

# MARINER MARS '64 BULLETIN

NUMBER FIFTY-TWO

DATE/TIME AUGUST 4, 1965

THIS BULLETIN HAS BEEN ISSUED TO PROVIDE EACH OF YOU WITH REPRODUCTIONS OF ALL THE MARINER IV TELEVISION PICTURES AND THE COMPLETE TEXT THAT ACCOMPANIED THEIR OFFICIAL RELEASE.

## INITIAL SCIENTIFIC INTERPRETATION OF MARINER IV PHOTOGRAPHY

STATEMENT BY TELEVISION SCIENTIFIC INVESTIGATORS:

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MAN'S FIRST CLOSE-UP LOOK AT MARS HAS REVEALED THE SCIENTIFICALLY STARTLING FACT THAT AT LEAST PART OF ITS SURFACE IS COVERED WITH LARGE CRATERS.

THIS IS A PROFOUND FACT WHICH LEADS TO FAR-REACHING FUNDAMENTAL INFERENCES CONCERNING THE EVOLUTIONARY HISTORY OF MARS AND FURTHER ENHANCES THE UNIQUENESS OF EARTH WITHIN THE SOLAR SYSTEM.

FRAME NUMBER 11 OF THE MARINER SEQUENCE MUST SURELY RANK AS ONE OF THE MOST REMARKABLE SCIENTIFIC PHOTOGRAPHS OF THIS AGE.

THE EXISTENCE OF MARTIAN CRATERS IS DEMONSTRATED BEYOND QUESTION; THEIR MEANING AND SIGNIFICANCE IS, OF COURSE, A MATTER OF INTERPRETATION. THE SEVENTY CRATERS CLEARLY DISTINGUISHABLE ON MARINER PHOTOS NOS. 5 THROUGH 15, RANGE IN DIAMETER FROM 3 TO 75 MILES. IT SEEMS LIKELY THAT SMALLER CRATERS EXIST, AND THERE ALSO MAY BE STILL LARGER ONES THAN THOSE PHOTOGRAPHED, SINCE THE MARINER PHOTOGRAPHS, IN TOTAL, SAMPLED ONLY ABOUT ONE PERCENT OF THE MARTIAN SURFACE.

THE OBSERVED CRATERS HAVE RIMS RISING A FEW HUNDRED FEET ABOVE THE SURROUNDING SURFACE AND DEPTH OF A FEW THOUSAND FEET BELOW THE RIMS. CRATER WALLS SO FAR MEASURED SEEM TO SLOPE AT ANGLES UP TO ABOUT 10°.

THE NUMBER OF LARGE CRATERS PER UNIT AREA OF THE MARTIAN SURFACE IS CLOSELY COMPARABLE TO THE DENSELY CRATERED UPLAND AREAS OF THE MOON.

IF THE MARINER SAMPLE IS REPRESENTATIVE OF THE MARTIAN SURFACE, THE TOTAL NUMBER OF CRATERS OF THE SIZES SO FAR OBSERVED IS MORE THAN 10,000 COMPARED TO A MERE HANDFUL ON EARTH.

IN APPEARANCE, THE MARTIAN CRATERS CLOSELY RESEMBLE IMPACT CRATERS ON EARTH, BOTH ARTIFICIAL AND NATURAL, AND THE CRATERS OF THE MOON. CRATERS OF WIDELY DIFFERENT DEGREE OF PRESERVATION AND, PRESUMABLY AGE, ARE DISTINGUISHABLE.

A FEW ELONGATED DIFFUSE MARKINGS ARE PRESENT ON THE MARINER PHOTOS BUT AT THIS EARLY STAGE OF ANALYSIS NO CONCLUSIONS CAN BE OFFERED CONCERNING THEM. ON FRAME NO. 13, ONE SUCH FEATURE LOOKS LIKE A PART OF THE EDGE OF A VERY LARGE CRATER AND, PERHAPS SIGNIFICANTLY, LIES NEAR THE BORDER OF A MARTIAN DARK AREA.

IN SOUTHERN SUB-POLAR LATITUDES, WHERE THE SEASON IS LATE MID-WINTER SOME CRATERS APPEAR TO BE RIMMED WITH FROST, PARTICULARLY IN FRAME 14.

SOME MENTION MUST BE MADE OF FEATURES LOOKED FOR BUT NOT SEEN ON THE MARINER PHOTOS. ALTHOUGH THE FLIGHT LINE CROSSED SEVERAL "CANALS,"

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SKETCHED FROM TIME TO TIME ON MAPS OF MARS, NO TRACE OF THESE FEATURES WAS DISCERNIBLE. IT SHOULD BE REMEMBERED IN THIS RESPECT THAT THE VISIBILITY OF MANY MARTIAN SURFACE FEATURES, INCLUDING THE "CANALS," IS VARIABLE WITH TIME.

NO EARTH-LIKE FEATURES, SUCH AS MOUNTAIN CHAINS, GREAT VALLEYS, OCEAN BASINS OR CONTINENTAL MASSES WERE RECOGNIZED.

CLOUDS WERE NOT IDENTIFIED AND THE FLIGHT PATH DID NOT CROSS EITHER POLAR CAP.

THE FOLLOWING ARE SOME OF THE FUNDAMENTAL INFERENCES TO BE DRAWN FROM THE MARINER IV PHOTOS:

1. IN TERMS OF ITS EVOLUTIONARY HISTORY, MARS IS MORE MOON-LIKE THAN EARTH-LIKE. NONETHELESS, BECAUSE IT HAS AN ATMOSPHERE, MARS MAY SHED MUCH LIGHT ON EARLY PHASES OF EARTH'S HISTORY.
2. REASONING BY ANALOGY WITH THE MOON, MUCH OF THE HEAVILY CRATERED SURFACE OF MARS MUST BE VERY ANCIENT -- PERHAPS TWO TO FIVE BILLION YEARS OLD.
3. THE REMARKABLE STATE OF PRESERVATION OF SUCH AN ANCIENT SURFACE LEADS US TO THE INFERENCE THAT NO ATMOSPHERE SIGNIFICANTLY DENSER THAN THE PRESENT VERY THIN ONE HAS CHARACTERIZED THE PLANET SINCE THAT SURFACE WAS BORN. SIMILARLY, IT IS DIFFICULT TO BELIEVE THAT FREE WATER IN QUANTITIES SUFFICIENT TO FORM STREAMS OR TO FILL OCEANS COULD HAVE EXISTED ANYWHERE ON MARS SINCE THAT TIME. THE PRESENCE OF SUCH AMOUNTS OF WATER (AND CONSEQUENT ATMOSPHERE) WOULD HAVE CAUSED SEVERE EROSION OVER THE ENTIRE SURFACE.
4. THE PRINCIPAL TOPOGRAPHIC FEATURES OF MARS PHOTOGRAPHS BY MARINER HAVE NOT BEEN PRODUCED BY STRESS AND DEFORMATION ORIGINATING WITHIN THE PLANET, IN DISTINCTION TO THE CASE OF THE EARTH. EARTH IS INTERNALLY DYNAMIC GIVING RISE TO MOUNTAINS, CONTINENTS, AND OTHER FEATURES, WHILE EVIDENTLY MARS HAS LONG BEEN INACTIVE. THE LACK OF INTERNAL ACTIVITY IS ALSO CONSISTENT WITH THE ABSENCE OF A SIGNIFICANT MAGNETIC FIELD ON MARS AS WAS DETERMINED BY THE MARINER MAGNETOMETER EXPERIMENT.
5. AS WE HAD ANTICIPATED, MARINER PHOTOS NEITHER DEMONSTRATE NOR PRECLUDE THE POSSIBLE EXISTENCE OF LIFE ON MARS. THE SEARCH FOR A FOSSIL RECORD DOES APPEAR LESS PROMISING IF MARTIAN OCEANS NEVER EXISTED. ON THE OTHER HAND, IF THE MARTIAN SURFACE IS TRULY IN ITS PRIMITIVE FORM, THAT SURFACE MAY PROVE TO BE THE BEST -- PERHAPS THE ONLY -- PLACE IN THE SOLAR SYSTEM STILL PRESERVING CLUES TO ORIGINAL ORGANIC DEVELOPMENT, TRACES OF WHICH HAVE LONG SINCE DISAPPEARED FROM EARTH.

THE MARINER PHOTOS WILL PROFOUNDLY AFFECT SCIENTIFIC VIEWS ABOUT THE ORIGIN AND EVOLUTION OF PLANETARY BODIES IN THE PLANETARY SOLAR SYSTEM.

# MARINER

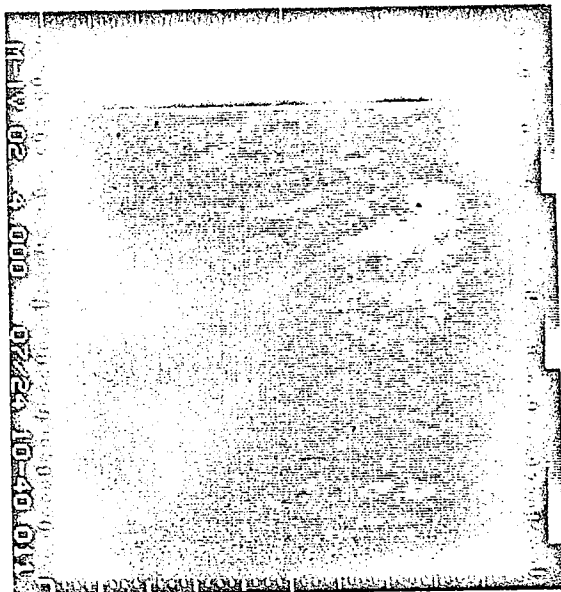
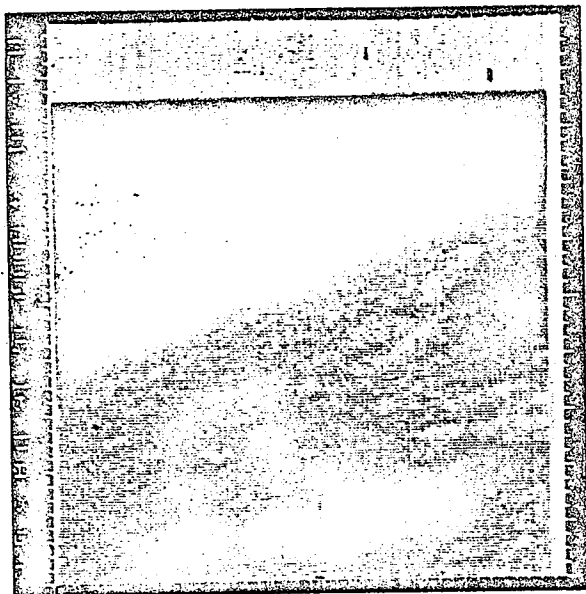


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DATA FOR PICTURES 1 AND 2 ARE, RESPECTIVELY:

SUN: 25° AND 20° FROM THE ZENITH, FROM SOUTHEAST, IN PHOTOS.

TIME TAKEN: 5:18:33 AND 5:19:21 PM PDT, JULY 14, 1965.

SLANT RANGE - MILES: 10,500 AND 10,100.

APPROX. AREA COVERED IN MILES: 410 ALONG LIMB AND 800 FROM LIMB TO BOTTOM OF PICTURE. 290 E-W AND 530 N-S.

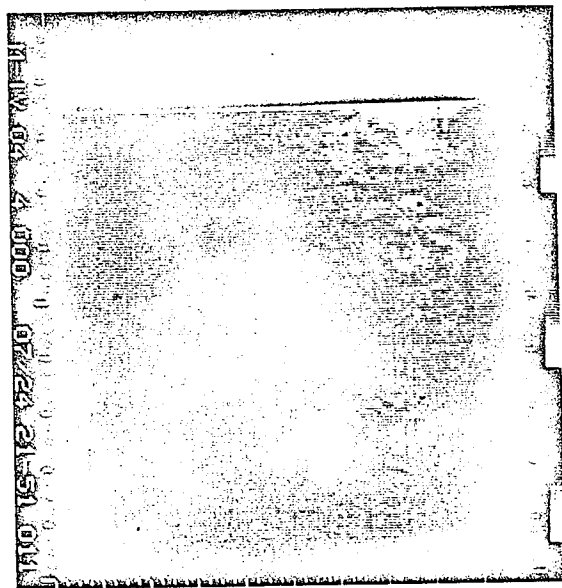
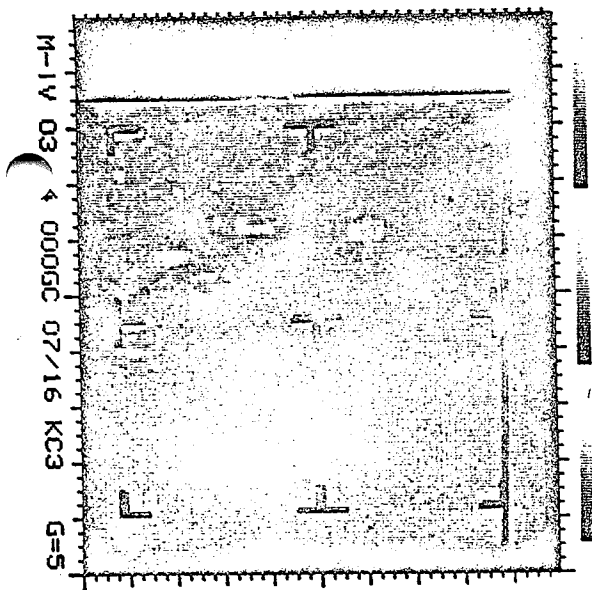
LOCATION: 35° N, 172° E AND 27° N, 174° E.

MAP DESCRIPTION: 1-BETWEEN TRIVIUM CHARONTIS AND PROPONTUS II; PHLEGRA IS BRIGHT REGION ON LIMB. 2-NE OF TRIVIUM CHARONTIS.

FILTER: 1-ORANGE AND 2-GREEN.

OVERLAP: LOWER RIGHT OF 1 OVERLAPPED BY UPPER LEFT OF 2.

CONTRAST ENHANCEMENT FACTOR: FOR BOTH, TWO.



DATA FOR PICTURES 3 AND 4 ARE, RESPECTIVELY:

SUN: FOR BOTH, 14° FROM ZENITH, FROM EAST IN PHOTO 3 AND NE IN 4.

TIME TAKEN: 5:20:57 AND 5:21:45 PM PDT, JULY 14, 1965.

SLANT RANGE - MILES: 9,500 AND 9,300.

APPROX. AREA COVERED IN MILES: 220 E-W, 310 N-S AND 210 E-W, 270 N-S.

LOCATION: 13° N, 177° E AND 7° N, 179° E.

MAP DESCRIPTION: 3-BRIGHT REGION SE OF TRIVIUM CHARONTIS, 4-BRIGHT REGION IN MESOGAEA.

FILTER: 3-GREEN AND 4-ORANGE.

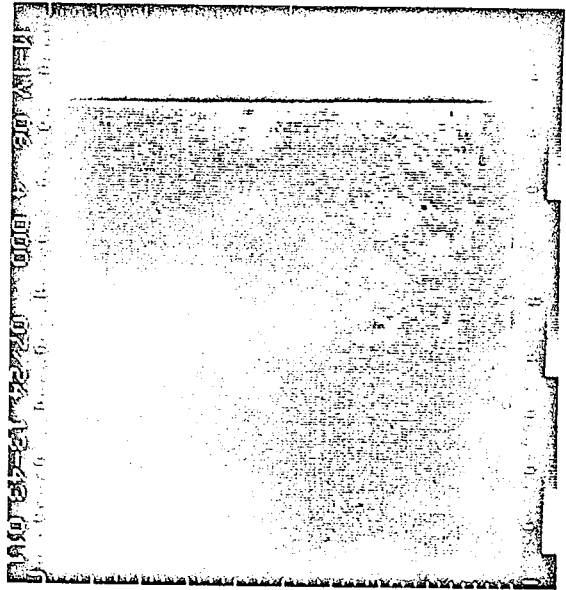
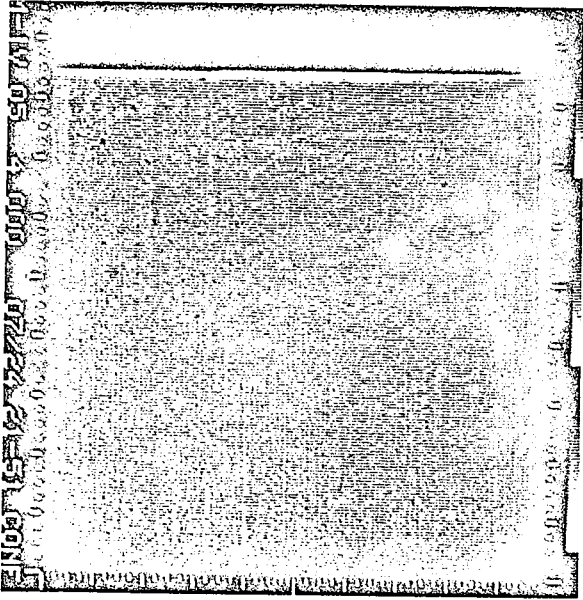
OVERLAP: LOWER RIGHT OF 3 OVERLAPPED BY UPPER LEFT OF 4.

CONTRAST ENHANCEMENT FACTOR: FIVE AND TWO.

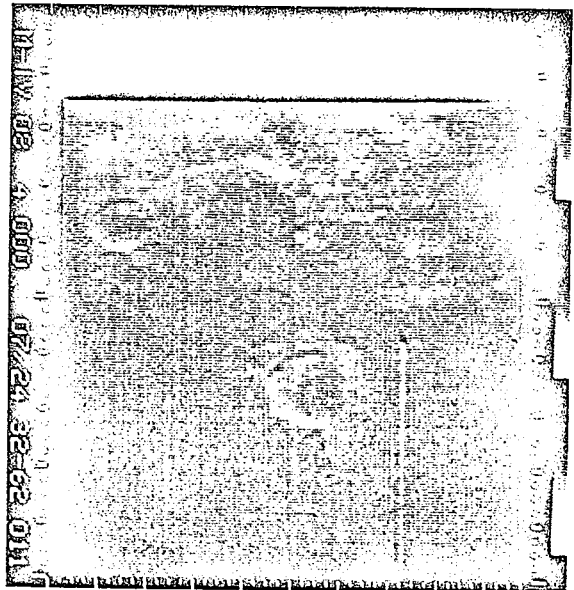
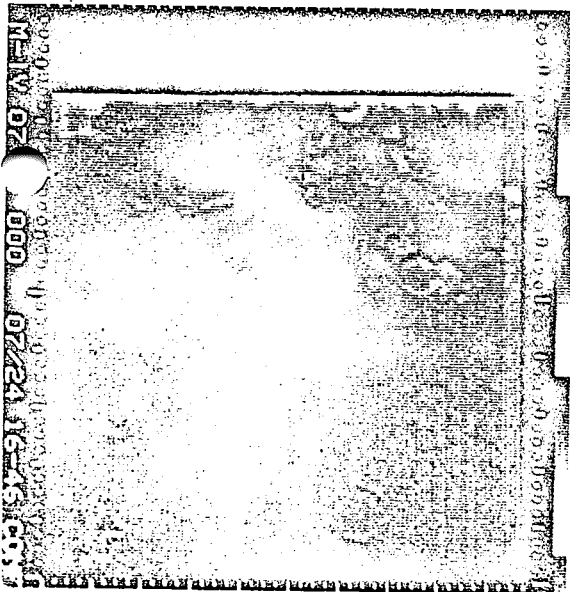
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DATA FOR PICTURES 5 AND 6 ARE, RESPECTIVELY:  
SUN: 19° AND 22° FROM THE ZENITH, FROM NORTH IN PHOTOS.  
TIME TAKEN: 5:23:21 AND 5:24:09 PM PDT, JULY 14, 1965.  
SLANT RANGE - MILES: 8,900 AND 8,700.  
APPROX. AREA COVERED IN MILES: 190 E-W, 220 N-S AND 190 E-W, 200 N-S.  
LOCATION: 2° S, 181° E AND 6° S, 183° E.  
MAP DESCRIPTION: FOR BOTH, BRIGHT REGION IN EASTERN ZEPHYRIA.  
FILTER: 5-ORANGE AND 6-GREEN.  
OVERLAP: LOWER RIGHT OF 5 OVERLAPPED BY UPPER LEFT OF 6.  
CONTRAST ENHANCEMENT FACTOR: FOR BOTH, TWO.



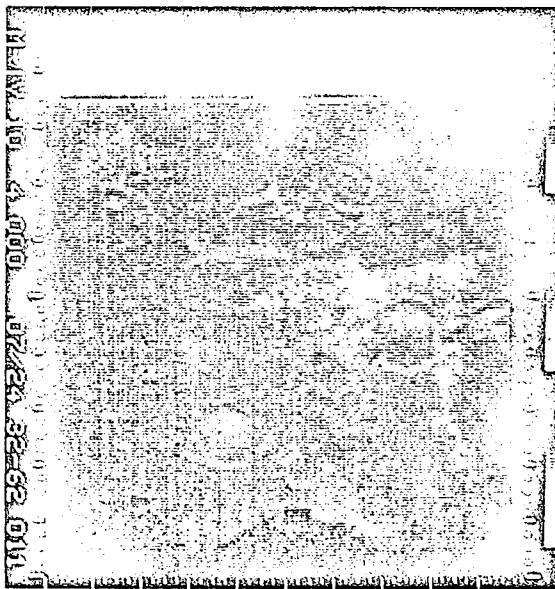
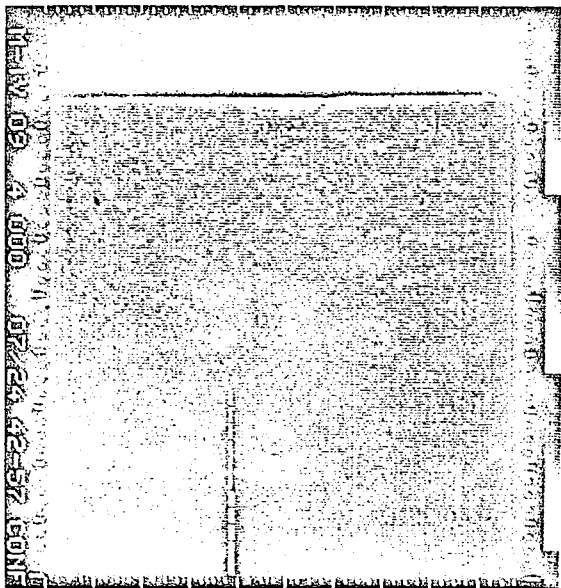
DATA FOR PICTURES 7 AND 8 ARE, RESPECTIVELY:  
SUN: 29° AND 32° FROM THE ZENITH, FROM NORTH IN PHOTOS.  
TIME TAKEN: 5:25:45 AND 5:26:33 PM PDT, JULY 14, 1965.  
SLANT RANGE - MILES: 8,400 AND 8,300.  
APPROX. AREA COVERED IN MILES: 180 E-W, 180 N-S AND 180 E-W, 170 N-S.  
LOCATION: 13° S, 186° E AND 16° S, 187° E.  
MAP DESCRIPTION: 7-BRIGHT REGION IN SE ZEPHYRIA, NEAR MARE SIRENUM.  
8-BORDER BETWEEN ZEPHYRIA AND MARE SIRENUM.  
FILTER: 7-GREEN AND 8-ORANGE.  
OVERLAP: LOWER RIGHT OF 7 OVERLAPPED BY UPPER LEFT OF 8.  
CONTRAST ENHANCEMENT FACTOR: FOR BOTH, TWO.

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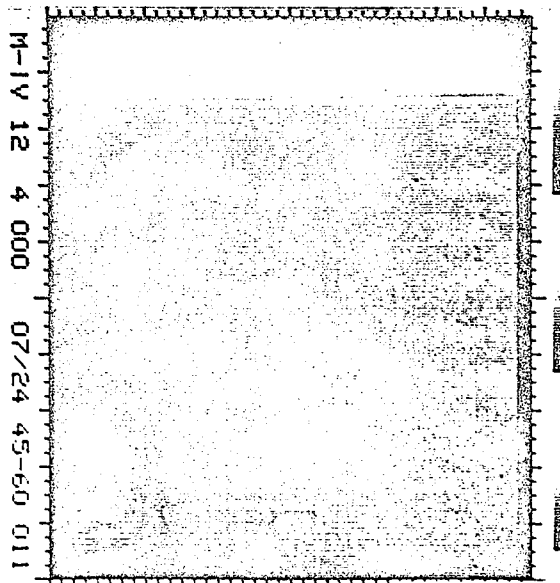
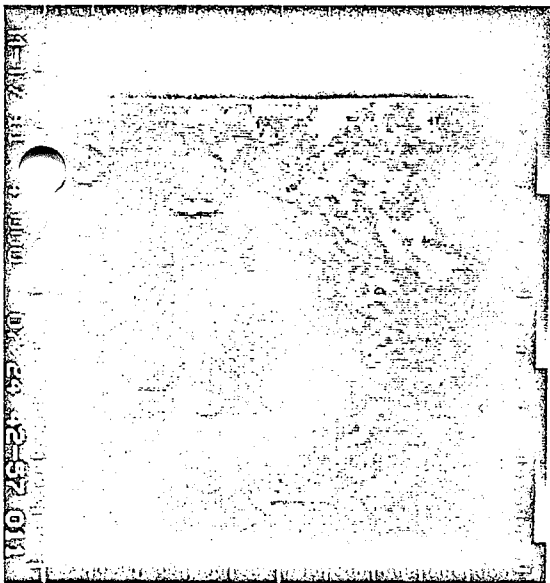


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DATA FOR PICTURES 9 AND 10 ARE, RESPECTIVELY:  
 SUN: 38° AND 41° FROM THE ZENITH, FROM NORTH IN PHOTOS.  
 TIME TAKEN: 5:28:09 AND 5:28:57 PM PDT, JULY 14, 1965.  
 SLANT RANGE - MILES: 8,100 AND 8,000.  
 APPROX. AREA COVERED IN MILES: 170 E-W, 160 N-S AND 170 E-W, 160 N-S.  
 LOCATION: 23° S, 191° E AND 26° S, 192° E.  
 MAP DESCRIPTION: 9-MARE SIRENUM BORDERING ON ATLANTIS IN SW CORNER OF PHOTO. 10- ATLANTIS BORDERING ON MARE SIRENUM IN NE CORNER OF PHOTO.  
 FILTER: 9-ORANGE AND 10-GREEN.  
 OVERLAP: LOWER RIGHT OF 9 OVERLAPPED BY UPPER LEFT OF 10.  
 CONTRAST ENHANCEMENT FACTOR: FOUR AND TWO.

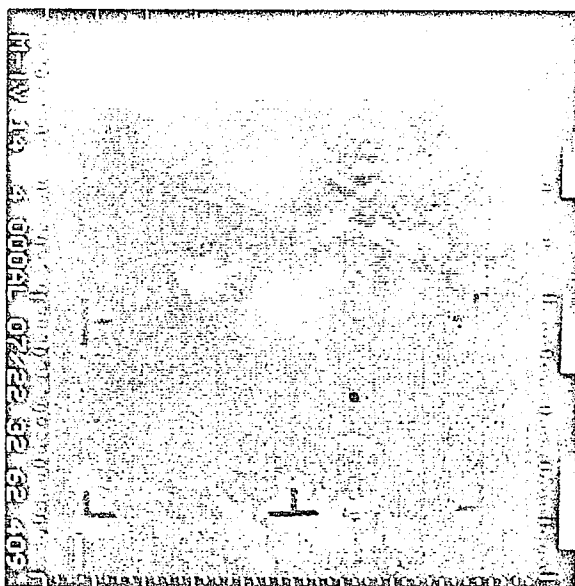
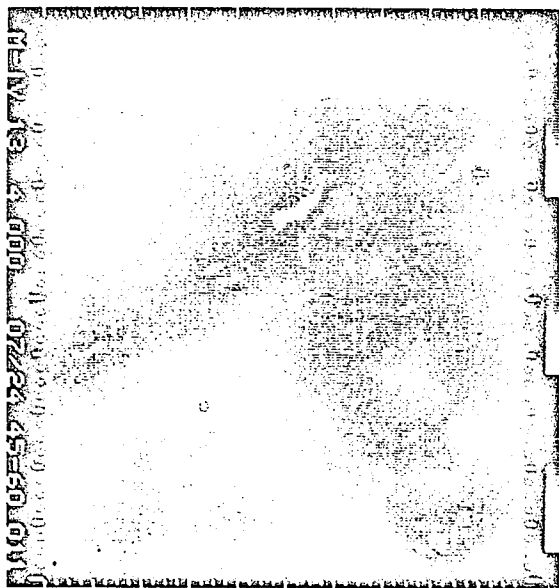


DATA FOR PICTURES 11 AND 12 ARE, RESPECTIVELY:  
 SUN: 47° AND 50° FROM THE ZENITH, FROM NORTH IN PHOTOS.  
 TIME TAKEN: 5:30:33 AND 5:31:21 PM PDT, JULY 14, 1965.  
 SLANT RANGE -MILES: 7,800 AND 7,700.  
 APPROX. AREA COVERED IN MILES: 170 E-W, 150 N-S AND 170 E-W, 150 N-S.  
 LOCATION: 31° S, 197° E AND 34° S, 199° E.  
 MAP DESCRIPTION: 11-ATLANTIS, BETWEEN MARE SIRENUM AND MARE CIMMERIUM. 12-MARE CIMMERIUM BORDERING ON ATLANTIS IN NE CORNER OF PHOTO.  
 FILTER: 11-GREEN AND 12-ORANGE.  
 OVERLAP: LOWER RIGHT OF 11 OVERLAPPED BY UPPER LEFT OF 12.  
 CONTRAST ENHANCEMENT FACTOR: FOR BOTH, FOUR.

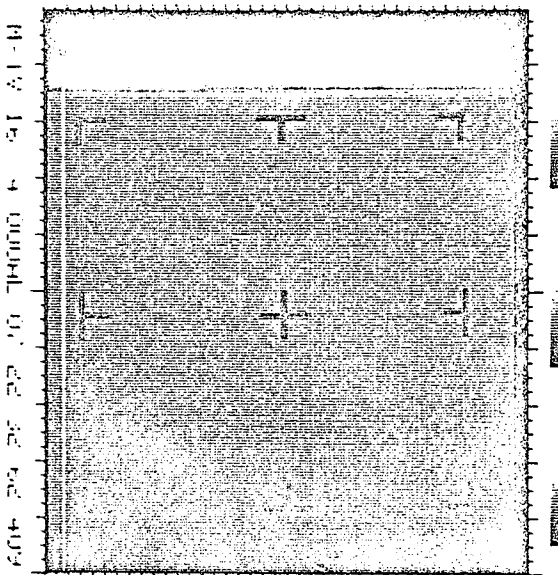
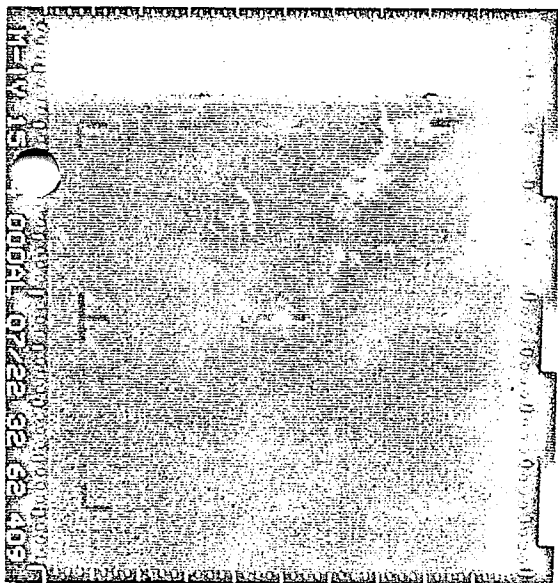
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DATA FOR PICTURES 13 AND 14 ARE, RESPECTIVELY:  
 SUN: 57° AND 60° FROM THE ZENITH, FROM NORTH IN PHOTOS.  
 TIME TAKEN: 5:32:57 AND 5:33:45 PM PDT, JULY 14, 1965.  
 SLANT RANGE - MILES: FOR BOTH, 7,600.  
 APPROX. AREA COVERED IN MILES: FOR BOTH, 170 E-W AND 140 N-S.  
 LOCATION: 39° S, 205° E AND 41° S, 208° E.  
 MAP DESCRIPTION: 13-BORDER BETWEEN MARE CIMMERIUM TO NORTH AND THE BRIGHT REGION PHAETHONTIS. 14-BRIGHT REGION, NORTHWESTERN PHAETHONTIS.  
 FILTER: 13-ORANGE AND 14-GREEN.  
 OVERLAP: LOWER RIGHT OF 13 OVERLAPPED BY UPPER LEFT OF 14.  
 CONTRAST ENHANCEMENT FACTOR: FOUR AND TWO.



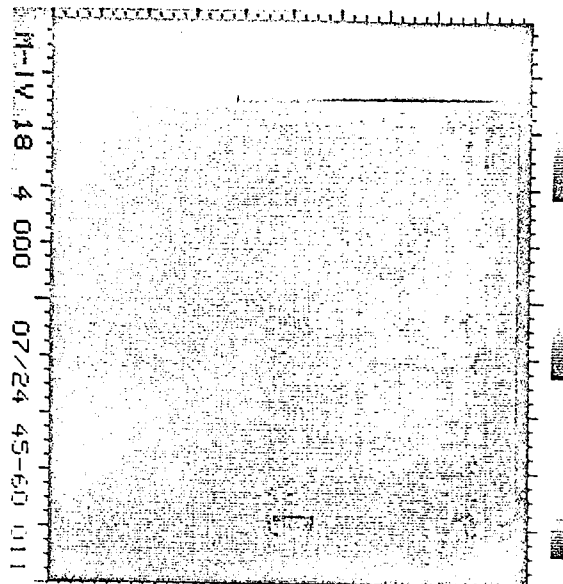
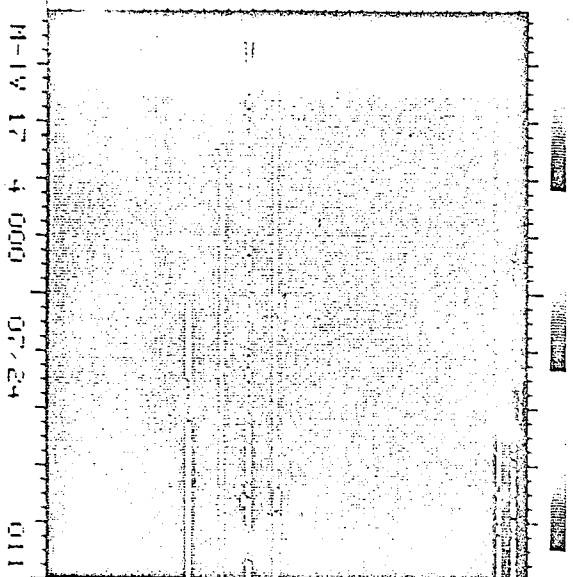
DATA FOR PICTURES 15 AND 16 ARE, RESPECTIVELY:  
 SUN: 66° AND 69° FROM THE ZENITH, FROM NORTH IN PHOTOS.  
 TIME TAKEN: 5:35:21 AND 5:36:09 PM PDT, JULY 14, 1965.  
 SLANT RANGE - MILES: FOR BOTH, 7,500.  
 APPROX. AREA COVERED IN MILES: 180 E-W, 140 N-S AND 190 E-W, 140 N-S.  
 LOCATION: 45° S, 216° E AND 47° S, 221° E.  
 MAP DESCRIPTION: 15-BRIGHT REGION IN PHAETHONTIS. 16-BRIGHT REGION IN PHAETHONTIS, NEAR AONIUS SINUS.  
 FILTER: 15-GREEN AND 16-ORANGE.  
 OVERLAP: LOWER RIGHT OF 15 OVERLAPPED BY UPPER LEFT OF 16.  
 CONTRAST ENHANCEMENT FACTOR: FOR BOTH, TWO.



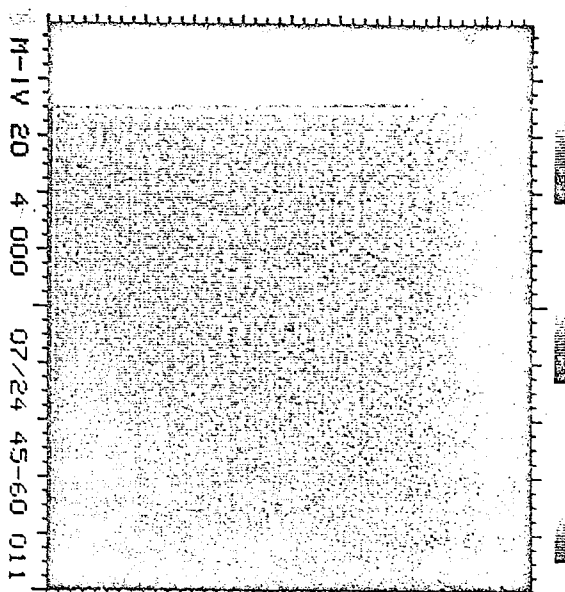
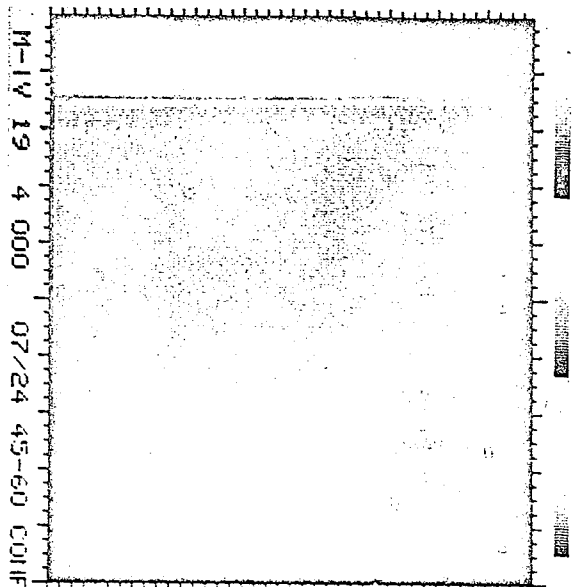
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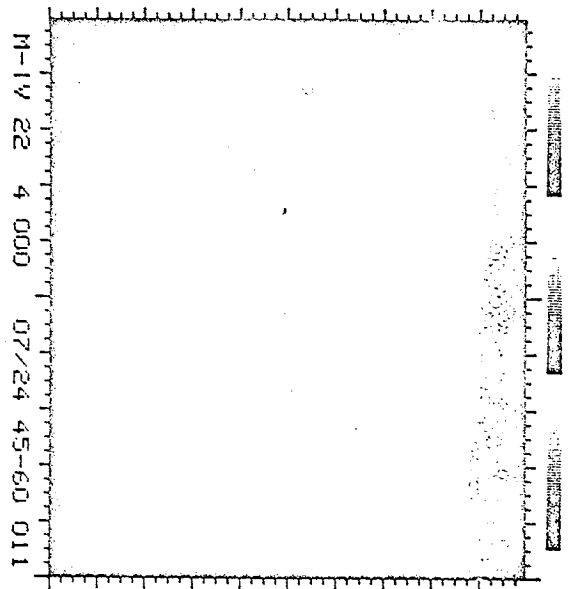
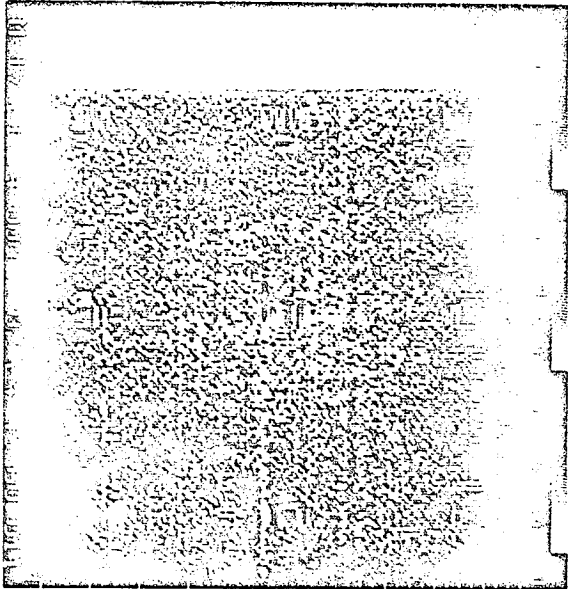
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DATA FOR PICTURES 17 AND 18 ARE, RESPECTIVELY:  
SUN: 76° AND 80° FROM THE ZENITH, FROM NORTHWEST IN PHOTOS.  
TIME TAKEN: 5:37:45 AND 5:38:33 PM PDT, JULY 14, 1965.  
SLANT RANGE - MILES: FOR BOTH, 7,400.  
APPROX. AREA COVERED IN MILES: 200 NE-SW, 140 NW-SE AND 210 NE-SW,  
140 NW-SE.  
LOCATION: 50° S, 232° E AND 51° S, 238° E.  
MAP DESCRIPTION: FOR BOTH, DARK REGION IN AONIUS SINUS.  
FILTER: 17-ORANGE AND 18-GREEN.  
OVERLAP: LOWER RIGHT OF 17 OVERLAPPED BY UPPER LEFT OF 18.  
CONTRAST ENHANCEMENT FACTOR: 17-THIS PICTURE IS IN RAW FORM WITH  
NO ENHANCEMENT. 18-FOUR.



DATA FOR PICTURE 19  
SUN: 88° FROM THE ZENITH, FROM NORTHWEST IN PHOTO.  
TIME TAKEN: 5:40:09 PM PDT, JULY 14, 1965.  
SLANT RANGE - MILES: 7,500.  
APPROX. AREA COVERED IN MILES: 240 NE-SW, 150 NW-SE.  
LOCATION: 51° S, 253° E.  
MAP DESCRIPTION: DARK REGION IN AONIUS SINUS. TERMINATOR IN EASTERN  
CORNER OF FRAME.  
FILTER: GREEN  
OVERLAP: LOWER RIGHT OF 19 OVERLAPPED BY UPPER LEFT OF 20.  
CONTRAST ENHANCEMENT FACTOR: FOUR  
PICTURE 20 IS ALMOST ENTIRELY BEYOND THE TERMINATOR.



PICTURE 21 IS ENTIRELY BEYOND THE TERMINATOR.

PICTURE 22, A PARTIAL FRAME, IS ENTIRELY BEYOND THE TERMINATOR AND MAY BE PARTLY BEYOND THE DARK LIMB OF THE PLANET.