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Document

LMSC

Statement of Work

Follow-On Corona J Program

J21-39

APPROVED:

[redacted]

for [redacted]

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[redacted]

I INTRODUCTION

1.0 This document defines the work required of LMSC, hereinafter referred to as the Contractor, for providing (a) the design, manufacture and test of a space structure subsystem as a part of the Corona J Program, (b) the integration of several specified subsystems into a payload system and (c) the preparation of the payload system for launch of nineteen (19) operational payload systems.

1.1 The Contractor is responsible to effect integration of (1) the Agena/PL interface, (2) the space structure subsystem, (3) the camera subsystem and (4) the recovery subsystem, in accordance with LMSC specification, "Requirement Specification, J Systems 21-39," [redacted] Revision [redacted], dated [redacted], which, by reference, is included as part of this work statement. The hardware in connection with the Corona "J" Program consists of:

a. Panoramic camera subsystem
b. Double frame camera subsystem
c. Space Structure subsystem
d. Two satellite recovery subsystems
e. Clock assembly
f. Aerospace ground equipment
g. Ancillary equipment

1.2 Each panoramic camera subsystem shall consist of two "J" type cameras, a supply cassette and two take-up cassettes. Each double frame camera subsystem shall consist of two double frame cameras with associated supply and take-up cassettes. This equipment shall be provided GFE to the Contractor in the quantities listed under section 3.3. herein, Government Furnished Equipment Facilities, and will comply with the appropriate requirements of [redacted]

1.3 Each space structure subsystem shall consist of a vehicle structure enclosure to house and support (a) the panoramic camera subsystem, (b) the double frame subsystem, (c) a clock and (d) the recovery subsystem.

1.3.1 The fairing assembly will include (1) the necessary electrical controls, (2) the mounting for the double frame camera, and (3) the mounting of and ejection mechanisms for one recovery subsystem.

1.3.2 The "recovery barrel" will include (1) the mounting of and ejection mechanism for the second recovery subsystem, (2) the mounting for the second double frame camera, (3) the necessary mechanism for ejection of the fairing assembly, (4) the necessary electrical controls, and (5) the mounting structure for one pressure make-up system.

1.3.3 Each of the two (2) "instrument barrels" will include (1) the mounting for one panoramic camera, (2) door ejection mechanisms, and (3) the necessary electrical controls.

1.3.4 The conic adapter will include (1) the mounting for the supply cassette of the panoramic camera subsystem, (2) the vehicle clock assembly and (3) the proper mechanical and electrical interface for the payload system and Agena vehicle and (4) the necessary electrical controls.

1.4 Each of the two (2) satellite recovery vehicles will consist of a modified Mark 5A SRV configured to the provisions of para. 4.3 of LMSC "Requirements Specification J Systems 21-39, [redacted] Revision F of 11 January 1965." The SRV's will be delivered GFE to the Contractor in quantities listed in section 3.3 herein, "Government Furnished Equipment/Facilities."

1.5 The Contractor will furnish and/or use [redacted] ground equipment and ancillary equipment as specified in Section II herein.

1.6 [redacted] perform technical functions in support of the establishment of one (1) set of flight operation support functions. Refer to Section 2.1 for a detailed summary of the functions included in flight operations support.

1.7 The Contractor will provide a test and checkout function of the integrated subsystems into a complete payload system and, following successful completion, shall effect the preparation of the payload system for flight.

1.8 Contractor/Itek, Field Representative Relationship

The Contractor shall have the responsibility to direct and guide the efforts of Itek field representatives. The responsibilities of the Contractors in various related functions are as defined in the following paragraphs:

1.8.1 [redacted] Responsibility:

1. Security at jointly used facilities
2. Housekeeping at jointly used facilities
3. Day to day work schedules and necessary manpower at jointly used facilities.
4. Payload system functional and environmental acceptance tests at Contractor facilities.
5. Film handling at Contractor facilities, except as given in paragraph 1.8.2 (5) below.
6. Processing of test film at Contractor facilities.
7. Certify the "J" Payload System for flight.

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1.8.2 Itek Field Representatives' Responsibility:

1. Furnish technical support to the Contractor during all testing functions wherein the camera subsystem is a functional part of the test and on the schedule established by the Contractor.
2. Perform camera subsystem preliminary functional acceptance test upon receipt at the Contractor's facility.
3. Furnish to Contractor proper documentation of all proposed retrofits and modifications to camera subsystems and related ground support equipment.
4. Retrofit, modify and maintain the camera subsystems and related ground support equipment.
5. Load and splice all test film
6. Load and splice all flight film prior to launch.
7. Certify the camera subsystem prior to launch.

II WORK ELEMENTS

2.1 Program Management

2.1.1 The Contractor shall plan and conduct program development, manufacturing, testing and system integration of subsystems to attain the Corona "J" Reconnaissance System.

2.1.2 Management of the entire Corona J Program is the joint responsibility of several agencies of this government. In the interests of effective management, however, Technical Direction will be provided through [redacted], acting as the agent for all interested agencies of the Government. [redacted] established [redacted] as the day to day point of contact for the Contractor.

2.1.3 The Air Force has entered into a contract with the [redacted] for the services of a technical group which will, under the management of [redacted] be responsible for General Systems Engineering and corresponding Technical Direction of the efforts under this contract.

2.1.3.1 In the performance of this contract, the Contractor agrees to cooperate with the [redacted] responding to invitations to meetings, requests for technical information, and requests for research and development planning data on all matters pertaining to this contract and by discussing with the [redacted] employees, technical matters relating to their program. The Contractor further agrees to accept Technical Direction as described herein.

2.1.3.2 Formalization of General System Engineering and Technical Direction [redacted] effort under this contract will be documented by the issuances of a serially numbered "Technical Directive," [redacted] and signed by the appropriate Government Contracting Officer, stating that compliance with such "Technical Directive" is directed pursuant the clause of this contract entitled "Changes".

2.1.4 Training

The Contractor shall conduct such training classes among its employees as necessary to provide a thorough and up-to-date familiarization in the operation and maintenance of flight equipment and ground support equipment. It is the intent of this training that personnel designing and/or operating the equipments [redacted] will inherently know the effect of each function of the equipments regardless of the configuration being tested and will protect the integrity of the equipments against potential failure.

Insert para 10

2.1.5 Replace Test Philosophy and Matrix

The Contractor shall conduct such analyses as necessary to develop a sequence of testing of flight hardware which will provide adequacy, completeness and non-redundancy of testing of flight hardware consistent with program test philosophy. The testing sequence, and specifications and procedures will be revised as necessary to reflect further design changes. [redacted] Negotiate

The test matrix philosophy and report shall be expanded to provide a plan for implementation.

2.2 Development

2.2.1 New Design

This follow-on program shall seek to duplicate J-1 through J-20 design. The extent of this duplication shall be as defined in [redacted] Revision B, dated 11 January 1965.

2.2.1.1 The Contractor shall re-design SRV water seals.

2.2.1.2 The design modifications to be incorporated in this vehicle series are shown on schedule A attached.

2.2.1.3 The Contractor shall undertake, at this time, studies intended to yield corrosion resistant surface coatings and an improved thermal finish.

The production application of the optimum surface coating and/or finish shall be the subject of a separate negotiation.

2.2.1.4 The Contractor shall conduct studies and tests to develop a method of employing standard M 11 squibs throughout the space structures.

2.2.2 Studies and Analysis

The Contractor shall provide a sustaining effort for studies and analysis of post flight data and for new development as required by changes in configuration and/or flight operations.

2.2.3 Weight Reduction Study

A detailed weight reduction study shall be conducted. The study shall indicate weight reduction effects on hardware, and pertinent changes necessary to AGE, manufacturing, operations, and test, in sufficient detail to determine feasibility of J-system modifications and redesign.

2.2.4 Technical Reports

The Contractor shall provide weekly technical reports to [redacted] of the status of all systems in work from the time major subsystems are integrated into a payload system to the time of preparation for launch.

2.3 Reliability

Reliability shall be promoted by the use of LMSC standard design practices and the introduction of an adaptation of the [redacted] Design Review Plan, [redacted] A formal reliability program is not part of this effort.

2.3.1 [redacted]

The Contractor shall conduct design reviews in accordance with Addendum A of [redacted] "Advanced Projects Design Review Plan."

2.3.2 Failure Mode Analysis

The elements of all design will be carefully examined in order to disclose and eliminate possible avenues for inducing malfunction in either (a) the subject component or (b) functionally related components.

2.4 Tests

2.4.1 Development Testing

In accordance with paragraph 2.2.1, development testing is limited to the device specified in paragraph 2.2.1.1 and in support of paragraph 2.2.1.3 and paragraph 2.2.1.4

2.4.2 Qualification Testing

In accordance with paragraph 2.2.1, qualification testing is limited to the device specified in paragraph 2.2.1.1 and as necessary to support the modifications referenced in para. 2.2.1.2

2.4.3 Weight and Balance

Mass properties of the SRV's shall be determined and corrected to the requirements of [redacted] at the Contractor's AP facility.

2.4.4 Acceptance Testing

The Contractor shall prepare acceptance test specifications consistent with the design indicated in paragraph 2.2.1, and shall furnish copies to [redacted]

[redacted]

[redacted]

2.4.4.1 Changes in Acceptance Test Specifications. - Following approval of test specifications per above requirements, the Contractor will maintain an up-to-date set of specifications available for Government review. Specification changes will be subject to [redacted] approval.

2.4.4.2 The Contractor shall conduct acceptance tests on each deliverable end product subassembly or assembly upon completion of fabrication and prior to delivery to its next major milestone.

2.4.4.3 Acceptance tests of vehicle systems at AP shall be of sufficient scope to preclude the need for further testing prior to pad systems run at VAFB. Acceptance tests shall be run on production units to verify workmanship and operability. The individual test shall be run with no adjustments or repairs during the course of the test. If any modifications or repairs are made following the completion of any acceptance test, tests previously run on the repaired or modified component must be repeated, unless an explicit waiver is granted, based on the demonstration that the modification or repair will not affect the response to the particular test or tests. Tests may be witnessed by the Government and recommendations thereon shall be made to ~~[illegible]~~ AQ.

Include TD-004

Provide for sufficient notification 48 hr. Notice

2.4.4.4 The Contractor shall provide for support of pre-launch activities from time of delivery of the total payload system to the launch site.

2.5 Hardware

2.5.1 Manufacturing Services

The Contractor shall provide, either by in-house or subcontracted effort, all manufacturing services required in the performance of the effort of this Work Statement. These services shall consist of, but not be limited to, such efforts as planning, routing, dispatching and such other work that is performed in support of manufacturing of space structure subsystem and the integrated testing and checkout of payload systems.

2.5.2 Fabrication and Assembly

The Contractor shall provide the necessary facilities, materials and labor to fabricate and assemble the space structure subsystem in quantities required in paragraph 1.0 hereof.

2.5.3 Quality Control

The Contractor will provide a quality control system in accordance with "Quality Assurance Implementation Plan," [redacted] dated 4-7-64, which by reference is included as part of this Work Statement.

2.5.4 The Contractor will furnish the following items of equipment to General Electric (Associate Contractor) in accordance with the requirements of paragraph 4.3 of LMSC "Requirements Specification J Systems 21-39," [redacted] Revision E of 11 January 1965.

a.	Nozzle-Spin System	120 units
b.	Valve Assembly	60
c.	Aft Covers	30
d.	Water Seals	60
e.	Ballast Assemblies	30
f.	Sink Valves	30
g.	Drain Valves	30
h.	Chute Guides (Left)	30
i.	Chute Guides (Right)	30

2.6 Manuals and Documents

The Contractor shall furnish manuals and documents as follows:

a. System Log Books for each system, showing the sequence of testing from the time of integration of subsystems to the time of launch.

b. System Manual composed of a complete set of System Test Specifications and Test Procedures. This manual will be accumulated to cover all systems and is not necessary for each system.

c. Launch Requirements Lists for each system, showing the items required to be verified during final launch countdown.

d. Flight Data Book for each system per paragraph 2.8.3 b.

e. Buy-off Book for each flight system, showing the serial numbers of subsystems, major assemblies, etc., and flight certifications by appropriate associate contractors.

2.7 Spare Parts

2.7.1 a. The Contractor shall furnish to [redacted] (by subsystem) containing the part number, description and quantity and need date of GFE spare parts deemed necessary by the Contractor to support the equipments during checkout and flight operations. This list shall also indicate those long leadtime items already released to support the equipment. These spare parts, when furnished by the Government, will be assumed to be in a flight worthy condition without further testing required.

b. The delivery schedule of these spares shall be determined at a later date in accordance with the need dates.

c. The Contractor shall maintain stockrooms and inventories of all spare parts provisioned to support the program.

2.7.2 Manufacturing Extras

The Contractor shall provide manufacturing extras in form of raw stock and small parts which are expended as scrap and spoilage and are not included as items within spares provisioning requirements of paragraph 2.7.1 above.

2.7.3 Logistics Data

The Contractor shall provide logistics data on failure rates and consumption information and other technical data required for logistics management. The Contractor shall also:

a. Maintain liaison with associate contractors, venders, and all suppliers to insure the timely delivery of spares.

b. Establish and moniter hardware recycling plan rework and/or repair for Contractor vendor and suppliers.

c. Maintain liaison for the hardware recycling plan rework and/or repair for government furnished equipment from associate contractors.

2.7.4 System or Subsystem Overhaul

The Contractor shall provide for such refurbishment and/or retesting as may be necessary on subassemblies, assemblies, subsystems and systems, other than camera subsystems and related spare parts, to efficiently maintain a level of these categories for flight or test usage. Costs for retesting of Government furnished equipment returned to associate contractors PLANT for modification or refurbishment shall be the subject of separate negotiations. Any portion of the space structure subsystem used in qualification testing shall not be refurbished for use on a flight system.

2.7.5 System Maintenance

The Contractor shall maintain each payload system in flight readiness until the flight schedule set forth in Section IV.

2.8 Pre-flight, In-flight, and Post-flight Operational Support

Once for each operational system the Contractor shall provide technical functions as required in the following paragraphs:

8.8.1 Pre-Flight

a. Provide data reduction and analysis of ground functional acceptance tests, environmental acceptance tests, and pad system run. This includes processing and evaluation of test film from panoramic and stellar-index cameras to verify optical performance and camera functions; presence or absence of corona, pressure marking, scratching and other camera-induced degradations; verification of V/H, scan rate data, and recording of auxiliary data. Results shall be summarized in a memorandum performance prediction report. The Contractor shall prepare recommendations for the configuration of the stellar baffles to be employed.

Contractor shall verify that suitable data for determination of the alignment and lens distortion calibration of the stellar-index camera and panoramic cameras have been obtained by the Associate Contractor. Such data will be included in the flight data book. Contractor shall also analyze forecast flight operational parameters and prepare recommendations if any limiting conditions of system operating capabilities, such as exposure, cycle rates, thermal conditions and similar factors, will be encountered or exceeded.

b. Establish and verify orbital parameters, launch window, illumination, exposure, and stellar field requirements, camera subsystem parameters, cycle rate requirements for FMC, camera subsystem programming, recovery subsystem programming, payload system information for tape recorder programming, vehicle sequencing, system command generation, film consumption and orbital timer tape preparation.

c. Provide coordination and integration of primary instrumentation schedule, back-up T/M instrumentation, tape recorder requirements, STC data reduction requirements, compatibility of payload system and vehicle data reduction requirements, primary and real time instrumentation readout requirements and preparation of operational flight requirements list.

d. Prepare flight readiness report.

e. Maintenance of computer programs to support the above requirements.

2.8.2 In-Flight

a. Provide in-flight support capability for:

1. Determination of actual orbital elements and ephemeris data for customer analysis of ground track and target coverage.

2. Determination of tracking station acquisition data for planning of command and control capabilities.

b. Provide in-flight operational recommendations to appropriate customer representatives on:

1. V/H ramp setting for optimum IMC.

2. Influence of possible deactivation periods upon ground tracks and program selection.

3. Timer resets for best latitude synchronization for target acquisition.

c. Provide in-flight technical analyses for estimating instrument and and auxiliary systems performance and film consumption from telemetry data, command histories, and time correlations.

[redacted]

2.4.3 Post-Flight

a. Provide post-flight reduction and analysis of telemetry data for engineering evaluation of the mission performance. The data are presented in report form, covering the flight performance of:

1. Panoramic Instrument
2. Double Frame Camera
3. Subsystem Command and Control
4. Camera Subsystem Instrumentation
5. Recovery Systems
6. Thermal Control System (based on real time flight data)
7. Clock Performance

b. Provide flight data book showing the technical parameters applicable to the operational system. Reduce, collate, analyze and present to the customer the following data:

1. Vehicle Layout
2. General Flight Data
3. Camera and Film Data
4. FMC Parameters
5. Lens Data Summaries
6. Pan Camera Format Dimensions and Calibrations
7. Preliminary Clock/Systems Time Correlation
8. Performance Estimate

c. Maintenance of computer programs to support the above requirements.

2.9 System Performance Evaluation

The Contractor shall furnish selected personnel to participate in the technical functions as required in the following paragraphs:

2.9.1 Post-flight analysis to provide feedback of technical information of total system results.

2.9.2 Support Systems Integration in verifying and comparing actual flight results with pre-flight test results.

2.9.3 Evaluation of vehicles attitude performance.

2.9.4 Analysis, calculation and correlation of limiting ground resolution and smear factors.

2.9.5 Analysis of any observed in-flight problems.

2.9.6 Analysis of stellar baffle performance.

2.9.7 Maintenance of computer programs to support the above requirements.

2.10 Government Owned Test Equipment Tooling and Facilities

The Contractor shall utilize Government owned test equipment, tooling and facilities accountable under and subject to the provisions of such relevant test equipment management contracts as may authorize use of such items by the Contractor.

2.10.1 The Contractor shall provide for maintenance of equipments covered in paragraph 2.10 utilized in the performance of the effort covered by this Work Statement.

2.10.2 Insofar as is possible, items of test equipment, tooling and facilities used in connection with the earlier vehicle series will be applied to the effort covered by this work.

2.10.3 Test aids and other checkout equipment in use at AP and VAFB, and manufactured to informal definition, will be re-documented to conventional LMSC format and standards. Re-inspection to this documentation will follow.

2.10.4 The Contractor will design and fabricate (P/L vehicle) pyro circuit checkout equipment, and improved payload vehicle simulators for use in checkout of Agena systems at VAFB and Sunnyvale. This equipment is required to implement the factory-to-pad concept, ref. paragraph 2.4.4.3

2.10.5 The Contractor shall provide the effort necessary to maintain the Payload System Mockup and Simulators which have been made available to the Contractor under other programs.

III GENERAL REQUIREMENTS/INFORMATION

3.1 Removal of Identification Markings

Insofar as it is practicable, the Contractor shall remove all identification markings from all flight hardware prior to assembly in total payload systems.

3.2 Final Acceptance

Final acceptance of the space structure subsystem and integration of subsystems into the payload system will be evidenced by the authorized representatives approval of U. S. Government DD Form 250.

3.3 Government Furnished Facilities, Equipment and/or Services

The Government shall furnish facilities, equipments and services at such locations and times appropriate to maintain program schedules as provided in the following paragraphs.

3.3.1 The following government-furnished facilities shall be required:

(1) Vandenberg Missile Assembly Area

(2) Vandenberg L Building

(3) Vandenberg and/or Point Arguello Launch Pads

(4) Engineering and office space plus necessary office furnishings and equipment at VAFB.

[redacted]

[illegible] checkout and firing facilities, consoles and special instrumentation as required.

(6) Outdoor storage area at all sites, if required.

(7) Hazard storage area at all sites as required.

(8) Shop and laboratory space, necessary machine and portable tools, laboratory and testing equipment, material handling equipment and necessary installation [illegible] at VAFB.

(9) Resolution and theodolite test equipment at AP.

3.3.2 The following government-furnished services shall be required:

(1) Equipment transportation to and from the sites, except between VAFB and the Contractor's checkout facility.

3.3.3 Government-Furnished Equipment shall be delivered in accordance with the following schedule.

(1) Nineteen (19) panoramic camera [illegible] [redacted] and contractor-established spares [illegible]

1.	[illegible] Nov. 1964	11.	13 Aug. [illegible]
2.	8 Dec. 1964	12.	30 Aug. 1965
3.	2 Jan. 1965	13.	6 Sept. 1965
4.	1 Feb. 1965	14.	17 Sept. 1965
5.	26 Apr. 1965	15.	1 Oct. 1965
6.	17 May 1965	16.	1 Nov. 1965
7.	27 May 1965	17.	3 Dec. 1965
8.	16 June 1965	18.	30 Dec. 1965
9.	5 July 1965	19.	20 [illegible]
10.	[illegible] July 1965		

[redacted]

[illegible]

(2) [illegible]

1.	16 [illegible] 1965	[illegible]	[illegible] 1965
2.	8 Dec. 1965	[illegible]	[illegible] 1965
3.	[illegible] 1965	[illegible]	[illegible] 1965
4.	[illegible] 1965	[illegible]	[illegible] 1965
5.	26 Apr. 1965	[illegible]	[illegible] 1965
6.	17 May 1965	[illegible]	[illegible] 1965
7.	27 May 1965	17.	[illegible] Dec. 1965
8.	16 June 1965	[illegible]	[illegible] 1965
9.	5 July 1965	19.	[illegible] 1966
10.	26 July 1965		

(3) Thirty [illegible] (3[illegible]) [illegible] spares. Eight are in house; the [illegible] each, on the dates shown.

1.	In House	[illegible]	[illegible] 1965
2.	In House	[illegible]	[illegible] 1965
3.	In House	[illegible]	[illegible] 1965
4.	In House	[illegible]	[illegible] 1965
5.	30 Apr. 1965	15.	29 Oct. 1965
6.	28 May 1965	16.	1[illegible] Nov. 1965
7.	21 June 1965	17.	30 Nov. 1965
8.	12 July 1965	18.	14 Dec. 1965
9.	30 July 1965	19.	31 Dec. 1965
10.	17 Aug. 1965		

(4) Film of type and quantity to [illegible] out, and flight operations. [illegible]

(5) Raw film shipping cases for item [illegible]

(6) Camera subsystem handling dollies/slings. [illegible]

(7) Tools, jigs and similar items [illegible] install, check and adjust [illegible] or subassembly of the [illegible]

[illegible]

(8) Camera subsystem maintenance manual.

IV DELIVERY SCHEDULE

4.1 The Contractor shall deliver to the Government nineteen (19) [illegible] systems in accordance with the following schedule:

1.	22 Feb. 1965	11.	19 Sept. 1966
2.	2 Mar. 1965	12.	3 Nov. 1965
3.	16 Mar. 1965	13.	18 Nov. 1965
4.	12 Apr. 1965	14.	6 Dec. 1965
5.	17 July 1965	15.	3 Jan. 1966
6.	2 Aug. 1965	16.	[illegible]
7.	11 Aug. 1965	17.	[illegible]
8.	1 Sept. 1965	18.	10 Mar. 1966
9.	20 Sept. 1965	19.	31 Mar. 1966
10.	18 Oct. 1965		

SCHEDULE A - [illegible] MODIFICATIONS [illegible]

(1) Monitor [illegible] roller rotation instead of A & B cassette rotation.

(2) Circuitry [illegible]

a. Reset [illegible] relay which [illegible] the [illegible] cutter prior to P29 disconnect to preclude current flow during disconnect.

b. Elimination of arm/safe plugs in pyro [illegible]xes and associated wiring.

c. Addition of an emergency operate mode, which by-passes existing [illegible] command circuitry, to provide for stereo operation in the event of a failure in any one of the series connected mode select relays.

(3) Pyro (interface) circuit revisions.

(4) Shutter Verification Test Aid.

(5) Elimination of buffer relays in [illegible]

~~(6) [illegible]~~

(7) Installation of improved separation switches.

(8) Enable P/L TM by recovery arm signal.

(9) Simplification of harness design by elimination of those features which anticipated an alternate vehicle configuration.

(10) Installation of improved Thermal Instrumentation.

(11) Redesign of space structure lens baffles.

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