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6 October 1967

Brigadier General Russell A. Berg
Director of NRO Staff
Room 4C1000, The Pentagon
Washington, D.C.

Dear Russ,

I am sure that you are aware that we have been discussing a number of questions in COMIREX that relate to our requirements involving mapping, charting, and geodesy. These are problems of a fairly complex nature and some of us who are not professional members of the mapping, charting, and geodesy community have been encountering rough weather in analysing these problems and in coming to some firm judgment about the extent to which we should call on your organization to help meet our requirements in these fields. In our discussions of these problems, I have sometimes felt that it was difficult to make facts hold still. Things that we firmly believe at one moment sometimes appear to turn out to be untrue the next. Before we go any farther with this difficult problem, I would like to enlist your assistance in establishing some of the pertinent facts and in helping us to understand the consequences of what we have asked or are contemplating asking you to undertake on our behalf. I think I would also benefit by a better understanding of some of the realistic alternatives.

In order to set the background and to explain the nature of the help that I would appreciate receiving from you, let me give you my personal understanding of some of the pertinent factors. Please recognize that these are my personal thoughts and do not represent a formal COMIREX judgement. Our problems seem to revolve around two questions. One question relates to our requirements for large-scale mapping, and the other involves the need for geodetic accuracy. It seems to me that these questions could impact one another under certain circumstances. But under other circumstances, they are clearly separable and since some members of the mapping, charting, and geodesy community feel strongly that that should be kept clearly separated, I have put my understanding of each question in a separate paper which I am attaching to this letter.

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I hope that these attachments will help you understand the intellectual problem that I feel we have. It would be of great help to me, and I believe that it would help all of us in our discussion of our requirements for medium and large scale maps and charts if you could give us your best judgment of the various alternative configurations that could be used in approaching these requirements, including the cost of such an alternative and the effects, if any, on the primary missions of the systems involved. I am especially interested in receiving your estimate of the impact of the proposed 12-inch terrain index camera upon the resolution and coverage of the HEXAGON system in the performance of the system's primary intelligence mission.

I would also appreciate your giving me your thoughts on possible ways in which covert satellite systems could be used to aid in achieving improved world-wide geodetic accuracies by 1970.

I realize that I am asking some difficult questions, but I feel that we are at a crucial point in our study of requirements in these fields and that our final recommendations could have a considerable impact on the expenditure of funds, the performance of our primary intelligence systems, and the strategic capabilities of the United States to the extent that these are influenced by mapping, charting, and geodesy.

I am sure that members of the COMIREX Mapping, Charting, and Geodesy Working Group would be glad to work with your people if they could be of any assistance to you in developing some of the answers to these tough questions.

Bill

William A. Tidwell
Chairman, COMIREX

Attachments
Appendices A and B
COMIREX-D-15.2/1

Appendix A

Mapping and Charting Requirements

1. In COMOR-D-13/65, the recommendations of which were approved by USIB on 14 July 1966, the horizontal and vertical control accuracies with 90 per cent assurance for maps and charts at various scales are stated in detail as are the error limits for control networks within regions extending 500 miles in any direction. This paper recommended that the HEXAGON be designed to meet the stated requirement for medium and large-scale maps with the proviso that, if meeting these requirements might result in significant adverse effects on intelligence collection, the problem should be brought to the attention of COMOR. It recommended additionally that the NRO continue to study the problem of improving the cost-effectiveness of photographic satellite systems for the production of maps and charts.

2. The mapping, charting and geodesy community recognizes that data sufficient for fulfilling vertical accuracy requirements for maps and charts of scales of 1:50,000 and larger, as specified in COMOR-D-13/65 cannot be obtained at this time because of limitations of current satellite photographic systems.

3. COMIREX is aware that the introduction of the DISIC as a part of the J-3 will probably meet the horizontal but not the vertical accuracies specified for medium and large-scale maps. On the other hand it has been estimated that the 12" focal length terrain index camera proposed for the S1 camera configuration on the HEXAGON system, when flown in orbits compatible with its primary intelligence mission, will provide the specified vertical accuracies for maps and charts of scales of 1:50,000 and larger. Furthermore, it is reported that the cost of compiling data in readiness for the printing of large-scale maps would be substantially reduced by using photography acquired by this camera with the current highly sophisticated computerized data reduction and compilation equipment available now. This is because data reduction would be greatly simplified, the rectification problem would be negligible, and the number of stereoscopic models required for a given area would be decreased.

4. The Chairman of the Mapping, Charting and Geodesy Working Group has provided updated estimates of both the horizontal and vertical accuracies attainable and the cost of producing maps and charts from the data acquired by each configuration. This information will be used to compare the usefulness of photography from alternate configurations of satellite reconnaissance systems now current and anticipated in the near future.

Appendix B

World-Wide Geodetic Requirements

1. In COMOR-D-11/65, approved by USIB on 14 July 1966, it was estimated that the objective of 150' horizontal and 300' vertical accuracy, with 90 per cent assurance, in 1970 probably could be achieved by combining the DAFF product with applicable data from existing and funded U.S. geodetic satellite programs. It was further stated that these accuracies would probably be satisfied without further development of covert satellite systems specifically for geodetic purposes. Even so, it was recommended that the NRO should continue consideration of major advances in the application of satellites to the solution of world-wide geodetic problems.

2. On 2 August 1967, COMIREX received from its mapping, charting and geodesy working group a paper summarizing results of DoD data reduction activities involving the use of satellite photography toward meeting worldwide geodetic accuracies and setting forth actions required in support of improved geodetic positioning (COMIREX-D-15.2/1, copy attached). COMIREX also was advised that data reduction efforts, accomplished since July 1966, indicate that existing materials when combined with ongoing and funded geodetic programs will not produce the results estimated earlier. (Data produced by the J-3 system, however, has not been analyzed; but since considerable time will be required to accumulate adequate J-3 materials for evaluation, I believe it is desirable to begin study of methods by which desired accuracies may be achieved.)