INTRODUCTORY REMARKS ON 1964 OART FIELD INSPECTION

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The Field Inspection of Advanced Research and Technology in which you will participate today is based on programs sponsored primarily by NASA's Office of Advanced Research and Technology. This office, as indicated in figure 1, is one of three major offices in NASA Headquarters carrying both program and institutional responsibilities. The NASA Centers reporting institutionally to each office are indicated in the figure. All program offices report to NASA's General Manager and Associate Administrator, Dr. Robert Seamans. Any of the NASA Centers, however, may undertake programs or projects under the direction of a program office other than the one to which it reports institutionally. The inspection today, however, will be devoted to the programs and Field Centers coming under the jurisdiction of the Office of Advanced Research and Technology.

The Associate Administrator for the Office of Advanced Research and Technology is Dr. Raymond Bisplinghoff. This office carries an important and unique responsibility in the national aeronautical and space effort. It is responsible for the initiation of pioneering programs and projects in science and technology to further airborne and space flight. The feasibility and planning for future aircraft and spacecraft depends on knowledge obtained from such programs just as today's aircraft and spacecraft that have strengthened our country's defense and enhanced our national prestige came into existence only because a reservoir of scientific and technological knowledge was available to provide the base for sound development programs. The responsibility for seeing that the research required to feed that reservoir of advanced knowledge rests primarily with the Office of Advanced Research and Technology, or, as commonly abbreviated, OART.

The complete process of generating and creating new aeronautical and space technologies employs, of course, the resources of all the NASA program offices and Field Centers as well as the universities, research institutes, and industry. The OART office not only has the responsibility of pursuing programs under its immediate jurisdiction, but has been assigned the additional responsibility for the coordination of all allied activity to insure that there is no undesirable duplication within the total supporting research and technology activities of NASA.

The operating organization of the Office of Advanced Research and Technology is shown in figure 2. The office itself is organized in numerous divisions, each of which represents a distinct area of technology. You will notice that some areas, such as Aeronautics, are object oriented while others, such as the Electronics and Control Division, are more discipline oriented. The principal instruments by which the advanced research and technology programs of OART are carried out are the NASA Field Centers. The five Centers shown on the bottom of the figure are primarily research oriented and are managed institutionally by the Office of Advanced Research and Technology. These Centers carry out a large share of the OART programs through in-house activities and by contracts with universities and industry. The remainder of the program is carried out in similar fashion by other NASA Centers, the Jet Propulsion Laboratory of the California Institute of Technology, and by contract research

with universities and industry through the program offices. This is in keeping with the NASA policy for all major program offices to use strength and capability where it is to be found and thus make maximum use of special competence.

What then is the specific role or mission of a Field Center such as Langley? Briefly, the mission of the Langley Research Center, which may be considered typical of the missions of the other OART Research Centers, is indicated in figure 3. The first item pertains to broad and long-range programs in advance research and technology which are aimed at establishment of future mission capability. The scope of this item includes the generation of new ideas and concepts for accomplishing aeronautical and space missions and the conception, planning, and implementation of research equipment and facilities that may be required to implement the programs. In regard to this activity, the programs at each Center are planned to be complementary and to reflect specific interests and areas of unique competence not duplicated elsewhere. In the course of today's inspection you will see, in addition to examples of programs conducted at Langley, representative program exhibits from the Ames Research Center, the Lewis Research Center, and the Flight Research Center.

The second item in figure 3 concerns the manner in which the technical information generated from the research programs is made available to interested users. The technical results of investigations are reported in technical documents of one kind or another and constitute the principal outlet for NASA research. It frequently happens, however, that the pace of technological progress is such that on-going national aeronautical and space programs can utilize new information as soon as it becomes available, and more immediate dissemination of the information is required. Thus, special meetings and conferences are frequently arranged to provide more timely dissemination of the information. This has proven over the years - first as NACA and now as NASA - an extremely effective means of providing technical inputs to Government and industry. We attach considerable importance to the obligation of providing research advice and assistance to other NASA organizations, other Government agencies, such as DOD and FAA, as well as to industry. The scope of this item also includes the dissemination of information relative to our Technology Utilization Program.

In order to relate our programs here at the Langley Research Center with other parts of the nation's activities in aeronautics and space, we have found it helpful to catalog our activity within the framework of the underlying scientific disciplines as well as within the framework of its principal functional objectives. The pie chart in figure 4 is indicative of work going on at Langley in various scientific and technological fields. The slices of pie represent approximate proportions of our professional in-house manpower effort in the areas noted. At Langley the fields of aerodynamics, structures, mechanics of flight, and fluid mechanics obviously represent a major portion of our effort. A similar breakdown of technical field effort for other Research Centers would, of course, indicate a different specialty structure although some areas such as aerodynamics and fluid mechanics might be common to all Centers in varying degree.

You will recognize in the course of the inspection some of the programs in aeronautics and in space that are related to these specific disciplines. We have found that through the mechanism of a strong in-house and graduate educational program the engineers and scientists specializing in these disciplines are able to apply their knowledge and skills to the solution of problems in both aeronautics and space. The extent to which this role is practiced at Langley is illustrated in figure 5.

The pie chart shown in figure 5 indicates the distribution and variety of effort at Langley as it relates to principal end objectives. This represents the same professional effort as the previous figure but oriented toward end objectives. You will notice that in this aerospace pie chart over a third of our effort (shaded area) might be identified as aircraft oriented in the various specialties noted. The other divisions are more properly identified with space activity, although you will observe that the shaded area identified with aeronautics extends well into the manned earth satellite region and into the launch vehicle area. The reason for this is that some of the technological problems of a hypersonic air-breathing airplane are similar to those of a winged maneuverable reentry vehicle. Also, the structural problems of a winged recoverable launch vehicle and those of a hypersonic airplane require similar studies. Thus, the classification of our work here into these objectives is somewhat arbitrary and does, in fact, include items from other program offices. It should be noted that this distribution of effort is only for our activity at Langley and involves only in-house professional manpower effort. The distribution of funds associated with the programs involved in those areas would be different because the NASA policy has been to work closely with DOD in obtaining support for aircraft projects. Thus, the cost of aircraft used in our programs is usually not borne by NASA.

In the course of your visit here today, you will observe examples of OART programs being conducted here at Langley and at the other Research Centers that are oriented toward these objectives - and which involve the technical disciplines shown in figure 4.

In your program, you will see listed three stops pertaining to aeronautics: Low-Speed Aeronautics, High-Speed Aeronautics, and Aircraft Operating Problems. In addition, the exhibit in the hangar contains information on the aeronautical oriented programs being carried out at the Lewis Research Center and the Flight Research Center. You will also witness, weather permitting, a fly-by of a Boeing prototype 707 aircraft equipped with a blowing boundary-layer control flap. This aircraft will fly by at about 100 mph - a remarkably low speed for an aircraft of its size and performance. The purpose of this program will be discussed at the stop on aircraft operating problems.

Allied with the aeronautical programs is the stop on hypersonics and reentry. We believe you will find the problems and programs discussed there of major significance to our future aeronautical and space programs.

There are three stops relating to aircraft and spacecraft structures - and their behavior under dynamic conditions. These stops are identified at Structures and Materials, Hypersonic Structures Facilities, and Launch Vehicle

and Spacecraft Dynamics. Of particular interest here is the manner in which the techniques and methods that have proven to be such powerful tools for the analysis of aircraft structures are now being applied here with gratifying success to the dynamical structural problems of launch vehicles and spacecraft.

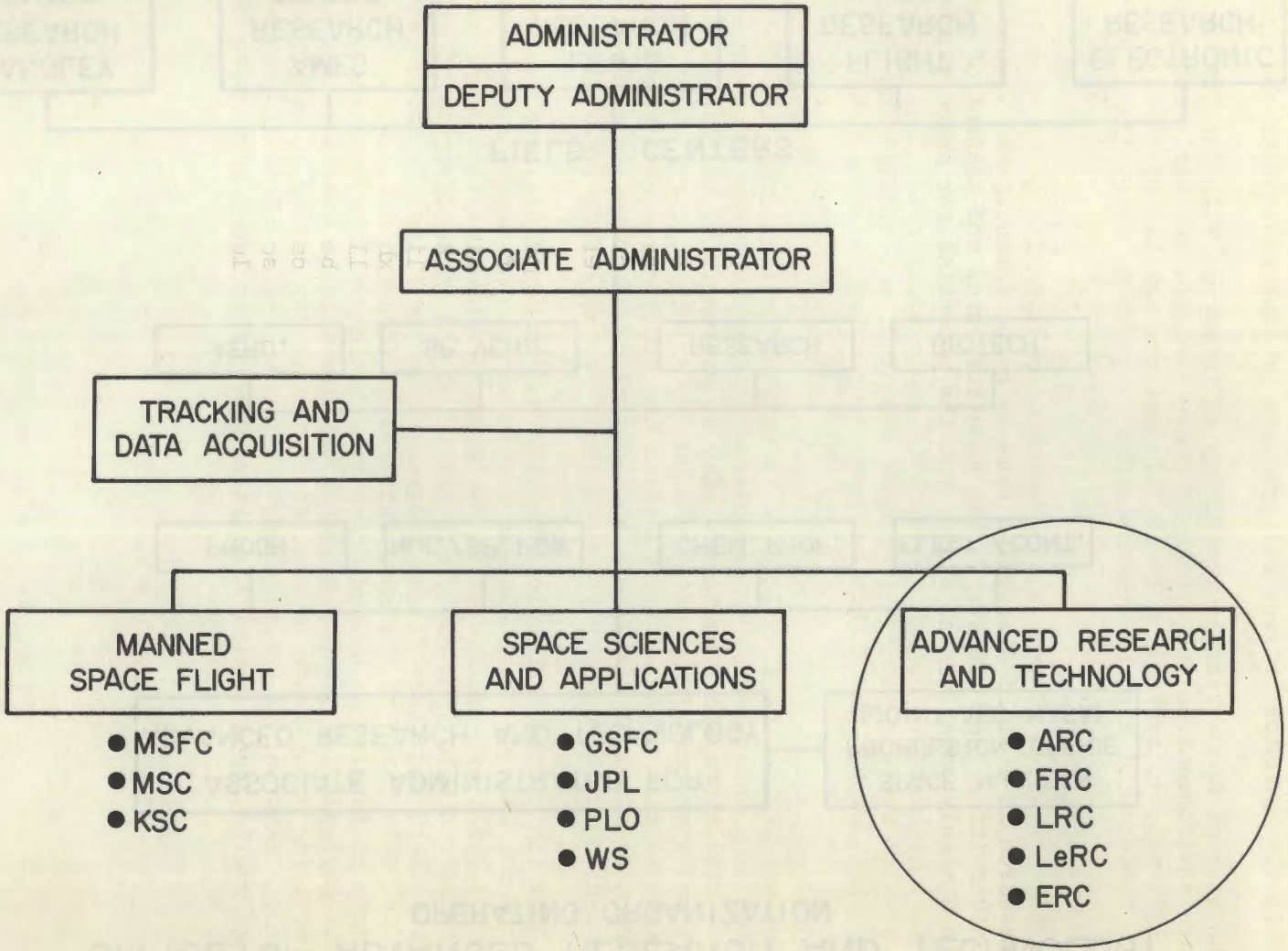
The stop on Space Vehicle Technology is concerned with the influence of the space environment on the design of space vehicles and their subsystems such as the life support system. A basic life science exhibit prepared by the Ames Research Center will also be available for inspection, after lunch, in the hangar.

We have included a stop called Magnetoplasmadynamics as an example of basic research in a field discipline that is being investigated vigorously by NASA, universities, and industry. The behavior, use, and control of plasma is still in a highly experimental state, but the potential for space flight application seems attractive enough to warrant continued effort. The Lewis Research Center is also heavily engaged in plasma research, especially from the viewpoint of space propulsion. An exhibit on space propulsion is on display in the hangar.

The last two topics I would like to call attention to are the Space Flight Simulation stop and the stop on Computers in Aerospace Research. These two devices - simulators and computers - play an extremely vital role in our aeronautical and space programs. It would be impossible to carry on effective programs in certain areas of aeronautical and space research without their use. There are many kinds of simulators and many kinds of computers. These two stops have been planned to acquaint you with their use and effectiveness.

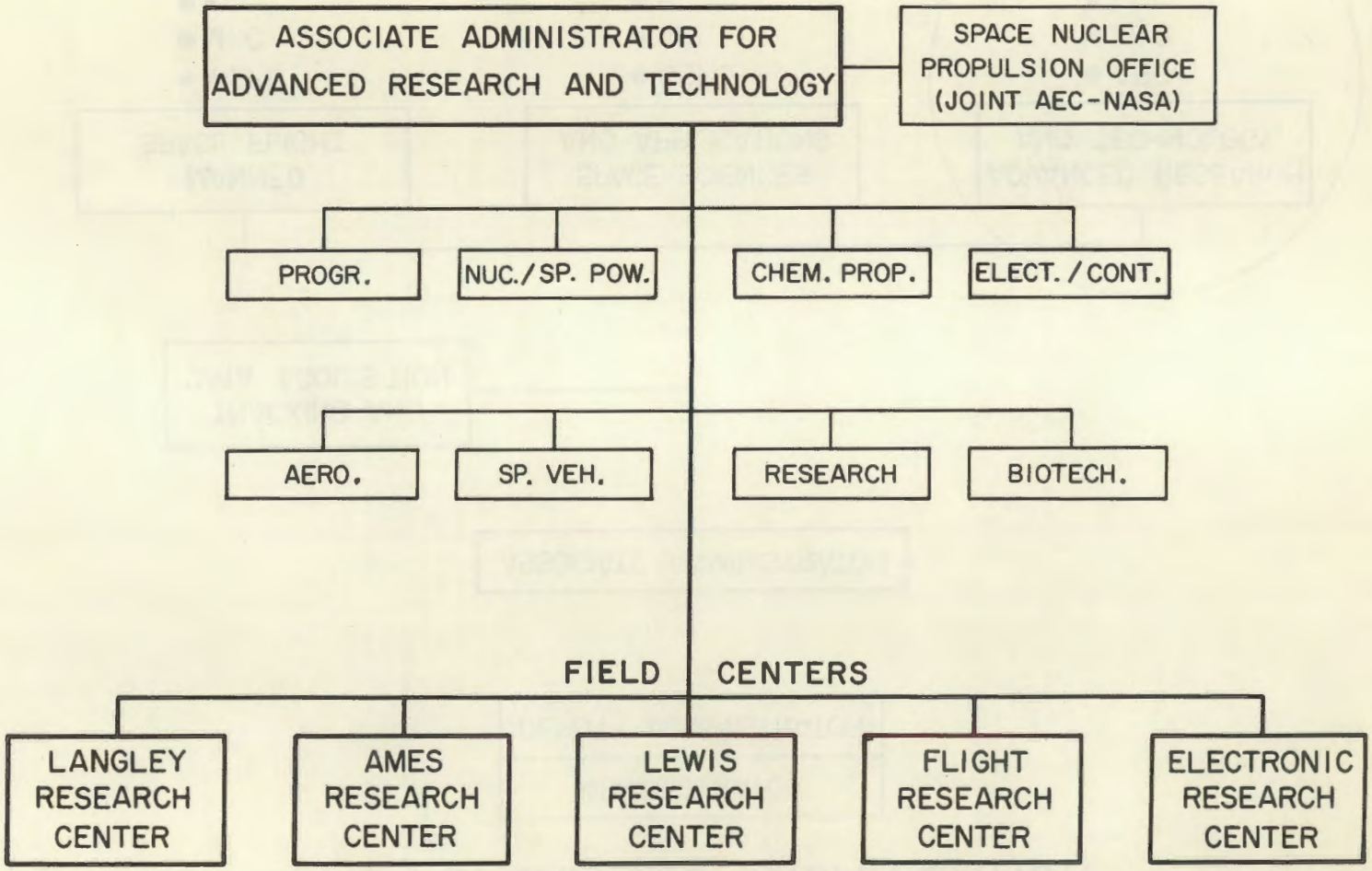
In addition to the scheduled discussions and demonstrations we have on display in the Langley flight hangar a wide variety of exhibits of scientific and technological programs relative to NASA's aeronautical and space activities. Life science exhibits from Ames, air-breathing and rocket propulsion exhibits from Lewis, X-15 and other flight programs from the Flight Research Center at Edwards are only three of the many features of this exhibit. Work being conducted here at Langley in advanced instrumentation will be on display. Numerous satellite payloads for the Scout launch vehicle will be available for inspection, including a duplicate of the international payload Ariel recently launched from Wallops Station. A Scout launch vehicle will also be on display. We encourage you to spend as much time as you can after lunch inspecting this exhibit.

NASA OPERATING ORGANIZATION



OFFICE OF ADVANCED RESEARCH AND TECHNOLOGY

OPERATING ORGANIZATION



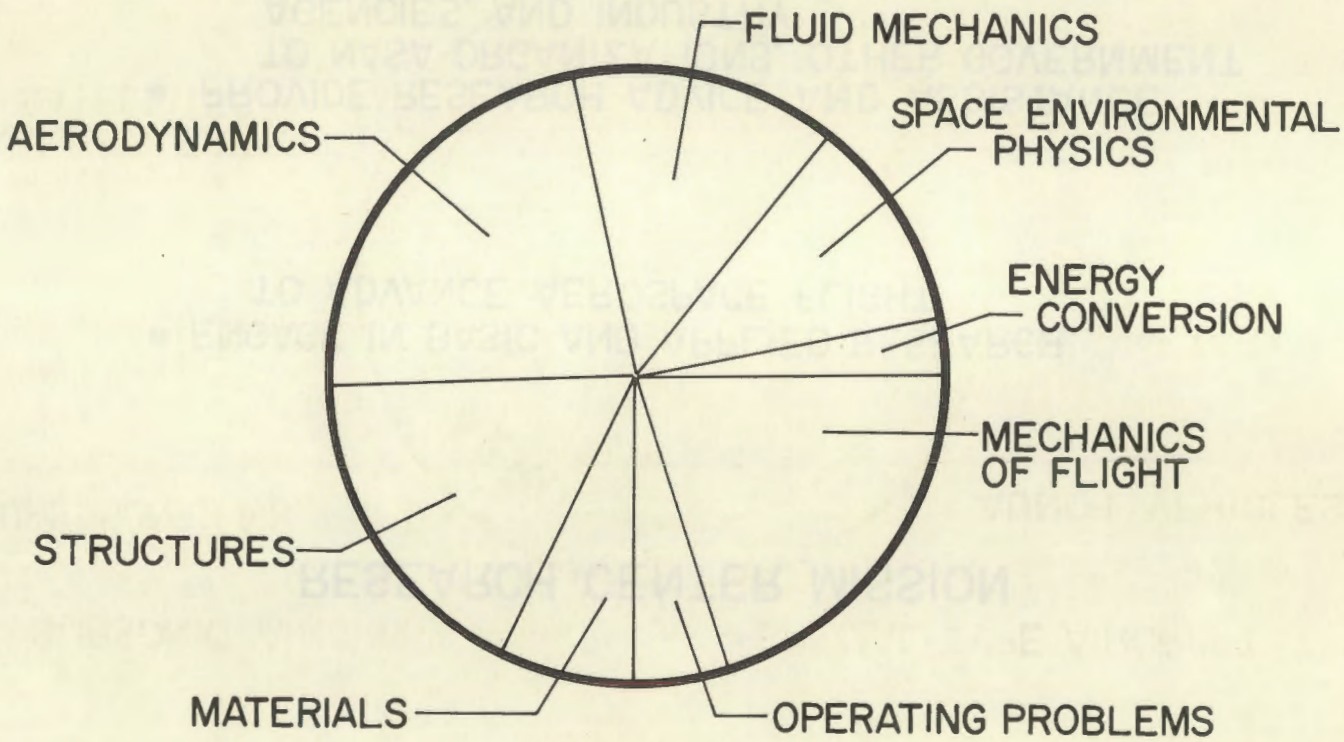
RESEARCH CENTER MISSION

- ENGAGE IN BASIC AND APPLIED RESEARCH TO ADVANCE AEROSPACE FLIGHT

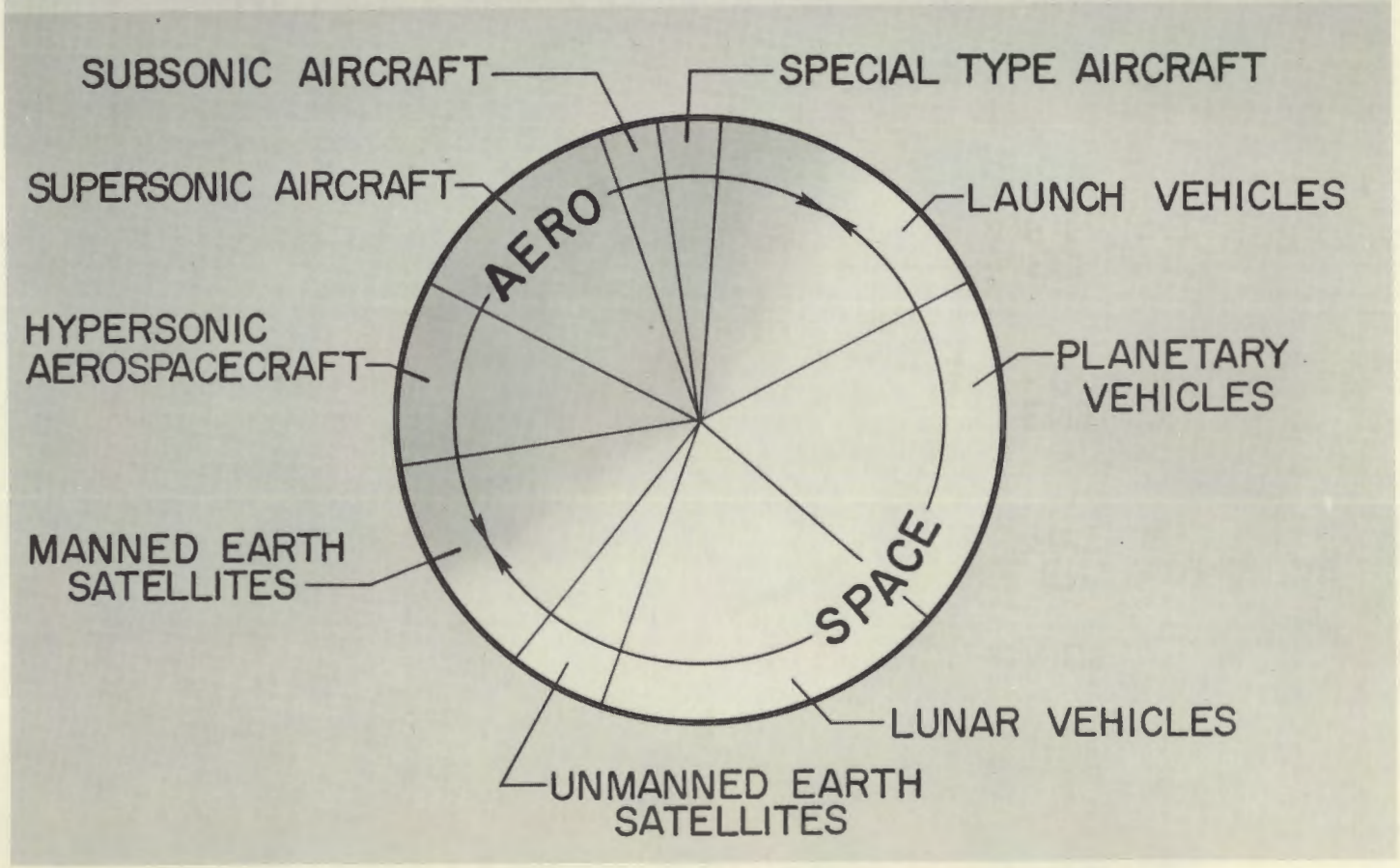
- PROVIDE RESEARCH ADVICE AND ASSISTANCE TO NASA ORGANIZATIONS, OTHER GOVERNMENT AGENCIES, AND INDUSTRY

TYPICAL LRC EFFORT

TECHNICAL FIELDS



TYPICAL LRC EFFORT
END OBJECTIVES



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