MARINER 9 CONTROL NET OF MARS: AUGUST 1972

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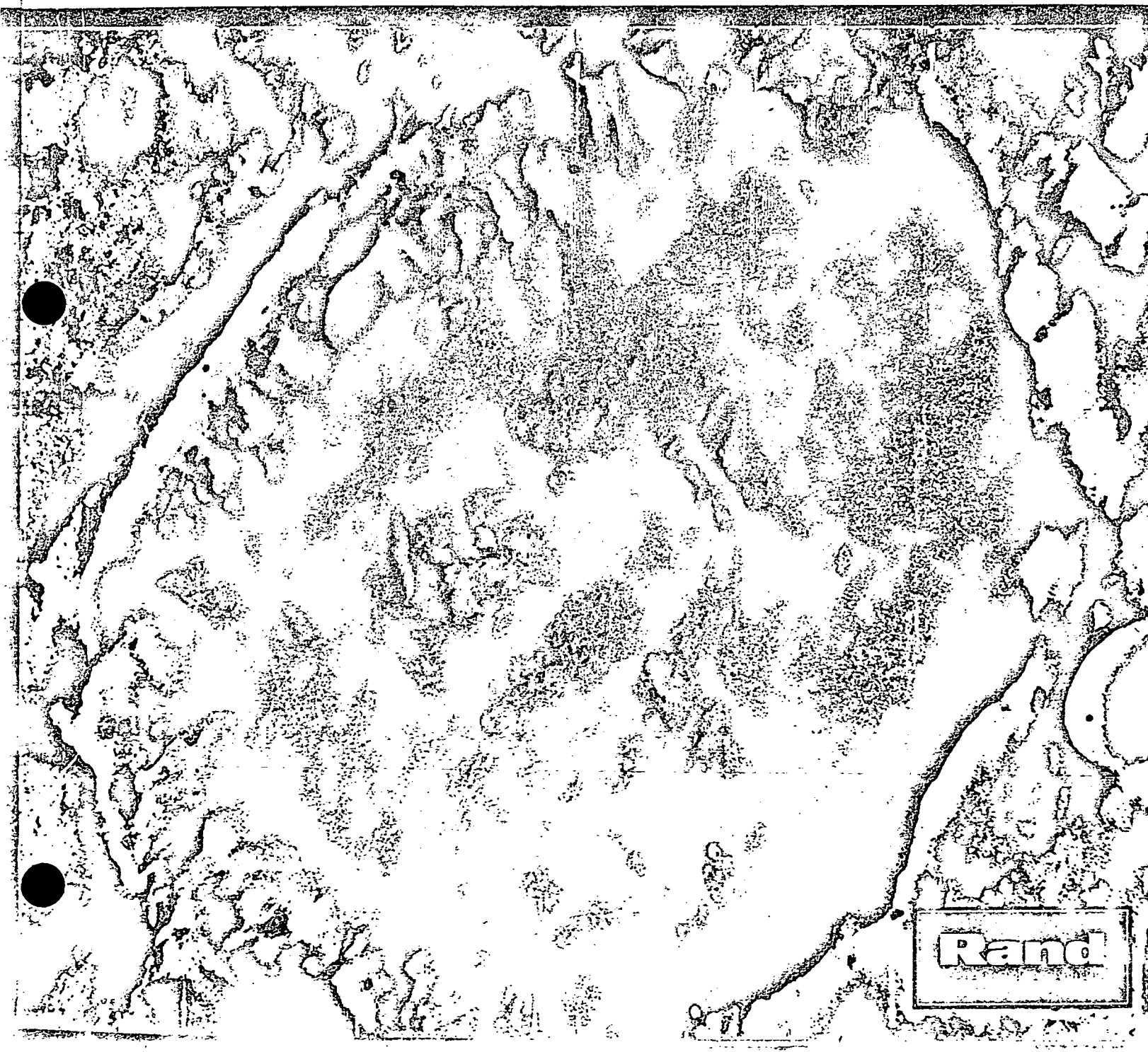
MERTON E. DAVIES R-1122-JPL OCTOBER 1972



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This research is sponsored by the Jet Propulsion Laboratory, California Institute of Technology under Contract No. 953011. Views or conclusions contained in this study should not be interpreted as representing the official opinion or policy of the Jet Propulsion Laboratory.

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Rand
SANTA MONICA, CA. 90406

PREFACE

The computation of a control net of Mars based on pictures from the Mariner 9 television experiment was started in January 1972 and has been expanded by incorporating additional frames and points. As time goes on, improved surface coverage, better basic assumptions, and improved computational techniques will cause revisions in the control net. However, an interim system that can be used for control is essential to the preliminary layout for new maps of Mars. Thus, this report is the first of a series presenting the best and most current results available to date.

SUMMARY

A planet-wide geodetic control net of Mars that is based on the Mariner 9 pictures is in the process of being computed. This report summarizes the status of the results as of August 1972. Areocentric and areographic coordinates of 809 control points have been computed using 407 television frames. As improved techniques and additional data become available, the net will be expanded to cover the entire planet. Coordinates of the new control points will be determined and coordinates of the old ones may be revised.

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CONTENTS

FIGURES

I. INTRODUCTION

Large-area pictures of the surface of Mars could not be obtained before December 1971 because a dust storm obscured most of the surface detail. When the Mars environment began to clear in December 1971, the terminator had moved toward periapsis enough so that the planet was dark when seen from a distance and it was again infeasible to obtain large-area pictures. It therefore has been necessary to use a large number of small-area frames to obtain photographic coverage of the planet, making the photogrammetric solutions for the control net difficult and involving a large number of computations.

The photogrammetric parameters and methodology used in the computations are discussed in the next section. Section III contains the coordinates of the features and 48 figures that show the locations of the control points on the surface of Mars.

II. PHOTOGRAMMETRIC PARAMETERS AND METHODOLOGY

The same least squares methods and photogrammetric formulation that were used in the reduction of the Mariner 6 and 7 pictures[1] are being employed in the current Mariner 9 computations. The only difference is that the 1950.0 Earth-equatorial coordinate system is used as the basic inertial reference instead of the 1950.0 Earth-ecliptic coordinate system that was used previously. Moreover, since the number of unknowns becomes very large, it is necessary to obtain solutions by blocks.

The areocentric latitude and longitude of the points and the three orientation angles of the camera when the frames were taken are treated as variables. Best values for these parameters are determined by a least squares adjustment designed to minimize the sum of the squares of the differences between the computed and measured coordinates of the points on the frames.

The coordinates of the points are measured in pixels using special map-gridded pictures furnished by the Image Processing Laboratory (IPL) at the Jet Propulsion Laboratory. The IPL GEOM program is used to remove the electronic and optical distortions from the measured pixel coordinates and to scale them to image coordinates in millimeters. The focal length of the A camera that took these frames is 52.267 mm.

The positional coordinates of the spacecraft when the pictures were taken (camera stations) come from the preliminary Minilibset program.

Areographic coordinates (in contrast to areocentric) will be used on all cartographic products and the reference spheroid will have an equatorial radius of 3393.4 km and a polar radius of 3375.8 km.[2] The areographic latitude, ϕ', of a point is defined as the angle between the normal to the reference spheroid through the point and the equatorial plane. The areocentric latitude, ϕ, is defined as the angle between the radius vector to the point and the equatorial plane. When the reference figure is a spheroid with equatorial radius, a, and polar

radius, c, the latitudes of the point are related by

$$\tan \phi = \left(\frac{c}{a}\right)^2 \tan \phi'$$

The radii at the control points come from the occultation experiment. The radius is computed as the sum of the radius of the reference spheroid and the interpolated elevation from Table 1 at the coordinates of the point. The elevations at 10° intervals of latitude and longitude shown in Table 1 were determined by linear interpolation between points at which the planet's radii (and hence elevations) were measured by the occultation experiment.[3] For lack of better data, the elevation was assumed to be zero at 90°N and south of 65°S.

A new spin axis for Mars is incorporated in the control net computations.[2] Using the notation of Sturms,[4] the coordinates of the new pole are

$$\alpha_{50} = 317.32 - 0.1011\ T \qquad \text{(from Ref. 5)}$$

and

$$\delta_{50} = 52.68 - 0.0570\ T$$

The Mariner 9 coordinate system uses a crater on the surface of Mars to define the 0° meridian;[2] this crater has tentatively been designated Airy-0 and is shown in the two photographs of Fig. 1. As determined from the current control net computations, the right ascension of the prime meridian is

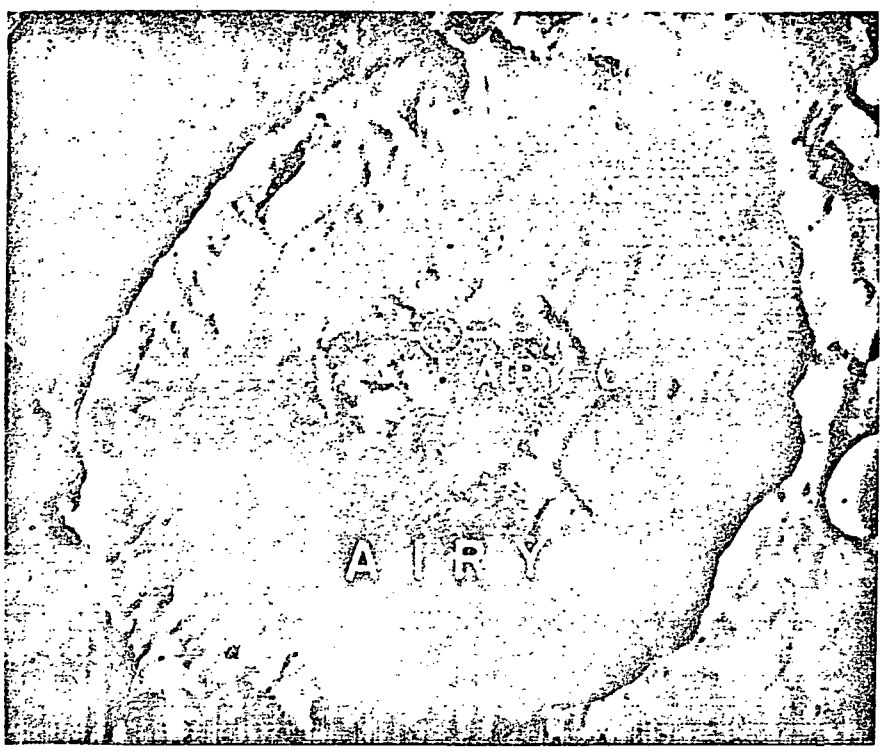
$$V = 148.59 + 350.891962\ d$$

Table

SURFACE ELEVATIONS ABOVE REFERENCE SPHEROID AT 10° INTERVALS (AREOCENTRIC)
(Derived from occultation experiment radii)
(in kilometers)

Latitude	West Longitude																	
	170	160	150	140	130	120	110	100	90	80	70	60	50	40	30	20	10	0
90	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
80	-1.01	-1.07	-0.86	-0.74	-0.69	-0.56	-0.51	-0.54	-0.53	-0.78	-0.87	-1.07	-1.19	-1.12	-1.16	-1.07	-0.89	-0.89
70	-2.02	-2.13	-1.71	-1.47	-1.38	-1.12	-1.03	-1.08	-1.05	-1.55	-1.74	-2.15	-2.38	-2.23	-2.32	-2.15	-1.78	-1.78
60	-2.39	-1.91	-1.51	-1.37	-0.92	-1.18	-0.91	-0.91	-1.07	-0.92	-1.32	-2.04	-2.82	-2.95	-3.03	-2.83	-2.36	-2.05
50	-2.08	-1.75	-1.61	-1.47	-0.12	0.26	0.38	0.23	0.39	0.58	-0.51	-0.92	-1.63	-2.12	-2.37	-2.47	-1.83	-1.59
40	-1.77	-1.81	-0.70	-1.59	0.68	1.77	1.83	1.68	1.62	1.76	0.34	-0.27	-0.67	-1.53	-1.79	-1.47	-1.31	-1.15
30	-1.72	-1.92	-0.14	0.32	1.48	3.29	3.29	3.14	2.86	2.94	1.19	0.39	0.29	-0.94	-1.44	-0.87	-1.01	-0.69
20	-1.73	-1.96	0.43	1.14	3.61	4.22	4.69	4.16	4.19	3.32	2.82	1.99	0.56	0.08	-0.68	-0.36	-0.38	-0.23
10	-0.74	-0.53	0.24	1.97	4.45	5.32	6.14	5.61	5.44	4.25	3.65	2.70	1.56	1.03	0.09	0.15	0.25	0.23
0	0.68	0.38	1.54	3.27	5.29	6.42	7.60	7.06	6.70	5.18	4.48	3.41	2.56	1.97	0.85	0.64	0.99	1.05
-10	1.99	1.71	2.67	4.36	6.28	7.52	9.05	8.51	7.94	6.07	4.68	4.27	3.35	2.24	1.19	1.07	1.80	1.82
-20	3.30	3.04	3.79	4.56	6.60	8.48	8.78	9.06	8.24	6.17	5.61	4.24	3.23	2.42	1.76	1.50	2.60	2.58
-30	3.21	2.99	4.38	4.13	6.68	8.66	7.54	9.37	8.46	6.67	6.60	4.89	3.30	2.79	1.98	2.55	2.05	2.55
-40	2.29	2.14	2.11	5.14	4.12	5.92	6.41	5.64	6.76	5.21	4.35	3.52	2.36	1.99	1.42	1.82	1.47	1.82
-50	1.37	1.28	1.27	3.08	2.47	3.55	3.85	3.39	4.05	3.13	2.61	2.11	1.41	1.19	0.85	1.09	0.88	1.09
-60	0.46	0.43	0.42	1.03	0.82	1.18	1.28	1.13	1.35	1.04	0.87	0.70	0.47	0.40	0.28	0.36	0.29	0.36
-70	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
-80	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
-90	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Latitude	West Longitude																	
	350	340	330	320	310	300	290	280	270	260	250	240	230	220	210	200	190	180
90	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
80	-0.94	-0.84	-0.69	-0.79	-0.71	-0.31	-0.26	-0.61	-0.64	-0.65	-0.58	-0.70	-0.86	-1.03	-1.34	-1.03	-0.96	-0.97
70	-1.88	-1.67	-1.38	-1.58	-1.42	-0.62	-0.52	-1.21	-1.28	-1.30	-1.16	-1.41	-1.72	-2.07	-2.68	-2.06	-1.92	-1.95
60	-0.57	-1.74	-0.92	-1.36	-1.46	-1.34	-1.50	-1.50	-1.52	-1.55	-1.72	-1.86	-1.54	-1.86	-2.80	-2.14	-2.20	-2.15
50	-0.24	-1.11	-0.30	-0.58	-0.64	-0.76	-0.73	-0.98	-0.17	-1.09	-1.44	-1.59	-1.96	-1.80	-1.46	-1.77	-1.78	-1.65
40	-0.75	0.24	0.58	-0.04	0.19	0.06	0.11	-0.15	0.74	-0.08	-0.58	-0.77	-0.94	-1.46	-1.16	-1.55	-1.46	-1.44
30	-0.12	0.78	1.18	0.65	0.48	0.89	0.94	0.68	1.65	1.33	0.32	-0.21	-0.45	-1.12	-0.97	-1.27	-1.59	-1.43
20	0.51	1.36	1.98	1.66	1.20	1.78	1.61	2.51	1.73	2.17	1.18	0.76	-0.04	-0.81	-0.92	-1.07	-1.42	-1.40
10	1.27	2.46	2.60	2.49	1.92	2.59	2.44	3.31	2.71	3.00	2.04	1.74	0.37	-0.46	-0.75	-0.88	-1.24	-1.36
0	2.12	2.94	3.17	2.72	2.71	3.41	3.26	4.10	3.69	3.84	2.90	2.71	0.77	-0.12	0.05	0.0	-0.32	0.12
-10	3.00	3.43	4.08	3.72	3.27	4.22	4.09	4.90	4.67	4.53	3.44	3.36	2.26	1.50	1.50	1.97	1.98	1.14
-20	3.91	4.33	4.58	3.98	3.79	2.55	2.10	2.95	2.96	4.03	3.69	3.67	4.04	2.58	2.70	3.14	3.19	2.58
-30	3.15	3.46	3.51	4.22	3.03	-1.28	-1.47	-0.09	1.03	2.39	3.58	3.96	4.19	3.75	3.25	3.82	3.25	2.57
-40	2.25	2.47	2.51	3.62	-0.96	-3.38	-3.03	-1.17	0.20	1.53	2.65	2.83	2.99	2.68	2.32	2.73	2.32	1.84
-50	1.35	1.48	1.50	2.17	-0.57	-2.03	-1.82	-0.70	0.12	0.92	1.59	1.70	1.79	1.61	1.39	1.64	1.39	1.10
-60	0.45	0.49	0.50	0.72	-0.19	-0.68	-0.61	-0.23	0.04	0.31	0.53	0.57	0.60	0.54	0.46	0.55	0.46	0.37
-70	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
-80	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
-90	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0



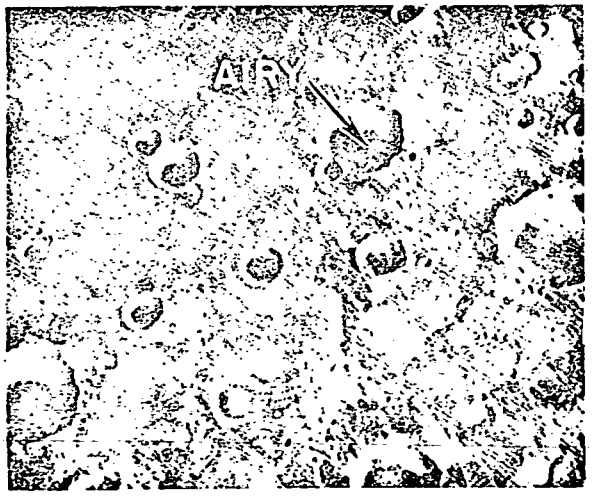


Fig. 1 — 0° longitude passes through the center of crater Airy - 0

III. COORDINATES OF FEATURES

The computations have been broken into four blocks because of the large number of points and frames. Adjoining blocks have large regions of overlap, permitting solution by successive iteration by holding the coordinates of a few points (three or four) in the overlap region fixed during the adjustment of one block. Different points of the same region are held fixed (at the values just derived) for the adjustment of the adjoining block. These successive adjustments are continued until the coordinates of all the points in the overlapping regions cease to change. The four blocks have been designated 0° north, 0° south, 180° north, and 180° south. A summary of the final block computations is given in Table 2. The four least squares adjustments required solutions for 634 to 1084 unknowns, and the standard error of the residuals of each computation was about one pixel (~0.015 mm). Areocentric coordinates of the control points are given in Table 3, and the areographic coordinates appear in Table 4.

Table 2

SUMMARY OF CONTROL NET COMPUTATIONS

Block	Number of Points	Number of Frames	Number of Equations	Number of Unknowns	Standard Error, σ (mm)
0° north	323	122	1516	1012	0.01950
0° south	156	113	1112	651	0.01742
180° north	344	132	1638	1084	0.01503
180° south	140	118	1018	634	0.01311

NOTE: The present control net consists of 809 points and 407 frames. The four blocks contain 154 overlapping points and 78 overlapping frames.

Table 3

AREOCENTRIC COORDINATES OF THE CONTROL POINTS

Point	Latitude, ϕ^{o}	W.Longitude, λ^{o}	Radius, km	No. of Frames
0	-5.12	0.0	3394.7	2
26	-15.64	3.87	3394.4	2
31	-5.89	359.06	3394.8	4
33	-4.07	356.36	3395.0	2
34	-8.62	0.56	3394.7	3
35	-4.70	2.64	3394.7	3
37	0.65	358.48	3394.5	2
38	-3.83	0.98	3394.7	4
49	-76.95	0.69	3376.7	5
66	-80.18	353.43	3376.3	8
70	-75.56	324.08	3376.9	7
71	-75.25	307.58	3376.9	5
138	-79.62	329.93	3376.4	8
147	-69.45	42.58	3378.0	4
148	-66.76	56.77	3378.7	3
149	-71.00	26.37	3377.6	3
150	-41.53	7.33	3387.1	6
153	-37.47	3.02	3388.7	5
160	-80.98	340.75	3376.2	8
161	-77.94	358.75	3376.6	2
162	-73.87	324.03	3377.1	5
163	-78.68	142.84	3376.5	3
166	-72.08	176.13	3377.4	6
167	-72.03	163.76	3377.5	8
171	-72.53	258.10	3377.4	7
172	-72.64	264.64	3377.3	5
176	-83.23	353.23	3376.0	3
177	-81.15	19.21	3376.2	4
180	-48.66	10.52	3384.4	4
181	-39.43	16.36	3388.0	5
182	-53.45	32.38	3382.7	5
183	-47.75	20.06	3385.0	5
187	-33.18	75.44	3394.2	2
190	-42.12	68.03	3389.3	4
191	-43.57	60.28	3388.0	4
192	-51.72	56.88	3384.2	3
193	-50.06	72.68	3385.8	5
194	-45.15	74.12	3388.3	3
196	-80.84	48.34	3376.2	2
197	-82.21	73.14	3376.1	2
198	-66.81	17.17	3378.6	5
199	-69.41	146.25	3378.0	2
200	-41.82	196.15	3387.9	4
201	-49.75	191.11	3384.6	4

AREOCENTRIC

Table 3--continued

Point	Latitude, ϕ^{o}	W.Longitude, λ^{o}	Radius, km	No. of Frames
202	-55.32	185.22	3382.3	3
203	-50.05	175.75	3384.2	4
204	-40.01	178.08	3388.0	3
205	-26.44	188.70	3393.0	4
206	-32.28	186.47	3391.2	4
207	-33.49	202.95	3391.3	2
208	-33.85	210.29	3390.8	5
209	-26.97	217.38	3393.1	5
210	-27.69	208.22	3392.8	4
211	-32.95	227.66	3391.9	4
212	-38.54	212.58	3389.1	5
213	-43.02	225.76	3387.7	6
214	-39.64	229.75	3389.2	5
215	-23.13	237.71	3394.5	2
216	-67.20	343.07	3378.6	2
222	-75.80	289.60	3376.8	4
223	-80.59	289.75	3376.3	9
224	-78.37	254.13	3376.5	2
229	-70.47	349.70	3377.8	5
232	-69.00	359.40	3378.1	8
233	-74.14	344.54	3377.1	7
234	-68.67	298.16	3378.0	2
236	-80.46	320.75	3376.3	5
237	-74.27	235.19	3377.1	4
238	-85.54	264.01	3375.9	2
239	-78.04	230.49	3376.5	3
240	-75.83	210.77	3376.8	4
242	-63.73	317.61	3379.5	7
243	-66.77	322.84	3378.7	9
244	-70.62	311.66	3377.7	9
245	-64.58	312.46	3379.0	7
246	-70.20	285.04	3377.8	4
248	-61.88	148.70	3380.1	4
249	-55.03	152.56	3382.4	3
250	-60.36	142.25	3380.9	4
251	-65.38	131.32	3379.2	4
252	-64.91	122.03	3379.5	4
253	-69.62	114.77	3378.0	5
254	-68.29	97.34	3378.4	3
255	-70.08	92.04	3377.8	4
256	-72.80	105.48	3377.3	5
257	-71.90	81.90	3377.5	4
258	-71.96	131.85	3377.5	8
259	-77.06	128.26	3376.7	5
260	-68.84	146.02	3378.1	2

AREOCENTRIC

Table 3--continued

Point	Latitude, ϕ^{o}	W.Longitude, λ^{o}	Radius, km	No. of Frames
261	-58.45	111.68	3382.2	3
262	-53.04	125.38	3384.5	4
263	-46.60	121.26	3388.2	4
264	-42.42	120.19	3390.6	3
266	-36.46	128.83	3392.3	3
268	-55.39	78.02	3383.4	2
269	-62.55	70.78	3380.2	2
270	-62.23	44.01	3379.9	4
271	-30.60	65.50	3394.6	2
272	-37.85	52.98	3389.7	3
273	-32.04	51.74	3391.8	2
274	-20.17	45.87	3394.2	2
275	-33.06	39.73	3390.7	3
276	-42.51	34.45	3386.8	3
277	-52.44	41.36	3383.3	6
278	-30.20	25.98	3391.1	5
279	-32.11	18.64	3390.7	5
280	-38.73	25.71	3388.1	3
281	-53.51	20.96	3382.8	5
282	-59.78	23.42	3380.6	4
283	-45.79	9.58	3385.4	5
284	-63.73	259.28	3379.4	4
285	-62.81	231.32	3379.9	7
286	-48.71	260.11	3384.4	4
289	-61.13	252.57	3380.3	4
291	-32.72	245.58	3391.7	4
292	-32.54	256.85	3390.8	3
293	-49.06	237.88	3385.1	6
294	-39.90	243.50	3388.9	4
295	-48.97	219.12	3385.0	6
296	-63.88	209.86	3379.5	11
297	-27.70	233.40	3393.6	4
298	-33.54	219.56	3391.4	6
299	-43.52	215.32	3387.2	5
300	-48.06	206.10	3385.3	3
301	-44.20	203.60	3387.0	5
303	-43.36	189.98	3387.1	4
304	-63.82	196.91	3379.5	9
305	-69.81	71.67	3377.9	4
306	-76.92	71.32	3376.7	5
307	-52.98	197.17	3383.4	3
309	-47.19	183.32	3385.3	4
310	-32.45	195.96	3391.7	4
312	-60.80	177.08	3380.3	4

AREOCENTRIC

Table 3--continued

Point	Latitude, ϕ°	W.Longitude, λ°	Radius, km	No. of Frames
313	-68.96	198.52	3378.1	7
314	-32.18	176.13	3391.0	2
315	-47.48	172.85	3385.3	5
316	-32.94	166.09	3391.0	4
317	-60.40	165.14	3380.5	2
318	-46.39	162.34	3385.8	6
319	-36.86	161.52	3389.5	3
320	-42.08	132.34	3389.5	3
321	-61.76	133.17	3380.4	6
322	-33.87	151.86	3391.2	3
323	-49.12	152.85	3384.6	4
324	-54.93	156.31	3382.4	3
325	-34.59	144.84	3391.7	2
326	-31.09	160.22	3391.6	4
327	-42.73	145.37	3388.3	5
328	-55.35	136.84	3383.3	2
329	-46.89	137.99	3387.6	3
331	-33.71	11.73	3389.9	5
334	-45.78	126.89	3387.9	3
335	-33.78	0.27	3390.2	6
336	-45.73	1.40	3385.7	6
337	-55.95	8.50	3381.8	2
338	-60.14	11.93	3380.4	4
339	-27.94	2.18	3392.0	3
340	-32.90	352.85	3390.9	4
341	-47.62	345.80	3385.4	6
342	-57.51	354.09	3381.5	5
343	-34.78	339.16	3390.6	4
344	-25.36	344.19	3393.8	3
345	-23.22	352.69	3394.0	2
346	-49.25	335.58	3384.8	6
347	-61.25	338.97	3380.3	6
348	-35.07	331.73	3390.5	4
349	-24.52	333.11	3394.4	3
350	-41.73	337.96	3387.9	5
351	-46.36	325.18	3386.4	6
352	-56.43	339.66	3382.0	4
353	-58.95	322.71	3381.3	6
354	-27.04	324.19	3393.8	3
355	-35.47	322.94	3391.0	3
356	-67.63	245.28	3378.5	3
357	-70.53	327.87	3377.7	5
358	-65.28	335.47	3379.1	2
359	-72.90	57.30	3377.3	3
361	-71.87	294.56	3377.5	4

AREOCENTRIC

Table 3--continued

Point	Latitude, ϕ^{o}	W.Longitude, λ^{o}	Radius, km	No. of Frames
362	-72.18	276.30	3377.4	6
363	-68.70	216.86	3378.2	3
364	-54.05	329.08	3383.0	4
365	-69.07	45.42	3378.1	6
366	-70.19	56.89	3377.8	2
367	-73.37	317.14	3377.2	3
368	-80.22	82.15	3376.3	3
375	-57.13	312.97	3381.1	4
376	-43.48	323.81	3387.8	4
377	-43.24	315.48	3386.5	4
378	-30.85	316.43	3391.4	2
379	-33.87	314.74	3389.7	3
380	-52.94	316.95	3383.3	4
381	-45.46	305.02	3382.8	2
382	-77.37	54.43	3376.6	5
383	-75.09	82.73	3377.0	5
384	-72.92	99.93	3377.3	2
400	9.32	136.81	3395.9	3
401	10.16	135.22	3396.2	4
404	20.08	137.30	3392.7	3
405	18.02	131.86	3404.3	4
406	21.59	131.60	3392.7	2
407	22.57	136.77	3391.6	3
408	11.49	124.89	3397.5	2
409	11.00	121.77	3397.9	2
410	10.50	119.34	3398.2	2
411	15.83	127.46	3396.3	2
413	19.31	119.84	3395.9	3
414	24.13	128.16	3393.5	2
415	8.04	119.62	3398.7	3
416	6.66	120.80	3398.9	2
417	3.25	121.56	3399.3	2
418	16.57	119.21	3396.7	2
419	15.03	117.47	3397.2	2
420	23.10	119.49	3394.7	2
421	23.42	117.50	3394.7	2
422	2.71	111.27	3400.5	2
423	7.66	112.84	3399.4	2
424	24.49	109.90	3394.5	2
425	18.71	111.13	3396.5	2
426	17.33	114.19	3396.8	2
427	9.09	102.21	3398.9	3
430	8.31	112.18	3399.3	2
433	11.06	97.47	3398.2	2

AREOCENTRIC

Table 3--continued

Point	Latitude, ϕ°	W.Longitude, λ°	Radius, km	No. of Frames
435	17.94	95.21	3396.2	2
436	21.75	103.31	3395.1	2
437	24.95	102.56	3394.0	2
438	25.19	98.91	3393.8	2
439	24.19	91.63	3394.1	2
440	26.38	92.18	3393.3	2
442	28.16	87.83	3392.5	2
443	24.21	89.82	3394.0	2
444	21.79	89.34	3394.9	2
445	21.28	80.98	3394.4	4
446	12.88	83.28	3396.9	3
447	13.47	79.83	3396.4	3
449	4.18	82.56	3398.5	2
450	16.49	82.26	3395.9	2
451	19.99	77.20	3394.5	2
452	28.13	79.53	3392.4	2
453	25.11	81.09	3393.4	2
454	11.31	76.89	3396.7	2
455	1.00	71.93	3397.9	2
456	7.52	72.89	3397.1	2
457	11.55	72.40	3396.4	4
458	11.19	69.01	3396.2	2
459	19.83	71.91	3394.3	5
460	17.87	72.58	3394.9	2
461	19.28	68.43	3394.2	3
462	26.67	71.20	3391.8	3
463	23.03	72.24	3393.2	3
464	20.52	64.18	3393.5	4
465	25.03	63.68	3391.7	3
466	16.55	64.26	3394.6	3
467	11.19	64.37	3395.8	3
468	6.67	64.13	3396.5	2
470	12.66	60.66	3395.1	2
471	20.57	58.54	3392.9	2
472	13.15	53.99	3394.2	3
473	10.07	55.33	3395.0	2
475	11.43	50.68	3394.2	2
476	16.37	54.36	3393.5	2
477	19.93	56.23	3392.8	2
478	22.87	55.96	3391.8	2
479	20.24	47.76	3391.7	3
480	24.70	47.12	3390.5	2
481	19.28	45.27	3391.9	3
483	19.50	41.98	3391.7	2
484	10.51	40.00	3393.8	2

AREOCENTRIC

Table 3--continued

Point	Latitude, ϕ°	W.Longitude, λ°	Radius, km	No. of Frames
485	7.52	45.94	3394.7	2
486	2.58	46.24	3395.5	2
487	19.38	29.75	3390.8	2
488	10.70	34.81	3393.3	4
489	11.86	25.34	3392.6	4
490	8.30	25.29	3393.3	2
491	17.14	24.87	3391.5	2
492	19.66	23.96	3390.9	2
493	23.45	29.77	3389.8	2
495	19.36	15.68	3391.1	3
496	25.06	17.43	3389.6	2
497	19.57	12.04	3391.1	2
498	18.98	19.93	3391.2	2
500	11.15	17.21	3392.8	3
501	4.81	16.29	3393.8	2
502	11.03	12.05	3392.9	2
503	10.16	16.04	3393.0	2
504	10.87	6.60	3393.0	3
505	0.41	6.84	3394.4	2
506	15.75	7.15	3392.0	2
507	18.90	7.39	3391.3	3
508	25.76	7.58	3389.4	2
509	18.26	2.58	3391.5	2
510	10.07	2.66	3393.1	2
511	8.33	1.48	3393.4	2
512	10.98	358.75	3393.0	4
513	5.00	358.03	3394.1	3
514	15.30	357.76	3392.3	3
515	18.54	358.12	3391.6	3
516	13.28	355.24	3393.0	2
517	8.77	355.05	3393.8	3
518	5.77	354.36	3394.4	2
519	11.34	354.65	3393.4	3
520	18.13	353.16	3392.1	2
521	14.84	355.04	3392.7	3
522	15.23	350.78	3393.0	2
523	0.30	2.71	3394.4	3
524	2.20	2.51	3394.2	3
525	6.67	358.19	3393.8	3
527	4.92	38.83	3394.7	3
528	4.01	33.62	3394.3	2
529	6.06	34.94	3394.1	2
530	8.94	37.19	3393.9	3
531	10.37	31.30	3393.0	4

AREOCENTRIC

Table 3--continued

Point	Latitude, ϕ^{o}	W.Longitude, λ^{o}	Radius, km	No. of Frames
532	15.25	34.63	3392.3	3
533	18.03	28.97	3391.2	3
534	12.44	30.90	3392.6	3
535	9.58	346.29	3394.6	2
536	9.17	345.59	3394.8	2
537	14.12	344.92	3393.8	2
538	12.59	338.89	3394.8	2
539	14.33	346.07	3393.6	2
540	10.37	348.09	3394.3	2
542	18.39	346.98	3392.5	2
543	20.41	345.47	3392.1	2
544	21.83	338.12	3392.3	2
545	11.12	336.83	3395.2	2
546	5.18	338.81	3395.9	2
547	10.70	331.85	3395.3	2
548	11.01	329.68	3395.3	2
549	15.73	337.25	3394.1	2
550	19.31	336.46	3393.1	3
551	18.75	332.93	3393.5	2
552	19.19	329.08	3393.5	2
553	24.20	336.73	3391.7	3
554	27.02	337.33	3390.8	4
555	6.70	328.04	3395.9	2
556	9.18	328.77	3395.6	2
557	10.21	321.50	3395.4	3
558	11.92	323.45	3395.1	2
560	15.84	329.58	3394.3	2
561	18.96	324.60	3393.4	2
562	19.53	320.45	3393.2	4
563	23.33	328.36	3392.3	2
564	26.10	327.54	3391.4	3
567	7.63	319.65	3395.6	2
568	10.06	317.36	3395.2	2
569	10.23	311.62	3394.9	2
570	13.75	320.92	3394.6	2
571	15.48	319.73	3394.2	2
572	18.51	318.13	3393.3	2
573	17.43	312.03	3393.3	3
574	22.04	320.99	3392.4	2
575	23.61	318.63	3391.8	2
577	7.66	312.22	3395.3	2
578	5.05	311.27	3395.6	2
579	12.24	309.57	3394.4	2
580	12.20	305.61	3394.7	2
581	11.35	302.48	3395.0	3

AREOCENTRIC

Table 3--continued

Point	Latitude, ϕ^{o}	W.Longitude, λ^{o}	Radius, km	No. of Frames
582	12.20	311.87	3394.5	2
583	14.94	312.23	3393.9	2
584	21.64	312.31	3392.2	2
585	25.95	310.72	3390.8	2
586	19.92	305.85	3392.8	2
587	21.12	306.96	3392.4	2
588	19.43	301.21	3393.2	3
589	6.32	303.80	3395.8	2
590	9.08	303.14	3395.4	3
591	9.92	301.30	3395.4	3
592	9.88	295.60	3395.4	4
593	8.93	294.18	3395.6	3
594	14.91	303.36	3394.2	2
595	18.49	303.02	3393.3	3
596	18.04	297.92	3393.6	3
597	17.90	294.69	3393.6	4
598	23.31	303.95	3391.9	2
599	26.59	300.50	3391.0	2
600	23.67	293.26	3391.9	3
601	25.57	294.39	3391.4	3
602	18.88	296.27	3393.4	3
603	19.08	285.99	3393.5	4
604	18.37	289.04	3393.5	3
605	13.74	293.78	3394.6	2
606	9.85	287.43	3395.5	2
607	10.57	290.52	3395.2	2
608	4.56	294.03	3396.3	2
609	1.32	296.30	3396.6	2
610	6.81	285.33	3396.3	2
611	2.94	285.54	3396.7	2
612	11.20	285.21	3395.5	2
613	10.99	280.55	3395.9	2
614	11.11	277.05	3395.8	2
615	17.09	286.23	3394.0	2
616	13.64	285.49	3394.9	2
617	19.86	283.27	3393.6	2
618	19.58	278.48	3393.9	3
619	23.27	287.41	3392.2	3
620	25.48	284.77	3391.5	2
621	22.46	277.72	3392.8	3
622	24.71	275.28	3392.0	3
623	17.16	274.96	3394.2	3
624	16.81	279.92	3394.7	2
625	15.25	278.71	3395.0	2

AREOCENTRIC

Table 3--continued

Point	Latitude, ϕ°	W.Longitude, λ°	Radius, km	No. of Frames
626	13.45	277.03	3395.3	2
628	8.10	274.98	3396.2	2
629	6.36	276.59	3396.6	2
631	6.11	279.40	3396.8	2
632	18.11	350.79	3392.3	2
633	19.00	350.05	3392.1	2
634	3.78	270.30	3396.7	2
635	2.73	269.69	3396.8	2
636	5.88	268.90	3396.3	2
637	6.30	270.53	3396.3	2
638	8.02	268.37	3396.0	2
641	8.06	265.47	3396.0	2
642	7.80	264.63	3396.1	2
643	16.88	268.25	3394.0	2
644	14.20	268.61	3394.7	2
645	13.16	268.54	3394.9	2
646	12.24	263.20	3395.3	3
647	12.49	265.88	3395.2	2
648	11.07	267.74	3395.4	2
650	13.05	256.21	3394.9	2
651	14.56	264.18	3394.7	2
652	15.03	260.43	3397.8	2
653	16.78	266.35	3394.1	2
654	20.13	258.75	3393.3	2
655	21.11	257.95	3393.0	3
657	26.46	256.45	3391.2	2
658	23.71	258.23	3392.2	2
659	19.24	250.52	3392.8	2
662	16.55	256.89	3394.1	2
663	12.50	249.05	3394.4	3
664	11.62	253.11	3394.9	2
668	12.58	247.50	3394.3	3
669	9.88	248.60	3394.9	2
670	6.52	249.39	3395.5	2
671	4.48	247.95	3395.8	2
672	1.88	248.16	3396.1	2
673	11.44	238.97	3394.2	3
674	11.22	244.53	3394.5	2
675	15.72	248.77	3393.6	2
676	17.10	249.45	3393.3	2
677	20.33	241.04	3392.0	3
678	20.04	243.58	3392.2	2
679	19.94	246.21	3392.4	2
680	21.68	248.64	3392.0	2
681	23.46	249.92	3391.5	2

AREOCENTRIC

Table 3--continued

Point	Latitude, ϕ^{o}	W.Longitude, λ^{o}	Radius, km	No. of Frames
682	25.95	249.24	3390.6	2
684	22.56	238.79	3391.2	2
685	23.14	241.93	3391.2	2
686	25.49	239.61	3390.3	2
687	17.93	241.88	3392.8	2
688	17.03	238.00	3392.8	2
689	16.95	231.75	3392.2	2
690	13.09	241.64	3394.0	2
691	15.24	240.14	3393.4	2
692	9.95	238.83	3394.5	3
693	9.04	240.91	3394.8	3
694	8.50	236.82	3394.5	2
695	8.44	231.44	3393.7	2
696	6.25	239.61	3395.3	2
697	2.16	242.57	3395.9	2
698	1.79	240.65	3395.9	2
699	9.76	230.89	3393.4	2
700	5.85	231.18	3394.0	2
701	12.20	229.60	3392.9	2
702	12.16	221.00	3392.2	4
703	21.57	227.28	3390.7	2
704	21.00	224.64	3390.6	2
705	21.36	221.83	3390.3	2
706	29.62	229.22	3388.6	2
707	28.01	221.64	3388.6	2
708	28.86	228.06	3388.8	2
709	26.96	220.92	3388.8	2
710	9.53	221.31	3392.6	2
711	7.78	220.45	3392.7	2
714	2.07	221.26	3393.3	2
715	11.65	215.33	3392.0	2
716	11.81	213.23	3392.0	2
717	14.57	222.30	3391.9	2
718	20.11	220.45	3390.5	3
720	19.73	212.95	3390.5	2
721	24.46	221.48	3389.5	3
722	23.35	211.41	3389.7	2
723	26.44	211.62	3389.0	2
724	27.15	208.12	3388.8	2
725	25.16	208.93	3389.3	2
726	26.14	202.18	3388.8	2
727	21.35	206.28	3390.1	3
728	20.36	200.70	3390.2	5
729	18.77	206.41	3390.6	2

AREOCENTRIC

Table 3--continued

Point	Latitude, ϕ°	W.Longitude, λ°	Radius, km	No. of Frames
730	16.97	200.11	3390.9	3
731	13.45	208.10	3391.6	2
732	12.78	205.28	3391.7	2
733	13.60	202.31	3391.5	2
734	12.78	201.28	3391.6	3
735	4.04	199.72	3392.9	2
736	8.60	200.25	3392.3	2
737	10.73	199.48	3391.9	2
738	13.21	198.58	3391.5	2
739	13.04	193.03	3391.3	2
740	11.79	190.82	3391.4	3
741	23.47	201.57	3389.5	3
742	27.07	200.35	3388.5	3
743	20.28	197.05	3390.1	2
744	20.33	194.94	3390.0	2
745	20.13	190.43	3389.9	4
746	16.96	190.93	3390.6	2
747	14.94	190.26	3390.9	2
750	11.27	181.36	3391.4	3
751	20.38	185.36	3389.8	2
752	20.40	180.93	3389.8	4
753	3.12	178.31	3393.1	2
754	1.75	178.09	3393.3	2
755	2.55	172.31	3393.5	2
756	13.07	177.89	3391.2	2
757	12.81	175.75	3391.3	2
758	17.36	182.70	3390.4	2
759	14.59	181.45	3390.9	2
760	20.13	178.44	3389.8	2
761	20.22	176.91	3389.8	2
762	19.46	174.67	3389.9	2
763	21.99	181.05	3389.5	2
764	24.25	181.12	3389.0	2
765	26.17	182.41	3388.5	2
766	27.50	180.32	3388.2	2
769	12.60	169.44	3391.6	2
771	5.43	163.36	3393.1	2
772	6.63	163.04	3392.9	3
773	9.81	152.50	3392.9	3
774	4.72	152.84	3393.9	3
775	7.21	145.43	3394.5	2
785	7.38	174.83	3392.4	2
786	6.24	173.16	3392.8	2
787	6.23	177.06	3392.6	2
788	10.75	175.33	3391.7	2

AREOCENTRIC

Table 3--continued

Point	Latitude, ϕ^{o}	W.Longitude, λ^{o}	Radius, km	No. of Frames
791	9.28	169.28	3392.3	3
792	7.36	171.74	3392.6	3
793	15.76	170.59	3390.8	2
796	6.73	168.41	3392.9	2
797	8.76	157.55	3392.8	2
800	-26.10	9.32	3392.3	3
801	-26.67	7.74	3392.1	3
802	-24.17	6.12	3392.9	2
803	-26.81	14.85	3392.0	3
804	-23.77	15.12	3392.6	3
806	-18.38	4.73	3394.1	3
807	-16.90	8.40	3394.3	3
808	-23.76	7.85	3392.9	2
809	-22.88	7.60	3393.2	3
810	-22.79	4.47	3393.3	2
811	-21.10	5.70	3393.6	2
812	-22.48	6.32	3393.3	2
813	-18.97	1.39	3394.0	3
814	-17.52	3.69	3394.2	2
815	-13.87	3.31	3394.5	3
817	-12.38	1.27	3394.6	2
818	-14.90	358.90	3394.5	3
819	-8.60	2.64	3394.7	3
820	-9.58	0.76	3394.7	3
822	-10.61	356.23	3395.1	3
823	-7.59	358.50	3394.9	3
824	-14.16	6.92	3394.5	2
825	-4.61	0.52	3394.7	3
826	-4.20	2.41	3394.7	4
827	-5.35	358.71	3394.8	3
828	-3.74	358.46	3394.8	4
829	-8.53	5.17	3394.7	3
830	-10.57	11.79	3394.5	2
831	-10.30	10.41	3394.6	2
832	-8.85	10.68	3394.6	3
833	-6.83	14.17	3394.4	2
834	-5.06	9.62	3394.7	2
835	-4.14	9.50	3394.6	3
836	-3.02	12.21	3394.5	2
837	1.36	8.17	3394.3	2
839	-12.35	14.99	3394.1	2
840	-16.61	13.50	3393.9	2
841	-16.12	12.58	3394.1	2
842	-13.98	11.92	3394.3	2

AREOCENTRIC

Table 3--continued

Point	Latitude, ϕ°	W.Longitude, λ°	Radius, km	No. of Frames
843	-15.17	13.53	3394.0	2
844	-18.74	9.36	3394.1	2
845	-13.03	10.14	3394.5	2
846	-8.78	7.50	3394.7	2
847	-22.22	10.68	3393.3	2
848	-18.50	12.21	3393.8	2
849	-18.12	14.58	3393.6	2
850	-22.92	14.05	3392.9	2
851	-17.60	16.23	3393.5	2
852	-22.44	16.57	3392.8	2
853	-22.17	15.43	3392.9	3
854	-20.17	14.67	3393.4	2
856	-21.55	10.42	3393.5	3
857	-23.36	16.26	3392.7	2
858	-22.44	17.59	3392.7	2
859	-21.23	19.76	3392.7	2
861	-25.28	16.97	3392.3	2
862	-24.00	2.88	3393.0	2
863	-21.91	0.38	3393.5	2
864	-21.38	355.93	3394.1	2
865	-20.18	-0.01	3393.9	2
866	-17.49	359.03	3394.3	2
867	-14.84	358.13	3394.6	3
868	-16.61	353.97	3395.0	3
869	-12.54	356.20	3395.0	2
870	-11.86	351.88	3395.6	3
871	-11.10	353.97	3395.3	2
872	-9.67	356.56	3395.1	3
873	-5.15	355.51	3395.2	2
874	-8.99	354.80	3395.3	2
875	-5.85	353.26	3395.4	2
876	-6.40	352.31	3395.6	2
877	-2.09	350.14	3395.6	2
878	-2.43	352.20	3395.4	2
879	-0.66	353.53	3395.2	2
880	3.19	348.50	3395.3	2
881	3.95	354.65	3394.6	2
882	-25.83	358.24	3392.7	2
883	-23.93	359.06	3393.1	2
884	-23.05	356.59	3393.6	2
885	-24.72	358.16	3393.0	2
887	-20.16	353.24	3394.7	2
888	-24.33	354.47	3393.5	2
890	-18.43	355.41	3394.7	2
891	-17.76	353.29	3395.0	2

AREOCENTRIC

Table 3--continued

Point	Latitude, ϕ°	W.Longitude, λ°	Radius, km	No. of Frames
892	-19.15	352.03	3395.0	3
893	-13.91	352.88	3395.3	2
895	-15.09	349.20	3395.7	2
896	-8.73	351.11	3395.7	2
897	-9.97	352.73	3395.5	2
898	-10.39	347.09	3396.0	2
899	-9.21	348.74	3395.9	2
900	-5.90	350.09	3395.8	2
901	-8.51	347.62	3396.0	2
902	-9.20	345.07	3396.1	2
903	-8.36	343.98	3396.2	2
904	-7.57	345.61	3396.1	2
905	-4.58	341.03	3396.4	2
906	-3.87	342.55	3396.3	2
907	-2.75	343.84	3396.1	2
908	-17.12	351.37	3395.3	2
909	-17.66	348.58	3395.5	2
910	-21.83	351.23	3394.5	2
911	-23.64	12.07	3392.8	2
912	-4.18	349.00	3395.8	2
913	2.50	345.22	3395.7	2
914	1.45	344.43	3395.8	2
915	2.05	340.58	3396.1	2
916	0.69	340.16	3396.3	2
917	6.16	342.59	3395.5	2
918	5.05	339.87	3395.9	2
919	5.02	337.62	3396.0	2
920	-24.38	196.08	3393.7	3
921	-25.10	189.00	3393.4	3
922	-28.42	191.01	3392.7	4
923	-22.46	194.42	3394.1	4
924	-2.75	178.91	3393.8	2
925	-2.39	178.04	3393.8	2
926	-3.80	175.53	3394.1	2
927	-7.23	175.29	3394.3	2
928	-5.40	175.77	3394.2	2
929	-9.56	178.58	3394.1	2
930	-10.29	178.62	3394.1	2
931	-10.88	176.54	3394.3	2
932	-9.51	176.21	3394.3	2
933	-10.89	174.52	3394.5	2
934	-9.54	173.72	3394.5	2
935	-11.40	173.05	3394.6	2
936	-14.59	174.21	3394.5	2

AREOCENTRIC

Table 3--continued

Point	Latitude, ϕ^{o}	Longitude, λ^{o}	Radius, km	No. of Frames
937	-15.37	174.67	3394.5	2
938	-11.84	180.38	3394.1	2
939	-12.66	178.49	3394.2	2
940	-13.80	177.57	3394.3	2
941	-14.37	178.31	3394.2	2
942	-15.38	178.58	3394.2	2
947	-16.76	181.11	3394.1	2
948	-17.62	179.07	3394.1	2
952	-19.06	186.59	3394.4	2
954	-20.15	186.08	3394.3	2
955	-21.40	183.63	3393.8	2
956	-17.15	188.62	3394.6	2
958	-22.72	186.41	3393.7	2
960	-24.00	187.80	3393.5	2
961	-23.95	189.02	3393.6	2
962	-21.70	190.75	3394.2	3
963	-18.02	180.50	3394.0	2
964	-19.72	180.83	3394.0	2
965	-19.37	182.07	3394.1	2
966	-21.10	180.67	3393.7	2
969	-22.39	190.91	3394.0	2
970	-24.28	191.32	3393.6	2
971	-23.68	194.47	3393.8	2
972	-25.72	193.57	3393.4	2
973	-17.69	189.38	3394.6	2
974	-18.27	188.69	3394.6	2
975	-19.52	189.55	3394.5	2
976	-19.24	191.72	3394.6	2
977	-12.69	187.26	3394.6	2
978	-13.99	187.01	3394.6	2
979	-14.13	188.81	3394.8	2
980	-15.08	187.93	3394.7	2
981	-15.75	189.75	3394.8	2
982	-16.68	188.71	3394.6	2
988	-19.58	194.92	3394.5	2
989	-21.23	192.17	3394.3	2
991	-15.82	191.67	3394.8	2
992	-16.64	189.80	3394.7	2
993	-11.75	188.76	3394.8	2
994	-7.76	185.24	3394.3	2
995	-2.93	186.71	3393.7	2
996	-3.00	185.74	3393.7	2
997	-7.41	184.60	3394.2	2
1000	-5.27	185.69	3394.0	2
1001	-4.75	183.61	3393.9	2

AREOCENTRIC

Table 3--continued

Point	Latitude, ϕ^{o}	W.Longitude, λ^{o}	Radius, km	No. of Frames
1002	-6.38	183.64	3394.1	2
1003	-5.38	179.94	3393.9	2
1004	-24.00	139.77	3394.9	2
1005	-25.06	146.23	3394.4	2
1006	-24.97	143.59	3394.5	2
1025	-30.52	143.47	3393.0	4
1026	-31.76	147.89	3392.5	4
1027	-27.64	150.77	3393.7	3
1039	-17.63	178.26	3394.1	2
1040	-19.28	177.60	3394.1	2
1231	25.77	67.85	3391.8	2
1232	26.83	55.97	3390.5	2
1373	25.54	272.08	3391.8	2
1374	21.74	272.49	3392.8	2
1429	40.88	208.94	3384.6	2
1435	32.34	205.06	3387.2	4
1438	38.50	204.48	3385.3	3
1439	40.68	199.62	3384.4	3
1441	28.70	210.28	3388.4	3
1442	32.04	208.38	3387.5	3
1443	29.45	205.71	3388.1	2
1444	31.53	201.95	3387.3	2
1445	33.32	196.26	3386.6	3
1446	33.26	202.49	3386.8	3
1447	36.37	204.42	3385.9	2
1448	37.23	200.83	3385.5	2
1449	40.62	196.20	3384.4	3
1450	38.97	193.78	3384.9	3
1451	25.09	197.11	3388.9	3
1452	26.70	194.80	3388.4	2
1454	33.82	192.83	3386.4	2
1455	34.10	187.95	3386.3	2
1456	35.73	193.60	3385.9	3
1457	40.12	190.44	3384.6	4
1458	37.87	187.32	3385.3	3
1459	38.14	182.07	3385.2	4
1460	46.65	190.52	3382.4	3
1465	34.29	184.32	3386.3	2
1466	33.61	178.95	3386.5	2
1467	36.92	179.36	3385.6	2
1468	40.02	172.65	3384.4	4
1469	46.81	180.46	3382.4	4
1470	44.53	180.12	3383.2	4
1471	26.60	176.66	3388.3	2

AREOCENTRIC

Table 3--continued

Point	Latitude, ϕ^{o}	W.Longitude, λ^{o}	Radius, km	No. of Frames
1472	26.26	174.27	3388.3	2
1473	27.35	178.48	3388.2	2
1476	33.05	173.91	3386.5	3
1477	32.15	170.37	3386.7	2
1478	34.39	176.37	3386.2	3
1479	36.12	173.70	3385.6	2
1480	38.20	170.86	3384.9	3
1481	43.67	172.56	3383.2	2
1482	39.05	165.32	3384.6	2
1486	42.22	163.90	3383.6	3
1487	44.29	157.08	3383.2	3
1489	39.12	158.49	3384.7	3
1490	49.11	151.75	3381.7	2
1491	43.60	147.86	3383.8	2
1492	44.52	149.73	3383.6	3
1493	40.23	145.53	3384.9	3
1494	43.31	138.88	3383.8	2
1499	43.15	134.40	3384.8	2
1500	38.95	133.15	3386.6	4
1501	38.16	131.00	3387.4	4
1502	38.54	136.54	3386.0	4
1503	37.73	127.22	3388.1	3
1504	40.46	128.55	3386.9	3
1505	34.15	131.41	3388.8	2
1506	31.67	129.64	3390.0	2
1507	33.25	126.84	3389.9	3
1508	28.20	125.87	3392.1	2
1509	26.47	122.82	3393.2	2
1510	26.53	126.33	3392.8	2
1511	26.00	124.46	3393.2	2
1512	32.75	123.16	3390.7	4
1513	39.06	121.55	3388.3	5
1514	42.19	120.24	3387.1	4
1515	44.90	123.95	3385.5	2
1516	46.52	121.30	3385.1	2
1517	45.74	115.44	3385.5	3
1519	26.61	118.86	3393.6	2
1520	25.33	117.05	3394.1	2
1521	40.74	110.59	3387.9	5
1522	39.64	114.18	3388.3	4
1523	44.06	110.21	3386.4	4
1524	40.96	118.00	3387.7	4
1525	35.42	118.02	3390.2	2
1600	10.94	133.64	3396.0	3
1601	13.75	129.44	3396.5	2

AREOCENTRIC

Table 3--continued

Point	Latitude, ϕ^{o}	W.Longitude, λ^{o}	Radius, km	No. of Frames
1602	14.65	130.85	3397.1	3
1603	16.87	133.53	3405.5	4
1604	16.88	129.34	3396.0	4
1605	13.76	131.45	3395.7	2
1606	18.49	133.12	3402.4	5
1607	22.63	133.57	3389.7	2
1608	20.06	135.48	3394.2	3
1609	18.14	135.83	3395.8	4

Table 4

AREOGRAPHIC COORDINATES OF THE CONTROL POINTS

Point	Latitude, $\phi'°$	W.Longitude, $\lambda°$	Elevation, km
0	-5.17	0.0	1.4
26	-15.79	3.87	2.2
31	-5.95	359.06	1.6
33	-4.11	356.36	1.7
34	-8.71	0.56	1.7
35	-4.75	2.64	1.4
37	0.66	358.48	1.1
38	-3.87	0.98	1.3
49	-77.08	0.69	-0.0
66	-80.28	353.43	0.0
70	-75.70	324.08	0.0
71	-75.40	307.58	-0.0
138	-79.73	329.93	0.0
147	-69.64	42.58	0.0
148	-66.98	56.77	0.2
149	-71.19	26.37	-0.0
150	-41.83	7.33	1.5
153	-37.76	3.02	1.9
160	-81.07	340.75	0.0
161	-78.06	358.75	-0.0
162	-74.03	324.03	0.0
163	-78.79	142.84	-0.0
166	-72.25	176.13	-0.0
167	-72.21	163.76	-0.0
171	-72.70	258.10	-0.0
172	-72.81	264.64	-0.0
176	-83.30	353.23	-0.0
177	-81.24	19.21	-0.0
180	-48.96	10.52	1.0
181	-39.72	16.36	1.7
182	-53.74	32.38	0.7
183	-48.05	20.06	1.2
187	-33.46	75.44	6.1
190	-42.41	68.03	3.8
191	-43.87	60.28	3.0
192	-52.01	56.88	1.7
193	-50.35	72.68	2.7
194	-45.45	74.12	3.8
196	-80.93	48.34	-0.0
197	-82.29	73.14	-0.0
198	-67.02	17.17	0.1
199	-69.60	146.25	0.0
200	-42.11	196.15	2.4
201	-50.04	191.11	1.4
202	-55.60	185.22	0.8

AREOGRAPHIC

Table 4--continued

Point	Latitude, ϕ'°	W.Longitude, λ°	Elevation, km
203	-50.34	175.75	1.2
204	-40.31	178.08	1.9
205	-26.67	188.70	3.1
206	-32.55	186.47	2.8
207	-33.76	202.95	3.3
208	-34.12	210.29	2.9
209	-27.21	217.38	3.3
210	-27.93	208.22	3.2
211	-33.22	227.66	3.7
212	-38.83	212.58	2.6
213	-43.32	225.76	2.5
214	-39.93	229.75	3.0
215	-23.35	237.71	3.8
216	-67.41	343.07	0.1
222	-75.94	289.60	-0.0
223	-80.68	289.75	0.0
224	-78.49	254.13	0.0
229	-70.66	349.70	-0.0
232	-69.20	359.40	0.0
233	-74.29	344.54	0.0
234	-68.88	298.16	-0.1
236	-80.56	320.75	0.0
237	-74.42	235.19	0.0
238	-85.58	264.01	0.0
239	-78.16	230.49	0.0
240	-75.97	210.77	-0.0
242	-63.96	317.61	0.3
243	-66.99	322.84	0.2
244	-70.80	311.66	-0.0
245	-64.81	312.46	0.0
246	-70.39	285.04	-0.0
248	-62.13	148.70	0.4
249	-55.31	152.56	0.8
250	-60.61	142.25	0.9
251	-65.61	131.32	0.4
252	-65.14	122.03	0.6
253	-69.82	114.77	0.0
254	-68.49	97.34	0.2
255	-70.27	92.04	0.0
256	-72.96	105.48	0.0
257	-72.07	81.90	0.0
258	-72.14	131.85	0.0
259	-77.19	128.26	0.0
260	-69.04	146.02	0.1

AREOGRAPHIC

Table 4--continued

Point	Latitude, ϕ'°	W.Longitude, λ°	Elevation, km
261	-58.71	111.68	1.6
262	-53.33	125.38	2.4
263	-46.90	121.26	4.2
264	-42.72	120.19	5.3
266	-36.74	128.83	5.1
268	-55.67	78.02	1.9
269	-62.79	70.78	0.7
270	-62.47	44.01	0.3
271	-30.86	65.50	5.7
272	-38.14	52.98	2.9
273	-32.31	51.74	3.4
274	-20.36	45.87	2.9
275	-33.33	39.73	2.5
276	-42.81	34.45	1.5
277	-52.73	41.36	1.0
278	-30.46	25.98	2.2
279	-32.37	18.64	2.3
280	-39.02	25.71	1.7
281	-53.79	20.96	0.8
282	-60.04	23.42	0.3
283	-46.09	9.58	1.1
284	-63.96	259.28	0.2
285	-63.05	231.32	0.4
286	-49.01	260.11	1.0
289	-61.38	252.57	0.4
291	-33.00	245.58	3.5
292	-32.81	256.85	2.5
293	-49.35	237.88	1.8
294	-40.19	243.50	2.8
295	-49.27	219.12	1.7
296	-64.11	209.86	0.3
297	-27.94	233.40	4.1
298	-33.82	219.56	3.4
299	-43.82	215.32	2.2
300	-48.36	206.10	1.7
301	-44.49	203.60	2.1
303	-43.66	189.98	2.0
304	-64.06	196.91	0.3
305	-70.00	71.67	0.0
306	-77.05	71.32	-0.0
307	-53.27	197.17	1.3
309	-47.48	183.32	1.4
310	-32.72	195.96	3.4
312	-61.05	177.08	0.4
313	-69.16	198.52	0.1

AREOGRAPHIC

Table 4--continued

Point	Latitude, ϕ'°	W.Longitude, λ°	Elevation, km
314	-32.45	176.13	2.6
315	-47.77	172.85	1.5
316	-33.22	166.09	2.9
317	-60.66	165.14	0.4
318	-46.69	162.34	1.6
319	-37.14	161.52	2.4
320	-42.37	132.34	4.0
321	-62.01	133.17	0.7
322	-34.15	151.86	3.3
323	-49.41	152.85	1.3
324	-55.21	156.31	0.9
325	-34.87	144.84	4.0
326	-31.35	160.22	2.9
327	-43.03	145.37	3.1
328	-55.63	136.84	1.9
329	-47.19	137.99	3.6
331	-33.98	11.73	1.9
334	-46.08	126.89	3.6
335	-34.05	0.27	2.2
336	-46.03	1.40	1.3
337	-56.23	8.50	0.5
338	-60.39	11.93	0.3
339	-28.19	2.18	2.5
340	-33.17	352.85	2.7
341	-47.91	345.80	1.6
342	-57.78	354.09	0.6
343	-35.06	339.16	3.0
344	-25.59	344.19	3.7
345	-23.43	352.69	3.4
346	-49.55	335.58	1.6
347	-61.50	338.97	0.4
348	-35.35	331.73	3.0
349	-24.74	333.11	4.0
350	-42.03	337.96	2.3
351	-46.66	325.18	2.3
352	-56.71	339.66	0.8
353	-59.21	322.71	0.8
354	-27.28	324.19	4.0
355	-35.75	322.94	3.6
356	-67.84	245.28	0.1
357	-70.72	327.87	-0.0
358	-65.50	335.47	0.2
359	-73.07	57.30	-0.0
361	-72.04	294.56	-0.0

AREOGRAPHIC

Table 4--continued

Point	Latitude, ϕ'°	W.Longitude, λ°	Elevation, km
362	-72.36	276.30	0.0
363	-68.90	216.86	0.1
364	-54.33	329.08	1.1
365	-69.27	45.42	0.0
366	-70.38	56.89	0.0
367	-73.53	317.14	-0.0
368	-80.32	82.15	-0.0
375	-57.40	312.97	0.1
376	-43.78	323.81	2.7
377	-43.53	315.48	1.4
378	-31.11	316.43	2.7
379	-34.14	314.74	1.8
380	-53.23	316.95	1.1
381	-45.76	305.02	-1.7
382	-77.50	54.43	-0.0
383	-75.24	82.73	0.0
384	-73.09	99.93	0.0
400	9.41	136.81	3.0
401	10.27	135.22	3.4
404	20.27	137.30	1.4
405	18.20	131.86	12.6
406	21.79	131.60	1.7
407	22.78	136.77	0.8
408	11.61	124.89	4.9
409	11.11	121.77	5.2
410	10.61	119.34	5.4
411	15.98	127.46	4.2
413	19.50	119.84	4.4
414	24.35	128.16	3.1
415	8.12	119.62	5.7
416	6.73	120.80	5.7
417	3.28	121.56	6.0
418	16.73	119.21	4.8
419	15.18	117.47	5.0
420	23.32	119.49	4.1
421	23.64	117.50	4.1
422	2.74	111.27	7.2
423	7.73	112.84	6.3
424	24.72	109.90	4.1
425	18.89	111.13	4.9
426	17.50	114.19	4.9
427	9.18	102.21	5.9
430	8.40	112.18	6.3
433	11.17	97.47	5.5
435	18.11	95.21	4.5

AREOGRAPHIC

Table 4--continued

Point	Latitude, ϕ'°	W.Longitude, λ°	Elevation, km
436	21.96	103.31	4.2
437	25.18	102.56	3.8
438	25.42	98.91	3.6
439	24.41	91.63	3.7
440	26.62	92.18	3.4
442	28.41	87.83	3.1
443	24.44	89.82	3.6
444	22.00	89.34	3.9
445	21.48	80.98	3.4
446	13.01	83.28	4.4
447	13.61	79.83	3.9
449	4.22	82.56	5.2
450	16.65	82.26	3.9
451	20.18	77.20	3.2
452	28.38	79.53	3.0
453	25.34	81.09	3.2
454	11.43	76.89	4.0
455	1.01	71.93	4.5
456	7.60	72.89	4.1
457	11.67	72.40	3.7
458	11.31	69.01	3.5
459	20.02	71.91	2.9
460	18.04	72.58	3.1
461	19.47	68.43	2.8
462	26.91	71.20	1.9
463	23.24	72.24	2.5
464	20.72	64.18	2.3
465	25.26	63.68	1.5
466	16.72	64.26	2.6
467	11.31	64.37	3.0
468	6.74	64.13	3.4
470	12.79	60.66	2.6
471	20.77	58.54	1.7
472	13.29	53.99	1.8
473	10.18	55.33	2.2
475	11.55	50.68	1.5
476	16.54	54.36	1.5
477	20.13	56.23	1.5
478	23.08	55.96	1.1
479	20.44	47.76	0.4
480	24.93	47.12	0.2
481	19.47	45.27	0.4
483	19.69	41.98	0.2
484	10.62	40.00	1.0

AREOGRAPHIC

Table 4--continued

Point	Latitude, ϕ'°	W.Longitude, λ°	Elevation, km
485	7.60	45.94	1.6
486	2.61	46.24	2.1
487	19.57	29.75	-0.6
488	10.81	34.81	0.5
489	11.99	25.34	-0.0
490	8.38	25.29	0.2
491	17.31	24.87	-0.3
492	19.85	23.96	-0.5
493	23.66	29.77	-0.8
495	19.55	15.68	-0.3
496	25.29	17.43	-0.6
497	19.76	12.04	-0.4
498	19.17	19.93	-0.3
500	11.26	17.21	0.1
501	4.86	16.29	0.5
502	11.14	12.05	0.2
503	10.26	16.04	0.2
504	10.98	6.60	0.2
505	0.41	6.84	1.0
506	15.90	7.15	-0.1
507	19.08	7.39	-0.3
508	25.99	7.58	-0.7
509	18.44	2.58	-0.2
510	10.17	2.66	0.2
511	8.42	1.48	0.4
512	11.09	358.75	0.3
513	5.05	358.03	0.8
514	15.45	357.76	0.2
515	18.72	358.12	-0.0
516	13.41	355.24	0.5
517	8.86	355.05	0.8
518	5.83	354.36	1.1
519	11.46	354.65	0.7
520	18.31	353.16	0.4
521	14.99	355.04	0.4
522	15.38	350.78	0.8
523	0.31	2.71	1.0
524	2.22	2.51	0.9
525	6.74	358.19	0.7
527	4.97	38.83	1.4
528	4.06	33.62	0.9
529	6.12	34.94	0.9
530	9.03	37.19	0.9
531	10.48	31.30	0.2
532	15.40	34.63	0.1

AREOGRAPHIC

Table 4--continued

Point	Latitude, ϕ'°	W.Longitude, λ°	Elevation, km
436	21.96	103.31	4.2
437	25.18	102.56	3.8
438	25.42	98.91	3.6
439	24.41	91.63	3.7
440	26.62	92.18	3.4
442	28.41	87.83	3.1
443	24.44	89.82	3.6
444	22.00	89.34	3.9
445	21.48	80.98	3.4
446	13.01	83.28	4.4
447	13.61	79.83	3.9
449	4.22	82.56	5.2
450	16.65	82.26	3.9
451	20.18	77.20	3.2
452	28.38	79.53	3.0
453	25.34	81.09	3.2
454	11.43	76.89	4.0
455	1.01	71.93	4.5
456	7.60	72.89	4.1
457	11.67	72.40	3.7
458	11.31	69.01	3.5
459	20.02	71.91	2.9
460	18.04	72.58	3.1
461	19.47	68.43	2.8
462	26.91	71.20	1.9
463	23.24	72.24	2.5
464	20.72	64.18	2.3
465	25.26	63.68	1.5
466	16.72	64.26	2.6
467	11.31	64.37	3.0
468	6.74	64.13	3.4
470	12.79	60.66	2.6
471	20.77	58.54	1.7
472	13.29	53.99	1.8
473	10.18	55.33	2.2
475	11.55	50.68	1.5
476	16.54	54.36	1.5
477	20.13	56.23	1.5
478	23.08	55.96	1.1
479	20.44	47.76	0.4
480	24.93	47.12	0.2
481	19.47	45.27	0.4
483	19.69	41.98	0.2
484	10.62	40.00	1.0

AREOGRAPHIC

Table 4--continued

Point	Latitude, ϕ'°	W.Longitude, λ°	Elevation, km
533	18.21	28.97	-0.5
534	12.56	30.90	0.0
535	9.68	346.29	1.7
536	9.27	345.59	1.8
537	14.26	344.92	1.4
538	12.71	338.89	2.2
539	14.48	346.07	1.3
540	10.48	348.09	1.4
542	18.57	346.98	0.9
543	20.61	345.47	0.9
544	22.04	338.12	1.4
545	11.23	336.83	2.5
546	5.23	338.81	2.7
547	10.81	331.85	2.5
548	11.12	329.68	2.6
549	15.89	337.25	2.0
550	19.50	336.46	1.7
551	18.93	332.93	1.9
552	19.37	329.08	2.0
553	24.42	336.73	1.3
554	27.26	337.33	1.1
555	6.77	328.04	2.8
556	9.27	328.77	2.7
557	10.31	321.50	2.5
558	12.04	323.45	2.4
560	15.99	329.58	2.3
561	19.14	324.60	1.9
562	19.72	320.45	1.8
563	23.54	328.36	1.7
564	26.33	327.54	1.4
567	7.70	319.65	2.6
568	10.16	317.36	2.4
569	10.33	311.62	2.0
570	13.89	320.92	2.2
571	15.63	319.73	2.1
572	18.69	318.13	1.7
573	17.60	312.03	1.5
574	22.24	320.99	1.5
575	23.83	318.63	1.3
577	7.74	312.22	2.2
578	5.10	311.27	2.4
579	12.36	309.57	1.8
580	12.33	305.61	2.1
581	11.46	302.48	2.3

AREOGRAPHIC

Table 4--continued

Point	Latitude, ϕ'°	W.Longitude, λ°	Elevation, km
582	12.32	311.87	1.9
583	15.09	312.23	1.7
584	21.85	312.31	1.2
585	26.19	310.72	0.8
586	20.11	305.85	1.5
587	21.32	306.96	1.3
588	19.62	301.21	1.8
589	6.39	303.80	2.6
590	9.18	303.14	2.5
591	10.02	301.30	2.5
592	9.98	295.60	2.6
593	9.02	294.18	2.6
594	15.06	303.36	2.0
595	18.67	303.02	1.7
596	18.22	297.92	1.9
597	18.08	294.69	1.9
598	23.52	303.95	1.3
599	26.83	300.50	1.2
600	23.89	293.26	1.4
601	25.80	294.39	1.3
602	19.06	296.27	1.8
603	19.26	285.99	2.0
604	18.55	289.04	1.8
605	13.88	293.78	2.2
606	9.95	287.43	2.7
607	10.68	290.52	2.4
608	4.61	294.03	3.0
609	1.33	296.30	3.3
610	6.89	285.33	3.1
611	2.97	285.54	3.4
612	11.31	285.21	2.7
613	11.10	280.55	3.2
614	11.23	277.05	3.0
615	17.25	286.23	2.2
616	13.77	285.49	2.5
617	20.05	283.27	2.2
618	19.77	278.48	2.5
619	23.49	287.41	1.5
620	25.71	284.77	1.4
621	22.67	277.72	2.0
622	24.93	275.28	1.7
623	17.33	274.96	2.4
624	16.98	279.92	2.8
625	15.40	278.71	2.8
626	13.58	277.03	2.8

AREOGRAPHIC

Table 4--continued

Point	Latitude, ϕ'°	W.Longitude, λ°	Elevation, km
628	8.19	274.98	3.2
629	6.42	276.59	3.4
631	6.17	279.40	3.6
632	18.29	350.79	0.6
633	19.19	350.05	0.6
634	3.81	270.30	3.3
635	2.76	269.69	3.4
636	5.94	268.90	3.1
637	6.37	270.53	3.1
638	8.10	268.37	2.9
641	8.14	265.47	3.0
642	7.88	264.63	3.1
643	17.04	268.25	2.1
644	14.34	268.61	2.3
645	13.29	268.54	2.4
646	12.36	263.20	2.7
647	12.62	265.88	2.6
648	11.18	267.74	2.7
650	13.18	256.21	2.4
651	14.71	264.18	2.5
652	15.18	260.43	5.6
653	16.95	266.35	2.2
654	20.33	258.75	2.0
655	21.31	257.95	1.9
657	26.70	256.45	1.3
658	23.93	258.23	1.7
659	19.43	250.52	1.3
662	16.71	256.89	2.2
663	12.63	249.05	1.8
664	11.74	253.11	2.2
668	12.71	247.50	1.7
669	9.98	248.60	2.0
670	6.59	249.39	2.3
671	4.53	247.95	2.5
672	1.89	248.16	2.7
673	11.56	238.97	1.5
674	11.33	244.53	1.8
675	15.88	248.77	1.5
676	17.27	249.45	1.4
677	20.53	241.04	0.8
678	20.23	243.58	0.9
679	20.13	246.21	1.0
680	21.88	248.64	1.0
681	23.68	249.92	0.9

AREOGRAPHIC

Table 4--continued

Point	Latitude, ϕ'°	W.Longitude, λ°	Elevation, km
682	26.19	249.24	0.6
684	22.77	238.79	0.4
685	23.36	241.93	0.5
686	25.72	239.61	0.2
687	18.11	241.88	1.0
688	17.19	238.00	0.9
689	17.11	231.75	0.3
690	13.23	241.64	1.5
691	15.39	240.14	1.2
692	10.05	238.83	1.6
693	9.13	240.91	1.9
694	8.59	236.82	1.4
695	8.53	231.44	0.7
696	6.32	239.61	2.1
697	2.18	242.57	2.6
698	1.81	240.65	2.5
699	9.86	230.89	0.5
700	5.91	231.18	0.8
701	12.32	229.60	0.3
702	12.28	221.00	-0.4
703	21.78	227.28	-0.3
704	21.20	224.64	-0.5
705	21.57	221.83	-0.7
706	29.87	229.22	-0.5
707	28.26	221.64	-0.9
708	29.12	228.06	-0.5
709	27.20	220.92	-0.9
710	9.63	221.31	-0.3
711	7.86	220.45	-0.3
714	2.09	221.26	-0.1
715	11.76	215.33	-0.6
716	11.93	213.23	-0.7
717	14.71	222.30	-0.4
718	20.30	220.45	-0.8
720	19.92	212.95	-0.9
721	24.69	221.48	-0.8
722	23.57	211.41	-0.9
723	26.68	211.62	-0.9
724	27.39	208.12	-0.9
725	25.39	208.93	-0.9
726	26.37	202.18	-1.1
727	21.55	206.28	-1.0
728	20.56	200.70	-1.1
729	18.95	206.41	-1.0
730	17.13	200.11	-1.0

AREOGRAPHIC

Table 4--continued

Point	Latitude, ϕ'°	W.Longitude, λ°	Elevation, km
731	13.58	208.10	-0.8
732	12.91	205.28	-0.9
733	13.74	202.31	-0.9
734	12.91	201.28	-0.9
735	4.08	199.72	-0.4
736	8.69	200.25	-0.8
737	10.84	199.48	-0.9
738	13.35	198.58	-1.0
739	13.17	193.03	-1.2
740	11.91	190.82	-1.2
741	23.69	201.57	-1.1
742	27.31	200.35	-1.2
743	20.48	197.05	-1.2
744	20.53	194.94	-1.3
745	20.33	190.43	-1.4
746	17.12	190.93	-1.3
747	15.09	190.26	-1.3
750	11.39	181.36	-1.4
751	20.58	185.36	-1.4
752	20.60	180.93	-1.4
753	3.16	178.31	-0.2
754	1.77	178.09	-0.0
755	2.57	172.31	0.2
756	13.20	177.89	-1.3
757	12.94	175.75	-1.2
758	17.53	182.70	-1.4
759	14.73	181.45	-1.4
760	20.32	178.44	-1.5
761	20.42	176.91	-1.5
762	19.65	174.67	-1.6
763	22.20	181.05	-1.4
764	24.48	181.12	-1.4
765	26.40	182.41	-1.5
766	27.74	180.32	-1.4
769	12.73	169.44	-1.0
771	5.49	163.36	-0.1
772	6.70	163.04	-0.2
773	9.91	152.50	0.0
774	4.77	152.84	0.6
775	7.29	145.43	1.3
785	7.45	174.83	-0.7
786	6.30	173.16	-0.4
787	6.29	177.06	-0.6
788	10.86	175.33	-1.1

AREOGRAPHIC

Table 4--continued

Point	Latitude, ϕ'°	W.Longitude, λ°	Elevation, km
791	9.38	169.28	-0.6
792	7.44	171.74	-0.5
793	15.91	170.59	-1.3
796	6.80	168.41	-0.3
797	8.85	157.55	-0.2
800	-26.34	9.32	2.3
801	-26.91	7.74	2.3
802	-24.39	6.12	2.4
803	-27.05	14.85	2.2
804	-23.99	15.12	2.1
806	-18.55	4.73	2.5
807	-17.07	8.40	2.3
808	-23.98	7.85	2.4
809	-23.09	7.60	2.5
810	-23.01	4.47	2.5
811	-21.30	5.70	2.5
812	-22.69	6.32	2.5
813	-19.15	1.39	2.5
814	-17.69	3.69	2.4
815	-14.01	3.31	2.1
817	-12.51	1.27	2.0
818	-15.05	358.90	2.3
819	-8.69	2.64	1.7
820	-9.67	0.76	1.8
822	-10.71	356.23	2.3
823	-7.67	358.50	1.8
824	-14.30	6.92	2.1
825	-4.66	0.52	1.4
826	-4.24	2.41	1.4
827	-5.41	358.71	1.6
828	-3.78	358.46	1.5
829	-8.62	5.17	1.7
830	-10.68	11.79	1.7
831	-10.41	10.41	1.8
832	-8.94	10.68	1.6
833	-6.90	14.17	1.3
834	-5.11	9.62	1.4
835	-4.19	9.50	1.3
836	-3.05	12.21	1.1
837	1.38	8.17	0.9
839	-12.47	14.99	1.6
840	-16.77	13.50	2.0
841	-16.28	12.58	2.0
842	-14.12	11.92	1.9
843	-15.32	13.53	1.9

AREOGRAPHIC

Table 4--continued

Point	Latitude, ϕ'°	W.Longitude, λ°	Elevation, km
844	-18.92	9.36	2.5
845	-13.16	10.14	2.0
846	-8.87	7.50	1.7
847	-22.43	10.68	2.4
848	-18.68	12.21	2.2
849	-18.30	14.58	2.0
850	-23.13	14.05	2.2
851	-17.78	16.23	1.8
852	-22.65	16.57	2.0
853	-22.38	15.43	2.1
854	-20.37	14.67	2.1
856	-21.75	10.42	2.5
857	-23.57	16.26	2.0
858	-22.66	17.59	1.9
859	-21.43	19.76	1.6
861	-25.51	16.97	2.1
862	-24.22	2.88	2.5
863	-22.12	0.38	2.6
864	-21.59	355.93	3.1
865	-20.38	-0.01	2.6
866	-17.66	359.03	2.5
867	-14.99	358.13	2.4
868	-16.77	353.97	3.1
869	-12.67	356.20	2.4
870	-11.99	351.88	2.9
871	-11.21	353.97	2.6
872	-9.77	356.56	2.2
873	-5.20	355.51	1.9
874	-9.08	354.80	2.3
875	-5.91	353.26	2.2
876	-6.47	352.31	2.4
877	-2.11	350.14	2.3
878	-2.46	352.20	2.1
879	-0.66	353.53	1.8
880	3.23	348.50	2.0
881	3.99	354.65	1.3
882	-26.06	358.24	2.7
883	-24.15	359.06	2.6
884	-23.26	356.59	2.9
885	-24.95	358.16	2.7
887	-20.35	353.24	3.4
888	-24.55	354.47	3.1
890	-18.61	355.41	3.0
891	-17.93	353.29	3.2

AREOGRAPHIC

Table 4--continued

Point	Latitude, $\phi'°$	W.Longitude, $\lambda°$	Elevation, km
892	-19.33	352.03	3.5
893	-14.05	352.88	3.0
895	-15.24	349.20	3.5
896	-8.82	351.11	2.7
897	-10.07	352.73	2.6
898	-10.50	347.09	3.1
899	-9.30	348.74	3.0
900	-5.96	350.09	2.6
901	-8.60	347.62	3.0
902	-9.29	345.07	3.1
903	-8.45	343.98	3.1
904	-7.65	345.61	3.0
905	-4.63	341.03	3.1
906	-3.91	342.55	2.9
907	-2.77	343.84	2.8
908	-17.29	351.37	3.4
909	-17.84	348.58	3.8
910	-22.03	351.23	3.6
911	-23.86	12.07	2.3
912	-4.22	349.00	2.5
913	2.53	345.22	2.3
914	1.46	344.43	2.5
915	2.07	340.58	2.8
916	0.70	340.16	2.9
917	6.23	342.59	2.3
918	5.11	339.87	2.7
919	5.08	337.62	2.7
920	-24.61	196.08	3.4
921	-25.33	189.00	3.2
922	-28.67	191.01	3.3
923	-22.68	194.42	3.3
924	-2.78	178.91	0.5
925	-2.42	178.04	0.5
926	-3.84	175.53	0.8
927	-7.30	175.29	1.2
928	-5.46	175.77	1.0
929	-9.66	178.58	1.2
930	-10.40	178.62	1.3
931	-10.99	176.54	1.6
932	-9.60	176.21	1.4
933	-11.00	174.52	1.7
934	-9.64	173.72	1.6
935	-11.52	173.05	1.9
936	-14.74	174.21	2.2
937	-15.52	174.67	2.3

AREOGRPHIC

Table 4--continued

Point	Latitude, $\phi'°$	W.Longitude, $\lambda°$	Elevation, km
938	-11.96	180.38	1.4
939	-12.79	178.49	1.6
940	-13.94	177.57	1.9
941	-14.51	178.31	1.9
942	-15.53	178.58	2.0
947	-16.92	181.11	2.2
948	-17.79	179.07	2.3
952	-19.24	186.59	2.9
954	-20.34	186.08	3.0
955	-21.61	183.63	2.8
956	-17.32	188.62	2.8
958	-22.94	186.41	3.0
960	-24.23	187.80	3.1
961	-24.17	189.02	3.2
962	-21.91	190.75	3.2
963	-18.19	180.50	2.3
964	-19.91	180.83	2.6
965	-19.55	182.07	2.6
966	-21.30	180.67	2.6
969	-22.60	190.91	3.2
970	-24.51	191.32	3.2
971	-23.90	194.47	3.3
972	-25.95	193.57	3.3
973	-17.87	189.38	2.9
974	-18.45	188.69	2.9
975	-19.71	189.55	3.1
976	-19.43	191.72	3.1
977	-12.82	187.26	2.1
978	-14.13	187.01	2.2
979	-14.27	188.81	2.4
980	-15.23	187.93	2.5
981	-15.91	189.75	2.7
982	-16.84	188.71	2.7
988	-19.77	194.92	3.1
989	-21.43	192.17	3.2
991	-15.98	191.67	2.7
992	-16.81	189.80	2.8
993	-11.87	188.76	2.1
994	-7.84	185.24	1.2
995	-2.96	186.71	0.4
996	-3.04	185.74	0.4
997	-7.49	184.60	1.1
1000	-5.32	185.69	0.8
1001	-4.80	183.61	0.7

AREOGRAPHIC

Table 4--continued

Point	Latitude, ϕ'°	W.Longitude, λ°	Elevation, km
1002	-6.45	183.64	0.9
1003	-5.44	179.94	0.7
1004	-24.22	139.77	4.4
1005	-25.29	146.23	4.2
1006	-25.19	143.59	4.2
1025	-30.78	143.47	4.2
1026	-32.02	147.89	4.0
1027	-27.89	150.77	4.1
1039	-17.81	178.26	2.4
1040	-19.47	177.60	2.6
1231	26.01	67.85	1.7
1232	27.07	55.97	0.7
1373	25.78	272.08	1.6
1374	21.94	272.49	1.8
1429	41.18	208.94	-1.2
1435	32.61	205.06	-1.1
1438	38.79	204.48	-1.3
1439	40.97	199.62	-1.5
1441	28.95	210.28	-0.9
1442	32.31	208.38	-1.0
1443	29.70	205.71	-1.0
1444	31.80	201.95	-1.2
1445	33.60	196.26	-1.4
1446	33.53	202.49	-1.2
1447	36.65	204.42	-1.2
1448	37.52	200.83	-1.4
1449	40.91	196.20	-1.5
1450	39.26	193.78	-1.5
1451	25.32	197.11	-1.3
1452	26.94	194.80	-1.4
1454	34.10	192.83	-1.5
1455	34.38	187.95	-1.5
1456	36.01	193.60	-1.5
1457	40.41	190.44	-1.5
1458	38.16	187.32	-1.5
1459	38.43	182.07	-1.4
1460	46.95	190.52	-1.7
1465	34.56	184.32	-1.5
1466	33.88	178.95	-1.5
1467	37.21	179.36	-1.5
1468	40.31	172.65	-1.7
1469	47.11	180.46	-1.6
1470	44.82	180.12	-1.5
1471	26.84	176.66	-1.5
1472	26.50	174.27	-1.6

AREOGRAPHIC

Table 4--continued

Point	Latitude, ϕ'°	W.Longitude, λ°	Elevation, km
1473	27.59	178.48	-1.5
1476	33.32	173.91	-1.6
1477	32.42	170.37	-1.7
1478	34.67	176.37	-1.5
1479	36.40	173.70	-1.6
1480	38.49	170.86	-1.7
1481	43.96	172.56	-1.8
1482	39.34	165.32	-1.8
1486	42.52	163.90	-1.8
1487	44.59	157.08	-1.6
1489	39.41	158.49	-1.7
1490	49.40	151.75	-1.6
1491	43.90	147.86	-1.2
1492	44.82	149.73	-1.2
1493	40.52	145.53	-1.1
1494	43.60	138.88	-1.3
1499	43.45	134.40	-0.4
1500	39.24	133.15	0.2
1501	38.45	131.00	0.7
1502	38.83	136.54	-0.5
1503	38.02	127.22	1.3
1504	40.76	128.55	0.9
1505	34.42	131.41	1.0
1506	31.94	129.64	1.5
1507	33.53	126.84	1.8
1508	28.44	125.87	2.7
1509	26.71	122.82	3.3
1510	26.77	126.33	2.9
1511	26.23	124.46	3.2
1512	33.02	123.16	2.5
1513	39.35	121.55	1.9
1514	42.49	120.24	1.6
1515	45.20	123.95	1.0
1516	46.81	121.30	1.0
1517	46.04	115.44	1.2
1519	26.85	118.86	3.8
1520	25.56	117.05	3.9
1521	41.04	110.59	2.0
1522	39.93	114.18	2.1
1523	44.36	110.21	1.5
1524	41.25	118.00	1.9
1525	35.70	118.02	2.7
1600	11.05	133.64	3.2
1601	13.89	129.44	4.1

AREOGRAPHIC

Table 4--continued

Point	Latitude, ϕ'°	W.Longitude, λ°	Elevation, km
1602	14.80	130.85	4.8
1603	17.03	133.53	13.6
1604	17.05	129.34	4.1
1605	13.89	131.45	3.3
1606	18.67	133.12	10.8
1607	22.85	133.57	-1.1
1608	20.26	135.48	2.9
1609	18.32	135.83	4.1

The entire surface of Mars has been divided into 30 sections for the preparation of scale 1:5,000,000 maps. There are two stereographic projection charts that cover the poles, 12 Lambert projection charts between 30° and 65° latitudes in the north and south, and 16 Mercator projection charts that cover the equatorial region. Figure 2 shows the planet-wide distribution of these charts. Figures 3-26 show the distribution of the control points in 24 of these regions, and Figs. 27-50 have the control points circled on the U.S. Geological Survey mosaics of these 24 sections. (Points in the remaining six regions are in the process of being computed and will appear in the next report.) Control point numbers listed below cannot be located on the charts at present.

0	364	702	977
187	368	703	1025
192	433	704	1026
196	477	708	1039
197	479	757	1040
205	481	760	1445
234	485	761	1469
236	486	762	1470
243	496	766	1471
246	498	813	1472
271	595	818	1473
277	615	863	1490
279	643	865	1508
306	645	891	1514
316	654	938	1600
335	699	954	1602
358	701	963	1605

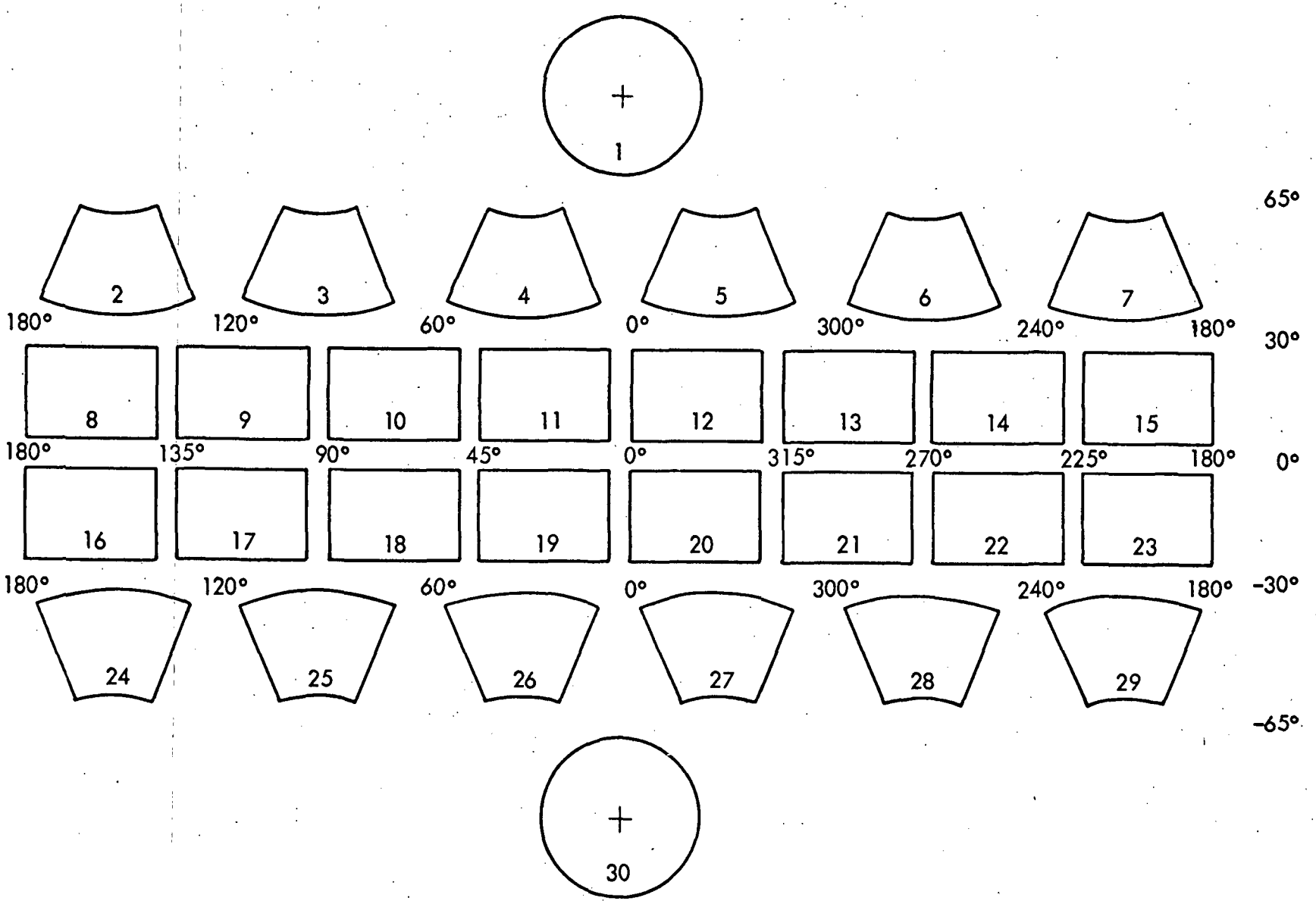


Fig. 2 — Surface of Mars divided into 30 sections for 1:5,000,000 charts

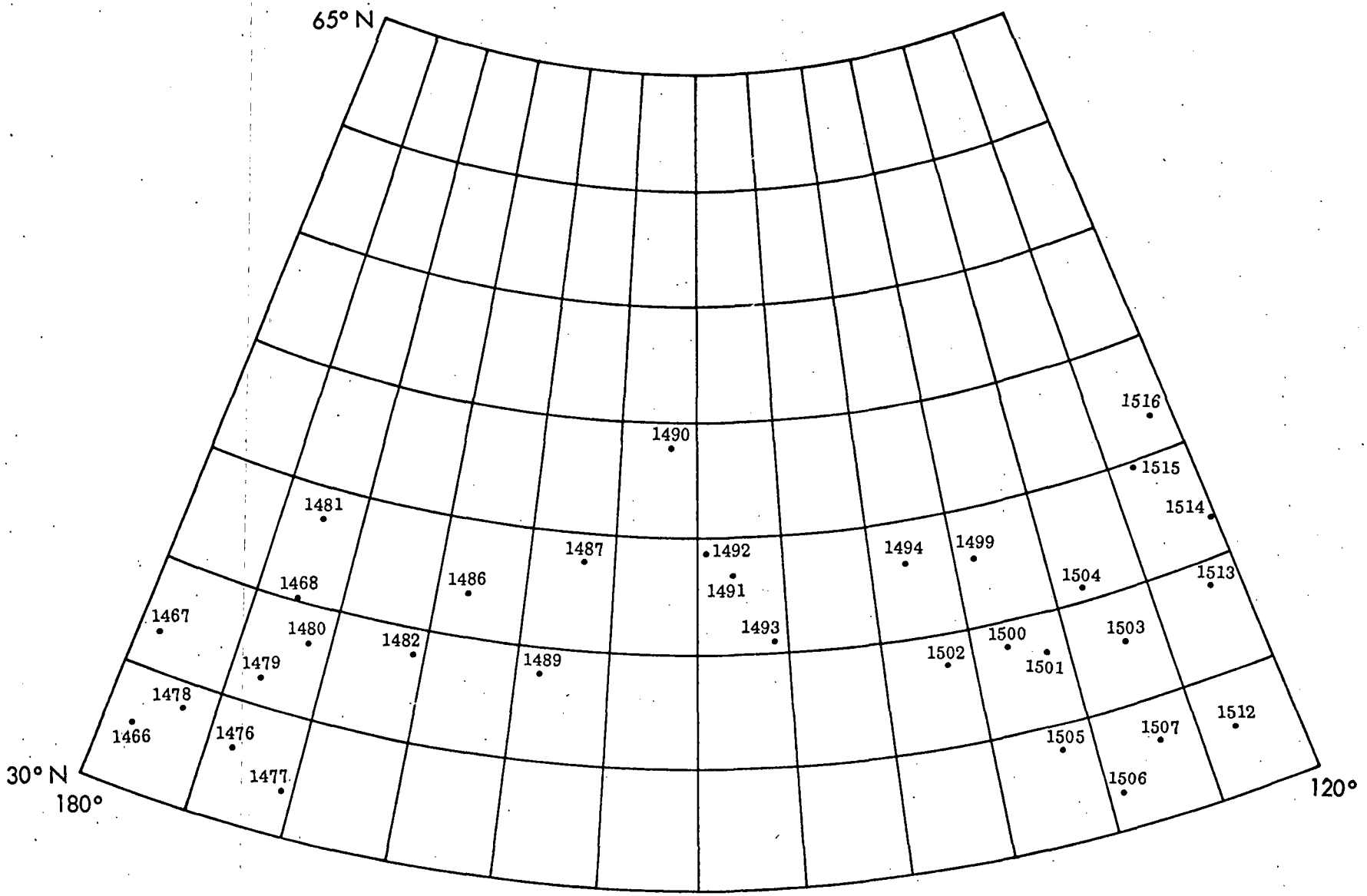


Fig. 3— Control point locations on MC-2

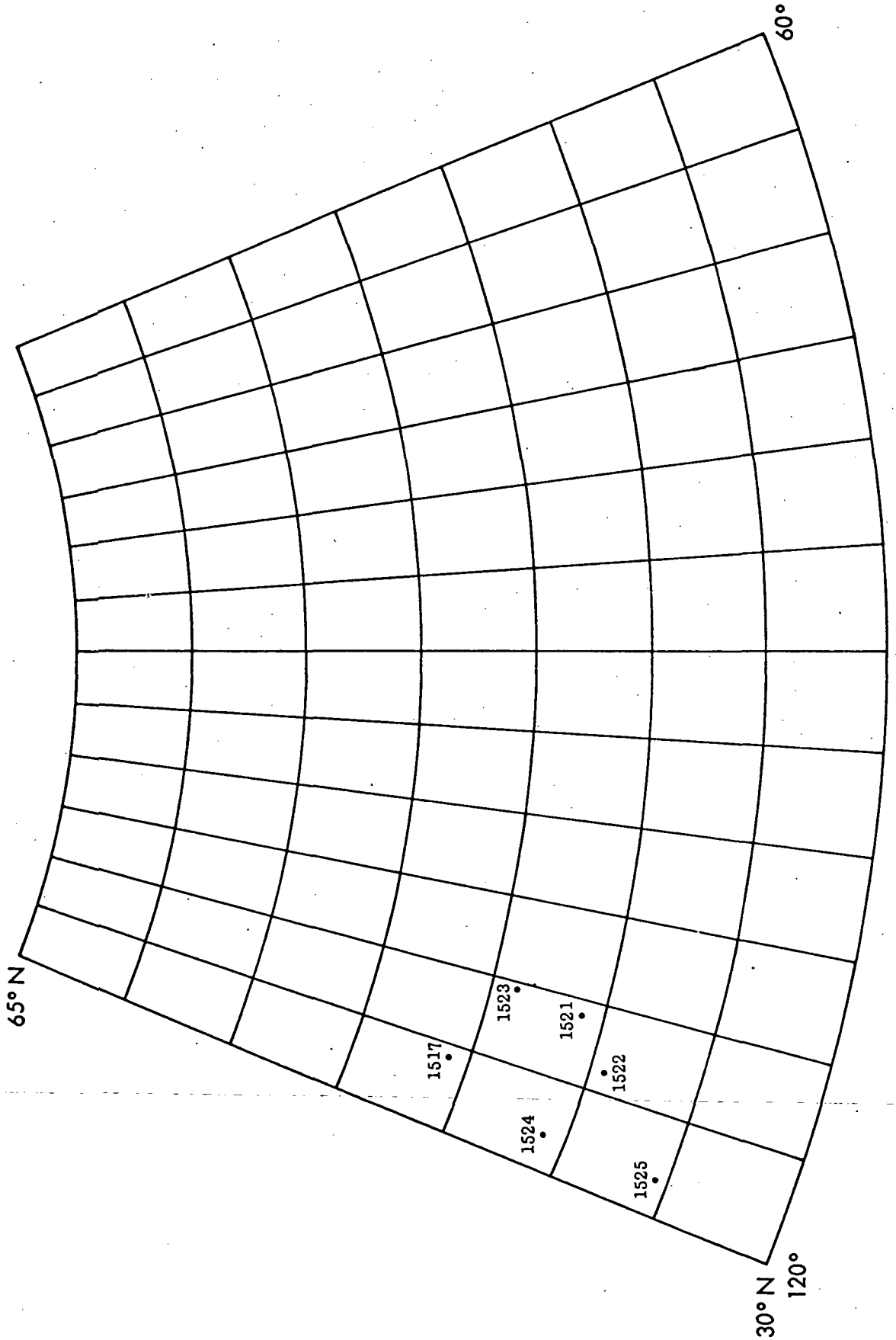


Fig. 4—Control point locations on MC-3

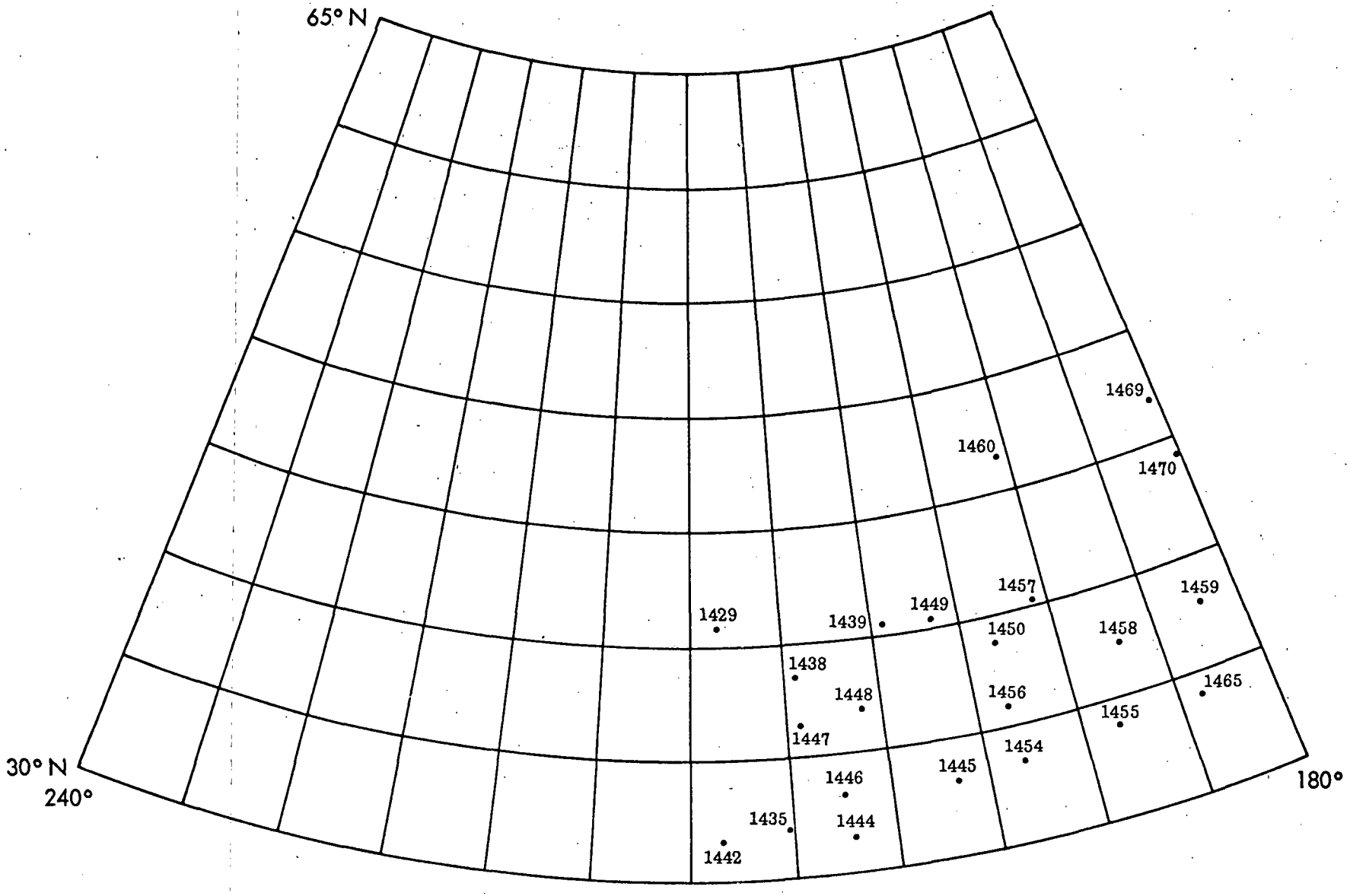


Fig. 5— Control point locations on MC-7

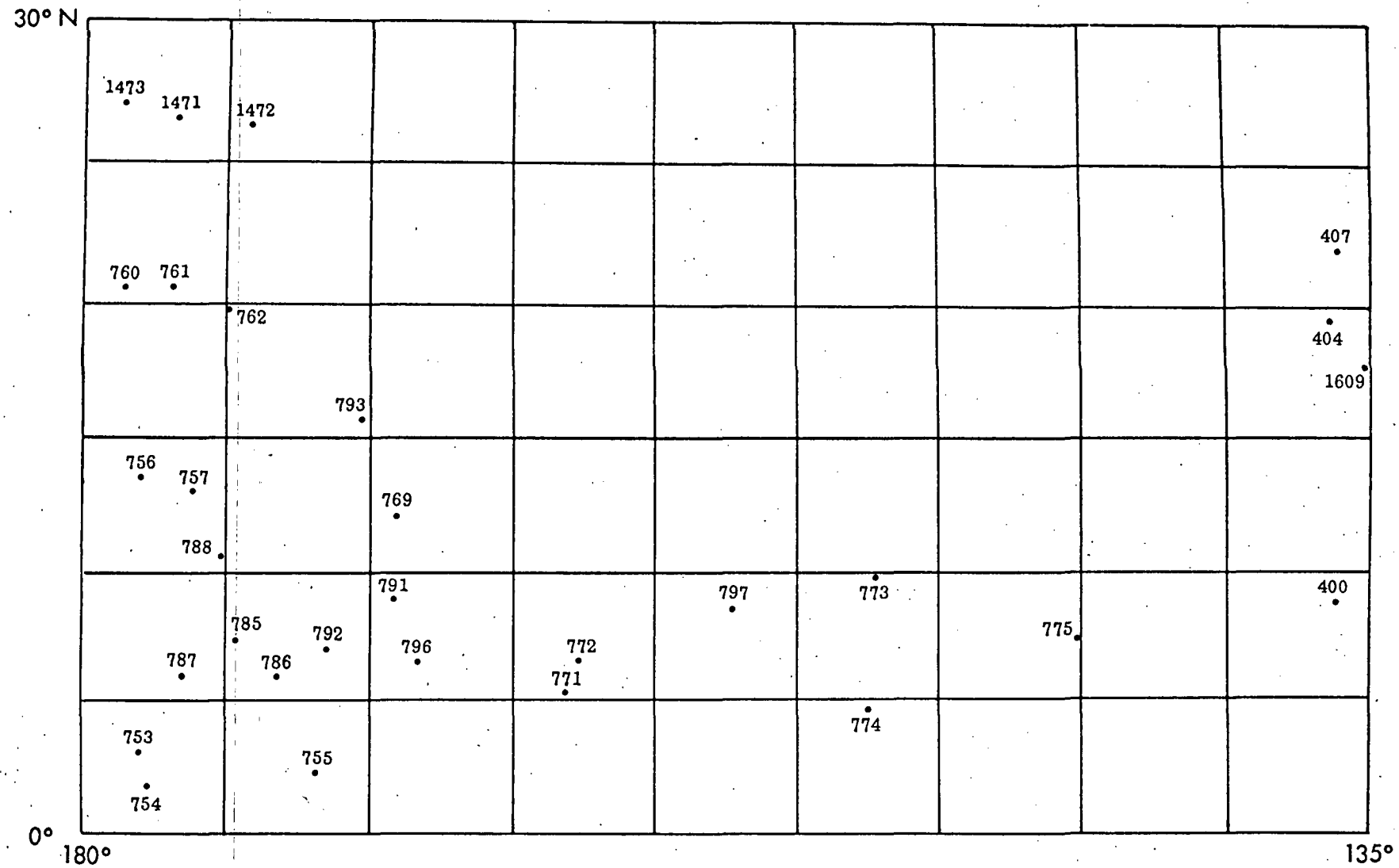


Fig. 6— Control point locations on MC-8

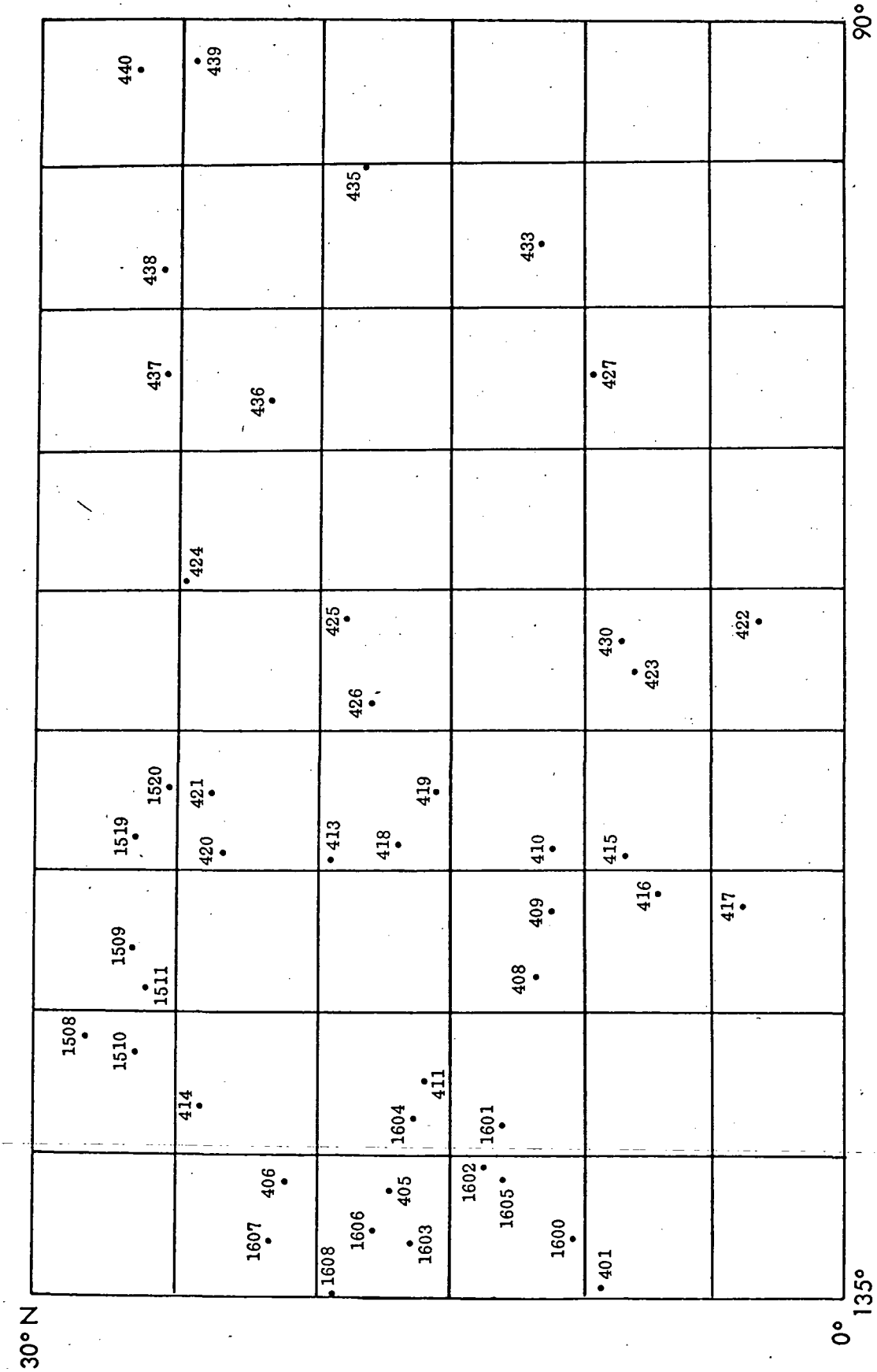


Fig. 7—Control point locations on MC-9

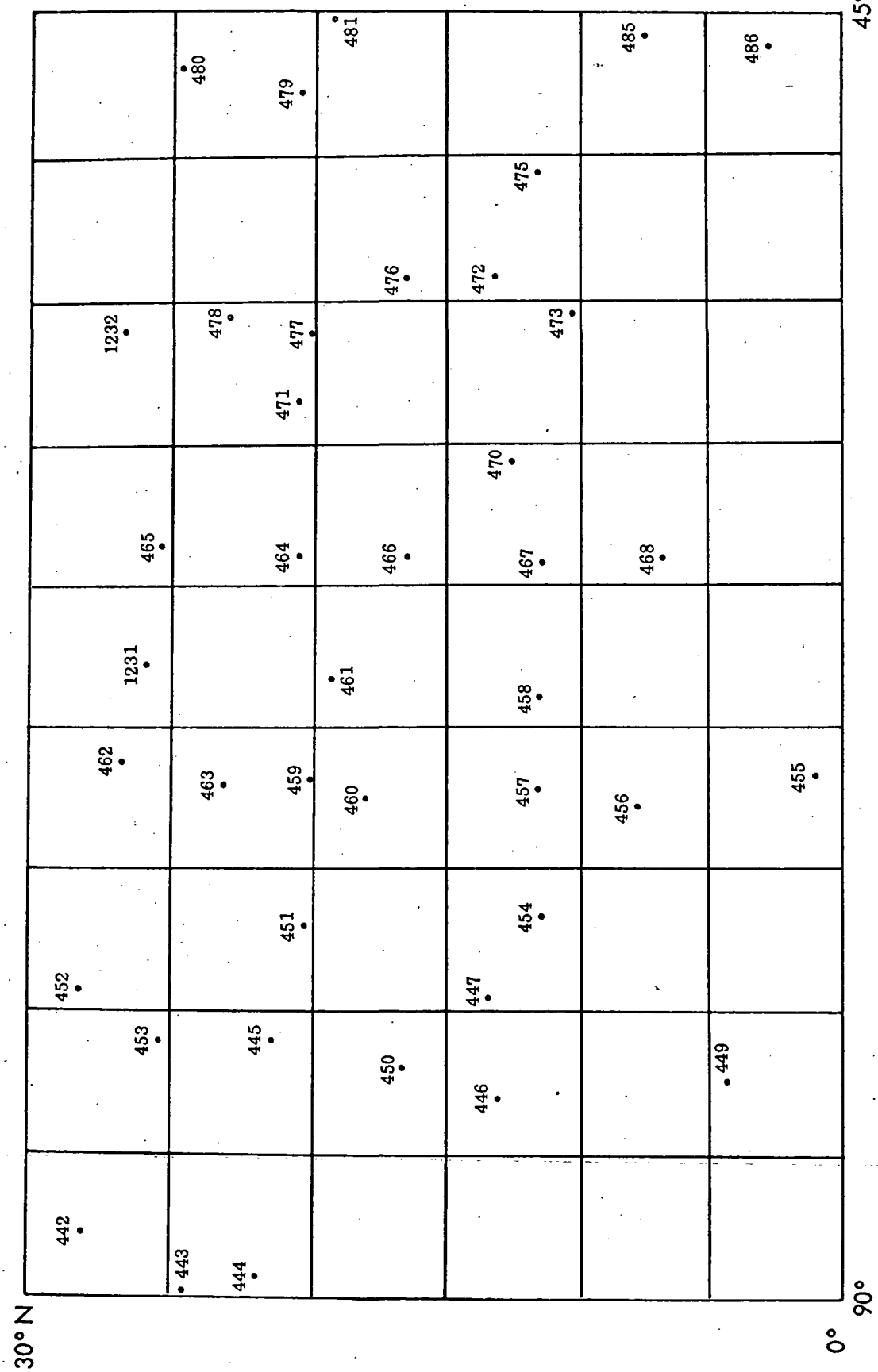


Fig. 8—Control point locations on MC-10

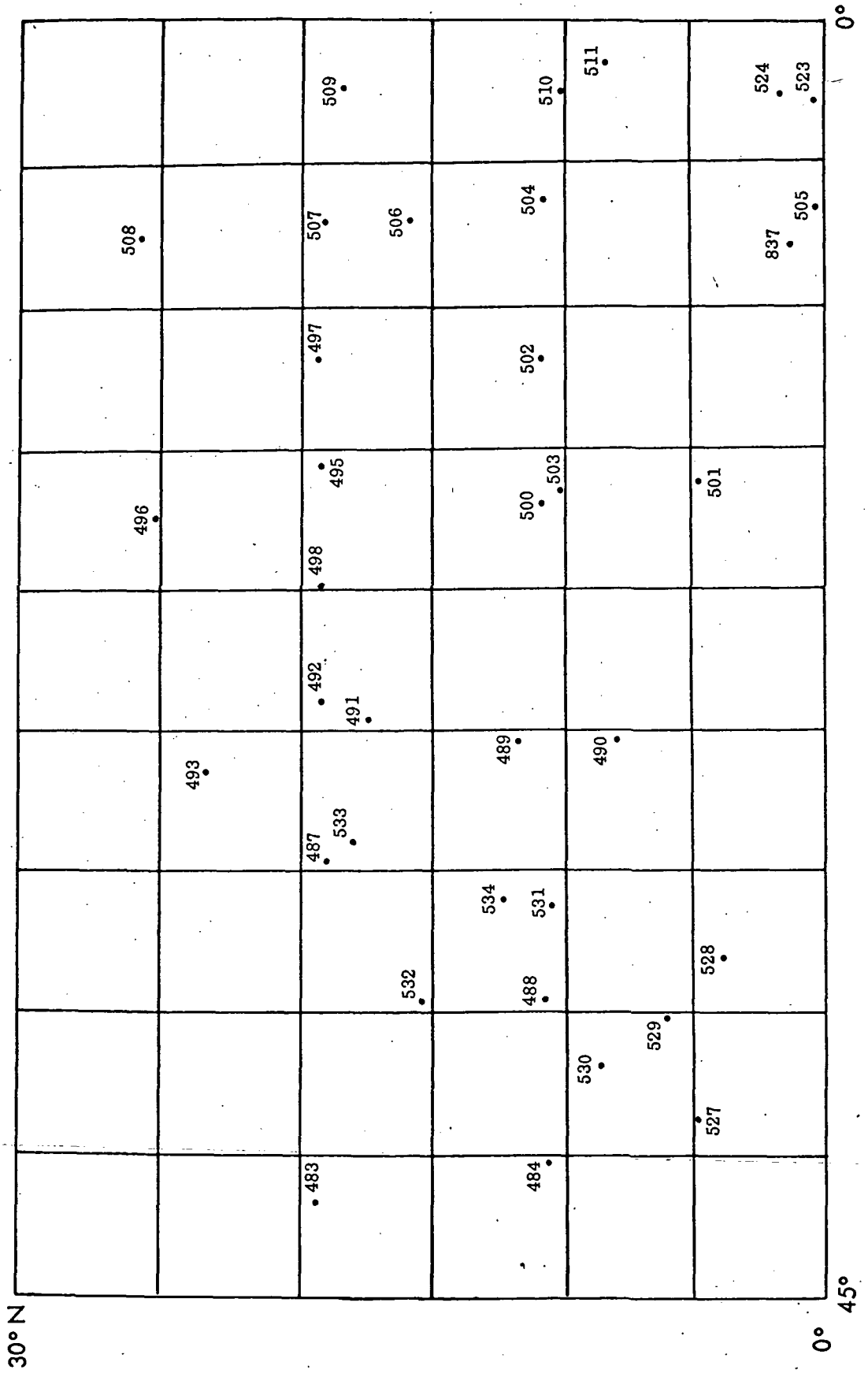


Fig. 9 — Control point locations on MC-11

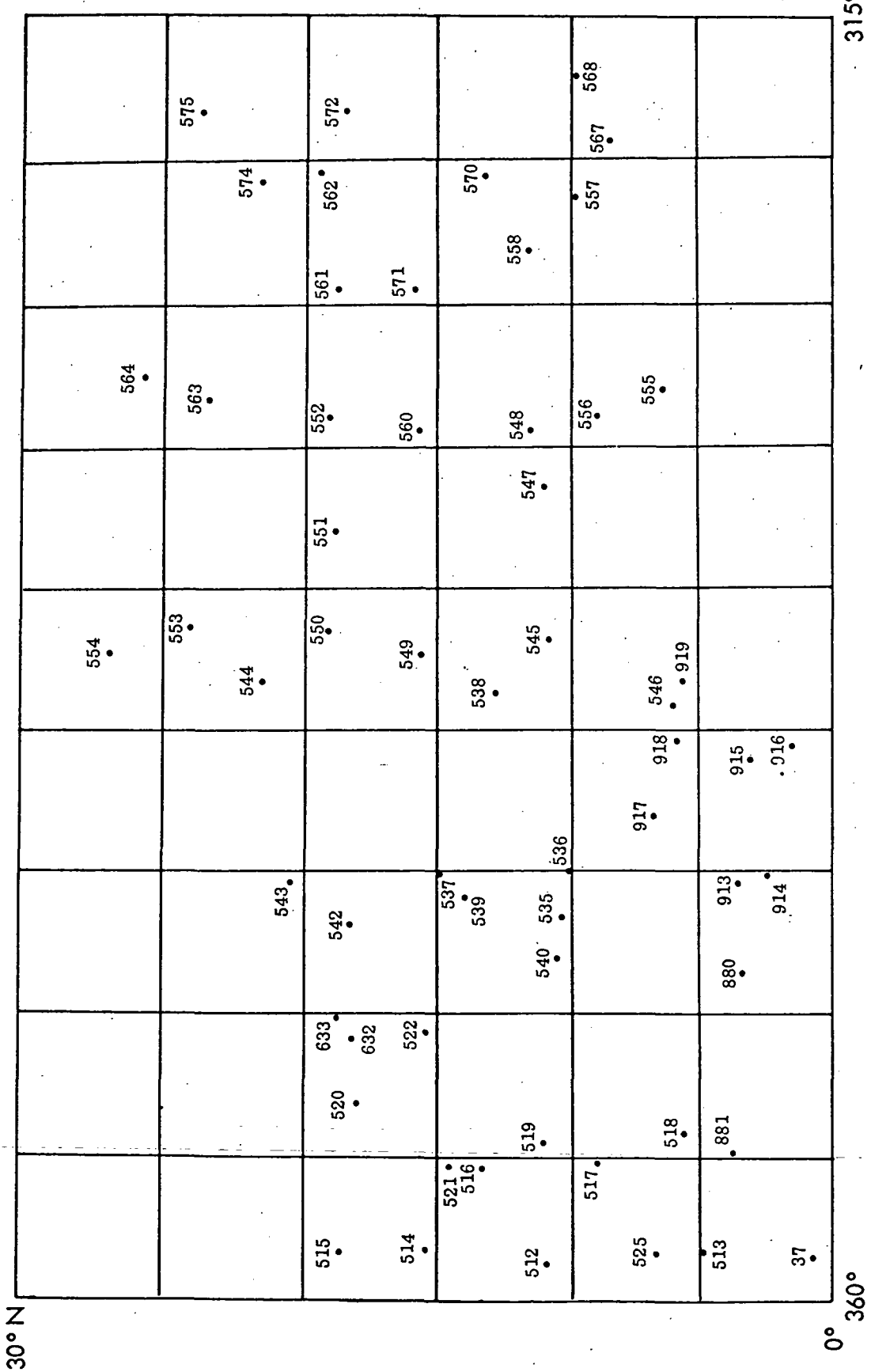


Fig. 10—Control point locations on MC-12

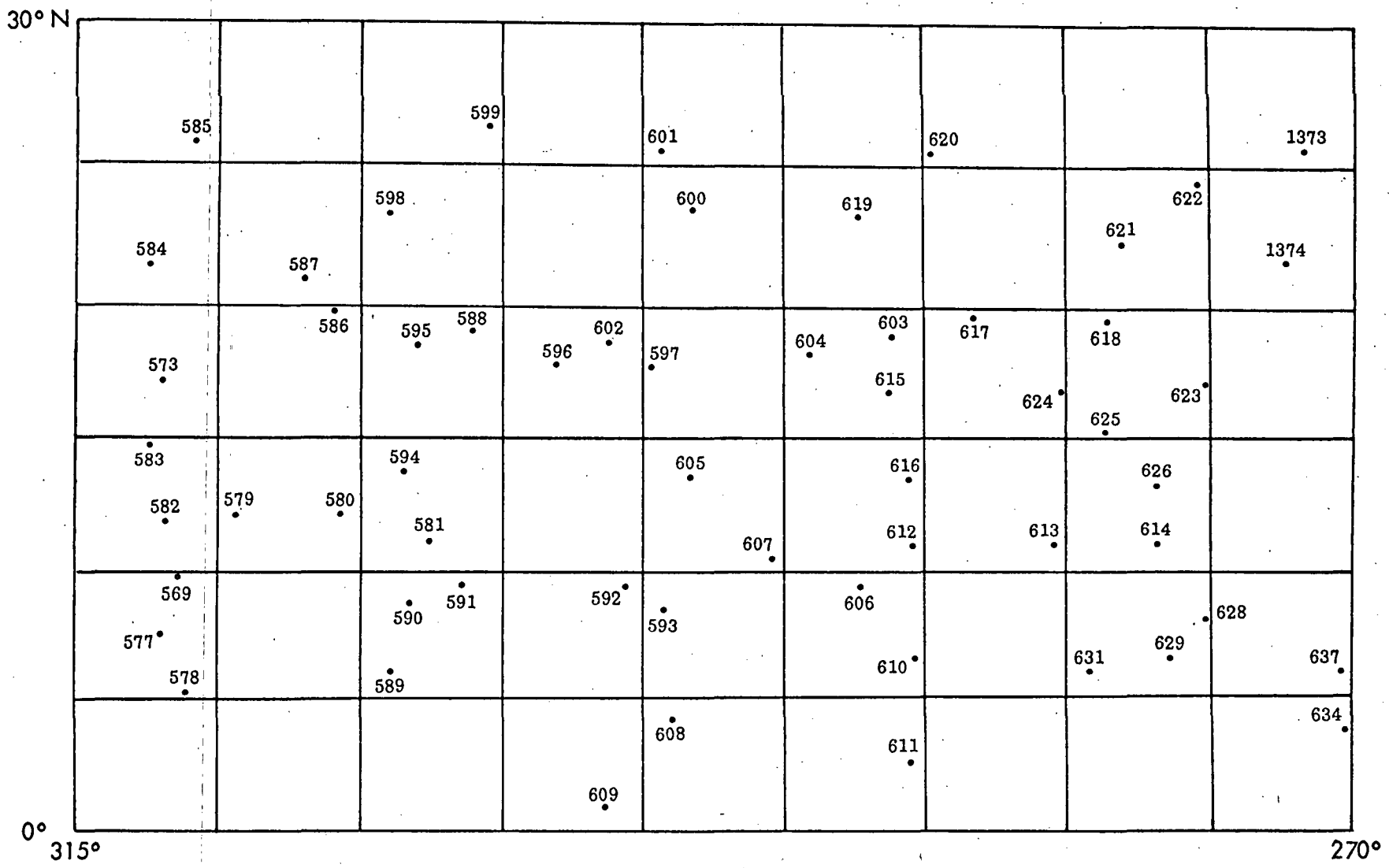


Fig. 11 — Control point locations on MC-13

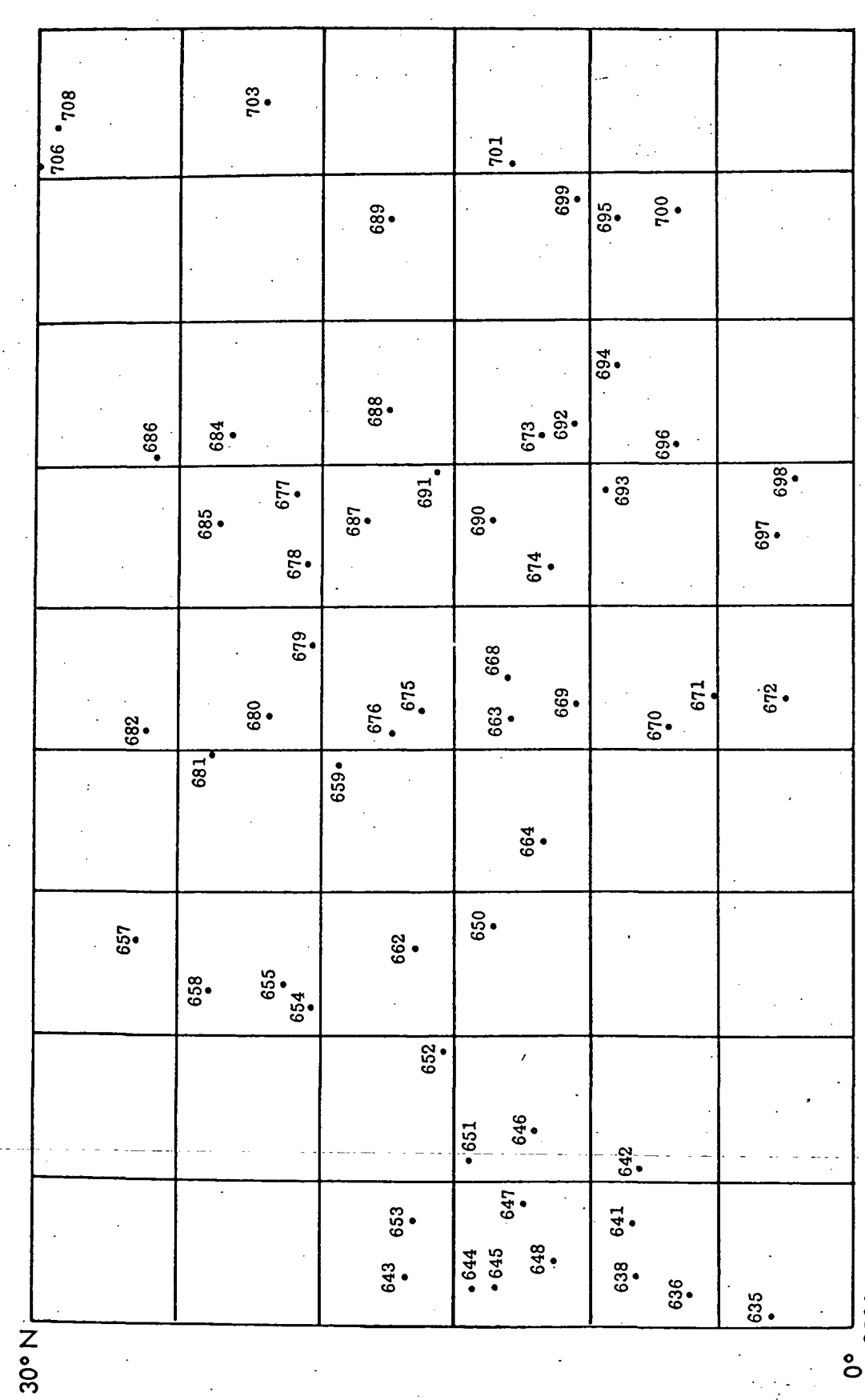


Fig. 12—Control point locations on MC-14

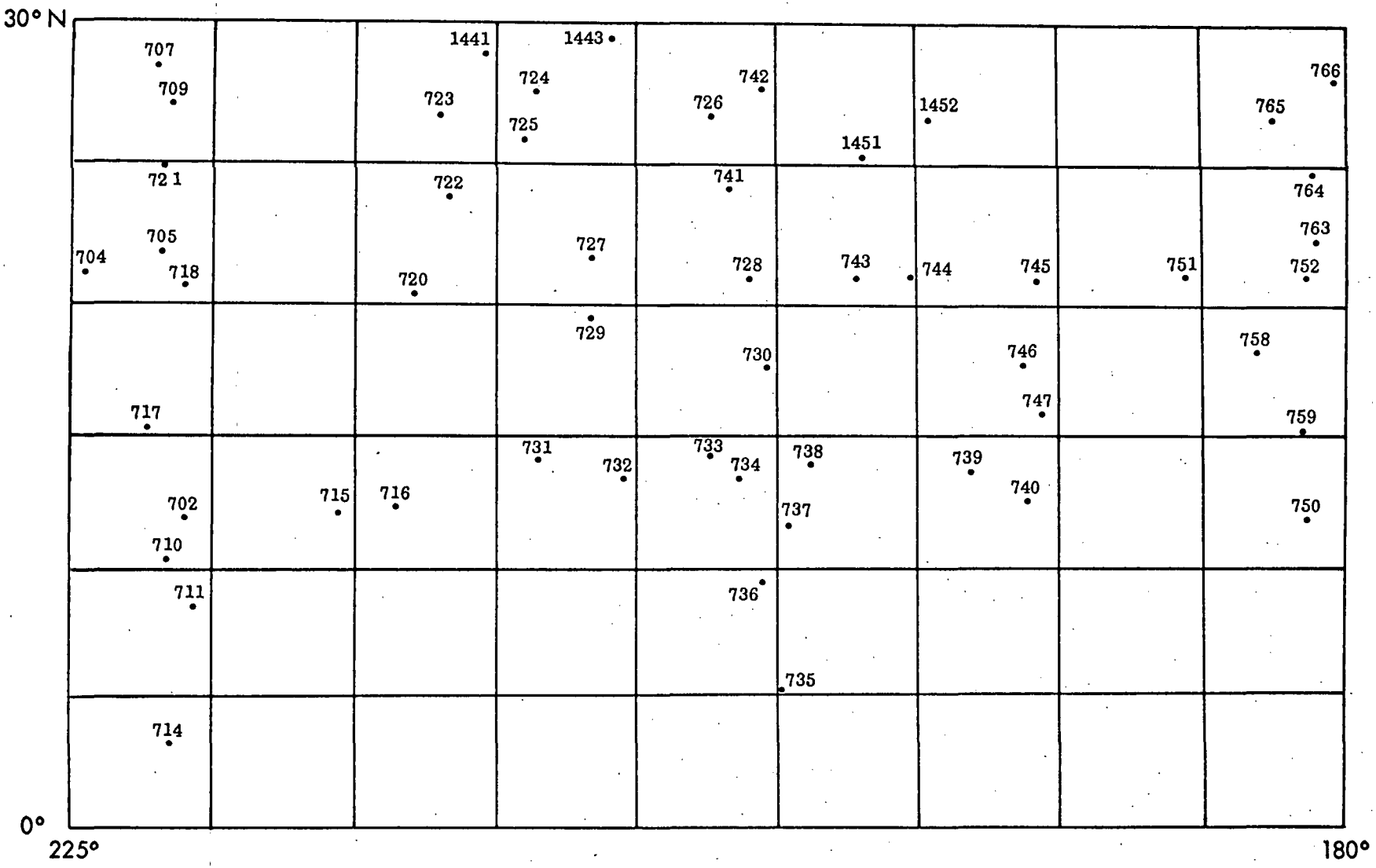


Fig. 13 — Control point locations on MC-15

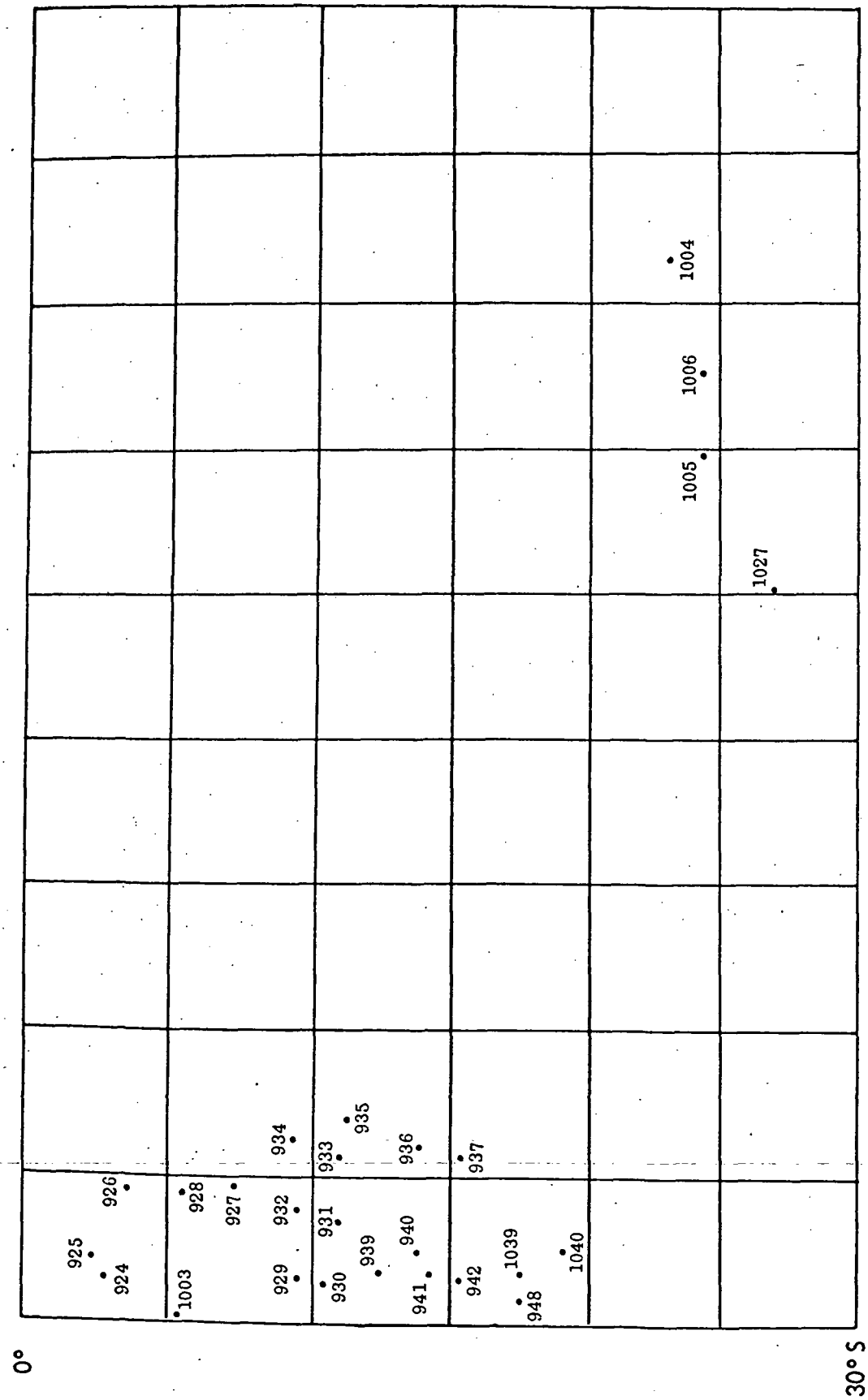


Fig. 14— Control point locations on MC-16

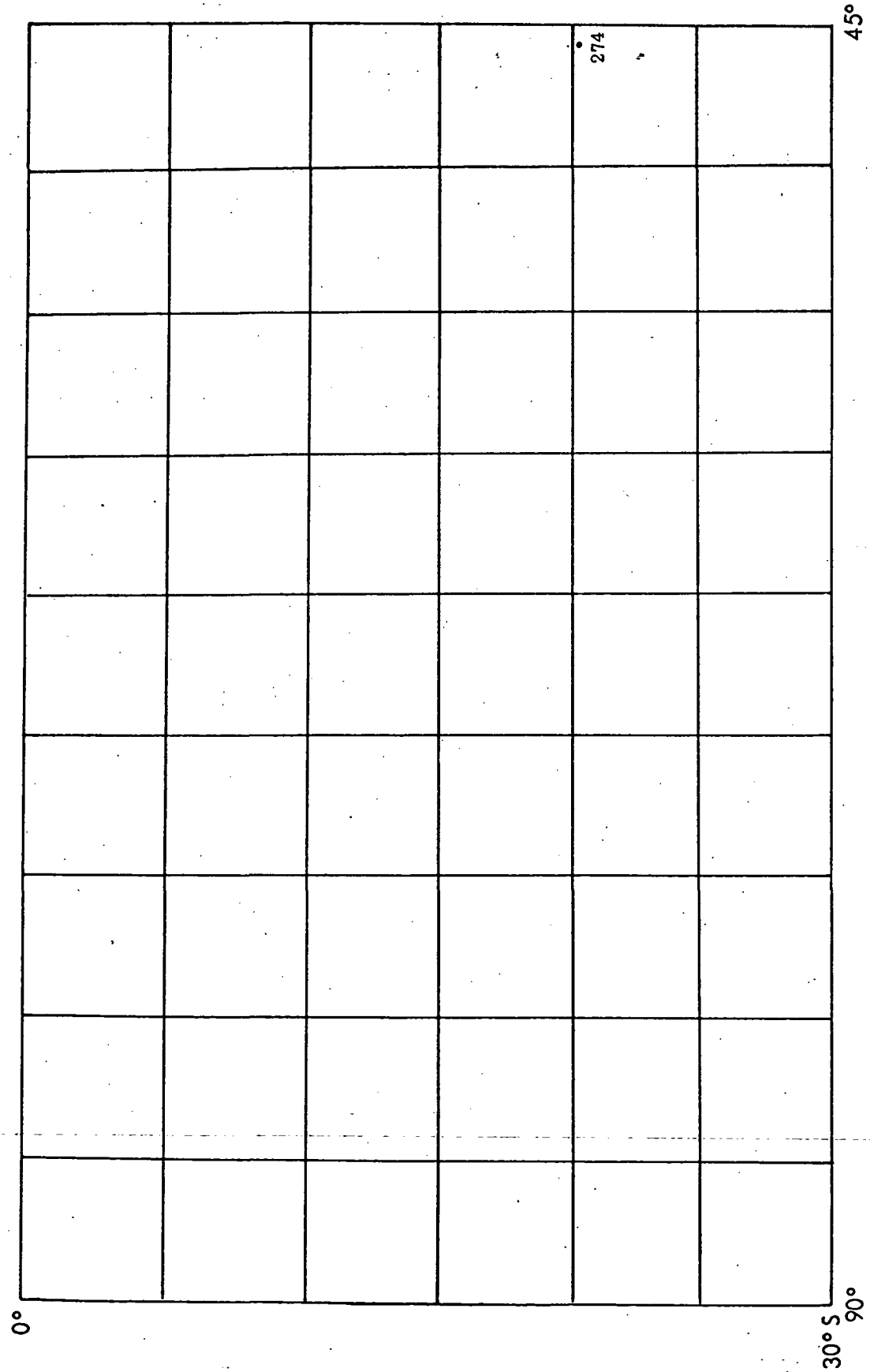


Fig. 15—Control point locations on MC-18

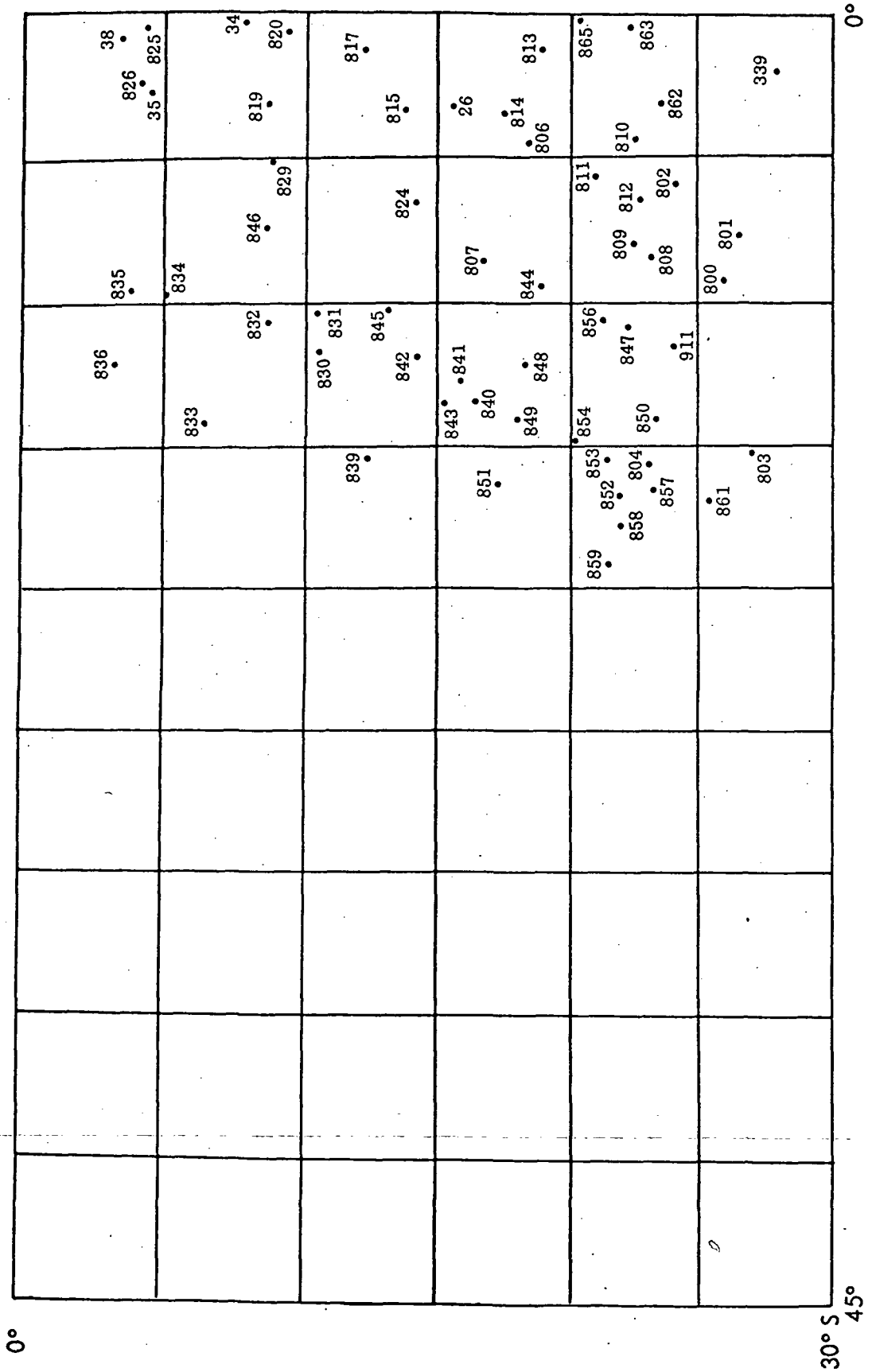


Fig. 16—Control point locations on MC-19

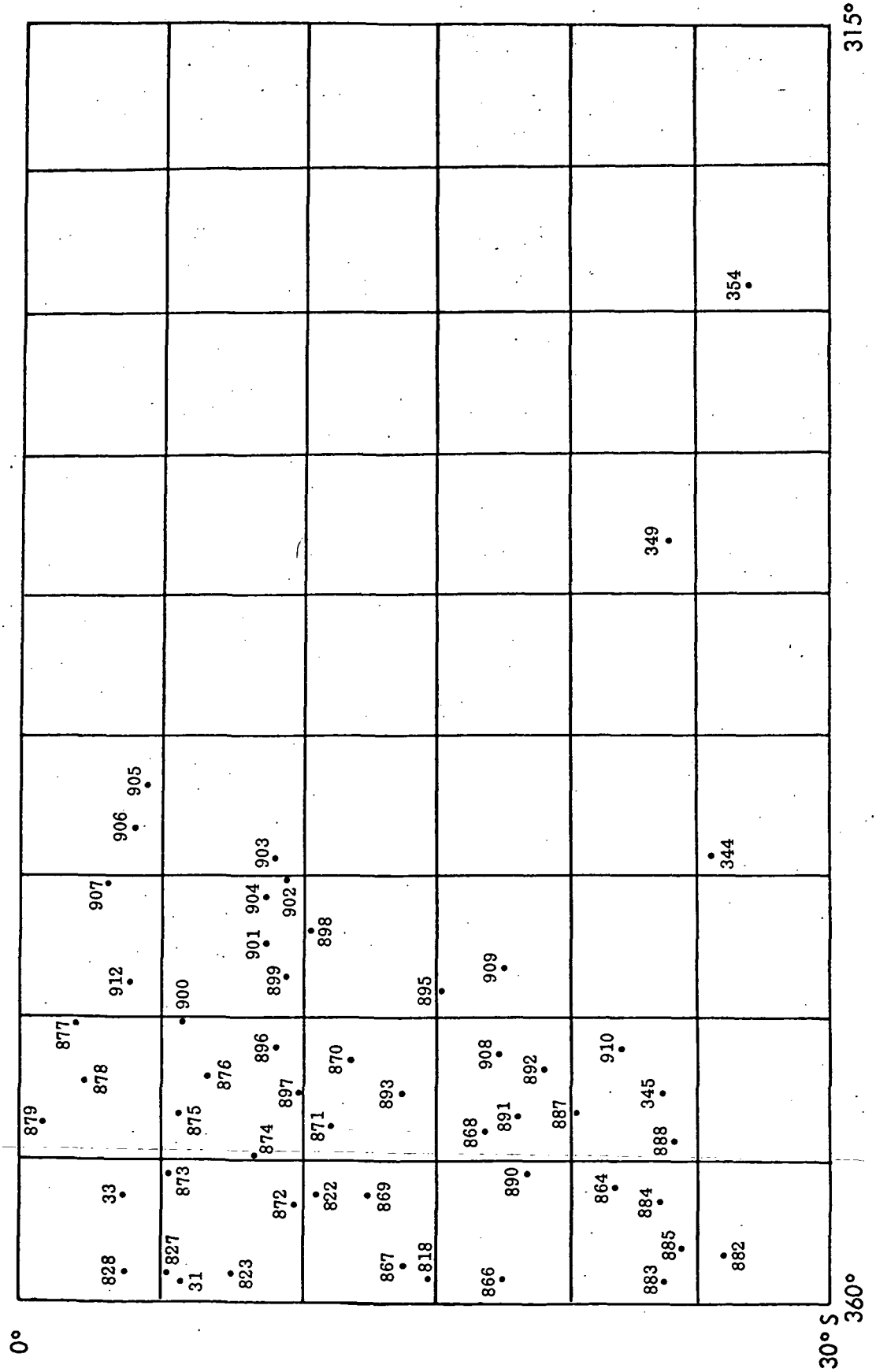


Fig. 17—Control point locations on MC-20

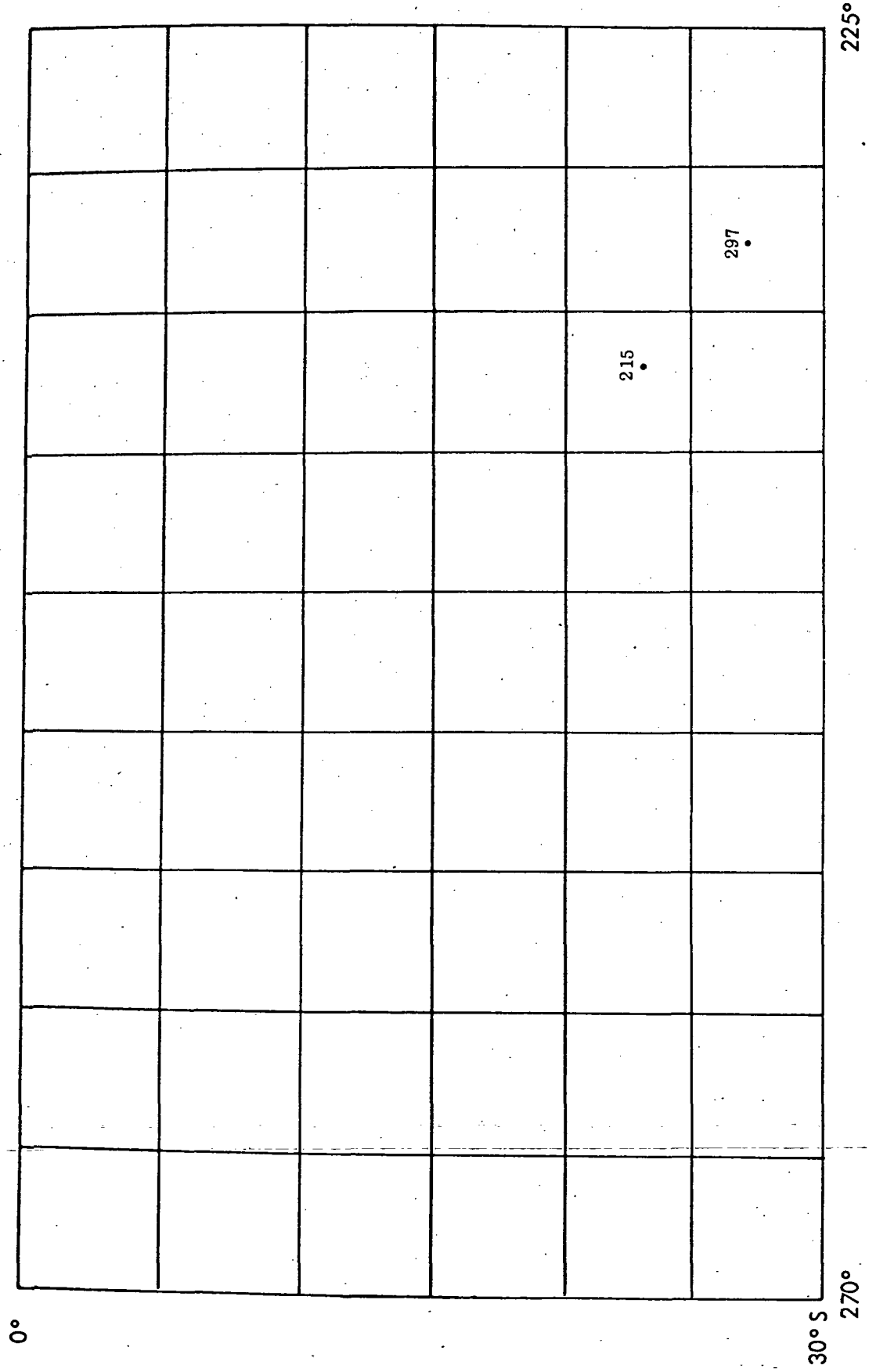


Fig. 18— Control point locations on MC-22

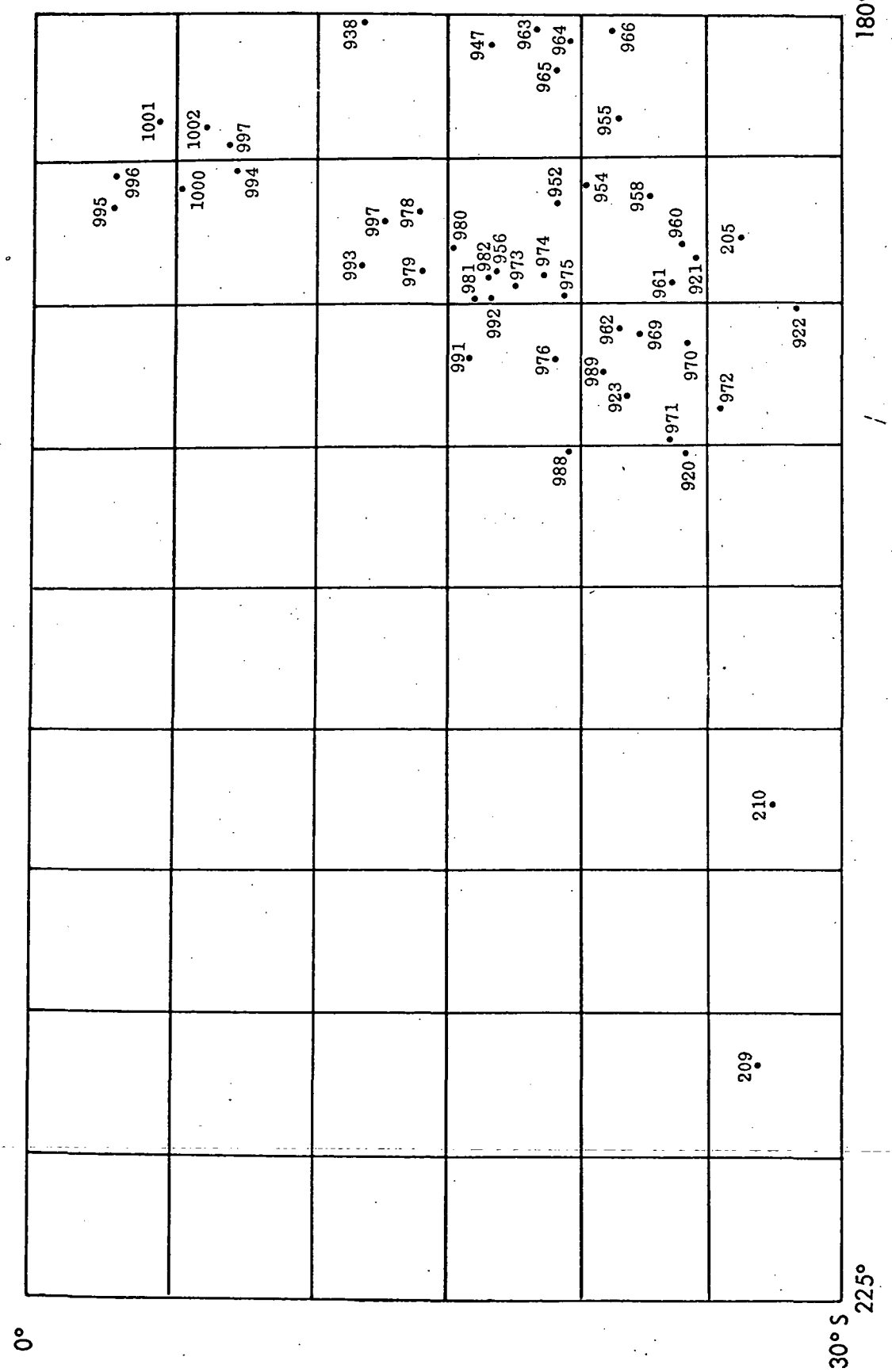


Fig. 19— Control point locations on MC-23

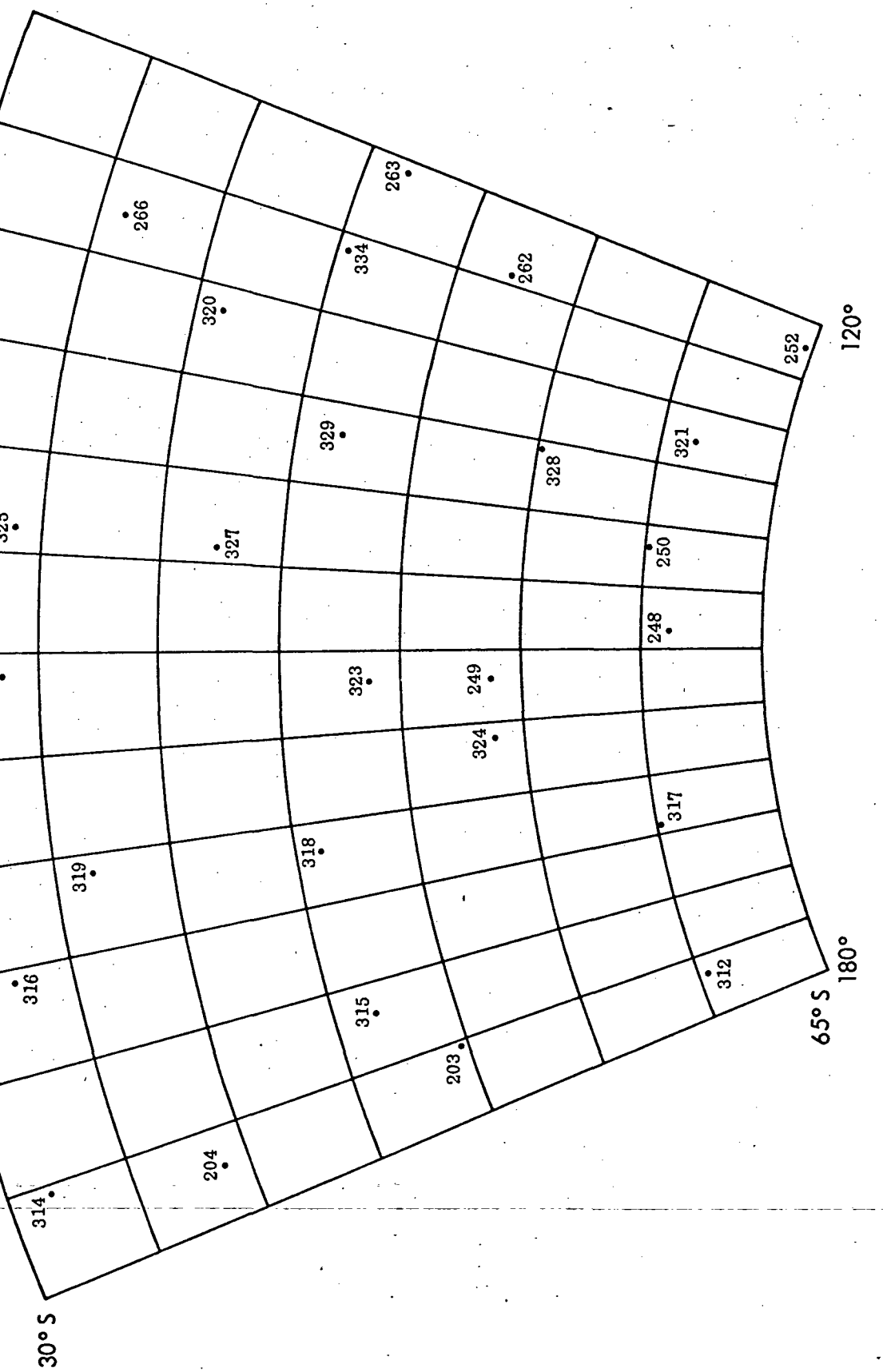


Fig. 20— Control point locations on MC-24

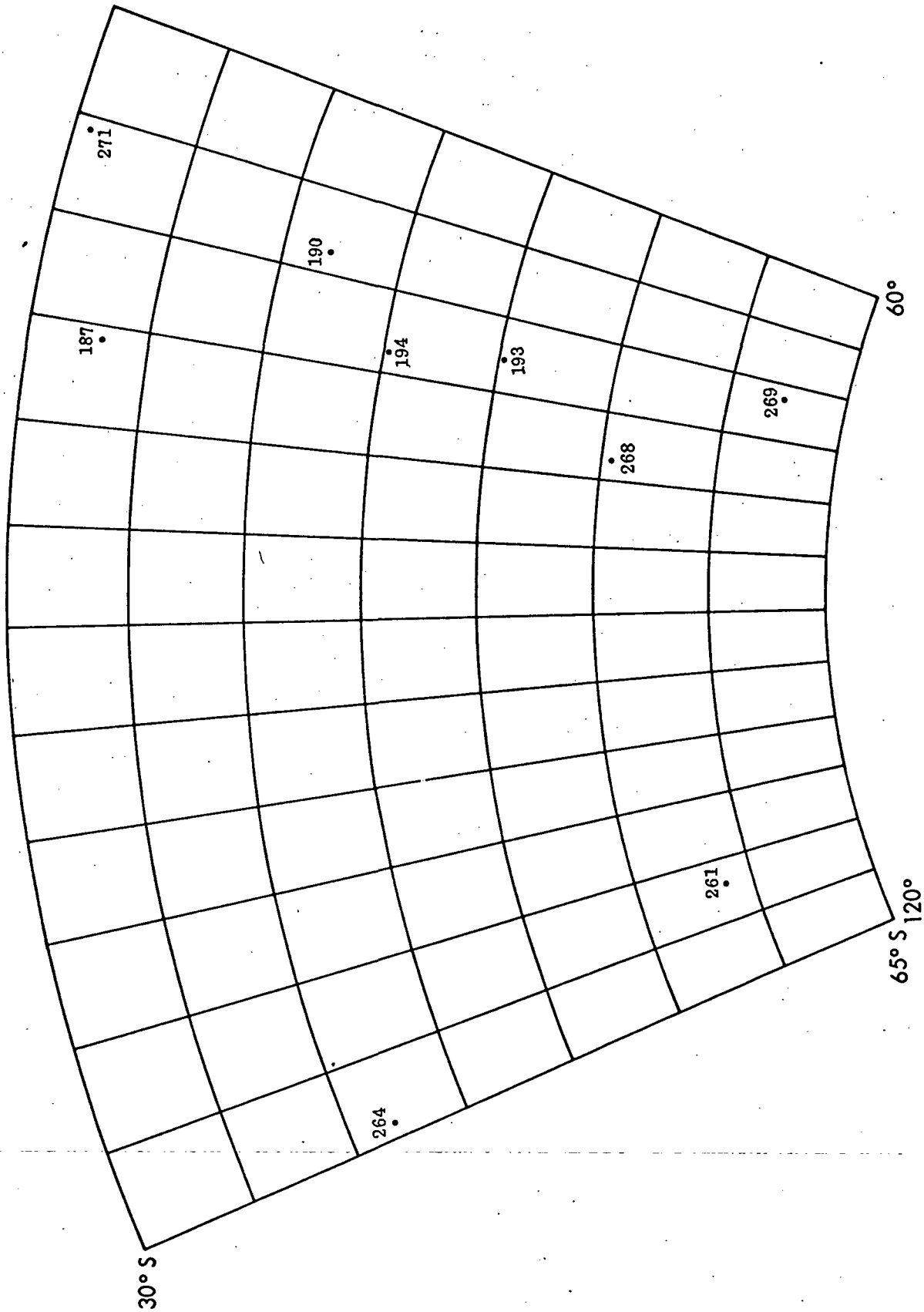


Fig. 21 — Control point locations on MC-25

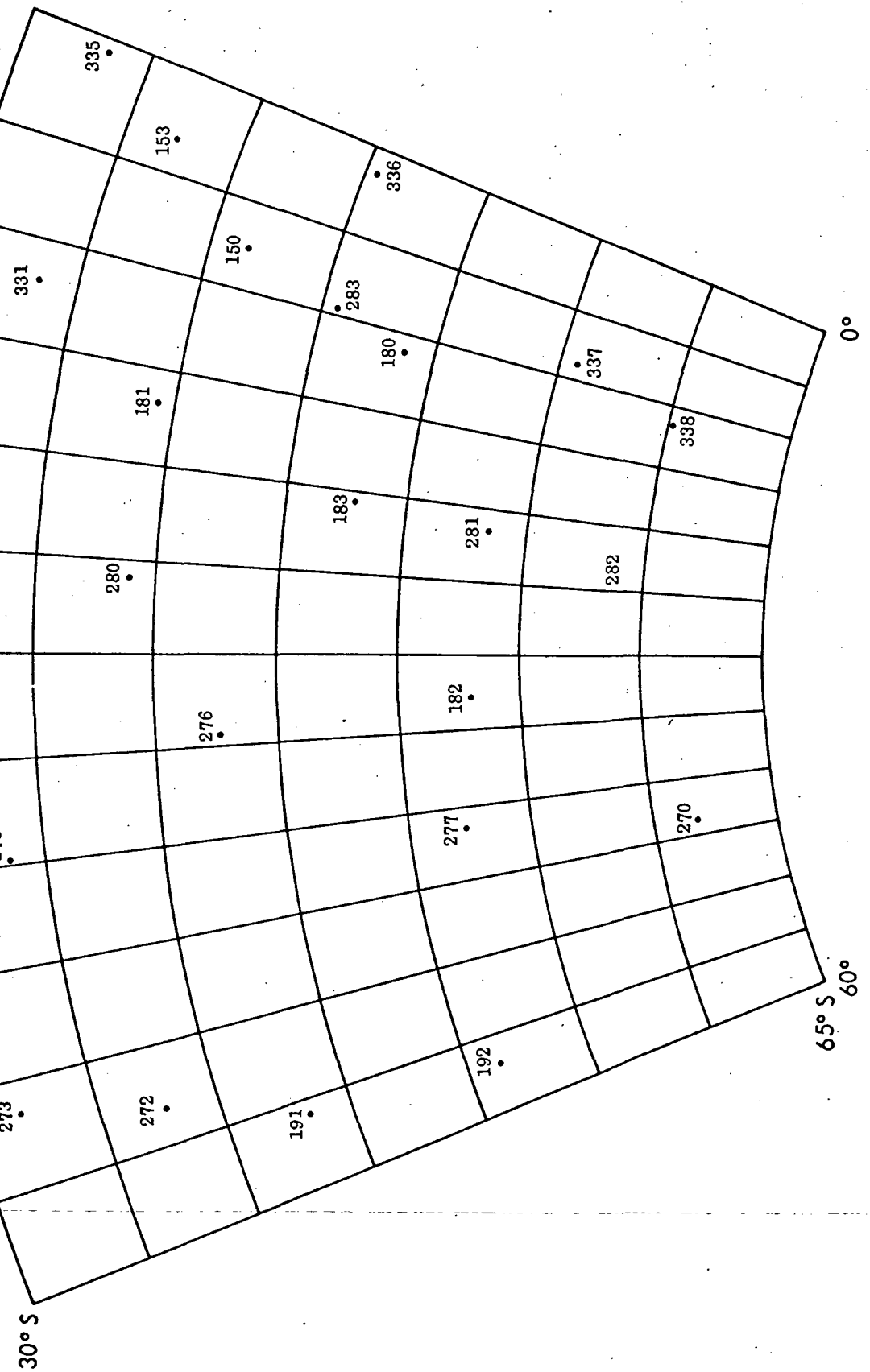


Fig. 22 — Control point locations on MC-26

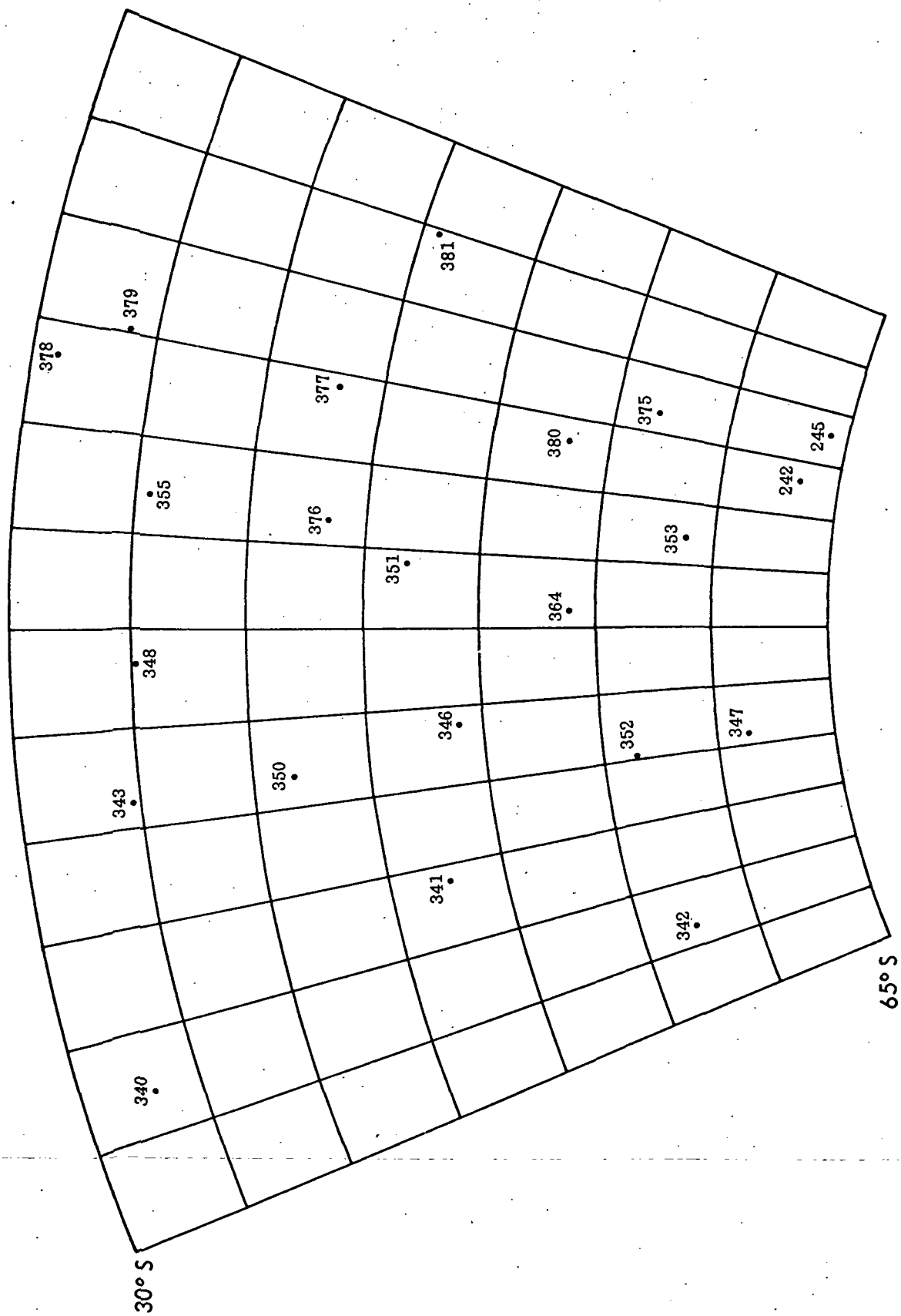


Fig. 23—Control point locations on MC-27

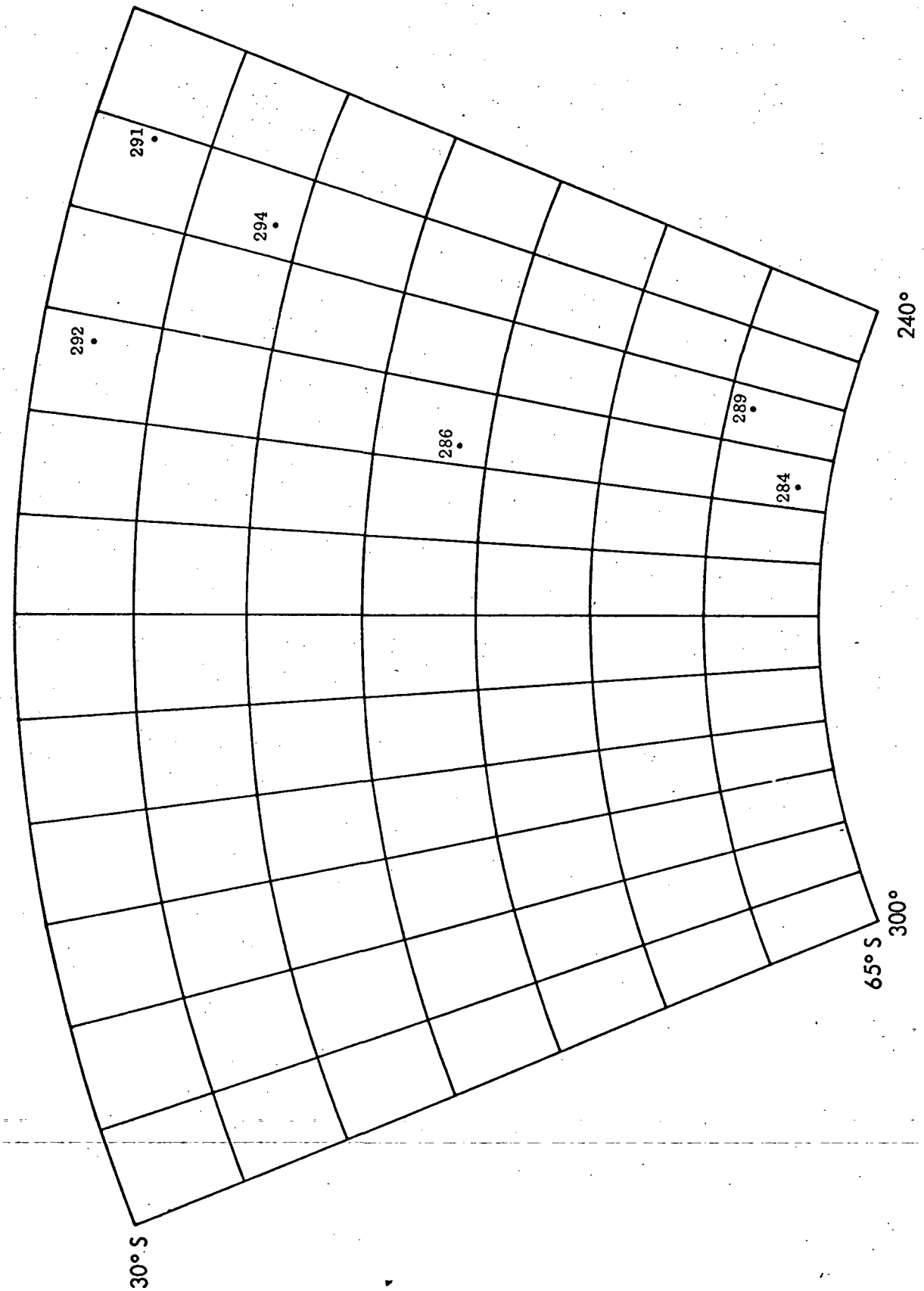


Fig. 24—Control point locations on MC-28

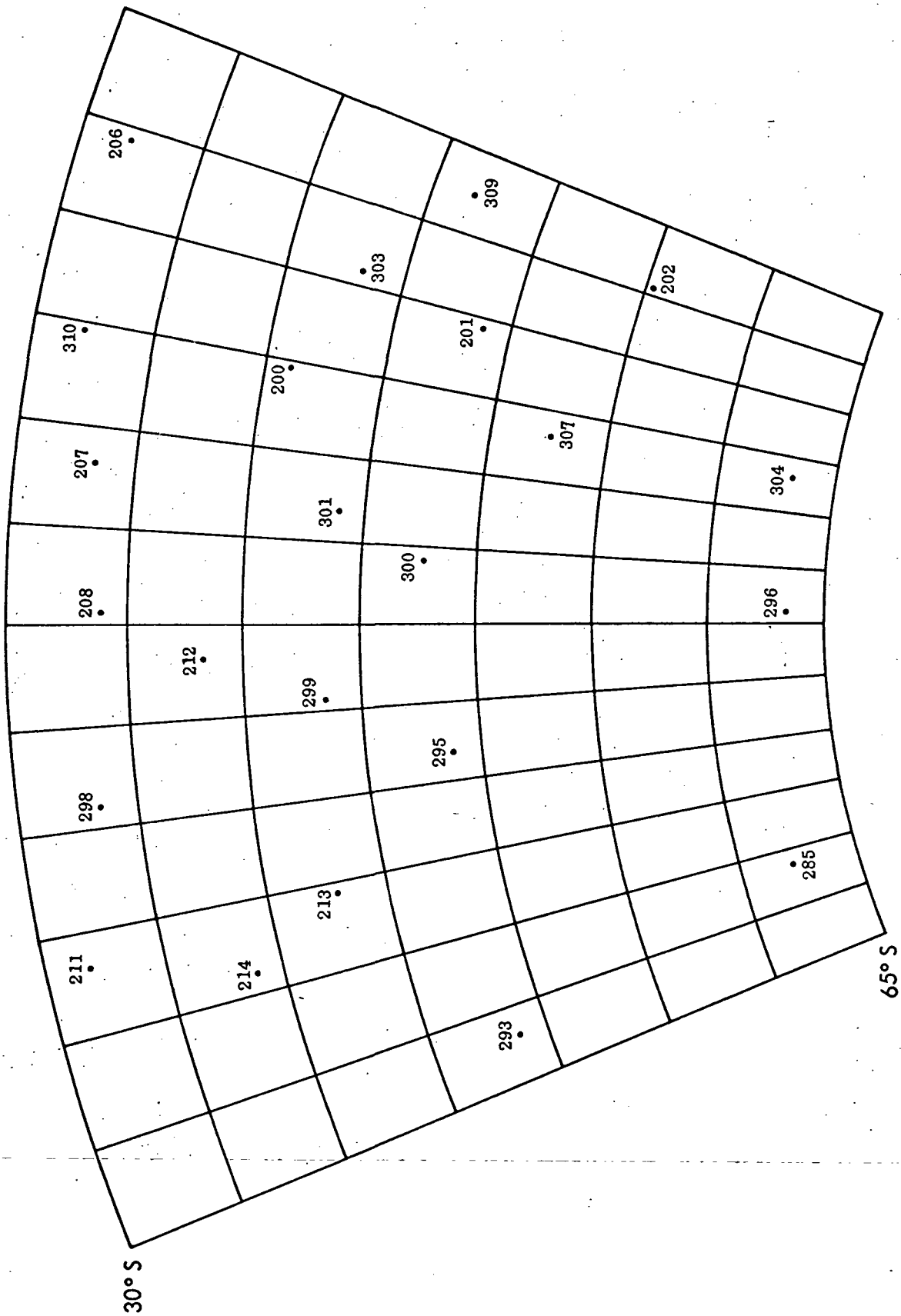


Fig. 25—Control point locations on MC-29

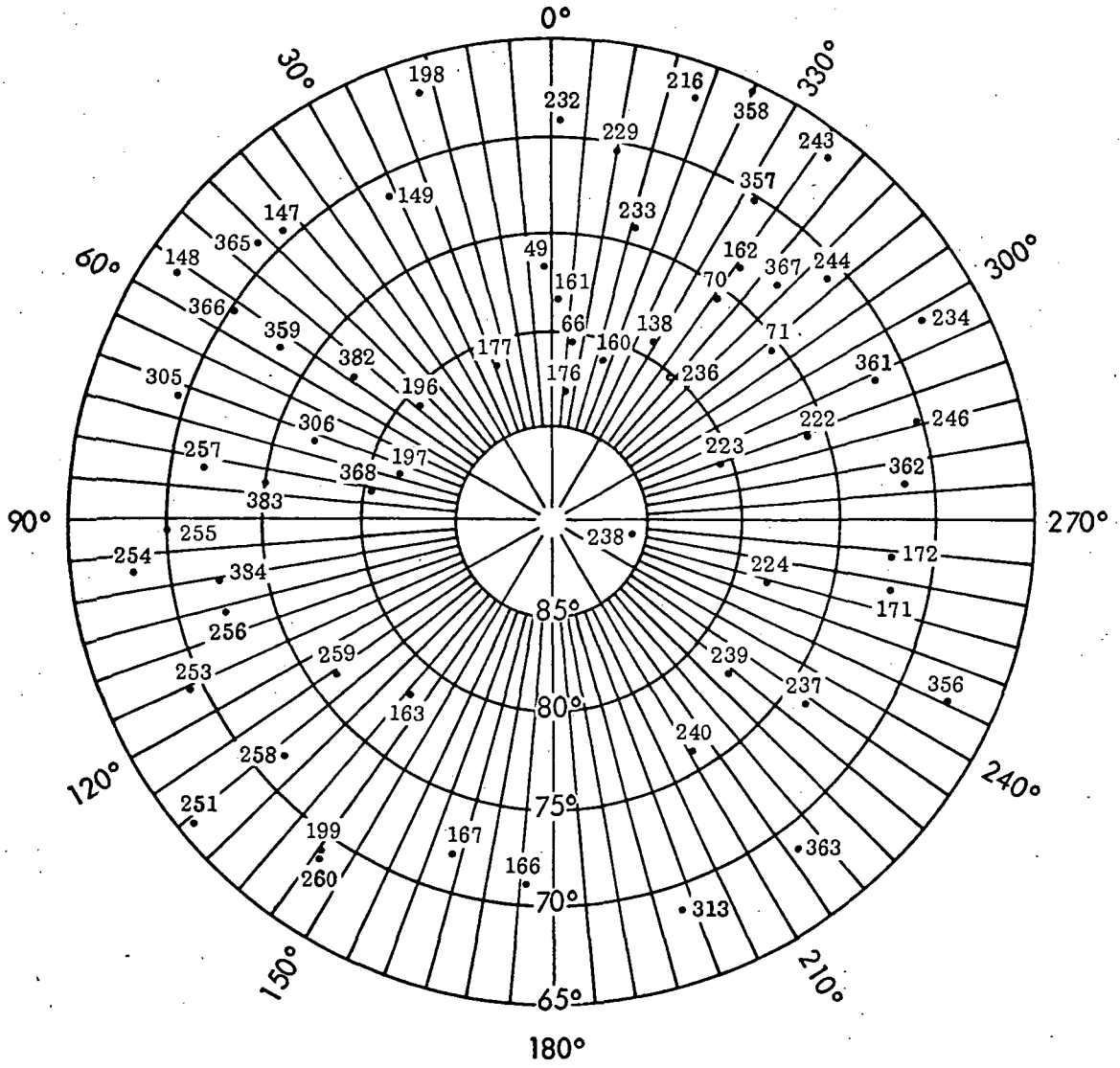


Fig. 26—Control point locations on MC-30

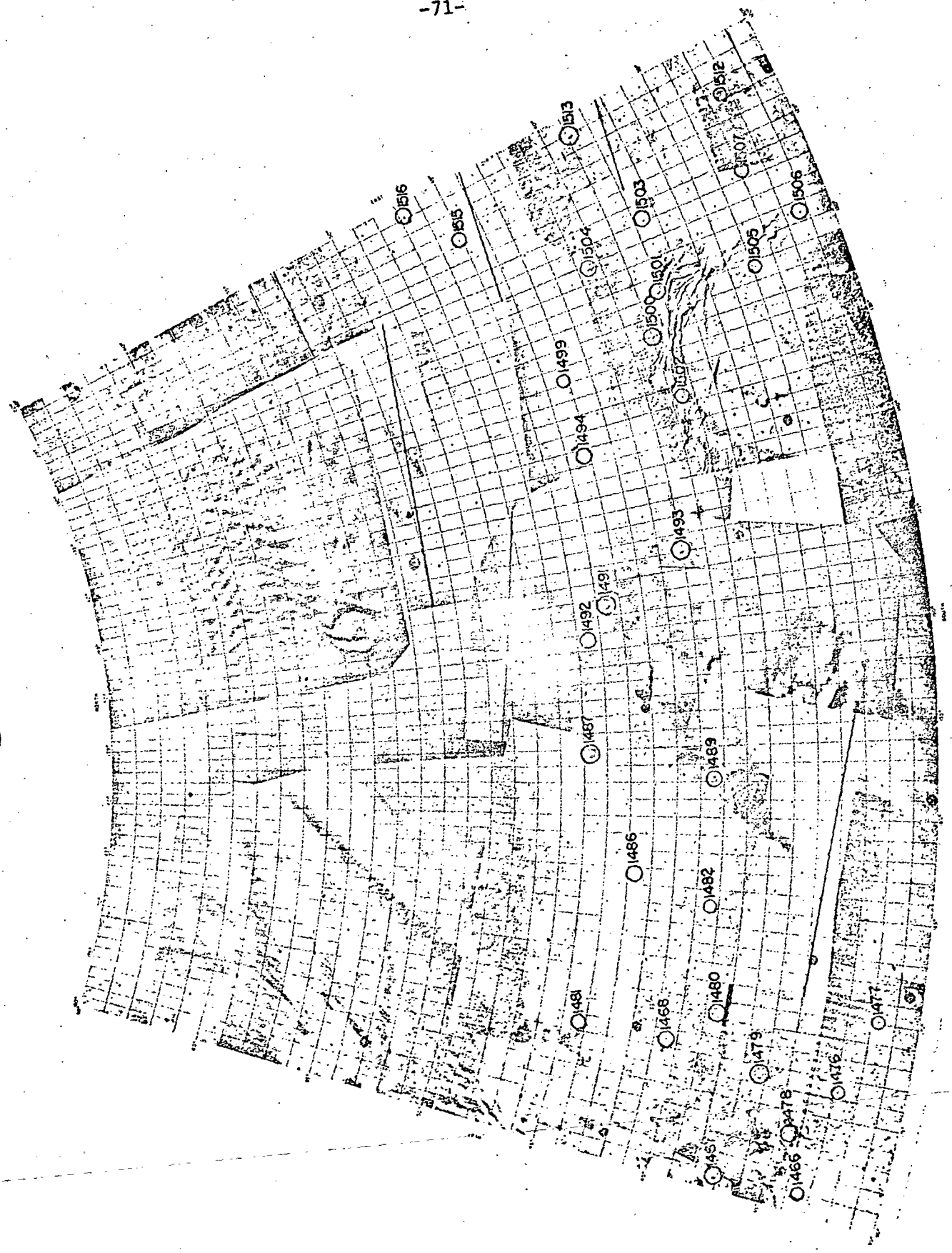


Fig. 27—Control points identified on MC-2

Fig. 28— Control points identified on MC-3

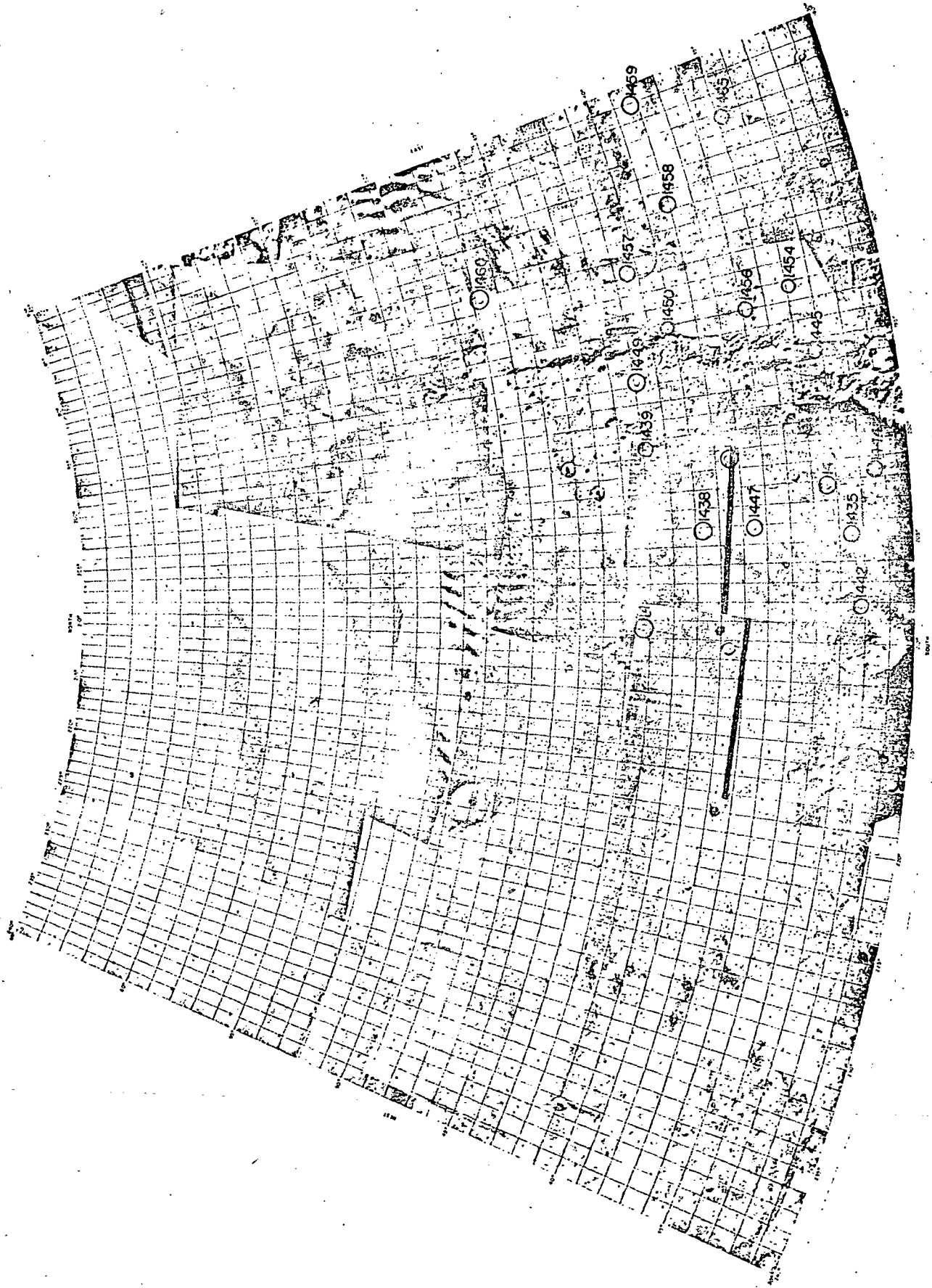


Fig. 29— Control points identified on MC-7

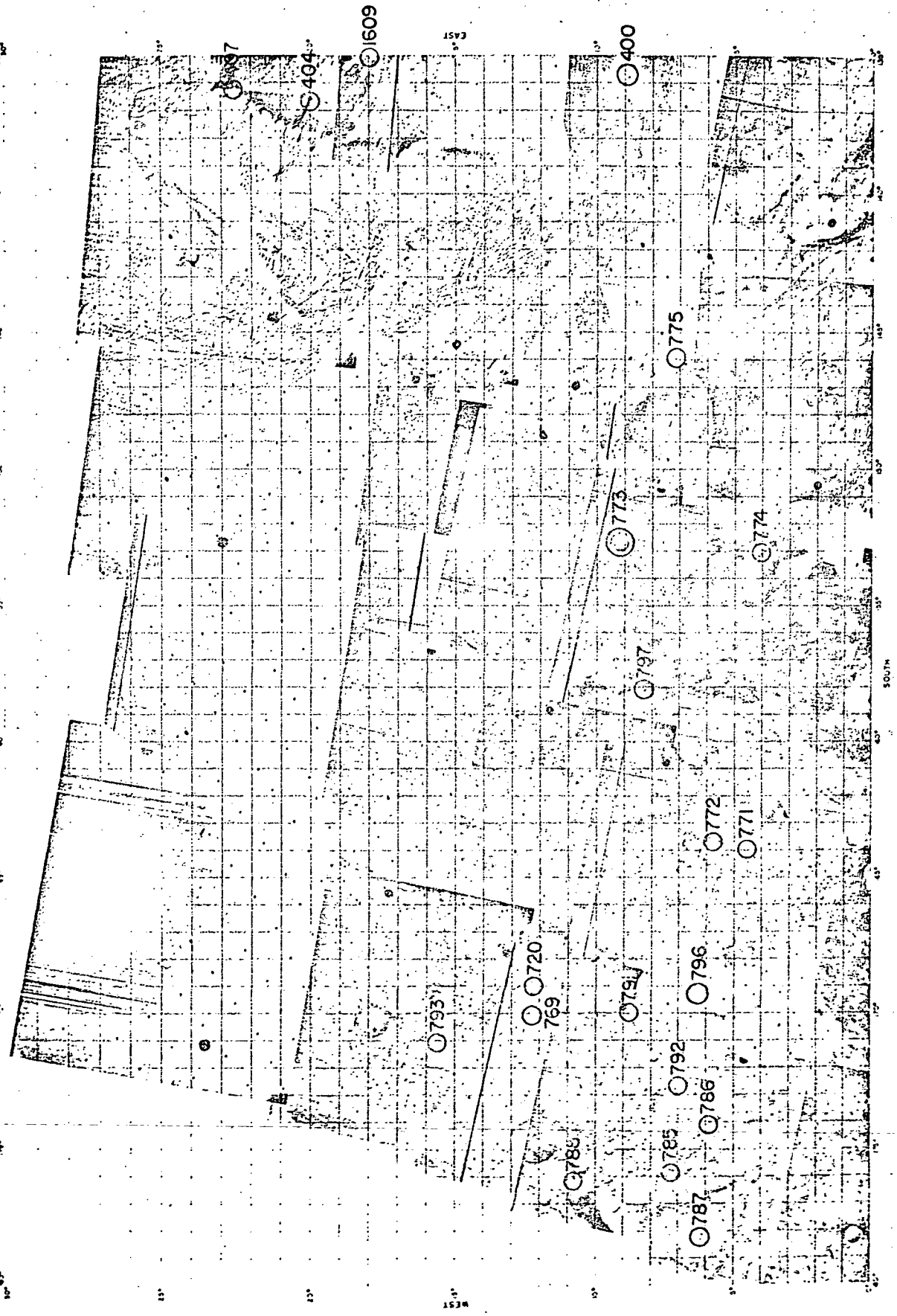


Fig. 30 — Control points identified on MC-8

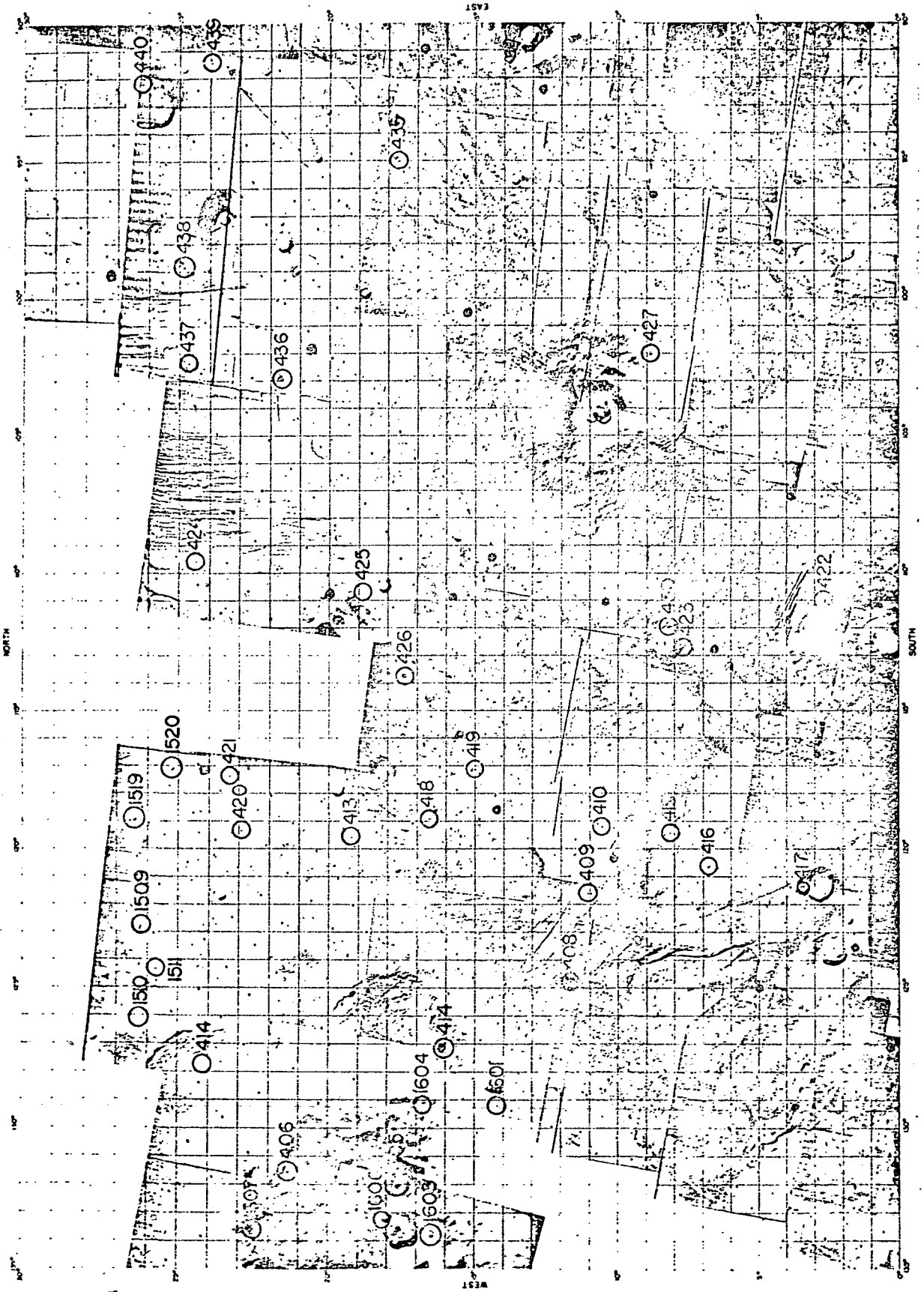


Fig. 31 — Control points identified on MC-9

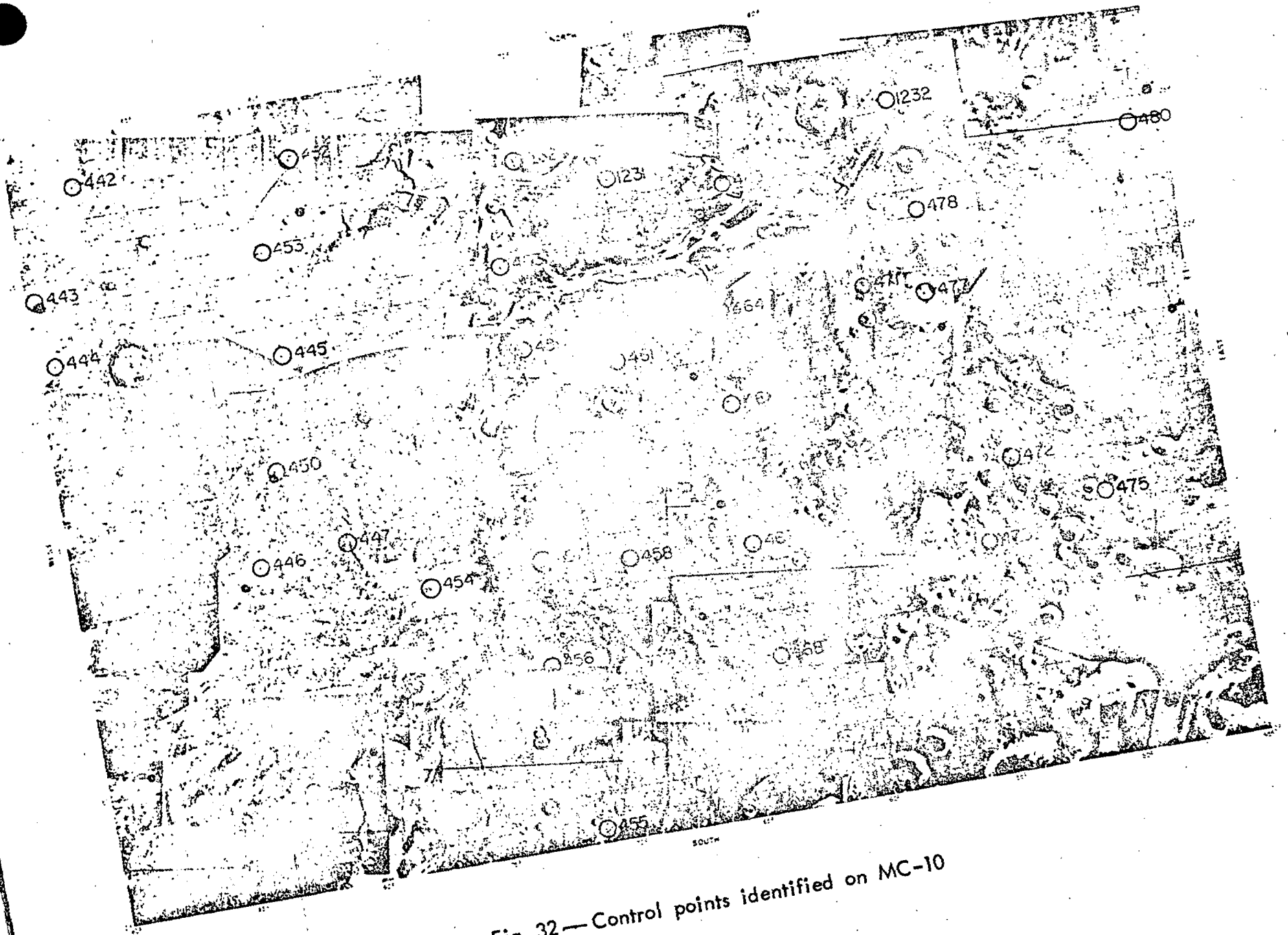


Fig. 32 — Control points identified on MC-10

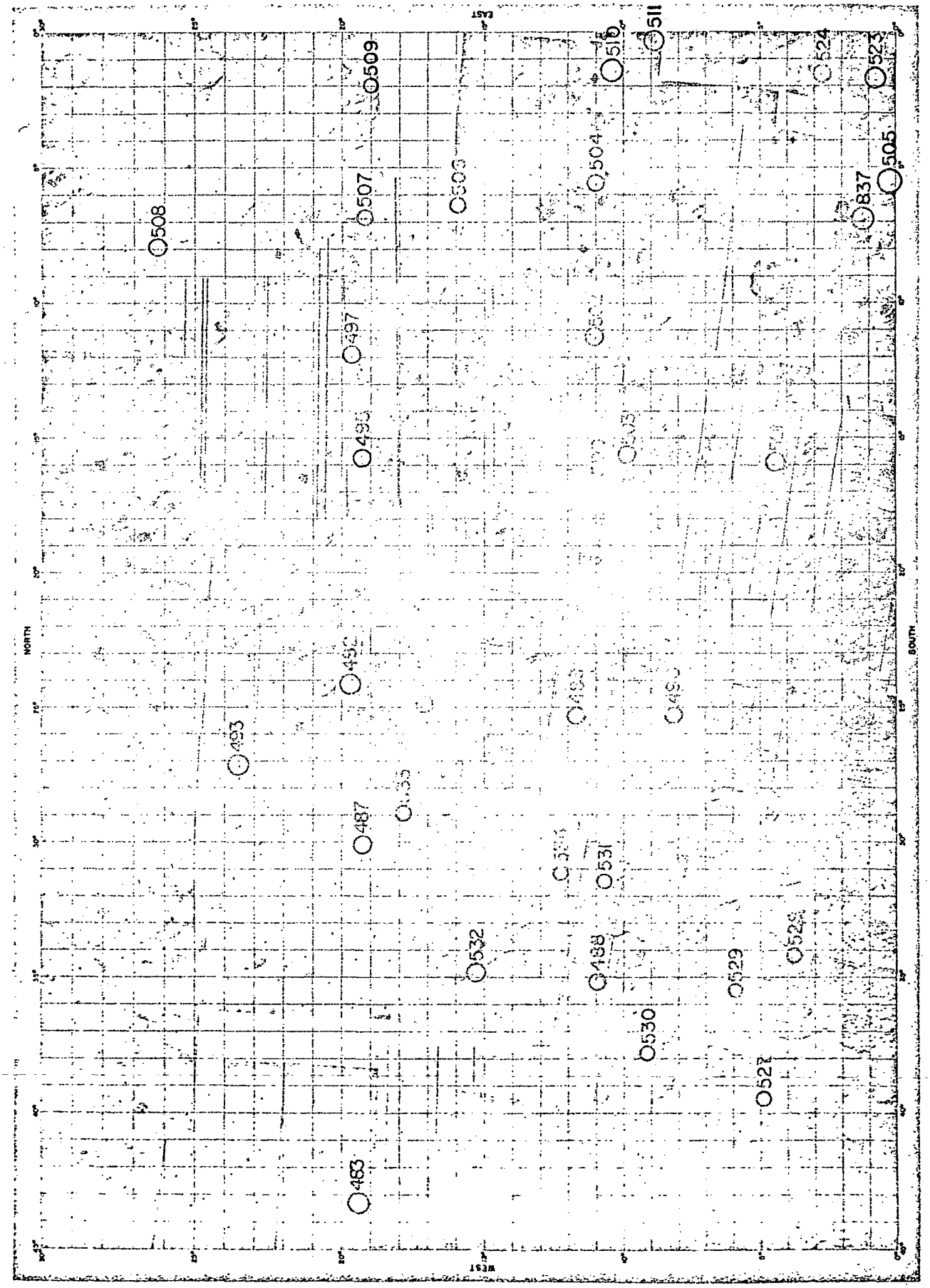


Fig. 33 — Control points identified on MC-11

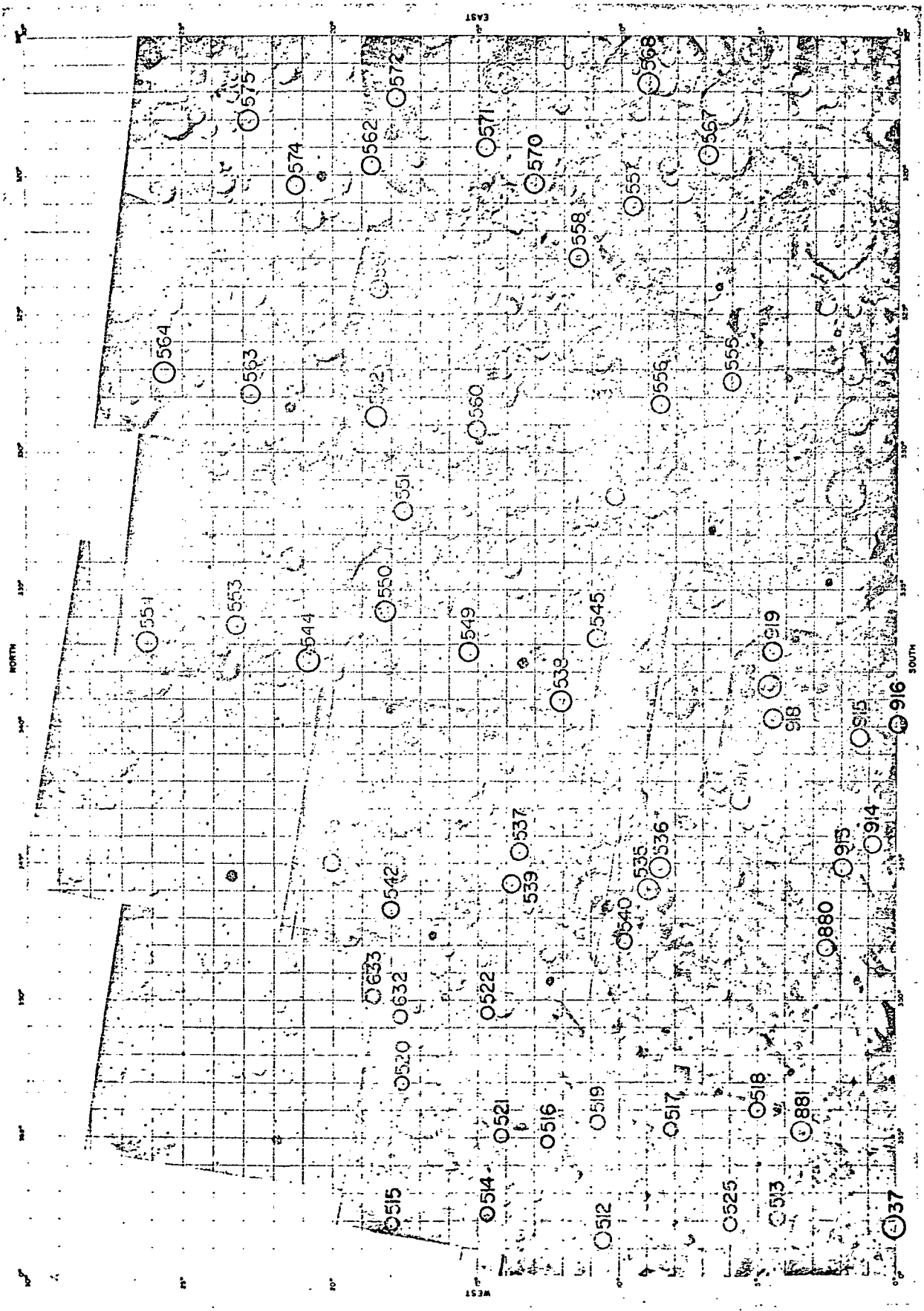


Fig. 34 — Control points identified on MC-12

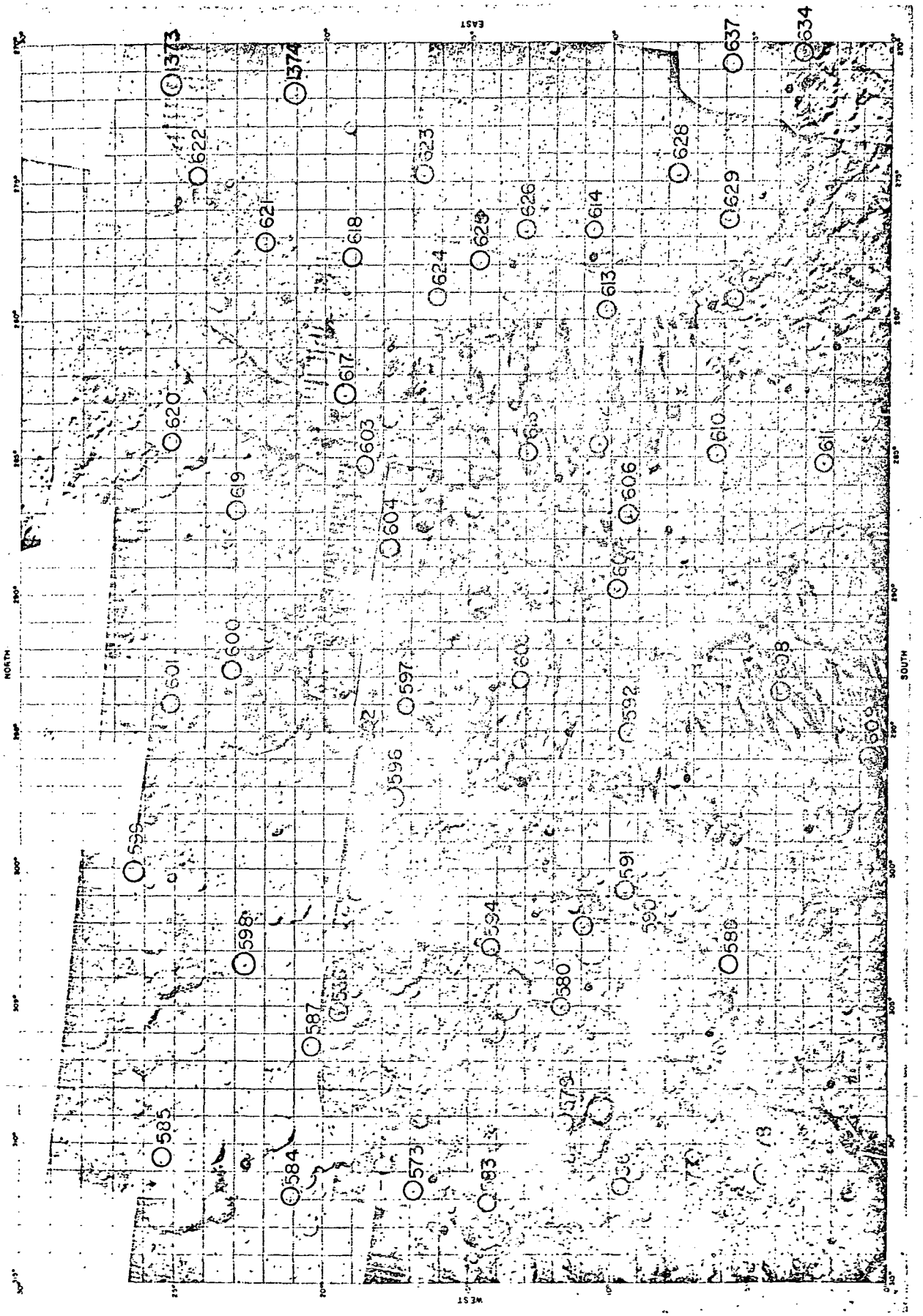


Fig. 35— Control points identified on MC-13

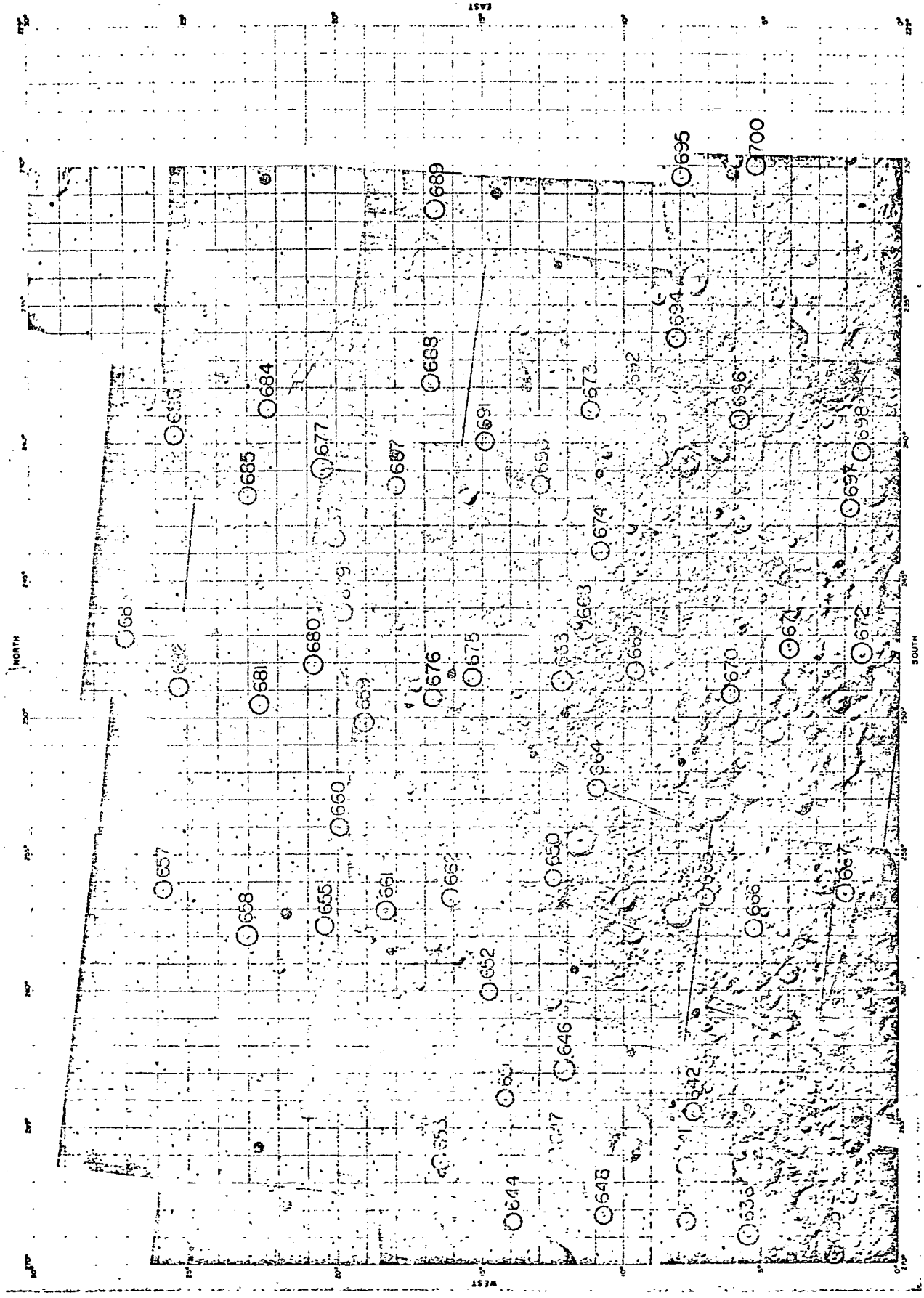


Fig. 36 — Control points identified on MC-14

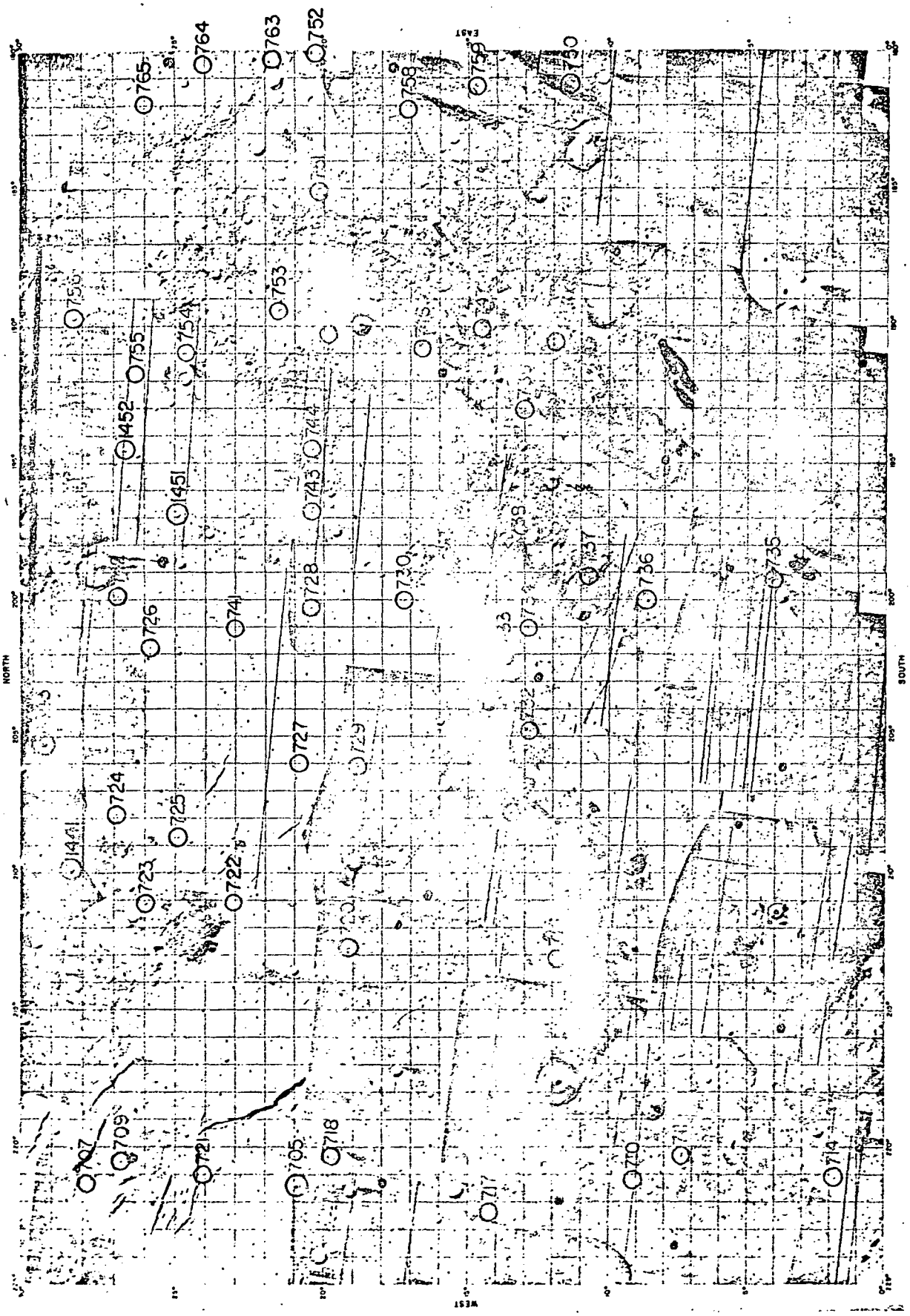


Fig. 37— Control points identified on MC-15

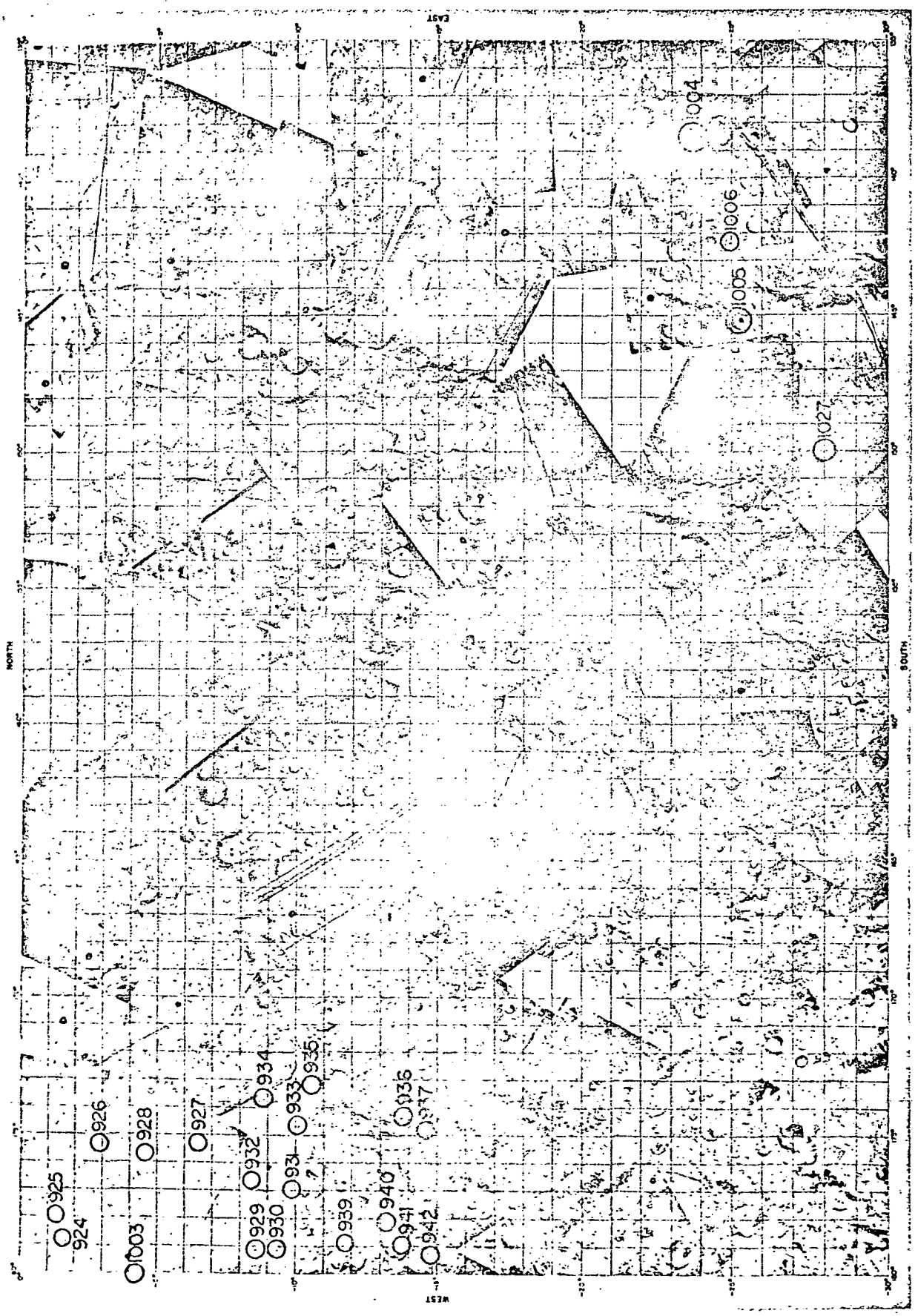


Fig. 38— Control points identified on MC-16

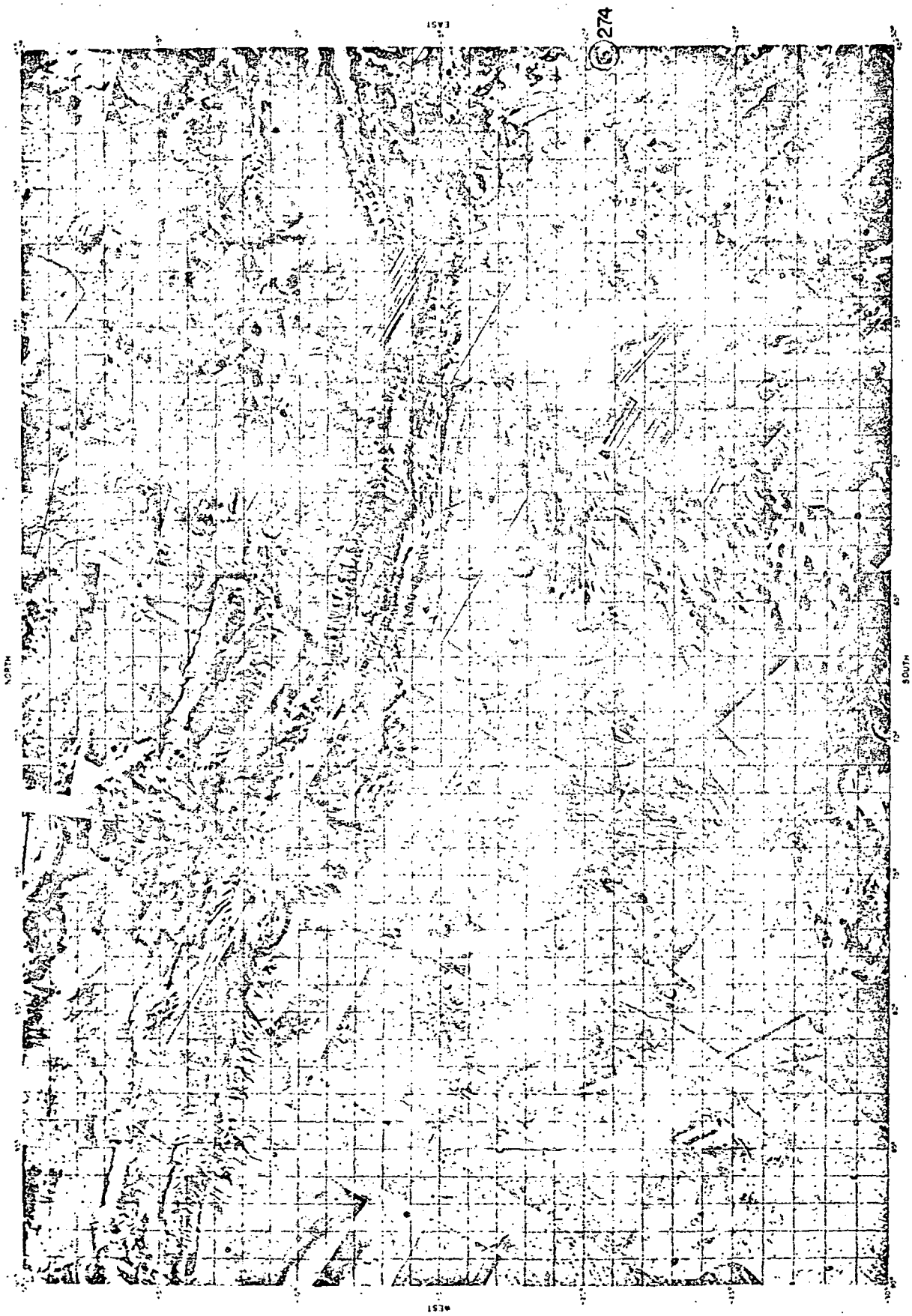


Fig. 39— Control points identified on MC-18

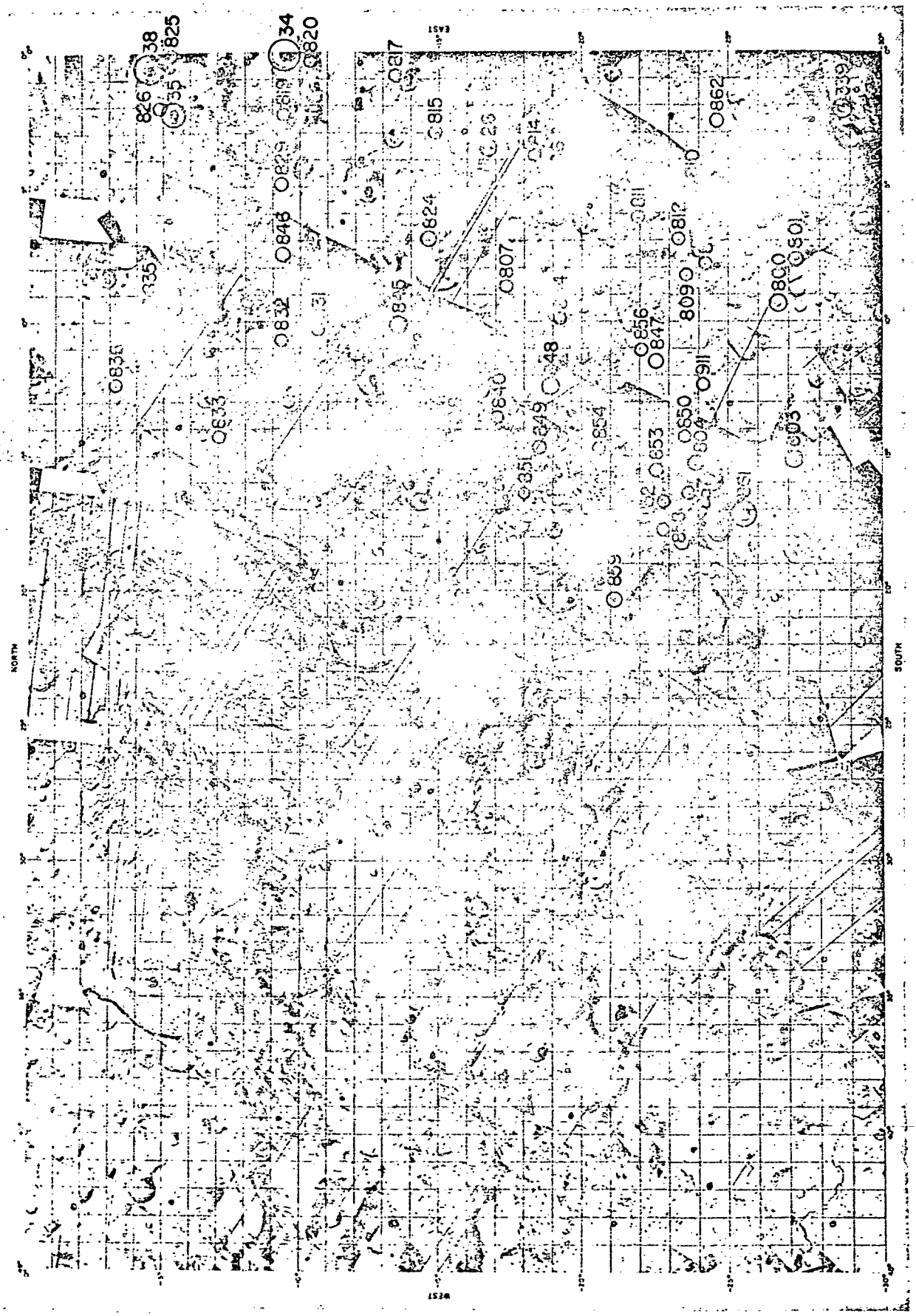


Fig. 40— Control points identified on MC-19

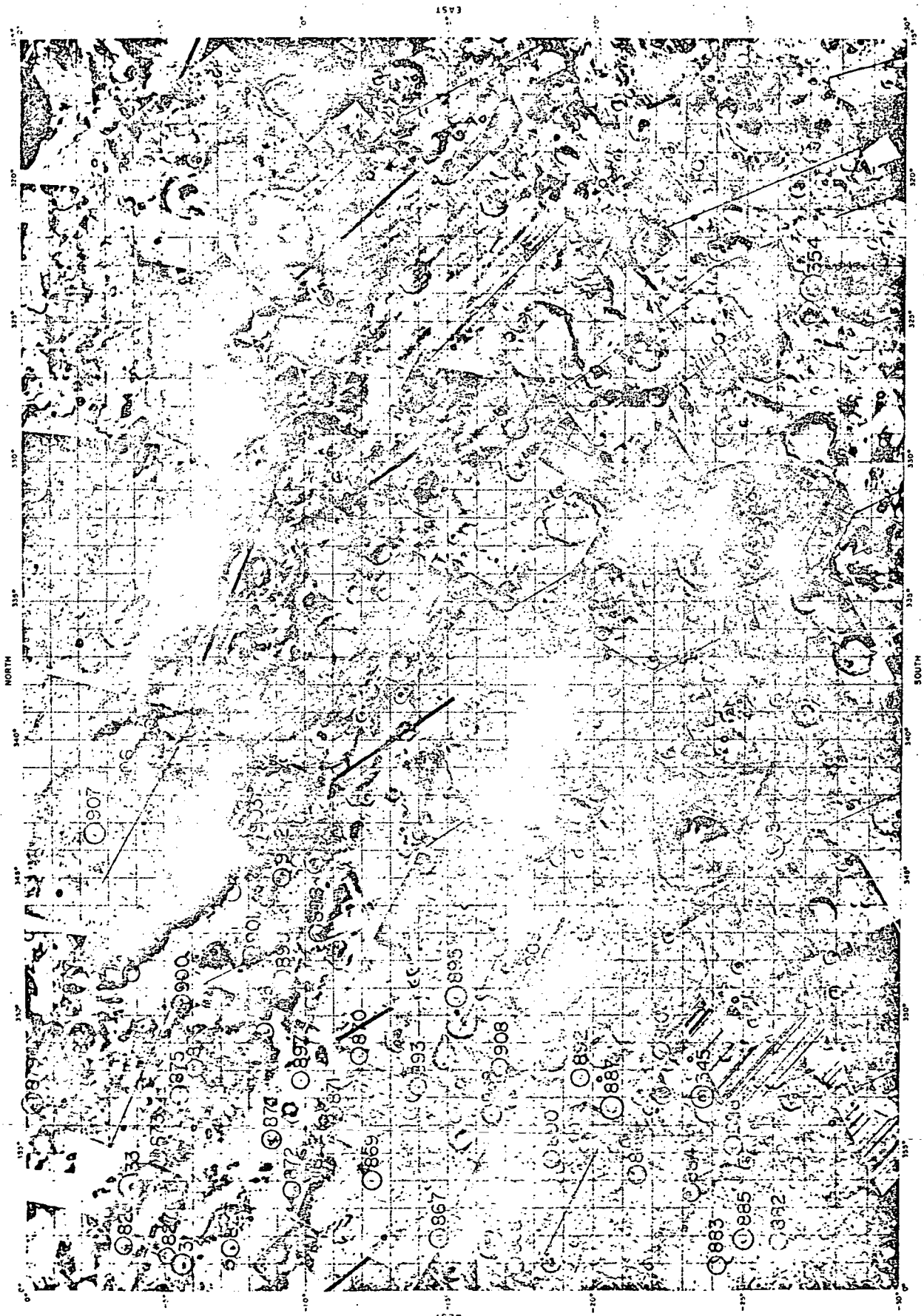


Fig. 41 — Control points identified on MC-20

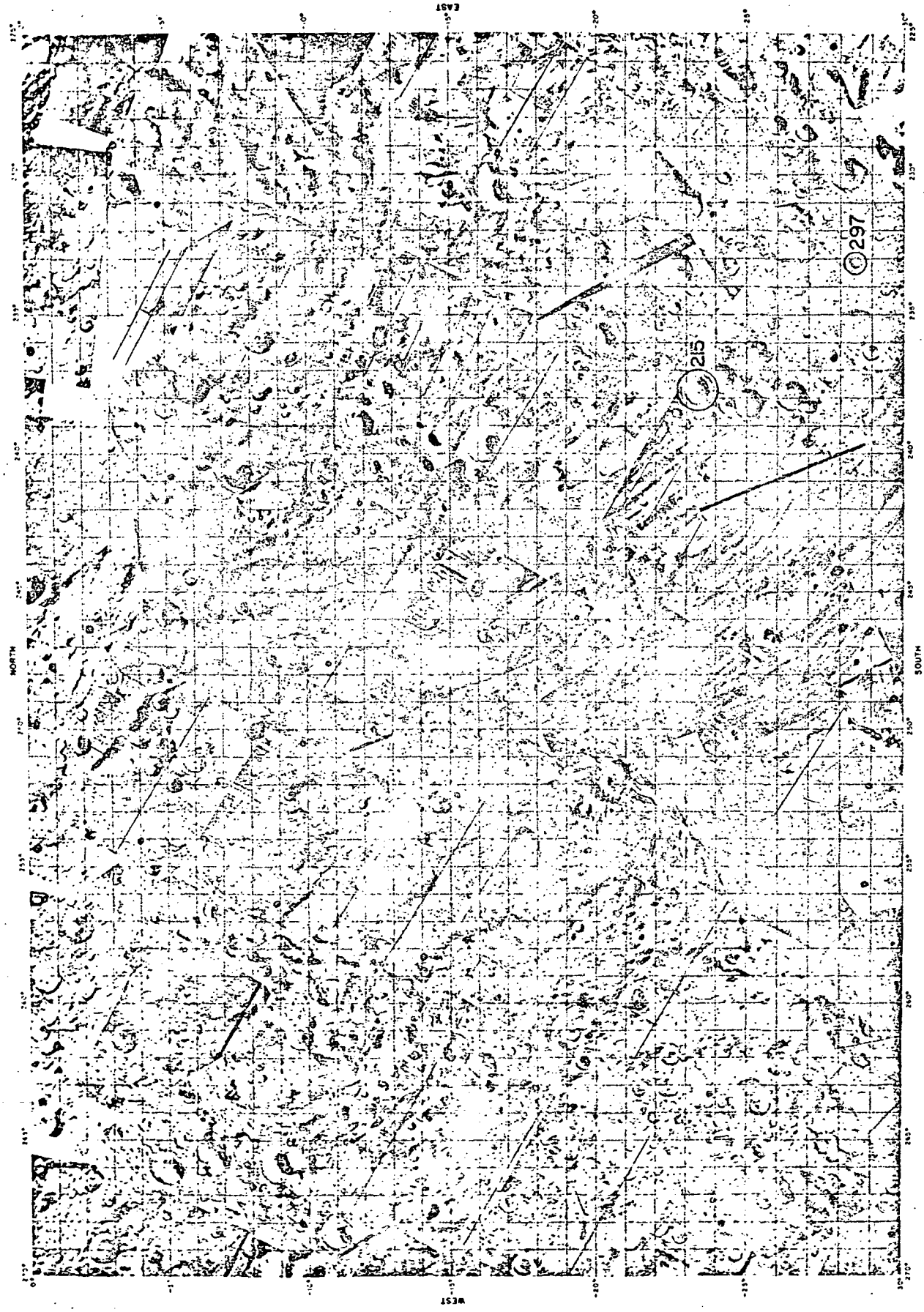


Fig. 42—Control points identified on MC-22

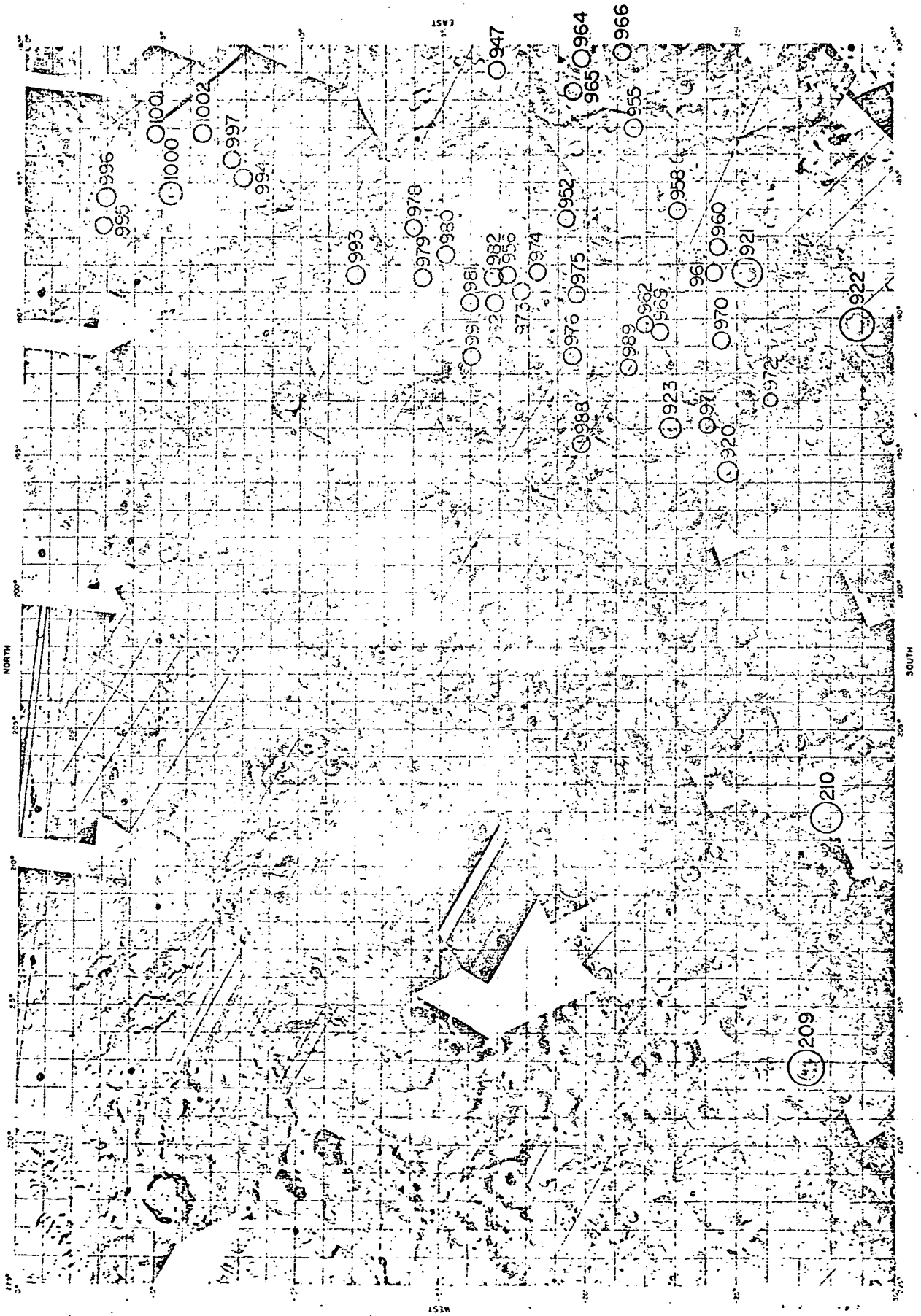


Fig. 43 — Control points identified on MC-23

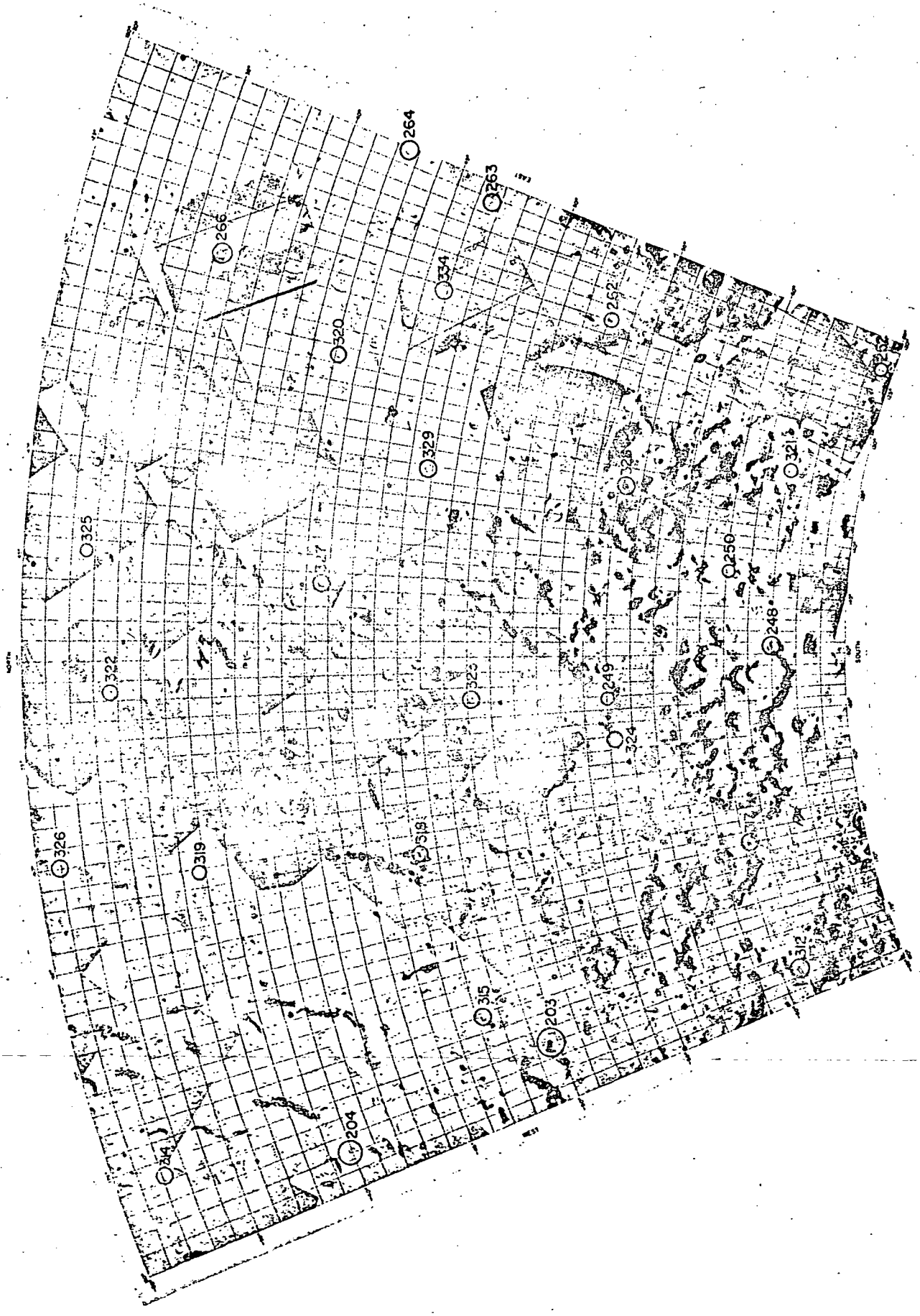


Fig. 44 — Control points identified on MC-24

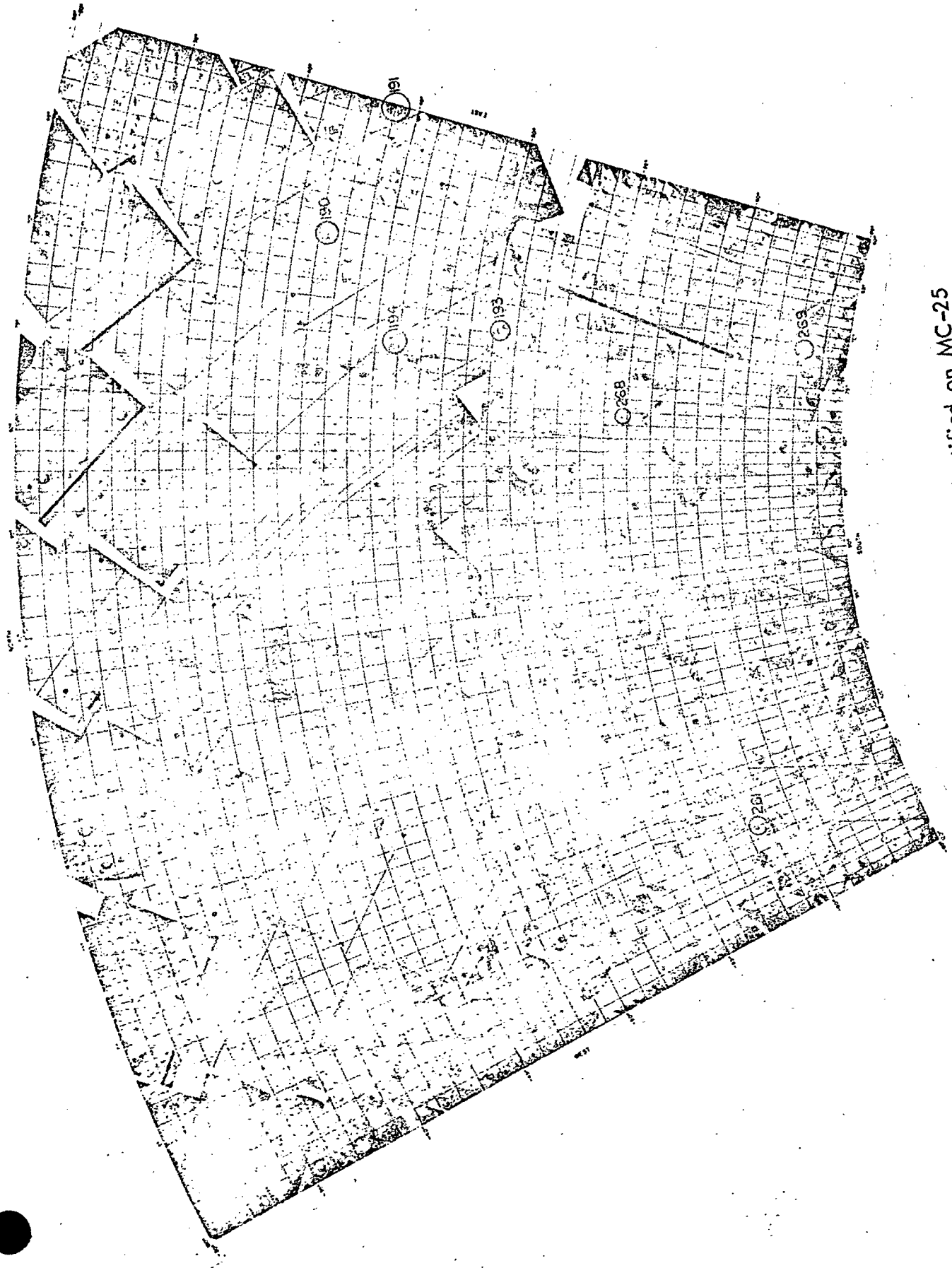


Fig. 45—Control points identified on MC-25

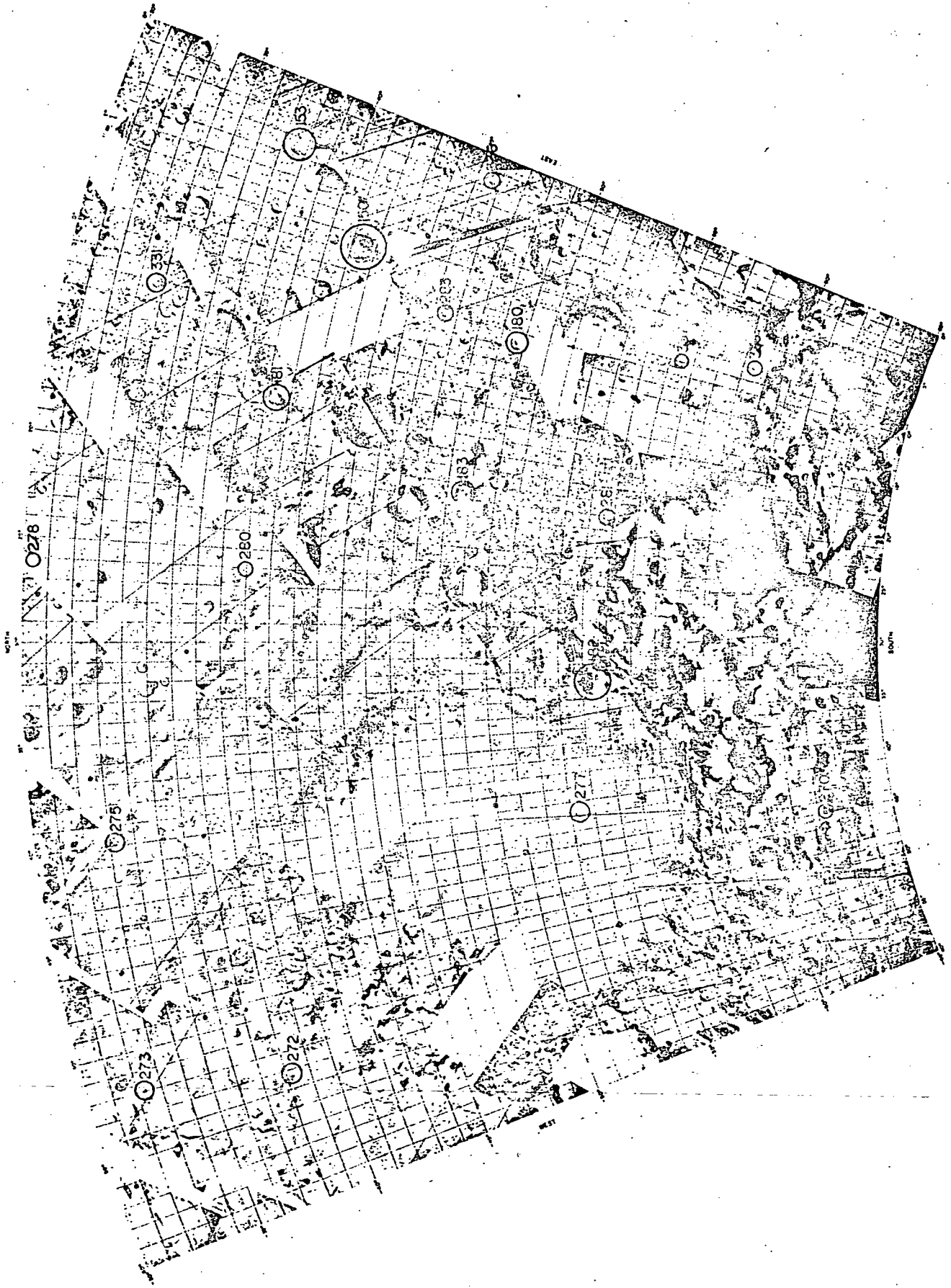


Fig. 46— Control points identified on MC-26

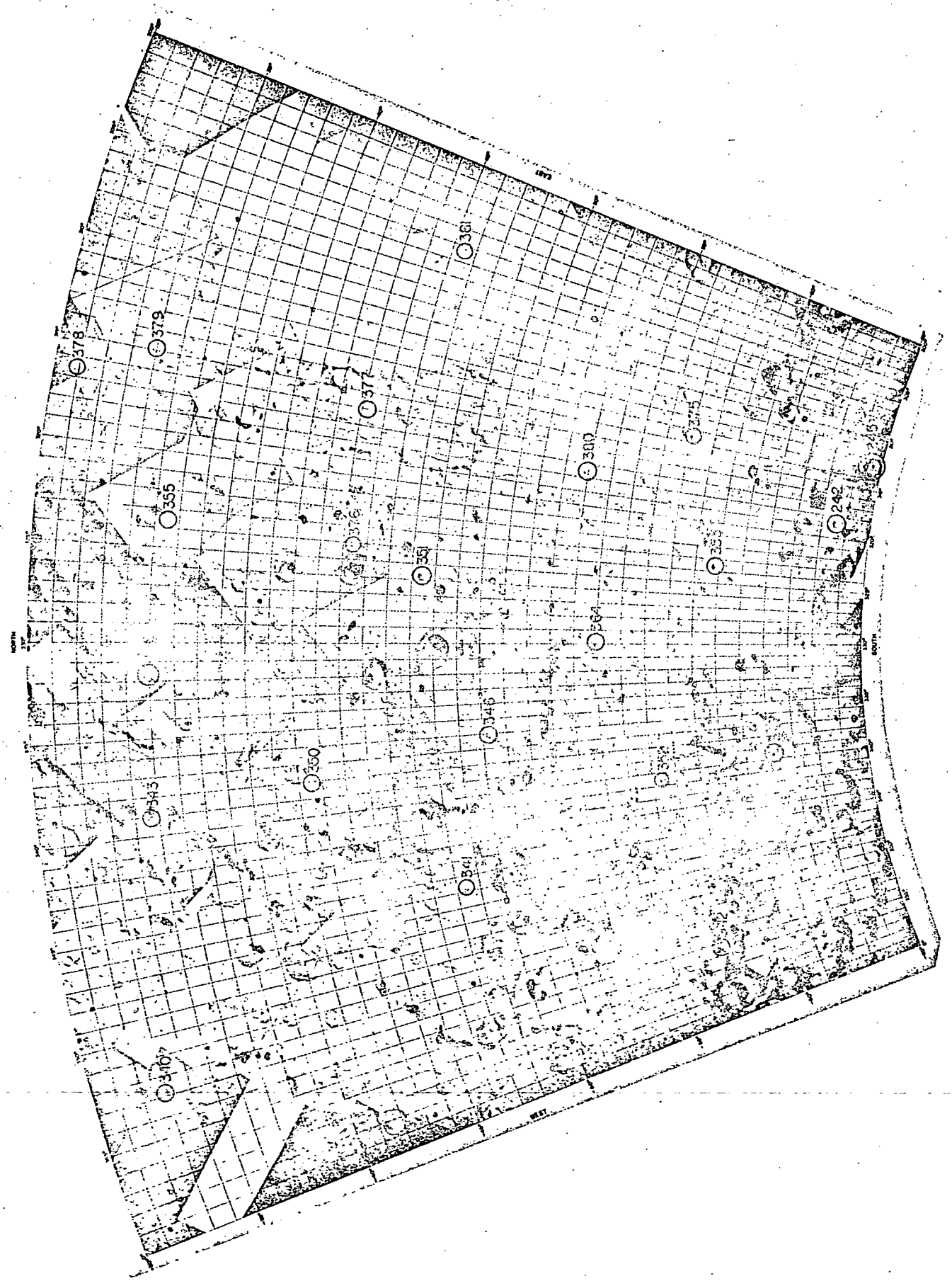


Fig. 47— Control points identified on MC-27

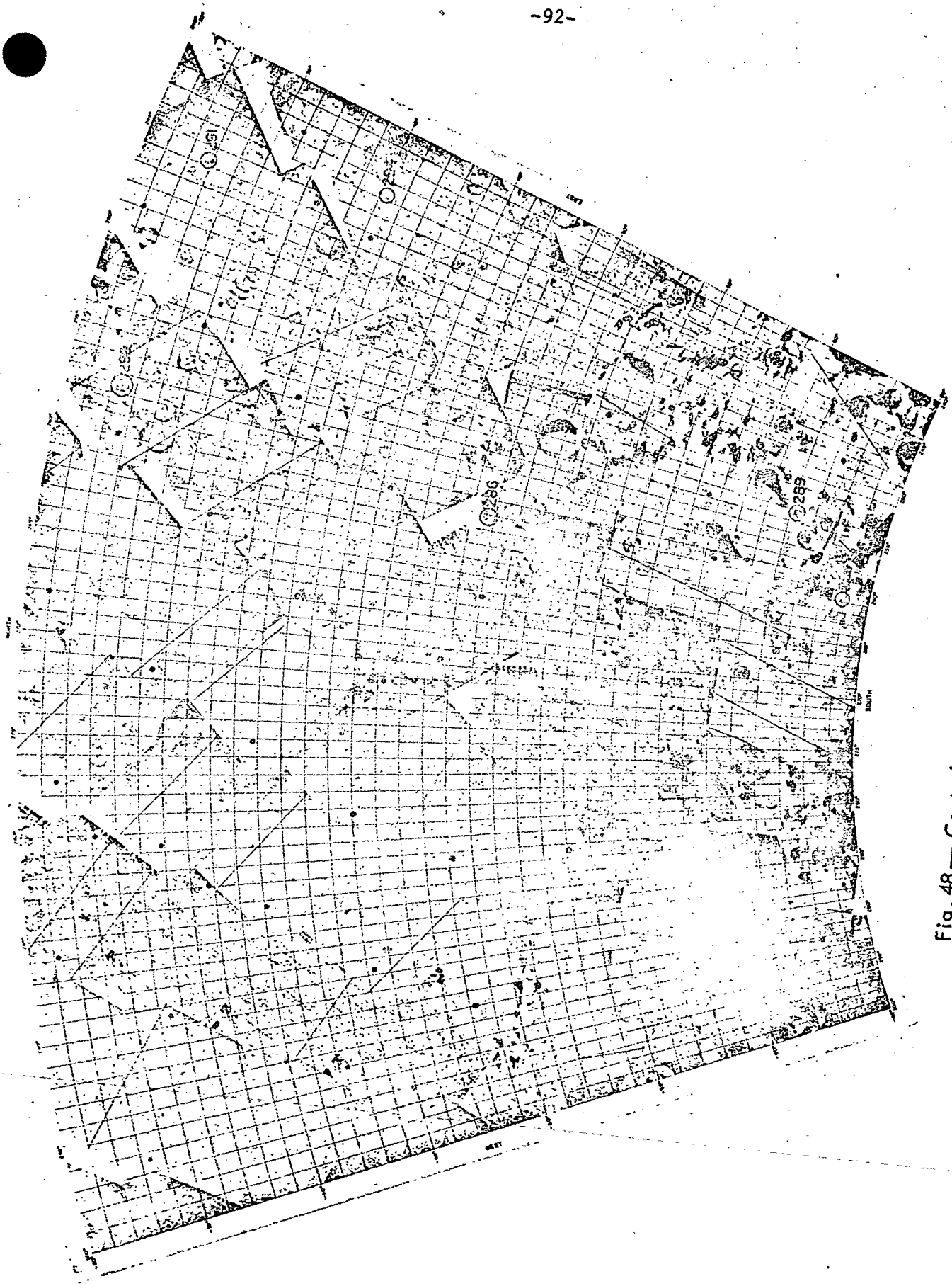


Fig. 48 — Control points identified on MC-28

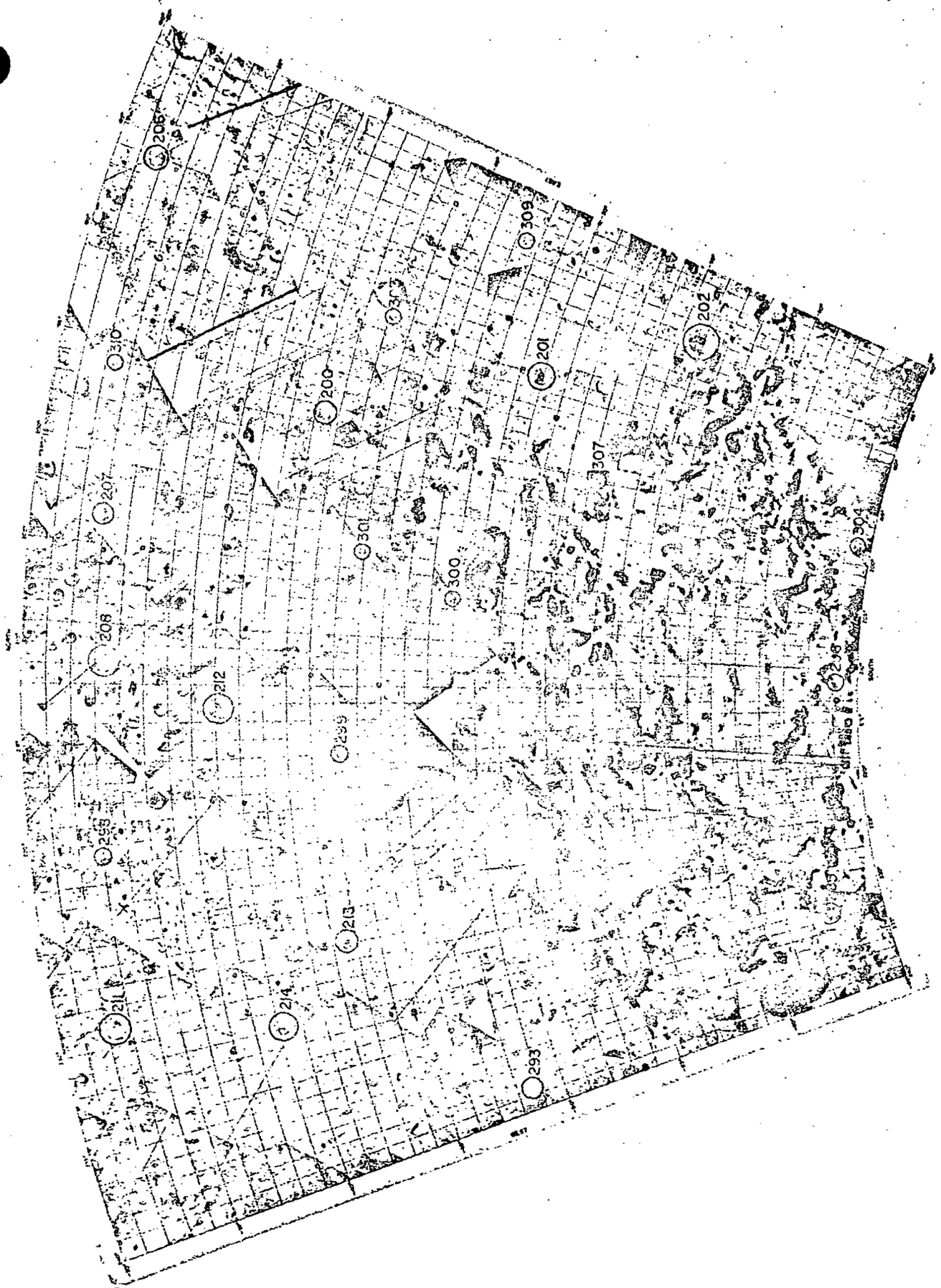


Fig. 49— Control points identified on MC-29

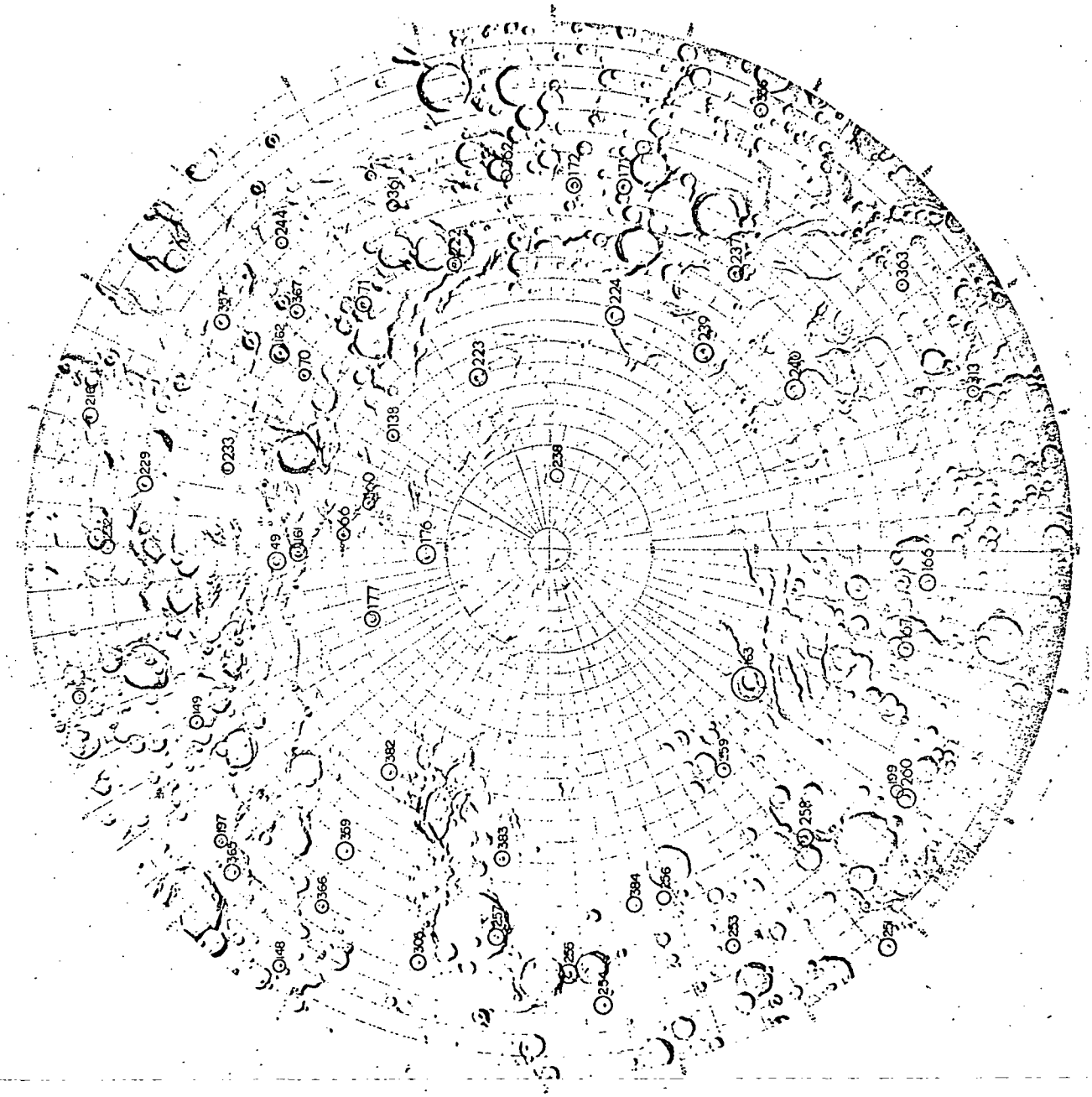


Fig. 50— Control points identified on MC-30

ACKNOWLEDGMENTS

The author would like to express his appreciation for the help and cooperation of Harold Masursky of the U.S. Geological Survey and all the members of the Mariner 9 TV experimenter team. Particular thanks go to Gerard de Vaucouleurs, David Arthur, Raymond Batson, and Warren Borgeson of the Geodesy/Cartography Group.

The author is indebted to Gordon Hoover and Tav Heistand of Caltech for measuring the coordinates of the points on the pictures and for preparing the photographs.

Frank Katayama and Rose Heirschfeldt of Rand deserve thanks. Frank prepared the many computer runs required and Rose prepared and used a variety of computer programs and helped with the figures. Richard Berg of the University of Delaware helped to make changes in the main computer program.

William Green and many other members of the Image Processing Laboratory at JPL were most helpful in preparing special versions of the pictures (map-gridded) for making measurements and in furnishing data for removing camera distortions from the measurements. Michael Sander and members of the Mariner 9 Science Data Team at JPL were very helpful in obtaining coordinates of the picture stations.

This research was supported by the Jet Propulsion Laboratory, California Institute of Technology, through Rand Contract No. 953011.

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