

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 1:25 000 000 and 1:500 000 (Barton, 1973, 1976). The major sources of map data were the Mariner 9 television experiment (Mausky and others, 1970) and Viking Orbiter pictures.

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 3357.7 km. This is not the height datum, which is defined below under the heading "Contours".

PROJECTION
The Lambert conformal conic projection is used for this sheet with standard parallels at -35.8° and -59.2°. A scale of 1:4 336 000 at lat -30° was chosen to match the scale at lat -30° of the adjacent Mercator projection. Longitudes increase to the west in accordance with usage of the International Astronomical Union (IAU, 1973). Latitudes are areographic (de Vascoult 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°) within the crater Alys. No simple statement is possible for the precision, but local consistency is about 10 km.

MAPPING TECHNIQUE
A series of mosaics of Lambert conformal conic 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. Various computer enhancements of many Mariner 9 and Viking Orbiter 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.)

Shaded relief analysis and representation were made by Susan L. Davis.

ALBEDO MARKINGS
The markings superimposed on the shaded relief were hand copied from Mariner 9 pictures that were computer enhanced especially to show low-frequency tone variation (Barton and Inge, 1976). The surface in these pictures is illuminated from a variety of angles from the camera line of sight. The markings therefore delineate boundaries of local brightness variations only and should not be considered as a true measure of albedo. No attempt was made to use faith-based telescopic albedo data.

Airbrush portrayal of albedo markings was done by Susan L. Davis.

CONTOURS
Because Mars has no seas and hence no sea level, the datum (the 0-km contour line) for altitudes is defined by a gravity field described by spherical harmonics of fourth order and fourth degree (Jordan and Lurell, 1975) combined with a 6.1-millibar atmospheric pressure surface derived from radio-occultation data (Klore and others, 1973; Christensen, 1975; Wu, 1975, 1978).

The contour lines on most of the Mars maps (Wu, 1975) were compiled from Earth-based radar determinations (Davies and others, 1971; Pettengill and others, 1971) and measurements made by Mariner 9 instruments, including the ultraviolet spectrometer (Hord and others, 1974), infrared interferometer spectrometer (Conrath and others, 1973), and stereoscopic Mariner 9 television pictures (Wu and others, 1973).

Formal analysis of the accuracy of topographic elevations has not been made. The estimated vertical accuracy of each source of data indicates a probable error of 1-2 km.

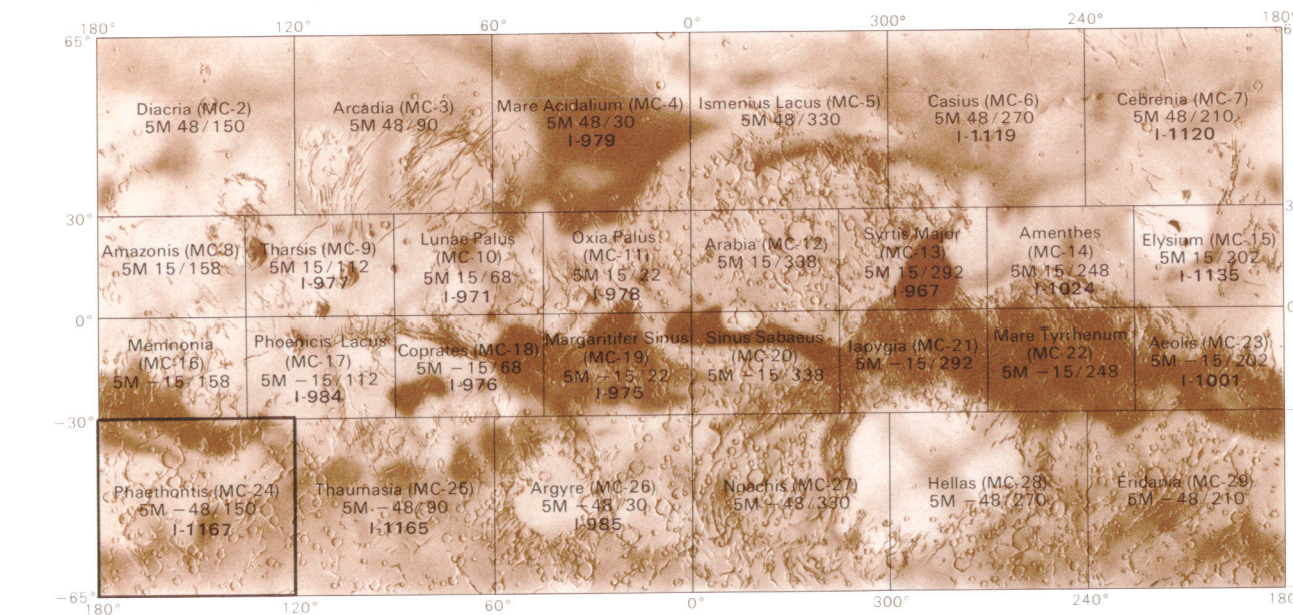
COLOR
No attempt was made on the map to duplicate precisely the color of the Martian surface, although the color used does approximate it.

NOMENCLATURE
All names on this sheet are approved by the International Astronomical Union (IAU, 1974, 1980). 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 (N) and latitude (N). The complete designation of a crater is the name of the quadrangle followed by double or triple letters. The prefix PHA (identifying the Phaethontis quadrangle) is part of the complete designation but, for brevity, 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-24: Abbreviation for Mars Chart 24.
M 5M -48/150 RMC: Abbreviation for Mars 1:5 000 000 series; center of sheet, lat -48°, long 150° shaded relief map, R, with albedo markings, M, and contours, C.

REFERENCES

Barton, R. M., 1973, Cartographic products from the Mariner 9 mission: Journal of Geophysical Research, v. 78, no. 20, p. 4424-4433.
1976, Cartography of Mars, 1975. The American Cartographer, v. 3, no. 1, p. 57-63.
Barton, R. M., and Inge, J. L., 1976, Albedo boundaries on Mars in 1972: Results from Mariner 9. Icarus, v. 27, p. 531-536.
Christensen, E. J., 1975, Martian topography derived from occultation, radar, spectral, and optical measurements: Journal of Geophysical Research, v. 80, no. 20, p. 2989-2993.
Conrath, B. J., Curran, R. K., Hand, R. A., Kunde, V. G., Maguire, W. W., Pearl, J. C., Pettengill, J. A., Walker, J., and Burke, T. E., 1973, Atmospheric and surface properties of Mars obtained by infrared spectroscopy on Mariner 9: Journal of Geophysical Research, v. 78, no. 20, p. 4267-4278.
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.
Downs, G. S., Goldstein, R. M., Green, R. R., and Morris, G. A., 1971, Mars radar observations, a preliminary report: Science, v. 174, no. 4016, p. 1324-1327.
Green, W. B., Jepsen, P. L., Kresner, J. E., Ruiz, R. M., Schwartz, A. A., and Sedman, J. B., 1975, Removal of instrument signature from Mariner 9 television images of Mars: Applied Optics, v. 14, no. 1, p. 185-194.
Hord, C. W., Simmons, K. E., and McLaughlin, L. K., 1974, Mariner 9 ultraviolet spectrometer experiment: Pressure altitude measurements on Mars: Icarus, v. 21, no. 3, p. 292-302.
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. 745-760.
International Astronomical Union, Commission 16, 1971, Physical study of planets and satellites, in Proceedings 14th General Assembly, 1970: International Astronomical Union Transactions, v. 14B, p. 128-137.
1974, Physical study of planets and satellites, in Proceedings 15th General Assembly, 1973: International Astronomical Union Transactions, v. 15B, p. 105-108.
1980, Physical study of planets and satellites, in Proceedings 17th General Assembly, 1979: International Astronomical Union Transactions, v. 17B (in press).
Jordan, J. L., and Lurell, Jack, 1975, Mariner 9, an instrument of dynamical science: Icarus, v. 25, p. 146-165.
Klore, A. J., Fialdo, Gunnar, Sedra, R. L., Sykes, M. L., and Wozniak, P. M., 1973, Shaded 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. 4331-4341.
Levinthal, E. C., Green, W. B., Curtis, J. A., Jabluka, E. D., Johansen, R. A., Sander, M. J., Seidman, J. B., Young, A. T., and Soderholm, L. A., 1973, Mariner 9: Image processing and products: Icarus, v. 18, no. 1, p. 75-101.
Mausky, Harold, Barton, R. M., Bergeson, W. T., Carr, M. H., McCauley, J. J., Milson, D. W., Wilder, R. L., Williams, D. E., Murray, B. C., Horowitz, N. H., Leighton, R. B., Sharp, R. V., Thompson, T. W., Briggs, G. A., Chandraseon, P. L., Shipley, E. N., Sagan, Carl, Pollack, J. B., Lederberg, Joshua, Levinthal, E. C., Hartmann, W. K., McCord, T. B., Smith, B. A., Davies, M. E., de Vascoult, G. D., and Leovy, C. B., 1970, Television experiment for Mariner Mars 1971: Icarus, v. 12, no. 1, p. 10-45.
Pettengill, G. H., Rogers, A. E. E., and Shapiro, J. I., 1971, Martian craters and a scar as seen by radar: Science, v. 174, no. 4016, p. 1321-1324.
de Vascoult, G. D., Davies, M. E., and Sturm, E. M., Jr., 1973, The Mariner 9 areographic coordinate system: Journal of Geophysical Research, v. 78, no. 20, p. 4395-4404.
Wu, S. S. C., 1975, Topographic mapping of Mars: U.S. Geological Survey Interagency Report Astrogeology 63, 193 p.
1978, Mars synthetic topographic mapping: Icarus, v. 33, no. 3, p. 417-440.
Wu, S. S. C., Schafer, F. J., Nakata, G. M., Jordan, Raymond, and Blain, K. R., 1973, Photogrammetric evaluation of Mariner 9 photography: Journal of Geophysical Research, v. 78, no. 20, p. 4405-4410.



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

Albedo features from International Photo
Key: Relief photographs, shaded elevation
Key: Flagstaff, AZ

Users noting errors or omissions are urged to indicate them on the map and to forward it to Astrogeology Studies, Geologic Division, 2220 North Gemini Drive, Flagstaff, Arizona 86001. A replacement copy will be returned.

NOTE TO USERS

SUPPLEMENTAL SOURCE INDEX
Viking pictures were used where available to clarify Mariner 9 data. The outline for each sequence of pictures is shown.

INDEX TO MARINER 9 PICTURES
The mosaic used to control the positioning of features on this map was by vertical numbers. Useful coverage is not available in the cross-hatched area. Also shown by solid black rectangles are the high-resolution B-camera pictures, identified by italic numbers. The DAS numbers may differ slightly (usually by 5) among various versions of the same pictures.

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