DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

Prepared in Cooperation with the
JET PROPULSION LABORATORY, CALIFORNIA INSTITUTE OF TECHNOLOGY
FOR THE LANGLEY RESEARCH CENTER
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

ATLAS OF MARS
1:5,000,000 TOPOGRAPHIC SERIES
OXIA PALUS QUADRANGLE
M 5M 15/22 RMC, 1976
I-978 (MC-11)

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-occultation data Kliore 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 commun., 1975). 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-11: Abbreviation for Mars Chart 11.
M 5M 15/22 RMC: Abbreviation for Mars 1:5,000,000 series; center of sheet, 15° latitude, 22° longitude; shaded relief map, R, with albedo markings, M, and contours, C.

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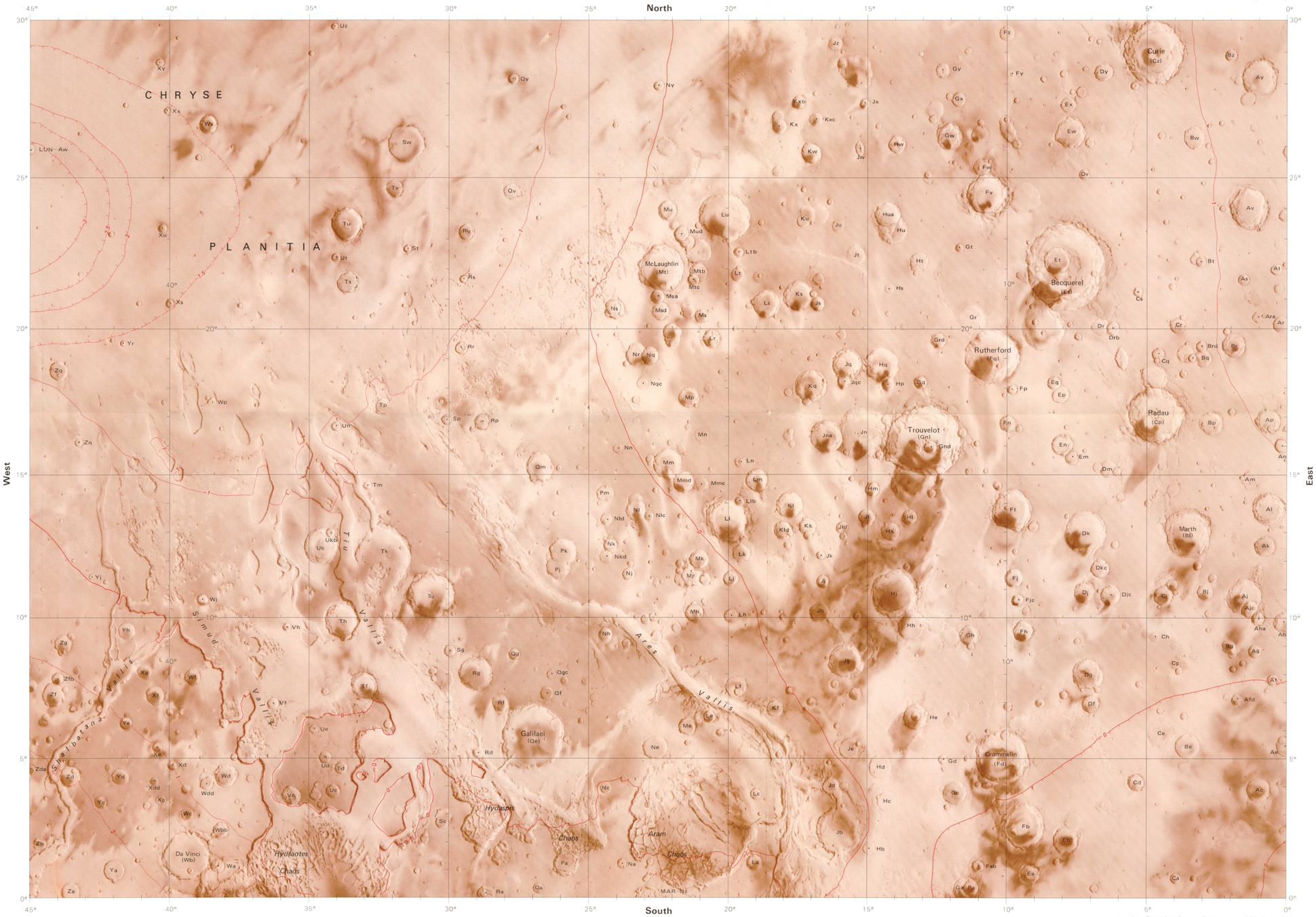
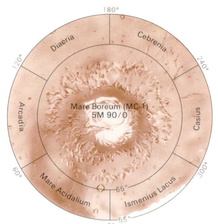
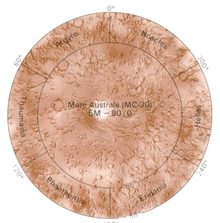
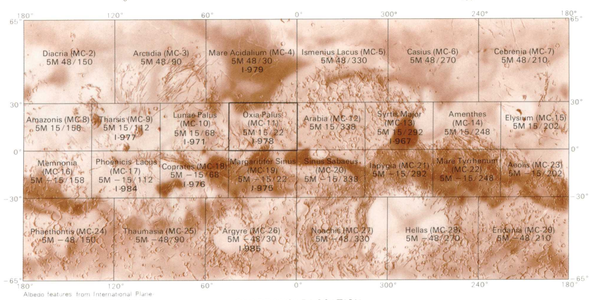








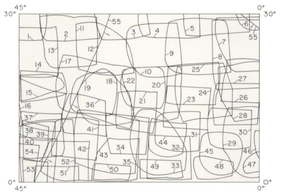
Albedo features from International Planetary Patrol photographs: Lowell Observatory, Flagstaff, Ariz.

QUADRANGLE LOCATION
Number preceded by I refers to published topographic map

SCALE 1:5 000 000 AT 0° LATITUDE
MERCATOR PROJECTION

100 50 0 KILOMETRES 100 200 300 400 500 600 700 800 900 1000

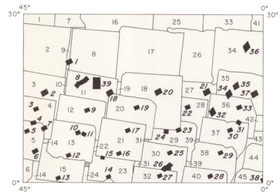
CONTOUR INTERVAL 1 KILOMETRE



INDEX OF MARINER 9 PICTURES USED TO MAKE THE ALBEDO MARKINGS OVERLAY

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	8946674	22	7759188	43	7758698
2	9018564	23	7830798	44	7830588
3	9090454	24	7830728	45	7902478
4	9162344	25	7831078	46	6571428
5	9234234	26	7902688	47	6571358
6	9306124	27	7902618	48	7902408
7	7903038	28	7902968	49	7830518
8	13021687	29	7902898	50	7758628
9	7831148	30	7902548	51	7686738
10	7759258	31	7830658	52	7615338
11	7687368	32	6422798	53	10492694
12	10493114	33	7759118	54	7614918
13	7615478	34	7758768	55	13328750
14	7615128	35	7687228		
15	7615408	36	7686948		
16	9089824	37	10492834		
17	13460073	38	7615058		
18	7687018	39	7614988		
19	7687298	40	10492764		
20	7758908	41	7686878		
21	7758838	42	7686808		



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. Useful coverage is not available in cross-hatched area. Also shown (by solid black rectangles) are the high-resolution B-camera pictures, identified by italic numbers.

A-camera pictures				High-resolution B-camera pictures			
Index No.	DAS No.	Index No.	DAS No.	Index No.	DAS No.	Index No.	DAS No.
1	8946674	24	7758628	*1*	*10493079*	*20*	*7759218*
2	7615478	25	9162344	*2*	*7615438*	*21*	*7841108*
3	7615128	26	7831148	*3*	*7615088*	*22*	*7830758*
4	9089819	27	7830798	*4*	*9089784*	*23*	*7830688*
5	7614983	28	7830728	*5*	*7615018*	*24*	*6427328*
6	7614913	29	7830658	*6*	*10492794*	*25*	*7830618*
7	9018964	30	7759118	*7*	*10492864*	*26*	*12362246*
8	7687368	31	7783098	*8*	*12186872*		*9233284*
9	10493114	32	7830518		*12187012*		*12362176*
10	7615408	33	9234234		*12186802*	*27*	*7830548*
11	7687018	34	7903038	*9*	*7686978*	*28*	*7902438*
12	7686943	35	7902688	*10*	*7686908*	*29*	*7902508*
13	7686878	36	7902518	*11*	*9089504*	*30*	*7902578*
14	7615338	37	7902548	*12*	*7686838*	*31*	*9305174*
15	7615333	38	7902478	*13*	*7686768*	*32*	*13021508*
16	9089449	39	7831008	*14*	*7758658*	*33*	*7902648*
17	7759259	40	7902408	*15*	*9161394*	*34*	*13021578*
18	7759188	41	9306124	*16*	*7758728*	*35*	*13021648*
19	7758903	42	7902963	*17*	*7758798*	*36*	*13021718*
20	7758833	43	7902898	*18*	*7687333*	*37*	*7902998*
21	7758768	44	6571423	*19*	*7758868*	*38*	*6571368*
22	7687228	45	6571358				*10492724*
23	7758698					*39*	*13460108*

TOPOGRAPHIC MAP OF THE OXIA PALUS QUADRANGLE OF MARS

MC-11
M 5M 15/22 RMC
1976

Interior—Geological Survey, Reston, VA.—1976—G76124

Prepared on behalf of the Viking Project Office, National Aeronautics and Space Administration under contract L-55232.

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