



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 20° and 1:4,306,000 at lat 45°. Standard parallels for the Lambert Conformal Conic projection are at lat 335.8° and 359.2°. 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, Atry-O (lat 5.19° S, long 0°), within the crater Atry. 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 (Pattengill and others, 1971; Downs and others, 1975), and the Mars primary control network of the Rand Corporation (Davies and others, 1978).

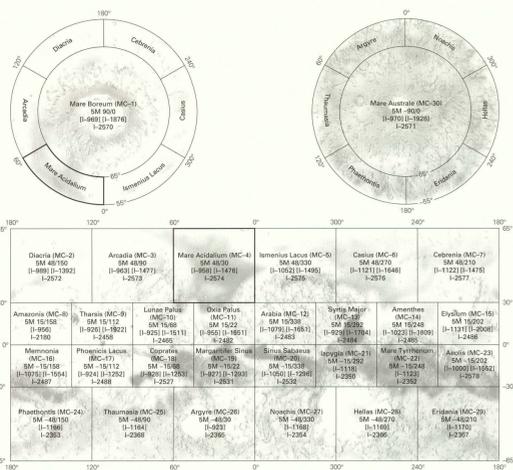
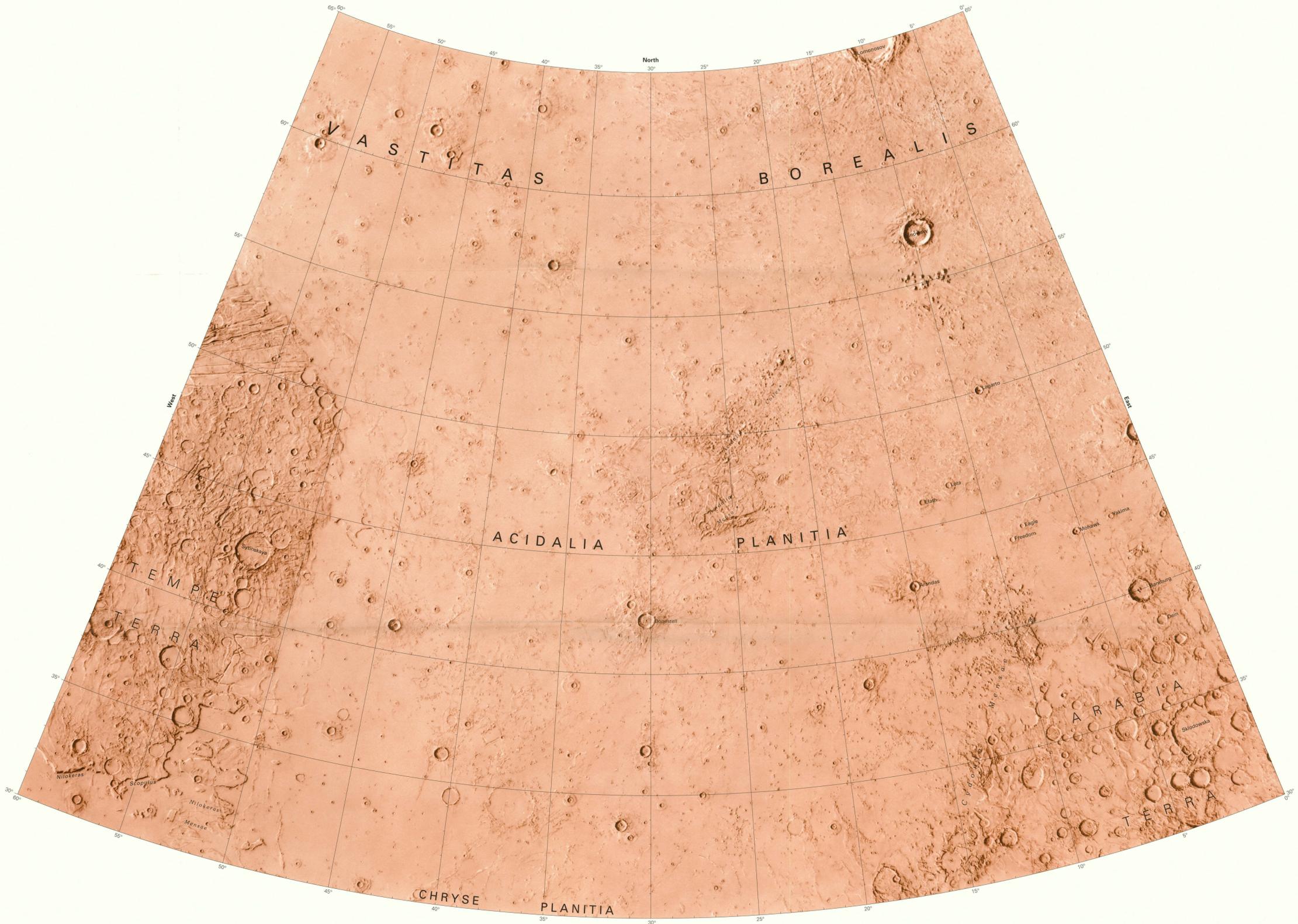
MAPPING TECHNIQUE
Shaded relief was portrayed by photointerpretive methods described by Inge and Bridges (1976). Uniform sun illumination from the west was used throughout. The original rendition of feature positions, sizes, and shapes was taken from a controlled base mosaic of Mariner 9 images. Various 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 Joy L. Inge; 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.

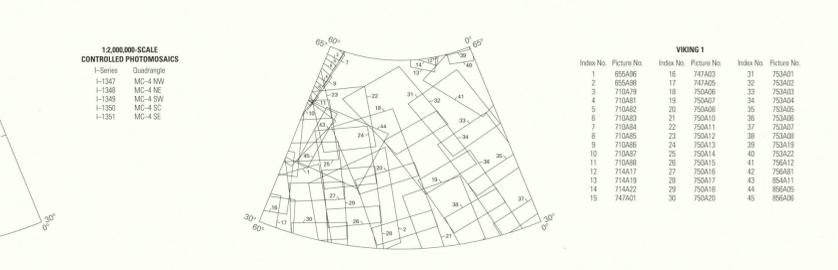
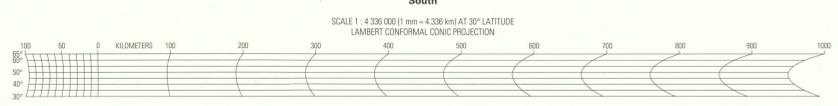
NOMENCLATURE
Names on this sheet are approved by the International Astronomical Union (IAU), 1974, 1977, 1983, 1989, 1998, except for provisional names which are indicated by an asterisk. MC-4: Abbreviation for Mars Chart 4. M 5M 48/30 RN: Abbreviation for Mars 1:5,000,000 series; center of sheet, lat 48° N, long 30° W; shaded relief map (R) with nomenclature (N).

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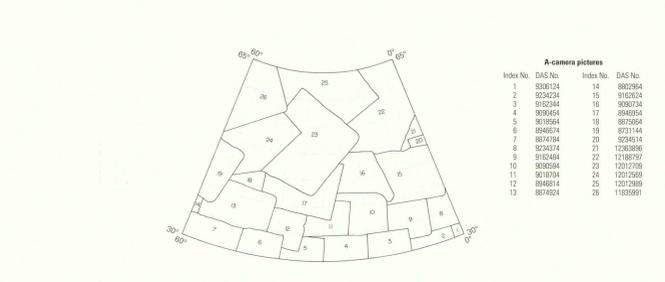
QUADRANGLE LOCATION
Number preceded by 1 refers to published shaded relief map. (Number in brackets refers to earlier map superseded by revised version.)

NOTE TO USERS
Users noting errors or omissions are urged to indicate them on the map and to forward it to U.S. Geological Survey, Building 4, Room 654, 2255 North Gemini Drive, Flagstaff, Arizona 86001. A replacement copy will be returned.



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.

Shaded relief revised in May 1999 on behalf of the Planetary Geology Program, Solar System Exploration Division, Office of Space Science, National Aeronautics and Space Administration.
This map supersedes I-1476.
Edited by Derrick D. Hirsch; cartography by Darlene A. Casebeer.
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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 cross-hatched areas. The DAS number may vary slightly (usually by 5) among different versions of the same picture.