General Mills, Inc.
Mechanical Division

ENGINEERING RESEARCH & DEVELOPMENT DEPARTMENT

2003 EAST HENNEPIN AVENUE
MINNEAPOLIS 13, MINN.

8268 MD-2

FINAL REPORT

CONTRACT NO. Nonr 875(00)

Annex IX

4 April 1954

Prepared for

The Office of Naval Research
Washington, D. C.

Report No. 1303

Prepared by : Keith C. Giles

Approved by:

C. Brunetti

Cledo Brunetti, Director

GENERAL MILLS, INC.
Mechanical Division
ENGINEERING RESEARCH AND DEVELOPMENT
2003 E. Hennepin
Minneapolis 13, Minn.

I. AIMS

On 1 April 1953, Contract Nonr 875(00) between General Mills, Inc. and the Office of Naval Research was amended to provide for the execution of shipboard balloon flights during the summer of 1953 at northerly latitudes. Plastic balloons were used to hoist Deacon rockets with scientific equipment housed in the warhead. The scientific payloads were supplied by the Naval Research Laboratory and Iowa State University. General Mills, Inc. supplied "Skyhook" balloons, balloon controls and safety equipment. Engineering services for launching and telemetering altitude information were also supplied by General Mills technical personnel.

II. WORK ACCOMPLISHED

The project consisted of two series of launchings from ice-breakers, one series from the U.S.S. Staten Island and the other from the U.S.C.G.C. Eastwind. In general, the series of launchings from the U.S.S. Staten Island were made between Boston, Mass. and Thule, Greenland, from the middle of July to the middle of August, 1953. The series of launchings from the U.S.C.G.C. Eastwind were made the last of August and the first of September between the Straits of Belle Isle and Boston. Specific launch positions are tabulated in the next section.

General Mills balloons were used as vehicles to carry rockets to high altitudes before being fired.

Two types of balloons were used, a 55 foot balloon for all the Iowa State University flights and a 68 foot balloon for the Naval Research Laboratory flights. All flights carried the following equipment:

1. Balloon control instruments, including safety timers and descent switches.

2. Radiosonde, AN/AMT-7A, for telemetering altitude.

3. Deacon rocket.

4. Firing unit for rocket.

5. Scientific payload in warhead of rocket.

The Iowa State University flights carried cosmic ray equipment in the rocket warhead and the Naval Research Laboratory flights were instrumented to measure physical properties of the upper atmosphere.

In the first series, 10 flights were made for Iowa State University, and 4 flights for the Naval Research Laboratory. In the second series, 6 flights were made for Iowa State University and 2 for the Naval Research Laboratory. Of this total of 22 flights, 5 were not successful as a result of failures of the rockets to ignite. One balloon failed prematurely, and on 2 flights the rockets failed to fire but the cause of failure was unknown, and may have included faulty timers.

Except for the Iowa State University flights on the U.S.S. Staten Island series, for which no altitude data are available, the flight data are presented in the next section.

It is hoped that the scientific payload performed satisfactorily and that the entire operation met with success. General Mills, Inc. is happy to have had the opportunity of working with the Office of Naval Research and Iowa State University in carrying out these experiments.

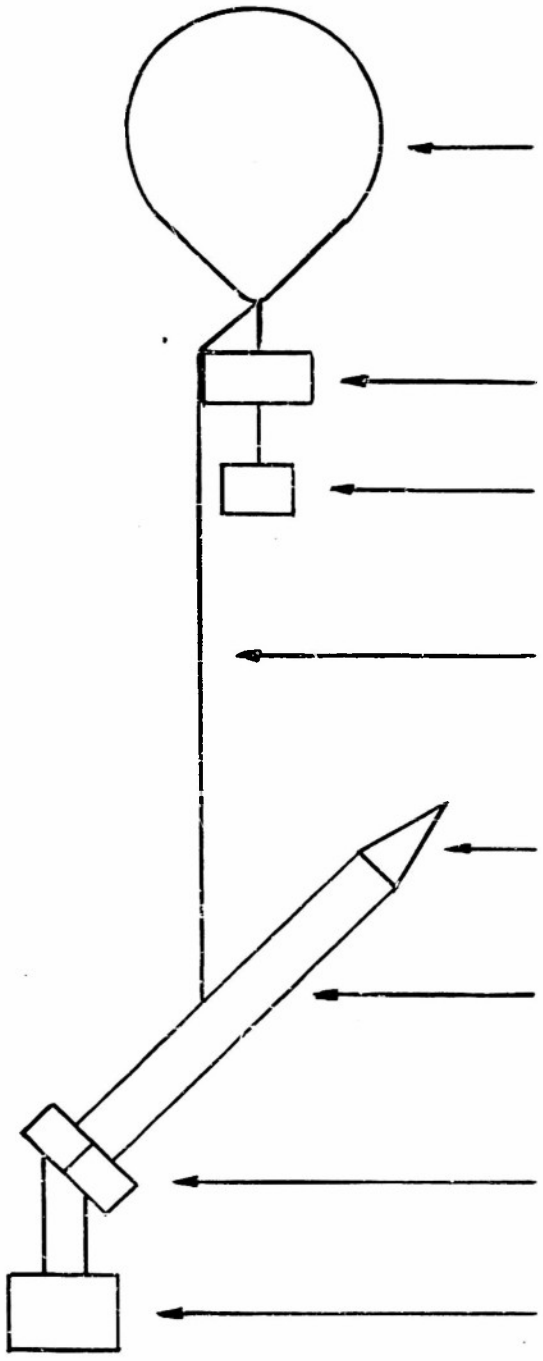
Flights from U. S. S. Staten Island

Flight No.	Date	Time	Launch Position
1011	18 July	2327Z	42-26.2 N, 70-22 W
1012	19 July	2330Z	43-04 N, 65-07 W
1013	19 July	1653Z	43-41 N, 63-28.5 W
1014	19 July	2257Z	44-16 N, 62-09.5 W
1015	24 July	1640Z	58-32.5 N, 61-55 W
1016	28 July	0941Z	62-30.5 N, 64-13.5 W
1017	3 August	1828Z	62-45 N, 66-15 W
1018	5 August	2154Z	62-04 N, 63-55 W
1019	6 August	1507Z	64-20 N, 59-06 W
1020	6 August	1840Z	65-13 N, 58-35 W
1021	8 August	1509Z	73-37 N, 61-37 W
1022	9 August	0554Z	74-23 N, 71-56 W
1023	9 August	0915Z	74-29 N, 73-31 W
1024	11 August	1709Z	74-34 N, 94-29 W

Flights from U.S.C.G.C Eastwind

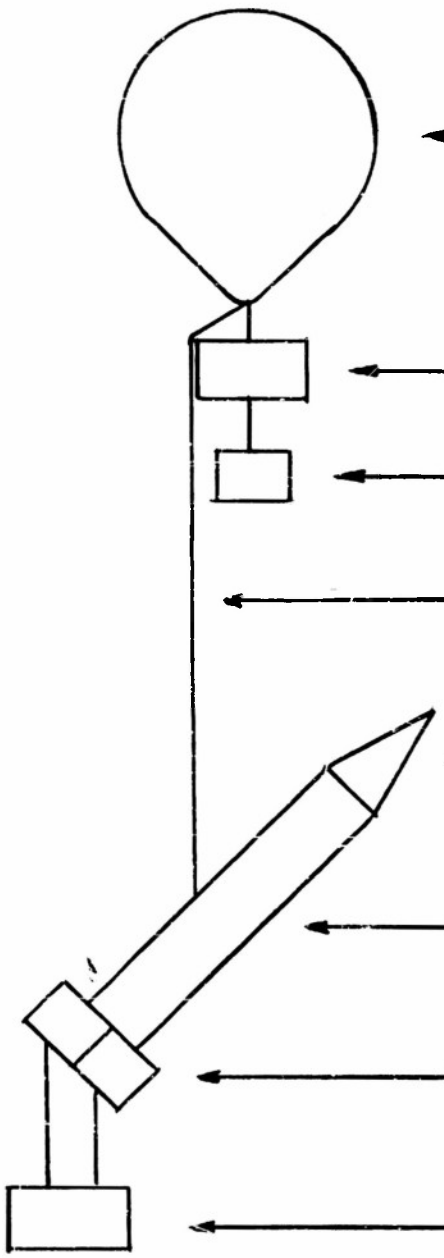
1025	30 August	1400Z	53-06 N, 55-05 W
1026	30 August	1620Z	52-47 N, 55-24 W
1027	30 August	2046Z	53-08 N, 54-45 W
1028	3 September	0950Z	44-50 N, 57-13 W
1029	3 September	1151Z	44-45 N, 57-10 W
1030	3 September	1405Z	44-33 N, 57-03 W
1031	4 September	0359Z	43-30 N, 59-20 W
1032	4 September	1551Z	43-00 N, 62-30 W

TYPICAL NAVAL RESEARCH LABORATORY TYPE FLIGHT

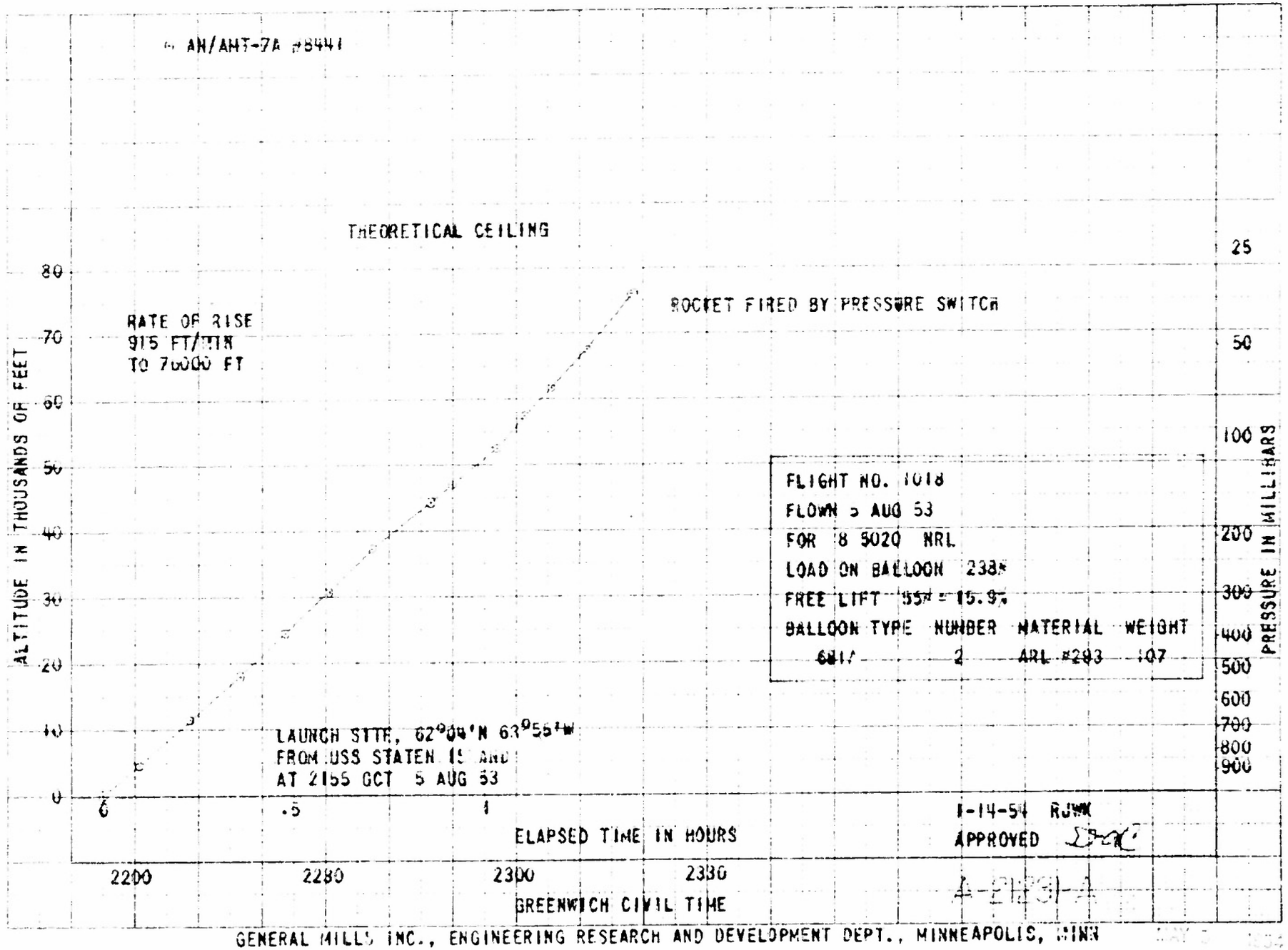


68 foot balloon	100 lbs.
Instrument Bag	6.75
Radiosonde (AN/AMT-7A)	3.50
100 ft. Nylon Line with hook	4.30
Warhead	51.00
Rocket	150.50
Tail Fins	16.00
Firing Unit	6.00
Total Equipment Weight	238.05 lbs.
Gross Load	338.05
Free Lift	55.00
Gross Lift	393.05 lbs.

TYPICAL IOWA STATE UNIVERSITY TYPE FLIGHT



55 foot Balloon	67.75 lbs.
Instrument Bag	6.75
Radiosonde (AN/AMT-7A)	3.50
100 ft. Nylon Line with Hook	4.30
Warhead	32.00
Rocket Body	150.50
Tail Fins	16.00
Firing Unit	12.50
Total Equipment Weight	225.55 lbs.
Gross Load	293.30
Free Lift	30 to 40 lbs.
Gross Lift	323 to 333 lbs.


AN/AMT-7A #8441
THEORETICAL CEILING
ROCKET FIRED BY PRESSURE SWITCH
RATE OF RISE
915 FT/MIN
TO 70000 FT
FLIGHT NO. 1018
FLOWN 5 AUG 53
FOR 8 5020 NRL
LOAD ON BALLOON 2385
FREE LIFT 55# = 15.9%
BALLOON TYPE NUMBER MATERIAL WEIGHT
6817 2 ARL #293 107
LAUNCH SITE, 62°04'N 63°55'W
FROM USS STATEN IS AND
AT 2155 GCT 5 AUG 53
ALTITUDE IN THOUSANDS OF FEET
PRESSURE IN MILLIBARS
ELAPSED TIME IN HOURS
GREENWICH CIVIL TIME
1-14-54 RJWK
APPROVED
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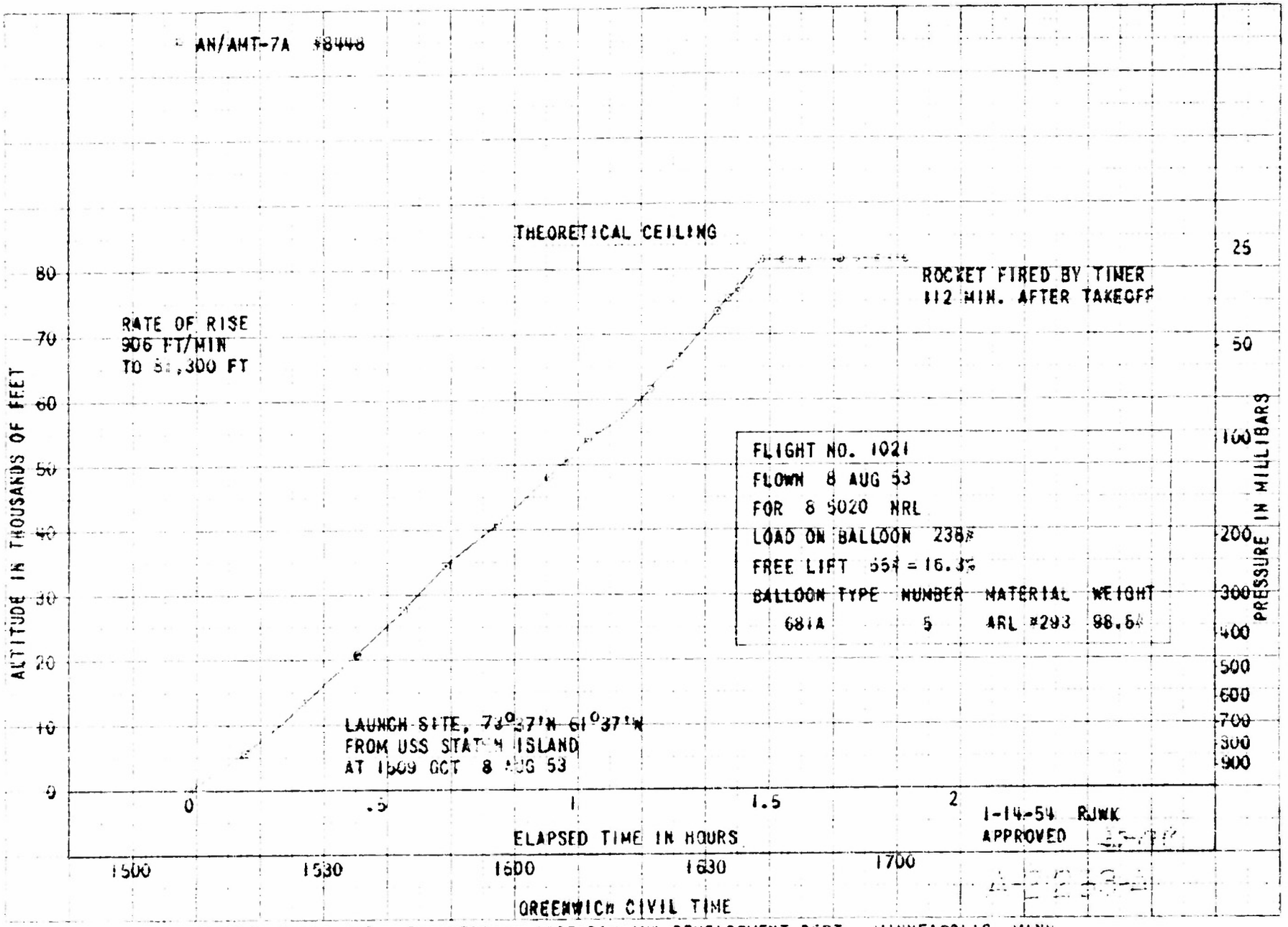

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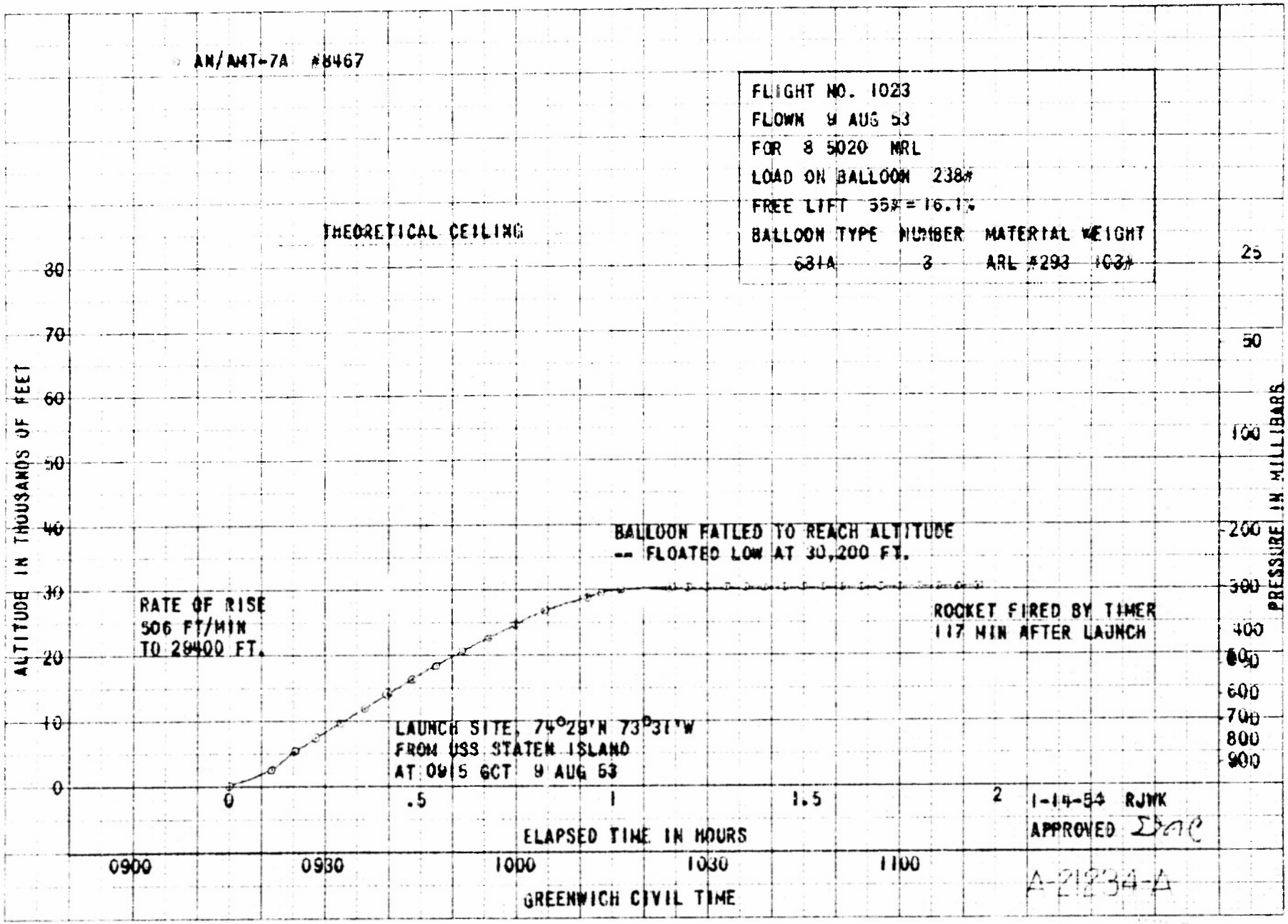

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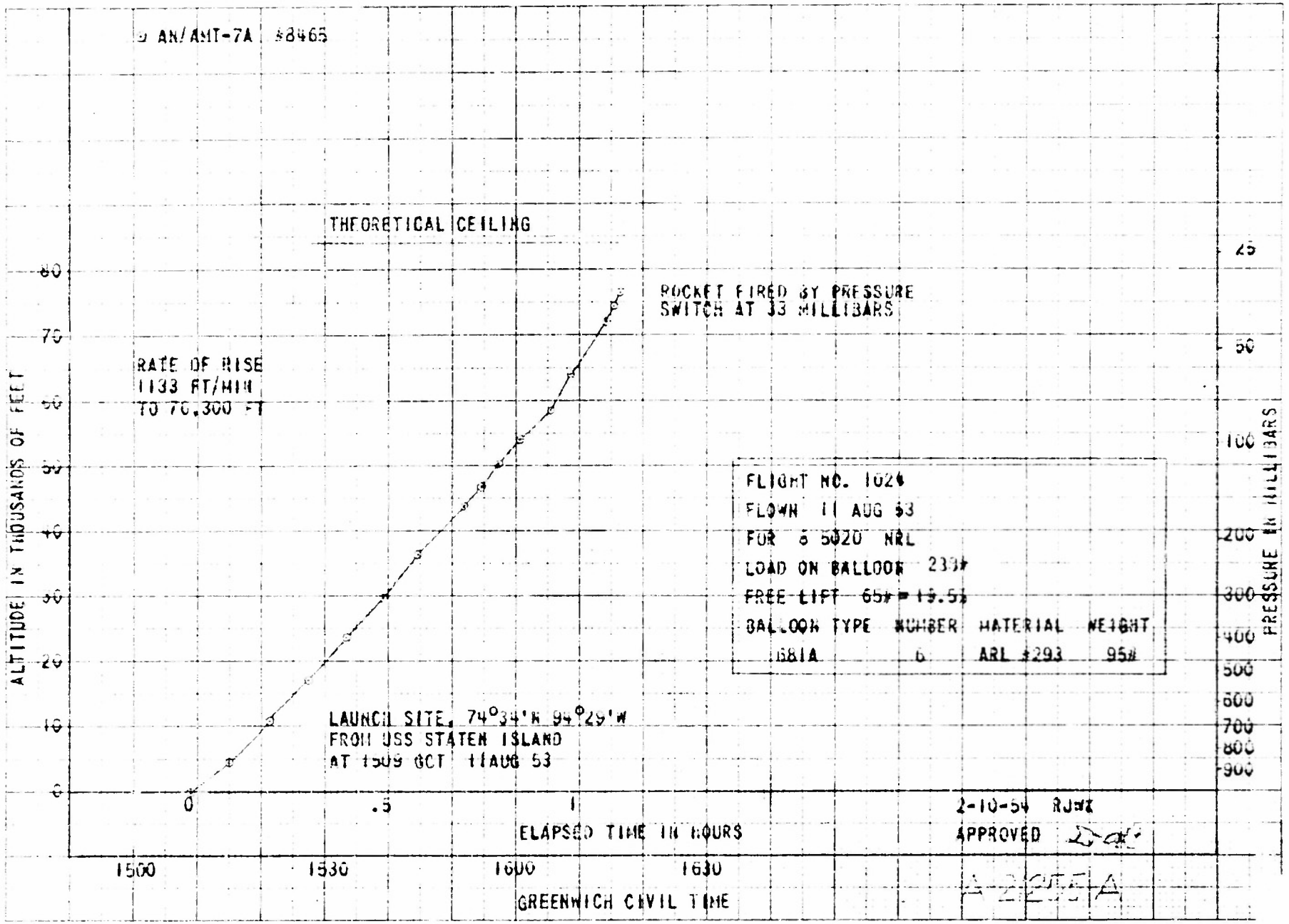

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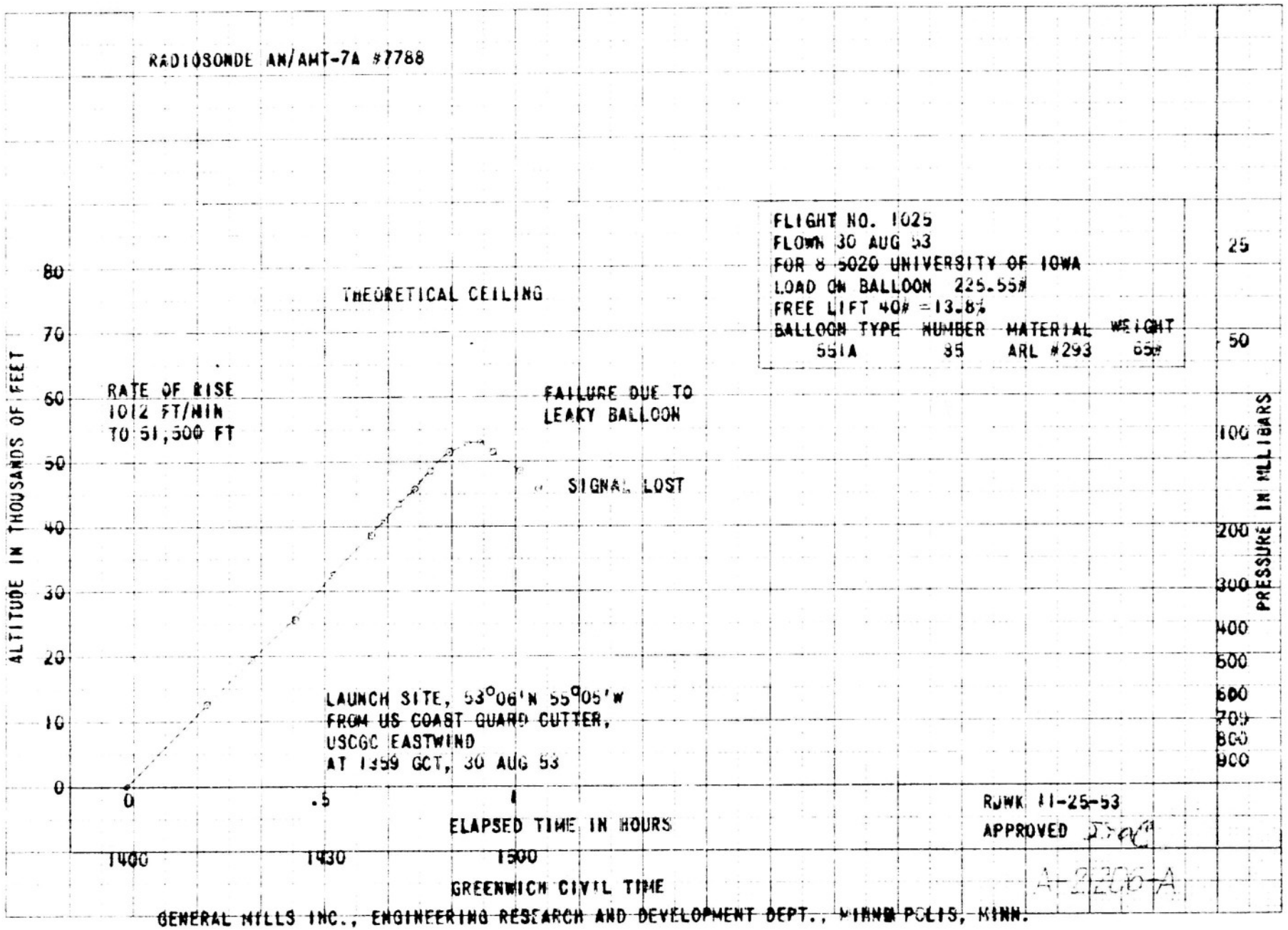

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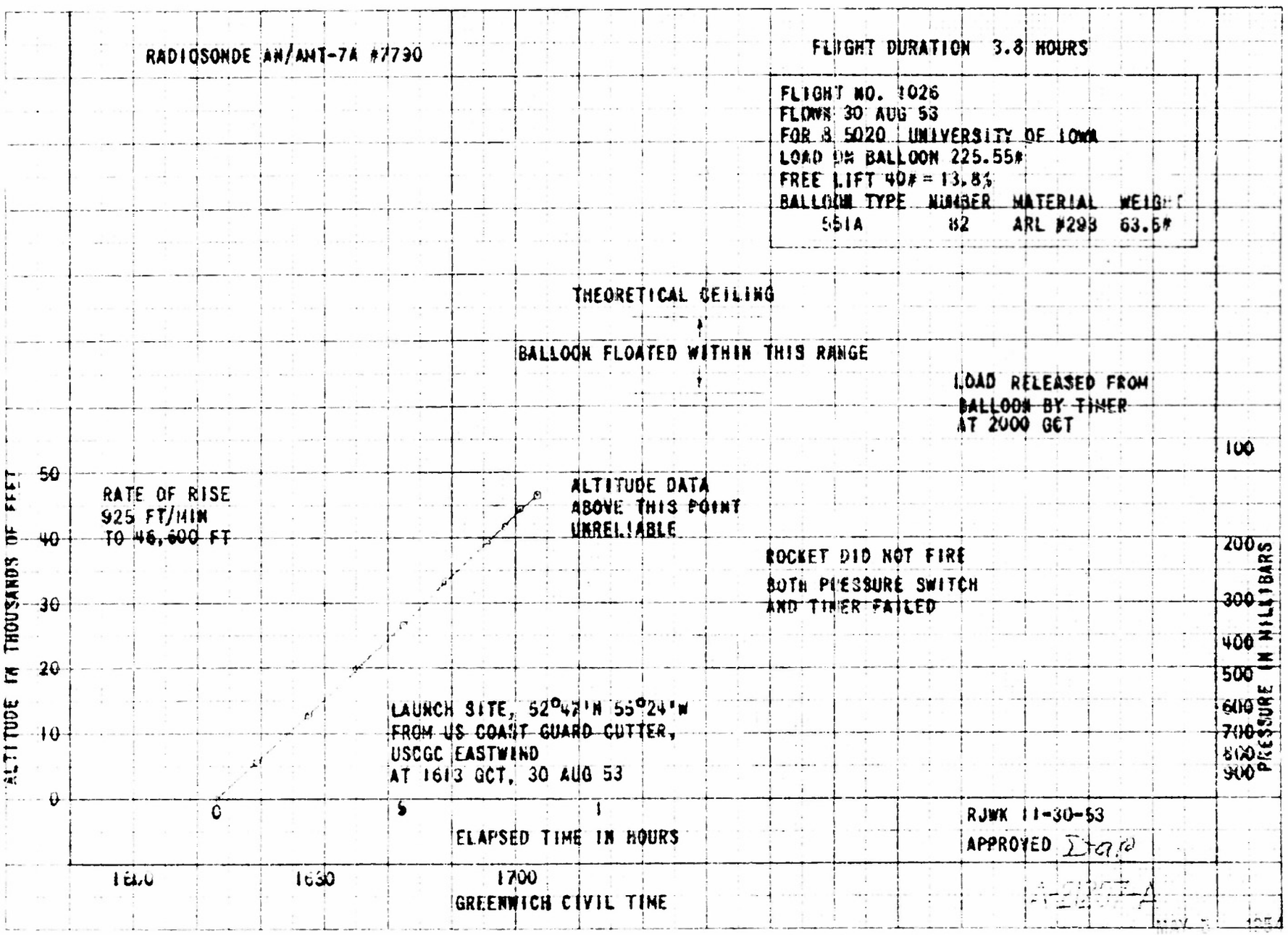

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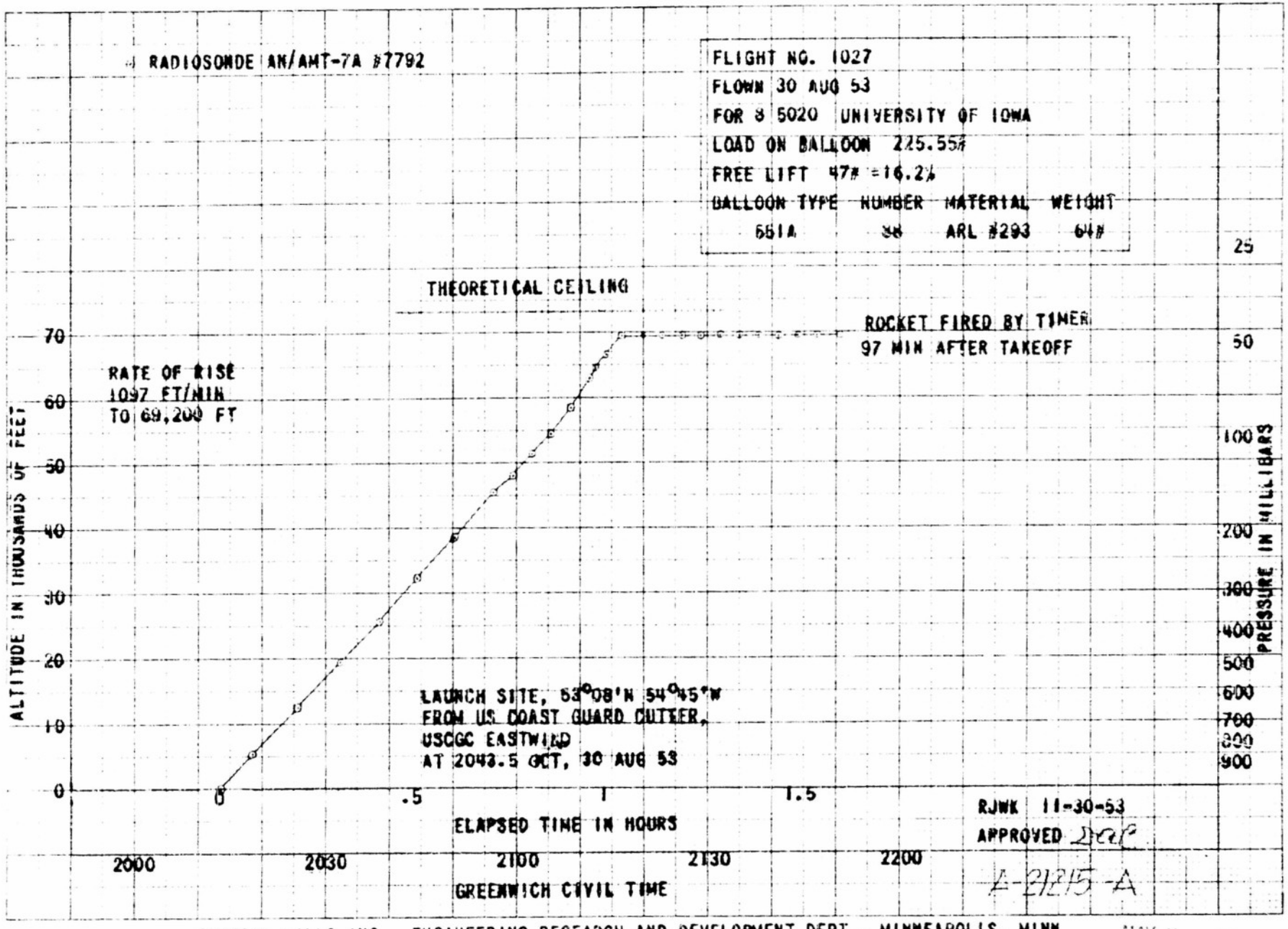

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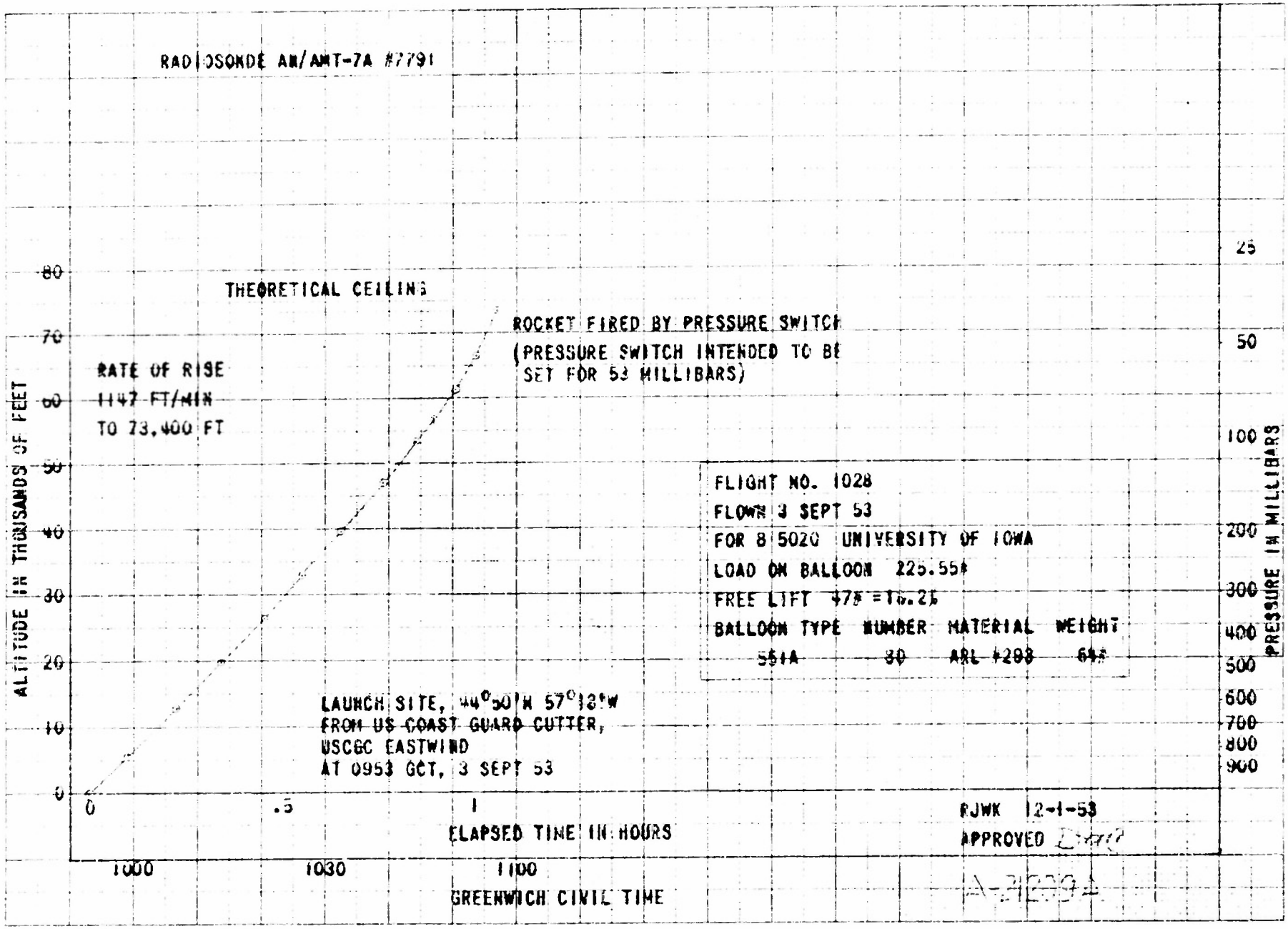

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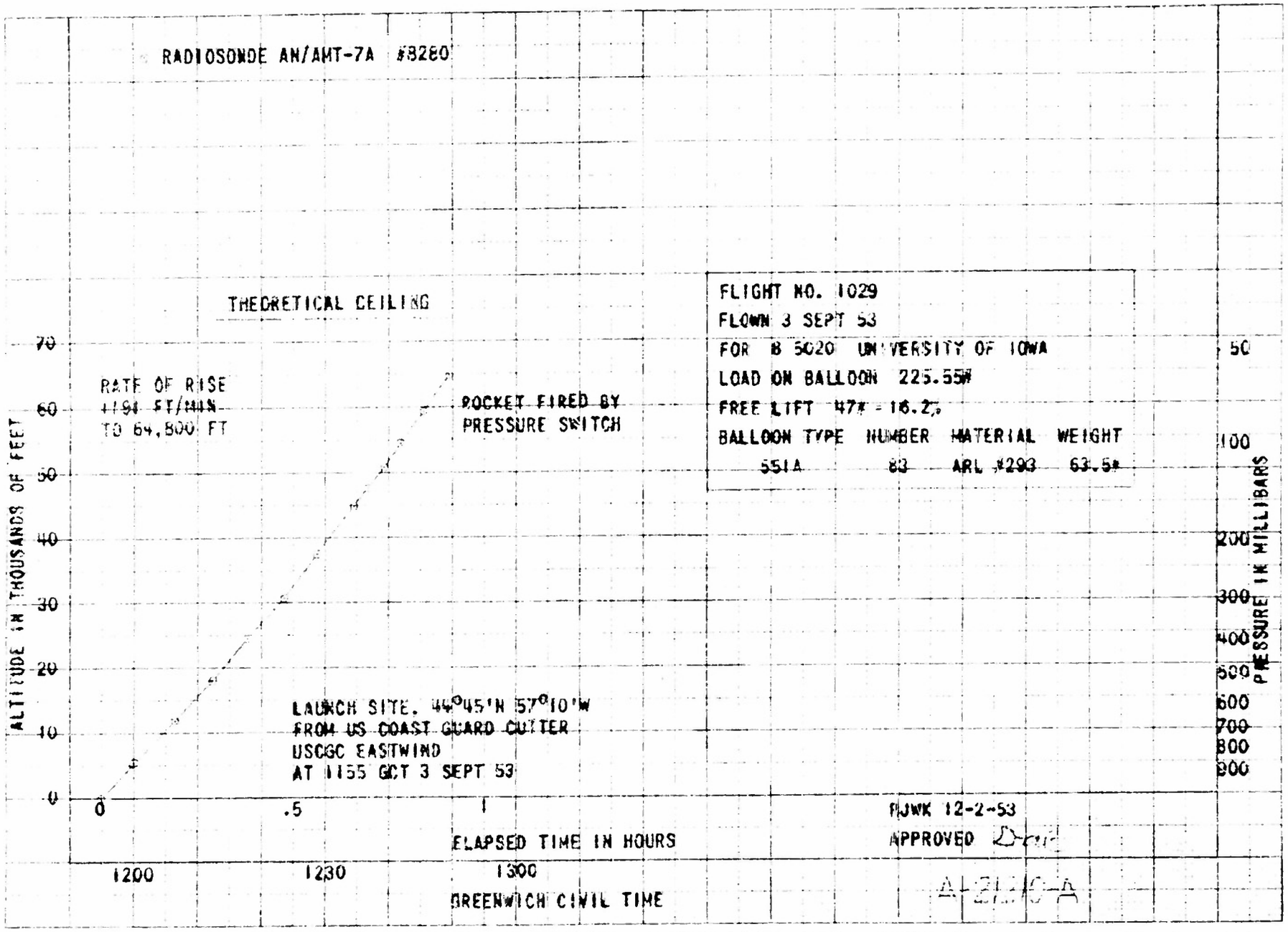
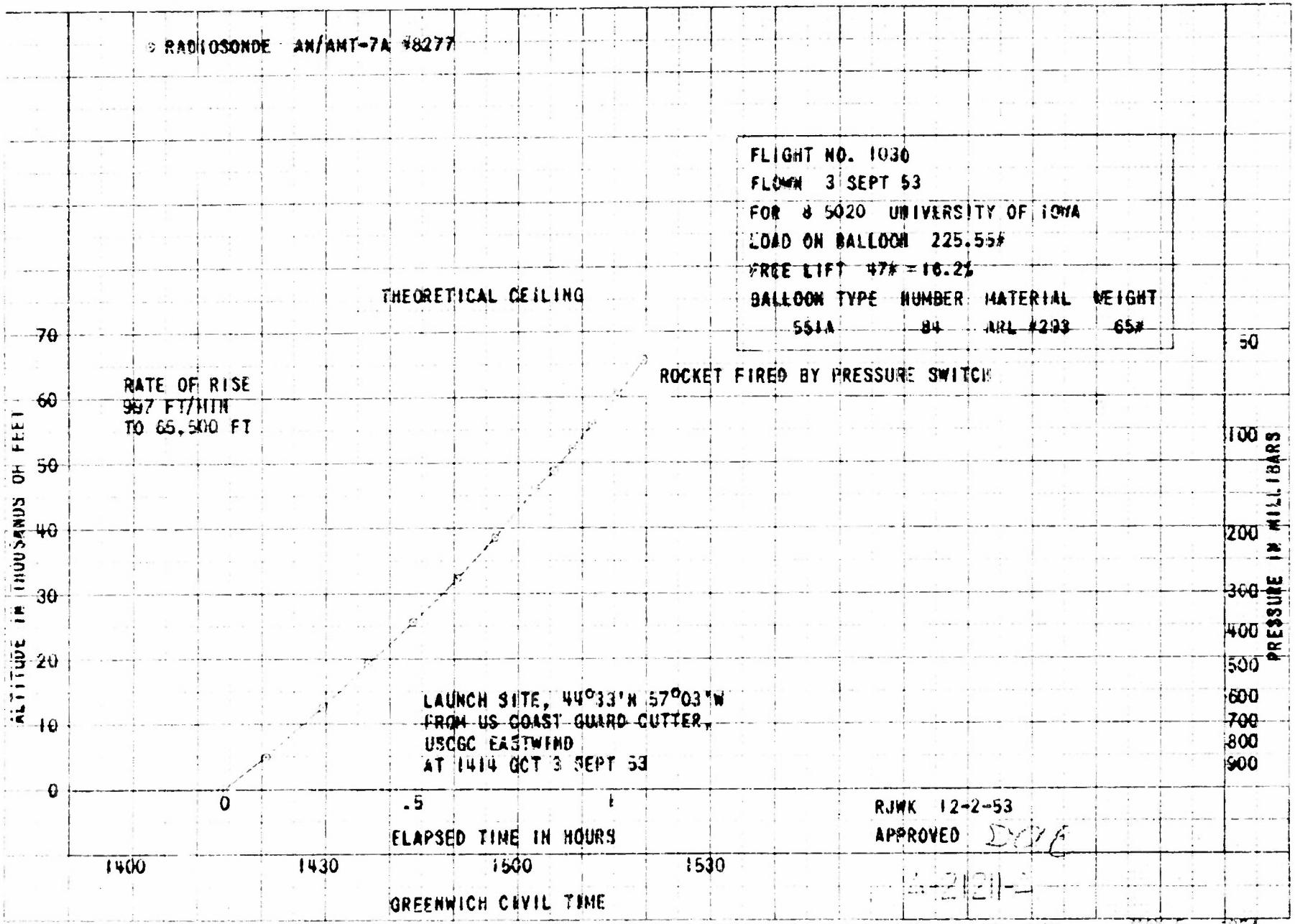


GENERAL MILLS INC., ENGINEERING RESEARCH AND DEVELOPMENT DEPT., MINNEAPOLIS, MINN. MAY 5 1954



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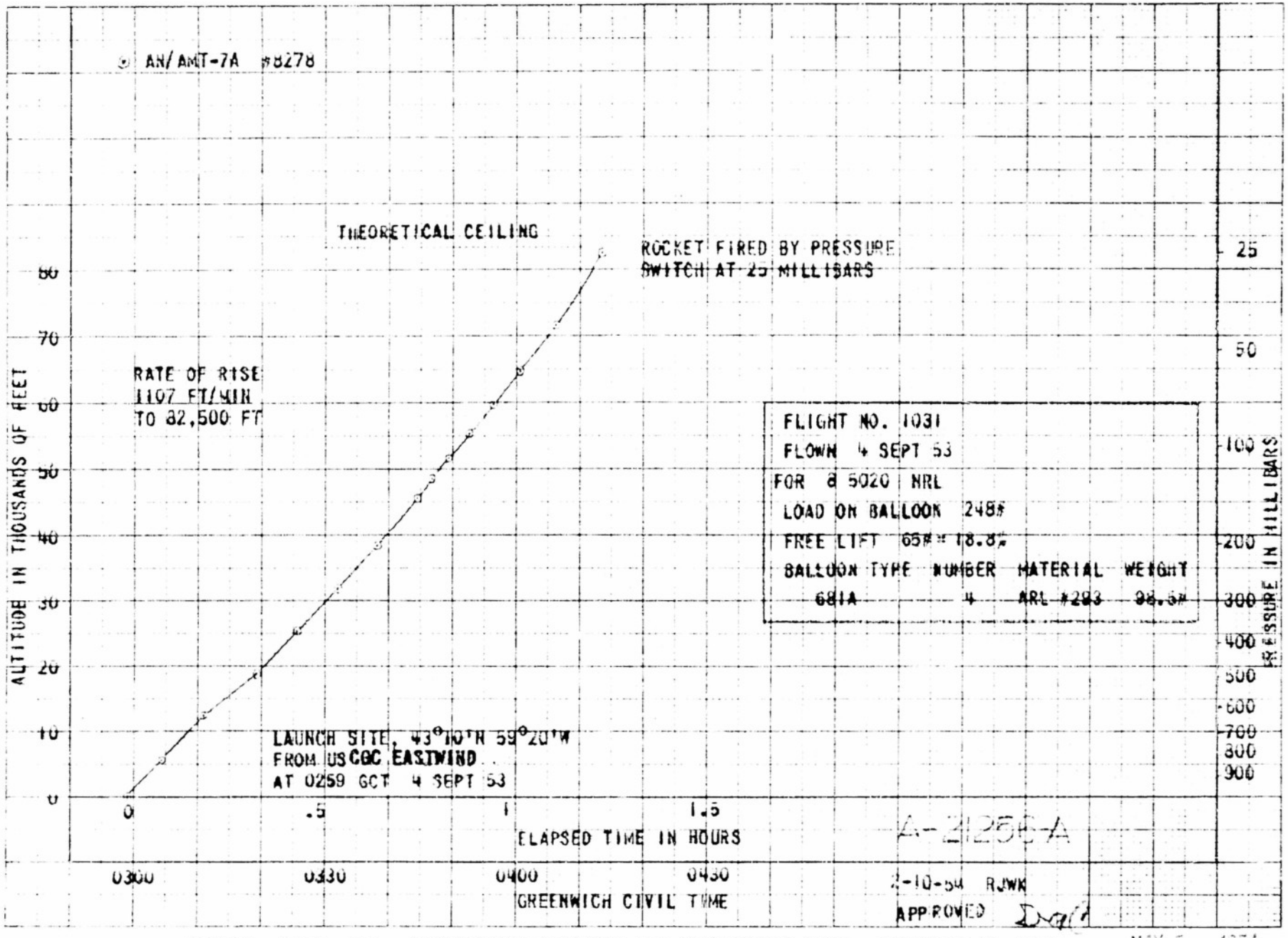

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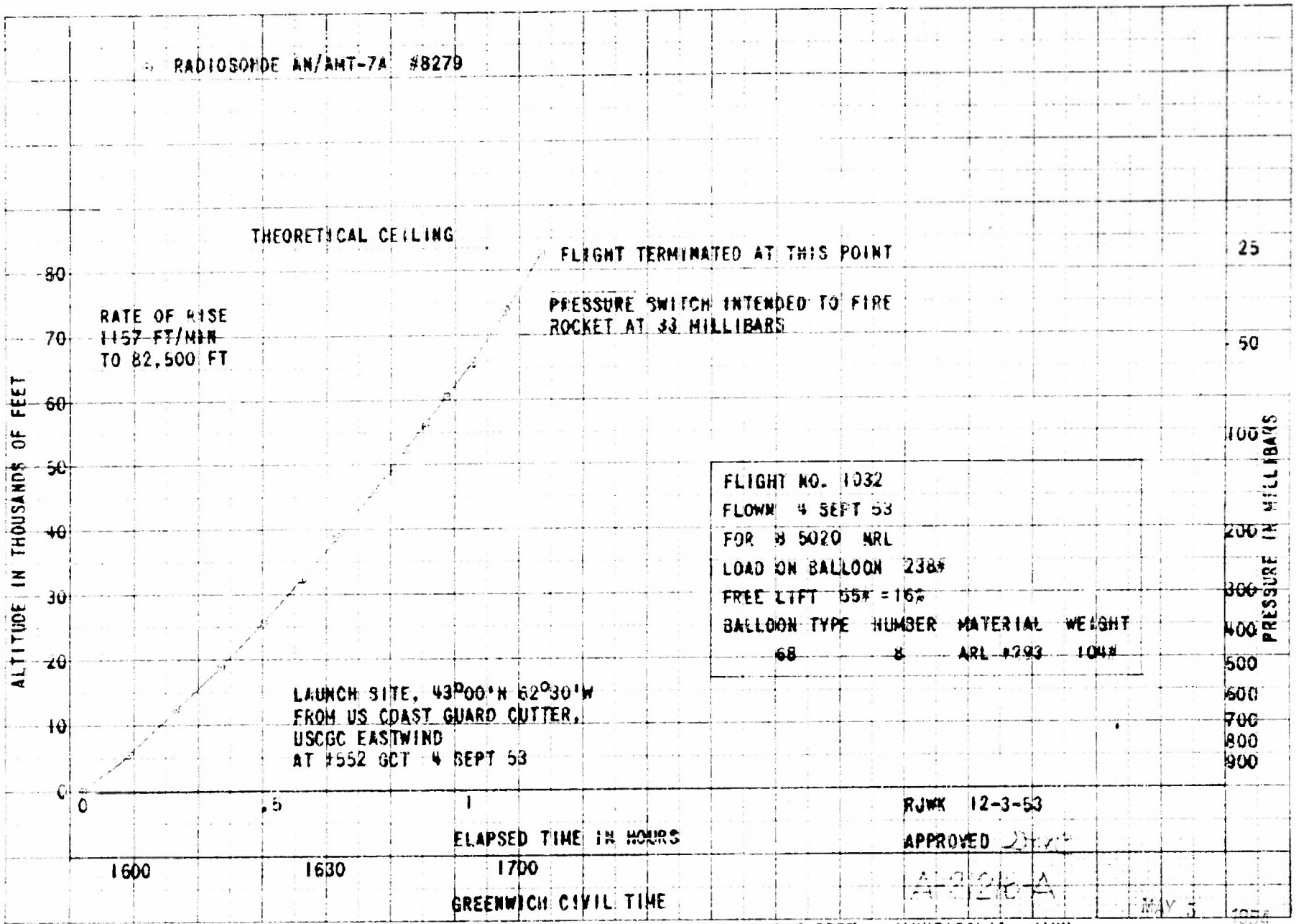

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