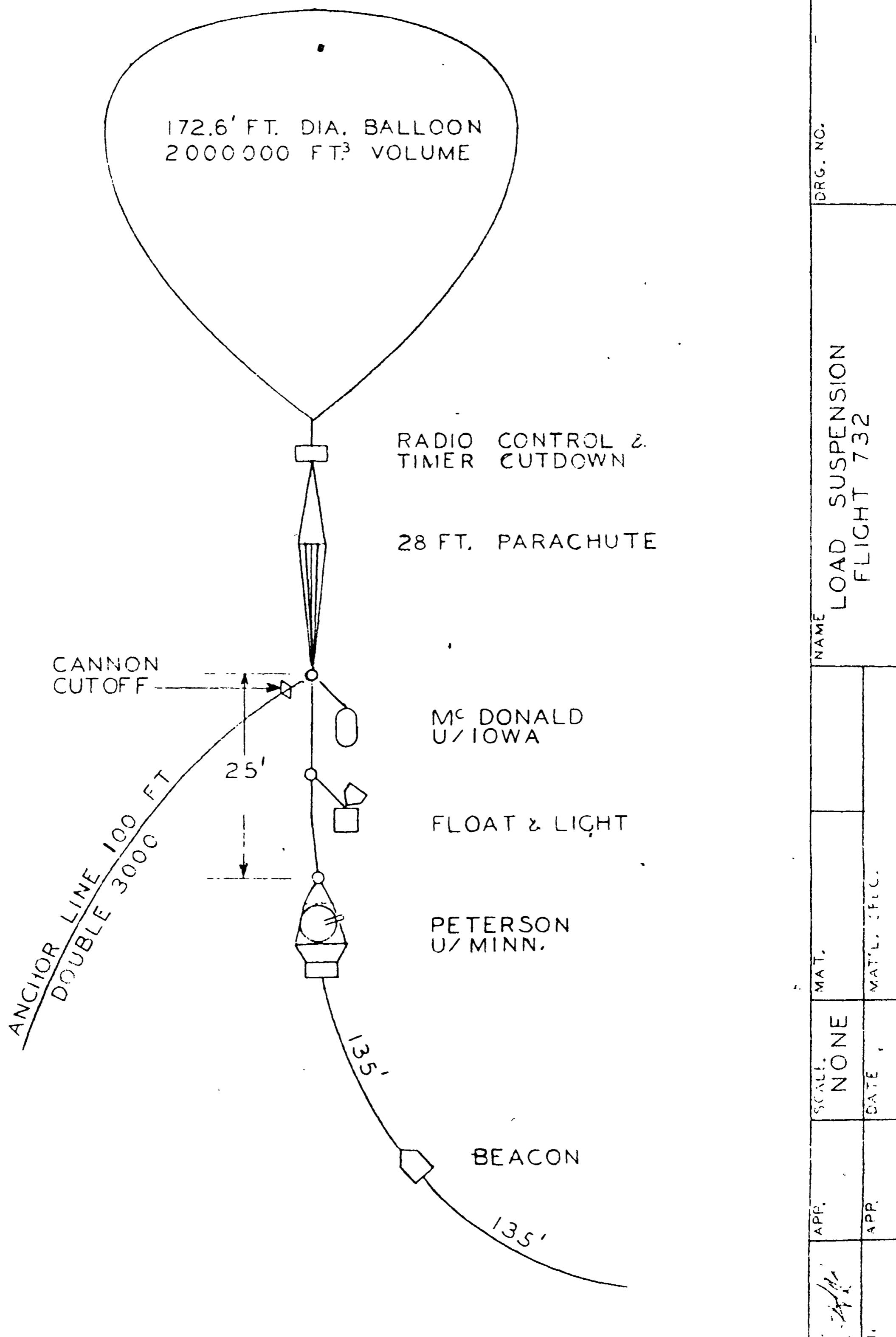
Good launching. Load in 2 units (1 = 121, 2 = 208#). Sharp vertical jerk on #2 upon pickup.



WINZEN RESEARCH INC.  
FLIGHT #2 OF 1957 GUAM SERIES  
FLIGHT NO. 732  
DATE 30 JAN 1957

WRI BEACON DATA





# WINZEN RESEARCH INC.

8401 LYNDALE AVE. SO.  
MINNEAPOLIS, MINNESOTA

## BALLOON FLIGHT REPORT

Flight No. 733

Date: 2 February 1957

Time: 0720K

Project No.: NA-418

Flight For: ONR (Equex '57)

Scientific Payload: Cosmic Radiation Measurement Equipment Weight: 255

Scientific Purpose: High altitude exposure

Scientific Success: None

### BALLOON DATA

Manufacturer: WRI Size: 172.6' x .0012 Serial No.: 172.6-120-V-28

Type: "FIST" construction, bicornuate ducts, 140# load bands (60) Weight: 528

### LAUNCHING DATA

Launching Site: Orote Airstrip, Guam, M. I. Launching Method: Roller platform

Wind: ENE 8-12 Sky: Clear (1/10 cu) Temperature 79

Total Payload: 309 # Free Lift 15 % 148 # Gross Inflation: 985

### FLIGHT DATA

Max. Altitude: 15,500 Theoretical Altitude: 116,000

Flight Duration: 2 hrs., 12 min. Altitude Maintenance: None

Ballast: None Rate of Ascent: 172 FPM

Landing Site: 12°57'N 144°08'E Recovery Time: 1055K

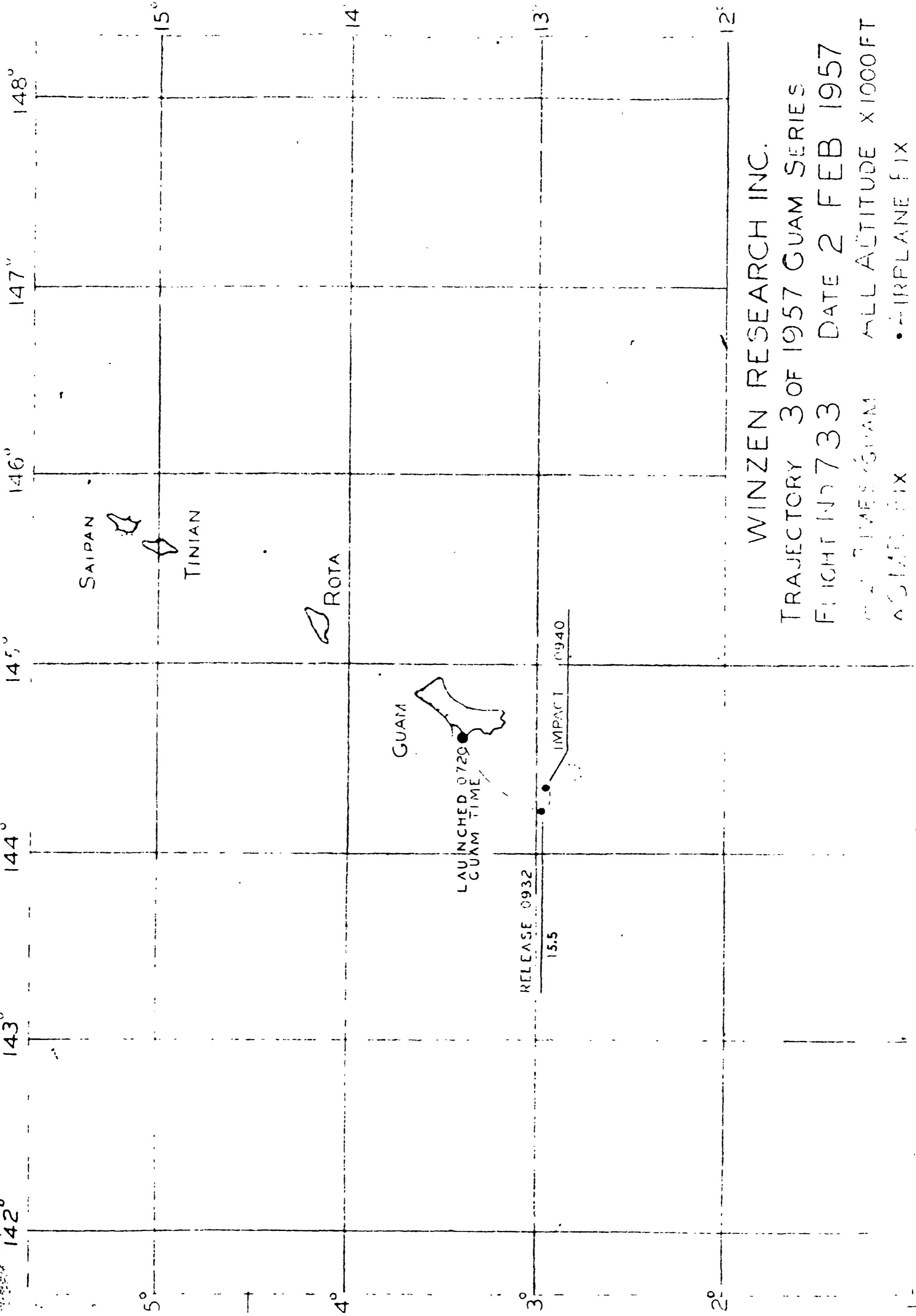
Balloon Performance: Damaged in platform Balloon Landing Site: Near load

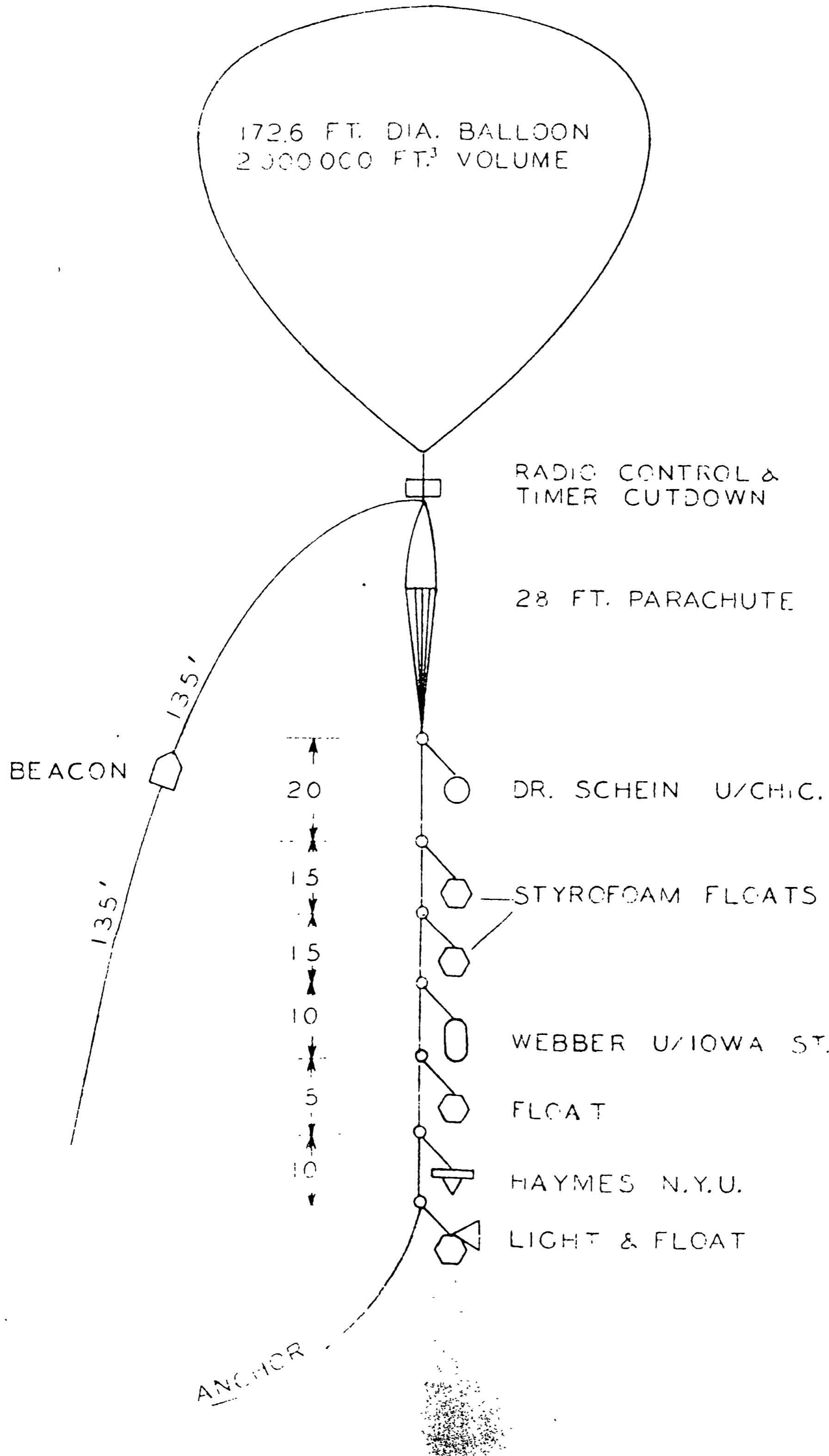
### FLIGHT RESUME

Difficult inflation and launch. Combination of gusty surface winds and exposed location allowed bubble to continually twist and pull in platform. Layout and inflation made against advice of WRI Crew Chief. ONR Field Representative accepted responsibility of "go ahead" decision. Decision was based on limited extended availability of recovery vessels and predicted bad weather conditions for next two days. Gusty conditions made accurate weighoff difficult. After launch, balloon rose slowly to 15,500', levelled, and then commenced descending. Load cut away to prevent extreme drift.

PRESSURE IN MILLIBARS

5	15	25	35	45	55	65	75	85	95	105	115	125	135	145	155	165	175	185	195	205	215	225	235	245	255	265	275	285	295	305	315	325	335	345	355	365	375	385	395	405	415	425	435	445	455	465	475	485	495	505	515	525	535	545	555	565	575	585	595	605	615	625	635	645	655	665	675	685	695	705	715	725	735	745	755	765	775	785	795	805	815	825	835	845	855	865	875	885	895	905	915	925	935	945	955	965	975	985	995	1005	1015	1025	1035	1045	1055	1065	1075	1085	1095	1105	1115	1125	1135	1145	1155	1165	1175	1185	1195	1205	1215	1225	1235	1245	1255	1265	1275	1285	1295	1305	1315	1325	1335	1345	1355	1365	1375	1385	1395	1405	1415	1425	1435	1445	1455	1465	1475	1485	1495	1505	1515	1525	1535	1545	1555	1565	1575	1585	1595	1605	1615	1625	1635	1645	1655	1665	1675	1685	1695	1705	1715	1725	1735	1745	1755	1765	1775	1785	1795	1805	1815	1825	1835	1845	1855	1865	1875	1885	1895	1905	1915	1925	1935	1945	1955	1965	1975	1985	1995	2005	2015	2025	2035	2045	2055	2065	2075	2085	2095	2105	2115	2125	2135	2145	2155	2165	2175	2185	2195	2205	2215	2225	2235	2245	2255	2265	2275	2285	2295	2305	2315	2325	2335	2345	2355	2365	2375	2385	2395	2405	2415	2425	2435	2445	2455	2465	2475	2485	2495	2505	2515	2525	2535	2545	2555	2565	2575	2585	2595	2605	2615	2625	2635	2645	2655	2665	2675	2685	2695	2705	2715	2725	2735	2745	2755	2765	2775	2785	2795	2805	2815	2825	2835	2845	2855	2865	2875	2885	2895	2905	2915	2925	2935	2945	2955	2965	2975	2985	2995	3005	3015	3025	3035	3045	3055	3065	3075	3085	3095	3105	3115	3125	3135	3145	3155	3165	3175	3185	3195	3205	3215	3225	3235	3245	3255	3265	3275	3285	3295	3305	3315	3325	3335	3345	3355	3365	3375	3385	3395	3405	3415	3425	3435	3445	3455	3465	3475	3485	3495	3505	3515	3525	3535	3545	3555	3565	3575	3585	3595	3605	3615	3625	3635	3645	3655	3665	3675	3685	3695	3705	3715	3725	3735	3745	3755	3765	3775	3785	3795	3805	3815	3825	3835	3845	3855	3865	3875	3885	3895	3905	3915	3925	3935	3945	3955	3965	3975	3985	3995	4005	4015	4025	4035	4045	4055	4065	4075	4085	4095	4105	4115	4125	4135	4145	4155	4165	4175	4185	4195	4205	4215	4225	4235	4245	4255	4265	4275	4285	4295	4305	4315	4325	4335	4345	4355	4365	4375	4385	4395	4405	4415	4425	4435	4445	4455	4465	4475	4485	4495	4505	4515	4525	4535	4545	4555	4565	4575	4585	4595	4605	4615	4625	4635	4645	4655	4665	4675	4685	4695	4705	4715	4725	4735	4745	4755	4765	4775	4785	4795	4805	4815	4825	4835	4845	4855	4865	4875	4885	4895	4905	4915	4925	4935	4945	4955	4965	4975	4985	4995	5005	5015	5025	5035	5045	5055	5065	5075	5085	5095	5105	5115	5125	5135	5145	5155	5165	5175	5185	5195	5205	5215	5225	5235	5245	5255	5265	5275	5285	5295	5305	5315	5325	5335	5345	5355	5365	5375	5385	5395	5405	5415	5425	5435	5445	5455	5465	5475	5485	5495	5505	5515	5525	5535	5545	5555	5565	5575	5585	5595	5505	5515	5525	5535	5545	5555	5565	5575	5585	5595	5605	5615	5625	5635	5645	5655	5665	5675	5685	5695	5705	5715	5725	5735	5745	5755	5765	5775	5785	5795	5805	5815	5825	5835	5845	5855	5865	5875	5885	5895	5905	5915	5925	5935	5945	5955	5965	5975	5985	5995	6005	6015	6025	6035	6045	6055	6065	6075	6085	6095	6005	6015	6025	6035	6045	6055	6065	6075	6085	6095	6105	6115	6125	6135	6145	6155	6165	6175	6185	6195	6205	6215	6225	6235	6245	6255	6265	6275	6285	6295	6305	6315	6325	6335	6345	6355	6365	6375	6385	6395	6405	6415	6425	6435	6445	6455	6465	6475	6485	6495	6505	6515	6525	6535	6545	6555	6565	6575	6585	6595	6605	6615	6625	6635	6645	6655	6665	6675	6685	6695	6705	6715	6725	6735	6745	6755	6765	6775	6785	6795	6805	6815	6825	6835	6845	6855	6865	6875	6885	6895	6905	6915	6925	6935	6945	6955	6965	6975	6985	6995	7005	7015	7025	7035	7045	7055	7065	7075	7085	7095	7105	7115	7125	7135	7145	7155	7165	7175	7185	7195	7205	7215	7225	7235	7245	7255	7265	7275	7285	7295	7305	7315	7325	7335	7345	7355	7365	7375	7385	7395	7405	7415	7425	7435	7445	7455	7465	7475	7485	7495	7505	7515	7525	7535	7545	7555	7565	7575	7585	7595	7605	7615	7625	7635	7645	7655	7665	7675	7685	7695	7705	7715	7725	7735	7745	7755	7765	7775	7785	7795	7705	7715	7725	7735	7745	7755	7765	7775	7785	7795	7805	7815	7825	7835	7845	7855	7865	7875	7885	7895	7905	7915	7925	7935	7945	7955	7965	7975	7985	7995	8005	8015	8025	8035	8045	8055	8065	8075	8085	8095	8105	8115	8125	8135	8145	8155	8165	8175	8185	8195	8205	8215	8225	8235	8245	8255	8265	8275	8285	8295	8305	8315	8325	8335	8345	8355	8365





NAME	LCAD SUSPENSION
FL GHT	733

APP	SCALE NAME	MAT.

WINZEN RESEARCH INC.  
8401 LYNDALE AVE. SO.  
MINNEAPOLIS, MINNESOTA

BALLOON FLIGHT REPORT

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Flight No.	Date:	Time:
734	7 February 1957	0720K
Project No.:	Flight For:	
NA-418	CNR (Equex '57)	
Scientific Payload:		Weight:
	Cosmic Ray Measurement Equipment	472
Scientific Purpose:		
Scientific Success:		
	None	

---

BALLOON DATA

Manufacturer:	Size:	Serial No.:
WRI	172.8' x .0012"	172.8-120-V-27
Type:		Weight:
"FIST" construction, biconvex duote, 140# load bands	(60)	531

LAUNCHING DATA

Launching Site:	Launching Method:	
#2 launch site, Guam, M. I.	Roller platform	
Wind:	Temperature	
E 2-5 (1 gust to 20)	79	
Total Payload:	# Free Lift % # Gross Inflation.	
538	15 137	1254

FLIGHT DATA

Max. Altitude:	Theoretical Altitude:
Flight Duration:	Altitude Maintenance:
Ballast:	Rate of Ascent:
Landing Site:	Recovery Time:
Balloon Performance:	Balloon Landing Site:

FLIGHT RESUME

Balloon ruptured in platform. Single rain squall with gusts to 20 knots near end of inflation tore bubble.

## WINZEN RESEARCH INC.

8401 LYNDALE AVE. SO.  
MINNEAPOLIS, MINNESOTA

## BALLOON FLIGHT REPORT

Flight No.	<b>735</b>	Date:	<b>9 February 1957</b>	Time:	<b>0627K</b>
Project No.:	<b>NA-418</b>	Flight For:	<b>CNR (Equex '57)</b>		
Scientific Payload:	<b>Cosmic Ray Measurement Equipment</b>			Weight:	<b>358</b>
Scientific Purpose:	<b>High altitude exposure</b>				
Scientific Success:	<b>None</b>				

---

## BALLOON DATA

Manufacturer:	<b>WRI</b>	Size:	<b>172.6' x .0012</b>	Serial No.:	<b>172.6-120-V-29</b>
Type:	<b>"FIST" construction, biconvolute ducts, 140# load bands</b>			Weight:	<b>535</b>

---

## LAUNCHING DATA

Launching Site:	<b>#2 launch site, Guam, M. I.</b>	Launching Method:	<b>Roller platform</b>
Wind:	<b>ENE 3-5</b>	Sky:	<b>1/10 ou</b>
Total Payload:	<b>420</b>	# Free Lift	<b>15</b>
		%	<b>169</b>
		# Gross Inflation:	<b>1124</b>

---

## FLIGHT DATA

Max. Altitude:	<b>56,000</b>	Theoretical Altitude:	<b>113,600</b>
Flight Duration:	<b>34 min.</b>	Altitude Maintenance:	<b>—</b>
Ballast:	<b>None</b>	Rate of Ascent:	<b>1060 FPM</b>
Landing Site:	<b>18°24'N 144°38'E</b>	Recovery Time:	<b>0827K</b>
Balloon Performance:	<b>—</b>	Balloon Landing Site:	<b>Near load (2 miles)</b>

---

## FLIGHT RESUME

Good launch. Load separated from balloon at 56,000 feet. Balloon and chute observed descending separately by several observers. Probable cause of release--low voltage actuation of radio control release.

## PRESSURE IN MILLIBARS

THEORETICAL CEILING

0

100

200

300

400

500

600

700

800

900

1000

1100

1200

1300

1400

1500

1600

1700

1800

1900

2000

2100

2200

2300

2400

2500

2600

2700

WINZEN RESEARCH INC.

SERIES 2 OF 957 GUAM

FLIGHT NO. B 735  
DATE 9 FEB 1957

BEACON DATA

200

300

400

500

600

700

800

900

1000

1100

1200

1300

1400

1500

1600

1700

1800

1900

2000

2100

2200

2300

2400

2500

2600

2700

2800

2900

3000

3100

3200

3300

3400

3500

3600

3700

3800

3900

4000

4100

4200

4300

4400

4500

4600

4700

4800

4900

5000

5100

5200

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5900

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7200

7300

7400

7500

7600

7700

7800

7900

8000

8100

8200

8300

8400

8500

8600

8700

8800

8900

9000

9100

9200

9300

9400

9500

9600

9700

9800

9900

10000

10100

10200

10300

10400

10500

10600

10700

10800

10900

11000

11100

11200

11300

11400

11500

11600

11700

11800

11900

12000

12100

12200

12300

12400

12500

12600

12700

12800

12900

13000

13100

13200

13300

13400

13500

13600

13700

13800

13900

14000

14100

14200

14300

14400

14500

14600

14700

14800

14900

15000

15100

15200

15300

15400

15500

15600

15700

15800

15900

16000

16100

16200

16300

16400

16500

16600

16700

16800

16900

17000

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17500

17600

17700

17800

17900

18000

18100

18200

18300

18400

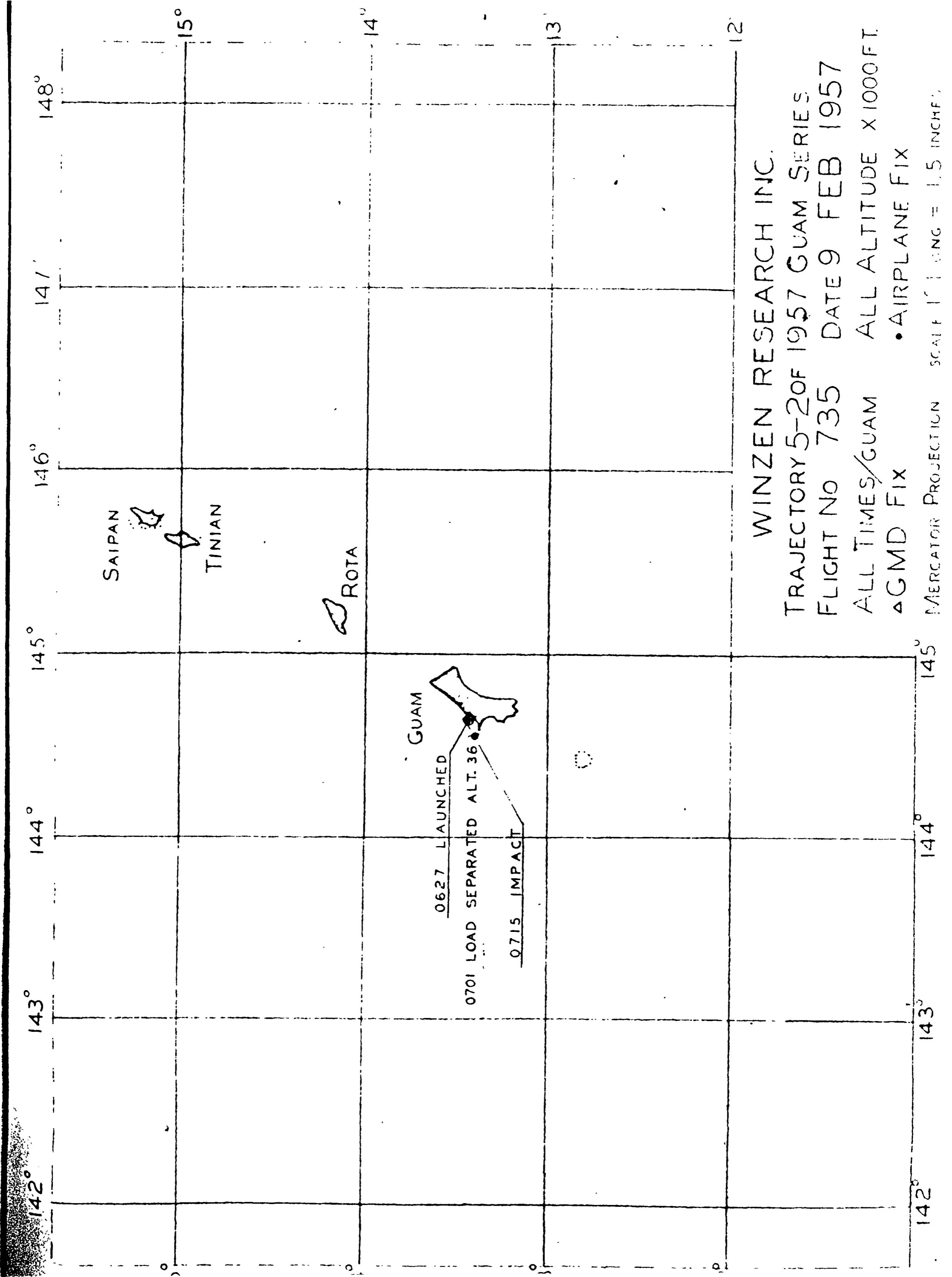
18500

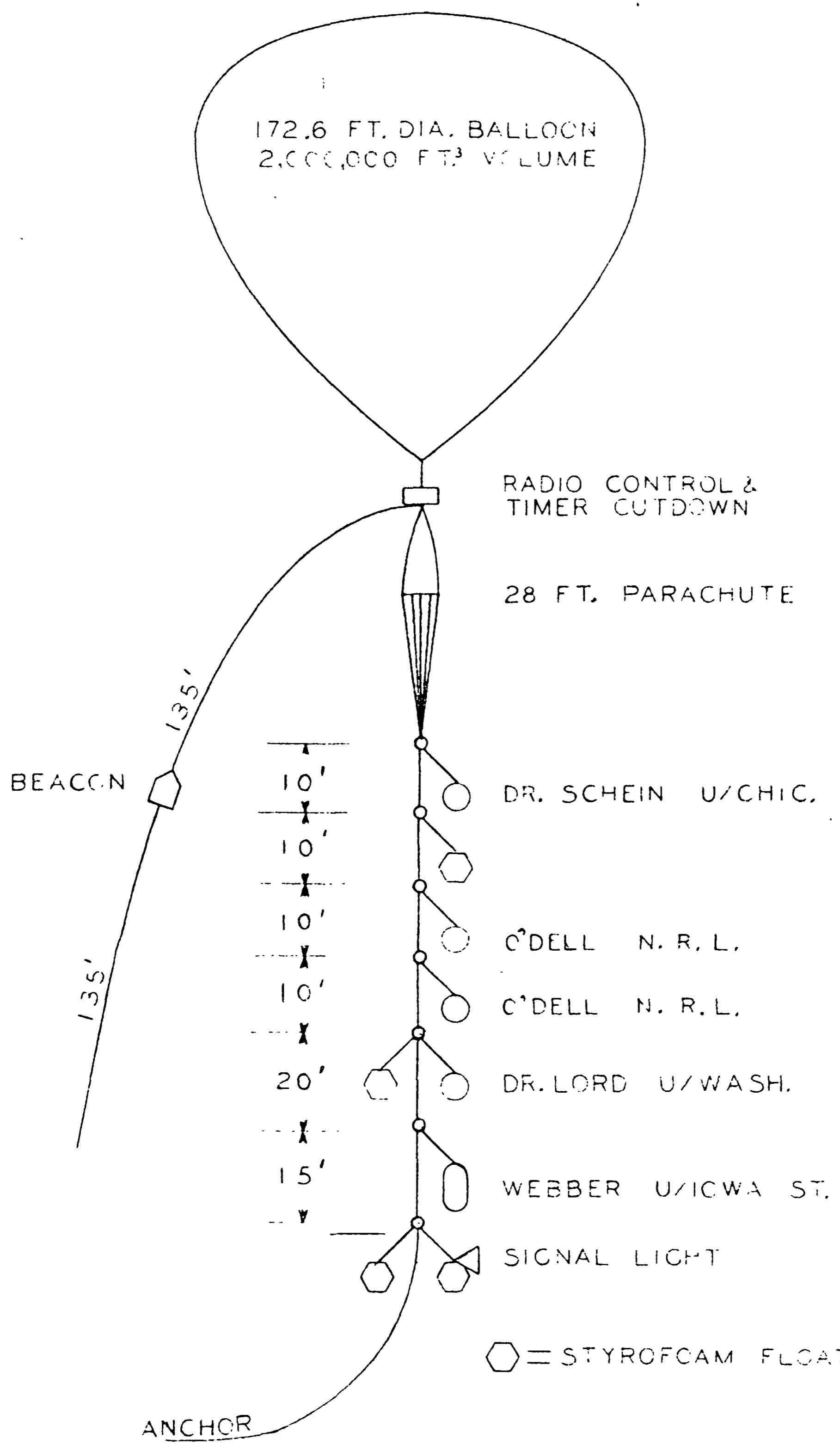
18600

18700

18800

18900





NAME	LOAD SUSPENSION	DATE	APP	SCALE	MAT
	FLIGHT 735			NONE	MATL SPEC

11/6/73

# WINZEN RESEARCH INC.

8401 LYNDALE AVE. SO.  
MINNEAPOLIS, MINNESOTA

## BALLOON FLIGHT REPORT

Flight No. **738**

Date: **10 February 1957**

Time: **0630K**

Project No.: **NA-418**

Flight For: **CNR (Equex '57)**

Scientific Payload: **Radiation Measurement Equipment**

Weight: **174**

Scientific Purpose: **High altitude exposure**

Scientific Success: **Good**

### BALLOON DATA

Manufacturer: **WRI**

Size: **120.8' x .0012**

Serial No.: **120.8-120-V-29**

Type: **"FIST" construction**

Weight: **260**

### LAUNCHING DATA

Launching Site: **#2 launch site, Guam, M. I.**

Launching Method: **Roller platform**

Wind: **E 2-3**

Sky: **Clear**

Temperature: **77**

Total Payload:

**223**

# Free Lift **14.2**

% **50**

**80**

# Gross Inflation.

**563**

### FLIGHT DATA

Max. Altitude: **103,300**

Theoretical Altitude:

**105,800**

Flight Duration: **9 hours, 20 min.**

Altitude Maintenance:

**Excellent**

Ballast: **None**

Rate of Ascent:

**824**

Landing Site: **13°52'N 140°50'E at 1622K**

Recovery Time:

**1635K**

Balloon Performance: **Excellent**

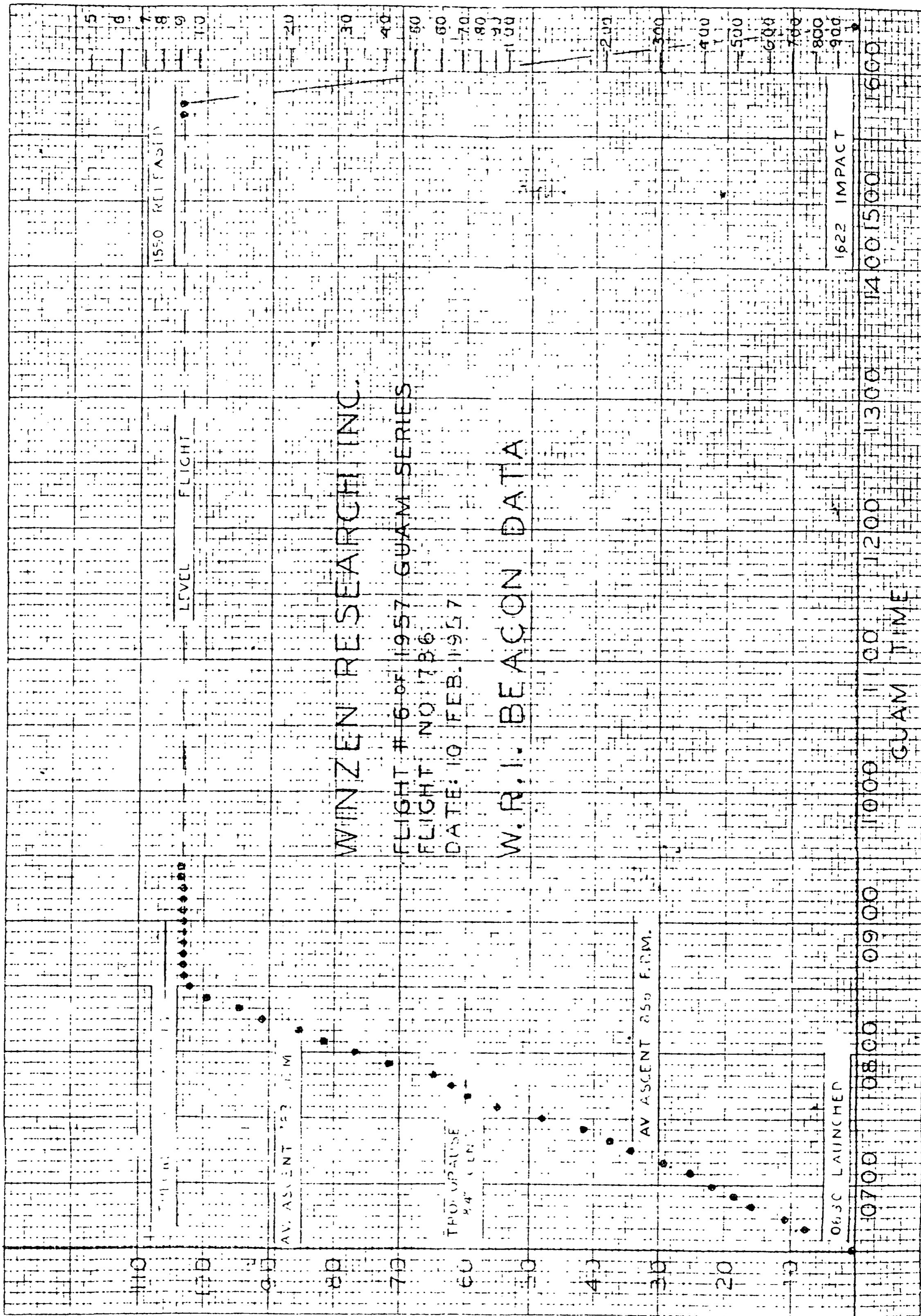
Balloon Landing Site:

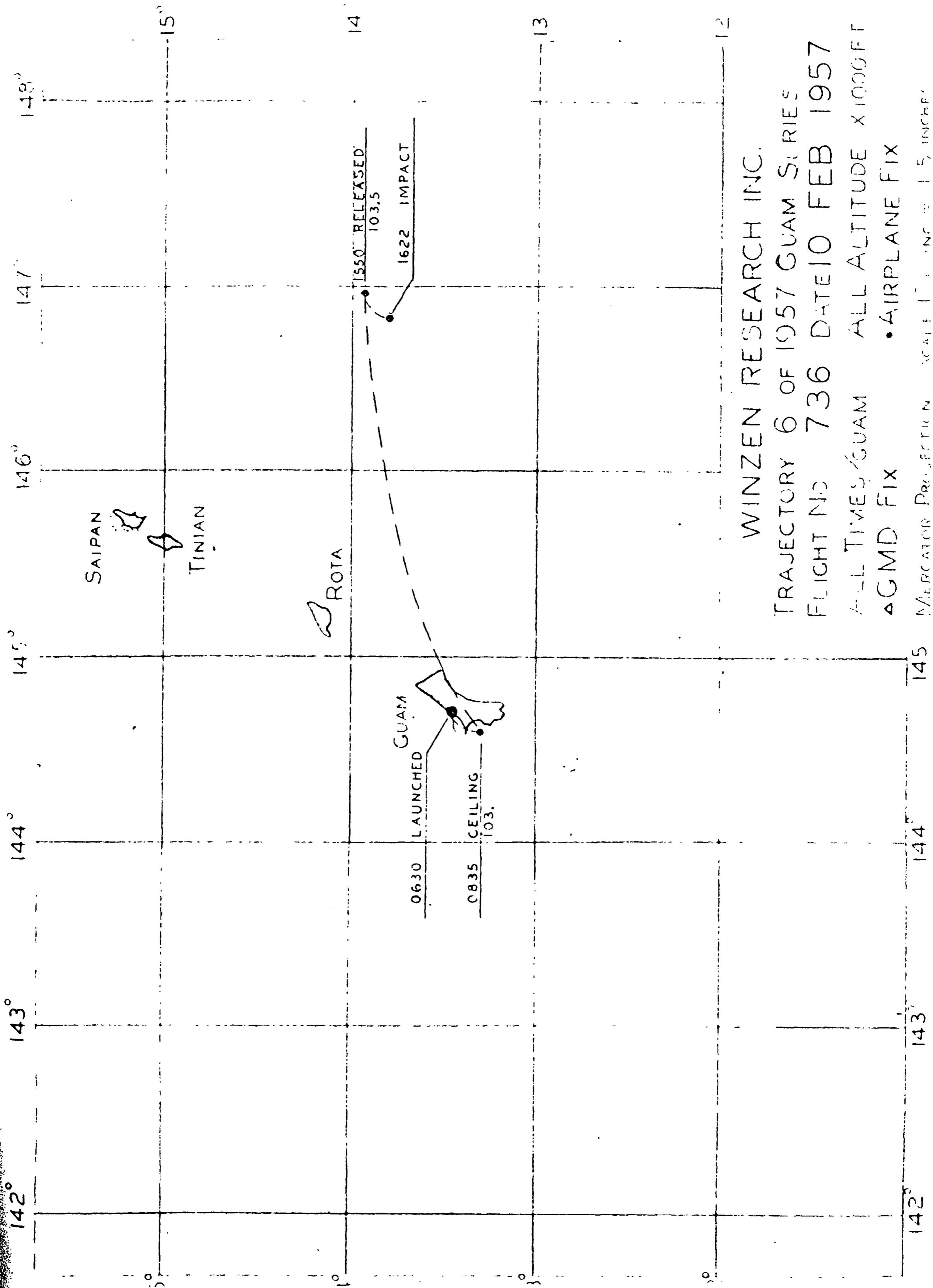
**Unknown**

### FLIGHT RESUME

**Good launch. Excellent flight throughout.**

## PRESSURE IN MILLIBARS





WINZEN RESEARCH INC.

TRAJECTORY 6 OF 1957 GUAM SERIES  
FLIGHT NO. 736 DATE 10 FEB 1957  
FROM TINIAN TO GUAM ALL ALTITUDE X 1000 FT

• AIRPLANE FIX  
△ GMD FIX

MARSHAL ISLANDS POSITION IN LONGITUDINE 15 MILES

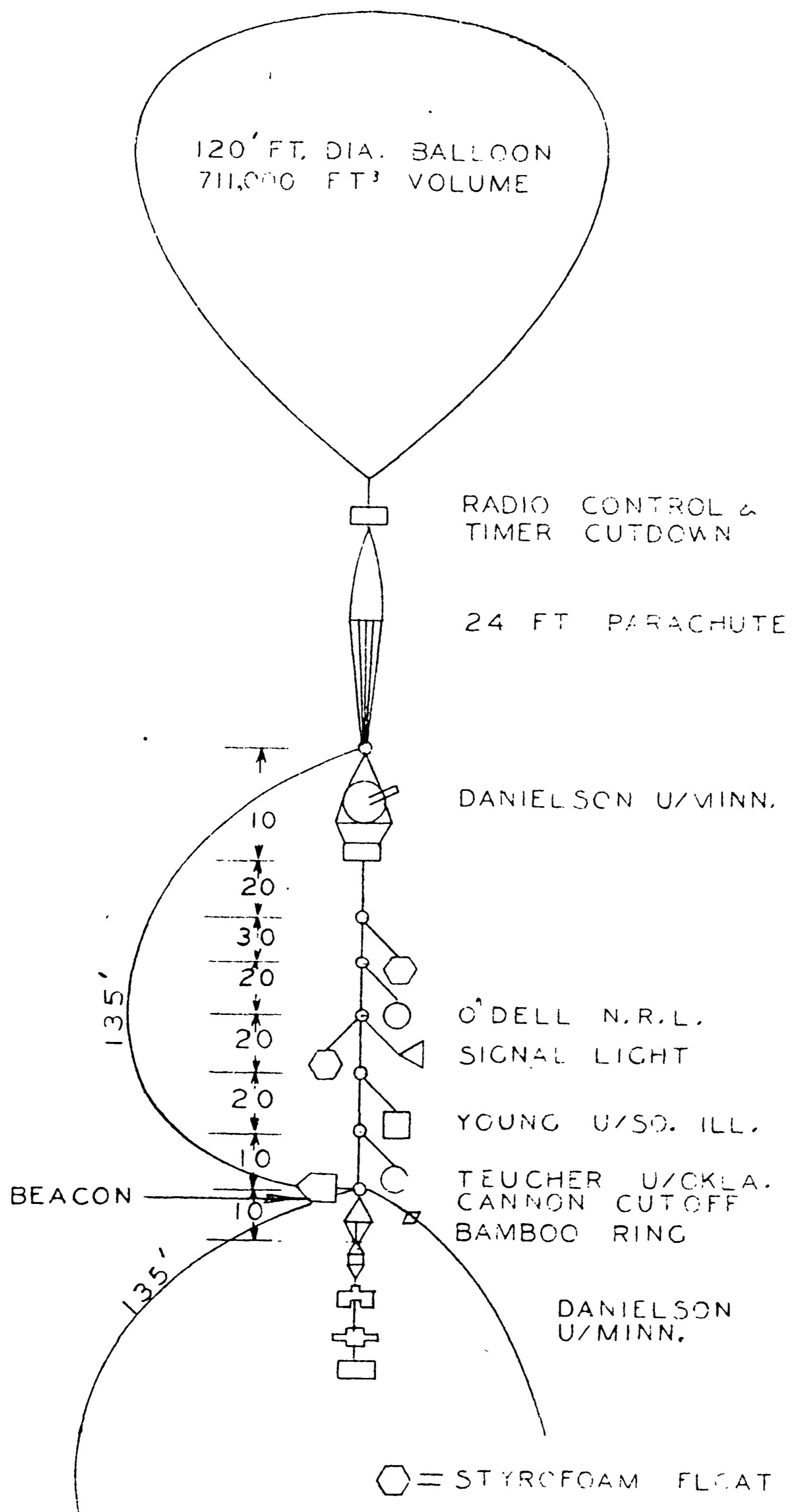


FIG. NO.

LOAD SUSPENSION  
FLIGHT 726

APP.	SCALE NONE	MAT.	NAME

# WINZEN RESEARCH INC.

8401 LYNDALE AVE. SO.  
MINNEAPOLIS, MINNESOTA

## BALLOON FLIGHT REPORT

Flight No. **737**

Date: **10 February 1957**

Time: **1805K**

Project No.: **MA-418**

Flight For: **CNR (Equex '57)**

Scientific Payload: **GMD Counter Equipment**

Weight: **37**

Scientific Purpose: **Gamma Ray Measurement**

Scientific Success: **None**

### BALLOON DATA

Manufacturer: **WRI**

Size: **45' x .0012**

Serial No.: **45-120-V-**

Type: **"FIST" construction, skirt app., reefing sleeve**

Weight: **52**

### LAUNCHING DATA

Launching Site: **#2 launch site, Guam, M. I.**

Launching Method: **Vertical hand**

Wind: **ESE 5-8**

Sky: **3/10 cumulus**

Temperature **84**

Total Payload: **48**

# Free Lift **18** %

# Gross Inflation: **14**

**109**

### FLIGHT DATA

Max. Altitude: **Unknown**

Theoretical Altitude: **84,600**

Flight Duration: **Unknown**

Altitude Maintenance: **---**

Ballast: **None**

Rate of Ascent: **---**

Landing Site: **Unknown**

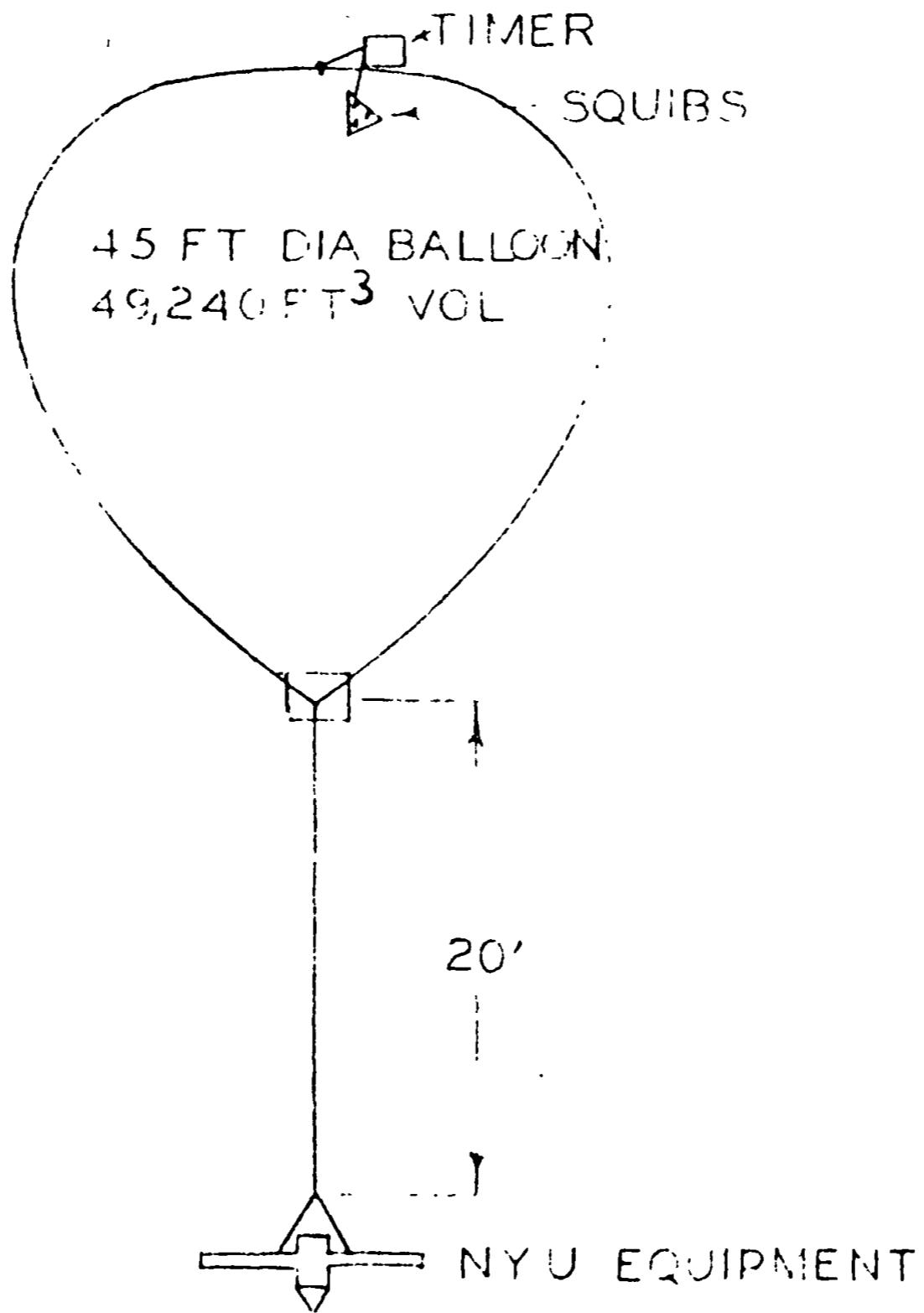
Recovery Time: **---**

Balloon Performance: **Unknown**

Balloon Landing Site: **---**

### FLIGHT RESUME

Due to special requirements, this flight was launched in afternoon. Conditions were far from suitable for a vertical inflation. Scientific equipment (modified GMD transmitter) transmitted intermittently but no readable data received. No flight data available.



LAUNCHED 1605 GUAM/TIME  
10 FEB 1957

ZONE	SCALE	INAT.
ONE	1 NONE	1 1000 FT REC
	2 100 FT REC	3 10 FT REC
	4 10 FT REC	5 1 FT REC
	6 1 FT REC	7 1 FT REC
	8 1 FT REC	9 1 FT REC
	10 1 FT REC	11 1 FT REC
	12 1 FT REC	13 1 FT REC
	14 1 FT REC	15 1 FT REC
	16 1 FT REC	17 1 FT REC
	18 1 FT REC	19 1 FT REC
	20 1 FT REC	21 1 FT REC
	22 1 FT REC	23 1 FT REC
	24 1 FT REC	25 1 FT REC
	26 1 FT REC	27 1 FT REC
	28 1 FT REC	29 1 FT REC
	30 1 FT REC	31 1 FT REC
	32 1 FT REC	33 1 FT REC
	34 1 FT REC	35 1 FT REC
	36 1 FT REC	37 1 FT REC

# WINZEN RESEARCH INC.

8401 LYNDALE AVE. SO.  
MINNEAPOLIS, MINNESOTA

## BALLOON FLIGHT REPORT

Flight No. **738**

Date: **11 February 1957**

Time: **0645K**

Project No.: **NA-418**

Flight For: **CNR (Equex '57)**

Scientific Payload: **Oriented counter equipment**

Weight: **208**

Scientific Purpose: **High altitude exposure**

Scientific Success: **None**

### BALLOON DATA

Manufacturer: **WRI**

Size: **120.8' x .0012"** Serial No.: **120.8-120-V-30**

Type: **"FIST" construction, biconvolute ducts, heat-seal load  
bands** Weight: **260**

### LAUNCHING DATA

Launching Site: **#2 launch site, Guam, M. I.**

Launching Method: **Roller platform**

Wind: **E 3-5**

Sky: **8/10 cumulus**

Temperature **79**

Total Payload:

**304** # Free Lift

**13.1 %**

85 # Gross Inflation:

**649**

### FLIGHT DATA

Max. Altitude: **100,000/105,000 after ballast drop**

Theoretical Altitude: **102,600/104,500**

Flight Duration: **8 hours, 28 minutes**

Altitude Maintenance: **Excellent**

Ballast: **60#**

Rate of Ascent: **800 FPM**

Landing Site: **14°06'N 148°49'E**

Recovery Time: **1745K**

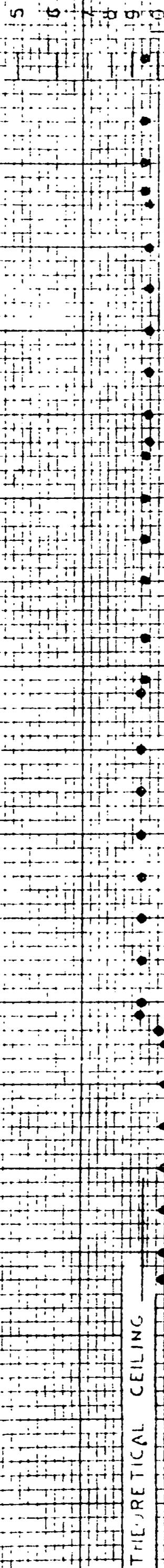
Balloon Performance: **Excellent**

Balloon Landing Site: **Unknown**

### FLIGHT RESUME

Good launch and flight. Electronic failure in scientific equipment made flight scientific failure.

PRESSURE IN MILIBARS



AV. ASCENT 683 F.P.M.

WINZEN RESEARCH INC

FLIGHT NO. 738 OF 1957 GUAM SERIES

DATE 11 FEB 1957

W.R.L. BEACON DATA

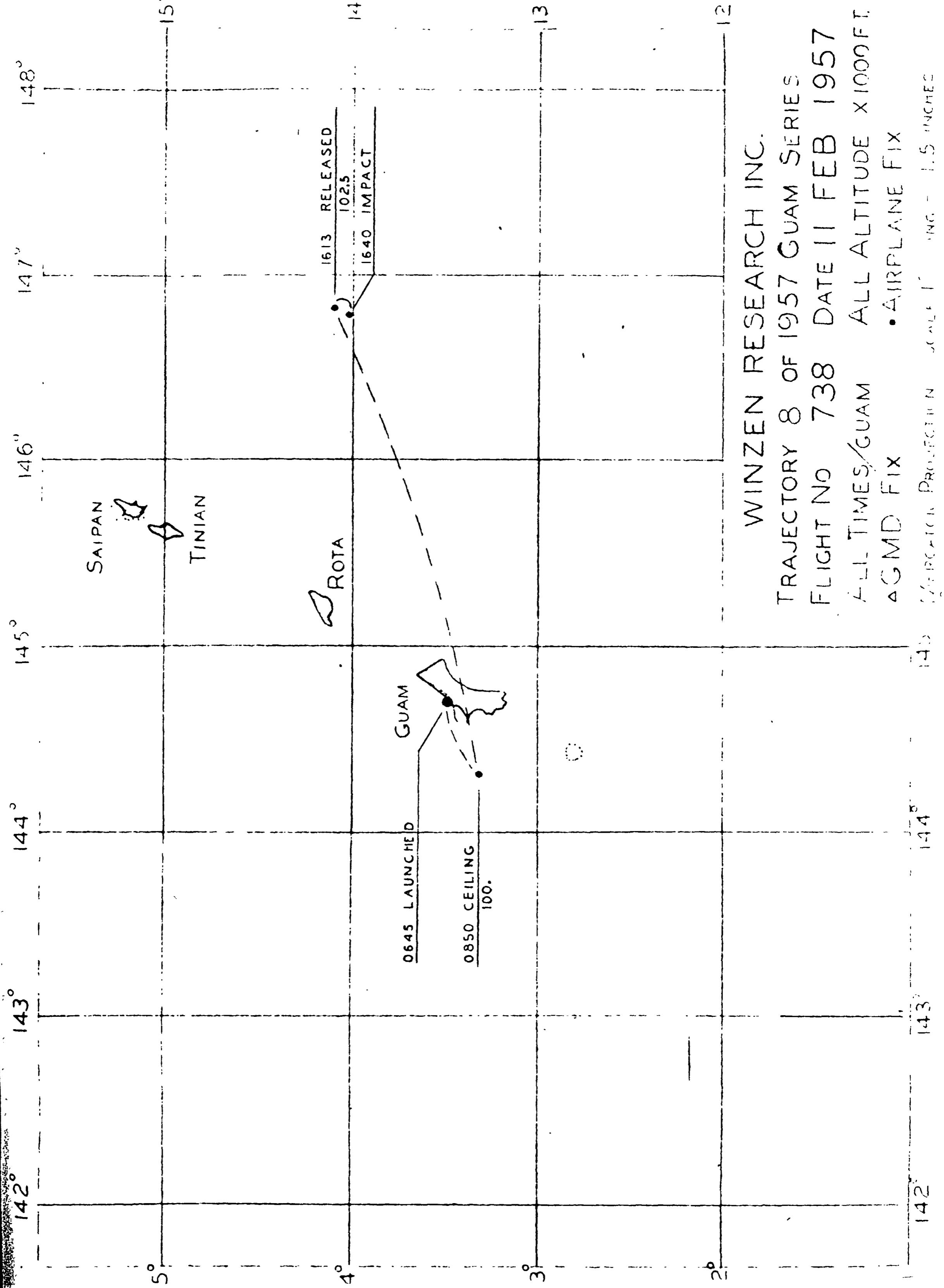
TROPOLPAUSE  
W7.5 CEN.

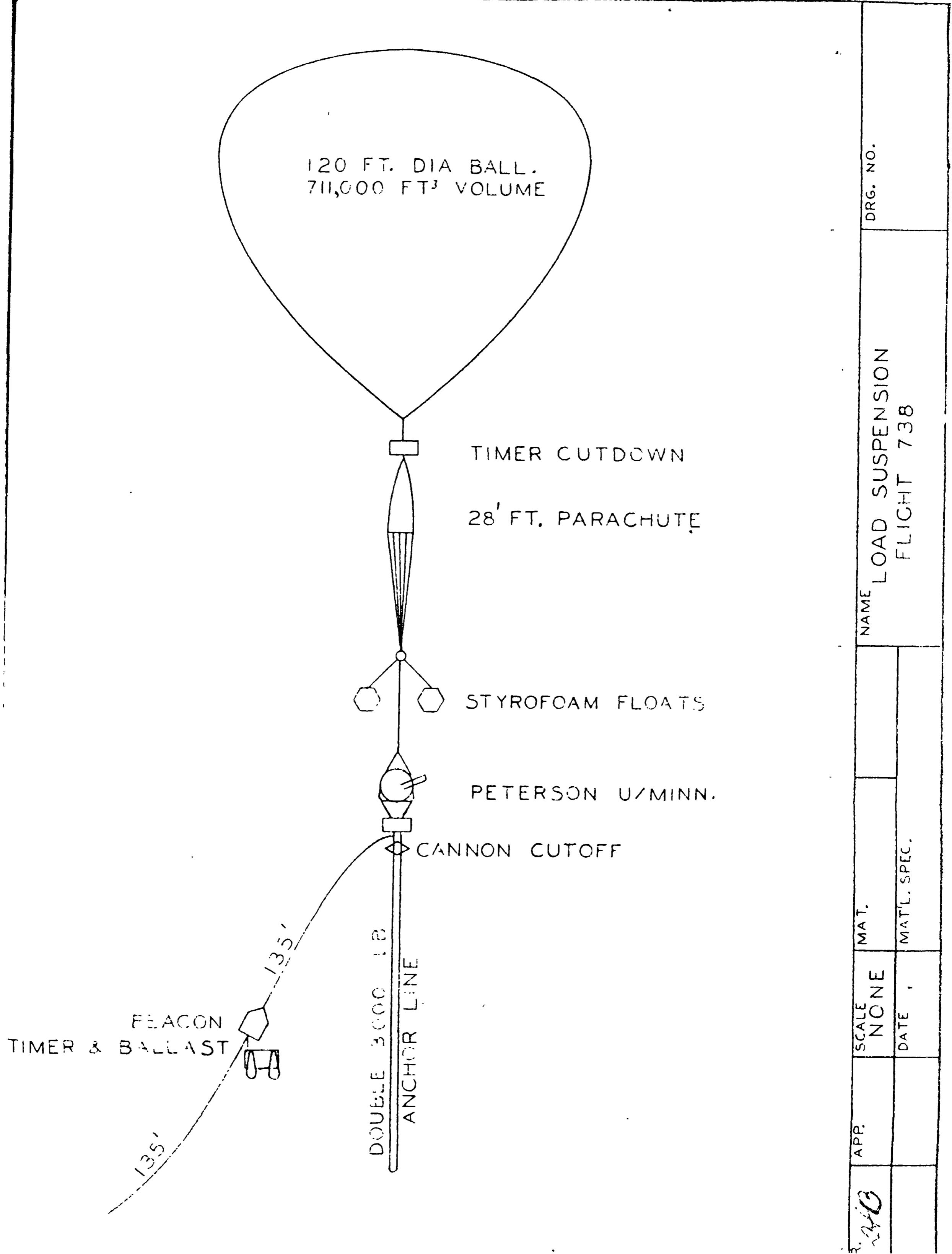
AV. ASCENT 909 F.P.M.

0645 LAUNCHED

0705 0800 0900 1000 1100 1200 1300 1400 1500 1600

GUAM TIME  
1640 IMPACT





# WINZEN RESEARCH INC.

8401 LYNDALE AVE. SO.  
MINNEAPOLIS, MINNESOTA

## BALLOON FLIGHT REPORT

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Flight No. **789** Date: **12 February 1957** Time: **0625K**  
Project No.: **NA-418** Flight For: **CNR (Equex '57)**  
Scientific Payload: **Photo Plate Packages** Weight: **219**  
Scientific Purpose: **High altitude exposure**  
Scientific Success: **Good**

---

### BALLOON DATA

Manufacturer: **WRI** Size: **120.8' x .001** Serial No.: **120.8-100-V-31**  
Type "FIST" construction, bicornuate ducts, heat-seal lead  
bands Weight: **222**

---

### LAUNCHING DATA

Launching Site: **#2 launch site, Guam, M. I.** Launching Method: **Roller platform**  
Wind: **ENE 3-5** Sky: **5/10 cumulus** Temperature **78**  
Total Payload: **265** # Free Lift **14.2%** # Gross Inflation: **80** # **565**

---

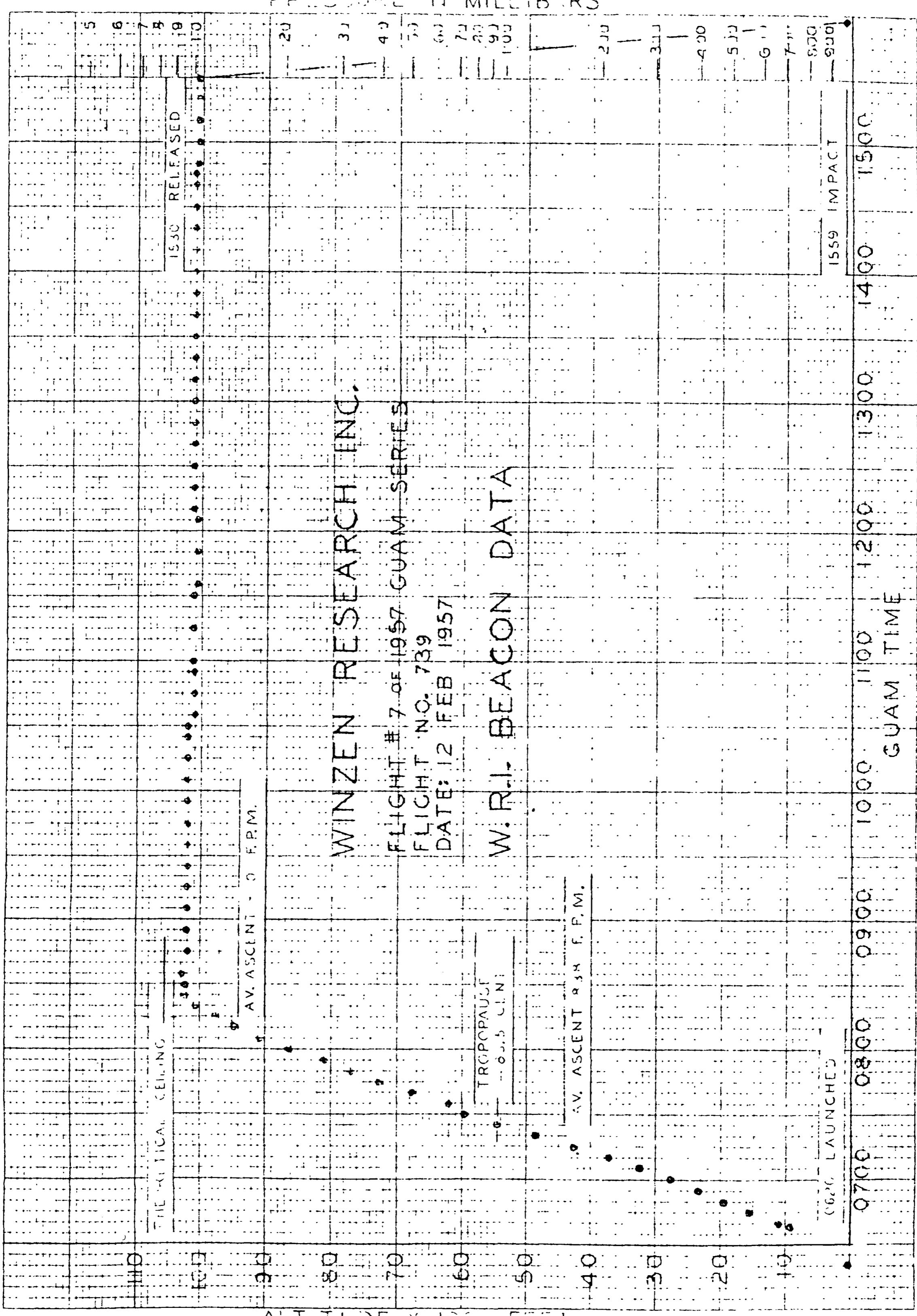
### FLIGHT DATA

Max. Altitude: **102,500** Theoretical Altitude: **105,500**  
Flight Duration: **9 hours, 5 minutes** Altitude Maintenance: **Excellent**  
Ballast: **None** Rate of Ascent: **820 FPM**  
Landing Site: **13°20'N 148°25'E** Recovery Time: **1612K**  
Balloon Performance: **Excellent** Balloon Landing Site: **Unknown**

---

### FLIGHT RESUME

**Excellent launch and flight.**



### WINZEN RESEARCH INC.

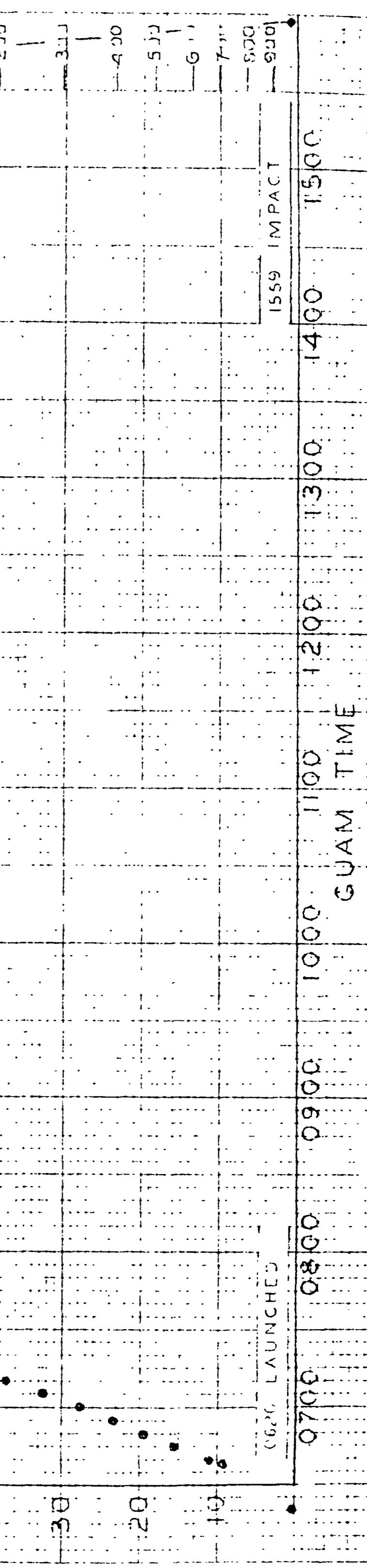
FLIGHT # 7 OF 1957 GUAM SERIES

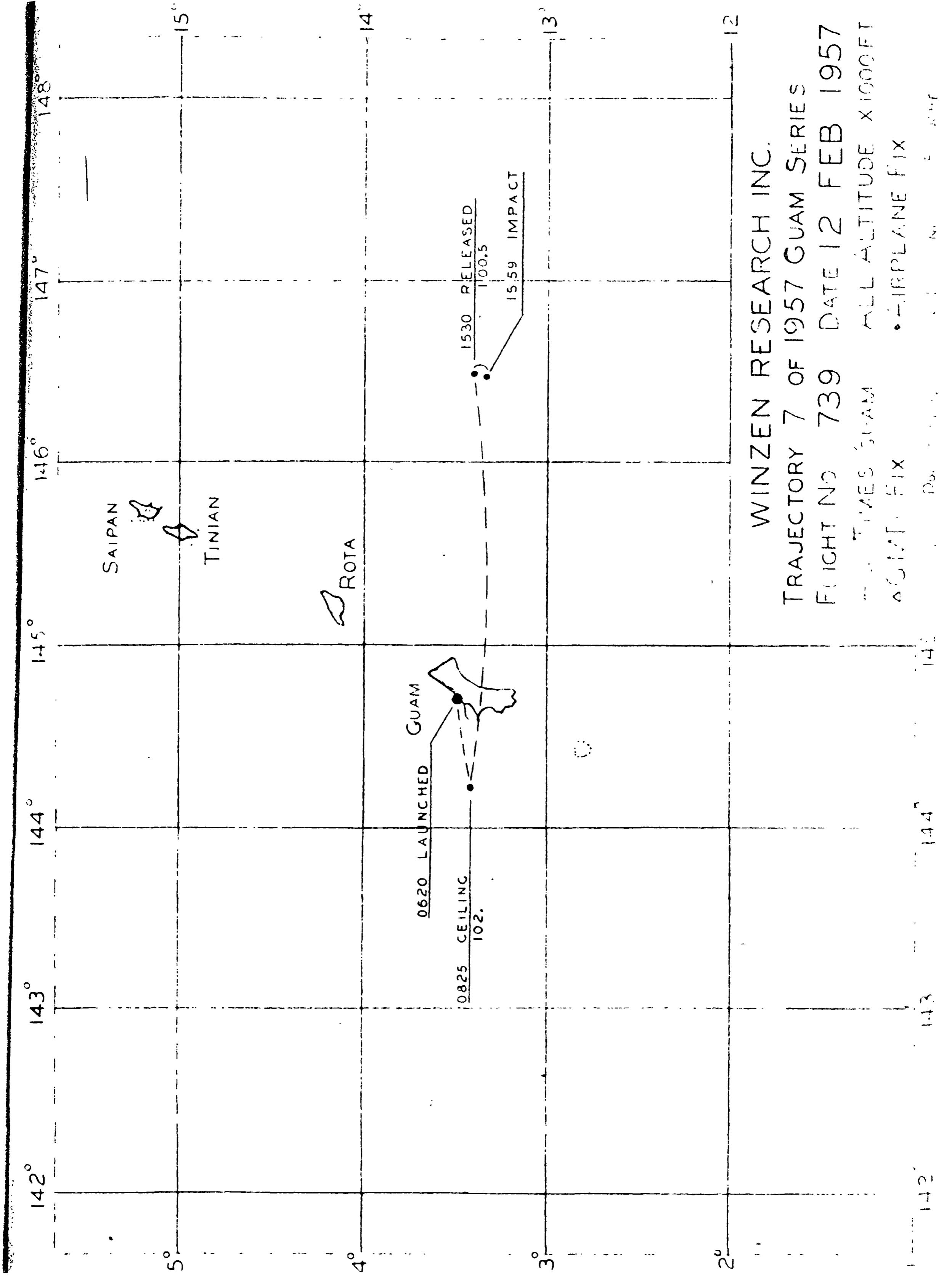
FLIGHT NO. 739

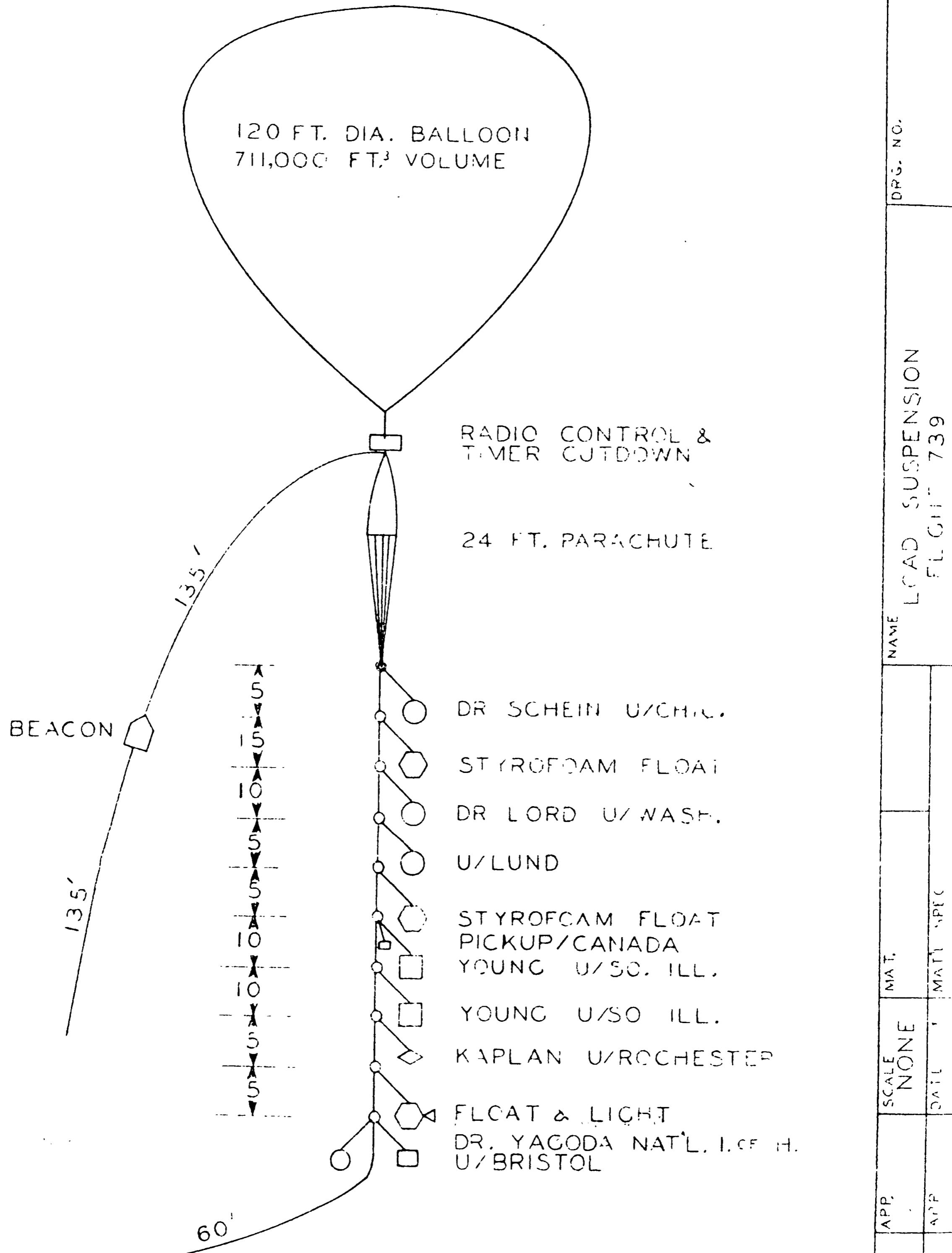
DATE: 12 FEB 1957

### W. R. I. BEACON DATA

AV. ASCENT 034 F.M.  
TRIGGERED  
6000 FT  
AV. ASCENT 034 F.M.







## WINZEN RESEARCH INC.

8401 LYNDALE AVE. SO.  
MINNEAPOLIS, MINNESOTA

## BALLOON FLIGHT REPORT

Flight No. 740

Date: 13 February 1957

Time: 0610

Project No.: NA-418

Flight For: OMR (Equex '57)

Scientific Payload: Various Plate Packages

Weight: 184

Scientific Purpose: High altitude exposure

Scientific Success: Good

## BALLOON DATA

Manufacturer: WRI

Size: 172.6' x .0075

Serial No.: 172.6-075-Y-30

Type: "FIST" construction, biconvolute ducts, 1, #load bands

Weight: 552

(65)

## LAUNCHING DATA

Launching Site: #2 launch site, G usm, N. I.

Launching Method: Roller platform

Wind: ENE 2-3

Sky: 2/10 cumulus

Temperature 78

Total Payload:

284

# Free Lift

14

%

100

# Gross Inflation:

716

## FLIGHT DATA

Max. Altitude: 116,000

Theoretical Altitude: 122,900

Flight Duration: 3 hours, 9 minutes

Altitude Maintenance: Excellent

Ballast: None

Rate of Ascent: 972 FPM

Landing Site: 15°18'N 143°45'E

Recovery Time: 1700K

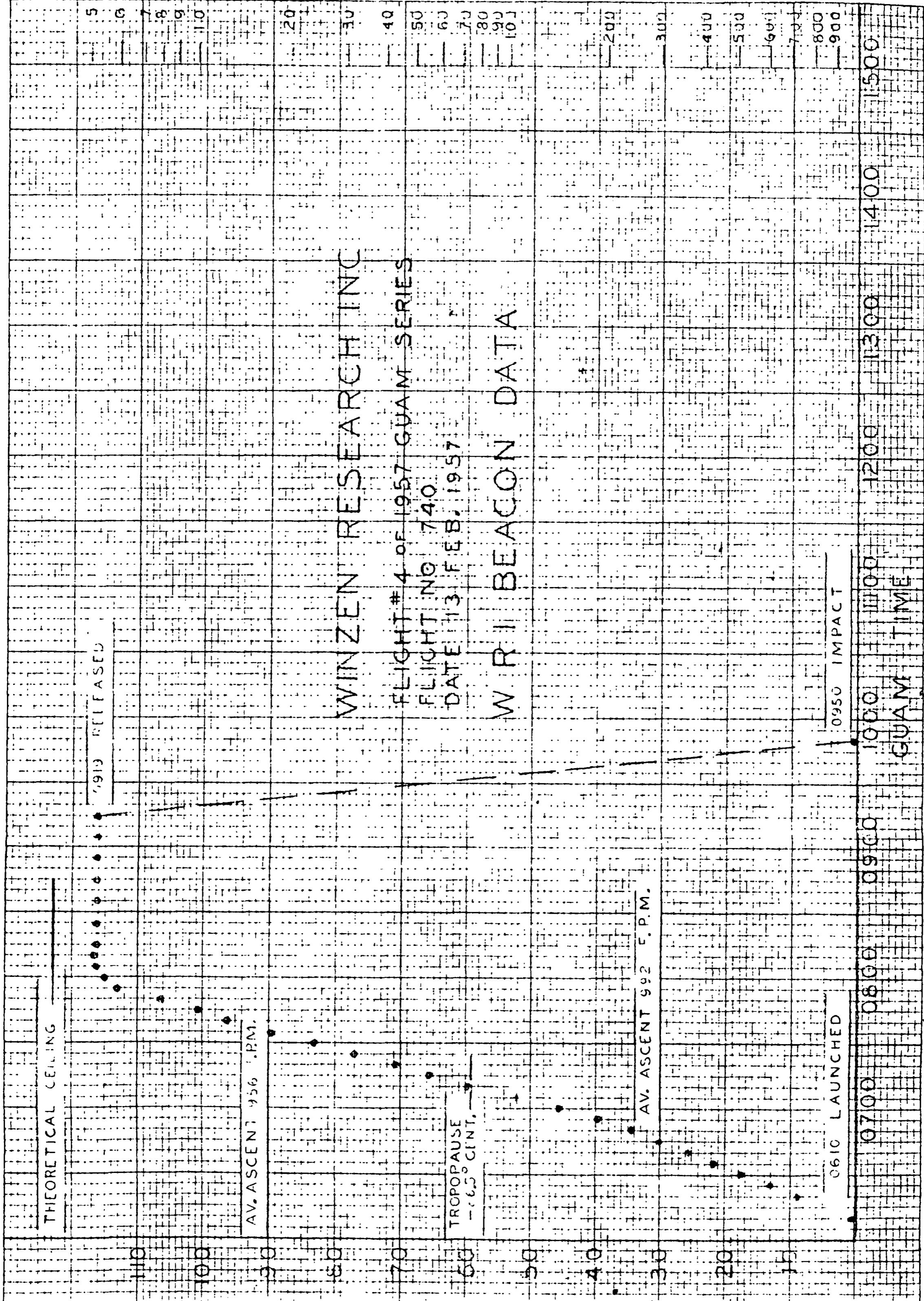
Balloon Performance: Excellent

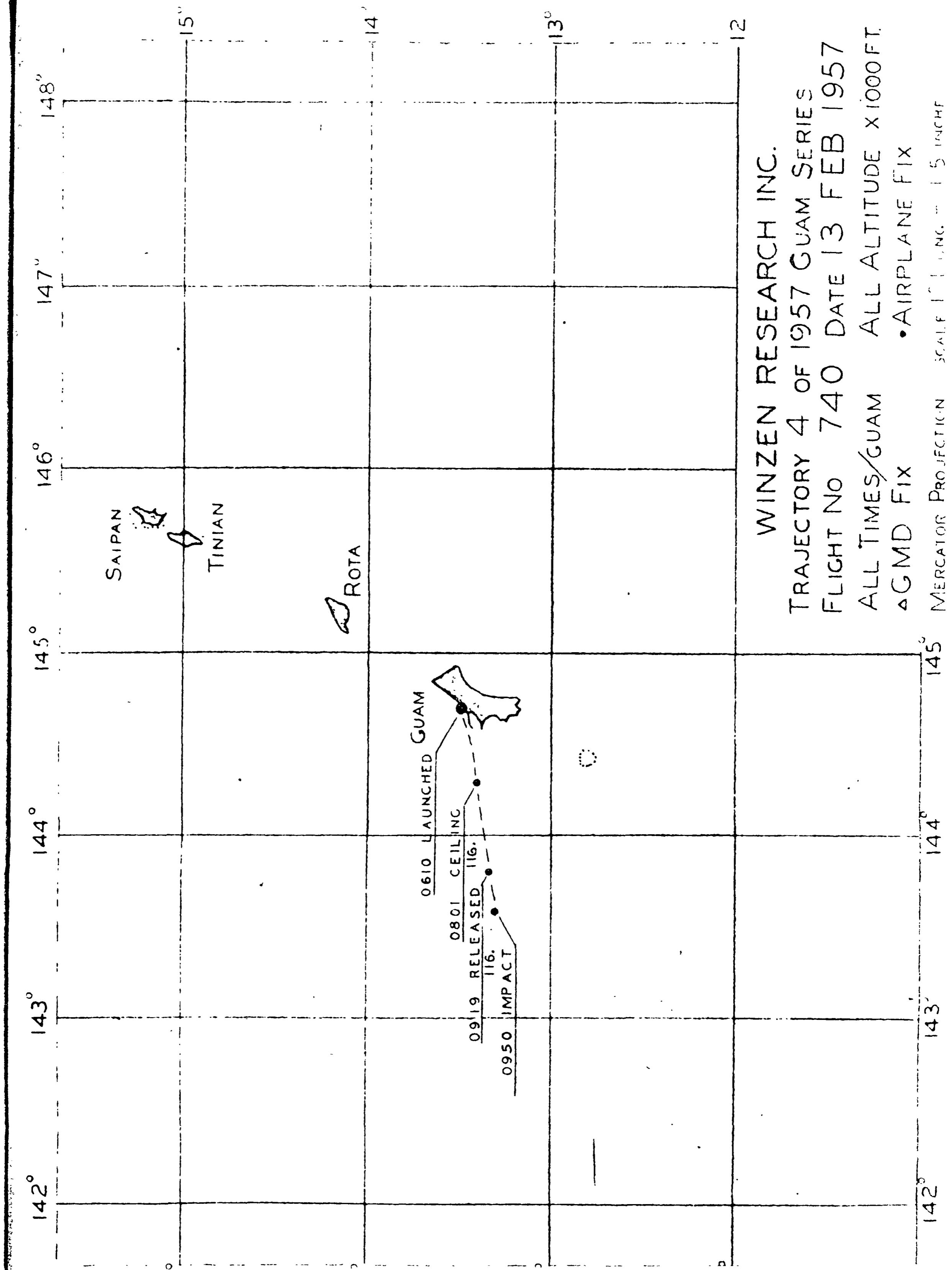
Balloon Landing Site: Unknown

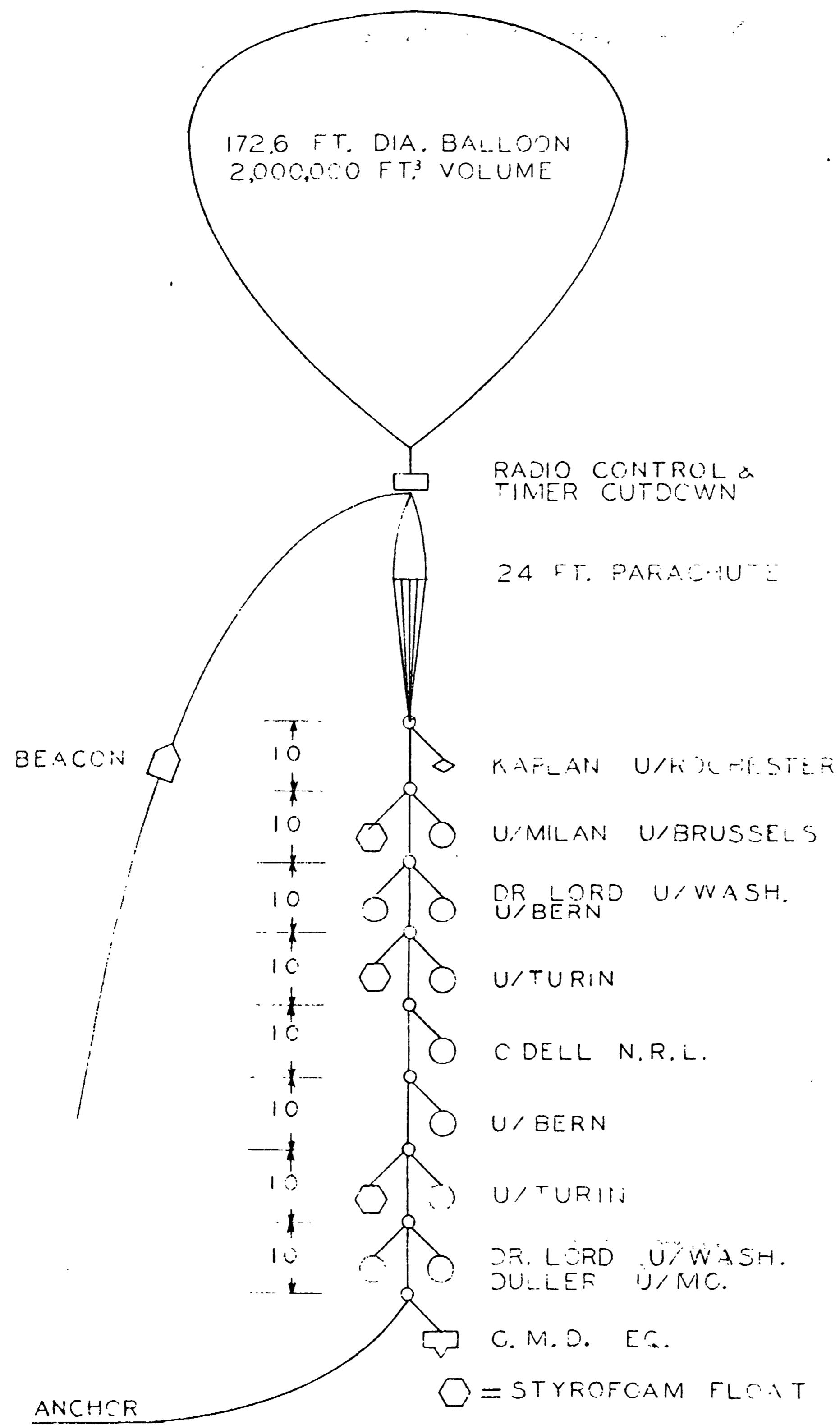
## FLIGHT RESUME

Excellent launch. Despite rather high rate of rise and exposure to temperatures below the cold brittleness temperature of -70°C (from 49,300' to 67,900') with a tropopause temperature of -86.5° at 76 mb, the balloon rose to a maximum altitude of 116,000 feet and floated until load was released by radio control at 0930K. Load was released early to facilitate recovery. Winds at ceiling had shifted 180° from previous day. Recovery vessel despatched from harbor was losing ground as flight travelled west at 60 knots. Despite early release, it was not until 1700K that the load was retrieved.

## PRESSURE IN MILLIBARS







DIRG. NO.

L CAD SUSPENSION  
FLIGHT 74 C

NAME

APP	SCALE NONE	MAT.
APP	DATE	MAT'L. SPEC.

# WINZEN RESEARCH INC.

8401 LYNDALE AVE. SO.  
MINNEAPOLIS, MINNESOTA

## BALLOON FLIGHT REPORT

Flight No. 741

Date: 13 February 1957

Time: 0715K

Project No.: NA-419

Flight For: SUI (Cahill)

Scientific Payload: "LOKI" Rocket

Weight: 42

Scientific Purpose: Performance test, modified nose cone

Scientific Success:

### BALLOON DATA

Manufacturer: WRI

Size: 45' x .0012

Serial No.: 45-120-V-195

Type: "FIST" construction, skirt app., 1, heat-seal load bands, Weight: 52  
~~reefing sleeve~~

### LAUNCHING DATA

Launching Site: #2 launch site, Guam, M. I.

Launching Method: Vertical hand

Wind: E 1-3

Sky: Clear

Temperature 78

Total Payload:

95 # Free Lift 13.4%

22 # Gross Inflation:

167

### FLIGHT DATA

Max. Altitude: 74,000 app.

Theoretical Altitude: 75,800

Flight Duration: Unknown

Altitude Maintenance: Good

Ballast: None

Rate of Ascent: Unknown

Landing Site: Unknown

Recovery Time: —

Balloon Performance: Excellent

Balloon Landing Site: Unknown

### FLIGHT RESUME

Good launch, good flight. Attempts to fire rocket by radio control futile, probably due to orientation blocking device in firing circuit.

ERG. NO.

LCAP SUSPENSION

F-1C4774

NAME

LAUNCHED AT 0715 JUAN TIME  
13 FEB 1957

SCALE

NAME

CONE

45 FT. DIA. BALLOON  
49240 FT<sup>3</sup> VOL

TIMER & CUTOFF  
--- 30 LBS RALLANT  
GND UNIT

70'

LOKI ROCKET

RADIO CONTROL RCVR

35'

--- ANTENNA

# WINZEN RESEARCH INC.

8401 LYNDALE AVE. SO.  
MINNEAPOLIS, MINNESOTA

## BALLOON FLIGHT REPORT

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Flight No. 742 Date: 20 February 1957 Time: 0842K  
Project No.: MA-418 Flight For: CNR (Equinox '57)  
Scientific Payload: Various types of cosmic ray equipment Weight: 674  
Scientific Purpose: High altitude exposure  
Scientific Success: Good

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### BALLOON DATA

Manufacturer: WRI Size: 172.6' x .002" Serial No.: 172.6-200-v-7  
Type: "FIST" construction, biconvolute ducts, heat-seal load Weight: 975  
~~bands on seam and fold~~

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### LAUNCHING DATA

Launching Site: #2 launch site, Guam, M. I. Launching Method: Roller platform  
Wind: ENE 5 Sky: 5/10 cumulus Temperature: 77  
Total Payload: 626 # Free Lift 14.8 % 280 # Gross Inflation: 1881

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### FLIGHT DATA

Max. Altitude: 99,600 Theoretical Altitude: 102,500  
Flight Duration: 5 hours, 50 minutes Altitude Maintenance: Excellent  
Ballast: None Rate of Ascent: 592 FPM  
Landing Site: 14°55'N 146°58'E Recovery Time: 1710K  
Balloon Performance: Excellent Balloon Landing Site: Near load

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### FLIGHT RESUME

Good launch and flight. Extremely long load line with heaviest load at bottom due to special lead requirements made launch rather difficult.

