

NOTES ON BASE

This map is one in a series covering the entire surface of Mars at a nominal scale of 1:5,000,000. The series was originally compiled from Mariner 9 data (Bateson and others, 1973). The original shaded relief base was revised and augmented with image data from Viking Orbiter, but feature positions were not shifted to fit controls derived from Viking.

ADOPTED FIGURE

The figure of Mars used for the compilation of the map projection is an oblate spheroid (flattening of 1/132) with an equatorial radius of 3,393.4 km and a polar radius of 3,375.7 km.

PROJECTION

The Mercator, Lambert Conformal Conic, and Polar Stereographic projections are used for this map series. The scale of the series is 1:5,000,000 at the equator. The projections have common scales of 1:4,336,000 at lat ±30° and 1:4,306,000 at lat ±65°. Standard parallels for the Lambert Conformal Conic projection are at lat ±35.8° and ±59.2°. Longitude increases to the west in accordance with astronomical convention for Mars. Latitude is planigraphic.

CONTROL

Planimetric control of the shaded relief is provided by photogrammetric triangulation using Mariner 9 images (Davies, 1973; Davies and Arthur, 1973) and the radio-tracked positions of the Mariner 9 spacecraft. The first meridian passes through the center of a small crater, Ary-O (at 5.19° S, long 0°), within the crater Ary. Primary controls used in the network include the Viking Orbiter Secondary Experiment Data Record, radio-occultation measurements from both Mariner 9 and Viking Missions (Lorell and others, 1972; Klore and others, 1973; Lindell and others, 1979). Earth-based radar observations (Petengill and others, 1971; Downs and others, 1975), and the Mars primary control network of the Rand Corporation (Davies and others, 1978).

MAPPING TECHNIQUE

Shaded relief was portrayed by photostereographic methods described by Inge and Bridges (1976). Uniform sun illumination from the west was used throughout. The original rendition of feature positions, sizes, and shapes was taken from a controlled base mosaic of Mariner 9 images. Various computer enhancements of many Mariner 9 and Viking Orbiter images besides those in the base mosaic were examined in an attempt to portray the surface as accurately as possible.

COLOR

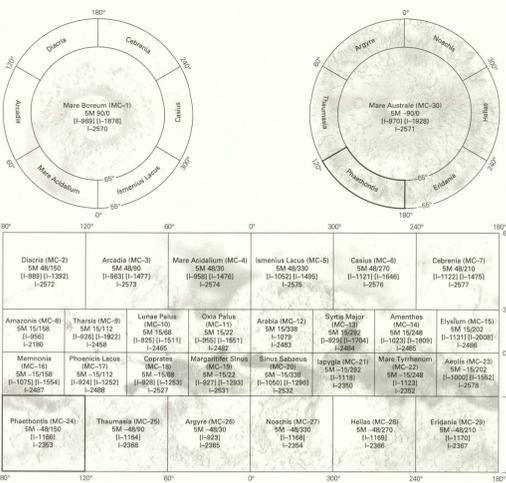
No attempt was made on the map to duplicate precisely the color of the martian surface, although the color used may approximate it.

NOMENCLATURE

Names on this sheet are approved by the International Astronomical Union (IAU), 1974, 1977, 1980, 1983, 1986, 1996.
MC-24: Abbreviation for Mars Chart 24.
M 5M -48/150 RN: Abbreviation for Mars 1:5,000,000 series; center of sheet, lat 48° S, long 150°; shaded relief map (R) with nomenclature (N).

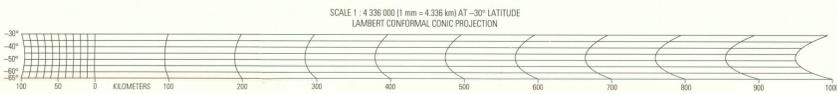
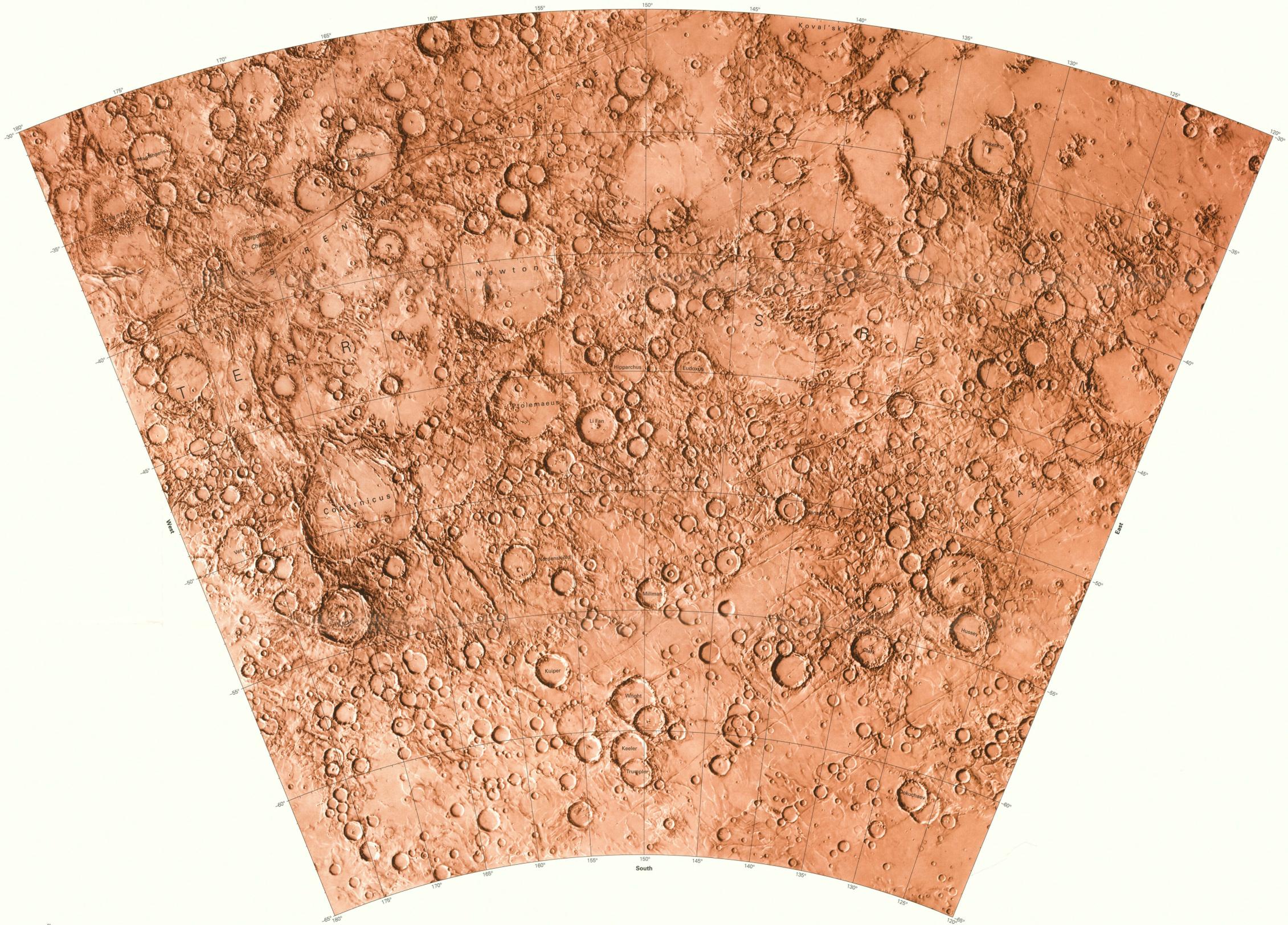
REFERENCES

Bateson, R.M., Bridges, P.M., and Inge, J.L., 1979, Atlas of Mars—The 1:5,000,000 map series: National Aeronautics and Space Administration Special Publication 438, 146 p.
Davies, M.E., 1973, Mariner 9—Primary control net: Photogrammetric Engineering, v. 39, no. 12, p. 1297-1302.
Davies, M.E., and Arthur, D.W.C., 1973, Martian surface coordinates: Journal of Geophysical Research, v. 78, no. 20, p. 4355-4394.
Davies, M.E., Katayama, F.Y., and Roth, J.A., 1978, Control net of Mars: February 1987: The Rand Corporation, R-2309-NASA, 91 p.
Downs, G.S., Reichley, P.E., and Green, R.R., 1975, Radar measurements of martian topography and surface properties: Icarus, v. 26, no. 3, p. 273-312.
Inge, J.L., and Bridges, P.M., 1976, Applied photointerpretation for airbrush cartography: Photogrammetric Engineering and Remote Sensing, v. 42, no. 6, p. 749-760.
International Astronomical Union, 1974, Commission 16: Physical study of planets and satellites and Lunar and martian nomenclature, in Proceedings of the 15th General Assembly, Sydney, 1973: Transactions of the International Astronomical Union, v. 15B, p. 105-108, 207-221.
—1977, Working Group for Planetary System Nomenclature, in Proceedings of the 16th General Assembly, Grenoble, 1976: Transactions of the International Astronomical Union, v. 16B, p. 321-369.
—1980, Working Group for Planetary System Nomenclature, in Proceedings of the 17th General Assembly, Montreal, 1979: Transactions of the International Astronomical Union, v. 17B, p. 285-304.
—1983, Working Group for Planetary System Nomenclature, in Proceedings of the 18th General Assembly, Patras, 1982: Transactions of the International Astronomical Union, v. 18B, p. 331-346.
—1986, Working Group for Planetary System Nomenclature, in Proceedings of the 19th General Assembly, New Delhi, 1985: Transactions of the International Astronomical Union, v. 19B, p. 339-353.
—1996, Working Group for Planetary System Nomenclature, in Proceedings of the 22th General Assembly, The Hague, 1994: Transactions of the International Astronomical Union, v. 22B, p. 925-923.
Klore, A.J., Feldbo, Gunnar, Seidel, B.L., Sykes, M.J., and Weisshyn, P.M., 1973, S-band radio occultation measurements of the atmosphere and topography of Mars with Mariner 9: Extended mission coverage of polar and intermediate latitudes: Journal of Geophysical Research, v. 78, no. 20, p. 4331-4351.
Lindell, G.F., Hatz, H.B., Sweetnam, D. N., Shapero, Zt, Breckle, J.P., Hartsell, G.V., and Spear, R.T., 1979, Viking radio occultation measurements of the atmosphere and topography of Mars: Journal of Geophysical Research, v. 84, no. 814, p. 8443-8456.
Lorell, Jack, Born, G.H., Jordan, J.F., Laing, P.A., Martin, W.L., Sjogren, W.J., Shapiro, I.I., Reasenberg, R.D., and Slater, G.L., 1972, Mariner 9 orbital mechanics experiment—Gravity field and pole direction of Mars: Science, v. 175, no. 4019, p. 317-320.
Petengill, G.H., Rogers, A.E.E., and Shapiro, I.I., 1971, Martian craters and a scarp as seen by radar: Science, v. 174, no. 4016, p. 1321-1324.



QUADRANGLE LOCATION
Number preceded by 1 refers to published shaded relief map.
(Number in brackets refers to earlier map superseded by revised version.)

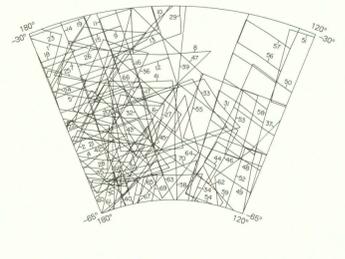
NOTE TO USERS
Users noting errors or omissions are invited to indicate them on the map and to forward it to U.S. Geological Survey, Building 4, Room 460, 2255 North Gemini Drive, Flagstaff, Arizona 86001. A replacement copy will be returned.



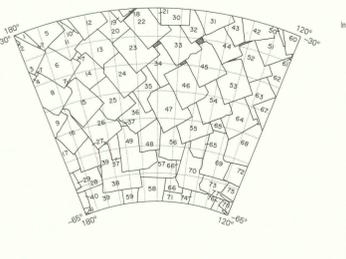
WIKING 1—HISTORICAL SURVEY REGION, M-106

12,000-M SCALE CONTROLLED PHOTOMOSAICS

I-Series	Quadrangle
I-1503	MC-24 NW
I-1601	MC-24 NE
I-1555	MC-24 NC
I-1601	MC-24 SW
I-1603	MC-24 SE



VIKING 1				VIKING 2			
Index No.	Picture No.						
1	88A7	27	409A56	34	6288	60	438E71
2	88A21	28	409A26	35	62914	61	438E73
3	88A71	29	412A12	36	62918	62	438E72
4	88A33	30	433E76	37	7582	63	438E80
5	88A34	31	433E77	38	75810	64	438E81
6	88A35	32	433E78	39	75814	65	438E82
7	88A36	33	433E80	40	75821	66	438E84
8	88A37	41	270E68	41	270E68	67	438E83
9	88A38	42	248E88	42	248E88	68	478E24
10	88A40	43	248E10	43	248E10	69	478E26
11	312A62	44	248E11	70	478E28	70	478E28
12	312A64	45	248E12				
13	312A66	46	248E13				
14	312A74	47	248E14				
15	312A76	48	248E15				
16	312A78	49	248E17				
17	312A80	50	248E18				
18	312A86	51	362E67				
19	312A88	52	362E68				
20	312A90	53	362E62				
21	312A92	54	362E63				
22	312A94	55	362E64				
23	409A47	56	409A44				
24	409A48	57	366A66				
25	409A50	58	366A68				
26	409A51	59	366E60				



A-camera pictures			
Index No.	DAS No.	DAS No.	Index No.
1	527E38	29	549E66
2	88E128	28	549E68
3	327E38	29	541E66
4	327E28	30	836E04
5	853E28	31	844E24
6	534E78	32	556E28
7	606E53	33	556E148
8	534E78	34	556E78
9	534E78	35	556E308
10	537E38	36	556E308
11	534E78	37	556E728
12	625E24	38	6634E18
13	541E78	39	6634E6
14	541E68	40	549E558
15	541E78	41	556E218
16	541E68	42	851E24
17	541E78	43	362E68
18	825E24	44	562E78
19	541E28	45	562E108
20	541E78	46	562E628
21	549E28	47	562E68
22	549E18	48	562E78
23	549E18	49	562E68
24	549E18	50	570E78
25	549E18	51	570E78
26	549E18	52	570E78

INDEX OF 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. Useful coverage is not available in the crosshatched areas. The DAS number may vary slightly (usually by 5) among different versions of the same picture.

INDEX OF VIKING SOURCES
This shaded relief map has been revised by utilizing 12,000-meter scale controlled photomosaics and supplementary Viking pictures outlined above. Copies of various enhancements of these pictures are available from National Space Science Data Center, Code 801, Goddard Space Flight Center, Greenbelt, MD 20771.

REVISED SHADED RELIEF MAP OF THE PHAETHONTIS QUADRANGLE (MC-24) OF MARS