DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

Prepared for the
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

ATLAS OF MARS
1:5,000,000 TOPOGRAPHIC SERIES
CASIUS QUADRANGLE
M 5M 48/270 RMC, 1978
I-1119 (MC-6)

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 1:5,000,000 (Batson, 1973; 1976). The major source of map data was the Mariner 9 television experiment (Masursky and others, 1970).

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.

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 projections. Longitudes increase to the west in accordance with usage of the International Astronomical Union (IAU, 1971). Latitudes are areographic (de Vaucouleurs 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 Airy-0 (lat 5.19° S) within the crater Airy. 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 copied from the mosaics and portrayed with uniform illumination with the sun to the west, using airbrush techniques described by Inge (1972) and Inge and Bridges (1976). To improve portrayal, various computer enhancements of many pictures besides those in the base mosaic were used. (Computer enhancement of Mariner 9 pictures is described by Levinthal and others, 1973, and Green and others, 1975.) Viking orbiter pictures were also examined and used where they significantly clarified Mariner 9 image data. No attempt was made to portray all information in the Viking pictures, however.

Shaded relief analysis and representation were made by Patricia M. Bridges.

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 (Batson 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 Earth-based telescopic albedo data.

Airbrush portrayal of albedo markings was done by Patricia M. Bridges.

CONTOURS

Since 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 Lorell, 1973) combined with a 6.1-millibar atmospheric pressure surface derived from radio-occultation data (Kliore and others, 1973; Christensen, 1975; Wu, 1975).

The contour lines on most of the Mars maps (Wu, 1975) were compiled from Earth-based radar determinations (Downs and others, 1971; Pettengill and others, 1971) and measurements made by Mariner 9 instrumentation, 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 elevation information has not been made. The estimated vertical accuracy of each source of data indicates a probable error 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). 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 (W) and latitude (N). The complete designation of a crater is the name of the quadrangle followed by a double or triple letter. The prefix CAS (identifying the Casius quadrangle) is part of the complete designation but, for brevity, is 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-6: Abbreviation for Mars Chart 6
M 5M 48/270 RMC: Abbreviation for Mars 1:5,000,000 series; center of sheet, lat 48° N, long 270°; shaded relief map, R, with albedo markings, M, and contours, C.

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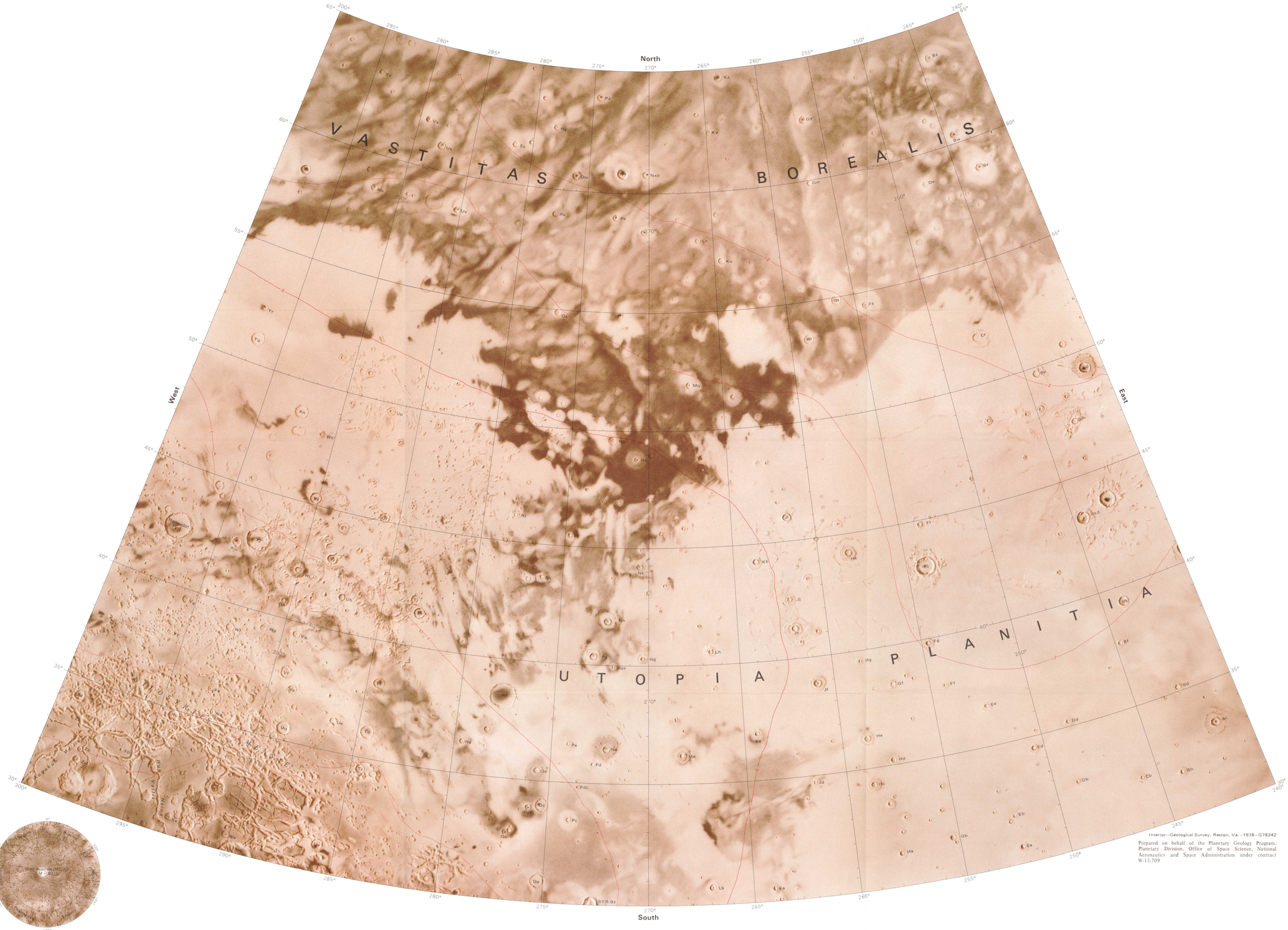
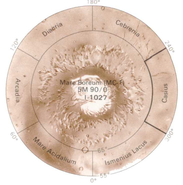
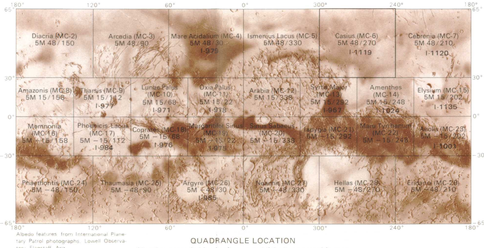




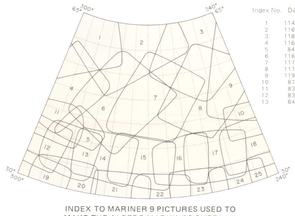


QUADRANGLE LOCATION
Number preceded by I refers to published topographic map

SCALE 1:4 336 000 AT 30° LATITUDE
LAMBERT CONFORMAL PROJECTION

100 50 0 KILOMETERS 100 200 300 400 500 600 700 800 900 1000

CONTOUR INTERVAL 1 KILOMETER



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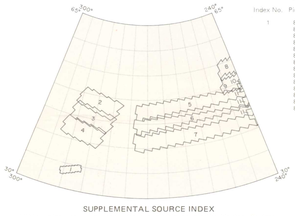
2	11622910	15	8551034
3	11800011	16	8622994
4	11622385	17	8695004
5	8407114	18	8766984
6	11627560	19	8406834
7	11799591	20	9953834
8	11799731	21	8550894
9	11976589	22	8622864
10	8767124	23	8694884
11	8335154	24	8766844
12	8335014	25	8838804
13	8406974		

INDEX TO MARINER 9 PICTURES USED TO MAKE THE ALBEDO MARKINGS OVERLAY
Most of the pictures indexed above were specially processed to accentuate albedo markings. Only the useful image areas of the pictures are outlined.



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

Viking 1

Index No.	Picture No.	Index No.	Picture No.
1	84A71		
	84A72		
	84A73		
	84A74		
	84A75		
	84A76		
	84A77		
	84A78		
	84A79		
	84A80		
	84A81		
	84A82		
	84A83		
	84A84		

Viking 2

Index No.	Picture No.	Index No.	Picture No.	Index No.	Picture No.	Index No.	Picture No.
2	11801	5	10810	6	10840	7	10870
	11802		10811		10841		10871
	11803		10812		10842		10872
	11804		10813		10843		10873
	11805		10814		10844		10874
	11806		10815		10845		10875
	11807		10816		10846		10876
	11808		10817		10847		10877
	11809		10818		10848		10878
	11810		10819		10849		10879
3	11811		10820		10850		10880
	11822		10821		10851		10881
	11823		10822		10852		10882
	11824		10823		10853		10883
	11825		10824		10854		10884
	11826		10825		10855		10885
	11827		10826		10856		10886
	11828		10827		10857		10887
	11829		10828		10858		10888
	11830		10829		10859		10889
	11841		10830		10860		10890
	11842		10831		10861		10891
	11843		10832		10862		10892
	11844		10833		10863		10893
	11845		10834		10864		10894
	11846		10835		10865		10895
	11847		10836		10866		10896
	11848		10837		10867		10897
	11849		10838		10868		10898
	11850		10839		10869		10899
4	11861						
	11862						
	11863						
	11864						
	11865						
	11866						
	11867						
	11868						
	11869						
	11870						

Index No.	Picture No.
8	21811
	21812
	21813
	21814
	21815
	21816
	21817
	21818
	21819
9	21801
	21802
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10	21821
11	9801
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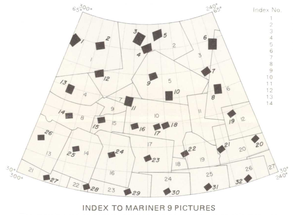
	9841
	9842



INDEX TO 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, identified by vertical numbers. 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 picture.

A-camera pictures

Index No.	DAS No.	Index No.	DAS No.
1	11446128	15	8479144
2	11622905	16	8479004
3	11800006	17	8551014
4	11622429	18	8621993
5	11799591	19	8695004
6	11976589	20	8695054
7	11623560	21	8406839
8	8335149	22	9953829
9	8483144	23	8550894
10	8551124	24	8622849
11	8695164	25	8694884
12	8767124	26	8766844
13	8335014	27	8838804
14	8406974		

High-resolution B-camera pictures

Index No.	DAS No.	Index No.	DAS No.
1	11446164	17	7279938
2	8407424	18	8551204
3	11622940	19	8695194
4	8551484	20	8767014
5	9882184	21	8695054
6	11800041	22	8551064
7	8695404	23	8551064
8	11799761	24	8479034
9	8551414	25	8481004
10	11799921	26	8325044
11	11622590	27	8406864
12	8407354	28	8478894
13	11622450	29	8550924
14	8335184	30	8622884
15	8407144	31	8694814
16	8479174	32	8766874

TOPOGRAPHIC MAP OF THE CASIUS QUADRANGLE OF MARS

MC-6
M 5M 48/270 RMC
1978

NOTE TO USERS
Users noting errors or omissions are urged to indicate them on the map and to forward the map to Astrogeologic Studies, Geologic Division, 2255 North Gemini Drive, Flagstaff, Arizona 86001. A replacement copy will be returned.

Interior—Geological Survey, Reston, Va.—1978—G78242

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