PROJECT 10073 RECORD CARD

1. DATE 14 Oct 1963	2. LOCATION Saint John Canada	12. CONCLUSIONS ☐ Was Balloon ☐ Probably Balloon ☐ Possibly Balloon ☐ Was Aircraft ☐ Probably Aircraft ☐ Possibly Aircraft ☐ Was Astronomical ☐ Probably Astronomical ☐ Possibly Astronomical ☒ Other Satellite. ☐ Insufficient Data for Evaluation ☐ Unknown
3. DATE-TIME GROUP Local 0618 Am DST GMT 14/0848Z	4. TYPE OF OBSERVATION ☒ Ground-Visual ☐ Ground-Radar ☐ Air-Visual ☐ Air-Intercept Radar	
5. PHOTOS ☐ Yes ☒ No	6. SOURCE Civilian	
7. LENGTH OF OBSERVATION 20 Seconds	8. NUMBER OF OBJECTS 1	9. COURSE NW-SE

10. BRIEF SUMMARY OF SIGHTING

Observer reported object which he believed to be ECHO.

11. COMMENTS

ECHO Data indicates object not ECHO. Possibly other Satellite.

ATIC FORM 329 (REV 26 SEP 52)

Mail Sec. OCT 29 1963
AFP

[redacted]
Saint John, N. B.
Canada,
Oct 26, 1963

National Aeronautics and Space Administration,
Washington, D. C

Gentlemen:

Several days ago I witnessed a puzzling phenomenon in the skies which has since aroused my curiosity.

At 6:18 AM local time, 5:18 AM Washington time, (10:18 AM GMT) I saw what looked like a bright star travelling very rapidly, headed in a direction about 5 to 10 degrees north of South-East.

The object brightened and dimmed 3 or 4 seconds.

Thanking you in advance for any information you have on this matter,

Yours respectfully,

[redacted]

WALSH, Item 4

October 30, 1963

Dear Mr. [redacted]

This is in response to your recent letter in which you reported seeing an unusual phenomena in the sky around the period 20-26 October 1963.

We are inclined to believe that what you saw was the passage of ECHO I which was in the Halifax area on October 24th at 8:54 a.m. (GMT), 1° above the city, traveling in a southeasterly direction. However, since we do not definitely know the date of your sighting, we are inclosing a form (FTD 164) which we request you execute and return to this office. This will better enable the Air Force to evaluate the sighting. You will be notified upon completion of the investigation.

Sincerely,

MASTON M. JACKS
Major, USAF
Public Information Division
Office of Information

[redacted]
Saint John, N. B.
Canada

10/14

WALSH

U.S. AIR FORCE TECHNICAL INFORMATION

This questionnaire has been prepared so that you can give the U.S. Air Force as much information as possible concerning the unidentified aerial phenomenon that you have observed. Please try to answer as many questions as you possibly can. The information that you give will be used for research purposes. Your name will not be used in connection with any statements, conclusions, or publications without your permission. We request this personal information so that if it is deemed necessary, we may contact you for further details.

1. When did you see the object?

14 (Day) OCTOBER (Month) 1963 (Year)

2. Time of day: 6 (Hour) 18 (Minutes)

(Circle One): (A.M.) or P.M.

3. Time Zone:

(Circle One): a. Eastern
b. Central
c. Mountain
d. Pacific
e. Other ATLANTIC (CANADIAN)

(Circle One): a. Daylight Saving
~~b. Standard~~

4. Where were you when you saw the object?

[redacted] (Nearest Postal Address) SAINT JOHN (City or Town) N.B. (State or County)

5. How long was object in sight? (Total Duration) — (Hours) — (Minutes) 30 (Seconds)

a. Certain
(b.) Fairly certain
c. Not very sure
d. Just a guess

5.1 How was time in sight determined? ESTIMATED

5.2 Was object in sight continuously? Yes ✓ No ____

6. What was the condition of the sky?

DAY
a. Bright
b. Cloudy

~~NIGHT~~
(a.) Bright
~~b. Cloudy~~

7. IF you saw the object during DAYLIGHT, where was the SUN located as you looked at the object?

(Circle One): a. In front of you
b. In back of you
c. To your right
d. To your left
e. Overhead
f. Don't remember

FTD FORM OCT 62 164 This form supersedes FTD 164, Jul 61, which is obsolete.

8. IF you saw the object at NIGHT, what did you notice concerning the STARS and MOON?

8.1 STARS (*Circle One*):

a. None
b. A few
c. Many
d. Don't remember

8.2 MOON (*Circle One*):

a. Bright moonlight
b. Dull moonlight
c. No moonlight – pitch dark
d. Don't remember

9. What were the weather conditions at the time you saw the object?

CLOUDS (*Circle One*):

a. Clear sky
b. Hazy
c. Scattered clouds
d. Thick or heavy clouds

WEATHER (*Circle One*):

a. Dry
b. Fog, mist, or light rain
c. Moderate or heavy rain
d. Snow
e. Don't remember

10. The object appeared: (*Circle One*):

a. Solid
b. Transparent
c. Vapor
d. As a light
e. Don't remember

11. If it appeared as a light, was it brighter than the brightest stars? (*Circle One*):

a. Brighter
b. Dimmer
c. About the same
d. Don't know

11.1 Compare brightness to some common object:

AS BRIGHT AS A BRIGHT STAR

12. The edges of the object were:

(*Circle One*): a. Fuzzy or blurred
b. Like a bright star
c. Sharply outlined
d. Don't remember

e. Other _____

13. Did the object:

(*Circle One for each question*)

a. Appear to stand still at any time?	Yes	No	Don't know
b. Suddenly speed up and rush away at any time?	Yes	No	Don't know
c. Break up into parts or explode?	Yes	No	Don't know
d. Give off smoke?	Yes	No	Don't know
e. Change brightness?	Yes	No	Don't know
f. Change shape?	Yes	No	Don't know
g. Flash or flicker?	Yes	No	Don't know
h. Disappear and reappear?	Yes	No	Don't know

14. Did the object disappear while you were watching it? If so, how?

IT GRADUALLY BECAME DIMMER AND DIMMER UNTILL IT WAS NO LONGER VISIBLE.

15. Did the object move behind something at any time, particularly a cloud?

(Circle One): Yes (No) Don't Know. IF you answered YES, then tell what it moved behind: _____

16. Did the object move in front of something at any time, particularly a cloud?

(Circle One): Yes (No) Don't Know. IF you answered YES, then tell what in front of: _____

17. Tell in a few words the following things about the object:

a. Sound NONE

b. Color SILVERY, LIKE A STAR

18. We wish to know the angular size. Hold a match stick at arm's length in line with a known object and note how much of the object is covered by the head of the match. If you had performed this experiment at the time of the sighting, how much of the object would have been covered by the match head?

THE OBJECT WOULD HAVE BEEN COMPLETELY COVERED.

19. Draw a picture that will show the shape of the object or objects. Label and include in your sketch any details of the object that you saw such as wings, protrusions, etc., and especially exhaust trails or vapor trails. Place an arrow beside the drawing to show the direction the object was moving.

IT APPEARED AS A STAR

20. Do you think you can estimate the speed of the object?

(Circle One) Yes (No)

IF you answered YES, then what speed would you estimate? _____

21. Do you think you can estimate how far away from you the object was?

(Circle One) Yes (No)

IF you answered YES, then how far away would you say it was? _____

22. Where were you located when you saw the object? (Circle One):

a. Inside a building
b. In a car
c. Outdoors
d. In an airplane (type)
e. At sea
f. Other ON A ROOF-TOP

23. Were you (Circle One)

a. In the business section of a city?
b. In the residential section of a city?
c. In open countryside?
d. Near an airfield?
e. Flying over a city?
f. Flying over open country?
g. Other _____

24. IF you were MOVING IN AN AUTOMOBILE or other vehicle at the time, then complete the following questions:

24.1 What direction were you moving? (Circle One)

a. North c. East e. South g. West
b. Northeast d. Southeast f. Southwest h. Northwest

24.2 How fast were you moving? _____ miles per hour.

24.3 Did you stop at any time while you were looking at the object?

(Circle One) Yes No

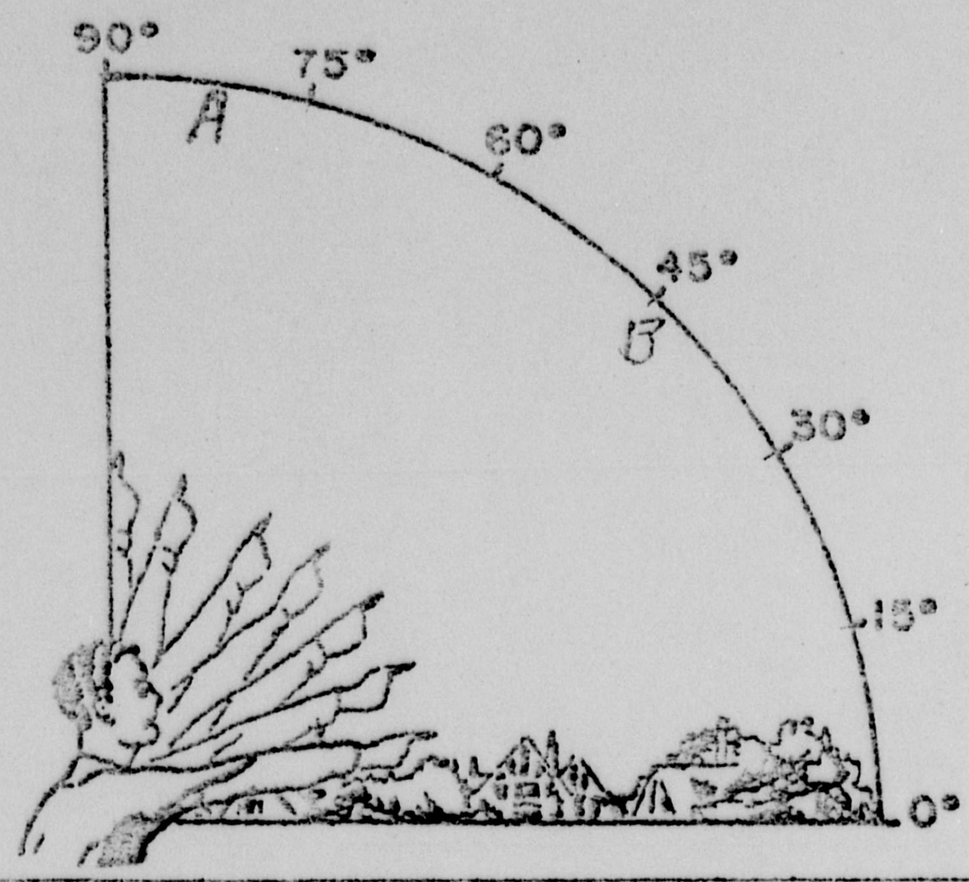
25. Did you observe the object through any of the following?

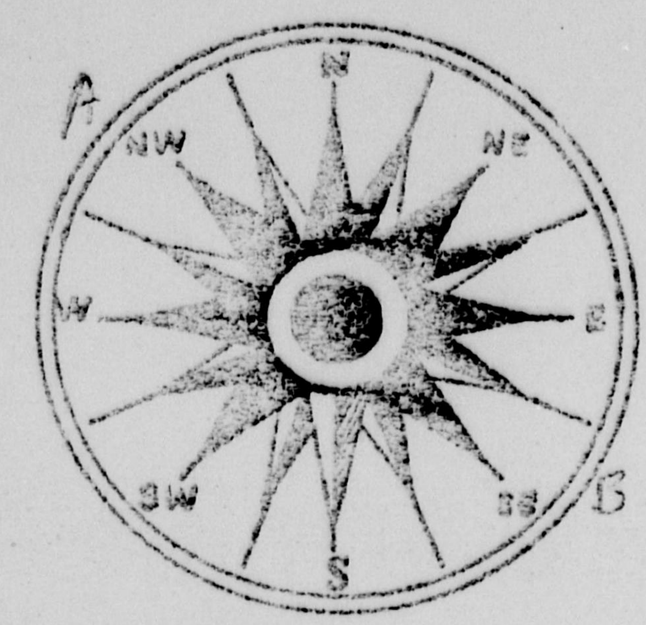
a. Eyeglasses	Yes	(No)	e. Binoculars	(Yes)	No
b. Sun glasses	Yes	(No)	f. Telescope	Yes	(No)
c. Windshield	Yes	(No)	g. Theodolite	Yes	(No)
d. Window glass	Yes	(No)	h. Other NAKED EYE		

26. In order that you can give as clear a picture as possible of what you saw, describe in your own words a common object or objects which, when placed up in the sky, would give the same appearance as the object which you saw.

A BRIGHT STAR

27. In the following sketch, imagine that you are at the point shown. Place an "A" on the curved line to show how high the object was above the horizon (skyline) when you *first* saw it. Place a "B" on the same curved line to show how high the object was above the horizon (skyline) when you *last* saw it. Place an "A" on the compass when you *first* saw it. Place a "B" on the compass where you *last* saw the object.





28. Draw a picture that will show the motion that the object or objects made. Place an "A" at the beginning of the path, a "B" at the end of the path, and show any changes in direction during the course.

IT TRAVELLED IN A STRAIGHT LINE.

29. IF there was MORE THAN ONE object, then how many were there? _____

Draw a picture of how they were arranged, and put an arrow to show the direction that they were traveling.

30. Have you ever seen this, or a similar object before. If so give date or dates and location.

IN NOVEMBER OF 1957, I WITNESSED THE PASSAGE OF SPUTNIK II FROM THE SAME NEIGHBOURHOOD, ABOUT 3 BLOCKS AWAY; BOTH SIGHTINGS HAD MANY SIMILARITIES.

31. Was anyone else with you at the time you saw the object? (Circle One) Yes (No)

31.1 IF you answered YES, did they see the object too? (Circle One) Yes No

31.2 Please list their names and addresses:

32. Please give the following information about yourself:

NAME [redacted] [redacted] [redacted]
Last Name First Name Middle Name

ADDRESS [redacted] [redacted] N.B.
Street City Zone State

TELEPHONE NUMBER [redacted] AGE 21 SEX MALE

Indicate any additional information about yourself, including any special experience, which might be pertinent.

33. When and to whom did you report that you had seen the object?

20 (APPROX) OCTOBER 1963 TO THE NATIONAL
Day Month Year

AERONAUTICS AND SPACE ADMINISTRATION.

34. Date you completed this questionnaire: 3 (Day) NOVEMBER (Month) 1963 (Year)

35. Information which you feel pertinent and which is not adequately covered in the specific points of the questionnaire or a narrative explanation of your sighting.

I FEEL CONFIDENT, HAVING READ COUNTLESS ACCOUNTS OF UFO SIGHTINGS, FROM THE RIDICULOUS TO THE SINCERE, HAVING OBSERVED MANY SHOOTING STARS, HAVING BECOME ~~FARAILI~~ FAMILAR WITH THE PRESENCE OF SATELLITES AND THEIR APPEARANCE TO THE NAKED EYE, AND BEING RELATIVELY FAMILAR WITH THE SOLAR SYSTEM AND THE CONSTELLATIONS, THAT WHAT I WITNESSED ON OCT. 14 WAS THE COMMON PASSAGE OF A SATELLITE, AS WAS STATED IN THE LETTER ACCOMPANYING THIS QUESTIONNAIRE.

SE 14/0848

0758 MT 16.56 — 85188
-149. —

POT ECHO.

INCOMING
1963 NOV 14 PM 04
OFFICE OF INFORMATION
OSAF

SMITHSONIAN ASTROPHYSICAL OBSERVATORY, CAMBRIDGE, MASSACHUSETTS

OCTOBER 9, 1963

SATELLITE 1960 IOTA 1, ECHO I

These predictions are based on orbital elements revised on October 7, 1963
T_0 = October 8.0, times are in days, U.T.
Advance of perigee = $34^\circ.454 + 3^\circ.886\ (t-T_0)$
Eastward ascension of ascending node = $145^\circ.719 - 3^\circ.3234\ (t-T_0)$

Inclination = $47^\circ.2678$
Eccentricity = $0.056263 + 1.91 \times 10^{-5}\ (t-T_0)$
Semi-major axis = 7.825749 megameters
Mean anomaly (Rev.) = $0.44772 + 12.519382\ (t-T_0)\ 2.8463 \times 10^{-4}\ (t-T_0)^2$

SATELLITE 1960 IOTA 1

EQUATOR S-N TIME (UT)	EQUATOR S-N LONG. (W)	EQUATOR S-N LAT.	FOR OTHER LATITUDES SOUTH-NORTH TIME CORR.	SOUTH-NORTH LONG. CORR.	SOUTH-NORTH HT. (MI)	SOUTH-NORTH BEAR. (N-E)	NORTH-SOUTH TIME CORR.	NORTH-SOUTH LONG. CORR.	NORTH-SOUTH HT. (MI)	NORTH-SOUTH BEAR. (N-E)
OCTOBER 12, 1963										
0 31.1	255.13	47.5	25.8	-83.45	682	90.0*	25.8	-83.50	682	90.0*
2 24.9	284.16	45.0	21.1	-61.25	643	72.3	30.6	-105.68	737	107.8*
4 20.6	313.18	40.0	17.4	-45.95	625	60.7	34.5	-120.92	789	119.3*
6 15.3	342.21	35.0	14.7	-36.27	620	54.1	37.5	-130.54	832	126.0*
8 10.1	11.23	30.0	12.3	-28.88	621	49.5	40.1	-137.87	872	130.6*
10 4.8	40.26	20.0	8.0	-17.48	635	43.8	44.9	-149.12	945	136.4*
12 59.5	69.29	0.	0.	0.	707	40.0*	54.1	-166.30	1070	140.2*
14 54.3	98.31	-20.0	-8.4	17.40	824	43.7*	-51.0	147.57	1160	136.5*
16 49.0	127.34	-30.0	-13.1	28.68	899	49.4*	-45.7	136.45	1183	130.8
18 43.7	156.36	-35.0	-15.8	35.99	942	53.9*	-42.7	129.22	1187	126.2
20 38.4	185.39	-40.0	-18.9	45.56	990	60.6*	-39.2	119.72	1183	119.4
22 33.2	214.41	-45.0	-23.3	60.69	1051	72.2*	-34.8	104.66	1163	107.8*
24 27.9	243.44	-47.5	-28.0	82.67	1116	90.0*	-28.9	82.72	1116	90.0*
OCTOBER 13, 1963										
0 22.6	272.46	47.5	25.9	-83.44	670	90.0	25.8	-83.49	671	90.0
2 17.4	301.49	45.0	21.1	-61.23	636	72.3	30.6	-105.68	722	107.8*
4 12.1	330.51	40.0	17.4	-45.94	622	60.7	34.5	-120.93	772	119.3*
6 6.8	359.54	35.0	14.7	-36.26	620	54.1	37.4	-130.55	813	126.0*
8 1.5	28.57	30.0	12.3	-28.87	623	49.5	40.0	-137.88	852	130.6*
10 57.2	57.59	20.0	8.1	-17.47	643	43.8	44.8	-149.15	924	136.4*
12 51.8	86.61	0.	0.	0.	722	40.0*	53.9	-166.35	1053	140.2*
14 46.5	115.64	-20.0	-8.4	17.38	843	43.7*	-51.3	147.52	1151	136.5*
16 41.2	144.66	-30.0	-13.2	28.66	919	49.4*	-45.9	136.39	1180	130.8*
18 35.9	173.69	-35.0	-15.9	35.96	961	53.9*	-42.9	129.16	1186	126.2
20 30.6	202.71	-40.0	-19.1	45.53	1009	60.6*	-39.5	119.66	1180	119.4
22 25.3	231.74	-45.0	-23.4	60.65	1068	72.2*	-34.9	104.60	1171	107.8*
24 20.0	260.76	-47.5	-29.1	82.62	1130	90.0*	-29.1	82.67	1130	90.0*
OCTOBER 14, 1963										
0 14.7	289.78	47.5	25.8	-83.44	661	90.0	25.9	-83.49	661	90.0
2 9.4	318.81	45.0	21.2	-61.22	631	72.3	30.6	-105.68	708	107.7*
4 4.1	347.83	40.0	17.5	-45.92	621	60.7	34.5	-120.93	756	119.3*
6 58.8	16.86	35.0	14.8	-36.24	621	54.1	37.4	-130.56	796	126.0*
8 53.5	45.88	30.0	12.4	-28.86	627	49.5	40.0	-137.90	834	130.6*
10 48.2	74.90	20.0	8.1	-17.46	651	43.8	44.7	-149.18	906	136.4*
12 42.9	103.93	0.	0.	0.	736	40.0*	53.8	-166.39	1037	140.2*
14 37.6	132.95	-20.0	-8.5	17.37	861	43.7*	-51.5	147.46	1141	136.5*
16 32.3	161.98	-30.0	-13.3	28.63	937	49.3*	-46.2	136.33	1175	130.8*
18 27.0	191.00	-35.0	-16.0	35.93	979	53.9*	-43.2	129.10	1185	126.2*
20 21.7	220.03	-40.0	-19.2	45.49	1026	60.6*	-39.7	119.60	1188	119.4*
22 16.4	249.05	-45.0	-23.6	60.61	1083	72.2*	-35.1	104.55	1177	107.8*
24 11.1	278.07	-47.5	-29.3	82.57	1141	90.0*	-29.3	82.62	1141	90.0*
OCTOBER 15, 1963										
0 5.8	307.10	47.5	25.9	-83.42	652	90.0	25.9	-83.47	652	90.0
2 0.5	336.12	45.0	21.2	-61.21	627	72.3	30.6	-105.67	695	107.7*
4 55.2	365.14	40.0	17.6	-45.91	620	60.7	34.5	-120.93	740	119.3*
6 49.9	394.17	35.0	14.8	-36.23	624	54.1	37.4	-130.57	778	126.0*
8 44.6	23.19	30.0	12.5	-28.86	632	49.5	39.9	-137.91	815	130.6*
10 39.3	52.21	20.0	8.1	-17.45	651	43.8*	44.6	-149.20	882	136.3*
12 34.0	81.24	0.	0.	0.	731	40.0*	53.6	-166.43	1019	140.2*
14 28.7	110.26	-20.0	-8.4	17.34	851	43.7*	-51.7	147.41	1130	136.5*
16 23.4	139.29	-30.0	-13.2	28.61	927	49.3*	-46.4	136.28	1168	130.8*
18 18.1	168.31	-35.0	-16.1	35.90	969	53.9*	-43.4	129.06	1181	126.2*
20 12.8	197.34	-40.0	-19.3	45.45	1017	60.6*	-39.9	119.55	1187	119.4*
22 7.5	226.36	-45.0	-23.7	60.57	1076	72.2*	-35.3	104.51	1180	107.8*
24 2.2	255.38	-47.5	-29.4	82.52	1135	90.0*	-29.4	82.57	1135	90.0*

SATELLITE 1960 IOTA 1

EQUATOR S-N TIME (UT)	EQUATOR S-N LONG. (W)	EQUATOR S-N LAT.	FOR OTHER LATITUDES SOUTH-NORTH TIME CORR.	SOUTH-NORTH LONG. CORR.	SOUTH-NORTH HT. (MI)	SOUTH-NORTH BEAR. (N-E)	NORTH-SOUTH TIME CORR.	NORTH-SOUTH LONG. CORR.	NORTH-SOUTH HT. (MI)	NORTH-SOUTH BEAR. (N-E)
OCTOBER 16, 1963										
0 7.3	266.33	47.5	25.9	-83.41	644	90.0	26.0	-83.46	644	90.0
2 2.0	295.36	45.0	21.3	-61.19	624	72.3	30.7	-105.66	683	107.7*
3 56.7	324.38	40.0	17.6	-45.89	621	60.7	34.5	-120.93	725	119.3*
5 51.4	353.40	35.0	14.9	-36.21	627	54.1	37.4	-130.57	762	126.0*
7 46.2	22.42	30.0	12.5	-28.83	638	49.5*	39.9	-137.91	798	130.6*
9 40.9	51.44	20.0	8.2	-17.44	670	43.8*	44.6	-149.21	867	136.3*
11 35.6	80.46	0.	0.	0.	760	40.0*	53.5	-166.48	1001	140.2*
13 30.3	109.49	-20.0	-8.6	17.33	899	43.6*	-51.9	147.37	1118	136.5*
15 25.0	138.51	-30.0	-13.5	28.58	975	49.3*	-46.6	136.23	1161	130.8*
17 19.7	167.53	-35.0	-16.3	35.87	1016	53.9*	-43.6	129.99	1177	126.2*
19 14.4	196.55	-40.0	-19.5	45.42	1060	60.6*	-40.2	119.49	1187	119.4*
21 9.1	225.57	-45.0	-23.9	60.52	1112	72.2*	-35.5	104.44	1186	107.8*
23 3.8	254.59	-47.5	-29.7	82.47	1161	90.0*	-29.7	82.51	1161	90.0*
OCTOBER 17, 1963										
0 58.6	283.61	47.5	26.0	-83.39	637	90.0	26.0	-83.44	637	90.0
2 53.3	312.63	45.0	21.4	-61.17	622	72.3	30.7	-105.65	672	107.7*
4 48.0	341.65	40.0	17.7	-45.87	623	60.7	34.5	-120.92	711	119.3*
6 42.7	10.67	35.0	15.0	-36.19	632	54.0*	37.4	-130.57	746	126.0*
8 37.4	39.69	30.0	12.6	-28.81	645	49.5*	39.9	-137.92	780	130.6*
10 32.1	68.71	20.0	8.2	-17.43	682	43.8*	44.5	-149.22	848	136.3*
12 26.8	97.73	0.	0.	0.	765	39.9*	53.4	-166.49	982	140.2*
14 21.5	126.75	-20.0	-8.7	17.32	919	43.6*	-52.1	147.32	1104	136.5*
16 16.2	155.77	-30.0	-13.6	28.55	995	49.3*	-46.8	136.17	1152	130.8*
18 10.9	184.79	-35.0	-16.4	35.84	1034	53.9*	-43.8	128.94	1170	126.2*
20 5.6	213.81	-40.0	-19.8	45.39	1077	60.6*	-40.4	119.44	1184	119.4*
22 0.3	242.83	-45.0	-24.1	60.47	1126	72.2*	-35.7	104.38	1188	107.8*
23 55.1	271.85	-47.5	-29.9	82.41	1170	90.0*	-29.9	82.46	1170	90.0*
OCTOBER 18, 1963										
1 49.8	300.87	47.5	26.1	-83.37	631	90.0	26.1	-83.42	632	90.0
3 44.5	329.89	45.0	21.5	-61.15	621	72.3	30.8	-105.63	661	107.7
5 39.2	358.91	40.0	17.8	-45.86	626	60.7*	34.6	-120.91	697	119.3*
7 33.9	27.93	35.0	15.1	-36.17	638	54.0*	37.4	-130.56	730	126.0*
9 28.6	56.95	30.0	12.7	-28.78	655	49.5*	39.9	-137.91	762	130.6*
11 23.3	85.97	20.0	8.3	-17.41	694	43.8*	44.5	-149.23	828	136.3*
13 18.0	114.99	0.	0.	0.	803	39.9*	53.3	-166.52	962	140.2*
15 12.7	144.01	-20.0	-8.7	17.30	937	43.6*	-52.2	147.28	1089	136.5*
17 7.4	173.03	-30.0	-13.7	28.53	1013	49.3*	-47.0	136.13	1141	130.8*
19 2.1	202.05	-35.0	-16.5	35.80	1052	53.9*	-44.0	128.89	1163	126.2*
20 56.8	231.06	-40.0	-19.8	45.34	1093	60.6*	-40.6	119.38	1180	119.4*
22 51.5	260.08	-45.0	-24.3	60.44	1139	72.2*	-36.0	104.32	1189	107.8*
		-47.5	-30.1	82.46	1177	90.0*	-30.1	82.41	1177	90.0*
OCTOBER 19, 1963										
0 46.2	289.10	47.5	26.2	-83.35	627	90.0	26.2	-83.40	627	90.0
2 40.9	318.12	45.0	21.6	-61.13	621	72.3	30.9	-105.61	652	107.7
4 35.6	347.14	40.0	17.9	-45.84	630	60.7*	34.6	-120.89	685	119.3*
6 30.3	16.16	35.0	15.1	-36.15	645	54.0*	37.4	-130.55	718	126.0*
8 25.0	45.17	30.0	12.7	-28.77	663	49.5*	39.9	-137.91	747	130.6*
10 19.7	74.19	20.0	8.3	-17.41	707	43.8*	44.5	-149.23	811	136.3*
12 14.4	103.21	0.	0.	0.	822	39.9*	53.2	-166.53	944	140.2*
14 9.1	132.23	-20.0	-8.8	17.29	955	43.6*	52.5	147.25	1074	136.5*
16 3.8	161.25	-30.0	-13.8	28.50	1030	49.3*	-47.1	136.07	1132	130.8*
18 58.5	190.27	-35.0	-16.6	35.77	1069	53.9*	-44.2	128.84	1154	126.2*
20 53.2	219.28	-40.0	-20.0	45.29	1110	60.6*	-40.8	119.29	1171	119.4*
22 47.9	248.30	-45.0	-24.5	60.37	1155	72.2*	-36.3	104.22	1180	107.8*
24 42.6	277.32	-47.5	-30.3	82.41	1193	90.0*	-30.3	82.36	1193	90.0*