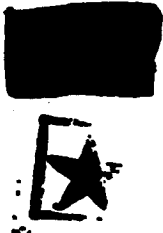


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~~(S)~~ NATIONAL RECONNAISSANCE OFFICE
WASHINGTON, D.C.



THE NRO STAFF

14 February 1968

MEMORANDUM FOR MR. JOHN KIRK, OSD, DDR&E
COLONEL PAUL E. WORTHMAN, NRO

SUBJECT: Discussion of Presentation to be made by
Mr. Fred Doyle, Autometric Operation of
Raytheon Corporation, During the American
Society of Photogrammetry Convention and
International Society of Photogrammetry
Meeting Scheduled for Later this Year.

In accordance with your instructions, Major Williamson,
NRO Staff, and LtColonel [REDACTED] DIA, met with Mr. Doyle
after your meeting with him and other representatives from
Autometrics and DIA on 13 February 1968. The three items
discussed were:

a. The American Society of Photogrammetry request
that Mr. Doyle present a paper on extra-terrestrial (lunar)
mapping during the annual convention to be held in March 1968.

b. Dr. Harry, President of the International
Society of Photogrammetry, request for Mr. Doyle to organize
a presentation of NASA Photogrammetric Space Programs to be
delivered at Lucerne, Switzerland, during the summer of 1968.

c. Response by Mr. Doyle to requests for copies
of his paper on mapping from satellite systems which was
presented at George Washington University.

ASP Presentation

The outline of the proposed paper for the American
Society of Photogrammetry presentation is attached. In going
over the entire outline in detail with Mr. Doyle, the following
points were brought out:

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a. Requirement for lunar mapping and control will be based on the reference contained in the outline, and will be limited to lunar application only. Size and density of control nets will be based on lunar requirements only.

b. The camera systems to be discussed as possible collectors of required information for lunar mapping will be limited to frame cameras of 6, 12, and 24 inch focal lengths. The 24 inch lens is the lunar orbiter lens and would be used for collection of detail needed for very large scale charts. No mention of panoramic or strip cameras will be made. It was agreed that the ability to orient the terrain cameras and/or the vehicle by use of stellar cameras, would be based on data collected from the ESSA BC-4 cameras with appropriate remarks that satellite systems could never achieve the accuracy in the BC-4.

Paragraphs 4 and 5 of the outline are theoretical discussions of mathematical formulations required to achieve the results for the products required under subject headings of these paragraphs. These paragraphs present no real problem in that they are not directly relatable to imagery and sensor systems. Under paragraph 6, conclusion, Mr. Doyle would show that it is possible to map the moon at various scales including 1-50,000 or better with systems composed of sensors that are familiar to mappers the world over, and have been in use, for the most part, in the aircraft programs of long duration. The only exception to this is the 24 inch lens from the lunar orbital program which does have a parallel in conventional frame camera systems being produced by such manufacturers as Zeiss and Wild.

The orbital altitudes which come under discussion for the lunar mapping would be 93 and 45 kilometers. These altitudes are dictated in order to achieve full coverage at the equator of the moon with conventional 9x9 or 9x18 inch format photography.

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ISP Program

It appears that the International Society of Photogrammetry presentation presents a less critical problem in that Mr. Doyle will not be making the presentation. It was tentatively agreed that Mr. Doyle should look into a program built around the following:

- a. NASA film showing launches, general satellite launch operations, probably heavily flavored by GEMINI Program.
- b. An exhibit earth imagery (GEMINI photography).
- c. A paper describing the purposes to which this photography can be put by Dr. Loman and Dr. McNair.

The intent of this paper by these two un-cleared persons would be to show geologic and similar capabilities in addition to its application in map revision. Future possible NASA programs beyond the collection of similar photography in early APOLLO test missions, would not be discussed.

It was agreed that additional meetings on the International Society of Photogrammetry Program, would be held with Mr. Doyle during the week of 20 February after he had been able to check out the availability of Dr. Loman and Dr. McNair, and also after he had contacted NASA on other material needed for this presentation.

Request for Copies of Mr. Doyle's Speech

The request for copies of the speech on mapping from satellites which was approved and given in December 1967 at the George Washington University, presents a confusing problem. This speech which was modified to include data on weather probabilities vs. coverage, and a more positive tone on system capabilities than the original version, was disapproved, and Mr. Doyle was instructed that he could no longer give any presentation involving earth sensing by satellite systems having a capability in excess of NASA's current authorization of 0.10 milliradian.

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The American Society of Photogrammetry published a very brief summary of Mr. Doyle's speech which was presented under their sponsorship and stated that copies of the speech were available from Mr. Doyle.

Permission to publish the speech in full by the American Society of Photogrammetry in their Bi-Monthly Magazine, Photogrammetric Engineering, has been denied as a result of the action taken to stop the series of speeches Mr. Doyle was to deliver as a distinguished lecturer for the National Academy of Sciences.

It would appear that the most logical solution to this problem without having to resort to publicly stating that security prevents fulfilling the requests for copies of this speech, would be to authorize Mr. Doyle, under the monitorship of the Automatic's security officer, to release copies of the originally approved speech to requestors from U.S. Government Agencies, U.S. Universities, and U.S. Industrial firms. All other requests would be rejected and publication of the speech would be prohibited.

If you agree with the above, appropriate direction will be drafted for transmittal by DIA to Mr. Doyle.

[REDACTED]
Major, U.S.A.

Attachment
Outline (Uncl)

COORDINATION

[REDACTED]
DIA-XX [REDACTED]
DIAMC [REDACTED]

[REDACTED]
[REDACTED]

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OUTLINE

PHOTOGRAMMETRIC GEODESY ON THE MOON

1. **INTRODUCTION**
Lunar exploration in the post Apollo period.
2. **REQUIREMENTS FOR LUNAR MAPPING AND CONTROL**
 - a. Falmouth Conference 1965
Geodesy cartography panel
Geology panel
 - b. Santa Cruz Conference 1967
Geodesy Cartography panel
3. **PHOTOGRAMMETRIC SYSTEM PERFORMANCE**
 - a. Lunar Orbiter
 - b. 6 Inch Metric Camera
 - c. 12 Inch Metric Camera
 - d. 24 Inch Convergent Frame
 - e. Stellar Cameras
4. **PHOTOGRAMMETRIC PROCEDURES**
 - a. Use of Lunar Orbiter photos
 - (1) Site triangulation
 - (2) Area triangulation
 - b. Determination of Moon's celestial orientation and rotation rate
 - c. Determination of control network
 - d. Cartographic products
5. **AUXILIARY PHOTOGRAMMETRIC REQUIREMENTS**
 - a. Landing site surveys
 - b. Roving vehicle control
 - c. Real time mapping
6. **CONCLUSION**

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