

FAO

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|------------------------------|-------------|
| APOLLO 12 | |
| LM LUNAR SURFACE MAPS | |
| PART NO | S/N |
| SKB32100081-371 | 1002 |

14 NOV, 1969

REVIEW OF
REQUIREMENTS AND DESIGN PARAMETERS
FOR
APOLLOS 14-15 EXPLORATION MAP DATA PACKAGES
AND
APOLLOS 16-19 ROVER MAP DATA PACKAGES
MAY 20, 1970

APOLLOS 14-15 EXPLORATION MAP DATA PACKAGES

I. AGENDA:

- A. Map Series and Scales
- B. Map Formats
- C. Map Coverage
- D. Photo-Imagery
- E. Grid Requirements
- F. Grid Labeling System
- G. Type Orientation
- H. Index Tabs
- I. Geology Overprint
- J. Traverse Annotation
- K. Reproduction Materials
- L. Special Purpose Formats/Scales

II. REVIEW OF CURRENT REQUIREMENTS AND DESIGN PARAMETERS:

A. Map Series and Scales Requirements:

1. Small Scale Maps (currently 1:100,000):

- a. Photomaps
 - (1) Locate LM from CSM.
 - (2) Index underlying intermediate scale (1:25,000) map coverage.
- b. Geology Map.
Geology training.

2. Intermediate Scale Maps (currently 1:25,000):

- a. Photomap
 - (1) Initially determine LM location.
 - (2) Index underlying large scale (1:5,000) map coverage.

b. Geology Map

- (1) Geology training.**
- (2) Plan surface traverses in the event LM lands outside of the large scale (1:5,000) geology map coverage.**

3. Large Scale Maps (currently 1:5,000):

a. Photomaps

- (1) Pin-point LM location.**
- (2) Annotate traverse plan in areas not covered by same scale geology map.**

b. Geology Maps

Base map for planning and annotating traverse (pre-mission and/or real-time).

B. Formats:

1. Sheet Size:

Map sheets currently conform to the 8.0" x 10.5" LM onboard data file format.

2. Sheet Orientation:

Map imagery is oriented with east-west parallel to the long (10.5") sheet axis.

3. Imagery Overlap (1:5,000 scale maps only):

Adjoining 1:5,000 scale maps contain approximately 1000' of common imagery. This was to insure that only one map would be required to plan a traverse. This requirement was applicable to "early" Apollo landing missions and no longer appears valid.

4. Back-to-Back Printing:

- a. Geology maps are printed on the back of their companion photomaps to insure that both are available during traverses.**
- b. Apollo 11 and 12 data package 1:5,000 scale photomaps (92 and 104 respectively) were printed back-to-back to reduce weight and volume. The 25 Apollo 13 (Fra Mauro) 1:5,000 scale photomaps were not printed back-to-back.**

C. Coverage:

1. Small Scale (1:100,000) Maps:

Limited to one 8.0" x 10.5" onboard format sheet (approximately 27 km E-W x 20 km N-S centered on the landing site).

2. Intermediate Scale (1:25,000) Maps:

Limited to the number of 8.0" x 10.5" onboard format sheets required to cover the current 99.78% landing dispersion ellipse. The Apollo 13 (Fra Mauro) data package contained one sheet (approximately 6.7 km E-W x 5 km N-S centered on the landing site center).

3. Large Scale (1:5,000) Photomaps:

Limited to the number of 8.0" x 10.5" onboard format sheets required to cover the 99.78% landing dispersion ellipse. The Apollo 13 (Fra Mauro) data package contained 25 photomaps based upon a preliminary ellipse size and orientation. The final mission ellipse could have been covered by 15 photomaps.

4. Large Scale (1:5,000) Geology Maps:

Limited to the number of 8.0" x 10.5" sheets required to cover the area within one kilometer radius of the landing site center (9 maps).

D. Base Map Photo-Imagery:

1. Small Scale (1:100,000) Maps:

Existing controlled or uncontrolled 1:100,000 scale Orbiter Photomap imagery (Orbiter's II, III, and V moderate resolution photography).

2. Intermediate and Large Scale Maps (common Photo-Imagery):

Uncontrolled Lunar Orbiter's II, III, and V high-resolution photography enhanced and proceeded to attain near-constant tonal match and retain maximum resolution.

E. Grid Requirements:

1. Small Scale (1:100,000) Maps:

One thousand meter grid centered on the landing site center with alternating continuous and dashed lines.

2. Intermediate Scale (1:25,000) Maps:

Two hundred and fifty meter grid centered on the landing site center with alternating continuous and dashed lines. The line width of each fourth line is emphasised to denote a common line with the overlying 1:100,000 scale map grid.

3. Large Scale (1:5,000) Maps:

A coordinated fifty meter grid with the center map sheet grid centered on the landing site center. Alternate grid lines are continuous and dashed. The line width of each fifth line is emphasised to denote a common line with the overlying 1:25,000 scale map grid.

F. Grid Labeling System:

1. Basic System:

Each individual map grid (all three scales) is independently labeled with the numerals 1 through 27 utilized for longitudinal line values and the letters A through W (omitting I and O) utilized for latitudinal line values. The lower left (southwest) grid intersection is the grid label origin point. Decimal interpolations are read to the east of longitudinal lines and north of latitudinal lines.

2. Grid Correlation:

- a. 1:25,000 and 1:100,000 scale grids are correlated by labeling each fourth 1:25,000 scale grid line with the value of its common (relative to imagery registration) grid line on the 1:100,000 scale grid.
- b. 1:5,000 and 1:25,000 scale grids are correlated by labeling each fifth 1:5,000 scale grid line with the value of its common line on the 1:25,000 scale grid.

G. Type Orientation:

Type on existing maps is oriented to read west to east (north is top of map).

H. Index Tabs:

Fourteen index tabs are equally distributed in the map package.

I. Geolog/ Overprint:

Geolog/ overprints currently consist of lines, symbols, and type and is shown in white (hold-out mask).

J. Traverse Annotations:

Pre-planned traverse have been hand annotated on a limited number of data package maps.

K. Reproduction Materials:

Data package maps are produced both on JCP E-20 and cronapaque.

L. Special Purpose Formats/Scales:

Special large sheet cronapaque formats are produced at 1:2,500, 1:5,000, and 1:10,000 scales.

APOLLOS 16-19 ROVER MAP DATA PACKAGES

DISCUSSION ITEMS:

- A. Map Series and Scales
 - 1. Photomaps
 - 2. Geology Maps
- B. Map Coverage
- C. Map Formats
- D. Grid Reference Systems
- E. Reproduction Materials

LUNAR RELIEF MODELS

- I. APOLLOS 14 and 15:
 - A. Scales
 - B. Coverage
- II. APOLLOS 16 THROUGH 19:
 - A. Scales
 - B. Coverage

LUNAR SURFACE EXPLORATION MAP DATA PACKAGE
SKB 32100081-371

APOLLO LANDING SITE 7
CENTER COORDINATES 02°58'56"S 23°23'31"W

MAP PACKAGE CONTENT

| <u>Map Series</u> | <u>Series Code</u> | <u>Scale</u> | <u>Number of Maps</u> |
|-------------------------------------|--------------------|--------------|-----------------------|
| lunar landing Area Maps | LAM | 1:100,000 | 1 |
| lunar landing Area Geology Maps | LAM-G | 1:100,000 | 1 |
| lunar landing Site Maps | LSM | 1:25,000 | 3 |
| lunar landing Site Geology Maps | LSM-G | 1:25,000 | 3 |
| lunar Surface Exploration Maps | ISE | 1:5,000 | 104 |
| lunar Surface Exploration Geo. Maps | ISE-G | 1:5,000 | 8 |

Geology legends

1:100,000 Scale Geology Map legend, Site 7

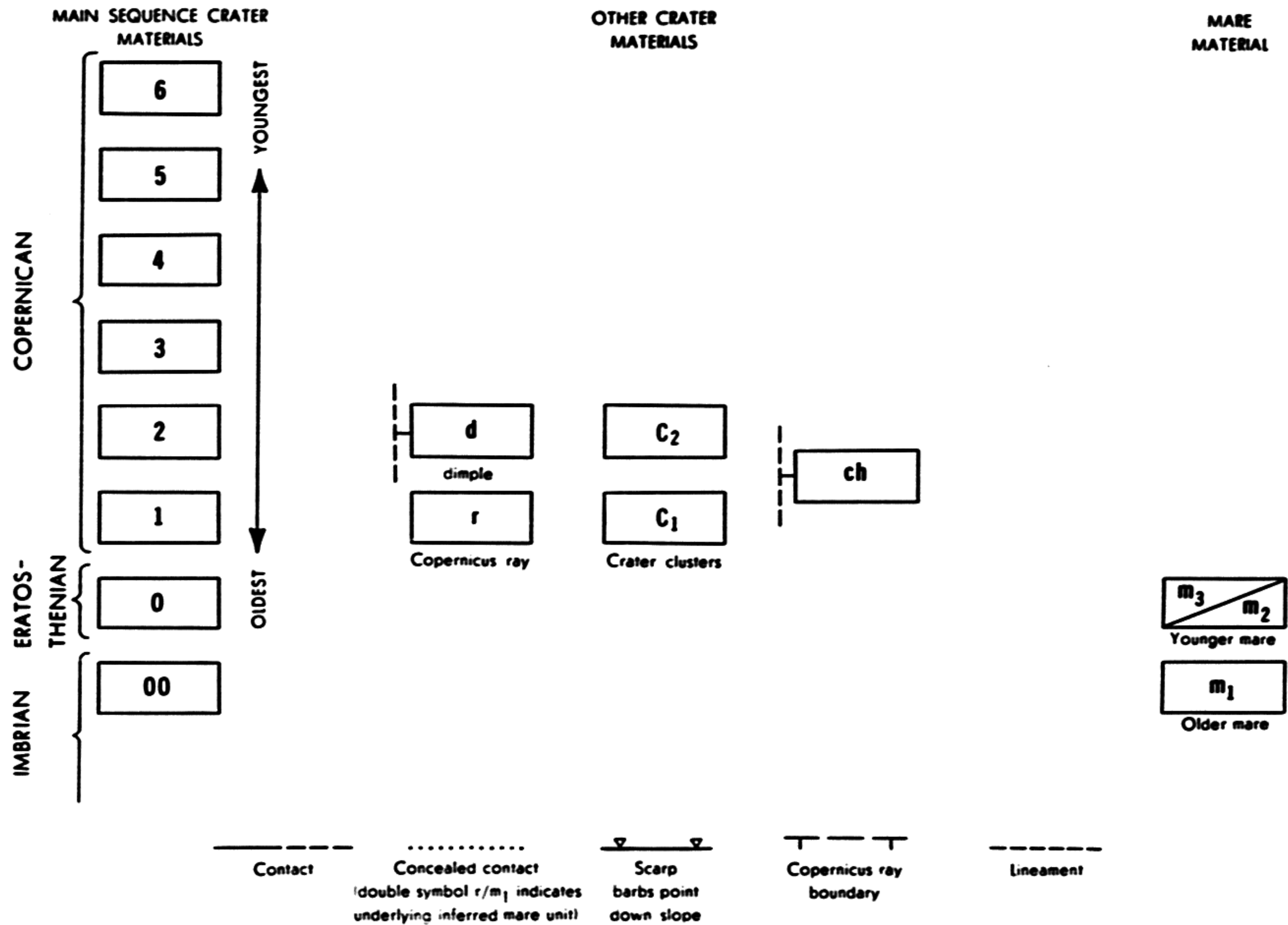
1:25,000 Scale Geology Map legend, Site 7

1:5,000 Scale Geology Map legend, Site 7

APOLLO MISSION 12
14 NOVEMBER 1969

PREPARED UNDER THE DIRECTION OF THE DEPARTMENT OF DEFENSE BY
THE U. S. ARMY TOPOGRAPHIC COMMAND (TPC) FOR THE NATIONAL
AERONAUTICS AND SPACE ADMINISTRATION. GEOLOGICAL DATA, UNITED
STATES GEOLOGICAL SURVEY, CENTER OF ASTROGEOLOGY.

LANDING SITE 7 1:25,000 SCALE GEOLOGY MAP LEGEND



250
209
50001

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- 2. Intermediate Scale Maps (currently 1:25,000):
 - a. Photomap
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*will still do
the mapping
for ground map*

*no
need in
surface
package*

b. **Geology Map**

- (1) **Geology training.**
- (2) **Plan surface traverses in the event LM lands outside of the large scale (1:5,000) geology map coverage.**

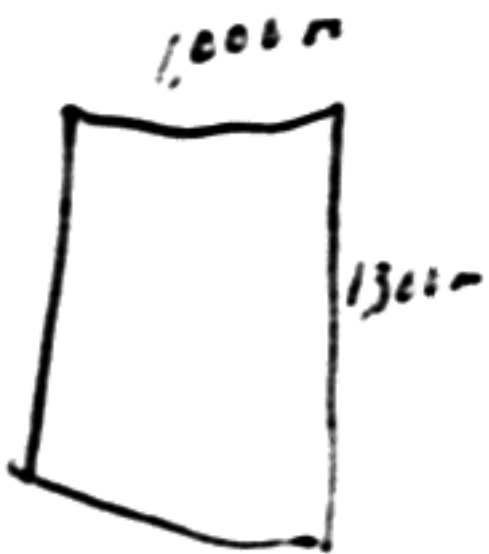
3. **Large Scale Maps (currently 1:5,000):**

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b. **Geology Maps**

Base map for planning and annotating traverse (pre-mission and/or real-time).



B. **Formats:**

1. **Sheet Size:** 8K

Map sheets currently conform to the 8.0" x 10.5" LM onboard data file format.

2. **Sheet Orientation:** 8K

Map imagery is oriented with east-west parallel to the long (10.5") sheet axis.

3. **Imagery Overlap (1:5,000 scale maps only):**

not required

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4. **Back-to-Back Printing:**

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Apollo 16-19

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$$\begin{array}{r} 230 \\ 20 \\ \hline 500 \end{array}$$

$$\begin{array}{r} 250 \\ 26 \\ \hline 1500 \\ 500 \end{array}$$

546.5

LUNAR RELIEF MODELS

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 - B. Coverage
- II. APOLLOS 16 THROUGH 19:
 - A. Scales
 - B. Coverage

20 x 32

