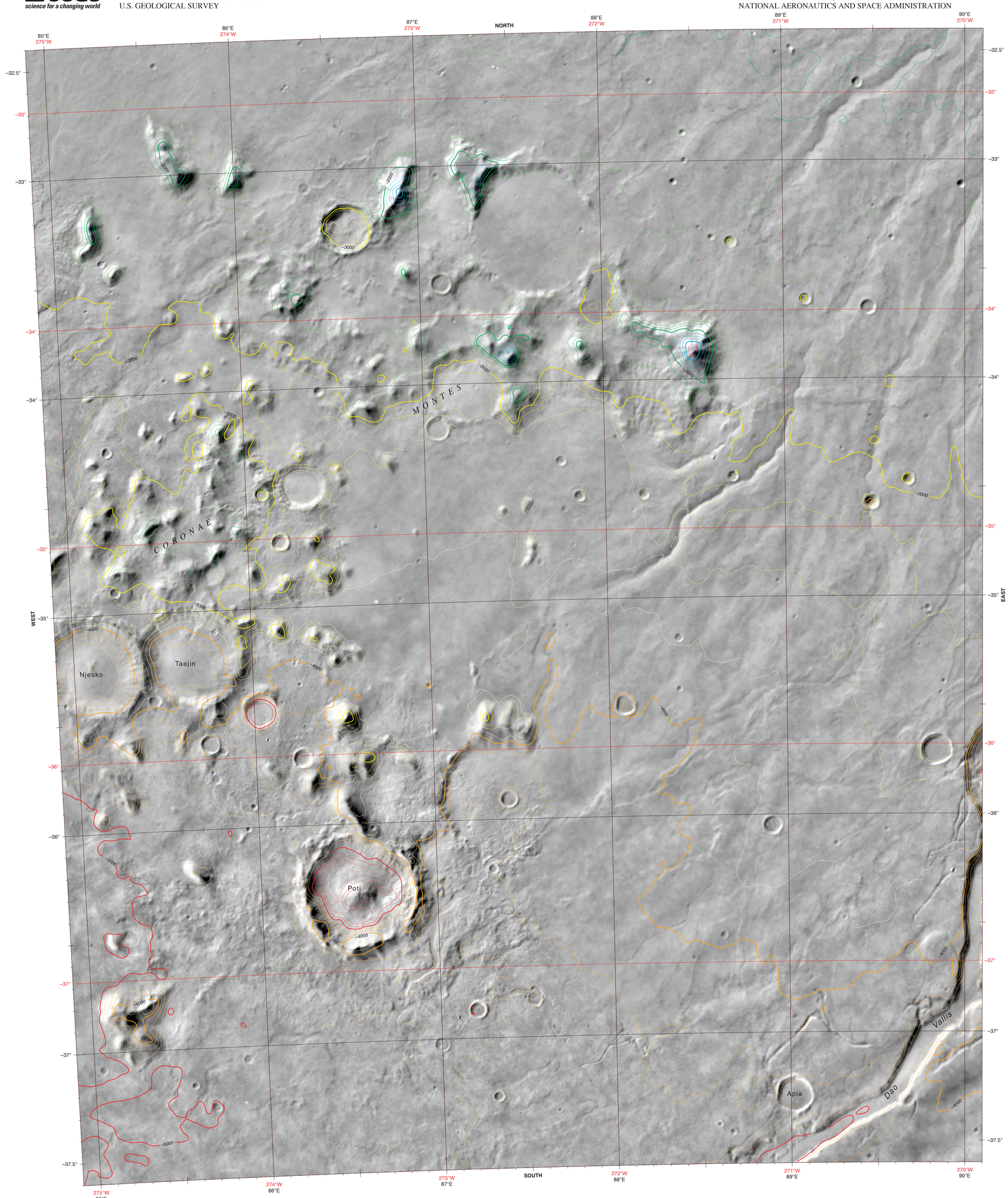
U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

Prepared for the
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

SCIENTIFIC INVESTIGATIONS MAP 2867



Prepared on behalf of the Planetary Geology and Geophysics Program, Solar System Exploration Division, Office of Space Science, National Aeronautics and Space Administration.

SCALE 1:502 000 (1 mm = 502 m) AT 90° E. (270° W.) LONGITUDE
TRANSVERSE MERCATOR PROJECTION

10 0 10 20 30 40 50 60 70 80 90 100 KILOMETERS

CONTOUR INTERVAL 250 METERS

Planetocentric latitude and east longitude coordinate system shown in black.
Planetographic latitude and west longitude coordinate system shown in red.

Topographic Map of the Coronae Montes Region of Mars

MTM 500k –35/087E OMKT

By

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NOTES ON BASE

This map, compiled photogrammetrically from Viking Orbiter stereo image pairs, is part of a series of topographic maps of areas of special scientific interest on Mars.

MTM 500k –35/087E OMKT

The map code identifies the Mars topographic maps:

MTM 500k –35/087E OMKT: Abbreviation for Mars transverse Mercator projection; 1:500,000 series; center of sheet lat 35° S., long 87.5° E. in planetocentric coordinate system (this corresponds to –35/272; lat 35° S., long 272.5° W. in planetographic coordinate system); orthophotomosaic (OM) with color-coded (K) topographic contours and nomenclature (T) (Greeley and Batson, 1990)

ADOPTED FIGURE

The figure of Mars used for the computation of the map projection is an oblate spheroid (flattening of 1/176.875) with an equatorial radius of 3,396.19 km and a polar radius of 3,376.2 km (Seidelmann and others, 2002). The datum (the 0-km contour line) for elevations is defined as the equipotential surface (gravitational plus rotational) whose average value at the equator is equal to the mean radius as determined by Mars Orbiter Laser Altimeter (MOLA; Smith and others, 2001).

PROJECTION

The projection is part of a Mars transverse Mercator (MTM) system with 20°-wide zones. For the area covered by this map, the central meridian is at 90° E. (270° W.). The scale factor at the central meridian of the zone containing this quadrangle is 0.9960 relative to a nominal scale of 1:500,000.

COORDINATE SYSTEM

Longitude increases to the east and latitude is planetocentric (black) as allowed by International Astronomical Union/International Association of Geodesy (IAU/IAG) standards (Seidelmann and others, 2002) and in accordance with current National Aeronautics and Space Administration (NASA) and U.S. Geological Survey (USGS) standards (Duxbury and others, 2002). A secondary grid (red) has been added to the map as a reference to the west longitude/planetographic latitude system that is also allowed by IAU/IAG standards (Seidelmann and others, 2002) and has been used for previous Mars maps.

CONTROL

Horizontal and vertical control was established using the Mosaicked Digital Image Model 2.0 (MDIM 2.0; Kirk and others, 2000) and MOLA data. A portion of MDIM 2.0 covering the map area was extracted in simple cylindrical projection. This MDIM image was georeferenced to the MOLA data with an affine transformation. The MDIM image and georeferencing information were imported into a digital photogrammetric workstation (Miller and Walker, 1993) and used as an orthophoto to provide horizontal control to stereopairs of Viking imagery. The horizontal information was used to extract vertical control from the MOLA data. Note that the distribution of Viking Orbiter images suitable for mapping at a scale of 1:500,000 is uneven. Areas mapped in this series are chosen, often in blocks of two or more adjacent quadrangles, based on scientific interest as well as on the availability of suitable data for accurate mapping.

CONTOURS

Contours were derived from a digital elevation model (DEM) compiled on a digital photogrammetric workstation using Viking Orbiter stereo image pairs with orientation parameters derived from an analytic aerotriangulation. Contours were drawn automatically using a commercial geographic information system (GIS) software package (Environmental Systems Research Institute, 1994). For the stereomodels, the local expected vertical precision, based on image resolutions, parallax-to-height ratio (that is, convergence angle), and a matching accuracy of 0.2 pixel, ranges from 81 m to 132 m with a mean of 99 m. Elevation (in meters) is given with respect to the adopted Mars topographic datum (see section named "Adopted Figure"). A comparison of the DEM values at the MOLA point locations shows that the DEM is on average 4.4 m lower than the MOLA points (n=362,879; μ=-4.4 m; Ƴ=81.5 m). Contour lines were generated automatically using GIS software and were not edited. Because the contour lines were not edited, small closed contour lines, contour lines that intersect, and contour lines that do not match features are present. The post spacing for the DEM is 600 m; features that are less than 600 m in size will not be resolved and features that are smaller than 1,800 m in size may only have four elevation measurements associated with them. This lack of elevation measurements may result in contour lines that do not adequately represent some features. The purpose of this mapping project is to produce the digital orthophoto and DEM. This map provides a graphical representation of the digital products that are available.

IMAGE BASE

The image base for this map employs Viking Orbiter images from orbits 406, 407, and 408. An orthophotomosaic was created on the digital photogrammetric workstation using the DEM compiled from stereo models. Integrated Software for Imagers and Spectrometers (ISIS; Torson and Becker, 1997) provided the software to project the orthophotomosaic into the transverse Mercator projection.

NOMENCLATURE

Names on this map are approved by the IAU. For a complete list of IAU-approved names, see the Gazetteer of Planetary Nomenclature at http://planetarynames.wr.usgs.gov.

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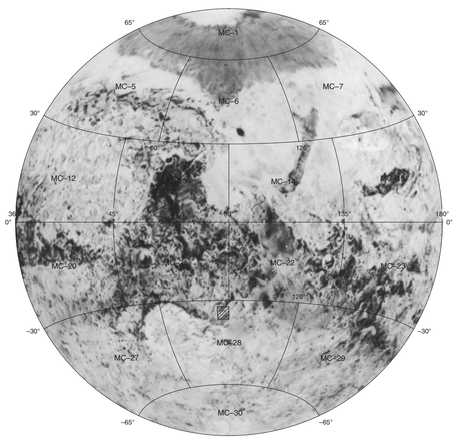
CONTOUR GUIDE (meters)

MTM –35/087E QUADRANGLE VIKING STEREOMODEL COVERAGE

Diagram of map area showing locations of image pairs used to produce the topographic information. Numbers on the diagram correspond to numbered image pairs listed below.

No.	IMAGE PAIR	No.	IMAGE PAIR	No.	IMAGE PAIR
1	407S05/408S04	11	408S08/408S66	21	407S13/408S10
2	407S07/408S04	12	407S09/408S06	22	407S10/408S08
3	407S07/408S06	13	408S08/408S68	23	406S19/407S10
4	408S06/408S64	14	408S09/408S68	24	406S21/407S10
5	408S04/408S64	15	407S08/408S06	25	406S21/406S43
6	408S05/408S64	16	329S32/363S49	26	406S21/407S12
7	408S06/408S66	17	406S19/407S08	27	407S12/408S08
8	408S07/408S66	18	329S30/363S47	28	407S12/408S10
9	408S07/408S65	19	407S11/408S08	29	407S15/408S10
10	408S07/408S67	20	408S10/408S70	30	407S06/408S04



QUADRANGLE LOCATION

Photomosaic showing location of map area. An outline of 1:5,000,000-scale quadrangles is provided for reference

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Map compilation by M.R. Rosiek and B.L. Redding
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Nomenclature by J.S. Blue
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