

NOTES ON BASE

This map is one of a series of topographic map sheets covering the entire surface of Mars at nominal scales of 1:15,000,000 and 1:2,000,000. The major sources of map data were various experiments from the Viking and Mariner 9 missions. Source of the shaded relief base was U.S. Geological Survey (1985).  
M 15M 0/90 TR: Abbreviation for Mars; 1:15,000,000 series; center of map, lat 0°, long 90°; contours (T), shaded relief (R).

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 3373.7 km. Because Mars has no surface water, and hence no sea level, the datum (the 0 km contour line) for elevations is defined by a gravity field described by spherical harmonics of fourth order and fourth degree (Jordan and Lowell, 1973) combined with a 6.1 millibar atmospheric pressure surface derived from radio occultation data (Klore and others, 1973; Christensen, 1975). This datum can be approximated by a triaxial ellipsoid with semi-major axes of A=3394.6 km and B=3393.3 km and a semi-minor axis of C=3376.3 km. Semi-major axis A intersects the Martian surface at long 105° (Wu, 1978, 1981).

PROJECTIONS

The Mercator projection is used between the 55° parallels, and a Polar Stereographic projection is used for the polar regions north and south of the 55° parallels. Longitude increases to the west in accordance with astronomical convention for Mars. Latitudes are areographic.

CONTROL

Horizontal and vertical controls were established by analytical photogrammetric aerotriangulation (Wu and Schaler, 1984), using the General Integrated Analytical Triangulation (GIANT) program of the U.S. Geological Survey. Primary controls used in the control network include the Viking Orbiter Secondary Experiment Data Record, radio occultation measurements from both Mariner 9 and Viking missions (Lowell and others, 1972; Klore 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).

CONTOURS

Between the 55° parallels, contour lines were transferred from the 1:2,000,000-scale topographic maps originally compiled from stereoscopic Viking Orbiter pictures on analytical stereoplotters (Wu and others, 1982). Contour lines above and below lat 55° were compiled from measurements made by both Viking and Mariner 9 experiments, including the ultraviolet spectrometer (Hord and others, 1974), infrared interferometer spectrometer (Conrath and others, 1973), and elevation data from both the Mars primary control network (Davies and others, 1978) and the Mars planetwide control network (Wu and Schaler, 1984). Elevation values (expressed in meters) are given with respect to the adopted Mars topographic datum. As the stereoscopic compilation of 1:2,000,000-scale topographic maps progresses, we plan to update periodically this map and the two other 1:15,000,000-scale maps, as well as to improve the estimated elevation accuracy shown on their index maps of probable error.

COLOR

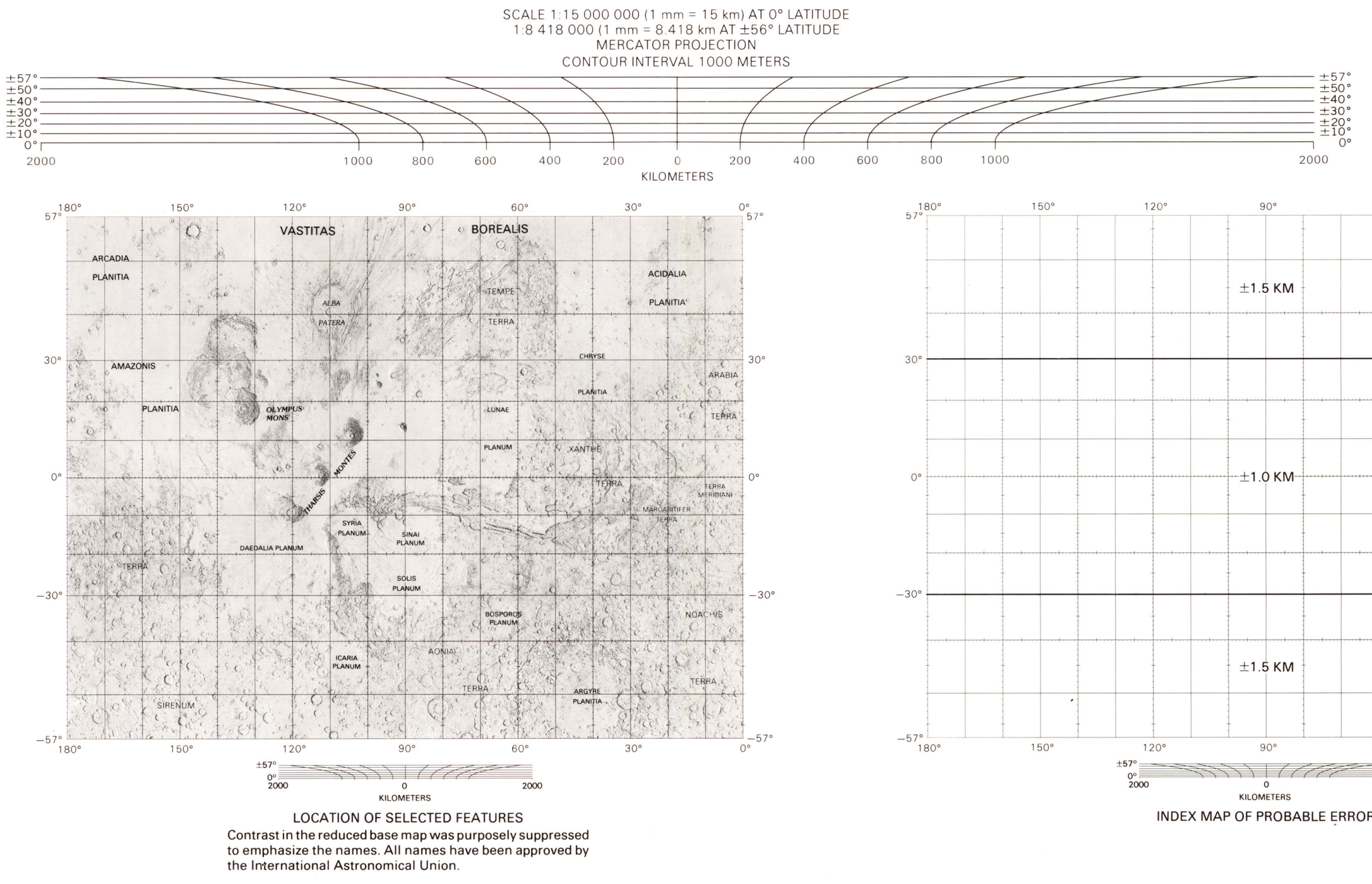
Color on map was purposely suppressed to enhance contour lines.

NOTES TO USERS

Users noting errors or omissions are urged to indicate them on the map and to forward it to U.S. Geological Survey, Room 412, Building A, 2255 North Gemini Drive, Flagstaff, AZ 86001. A replacement copy will be returned.

REFERENCES

Christensen, E.J., 1975, Martian topography derived from occultation, radar, spectral, and optical measurements. *Journal of Geophysical Research*, v. 80, no. 20, p. 2909-2913.  
Conrath, B.J., Curran, R.K., Hanel, R.A., Kunde, V.G., Maguire, W.W., Pearl, J.C., Pirraglia, J., Walker, J., and Barker, T., 1972, 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., Katayama, F.Y., and Roth, J.A., 1978, Control net of Mars: February 1978. 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.  
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.  
Jordan, J.F., and Lowell, Jack, 1973, Mariner 9: an instrument of dynamical science. Paper presented at AAS/AIAA Astrodynamics Conference, Vol. Colo., July 16-18, 1973.  
Klore, A.J., Fiedler, Gernot, Sedel, R.L., Sykes, M.J., and Woiceshn, 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., Hertz, H.B., Sweetnam, D.N., Shoppo, Z., Brinkley, J.P., Hartell, 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.  
Lowell, Jack, Born, G.H., Jordan, J.F., Laine, P.A., Martin, W.J., Sigmund, W.J., Shapiro, I.I., Resenberg, R.D., and Slater, G.I., 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.  
U.S. Geological Survey, 1985, Shaded relief maps of the eastern, western, and polar regions of Mars: U.S. Geological Survey Miscellaneous Investigations Series Map I-1618.  
Wu, S.S.C., 1978, Mars synthetic topographic mapping. *Icarus*, v. 33, no. 3, p. 417-440.  
1981, A method of defining topographic datums of planetary bodies. *Annales de Geophysique*, AGEPA 7, tome 37, fascicule 1, p. 147-160.  
Wu, S.S.C., Bassal, A.A., Jordan, Raymond, and Schaler, F.J., 1982, Photogrammetric applications of Viking orbital photography. *Planetary and Space Science*, v. 30, no. 1, p. 45-55.  
Wu, S.S.C., and Schaler, F.J., 1984, Mars control network: American Society of Photogrammetry, in Technical papers of the 56th annual meeting of the American Society of Photogrammetry, v. 2, Washington, D.C., March 11-16, 1984, p. 456-463.



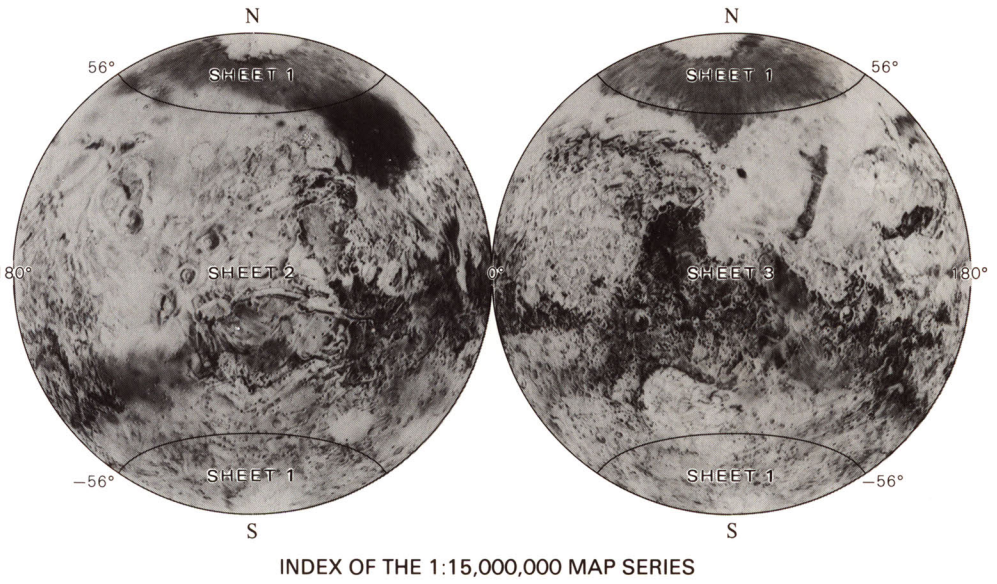
LOCATION OF SELECTED FEATURES  
Contrast in the reduced base map was purposely suppressed to emphasize the names. All names have been approved by the International Astronomical Union.

TOPOGRAPHIC MAP OF THE WESTERN EQUATORIAL REGION OF MARS

M 15M 0/90 TR

1989

Prepared on behalf of the Planetary Geology Program, Solar System Exploration Division, Office of Space Science, National Aeronautics and Space Administration, under contract W-15014.



INDEX OF THE 1:15,000,000 MAP SERIES

U.S. GEOLOGICAL SURVEY  
AUG 27 1990  
LIBRARY

M(200)  
I  
no. 2030  
sheet 2  
c. 2

USGS LIBRARY  
3 1818 00567626 5