U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

Prepared for the
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

ATLAS OF MARS
1:5,000,000 TOPOGRAPHIC SERIES
SINUS SABAEUS QUADRANGLE
M 5M –15/338 RN, 1998
I–2532 (MC–20) SHEET 1 OF 2

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 (Batson and others, 1979). 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 computation of the map projection is an oblate spheroid (flattening of 1/192) 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 planetographic.

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

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; Kliore and others, 1973; Lindal and others, 1979), Earth-based radar observations (Pettengill 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 photointerpretive 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.

Initial shaded relief analysis and representation were made by Barbara J. Hall; revisions were made by Patricia M. Bridges.

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, 1980, 1983, 1986, 1998).

MC–20: Abbreviation for Mars Chart 20.

M 5M –15/338 RN: Abbreviation for Mars; 1:5,000,000 series; center of sheet, lat 15° S., long 338°; shaded relief map (R) with nomenclature (N).

REFERENCES

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 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.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 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.

———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.

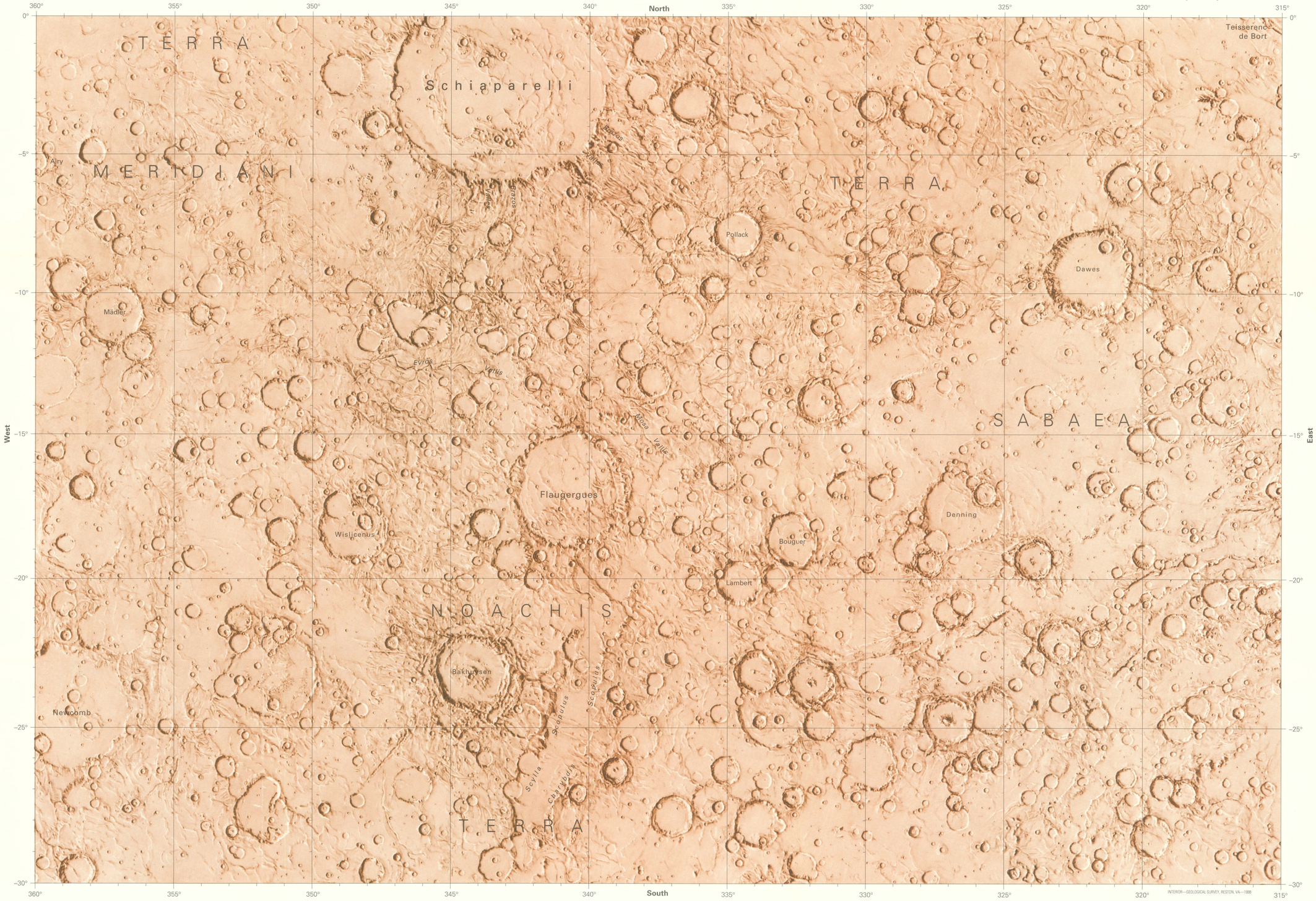
———1998, Working Group for Planetary System Nomenclature, *in* Proceedings of the 23rd General Assembly, Kyoto, 1997: Transactions of the International Astronomical Union, v. 23B, [in press].

Kliore, A.J., Fjeldbo, Gunnar, Seidel, B.L., Sykes, M.J., and Woiceshyn, 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.

Lindal, G.F., Hotz, H.B., Sweetnam, D.N., Shippony, Zvi, Brenkle, 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. B14, 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 celestial mechanics experiment—Gravity field and pole direction of Mars: Science, v. 175, no. 4019, p. 317–320.

Pettengill, 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.



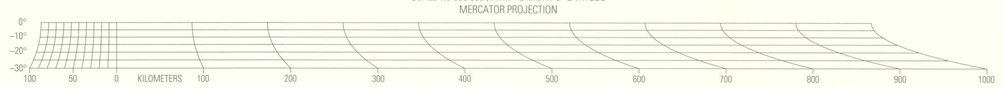
Shaded relief revised in January 1987 on behalf of the Planetary Geology Program, Solar System Exploration Division, Office of Space Science, National Aeronautics and Space Administration

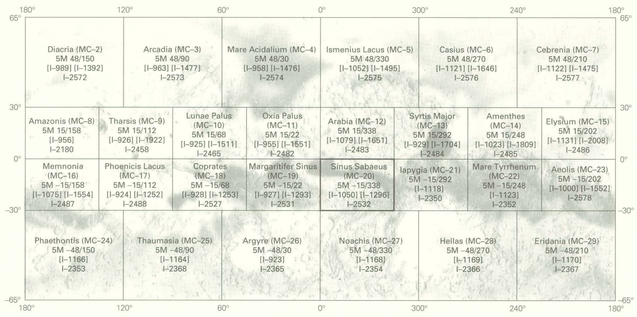
This map supersedes map I–1296

Edited by Doris Weir and Derrick D. Hirsch; cartography by Darlene A. Casebier

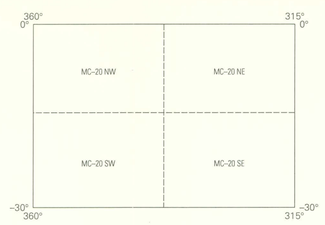
Manuscript approved for publication December 5, 1994

SCALE 1:5 000 000 (1 mm = 5 km) AT 0° LATITUDE
MERCATOR PROJECTION



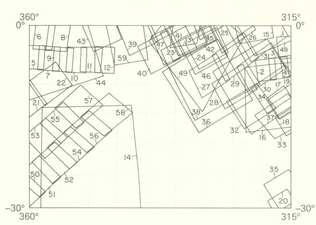


QUADRANGLE LOCATION
Number preceded by I refers to published shaded relief map.
(Number in brackets refers to earlier map superseded by revised version.)



1:2,000,000-SCALE CONTROLLED PHOTOMOSAICS

I–Series	Quadrangle
I–1376	MC–20 NW
I–1377	MC–20 NE
I–1630	MC–20 SW
I–1212	MC–20 SE

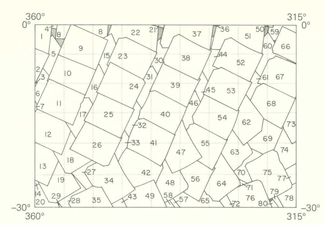


VIKING 1

Index No.	Picture No.	Index No.	Picture No.	Index No.	Picture No.
1	280A16	21	615A53	41	655A52
2	280A31	22	615A55	42	655A53
3	280A33	23	618A12	43	655A69
4	280A35	24	618A13	44	669A22
5	321A24	25	618A14	45	694A67
6	321A25	26	618A15	46	694A69
7	321A26	27	618A32	47	694A70
8	321A27	28	618A33	48	694A89
9	321A28	29	618A34	49	793A15
10	321A30	30	618A35	50	84A17
11	321A32	31	618A36	51	84A19
12	321A34	32	618A54	52	84A21
13	321A43	33	618A55	53	84A22
14	441A39	34	618A56	54	84A23
15	456A22	35	620A24	55	84A24
16	494A14	36	623A68	56	84A25
17	510A02	37	623A70	57	84A26
18	510A03	38	626A02	58	84A27
19	510A10	39	655A50	59	91A78
20	547A33	40	655A51		

INDEX OF VIKING SOURCES

This shaded relief map has been revised by utilizing 1:2,000,000-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 601, Goddard Space Flight Center, Greenbelt, MD 20771.



A-camera pictures

Index No.	DAS No.	Index No.	DAS No.	Index No.	DAS No.	Index No.	DAS No.
1	6571353	21	6715273	41	6786603	61	8333539
2	6571003	22	6715203	42	6786533	62	8333469
3	6070933	23	6714853	43	5383243	63	8333399
4	6571423	24	6714783	44	8261579	64	8333329
5	8045763	25	6714713	45	8261509	65	8333259
6	8045693	26	6714643	46	8261439	66	6930803
7	8045623	27	5311423	47	8261369	67	6930733
8	6643313	28	5311353	48	8261299	68	6930663
9	6642963	29	5311283	49	8261229	69	6930593
10	6642893	30	8189619	50	6859193	70	6930523
11	6642823	31	8189549	51	6859123	71	5527303
12	6642753	32	8189479	52	6858773	72	5527233
13	6642683	33	8189409	53	6858703	73	8405429
14	5239463	34	8189339	54	6858633	74	8405359
15	8117653	35	8189269	55	6858563	75	8405289
16	8117583	36	6787233	56	6858493	76	8405219
17	8117513	37	6787163	57	5455273	77	7002483
18	8117443	38	6786813	58	5455203	78	8477249
19	8117373	39	6786743	59	6831153	79	5598263
20	8117303	40	6786673	60	8222609	80	5599193

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.

NOTE TO USERS

Users noting errors or omissions are urged to indicate them on the map and to forward it to U.S. Geological Survey, Building 4, Room 450, 2255 North Gemini Drive, Flagstaff, Arizona 86001. A replacement copy will be returned.

REVISED SHADED RELIEF MAP OF THE SINUS SABAEUS QUADRANGLE (MC–20) OF MARS

1998

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