

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).
In the north polar region, images from which this base was made were obtained in the northern late spring and summer; in the south polar region, they were obtained in the southern summer.
M 15M ±90/0 TR: Abbreviation for Mars; 1:15,000,000 series; center of map, lat 90° N. or lat 90° S., long 0°; 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 3375.7 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 Lovell, 1973) combined with a 6.1-millibar atmospheric pressure surface derived from radio-occultation data (Kilore 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).

The Mercator projection is used between the ±57° 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 (Lovell and others, 1972; Kilore 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 ±30° 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 ±30° were compiled from measurements made by both Viking and Mariner 9 experiments, including the ultraviolet spectrometer (Hord and others, 1976), infrared interferometer spectrometer (Conrath and others, 1973), and elevation data from both the Mars primary control network (Davies and others, 1978) and the Mars planimeter

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, Room 612, Building 4, 2255 North Gemini Drive, Flagstaff, AZ 86001. A replacement copy will be returned.

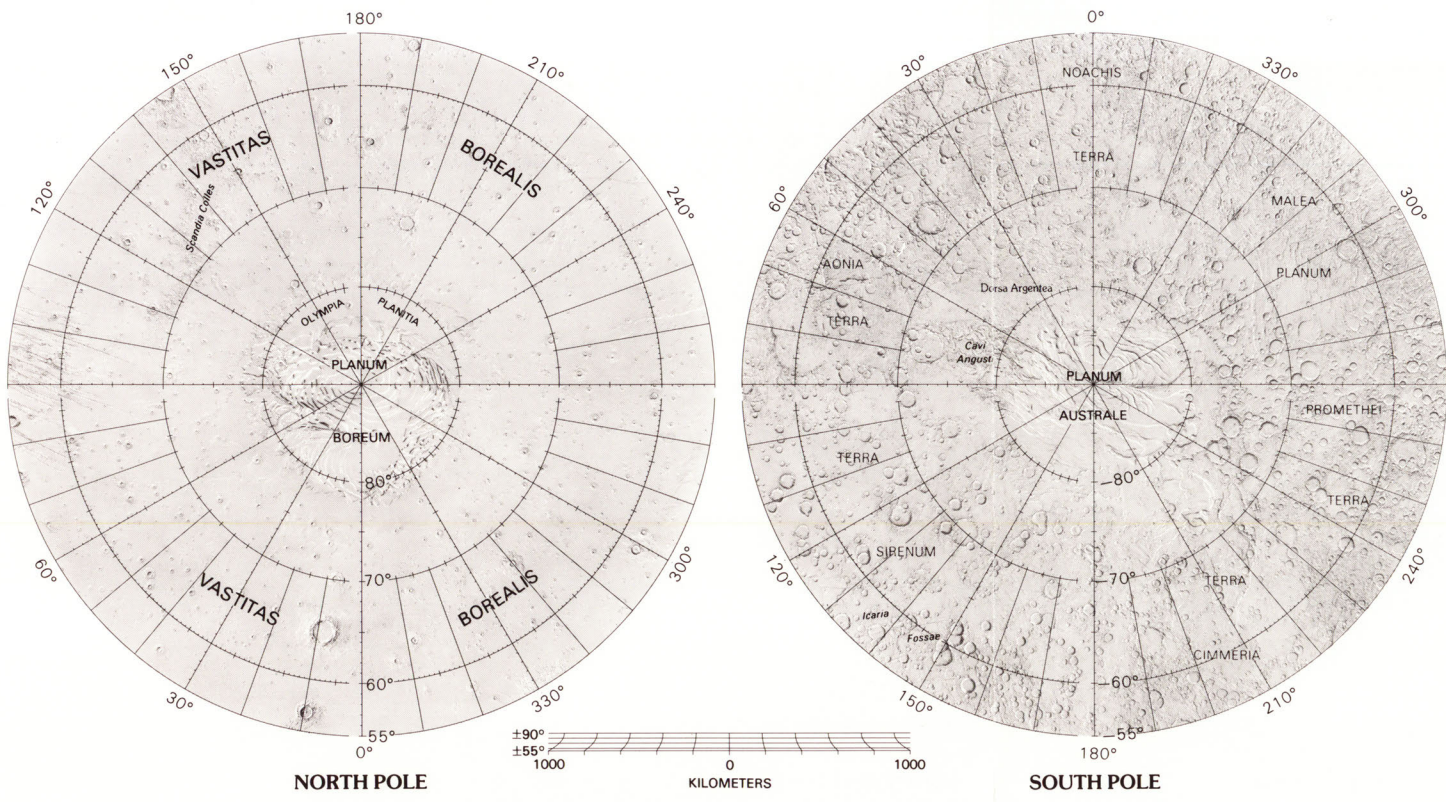
control network (Wu and Schaler, 1984). Elevation values (expressed in meters) are given with respect to the adopted Mars topographic datum. As the stereoscopic compilation of 1:2,000,000-scale topographic maps progresses, we plan to update periodically this map and the two other 1:15,000,000-scale maps, 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.

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., Povel, J.C., Perazich, J., Walker, J., and Burke, T., 1973, Atmospheric and surface properties of Mars obtained by infrared spectroscopy on Mariner 9. *Journal of Geophysical Research*, v. 78, no. 20, p. 4687-4678.
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 Lovell, Jack, 1973, Mariner 9, an instrument of dynamical science: Paper presented at AAS/AIAA Astrodynamics Conference, Vail, Colo., July 16-18, 1973.

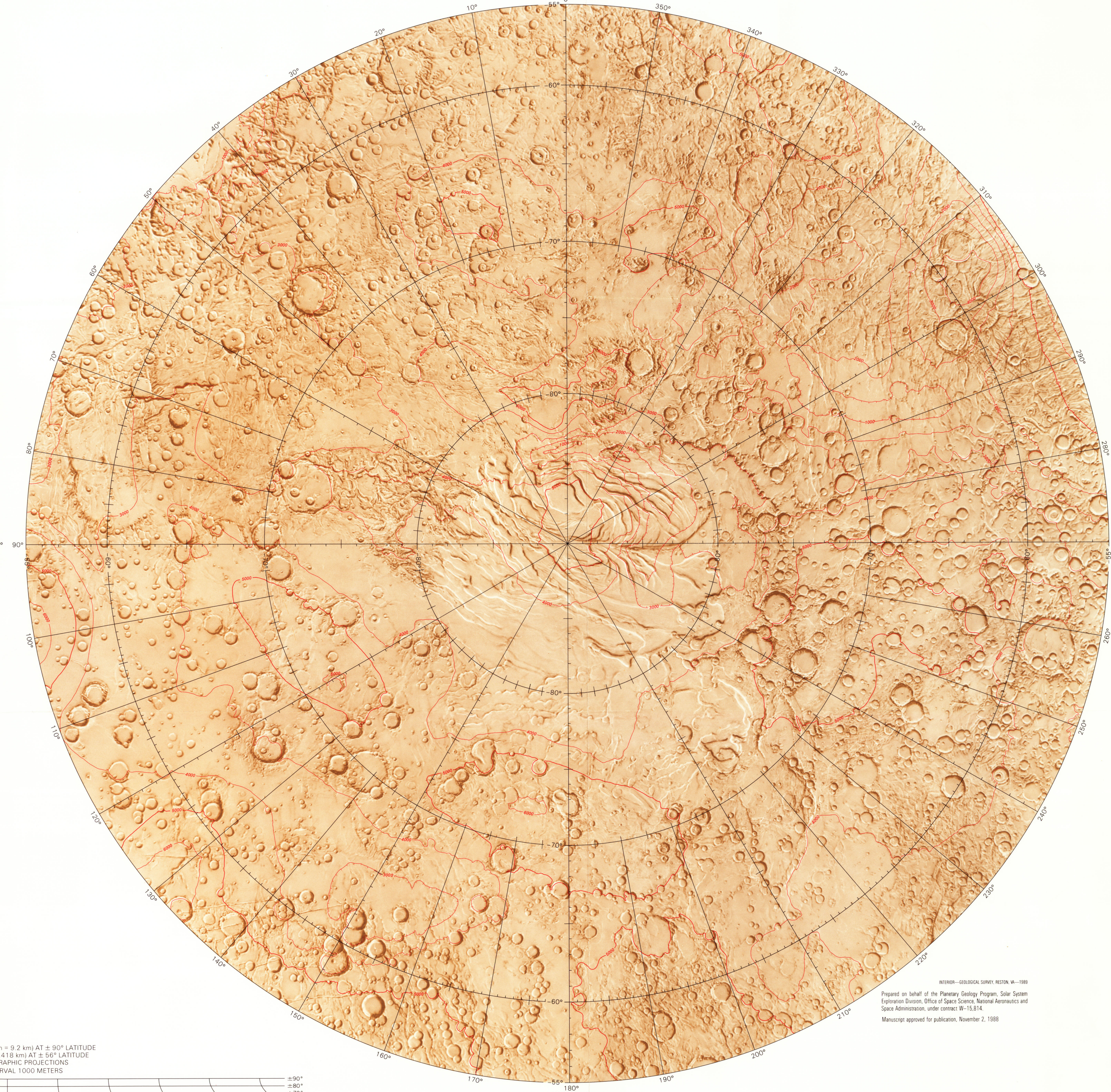
**NORTH POLAR REGION
M 15M 90/0 TR**

SCALE 1:9 203 425 (1 mm = 9.2 km) AT ± 90° LATITUDE
1:8 418 000 (1 mm = 8.418 km) AT ± 56° LATITUDE
POLAR STEREOGRAPHIC PROJECTIONS
CONTOUR INTERVAL 1000 METERS

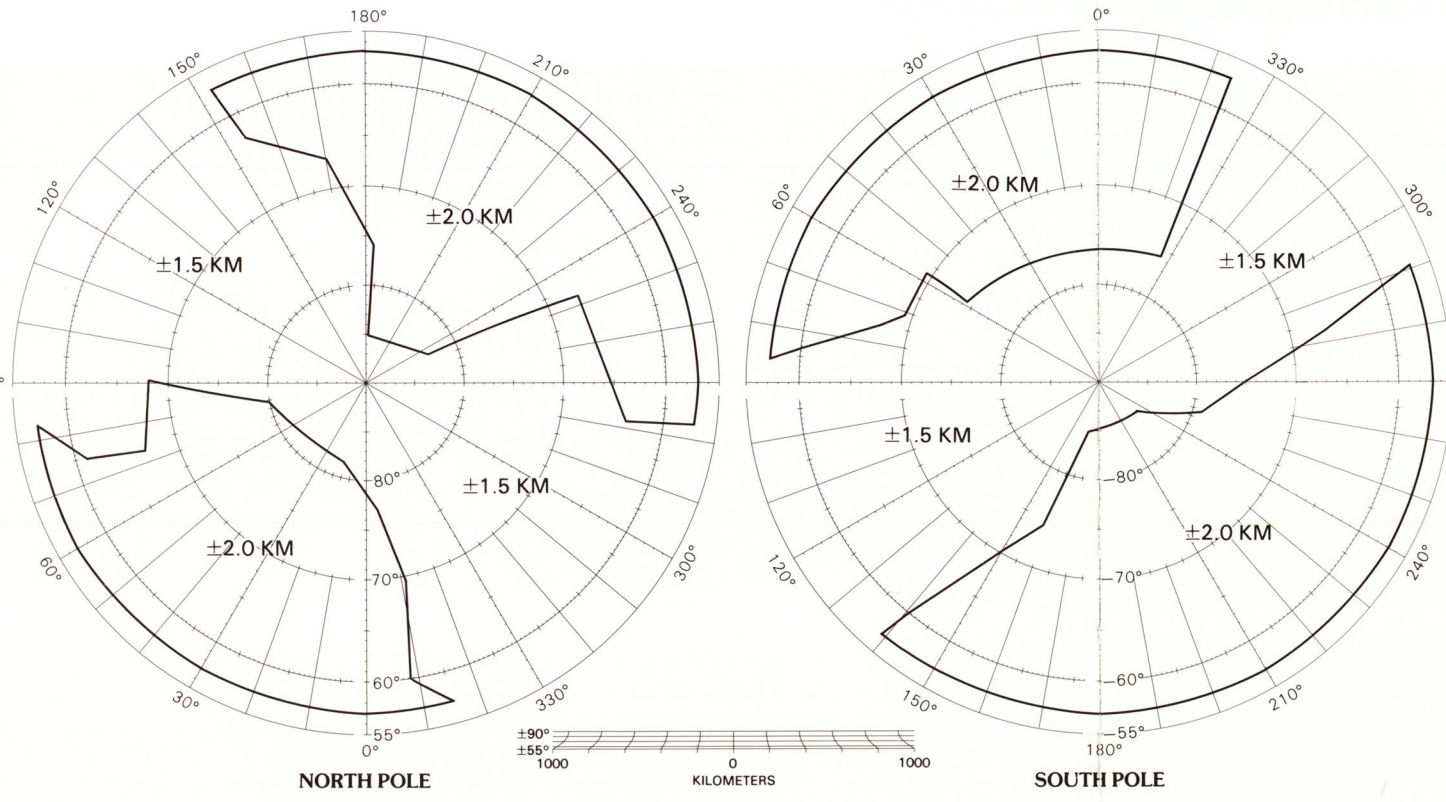


LOCATION OF SELECTED FEATURES
Contrast in the reduced base map was purposely suppressed to emphasize the names. All names have been approved by the International Astronomical Union.

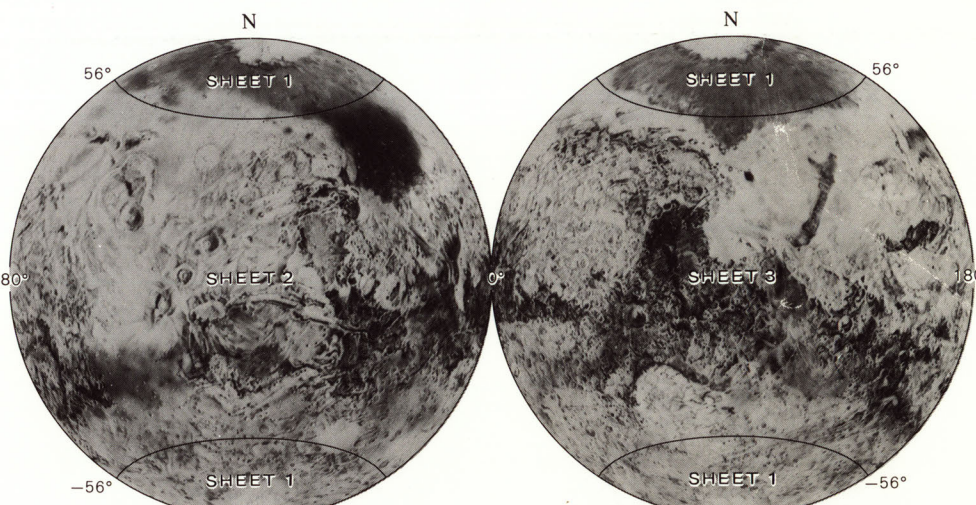
**TOPOGRAPHIC MAP OF THE POLAR REGIONS OF MARS
M 15M ±90/0 TR**



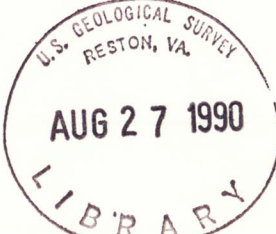
**SOUTH POLAR REGION
M 15M -90/0 TR**



INDEX MAPS OF PROBABLE ERROR



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



For sale by U.S. Geological Survey, Map Distribution, Box 25136, Federal Center, Denver, CO 80225

M(200)
I
no. 2030
sheet 1
c. 2