

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

Prepared for the
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

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 $\pm 30^\circ$ and 1:4,306,000 at lat $\pm 65^\circ$. Standard parallels for the Lambert Conformal Conic projection are at lat $\pm 35.8^\circ$ and $\pm 59.2^\circ$. 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-0 (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; Klore and others, 1973; Lindal and others, 1979), Earth-based radar observations (Pettingill 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 based on Viking Orbiter data were made by Susan L. Davis; revisions were made by Barbara J. Hall.

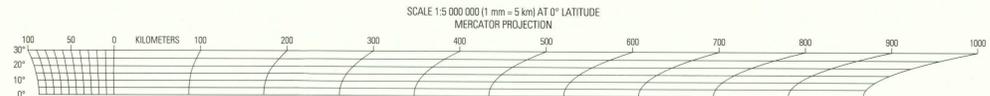
COLOR
No attempt was made on the map to duplicate precisely the color of the martian surface, although the color used may approximate it.

NOMENCLATURE
Names on this sheet are approved by the International Astronomical Union (1974, 1977, 1980, 1986, 1989).

MC-10: Abbreviation for Mars Chart 10.
M 5M 15/68 RN: Abbreviation for Mars; 1:5,000,000 series; center of sheet, lat 15° N., long 68° ; shaded relief map (R) with nomenclature (N).

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Shaded relief revised in January 1997 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-1511
Edited by Doris Weir and Derrick D. Hirsch; cartography by Darlene A. Cassiber
Manuscript approved for publication January 14, 1994



Quadrangle Name	MC-10	MC-11	MC-12	MC-13	MC-14	MC-15	MC-16	MC-17	MC-18	MC-19	MC-20	MC-21	MC-22	MC-23	MC-24	MC-25	MC-26	MC-27	MC-28	MC-29																																			
Dioclea (MC-2)	SM 48910 I-1961 I-1962	Arcadia (MC-3)	SM 48950 I-1961 I-1973	Mare Acidalium (MC-4)	SM 48930 I-1961 I-1973	Immenius Lacus (MC-5)	SM 48930 I-1961 I-1973	Casius (MC-6)	SM 48930 I-1961 I-1973	Cebrenia (MC-7)	SM 48930 I-1961 I-1973	Amazonia (MC-8)	SM 48930 I-1961 I-1973	Tharsis (MC-9)	SM 48930 I-1961 I-1973	Lunae Palus (MC-10)	SM 48930 I-1961 I-1973	Oxia Palus (MC-11)	SM 48930 I-1961 I-1973	Arabia (MC-12)	SM 48930 I-1961 I-1973	Syrtis Major (MC-13)	SM 48930 I-1961 I-1973	Amenethes (MC-14)	SM 48930 I-1961 I-1973	Elysiun (MC-15)	SM 48930 I-1961 I-1973	Memnonia (MC-16)	SM 48930 I-1961 I-1973	Phoenicis Lacus (MC-17)	SM 48930 I-1961 I-1973	Corvina (MC-18)	SM 48930 I-1961 I-1973	Marquander Sinus (MC-19)	SM 48930 I-1961 I-1973	Sinus Sabaeus (MC-20)	SM 48930 I-1961 I-1973	Argyria (MC-21)	SM 48930 I-1961 I-1973	Mare Tyrrhenum (MC-22)	SM 48930 I-1961 I-1973	Acolis (MC-23)	SM 48930 I-1961 I-1973	Phaethon (MC-24)	SM 48930 I-1961 I-1973	Thaumasia (MC-25)	SM 48930 I-1961 I-1973	Argyria (MC-26)	SM 48930 I-1961 I-1973	Noachis (MC-27)	SM 48930 I-1961 I-1973	Helias (MC-28)	SM 48930 I-1961 I-1973	Eridania (MC-29)	SM 48930 I-1961 I-1973

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 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.

12,000,000-SCALE CONTROLLED PHOTOMOSAICS

I-Series	Quadrangle
I-1303	MC-10 NW
I-1305	MC-10 NE
I-1306	MC-10 SW
I-1307	MC-10 SE



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.

VIKING 1

Index No.	Picture No.	Index No.	Picture No.	Index No.	Picture No.
1	40483	25	482A11	49	68A464
2	444A12	26	482A12	50	68A465
3	444A13	27	482A13	51	68A466
4	444A15	28	482A15	52	68A467
5	444A22	29	482A21	53	68A468
6	444A24	30	682A23	54	68A469
7	444A25	31	682A25	55	68A470
8	444A26	32	682A26	56	747A05
9	444A27	33	682A28	57	747A06
10	444A28	34	682A27	58	747A07
11	444A29	35	682A28	59	747A08
12	444A30	36	68A441	60	747A09
13	444A31	37	68A442	61	747A10
14	444A32	38	68A443	62	750A20
15	444A33	39	68A444	63	816A07
16	444A35	40	68A445	64	816A09
17	450A01	41	68A446	65	816A09
18	450A02	42	68A447	66	816A12
19	450A03	43	68A448	67	85A415
20	462A05	44	68A449	68	85A416
21	462A07	45	68A450	69	85A417
22	462A08	46	68A461	70	85A418
23	462A09	47	68A462	71	85A419
24	462A10	48	68A463	72	85A420

A-camera pictures

Index No.	DAS No.	Index No.	DAS No.
1	07258B13	24	07471343
2	07258B33	25	07471373
3	07258B35	26	07471323
4	07258B73	27	07471133
5	07258233	28	07471063
6	07271413	29	08014773
7	07258B53	30	07543953
8	07327773	31	07543233
9	07327423	32	07543163
10	07327373	33	07543093
11	07327283	34	07543023
12	07327213	35	07471558
13	05380798	36	07542953
14	08738898	37	08138738
15	07389723	38	08986668
16	07389838	39	07615473
17	07389813	40	07615053
18	07389728	41	07543158
19	07389243	42	07614883
20	07389173	43	07543448
21	07389103	44	07614913
22	08028193	45	07614843
23	07471693		

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. The DAS number may vary slightly (usually by 5) among different versions of the same picture.

REVISED SHADED RELIEF MAP OF THE LUNAE PALUS QUADRANGLE (MC-10) OF MARS

