[COMMITTEE PRINT]

CAPE CANAVERAL
THE HOPE OF THE FREE WORLD

REPORT

OF THE

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U.S. HOUSE OF REPRESENTATIVES
EIGHTY-SEVENTH CONGRESS
SECOND SESSION

MAY 24, 1962

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LETTER OF TRANSMITTAL

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE AND ASTRONAUTICS,
Washington, D.C., May 24, 1962.

Hon. GEORGE P. MILLER,
Chairman, Committee on Science and Astronautics.

DEAR MR. CHAIRMAN: I am forwarding to you herewith for committee consideration a report of my observations and conclusions during my recent visit to the Atlantic Missile Range at Cape Canaveral, Fla., January 1–8, 1962. This report reviews the management of the Atlantic Missile Range by the U.S. Air Force, the possibility of making different management arrangements, and prospects and plans for the further development of the range.

Sincerely yours,

VICTOR L. ANFUSO,
Member of Congress.

Dedicated

to the free world's first orbital astronauts,

Lieutenant Colonel John H. Glenn, Jr., United States Marine Corps,

Lieutenant Commander M. Scott Carpenter, United States Navy,

to their precursors,

Commander Alan B. Shepard, Jr., United States Navy,

Captain Virgil I. Grissom, United States Air Force,

and

to the team of scientists and technologists

whose high competence and devotion to public service

made their accomplishments possible

CAPE CANAVERAL: THE HOPE OF THE FREE WORLD

It is my considered opinion that Cape Canaveral can become the hope (or the graveyard) of the free world. I believe that for many years to come the Cape will represent the most important military and peaceful spaceport in the non-Communist world. I believe that Congress must continue to support fully this major base. Our survival depends as much (possibly more) upon the success of the work being done at Cape Canaveral as upon all the manned aircraft of this Nation.

I earnestly urge all Members of the Senate, as well as my colleagues in the House of Representatives, to visit and see first hand the outstanding accomplishments being achieved at Cape Canaveral under the able leadership of Maj. Gen. Leighton I. Davis of the U.S. Air Force and Dr. K. H. Debus of NASA.

INTRODUCTION

The Atlantic Missile Range is one of the three national missile ranges of the United States. The other two are the Pacific Missile Range operated by the Navy from Point Arguello, Calif., and the White Sands Missile Range operated by the Army near Alamogordo, N. Mex.

The Atlantic Missile Range is developed, maintained, and operated by the Air Force Missile Test Center. Since 1953 the development, maintenance, and operation of the range has been too big a job for the military and has been contracted to the Pan American World Airways, Guided Missile Division. In turn, Pan Am has subcontracted the technical functions of the job to the Radio Corp. of America, and the operation of the ocean range vessels of the range to the Suwanee Steamship Co.

Tested here are missiles of the Air Force, Navy, Army, and National Aeronautics and Space Administration. To carry out this mission, the range must provide, among other things, a place for launching the missiles, the means of tracking them, safety for the populated areas adjacent to the range, and, last but not least, the means of receiving and processing the test data from each missile operation. Approximately 24,000 people are employed on the range, including those on the downrange stations. Pan American and RCA represent the greatest number, totaling some 9,400 (the ratio of Pan Am to RCA employees is about 5 to 3). Employees of the various missile contractors number about 5,800; civil service about 3,000; temporary construction workers about 2,000; and military about 3,800 (including about 2,700 Air Force).

The headquarters of the missile test center are located about 18 miles south of Cape Canaveral at Patrick Air Force Base. Here, some 10,000 of the total of about 24,000 employees work as administrators, planners, and programers, and in air test support operations.

HISTORY OF THE RANGE

Following World War II, the Joint Chiefs of Staff decided to develop a U.S. missile capability. Since no suitable range was available for flight tests of long-range missiles, a Committee on Long-Range Proving Ground was appointed in 1946 to select a suitable test location. After a study of possible sites, Cape Canaveral was chosen as the launching point.

The Cape was selected for several reasons. It contained an existing base—the then inactive Banana River Naval Air Station (now Patrick Air Force Base). The long shoreline permitted the siting of launch complexes so that missiles would not fly over other launch complexes on their way downrange. The relative isolation of the Cape—with the Atlantic Ocean on the east, a deep-water port on the south, a broad salt-water bay on the west, and only a narrow neck of land on the north—considerably reduced the problem of security. In addition, the location allowed nearly unlimited overwater flights in a southeasterly direction, where conveniently located islands could be used as missile tracking stations. Finally, the orientation of the Cape for generally eastward launches took advantage of the Earth's eastward rotation, giving additional impetus to missile launches, and reducing the thrust required to reach a given velocity.

In July of 1947, the Air Force was directed to develop this range. Negotiations were started to establish tracking stations on islands in the Bahamas and the West Indies. In mid-1949, legislation signed by President Truman established the long-range missile proving ground. Construction was started at Cape Canaveral for launching pads and instrumentation sites. A year later, the proving ground became the sole responsibility of the Air Force.

First construction of the downrange missile tracking stations started early in 1951. In 1957, agreements were signed with Great Britain, the Dominican Republic, and Brazil to establish all of today's major tracking stations. In addition, a number of ocean range vessels were modified to serve as floating tracking stations, and special aircraft were equipped to gather midcourse and reentry missile flight data.

Pan American World Airways, Inc., received a contract on June 30, 1953, to maintain and operate the Atlantic Missile Range under Air Force supervision. Pan American has subcontracted with the Radio Corp. of America for the technical instrumentation and data reduction work.

Today, the Atlantic Missile Range begins at Cape Canaveral and extends over 9,000 miles into the Indian Ocean beyond the Cape of Good Hope in Africa. This range extension is made possible by the deployment of aircraft and instrumented ships to impact locations in the Indian Ocean. Over 40 special instrumentation and cargo aircraft and a fleet of ocean vessels are used to support the range.

Operating costs exceed $230 million annually. The capital plant is worth $1 billion, including Patrick Air Force Base—the management headquarters—and the Atlantic Missile Range. Although Air Force

operated, the range is used by other branches of the armed services and governmental agencies engaged in long-range missile testing and space operations.

In recent years a spectacular record of "firsts" in the Nation's military missile and space programs has been compiled at Cape Canaveral. Among them are the first orbiting of a U.S. satellite, the first full-range Atlas intercontinental ballistic missile, the first U.S. lunar and space probes, the launching of the first U.S. astronaut into space on May 5, 1961, and the orbiting of the first U.S. manned satellite on February 20, 1962. All of the Nation's long-range missiles have been or are scheduled to be tested at the Atlantic Missile Range.

The present Cape area of about 15,000 acres is adjacent to the 72,500 acres which are being procured through the Corps of Engineers for support of the manned lunar landing program. Along the shoreline will be located additional SATURN pads and possibly NOVA pads. The central part of the new area will be used for hangar construction, industrial areas, additional instrumentation, and, depending upon the problems of constructing, manufacturing, and transporting the ultra-heavy boosters, may even include manufacturing facilities. The western part of the area will be used as a buffer for protection of the populated areas on the mainland to the west.

REPORT ON 1962 INSPECTION

On May 10–15, 1960, I visited the Atlantic Missile Range at Cape Canaveral, Fla., on behalf of the Committee on Science and Astronautics. A report of my observations and conclusions was published on June 27, 1960, under the title "Report on Cape Canaveral Inspection." I revisited the range on January 1–8, 1962. The present report is intended to update my initial observations and conclusions.

As in my prior visit, I devoted most of my attention to the Air Force management of the Atlantic Missile Range (AMR), as assisted by the prime range contractor, Pan American World Airways, Inc. (Pan Am). To aid me in my review of the AMR operation, I had the benefit of five management studies made during 1960 and 1961 by various high-level investigative groups within the Department of Defense and made available to me by request.

The size and complexity of the AMR operation can be seen from the fact that these Department of Defense management studies included nearly a dozen thick volumes of reports and exhibits. Investment in range facilities and equipment is continuing on a large scale, and has received considerable impetus since the inauguration of the manned lunar landing program (MLLP) by President Kennedy in the summer of 1961.

In my previous report, I quoted from a Defense Department management study which concluded that the Atlantic Missile Range is already "substantially saturated with missile launching facilities and flight test instrumentation." This statement was correct to the extent of available land for launch complex construction on Cape Canaveral as it then existed, considering the range safety problems involved. However, with the addition of approximately 72,000 acres now being purchased by the Government (see illustration), the Cape

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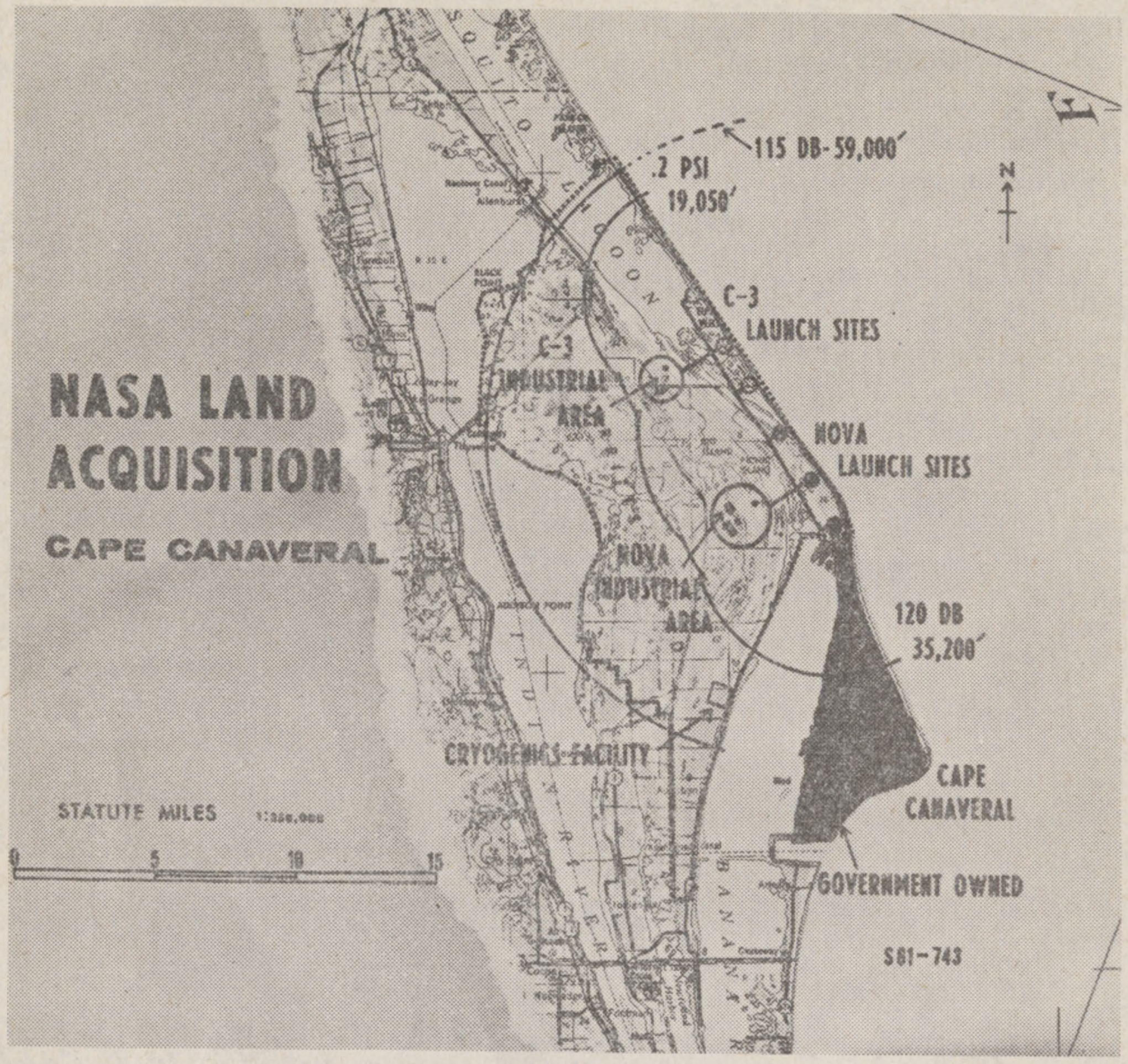

Canaveral launch area can handle all missile and space launches except those requiring polar orbits. I was informed, and statistics were presented to me for review which confirmed, that today's launch rate could be greatly increased without additional facilities or instrumentation systems. The Atlantic Missile Range operates a standard 17-hour day, 5 days per week for launch and launch support tests, but major tests are not scheduled each working hour. A 24-hour, 7-day operation would increase the launch capacity at AMR, although this does not appear to be necessary at the present time.

In 1962, the salary of the Pan American vice president, Richard Mitchell, was $30,000 plus a bonus of $12,000. His deputy, R. L. Yordy, who is general manager, received a salary of $20,000 plus a bonus of $2,000. The operations manager, C. L. Ellis, received a salary of $18,500 plus a bonus of $1,500 and R. M. Barnes, manager of range development, received $19,000 salary and $1,000 bonus. Other Pan Am officials at Cape Canaveral receive salaries within the pay ceiling of the regular Government salary structure.

At my request, I was again briefed by Air Force and Pan American personnel on the transfer of certain RCA employees to Pan Am. This transfer was underway at the time of my previous visit. The transfer had been made in accordance with an Air Force plan under which Pan Am would assume more of the functions performed by the subcontractor. The plan had as its objectives a minimum of duplication

of effort in certain planning and reporting functions, the elimination of any area of potential conflict of interest, the provision of single-line operating responsibility, and the reduction in engineering requirements by increasing "outside" contracting, by project, for engineering services. Pan Am had been requested to begin the transfer on or before June 30, 1960. The transfer was actually completed 45 days earlier. Approximately 125 RCA engineering and planning engineers transferred to Pan American. The balance of the affected employees (about 150) were either transferred to unfilled operating positions within the subcontractor's organization at AMR or transferred to other locations of the company. Very few of the affected employees refused reassignment to the other work and actually resigned from the subcontractor's employment.

My review of the record of the planning and engineering accomplishments at the Atlantic Missile Range since my last visit indicates that these activities have been performed in an excellent manner. There was no disruption in the contractor's performance as a result of the transfer of employees from RCA, and a considerable economy in operation was achieved. I have concluded that the Air Force's decision in this matter was a sound one.

The Presidential address to Congress on May 25, 1961, defined the landing of a man on the Moon and returning safely to Earth within the decade as a national goal. In furtherance of this effort, the Department of Defense and the National Aeronautics and Space Administration were directed to provide the planning necessary to insure proper combination and application of resources to accomplish the objective during 1967.

The commander of the Air Force Missile Test Center was designated to provide for Department of Defense planning. Under his direction the Atlantic Missile Range has been engaged in this work since early June of 1961. This work will increase in size and scope during the fiscal year, demanding a complete review of range resources and lunar program needs based on current estimates of the state of the art of missilery and instrumentation covering a 7-year period into the future. The magnitude of the studies involved has dwarfed all previous missile support planning work by comparison. Also, and more than ever before, the final success of this program will be measured in terms of time.

Planning will completely embrace the analysis of all factors regarding launch needs and methods and procedures for the execution of manned lunar launches, assuming a direct flight to the Moon using solid NOVA vehicles for lunar landings, and a parallel or alternate orbital operation using SATURN C–3 and liquid NOVA as vehicles.

Immediate and primary efforts have been given to preparations of the initial plans to go forward to NASA and the Department of Defense. Studies now in progress essentially compare the several alternative solutions to the problems of launch area construction and logistic buildup. Continued work during this fiscal year involves engineering and logistic studies regarding launching sites, considering safety hazards caused by blast and sonic effects of considerably heavier boosters than previously used, and the availability and costs of the enormous logistic support needed. Examples of such studies include launch complex and land needs, missile handling, fuel support, utilities, buildings, equipment, instrumentation, communications and

transportation needs (vehicles, roads, canals, and railway support). Associated problems include geographical locale, site accessibility, terrain, geology, land preparation, meteorology and climatology, electronic atmospheric conditions, sources of labor, land acquisition, instrumentation systems, and facility siting. Followup planning must also provide for worldwide tracking and command stations, comprehensively delineating the instrumentation and global range problems and solution proposals.

In my initial report of June 27, 1960, I indicated my acceptance of a recent DOD management study conclusion that Pan Am contract management had not been significantly more expensive than alternative management arrangements, and that it had probably been more effective. I also stated my belief that, in general, the AMR was then being satisfactorily managed and operated. Furthermore, I recommended that the existing AMR management arrangements be kept under close and continuing watch by the committee and its staff, with special attention to management costs and efficiency of operation.

On the occasion of my second visit, at my request, I was briefed by the Air Force regarding the scope and results of DOD efforts in this regard during the intervening period of 1½ years since my last inspection of Cape Canaveral. This briefing disclosed that there had been no less than five related high-level DOD studies having to do with the efficiency and economy of the range contractor method of operation. These several investigative actions had culminated in a decision in August 1961 by the Secretary of the Air Force that the prime range operations contract held by Pan Am should not be placed on a competitive basis before fiscal year 1964, but that certain actions should be taken in fiscal years 1962 and 1963 which would broaden the base of Pan Am's subcontractual operations without adverse effect upon test programs.

From my own review of the considerable documentation in support of the findings and conclusions presented in the DOD management studies, I am convinced that the Air Force Secretary's decision to continue the present form of Air Force management and operation of the AMR was a sound one. As a second appendix to this report I have included a more detailed résumé of this subject.

During the course of my inspection, I was again impressed by the extraordinary effectiveness of the system which has been evolved at the Air Force Missile Test Center to provide the integrated land-sea-air facilities and services necessary to assure maximum responsiveness to users of the Atlantic Missile Range. Under this unique system, pioneered at the AFMTC, the commander, Maj. Gen. Leighton I. Davis, has complete and centralized control over all of the integrated military, civil service, and range contractor activities engaged in the development, operation, maintenance, management, and logistical support of the AMR. This vital centralized control includes the exercise of full procurement authority since both procuring contracting officer (PCO) and administrative contracting officer (ACO) functions for the center and the AMR have been delegated to him by the Air Force Systems Command. This centralized control provides General Davis with the economies and efficiencies derived from industrial (range contractor) flexibility without relinquishment of certain essential Air Force military or command controls and operations. In my opinion, this single center commander

managership over all of the land, sea, and air elements which go to make up the overall AMR operation is crucial to the timely and successful accomplishment of this Nation's missile and space programs; and I believe that any actions which might splinter off or otherwise weaken this effective control over the AMR operational complex would be ill advised and could prove disastrous.

CONCLUSIONS

In my opinion, General Davis and all Air Force people, Dr. Debus and all NASA people, deserve to be commended for the outstanding job they are doing at AMR. Also, Pan Am and RCA deserve to be complimented for their able assistance to the Air Force, Army, Navy, NASA, and other Government agencies in providing support to this Nation's space and missile testing programs. As I stated in my last report, the primary motivation of both Pan Am and RCA in accepting and conducting their contract operation of AMR has been patriotism, and the profit motive has been decidedly secondary. This conclusion is borne out by the fact that while the contract dollars have increased because of the additional workload, the amount of the Pan Am fee has not been increased one dollar. Even at the time of my previous inspection, the percentage rate of the fixed fee was considered low, at 2 percent. The general and administrative costs of RCA have also been established at an amount not to exceed a certain dollar ceiling, subject to Government audit.

I have carefully reviewed the AMR operations which have been conducted since the time of my initial inspection of Cape Canaveral in May of 1960. In so doing, I have sampled past performance in terms of ability to accomplish projected tasks with success and dispatch. In general, I am still of the belief—which I expressed in my first report of June 27, 1960—that the management and operation of the AMR are highly efficient and effective. Both costs and efficiency of operation are being most effectively scrutinized and controlled. I therefore recommend that there be no change in the existing Air Force method of managing and operating the AMR.

APPENDIX I

Air Force Management of the Range Contract

In accordance with the recommendation made to the committee in my last report, on this visit I gave special attention to Pan Am costs as reflected in the Air Force management of the range contract. A careful review of the official "Memorandum for the Record" (covering the Air Force evaluation of Pan Am's proposal for the operation and maintenance of the AMR for the fiscal year 1962) revealed that, by means of an eight-stop "scrub-down" negotiating procedure, the contractor's original estimate of $108,927,000 was reduced to a figure of $98,490,000, a saving of $10,437,000. This procedure, conducted by a centralized and effective PCO (procuring contracting officer)/ACO (administrative contracting officer) relationship, assures reduction of the contractor's proposal to the maximum extent possible without jeopardizing the support of missile test programs. All the AFMTC agencies participate in this procedure by specifically reviewing functions and costs assigned their respective segmented area of responsibility for surveillance of the contractor's performance, and submit recommendations to the ACO for his consideration in the negotiating process. In addition the ACO conducts reviews and manpower surveys of each of some 30 of the contractor's functional work areas, thus assuring a sound businesslike basis for entering into the negotiations.

AFMTC agencies, for their respective areas of surveillance, directly instruct the contractor by means of written communications with copies to the ACO for his approval concerning contract provisions. This procedure permits expeditious performance without the loss of time which would occur if all instructions were furnished through the ACO, and yet without compromising the ACO's responsibility for the administration of the contract. In February 1961 a system of performance reports was established under which any range user could report directly to Richard Mitchell, Pan Am vice president, any instances of unsatisfactory support from Pan Am, so that immediate corrective action might be taken. To date no such unsatisfactory reports have been submitted.

I reviewed the costs of fixed-fee and general and administrative expenses of Pan Am and RCA. The fee of 2 percent is unusually low for contracts of this type, especially considering the fact that the contract is complex and difficult to administer, and involves many diverse elements (technical, logistic, procurement, planning, marine, development). The PCO and ACO have progressively achieved greater control of G. & A. expenses since 1957 and have achieved a steady reduction in the percentage value of G. & A. for both Pan Am and RCA. This is accomplished by a most searching scrutiny of elements of G. & A. costs and a realistic position in reviewing the acceptance of the contractor's justification for such costs. Pan Am's percentage for G. & A. has been reduced from 2.04 percent for fiscal

year 1957 to 1.14 percent for 1962. RCA's percentage has been reduced from 4.03 percent in 1957 to 1.82 percent in 1961, with an agreement by RCA that the maximum figure will be $750,000 for any one annual period. Pan Am has likewise agreed to a maximum of $950,000 for any one year.

In a review of cost impacts of our national ranges, conducted in 1961 by the Office of the Assistant Secretary of Defense (Comptroller), it was concluded that, generally speaking, average annual costs resulting from the use of contractor resources were lower at AMR than at either the Pacific Missile Range or the White Sands Missile Range. In downrange operations resulting from the use of contractor resources, cost impacts were substantially lower at AMR than at PMR. A principal factor resulting in lower costs at AMR is that the prime contractor finds it incumbent because of overall union relationships to maintain pay scales for its personnel assigned to AMR in conformity with those paid throughout the operating divisions of its commercial operations. Another significant factor is that the commanding officer at the AMR, acting as the contracting officer, is in complete control of contractual relationships. The effectiveness of this control is indicated by the reduction in overhead and fee costs which has resulted over the years.

In summary, the Air Force management of the range contract, through a centralized PCO/ACO relationship, continues to be effective and certainly in the best interests of the Government, which controls but does not hamper the contractor or interfere with his assigned responsibilities for the operation and maintenance of the AMR.

APPENDIX II

Continue Present Form of Management

The primary mission of the Air Force Missile Test Center is to develop, operate, and maintain a research and development test range (Atlantic Missile Range—AMR) for the Nation's missile and space programs. To accomplish this mission in the most efficient and economical manner, it has been Air Force policy since 1953 to manage and operate the AMR for the Department of Defense through the employment of a suitable proportion of military, civil service, and range contractor people.

Primarily, the range contractor's responsibility is to operate and maintain the AMR. Overall management of the range remains an Air Force responsibility, with the range contractor assisting in the carrying out of technical analyses, including the making of recommendations with respect to certain elements of the test programs. The range contractor does not make decisions as to these programs. Such decisions are made by the Air Force.

The range contractor workforce increases Air Force operational efficiency by providing research and development know-how which is militarily either in extremely short supply or altogether unavailable. This permits the concentration of military and in-house skills on AMR activities which the Air Force should, for effective control, perform itself—such as test scheduling, range safety policy, and approvals including flight launch and termination decisions and actions, and operation of AMR support aircraft. Increased effectiveness is also derived from the continuity of effort provided by range contractor people, as opposed to the loss of skills normally due to the rotation of military people. Further increased effectiveness results from the greater flexibility inherent in the range contractor's operations. This flexibility is found in his use, hiring and firing, and promoting and paying of people. It is also noted in his acquisition of certain supplies and equipment needed to discharge his responsibilities under the range contract.

In a given period, the range contractor's people devote more of their time to the accomplishment of the prime AMR operational and support mission than do the military. For example, range contractor people are not required to perform KP duty, officer-of-the-day duty, drills, and parades, all of which interfere with the performance of routine duties by the military. Similar savings are noted in comparison with civil service people; and are also realized through the use of streamlined administrative procedures on the part of the range contractor—savings which are possible only in nongovernmental agencies.

A third justification for the use of a range contractor encompasses both effectiveness and economy. Owing to the nature of missile and space vehicle testing, there is little or no requirement in the combat commands of the Air Force for many of the unique skills required to operate and maintain the AMR. It therefore follows that the

types of AMR work performed by the range contractor and his several subcontractors are not only especially suitable for contractor operation, rather than military operation, but are definitely unsuitable for military operation from the standpoint of conservation and effective use of military manpower (always in short supply).

The present range contractor arrangement for development, operation, maintenance, and management of the AMR for the Department of Defense has been arrived at through an evolutionary process extending back over 11 years to 1949—an operational experience greater than that of any other range. It would not seem prudent or desirable to change over from the present single range contractor arrangement, which has proved eminently satisfactory in performance. Among the serious adverse effects which could and probably would result from any such changeover are disruption of operations, increased costs, introduction of a major recruiting problem, and the impact of military rotation.

The soundness and effectiveness of the present form of Air Force management of the AMR with the assistance of a prime range contractor and several subcontractors has been attested to by several high-level governmental investigative groups which have evaluated it within the past year and a half. The consensus of their conclusions was expressed in a July 5, 1960, report on management and operation of the Atlantic Missile Range prepared by Mr. Spencer M. Beresford, special counsel for the Committee on Science and Astronautics, U.S. House of Representatives, as follows: "To put the range under a different contract manager or form of management would be disruptive and expensive, and might further delay the national space and missile program."

The foregoing conclusion that the present form of AMR management should be continued is supported by no less than five related Department of Defense studies having to do with the efficiency and economy of the range contractor method of operation.

The first of these studies was that of the Advisory Group on Ranges and Space Ground Support, which was formed in April 1960 to advise the Director of Defense Research and Engineering on the management aspects of ranges and space ground support activities. The report of this group ("Cisler Report") discussed the advisability of having the range contract bid on some other basis than the existing negotiated estimates of a cost-plus-fixed-fee (CPFF) type of contract, and raised a question as to the desirability of changing the CPFF type contract to a cost-incentive contract.

In response to a specific request from the Cisler group, the second study—a management cost analysis—was prepared by Mr. Lee Harding of the ASD Comptroller's staff, with the objective of establishing the cost impacts of missile range management policy. The results of this management cost analysis indicated the need for a review of the contracting procedures and organizations at the three national test ranges. Other major conclusions were as follows:

(1) That some types of contract, in which the parameters have become reasonably well-known and defined, might well be shifted to other types of contracts such as fixed price, fixed price incentive, or cost incentive as a means of reducing the present high cost of operations;

(2) That while some adjustments appeared to be desirable, no significant reasons had been advanced for changing either the present three-service arrangement for managing the ranges, or the basic military service-civil service-contractor arrangements in existence at the three ranges.

The report pointed out that this latter conclusion did not preclude further management changes to make the three ranges more compatible as to instrumentation, procedure, and management.

The report included the following recommendations:

(1) That, until the need had been established, the existing military and civil service forces should not be expanded to operate additional stations or large increments to existing facilities.

(2) That the Director of Defense Research and Engineering should request an ad hoc committee of the three principal ranges to review the management cost analysis model developed by the staff of ASD (Comptroller); and

(3) That the report of the ASD (Comptroller) staff on the management cost analysis should be forwarded to the services for comment and implementation.

The third study was that of a special group which was organized in April 1961, at the request of the Assistant Secretary of the Air Force for Financial Management, Hon. Lyle Seaver Garlock. Mr. Garlock, in approving a determination and finding for the fiscal year 1962 PAA/RCA contract for operation and maintenance of the AMR, had indicated that a question of continuing operation of facilities such as the AMR over an extended period of time was to be reviewed. To facilitate this review, the special group was instructed to be prepared to discuss the following:

(1) The program that might be followed whereby the operation of the AMR for fiscal year 1963 could be made subject to competitive bids, including the possibility of separating the operation into two or more contracts;

(2) The various facets of the range contract such as electrical accounting machine rentals, local purchase, supplies and equipment, reimbursements from other services and civilian agencies, maintenance and repairs of facilities and equipment, and other individual functions included in the existing PAA/RCA contract arrangements.

The fourth study consisted of a personal inspection of the AMR, including a review of its range contract management aspects, conducted in May 1961 by the Secretary of the Air Force, Hon. Eugene M. Zuckert, and the Assistant Secretary of the Air Force for Materiel, Hon. Joseph S. Imirie. As a result of this inspection and review, Mr. Imirie reaffirmed continuation of the special group initiated by Mr. Garlock and in a June 5, 1961, memorandum to the Air Force Chief of Staff directed that the group should—

(1) Completely evaluate the pending contract with Pan American covering the fiscal year 1962 operations;

(2) Place particular emphasis on justification for fee, justification for overhead rates, the possibility of broadening the subcontracting base, and the advisability of direct Air Force contracting for major portions of the existing range contract operations;

(3) Base its evaluation of the foregoing on the decision that

the fiscal year 1963 as well as the fiscal year 1962 prime contract would have to go to Pan American to avoid disruption of the range operation during a critical period; and

(4) Determine whether the range could ultimately be placed on a competitive basis.

The fifth study was that covered by the final June 26, 1961, report to Mr. Imirie of the special study group initiated in April 1961 by Mr. Garlock. This study and report culminated in the following August 9, 1961, memorandum from Mr. Imirie to the Air Force Chief of Staff under the subject of "Competition on the AMR Contract":

> Based on recent investigations by Mr. Zuckert and myself, we conclude that the prime operations contract on the Atlantic Missile Range, now held by Pan American World Airways, should not be placed on a competitive basis before fiscal year 1964. The recently accelerated national space program will place such heavy requirements on the range that any jeopardy to the effectiveness of range operations and development through the unsettling effects of the competitive process and of a possible change in prime contractor, must be avoided in the national interest. This conclusion is based upon the special circumstances now surrounding the AMR and does not change the general Air Force policy that participation in Air Force contractor-performed activities should be open to as broad a segment of industry as is possible. The commander, Atlantic Missile Range, must continuously seek to introduce competition into range contract operations whenever there is reasonable chance of improving economy or efficiency of the operation thereby. In addition, the issue of competition on the prime contract after fiscal year 1963 will be assessed periodically. A task group appointed by my office with representatives from Headquarters USAF, the Air Force Systems Command, and the Air Force Missile Test Center has determined that certain actions might be taken in fiscal year 1962 and 1963 to introduce competition into elements of the range contract with small risk to mission effectiveness. The following actions recommended by the task group are considered to be straightforward and should be implemented on the schedule indicated unless there are cogent reasons to the contrary: (*a*) Place the security guard functions on the AMR under competitive subcontract by PAA no later than fiscal year 1963; (*b*) place the test equipment standards laboratory on competitive subcontract by PAA in fiscal year 1963. In addition, the rental of scientific electronic data processing equipment should be placed on direct contract by the Air Force by October 1, 1961. Other functions were identified by the task group as being susceptible to competition through subcontract or direct Air Force contract. Various complications in such matters as labor relations, costs, and possible implications to mission performance, make action on these items less straightforward. The commander, Atlantic Missile Range, should be charged to make a final decision regarding contractual change on these functions based on his own analysis of the situation

but consistent with the policy stated in paragraph 2 above: (*a*) Cape Canaveral commissary; (*b*) Cape Canaveral communications switchboard; (*c*) Cape Canaveral janitorial services; (*d*) photographic laboratory; (*e*) vehicle maintenance.

The foregoing instructions of the Assistant Secretary of the Air Force for Materiel were in the process of implementation at the time of the inspection covered by this report.

APPENDIX III

What Are the Plans Now Projected by the Atlantic Missile Range?

Continuous planning is performed by the Atlantic Missile Range to accommodate missile and space programs which are scheduled to use the range facilities. The programs now being planned include the manned lunar landing (NOVA), Advent, Dyna-Soar, Vela-Hotel, Tabstone, Mariner, Saint, Surveyor, Titan III, Phoenix, Voyager, Saturn C–3, and Prospector.

Advanced planning (5 to 15 years ahead) is conducted to accommodate programs beyond the firm requirements stage. This type of planning is limited to reviewing state of the art advancements having direct relation to the AMR mission, and to anticipating and predicting future AMR needs in instrumentation systems and facilities to provide sufficient leadtime for orderly funding, development, or procurement at the time requirements become firm.

Some of the planning actions now underway on the Atlantic Missile Range are listed below, divided between the manned lunar landing program and others.

1. Manned lunar landing program

To date the Atlantic Missile Range has accomplished the following actions relating to the manned lunar landing program:

(*a*) A joint NASA/DOD report on facilities and resources required at the launch site to support the NASA manned lunar landing program was published on July 31, 1961.

(*b*) A preliminary budget for the manned lunar landing program was approved as of October 26, 1961.

(*c*) Programing documents, DOD Forms 33 and 161, in support of the preliminary budget, were submitted on November 2, 1961.

(*d*) The associated advanced communications electronics requirements plan (ACERP) was submitted on November 1, 1961.

(*e*) A preliminary siting plan for the launch complexes and mission support facilities has been prepared.

(*f*) A preliminary siting plan for associated instrumentation facilities has been prepared.

The fiscal year 1962 Atlantic Missile Range effort will be limited to the following functions:

(*a*) Preparation and maintenance of a site location plan for all facilities and instrumentation systems on manned lunar landing program land.

(*b*) Selecting actual site for mission and support facilities.

(*c*) Preparing design criteria for all land improvements and range support facilities.

(*d*) Designing, developing, and procuring all communications, range instrumentation, and range support equipment.

(*e*) Performing security and fire protection services on the manned lunar landing program land.

(*f*) Maintaining vehicle equipment used in support of manned lunar landing program activities.

(*g*) Performing engineering studies for required telemetry, data handling, timing, and firing systems.

(*h*) Performing engineering studies for required trajectory measurement systems.

(*i*) Planning for range safety.

(*j*) Conducting studies for meteorology needs.

(*k*) Performing engineering studies for required communications, command control, and frequency control and analysis systems.

(*l*) Conducting studies for engineering sequential optics and documentary photographic systems.

(*m*) Preparing a launch support plan for the orbital rendezvous approach.

(*n*) Preparing a global range communications plan.

(*o*) Initiating studies for a launch abort rescue plan.

(*p*) Performing site surveys in support of design criteria.

(*q*) Developing criteria for design of propellant handling, storage, and disposal.

2. Other

(*a*) Development of an instrumentation system to measure velocity accuracy to 0.03 foot per second or better for the first few hundred feet of flight and to 0.1 foot per second up to 100,000 feet in altitude. The data provided by this system will allow computation of the lift-off mass and thrust of the vehicle and will evaluate engine and control system performance and determine the aerodynamic characteristics of the missile. Two concurrent studies will be made, one using infrared tracking with an infrared beacon; the second will investigate the use of a nuclear radiation ranging system.

(*b*) Establishment of a new telemetry receiving station to be the focal point of all telemetered data received on the Atlantic Missile Range.

(*c*) Replacement of M–45 and M–51 gun mounts used as camera mounts with a new tracking camera system designated the mobile optical surveillance tracker (MOST). This system is being developed for remote control operation inside the hazard area of large boosters.

(*d*) Installation of magnetic tape recording systems which have the bandwidth needed to record and reproduce high resolution television images. This system will replace some motion picture cameras, reduce the volume of film to be processed, and reduce the time for results to be viewed.

(*e*) Installation of the Azusa MK1 trajectory measurement system at Grand Bahama Island to support the Polaris program.

(*f*) Installation of a new baseline interferometer system (MISTRAM) at Eleuthera for trajectory measurements for the Minuteman missile.

(*g*) Final development and checkout of the MISTRAM system under construction on the Florida mainland to provide trajectory measurements for Titan and Minuteman.

(*h*) Installation of AN/TPQ–18 and AN/FPQ–6 radar at Patrick Air Force Base and Grand Bahama Island to increase the tracking range.

(*i*) Development of a new trajectory measurement system capable of measuring velocity to an accuracy of 0.01 foot per second at a range of 500 nautical miles.

(*j*) Installation of an 85-foot diameter parabolic autotrack antenna at Grand Bahama Island to replace a manual track trihelix antenna now in use. The present system is marginal for solid propellant missiles because of the effects of flame plasma.

(*k*) Development of a new tracking telescope with larger aperture and longer focal length to obtain images of a size and quality not now provided by the ROTI (recording optical tracking instrument) and IGOR (intercept ground optical recorder) systems now in use.

(*l*) Investigation of the feasibility of carrying an airborne optical system above a large part of the degrading effects of atmospheric absorption, scattering, scintillation, and refraction.

(*m*) Installation of a tracking telescope aboard a C–130 aircraft.

(*n*) Development of small computers for installation at Cape Canaveral, Patrick Air Force Base, Grand Bahama Island, San Salvador, Puerto Rico, and Antigua to aid in the selection of the source of the best quality of radar data and to provide multiple data inputs to the impact predictor computer at Cape Canaveral.

(*o*) Development of improved data-handling systems to handle more precise tracking information. The angle information will increase from 17 to 19 bits per word, and the sampling rate will increase from 10 pulses per second to 20.

(*p*) Installation of backup facilities with failure switchover capability for the real-time computer.

(*q*) Development of the supervisory control system on the underwater cable to give a greatly increased status reporting and switching capability and to reduce the operating time delay from 1 to 2 seconds to 1 millisecond.

(*r*) Development of a flight control center to meet the powered flight needs of missiles launched from Cape Canaveral. The use of a common flight control center will drastically reduce costs of checkout, launch, and coverage of the vehicle during powered flights. The center will provide for multiple operations.

(*s*) Development and installation of a SHF command control system to meet the needs generated by the higher accelerations and velocities of the newer vehicles.

(*t*) Development and installation of new surveillance receivers to provide protection for electronic equipment that is more sensitive than −75 decibels per minute or operates above or below the frequencies between 540 kilocycles and 10.7 kilocycles.

(*u*) Installation of vlf/LORAN-C to replace the correlation channel of the submarine cable to provide synchronization of range timing of 100 milliseconds and development of a timing system to provide synchronization to 10 microseconds.

(*v*) Establishment of a meteorological laboratory at Cape Canaveral which will accept data from field sources, process the data, and display the results for rapid determination of the weather along the powered flight portion of the ballistic trajectory of a vehicle.

(*w*) Improvement of the existing intercommunications system (MOPS) by replacing the system with a more flexible and reliable system (MITOC).

(*x*) Installation of improved hf, vlf, uhf, microwave, and tropospheric scatter communications systems on the Atlantic Missile Range to meet range communication needs.

(*y*) Planning for the transmission of real-time telemetry data from Ascension and Mauritius to Cape Canaveral during midcourse portion of vehicle flight.

(*z*) Installation and operation of AN/FPQ–6 radar at Antigua.

(*aa*) Installation and operation of AN/TPQ–18 radar at Ascension.

(*bb*) Continued development of the mobile impact and terminal instrumentation system (mobile Atlantic range stations).

(*cc*) Development of a new airborne telemetry antenna system providing 10 decibels of gain capable of manually tracking a target.

(*dd*) A study on the problem of reentry blackout to determine the dependence of plasma attenuation on nose cone shapes, reentry velocities and frequencies.

(*ee*) Installation of a computer at station 13, St. Lucia, and two other stations (classified) to aid in the acquisition of vehicle track. Each station will have the capability to update orbital parameters and transfer this information to the next station.

(*ff*) Development of a remote control status reporting system in the impact areas.

(*gg*) Development of a mobile spectrum surveillance facility for impact areas.

(*hh*) Development of an improved, expanded, and calibrated missile impact location system.

(*ii*) Planning for a global range development comprised of all the national ranges with compatible instrumentation, integrated communications, and unified operations.

(*jj*) Planning instrumentation and support facilities for "parking orbits" and "rendezvous" techniques planned for use in space exploration.

(*kk*) Planning for instrumentation and support facilities for the successful injection of a vehicle into synchronous orbit with the Earth.

(*ll*) Planning an advanced computer system capable of providing inventory and stock control for 300,000 line items stocked in over 50 locations on the Atlantic Missile Range.

(*mm*) Continuing review of operations requirements and directives with the aim of eliminating redundant instrumentation.

(*nn*) Constant surveillance of all supporting programs to insure maximum use of manpower and facilities in accomplishment of the range mission and prevent generation of any unnecessary expense.

(*oo*) Further shortening of the data acquisition and reduction cycle by developing instrumentation and recording data in digital form for automatic reduction by a central computing facility with resultant economies of time and manpower.

(*pp*) Reduction of the number of instrumentation systems that produce data on film so that the need for photo lab processing and attendant loss of time may be eliminated.

(*qq*) Establishment of infrared tracking techniques in terminal areas to determine radiation patterns emitted by bodies upon reentry.

(*rr*) Accomplishment of radar cross-section measurements on reentering bodies.

(*tt*) Preparing specifications for and engineering the accommodation of the exotic fuels required for future programs, and establishing safe handling techniques for their use.

(*uu*) Development of data compaction techniques.

(*vv*) Development of an upper air observation system that will not require balloon-borne packages. Development aims will be to obtain a rapid measure of the profile of temperature, humidity, wind velocity, and density directly over the observing station and up to altitudes of 400,000 feet.

(*ww*) Establishment of a secure command control coding system—exhibiting antijam, antispoofing characteristics for ground and airborne use.

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