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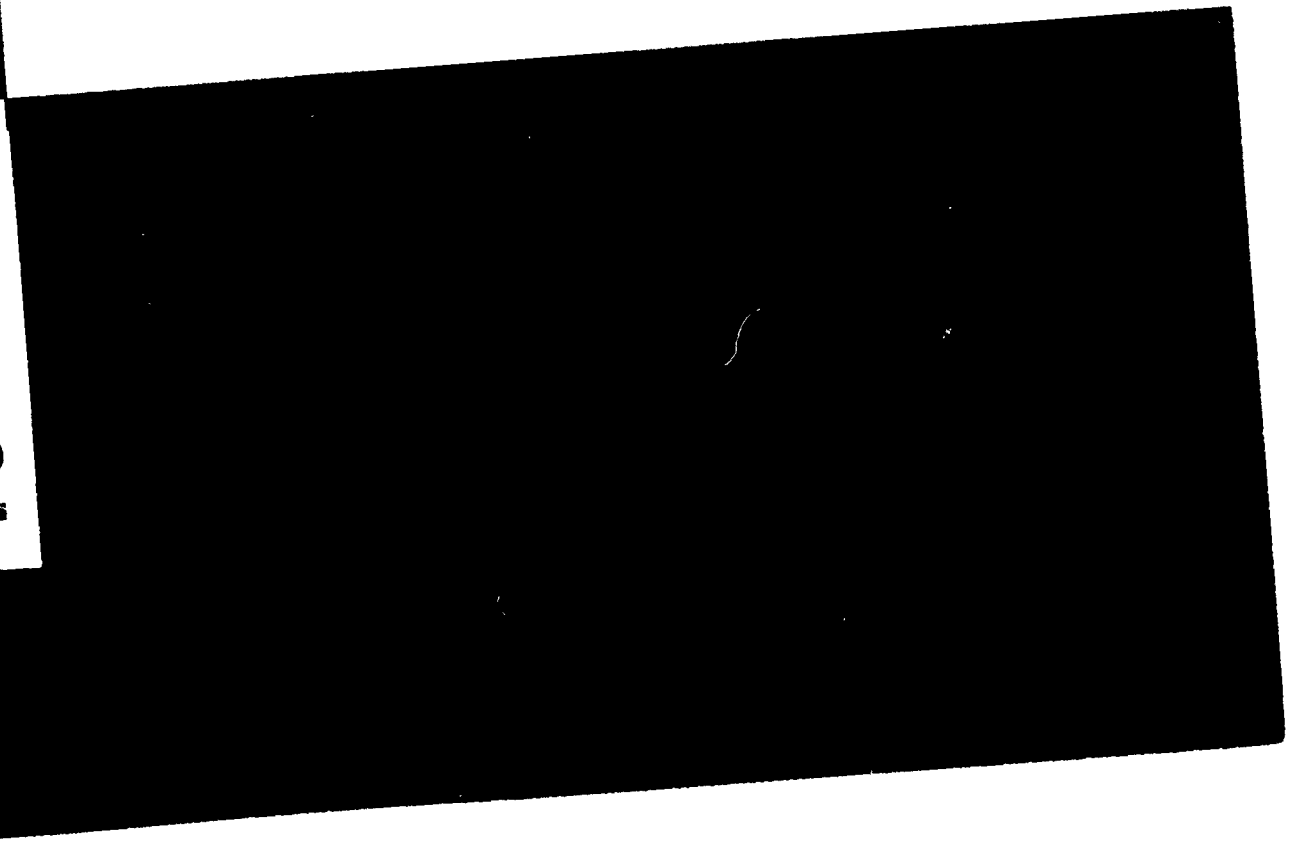
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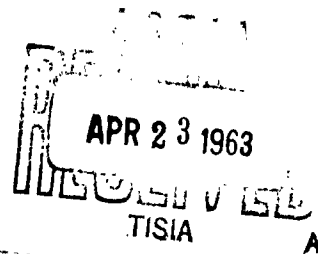


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GEMINI PROGRAM
OFFICE



W. T. Lusk

H. T. LUSKIN, DIRECTOR
MEDIUM SPACE VEHICLES PROGRAMS

FOREWORD

This program plan has been prepared by the Medium Space Vehicles Programs (MSVP) Division, Lockheed Missiles and Space Company (LMSC), Sunnyvale, California, under the direction of the Air Force Space Systems Division (AFSSD), United States Air Force (USAF), Inglewood, California, as authorized in Letter Contract No. AF 04(695)-129, dated 19 March 1962.

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INTRODUCTION

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The Gemini Program has been established by the National Aeronautics and Space Administration (NASA) for the purpose of investigating, testing, and evaluating techniques for the rendezvous, docking, and joint maneuvering of vehicles in space. Each demonstration will involve the launching, operation, and orbital rendezvous of an unmanned Agena Target Vehicle and a two-man, manned, Gemini Spacecraft. The Agena Target Vehicle and the Spacecraft will be launched from Cape Canaveral, Florida, over the Atlantic Missile Range (AMR) into orbits about the earth. The launching of the Agena Target Vehicle will occur at an azimuth angle of 83.8 degrees from true north, at an angle of inclination of 29 degrees from the equator. The Spacecraft will be launched approximately 24 hours later. The desired rendezvous orbit will be circular with an altitude of 161 nautical miles.

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The orbiting Agena Target Vehicle will be capable of responding to commands from an internal programmer, the ground, and the Spacecraft, achieving orbital and attitude corrections, and transmitting telemetry data. The Spacecraft will be capable of maneuvering in response to programmed and manual commands and transmitting Agena Target Vehicle commands. While demonstrating the rendezvous techniques, the spacecraft may direct the Agena Target Vehicle into the position and attitude required for rendezvous and docking, and utilize the attitude control and propulsive capabilities of the Target Vehicle for maneuvering and reorientation prior to the undocking, re-entry and return to earth. The technical details of the interfaces of the Agena Target Vehicle are described in LMSC-A061949, entitled, "Project Gemini Systems Interface Requirements and Restraints Document."

~~Lockheed Missiles and Space Company~~

Under the terms of the agreement described in LMSC-A048441, entitled, "Statement of Work, Target Vehicle System, Gemini Program," (LMSC) has been designated as the Agena System and Integrating Contractor for the Gemini Target Vehicle System. In this capacity, LMSC will be responsible for the design, development, manufacture, testing, support, and operation of the Agena Vehicle and the integration of the Agena System with the Aerospace Ground Equipment (AGE), Atlas Booster, and Target Docking Adapter. The purpose of this plan is to describe the manner in which LMSC intends to satisfy program obligations.

1.0 ORGANIZATION

The Gemini Program will establish separate but coordinated organizations for the development, manufacturing, testing, operating, and evaluation of the Gemini Manned Spacecraft and Target Vehicle Systems. As required by contract, the Lockheed Missiles and Space Company (LMSC) will operate within the organizational structure established for the Target Vehicle System with an internal organization designed to provide essential interfaces and functional capabilities. The organizations participating in the work on the Target Vehicle System will include the National Aeronautics and Space Administration (NASA), the United States Air Force (USAF), and a group of independent contractors. NASA will be represented by the Manned Spacecraft Center (MSC), Houston, Texas. The USAF will be represented by the Air Force Space Systems Division (AFSSD), Inglewood, California. The contractors will include the McDonnell Aircraft Corporation (MAC), St. Louis, Missouri, General Dynamics/Astronautics (GD/A), San Diego, California, and LMSC, Sunnyvale, California. The purpose of this section is to provide a general description of the organization in which LMSC expects to work, the organization LMSC intends to provide, the interfaces between the two, and the responsibilities of each. The basic organization is illustrated in Figure 1-1.

1.1 Manned Spacecraft Center

MSC will represent NASA as the administrative and technical director of all activities associated with the Target Vehicle System. In this capacity, MSC will issue formal communications to MAC directly and through AFSSD, as the contracting agent, to GD/A and LMSC. Informal coordination will be accomplished when and as necessary and by the most expedient means available.

1.2 Air Force Space Systems Division

AFSSD will be responsible for providing LMSC with the scheduled delivery of such Government Furnished Items (GFI) as Agena D vehicles, optionals, and

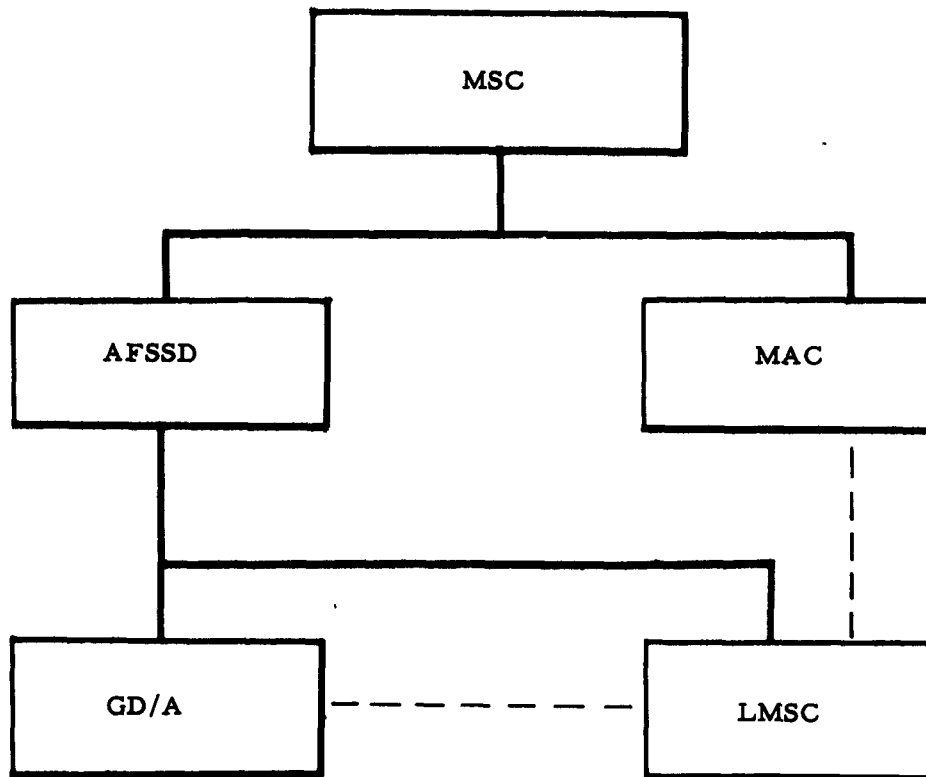


Figure 1-1 NASA, Gemini Program, Target Vehicle System Organization

associated documentation, and for representing MSC as the contracting agent to GD/A and LMSC. As contracting agent, AFSSD will be responsible for the direction, monitoring, and approval of the activities of GD/A and LMSC in accordance with the requirements established by MSC.

1.3 McDonnell Aircraft Corporation

MAC, as Spacecraft Contractor, will be responsible for the Target Docking Adapter, associated Aerospace Ground Equipment (AGE), facilities, and documentation. To assure design compatibility between the Target Docking Adapter and the Agena Vehicle and the proper integration, operation, and testing of the combined systems, MAC will provide LMSC with a simulator which is capable of simulating the electrical functions of the Spacecraft, a structural model of the Target Docking Adapter, a flight-type Target Docking Adapter, the information and physical changes necessary to maintain these items in a current status, and essential drawings, specifications, operating instructions, and other pertinent documentation. Design integration problems will be resolved by MAC jointly and in cooperation with LMSC.

1.4 General Dynamics/Astronautics

GD/A as the Booster Contractor, will be responsible for the first-stage Atlas Booster, associated AGE, and documentation. The drawings, specifications, performance data, and other essential documentation will be delivered by GD/A to LMSC in time to assure compatible electrical and mechanical design interfaces between the Atlas and the Agena Vehicle, the integration of the systems, and the performance of trajectory analyses. Interface problems will be resolved through joint communications and cooperation between GD/A and LMSC and the Atlas-Agena Interface Document prepared and maintained by LMSC. The interface document, LMSC-A061949, entitled, "Project Gemini Systems Interface Requirements and Restraints Document," will be maintained by LMSC.

1.5 Lockheed Missiles and Space Company

LMSC, the Agena Vehicle and Target Vehicle System Integration Contractor, will be responsible for the Agena Target Vehicle, including the aerodynamic fairing, associated AGE, the electrical and mechanical integration and mating of the vehicle systems and interfaces with the Target Docking Adapter, first-stage Booster, and AGE, interface tooling for the Target Docking Adapter, facilities criteria, trajectory and orbital analyses, the Agena Target Vehicle countdown, requirements and schedules for the exchange of data between MAC, GD/A, and LMSC, and required drawings, specifications, reports, and other documentation. As required, LMSC will confer and cooperate with MAC, GD/A, AFSSD, and MSC in the definition, coordination, and resolution of administrative and technical policies, activities, and problems, provide MAC with the interface tooling, design data, data requirements and schedules, and supporting documentation, provide GD/A with interface data, data requirements and schedules, and supporting documentation, deliver the Agena Vehicle and contractually required documentation to AFSSD, install and use the program peculiar AGE at Sunnyvale and Santa Cruz, California, and at Hangar E, Merritt Island, and Launch Complex 14, Cape Canaveral, Florida, to transport, service, checkout, and launch vehicles, and process data, and perform such other obligatory services when, where, and as necessary to assure the success of the program. At Launch Complex 14, however, all launch control equipment that is not peculiar to the Gemini Program will be provided and installed under a separate contract (AF 04(695)-287). The plans for the organization and conduct of program activities, within and under the direction of LMSC and including management, administration, engineering, manufacturing, testing, facilities, product assurance, and operations, are described in the following sections.

2.0 MANAGEMENT AND ADMINISTRATION

The management and administration of Gemini target vehicle system activities within and under the direction of LMSC will be accomplished through the existing internal organizational structure of the company with adaptations and changes as necessary to satisfy special requirements and conditions. Management will provide the creative, executive leadership and authority required to regulate the affairs of LMSC in accordance with contractual agreements and the objectives of the program. Typical management responsibilities will include the coordination of LMSC with MSC, AFSSD, MAC, and GD/A, the review and approval of proposed agreements and contractual changes, the analysis and evaluation of the organizational, administrative, and technical requirements of the program, the formulation, definition, and publication of compatible policies, directives, and guidelines, the review of the performance of subordinate organizations for policy compliance and progress, and the exercise of such other prerogatives as may be necessary to direct the activities of the program to a successful conclusion. The administration of the program will consist essentially of the specialized supervision and performance of the detailed activities required to give effect to the directives of management through the imposition and exercise of effective management controls. The administrative responsibilities will include those activities normally associated with the direction of contracts, budgets, other fiscal matters, schedules, coordination, personnel, office facilities, security, publications, and other related services. Within LMSC, the organizations primarily responsible for these activities will be the Medium Space Vehicles Programs Division (MSVP) and the Space Systems Division (SSD), as described in Paragraphs 2.1 and 2.2. The basic internal organization of LMSC, as it affects the program, is illustrated in Figure 2-1. Illustrative schedules are described in Paragraph 2.3.

2.1 Medium Space Vehicles Programs Division

The general authority, functions, and responsibilities of LMSC for the Gemini Target Vehicle System have been delegated to MSVP. As authorized, MSVP

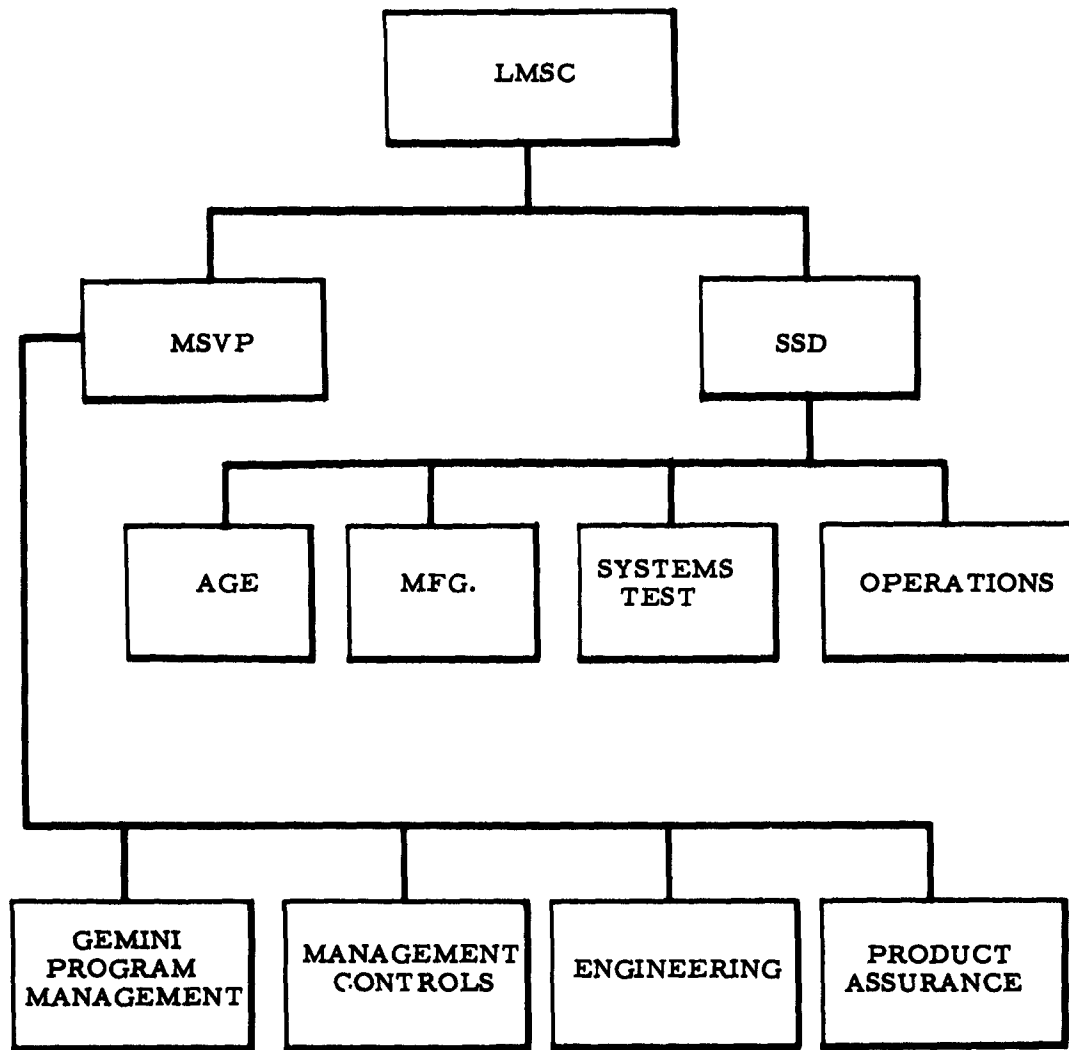


Figure 2-1 LMSC Gemini Program Organization

will direct, monitor, perform or acquire, coordinate, and review the activities necessary to bring the program to a successful conclusion. These activities will include the negotiation and administration of contractual requirements, the coordination of internal and external affairs, the direction, monitoring, and review of the progress of the program, and the acquisition, use, or performance of the total facilities, materials, and specialized services needed to manufacture the hardware, publish the documentation, and make delivery in accordance with the terms of the contract. The responsibilities for the direction of the program, the exercise of management controls, vehicle engineering, and product assurance, will be delegated, within MSVP, to subordinate organizations.

2.1.1 Gemini Program Office. The Gemini Program Office of MSVP will be delegated the responsibility for the programming of activities associated with the Target Vehicle System. In accordance with this assignment, the Program Office will be responsible for conducting the program in compliance with the provisions of the contract and the policies and directives of LMSC and MSVP, establishing and defining the basic philosophy of the program, directing, coordinating, monitoring, and reviewing the activities of support organizations, integrating the requirements of the program with those of other programs to reduce conflicts, assure the assignment of appropriate priorities, utilize required services effectively, and identify, analyze, and resolve problems when and as they arise, and provide the programming services and capabilities required to assure compliance with contractual obligations. These activities will include the definition of the managerial, administrative, and technical requirements of the program, the transmission of these requirements to appropriate internal or associate contractor organizations, the authorization of work, funding, and the schedule of activities to be accomplished, the negotiation of organizational interfaces, resolution of questions of responsibility,

and establishment of satisfactory channels and procedures for communication, the coordination of essential program functions, the monitoring of organizational interfaces for progress and compliance with policies, requirements, standards, and schedules, the preparation and presentation of reports, and such other functions as may be necessary to direct the program successfully.

2.1.2 Management Controls. The administrative requirements of the program will be defined by the Gemini Program Office and transmitted to the Management Controls organization of MSVP. The Management Controls organization will provide the specialized services and performance capabilities needed to comply with the requirements in accordance with appropriate operating standards and procedures. The services will include the activities normally associated with the administration of contracts, budgets and other fiscal matters, schedules, coordination, office facilities, equipment, and supplies, publications, photography, document control, personnel, and related functions. During these activities, the essential administrative interfaces and channels of communication between the Management Controls and support organizations will be established; the provisions of the contract, including change procedures, will be defined, coordinated, reviewed, negotiated, and approved, written work authorizations and budget allocations will be prepared and transmitted; the schedule milestone bar charts will be prepared, coordinated, and published; the formal publications and photography required by the contract will be prepared and submitted; appropriate security measures will be taken for the control of classified documents; and qualified personnel will be assigned to suitable working facilities. The normal progress and status of the program will be reflected in the periodic reports submitted to AFSSD. The appearance of conditions which might disrupt the normal routine of business will be reported immediately to the Gemini Program Office for appropriate action.

2.1.3 Engineering. The Engineering organization of MSVP will be responsible for the satisfaction of the technical and administrative requirements associated with the engineering of the Agena Vehicle. The basic requirements will be defined by the Gemini Program Office (see Paragraph 2.1.1.1) and the Management Controls organization (see Paragraph 2.1.2) in accordance with the provisions of the contract. Engineering will provide the specialized capabilities necessary to implement the requirements, design, develop, and integrate the Agena Vehicle, and provide appropriate support for the subsequent manufacturing, test, product assurance, and operations activities. In the process of accomplishing these objectives, Engineering will perform design studies, define criteria, establish the mechanical and electrical interfaces of the Agena Vehicle for integration with associated equipment, design, integrate, and analyze the system, develop the components, subsystems, and completed vehicle, conduct reliability reviews, plan tests, and prepare appropriate drawings, specifications, procedures, and reports. These activities will be conducted in accordance with the schedules provided in the current schedule milestone bar charts. Technical or administrative problems which threaten to jeopardize the fulfillment of program obligations will be brought to the attention of the Gemini Program Office as they arise.

2.1.4 Product Assurance. The responsibility for the satisfaction of the technical and administrative requirements of the program for the reliability and quality assurance of the Agena Vehicle and associated AGE will be delegated to the Product Assurance organization of MSVP. The basic requirements will be defined by the Gemini Program Office (see Paragraph 2.1.1.1) and the Management Controls organization (see Paragraph 2.1.2). As the requirements are defined, the Product Assurance organization will provide the specialized capabilities and services needed to establish and conduct the appropriate reliability and quality assurance activities. Reliability will include all functions normally associated with the establishment of an acceptable mathematical probability that the Agena Vehicle and associated AGE will perform required functions, under specified conditions, without failure, for stipulated periods of time. Quality assurance will

include all functions normally associated with the assurance of the quality of the materials, parts, and processes used in the vehicle and the AGE and of the quality of the completed products. In accomplishing these functions, both groups will train personnel, establish standards, tests, procedures, and instructions, review drawings and specifications, inspect and test hardware, analyze data, recommend corrections and improvements, prepare and submit appropriate documentation, and perform any and all related functions which may be necessary to assure acceptable levels of quality and reliability. These activities will be conducted throughout all phases of the program planning, engineering design and development, manufacturing, tests, shipping, flight operations, and flight-data analysis. Conditions which threaten, disrupt, delay, or otherwise jeopardize the achievement of these objectives will be brought immediately to the attention of the Gemini Program Office for consideration and resolution.

2.2 Space Systems Division

In accordance with the policies and procedures of LMSC, SSD will cooperate with MSVP in the satisfaction of program obligations. These obligations will be interpreted by MSVP, defined in terms of specific requirements, and communicated to SSD. The requirements will include those normally associated with adherence to program policies, administrative work authorizations, budget allocations, schedules, and procedures. engineering drawings, specifications, and procedures, and product assurance procedures and standards. As these requirements are received, SSD will provide the capabilities and perform the managerial, administrative, and technical tasks and functions needed for manufacture, system testing, and operation of the Agena Vehicles, and the engineering, manufacturing, testing, and operation of the associated AGE. The responsibility for the supervision and performance of the detailed activities necessary for compliance with the above requirements will be delegated to appropriate subordinate organizations. The basic functions and responsibilities assigned to each subordinated organization are described in the following paragraphs.

2.2.1 Manufacturing. The responsibility for the management and administration of the activities required to manufacture the Agena Vehicles will be delegated to the MSVP Manufacturing organization of SSD. As the documentation authorizing the performance of the work and defining the requirements is received, the functions needed for the layout and equipment of facilities and the procurement, acceptance, storage, transportation, fabrication, testing, final assembly, and quality control of the hardware incorporated in Agena Vehicles will be initiated. During this period, the facilities will be organized, equipped, tooled, and supplied as necessary to enable the manufacturing functions to be performed with maximum efficiency, skilled personnel will be assigned to definitized tasks, the Agena D vehicles, optional equipment, and subcontract development items comprising the mission peculiar installations will be procured and fabricated, modified, or assembled, as necessary, the appropriate tests will be performed on all modified or new hardware, the Agena D vehicles will be modified, the installation of optional and mission peculiar equipment will be completed, the quality control personnel will have ascertained that each portion of this function has been conducted in compliance with appropriate standards and procedures, and the finished Agena Vehicles will be ready for subsystem and system tests.

2.2.2 Agena Vehicle Testing. The Vehicle/Santa Cruz Test organization of SSD will be responsible for providing the capabilities and managing, administering, and performing the specialized test functions and services necessary to assure the compliance of the completed Agena Vehicles with the administrative and technical requirements of the program at Sunnyvale and Santa Cruz, California. Compliance will be assured through the application and documentation of subsystem and system tests. The tests will include subsystem and system performance, hot firing, and radio frequency compatibility. The hot firing and radio frequency compatibility tests will be performed only on the first flight vehicle. The testing will be initiated upon the receipt of the administrative authorization and requirements, the technical plans, drawings, specifications, and procedures from Engineering and Product Assurance, the manufactured Agena Vehicles, and the AGE checkout equipment. As

necessary, the facilities will be established, equipped, tooled, and supplied, qualified personnel will be instructed and assigned to definitized tasks, and the tests will be performed. The test philosophy will be to test all hardware which has been modified or incorporated into configurations to a degree which will cast doubt on the validity of previous tests. At the conclusion of these activities, the vehicles will be submitted to the appropriate representatives of AFSSD for approval and acceptance.

2.2.3 Aerospace Ground Equipment (AGE). The Aerospace Ground Equipment organization of SSD at Van Nuys, California, will conduct the activities necessary to fulfill the administrative and technical requirements of the program for AGE. The AGE will include the ground handling, checkout, service, and launch control equipment. As the work is authorized and funded and the requirements are received, the AGE organization will assign and instruct personnel, provide the facilities, equipment, and tools needed to carry out the functions involved, and perform the specialized acts and services necessary for compliance. The activities required will be programming, administration, engineering, manufacturing, and associated support functions. These activities will provide the capabilities required to design and develop the equipment, assure compatibility between the designs, the vehicle, and the test facilities at Sunnyvale, California, and Cape Canaveral, Florida, prepare plans, drawings, specifications, and procedures, procure supplies, purchased parts, and raw materials, modify or fabricate specific items of hardware, assemble the various units of equipment, perform manufacturing tests, ascertain full compliance with product assurance procedures and standards, and submit the finished products with appropriate documentation to the proper representatives of AFSSD for approval and acceptance.

2.2.4 Operations. The Operations organization of SSD will be responsible for providing the capabilities and managing, administering, and performing the specialized activities necessary to satisfy the administrative and technical requirements of the program for the launching of Agena Target Vehicles from Cape Canaveral, Florida. These responsibilities will be carried out,

as they apply to program peculiarities, pad activation, and launch capabilities, under Contract Nos. AF 04(695)-129, -287, and -198, respectively. The activities and services involved include the coordination of the Gemini program functions of LMSC with those of AFSSD, MSC, and other contractors, the layout, equipment, and supplying of facilities, the assignment and instruction of appropriately skilled personnel, the installation of AGE, the reception, inspection, storage, ground handling, mating, checkout, servicing, and launching of the vehicles, and the preparation and submission of appropriate documentation. Work will be initiated upon receipt of the authorization, funding, and requirements. After the Agena Vehicle is transported to Cape Canaveral, it will be received and inspected for damage and compliance with accompanying documentation, stored, if necessary, and subsequently subjected to a series of tests. Included in the preparatory and test functions will be the validation of the vehicle subsystems, the mating of the Agena Vehicle with the Target Docking Adapter, the installation of critical components, a demonstration of Agena Vehicle and Spacecraft command compatibility, the preflight validation of the launch pad, the mating of the Agena Target Vehicle with the Atlas Booster on the launch pad, a Flight Readiness Demonstration (FRD) with the launch facilities, and a Joint Flight Composite Acceptance Test (J-FACT) simulating the countdown and ascent. At the conclusion of these activities, as required by schedule, the Target Vehicle will be serviced and launched.

2.3 Schedules

The scheduled funding requirements, subcontract expenditures, manpower loading conditions, and program activities, anticipated by LMSC in satisfaction of contractual obligations to the Gemini Program, are illustrated in Figures 2-2 through 2-5.

2.3.1 Funding. Figure 2-2 presents current anticipated cumulative expenditures of LMSC at the end of each quarter of each fiscal year. The small area at the

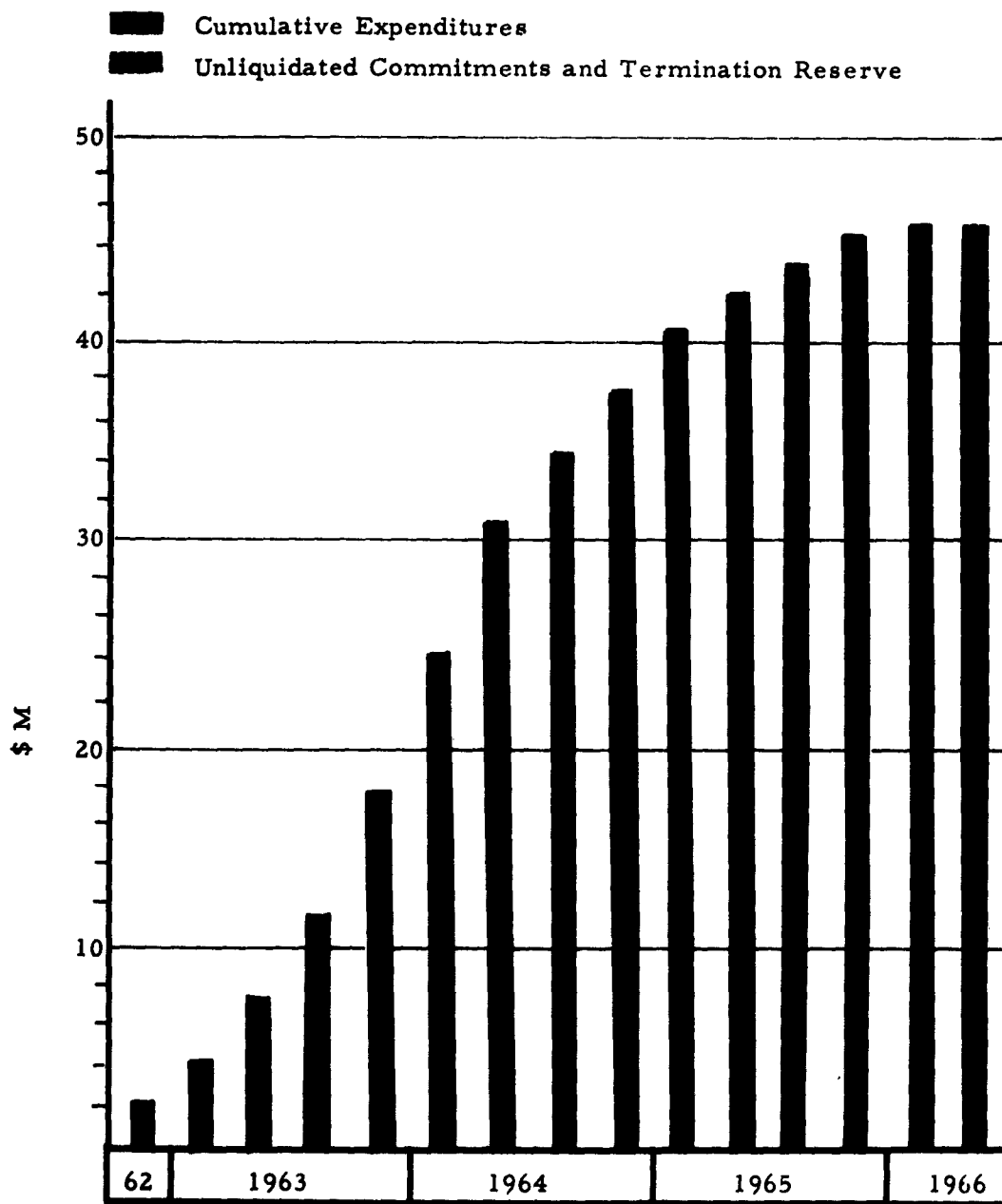


Figure 2-2 Cumulative Funding Requirements by Fiscal Year, Quarter End

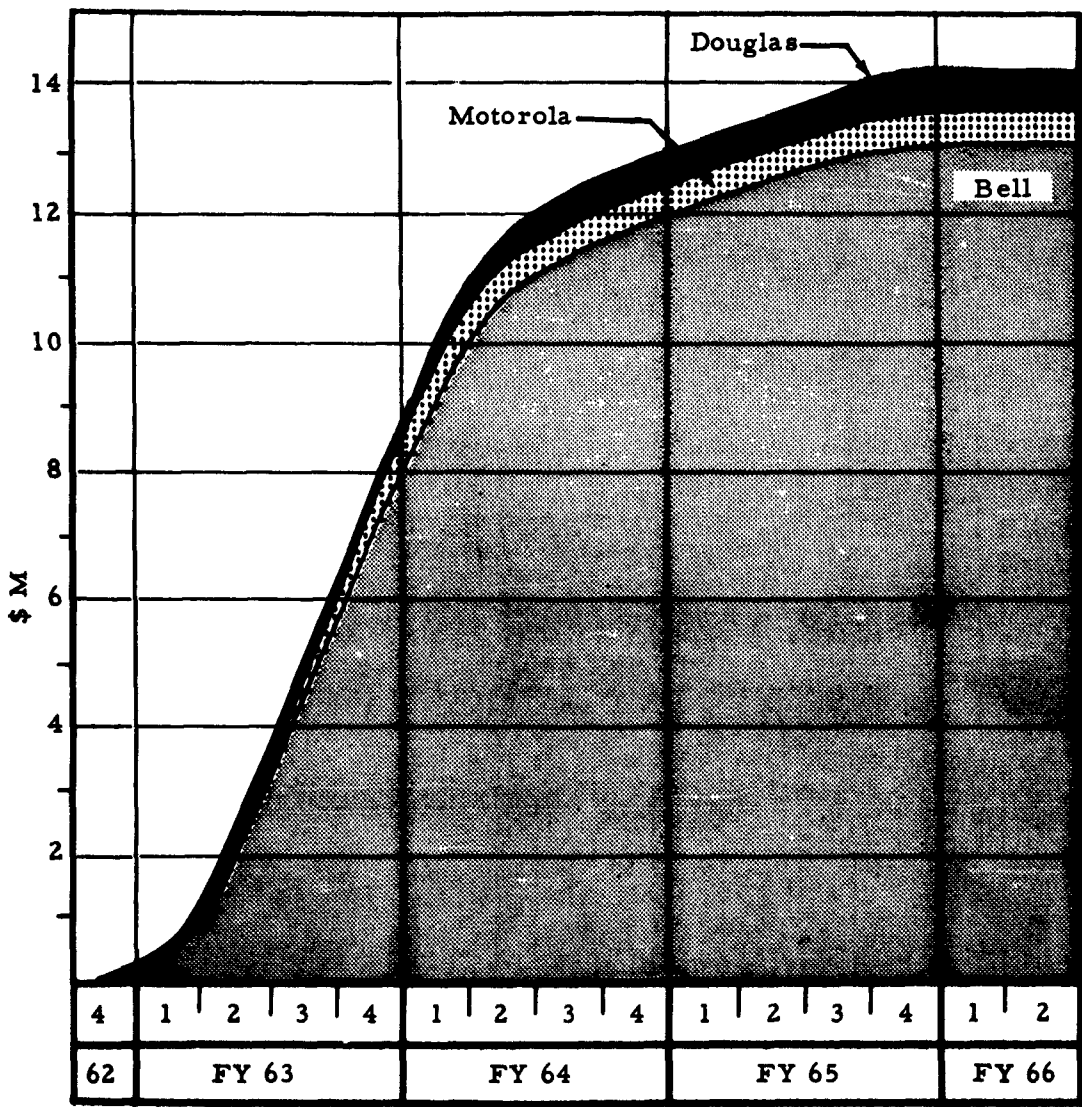


Figure 2-3 Cumulative Major Subcontracted Expenditures

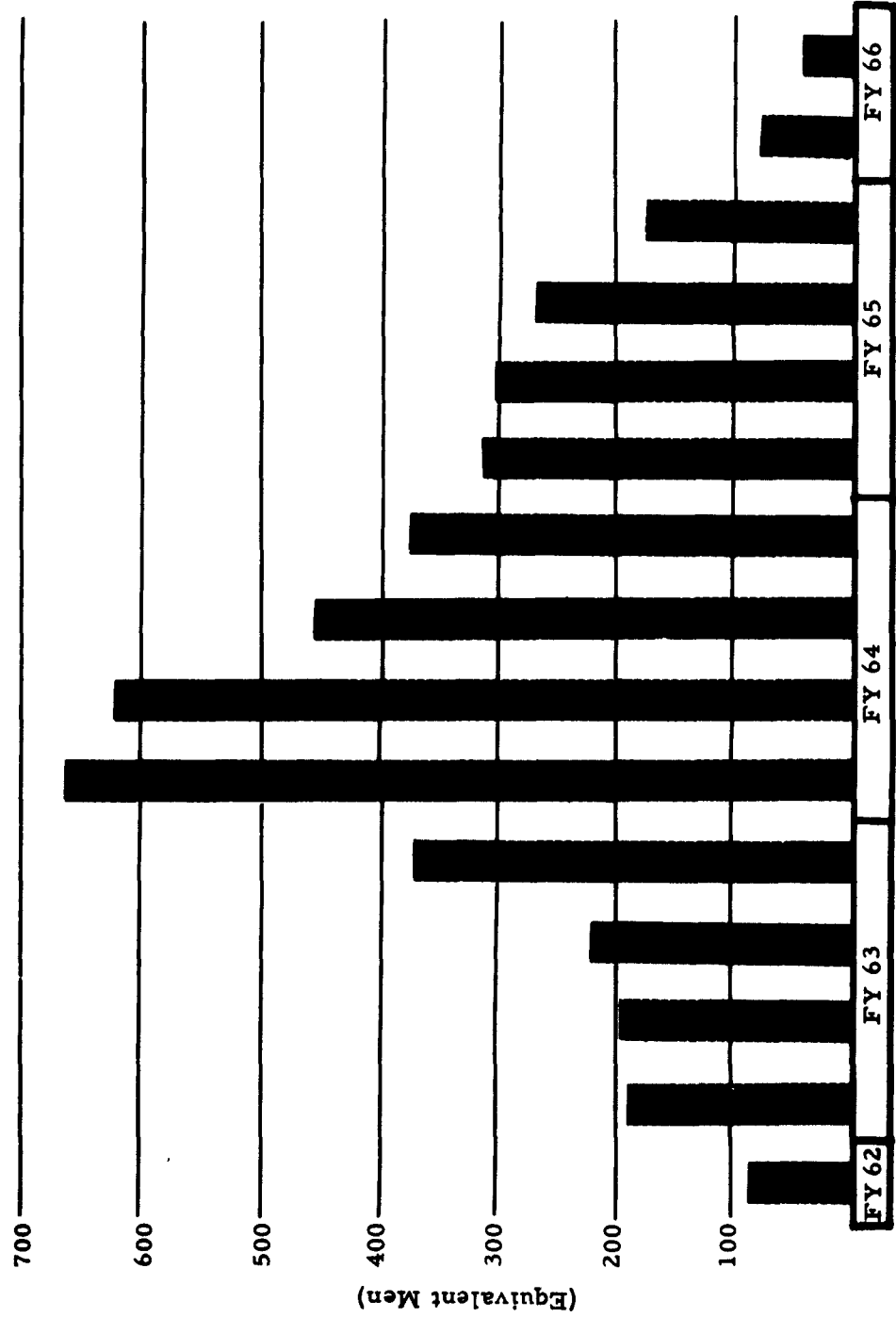
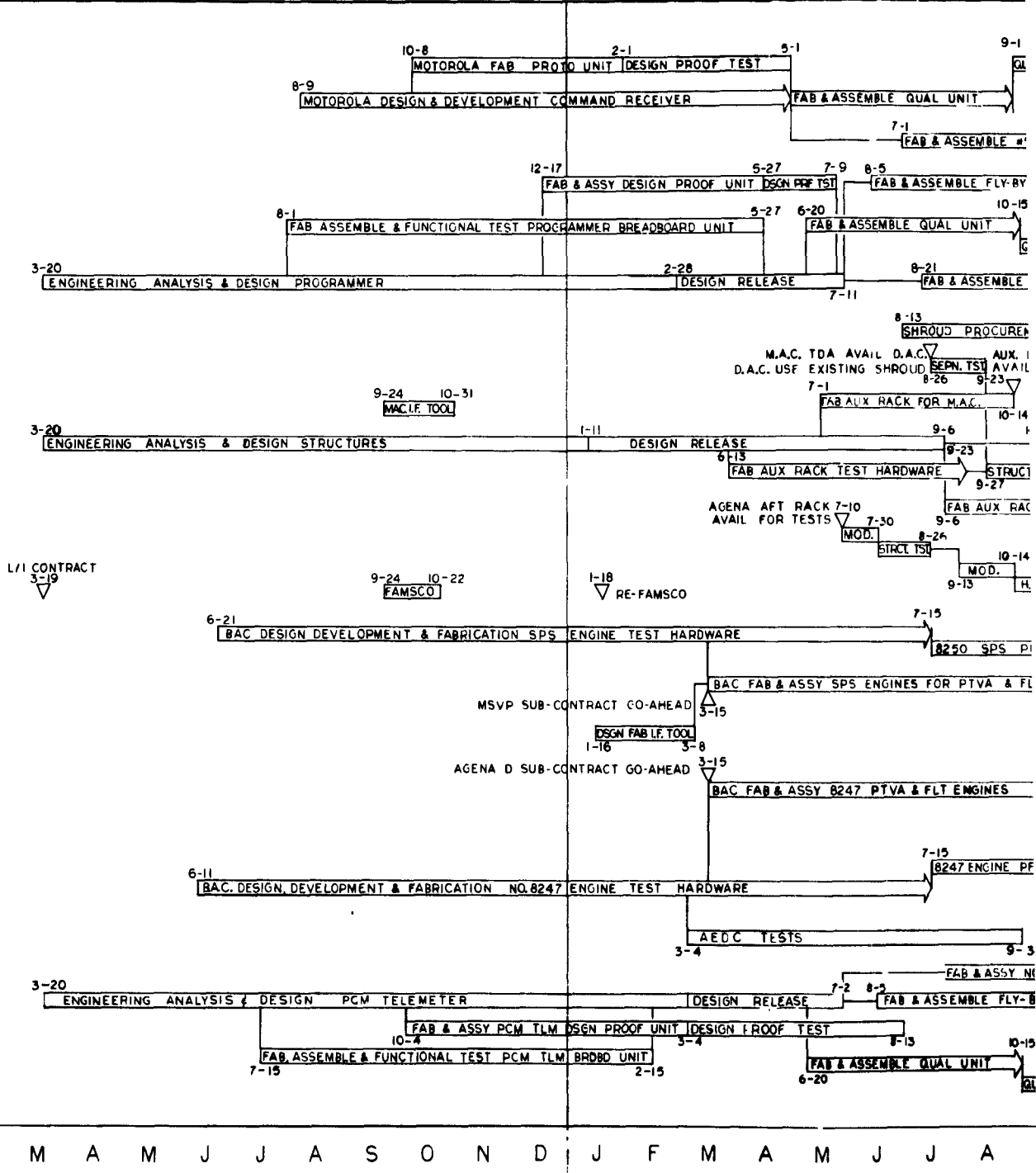


Figure 2-4 LMSC Inplant Manpower Loading - Quarterly Average



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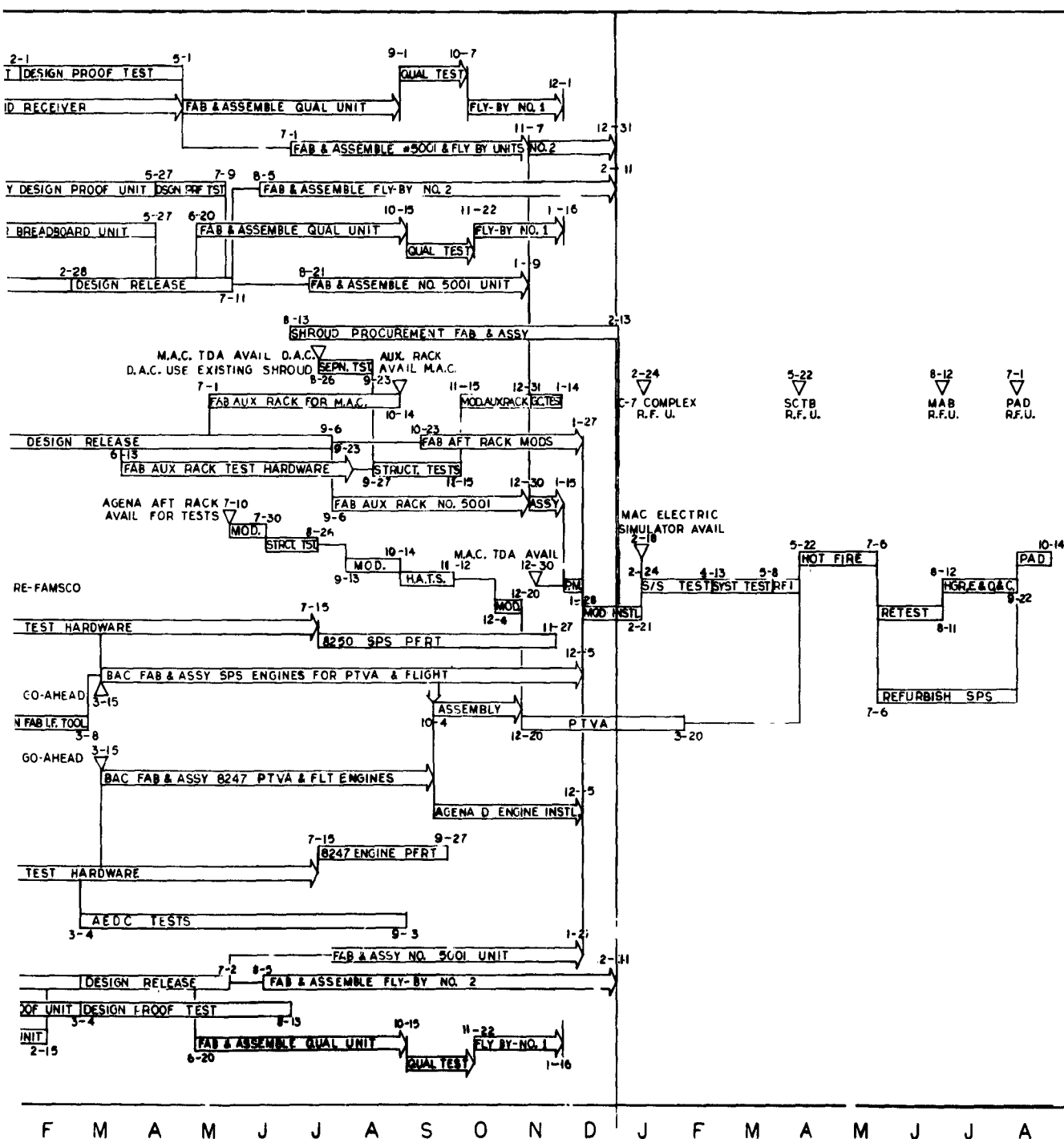


Figure 2-5 Gemini Master Schedule

top of each bar represents unliquidated commitments and the termination reserve which must be maintained until the completion of the contract.

2.3.2 Subcontract Expenditures. The cumulative anticipated expenditures for subcontracted activities are illustrated in Figure 2-3.

2.3.3 Manpower Loading. Figure 2-4 illustrates the total in-plant manpower equivalent men required to satisfy program obligations.

2.3.4 Activities. The master schedule of the activities engaged in the satisfaction of program requirements under the direction or in cooperation with LMSC is shown in Figure 2-5.

3.0 VEHICLE ENGINEERING

The engineering of the Agena Vehicle will consist of the process of converting the general objectives and requirements of the mission into the specific requirements and documentation necessary to construct, test, and operate suitable hardware. This process will consist of a tier by tier analysis, evaluation, implementation, and coordination of technical requirements, data, and activities. From the mission requirements of the entire Gemini Program will be derived the program requirements to be imposed on LMSC. The LMSC requirements will be separated into vehicle and support requirements. The vehicle requirements will define the prevailing design considerations. These considerations will include performance parameters, weight limitations, structural, thermal, and environmental criteria, electrical and mechanical compatibility between the Agena Target Vehicle, other flight hardware, the AGE, and the launch facilities, the necessity of design studies, and the application of human and value engineering criteria. Using the data evolved from these considerations, in accordance with standard engineering practices and procedures, the system of the vehicle will be designed. The design will be integrated with the associated flight and support hardware, and the performance capabilities will be analyzed in comparison with the performance requirements to assure compatibility. Following the analysis, the components and subsystems of the vehicle will be developed and incorporated into the complete vehicle. Simultaneously with the integration, analysis, and development of the hardware, the design will be reviewed for compliance with applicable reliability, human engineering, and value engineering criteria, tests will be planned, and the required documentation, in the form of plans, drawings, specifications, procedures, and reports, will be prepared. Copies of the completed documentation will be transmitted to the manufacturing organization to guide the procurement, construction, and testing of vehicle hardware. The effect of this information will be to enable the manufacturing organization to incorporate Agena D vehicles, selected optional equipment, and mission peculiar equipment into Agena Vehicles which meet or exceed the minimum standards of acceptability established for the program. The functional

sequence of the activities described here is described in Figures 3-1 and 3-2. Detailed descriptions of each activity are presented in the following paragraphs.

3.1 Mission Requirements

The requirements of the mission will be defined by MSC and AFSSD in terms of the technical objectives of the program, the hardware necessary to accomplish these objectives, the standards to which the hardware will be designed, manufactured, tested, stored, transported, serviced, and operated, the sequence of operations, and the apportionment of responsibility among the contractors engaged in the program. The definitions will provide the numerical values necessary to ascertain precise goals, limiting factors, interfaces, and points of departure. As this information is developed, the data pertaining to the Agena Vehicles, AGE, and support facilities, will be transmitted to LMSC and used as the basis for the definition of detailed program requirements within LMSC.

3.2 Program Requirements

The mission requirements and special conditions imposed on LMSC will be analyzed, evaluated, and implemented to the extent necessary to provide a complete definition of the program requirements for Agena Vehicles, AGE, and support facilities. The requirements will include the conditions to be satisfied in the design, manufacture, storage, transportation, ground handling, checkout, servicing, launching, and operation of the vehicles, the AGE required to support these activities, the facilities necessary to produce and support this equipment, the extent to which existing facilities and equipment will be used, areas in which new design or construction is permissible or necessary, and associated details. The requirements will include the interfaces and interrelationships between the hardware produced by LMSC and that of other contractors, the sequence of operations, the magnitude of functions which are essential and necessary precedents to the operation of the vehicle, AGE, facilities, or related equipment, and other circumstances which would

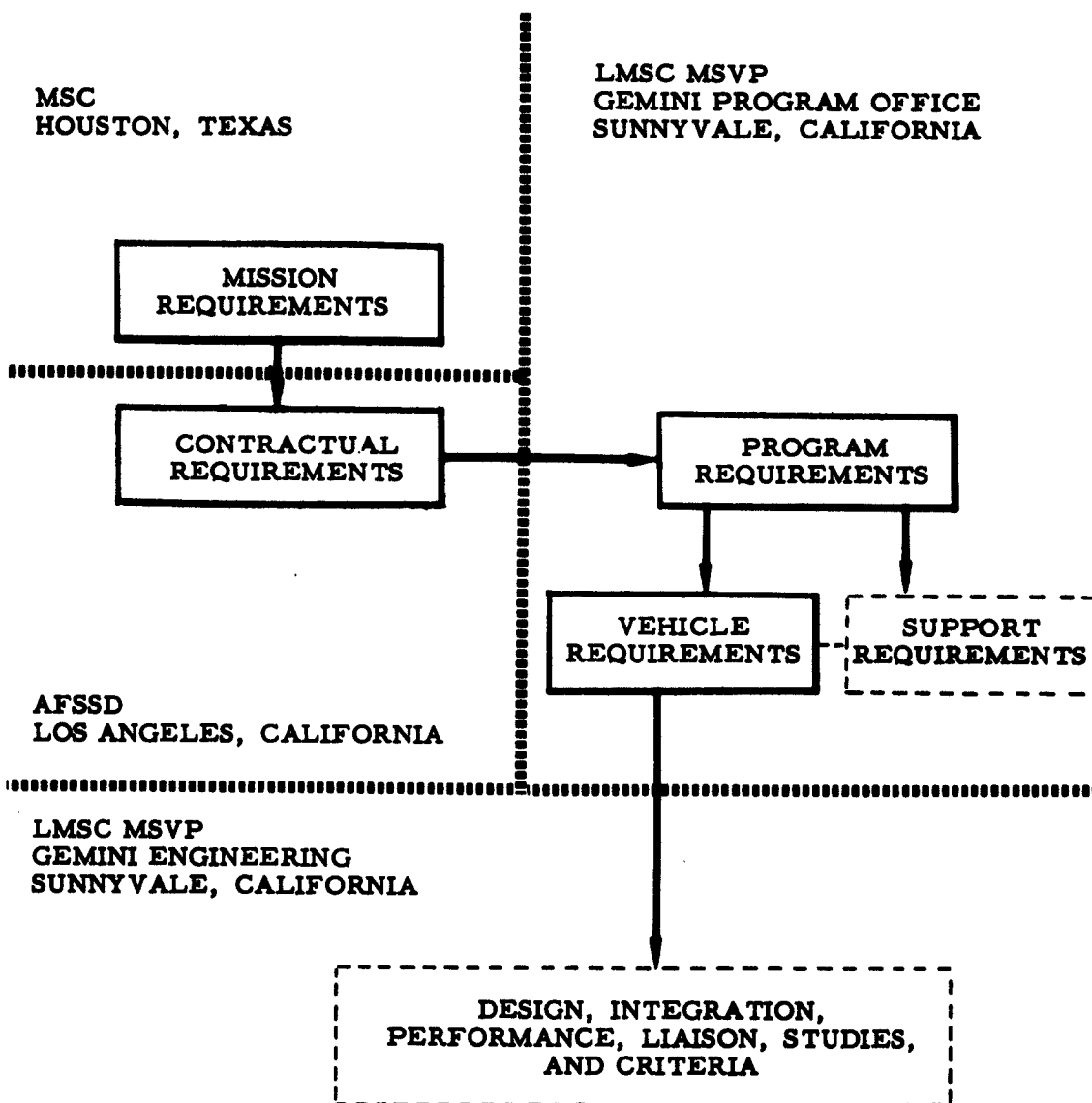


Figure 3-1 Flight Requirements

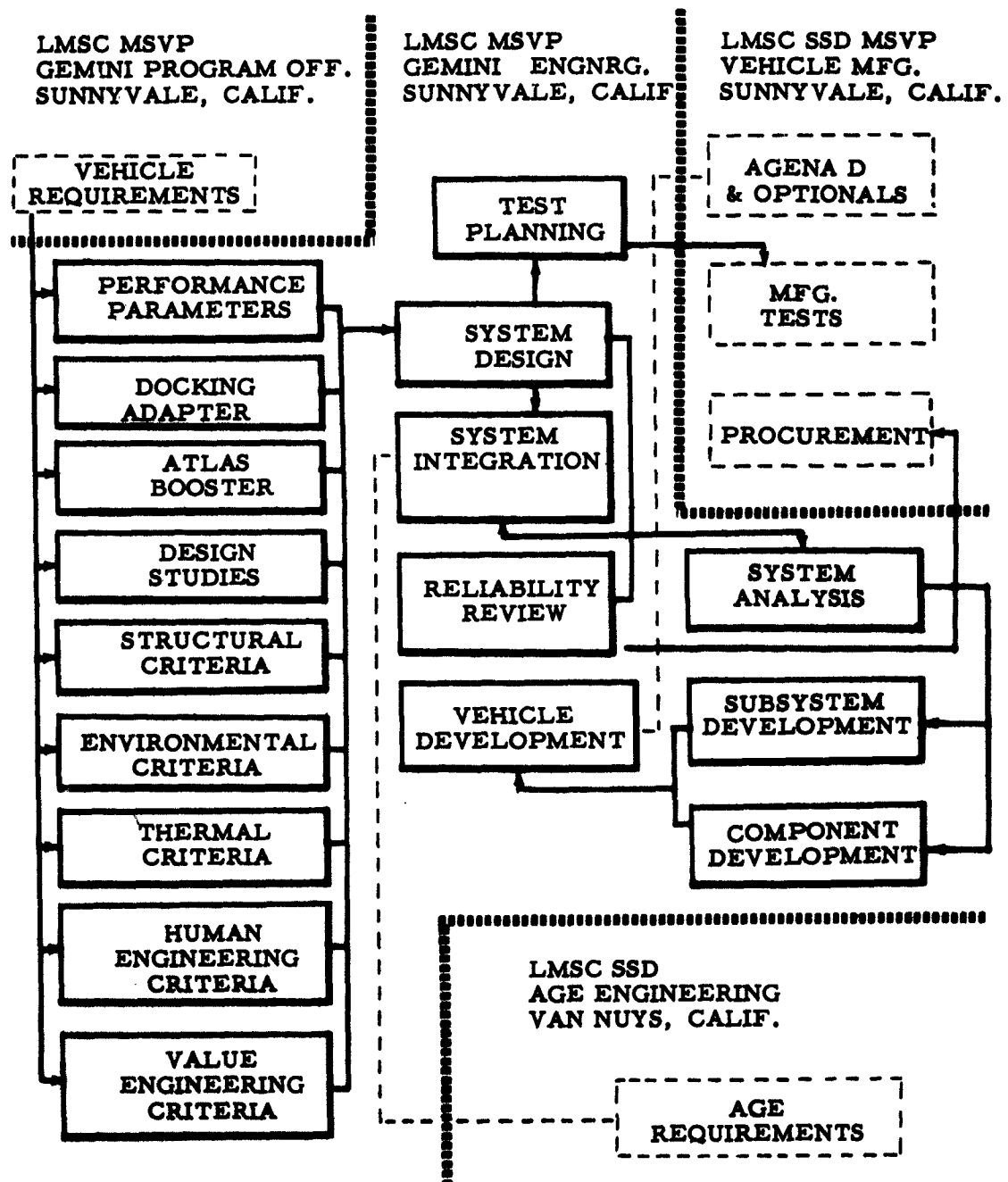


Figure 3-2 Vehicle Engineering

or could seriously affect the satisfaction of the mission requirements. This information will be transmitted to the appropriate engineering organizations within LMSC.

3.3 Agena Vehicle Requirements

The program requirements for the vehicles will include the activities necessary to acquire the specific data upon which the design of the vehicles will be based. These activities will include the detailed analysis and evaluation of the performance parameters and reliability criteria, design studies of the Agena D, available configurations of optional equipment, and proposed configurations of mission peculiar items, the degree to which existing equipment can be used as is, may be modified, or should be redesigned, the potentialities of complete new designs, the applicable structural, thermal, and environmental criteria, the electrical and mechanical interfaces of the Target Docking Adapter, Atlas Booster, AGE, and launch facilities, and the consideration of human and value engineering techniques. The requirements will be sufficiently extensive and detailed to assure the investigation, definition, and availability of the technical conditions, factors, and data necessary for the evaluation of the optimum vehicle configuration. Upon completion, the requirements will be transmitted to appropriately specialized organizations for action.

3.4 Performance

The performance requirements and parameters will be carefully analyzed and evaluated in terms of the objectives to be accomplished, the hardware to be used, the sequence of operations to be conducted, the capabilities to be provided, and the limits and tolerances to be imposed. Detailed attention will be given to the passive and active conditions to be satisfied before a flight, during the launching, and subsequent to injection into orbit. The flight conditions will include the trajectory to be flown, the load capabilities of the Atlas Booster, the altitude, attitude, velocity, and stability required

for the proper functioning of the Agena Vehicle, the separation of the first and second stages of the launch vehicle, the load capabilities of the Agena Vehicle, the altitude, attitude, velocity, and stability required for orbital injections, the responsiveness of the vehicle to realtime and programmed commands, the nature and quantity of telemetry data to be transmitted, and the orbital pattern to be achieved. The orbital conditions will include the duration of the flight, the exercise of attitude controls, the responsiveness of the system to programmed and realtime commands, the type and quantity of telemetry data to be transmitted, the comparative requirements for passive and active operation of the system, the compatibility of the Agena Vehicle with the Target Docking Adapter, Spacecraft, and tracking facilities, and comparable considerations. The conclusions derived from the analysis of the performance requirements will be documented and supplied to the system design organization as the minimum standards of acceptability for the performance of Agena Vehicles.

3.5 Target Docking Adapter

The proposed design of the Target Docking Adapter will be reviewed, analyzed, and evaluated for its potential effect upon the design of the Agena Vehicle. The considerations involved will include the aerodynamic shape of the adapter, its weight, the center of gravity, the thermal, environmental, and structural conditions existing at the interface with the vehicle, the electrical power requirements, the type, amplitude, and duration of signals received or transmitted, and any other factors which could reasonably be expected to affect the compatibility of the adapter with the vehicle. This information will be periodically reviewed and coordinated throughout the progress of the program, and will be documented and supplied to the design organization for use in the design and integration of the system.

3.6 Atlas Booster

The interface design of the Atlas Booster will be reviewed, analyzed, and evaluated for compatibility with the proposed design of the Agena Vehicle.

The review will include the structural, environmental, and thermal conditions anticipated at the interface, on the ground and in flight, the type, amplitude, and duration of signals transmitted through the interface, and comparable conditions which might be expected to affect the compatibility of the Agena Vehicle with the Booster. The information derived from this investigation will be coordinated, documented, supplied to the system design organization, and periodically updated.

3.7 Design Studies

Detailed design studies will be conducted for the purpose of determining the most favorable configurations of hardware available for the satisfaction of the vehicle requirements of the rendezvous mission. These studies will investigate the structure, propulsion, electrical power, guidance, attitude control, communications, and command control requirements of the vehicle. Existing and proposed designs will be reviewed and considered on the basis of potential contributions, side effects, availability, and costs. The considerations involved will include weights, basic loads, dynamics, electrical power requirements, performance characteristics, environmental limitations, reliability, programming, timing, telemetry instrumentation, command responsiveness, susceptibility to electromagnetic interference, error analyses, and comparable data. The analytical information developed will be used to determine the cumulative advantages of using existing equipment as is, with modifications, after the completion of minor redesign efforts, or whether a complete new design would be more satisfactory. Simultaneously, it is conceivable that recommendations may be made for modifications in the mission requirements within the limitations imposed by the rendezvous objectives.

3.8 Thermal Criteria

The thermal criteria will define the conditions and standards of temperature control which must be imposed on the vehicle to optimize the operation of equipment and prevent adverse effects from temperature extremes and fluctuations. The criteria will be evolved from a study of the temperature

ranges and fluctuations that may be encountered externally by the vehicle during testing, storage, transportation, ground handling, checkout, servicing, launching, active flight, and in orbit, the presence or lack of heat in specific locations, the advantages of artificial heating, the internal sources of heat while in active and passive operation, methods of heat distribution and dissipation, the cumulative effects of the heating minus the heat losses, and the compatibility of the resulting temperature conditions with the locations and optimum operating temperatures of equipment within the vehicle. The sources of heat to be considered will include conduction by the atmosphere, radiation from the sun, friction between the atmosphere and the aerodynamic surfaces of the vehicle, conduction and radiation from the mechanical and electrical interfaces of the docking adapter and the booster, the contributions of operating, standby, and passive system equipment, artificial heaters, and other material contributors. The methods of dissipation will include artificial cooling on the ground and selective insulation, conduction, convection, and radiation during flight. The data and conclusions developed from these investigations will be furnished to the system design organization for application to the design of the vehicle.

3.9 Environmental Criteria

The environmental criteria will describe the minimum capabilities the vehicle will require to withstand the adverse effects of vibration, shock, ambient temperatures, humidity, moisture, water, sleet, snow, ice, salt spray, direct sunlight, wind, sand, fungi, cosmic radiation and similar conditions, alone or in combination, with no degradation in performance. These standards and limitations will be evolved from a study of the conditions that may be anticipated during the various phases of material handling, fabrication, assembly, testing, storage, transportation, ground handling, checkout, servicing, launching, active flight, and passive and active operation in orbit. As these standards are being defined, studies will be made of methods to minimize or eliminate conditions which are excessively detrimental. The requirements evolved from these activities will be

transmitted to the system design organization for comparison with the maximum capabilities of proposed designs and the definition of appropriate methods and levels of testing.

3.10 Structural Criteria

The structural criteria will establish the minimum standards that must be imposed on the structure of the Agena Vehicle to meet or exceed the capabilities required for the mission. This criteria will be evolved from studies of the static and dynamic loading conditions that will or may be imposed on the vehicle, alone and in combination with the Atlas Booster and the Target Docking Adapter, in various attitudes, and during the phases of testing, storage, transportation, ground handling, checkout, servicing, launching, flight, in orbit, and during the rendezvous. The considerations will include the effects of the aerodynamic shape of the vehicle, bending modes, wind shears, distribution of loads, compartmentalization of the vehicle, environmental conditions, thermal criteria, and the strength, weight, elasticity, and thermal properties of the materials to be used. This data will be submitted to the system design organization for use in the design, review, analysis, and test planning activities associated with the Agena Vehicle structure.

3.11 Human Engineering

The human engineering criteria will establish the factors that must be considered for the optimum performance of human tasks associated with the vehicle. These factors will be determined from studies of the human functions to be performed during the manufacturing, testing, storage, transportation, ground handling, mating, checkout, servicing, launching, and rendezvous activities. The studies will include the sequence in which the functions are to be performed, the conditions under which performance is to take place, the relative dangers involved with respect to the individual as well as the equipment, the complexity of the functions, the tools required,

the number of persons needed for each activity, the level of skills required, the necessity of additional or specialized training, available alternatives, the advantages and disadvantages of the available alternatives, the presence of factors which would ordinarily tend to defeat the performance of a function, and associated information. This data will be furnished to the system design organization for use in the design of the vehicle. The application of this criteria will enable the system design organization to achieve the maximum benefit of human capabilities while minimizing the opportunities for the introduction and effect of human errors. The detailed plans for the development and application of this criteria are presented in LMSC-315601, entitled, "Gemini Target Vehicle Human Engineering Program Plan."

3.12 Value Engineering

The purpose of value engineering will be to provide the system design organization with the information necessary to obtain the maximum benefit from available materials, methods, procedures, processes, tools, installations, and personnel skills. This information will be derived from studies of the requirements to be imposed on the vehicle, existing and proposed designs, the existing and potential capability of LMSC to produce equivalent hardware, available alternatives or substitutes, the advantages and disadvantages of each proposed alternative or substitute, the most effective, efficient, and least costly means of satisfying particular requirements, the availability of appropriate documentation, and similar conditions. The data acquired from these studies will be continuously revised and implemented during the progress of the design activities.

3.13 System Design

The system of the Agena Vehicle will be designed to incorporate a modified Agena D with selected optional and mission peculiar equipment. The design will be based upon the requirements imposed by the performance parameters, the conclusions developed from the design studies, the interface conditions

between the Agena Vehicle and the Booster, the Target Docking Adapter, and the AGE, the applicability of the thermal, environmental, structural, human engineering, and value engineering criteria, and the capabilities of existing hardware. The new design efforts will be concentrated on bridging the gap between the existing and the required capabilities. Upon the completion of these efforts, the entire Agena Vehicle concept will be reviewed for its capabilities, reliability, compatibility with the Booster, Target Docking Adapter, and AGE, and compliance with the various standards of acceptability. The review of the subsystems will assure the vehicle the theoretical design integrity necessary to satisfy the integral mechanical and electrical requirements imposed by manufacturing, testing, storage, transportation, ground handling, mating, checkout, servicing, launching, flight, orbital operation, and rendezvous with the Spacecraft. When all of the requirements imposed upon the Agena Vehicle design have been satisfied, the design will be integrated with the Booster, Target Docking Adapter, and AGE systems.

3.14 System Integration

The complete design configuration of the Agena Vehicle system will be integrated with the first-stage Booster, Target Docking Adapter, Spacecraft, and AGE, to assure mechanical, electrical, radio frequency, and functional compatibility. The determination of mechanical compatibility will be accomplished by reviewing each interface, the locations, shapes, dimensions, materials, and components of the connecting areas, the capacity of the interface areas to be mated, compliance with the requirements for fixed and separable installations, the accessibility of these interfaces from the facilities used for launching, and the aerodynamic shape, weight, load, and load distribution of the integrated structure. Electrical compatibility will be determined by reviewing the electrical connectors at each interface, the suitability of the connectors for the transmission of the power or signals required, the continuity of the connectors when mated, the absence of undesirable ground connections or short circuits, and the compatibility of the mated systems with the type, amplitude, duration, and frequency of

the transmissions. The radio frequency compatibility of the systems will be assured by reviewing the interface shielding and the radiation produced by each system to be certain that the individual and cumulative levels do not exceed the maximum permissible limits. The functional compatibility of the systems will be determined by investigating the capability of the interfacing systems to perform the passive and active functions for which they were intended. These functions will include the sequence of activities necessary to mate, checkout, service, launch, and operate the vehicle. When the integration of the Agena Vehicle and the associated, interfacing systems, the launch facilities, and the Spacecraft, has been completed, a complete system analysis will be performed.

3.15 System Analysis

Following the design integration of the Agena Vehicle and associated hardware, the operating capabilities will be subjected to analysis. The analysis will begin with the theoretical operation of the completely integrated system on the ground and will continue, in sequential order, through the functions necessary to handle, mate, checkout, service, launch, operate, and rendezvous with the Spacecraft. Each function will be assessed in detail to be certain that the necessary configuration of equipment is present, that the equipment is appropriately mounted, supported, and housed, that the necessary operating environment exists, that the type and quantity of electrical or mechanical power necessary to operate the equipment is available, that the controlling signals or activities will occur automatically or may be commanded to occur at the desired time and in the proper order and magnitude, that the exercise of the controls will produce the desired types and levels of response, that the performance capabilities will meet or exceed the requirements of the mission, that this capability will not be degraded or adversely affected by the performance of prior, concurrent, or subsequent functions, and that the performance of this function will not adversely affect or degrade the performance of prior, concurrent, or subsequent functions, except and unless the the extent of the degradation will not diminish the quality of performance below

acceptable levels or will be offset by the presence of adequately compensating factors. After the individual functions have been analyzed, the cumulative effects of the operation of the system will be computed and compared with the requirements for assurance of compliance under the most adverse combination of circumstances that may reasonably be anticipated. Upon the conclusion of the design analysis, the development of the required hardware components, subsystems, and eventually of the integrated Agena Vehicle, will begin.

3.16 Component Development

As the design requirements of the system are released, the drawings, specifications, and procedures for the acquisition or manufacture and testing of appropriate components of vehicle hardware will be prepared. The Agena D vehicles and selected optional equipment will be supplied to the program, with the assurance that both have been tested and qualified to acceptable standards, as Government Furnished Equipment (GFE) by AFSSD. Materials, parts, subassemblies, and assemblies not furnished as GFE or modified after receipt as GFE will be tested or retested and qualified by compliance with appropriate standards. Standard stocks, processes, and procedures will be utilized as extensively as the technical requirements of the program permit. Non-standard items of equipment will be designed, developed, tested, and qualified separately. Typical examples of developmental mission-peculiar items are the shroud, forward auxiliary rack, command receiver, programmer, telemetry, and secondary propulsion hardware. As acceptable components are developed, they will be incorporated into appropriate subsystems, and formal design control drawings, specifications, and procedures will be prepared.

3.17 Subsystem Development

The development of the subsystems will follow the qualification of the constituent components. As the components become available, they will be incorporated into the hardware configurations necessary to manufacture,

test, launch, and operate the Agena Vehicle successfully. These configurations will include the basic structure and the equipment needed for propulsion, electrical power, guidance, attitude control, programming, tracking, command control, and communications. The hardware will be comprised of the original or modified subsystems of the Agena D, the optional equipment, and the mission peculiar installations. The configurations will reflect the conclusions of the preliminary studies and analyses and the corresponding optimum design compromises. The components will be checked for mechanical and electrical compatibility, connected into the appropriate subsystem configurations, supplied with power, and operated. The operation will simulate the dynamic and static requirements that may be imposed during manufacturing, testing, storage, transportation, ground handling, checkout, servicing, launching, flight, and orbital operation and will test the ability of the configuration to comply with the specific subsystem requirements. The tests will include the determination of the capacity of the subsystems to operate on a given supply of power, in response to given conditions, electrical signals, or mechanical inputs, and to react with corresponding, proportional, electrical or mechanical outputs. The performance characteristics of the power, signal, and mechanical inputs and outputs will be compared with the design requirements of the vehicle to assure compliance. The qualified subsystems will be ready for incorporation into the final Agena Vehicle configuration. To assure the validity of the data obtained, only qualified equipment will be used in subsystem developmental tests. Equipment which has been altered or modified in any manner which does or could contribute to the degradation of performance will be requalified before incorporation in its associated subsystem for test purposes. Failures will be noted and the causes will be remedied. Parts, components, subassemblies, and assemblies which are incompatible with associated subsystems or which fail during tests will be reviewed for a determination of the cause, redesigned when necessary, requalified, and retested.

3.18 Agena Vehicle Development

The development of the Agena Vehicle will include the incorporation of the qualified subsystems into the final hardware configuration, testing, design reviews, and the preparation and approval of the final drawings, specifications, procedures, and engineering reports. The hardware configuration will be developed by reviewing the configuration of the modified Agena D for electrical and mechanical compatibility with the optional and program peculiar equipment, installing the equipment, inspecting all connections, checking the electrical circuits for shorts, continuity, and proper resistance values, providing operating power, and making limited functional tests. These tests will be followed by a system test (see Section 5.0). The necessary test planning will begin with the design of the vehicle and parallel the progress of the subsequent engineering functions. The test results will be compared with the design, performance, and integrated system requirements to assure compatibility and the theoretical capability of the vehicle to respond satisfactorily to the most adverse combinations of circumstances that may reasonably be expected. The design reviews will be performed to resolve any technical difficulties and differences of engineering opinion that may arise. When the final configuration has been established, the remaining drawings, specifications, and procedures will be prepared, the test planning activities will be concluded, and a final reliability review will be conducted.

3.19 Test Planning

The test planning activities will begin as soon as the technical requirements of the vehicle system are defined and will be continued until the final hardware configuration has been developed, integrated, operated, tested, qualified, and approved. The vehicle will be completely tested for compliance with the design, system compatibility, performance, environmental, and reliability requirements of the program. The various levels of testing will include materials, parts, components, subassemblies, assemblies, subsystems, the vehicle system, and the vehicle system as it will be integrated with the

launch facilities, AGE, and associated flight hardware. The testing of designs with performance and reliability factors of proven dependability will be restricted to a minimum. New and unproven designs will be tested more extensively. Simulators will be used to avoid the excessive handling and testing of flight hardware, and test equipment and facilities will be shared as much as possible. All tests will be conducted in accordance with the applicable drawings, specifications, procedures, and final test plan. The test plan will be presented in LMSC-A306106, entitled, "Integrated Test Plan, Gemini Agena Target Vehicle." The completion of the test plan will be followed by the reliability review.

3.20 Reliability

Every effort will be made to assure the operating reliability of the hardware configuration comprising the Agena Vehicle. For this reason, all engineering requirements, drawings, specifications, procedures, and practices involved in the design, development, manufacture, testing, and operation of the vehicle hardware will be reviewed in accordance with reliability concepts and procedures. The manner and extent to which these concepts will be applied is described under the heading of Product Assurance (see Section 9.0) Following the reliability review, the appropriate drawings and specifications will be transmitted to the manufacturing organization for procurement, manufacture, and testing.

3.21 Agena Target Vehicle

The proposed outline and anticipated propulsion performance capabilities of the Agena Target Vehicle are illustrated in Figures 3-3 through 3-6.

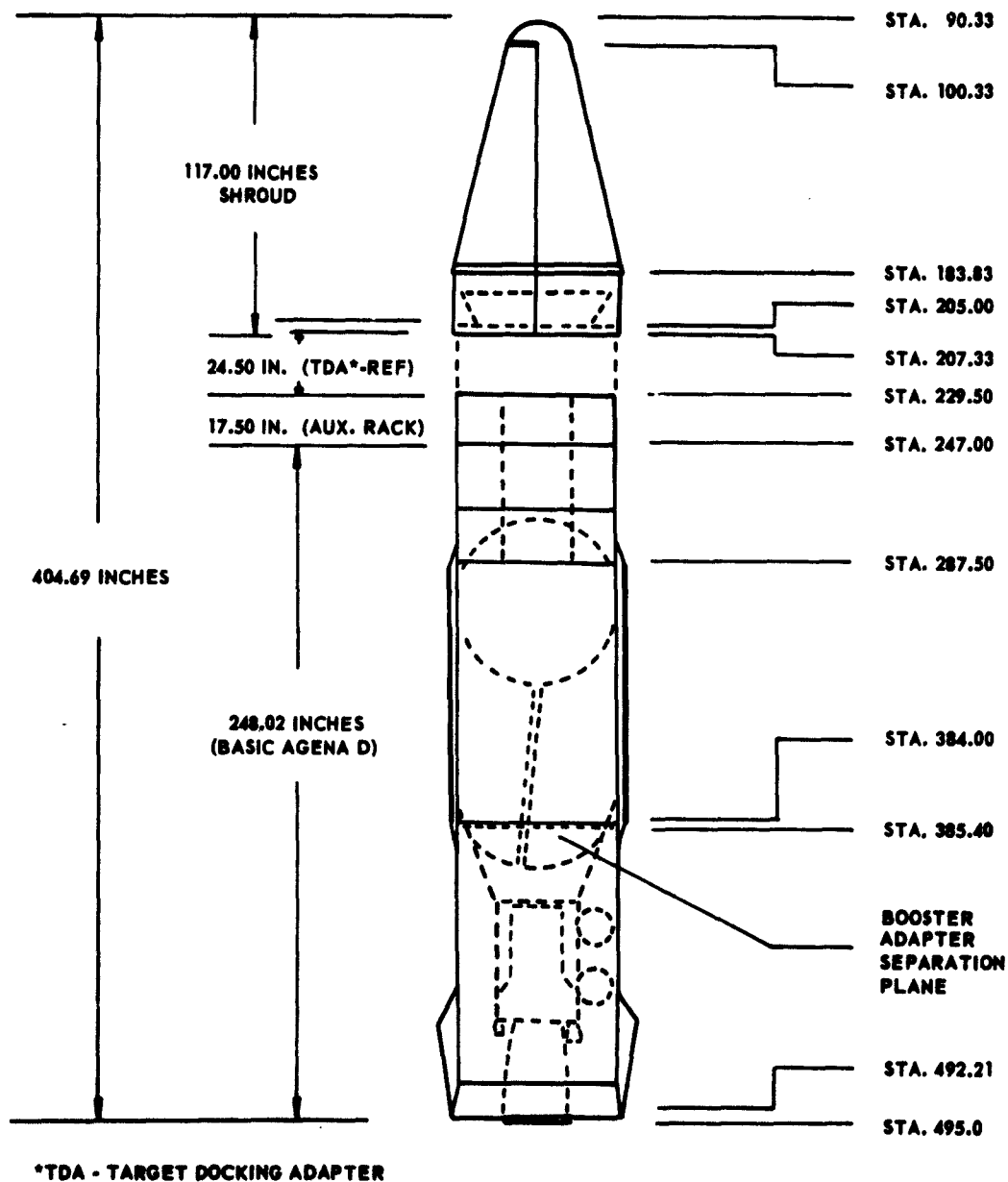


Figure 3-3 Agena Target Vehicle

NOTE: WEIGHT AND PERFORMANCE STATUS GEMINI MISSION 1 MARCH 1963 (LMSC-A372405). ALLOWANCE FOR EXPENDITURE OF 7 LBS. CONTROL GAS BETWEEN PRE DOCKED BURN AND POST DOCKED BURN IS INCLUDED IN CURVE. SINGLE PRE DOCKED BURN AND SINGLE POST DOCKED BURN.

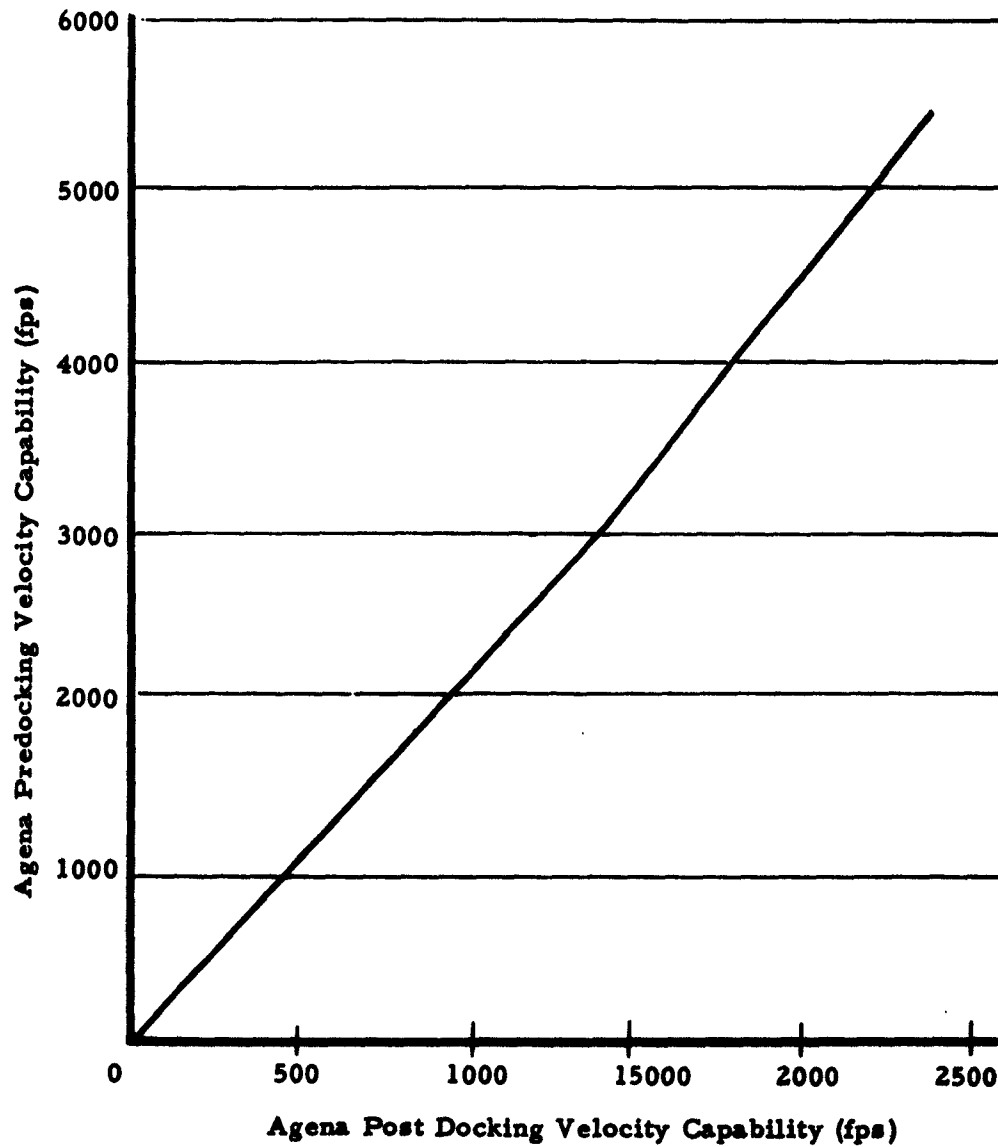
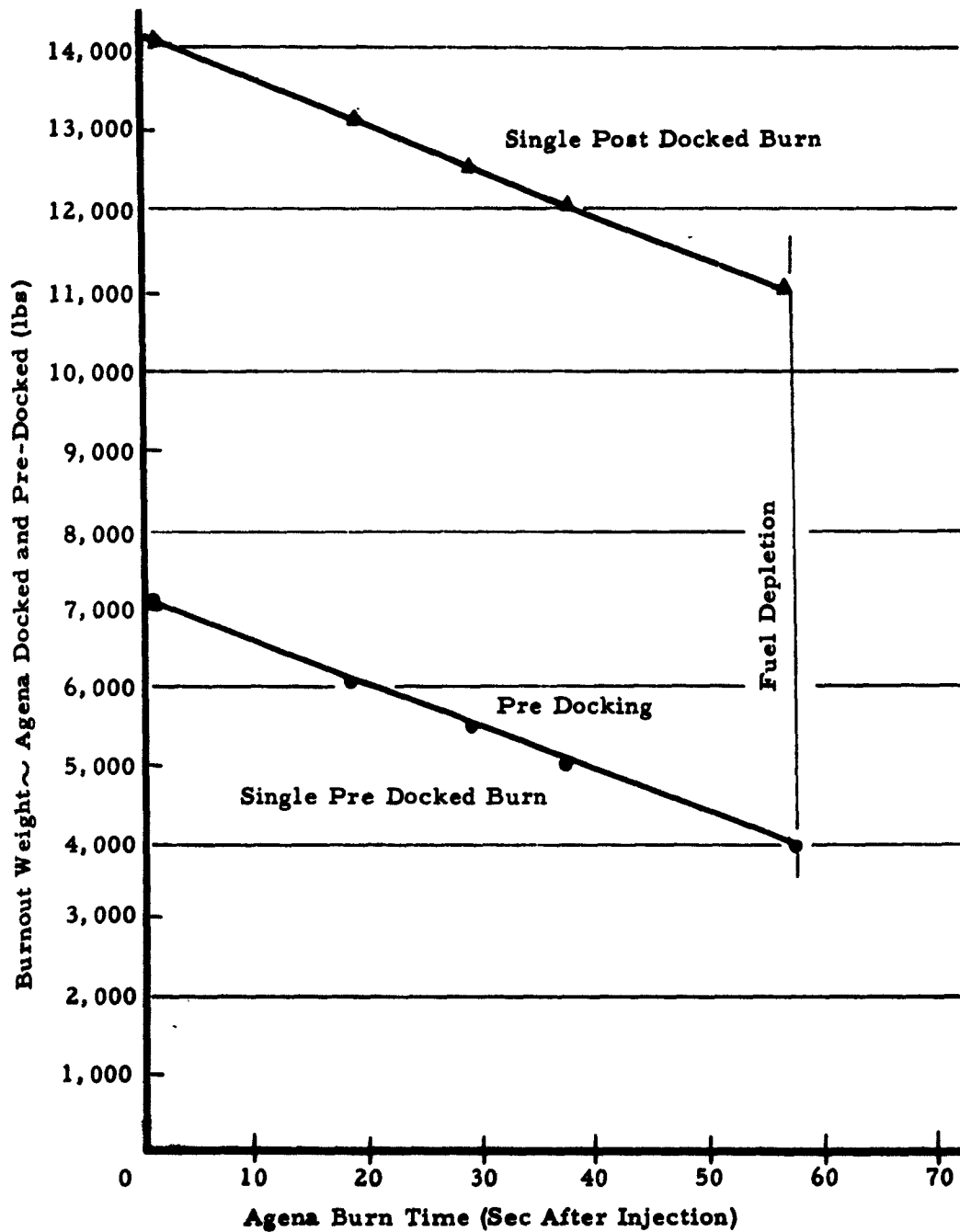


Figure 3-4 Agena Pre & Post Docking Velocity Capability
For The Gemini Mission



Ref. LMSC-A372405

Figure 3-5 Burnout Weight vs. Burn Time

SPS Velocity Capability (Single Burn)
Units Cannot Fire Simultaneously

Unit I — 16# Chambers

Unit II -- 200# Chambers

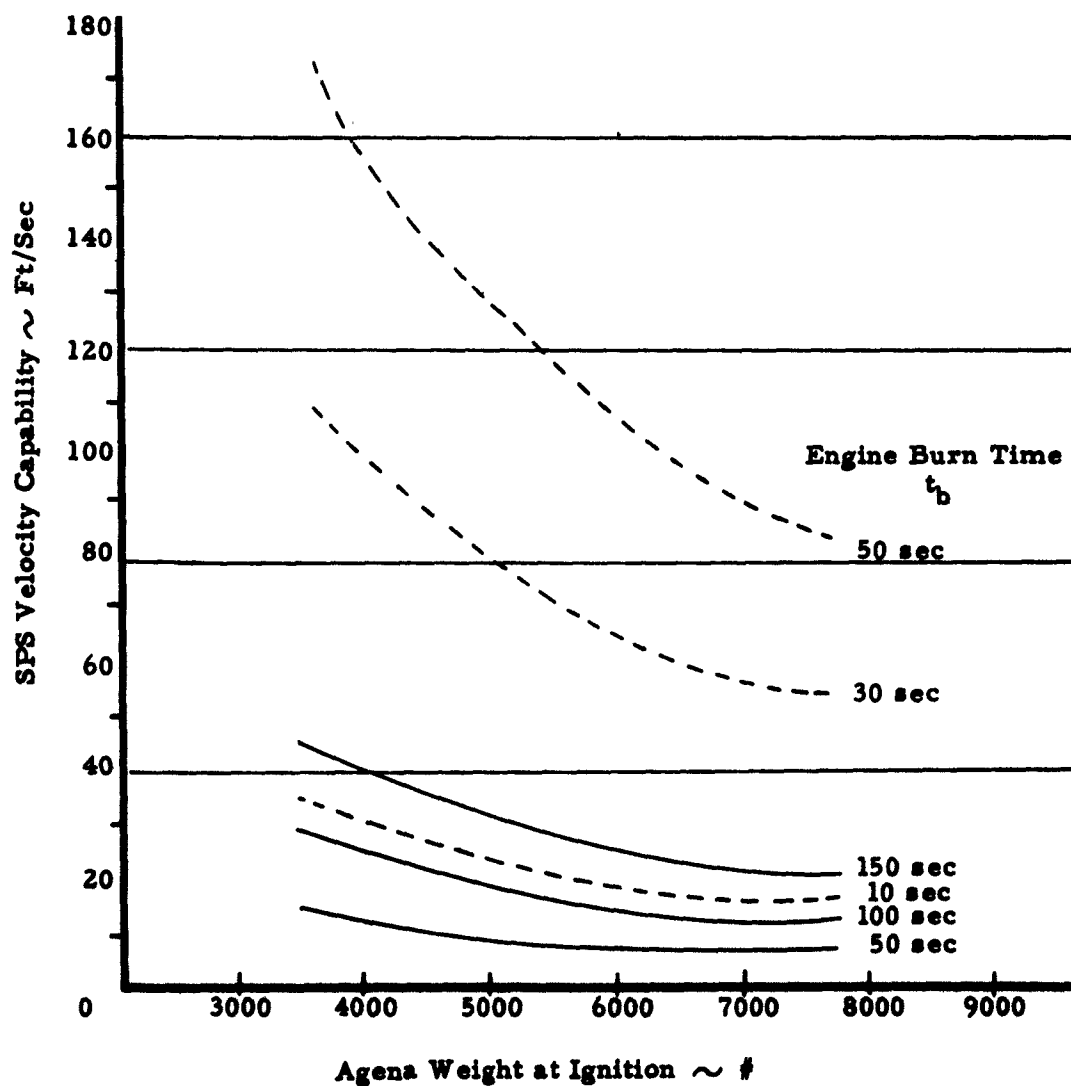


Figure 3-6 SPS Velocity Capability

4.0 VEHICLE MANUFACTURING

The manufacturing functions will be initiated upon the release of vehicle drawings, specifications, and procedures, as programmed and in accordance with established manufacturing schedules. The manufacturing functions (see Figure 4-1) will include the layout of facilities, procurement, fabrication, manufacturing tests, final assembly, and compliance with quality control requirements. The layout of the facilities will provide the organization and assignment of space, equipment, tools, and documentation necessary to receive, store, transport, and process the hardware of the vehicle efficiently, according to applicable standards, and under the environmental conditions necessary to prevent degradation. The procurement, fabrication, test, assembly, and quality control functions are described in the following paragraphs. A more detailed description will be found in the LMSC document entitled, "Manufacturing Program Plan, Gemini Project Vehicles, Model 37205, Serials 5001 and Up."

4.1 Procurement

The Agena D vehicles and optional equipment, tested and qualified by program standards, will be supplied as GFE by AFSSD. The materials, parts, sub-assemblies, and assemblies required to manufacture the remaining mission peculiar equipment will be purchased from eligible vendors, developed by subcontractors, or fabricated by LMSC. The purchased and subcontract development hardware will be produced, tested, and qualified by the vendor or subcontractor in accordance with the applicable drawings, specifications, and procedures prepared for the vehicle configuration. Deliveries will be effected in accordance with the schedule of anticipated requirements. Delivered items will be received and inspected for compliance with the minimum standards of acceptability. The items fabricated within LMSC will be produced and tested to appropriate standards in compliance with the applicable production schedules. Complete, competent, and continuous monitoring of vendor and subcontractor activities will be provided to assure compliance.



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Alternate sources of supply will be selected and other actions taken as necessary to assure the manufacturing organization of the presence of the quantity and quality of hardware necessary to comply with the production schedules of the Agena Vehicles. As the basic hardware becomes available, the manufacturing organization will fabricate the items which have not been purchased from vendors or subcontractors in the desired configuration.

4.2 Fabrication

The fabrication of hardware will consist of the process necessary to shape, assemble, finish, and test mission peculiar components, subassemblies, and assemblies which have not been acquired in the basic configuration required for installation into the vehicles. Typical items will include the structure of the forward auxiliary equipment rack, distribution junction boxes, telemetry signal conditioner boxes, command controllers, and power supplies, and other assemblies. The completion of fabrication will be scheduled to coincide with the delivery of the corresponding Agena D vehicle, optional equipment, and usable mission peculiar equipment.

4.3 Purchased Mission Peculiar Components

The mission peculiar components, subassemblies, and assemblies which do not require fabrication will be purchased from qualified stocks or developed and qualified through appropriate subcontract channels. Examples of hardware which will be purchased from qualified stocks are batteries, power supplies, receivers, transmitters, transducers, and beacons. The primary subcontractor development items will include the secondary propulsion system, receiver for the command system, and the shroud. This equipment will be scheduled for delivery to LMSC before or concurrently with the completion of fabrication within LMSC and the delivery of the corresponding Agena D vehicle and associated optional equipment.

4.4 Agena D Vehicle and Optional Equipment

The Agena D vehicles and optional equipment will be delivered by AFSSD as GFE. The construction and testing of the hardware, prior to delivery, will have complied with the requirements described in LMSC-1414554, entitled, "Detail Specification for the Agena D Vehicle." The delivery, in each instance, will be timed to correspond with the delivery or fabrication of the related mission peculiar equipment. Following delivery, the modifications required by the program will be completed. The modified vehicle will be subjected to manufacturing tests along with the optional and mission peculiar hardware.

4.5 Manufacturing Tests

The modified vehicles and associated optional and mission peculiar hardware will be tested as extensively as necessary to assure the compatibility and operating integrity of the various units and to provide assurance that no degradation has occurred due to excessive handling, modifications, or other causes. The testing will be performed in accordance with the requirements of LMSC-A306106, entitled, "Integrated Test Plan, Gemini Agena Target Vehicle." The manufacturing tests will be performed before and after the final assembly of the Agena Vehicle, as appropriate.

4.6 Final Assembly

During final assembly, the optional and mission peculiar installations will be completed and the entire configuration of the Agena Vehicle will be assembled. Following completion, the vehicle will be inspected for compliance with the appropriate production drawings and specifications, tested in preparation for the conclusion of the manufacturing activities and the beginning of system tests, and reviewed for adherence to the standards and procedures established for quality control. The final product will have been constructed and tested in accordance with the requirements and procedures specified in LMSC-A306192, entitled, "Gemini/Agena Target Vehicle Detail

Model Specification" and LMSC-A306106, entitled, "Integrated Test Plan, Gemini Agena Target Vehicle," before submission to the quality control review.

4.7 Quality Control

Standard quality control methods and procedures will be employed during the manufacture of the Agena Vehicles as factors contributing to the assurance that the quality of the finished configurations will equal or exceed the minimum criteria of acceptability. These procedures will include the review of documentation, periodic inspection of hardware, and performance of such other activities as may be necessary to anticipate, detect, or eliminate the introduction of degrading factors into the manufacturing process. A detailed description of the function of quality control in product assurance is provided in Section 9.0. When each vehicle has been completely reviewed and the requirements imposed upon manufacturing have been satisfied, the system tests will begin.

5.0 VEHICLE SYSTEM TEST

Each completed vehicle will be transferred from manufacturing to the system test area. The system test area will be suitably staffed, equipped, and isolated from detrimental influences. A shroud, Target Docking Adapter, Spacecraft simulator, and AGE checkout equipment will be present and available for use. The purpose of this series of test activities is to demonstrate the readiness of the vehicle for acceptance by AFSSD and transportation to the operations launch base test facility at Cape Canaveral, Florida. The support required for propulsion and hot firing tests will be provided by the test base at Santa Cruz, California (see Section 8.0). The philosophy of the demonstration will be to perform the activities necessary to assure the mechanical and electrical compatibility of the vehicle with the requirements imposed by the mission without indulging in excesses which might reasonably be expected to contribute to the degradation of the hardware. A flow diagram, illustrating the basic functions, is presented in Figure 5-1. In conducting the test, the first flight vehicle will be mated with the Target Docking Adapter and shroud, weighed to establish the total weight and center of gravity, subjected to limited subsystem and system tests, transferred into the anechoic chamber for radio frequency compatibility tests, transferred to Santa Cruz for a hot firing test, returned for a repetition of the system tests and a review for quality control, and will be submitted through the DD 250 procedure to AFSSD for acceptance.

5.1 Subsystem Tests

The subsystem tests will be performed after the vehicle has been transferred from manufacturing to the system test area, aligned, mated with the Target Docking Adapter and shroud, weighed, and the center of gravity has been determined. The tests will be limited to confidence tests of the guidance, attitude control, command control, and telemetry functions. The purpose of the tests will be to demonstrate the capability of the affected hardware to respond to mechanical, electrical, electronic, and radio frequency inputs with corresponding outputs of the desired types, magnitudes, and duration.

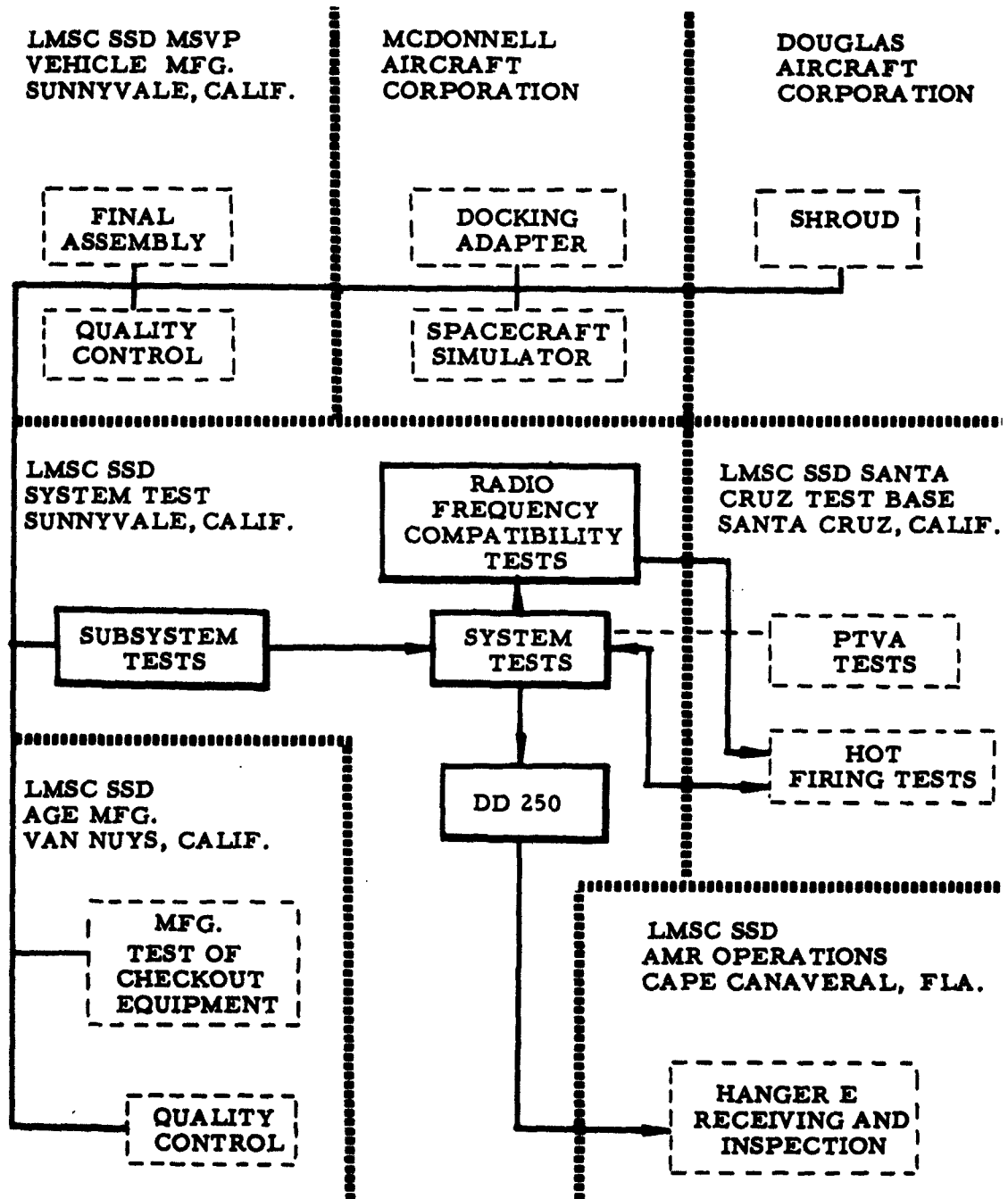


Figure 5-1 System Test

During this demonstration, the guidance and control subsystem will be required to initiate a programmed sequence of events, sense attitude deviations about the axes of the vehicle, and provide corrective responses by repositioning the main engine, activating the attitude control jets, or both, in the combinations required by the simulated mode of flight. The command and communications subsystem will be required to initiate a programmed sequence of events and transmit telemetry data, as directed, upon receipt of appropriate radio frequency commands. After these tests have been conducted, the programmers will be reset, and remaining subsystem tests will be conducted in conjunction with the system tests that will follow.

5.2 System Tests

The system tests will be performed for the purpose of verifying the compliance of the vehicle with the performance requirements of the applicable engineering specification. For these tests, the vehicle will be fully operational, except for the absence of batteries, propellants, and explosive devices. Electrical power will be supplied from an external source through the battery and umbilical plugs. Propellants will not be loaded into the tanks except during the hot firing test of the first flight vehicle at Santa Cruz. Explosive devices will be simulated. The tests will include ground cooling, pressurization leaks, and the simulated countdown, launching, ascent, orbital operation, and rendezvous, with the Spacecraft, of the Agena Vehicle. During the simulated flight, the vehicle will be tested for response to commands and the operation of the guidance and control, command and communications, and propulsion subsystems, with the exception of explosive functions. The command test will include the initial and backup commands provided by hardline, flight programming, and radio frequency. The command functions will include the activities normally associated with the countdown, flight termination, flight correction, booster discrete signals, ascent and orbital programming, telemetry readout, rendezvous, and docking. The guidance and control tests will include ascent programming and attitude control. The command and communications functions will include the transmission of beacon signals and telemetry data, the response to radar interrogation, reception of radio frequency commands from the

ground and the spacecraft, and orbital programming. The propulsion tests will be limited to pressure leaks, pressure switch functions, and the repositioning of the engine in response to attitude control signals. The telemetry transducers and voltage levels at the pickup points for all subsystems will be monitored. The tests will be monitored by AGE checkout equipment with the capability of identifying malfunctioning equipment down to the level of replaceable modules. Following these tests, the first flight vehicle will be placed in the anechoic chamber for radio frequency compatibility tests, transferred to Santa Cruz for hot firing, returned for limited system tests, and, on qualification and approval, will be submitted to AFSSD for acceptance and the subsequent transfer to Cape Canaveral. The acceptance of the vehicle will be accomplished by means of the DD 250 procedure. Subsequent vehicles will not be subjected to the hot firing or radio frequency compatibility tests but will be submitted for acceptance upon the successful completion of the system tests.

5.3 Radio Frequency Compatibility Test

The purpose of this test is to demonstrate the compatibility of the radio frequency systems of the Agena Vehicle and Spacecraft, in operation, under the conditions imposed by the environment in space. The test will be conducted in the anechoic chamber in Sunnyvale. Within the chamber, radio frequency interference will be reduced to the level of the desired environment. The test will begin with the Agena Vehicle, and a functional radio frequency, mockup of the Spacecraft, mounted in the docking approach attitudes, and will be continued through the simulated operation of the Agena Vehicle and Spacecraft in the docking configuration. During the test, the command and telemetry equipment of the Agena Vehicle and Spacecraft will be operated, all significant, non-explosive, functions of the vehicle will be performed in the order required by the flight, rendezvous, and docking procedures, and the interference and transient levels created by the operation of the vehicle and interaction of the radio frequency transmissions will be monitored and measured. After this test, the vehicle will be transferred to the Santa Cruz Test Base.

5.4 Hot Firing Test

The first flight vehicle will be subjected to the hot firing test at the Santa Cruz Test Base (SCTB). The purpose of the hot firing test is to demonstrate the capabilities of the vehicle before, during, and after the ignition and operation of the main engine and the secondary propulsion system. This test and the testing of the propulsion test vehicle assembly (PTVA) which precedes it are described in Section 6.0. Following the hot firing, the vehicle will be returned to the system test area in Sunnyvale for limited system tests.

5.5 DD 250

At the conclusion of the system tests, the vehicle will be formally submitted to the appropriate representatives of AFSSD for acceptance. The vehicle will be accompanied by qualifying documentation. During the DD 250 proceedings, the hardware and documentation will be reviewed. When sufficient evidence has been presented in the form and manner necessary to assure compliance with the contract, the vehicle will be accepted. Following this procedure the Agena Vehicle will be transported to the operations launch base test facility at Cape Canaveral.

6.0 PTVA AND HOT FIRING TESTS

The propulsion subsystems of the propulsion test vehicle assembly (PTVA) and the first Agena flight vehicle will be tested at the Santa Cruz Test Base (SCTB), Santa Cruz, California. The purpose of these tests will be to demonstrate the operating capabilities of the main and secondary propulsion systems, the environmental conditions created by the operation of the system, and the effects of the conditions created on the operation of the remainder of the vehicle. The PTVA will be assembled first, mounted in a fixed installation, instrumented, loaded with propellants, pressurized, and fired. The data acquired from this test will be reviewed for compliance with the applicable specifications and used for reference information during the subsequent, testing of the Agena Vehicle. The first flight vehicle will undergo a similar procedure upon its arrival, following the system tests (see Section 5.0) in Sunnyvale, with the addition of the operation, in flight sequence, of the other subsystems of the vehicle. The test data obtained during the hot firing will be used to confirm the compliance of the vehicle with the requirements of the applicable specifications and the contract. The test stand, instrumentation, and other required support will be installed at SCTB or provided by portable units. In the following paragraphs, the distinctive aspects of the PTVA and flight vehicle test are described. (See Figure 6-1.)

6.1 Propulsion Test Vehicle Assembly (PTVA)

The PTVA will be constructed in Sunnyvale and transported to SCTB for testing. The hardware will include a multi-start engine, engine cone, aft rack, and secondary propulsion system, identical to those designed for use in the Agena Vehicle. The flight hardware will be supported by the SCTB facilities, fixtures, instrumentation, and portable AGE. The tests will be accomplished by mounting the PTVA on the test stand in a manner permitting a simulated flight, attaching the AGE and other desired instrumentation, connecting the propulsion hardware to the propellant tanks provided by the base as fixed installations, pressurizing the system, checking for leaks, and igniting the propellants, and monitoring and recording the resulting data.

LMSC SSD
SYSTEM TEST
SUNNYVALE, CALIFORNIA

LMSC SSD
SANTA CRUZ TEST BASE
SANTA CRUZ, CALIFORNIA

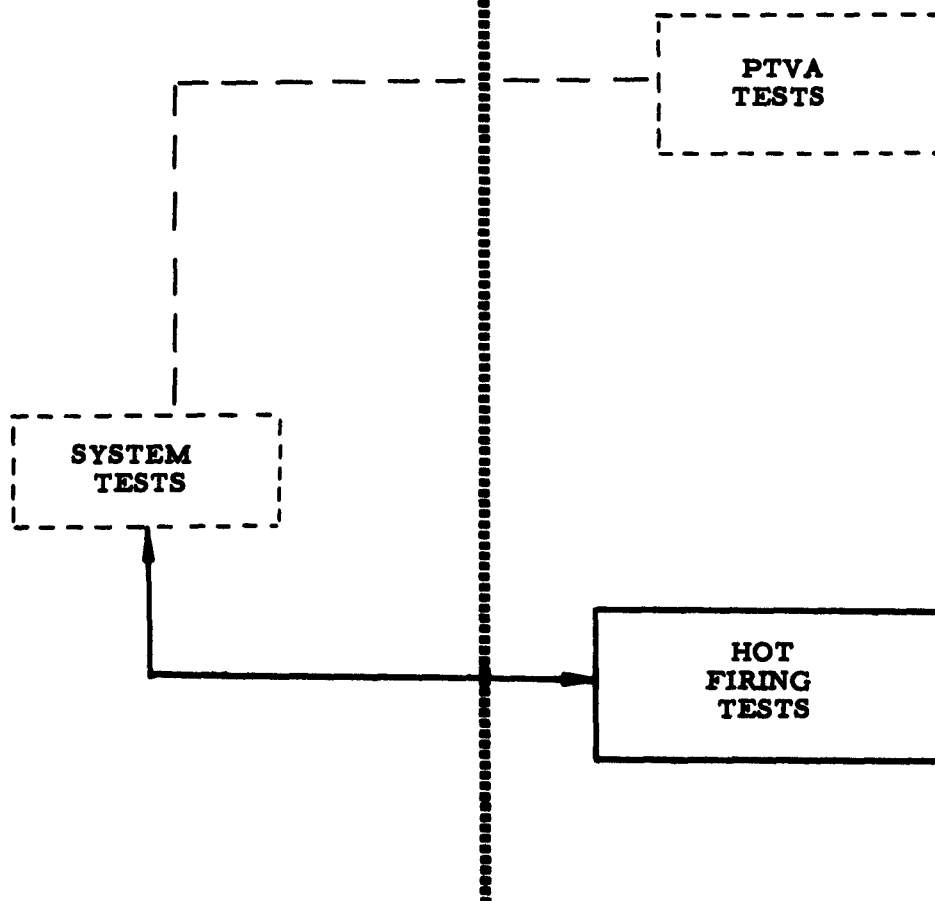


Figure 6-1 PTVA and Hot Firing Tests

The objectives of the tests will be the determination of the operating characteristics of the components tested, the verification of the capability of the secondary propulsion system to satisfy the requirements of the mission, the verification of the compliance of the hardware with the applicable specifications, demonstrations of the environmental conditions created, reliability of operation, and the performance capabilities of the subsystem, and the proving of the adequacy of the AGE and procedures used to monitor these activities. The recorded data will be returned to Sunnyvale for examination, analysis, evaluation, and application to associated design, manufacturing, and test functions.

6.2 Hot Firing Test

The first Agena flight vehicle will be transferred to SCTB for the hot firing test. The vehicle hardware will include the entire Agena Vehicle configuration and the Target Docking Adapter and will be accompanied by the Spacecraft simulator. The facilities, fixtures, equipment, instrumentation, AGE, and other support capabilities required will be provided by SCTB or supplied in a portable form. The hot firing will supplement the system tests performed at Sunnyvale. The purpose of the test is to operate the vehicle under simulated flight conditions to demonstrate compliance with the performance capability requirements of the mission and the applicable specifications. The test will be accomplished by mounting the vehicle, with the docking adapter attached, on the test stand with provisions for pitching, yawing, and ascertaining the effects of shock and vibration, attaching the instrumentation, spacecraft simulator, and AGE, loading the vehicle propellant tanks, pressurizing the propellant and attitude control systems, checking for electrical continuity, pneumatic and hydraulic leaks, and the functional responses of vehicle components to command inputs, simulating the countdown, launching, ascent, orbital, rendezvous, and docking operations of the vehicle, including the ignition and burning of the main engine and secondary propulsion system, and supplying the command data inputs required for operation. When the hot firing has been completed, the functional tests of the vehicle will be repeated. The test data will be recorded and used to demonstrate the compliance of the vehicle with the applicable mission and specification requirements. Following

the test, the vehicle, docking adapter, spacecraft simulator, and recorded data will be returned to Sunnyvale. The vehicle will be retested in the system test area, and submitted with the qualifying data to AFSSD for acceptance.

7.0 VEHICLE LAUNCH BASE TESTS

The launch base tests will be performed on the Agena Vehicle after the transfer from Sunnyvale, California, to Cape Canaveral, Florida. The purpose of these tests will be to ascertain the condition of the vehicle upon its arrival, make necessary repairs, alignments, and calibrations, demonstrate mechanical, electrical, radio frequency, and functional compatibility with the associated flight hardware, AGE, and launch facilities, assure adequate logistics support, and establish the state of readiness required for a successful countdown, launching, and flight. The associated flight hardware will be provided at the launch base, as shown in Figure 7-1, and will include the Spacecraft, Target Docking Adapter, and first-stage Atlas Booster. The AGE will include the ground handling, checkout, service, and launch control equipment. The facilities will include the sites, buildings, installations, structures, fixtures, equipment, tools, communications, utilities, and other services necessary to support the AGE, test, and launching functions. The manner in which the requirements for AGE, facilities, and logistics support will be defined and satisfied is described in Section 8.0. The tests will be performed in a sequential and cumulative manner so that each function will contribute to the desired results without invalidating previous work. Included in the tests, in the following order, will be the receiving and inspection of the Agena Vehicle, the validation of the vehicle subsystems, interface and system compatibility tests with the Target Docking Adapter and the Spacecraft, the preflight validation of the vehicle, pad compatibility demonstrations using the associated flight hardware, AGE, and launch facilities, the Joint Flight Acceptance Composite Test (J-FACT), and the final tests and preparations for launching. The entire procedure will be monitored for compliance with applicable quality control standards. The tests and quality control requirements are described in the following paragraphs.

7.1 Receiving and Inspection Tests

The vehicle and accompanying documentation will be delivered to the receiving and inspection area in Hangar E at Cape Canaveral. Upon delivery,

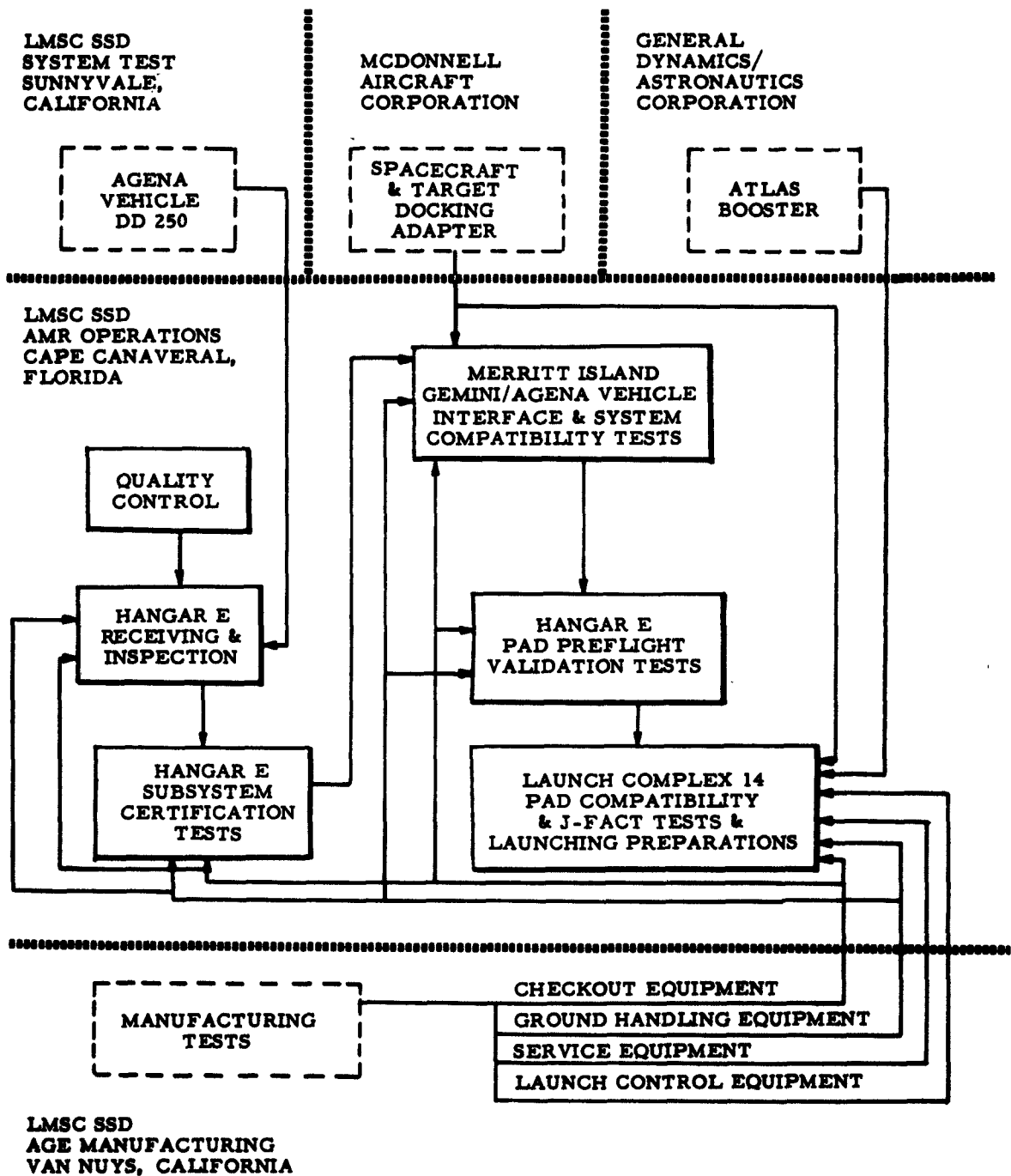


Figure 7-1 Vehicle Launch Base Tests

the shipment will be formally received, inspected, and reviewed. The inspection will be essentially a visual procedure for the purpose of ascertaining the physical condition of the hardware and assuring compliance with the transfer documents. When the damage and inconsistencies, if any, have been noted and corrected, and the delivery is considered to be acceptable, the vehicle will be transferred within Hangar E to the subsystem certification area.

7.2 Subsystem Certification Tests

Following the reception and inspection of the vehicle, the subsystem certification tests will be performed. These tests will be conducted for the purpose of validating the compatibility, alignment, pressurization, calibration, and functional capabilities of the vehicle. During this procedure, the compatibility of the Agena Vehicle and the shroud, Target Docking Adapter, and Hangar E checkout equipment will be established, the engine turbine exhaust duct, secondary propulsion system, and horizon sensor will be aligned, the oxidizer pump lip seal pressure will be tested, instrumentation will be calibrated, and functional tests will be performed on the propellant pressurization system, electrical direct-current amplifier, inverters, ampere-hour meter, and power transfer relay, guidance and control subsystem, and command and communications beacon, transponder, destruct, telemetry, and command operations. The test data will be recorded and used to certify the condition of the subsystems. When the tests have been completed and the subsystems have been certified to be in conformance with the standards and procedures imposed, the vehicle will be transferred to Merritt Island for interface and system compatibility tests.

7.3 Interface and System Compatibility Tests

When the subsystems have been certified and the vehicle has been transferred to Merritt Island, the interface and system compatibility tests will be performed. The object of these tests will be to demonstrate the mechanical, electrical, radio frequency, and functional compatibility of the Agena Vehicle,

Target Docking Adapter, and Spacecraft in a docked configuration. These tests will simulate but will not include the actual mating of the Spacecraft with the Agena Vehicle. During the tests, commands will be transmitted from the Spacecraft to the Agena Vehicle by radio frequency and by hard-line. The response of the vehicle to the commands will be recorded. When these tests have been concluded in a satisfactory manner, the vehicle will be returned to Hangar E for preflight validation.

7.4 Preflight Validation Tests

The preflight validation tests will be performed on the Agena Vehicle following the conclusion of the interface and compatibility tests and the return of the Agena Vehicle to Hangar E. These tests will be performed within stipulated periods of time preceding the scheduled launching of the Agena Vehicle to assure compliance with critical parameters, and will include the charging and testing of the batteries, the functional operation of the propulsion subsystem, (with the exception of propellant loading, pressurization, and firing), and the calibration and functional testing of the guidance and control subsystem. The data obtained from these tests will be recorded. Upon the conclusion of the preflight validation tests, the Agena Vehicle will be transferred to Launch Complex 14 for pad compatibility tests.

7.5 Facilities Checkout Vehicle (FCV) and Vehicle Functional Generator (VFG)

The pad compatibility test of the first Agena Vehicle will be preceded by compatibility tests with the FCV and the VFG. The FCV will be used to demonstrate gantry clearances, test the loading, pressurization, and dumping of propellants, and the operation of the umbilical release system, and will consist of the minimum structure necessary to accomplish these functions. The VFG will be used to simulate the electrical responses of the Agena Vehicle to the launch pad AGE, and will consist of a console. Upon the completion of the FCV and VFG tests, the launch pad will be ready for the pad compatibility test.

7.6 Pad Compatibility Tests

The pad compatibility tests will follow the preflight validation of the vehicle and will be performed at Launch Complex 14. These tests will demonstrate the mechanical, electrical, radio frequency, and functional compatibility of the Agena Vehicle with the associated flight hardware, AGE, and launch pad facilities. During the tests, the Agena will be mated with the Atlas, Target Docking Adapter, and shroud, and aligned. The AGE ground handling, check-out, service, and launch control equipment will be available and used as necessary. Emphasis will be placed on the functional operations of the guidance, attitude control, communications, command control, and electrical equipment. The electrical components will be operated on internal and external power. The guidance and control subsystem will be tested for responses to flight corrections. The communications and control subsystem will be tested for beacon transmissions, responses to radar interrogation, telemetry transmissions, and vehicle responses to command transmissions from the Spacecraft. When these tests have been completed, the Joint Flight Acceptance Composite Test (J-FACT) will be performed.

7.7 Joint Flight Acceptance Composite Test (J-FACT)

The J-FACT test will be performed at Launch Complex 14 upon the completion of the pad compatibility tests. The purpose of this test will be to validate the readiness of the Agena Vehicle, associated flight hardware, AGE, and launch facilities for the launching. The procedure will consist of a simulated count-down and ascent sequence, excluding propellant loading and pressurization. When this test has been successfully concluded, the Agena Vehicle will be ready for the final tests and preparations for launching.

7.8 Final Tests and Preparations for Launching

The final tests and preparations for launching will follow the conclusion of the J-FACT test and will be performed at Launch Complex 14. During these

tests, the fusistors will be checked for continuity and the propellant pressurization system will be examined for leakage. The preparations for launching will include the installation of the batteries, pyrotechnics, and the destruct initiator, and the arming of the destruct system. When these tests and preparations have been completed, the Agena Target Vehicle will be ready for the initiation of the launch countdown.

7.9 Quality Control

The entire sequence of launch base tests, procedures, and preparations for launching, will be performed in accordance with standards and requirements imposed for the maintenance of quality control. The definition, development, and satisfaction of these standards, requirements, and associated functions, are described in Section 9.0.

8.0 SUPPORT

The general support requirements of the program and the proposed method of satisfaction are described throughout the text of this document in association with the functions under discussion. The facilities requirements are described in LMSC-A322586, entitled, "Gemini Program Facilities Master Plan." The purpose of this section is to place particular emphasis upon the requirements and plans for the support necessary to handle, checkout, mate, service, launch, and control the flight of the Agena Vehicle. These requirements will be evolved from the mission and program requirements, as illustrated in Figure 8-1, in the manner described in Section 3.0, and will be coordinated with the requirements assigned to the Agena Vehicle, at the time and continuously throughout the balance of the program, to assure compatibility. The support necessary to satisfy these requirements will include the allocation, modification, or manufacture of the specialized equipment necessary to perform the ground handling, checkout, servicing, and launch-control functions, the allocation, modification, manufacture, installation, or construction of the facilities and the acquisition of utilities and other services in and with which the prelaunch, launch and flight-control functions are to be performed, and the logistics supplies, services, and capabilities needed to implement the existing activities. The requirements for the ground handling, checkout, servicing, and launch-control capabilities will be satisfied by aerospace ground equipment (AGE). The facilities will be located at Cape Canaveral, Florida. The logistics support will be provided when, where, and as needed. The manner in which the detailed AGE, facilities, and logistics requirements will be defined and satisfied is described in the following paragraphs. It should be noted, however, that the contents of this document apply only to the requirements to be satisfied under the terms of the Contract No. AF 04(695)-129. The requirements for the activation of the launch pad are established by Contract No. AF 04(695)-287. The launch capability requirements are established under Contract No. AF 04(695)-198.

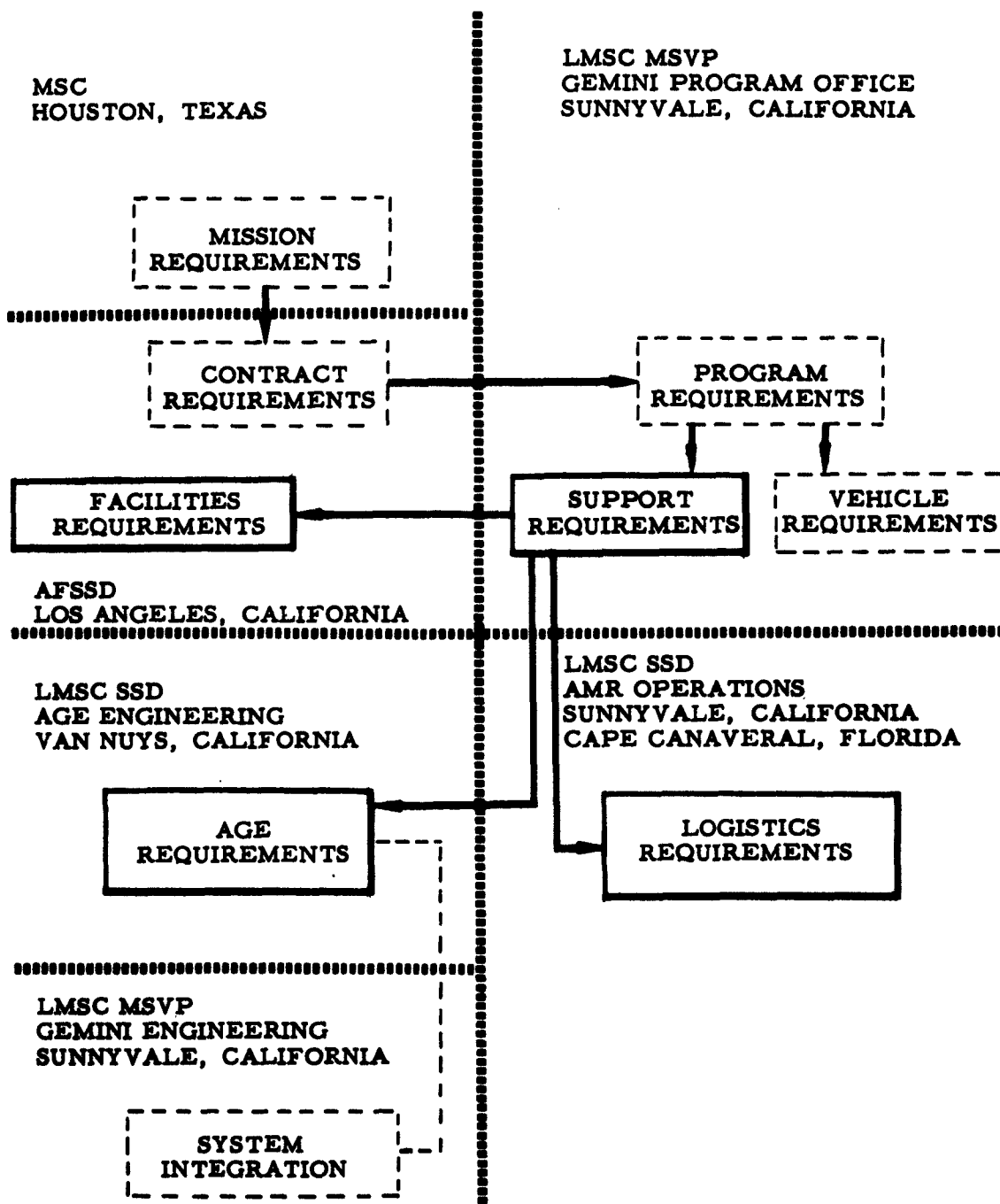


Figure 8-1 Support Requirements

8.1 Aerospace Ground Equipment (AGE) Requirements

The AGE requirements will be defined in terms of hardware, functional capabilities, technical interfaces, operating conditions, and the time, place, and manner of delivery or installation. These requirements will describe the equipment necessary to perform all ground handling, checkout, servicing, and launch-control functions required to support the Agena vehicle at Sunnyvale and Santa Cruz, California, and at Cape Canaveral. When these requirements have been defined, an investigation and analysis of existing AGE equipment will be performed. The purpose of the investigation and analysis will be to determine the extent to which the requirements can be satisfied by the use of available equipment, as it exists or with modifications, or by existing or modified designs, and the extent of the necessity for the design, development, and manufacture of hardware. The equipment which is usable in its existing condition will, as necessary, be tested and calibrated, transported to the desired location, retested and recalibrated, and made available for use. The requirements for the modification or design of hardware will be transmitted to the responsible AGE engineering organizations (see Figure 8-2).

8.1.1 Ground Handling Equipment Design and Development. The ground handling equipment will be designed to satisfy the mechanical requirements of the program for the new or modified capabilities necessary to cover, transport, support, hold, tilt, hoist, and mate the Agena with its shroud and booster adapter, support cables, install batteries, and perform similar functions. Typical items of ground handling equipment include transporters, covers, yokes, dollies, slings, work stands, and mating fixtures. As requirements are received, the new or modified hardware will be designed, developed, tested, and reviewed for compatibility with appropriate human and value engineering, reliability, and interface criteria. The approved designs will be documented. The documents will include the drawings, specifications, and procedures required for the manufacture and testing of the equipment. This information will be transmitted to the AGE manufacturing organization, as shown in Figure 8-3.

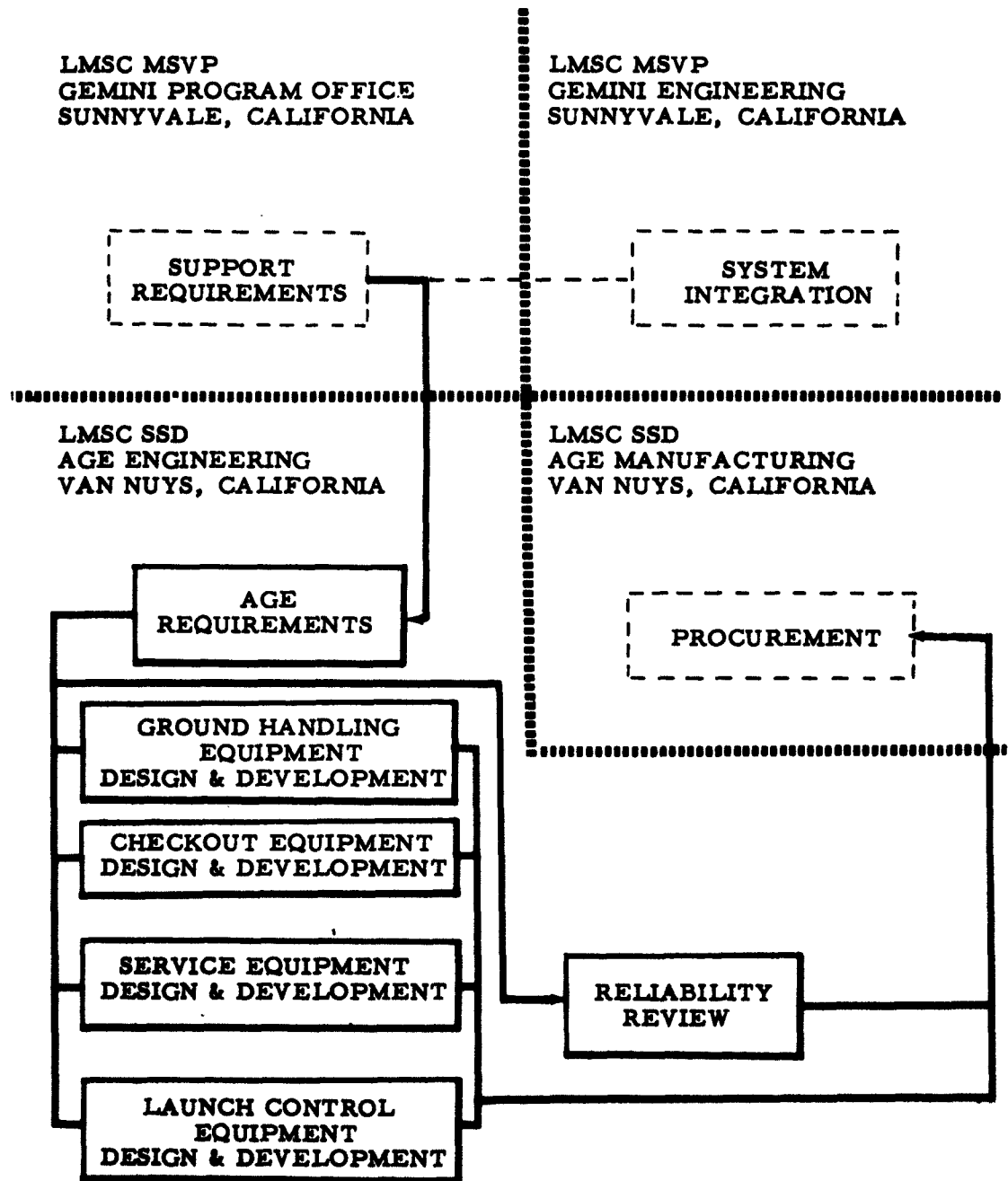


Figure 8-2 AGE Engineering

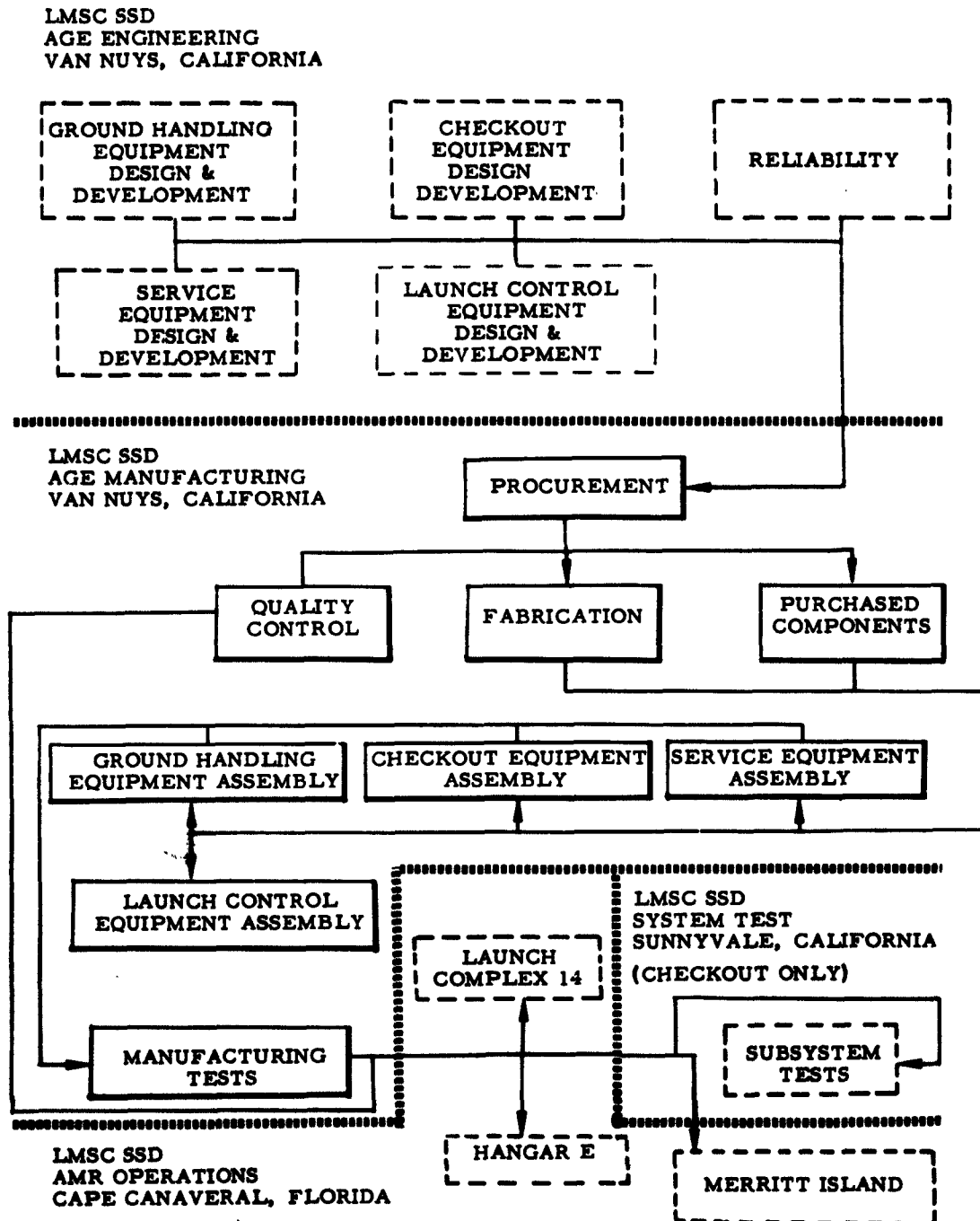


Figure 8-3 AGE Manufacturing

8.1.2 Checkout Equipment Design and Development. New or modified checkout equipment will be designed and developed as required to provide the checkout capabilities needed for the Agena Vehicle at Sunnyvale, Santa Cruz, and Cape Canaveral during the factory-to-launch test sequence. Checkout functions include the supply and distribution of power, the distribution, monitoring, and recording of signals, the exercise of controls, and similar electro-mechanical activities necessary to demonstrate and confirm the readiness of the Agena Vehicle to perform the functions for which it has been designed. The checkout equipment includes consoles, test carts, alignment fixtures, tools, and similar hardware. In the manner described in Paragraph 8.1.1, the requirements will be satisfied and the resulting information will be supplied to the manufacturing organization.

8.1.3 Service Equipment Design and Development. The equipment capabilities necessary to service the Agena on the launch pad will be designed and developed as the requirements are defined for new or modified hardware. The functions of the service equipment include the transportation of the propellants and pressurization gases to the launch pad, loading of the propellants into the Agena Vehicle, pressurization of the vehicle propellant and attitude control systems, detection of propellant leaks, air conditioning of the vehicle, electrical and mechanical coupling of the vehicle to the launch pad AGE, and similar activities. The equipment used to perform these functions includes a gas pressurization trailer, propellant transporter, chiller, and leak detector, umbilical boom, appropriate couplings, and comparable hardware. As described in Paragraph 8.1.1, requirements for new or modified service equipment will be satisfied by a process of design, development, testing, documentation, and review, and the AGE manufacturing organization will be supplied with the resulting information.

8.1.4 Launch-Control Equipment Design and Development. The new or modified launch-control capabilities required to conduct and control the countdown and launching of the Agena Vehicle will be created through the design and development of appropriate hardware as the requirements are

and equipment, related to the Agena vehicle, associated flight hardware, AGE, facilities, and other hardware, through the various phases of packaging, shipment, transportation inspection, storage, handling, control, distribution, manufacturing, testing, and operation. The quality control function is described in greater detail in LMSC-A372078, entitled, "Quality Program Plan - NASA."

9.0 PRODUCT ASSURANCE

The assurance that the services, documentation, and hardware, produced or provided by or under the direction of LMSC, in satisfaction of program requirements, will be provided by a system of definition, indoctrination, monitoring, review, comparison, and acceptance or rejection. These activities will be initiated at the beginning of the program and continued, as appropriate, until the last deliverable items have been accepted. The definition will precede the balance of the program and will establish the applicable requirements, standards, procedures, conditions, alternatives, and associated data necessary to meet or exceed the minimum levels of acceptability and to provide confirmation of compliance. Upon the completion of the necessary levels of definition, personnel will be indoctrinated, trained, and assigned to perform the detailed tasks at levels compatible with their individual skills. As the program progresses, the responsible personnel will identify and monitor critical control points to be certain that all procedural requirements are satisfied. Drawings, specifications, procedures, processes, reports, materials, subassemblies, assemblies, subsystems, and systems, will be reviewed as necessary to assure compliance with appropriate requirements. The data evolved from the monitoring and review functions will be compared with the requirements and standards established as the minimum level of acceptability. Acceptable products will be approved, identified, and utilized in the program. Products which fail to meet the minimum standards of acceptability will be rejected, accompanied by the reasons for rejection, and followed by the actions necessary to remedy the deficiency and prevent opportunities for a recurrence. The responsibilities assigned to product assurance will be separated into the specialized functions associated with reliability and quality control.

9.1 Reliability

The activities of product assurance, as they apply to reliability, will be conducted for the purpose of assuring the capability of the Agena Vehicle and support hardware, produced or to be used by or under the direction of LMSC,

to dependably perform the functions, at the levels, to the extent, and under the conditions imposed by the program, and to prevent the introduction of influences which would or could reasonably be expected to degrade this capability below the minimum levels of acceptability. To accomplish this objective, the reliability organization will provide the techniques and skills necessary to acquire appropriate data, establish criteria, review requirements, monitor procedures and processes, define tests, analyze test data in comparison with applicable criteria, make predictions, identify deficiencies recommend corrective actions, indoctrinate personnel, and prepare, maintain, and distribute documentation. These activities will be performed within LMSC and in cooperation with vendors, subcontractors, associate contractors, AFSSD, and NASA, as necessary, to establish the percentage probability of dependability required. More detailed information will be found in LMSC-A057701, entitled, "Reliability Plan for Gemini/Agenda D Program."

9.2 Quality Control

The quality control aspects of product assurance will be concerned with the enforcement and confirmation of compliance with the standards of quality established for vehicle and support hardware and with the prevention of the introduction of influences which could or would reasonably be expected to reduce otherwise deliverable items below minimum levels of acceptability. This will be accomplished by reviewing the contract, drawings, specifications, procedures, processes, and other documentation, used within LMSC or imposed upon vendors, subcontractors, and associate contractors, for requirements which are applicable to quality control, establishing and defining the standards and procedures necessary to assure compliance, training and assigning skilled personnel to detailed tasks which are compatible with their capabilities, monitoring critical control points, performing the tasks necessary to assure compliance or identify deficiencies, approving qualified products, rejecting unqualified products and taking appropriate corrective action, and preparing and distributing necessary documentation. The scope of these activities will extend from the procurement or acquisition of materials, parts, components,

with the applicable drawings, specifications, and procedures, and the minimum standards of acceptability. The final review and approval of the AGE will be provided before the equipment is transported to the test or launch site. These activities are performed as a function of product assurance and are described in detail in Section 9.0.

8.2 Facilities Requirements

The testing, logistics support, and launching of the vehicle will require facilities support at Sunnyvale, Santa Cruz, and Cape Canaveral. The Sunnyvale and Santa Cruz requirements are described, respectively, in Section 5.0 and 6.0, and will be satisfied by LMSC. The facilities required at Cape Canaveral will include those necessary to house, support, and operate the AGE, and perform the test, launching, and associated functions necessary for receiving and inspection, subsystem certification, the assurance of interface and system compatibility, preflight validation, pad compatibility, Joint Flight Acceptance Composite Test (J-FACT), and launching tests and preparations. These requirements will be supplied to NASA or AFSSD, as necessary, and will include the detailed criteria for sites, buildings, structures, installations, utilities, equipment, safety devices, communications, and other necessities. The criteria are described in LMSC-A062314, entitled, "Final Facilities Design Criteria for the Modification of Complex 14, Atlantic Missile Range, Florida."

8.3 Logistics Requirements

Logistics support will be required at Sunnyvale, Santa Cruz, and Cape Canaveral, throughout the entire factory-to-launch test sequence. The basic requirements will be transmitted to the operations organization of LMSC, as shown in Figure 8-1. The operations organization will implement the requirements and provide the means of satisfaction. Included in the logistics functions will be the determination of requirements, acquisition, storage, inventory control, and distribution of spares, the provisions for depot maintenance, the training of personnel, the preparation of records,

reports, and associated documentation, and the performance of other related activities as necessary. The detailed plans for logistics support are described in LMSC-A059054, entitled, "Preliminary Support Plan for Gemini Program Target Vehicle."

defined. The functions normally performed by this equipment include the supply and distribution of power, transmission of commands, exercise of controls, monitoring of signals, event and analog recording, and comparable activities. This equipment consists mainly of consoles. Upon receipt of the requirements, the design and developmental activities will follow the pattern described in Paragraph 8.1.1 (Refer to delineation of responsibilities for the AF 04(695)-129, -287, and -198 contracts.)

8.1.5 Reliability Review. The designs, developmental hardware, and drawings, specifications, and procedures for all new or modified AGE will be reviewed upon completion for compliance with applicable standards of reliability. The reliability reviews will be performed as a function of product assurance before the initiation of the manufacturing operations. Upon approval, the drawings, specifications, and procedures will be released to the AGE manufacturing organization. The detailed activities required for the assurance of reliability are described in Section 9.0.

8.1.6 Procurement. The drawings, specifications, and procedures for the manufacture or modification of AGE equipment will be reviewed upon receipt from the engineering organization. This review will be conducted for the purpose of determining the extent to which the requirements can be most expediently satisfied by the internal fabrication of parts, purchasing of components from existing stores, and the subcontracting of major levels of effort. On the basis of the conclusions developed from this review, lists of qualified vendors and subcontractors will be prepared, invitations to bid will be released, offers and proposals will be analyzed, and the orders and subcontracts will be placed. The orders and subcontracts will specify the technical requirements to be satisfied, the conditions to be satisfied by each party before, during, and after the requirements have been fulfilled, and the terms and conditions of delivery and payment. Provisions will be made to assure compliance. Upon delivery, the hardware and supporting documentation will be reviewed for compliance with the requirements before it is transferred to the storage, fabrication, or assembly areas. When this

hardware has been reviewed and found to be in compliance with the applicable quality control standards, the indicated transfer will be accomplished.

8.1.7 Purchased Components. The requirements for components will be satisfied by purchase from existing stocks whenever qualified stocks are available or available stocks can be qualified and the total costs, delivery schedules, and other pertinent factors are compatible with the needs of the program. Upon receipt, inspection, testing if necessary, and the confirmation of compliance with the applicable standards of quality control, these components will be transferred to the appropriate assembly area.

8.1.8 Fabrication. The components, subassemblies, and assemblies which can not be more expediently purchased will be fabricated, tested, and qualified by the AGE manufacturing organization. Upon completion, the fabricated hardware will be reviewed for compliance with the appropriate drawings, specifications, procedures, and quality control standards. The qualified hardware will be transferred to the appropriate assembly area.

8.1.9 Assembly. The assembly of the ground handling, checkout, servicing, and launch-control equipment will be performed in essentially the same manner. As the fabricated, purchased, and subcontracted hardware becomes available, it will be checked for electrical and mechanical compatibility, assembled, calibrated, if necessary, and subjected to functional tests. The complete units will undergo final manufacturing tests and a quality control review before release and shipment to the test and launch sites.

8.1.10 Manufacturing Tests. The manufacturing tests will be performed to assure the capability of the complete equipment to perform in accordance with the requirements of the applicable drawings and specifications. When these tests have been completed, a final quality control review will be performed.

8.1.11 Quality Control Review. A quality control review will be conducted at each critical stage of the manufacturing operation to assure compliance