20 July 1966

MEMORANDUM FOR: Consultants to Technical Evaluation Group (HEXAGON Sensor Subsystem Source Selection)

SUBJECT : Consultant Tasking

1. This memorandum supplements discussions held by the Source Selection Board Chairman with the Technical Consultants.

2. To support the HEXAGON Sensor Subsystem Source Selection a Technical and Operations Evaluation Group and a Management, Production and Logistics Evaluation Group have been constituted. These Evaluation Groups are to rate the proposals received according to a scheme approved by the Source Selection Board. The Technical Consultants are to serve in support of the Technical Evaluation Group in conducting this rating.

3. For your guidance, Attachment 1 to this document is a detailed definition of each of the ten rating categories as established by the Source Selection Board. The Technical Consultants are to prepare an evaluation of each of the proposals received in support of the Technical Evaluation Groups deliberations on the category entitled "Operational Considerations." As each of the Technical Consultants represents a specific area of concern, any comment which falls within the general definition of "Operational Considerations" and also within the area of expertise of the consultant, is appropriate.

4. The Technical and Operations Evaluation Group will be receiving formal presentations from its advisors and consultants during the week of 8 August. The Technical Consultants presentations will begin at 0800 on 8 August. All Technical Consultants should plan to be available through the remainder of that day. Each presentation should treat the proposed systems in a serial fashion and avoid wherever possible a direct comparative mode of presentation. Emphasis should be placed on identifying those aspects of the various proposals which in the judgment of the Consult impose undue or undesirable constraints on the utilization of the system.

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SUBJECT: Consultant Tasking

5. Five copies of all briefing aids used should be available for the Technical Evaluation Group's retention at the time of the presentations. In addition, a written summary of the presentations should be prepared and submitted to the Chairman, Source Selection Board by 29 August 1966.

6. As the Chairman of the Source Selection Board is also serving as the Chairman of the Technical and Operations Evaluation Group, he will be your point of contact during the evaluation period. The Chairman of the Technical and Operations Evaluation Group can be reached at any time during the evaluation period. A detailed schedule of his whereabouts and list of contacts is included with this memorandum as Attachment II.

Leslie C. Dirks

LESLIE C. DIRKS
Chairman, Sensor Subsystem
Source Selection Board

Attachments: as stated

Distribution:
1 - Col. H. Howard
2 - Capt. R. Koch
[redacted]
4 - Maj. Louis Neuner

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DEFINITION OF RATING CATEGORIES

The following is a detailed definition of the rating categories to be used by the Technical and Operations Evaluation Group in assessing the relative merits of the HEXAGON Sensor Subsystem proposals.

I. Performance Evaluation

In this category attention should be focused on the overall camera system performance. In particular, careful consideration should be given to the degree of satisfaction of the minimum design requirements as specified in the Sensor Subsystem Request for Proposal. In general, a proposal should be downrated if it does not meet these minimum objectives. In addition, additional capability over and above these minimum design requirements should be assessed and a positive score should be assigned to proposals if any additional capabilities are judged to be of value. However, no weight should be given for any additional capability which is not directly relevant to the basic mission objectives.

In evaluating the Sensor Subsystem performance, careful attention should be given to the adequacy and completeness of the basic sensor design and supporting data. In the rating of this category, adequacy and completeness should be measured against a judgment of what can reasonably be expected in the context of the proposal. A proposal should be downrated if in the judgment of the evaluator the analysis of the contractor does not support the stated design objectives. Careful attention should be given to a verification of the arguments that are presented by the contractor and identification of errors in assumptions or conclusions.

In proceeding with deliberations in this rating category, the evaluators should consider separately each of the major subsystems as well as the overall systems analysis and design integration. For the purposes of this evaluation the major sensor subsystems are:

A. Optics
B. Film Transport
C. Thermal Design
D. Focus Control
E. Supporting Structure

Under the heading of Systems Analysis and Design Integration, the contractors comprehension of the design requirements as stated in the RFP should be assessed along with the overall system performance. In addition, the adequacy and reasonableness of the subsystem design requirements should be examined. Particular attention must be paid to the overall allocation of the error budgets and to the reasonableness of the methodology used for predicting sensor resolution performance.

Care must be taken to insure that elements properly belonging in other rating categories are not considered in forming judgments in this category. Specifically, design or development risk consideration should not influence the performance evaluation scoring. For example, if a particular subsystem embodies a novel or a state-of-the-art design concept it should not necessarily be downrated in the Performance Evaluation category. However, if the thoroughness or accuracy of the contractors analysis of this subsystem is less than could reasonable be expected, a downrating in this category heading is appropriate.

While overall system performance should properly be considered in this rating category, those aspects of performance which are specifically included in the Value Function computation (Category IV) must not be included here. For example, sensor weight is important only as it effects the days on orbit/launch. This trade-off is properly accounted for in the Value Function category and should receive no weight in the Performance Evaluation category. Similarly, resolution and swath width are explicitly included in the Value Function. However, all aspects of sensor resolution under all operating conditions are not accounted for by the Value Function. For example, only resolution over the non-overlapping portion of a frame for the reference orbit is weighted into the Value Function so camera behavior for other conditions should properly bear on Performance Evaluation.

II. Development Risk

In the category of Development Risk, the likelihood of the contractor meeting the required performance objectives within the specified schedule and without substantial cost overruns should be assessed. In analyzing this aspect of the proposed designs, critical components and subsystems should be identified along with unfamiliar or novel design approaches. Each of these items should then be considered from a development risk point of view and a risk judgment formed using the evaluators experience, contractor supplied data, and any other supporting information which is available. In addition to the sensor proposal per se, consideration should be given to any special test equipment which may be required.

Under this heading a high score should be given if the evaluator concludes that there is a high probability of successfully meeting performance objectives within the schedule constraints, and a low score if the evaluator rates the proposed program as a high risk undertaking.

III. Design Margin

Under this rating category consideration should be given to the sensitivity of overall sensor performance to possible variations in the operational environment or deviations in specified tolerances. Every effort should be made to identify those system design parameters which have a strong functional relationship to system performance. These relationships should then be weighted by the evaluators judgment of the likelihood of variations actually occurring.

The general objective of this rating category is to measure the basic dependability of the proposed systems in an operational context. A low score should be given to a proposal in this category if the evaluator judges a particular design to be unusually sensitive to manufacturing or operational tolerances or particularly difficult to handle, to align, or to produce to a defined schedule. Some examples of considerations in this category are:

A. Resolution sensitivity to changes in focus tolerance, film and processing characteristics, scene brightness and contrast, external error sources, servo performance, alignment, and optical system performance.

B. Performance sensitivity to changes in thermal environment, launch and handling modes, electrical power and pneumatic regulation, and mission duration and duty cycle requirements.

IV. Value Function

A detailed set of instructions for computing the value function for a particular sensor configuration have been included in Attachment II of the RFP. This value function has been designed to provide a quantitative relationship between days on orbit and sensor swath width on the ground. Implicitly accounted for in the definition of this function are sensor weight, overall space vehicle weight and sensor ground resolution. The scoring in this rating category should be in strict accordance with the numerical values of this function for the proposals under evaluation. The proposal with the highest value function should be given a score of 9 points. The other proposals should receive a proportionately lower score in accordance with their value function.

It should be noted that this is the only rating category in which explicit consideration should be given to the comparative utility of the proposed systems with regard to the systems weight, days on orbit, ground resolution in the non-overlapping portion of a frame for the reference orbit, and swath width.

V. Reliability

In this category the contractor should be graded on his understanding of the overall reliability problem as well as on the numerical failure rate predicted for his proposed system. The failure rate analysis should be reviewed for accuracy and completeness. Also, failure modes should be taken into account in rating the overall reliability of the system. For example, a particular design may have some failure modes which may occur with a relatively high probability but which result in a minimal overall systems performance degradation. Whereas an alternative system may have high probability failure modes which are more critical with regard to systems performance. Under these circumstances overall systems failure rate is not a complete measure of a systems reliability. Particular attention should be paid to the contractors analysis of the trade-off between subsystem and component redundancy and reliability.

In this category a high score should be assigned to a proposal if its reliability, taking into account both its overall failure rate and failure modes, is judged to be high.

VI. Operational Considerations

This rating category is to be used as a measure of the operational utility and convenience of the proposed systems. The point of view to be taken while judging the relative merits of the proposed systems in this category should be that of the system operators (Satellite Operations Center, Satellite Control Facility, Assembly and Checkout Facility, and Launch Operations) and of those concerned with the exploitation of the resulting photography. The following considerations are illustrative of those that should be examined in this category:

A. Assembly and checkout facility and personnel requirements.

B. Impact on launch operations.

C. Impact on SCF operations (command requirements, frequency of command load generation, size of command load, impact on ground station operations and configuration, telemetry data handling requirements, and orbit determination requirements).

D. Mission planning and targeting implications.

E. Film processing requirements.

F. Product utilization implications (both photographic interpretation and mensuration).

Particular care must be taken to avoid overlapping this category with any of the above categories. For example, if one proposal provides a higher ground resolution than others, the product clearly will be of greater value to the users. However, systems ground resolution has been rated under the Value Function category and should not be included as a consideration in this category. Similarly a high failure rate or a particularly annoying failure mode will undoubtedly impact the operational utility of the system in an unfavorable way. However, problems of this character are properly accounted for under the heading of Reliability and not in this category.

VII. Effect on Space Vehicle

Scoring in this category should be a measure of the overall design impact on the space vehicle of the proposed sensor system. Impact on each of the major space vehicle subsystems should be examined from the following points of view:

A. Reliability

B. Overall space vehicle configuration

C. Special design requirements imposed by the sensor

D. Compatibility with launch vehicle

Of particular importance are the requirements imposed by the sensor on the attitude control subsystem, the power subsystem, thermal control subsystem, the command subsystem and the telemetry subsystem.

In this category proposals should receive a high score if in the judgment of the evaluator the resulting space vehicle can be designed in a simple and convenient manner using conventional techniques.

VIII. Interface Definition

Under this category consideration should be focused on the contractors definition of the interface requirements with the space vehicle. Both the completeness of the contractors definition and

understanding of these interfaces and the adequacy of the interface requirements from the point of view of the sensor should be examined. The following interfaces should receive primary attention:

A. Thermal
B. Film Path
C. Mechanical mounting (both dynamic and static)
D. Viewport door and baffling
E. Command and telemetry
F. EMI and RFI provisions
G. Recovery vehicle interface

The impact of interface requirements on space vehicle design should be accounted for in the Effect on Space Vehicle category and not in this category.

IX. Master Program Plan, Design and Development Plan, Qualification Plan, Integration, Assembly and Checkout Plan

(See Category X)

X. Fabrication and Delivery Plan, AGE Design, Development and Delivery Plan, Mass Properties Control Plan, Reliability Program Plan

Both categories IX and X should be examined from the point of view of technical content only. These plans will also be examined by the Management, Production, and Logistics Evaluation Group from an overall point of view. The following kinds of considerations should be examined:

A. Technical completeness of planning
B. Identification of critical paths
C. Understanding of overall program technical requirements
D. Engineering realism of scheduling
E. Program Control techniques.