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# VIEWS FROM THE SPACECRAFT DURING APOLLO 10 (MISSION F)

Flight Analysis Branch

MISSION PLANNING AND ANALYSIS DIVISION

MANNED SPACECRAFT CENTER

HOUSTON, TEXAS

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PROJECT APOLLO

# VIEWS FROM THE SPACECRAFT DURING APOLLO 10 (MISSION F)

By Alfred N. Lunde
Flight Analysis Branch

March 21, 1969

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

Approved: Charles F. Hyle
for Charlie C. Allen, Acting Chief
Flight Analysis Branch

Approved: D H Owen
for John P. Mayer, Chief
Mission Planning and Analysis Division

FIGURES


| Figure | | Page |
|---|---|---|
| 1 | Illustration of lunar orbital plane in year 1969 | 28 |
| 2 | Sun-centered inertial geometry of Apollo 10 (Mission F) | 29 |
| 3 | Position of the moon at various stages of Apollo 10 (Mission F) | 30 |
| 4 | A schematic of the maneuver attitudes and lighting conditions for the nominal mission | 31 |
| 5 | Nominal Apollo 10 (Mission F) projected on a map of the celestial sphere | 32 |
| 6 | Translunar injection burn | |
| | (a) Initiation of TLI | 34 |
| | (b) Middle of TLI | 35 |
| | (c) End of TLI | 36 |
| 7 | Passive thermal control | |
| | (a) Roll = 0° | 38 |
| | (b) Roll = 90° | 39 |
| | (c) Roll = 180° | 40 |
| | (d) Roll = 270° | 41 |
| 8 | Translunar coast, constant field of view (earth) | |
| | (a) G.e.t. = 5 hours | 44 |
| | (b) G.e.t. = 10 hours | 45 |
| | (c) G.e.t. = 15 hours | 46 |
| | (d) G.e.t. = 20 hours | 47 |
| | (e) G.e.t. = 25 hours | 48 |
| | (f) G.e.t. = 30 hours | 49 |
| | (g) G.e.t. = 35 hours | 50 |
| | (h) G.e.t. = 40 hours | 51 |
| | (i) G.e.t. = 45 hours | 52 |
| | (j) G.e.t. = 50 hours | 53 |
| | (k) G.e.t. = 55 hours | 54 |
| | (l) G.e.t. = 60 hours | 55 |
| | (m) G.e.t. = 65 hours | 56 |
| | (n) G.e.t. = 70 hours | 57 |
| | (o) G.e.t. = 75 hours | 58 |


Preceding page blank

Figure | Page


9 Translunar coast, variable field of view (earth)

(a) G.e.t. = 4 hours . . . . . 60
(b) G.e.t. = 5 hours . . . . . 60
(c) G.e.t. = 6 hours . . . . . 60
(d) G.e.t. = 7 hours . . . . . 60
(e) G.e.t. = 8 hours . . . . . 61
(f) G.e.t. = 9 hours . . . . . 61
(g) G.e.t. = 10 hours . . . . . 61
(h) G.e.t. = 11 hours . . . . . 61
(i) G.e.t. = 12 hours . . . . . 62
(j) G.e.t. = 13 hours . . . . . 62
(k) G.e.t. = 14 hours . . . . . 62
(l) G.e.t. = 15 hours . . . . . 62
(m) G.e.t. = 16 hours . . . . . 63
(n) G.e.t. = 17 hours . . . . . 63
(o) G.e.t. = 18 hours . . . . . 63
(p) G.e.t. = 19 hours . . . . . 63
(q) G.e.t. = 20 hours . . . . . 64
(r) G.e.t. = 21 hours . . . . . 64
(s) G.e.t. = 22 hours . . . . . 64
(t) G.e.t. = 23 hours . . . . . 64
(u) G.e.t. = 24 hours . . . . . 65
(v) G.e.t. = 25 hours . . . . . 65
(w) G.e.t. = 26 hours . . . . . 65
(x) G.e.t. = 27 hours . . . . . 65
(y) G.e.t. = 28 hours . . . . . 66
(z) G.e.t. = 29 hours . . . . . 66
(aa) G.e.t. = 30 hours . . . . . 66
(bb) G.e.t. = 31 hours . . . . . 66
(cc) G.e.t. = 32 hours . . . . . 67
(dd) G.e.t. = 33 hours . . . . . 67
(ee) G.e.t. = 34 hours . . . . . 67
(ff) G.e.t. = 35 hours . . . . . 67
(gg) G.e.t. = 36 hours . . . . . 68
(hh) G.e.t. = 37 hours . . . . . 68
(ii) G.e.t. = 38 hours . . . . . 68
(jj) G.e.t. = 39 hours . . . . . 68
(kk) G.e.t. = 40 hours . . . . . 69
(ll) G.e.t. = 41 hours . . . . . 69
(mm) G.e.t. = 42 hours . . . . . 69
(nn) G.e.t. = 43 hours . . . . . 69
(oo) G.e.t. = 44 hours . . . . . 70
(pp) G.e.t. = 45 hours . . . . . 70
(qq) G.e.t. = 46 hours . . . . . 70

Figure | Page


(rr) G.e.t. = 47 hours . . . . . 70
(ss) G.e.t. = 48 hours . . . . . 71
(tt) G.e.t. = 49 hours . . . . . 71
(uu) G.e.t. = 50 hours . . . . . 71
(vv) G.e.t. = 51 hours . . . . . 71
(ww) G.e.t. = 52 hours . . . . . 72
(xx) G.e.t. = 53 hours . . . . . 72
(yy) G.e.t. = 54 hours . . . . . 72
(zz) G.e.t. = 55 hours . . . . . 72
(aaa) G.e.t. = 56 hours . . . . . 73
(bbb) G.e.t. = 57 hours . . . . . 73
(ccc) G.e.t. = 58 hours . . . . . 73
(ddd) G.e.t. = 59 hours . . . . . 73
(eee) G.e.t. = 60 hours . . . . . 74
(fff) G.e.t. = 61 hours . . . . . 74
(ggg) G.e.t. = 62 hours . . . . . 74
(hhh) G.e.t. = 63 hours . . . . . 74
(iii) G.e.t. = 64 hours . . . . . 75
(jjj) G.e.t. = 65 hours . . . . . 75
(kkk) G.e.t. = 66 hours . . . . . 75
(lll) G.e.t. = 67 hours . . . . . 75
(mmm) G.e.t. = 68 hours . . . . . 76
(nnn) G.e.t. = 69 hours . . . . . 76
(ooo) G.e.t. = 70 hours . . . . . 76
(ppp) G.e.t. = 71 hours . . . . . 76
(qqq) G.e.t. = 72 hours . . . . . 77
(rrr) G.e.t. = 73 hours . . . . . 77
(sss) G.e.t. = 74 hours . . . . . 77
(ttt) G.e.t. = 75 hours . . . . . 77

10 Translunar coast, constant field of view (moon)

(a) G.e.t. = 10 hours . . . . . 80
(b) G.e.t. = 20 hours . . . . . 81
(c) G.e.t. = 30 hours . . . . . 82
(d) G.e.t. = 40 hours . . . . . 83
(e) G.e.t. = 50 hours . . . . . 84
(f) G.e.t. = 60 hours . . . . . 85
(g) G.e.t. = 65 hours . . . . . 86
(h) G.e.t. = 70 hours . . . . . 87
(i) G.e.t. = 75 hours . . . . . 88

11 Translunar coast, variable field of view (moon)

(a) G.e.t. = 10 hours . . . . . 89
(b) G.e.t. = 20 hours . . . . . 89

Figure | Page

(c) G.e.t. = 30 hours . . . . . 89
(d) G.e.t. = 40 hours . . . . . 89
(e) G.e.t. = 50 hours . . . . . 90
(f) G.e.t. = 60 hours . . . . . 90
(g) G.e.t. = 70 hours . . . . . 90
(h) G.e.t. = 75 hours . . . . . 90

12 Constant inertial attitude prior to LOI

(a) 30 minutes prior to LOI . . . . . 92
(b) 15 minutes prior to LOI . . . . . 93

13 Lunar orbit insertion burn

(a) Begin LOI burn. . . . . 96
(b) Middle of LOI burn . . . . . 97
(c) End of LOI burn . . . . . 98

14 LM as seen from CSM

(a) 18 seconds after separation . . . . . 100
(b) 36 seconds after separation . . . . . 101
(c) 54 seconds after separation . . . . . 102
(d) 1 minute 30 seconds after separation . . . . . 103
(e) 1 minute 48 seconds after separation . . . . . 104
(f) 4 minutes 48 seconds after separation . . . . . 105

15 CSM as seen from LM

(a) 18 seconds after separation . . . . . 106
(b) 36 seconds after separation . . . . . 107
(c) 54 seconds after separation . . . . . 108
(d) 1 minute 30 seconds after separation . . . . . 109
(e) 1 minute 48 seconds after separation . . . . . 110
(f) 4 minutes 48 seconds after separation . . . . . 111
(g) 18 seconds after separation . . . . . 112
(h) 36 seconds after separation . . . . . 113
(i) 54 seconds after separation . . . . . 114
(j) 1 minute 30 seconds after separation . . . . . 115
(k) 1 minute 48 seconds after separation . . . . . 116

Figure | Page

16 Transearth injection burn

(a) Begin TEI burn . . . . . 118
(b) Middle of TEI burn . . . . . 119
(c) End of TEI burn . . . . . 120

17 Earth as seen after TEI

(a) G.e.t. = 128:02:42 . . . . . 124
(b) G.e.t. = 128:03:00 . . . . . 125
(c) G.e.t. = 128:03:18 . . . . . 126

18 Transearth coast, constant field of view (moon)

(a) G.e.t. = 130 hours . . . . . 128
(b) G.e.t. = 140 hours . . . . . 129
(c) G.e.t. = 150 hours . . . . . 130
(d) G.e.t. = 160 hours . . . . . 131
(e) G.e.t. = 170 hours . . . . . 132
(f) G.e.t. = 180 hours . . . . . 133
(g) G.e.t. = 190 hours . . . . . 134

19 Transearth coast, variable field of view (moon)

(a) G.e.t. = 130 hours . . . . . 135
(b) G.e.t. = 140 hours . . . . . 135
(c) G.e.t. = 150 hours . . . . . 135
(d) G.e.t. = 160 hours . . . . . 135
(e) G.e.t. = 170 hours . . . . . 136
(f) G.e.t. = 180 hours . . . . . 136
(g) G.e.t. = 185 hours . . . . . 136

20 Transearth coast, constant field of view (earth)

(a) G.e.t. = 130 hours . . . . . 138
(b) G.e.t. = 135 hours . . . . . 139
(c) G.e.t. = 140 hours . . . . . 140
(d) G.e.t. = 145 hours . . . . . 141
(e) G.e.t. = 150 hours . . . . . 142
(f) G.e.t. = 155 hours . . . . . 143
(g) G.e.t. = 160 hours . . . . . 144
(h) G.e.t. = 165 hours . . . . . 145
(i) G.e.t. = 170 hours . . . . . 146
(j) G.e.t. = 175 hours . . . . . 147
(k) G.e.t. = 180 hours . . . . . 148
(l) G.e.t. = 185 hours . . . . . 149
(m) G.e.t. = 190 hours . . . . . 150

Figure | Page


21 Transearth coast, variable field of view (earth)

(a) G.e.t. = 129 hours . . . . . 151
(b) G.e.t. = 130 hours . . . . . 151
(c) G.e.t. = 131 hours . . . . . 151
(d) G.e.t. = 132 hours . . . . . 151
(e) G.e.t. = 133 hours . . . . . 152
(f) G.e.t. = 134 hours . . . . . 152
(g) G.e.t. = 135 hours . . . . . 152
(h) G.e.t. = 136 hours . . . . . 152
(i) G.e.t. = 137 hours . . . . . 153
(j) G.e.t. = 138 hours . . . . . 153
(k) G.e.t. = 139 hours . . . . . 153
(l) G.e.t. = 140 hours . . . . . 153
(m) G.e.t. = 141 hours . . . . . 154
(n) G.e.t. = 142 hours . . . . . 154
(o) G.e.t. = 143 hours . . . . . 154
(p) G.e.t. = 144 hours . . . . . 154
(q) G.e.t. = 145 hours . . . . . 155
(r) G.e.t. = 146 hours . . . . . 155
(s) G.e.t. = 147 hours . . . . . 155
(t) G.e.t. = 148 hours . . . . . 155
(u) G.e.t. = 149 hours . . . . . 156
(v) G.e.t. = 150 hours . . . . . 156
(w) G.e.t. = 151 hours . . . . . 156
(x) G.e.t. = 152 hours . . . . . 156
(y) G.e.t. = 153 hours . . . . . 157
(z) G.e.t. = 154 hours . . . . . 157
(aa) G.e.t. = 155 hours . . . . . 157
(bb) G.e.t. = 156 hours . . . . . 157
(cc) G.e.t. = 157 hours . . . . . 158
(dd) G.e.t. = 158 hours . . . . . 158
(ee) G.e.t. = 159 hours . . . . . 158
(ff) G.e.t. = 160 hours . . . . . 158
(gg) G.e.t. = 161 hours . . . . . 159
(hh) G.e.t. = 162 hours . . . . . 159
(ii) G.e.t. = 163 hours . . . . . 159
(jj) G.e.t. = 164 hours . . . . . 159
(kk) G.e.t. = 165 hours . . . . . 160
(ll) G.e.t. = 166 hours . . . . . 160
(mm) G.e.t. = 167 hours . . . . . 160
(nn) G.e.t. = 168 hours . . . . . 160
(oo) G.e.t. = 169 hours . . . . . 161
(pp) G.e.t. = 170 hours . . . . . 161
(qq) G.e.t. = 171 hours . . . . . 161
(rr) G.e.t. = 172 hours . . . . . 161

Figure | Page


(ss) G.e.t. = 173 hours . . . . . 162
(tt) G.e.t. = 174 hours . . . . . 162
(uu) G.e.t. = 175 hours . . . . . 162
(vv) G.e.t. = 176 hours . . . . . 162
(ww) G.e.t. = 177 hours . . . . . 163
(xx) G.e.t. = 178 hours . . . . . 163
(yy) G.e.t. = 179 hours . . . . . 163
(zz) G.e.t. = 180 hours . . . . . 163
(aaa) G.e.t. = 181 hours . . . . . 164
(bbb) G.e.t. = 182 hours . . . . . 164
(ccc) G.e.t. = 183 hours . . . . . 164
(ddd) G.e.t. = 184 hours . . . . . 164
(eee) G.e.t. = 185 hours . . . . . 165
(fff) G.e.t. = 186 hours . . . . . 165
(ggg) G.e.t. = 187 hours . . . . . 165
(hhh) G.e.t. = 188 hours . . . . . 165
(iii) G.e.t. = 189 hours . . . . . 166
(jjj) G.e.t. = 190 hours . . . . . 166
(kkk) G.e.t. = 191 hours . . . . . 166

22 Entry phase

(a) 15 minutes prior to entry . . . . . 168
(b) 13 minutes prior to entry . . . . . 169
(c) 11 minutes prior to entry . . . . . 170
(d) 9 minutes prior to entry . . . . . 171
(e) 7 minutes prior to entry . . . . . 172
(f) 5 minutes prior to entry . . . . . 173
(g) 3 minutes prior to entry . . . . . 174
(h) 1 minute prior to entry . . . . . 175
(i) Entry interface . . . . . 176

23 Translunar coast, ecliptic reference

(a) G.e.t. = 5 hours . . . . . 178
(b) G.e.t. = 10 hours . . . . . 178
(c) G.e.t. = 15 hours . . . . . 178
(d) G.e.t. = 20 hours . . . . . 178
(e) G.e.t. = 25 hours . . . . . 179
(f) G.e.t. = 30 hours . . . . . 179
(g) G.e.t. = 35 hours . . . . . 179
(h) G.e.t. = 40 hours . . . . . 179
(i) G.e.t. = 45 hours . . . . . 180
(j) G.e.t. = 50 hours . . . . . 180
(k) G.e.t. = 55 hours . . . . . 180

Figure | Page

(l) G.e.t. = 65 hours . . . . . 180
(m) G.e.t. = 70 hours . . . . . 181
(n) G.e.t. = 75 hours . . . . . 181

24 Transearth coast, ecliptic reference

(a) G.e.t. = 130 hours . . . . . 182
(b) G.e.t. = 140 hours . . . . . 182
(c) G.e.t. = 150 hours . . . . . 182
(d) G.e.t. = 160 hours . . . . . 182
(e) G.e.t. = 170 hours . . . . . 183
(f) G.e.t. = 180 hours . . . . . 183
(g) G.e.t. = 189 hours . . . . . 183

# VIEWS FROM THE SPACECRAFT DURING APOLLO 10 (MISSION F)

By Alfred N. Lunde

## SUMMARY

The purpose of this document is to depict the star field, the earth and moon terminators, and the horizon orientations for Apollo 10 (Mission F) as viewed from the spacecraft. The LM as seen through the CM rendezvous window, and the CSM as seen through the LM windows are shown. These data should prove invaluable in assuring the crew that maneuver attitudes are correct. All data shown in this report are for the May 17, 1969, launch date, with a 72° launch azimuth, first opportunity.

## INTRODUCTION

The geometry of a lunar mission can be very difficult to visualize (refs. 1 and 2). The primary objective of this report is to provide views from the spacecraft during Apollo 10 (Mission F) because a knowledge of how the spacecraft should be oriented with respect to familiar objects visible from the spacecraft window would be invaluable for performance of abort maneuvers as well as nominal maneuvers.

Other important objectives are as follows.

1. To establish possible backup attitude references for the major maneuvers such as TLI, LOI, TEI, and entry

2. To provide moon reference horizon information to support an LOI GO/NO-GO

3. To show the LM in a docked configuration

4. To show a head-on view of the LM and CSM at various distances from each other

Because of the LM, the visibility through the rendezvous windows is severely limited during the translunar portion of the mission; therefore, one of the other three windows may be used for star sighting or photography.

This document and its relation to other Apollo 10 (Mission F) milestones for the Contingency Analysis Section are shown in the appendix.

The major analytic tool used to produce this report was developed by Mr. G. B. Roush of the Computation and Analysis Division.

## NOMENCLATURE

| | |
|---|---|
| c.g. | center of gravity |
| CM | command module |
| CSM | command and service modules |
| EI | entry interface |
| g.e.t. | ground elapsed time |
| $h_E$ | altitude above earth's surface |
| $h_M$ | altitude above moon's surface |
| LOI | lunar orbit insertion |
| LM | lunar module |
| PTC | passive thermal control |
| $R_E$ | radius from center of earth |
| $R_M$ | radius from center of moon |
| SEQ | star identification number |
| SM | service module |
| TEC | transearth coast |
| TEI | transearth injection |
| TLC | translunar coast |
| TLI | translunar injection |
| $V_i$ | inertial velocity |

## TRAJECTORY GEOMETRY

The relationship of the ecliptic, equatorial, and lunar planes as they appear in 1969 are shown in figure 1. The ecliptic plane is always inclined 23°26" to the equatorial plane. In 1969, the lunar plane is inclined 28.5° to the equatorial plane.

The position of the earth's equatorial plane in the ecliptic plane for May is shown in figure 2. The moon's location at the various phases during the mission are shown in figure 3. The sun and the moon at TLI have right ascensions of 54° and 70°, respectively. Because of the northerly inclination of the trajectory for most of the mission, the crew of the spacecraft will have a good view of the northern hemisphere. The opposite was true for the Apollo 8 mission (ref. 2).

Because of the positions of the moon and the sun during the translunar portion of the mission, the spacecraft will be traveling toward the general direction of the sun, especially during the first few hours after translunar injection. Thus, the majority of the earth will be in daylight and the moon almost totally dark as seen from the spacecraft.

A schematic of the nominal Apollo 10 (Mission F) trajectory as viewed from above the earth-moon plane shows spacecraft, crew, and terminator orientation. The Apollo 10 (Mission F) trajectory has been plotted on a map of the celestial sphere and shows the inertial position of the spacecraft with respect to the stars, sun, and moon (fig. 5).

## GENERAL INFORMATION

For a better understanding of the data presented in this report, a short explanation follows. Views of the particular maneuvers from the TLI burn through the entry phase are presented in figures 6 through 24.

All the views of the critical maneuvers such as TLI, LOI, TEI, and entry have a field of view of 100°. A large field of view is used so that the horizon of the body of interest can be seen and so that the available stars can be shown. Superimposed on these views is the view out the left rendezvous window from a restrained couch position. The X-body axis is indicated by a mark at the center of each picture.

During the translunar and transearth coast phases, the field of view has been varied. To give a close-up view of the earth or the moon, the field of view generally has been kept small.

The CM window configuration data were obtained from the command module manufacturer and from the CSM/LM Spacecraft Operational Data Book (ref. 3). The LM window configuration and the LM dimensions were obtained from reference 4. The approximate docked LM configuration has been shown in figures 7, 12, and 13.

Stars with a magnitude larger than +3 have been shown in all of the views. Some of the larger stars have been named in figures. The star's name, location, and magnitude can be found in the star catalogue (table I).

The vertical and horizontal scales on the figures are marked in units for the quick location of stars in those figures. The field of view in degrees is marked on the top of each figure. The velocity in fps and the radius are given in each figure. Also, the velocity in mph and altitude above the surface in statute miles are given.

## DISCUSSION OF DATA

### Translunar injection maneuver

The beginning, middle, and end of the TLI burn are shown in figure 6. The maneuver is executed in a heads down position. The horizon is dark until shortly before the end of the burn, at which time the terminator is visible. The spacecraft is in sunlight for part of the burn. The TLI burn places the spacecraft on its lunar trajectory so that at the end of the burn the velocity is 35 598 fps. The vectors and REFSMMAT used were obtained from reference 5 and reference 6, respectively.

Passive thermal control.- The PTC is scheduled to start shortly after the first planned midcourse maneuver, at 7 hours after TLI. At that time, the PTC REFSMMAT is being used, and the initial gimbal angles are pitch = 90°, yaw = 0°, and roll = 0° (ref. 7). With a planned roll rate of 0.1 deg/sec, the spacecraft will make one complete revolution about its X-axis in 1 hour. The four views shown are at time intervals of 15 minutes (90° in roll). Also shown in these views is the approximate area of view obstructed by the LM in a docked configuration.

Earth and moon views during TLC.- The earth is shown in figure 8 with a constant field of view. Because the earth gets quite small as the spacecraft progresses on its lunar trajectory, figure 9 depicts the earth with a variable field of view. The purpose of these enlarged views of the earth is to show details such as continents and terminator. The views start at a g.e.t. of 4 hours and are shown for every hour until shortly before LOI. The earth appears to be in total daylight when viewed from the spacecraft shortly after TLI, which offers a great opportunity

to take photographs because the spacecraft is above the west coast of the U.S. All of North America, Greenland, and the North Pole area will be visible at this time. Excellent views of all of Europe can be obtained at a g.e.t. of 22 hours. The spacecraft enters the lunar gravitational sphere of influence at approximately 64 hours g.e.t. All of the visual data of the earth and the moon are taken in the trajectory plane from a view down the radius vector at the body of interest. However, in figures 23 and 24, the ecliptic plane was used as the reference plane. Most of the input data needed for the generation of this section were obtained from reference 8.

Views of the moon are presented in figures 10 and 11. Because of the earth-moon-sun geometry at this particular time, the moon will be almost totally dark as viewed from the spacecraft on the approach trajectory. The sun is close to the moon in right ascension and declination for much of the translunar coast. The star background prior to LOI is shown in figure 12 with the spacecraft in the LOI inertial attitude.

## Lunar Orbit Insertion Maneuver

The beginning, middle, and end of the LOI burn are depicted in figure 13. Because of the obstruction caused by the docked LM, the view from the rendezvous windows was severely limited. However, one of the other windows could possibly be used. The crew are in a heads down position during this burn, and the burn is performed in a retrograde attitude to brake the trajectory speed so that a lunar orbit may be acheived.

## LM and CSM After Separation In Lunar Orbit

The LM as seen through the rendezvous window of the CM is shown in figure 14. Only the front view of the LM is shown. The distance between the c.g. of the two spacecraft is shown, as well as the relative velocity between the two spacecraft. The front view of the CSM as seen through the LM docking and front windows is shown in figure 15.

## Transearth Injection Maneuver

As with TLI and LOI, the beginning, middle, and end of the TEI burn are shown in the correct burn attitude. The maneuver is a posigrade burn designed to free the spacecraft from the lunar gravitational attraction. The spacecraft attains a velocity of 8582 fps at the end of the burn. The velocity gradually decreases until the spacecraft passes from the lunar sphere of influence into the gravitational sphere of influence of the earth, at which time the velocity gradually increases again.

## Post-TEI Views

The three post-TEI views depict the view from the spacecraft as the earth comes into view after the TEI maneuver. The earth becomes visible over the lunar horizon shortly after TEI. At this time, the crew is looking at the U.S.

## Transearth Coast

As with the translunar coast, the views of the earth and the moon are shown at various times during the coast period (figs. 18, 19, 20, and 21). During this period, both the moon and the spacecraft have moved a considerable distance in right ascension and declination since TLC. Thus, when the spacecraft crew looks at either the moon or the earth, approximately one-half of both bodies are visible to the crew (fig. 3). The spacecraft leaves the lunar gravitational sphere of influence at approximately 140 hours g.e.t.

# ENTRY

The entry phase is shown in figure 22. The SM is jettisoned at approximately 15 minutes prior to entry interface, and the CM is in a heatshield forward attitude. The angle between the spacecraft X-axis and the earth horizon is held at +31.7°, which can be monitored on the 31.7° scribe on the window. The entry is made in darkness, and the moon is visible during part of entry phase. The gimbal angles were obtained from reference 9.

# ECLIPTIC REFERENCE

The translunar and transearth coast phases of the mission are shown in figures 23 and 24; the ecliptic is used instead of the trajectory plane as the reference for the views. Pertinent information such as velocity and altitude can be found for corresponding times from figures 9 and 21.

# CONCLUSIONS

An understanding of spacecraft attitudes with respect to the sun, earth, moon, and stars is particularly useful to verify maneuver attitudes normally described by IMU gimbal angles. This information is especially useful for Apollo 10 (Mission F) because IMU gimbal angles

are referenced to several specific inertial orientations (REFSMMATS) instead of to preferred platform alinements.

This report has presented numerous figures which depict the view from the Apollo 10 (Mission F) window; star field, earth and moon terminators, and horizon orientations are included. This information should prove invaluable in assuring the crew that maneuver attitudes are correct.

TABLE I. - STAR INDENTIFICATION CATALOGUE

| SEQ NO. | IDENTIFICATION | | RIGHT ASCENSION DEGREES | HRS | MIN | SEC | DECLINATION DECIMAL | DEG | MIN | SEC | MAG | IDENTIFICATION | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 33330 | | .00275000 | .0 | .0 | 9.9 | -6.20861110 | -6.0 | 12.0 | 31.0 | 4.66 | 30 | | PSC |
| 2 | 23 | | .03244444 | .0 | 1.0 | 56.8 | -17.53083300 | -17.0 | 31.0 | 51.0 | 4.62 | 2 | | CET |
| 3 | 59 | | .05905555 | .0 | 3.0 | 32.6 | -5.90333330 | -5.0 | 54.0 | 12.0 | 4.68 | 33 | | PSC |
| 4 | 127 | ALPHERATZ SIRRAH | .10955555 | .0 | 6.0 | 34.4 | 28.89722100 | 28.0 | 53.0 | 50.0 | 2.15 | 21 | A | AND |
| 5 | 147 | CAPH | .12163889 | .0 | 7.0 | 17.9 | 58.95666600 | 58.0 | 57.0 | 24.0 | 2.42 | 11 | B | CAS |
| 6 | 158 | | .12733333 | .0 | 7.0 | 38.4 | -45.94055500 | -45.0 | 56.0 | 26.0 | 3.94 | 0 | E | PHE |
| 7 | 238 | ALGENIB | .19049999 | .0 | 11.0 | 25.8 | 14.98916660 | 14.0 | 59.0 | 21.0 | 2.87 | 88 | G | PEG |
| 8 | 272 | | .21438888 | .0 | 12.0 | 51.8 | -19.12666600 | -19.0 | 7.0 | 36.0 | 4.68 | 7 | | CET |
| 9 | 334 | | .25427777 | .0 | 15.0 | 15.4 | 38.48749900 | 38.0 | 29.0 | 15.0 | 4.44 | 24 | J | AND |
| 10 | 362 | | .27486110 | .0 | 16.0 | 29.5 | 36.59138800 | 36.0 | 35.0 | 29.0 | 4.51 | 25 | S | AND |
| 11 | 388 | | .29405555 | .0 | 17.0 | 38.6 | -9.01777770 | -9.0 | 1.0 | 4.0 | 3.75 | 8 | I | CET |
| 12 | 401 | | .30430555 | .0 | 18.0 | 15.5 | -65.08055500 | -65.0 | 4.0 | 50.0 | 4.34 | 0 | Z | TUC |
| 13 | 503 | ALGENIB | .39897221 | .0 | 23.0 | 56.3 | -77.45138800 | -77.0 | 27.0 | 5.0 | 2.90 | 0 | B | HYI |
| 14 | 516 | | .40808333 | .0 | 24.0 | 29.1 | -43.87388800 | -43.0 | 52.0 | 26.0 | 3.90 | 0 | K | PHE |
| 15 | 519 | ANKAA | .40927777 | .0 | 24.0 | 33.4 | -42.49611000 | -42.0 | 29.0 | 46.0 | 2.44 | 0 | A | PHE |
| 16 | 625 | | .49936111 | .0 | 29.0 | 57.7 | -63.15833300 | -63.0 | 9.0 | 30.0 | 4.52 | 0 | B | TUC |
| 17 | 645 | | .51655555 | .0 | 30.0 | 59.6 | 62.73888900 | 62.0 | 44.0 | 20.0 | 4.24 | 15 | K | CAS |
| 18 | 729 | | .58341666 | .0 | 35.0 | .3 | 33.52694400 | 33.0 | 31.0 | 37.0 | 4.44 | 29 | P | AND |
| 19 | 727 | | .58349999 | .0 | 35.0 | .6 | 53.70444400 | 53.0 | 42.0 | 16.0 | 3.72 | 17 | Z | CAS |
| 20 | 759 | | .61166666 | .0 | 36.0 | 42.0 | 29.12194400 | 29.0 | 7.0 | 19.0 | 4.52 | 30 | E | AND |
| 21 | 774 | | .62416665 | .0 | 37.0 | 27.0 | 30.66972200 | 30.0 | 40.0 | 11.0 | 3.49 | 31 | D | AND |
| 22 | 792 | SCHEDIR SCHEDAR | .64180554 | .0 | 38.0 | 30.5 | 56.34583300 | 56.0 | 20.0 | 45.0 | 2.47 | 18 | A | CAS |
| 23 | 823 | | .66129999 | .0 | 39.0 | 40.5 | -46.27694400 | -46.0 | 16.0 | 37.0 | 4.65 | 0 | H | PHE |
| 24 | 866 | | .69644444 | .0 | 41.0 | 47.2 | -57.65499900 | -57.0 | 39.0 | 18.0 | 4.53 | 0 | H | PHE |
| 25 | 865 | DIPHDA DENEB | .69722222 | .0 | 41.0 | 50.0 | -18.17833300 | -18.0 | 10.0 | 42.0 | 2.24 | 16 | B | CET KAITOS |
| 26 | 882 | | .71275000 | .0 | 42.0 | 45.9 | 48.09305500 | 48.0 | 5.0 | 35.0 | 4.70 | 22 | D | CAS |
| 27 | 940 | | .75797221 | .0 | 45.0 | 28.7 | 24.07694400 | 24.0 | 4.0 | 37.0 | 4.30 | 34 | Z | AND |
| 28 | 963 | | .78105554 | .0 | 46.0 | 51.8 | 7.39500000 | 7.0 | 23.0 | 42.0 | 4.55 | 63 | D | PSC |
| 29 | 962 | ACHIRD | .78277776 | .0 | 46.0 | 58.0 | 57.63055500 | 57.0 | 37.0 | 50.0 | 3.64 | 24 | H | CAS |
| 30 | 989 | | .79791665 | .0 | 47.0 | 52.5 | 40.88861000 | 40.0 | 53.0 | 19.0 | 4.42 | 35 | N | AND |
| 31 | 1117 | | .90966666 | .0 | 54.0 | 34.8 | 60.52777800 | 60.0 | 31.0 | 40.0 | 2.30 | 27 | G | CAS |
| 32 | 1122 | | .91338888 | .0 | 54.0 | 48.2 | 38.31000000 | 38.0 | 18.0 | 36.0 | 3.94 | 37 | M | AND |
| 33 | 1136 | | .92222221 | .0 | 55.0 | 20.0 | 23.22916600 | 23.0 | 13.0 | 45.0 | 4.62 | 38 | H | AND |
| 34 | 1172 | | .94866666 | .0 | 56.0 | 55.2 | -29.54638800 | -29.0 | 32.0 | 47.0 | 4.39 | 0 | A | SCL |
| 35 | 1258 | | 1.01872221 | 1.0 | 1.0 | 7.4 | 7.70222220 | 7.0 | 42.0 | 8.0 | 4.45 | 71 | E | PSC |
| 36 | 1288 | | 1.05997221 | 1.0 | 3.0 | 35.9 | 86.07055500 | 86.0 | 4.0 | 14.0 | 4.50 | 43 | | CEP |
| 37 | 1335 | | 1.07541665 | 1.0 | 4.0 | 31.5 | -46.90583300 | -46.0 | 54.0 | 21.0 | 3.35 | 0 | B | PHE |
| 38 | 1384 | | 1.11380555 | 1.0 | 6.0 | 49.7 | -10.36722210 | -10.0 | 22.0 | 2.0 | 3.60 | 31 | H | CET |
| 39 | 1387 | | 1.11527777 | 1.0 | 6.0 | 55.0 | -55.43249900 | -55.0 | 25.0 | 57.0 | 4.13 | 0 | Z | PHE |
| 40 | 1394 | | 1.12433332 | 1.0 | 7.0 | 27.6 | 47.05555500 | 47.0 | 3.0 | 20.0 | 4.28 | 42 | V | AND |
| 41 | 1400 | MIRACH | 1.12941666 | 1.0 | 7.0 | 45.9 | 35.43555500 | 35.0 | 26.0 | 8.0 | 2.37 | 43 | B | AND |
| 42 | 1424 | | 1.14930554 | 1.0 | 8.0 | 57.5 | 54.96416600 | 54.0 | 57.0 | 51.0 | 4.52 | 33 | J | CAS |
| 43 | 1441 | | 1.16211109 | 1.0 | 9.0 | 43.6 | 29.90416600 | 29.0 | 54.0 | 15.0 | 4.70 | 83 | T | PSC |
| 44 | 1474 | | 1.19736110 | 1.0 | 11.0 | 50.5 | 24.39861100 | 24.0 | 23.0 | 55.0 | 4.64 | 85 | V | PSC |
| 45 | 1591 | | 1.29227777 | 1.0 | 17.0 | 32.2 | 27.08055500 | 27.0 | 4.0 | 50.0 | 4.47 | 90 | U | PSC |
| 46 | 1695 | | 1.37119444 | 1.0 | 22.0 | 16.3 | -8.36361110 | -8.0 | 21.0 | 49.0 | 3.83 | 45 | J | CET |
| 47 | 1715 | KSORA RUCHA | 1.39180554 | 1.0 | 23.0 | 30.5 | 60.05416600 | 60.0 | 3.0 | 15.0 | 2.80 | 37 | D | CAS |
| 48 | 1787 | | 1.44744442 | 1.0 | 26.0 | 50.8 | -43.49722200 | -43.0 | 29.0 | 50.0 | 3.40 | 0 | G | PHE |
| 49 | 1839 | | 1.49344443 | 1.0 | 29.0 | 36.4 | 15.16583320 | 15.0 | 9.0 | 57.0 | 3.72 | 99 | H | PSC |
| 50 | 1847 | | 1.49658331 | 1.0 | 29.0 | 47.7 | -49.25416600 | -49.0 | 15.0 | 15.0 | 3.96 | 0 | D | PHE |
| 51 | 1948 | | 1.57888888 | 1.0 | 34.0 | 44.0 | 41.23111100 | 41.0 | 13.0 | 52.0 | 4.18 | 50 | U | AND |
| 52 | 1966 | | 1.59719443 | 1.0 | 35.0 | 49.9 | 48.45166600 | 48.0 | 27.0 | 6.0 | 3.77 | 51 | | AND |
| 53 | 1979 | ACHERNAR | 1.60686110 | 1.0 | 36.0 | 24.7 | -57.41416600 | -57.0 | 24.0 | 51.0 | .60 | 0 | A | ERI |
| 54 | 2055 | | 1.66011110 | 1.0 | 39.0 | 36.4 | 5.31111110 | 5.0 | 18.0 | 40.0 | 4.68 | 106 | N | PSC |
| 55 | 2102 | | 1.69091664 | 1.0 | 41.0 | 27.3 | 50.51305500 | 50.0 | 30.0 | 47.0 | 4.20V | 0 | V | PER |

TABLE I. - STAR IDENTIFICATION CATALOGUE - Continued

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 56 | 2123 | | 1.70736109 | 1.0 | 42.0 | 26.5 | -16.12111000 | -16.0 | 7.0 | 16.0 | 3.65 | 52 | T | CET | | |
| 57 | 2139 | | 1.72569442 | 1.0 | 43.0 | 32.5 | 8.98222220 | 8.0 | 58.0 | 56.0 | 4.50 | 110 | O | PSC | | |
| 58 | 2249 | BATEN KAITOS | 1.82886110 | 1.0 | 49.0 | 43.9 | -10.50722210 | -10.0 | 30.0 | 26.0 | 3.92 | 55 | Z | CET | | |
| 59 | 2272 | METALLAH MOTHALLAH | 1.85133332 | 1.0 | 51.0 | 4.8 | 29.74249900 | 29.0 | 44.0 | 33.0 | 3.58 | 2 | A | TRI | | |
| 60 | 2291 | | 1.86008333 | 1.0 | 51.0 | 36.3 | 19.12277700 | 19.0 | 7.0 | 22.0 | 4.75 | 5 | G | ARI | | |
| 61 | 2289 | SEGIN | 1.86424999 | 1.0 | 51.0 | 51.3 | 63.49861100 | 63.0 | 29.0 | 55.0 | 3.44 | 45 | E | CAS | | |
| 62 | 2303 | | 1.87072220 | 1.0 | 52.0 | 14.6 | -46.47361000 | -46.0 | 28.0 | 25.0 | 4.41 | 0 | Y | PHE | | |
| 63 | 2309 | SHERATAN | 1.87836109 | 1.0 | 52.0 | 42.1 | 20.63777700 | 20.0 | 38.0 | 16.0 | 2.72 | 6 | B | ARI | | |
| 64 | 2331 | | 1.90074998 | 1.0 | 54.0 | 2.7 | -67.81916600 | -67.0 | 49.0 | 9.0 | 4.72 | 0 | W | HYI | | |
| 65 | 2339 | | 1.90994443 | 1.0 | 54.0 | 35.8 | -51.78277700 | -51.0 | 46.0 | 58.0 | 3.73 | 0 | X | ERI | | |
| 66 | 2369 | | 1.92966665 | 1.0 | 55.0 | 46.8 | -47.55555500 | -47.0 | 33.0 | 20.0 | 4.74 | 0 | | PHE | | |
| 67 | 2405 | | 1.96111110 | 1.0 | 57.0 | 40.0 | -61.73972100 | -61.0 | 44.0 | 23.0 | 3.02 | 0 | A | HYI | | |
| 68 | 2419 | | 1.97258331 | 1.0 | 58.0 | 21.3 | -21.24666600 | -21.0 | 14.0 | 48.0 | 4.18 | 59 | U | CET | | |
| 69 | 2424 | | 1.98408331 | 1.0 | 59.0 | 2.7 | 70.73861000 | 70.0 | 44.0 | 19.0 | 4.61 | 48 | | CAS | | |
| 70 | 2243 | POLARIS ALRUCCABA | 1.99008331 | 1.0 | 59.0 | 24.3 | 89.10222100 | 89.0 | 6.0 | 8.0 | 2.12 | 0 | A | UMI | CYNSR | |
| 71 | 2452 | ALRISHA KAITAIN | 2.00388890 | 2.0 | .0 | 14.0 | 2.59555550 | 2.0 | 35.0 | 44.0 | 4.33 | 113 | A | PSC | OKDA | |
| 72 | 2445 | | 2.00675000 | 2.0 | .0 | 24.3 | 72.25333300 | 72.0 | 15.0 | 12.0 | 4.06 | 50 | | CAS | | |
| 73 | 2477 | ALMACH ALAMAK | 2.02902770 | 2.0 | 1.0 | 44.5 | 42.16277700 | 42.0 | 9.0 | 46.0 | 2.28 | 0 | G | AND | | |
| 74 | 2506 | | 2.04869440 | 2.0 | 2.0 | 55.3 | -29.46416700 | -29.0 | 27.0 | 51.0 | 4.74 | 0 | N | FOR | | |
| 75 | 2538 | HAMAL | 2.08658320 | 2.0 | 5.0 | 11.7 | 23.29777700 | 23.0 | 17.0 | 52.0 | 2.23 | 13 | A | ARI | | |
| 76 | 2572 | | 2.12422210 | 2.0 | 7.0 | 27.2 | 34.82250000 | 34.0 | 49.0 | 21.0 | 3.08 | 4 | B | TRI | | |
| 77 | 2656 | | 2.19902770 | 2.0 | 11.8 | 8.5 | 8.68333330 | 8.0 | 41.0 | .0 | 4.54 | 65 | C | CET | | |
| 78 | 2742 | | 2.25377770 | 2.0 | 15.0 | 13.6 | 33.68638800 | 33.0 | 41.0 | 11.0 | 4.07 | 9 | G | TRI | | |
| 79 | 2756 | | 2.25430550 | 2.0 | 15.0 | 15.5 | -51.67361100 | -51.0 | 40.0 | 25.0 | 3.78 | 0 | V | ERI | | |
| 80 | 2796 | MIRA | 2.29291660 | 2.0 | 17.0 | 34.5 | -3.13555550 | -3.0 | 8.0 | 8.0 | 2.00V | 68 | O | CET | | |
| 81 | 2872 | | 2.35200000 | 2.0 | 21.0 | 7.2 | -68.81833200 | -68.0 | 49.0 | 6.0 | 4.26 | 0 | D | HYI | | |
| 82 | 2954 | | 2.42836100 | 2.0 | 25.0 | 42.1 | -47.84027700 | -47.0 | 51.0 | 37.0 | 4.44 | 0 | K | ERI | | |
| 83 | 2952 | | 2.43588880 | 2.0 | 26.0 | 9.2 | 67.24666600 | 67.0 | 14.0 | 48.0 | 4.59 | 0 | I | CAS | | |
| 84 | 2960 | | 2.43824990 | 2.0 | 26.0 | 17.7 | 8.30416660 | 8.0 | 18.0 | 15.0 | 4.34 | 73 | C | CET | | |
| 85 | 3192 | | 2.62808320 | 2.0 | 37.0 | 41.1 | .17861111 | .0 | 10.0 | 43.0 | 4.04 | 82 | D | CET | | |
| 86 | 3217 | | 2.64108330 | 2.0 | 38.0 | 27.9 | -43.04111100 | -43.0 | 2.0 | 28.0 | 4.53 | 0 | | ERI | | |
| 87 | 3240 | | 2.65074990 | 2.0 | 39.0 | 2.7 | -68.91638800 | -68.0 | 24.0 | 59.0 | 4.26 | 0 | E | HYI | | |
| 88 | 3237 | | 2.65474990 | 2.0 | 39.0 | 17.1 | -40.00444400 | -40.0 | .0 | 16.0 | 4.06 | 0 | I | ERI | | |
| 89 | 3273 | | 2.68986110 | 2.0 | 41.0 | 23.5 | 27.55944400 | 27.0 | 33.0 | 34.0 | 4.58 | 35 | | ARI | | |
| 90 | 3276 | KAFFALJIDHMA | 2.69141660 | 2.0 | 41.0 | 29.1 | 3.08916670 | 3.0 | 5.0 | 21.0 | 3.58 | 86 | G | CET | | |
| 91 | 3277 | | 2.69661110 | 2.0 | 41.0 | 47.8 | 49.08166600 | 49.0 | 4.0 | 54.0 | 4.22 | 13 | J | PER | | |
| 92 | 3300 | | 2.70758330 | 2.0 | 42.0 | 27.3 | -14.00611100 | -14.0 | .0 | 22.0 | 4.39 | 89 | P | CET | | |
| 93 | 3309 | | 2.71744440 | 2.0 | 43.0 | 2.8 | 9.96750000 | 9.0 | 58.0 | 3.0 | 4.36 | 87 | M | CET | | |
| 94 | 3318 | | 2.72447210 | 2.0 | 43.0 | 28.1 | -18.71972200 | -18.0 | 43.0 | 11.0 | 4.61 | 1 | T | ERI | | |
| 95 | 3356 | | 2.76363890 | 2.0 | 45.0 | 49.1 | 29.10277800 | 29.0 | 6.0 | 10.0 | 4.62 | 39 | | ARI | | |
| 96 | 3387 | | 2.79374990 | 2.0 | 47.0 | 37.5 | -32.55222100 | -32.0 | 33.0 | 8.0 | 4.50 | 0 | B | FOR | | |
| 97 | 3391 | | 2.79863890 | 2.0 | 47.0 | 55.1 | 27.11750000 | 27.0 | 7.0 | 3.0 | 3.68 | 41 | | ARI | | |
| 98 | 3390 | MIRAM | 2.80213890 | 2.0 | 48.0 | 7.7 | 55.75166600 | 55.0 | 45.0 | 6.0 | 3.93 | 15 | H | PER | | |
| 99 | 3401 | | 2.80611110 | 2.0 | 48.0 | 22.0 | 38.17583300 | 38.0 | 10.0 | 33.0 | 4.27 | 16 | | PER | | |
| 100 | 3419 | | 2.82252770 | 2.0 | 49.0 | 21.1 | 34.91694400 | 34.0 | 55.0 | 1.0 | 4.67 | 17 | | PER | | |
| 101 | 3463 | | 2.84461100 | 2.0 | 50.0 | 40.6 | -75.20999900 | -75.0 | 12.0 | 36.0 | 4.70 | 0 | N | HYI | | |
| 102 | 3462 | | 2.86272220 | 2.0 | 51.0 | 45.8 | 52.62055500 | 52.0 | 37.0 | 14.0 | 4.06 | 18 | T | PER | | |
| 103 | 3539 | AZHA | 2.91191660 | 2.0 | 54.0 | 42.9 | -9.03638890 | -9.0 | 2.0 | 11.0 | 4.05 | 3 | H | ERI | | |
| 104 | 3567 | | 2.94191660 | 2.0 | 56.0 | 30.9 | 39.52388800 | 39.0 | 31.0 | 26.0 | 4.62 | 22 | P | PER | | |
| 105 | 3584 | ACAMAR | 2.94888880 | 2.0 | 56.0 | 56.0 | -40.44416600 | -40.0 | 26.0 | 39.0 | 3.42 | 0 | J | ERI | | |
| 106 | 3582 | | 2.95391660 | 2.0 | 57.0 | 12.3 | 21.20138900 | 21.0 | 12.0 | 5.0 | 4.64 | 48 | E | ARI | | |
| 107 | 3595 | | 2.96391660 | 2.0 | 57.0 | 50.1 | 8.76888890 | 8.0 | 46.0 | 8.0 | 4.69 | 91 | L | CET | | |
| 108 | 3643 | MENKAR MEKAB | 3.00794440 | 3.0 | .0 | 26.8 | 3.95361110 | 3.0 | 57.0 | 13.0 | 2.82 | 92 | A | CET | | |
| 109 | 3649 | | 3.01413890 | 3.0 | .0 | 50.9 | -23.76055500 | -23.0 | 45.0 | 38.0 | 4.16 | 11 | T | ERI | | |
| 110 | 3664 | | 3.03747220 | 3.0 | 2.0 | 14.9 | 53.37083300 | 53.0 | 22.0 | 15.0 | 3.08 | 23 | G | PER | | |
| 111 | 3682 | | 3.04877770 | 3.0 | 2.0 | 55.6 | 38.70583300 | 38.0 | 42.0 | 21.0 | 3.00V | 25 | | PER | | |
| 112 | 3733 | ALGOL GORGONA | 3.09805550 | 3.0 | 5.0 | 53.0 | 40.82222100 | 40.0 | 49.0 | 20.0 | 2.30 | 26 | B | PER | | |
| 113 | 3740 | | 3.10883330 | 3.0 | 6.0 | 31.8 | 49.48111100 | 49.0 | 28.0 | 52.0 | 4.17 | 0 | I | PER | | |

TABLE I. - STAR IDENTIFICATION CATALOGUE - Continued

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 114 | 3755 | MISAM | | 3.11874990 | 3.0 | 7.0 | 7.5 | 44.72611000 | 44.0 | 43.0 | 34.0 | 4.00 | 27 | K | PER |
| 115 | 3805 | BOTEIN | | 3.16038880 | 3.0 | 9.0 | 37.4 | 19.59555500 | 19.0 | 35.0 | 44.0 | 4.53 | 57 | O | ARI |
| 116 | 3831 | | | 3.17638880 | 3.0 | 10.0 | 35.0 | -29.12416600 | -29.0 | 7.0 | 27.0 | 3.95 | 0 | A | FOR |
| 117 | 3979 | | | 3.29930550 | 3.0 | 17.0 | 57.5 | -21.88416600 | -21.0 | 53.0 | 3.0 | 3.95 | 16 | T | ERI |
| 118 | 3981 | | | 3.30361110 | 3.0 | 18.0 | 13.0 | 28.92277800 | 28.0 | 55.0 | 22.0 | 4.72 | 0 | | ARI |
| 119 | 4000 | | | 3.30886100 | 3.0 | 18.0 | 31.9 | -43.20277700 | -43.0 | 12.0 | 10.0 | 4.30 | 82 | | ERI |
| 120 | 4041 | MIRFAK | MARFAK | 3.36355550 | 3.0 | 21.0 | 48.8 | 49.73833300 | 49.0 | 44.0 | 18.0 | 1.90 | 33 | A | PER |
| 121 | 4070 | | | 3.38211100 | 3.0 | 22.0 | 55.6 | 8.90694440 | 8.0 | 54.0 | 25.0 | 3.80 | 1 | D | TAU |
| 122 | 4107 | | | 3.42113880 | 3.0 | 25.0 | 16.1 | 9.61194450 | 9.0 | 36.0 | 43.0 | 3.75 | 2 | C | TAU |
| 123 | 4113 | | | 3.43697210 | - - | -6.0 | 13.1 | 59.82027700 | 59.0 | 49.0 | 13.0 | 4.42 | 2 | | CAM |
| 124 | 4133 | | | 3.44758320 | 3.0 | 26.0 | 51.3 | 49.38916600 | 49.0 | 23.0 | 21.0 | 4.67 | 34 | | PER |
| 125 | 4158 | | | 3.46827770 | 3.0 | 28.0 | 5.8 | 47.87611100 | 47.0 | 52.0 | 34.0 | 4.55 | 35 | B | PER |
| 126 | 4184 | | | 3.48227770 | 3.0 | 28.0 | 56.2 | 12.81805550 | 12.0 | 49.0 | 5.0 | 4.28 | 5 | | TAU |
| 127 | 4244 | | | 3.52133330 | 3.0 | 31.0 | 16.8 | -9.57555550 | -9.0 | 34.0 | 32.0 | 3.81 | 18 | E | ERI |
| 128 | 4258 | | | 3.53733330 | 3.0 | 32.0 | 14.4 | -21.74916600 | -21.0 | 44.0 | 57.0 | 4.32 | 19 | T | ERI |
| 129 | 4287 | | | 3.56655550 | 3.0 | 33.0 | 59.6 | 48.07777700 | 48.0 | 4.0 | 40.0 | 4.26 | 37 | Y | PER |
| 130 | 4313 | | | 3.58474990 | 3.0 | 35.0 | 5.1 | .29166666 | .0 | 17.0 | 30.0 | 4.40 | 10 | | TAU |
| 131 | 4329 | | | 3.59727770 | 3.0 | 35.0 | 50.2 | -40.38861000 | -40.0 | 23.0 | 19.0 | 4.58 | 0 | | ERI |
| 132 | 4427 | | | 3.67372220 | 3.0 | 40.0 | 25.4 | 47.67722100 | 47.0 | 40.0 | 38.0 | 3.10 | 39 | D | PER |
| 133 | 4455 | | | 3.69225000 | 3.0 | 41.0 | 32.1 | -37.42305500 | -37.0 | 25.0 | 23.0 | 4.64 | 0 | | ERI |
| 134 | 4450 | RANA | | 3.69283330 | 3.0 | 41.0 | 34.2 | -9.88083330 | -9.0 | 52.0 | 51.0 | 3.72 | 23 | D | ERI |
| 135 | 4461 | ATIKS | | 3.70197210 | 3.0 | 42.0 | 7.1 | 32.17888800 | 32.0 | 10.0 | 44.0 | 3.94 | 38 | D | PER |
| 136 | 4477 | ELECTRA | | 3.71322220 | 3.0 | 42.0 | 47.6 | 24.00472200 | 24.0 | .0 | 17.0 | 3.81 | 17 | | TAU |
| 137 | 4474 | | | 3.71347220 | 3.0 | 42.0 | 48.5 | 42.46972100 | 42.0 | 28.0 | 11.0 | 3.93 | 41 | N | PER |
| 138 | 4486 | TAYGETA | | 3.71866660 | 3.0 | 43.0 | 7.2 | 24.35888900 | 24.0 | 21.0 | 32.0 | 4.37 | 19 | | TAU |
| 139 | 4500 | MAIA | | 3.72899990 | 3.0 | 43.0 | 44.4 | 24.25972100 | 24.0 | 15.0 | 35.0 | 4.02 | 20 | | TAU |
| 140 | 4517 | | | 3.72922220 | 3.0 | 43.0 | 45.2 | -64.91694300 | -64.0 | 55.0 | 1.0 | 3.80 | 0 | B | RET |
| 141 | 4512 | MEROPE | | 3.73741660 | 3.0 | 44.0 | 14.7 | 23.84083300 | 23.0 | 50.0 | 27.0 | 4.25 | 23 | | TAU |
| 142 | 4525 | | | 3.74141660 | 3.0 | 44.0 | 29.1 | -12.21027760 | -12.0 | 12.0 | 37.0 | 4.64 | 26 | P | ERI |
| 143 | 4547 | | | 3.75569440 | 3.0 | 45.0 | 20.5 | -23.35194300 | -23.0 | 21.0 | 7.0 | 4.33 | 27 | T | ERI |
| 144 | 4541 | ALCYONE | | 3.75666660 | 3.0 | 45.0 | 24.0 | 23.99833300 | 23.0 | 59.0 | 54.0 | 2.96 | 25 | H | TAU |
| 145 | 4553 | | | 3.77158330 | 3.0 | 46.0 | 17.7 | 65.41999900 | 65.0 | 25.0 | 12.0 | 4.71 | 0 | | CAM |
| 146 | 4557 | | | 3.77719440 | 3.0 | 46.0 | 37.9 | 71.22694400 | 71.0 | 13.0 | 37.0 | 4.67 | 0 | G | CAM |
| 147 | 4586 | ATLAS | | 3.78461110 | 3.0 | 47.0 | 4.6 | 23.94777800 | 23.0 | 56.0 | 52.0 | 3.80 | 27 | | TAU |
| 148 | 4633 | | | 3.79602770 | 3.0 | 47.0 | 45.7 | -74.34666600 | -74.0 | 20.0 | 48.0 | 3.17 | 0 | B | HYI |
| 149 | 4624 | | | 3.80238880 | 3.0 | 48.0 | 8.6 | -36.30527700 | -36.0 | 18.0 | 19.0 | 4.24 | 0 | | ERI |
| 150 | 4688 | MENKHIB | | 3.86594440 | 3.0 | 51.0 | 55.6 | 31.78111100 | 31.0 | 46.0 | 52.0 | 2.91 | 44 | Z | PER |
| 151 | 4759 | | | 3.92497220 | 3.0 | 55.0 | 29.9 | 39.91055500 | 39.0 | 54.0 | 38.0 | 2.96 | 45 | E | PER |
| 152 | 4778 | ZAURAK | | 3.93991660 | 3.0 | 56.0 | 23.7 | -13.60694440 | -13.0 | 36.0 | 25.0 | 3.19 | 34 | G | ERI |
| 153 | 4779 | | | 3.94480550 | 3.0 | 56.0 | 41.3 | 35.69194400 | 35.0 | 41.0 | 31.0 | 4.05 | 46 | C | PER |
| 154 | 4808 | | | 3.96977770 | 3.0 | 58.0 | 11.2 | -61.49861100 | -61.0 | 29.0 | 55.0 | 4.41 | 0 | D | RET |
| 155 | 4801 | | | 3.97386100 | 3.0 | 58.0 | 25.9 | -24.11444400 | -24.0 | 6.0 | 52.0 | 4.69 | 36 | T | ERI |
| 156 | 4805 | | | 3.97897210 | 3.0 | 58.0 | 44.3 | 12.39277770 | 12.0 | 23.0 | 34.0 | 3.90 | 35 | L | TAU |
| 157 | 4855 | | | 4.00641660 | 4.0 | .0 | 23.1 | -62.25666600 | -62.0 | 15.0 | 24.0 | 4.46 | 0 | B | RET |
| 158 | 4862 | | | 4.02152770 | 4.0 | 1.0 | 17.5 | 5.89361110 | 5.0 | 53.0 | 37.0 | 3.94 | 38 | N | TAU |
| 159 | 4897 | | | 4.04369440 | 4.0 | 2.0 | 37.3 | 21.98777700 | 21.0 | 59.0 | 16.0 | 4.50 | 37 | | TAU |
| 160 | 4924 | | | 4.06613880 | 4.0 | 3.0 | 58.1 | 50.25805500 | 50.0 | 15.0 | 29.0 | 4.33 | 47 | L | PER |
| 161 | 4967 | | | 4.10186100 | 4.0 | 6.0 | 6.7 | 47.62083300 | 47.0 | 37.0 | 15.0 | 4.03 | 48 | U | PER |
| 162 | 5056 | BEID | | 4.16924990 | 4.0 | 10.0 | 9.3 | -6.92749990 | -6.0 | 55.0 | 39.0 | 4.14 | 38 | O | ERI |
| 163 | 5099 | | | 4.20533330 | 4.0 | 12.0 | 19.2 | 48.32222200 | 48.0 | 19.0 | 20.0 | 4.28 | 51 | M | PER |
| 164 | 5121 | | | 4.21400000 | 4.0 | 12.0 | 50.4 | -42.37999900 | -42.0 | 22.0 | 48.0 | 3.83 | 0 | A | HOR |
| 165 | 5134 | | | 4.22719430 | 4.0 | 13.0 | 37.9 | 8.80611110 | 8.0 | 48.0 | 22.0 | 4.32 | 49 | M | TAU |
| 166 | 5138 | | | 4.22766660 | 4.0 | 13.0 | 39.6 | -7.70611110 | -7.0 | 42.0 | 22.0 | 4.48 | 40 | O | ERI |
| 167 | 5164 | | | 4.23283320 | 4.0 | 13.0 | 58.2 | -62.56111000 | -62.0 | 33.0 | 40.0 | 3.36 | 0 | A | RET |
| 168 | 5179 | | | 4.25177770 | 4.0 | 15.0 | 6.4 | -51.57416600 | -51.0 | 34.0 | 27.0 | 4.36 | 0 | G | DOR |
| 169 | 5174 | | | 4.26005550 | 4.0 | 15.0 | 36.2 | 50.21138900 | 50.0 | 12.0 | 41.0 | 4.60 | 0 | | PER |
| 170 | 5194 | | | 4.26458320 | 4.0 | 15.0 | 52.5 | -59.38583300 | -59.0 | 23.0 | 9.0 | 4.42 | 0 | E | RET |
| 171 | 5201 | | | 4.27613880 | 4.0 | 16.0 | 34.1 | -33.88277700 | -33.0 | 52.0 | 58.0 | 3.59 | 41 | U | ERI |

TABLE I. - STAR IDENTIFICATION CATALOGUE - Continued

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 172 | 5226 | | | 4.29663880 | 4.0 | 17.0 | 47.9 | 15.54444450 | 15.0 | 32.0 | 40.0 | 3.86 | 54 | G | TAU | |
| 173 | 5304 | | | 4.34855550 | 4.0 | 20.0 | 54.8 | 17.46194400 | 17.0 | 27.0 | 43.0 | 3.93 | 61 | O | TAU | |
| 174 | 5349 | | | 4.37866660 | 4.0 | 22.0 | 43.2 | -34.09722100 | -34.0 | 5.0 | 50.0 | 4.06 | 43 | U | ERI | |
| 175 | 5350 | | | 4.38799990 | 4.0 | 23.0 | 16.8 | 22.21527700 | 22.0 | 12.0 | 55.0 | 4.36 | 65 | K | TAU | |
| 176 | 5354 | | | 4.39102780 | 4.0 | 23.0 | 27.7 | 17.84944400 | 17.0 | 50.0 | 58.0 | 4.24 | 68 | | TAU | |
| 177 | 5370 | | | 4.40350000 | 4.0 | 24.0 | 12.6 | 22.73583300 | 22.0 | 44.0 | 9.0 | 4.40 | 69 | U | TAU | |
| 178 | 5375 | | | 4.40580550 | 4.0 | 24.0 | 20.9 | 15.54027770 | 15.0 | 32.0 | 25.0 | 4.60 | 71 | | TAU | |
| 179 | 5430 | AIN | | 4.44283320 | 4.0 | 26.0 | 34.2 | 19.10416600 | 19.0 | 6.0 | 15.0 | 3.63 | 74 | E | TAU | |
| 180 | 5433 | | | 4.44286100 | 4.0 | 26.0 | 34.3 | 15.88583320 | 15.0 | 53.0 | 9.0 | 4.04 | 77 | J | TAU | |
| 181 | 5436 | | | 4.44433320 | 4.0 | 26.0 | 39.6 | 15.79472210 | 15.0 | 47.0 | 41.0 | 3.62 | 78 | J | TAU | |
| 182 | 5558 | | | 4.53100000 | 4.0 | 31.0 | 51.6 | 14.77222220 | 14.0 | 46.0 | 20.0 | 4.75 | 86 | R | TAU | |
| 183 | 5572 | | | 4.53561100 | 4.0 | 32.0 | 8.2 | -29.83638900 | -29.0 | 50.0 | 11.0 | 4.59 | 50 | U | ERI | |
| 184 | 5600 | | | 4.55397210 | 4.0 | 33.0 | 14.3 | -55.11694400 | -55.0 | 7.0 | 1.0 | 3.47 | 0 | A | DOR | |
| 185 | 5599 | | | 4.56213880 | 4.0 | 33.0 | 43.7 | 10.09055550 | 10.0 | 5.0 | 26.0 | 4.38 | 88 | | TAU | |
| 186 | 5605 | ALDEBARAN | PALILIC | 4.56516660 | 4.0 | 33.0 | 54.6 | 16.44027800 | 16.0 | 24.0 | 25.0 | 1.06 | 87 | A | TAU | IUM |
| 187 | 5414 | THEEMIN | | 4.56980550 | 4.0 | 34.0 | 11.3 | -30.63305500 | -30.0 | 37.0 | 59.0 | 3.88 | 52 | U | ERI | |
| 188 | 5409 | | | 4.57097220 | 4.0 | 34.0 | 15.5 | 41.19472200 | 41.0 | 11.0 | 41.0 | 4.46 | 58 | | PER | |
| 189 | 5417 | | | 4.57613890 | 4.0 | 34.0 | 34.1 | -3.42277770 | -3.0 | 25.0 | 22.0 | 4.12 | 48 | N | ERI | |
| 190 | 5645 | | | 4.60330550 | 4.0 | 36.0 | 11.9 | 12.44222210 | 12.0 | 26.0 | 32.0 | 4.30 | 90 | | TAU | |
| 191 | 5657 | SCEPTRUM | | 4.60961100 | 4.0 | 36.0 | 34.6 | -14.37111110 | -14.0 | 22.0 | 16.0 | 3.98 | 53 | | ERI | |
| 192 | 5695 | | | 4.64849990 | 4.0 | 38.0 | 54.6 | -19.73750000 | -19.0 | 44.0 | 15.0 | 4.54 | 54 | | ERI | |
| 193 | 5708 | | | 4.65719440 | 4.0 | 39.0 | 25.9 | -41.92972200 | -41.0 | 55.0 | 47.0 | 4.52 | 0 | A | CAE | |
| 194 | 5716 | | | 4.66902770 | 4.0 | 40.0 | 8.5 | 22.89138800 | 22.0 | 53.0 | 29.0 | 4.33 | 94 | T | TAU | |
| 195 | 5796 | | | 4.72916660 | 4.0 | 43.0 | 45.0 | -3.31750000 | -3.0 | 19.0 | 3.0 | 4.18 | 57 | M | ERI | |
| 196 | 5875 | TABIT | | 4.79897220 | 4.0 | 47.0 | 56.3 | 6.90166670 | 6.0 | 54.0 | 6.0 | 3.31 | 1 | P | ORI | |
| 197 | 5892 | | | 4.81169440 | 4.0 | 48.0 | 42.1 | 8.84166660 | 8.0 | 50.0 | 30.0 | 4.35 | 2 | P | ORI | |
| 198 | 5911 | | | 4.82233320 | 4.0 | 49.0 | 20.4 | 5.54666660 | 5.0 | 32.0 | 48.0 | 3.78 | 3 | P | ORI | |
| 199 | 5924 | | | 4.84261100 | 4.0 | 50.0 | 33.4 | 66.28583200 | 66.0 | 17.0 | 9.0 | 4.38 | 9 | A | CAM | |
| 200 | 5954 | | | 4.85288880 | 4.0 | 51.0 | 10.4 | -5.51000000 | -5.0 | 30.0 | 36.0 | 4.45 | 41 | W | ERI | |
| 201 | 5978 | | | 4.87377770 | 4.0 | 52.0 | 25.6 | 2.38472220 | 2.0 | 23.0 | 5.0 | 3.90 | 8 | P | ORI | |
| 202 | 5987 | | | 4.88277770 | 4.0 | 52.0 | 58.0 | 10.09666650 | 10.0 | 5.0 | 48.0 | 4.74 | 7 | P | ORI | |
| 203 | 6025 | | | 4.90669440 | 4.0 | 54.0 | 24.1 | 13.46055540 | 13.0 | 27.0 | 38.0 | 4.28 | 9 | O | ORI | |
| 204 | 6017 | | | 4.90788880 | 4.0 | 54.0 | 28.4 | 53.69833300 | 53.0 | 41.0 | 54.0 | 4.44 | 7 | | CAM | |
| 205 | 6029 | HASSALEH | | 4.91186100 | 4.0 | 54.0 | 42.7 | 33.11249900 | 33.0 | 6.0 | 45.0 | 2.90 | 3 | I | AUR | |
| 206 | 6068 | | | 4.94552770 | 4.0 | 56.0 | 43.9 | 1.66166665 | 1.0 | 39.0 | 42.0 | 4.73 | 10 | P | ORI | |
| 207 | 6123 | | | 4.99088880 | 4.0 | 59.0 | 27.2 | 43.77333300 | 43.0 | 46.0 | 24.0 | 3.00V | 7 | E | AUR | |
| 208 | 6137 | HOEDUS I | | 5.00047210 | 5.0 | .0 | 1.7 | 41.02666600 | 41.0 | 1.0 | 36.0 | 3.90 | 8 | Z | AUR | |
| 209 | 6136 | | | 5.00494440 | 5.0 | .0 | 17.8 | 60.39361100 | 60.0 | 23.0 | 37.0 | 4.22 | 10 | B | CAM | |
| 210 | 6158 | | | 5.01669440 | 5.0 | 1.0 | .1 | 21.54166600 | 21.0 | 32.0 | 30.0 | 4.70 | 102 | I | TAU | |
| 211 | 6191 | | | 5.04277770 | 5.0 | 2.0 | 34.0 | 15.35694450 | 15.0 | 21.0 | 25.0 | 4.65 | 11 | | ORI | |
| 212 | 6212 | | | 5.05244430 | 5.0 | 3.0 | 8.8 | -35.52799900 | -35.0 | 31.0 | 48.0 | 4.62 | 0 | G | CAE | |
| 213 | 6231 | | | 5.06630550 | 5.0 | 3.0 | 58.7 | -22.41694400 | -22.0 | 25.0 | 1.0 | 3.29 | 2 | E | LEP | |
| 214 | 6226 | HOEDUS II | | 5.06761110 | 5.0 | 4.0 | 3.4 | 41.18888800 | 41.0 | 11.0 | 20.0 | 3.28 | 10 | H | AUR | |
| 215 | 6274 | CURSA | | 5.10213880 | 5.0 | 6.0 | 7.7 | -5.13027770 | -5.0 | 7.0 | 49.0 | 2.92 | 67 | B | ERI | |
| 216 | 6304 | | | 5.12449990 | 5.0 | 7.0 | 28.2 | -8.77749990 | -8.0 | 47.0 | 51.0 | 4.34 | 69 | L | ERI | |
| 217 | 6374 | | | 5.17772210 | 5.0 | 10.0 | 39.8 | -11.90972220 | -11.0 | 54.0 | 35.0 | 4.54 | 3 | I | LEP | |
| 218 | 6382 | | | 5.18930550 | 5.0 | 11.0 | 21.5 | -16.24583300 | -16.0 | 14.0 | 45.0 | 3.30 | 5 | H | LEP | |
| 219 | 6381 | | | 5.19099990 | 5.0 | 11.0 | 27.6 | 2.82083330 | 2.0 | 49.0 | 15.0 | 4.64 | 17 | R | ORI | |
| 220 | 6387 | | | 5.19355540 | 5.0 | 11.0 | 36.8 | -12.98166660 | -12.0 | 58.0 | 54.0 | 4.46 | 4 | K | LEP | |
| 221 | 6410 | RIGEL | | 5.21424990 | 5.0 | 12.0 | 51.3 | -8.24083330 | -8.0 | 14.0 | 27.0 | .34 | 19 | B | ORI | |
| 222 | 6427 | CAPELLA | ALMAJOTH | 5.23500000 | 5.0 | 14.0 | 6.0 | 45.96444400 | 45.0 | 57.0 | 52.0 | .21 | 13 | A | AUR | |
| 223 | 6480 | | | 5.26508320 | 5.0 | 15.0 | 54.3 | -6.88083330 | -6.0 | 52.0 | 51.0 | 3.68 | 20 | T | ORI | |
| 224 | 6531 | | | 5.29936110 | 5.0 | 17.0 | 57.7 | -13.21166660 | -13.0 | 12.0 | 42.0 | 4.29 | 6 | L | LEP | |
| 225 | 6559 | | | 5.31588880 | 5.0 | 18.0 | 57.2 | -21.27361100 | -21.0 | 16.0 | 25.0 | 4.73 | 0 | | LEP | |
| 226 | 6579 | | | 5.33291660 | 5.0 | 19.0 | 58.5 | -.41555555 | .0 | 24.0 | 56.0 | 4.65 | 22 | O | ORI | |
| 227 | 6646 | | | 5.37099990 | 5.0 | 22.0 | 15.6 | -7.83888890 | -7.0 | 50.0 | 20.0 | 4.21 | 29 | | ORI | |
| 228 | 6655 | | | 5.37861100 | 5.0 | 22.0 | 43.0 | -2.42777770 | -2.0 | 25.0 | 40.0 | 3.44 | 28 | H | ORI | |
| 229 | 6660 | | | 5.38213880 | 5.0 | 22.0 | 55.7 | 1.81583333 | 1.0 | 48.0 | 27.0 | 4.73 | 25 | | ORI | |

TABLE I. - STAR IDENTIFICATION CATALOGUE - Continued

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 230 | 6668 | BELLATRIX | | 5.38752780 | 5.0 | 23.0 | 15.1 | 6.31944440 | 6.0 | 19.0 | 10.0 | 1.70 | 24 | G | ORI |
| 231 | 6681 | ELNATH | NATH | 5.40130550 | 5.0 | 24.0 | 4.7 | 28.57972200 | 28.0 | 34.0 | 47.0 | 1.78 | 112 | B | TAU |
| 232 | 6713 | | | 5.41669440 | 5.0 | 25.0 | .1 | 3.06666660 | 3.0 | 4.0 | .0 | 4.66 | 30 | Y | ORI |
| 233 | 6762 | NIHAL | | 5.44574990 | 5.0 | 26.0 | 44.7 | -20.78611000 | -20.0 | 47.0 | 10.0 | 2.96 | 9 | B | LEP |
| 234 | 6813 | | | 5.48183330 | 5.0 | 28.0 | 54.6 | 5.92277770 | 5.0 | 55.0 | 22.0 | 4.32 | 32 | | ORI |
| 235 | 6846 | | | 5.49947220 | 5.0 | 29.0 | 58.1 | -35.49527700 | -35.0 | 29.0 | 43.0 | 3.92 | 0 | E | COL |
| 236 | 6841 | | | 5.50266660 | 5.0 | 30.0 | 9.6 | 18.56972200 | 18.0 | 34.0 | 11.0 | 4.70 | 119 | | TAU |
| 237 | 6847 | MINTAKA | | 5.50361100 | 5.0 | 30.0 | 13.0 | -.32361110 | .0 | 19.0 | 25.0 | 2.48 | 34 | D | ORI |
| 238 | 6850 | | | 5.50394430 | 5.0 | 30.0 | 14.2 | -7.32583330 | -7.0 | 19.0 | 33.0 | 4.64 | 36 | U | ORI |
| 239 | 6875 | ARNEB | | 5.51975000 | 5.0 | 31.0 | 11.1 | -17.84611000 | -17.0 | 50.0 | 46.0 | 2.69 | 11 | A | LEP |
| 240 | 6907 | | | 5.54830550 | 5.0 | 32.0 | 53.9 | 9.46750000 | 9.0 | 28.0 | 3.0 | 4.53 | 37 | V | ORI |
| 241 | 6915 | HEKA | | 5.55347220 | 5.0 | 33.0 | 12.5 | 9.91222220 | 9.0 | 54.0 | 44.0 | 3.66 | 39 | L | ORI |
| 242 | 6944 | | | 5.55530550 | 5.0 | 33.0 | 19.1 | -62.51250000 | -62.0 | 30.0 | 45.0 | 4.00V | 0 | B | DOR |
| 243 | 6926 | | | 5.55555540 | 5.0 | 33.0 | 20.0 | -6.02388890 | -6.0 | 1.0 | 26.0 | 4.67 | 0 | | ORI |
| 244 | 6934 | | | 5.56097220 | 5.0 | 33.0 | 39.5 | -4.85999990 | -4.0 | 51.0 | 36.0 | 4.65 | 42 | | ORI |
| 245 | 6937 | HATYSA | | 5.56199990 | 5.0 | 33.0 | 43.2 | -5.93138890 | -5.0 | 55.0 | 53.0 | 2.87 | 44 | I | ORI |
| 246 | 6960 | ALNILAM | | 5.57394440 | 5.0 | 34.0 | 26.2 | -1.22277777 | -1.0 | 13.0 | 22.0 | 1.75 | 46 | E | ORI |
| 247 | 6972 | | | 5.58302780 | 5.0 | 34.0 | 58.9 | 9.27305560 | 9.0 | 16.0 | 23.0 | 4.39 | 40 | V | ORI |
| 248 | 6985 | | | 5.59252780 | 5.0 | 35.0 | 33.1 | 21.12277700 | 21.0 | 7.0 | 22.0 | 3.00 | 123 | Z | TAU |
| 249 | 7031 | | | 5.61647220 | 5.0 | 36.0 | 59.3 | -2.61888880 | -2.0 | 37.0 | 8.0 | 3.78 | 48 | S | ORI |
| 250 | 7042 | | | 5.62227770 | 5.0 | 37.0 | 20.2 | 4.10305550 | 4.0 | 6.0 | 11.0 | 4.54 | 47 | W | ORI |
| 251 | 7078 | PHAKT | | 5.63966660 | 5.0 | 38.0 | 22.8 | -34.09166600 | -34.0 | 5.0 | 30.0 | 2.75 | 0 | A | COL |
| 252 | 7089 | ALNITAK | | 5.64986110 | 5.0 | 38.0 | 59.5 | -1.95972221 | -1.0 | 57.0 | 35.0 | 2.05 | 50 | Z | ORI |
| 253 | 7197 | | | 5.71672220 | 5.0 | 43.0 | .2 | -22.45861100 | -22.0 | 27.0 | 31.0 | 3.80 | 13 | G | LEP |
| 254 | 7246 | | | 5.74516660 | 5.0 | 44.0 | 42.6 | -65.74861000 | -66.0 | 44.0 | 55.0 | 4.52 | 0 | D | DOR |
| 255 | 7247 | | | 5.75613880 | 5.0 | 45.0 | 22.1 | -14.83388870 | -14.0 | 50.0 | 2.0 | 3.67 | 14 | Z | LEP |
| 256 | 7264 | SAIPH | | 5.76824990 | 5.0 | 46.0 | 5.7 | -9.68083320 | -9.0 | 40.0 | 51.0 | 2.20 | 53 | K | ORI |
| 257 | 7287 | | | 5.77425000 | 5.0 | 46.0 | 27.3 | -51.07861100 | -51.0 | 4.0 | 43.0 | 3.94 | 0 | B | PIC |
| 258 | 7277 | | | 5.77913890 | 5.0 | 46.0 | 44.9 | 39.17111100 | 39.0 | 10.0 | 16.0 | 4.64 | 29 | T | AUR |
| 259 | 7334 | | | 5.81772220 | 5.0 | 49.0 | 3.8 | 39.14027700 | 39.0 | 8.0 | 25.0 | 4.18 | 32 | N | AUR |
| 260 | 7353 | | | 5.81983330 | 5.0 | 49.0 | 11.4 | -56.17472200 | -56.0 | 10.0 | 29.0 | 4.38 | 0 | G | PIC |
| 261 | 7364 | | | 5.82875000 | 5.0 | 49.0 | 43.5 | -35.78055500 | -35.0 | 46.0 | 50.0 | 3.22 | 0 | B | COL |
| 262 | 7362 | | | 5.83024990 | 5.0 | 49.0 | 48.9 | -20.88083300 | -20.0 | 52.0 | 51.0 | 3.90 | 15 | D | LEP |
| 263 | 7389 | | | 5.85211110 | 5.0 | 51.0 | 7.6 | 27.60555500 | 27.0 | 36.0 | 20.0 | 4.54 | 136 | | TAU |
| 264 | 7419 | | | 5.87180550 | 5.0 | 52.0 | 18.5 | 20.27138800 | 20.0 | 16.0 | 17.0 | 4.62 | 54 | X | ORI |
| 265 | 7451 | BETELGEUSE | | 5.88794440 | 5.0 | 53.0 | 16.6 | 7.40194440 | 7.0 | 24.0 | 7.0 | .00V | 58 | A | ORI |
| 266 | 7477 | | | 5.89719440 | 5.0 | 53.0 | 49.9 | -63.10027700 | -63.0 | 6.0 | 1.0 | 4.53 | 0 | | PIC |
| 267 | 7492 | | | 5.91350000 | 5.0 | 54.0 | 48.6 | -14.17277780 | -14.0 | 10.0 | 22.0 | 3.77 | 16 | H | LEP |
| 268 | 7536 | | | 5.93824990 | 5.0 | 56.0 | 17.7 | -35.28611100 | -35.0 | 17.0 | 10.0 | 4.36 | 0 | G | COL |
| 269 | 7521 | | | 5.94408330 | 5.0 | 56.0 | 38.7 | 54.28416600 | 54.0 | 17.0 | 3.0 | 3.88 | 33 | D | AUR |
| 270 | 7543 | MENKALINAN | | 5.94933320 | 5.0 | 56.0 | 57.6 | 44.94583300 | 44.0 | 56.0 | 45.0 | 2.07 | 34 | B | AUR |
| 271 | 7557 | | | 5.95555550 | 5.0 | 57.0 | 20.0 | 37.21194300 | 37.0 | 12.0 | 43.0 | 2.71 | 37 | J | AUR |
| 272 | 7554 | | | 5.95561100 | 5.0 | 57.0 | 20.2 | 45.93565500 | 45.0 | 56.0 | 8.0 | 4.59 | 35 | P | AUR |
| 273 | 7591 | | | 5.96788880 | 5.0 | 58.0 | 4.4 | -42.81638900 | -42.0 | 48.0 | 59.0 | 4.03 | 0 | H | COL |
| 274 | 7587 | | | 5.97172220 | 5.0 | 58.0 | 18.2 | -3.07416660 | -3.0 | 4.0 | 27.0 | 4.68 | 0 | | ORI |
| 275 | 7635 | | | 6.00761110 | 6.0 | .0 | 27.4 | 9.64888890 | 9.0 | 38.0 | 56.0 | 4.19 | 61 | M | ORI |
| 276 | 7675 | | | 6.03066670 | 6.0 | 1.0 | 50.4 | 20.14083300 | 20.0 | 8.0 | 27.0 | 4.71 | 62 | X | ORI |
| 277 | 7676 | | | 6.03319440 | 6.0 | 1.0 | 59.5 | 23.26694400 | 23.0 | 16.0 | 1.0 | 4.30 | 1 | | GEM |
| 278 | 7742 | | | 6.07416660 | 6.0 | 4.0 | 34.2 | -14.93083330 | -14.0 | 55.0 | 51.0 | 4.67 | 18 | J | LEP |
| 279 | 7772 | | | 6.09288890 | 6.0 | 5.0 | 34.4 | 14.77416660 | 14.0 | 46.0 | 27.0 | 4.40 | 67 | N | ORI |
| 280 | 7889 | | | 6.16583330 | 6.0 | 9.0 | 57.0 | 14.21833320 | 14.0 | 13.0 | 6.0 | 4.35 | 70 | C | ORI |
| 281 | 7969 | TEJAT PRIOR | | 6.21274990 | 6.0 | 12.0 | 45.9 | 22.51861100 | 22.0 | 31.0 | 7.0 | 3.00V | 7 | H | GEM |
| 282 | 7981 | | | 6.21913890 | 6.0 | 13.0 | 8.9 | 29.51277700 | 29.0 | 30.0 | 46.0 | 4.45 | 44 | K | AUR |
| 283 | 7986 | | | 6.21913890 | 6.0 | 13.0 | 8.9 | -6.26277770 | -6.0 | 15.0 | 46.0 | 4.09 | 5 | G | MON |
| 284 | 8020 | | | 6.24988880 | 6.0 | 14.0 | 59.6 | 69.33527700 | 69.0 | 20.0 | 7.0 | 4.73 | 22 | | CAM |
| 285 | 8062 | | | 6.25508320 | 6.0 | 15.0 | 18.3 | -35.12805500 | -36.0 | 7.0 | 41.0 | 4.51 | 0 | K | COL |
| 286 | 8068 | | | 6.27561110 | 6.0 | 16.0 | 32.2 | 59.02611000 | 59.0 | 1.0 | 34.0 | 4.42 | 2 | | LYN |
| 287 | 8170 | FURUD | | 6.31613880 | 6.0 | 18.0 | 58.1 | -30.04666600 | -30.0 | 2.0 | 48.0 | 3.10 | 1 | Z | CMA |

TABLE I. - STAR IDENTIFICATION CATALOGUE - Continued

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 288 | 8214 | | | 6.34722220 | 6.0 | 20.0 | 50.0 | -33.41777700 | -33.0 | 25.0 | 4.0 | 3.98 | 3 | D | COL |
| 289 | 8208 | TEJAT POSTERIOR | | 6.34738880 | 6.0 | 20.0 | 50.6 | 22.53333300 | 22.0 | 32.0 | .0 | 3.19 | 13 | M | GEM |
| 290 | 8223 | MIRZAM | | 6.35263880 | 6.0 | 21.0 | 9.5 | -17.93722100 | -17.0 | 56.0 | 14.0 | 1.99 | 2 | B | CMA |
| 291 | 8240 | | | 6.36522220 | 6.0 | 21.0 | 54.8 | 4.61194440 | 4.0 | 36.0 | 43.0 | 4.48 | 8 | E | MON |
| 292 | 8302 | CANOPUS | SUHEL | 6.38625000 | 6.0 | 23.0 | 10.5 | -52.67611100 | -52.0 | 40.0 | 34.0 | -.86 | 0 | A | CAR |
| 293 | 8410 | | | 6.44783330 | 6.0 | 26.0 | 52.2 | -32.55694400 | -32.0 | 33.0 | 25.0 | 4.48 | 0 | L | CMA |
| 294 | 8394 | | | 6.44808320 | 6.0 | 26.0 | 53.1 | 20.23583300 | 20.0 | 14.0 | 9.0 | 4.06 | 18 | N | GEM |
| 295 | 8413 | | | 6.45197220 | 6.0 | 27.0 | 7.1 | -7.00916660 | -7.0 | .0 | 33.0 | 4.64 | 11 | B | MON |
| 296 | 8496 | | | 6.50661100 | 6.0 | 30.0 | 23.8 | -23.39194400 | -23.0 | 23.0 | 31.0 | 4.35 | 4 | C | CMA |
| 297 | 8506 | | | 6.51686110 | 6.0 | 31.0 | .7 | 7.35999990 | 7.0 | 21.0 | 36.0 | 4.50 | 13 | | MON |
| 298 | 8577 | | | 6.55980540 | 6.0 | 33.0 | 35.3 | -22.93583300 | -22.0 | 56.0 | 9.0 | 4.54 | 5 | C | CMA |
| 299 | 8604 | | | 6.57005560 | 6.0 | 34.0 | 12.2 | -52.94638900 | -52.0 | 56.0 | 47.0 | 4.44 | 0 | | CAR |
| 300 | 8624 | | | 6.58594440 | 6.0 | 35.0 | 9.4 | -19.22500000 | -19.0 | 13.0 | 30.0 | 4.14 | 7 | N | CMA |
| 301 | 8633 | ALHENA | | 6.59483330 | 6.0 | 35.0 | 41.4 | 16.43055500 | 16.0 | 25.0 | 50.0 | 1.93 | 24 | G | GEM |
| 302 | 8660 | | | 6.60583330 | 6.0 | 36.0 | 21.0 | -18.20583300 | -18.0 | 12.0 | 21.0 | 4.65 | 8 | N | CMA |
| 303 | 8675 | | | 6.61149990 | 6.0 | 36.0 | 41.4 | -43.16444400 | -43.0 | 9.0 | 52.0 | 3.18 | 0 | N | PUP |
| 304 | 8720 | | | 6.65083330 | 6.0 | 39.0 | 3.0 | 9.92972220 | 9.0 | 55.0 | 47.0 | 4.68 | 15 | | MON |
| 305 | 8786 | MEBSUTA | | 6.69633320 | 6.0 | 41.0 | 46.8 | 25.16749900 | 25.0 | 10.0 | 3.0 | 3.18 | 27 | E | GEM |
| 306 | 8793 | | | 6.70025000 | 6.0 | 42.0 | .9 | 13.26472210 | 13.0 | 15.0 | 53.0 | 4.65 | 30 | | GEM |
| 307 | 8823 | | | 6.72208320 | 6.0 | 43.0 | 19.5 | 12.93472220 | 12.0 | 56.0 | 5.0 | 3.40 | 31 | C | GEM |
| 308 | 8833 | SIRIUS | CANICULA | 6.72677770 | 6.0 | 43.0 | 36.4 | -16.66666600 | -16.0 | 40.0 | .0 | -1.37 | 9 | A | CMA |
| 309 | 8892 | | | 6.76724990 | 6.0 | 46.0 | 2.1 | 2.45194440 | 2.0 | 27.0 | 7.0 | 4.70 | 18 | | MON |
| 310 | 8941 | | | 6.79722210 | 6.0 | 47.0 | 50.0 | -61.90361000 | -61.0 | 54.0 | 13.0 | 3.30 | 0 | A | PIC |
| 311 | 8946 | | | 6.80888880 | 6.0 | 48.0 | 32.0 | -32.46694400 | -32.0 | 28.0 | 1.0 | 3.78 | 13 | K | CMA |
| 312 | 8969 | | | 6.81777780 | 6.0 | 49.0 | 4.0 | -50.57222200 | -50.0 | 34.0 | 20.0 | 2.83 | 0 | Y | PUP |
| 313 | 8972 | | | 6.81825000 | 6.0 | 49.0 | 5.7 | -53.58083200 | -53.0 | 34.0 | 51.0 | 4.38 | 0 | | CAR |
| 314 | 8989 | | | 6.84138880 | 6.0 | 50.0 | 29.0 | 34.00527800 | 34.0 | .0 | 19.0 | 3.64 | 34 | J | GEM |
| 315 | 9034 | | | 6.86724990 | 6.0 | 52.0 | 2.1 | -20.17972200 | -20.0 | 10.0 | 47.0 | 4.66 | 15 | | CMA |
| 316 | 9051 | | | 6.87605540 | 6.0 | 52.0 | 33.8 | -11.99361120 | -11.0 | 59.0 | 37.0 | 4.25 | 14 | J | CMA |
| 317 | 9049 | | | 6.87783320 | 6.0 | 52.0 | 40.2 | 13.22361100 | 13.0 | 13.0 | 25.0 | 4.70 | 38 | | GEM |
| 318 | 9059 | | | 6.87797210 | 6.0 | 52.0 | 40.7 | -24.13916600 | -24.0 | 8.0 | 21.0 | 4.12 | 16 | O | CMA |
| 319 | 9096 | | | 6.90175000 | 6.0 | 54.0 | 6.3 | -20.09055500 | -20.0 | 5.0 | 24.0 | 4.62 | 18 | P | CMA |
| 320 | 9082 | | | 6.90419440 | 6.0 | 54.0 | 15.1 | 58.47083300 | 58.0 | 28.0 | 15.0 | 4.54 | 15 | | LYN |
| 321 | 9107 | | | 6.90958330 | 6.0 | 54.0 | 34.5 | -17.00750000 | -17.0 | .0 | 27.0 | 4.39 | 20 | I | CMA |
| 322 | 9073 | | | 6.91652770 | 6.0 | 54.0 | 59.6 | 77.02583300 | 77.0 | 1.0 | 33.0 | 4.75 | 24 | | CAM |
| 323 | 9188 | ADHARA | ADARA | 6.95416670 | 6.0 | 57.0 | 15.0 | -28.92333300 | -28.0 | 55.0 | 24.0 | 1.63 | 21 | E | CMA |
| 324 | 9276 | | | 7.00541660 | 7.0 | .0 | 19.5 | -27.88361100 | -27.0 | 53.0 | 1.0 | 3.68 | 22 | S | CMA |
| 325 | 9307 | | | 7.02605550 | 7.0 | 1.0 | 33.8 | -23.78111000 | -23.0 | 46.0 | 52.0 | 3.12 | 24 | O | CMA |
| 326 | 9313 | MEKBUDA | | 7.03388880 | 7.0 | 2.0 | 2.0 | 20.62333300 | 20.0 | 37.0 | 24.0 | 3.90 | 43 | Z | GEM |
| 327 | 9320 | MULIPHEIN | | 7.03624990 | 7.0 | 2.0 | 10.5 | -15.58027770 | -15.0 | 34.0 | 49.0 | 4.07 | 23 | G | CMA |
| 328 | 9443 | WEZEN | | 7.11613880 | 7.0 | 6.0 | 58.1 | -26.33666600 | -26.0 | 20.0 | 12.0 | 1.98 | 25 | D | CMA |
| 329 | 9484 | | | 7.14855550 | 7.0 | 8.0 | 54.8 | 30.30916600 | 30.0 | 18.0 | 15.0 | 4.48 | 46 | T | GEM |
| 330 | 9514 | | | 7.15086110 | 7.0 | 9.0 | 3.1 | -70.44222100 | -70.0 | 26.0 | 32.0 | 3.87 | 0 | G | VOL |
| 331 | 9518 | | | 7.16794440 | 7.0 | 10.0 | 4.6 | -.43333333 | .0 | 26.0 | .0 | 4.09 | 22 | D | MON |
| 332 | 9549 | | | 7.19269440 | 7.0 | 11.0 | 33.7 | -46.69999900 | -46.0 | 42.0 | .0 | 4.47 | 0 | | PUP |
| 333 | 9604 | | | 7.20783330 | 7.0 | 12.0 | 28.2 | -44.58194400 | -44.0 | 34.0 | 55.0 | 4.50 | 0 | | PUP |
| 334 | 9608 | | | 7.21375000 | 7.0 | 12.0 | 49.5 | -26.29111000 | -26.0 | 17.0 | 28.0 | 4.66 | 27 | | CMA |
| 335 | 9625 | | | 7.22316660 | 7.0 | 13.0 | 23.4 | -26.71083300 | -26.0 | 42.0 | 39.0 | 3.83 | 28 | H | CMA |
| 336 | 9706 | | | 7.26511110 | 7.0 | 15.0 | 54.4 | -37.03361100 | -37.0 | 2.0 | 1.0 | 2.74 | 0 | P | PUP |
| 337 | 9701 | | | 7.26805550 | 7.0 | 16.0 | 5.0 | 16.60499900 | 16.0 | 36.0 | 18.0 | 3.65 | 54 | L | GEM |
| 338 | 9747 | | | 7.28088890 | 7.0 | 16.0 | 51.2 | -67.89333200 | -67.0 | 53.0 | 36.0 | 4.02 | 0 | D | VOL |
| 339 | 9733 | | | 7.28436100 | 7.0 | 17.0 | 3.7 | -36.66916600 | -36.0 | 40.0 | 9.0 | 4.68 | 0 | U | PUP |
| 340 | 9736 | | | 7.28761110 | 7.0 | 17.0 | 15.4 | -24.88944400 | -24.0 | 53.0 | 22.0 | 4.40 | 30 | Y | CMA |
| 341 | 9755 | WASAT | | 7.30058330 | 7.0 | 18.0 | 2.1 | 22.04833300 | 22.0 | 2.0 | 54.0 | 3.51 | 55 | D | GEM |
| 342 | 9886 | ALUDRA | | 7.37850000 | 7.0 | 22.0 | 42.6 | -29.23388900 | -29.0 | 14.0 | 2.0 | 2.43 | 31 | H | CMA |
| 343 | 9897 | | | 7.39258330 | 7.0 | 23.0 | 33.3 | 27.86916600 | 27.0 | 52.0 | 9.0 | 3.89 | 60 | I | GEM |
| 344 | 9909 | | | 7.40130550 | 7.0 | 24.0 | 4.7 | 49.28305500 | 49.0 | 16.0 | 59.0 | 4.45 | 21 | | LYN |
| 345 | 9947 | GOMEISA | | 7.42088880 | 7.0 | 25.0 | 15.2 | 8.36111110 | 8.0 | 21.0 | 40.0 | 3.09 | 3 | B | CMI |

TABLE I. - STAR IDENTIFICATION CATALOGUE - Continued

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 346 | 9974 | | 7.43763880 | 7.0 | 26.0 | 15.5 | 8.99777770 | [illegible] | 59.0 | 52.0 | 4.60 | 4 | G | CMI |
| 347 | 9987 | | 7.44772210 | 7.0 | 26.0 | 51.8 | 31.85555500 | 31.0 | 51.0 | 20.0 | 4.18 | 62 | R | GEM |
| 348 | 10040 | | 7.46866660 | 7.0 | 28.0 | 7.2 | -43.22972100 | -43.0 | 13.0 | 47.0 | 3.27 | 0 | S | PUP |
| 349 | 10120 | CASTOR | 7.53947210 | 7.0 | 32.0 | 22.1 | 31.96638800 | 31.0 | 57.0 | 59.0 | 1.58 | 66 | A | GEM |
| 350 | 10134 | | 7.54255550 | 7.0 | 32.0 | 33.2 | -22.21944400 | -22.0 | 13.0 | 10.0 | 4.52 | 108 | | PUP |
| 351 | 10167 | | 7.56280550 | 7.0 | 33.0 | 46.1 | 26.97500000 | 26.0 | 58.0 | 30.0 | 4.22 | 69 | U | GEM |
| 352 | 10178 | | 7.56624990 | 7.0 | 33.0 | 58.5 | -28.29111100 | -28.0 | 17.0 | 28.0 | 4.55 | 0 | | PUP |
| 353 | 10246 | | 7.60119440 | 7.0 | 36.0 | 4.3 | -34.88888800 | -34.0 | 53.0 | 20.0 | 4.62 | 0 | | PUP |
| 354 | 10266 | | 7.61405550 | 7.0 | 36.0 | 50.6 | -25.28444400 | -25.0 | 17.0 | 4.0 | 4.64 | 0 | | PUP |
| 355 | 10281 | MARKEB | 7.62311100 | 7.0 | 37.0 | 23.2 | -26.72111100 | -26.0 | 43.0 | 16.0 | 4.60 | 0 | K | PUP |
| 356 | 10277 | PROCYON ELGOMAISA | 7.62449990 | 7.0 | 37.0 | 28.2 | 5.31583330 | 5.0 | 18.0 | 57.0 | .48 | 10 | A | CMI |
| 357 | 10345 | | 7.65958320 | 7.0 | 39.0 | 34.5 | -9.46833330 | -9.0 | 28.0 | 6.0 | 4.07 | 26 | A | MON |
| 358 | 10373 | | 7.68544440 | 7.0 | 41.0 | 7.6 | 28.96972100 | 28.0 | 58.0 | 11.0 | 4.26 | 75 | S | GEM |
| 359 | 10444 | | 7.70438890 | 7.0 | 42.0 | 15.8 | -72.52249900 | -72.0 | 31.0 | 21.0 | 3.89 | 0 | Z | VOL |
| 360 | 10403 | | 7.70561110 | 7.0 | 42.0 | 20.2 | 24.48333300 | 24.0 | 29.0 | .0 | 3.68 | 77 | K | GEM |
| 361 | 10417 | | 7.70669450 | 7.0 | 42.0 | 24.1 | -28.87027700 | -28.0 | 52.0 | 13.0 | 4.10 | 3 | | PUP |
| 362 | 10438 | POLLUX | 7.71961110 | 7.0 | 43.0 | 10.6 | 28.11222200 | 28.0 | 6.0 | 44.0 | 1.21 | 78 | B | GEM |
| 363 | 10462 | | 7.73344440 | 7.0 | 44.0 | .4 | -37.88277700 | -37.0 | 52.0 | 58.0 | 3.72 | 0 | | PUP |
| 364 | 10532 | | 7.77716660 | 7.0 | 46.0 | 37.8 | -25.84914700 | -25.0 | 50.0 | 57.0 | 4.59 | 0 | Q | PUP |
| 365 | 10553 | | 7.78824990 | 7.0 | 47.0 | 17.7 | -46.98861000 | -46.0 | 59.0 | 19.0 | 4.64 | 0 | | PUP |
| 366 | 10562 | AZMIDISKE | 7.79702770 | 7.0 | 47.0 | 49.3 | -24.77083300 | -24.0 | 46.0 | 15.0 | 3.47 | 7 | C | PUP |
| 367 | 10576 | | 7.80286100 | 7.0 | 48.0 | 10.3 | -46.28444400 | -46.0 | 17.0 | 4.0 | 4.25 | 0 | | PUP |
| 368 | 10655 | | 7.85022210 | 7.0 | 51.0 | .8 | -40.48472200 | -40.0 | 29.0 | 5.0 | 3.76 | 0 | A | PUP |
| 369 | 10661 | | 7.85675000 | 7.0 | 51.0 | 24.3 | -38.77138800 | -38.0 | 46.0 | 17.0 | 4.53 | 0 | | PUP |
| 370 | 10689 | | 7.87122210 | 7.0 | 52.0 | 16.4 | -48.01111100 | -48.0 | .0 | 40.0 | 4.32 | 0 | | PUP |
| 371 | 10756 | | 7.92255550 | 7.0 | 55.0 | 21.2 | -22.78555500 | -22.0 | 47.0 | 8.0 | 4.35 | 11 | | PUP |
| 372 | 10770 | | 7.93147220 | 7.0 | 55.0 | 53.3 | -52.88777700 | -52.0 | 53.0 | 16.0 | 3.60 | 0 | I | CAR |
| 373 | 10802 | | 7.95388880 | 7.0 | 57.0 | 14.0 | -49.14916600 | -49.0 | 8.0 | 57.0 | 4.00V | 0 | | PUP |
| 374 | 10825 | | 7.97163890 | 7.0 | 58.0 | 17.9 | -18.30222200 | -18.0 | 18.0 | 8.0 | 4.64 | 232 | | PUP |
| 375 | 10891 | | 8.00741670 | 8.0 | .0 | 26.7 | 2.43194440 | 2.0 | 25.0 | 55.0 | 4.52 | 0 | | CMI |
| 376 | 10947 | NAOS | 8.03922210 | 8.0 | 2.0 | 21.2 | -39.90361000 | -39.0 | 54.0 | 13.0 | 2.27 | 0 | Z | PUP |
| 377 | 11034 | | 8.10088870 | 8.0 | 6.0 | 3.2 | -24.20250000 | -24.0 | 12.0 | 9.0 | 2.88 | 15 | R | PUP |
| 378 | 11051 | | 8.11391650 | 8.0 | 6.0 | 50.1 | -2.88055550 | -2.0 | 52.0 | 50.0 | 4.41 | 29 | Z | MON |
| 379 | 11071 | | 8.12438870 | 8.0 | 7.0 | 27.8 | -19.14138800 | -19.0 | 8.0 | 29.0 | 4.34 | 16 | | PUP |
| 380 | 11098 | | 8.13041650 | 8.0 | 7.0 | 49.5 | -68.51416500 | -68.0 | 30.0 | 51.0 | 4.46 | 0 | E | VOL |
| 381 | 11105 | | 8.14088880 | 8.0 | 8.0 | 27.2 | -47.23277800 | -47.0 | 13.0 | 58.0 | 1.90 | 0 | G | VEL |
| 382 | 11134 | | 8.16049990 | 8.0 | 9.0 | 37.8 | -12.82194440 | -12.0 | 49.0 | 19.0 | 4.68 | 19 | | PUP |
| 383 | 11149 | | 8.16844440 | 8.0 | 10.0 | 6.4 | -39.51333300 | -39.0 | 30.0 | 48.0 | 4.43 | 0 | | PUP |
| 384 | 11215 | | 8.21341660 | 8.0 | 12.0 | 48.3 | -40.24027700 | -40.0 | 14.0 | 25.0 | 4.43 | 0 | | PUP |
| 385 | 11254 | | 8.24363880 | 8.0 | 14.0 | 37.1 | 9.29472220 | 9.0 | 17.0 | 41.0 | 3.74 | 17 | B | CNC |
| 386 | 11343 | | 8.28741660 | 8.0 | 17.0 | 14.7 | -36.55000000 | -36.0 | 33.0 | .0 | 4.43 | 0 | | PUP |
| 387 | 11419 | | 8.32433320 | 8.0 | 19.0 | 27.6 | -76.80972100 | -76.0 | 48.0 | 35.0 | 4.08 | 0 | A | CHA |
| 388 | 11401 | | 8.34077770 | 8.0 | 20.0 | 26.8 | 43.30194400 | 43.0 | 18.0 | 7.0 | 4.43 | 31 | | LYN |
| 389 | 11481 | | 8.36211100 | 8.0 | 21.0 | 43.6 | -77.37222200 | -77.0 | 22.0 | 20.0 | 4.26 | 0 | J | CHA |
| 390 | 11463 | AVIOR | 8.36327770 | 8.0 | 21.0 | 47.8 | -59.39638800 | -59.0 | 23.0 | 47.0 | 1.74 | 0 | E | CAR |
| 391 | 11499 | | 8.39852770 | 8.0 | 23.0 | 54.7 | -3.79111100 | -3.0 | 47.0 | 28.0 | 3.95 | 30 | | MON |
| 392 | 11567 | | 8.42272210 | 8.0 | 25.0 | 21.8 | -66.01972100 | -66.0 | 1.0 | 11.0 | 3.65 | 0 | B | VOL |
| 393 | 11593 | | 8.45619430 | 8.0 | 27.0 | 22.3 | 60.83694400 | 60.0 | 50.0 | 13.0 | 3.47 | 1 | Q | UMA |
| 394 | 11823 | | 8.59674990 | 8.0 | 35.0 | 48.3 | 5.82694440 | 5.0 | 49.0 | 37.0 | 4.18 | 4 | D | HYA |
| 395 | 11852 | | 8.60686100 | 8.0 | 36.0 | 24.7 | -42.86611100 | -42.0 | 51.0 | 58.0 | 4.13 | 0 | | VEL |
| 396 | 11856 | | 8.61547210 | 8.0 | 36.0 | 55.7 | 3.46527780 | 3.0 | 27.0 | 55.0 | 4.54 | 5 | S | HYA |
| 397 | 11923 | | 8.64552770 | 8.0 | 38.0 | 43.9 | -35.18305500 | -35.0 | 10.0 | 59.0 | 4.04 | 0 | B | PYX |
| 398 | 11943 | | 8.65483320 | 8.0 | 39.0 | 17.4 | -52.79722200 | -52.0 | 47.0 | 50.0 | 3.68 | 0 | O | VEL |
| 399 | 11951 | | 8.65772210 | 8.0 | 39.0 | 27.8 | -46.52361100 | -46.0 | 31.0 | 25.0 | 4.06 | 53 | | VEL |
| 400 | 11964 | | 8.66408330 | 8.0 | 39.0 | 50.7 | -59.63583300 | -59.0 | 38.0 | 9.0 | 4.42 | 0 | | CAR |
| 401 | 11982 | ASELLUS-BOR. | 8.68772210 | 8.0 | 41.0 | 15.8 | 21.59555600 | 21.0 | 35.0 | 44.0 | 4.73 | 43 | G | CNC |
| 402 | 11987 | | 8.68994440 | 8.0 | 41.0 | 23.8 | 3.52527770 | 3.0 | 31.0 | 31.0 | 4.32 | 7 | H | HYA |
| 403 | 12006 | | 8.69924980 | 8.0 | 41.0 | 57.3 | -7.10666660 | -7.0 | 6.0 | 24.0 | 4.70 | 31 | | MON |

TABLE I. - STAR IDENTIFICATION CATALOGUE - Continued

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 404 | 12018 | | | 8.70308320 | 8.0 | 42.0 | 11.1 | -33.05944400 | -33.0 | 3.0 | 34.0 | 3.70 | 0 | A | PYX | |
| 405 | 12022 | ASELLUS-AUSTR. | | 8.71163880 | 8.0 | 42.0 | 41.9 | 18.28416600 | 18.0 | 17.0 | 3.0 | 4.17 | 47 | D | CNC | |
| 406 | 12050 | | | 8.71913870 | 8.0 | 43.0 | 8.9 | -42.52166600 | -42.0 | 31.0 | 18.0 | 4.12 | 0 | | VEL | |
| 407 | 12069 | | | 8.72894430 | 8.0 | 43.0 | 44.2 | -54.57972100 | -54.0 | 34.0 | 47.0 | 2.01 | 0 | D | VEL | |
| 408 | 12083 | | | 8.74305540 | 8.0 | 44.0 | 35.0 | 28.88916700 | 28.0 | 53.0 | 21.0 | 4.20 | 48 | I | CNC | |
| 409 | 12097 | | | 8.74534100 | 8.0 | 44.0 | 43.3 | -13.41888870 | -13.0 | 25.0 | 8.0 | 4.44 | 12 | | HYA | |
| 410 | 12109 | | | 8.74733320 | 8.0 | 44.0 | 50.4 | -45.91277700 | -45.0 | 54.0 | 46.0 | 4.09 | 0 | | VEL | |
| 411 | 12102 | | | 8.74872210 | 8.0 | 44.0 | 55.4 | 6.54833330 | 6.0 | 32.0 | 54.0 | 3.48 | 11 | E | HYA | |
| 412 | 12138 | | | 8.76341660 | 8.0 | 45.0 | 48.3 | -56.64055500 | -56.0 | 38.0 | 26.0 | 4.63 | 0 | | CAR | |
| 413 | 12148 | | | 8.77633330 | 8.0 | 46.0 | 34.8 | 5.98472220 | 5.0 | 58.0 | 65.0 | 4.42 | 13 | R | HYA | |
| 414 | 12216 | | | 8.81744440 | 8.0 | 49.0 | 2.8 | -27.57916600 | -27.0 | 34.0 | 45.0 | 4.19 | 0 | G | PYX | |
| 415 | 12327 | | | 8.89241660 | 8.0 | 53.0 | 32.7 | 6.07972220 | 6.0 | 4.0 | 47.0 | 3.30 | 16 | Z | HYA | |
| 416 | 12359 | | | 8.90427770 | 8.0 | 54.0 | 15.4 | -60.51027800 | -60.0 | 30.0 | 37.0 | 3.98 | 0 | | CAR | |
| 417 | 12406 | ACUBENS | SERTAN | 8.94291650 | 8.0 | 56.0 | 34.5 | 11.99416670 | 11.0 | 59.0 | 39.0 | 4.27 | 65 | A | CNC | |
| 418 | 12407 | TALITHA | | 8.94699990 | 8.0 | 56.0 | 49.2 | 48.18027700 | 48.0 | 10.0 | 49.0 | 3.12 | 9 | I | UMA | |
| 419 | 12434 | | | 8.97291650 | 8.0 | 58.0 | 22.5 | 41.92249900 | 41.0 | 55.0 | 21.0 | 4.09 | 10 | | UMA | |
| 420 | 12451 | | | 8.97969420 | 8.0 | 58.0 | 46.9 | -41.11666600 | -41.0 | 7.0 | .0 | 4.42 | 91 | | VEL | |
| 421 | 12503 | | | 9.02074990 | 9.0 | 1.0 | 14.7 | 47.29611100 | 47.0 | 17.0 | 46.0 | 3.68 | 12 | K | UMA | |
| 422 | 12532 | | | 9.03163890 | 9.0 | 1.0 | 53.9 | -66.25611000 | -66.0 | 15.0 | 22.0 | 4.18 | 0 | A | VOL | |
| 423 | 12545 | | | 9.04908320 | 9.0 | 2.0 | 56.7 | -46.95777700 | -46.0 | 57.0 | 28.0 | 3.69 | 0 | | VEL | |
| 424 | 12565 | | | 9.07180550 | 9.0 | 4.0 | 18.5 | 38.59333300 | 38.0 | 35.0 | 36.0 | 4.71 | 0 | | LYN | |
| 425 | 12595 | | | 9.08452760 | 9.0 | 5.0 | 4.3 | -72.46199300 | -72.0 | 27.0 | 43.0 | 4.50 | 0 | | CAR | |
| 426 | 12604 | | | 9.10688880 | 9.0 | 6.0 | 24.8 | 51.74722100 | 51.0 | 44.0 | 50.0 | 4.64 | 15 | | UMA | |
| 427 | 12623 | SUHAIL | ALSUHAIL | 9.11177770 | 9.0 | 6.0 | 42.4 | -43.29055500 | -43.0 | 17.0 | 26.0 | 2.22 | 0 | L | VEL | |
| 428 | 12646 | | | 9.13422220 | 9.0 | 8.0 | 3.2 | 63.65749900 | 63.0 | 39.0 | 27.0 | 4.74 | 14 | T | UMA | |
| 429 | 12696 | | | 9.16741660 | 9.0 | 10.0 | 2.7 | -58.82305500 | -58.0 | 49.0 | 23.0 | 3.56 | 0 | | CAR | |
| 430 | 12707 | | | 9.17474990 | 9.0 | 10.0 | 29.1 | -62.17305500 | -62.0 | 10.0 | 23.0 | 4.18 | 0 | | CAR | |
| 431 | 12743 | | | 9.20908320 | 9.0 | 12.0 | 32.7 | 2.46277770 | 2.0 | 27.0 | 46.0 | 3.89 | 22 | J | HYA | |
| 432 | 12764 | MIAPLACIDUS | | 9.21374990 | 9.0 | 12.0 | 49.5 | -69.57305500 | -69.0 | 34.0 | 23.0 | 1.80 | 0 | B | CAR | |
| 433 | 12787 | | | 9.23916650 | 9.0 | 14.0 | 21.0 | -37.26666600 | -37.0 | 16.0 | .0 | 4.70 | 0 | | VEL | |
| 434 | 12813 | | | 9.25358320 | 9.0 | 15.0 | 12.9 | -57.39444300 | -57.0 | 23.0 | 40.0 | 4.18 | 0 | | CAR | |
| 435 | 12831 | TUREIS | | 9.26922220 | 9.0 | 16.0 | 9.2 | -59.12805500 | -59.0 | 7.0 | 41.0 | 2.25 | 0 | I | CAR | |
| 436 | 12830 | | | 9.27786100 | 9.0 | 16.0 | 40.3 | 36.95194400 | 36.0 | 57.0 | 7.0 | 3.82 | 38 | | LYN | |
| 437 | 12880 | | | 9.31547220 | 9.0 | 18.0 | 55.7 | 34.54166700 | 34.0 | 32.0 | 30.0 | 3.30 | 40 | A | LYN | |
| 438 | 12938 | | | 9.35047210 | 9.0 | 21.0 | 1.7 | -54.86083300 | -54.0 | 51.0 | 39.0 | 2.63 | 0 | K | VEL | |
| 439 | 12972 | | | 9.37699990 | 9.0 | 22.0 | 37.2 | 26.33388900 | 26.0 | 20.0 | 2.0 | 4.61 | 1 | K | LEO | |
| 440 | 13044 | ALPHARD | COR-HYDRAE | 9.43111100 | 9.0 | 25.0 | 52.0 | -8.50611110 | -8.0 | 30.0 | 22.0 | 2.16 | 30 | A | HYA | ALFARD |
| 441 | 13091 | | | 9.46330550 | 9.0 | 27.0 | 47.9 | -35.79777700 | -36.0 | 47.0 | 52.0 | 4.64 | 0 | E | ANT | |
| 442 | 13109 | | | 9.47983320 | 9.0 | 28.0 | 47.4 | 63.21611000 | 63.0 | 12.0 | 58.0 | 3.75 | 23 | | UMA | |
| 443 | 13140 | | | 9.48866660 | 9.0 | 29.0 | 19.2 | -40.31277700 | -40.0 | 18.0 | 46.0 | 3.64 | 0 | Y | VEL | |
| 444 | 13143 | | | 9.49544430 | 9.0 | 29.0 | 43.6 | 23.12333300 | 23.0 | 7.0 | 24.0 | 4.48 | 4 | L | LEO | |
| 445 | 13160 | | | 9.50261090 | 9.0 | 30.0 | 9.4 | -56.87944400 | -56.0 | 52.0 | 46.0 | 3.00 | 0 | | VEL | |
| 446 | 13153 | | | 9.50330550 | 9.0 | 30.0 | 11.9 | -1.02972221 | -1.0 | 1.0 | 47.0 | 4.50 | 32 | Y | HYA | |
| 447 | 13157 | | | 9.50877760 | 9.0 | 30.0 | 31.6 | 51.83777700 | 51.0 | 50.0 | 16.0 | 3.26 | 26 | J | UMA | |
| 448 | 13192 | | | 9.52274990 | 9.0 | 31.0 | 21.9 | -62.63361100 | -62.0 | 38.0 | 1.0 | 4.00V | 0 | | CAR | |
| 449 | 13171 | | | 9.52366670 | 9.0 | 31.0 | 25.2 | 69.98555400 | 69.0 | 59.0 | 8.0 | 4.57 | 24 | | UMA | |
| 450 | 13203 | | | 9.53474990 | 9.0 | 32.0 | 5.1 | 36.55388900 | 36.0 | 33.0 | 14.0 | 4.62 | 10 | | LNI | |
| 451 | 13174 | | | 9.53741660 | 9.0 | 32.0 | 14.7 | 81.48333200 | 81.0 | 29.0 | .0 | 4.58 | 1 | | DRA | |
| 452 | 13212 | | | 9.54061110 | 9.0 | 32.0 | 26.2 | 52.20805500 | 52.0 | 12.0 | 29.0 | 4.65 | 26 | | UMA | |
| 453 | 13294 | | | 9.55713880 | 9.0 | 33.0 | 25.7 | -59.07305500 | -59.0 | 4.0 | 23.0 | 4.20 | 0 | | CAR | |
| 454 | 13293 | | | 9.59288870 | 9.0 | 35.0 | 34.4 | -49.19777700 | -49.0 | 11.0 | 52.0 | 4.49 | 0 | | VEL | |
| 455 | 13341 | | | 9.63447210 | 9.0 | 38.0 | 4.1 | -.98305555 | .0 | 58.0 | 59.0 | 4.10 | 35 | I | HYA | |
| 456 | 13355 | | | 9.63966660 | 9.0 | 38.0 | 22.8 | -61.16916600 | -61.0 | 10.0 | 9.0 | 4.67 | 0 | | CAR | |
| 457 | 13366 | SUBRA | | 9.65472210 | 9.0 | 39.0 | 17.0 | 10.05222220 | 10.0 | 3.0 | 8.0 | 3.76 | 14 | O | LEO | |
| 458 | 13373 | | | 9.66141660 | 9.0 | 39.0 | 41.1 | -23.43166600 | -23.0 | 25.0 | 54.0 | 4.74 | 0 | | HYA | |
| 459 | 13443 | RAS-ELASED | AUSTR. | 9.73113870 | 9.0 | 43.0 | 52.1 | 23.93611100 | 23.0 | 56.0 | 10.0 | 3.12 | 17 | E | LEO | |
| 460 | 13462 | | | 9.73808310 | 9.0 | 44.0 | 17.1 | -62.34583300 | -62.0 | 20.0 | 45.0 | 4.00 | 0 | | CAR | |
| 461 | 13506 | | | 9.77047220 | 9.0 | 46.0 | 13.7 | -64.90916600 | -64.0 | 54.0 | 33.0 | 3.08 | 0 | U | CAR | |

TABLE I. - STAR IDENTIFICATION CATALOGUE - Continued

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 462 | 13540 | | 9.80861110 | 9.0 | 48.0 | 31.0 | 59.20444400 | 59.0 | 12.0 | 16.0 | 3.89 | 29 | U | | UMA |
| 463 | 13559 | | 9.82894440 | 9.0 | 49.0 | 44.2 | 54.22888800 | 54.0 | 13.0 | 44.0 | 4.54 | 30 | V | | UMA |
| 464 | 13570 | | 9.82988890 | 9.0 | 49.0 | 47.6 | -14.68166660 | -14.0 | 40.0 | 54.0 | 4.29 | 39 | U | | HYA |
| 465 | 13587 | | 9.83872210 | 9.0 | 50.0 | 19.4 | -46.38305500 | -46.0 | 22.0 | 59.0 | 4.56 | 0 | | | VEL |
| 466 | 13590 | RAS-ELASED BOR. | 9.84627760 | 9.0 | 50.0 | 46.6 | 26.17249900 | 26.0 | 10.0 | 21.0 | 4.10 | 24 | M | | LEO |
| 467 | 13711 | | 9.92719430 | 9.0 | 55.0 | 37.9 | -54.40055500 | -54.0 | 24.0 | 2.0 | 3.70 | 0 | V | | VEL |
| 468 | 13861 | | 10.05697210 | 10.0 | 3.0 | 25.1 | -12.89444430 | -12.0 | 53.0 | 40.0 | 4.72 | 40 | U | | HYA |
| 469 | 13896 | | 10.08949980 | 10.0 | 5.0 | 22.2 | 35.41611100 | 36.0 | 24.0 | 58.0 | 4.47 | 21 | | | LMI |
| 470 | 13899 | | 10.09044420 | 10.0 | 5.0 | 25.6 | 16.93388800 | 16.0 | 56.0 | 2.0 | 3.58 | 30 | M | | LEO |
| 471 | 13911 | | 10.10080530 | 10.0 | 6.0 | 2.9 | 10.16972210 | 10.0 | 10.0 | 11.0 | 4.60 | 31 | | | LEO |
| 472 | 13916 | | 10.10244430 | 10.0 | 6.0 | 8.8 | -.20000000 | .0 | 12.0 | .0 | 4.50 | 15 | A | | SEX |
| 473 | 13926 | REGULUS | KALB 10.10849980 | 10.0 | 6.0 | 30.6 | 12.13888880 | 12.0 | 8.0 | 20.0 | 1.34 | 32 | A | | LEO |
| 474 | 13982 | | 10.14799980 | 10.0 | 8.0 | 52.8 | -12.18055550 | -12.0 | 10.0 | 50.0 | 3.83 | 41 | L | | HYA |
| 475 | 14074 | | 10.21516650 | 10.0 | 12.0 | 54.6 | -69.86388900 | -69.0 | 51.0 | 50.0 | 3.56 | 0 | W | | CAR |
| 476 | 14076 | | 10.22105530 | 10.0 | 13.0 | 15.8 | -41.94833300 | -41.0 | 56.0 | 54.0 | 4.09 | 0 | | | VEL |
| 477 | 14107 | ADHAFERA | 10.24577750 | 10.0 | 14.0 | 44.8 | 23.59222200 | 23.0 | 35.0 | 32.0 | 3.65 | 36 | Z | | LEO |
| 478 | 14113 | TANIA BOR. | 10.24988870 | 10.0 | 14.0 | 59.6 | 43.08972200 | 43.0 | 5.0 | 23.0 | 3.52 | 33 | L | | UMA |
| 479 | 14133 | | 10.26519430 | 10.0 | 15.0 | 54.7 | -61.15694400 | -61.0 | 9.0 | 25.0 | 3.44 | 187 | | | CAR |
| 480 | 14177 | ALGIEBA | 10.30074980 | 10.0 | 18.0 | 2.7 | 20.01916400 | 20.0 | 1.0 | 9.0 | 2.61 | 41 | G | | LEO |
| 481 | 14185 | | 10.30491650 | 10.0 | 18.0 | 17.7 | -54.85333300 | -54.0 | 51.0 | 12.0 | 4.58 | 0 | | | VEL |
| 482 | 14220 | | 10.32677770 | 10.0 | 19.0 | 36.4 | -55.86638800 | -55.0 | 51.0 | 59.0 | 4.65 | 0 | | | VEL |
| 483 | 14232 | TANIA AUSTR. | 10.33749980 | 10.0 | 20.0 | 15.0 | 41.67611100 | 41.0 | 40.0 | 34.0 | 3.21 | 34 | M | | UMA |
| 484 | 14323 | | 10.39511100 | 10.0 | 23.0 | 42.4 | -73.85333300 | -73.0 | 51.0 | 12.0 | 4.08 | 0 | | | CAR |
| 485 | 14326 | | 10.40661110 | 10.0 | 24.0 | 23.8 | -16.65694400 | -16.0 | 39.0 | 25.0 | 4.06 | 42 | M | | HYA |
| 486 | 14352 | | 10.42580540 | 10.0 | 25.0 | 32.9 | -30.88916400 | -30.0 | 53.0 | 21.0 | 4.42 | 0 | A | | ANT |
| 487 | 14358 | | 10.43108310 | 10.0 | 25.0 | 51.9 | 36.88722200 | 36.0 | 53.0 | 14.0 | 4.41 | 31 | B | | LMI |
| 488 | 14388 | | 10.44316650 | 10.0 | 26.0 | 35.4 | -58.56027700 | -58.0 | 33.0 | 37.0 | 4.08 | 0 | | | CAR |
| 489 | 14489 | | 10.51291640 | 10.0 | 30.0 | 46.5 | -61.50500000 | -61.0 | 30.0 | 18.0 | 3.58 | 0 | | | CAR |
| 490 | 14487 | | 10.51616640 | 10.0 | 30.0 | 58.2 | 9.48722220 | 9.0 | 29.0 | 14.0 | 3.85 | 47 | R | | LEO |
| 491 | 14570 | | 10.57063880 | 10.0 | 34.0 | 14.3 | -57.37611100 | -57.0 | 22.0 | 34.0 | 4.54 | 0 | | | CAR |
| 492 | 14604 | | 10.58452760 | 10.0 | 35.0 | 4.3 | -78.42611000 | -78.0 | 25.0 | 34.0 | 4.10 | 0 | G | | CHA |
| 493 | 14614 | | 10.59711100 | 10.0 | 35.0 | 49.6 | -48.04361100 | -48.0 | 2.0 | 37.0 | 4.06 | 0 | | | VEL |
| 494 | 14647 | | 10.62358320 | 10.0 | 37.0 | 24.9 | -59.00055500 | -59.0 | .0 | 2.0 | 4.73 | 0 | | | CAR |
| 495 | 14662 | | 10.63183320 | 10.0 | 37.0 | 54.6 | -55.42083300 | -55.0 | 25.0 | 15.0 | 4.25 | 0 | | | VEL |
| 496 | 14755 | | 10.69505540 | 10.0 | 41.0 | 42.2 | -64.21083200 | -64.0 | 12.0 | 39.0 | 3.03 | 0 | J | | CAR |
| 497 | 14762 | | 10.70333330 | 10.0 | 42.0 | 12.0 | -60.38277700 | -60.0 | 22.0 | 58.0 | 4.49 | 0 | | | CAR |
| 498 | 14842 | | 10.75430540 | 10.0 | 45.0 | 15.5 | -49.23472200 | -49.0 | 14.0 | 5.0 | 2.84 | 0 | M | | VEL |
| 499 | 14863 | | 10.75799970 | 10.0 | 45.0 | 28.8 | -80.35555600 | -80.0 | 21.0 | 20.0 | 4.62 | 0 | D | | CHA |
| 500 | 14898 | | 10.79827770 | 10.0 | 47.0 | 53.8 | -16.01000000 | -16.0 | .0 | 36.0 | 3.32 | 0 | N | | HYA |
| 501 | 14961 | | 10.85599990 | 10.0 | 51.0 | 21.6 | 34.40388800 | 34.0 | 24.0 | 14.0 | 3.92 | 46 | O | | LMI |
| 502 | 14980 | | 10.86774980 | 10.0 | 52.0 | 3.9 | -58.66722200 | -58.0 | 40.0 | 2.0 | 3.88 | 0 | | | CAR |
| 503 | 15014 | | 10.89536100 | 10.0 | 53.0 | 43.3 | 24.93666600 | 24.0 | 56.0 | 12.0 | 4.51 | 54 | | | LEO |
| 504 | 15047 | | 10.91819440 | 10.0 | 55.0 | 5.5 | -36.94444400 | -36.0 | 56.0 | 58.0 | 4.70 | 0 | I | | ANT |
| 505 | 15106 | ALKES | 10.94788870 | 10.0 | 58.0 | 4.4 | -18.11194400 | -18.0 | 6.0 | 43.0 | 4.20 | 7 | A | | CRT |
| 506 | 15118 | | 10.97572210 | 10.0 | 58.0 | 32.6 | -42.03777700 | -42.0 | 2.0 | 16.0 | 4.56 | 239 | | | VEL |
| 507 | 15145 | MERAK | 10.99569420 | 10.0 | 59.0 | 44.5 | 56.57027700 | 56.0 | 34.0 | 13.0 | 2.44 | 48 | B | | UMA |
| 508 | 15142 | | 11.00772220 | 11.0 | .0 | 27.8 | 20.36777700 | 20.0 | 22.0 | 4.0 | 4.42 | 60 | | | LEO |
| 509 | 15185 | DUBHE | 11.02638870 | 11.0 | 1.0 | 35.0 | 61.94027700 | 61.0 | 56.0 | 25.0 | 1.95 | 50 | A | | UMA |
| 510 | 15235 | | 11.05352770 | 11.0 | 3.0 | 12.7 | 7.52555550 | 7.0 | 31.0 | 32.0 | 4.66 | 63 | X | | LEO |
| 511 | 15329 | | 11.11813870 | 11.0 | 7.0 | 5.3 | -58.78527700 | -58.0 | 47.0 | 7.0 | 4.02 | 240 | | | CAR |
| 512 | 15340 | | 11.12838880 | 11.0 | 7.0 | 42.2 | 44.68861100 | 44.0 | 41.0 | 19.0 | 3.15 | 0 | Y | | UMA |
| 513 | 15385 | | 11.16555540 | 11.0 | 9.0 | 56.0 | -22.63444400 | -23.0 | 38.0 | 4.0 | 4.52 | 11 | B | | CRT |
| 514 | 15415 | | 11.18486090 | 11.0 | 11.0 | 5.5 | -60.12694400 | -60.0 | 7.0 | 37.0 | 4.73 | 0 | | | CAR |
| 515 | 15438 | ZOSMA | 11.20416660 | 11.0 | 12.0 | 15.0 | 20.71555500 | 20.0 | 42.0 | 56.0 | 2.58 | 68 | D | | LEO |
| 516 | 15441 | COXA | 11.20675000 | 11.0 | 12.0 | 24.3 | 15.62111110 | 15.0 | 37.0 | 16.0 | 3.41 | 70 | J | | LEO |
| 517 | 15511 | | 11.24802750 | 11.0 | 14.0 | 52.9 | -3.45999990 | -3.0 | 27.0 | 36.0 | 4.58 | 74 | V | | LEO |
| 518 | 15537 | ALULA-AUSTR. | 11.27199990 | 11.0 | 16.0 | 19.2 | 31.72638900 | 31.0 | 43.0 | 35.0 | 3.88 | 53 | C | | UMA |
| 519 | 15547 | ALULA-BOR. | 11.27652760 | 11.0 | 16.0 | 35.5 | 33.28555500 | 33.0 | 17.0 | 8.0 | 3.71 | 54 | N | | UMA |

TABLE I. - STAR IDENTIFICATION CATALOGUE - Continued

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 520 | 15567 | | | 11.29313870 | 11.0 | 17.0 | 35.3 | -14.58888890 | -14.0 | 35.0 | 20.0 | 3.82 | 12 | O | CRT |
| 521 | 15600 | | | 11.32219430 | 11.0 | 19.0 | 19.9 | 6.22138890 | 6.0 | 13.0 | 17.0 | 4.13 | 77 | S | LEO |
| 522 | 15601 | | | 11.32338880 | 11.0 | 19.0 | 24.2 | -54.29916600 | -54.0 | 17.0 | 57.0 | 4.26 | 0 | P | CEN |
| 523 | 15652 | | | 11.36836100 | 11.0 | 22.0 | 6.1 | 10.72222220 | 10.0 | 43.0 | 20.0 | 4.03 | 78 | I | LEO |
| 524 | 15669 | | | 11.38550000 | 11.0 | 23.0 | 7.8 | -17.49166600 | -17.0 | 29.0 | 30.0 | 4.14 | 15 | G | CRT |
| 525 | 15799 | GIANFAR | | 11.48911090 | 11.0 | 29.0 | 20.8 | 69.52444300 | 69.0 | 31.0 | 28.0 | 4.06 | 1 | L | DRA |
| 526 | 15845 | | | 11.52127770 | 11.0 | 31.0 | 16.6 | -31.66388900 | -31.0 | 39.0 | 50.0 | 3.72 | 0 | C | HYA |
| 527 | 15899 | | | 11.56930540 | 11.0 | 34.0 | 9.5 | -62.82611000 | -62.0 | 49.0 | 34.0 | 3.34 | 0 | L | CEN |
| 528 | 15927 | | | 11.58594430 | 11.0 | 35.0 | 9.4 | -.63055555 | .0 | 37.0 | 50.0 | 4.47 | 92 | U | LEO |
| 529 | 16131 | | | 11.73238870 | 11.0 | 43.0 | 56.6 | -66.53472100 | -66.0 | 32.0 | 5.0 | 3.80 | 0 | L | MUS |
| 530 | 16135 | | | 11.73433320 | 11.0 | 44.0 | 3.6 | 6.72555550 | 6.0 | 43.0 | 32.0 | 4.20 | 3 | N | VIR |
| 531 | 16137 | | | 11.73680540 | 11.0 | 44.0 | 12.5 | 47.97333300 | 49.0 | 58.0 | 24.0 | 3.85 | 63 | X | UMA |
| 532 | 16147 | | | 11.74683320 | 11.0 | 44.0 | 48.6 | -60.98388800 | -60.0 | 59.0 | 2.0 | 4.22 | 65 | | CEN |
| 533 | 16173 | | | 11.76969440 | 11.0 | 46.0 | 10.9 | 20.41333300 | 20.0 | 24.0 | 48.0 | 4.54 | 93 | | LEO |
| 534 | 16176 | | | 11.77574990 | 11.0 | 46.0 | 32.7 | -66.62027700 | -66.0 | 37.0 | 13.0 | 4.71 | 0 | M | MUS |
| 535 | 16189 | DENEBOLA | | 11.78791660 | 11.0 | 47.0 | 16.5 | 14.76777760 | 14.0 | 46.0 | 4.0 | 2.23 | 94 | B | LEO |
| 536 | 16201 | | | 11.79949980 | 11.0 | 47.0 | 58.2 | -63.59388800 | -63.0 | 35.0 | 38.0 | 4.52 | 0 | | CEN |
| 537 | 16215 | ALARAPH | ZAVIJAH | 11.81452770 | 11.0 | 48.0 | 52.3 | 1.96194443 | 1.0 | 57.0 | 43.0 | 3.80 | 5 | B | VIR |
| 538 | 16226 | | | 11.82311090 | 11.0 | 49.0 | 23.2 | -44.97861000 | -44.0 | 58.0 | 43.0 | 4.71 | 0 | | CEN |
| 539 | 16258 | | | 11.85224980 | 11.0 | 51.0 | 8.1 | -33.71333300 | -33.0 | 42.0 | 48.0 | 4.40 | 0 | B | HYA |
| 540 | 16268 | PHECDA | PHEKDA | 11.86661090 | 11.0 | 51.0 | 59.8 | 53.88916600 | 53.0 | 53.0 | 21.0 | 2.54 | 64 | G | UMA |
| 541 | 16425 | | | 11.98463870 | 11.0 | 59.0 | 4.7 | 6.80944440 | 6.0 | 48.0 | 34.0 | 4.57 | 8 | P | VIR |
| 542 | 16463 | | | 12.02052770 | 12.0 | 1.0 | 13.9 | -63.11805500 | -63.0 | 7.0 | 5.0 | 4.48 | 0 | J | CRU |
| 543 | 16512 | | | 12.05711100 | 12.0 | 3.0 | 25.6 | 8.92722210 | 8.0 | 55.0 | 38.0 | 4.24 | 9 | O | VIR |
| 544 | 16551 | | | 12.08402770 | 12.0 | 5.0 | 2.5 | -64.41861000 | -64.0 | 25.0 | 7.0 | 4.30 | 0 | H | CRU |
| 545 | 16584 | | | 12.10891650 | 12.0 | 6.0 | 32.1 | -50.52777800 | -50.0 | 31.0 | 40.0 | 2.88 | 0 | D | CEN |
| 546 | 16586 | ALCHITA | | 12.11005540 | 12.0 | 6.0 | 36.2 | -24.53388900 | -24.0 | 32.0 | 2.0 | 4.18 | 1 | A | CRV |
| 547 | 16618 | MINKAR | | 12.13869440 | 12.0 | 8.0 | 19.3 | -22.42527800 | -22.0 | 25.0 | 31.0 | 3.21 | 2 | E | CRV |
| 548 | 16651 | | | 12.16355550 | 12.0 | 9.0 | 48.8 | -52.17388900 | -52.0 | 10.0 | 26.0 | 4.20 | 0 | R | CEN |
| 549 | 16724 | | | 12.22124980 | 12.0 | 13.0 | 16.5 | -58.55444400 | -58.0 | 33.0 | 16.0 | 3.08 | 0 | D | CRU |
| 550 | 16736 | MEGREZ | KAFFA | 12.22836110 | 12.0 | 13.0 | 42.1 | 57.22694400 | 57.0 | 13.0 | 37.0 | 3.44 | 69 | D | UMA |
| 551 | 16740 | GIENAH | | 12.23338870 | 12.0 | 14.0 | .2 | -17.34777700 | -17.0 | 20.0 | 52.0 | 2.78 | 4 | G | CRV |
| 552 | 16764 | | | 12.26105540 | 12.0 | 15.0 | 39.8 | -67.76611000 | -67.0 | 45.0 | 58.0 | 4.16 | 0 | E | MUS |
| 553 | 16775 | | | 12.27094440 | 12.0 | 16.0 | 15.4 | -79.11805500 | -79.0 | 7.0 | 5.0 | 4.38 | 0 | B | CHA |
| 554 | 16785 | | | 12.27541660 | 12.0 | 16.0 | 31.5 | -63.80888800 | -63.0 | 48.0 | 32.0 | 4.26 | 0 | Z | CRU |
| 555 | 16813 | | | 12.30188880 | 12.0 | 18.0 | 6.8 | -.47250000 | .0 | 28.0 | 21.0 | 4.00 | 15 | H | VIR |
| 556 | 16849 | | | 12.32430550 | 12.0 | 19.0 | 27.5 | -60.20805500 | -60.0 | 12.0 | 29.0 | 3.57 | 0 | E | CRU |
| 557 | 16953 | ACRUX | | 12.41061110 | 12.0 | 24.0 | 38.2 | -62.90527700 | -62.0 | 54.0 | 19.0 | 1.00 | 0 | A | CRU |
| 558 | 16964 | | | 12.41991650 | 12.0 | 25.0 | 11.7 | 28.46277700 | 28.0 | 27.0 | 46.0 | 4.56 | 15 | G | COM |
| 559 | 16990 | | | 12.43563880 | 12.0 | 26.0 | 8.3 | -50.03722200 | -50.0 | 2.0 | 14.0 | 4.16 | 0 | S | CEN |
| 560 | 17029 | ALGORAB | | 12.46749980 | 12.0 | 28.0 | 3.0 | -16.32083300 | -16.0 | 19.0 | 15.0 | 3.11 | 7 | O | CRV |
| 561 | 17052 | GACRUX | | 12.48686110 | 12.0 | 29.0 | 12.7 | -56.91749900 | -56.0 | 55.0 | 3.0 | 1.61 | 0 | G | CRU |
| 562 | 17087 | | | 12.50438870 | 12.0 | 30.0 | 15.8 | -16.00249900 | -16.0 | .0 | 9.0 | 4.42 | 8 | H | CRV |
| 563 | 17086 | | | 12.50588860 | 12.0 | 30.0 | 21.2 | -71.94000000 | -71.0 | 56.0 | 24.0 | 4.04 | 0 | G | MUS |
| 564 | 17126 | | | 12.53330560 | 12.0 | 31.0 | 59.9 | 69.98083300 | 69.0 | 58.0 | 51.0 | 3.88 | 5 | K | DRA |
| 565 | 17127 | ASTERION | | 12.53472210 | 12.0 | 32.0 | 5.0 | 41.54722200 | 41.0 | 32.0 | 50.0 | 4.32 | 8 | B | CVN |
| 566 | 17133 | KRAZ | | 12.54241660 | 12.0 | 32.0 | 32.7 | -23.20333300 | -23.0 | 12.0 | 12.0 | 2.84 | 9 | B | CRV |
| 567 | 17179 | | | 12.58461090 | 12.0 | 35.0 | 4.6 | -68.94305500 | -68.0 | 56.0 | 35.0 | 2.94 | 0 | A | MUS |
| 568 | 17194 | | | 12.59630530 | 12.0 | 35.0 | 46.7 | -48.34888900 | -48.0 | 20.0 | 56.0 | 4.02 | 0 | T | CEN |
| 569 | 17262 | | | 12.65961100 | 12.0 | 39.0 | 34.6 | -48.76777700 | -48.0 | 46.0 | 4.0 | 2.38 | 0 | G | CEN |
| 570 | 17270 | ARICH | PORRIMA | 12.66474990 | 12.0 | 39.0 | 53.1 | -1.25777777 | -1.0 | 15.0 | 28.0 | 2.91 | 29 | G | VIR |
| 571 | 17282 | | | 12.67738880 | 12.0 | 40.0 | 38.6 | -48.62111100 | -48.0 | 37.0 | 16.0 | 4.65 | 0 | | CEN |
| 572 | 17339 | | | 12.72597210 | 12.0 | 43.0 | 33.5 | -60.78944400 | -60.0 | 47.0 | 22.0 | 4.68 | 0 | I | CRU |
| 573 | 17348 | | | 12.73524980 | 12.0 | 44.0 | 6.9 | -67.91694300 | -67.0 | 55.0 | 1.0 | 3.26 | 0 | B | MUS |
| 574 | 17374 | BETA CRUCIS | | 12.76102750 | 12.0 | 45.0 | 39.7 | -59.49777700 | -59.0 | 29.0 | 52.0 | 1.50 | 0 | B | CRU |
| 575 | 17473 | | | 12.85205540 | 12.0 | 51.0 | 7.4 | -48.75305400 | -48.0 | 45.0 | 11.0 | 4.35 | 0 | | CEN |
| 576 | 17489 | | | 12.85816640 | 12.0 | 51.0 | 29.4 | -39.98888800 | -39.0 | 59.0 | 20.0 | 4.34 | 0 | | CEN |
| 577 | 17518 | ALIOTH | | 12.87491650 | 12.0 | 52.0 | 29.7 | 56.14944400 | 56.0 | 8.0 | 58.0 | 1.68 | 77 | E | UMA |

TABLE I. - STAR IDENTIFICATION CATALOGUE - Continued

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 578 | 17512 | | | 12.87538870 | 12.0 | 52.0 | 31.4 | -56.98833300 | -56.0 | 59.0 | 18.0 | 4.26 | 0 | M | CRU |
| 579 | 17543 | AUVA | MINELAUVA | 12.89730550 | 12.0 | 53.0 | 50.3 | 3.58722220 | 3.0 | 35.0 | 14.0 | 3.66 | 43 | D | VIR |
| 580 | 17557 | CHARA | COR CAROLI | 12.90655540 | 12.0 | 54.0 | 23.6 | 38.50694400 | 38.0 | 30.0 | 25.0 | 2.90 | 12 | A | CVN |
| 581 | 17672 | | | 12.99724980 | 12.0 | 59.0 | 50.1 | -71.36083300 | -71.0 | 21.0 | 39.0 | 3.63 | 0 | D | MUS |
| 582 | 17687 | VINDEMIATRIX | | 13.00722210 | 13.0 | .0 | 26.0 | 11.14694450 | 11.0 | 8.0 | 49.0 | 2.95 | 47 | E | VIR |
| 583 | 17773 | | | 13.08094430 | 13.0 | 4.0 | 51.4 | -49.71916600 | -49.0 | 43.0 | 9.0 | 4.40 | 0 | C | CEN |
| 584 | 17828 | | | 13.13558330 | 13.0 | 8.0 | 8.1 | -5.35249990 | -5.0 | 21.0 | 9.0 | 4.44 | 51 | J | VIR |
| 585 | 17833 | DIADEM | | 13.13808320 | 13.0 | 8.0 | 17.1 | 17.71388900 | 17.0 | 42.0 | 50.0 | 4.50 | 42 | A | COM |
| 586 | 17874 | | | 13.17066650 | 13.0 | 10.0 | 14.4 | 28.05500000 | 28.0 | 3.0 | 18.0 | 4.32 | 93 | B | COM |
| 587 | 18000 | | | 13.26629970 | 13.0 | 15.0 | 58.5 | 40.75638800 | 40.0 | 45.0 | 23.0 | 4.66 | 20 | | CVN |
| 588 | 18012 | | | 13.28355550 | 13.0 | 17.0 | .8 | -22.98750000 | -22.0 | 59.0 | 15.0 | 3.33 | 46 | G | HYA |
| 589 | 18039 | | | 13.31038880 | 13.0 | 18.0 | 37.4 | -36.52833300 | -36.0 | 31.0 | 42.0 | 2.91 | 0 | I | CEN |
| 590 | 18087 | | | 13.33922210 | 13.0 | 20.0 | 21.2 | -60.80555500 | -60.0 | 48.0 | 20.0 | 4.62 | 0 | | CEN |
| 591 | 18107 | | | 13.36061090 | 13.0 | 21.0 | 38.2 | -64.35333200 | -64.0 | 21.0 | 12.0 | 4.50 | 0 | | CEN |
| 592 | 18133 | MIZAR | | 13.37533320 | 13.0 | 22.0 | 31.2 | 55.10749900 | 55.0 | 6.0 | 27.0 | 2.40 | 79 | Z | UMA |
| 593 | 18144 | SPICA | AZIMECH | 13.38908330 | 13.0 | 23.0 | 20.7 | -10.97916660 | -10.0 | 58.0 | 45.0 | 1.21 | 67 | A | VIR |
| 594 | 18155 | ALCOR | | 13.39711100 | 13.0 | 23.0 | 49.6 | 55.17000000 | 55.0 | 10.0 | 12.0 | 4.02 | 80 | | UMA |
| 595 | 18239 | | | 13.46325000 | 13.0 | 27.0 | 47.7 | -23.10111100 | -23.0 | 6.0 | 4.0 | 3.00V | 0 | | HYA |
| 596 | 18254 | | | 13.48344430 | 13.0 | 29.0 | .4 | -39.22722200 | -39.0 | 13.0 | 38.0 | 3.96 | 0 | | CEN |
| 597 | 18351 | HEZE | | 13.54844440 | 13.0 | 32.0 | 54.4 | -.41777777 | .0 | 25.0 | 4.0 | 3.44 | 79 | Z | VIR |
| 598 | 18356 | | | 13.55044440 | 13.0 | 33.0 | 1.6 | 49.19416600 | 49.0 | 11.0 | 39.0 | 4.63 | 24 | | CVN |
| 599 | 18458 | | | 13.62761100 | 13.0 | 37.0 | 39.4 | -53.28916600 | -53.0 | 17.0 | 21.0 | 2.56 | 0 | E | CEN |
| 600 | 18504 | | | 13.65686100 | 13.0 | 39.0 | 24.7 | 54.85833300 | 54.0 | 51.0 | 30.0 | 4.75 | 83 | | UMA |
| 601 | 18593 | | | 13.72819440 | 13.0 | 43.0 | 41.5 | -32.86749900 | -32.0 | 52.0 | 3.0 | 4.36 | 1 | | CEN |
| 602 | 18607 | | | 13.74047200 | 13.0 | 44.0 | 25.7 | -51.25805500 | -51.0 | 15.0 | 29.0 | 4.68 | 0 | | CEN |
| 603 | 18637 | | | 13.75997220 | 13.0 | 45.0 | 35.9 | 17.63027800 | 17.0 | 37.0 | 49.0 | 4.51 | 4 | T | BOO |
| 604 | 18643 | ALKAID | BENETNASH | 13.76938880 | 13.0 | 46.0 | 9.8 | 49.48749900 | 49.0 | 29.0 | 15.0 | 1.91 | 85 | H | UMA |
| 605 | 18665 | | | 13.78994440 | 13.0 | 47.0 | 23.8 | -41.51416600 | -41.0 | 30.0 | 51.0 | 3.53 | 0 | N | CEN |
| 606 | 18666 | | | 13.79016670 | 13.0 | 47.0 | 24.6 | -34.27666600 | -34.0 | 16.0 | 36.0 | 4.40 | 2 | | CEN |
| 607 | 18667 | | | 13.79163890 | 13.0 | 47.0 | 29.9 | -42.29999900 | -42.0 | 18.0 | .0 | 3.32 | 0 | M | CEN |
| 608 | 18674 | | | 13.79647210 | 13.0 | 47.0 | 47.3 | 15.97083330 | 15.0 | 58.0 | 15.0 | 4.28 | 5 | U | BOO |
| 609 | 18724 | | | 13.82997210 | 13.0 | 49.0 | 47.9 | -32.82138900 | -32.0 | 49.0 | 17.0 | 4.72 | 3 | | CEN |
| 610 | 18805 | MUFRID | | 13.88361110 | 13.0 | 53.0 | 1.0 | 18.57250000 | 18.0 | 34.0 | 21.0 | 2.80 | 8 | H | BOO |
| 611 | 18809 | | | 13.88908330 | 13.0 | 53.0 | 20.7 | -47.11694400 | -47.0 | 7.0 | 1.0 | 3.06 | 0 | Z | CEN |
| 612 | 18845 | | | 13.91824990 | 13.0 | 55.0 | 5.7 | -63.51611100 | -63.0 | 30.0 | 58.0 | 4.68 | 294 | | CEN |
| 613 | 18874 | | | 13.93555550 | 13.0 | 56.0 | 8.0 | -41.93055500 | -41.0 | 55.0 | 50.0 | 4.05 | 0 | V | CEN |
| 614 | 18883 | | | 13.94177760 | 13.0 | 56.0 | 30.4 | -44.63361100 | -44.0 | 38.0 | 1.0 | 4.17 | 0 | U | CEN |
| 615 | 18939 | | | 13.99216650 | 13.0 | 59.0 | 31.8 | -45.43472200 | -45.0 | 26.0 | 5.0 | 4.39 | 0 | U | CEN |
| 616 | 18945 | | | 13.99772200 | 13.0 | 59.0 | 51.8 | 1.71305555 | 1.0 | 42.0 | 47.0 | 4.34 | 93 | T | VIR |
| 617 | 18971 | | | 14.02227770 | 14.0 | 1.0 | 20.2 | -60.20527700 | -60.0 | 12.0 | 19.0 | .86 | 0 | B | CEN |
| 618 | 19019 | THUBAN | | 14.05733320 | 14.0 | 3.0 | 26.4 | 64.54249900 | 64.0 | 32.0 | 33.0 | 3.64 | 11 | A | DRA |
| 619 | 19017 | | | 14.06500000 | 14.0 | 3.0 | 54.0 | -41.01277700 | -41.0 | .0 | 46.0 | 4.54 | 0 | X | CEN |
| 620 | 19029 | | | 14.07286090 | 14.0 | 4.0 | 22.3 | -26.51472200 | -26.0 | 30.0 | 53.0 | 3.48 | 49 | P | HYA |
| 621 | 19033 | MENKENT | | 14.07691660 | 14.0 | 4.0 | 36.9 | -36.19861100 | -36.0 | 11.0 | 55.0 | 2.26 | 5 | J | CEN |
| 622 | 19168 | | | 14.18374990 | 14.0 | 11.0 | 1.5 | -10.11166650 | -10.0 | 6.0 | 42.0 | 4.31 | 98 | K | VIR |
| 623 | 19207 | | | 14.20383320 | 14.0 | 12.0 | 13.8 | 51.95305500 | 51.0 | 57.0 | 11.0 | 4.60 | 17 | K | BOO |
| 624 | 19242 | ARCTURUS | | 14.23438880 | 14.0 | 14.0 | 3.8 | 19.36388800 | 19.0 | 21.0 | 50.0 | .24 | 16 | A | BOO |
| 625 | 19244 | | | 14.23627760 | 14.0 | 14.0 | 10.6 | -5.83416660 | -5.0 | 50.0 | 3.0 | 4.16 | 99 | I | VIR |
| 626 | 19273 | | | 14.25088870 | 14.0 | 15.0 | 3.2 | 46.24833200 | 46.0 | 14.0 | 54.0 | 4.26 | 19 | L | BOO |
| 627 | 19309 | | | 14.28586100 | 14.0 | 17.0 | 9.1 | -45.89749900 | -45.0 | 53.0 | 51.0 | 4.10 | 0 | I | LUP |
| 628 | 19311 | | | 14.28686110 | 14.0 | 17.0 | 12.7 | -13.21083340 | -13.0 | 12.0 | 39.0 | 4.60 | 100 | L | VIR |
| 629 | 19318 | | | 14.29774980 | 14.0 | 17.0 | 51.9 | -56.22638800 | -56.0 | 13.0 | 35.0 | 4.41 | 0 | U | CEN |
| 630 | 19337 | | | 14.30699990 | 14.0 | 18.0 | 25.2 | -37.72527700 | -37.0 | 43.0 | 31.0 | 4.17 | 0 | Y | CEN |
| 631 | 19377 | | | 14.34786100 | 14.0 | 20.0 | 52.3 | -39.35305600 | -39.0 | 21.0 | 11.0 | 4.55 | 0 | | CEN |
| 632 | 19349 | | | 14.35141650 | 14.0 | 21.0 | 5.1 | -83.50999900 | -83.0 | 30.0 | 36.0 | 4.14 | 0 | D | OCT |
| 633 | 19453 | | | 14.39799990 | 14.0 | 23.0 | 52.8 | -45.06416600 | -45.0 | 3.0 | 51.0 | 4.65 | 0 | T | LUP |
| 634 | 19454 | | | 14.39863890 | 14.0 | 23.0 | 55.1 | -45.22222100 | -45.0 | 13.0 | 20.0 | 4.49 | 0 | T | LUP |
| 635 | 19467 | | | 14.40008330 | 14.0 | 24.0 | .3 | 52.01194400 | 52.0 | .0 | 43.0 | 4.06 | 23 | J | BOO |

TABLE I. - STAR IDENTIFICATION CATALOGUE - Continued

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 636 | 19548 | | | 14.45961090 | 14.0 | 27.0 | 34.6 | 75.85138800 | 75.0 | 51.0 | 5.0 | 4.37 | 5 | | UMI | |
| 637 | 19590 | | | 14.50408310 | 14.0 | 30.0 | 14.7 | -50.30305500 | -50.0 | 18.0 | 11.0 | 4.60 | 0 | S | LUP | |
| 638 | 19597 | | | 14.50536100 | 14.0 | 30.0 | 19.3 | 30.52416600 | 30.0 | 31.0 | 27.0 | 3.78 | 25 | R | BOO | |
| 639 | 19607 | HARIS | | 14.51113860 | 14.0 | 30.0 | 40.1 | 38.46055500 | 38.0 | 27.0 | 38.0 | 3.00 | 27 | G | BOO | |
| 640 | 19659 | | | 14.55258320 | 14.0 | 33.0 | 9.3 | 29.89638800 | 29.0 | 53.0 | 47.0 | 4.48 | 28 | S | BOO | |
| 641 | 19656 | | | 14.55458310 | 14.0 | 33.0 | 16.5 | -42.00500000 | -42.0 | .0 | 18.0 | 2.65 | 0 | H | CEN | |
| 642 | 19698 | | | 14.59199990 | 14.0 | 35.0 | 31.2 | -49.27444400 | -49.0 | 16.0 | 28.0 | 4.14 | 0 | R | LUP | |
| 643 | 19728 | RIGIL KENTAURUS | | 14.62013870 | 14.0 | 37.0 | 12.5 | -60.69222200 | -60.0 | 41.0 | 32.0 | .06 | 0 | A | CEN | TOLIMN |
| 644 | 19777 | | | 14.65791660 | 14.0 | 39.0 | 28.5 | 13.87750000 | 13.0 | 52.0 | 39.0 | 3.86 | 30 | Z | BOO | |
| 645 | 19774 | | | 14.65986100 | 14.0 | 39.0 | 35.5 | -47.23916600 | -47.0 | 14.0 | 21.0 | 2.89 | 0 | A | LUP | |
| 646 | 19772 | | | 14.66091660 | 14.0 | 39.0 | 39.3 | -64.82416600 | -64.0 | 49.0 | 27.0 | 3.41 | 0 | A | CIR | |
| 647 | 19779 | | | 14.66297210 | 14.0 | 39.0 | 46.7 | -37.64444400 | -37.0 | 38.0 | 40.0 | 4.09 | 0 | | CEN | |
| 648 | 19816 | | | 14.68686100 | 14.0 | 41.0 | 12.7 | -5.50722220 | -5.0 | 30.0 | 26.0 | 3.95 | 107 | M | VIR | |
| 649 | 19820 | | | 14.69180550 | 14.0 | 41.0 | 30.5 | -35.02416600 | -35.0 | 1.0 | 27.0 | 4.13 | 371 | | CEN | |
| 650 | 19834 | | | 14.72374990 | 14.0 | 43.0 | 25.5 | -78.89833200 | -78.0 | 53.0 | 54.0 | 3.81 | 0 | A | APS | |
| 651 | 19856 | IZAR | PULCHERRIMA | 14.72430540 | 14.0 | 43.0 | 27.5 | 27.22083300 | 27.0 | 13.0 | 15.0 | 2.70 | 36 | E | BOO | MIRAK |
| 652 | 19858 | | | 14.72677770 | 14.0 | 43.0 | 36.4 | 17.11138900 | 17.0 | 6.0 | 41.0 | 4.69 | 35 | D | BOO | |
| 653 | 19884 | | | 14.74127750 | 14.0 | 44.0 | 28.6 | 2.03916660 | 2.0 | 2.0 | 21.0 | 3.76 | 109 | | VIR | |
| 654 | 19954 | | | 14.80377760 | 14.0 | 48.0 | 13.6 | -27.81583300 | -27.0 | 48.0 | 57.0 | 4.63 | 58 | | HYA | |
| 655 | 19975 | ZUBEN ELGENUBI | | 14.81563880 | 14.0 | 48.0 | 56.3 | -15.89749990 | -15.0 | 53.0 | 51.0 | 2.90 | 9 | A | LIB | KIFFAA |
| 656 | 19977 | | | 14.82241660 | 14.0 | 49.0 | 20.7 | -43.43166600 | -43.0 | 25.0 | 54.0 | 4.49 | 0 | O | LUP | |
| 657 | 19991 | | | 14.82952760 | 14.0 | 49.0 | 46.3 | 19.24527700 | 19.0 | 14.0 | 43.0 | 4.64 | 37 | C | BOO | |
| 658 | 20029 | KOCHAB | | 14.84644430 | 14.0 | 50.0 | 47.2 | 74.29861100 | 74.0 | 17.0 | 55.0 | 2.24 | 7 | B | UMI | |
| 659 | 20115 | | | 14.92252770 | 14.0 | 55.0 | 21.1 | -4.20500000 | -4.0 | 12.0 | 18.0 | 4.59 | 16 | | LIB | |
| 660 | 20128 | | | 14.93716660 | 14.0 | 56.0 | 13.8 | -42.99444400 | -42.0 | 59.0 | 40.0 | 2.81 | 0 | B | LUP | |
| 661 | 20146 | | | 14.94791660 | 14.0 | 56.0 | 52.5 | -41.96500000 | -41.0 | 57.0 | 54.0 | 3.35 | 0 | K | CEN | |
| 662 | 20226 | MEREZ | NEKKAR | 15.01044440 | 15.0 | .0 | 37.6 | 40.52749900 | 40.0 | 31.0 | 39.0 | 3.63 | 42 | B | BOO | |
| 663 | 20237 | | | 15.01883330 | 15.0 | 1.0 | 7.8 | 2.22749990 | 2.0 | 13.0 | 39.0 | 4.62 | 110 | | VIR | |
| 664 | 20253 | | | 15.03361110 | 15.0 | 2.0 | 1.0 | -25.14583300 | -25.0 | 8.0 | 45.0 | 3.41 | 20 | S | LIB | |
| 665 | 20271 | | | 15.04541670 | 15.0 | 2.0 | 43.5 | -46.91555500 | -46.0 | 54.0 | 56.0 | 4.02 | 0 | P | LUP | |
| 666 | 20285 | | | 15.04908320 | 15.0 | 2.0 | 56.7 | 27.08305500 | 27.0 | 4.0 | 59.0 | 4.67 | 43 | Y | BOO | |
| 667 | 20356 | | | 15.10791640 | 15.0 | 6.0 | 28.5 | -45.14666600 | -45.0 | 8.0 | 48.0 | 4.39 | 0 | L | LUP | |
| 668 | 20409 | | | 15.15816660 | 15.0 | 9.0 | 29.4 | -48.60638800 | -48.0 | 36.0 | 23.0 | 4.14 | 0 | K | LUP | |
| 669 | 20418 | | | 15.16263870 | 15.0 | 9.0 | 45.5 | -51.96749900 | -51.0 | 58.0 | 3.0 | 3.50 | 0 | Z | LUP | |
| 670 | 20433 | | | 15.17036110 | 15.0 | 10.0 | 13.3 | -19.66055500 | -19.0 | 39.0 | 38.0 | 4.66 | 24 | I | LIB | |
| 671 | 20523 | | | 15.23483310 | 15.0 | 14.0 | 5.4 | 33.44444400 | 33.0 | 26.0 | 40.0 | 3.54 | 49 | D | BOO | |
| 672 | 20507 | | | 15.24594430 | 15.0 | 14.0 | 45.4 | -58.67222200 | -58.0 | 40.0 | 20.0 | 4.16 | 0 | B | CIR | |
| 673 | 20539 | ZUBEN ELSCHEMALI | | 15.25199980 | 15.0 | 15.0 | 7.2 | -9.25500000 | -9.0 | 15.0 | 18.0 | 2.74 | 27 | B | LIB | KIFFAB |
| 674 | 20538 | | | 15.26024980 | 15.0 | 15.0 | 36.9 | -68.55222100 | -68.0 | 33.0 | 8.0 | 3.06 | 0 | G | TRA | |
| 675 | 20550 | | | 15.26158320 | 15.0 | 15.0 | 41.7 | -30.02138800 | -30.0 | 1.0 | 17.0 | 4.43 | 2 | | LUP | |
| 676 | 20556 | | | 15.26811090 | 15.0 | 16.0 | 5.2 | -47.74777700 | -47.0 | 44.0 | 52.0 | 4.36 | 0 | H | LUP | |
| 677 | 20620 | | | 15.31788870 | 15.0 | 19.0 | 4.4 | -40.52222100 | -40.0 | 31.0 | 20.0 | 3.43 | 0 | O | LUP | |
| 678 | 20643 | | | 15.32630530 | 15.0 | 19.0 | 34.7 | -36.13583300 | -36.0 | 8.0 | 9.0 | 3.59 | 0 | V | LUP | |
| 679 | 20659 | | | 15.33824980 | 15.0 | 20.0 | 17.7 | -44.56499900 | -44.0 | 33.0 | 54.0 | 3.74 | 0 | E | LUP | |
| 680 | 20663 | | | 15.34288870 | 15.0 | 20.0 | 34.4 | -59.19638900 | -59.0 | 11.0 | 47.0 | 4.54 | 0 | G | CIR | |
| 681 | 20692 | PHERKAD | | 15.34613880 | 15.0 | 20.0 | 46.1 | 71.95861000 | 71.0 | 57.0 | 31.0 | 3.14 | 13 | G | UMI | |
| 682 | 20676 | | | 15.34852770 | 15.0 | 20.0 | 54.7 | -36.73444400 | -36.0 | 44.0 | 4.0 | 4.69 | 0 | V | LUP | |
| 683 | 20714 | | | 15.38430540 | 15.0 | 23.0 | 3.5 | -38.61111000 | -38.0 | 36.0 | 40.0 | 4.68 | 0 | K | LUP | |
| 684 | 20724 | ALKALUROPS | | 15.38611100 | 15.0 | 23.0 | 10.0 | 37.49888800 | 37.0 | 29.0 | 56.0 | 4.47 | 51 | M | BOO | |
| 685 | 20747 | | | 15.40222210 | 15.0 | 24.0 | 8.0 | 59.08805500 | 59.0 | 5.0 | 17.0 | 3.47 | 12 | I | DRA | |
| 686 | 20795 | NUSAKAN | | 15.43974980 | 15.0 | 26.0 | 23.1 | 29.22527700 | 29.0 | 13.0 | 31.0 | 3.72 | 3 | B | CRB | |
| 687 | 20908 | | | 15.52527770 | 15.0 | 31.0 | 31.0 | 31.47611000 | 31.0 | 28.0 | 34.0 | 4.17 | 4 | J | CRB | |
| 688 | 20926 | | | 15.54666670 | 15.0 | 32.0 | 48.0 | -41.05055500 | -41.0 | 3.0 | 2.0 | 2.95 | 0 | G | LUP | |
| 689 | 20942 | | | 15.55213880 | 15.0 | 33.0 | 7.7 | 10.65472200 | 10.0 | 39.0 | 17.0 | 4.23 | 13 | O | SER | |
| 690 | 20947 | ALPHECCA | GNOSIA | 15.55341660 | 15.0 | 33.0 | 12.3 | 26.83138800 | 26.0 | 49.0 | 53.0 | 2.31 | 5 | A | CRB | GEMMA |
| 691 | 20932 | | | 15.55822210 | 15.0 | 33.0 | 29.6 | -66.20166500 | -66.0 | 12.0 | 6.0 | 4.11 | 0 | E | TRA | |
| 692 | 20949 | ZUBEN ELAKRAB | | 15.55941660 | 15.0 | 33.0 | 33.9 | -14.67416660 | -14.0 | 40.0 | 27.0 | 4.02 | 38 | G | LIB | |
| 693 | 20979 | | | 15.58155550 | 15.0 | 34.0 | 53.6 | -28.02055500 | -28.0 | 1.0 | 14.0 | 3.78 | 39 | U | LIB | |

TABLE I. - STAR IDENTIFICATION CATALOGUE - Continued

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 694 | 21001 | | | 15.59480530 | 15.0 | 35.0 | 41.3 | -42.45388800 | -42.0 | 27.0 | 14.0 | 4.27 | 0 | W | LUP | |
| 695 | 21019 | | | 15.60833320 | 15.0 | 36.0 | 30.0 | -29.66416600 | -29.0 | 39.0 | 51.0 | 3.80 | 40 | T | LIB | |
| 696 | 21042 | | | 15.62561090 | 15.0 | 37.0 | 32.2 | -34.29888900 | -34.0 | 17.0 | 56.0 | 4.63 | 3 | Y | LUP | |
| 697 | 21070 | | | 15.64622210 | 15.0 | 38.0 | 46.4 | -44.54694400 | -44.0 | 32.0 | 49.0 | 4.69 | 0 | | LUP | |
| 698 | 21102 | | | 15.66647220 | 15.0 | 39.0 | 59.3 | 19.78194400 | 19.0 | 46.0 | 55.0 | 4.49 | 21 | I | SER | |
| 699 | 21130 | | | 15.68786100 | 15.0 | 41.0 | 16.3 | 26.40527700 | 26.0 | 24.0 | 19.0 | 3.93 | 8 | G | CRB | |
| 700 | $2115_8$ | COR SERPENTIS | UNUK | $15.70_9 02760$ | 15.0 | 42.0 | 32.5 | 6.53444440 | 6.0 | 32.0 | 4.0 | 2.75 | 24 | A | SER | ELMAIA |
| 701 | 21194 | | | 15.74283320 | 15.0 | 44.0 | 34.2 | 15.53000000 | 15.0 | 31.0 | 48.0 | 3.74 | 28 | B | SER | |
| 702 | 21201 | | | 15.74569430 | 15.0 | 44.0 | 44.5 | 7.46166660 | 7.0 | 27.0 | 42.0 | 4.42 | 27 | L | SER | |
| 703 | 21243 | | | 15.75447200 | 15.0 | 45.0 | 16.1 | 77.90305500 | 77.0 | 54.0 | 11.0 | 4.34 | 16 | Z | UMI | |
| 704 | 21255 | | | 15.78605550 | 15.0 | 47.0 | 9.8 | 18.24833300 | 18.0 | 14.0 | 54.0 | 4.28 | 35 | K | SER | |
| 705 | 21269 | | | 15.79650000 | 15.0 | 47.0 | 47.4 | -3.32444440 | -3.0 | 19.0 | 28.0 | 3.63 | 32 | M | SER | |
| 706 | 21276 | | | 15.80208330 | 15.0 | 48.0 | 7.5 | 26.17416600 | 26.0 | 10.0 | 27.0 | 4.73 | 10 | D | CRB | |
| 707 | 21281 | | | 15.81213880 | 15.0 | 48.0 | 43.7 | -33.52222100 | -33.0 | 31.0 | 20.0 | 4.11 | 5 | X | LUP | |
| 708 | 21288 | | | 15.81780540 | 15.0 | 49.0 | 4.1 | 4.58166670 | 4.0 | 34.0 | 54.0 | 3.75 | 37 | E | SER | |
| 709 | 21340 | | | 15.85772200 | 15.0 | 51.0 | 27.8 | 42.54861000 | 42.0 | 32.0 | 55.0 | 4.61 | 1 | X | HER | |
| 710 | 21329 | | | 15.85841660 | 15.0 | 51.0 | 30.3 | -25.22416600 | -26.0 | 13.0 | 27.0 | 4.66 | 2 | | SCO | |
| 711 | 21342 | | | 15.86380540 | 15.0 | 51.0 | 49.7 | -16.62805500 | -16.0 | 37.0 | 41.0 | 4.34 | 46 | J | LIB | |
| 712 | 21332 | | | 15.86733310 | 15.0 | 52.0 | 2.4 | -63.32472100 | -63.0 | 19.0 | 29.0 | 3.04 | 0 | B | TRA | |
| 713 | 21398 | | | 15.91197220 | 15.0 | 54.0 | 43.1 | -29.11333300 | -29.0 | 6.0 | 48.0 | 4.02 | 5 | R | SCO | |
| 714 | 21408 | | | 15.91391650 | 15.0 | 54.0 | 50.1 | 15.77444430 | 15.0 | 46.0 | 28.0 | 3.86 | 41 | G | SER | |
| 715 | 21440 | | | 15.93561100 | 15.0 | 56.0 | 8.2 | 26.97805500 | 26.0 | 58.0 | 41.0 | 4.22 | 13 | E | CRB | |
| 716 | 21439 | | | 15.93708320 | 15.0 | 56.0 | 13.5 | -14.18000000 | -14.0 | 10.0 | 48.0 | 4.68 | 48 | | LIB | |
| 717 | 21447 | | | 15.94549980 | 15.0 | 56.0 | 43.8 | -26.01472100 | -26.0 | .0 | 53.0 | 3.00 | 6 | P | SCO | |
| 718 | 21478 | | | 15.96325000 | 15.0 | 57.0 | 47.7 | -38.29833300 | -38.0 | 17.0 | 54.0 | 3.64 | 0 | H | LUP | |
| 719 | 21489 | DSCHUBBA | | 15.97099990 | 15.0 | 58.0 | 15.6 | -22.52361100 | -22.0 | 31.0 | 25.0 | 2.54 | 7 | D | SCO | |
| 720 | 21539 | | | 16.01052700 | 16.0 | .0 | 37.9 | -49.13388900 | -49.0 | 8.0 | 2.0 | 4.74 | 0 | H | NOR | |
| 721 | 21572 | | | 16.02050000 | 16.0 | 1.0 | 13.8 | 58.65805500 | 58.0 | 39.0 | 29.0 | 4.11 | 13 | J | DRA | |
| 722 | 21580 | | | 16.02844400 | 16.0 | 1.0 | 42.4 | 46.13305500 | 46.0 | 7.0 | 59.0 | 4.64 | 6 | U | HER | |
| 723 | 21593 | | | 16.04066600 | 16.0 | 2.0 | 26.4 | -11.27805560 | -11.0 | 16.0 | 41.0 | 4.16 | 0 | C | SCO | |
| 724 | 21609 | ACRAB | ELACRAB | 16.05663800 | 16.0 | 3.0 | 23.9 | -19.71111100 | -19.0 | 42.0 | 40.0 | 2.90 | 8 | B | SCO | |
| 725 | 21625 | | | 16.07147200 | 16.0 | 4.0 | 17.3 | -36.70861100 | -36.0 | 42.0 | 31.0 | 4.33 | 0 | J | LUP | |
| 726 | 21639 | | | 16.07924900 | 16.0 | 4.0 | 45.3 | -20.57583300 | -20.0 | 34.0 | 33.0 | 4.13 | 9 | W | SCO | |
| 727 | 21659 | | | 16.08913800 | 16.0 | 5.0 | 20.9 | -20.77555500 | -20.0 | 46.0 | 32.0 | 4.58 | 10 | W | SCO | |
| 728 | 21736 | | | 16.12775000 | 16.0 | 7.0 | 39.9 | 45.02555500 | 45.0 | 1.0 | 32.0 | 4.26 | 11 | V | HER | |
| 729 | 21773 | LESATH | | 16.16594300 | 16.0 | 9.0 | 57.4 | -19.37111000 | -19.0 | 22.0 | 16.0 | 4.29 | 14 | N | SCO | |
| 730 | 21778 | | | 16.16902700 | 16.0 | 10.0 | 8.5 | -27.83722200 | -27.0 | 50.0 | 14.0 | 4.70 | 13 | | SCO | |
| 731 | 21819 | | | 16.20391600 | 16.0 | 12.0 | 14.1 | -63.59861000 | -63.0 | 35.0 | 55.0 | 4.03 | 0 | O | TRA | |
| 732 | 21838 | YED PRIOR | | 16.20847100 | 16.0 | 12.0 | 30.5 | -3.60555550 | -3.0 | 36.0 | 20.0 | 3.03 | 1 | D | OPH | |
| 733 | 21920 | YED POSTERIOR | | 16.27444400 | 16.0 | 16.0 | 28.0 | -4.60861100 | -4.0 | 36.0 | 31.0 | 3.34 | 2 | E | OPH | |
| 734 | 21933 | | | 16.28686000 | 16.0 | 17.0 | 12.7 | -50.07166600 | -50.0 | 4.0 | 18.0 | 4.14 | 0 | G | NOR | |
| 735 | 21987 | | | 16.31144400 | 16.0 | 18.0 | 41.2 | 46.39583300 | 46.0 | 23.0 | 45.0 | 3.91 | 22 | T | HER | |
| 736 | 21982 | | | 16.31761000 | 16.0 | 19.0 | 3.4 | -25.51055600 | -25.0 | 30.0 | 38.0 | 2.87 | 20 | S | SCO | |
| 737 | 22012 | | | 16.33958300 | 16.0 | 20.0 | 22.5 | 19.23416600 | 19.0 | 14.0 | 3.0 | 3.79 | 20 | G | HER | |
| 738 | 22020 | | | 16.34552700 | 16.0 | 20.0 | 43.9 | 30.97222100 | 30.0 | 58.0 | 20.0 | 4.72 | 19 | C | CRB | |
| 739 | 22042 | | | 16.36752700 | 16.0 | 22.0 | 3.1 | -19.95694400 | -19.0 | 57.0 | 25.0 | 4.59 | 4 | Y | OPH | |
| 740 | 22101 | | | 16.39186100 | 16.0 | 23.0 | 30.7 | 61.59305500 | 61.0 | 35.0 | 35.0 | 2.89 | 14 | H | DRA | |
| 741 | 22090 | KAJAM | | 16.39663800 | 16.0 | 23.0 | 47.9 | 14.11250000 | 14.0 | 6.0 | 45.0 | 4.53 | 24 | W | HER | |
| 742 | 22134 | | | 16.43177700 | 16.0 | 25.0 | 54.4 | -8.29500000 | -8.0 | 17.0 | 42.0 | 4.68 | 3 | U | OPH | |
| 743 | 22157 | ANTARES | VESPERTIL | 16.45427700 | 16.0 | 27.0 | 15.4 | -26.35611100 | -26.0 | 21.0 | 22.0 | 1.22 | 21 | A | SCO | 10 |
| 744 | 22142 | | | 16.46702700 | 16.0 | 28.0 | 1.3 | -78.82222200 | -78.0 | 49.0 | 20.0 | 3.90 | 0 | G | APS | |
| 745 | 22193 | KORNEPHOROS | RUTIL | 16.47855500 | 16.0 | 28.0 | 42.8 | 21.56472200 | 21.0 | 33.0 | 53.0 | 2.81 | 27 | B | HER | ICUS |
| 746 | 22195 | | | 16.48483300 | 16.0 | 29.0 | 5.4 | -34.62972200 | -34.0 | 37.0 | 47.0 | 4.33 | 8 | | SCO | |
| 747 | 22200 | | | 16.48552700 | 16.0 | 29.0 | 7.9 | -16.53805500 | -16.0 | 32.0 | 17.0 | 4.40 | 0 | V | OPH | |
| 748 | 22203 | | | 16.48577700 | 16.0 | 29.0 | 8.8 | 2.05916660 | 2.0 | 3.0 | 33.0 | 3.85 | 10 | L | OPH | |
| 749 | 22221 | | | 16.50094400 | 16.0 | 30.0 | 3.4 | -21.39305500 | -21.0 | 23.0 | 35.0 | 4.57 | 9 | W | OPH | |
| 750 | 22296 | | | 16.54955500 | 16.0 | 32.0 | 58.4 | 42.50833300 | 42.0 | 30.0 | 30.0 | 4.25 | 35 | S | HER | |
| 751 | 22303 | | | 16.56166600 | 16.0 | 33.0 | 42.0 | -28.14500000 | -28.0 | 8.0 | 42.0 | 2.91 | 23 | T | SCO | |

TABLE I. - STAR IDENTIFICATION CATALOGUE - Continued

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 752 | 22311 | | 16.56777700 | 16.0 | 34.0 | 4.0 | -35.18527700 | -35.0 | 11.0 | 7.0 | 4.30 | 0 | | SCO |
| 753 | 22332 | | 16.58713800 | 16.0 | 35.0 | 13.7 | -10.49777760 | -10.0 | 29.0 | 52.0 | 2.70 | 13 | Z | OPH |
| 754 | 22370 | | 16.63386100 | 16.0 | 38.0 | 1.9 | -77.44777700 | -77.0 | 26.0 | 52.0 | 4.16 | 0 | B | APS |
| 755 | 22464 | | 16.66608300 | 16.0 | 39.0 | 57.9 | 31.66500000 | 31.0 | 39.0 | 54.0 | 3.00 | 40 | Z | HER |
| 756 | 22502 | | 16.69491600 | 16.0 | 41.0 | 41.7 | 38.98777700 | 38.0 | 59.0 | 16.0 | 3.61 | 44 | H | HER |
| 757 | 22558 | ATRIA | 16.74902700 | 16.0 | 44.0 | 56.5 | -68.96611000 | -68.0 | 57.0 | 58.0 | 1.86 | 0 | A | TRA |
| 758 | 22606 | | 16.77922200 | 16.0 | 46.0 | 45.2 | -58.98138800 | -58.0 | 58.0 | 53.0 | 3.68 | 0 | H | ARA |
| 759 | 22640 | | 16.79819400 | 16.0 | 47.0 | 53.5 | -34.23138900 | -34.0 | 13.0 | 53.0 | 2.36 | 26 | E | SCO |
| 760 | 22643 | | 16.79825000 | 16.0 | 47.0 | 53.7 | -10.72277770 | -10.0 | 43.0 | 22.0 | 4.73 | 20 | | OPH |
| 761 | 22749 | | 16.82477700 | 16.0 | 49.0 | 29.2 | 82.09750000 | 82.0 | 5.0 | 51.0 | 4.40 | 22 | E | UMI |
| 762 | 22677 | | 16.82491600 | 16.0 | 49.0 | 29.7 | -37.96916600 | -37.0 | 59.0 | 21.0 | 3.09 | 0 | M | SCO |
| 763 | 22691 | | 16.83266600 | 16.0 | 49.0 | 57.6 | -37.95972200 | -37.0 | 57.0 | 35.0 | 3.69 | 0 | M | SCO |
| 764 | 22751 | GRAFIAS | 16.86858300 | 16.0 | 52.0 | 6.9 | -42.30333300 | -42.0 | 18.0 | 12.0 | 3.75 | 0 | Z | SCO |
| 765 | 22775 | | 16.87249900 | 16.0 | 52.0 | 21.0 | 10.22166650 | 10.0 | 13.0 | 18.0 | 4.29 | 25 | I | OPH |
| 766 | 22845 | | 16.92858300 | 16.0 | 55.0 | 42.9 | -55.93694400 | -55.0 | 56.0 | 13.0 | 3.06 | 0 | Z | ARA |
| 767 | 22862 | | 16.93349900 | 16.0 | 56.0 | .6 | 9.42805550 | 9.0 | 25.0 | 41.0 | 3.42 | 27 | K | OPH |
| 768 | 22869 | | 16.94644400 | 16.0 | 56.0 | 47.2 | -53.10888800 | -53.0 | 6.0 | 32.0 | 4.15 | 0 | E | ARA |
| 769 | 22935 | | 16.98247200 | 16.0 | 58.0 | 56.9 | 30.97666600 | 30.0 | 58.0 | 36.0 | 3.92 | 58 | E | HER |
| 770 | 23158 | SABIK | 17.13947100 | 17.0 | 8.0 | 22.1 | -15.68333330 | -15.0 | 41.0 | .0 | 2.63 | 35 | H | OPH |
| 771 | 23182 | NODUS I | 17.14469300 | 17.0 | 8.0 | 40.9 | 65.75750000 | 65.0 | 45.0 | 27.0 | 3.22 | 22 | Z | DRA |
| 772 | 23180 | | 17.16069400 | 17.0 | 9.0 | 38.5 | -43.19500000 | -43.0 | 11.0 | 42.0 | 3.44 | 0 | H | SCO |
| 773 | 23277 | RAS-ALGETHI | 17.21749900 | 17.0 | 13.0 | 3.0 | 14.42888890 | 14.0 | 25.0 | 44.0 | 3.50 | 64 | A | HER |
| 774 | 23294 | SARIN | 17.22652700 | 17.0 | 13.0 | 35.5 | 24.87916600 | 24.0 | 52.0 | 45.0 | 3.16 | 65 | D | HER |
| 775 | 23302 | | 17.23044400 | 17.0 | 13.0 | 49.6 | 36.84750000 | 36.0 | 50.0 | 51.0 | 3.36 | 67 | P | HER |
| 776 | 23359 | | 17.26719400 | 17.0 | 16.0 | 1.9 | 33.13666600 | 33.0 | 8.0 | 12.0 | 4.00V | 68 | | HER |
| 777 | 23392 | | 17.30538800 | 17.0 | 18.0 | 19.4 | -67.73666500 | -67.0 | 44.0 | 12.0 | 4.74 | 0 | Z | APS |
| 778 | 23424 | | 17.31427800 | 17.0 | 18.0 | 51.4 | -12.81305550 | -12.0 | 48.0 | 47.0 | 4.35 | 53 | N | SER |
| 779 | 23423 | | 17.31505500 | 17.0 | 18.0 | 54.2 | -21.07694400 | -21.0 | 4.0 | 37.0 | 4.46 | 40 | C | OPH |
| 780 | 23451 | | 17.33094400 | 17.0 | 19.0 | 51.4 | -24.96638800 | -24.0 | 57.0 | 59.0 | 3.37 | 42 | J | OPH |
| 781 | 23515 | | 17.37308300 | 17.0 | 22.0 | 23.1 | -55.49916600 | -55.0 | 29.0 | 57.0 | 2.80 | 0 | B | ARA |
| 782 | 23517 | | 17.37402700 | 17.0 | 22.0 | 26.5 | -56.34694400 | -56.0 | 20.0 | 49.0 | 3.51 | 0 | G | ARA |
| 783 | 23544 | | 17.37455500 | 17.0 | 22.0 | 28.4 | 37.17694400 | 37.0 | 10.0 | 37.0 | 4.52 | 0 | R | HER |
| 784 | 23597 | | 17.40383300 | 17.0 | 24.0 | 13.8 | -24.14500000 | -24.0 | 8.0 | 42.0 | 4.28 | 44 | | OPH |
| 785 | 23617 | | 17.41286100 | 17.0 | 24.0 | 46.3 | -5.05722220 | -5.0 | 3.0 | 26.0 | 4.61 | 27 | | OPH |
| 786 | 23621 | | 17.41294300 | 17.0 | 24.0 | 46.6 | 4.16916660 | 4.0 | 10.0 | 9.0 | 4.44 | 49 | S | OPH |
| 787 | 23627 | | 17.41861000 | 17.0 | 25.0 | 7.0 | -29.83722200 | -29.0 | 50.0 | 14.0 | 4.37 | 45 | | OPH |
| 788 | 23681 | | 17.46555500 | 17.0 | 27.0 | 56.0 | -60.65694400 | -60.0 | 39.0 | 25.0 | 3.79 | 0 | D | ARA |
| 789 | 23693 | | 17.47302700 | 17.0 | 28.0 | 22.9 | -37.27000000 | -37.0 | 16.0 | 12.0 | 2.80 | 34 | U | SCO |
| 790 | 23708 | | 17.48552700 | 17.0 | 29.0 | 7.9 | -49.85055500 | -49.0 | 51.0 | 2.0 | 2.97 | 0 | A | ARA |
| 791 | 23726 | MAASYM | 17.48869400 | 17.0 | 29.0 | 19.3 | 26.13583300 | 26.0 | 8.0 | 9.0 | 4.48 | 76 | L | HER |
| 792 | 23741 | ALWAID | 17.49399900 | 17.0 | 29.0 | 38.4 | 52.32638900 | 52.0 | 19.0 | 35.0 | 2.99 | 23 | B | DRA |
| 793 | 23769 | SHAULA | 17.52049900 | 17.0 | 31.0 | 13.8 | -37.08027700 | -37.0 | 4.0 | 49.0 | 1.71 | 35 | L | SCO |
| 794 | 23815 | | 17.55083300 | 17.0 | 33.0 | 3.0 | -46.48361100 | -46.0 | 29.0 | 1.0 | 4.63 | 0 | S | ARA |
| 795 | 23837 | RAS-ALHAGUE | 17.55513800 | 17.0 | 33.0 | 18.5 | 12.58416670 | 12.0 | 35.0 | 3.0 | 2.14 | 55 | A | OPH |
| 796 | 23846 | | 17.56888900 | 17.0 | 34.0 | 8.0 | -38.61249900 | -38.0 | 36.0 | 45.0 | 4.34 | 0 | | SCO |
| 797 | 23857 | | 17.58000000 | 17.0 | 34.0 | 48.0 | -42.97750000 | -42.0 | 58.0 | 39.0 | 2.09 | 0 | J | SCO |
| 798 | 23881 | | 17.59299900 | 17.0 | 35.0 | 34.8 | -15.37833320 | -15.0 | 22.0 | 42.0 | 3.64 | 55 | C | SER |
| 799 | 23889 | | 17.59899900 | 17.0 | 35.0 | 56.4 | -8.09916670 | -8.0 | 5.0 | 57.0 | 4.65 | 57 | M | OPH |
| 800 | 23965 | | 17.64124900 | 17.0 | 38.0 | 28.5 | 46.02416600 | 46.0 | 1.0 | 27.0 | 3.79 | 85 | I | HER |
| 801 | 23978 | | 17.65741600 | 17.0 | 39.0 | 26.7 | -12.85833330 | -12.0 | 51.0 | 30.0 | 4.39 | 56 | O | SER |
| 802 | 23988 | | 17.66772200 | 17.0 | 40.0 | 3.8 | -39.01388900 | -39.0 | .0 | 50.0 | 2.51 | 0 | K | SCO |
| 803 | 24048 | KELB-ALRAI | 17.69569400 | 17.0 | 41.0 | 44.5 | 4.58027770 | 4.0 | 34.0 | 49.0 | 2.94 | 60 | B | OPH |
| 804 | 24044 | | 17.70488800 | 17.0 | 42.0 | 17.6 | -64.70972200 | -64.0 | 42.0 | 35.0 | 3.56 | 0 | H | PAV |
| 805 | 24236 | PHERKARD | YILDUN 17.72425000 | 17.0 | 43.0 | 27.3 | 86.60472200 | 86.0 | 36.0 | 17.0 | 4.44 | 23 | D | UMI |
| 806 | 24138 | | 17.75144300 | 17.0 | 45.0 | 5.2 | 27.73999900 | 27.0 | 44.0 | 24.0 | 3.48 | 66 | H | HER |
| 807 | 24125 | | 17.75225000 | 17.0 | 45.0 | 8.1 | -40.11527700 | -40.0 | 6.0 | 55.0 | 3.14 | 0 | I | SCO |
| 808 | 24135 | | 17.75591600 | 17.0 | 45.0 | 21.3 | -27.81916600 | -27.0 | 49.0 | 9.0 | 4.00V | 3 | | SGR |
| 809 | 24162 | | 17.76894400 | 17.0 | 46.0 | 8.2 | 2.71888890 | 2.0 | 43.0 | 8.0 | 3.74 | 62 | G | OPH |

TABLE I. - STAR IDENTIFICATION CATALOGUE - Continued

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 810 | 24188 | | | 17.79125000 | 17.0 | 47.0 | 28.5 | -37.03416600 | -37.0 | 2.0 | 3.0 | 3.55 | 0 | | SCO |
| 811 | 24364 | GRUMIUM | | 17.88202700 | 17.0 | 52.0 | 55.3 | 56.67749900 | 56.0 | 52.0 | 39.0 | 3.90 | 32 | C | DRA |
| 812 | 24415 | | | 17.91752700 | 17.0 | 55.0 | 3.1 | 37.25416700 | 37.0 | 15.0 | 15.0 | 3.99 | 91 | J | HER |
| 813 | 24432 | ELTANIN | RASTABAN | 17.92986000 | 17.0 | 55.0 | 47.5 | 51.49222200 | 51.0 | 29.0 | 32.0 | 2.42 | 33 | G | DRA ETAMIN |
| 814 | 24448 | | | 17.94005500 | 17.0 | 56.0 | 24.2 | 29.25055500 | 29.0 | 15.0 | 2.0 | 3.82 | 92 | C | HER |
| 815 | 24468 | | | 17.95163800 | 17.0 | 57.0 | 5.9 | -9.77083330 | -9.0 | 46.0 | 15.0 | 3.50 | 64 | N | OPH |
| 816 | 24478 | | | 17.95269400 | 17.0 | 57.0 | 9.7 | 30.19111100 | 30.0 | 11.0 | 28.0 | 4.48 | 94 | N | HER |
| 817 | 24502 | | | 17.97494400 | 17.0 | 58.0 | 29.8 | 16.75166600 | 16.0 | 45.0 | 6.0 | 4.71 | 93 | | HER |
| 818 | 24503 | | | 17.97719400 | 17.0 | 58.0 | 37.9 | -3.66944440 | -3.0 | 41.0 | 22.0 | 4.60 | 57 | Z | SER |
| 819 | 24509 | | | 17.98149900 | 17.0 | 58.0 | 53.4 | 2.93166660 | 2.0 | 55.0 | 54.0 | 3.92 | 67 | | OPH |
| 820 | 24534 | | | 17.99961000 | 17.0 | 59.0 | 58.6 | 1.30444443 | 1.0 | 18.0 | 16.0 | 4.44 | 68 | | OPH |
| 821 | 24605 | | | 18.04638800 | 18.0 | 2.0 | 47.0 | -29.58333300 | -29.0 | 35.0 | .0 | 4.00V | 0 | | SGR |
| 822 | 24632 | NASH | NUSHABA | 18.05930500 | 18.0 | 3.0 | 33.5 | -30.42638800 | -30.0 | 25.0 | 35.0 | 3.07 | 10 | G | SGR |
| 823 | 24641 | | | 18.06141600 | 18.0 | 3.0 | 41.1 | 2.50611100 | 2.0 | 30.0 | 22.0 | 4.07 | 70 | | OPH |
| 824 | 24635 | | | 18.06508300 | 18.0 | 3.0 | 54.3 | -50.09611000 | -50.0 | 5.0 | 46.0 | 3.90 | 0 | J | ARA |
| 825 | 24665 | | | 18.08680500 | 18.0 | 5.0 | 12.5 | -63.67249900 | -63.0 | 40.0 | 21.0 | 4.44 | 0 | P | PAV |
| 826 | 24693 | | | 18.09383300 | 18.0 | 5.0 | 37.8 | 8.72805550 | 8.0 | 43.0 | 41.0 | 4.73 | 71 | | OPH |
| 827 | 24695 | | | 18.09480500 | 18.0 | 5.0 | 41.3 | 9.55749990 | 9.0 | 33.0 | 27.0 | 3.73 | 72 | | OPH |
| 828 | 24694 | | | 18.09774900 | 18.0 | 5.0 | 51.9 | -28.46277700 | -28.0 | 27.0 | 46.0 | 4.66 | 0 | | SGR |
| 829 | 24711 | | | 18.10291600 | 18.0 | 6.0 | 10.5 | 28.75638800 | 28.0 | 45.0 | 23.0 | 3.83 | 103 | O | HER |
| 830 | 24740 | | | 18.12100000 | 18.0 | 7.0 | 15.6 | 20.80777700 | 20.0 | 48.0 | 28.0 | 4.32 | 102 | | HER |
| 831 | 24767 | | | 18.14383300 | 18.0 | 8.0 | 37.8 | -45.96249900 | -45.0 | 57.0 | 45.0 | 4.60 | 0 | E | TEL |
| 832 | 24856 | | | 18.19447100 | 18.0 | 11.0 | 40.1 | -21.06972200 | -21.0 | 4.0 | 11.0 | 4.00V | 13 | M | SGR |
| 833 | 24944 | | | 18.25427700 | 18.0 | 15.0 | 15.4 | -36.77416600 | -36.0 | 46.0 | 27.0 | 3.16 | 0 | H | SGR |
| 834 | 24961 | | | 18.26436000 | 18.0 | 15.0 | 51.7 | -27.05694400 | -27.0 | 3.0 | 25.0 | 4.69 | 0 | | SGR |
| 835 | 25032 | | | 18.31055500 | 18.0 | 18.0 | 38.0 | 36.04777800 | 36.0 | 2.0 | 52.0 | 4.34 | 1 | K | LYR |
| 836 | 25024 | KAUS-MEDIUS | | 18.31255500 | 18.0 | 18.0 | 45.2 | -29.84499900 | -29.0 | 50.0 | 42.0 | 2.64 | 0 | D | SGR |
| 837 | 25046 | | | 18.32494400 | 18.0 | 19.0 | 29.8 | -2.90944440 | -2.0 | 54.0 | 34.0 | 3.42 | 58 | M | SER |
| 838 | 25045 | | | 18.33336100 | 18.0 | 20.0 | .1 | -61.51222100 | -61.0 | 30.0 | 44.0 | 4.25 | 0 | C | PAV |
| 839 | 25114 | | | 18.35433200 | 18.0 | 21.0 | 15.6 | 71.31944400 | 71.0 | 19.0 | 10.0 | 4.24 | 43 | V | DRA |
| 840 | 25122 | | | 18.36147200 | 18.0 | 21.0 | 41.3 | 72.71805500 | 72.0 | 43.0 | 5.0 | 3.69 | 44 | X | DRA |
| 841 | 25100 | KAUS AUSTR. | | 18.36413800 | 18.0 | 21.0 | 50.9 | -34.40305500 | -34.0 | 24.0 | 11.0 | 1.95 | 20 | E | SGR |
| 842 | 25116 | | | 18.37008300 | 18.0 | 22.0 | 12.3 | 21.75250000 | 21.0 | 45.0 | 9.0 | 3.92 | 109 | | HER |
| 843 | 25154 | | | 18.40630500 | 18.0 | 24.0 | 22.7 | -45.98972100 | -45.0 | 59.0 | 23.0 | 3.76 | 0 | A | TEL |
| 844 | 25180 | KAUS-BOR. | | 18.43016600 | 18.0 | 25.0 | 48.6 | -25.44277800 | -25.0 | 26.0 | 34.0 | 2.94 | 22 | L | SGR |
| 845 | 25183 | | | 18.43558300 | 18.0 | 26.0 | 8.1 | -49.09194400 | -49.0 | 5.0 | 31.0 | 4.14 | 0 | Z | TEL |
| 846 | 25220 | | | 18.45336000 | 18.0 | 27.0 | 12.1 | -14.58972220 | -14.0 | 35.0 | 23.0 | 4.73 | 0 | G | SCT |
| 847 | 25313 | | | 18.51672200 | 18.0 | 31.0 | .2 | -42.33972200 | -42.0 | 20.0 | 23.0 | 4.69 | 0 | J | CRA |
| 848 | 25385 | | | 18.55502700 | 18.0 | 33.0 | 18.1 | -8.27000000 | -8.0 | 16.0 | 12.0 | 4.06 | 0 | A | SCT |
| 849 | 25466 | VEGA | | 18.59586100 | 18.0 | 35.0 | 45.1 | 38.75000000 | 38.0 | 45.0 | .0 | .14 | 3 | A | LYR |
| 850 | 25522 | | | 18.64925000 | 18.0 | 38.0 | 57.3 | -71.46138800 | -71.0 | 27.0 | 41.0 | 4.10 | 0 | Z | PAV |
| 851 | 25580 | | | 18.67261000 | 18.0 | 40.0 | 21.4 | -9.08750000 | -9.0 | 5.0 | 15.0 | 4.70V | 0 | D | SCT |
| 852 | 25668 | | | 18.72033300 | 18.0 | 43.0 | 13.2 | 39.57527700 | 39.0 | 34.0 | 31.0 | 4.50 | 5 | E | LYR |
| 853 | 25661 | | | 18.72450000 | 18.0 | 43.0 | 28.2 | -27.02861100 | -27.0 | 1.0 | 43.0 | 3.30 | 27 | V | SAG |
| 854 | 25676 | | | 18.72608300 | 18.0 | 43.0 | 33.9 | 37.56749900 | 37.0 | 34.0 | 3.0 | 4.29 | 6 | Z | LYR |
| 855 | 25698 | | | 18.73588800 | 18.0 | 44.0 | 9.2 | 20.51166600 | 20.0 | 30.0 | 42.0 | 4.26 | 110 | | HER |
| 856 | 25730 | | | 18.75527700 | 18.0 | 45.0 | 19.0 | -4.78694440 | -4.0 | 47.0 | 13.0 | 4.47 | 0 | B | SCT |
| 857 | 25734 | | | 18.75788800 | 18.0 | 45.0 | 28.4 | 18.19111000 | 18.0 | 6.0 | 28.0 | 4.37 | 111 | | HER |
| 858 | 25735 | | | 18.76022100 | 18.0 | 45.0 | 36.8 | -5.74416660 | -6.0 | 44.0 | 39.0 | 4.00V | 0 | | SCT |
| 859 | 25847 | SHELIAK | | 18.81311000 | 18.0 | 48.0 | 47.2 | 33.32083300 | 33.0 | 19.0 | 15.0 | 3.38 | 10 | B | LYR |
| 860 | 25823 | | | 18.81630500 | 18.0 | 48.0 | 58.7 | -62.23027700 | -62.0 | 13.0 | 49.0 | 4.42 | 0 | L | PAV |
| 861 | 25941 | NUNKI | | 18.88491600 | 18.0 | 53.0 | 5.7 | -26.34194400 | -26.0 | 20.0 | 31.0 | 2.14 | 34 | S | SGR |
| 862 | 25954 | | | 18.88780500 | 18.0 | 53.0 | 16.1 | 22.59944400 | 22.0 | 35.0 | 58.0 | 4.56 | 113 | | HER |
| 863 | 25959 | | | 18.88797100 | 18.0 | 53.0 | 16.7 | 36.85333300 | 36.0 | 51.0 | 12.0 | 4.50V | 12 | D | LYR |
| 864 | 25930 | | | 18.88916600 | 18.0 | 53.0 | 21.0 | -67.28027700 | -67.0 | 16.0 | 49.0 | 4.00V | 0 | K | PAV |
| 865 | 25996 | | | 18.90447100 | 18.0 | 54.0 | 16.1 | 43.89888800 | 43.0 | 53.0 | 56.0 | 4.00V | 13 | | LYR |
| 866 | 25991 | ALYA | | 18.90797200 | 18.0 | 54.0 | 28.7 | 4.15666660 | 4.0 | 9.0 | 24.0 | 4.50 | 63 | J | SER |
| 867 | 26019 | | | 18.92736000 | 18.0 | 55.0 | 38.5 | -21.15444400 | -21.0 | 9.0 | 16.0 | 3.61 | 37 | C | SGR |

TABLE I. - STAR IDENTIFICATION CATALOGUE - Continued

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 868 | 26086 | SULAPHAT | | 18.96055500 | 18.0 | 57.0 | 38.0 | 32.64027700 | 32.0 | 38.0 | 25.0 | 3.30 | 14 | G | LYR |
| 869 | 26091 | | | 18.96722200 | 18.0 | 58.0 | 2.0 | 15.01944440 | 15.0 | 1.0 | 10.0 | 4.21 | 13 | E | AQL |
| 870 | 26141 | | | 18.99683300 | 18.0 | 59.0 | 48.6 | -5.78972220 | -5.0 | 47.0 | 23.0 | 4.15 | 12 | | AQL |
| 871 | 26161 | ASCELLA | | 19.00641600 | 19.0 | .0 | 23.1 | -29.93194400 | -29.0 | 55.0 | 55.0 | 2.71 | 38 | Z | SGR |
| 872 | 26224 | | | 19.04308300 | 19.0 | 2.0 | 35.1 | -21.79444400 | -21.0 | 47.0 | 40.0 | 3.90 | 39 | O | SGR |
| 873 | 26270 | | | 19.06333300 | 19.0 | 3.0 | 48.0 | 13.81000000 | 13.0 | 48.0 | 36.0 | 3.02 | 17 | Z | AQL |
| 874 | 26263 | | | 19.06755500 | 19.0 | 4.0 | 3.2 | -37.11527700 | -37.0 | 6.0 | 55.0 | 4.26 | 0 | G | CRA |
| 875 | 26285 | | | 19.07316600 | 19.0 | 4.0 | 23.4 | -4.93638880 | -4.0 | 56.0 | 11.0 | 3.55 | 16 | L | AQL |
| 876 | 26291 | | | 19.07924900 | 19.0 | 4.0 | 45.3 | -27.72333200 | -27.0 | 43.0 | 24.0 | 3.42 | 40 | T | SGR |
| 877 | 26322 | | | 19.09855500 | 19.0 | 5.0 | 54.8 | -40.55277800 | -40.0 | 33.0 | 10.0 | 4.66 | 0 | O | CRA |
| 878 | 26360 | | | 19.11822200 | 19.0 | 7.0 | 5.6 | -37.96083300 | -37.0 | 57.0 | 39.0 | 4.12 | 0 | A | CRA |
| 879 | 26380 | | | 19.12702700 | 19.0 | 7.0 | 37.3 | -39.39833300 | -39.0 | 23.0 | 54.0 | 4.16 | 0 | B | CRA |
| 880 | 26386 | | | 19.12802700 | 19.0 | 7.0 | 40.9 | -21.08083300 | -21.0 | 4.0 | 51.0 | 3.02 | 41 | P | SGR |
| 881 | 26520 | NODUS I | ALDIB | 19.20916600 | 19.0 | 12.0 | 33.0 | 67.59999900 | 67.0 | 36.0 | .0 | 3.24 | 57 | O | DRA |
| 882 | 26507 | | | 19.20941600 | 19.0 | 12.0 | 33.9 | 39.08472100 | 39.0 | 5.0 | 5.0 | 4.45 | 20 | H | LYR |
| 883 | 26569 | | | 19.24516600 | 19.0 | 14.0 | 42.6 | 21.32749900 | 21.0 | 19.0 | 39.0 | 4.60 | 1 | | VUL |
| 884 | 26585 | | | 19.25252700 | 19.0 | 15.0 | 9.1 | 38.07027700 | 38.0 | 4.0 | 13.0 | 4.46 | 21 | J | LYR |
| 885 | 26638 | | | 19.27058200 | 19.0 | 16.0 | 14.1 | 73.29111100 | 73.0 | 17.0 | 28.0 | 4.63 | 60 | T | DRA |
| 886 | 26621 | | | 19.27155500 | 19.0 | 16.0 | 17.6 | 53.30333300 | 53.0 | 18.0 | 12.0 | 3.98 | 1 | K | CYG |
| 887 | 26694 | | | 19.32738900 | 19.0 | 19.0 | 38.6 | -17.91972200 | -17.0 | 54.0 | 53.0 | 3.95 | 44 | R | SGR |
| 888 | 26697 | | | 19.32869400 | 19.0 | 19.0 | 43.3 | -16.02222200 | -16.0 | 1.0 | 20.0 | 4.58 | 46 | U | SGR |
| 889 | 26703 | ARKAB-PRIOR | | 19.33538800 | 19.0 | 20.0 | 7.4 | -44.52666600 | -44.0 | 31.0 | 36.0 | 4.24 | 0 | B | SGR |
| 890 | 26735 | | | 19.34152700 | 19.0 | 20.0 | 29.5 | 65.64694300 | 65.0 | 38.0 | 49.0 | 4.63 | 58 | P | DRA |
| 891 | 26718 | ARKAB-POSTERIOR | | 19.34488900 | 19.0 | 20.0 | 41.6 | -44.86749900 | -44.0 | 52.0 | 3.0 | 4.51 | 0 | B | SGR |
| 892 | 26737 | ALRAMI | RUKBAT | 19.35772200 | 19.0 | 21.0 | 27.8 | -40.66361100 | -40.0 | 41.0 | 1.0 | 4.11 | 0 | A | SGR |
| 893 | 26816 | DENEB OKAB | | 19.39555500 | 19.0 | 23.0 | 44.0 | 3.04361110 | 3.0 | 2.0 | 37.0 | 3.44 | 30 | O | AQL |
| 894 | 26904 | | | 19.45413800 | 19.0 | 27.0 | 14.9 | 24.59277700 | 24.0 | 35.0 | 34.0 | 4.63 | 6 | A | VUL |
| 895 | 26947 | | | 19.48038900 | 19.0 | 28.0 | 49.4 | 51.65444400 | 51.0 | 39.0 | 16.0 | 3.94 | 10 | I | CYG |
| 896 | 26953 | ALBIREO | | 19.48847200 | 19.0 | 29.0 | 18.5 | 27.88500000 | 27.0 | 53.0 | 6.0 | 3.24 | 6 | B | CYG |
| 897 | 27030 | | | 19.53963900 | 19.0 | 32.0 | 22.7 | 7.30333330 | 7.0 | 18.0 | 12.0 | 4.65 | 38 | M | AQL |
| 898 | 27089 | | | 19.57630500 | 19.0 | 34.0 | 34.7 | -24.96250000 | -24.0 | 57.0 | 45.0 | 4.66 | 52 | | SGR |
| 899 | 27103 | | | 19.58183300 | 19.0 | 34.0 | 54.6 | -1.36555554 | -1.0 | 21.0 | 56.0 | 4.28 | 41 | I | AQL |
| 900 | 27141 | | | 19.59169400 | 19.0 | 35.0 | 30.1 | 50.13916600 | 50.0 | 8.0 | 21.0 | 4.64 | 13 | J | CYG |
| 901 | 27215 | SHAM | | 19.64216600 | 19.0 | 38.0 | 31.8 | 17.93194400 | 17.0 | 55.0 | 55.0 | 4.37 | 5 | A | SGE |
| 902 | 27236 | | | 19.65791600 | 19.0 | 39.0 | 28.5 | 17.39361100 | 17.0 | 23.0 | 37.0 | 4.45 | 6 | B | SGE |
| 903 | 27347 | | | 19.73130500 | 19.0 | 43.0 | 52.7 | 45.04444400 | 45.0 | 2.0 | 40.0 | 2.97 | 18 | D | CYG |
| 904 | 27354 | REDA | TARAZED | 19.74325000 | 19.0 | 44.0 | 35.7 | 10.52666650 | 10.0 | 31.0 | 36.0 | 2.80 | 50 | G | AQL |
| 905 | 27391 | | | 19.76377700 | 19.0 | 45.0 | 49.6 | 18.44666600 | 18.0 | 26.0 | 48.0 | 3.78 | 7 | D | SGE |
| 906 | 27471 | TYL | | 19.80499900 | 19.0 | 48.0 | 18.0 | 70.17888800 | 70.0 | 10.0 | 44.0 | 3.99 | 63 | E | DRA |
| 907 | 27470 | ALTAIR | | 19.81791600 | 19.0 | 49.0 | 4.5 | 8.77444440 | 8.0 | 46.0 | 28.0 | .89 | 53 | A | AQL |
| 908 | 27481 | | | 19.82030500 | 19.0 | 49.0 | 13.1 | 32.82444400 | 32.0 | 49.0 | 28.0 | 4.00V | 0 | X | CYG |
| 909 | 27517 | | | 19.84483300 | 19.0 | 50.0 | 41.4 | .91444443 | .0 | 54.0 | 52.0 | 3.00V | 55 | H | AQL |
| 910 | 27544 | | | 19.86619400 | 19.0 | 51.0 | 58.3 | 23.98722200 | 23.0 | 59.0 | 14.0 | 4.50 | 13 | | VUL |
| 911 | 27557 | | | 19.88083300 | 19.0 | 52.0 | 51.0 | -41.96194400 | -41.0 | 57.0 | 43.0 | 4.21 | 0 | I | SGR |
| 912 | 27587 | ALSHAIN | | 19.89322200 | 19.0 | 53.0 | 35.6 | 6.31805550 | 6.0 | 19.0 | 5.0 | 3.90 | 60 | B | AQL |
| 913 | 27605 | | | 19.91336000 | 19.0 | 54.0 | 48.1 | -27.26416600 | -27.0 | 15.0 | 51.0 | 4.62 | 59 | | SGR |
| 914 | 27622 | | | 19.91652700 | 19.0 | 54.0 | 59.5 | 34.98944400 | 34.0 | 59.0 | 22.0 | 4.03 | 21 | H | CYG |
| 915 | 27631 | | | 19.94291600 | 19.0 | 56.0 | 34.5 | -73.00583300 | -73.0 | .0 | 21.0 | 4.10 | 0 | E | PAV |
| 916 | 27672 | | | 19.95330500 | 19.0 | 57.0 | 11.9 | 19.39583300 | 19.0 | 23.0 | 45.0 | 3.71 | 12 | G | SGE |
| 917 | 27670 | | | 19.95769400 | 19.0 | 57.0 | 27.7 | -35.37277700 | -35.0 | 22.0 | 22.0 | 4.39 | 0 | J | SGR |
| 918 | 27753 | | | 19.99430500 | 19.0 | 59.0 | 39.5 | 27.65583300 | 27.0 | 39.0 | 21.0 | 4.74 | 15 | | VUL |
| 919 | 27763 | | | 20.00847200 | 20.0 | .0 | 30.5 | -27.60861000 | -27.0 | 48.0 | 31.0 | 4.60 | 62 | | SGR |
| 920 | 27856 | | | 20.04441600 | 20.0 | 2.0 | 39.9 | 67.77361100 | 67.0 | 46.0 | 25.0 | 4.66 | 67 | R | DRA |
| 921 | 27886 | | | 20.08847100 | 20.0 | 5.0 | 18.5 | -66.27361100 | -66.0 | 16.0 | 25.0 | 3.69 | 0 | D | PAV |
| 922 | 28010 | | | 20.15830500 | 20.0 | 9.0 | 29.9 | -.92666665 | .0 | 55.0 | 36.0 | 3.37 | 65 | J | AQL |
| 923 | 28066 | | | 20.16836000 | 20.0 | 10.0 | 6.1 | 77.60694400 | 77.0 | 36.0 | 25.0 | 4.40 | 1 | K | CEP |
| 924 | 28099 | | | 20.20880500 | 20.0 | 12.0 | 31.7 | 46.63444400 | 46.0 | 38.0 | 4.0 | 3.95 | 31 | Q | CYG |
| 925 | 28108 | | | 20.20974900 | 20.0 | 12.0 | 35.1 | 56.45999900 | 56.0 | 27.0 | 36.0 | 4.32 | 33 | | CYG |

TABLE I. - STAR IDENTIFICATION CATALOGUE - Continued

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 926 | 28152 | | 20.23861000 | 20.0 | 14.0 | 19.0 | 27.70583300 | 27.0 | 42.0 | 21.0 | 4.73 | 23 | | VUL |
| 927 | 28160 | | 20.23980500 | 20.0 | 14.0 | 23.3 | 47.60611100 | 47.0 | 36.0 | 22.0 | 4.16 | 32 | O | CYG |
| 928 | 28189 | | 20.26180500 | 20.0 | 15.0 | 42.5 | -12.61777770 | -12.0 | 37.0 | 4.0 | 4.55 | 5 | A | CAP |
| 929 | 28200 | GRECI | 20.26855500 | 20.0 | 16.0 | 6.8 | -12.65472200 | -12.0 | 39.0 | 17.0 | 3.77 | 6 | A | CAP |
| 930 | 28295 | DABIH | 20.31741600 | 20.0 | 19.0 | 2.7 | -14.89333330 | -14.0 | 53.0 | 36.0 | 3.25 | 9 | B | CAP |
| 931 | 28338 | SADOR | 20.34950000 | 20.0 | 20.0 | 58.2 | 40.14388800 | 40.0 | 8.0 | 38.0 | 2.32 | 37 | G | CYG |
| 932 | 28378 | | 20.37433300 | 20.0 | 22.0 | 27.6 | 32.07611100 | 32.0 | 4.0 | 34.0 | 4.60 | 39 | | CYG |
| 933 | 28374 | PEACOCK | 20.38147200 | 20.0 | 22.0 | 53.3 | -56.84916600 | -56.0 | 50.0 | 57.0 | 2.12 | 0 | A | PAV |
| 934 | 28513 | | 20.46605500 | 20.0 | 27.0 | 57.8 | 30.25083300 | 30.0 | 15.0 | 3.0 | 4.09 | 41 | | CYG |
| 935 | 28541 | | 20.48327700 | 20.0 | 28.0 | 59.8 | 62.87611100 | 62.0 | 52.0 | 34.0 | 4.28 | 2 | J | CEP |
| 936 | 28593 | | 20.52566600 | 20.0 | 31.0 | 32.4 | 11.18305550 | 11.0 | 10.0 | 59.0 | 3.98 | 2 | E | DEL |
| 937 | 28659 | | 20.56119400 | 20.0 | 33.0 | 40.3 | 14.55249990 | 14.0 | 33.0 | 9.0 | 4.69 | 4 | Z | DEL |
| 938 | 28682 | | 20.58519400 | 20.0 | 35.0 | 6.7 | -47.41499900 | -47.0 | 24.0 | 54.0 | 3.21 | 0 | A | IND |
| 939 | 28709 | ROTANEV | 20.59844400 | 20.0 | 35.0 | 54.4 | 14.47222220 | 14.0 | 28.0 | 20.0 | 3.72 | 6 | B | DEL |
| 940 | 28725 | | 20.60883300 | 20.0 | 36.0 | 31.8 | -1.22861110 | -1.0 | 13.0 | 43.0 | 4.51 | 71 | | AQL |
| 941 | 28780 | SVALOCIN | 20.63352700 | 20.0 | 38.0 | .7 | 15.78749980 | 15.0 | 47.0 | 15.0 | 3.86 | 9 | A | DEL |
| 942 | 28846 | DENEB CYGNI | 20.67061100 | 20.0 | 40.0 | 14.2 | 45.15444400 | 45.0 | 9.0 | 16.0 | 1.33 | 50 | A | CYG ANIDED |
| 943 | 28860 | | 20.69127700 | 20.0 | 41.0 | 28.6 | -52.04749900 | -52.0 | 2.0 | 51.0 | 4.70 | 0 | H | IND |
| 944 | 28873 | | 20.69705500 | 20.0 | 41.0 | 49.4 | 14.94777770 | 14.0 | 56.0 | 52.0 | 4.53 | 11 | D | DEL |
| 945 | 28862 | | 20.69708300 | 20.0 | 41.0 | 49.5 | -66.33083200 | -66.0 | 19.0 | 51.0 | 3.60 | 0 | B | PAV |
| 946 | 28929 | | 20.73374900 | 20.0 | 44.0 | 1.5 | -25.39805500 | -25.0 | 23.0 | 53.0 | 4.26 | 16 | Y | CAP |
| 947 | 28942 | | 20.73691600 | 20.0 | 44.0 | 12.9 | 30.59111100 | 30.0 | 35.0 | 28.0 | 4.34 | 52 | | CYG |
| 948 | 28956 | | 20.74138800 | 20.0 | 44.0 | 29.0 | 57.45361100 | 57.0 | 27.0 | 13.0 | 4.63 | 6 | | CEP |
| 949 | 28962 | | 20.74299900 | 20.0 | 44.0 | 34.8 | 61.70250000 | 61.0 | 42.0 | 9.0 | 3.59 | 3 | H | CEP |
| 950 | 28959 | GIENAH | 20.74655500 | 20.0 | 44.0 | 47.6 | 33.83805500 | 33.0 | 50.0 | 17.0 | 2.64 | 53 | E | CYG |
| 951 | 28966 | | 20.75055500 | 20.0 | 45.0 | 2.0 | 15.99722220 | 15.0 | 59.0 | 50.0 | 4.49 | 12 | G | DEL |
| 952 | 28978 | ALBALI | 20.76302700 | 20.0 | 45.0 | 46.9 | -9.62499990 | -9.0 | 37.0 | 30.0 | 3.83 | 2 | E | AQR |
| 953 | 28979 | | 20.76483300 | 20.0 | 45.0 | 53.4 | -5.15694440 | -5.0 | 9.0 | 25.0 | 4.60 | 3 | | AQR |
| 954 | 28994 | | 20.76738800 | 20.0 | 46.0 | 2.6 | 36.36111000 | 36.0 | 21.0 | 40.0 | 4.47 | 54 | L | CYG |
| 955 | 29079 | | 20.82891600 | 20.0 | 49.0 | 44.1 | -27.05138800 | -27.0 | 3.0 | 5.0 | 4.24 | 18 | N | CAP |
| 956 | 29150 | | 20.86677700 | 20.0 | 52.0 | .4 | 44.25388800 | 44.0 | 15.0 | 14.0 | 4.68 | 57 | | CYG |
| 957 | 29133 | | 20.86813800 | 20.0 | 52.0 | 5.3 | -58.58777800 | -58.0 | 35.0 | 16.0 | 3.72 | 0 | B | IND |
| 958 | 29251 | | 20.93111100 | 20.0 | 55.0 | 52.0 | 41.03166600 | 41.0 | 1.0 | 54.0 | 4.04 | 58 | N | CYG |
| 959 | 29331 | | 20.98580500 | 20.0 | 59.0 | 8.9 | -32.39583300 | -32.0 | 23.0 | 45.0 | 4.71 | 0 | G | MIC |
| 960 | 29459 | | 21.06091600 | 21.0 | 3.0 | 39.3 | 43.78750000 | 43.0 | 47.0 | 15.0 | 3.92 | 62 | C | CYG |
| 961 | 29460 | | 21.06636100 | 21.0 | 3.0 | 58.9 | -17.37305500 | -17.0 | 22.0 | 23.0 | 4.19 | 23 | J | CAP |
| 962 | 29490 | | 21.08472100 | 21.0 | 5.0 | 5.0 | -25.14694400 | -25.0 | 8.0 | 49.0 | 4.60 | 24 | | CAP |
| 963 | 29571 | | 21.12813800 | 21.0 | 7.0 | 41.3 | -11.51444440 | -11.0 | 30.0 | 52.0 | 4.52 | 13 | N | AQR |
| 964 | 29661 | | 21.19074900 | 21.0 | 11.0 | 26.7 | 30.08250000 | 30.0 | 4.0 | 57.0 | 3.40 | 64 | Z | CYG |
| 965 | 29591 | | 21.21291600 | 21.0 | 12.0 | 46.5 | 9.86416660 | 9.0 | 51.0 | 51.0 | 4.76 | 5 | D | EQU |
| 966 | 29723 | | 21.22319300 | 21.0 | 13.0 | 23.5 | 37.89527700 | 37.0 | 53.0 | 43.0 | 3.82 | 65 | T | CYG |
| 967 | 29735 | | 21.23455500 | 21.0 | 14.0 | 4.4 | 5.10222220 | 5.0 | 6.0 | 8.0 | 4.14 | 8 | A | EQU |
| 968 | 29786 | | 21.26730500 | 21.0 | 16.0 | 2.3 | 39.24722100 | 39.0 | 14.0 | 50.0 | 4.28 | 67 | S | CYG |
| 969 | 29802 | | 21.27461100 | 21.0 | 16.0 | 28.6 | 34.74916600 | 34.0 | 44.0 | 57.0 | 4.42 | 66 | U | CYG |
| 970 | 29819 | | 21.28969400 | 21.0 | 17.0 | 22.9 | -53.59749900 | -53.0 | 35.0 | 51.0 | 4.60 | 0 | J | IND |
| 971 | 29848 | ALDERAMIN | 21.29572200 | 21.0 | 17.0 | 44.6 | 62.43694400 | 62.0 | 26.0 | 13.0 | 2.60 | 5 | A | CEP |
| 972 | 29903 | | 21.33833200 | 21.0 | 20.0 | 18.0 | -16.98472200 | -16.0 | 59.0 | 5.0 | 4.30 | 32 | I | CAP |
| 973 | 29914 | | 21.34111100 | 21.0 | 20.0 | 28.0 | 19.65388800 | 19.0 | 39.0 | 14.0 | 4.24 | 1 | | PEG |
| 974 | 29979 | | 21.39288800 | 21.0 | 23.0 | 34.4 | -65.52611100 | -65.0 | 31.0 | 34.0 | 4.30 | 0 | G | PAV |
| 975 | 30020 | | 21.41119400 | 21.0 | 24.0 | 40.3 | -22.56388800 | -22.0 | 33.0 | 50.0 | 3.86 | 34 | Z | CAP |
| 976 | 30059 | | 21.44549900 | 21.0 | 26.0 | 43.8 | -21.96055500 | -21.0 | 57.0 | 38.0 | 4.59 | 36 | | CAP |
| 977 | 30118 | ALPHIRK | 21.47024900 | 21.0 | 28.0 | 12.9 | 70.40694400 | 70.0 | 24.0 | 25.0 | 3.32 | 8 | B | CEP |
| 978 | 30137 | SADALSUD | 21.49527700 | 21.0 | 29.0 | 43.0 | -5.72611110 | -5.0 | 43.0 | 34.0 | 3.07 | 22 | B | AQR |
| 979 | 30207 | | 21.54436000 | 21.0 | 32.0 | 39.7 | 45.43638800 | 45.0 | 26.0 | 11.0 | 4.22 | 73 | R | CYG |
| 980 | 30252 | | 21.58536100 | 21.0 | 35.0 | 7.3 | -19.62388800 | -19.0 | 37.0 | 26.0 | 4.72 | 39 | E | CAP |
| 981 | 30289 | | 21.62761100 | 21.0 | 37.0 | 39.4 | -77.54722200 | -77.0 | 32.0 | 50.0 | 3.74 | 0 | N | OCT |
| 982 | 30320 | NASHIRA | 21.63588900 | 21.0 | 38.0 | 9.2 | -16.82138800 | -16.0 | 49.0 | 17.0 | 3.80 | 40 | G | CAP |
| 983 | 30440 | ERAKIS | 21.70724900 | 21.0 | 42.0 | 26.1 | 58.61888800 | 58.0 | 37.0 | 8.0 | 4.00V | 0 | M | CEP |

TABLE I. - STAR IDENTIFICATION CATALOGUE - Continued

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 984 | 30431 | ENIF | 21.70774900 | 21.0 | 42.0 | 27.9 | 9.71361100 | 9.0 | 42.0 | 49.0 | 2.54 | 0 | E | PEG | |
| 985 | 30436 | | 21.70958300 | 21.0 | 42.0 | 34.5 | 26.58384900 | 26.0 | 35.0 | 2.0 | 4.74 | 78 | M | CYG | |
| 986 | 30444 | | 21.71419300 | 21.0 | 42.0 | 51.1 | 17.18061100 | 17.0 | 11.0 | 19.0 | 4.52 | 9 | | PEG | |
| 987 | 30439 | | 21.71444400 | 21.0 | 42.0 | 52.0 | -33.18038000 | -33.0 | 11.0 | 11.0 | 4.35 | 9 | I | PSA | |
| 988 | 30450 | | 21.71763800 | 21.0 | 43.0 | 3.5 | 25.48333300 | 25.0 | 29.0 | .0 | 4.27 | 10 | K | PEG | |
| 989 | 30483 | | 21.74063800 | 21.0 | 44.0 | 26.3 | 60.95886000 | 60.0 | 57.0 | 32.0 | 4.46 | 10 | N | CEP | |
| 990 | 30491 | DENEB ALGIEDI | 21.75183300 | 21.0 | 45.0 | 6.6 | -16.28694400 | -16.0 | 17.0 | 13.0 | 2.98 | 49 | D | CAP | SCHEDI |
| 991 | 30512 | | 21.75827700 | 21.0 | 45.0 | 29.4 | 49.19694400 | 49.0 | 8.0 | 49.0 | 4.26 | 81 | P | CYG | |
| 992 | 30640 | | 21.86358300 | 21.0 | 51.0 | 48.9 | -37.53027800 | -37.0 | 31.0 | 49.0 | 3.14 | 0 | G | GRU | |
| 993 | 30720 | | 21.92580500 | 21.0 | 55.0 | 32.9 | -55.15999900 | -55.0 | 9.0 | 36.0 | 4.56 | 0 | D | IND | |
| 994 | 30817 | | 22.01158300 | 22.0 | .0 | 41.7 | -56.93111000 | -56.0 | 55.0 | 52.0 | 4.74 | 0 | E | IND | |
| 995 | 30849 | | 22.02505500 | 22.0 | 1.0 | 30.2 | -2.32499990 | -2.0 | 19.0 | 30.0 | 4.66 | 31 | O | AQR | |
| 996 | 30877 | | 22.04629900 | 22.0 | 2.0 | 46.5 | 64.45694300 | 64.0 | 27.0 | 25.0 | 4.57 | 17 | C | CEP | |
| 997 | 30896 | SADALMELEK | 22.06641600 | 22.0 | 3.0 | 59.1 | -.49055555 | .0 | 29.0 | 28.0 | 3.19 | 34 | A | AQR | |
| 998 | 30892 | | 22.06683300 | 22.0 | 4.0 | .6 | -39.71305500 | -39.0 | 42.0 | 47.0 | 4.60 | 0 | L | GRU | |
| 999 | 30914 | | 22.07580500 | 22.0 | 4.0 | 32.9 | -14.04027770 | -14.0 | 2.0 | 25.0 | 4.35 | 33 | I | AQR | |
| 1000 | 30932 | | 22.08963900 | 22.0 | 5.0 | 22.7 | 25.17333300 | 25.0 | 10.0 | 29.0 | 3.96 | 24 | I | PEG | |
| 1001 | 30942 | NAQIR ALNAIR | 22.10058300 | 22.0 | 6.0 | 2.1 | -47.13138900 | -47.0 | 7.0 | 53.0 | 2.16 | 0 | A | GRU | |
| 1002 | 30954 | | 22.10575000 | 22.0 | 6.0 | 20.7 | -33.16027700 | -33.0 | 9.0 | 37.0 | 4.62 | 34 | M | PSA | |
| 1003 | 31016 | | 22.14049900 | 22.0 | 8.0 | 25.8 | 33.00583300 | 33.0 | .0 | 21.0 | 4.36 | 29 | P | PEG | |
| 1004 | 31013 | | 22.14055500 | 22.0 | 8.0 | 26.0 | 6.02500000 | 6.0 | 1.0 | 30.0 | 3.70 | 26 | J | PEG | |
| 1005 | 31044 | | 22.16061100 | 22.0 | 9.0 | 38.2 | 58.02833300 | 58.0 | 1.0 | 42.0 | 3.62 | 21 | Z | CEP | |
| 1006 | 31104 | | 22.20622200 | 22.0 | 12.0 | 22.4 | 39.54055500 | 39.0 | 32.0 | 26.0 | 4.64 | 1 | | LAC | |
| 1007 | 31135 | | 22.22905500 | 22.0 | 13.0 | 44.6 | 56.88861100 | 56.0 | 52.0 | 7.0 | 4.23 | 23 | E | CEP | |
| 1008 | 31143 | | 22.24066600 | 22.0 | 14.0 | 26.4 | 37.57388800 | 37.0 | 34.0 | 26.0 | 4.22 | 1 | | LAC | |
| 1009 | 31152 | ANCHA | 22.24977700 | 22.0 | 14.0 | 59.2 | -7.95833330 | -7.0 | 57.0 | 30.0 | 4.32 | 43 | J | AQR | |
| 1010 | 31183 | | 22.26863900 | 22.0 | 16.0 | 7.1 | -60.43499900 | -60.0 | 26.0 | 6.0 | 2.91 | 0 | A | TUC | |
| 1011 | 31252 | | 22.32625000 | 22.0 | 19.0 | 34.5 | 46.35972200 | 46.0 | 21.0 | 35.0 | 4.66 | 2 | | LAC | |
| 1012 | 31257 | SADALACHBIA | 22.33080500 | 22.0 | 19.0 | 50.9 | -1.56444444 | -1.0 | 33.0 | 52.0 | 3.97 | 48 | G | AQR | |
| 1013 | 31310 | | 22.36963800 | 22.0 | 22.0 | 10.7 | 52.05305500 | 52.0 | 3.0 | 11.0 | 4.58 | 3 | B | LAC | |
| 1014 | 31326 | | 22.38486000 | 22.0 | 23.0 | 5.5 | 49.29833300 | 49.0 | 17.0 | 54.0 | 4.64 | 4 | | LAC | |
| 1015 | 31328 | | 22.39147100 | 22.0 | 23.0 | 29.3 | 1.19916666 | 1.0 | 11.0 | 57.0 | 4.64 | 52 | P | AQR | |
| 1016 | 31399 | | 22.45049900 | 22.0 | 27.0 | 1.8 | -.20000000 | .0 | 12.0 | .0 | 4.42 | 55 | Z | AQR | |
| 1017 | 31400 | | 22.45305500 | 22.0 | 27.0 | 11.0 | -43.67499900 | -43.0 | 40.0 | 30.0 | 4.02 | 0 | O | GRU | |
| 1018 | 31412 | | 22.46122100 | 22.0 | 27.0 | 40.4 | -43.92916600 | -43.0 | 55.0 | 45.0 | 4.31 | 0 | O | GRU | |
| 1019 | 31421 | | 22.46444400 | 22.0 | 27.0 | 52.0 | 58.23555500 | 58.0 | 14.0 | 8.0 | 3.96 | 27 | O | CEP | |
| 1020 | 31426 | | 22.46780500 | 22.0 | 28.0 | 4.1 | 47.52722200 | 47.0 | 31.0 | 38.0 | 4.61 | 5 | | CAC | |
| 1021 | 31449 | | 22.48286000 | 22.0 | 28.0 | 58.3 | 42.94361000 | 42.0 | 56.0 | 37.0 | 4.54 | 6 | | LAC | |
| 1022 | 31459 | | 22.49199900 | 22.0 | 29.0 | 31.2 | -32.52611000 | -32.0 | 31.0 | 34.0 | 4.36 | 17 | B | PSA | |
| 1023 | 31471 | | 22.49741600 | 22.0 | 29.0 | 50.7 | 50.10194300 | 50.0 | 6.0 | 7.0 | 3.85 | 7 | A | LAC | |
| 1024 | 31534 | | 22.55927700 | 22.0 | 33.0 | 33.4 | -.29833332 | .0 | 17.0 | 54.0 | 4.13 | 62 | M | AQR | |
| 1025 | 31646 | | 22.64538900 | 22.0 | 38.0 | 43.4 | -27.22666600 | -27.0 | 13.0 | 36.0 | 4.22 | 18 | E | PSA | |
| 1026 | 31652 | | 22.64958200 | 22.0 | 38.0 | 58.5 | 44.09305500 | 44.0 | 5.0 | 35.0 | 4.64 | 11 | | LAC | |
| 1027 | 31664 | HOMAM | 22.66191600 | 22.0 | 39.0 | 42.9 | 10.64805540 | 10.0 | 38.0 | 53.0 | 3.61 | 42 | Z | PEG | |
| 1028 | 31685 | | 22.67641600 | 22.0 | 40.0 | 35.1 | -47.06833300 | -47.0 | 4.0 | 6.0 | 2.29 | 0 | B | GRU | |
| 1029 | 31706 | MATAR | 22.68930500 | 22.0 | 41.0 | 21.5 | 30.03777700 | 30.0 | 2.0 | 16.0 | 3.10 | 44 | M | PEG | |
| 1030 | 31712 | | 22.70994400 | 22.0 | 42.0 | 35.8 | -81.56611000 | -81.0 | 33.0 | 58.0 | 4.34 | 0 | B | OCT | |
| 1031 | 31776 | | 22.74736000 | 22.0 | 44.0 | 50.5 | 23.38083300 | 23.0 | 22.0 | 51.0 | 4.14 | 47 | L | PEG | |
| 1032 | 31778 | | 22.74902700 | 22.0 | 44.0 | 56.5 | 11.99277770 | 11.0 | 59.0 | 34.0 | 4.31 | 46 | C | PEG | |
| 1033 | 31813 | | 22.77413800 | 22.0 | 46.0 | 24.9 | -51.50138800 | -51.0 | 30.0 | 5.0 | 3.69 | 0 | E | GRU | |
| 1034 | 31836 | | 22.79566600 | 22.0 | 47.0 | 44.4 | -13.77777770 | -13.0 | 46.0 | 40.0 | 4.21 | 71 | T | AQR | |
| 1035 | 31851 | | 22.80516600 | 22.0 | 48.0 | 18.6 | 24.41638900 | 24.0 | 24.0 | 59.0 | 3.67 | 48 | M | PEG | |
| 1036 | 31857 | | 22.80713800 | 22.0 | 48.0 | 25.7 | 66.01611000 | 66.0 | .0 | 58.0 | 3.68 | 32 | I | CEP | |
| 1037 | 31895 | | 22.83305500 | 22.0 | 50.0 | 35.0 | -33.06166600 | -33.0 | 3.0 | 42.0 | 4.52 | 22 | G | PSA | |
| 1038 | 31903 | | 22.84647200 | 22.0 | 50.0 | 47.3 | -7.76638880 | -7.0 | 45.0 | 59.0 | 3.84 | 73 | L | AQR | |
| 1039 | 31943 | SKAT | 22.87988800 | 22.0 | 52.0 | 47.6 | -16.00749900 | -16.0 | .0 | 27.0 | 3.51 | 76 | O | AQR | |
| 1040 | 31974 | | 22.90022100 | 22.0 | 54.0 | .8 | -32.72722100 | -32.0 | 43.0 | 38.0 | 4.33 | 23 | D | PSA | |
| 1041 | 32000 | FOMALHAUT | 22.92866600 | 22.0 | 55.0 | 43.2 | -29.60833300 | -29.0 | 48.0 | 30.0 | 1.29 | 24 | A | PSA | |

TABLE I. - STAR IDENTIFICATION CATALOGUE - Concluded

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1042 | 32061 | | 22.98036100 | 22.0 | 58.0 | 49.3 | -52.99222200 | -52.0 | 56.0 | 32.0 | 4.18 | 0 | Z | GRU |
| 1043 | 32095 | | 23.00508300 | 23.0 | .0 | 18.3 | 42.13749900 | 42.0 | 8.0 | 15.0 | 3.60V | 1 | O | AND |
| 1044 | 32135 | SCHEAT | 23.03455500 | 23.0 | 2.0 | 4.4 | 27.89249900 | 27.0 | 53.0 | 33.0 | 2.61 | 53 | B | PEG |
| 1045 | 32134 | | 23.03488900 | 23.0 | 2.0 | 5.6 | 3.63138880 | 3.0 | 37.0 | 53.0 | 4.58 | 4 | B | PSC |
| 1046 | 32149 | MARKAB | 23.05024900 | 23.0 | 3.0 | .9 | 15.01666670 | 15.0 | 1.0 | .0 | 2.57 | 54 | A | PEG |
| 1047 | 32184 | | 23.08188800 | 23.0 | 4.0 | 54.8 | -43.70999900 | -43.0 | 42.0 | 36.0 | 4.35 | 0 | J | GRU |
| 1048 | 32196 | | 23.08733300 | 23.0 | 5.0 | 14.4 | 9.21999990 | 9.0 | 13.0 | 12.0 | 4.69 | 55 | | PEG |
| 1049 | 32237 | | 23.11297100 | 23.0 | 6.0 | 46.7 | 75.19833200 | 75.0 | 11.0 | 54.0 | 4.56 | 33 | P | CEP |
| 1050 | 32246 | | 23.12636100 | 23.0 | 7.0 | 34.9 | -21.36277700 | -21.0 | 21.0 | 46.0 | 3.80 | 88 | | AQR |
| 1051 | 32270 | | 23.13972100 | 23.0 | 8.0 | 23.0 | -45.43666600 | -45.0 | 26.0 | 12.0 | 4.10 | 0 | I | GRU |
| 1052 | 32316 | | 23.18233300 | 23.0 | 10.0 | 56.4 | 49.21472100 | 49.0 | 12.0 | 53.0 | 4.62 | 7 | | AND |
| 1053 | 32346 | | 23.20847100 | 23.0 | 12.0 | 30.5 | -6.23805550 | -6.0 | 14.0 | 17.0 | 4.40 | 90 | V | AQR |
| 1054 | 32374 | | 23.23430500 | 23.0 | 14.0 | 3.5 | -9.27861110 | -9.0 | 16.0 | 43.0 | 4.46 | 91 | Y | AQR |
| 1055 | 32415 | | 23.25583200 | 23.0 | 15.0 | 21.0 | 3.09083330 | 3.0 | 5.0 | 27.0 | 3.85 | 6 | G | PSC |
| 1056 | 32413 | | 23.25661000 | 23.0 | 15.0 | 23.8 | -58.42805500 | -58.0 | 25.0 | 41.0 | 4.10 | 0 | G | TUC |
| 1057 | 32429 | | 23.26808300 | 23.0 | 16.0 | 5.1 | -9.37388890 | -9.0 | 22.0 | 26.0 | 4.56 | 93 | Y | AQR |
| 1058 | 32450 | | 23.28227800 | 23.0 | 16.0 | 56.2 | -32.72305500 | -32.0 | 43.0 | 23.0 | 4.51 | 0 | G | SCL |
| 1059 | 32503 | KERB | 23.31502700 | 23.0 | 18.0 | 54.1 | 23.54861100 | 23.0 | 32.0 | 55.0 | 4.65 | 62 | T | PEG |
| 1060 | 32540 | | 23.35227100 | 23.0 | 21.0 | 8.0 | -20.29194400 | -20.0 | 17.0 | 31.0 | 4.20 | 98 | | AQR |
| 1061 | 32585 | | 23.39380500 | 23.0 | 23.0 | 37.7 | 23.21111000 | 23.0 | 12.0 | 40.0 | 4.57 | 66 | U | PEG |
| 1062 | 32594 | | 23.40347200 | 23.0 | 24.0 | 12.5 | -20.83416600 | -20.0 | 50.0 | 3.0 | 4.52 | 99 | | AQR |
| 1063 | 32647 | | 23.43649900 | 23.0 | 26.0 | 11.4 | 6.18638890 | 6.0 | 11.0 | 11.0 | 4.45 | 10 | J | PSC |
| 1064 | 32667 | | 23.45636000 | 23.0 | 27.0 | 22.9 | 12.56722210 | 12.0 | 34.0 | 2.0 | 4.67 | 70 | | PEG |
| 1065 | 32744 | | 23.51830500 | 23.0 | 31.0 | 5.9 | -38.01222100 | -38.0 | .0 | 44.0 | 4.46 | 0 | B | SCL |
| 1066 | 32832 | | 23.59738900 | 23.0 | 35.0 | 50.6 | 46.26833300 | 46.0 | 16.0 | 6.0 | 4.00 | 16 | L | AND |
| 1067 | 32850 | | 23.60688800 | 23.0 | 36.0 | 24.8 | 43.07416600 | 43.0 | 4.0 | 27.0 | 4.28 | 17 | I | AND |
| 1068 | 32875 | ALRAI | 23.63155500 | 23.0 | 37.0 | 53.6 | 77.43694300 | 77.0 | 26.0 | 13.0 | 3.42 | 35 | G | CEP |
| 1069 | 32879 | | 23.63580500 | 23.0 | 38.0 | 8.9 | 5.43638890 | 5.0 | 26.0 | 11.0 | 4.28 | 17 | I | PSC |
| 1070 | 32886 | | 23.64461000 | 23.0 | 38.0 | 40.6 | 44.14000000 | 44.0 | 8.0 | 24.0 | 4.33 | 19 | K | AND |
| 1071 | 32917 | | 23.67097100 | 23.0 | 40.0 | 15.5 | 1.58749999 | 1.0 | 35.0 | 15.0 | 4.61 | 18 | L | PSC |
| 1072 | 32931 | | 23.68177700 | 23.0 | 40.0 | 54.4 | -14.73861110 | -14.0 | 44.0 | 19.0 | 4.62 | 105 | * | AQR |
| 1073 | 33050 | | 23.78508300 | 23.0 | 47.0 | 6.3 | -28.32388900 | -28.0 | 19.0 | 26.0 | 4.64 | 0 | D | SCL |
| 1074 | 33160 | | 23.87708300 | 23.0 | 52.0 | 37.5 | 57.30472100 | 57.0 | 18.0 | 17.0 | 4.00V | 7 | R | CAS |
| 1075 | 33230 | | 23.93283200 | 23.0 | 55.0 | 58.2 | 24.99694400 | 24.0 | 56.0 | 49.0 | 4.75 | 84 | Y | PEG |
| 1076 | 33262 | | 23.95852700 | 23.0 | 57.0 | 30.7 | 6.66944440 | 6.0 | 40.0 | 10.0 | 4.03 | 28 | * | PSC |
| 1077 | 33280 | | 23.96849900 | 23.0 | 58.0 | 6.6 | -65.77194400 | -65.0 | 46.0 | 19.0 | 4.71 | 0 | E | TUC |
| 1078 | 33321 | | 23.99702700 | 23.0 | 59.0 | 49.3 | -77.25888600 | -77.0 | 15.0 | 32.0 | 4.73 | 0 | J | OCT |

AZM = 279.112310

LAT = -3.831588 LON = -155.314080

TRANSLUNAR INJECTION BURN

TRANSLUNAR COAST

PTC

EARTH VIEWS

MOON VIEWS

PRIOR TO LOI

LUNAR ORBIT INSERTION BURN

LM AND CSM IN LUNAR ORBIT

TRANSEARTH INJECTION BURN

TRANSEARTH COAST

AFTER TEI

MOON VIEWS

EARTH VIEWS

ENTRY PHASE

ECLIPTIC REFERENCE

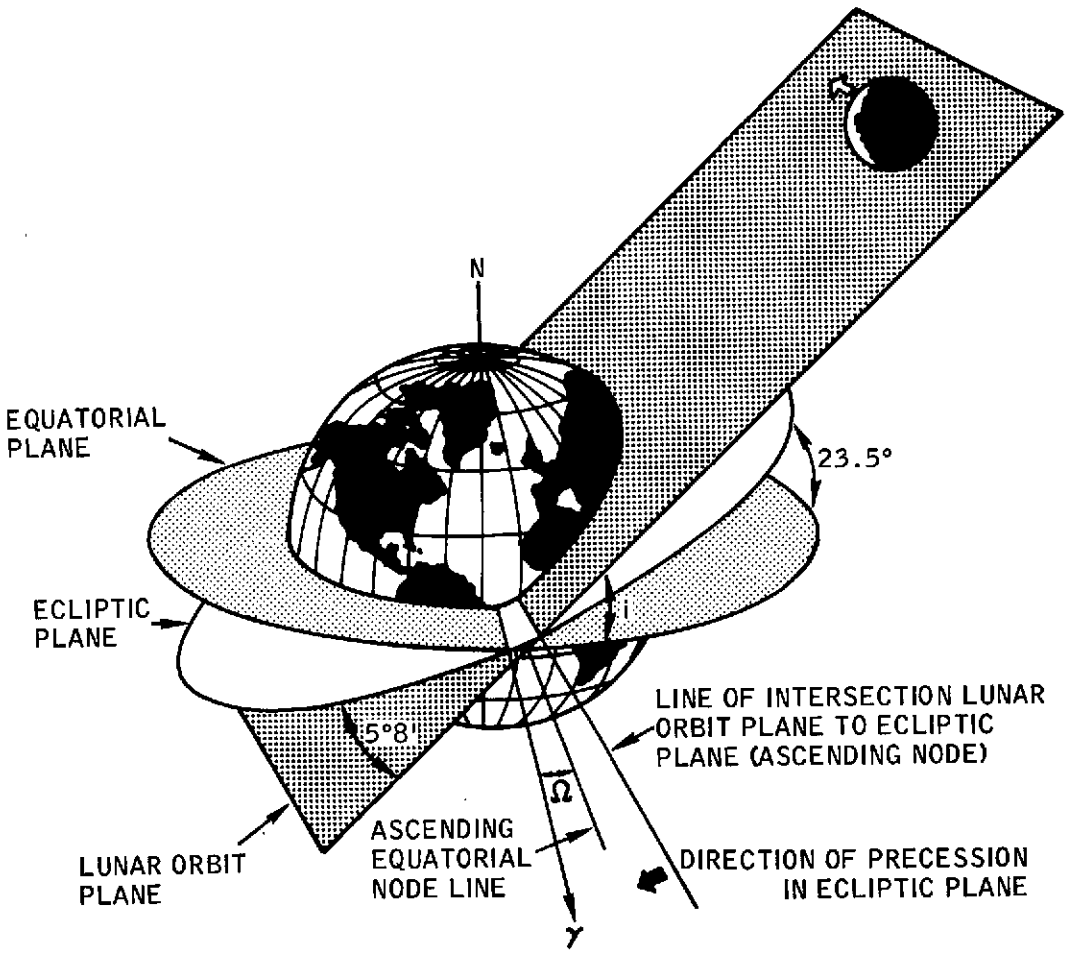



FIGURE 1.- ILLUSTRATION OF LUNAR ORBIT PLANE IN YEAR 1969
INCLINATION ANGLE (i) ≈ 28°
RIGHT ASCENSION OF ASCENDING EQUATORIAL NODE (Ω) = 5°

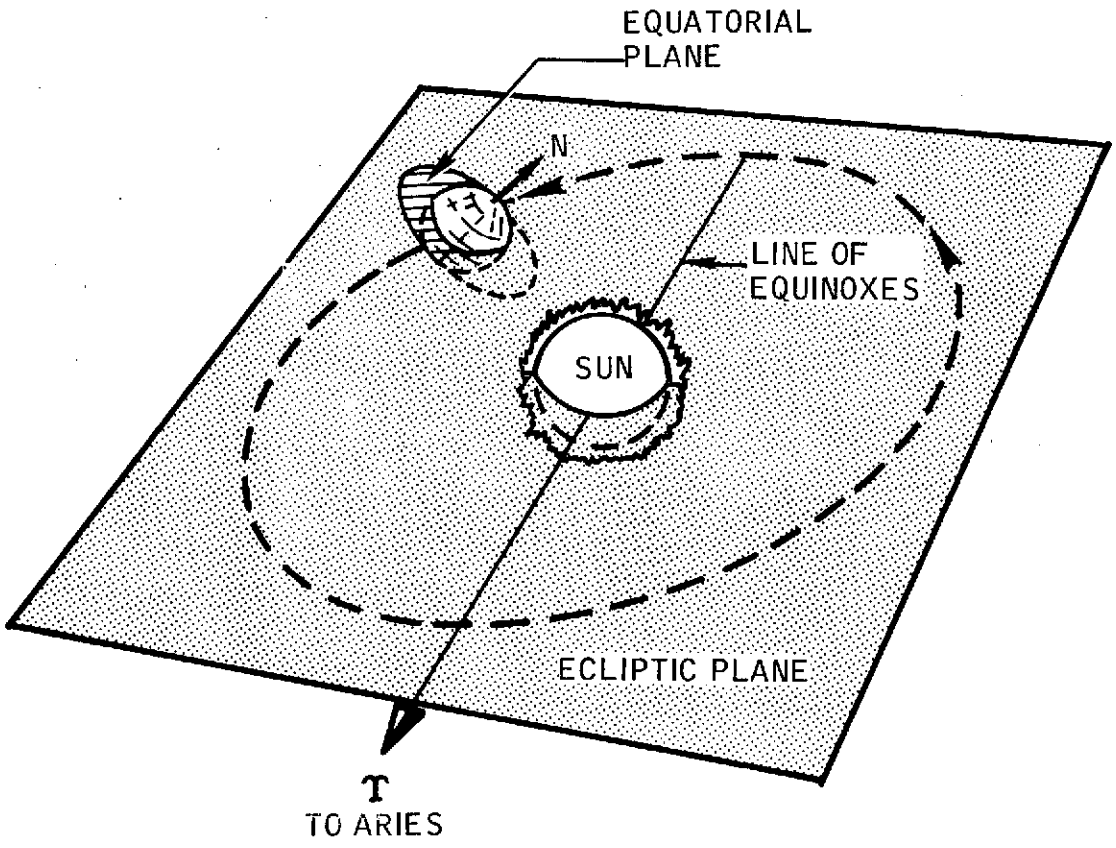



Figure 2.- Sun-centered inertial geometry of Apollo 10 (Mission F).

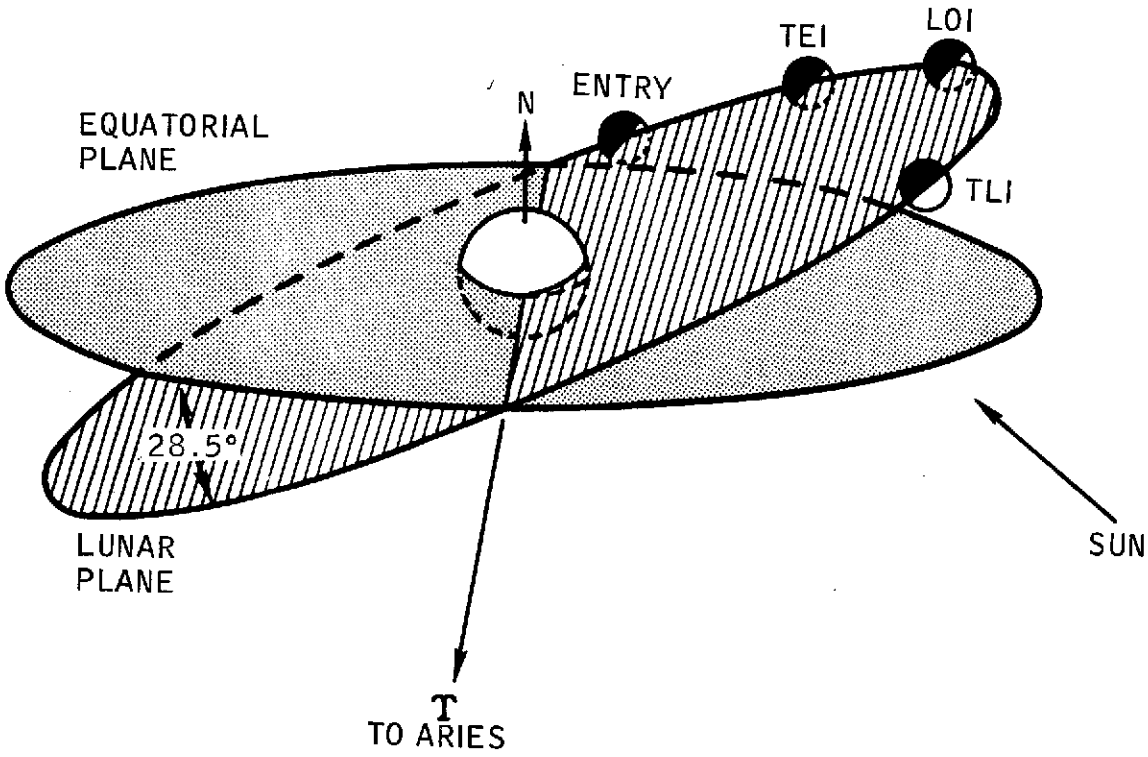



Figure 3.- Position of the moon at various stages of Apollo 10 (Mission F).

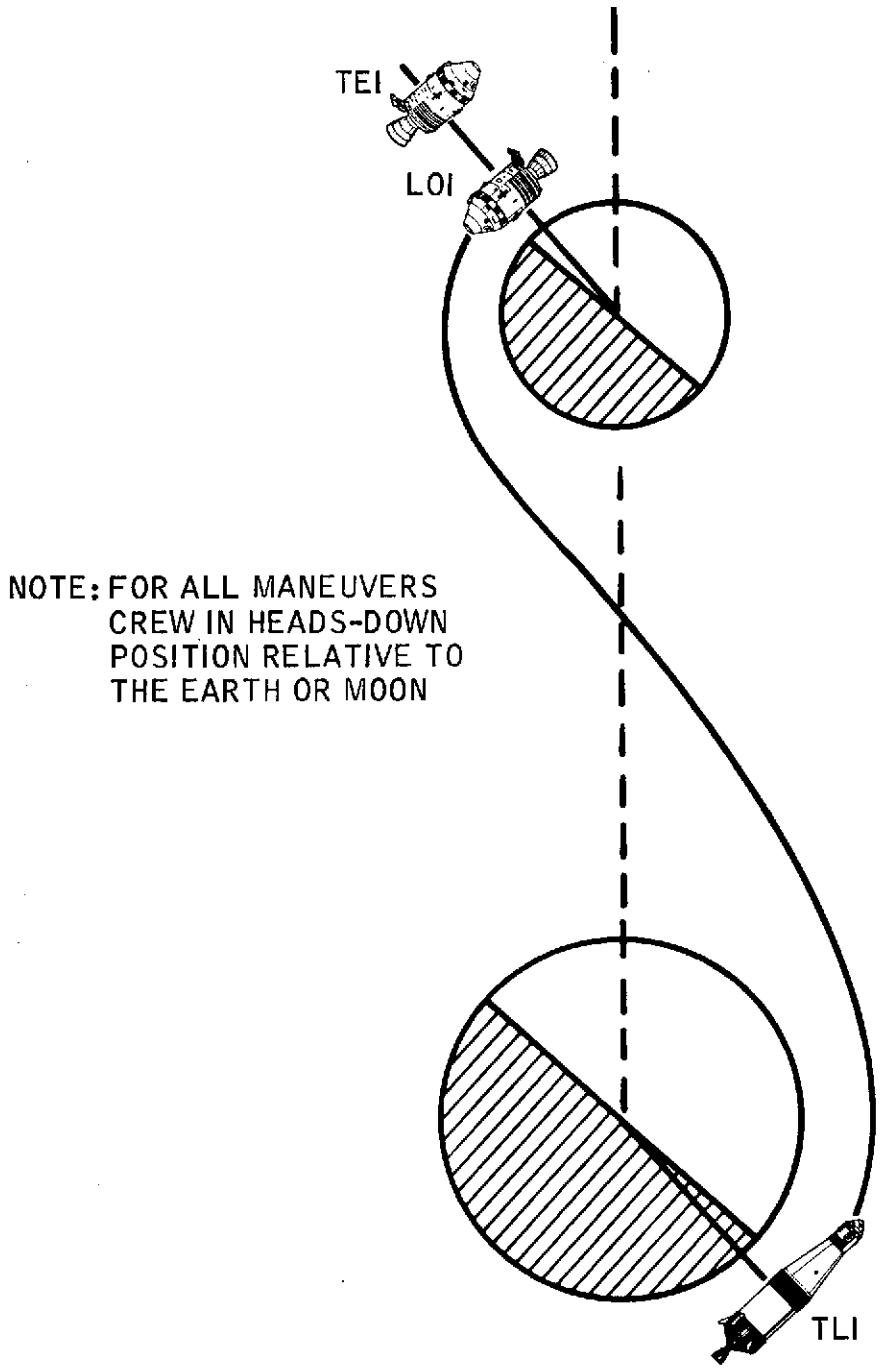



Figure 4.- A schematic of the maneuver attitudes and lighting for the nominal mission.

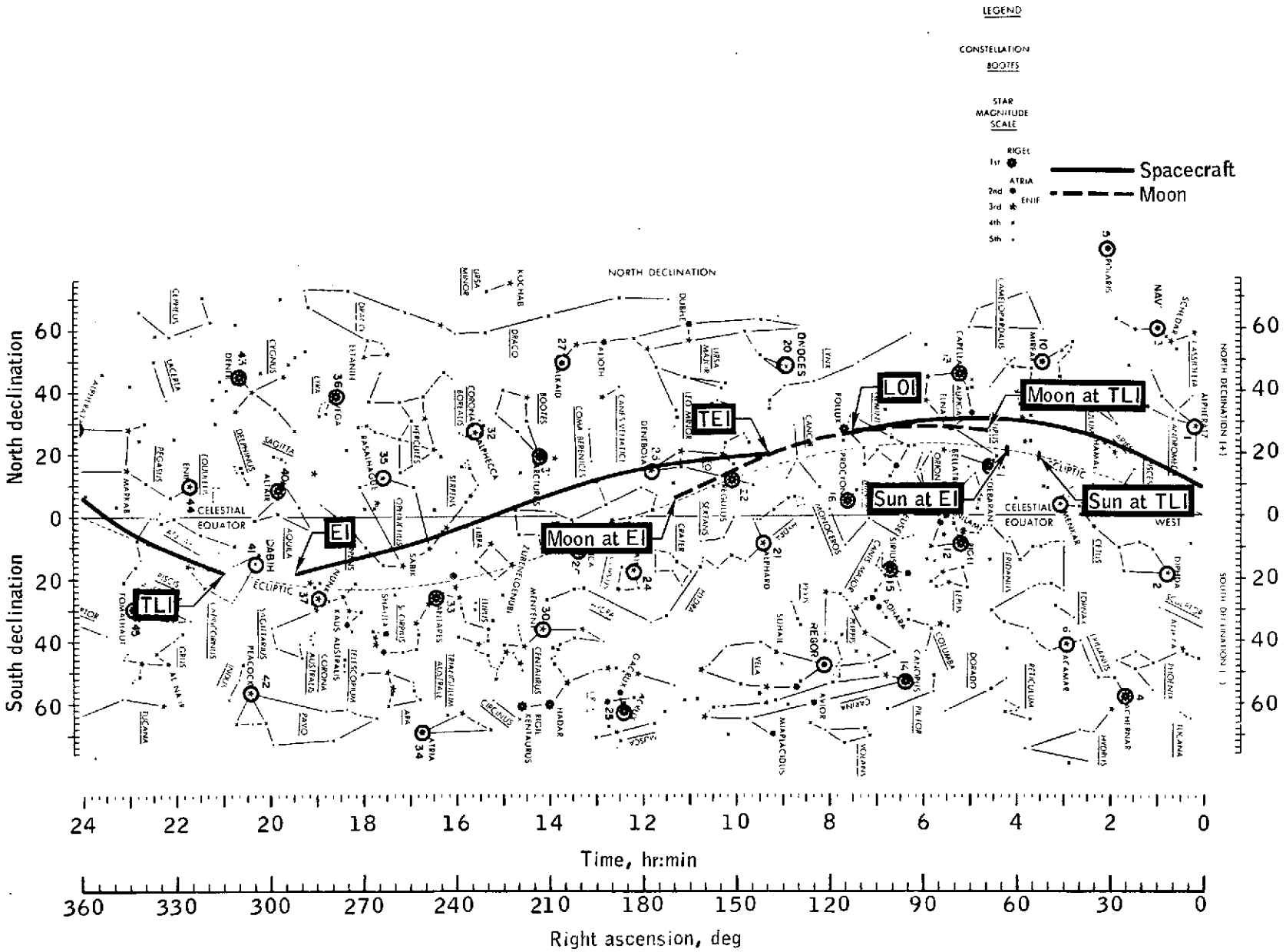
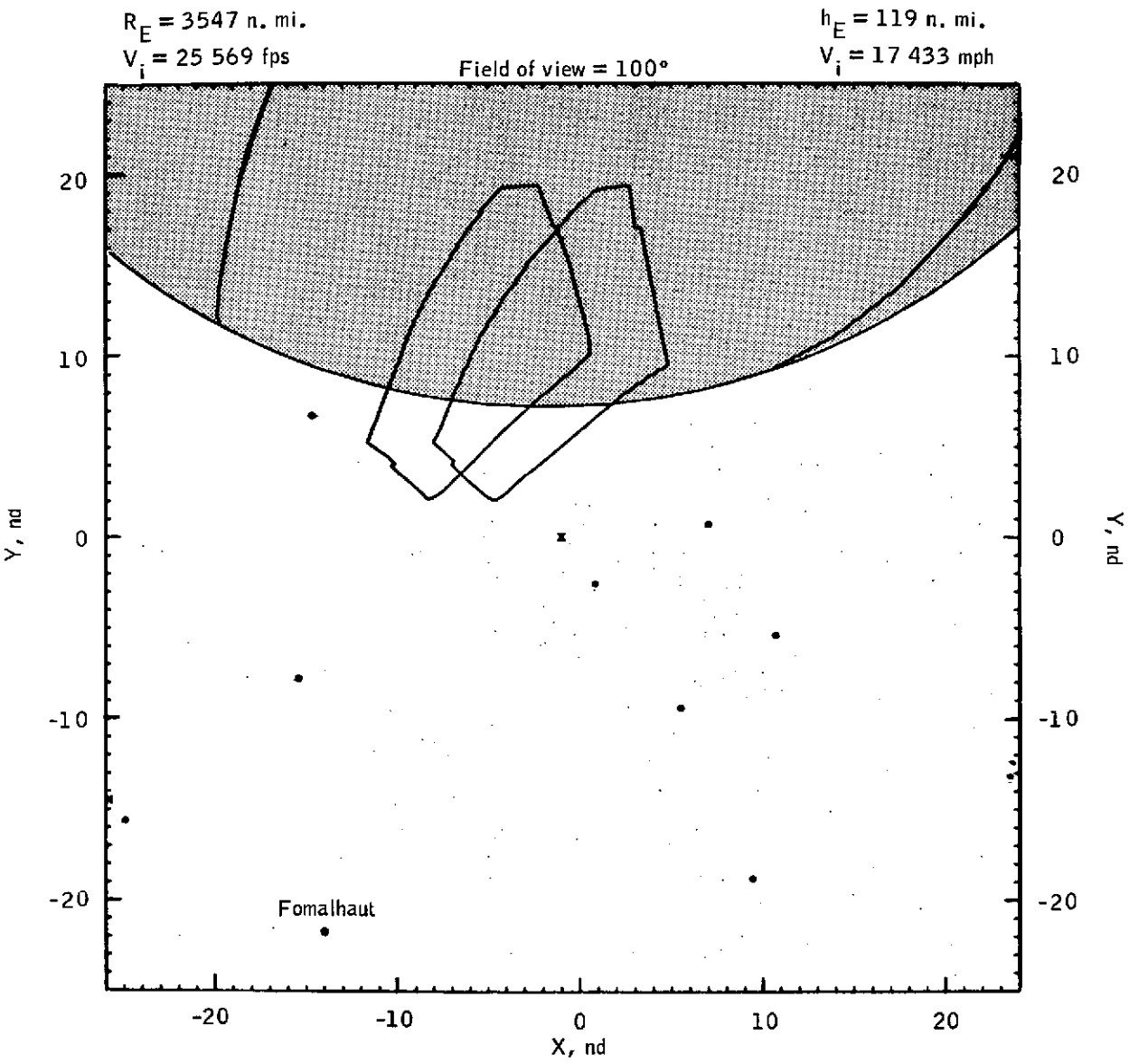



Figure 5.- Nominal Apollo 10 (Mission F) projected on a map of the celestial sphere.

TRANSLUNAR INJECTION BURN

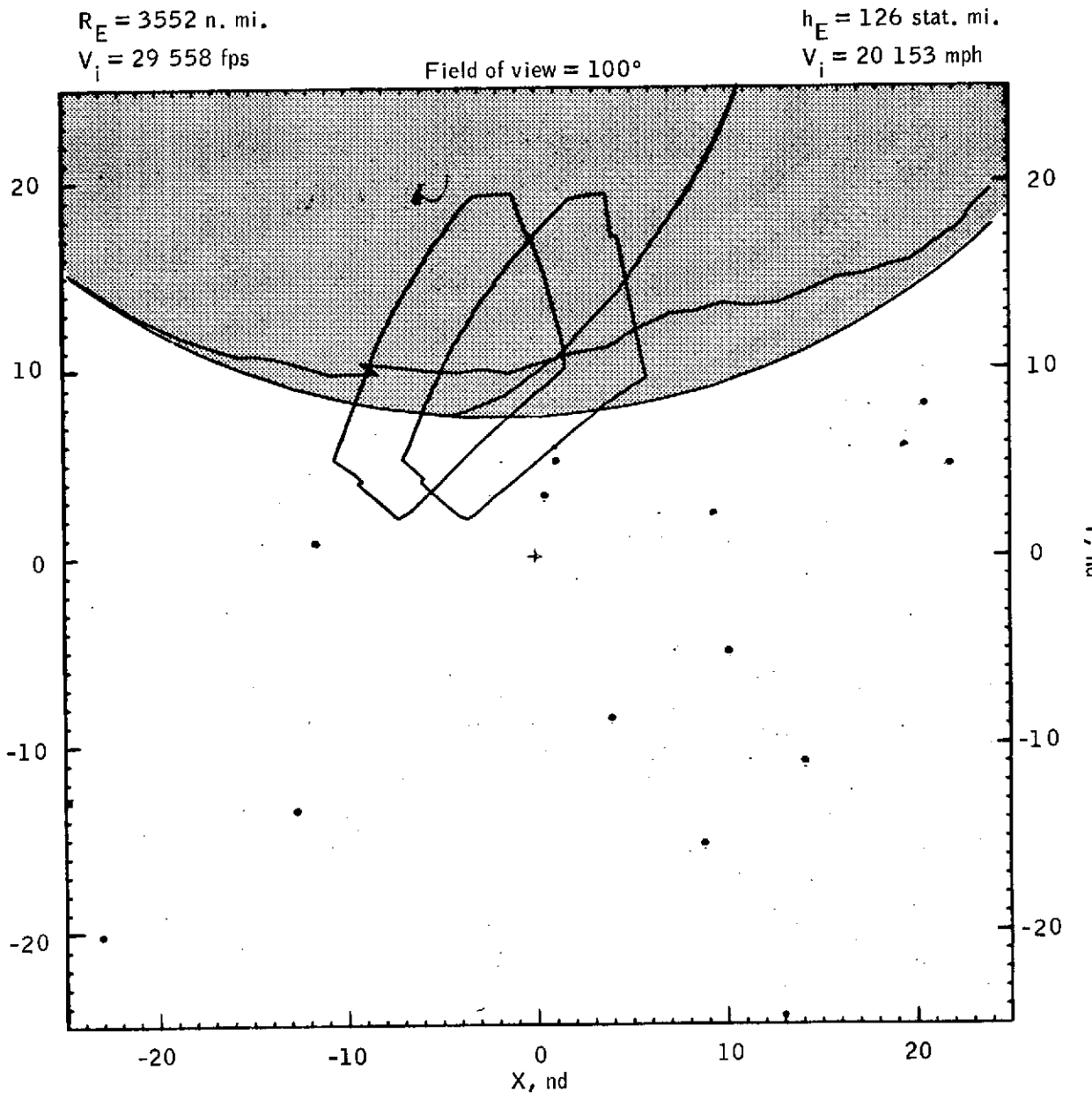
| SEQ | 4 | 7 | 15 | 25 | 80 | 950 | 984 | 1041 | 1044 | 1046 |
|---|---|---|---|---|---|---|---|---|---|---|
| X | 8 | 1 | -23 | -14 | -13 | 24 | 10 | -12 | 11 | 6 |
| Y | 0 | -2 | -15 | -7 | 6 | -13 | -18 | -21 | -5 | -9 |




(a) Begin TLI (g.e.t. = 2:31:20.4).

Figure 6.- Translunar injection burn.

| SEQ | 4 | 5 | 7 | 15 | 22 | 25 | 31 | 41 | 63 | 75 | 80 | 984 | 1044 | 1046 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| X | 10 | 21 | 3 | -23 | 19 | -12 | 20 | 9 | 0 | 1 | -11 | 13 | 14 | 8 |
| Y | -4 | 5 | -8 | -20 | 5 | -13 | 8 | 2 | 3 | 5 | 0 | -24 | -10 | -15 |

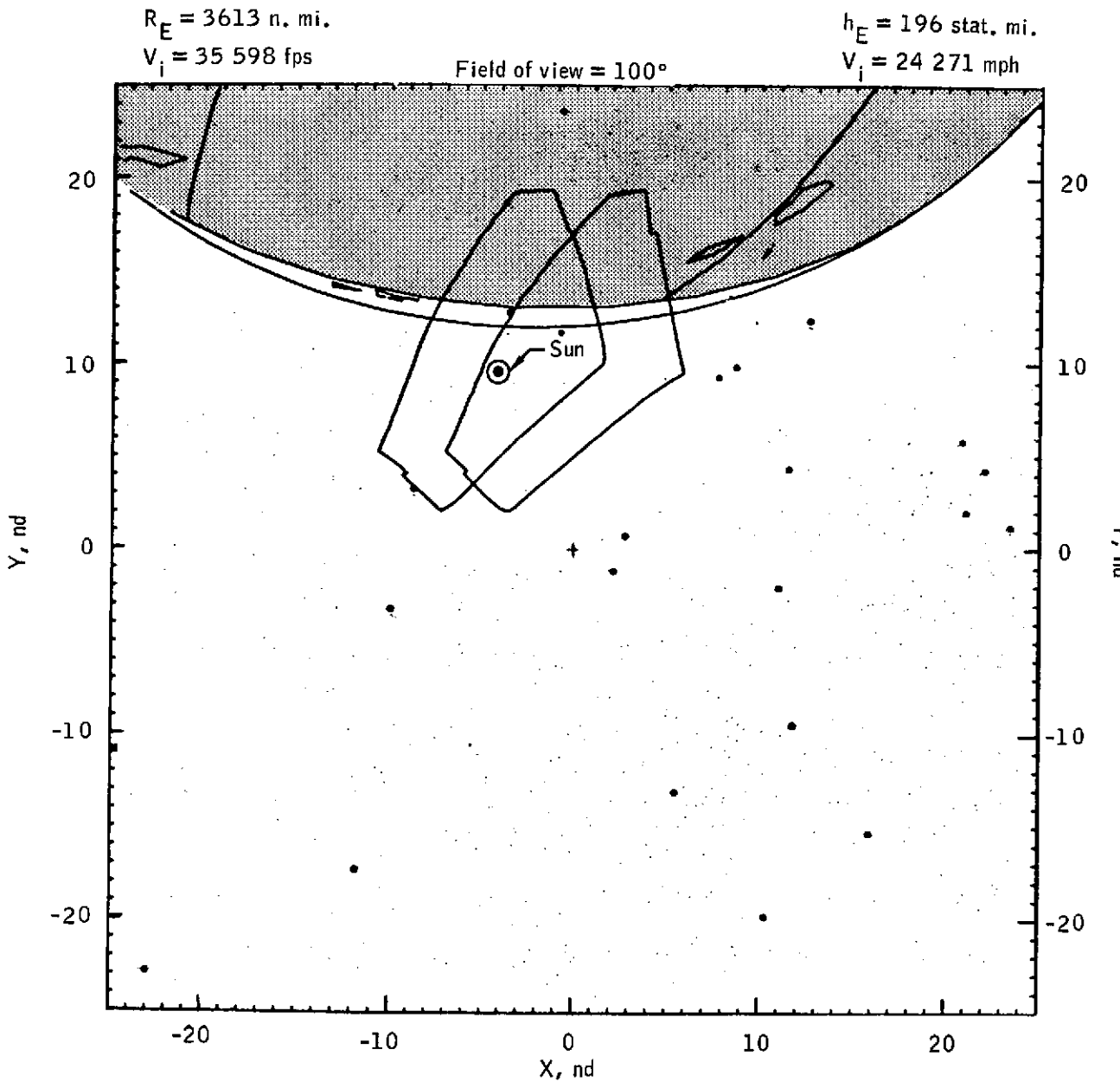



(b) Middle of TLI (g.e.t. = 2:34:11.0).

Figure 6.- Continued.

| SEQ | 4 | 5 | 7 | 15 | 22 | 25 | 31 | 41 | 47 | 63 | 73 | 75 | 80 | 108 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| X | 11 | 23 | 5 | -22 | 21 | -11 | 22 | 11 | 20 | 2 | 11 | 2 | -9 | -8 |
| Y | -9 | 1 | -12 | -22 | 2 | -17 | 4 | -1 | 5 | -1 | 4 | 0 | -3 | 3 |

| SEQ | 111 | 112 | 120 | 144 | 1044 | 1046 |
|---|---|---|---|---|---|---|
| X | 7 | 8 | 12 | 0 | 15 | 10 |
| Y | 9 | 9 | 12 | 11 | -15 | -19 |



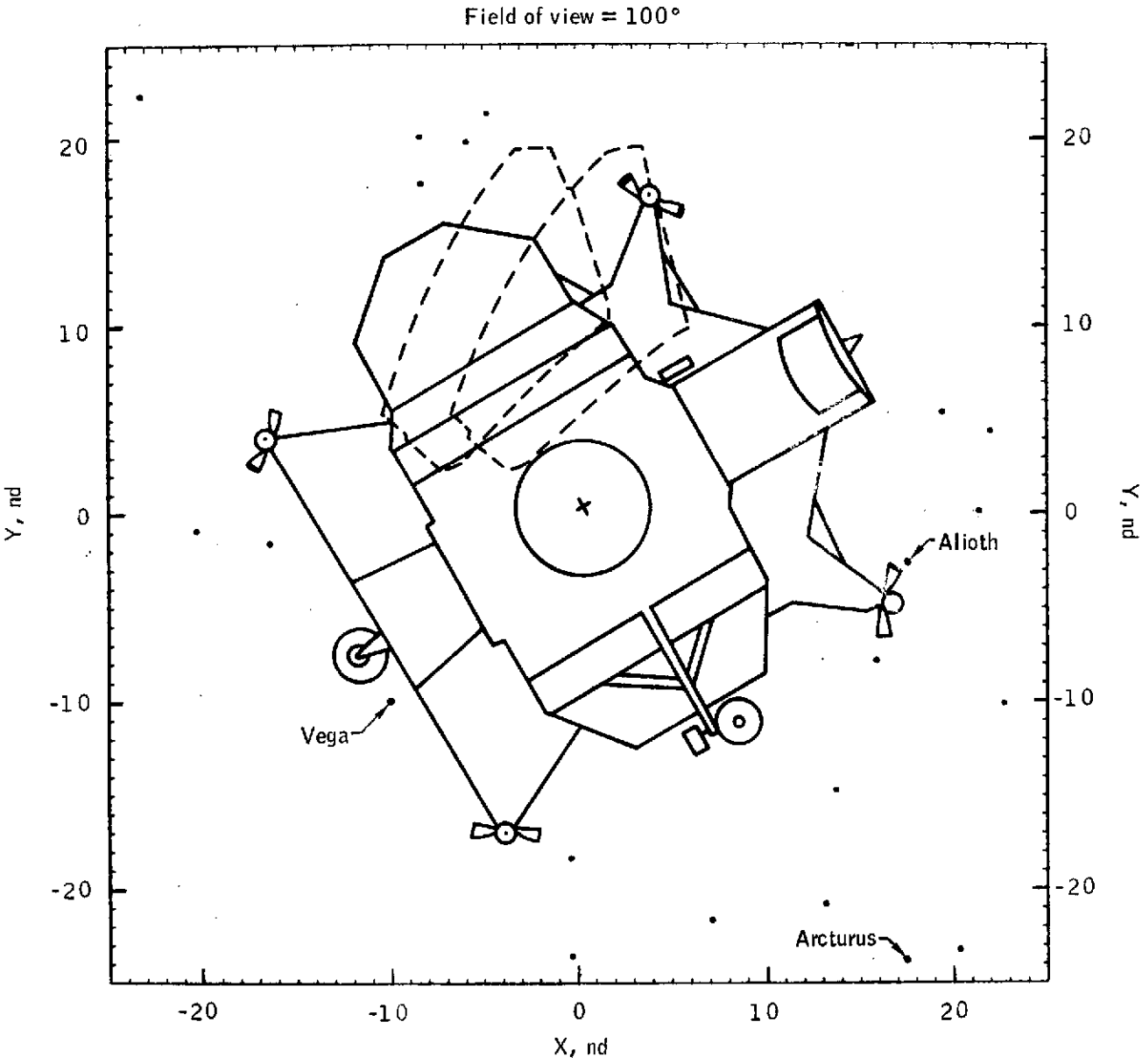

(c) End of TLI (g.e.t. = 2:37:02.3).

Figure 6.- Concluded.

PTC

| SEQ | 4 | 5 | 22 | 31 | 47 | 507 | 509 | 540 | 577 | 580 | 592 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| X | -23 | -8 | -8 | -5 | -4 | 22 | 19 | 21 | 17 | 22 | 16 |
| Y | 22 | 17 | 20 | 19 | 21 | 4 | 5 | 0 | -2 | -9 | -4 |

| SEQ | 604 | 610 | 624 | 639 | 651 | 690 | 745 | 755 | 849 |
|---|---|---|---|---|---|---|---|---|---|
| X | 15 | 20 | 17 | 13 | 13 | 7 | 0 | 0 | -9 |
| Y | -7 | -23 | -23 | -14 | -20 | -21 | -23 | -18 | -9 |

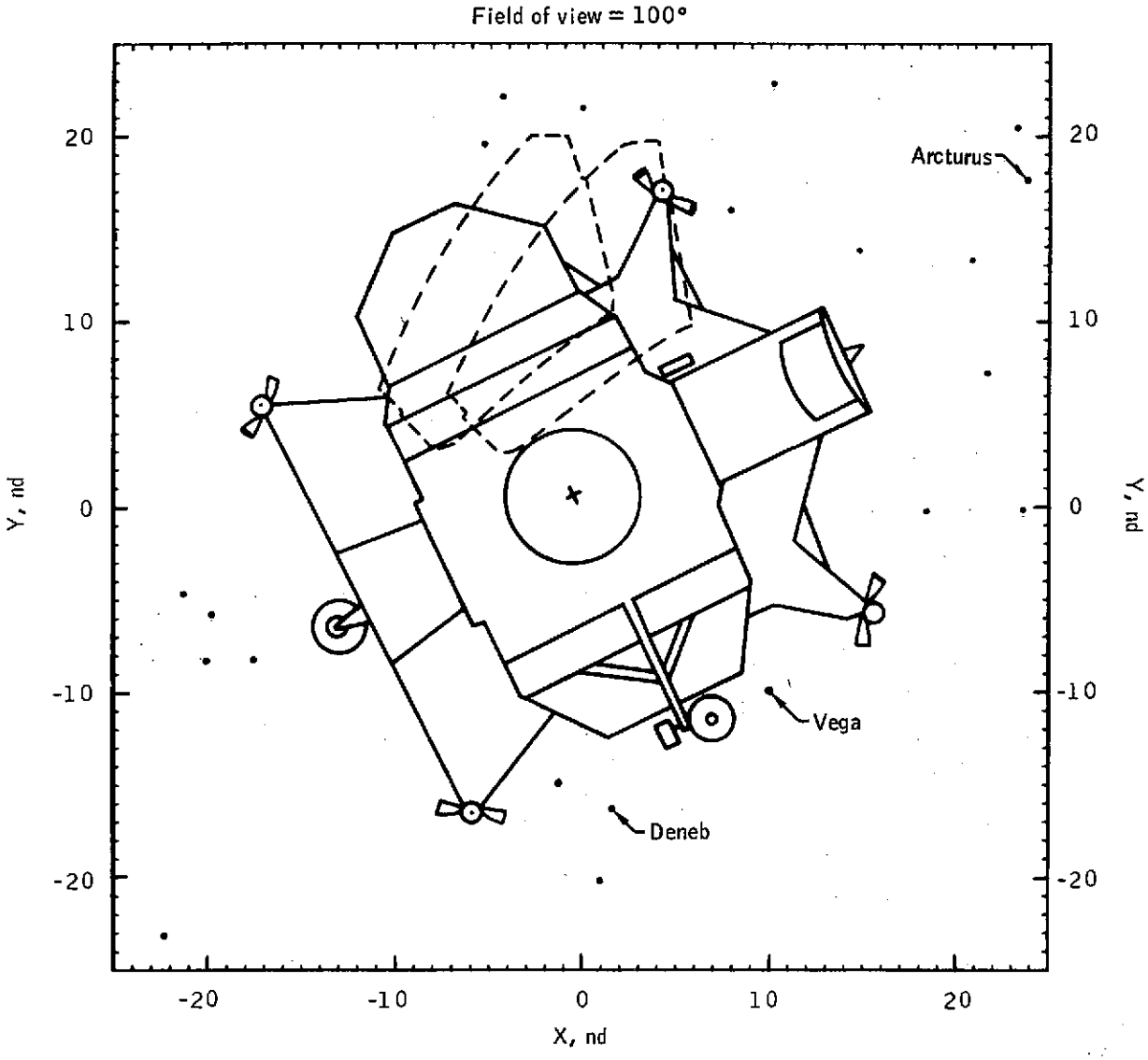



(a) Roll = 0°.

Figure 7.- Passive thermal control.

| SEQ | 4 | 5 | 22 | 31 | 47 | 507 | 509 | 540 | 580 | 604 | 610 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| X | -22 | -17 | -20 | -19 | -21 | -4 | -5 | 0 | 10 | 7 | 23 |
| Y | -22 | -8 | -8 | -5 | -4 | 22 | 19 | 21 | 22 | 16 | 20 |

| SEQ | 624 | 639 | 651 | 690 | 745 | 755 | 849 | 931 | 942 | 950 |
|---|---|---|---|---|---|---|---|---|---|---|
| X | 23 | 14 | 20 | 21 | 23 | 18 | 10 | 1 | -1 | 0 |
| Y | 17 | 13 | 13 | 7 | 0 | 0 | -9 | -16 | -14 | -20 |



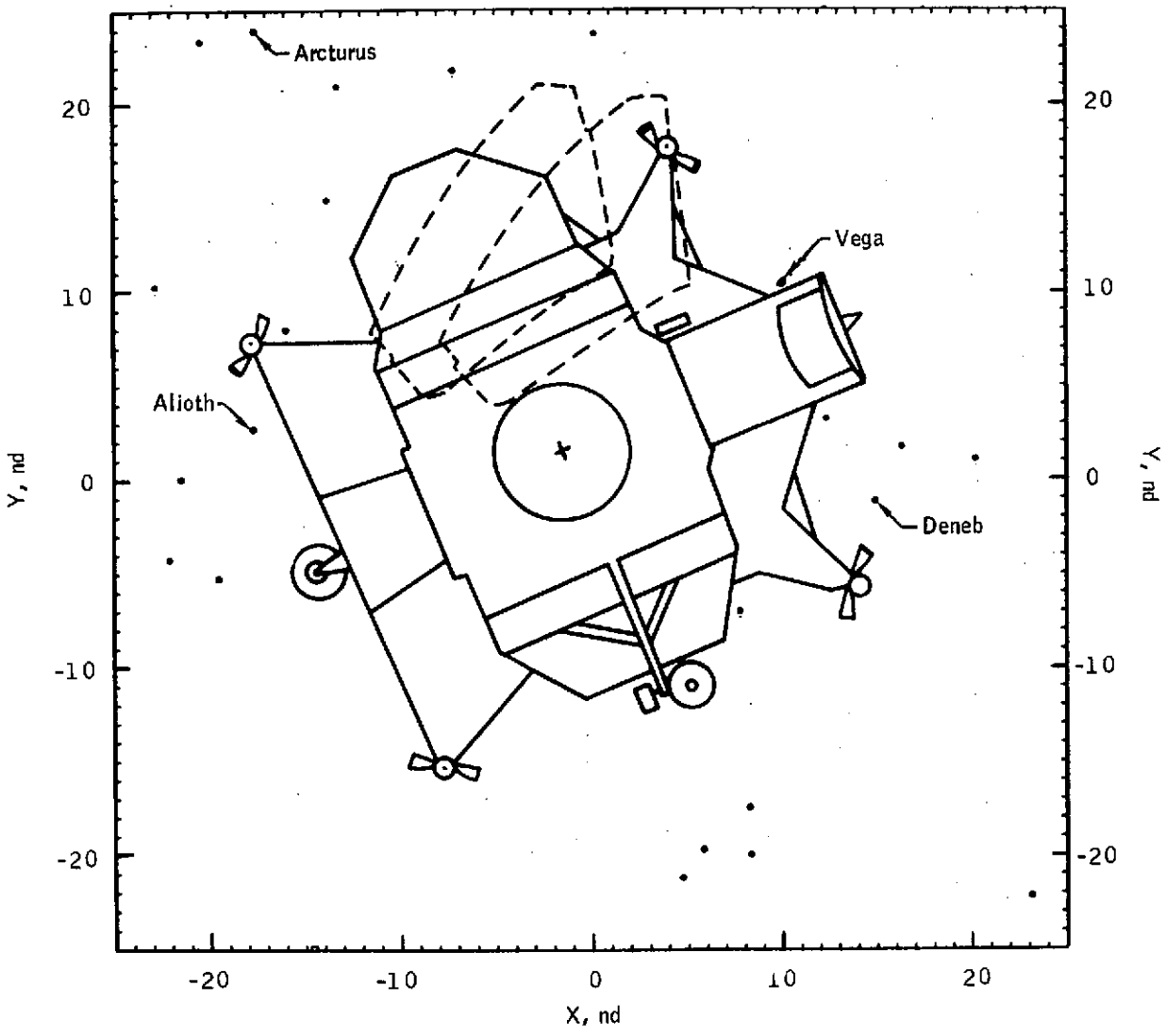

(b) Roll = 90°.

Figure 7. - Continued.

| SEQ | 4 | 5 | 22 | 31 | 47 | 507 | 509 | 540 | 577 | 580 | 604 | 610 | 624 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| X | 23 | 8 | 8 | 5 | 4 | -22 | -19 | -21 | -17 | -22 | -15 | -20 | -17 |
| Y | -22 | -17 | -19 | -19 | -21 | -4 | -5 | 0 | 2 | 10 | 8 | 23 | 24 |

| SEQ | 639 | 651 | 690 | 745 | 849 | 903 | 931 | 942 | 950 | 971 |
|---|---|---|---|---|---|---|---|---|---|---|
| X | 13 | -13 | -7 | 0 | 9 | 12 | 16 | 14 | 20 | 7 |
| Y | 15 | 21 | 21 | 23 | 10 | 3 | 1 | -1 | 1 | -6 |

Field of view = 100°

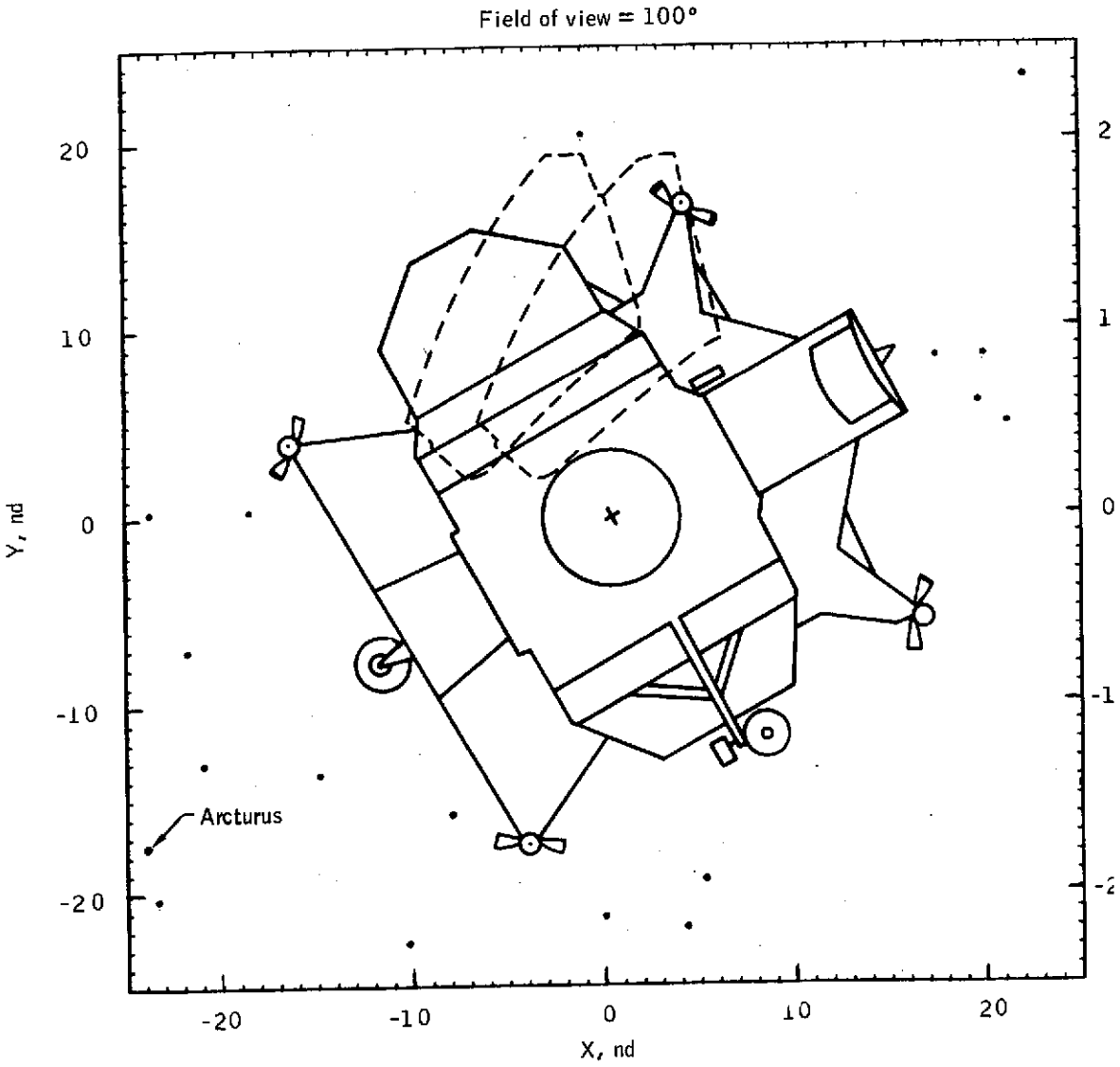



(c) Roll = 180°.

Figure 7. - Continued.

| SEQ | 4 | 5 | 22 | 31 | 47 | 507 | 509 | 540 | 580 | 604 | 610 | 624 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| X | 22 | 17 | 20 | 19 | 21 | 4 | 5 | 0 | -10 | -7 | -23 | -23 |
| Y | 23 | 8 | 8 | 6 | 4 | -21 | -19 | -21 | -22 | -15 | -20 | -17 |

| SEQ | 639 | 651 | 690 | 745 | 755 | 950 |
|---|---|---|---|---|---|---|
| X | -14 | -20 | -21 | -23 | -18 | 0 |
| Y | -13 | -12 | -6 | 0 | 0 | 20 |




(d) Roll = 270°.

Figure 7.- Concluded.

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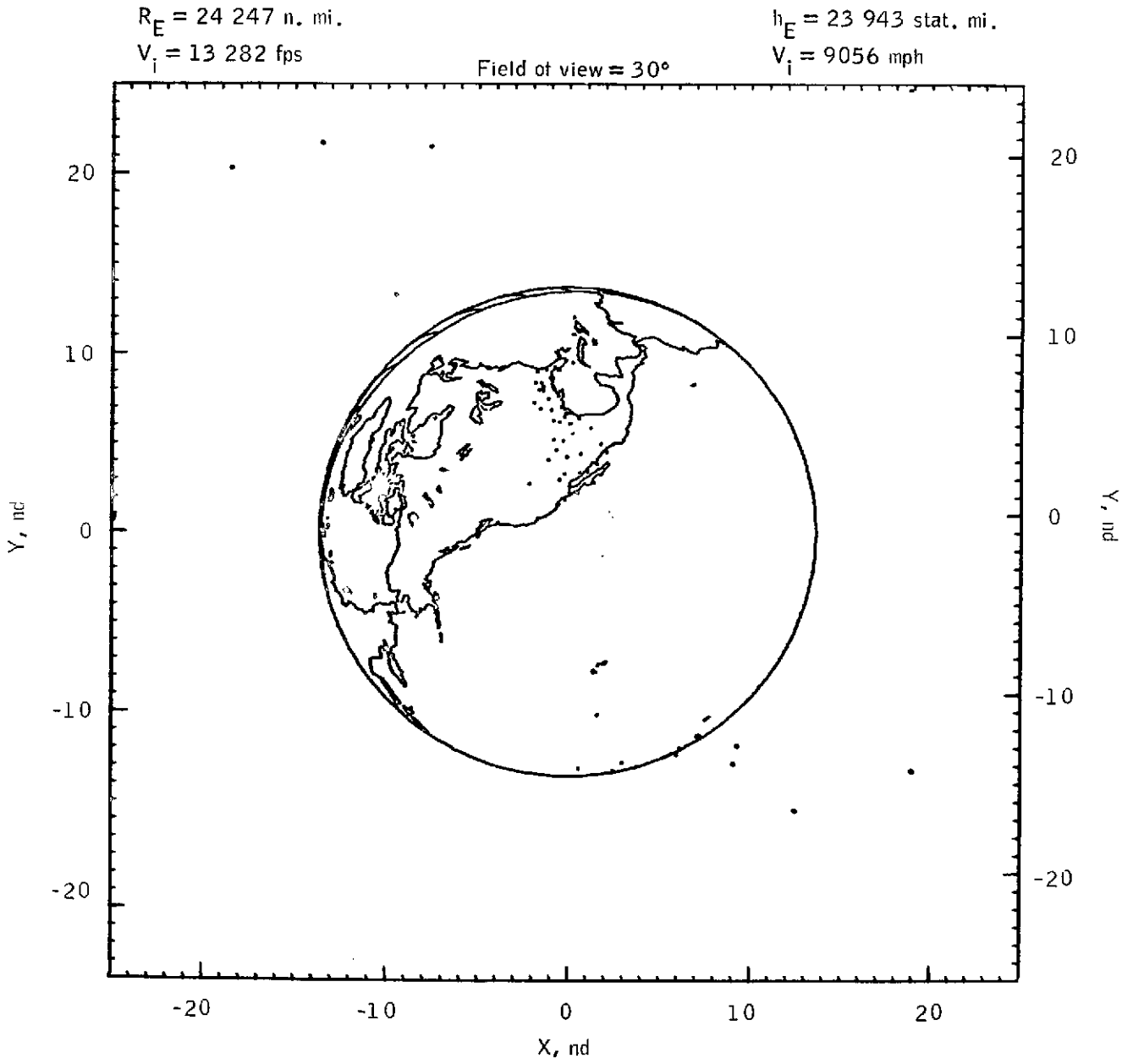
# TRANSLUNAR COAST

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 550 | 688 | 717 | 719 | 724 | 736 | 789 | 793 | 792 | 812 |
| X | 18 | -7 | -13 | -18 | -9 | 9 | 9 | 18 | 12 |
| Y | 24 | 21 | 21 | 20 | 13 | -13 | -12 | -13 | -15 |




(a) G.e.t. = 5 hours.

Figure 8.- Translunar coast - constant field of view (moon).

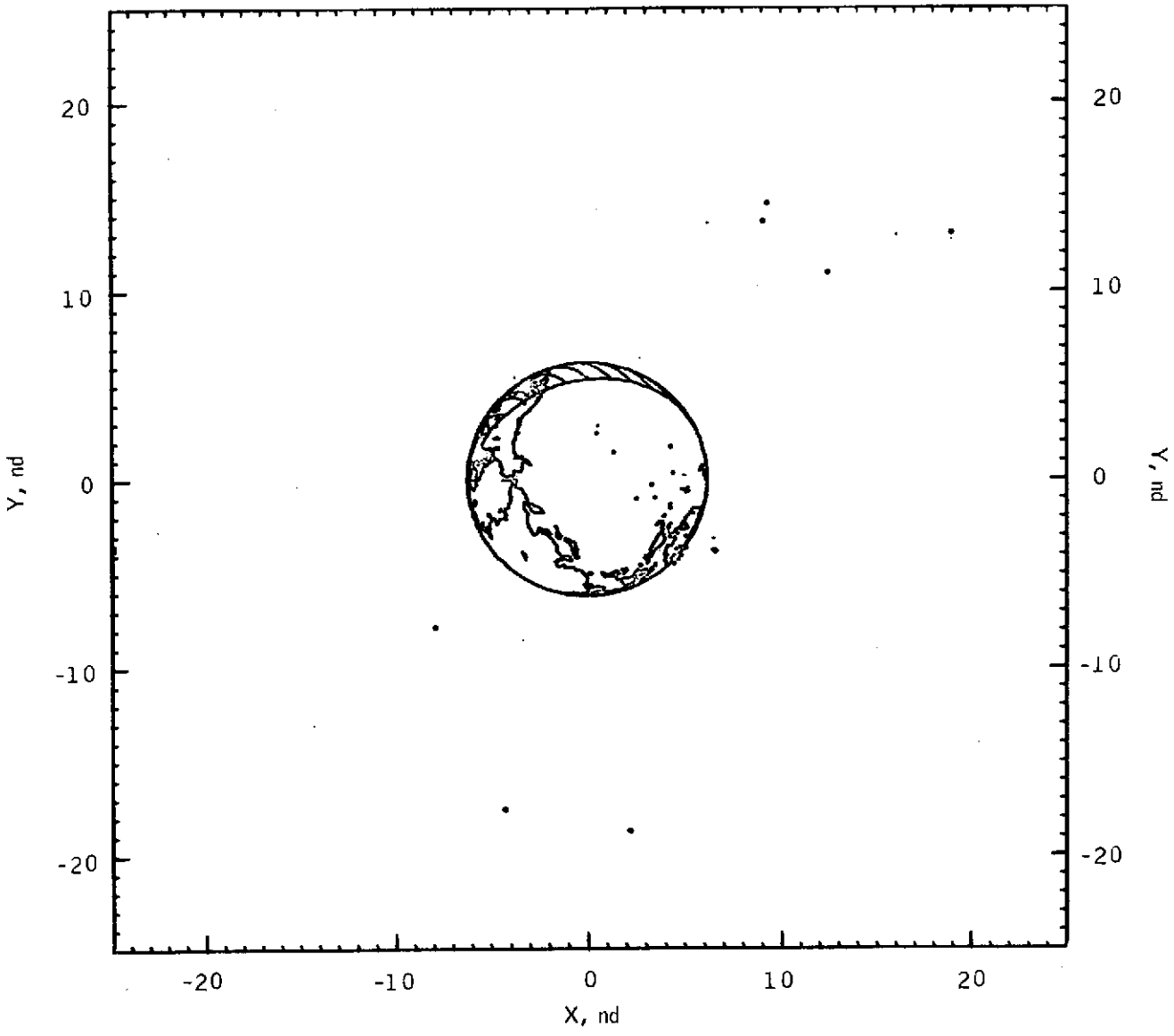
Reproduced from best available copy.

| SEQ | 789 | 793 | 797 | 812 | 841 | 844 | 851 | 871 |
|---|---|---|---|---|---|---|---|---|
| X | 9 | 9 | 13 | 12 | 5 | -7 | -4 | 2 |
| Y | 14 | 13 | 13 | 11 | -3 | -7 | -17 | -13 |

$R_E$ = 53 086 n. mi.
$V_i$ = 8521 fps

Field of view = 30°

$h_E$ = 57 130 stat. mi.
$V_i$ = 5809 mph




(b) G.e.t. = 10 hours.

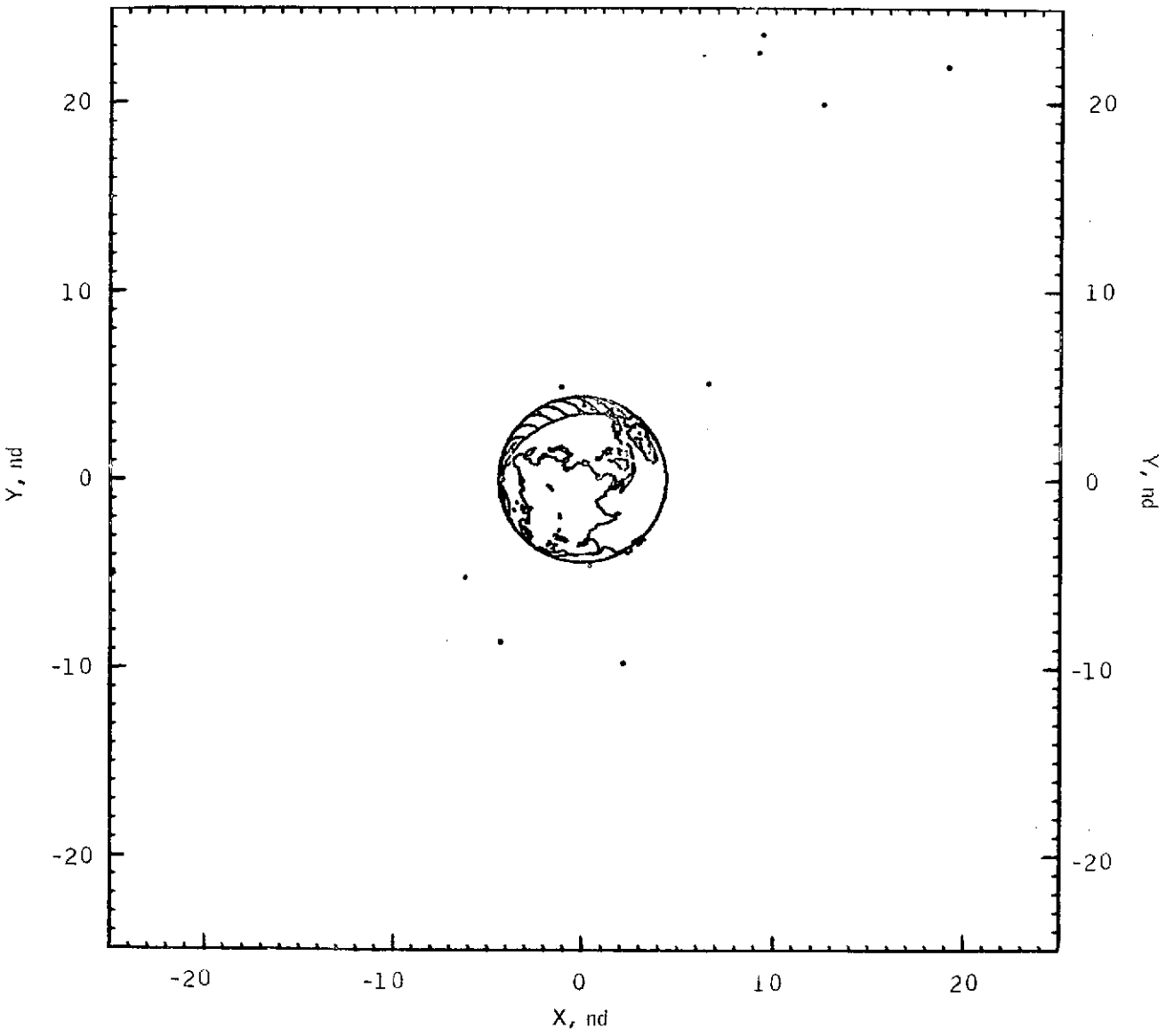
Figure 8. - Continued.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| $S^tQ$ | 789 | 793 | 797 | 802 | 836 | 841 | 844 | 861 | 871 |
| X | 9 | 9 | 19 | 12 | -1 | 6 | -7 | -4 | 2 |
| Y | 23 | 22 | 22 | 20 | 5 | 5 | 1 | -1 | -7 |

$R_E$ = 74 823 n. mi.
$V_i$ = 6876 fps

Field of view = 30°

$h_E$ = 82 145 stat. mi.
$V_i$ = 4688 mph




(c) G.e.t. = 15 hours.

Figure 8.- Continued.

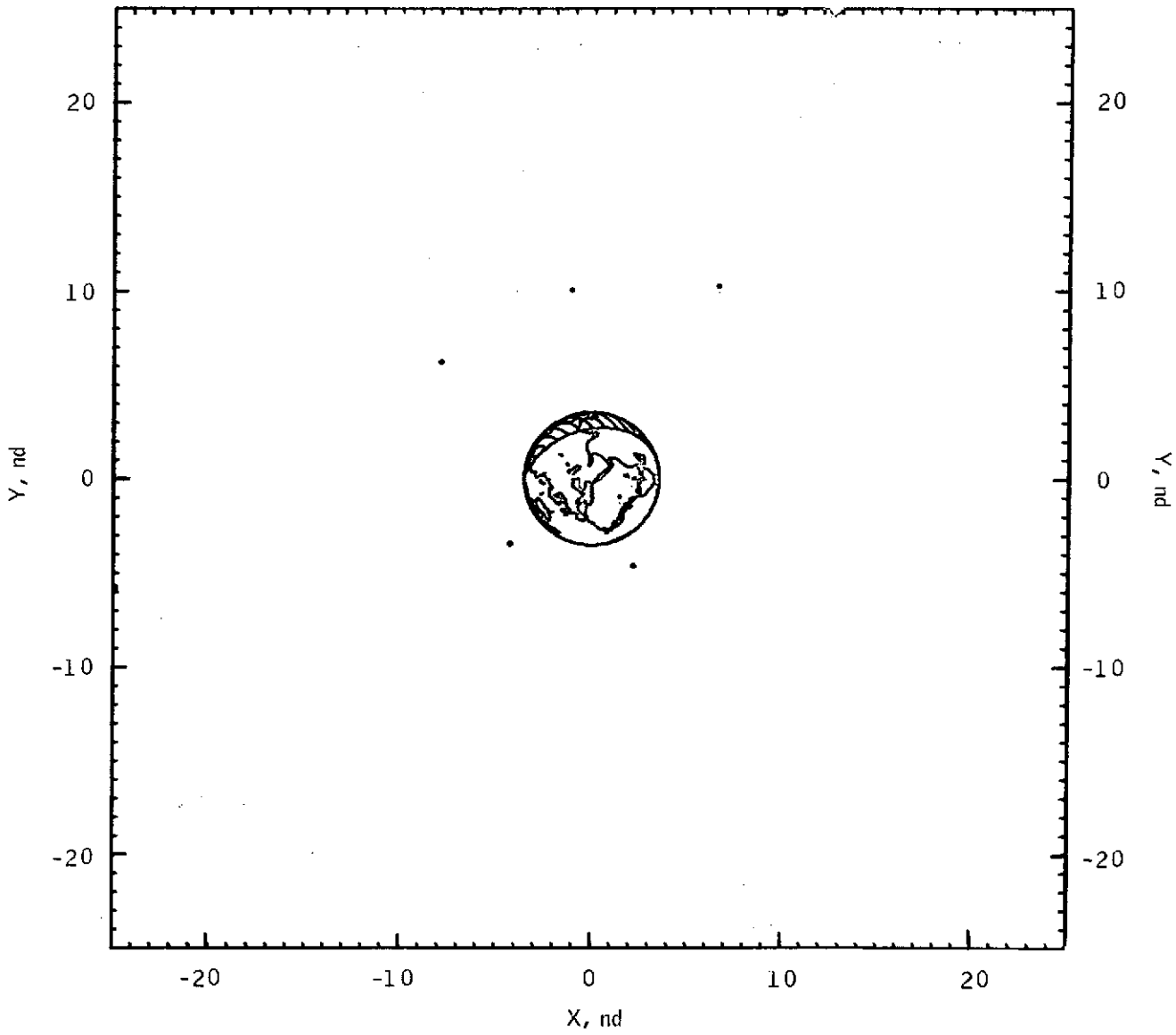
Reproduced from best available copy.

| STG | 802 | 836 | 841 | [illegible] | 861 | 871 |
|---|---|---|---|---|---|---|
| X | 12 | -1 | 6 | [illegible] | -4 | 2 |
| Y | 25 | 10 | 10 | [illegible] | -3 | -4 |

$R_E$ = 93 139 n. mi.
$V_i$ = 5926 fps

Field of view = 30°

$h_E$ = 103 222 stat. mi.
$V_i$ = 4040 mph




(d) G.e.t. = 20 hours.

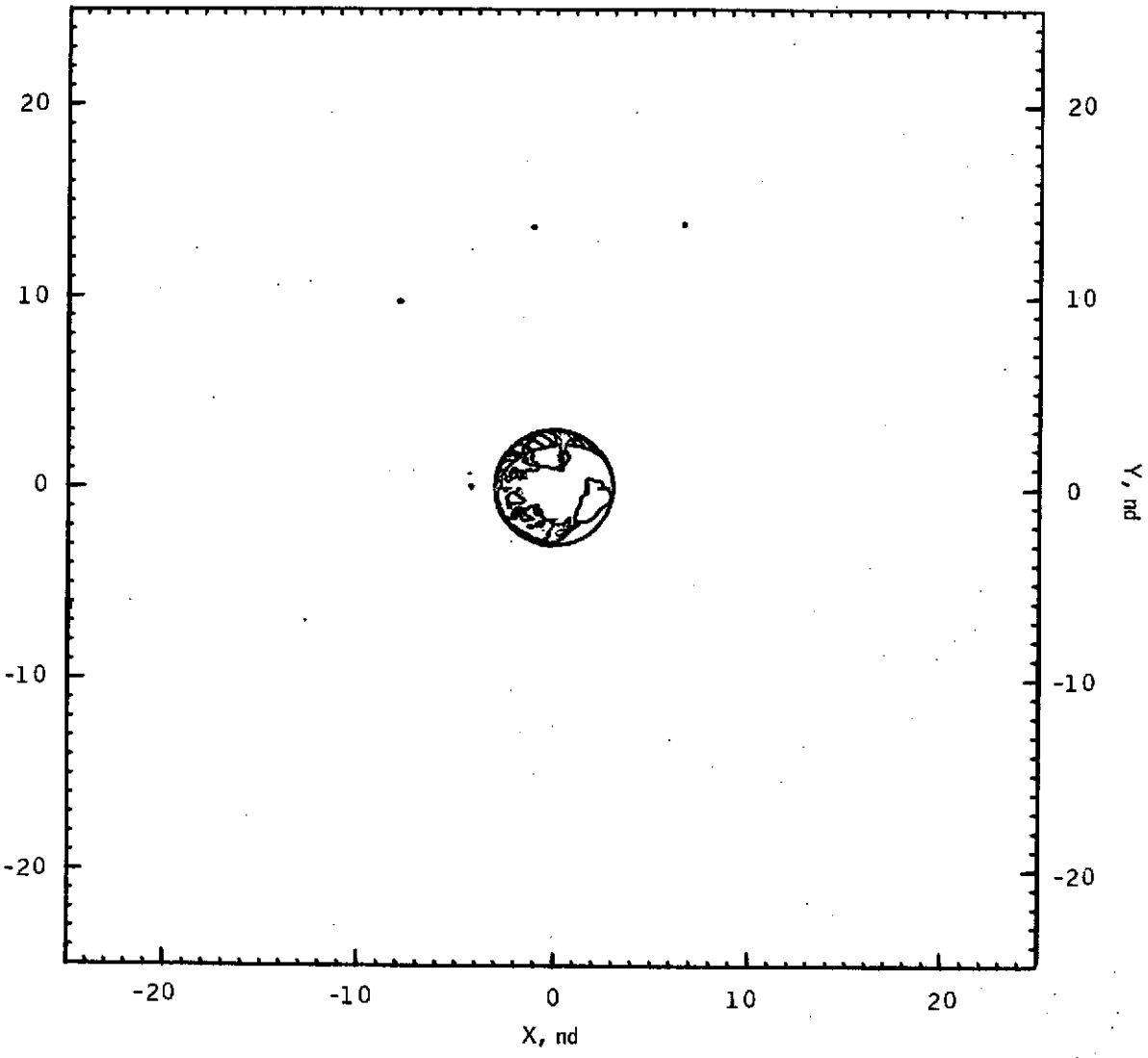
Figure 8.- Continued.

| SEQ | 836 | 841 | 844 | 861 |
|---|---|---|---|---|
| X | -1 | 6 | -7 | -4 |
| Y | 13 | 13 | 9 | 0 |

$R_E$ = 109 252 n. mi.
$V_i$ = 5273 fps

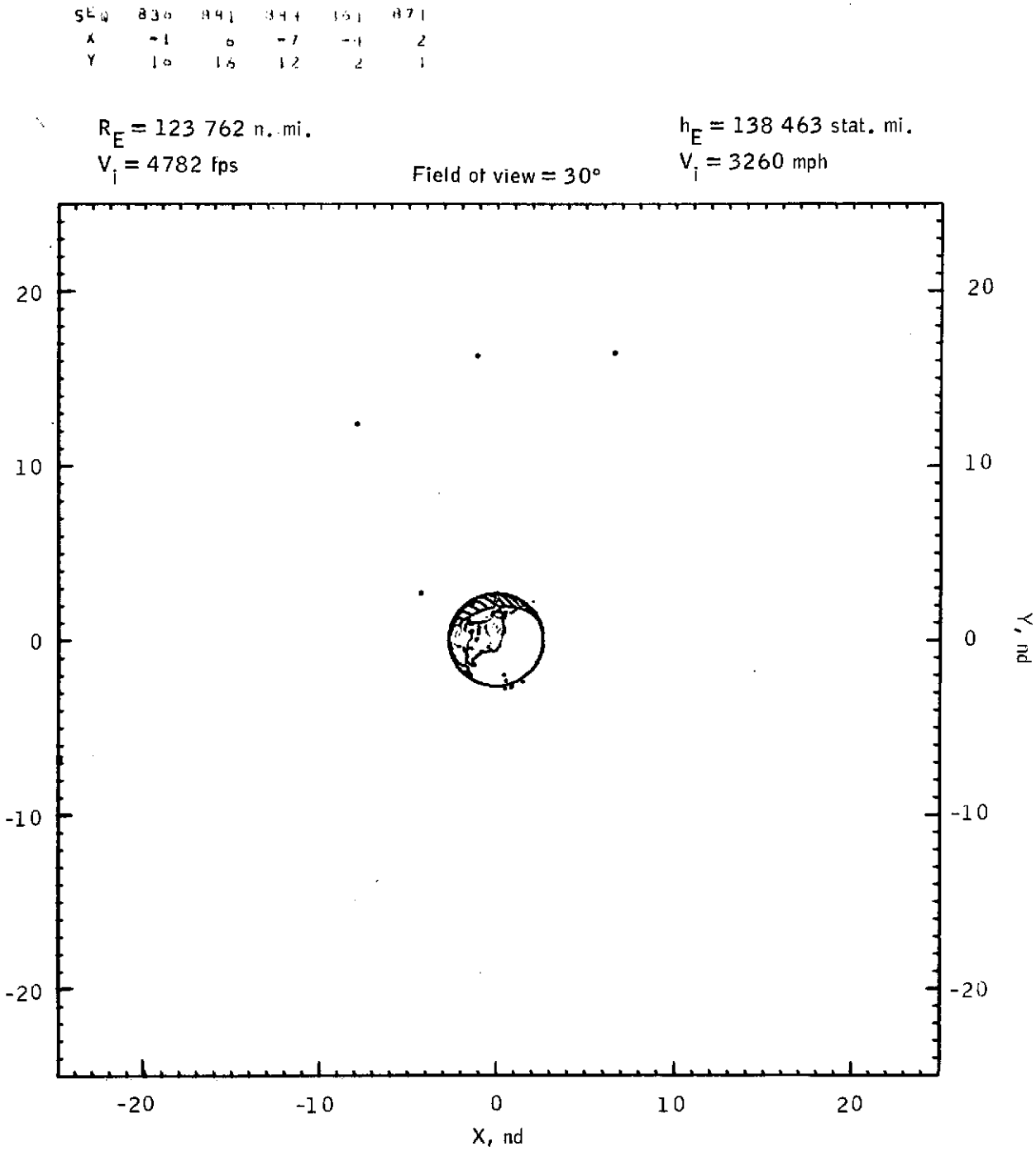
Field of view = 30°

$h_E$ = 121 765 stat. mi.
$V_i$ = 3592 mph




(e) G.e.t. = 25 hours.

Figure 8.- Continued.




(f) G.e.t. = 30 hours.

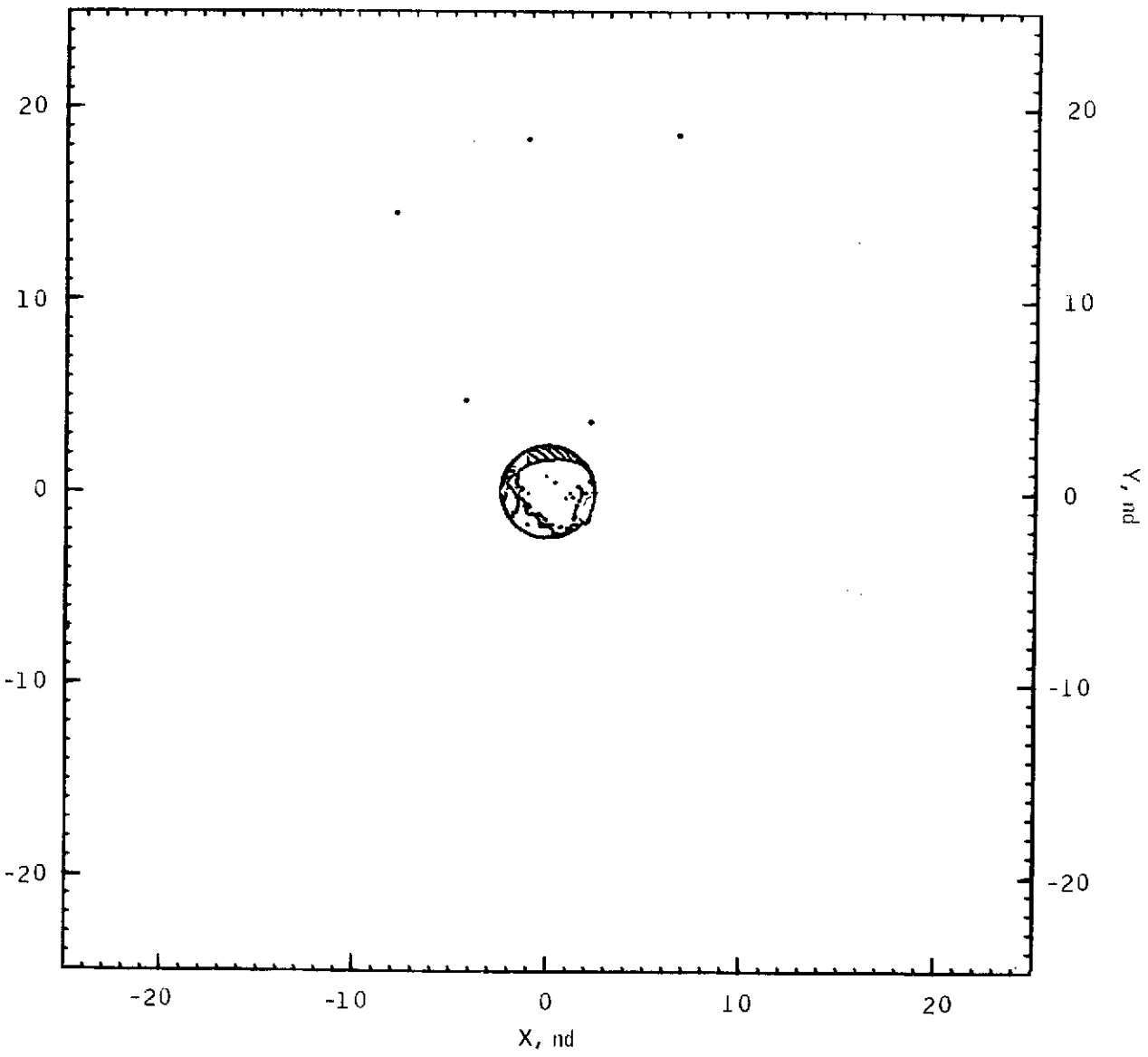
Figure 8.- Continued.

| SEQ | 836 | 841 | 849 | 861 | 871 |
|---|---|---|---|---|---|
| X | -1 | 5 | -7 | -9 | 2 |
| Y | 18 | 18 | 14 | 4 | 3 |

$R_E$ = 137 022 n. mi.
$V_i$ = 4391 fps

Field of view = 30°

$h_E$ = 153 721 stat. mi.
$V_i$ = 2994 mph




(g) G.e.t. = 35 hours.

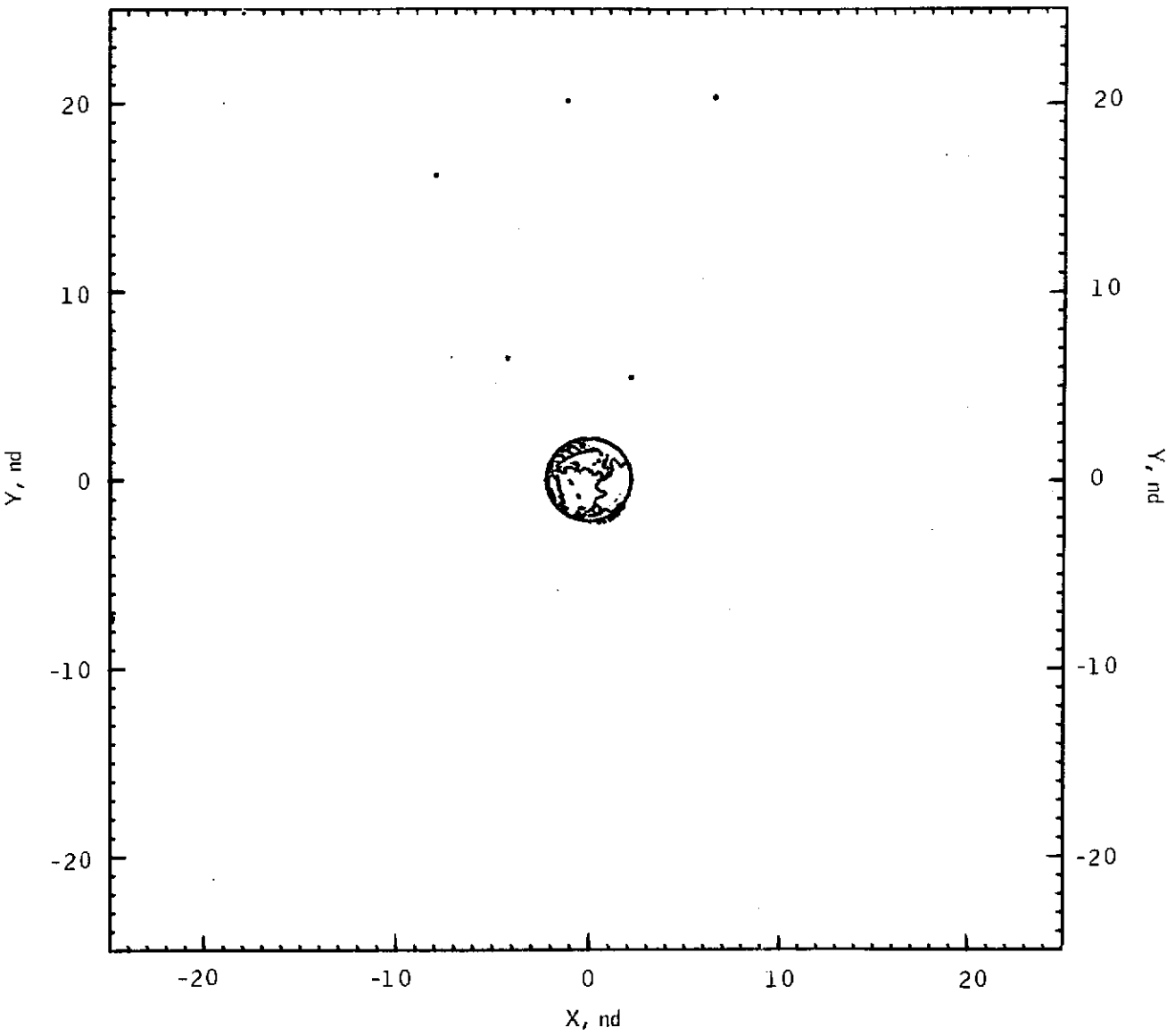
Figure 8.- Continued.

| SEQ | 836 | 841 | 844 | 861 | 871 |
|---|---|---|---|---|---|
| X | -1 | 6 | -7 | -4 | 2 |
| Y | 20 | 20 | 18 | 6 | 5 |

$R_E$ = 149 265 n. mi.
$V_i$ = 4068 fps

$h_E$ = 167 810 stat. mi.
$V_i$ = 2774 mph

Field of view = 30°




(h) G.e.t. = 40 hours.

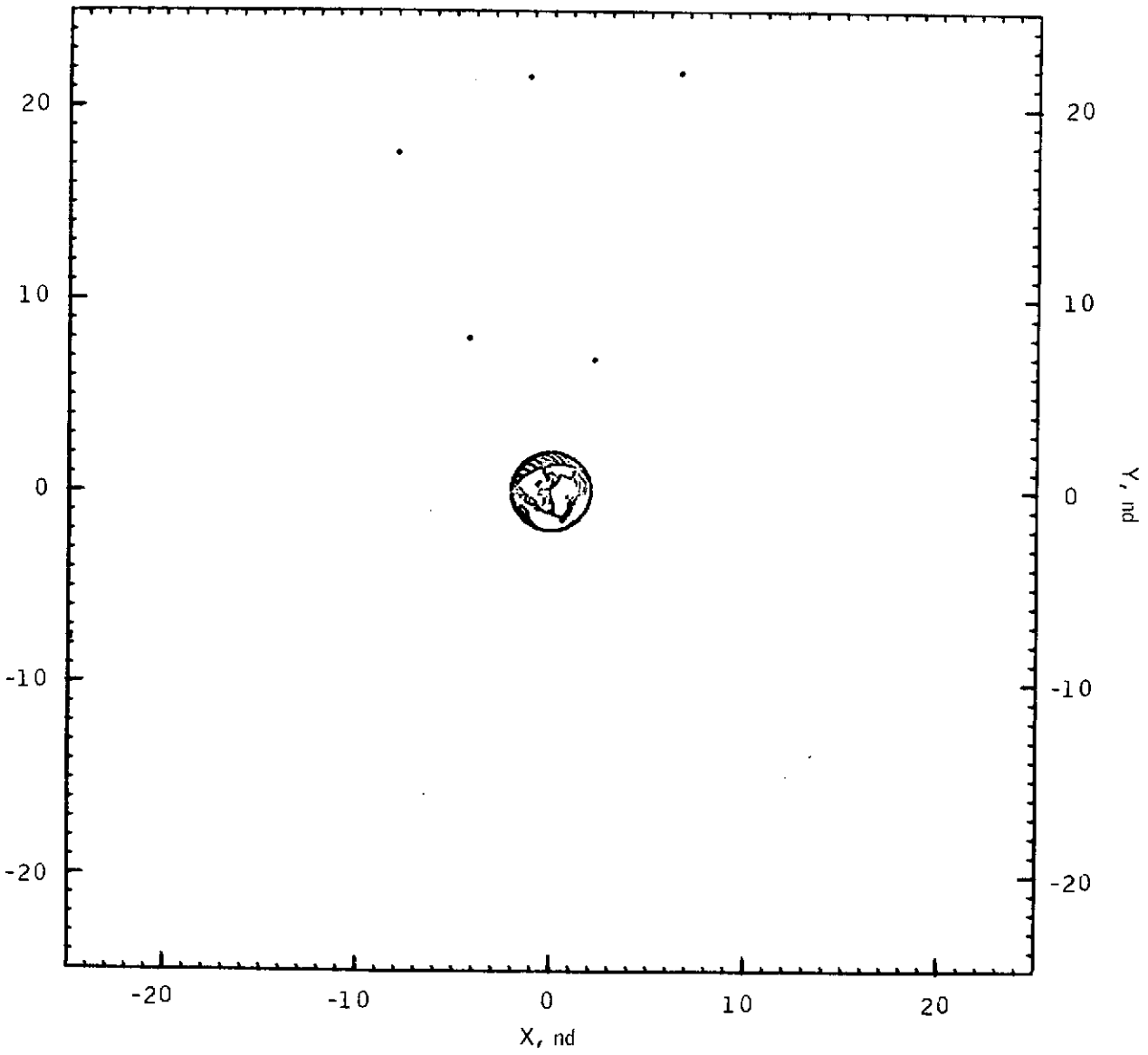
Figure 8. - Continued.

| SEG | 836 | 841 | 844 | 861 | 871 |
|---|---|---|---|---|---|
| X | -1 | 6 | -6 | -4 | 2 |
| Y | 21 | 21 | 17 | 6 | 7 |

$R_E$ = 160 655 n. mi.
$V_i$ = 3794 fps

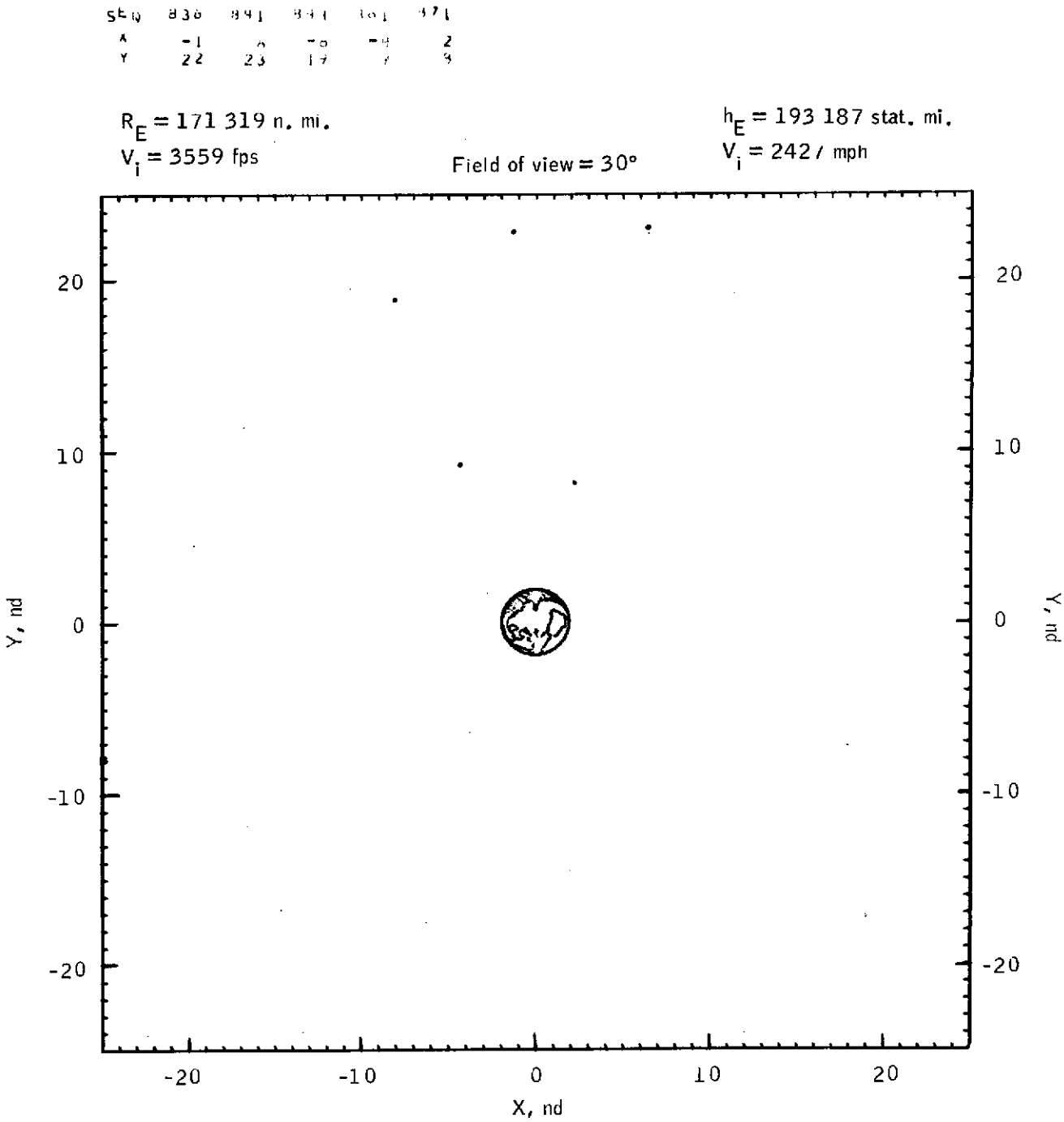
Field of view = 30°

$h_E$ = 180 917 stat. mi.
$V_i$ = 2587 mph




(i) G.e.t. = 45 hours.

Figure 8.- Continued.




(j) G.e.t. = 50 hours.

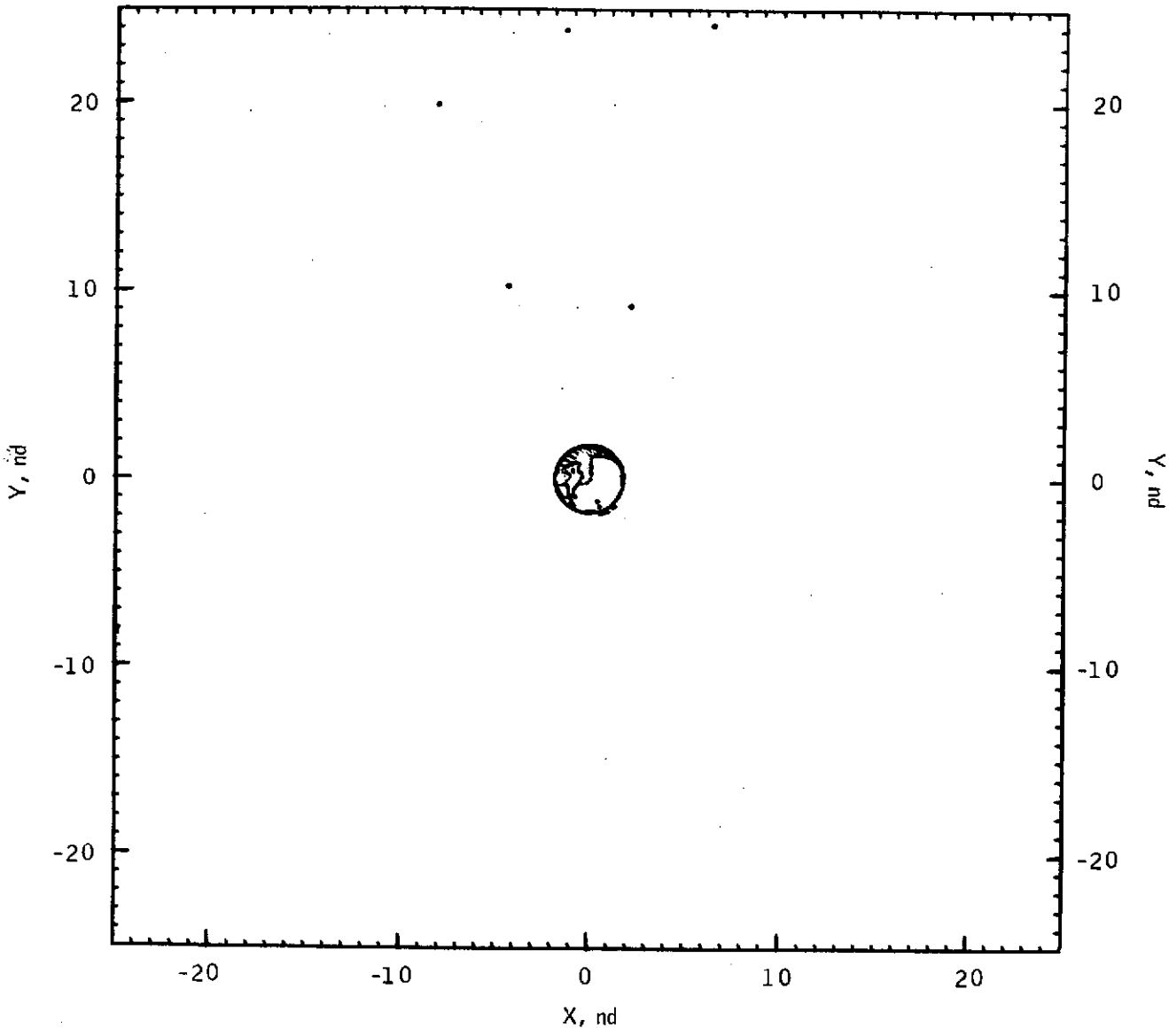
Figure 8.- Continued.

| SEQ | 836 | 841 | 844 | 861 | 871 |
|---|---|---|---|---|---|
| X | -1 | 6 | -6 | -4 | 2 |
| Y | 24 | 24 | 20 | 10 | 9 |

$R_E$ = 181 358 n. mi.
$V_i$ = 3356 fps

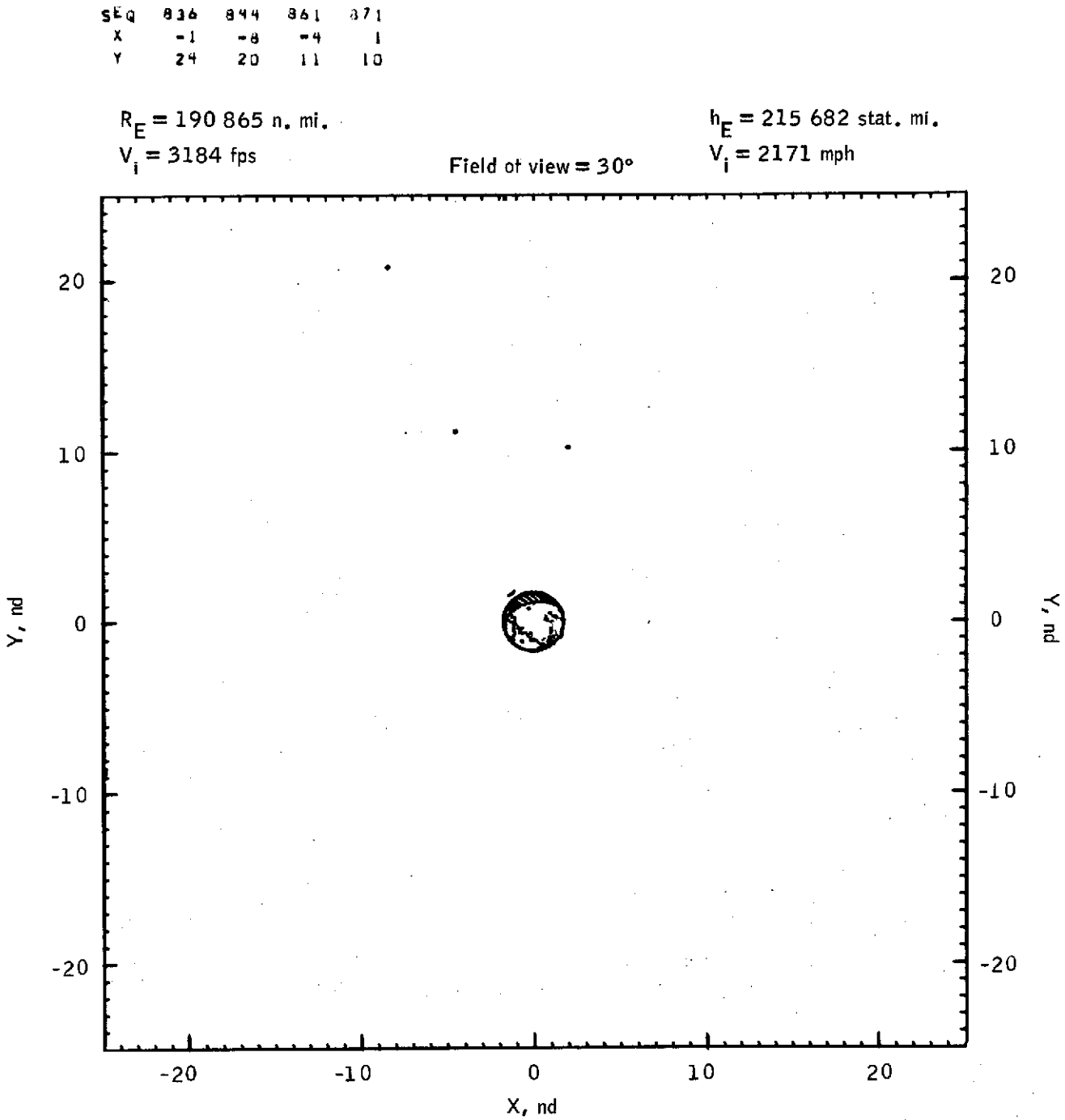
Field of view = 30°

$h_E$ = 204 742 stat. mi.
$V_i$ = 2288 mph



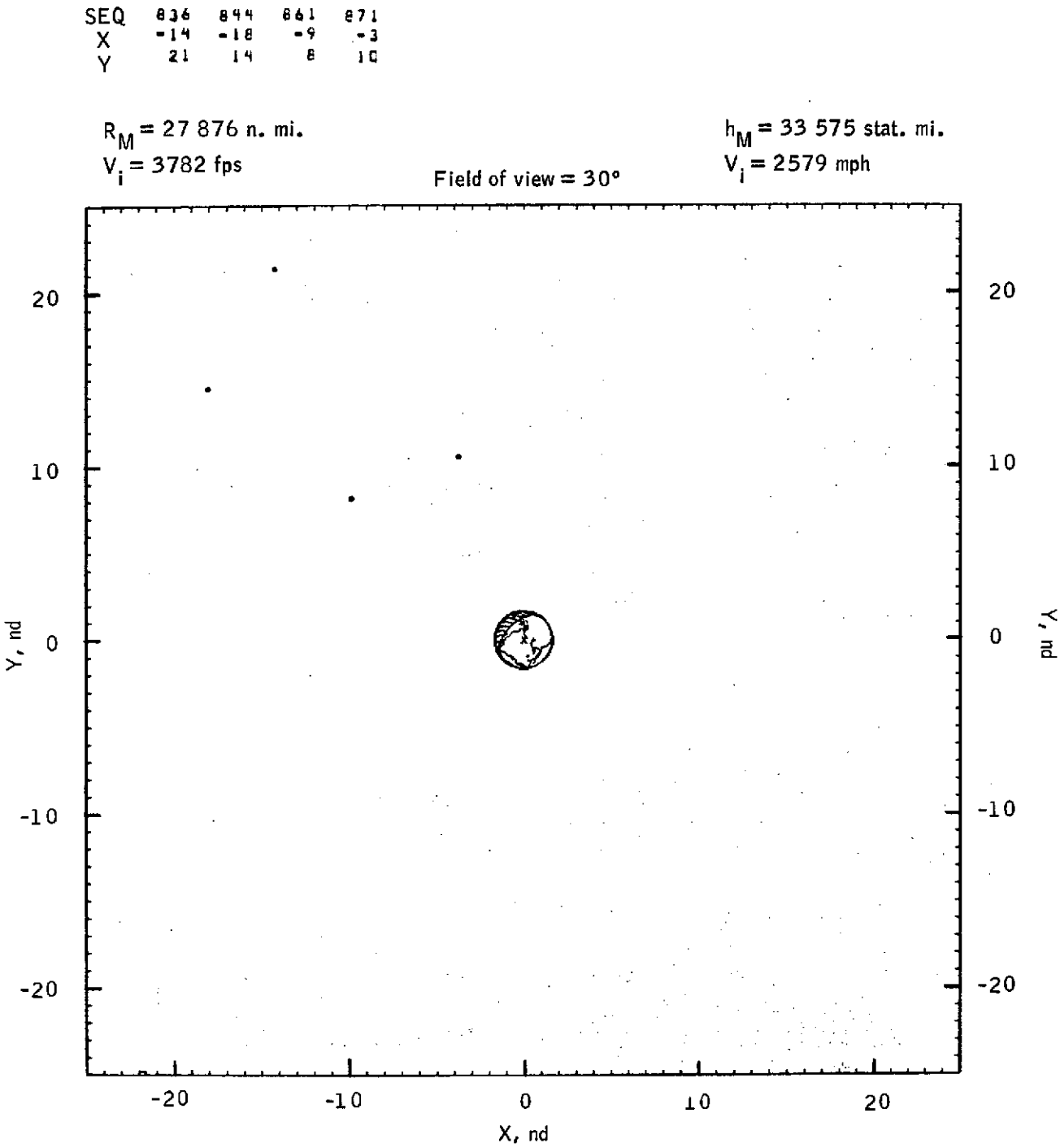

(k) G.e.t. = 55 hours.

Figure 8.- Continued.



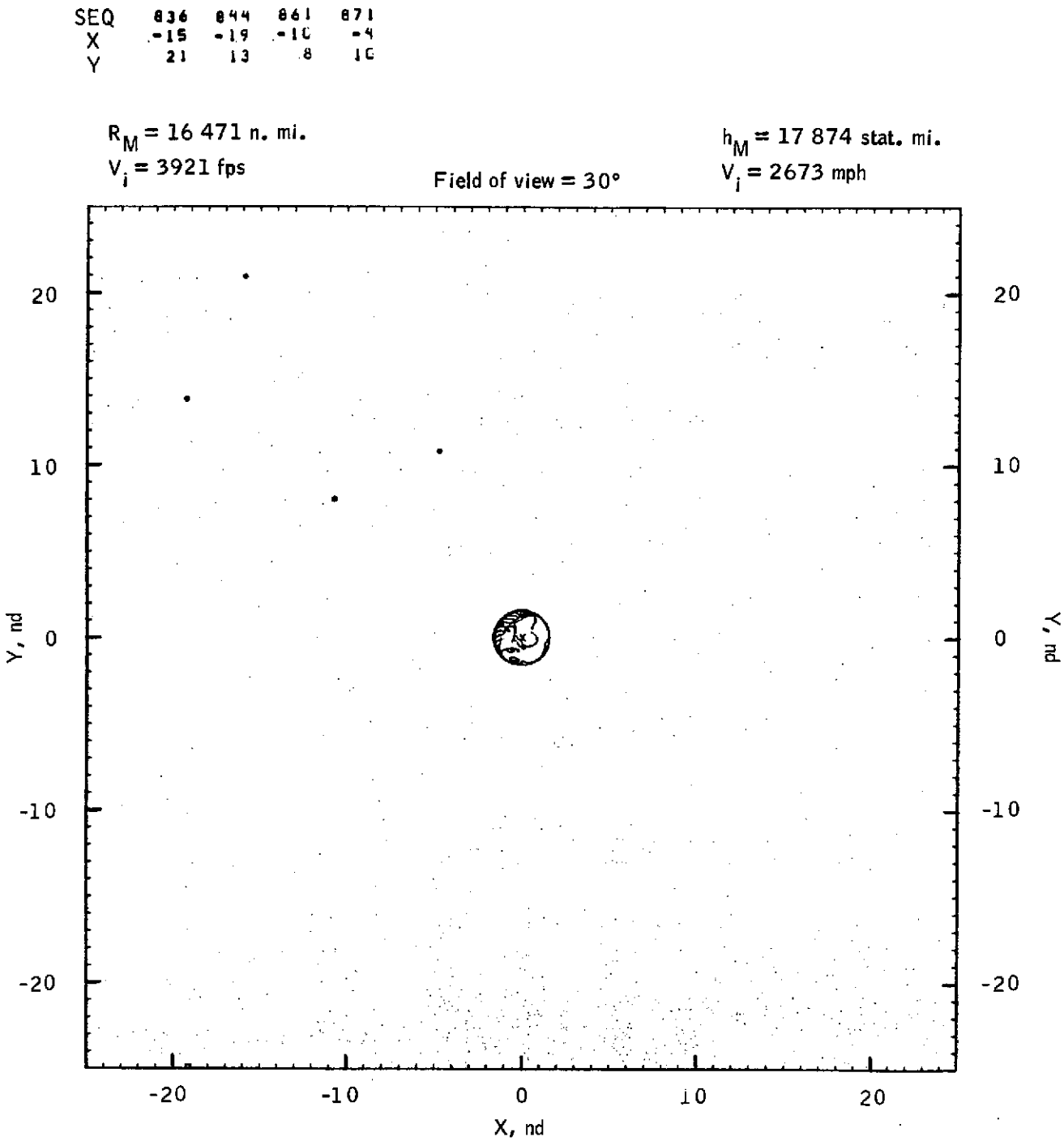

(l) G.e.t. = 60 hours.

Figure 8.- Continued.



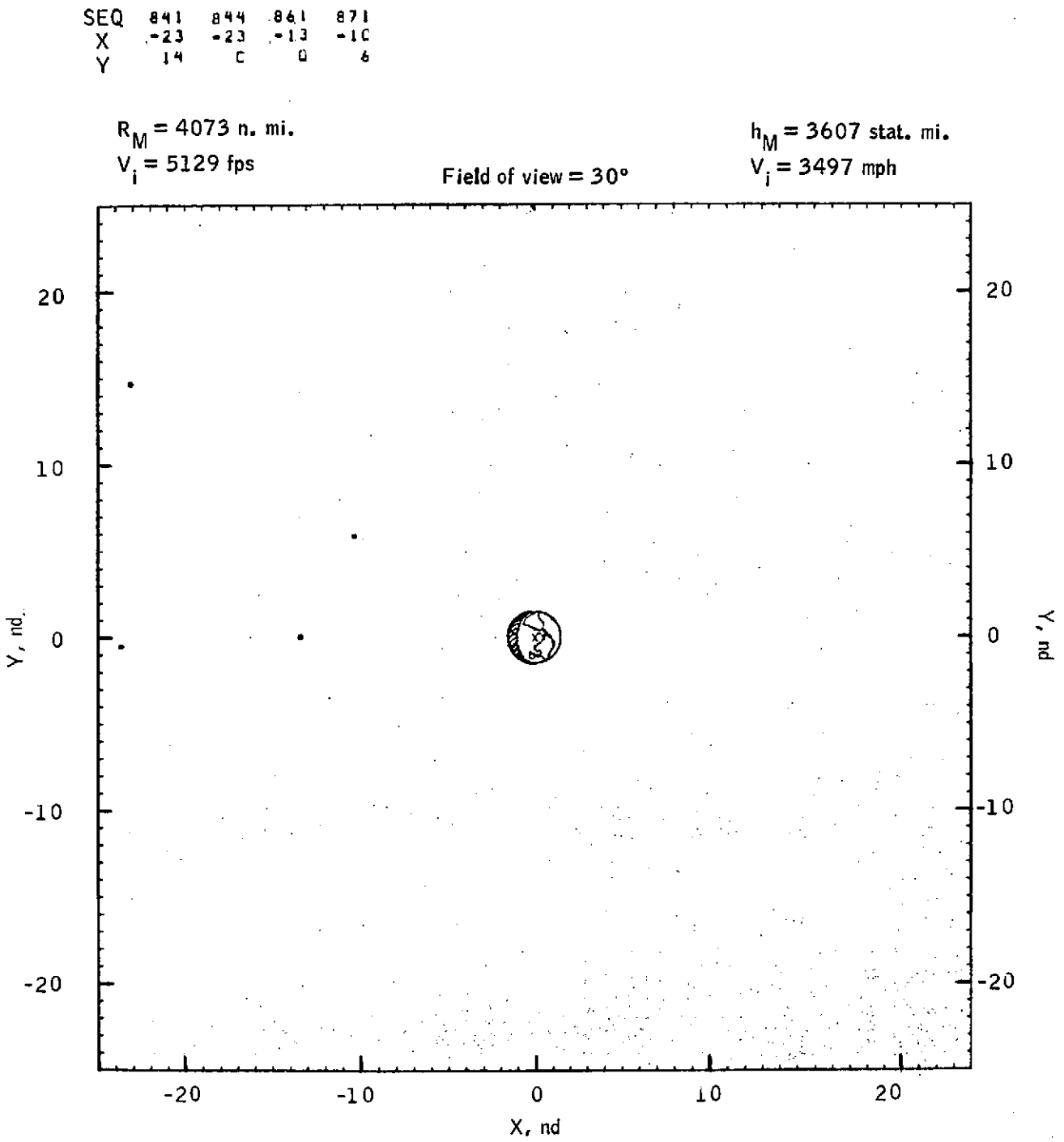

(m) G.e.t. = 65 hours.

Figure 8.- Continued.




(n) G.e.t. = 70 hours.

Figure 8. - Continued.




(o) G.e.t. = 75 hours.

Figure 8.- Concluded.

EARTH VIEWS

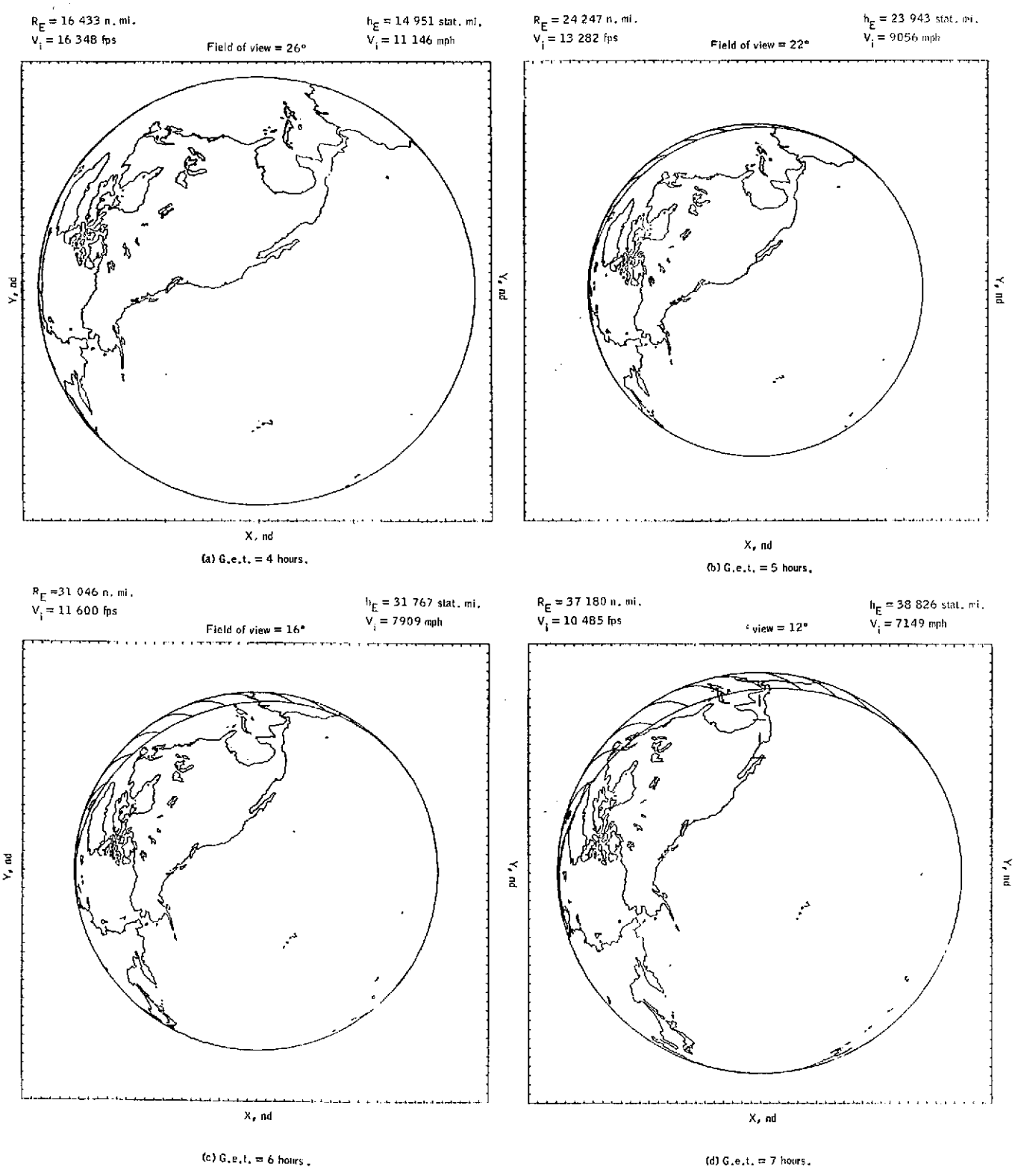
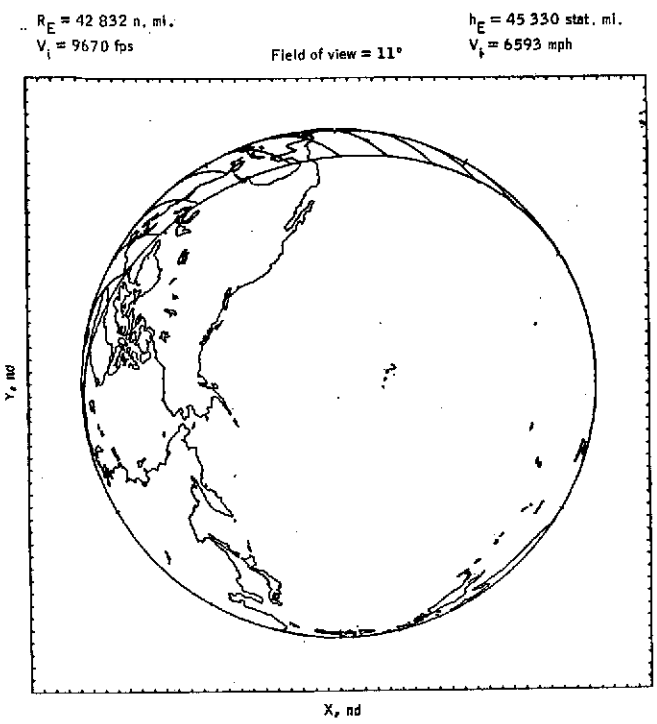
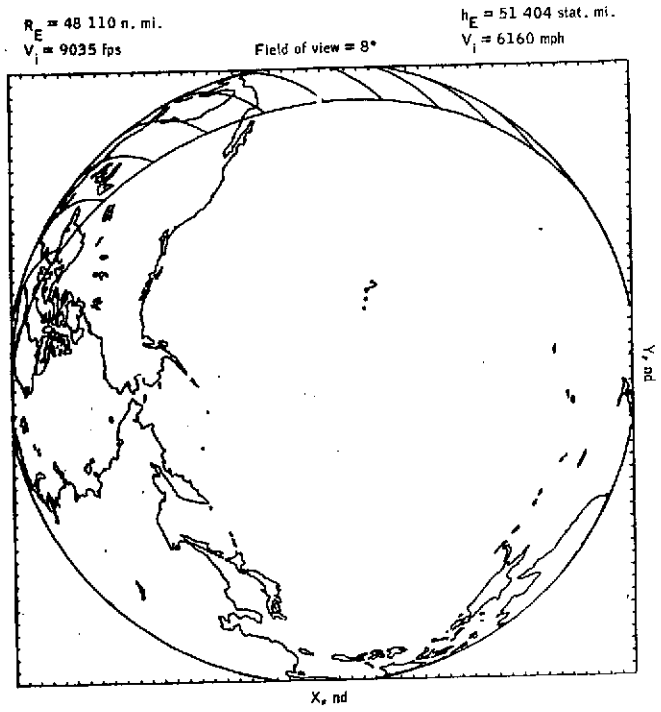


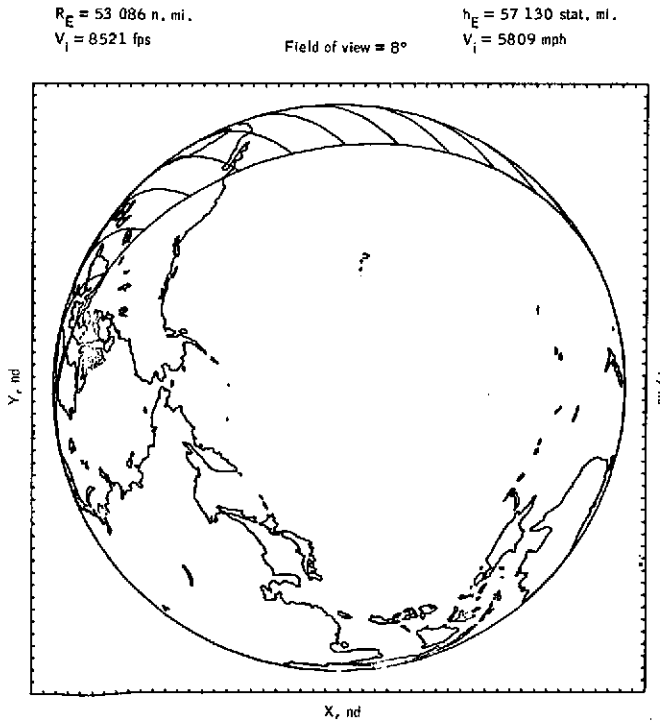

Figure 9.- Translunar coast- variable field of view (earth).



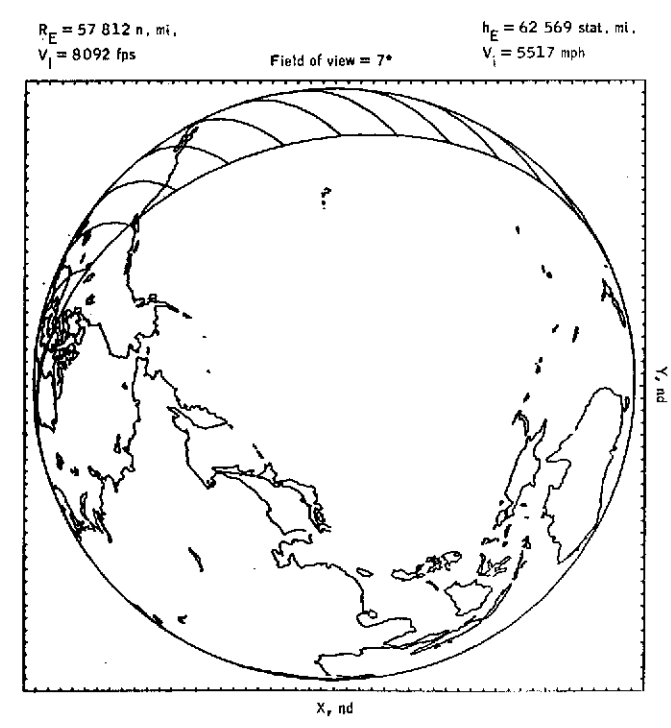

(e) G.e.t. = 8 hours.




(f) G.e.t. = 9 hours.




(g) G.e.t. = 10 hours.



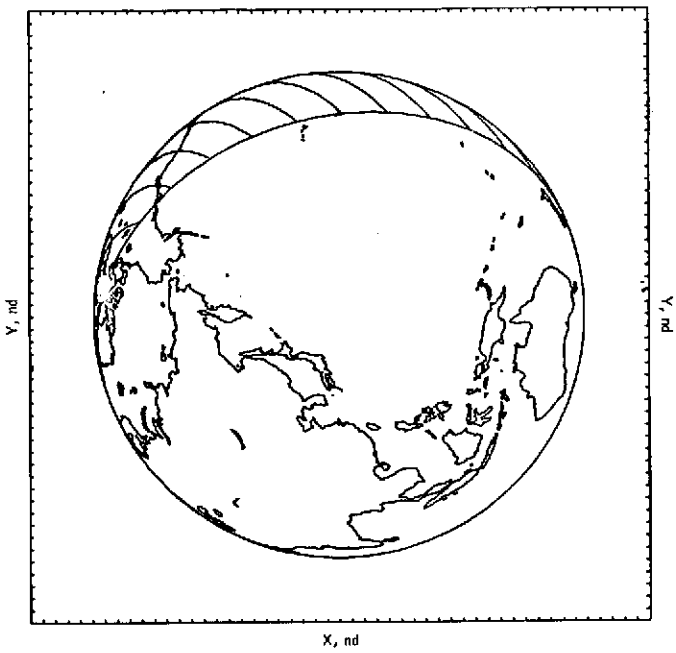

(h) G.e.t. = 11 hours.

Figure 9.- Continued.

$R_E$ = 62 323 n. mi.
$V_i$ = 7725 fps

Field of view = 8°

$h_E$ = 67 760 stat. mi.
$V_i$ = 5267 mph

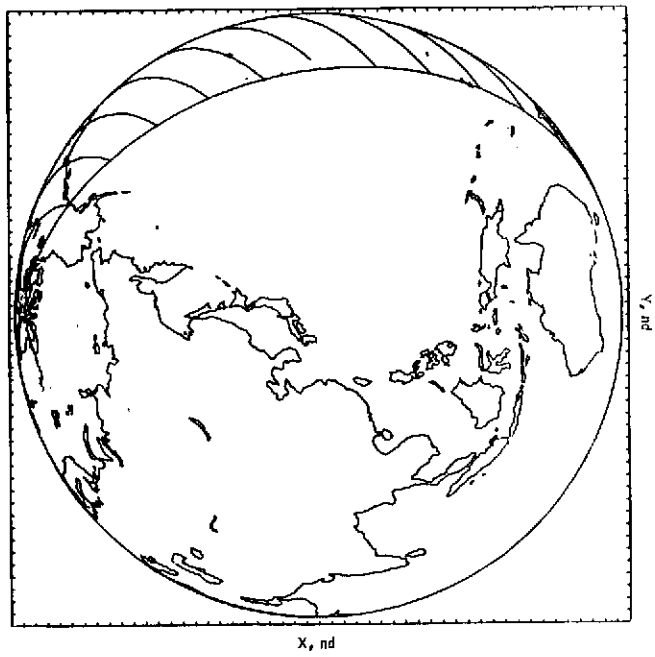



(i) G.e.t. = 12 hours.

$R_E$ = 66 648 n. mi.
$V_i$ = 7407 fps

Field of view = 6°

$h_E$ = 72 737 stat. mi.
$V_i$ = 5050 mph

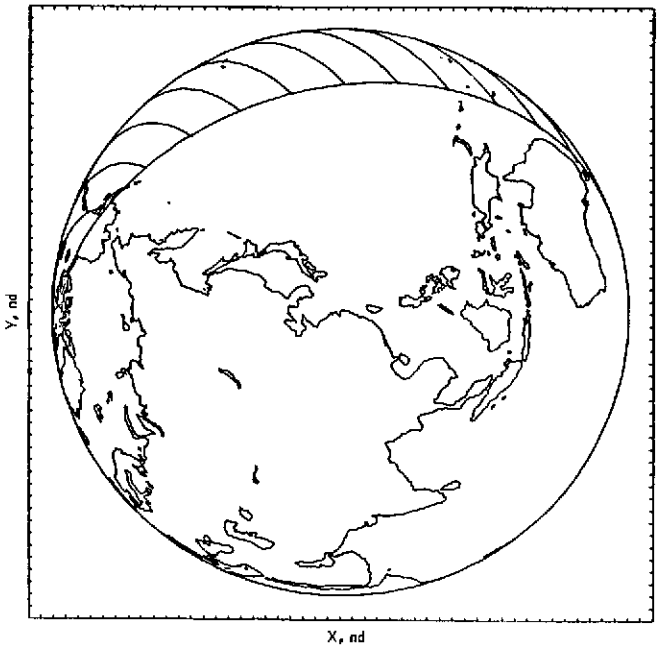



(j) G.e.t. = 13 hours.

$R_E$ = 708 08 n. mi.
$V_i$ = 7126 fps

Field of view = 6°

$h_E$ = 77 524 stat. mi.
$V_i$ = 4859 mph

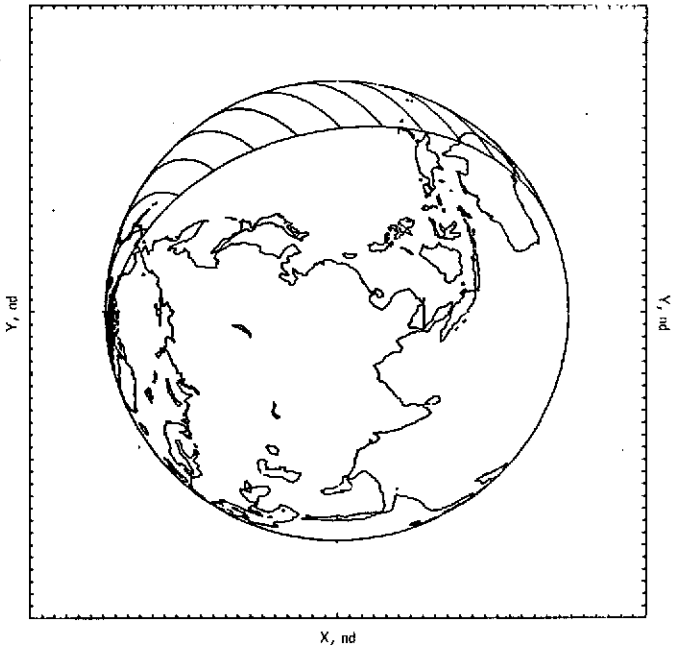



(k) G.e.t. = 14 hours.

$R_E$ = 74 823 n. mi.
$V_i$ = 6876 fps

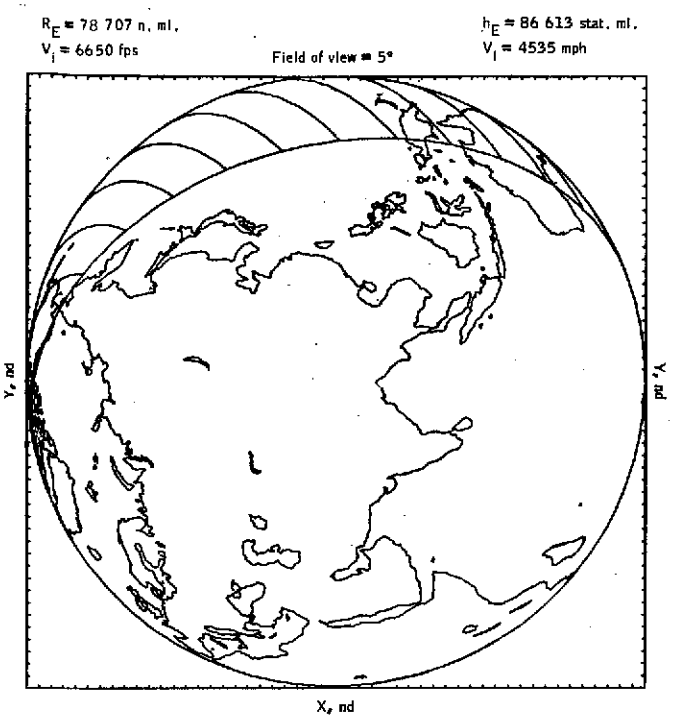
Field of view = 7°

$h_E$ = 82 145 stat. mi.
$V_i$ = 4688 mph

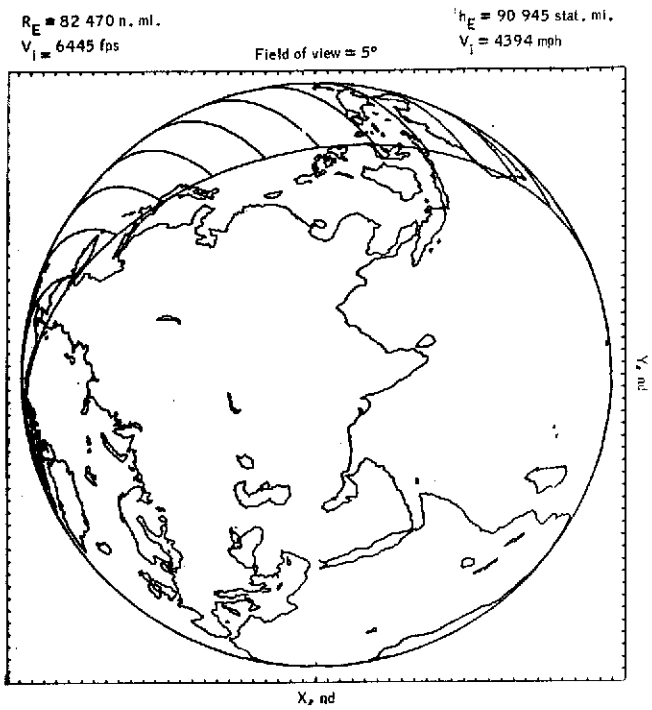



(l) G.e.t. = 15 hours

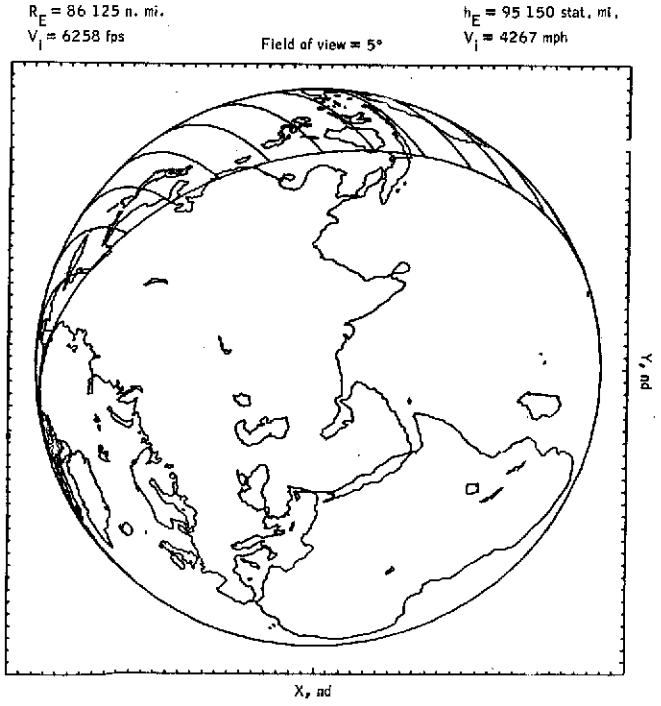
Figure 9.- Continued.



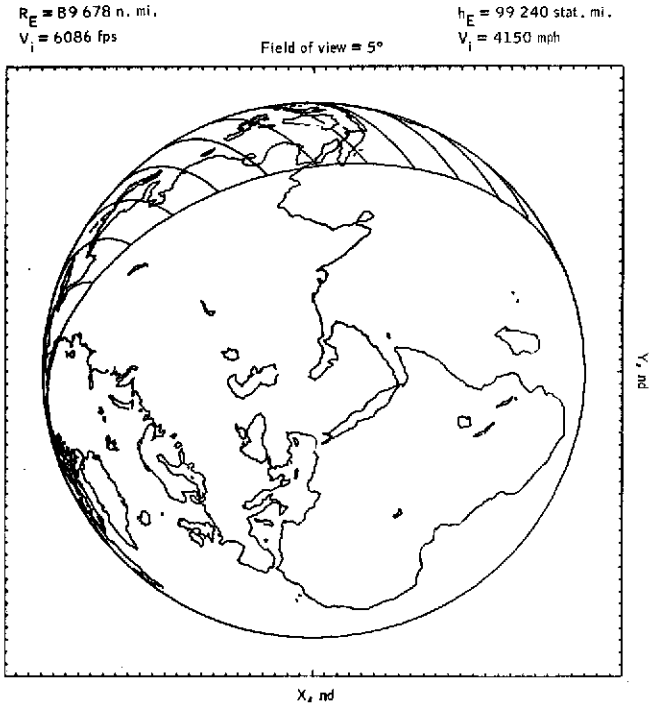

(m) G.e.t. = 16 hours.




(n) G.e.t. = 17 hours.



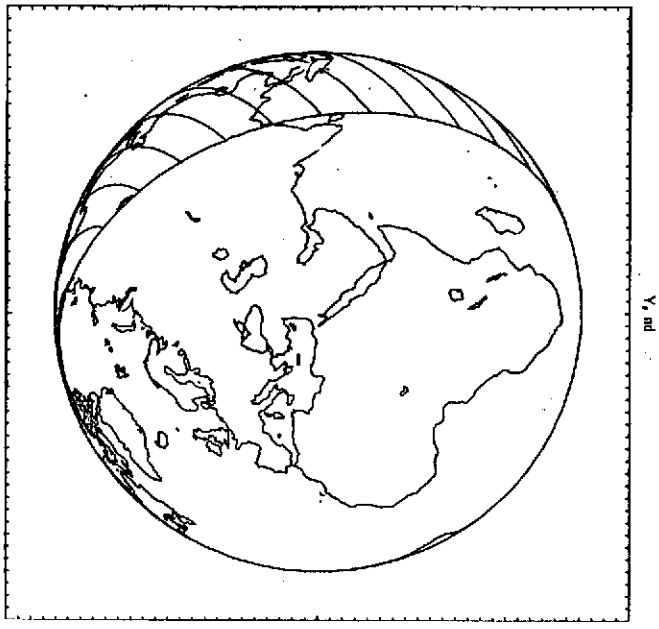

(o) G.e.t. = 18 hours.




(p) G.e.t. = 19 hours.

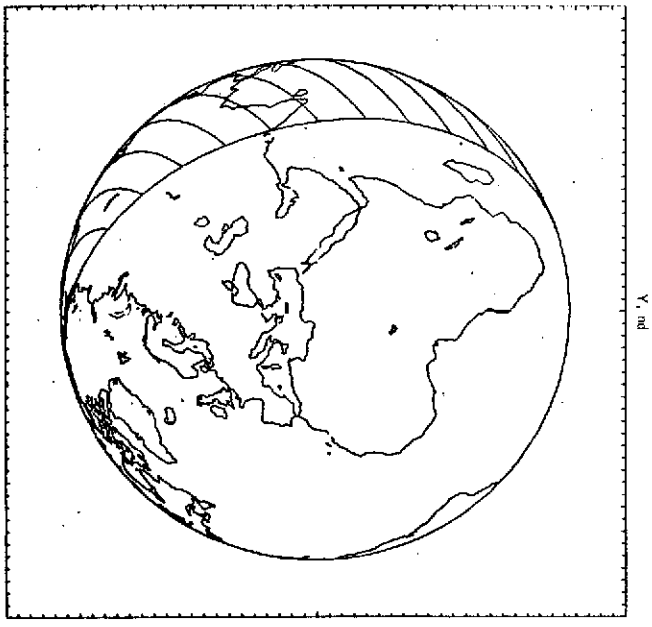
Figure 9.- Continued.

$R_E$ = 93 139 n. mi.
$V_i$ = 5926 fps
Field of view = 5°
$h_E$ = 103 222 stat. mi.
$V_i$ = 4040 mph



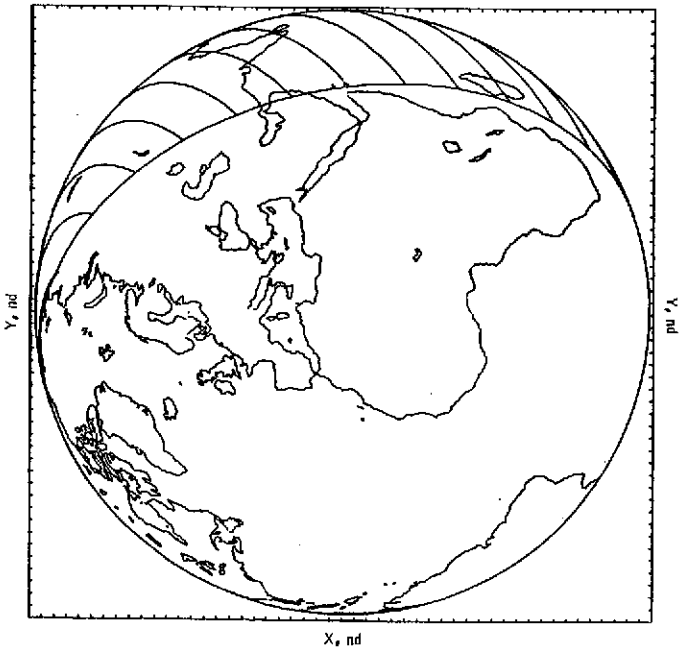

(q) G.e.t. = 20 hours.

$R_E$ = 96 514 n. mi.
$V_i$ = 5436 fps
Field of view = 5°
$h_E$ = 107 105 stat. mi.
$V_i$ = 3706 mph



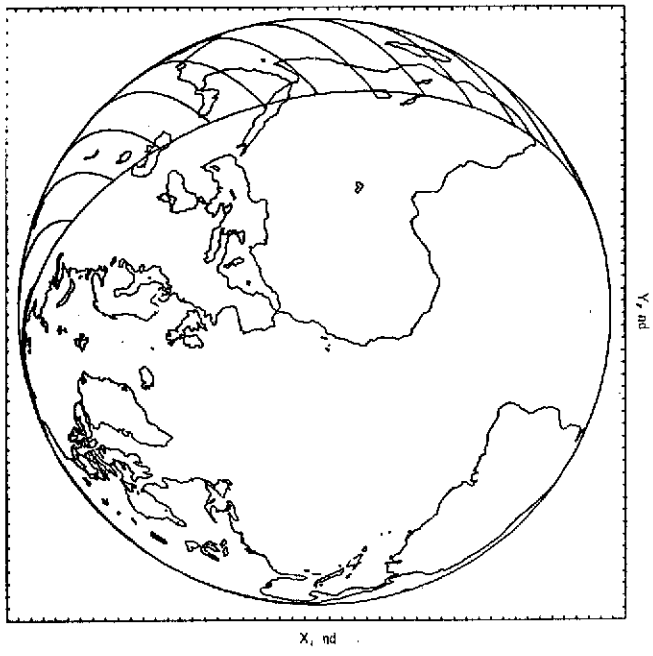

(r) G.e.t. = 21 hours.

$R_E$ = 99 807 n. mi.
$V_i$ = 5640 fps
Field of view = 4°
$h_E$ = 110 896 stat. mi.
$V_i$ = 3845 mph




(s) G.e.t. = 22 hours.

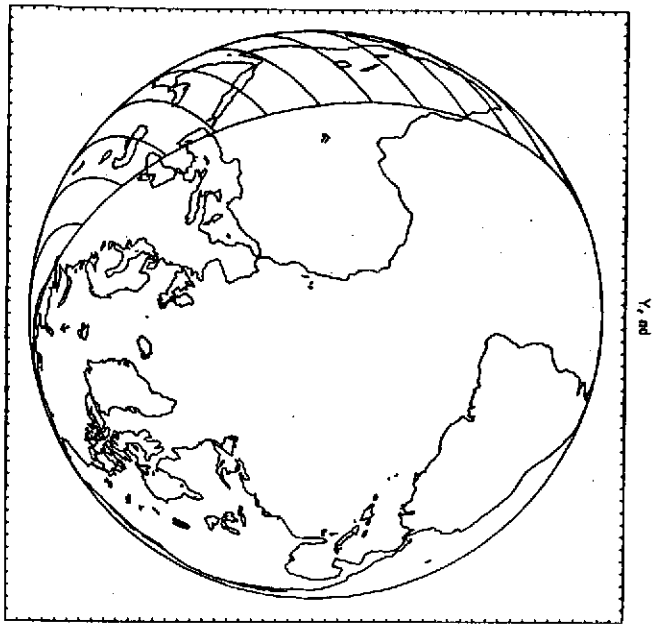
$R_E$ = 103 025 n. mi.
$V_i$ = 5510 fps
Field of view = 4°
$h_E$ = 114 599 stat. mi.
$V_i$ = 3757 mph




(t) G.e.t. = 23 hours.

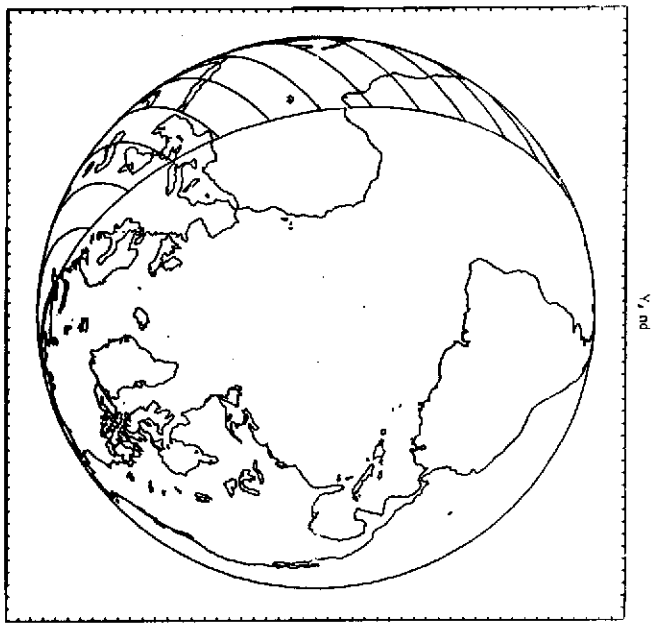
Figure 9. - Continued.

$R_E$ = 106 172 n. mi.
$V_i$ = 5388 fps
Field of view = 4°
$h_E$ = 116 781 stat. mi.
$V_i$ = 3674 mph



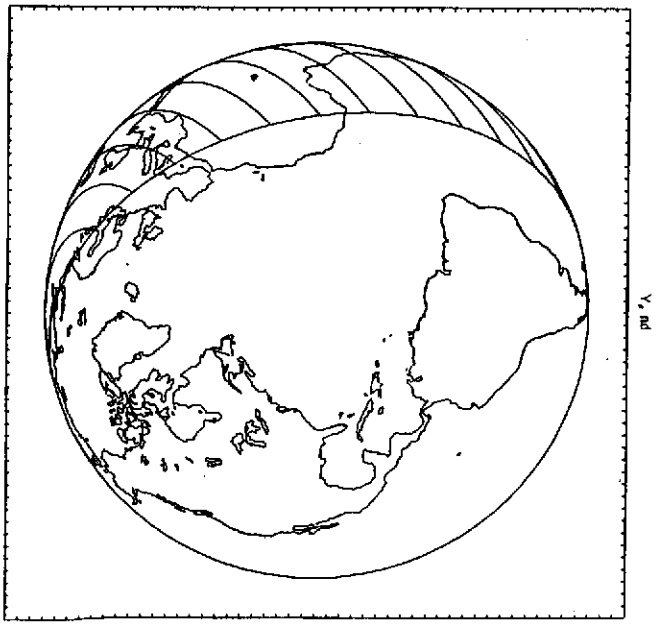

(u) G.e.t. = 24 hours.

$R_E$ = 109 252 n. mi.
$V_i$ = 5273 fps
Field of view = 4°
$h_E$ = 121 765 stat. mi.
$V_i$ = 3592 mph



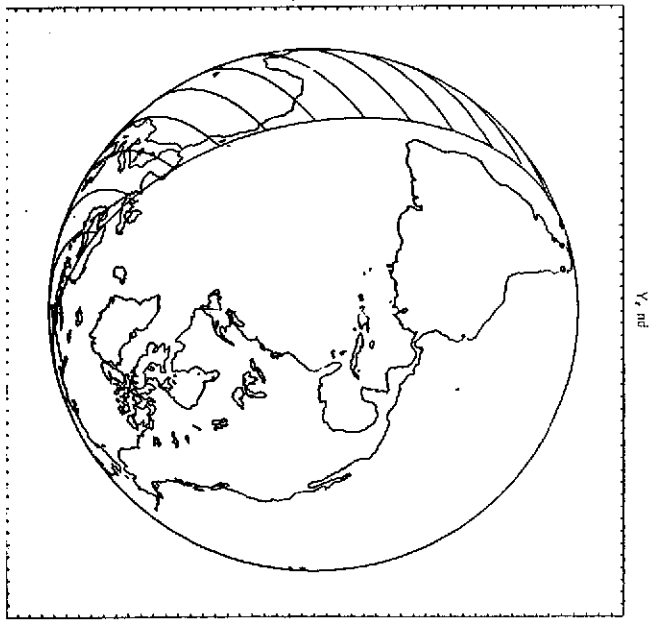

(v) G.e.t. = 25 hours.

$R_E$ = 112 268 n. mi.
$V_i$ = 5165 fps
Field of view = 4°
$h_E$ = 125 236 stat. mi.
$V_i$ = 3522 mph



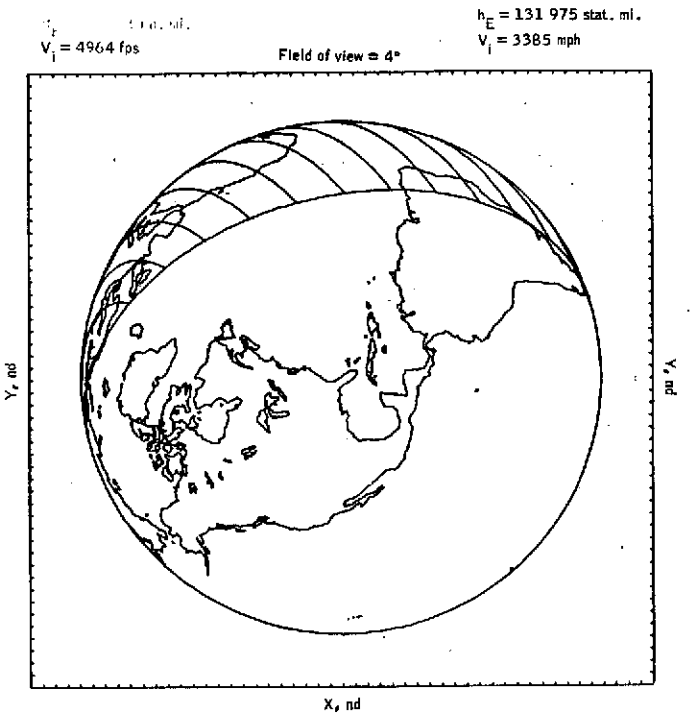

(w) G.e.t. = 26 hours.

$R_E$ = 115 225 n. mi.
$V_i$ = 5062 fps
Field of view = 4°
$h_E$ = 128 637 stat. mi.
$V_i$ = 3451 mph

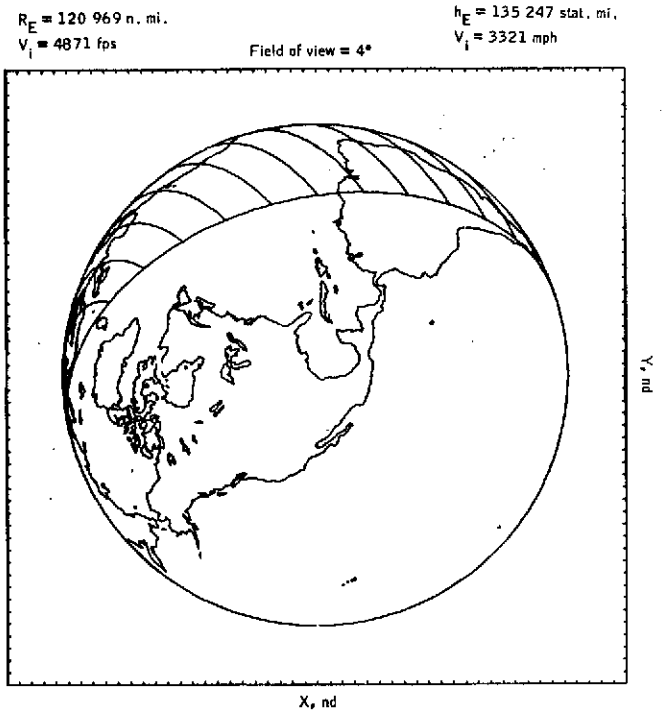



(x) G.e.t. = 27 hours.

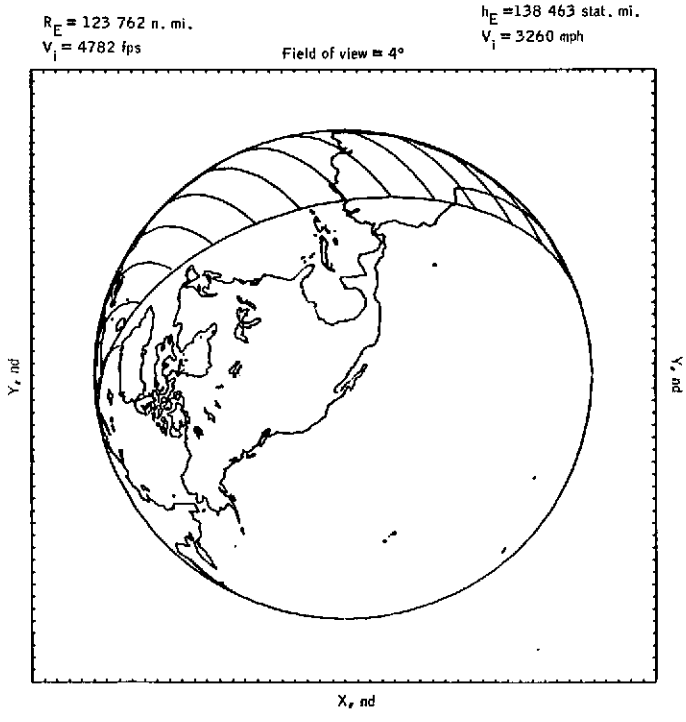
Figure 9. - Continued.



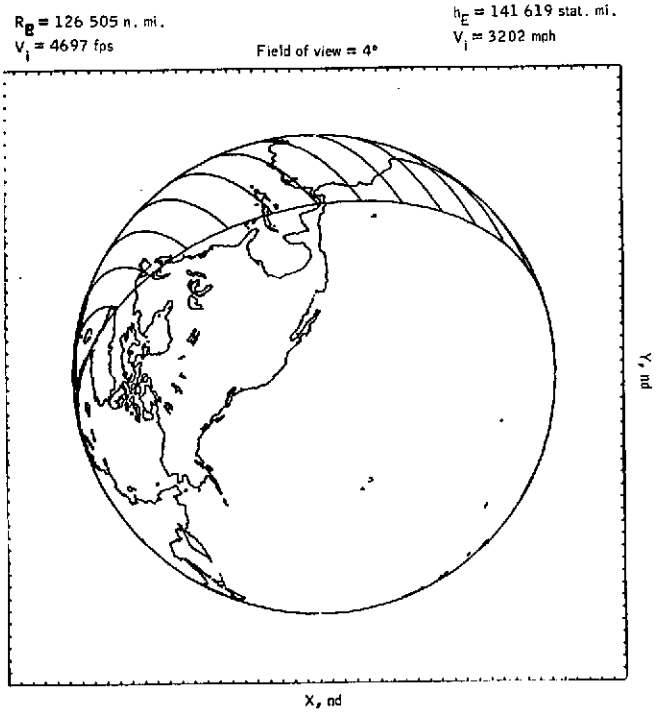

(y) G.e.t. = 28 hours.




(z) G.e.t. = 29 hours.

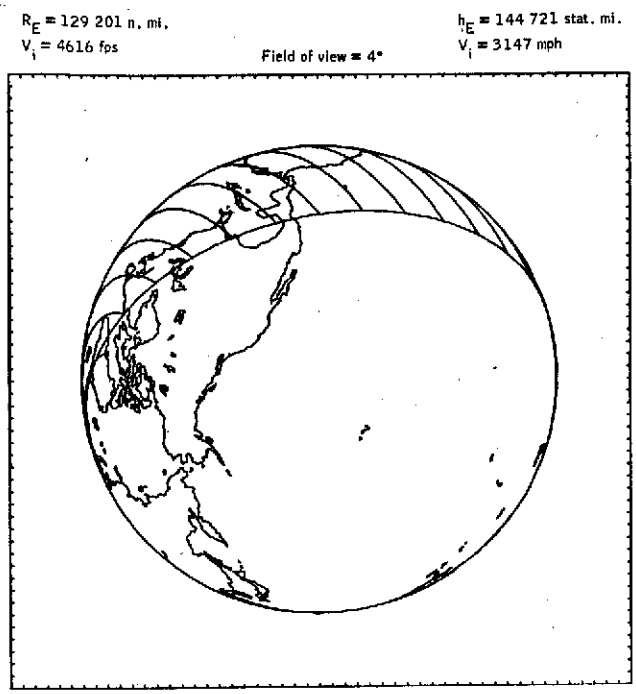



(aa) G.e.t. = 30 hours.

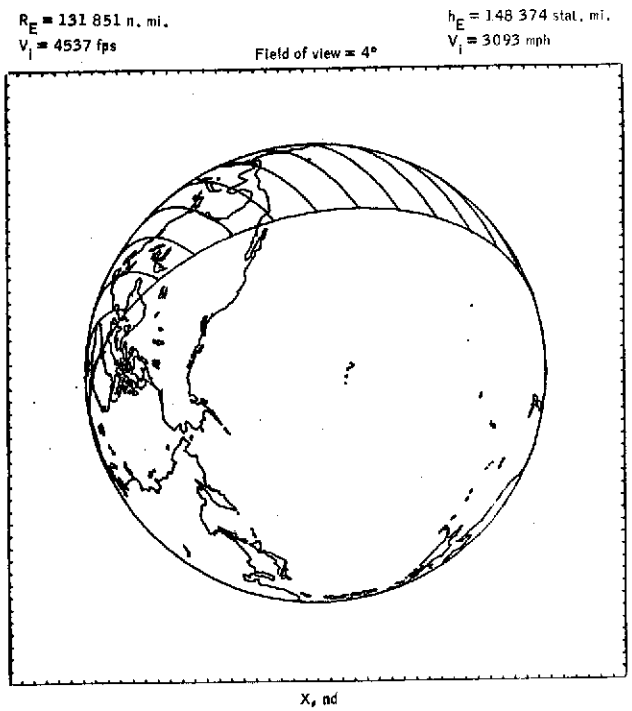



(bb) G.e.t. = 31 hours.

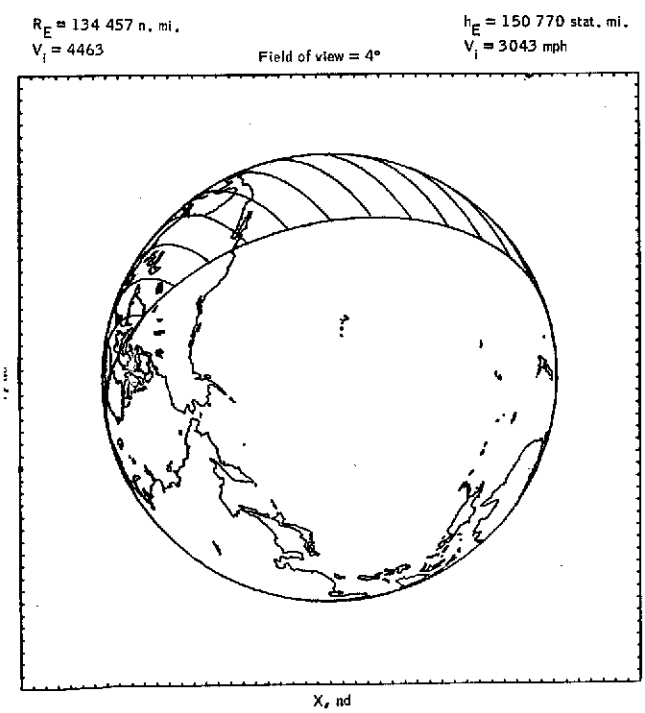
Figure 9. - Continued.



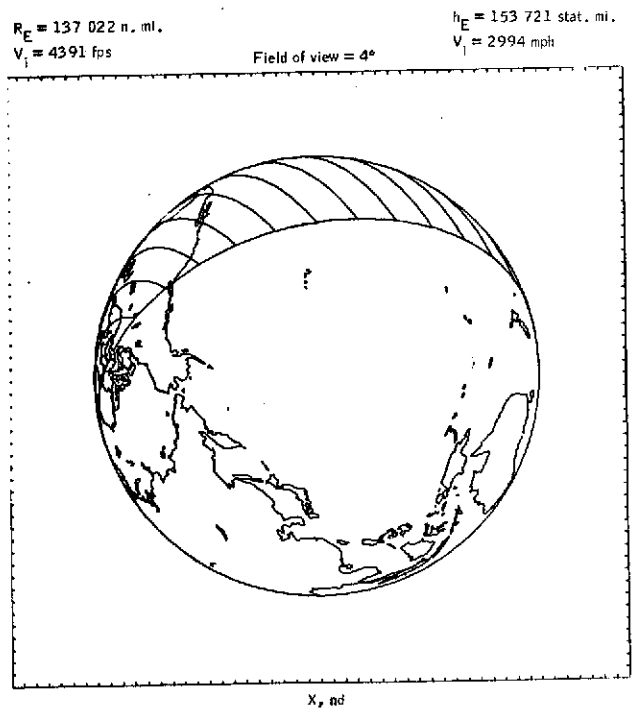

(cc) G.e.t. = 32 hours.




(dd) G.e.t. = 33 hours.

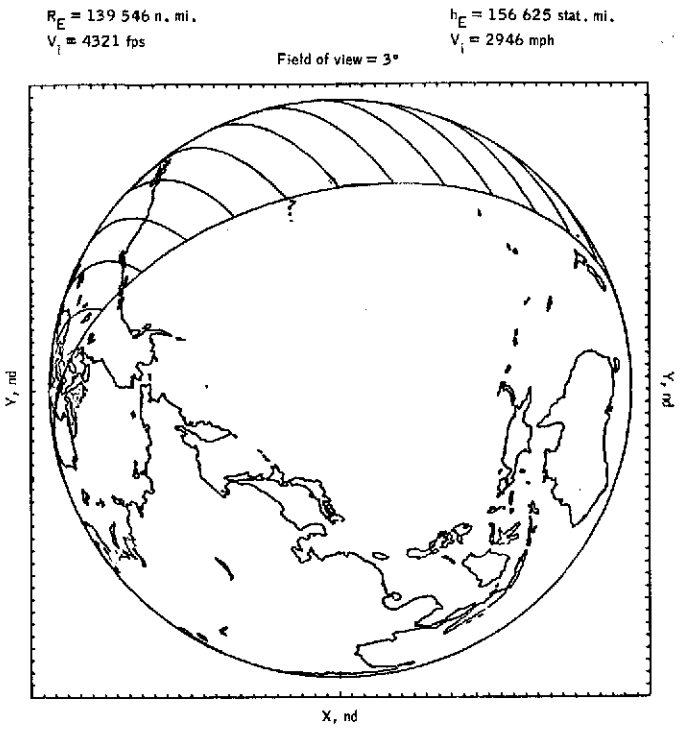



(ee) G.e.t. = 34 hours.

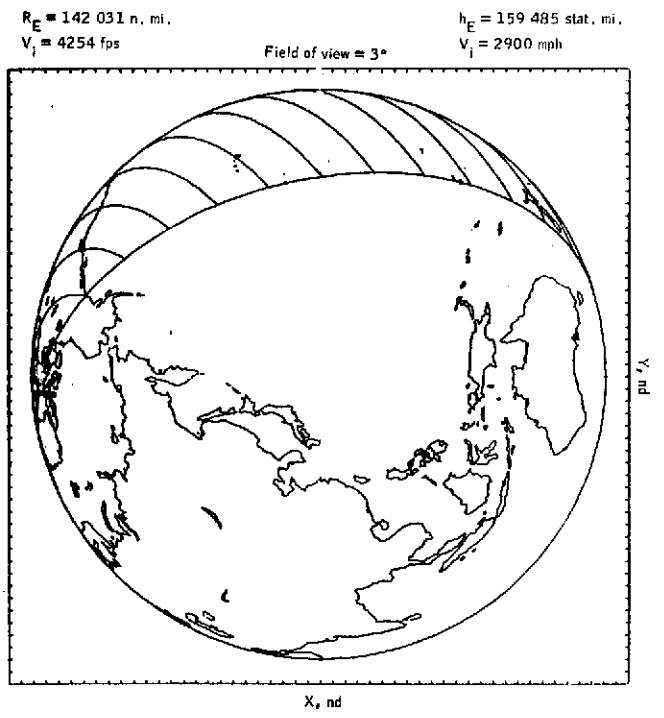



(ff) G.e.t. = 35 hours.

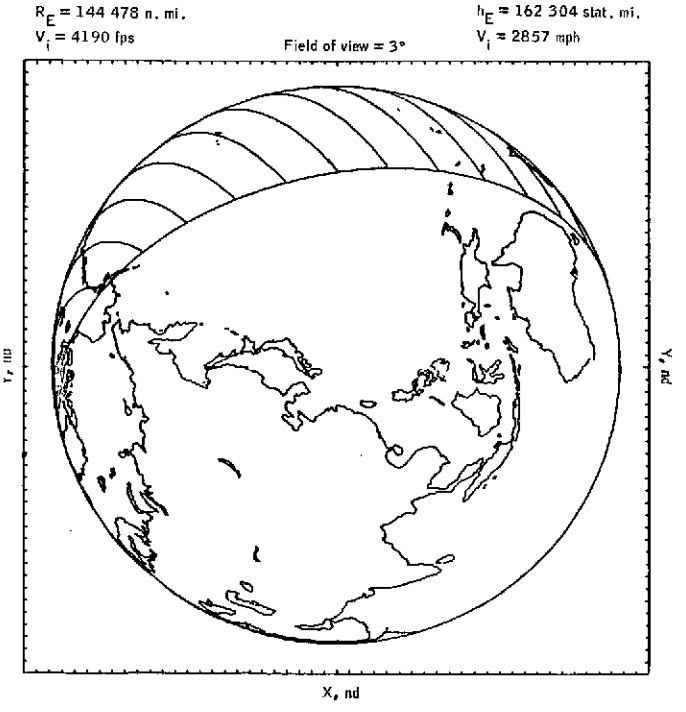
Figure 9. - Continued.



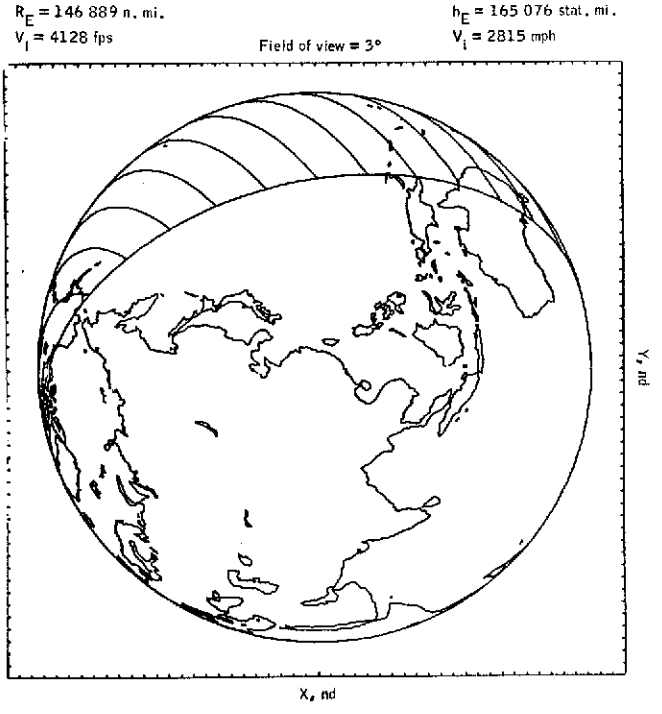

(gg) G.e.t. = 36 hours.




(hh) G.e.t. = 37 hours.

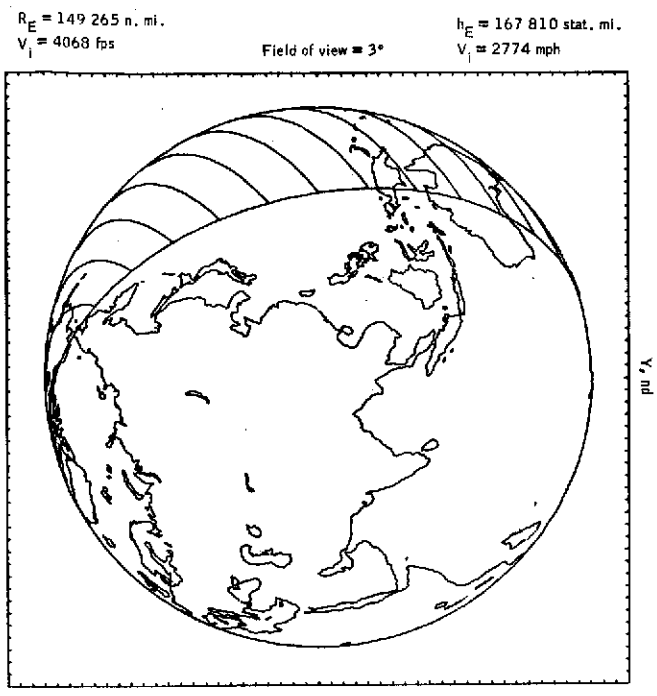



(ii) G.e.t. = 38 hours.

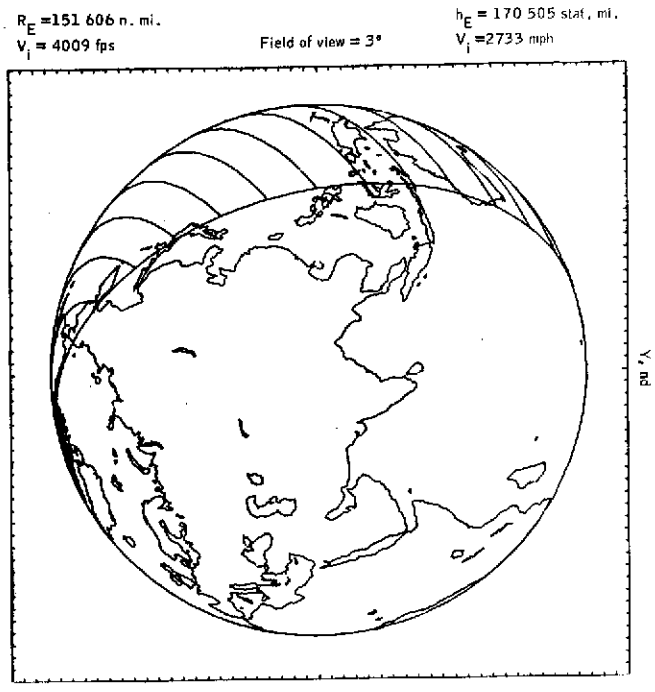



(jj) G.e.t. = 39 hours.

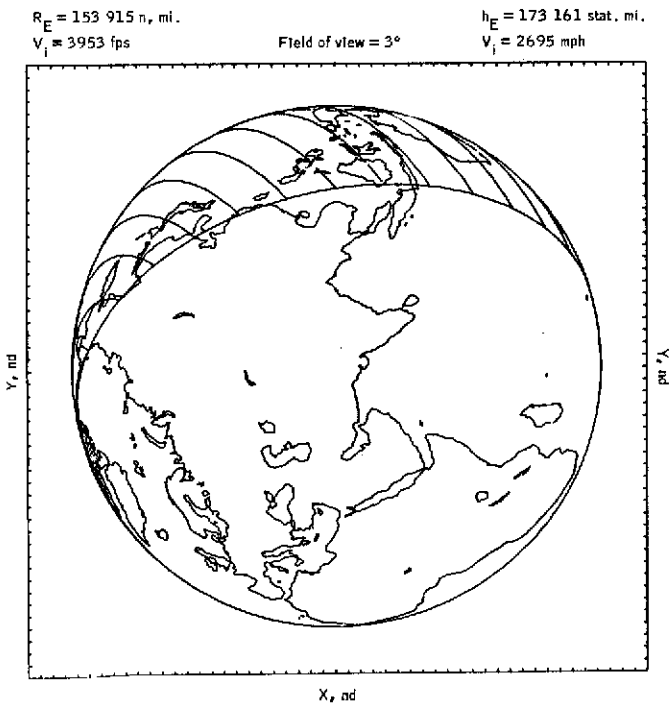
Figure 9. - Continued.



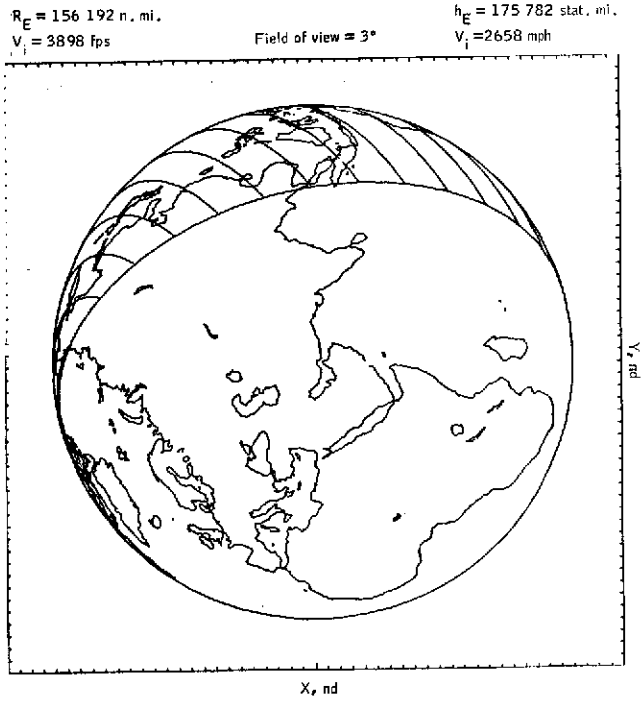

(kk) G.e.t. = 40 hours.




(ll) G.e.t. = 41 hours.

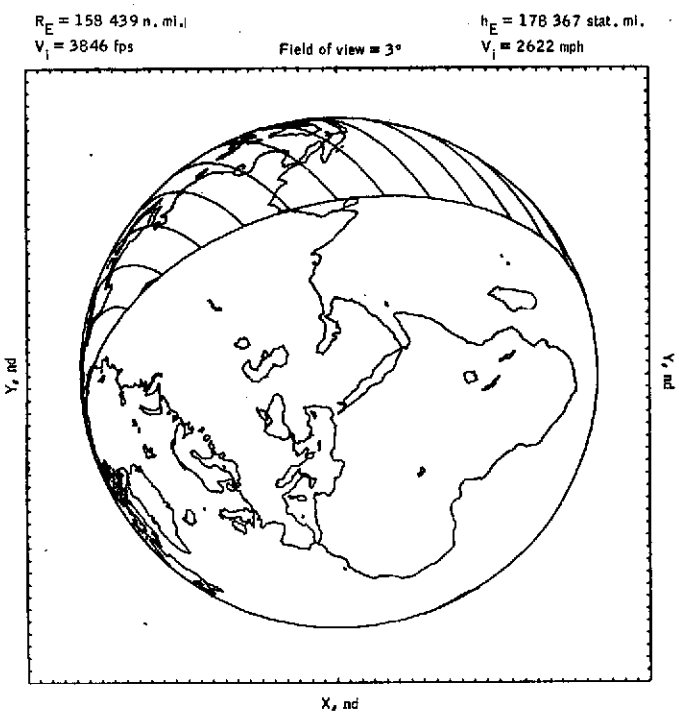



(mm) G.e.t. = 42 hours.

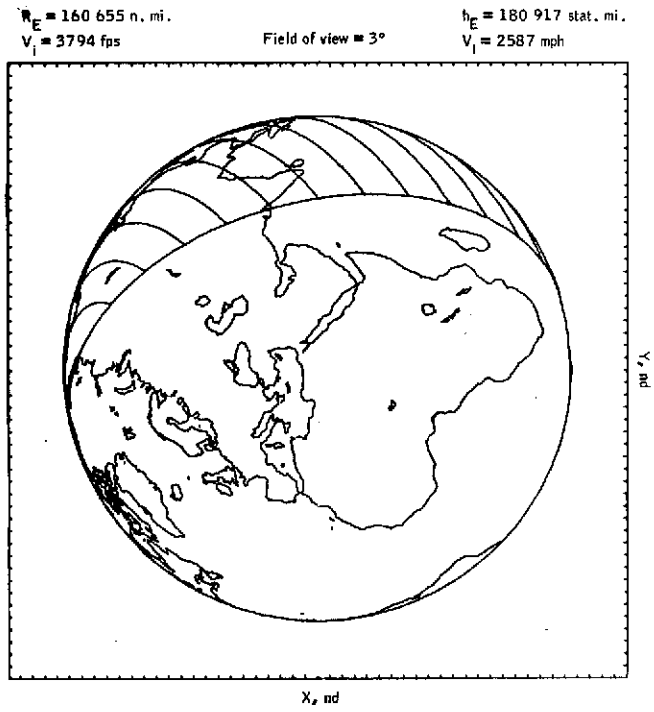



(nn) G.e.t. = 43 hours.

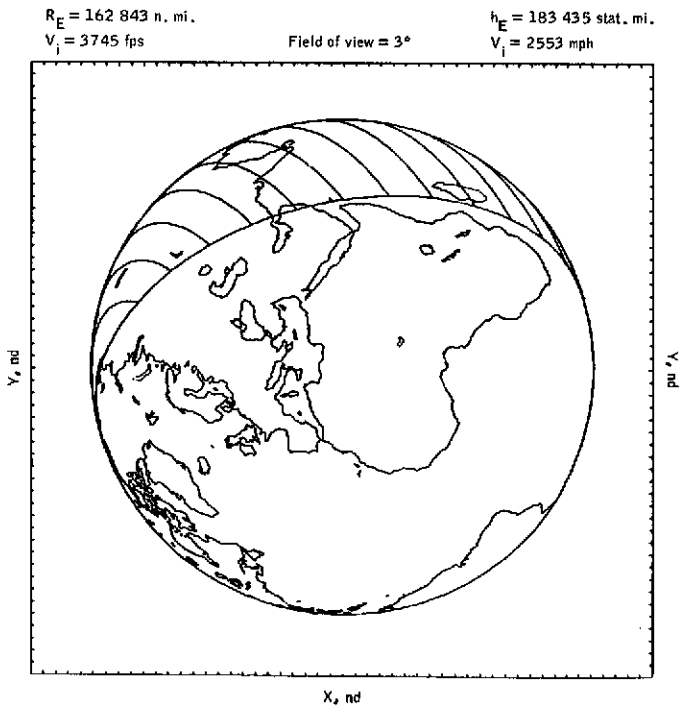
Figure 9.- Continued.



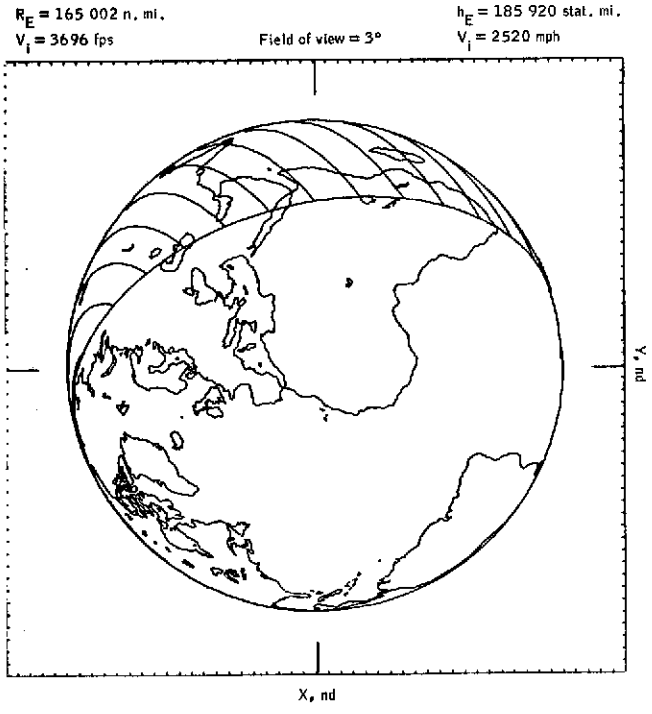

(oo) G.e.t. = 44 hours.




(pp) G.e.t. = 45 hours.



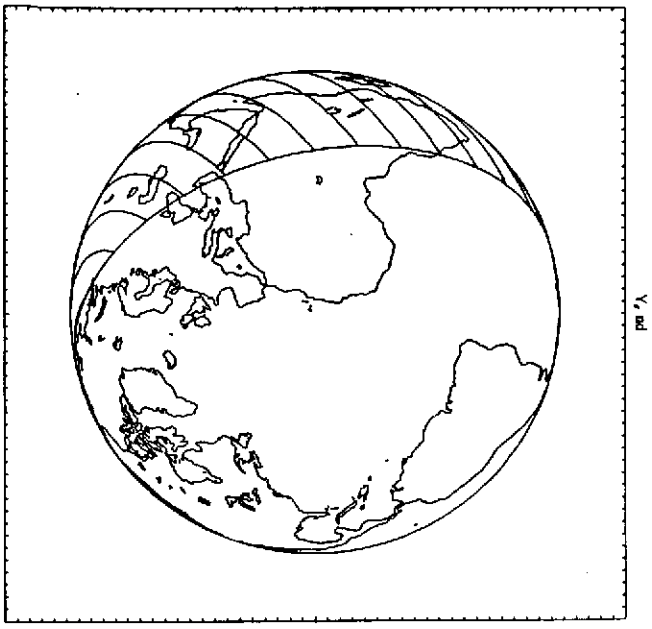

(qq) G.e.t. = 46 hours.




(rr) G.e.t. = 47 hours.

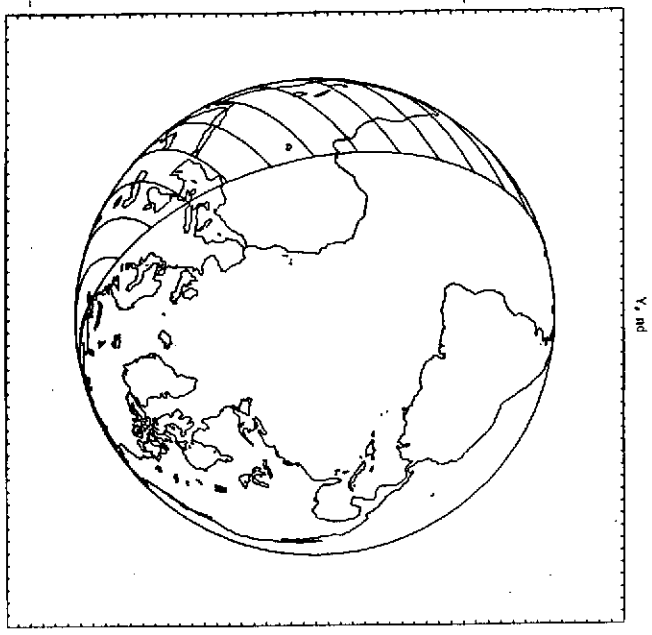
Figure 9. - Continued.

$R_E$ = 167 134 n. mi.
$V_i$ = 3649 fps
Field of view = 3°
$h_E$ = 188 373 stat. mi.
$V_i$ = 2488 mph



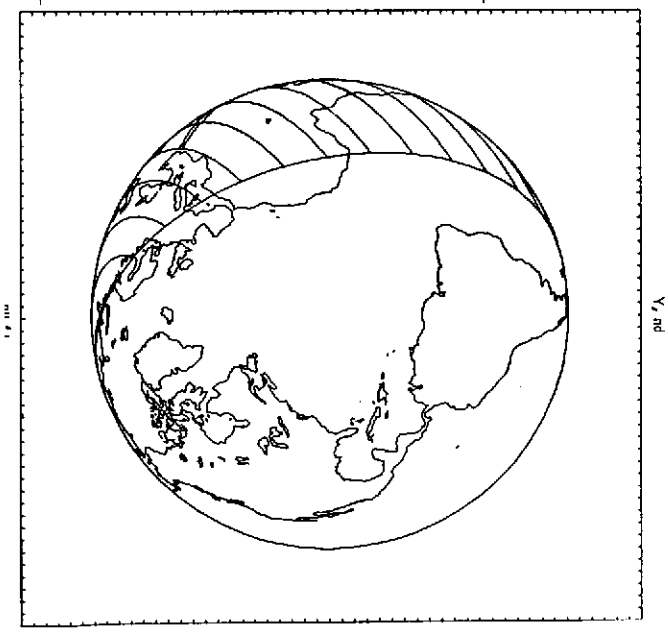

(ss) G.e.t. = 48 hours.

$R_E$ = 169 239 n. mi.
$V_i$ = 3604 fps
Field of view = 3°
$h_E$ = 190 796 stat. mi.
$V_i$ = 2457 mph



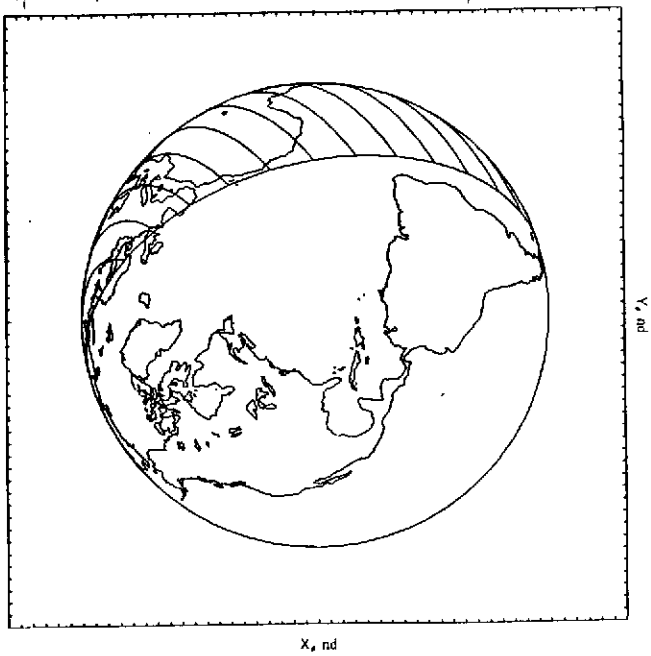

(tt) G.e.t. = 49 hours.

$R_E$ = 171 319 n. mi.
$V_i$ = 3559 fps
Field of view = 3°
$h_E$ = 193 189 stat. mi.
$V_i$ = 2427 mph




(uu) G.e.t. = 50 hours.

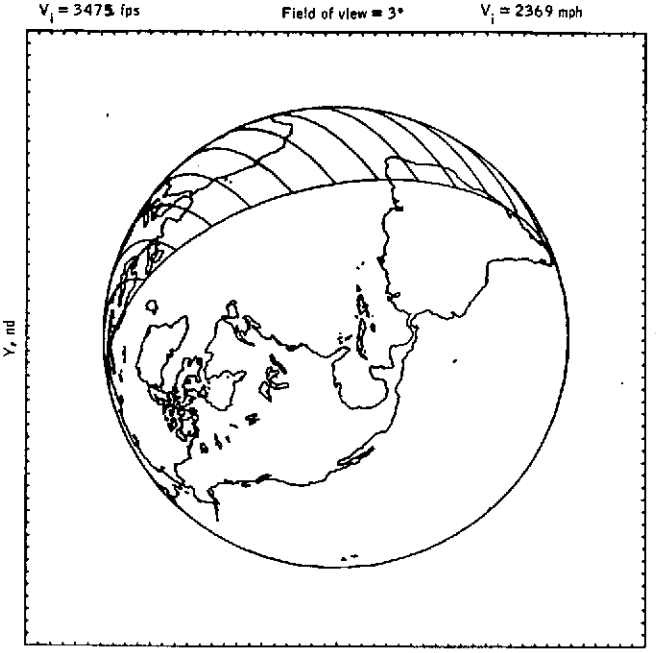
$R_E$ = 173 374 n. mi.
$V_i$ = 3517 fps
Field of view = 3°
$h_E$ = 195 318 stat. mi.
$V_i$ = 2398 mph




(vv) G.e.t. = 51 hours.

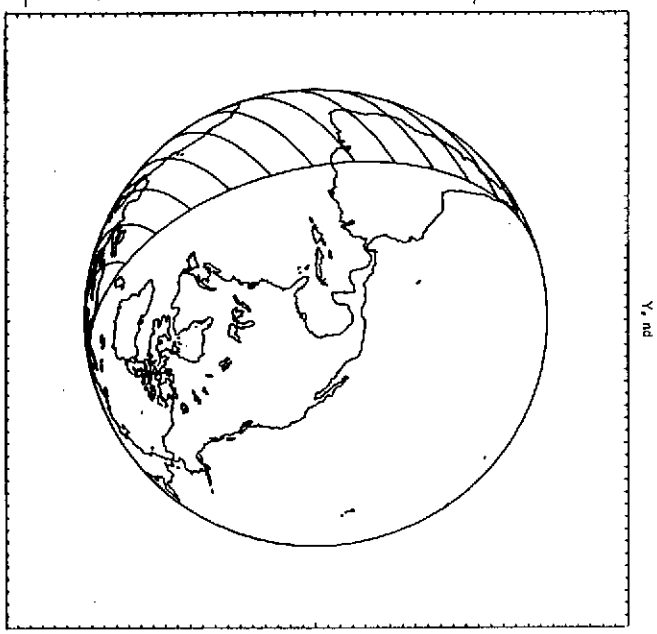
Figure 9.- Continued.

$R_E$ = 175 404 n. mi.
$V_i$ = 3475 fps
Field of view = 3°
$h_E$ = 197 890 stat. mi.
$V_i$ = 2369 mph



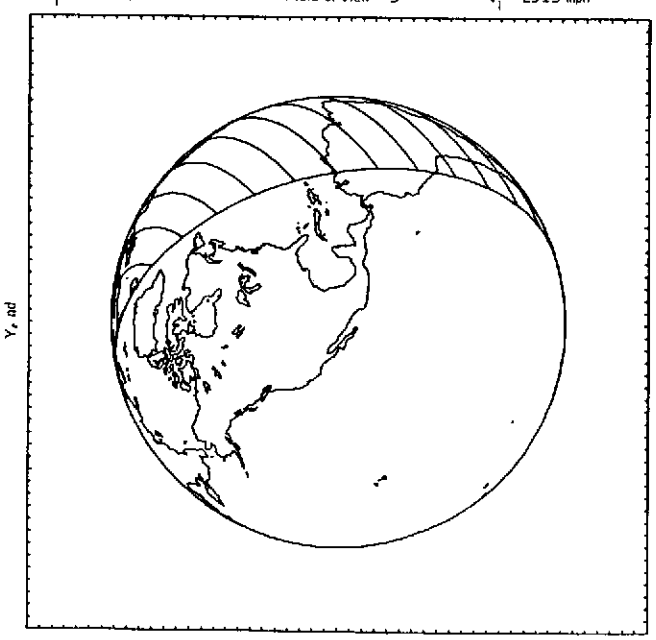

(ww) G.e.t. = 52 hours.

$R_E$ = 177 411 n. mi.
$V_i$ = 3434 fps
Field of view = 3°
$h_E$ = 200 201 stat. mi.
$V_i$ = 2341 mph



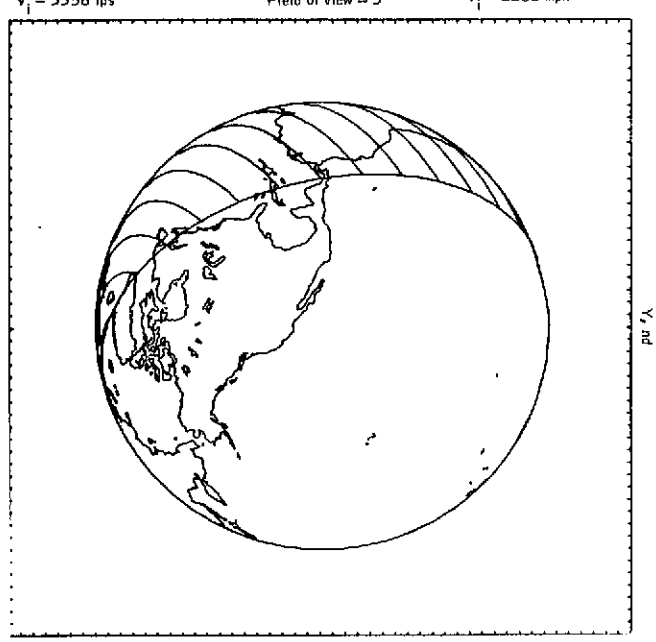

(xx) G.e.t. = 53 hours.

$R_E$ = 179 395 n. mi.
$V_i$ = 3395 fps
Field of view = 3°
$h_E$ = 202 484 stat. mi.
$V_i$ = 2315 mph



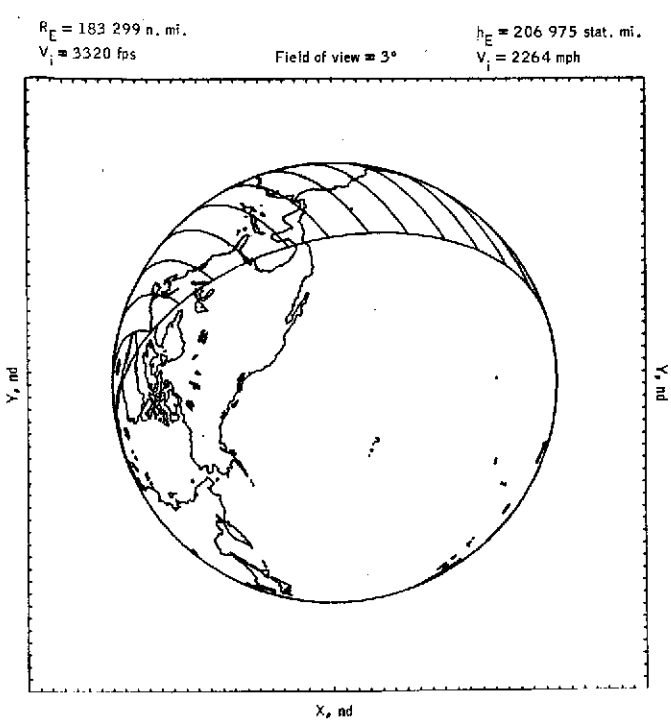

(yy) G.e.t. = 54 hours.

$R_E$ = 181 358 n. mi.
$V_i$ = 3356 fps
Field of view = 3°
$h_E$ = 204 742 stat. mi.
$V_i$ = 2288 mph

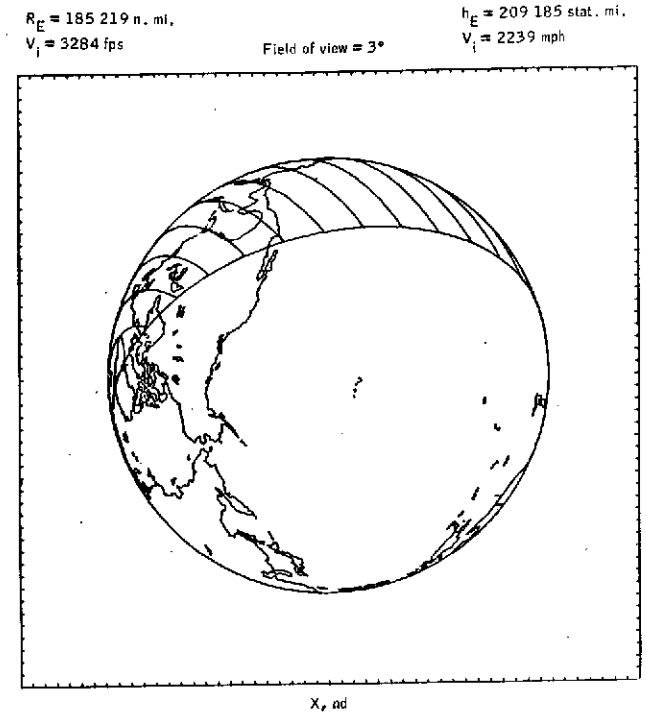



(zz) G.e.t. = 55 hours.

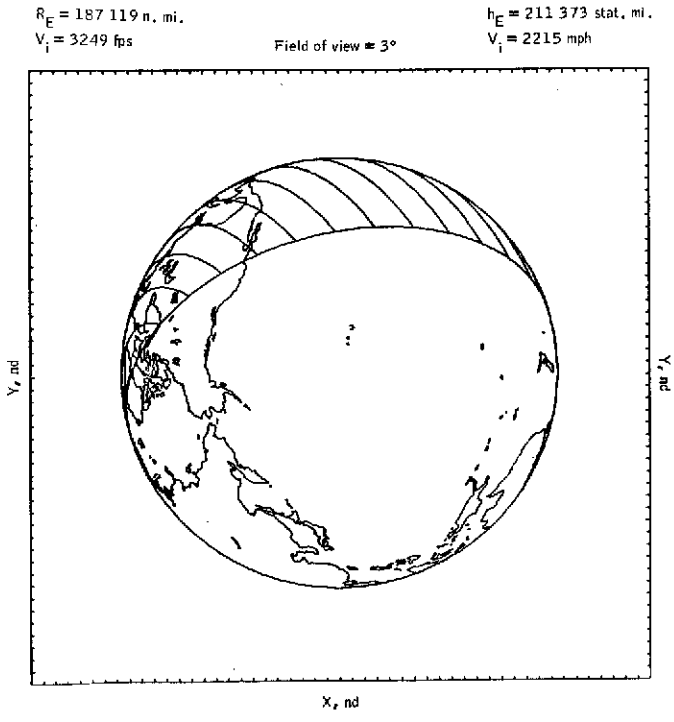
Figure 9.- Continued.



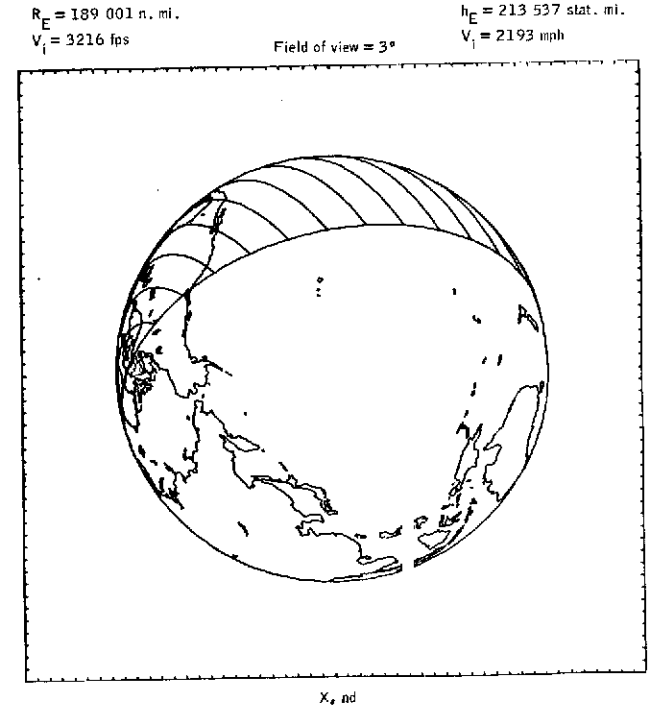

(aaa) G.e.t. = 56 hours.




(bbb) G.e.t. = 57 hours.




(ccc) G.e.t. = 58 hours.



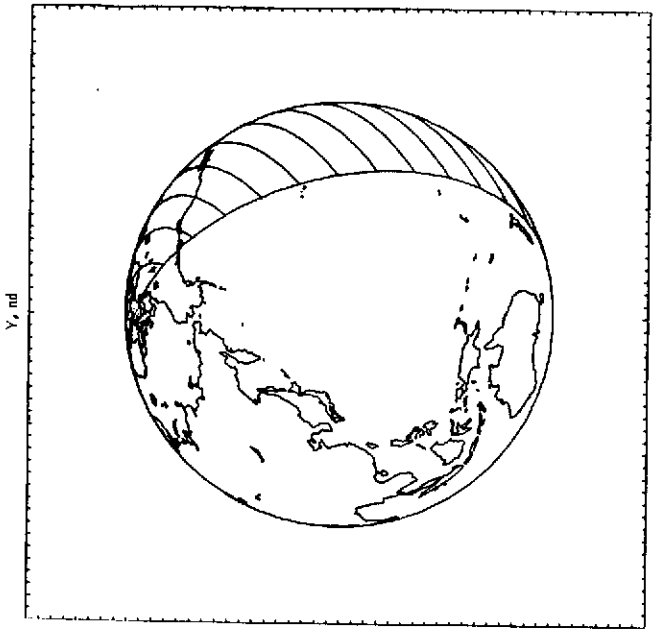

(ddd) G.e.t. = 59 hours.

Figure 9.- Continued.

$R_E$ = 190 865 n. mi.
$V_i$ = 3184 fps

Field of view = 3°

$h_E$ = 215 682 stat. mi.
$V_i$ = 2171 mph

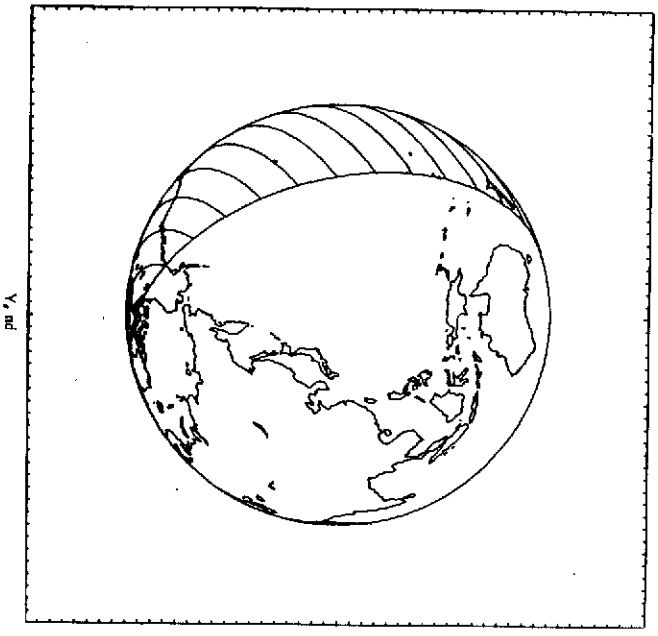



(eee) G.e.t. = 60 hours.

$R_E$ = 192 710 n. mi.
$V_i$ = 3153 fps

Field of view = 3°

$h_E$ = 217 826 stat. mi.
$V_i$ = 2150 mph

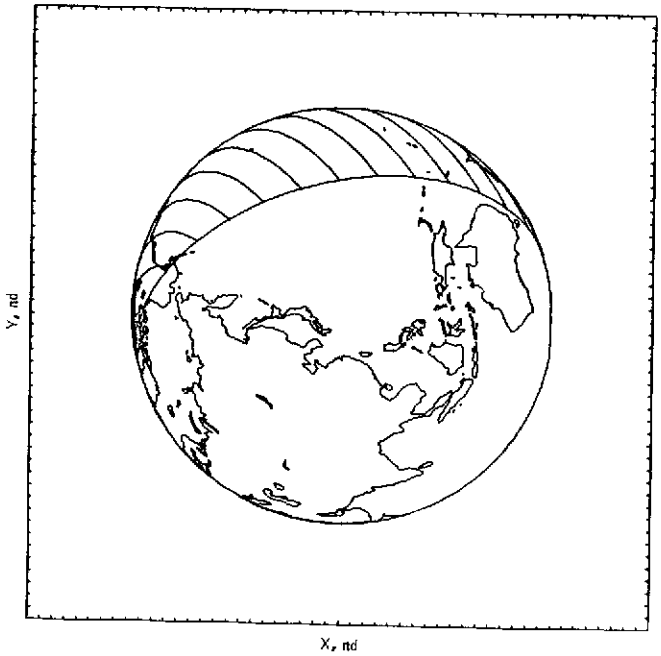



(fff) G.e.t. = 61 hours.

$R_E$ = 194 539 n. mi.
$V_i$ = 3123 fps

Field of view = 3°

$h_E$ = 219 910 stat. mi.
$V_i$ = 2129 mph

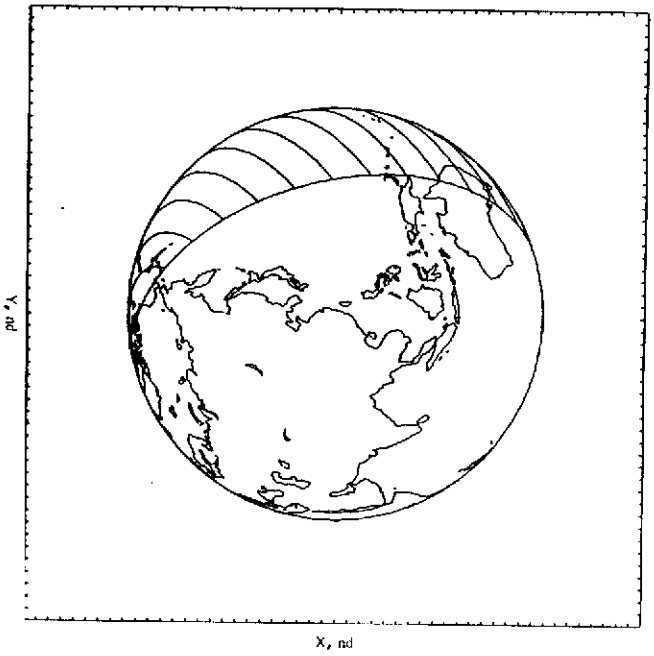



(ggg) G.e.t. = 62 hours.

$R_E$ = 196 353 n. mi.
$V_i$ = 3096 fps

Field of view = 3°

$h_E$ = 221 998 stat. mi.
$V_i$ = 2111 mph



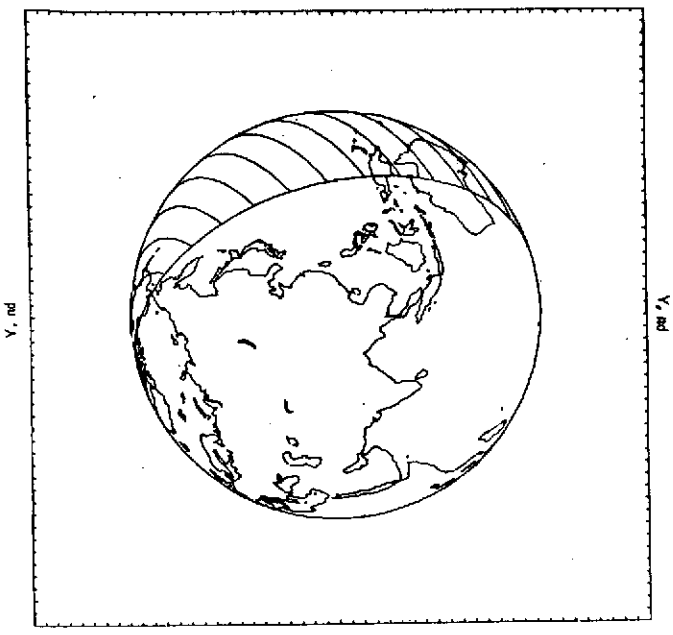

(hhh) G.e.t. = 63 hours.

Figure 9. - Continued.

$R_M$ = 30 114 n. mi.
$V_i$ = 3782 fps

Field of view = 3°

$h_M$ = 33 575 stat. mi.
$V_i$ = 2579 mph

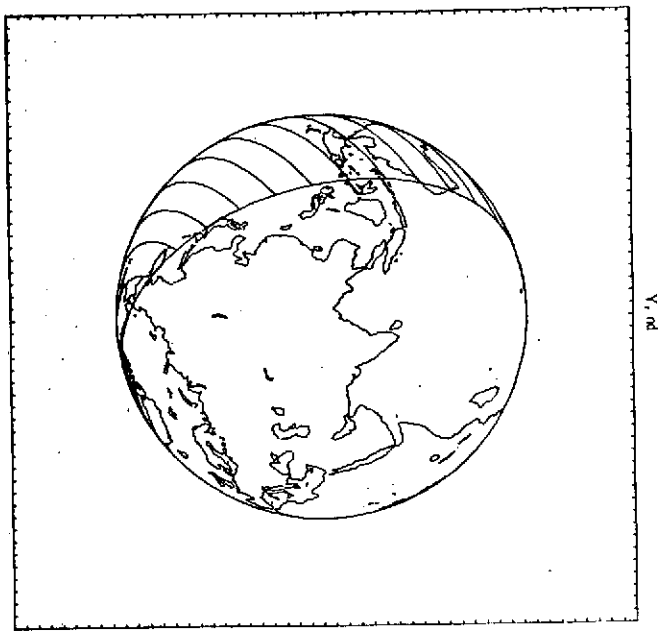



(iii) G.e.t. = 64 hours.

$R_M$ = 27 876 n. mi.
$V_i$ = 3799 fps

Field of view = 3°

$h_M$ = 31 000 stat. mi.
$V_i$ = 2590 mph

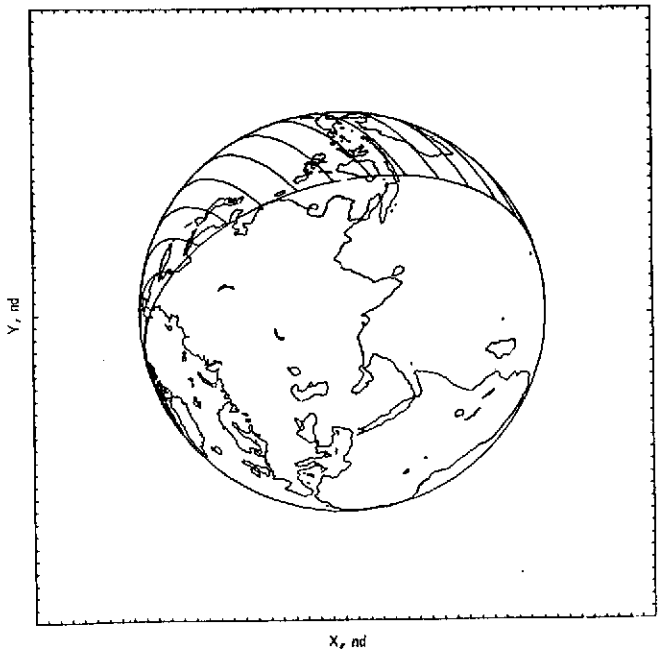



(jjj) G.e.t. = 65 hours.

$R_M$ = 25 627 n. mi.
$V_i$ = 3821 fps

Field of view = 3°

$h_M$ = 28 412 stat. mi.
$V_i$ = 2605 mph

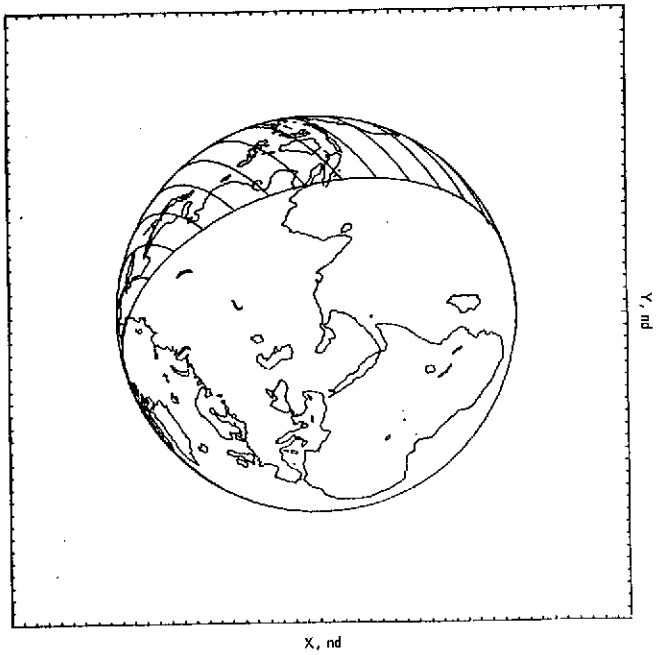



(kkk) G.e.t. = 66 hours.

$R_M$ = 23 366 n. mi.
$V_i$ = 3847 fps

Field of view = 3°

$h_M$ = 25 808 stat. mi.
$V_i$ = 2622 mph



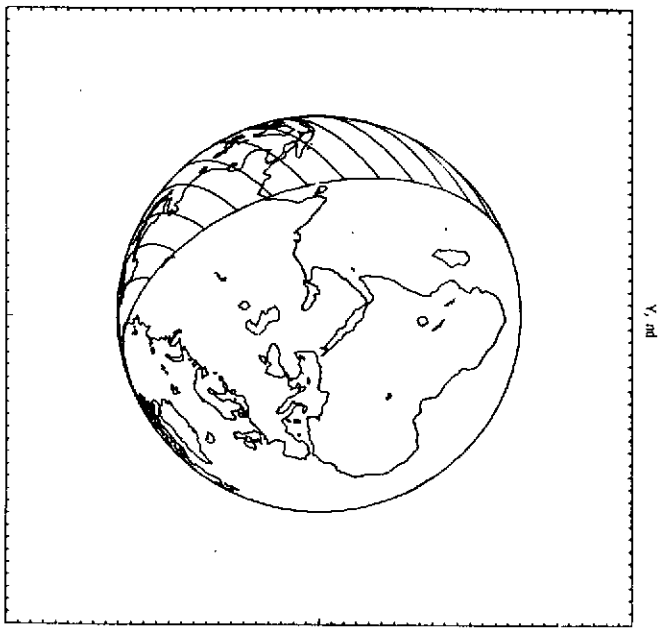

(lll) G.e.t. = 67 hours.

Figure 9.- Continued.

$R_M$ = 21 088 n. mi.
$V_i$ = 3880 fps

Field of view = 3°

$h_M$ = 23 188 stat. mi.
$V_i$ = 2645 mph

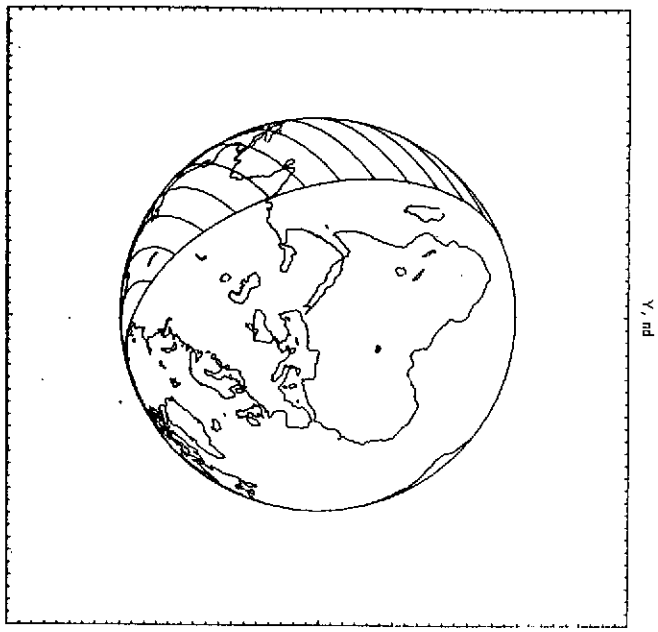



(mmm) G.e.t. = 68 hours.

$R_M$ = 18 792 n. mi.
$V_i$ = 3921 fps

Field of view = 3°

$h_M$ = 20 545 stat. mi.
$V_i$ = 2673 mph

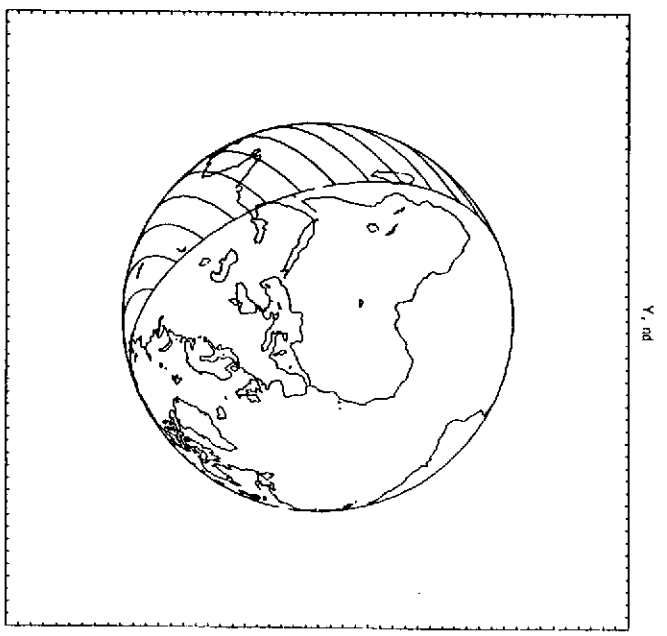



(nnn) G.e.t. = 69 hours.

$R_M$ = 16 471 n. mi.
$V_i$ = 3974 fps

Field of view = 3°

$h_M$ = 17 874 stat. mi.
$V_i$ = 2710 mph

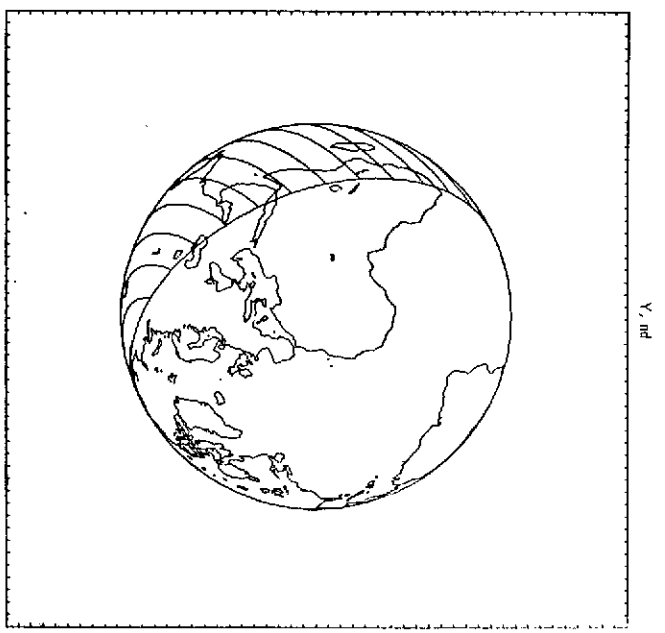



(ooo) G.e.t. = 70 hours.

$R_M$ = 14 118 n. mi.
$V_i$ = 4045 fps

Field of view = 3°

$h_M$ = 15 167 stat. mi.
$V_i$ = 2758 mph



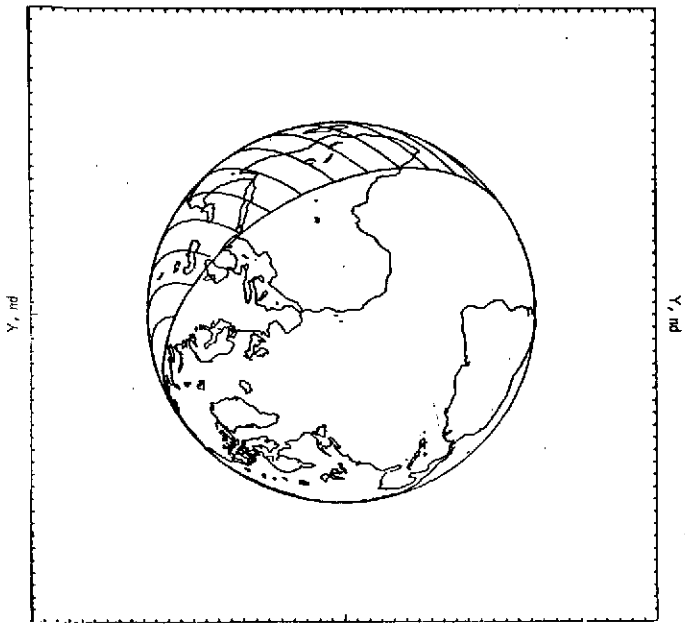

(ppp) G.e.t. = 71 hours.

Figure 9. - Continued.

$R_M$ = 11 725 n. mi.
$V_i$ = 4145 fps

Field of view = 3°

$h_M$ = 12 412 stat. mi.
$V_i$ = 2826 mph

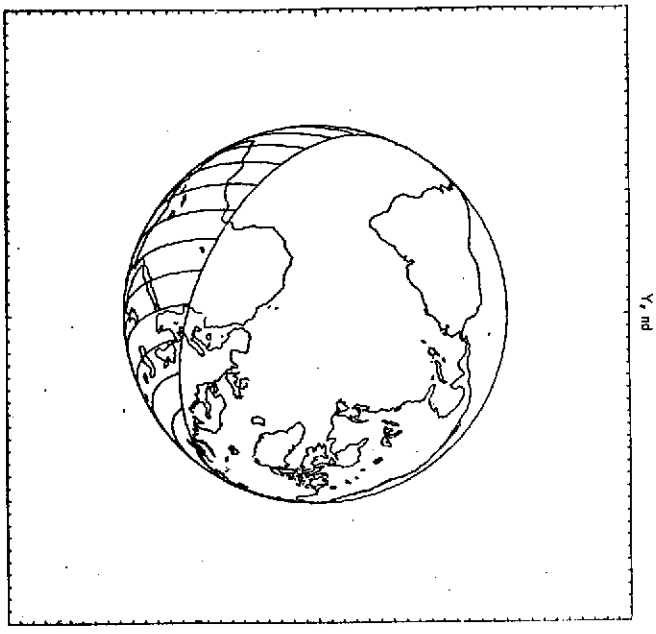



(qqq) G.e.t. = 72 hours.

$R_M$ = 9272 n. mi.
$V_i$ = 4297 fps

Field of view = 3°

$h_M$ = 9591 stat. mi.
$V_i$ = 2930 mph

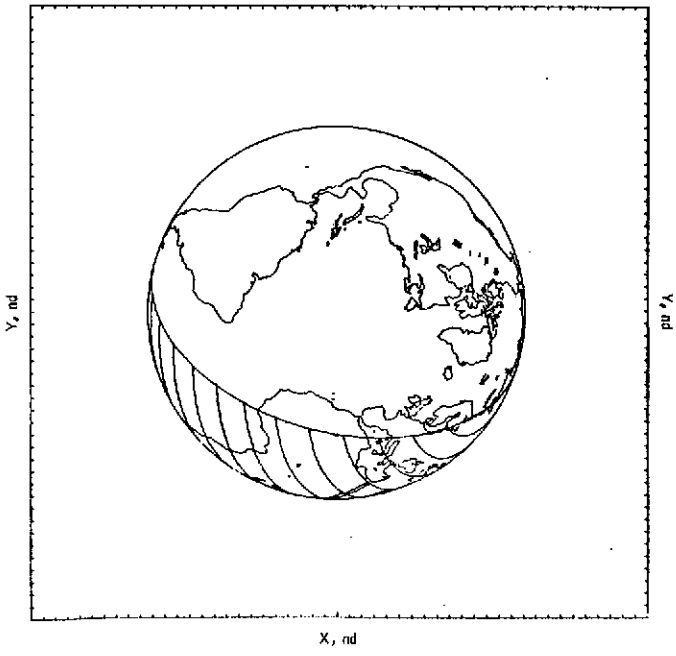



(rrr) G.e.t. = 73 hours.

$R_M$ = 6758 n. mi.
$V_i$ = 4555 fps

Field of view = 3°

$h_M$ = 6696 stat. mi.
$V_i$ = 3106 mph

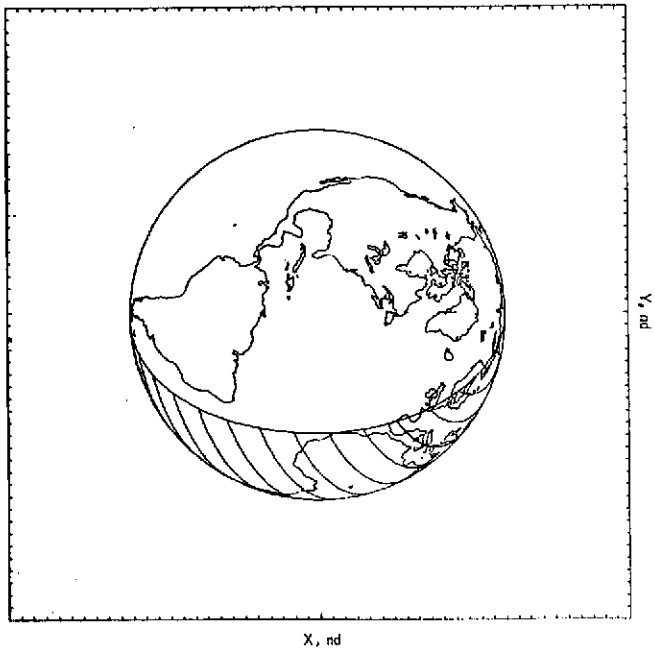



(sss) G.e.t. = 74 hours.

$R_M$ = 4072 n. mi.
$V_i$ = 5129 fps

Field of view = 3°

$h_M$ = 3607 stat. mi.
$V_i$ = 3497 mph




(ttt) G.e.t. = 75 hours.

Figure 9. - Concluded.

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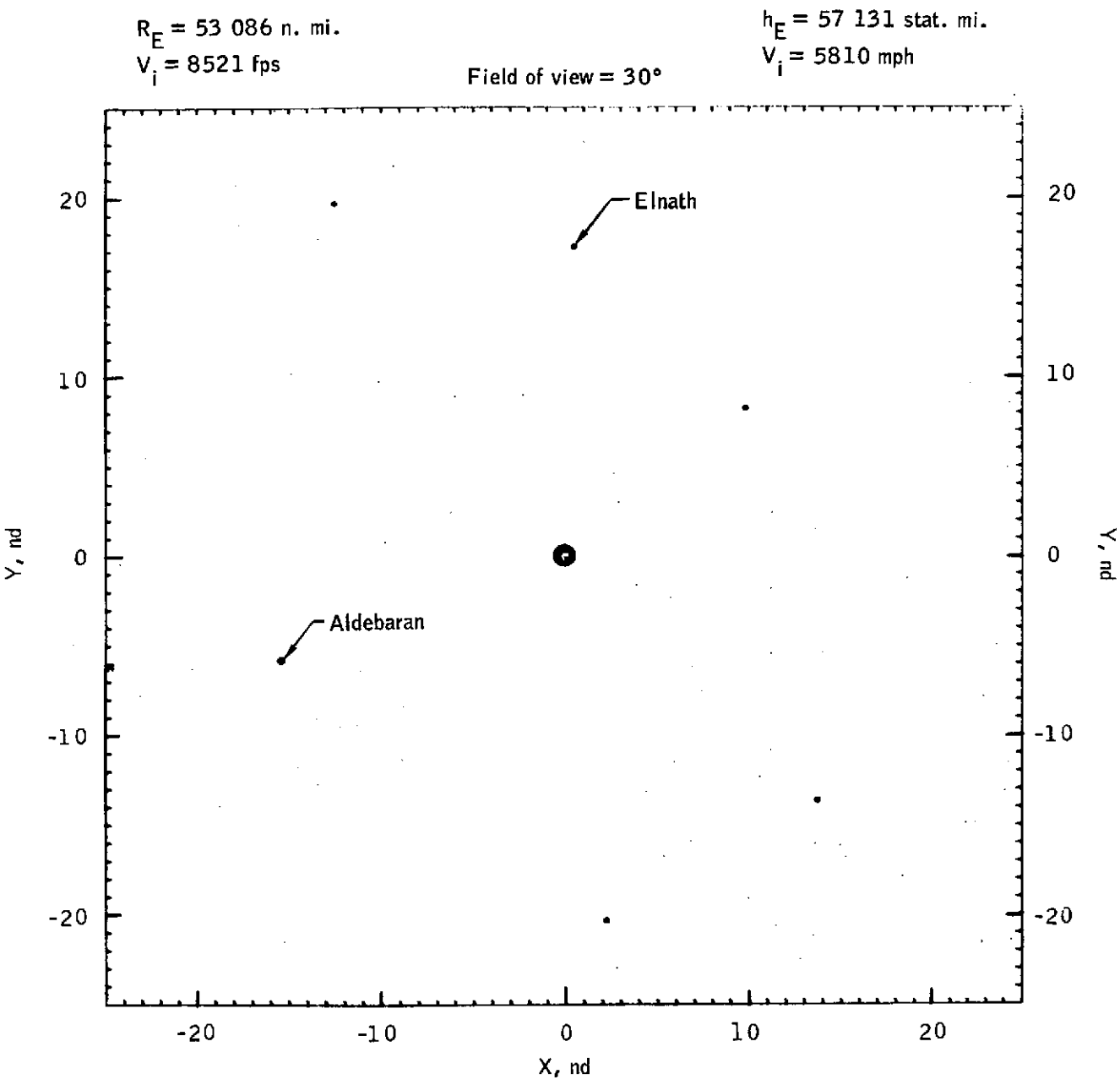
MOON VIEWS

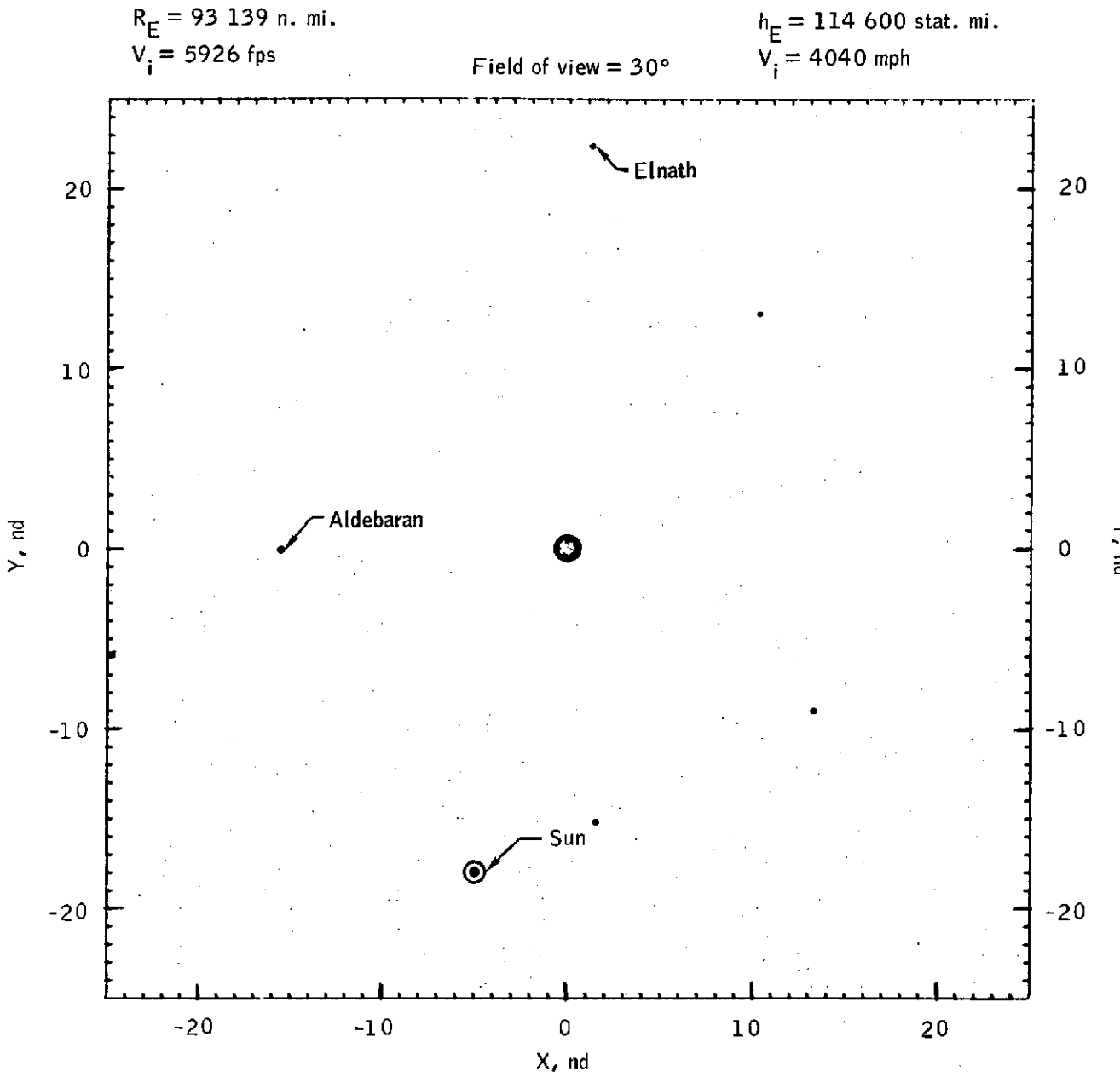
| | | | | | | |
|---|---|---|---|---|---|---|
| 580 | 144 | 150 | 186 | 205 | 231 | 248 |
| 2 | 2 | 13 | -15 | 9 | 0 | -12 |
| 3 | -20 | -13 | -5 | 0 | 17 | 19 |




(a) G.e.t. = 10 hours.

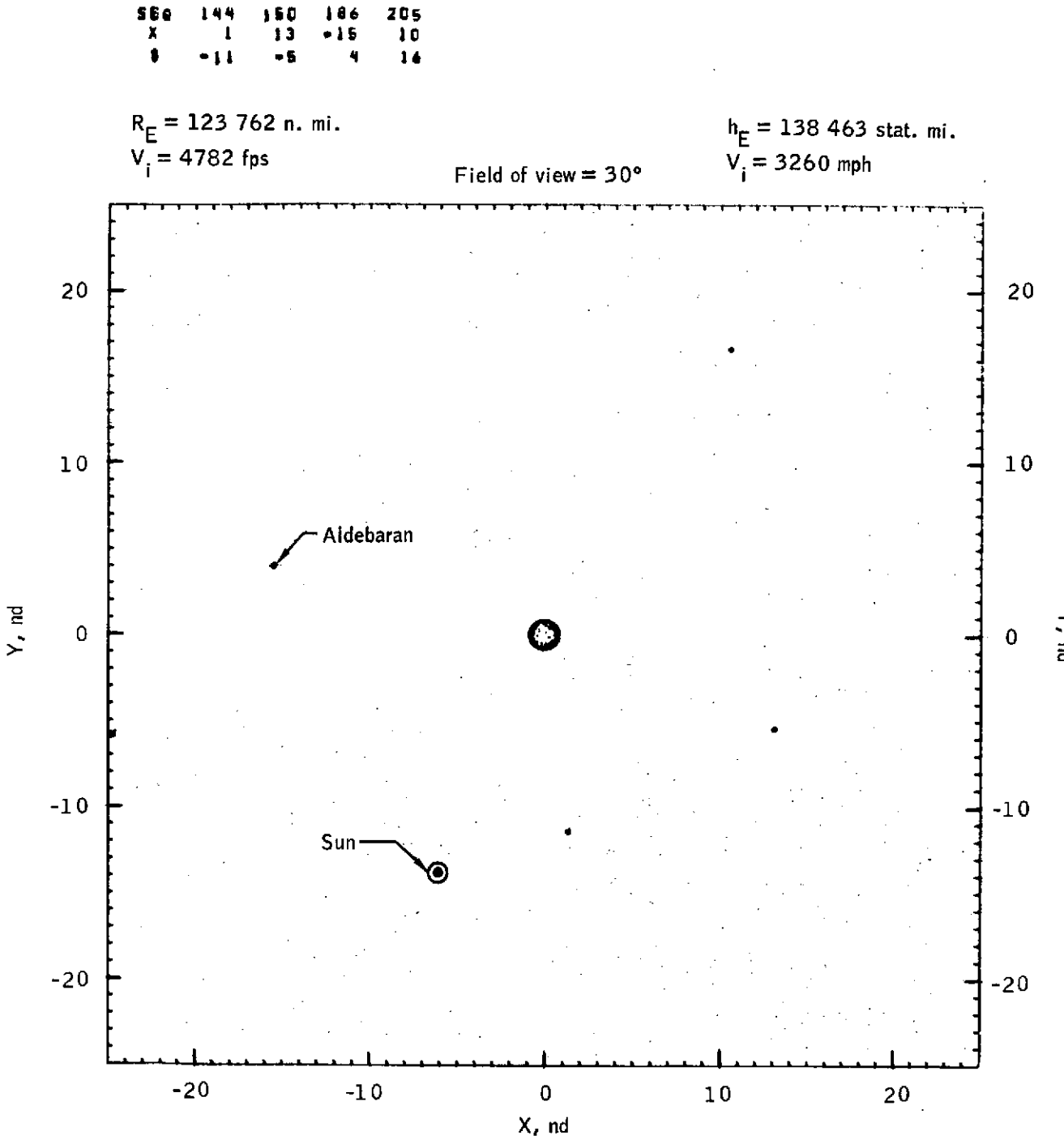
Figure 10.- Translunar coast - constant field of view (moon).

| SEQ | 144 | 150 | 186 | 205 | 231 |
|---|---|---|---|---|---|
| X | 1 | 13 | -15 | 10 | 1 |
| Y | -15 | -8 | 0 | 13 | 22 |




(b) G.e.t. = 20 hours.

Figure 10.- Continued.




(c) G.e.t. = 30 hours.

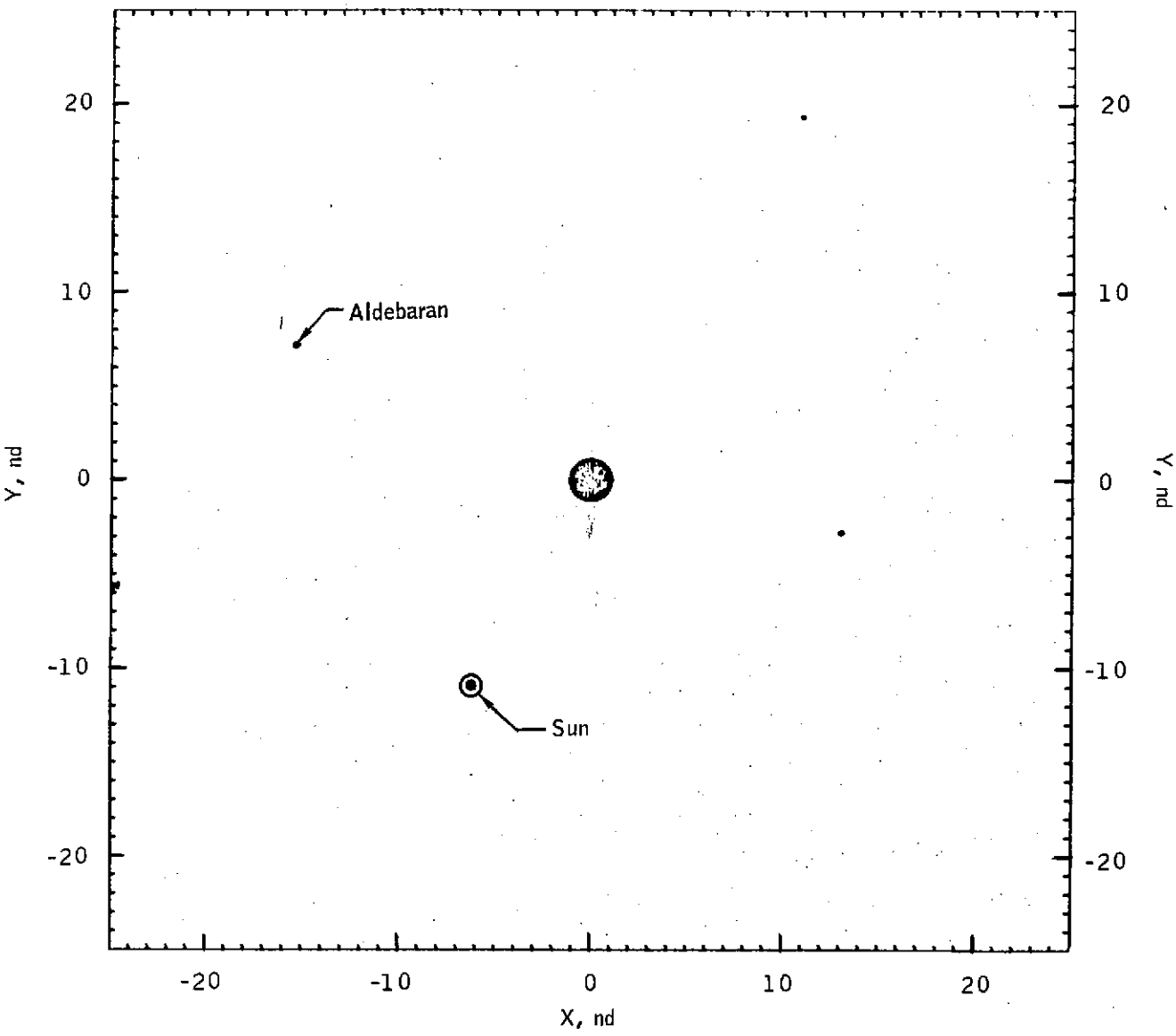
Figure 10.- Continued.

| SEQ | 144 | 150 | 186 | 205 |
|---|---|---|---|---|
| X | 1 | 13 | -15 | 10 |
| Y | -8 | -2 | 7 | 19 |

$R_E$ = 149 264 n. mi.
$V_i$ = 4068 fps

Field of view = 30°

$h_E$ = 167 810 stat. mi.
$V_i$ = 2774 mph




(d) G.e.t. = 40 hours.

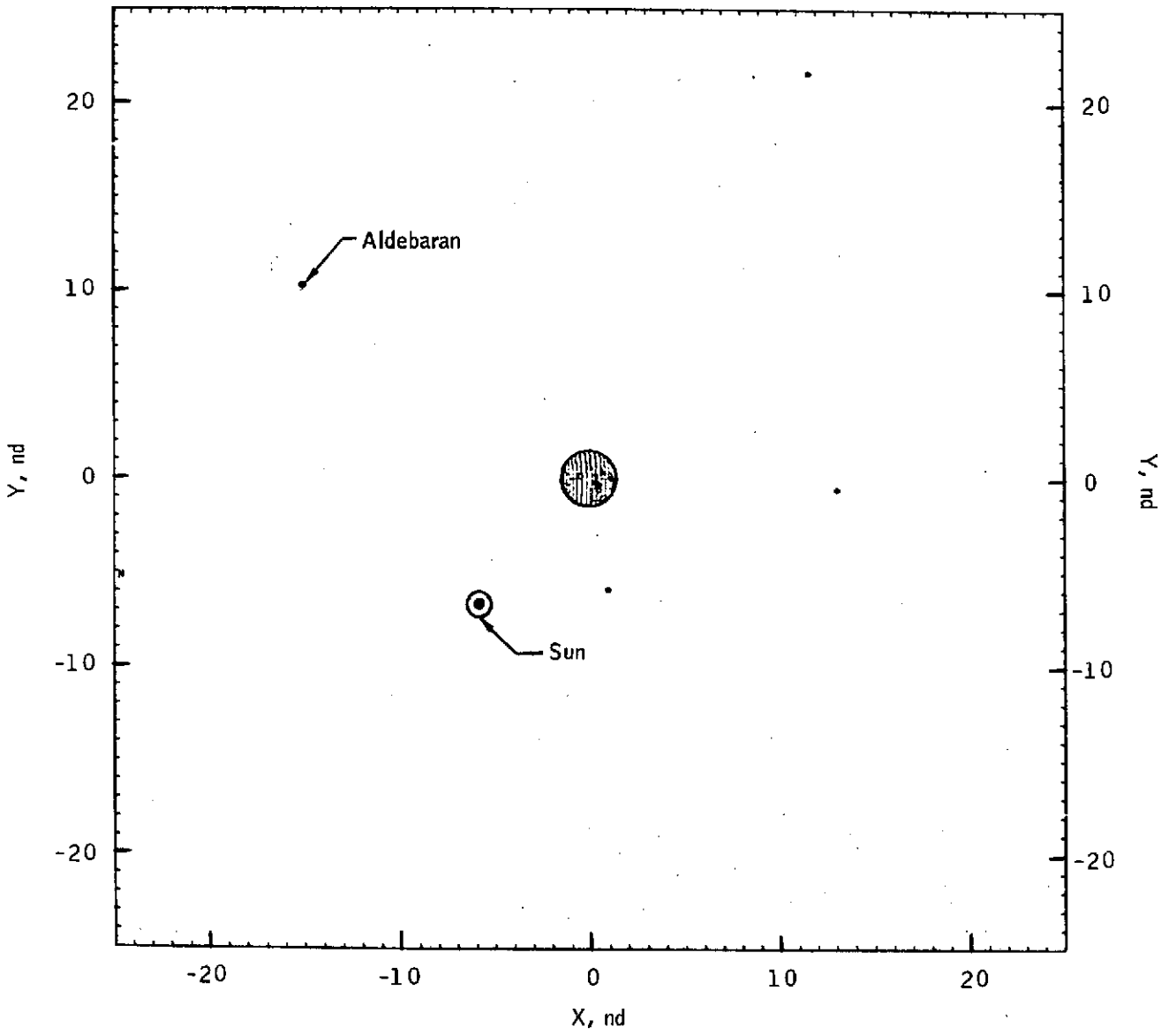
Figure 10. - Continued.

| SEQ | 144 | 150 | 186 | 205 |
|---|---|---|---|---|
| X | 0 | 12 | -15 | 11 |
| Y | -5 | 0 | 10 | 21 |

$R_E$ = 171 319 n. mi.
$V_i$ = 3559 fps

Field of view = 30°

$h_E$ = 193 189 stat. mi.
$V_i$ = 2427 mph




(e) G.e.t. = 50 hours.

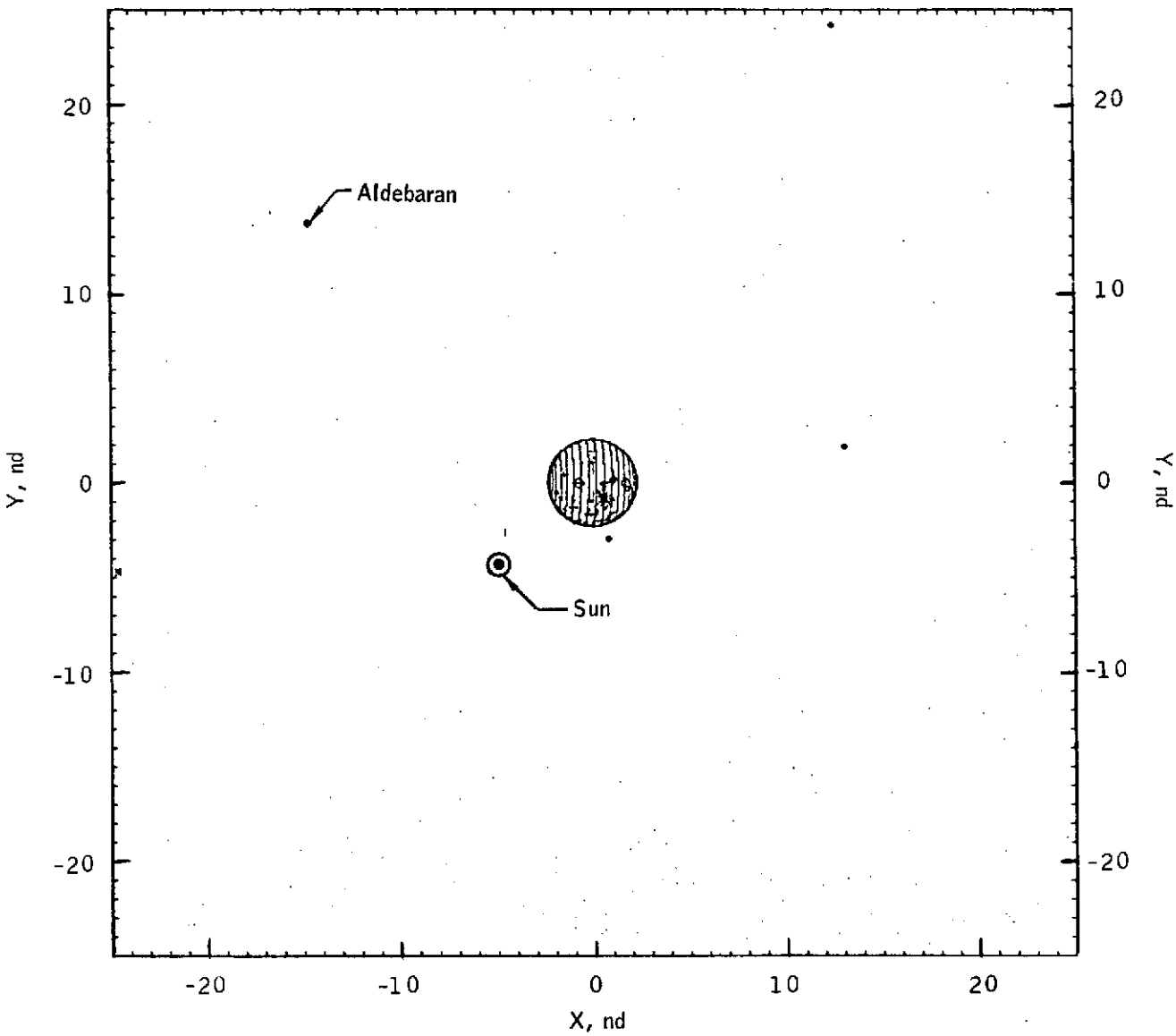
Figure 10.- Continued.

| SEQ | 144 | 150 | 186 | 205 |
|---|---|---|---|---|
| X | 0 | 12 | -14 | 12 |
| Y | -2 | 2 | 13 | 24 |

$R_E$ = 190 864 n. mi.
$V_i$ = 3184 fps

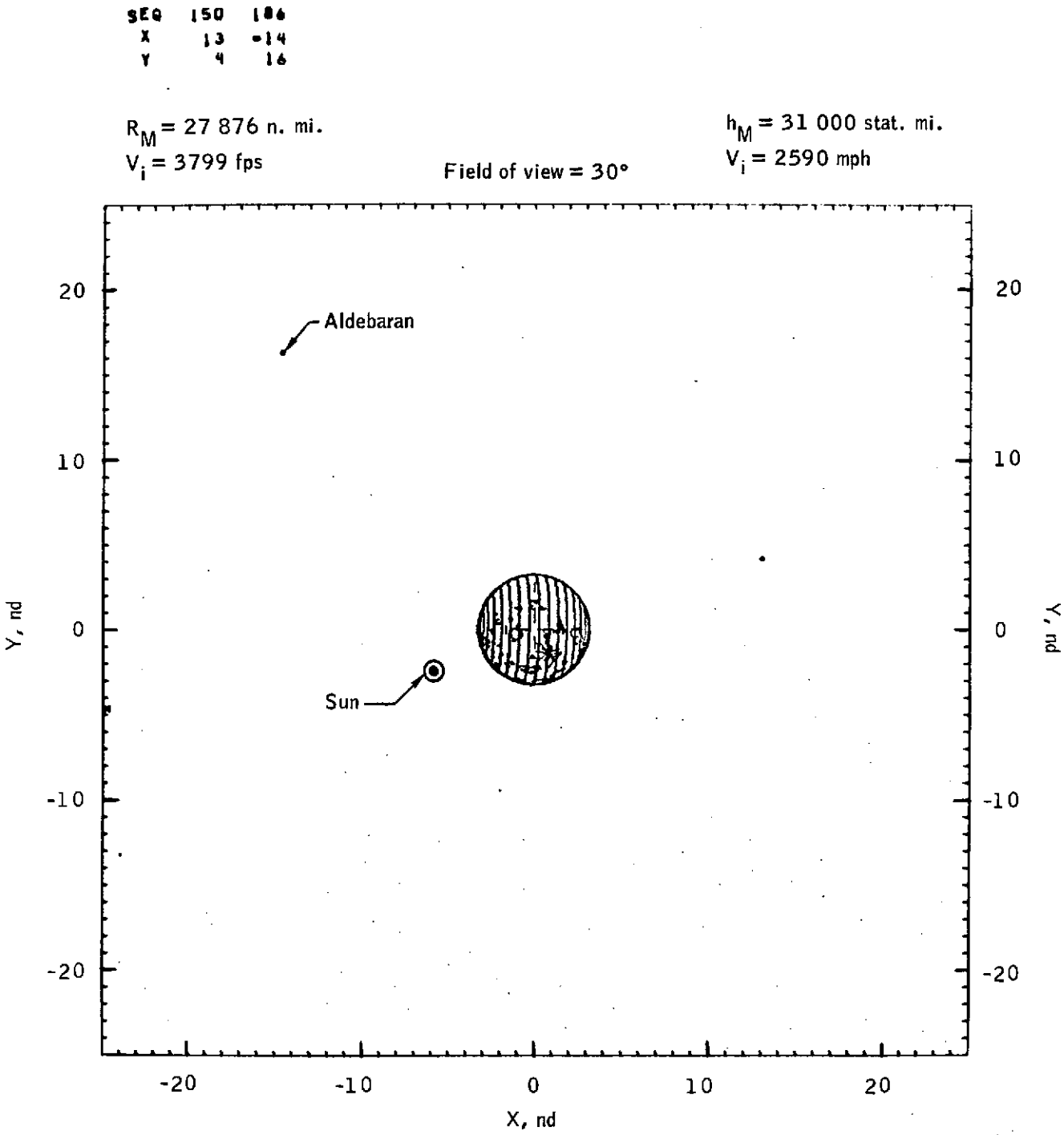
Field of view = 30°

$h_E$ = 215 682 stat. mi.
$V_i$ = 2171 mph



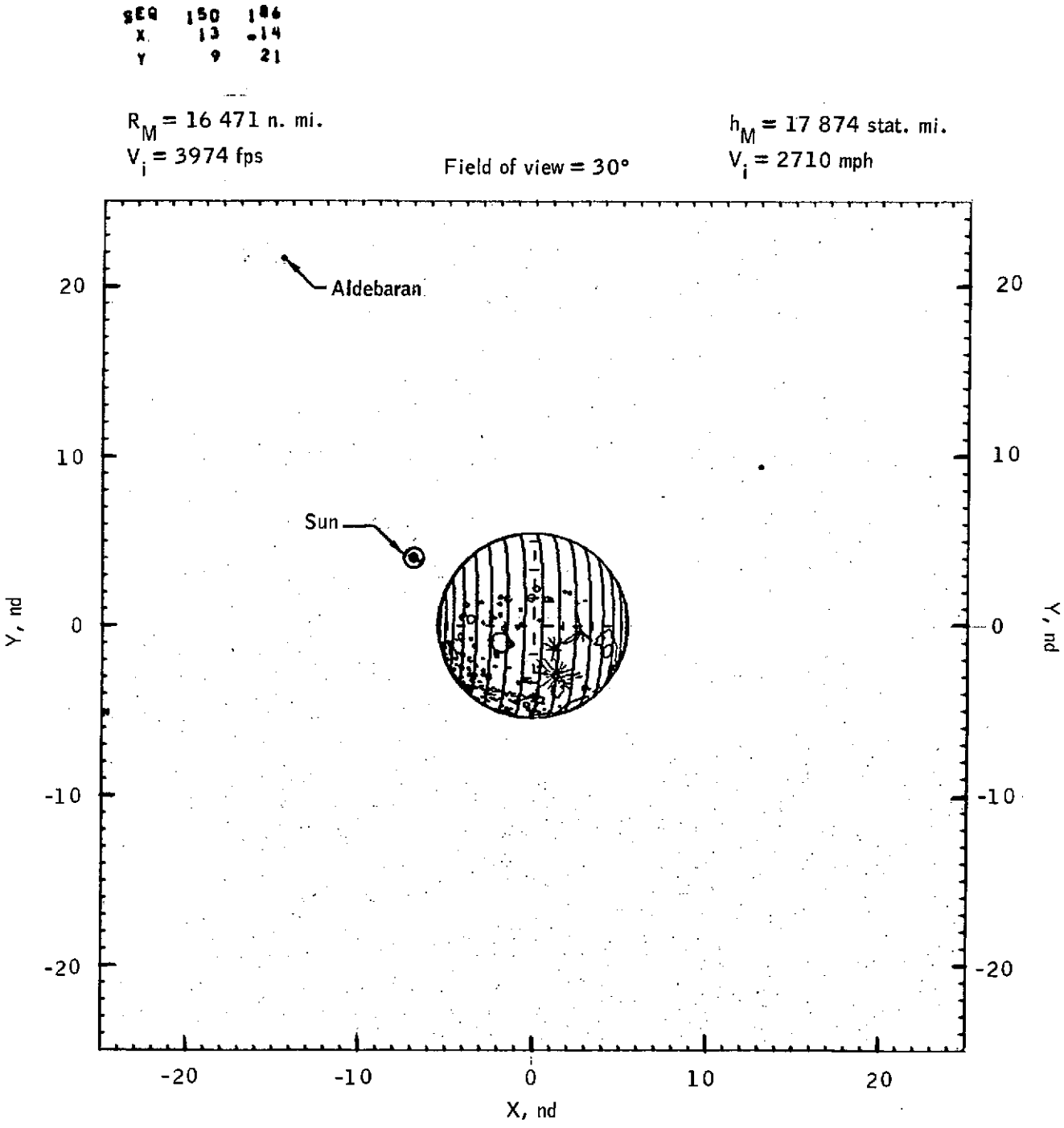

(f) G.e.t. = 60 hours.

Figure 10.- Continued.



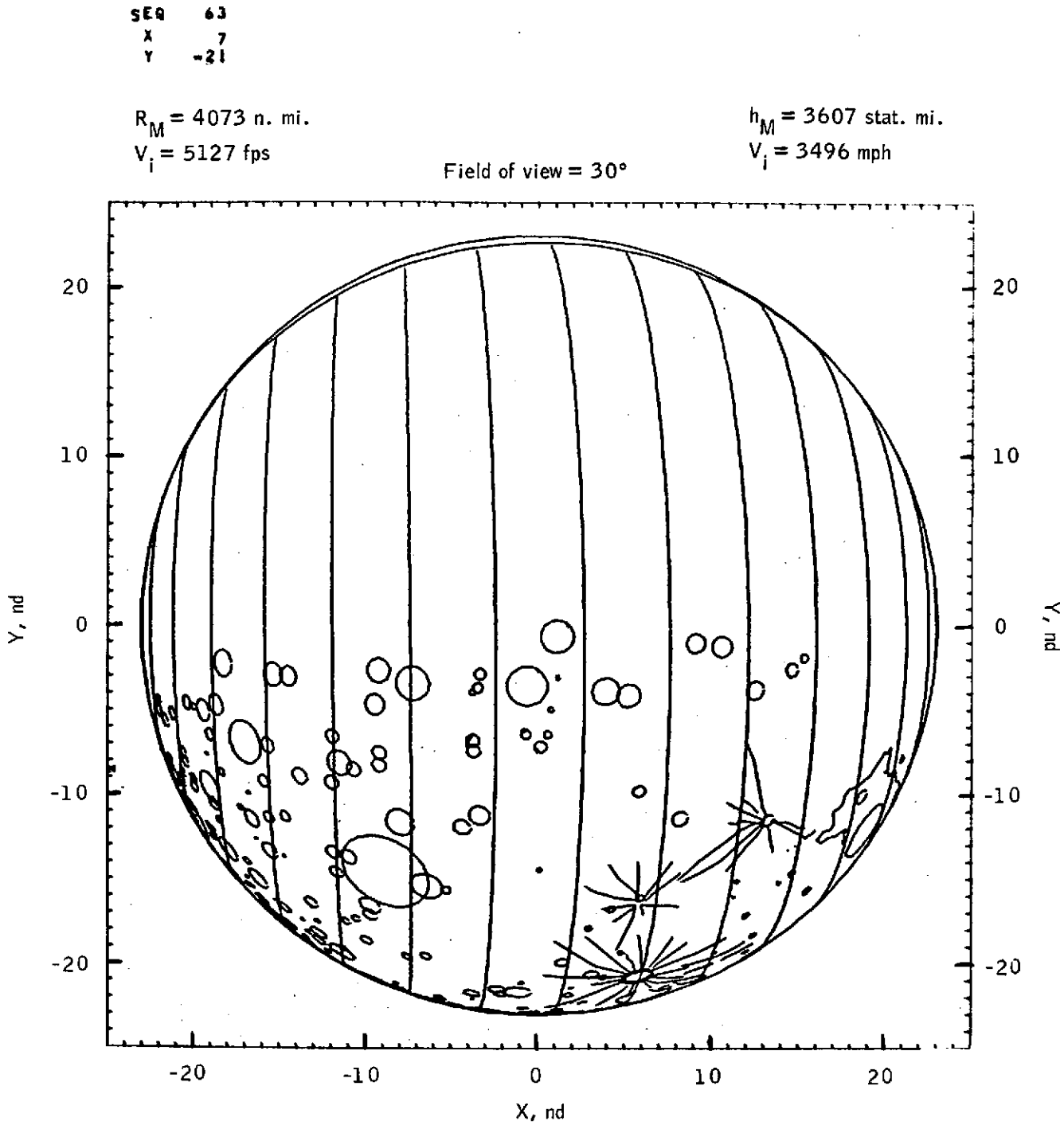

(g) G.e.t. = 65 hours.

Figure 10.- Continued.



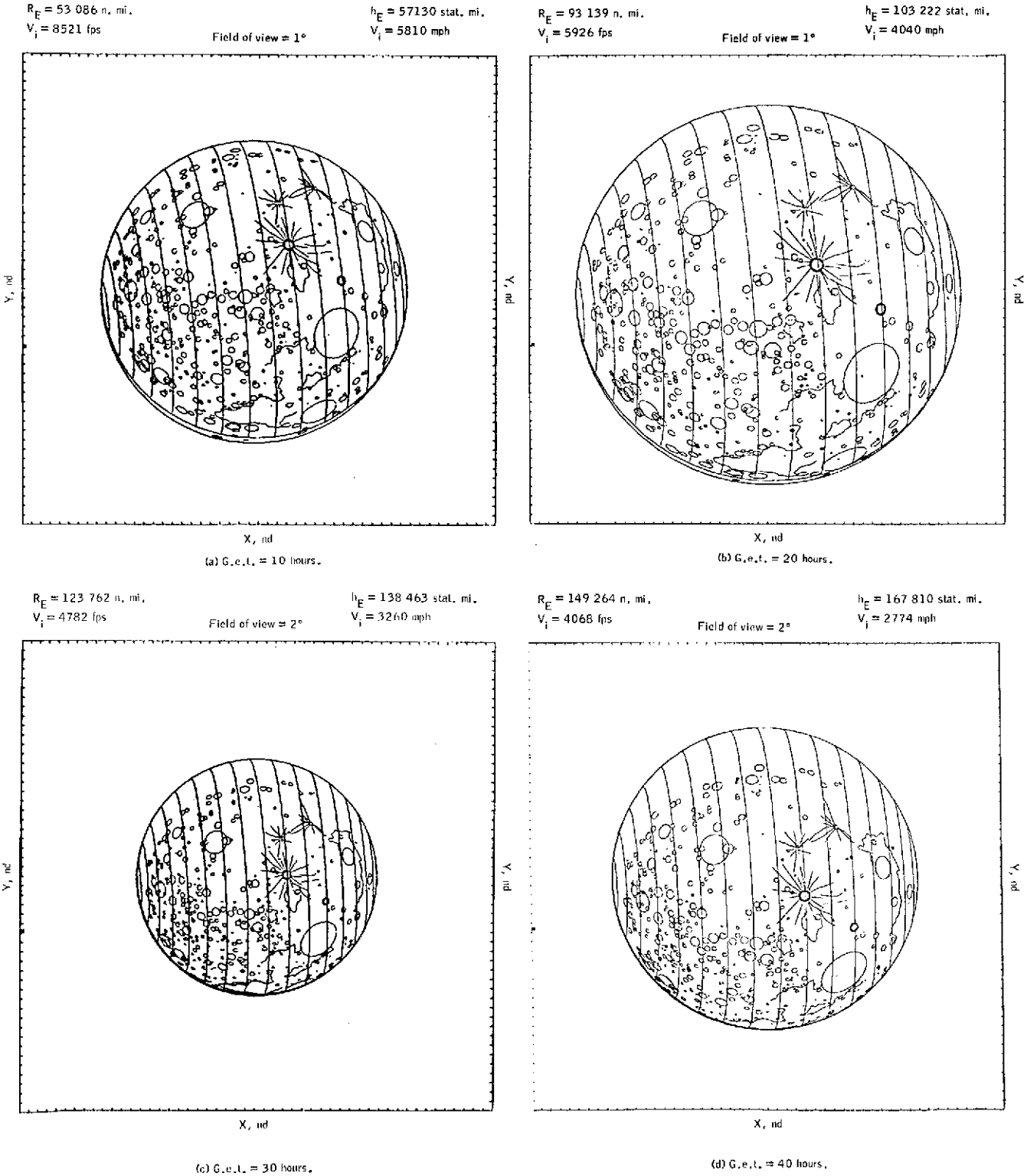

(h) G.e.t. = 70 hours.

Figure 10.- Continued.




(i) G.e.t. = 75 hours.

Figure 10.- Concluded.




(a) G.e.t. = 10 hours.

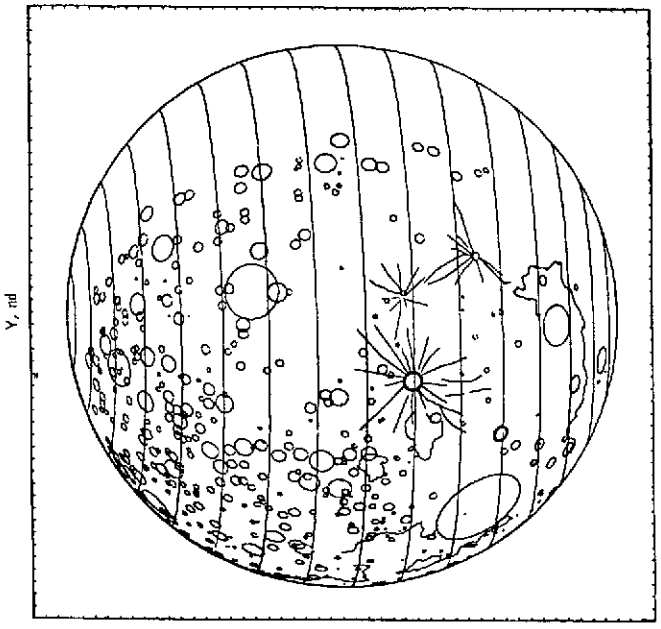
(b) G.e.t. = 20 hours.

(c) G.e.t. = 30 hours.

(d) G.e.t. = 40 hours.

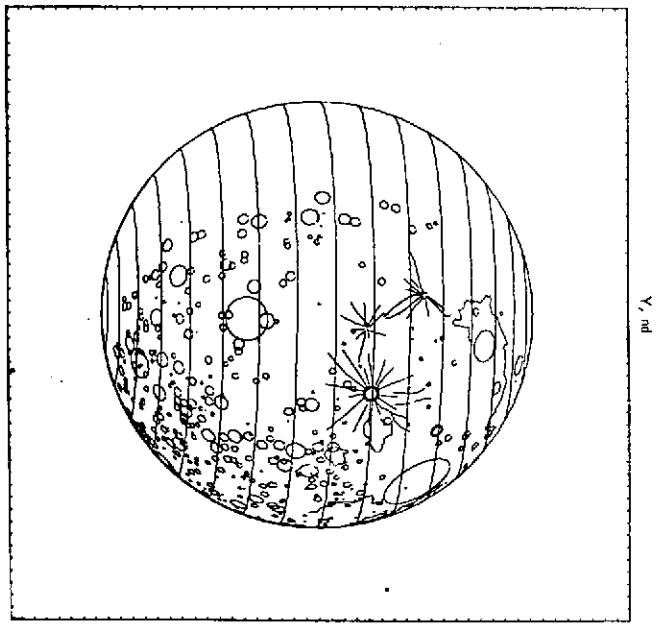
Figure 11.- Translunar coast - variable field of view (moon).

$R_E$ = 171 319 n. mi.
$V_i$ = 3559 fps
Field of view = 2°
$h_E$ = 193 189 stat. mi.
$V_i$ = 2427 mph



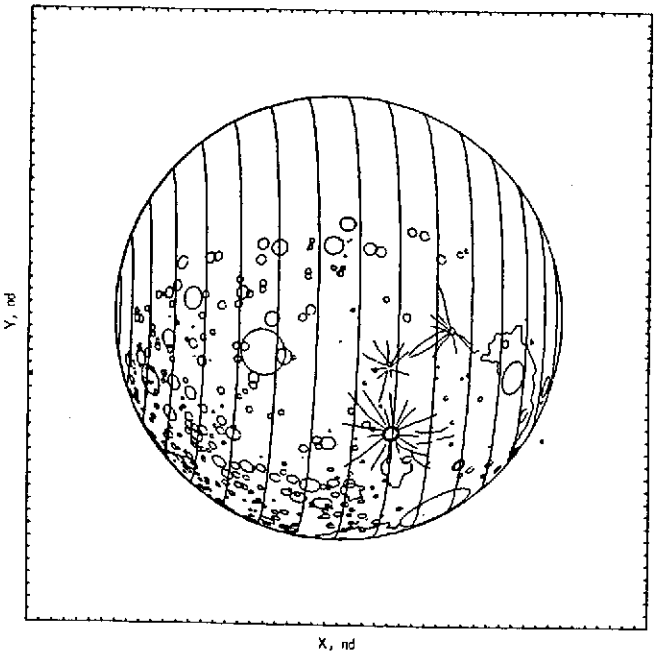

(e) G.e.t. = 50 hours.

$R_E$ = 190 864 n. mi.
$V_i$ = 3184 fps
Field of view = 4°
$h_E$ = 215 682 stat. mi.
$V_i$ = 2171 mph



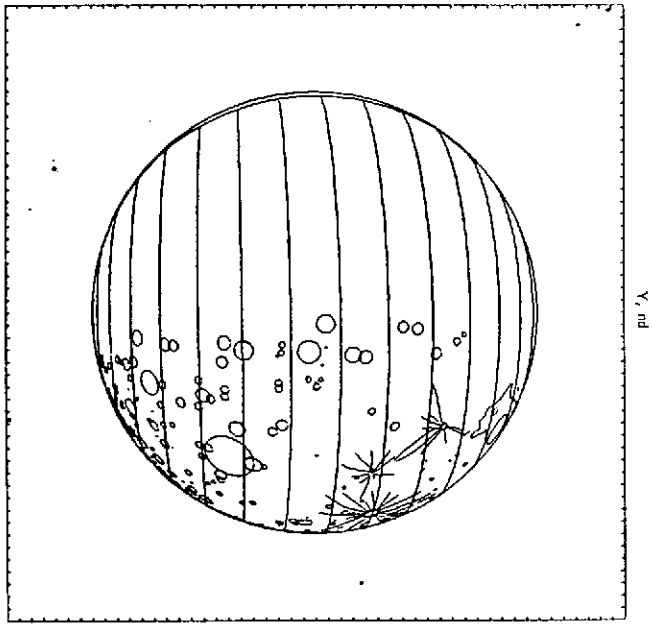

(f) G.e.t. = 60 hours.

$R_M$ = 16 471 n. mi.
$V_i$ = 3921 fps
Field of view = 8°
$h_E$ = 17874 stat. mi.
$V_i$ = 2673 mph




(g) G.e.t. = 70 hours.

$R_M$ = 4073 n. mi.
$V_i$ = 5129 fps
Field of view = 40°
$h_E$ = 3627 stat. mi.
$V_i$ = 3497 mph




(h) G.e.t. = 75 hours.

Figure 11. - Concluded.

PRIOR TO LOI

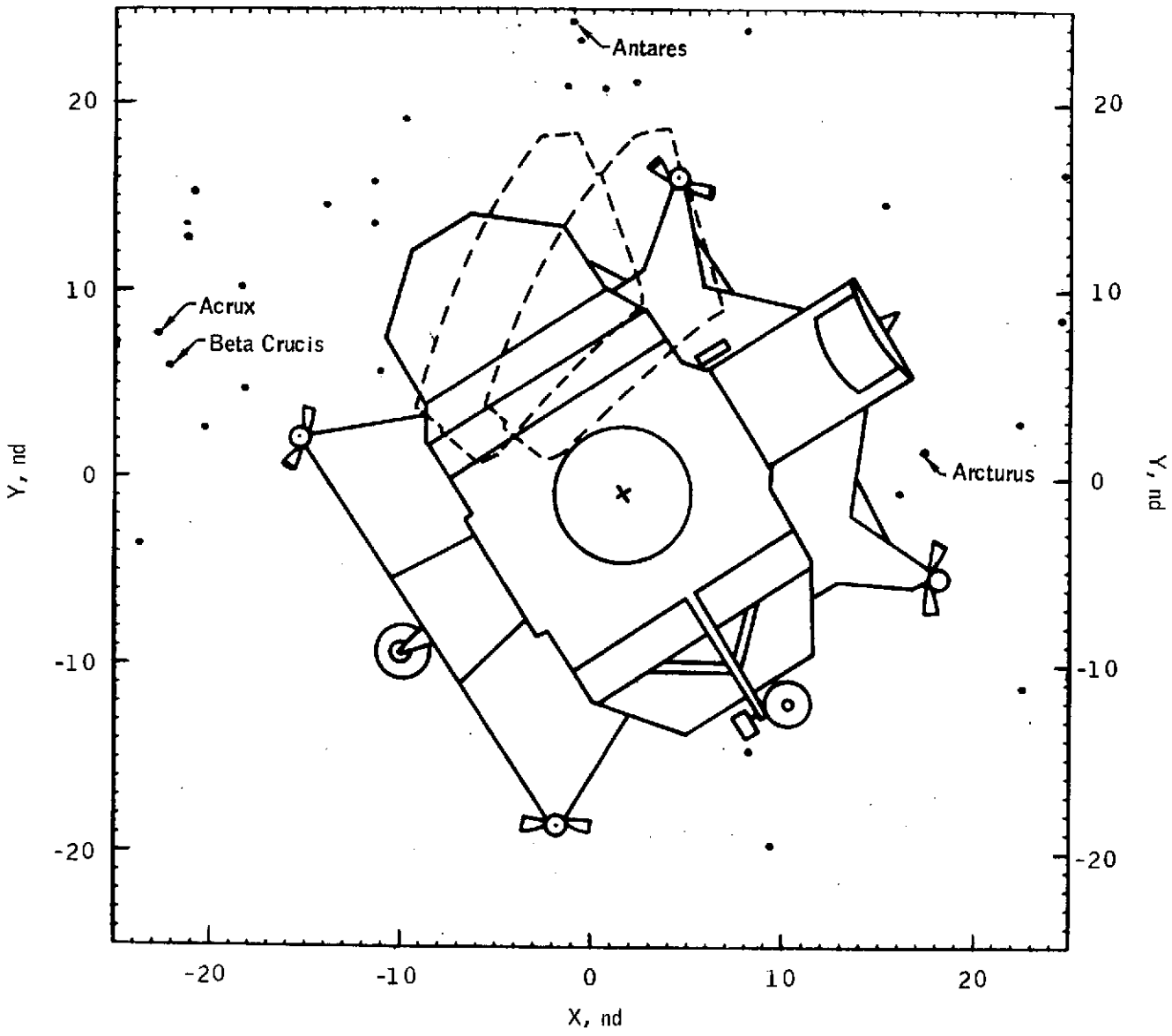
| SEQ | 498 | 515 | 535 | 545 | 557 | 561 | 569 | 574 | 580 | 589 | 599 | 610 | 617 | 624 | 641 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| X | -23 | 9 | 8 | -20 | -24 | -22 | -18 | -22 | 22 | -11 | -18 | 16 | -21 | 17 | -11 |
| Y | -3 | -19 | -14 | 2 | 7 | 6 | 4 | 7 | -11 | 5 | 10 | 0 | 12 | 1 | 13 |

| SEQ | 643 | 645 | 651 | 660 | 688 | 690 | 700 | 717 | 719 | 724 | 736 | 743 | 745 | 753 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| X | -20 | -13 | 22 | -11 | -9 | 24 | 15 | -1 | 0 | 2 | 0 | 0 | 24 | 8 |
| Y | 15 | 14 | 3 | 15 | 19 | 8 | 14 | 21 | 20 | 21 | 23 | 24 | 16 | 24 |

$R_M$ = 2216 n. mi.
$V_i$ = 6167 fps

Field of view = 100°

$h_M$ = 1470 stat. mi.
$V_i$ = 4205 mph




(a) 30 min prior to LOI (g.e.t. = 71:38:17.6).

Figure 12.- Constant inertial attitude prior to LOI.

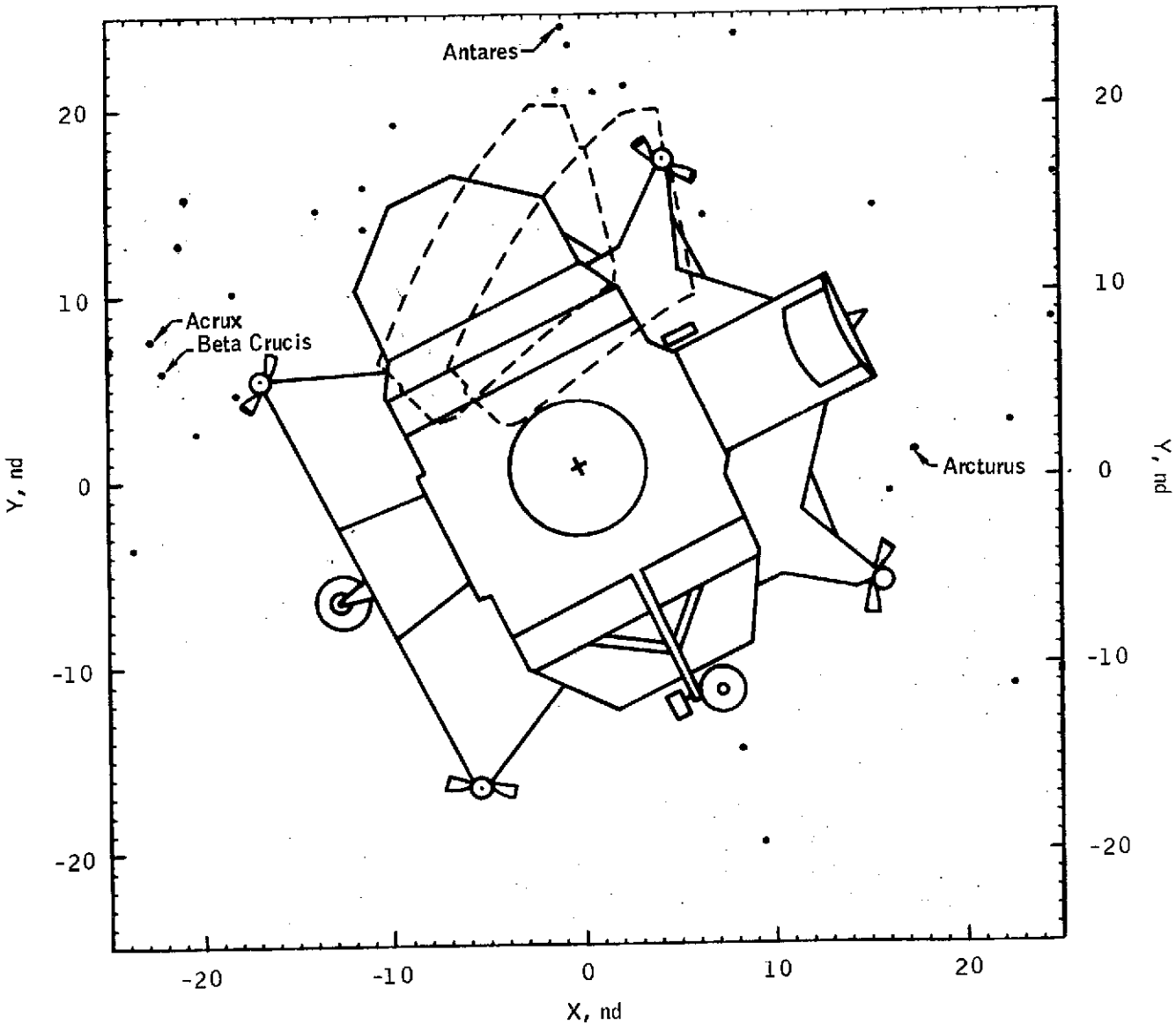
| SEQ | 498 | 515 | 535 | 545 | 557 | 561 | 569 | 574 | 580 | 589 | 599 | 610 | 617 | 624 | 641 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| X | -23 | 9 | 8 | -20 | -24 | -22 | -18 | -22 | 22 | -11 | -18 | 16 | -21 | 17 | -11 |
| Y | -3 | -19 | -14 | 2 | 7 | 6 | 4 | 7 | -11 | 5 | 10 | 0 | 12 | 1 | 13 |

| SEQ | 643 | 645 | 651 | 660 | 673 | 688 | 690 | 700 | 717 | 719 | 724 | 736 | 743 | 745 | 753 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| X | -20 | -13 | 22 | -11 | 6 | -9 | 24 | 15 | -1 | 0 | 2 | 0 | 0 | 24 | 8 |
| Y | 15 | 14 | 3 | 15 | 14 | 19 | 8 | 14 | 21 | 20 | 21 | 23 | 24 | 16 | 24 |

$R_M$ = 1512 n. mi.
$V_i$ = 7072 fps

Field of view = 100°

$h_M$ = 661 stat. mi.
$V_i$ = 4822 mph




(b) 15 min prior to LOI (g.e.t. = 71:53:17.6).

Figure 12.- Concluded.

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LUNAR ORBIT
INSERTION BURN

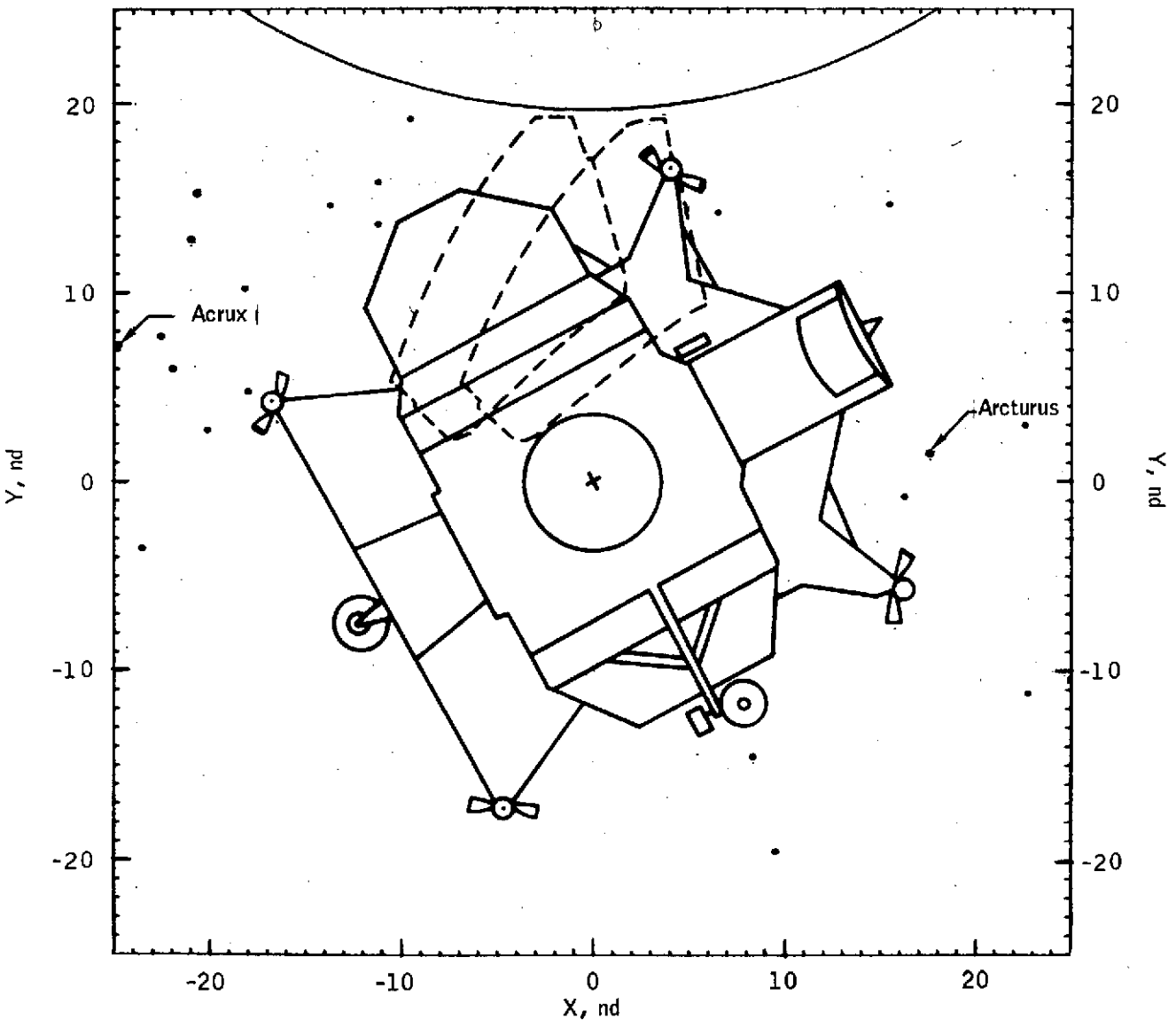
| SEQ | 498 | 515 | 535 | 545 | 557 | 561 | 569 | 574 | 580 | 599 | 610 | 617 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| X | -23 | 9 | 8 | -20 | -24 | -21 | -17 | -22 | 22 | -18 | 16 | -20 |
| Y | -3 | -19 | -14 | 2 | 7 | 6 | 4 | 7 | -11 | 10 | 0 | 12 |

| SEQ | 660 | 673 | 628 | 641 | 643 | 645 | 651 | 688 | 690 | 700 | 745 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| X | -11 | 6 | 17 | -11 | -20 | -13 | 22 | -9 | 24 | 15 | 24 |
| Y | 15 | 14 | 1 | 18 | 15 | 14 | 3 | 19 | 8 | 14 | 16 |

$R_M$ = 1022 n. mi.
$V_i$ = 8250 fps

Field of view = 100°

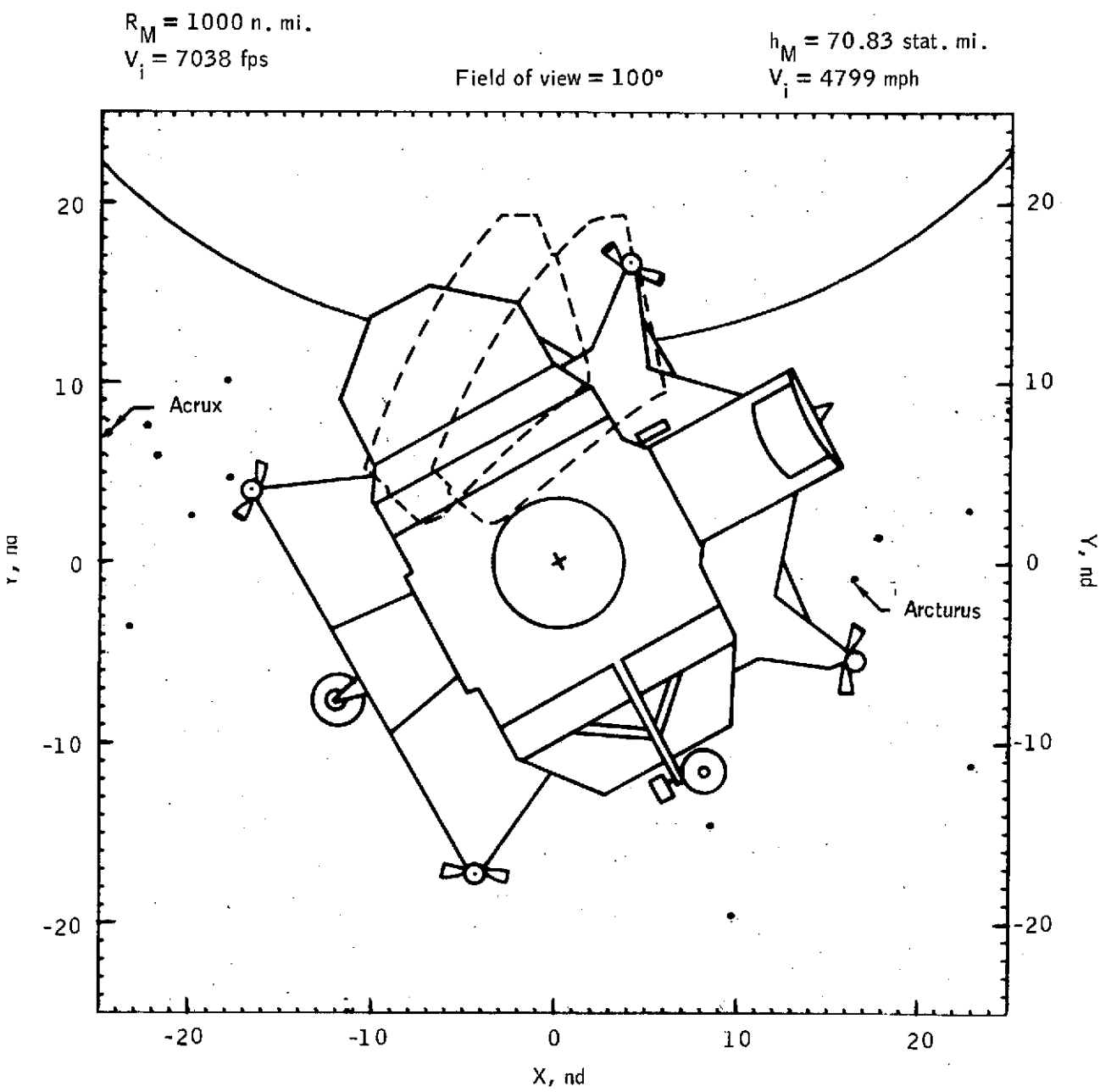
$h_M$ = 96.7 stat. mi.
$V_i$ = 5625 mph




(a) Begin LOI burn (g.e.t. = 76:08:17).

Figure 13.- Lunar orbit insertion burn.

| SEQ | 440 | 498 | 515 | 535 | 545 | 557 | 561 | 569 | 574 | 580 | 599 | 610 | 624 | 651 | 690 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| X | -11 | -23 | 9 | 8 | -19 | -24 | -21 | -17 | -22 | 22 | -17 | 16 | 17 | 22 | 24 |
| Y | -24 | -3 | -19 | -14 | 2 | 7 | 6 | 4 | 7 | -11 | 10 | 0 | 1 | 3 | 8 |




(b) Middle of LOI burn (g.e.t. = 76:11:09).

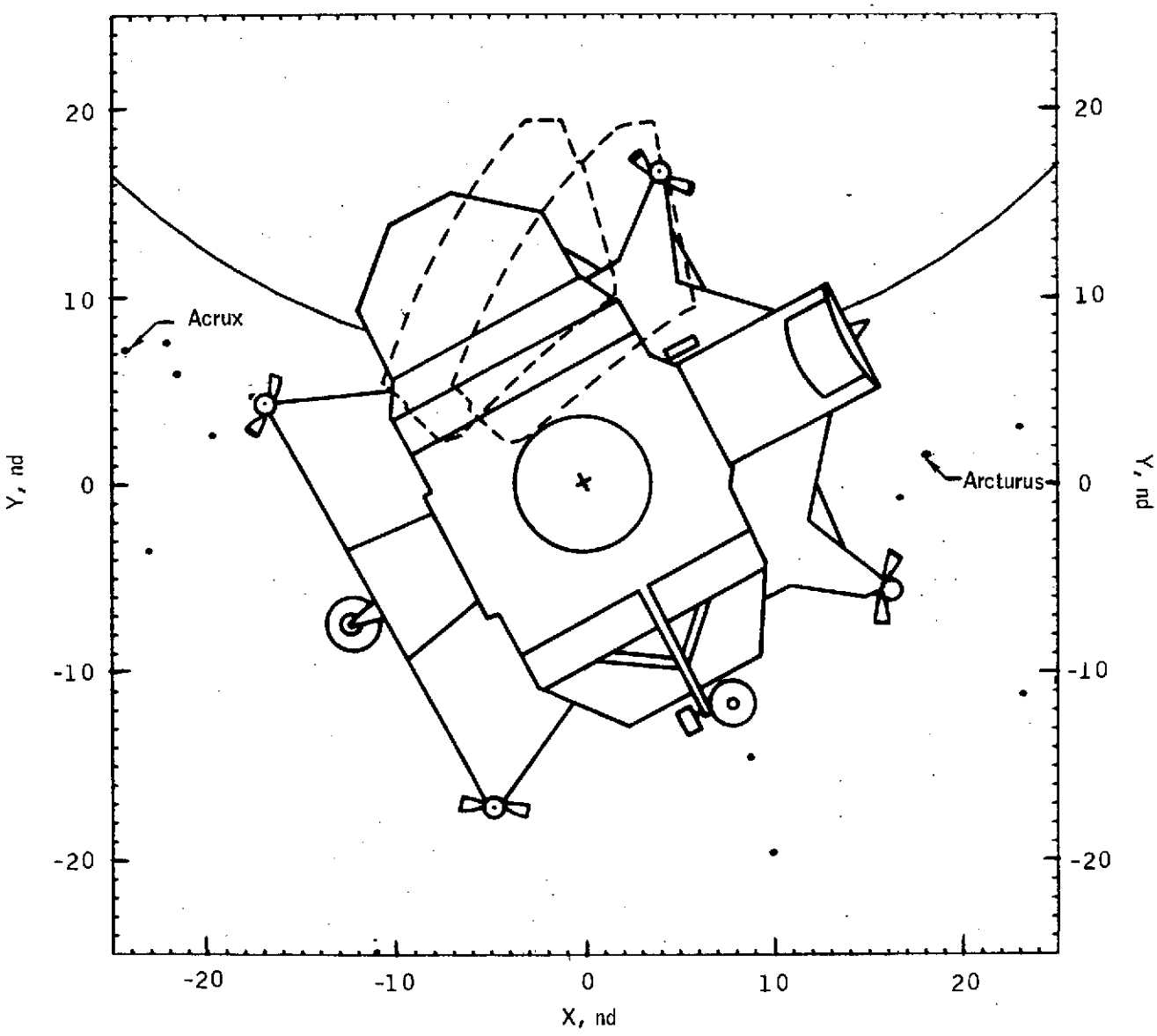
Figure 13.- Continued.

| SEQ | 440 | 498 | 515 | 535 | 545 | 557 | 561 | 569 | 574 | 580 | 610 | 624 | 651 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| X | -11 | -23 | 9 | 8 | -19 | -24 | -21 | -17 | -22 | 23 | 16 | 18 | 23 |
| Y | -24 | -3 | -19 | -14 | 2 | 7 | 6 | 4 | 7 | -11 | 0 | 1 | 3 |

$R_M$ = 997.4 n. mi.
$V_i$ = 5483 fps

Field of view = 100°

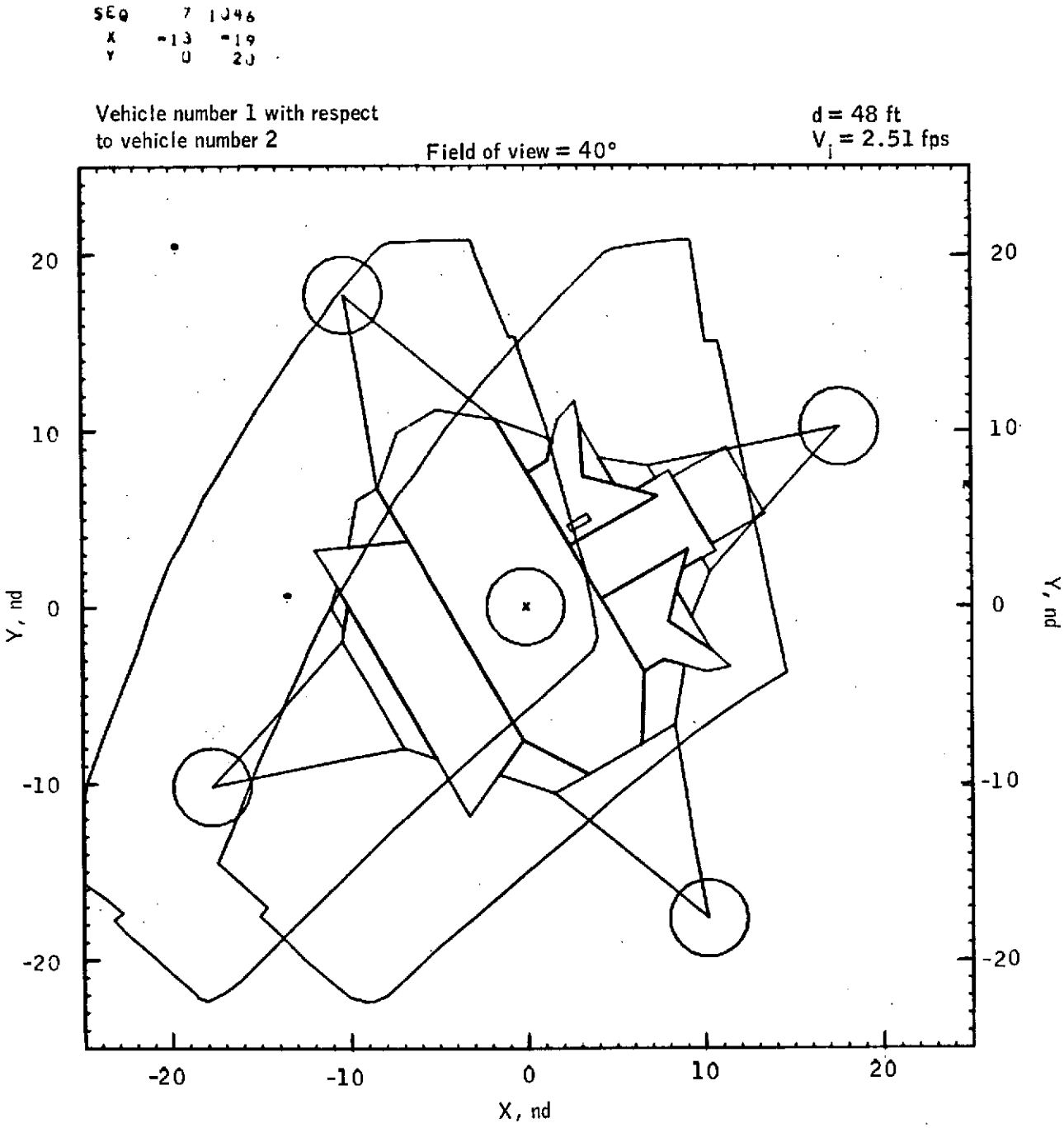
$h_M$ = 67.87 stat. mi.
$V_i$ = 3738 mph




(c) End of LOI burn (g.e.t. = 76:14:10).

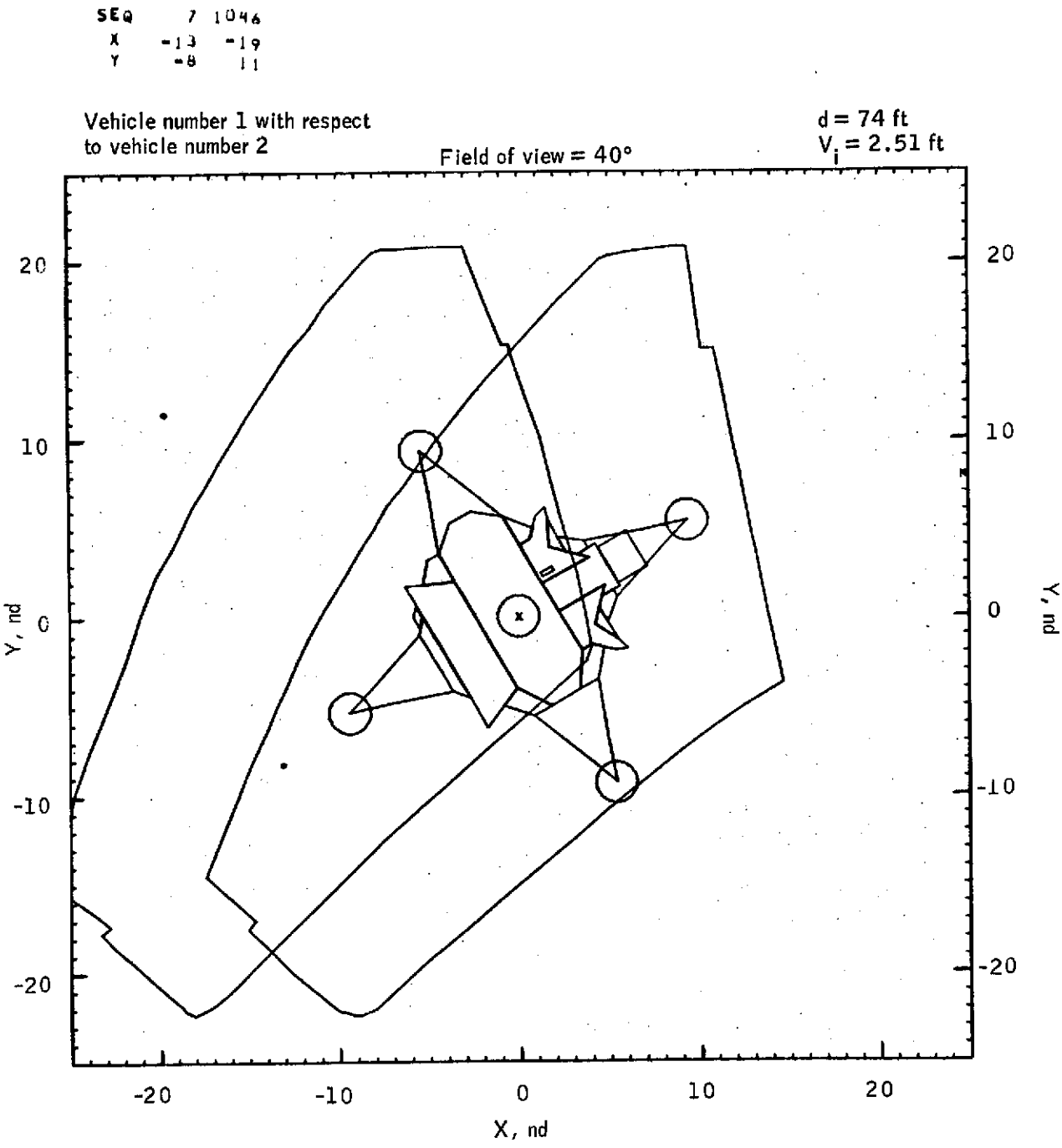
Figure 13.- Concluded.

LM AND CSM IN
LUNAR ORBIT



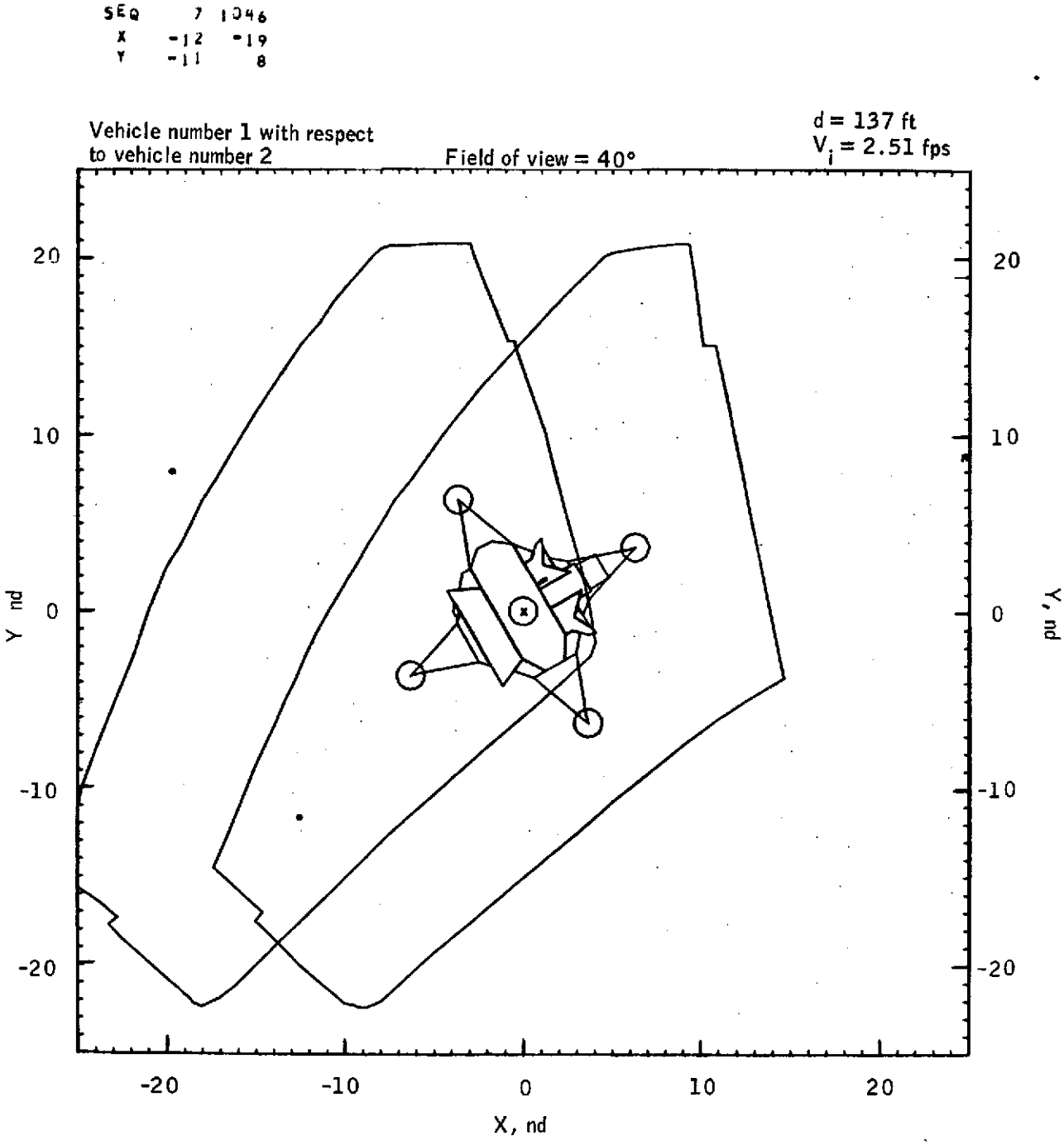

(a) 18 seconds after separation.

Figure 14.- LM as seen from CSM.



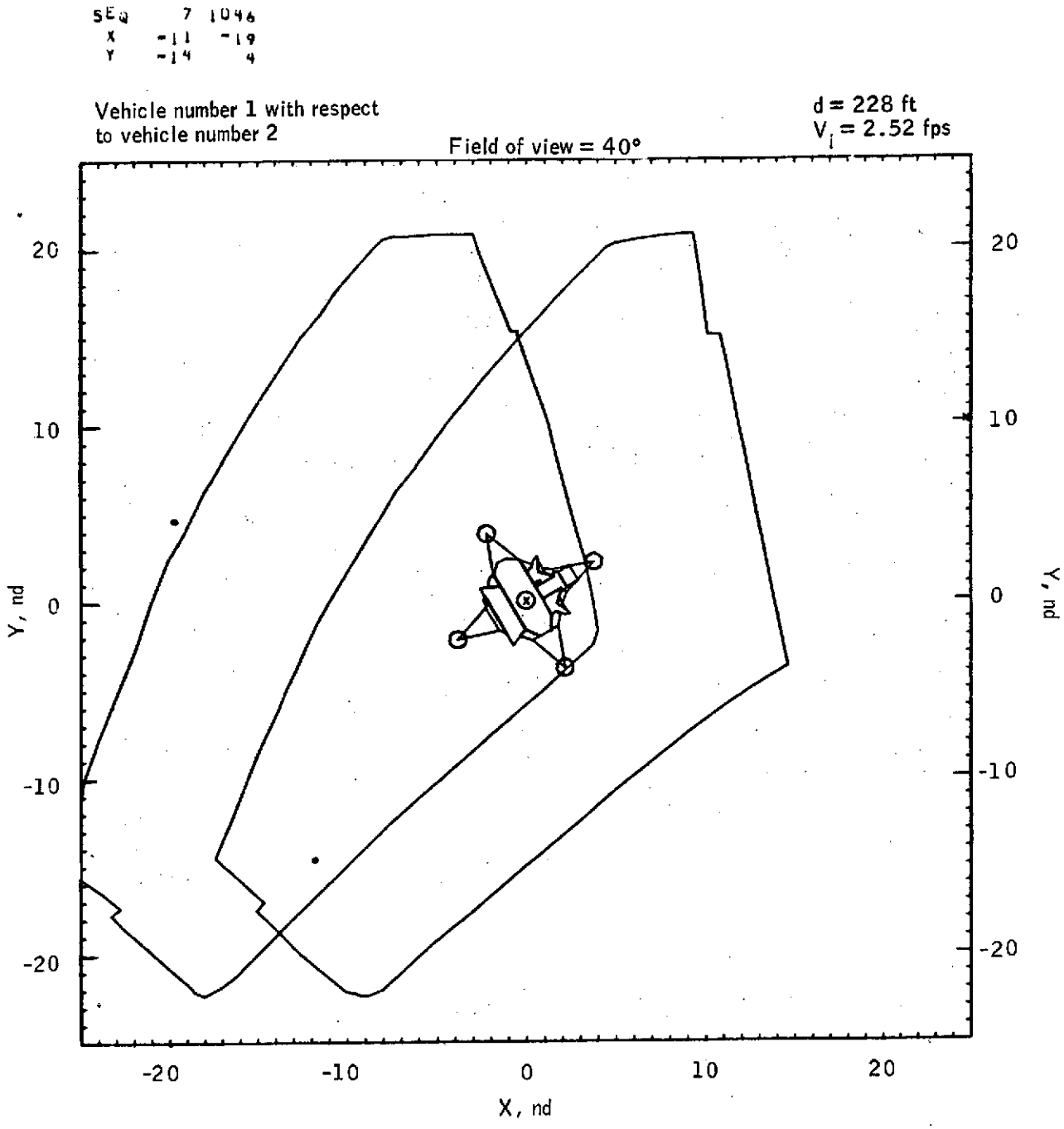

(b) 36 seconds after separation.

Figure 14.- Continued.



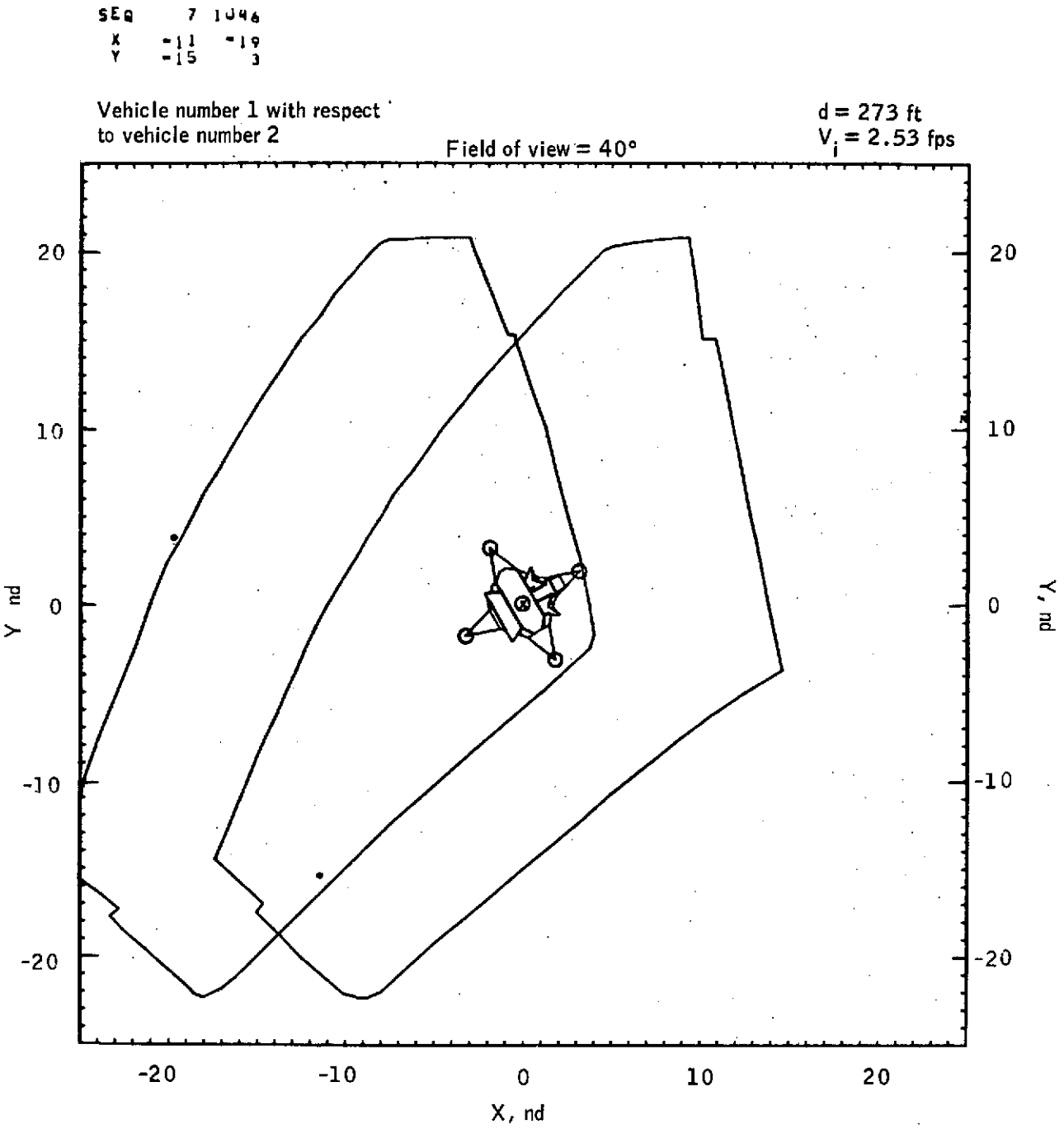

(c) 54 seconds after separation.

Figure 14.- Continued.



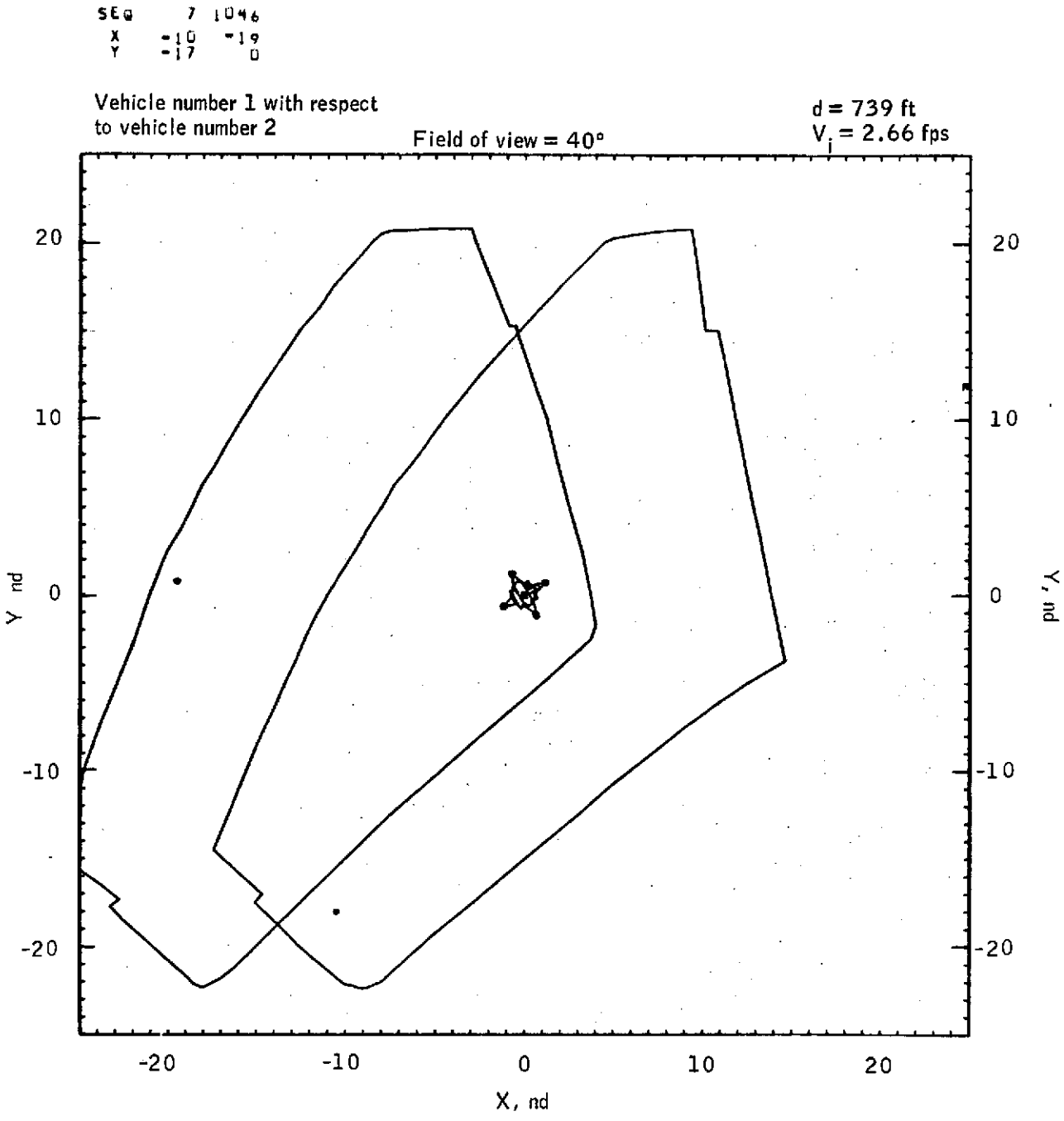

(d) 1 minute 30 seconds after separation.

Figure 14.- Continued.



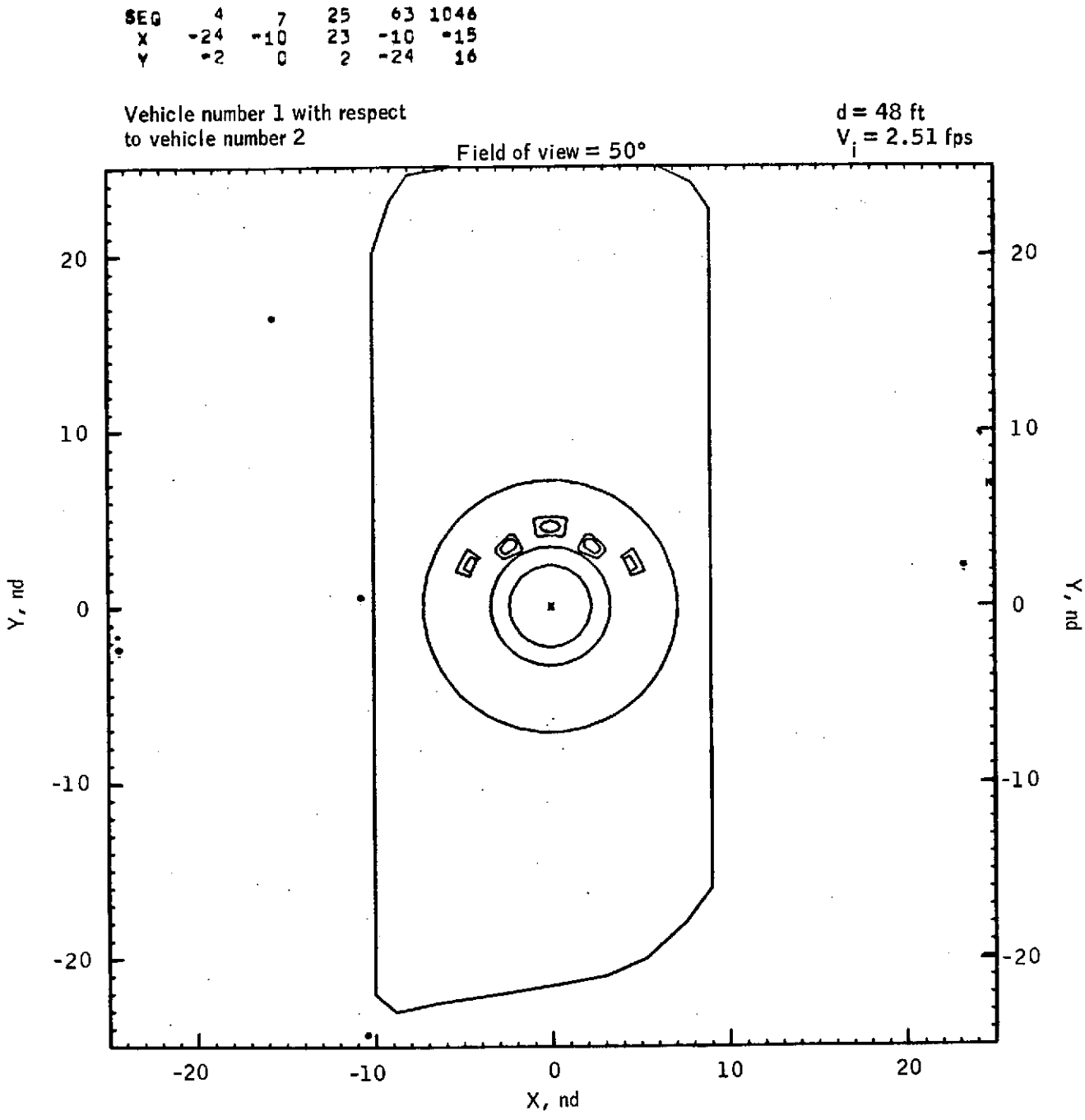

(e) 1 minute 48 seconds after separation.

Figure 14.- Continued.



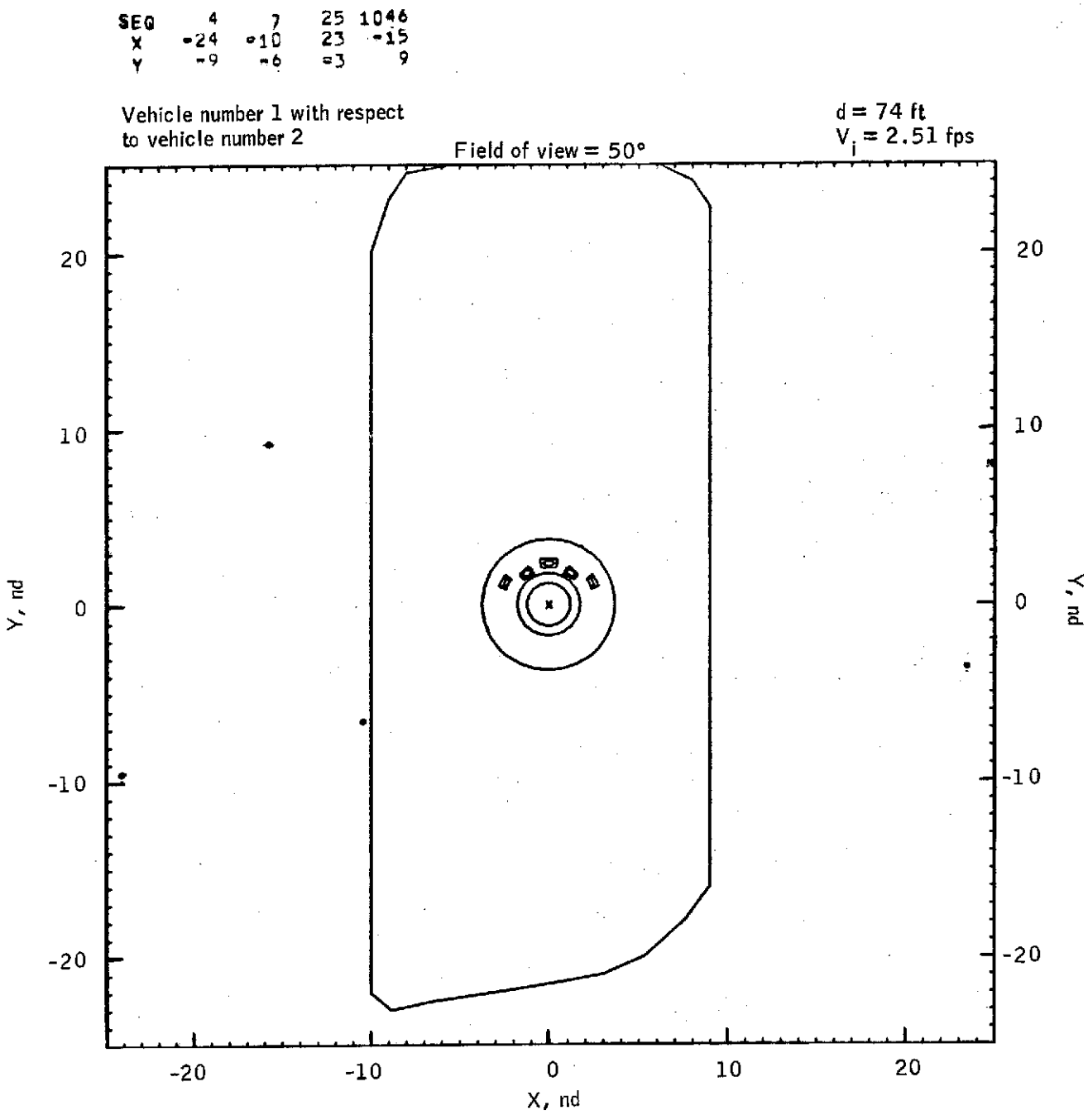

(f) 4 minutes 48 seconds after separation.

Figure 14.- Concluded.



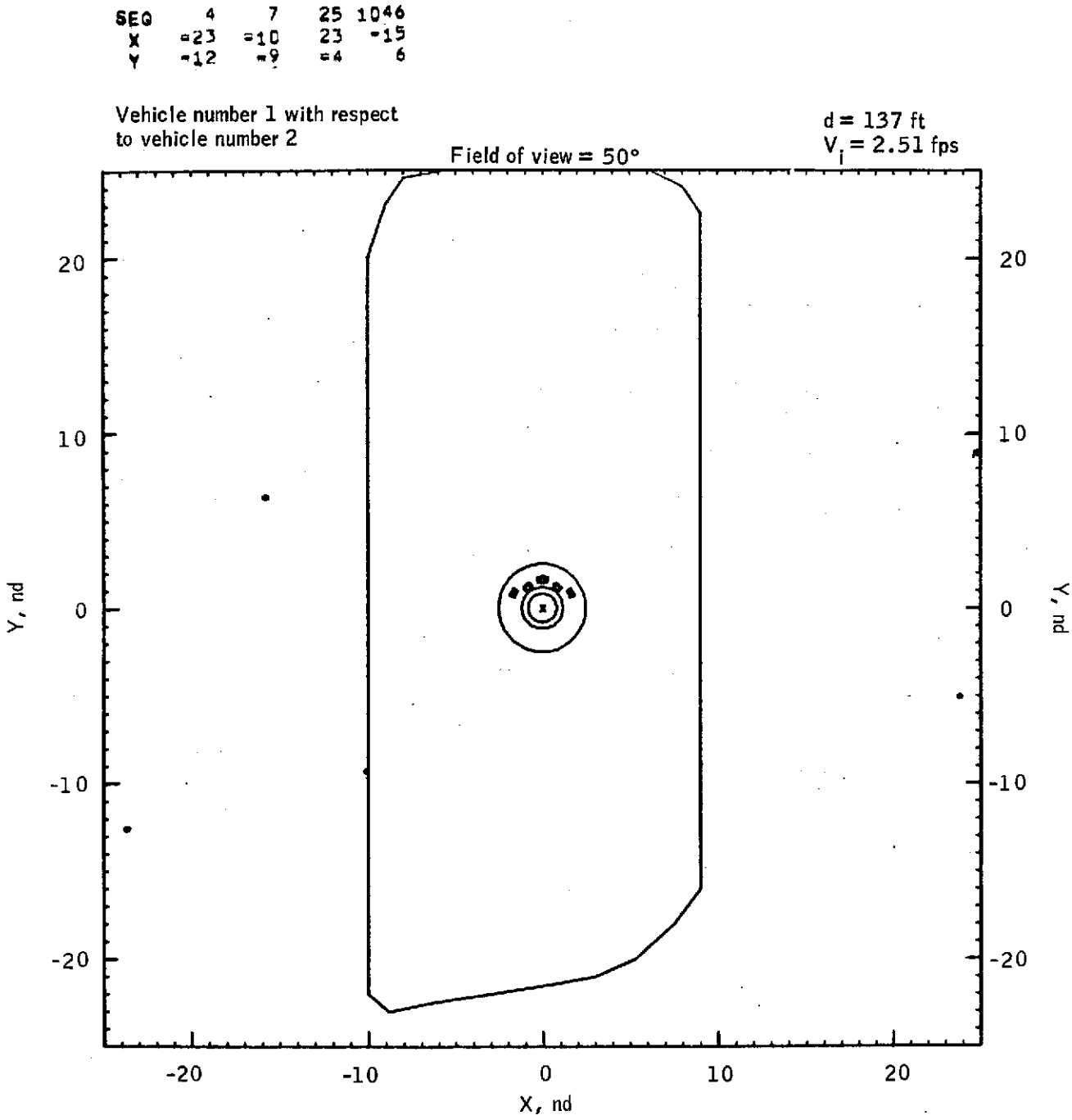

(a) 18 seconds after separation.

Figure 15.- CSM as seen from LM.



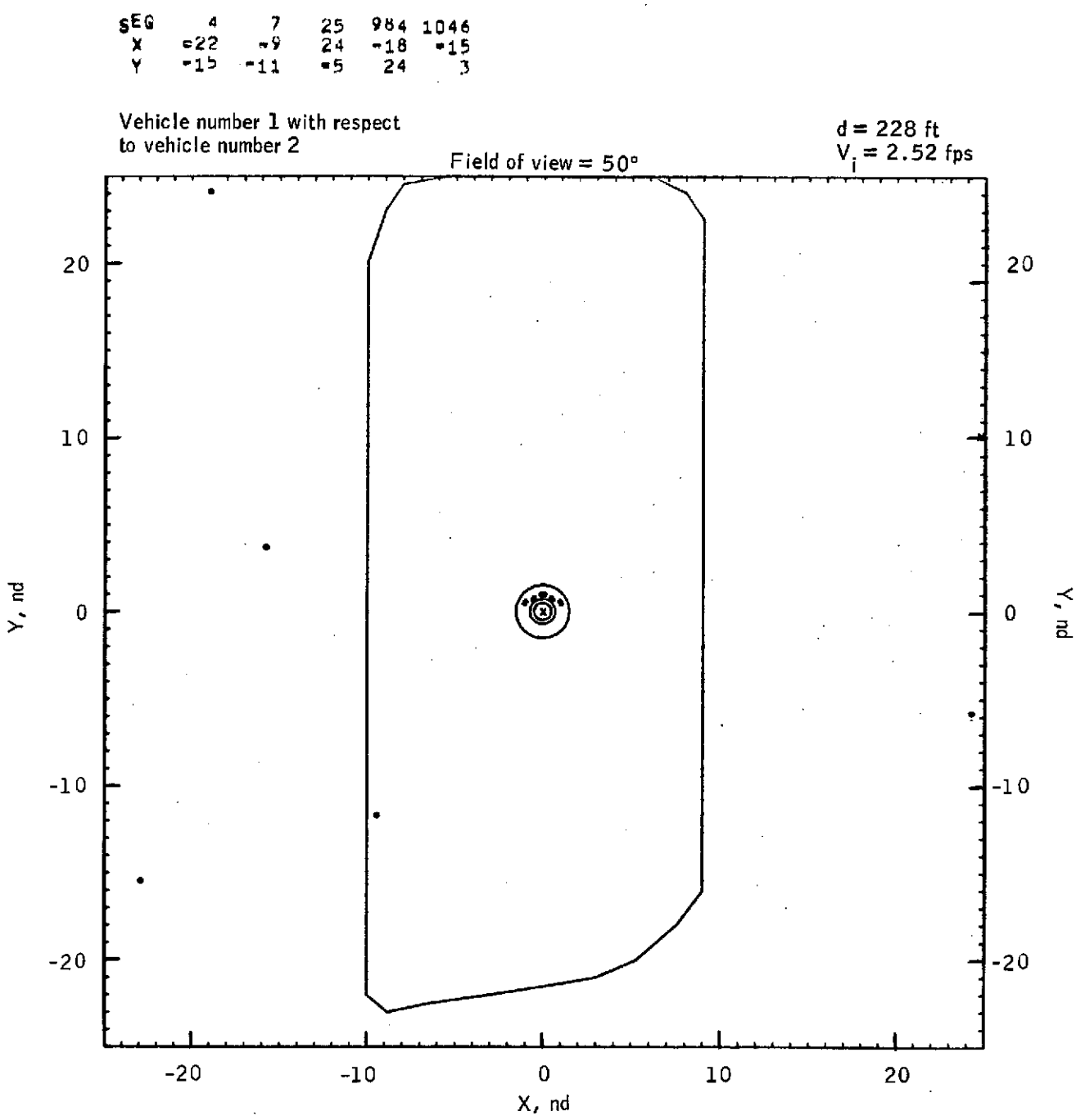

(b) 36 seconds after separation.

Figure 15.- Continued.



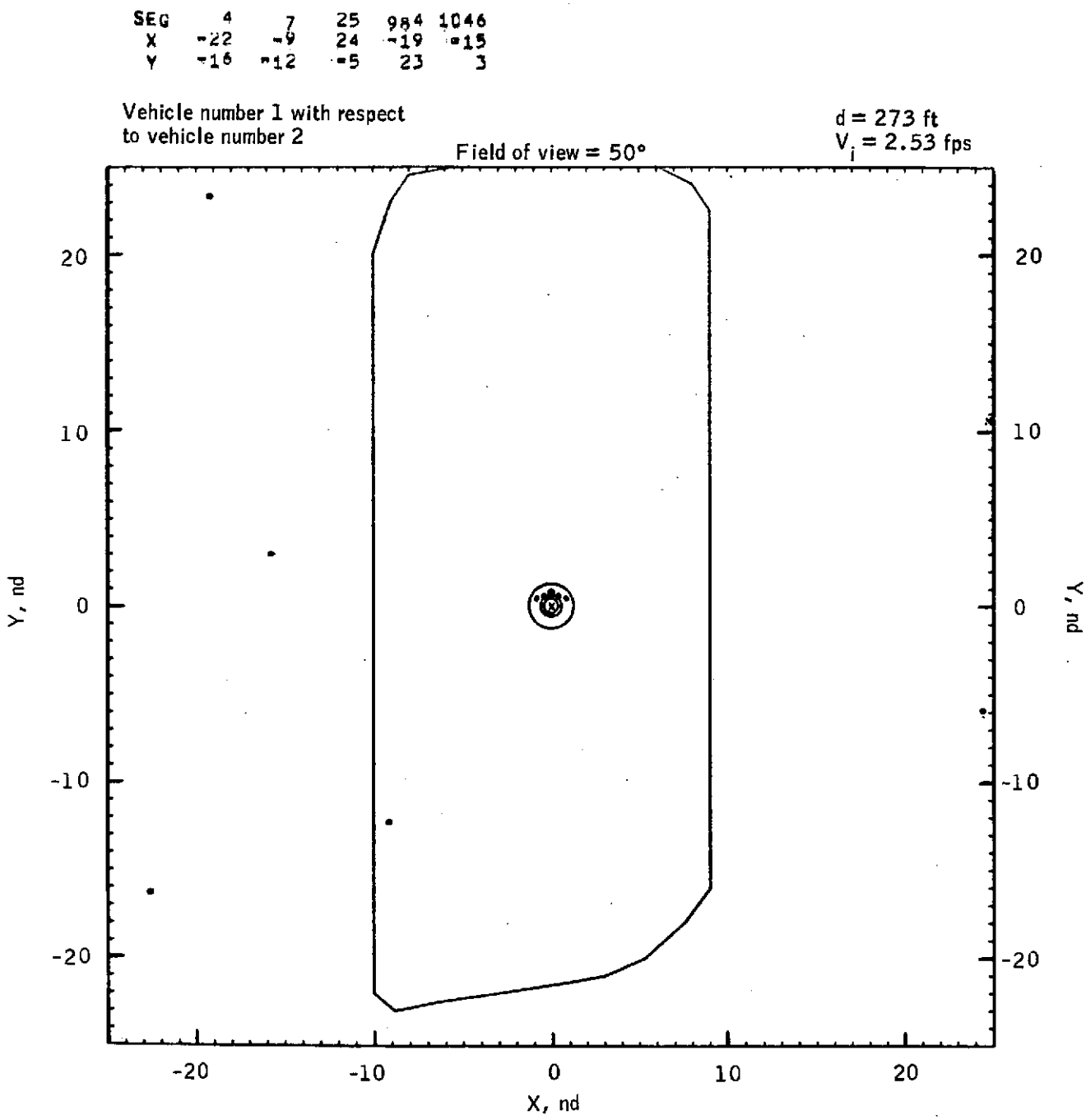

(c) 54 seconds after separation.

Figure 15.- Continued.



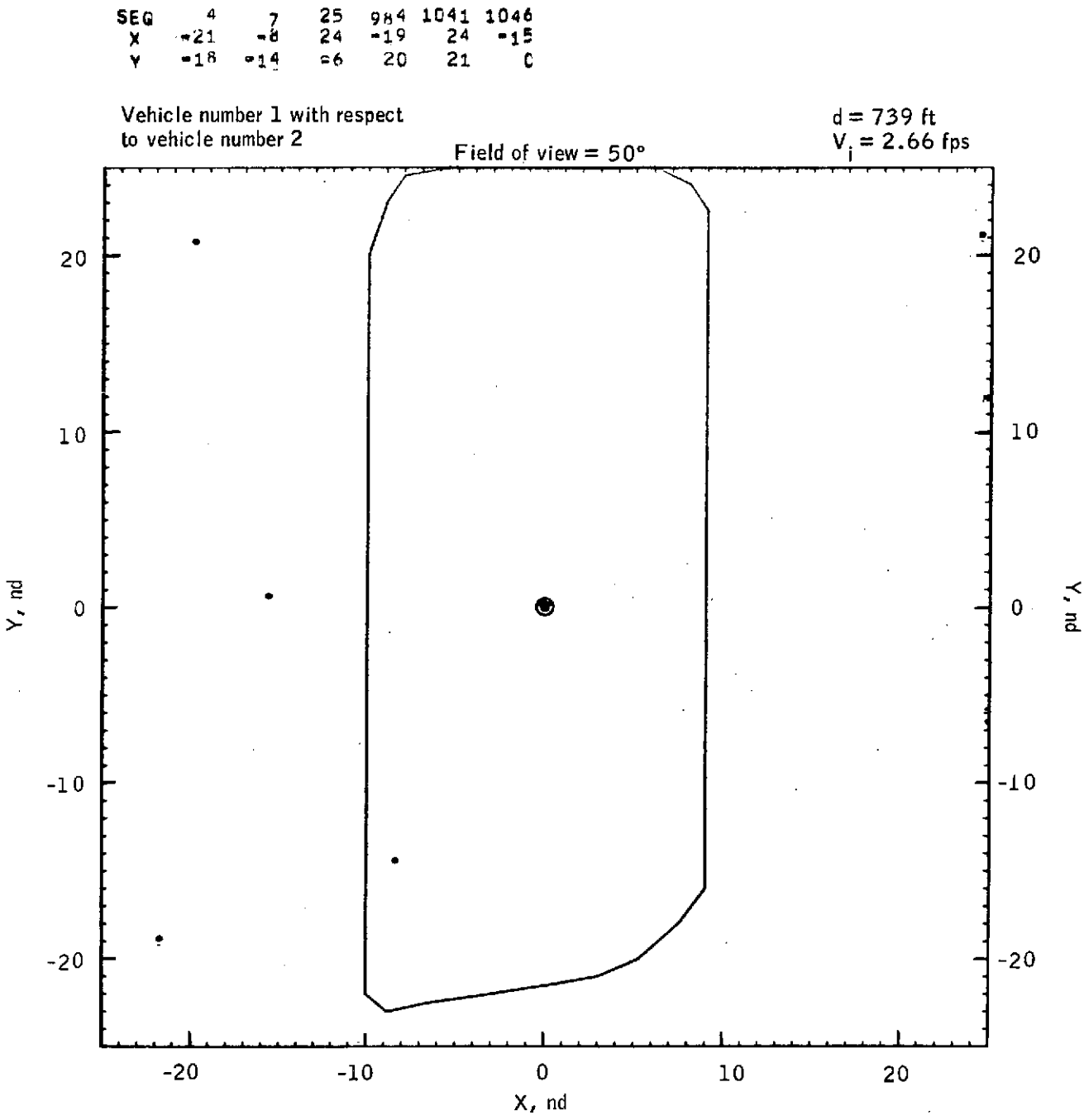

(d) 1 minute 30 seconds after separation.

Figure 15.- Continued.




(e) 1 minute 48 seconds after separation.

Figure 15.- Continued.

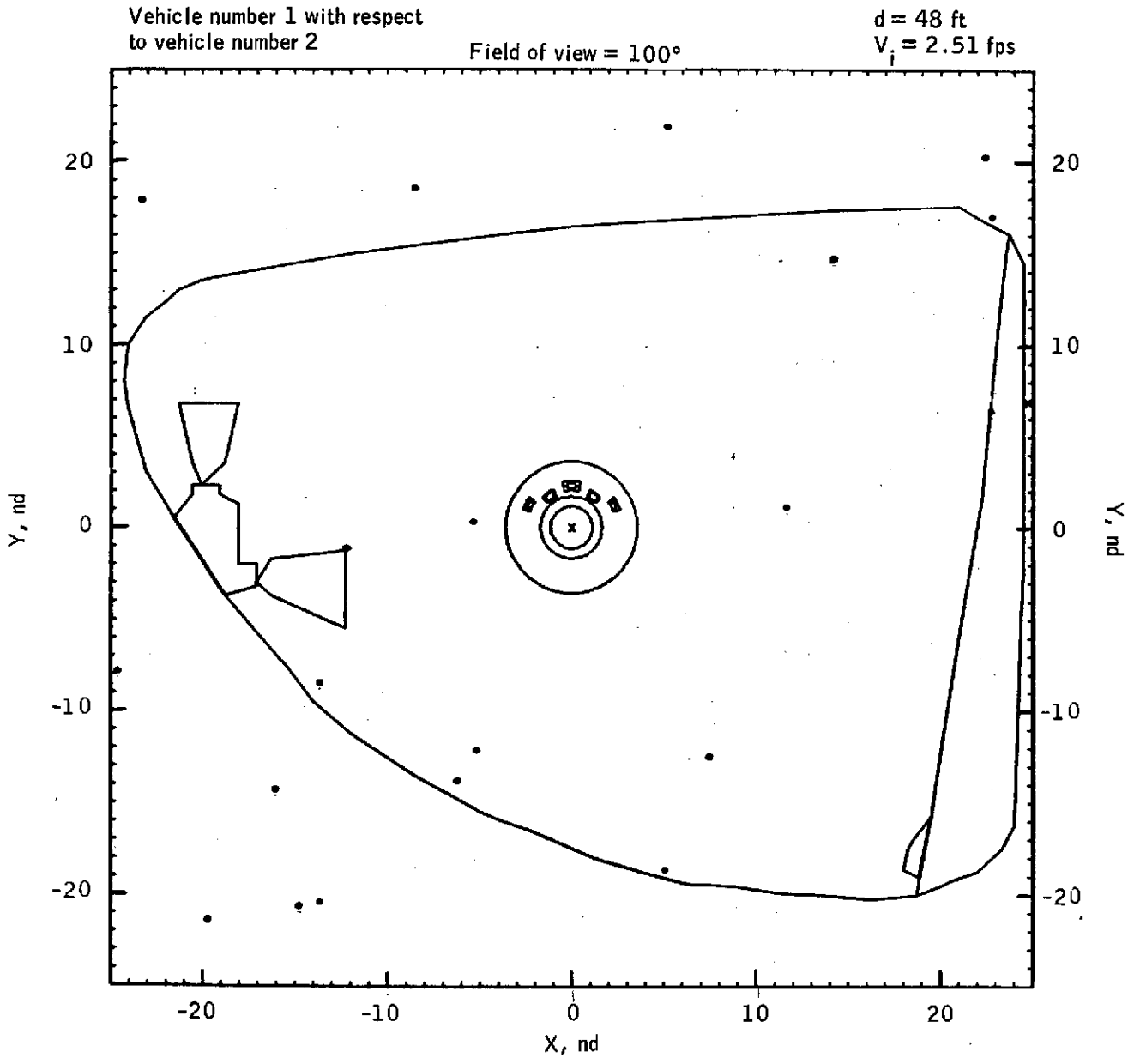



(f) 4 minutes 48 seconds after separation.

Figure 15.- Continued.

| SEQ | 4 | 7 | 15 | 22 | 25 | 41 | 63 | 73 | 75 | 80 | 108 | 111 | 112 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| X | -12 | -5 | 22 | -24 | 11 | -13 | -5 | -16 | -6 | 7 | 5 | -13 | -14 |
| Y | 0 | 0 | 6 | -7 | 1 | -8 | -11 | -14 | -13 | -12 | -18 | -20 | -20 |

| SEQ | 120 | 950 | 984 | 990 | 1001 | 1028 | 1041 | 1044 | 1046 |
|---|---|---|---|---|---|---|---|---|---|
| X | -19 | -23 | -8 | 5 | 22 | 22 | 14 | -14 | -7 |
| Y | -21 | 18 | 18 | 22 | 20 | 17 | 14 | 6 | 8 |

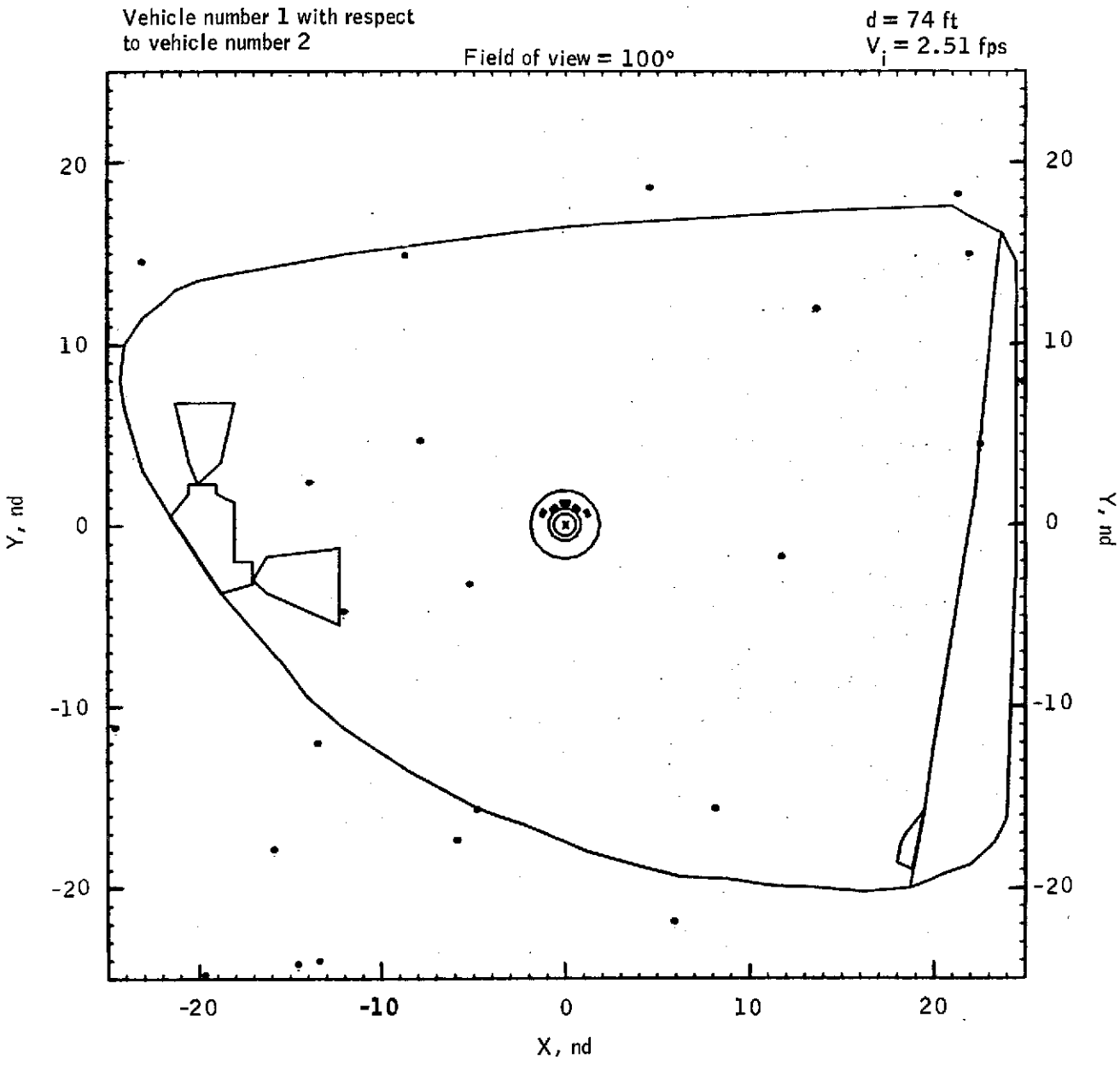



(g) 18 seconds after separation.

Figure 15.- Continued.

| SEQ | 4 | 7 | 15 | 22 | 25 | 41 | 63 | 73 | 75 | 80 | 108 | 111 | 112 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| X | -12 | -5 | 22 | -24 | 11 | -13 | -4 | -15 | -5 | 6 | 5 | -13 | -14 |
| Y | -4 | -3 | 4 | -10 | -1 | -11 | -15 | -17 | -17 | -15 | -21 | -23 | -24 |

| SEQ | 120 | 950 | 984 | 990 | 1001 | 1028 | 1041 | 1044 | 1046 |
|---|---|---|---|---|---|---|---|---|---|
| X | -19 | -23 | -8 | 4 | 21 | 21 | 13 | -13 | -7 |
| Y | -24 | 14 | 15 | 18 | 18 | 15 | 12 | 2 | 4 |

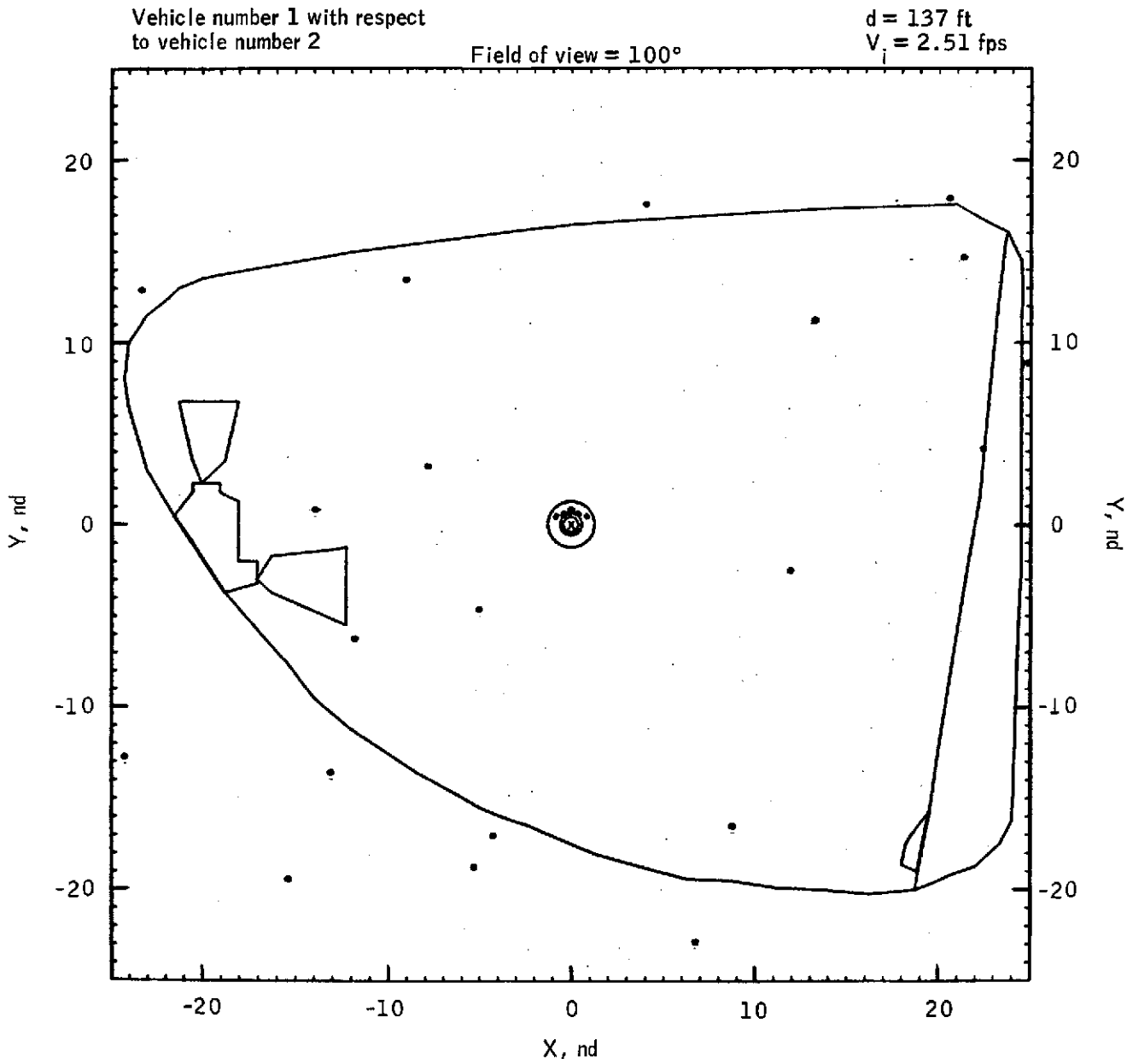



(h) 36 seconds after separation.

Figure 15.- Continued.

| SEQ | 4 | 7 | 15 | 22 | 25 | 41 | 63 | 73 | 75 | 80 | 108 | 950 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| X | -11 | -5 | 22 | -24 | 11 | -13 | -4 | -15 | -5 | 8 | 6 | -23 |
| Y | -6 | -4 | 4 | -12 | -2 | -13 | -16 | -19 | -18 | -16 | -22 | 13 |

| SEQ | 984 | 990 | 1001 | 1028 | 1041 | 1044 | 1046 |
|---|---|---|---|---|---|---|---|
| X | -9 | 4 | 20 | 21 | 13 | -13 | -7 |
| Y | 13 | 17 | 18 | 14 | 11 | 0 | 3 |

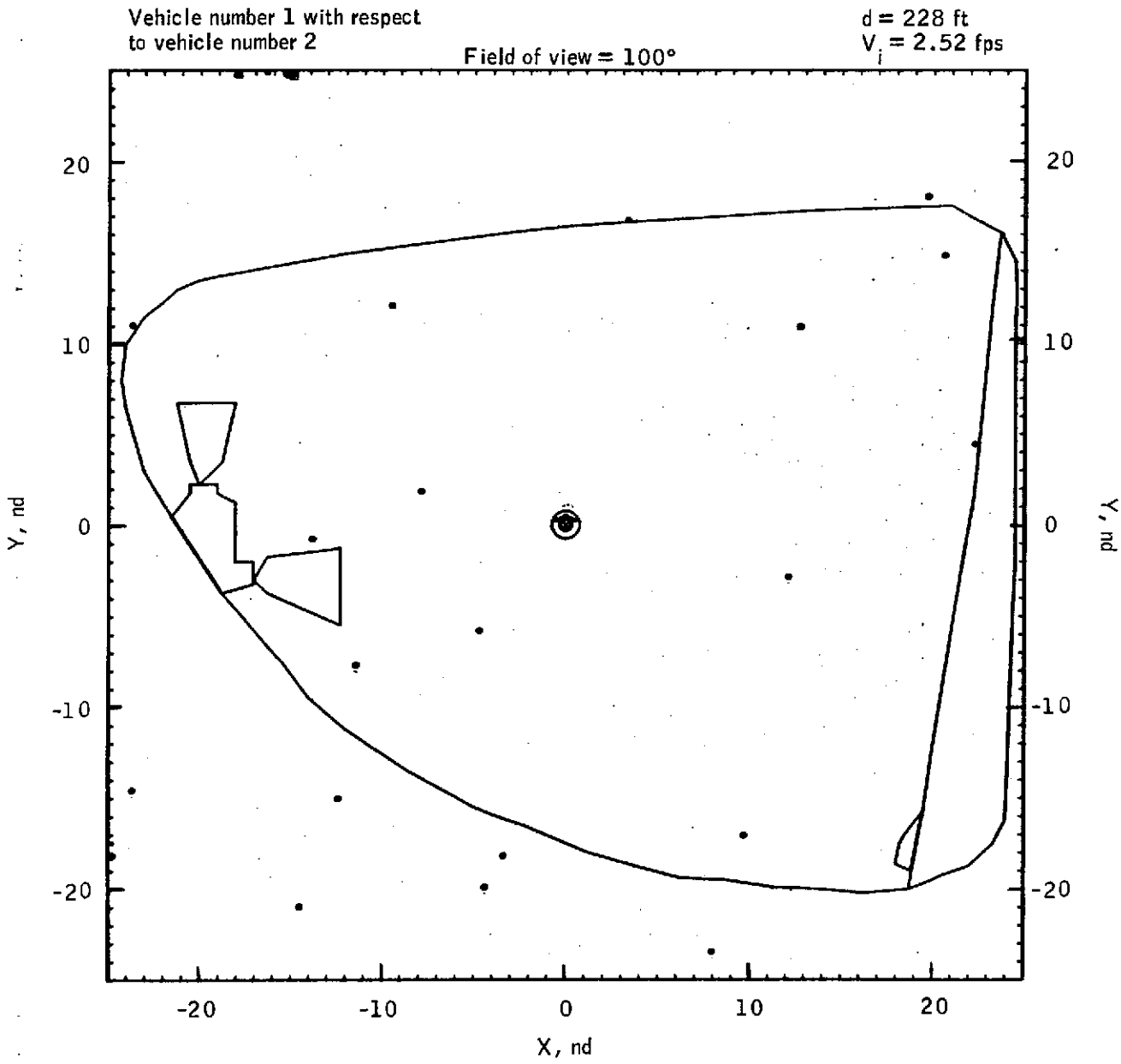



(i) 54 seconds after separation.

Figure 15.- Continued.

| SEQ | 4 | 7 | 15 | 22 | 25 | 41 | 47 | 63 | 73 | 75 | 80 | 108 | 904 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| X | -11 | -4 | 22 | -23 | 12 | -12 | -24 | -3 | -14 | -4 | 9 | 7 | -16 |
| Y | -7 | -5 | 4 | -14 | -2 | -14 | -18 | -18 | -20 | -19 | -16 | -23 | 25 |

| SEQ | 907 | 950 | 984 | 990 | 1001 | 1028 | 1041 | 1044 | 1046 |
|---|---|---|---|---|---|---|---|---|---|
| X | -15 | -23 | -9 | 3 | 19 | 20 | 12 | -13 | -7 |
| Y | 25 | 11 | 12 | 16 | 18 | 14 | 11 | 0 | 2 |

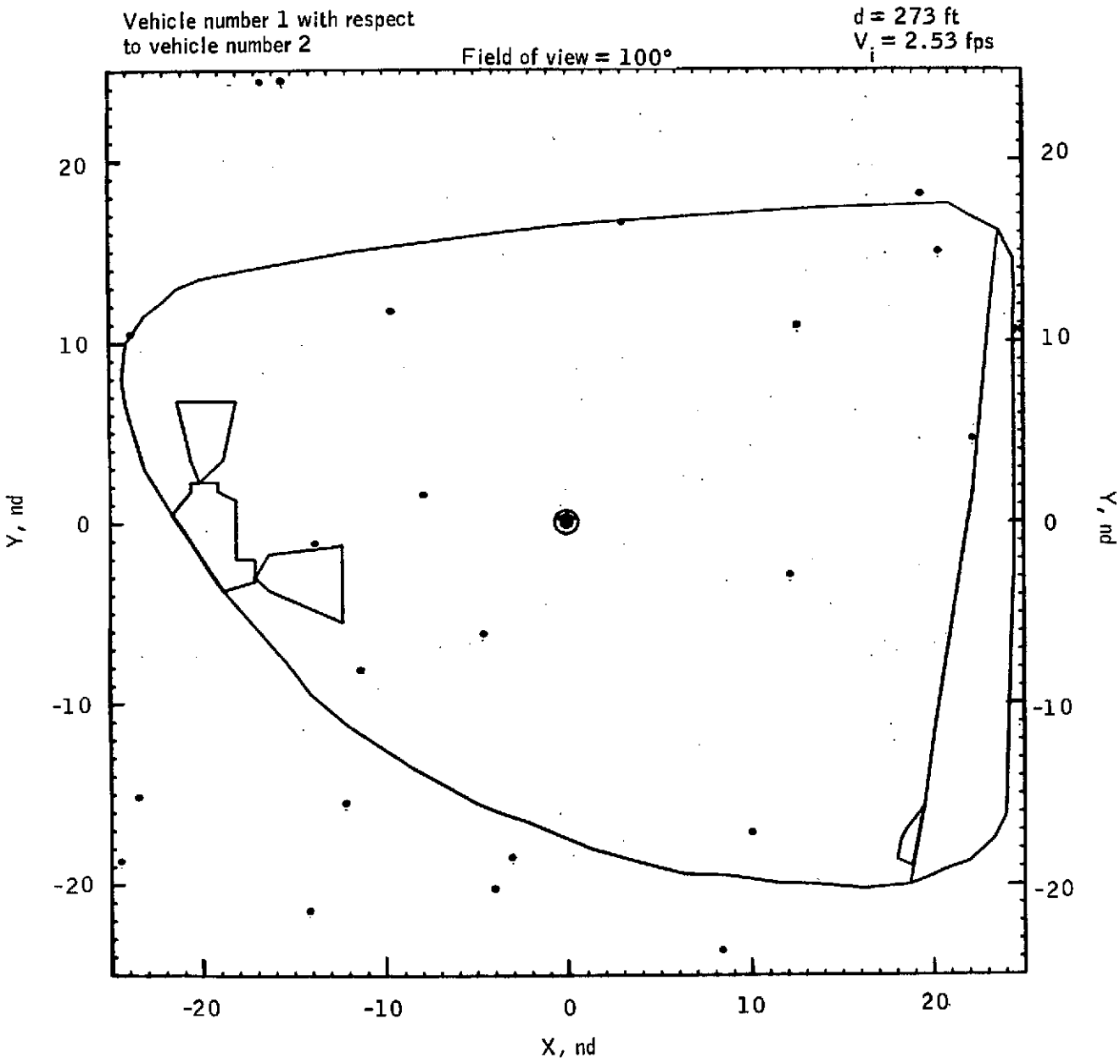



(j) 1 minute 30 seconds after separation.

Figure 15.- Continued.

| SEQ | 4 | 7 | 15 | 22 | 25 | 41 | 47 | 63 | 73 | 75 | 80 | 108 | 904 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| X | -11 | -4 | 22 | -23 | 12 | -12 | -24 | -3 | -14 | -4 | 10 | 8 | -16 |
| Y | -7 | -5 | 4 | -14 | -2 | -15 | -18 | -18 | -21 | -20 | -16 | -23 | 24 |

| SEQ | 907 | 950 | 984 | 990 | 1001 | 1028 | 1041 | 1044 | 1046 |
|---|---|---|---|---|---|---|---|---|---|
| X | -15 | -23 | -9 | 3 | 19 | 20 | 12 | -13 | -7 |
| Y | 24 | 10 | 11 | 16 | 18 | 15 | 11 | 0 | 1 |




(k) 1 minute 48 seconds after separation.

Figure 15.- Concluded.

TRANSEARTH INJECTION
BURN

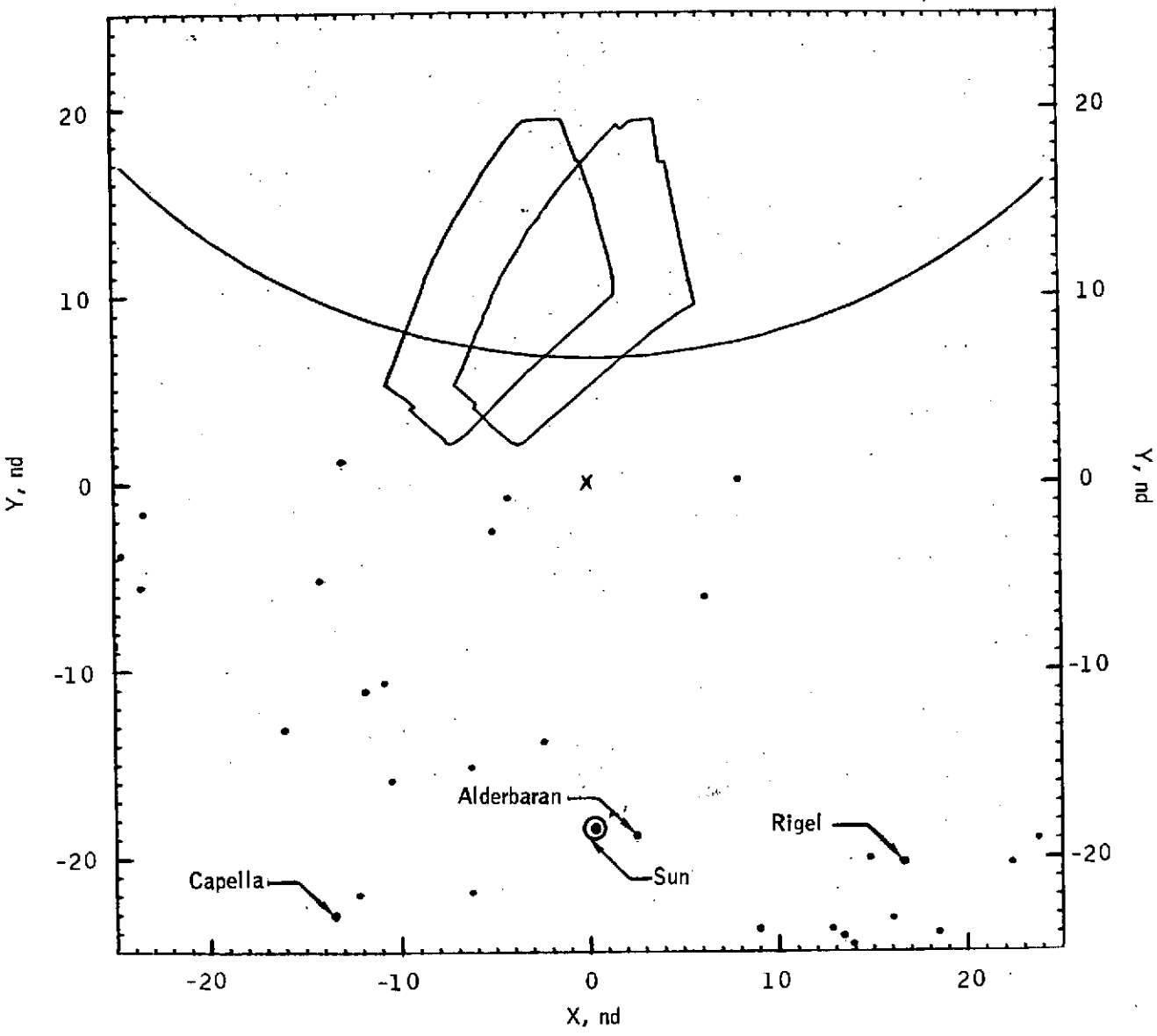
| SEQ | 28 | 31 | 41 | 47 | 63 | 73 | 75 | 80 | 108 | 111 | 112 | 120 | 144 | 150 | 151 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| X | -23 | -24 | -12 | -23 | -4 | -14 | -5 | 8 | 6 | -10 | -11 | -15 | -2 | -6 | -10 |
| Y | -1 | -3 | 1 | -5 | 0 | -5 | -2 | 0 | -5 | -10 | -10 | -13 | -13 | -16 | -16 |

| SEQ | 186 | 205 | 207 | 215 | 221 | 228 | 230 | 233 | 237 | 239 | 245 | 246 | 252 | 256 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| X | 2 | -6 | -12 | 14 | 16 | -18 | 9 | 23 | 12 | 22 | 16 | 13 | 13 | 18 |
| Y | -18 | -21 | -21 | -19 | -20 | -22 | -22 | -18 | -23 | -20 | -23 | -24 | -24 | -23 |

$R_M$ = 996.6 n. mi.
$V_i$ = 5349 fps

Field of view = 100°

$h_M$ = 66.86 stat. mi.
$V_i$ = 3647 mph




(a) Begin TEI burn (g.e.t. = 127:51:34).

Figure 16.- Transearth injection burn.

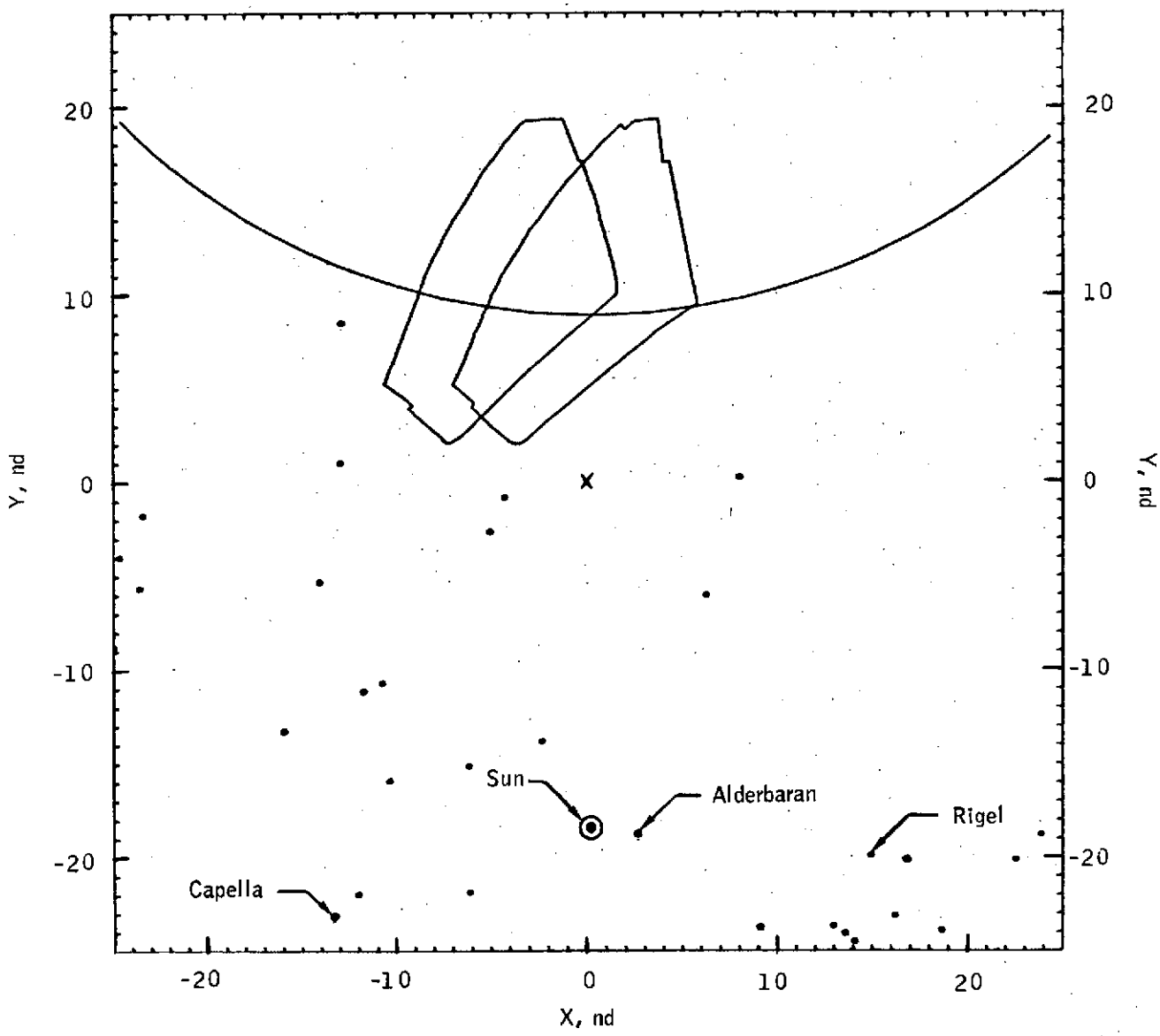
| SEQ | 4 | 22 | 31 | 41 | 47 | 63 | 73 | 75 | 80 | 108 | 111 | 112 | 120 | 144 | 150 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| X | -12 | -23 | -24 | -12 | -23 | -4 | -14 | -5 | 8 | 6 | -10 | -11 | -15 | -2 | -6 |
| Y | 8 | -1 | -3 | 1 | -5 | 0 | -5 | -2 | 0 | -5 | -10 | -11 | -13 | -13 | -15 |

| SEQ | 151 | 186 | 205 | 207 | 215 | 221 | 224 | 230 | 233 | 237 | 239 | 245 | 246 | 252 | 256 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| X | -10 | 4 | -6 | -11 | 14 | 14 | -13 | 9 | 23 | 14 | 22 | 16 | 13 | 14 | 16 |
| Y | -15 | -16 | -21 | -21 | -19 | -20 | -23 | -23 | -18 | -23 | -20 | -23 | -23 | -24 | -23 |

$R_M$ = 996.4 n. mi.
$V_i$ = 6842 fps

Field of view = 100°

$h_M$ = 66.63 stat. mi.
$V_i$ = 4665 mph




(b) Middle of TEI burn (g.e.t. = 127:52:55).

Figure 16.- Continued.

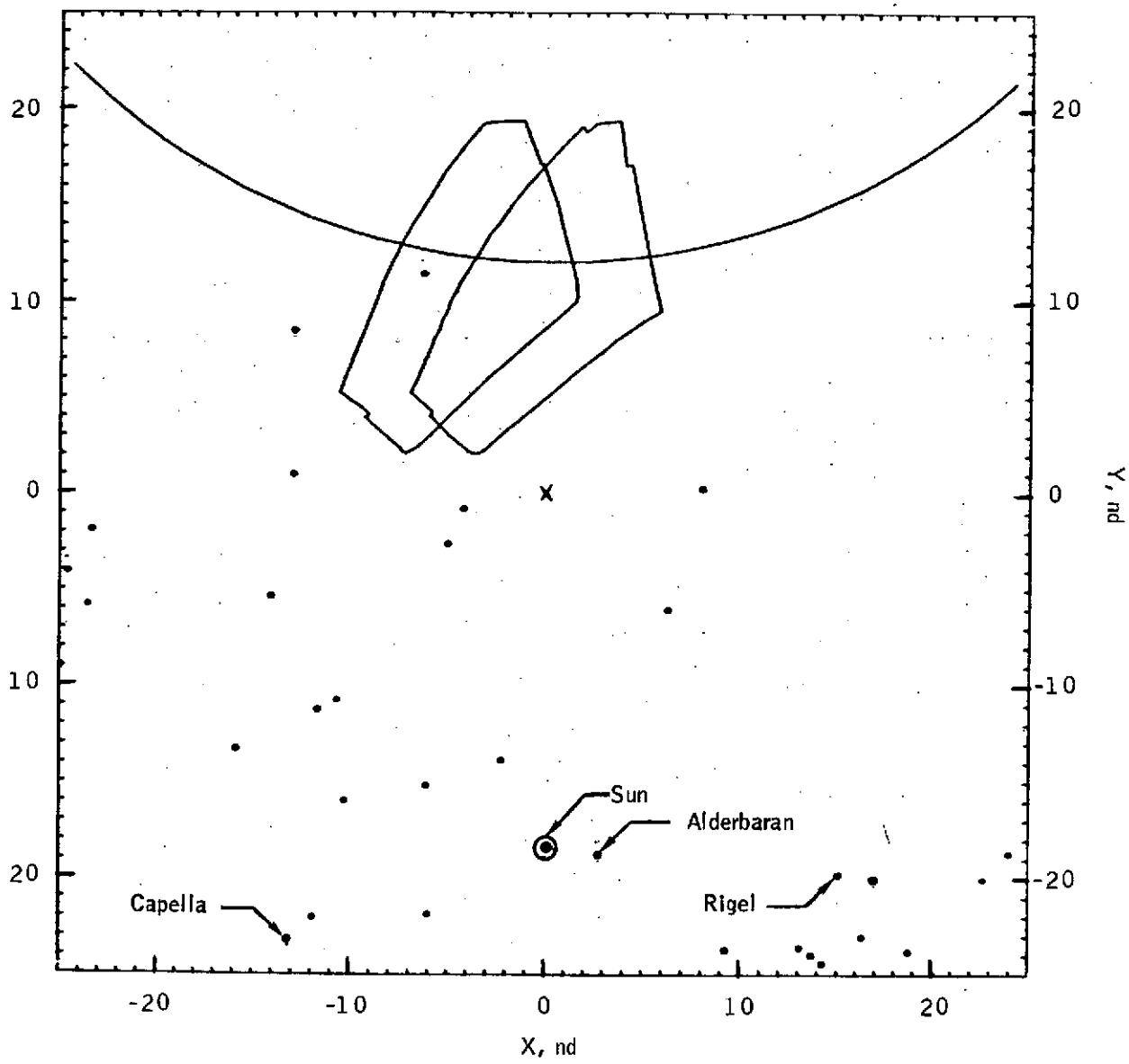
| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | 7 | 22 | 31 | 41 | 47 | 63 | 73 | 75 | 80 | 108 | 111 | 112 | 120 | 144 | 150 |
| -12 | -6 | -23 | -24 | -12 | -23 | -4 | -14 | -4 | 8 | 6 | -10 | -11 | -15 | -2 | -6 |
| 8 | 11 | -1 | -3 | 1 | -5 | 0 | -5 | -2 | 0 | -5 | -10 | -11 | -13 | -13 | -15 |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 151 | 186 | 205 | 207 | 216 | 221 | 222 | 230 | 233 | 237 | 239 | 245 | 246 | 252 | 256 |
| -10 | 2 | -5 | -11 | 18 | 18 | -13 | 9 | 24 | 13 | 22 | 16 | 13 | 14 | 18 |
| -15 | -18 | -21 | -21 | -18 | -18 | -23 | -23 | -18 | -23 | -19 | -22 | -23 | -24 | -23 |

$R_M$ = 998.8 n. mi.
$V_i$ = 8582 fps

Field of view = 100°

$h_M$ = 69.45 stat. mi.
$V_i$ = 5851 mph




(c) End of TEI burn (g.e.t. = 127:54:14).

Figure 16.- Concluded.

TRANSEARTH COAST

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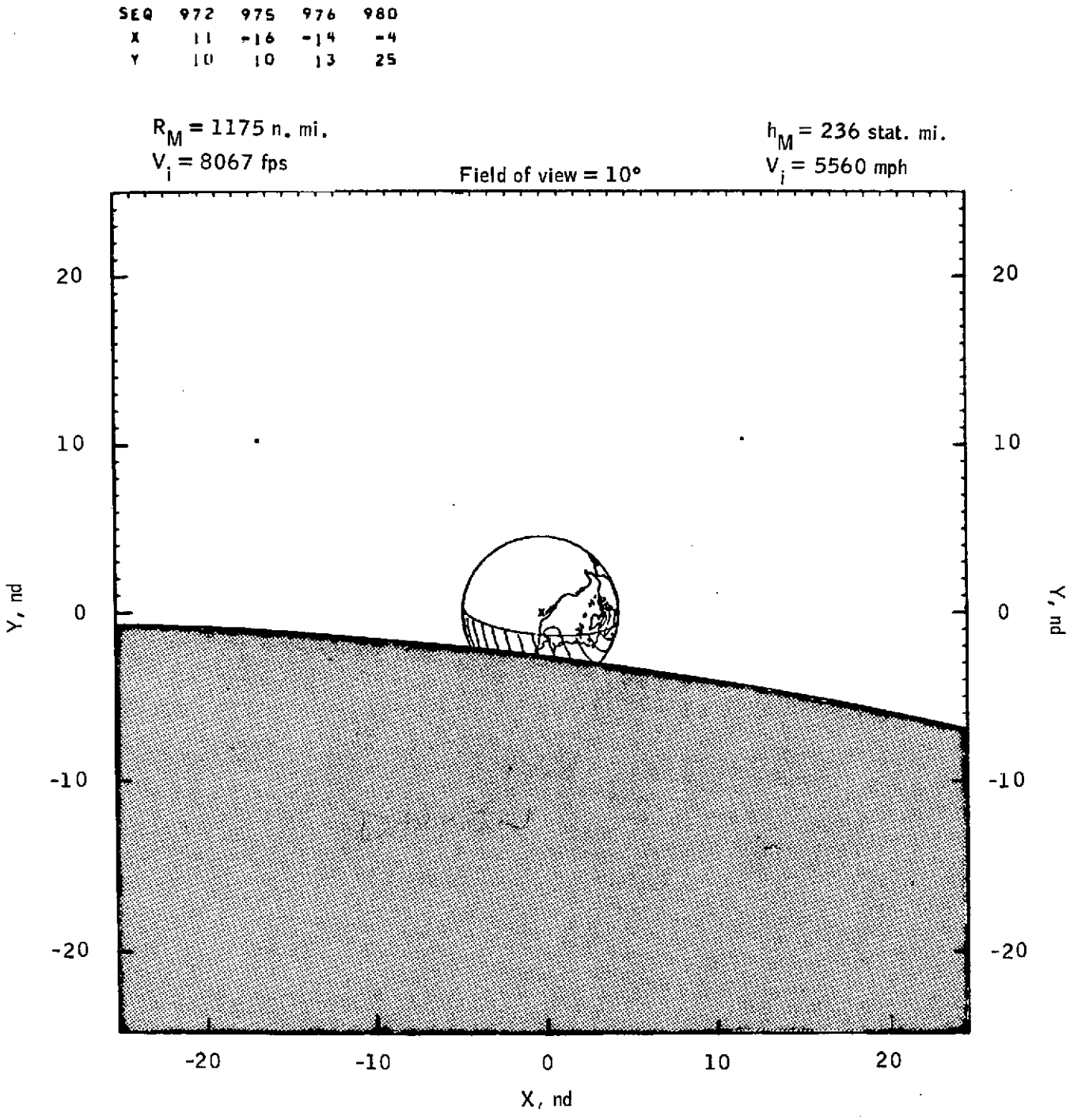
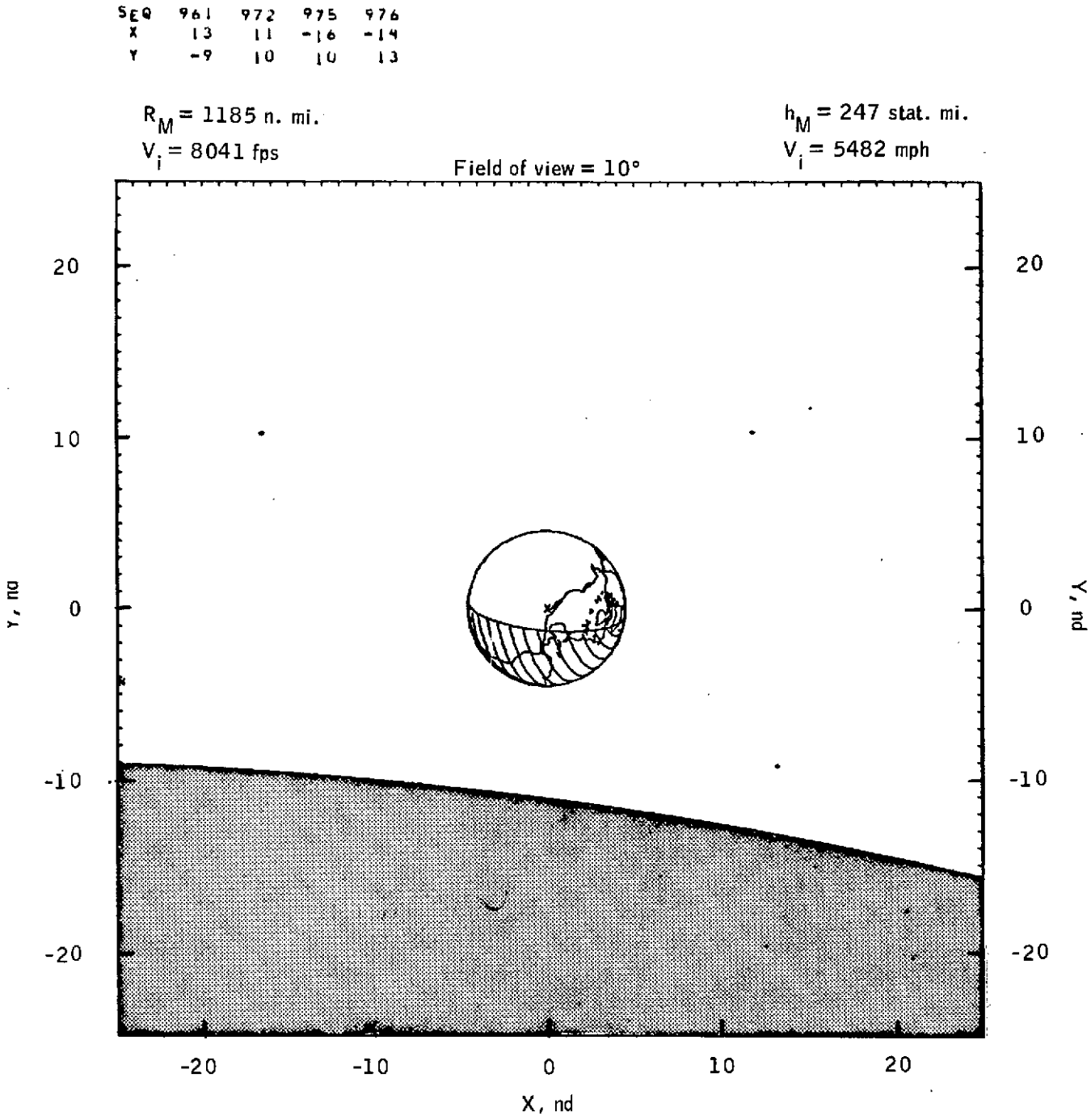
AFTER TEI



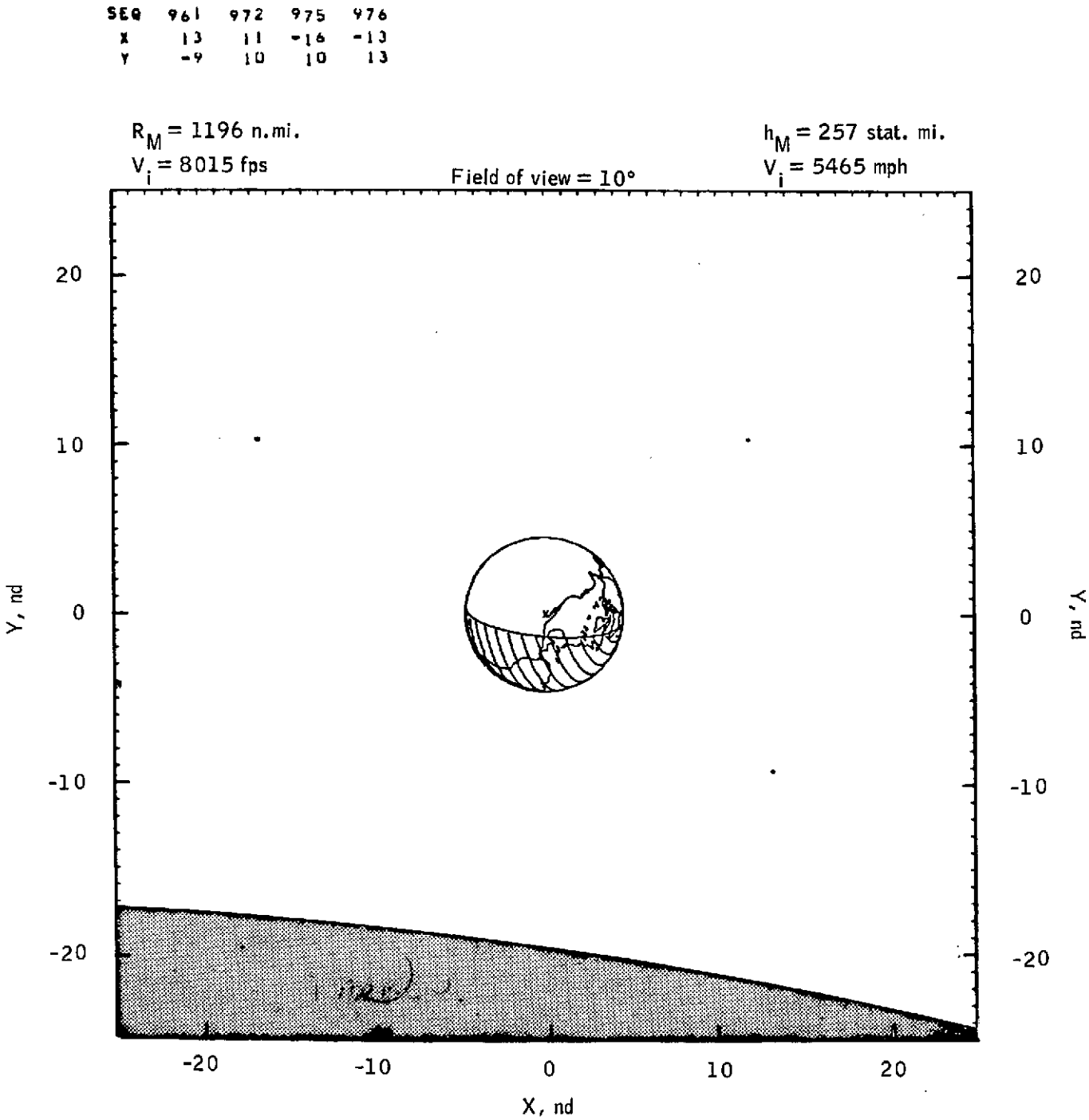

(a) G.e.t. = 128:02:42.0.

Figure 17.- After TEI.




(b) G.e.t. = 128:03:00.0

Figure 17.- Continued.

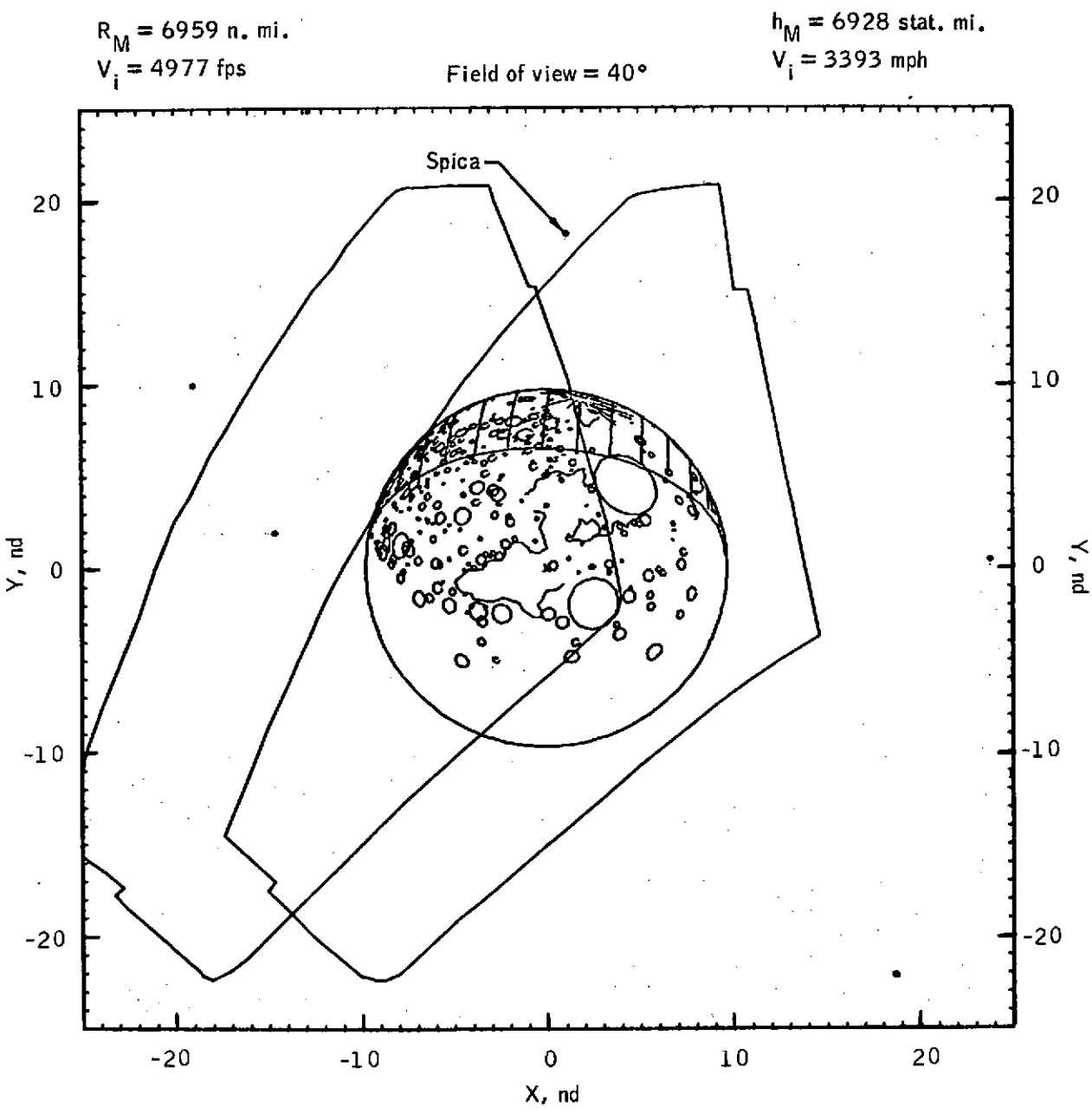



(c) G.e.t. = 128:03:18.0.

Figure 17.- Concluded.

MOON VIEWS

| SEQ | 535 | 551 | 566 | 582 | 593 | 595 |
|---|---|---|---|---|---|---|
| X | 18 | -14 | -18 | 23 | 1 | -12 |
| Y | -21 | 2 | 10 | 0 | 18 | 24 |




(a) G.e.t. = 130 hours.

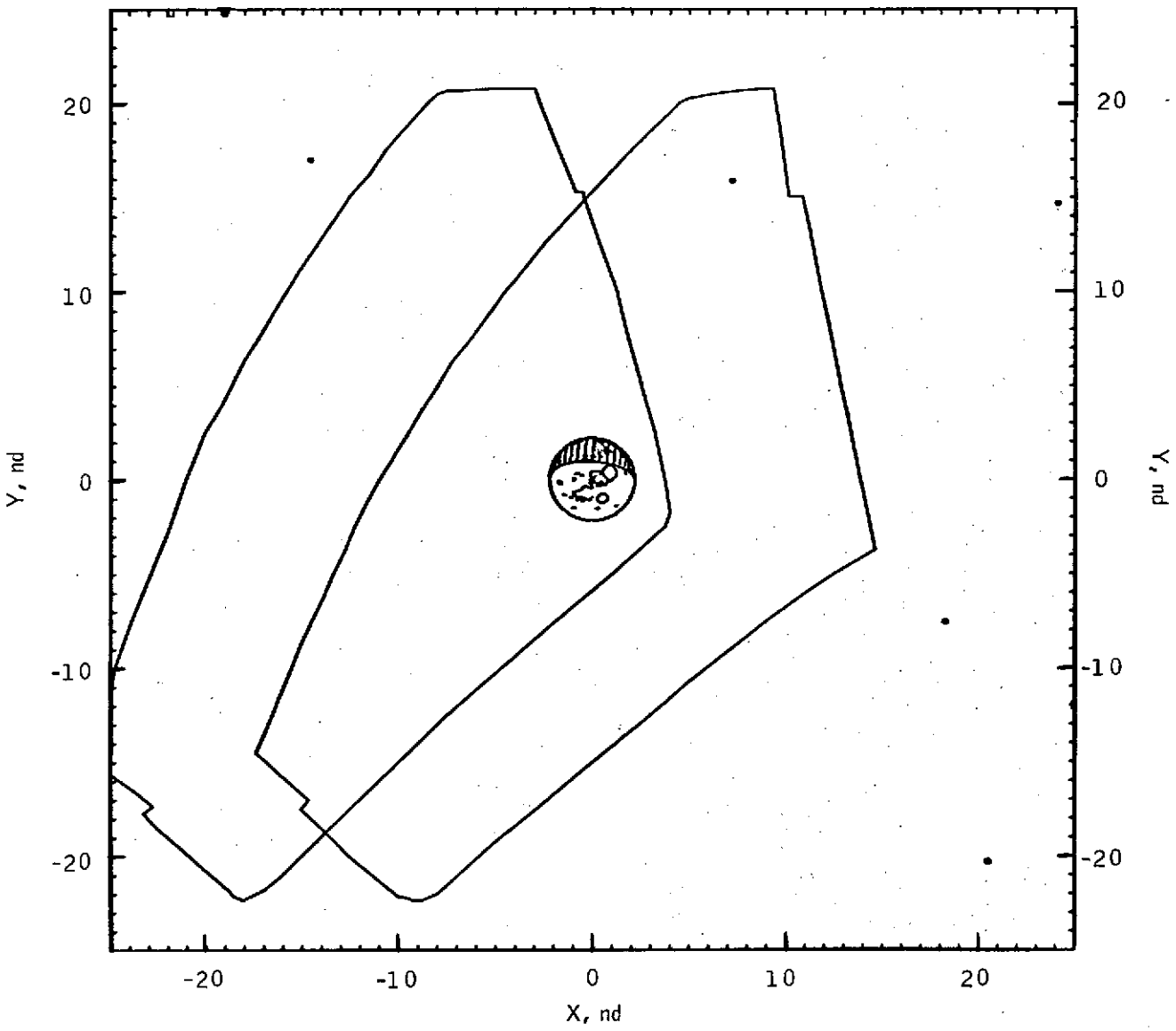
Figure 18.- Transearth coast - constant field of view (moon).

| SEQ | 515 | 535 | 551 | 566 | 570 | 582 |
|---|---|---|---|---|---|---|
| X | 20 | 18 | -14 | -19 | 7 | 24 |
| Y | -20 | -7 | 17 | 25 | 16 | 14 |

$R_E$ = 189 948 n. mi.
$V_i$ = 3909 fps

Field of view = 40°

$h_E$ = 214 625 stat. mi.
$V_i$ = 2665 mph




(b) G.e.t. = 140 hours.

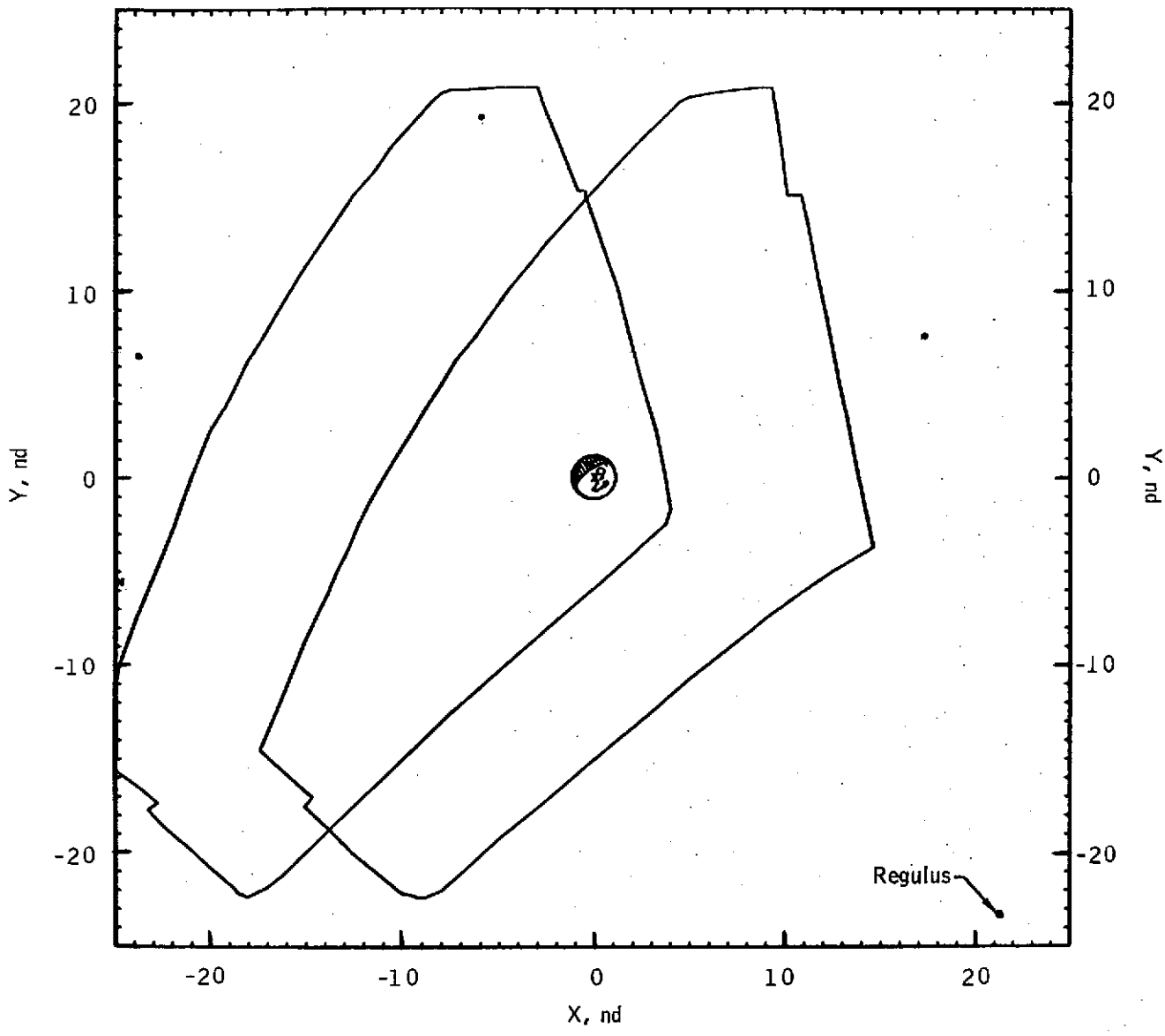
Figure18.- Continued.

| SEQ | 473 | 535 | 551 | 570 |
|---|---|---|---|---|
| X | 21 | 17 | -23 | -5 |
| Y | -23 | 7 | 6 | 19 |

$R_E$ = 166 086 n. mi.
$V_i$ = 4285 fps

Field of view = 40°

$h_E$ = 187 167 stat. mi.
$V_i$ = 2922 mph




(c) G.e.t. = 150 hours.

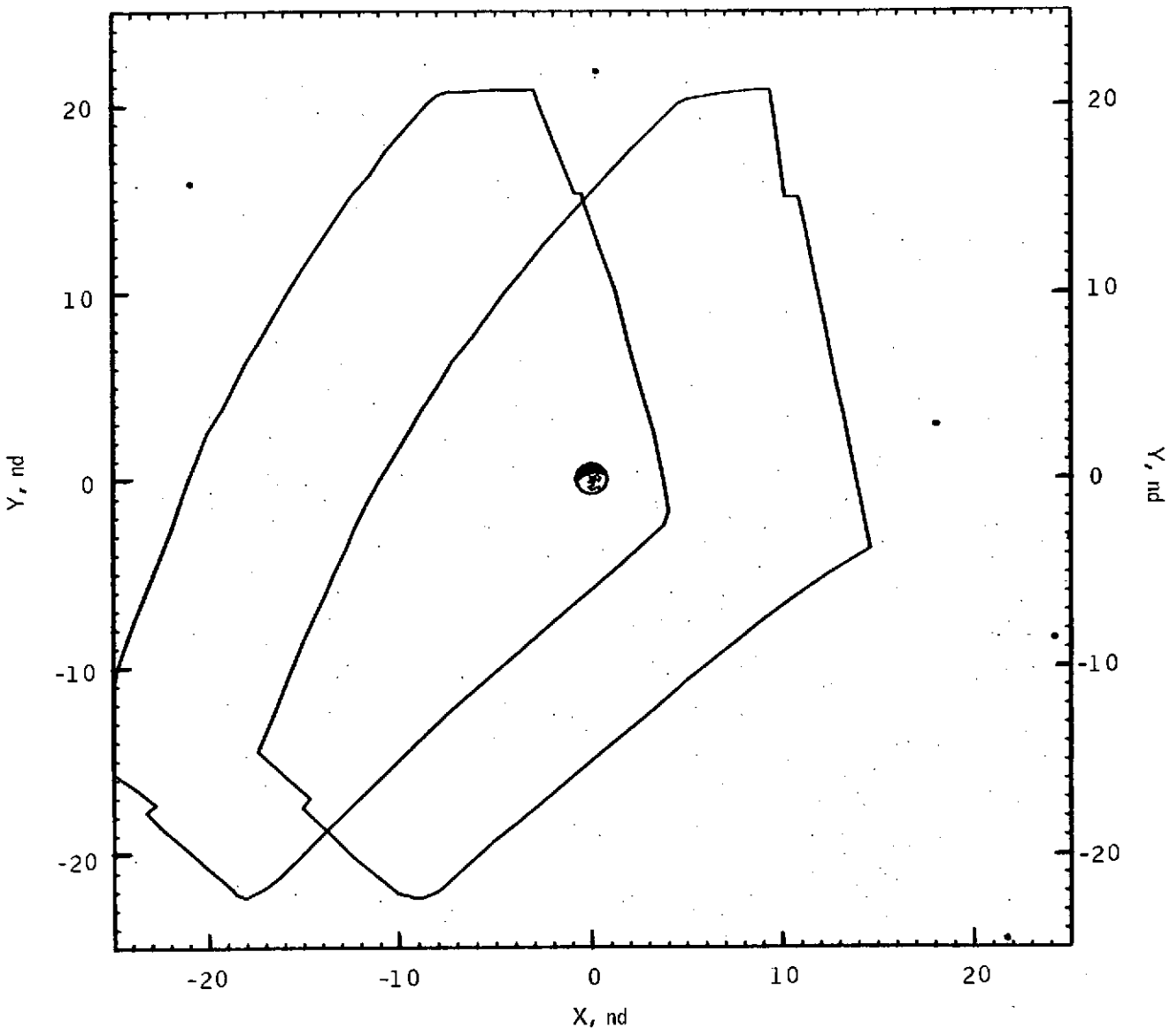
Figure 18. - Continued.

| SEQ | 480 | 515 | 535 | 551 | 570 |
|---|---|---|---|---|---|
| X | 21 | 24 | 18 | -20 | 0 |
| Y | -24 | -8 | 3 | 15 | 21 |

$R_E$ = 139 574 n. mi.
$V_i$ = 4846 fps

Field of view = 40°

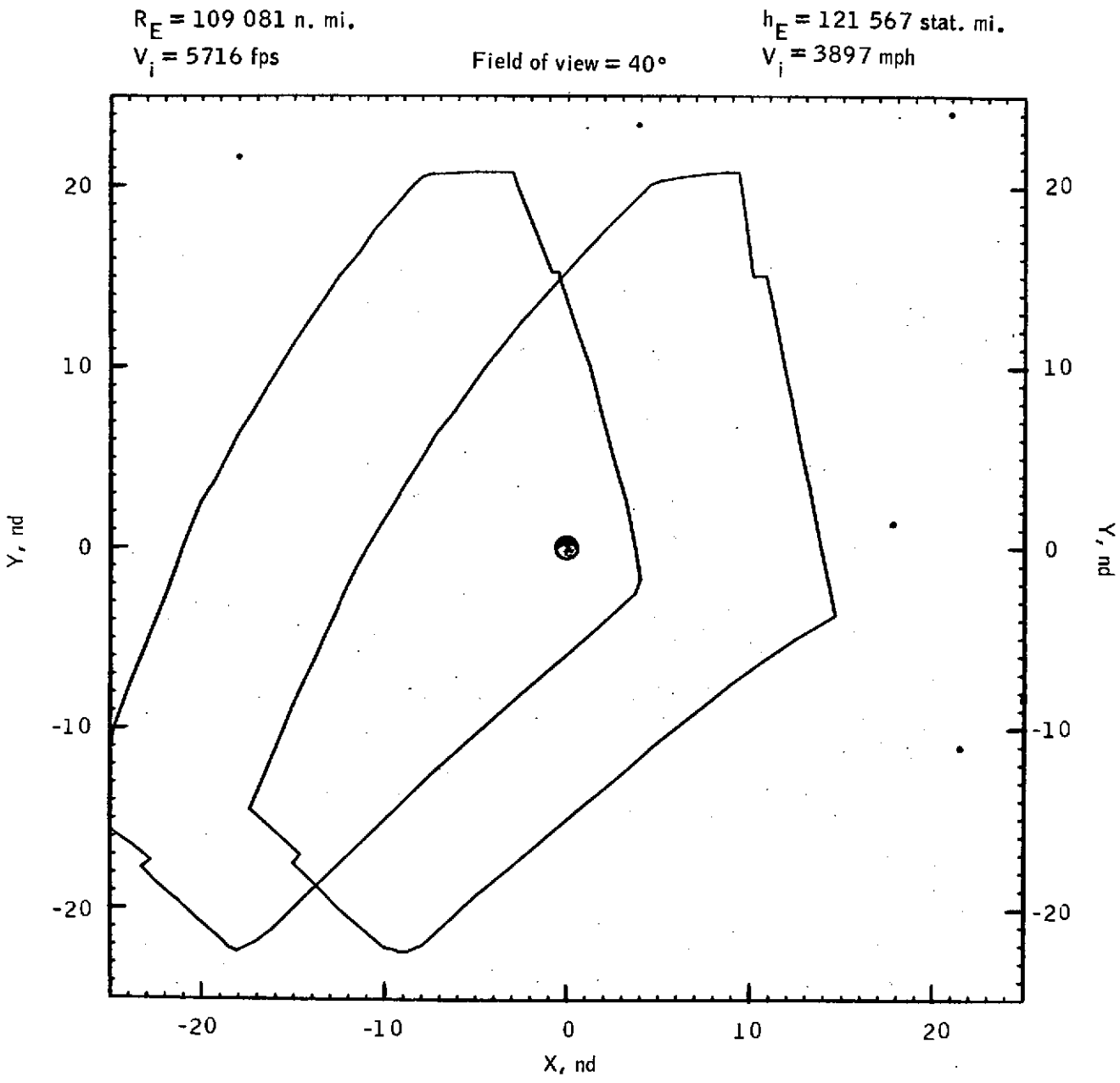
$h_E$ = 156 658 stat. mi.
$V_i$ = 3304 mph




(d) G.e.t. = 160 hours.

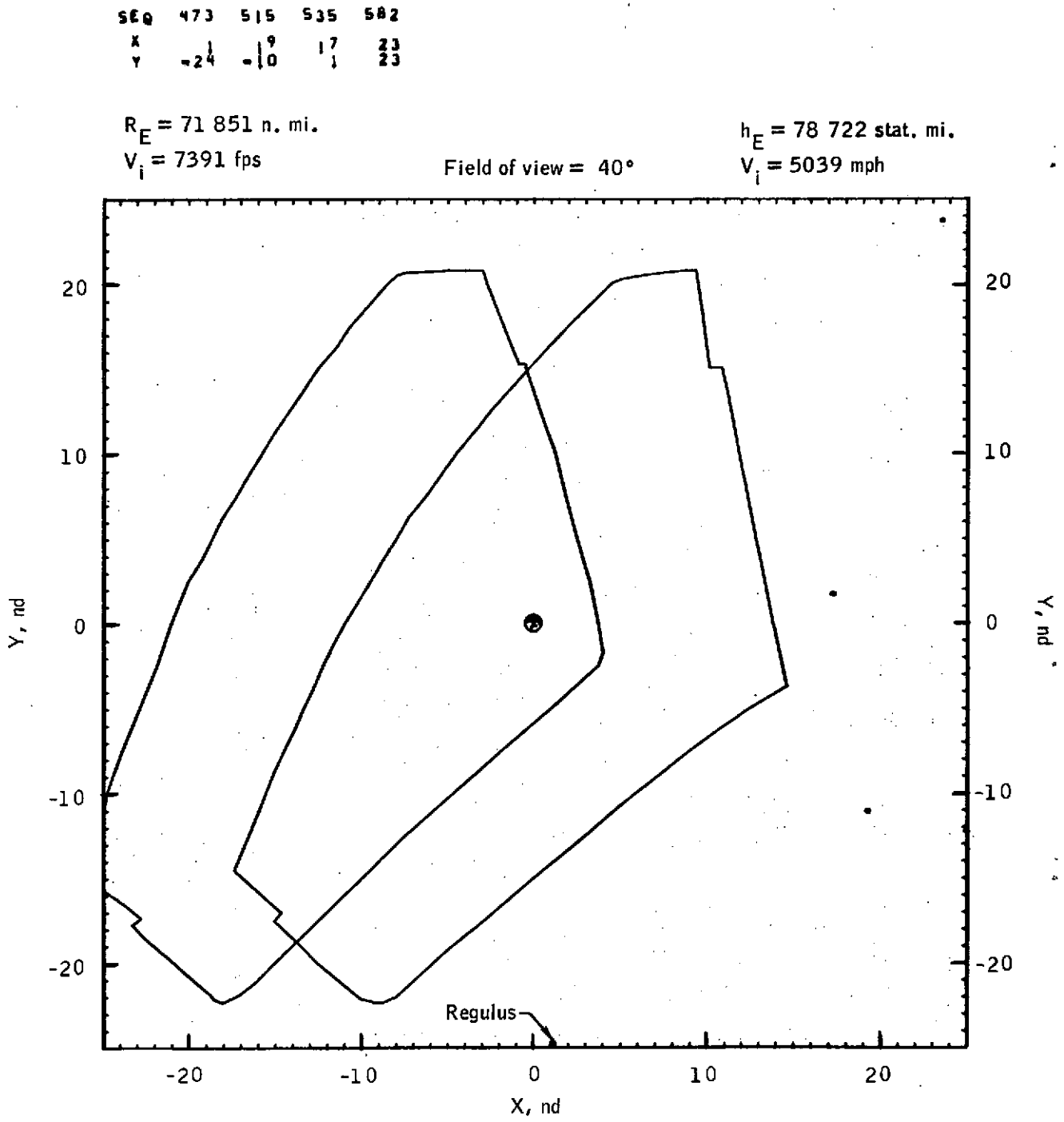
Figure 18.- Continued.

| SEQ | 515 | 535 | 551 | 570 | 582 |
|---|---|---|---|---|---|
| X | 21 | 17 | -17 | 3 | 20 |
| Y | -10 | 1 | 21 | 23 | 24 |




(e) G.e.t. = 170 hours.

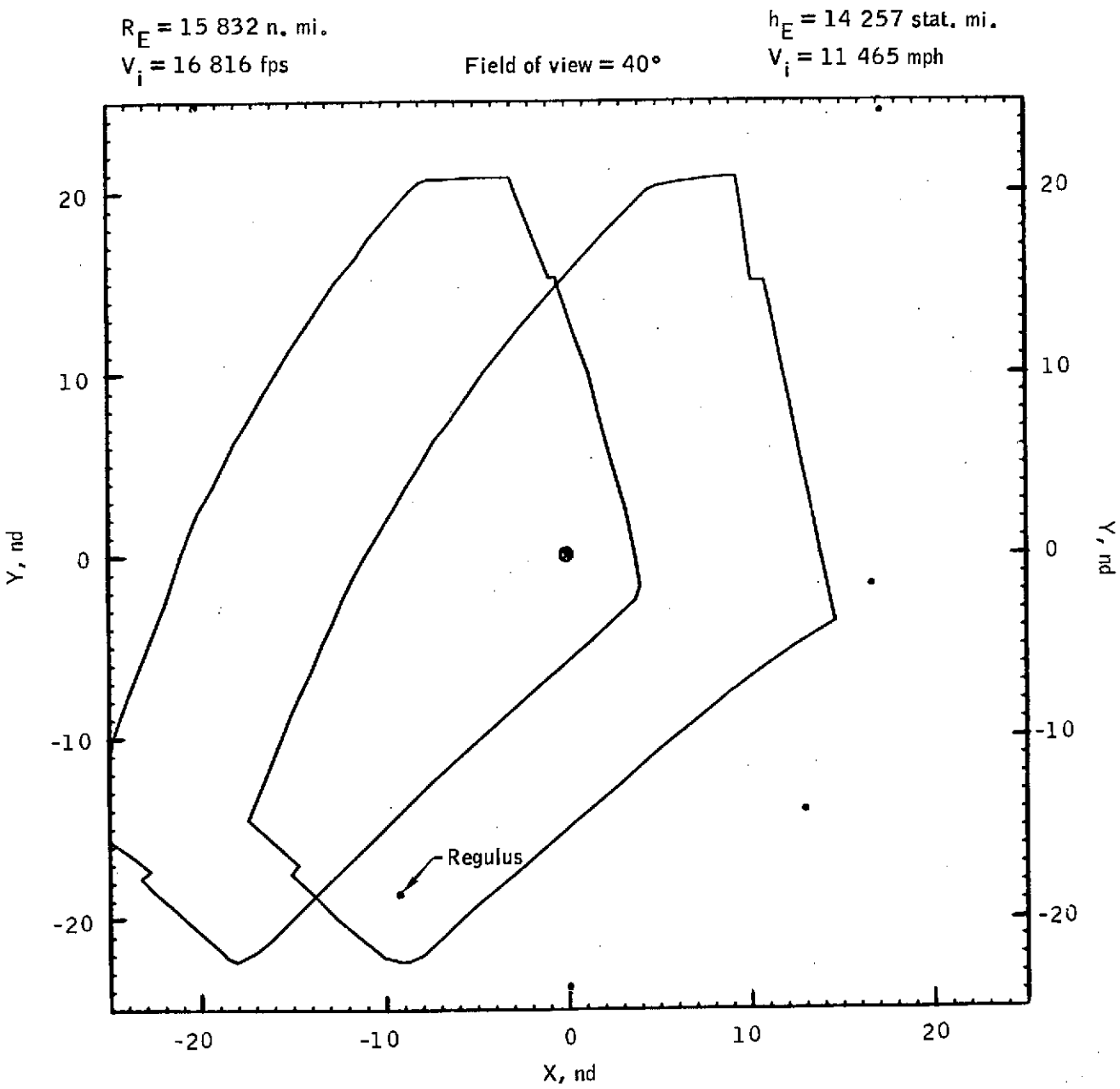
Figure 18.- Continued.




(f) G.e.t. = 180 hours.

Figure 18. - Continued.

| SEQ | 473 | 480 | 515 | 535 | 570 |
|---|---|---|---|---|---|
| X | -9 | 0 | 12 | 16 | 17 |
| Y | -18 | -23 | -13 | -1 | 24 |




(g) G.e.t. = 190 hours.

Figure 18.- Concluded.

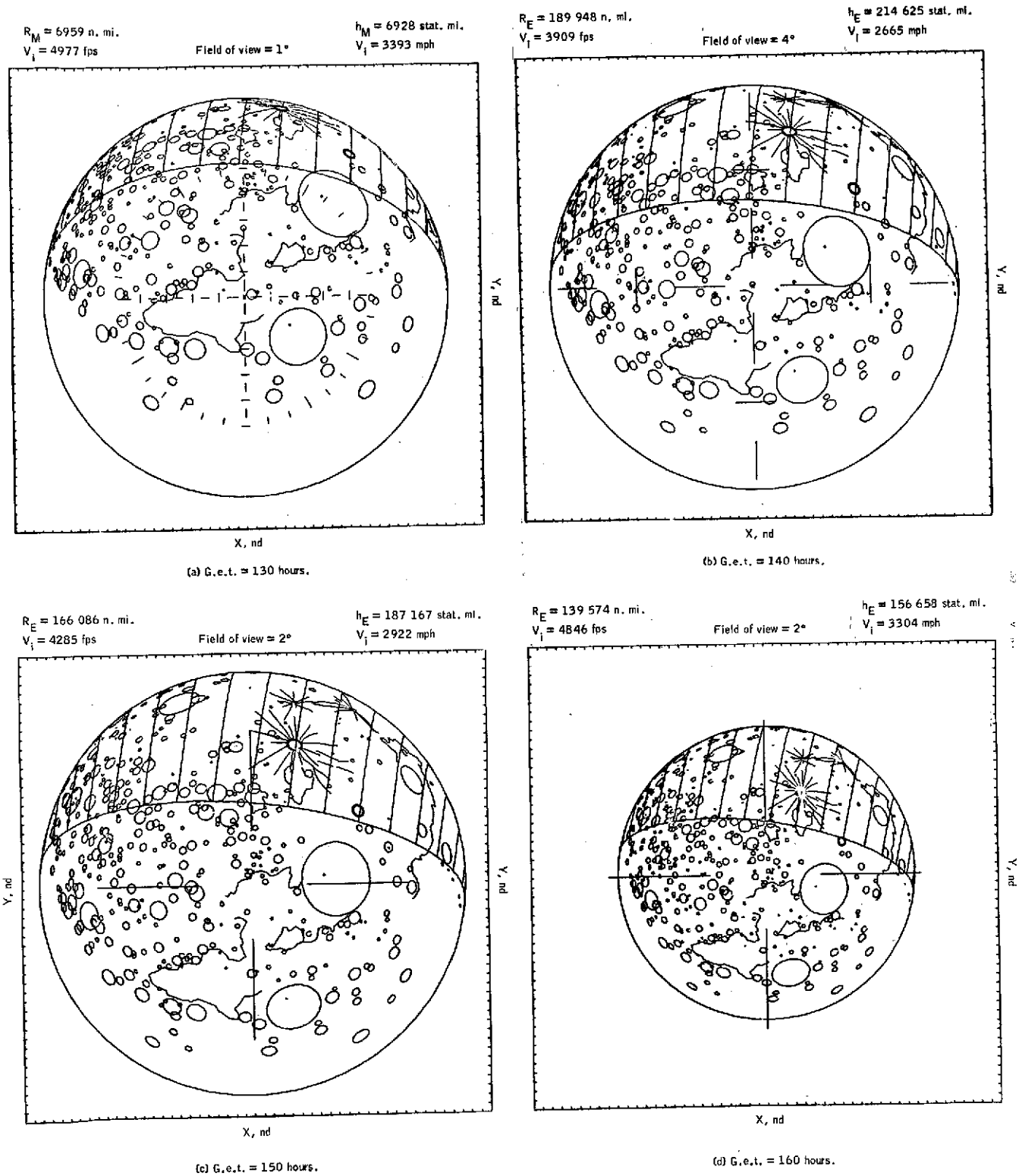
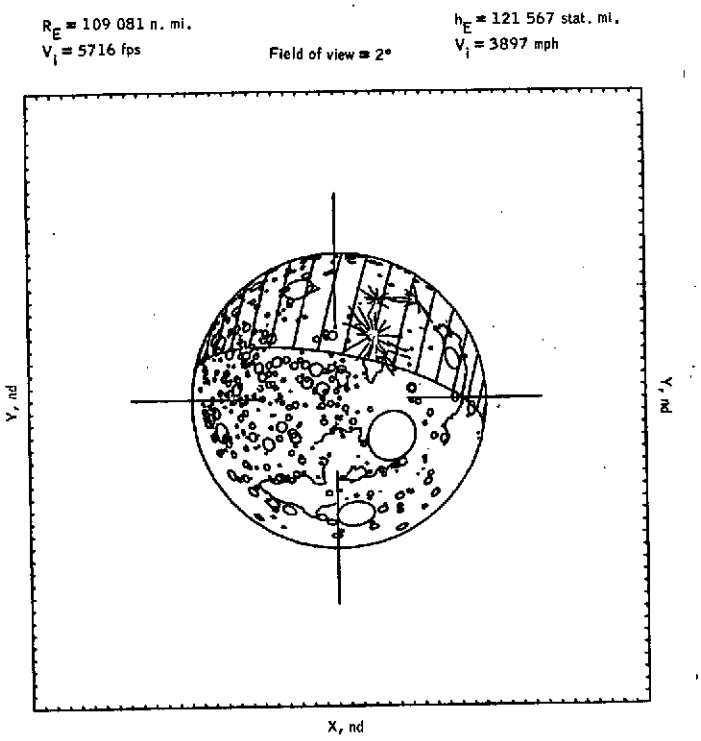
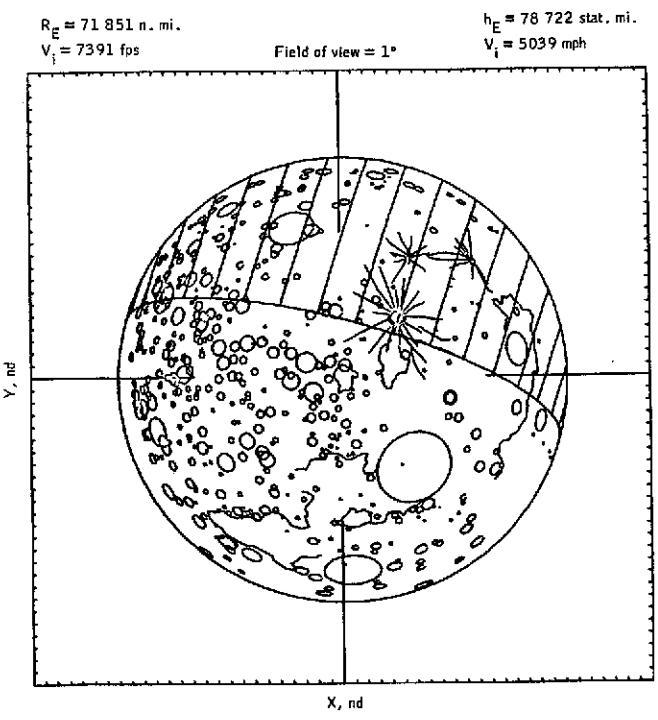


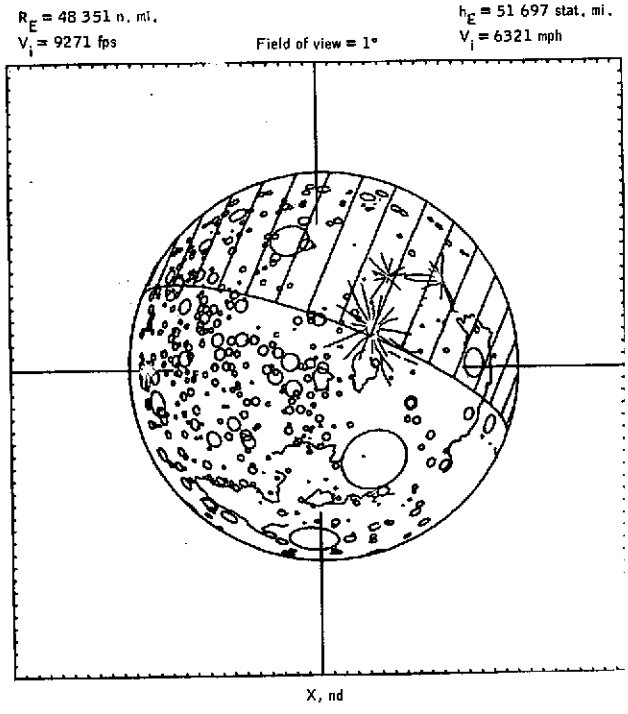

Figure 19.- Transearth coast - variable field of view (moon).




(e) G.e.t. = 170 hours.

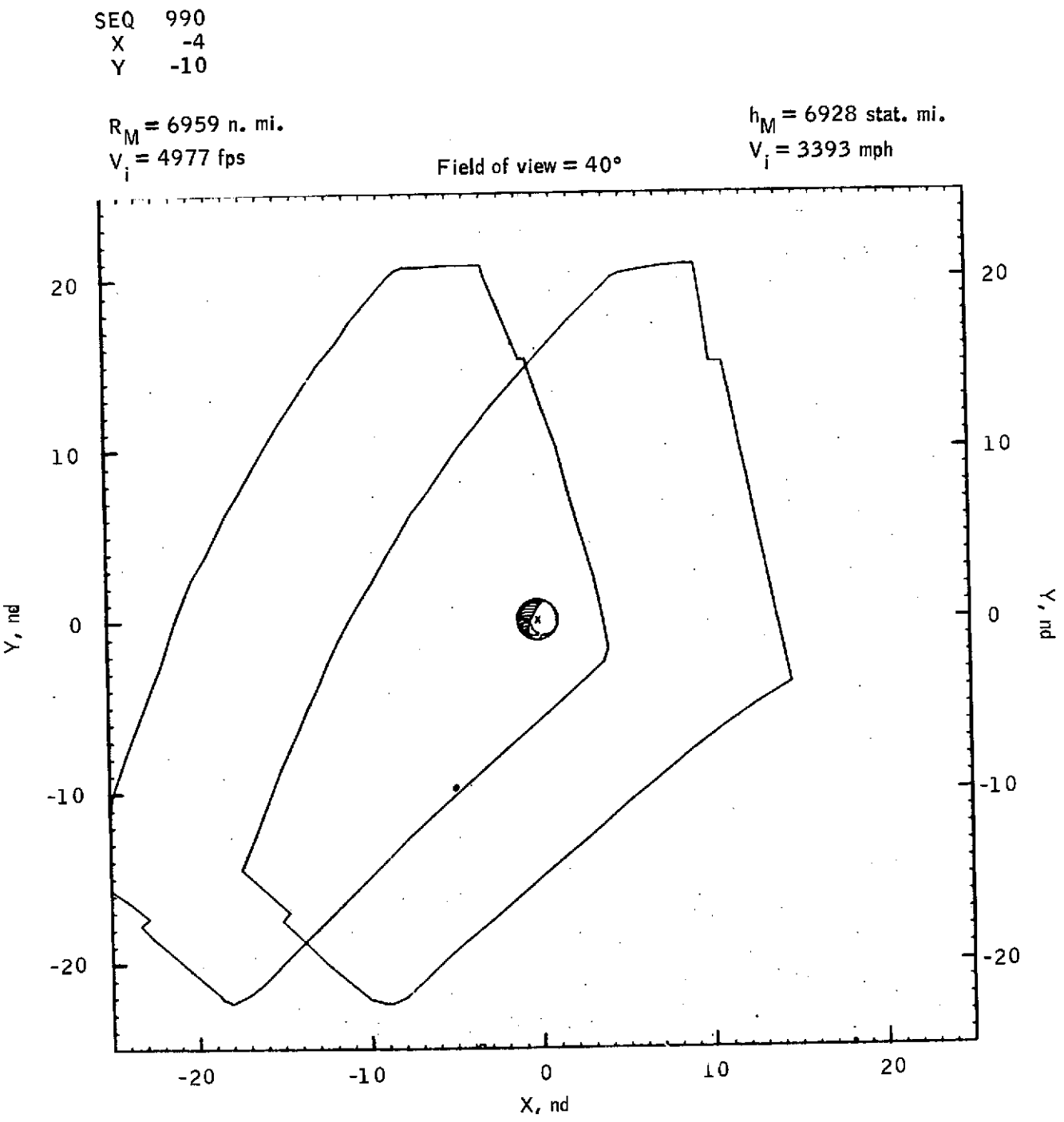



(f) G.e.t. = 180 hours.



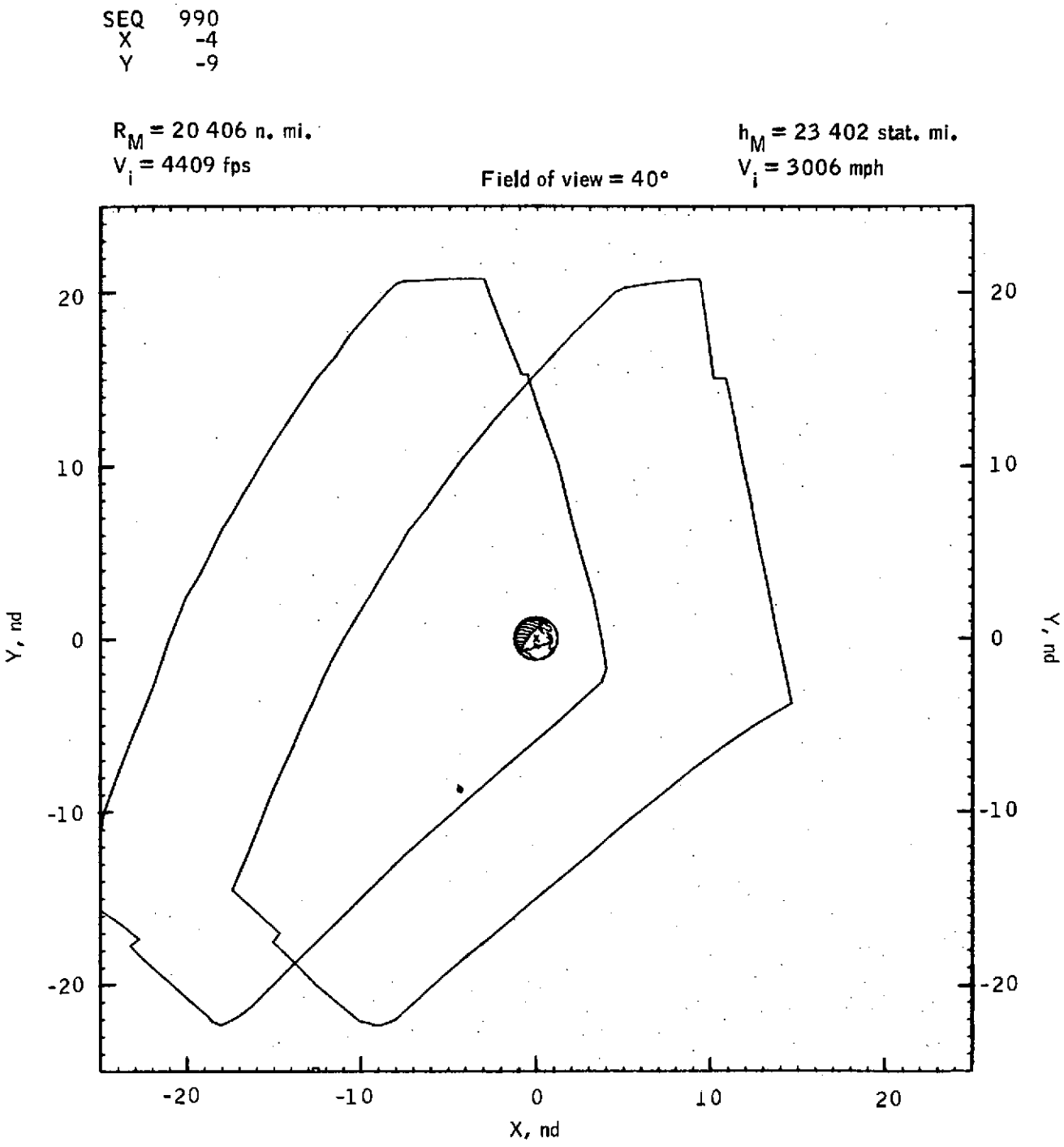

(g) G.e.t. = 185 hours.

Figure 19. - Concluded.



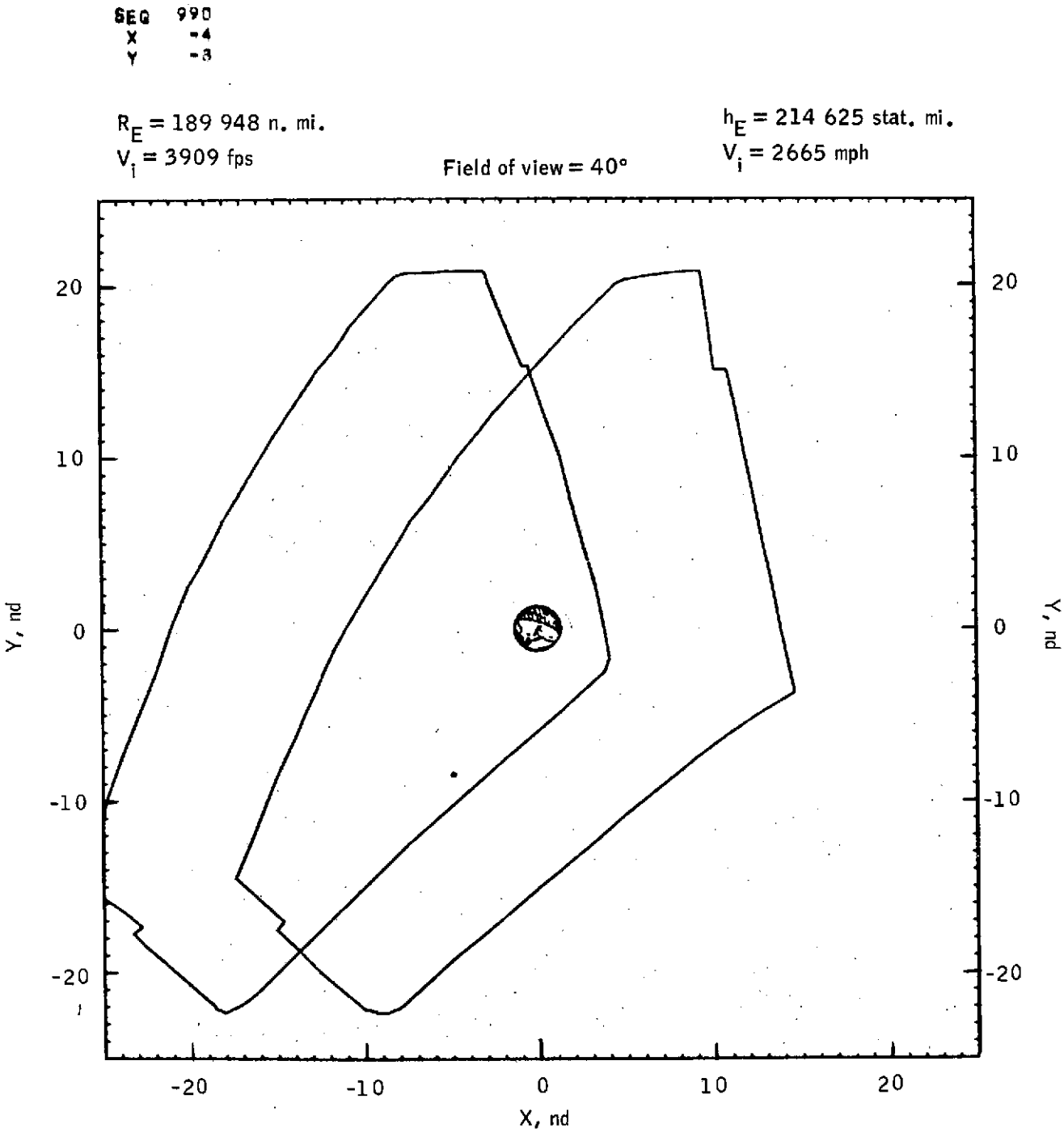

(a) G.e.t. = 130 hours.

Figure 20.- Transearth coast - Constant field of view (earth).



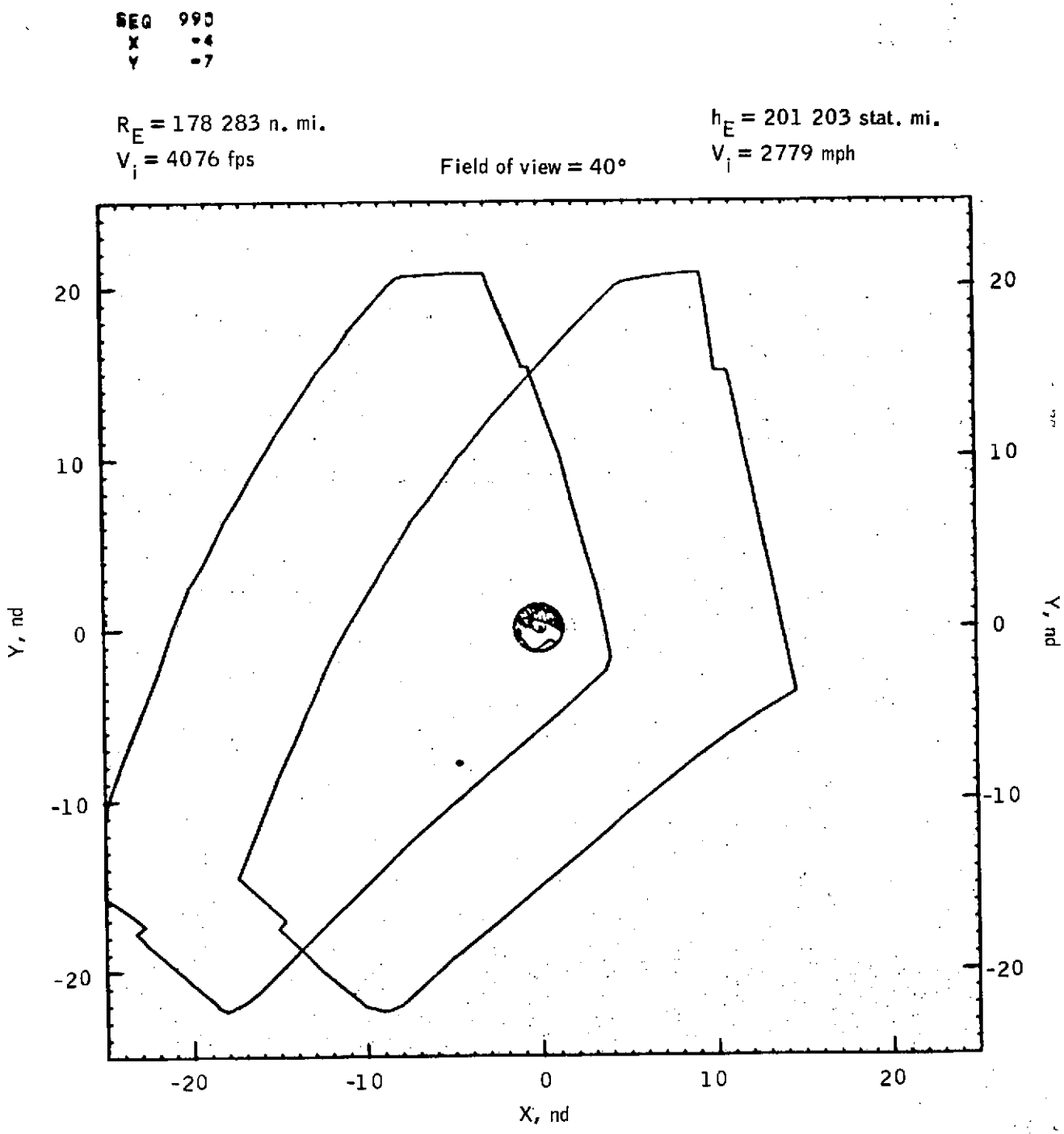

(b) G.e.t. = 135 hours.

Figure 20.- Continued.



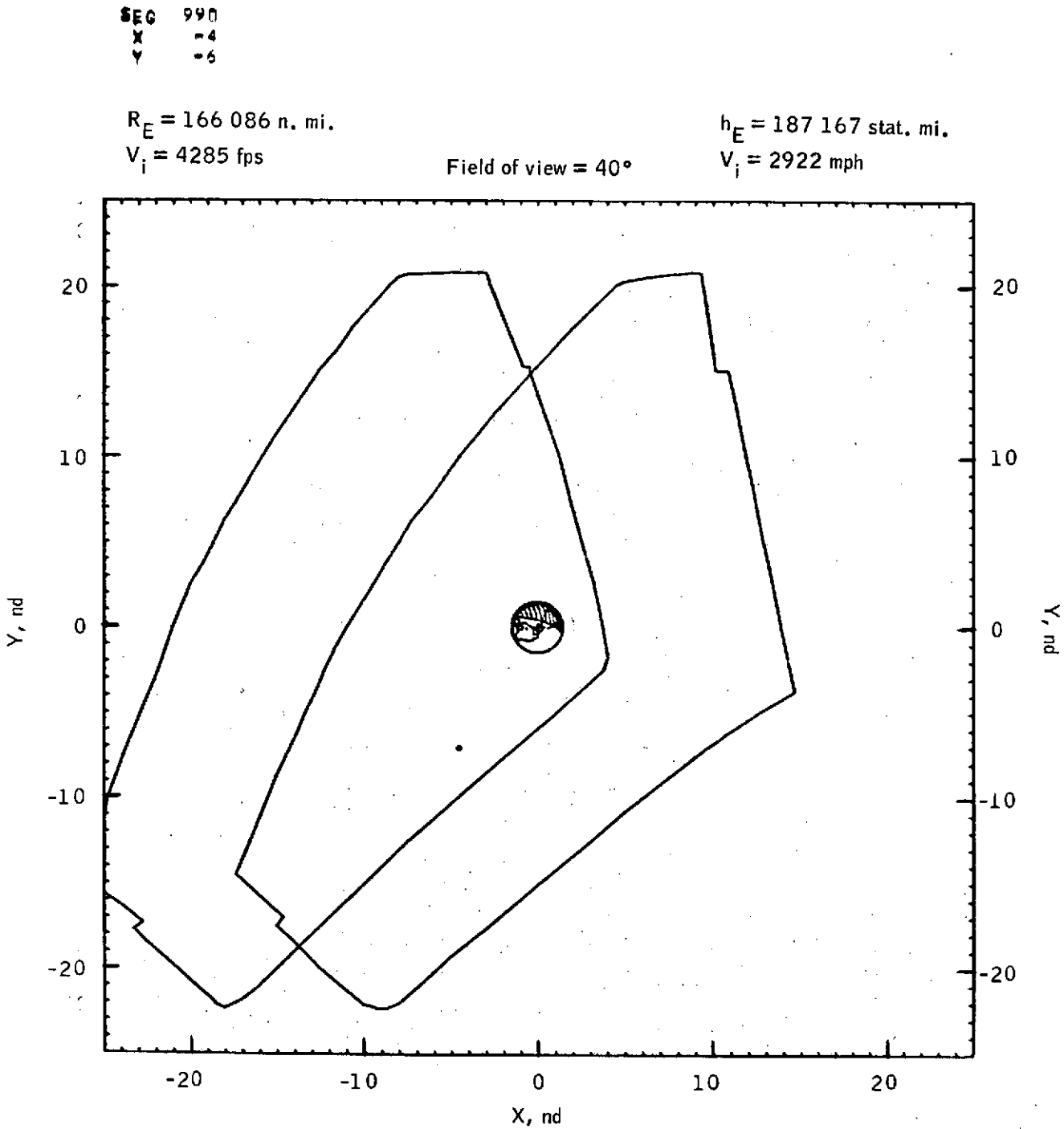

(c) G.e.t. = 140 hours.

Figure 20.- Continued.



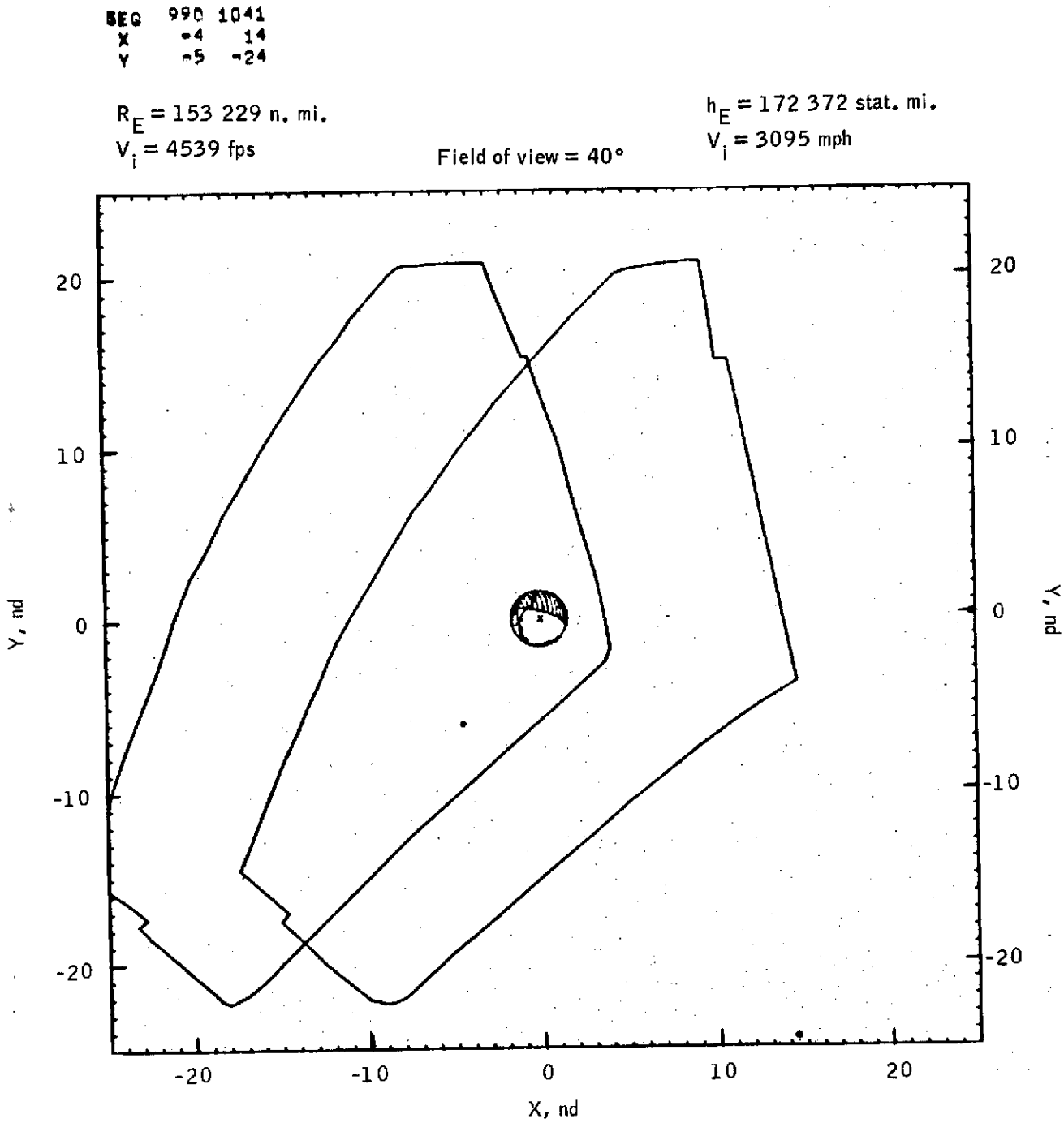

(d) G.e.t. = 145 hours.

Figure 20.- Continued.



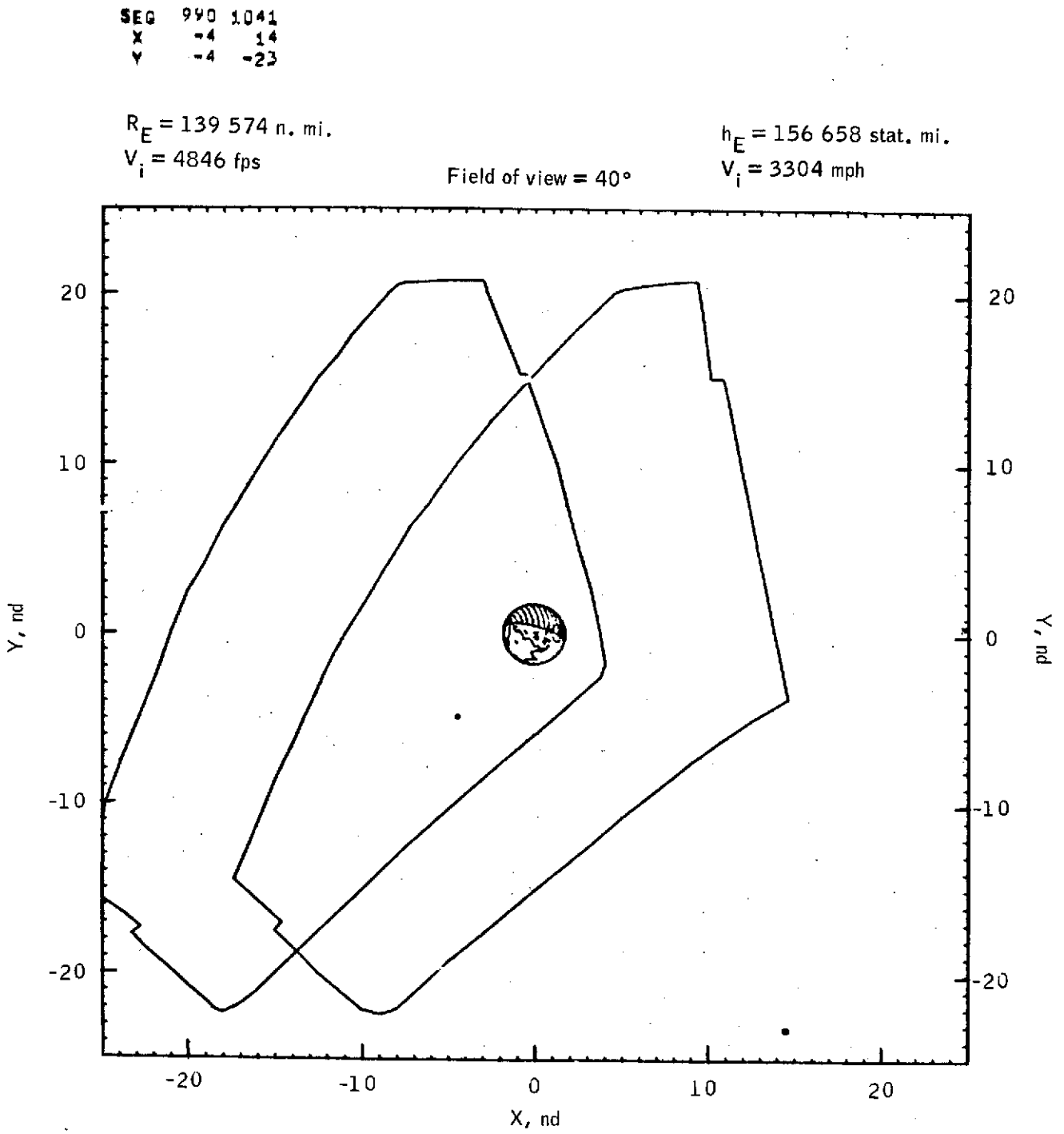

(e) G.e.t. = 150 hours.

Figure 20.- Continued.



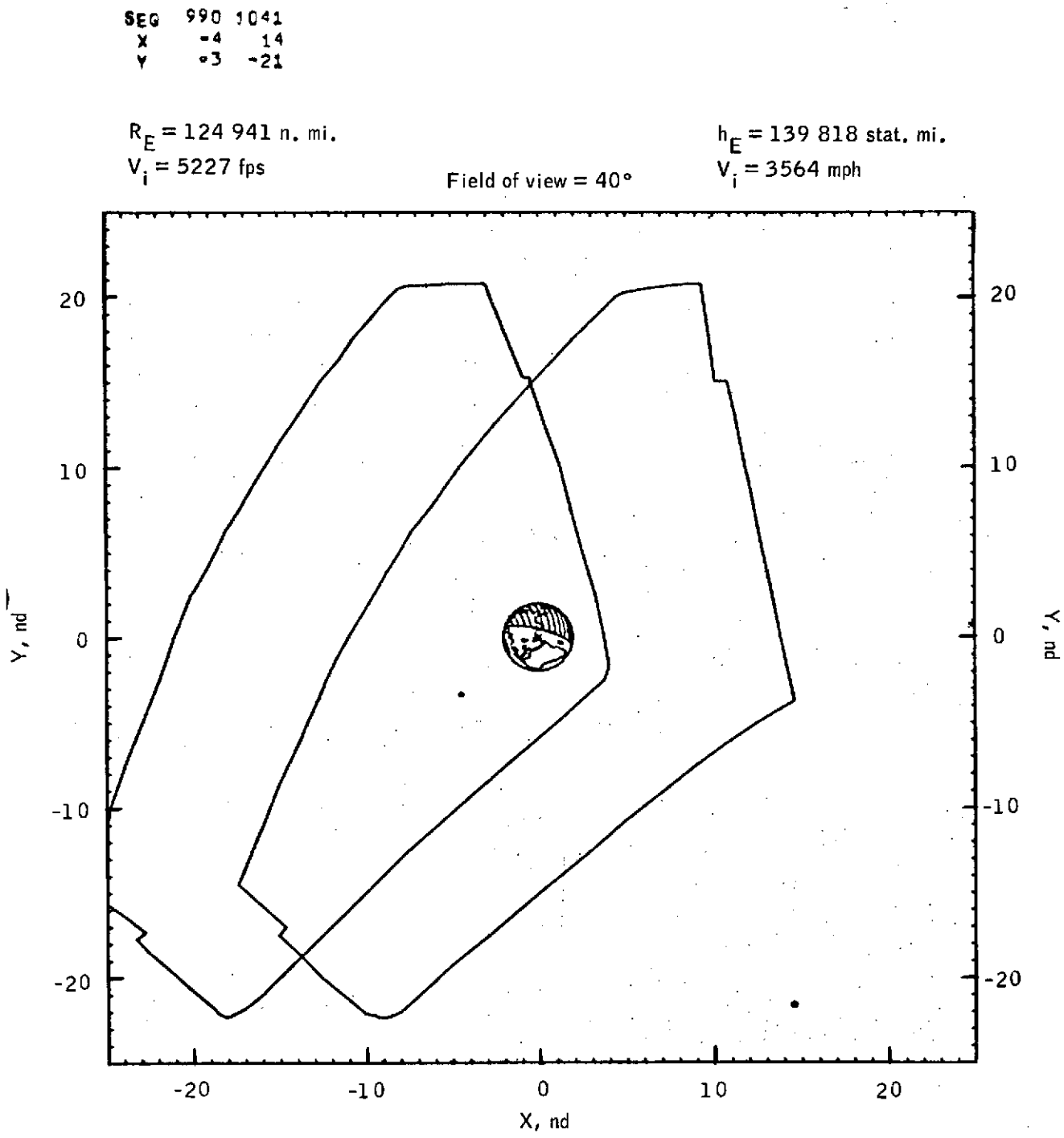

(f) G.e.t. = 155 hours.

Figure 20.- Continued.



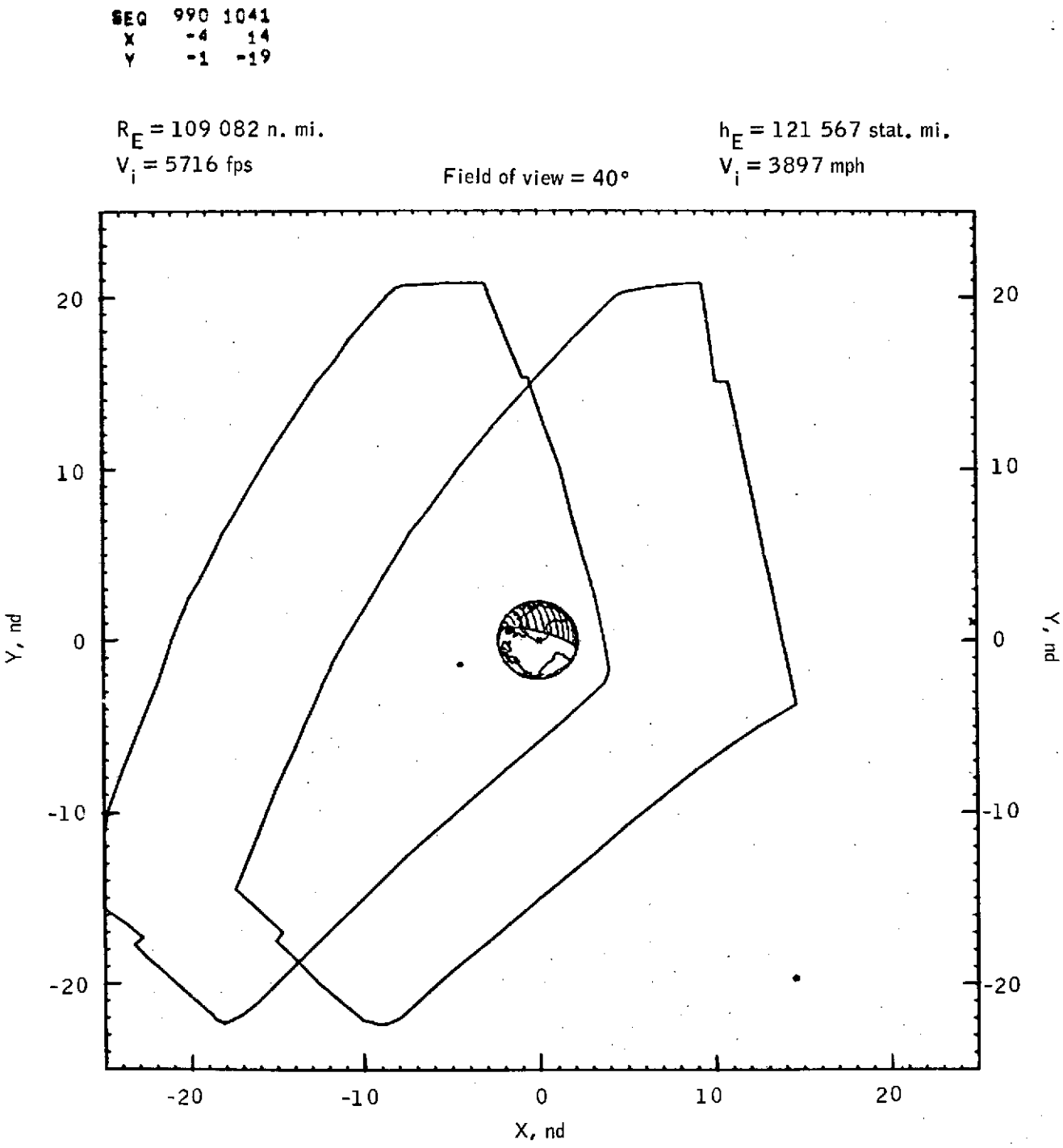

(g) G.e.t. = 160 hours.

Figure 20.- Continued.



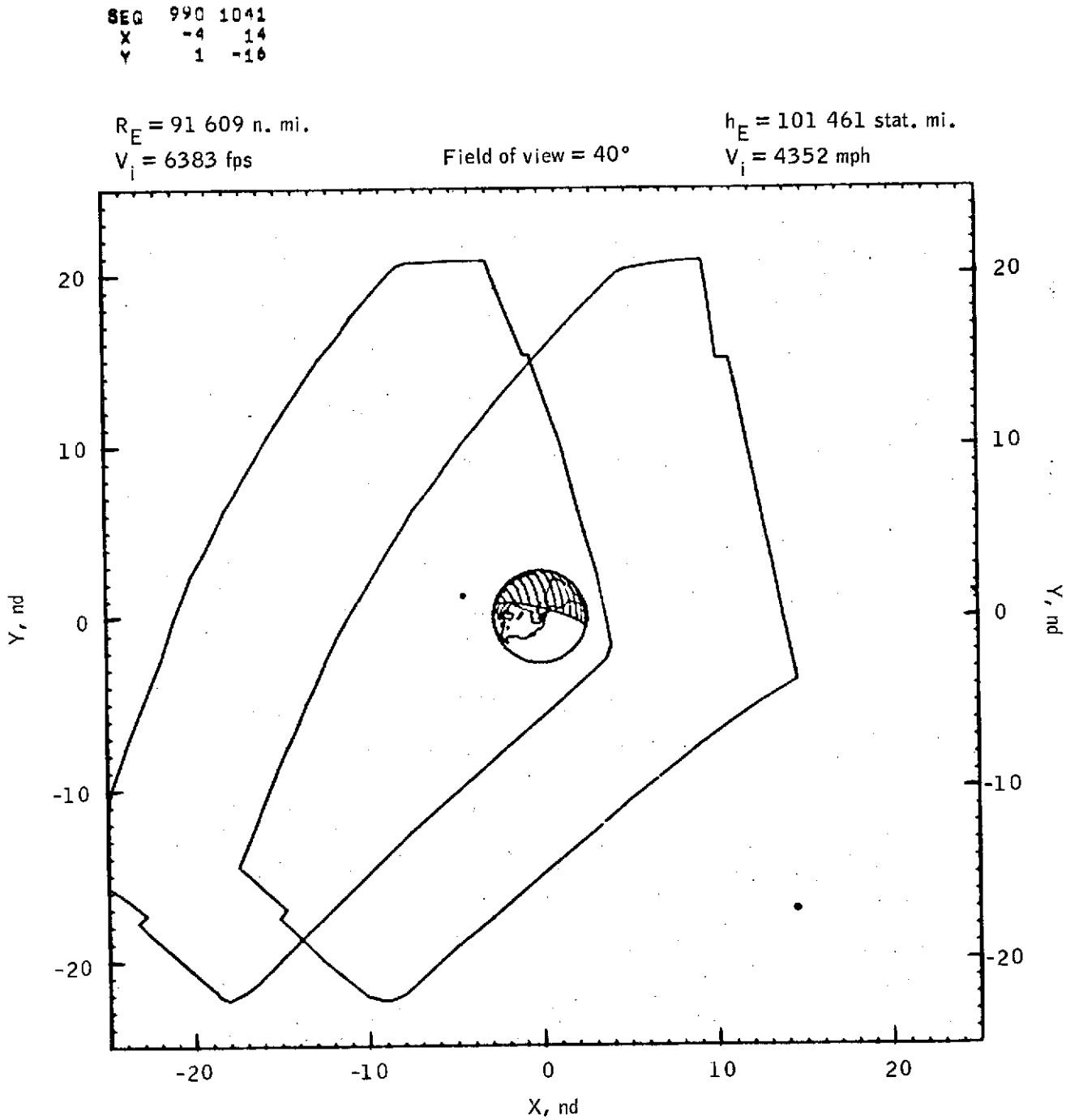

(h) G.e.t. = 165 hours.

Figure 20.- Continued.



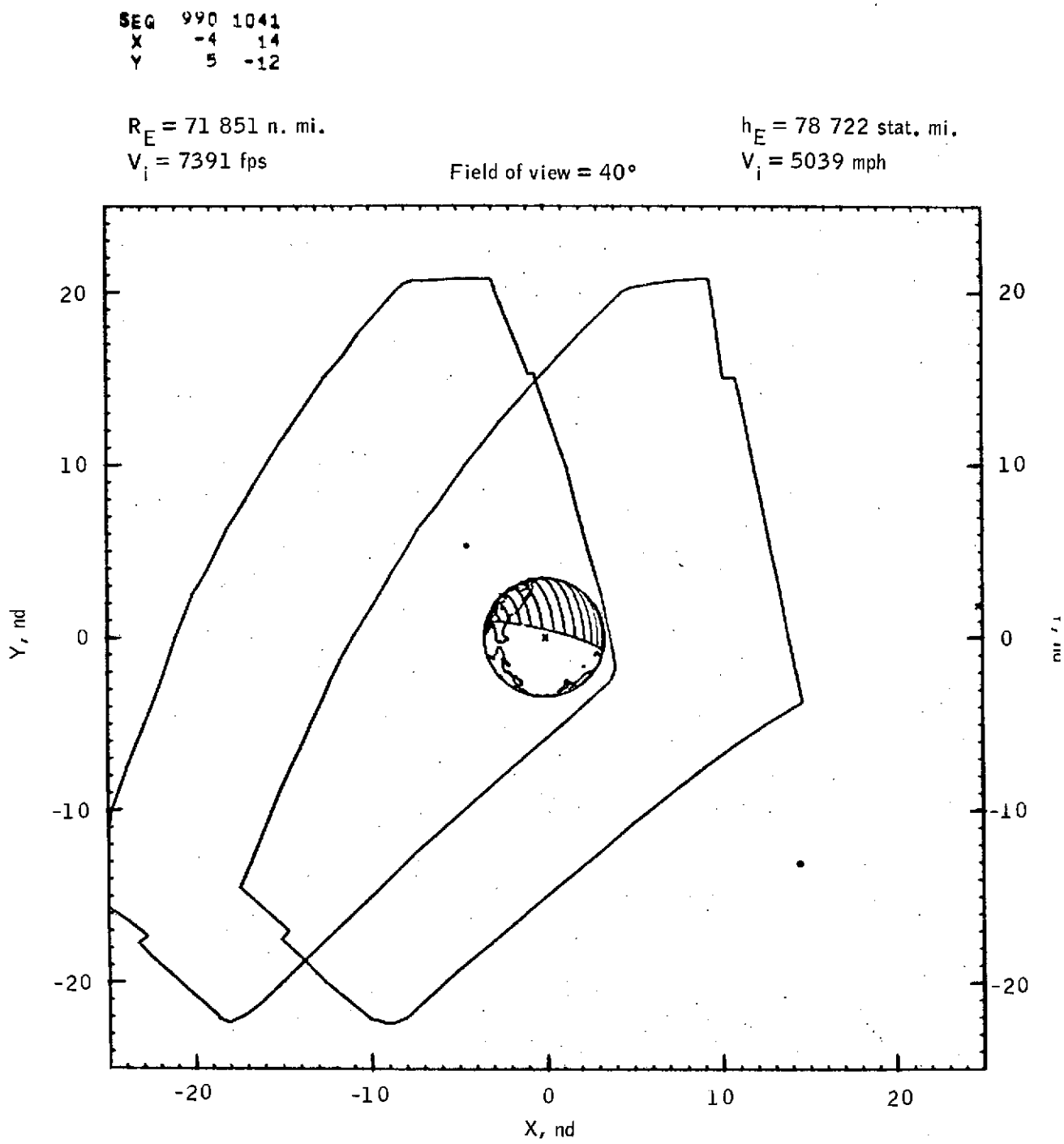

(i) G.e.t. = 170 hours.

Figure 20.- Continued.



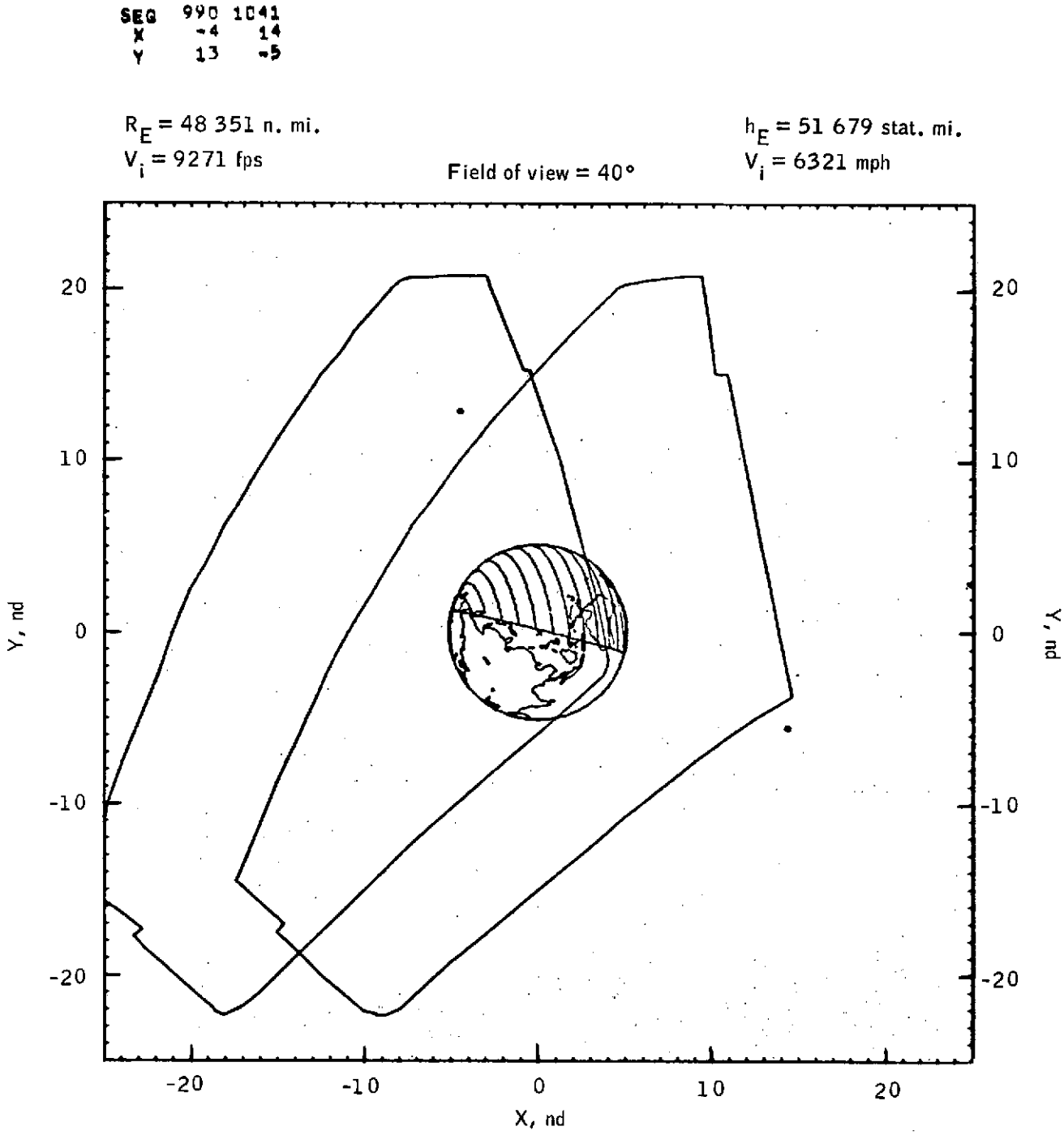

(j) G.e.t. = 175 hours.

Figure 20.- Continued.



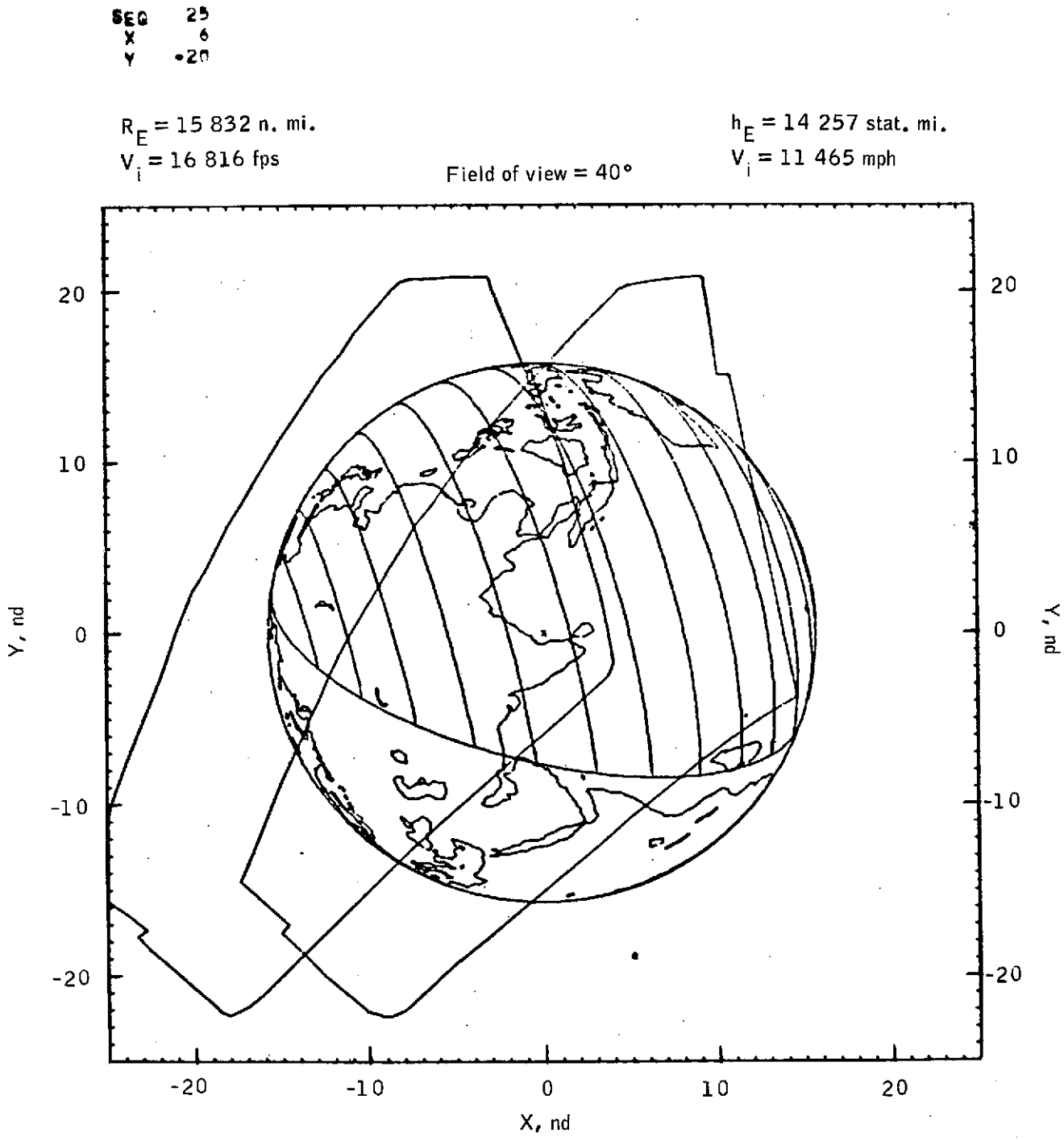

(k) G.e.t. = 180 hours.

Figure 20.- Continued.



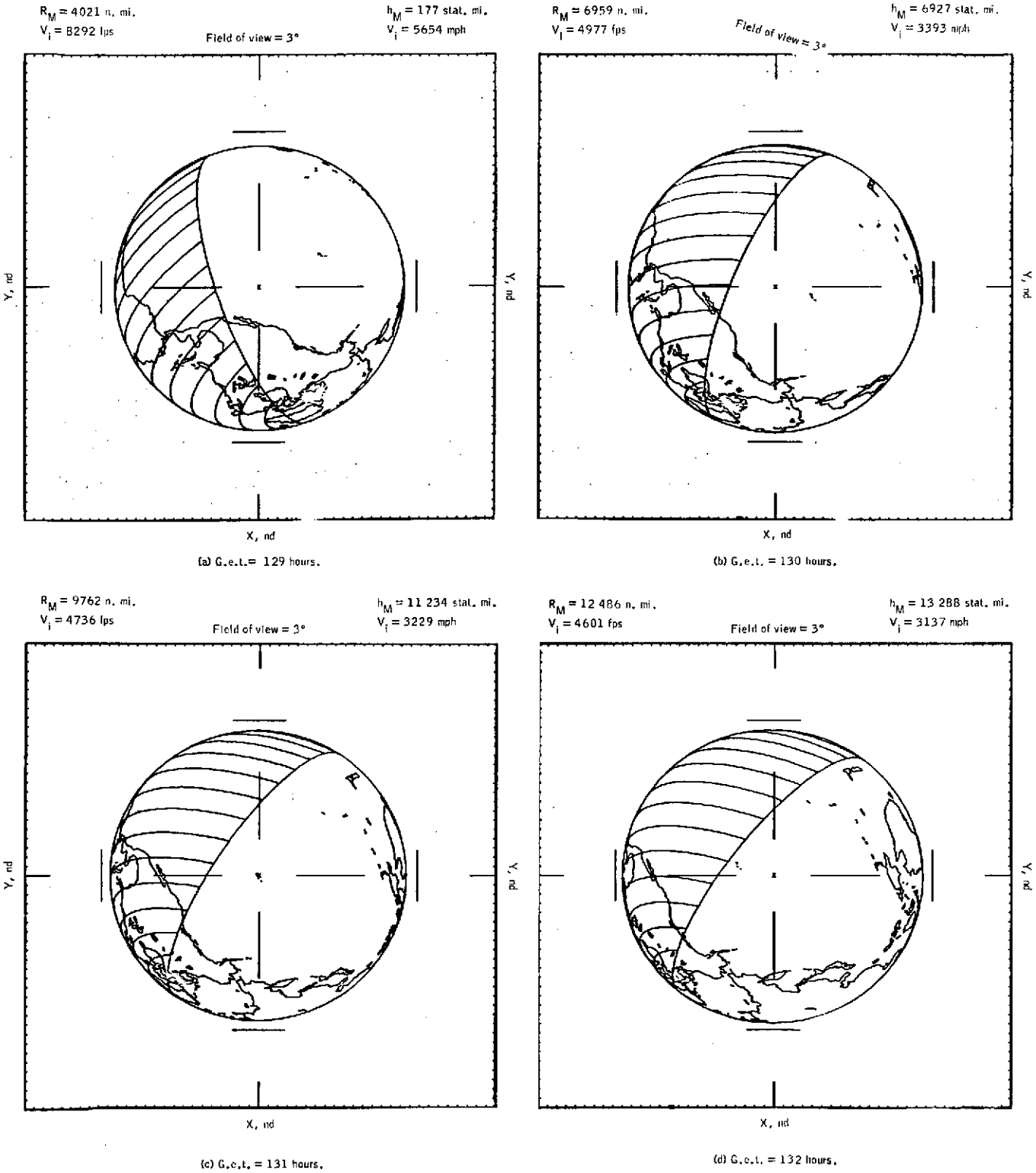

(l) G.e.t. = 185 hours.

Figure 20.- Continued.




(m) G.e.t. = 190 hours.

Figure 20.- Concluded.




(a) G.e.t.= 129 hours.

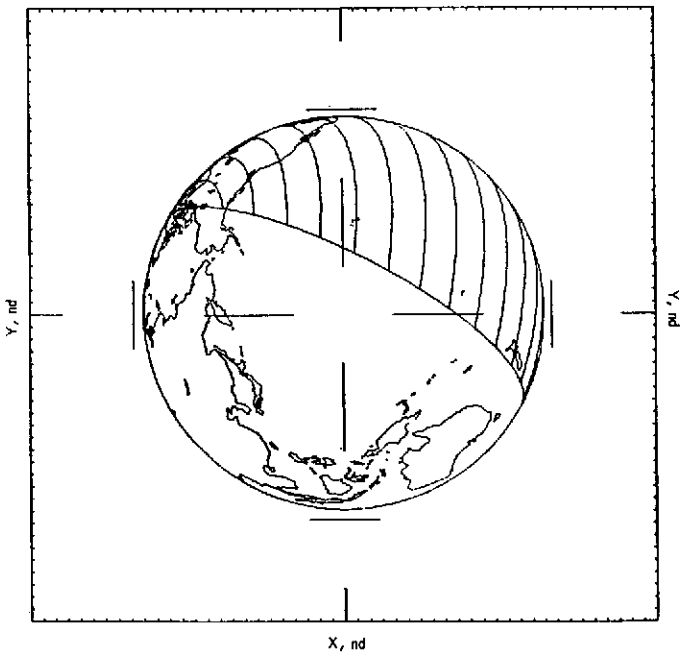
(b) G.e.t. = 130 hours.

(c) G.e.t. = 131 hours.

(d) G.e.t. = 132 hours.

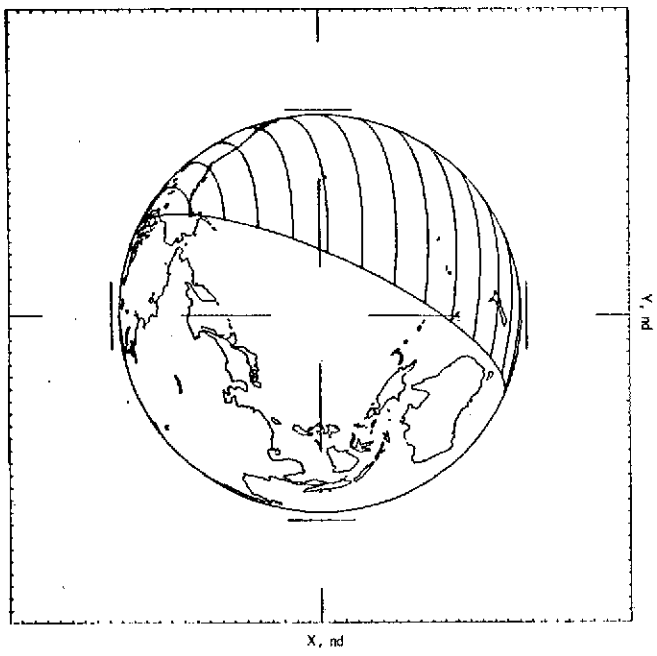
Figure 21.- Transearth coast - variable field of view (earth).

$R_M$ = 15 158 n. mi.
$V_i$ = 4513 fps
Field of view = 3°
$h_M$ = 16 364 stat. mi.
$V_i$ = 3077 mph



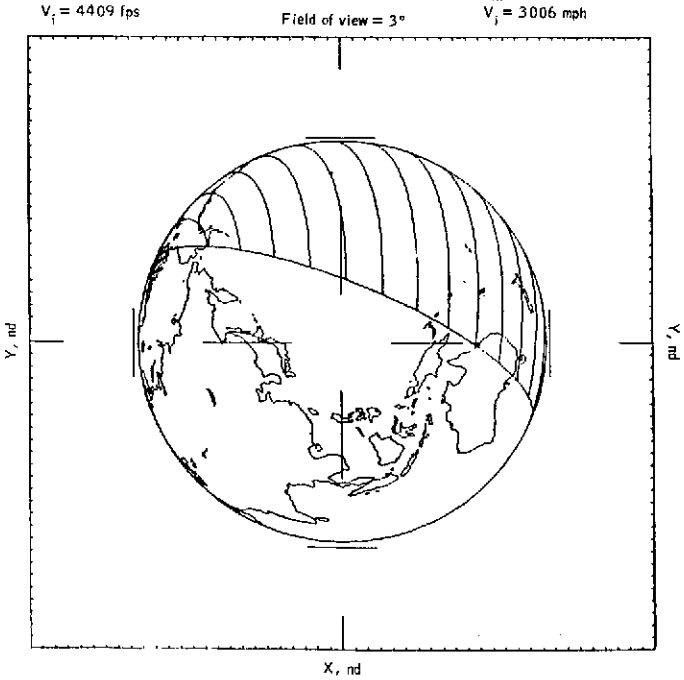

(e) G.e.t. = 133 hours.

$R_M$ = 17 795 n. mi.
$V_i$ = 4453 fps
Field of view = 3°
$h_M$ = 19 399 stat. mi.
$V_i$ = 3036 mph



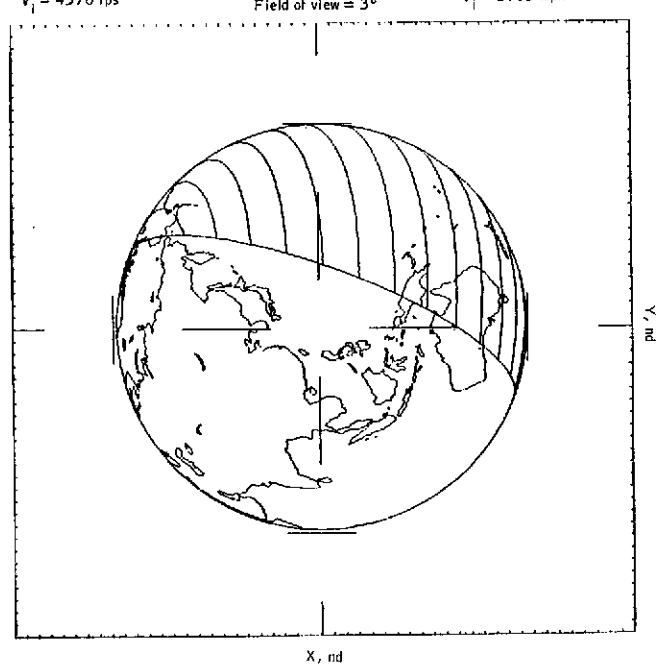

(f) G.e.t. = 134 hours.

$R_M$ = 20 406 n. mi.
$V_i$ = 4409 fps
Field of view = 3°
$h_M$ = 22 402 stat. mi.
$V_i$ = 3006 mph



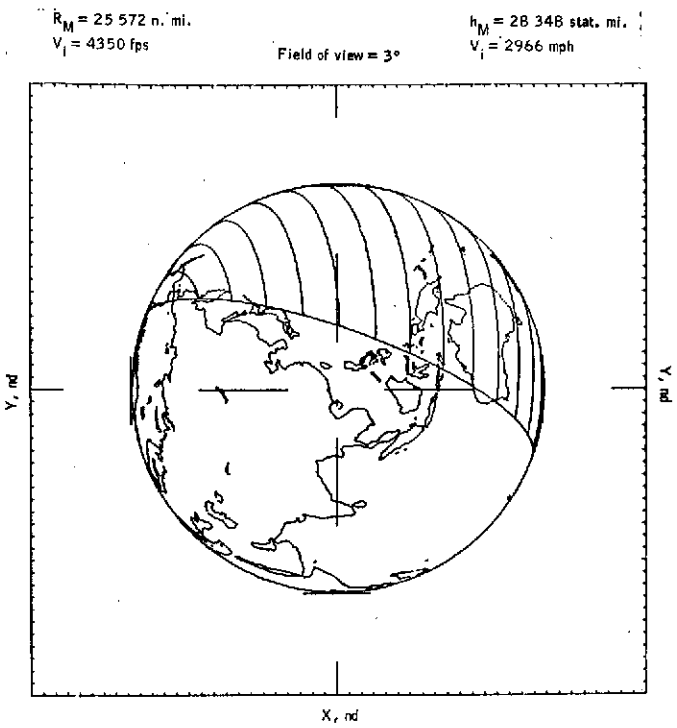

(g) G.e.t. = 135 hours.

$R_M$ = 22 997 n. mi.
$V_i$ = 4376 fps
Field of view = 3°
$h_M$ = 25 384 stat. mi.
$V_i$ = 2983 mph

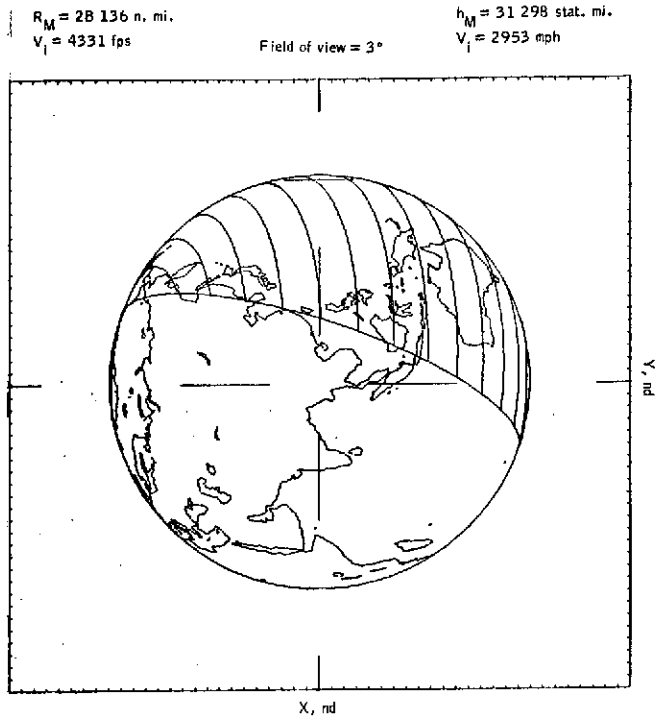



(h) G.e.t. = 136 hours.

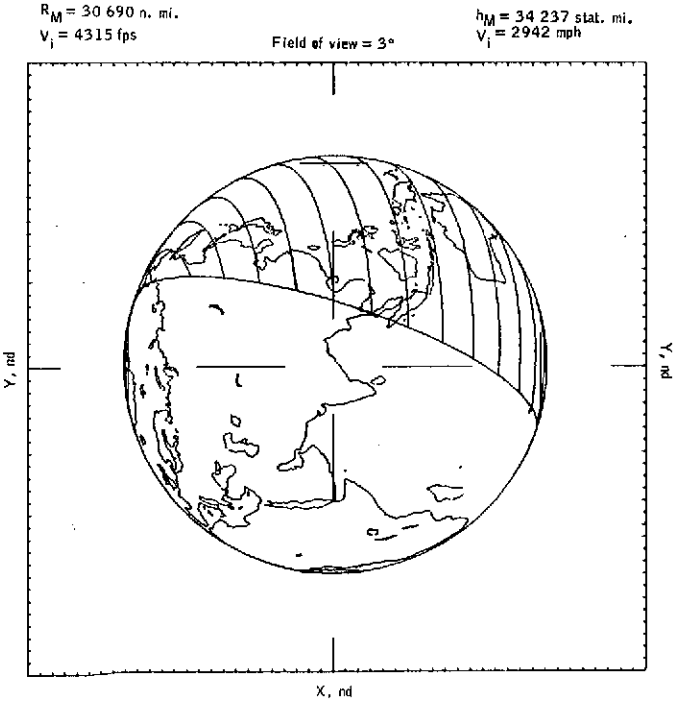
Figure 21.- Concluded.



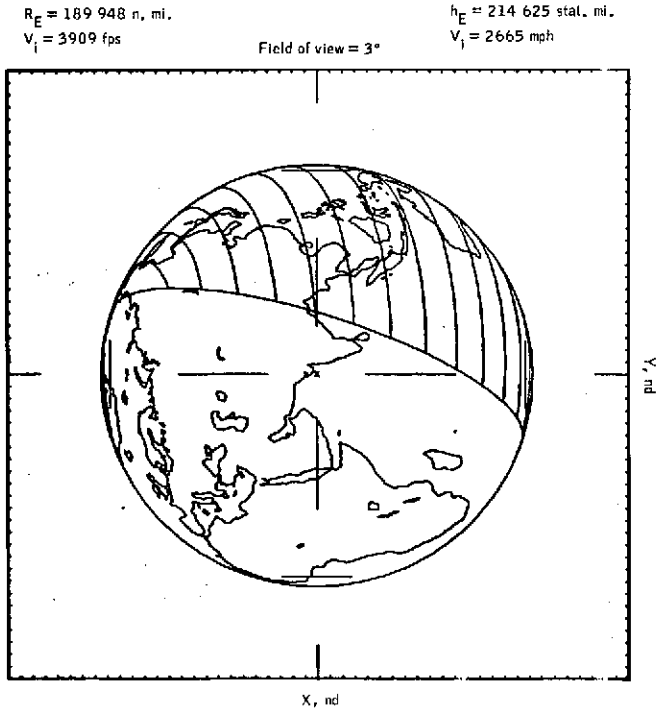

(i) G.e.t. = 137 hours.




(j) G.e.t. = 138 hours.

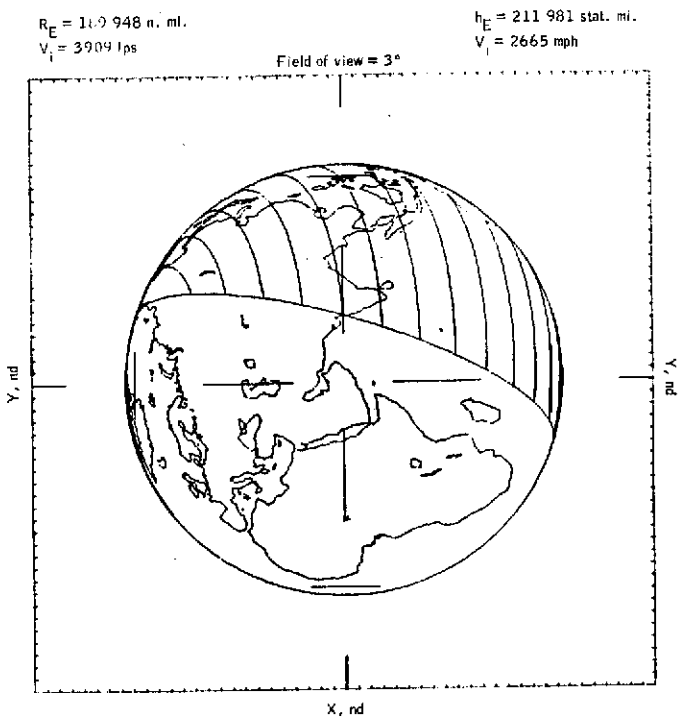



(k) G.e.t. = 139 hours.

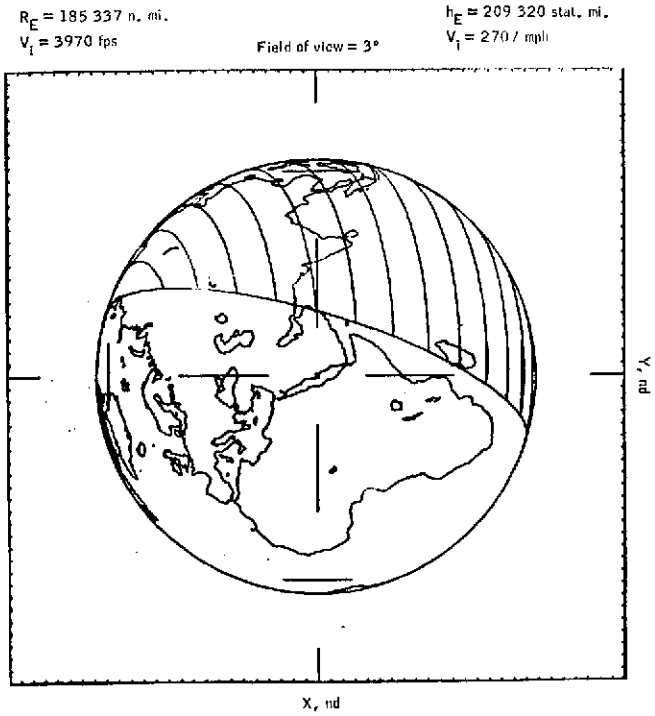



(l) G.e.t. = 140 hours.

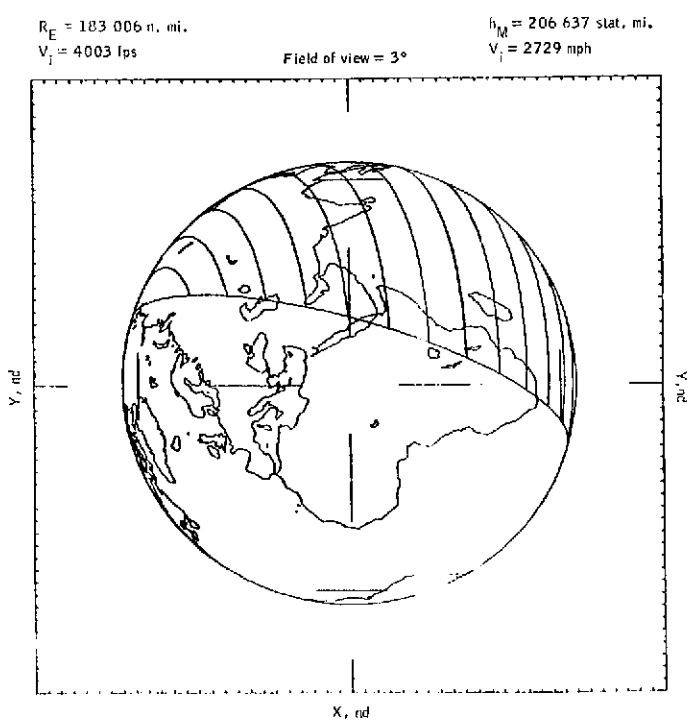
Figure 21. - Continued.



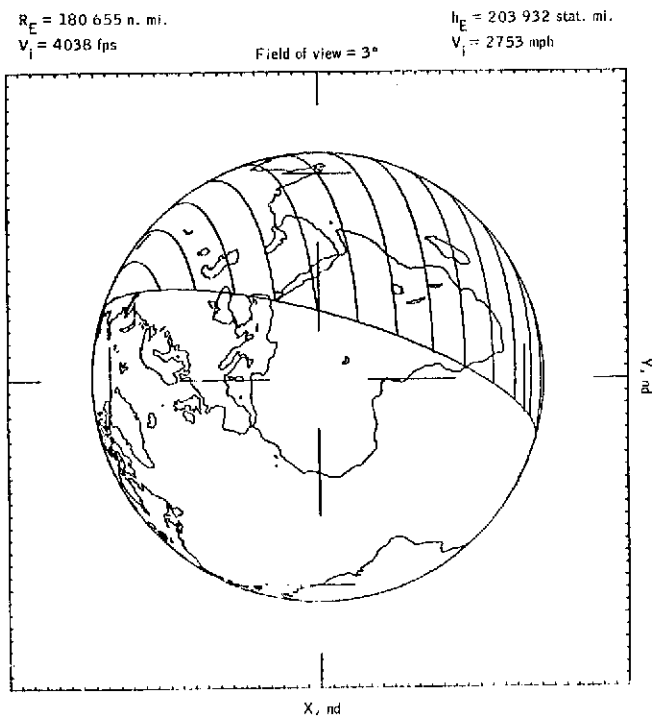

(m) G.e.t. = 141 hours




(n) G.e.t. = 142 hours.



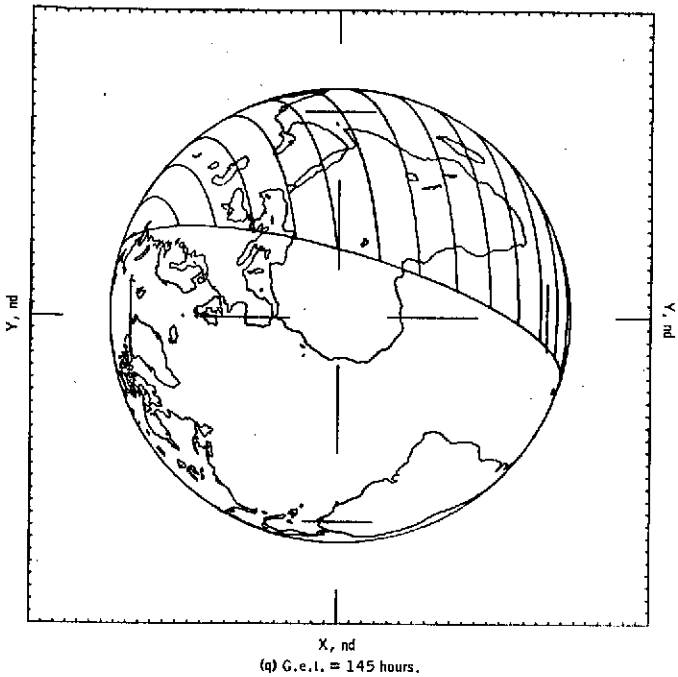

(o) G.e.t. = 143 hours.




(p) G.e.t. = 144 hours.

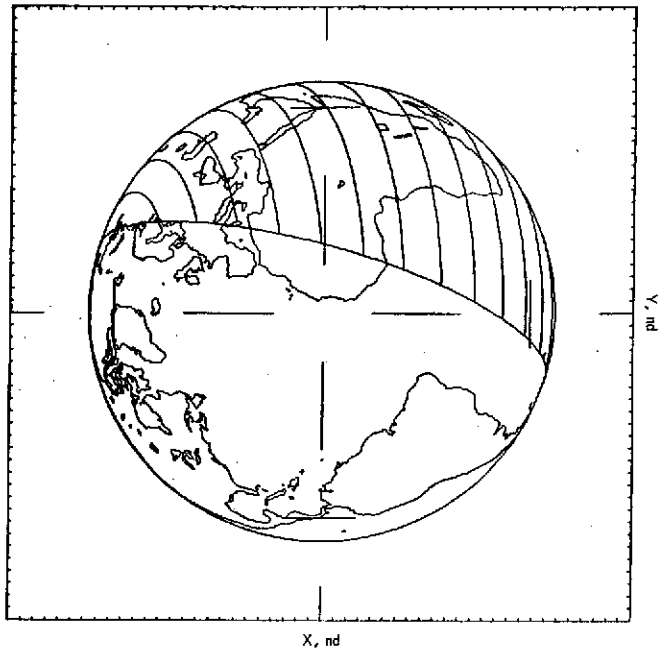
Figure 21.- Continued.

$R_E$ = 178 283 n. mi.
$V_i$ = 4075 fps
Field of view = 3°
$h_E$ = 201 203 stat. mi.
$V_i$ = 2778 mph



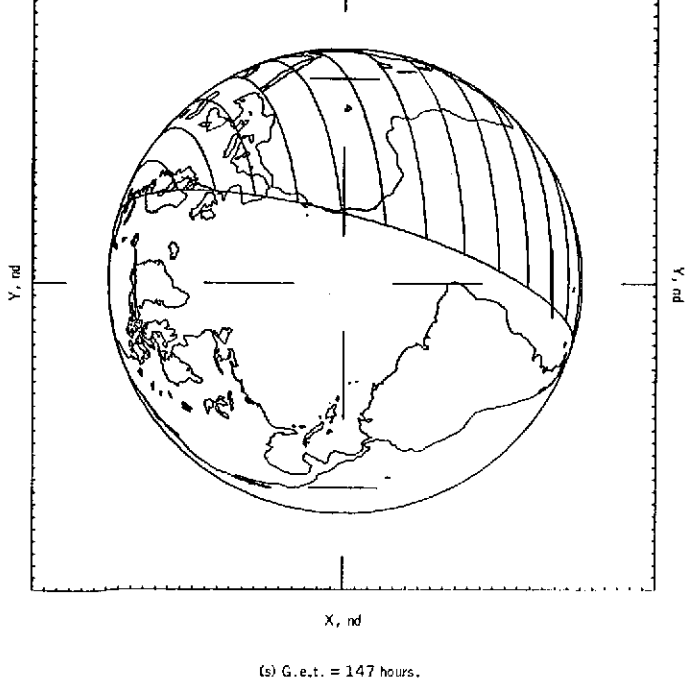

(q) G.e.t. = 145 hours.

$R_E$ = 175 891 n. mi.
$V_i$ = 4114 fps
Field of view = 3°
$h_E$ = 203 932 stat. mi.
$V_i$ = 2805 mph



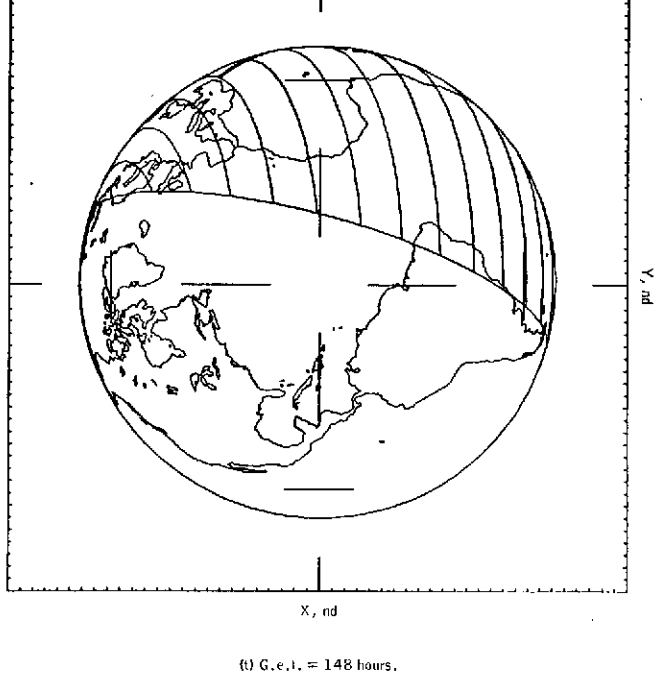

(r) G.e.t. = 146 hours.

$R_E$ = 173 475 n. mi.
$V_i$ = 4154 fps
Field of view = 3°
$h_E$ = 195 670 stat. mi.
$V_i$ = 2832 mph




(s) G.e.t. = 147 hours.

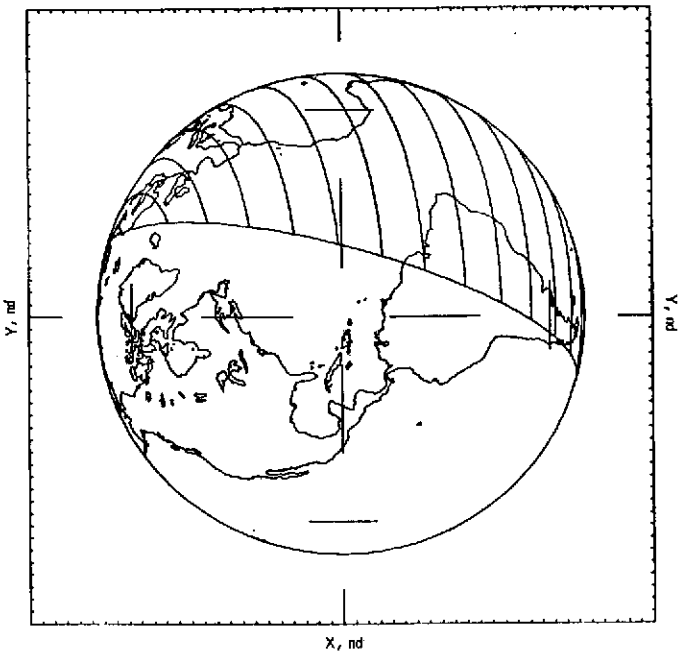
$R_E$ = 171 037 n. mi.
$V_i$ = 4196 fps
Field of view = 3°
$h_E$ = 192 865 stat. mi.
$V_i$ = 2861 mph




(t) G.e.t. = 148 hours.

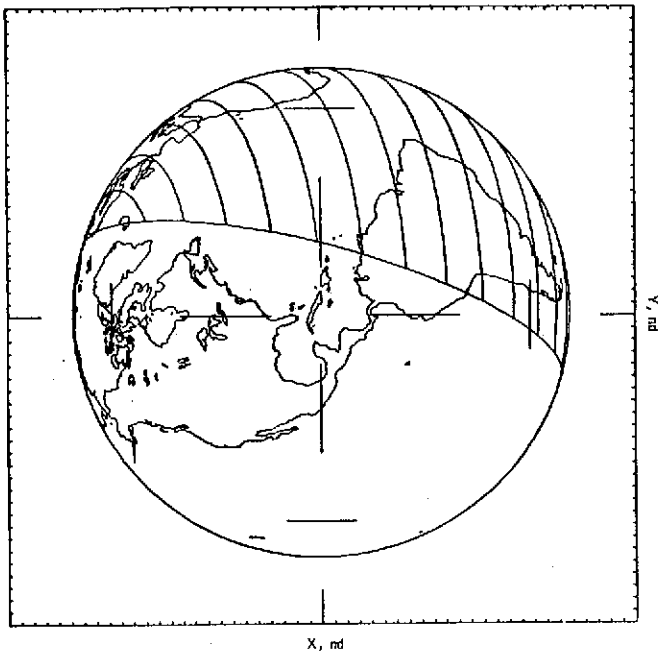
Figure 21.- Continued.

$R_E$ = 168 574 n. mi.
$V_i$ = 4240 fps
Field of view = 3°
$h_E$ = 190 029 stat. mi.
$V_i$ = 2891 mph



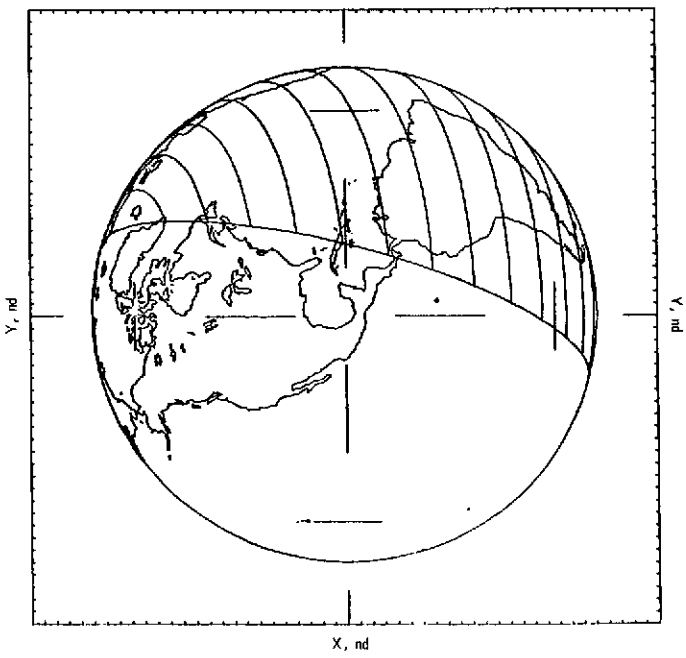

(u) G.e.t. = 149 hours.

$R_E$ = 166 086 n. mi.
$V_i$ = 4285 fps
Field of view = 3°
$h_E$ = 187 167 stat. mi.
$V_i$ = 2922 mph



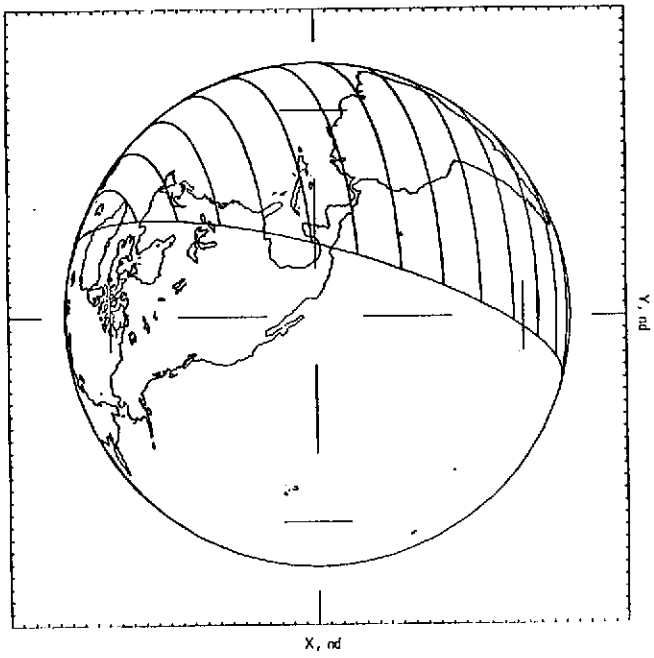

(v) G.e.t. = 150 hours.

$R_E$ = 163 572 n. mi.
$V_i$ = 4332 fps
Field of view = 3°
$h_E$ = 184 273 stat. mi.
$V_i$ = 2954 mph



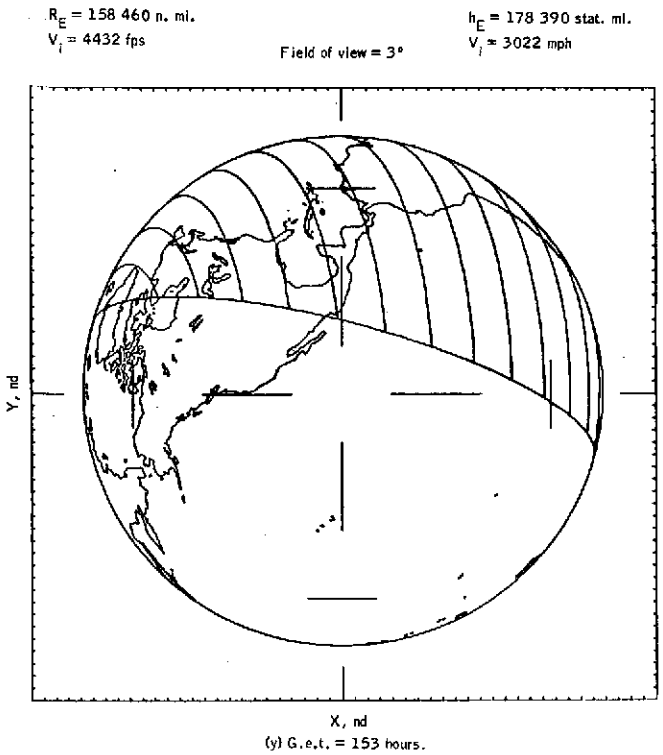

(w) G.e.t. = 151 hours.

$R_E$ = 161 030 n. mi.
$V_i$ = 4381 fps
Field of view = 3°
$h_E$ = 181 348 stat. mi.
$V_i$ = 2987 mph

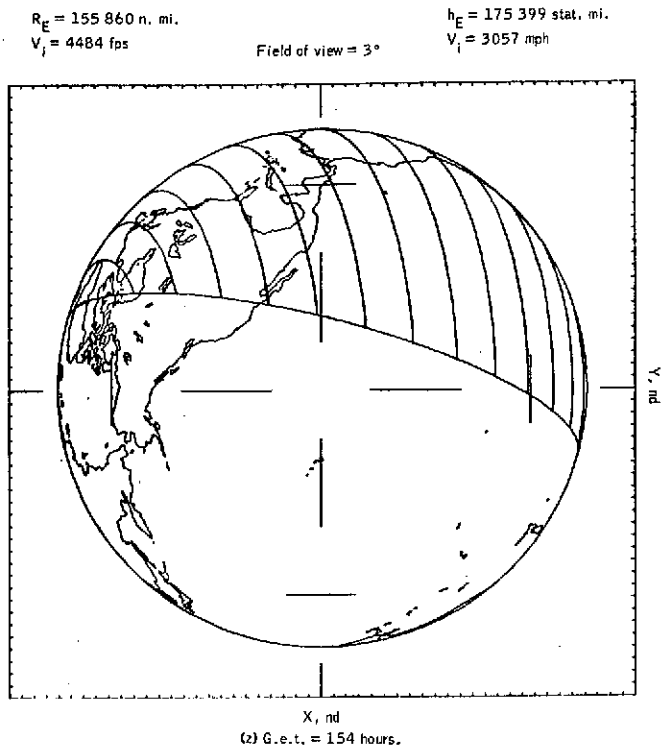



(x) G.e.t. = 152 hours.

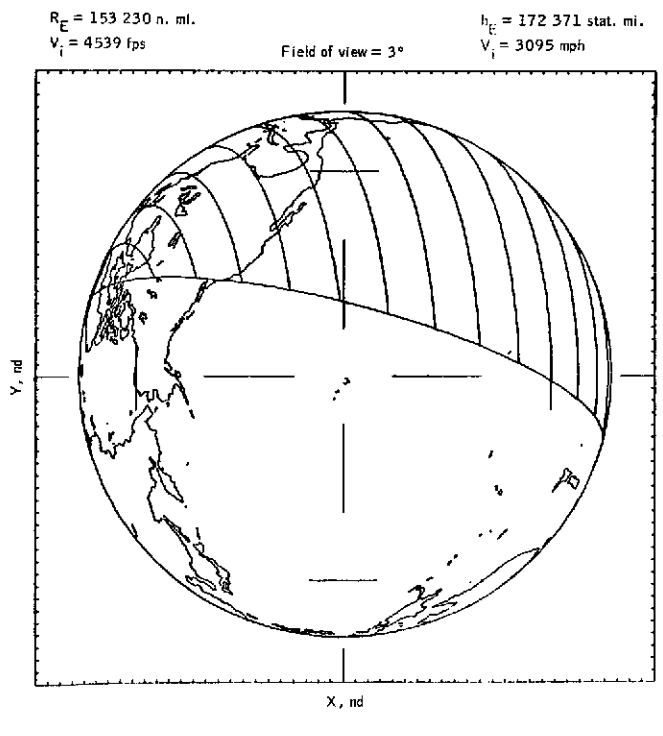
Figure 21.- Continued.



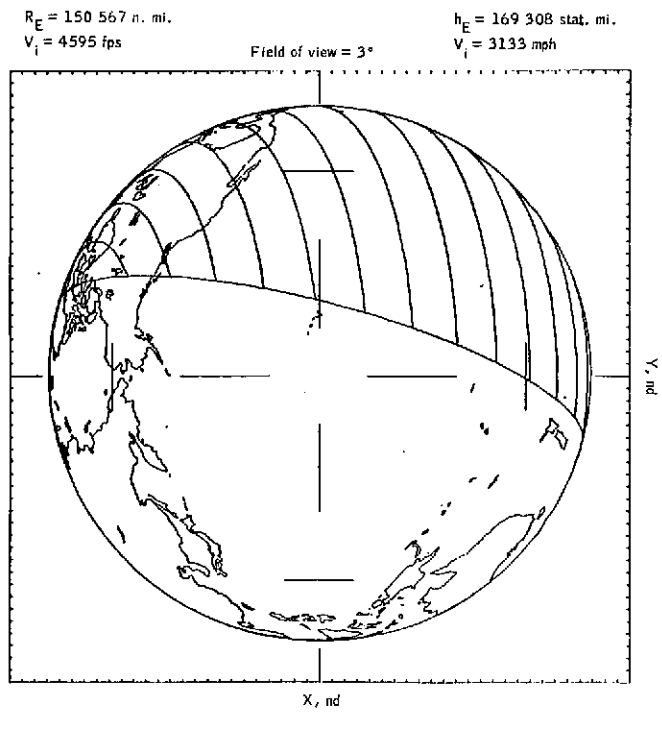

(y) G.e.t. = 153 hours.




(z) G.e.t. = 154 hours.



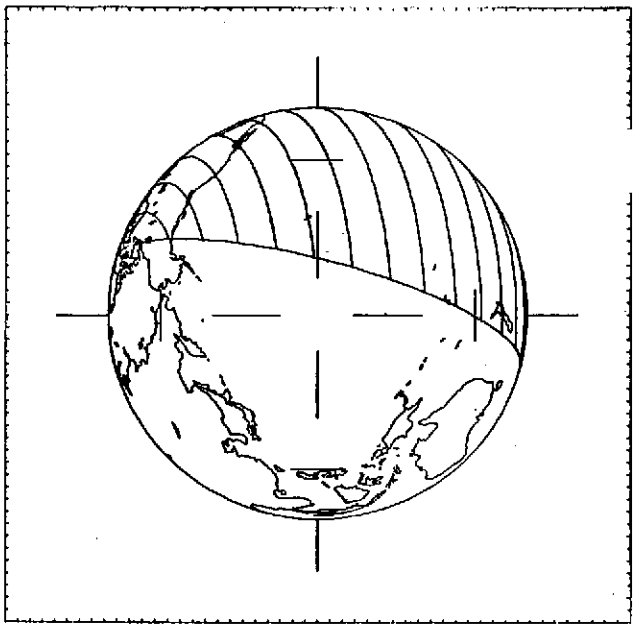

(aa) G.e.t. = 155 hours.




(bb) G.e.t. = 156 hours.

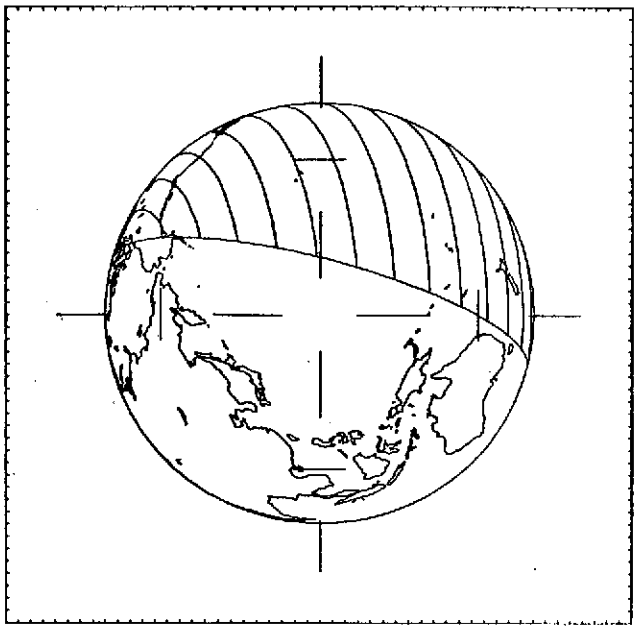
Figure 21. - Continued.

$R_i$ = 147 872 n. mi.
$V_i$ = 4654 fps
Field of view = 4°
$h_E$ = 166 206 stat. mi.
$V_i$ = 3173 mph



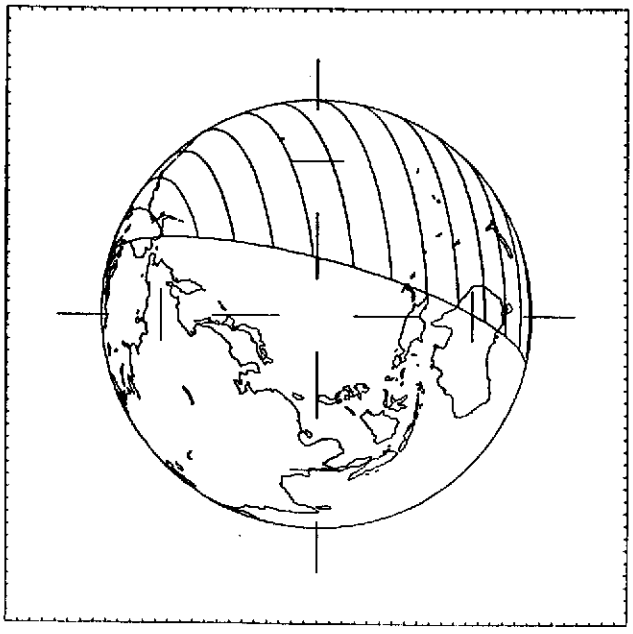

(cc) G.e.t. = 157 hours.

$R_E$ = 145 143 n. mi.
$V_i$ = 4716 fps
Field of view = 4°
$h_E$ = 163 065 stat. mi.
$V_i$ = 3215 mph



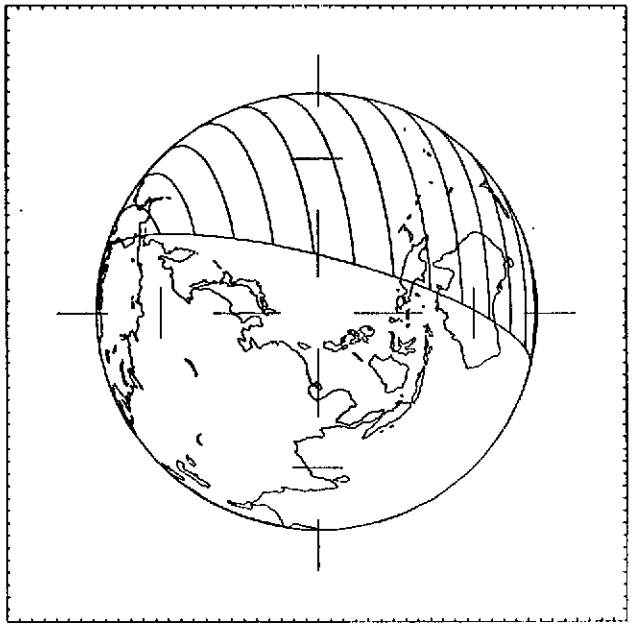

(dd) G.e.t. = 158 hours.

$R_E$ = 142 377 n. mi.
$V_i$ = 4779 fps
Field of view = 4°
$h_E$ = 159 882 stat. mi.
$V_i$ = 3258 mph




(ee) G.e.t. = 159 hours.

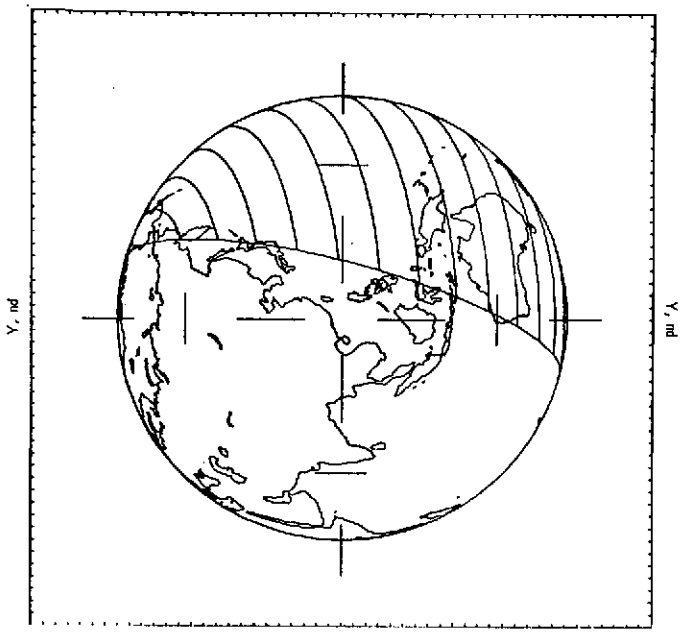
$R_E$ = 139 574 n. mi.
$V_i$ = 4846 fps
Field of view = 4°
$h_E$ = 156 658 stat. mi.
$V_i$ = 3304 mph




(ff) G.e.t. = 160 hours.

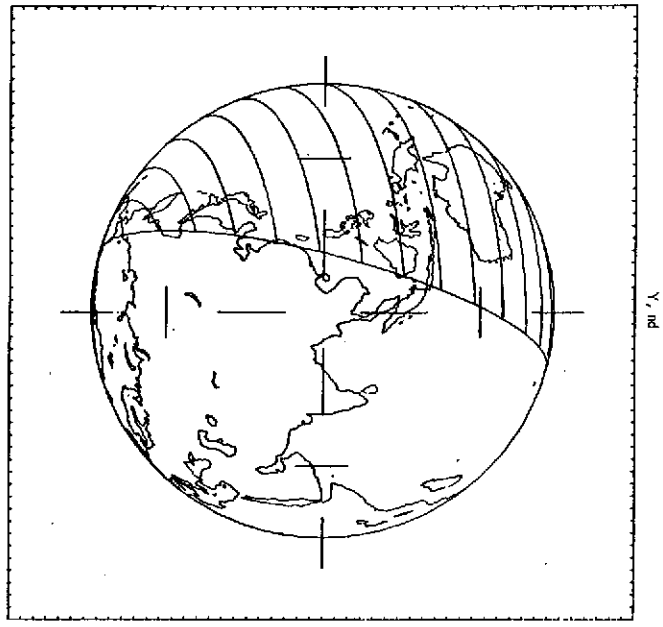
Figure 21. - Continued.

$R_E$ = 136 732 n. mi.
$V_i$ = 4916 fps
Field of view = 4°
$h_E$ = 153 386 stat. mi.
$V_i$ = 3352 mph



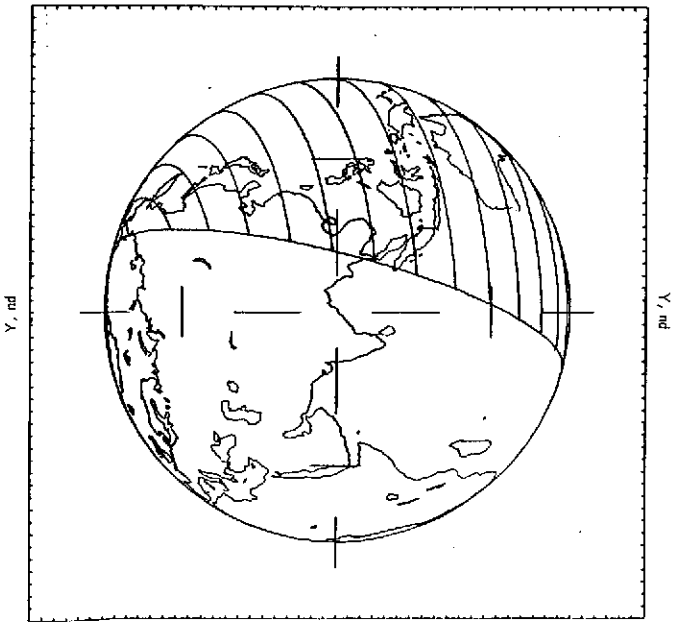

(gg) G.e.t. = 161 hours.

$R_E$ = 133 850 n. mi.
$V_i$ = 4988 fps
Field of view = 4°
$h_E$ = 150 070 stat. mi.
$V_i$ = 3401 mph



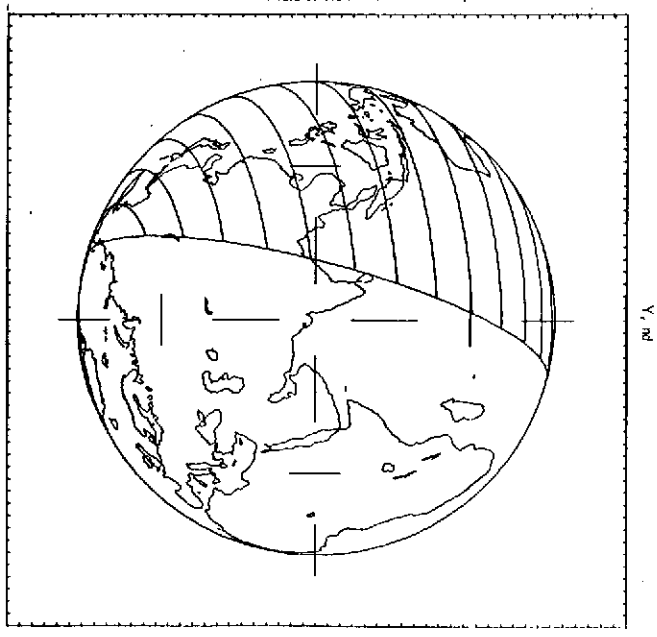

(hh) G.e.t. = 162 hours.

$R_E$ = 130 925 n. mi.
$V_i$ = 5064 fps
Field of view = 4°
$h_E$ = 146 705 stat. mi.
$V_i$ = 3453 mph




(ii) G.e.t. = 163 hours.

$R_E$ =127 956 n. mi.
$V_i$ = 5144 fps
Field of view = 4°
$h_E$ = 143 288 stat. mi.
$V_i$ = 3507 mph



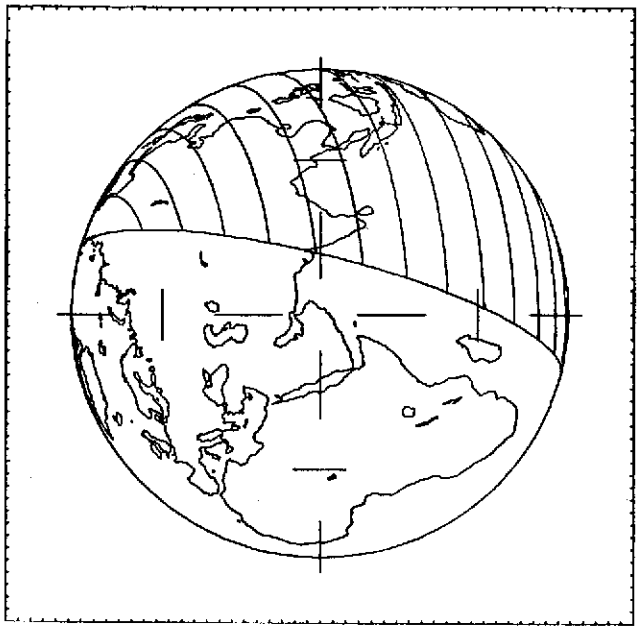

(jj) G.e.t. = 164 hours.

Figure 21. - Continued.

$R_E$ = 124 941 n. mi.
$V_i$ = 5227 fps

Field of view = 4°

$h_E$ = 139 818 stat. mi.
$V_i$ = 3564 mph

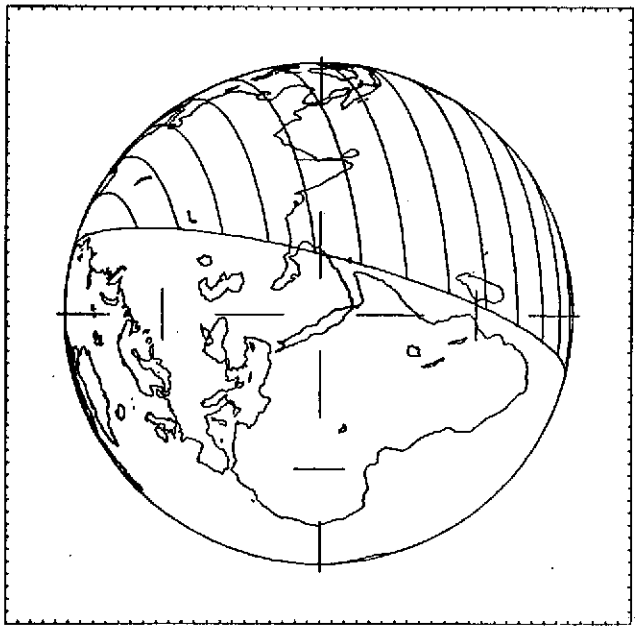



(kk) G.e.t. = 165 hours.

$R_E$ = 121 877 n. mi.
$V_i$ = 5315 fps

Field of view = 4°

$h_E$ = 136 292 stat. mi.
$V_i$ = 3624 mph

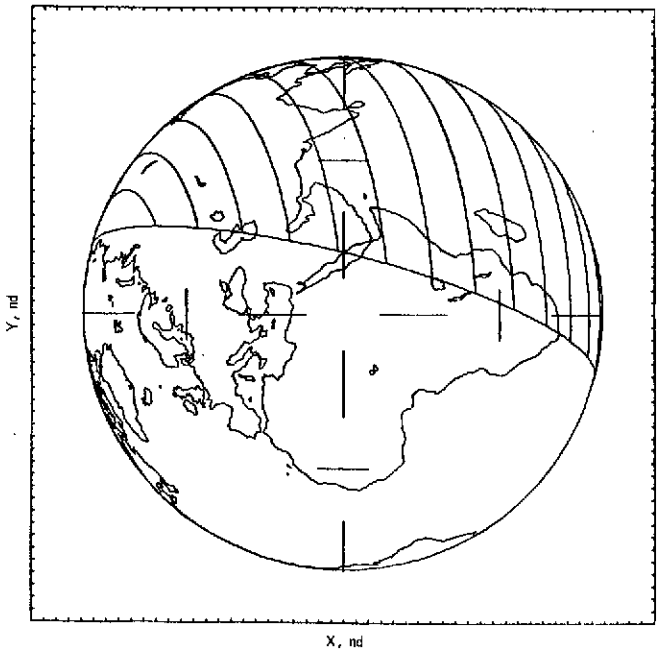



(ll) G.e.t. = 166 hours.

$R_E$ = 118 762 n. mi.
$V_i$ = 5407 fps

Field of view = 4°

$h_E$ = 132 707 stat. mi.
$V_i$ = 3687 mph

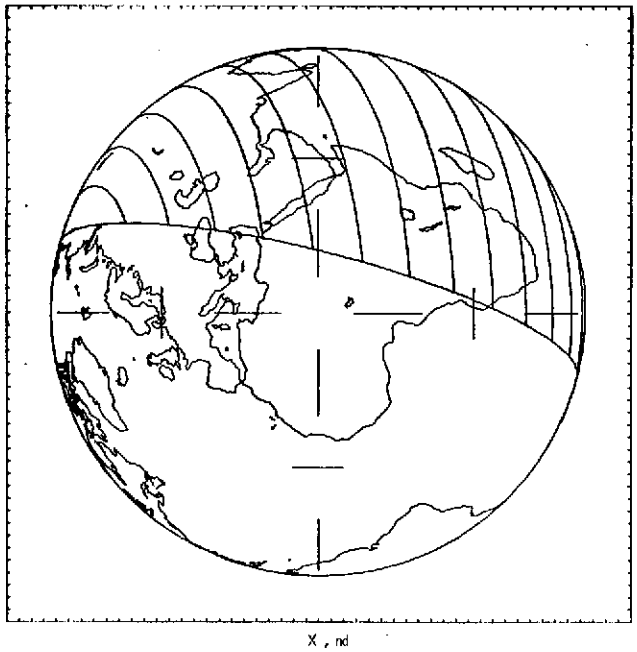



(mm) G.e.t. = 167 hours.

$R_E$ = 115 593 n. mi.
$V_i$ = 5504 fps

Field of view = 4°

$h_E$ = 129 061 stat. mi.
$V_i$ = 3752 mph



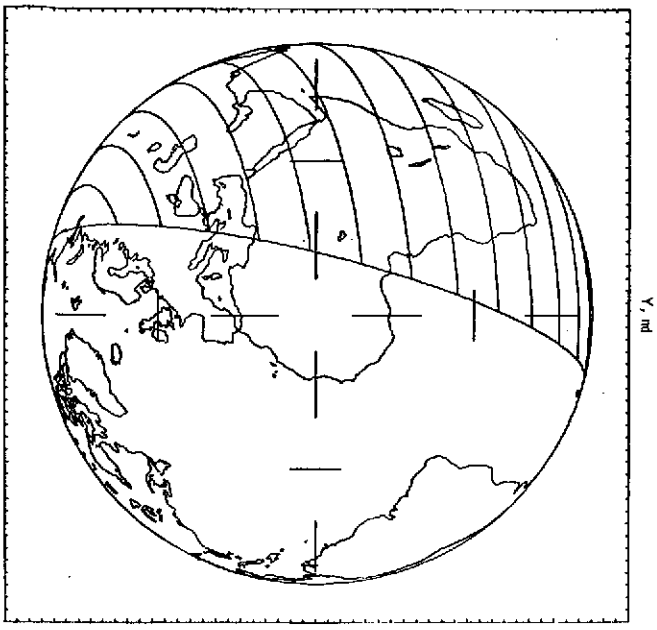

(nn) G.e.t. = 168 hours.

Figure 21.- Continued.

$R_E$ = 112 367 n. mi.
$V_i$ = 5607 fps

Field of view = 4°

$h_E$ = 125 348 stat. mi.
$V_i$ = 3823 mph

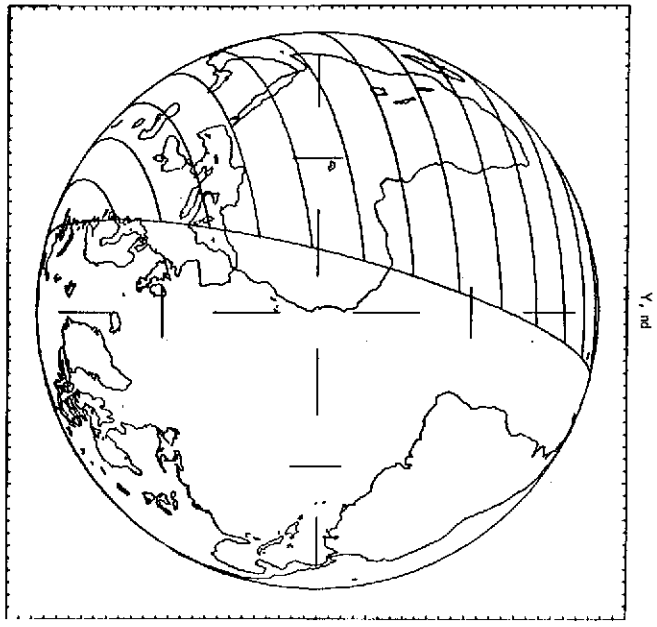



(oo) G.e.t. = 169 hours.

$R_E$ = 109 082 n. mi.
$V_i$ = 5716 fps

Field of view = 4°

$h_E$ = 121 567 stat. mi.
$V_i$ = 3897 mph

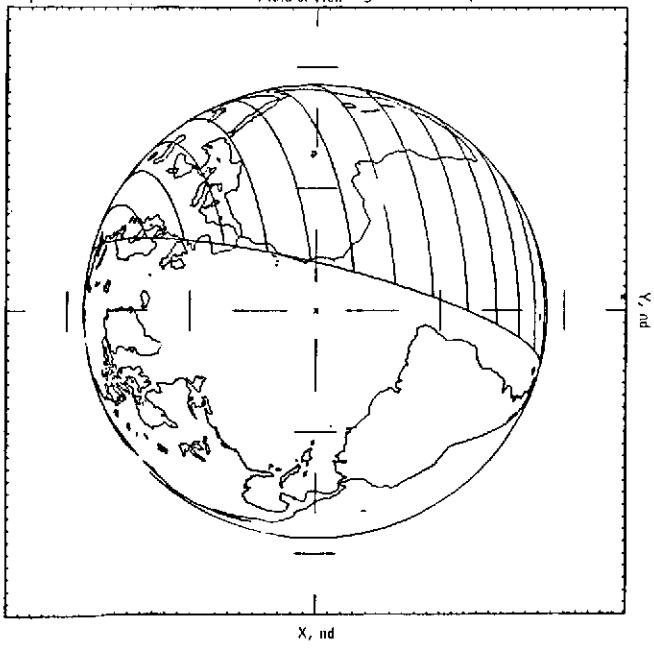



(pp) G.e.t. = 170 hours.

$R_E$ = 10 573 n. mi.
$V_i$ = 5832 fps

Field of view = 5°

$h_E$ = 117 712 stat. mi.
$V_i$ = 3976 mph

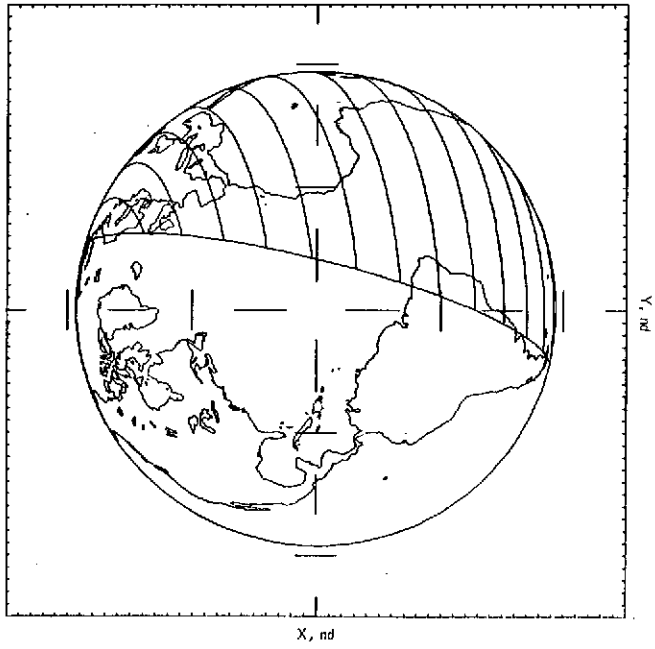



(qq) G.e.t. = 171 hours.

$R_E$ = 102 315 n. mi.
$V_i$ = 5956 fps

Field of view = 5°

$h_E$ = 113 779 stat. mi.
$V_i$ = 4061 mph



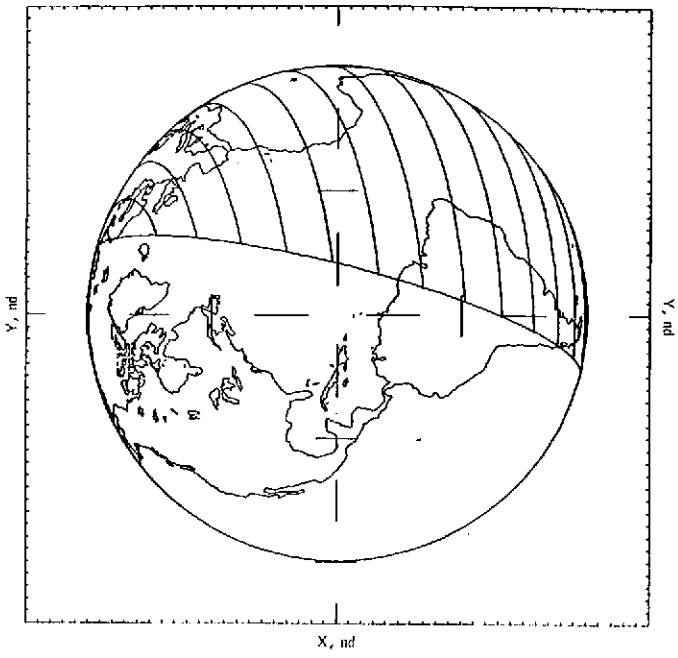

(rr) G.e.t. = 172 hours.

Figure 21.- Continued.

$R_E$ = 98 826 n. mi.
$V_i$ = 6088 fps

Field of view = 5°

$h_E$ = 109 764 stat. mi.
$V_i$ = 4151 mph

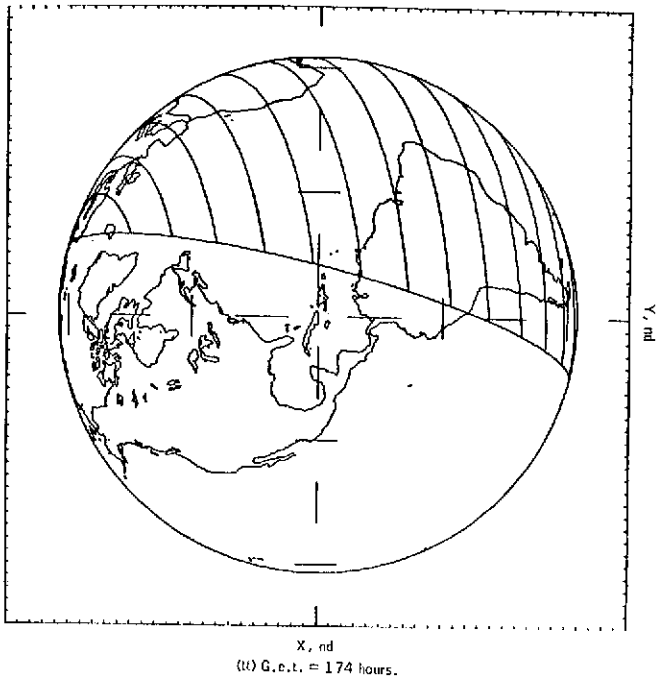



(ss) G.e.t. = 173 hours.

$R_E$ = 95 259 n. mi.
$V_i$ = 6230 fps

Field of view = 5°

$h_E$ = 105 661 stat. mi.
$V_i$ = 4248 mph

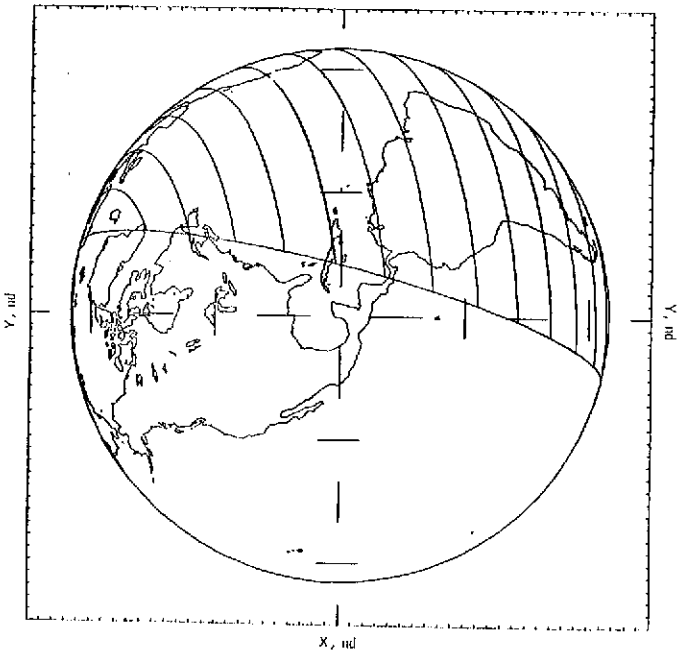



(tt) G.e.t. = 174 hours.

$R_E$ = 91 609 n. mi.
$V_i$ = 6383 fps

Field of view = 5°

$h_E$ = 101 461 stat. mi.
$V_i$ = 4352 mph

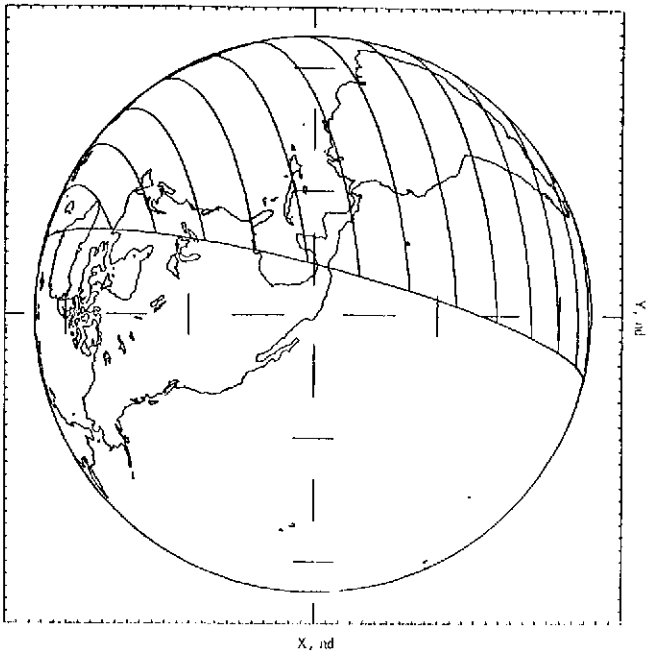



(uu) G.e.t. = 175 hours.

$R_E$ = 87 871 n. mi.
$V_i$ = 6549 fps

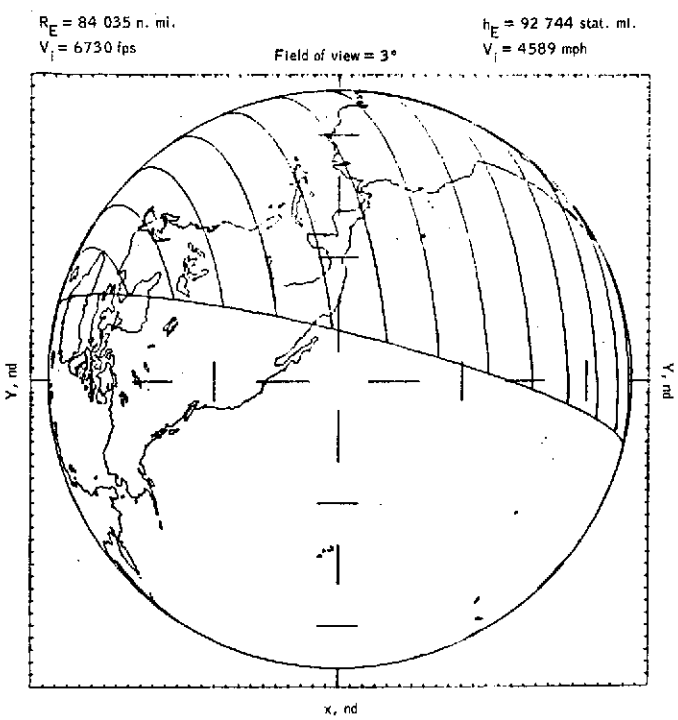
Field of view = 5°

$h_E$ = 97 158 stat. mi.
$V_i$ = 4465 mph

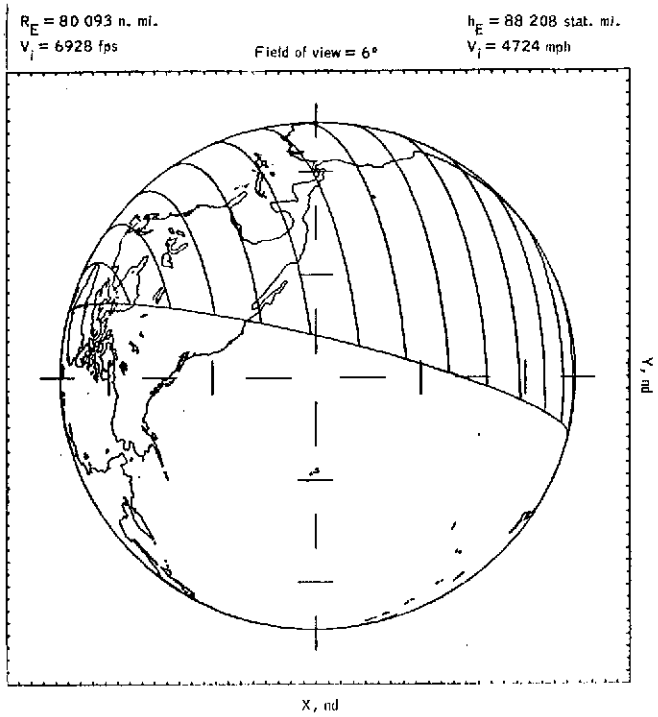



(vv) G.e.t. = 176 hours.

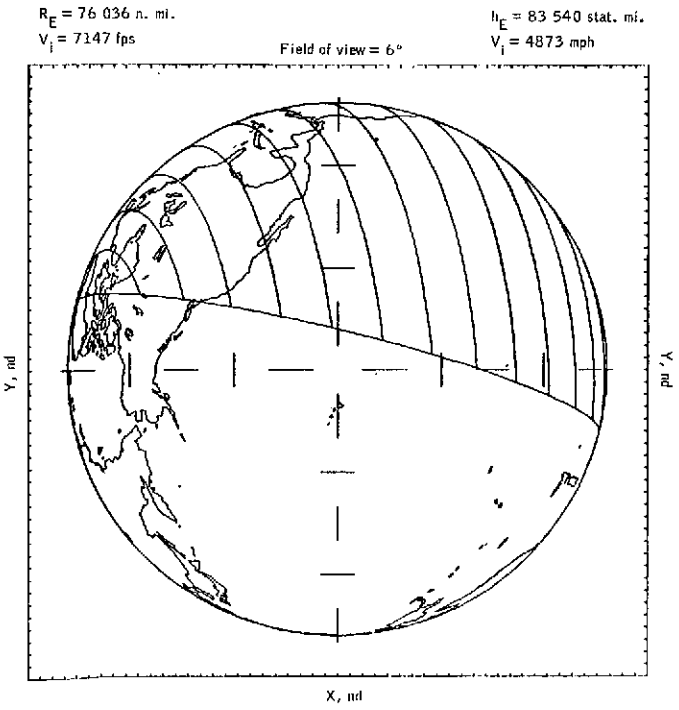
Figure 21. - Continued.



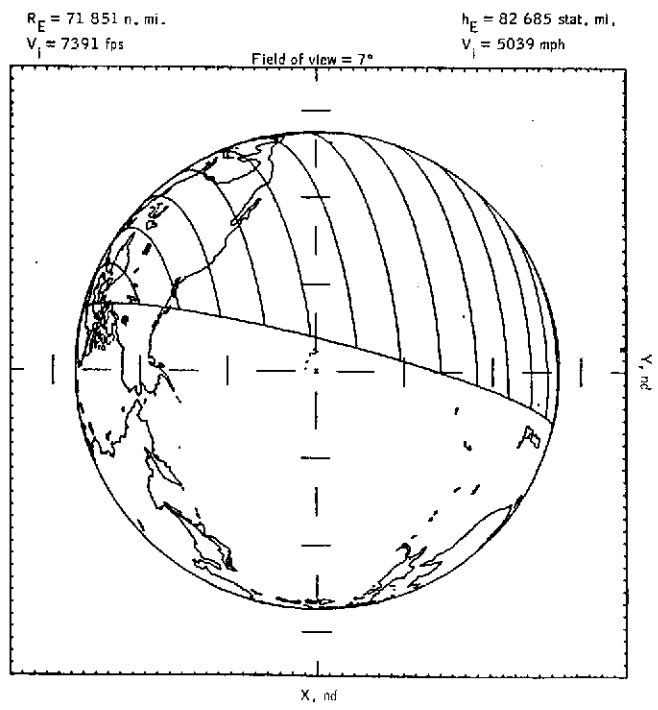

(ww) G.e.t. = 177 hours.




(xx) G.e.t. = 178 hours.



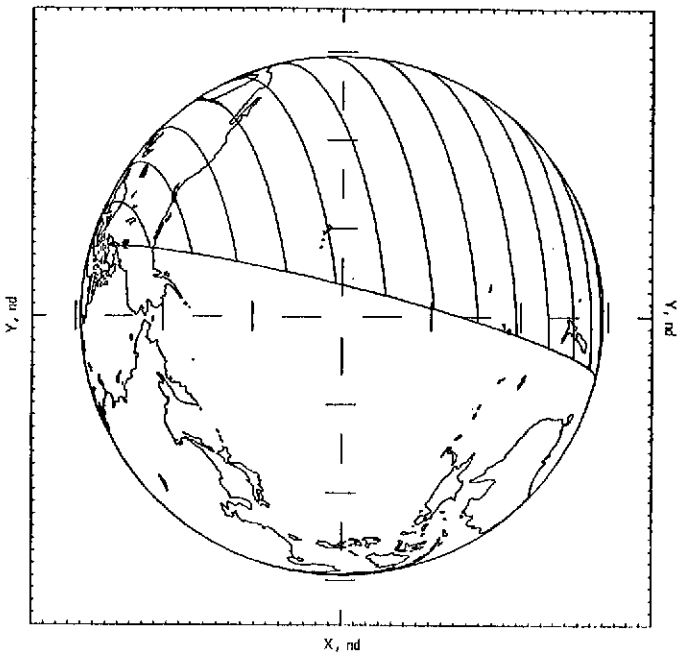

(yy) G.e.t. = 179 hours.




(zz) G.e.t. = 180 hours.

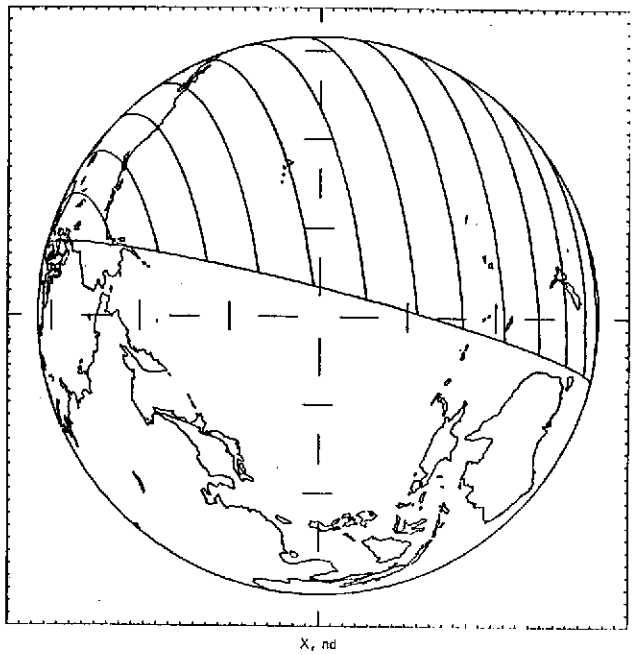
Figure 21. - Continued.

$R_E$ = 67 523 n. mi.
$V_i$ = 7665 fps
Field of view = 7°
$h_E$ = 73 743 stat. mi.
$V_i$ = 5226 mph



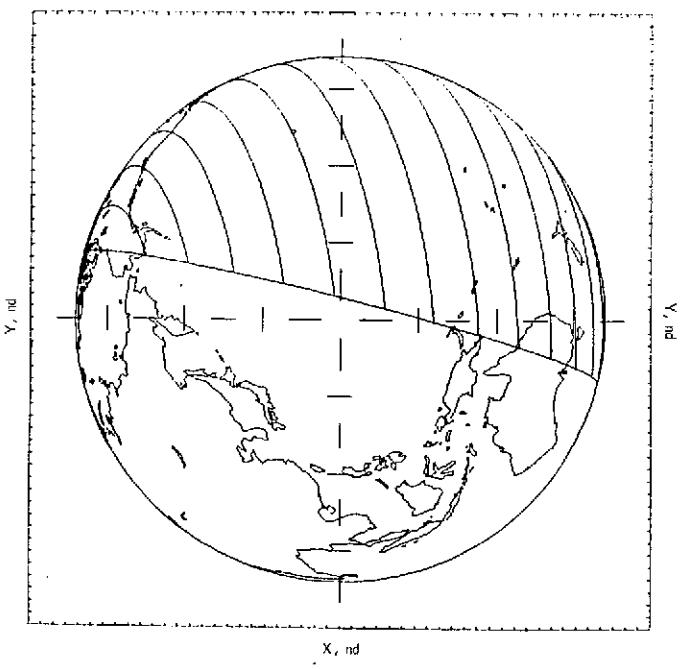

(aaa) G.e.t. = 181 hours.

$R_E$ = 63 035 n. mi.
$V_i$ = 7977 fps
Field of view = 7°
$h_E$ = 68 579 stat. mi.
$V_i$ = 5439 mph



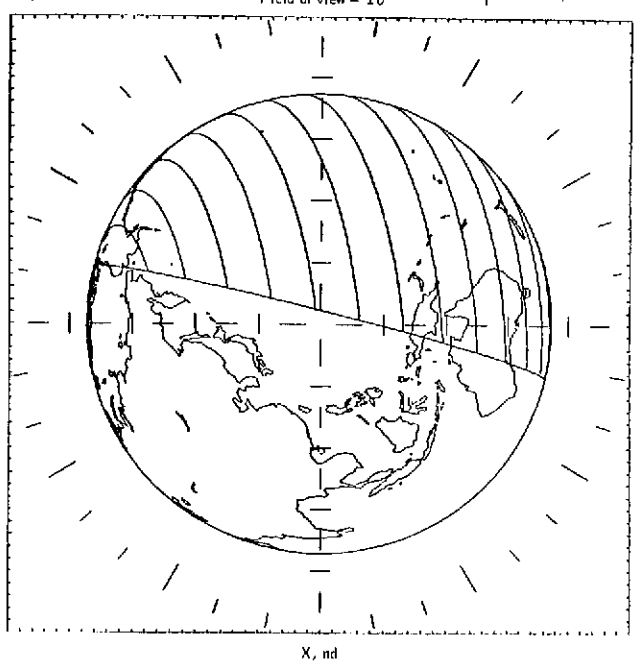

(bbb) G.e.t. = 182 hours.

$R_E$ = 58 364 n. mi.
$V_i$ = 8338 fps
Field of view = 8°
$h_E$ = 63 202 stat. mi.
$V_i$ = 5685 mph



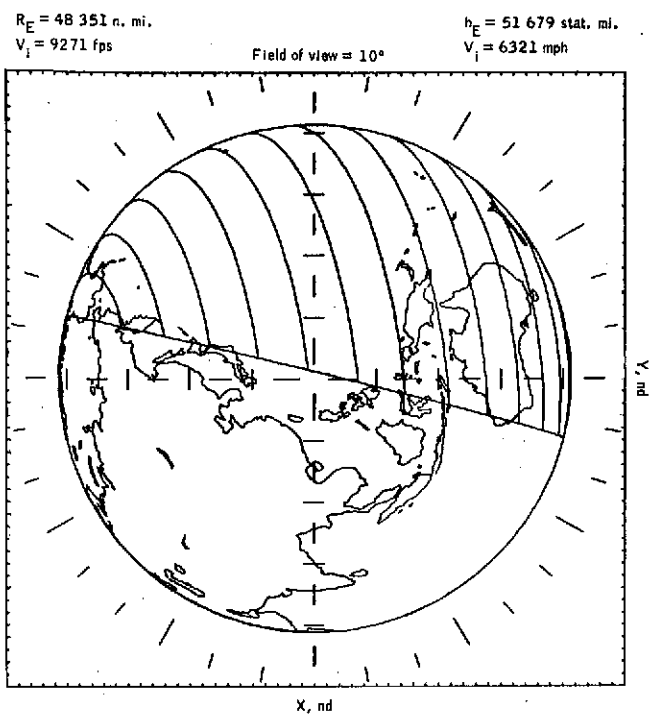

(ccc) G.e.t. = 183 hours.

$R_E$ = 53 482 n. mi.
$V_i$ = 8762 fps
Field of view = 10°
$h_E$ = 57 584 stat. mi.
$V_i$ = 5974 mph

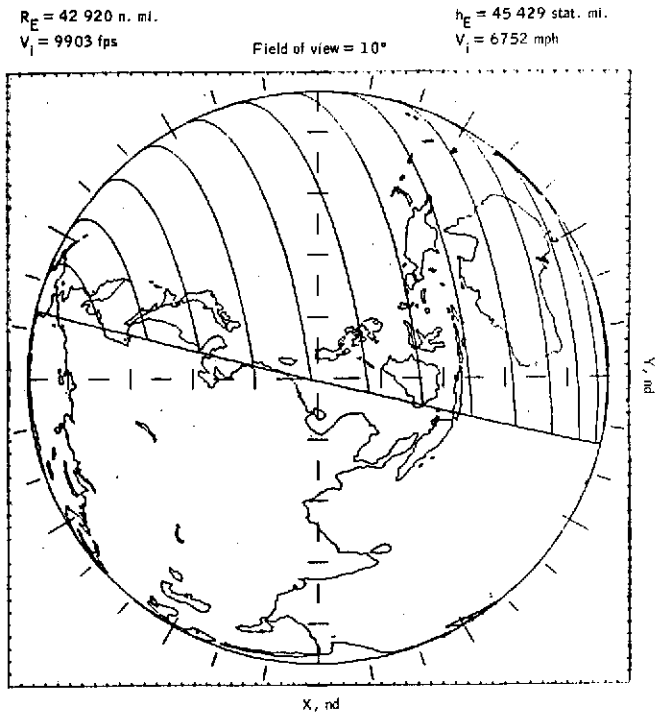



(ddd) G.e.t. = 184 hours.

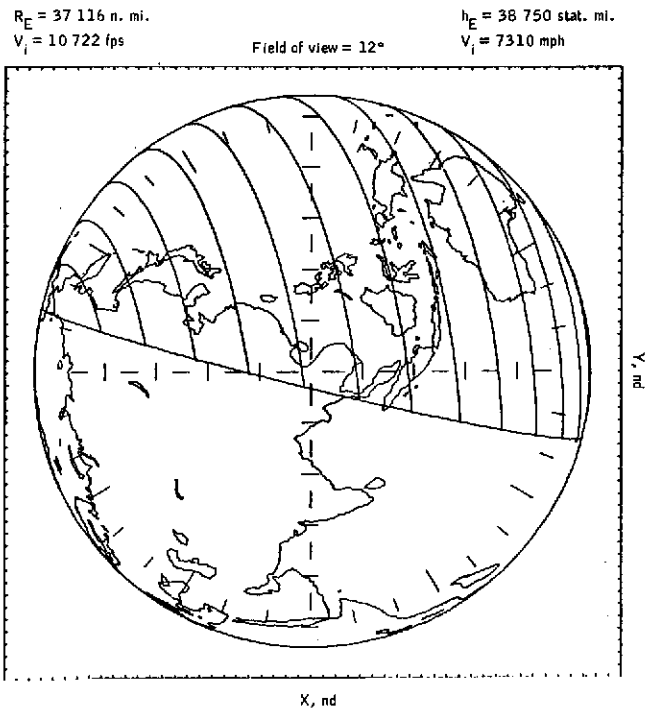
Figure 21. - Continued.



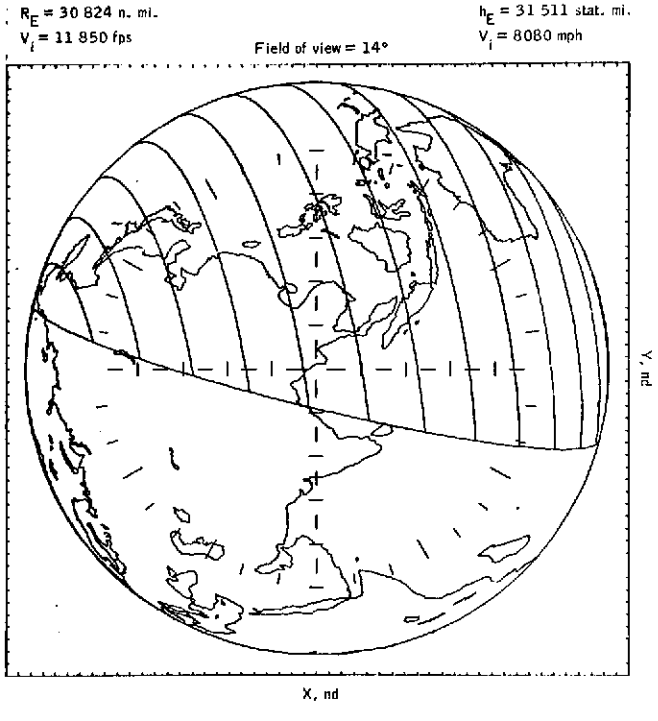

(eee) G.e.t. = 185 hours.




(fff) G.e.t. = 186 hours.

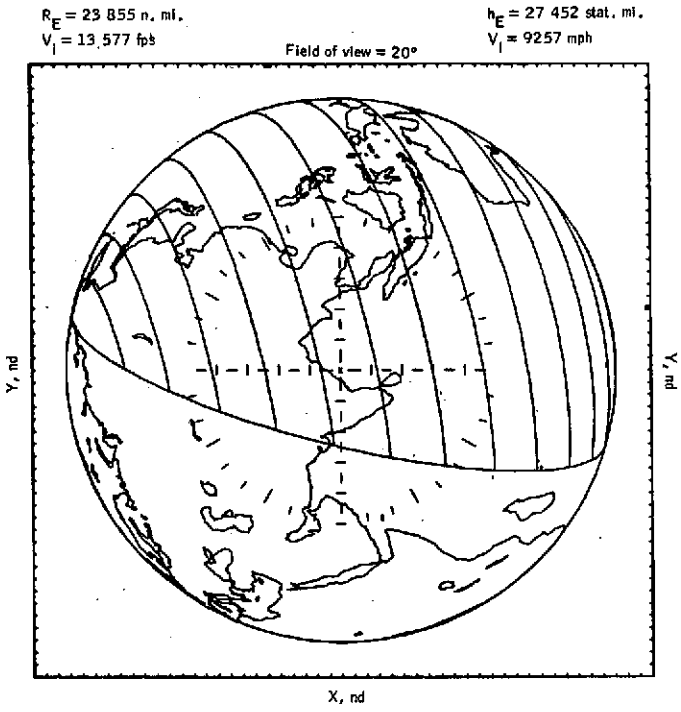



(ggg) G.e.t. = 187 hours.

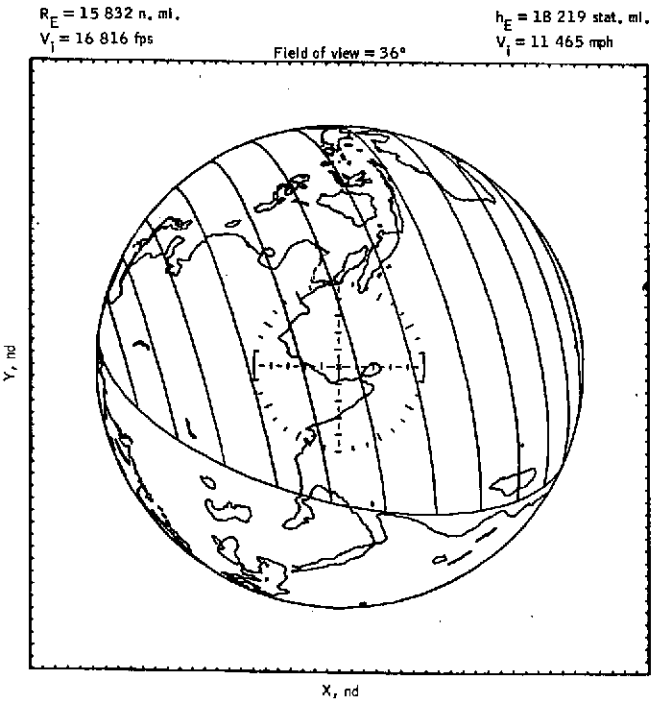



(hhh) G.e.t. = 188 hours.

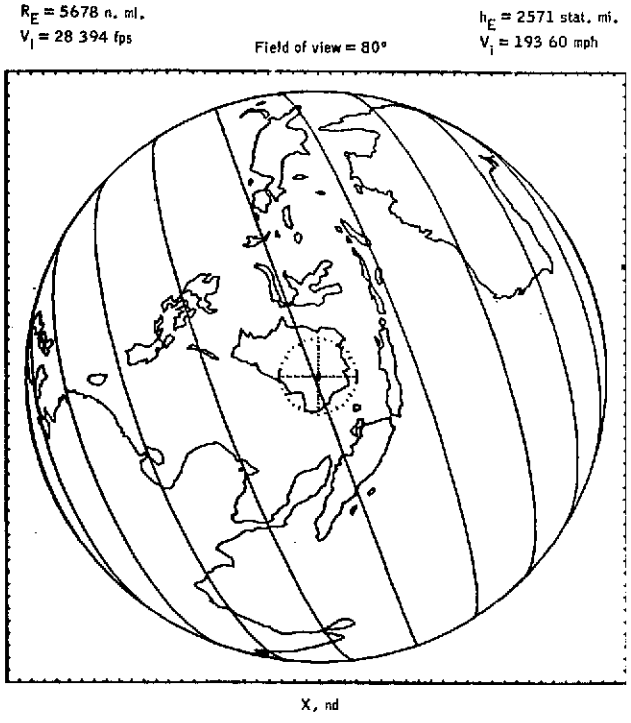
Figure 21. - Continued.




(iii) G.e.t. = 189 hours.




(jjj) G.e.t. = 190 hours.



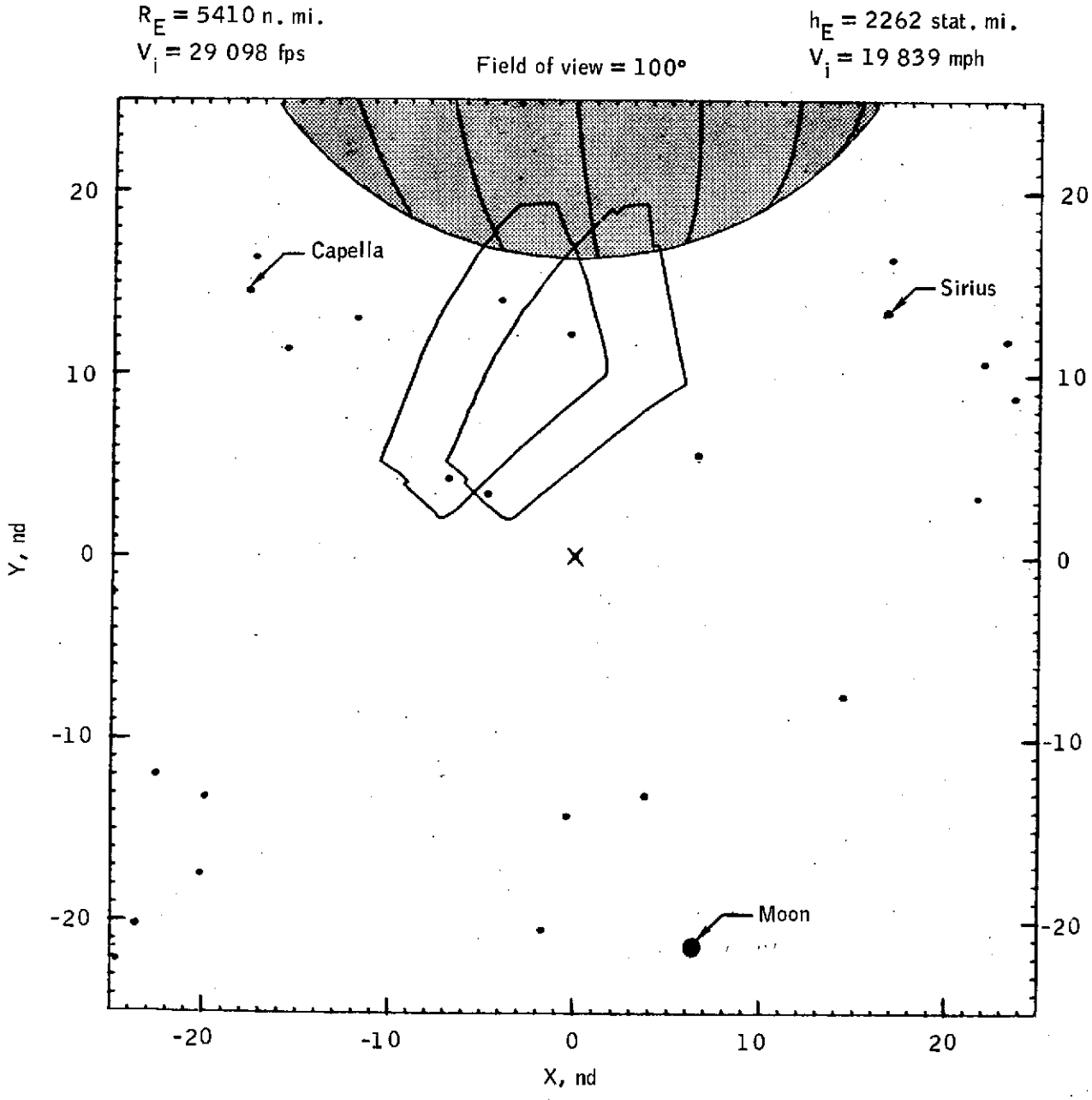

(kkk) G.e.t. = 191 hours.

Figure 21. - Concluded.

ENTRY PHASE

| SEQ | 207 | 222 | 270 | 271 | 281 | 290 | 301 | 308 | 323 | 328 | 342 | 349 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| X | -17 | -17 | -15 | -11 | -4 | 16 | 0 | 16 | 23 | 22 | 23 | -6 |
| Y | 16 | 14 | 11 | 13 | 14 | 16 | 12 | 13 | 11 | 10 | 8 | 4 |

| SEQ | 356 | 362 | 377 | 440 | 473 | 480 | 507 | 509 | 515 | 540 | 577 | 592 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| X | 6 | -4 | 21 | 14 | 3 | 0 | -19 | -22 | -1 | -20 | -23 | -24 |
| Y | 5 | 3 | 3 | -7 | -12 | -14 | -13 | -11 | -20 | -17 | -20 | -22 |




(a) 15 min prior to entry (g.e.t. = 191:03:15.9).

Figure 22.- Entry phase.

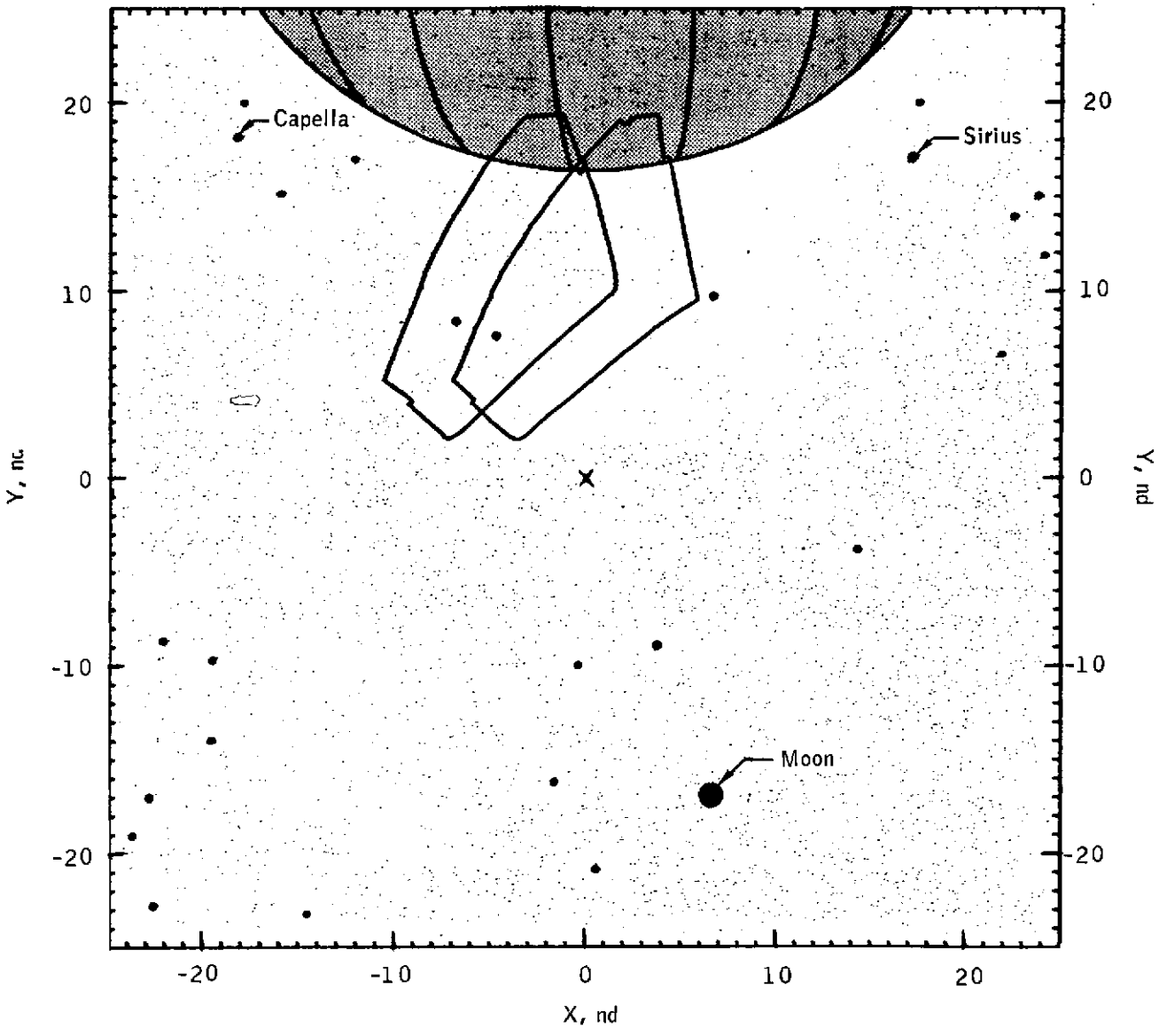
| SEQ | 207 | 222 | 270 | 271 | 290 | 301 | 308 | 323 | 328 | 342 | 349 | 356 | 362 | 377 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| X | -17 | -18 | -15 | -12 | 17 | 0 | 17 | 23 | 22 | 24 | -6 | 6 | -4 | 21 |
| Y | 20 | 18 | 15 | 17 | 20 | 16 | 17 | 15 | 14 | 12 | 8 | 9 | 7 | 6 |

| SEQ | 440 | 473 | 480 | 507 | 509 | 515 | 535 | 540 | 577 | 580 | 592 | 604 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| X | 14 | 3 | 0 | -19 | -22 | -1 | 0 | -19 | -22 | -14 | -23 | -22 |
| Y | -3 | -8 | -9 | -9 | -8 | -16 | -20 | -13 | -16 | -23 | -18 | -22 |

$R_E$ = 5072 n. mi.
$V_i$ = 30 065 fps

Field of view = 100°

$h_E$ = 1873 stat. mi.
$V_i$ = 20 499 mph




(b) 13 min prior to entry (g.e.t. = 191:05:15.9).

Figure 22. - Continued.

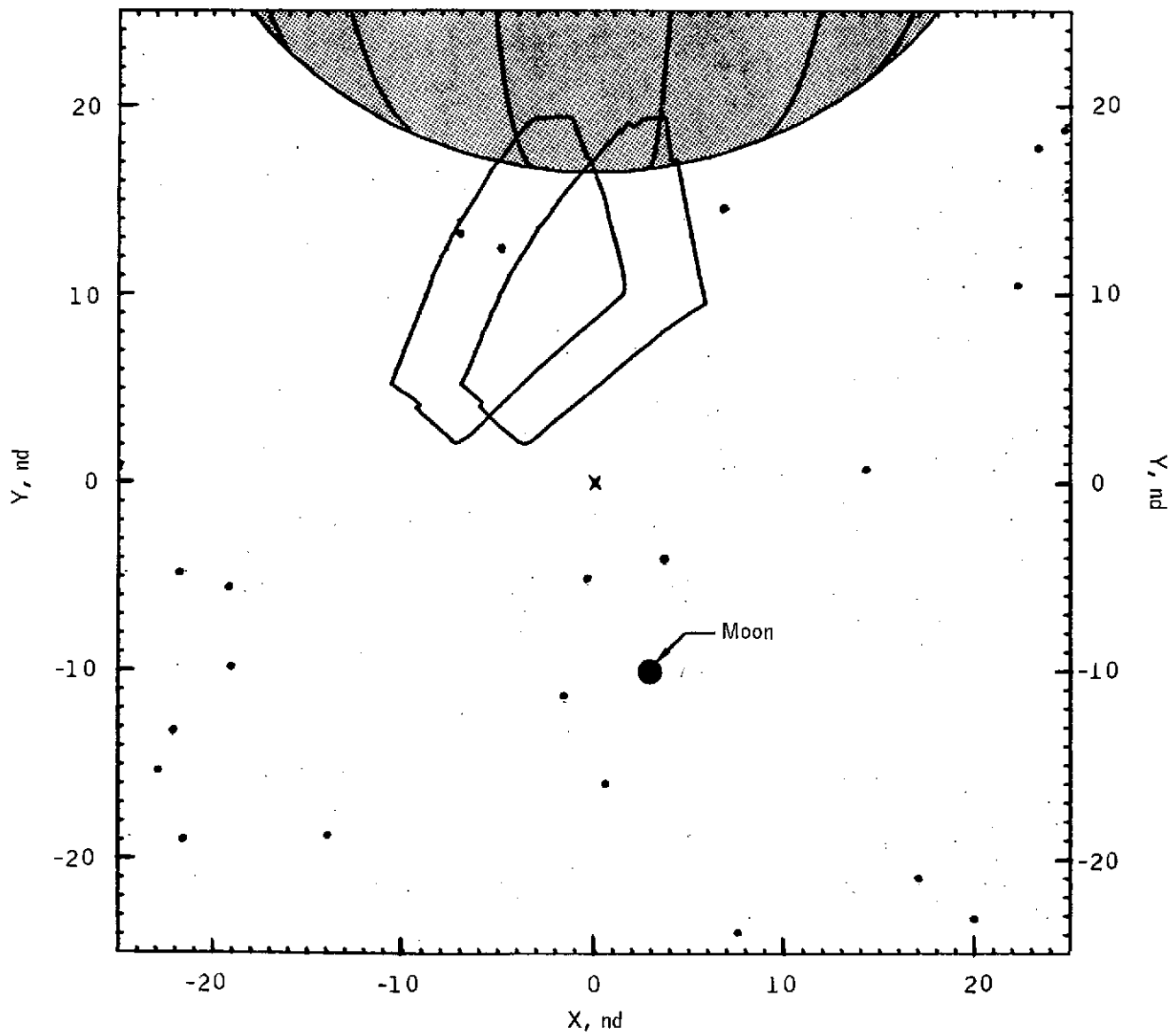
| SEQ | 323 | 328 | 342 | 349 | 356 | 362 | 377 | 440 | 473 | 480 | 507 | 509 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| X | 24 | 23 | 24 | -7 | 6 | -4 | 22 | 14 | 3 | 0 | -19 | -21 |
| Y | 18 | 17 | 15 | 13 | 14 | 12 | 10 | 0 | -3 | -4 | -5 | -4 |

| SEQ | 515 | 535 | 540 | 551 | 566 | 570 | 577 | 580 | 592 | 604 |
|---|---|---|---|---|---|---|---|---|---|---|
| X | -1 | 0 | -19 | 17 | 19 | 7 | -22 | -13 | -22 | -21 |
| Y | -11 | -15 | -9 | -20 | -22 | -23 | -13 | -18 | -15 | -18 |

$R_E$ = 4746 n. mi.
$V_i$ = 31 092 fps

Field of view = 100°

$h_E$ = 1498 stat. mi.
$V_i$ = 21 199 mph




(c) 11 min prior to entry (g.e.t. = 191:07:15.9).

Figure 22.- Continued.

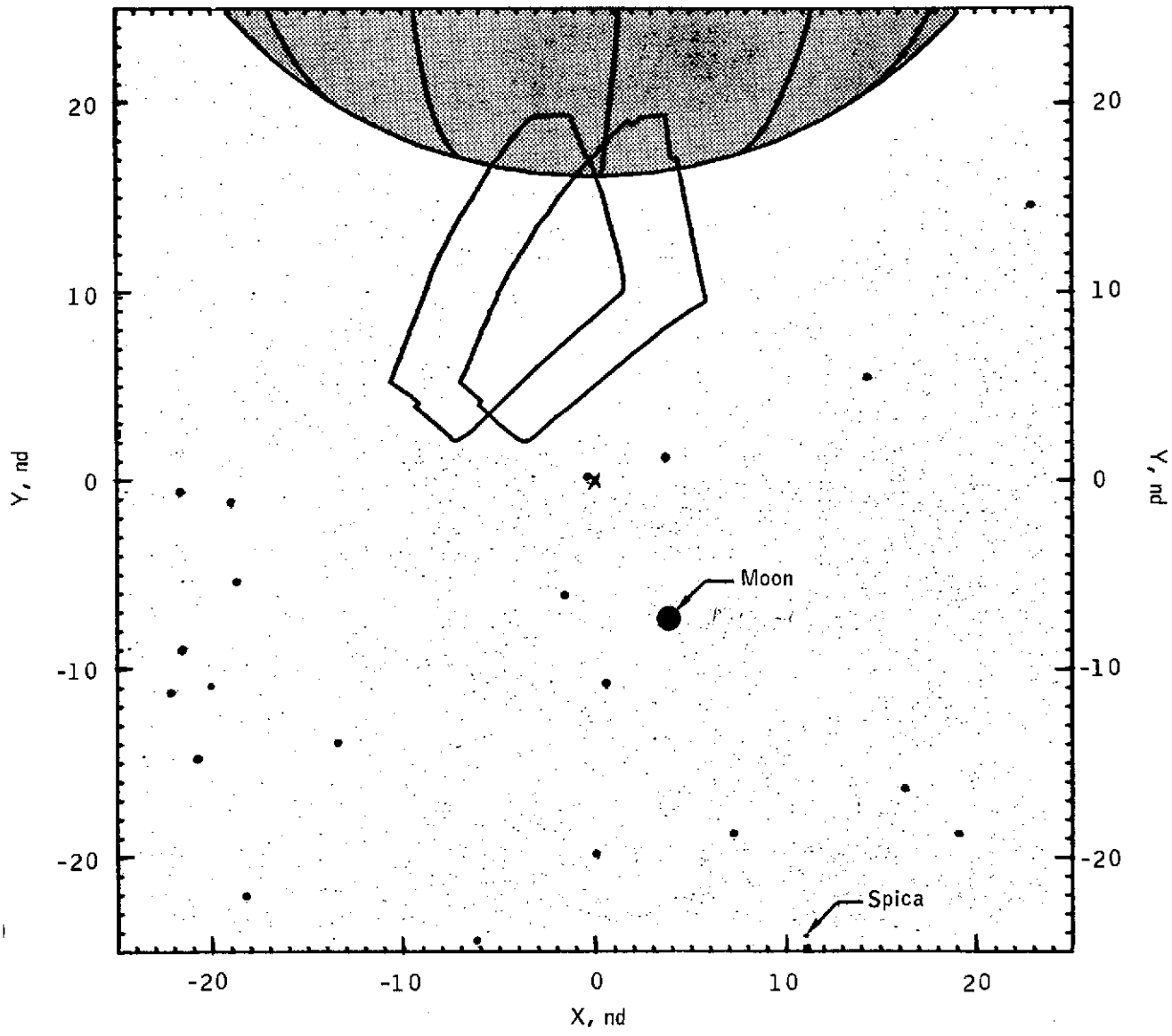
| SEQ | 377 | 440 | 473 | 480 | 507 | 509 | 515 | 535 | 540 | 551 |
|---|---|---|---|---|---|---|---|---|---|---|
| X | 22 | 14 | 3 | 0 | -18 | -21 | -1 | 0 | -18 | 16 |
| Y | 14 | 5 | 1 | 0 | 0 | 0 | -5 | -10 | -5 | -16 |

| SEQ | 566 | 570 | 577 | 580 | 582 | 592 | 593 | 604 | 610 | 639 |
|---|---|---|---|---|---|---|---|---|---|---|
| X | 19 | 7 | -21 | -13 | 0 | -22 | 11 | -20 | -6 | -18 |
| Y | -18 | -18 | -8 | -13 | -19 | -11 | -24 | -14 | -24 | -21 |

$R_E$ = 4438 n. mi.
$V_i$ = 32 163 fps

Field of view = 100°

$h_E$ = 1144 stat. mi.
$V_i$ = 21 929 mph

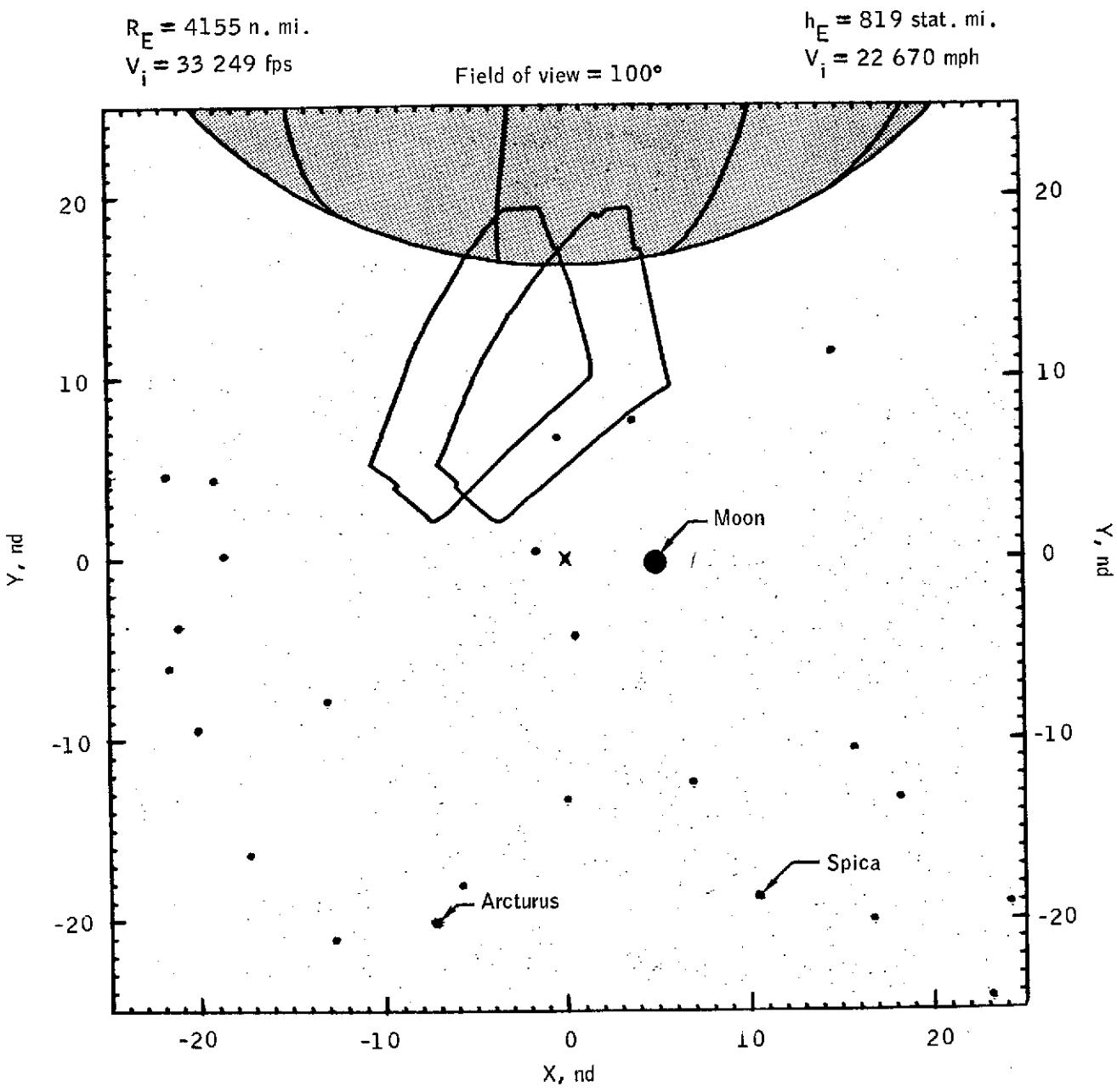



(d) 9 min prior to entry (g.e.t. = 191:09:15.9).

Figure 22. - Continued.

| SEQ | 440 | 473 | 480 | 507 | 509 | 515 | 535 | 540 | 551 | 566 | 570 | 577 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| X | 14 | 3 | 0 | -19 | -21 | -1 | 0 | -18 | 15 | 18 | 6 | -21 |
| Y | 11 | 7 | 6 | 4 | 4 | 0 | -4 | 0 | -10 | -13 | -12 | -3 |

| SEQ | 580 | 582 | 589 | 592 | 593 | 595 | 604 | 610 | 621 | 624 | 639 | 651 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| X | -13 | 0 | 24 | -21 | 10 | 16 | -20 | -5 | 23 | -7 | -17 | -12 |
| Y | -7 | -13 | -18 | -5 | -18 | -19 | -9 | -17 | -24 | -19 | -16 | -20 |




(e) 7 min prior to entry (g.e.t. = 191:11:15.9).

Figure 22.- Continued.

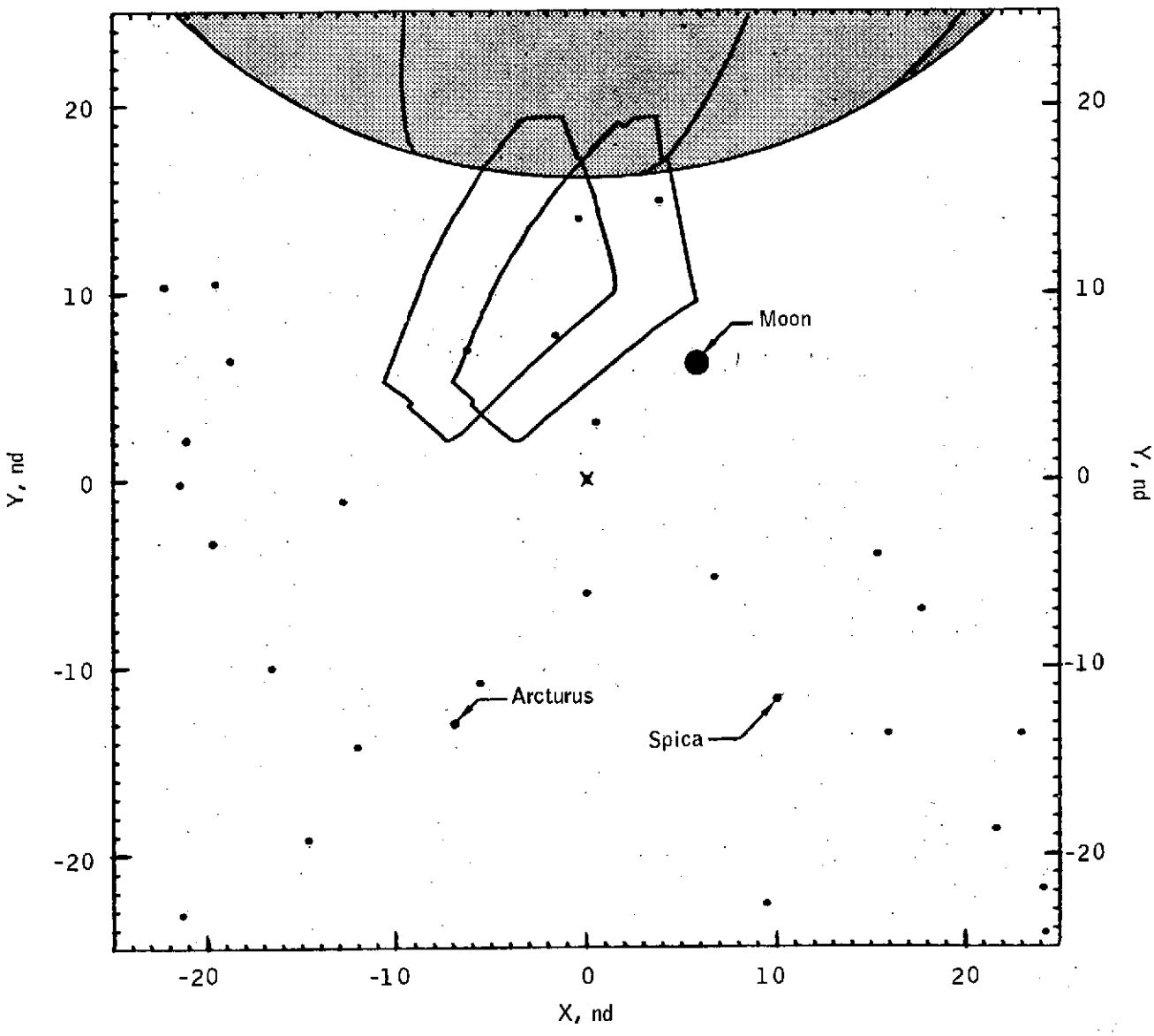
| SEQ | 473 | 480 | 507 | 509 | 515 | 535 | 540 | 551 | 566 | 570 | 577 | 580 | 582 | 589 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| X | 3 | 0 | -19 | -22 | -1 | 0 | -18 | 15 | 17 | 6 | -21 | -12 | 0 | 22 |
| Y | 15 | 14 | 10 | 10 | 7 | 3 | 6 | -3 | -6 | -5 | 2 | 0 | -5 | -13 |

| SEQ | 592 | 593 | 595 | 604 | 610 | 621 | 624 | 639 | 641 | 651 | 655 | 660 | 690 | 755 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| X | -21 | 10 | 15 | -19 | -5 | 21 | -6 | -16 | 24 | -12 | 9 | 24 | -14 | -21 |
| Y | 0 | -11 | -13 | -3 | -10 | -18 | -12 | -9 | -21 | -14 | -22 | -24 | -19 | -23 |

$R_E$ = 3907 n. mi.
$V_i$ = 34 297 fps

Field of view = 100°

$h_E$ = 534 stat. mi.
$V_i$ = 23 384 mph




(f) 5 min prior to entry (g.e.t. = 191:13:15.9).

Figure 22.- Continued.

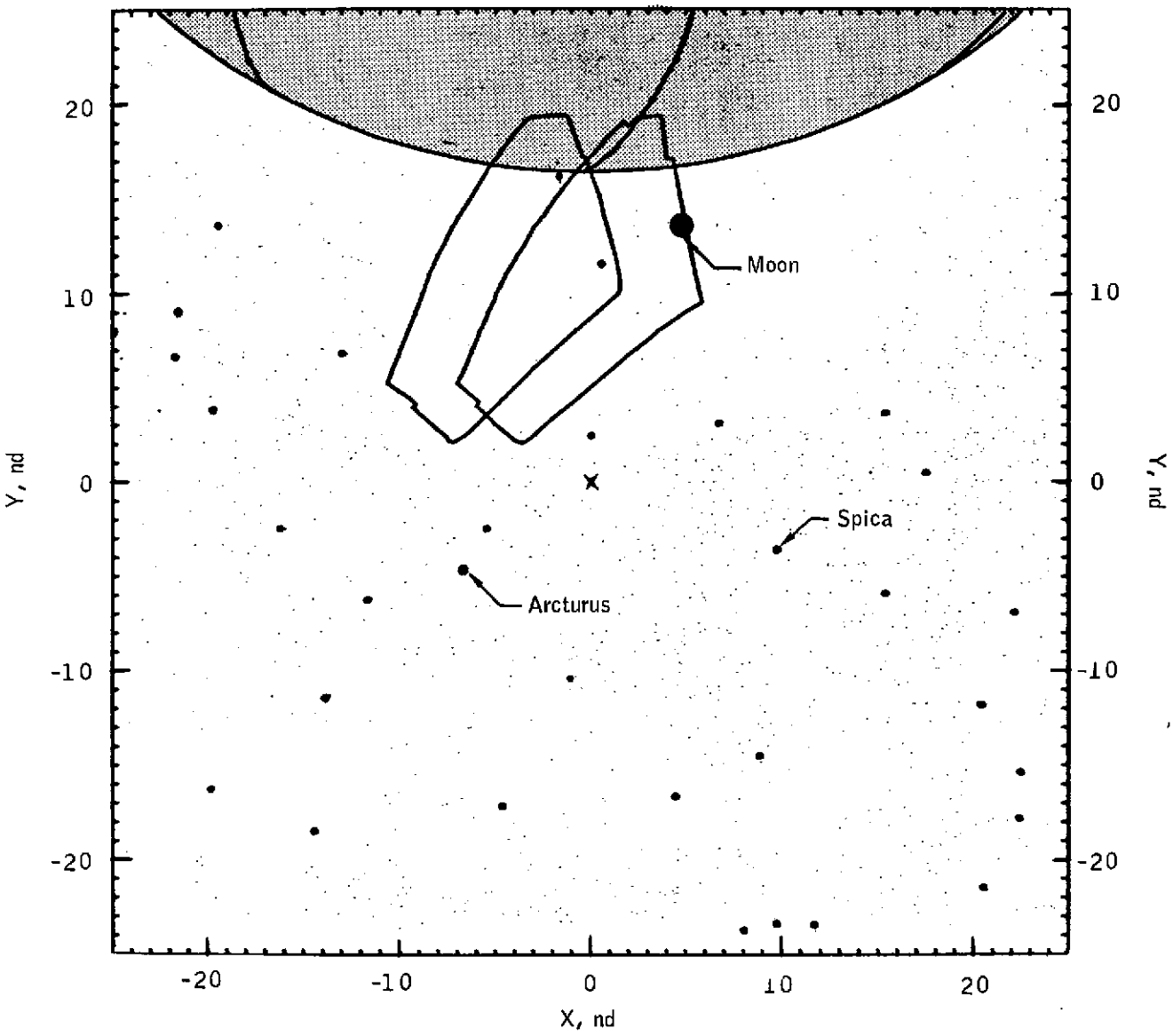
| SEQ | 515 | 535 | 540 | 551 | 566 | 570 | 577 | 580 | 582 | 589 | 592 | 593 | 595 | 604 | 610 | 621 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| X | -1 | 0 | -19 | 15 | 17 | 6 | -21 | -12 | 0 | 22 | -21 | 9 | 15 | -19 | -5 | 20 |
| Y | 16 | 11 | 13 | 3 | 0 | 3 | 9 | 6 | 2 | -6 | 6 | -3 | -5 | 3 | -2 | -11 |

| SEQ | 624 | 639 | 641 | 651 | 655 | 660 | 673 | 688 | 690 | 700 | 717 | 719 | 724 | 745 | 755 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| X | -6 | -16 | 22 | -11 | 8 | 22 | 4 | 20 | -13 | -4 | 11 | 9 | 8 | -14 | -19 |
| Y | -4 | -2 | -15 | -6 | -14 | -17 | -16 | -21 | -11 | -16 | -23 | -23 | -23 | -18 | -16 |

$R_E$ = 3704 n. mi.
$V_i$ = 35 233 fps

Field of view = 100°

$h_E$ = 300 stat. mi.
$V_i$ = 24 022 mph




(g) 3 min prior to entry (g.e.t. = 191:15:15.9).

Figure 22. - Continued.

| SEQ | 551 | 566 | 570 | 580 | 582 | 589 | 592 | 593 | 595 | 604 | 610 | 621 | 624 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| X | 15 | 17 | 6 | -13 | 0 | 21 | -22 | 9 | 15 | -20 | -5 | 19 | -6 |
| Y | 11 | 8 | 11 | 15 | 11 | 0 | 13 | 4 | 2 | 11 | 6 | -4 | 4 |

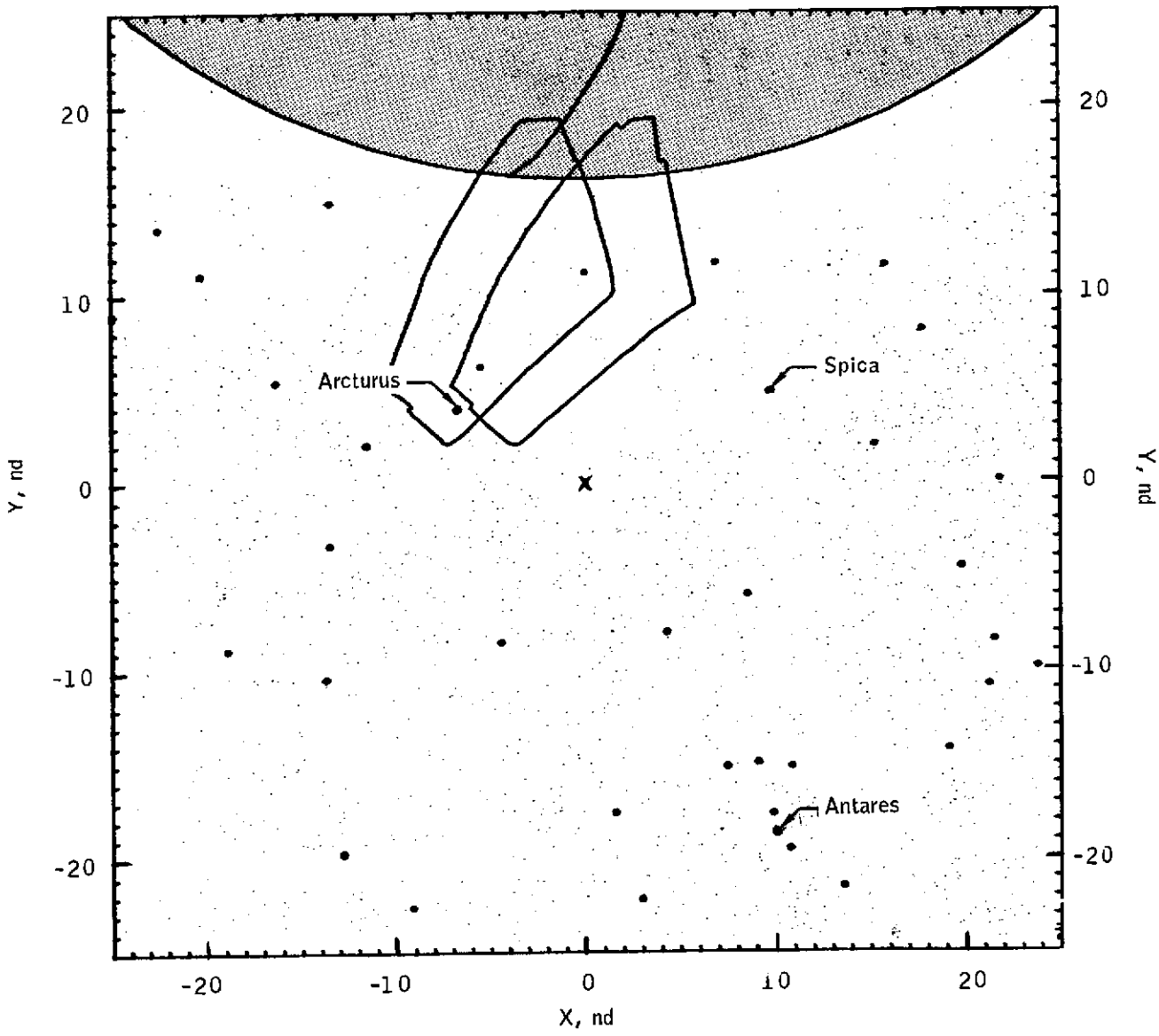
| SEQ | 639 | 641 | 645 | 651 | 655 | 660 | 673 | 688 | 690 | 700 | 717 | 719 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| X | -16 | 21 | 23 | -11 | 8 | 21 | 4 | 19 | -13 | -4 | 10 | 9 |
| Y | 5 | -8 | -9 | 2 | -5 | -10 | -7 | -14 | -3 | -8 | -14 | -14 |

| SEQ | 724 | 736 | 743 | 745 | 751 | 753 | 755 | 759 | 770 | 781 | 795 | 803 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| X | 7 | 9 | 10 | -13 | 10 | 1 | -18 | 13 | 2 | 24 | -12 | -9 |
| Y | -14 | -17 | -18 | -10 | -19 | -17 | -8 | -21 | -22 | -24 | -19 | -22 |

$R_E$ = 3557 n. mi.
$V_i$ = 35 958 fps

Field of view = 100°

$h_E$ = 131 stat. mi.
$V_i$ = 24 517 mph



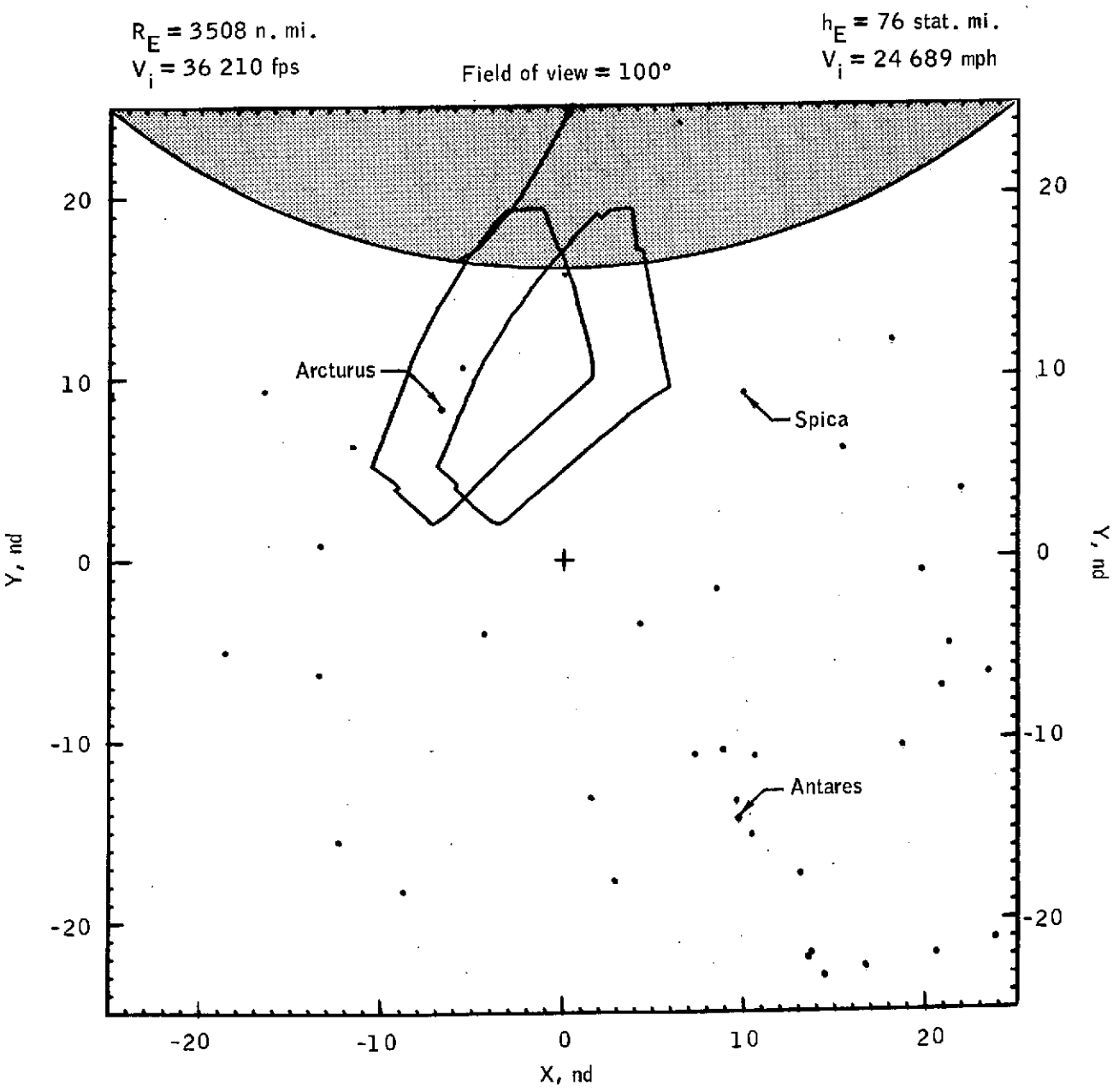

(h) 1 min prior to entry (g.e.t. = 191:17:15.9).

Figure 22.- Continued.

| SEQ | 566 | 582 | 589 | 593 | 595 | 610 | 621 | 624 | 639 | 641 | 645 | 651 | 655 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| X | 18 | 0 | 21 | 9 | 15 | -5 | 19 | -6 | -16 | 21 | 23 | -11 | 8 |
| Y | 12 | 15 | 3 | 9 | 6 | 10 | 0 | 8 | 9 | -4 | -6 | 6 | -1 |

| SEQ | 660 | 673 | 688 | 690 | 700 | 717 | 719 | 724 | 736 | 743 | 746 | 751 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| X | 20 | 4 | 18 | -13 | -4 | 10 | 8 | 7 | 9 | 9 | -13 | 10 |
| Y | -6 | -3 | -10 | 1 | -3 | -10 | -10 | -10 | -13 | -14 | -6 | -15 |

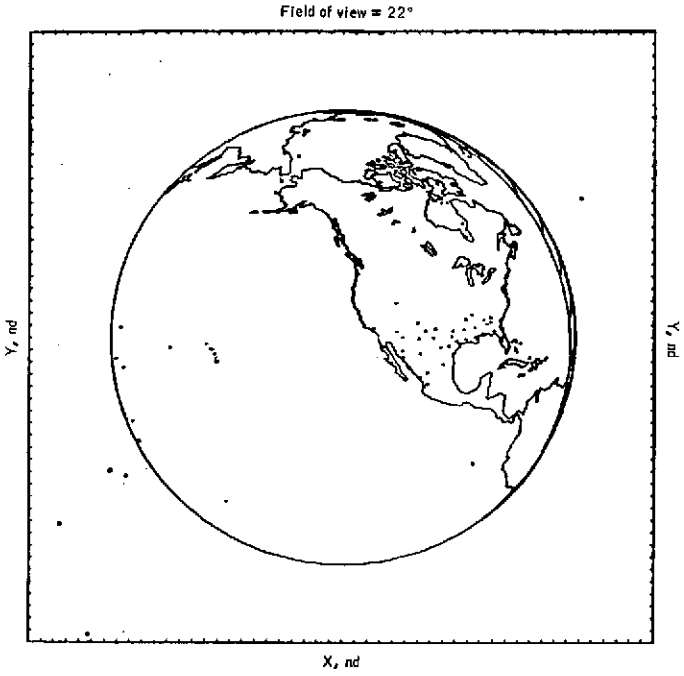
| SEQ | 753 | 755 | 759 | 770 | 781 | 789 | 790 | 793 | 795 | 797 | 802 | 803 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| X | 1 | -18 | 13 | 2 | 23 | 13 | 20 | 13 | -12 | 16 | 14 | -8 |
| Y | -12 | -4 | -17 | -17 | -20 | -21 | -21 | -21 | -15 | -22 | -22 | -18 |



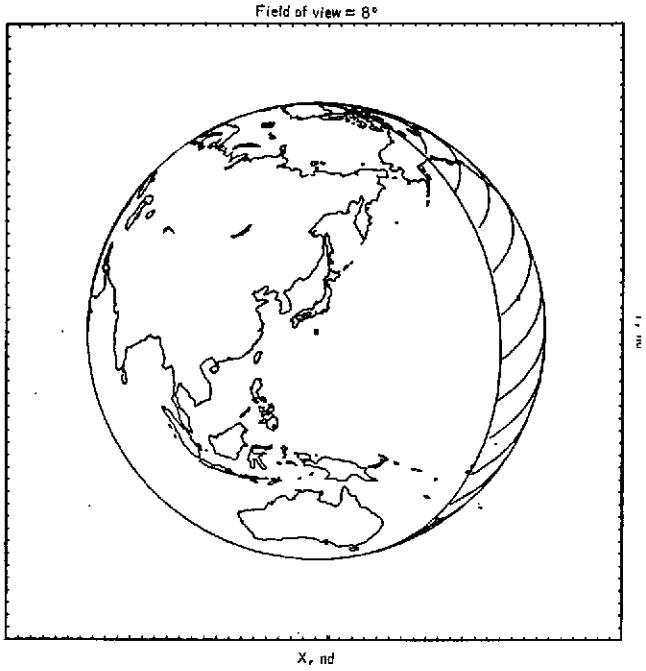

(i) Entry interface (g.e.t. = 191:18:15.9).

Figure 22.- Concluded.

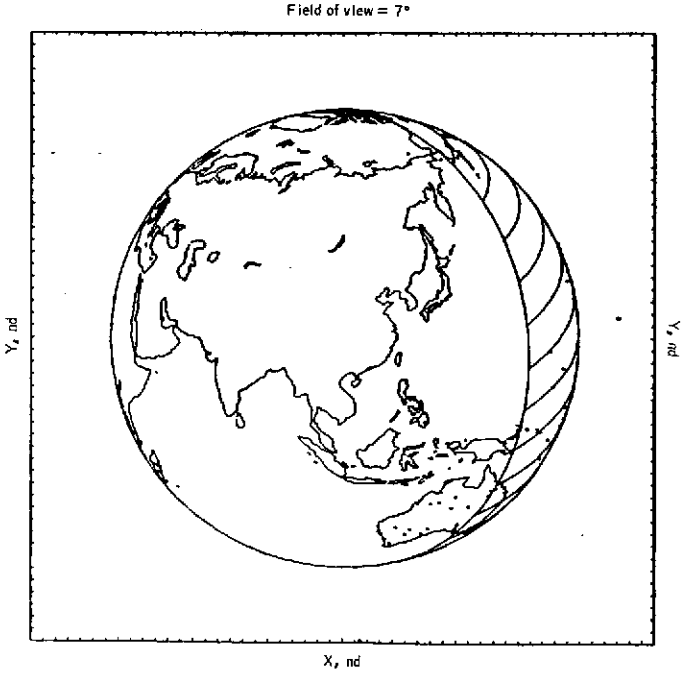
ECLIPTIC REFERENCE



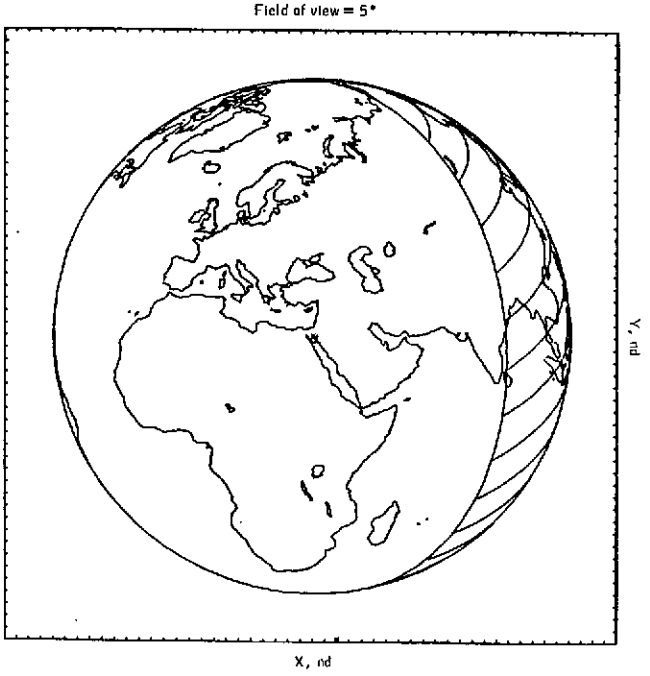

(a) G.e.t. = 5 hours.




(b) G.e.t. = 10 hours.

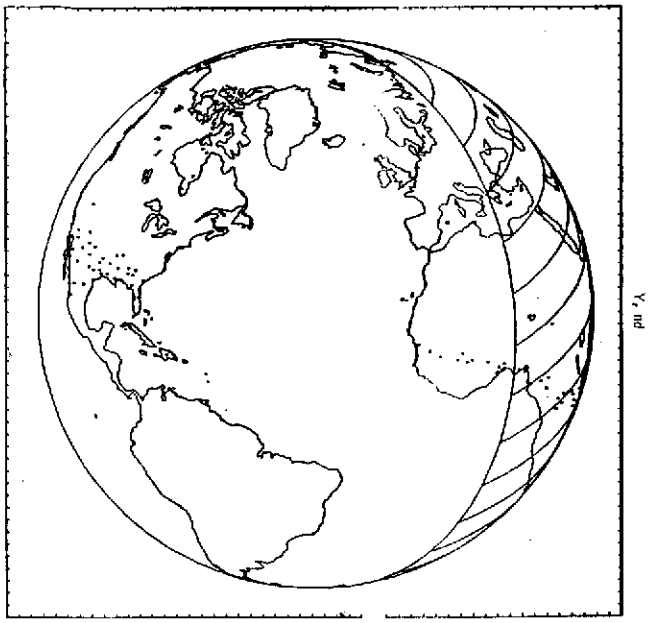



(c) G.e.t. = 15 hours.

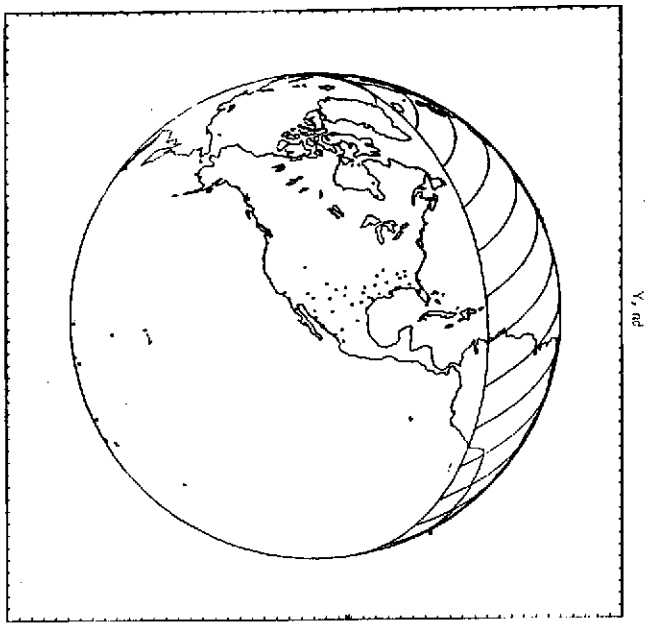



(d) G.e.t. = 20 hours.

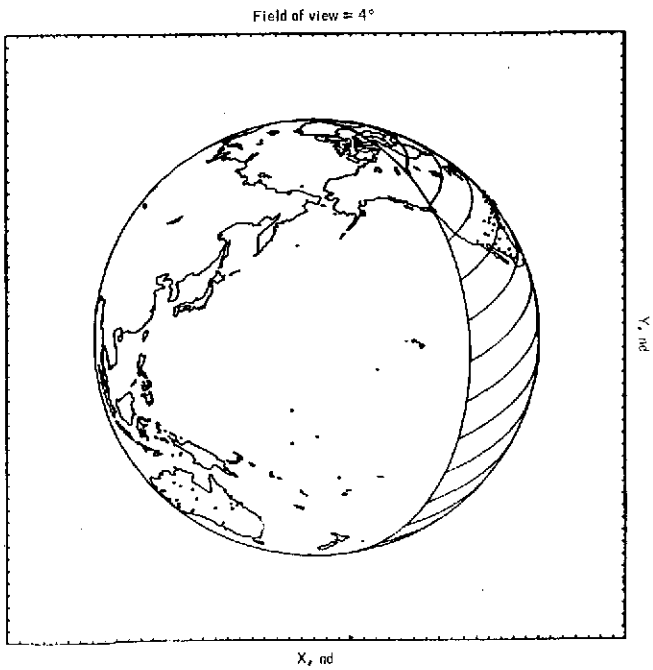
Figure 23.- Translunar coast - ecliptic reference.



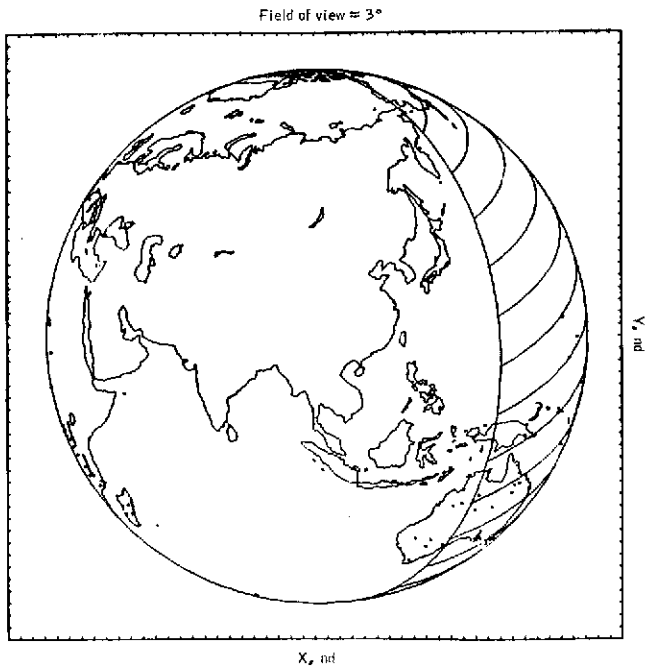

(e) G.e.t. = 25 hours.




(f) G.e.t. = 30 hours.

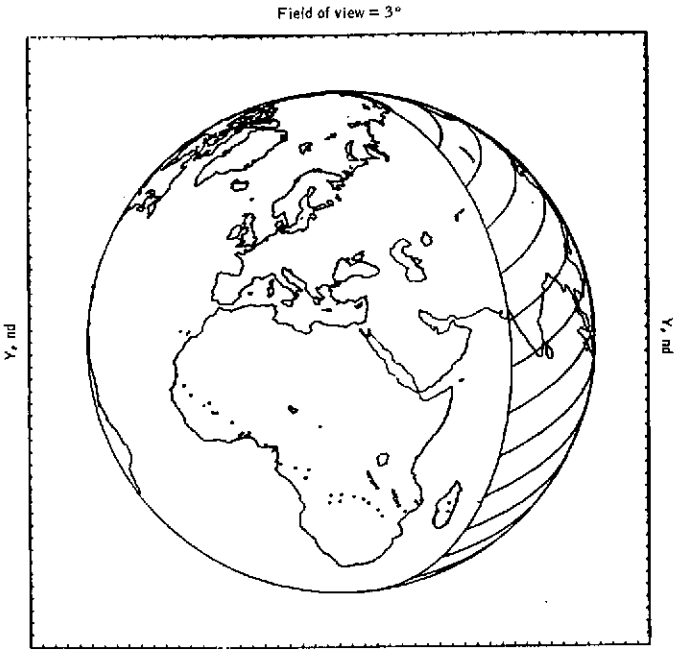



(g) G.e.t. = 35 hours.

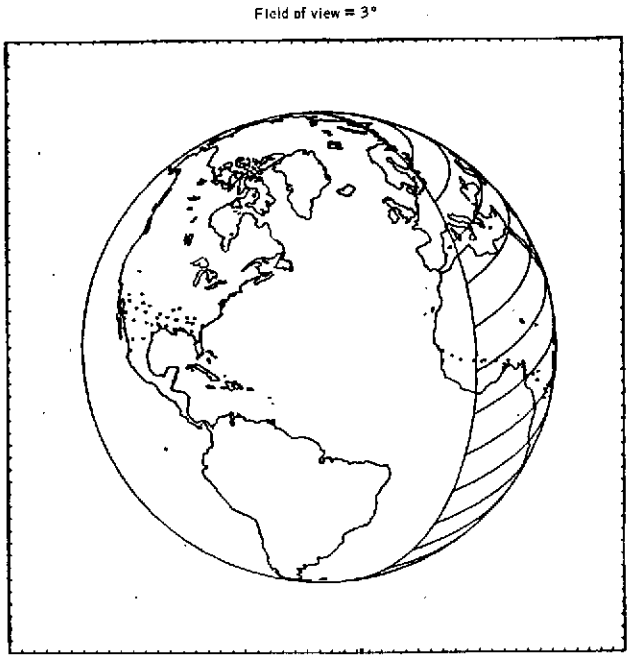



(h) G.e.t. = 40 hours.

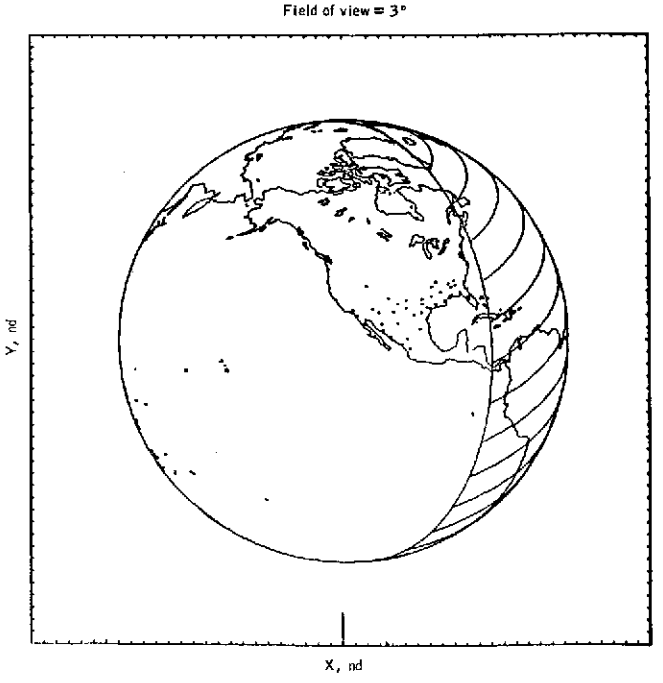
Figure 23. - Continued.



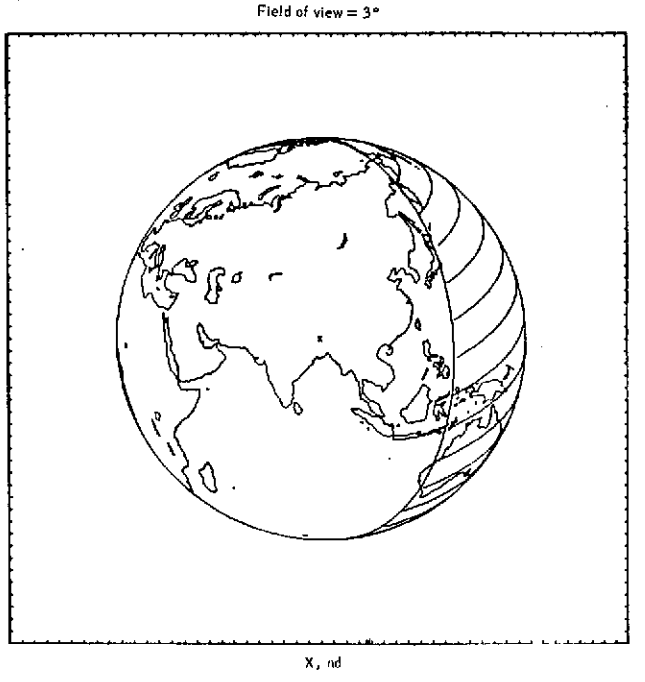

(i) G.e.t. = 45 hours.




(j) G.e.t. = 50 hours.

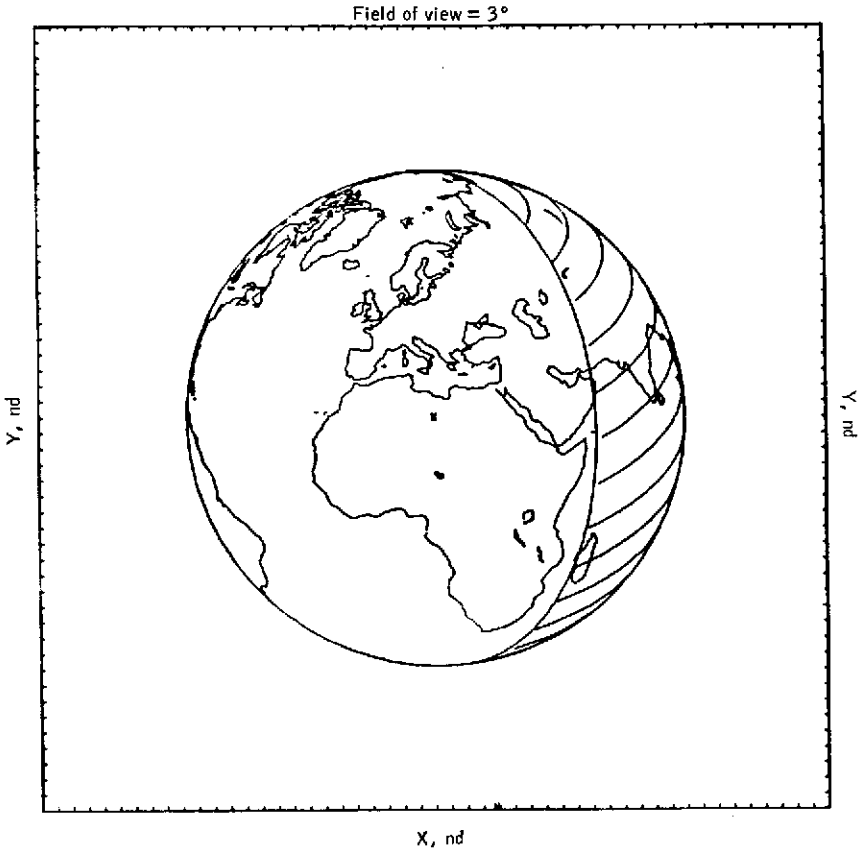



(k) G.e.t. = 55 hours.

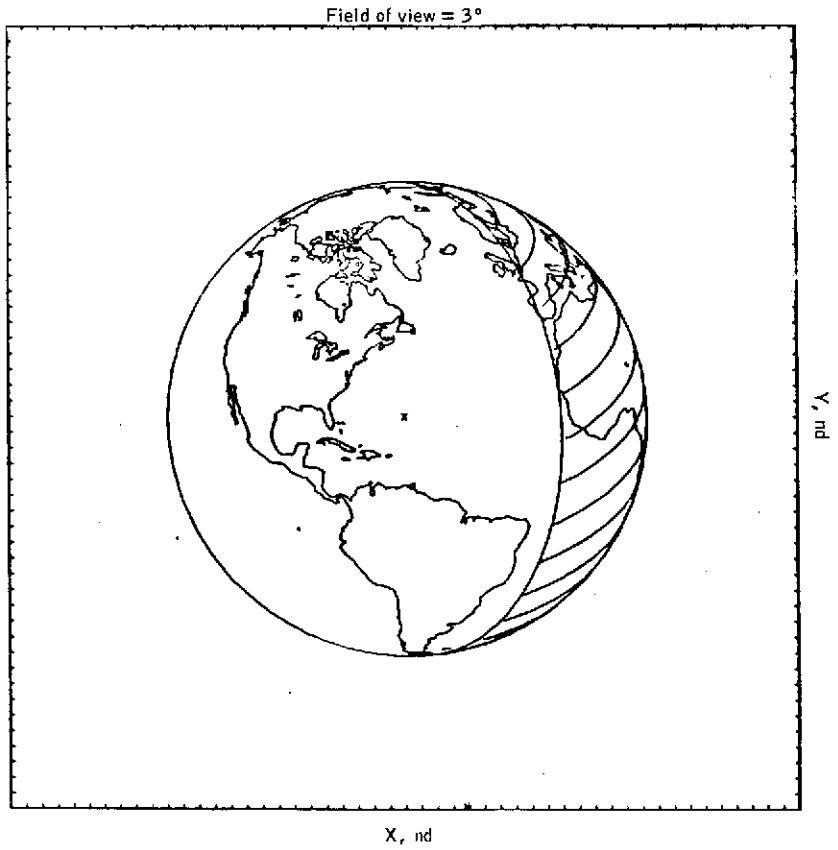



(l) G.e.t. = 65 hours.

Figure 23.- Continued.

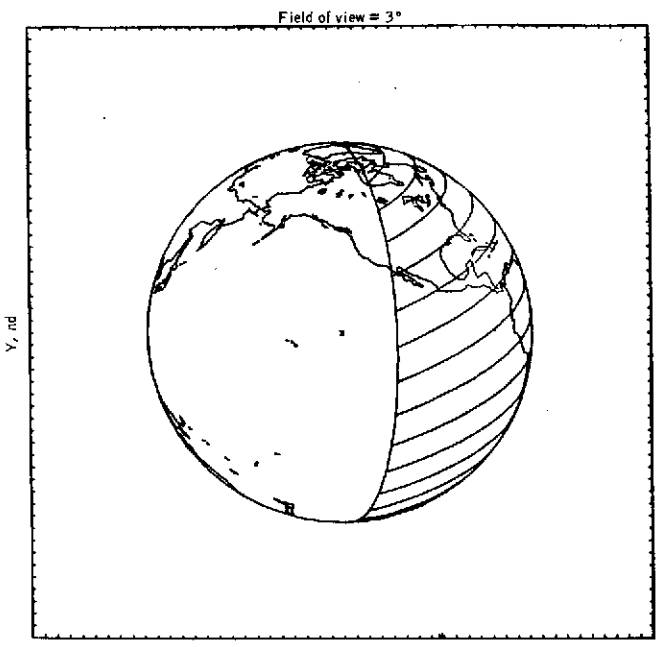



(m) G.e.t. = 70 hours.

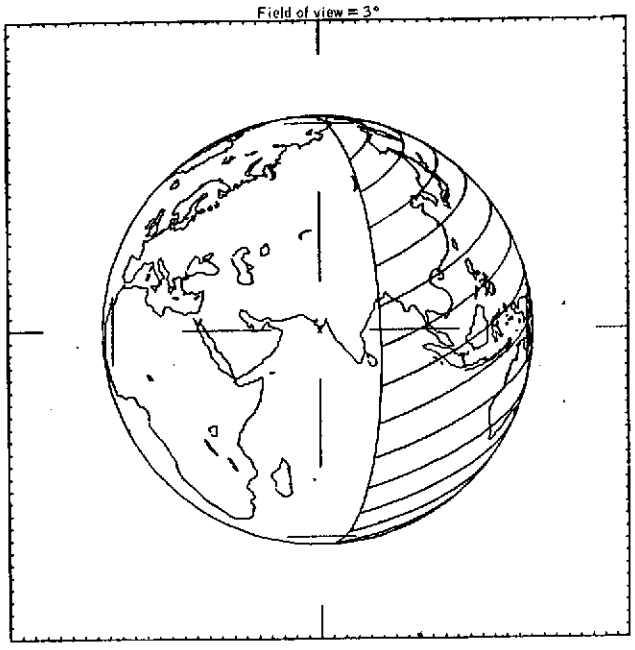



(n) G.e.t. = 75 hours.

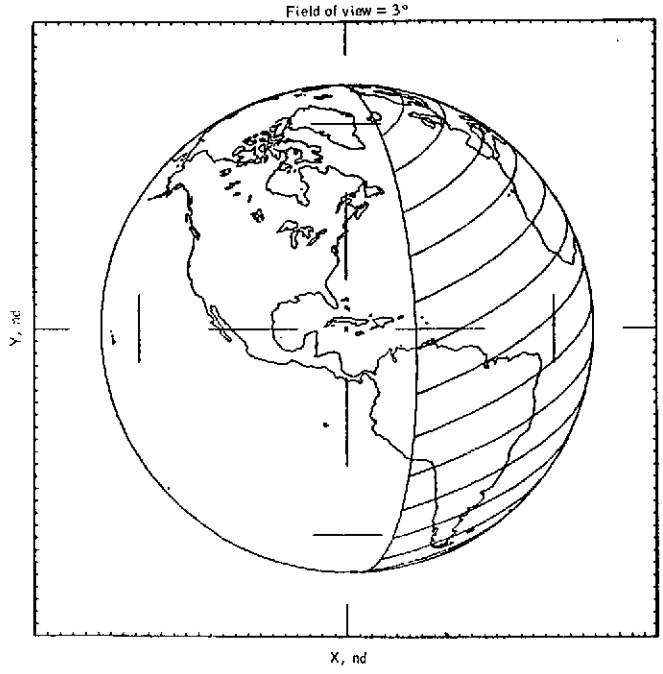
Figure 23.- Continued.



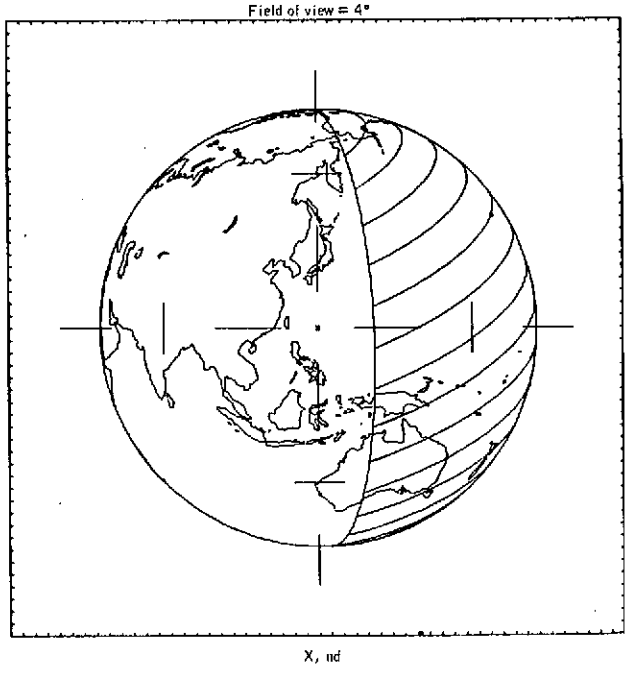

(a) G.e.t. = 130 hours.




(b) G.e.t. = 140 hours.

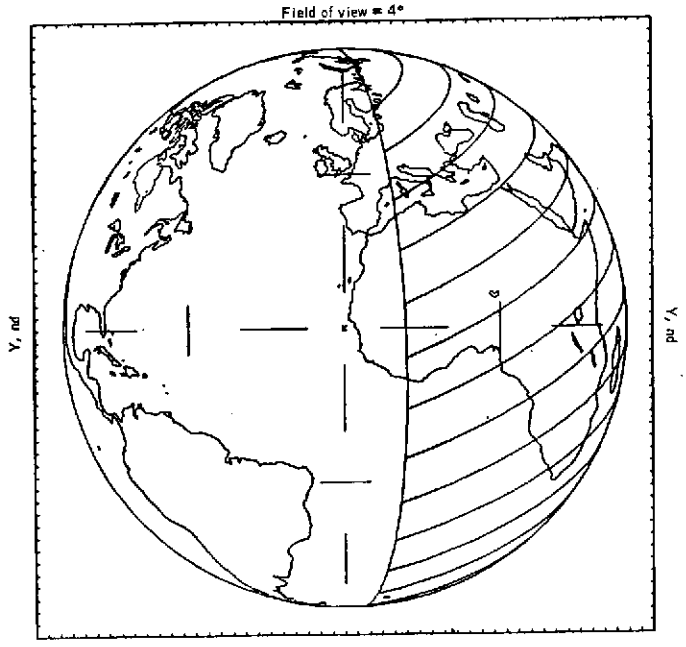



(c) G.e.t. = 150 hours.

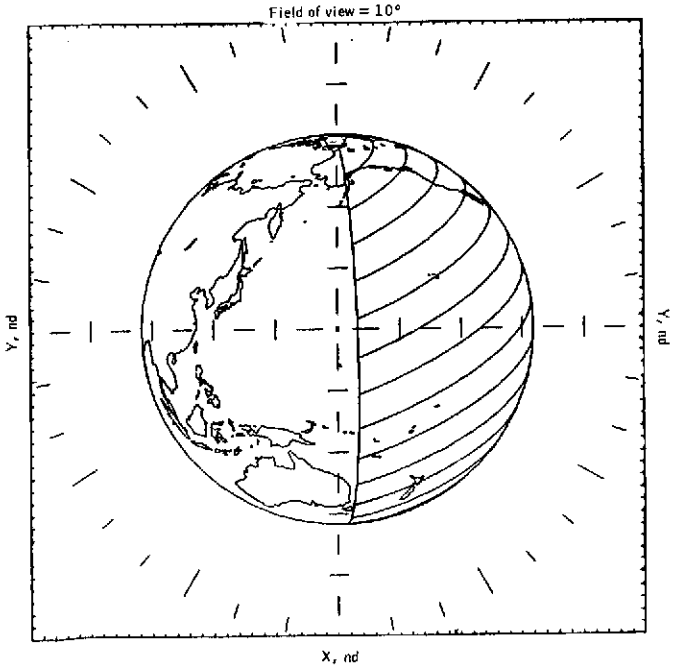



(d) G.e.t. = 160 hours.

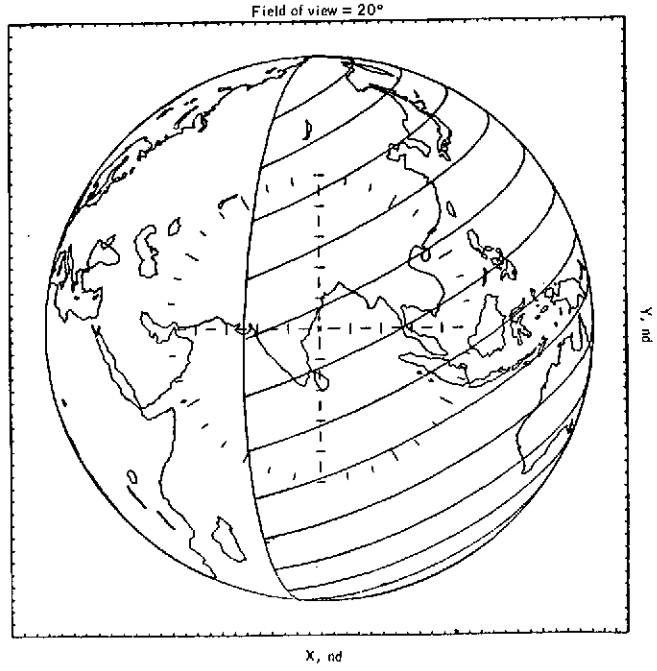
Figure 24.- Transearth coast - ecliptic reference.




(e) G.e.t. = 170 hours.




(f) G.e.t. = 180 hours.




(g) G.e.t. = 189 hours.

Figure 24.- Concluded.

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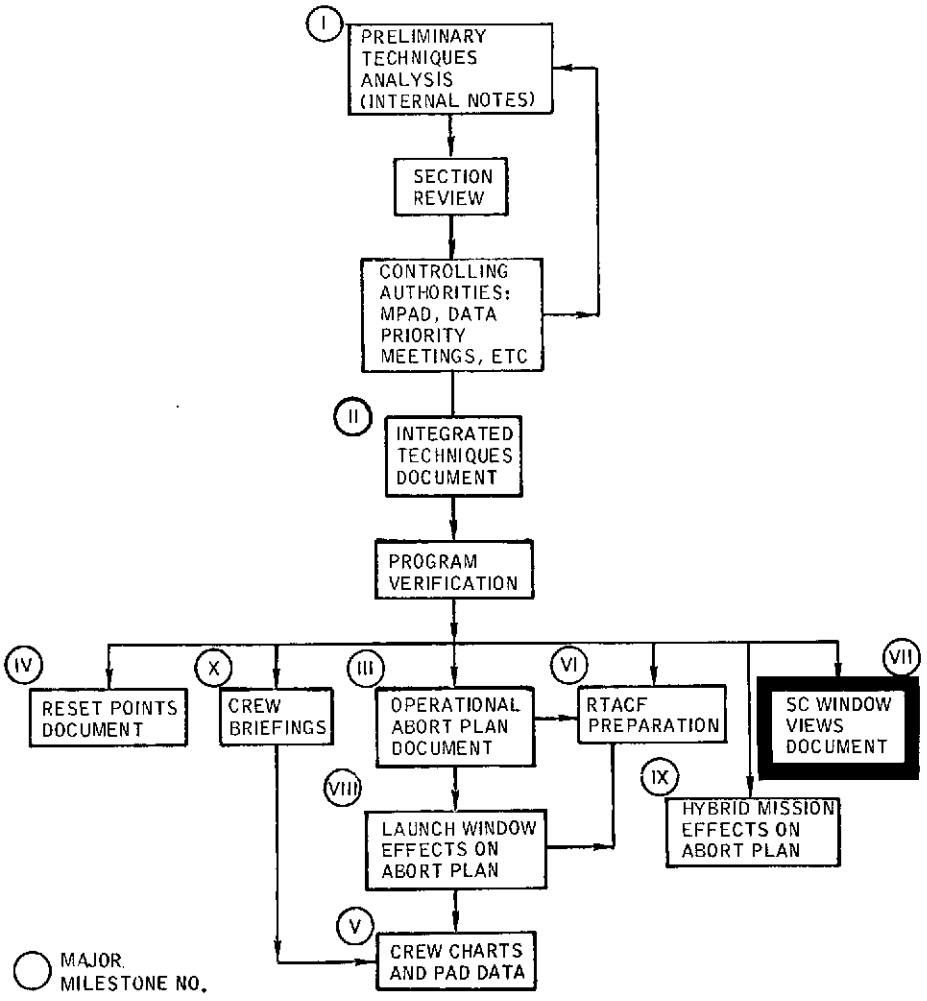
# APPENDIX




MAJOR MILESTONES

I. PRELIMINARY CONTINGENCY TECHNIQUES
(PRELIMINARY PROCEDURES TO BE FOLLOWED BY CREW AND GROUND)

II. INTEGRATED CONTINGENCY (ABORT) TECHNIQUES DOCUMENT
(DEFINES DETAILED PROCEDURES TO BE FOLLOWED BY CREW AND GROUND)

III. OPERATIONAL ABORT PLAN DOCUMENT
(PROVIDES DETAILED ABORT SOLUTIONS AND ASSOCIATED DATA FOR THE PRIMARY LAUNCH OPPORTUNITY)

IV. RESET POINTS DOCUMENT
(INSURES CREW/RTCC SIMULATION OF ABORTS ARE COMPATIBLE AND PROVIDES DRIVER FOR SIMULATION)

V. CREW CHARTS AND PAD DATA
(PROVIDES FINAL PLOTS AND CHARTS CREW NEEDS TO CARRY OUT OPERATIONAL ABORT PLAN; INCLUDES LAUNCH, TLI MONITOR, TLI + 10 MIN ABORT AND LOI 15 MIN ABORT CHARTS)

VI. RTACF PREPARATION
(INSURES REAL TIME OPERATIONAL COMPUTER SUPPORT REQUIREMENTS WILL BE MET)

VII. SC WINDOW VIEWS DOCUMENT
(PROVIDES STARFIELD, EARTH-MOON TERMINATOR, AND HORIZON SCHEMATICS FOR CREW FAMILIARIZATION AND INDEPENDENT MANEUVER ATTITUDE CHECKS)

VIII. LAUNCH WINDOW EFFECTS ON THE OPERATIONAL ABORT PLAN (DOCUMENT)
(INSURES ADEQUACY OF ABORT PLAN FOR LAUNCH WINDOW VARIATIONS)

IX. HYBRID MISSION EFFECTS ON THE OPERATIONAL ABORT PLAN
(SUPPLEMENTS ABORT PLAN FOR TRAJECTORY AND PROCEDURE CHANGES DUE TO A HYBRID PROFILE)

X. CREW BRIEFINGS
(EXPLANATION OF PROCEDURES AND ONBOARD ABORT CHARTS)

Flow chart 1.- Major Apollo F and G milestones for the Contingency Analysis Section.

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## REFERENCES


1. Hyle, Charles T; and Lunde, Alfred N.: Apollo 8 Maneuver Attitude Relative to the Celestial Sphere as Viewed from the Spacecraft. MSC IN 68-FM-294, December 9, 1968.

2. Hyle, Charles T.; and Lunde, Alfred N.: The Earth and the Moon as Viewed from the Spacecraft During the Apollo 8 Mission. MSC IN 68-FM-307, December 16, 1968.

3. CSM/LM Spacecraft Operational Data Book Volume I, CSM Data Book Revision 1. November 1, 1968.

4. CSM/LM Spacecraft Operational Data Book Volume II, LM Data Book. June 1968.

5. AS-505 Operational Trajectory, R-AERO-FMT-43-69. February 24, 1969.

6. Laetz, Curtis J.: Contingency Analysis Section Mission F Data Pack. MSC memorandum 69-FM36-59, February 18, 1969.

7. Jeness, M.: Mission F PTC REFSMMAT for May 1969. To be published.

8. OMAB; LMAB; and LAB: The Spacecraft Operational Trajectory for Apollo 10 (Mission F), Volume II. MSC IN 69-FM-66, March 10, 1969.

9. Rogers, Joseph E; and Burton, John K.: Apollo 8 Reentry Crew Charts. MSC memorandum 68-FM23-216, December 12, 1968.