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MSC INTERNAL NOTE NO. 68-FM-55

March 4, 1968

68-FM-55

PREDICTED LAUNCH ABORT LANDING POINT DATA COMPUTED DURING APOLLO 4

OCT 30 1969

By E. R. Hischke,
Flight Analysis Branch

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PROJECT APOLLO

PREDICTED LAUNCH ABORT LANDING POINT DATA COMPUTED DURING APOLLO 4

By E. R. Hischke
Flight Analysis Branch

March 4, 1968

MISSION PLANNING AND ANALYSIS DIVISION
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

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PREDICTED LAUNCH ABORT LANDING POINT DATA

COMPUTED DURING APOLLO 4

By E. R. Hischke

SUMMARY

This internal note presents tables and graphs of the mode I abort data used in the real-time support of Apollo 4. These data were generated for the landing and recovery operations to use in the event of a near-launch-pad abort, specifically aborts occurring during the first 90 seconds of the launch phase.

The mode I abort data provided were computed using actual wind measurements taken near the AS-501 launch complex at discrete intervals prior to launch. The computation considers the effects of a tower abort sequence applied at discrete times (0 through 90 seconds) along the launch trajectory, and determines for each time a predicted landing point for the command module.

INTRODUCTION

The AS-501 vehicle was launched on 9 November 1967 at 7:00:00 a.m., e.s.t. from launch complex 39A, Cape Kennedy, Florida, on a launch azimuth of 90°.

If a mode I launch abort is initiated due to a malfunction, a safe recovery of the crew and command module is of foremost importance. Although the Apollo 4 mission was unmanned, data to aid in recovery operations were made available prior to launch.

Wind profile measurements are made to be used as a basis for predicting command module landing points. Command module landing data are computed for aborts from a nominal launch trajectory as given in reference 1. For the non-nominal attitudes and trajectories that could exist, these data would serve only as a good approximation. The capability does exist for computing the landing point at any specific time upon request. The data presented here and the computation interval are those determined necessary for planning recovery operations.

This report is intended only to document the data mentioned. All constants, weights, and aerodynamics used in the computation are given in reference 1. Abort procedures and sequence of events are given in reference 2. Except for the measured wind data, all data were computed on a Univac 1108 computer. Data for command module landings were computed using equations of motion representing a three-degree-of-freedom point mass under the influence of an oblate, rotating earth with rotating atmosphere. The 1962 Standard Atmosphere was used as the altitude density model.

WIND PROFILE MEASUREMENT

Wind profile measurements prior to lift-off (T - 0 minutes) of the AS-501 launch vehicle began at approximately T - 7 hours, T - 5.5 hours, T - 4 hours, T - 2 hours, and T - 1 hour. Jimsphere balloons released at these times and tracked by the FPS-16 (1.16) radar were used as sensors for all wind data obtained. A brief description of the Jimsphere balloon and an evaluation of the wind data measurement by the FPS-16 radar-spherical balloon technique may be found in references 3 and 4, respectively.

For each of the five balloon releases, the parameters measured were altitude, wind velocity, and wind azimuth (direction from which the wind is blowing measured in a clockwise direction from north). Wind profile measurements up to approximately 57 000-ft altitude (60 minutes of radar track) were made.

These data are tabulated in tables I and II and plotted in figures 1 through 5.

MODE I ABORT

The mode I abort is an abort occurring in a region extending from lift-off until the launch escape tower is jettisoned at S-IB/S-IVB separation-plus-20-seconds (approximately).

Since no crew-ejection equipment is incorporated into the Apollo vehicle, command module landing point computations based on the measured wind profile data are the primary objective of the support effort. For the unmanned Apollo 4, command module landing data were computed for wind profile measurements which began at T - 7 hours, T - 5.5 hours, T - 4 hours, T - 2 hours, and T - 1 hour. These data are tabulated in table III and plotted in figure 6.

CONCLUSION

Presented herein are the predicted command module landing data as influenced by actual preflight winds for the Apollo 4 mission.

These data were available for use by the Landing and Recovery Division just prior to the lift-off of Apollo 4 and are documented here so they may be available for information.

TABLE I.- APOLLO 4 WIND DATA

(a) T - 7 hours

ALTITUDE FT	VELOCITY FT/SEC	AZIMUTH DEG	ALTITUDE FT	VELOCITY FT/SEC	AZIMUTH DEG
246.	34.	48.	8448.	17.	164.
410.	35.	47.	8612.	16.	358.
574.	37.	48.	8776.	18.	342.
738.	37.	52.	8940.	16.	322.
902.	35.	54.	9104.	19.	326.
1066.	36.	54.	9268.	18.	325.
1230.	37.	56.	9432.	20.	324.
1394.	36.	56.	9596.	21.	328.
1558.	37.	57.	9760.	20.	328.
1722.	36.	57.	9925.	19.	330.
1886.	36.	59.	10089.	20.	330.
2051.	35.	60.	10253.	20.	330.
2215.	34.	61.	10417.	18.	320.
2379.	34.	60.	10581.	21.	313.
2543.	33.	60.	10745.	21.	312.
2707.	33.	57.	10909.	21.	311.
2871.	32.	57.	11073.	24.	306.
3035.	30.	59.	11237.	27.	308.
3199.	28.	62.	11401.	27.	303.
3363.	28.	64.	11565.	26.	306.
3527.	28.	62.	11729.	27.	311.
3691.	30.	58.	11893.	27.	311.
3855.	32.	59.	12057.	28.	309.
4019.	29.	63.	12221.	30.	307.
4183.	29.	66.	12385.	31.	306.
4347.	30.	61.	12549.	30.	300.
4511.	31.	59.	12713.	32.	295.
4675.	31.	61.	12877.	34.	293.
4839.	31.	66.	13041.	36.	290.
5003.	30.	63.	13205.	39.	289.
5167.	32.	61.	13369.	38.	288.
5331.	33.	61.	13533.	38.	288.
5495.	32.	63.	13698.	39.	285.
5659.	35.	60.	13862.	42.	284.
5823.	36.	60.	14026.	44.	281.
5988.	36.	61.	14190.	46.	280.
6152.	37.	61.	14354.	51.	279.
6316.	37.	59.	14518.	54.	281.
6480.	37.	59.	14682.	57.	282.
6644.	35.	59.	14846.	61.	283.
6808.	36.	59.	15010.	62.	282.
6972.	39.	56.	15174.	62.	282.
7136.	41.	55.	15338.	62.	281.
7300.	42.	55.	15502.	63.	281.
7464.	42.	56.	15666.	64.	280.
7628.	41.	54.	15830.	62.	279.
7792.	37.	55.	15994.	63.	282.
7956.	30.	48.	16158.	62.	284.
8120.	18.	29.	16322.	60.	288.
8284.	16.	29.	16486.	60.	289.

TABLE I.- APOLLO 4 WIND DATA - Continued

(a) T - 7 hours - Continued

ALTITUDE FT	VELOCITY FT/SEC	AZIMUTH DEG	ALTITUDE FT	VELOCITY FT/SEC	AZIMUTH DEG
16650.	58.	291.	24852.	55.	280.
16814.	56.	289.	25016.	55.	279.
16978.	55.	288.	25180.	57.	278.
17142.	56.	286.	25344.	58.	280.
17306.	56.	286.	25509.	60.	282.
17470.	57.	282.	25673.	58.	282.
17635.	57.	280.	25837.	61.	282.
17799.	59.	274.	26001.	64.	281.
17963.	61.	272.	26165.	63.	281.
18127.	66.	270.	26329.	65.	280.
18291.	66.	274.	26493.	63.	278.
18455.	67.	276.	26657.	64.	277.
18619.	70.	279.	26821.	64.	278.
18783.	72.	278.	26985.	65.	280.
18947.	73.	279.	27149.	63.	280.
19111.	73.	279.	27313.	63.	280.
19275.	73.	278.	27477.	64.	280.
19439.	76.	278.	27641.	64.	280.
19603.	76.	278.	27805.	65.	279.
19767.	75.	280.	27969.	68.	278.
19931.	73.	280.	28133.	68.	275.
20095.	72.	282.	28297.	69.	274.
20259.	71.	282.	28461.	72.	275.
20423.	71.	283.	28625.	74.	274.
20587.	70.	284.	28789.	75.	273.
20751.	68.	285.	28953.	74.	274.
20915.	64.	286.	29117.	73.	273.
21079.	59.	285.	29281.	74.	272.
21243.	54.	284.	29446.	77.	272.
21407.	52.	286.	29610.	80.	270.
21572.	52.	288.	29774.	85.	270.
21736.	49.	286.	29938.	87.	270.
21900.	45.	283.	30102.	90.	268.
22064.	42.	281.	30266.	90.	269.
22228.	41.	283.	30430.	87.	270.
22392.	40.	283.	30594.	86.	268.
22556.	38.	285.	30758.	90.	268.
22720.	39.	282.	30922.	91.	267.
22884.	42.	282.	31086.	90.	267.
23048.	45.	285.	31250.	87.	267.
23212.	46.	287.	31414.	87.	265.
23376.	46.	288.	31578.	84.	266.
23540.	48.	288.	31742.	85.	267.
23704.	51.	291.	31906.	87.	270.
23868.	52.	296.	32070.	88.	269.
24032.	50.	293.	32234.	87.	269.
24196.	51.	287.	32398.	87.	269.
24360.	52.	285.	32562.	90.	271.
24524.	54.	281.	32726.	90.	270.
24688.	56.	281.	32890.	92.	272.

TABLE I.- APOLLO 4 WIND DATA-- Continued

(a) T - 7 hours - Continued

ALTITUDE FT	VELOCITY FT/SEC	AZIMUTH DEG	ALTITUDE FT	VELOCITY FT/SEC	AZIMUTH DEG
33054.	89.	272.	41257.	82.	280.
33219.	91.	272.	41421.	82.	279.
33383.	89.	273.	41585.	83.	276.
33547.	89.	274.	41749.	80.	278.
33711.	90.	274.	41913.	80.	280.
33875.	89.	274.	42077.	78.	278.
34039.	87.	274.	42241.	82.	279.
34203.	88.	272.	42405.	81.	277.
34367.	88.	272.	42569.	80.	278.
34531.	86.	272.	42733.	79.	278.
34695.	84.	271.	42897.	79.	279.
34859.	85.	270.	43061.	79.	280.
35023.	86.	270.	43225.	78.	282.
35187.	85.	270.	43389.	77.	282.
35351.	86.	269.	43553.	75.	282.
35515.	86.	268.	43717.	77.	282.
35679.	88.	267.	43881.	77.	281.
35843.	86.	267.	44045.	78.	284.
36007.	88.	267.	44209.	78.	285.
36171.	87.	267.	44373.	78.	289.
36335.	88.	267.	44537.	77.	286.
36499.	88.	268.	44701.	74.	287.
36663.	90.	269.	44865.	72.	285.
36827.	89.	269.	45030.	72.	284.
36991.	90.	270.	45194.	73.	282.
37156.	89.	273.	45358.	74.	284.
37320.	90.	273.	45522.	71.	279.
37484.	91.	272.	45686.	72.	283.
37648.	93.	273.	45850.	69.	281.
37812.	94.	272.	46014.	68.	282.
37976.	93.	271.	46178.	67.	283.
38140.	96.	272.	46342.	67.	280.
38304.	94.	271.	46506.	65.	279.
38468.	93.	271.	46670.	67.	280.
38632.	92.	272.	46834.	66.	281.
38796.	92.	273.	46998.	67.	284.
38960.	92.	272.	47162.	65.	282.
39124.	93.	271.	47326.	64.	282.
39288.	94.	273.	47490.	67.	284.
39452.	95.	275.	47654.	65.	285.
39616.	95.	275.	47818.	68.	282.
39780.	93.	276.	47982.	68.	284.
39944.	93.	278.	48146.	69.	282.
40108.	90.	277.	48310.	70.	283.
40272.	90.	278.	48474.	69.	285.
40436.	88.	278.	48638.	68.	284.
40600.	87.	278.	48802.	68.	287.
40764.	86.	276.	48967.	71.	291.
40928.	87.	277.	49131.	72.	284.
41093.	83.	279.	49295.	70.	294.

TABLE I.- APOLLO 4 WIND DATA - Continued

(a) T - 7 hours - Concluded

ALTITUDE FT	VELOCITY FT/SEC	AZIMUTH DEG
49459.	68.	288.
49623.	66.	289.
49787.	67.	288.
49951.	65.	291.
50115.	65.	293.
50279.	62.	288.
50443.	66.	294.
50607.	66.	293.
50771.	66.	297.
50935.	66.	301.
51099.	62.	301.
51263.	57.	301.
51427.	55.	298.
51591.	56.	298.
51755.	56.	292.
51919.	55.	288.
52083.	58.	284.
52247.	57.	284.
52411.	62.	282.
52575.	61.	281.
52740.	64.	281.
52904.	65.	285.
53068.	62.	287.
53232.	64.	290.
53396.	65.	296.
53560.	61.	298.
53724.	59.	294.
53888.	53.	293.

TABLE I.- APOLLO 4 WIND DATA - Continued

(b) T - 5.5 hours

ALTITUDE FT	VELOCITY FT/SEC	AZIMUTH DEG	ALTITUDE FT	VELOCITY FT/SEC	AZIMUTH DEG
410.	41.	57.	8612.	16.	26.
574.	43.	59.	8776.	13.	28.
738.	43.	60.	8940.	11.	34.
902.	42.	58.	9104.	10.	40.
1066.	40.	55.	9268.	8.	25.
1230.	41.	55.	9432.	9.	19.
1394.	41.	55.	9596.	10.	1.
1558.	41.	56.	9760.	10.	353.
1722.	40.	56.	9925.	11.	338.
1886.	42.	58.	10089.	10.	339.
2051.	41.	59.	10253.	10.	341.
2215.	41.	61.	10417.	8.	334.
2379.	41.	62.	10581.	10.	322.
2543.	40.	61.	10745.	10.	318.
2707.	41.	61.	10909.	11.	314.
2871.	40.	58.	11073.	13.	324.
3035.	38.	62.	11237.	13.	329.
3199.	39.	64.	11401.	12.	322.
3363.	39.	63.	11565.	15.	314.
3527.	41.	61.	11729.	21.	306.
3691.	39.	60.	11893.	25.	302.
3855.	37.	64.	12057.	28.	295.
4019.	38.	62.	12221.	31.	287.
4183.	35.	58.	12385.	35.	284.
4347.	34.	60.	12549.	36.	281.
4511.	31.	70.	12713.	35.	279.
4675.	28.	72.	12877.	37.	279.
4839.	29.	77.	13041.	38.	280.
5003.	29.	74.	13205.	40.	279.
5167.	25.	75.	13369.	41.	277.
5331.	25.	72.	13533.	43.	276.
5495.	26.	73.	13698.	48.	274.
5659.	23.	70.	13862.	50.	275.
5823.	21.	69.	14026.	52.	278.
5988.	18.	68.	14190.	54.	280.
6152.	17.	64.	14354.	53.	283.
6316.	17.	61.	14518.	50.	283.
6480.	17.	59.	14682.	49.	282.
6644.	19.	47.	14846.	51.	282.
6808.	27.	37.	15010.	52.	284.
6972.	28.	38.	15174.	53.	285.
7136.	29.	33.	15338.	52.	287.
7300.	28.	31.	15502.	50.	288.
7464.	30.	32.	15666.	48.	288.
7628.	30.	32.	15830.	48.	289.
7792.	28.	35.	15994.	48.	292.
7956.	28.	35.	16158.	45.	289.
8120.	24.	29.	16322.	43.	287.
8284.	21.	26.	16486.	41.	286.
8448.	19.	26.	16650.	38.	290.

TABLE I.- APOLLO 4 WIND DATA - Continued

(b) T - 5.5 hours - Continued

ALTITUDE FT	VELOCITY FT/SEC	AZIMUTH DEG	ALTITUDE FT	VELOCITY FT/SEC	AZIMUTH DEG
16814.	34.	295.	25016.	55.	282.
16978.	30.	295.	25180.	58.	280.
17142.	32.	300.	25344.	59.	279.
17306.	34.	301.	25509.	61.	278.
17470.	36.	301.	25673.	63.	276.
17635.	38.	301.	25837.	65.	275.
17799.	40.	297.	26001.	62.	273.
17963.	39.	291.	26165.	63.	274.
18127.	37.	286.	26329.	64.	275.
18291.	37.	287.	26493.	64.	275.
18455.	36.	290.	26657.	62.	274.
18619.	35.	292.	26821.	63.	275.
18783.	36.	294.	26985.	63.	272.
18947.	36.	296.	27149.	65.	271.
19111.	35.	295.	27313.	64.	273.
19275.	36.	296.	27477.	67.	273.
19439.	35.	294.	27641.	69.	274.
19603.	35.	291.	27805.	71.	275.
19767.	36.	288.	27969.	71.	274.
19931.	39.	286.	28133.	74.	273.
20095.	43.	281.	28297.	73.	275.
20259.	44.	284.	28461.	75.	276.
20423.	42.	286.	28625.	75.	277.
20587.	40.	288.	28789.	73.	278.
20751.	40.	289.	28953.	74.	278.
20915.	41.	291.	29117.	75.	276.
21079.	37.	284.	29281.	77.	275.
21243.	36.	280.	29446.	78.	276.
21407.	35.	276.	29610.	78.	276.
21572.	37.	280.	29774.	80.	276.
21736.	38.	286.	29938.	82.	276.
21900.	40.	289.	30102.	80.	275.
22064.	41.	292.	30266.	77.	277.
22228.	40.	295.	30430.	77.	280.
22392.	43.	297.	30594.	79.	281.
22556.	45.	300.	30758.	80.	279.
22720.	46.	304.	30922.	80.	278.
22884.	45.	304.	31086.	79.	276.
23048.	47.	298.	31250.	78.	277.
23212.	46.	291.	31414.	79.	278.
23376.	45.	286.	31578.	79.	278.
23540.	45.	284.	31742.	78.	276.
23704.	46.	283.	31906.	79.	276.
23868.	45.	286.	32070.	81.	274.
24032.	45.	289.	32234.	81.	275.
24196.	46.	286.	32398.	83.	278.
24360.	47.	283.	32562.	82.	275.
24524.	49.	283.	32726.	82.	274.
24688.	50.	284.	32890.	82.	274.
24852.	51.	282.	33054.	83.	273.

TABLE I.- APOLLO 4 WIND DATA - Continued

(b) T - 5.5 hours - Continued

ALTITUDE FT	VELOCITY FT/SEC	AZIMUTH DEG	ALTITUDE FT	VELOCITY FT/SEC	AZIMUTH DEG
33219.	83.	275.	41421.	76.	273.
33383.	84.	276.	41585.	76.	272.
33547.	84.	274.	41749.	75.	274.
33711.	82.	273.	41913.	77.	275.
33875.	83.	271.	42077.	79.	276.
34039.	82.	270.	42241.	78.	277.
34203.	82.	269.	42405.	78.	280.
34367.	81.	269.	42569.	77.	282.
34531.	80.	269.	42733.	77.	281.
34695.	80.	268.	42897.	78.	281.
34859.	79.	266.	43061.	76.	283.
35023.	80.	265.	43225.	76.	280.
35187.	79.	263.	43389.	74.	279.
35351.	80.	262.	43553.	74.	278.
35515.	81.	261.	43717.	72.	279.
35679.	82.	259.	43881.	72.	279.
35843.	84.	258.	44045.	71.	280.
36007.	85.	259.	44209.	71.	281.
36171.	84.	259.	44373.	72.	279.
36335.	84.	258.	44537.	73.	281.
36499.	84.	261.	44701.	74.	282.
36663.	83.	262.	44865.	73.	281.
36827.	82.	263.	45030.	72.	283.
36991.	83.	265.	45194.	74.	286.
37156.	85.	265.	45358.	72.	285.
37320.	86.	267.	45522.	70.	285.
37484.	85.	269.	45686.	70.	283.
37648.	87.	271.	45850.	72.	282.
37812.	86.	272.	46014.	72.	286.
37976.	86.	272.	46178.	69.	285.
38140.	86.	273.	46342.	67.	287.
38304.	88.	272.	46506.	68.	285.
38468.	89.	272.	46670.	66.	283.
38632.	90.	273.	46834.	64.	284.
38796.	89.	275.	46998.	66.	287.
38960.	86.	275.	47162.	62.	288.
39124.	86.	276.	47326.	62.	290.
39288.	87.	278.	47490.	63.	291.
39452.	84.	278.	47654.	63.	290.
39616.	82.	279.	47818.	65.	288.
39780.	81.	278.	47982.	64.	290.
39944.	77.	279.	48146.	64.	287.
40108.	77.	281.	48310.	64.	288.
40272.	75.	280.	48474.	67.	289.
40436.	76.	278.	48638.	67.	286.
40600.	76.	278.	48802.	66.	287.
40764.	78.	278.	48967.	66.	290.
40928.	78.	276.	49131.	62.	288.
41093.	77.	273.	49295.	62.	291.
41257.	76.	274.	49459.	65.	290.

TABLE I.- AS-501 WIND DATA - Continued

(b) T - 5.5 hours - Concluded

ALTITUDE FT	VELOCITY FT/SEC	AZIMUTH DEG
49623.	67.	293.
49787.	69.	301.
49951.	68.	300.
50115.	66.	305.
50279.	62.	303.
50443.	59.	300.
50607.	55.	302.
50771.	51.	294.
50935.	48.	293.
51099.	46.	284.
51263.	46.	283.
51427.	48.	278.
51591.	51.	277.
51755.	57.	282.
51919.	57.	280.
52083.	57.	285.
52247.	56.	286.
52411.	58.	289.
52575.	60.	290.
52740.	60.	296.
52904.	59.	297.
53068.	56.	294.
53232.	54.	293.
53396.	54.	296.
53560.	52.	291.
53724.	51.	291.
53888.	49.	286.
54052.	53.	299.
54216.	52.	298.
54380.	52.	304.

TABLE I.- APOLLO 4 WIND DATA - Continued

(c) T - 4 hours

ALTITUDE FT	VELOCITY FT/SEC	AZIMUTH DEG	ALTITUDE FT	VELOCITY FT/SEC	AZIMUTH DEG
410.	64.	79.	8612.	17.	26.
574.	42.	51.	8776.	15.	21.
738.	42.	55.	8940.	16.	20.
902.	39.	59.	9104.	13.	22.
1066.	40.	64.	9268.	12.	18.
1230.	38.	60.	9432.	10.	5.
1394.	37.	58.	9596.	10.	357.
1558.	38.	62.	9760.	10.	350.
1722.	36.	59.	9925.	10.	340.
1886.	35.	60.	10089.	11.	333.
2051.	35.	62.	10253.	12.	330.
2215.	34.	62.	10417.	11.	329.
2379.	35.	63.	10581.	11.	319.
2543.	37.	68.	10745.	12.	317.
2707.	35.	69.	10909.	15.	318.
2871.	32.	69.	11073.	18.	319.
3035.	33.	66.	11237.	20.	318.
3199.	33.	65.	11401.	20.	320.
3363.	32.	63.	11565.	20.	320.
3527.	33.	69.	11729.	22.	320.
3691.	33.	70.	11893.	25.	322.
3855.	33.	65.	12057.	25.	320.
4019.	35.	61.	12221.	26.	319.
4183.	34.	64.	12385.	27.	317.
4347.	33.	66.	12549.	28.	309.
4511.	34.	67.	12713.	29.	295.
4675.	33.	67.	12877.	31.	289.
4839.	33.	66.	13041.	33.	285.
5003.	31.	64.	13205.	34.	286.
5167.	30.	63.	13369.	33.	290.
5331.	29.	59.	13533.	32.	288.
5495.	27.	57.	13698.	33.	290.
5659.	25.	59.	13862.	35.	291.
5823.	23.	56.	14026.	35.	290.
5988.	22.	55.	14190.	35.	289.
6152.	21.	56.	14354.	35.	291.
6316.	24.	54.	14518.	34.	295.
6480.	28.	53.	14682.	33.	299.
6644.	30.	55.	14846.	31.	299.
6808.	31.	59.	15010.	28.	300.
6972.	28.	49.	15174.	25.	302.
7136.	27.	39.	15338.	27.	301.
7300.	27.	29.	15502.	25.	306.
7464.	27.	34.	15666.	23.	313.
7628.	27.	26.	15830.	23.	316.
7792.	23.	28.	15994.	19.	316.
7956.	24.	27.	16158.	18.	327.
8120.	21.	30.	16322.	17.	331.
8284.	20.	23.	16486.	19.	347.
8448.	19.	26.	16650.	21.	349.

TABLE I.- APOLLO 4 WIND DATA - Continued

(c) T - 4 hours - Continued

ALTITUDE FT	VELOCITY FT/SEC	AZIMUTH DEG	ALTITUDE FT	VELOCITY FT/SEC	AZIMUTH DEG
16814.	25.	349.	25016.	55.	278.
16978.	23.	354.	25180.	54.	276.
17142.	28.	348.	25344.	57.	277.
17306.	28.	348.	25509.	59.	279.
17470.	28.	341.	25673.	60.	278.
17635.	27.	338.	25837.	62.	277.
17799.	25.	335.	26001.	63.	278.
17963.	27.	335.	26165.	62.	278.
18127.	26.	335.	26329.	61.	277.
18291.	25.	329.	26493.	61.	277.
18455.	25.	322.	26657.	62.	277.
18619.	27.	305.	26821.	62.	276.
18783.	29.	306.	26985.	63.	275.
18947.	31.	303.	27149.	63.	273.
19111.	32.	304.	27313.	65.	274.
19275.	33.	307.	27477.	66.	275.
19439.	33.	304.	27641.	68.	275.
19603.	33.	304.	27805.	68.	275.
19767.	33.	306.	27969.	71.	275.
19931.	33.	303.	28133.	74.	275.
20095.	35.	302.	28297.	74.	275.
20259.	33.	300.	28461.	74.	275.
20423.	32.	297.	28625.	75.	277.
20587.	32.	294.	28789.	75.	279.
20751.	36.	296.	28953.	75.	280.
20915.	38.	300.	29117.	74.	279.
21079.	37.	290.	29281.	75.	279.
21243.	37.	285.	29446.	75.	278.
21407.	36.	279.	29610.	77.	279.
21572.	36.	269.	29774.	78.	280.
21736.	36.	275.	29938.	79.	280.
21900.	37.	279.	30102.	78.	281.
22064.	37.	279.	30266.	82.	283.
22228.	38.	282.	30430.	77.	282.
22392.	37.	287.	30594.	78.	282.
22556.	37.	289.	30758.	76.	282.
22720.	38.	292.	30922.	77.	279.
22884.	39.	296.	31086.	77.	276.
23048.	42.	297.	31250.	79.	272.
23212.	45.	298.	31414.	80.	273.
23376.	46.	294.	31578.	78.	274.
23540.	42.	285.	31742.	78.	272.
23704.	43.	282.	31906.	79.	274.
23868.	43.	279.	32070.	78.	274.
24032.	45.	280.	32234.	80.	274.
24196.	46.	280.	32398.	80.	274.
24360.	48.	280.	32562.	81.	273.
24524.	49.	282.	32726.	81.	273.
24688.	50.	279.	32890.	81.	274.
24852.	54.	279.	33054.	80.	275.

TABLE I.- APOLLO 4 WIND DATA - Continued

(c) T - 4 hours - Continued

ALTITUDE FT	VELOCITY FT/SEC	AZIMUTH DEG	ALTITUDE FT	VELOCITY FT/SEC	AZIMUTH DEG
33219.	81.	274.	41421.	73.	272.
33383.	79.	273.	41585.	73.	276.
33547.	79.	270.	41749.	74.	280.
33711.	81.	271.	41913.	74.	281.
33875.	81.	273.	42077.	71.	282.
34039.	80.	271.	42241.	73.	280.
34203.	79.	269.	42405.	72.	280.
34367.	82.	271.	42569.	71.	281.
34531.	81.	270.	42733.	69.	280.
34695.	82.	267.	42897.	71.	277.
34859.	82.	265.	43061.	69.	277.
35023.	82.	266.	43225.	68.	273.
35187.	82.	264.	43389.	69.	272.
35351.	83.	263.	43553.	66.	273.
35515.	82.	262.	43717.	68.	273.
35679.	84.	261.	43881.	70.	276.
35843.	86.	261.	44045.	68.	276.
36007.	87.	262.	44209.	69.	278.
36171.	86.	261.	44373.	70.	279.
36335.	86.	262.	44537.	70.	283.
36499.	88.	262.	44701.	68.	285.
36663.	87.	262.	44865.	67.	289.
36827.	87.	263.	45030.	68.	287.
36991.	85.	263.	45194.	65.	287.
37156.	88.	264.	45358.	64.	288.
37320.	84.	266.	45522.	65.	289.
37484.	81.	265.	45686.	65.	287.
37648.	81.	266.	45850.	63.	288.
37812.	85.	268.	46014.	64.	286.
37976.	85.	272.	46178.	62.	289.
38140.	88.	275.	46342.	61.	290.
38304.	88.	277.	46506.	61.	289.
38468.	89.	277.	46670.	59.	291.
38632.	87.	278.	46834.	57.	290.
38796.	85.	279.	46998.	56.	289.
38960.	83.	282.	47162.	58.	287.
39124.	82.	281.	47326.	57.	288.
39288.	80.	281.	47490.	58.	293.
39452.	78.	279.	47654.	59.	290.
39616.	75.	279.	47818.	60.	290.
39780.	71.	279.	47982.	60.	290.
39944.	71.	278.	48146.	61.	289.
40108.	72.	279.	48310.	61.	289.
40272.	72.	277.	48474.	62.	290.
40436.	74.	275.	48638.	62.	289.
40600.	74.	274.	48802.	63.	290.
40764.	74.	271.	48967.	59.	292.
40928.	74.	272.	49131.	60.	293.
41093.	71.	273.	49295.	59.	294.
41257.	72.	270.	49459.	62.	296.

TABLE I.- APOLLO 4 WIND DATA - Continued

(c) T - 4 hours - Concluded

ALTITUDE FT	VELOCITY FT/SEC	AZIMUTH DEG
49623.	64.	300.
49787.	66.	303.
49951.	63.	304.
50115.	62.	306.
50279.	59.	307.
50443.	55.	301.
50607.	50.	302.
50771.	46.	295.
50935.	47.	290.
51099.	44.	284.
51263.	45.	280.
51427.	46.	277.
51591.	49.	275.
51755.	51.	277.
51919.	51.	281.
52083.	54.	280.
52247.	56.	282.

TABLE I.- APOLLO 4 WIND DATA - Continued

(d) T - 2 hours

ALTITUDE FT	VELOCITY FT/SEC	AZIMUTH DEG	ALTITUDE FT	VELOCITY FT/SEC	AZIMUTH DEG
410.	35.	49.	8612.	21.	12.
574.	36.	49.	8776.	21.	10.
738.	37.	51.	8940.	19.	9.
902.	39.	53.	9104.	19.	5.
1066.	37.	53.	9268.	15.	359.
1230.	36.	56.	9432.	13.	350.
1394.	38.	56.	9596.	15.	346.
1558.	36.	55.	9760.	16.	342.
1722.	34.	54.	9925.	16.	338.
1886.	36.	60.	10089.	16.	331.
2051.	34.	61.	10253.	18.	333.
2215.	33.	63.	10417.	19.	336.
2379.	32.	66.	10581.	20.	332.
2543.	34.	65.	10745.	22.	331.
2707.	35.	64.	10909.	22.	334.
2871.	35.	63.	11073.	21.	329.
3035.	33.	60.	11237.	20.	323.
3199.	33.	57.	11401.	19.	312.
3363.	30.	60.	11565.	23.	309.
3527.	31.	57.	11729.	23.	314.
3691.	31.	56.	11893.	24.	313.
3855.	31.	57.	12057.	23.	313.
4019.	30.	57.	12221.	23.	315.
4183.	29.	57.	12385.	23.	316.
4347.	28.	50.	12549.	23.	308.
4511.	30.	40.	12713.	23.	296.
4675.	28.	40.	12877.	25.	294.
4839.	25.	39.	13041.	26.	298.
5003.	25.	34.	13205.	29.	306.
5167.	26.	34.	13369.	29.	312.
5331.	23.	33.	13533.	26.	314.
5495.	20.	35.	13698.	23.	308.
5659.	21.	32.	13862.	25.	301.
5823.	20.	34.	14026.	23.	301.
5988.	18.	43.	14190.	20.	305.
6152.	19.	47.	14354.	19.	322.
6316.	18.	52.	14518.	17.	335.
6480.	18.	47.	14682.	15.	343.
6644.	20.	43.	14846.	14.	340.
6808.	20.	39.	15010.	10.	331.
6972.	20.	37.	15174.	14.	346.
7136.	23.	29.	15338.	17.	359.
7300.	22.	31.	15502.	17.	2.
7464.	20.	32.	15666.	18.	7.
7628.	20.	31.	15830.	19.	13.
7792.	22.	31.	15994.	20.	16.
7956.	22.	32.	16158.	21.	22.
8120.	22.	27.	16322.	18.	22.
8284.	22.	20.	16486.	20.	17.
8448.	21.	16.	16650.	21.	16.

TABLE I.- APOLLO 4 WIND DATA - Continued

(d) T - 2 hours - Continued

ALTITUDE FT	VELOCITY FT/SEC	AZIMUTH DEG	ALTITUDE FT	VELOCITY FT/SEC	AZIMUTH DEG
16814.	20.	15.	25016.	51.	283.
16978.	21.	13.	25180.	52.	284.
17142.	22.	4.	25344.	54.	284.
17306.	23.	354.	25509.	54.	283.
17470.	25.	351.	25673.	52.	283.
17635.	25.	350.	25837.	53.	282.
17799.	23.	349.	26001.	54.	283.
17963.	24.	353.	26165.	56.	283.
18127.	24.	353.	26329.	57.	281.
18291.	24.	353.	26493.	58.	280.
18455.	22.	354.	26657.	60.	280.
18619.	20.	347.	26821.	62.	279.
18783.	19.	341.	26985.	62.	280.
18947.	17.	333.	27149.	65.	281.
19111.	19.	319.	27313.	66.	282.
19275.	22.	315.	27477.	69.	283.
19439.	22.	308.	27641.	69.	284.
19603.	23.	302.	27805.	70.	284.
19767.	24.	309.	27969.	69.	283.
19931.	25.	304.	28133.	70.	283.
20095.	27.	303.	28297.	71.	283.
20259.	28.	304.	28461.	72.	284.
20423.	31.	306.	28625.	72.	285.
20587.	32.	303.	28789.	72.	285.
20751.	36.	307.	28953.	72.	285.
20915.	34.	300.	29117.	72.	284.
21079.	36.	293.	29281.	75.	284.
21243.	34.	289.	29446.	79.	284.
21407.	33.	282.	29610.	78.	283.
21572.	34.	278.	29774.	77.	283.
21736.	36.	273.	29938.	78.	286.
21900.	35.	276.	30102.	76.	285.
22064.	35.	278.	30266.	75.	283.
22228.	35.	277.	30430.	75.	280.
22392.	36.	277.	30594.	77.	277.
22556.	35.	280.	30758.	78.	273.
22720.	36.	283.	30922.	82.	272.
22884.	35.	284.	31086.	82.	272.
23048.	36.	283.	31250.	81.	271.
23212.	39.	283.	31414.	81.	270.
23376.	40.	283.	31578.	79.	271.
23540.	41.	284.	31742.	79.	270.
23704.	41.	286.	31906.	79.	271.
23868.	43.	292.	32070.	80.	271.
24032.	46.	296.	32234.	81.	273.
24196.	46.	292.	32398.	80.	273.
24360.	45.	289.	32562.	81.	274.
24524.	45.	288.	32726.	80.	274.
24688.	46.	285.	32890.	82.	274.
24852.	50.	283.	33054.	79.	275.

TABLE I.- APOLLO 4 WIND DATA - Continued

(d) T - 2 hours - Continued

ALTITUDE FT	VELOCITY FT/SEC	AZIMUTH DEG	ALTITUDE FT	VELOCITY FT/SEC	AZIMUTH DEG
33219.	78.	273.	41421.	71.	279.
33383.	81.	270.	41585.	71.	280.
33547.	81.	271.	41749.	72.	280.
33711.	80.	268.	41913.	73.	281.
33875.	81.	267.	42077.	71.	280.
34039.	82.	268.	42241.	70.	279.
34203.	81.	269.	42405.	69.	279.
34367.	80.	270.	42569.	68.	279.
34531.	81.	270.	42733.	66.	277.
34695.	81.	270.	42897.	67.	276.
34859.	82.	270.	43061.	69.	280.
35023.	82.	269.	43225.	71.	281.
35187.	83.	269.	43389.	69.	282.
35351.	85.	269.	43553.	67.	283.
35515.	84.	267.	43717.	66.	285.
35679.	85.	267.	43881.	67.	287.
35843.	85.	267.	44045.	66.	288.
36007.	84.	267.	44209.	65.	287.
36171.	85.	267.	44373.	64.	287.
36335.	87.	266.	44537.	64.	287.
36499.	88.	267.	44701.	63.	289.
36663.	86.	266.	44865.	61.	290.
36827.	85.	266.	45030.	62.	288.
36991.	84.	266.	45194.	61.	288.
37156.	83.	267.	45358.	59.	287.
37320.	82.	269.	45522.	59.	286.
37484.	86.	270.	45686.	62.	283.
37648.	86.	273.	45850.	60.	284.
37812.	89.	275.	46014.	60.	281.
37976.	87.	276.	46178.	58.	281.
38140.	84.	275.	46342.	55.	283.
38304.	85.	275.	46506.	56.	283.
38468.	84.	277.	46670.	57.	284.
38632.	83.	279.	46834.	58.	283.
38796.	82.	279.	46998.	56.	288.
38960.	81.	279.	47162.	55.	287.
39124.	79.	278.	47326.	55.	283.
39288.	76.	276.	47490.	54.	279.
39452.	75.	273.	47654.	53.	283.
39616.	73.	272.	47818.	52.	284.
39780.	71.	274.	47982.	53.	286.
39944.	69.	276.	48146.	53.	287.
40108.	68.	276.	48310.	53.	291.
40272.	68.	275.	48474.	53.	289.
40436.	71.	276.	48638.	54.	289.
40600.	72.	275.	48802.	56.	286.
40764.	72.	274.	48967.	55.	287.
40928.	72.	274.	49131.	56.	287.
41093.	71.	274.	49295.	57.	289.
41257.	71.	276.	49459.	56.	288.

TABLE I.- APOLLO 4 WIND DATA - Continued.

(d) T - 2 hours - Concluded

ALTITUDE FT	VELOCITY FT/SEC	AZIMUTH DEG
49623.	56.	289.
49787.	55.	292.
49951.	57.	293.
50115.	58.	294.
50279.	57.	295.
50443.	58.	299.
50607.	57.	302.
50771.	57.	301.
50935.	51.	301.
51099.	50.	301.
51263.	44.	294.
51427.	43.	289.
51591.	43.	285.
51755.	44.	283.
51919.	44.	280.
52083.	49.	279.
52247.	53.	282.
52411.	54.	287.
52575.	57.	291.
52740.	57.	291.
52904.	54.	300.
53068.	51.	299.

TABLE I.- APOLLO 4 WIND DATA - Continued

(e) T - 1 hour

ALTITUDE FT	VELOCITY FT/SEC	AZIMUTH DEG	ALTITUDE FT	VELOCITY FT/SEC	AZIMUTH DEG
328.	34.	55.	8530.	17.	5.
492.	34.	57.	8694.	17.	1.
656.	33.	61.	8858.	16.	355.
820.	34.	61.	9022.	15.	348.
984.	36.	62.	9186.	16.	348.
1148.	35.	62.	9350.	15.	346.
1312.	34.	61.	9514.	14.	341.
1476.	33.	57.	9678.	16.	331.
1640.	33.	56.	9843.	18.	319.
1804.	32.	56.	10007.	16.	316.
1969.	33.	58.	10171.	19.	324.
2133.	36.	58.	10335.	18.	322.
2297.	38.	60.	10499.	18.	325.
2461.	36.	62.	10581.	20.	332.
2625.	36.	62.	10745.	22.	331.
2789.	33.	60.	10909.	22.	334.
2953.	36.	57.	11073.	21.	329.
3117.	36.	57.	11237.	20.	323.
3281.	34.	58.	11401.	19.	312.
3445.	33.	57.	11565.	23.	309.
3609.	35.	53.	11729.	23.	314.
3773.	36.	54.	11893.	24.	313.
3937.	35.	53.	12057.	23.	313.
4101.	34.	53.	12221.	23.	315.
4265.	36.	51.	12385.	23.	316.
4429.	35.	53.	12549.	23.	308.
4593.	35.	54.	12713.	23.	296.
4757.	36.	50.	12877.	25.	294.
4921.	37.	44.	13041.	26.	298.
5085.	36.	44.	13205.	29.	306.
5249.	38.	37.	13369.	29.	312.
5413.	36.	35.	13533.	26.	314.
5577.	37.	33.	13698.	23.	308.
5741.	38.	33.	13862.	25.	301.
5906.	35.	28.	14026.	23.	301.
6070.	35.	27.	14190.	20.	305.
6234.	36.	27.	14354.	19.	322.
6398.	37.	25.	14518.	17.	335.
6562.	39.	24.	14682.	15.	343.
6726.	37.	25.	14846.	14.	340.
6890.	32.	31.	15010.	10.	331.
7054.	25.	32.	15174.	14.	346.
7218.	19.	29.	15338.	17.	359.
7382.	14.	30.	15502.	17.	2.
7546.	13.	22.	15666.	18.	7.
7710.	12.	23.	15830.	19.	13.
7874.	13.	27.	15994.	20.	16.
8038.	13.	21.	16158.	21.	22.
8202.	13.	13.	16322.	18.	22.
8366.	16.	7.	16486.	20.	17.

TABLE I.- APOLLO 4 WIND DATA - Continued

(e) T - 1 hour - Continued

ALTITUDE FT	VELOCITY FT/SEC	AZIMUTH DEG	ALTITUDE FT	VELOCITY FT/SEC	AZIMUTH DEG
16650.	21.	16.	24852.	50.	283.
16814.	20.	15.	25016.	51.	283.
16978.	21.	13.	25180.	52.	284.
17142.	22.	4.	25344.	54.	284.
17306.	23.	354.	25509.	54.	283.
17470.	25.	351.	25673.	52.	283.
17635.	25.	350.	25837.	53.	282.
17799.	23.	349.	26001.	54.	283.
17963.	24.	353.	26165.	56.	283.
18127.	24.	353.	26329.	57.	281.
18291.	24.	353.	26493.	58.	280.
18455.	22.	354.	26657.	60.	280.
18619.	20.	347.	26821.	62.	279.
18783.	19.	341.	26985.	62.	280.
18947.	17.	333.	27149.	65.	281.
19111.	19.	319.	27313.	66.	282.
19275.	22.	315.	27477.	69.	283.
19439.	22.	308.	27641.	69.	284.
19603.	23.	302.	27805.	70.	284.
19767.	24.	309.	27969.	69.	283.
19931.	25.	304.	28133.	70.	283.
20095.	27.	303.	28297.	71.	283.
20259.	28.	304.	28461.	72.	284.
20423.	31.	306.	28625.	72.	285.
20587.	32.	303.	28789.	72.	285.
20751.	36.	307.	28953.	72.	285.
20915.	34.	300.	29117.	72.	284.
21079.	36.	293.	29281.	75.	284.
21243.	34.	289.	29446.	79.	284.
21407.	33.	282.	29610.	78.	283.
21572.	34.	278.	29774.	77.	283.
21736.	36.	273.	29938.	78.	286.
21900.	35.	276.	30102.	76.	285.
22064.	35.	278.	30266.	75.	283.
22228.	35.	277.	30430.	75.	280.
22392.	36.	277.	30594.	77.	277.
22556.	35.	280.	30758.	78.	273.
22720.	36.	283.	30922.	82.	272.
22884.	35.	284.	31086.	82.	272.
23048.	36.	283.	31250.	81.	271.
23212.	39.	283.	31414.	81.	270.
23376.	40.	283.	31578.	79.	271.
23540.	41.	284.	31742.	79.	270.
23704.	41.	286.	31906.	79.	271.
23868.	43.	292.	32070.	80.	271.
24032.	46.	296.	32234.	81.	273.
24196.	46.	292.	32398.	80.	273.
24360.	45.	289.	32562.	81.	274.
24524.	45.	288.	32726.	80.	274.
24688.	46.	285.	32890.	82.	274.

TABLE I.- APOLLO 4 WIND DATA - Continued

(e) T - 1 hour - Continued

ALTITUDE FT	VELOCITY FT/SEC	AZIMUTH DEG	ALTITUDE FT	VELOCITY FT/SEC	AZIMUTH DEG
33054.	79.	275.	41257.	71.	276.
33219.	78.	273.	41421.	71.	279.
33383.	81.	270.	41585.	71.	280.
33547.	81.	271.	41749.	72.	280.
33711.	80.	268.	41913.	73.	281.
33875.	81.	267.	42077.	71.	280.
34039.	82.	268.	42241.	70.	279.
34203.	81.	269.	42405.	69.	279.
34367.	80.	270.	42569.	68.	279.
34531.	81.	270.	42733.	66.	277.
34695.	81.	270.	42897.	67.	276.
34859.	82.	270.	43061.	69.	280.
35023.	82.	269.	43225.	71.	281.
35187.	83.	269.	43389.	69.	282.
35351.	85.	269.	43553.	67.	283.
35515.	84.	267.	43717.	66.	285.
35679.	85.	267.	43881.	67.	287.
35843.	85.	267.	44045.	66.	288.
36007.	84.	267.	44209.	65.	287.
36171.	85.	267.	44373.	64.	287.
36335.	87.	266.	44537.	64.	287.
36499.	88.	267.	44701.	63.	289.
36663.	86.	266.	44865.	61.	290.
36827.	85.	266.	45030.	62.	288.
36991.	84.	266.	45194.	61.	288.
37156.	83.	267.	45358.	59.	287.
37320.	82.	269.	45522.	59.	286.
37484.	86.	270.	45686.	62.	283.
37648.	86.	273.	45850.	60.	284.
37812.	89.	275.	46014.	60.	281.
37976.	87.	276.	46178.	58.	281.
38140.	84.	275.	46342.	55.	283.
38304.	85.	275.	46506.	56.	283.
38468.	84.	277.	46670.	57.	284.
38632.	83.	279.	46834.	58.	283.
38796.	82.	279.	46998.	56.	288.
38960.	81.	279.	47162.	55.	287.
39124.	79.	278.	47326.	55.	283.
39288.	76.	276.	47490.	54.	279.
39452.	75.	273.	47654.	53.	283.
39616.	73.	272.	47818.	52.	284.
39780.	71.	274.	47982.	53.	286.
39944.	69.	276.	48146.	53.	287.
40108.	68.	276.	48310.	53.	291.
40272.	68.	275.	48474.	53.	289.
40436.	71.	276.	48638.	54.	289.
40600.	72.	275.	48802.	56.	286.
40764.	72.	274.	48967.	55.	287.
40928.	72.	274.	49131.	56.	287.
41093.	71.	274.	49295.	57.	289.

TABLE I.- APOLLO 4 WIND DATA - Concluded

(e) T - 1 hour - Concluded

ALTITUDE FT	VELOCITY FT/SEC	AZIMUTH DEG
49459.	56.	288.
49623.	56.	289.
49787.	55.	292.
49951.	57.	293.
50115.	58.	294.
50279.	57.	295.
50443.	58.	299.
50607.	57.	302.
50771.	57.	301.
50935.	51.	301.
51099.	50.	301.
51263.	44.	294.
51427.	43.	289.
51591.	43.	285.
51755.	44.	283.
51919.	44.	280.
52083.	49.	279.
52247.	53.	282.
52411.	54.	287.
52575.	57.	291.
52740.	57.	291.
52904.	54.	300.
53068.	51.	299.

TABLE II.- AVERAGE WIND DATA FOR PRELAUNCH BALLOON RELEASES

Altitude above mean sea level, ft	Average velocity, fps	Drift direction, deg E of N	Avg wind vel, fps	
			North component	East component
(a) Balloon release at T-minus-7 hours				
1 000.	42.0	238.2	-22.1	-35.7
2 000.	41.3	237.0	-22.5	-34.6
3 000.	41.0	238.2	-21.6	-34.8
4 000.	40.4	239.2	-20.7	-34.7
5 000.	38.6	240.4	-19.1	-33.6
6 000.	35.7	241.9	-16.8	-31.5
7 000.	33.4	240.7	-16.3	-29.1
8 000.	32.4	237.8	-17.3	-27.4
9 000.	30.5	236.0	-17.1	-25.3
10 000.	28.0	234.6	-16.3	-22.9
(b) Balloon release at T-minus-5.5 hours				
1 000.	35.4	230.0	-22.8	-27.1
2 000.	35.8	233.6	-21.2	-28.8
3 000.	34.9	235.4	-19.8	-28.8
4 000.	33.5	236.6	-18.4	-27.9
5 000.	32.7	237.8	-17.5	-27.7
6 000.	32.8	238.4	-17.2	-28.0
7 000.	33.4	238.5	-17.5	-28.5
8 000.	34.0	237.8	-18.1	-28.8
9 000.	31.3	235.3	-17.8	-25.7
10 000.	28.3	231.4	-17.6	-22.1
(c) Balloon release at T-minus-4 hours				
1 000.	40.8	235.3	-23.3	-33.6
2 000.	38.6	238.6	-20.1	-32.9
3 000.	36.9	241.0	-17.9	-32.3
4 000.	35.8	242.3	-16.6	-31.7
5 000.	35.3	242.8	-16.1	-31.4
6 000.	33.5	242.3	-15.6	-29.7
7 000.	32.5	241.3	-15.6	-28.5
8 000.	31.2	238.3	-16.4	-26.5
9 000.	29.4	236.0	-16.4	-24.4
10 000.	27.0	234.2	-15.8	-21.9

TABLE II.- AVERAGE WIND DATA FOR PRELAUNCH BALLOON RELEASES - Concluded

Altitude above mean sea level, ft	Average velocity, fps	Drift direction, deg E of N	Avg wind vel, fps	
			North component	East component
(d) Balloon release at T-minus-2 hours				
1 000.	36.7	230.7	-23.2	-28.4
2 000.	36.3	233.7	-21.5	-29.3
3 000.	35.3	237.0	-19.2	-29.6
4 000.	34.3	237.3	-18.5	-28.8
5 000.	32.9	235.5	-18.6	-27.1
6 000.	30.5	232.7	-18.5	-24.2
7 000.	28.8	231.8	-17.8	-22.6
8 000.	27.7	229.8	-17.9	-21.1
9 000.	26.5	227.0	-18.1	-19.4
10 000.	24.8	224.0	-17.8	-17.2
(e) Balloon release at T-minus-1 hour				
1 000.	34.3	239.1	-17.6	-29.4
2 000.	33.9	238.9	-17.5	-29.0
3 000.	34.5	239.1	-17.7	-29.6
4 000.	34.6	238.1	-18.3	-29.4
5 000.	34.7	236.5	-19.2	-28.9
6 000.	34.6	232.7	-21.0	-27.6
7 000.	34.3	229.0	-22.5	-25.9
8 000.	31.9	227.6	-21.5	-23.6
9 000.	29.6	225.5	-20.7	-21.1
10 000.	27.2	222.4	-20.1	-18.3

TABLE III.- APOLLO 4 PRELAUNCH MODE I ABORT LANDING POINT DATA

(a) Balloon release at T - 7 hours

G.e.t. of abort, sec	Range, ft	Range, n. mi.	Bearing E/N[a] deg	Range E[b], ft	Range N[c], ft	G.e.t. of impact, sec	Geodetic latitude, deg	Longitude, deg	Maximum altitude[d], ft	Drogue deploy altitude, ft	Main deploy altitude, ft
0.	2562.	0.422	133.1	1872.	-1749.	107.	28.603609	-80.598515	4935.	4927.	3506.
10.	2676.	0.440	172.4	355.	-2652.	162.	28.601126	-80.603243	6121.	6086.	4824.
20.	3316.	0.546	-158.5	-1218.	-3085.	242.	28.599936	-80.608144	8113.	8039.	6924.
25.	3200.	0.527	-151.6	-1524.	-2814.	285.	28.600680	-80.609097	9270.	9183.	8110.
30.	3957.	0.651	-149.4	-2012.	-3408.	349.	28.599048	-80.610617	11 065.	10 959.	9943.
35.	4308.	0.709	-176.5	-266.	-4300.	424.	28.596594	-80.605178	13 292.	13 153.	12 224.
41.	6613.	1.088	139.6	4284.	-5037.	528.	28.594565	-80.590998	16 535.	16 345.	15 549.
42.	3690.	0.607	139.2	2411.	-2794.	391.	28.600784	-80.593942	17 136.	16 938.	10 200.
43.	3750.	0.617	143.6	2226.	-3018.	397.	28.600167	-80.594518	18 379.	18 076.	10 200.
50.	6751.	1.111	109.5	6366.	-2249.	422.	28.602278	-80.581622	23 028.	22 695.	10 200.
60.	15 835.	2.606	89.7	15 835.	83.	460.	28.608674	-80.552119	31 158.	30 762.	10 200.
67.	25 521.	4.200	84.7	25 411.	2363.	491.	28.614923	-80.522280	39 278.	38 634.	10 200.
68.	31 513.	5.186	80.5	31 083.	5186.	473.	28.622667	-80.504601	41 004.	23 500.	10 200.
75.	50 191.	8.260	78.5	49 179.	10 028.	503.	28.635915	-80.448196	53 455.	23 500.	10 200.
90.	151 315.	24.903	74.5	145 811.	40 439.	573.	28.718779	-80.146694	94 348.	23 500.	10 200.

[a]Minus sign indicates west of north (W/N).

[b]Minus sign indicates west.

[c]Minus sign indicates south.

[d]Altitude above mean sea level.

TABLE III.- APOLLO 4 PRELAUNCH MODE I ABORT LANDING POINT DATA - Continued

(b) Balloon release at T - 5.5 hours

G.e.t. of abort, sec	Range, ft	Range, n. mi.	Bearing E/N[a] deg	Range E[b], ft	Range N[c], ft	G.e.t. of impact, sec	Geodetic latitude, deg	Longitude, deg	Maximum altitude[d], ft	Drogue deploy altitude, ft	Main deploy altitude, ft
0.	2278.	0.375	142.7	1379.	-1813.	107.	28.603435	-80.600049	4934.	4927.	3507.
10.	2803.	0.461	-174.0	-291.	-2788.	163.	28.600753	-80.605256	6126.	6087.	4834.
20.	3801.	0.625	-147.9	-2017.	-3221.	242.	28.599560	-80.610633	8118.	8044.	6930.
25.	3353.	0.552	-140.9	-2114.	-2603.	285.	28.601260	-80.610936	9265.	9181.	8102.
30.	3729.	0.614	-148.1	-1972.	-3165.	349.	28.599714	-80.610494	11 064.	10 958.	9936.
35.	3731.	0.614	-168.7	-728.	-3659.	424.	28.598357	-80.606616	13 296.	13 156.	12 232.
41.	5228.	0.860	137.9	3507.	-3876.	527.	28.597759	-80.593418	16 526.	16 341.	15 535.
42.	3282.	0.540	139.3	2142.	-2487.	391.	28.601623	-80.594823	17 125.	16 934.	10 200.
43.	3338.	0.549	148.1	1766.	-2832.	397.	28.600673	-80.595994	18 360.	18 070.	10 200.
50.	6163.	1.014	109.9	5794.	-2102.	422.	28.602680	-80.583446	23 022.	22 693.	10 200.
60.	15 125.	2.489	89.4	15 124.	154.	460.	28.608870	-80.554378	31 150.	30.759.	10 200.
67.	24 746.	4.073	84.0	24 612.	2574.	491.	28.615503	-80.524813	39 273.	38 633.	10 200.
68.	30 866.	5.080	79.9	30 386.	5423.	473.	28.623318	-80.506815	40 997.	23 500.	10 200.
75.	49 533.	8.152	78.0	48 452.	10 293.	503.	28.636643	-80.450505	53 448.	23 500.	10 200.
90.	150 312.	24.738	74.5	144 825.	40 241.	573.	28.718246	-80.149817	94 326.	23 500.	10 200.

[a]Minus sign indicates west of north (W/N).

[b]Minus sign indicates west.

[c]Minus sign indicates south.

[d]Altitude above mean sea level.

TABLE III.- APOLLO 4 PRELAUNCH MODE I ABORT LANDING POINT DATA - Continued

(c) Balloon release at T - 4 hours

G.e.t. of abort, sec	Range, ft	Range, n. mi.	Bearing E/N[a], deg	Range E[b], ft	Range N[c], ft	G.e.t. of impact, sec	Geodetic latitude, deg	Longitude, deg	Maximum altitude[d], ft	Drogue deploy altitude, ft	Main deploy altitude, ft
0.	2306.	0.380	138.9	1517.	-1737.	107.	28.603641	-80.599619	4933.	4926.	3506.
10.	2524.	0.415	179.7	13.	-2524.	163.	28.601477	-80.604305	6125.	6088.	4833.
20.	3358.	0.553	-150.6	-1647.	-2927.	243.	28.600371	-80.609480	8120.	8045.	6933.
25.	3121.	0.514	-144.2	-1825.	-2532.	285.	28.601456	-80.610035	9265.	9180.	8100.
30.	3491.	0.574	-150.7	-1709.	-3044.	349.	28.600049	-80.609673	11 063.	10 958.	9938.
35.	3719.	0.612	-172.1	-511.	-3683.	424.	28.598289	-80.605941	13 289.	13 153.	12 222.
41.	5208.	0.857	148.1	2752.	-4422.	526.	28.596259	-80.595773	16 509.	16 334.	15 504.
42.	3041.	0.501	146.0	1699.	-2523.	390.	28.601525	-80.596304	17 108.	16 925.	10 200.
43.	3187.	0.525	156.7	1259.	-2928.	397.	28.600412	-80.597673	18 342.	18 062.	10 200.
50.	5823.	0.958	110.2	5465.	-2011.	422.	28.602929	-80.584572	23 024.	22 693.	10 200.
60.	14 760.	2.429	89.5	14 760.	123.	460.	28.608783	-80.555613	31 148.	30 759.	10 200.
67.	24 319.	4.002	84.1	24 190.	2500.	491.	28.615297	-80.526228	39 272.	38 634.	10 200.
68.	30 503.	5.020	79.7	30 014.	5443.	473.	28.623374	-80.508076	40 993.	23 500.	10 200.
75.	49 132.	8.086	77.9	48 040.	10 300.	503.	28.636665	-80.451888	53 445.	23 500.	10 200.
90.	149 973.	24.682	74.4	144 471.	40 248.	573.	28.718271	-80.151023	94 326.	23 500.	10 200.

[a]Minus sign indicates west of north (W/N).

[b]Minus sign indicates west.

[c]Minus sign indicates south.

[d]Altitude above mean sea level.

TABLE III.- APOLLO 4 PRELAUNCH MODE I ABORT LANDING POINT DATA - Continued

(d) Balloon release at T - 2 hours

G.e.t. of abort, sec	Range, ft	Range, n. mi.	Bearing E/N[a], deg	Range E[b], ft	Range N[c], ft	G.e.t. of impact, sec	Geodetic latitude, deg	Longitude, deg	Maximum altitude, ft	Drogue deploy altitude, ft	Main deploy altitude, ft
0.	2663.	0.438	133.1	1944.	-1819.	108.	28.603417	-80.598288	4937.	4929.	3513.
10.	2686.	0.442	169.5	489.	-2641.	163.	28.601155	-80.602825	6129.	6091.	4836.
20.	3381.	0.556	-168.9	-652.	-3318.	243.	28.599295	-80.606379	8122.	8046.	6934.
25.	3063.	0.504	-170.2	-519.	-3019.	285.	28.600118	-80.605967	9266.	9181.	8101.
30.	3463.	0.570	-177.1	-176.	-3458.	349.	28.598909	-80.604896	11 062.	10 958.	9936.
35.	4528.	0.745	166.2	1078.	-4398.	424.	28.596324	-80.600988	13 286.	13 151.	12 215.
41.	6558.	1.079	144.0	3858.	-5304.	526.	28.593832	-80.592328	16 499.	16 328.	15 488.
42.	4105.	0.676	135.7	2867.	-2938.	390.	28.600387	-80.593239	17 100.	16 921.	10 200.
43.	4132.	0.680	144.2	2415.	-3353.	397.	28.599247	-80.594648	18 338.	18 060.	10 200.
50.	7021.	1.155	109.5	6620.	-2339.	422.	28.602030	-80.581547	23 024.	22 693.	10 200.
60.	15 901.	2.617	91.2	15 897.	-322.	460.	28.607564	-80.552644	31 148.	30 758.	10 200.
67.	25 335.	4.170	85.5	25 256.	1996.	491.	28.613918	-80.523481	39 271.	38 634.	10 200.
68.	31 525.	5.188	80.9	31 125.	5005.	473.	28.622174	-80.505188	40 992.	23 500.	10 200.
75.	50 085.	8.243	78.6	49 102.	9870.	503.	28.635490	-80.449153	53 443.	23 500.	10 200.
90.	150 942.	24.842	74.7	145 599.	39 806.	573.	28.717064	-80.148087	94 326.	23 500.	10 200.

[a]Minus sign indicates west of north (W/N).

[b]Minus sign indicates west.

[c]Minus sign indicates south.

[d]Altitude above mean sea level.

TABLE III.- APOLLO 4 PRELAUNCH MODE I ABORT LANDING POINT POINT DATA - Concluded

(e) Balloon release at T - 1 hour

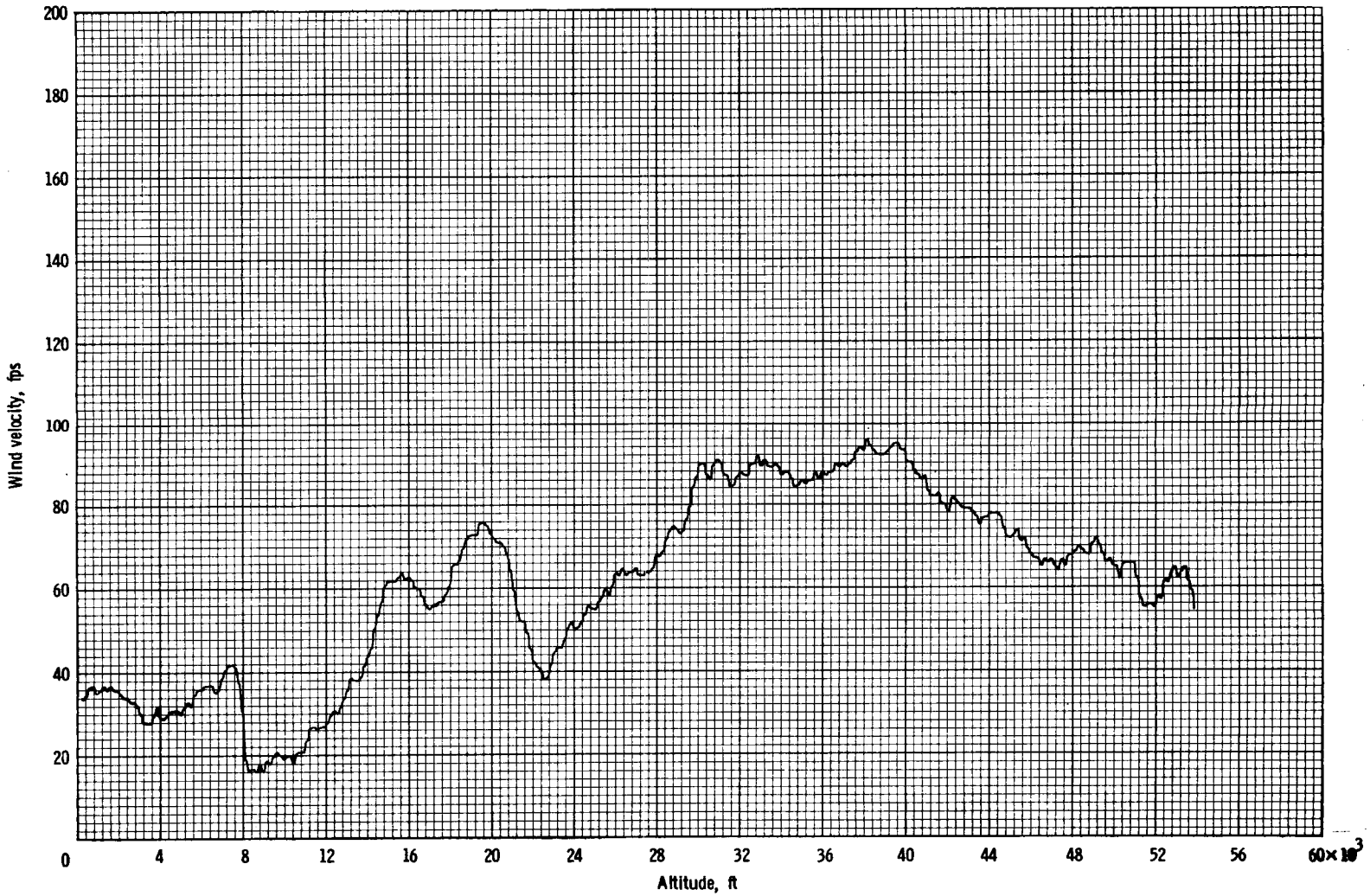
G.e.t. of abort, sec	Range, ft	Range, n. mi.	Bearing E/N[a], deg	Range E[b], ft	Range N[c], ft	G.e.t. of impact, sec	Geodetic latitude, deg	Longitude, deg	Maximum altitude[d], ft	Drogue deploy altitude, ft	Main deploy altitude, ft
0.	2429.	0.400	130.9	1836.	-1589.	107.	28.604048	-80.598624	4934.	4926.	3507.
10.	2674.	0.440	172.5	351.	-2651.	163.	28.601128	-80.603254	6125.	6088.	4832.
20.	3644.	0.600	-162.8	-1076.	-3482.	243.	28.598844	-80.607699	8124.	8047.	6940.
25.	3907.	0.643	-163.1	-1134.	-3739.	286.	28.598139	-80.607882	9268.	9183.	8105.
30.	4308.	0.709	-170.9	-684.	-4254.	349.	28.596721	-80.606480	11 063.	10 958.	9938.
35.	5124.	0.843	171.0	798.	-5061.	424.	28.594501	-80.601860	13 286.	13 151.	12 215.
41.	6954.	1.145	148.9	3589.	-5957.	526.	28.592037	-80.593164	16 499.	16 328.	15 488.
42.	4434.	0.730	147.4	2391.	-3734.	390.	28.598206	-80.594542	17 100.	16 921.	10 200.
43.	4579.	0.754	154.9	1939.	-4148.	397.	28.597067	-80.595951	18 338.	18 060.	10 200.
50.	6898.	1.135	117.0	6144.	-3135.	422.	28.599851	-80.582851	32 024.	22 693.	10 200.
60.	15 462.	2.545	94.1	15 422.	-1117.	460.	28.605384	-80.553946	31 148.	30 758.	10 200.
67.	24 810.	4.083	87.2	24 781.	1201.	491.	28.611738	-80.524784	39 271.	38 634.	10 200.
68.	30 937.	5.092	82.2	30 649.	4209.	473.	28.619996	-80.506492	40 992.	23 500.	10 200.
75.	49 466.	8.141	79.4	48 627.	9075.	503.	28.633309	-80.450457	53 443.	23 500.	10 200.
90.	150 275.	24.732	75.0	145 123.	39 011.	573.	28.714885	-80.149390	94 326.	23 500.	10 200.

[a]Minus sign indicates west of north (W/N).

[b]Minus sign indicates west.

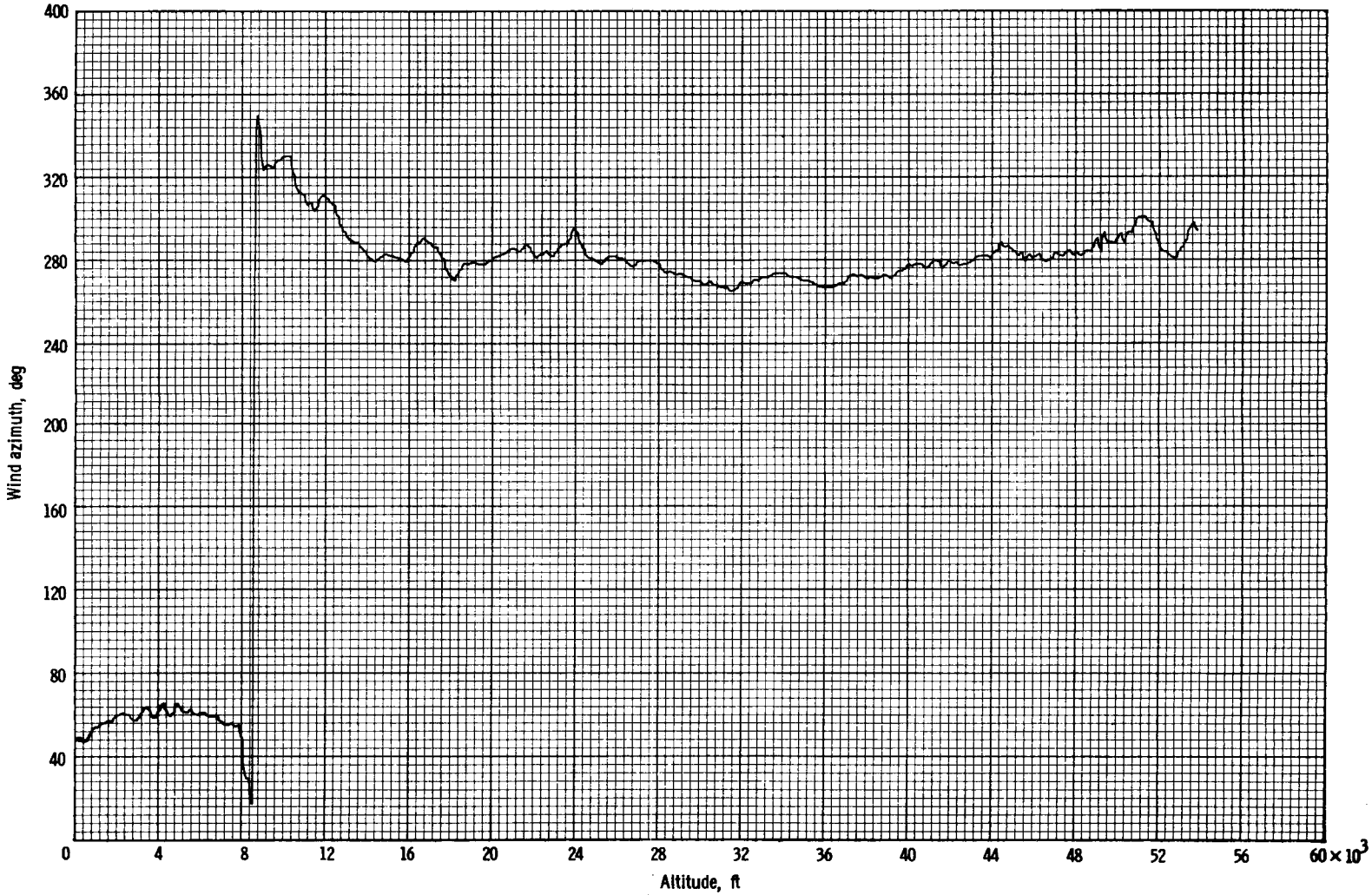
[c]Minus sign indicates south.

[d]Altitude above mean sea level.



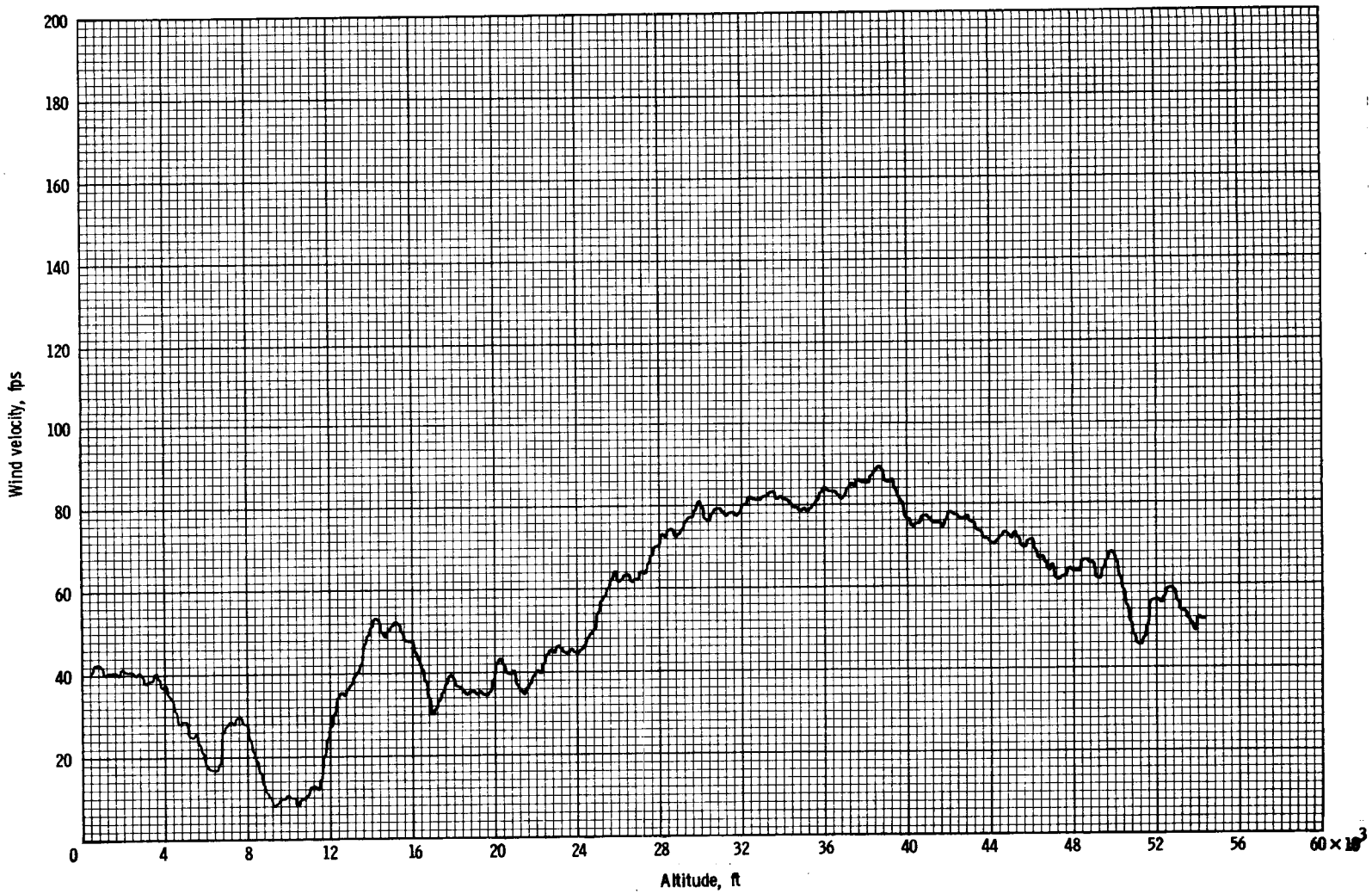
(a) Wind velocity.

Figure 1. - Apollo 4 wind profiles for balloon release at T-7 hours.



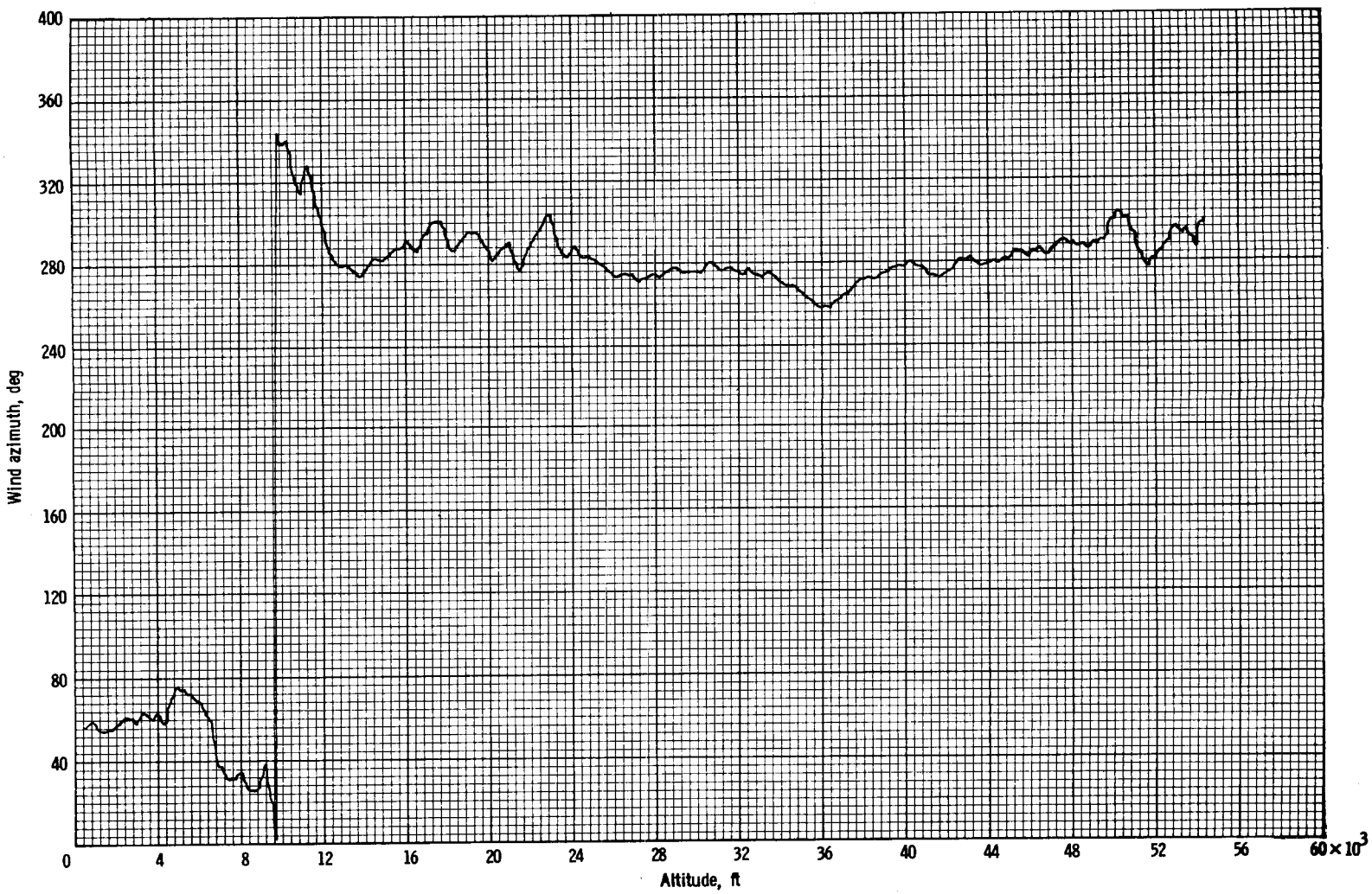
(b) Wind azimuth.

Figure 1. - Concluded.



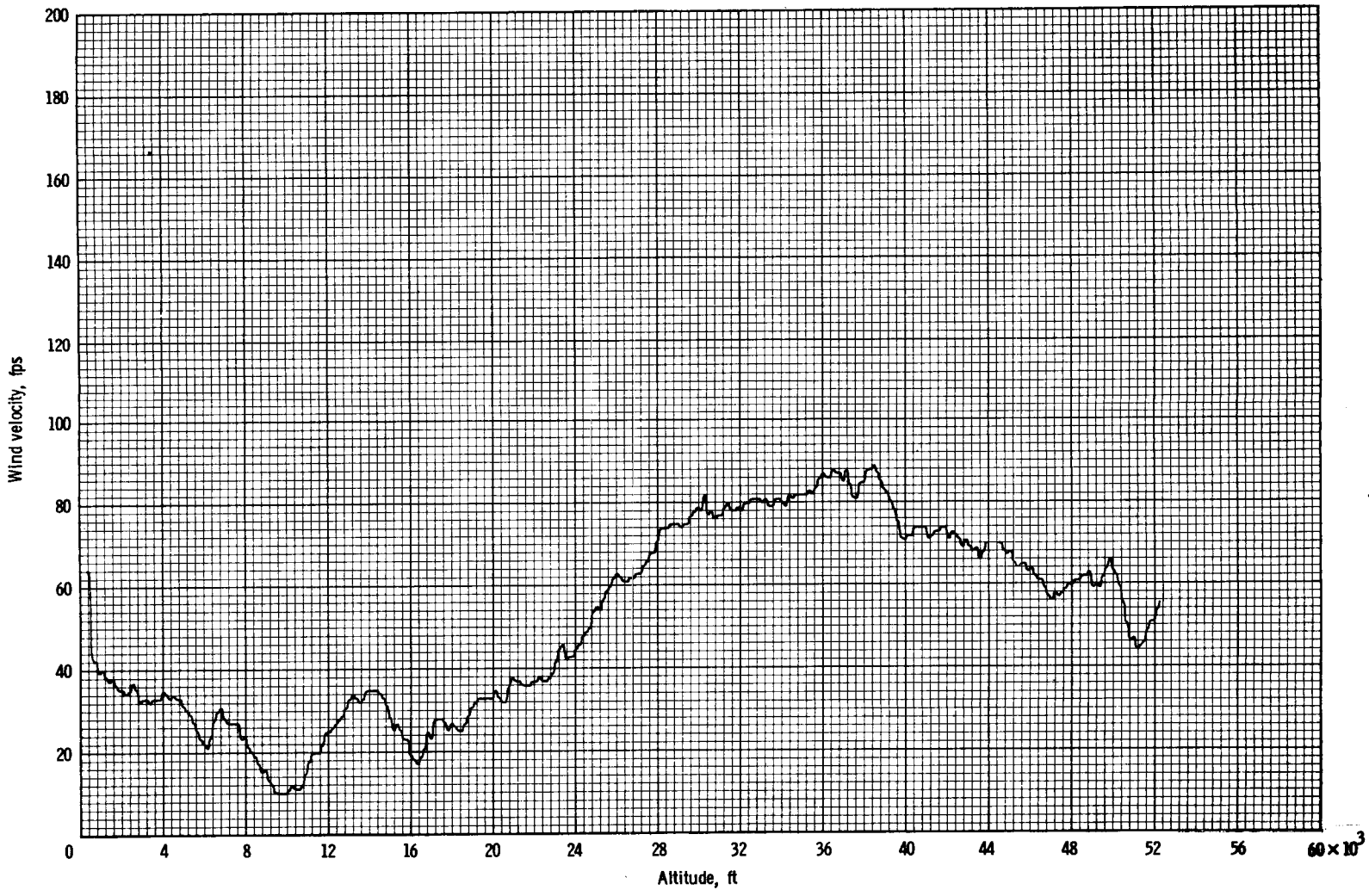
(a) Wind velocity.

Figure 2. - Apollo 4 wind profiles for balloon release at T-5.5 hours.



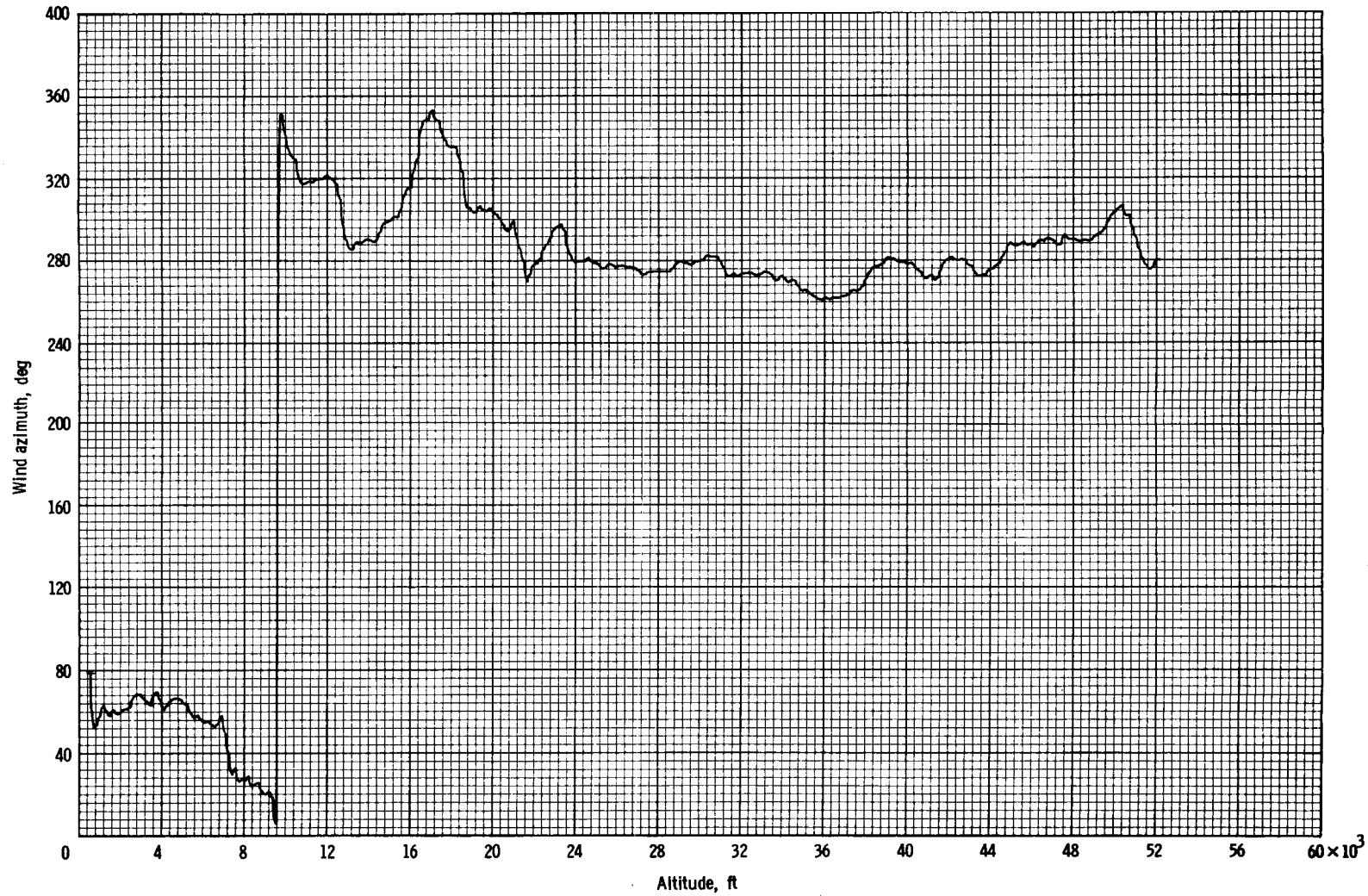
(b) Wind azimuth.

Figure 2. - Concluded.



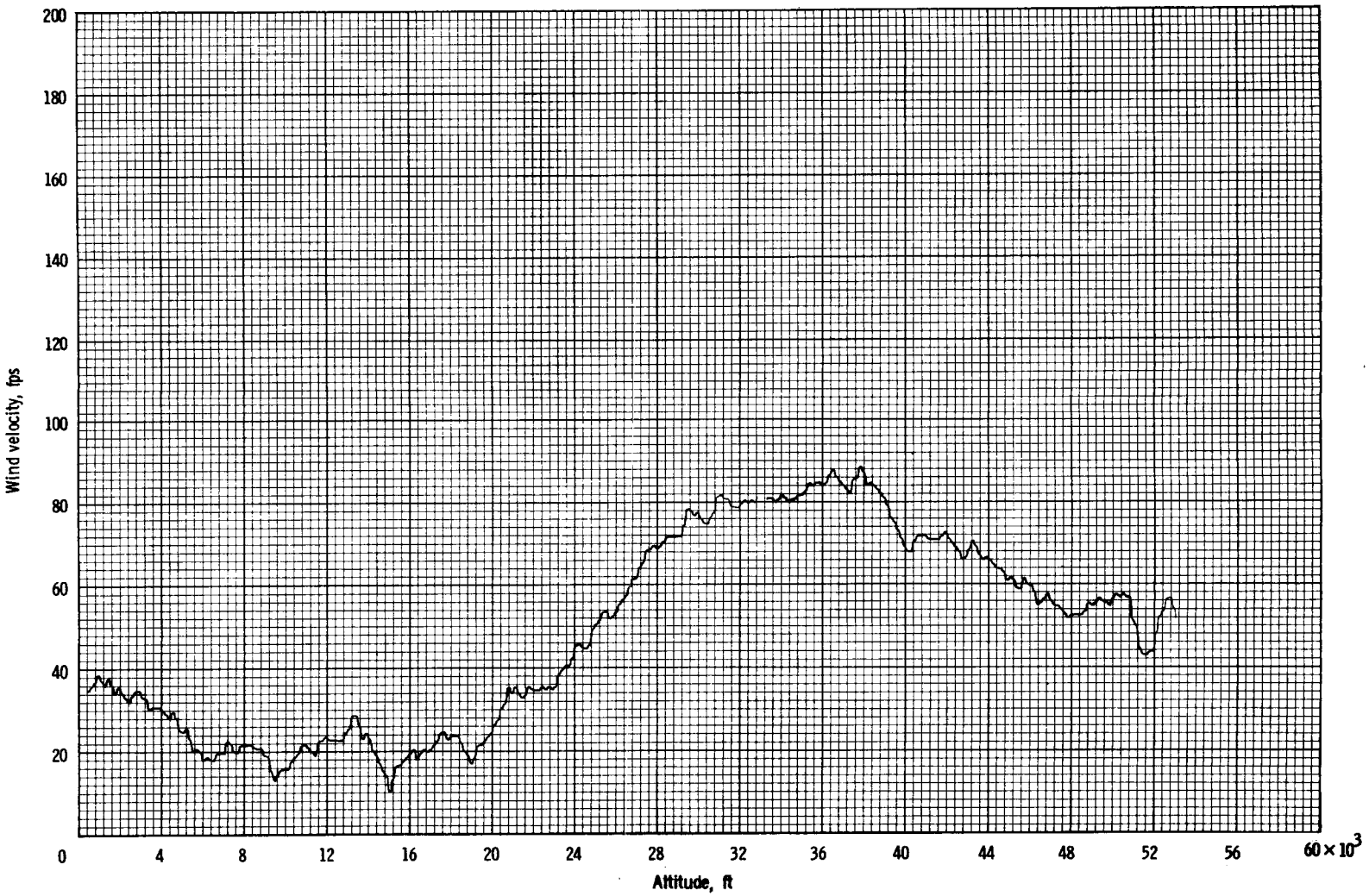
(a) Wind velocity.

Figure 3. - Apollo 4 wind profiles for balloon release at T-4 hours.



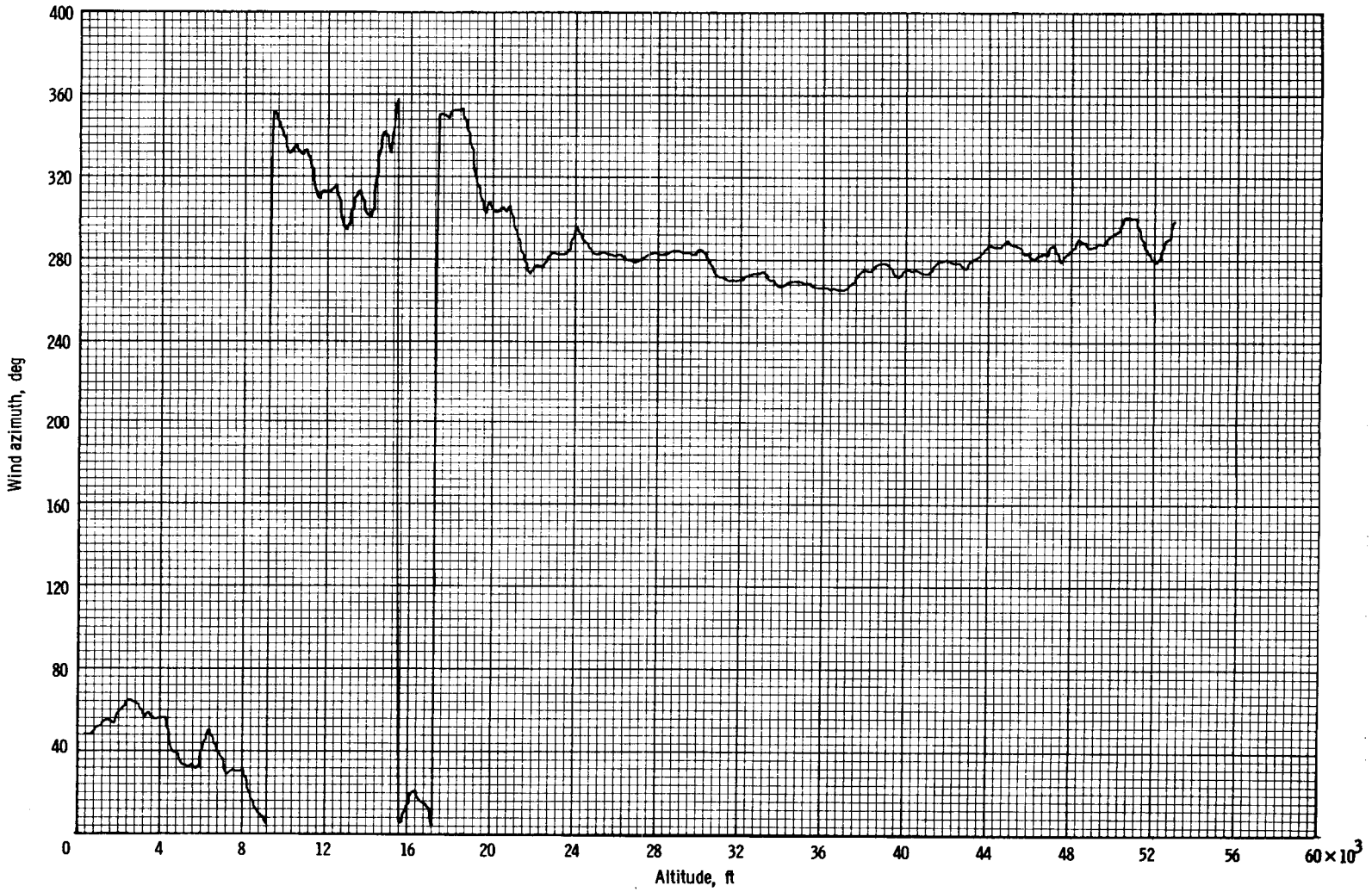
(b) Wind azimuth.

Figure 3. - Concluded.



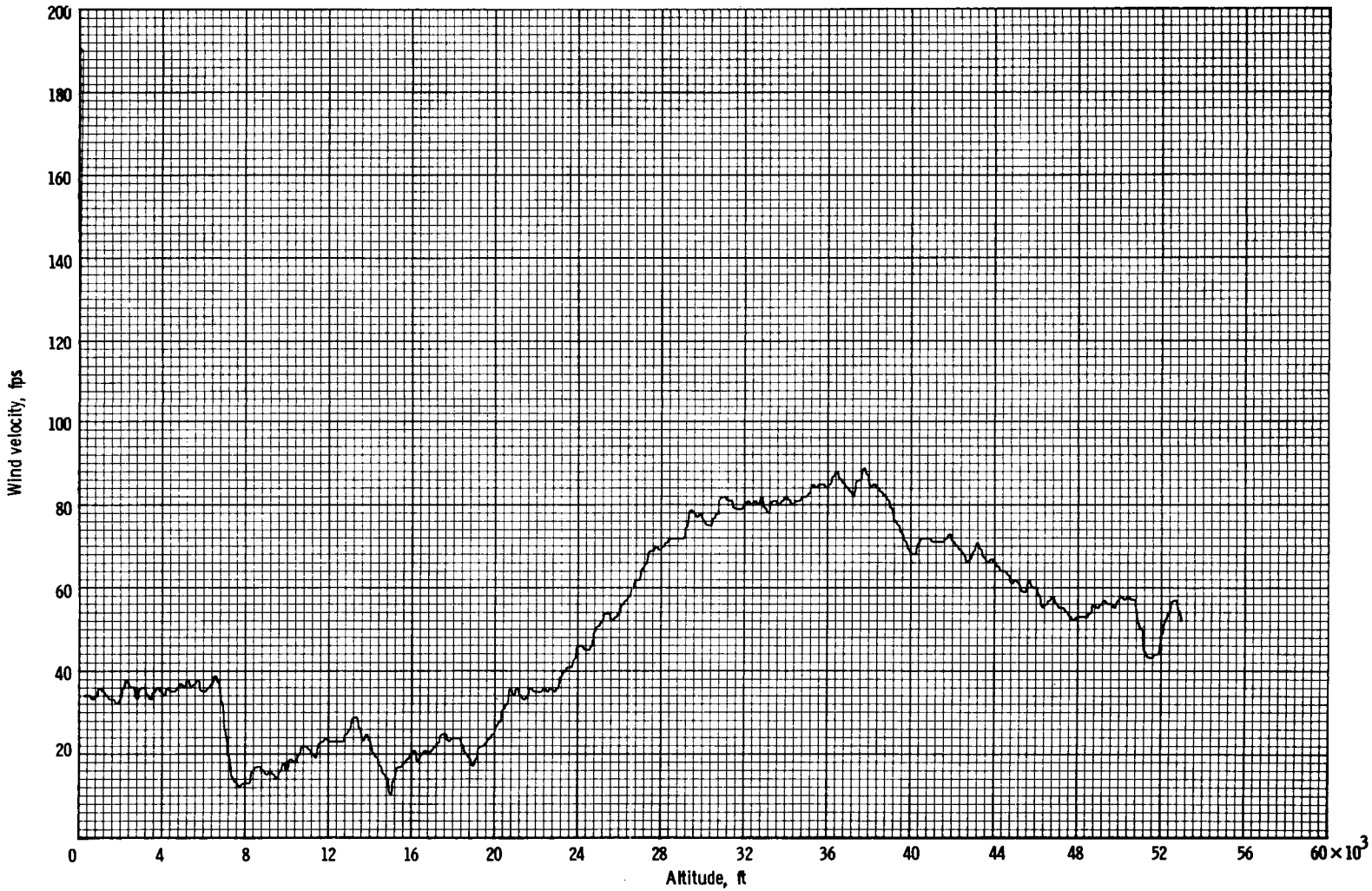
(a) Wind velocity.

Figure 4. - Apollo 4 wind profiles for balloon release at T-2 hours.



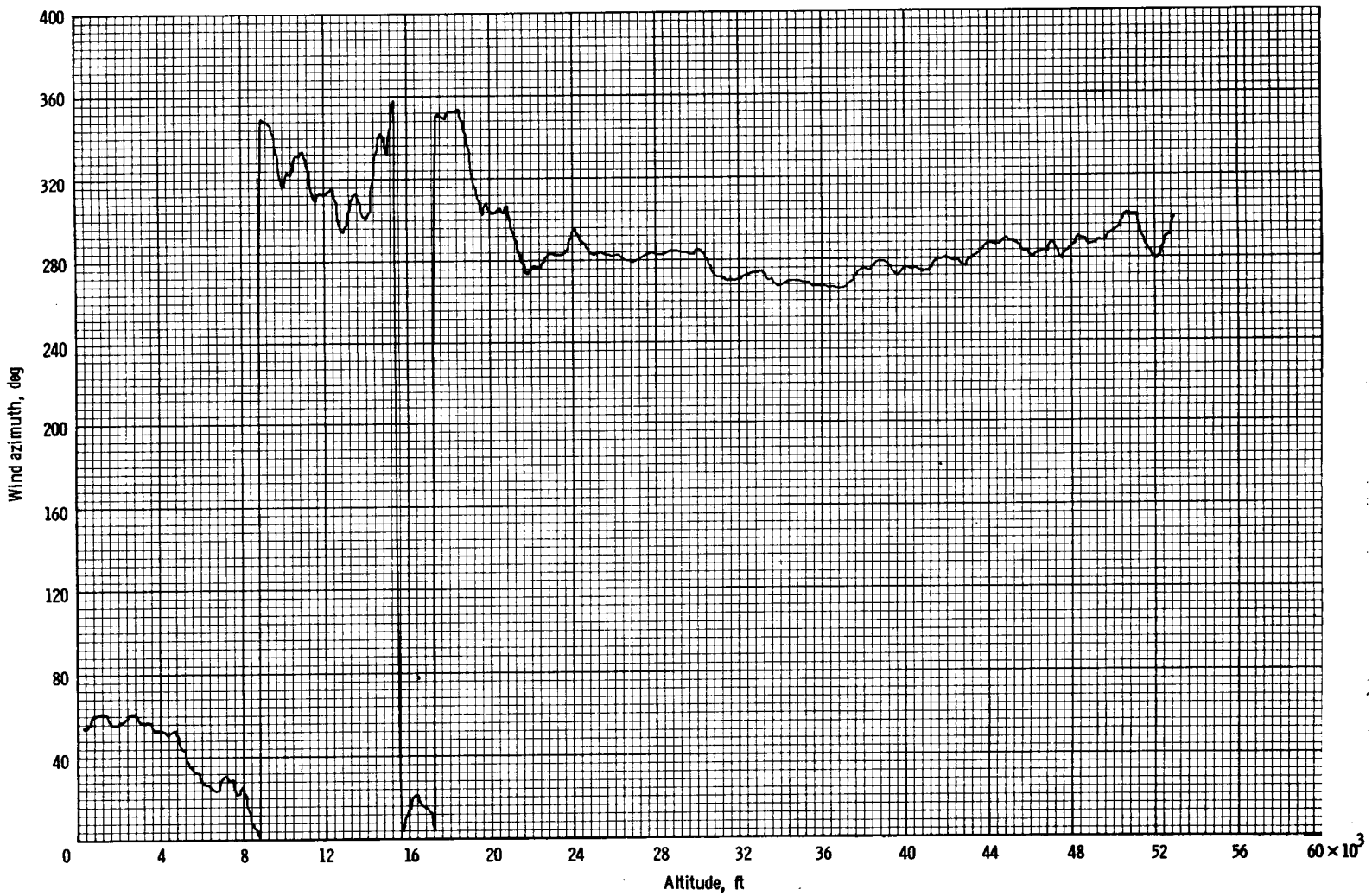
(b) Wind azimuth.

Figure 4. - Concluded.



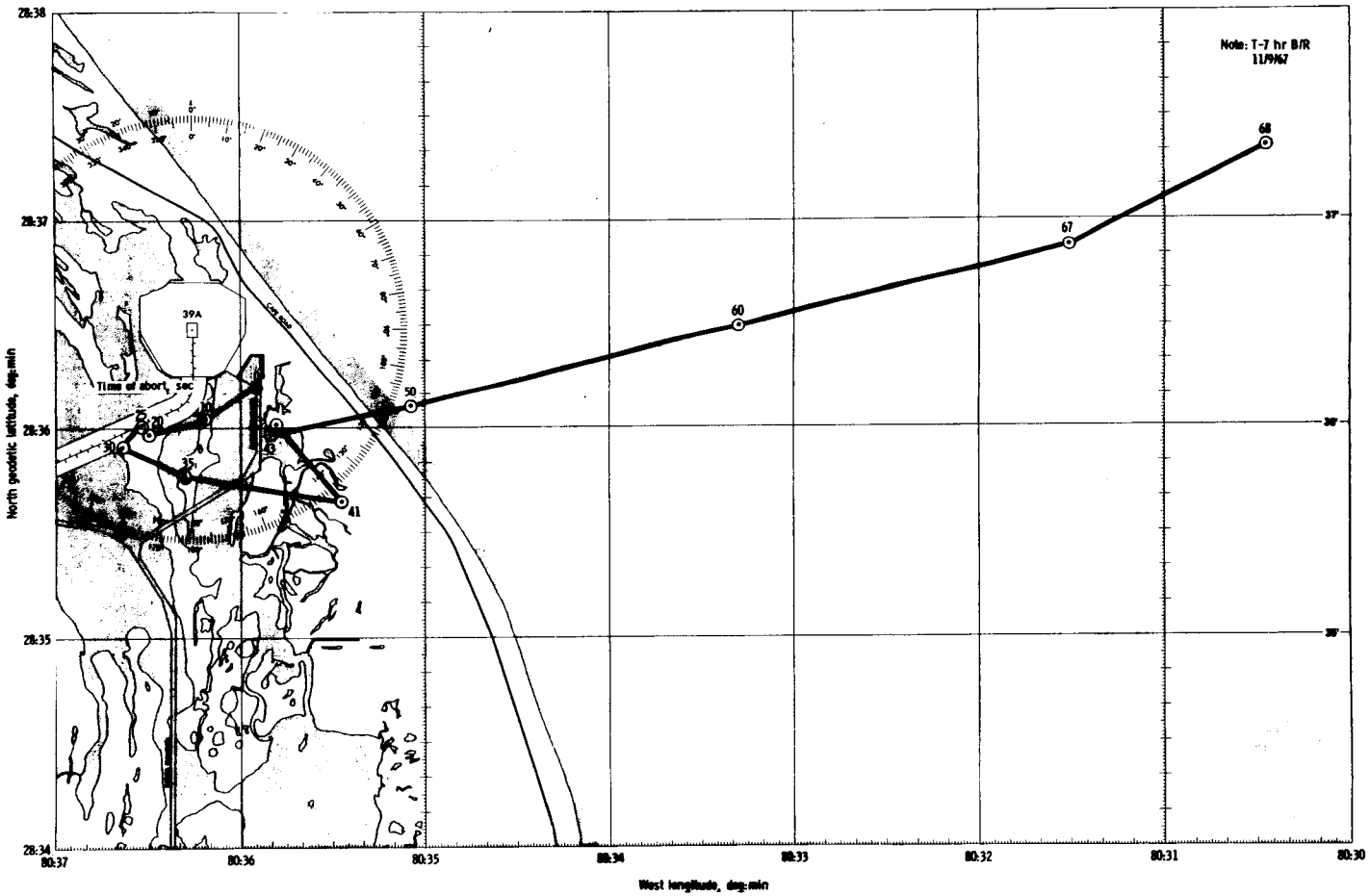
(a) Wind velocity.

Figure 5. - Apollo 4 wind profiles for balloon at release at T-1 hour.



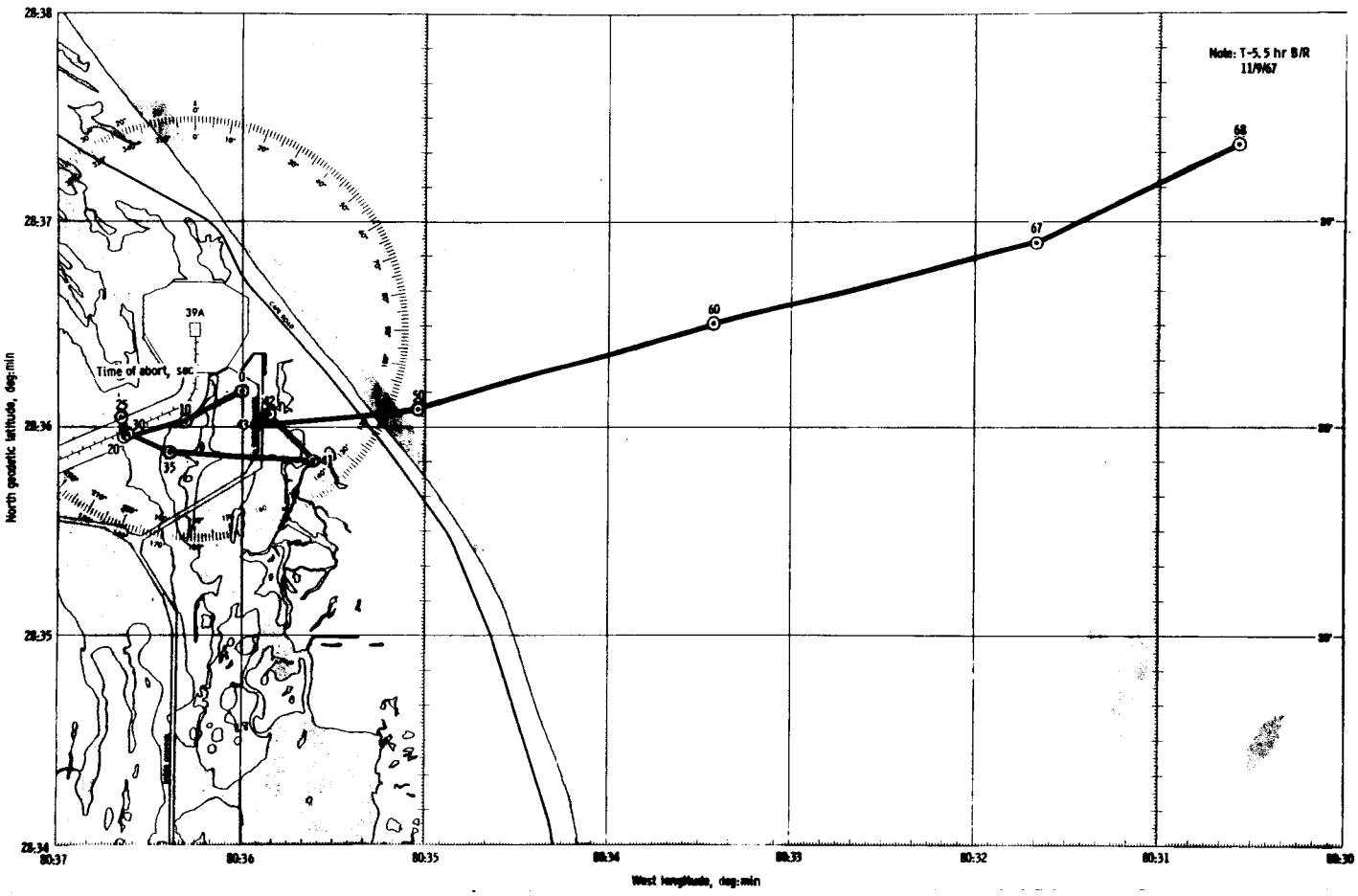
(b) Wind azimuth.

Figure 5. - Concluded.



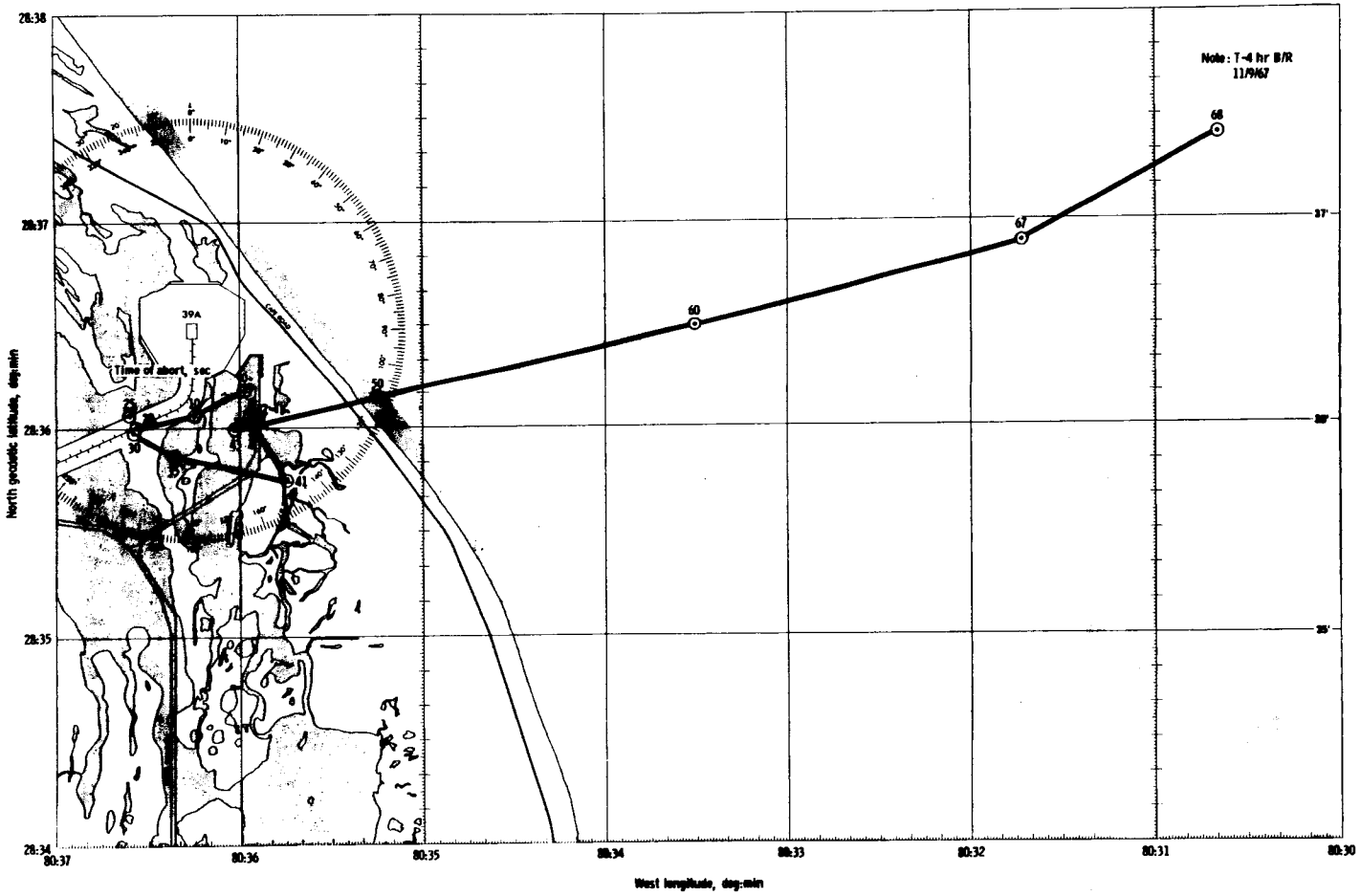
(a) Balloon release at T-7 hours.

Figure 6.- Command module landing points for Mode 1 aborts from the Apollo 4 launch trajectory.



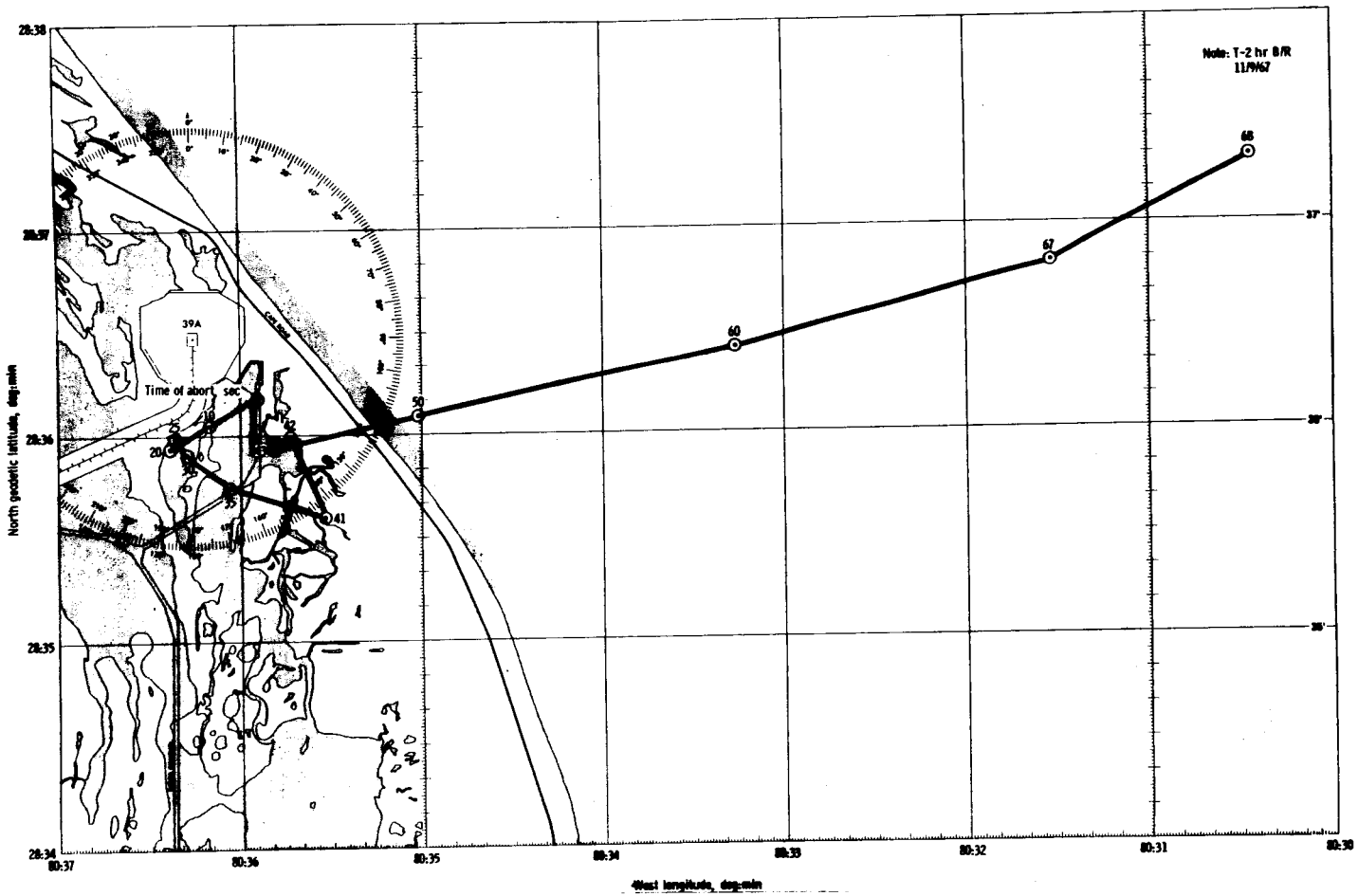
(b) Balloon release at T-5.5 hours.

Figure 6.- Continued.



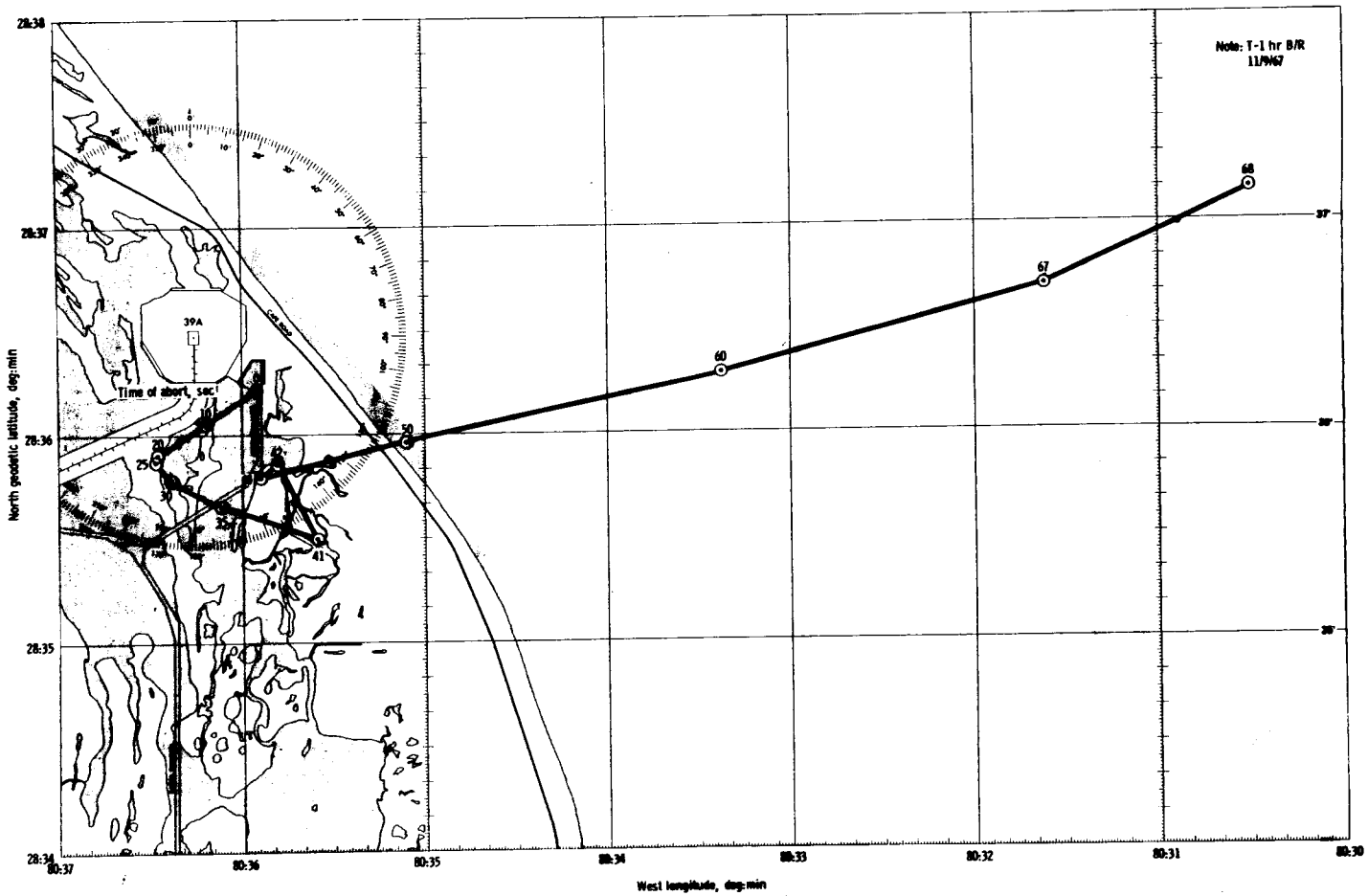
(c) Balloon release at T-4 hours.

Figure 6.- Continued.



(d) Balloon release at T-2 hours.

Figure 6.- Continued.



(e) Balloon release at T-1 hour.

Figure 6.- Concluded.

REFERENCES

1. TRW Systems: Apollo Mission Data Specification D for Apollo Saturn 501 (U). TRW document no. 2131-H009-R8-000, undated. Confidential.

2. Boeing Company: Saturn V AS-501 Launch Vehicle Operational Flight Trajectory - Final (U). D5-15551 (F)-1A, Volume II, April 3, 1967. Confidential.

3. Scoggins, James R.: Relative Accuracies of Wind Data Obtained from FPS-16 Radar/Super-pressure Balloon Measurements. Marshall Space Flight Center memorandum to Kennedy Space Center, November 16, 1964.

4. Scoggins, James R.: An Evaluation of Detail Wind Data as Measured by the FPS-16 Radar/Spherical Balloon Technique. NASA TN D-1572, May 1963.