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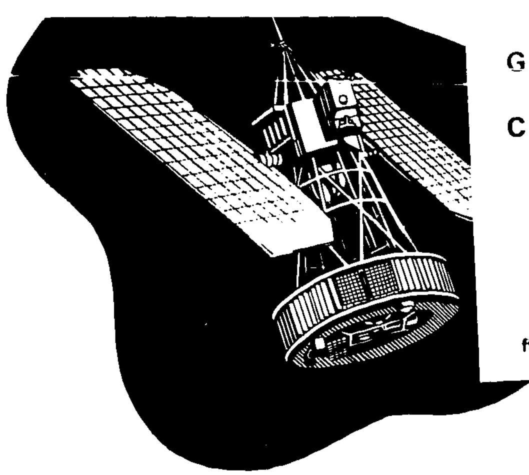

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NIMBUS METEOROLOGICAL SATELLITE INTEGRATION AND TESTING QUARTERLY PROGRESS REPORT

16 MAY TO 15 AUGUST 1966

CONTRACT NAS5-978

I.S. HAAS, MANAGER
NIMBUS PROGRAMS

PREFACE

This Quarterly Progress Report for the NIMBUS Integration and Test (NIMIT) Program is submitted in partial fulfillment of Contract NAS 5-978. It covers progress for the period 16 May to 15 August 1966. A summary of the report, printed on blue-colored stock for easy identification, is included at the beginning of the main body of the report.

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SUMMARY

I. ENGINEERING INVESTIGATIONS, STUDIES, AND ANALYSIS

I.1 NIMBUS II SPACECRAFT FLIGHT PERFORMANCE

After being successfully launched on 15 May 1966, the NIMBUS II Spacecraft performed exceedingly well throughout the first 90 days of flight. Nearly full global coverage was attained, high quality data received, and all major mission objectives were met. All subsystems operated normally until the PCM Tape Recorder failed in Orbit 949, and the MRIR Tape Recorder failed in Orbit 985. The Control Subsystem has maintained spacecraft orientation within required accuracy, and thermal control of the Sensory Subsystem has remained constant throughout the flight. As of 13 August 1966, 1200 orbits were achieved. Three Monthly Flight Evaluation Reports were issued during this reporting period (see Section 1).

II. INTEGRATION

II.1 NIMBUS B SYSTEM INTEGRATION

Several major decisions and accomplishments concerning the spacecraft electrical system evolved during this reporting period. All spacecraft electrical interfaces were defined. The Telemetry and Command Matrices were released. A listing of Spacecraft Test Restraints was established and issued. The Power and Command Distribution Harnesses were defined and schematics issued. The Spacecraft System Schematic neared completion. The Stage I Thermal Subsystem Specification was updated to Stage III and interface information was included.

All Phase I Interface Agreements were completed and delivered to NASA. Preparation of Phase II Interface Agreements was continued and 10 agreements were completed and forwarded to NASA during this reporting period. Subsystem Interconnection Diagrams and Tables, and Mechanical Interface Drawings were continuously generated for inclusion in the Interface Agreements.

Anticipated NIMBUS B weight at launch was reduced from 1475 pounds to 1462 pounds due to removal of the RTG Eject Command Subsystem from the vehicle.

The status of Government Furnished and General Electric Subsystems is included in this report, including GFE receipts, bench acceptance testing, and shipments.

Subsystem Bench Integration Test Requirements were prepared for 15 subsystem tests and 11 integration tests were conducted during the period (see Section 2 and 3).

II. 2 LAUNCH VEHICLE INTEGRATION

The gantry crane requirements were documented to assure compatibility with the NIMBUS B Spacecraft Cover. The spacecraft envelope was updated to manufacturing and assembly tolerance extremes. The GE Interface Drawing was re-issued including updating of the spacecraft configuration, shroud configuration, and shroud access doors. A SACS ring was received from Douglas Aircraft and a layout for the relocation of the Control Subsystem scanner stimulators in the SACS shroud was completed.

A shroud cooling test was conducted using a NIMBUS C shroud, the NIMBUS C Prototype Spacecraft, and an electrical model of the RTG Subsystem. Attendance at the NASA interface meeting included representatives from GE, GSFC, LeRC, LMSC, and AEC.

A structural evaluation of the present adapter based on a projected NIMBUS B Spacecraft and adapter weight of 1475 pounds confirmed the adequacy of the adapter structure for vibration and acceleration tests. Adapter Qualification Test Requirements were issued. Design of the adapter structure was completed and fabrication initiated. A layout for the adapter targets is nearly completed pending the use of re-radiators, and the adapter schematic was changed to accommodate the Lockheed Agena/adapter wiring changes and changes requested by NASA (see Section 4).

III. SPACECRAFT DESIGN AND DEVELOPMENT

III. 1 GENERAL ELECTRIC COMPONENTS

Antenna designs were reviewed and approved including the Command, PCM, RTTS, S-Band, and the newly designed IRLS antenna. Adapter-mounted component designs were reviewed and approved for Stage IV release, including the accelerometer, vibration measuring system, and IDCS, HRIR, MRIR target assemblies. Stage III design releases were approved for the IRIS and SIRS sparebeams and IRIS earthbeam. Sensory Ring-mounted component designs were approved for Stage III releases for the Unfold Timer and the Auxiliary Load Controller. The Environmental Test Requirements Specification for NIMBUS B Components was issued. Status of individual components is included in this report (see Section 5).

III. 2 HARNESS DEVELOPMENT

A specification was completed for procurement of Cannon D-type subminiature connectors used throughout the spacecraft. Harness segment and connector-type identification drawings were completed. As of the end of this reporting period, the interconnection tables for the major Telemetry and Power Subsystems harnesses, and the Solar Power and Paddle Unfold Squib harnesses were issued.

The Harness Mockup structure and connector locations were continuously updated to the flight configuration requirements. Channel reassignments were made in the Telemetry Subsystem and incorporated in the harnessing, and voltage drop in the battery distribution harness will require the use of a larger connector in the battery disconnect circuit. The status of interconnection tables, harness drawings, harness mockup segments, and a complete listing of all harnesses by subsystem and drawing number is included in this report (see Section 5).

III. 3 STRUCTURAL DEVELOPMENT

Comparisons of data from booster launch through shroud separation from NIMBUS A and C were found to be in close agreement, and it is anticipated that NIMBUS B will be exposed to the same environment.

Test reports were generated for the vibration and acceleration testing of the Structural Dynamics Model Spacecraft and verified the adequacy of the spacecraft structure to undergo these environments, including the increased weight configuration of the spacecraft.

The majority of the drawings defining the Electrical System Model Spacecraft were issued, and previously issued design layouts were used to accelerate assembly and drilling of mounting holes on this vehicle. A Controls Subsystem adapter was designed and fabricated to accommodate the mounting of the Prototype Controls Subsystem on the ESM Spacecraft. This unit is presently undergoing integration and test.

Structural requirements for the Flight Spacecraft Sensory Subsystem outer webs were released. Antenna installation and mounting was analyzed and approved. A method for mounting the SIRS to avoid distortion of the optical axis was established. A study for establishing paddle positions during the unfold sequence was conducted. Layouts defining the mounting provisions for the Auxiliary Load Panels and mounting of stimulators in the shroud were completed. The harness deck was redesigned from a tray to a flat desk. Design of the lower insulation was completed, including blankets, shells, assembly, and installation drawings (see Section 5).

III. 4 RELIABILITY

A total of 17 component design reviews were conducted during this reporting period and resulted in GE design approval of the spacecraft antennas, MRIR Target, and Telemetry Conversion Module. The Design Change Board convened 57 times and evaluated 310 change documents (approval/rejection status by design area is included). Specifications were issued to define requirements for connectors, resistors, transistors, and semi-conductor burn-in. Subsystem reliability analyses were completed for the electrical aspects of the Thermal Control Subsystem, an interim analysis of the Unfold Subsystem, and an assessment of the Separation Subsystem. A Failure Analysis Report was completed on Temperature Controllers and a failure analysis of Fluid Dampers is currently in process. The status of GSFC Malfunction Reports is included (see Section 9).

IV. TEST AND EVALUATION

IV.1 TEST PLANNING

The NIMBUS B Integrated Test Plan was continuously reviewed and revised. ESM and Flight Spacecraft test definition and test flow were modified to reflect schedule changes in hardware delivery. Task definition of the ESM Debug Test Procedure was completed and drafting of the procedure initiated (see Section 8).

IV.2 ANTENNA MODEL TESTING

Antenna testing at NMSU using the Antenna Model Spacecraft was completed and the spacecraft removed from the tower. Testing of antennas to the flight configuration was completed in June 1966 and pad configuration testing was concluded in July 1966. Testing of the IRLS antenna and re-radiator proof tests are presently being held pending NASA decision and action (see Section 5).

IV.3 NIMBUS B DATA SYSTEM

The Telemetry History File has been implemented and data collected from subsystem bench verification and integration testing. Seven programs were presented and approved by the Computer Program Review Board and are presently being documented. An operating system for use in the assembly, debug, and operation of the 160A computer programs has been established and partially checked out. Data is currently being collected for the Master Information Table (MIT) and MIT control and maintenance procedures generated. Eight sections of the Telemetry and Command Directory were completed in preliminary form and are currently being reviewed (see Section 7).

V. FACILITIES AND EQUIPMENT

V.1 NIMBUS INTEGRATED TEST FACILITY

During this reporting period the NIMBUS Ground Station Complex was constructed, equipment installed, checked out, and the complex made operational. Movement and integration of the Bench Test Console from the SETF building and the Systems Test Area was accomplished.

The Bench Integration Test Board was fabricated, set up in the new Bench Test Area, and successfully used to support subsystem bench integration testing (see Section 8).

V.2 AEROSPACE GROUND EQUIPMENT

Technical requirements were issued for the NEST Console, Target Control Console, Test Tees, and Check-of-Calibration Adapter (Ambient). The electrical AGE specification establishing standards for test equipment design, fabrication, and test, and the wiring and installation standards drawing were issued. Design of the NEST Console is approximately 85 percent complete. The RF Test Console was redesigned for NIMBUS B, preliminary design of the Target Control Console was completed, and design of the RF Dummy Load Panel was initiated.

Mechanical AGE requirements and design continued. Assumptions were used where specific requirements were lacking to facilitate processing, and NASA was kept cognizant of assumptions employed. The Sensory Ring Lift Sling was completed and successfully proof-load tested. Detail drawings of the Check-of-Calibration Adapter (Ambient) were completed and fabrication started. Use of the utility dolly "as is," and modification of the NIMBUS C Spacecraft Mounting Ring and match mate tool for NIMBUS B use was confirmed. The spacecraft lift sling will be modified to accommodate increased weight of the vehicle. The design plan for the alignment equipment was completed, a design review conducted, and approximately 80 percent of the drawings issued. Design layouts were completed for the spacecraft cover, spacecraft cover sling, and spacecraft mounting ring. Five RTG mounting concepts were prepared and forwarded to NASA for selection of method, and a preliminary RTG handling procedure issued.

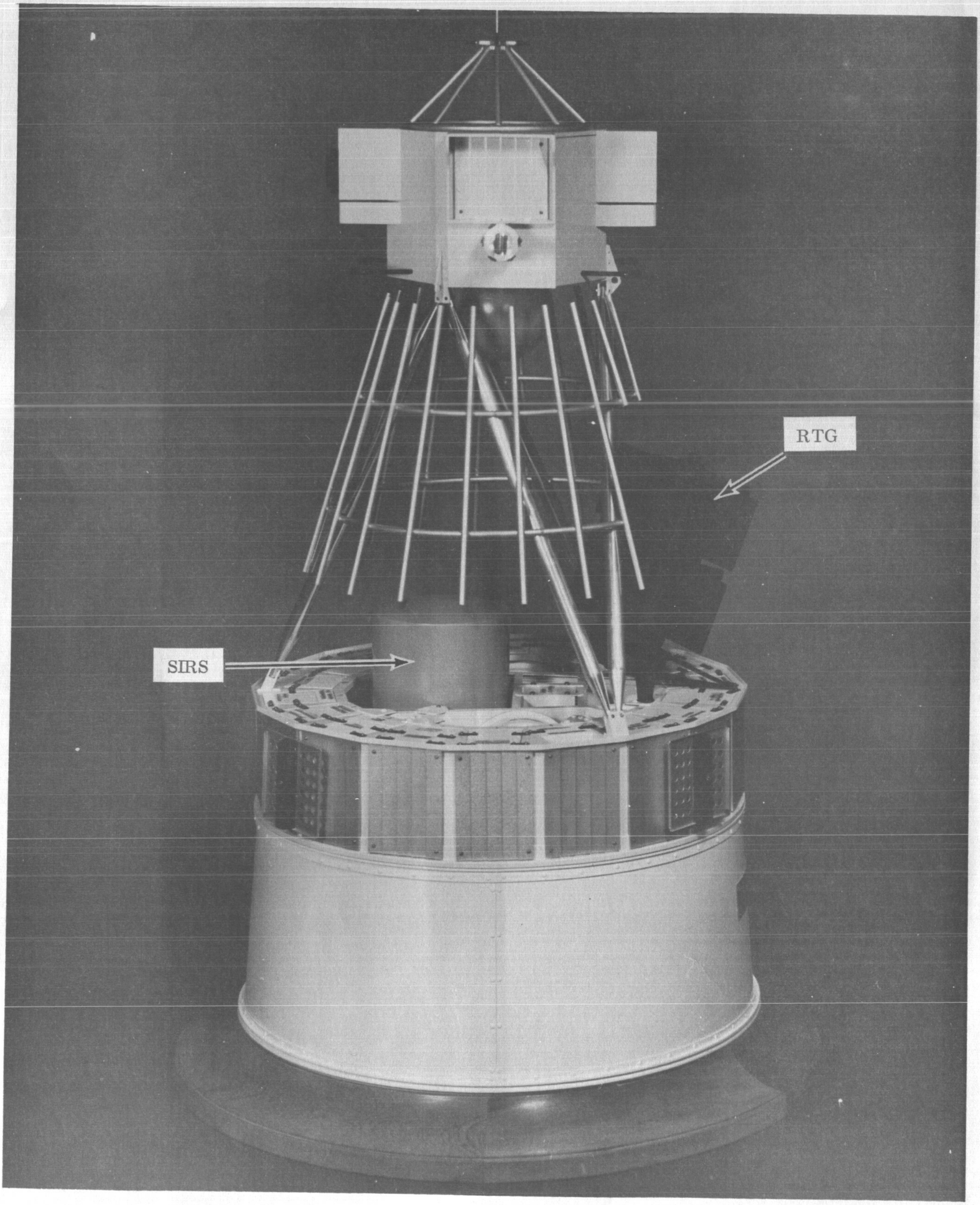
Equipment structural analyses and support activities are included in this report (see Section 6).

VI. PROGRAM MANAGEMENT

The NIMBUS B Program Schedule dated 1 March 1966, which was in effect at the beginning of this reporting period, was revised twice during this reporting period. A review of the program status in July 1966, coupled with a NASA desire to reduce manpower levels, resulted in the (tentative) 21 July 1966 schedule revision, which extended the program and Flight Spacecraft delivery from November 1967 to May 1968. However, due to expected improvement in GFE deliveries and the NASA desire for an earlier delivery of the Flight Spacecraft, the program was subsequently revised again resulting in the (tentative) 10 August 1966 schedule. This schedule revision advanced the delivery of the Flight Spacecraft from May 1968 to February 1968. Although this schedule was implemented, additional discussions with NASA are required to assure that total program requirements are met (see Section 10).

VII. NEW TECHNOLOGIES

During this reporting period, two surveys were conducted for the disclosure and reporting of new technologies, including reviews of technical activity and documentation. As a result of these reviews, no new technologies, nor items defined as reportable, were disclosed (see Section 11).



Model of NIMBUS B Spacecraft (without Paddles) (Note addition of SIRS and RTG Subsystems)

SECTION 1

NIMBUS II SPACECRAFT FLIGHT PERFORMANCE

During this reporting period, the following NIMBUS II Monthly Flight Evaluation Reports were prepared and issued under NIMBUS Technical Control Center Operation Contract NAS 5-9589:

Report No.	Reporting Period (1966)	Orbits	Document No.	Date (1966)
1	15 May to 14 June	1 to 400	66SD4404	30 June
2	14 June to 14 July	401 to 800	66SD4440	30 July
3	14 July to 13 Aug.	801 to 1200	66SD4478	30 Aug.

The following summarizes the flight performance of the NIMBUS II Spacecraft throughout this reporting period:

1.1 ORBITS 1 TO 400 (15 May to 14 June 1966)

NIMBUS II, designated NIMBUS C during development and testing at the General Electric Company Space Technology Center at Valley Forge, Pennsylvania, was successfully launched into a near-circular orbit on 15 May 1966 and performed well during the initial 30-day flight period. All major mission objectives were met and the favorable orbit and satisfactory performance of all systems resulted in nearly full-global coverage by the sensory subsystems on a daily basis. The sensory data output exceeded that of NIMBUS I on the 15th day of flight. All spacecraft subsystems performed normally throughout the first 30-day period of flight.

1.2 ORBITS 401 TO 800 (14 June to 14 July 1966)

The NIMBUS II Spacecraft continued to perform in an excellent manner during the second 30-day period of flight. There were no spacecraft failures during this period. Command and control of the spacecraft was, for the most part, normal. Difficulties were encountered with ground operations when the Rosman, North Carolina, DAF was struck by lightning which disrupted the antenna and receiver electronics. However, partial station operation was resumed within eight hours and autotrack data was usable within 1-1/2 days.

Some degradation of HRIR video data was experienced because of the increased detector cell temperature. However, the detector cell mean orbital temperature was expected to decrease proportionally with the decreasing solar incidence angle (β) which peaked about Orbit 780.

Voltage regulation of the spacecraft primary and auxiliary buses remained well within prescribed limits. The charge/discharge characteristics of the batteries remained essentially unchanged. The average solar array current at the end of 800 orbits was 12.6 amp, well above that required to support normal spacecraft operating loads.

In the absence of cold clouds, the Control Subsystem maintained the spacecraft orientation toward the Earth reference within the required pointing accuracy. The solar array drive characteristics remained unchanged throughout the second 30 days of the flight. However, because of the increased solar incidence angle (peaked at 11.37 degrees on about Orbit 780), solar array drive reversals became more pronounced during this flight period as was expected. The average control housing and component temperatures increased about $1^{o}C$ because of thermal coating degradation. This temperature increase, as expected, was much less than for the first 30-day flight period.

The PCM Subsystem continued to produce about 98 percent good data on a daily average basis.

Thermal control of the Sensory Ring remained constant throughout this flight period except for the 16-orbit period between Orbits 788 to 804 when the spacecraft was maintained in the APT Subsystem Coast-through Mode. Average Sensory Ring and component temperatures at the end of this period were $19^{o}C$ and $21^{o}C$, respectively. These temperatures returned to normal levels when normal spacecraft operations were resumed.

1.3 ORBITS 801 TO 1200 (14 July to 13 August 1966)

During the third 30-day period of flight, the NIMBUS II Spacecraft continued to perform well in most areas of operation although experiencing three failures -- the loss of the MRIR and

PCM Tape Recorders and 0.7 amp reduction in the solar array output (because of a failed solar array paddleboard). Command and control of the spacecraft was normal.

The PCM Tape Recorder failed in Orbit 949 resulting in the loss of A-stored data. A-real time data, still being received, has proved to be of sufficient quantity and quality to properly evaluate the spacecraft and to make any necessary adjustments.

The MRIR Tape Recorder failed in Orbit 985. Since that time, no MRIR data has been received from the spacecraft. Until the time of failure, the MRIR data had been excellent.

Between Orbits 1065 and 1070 the solar array output current decreased about 0.7 ampere. Normal operation of the spacecraft has continued with no reduction of sensory subsystem operation. The average solar array current at the end of 1200 orbits was 11.9 amperes. Voltage regulation of the regulated and auxiliary buses has been maintained within tolerances.

In the absence of cold clouds, the Control Subsystem maintained the spacecraft orientation within the required accuracy. The Solar Array Drive (SAD) characteristics remained essentially unchanged. The average Control Subsystem component temperatures increased about 1 to 2°C during this 30-day period.

Thermal control of the Sensory Ring has remained constant throughout the entire flight.

Some degradation of HRIR video is still being experienced because of high detector cell temperature. The detector cell temperature did not respond to the decreasing solar incidence angle as had been expected.

The APT Subsystem and HAX continued to give good-to-excellent video data.

The AVC Subsystem continued to give high quality data despite some RFI from within the spacecraft.

1.4 ACCUMULATED DATA

The total number of photographs accumulated, and the total operating time for the sensory subsystems from launch through Orbit 1200 (13 August 1966), is as follows:

Subsystem	Operation	Accumulated to Date
AVC	Frames	92,133
APT	Hours	949
HRIR	Night Orbit Swaths Day Orbit Swaths *Day Orbits	933 103 -
MRIR	Day/Night Orbit Swaths	789
DRIS (HAX)	Hours	774

*Operation for Recording Regulated Bus Current

SECTION 2

SYSTEM INTEGRATION (NIMBUS B SPACECRAFT)

2.1 SYSTEM ELECTRICAL DEFINITION

During this reporting period, the following major electrical system decisions were accomplished and documented as indicated:

a. Spacecraft Electrical Interfaces (Memo 41G3-49)

b. Switching of Selected Telemetry Points (PIR 4181-NB-64)

c. Method of Command Enable Wiring (Memo EWS-B-11)

d. RTG Emergency Shut-Down Provisions (Memo 41G3-63)

e. Subsystem Characteristics for Power Bus Fuse Sizing (PIR 4185-NB-154)

f. RMP Package Decisions (Memo 41G3-76)

g. Method of Insuring "RMP-off" Before Energizing the Spacecraft (Memo 41G3-81)

h. NIMBUS B Telemetry and Command Reassignments (PIR 4181-N-01)

i. Spacecraft Test Restraints (PIR 4181-NB-07)

j. Review of NIMBUS B Spacecraft Voltage Levels (PIR 4181-NB-08)

k. Use of the Battery Bus for Cable Cutter Squib Firing (PIR 4181-NB-19 and PIR 4181-NB-87)

l. Incorporation of Unencoded Command Logic (PIR 4181-NB-22 and PIR 4181-NB-25)

m. Incorporation of Hardwire "All Batteries On" AGE Command (Memo 41G3-49 Revision D).

The above listing reflects the following key decisions accomplished in the Electrical Systems Area during this reporting period:

a. All Spacecraft Electrical Interfaces were identified (The Adapter/Agena interface was not identified).

b. The Spacecraft has been modified to permit a reduction in regulated bus power demand by enabling certain Telemetry Sensors to be unpowered by command.

c. An Emergency Shut-Down provision removing the RTG from the regulated bus by hardwire was accomplished.

d. The RMP package was modified to permit an emergency control by hardwire from the AGE.

e. The Telemetry and Command Matrices were released.

f. A file of Spacecraft Test Restraints was published.

g. The Power and Command Distribution harnesses were defined and schematics published (GE Dwg. 47J209963, Sheets 6 to 12)

h. A review of the NIMBUS B Spacecraft Voltage Levels were accomplished to define any hi voltage harnessing requirements. There were no hi voltages present in the NIMBUS B Spacecraft.

i. The system schematic neared completion. A total of 19 of 31 sheets were released.

j. A decision was made to modify the Unfold Subsystem so that the squibs for the cable cutters can be fired from the battery bus instead of the regulated bus as on NIMBUS A and C. This change requires a modification to the Unfold Timer and subsequent system harnessing changes.

k. A decision was made to incorporate Unencoded Command Logic into the NIMBUS B Spacecraft. This system requires the simultanious transmission of two unencoded commands to execute a function as opposed to the previous NIMBUS A and C system of one unencoded command per function.

2.2 SYSTEM INTERFACE CONTROL

During this reporting period major effort was placed on preparation and issuance of Phase II, GFE interface agreements, and drawings.

2.2.1 INTERFACE AGREEMENTS

The Phase I interface agreement for IRIS and the Command/Clock revised Interconnection Tables were completed and delivered to NASA/GSFC for review. Phase II configurations of the following interface agreements were completed and delivered to NASA/GSFC for review, approval, and sign-off:

a. Attitude Control Subsystem

b. RTG Subsystem

c. IRLS Subsystem

d. HDRSS Subsystem

e. IDCS Subsystem

f. MUSE Subsystem

g. MRIR Electronics Subsystem

h. HRIR Subsystem

i. MRIR Radiometer Subsystem

j. RMP Subsystem

2.2.2 MECHANICAL INTERFACE DRAWINGS

The Mechanical Interface Drawings are supplements to the interface agreements. Each interface agreement listed above contained its own specific mechanical interface drawing. In addition, the Phase I mechanical interface drawing was issued for IRIS, Command/Clock, and PCM Telemetry. These drawings reflect the information available at the date of issuance. Information categories lacking are noted on the face of the drawing.

2.2.3 SYSTEM BLOCK DIAGRAM

Inputs for the formulation of the System Block Diagram have been made for each subsystem and the block diagram completed.

2.2.4 INTERCONNECTION DIAGRAMS AND TABLES

Each Phase I interface agreement contained the applicable interconnect diagram for each subsystem at the time of release. The interconnection table format was included in the Phase I agreements and completed in the Phase II agreements issued during this period.

2.2.5 SIGNAL FLOW DIAGRAMS

The Phase I interface agreements contain no flow diagrams, but contain a provision that these diagrams will be provided by the co-contractor.

2.3 SYSTEM WEIGHT

The RTG Eject Command Subsystem was removed from the vehicle. This necessitated reducing the anticipated flight weight at launch data from 1475 pounds to 1462 pounds. This compares to a current vehicle weight of 1339 pounds with adapter (PIR 41K2-FF3-23, dated 26 July 1966). Concurrence on the use of the projected flight weight of 1462 pounds for NIMBUS B has been requested from NASA.

Authorization was received from the Program Office to compute the mass properties of the solar paddles. Work will be completed during the next quarter.

2.4 THERMAL STUDIES AND ANALYSIS

Thermal analysis effort during this reporting period consisted of the following:

a. Sensory Subsystem Predicted Flight Performance Analysis - This analysis was performed using the analog computer facility at the Valley Forge Space Technology Center. The start of the analysis was delayed by the use of this facility in support of the NIMBUS C launch and terminated prematurely by the priority of another analysis. Thus, some conditions of satellite operation were not analysed. The results are presented in PIR-4T42-047/NB 4T42-1200.

b. Stage III Subsystem Specification - The Stage I Thermal Control Subsystem Specification (NIT-B-7447) was updated to Stage III and interface information was included.

c. Launch-coast Analysis - The radiant interchange portion of the analysis was finished and the conduction section is being set up. Completion is scheduled for the next quarter.

SECTION 3

SUBSYSTEM INTEGRATION (NIMBUS B SPACECRAFT)

3.1 GOVERNMENT FURNISHED SUBSYSTEMS

3.1.1 RTG SUBSYSTEM

The RTG Subsystem Interface Agreement, Phase II (a proof copy), was sent to GSFC, Martin Company, Sandia Corporation, and the AEC Technical Officer for review. A review meeting was held at GE on 1 June 1966. Suggestions and comments were incorporated into the final Phase II agreement.

The Phase II Interface Agreement was sent to GSFC on 24 June 1966, along with the Mechanical Interface Drawing and the Thermal Interface Drawing. The Phase II Interface Agreement deleted all reference to the RTG Eject Subsystem. The mechanical interface drawing still identifies hardware required for RTG eject. The RTG Subsystem Electrical Schematic was released, and the RTG Storage Facility requirements were identified. Martin Company was requested to revise the RTG Shipping Container sling to accommodate the storage facility crane hook height.

The interface meeting at GSFC on 15 June, 1966 between NASA/GSFC and NASA/Lewis to review launch vehicle and pad requirements for NIMBUS B was attended by the GE subsystem engineer. GSFC and GE requested that:

a. A platform be supplied at the base of the gantry for easy transfer of the RTG into the elevator.

b. A single level for access to the spacecraft in the "greenhouse" position.

c. A rail in the x-axis of the spacecraft for the crane to mount the RTG onto the spacecraft.

The Martin Company was requested to build the following additional handling equipment:

a. Heater Power Supply and Control Rack

b. RTG Handling Dolly (Mobile Carriage)

c. Generator Sling Bar.

A meeting was held on 2 June 1966 between GE, NASA (A. Fihelly) and AEC (C. Baxter) to discuss the RTG test flow plan. Several problems were disclosed during this discussion requiring further resolution by NASA and Martin Company. As a result of this meeting, changes in the test flow plan and rescheduling of activities were required. A meeting was scheduled to review the requirements and design for these items 8 August 1966, at Martin Company. The requirements and design conform generally to the descriptions in the Phase II Interface Agreement.

A trip was made to Martin Company to witness an acceptance test of the RTG Subsystem. The first RTG Subsystem and Ground Support Test Console was delivered to GE 25 July 1966.

The mechanical inspection and electrical performance test was acceptable and preparations began for bench integration tests. A Martin Company resident engineer is available at GE for test equipment operation and technical advice. A Martin Company representative was present for all testing of the RTG Subsystem at GE.

3.1.2 MUSE SUBSYSTEM

The following interface documents were published and transmitted to NASA/GSFC on 16 June 1966:

a. Phase II Interface Agreement 209775

b. MUSE Subsystem Mechanical Interface Drawing GE 47D209775

The MUSE engineering model and bench check unit were delivered to GE 13 July 1966. The engineering model had been held at GSFC from 7 June until licensing for the radioactive material on MUSE was resolved. Bench verification/acceptance test was performed by the NASA Technical Officer on 14 July 1966. The MUSE portion of the NIMBUS B Electrical System Schematic Diagram (sheet 15 of GE Dwg. 47J209963) was published 29 July 1966.

The MUSE engineering model was integrated with the bread board power supply and engineering model clock during the period 27 July to 5 August 1966. As a result of the integration, the following problem was identified: The MUSE 1Hz input circuit is too sensitive to high frequency noise spikes on the clock 1Hz signal line. A study of the input circuit schematic showed that this circuit is a differentiating type circuit which operates on the 1Hz transitions and tends to be sensitive to transient spikes. Resolution of this problem will be accomplished during the next report period (see Subsection 3. 4).

3.1.3 POWER SUBSYSTEM

The RCA/NASA/GE Interface Meeting of 18 May 1966 promoted the following significant factors:

a. The pin assignments made by GE for the regulated bus distribution were unacceptable to RCA because of internal arrangement of the wire bundles in the Control Module. RCA/GE working sessions were set up to resolve mutually compatible pin assignments. The RCA/GE meeting of 19 May 1966 produced an apparently compatible approach to the pin assignments.

b. RCA requested equal resistance legs for the battery discharge busses. NASA/GE agreed to the proposed changes. Revisions of the eight Battery Modules and Control Module Interconnect Tables were completed at the end of May 1966 by GE/RCA.

c. RCA presented the thermal dissipation of the Control Module and the Battery Modules using the "automatic" or shunt dissipator controls mode.

The average orbital dissipation with full experiment loading was:

Control	33.8 watts
Each Battery Module	19.2 watts

With 50 watts of regulated bus power from the Solar Power Subsystem, the orbital averages were:

Control Module	32.0 watts
Each Battery Module	33.4 watts

The foregoing dissipations are excessive and RCA recommended using auxiliary loads as was done on NIMBUS A and C. RCA will recommend the auxiliary load resistor values and will calculate the expected thermal dissipation for the selected resistor value configuration.

3.1.4 MRIR SUBSYSTEM

During MRIR/Clock integration in May 1966 an incompatibility between the Clock 200 kHz output and the MRIR 200 Hz input was identified. The problem was resolved by co-contractor modification of the Clock output and the MRIR input in accordance with NASA direction, and the MRIR was successfully integrated with the bread board power supply and the engineering model Clock on 14 June and 30 June 1966 (see Subsection 3.4).

The MRIR consists of the following components manufactured by two different co-contractors:

Radiometer & Electronics - Santa Barbara Research Center

Telemetry Electronics - California Computer Corporation

In accordance with NASA direction, separate interface documents were prepared for each co-contractor. The following documents were published and forwarded to NASA/GSFC on the dates indicated:

Phase II Interface Agreement	Drawing	GE Dwg. No.	Date (1966)
210157	MRIR Telemetry Electronics Mechanical Interface	47E210157	25 July
207678	MRIR Radiometer and Electronics Mechanical Interface	47E207678	4 Aug.

3.1.5 HRIR SUBSYSTEM

The Phase II Interface Agreement (207659) was reproduced and issued 15 July 1966. Changes and additions to the document are anticipated and an updated copy will be issued after the integration test is in its final stages.

The HRIR Subsystem (Engineering Model) was received by GE on 24 June 1966. The subsystem was set up in the subsystem checkout area and connected via GE bench test harness to the Power and Command and Clock Subsystems in preparation for an integration test. The integration test requirements and procedures were reviewed and approved internally by GE. Two problems were identified as a result of the integration test: (1) power transients appeared excessive and unreasonable and (2) clock reset when HRIR commanded ON and OFF. Both problems are being investigated further for solution and appropriate corrective action. Further testing will be done with the subsystem integrated to the HDRSS and RTTS Subsystems in addition to the Power and Command and Clock Subsystems (see Subsection 3.4).

The subsystem schematics were reviewed, corrected and are being redrawn in preparation for use in the Engineering Systems Model Spacecraft checkout test and reflect the latest subsystem information available.

3.1.6 RTTS SUBSYSTEM

The Phase II Interface Agreement (207675) was reproduced and issued 28 April 1966. This document will be modified as changes and additions dictate with modifications to be incorporated in the updated copy. The updated copy of the interface document will be released shortly after the integration test of the RTTS.

The subsystem bench integration test requirements and procedures were generated, reviewed and approved by GE in preparation for the integration test. The subsystem was integrated with the Power and Command and Clock Subsystems. Compatibility appeared satisfactory. The integration test was extended to include the HRIR and IDCS Subsystems. In the latter test, configuration power transients and clock reset were identified as possible problem areas. Further investigation in these areas is being pursued (see Subsection 3. 4).

The subsystem schematic is being redrawn to incorporate the latest information. This schematic is to be used for ECM checkout testing and debuging.

3.1.7 PCM SUBSYSTEM

The Phase II Interface Agreement (210575) is in the final stages of being approved by GE, reproduced and issued. This document, though it incorporates the latest valid information available to GE, may require changes or additions as a result of integration testing. These modifications will be issued after the final phase of integration testing.

The engineering model of the subsystem was initially received by GE 12 July 1966. The Bench Check Unit remained at the supplier's factory for operational verification and debug. Thus, the PCM Subsystem operation verification has not been made. The PCM Subsystem (Telemetry PCM, Recorders and Transmitters) were integrated with the Power and Command and Clock Subsystems. Verification of satisfactory subsystem operation was attempted by using the ground station but problems existed in the time code readout. The ground station reads out the time code in reverse order. The supplier representatives have determined that the problem is in the ground station wiring and modification of the ground station is under way. The PCM (engineering model) Subsystem was returned to the supplier on 29 July 1966 for use in checking out the compatibility and operability of the Bench Check Unit. Both the PCM Subsystem and the BCU will be returned to GE in September.

The subsystem schematic is being redrawn (after correction) and will be available for use for the ESM checkout test and debug.

3.1.8 IDCS SUBSYSTEM

The Phase II Interface Document (207651) was reproduced and issued 6 June 1966. It is anticipated that changes and additions to the document will require an updated copy to be issued. This will be done after integrated testing.

The IDCS Engineering Model and the Bench Check Unit were received 13 June 1966. The Bench Check Unit was installed in the subsystem checkout area and the IDCS installed on the subsystem checkout table where mating with the collimator (target) took place. Verification checks and compatibility checks were run in preparation for acceptance test and follow-on bench integration testing. Integration test requirements and procedures were prepared for use in the integration test.

Following acceptance testing 27 June through 3 July 1966 the subsystem underwent a Power and Command and Clock Subsystems integration test. During this test, two problems were identified: (1) preset gain ON/OFF command relay was incorrectly wired, and (2) the Bench Check Unit was also inproperly wired. NASA Technical Officer (G. Branchflower) verbally directed the supplier (ITT) to rewire both the IDCS and the to correct the problem. GE recommended that the acceptance test and integration test be revalidated after modification of the IDCS and Bench Check Unit.

The subsystem schematic was corrected and resubmitted to GE for incorporation and issuance. This drawing will be utilized for the Spacecraft Engineering Systems Model (ESM) checkout test and reflects the latest subsystem information available.

3.1.9 RMP SUBSYSTEM

A meeting was conducted with Sperry/NASA on 26 May 1966 at GE to discuss the electrical integration of the RMP package into the NIMBUS B Spacecraft. Minor problems were identified. The major area uncovered was the susceptability of the package to damage if operated incorrectly--especially when starting and shutting down. Minutes of the meeting were published in Memo 41G3-76. Sperry was given a copy of the Phase II Interface Agreement.

A meeting was conducted with the newly assigned NASA Technical Officer (R. Devlin) on RMP technical aspects. It was agreed to accept a GE recommended change internal to the RMP, simplifying spacecraft control and operation on the ground (Memo 41G3-81).

There is a definite stability problem in the spacecraft if the RMP is switched into the Controls Subsystem as planned. This effect has been documented in PIR 41M2-016. NIMCO Engineering recognizes this problem and NASA has been informed accordingly.

3.1.10 SIRS SUBSYSTEM

The draft of the Phase II Satellite Infrared Spectrometer (SIRS) Subsystem Interface Agreement was completed and updated to reflect the latest available information. A list of subsystem operating restraints was compiled and the turnoff sequence was confirmed. The subsystem schematic was reviewed, corrected, and is presently being updated for issuance.

The balloon model containing SIRS was checked out with the spacecraft Command and Clock Subsystem. Operating difficulties were traced to a broken wire in the interconnection and a bent connector pin. Operation and execution of command were normal. Present effort is to measure power drain and line transients. The Weather Bureau technical representative (Lee Johnson) confirmed that the SIRS target presently being used for the bench check will also be used in the ambient Check-of-Calibration Adapter. New targets using LN_2 are being designed for the thermal-vacuum adapter.

3.1.11 IRIS SUBSYSTEM

The Phase II Interface Agreement is currently in process for completion and issuance early in the next reporting period. Texan Instruments, Inc. furnished sketch SK565-477 in response to the latest mechanical interface drawing of IRIS Subsystem. The sketch was used as the basis for the design of spacecraft insulation around the IRIS. Six copper cooling coils were shipped to Texas Instruments for assembly into the cooled targets which will become part of the Check-of-Calibration Adapter. Inquiry was made concerning the problems that might arise in the Texas Instruments design of the IRIS if the Clock frequencies were furnished from an output impedance source of 1500 ohms rather than the proposed 3000-ohm source.

The decision in favor of the lowest possible impedance confirms the GE analysis.

The GE thermal analysis of the IRIS was discussed with the NASA Technical Officer (B. Schlachman) who, in turn, advised Texas Instruments. Analysis shows that the cooling area may be insufficient to maintain optics at design temperature. A previous manual computation of the IRIS thermal balance in orbit showed that the cooling area is marginally adequate. The computer analysis of the same thermal balance has been successfully programmed and is now yielding good data. The more exact answer will be valuable.

A list of operating restraints was compiled and the turnoff sequence was verified. Computer requirements were received from Texas Instruments for the bench check spectrum analysis. Subsystem bench test requirements were established and copies were forwarded to NASA. NASA is to furnish the program routine for the 7094 computer.

The subsystem block diagram was reviewed and updated. The telemetry and diagnostic maniforms and ranges were added to the subsystem schematic. The mechanical interface drawing was updated to include insulating shells and thermal interface parameters.

The humidity control requirements involving regular cycles of purging with dry nitrogen were received from Texas Instruments and disseminated to responsible GE personnel.

An internal wire change was negotiated with Texas Instruments to effect harness simplification.

Texas Instruments requested results of the GE vibration test in the vicinity of the IRIS mount. These were obtained and forwarded together with GE specifications on PV-100 thermal emissivity coating and application of D4D reflective coating conductive finishes.

The test and formatter rack used to prepared a computer tape from the IRIS output has been received from the supplier, Radiation, Inc. An acceptance test was conducted on this equipment by the NASA Technical Officer (B. Schlachman) and two boards were found to be defective. After repair, the unit operated satisfactorily and was accepted.

A test of an IRIS Subsystem engineering model for acceptance by NASA was witnessed at Texas Instruments. Interferograms were taken for subsequent data processing at NASA/GSFC. The delivery of the engineering model has been continuously slipping due to technical problems. The IRIS Spectrometer has been operating with a special mount because of sensitivity to vibration. The NASA Technical Officer is scheduled to discuss with GE the impact of further delaying shipment of the subsystem until the problems have been resolved.

3.1.12 COMMAND SUBSYSTEM

The Command and Clock Subsystem portion of the system schematic was completed and released 29 July 1966. The Command and Clock Subsystem was bench integrated with each available subsystem. Several minor interface problems were revealed. As a solution to one interface problem, the clocks were modified to reduce the output impedance of the 20 kc output to IRIS and MRIR from 2.9 kilohms to 1.7 kilohms. The in-house clocks were modified by resident Cal. Comp. personnel. The prototype and flight clocks will be modified at the Cal. Comp. factory.

During bench integration, both command clocks were frequently upset (clock time suddenly jumped to a random time) and reset (clock time suddenly jumped to zero). A limited amount of testing to determine the causes was performed, but the analysis testing was stopped to continue bench integration tests. The analysis will be continued as soon as the testing schedule will permit.

3.1.13 IRLS SUBSYSTEM

The IRLS Phase II Interface Agreement was completed and sent to NASA for approval. The IRLS electrical schematic and mechanical interface drawing were completed. A telemetry and command compendium was generated which describes the IRLS telemetry and command in detail. Requirements, test procedures, and evaluation reports were generated concerning the successful IRLS bench integration.

The IRLS flight equipment was integrated with a NIMBUS Command and Clock, and Power Supply. The IRLS operated satisfactorily. A GE intraconnecting harness was tested with the IRLS flight equipment and proved electrically satisfactory under operating conditions.

During the next quarter, the IRLS prototype will be acceptance tested and integrated into the NIMBUS Sensory Ring where it will undergo electrical systems model testing. This test will simulate actual flight conditions and make use of the Ground Acquisition (GA) and Command Station (CS) and Integration Support Equipment (ISE).

3.2 GENERAL ELECTRIC SUBSYSTEMS

3.2.1 POWER MANAGEMENT SUBSYSTEM

Power Status Reports 8 and 9 were updated and issued in June (FW23) and July (FW31) 1966, respectively. The power management subsystem fusing requirements, as defined by PIR NB 41G3-561 and PIR NB 41G3-632, and preflight connector isolation requirements redefined by Memo 41G3-50, will be incorporated into the subsystem Stage II specification. Memo 41G3-64, dated 25 May 1966, on fusing requirements has been transmitted to NASA satisfying NIMBUS B Action Item No. 79. A listing of subsystem power characteristics for bus fuse sizing was also prepared and issued in PIR 4185-NB-154 dated 20 July 1966.

A decision was finally obtained for GE to package all power management functions and preflight disconnect functions in the auxiliary load controller and package them in a 3/0 module. Functions to be contained in the auxiliary load controller are defined in PIR 4181-NB-03.

Definition of the auxiliary and shunt power management loads (involving capacity and switching requirements) was also obtained as a result of a GE/NASA meeting in June 1966 (FW23).

A Solar Power Subsystem interface meeting at RCA (Hightstown) was attended on 3 June 1966. An agreement was reached that the auxiliary loads will have an orbital duty cycle for thermal control purposes, as in NIMBUS A and C. Design of the auxiliary load panels was also discussed. GE will install the RCA shunt dissipation driver resistors in the panels at the request of NASA (reference PIR 4181-NB-72).

The Solar Power Subsystem design review meeting at NASA/GSFC on 28 and 29 June 1966 was a detailed design review presentation by RCA to NASA. The only GE action item involved a check that all telemetry circuits off the unregulated bus incorporate protective techniques to insure against shorting. RCA/GE/NASA agreed to pin designation assignments on the Power Electronics Control Module. The customer stated that due to problems in the power supply subsystem logic, the NIMBUS B Clock will be required to supply a 1 cps signal to the power subsystem.

The power system interconnection tables and the power management subsystem schematic (Dwg. 47J209963, Sheet 13) were completed and issued on 1 August 1966. The following documents were generated during this reporting period:

PIR No.	Title
PIR 4181-NB-64	Telemetry Functions Powered by Command Only (not full time)
PIR 4181-NB-62	Incorporation of RTG Converter Status Sensing Provision
PIR NB-4185-893 (Rev. A)	Request for RCA to Change Power Distribution Connectors Internal Wiring
PIR 4185-NB-149	RCA Solar Subsystem Design (28-29 June 1966 Design Review)

3.2.2 THERMAL SUBSYSTEM

At NASA request, the following changes were incorporated in the telemetry matirx with regard to telemetry conversion:

a. Reassignment of 28 HDRSS digital channels to analog channels in the T/M Matrix.

b. Assignment of tick-tock digital channels for two new Clock A/B tick-tock commands.

The telemetry assignments by subsystem were published in PIR 4181-NB-26. This document was revised to include all PCM harness revisions.

3.2.3 TARGET CONTROL SUBSYSTEM

The Target Subsystem Specification, Stage II, was completed in July 1966 (FW27), but was updated to the Stage III level before release to facilitate completion and issuance. The Stage III Specification was released in August 1966 (FW32). The MRIR Target Design Review was conducted on 29 June 1966 with no significant action items.

3.2.4 UNFOLD SUBSYSTEM

At the request of NASA (G. Burdett) a study was conducted to determine the feasibility of firing the cable cutter squibs from the unregulated bus. Results of the study were published in PIR 4181-NB 19 and submitted to NASA on 12 July 1966. The study recommended no changes to the system at present, but did recommend installation of two relays in the unfold timer as a precautionary measure to prevent the possibility of a problem at a later date. In August 1966 (FW 32), NASA approved the incorporation of the proposed GE change to the unfold subsystem to reduce regulated bus current transients at squib fire. An analysis was conducted to determine the changes required to use the unregulated bus to power the pyrotechnics and the impact of these changes.

An unfold timer design review was conducted in July 1966 (FW28) and constituted the third preliminary review of this item. The Unfold Timer Specification, Stage III, was released in July 1966 (FW29).

The interconnection tables and diagram were updated for incorporation into the Unfold Subsystem Specification, Stage II, and this specification was released in July 1966 (FW29). The Stage III Specification was also released in July (FW31).

The unfold subsystem schematic was completed and the unfold subsystem telemetry compendium is in process.

3.2.5 SEPARATION SUBSYSTEM

The flight adapter electrical sketch was updated to Revision B. The electrical section of the flight adapter portion of the Separation Subsystem Specification, Stage II, was completed. The interconnection tables and diagram for the flight adapter were issued in PIR 4185-120.

Results of the July 1966 (FW31) GE/NASA meeting concerning the Agena/adapter electrical interface are being used to update the adapter electrical schematic.

3.3 GOVERNMENT FURNISHED EQUIPMENT STATUS

3.3.1 GFE ITEMS RECEIVED

The following items of GFE were received during this reporting period:

DATE (1966)	ITEM	SERIAL NO.	ACTION (RECEIVED)
25 June	NIMBUS C Prototype Spacecraft		LR 5279
23 May	IRLS Power Filter	001	LR 5269
22 June	HRIR (Eng. Model)	EM1	LR 5328
7 June	PCM Gnd. Sta. Mod. Kit		LR 5298
20 June	S-Band Transmitter	01	LR 5323
9 June	SIRS - SoBad Module	21	LR 5309
23 June	IDCS Bench Test Equipment	2	LR 5331
21 June	IRIS Bench Test Equipment	4	LR 5326
17 June	RTG (2)	01 & 02	LR 5322
15 June	Spec. Mag. Tape	207	LR 5319
15 June	IDCS (Eng. Model)	EM01	LR 5317
8 June	HDRSS	F-4	LR 5307
13 June	Beacon Transmitter Test Equip.		LR 5314
27 June	BTE Replacement Counter		LR 5338
30 June	Gyro Bench Test Equipment		LR 5349
1 June	MinCom. Pwr. Supply & Amplifiers (3)		LR 5288
28 June	S-Band Transmitter	1	LR 5341
6 July	PCM Multicoder	1	LR 5354
	PCM Telemetry	1	LR 5354
	PCM Tape Recorder	T2	LR 5355
	PCM Tape Recorder	T3	LR 5355
13 July	MUSE Electronics	E101	LR 5369
	MUSE Sensor	E101	LR 5369
	MUSE SAS	E101	LR 5369
	MUSE Bench Test Equipment	#1	LR 5369
13 July	1A35176-3 Assembly		LR 5368
14 July	Equipment Instructions Manuals		LR 5380
28 July	IRLS Receiver	003	LR 5400
	IRLS Transmitter	002	LR 5400
	IRLS Memory	4	LR 5400
	IRLS Filter	0001	LR 5400
	IRLS D&R Module	001	LR 5400
	IRLS PC&D Module	0001	LR 5400
7 July	Bench Test Equipment Test Stand 4310-90536		LR 5360
14 July	Collimator (Ambient Check of Cal.)		LR 5370
25 July	10 PC Per List (Martin Aircraft)		LR 5391
	Test Console 452B171 0000-009		LR 5391
	Cable Assemblies 452B171 0001 (27)		LR 5391
	Cable Assemblies 452B150 0007 (9)		LR 5391
	Patch Cables (2)		LR 5391
	Camera & Hood (1)		LR 5391
10 August	HRIR Bench Test Equipment Modification Kit		LR 5433

3.3.2 GFE ITEMS SHIPPED

The following items of GFE were shipped during this reporting period:

DATE(1966)	ITEM	SERIAL NO.	ACTION (SHIPPED TO)
31 May	Command Clock (NIMBUS C)	P001Q	Cal. Comp.
16 May	IRLS D&R Module	0001	Radiation, Inc.
	IRLS PC&D Module	0001	Radiation, Inc.
	IRLS Memory Module	004	Radiation, Inc.
25 May	6 Cooling Coils (for assembly with IRLS Targets)		Texas Instru.
24 May	MRIR Radiometer	F-5	NASA(GSFC)
	MRIR Electronics	F-105	NASA(GSFC)
	MRIR Filter	E-1	NASA(GSFC)
24 May	10 Batt. Modules	145	RCA, Hightstown
		146	RCA, Hightstown
		147	RCA, Hightstown
		148	RCA, Hightstown
		149	RCA, Hightstown
		150	RCA, Hightstown
		151	RCA, Hightstown
		152	RCA, Hightstown
		153	RCA, Hightstown
		300-17	RCA, Hightstown
21 June	S-Band Xmitter	1(AA1)	Aircraft Armaments
17 June	PCM Tape Recorder	F-7	GSFC
29 June	SIRS System SoBads Unit	21	GSFC
	SIRS Systems Bench Check Unit		
28 June	1 Counter I. C. NP-0688	13902432	RCA, Hightstown
	1 Repeater Module		RCA, Hightstown
	1 Tape Recorder Base Plate		RCA, Hightstown
	1 HDRSS Bi-Phase Processor		RCA, Hightstown
	1 Electronics Box Cover & 2 CU Shields		RCA, Hightstown
	2 Printed Circuit Boards BD 1 & 2		RCA, Hightstown
	2 Test Cables		RCA, Hightstown
17 June	100 NIMBUS II Software Sys. Vol. II		NASA(GSFC)
21 July	S-Band Transmitter	1	GSFC
29 July	T/M Electronics Unit	0001	Radiation(Fla.)
	PCM Multiiodes	0001	Radiation(Fla.)

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DATE(1966)	ITEM	SERIAL NO.	ACTION (SHIPPED TO)
19 July	IRLS Receiver Module	0003	Radiation, Inc.
	IRLS Xmitter Module	0002	Radiation, Inc.
	IRLS Filter Module	0001	Radiation, Inc.
	IRLS Memory Module	004	Radiation, Inc.
	IRLS PC&D Module	001	Radiation, Inc.
	IRLS D&R Module	001	Radiation, Inc.
20 July	PCM Multicoder	0001	Radiation, Inc.
	PCM Time	0001	Radiation, Inc.
21 July	MRIR PCM Tester Display Console	002	Cal Comp
	MRIR PCM Tester Aux. Console	002	Cal Comp
15 July	8 Batteries	128A	RCA, Hightstown
		131A	RCA, Hightstown
		132A	RCA, Hightstown
		133A	RCA, Hightstown
		135A	RCA, Hightstown
		136A	RCA, Hightstown
		144A	RCA, Hightstown
		17H	RCA, Hightstown
8 July	1 NIMBUS Clock Subsystem	1	NASA (GSFC)
21 July	1 Mod. RP-60 Power Supply	206443	Honeywell, Farmingham, Mass.
28 July	(240) 697B Processing Chem. Kits		Hughes Aircraft,
	(240) RLS Recordak 70 mm film		El Segundo, Calif.
2 Aug.	Dynatronic Signal Conditioner	50030	
1 Aug.	Spacecraft Sling & Balancer Assembly		GSFC
	Lifting Cables		GSFC
1 Aug.	697B Processing Kits (240)		RCA, Calif.
1 Aug.	RLS 70 mn film (240)		RCA, Calif.
4 Aug.	MRIR T/V Target Calbedo	3	Santa Barbara, Calif.
	MRIR Check of Cal. Target Pwr. Supply	3	Santa Barbara, Calif.
	MRIR Check of Cal. Target Pwr. Supply	1	Santa Barbara, Calif.
	MRIR Carrying Case	F-6	Santa Barbara, Calif.
9 Aug.	PCM Tape Recorder Transports (2)	T-2/T-3	Radiation (Fla.)

3.3.3 GFE BENCH ACCEPTANCE TESTING

The following GFE bench acceptance testing activity was conducted during the reporting period:

Engineering Test Request No.	Item	Test	Completion Date (1966)	Results
B-010	Clock Receiver S/N NCR-6001-04A	Bench Acceptance	9 May	Conditionally released pending acceptance of discrepancies
B-011	MRIR S/N F-2	Bench Acceptance	10 May	Test satisfactory (placed in bonded stock)
B-012	MRIR-PCM S/N PP001	Bench Acceptance	11 May	Test satisfactory (placed in bonded stock)
B-016	S-Band Transmitter S/N 002	Bench Acceptance	19 May	Acceptance for limited use in engineering tests only.
B-019	RTTS Transmitter S/N F-4 Mod. #1; HAX Module S/N F-5	Bench Acceptance	19 July	Tests satisfactory (placed in bonded stock)
B-020	S-Band Transmitter S/N 001 (modified)	Bench Acceptance	19 July	Unusable (returned to manufacturer for rework)
B-021	S-Band Transmitter S/N 001	Bench Acceptance	20 July	Unsatisfactory (returned for rework)
B-024	HAX Module S/N E-1	Bench Acceptance	27 July	Test satisfactory (placed in bonded stock)
B-027	RTTS Transmitter S/N 501 P-1	Functional Test After Shipment	2 Aug	Test satisfactory (placed in bonded stock)

3.4 SUBSYSTEM BENCH INTEGRATION TESTING

Bench integration test requirements were prepared for the following subsystems during this reporting period:

a. MUSE
b. SIRS
c. RTTS
d. HRIR
e. IDCS
f. HDRSS
g. RMP
h. IRIS
i. PCM
j. MUSE/PCM
k. RTG
l. HRIR/IDCS/HDRSS
m. SIRS/PCM
n. MRIR
o. MRIR/HDRSS

At the beginning of this reporting period, the engineering model Command and Clock Subsystem, breadboard power regulator, and the bench test harness tests were satisfactorily concluded in preparation for the subsystem bench integration testing. A listing of the subsystems tested along with the test completion dates during this reporting period is as follows:

3.4.1 INTERROGATION, RECORDING AND LOCATING SYSTEM (IRLS)

The test was started on 26 May and was completed on 8 June 1966. The integration tests completed consisted of command/clock and power input checks for both the unload conditions. Subsystem operation was monitored using telemetry. Voltage and current turnon transients were photographed. Effect of switching clocks determined during interrogations of simulated platforms. Impedance of each IRLS telemetry point was determined for both the standby and transmission modes.

3.4.2 MEDIUM RESOLUTION INFRARED RADIOMETER (MRIR)

The test was started on 18 May and was completed on 30 June 1966. Prior to mating the MRIR and the Power/Command Subsystems ,the resistance, power, signal and command input measurements were made. Motor drive input signal leads were found to be reversed. After lead reversal, motor rotation was normal. Voltage and current transients and input power ripple were photographed. During the initial subsystem performance tests, no telemetry data was observed from the telemetry electronics. This was due to insufficient 200 kc input to drive the formatting circuits in the PCM Electronics Module. The threshold level required is 2 volts (p-p). Amplitude obtained was 1.6 volts (p-p). On 14 June, a change made to the PCM module corrected this problem. The 200 kc input level was increased to 3 volts (p-p). On 30 June, a change was also made in the clock 200 kc output circuit. This increased the signal level to 4.0 volts (p-p) and satisfactory operation was again verified.

3.4.3 SATELLITE INFRARED SPECTROMETER (SIRS)

This test was commenced on 13 June and completed on 27 June 1966 with a delay caused by rework to the Command and Clock Subsystem. The program consisted of an operational (bench) check of the subsystem with subsequent integration with the Command and Clock Subsystem. Tests were made to evaluate performance under command switching, effect of power transients, and measurement of analog and digital outputs. All aspects were found to be satisfactory and in normal operating condition. However, the analog to digital converter failed in the last portion of the test and was returned for repair. This did not affect completion of test objectives.

3.4.4 S-BAND TRANSMITTER

The S-Band Bench Integration test was conducted on 26 July 1966. The ETM No. 1 HDRSS Recorder was filled with data from the BCU simulator. The output of the S-Band Transmitter was handwired to a receiver using an RF attenuator set to 70db. The transmitted HDRSS data was evaluated with the following results:

a. The simulated HRIR, IDCS and time code signal were satisfactory.
b. The MRIR and IRIS data would not sync (this problem is under investigation).

A second record and playback test is planned for a later date.

3.4.5 HIGH DATA-RATE TELEMETRY SUBSYSTEM (HDRSS)

The test was started on 5 July and was completed on 11 July 1966. The integration tests consisted of four record and playback cycles of simulated signal inputs provided by the BCU. The objectives for each of these test periods were successfully met. During the record and playback cycles, power profile data was obtained and conducted noise levels were photographed with a nominal 5 amp load and again for a 15 amp maximum load. Power switching transients were measured and photographed. End of playback was monitored to verify S-Band OFF signal. During all record and playback cycles, automatic telemetry scan and printout were obtained.

3.4.6 IMAGE DISSECTOR CAMERA SYSTEM (IDCS)

The test was started on the 12 July and was completed 15 July 1966. After the preliminary no-load interface tests were completed, the command signal characteristics were photographed. Photographs were also obtained of the dc power ripple with the IDCS inoperative and operative. Subsystem operation was checked to determine duration of the white scan and the composite video. Telemetry points were evaluated for all modes of the IDCS operation. As a result of these tests, two command lines within the subsystem require rework.

3.4.7 PCM SUBSYSTEM

The test was started on 15 July and was completed on 20 July 1966. The integration test demonstrated the satisfactory operation of the PCM Subsystem with the Command and Clock and Power Subsystems. During the test, data that had been previously recorded at the vendors was successfully played back to the PCM ground station. This data was used to check the bit syncronizer and other ground station parameters. Minitrack time was transmitted to the command station via the beacon transmitters, and satisfactory operation of the systems verified in this configuration. Problems identified during the test were that two connectors would not mate, and the satellite time display at the PCM ground station did not operate properly. These problems have been dispositioned and corrective action taken. In addition to the integration tests, real time data was taken from the MUSE Subsystem and successfully encoded, transmitted and decoded by the PCM Subsystem and ground station.

3.4.8 HIGH RESOLUTION INFRARED RADIOMETER (HRIR)

The test was started on 21 July and completed on 3 August 1966. In the initial harness checks, the 1g test harness was required to conform to the information contained in the latest IT&T Interconnection drawings. The tests completed consisted of no-load clock/command and power interface checks. Photographs were taken of command characteristics, voltage and current transients and the clock drive signals to the radiometer. The subsystem operation was checked using telemetry and photographs were also taken of the two output video signals to HDRSS and output video to RTTS. During this period, a new bench integration test board was installed. This board contains an interconnection test harness that provides interface connections for all sensory ring experiments.

3.4.9 MONITOR OF ULTRAVIOLET SOLAR ENERGY (MUSE)

The test was started 18 July and was completed 4 August 1966. During the integration tests a sequencing problem was encountered. The subsystem would not operate normally with the spacecraft clock input as connected to the interface box and the bench test harness. Satisfactory MUSE operation was obtained following the connection of the signal ground lead to the module chassis. The results obtained indicated that the MUSE highly sensitive input circuitry was susceptible to random noise appearing on this input line thereby upsetting the MUSE sequencing circuitry. This problem is under investigation by NASA and the vendor.

3.4.10 REAL TIME TRANSMISSION SYSTEM (RTTS)

The test was started 4 August and was completed 5 August 1966. No-load voltage, command and clock signal characteristic measurements were made. With the subsystem connected to the power and command test harness,power profile measurements were obtained. Also, transmitter power and frequency and telemetry voltages were recorded. Photographs were taken of switching transients. Simulated signal inputs to the RTTS were used for both the IDCS and the HRIR inputs. The Mufax printout produced varying levels of gray corresponding to the signal input levels.

3.4.11 IDCS/HRIR/RTTS

The test was started on the 8 August and was completed on 15 August. Prior to applying power to this system, no-load voltage and command characteristic signal checks were verified to be correct. The RTTS transmitter output was connected to directional coupler terminated with a 5-watt, 50-ohm load. HRIR video data transmission was displayed on the BCU Mufax recorder. The IDCS video data transmission was also displayed on the BCU Mufax recorder. Subsystem operation was also verified via day/night relay switching. During this test telemetry data from the RTTS, HRIR, and IDCS was continuously monitored. During these integration tests, several clock upsets occurred. A Test Requirements Directive (005) was performed to determine cause of clock upsets. As a result of these tests it was determined that no clock upsets occurred when commands were sent while the clock was powered from a separate power supply. Additional testing is required to further define the problem.

SECTION 4

LAUNCH VEHICLE INTEGRATION (NIMBUS B SPACECRAFT)

4.1 SPACECRAFT ADAPTER

Preliminary Structural Evaluation for a Projected 1475 Pound NIMBUS B Spacecraft and Adapter, PIR 4145sd-FF3-383 (NB-4145727), dated 25 May 1966, has been prepared and released. This is an update of a memo of the same title, dated 1 April 1966, including completion of the adapter reanalysis recommended by the memo. The conclusion was reached that, based on a conservative evaluation, the present adapter structure is adequate for all design vibration and acceleration spectra for the increased weight configuration.

Structural analysis recommendations and inputs reflecting structural margins of safety and interface combined loads for various adapter configurations were provided for inclusion in PIR 41G2-587 (NB-41G2-763), NIMBUS B Adapter Qualification Test Requirements, dated 2 June 1966.

A structural analysis has been prepared in evaluation of the preliminary design of the adapter target installation and cross beam assembly. Of prime significance in this area was a requirement that the natural frequencies at the centers of gravity of the targets be no less than 100 cps. This requirement, rather than material failure, was the controlling factor in the analysis. Final design and analysis of this item has been delayed pending completion of the antenna range model tests at New Mexico State University. Possible relocation of antennas may result in a modified target and cross beam configuration.

Adapter drawings depicting necessary modifications to the adapter structure for the installation of the Preflight Disconnect Motor Bracket and the Separation Switch Bracket have been reviewed and approved. A major change involved the relocation of one access hole in the adapter skin.

The design of the adapter structure has been completed and fabrication started by Ludwig Honold. Changes for the separation switch bracket and preflight disconnect bracket mounting provisions have been incorporated.

A layout for the adapter targets has been initially completed. However, because of the reradiator redesign, this work must be redone.

In August 1966 (FW 32), NASA forwarded the Lockheed planned wiring of the Agena/adapter interface. This was so drastically different from that approved at the last interface meeting that a complete redrawing of the GE schematic was necessary. This change also affected AGE. Additional minor changes were incorporated in the adapter schematic at NASA request. NASA subsequently advised that NASA-LeRC and GSFC are now in agreement on the GE/Lockheed effort on the Agena/adapter wiring, and direction was given to proceed in accordance with this agreement.

4.2 LAUNCH VEHICLE INTERFACE

The major event of this reporting period was an interface meeting conducted on 15-16 June 1966 at Greenbelt, Md. attended by GE, GSFC, LeRC, LMSC and AEC representatives. Prior to this meeting a number of related tasks were completed.

The gantry crane requirements were documented to assure compatibility of these facilities with the spacecraft cover as being redesigned for NIMBUS B. These were telephoned to NASA/GSFC on 18 May 1966 and followed by the documented PIR.

A marked up copy of the restraints document containing consolidated GE comments was hand carried to GSFC on 23 May 1966.

The spacecraft envelope as determined by extremes of manufacturing and assembly tolerances were updated. These dimensions were incorporated on the fifth release of the GE interface drawing (ER47J207702) issued 21 June 1966. This drawing revision also included updating of the shroud access doors, shroud configuration, and spacecraft configuration.

Another major event in this reporting period was the running of a shroud cooling test utilizing the NIMBUS C shroud, NIMBUS C Prototype Spacecraft and an electrical model

RTG. Test results showed that the NIMBUS A and C position for the cooling air inlet will be acceptable for NIMBUS B. The RTG showed little tendency to heat up the Sensory Ring on which it is mounted. The allowable shutdown time for the NIMBUS B air conditioning apparently can be increased from five minutes. The allowable time will be based on differences between the NIMBUS B and C shrouds as well as the test using the NIMBUS C shroud.

GE received a SACS ring from Douglas Aircraft. This is a NIMBUS peculiar ring and will be used later on in development tests at GE-STC.

The layout for the position of the NIMCO scanner stimulators in the SACS shroud was redone. Relocation was required because of differences in the design of the NIMBUS B and C shrouds. Layouts include dimensions which position the stimulators in the NIMBUS B shroud. The layouts and sets of stimulator drawings were sent to GSFC, LeRC, and LMSC with a transmittal letter dated 9 August 1966.

SECTION 5

DESIGN AND DEVELOPMENT (NIMBUS B SPACECRAFT)

5.1 GENERAL ELECTRIC COMPONENTS

5.1.1 GENERAL

Analytical support was provided for the antenna design effort during this reporting period and the following NIMBUS C components were reviewed and approved for use on the NIMBUS B Spacecraft: Command Antenna, PCM (Quadraloop) Antenna, RTTS Antenna, and the S-Band (HDRSS) Antennas. In addition, the newly designed IRLS Antenna was analyzed and approved. All of these components were evaluated for the criteria specified in NIT-B-7445 and the results documented in PIR 41K2-FF3-4 (NB-41K2-781), dated 7 June 1966. Revision "A" of the above PIR will be released during the next quarter to evaluate design modifications to the IRLS Antenna.

The following adapter-mounted components were reviewed and approved for Stage IV releases for use on the NIMBUS B Adapter: the linear accelerometer; the vibration measuring system; and the IDCS, HRIR, and MRIR target assemblies. These items are documented in PIR 4145s-358 (NB-4145-526), dated 26 April 1966, and PIR 41K2-10 (NB-41K2-944), dated 28 June 1966. In addition, preliminary analyses were performed for Stage III releases of the following targets: IRIS and SIRS spacebeams, and IRIS earthbeam.

Stage III releases were signed-off and preliminary analyses completed for the unfold timer and auxiliary load controller. The analyses of these Sensory Ring-mounted components will be updated and documented during the next quarter in preparation for Stage IV releases of the components.

The Environmental Test Requirements for NIMBUS B Components (Specification NIT-B-7445) was issued during this reporting period.

5.1.2 AUXILIARY LOAD CONTROLLER

Stage II design information was released in May 1966 (F/W 22). NASA specified that the package be a 3/0 Module and contain all the assigned functions. Packaging of the components into a 3/0 Module was reviewed by engineering and is considered very tight. The producibility engineering unit supplied a wiring mockup plan for the internal harnessing. Advance order information for qualification units was released in July 1966 (F/W 29). Three changes to be incorporated are: (1) RTG OFF Regulated Bus Emergency System; (2) all batteries on Emergency System; and (3) Unencoded Command Logic. Fabrication of the engineering unit for the ESM was started as well as the engineering unit test equipment.

5.1.3 UNFOLD TIMER

The Stage II release was issued in May 1966 (F/W 21). The advance order for qualification hardwire was issued in June 1966 (F/W 26). A design review on the Unfold Timer was conducted and the Stage III design release was issued in July 1966 (F/W 28 and 29). Two relays are being added to fire the squibs from the unregulated bus instead of the regulated bus.

5.1.4 PRE-FLIGHT DISCONNECT

An engineering design review was conducted on 16 May 1966; a draft of Revision 1 of the Component Specification (NIT-B-7459) was reviewed; and the criteria for the component specification vibration test requirements for acceptance and qualification were released. A technical evaluation of the proposals submitted resulted in the selection of Kinetics Corporation and an order was released in June 1966 (F/W 25). Verbal inputs received, concerning changes to the overall dimensions, affect the mounting brackets. Kinetics forwarded revised outline drawings and there appears to be no problem in meeting delivery dates.

5.1.5 PADDLE UNFOLD SWITCH

Unfold Switch AN was revised to resolve procedural disagreements of reviewers. Separation Switch AN was revised to assure that requalification of switches is not necessary to minimize component testing.

The vibration test was completed in August 1966 (F/ W 32). However, the unit produced evidence of "contact bounce" during one plane of the qualification level random vibration test. An evaluation is underway to determine what refinements are needed in test instrumentation before rerun of qualification level vibration.

5.1.6 COMPENSATING LOADS

Tests were begun in early July by the Materials and Processes Laboratory to minimize the bake cycle for strip heaters which would eliminate the thermal-vacuum test requirement. The component specification was revised to incorporate the bakeout requirement qualification.

Compensation Load Stage III information was prepared in anticipation of converting this component to a standard drawing to be incorporated into the NIMBUS B "Approved Parts List", GE Dwg. No. 490L120.

5.1.7 AUXILIARY LOAD PANEL

A meeting on 21 June 1966 resolved the design criteria to include two panels each capable of 400 watts continuous dissipation. An advanced order PIR was generated for the engineering model ESM and qualification unit parts in June 1966 (F/W 26). Preliminary stress analysis was completed in July 1966 (F/ W 28). Preliminary details were released to Production Control for fabrication in July 1966 (F/ W 29) and the test plan was updated to incorporate circuit additions.

5.1.8 UNFOLD/ SEPARATION SWITCHES

NIMBUS C separation switch qualification data was determined by ITPB Board to require requalification at NIMBUS B vibration levels. The NIMBUS C specification control drawings and associated component specifications are applicable for NIMBUS B, but require revisions to incorporate applicable NIMBUS B NASA/ GE documents.

An AN was issued to change the specification to allow purchase of flight hardware. Recommendations of methods for pairing switches for installation also were included.

5.2 HARNESS DEVELOPMENT

5.2.1 GENERAL

At the end of this reporting period in August 1966 (F/W 33), the interconnection tables for the major telemetry and power subsystems and the solar power and paddle unfold squib harnesses were issued. The status of harness development (not including the adapter) was at that time as follows:

	Required	Completed
Harness Mockup Segments	82	76
Interconnection Tables	63	60
Harness Drawings (non-coaxial)	63	58
Harness Drawings (coaxial)	10 groups	9 groups

Primary effort was expended on the power, command, and telemetry spacecraft harnesses. Delays were incurred in finalization of the spacecraft power harness resulting from time required to coordinate ground and return circuits among the subsystems. The power and telemetry spacecraft harnesses were segmented to consist of three assemblies in each harness.

5.2.2 CONNECTOR SPECIFICATION

Specification R4101 was completed as a procurement specification for the Cannon D-type subminiature connector to be used throughout the NIMBUS B Spacecraft. This specification consolidates requirements previously covered by several documents.

5.2.3 HARNESS IDENTIFICATION FOR MOCKUP DRAWINGS

The series of sketch drawings identifying harness segments and connector types was completed. These drawings, consisting of block diagrams covering each subsystem and the spacecraft harnesses, are used throughout the design cycle for identification purposes.

5.2.4 HARNESS MOCKUP STRUCTURE

The harness mockup structure and connector locations were continuously updated to the latest Flight Spacecraft configuration requirements as specified by GE Dwg. No. 47J209953.

5.2.5 TELEMETRY SUBSYSTEM CHANGES

Approximately 160 telemetry channels remained unassigned. Direction was received to ground approximately 60 channels and reassign the remainder as redundant channels for those previously assigned. This change was accomplished by bussing the required additional wires at six Cannon D 50-contact connectors added to the Telemetry Subsystem harness, locating the connectors on a bracket near the multicoder.

5.2.6 BATTERY DISCONNECT

Voltage drop equilization in the battery distribution harness will necessitate the use of a 61-contact connector in the battery disconnect circuit.

5.2.7 HARNESS ASSEMBLY AND INTERCONNECTION TABLE DRAWING LIST

The following is a complete listing of harness assemblies and associated subsystems, including the harness assembly and interconnection table drawing numbers (the Adapter and Controls Subsystem harnesses are not included in this listing):

(See Listing on Next two Pages)

HARNESS DESIGNATION	SUBSYSTEM	HARNESS ASSEMBLY DWG. NO. (G1)	INTERCONNECTION TABLE DWG. NO.
1A	IRLS	47A210455	47B209821
1B	IRLS	47A210458	822
1C	IRLS	47A210120	823
1D	IRLS	47A210462	824
1E	IRLS	47A210550	COAX
1F	RTTS	47A210454	814
1G	HRIR	47A210451	818
1J	HRIR	47A210116	819
1K	IRLS	47A210463	825
1M	IRLS	47A210465	826
2A	SIRS	47F210085	807
2B	SIRS	47D209791	808
2C	SIRS	47D209792	809
2D	SIRS	47D209793	810
2F	Command	47F210493	855
2J	S-Band Ant.	47A210550	COAX
2K	MUSE	47A210461	815
2L	MUSE	47A210459	816
2M	SIRS	47A210482	850
2N	S-Band Ant.	47D210550	COAX
3A	PCM	47A210488	852
3B	PCM	47D210550	COAX
3D	S-Band Ant.	47D210550	COAX
3E	S-Band Xmtr.	47D210550	COAX
3K	IRIS	47A210457	827
3L	IRIS	47A210451	828
3M	IRIS	47A210450	829
3N	IRIS	47A210460	830
3P	PCM	47A210484	853
3Q	MUSE	47A210480	851
4A	RTG	47E210097	805
4B	RTG	47A210464	806
4C	MRIR	47A210473	831
4D	MRIR	47A210474	832
4E	MRIR	47A210472	833

HARNESS DESIGNATION	SUBSYSTEM	HARNESS ASSEMBLY DWG. NO. (G1)	INTERCONNECTION TABLE DWG. NO.
5A	SIRS	47A210121	811
5B	SIRS	47A210122	812
5C	Command	47A210490	856
5D	SIRS	47A210123	813
5E	IRLS	47D210550	COAX
5F	HRIR	47A210453	820
5G	MRIR	47A210115	835
5H	MRIR	47A210470	834
5I	RTTS	47D210550	COAX
5J	IDCS	47A210124	817
5K	HDRSS	47A210471	836
5L	RMP Interface	47A210481	848
5M	Thermal-Ther.	47A210466	842
5N	HRIR	47A210479	849
5O	Thermal-Ther.	47A210465	843
5P	FWR. (PWM)	47A210503	860
5Q	HDRSS	47A210477	838
5R	Thermal-Ther.	47A210467	844
5S	Thermal-Pot.	47A210117	845
5T	Telemetry	47A210485	854
5U	PCM	47E210591	COAX
5V	Thermal-Pot.	47A210119	846
5W	HDRSS	47A210469	837
5X	HDRSS	47A210478	839
5Y	Thermal-Pot.	47A210118	847
5Z	PWR.	47A210497	859
VA	HDRSS	47A210475	840
VB	HDRSS	47A210476	841
5P1	Power	47A210491	861
5T1	Telemetry	47A210486	857
5T2	Telemetry	47A210487	858
VE	Pwr. Aux. Load	47A210493	866
VC	Preflight	47A210492	865
6A	Controls	47A210499	862
6B	Command	47D210550	COAX
6C	Solar Pwr.	47A210498	863
6E	Unfold	47A210502	864
6F	Unfold	47A210502	868
Battery Conditioning Cables		47A210468	
Battery Disconnect		47C210643	
Sep. Switch Cable Assy.		47D210722	

5.3 STRUCTURAL DEVELOPMENT

5.3.1 NIMBUS II FLIGHT TELEMETRY

A copy of the NIMBUS C Spacecraft Triax Accelerometer Boost Flight Telemetry was received from GSFC. The data was for the time period from booster launch through shroud separation. Comparisons of these data indicated close agreement with the resonant frequencies and accelerations evidenced on the NIMBUS A Launch (Flight I). It is anticipated that the NIMBUS B Spacecraft will be exposed to about the same environment. The results are summarized in PIR 4T45-FF3-8, dated 1 August 1966.

5.3.2 STRUCTURAL DYNAMICS MODEL SPACECRAFT

PIR 4145sd-FF3-383 (NB-4145-727), dated 25 May 1966, entitled "Preliminary Structural Evaluation for a Projected 1475 Pound NIMBUS B Spacecraft and Adapter" was released. This is basically a re-lease of a memo of the same title, dated 1 April 1966. The conclusion was reached that, based on a conservative evaluation, the present spacecraft structure is adequate for all design conditions, with the possible exception of one vibration design condition, for the increased weight configuration. The recommendation was made that the truss/ sensory section be re-analyzed for this one doubtful condition (32.7 cps roll axis input) although no structural deficiency is expected to result. This evaluation was a requirement to establish a vehicle specification weight in line with the expected spacecraft weight growth curve.

Evaluation of the structural dynamics model spacecraft strain gage test data was completed and incorporated in GE Document No. 66SD5228, "NIMBUS B Structural Vibration Test," dated June 1966. In general, it is concluded that the structural design is conservative and structurally adequate.

The final report on the results of the NIMBUS B Vibration Test was issued in June 1966 (F/ W 26). Volume I of GE Document No. 66SD5228 describes the qualification portion of the report and Volume II the model test portion. In addition, approximately 2000 x-y plots of the test data were delivered to the customer. Based on the new weight forcast of 1475 pounds for spacecraft and adapter, the drawing describing the Structural Dynamics Model (GE Dwg. No. 47J207708) was updated to reflect this weight and incorporate new or changed component and mounting designs. This updated model will be tested in conjunction with the adapter qualification tests.

5.3.3 NIMBUS B STRUCTURAL VIBRATION TEST REVIEW

The GSFC Environmental Committee conducted its sixth meeting on 15 and 16 August to review the proposed NIMBUS B Environmental Test Specification. The activities of this meeting were to be documented in an official NASA meeting report. The first day's discussion dealt with details regarding the presentation of the NIMBUS B structural vibration test and included commentary on the spacecraft vibratory test and flight environments. On the second day, a thorough review of the model test results and conclusions was conducted wtih GSFC, and GE test and evaluation personnel. All parties present indicated agreement wit' the conclusions and recommendations of the two volumes. Neither of the two discussions resulted in action items for GE.

5.3.4 ACCELERATION TEST MODEL SPACECRAFT

Strain gage data for the acceleration testing was reduced and evaluated. These data, together with written inputs concerning strain gage locations and anticipated stresses and strains, were summarized and included in PIR 41G2-582 (NB-41G2-712), NIMBUS B Acceleration Test Report, dated 23 May 1966. The final report on the NIMBUS acceleration test was released in June 1966 (F/ W 23).

5.3.5 ANTENNA MODEL SPACECRAFT

The antenna tests were completed at NMSU and the model removed from the tower. Testing of antennas to the flight configuration was completed in June 1966 (F/ W26) and pad configuration testing was completed in July 1966 (F/ W 29). Testing of the IRLS antenna and re-radiator proof tests are on "hold" pending NASA decision and action.

5.3.6 ELECTRICAL SYSTEMS MODEL SPACECRAFT

An analysis of the ESM Prototype Adapter was performed and drawings depicting the assembly and installation of this item reviewed and signed-off. This item will be mounted to the truss tubes only during the ESM thermal-vacuum tests and will not be subjected to vibration or acceleration testing. Therefore, the mount was designed to a criteria similar to that used for the mechanical support equipment.

The majority of the drawings defining the ESM vehicle were issued. Most of these drawings are applicable for the Flight Spacecraft (see Subsection 5.3.5). Prior to release, layouts of these designs were forwarded to manufacturing to accelerate assembly and drilling of mounting holes.

No harness installation drawing is planned for this vehicle. All hole and clamp locations and harness routing will be accomplished in accordance with the harness mockup vehicle. The upper insulation structure and blankets will be fabricated to sketch drawings.

5.3.7 FLIGHT SPACECRAFT

5.3.7.1 Spacecraft Design

Structural requirements (gage and material) for the Flight Sensory Subsystem outer webs were released in PIR 41K2-FF3-1 (NB-41K2-777), dated 6 June 1966. An analysis was performed indicating that the shear buckling characteristics for the flight model outer webs exceeds that of the reinforced outer webs for the vibration test model and, therefore, will not require requalification. In support of the design effort for the development of the Flight Spacecraft, the following items, also applicable to the Electrical Systems Model, were analyzed and approved: The Infrared Scanner Amplifier (IRSA), separation switch and unfold timer connector bracket, Sensory Ring lower insultation shells and installation, thermal radiator, controls interface panel bracket, and the antenna installation. The antenna installation includes the mounts and installations of the PCM (Quadraloop), S-Band (HDRSS), RTTS, and the IRLS Antennas.

A method to be used for mounting the SIRS unit so that the optical axis will not be distorted out of specification was defined by PIR. A study program was completed in which methods for establishing paddle positions during unfold sequence were evaluated. Four methods were found to be feasible and were submitted to the customer for evaluation. A layout was completed of the IDCS collimater-MRIR insulation interference study showing a maximum interference of 1/8-inch taking all tolerance buildups into consideration. However, since normally there is no interference, no changes will be made until the ESM vehicle has been assembled and actual clearances or interferences checked.

A layout was made defining the mounting provisions for the auxiliary load panel and the layout was completed of the stimulators which mount in the shroud. The harness deck was redesigned changing the primary function from a tray to a flat deck. This was accomplished by reducing the flange heights from 2 to 3/8-inch.

One unexpected design problem was the design of a command interface panel capable of mounting 15 Cannon connectors. Because of the limited space, a number of designs were fabricated and assembled before a final design was chosen and drawings issued.

A recommendation not to conduct a separation test was approved by all required personnel.

5.3.7.2 Spacecraft

The design of the lower insulation was completed including all blanket, assembly and installation drawings. A wire drawstring system for the upper insulation design was investigated. However, various problems necessitated abandoning the concept and to fall back on the previous button snap system. This design was started and a layout completed.

5.3.7.3 Drawing Status

Drawings issued during this reporting period include the antenna installation, RTTS mount, shorting plug and test connector brackets, battery conditioning connector brackets, thermal radiator cap, preflight disconnect, command interface panel and IDCS thermal strap.

All NIMBUS C drawings which will be used on NIMBUS B have had all outstanding ANs incorporated and usage blocks updated.

SECTION 6

AEROSPACE GROUND EQUIPMENT (NIMBUS B SPACECRAFT)

6.1 MECHANICAL AGE

6.1.1 MECHANICAL AGE PLANNING

All work proceeded in accordance with the schedule. Where specific requirements or information were unavailable, assumptions were made to meet schedule milestone dates. This applied in particular to the ambient check-of-calibration adapter and the spacecraft cover. NASA was informed of the design assumptions used to facilitate the continued processing of AGE requirements. The revised program schedules of 21 July and 10 August 1966 affected the dates for mechanical AGE and resulted in replanning of requirements and work effort. Specific items were advanced in schedule and others extended to accommodate systems test schedules as required.

6.1.2 MECHANICAL AGE STATUS

6.1.2.1 Utility Dolly

The drawings were reviewed and a stress check was made on the dolly as applicable to the heavier spacecraft. The utility dolly is acceptable "as is" for use on the NIMBUS B Program.

6.1.2.2 Ambient Check-of-Calibration Adapter

All detail drawings on this unit were released and manufacturing started on the majority of the details. The subassembly and assembly drawings were issued with the exception of the piping installation. A large portion of the design is predicated on assumptions that were presented to the customer for approval during the design review layout phase. Various anticipated subsystem changes and/or revisions will probably cause changes to the completed drawings.

6.1.2.3 RTG Handling Sling

As requested by the customer, five design concepts were prepared on methods of attaching to the RTG for handling purposes. The customer selected the method with four threaded studs on top of the RTG and has directed Martin Company to modify the RTG to provide this attaching interface. NASA has verbally informed GE to provide the handling sling. The preliminary handling procedure for the RTG was issued.

6.1.2.4 Experiment Alignment Equipment

The design plan on this item was issued. A conceptual design review was held in which the main action item was to reinvestigate the feasibility of moving the Rotab off the large surface plate and mounting it on a lower surface so that the facility crane hook height is compatible with this setup. The result is that this can be performed and agreement was reached with the responsible inspection and test personnel on this new alignment setup.

Manufacturing drawings have been prepared on the Holding Fixture, IDCS Target and RTG Target. Approximately 80 percent of the drawing effort is completed. The NIMCO alignment requirements were reviewed and it was determined that the NIMCO alignment equipment used with NIMBUS C can be used for the NIMBUS B Spacecraft.

6.1.2.5 Spacecraft Cover

The spacecraft cover manufacturing drawings were issued. Since the program was rescheduled, no fabrication was started except for the torsion springs with Hunter Spring Company winning the contract award for manufacture and test of the springs. Spacecraft cover drawing and layouts defining the handling of the cover at the gantry were forwarded to NASA/Lewis and Lockheed to acquaint these activities with the GE concept and requirements.

6.1.2.6 Spacecraft Mounting Ring

The design plan was issued and a conceptual design review was held, but no significant action items were generated. The design layout was completed and it was determined that the NIMBUS B Spacecraft cover mounting ring can be modified for use with the new spacecraft cover.

6.1.2.7 Spacecraft Cover Sling

The design plan was issued and a conceptual design review was held, but no significant action items were generated. The design layout was completed and it was determined to use the dolly and spacecraft sling assembly spreader but utilizing different wire rope legs.

6.1.2.8 Match-Mate Tool

The investigation to determine the feasibility of modifying the match-mate tool was completed. It was concluded that the tool can be modified to meet NIMBUS B requirements.

6.1.2.9 Spacecraft Lift Sling

An alteration notice was issued on the sling to increase its section modules on one member. This change was necessary because of the increased spacecraft weight.

6.1.2.10 Sensory Ring Lift Sling

Operating and maintenance instructions were issued on this item. Fabrication of the sling was completed and it was successfully proof-load tested in August 1966 (FW 35).

6.2 ELECTRICAL AGE

6.2.1 ELECTRICAL AGE PLANNING

Technical requirements were issued for the NIMBUS Electrical Systems Test Console, Check-of-Calibration Adapter (ambient), Target Control Console and Test Tees. Layout of the ground station was completed. All equipment except Command Ground Station No. 2 and the WWV receiver were implaced. PCM Ground Stations 1 and 2 were powered and operated satisfactorily and the bench acceptance area is nearing completion.

The Electrical AGE and systems test equipment design, fabrication and test specification (47A210106) and Electrical AGE standard fabrication, wiring and installation drawing were issued.

6.2.2 ELECTRICAL AGE STATUS

6.2.2.1 Nimbus Electrical Systems Test (NEST) Console

Design of the NEST Console is approximately 85 percent complete. The first console is scheduled to be available to support Electrical System Model testing. Consistent with the ESM test schedule, those portions of the console required for controls package tests, deployment tests, and flight adapter go/no go targets will not be made available until the fourth quarter.

6.2.2.2 RF Test Console

The NIMBUS C RF test equipment was redesigned for NIMBUS B. Important additions to the equipment include UHF test capability for IRLS and a direct reading frequency counter.

6.2.2.3 Check-of-Calibration Adapter (Ambient)

The electrical definition for the ambient Check-of-Calibration Adapter was completed and drawings released.

6.2.2.4 Target Control Console

Preliminary design of the Target Control Console for operation with the Check-of-Calibration Adapter was completed. Still to be resolved are definition of the MUSE target, controls and cables.

6.2.2.5 Test Tees

Definition of Test Tees was completed during this reporting period and fabrication of the units was started.

6.2.2.6 RF Dummy Load Panel

Design of an RF Dummy Load Panel was started. This panel will be located close to the spacecraft during testing and provide loading, isolation, and attenuation as necessary for each of the spacecraft transmitters. The purpose of locating this panel as close to the spacecraft as possible is to minimize potential damage to the transmitters caused by operation without proper loading.

6.3 AGE STRUCTURAL ANALYSIS

Support of the AGE design effort was provided in the form of analysis and approval of drawings for the spacecraft cover, Sensory Ring lift sling, utility dolly, collector ring, and spacecraft spacer. The results of the analyses are documented in the following PIR's: 4145s-FF3-386 (NB-4145-753), dated 27 March 1966; 4145s-FF3-392, dated 3 June 1966; 41K2-FF3-13 (NB-41K2-91D), dated 27 June 1966; 41K2-FF3-14 (NB-41K2-924), dated 13 July 1966; and 41K2-FF3-15 (NB-41K2-925), dated 13 July 1966.

Preliminary analyses evaluating the spacecraft cover sling and spacecraft cover mounting ring preliminary designs were completed indicating the structural sufficiency of these items. The designs and analyes of these items will be finalized during the next quarter. An analysis was performed evaluating stresses and deflections in the experimental alignment equipment indicating very low levels for both. This analysis will be documented during the next quarter and drawings which are in process will be reviewed upon completion.

SECTION 7

NIMBUS B DATA SYSTEM

7.1 DATA COLLECTION

The Telemetry History File has been implemented and data is being collected manually from bench verification and bench integration tests. Once the PCM airborne equipment is integrated and operating the Working Group will investigate the necessity of automating the history file.

7.2 DATA PROCESSING

An operating system for use in assembly, debug, and operation of the 160A programs has been designed, coded, and partially checked out. Complete checkout will be accomplished when the new memory modules and card reader are installed and operating.

Seven programs have been approved by the Computer Program Review Board and are presently being written. These are:

a. The Operating System

b. Raw Data Tape Generator

c. MIT Program

d. Engineering Units Tape Generator

e. Data Listing Program

f. Status Program

g. Temperature Set Point Program

A number of other programs are currently under study by the Board.

Data is currently being collected for inclusion in the Master Information Table (MIT). The first of the three MIT cards for each telemetry function has been keypunched. Control and maintenance procedures for MIT are now being generated.

7.3 DATA EVALUATION

A series of meetings was held with evaluation representatives and data system personnel to discuss the purpose and output of each program and to establish new program requirements. In addition, the preliminary data flow plan was discussed in order to resolve any incompatibilities within the data system.

7.4 THE TELEMETRY AND COMMAND DIRECTORY

Eight sections of the Telemetry and Command Directory have been distributed in preliminary form for review by system and subsystem engineers. Similar versions of the remaining sections are due by the end of the reporting period.

SECTION 8

TEST AND EVALUATION (NIMBUS B SPACECRAFT)

8.1 TEST PLANNING

8.1.1 INTEGRATED TEST PLAN

During this reporting period the Integrated Test Plan was under continuous review and revision. The overall test definition and test flow for both the ESM and Flight Spacecraft were in the process of being modified to reflect target date changes in hardware delivery.

8.1.2 ESM DEBUG TEST PROCEDURE

Task definition for this test procedure was accomplished and the drafting of the preliminary procedure was started.

8.2 NIMBUS INTEGRATED TEST FACILITY

During this reporting period the NIMBUS ground station complex at GSFC, Greenbelt, Md. was constructed, furnished and made operational. Site clearance began on 13 June 1966 (FW25) with the major portion of construction completed by FW31. On 3 August 1966 (FW32) the ground station portion of the complex was turned over to the NIMBUS Program for initial occupancy. During FW32 the Command Ground Station No. 2 and PCM Ground Stations 1 and 2 were moved from the SETF building to the NIMBUS Ground Station. During this equipment move, Command Station No. 1 and the WWV receiver were left at SETF to allow continual support of the bench integration testing during the equipment transferral.

During FW 33 the IRLS and Telemetry Ground Stations were set up in the ground station and Command Station No. 2 and PCM Station No. 1 checked out and made operational.

During FW 34 Command Station No. 1 and the WWV receiver were set up and Command Station No. 2 used to support bench integration testing while Command Station No. 1 was being checked out. During FW 34 the RCA station was also moved into the ground station from SETF.

At the end of FW 34 the ground station was fully occupied.

The RCA modification of the NIMBUS C Ground Station to the HDRSS requirements was incorporated FW 35 and FW 36.

The additional 16 K memory unit for the CDC 160A computer system, which is part of the PCM Ground Station, was installed and checked out during FW 35. The PCM Ground Station No. 2 has not been updated to the NIMBUS B configuration to date. Expected availability is FW 1, 1967.

During the ground station occupancy and checkout, work continued on finishing the remainder of the ground station complex. During FW 34 movement of the bench test console from the SETF building and the System Test Area was accomplished.

The Bench Integration Test Board was set up in the new bench test area in FW 34 with no impact on the bench integration test schedules.

Movement of co-contractor personnel to the new mezzanine office area was done during FW 35. The mezzanine office area contains four offices for ground station service company personnel, two offices for subsystem technical representatives, a NASA office, a GE conference room, a data room and a library.

Bench Integration Testing performed during this reporting period utilized the Bench Integration Test Board, fabricated to provide basic power, command and telemetry interfaces for each Sensory Ring Subsystem. Fabrication on the board started FW 29 and the Power and Command harnesses were completed in FW 32.

During subsystem integration with power and command, work continued with the fabrication of the telemetry interface harnessing. Check out of this harness was finished FW 37, and during FW 38 and 39, this harness was utilized during subsystem integration with telemetry.

The Bench Integration Test Board was deactivated FW 39 when the Power Command and PCM Subsystem modules were removed from the board for installation into Sensory Ring. The board was stored in the Bench Test Area for ready activation when modules become available.

SECTION 9

RELIABILITY (NIMBUS B SPACECRAFT)

9.1 CONFIGURATION MANAGEMENT

The Design Change Board conducted 57 meetings and evaluated 310 change documents during this reporting period. Change records and action items are maintained by the DCB chairman. The following presents the results of the changes evaluated during this period:

	Approved	Rejected	Total
Components	12	8	20
Structures	91	14	105
Harnesses	92	1	93
Systems	17	0	17
AGE	31	4	35
Standards	30	7	37
Unit change instructions	3	0	3
Totals	276	34	310

9.2 DESIGN REVIEW

Complete status of all design reviews and action items generated is issued in monthly and quarterly Design Review Status Reports. The following lists the design reviews conducted during this period and their respective status:

Item Description	Prelim-inary Review	Interim Review	Final Review	GE Approval
1. Fluid (Paddle) Damper Assembly				
2. Unfold Timer	X	X		
3. Solar Paddle Latch Cable	X			
4. Proposed NIMIT Harness Support	X			
5. Proposed Turnbuckle Design	X			
6. Separation Springs/Supports/Switches	X			
7. HRIR, MRIR, IDCS, IRIS and SIRS Targets	X			
8. Thermal Subsystem	X			

(Continued on Next Page)

(Continued from Previous Page)

Item Description	Preliminary Review	Interim Review	Final Review	GE Approval
9. Check of Calibration Adapter	X	X		
10. S/C Cover Modification	X			
11. NEST Console	X			
12. Experiment Alignment Equipment	X			
13. Antenna Subsystems	X		X	X
14. R. F. Test Console and Antenna Carrier	X			
15. MRIR Target (Final)	X		X	X
16. Telemetry Conversion Module (Final)			X	X
17. Auxiliary Load Controller	X			

9.3 RELIABILITY STANDARDS

The following specifications were issued to define specification requirements for the following items:

Specification	Issued (1966)
Connectors R4101	2 June
Resistors R4411	13 July
Transistors R4180	13 July
Semi-Conductor Burn-in 171A8333	13 July

9.4 RELIABILITY ANALYSIS

An interim reliability assessment of the Auxiliary Load Controller, Auxiliary Load Panel, and Compensating Loads was conducted and results published in PIR 4341-18. The final reliability report on the Power Management Subsystem is scheduled for release in September 1966.

An analysis of the electrical aspects of the Thermal Control Subsystem was completed in June 1966 (FW 26). A complete analysis of the subsystem, including the mechanical aspects, is now being performed and scheduled for completion in September 1966. This analysis will be combined with previous work completed on the telemetry conversion circuitry (reference PIR 4341-4).

An interin analysis was completed on the Unfold Subsystem in June 1966 (FW 24). The final report is scheduled for September 1966.

An assessment of the Separation Subsystem was completed in August 1966 (FW 35) and issued in PIR 4341-21.

9.5 FAILURE ANALYSIS

The status of GSFC malfunction reports processed during this reporting period is as follows:

GSFC reports written	68
GSFC reports closed	34
GSFC reports open	34

All written reports are listed in the NIMBUS B Malfunction Report Status document. The breakdown of the open reports is as follows:

Co-Contractor Responsibility	22
GE Engineering Responsibility	1
GE Reliability Assurance Responsibility	7
GE Program Office	4
Total	34

A Failure Analysis Report (Report 182-J-1) was completed on Temperature Controllers and issued 27 July 1966. A film analysis on the Fluid Dampers (Report 204-J-2) is currently in process.

SECTION 10

PROGRAM MANAGEMENT (NIMBUS B SPACECRAFT)

10.1 ORGANIZATION

The NIMBUS Program Organization Chart is shown in Figure 10-1. There have been no major operational changes in the organization during this reporting period. The chart shows the organization and personnel status as of 15 August 1966.

10.2 SCHEDULE AND PROGRAM STATUS

At the beginning of this reporting period, the 1 March 1966 Program Schedule was in effect. Program development proceeded generally in accordance with this schedule until July 1966. At that time, current program status, coupled with a NASA desire to reduce applied manpower levels, indicated the necessity to reschedule the program. A rescheduling exercise was undertaken resulting in the (tentative) 21 July 1966 Program Schedule. Among other effects, this schedule stretched the program out to a Flight Spacecraft delivery in May 1968.

The major areas affected by the tentative schedule revision were the schedules for qualification testing of components, mechanical and electrical aerospace ground equipment (AGE), harnesses and components for the Flight Spacecraft, assembly and testing of the Flight Spacecraft, assembly and testing of the Flight Spacecraft, and the aforementioned delayed delivery of the Flight Spacecraft from November 1967 to May 1968.

Subsequent negotiations with NASA revealed that certain limiting GFE deliveries would be improved and that the NASA expressed desire was an earlier delivery of the Flight Spacecraft. Incorporation of these considerations resulted in development of the (tentative) 10 August 1966 Program Schedule, which is shown in Figures 10-2 through 10-5.

The significant changes of this schedule revision over the tentative 21 July 1966 schedule are the advancement of the Flight Spacecraft delivery from May 1968, the consequential advancement of the start of Flight Spacecraft testing and required AGE availability, and the preservation of the start date (FW 40, 1966) for the debug testing of the Electrical Systems Model Spacecraft. Additional changes in program content and manner of implementation were incorporated to facilitate the advancement of the schedule and reduction of manpower levels. Some of these changes were:

a. reductions in component qualification,
b. elimination of certain engineering components.
c. elimination of the retrofitting of engineering hardware on the ESM spacecraft and its related post-retrofit debug test,
d. elimination of Phase III Interface Agreements,
e. deletion of the Command Simulator,
f. the use of existing NIMBUS C Prototype antennas (except IRLS), and
g. the fabrication of certain AGE to sketches rather than drawings.

Although the 10 August 1966 Program Schedule has been implemented, additional discussions with NASA are still anticipated to insure that it meets total program requirements.

10.3 CONTRACT STATUS AND NEGOTIATIONS

No contract negotiations were held during the reporting period. The report on non-fee bearing effort authorized by Supplemental Agreement Modification No. 44 issued 19 July 1966 has not been contractually definitized.

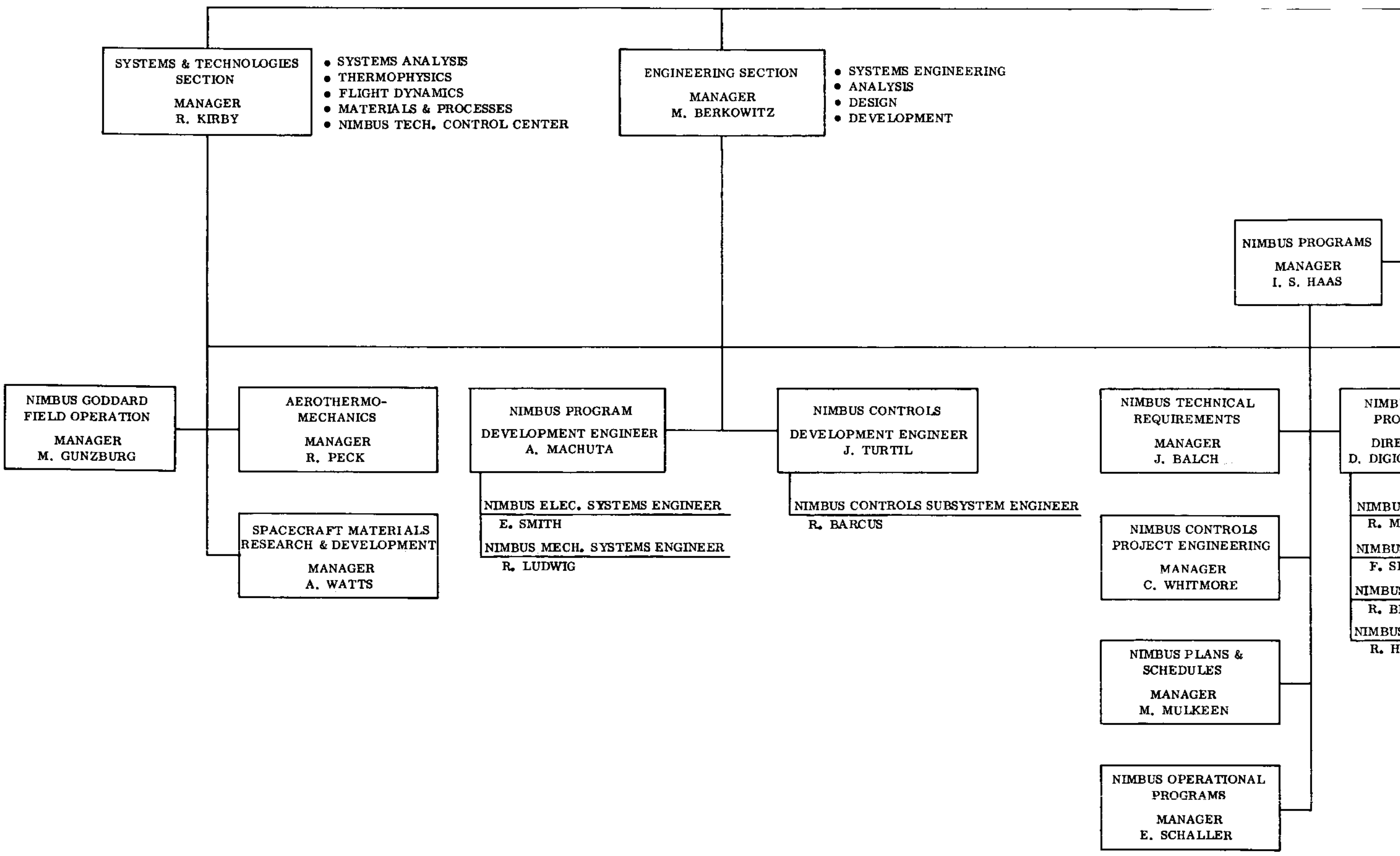
Proposal Number F-20322 dated 13 December 1965 covering "Integration and Test of the NIMBUS B Spacecraft" authorized by Change Order Modification 77 has not been contractually definitized.

The following proposal was issued during the reporting period:

Proposal No.	Title	Authorized by
F-20323	Modification of Nimco Prototype (GFP)	NASA TWX Dated 14 April 1966

The following contractual changes were received during the reporting period:

Title	Number	Date (1966)
Definitization of Change Order (Mod. 72)	Supplemental Agreement Mod. No. 85	15 June
Increased Funding	Supplemental Agreement Mod. No. 86	20 June
Increased Funding	Supplemental Agreement Mod. No. 87	8 Aug.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• THERMOPHYSICS
• FLIGHT DYNAMICS
• MATERIALS & PROCESSES
• NIMBUS TECH. CONTROL CENTER
ENGINEERING SECTION
MANAGER
M. BERKOWITZ
• SYSTEMS ENGINEERING
• ANALYSIS
• DESIGN
• DEVELOPMENT
NIMBUS PROGRAMS
MANAGER
I. S. HAAS
NIMBUS GODDARD FIELD OPERATION
MANAGER
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MANAGER
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MANAGER
A. WATTS
NIMBUS PROGRAM
DEVELOPMENT ENGINEER
A. MACHUTA
NIMBUS ELEC. SYSTEMS ENGINEER
E. SMITH
NIMBUS MECH. SYSTEMS ENGINEER
R. LUDWIG
NIMBUS CONTROLS
DEVELOPMENT ENGINEER
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NIMBUS TECHNICAL REQUIREMENTS
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C. WHITMORE
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MANAGER
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NIMBUS OPERATIONAL PROGRAMS
MANAGER
E. SCHALLER

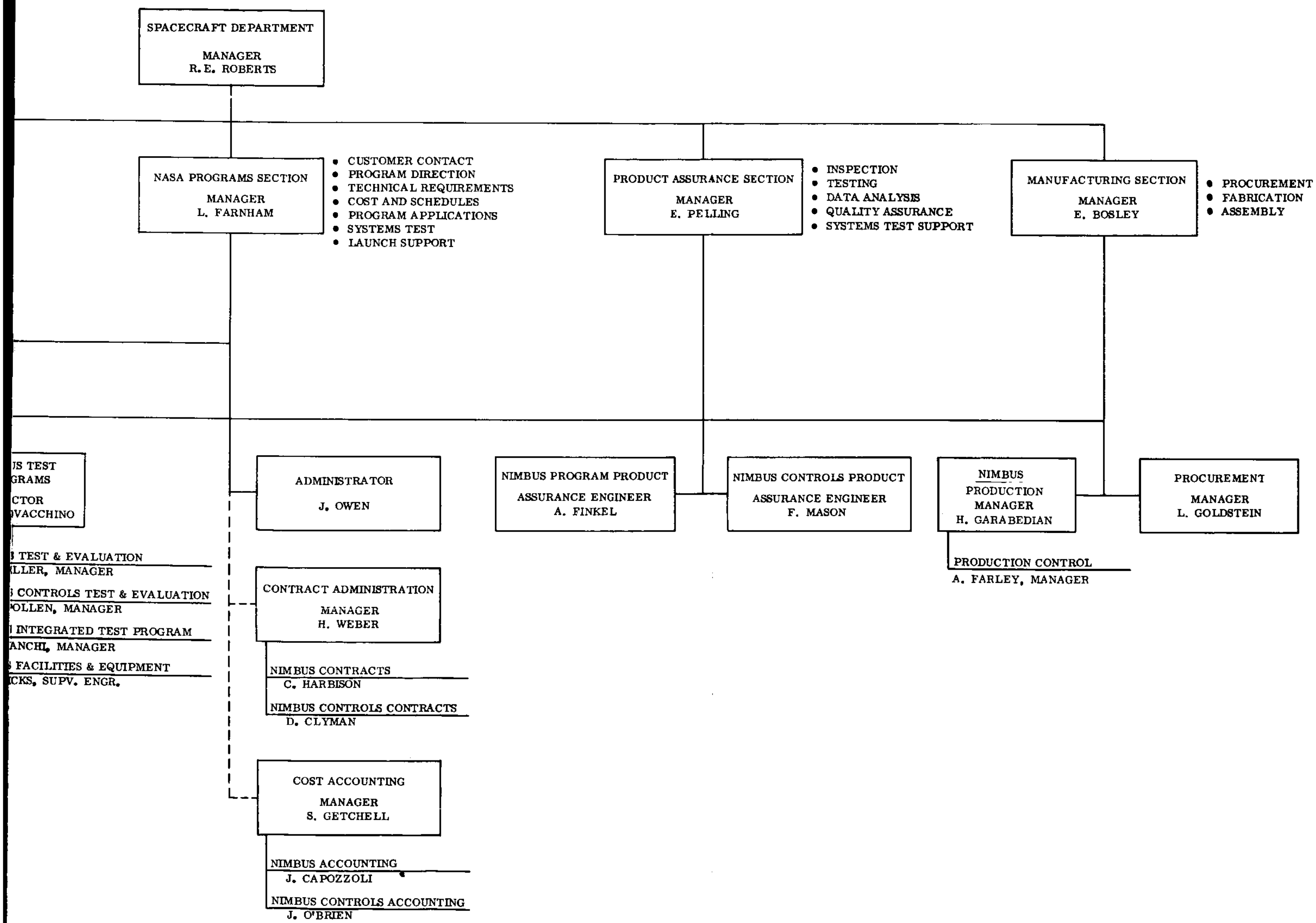


Figure 10-1. NIMBUS B Program
Organization Chart
(15 August 1966)

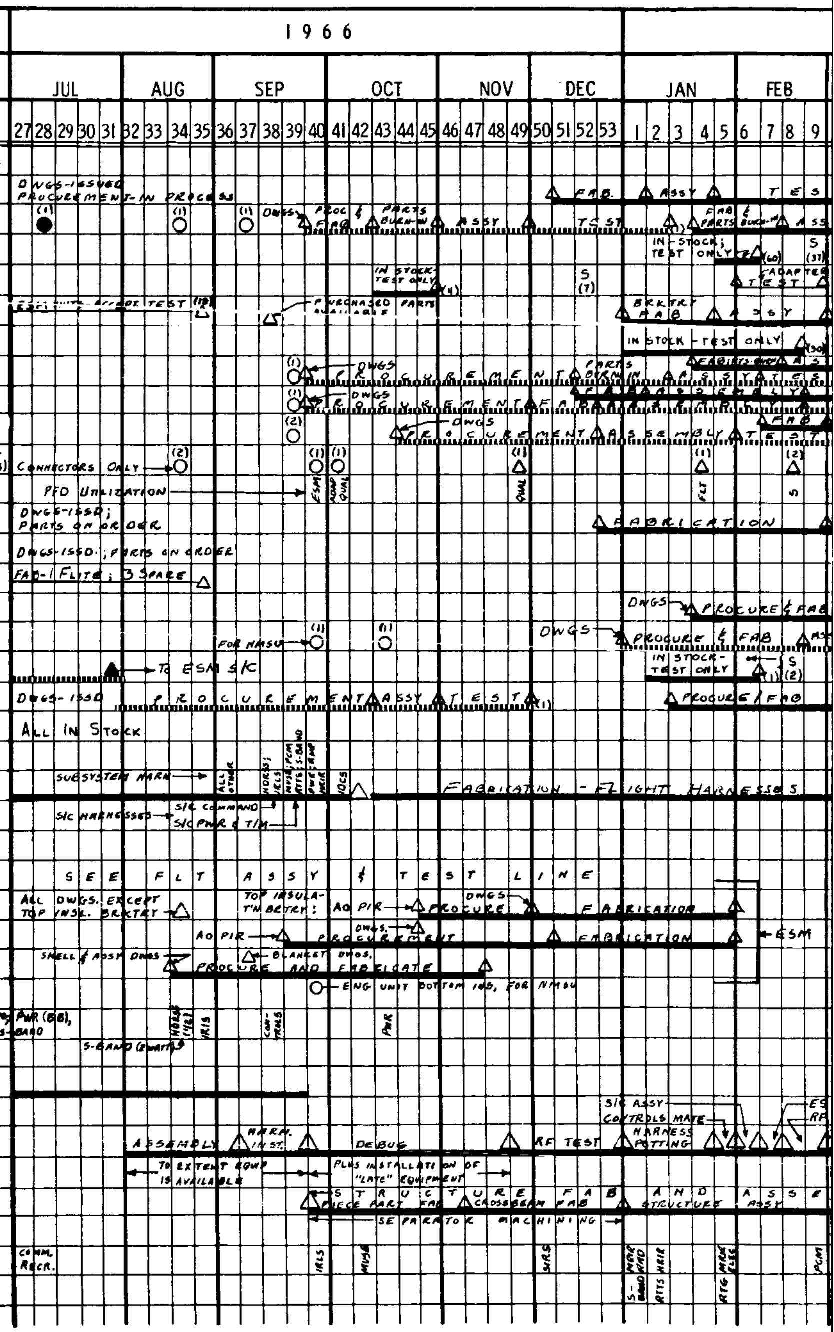
PROGRAM SCHEDULE

NIMBUS B PROGRAM SCHEDULE

AUGUST 10, 1966

(TENTATIVE)

COMPONENTS	TYPE OF UNIT TO BE USED IN ESM S/C	QUAL. REQD?
Temperature Controllers	"C" UNITS SUBJECTED TO SPECIAL TESTS, INCL. V/T.	No
T/M Conversion Circuits	ENGINEERING MODELS	YES
Thermistors	ACCEPTANCE TESTED UNITS	No
Separation Switch	ACCEPTANCE TESTED UNITS	No
Shutter Position Indicator	ACCEPTANCE TESTED UNITS	No
Compensating Loads	ACCEPTANCE TESTED UNITS	No
Unfold Timer	ENGINEERING MODEL	YES
Auxiliary Load Controller	ENGINEERING MODEL	YES
Auxiliary Load Panel	ENGINEERING MODEL	YES
Pre-flight Disconnect	ENGINEERING MODEL	YES (AT VENDOR'S)
Antennas		
PCM (4)	UNITS FROM "C" PROTO S/C	No
S - Band (2)	1- FROM "C" PROTO S/C 1- "C" SPARE	YES
Command	UNIT FROM "C" PROTO S/C	No
RTTS	APTS UNIT FROM "C" PROTO	No
IRLS	ENGINEERING MODEL	YES
Unfold Switch	QUALIFICATION UNIT	YES
Paddle Damper	UNITS FROM "C" VIB MODEL	YES
Load Cell	ACCEPTANCE TESTED UNITS	No
HARNESSES		
STRUCTURE & INSULATION		
Primary Structure		
Secondary Structure		
Top Insulation		
Bottom Insulation		
ESM GFE	CURRENTLY AVAILABLE: NORSS (1/2), IRLS, MRIR, RTTS, PWR (BB), COMM, PCM, IRIS, RMP, MUSE, RTTS, HRIR, IDCS, SIRS (S-BAND) — BB: BREADBOARD	
BENCH INTEGRATION TEST		
ESM TEST		
FLIGHT ASSY & TEST		
FLIGHT GFE	UNSCHEDULED: RMP, IDCS, IRIS	



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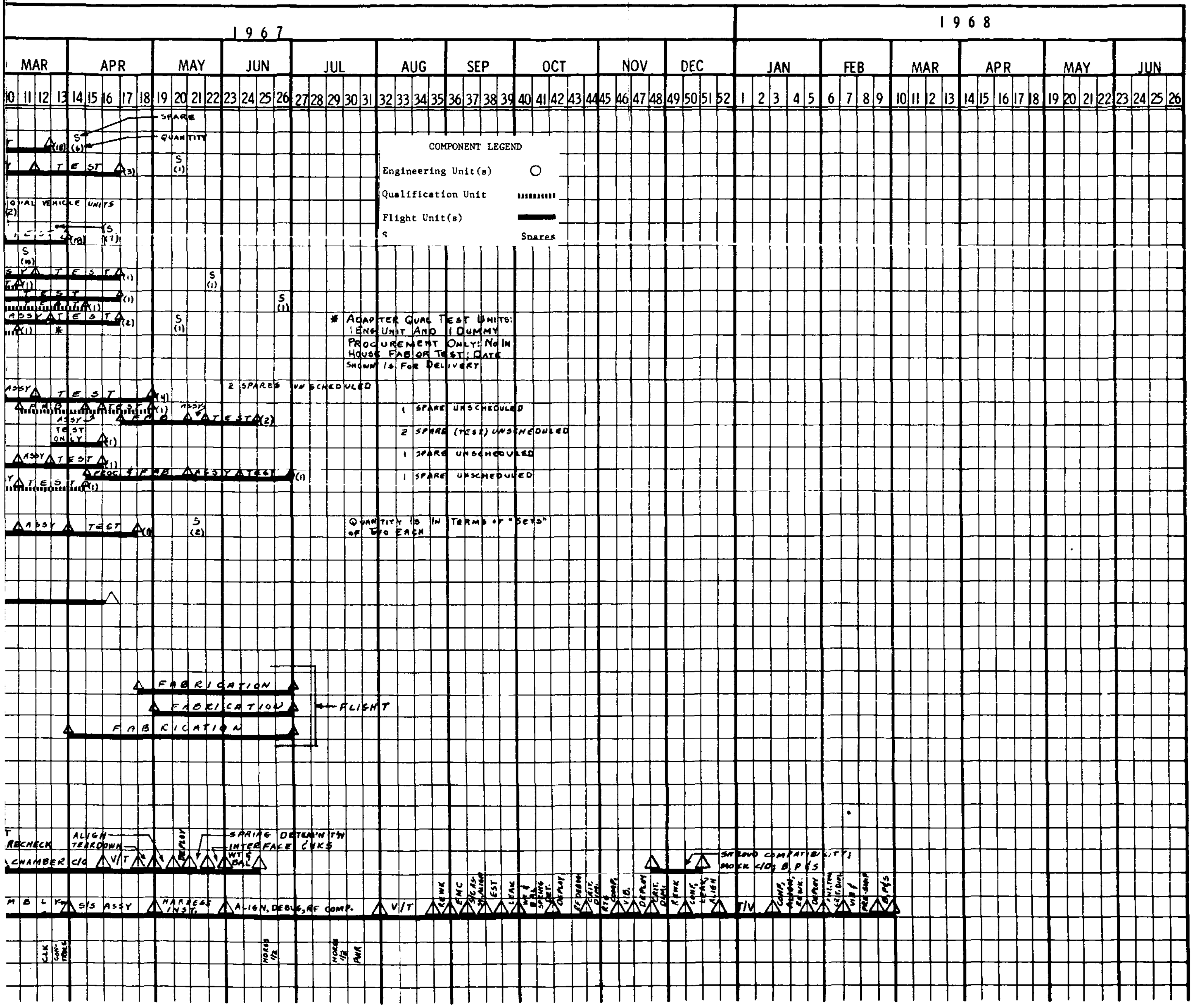


PAGE 1

(Re-issued 23 Aug. 1966)

Figure 10-2. Overall NIMBUS B Program Schedule (10 August 1966) (Sheet 1 of 4)

[redacted]

PROGRAM SCHEDULE

NIMBUS B PROGRAM SCHEDULE

AUGUST 10, 1966

(TENTATIVE)

1966: JUL (27 28 29 30 31), AUG (32 33 34 35), SEP (36 37 38 39 40), OCT (41 42 43 44 45), NOV (46 47 48 49), DEC (50 51 52 53); JAN (1 2 3 4 5), FEB (6 7 8 9)

Item	Schedule notes
AGE	
Test Tees	Dwg Issued; Procurement & Fabrication; Assy; C/O
NEST (Less Go-No-Go Panel & TE Rack)	Procurement, Fab & Assy; Dwgs; C/O
AGE Test Module and Battery Shunt Module	Procurement & Fab; Dwgs.; Assy; C/O
Controls Load & T/M Simulator	Design; Dwgs; Procure & Fab; Assy; C/O
Sensory Ring Lift Sling	Dwgs Issued; Modify & Proof Load
Chk. of Cal Adapter	Proc. Reqd for Jury Rig; Procurement and Fabricat'n; Al. Dwgs
Antenna Control Console	Chk of Cal Target Reqd; Dwgs; "Jury Rig"
Antenna Carrier	Procure; Antennas and Tripods
RF Test Rack	Procure and Fabrication; Cable Drawings; C/O; Equip. Only
S/G Sling;	Dwgs Issd; Procure and Fab; Assy; C/O
PreLaunch & ERC Panels of NEST Console	Des Reqmts Issued; Design; Dwgs; Procure / Fab; Assy; C/O
Alignment Equipment	Design; Procure / Fab
Vacuum/Thermal Cham. Equip. (Including V/T C of C Adapter)	Design; Procurement and Fab.; Instal. & Ch
Squib Sim. Mod. & Deploy Events Mod.	Des Reqmts Issued; Design; Procure / Fab; Dwgs Issued
AGE Test Mod. Control Box	
T & C Dolly; Dolly Sling & Bal.	Design; Procure and
Matchmate Tool	Design
NEST #2	Procure and Fab
Mass. Prop Determination Equip.	Design; P
S/C Cover	Dwgs. Issd.
RTG Protective Cover and Sling	Des
Controls Simulator Control Rk.	
Blockhouse Console	Des Reqmts Issued
S/C & Adapter Simulator	Des Reqmts Issued
Line Resistance Simulator	
Kits: Clearance Tool; S/C Cleaning; Mechanics Tool; Accountability	
Solar Paddle Cont. Test Set	Des Reqmts Issued
AGE Simulator	Des Reqmts Issued
Target Control Console	Design; Dwgs; Procure and Fab; Assy; C/O
Spacecraft Cover Sling Assembly	
Spacecraft Cover Mounting Ring	
Spacecraft Spacer	Dwgs - Issued; Modific'tn; C/O

FORM 1-6300 (10/66)

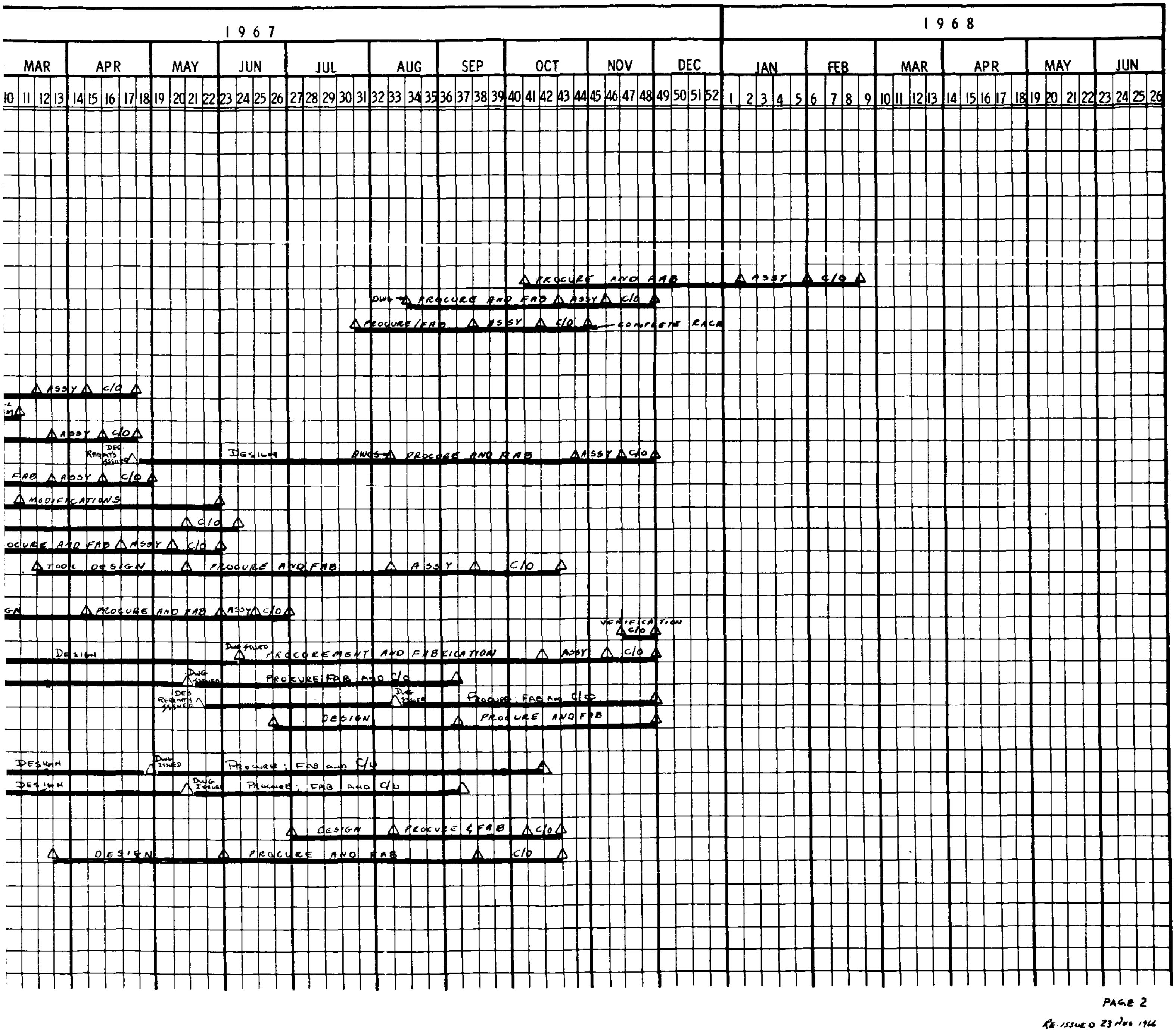
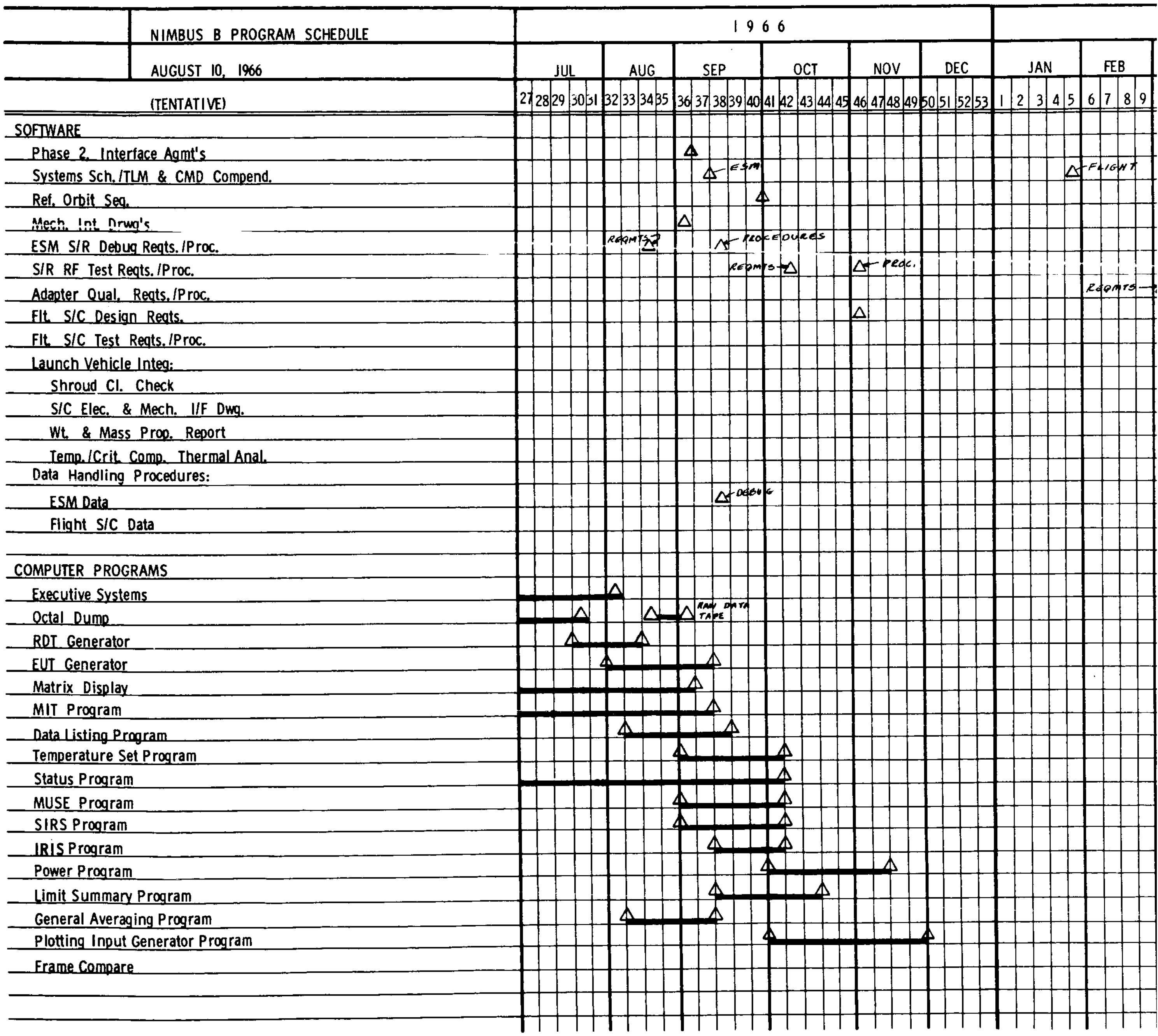
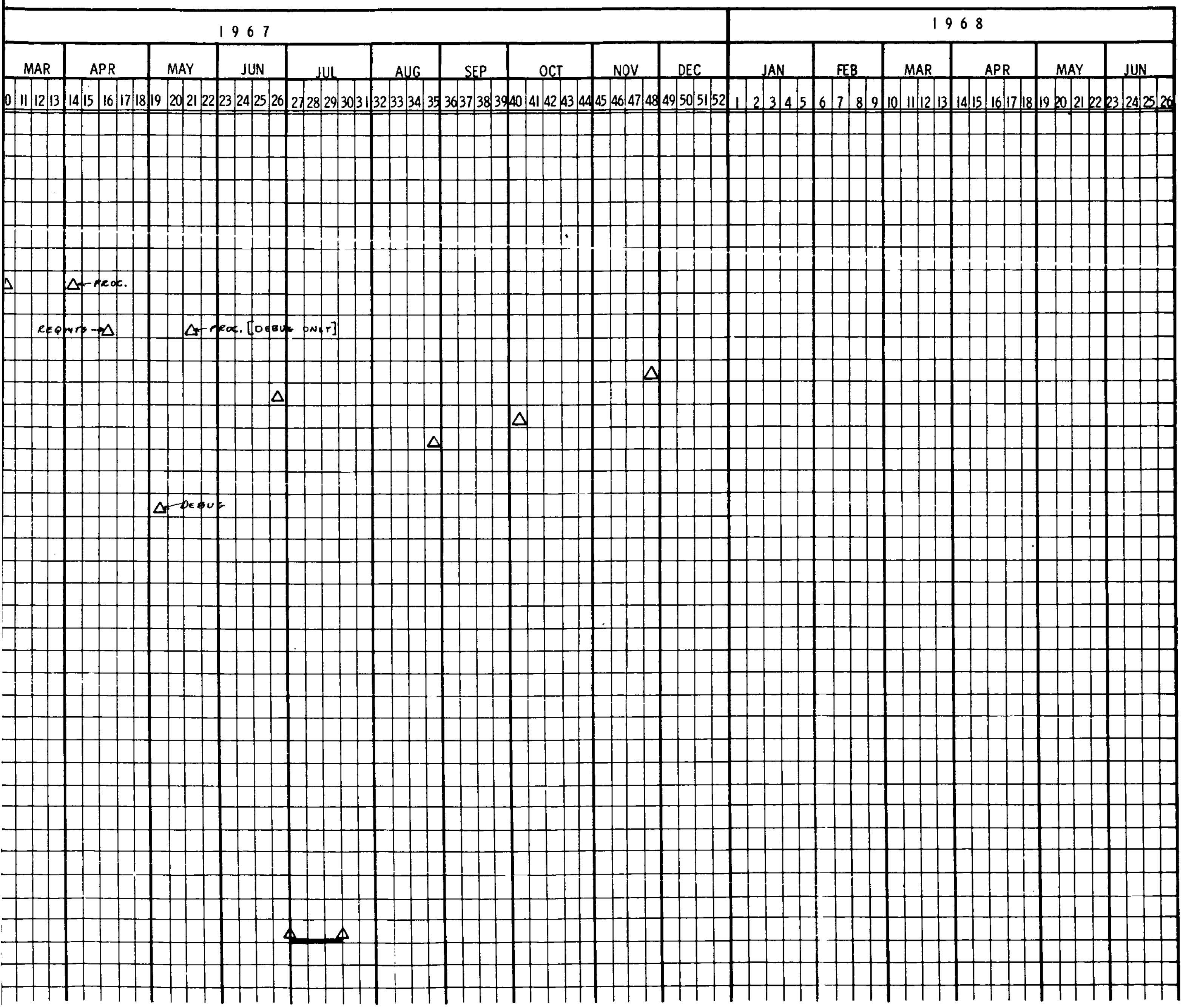


Figure 10-3. Overall NIMBUS B Program Schedule (10 August 1966) (Sheet 2 of 4)

PROGRAM SCHEDULE





PAGE 3
(REVISED 20 AUG. 1966)

Figure 10-4. Overall NIMBUS B Program Schedule (10 August 1966) (Sheet 3 of 4)

PROGRAM SCHEDULE

NIMBUS B PROGRAM SCHEDULE — 1966

AUGUST 10, 1966

(TENTATIVE)

Months: JUL, AUG, SEP, OCT, NOV, DEC (1966); JAN, FEB

Weeks: 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 1, 2, 3, 4, 5, 6, 7, 8, 9

Item	Schedule entries
ADAPTER	
Primary Structure Deliveries	#1 Qual Unit (ESM) (SEP); #2 Flight (OCT); #3 Flight Spare (NOV); #4 Flight Spare (DEC); #5 Seperation (JAN)
Secondary Structure:	
First Set	Design (JAN); Fab (FEB)
Second Set	
Third Set	
Targets: (1):	
First Set	Design Held Pending Re Radiator Definition (JUL–OCT); Design Rel (JAN); Procure & Fa… (FEB)
Second Set	Procure… (FEB)
Third Set	Procur… (FEB)
Harnesses: (2)	
Mockup	"C" Adapter fur mi… (JAN); Fab and ma… (FEB)
First Set	
Second Set	
Third Set	
Components:	
All but springs (3)	
Springs	
Reradiators:	
First Set	NASA Definition (DEC); Design (JAN); Fab (FEB)
Second Set	Fab (FEB)
Third Set	Fab (FEB)
Assembly and Test:	
First Adapter	
Structural Dynamics Model S/C	Des. De… (FEB)
Second Adapter	
Third Adapter	
SPECIAL TESTS	
Matchmate (At LMSD)	
Shroud Clearance (At LMSD)	

(1) Targets: SIRS Earthbeam, SIRS Spacebeam, IRIS Earthbeam, IRIS Spacebeam, MRIR Heater, MRIR Lamp, IDCS, HRIR

(2) Harnesses: 9 A, B, C, D, E and F

(3) Components: Accelerometers, Vibration Measuring System, Sep. Band, Bolts, and Cutters

FORM 1-0250 (10/60)

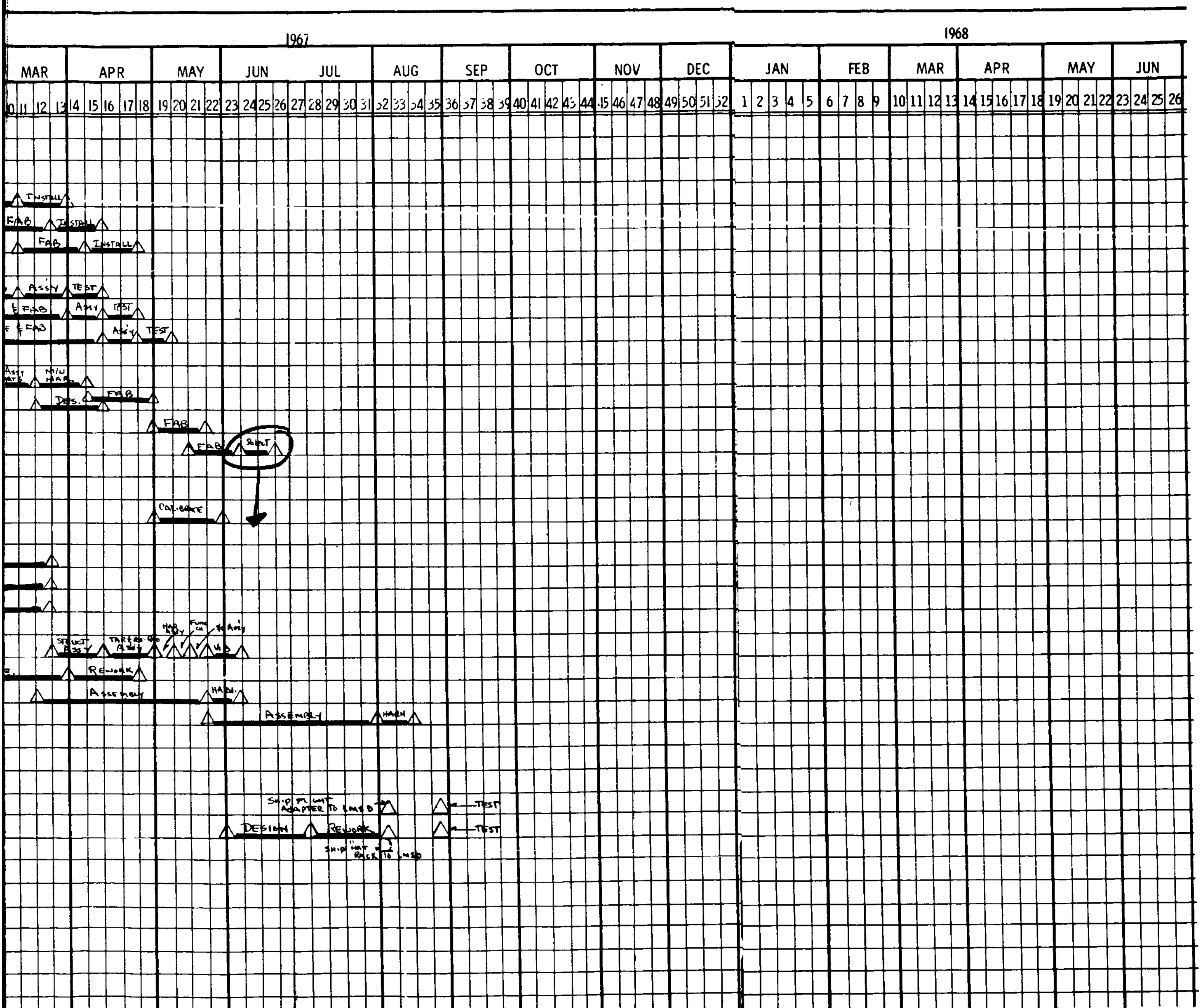


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Figure 10-5. Overall NIMBUS B Program Schedule (10 August 1966) (Sheet 4 of 4)

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SECTION 11

NEW TECHNOLOGIES

During this reporting period, two surveys were conducted as separate searches for the disclosure and reporting of new technologies. The surveys included reviews of all technical activity, accomplishments, and documentation during the period.

As a result of the reviews, there are no new technologies, nor items definable as reportable under the New Technology Clause, for reporting purposes during the subject period.

Formal notification of this status will be included in the GE Annual New Technology Report covering the period 11 October 1965 through 11 October 1966 in accordance with Contract NAS 5-978, Contract Modification No. 75, dated 11 October 1965.

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