

DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

Prepared for the
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

NOTES ON BASE
This is one map in a series of topographic map sheets covering the entire surface of Mars at nominal scales of 1:25,000,000 and 1:5,000,000 (Batson, 1973). The major source of map data was the Mariner 9 television experiment (Masursky and others, 1970).

ADOPTED FIGURE
The figure of Mars used for the computation of the map projection is an oblate spheroid (flattening of 1/192) with an equatorial radius of 3393.4 km and a polar radius of 3375.7 km.

PROJECTION
The Mercator projection is used for this sheet, with a scale of 1:5,000,000 at the equator and 1:4,336,000 at lat 30°. Longitudes increase to the west in accordance with usage of the International Astronomical Union (IAU, 1971). Latitudes are areographic (de Vaucouleurs and others, 1973).

CONTROL
Planimetric control is provided by photogrammetric triangulation using Mariner 9 pictures (Davies, 1973; Davies and Arthur, 1973) and the radio-tracked position of the spacecraft. The first meridian passes through the crater Airy-O (lat 5.19° S) within the crater Airy. No simple statement is possible for the precision, but local consistency is 5-15 km.

MAPPING TECHNIQUE
A series of mosaics of Mercator projections of Mariner 9 pictures was assembled at 1:5,000,000.

Shaded relief was copied from the mosaics and portrayed with uniform illumination with the sun to the west. Many Mariner 9 pictures besides those in the base mosaic were examined to improve the portrayal (Levinthal and others, 1973). The shading is not generalized and may be interpreted with photographic reliability (Inge, 1972).

Shaded relief analysis and representation were made by Susan L. Davis.

ALBEDO MARKINGS
The markings superimposed on the shaded relief were hand copied from pictures that were computer enhanced especially to show low frequency tone variation (Batson and Inge, 1976). The surface in these pictures is illuminated from a variety of angles from the camera line of sight. The markings therefore delineate boundaries of local brightness variations only and should not be considered as a true measure of albedo. No attempt was made to use Earth based telescopic albedo data.

Airbrush portrayal of albedo markings was done by Patricia M. Bridges.

CONTOURS
Since Mars has no seas and hence no sea level, the datum (the 0 km contour line) for altitudes is defined by a gravity field described by spherical harmonics of fourth order and fourth degree (Jordan and Lorell, 1973) combined with a 6.1 millibar atmospheric pressure surface derived from radio-occlusion data (Klore and others, 1973; Christensen, 1975). This datum is a triaxial ellipsoid with semi-major axes of A=3394.6 km, B=3393.3 km, and a semi-minor axis of C=3376.3 km. The semi-major axis A intersects the Martian surface at long 105°.

The contour lines (Wu, 1975) were compiled from Earth-based radar determinations (Downs and others, 1971; Pettengill and others, 1971) and measurements made by Mariner 9 instrumentation, including the ultraviolet spectrometer (Hord and others, 1974), infrared interferometer spectrometer (Conrath and others, 1973), and stereoscopic Mariner 9 television pictures (Wu and others, 1973).

Formal analysis of contour-line accuracy has not been made. The estimated vertical accuracy of each source of data indicates a probable error of 1-2 km.

COLOR
No attempt was made on the map to precisely duplicate the color of the Martian surface, although the color used does approximate it.

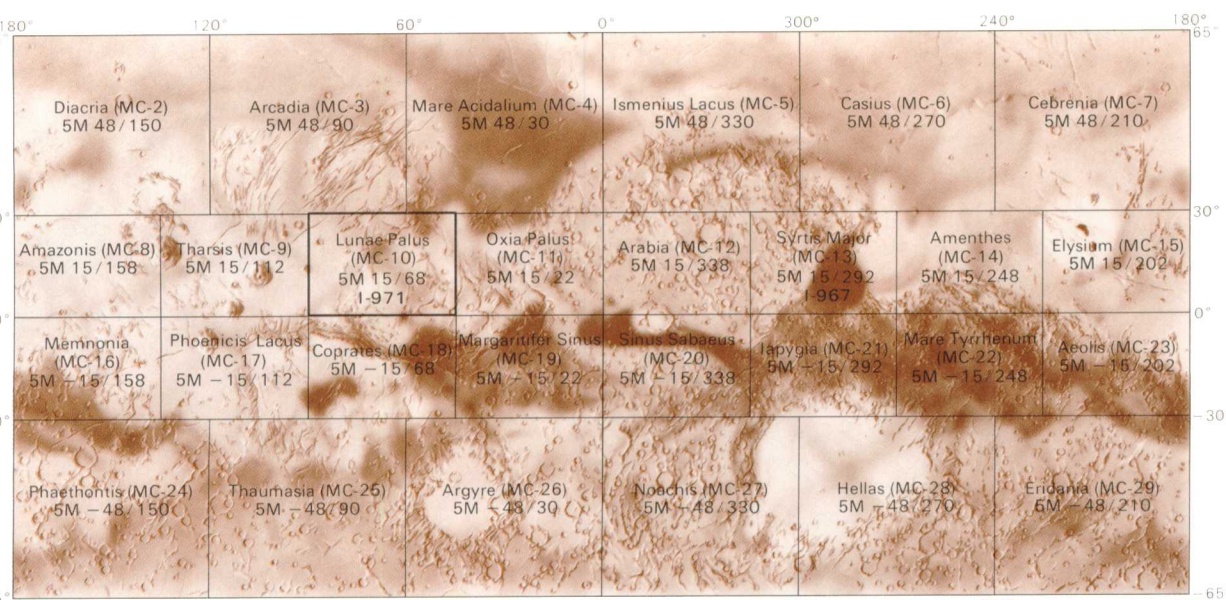
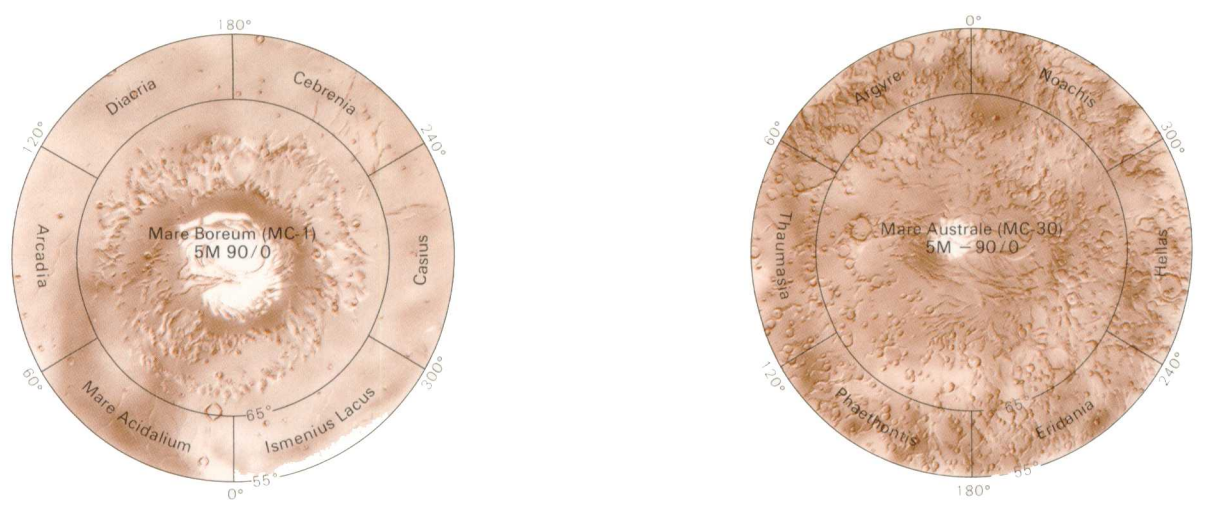
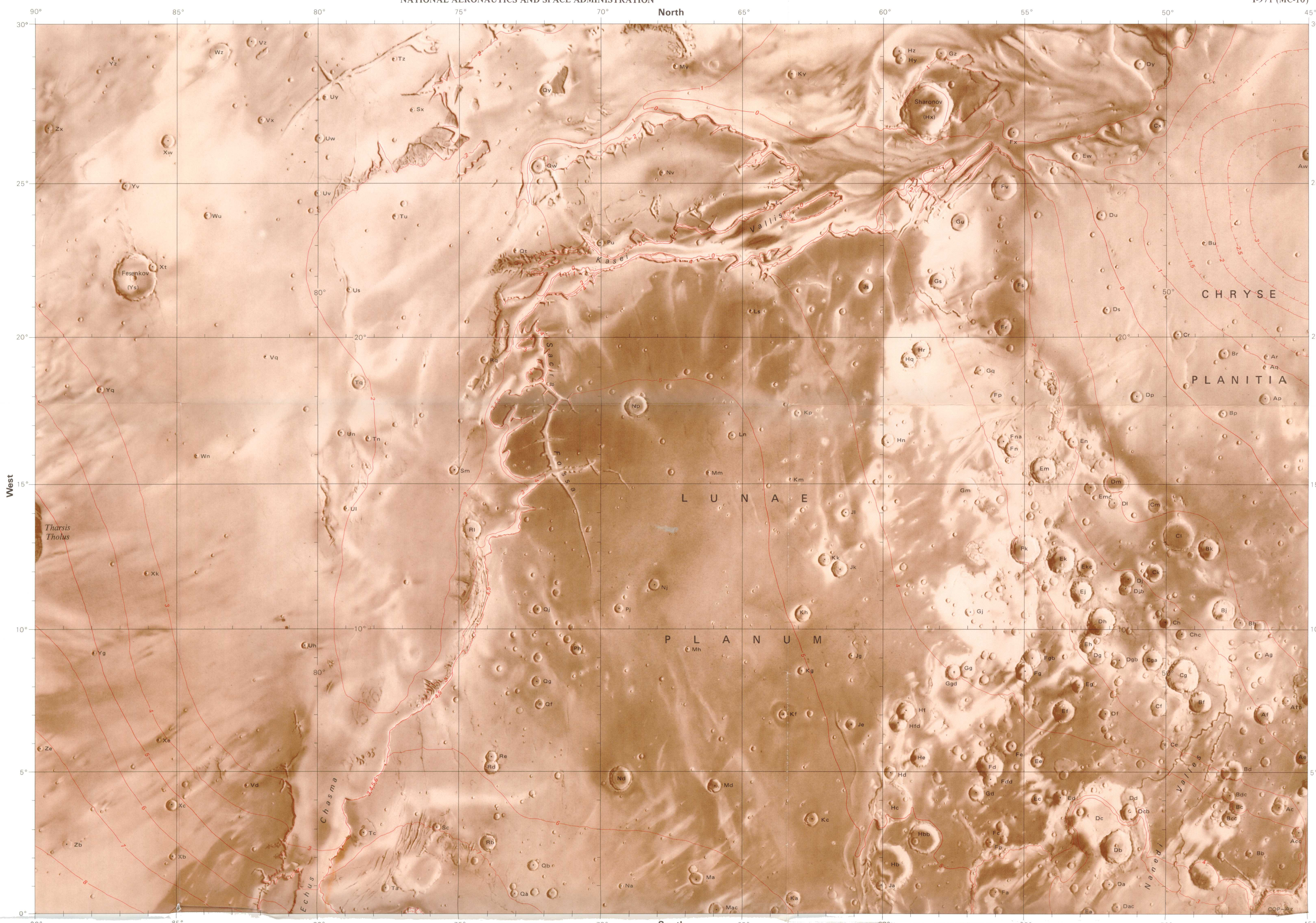
NOMENCLATURE
All names on this sheet are approved by the International Astronomical Union (IAU, 1974; Millman, written communication, 1975), except the following name which is provisional: Sora Fossae. Double and triple letter designations for craters refer to position on the map. Some craters have commemorative names; letter designations for these craters are shown in parentheses. Where craters lie mostly on an adjoining map, their letters are derived from the other map; where craters lie exactly on the boundary of two maps, their letters are derived from the eastern or southern map.

MC-10
Abbreviation for Mars Chart 10.

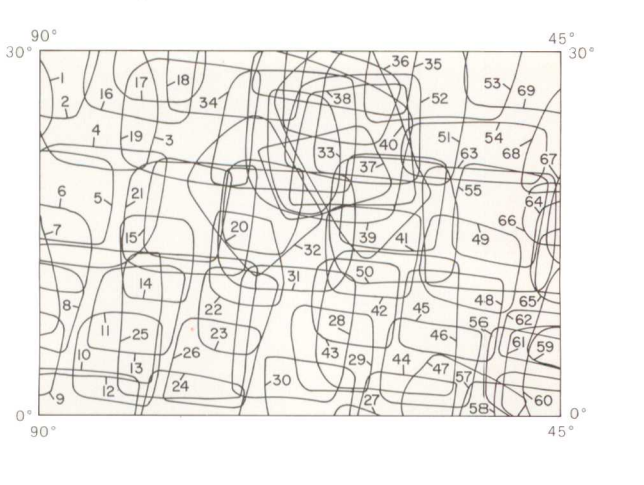
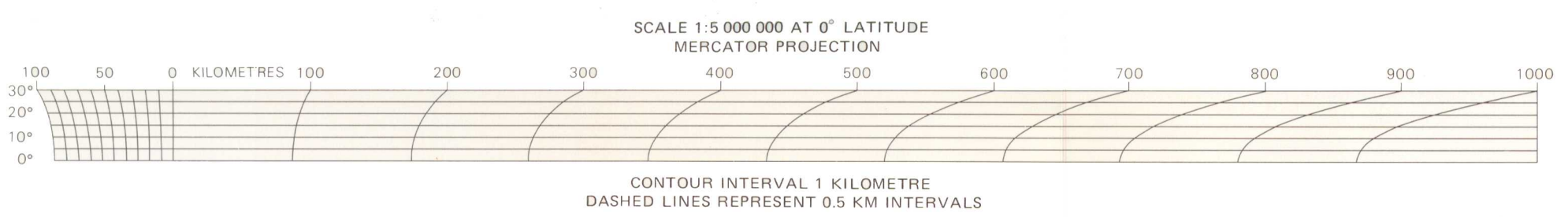
M 5M 15/68 RMC
Abbreviation for Mars 1:5,000,000 series; center of sheet, 15° latitude, 68° longitude; shaded relief map, R, with albedo markings, M, and contours, C.

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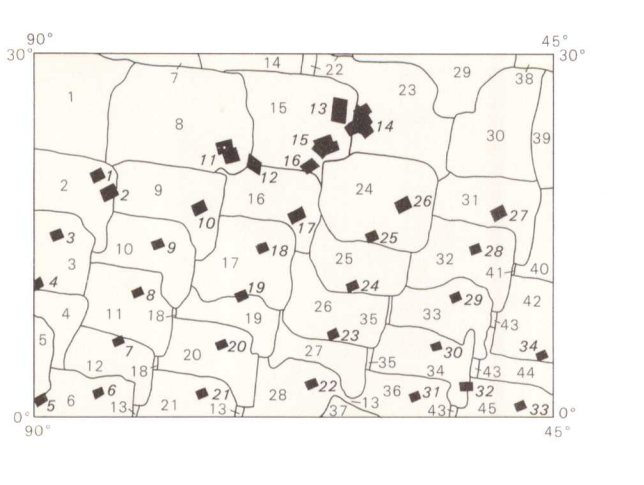


Albedo features from International Plane
Top: Polar photograph; Lower: Observations; Flight Alt.
QUADRANGLE LOCATION
Number preceded by r refers to published topographic map



Index No.	DAS No.	Index No.	DAS No.	Index No.	DAS No.
1	7183923	24	7399103	47	6283613
2	8056869	25	7327638	48	7543093
3	7255813	26	7399173	49	7543183
4	7255443	27	6139723	50	7471623
5	7255483	28	7399593	51	7471693
6	7255383	29	7471133	52	7471733
7	8657849	30	7471063	53	8874779
8	7255253	31	7898663	54	7614913
9	7255253	32	8873799	55	7542233
10	7327143	33	7327843	56	7614913
11	7327213	34	7399753	57	7614843
12	7255673	35	8802819	58	1049289
13	7327283	36	0989273	59	1049279
14	7327353	37	1286628	60	7615333
15	7327423	38	1013519	61	1049279
16	8658879	39	1331393	62	7614983
17	7255953	40	8945689	63	7615053
18	8730859	41	7471343	64	9089819
19	7327773	42	7471273	65	7615123
20	7399583	43	7471203	66	7615193
21	7327703	44	7642853	67	7615263
22	7399113	45	7643023	68	7615333
23	7399243	46	7471556	69	8946669

INDEX TO MARINER 9 PICTURES USED TO MAKE THE ALBEDO MARKINGS OVERPRINT
Most of the pictures indexed above were specially processed to accentuate albedo markings. Only the useful image areas of the pictures are outlined.



Index No.	DAS No.	Index No.	DAS No.	Index No.	DAS No.
1	07255813	24	07411843	1	07312450
2	07255483	25	07411273	2	07255278
3	07255393	26	07411203	3	07255428
4	07255443	27	07411133	4	07255358
5	07255253	28	07411063	5	07255228
6	07255183	29	08174779	6	07255158
7	07255053	30	07643268	7	07327248
8	07327273	31	07643233	8	07327218
9	07327243	32	07643163	9	07327188
10	07327353	33	07643093	10	07327338
11	07327323	34	07643023	11	07327308
12	07327213	35	07411808	12	07411738
13	08380798	36	07542958	13	08873838
14	08730859	37	08138798	14	08730828
15	07399723	38	08946669	15	08946728
16	07399653	39	07643158	16	07643088
17	07399583	40	07615053	17	10274728
18	07377638	41	07615023	18	10274658
19	07399243	42	07614983	19	12017339
20	07399113	43	07614943	20	10274408
21	07399043	44	07614913	21	12867123
22	08902819	45	07614843	22	10274338
23	07411893			23	07614818

INDEX TO MARINER 9 PICTURES
The mosaic used to control the positioning of features on this map was made with the Mariner 9 A-camera pictures outlined above, identified by vertical numbers. Also shown (by solid black rectangles) are the high-resolution B-camera pictures, identified by italic numbers.

TOPOGRAPHIC MAP OF THE LUNAE PALUS QUADRANGLE OF MARS

MC-10
M 5M 15/68 RMC
1976