

DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

Prepared for the
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

NOTES ON BASE
A series of topographic maps covering the entire surface of Mars at a nominal scale of 1:5,000,000 was originally compiled from Mariner 9 data. Details of the Mariner 9 mission that are related to the mapping are described by Batson and others (1979). This revised version was based on Viking Orbiter images. A series of papers describing the Viking mission was published in the Journal of Geophysical Research (American Geophysical Union, 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, 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 13° and 1:4,290,000 at lat 25°. Standard parallels for the Lambert conformal conic projection are at lat 33.8° and 59.2°. Longitudes increase to the west in accordance with astronomical convention for Mars.

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 Mariner 9 spacecraft. The first meridian passes through the center of a small crater, Ary 0 (lat 5.19° S., long 0°), located within the crater Ary.

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

Shaded relief was portrayed using airbrush techniques detailed by Inge (1972) and photostereographic methods described by Inge and Bridges (1976). Uniform sun illumination from the west was used throughout. Size, shape, and position of features were taken from the base mosaic. In the first edition of the map, 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. This revised edition was produced by incorporating information derived from various enhancements of higher resolution Viking images of the map area.

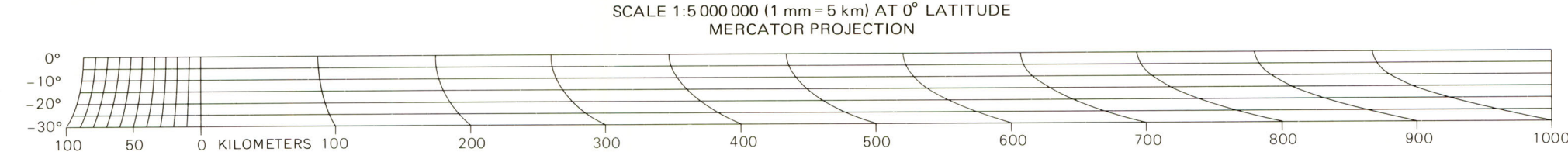
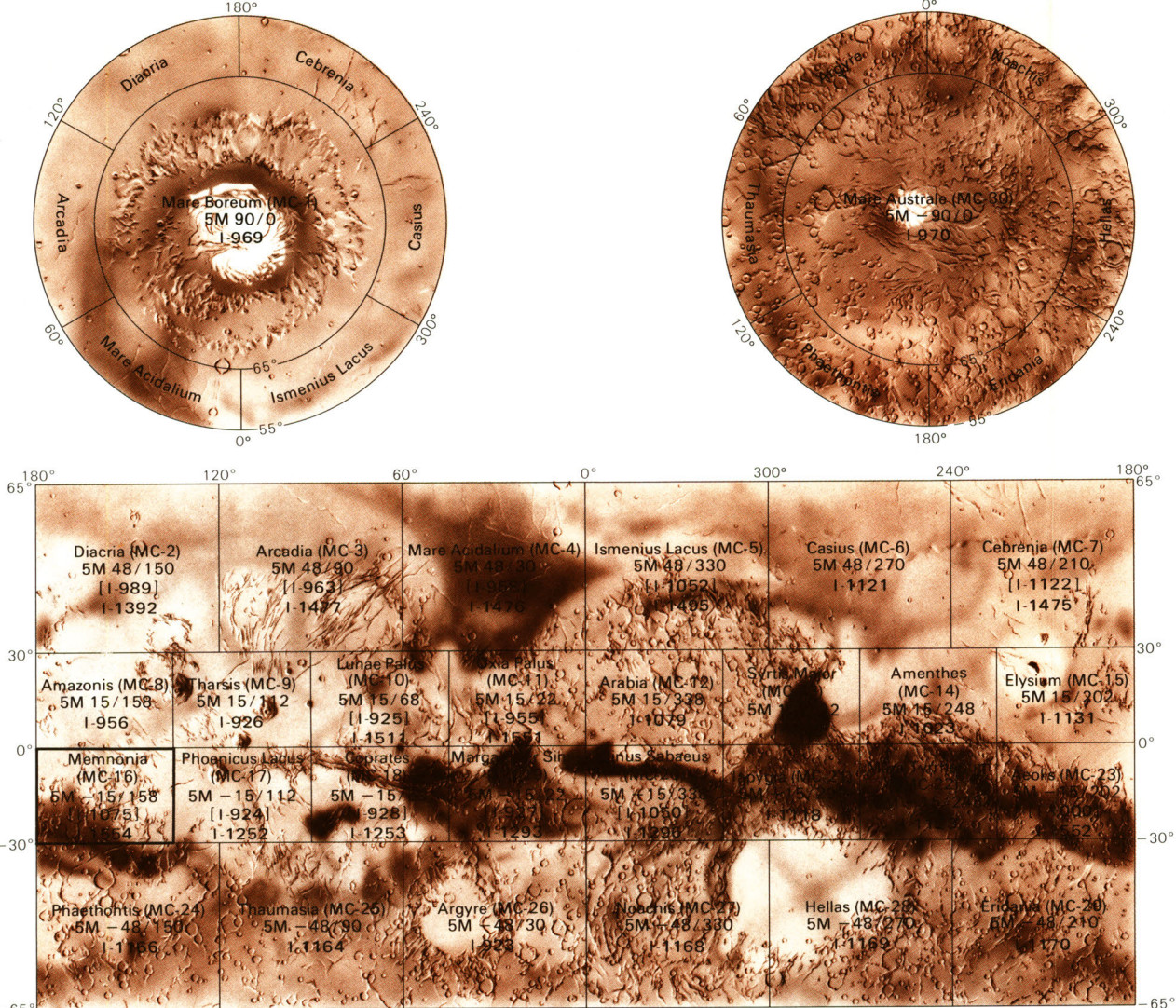
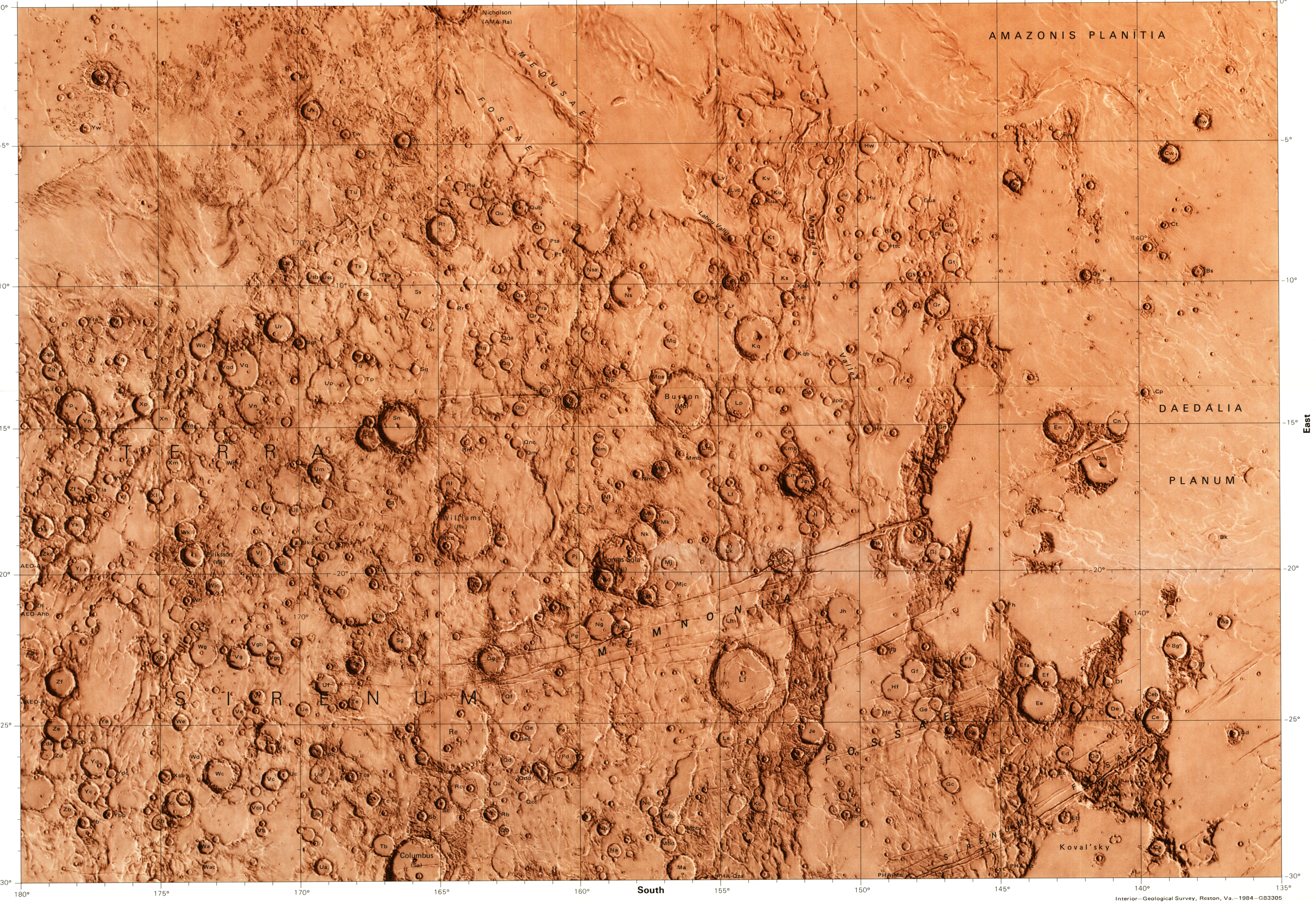
Original shaded relief analysis and representation were made by Anthony G. Sanchez. Revisions were made by Barbara J. Hall.

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

NOMENCLATURE
Names on this sheet are approved by the International Astronomical Union (IAU, 1974, 1975, 1980, and 1983) except for provisional names, which are listed below. 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 alphabet (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 MEM (identifying the Memnonia 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.

Provisional names: Labou Vallis and Koval'sky
MC-16: Abbreviation for Mars Chart
M 5M -15/158 RN: Abbreviation for Mars, 1:5,000,000 series, center of sheet, lat 15° S., long 158°; shaded relief map (R), with nomenclature (N).

REFERENCES
American Geophysical Union, 1977, Journal of Geophysical Research, v. 82, no. 28, p. 3959-4681.
Batson, 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, NASA SP-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. G., 1973, Martian surface coordinates: Journal of Geophysical Research, v. 78, no. 20, p. 4355-4364.
Inge, J. L., 1972, Principles of lunar illustration: Aeronautical Chart and Information Center Reference Publication RPT-72-1, 60 p.
Inge, J. L., and Bridges, P. M., 1976, Applied photostereography 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 15th General Assembly, Sydney, 1973, Proceedings: International Astronomical Union Transactions, v. 15B, p. 105-108, 217-221.
1977, Working Group for Planetary System Nomenclature, in 14th General Assembly, Grenoble, 1976, Proceedings: International Astronomical Union Transactions, v. 14B, p. 321-325, 331-336, 355-362.
1980, Working Group for Planetary System Nomenclature, in 17th General Assembly, Montreal, 1979, Proceedings: International Astronomical Union Transactions, v. 17B, p. 293-297.
1983, Working Group for Planetary System Nomenclature, in 18th General Assembly, Paris, 1982, Proceedings: International Astronomical Union Transactions, v. 18B, p. 334-336.



1:2,000,000 Controlled photomosaics

I. No.	Quadrangle No.
11185	MC-16 NE
11186	MC-16 NW
11187	MC-16 SE
11188	MC-16 SW

Viking 1

Index No.	Picture No.	Index No.	Picture No.
1	34A01	28	40A21
2	34A02	29	43A08
3	34A03	30	43A09
4	34A04	31	43A09
5	34A05	32	43A10
6	34A06	33	43A21
7	34A08	34	43A22
8	31A06	35	43A23
9	31A07	36	43A23
10	31A08	37	43A29
11	31A09	38	43A40
12	31A10	39	43A41
13	31A11	40	43A42
14	31A12	41	50A12
15	31A13	42	50A17
16	31A14	43	50A17
17	31A15	44	50A17
18	31A16	45	51A11
19	31A17	46	51A11
20	31A18	47	51A13
21	40A11	48	51A14
22	40A12	49	51A15
23	40A14	50	51A16
24	40A15	51	51A17
25	40A16	52	51A18
26	40A17	53	51A19
27	40A19	54	51A20

INDEX TO VIKING SOURCES

This shaded relief map has been revised utilizing 1:2,000,000 controlled photomosaics and supplementary Viking pictures outlined above. Copies of various enhancements of these pictures are available from National Space Science Data Center, Code 601, Goddard Space Flight Center, Greenbelt, MD 20771.

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. Useful coverage is not available in the cross-hatched areas. The DAS number may vary slightly (usually by 5) among various versions of the same picture.

Index No.	DAS No.	Index No.	DAS No.
1	6500713	27	6750693
2	6500843	28	6750763
3	6500913	29	6750833
4	6500983	30	6751183
5	6501333	31	6752079
6	6501383	32	6752083
7	6501403	33	6752333
8	6501503	34	6752623
9	6501603	35	6752919
10	6501653	36	6752969
11	6501723	37	6753459
12	6501773	38	6753529
13	6501803	39	6753599
14	6501863	40	6753649
15	6501873	41	6753723
16	6501883	42	6753799
17	6501893	43	6753929
18	6501913	44	6754083
19	6501923	45	6754183
20	6501943	46	6754233
21	6501953	47	6754283
22	6501963	48	6754349
23	6501973	49	6754419
24	6501983	50	6754489
25	6501993	51	6754539
26	6502023	52	6754629

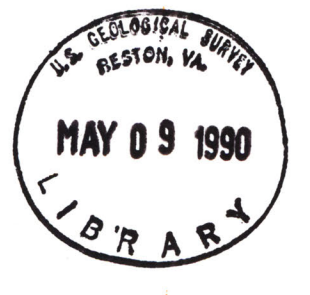
Interior - Geological Survey, Reston, Va. - 1984 - G03205
Revised in March 1983 on behalf of the Planetary Science Program, Planetary Division, Office of Space Science, National Aeronautics and Space Administration under contract W-13709.
This map supersedes I-1075, the first edition of this sheet.

QUADRANGLE LOCATION
Number preceded by I 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 urged to indicate them on the map and forward it to U.S. Geological Survey, Building 4, Room 454, 2255 North Gemini Drive, Flagstaff, Arizona 86001. A replacement copy will be returned.

SHADED RELIEF MAP OF THE MEMNONIA QUADRANGLE OF MARS

MC-16
M 5M -15/158 RN
1984



M(200)
no. 1554
c.2

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