

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 1:5,000,000 and 1:25,000,000. First-edition sheets in this series were compiled largely with Mariner 9 data. Selected parts of the series are being revised on the basis of Viking data. The mapping is described by Batson (1973, 1976, and 1978). The Mariner 9 television experiment is described by Mausky and others (1976). A series of papers on the Viking missions is contained in the Journal of Geophysical Research, v. 82, no. 28 (September 30, 1977).

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 1:4,338,000 at lat 30°. Longitudes increase to the west in accordance with usage of the International Astronomical Union (IAU, 1971). Latitudes are areographic (de Vancouleurs 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 Alys-O (lat 5.19° S) within the crater Alys. In February 1978, the Mariner 9 control net was upgraded through the use of Viking data (Davies and others, 1978). Random discrepancies as large as 11 km exist between the Mariner 9 net (on which this sheet is based) and the new Viking net.

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

Shaded relief was portrayed with uniform illumination with the sun to the west, using airbrush techniques described by Inge (1972) and Inge and Bridges (1976). Sizes, shapes, and positions of features were taken from the base mosaic. In the first edition of the map (U. S. Geological Survey, 1975), various computer enhancements of many Mariner 9 pictures besides those in the base mosaic were examined in an attempt to portray the surface as accurately as possible. Computer enhancement of Mariner 9 pictures is described by Levinthal and others, 1973, and Green and others, 1975. This rendition was revised through examination of Viking Orbiter pictures to produce the current version.

Shaded relief analysis and representation were made by Patricia M. Bridges. Shaded relief revisions were made by Patricia M. Bridges.

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

NOMENCLATURE
All names on this sheet are approved by the International Astronomical Union (IAU, 1974, 1977). Double- and triple-letter designations for craters refer to position on the map and are derived from a grid based on equidistant meridians and parallels; the alphabets (I and O omitted) runs in the direction of increasing longitude (W) and latitude (N). The complete designation of a crater is the name of the quadrangle followed by a double or triple letter. The prefix PII (identifying the Phoenicis Lacus quadrangle) is part of the complete designation but, for brevity, is not shown on most craters. 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-17: Abbreviation for Mars Chart 17.
M 5M-15/112 RN: Abbreviation for Mars 1:5,000,000 series; center of sheet, 15° S lat, 112° W long; shaded relief map, R, nomenclature N.

REFERENCES
Batson, R. M., 1973, Cartographic products from the Mariner 9 mission: Journal of Geophysical Research, v. 78, no. 20, p. 4424-4435.

1976, Cartography of Mars, 1975: The American Cartographer, v. 3, no. 1, p. 57-63.

1978, Planetary mapping with the airbrush: Sky and Telescope, v. 55, no. 2, p. 109-112.

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. G., 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 1978: The Rand Corporation, R-2309-NASA, February 1978.

Green, W. B., Jepsen, P. L., Kremer, J. E., Ruiz, R. M., Schwartz, A. A., and Seidman, J. B., 1975, Removal of instrumental distortions from Mariner 9 television images of Mars: Applied Optics, v. 14, no. 1, p. 105-114.

Inge, J. L., 1972, Principles of lunar illustration: Aeronautical Chart and Information Center Reference Publication RP 72-1, 60 p.

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, Commission 16, 1971, Physical study of planets and satellites, in 14th General Assembly, 1970, Proceedings: International Astronomical Union Transactions, v. 149, p. 128-137.

1974, Physical study of planets and satellites, in 15th General Assembly, 1973, Proceedings: International Astronomical Union Transactions, v. 158, p. 185-188.

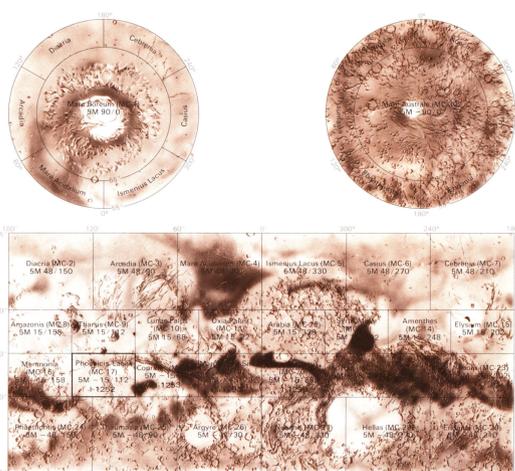
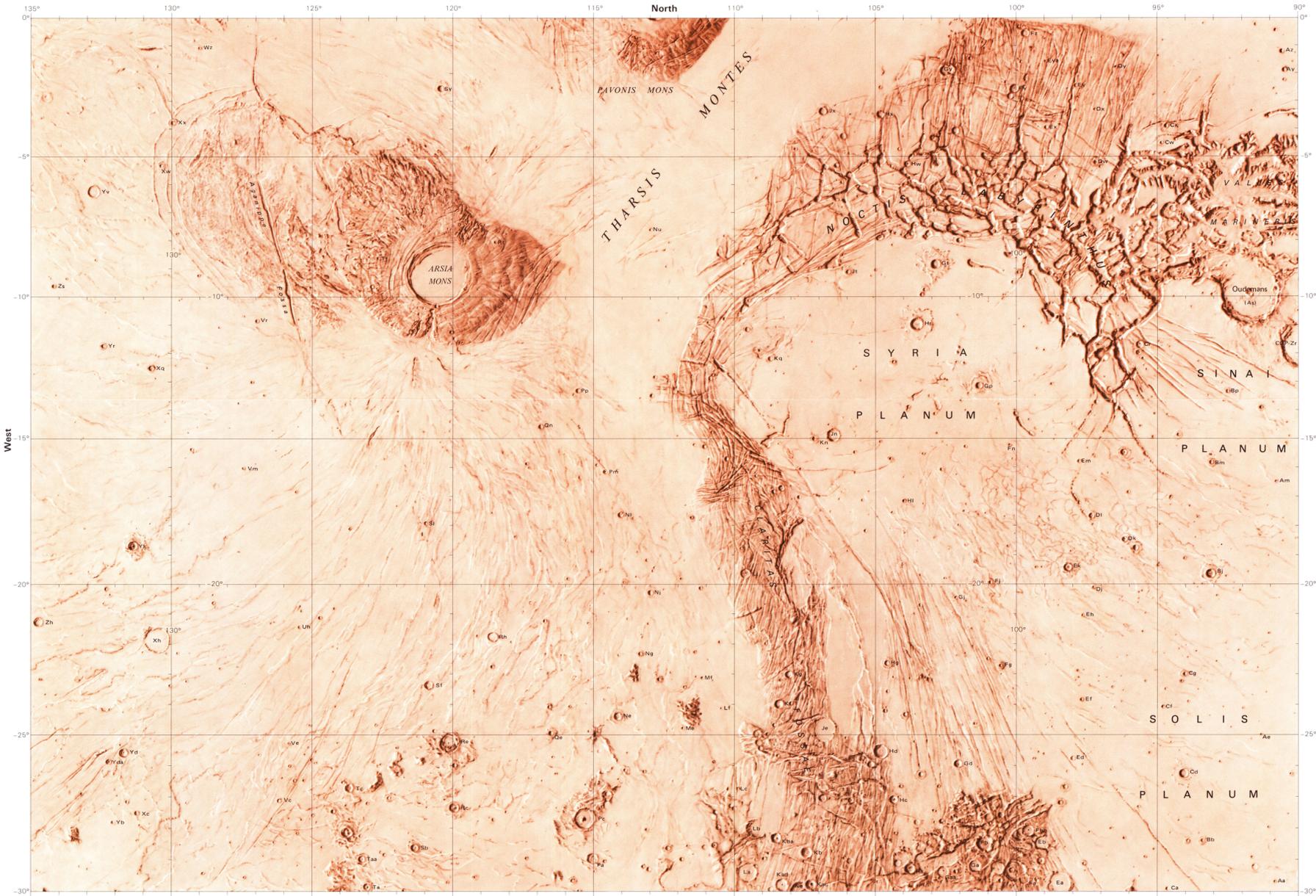
1977, Physical study of planets and satellites, in 16th General Assembly, 1976, Proceedings: International Astronomical Union Transactions, v. 168, p. 325-331, 336-352, 362.

Levinthal, E. C., Green, W. B., Curtis, J. A., Jabalka, E. D., Johansen, R. A., Sander, M. J., Seidman, J. B., Young, A. T., and Soderblom, L. A., 1973, Mariner 9—Image processing and products: Icarus, v. 18, no. 1, p. 75-101.

Mausky, Harold, Batson, R. M., Borgeson, W. T., Carr, M. H., McCauley, J. F., Milton, D. J., Wiley, R. L., Wilhelm, D. E., Murray, B. C., Rowlett, N. H., Leighton, R. B., Sharp, R. V., Thompson, T. W., Briggs, G. A., Chandrasekhar, P., Shipley, E. N., Sagan, Carl, Pollack, J. B., Lederberg, Joshua, Levinthal, E. C., Hartmann, W. K., McCord, T. E., Smith, B. A., Davies, M. E., de Vancouleurs, G. D., and Leovy, C. B., 1976, Television experiment for Mariner Mars 1971: Icarus, v. 12, no. 1, p. 10-45.

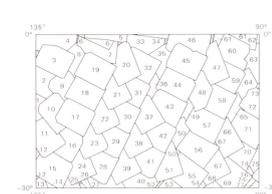
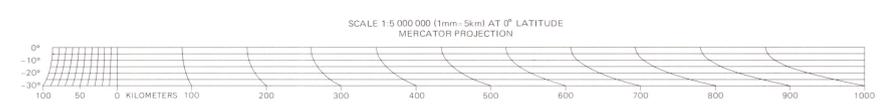
U. S. Geological Survey, 1975, Shaded relief map of the Phoenicis Lacus quadrangle of Mars, U. S. Geological Survey Miscellaneous Investigations Series Map I-924.

de Vancouleurs, G. D., Davies, M. E., and Sturms, F. M., Jr., 1973, The Mariner 9 areographic coordinate system: Journal of Geophysical Research, v. 78, no. 20, p. 4395-4404.



QUADRANGLE LOCATION
Number preceded by 1 refers to published topographic map.

Users noting errors or omissions are urged to indicate them on the map and forward it to U.S. Geological Survey, Building 4, Room 64, 2255 North Gemini Drive, Flagstaff, Arizona 86001. A replacement copy will be returned.



A camera pictures			
Index No.	DAS No.	Index No.	DAS No.
1	6966643	21	8513909
2	6966713	22	8513936
3	6966783	23	8513969
4	6967153	24	8513998
5	7019163	25	8517033
6	8513854	26	8517073
7	7039093	27	8585259
8	8441619	28	8511083
9	8441549	29	7110663
10	8441509	30	7110633
11	8441459	31	7110703
12	8441359	32	7110773
13	8435243	33	7111123
14	8513239	34	7111193
15	7038463	35	8585409
16	7038513	36	8585399
17	7038463	37	8585409
18	7038613	38	8585399
19	7038743	39	8585329
20	8513919	40	8517013
		41	7182523
		42	7182563
		43	7182593
		44	7182533
		45	7182603
		46	7182553
		47	8587489
		48	8587499
		49	8587429
		50	8587359
		51	8587289
		52	8587219
		53	8587333
		54	8587303
		55	8587403
		56	8587473
		57	7254623
		58	7254693
		59	7254763
		60	7254833



Viking 1				Viking 2			
Index No.	Picture No.						
1	416A63	15	348880	31	348804		
2	294A69	16	348832	32	348818		
3	294A68	17	348834	33	348832		
4	294A69	18	348836	34	348834		
5	294A69	19	348838	35	348836		
6	416A69	20	348839	36	348837		
7	444A18	21	348838	37	348837		
8	444A18	22	348839	38	348837		
9	444A18	23	348840	39	348838		
10	444A18	24	348840	40	348838		
11	444A20	25	348842	41	348840		
12	416A69	26	348842	42	348840		
13	416A69	27	348843	43	348841		
14	416A69	28	348844	44	348841		
		29	348845	45	348842		
		30	348846	46	348843		

SHADED RELIEF MAP OF THE PHOENICIS LACUS QUADRANGLE OF MARS
MC-17
M 5M-15/112 RN
1980



For sale by Branch of Distribution, U.S. Geological Survey, 1200 South East Street, Arlington, VA 22202 and Branch of Distribution, U.S. Geological Survey, Box 25286, Federal Center, Denver, CO 80225

M(200)
I-1252
C2