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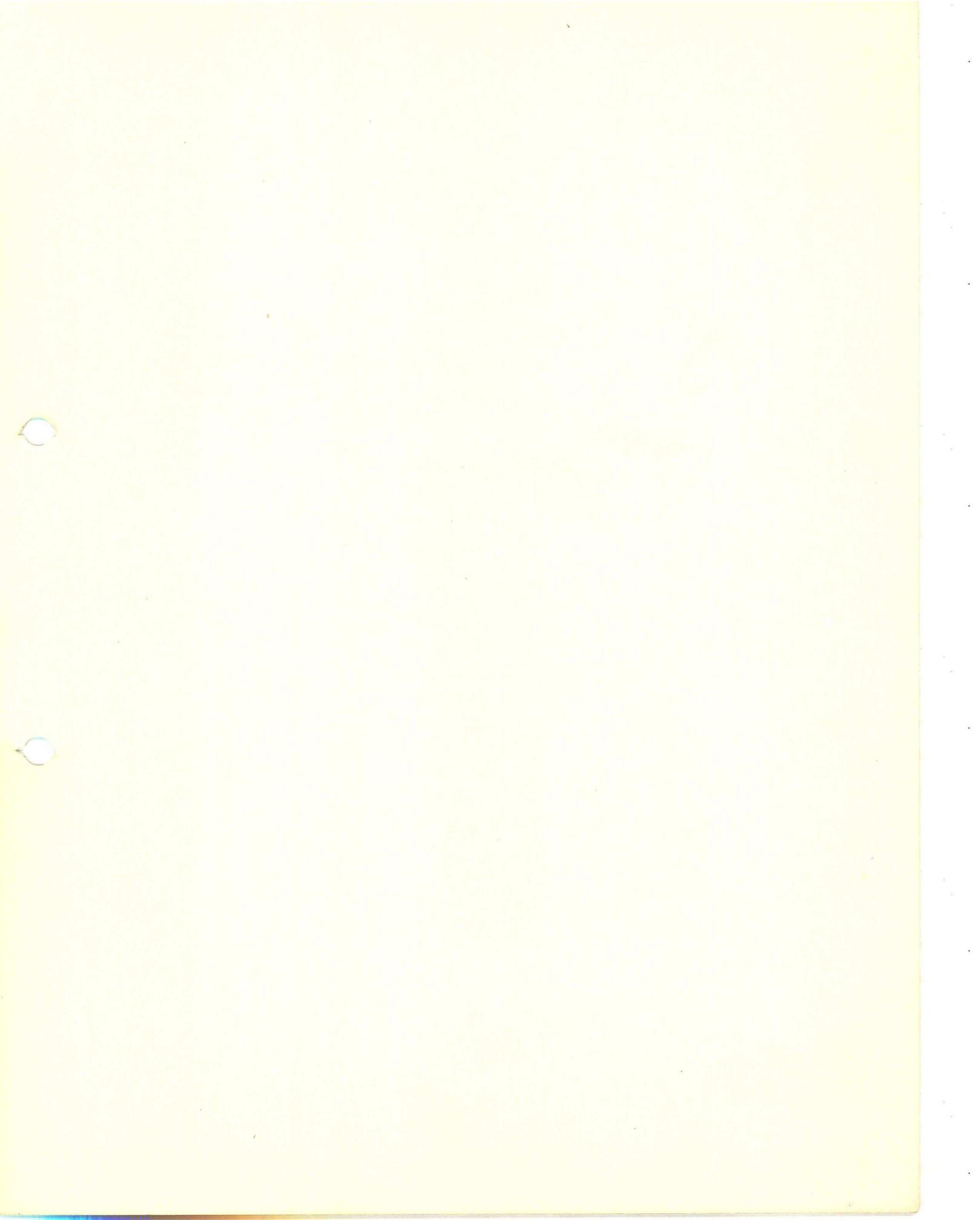
C. C. Kraft, Jr.

Dec 11, 1962, to
Jan. 16, 1963



REPORT OF THE
SOURCE EVALUATION BOARD
FOR THE
INTEGRATED MISSION CONTROL CENTER

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COMPANY	TECHNICAL (60%)		PROGRAM MANAGEMENT (40%)		TOTAL SCORE
	RATING	SCORE	RATING	SCORE	
Philco	Very Good	3.0	Good	1.6	4.6
ITT	Good	2.4	Very Good	2.0	4.4
RCA	Satis.	1.8	Good	1.6	3.4
Lockheed	Fair	1.2	Very Good	2.0	3.2
IBM	Satis.	1.8	Fair	0.8	2.6
Hughes	Fair	1.2	Satis.	1.2	2.4
Bendix	Fair	1.2	Satis.	1.2	2.4

NOTE: Outstanding - 7 Satisfactory - 3
 Excellent - 6 Fair - 2
 Very Good - 5 Poor - 1
 Good - 4 Unacceptable - 0

Examination, by the board, of the above ratings of the Technical and Program Management Committees, revealed all findings to be fully substantiated.

The Source Evaluation Board unanimously concurs with the reservations of the Technical Committee with regard to the ITT proposal. The field committee report to the board in most cases substantiated the findings of the committees in the evaluation. The reports indicated that most of the contractors had performed satisfactorily on previous contracts and could be expected to meet schedules and assigned tasks. The one exception was the ITT company. It was noted that previous customers had found it necessary to direct ITT to provide adequate manpower to support the program. (This confirmed the findings of the evaluation committees of a

The third rated company was Radio Corporation of America (RCA).

Although RCA had a good appreciation of the operating problems, particularly in the unification and integration tasks, the display concept lacked detail. In general the RCA proposal avoided specific systems recommendations. In addition RCA made some unwarranted assumptions of the RTCC and placed undue reliance on the commercial carrier. RCA proposed a unique but effective organization and control with sound-rationale for locating key personnel in both Houston and Moorestown, New Jersey, to be compatible with the various phases of the program. The cost of this proposal, although fifth highest was considered by the Source Evaluation Board to be not representative for the required system. This company was unfavorable in the subcontract area primarily due to the fact that all purchasing will be performed outside the program manager's office with no control exercised by the project manager.

Lockheed Missile and Space Company (LMSC) was the fourth rated company.

In spite of a good appreciation of the technical problem the proposal showed a misconception of the entire information flow requirement. The high degree of manual operation in the display and communications areas is so incompatible with the operational requirements that it was considered almost unacceptable.

Lockheed was rated very good in the Program Management area with only secondary weaknesses. Cost estimates submitted were very low and received a very good rating. However, the considerable amount of redirection required in the technical area would significantly increase the total cost.

The remaining companies are considered undesirable in that weaknesses in one or more major elements would require a prohibitive amount of redirection.

The combined evaluation of the Technical and Program Management committees, prior to the Source Evaluation Board review, resulted in the following ratings:

SUMMARY

The Source Evaluation Board has examined the results of the evaluation of the proposals submitted for the Integrated Mission Control Center (IMCC) and has determined that Philco, Western Development Laboratory, is the best and most capable company for performing the assigned tasks.

The technical evaluation showed that Philco was equal to and in most cases better than all other companies in all of the technical areas. Their proposal was technically the most complete and was the only one presenting a complete and well thought out design concept for the IMCC. In addition Philco can proceed with the contract with the minimum of redirection.

Philco proposed a very strong organization group to be located in Houston with direct control over practically all necessary functions. Key personnel with relevant experience were impressive. The subcontract structure although generally sound was not fully defined in the area of split control over these functions. Philco proposed the third highest cost, but was considered by the board to be realistic for the proposed system. The method of cost evaluation penalized Philco for their cost. In spite of this, they remained the outstanding bidder.

International Telephone and Telegraph Company (ITT) was rated as the second best bidder.

In the technical area ITT showed a good appreciation of the overall tasks. However, the proposal lacked a unified design concept in the display area. There were strong technical reservations regarding the extensive use of the proposed communications processor and the acceptance of this proposal would necessitate considerable redirection of both ITT and the Real Time Computer Complex (RTCC) contractor. These reservations were passed to the board for separate consideration.

The ITT proposal was favored over all others in the Program Management area. They proposed a very effective organization group located in Houston with necessary control and authority. Their subcontract structure was very good and costs submitted were fourth highest. However, the manpower proposed for unification and integration as well as for the operations and maintenance was considered to be considerably underestimated.

The Field Committee evaluation was not entirely favorable for this bidder. One of the two customers interviewed commented unfavorably on the performance of ITT, Federal Electric. The other customer, although indicating good performance, stated that it was necessary to direct ITT, International Electric, to provide sufficient manpower to accomplish the task.

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SUMMARY OF
TECH EVAL RESULTS

SUMMARY OF TECHNICAL EVALUATION COMMITTEE

Seven companies submitted proposals in response to RFP No. MSC-63-297P. In the opinion of the Technical Committee only one proposal was "very good". This proposal submitted by Philco Corporation was considered by the committee to be the best, in as much as the systems proposed and the tasks delineated were significantly better defined than in any other proposal. The committee is unanimously agreed that this bidder could proceed with the detailed design with a minimum of redirection from the Manned Spacecraft Center (MSC). The committee further believes that considerable time-saving would result from this fact, and that, therefore, this bidder would be in the best position to meet the stringent schedule requirements.

The proposal submitted by International Telephone and Telegraph (ITT) is considered to be the next best. However, the major design concept is in disagreement with the MSC philosophy to clearly separate functions. Furthermore, this concept will result in serious conflict with presently conceived RTCC, necessitating redirection of this contractor. This redirection could have severe repercussion on the computer programming schedule. The committee considers that the bidder has assigned too many varied tasks to the communications processor. The concept proposed results in many of the major functions performed in the Integrated Mission Control Center, (communications processing; display driving; simulation), being dependent on the operation of the ITT 025 computer. If the Source Evaluation Board concurs with the technical committee, then this proposal's rating should be reduced. Nevertheless, the committee believes that based on technical considerations, the position relative to the other bidders would remain the same as presently shown. For a complete discussion of this subject, see the committee report on this bidder.

The proposals submitted by International Business Machines (IBM) and Radio Corporation of America (RCA) are considered to be about equal, but below the other two bidders. The IBM system proposed is well defined in most areas, but is considered over-sophisticated. The committee feels that this bidder lacked appreciation of many of the operational problems. The proposal submitted by RCA shows an appreciation of operational problems, but vague in the systems design with some unwarranted assumptions. Both these bidders would require considerable redirection.

The last three proposals; namely, Hughes Aircraft, Lockheed Aircraft and Bendix, are so weak in one or more major areas, that though only rated as fair, the committee considers them to be undesirable. This statement is based upon the fact that the amount of guidance and redirection required by the bidder from MSC would be prohibitive.

It should be noted that the proposal submitted by Lockheed Aircraft is entirely different in concept from all others. The communication and data flow system is a manual concept with a minimum of automation, thus resulting in a substantially lower cost. The committee feels that any attempt at simplifying what are of necessity complex systems, is commendable. However, it considers the extent proposed by Lockheed to be bordering on the ridiculous, and is not acceptable.

It is significant that all the bidders proposing an automated display system tend to provide a capacity of display selection in excess of what the committee feels is required. This indicates that this is one area which will require more effort to realize an acceptable design. It may well prove that the display requirements are such as to necessitate an automatic system, and that the large capacity is, therefore, inevitable.

TECH COM
EVAL

COMMITTEE EVALUATION

COMMITTEE: Technical

CHAIRMAN: T. Roberts

COMPANY: Bendix

General Comments:

1. The bidder is considered undesirable on an overall basis. His proposal is weak, vague and generally lacking in sufficient detail to make an adequate technical evaluation. In many areas, the concepts of implementation, manning, and design do not comply with the requirements of RFP. Even where problem areas are properly identified, no detailed solutions are presented. In many areas, the bidder's stipulated intent was to design and build new equipment as opposed to procurement of commercially available items. This intent is not realistic in view of the stringent schedule requirements, nor the bidder's past experience. For an acceptable system, this bidder would require prohibitive guidance and redirection from MSC.

Favorable Features:

1. Of the entire proposal, the discussion of detailed subsystem checkout stands out as having a strong Mercury carry-over and being somewhat above average. The overall checkout, however, is not outstanding.

Unfavorable Features:

1. The bidder has shown a poor understanding of scope and a major problem area as demonstrated by the following:

- a. Small liaison group in Houston.
- b. Use of TWX, Telephone, and Air shuttle for coordination and for information flow from MSC.

2. The bidder states that he will design and build most of the equipment including the communications processor. The committee considers this undesirable, as similar equipment of known characteristics are available from many sources. Development of new equipment further does not comply with the RFP requirement of maximum use of "off the shelf" equipment, or with the required time schedule.

3. The relationship of responsibility of the MOCR and the SSR, their communications, displays, etc., are all out of context with the RFP. The bidder proposes a system which makes the MOCR dependent on the SSR. The proposed method to accomplish the operation are vague and appear inadequate; e.g. the use of a single display selection console can create a severe bottleneck. The capability for forced displays to override selected displays is not acceptable.

4. The bidder has proposed a data storage system for use of post-mission analysis and not for real-time callup as part of flight control.

5. The maintenance and operations discussion was generally satisfactory; however, manning requirements are vague. The committee believes he is understaffed by a factor of 2.

6. The bidder indicates a poor understanding of the integration and unification task.

7. The error detection and control proposed is unacceptable in that it is not sufficiently detailed; cannot be applied to alphanumeric Text Type messages, and limits HSD information rate to half that normally available. Other data channels, i.e., WBD, are completely inadequately described and cannot be evaluated.

COMMITTEE EVALUATION

COMMITTEE: Technical

CHAIRMAN: T. Roberts

COMPANY: Hughes

General Comments:

1. This proposal generally reflects a poor understanding of the scope of the task. The technical depth of their proposal was extremely limited and would not permit a thorough evaluation or recognition of their technical capability. The bidders overall systems concepts were poorly coordinated and subject to strong criticism in the operations and communications area. The proposal is representative of a systems design organization lacking experience in communications and operational integration. The committee believes that the bidder would require excessive guidance by MSC to accomplish the required tasks.

Favorable Features:

1. Operational checkout philosophy is considered good, as demonstrated 1-68 through 1-71. However, the bidder is vague in his discussions of initial installation checkout and testing.

Unfavorable Features:

1. The bidder demonstrates poor understanding of scope and timing of task, especially in area of relationship with MSC, as demonstrated by the following:

- a. Small liaison staff in Houston with maximum effort in home plant.
- b. Provides no plan to have MSC review specifications until complete final items are delivered.
- c. Propose to design and assemble IMCC system at home plant for testing prior to shipment to MSC.

2. The bidder is weak and vague in the entire area of unification and integration. This is deemed unacceptable for the "Integration Contractor". He is also vague in the areas of staffing for M and O and indicates a lack of operational knowledge by suggesting flying design people to MSC whenever multi-shift operations are required.

3. The bidder was extremely vague and confusing in his use of the IBM 7040 computers. The committee has not been able to resolve the total number proposed, nor to separate the functions clearly into display processor, communications processor, and SPAF.

4. In the area of operations the bidder did not indicate a basic understanding of the relationship of the IMCC to the goss. He was vague and lacking in sufficient detail to make a thorough evaluation of operational philosophy.

5. The bidder indicates a further weakness by his contradictory and vague statements on support of variations of missions. Page 1-27 states that "fundamentally different systems" are required, while page 1-45 states "adaptation is largely a matter of software."

6. The bidder's concepts of Group displays although correctly defined, are unacceptable from operational standpoints in that the "color data" system is incompatible with the dynamic display requirements.

7. The bidder inadequately describes the display storage subsystem and indicates lack of real knowledge of this system.

8. The bidder failed to demonstrate an understanding of the objectives of the communication system. One indication of this is bidder's lack of clearly separating simulation and operational traffic on the communications processor.

9. The bidder was poor on his knowledge of commercial carrier techniques and services, as typically indicated by his dependence for diversity on Government lines and not on Commercial carrier lines.

10. In the area of SCATS, though the bidder demonstrates understanding of requirements, his descriptions of equipments and equipment usage are poor and difficult to understand.

11. The bidder's selection of an experimental HS Data modem is questionable, as is his proposed use of the communications processor for error correction.

COMMITTEE EVALUATION

COMMITTEE: Technical

CHAIRMAN: T. Roberts

COMPANY: IBM

General Comments:

This proposal was rated satisfactory. The bidder presented a highly flexible but over-sophisticated system, which is reflected in the high cost. This is interpreted by the committee as a lack of detailed understanding of the operational requirements.

Favorable Features:

1. The bidder is eminently qualified in the fields of computing and computer-related activities. This is reflected in the excellent design detail associated with the proposed communications processor. The design philosophy shows good consideration for reliability and logical division of systems and operational functions.

2. The bidder has a very good appreciation for the tasks involved in checking out the data network; i.e., IBM provides diagnostic routines for checking out the data network as well as provision for automatic exercise of the data lines during all non-busy periods.

3. The bidder proposed the best utilization of two communications processors, has justified this concept and has provided reasonable separation of the mission and simulation tasks. However, the committee recommends that three communication processors are required in order to do the specified tasks, to provide adequate separation of mission and simulation functions, and to isolate blocks of equipment.

Unfavorable Features:

1. The bidder did not adequately provide a plan for accomplishing the design, development and implementation, integration and unification tasks, which indicated that he lacked the desired appreciation for these critical problems.

2. The bidder's concept of using the second MOCR to accomplish the change of shifts during a mission is unacceptable due to the subsequent complication of communications and the operational control problems involved, and indicates a poor understanding in these areas.

3. The bidder did not indicate a consideration for the physical environment within the MOCR and SSR's.

4. The bidder's proposal was incomplete and lacked sufficient detail in the areas of dual mission support, influence of mission phases and the variations in missions. The bidder did not adequately develop or indicate an understanding that the concept of centralized control of the mission includes flight control, network control, and data processing control.

5. The bidder's development of the personnel console and group displays did not provide an adequate specification of the equipment employed, how the displays were driven or controlled, and where the group displays were located in relation to the viewing personnel.

6. The bidder presented an incomplete discussion of error control and associated techniques and did not specifically recommend an acceptable technique.

7. The bidder proposed a comprehensive system for the SCATS; however, it is considered over-elaborate and costly. The operational flexibility is limited because small scale simulations are not possible without involving three or more computers.

COMMITTEE EVALUATION

COMMITTEE: Technical

CHAIRMAN: T. Roberts

COMPANY: ITT

General Comments:

This proposal was generally good in that most of the problem areas were recognized and technical solutions were proposed. The technical presentation was not fully developed in all areas.

The ITT systems concept is based on the highest degree of data handling automation of any bidder. This systems plan is severely questioned by the technical committee. As the ITT data automation approach is so basic in the overall IMCC implementation, it is discussed in detail at the end of this report. However, it is believed that ITT can be redirected to provide an acceptable system.

Favorable Features:

1. The bidder has a good understanding of the simulation, communications and design, development and implementation tasks. He thoroughly identified the integration tasks and proposed good overall solutions to the GOSS unification and maintenance/operations problems. However, he failed to propose adequate staffing to accomplish these tasks on schedule.
2. The bidder proposed good communications facilities control techniques and proposed a good plan for actively exercising quiet circuits to maintain circuit performance and perform network checkouts.
3. ITT was the only bidder recognizing the need for providing a rapid effective system of working documentation.

Unfavorable Features:

1. The bidder's display concepts and detailed planning were not considered fully compatible with MSC needs. The control personnel consoles have an over-abundance of different types of displays which would make monitoring very difficult. The location of a large amount of display support electronics in individual consoles would produce a maintenance problem in the operation control room which could be avoided with a better selection of display techniques. In general, the personnel console indicated the bidder has not done adequate planning to identify the operational requirements and has provided a large variety of displays to hopefully meet any desire.

Special Comments on ITT Data Automation Approach:

1. The bidder's data communications concept within the IMCC is based on a complex of three advanced large capacity digital communications

processors. The bidder plans to use the processor complex to replace the functions and need for separate real-time computer complex input/output communications channels, much of the real-time computer complex display processing and display routing equipment, considerable simulation subsystem interface equipment, communication modem special purpose error detection and control equipment, and pulse code modulation telemetry decommutation equipment.

2. This proposal may be technically feasible, but the system approach proposed does not agree with the MSC philosophy of clearly separating functions in modular equipment units so that subsystems can be developed and operated with a minimum of interaction and reliance for support from related subsystems. The bidder claims that his approach will have the following advantages:

- a. A high degree of data control automation
- b. High reliability
- c. Great flexibility and growth potential
- d. Fully centralized data switching and processing which will reduce checkout and system debugging problems
- e. Low costs

3. The technical committee has serious reservations in risking acceptance of the bidder's concepts for the following reasons:

- a. Any mode of simulation subsystem checkout or use would involve significant support of the communications processors and fully developed computer programs in the processors.
- b. The presently planned capability of the real-time computer complex could not be fully used with the proposed IIT systems design.
- c. Any checkout or use of the real-time computer complex involving use of the communication inputs or IMCC displays requires major support of the communications processor complex.
- d. Adaption of the bidder's approach would require a major redirection of the present MSC contractor working on the real-time computer complex, with a resulting delay in computer program development and added cost of the total IMCC job.
- e. The bidder's approach would replace a number of presently planned modules equipments in the IMCC concept with communications processor equipment and increased processor programming complexity. MSC is

Not convinced that this would result in a net advantage in either cost or reliability. It would certainly result in a system more centralized but more difficult to understand and control.

f. Should difficulties develop in the proposed communications processor equipment development or program development, operational checkout of all major subsystems within the IMCC will be delayed because of the proposed systems design which provides for absorbing some functions of all subsystems within the communications processor complex.

g. Communications processor computer programs will become large and complex. Changes in programs required by any one subsystem could result in bugs which easily could interfere with the operation of related subsystems.

4. In summary, the bidder has proposed a communications processor complex with capability to absorb many functions of other subsystems in the IMCC. Although the unique and rather advanced concepts in this approach may be feasible, the plan is in disagreement with MSC philosophy to clearly separate functions into equipment modules and MSC believes the risk in adopting the proposed approach is too great to balance possible advantages. Since the committee's reservations are based largely on philosophy of systems approach, this has not been reflected in the evaluation scoring. However, should the Source Evaluation Board concur with these reservations, a reduction in the rating assigned this bidder is recommended.

COMMITTEE EVALUATION

COMMITTEE: Technical

CHAIRMAN: T. Roberts

COMPANY: Lockheed

General Comments:

1. This proposal is reasonably developed in the establishment of requirements but is generally poor in the presentation of a technical approach. The presented systems concept is aimed at simplicity and is centered about a low speed and manual operation approach. The concept is particularly poor in the area of communications to the extent of being considered unacceptable. While this poor concept reflects in other areas these areas were generally well developed. The bidder will require major redirection to realize a suitable approach in the communications area and it is believed that considerable MSC effort would be required to achieve a satisfactory system design. The proposed concept enables the bidder to present a low cost proposal in this area. The substitution of a new concept (Automatic Communications Processors) would substantially add to the cost of the bidders proposal.

Favorable Comments:

1. The bidder proposes a well balanced buildup of appropriate engineering personnel in the Houston area, and proposed acceptable coordination with MSC.

2. The bidders understanding of the GOSS integration effort was good. This is reflected in the large magnitude of effort planned in this area.

3. The Maintenance and Operation Plan was particularly good, including a logical accommodation of three shift operations, a well balanced training plan, and a reasonable proposal for the numbers of M and O personnel required.

4. The bidder demonstrates a good understanding of the simulation and checkout requirements, and shows a fair depth of understanding in the training requirements.

Unfavorable Comments:

1. The bidders overall operation concept is inadequate to support a manned space mission.

a. The concept of real time control (page 3-2) is inadequate to provide effective response to contingency operations.

b. The MOCR staff organization is constrained by lack of central control.

c. Adequate and timely data reductions within the SSR is not possible without large expenditures of personnel.

2. The bidder showed poor general understanding of the internal IMCC information handling. This lack of understanding extended to the bidders discussion related to long duration missions and dual mission support.

3. While the bidder gave a good definition of the overall display guidelines, his subsequent design approach did not adequately satisfy the anticipated requirements.

4. The bidder proposed a predominantly manned concept which gave an apparently simple and economic approach to the support of a nominal mission profile; however, this concept must be criticized in that it cannot adequately accommodate the critical or non-standard mission. This is particularly emphasized in the limited availability of real time data in the MOCR.

5. The bidder has not adequately considered the extensive operational paperwork which would be required in this 'manual' approach.

6. The bidders communications proposal is based upon a rationalization that the data flow requirements are less than those required for Mercury. It is inconceivable that the bidder has proposed a 'manual' switching' system with considerable less capacity than the present switching center at the GSFC, and expect their system to handle the far more complex programs such as Gemini and Apollo.

7. The bidders general approach to the communications requirements showed a lack of understanding both of the basic requirements and of communications systems and techniques. This is typically demonstrated in the bidders proposal to base his expansion capability in terms of moving from TTY to HSD circuits. This in itself involves considerable increase in systems provision, and also reflects poor knowledge of carrier techniques.

8. The systems configuration does not appear to satisfy the overall operational concept described by the bidder, particularly in the TTY hubbing center.

COMMITTEE EVALUATION

COMMITTEE: Technical

CHAIRMAN: T. Roberts

COMPANY: Philco

General Comments:

This proposal is very good and the best submitted. The proposal is developed in considerable detail and reflects a well considered design approach. The systems concept is considered good but with minor reservations in the display selection sophistication and in the philosophy for the application of the communications processors. The design approach shows a good balance between the logical development of the requirements and a good technical solution. It is generally considered that Philco's good grasp of the overall problem would result in their requiring the minimum of redirection and technical guidance by MSC.

Favorable Features:

1. The Philco proposal shows a sound and well-founded comprehension of the IMCC performance requirements and the development of a logical implementation plan which already has met with the general acceptance of MSC. It is evident that Philco has demonstrated an effective application of the experience they have gained from their previous related contract associations with MSC.

2. The basic systems approach is one which separates each major function within the IMCC and is handled as an independent system approach while retaining definable interfaces.

3. The bidder's design approach into the IMCC systems is more developed than any of the other bidders, and significantly the proposed design approach is in accordance with the MSC requirements.

4. The bidder proposed a unique and seemingly feasible method of relaying outgoing traffic from the MOCR/SSR to the message center.

5. The bidder recognized the considerable design problems associated with the magnitude of display requirements and flexibility. However, the presented display selection capability was generally considered to exceed that which would be required in practice. It is recognized that the solution of this problem is difficult. However, it should be noted that Philco has made the best efforts to develop an acceptable solution.

6. The bidder handles communications problems competently and adequately. His error control techniques are well developed.

7. The bidder presented the most comprehensive proposal for the SCATS, and indicated a high level of understanding of the functions and interface requirements of the SCATS. In particular, the flight controller training plans were well defined and clearly described. The interface problems associated with SPAF were clearly indicated and well justified.

Unfavorable Features:

1. The bidder proposes the use of two communications processors in parallel. Each machine has the same program; one is prime unit, the second operates in a parallel backup mode. The bidder does not adequately demonstrate to the committee how simulation traffic and mission traffic separation is assured.

COMMITTEE EVALUATION

COMMITTEE: Technical

CHAIRMAN: T. Roberts

COMPANY: RCA

General Comments:

This proposal was rated satisfactory. This response provided a generally good level of detail relative to his choice of specific display systems components; however, he did not develop an integrated system. The concepts he developed were good; however, he failed to adequately elaborate his system design and often contradicted his concept.

The bidder's approach indicates an over-reliance, primarily in the design and lease of equipment, on the RTCC Contractor, and the telephone company.

The bidder will require considerable redirection which will result in a significant increase in overall cost.

Favorable Features:

1. RCA basically recognized the problems associated with schedules, and presented a fully comprehensive discussion on interface problems; however, in many cases they failed to indicate specific solutions and/or developed conflicting solutions in their technical approach.

2. The bidder presented a detailed understanding of the operational requirements such as:

a. Good evaluation of GOSS control, centralization of facilities and network administration.

b. Good evaluation of span of control, personnel requirements and division of responsibilities.

c. Good understanding of real-time flight control.

Unfavorable Features:

1. The bidder's selection of types of equipments was well defined and his selection would provide for system flexibility; however, the bidder did not identify the numbers of components, and as such, the committee feels that it is not possible to evaluate whether there is an adequate total display capability for the operational tasks.

2. The bidder did not provide M and O manning requirements.

3. The proposal to subcontract all design and lease IMCC Intercom and related telephone equipment to Southwestern Bell is undesirable. This approach would create undesirable management interface problems. The committee believes that cooperation and compliance of the telephone company management to RCA control is no more likely than it has been to MSC in the past.

4. The bidder did not recognize or adequately discuss the problems associated with dual mission support, neither the separation of functions nor sharing of equipment.

5. The bidder did not identify his approach or the problems associated with display selection. The committee feels that this is a relatively complex task that the bidder did not adequately discuss.

6. The bidder did not recognize the operational desirability of the separation of the RTCC and Communications Processor, and assigned the communications processing functions to the RTCC without sufficient justification, adequate evaluation of the capacity of the RTCC, and in direct contradiction to the RFP. The bidder further includes an alternative system should his proposed use of the RTCC not be acceptable. This alternate system utilizes the RCA 4102 computer as a communications processor which could not be evaluated because of lack of detail. It should be noted that the final cost estimate does not reflect the cost of this system.

SUMMARY OF PROG
MGMT EVAL RESULTS

SUMMARY OF
PROGRAM MANAGEMENT COMMITTEE

The Program Management Committee was in complete agreement on the results of the business portion of the IMCC evaluation. Out of the seven proposals received, each fell into one of four general adjective categories, for example: Very Good, Good, Satisfactory, Fair. No proposals were considered "Outstanding" or "Excellent" nor were any in the category of "Unacceptable."

Following is a listing in order of preference of the Program Management Committee final results:

ITT	-	Very Good
Lockheed	-	Very Good
RCA	-	Good
Philco	-	Good
Hughes	-	Satisfactory
Bendix	-	Satisfactory
IBM	-	Fair

These conclusions were developed with preselected relative importance (weight factors) applied to each of the three major areas of evaluation -

Organization and management	50%
Subcontract administration	20%
Costing	30%

The two highest rated proposals were ITT and Lockheed with very little difference between.

ITT was strong in each of all three business areas while Lockheed, although strong, was slightly downgraded because of Subcontract Administration. There were no unfavorable comments in this area, however the strong features were fewer than those of ITT.

The next group was RCA and Philco respectively. For all practical purposes the differences between these two organizations pretty well balanced in terms of equal ratings. RCA total direct manpower appeared low. More than one-half the contract cost consisted of subcontracts and direct material purchases. Since the manpower of subcontract effort was not identified, the validity of the manpower estimate is unknown. However, in areas for which direct manpower appears low substantial subcontracts are indicated. More important was the weakness in subcontract administration wherein all purchasing will be performed outside the program managers control. Philco was downgraded primarily in the cost portion of the evaluation. The high G&A, fee and total overall price of 34 million dollars is considerably higher than other companies except IBM and Hughes.

Hughes and Bendix fell into the lesser desirable category of "Satisfactory". For example, Hughes proposed only an extremely limited office in Houston for liaison purposes and it was not staffed to properly handle the functions. In addition, their work experience was quite limited in integration type projects. Costs were also second highest of all proposals. Bendix does not plan a program manager or staff at Houston. There was no description of how their organization would work and in general were weak in all factors except cost wherein they provided the lowest total cost of all contractors.

The last contractor, IBM was considered ridiculously high (70 million dollars). Their experience was not relevant to an IMCC project. They were weak in key personnel proposed and the extremely high manpower estimates indicated. Due to the numerous weaknesses identified, this company was the least desirable for the IMCC contract.

A separate section has been prepared indicating the technical factors which were considered by the Committee in review of the Cost Panel ratings. None were sufficiently significant to warrant a change in rating. That report is, however, included for the SEB additional consideration.

FROM MEMO
COM EVAL

COMMITTEE EVALUATION

COMMITTEE: Program Management

CHAIRMAN: A. E. Garrison

COMPANY: Bendix Radio Division, Bendix Corporation

Favorable Features:

1. Bendix was rated highest in cost evaluation as its proposed estimated costs were the lowest of all companies. In the task area it was within the top three for each effort. Bendix's proposal indicated knowledge of the requirements, for the costs proposed by task were not extremely high or low to the extent that can be judged from a cost view-point. Bendix had the lowest G&A and fee and labor costs were better than average. However, there is some indication that Bendix underestimated maintenance and operations.

Unfavorable Features:

1. The Program Manager and staff are not planned as a Houston located group. The numerous Bendix Divisions and consultants proposed will present difficult problems to the off-site located Program Manager. While an organization is proposed there is no description of how it will operate.

2. Work experience of an IMCC related nature is confined to participation in the Mercury program. Most experience has been in radio and tracking station operations with but little in control center design and network unification. The proposed extensive use of outside consultants indicates a lack of in-house capability.

3. Key personnel to be assigned are weak in the areas of network integration, control center design, displays and digital equipment engineering. Most key personnel proposed are field service type and too few with electronic systems engineering background.

4. The overall staffing proposed is inadequate in the majority of functional areas. This is especially true of GOSS Integration, Documentation and IMCC Integration.

5. The subcontract organization, as described, could not be adequate. There are multiple subcontracting elements and the Program Manager has no control of this effort.

6. The Make-or-Buy committee does not include any of the Program Manager's staff and decisions do not require his approval. Furthermore, only representatives of three functional elements are required to be in attendance at decision meetings, attendance of others is not mandatory. The Make-or-Buy structure proposed lists only two subcontractors which obviously is not complete.

7. The subcontractor control procedure is at least fair but the lack of responsiveness to the Program Manager will present difficulties. It would also be extremely difficult for MSC to keep abreast of subcontractor problems, for its immediate contact, the Program Manager, would be experiencing the same trouble.

General Comments:

The proposal of Bendix contained but one favorable feature which was in the cost field. In relative ranking with other companies it is considered sixth.

COMMITTEE EVALUATION

COMMITTEE: Program Management

CHAIRMAN: A. E. Garrison

COMPANY: Hughes Aircraft Company - Ground Systems Group

Favorable Features:

1. Key personnel proposed for this work were generally experienced, and are already in the Ground Systems Group organization.
2. Subcontract organization, policies and procedures were good. A very good Make-or-Buy program is maintained, backed up by a desirable source selection procedure. Subcontractor control is strong with many appropriate control techniques described.
3. An excellent Small Business program is maintained which has resulted in a good proportion of Hughes procurement going to small business concerns.
4. Quoted rates were attractive with fee considered excellent and very good G&A and labor rates.

Unfavorable Features:

1. The proposed organization was weak because the project office in Houston would be limited to primarily liaison and information flow, and was not adequately staffed to handle adequately the necessary functions centered here.
2. Work experience was too limited. While the company has some experience in communications, displays and data processing, they lacked experience in overall project management and integration. Some experience cited was not directly applicable.
3. Manpower estimates for several facets of the job appeared unrealistically low, particularly for IMCC & GOSS integration efforts. This ties in with a lack of experience in these areas.
4. The Hughes estimate of total cost was second highest of all bids. The high total reflected high estimates in all tasks except GOSS unification and IMCC integration which were low, which again evidences lack of integration experience.

General Comments:

It appears that the same general weakness -- lack of experience in systems management and system integration -- showed up in weak proposals in the areas of experience, manpower estimates and cost estimates. Only a solid subcontracting discussion partially redeemed an otherwise weak proposal.

COMMITTEE EVALUATION

COMMITTEE: Program Management

CHAIRMAN: A. E. Garrison

COMPANY: International Business Machine - Federal Systems Division

Favorable Features:

1. The organizational structure and relationship was considered quite favorable. The Project Manager and his organization are to be located in Houston with a complete and well oriented functional and administrative staff. Essential controls have been recognized and planned, particularly, the Engineering Change Board function.

2. The past experience cited is generally extensive but much of it is not relevant for a project of this type. For example:

- a. Major Contractor on Sage (Air Defense System)
- b. Mercury Computing
- c. Other programs involving digital data handling.

NOTE: IBM is very strong on digital data systems; however, no experience is cited which is directly applicable to GOSS unification (radar and telemetry problems). The remaining experience cited is only applicable to the computing elements of IMCC.

3. Because limited applicable experience was evidenced, only minor credit could be given to IBM on this feature.

4. The contract administration procedures and controls were considered the strongest feature in the committee's evaluation for IBM. The Subcontract organization, policies, make or buy procedures, source selection, etc., were all in highly desirable area of contract administration.

5. Flexibility and responsiveness to MSC requirements were recognized. All major procurements are to be conducted from Houston and within the Project Office. Although strong in this area, very little weight could be applied to this element for the total Program Management evaluation.

Unfavorable Comments:

1. Key personnel are drawn from a variety of Divisions and Staffs with strong background in digital computer design and application but little or no experience in GOSS integration problems regarding radar telemetry and space flight operations.

2. Overall manpower estimates, particularly in indirect personnel, are extremely high, (4335 man months), SCATS (3517 mm), Displays (3941 mm) etc. However, the manpower estimate for maintenance and operations is extremely low (29 man months for 4th quarter, 1964).

3. The cost figures submitted by IBM were considered extremely poor. For example, the overall costs were 100 per cent higher than the next highest contender.

4. In the eight tasks, IBM proposed the highest cost in five and was a close second high cost in the remaining three.

General Comments:

1. This company could not receive a favorable rating by this committee in view of the weak favorable features and strong unfavorable features of costs, key personnel and manpower.

COMMITTEE EVALUATION

COMMITTEE: Program Management

CHAIRMAN: A. E. Garrison

COMPANY: International Telephone and Telegraph Corporation

Favorable Features:

1. The Program Manager will be assigned full time to Houston with all necessary functions controlled by him. The Program Office is established as a separate entity reporting to the corporate Vice-President and Deputy to the President of ITT.

2. ITT's applicable program experience was gained as an associate contractor in the Strategic Air Command Control System, which had interface problems similar to IMCC. Related experience was obtained in ground communications for Atlas and Titan missile sites, in maintenance and operations of the Dewline as an instrumentation contractor for the AF Eglin Gulf Missile Range.

3. Program control is well planned in that liaison requirements at the working levels is recognized and the Program Manager has procedural controls to ensure changes in both technical and contractual documentation. ITT has had experience in PERT application and has available PERT personnel for the IMCC project.

4. The majority of the 35 key personnel described have very good experience with immediate experience in ITT Corporation. The manpower projected for IMCC overall appears good but manpower loading for IMCC integration and GOSS integration is low while that of communications is high.

5. Included in the Program Office to be established at Houston will be a Director of Subcontracts who will report directly to the Program Manager. He will be on the same level as the Manager of Contracts and the Assistance Controller. He will have great ease of communication with technical personnel for the Technical Director with his staff will also be assigned to the Program Management Office.

6. The Make-or Buy Committee at Houston will be composed of the Directors of all elements and will be chaired by the Program Manager. This Committee will approve the Make-or-Buy structure of all participating ITT divisions as well as that of first tier subcontractors. The criteria for decisions is all inclusive of desirable features. Review of all decisions is made by the Corporate President.

7. The method for source selection proposed is sound. It includes consideration to experienced companies and survey visits made prior to final source selection. The criteria for source selection, which is based on point evaluation, is complete.

8. The control of subcontractors to be exercised by ITT is featured by the fact that control provisions are incorporated in the subcontract. The control provisions include second-tier subcontract approval, essential reports, approval of Make-or-Buy structure, liaison and residencies, and requirements for procedures and controls in critical areas. The Director of subcontracts, who will have control of all subcontracts, will receive support from technical personnel of the Program Office.

9. The estimated cost proposed by ITT was the middle quote of seven companies. ITT had the lowest labor rates and the fee requested was also the lowest. However, ITT proposed only enough manpower for one shift operation therefore it seems evident that an under estimate was made in this task. Despite this the cost proposed cannot be considered as unrealistic or showing lack of understanding of the program.

General Comments:

In the Program Management area ITT did not receive a single unfavorable comment and was rated the leader in the field of Program Management.

COMMITTEE EVALUATION

COMMITTEE: Program Management

CHAIRMAN: A. E. Garrison

COMPANY: Lockheed Aircraft Corporation

Favorable Features:

1. An excellent project organization was proposed providing for a project manager in Houston with full control of the work of the project. Work experience was very strong and included AF Satellite Tracking and Data System Network, AF Satellite Control Center, and the Polaris Control Program.

2. Key personnel were very good and phase-out of existing programs assures availability.

3. Subcontractor organization and control was very good. Resident contract administrators are provided for at subcontractor plants, and a system of visits and reports is maintained.

4. The Lockheed total cost estimate was second lowest and was rated Very Good, and in addition proposed the lowest off-site burden rate and third lowest G&A rate.

Unfavorable Features:

None

General Comments:

Lockheed was judged Very Good overall with no real weaknesses in the program management area. It is one of the two top companies in the final Committee ratings.

COMMITTEE EVALUATION

COMMITTEE: Program Management

CHAIRMAN: A. E. Garrison

COMPANY: Philco Corporation - Western Development Laboratories
Division

Favorable Features:

1. An excellent organization concept is presented which provides for a strong project management group in Houston, headed by a project manager with direct control over all necessary functions. Strong program control techniques are discussed including a Change Control Committee to assure GOSS compatibility, and PERT/TIME and PERT/COST techniques.

2. Philco work experience is very good including their participation in the MSC study contract on the IMCC and Gemini/Apollo GOSS. In addition, experience on the AF Satellite Control program design, development and integration, on Advent program tracking, telemetry and command ground station networks, and on Mercury as flight controllers was considered applicable.

3. Key personnel were judged very good in terms of their general experience and education. Many of the men proposed for this contract are already participating on the Philco IMCC study contract.

4. Philco's Make-or-Buy program was very good and was backed up by a good source selection process. Company procurement policies, procedures and organization were solid and a small business program is maintained which complies with government regulations and intent.

5. Philco submitted rate estimates for engineering man hours which were excellent.

Unfavorable Features:

1. Total dollar estimates submitted were very high, totaling almost \$34 million. In addition, the proposed G&A rate (13.1%) was considered poor in comparison with other proposals, and the proposed fee (7.9%) was rated only fair.

General Comments:

The Philco proposal was generally strong but was downgraded primarily because of its cost estimate which was high in total and weak in specific factors.

COMMITTEE EVALUATION

COMMITTEE: Program Management

CHAIRMAN: A. E. Garrison

COMPANY: RCA

Favorable Features:

1. RCA proposes a program office with authority to do the job from start through operational status. Details were developed for locating key personnel both in Houston and Moorestown, New Jersey, at various phases of the program. Rationale given to support this feature sounded excellent; i.e., functions which should be close to MSC will be accomplished in Houston. Functions relating primarily to equipment implementation will be in Moorestown with the Program Manager having full responsibility and authority for all functions with possible exception of such contracting areas (see unfavorable features). Change control procedures and effective liaison are well planned.

2. RCA has had excellent work experience. For example, BMEWS (Ballistic Missile Early Warning System) for which scope was much larger than IMCC. In addition, the RCA Service Company at AMR and on the Mercury program specifically, is directly related.

3. Key personnel proposed to include many from BMEWS program with very good breakdown of work functions. A strong full-time staff is planned with experience and background of depth and scope required for IMCC.

4. The cost elements of RCA, particularly by task, appeared quite favorable with weakness only in rates and fee because of the high percentage.

Unfavorable Features:

1. The total direct manpower loading appeared low however, because over half the contract cost consists of Subcontracts and direct material purchase the validity of manpower estimates is unknown. Consequently, this feature cannot be presumed to be favorable and was slightly unfavorable because RCA did not furnish Subcontract manpower loading estimate.

2. RCA was very weak in the general sub-contract administration. At no time during the program will such contract administration or control be in Houston; consequently, the Program Manager cannot adequately supervise this function and general liaison and communication's problems may be expected.

3. All purchasing will be performed outside the Program Managers office and in several instances outside the Division in which the Program Manager is located, page 11 - 74. These Divisions will select the source, evaluate the proposals and administer the contracts without right of disapproval by the Program Manager. The supporting purchasing divisions are responsible to their own divisional vice-president and general manager, page 11 - 74.

4. Control - Fair. The control criteria and methods employed to enforce these criteria are very good, page 11 - 80. The real problem lies in who does the controlling--their responsiveness to the Program Manager and ultimately to MSC. Subcontract administrators (Division personnel) are assigned within the Project Management organization to assist the Project Engineers in dealing with the other three RCA divisions, page 11 - 80. In addition, resident subcontract representatives are located in two of the three divisions, but they report to the Home Office Subcontract Administrator, page 11 - 80. It is not understood how the Program Manager controls or manages under this arrangement. All purchase orders are prepared by the subcontract administrator, coordinated with the Project Engineers and submitted to the Subcontract Project Administrator for approval, page 11 - 80. This appears a little unusual in that the Subcontract Administrator has Division status and the Subcontract Project Administrator, who does not have division status, approves or disapproves procurements. The distance between these two persons does not contribute to fast reaction time.

General Comments:

1. RCA, in general, had an effective proposal with the real weaknesses in such contract administration and control as well as proposed fee and rates.

2. The strong features of experience. Key personnel and overall organization easily outweighed the secondary weaknesses of this proposal.

SUMMARY OF FIELD
SURVEY EVAL RESULTS

REPORT OF THE FIELD SURVEY COMMITTEE

Purpose:

The Field Survey Teams were established to accomplish two general purposes:

a. To obtain independent opinions from previous customers of bidders on the IMCC regarding their evaluation of the actual performance of these companies on previous or existing contracts.

b. To verify or clarify specific information or questions found in the written proposals, either in general or for a specific company.

Survey Procedures:

Three teams were designated as follows:

<u>Team No.</u>	<u>Technical</u>	<u>Management/Cost</u>
I	M. F. Brooks LaRue Burbank	C. R. Symonds
II	D. T. Myles	J. I. Papac
III	J. B. Copenhaver	J. C. Jones

Each bidder was asked to specify in his proposal two present or recent customers for whom work had been done pertinent to this procurement, and whom SEB could interview. (See Appendix A.) Upon receipt of the bidders' proposals, these customers' names were arranged into three groups. One group was assigned to each of the teams above for interview. Each team conducted a structural interview using the general guidelines shown in the attached Interview Questionnaire (Appendix B). This guideline was not intended to be all-inclusive, particularly if there were specific questions on a given company that the team wished to ask. An effort was made, however, to cover at least those points shown.

Each team was cautioned to keep in mind that we were obtaining in most cases what amounted to a personal opinion from the people being interviewed. Every effort was made in the interview to determine the validity of the opinions obtained.

The interviews were accomplished as planned, during the first week in January 1963. The detailed evaluation reports are attached as Appendix C. Results are summarized by company below:

Summary of Results:

Lockheed:

On the Polaris program, Lockheed met its milestones in creditable fashion, though costly. PERT was originated on this program and utilized successfully. Documentation was satisfactory. The persons interviewed expressed complete confidence in Lockheed's ability to perform.

On design and operation of the Air Force Satellite Control Center and network, Lockheed has gained experience directly applicable to the IMCC contract. Liaison was good with the Air Force, although disagreements occurred with an associate contractor. Lockheed's attitude toward sub-contractors also caused friction. On-change orders, contractual-coverage-first was the policy. Costing practices favor the buying-in approach. Though organization was satisfactory, and the response time on changes was rapid, schedules were not met. Lockheed's proposed fixes, during implementation, were consistently good but very costly.

Hughes:

On the AN/MSG-4 system development, Hughes has been a young, enthusiastic team of high caliber engineering personnel. Acceptance of technical changes was very informal, and many Hughes-conceived changes were volunteered. The company had a spirited commitment to make the system work and has continued this attitude in an excellent field support program. Management coordination of the several USADEA projects on board was poor during one period, but is now very satisfactory.

Technically, Hughes did a very good job on the development of the AN/SPS-32 and -33 radar systems, and delivered equipment which is quite satisfactory for the use intended. Administratively, they were very cooperative but cost estimating and ability to meet delivery requirements were considered average. The interest shown by top management and initiative in suggesting technical changes and improvements were outstanding strong points.

ITT:

The work of ITT (Federal Electric) on Project Big Rally II and MEDTROPO was considered poor by the customer. FEC required extensive direction and guidance from the Air Force. It was stated that of some 20 contractors on board at the Space Project Office, Air Force Systems Command, ITT has demonstrated the poorest performance.

ITT (International Electric) is performing well on the SAC Control System. Costs are realistic; considerable initiative has been demonstrated and equipments thus far delivered reflect excellent engineering and design accomplishments. The 025 computer, proposed for use in the IMCC, was designed specifically for Project 465L by ITT (Federal Labs). A prototype

has been in operation for two years, with good results. Operational 025's, however, will not be identical to the prototype, and the operational programs have not been debugged. The customer could not, then, comment on the performance and reliability of the final computer configuration.

Philco:

Philco performed extremely well in implementing the ground station network for ADVENT. An all-out effort was made to meet schedules despite numerous technical change orders. The company extended itself many times without contractual coverage as a part of the same determined effort to remain on schedule. The final product was sound, and technical management was excellent. Documentation schedules were criticized, but overall, Philco was recommended highly as being extremely dependable under a tight schedule.

In designing and building the Defense Communications Control Center, Philco proved to be a reliable, highly satisfactory contractor. The only unfavorable feature mentioned was Philco's inability to make Systems Development Corporation produce on its programming subcontract.

IBM:

On the SAGE project, given as a reference by IBM, it was found that IBM's participation was limited to the development of a special purpose computer, of which 26 were furnished for SAGE. To the limited extent it participated, IBM was rated as excellent.

On the Project SD-115, automation of the Defense Communications Agency's world-wide communications network, IBM possessed the capability to perform from the start of the contract. The technical equipment furnished under the contract easily meets the performance requirements. The company was cooperative and did not attempt to take advantage of the Government in negotiations. It underestimated the programming task, as did the government. Project management was adequate.

RCA:

On the BMEWS (Ballistic Missile Early Warning System) and TRADEX (Target Resolution and Discrimination Experiments), RCA performed large, complex systems projects delivering operational equipment within the established schedules and budget. The overall evaluation by the customers was excellent. It was felt that RCA costs were high, but the product outstanding.

Bendix:

The reference given by Bendix on its work in Project Syncom was not knowledgeable in detail on the contractor's performance. He did state, however, that the end results appear to be technically sound, and that Bendix responded well to technical change orders. The program was completed on a crash basis with minimum slippage. Costs were excessive.

The performance of Bendix on Project Mercury was similar to that described above. Competent solutions were found to technical problems, but the proposed solutions were usually more elaborate than desired. It was not possible to evaluate the systems performance of Bendix on this project since Bendix was not the prime.

APPENDIX A

ORGANIZATION OF SOURCE EVALUATION BOARD AND METHOD OF EVALUATION

ORGANIZATION

The Proposals for implementation of the Integrated Mission Control Center (IMCC) and unification of the Ground Operational Support System (GOSS) were evaluated at the Manned Spacecraft Center (MSC) between December 11, 1962, and January 16, 1963.

The membership of the Source Evaluation is shown in the attached table and the organization of the Source Evaluation Board is shown in the enclosure. To assist the Board Members selected by the Associate Administrator, the evaluation group included personnel selected by the Board.

The Program Management Committee was responsible for evaluating all business aspects of the proposals. The Committee consisted of the following members augmented by the full time assistance of other personnel:

Arthur E. Garrison, Chairman
Charles F. Bingman
A. E. Hyatt
Harry L. Watkins

The members of the Technical Evaluation Committee, listed below, utilized the full time help of other personnel in evaluating the technical soundness of all proposals.

Tecwyn Roberts, Chairman
Stanley Faber
Dennis E. Fielder
Paul H. Vavra
Eugene F. Kranz

The Performance Analysis Field Committee was composed of members of the evaluation committees. This committee was responsible for obtaining past performance records of the companies submitting proposals. Field trips were made to past customers.

The Coordination Group was responsible for coordinating the efforts of the Program Management and Technical Evaluation Committees. It was comprised as follows:

John D. Hodge
Arthur E. Garrison
Tecwyn Roberts

A meeting of the SEB was held on November 21, 1962, to finalize both the detailed evaluation criteria and the method of scoring to be used. This information was promulgated to the Committees prior to receipt of the contractor's proposals.

The evaluation period was from December 11, 1962 to January 25, 1963. The working schedule was as follows:

December 10	-	Contractors' proposals arrive.
December 11	-	Evaluation committees meet.
January 2	-	Field visit start.
January 7	-	Committees' reports finished.
January 8	-	Committees' presentation to SEB.
January 9	-	SEB's preliminary evaluation starts.
January 9	-	Field committee's report to SEB.
January 9	-	SEB's evaluation finished.
January 14	-	SEB's preliminary report finished.
January 15	-	Contractors' presentations to Source Evaluation Board.
January 18	-	Preliminary report to Director, MSC.
January 18	-	SEB report finished.
January 21	-	SEB report to Director, MSC.
January 25	-	SEB presentation to Administrator.

METHOD OF EVALUATION

Working committee evaluation. The working committees (Program Management Committee, Technical Evaluation Committee, and Performance Analysis Field Committee) presented their evaluations in the form of a qualitative or narrative rating of each company based on the pre-established criteria. The committees listed the good features and the unfavorable features of each company's proposal. In addition, the committee gave general comments on each contractor's proposal. No numerical rating system was given in the committee's report to the Source Evaluation Board. This did not, however, preclude individual panels within such committees from using a numerical system if it helped them in arriving at conclusions to be given in the narrative report of the committee. Each committee rated each company with an adjective rating in addition to the general comments. The adjective ratings used were the following:

Outstanding
Excellent
Very Good
Good
Satisfactory
Fair
Poor
Unacceptable

In arriving at an adjective rating for each company, the working committees applied a relative importance factor to each of the major areas. These importance factors for the various areas were as follows:

Program Management Committee

Relative Importance Factor

Organization/Management Group	5
Sub-Contract Administration Group	2
Cost Evaluation Group	3

Technical Evaluation Committee

Design, Development and Implementation	3
Operations and Displays	2
Communications	3
Simulation and Checkout	2

The results of the Field Survey Committee were integrated into the final at the Source Evaluation Board level.

Source Evaluation Board Evaluation. The Source Evaluation Board evaluation was similar in nature to that of the working committees and included a compilation of the results of the working committees. In addition, however, the Source Evaluation Board rated numerically the company proposals in each working committee's area and combined these ratings with an importance factor of 3 applied to the Technical Evaluation and a factor of 2 applied to the Program Management Evaluation.

The Chairman of the Source Evaluation Board requested all seven bidders to make an oral presentation to the board on the subject of the company's qualifications and facilities. This presentation was attended by 3 representatives from each company and seven bidders responded satisfactorily.

The Source Evaluation Board convened immediately following the presentation. A review of the information obtained from the presentation concluded that no significant factors had been revealed. The Source Evaluation Board considered the presentation to be of value in substantiating the findings of the three committees.

This evaluation was based on the following numerical rating system.

Outstanding	7	Satisfactory	3
Excellent	6	Fair	2
Very Good	5	Poor	1
Good	4	Unacceptable	0

TABLE I

SOURCE EVALUATION BOARD MEMBERS

Christopher C. Kraft, Jr. (Chairman)	Chief, Flight Operations Division, MSC
James Stroup (Secretary)	Acting Chief, Control Systems Procurement Office, MSC
J. D. Hodge (Alternate Chairman)	Assistant Chief for Flight Control, Flight Operations Division, MSC
G. B. Graves	Assistant Director for Information and Control Systems, MSC
Tecwyn Roberts	Head, Mission Control Center Branch, Flight Operations Division, MSC
Charles F. Bingman	Chief, Management Analysis Division, MSC
M. R. Franklin	Deputy, Ground Operational Support System, Apollo Project Office, MSC
John Roberts	Technical Advisor to Gemini Pro- ject Manager, MSC
A. E. Garrison	Chief, Procurement Plans and Systems, MSC
D. R. Hendrickson	Acting Chief, Financial Management Division, MSC
J. P. Elstun	Center Facilities and Construc- tion Procurement, MSC
Harper E. Van Ness	Assistant Director Spacecraft and Flight Missions Division, Office of Manned Space Flight, Head- quarters, NASA
Dietrich Schroeder	Procurement Review Office, Pro- curement and Supply Division, Headquarters, NASA

*John Condon

Assistant Director, Office of
Reliability and Quality Assurance,
Headquarters, NASA

*Non-voting Member (General Management Instruction 2-4-3)

SOURCE EVALUATION BOARD
C. C. Kraft, Jr., Chairman

Administrative Services

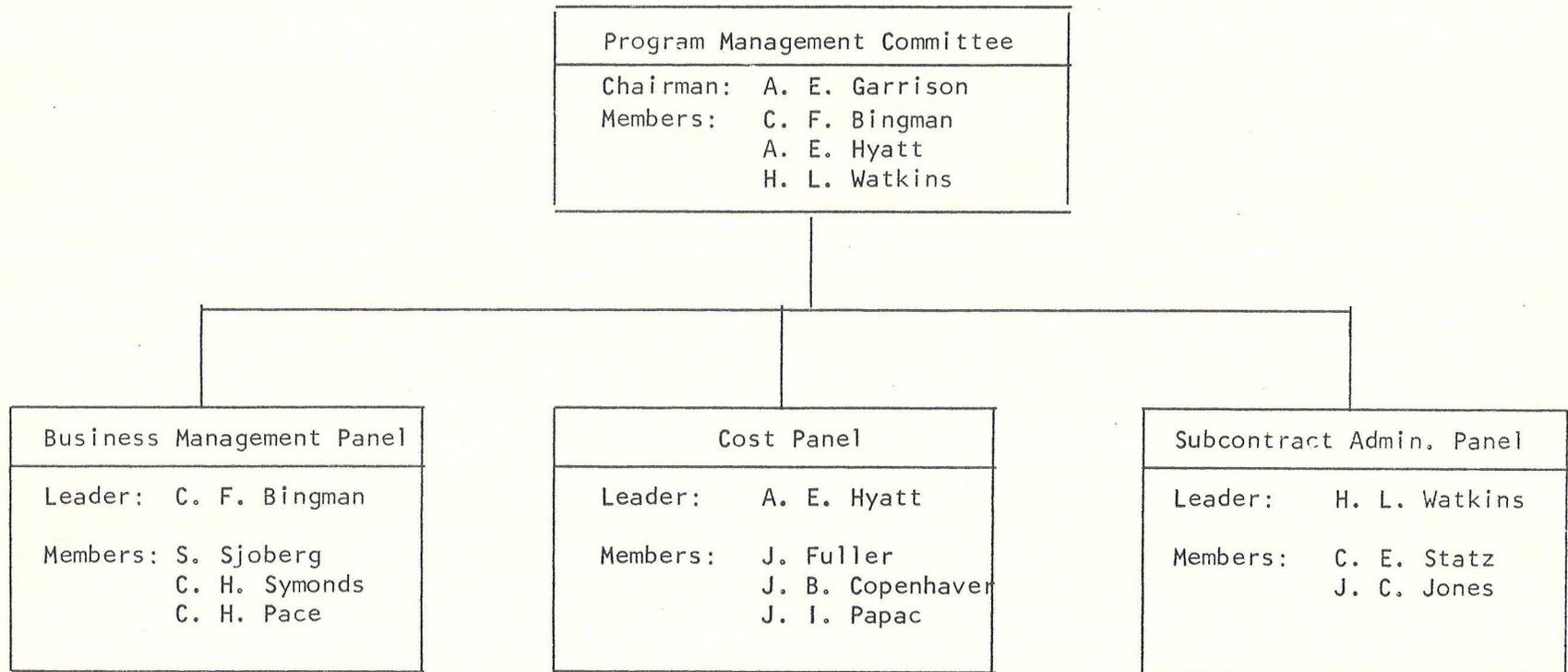
Management - Technical
Coordination
Garrison, Hodge, Roberts

Program Management
Committee
A. E. Garrison, Chairman

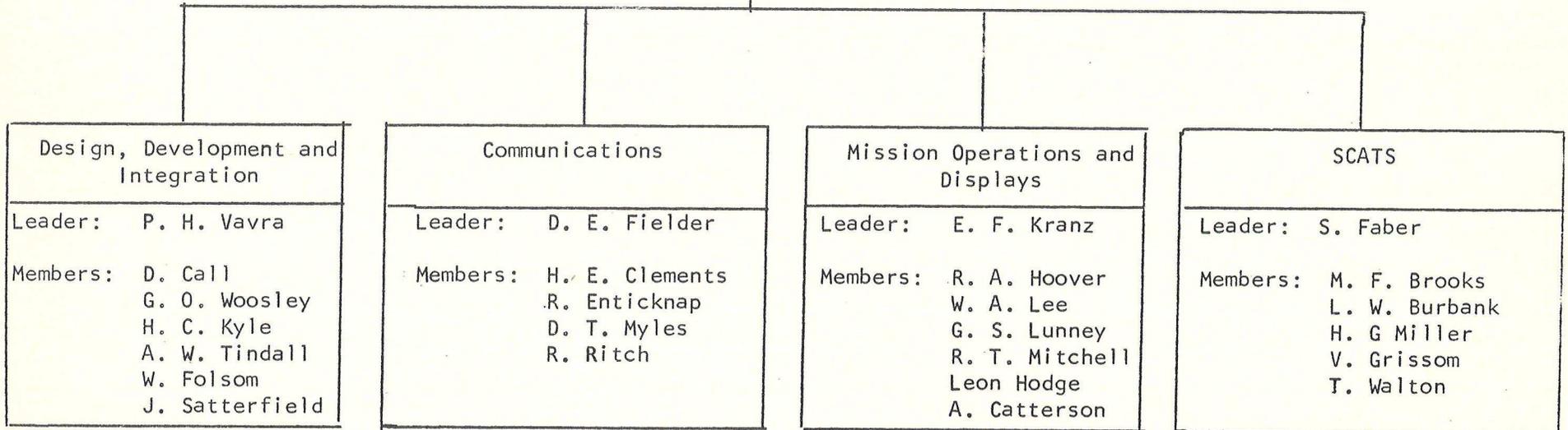
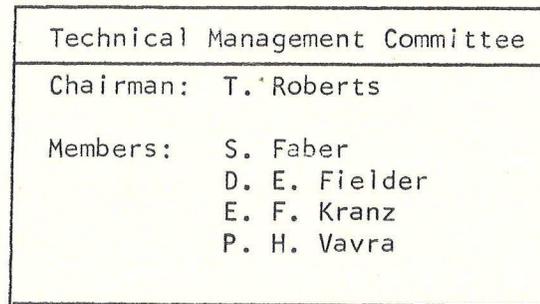
Technical Evaluation
Committee
Tecwyn Roberts, Chairman

Performance Analysis
Field Committee
J. B. Copenhaver,
Chairman

ORGANIZATION
PROGRAM MANAGEMENT COMMITTEE



ORGANIZATION
TECHNICAL MANAGEMENT COMMITTEE



ORGANIZATION FIELD SURVEY COMMITTEE

