2miu

NASA CR-132926

IMP I, H, & J

FINAL REPORT

NOVEMBER 1973

(NASA-CR-132926) IMP I, H, AND J Final Report (Weston Instruments, Inc.) ~~399~~ 367 p HC $21.00 CSCL 22C

N74-17563

Unclas

G3/31 29697

CONTRACT NO. NAS 5-11211

Prepared By:

EMR-Aerospace Sciences
EMR Division
Weston Instruments, Inc.
College Park, Maryland

For:

National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

LIST OF TABLES

SECTION I

INTRODUCTION

1-1. GENERAL

1-2. At 2226 hours EDT, 25 October 1973, the Interplanetary Monitoring Platform (IMP) J was launched from Pad 17B at the NASA Eastern Test Range (ETR), Cape Kennedy Air Force Station, Florida. This launch brought to a successful conclusion the IMP I, H, and J program in which EMR-Aerospace Sciences, College Park, Maryland, provided the administrative and technical integration capabilities under contract NAS 5-11211 with Goddard Space Flight Center, Greenbelt, Maryland. After launch, IMP I became Explorer 43, IMP H became Explorer 47, and IMP J became Explorer 50.

1-3. The IMP I, H, and J spacecraft are the eighth, ninth, and tenth of a series of lightweight, scientific spacecraft. These three spacecraft were placed in high apogee orbits to perform detailed and near continuous studies of the interplanetary environment for orbital periods comparable to several rotations of active solar regions. Specifically, the mission objectives are:

a. To assist in providing solar flare prediction capability.

b. To expand the total knowledge of solar/lunar/terrestrial relationships through continuous observations of the cislunar environment concurrent with studies of the magnetic field characteristics.

c. To explore the earth's magnetosphere and the near regions of interplanetary space.

1-4. PURPOSE OF REPORT

1-5. This report is prepared in accordance with the requirements of Contract NAS 5-11211. The purpose of this report is to present the IMP I, H, and J schedule and the scope of EMR's participation in the program. Section II provides a broad description of the three spacecraft and the weekly summaries of IMP H and J are included in Section III to provide in detail the operations performed on those spacecraft. Section IV is included to accurately describe the as-launched configuration of IMP H and J in terms of weight and Experiment/Instrument complement. Included in Appendices A through J are important documents for describing the project planning, project problems and recommendations, and reports of the launch operations.

1-6. PROGRAM SCHEDULE

1-7. The contract commenced on 15 April 1969 after the design of the IMP I, H, J series of spacecraft had started at GSFC. Initially, the program schedule called for an IMP H launch in April 1972, and an IMP J launch in June 1973. This provided a 14-month spacing between the two launches which was a scientific requirement. In September 1971, the IMP H launch date was changed to July 1972 due to late experiment deliveries; and the IMP J launch date was changed to September 1973 to maintain the 14-month spacing. The official IMP H launch date was changed again in May 1972 to reflect a September 1972 date due to launch vehicle

and spacecraft problems. The IMP H was successfully launched on 22 September 1972. The IMP J schedule was modified in October 1972 due to budget reductions to reflect an October 1973 launch. The IMP J spacecraft was successfully launched on 25 October 1973.

1-8. The actual progress of the IMP I, H, and J spacecraft is shown on Figure 1-1 beginning with the start of contract on 15 April 1969. The milestones, which are identified for each spacecraft, are: 1) the start of structure assembly, 2) the start of electrical integration, 3) the start of test and evaluation, 4) the start of prelaunch operations, and 5) the launch date.

1-9. In utilizing these schedules for future spacecraft planning, certain progress considerations must be remembered. For each spacecraft, the period of time identified as "Structure Assembly" includes all preintegration activities such as primary structure buildup, harness fabrication, computer program development, and preparation of the integration GSE. Integration commences with the first harness-instrument mated to the spacecraft electrical harness. During electrical integration, the spacecraft structure buildup is continued with completion usually occurring near the end of integration. Due to late deliveries, electrical integration is frequently not complete by the start of Test and Evaluation (T&E), and the final experiment integration is completed during the test phase.

1-10. SCOPE OF WORK

1-11. From April 1969 until December 1973, EMR provided technical and administrative manpower and facilities as specified in the NAS 5-11211

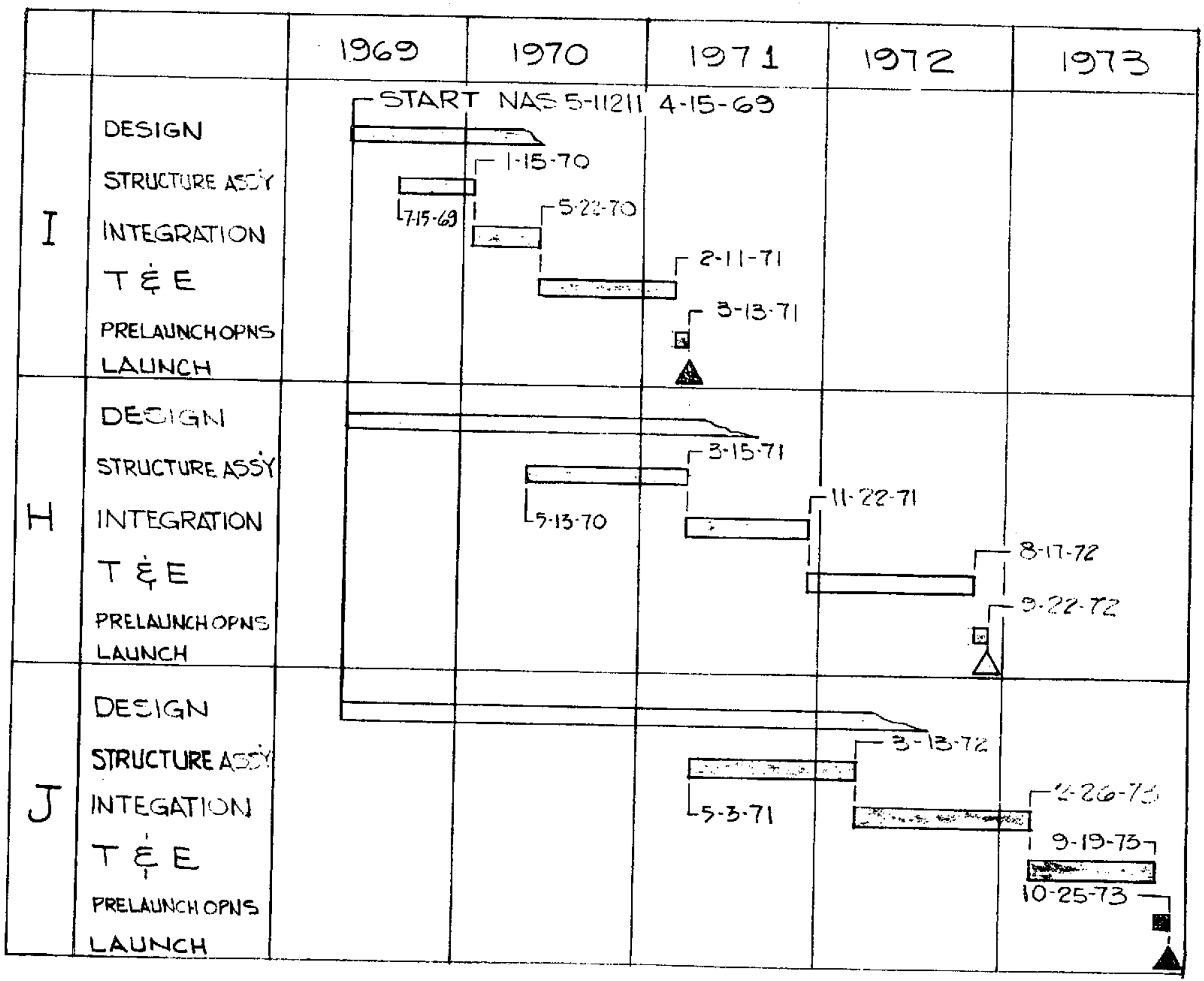


Figure 1-1. IMP I, H, & J Milestone Schedule

contract for the successful manufacture, integration, test, and launch of the IMP H and J spacecraft. EMR's support of GSFC during the IMP I project was intended to familiarize the EMR team with the IMP I, H, and J hardware and software. During IMP H and J, EMR was responsible for the technical performance and safety of the spacecraft throughout the program. The scope of EMR's involvement in each of the IMP I, H, and J spacecraft is best described by a discussion of each individual project.

1-12. IMP I

1-13. Engineering support was provided by an on-site mechanical engineer who participated in the structural design and mass property analysis. In addition, the integration, T&E phase, and launch operations for IMP I were monitored for EMR by both electrical and mechanical engineering personnel. Technician support was provided to GSFC in both the mechanical and electrical areas. Mechanical technicians worked with Mechanical Systems Division (MSD) throughout the IMP I structural buildup, electrical integration, T&E, and launch phases. Electrical technicians supported GSFC during harness design, checkout, and installation; during electrical integration; and during the launch activities. EMR provided computer programming support of IMP I for spacecraft and experiment checkout during all phases of the IMP I program.

1-14. IMP H

1-15. As integration contractor, EMR was responsible for supporting all activities leading to the successful launch of IMP H. Early in the program, this included cooperation with the MSB in refining the IMP I

mechanical design into the IMP H design by accommodating all mission-peculiar requirements such as the kick motor. This included participation by EMR in all experiment design reviews as well as close interface with all spacecraft instrumenters. This interface resulted in harness fabrication drawings as well as detail mechanical design. Mechanical drawings were prepared and maintained by EMR subject to approval by GSFC/MSB. Electrical interface drawings were prepared and maintained by EMR through coordination with each experimenter and instrumenter.

1-16. During the initial phases of the program, EMR assisted the GSFC Project Office in preparation of plans, schedules, and flow diagrams to define the sequence of events and the time required for each project phase. Throughout the project, these documents were revised as required to provide the Project Office with the necessary management tools.

1-17. Because of the large number of plans, procedures, and specifications required during the project, EMR prepared and maintained an IMP H Documentation Plan to help the Project Office control the paperwork.

1-18. On 13 May 1970, EMR entered the assembly phase of the IMP H project. During this time, EMR purchased and/or fabricated all items necessary to assemble the IMP H spacecraft exclusive of GFE. By 15 March 1971, the primary structure was completed, the harness was installed, and the spacecraft was ready for electrical integration. Integration of experiments and instruments was handled on a black-box basis. EMR worked only with the interface and did not attempt to troubleshoot malfunctions in the experiments or instruments. EMR did coordinate

with the experimenters to determine expected data requirements. On 22 November 1971, IMP H began the Test and Evaluation Phase. During this phase, EMR was responsible for spacecraft qualification through procedure preparation, test setups, conducting tests, experiment data reduction and review. On 17 August 1972, the spacecraft was shipped from GSFC to ETR for prelaunch operations. EMR participated in the convoy. Once at ETR, EMR provided all administrative and technical support necessary to test and launch the IMP H spacecraft. The IMP H ETR Daily Operations Summary is included as Appendix A.

1-19. IMP J

1-20. Since the primary differences between the IMP H and the IMP J spacecraft are in the experiment complement, the scope of EMR support for IMP J was essentially the same as for IMP H. Administrative and technical support was provided to mechanically and electrically fabricate and assemble the completed spacecraft, integrate and qualify the spacecraft at GSFC, perform prelaunch test and preparations at ETR. The IMP J ETR Daily Operations Summary is included as Appendix B.

1-21. PROGRAM PROBLEMS

1-22. Problem areas which were encountered during the IMP H and J program are outlined in the Summary Technical Reports. The purpose of these reports is to provide a baseline for subsequent programs in order that previous problems are avoided. The IMP H and J Summary Technical Reports are included as Appendices C and D, respectively.

SECTION II

SPACECRAFT DESIGN

2-1. GENERAL

2-2. The IMP I, H, and J spacecraft developed as the natural evolution of earlier IMP spacecraft. They were designed with 16 facets to house larger, heavier, more complex experiments. The three spacecraft have design similarity in order that the base structure could be used for all three missions.

2-3. MECHANICAL DESIGN

2-4. The geometric structure of the IMP I, H, and J spacecraft is a 16-sided drum measuring 52.8 inches across the flats, with an overall height of 71.7 inches for IMP I and 62.1 inches for IMP H and J. The spacecraft contains an aluminum honeycomb shelf which is supported by eight struts and a 18-inch diameter thrust tube on the underside; the experiment modules are mounted on the topside of the shelf. To satisfy stringent RF and thermal requirements, the instrumentation midsection is fully enclosed by metallic covers and side panels. Two bands of solar panels above the midsection, and one below it, supply all the required electrical power. Four active and four passive turnstile type RF antennas extend radially from a spacer between the two upper solar panel bands. Appended to the exterior of the structure are two ACS booms and two experiment booms. These booms are folded alongside the spacecraft at launch. The orbital and launch configurations of the spacecraft are shown for IMP I, H, and J in Figures 2-1 through 2-6.

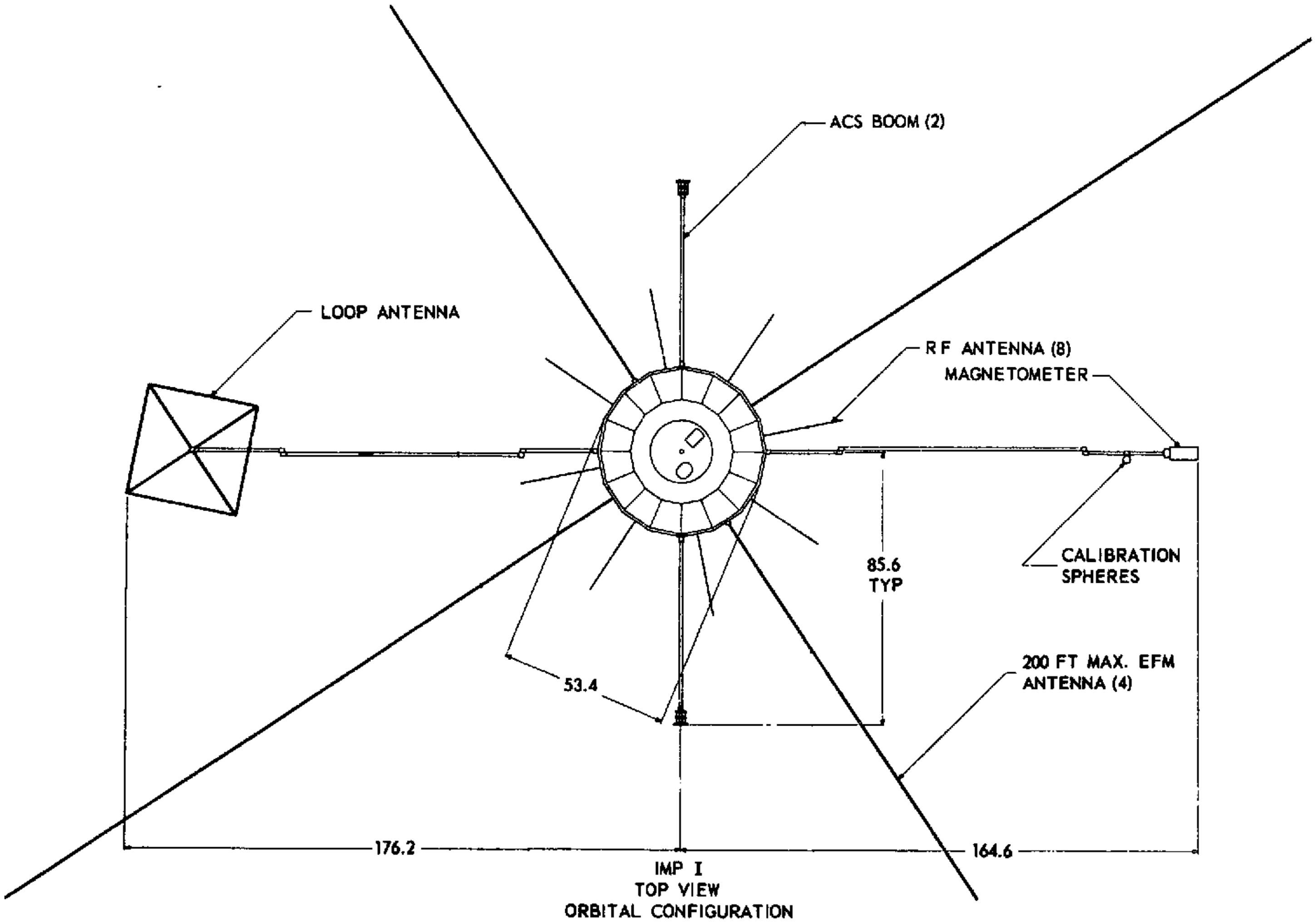


Figure 2-1. IMP I Orbital Configuration

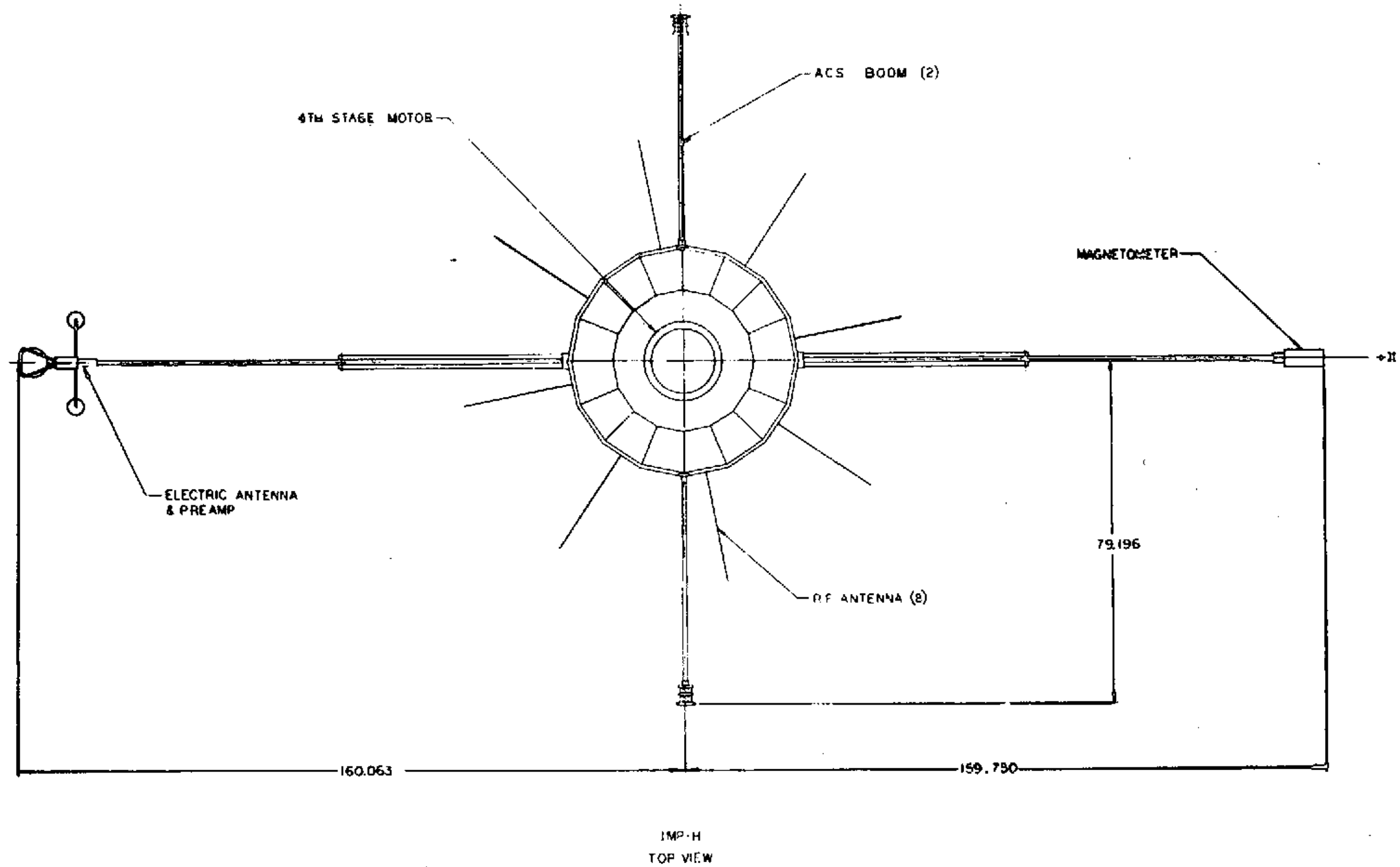


Figure 2-2. IMP H Orbital Configuration

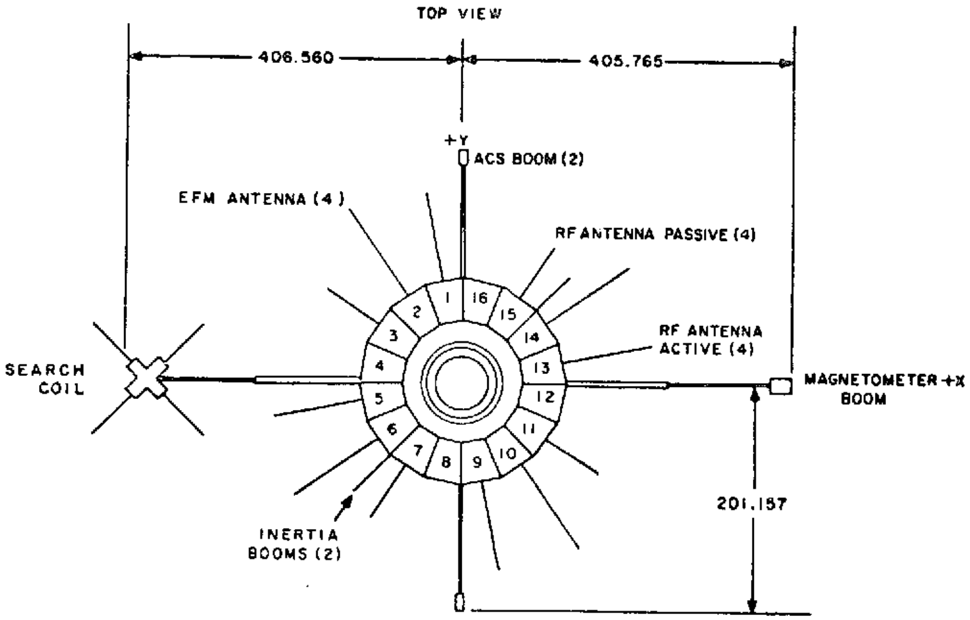


Figure 2-3. IMP J Orbital Configuration

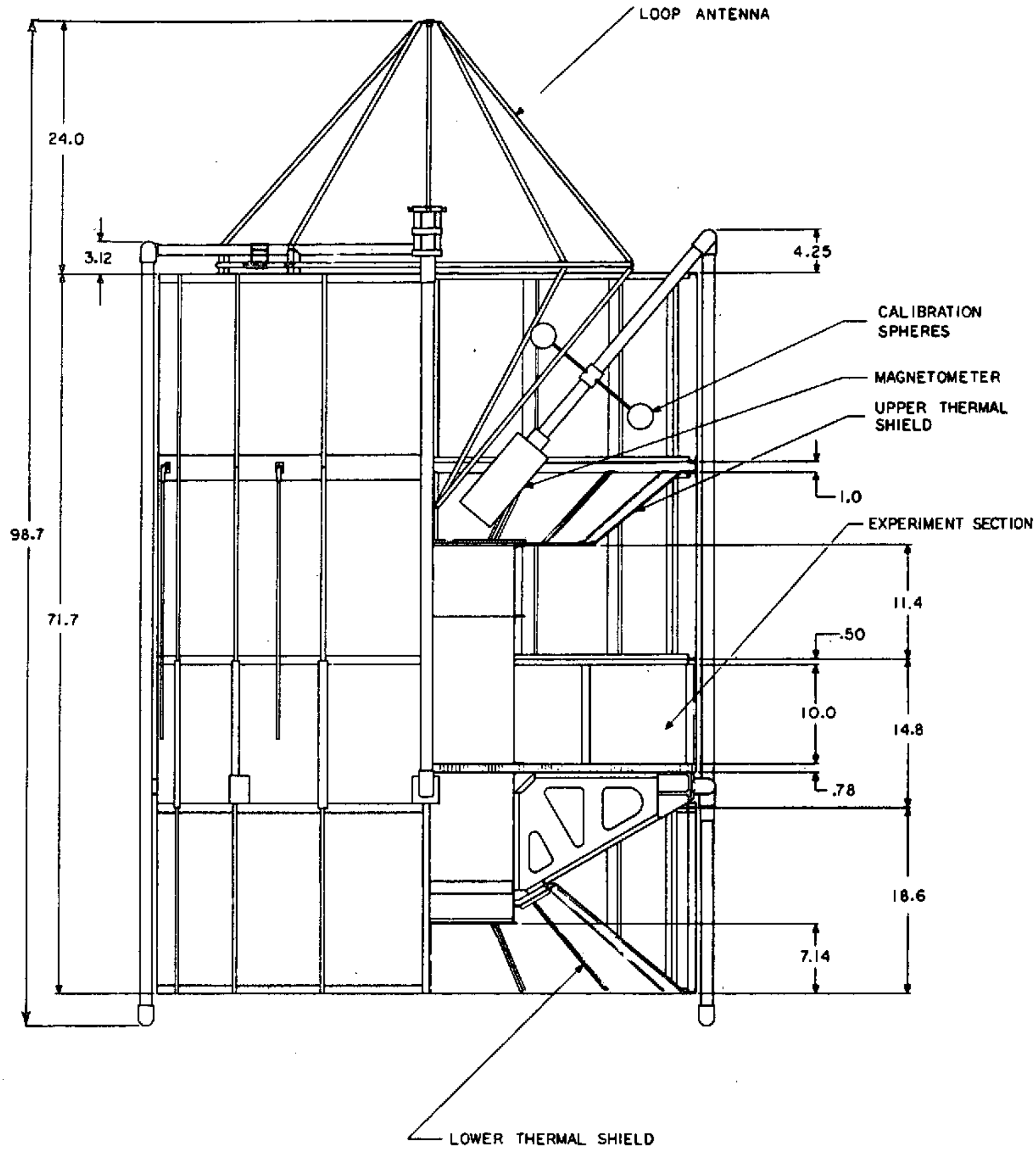


Figure 2-4. IMP I Structural Configuration

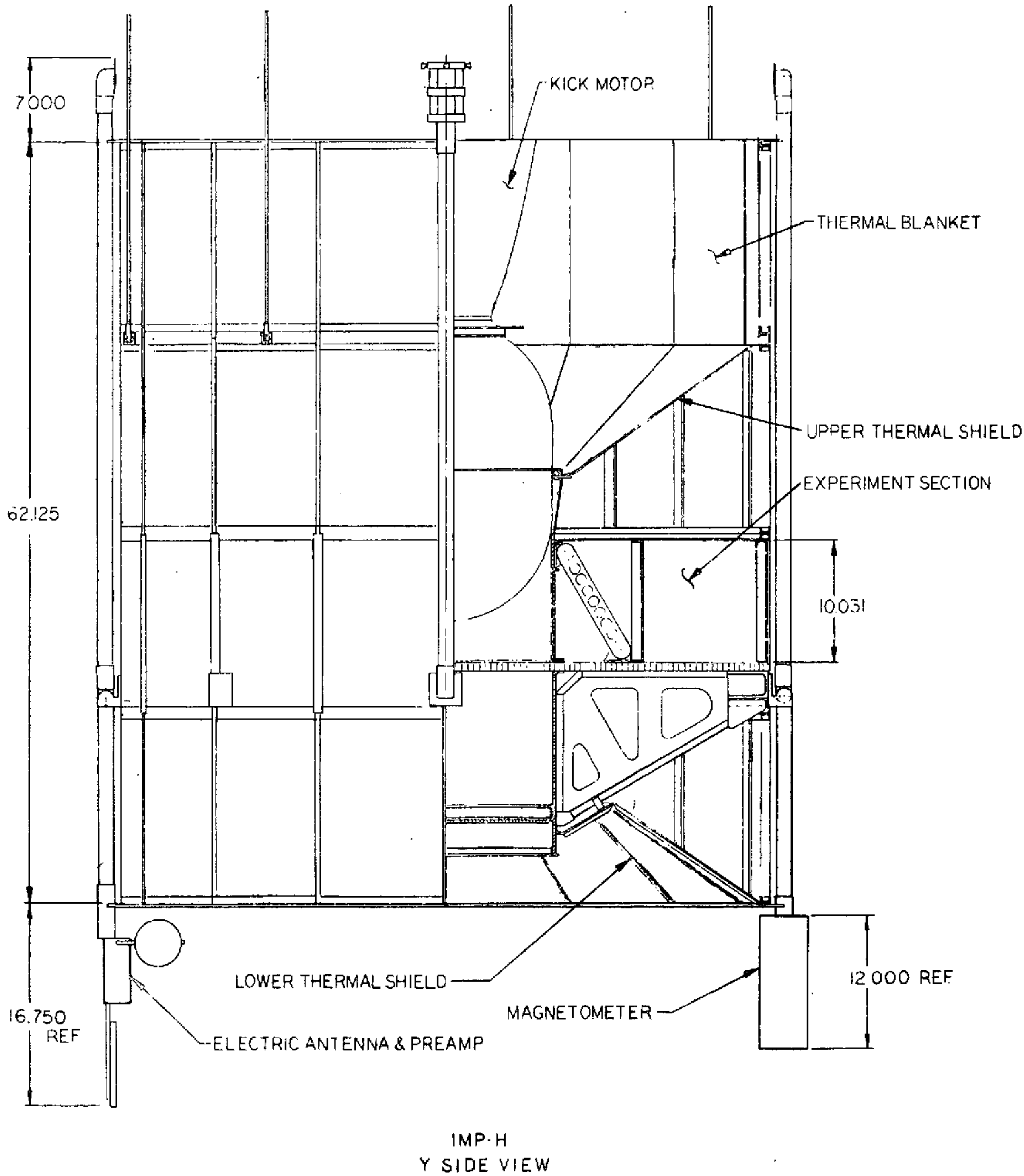


Figure 2-5. IMP H Structural Configuration

Page intentionally left blank

2-5. The basic IMP I structure was modified to accommodate the mission specific requirements of IMP H and J. The mechanical and structural differences between IMP I and IMP H are discussed in the "Summary Report of Design Differences Between IMP H and IMP I" (HER-010). Included in HER-010 are discussions of changes or additions regarding the Kick Motor, Upper Center Tube, Kick Motor Heater System, Kick Motor Nozzle Cover, Plume Shields, Solar Panels, ACS Booms, Experiment Booms, Nutation Damper, Inertia Booms, EFM Antennas, and Yo-Yo Despin System. The detail design of the IMP H and J spacecraft are defined on GSFC drawings starting with GD1063402 and concluding with GE1073424.

2-6. IDENTIFICATION CODE SYSTEM

2-7. In order to assign a name and serial number to both spacecraft components, an Identification Code System was developed. The IMP I system is shown in Figure 2-7 and the IMP H/J system in Figure 2-8. With the use of this guideline, a distinct identification serial number is assigned to each structural and electrical component. Appendix E shows the launch configuration as described by the Identification Code System serial numbers for each instrument and experiment.

2-8. MODULE FRAME STACKUPS

2-9. One of the initial tasks early in the IMP H/J program was the assignment of specific locations to each spacecraft instrument and each experiment selected to fly on each spacecraft. Figure 2-9 shows the IMP I stackup which was developed prior to the start of contract NAS 5-11211. However, the IMP H and IMP J stackup shown in Figure 2-10

INTERPLANETARY MONITORING PLATFORM
IMP-I IDENTIFICATION CODE SYSTEM

Dec. 19, 1969.

EXPERIMENTATION

GME — COSMIC RAY (GSFC — McDONALD)
1. MEDIUM ENERGY DETECTOR (MED)
2. VERY LOW ENERGY DETECTOR #2 (VLED#2)
3. VERY LOW ENERGY DETECTOR #1 (VLED#1)
4. LOW ENERGY DETECTOR (LED)
5. LED ELECTRONICS
6. MED ELECTRONICS
7. VLED ELECTRONICS

GCE — SOLAR ELECTRONS (GSFC — CLINE)
1. SOLAR ELECTRON EXPERIMENT

CHE — COSMIC RAY (CHICAGO — SIMPSON)
1. MAIN TELESCOPE (MT) OUTPUT ELECTRONICS
2. MAIN TELESCOPE INPUT ELECTRONICS
3. LOW ENERGY TELESCOPE (LET) DETECTOR
4. MAIN TELESCOPE DETECTOR

IOE — LOW ENERGY PARTICLES (IOWA — FRANK)
1. LEPEDEA EXPERIMENT

CAE — MEDIUM ENERGY PARTICLES (CAL — ANDERSON)
1. MEDIUM ENERGY PARTICLES EXPERIMENT

APE — SOLAR PROTONS (APL — BOSTROM)
1. SOLAR PROTONS EXPERIMENT

GCC — COMPUTER (GSFC CLIFF)
1. MEMORY SYSTEM UNIT (MSU)
2. CENTRAL PROCESSING UNIT (CPU)
3. REAL TIME UNIT (RTU)

GOP — PLASMA (GSFC — OGILVIE)
1. DETECTOR NO 1
2. DETECTOR NO 2
3. STATISTICS COMPUTER

LAP — PLASMA (LOS ALAMOS — BAME)
1. PLASMA EXPERIMENT

GAF — DC ELECTRIC FIELDS (GSFC — AGGSON)
1. SPECTROMETER
2. A/D CONVERTER
3. LONG ELECTRIC PREAMPLIFIER

IOF — AC ELECTRIC AND MAGNETIC FIELDS (IOWA — GURNETT)
1. AC EM FIELDS EXPERIMENT
2. MAGNETIC LOOP (ML) ANTENNA
3. X ML PREAMPLIFIER
4. Y ML PREAMPLIFIER
5. Z ML PREAMPLIFIER
6. SHORT ELECTRIC ANTENNA
7. SHORT ELECTRIC PREAMPLIFIER
8. LONG ELECTRIC PREAMPLIFIER
9. POWER SUPPLY

MNF — ELECTRIC AND MAGNETIC FIELDS (MINN — KELLOG)
1. E M FIELDS EXPERIMENT
2. LONG ELECTRIC PREAMPLIFIER

GNF — MAGNETIC FIELDS (GSFC — NESS)
1. SENSOR
2. MAGNETOMETER ELECTRONICS
3. MAGNETOMETER PROCESSOR
4. FLIPPER

MIR — RADIO ASTRONOMY (MICHIGAN — HADDOCK)
1. RADIOMETER
2. LONG ELECTRIC PREAMPLIFIER

MDR — RADIO ASTRONOMY (MARYLAND — ERICKSON)
1. IMPEDANCE MODE

GSR — RADIO ASTRONOMY (GSFC — STONE)
1. RADIOMETER
2. LONG ELECTRIC PREAMPLIFIER

INSTRUMENTATION

IT — TELEMETRY AND COMMAND
1. ENCODER
2. PCM TRANSMITTER
3. SEQUENTIAL DECODER AND RECEIVER
4. RARR AND PCM RECEIVER
5. PCM DECODER
6. ANALOG TRANSMITTER
7.
8. ENCODER CONVOLVER
9. SYSTEM PROGRAMMER
10. EXPERIMENT PROGRAMMER
11. DEPLOYMENT PROGRAMMER
12. RF ANTENNA, HYBRID

IP — POWER
1. SOLAR PANELS
2. BATTERY
3. SHUNT, CHARGE, AND DISCHARGE REGULATORS
4. OA CONVERTER
5. DECODER CONVERTER
6. COMPUTER CONVERTER
7. ENCODER CONVERTER
8. DUMP RESISTORS
9. DUMP TRANSISTORS

IE — ELECTRICAL
1. OPTICAL ASPECT SENSOR
2. OPTICAL ASPECT ELECTRONICS
3. TURN ON
4. $+X^1$ EFM PREAMPLIFIER
5. $-X^1$ EFM PREAMPLIFIER
6. $+Y^1$ EFM PREAMPLIFIER
7. $-Y^1$ EFM PREAMPLIFIER
8. +Z EFM PREAMPLIFIER
9. -Z EFM PREAMPLIFIER
10. HARNESS
11. SOLAR ARRAY FILTER

IC — CONTROL
1. ACS ELECTRONICS
2. ACS TANK
3. ACS REGULATOR
4. ACS PULSE VALVE
5. ACS CHARGING VALVE
6. ACS HIGH PRESSURE TRANSDUCER
7. ACS LOW PRESSURE TRANSDUCER
8. ACS LOW PRESSURE DISCONNECT VALVE
9. ACS HIGH PRESSURE LINE
10. ACS LOW PRESSURE LINE
11. ACS [illegible] LINES
12. ACS DIODE PACKAGE
13. ACS MANIFOLD
14. ACS FILTER
15. ACS CHECK VALVE
16. ACS NOZZLES
17. ACS SWIVEL FITTINGS
18. ACS SOLENOID VALVES

IS — STRUCTURE
1. EFM ANTENNA MECHANISM
2. Z EFM ANTENNA MECHANISM
3. ANTENNA CUP
4. ANTENNA
5. SEPARATION SWITCH
6. DIODE PACK
7. THERMAL BLANKET
8. CENTER TUBE, LOWER
9. PLATFORM, PRIMARY
10. CENTER TUBE, UPPER
11. STRUTS
12. HANDLING BRACKETS
13. BOOM BRACKETS
14. SPRING SEATS
15. SUPPORT COLUMNS, REAR
16. SUPPORT COLUMNS, FRONT
17. BRACES
18. HARNESS SUPPORT PANELS
19. UPPER EXPERIMENT PANEL SUPPORT
20. LOWER EXPERIMENT PANEL SUPPORT
21. CENTER TUBE EXTENSION
22. PLATFORM, SECONDARY
23. SOLAR PANEL SUPPORT, INTERMEDIATE
24. SOLAR PANEL SUPPORT, UPPER
25. SOLAR PANEL SUPPORT, LOWER
26. R.F. SHIELD, UPPER
27. R.F. SHIELD, LOWER
28. SPACER, 1" RING
29. SHELF, LOWER
30. SHELF, UPPER
31. EXPERIMENT PANELS
32. MED PANEL
33. MED PANEL BRACKETS
34. FICS BOOMS
35. EXPERIMENT BOOMS
36. EXPERIMENT BOOMS RESTRAINING SYSTEM
37. YO-YO DESPIN, CABLES & WEIGHTS
38. YO-YO DESPIN, BODIES
39. HOLDING, EXPERIMENT PANELS
40. HOLDING, SOLAR PANELS

SPACECRAFT DESIGNATION
EXPERIMENT OR INSTRUMENT
IMP(I) GME 1-01
SERIAL NO.
CARD NO.

Figure 2-7. IMP I Identification Code System

INTERPLANETARY MONITORING PLATFORM
IMP-H & J IDENTIFICATION CODE SYSTEM

November 17, 1971

EXPERIMENTATION

GNF — MAGNETIC FIELDS (GSFC-NESS)

1. SENSOR
2. MAGNETOMETER ELECTRONICS
3. MAGNETOMETER PROCESSOR

TRF — PLASMA WAVE (TRW-SCARF)

*1. ELECTRONICS
*2. SENSOR

GAF — DC ELECTRIC FIELDS (GSFC-AGGSON)

**1. SPECTROMETER
**2. A/D CONVERTER
**3. +X EFM PREAMPLIFIER
**4. -X EFM PREAMPLIFIER
**5. +Y EFM PREAMPLIFIER
**6. -Y EFM PREAMPLIFIER

IOF — AC ELECTRIC & MAGNETIC FIELDS (IOWA-GURNETT)

**1. AC EM FIELDS EXPERIMENT
**2. SENSOR
**3. X' EFM PREAMPLIFIER
**4. Y' EFM PREAMPLIFIER

GME — COSMIC RAY (GSFC-McDONALD)

1. MEDIUM ENERGY DETECTOR (MED)
2. LOW ENERGY TELESCOPE II (LET)
3. NOT USED
4. LOW ENERGY DETECTOR (LED)
5. LED ELECTRONICS
6. MED ELECTRONICS
7. LET II ELECTRONICS

CHE — COSMIC RAY (CHICAGO-SIMPSON)

1. MAIN TELESCOPE - OUTPUT ELECTRONICS
2. MAIN TELESCOPE - INPUT ELECTRONICS
3. LOW ENERGY TELESCOPE DETECTOR
4. MAIN TELESCOPE DETECTOR

GWP — ENERGETIC PARTICLES (NOAA/APL-WILLIAMS)

1. PARTICLE EXPERIMENT
2. DETECTOR TELESCOPE ASSEMBLY

APP — CHARGED PARTICLES (APL-KRIMIGIS)

1. CHARGED PARTICLES EXPERIMENT

CAI — ELECTRON ISOTOPES (CAL. TECH.-STONE)

1. ISOTOPES EXPERIMENT

MAE — ION & ELECTRON (MARYLAND-GLOECKLER)

1. ION-ELECTRON SENSOR
2. ION-ELECTRON ELECTRONICS

GCE — SOLAR ELECTRONS (GSFC-CLINE)

*1. SOLAR ELECTRON EXPERIMENT

GOP — ION COMPOSITION (GSFC-OGILVIE)

*1. ION COMPOSITION EXPERIMENT

IOE — LOW ENERGY PARTICLES (IOWA-FRANK)

1. LEPEDEA EXPERIMENT

LAP — PLASMA (LOS ALAMOS-BAME)

1. ELECTRONICS
2. SENSOR

MAP — PLASMA (M.I.T.-BRIDGE)

1. PLASMA EXPERIMENT

INSTRUMENTATION (I)

IT — TELEMETRY AND COMMAND

1. ENCODER
2. PCM TRANSMITTER
3. SEQUENTIAL DECODER AND RECEIVER
4. RARR AND PCM RECEIVER
5. PCM DECODER
6. ANALOG TRANSMITTER
7. NOT USED
8. ENCODER CONVOLVER
9. SYSTEM PROGRAMMER
10. EXPERIMENT PROGRAMMER
11. DEPLOYMENT PROGRAMMER
12. ANTENNA DISTRIBUTION UNIT

IP — POWER

1. SOLAR PANELS
2. BATTERY
3. SHUNT, CHARGE, & DISCHARGE REGULATORS
4. OA CONVERTER
5. DECODER CONVERTER
6. NOT USED
7. ENCODER CONVERTER
8. DUMP RESISTORS
9. DUMP TRANSISTORS
*10. TEST SOLAR PANEL

IE — ELECTRICAL

1. OPTICAL ASPECT SENSOR
2. OPTICAL ASPECT ELECTRONICS
3. TURN ON
**4. NOT USED
**5. NOT USED
**6. NOT USED
**7. NOT USED
8. NOT USED
9. NOT USED
10. HARNESS
11. RF FILTER
*12. THERMAL COATING TEST
*13. DATA MULTIPLEX (DMU)
*14. DATA PROCESSING UNIT (DPU)
*15. DELTA INSTRUMENTATION PACKAGE

IC — CONTROL

1. ACS ELECTRONICS
2. ACS TANK
3. ACS DIODE PACK
4. ACS VALVE NOZZLE
5. ACS SHELF ASSY
6. ACS BOOM LINE
7. ACS SWIVEL JOINT
8. ACS TEMP. PROBE
9. ACS HIGH PRESSURE LINE
10. ACS LOW PRESSURE LINE

IS — STRUCTURE

1. LOWER STRUCTURE ASSEMBLY
2. UPPER CENTER TUBE
3. LOWER EXPERIMENT PANEL SUPPORT RING
4. UPPER EXPERIMENT PANEL SUPPORT RING
5. LOWER EXPERIMENT PANEL SUPPORT RING BRACKETS
6. HARNESS SUPPORT PANELS
7. SUPPORT COLUMNS, EXPERIMENT PANELS
8. RADIAL BRACES
9. SUPPORT COLUMNS, HARNESS SUPPORT
10. UPPER STRUTS
11. MAIN STRUCTURE ASSEMBLY HARDWARE
*12. UPPER SOLAR PANEL ASSEMBLY
13. MIDDLE SOLAR PANEL ASSEMBLY
14. LOWER SOLAR PANEL ASSEMBLY
15. RF ANTENNAS
16. EXPERIMENT PANELS
17. RF SHIELD ASSEMBLY (UPPER)
18. BOTTOM SHELF ASSEMBLY
19. ACS STRUCTURAL PIECES
20. MAGNETOMETER BOOM ASSEMBLY
21. UPPER PLATFORM ASSEMBLY
*22. PLASMA WAVE BOOM ASSEMBLY
**23. YO-YO DESPIN SYSTEM
24. MISCELLANEOUS
25. MID RING, ANTENNA MOUNTING
26. RF SHIELD ASSEMBLY (LOWER)
27. UMBILICAL PLUG BRACKET
28. HEAT SINK PANELS
29. SEPARATION SWITCH
30. CENTER TUBE THERMAL INSULATOR
31. THERMAL BLANKETS
32. MED SHELF
33. ACS BOOM ASSEMBLY (+Y)
34. ACS BOOM ASSEMBLY (-Y)
**35. TOF BOOM ASSEMBLY
**36. EFM ANTENNA MECHANISM
37. PLUME SHIELD

*IMP H ONLY
**IMP J ONLY

SPACECRAFT DESIGNATION
EXPERIMENT OR INSTRUMENT

IMP (H & J) GME 1 - 10

SERIAL NO.
CARD NO

2-10 Figure 2-8. IMP H & J Identification Code System

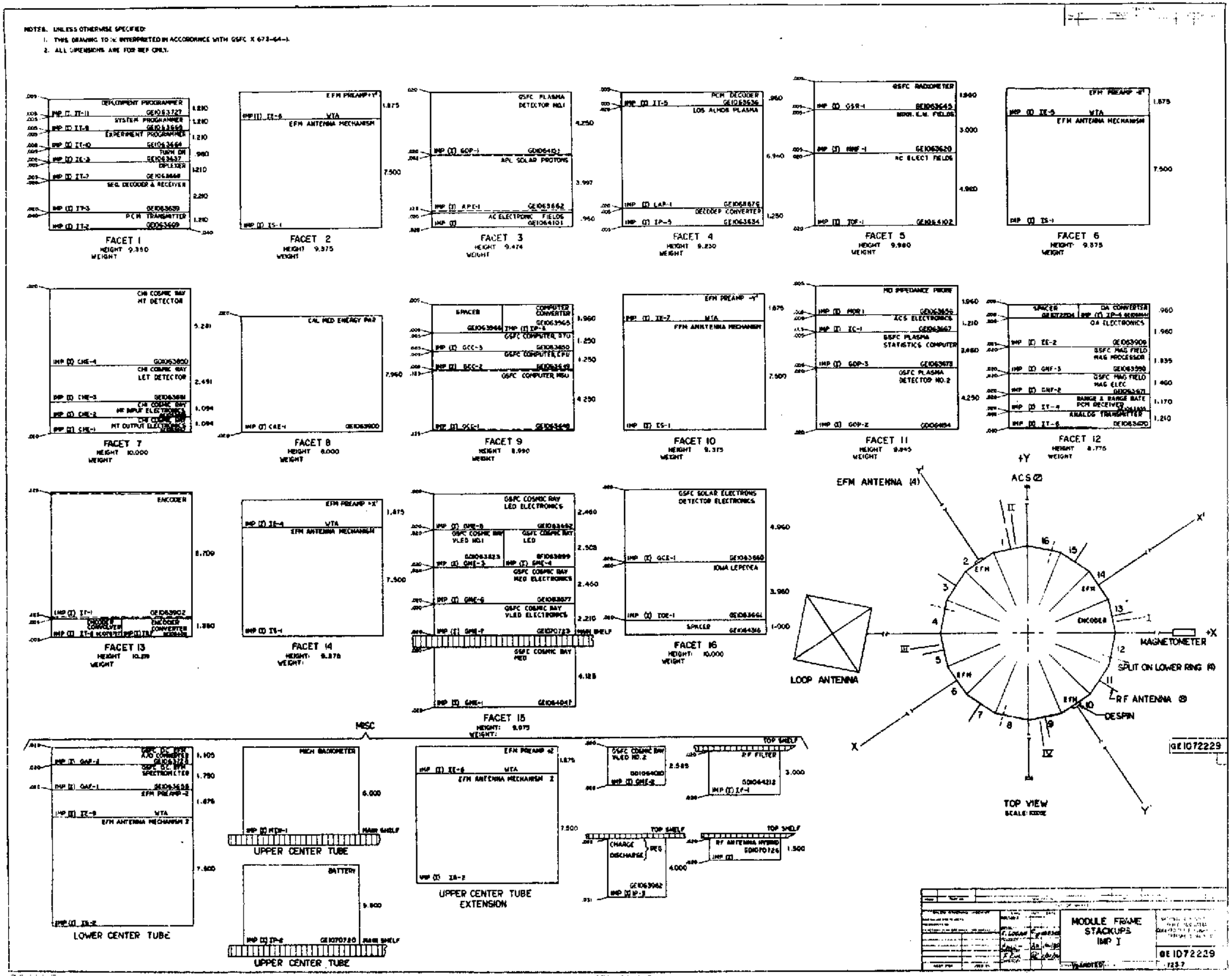


Figure 2-9. IMP I Module Frame Stackup

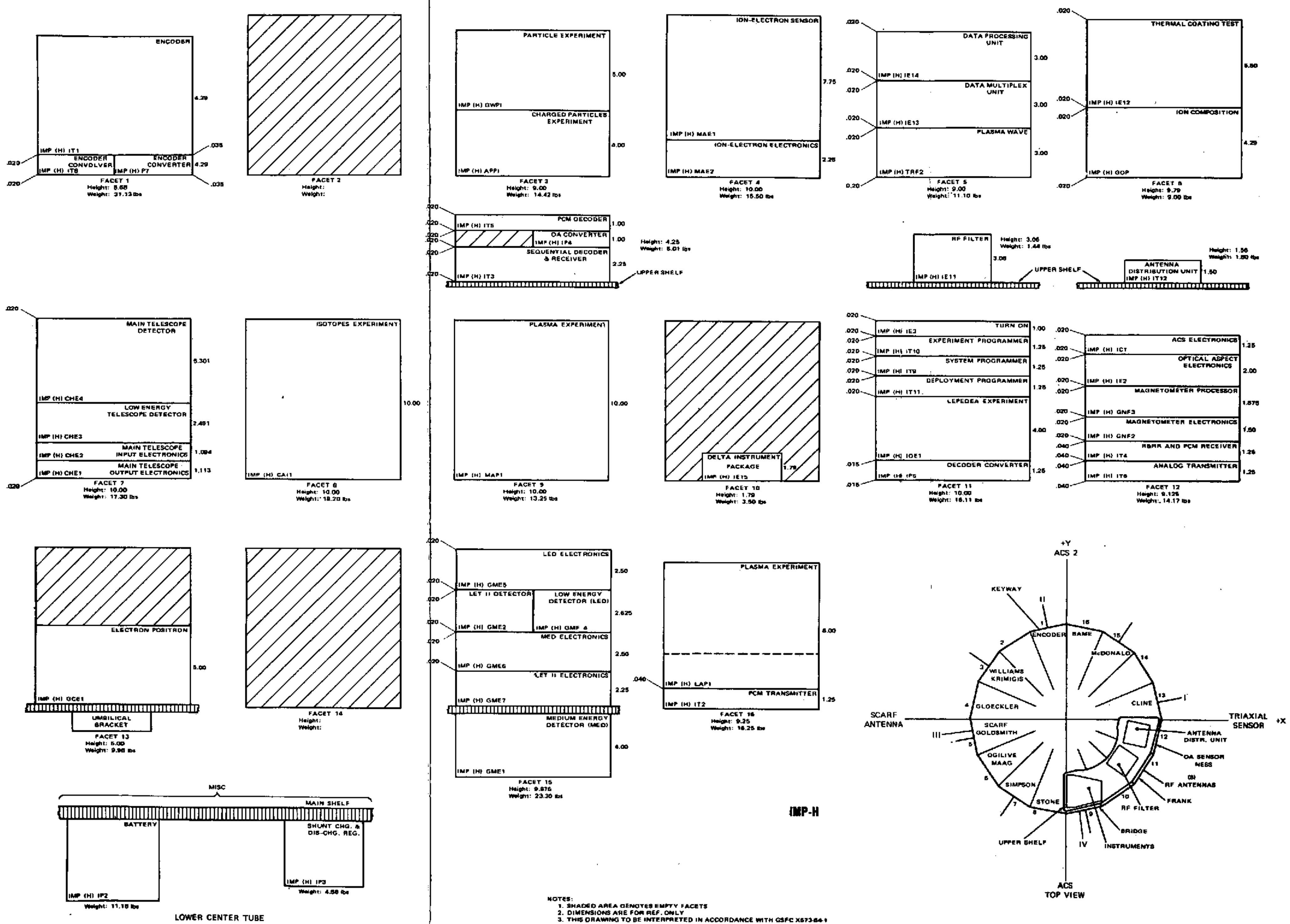


Figure 2-10.. IMP H Module Frame Stackup

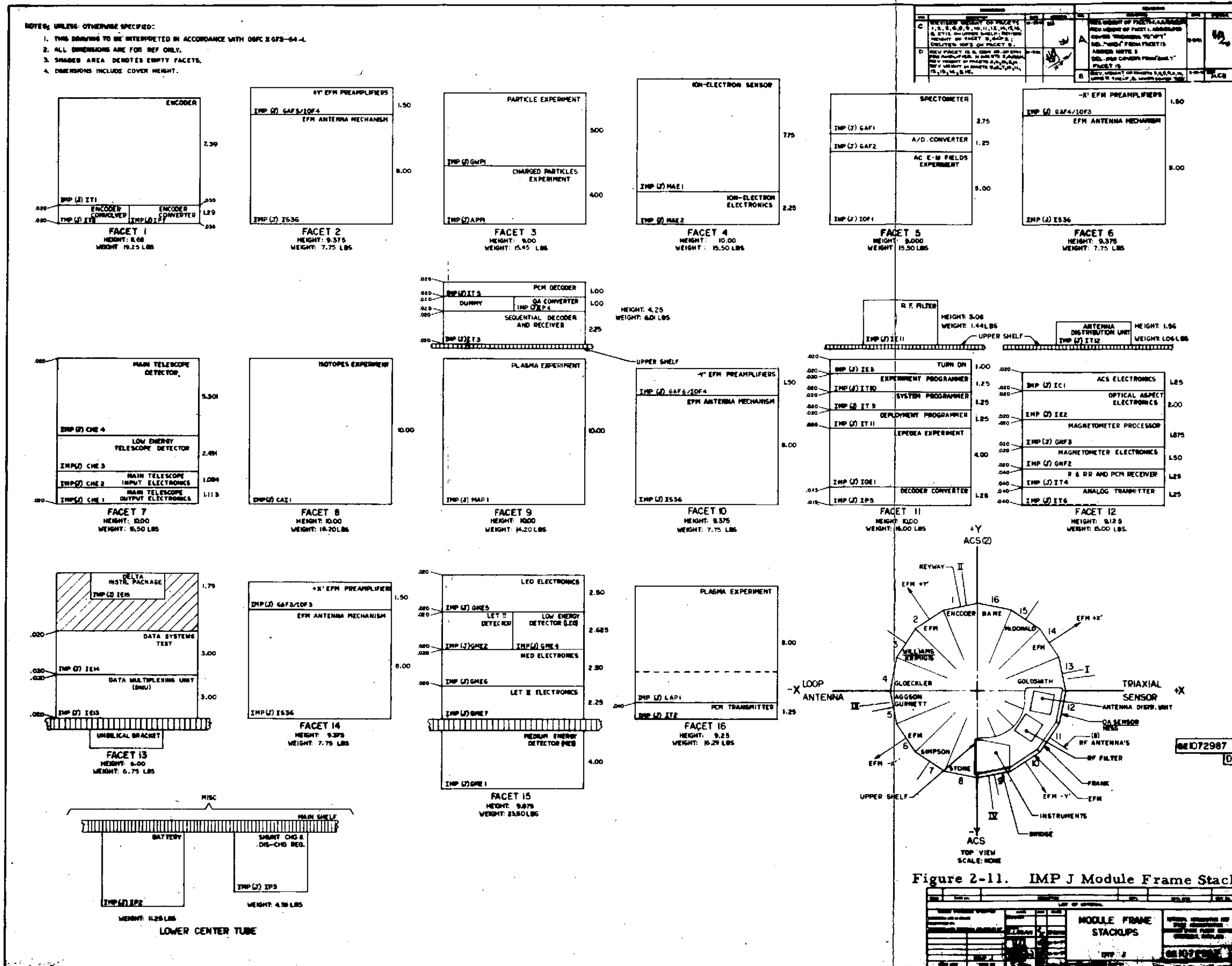


Figure 2-11. IMP J Module Frame Stackup

FOLDOUT FRAME 1

FOLDOUT FRAME 2

and Figure 2-11 were developed under NAS 5-11211 as part of the spacecraft design. Some of the important criteria used to develop these module frame stackups are heat sink requirements, view angles, boom locations, weight, center-of-gravity, and module height.

2-10. Initially, the concept was that the IMP J spacecraft would fly a complete instrument and experiment complement, and that certain IMP H facets would remain empty since IMP H flew fewer experiments. This meant that since the IOF sensor, the EFM antennas, and the IOF and GAF experiments did not fly on IMP H that 5 facets (2, 5, 6, 10, 14) and a counterbalance boom would be included in the IMP H design. In addition, early in the program the WID experiment was deleted from both the IMP H and J payloads freeing Facet 13.

2-11. As the IMP H project proceeded, the concept was changed and several experiments were added to the IMP H payload. The Plasma Wave Experiment (TRF) was added which required a boom-mounted sensor that counterbalanced the GNF magnetometer sensor. Other additions were the Ion Composition Experiment (GOP), the Solar Electrons Experiment (GCE), the Thermal Coatings Test, the Data Systems Test, and the Delta Instrumentation Package.

2-12. For IMP J, the only additions which could be made to the instrument/experiment complement were those which could be accommodated in Facet 13. The additions for IMP J were the Data Systems Test and the Delta Instrumentation Package.

2-13. EXPERIMENT/INSTRUMENT INTERFACE

2-14. One of the problems encountered in the Mechanical Design was the experiment and instrument interface with the spacecraft system. Certain interface parameters between the spacecraft and each package had to be defined and in most cases the frames were provided by EMR. The design guidelines were defined for experiments and instruments in the IMP H and J Mechanical Interface Document, which is included as Appendix F. The actual interface was defined for each package through personal contact and Design Reviews.

2-15. The package interface data which were necessary included frame size, frame material, mounting provisions, frame cover requirements, frame connectors (size, number, gender, location, type, orientation, mounting), frame engraving, spacecraft harness interface, encapsulation requirements, frame internal loading requirements, PC board requirements, venting, thermal constraints (blanket, coatings, heat sinking), electrical grounding, and harness routing.

2-16. ELECTRICAL DESIGN

2-17. The IMP I, H, and J spacecraft were conceptually designed by the GSFC to meet mission requirements. Thus, the size,weight, power requirements, and instrument/experiment complement were established by GSFC. EMR contractor support was in two phases. In Phase I, EMR assisted GSFC personnel in design, assembly, integration, test, and launch of IMP I. In Phase II, EMR, using the experience gained in Phase I, assumed the responsibility for design, assembly, integration, test,

and launch of IMP H and J spacecraft while working closely with the GSFC Project Office and the Mechanical and Electrical Systems Branches (MSB, ESB).

2-18. The electrical design considerations and distribution of information for the spacecraft were carefully preplanned and controlled to avoid incompatible hardware and software. Distribution of hardware information to the various scientific experimenters, engineering experimenters, and instrumenters was an initial step to ensure that compatible hardware would arrive at the spacecraft for integration. The essential steps in the electrical design are given in sequence below. Prior to these steps, the spacecraft physical size, experiment/instrument complement and power available have been determined. The IMP J Power Summary is presented as Table 2-1. Figure 2-12 is the Spacecraft Electrical Design Procedure Flow Chart which shows the relationship of the following paragraphs.

a. EMR supplies each experimenter/instrumenter with a document defining the physical and electrical requirements and restraints on the component to be delivered. Refer to "IMP H & J Specifications For Electrical Interface", Revision C, 8 Nov 72, in Appendix G.

b. EMR participates in a Design Review where the instrumenter/experimenter presents the design to a GSFC review committee. In this review, particular attention is given to the designer's compliance with the previously supplied interface specification and to the circuit component selection with specific attention to all high voltage designs. In the high voltage circuits, considerations of component selection, packaging techniques and materials, and venting are carefully reviewed.

October 14, 1971

TABLE 2-1.

IMP H POWER SUMMARY

EXPERIMENTS	Actual	Estimated
APP-Charged Particles, Krimigis	2.1A	2.1E
CAI-Electron Isotopes, Stone	4.2A	4.0E
CHE-Cosmic Ray, Simpson	3.3A	3.8E
GME-Cosmic Ray, McDonald (includes heater, 2.0E)	6.2A	6.8E
GNF-Magnetic Fields, Ness	5.0E	5.0E
GWP-Energetic Particles, Williams	2.8A	3.1E
IOE-Low Energy Particles, Frank	2.0A	2.0E
LAP-Plasma, Bame	2.3A	3.3E
MAE-Ion & Electron, Gloeckler	3.1A	4.0E
MAP-Plasma, Bridge	9.8A	8.5E
TRF-Plasma Wave, Scarf	2.0A	2.2E
GOP-Ion Composition, Ogilvie	1.2A	1.3E
GCE-Solar Electrons, Cline	4.0A	3.6E
IE13-Data System Test, Goldsmith	6.0E	6.0E
IE12 & IP10-Thermal Coatings and Solar Panel Tests	0.5A	1.0E
Subtotal	54.5E	56.7E
INSTRUMENTS		
Basic Spacecraft:		
IT7 & IT8, Encoder Convolver and Converter	5.9A	6.2E
IP3 & IP5, Shunt Regulator (Idle) and Decoder Converter (Includes IT3, Sequential Decoder Receiver; IT4, R&RR Receiver; IT9, System Programmer; IT10, Experiment Programmer; IT11, Deployment Programmer; and IC1, ACS Electronics (Idle).	2.7A	7.5E
Subtotal	8.6A	13.7E
IP2, Battery Heater	11.6A	10.0E
IP4, OA Converter	1.4A	1.4E
IT2, PCM Transmitter	26.0A	26.7E
Subtotal	39.0A	38.1E
PRIMARY DISTRIBUTION LOSS**		
IE10, Harness (IT6 On)	2.9E	2.9E
IE11, RF Filter (IT6 On)	0.5E	0.5E
Subtotal	3.4E	3.4E
Total S/C Power	105.5E	111.9E
IT6, Analog Transmitter	16.8A	18.3E
Total S/C Power with IT6 On	122.3E	130.2E

**Does not include loss in Solar Array Blocking Diodes.

NOTE: A = Actual E = Estimated

TABLE 2-1. 9 Mar 73

IMP J POWER SUMMARY

	I_{SCS}	Actuals
EXPERIMENTS		
APP-Charged Particles, Krimigis	105 ma	2.9W
GWP-Energetic Particles, Williams	100	2.8
MAE-Ion & Electron, Gloeckler	110	3.1
IOF-AC Electric & Magnetic Fields, Gurnett	140	3.9 (1)
GAF-DC Electric Fields, Aggson	150	4.2 (1)
CHE-Cosmic Ray, Simpson	110	3.1
CAI-Electron Isotopes, Stone	140	3.9
MAP-Plasma, Bridge (HV Mod 200 to 350)	220 Avg	6.2
IOE-Low Energy Particles, Frank	62	1.7
GNF-Magnetic Fields, Ness	162	4.5 (3)
GME-Cosmic Ray, McDonald (MED, LED, LET II) (65, 50, 30 + 75 ma MHR)	220	6.1 (4)
LAP-Plasma, Bame	55	1.6
Subtotal:	1574 ma	44.0W
INSTRUMENTS		
IT-1, Encoder	(5)	
IT-2, PCM Transmitter (12W)	930 ma	26.0W
IT-3, -4, Decoder Rcvr., & R&RR Rcvr.	(5)	
IT-8, Encoder Convolver	(5)	
IT-9, 10, 11, Programmers	(5)	
IP-2, Battery Heater 11 Ω/el x 8 el	317	8.9
IP-3, Shunt Regulator	(5)	
IP-4, OA Converter	50	1.4
IP-5, Decoder Converter	(5)	
IP-7, Encoder Converter	(5)	
IE-13, Data System Test, Goldsmith	120 (E)	3.4 (E)
IE-15, Delta Instrumentation Package	60 (E)	1.7 (E)
Note (5) Components Subtotal:	315	8.8
Subtotal:	1792 ma	50.2W
PRIMARY DISTRIBUTION LOSS (2)		
IE-10, Harness	---	2.1 (E)
IE-11, RF Filter	---	1.4 (E)
Subtotal:	---	3.5W
Total S/C Power:	3366 ma	97.7 W
IT-6, Analog Transmitter	640	17.9
Total S/C Power with Analog Transmitter "On"	4006 ma	115.6W

NOTES:

1. Does not include power for EFM Antennas (30 watts/antenna).
2. Does not include loss in Solar Array Blocking Diodes.
3. Does not include Flipper Heater Power, 5.6W, i_h = 200 ma.
4. Includes MED Heater, 2.1W, i_h = 75 ma.
5. These components form the minimum power drain of the spacecraft, 8.8W, i = 315 ma.
6. Kick Motor Heaters are not listed in summary; but i = 1.1A and P = 31W.

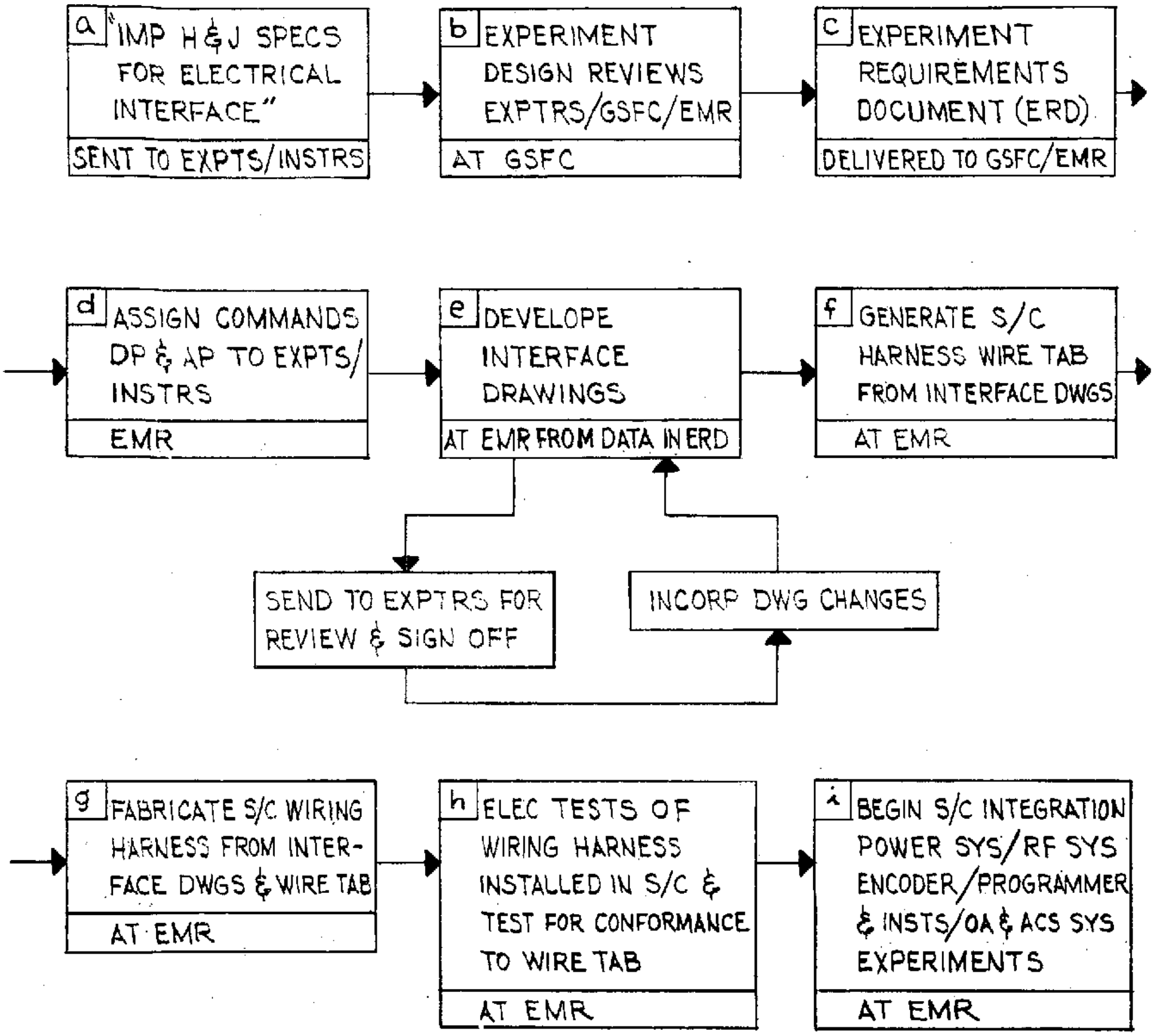


Figure 2-12. Spacecraft Electrical Design Procedure Flow Chart

c. The experimenter is required to provide the GSFC and the spacecraft contractor with an "Experiment Requirements Document" (ERD) that describes the experiment and interfaces. This document is to a GSFC format and has particular sections for each experiment requirement. Of particular interest for spacecraft electrical integration, are the connectors, pin assignments, and shielding. From this information, the electrical integration team develops an interface drawing.

d. EMR allocates the spacecraft commands, Digital Performance Parameters, and Analog Performance Parameters (DP's, AP's) in concert with the various experiment/instrument requirements. Since only a limited number of commands, DP's, and AP's are available, some trade-offs with the designers are usually required.

e. An interface drawing is developed showing how each experiment electrically interfaces to every spacecraft instrument (OA, Experiment Programmer, Encoder, etc.). The interface drawing shows all wire sizes, connector types, and shielding. The signal common, 28-volt return, and chassis connections are clearly differentiated. The interface drawing is the basis for generation of the spacecraft wire tab. These drawings are sent to each experimenter/instrumenter for review, and sign-off. The reviewed drawings are returned to EMR, where any changes are incorporated. (See sample interface drawing, Figure 2-13.)

f. The wire tab is generated from the interface drawings. This information is reduced to punched IBM cards and a printout is obtained. Computer checks may then determine that each connector pin is addressed and that only one wire is addressed to each pin. The wire tab is subsequently used for the wiring harness ring-out.

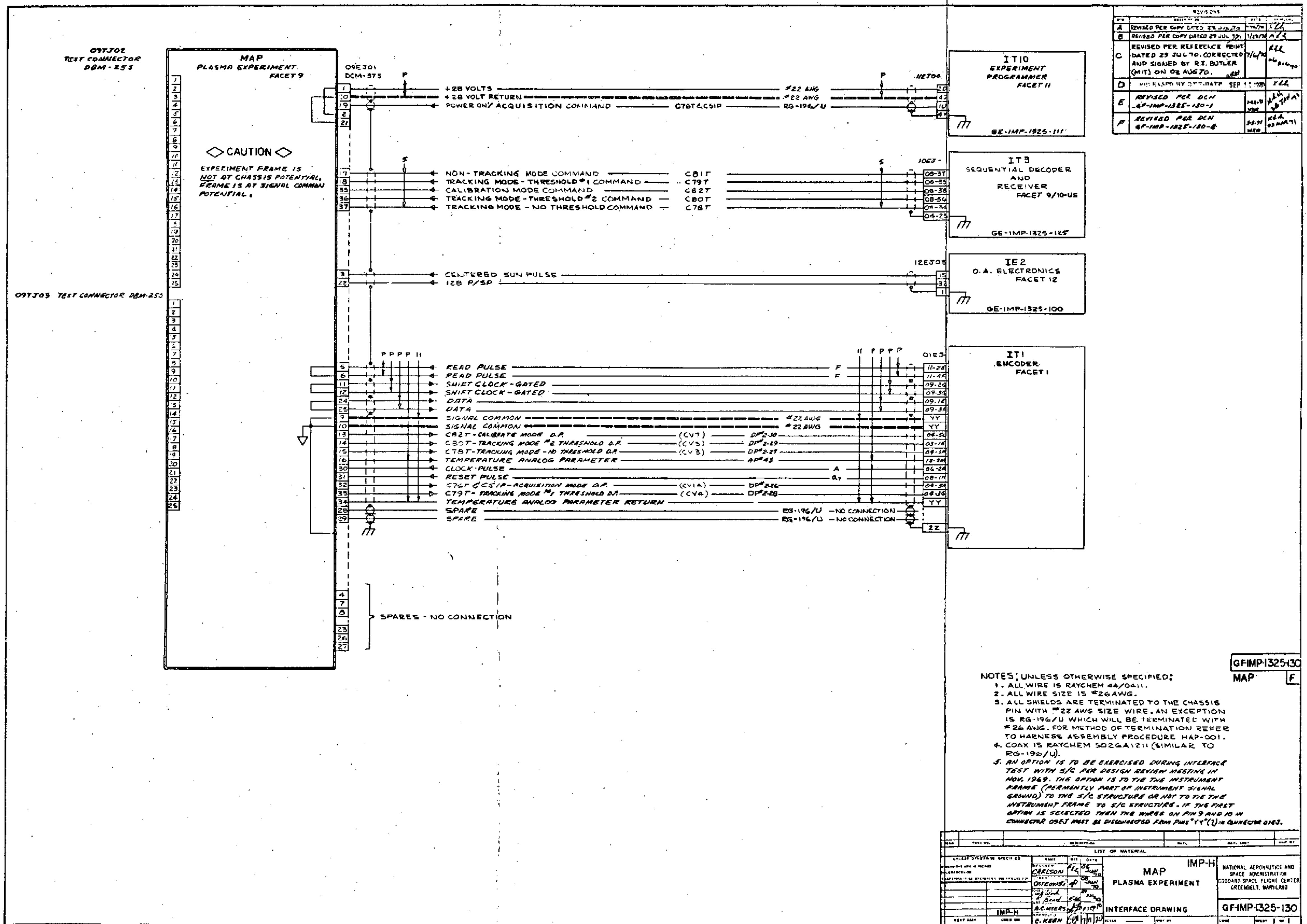


Figure 2-13. MAP Experiment Interface

FOLDOUT FRAME 1

FOLDOUT FRAME 2

g. The spacecraft wiring harness is fabricated using controlled interface drawings. Drawing distribution and a Design Change Notice (DCN) system is now put into operation.

h. The harness, fabricated in a spacecraft mockup, is electrically checked to the wire tab and any errors are corrected. Then, the harness is installed and integrated in the spacecraft structure, and is electrically rechecked to the wire tab.

i. Spacecraft integration is started at EMR and includes the power system, RF system, Encoder, Programmers and Instruments, OA and AC systems, and experiments. The flow plan developed for integration is included as Appendix H. This document was prepared as a tool to aid in the planning and preparation for the integration activities. Similar documents were prepared for both IMP H and IMP J.

2-19. Spacecraft qualification was conducted at the GSFC T&E facilities. In preparation for the spacecraft qualification, a Test Plan Flow Chart was developed for each spacecraft. The IMP H Test Plan is included as Appendix I. The actual operations during each T&E test are documented in the Test Procedures and Reports.

SECTION III

WEEKLY SUMMARIES

3-1. GENERAL

3-2. The Weekly Summary is a compilation of each week's entries into the Mechanical Log Book, the Electrical Log Book, the Spacecraft Nonconformance Log, the Work Order Authorization Log, and the Receiving Inspection Log. These Weekly Summaries were gathered together and periodically submitted to the Project Office in the Monthly Progress Reports. For both the IMP H and J spacecraft, the Weekly Summaries were initiated around the start of Spacecraft Electrical Integration. These summaries are valuable in providing a history of both the mechanical and electrical operations performed on the spacecraft from electrical integration through test and evaluation, and prelaunch.

3-3. The following Weekly Summaries cover the period for IMP H from 15 March 1971 until 24 September 1972, and for IMP J from 25 September 1972 until 28 October 1973.

REFERENCE	SUMMARY
Electrical Log, HEL-001 IP2, IE11, IE3, IP5, IP3 IT9, IP7, IT1, IT8 IE11, IE3 IP2, IE11, IE3 Umbilical	Electrical systems performed IP2, S/N 01; IE11, S/N 12; IE3, S/N 10; IP5, S/N 10; IP3, S/N 10; IT9, S/N 10; IP7, S/N 10; IT1, S/N 12; and IT8, S/N 10, receiving inspections. Integration of spacecraft wire harness; IE11, S/N 12; IE3, S/N 10; and IP2, S/N 01, started. Integration of IE11 and IE3 completed. Umbilical connected to the spacecraft.
Spacecraft Nonconformance Log, HEL-005-4 RF Filter SDR-001 Turn on Card SDR-002 SDR-003 GSE SDR-004 (MRD01701)	The following SDR's were written: SDR-001, RF Filter wiring does not agree with drawing. SDR-002, turn on card arming plug does not fully engage with connector 11TJ12. SDR-003, turn on card connector pins not connected to ORD BUSS. SDR-004, interrupter box pin intermittent. MRD01701 resulted from SDR-003. All SDR's cited are in process.
Work Order Authorization Log, HEL-005-5	No work orders were written during this period.

WEEKLY SUMMARY LOG

(15 March through 21 March 1971)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( ) IP2 DR5247 IE11 DR5299 DR5248 IE3 DR5252 IP5 DR5250 IP3 DR5251 DR5257 IT9 DR5253 DR5254 DR5255 IP7 DR5309 GCE-1, IT1 IT8	IP2, S/N 01, received and rejected by Q.C. per DR5247 (unit not packaged, paint peeling, and scratched, and holes not countersunk on cover). Unit conditionally accepted for integration. IE11, S/N 12, received and rejected by Q.C. per DR5299 (improper packaging, no connector protectors, and connectors not identified). Unit returned to GSFC. Unit reinspected and rejected by Q.C. per DR5248 (connectors not identified). Unit conditionally accepted for integration. IE3, S/N 10, received and rejected by Q.C. per DR5252 (cover not secured and outside dimensions out of tolerance). Unit conditionally accepted for integration. IP5, S/N 10, received and rejected by Q.C. per DR5250 (connectors not identified and outside dimensions out of tolerance). IP3, S/N 10, received and rejected by Q.C. per DR5251 (outside dimensions out of tolerance and packaging too small causing stress on unit) and DR5257 (damaged connector). Unit conditionally accepted for integration. IT9, S/N 10, received and rejected by Q.C. per DR5253 (covers not secured, dented and not riveted, connectors out of alignment, and through bolt holes too small). Unit fell and was returned to GSFC for electrical tests (DR5254). Unit returned to EMR and reinspected and rejected per DR5255 (missing shipping report, covers not attached, and circuit-to-chassis ground measures open). Unit conditionally accepted for integration. IP7, S/N 10, received and rejected by Q.C. per DR5309 (not loctited, chipped paint, connectors misaligned, and outside dimensions out of tolerance). GCE-1, S/N 01; IT1, S/N 12; and IT8, S/N 10, received for fit check only. Fit check completed and all units returned to GSFC.
Mechanical Log, HEL-002 IP2, IE11 IE3, IP5, IP3, IT9 IP7, IT1, IT8 IE11, IE3, IP2	Mechanical systems performed IP2, S/N 01; IE11, S/N 12; IE3, S/N 10; IP5, S/N 10; IP3, S/N 10; IT9, S/N 10; IP7, S/N 10; IT1, S/N 12; and IT8, S/N 10, receiving inspections. IE11, IE3, and IP2, were fit checked and readied for electrical integration. Supported electrical integration of all components. Construction and assembly of spacecraft parts continues.
Spacecraft	Spacecraft assembly has progressed to where electrical integration of wire harness and components may begin.

(OVER)

WEEKLY SUMMARY LOG
(22 March through 28 March, 1971)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( ) SCDR (IP3) IT12 DR5240 DR5241 DR5242	IP3, S/N 01, (SCDR) received and accepted for integration. IT12, S/N 11, received and rejected by Q.C. per DR5240 (improper packaging, not loctited, loose covers and bowed, loose connector protective caps), DR5241 (mounting screws too long), and DR5242 (coax connector strains the spacecraft harness).
Mechanical Log, HEL-002 SCDR (IP3) IT12 Spacecraft	Mechanical systems performed IP3, S/N 01, and IT12, S/N 11, receiving inspections. Supported electrical integration of all components. Construction and assembly of spacecraft parts continues. Fit checked upper RF shield and solar panel support frame.
Electrical Log, HEL-001 SCDR (IP3) IT12 IP2 IT9, IP3 (SCDR) DR5256 DR5257 IT9	Electrical systems performed IP3, S/N 01, and IT12, S/N 11, receiving inspections. Integration of IP2, S/N 01 continues. Integration of IT9, S/N 10; IP3, S/N 10; and IP3, S/N 01; started. Integration of IP3, S/N 10, stopped per DR5256 and DR5257. Part I of IT9, S/N 10, integration completed.
Spacecraft Nonconformance Log, HEL-005-4 Harness SDR-005 SDR-006 SDR-007	The following SDR's were written: SDR-005, connector center pin 15EJ05-A6 projects too far beyond insert; SDR-006, connector pin 15EJ07-A1 is smaller than A2; SDR-007, connector pin 15EJ12-A5/A6 not seated.
Work Order Authorization Log, HEL-005-5	No work orders were written during this week.

WEEKLY SUMMARY LOG
(29 March through 4 April 1971)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( ) IT6 DR5661 IT2 DR5262 IT4 DR5263 IT3 DR5259 DR5260 IT5	IT6, S/N 10, received and rejected by Q.C. per DR5661 (packaging crumbling, tarnished connectors, pencil writing on cover, connector location out of tolerance). Unit conditionally accepted for integration. IT2, S/N 03, received and rejected by Q.C. per DR5262 (packaging secured with unapproved glue, unapproved tape on front panel, and coax connector tarnished and canted). Unit conditionally accepted for integration. IT4, S/N 10, received and rejected by Q.C. per DR5263 (packaging secured with unapproved glue, tarnished coax, and length out of tolerance.) Unit conditionally accepted for integration. IT3, S/N 10, received and rejected by Q.C. per DR5259 (connectors location out of tolerance, covers misaligned, and unit will not fit in spacecraft), and DR5260 (loose covers, front cover secured with non-flight tape, and connector screws too short). Unit conditionally accepted for integration. IT5, S/N 02, received and accepted for integration.
Mechanical Log, HEL-002 IT6, IT2 IT4, IT3, IT5 Spacecraft	Mechanical systems performed IT6, S/N 10; IT2, S/N 03; IT4, S/N 10; IT3, S/N 10; and IT5, S/N 02; receiving inspections. Supported electrical integration of all components. Construction, modification, and assembly of spacecraft parts continues.
Electrical Log, HEL-001 IT6, IT2 IT4, IT3, IT5 IP2 IP3 IT6, IT9 IP5, IT3, IT12	Electrical systems performed IT6, S/N 10; IT2, S/N 03; IT4, S/N 10; IT3, S/N 10; and IT5, S/N 02; receiving inspections. Integration of IP2, S/N 01, and IP3, S/N's 01 and 10, continues. Integration of IT6, S/N 10 and IT9, S/N 10, Part II started. Integration of IP5, S/N 10; IT3, S/N 10; and IT12, S/N 11; started and completed.
Spacecraft Nonconformance Log, HEL-005-4 Tone Generator SDR-009	SDR-009 (tone generator, DEI, outputs too short) was written this reporting period.
Work Order Authorization Log, HEL-005-5 Spacecraft	WOA-001 removed and machined brackets modified per DCN's to drawings 1072829 and 1072830.

WEEKLY SUMMARY LOG

(5 April through 11 April 1971)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	
IP7 DR5265	IP7, S/N 03, received and rejected by Q. C. per DR5265 (loose screws and unit height out of tolerance). Unit conditionally accepted for integration.
Mechanical Log, HEL-002	
IP7	Mechanical systems performed IP7, S/N03, receiving inspection. Work continues on experiment panel templates. Fabrication of heat sink blanket started.
Spacecraft	General construction, modification, and assembly of spacecraft parts continues. Supported electrical integration of all components.
Electrical Log, HEL-001	
IP7 IT6 IT2	Electrical systems performed IP7, S/N 03, receiving inspection. Integration of IT6, S/N 10, and Part I of IT2, S/N 03, completed.
Spacecraft Nonconformance Log, HEL-005-4	
PCM XMTR SDR-010	SDR-010 (no continuity between Pins 7 and 16 of the PCM transmitter) was written during this period.
Work Order Authorization Log, HEL-005-5	
	No work orders were written during this period.

WEEKLY SUMMARY LOG
(12 April through 18 April 1971)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( ) IT1 DR5266 DR5267 DR5268 IT8 DR5269	IT1, S/N 10, received and rejected by Q.C. per DR5266 (unit too long by +0.052, thru-bolt holes out by -0.016, dirty connectors), DR5267 (connectors bowed, case bent and metal chips shorting connector pins), and DR5268 (metal chips in connectors and glue on outside of unit). Unit conditionally accepted for integration. IT8, S/N 01, received and rejected by QC per DR5269 (unit width out of tolerance and drawings do not agree with unit). Unit conditionally accepted for integration.
Mechanical Log, HEL-002 IT1 IT8 Spacecraft GME Harness	Mechanical systems performed IT1, S/N 10, and IT8, S/N 01, receiving inspections. Supported electrical integration of all components. Layout of experiment panel templates continues. Fabricated spacers for encoder converter and convolver units. Fit check GME experiment and returned experiment to GSFC. Performed work on encoder cable harness assembly.
Electrical Log, HEL-001 IT1, IT8 IP7 IT1 IT8	Electrical systems performed IT1, S/N 10, and IT8, S/N 01, receiving inspections. Integration of IP7, S/N 03, started and Part I completed. Integration of IT1, S/N 10, and IT8, S/N 01, started; IT1 completed.
Spacecraft Nonconformance Log, HEL-005-4 XMTR SDR-011 System Programmer SDR-012, MRD01703 GSE SDR-004	SDR-011 (XMTR heat sinks drilled through main body of strut instead of flange) and SDR-012 (system programmer chassis ground not connected) were written. SDR-012 resulted in MRD01703. SDR-004 was closed this week.
Work Order Authorization Log, HEL-005-5 GME	WOA-002 removed the spacecraft instruments for installation of GME wiring.
MPAS Log, HEL-004	MPAS trailer received, and setup and checkout continues.

WEEKLY SUMMARY LOG

(19 April through 25 April 1971)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( ) IP5	IP5, S/N 03, received, fit checked and returned to GSFC.
Mechanical Log, HEL-002 IP5 Harness Spacecraft PCM Decoder	Mechanical system fit checked IP5, S/N 03. Work continues on harness support panel and experiment panel templates. Fabricated a new cover for PCM decoder card and sent to GSFC for permanent bonding. Supported electrical integration of all components.
Electrical Log, HEL-001 Harness IT8 IT7, IT2, IT4	Electrical systems installed and checked out harness connectors. Integration of IT8, S/N 01, completed; integration of IP7, S/N 03; IT2, S/N 03; and IT4, S/N 10, started.
Spacecraft Nonconformance Log, HEL-005-4 Harness SDR-013 UTC SDR-014	SDR-013 (Pin 17 of Connector G13LP03 wearing due to excessive use) and SDR-014 (45' extension cable for UTC not identified) were written. SDR-002, -003, and -004 were closed.
MPAS Log, HEL-004	Setup and checkout of MPAS trailer continues.
Work Order Authorization Log, HEL-005-5 MED Harness ACS	WOA-003 added heater wires to MED(IE10). WOA-004 rewired encoder facet to change IOE AP11 to AP4. WOA-005 installed brackets for ACS test connector.

WEEKLY SUMMARY

(26 April through 2 May 1971)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( ) IP5 IT11 DR5275 IT10 DR5273 IP4 DR5279 IP4 DR5278 IT5 IC1 DR5274 DR5276 GNF4	IP5, S/N 03, received for a second fit check and returned to GSFC, IT11, S/N 10, received and rejected by Q.C. per DR5275 (shorting plug not identified, thru bolts will not fit, covers too large, bent and not riveted). Unit conditionally accepted for integration. IT10, S/N 10, received and rejected by Q.C. per DR5273 (covers too large, panels not riveted, thru bolts do not fit, and unapproved marking tape on connectors). Unit conditionally accepted for integration. IP4, S/N 10, received and rejected by Q.C. per DR5279 (tranished connector pins and no covers on unit). Unit conditionally accepted for integration. IP4, S/N 03, received and rejected by Q.C. per DR5278 (tarnished connector pins and no covers on unit). Unit conditionally accepted for integration. IT5, S/N 10, received and accepted for integration. IC1, S/N 10, received and rejected by Q.C. per DR5274 (28 volts return to signal common $<$ 100kohms) and DR5276 (covers do not fit, bowed, dented, and nicked; connector misaligned and bent; and potting material in connector face). GNF4, S/N 02, received, fit checked, and returned to GSFC.
Mechanical Log, HEL-002 IT11, IT10 IP4, IT5, IC1 Plume Dump Circuits Flipper Spacecraft	Mechanical systems performed IT11, S/N 10; IT10, S/N 10; IP4, S/N 10 and 03; IT5, S/N 10; and IC1, S/N 10, receiving inspections. Supported electrical integration of all components Work continues on plume shield, dump circuit boards, and experiment panels. Boom flipper terminals repotted after performing wiring changes. Construction, modification, and assembly of spacecraft hardware continues.
Electrical Log, HEL-001 IT11, IT10 IP4, IT5, IC1 IT4 IT5 WOA-006	Electrical systems performed IT11, S/N 10; IT10, S/N 10; IP4, S/N 10 and 03; IT5, S/N 10; and IC1, S/N 10, receiving inspections. Integration of IT4, S/N 10, completed. Integration of IT5, S/N 02, started with major signal problems discovered. Special tests performed to determine origin of problem. WOA-006 written to aid in determining origin.
Spacecraft Nonconformance Log, HEL-005-4 IT5 (PCM Decoder) SDR-015	SDR-015 (PCM decoder IT5, S/N 02, does not respond to commands) was written. SDR-015 resulted in MRD01704. SDR-008, -009, and -014 were closed.
Work Order Authorization Log, HEL-005-5 Power System	WOA-006 performed transient tests on power system.
MPAS Log, HEL-004	Checkout of MPAS trailer continues.

WEEKLY SUMMARY

(3 May through 9 May 1971)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	
IP5 IE2 DR5277	IP5, S/N 03, received, fit checked, and returned to GSFC. IE2, S/N 10, received and rejected by Q. C. per DR5277 (sensor covers not painted red).
Mechanical Log, HEL-002	
IE2 Spacecraft	Mechanical systems performed IE2, S/N 10, receiving inspection. Supported electrical integration of all components. Completed plume shields and dump circuit boards. Work continues on experiment panel templates. Moved spacecraft into RF screen room to facilitate rework of clean room grounding system and install crane assembly (WOA-007).
Electrical Log, HEL-001	
IE2 UTC Power System IT5 IT9	Electrical systems performed IE2, S/N 10, receiving inspection. Modified UTC I_{SC} circuit. Checked and recorded spacecraft voltages and currents, and performed spacecraft undervoltage and +28 volt buss level detector tests. Completed integration of IT5, S/N 10, and part III of IT9, S/N 10; part IV of IT9 continues.
Spacecraft Nonconformance Log, HEL-005-4	
System Programmer SDR-016	SDR-016 (no output signals at pins 6, 2F, and 3G of system programmer when commanded) was written. MRD01705 resulted from SDR-016.
Work Order Authorization Log, HEL-005-5	
Spacecraft Deployment Programmer (IT11)	WOA-007 moved spacecraft from main laboratory to RF screen room and back to main laboratory. WOA-008 modified deployment programmer (IT11) wiring.
MPAS Log, HEL-004	Testing, checkout, and installation of MPAS trailer continues.

WEEKLY SUMMARY

(10 May through 16 May 1971)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	
MAE 1 and 2 DR5280 DR5281 DR5282 DR5283 APP1 DR5285 SCDR IT9 DR5284 IT2	MAE 1 and 2, S/N 10, received and rejected by Q. C. per DR5280 (packaged in plastic bag, unknown glue, screws not loctited, ID not white filled, and thermal paint on mating flanges), DR5281 (thru bolt holes misaligned, front and side panels not riveted, shorting plugs not potted or identified, and sensor covers not identified), DR5282 (screws missing from right side, rear connectors misaligned and dirty, Pin4 of 04EP02 grounded, and thru bolt bushing does not seat), and DR5283 (top cover screw holes too small, and sensor cover cutouts too small). Unit returned to experimenter for repair. APP1, S/N 10, received and rejected by Q. C. per DR5285 (source holder not identified, front and side panels not riveted, sensors dirty, and thru bolt hole misaligned). Unit conditionally accepted for integration. SCDR, IP3, S/N 10, received and accepted for integration. IT9, S/N 10, received and rejected by Q. C. per DR5284 (system test history form incomplete and connectors dirty). Unit conditionally accepted for integration. IT2, S/N 10, received for fit check only.
Mechanical Log, HEL-002	
MAE 1 and 2, APP1, SCDR, IT9, IT2 Spacecraft Velostat cover	Mechanical systems performed MAE 1 and 2, APP1, SCDR and IT9 receiving inspections. Fit checked IT2 and supported electrical integration. Installed aluminum grounding sheets in the spacecraft work area and moved the spacecraft back into the main laboratory. Work on the experiment panels and templates continues. Constructed the Velostat cover for the spacecraft.
Electrical Log, HEL-001	
MAE 1 and 2, APP1, SCDR IT9, IP4 IT9, IT10 IE2, WOA-010 Kick Motor Heater	Electrical systems performed MAE 1 and 2, APP1, SCDR, and IT9 receiving inspections. Completed integration of IP4, S/N 10, and IT9, S/N 10. Integration of IT10, S/N 10, and IE2 continues. WOA-010 was completed and the kick motor heater 28 volt circuit checked.
Spacecraft Nonconformance Log, HEL-005-4	
GSE (MPAS), SDR-017 Main Lab, SDR-018 System Programmer SDR-019 SDR-020 SDR-021 SDR-022 OA Converter SDR-024 SDR-025	The following SDR's were written: SDR-017 (tone commands from MPAS vary in width); SDR-018 (oil leaking from main laboratory overhead crane); SDR-019 (system programmer analog output to encoder A/D does not agree with laboratory measurements); SDR-020 (system programmer 28v buss level detector tripping at 25.32 volts); SDR-021 (system programmer battery undervoltage detector trips at 13.12 volts); SDR-022 (system programmer current overload detector trips at 6.6 amps); SDR-024 (OA converter current transient out of specification on 28v line); SDR-025 (IP4 front panel nomenclature incorrect.

OVER

REFERENCE	SUMMARY
Spacecraft Nonconformance Log, HEL-005-4 (continued)	
MRD01708, MRD01709 MRD01710, DR5282 SDR-023	MRD01708 and MRD01709 resulted from SDR-024. MRD01710 resulted from DR5282, SDR-023 was closed this period.
Work Order Authoriza ion Log, HEL-005-5	
Kick Motor Heater System Programmer MAE	WOA-009 directed experimenter to determine reason for lose of +28v to kick motor. WOA-010 returned system programmer to GSFC for repair and reinstallation into spacecraft. WOA-011 modified MAE harness panel per 1072924.
MPAS Log, HEL-004	
APP, H List, OAPRO, HSNP HSCAN, MAE	Compiled APP, H List, OAPRO, and HSNP programs. HSCAN program completed. Assembled MAE program.

WEEKLY SUMMARY

(17 May through 23 May 1971)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( ) MAE 1 and 2 DR5280, 5281, 5282 TRF2, CAI-1 GOP1	MAE 1 and 2, S/N 10, received and conditionally accepted for integration. DR's 5280, 5281, and 5282 are open from a previous inspection (5/10/71). TRF 2, S/N 10; CAI-1, S/N 11; and GOP1, S/N 10, received for fit check only.
Mechanical Log, HEL-002 TRF; CAI-1 GOP1 Spacecraft	Mechanical systems performed TRF2, S/N 10; CAI-1, S/N 11, and GOP1, S/N 10, fit checks and supported electrical integration. Work on experiment panels, panel templates, and harness support panel continues. Installed dump circuit connectors and antenna distribution unit coax cables.
Electrical Log, HEL-001 IE2 APP1 MAE 1 and 2 WOA-008	Electrical systems continues the integration of IE2, S/N10. Integration of APP1, S/N 10, started and discontinued until a later date. Integration of MAE 1 and 2, S/N 10, started. WOA-008 completed.
Spacecraft Nonconformance Log, HEL-005-4 Encoder SDR-026, MRDO1722 OA Converter SDR-027, MRDO1711 SDR-012	The following SDR-026 (encoder function C_3 amplitude incorrect) and SDR-027 (OA converter output 3.2K instead 6.4 K_c). MRDO1711 resulted from SDR-027. SDR-012 was closed this period.
Work Order Authorization Log, HEL-005-5	No work orders were written this period.
MPAS Log, HEL-004 APP, MAE, HSCAN Time Code Generagor APP	Compiled and loaded APP, MAE, and HSCAN programs. Removed time code generator for use in main laboratory. Assembled APP and checked APP with experimenter data.

WEEKLY SUMMARY

(24 May through 30 May 1971)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( ) LAP	LAP received for fit check only.
Mechanical Log, HEL-002 LAP Spacecraft	Mechanical systems performed LAP fit check and supported electrical integration of spacecraft components. Work on the experiment panels, panel templates, and harness support panels continues. Work began on spacecraft lifting fixture.
Electrical Log, HEL-001 MAE 1 and 2 APP1 DP IT10 IT11	Integration and calibration of MAE 1 and 2, S/N 10, continues. Special testing and integration of APP1, S/N 10, continues. Verification tests of all DP performed. Integration of IT10, S/N 10, completed. Integration of IT11, S/N 10, continues.
Spacecraft Nonconformance Log, HEL-005-4 Main Lab SDR-028 MAE SDR-029, SDR-030 GSE SDR-031 SDR-025	The following SDR's were written: SDR-028 (main laboratory humidity over 50%); SDR-029 (MAE AP47 does not readout when stimulated); SDR-030 (MAE GSE chassis ground tied to spacecraft signal common); SDR-031 (GSE relay card, HRC-10, 28 volt relay malfunctioning). All SDR's cited above are in process. SDR-025 was closed this period.
MPAS Log, HEL-004 APP, GWP GME	Compiled APP and GWP programs. Operated system for APP special integration test and assembled GME.

WEEKLY SUMMARY

(31 May through 6 June 1971)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( ) GME5 DR5286 DR5287 GME6 DR5288 DR5289 GME7 DR5290	GME5, S/N 03, received and rejected by Q. C. per DR5286 (no loctiting, bad potting, exposed potting at rear connector, width +0.008 and depth -0.0817) and DR5287 (guide pin loose and ID does not agree with drawing). Unit conditionally accepted for integration. GME6, S/N 02, received and rejected by Q. C. per DR5288 (screws missing from cover, no loctiting, bad potting, pencil marks on cover, and thermal paint scratched) and DR5289 (ID does not agree with drawing, width +0.012, depth -0.008 to -0.016, and glue on back of unit). Unit conditionally accepted for integration. GME7, S/N 10, received and rejected by Q. C. per DR5290 (covers thermal painted, no loctiting, lettering upside down, epoxy on front panel, height +0.002 to +0.013, depth -0.008, and dirty connectors). Unit conditionally accepted for integration.
Mechanical Log, HEL-002 GME5, GME6 GME7 Harness Spacecraft Lift Fixture	Mechanical systems performed GME5, S/N 03; GME6, S/N 02; and GME7, S/N 10, receiving inspections. Supported electrical integration of spacecraft components. Work continues on harness support panel. Assembled and installed separation switch and adjusted microswitches. Completed spacecraft lifting fixture.
Electrical Log, HEL-001 GME5, GME6 GME7 IT11 APP1, GME	Electrical systems performed GME5, S/N 03; GME6, S/N 02; and GME7, S/N 10, receiving inspections. Integration of IT11, S/N 10, continues. Special testing of APP1 continues. Integration of GME started.
Spacecraft Nonconformance Log, HEL-005-4 Experiment programmer SDR-033 SDR-034 Main Laboratory SDR-035 OA Electronics, SDR-036 GME GSE, SDR-037 MRDO1712	The following SDR's were written: SDR-033 (experiment programmer does not apply 28v to MED when commanded); SDR-034 (experiment programmer does not apply 28v to LETII when commanded); SDR-035 (main laboratory humidity > 50%); SDR-036 (OA electronics CSP is 1.5ms after function); SDR-037 (GME GSE is arcing to ground). SDR-032 resulted in MRDO1712. SDR-001, -028, and -035 were closed this period.
Work Order Authorization Log, HEL-005-5 TRF Battery	WOA-012 modified TRF harness panel. WOA-013 installed the battery insulator in the spacecraft.
MPAS Log, HEL-004 GME APP Bit Synchronizer	Compiled and loaded GME and APP. Bit synchronizer malfunctioned and was replaced.

WEEKLY SUMMARY

(7 June through 13 June 1971)

REFERENCE	SUMMARY
Receiving Inspection, QCP( )	No instruments or experiments were received this report period.
Mechanical Log, HEL-002 Spacecraft Laboratory	Mechanical systems supported electrical integration. Work on encoder and delta instrumentation frames completed and hardware sent to GSFC for thermal painting. Modified main laboratory crane pulley system and proof tested same.
Electrical Log, HEL-001 RF Link GME IOE	Set up and tested spacecraft to GSFC RF link. Integration of GME continues using GSFC computer. Performed system programmer overcurrent tests. Integration of IOE started.
Spacecraft Nonconformance Log, HEL-005-4 Deployment Programmer SDR-038, (MRDO1713)	SDR-038 (deployment programmer flag voltages <7.7 volts) was written and resulted in MRDO1713.
Work Order Authorization Log, HEL-005-5	No work orders were written during the reporting period.
MPAS Log, HEL-004 Air Conditioner GNF	MPAS air conditioner leaking; repairs completed. Compiled GNF program.

WEEKLY SUMMARY

(14 June through 20 June 1971)

REFERENCE	SUMMARY
Receiving Inspection, QCP( ) IOE1 DR5292 DR5293 GCE1 DR5294 IT2 DR5295 IP4 CHE1, 2, 3, 4 GWP1	Mechanical and electrical systems performed the following receiving inspections: IOE1, S/N 01, received and rejected by Q. C. per DR5292 (scratches and fingerprints on covers and front panel, no hardware on ID for shorting plug, ID tags not approved for spacecraft use, and bottom cover has high spots and machine errors) and DR5293 (not loctite indicated and a white residue on pins of connector 11EP09). Unit conditionally accepted for integration. GCE1, S/N 01, received and rejected by Q. C. per DR5294 (connector pin to chassis ground measures >0.2 ohms, front and side panels not riveted, and shipping report indicates nonflight power supply and no detectors). Unit returned to GSFC for repairs and returned to EMR for integration on a conditional basis. IT2, S/N 10, received and rejected by Q. C. per DR5295 (tarnished connectors, red marks on bottom of unit, and unit too long by +0.001 to 0.002 inch). Unit conditionally accepted for integration. IP4, S/N 03, received and accepted for integration. CHE1, 2, 3, and 4, S/N 01, 02, 10, and 02 (respectively) and GWP1, S/N 10, received for fit check only.
Mechanical Log, HEL-002 IOE WOA-014 GME5, 6, 7 IE1	Supported electrical integration and installed/removed IOE source (Co60). Per WOA-014 removed GME5, S/N 03; GME6, S/N 02; GME7, S/N 10, and returned to experimenter. Mounted floaters to front columns for IE1, S/N 03, data system test.
Electrical Log, HEL-001 GME, GCE1 IOE	Integration of GME completed. Integration of GCE1, S/N 01, started and integration of IOE continues.
Spacecraft Nonconformance Log, HEL-005-4	No SDR's were written during this report period.
Work Order Authorization Log, HEL-005-5 GME, WOA-014 Spacecraft WOA-015, WOA-016 WOA-017 WOA-018 WOA-019	WOA-014 removed GME5, 6, and 7 from the spacecraft and returned same to experimenter. WOA-015 modified spacecraft hardware to accept DST frames. WOA-016 directed drilling of upper center tube and upper RF shield. WOA-017 installed harness attaching fixtures. WOA-018 notched mounting column for proper fit of CHE experiment. WOA-019 provided proper clearance between upper ring and card covers.
MPAS Log, HEL-004	Compiled and debugged GNF program.

WEEKLY SUMMARY LOG
(21 June through 27 June 1971)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	IT2-10 received and rejected by QC per DR 5295 (connector tarnished, red markings on unit bottom, and package length out of tolerance). Unit conditionally accepted for integration. TRF1-10, 2-10 received and rejected by QC per DR 5296 (screws not loctite indicated, package length out of tolerance, TRF2-10 not identified, sensor has no thermal blanket). Unit conditionally accepted for integration. IP3-10 and IP4-03 were received and accepted.
Mechanical Log, HEL-002	Mechanical Systems performed receiving inspection on IT2-10 and TRF1-10. Fit checked TRF1-10 and supported electrical integration of spacecraft components.
Electrical Log, HEL-001	Electrical Systems started reintegration of IP3-10 and completed Part I. Integration of IT2-10, IP4-03, TRF1 and 2-10 completed. Integration of IT11-10 started.
Spacecraft Nonconformance Log, HEL-005-4	No spacecraft nonconformances were written during this week.
Work Order Authorization Log, HEL-005-5	The following Work Order Authorization was written: WOA-020 directed removal and replacement of OA Converter.

WEEKLY SUMMARY LOG
(28 June through 4 July 1971)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	IC1-10 and LAP 1-10 were received and accepted.
Mechanical Log, HEL-002	Mechanical Systems fit checked LAP1-10 and IE13-10 module frame and its experiment panel template. Supported electrical integration of spacecraft components. Construction, modification, and assembly of parts continues.
Electrical Log, HEL-001	Electrical Systems continued integration of IT11-10. Integration of IC1-10 completed. Reintegration of IT9-10 started, and undervoltage checks and adjustments performed. Performed part 2 of IP3 integration.
Spacecraft Nonconformance Log, HEL-005-4	The following nonconformances were written: SDR-039 (ACS Electronics, nine pulses occur for Orient maneuvers instead of the required eight pulses); MRD03302 (Sequential Decoder and Receiver, command checkout of ACS is low before and after halfed by ACS); SDR-041 (ACS Electronics, Orient South ACS mode pulse width is 68 ms instead of 82 ms).
Work Order Authorization Log, HEL-005-5	The following Work Order Auhtorization was written: WOA-021 directed installation of red tag connector covers on ACS Electronics and PCM Decoder.

WEEKLY SUMMARY LOG
(5 July through 11 July 1971)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	CHE1-1 was received and rejected by QC per DR's 5301 and 5302 (screws not loctite indicated; marking ink smeared; thermal paint chipped; potting material on frame, screws, and connector; bottom cover bent and not secured; frame bowed and dented; connector dirty and pins tarnished). CHE2-2 was received and rejected by QC per DR 5303 (screws not loctite indicated, thermal paint chipped, package height and depth out of tolerance, potting material on frame and connector, connector dirty, unit connector differs from drawing). CHE3-10 was received and rejected by QC per DR's 5304 and 5305 (screws not loctite indicated, missing connector, glue on frame, thermal paint chipped, package length out of tolerance, front and side not riveted, connector dirty, several pins not connected to ground). CHE4-02 was received and rejected by QC per DR 5306 (screws not loctite indicated, thermal paint chipped, top cover missing, potting material exposed, detectors not shown on outline drawing). CHE conditionally accepted for integration.
Mechanical Log, HEL-002	Mechanical Systems performed receiving inspection on IT9-11 and CHE1-1, 2-2, 3-10, and 4-02. Fit checked CHE and experiment panel template. Supported electrical integration of spacecraft components.
Electrical Log, HEL-001	Electrical Systems performed CHE harness checkout, and CHE integration (CHE1-1, 2-2, 4-02). Continued reintegration of IT9-10.
Spacecraft Nonconformance Log, HEL-005-4	The following nonconformance was written: MRD01714 (System Programmer, Battery undervoltage detector did not open Battery switch).
Work Order Authorization Log, HEL-005-5	The following Work Order Authorization was written: WOA-022 directed removal of Experiment Programmer, IT10-10, for troubleshooting command 46P.

WEEKLY SUMMARY LOG
(12 July through 18 July 1971)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	MAP1-10 was received and rejected by QC per DR 5308 (screws not loctite indicated, lacing cord not approved, packaging material on unit and rear connector). IP7-10 was received and rejected by QC per DR 5309 (screws not loctite indicated; thermal paint chipped; package height, width, and length out of tolerance). IT1-11 was received and rejected by QC per DR 5310 (package height and length out of tolerance, connector dirty and has metal chips, and connector location and quantity do not agree with drawing). IT8-01 was received and rejected by QC per DR 5311 (screws not loctite indicated, no pretest history form, top and bottom not secured). GWP1-10 was received and rejected by QC per DR 5312 (screws not loctite indicated, strip coat shedding, thermal paint chipped, dust in connector, no connector dust cap, non-flight items not tagged). GWP2-10 was received and accepted.
Mechanical Log, HEL-002	Mechanical Systems performed receiving inspection on MAP1-10 and GWP1-10. Fit checked MAP1-10, IP7-10, and GWP1-10. Supported electrical integration of spacecraft components.
Electrical Log, HEL-001	Electrical Systems performed IT9-11 integration, Part 3. GN_2 purge of MAP performed. Integration of IP7-10 and GWP1-10 completed. Completed Encoder "E" test (IP7-10, IT8-01, IT1-11 installed in spacecraft).
Spacecraft Nonconformance Log, HEL-005-4	The following nonconformances were written: MRD01723 (System Programmer, undervoltage trip point is 13.07V, instead of 12.9V); SDR-044 (System Programmer, 06 connector pulse 3J-M buffered level detector is low); MRD01719 (System Programmer, spacecraft overload current detector did not function at 7.33 amps); MRD01724 (MAP1-10, transfer pulse seems to respond to line transient); MRD01731 (OA Electronics, CSP to MAP has ≈1V droop at 10 ms in 75 ms pulse width).
Work Order Authorization Log, HEL-005-5	The following Work Order Authorization was written: WOA-023 directed removal and replacement of Deployment Programmer, IT11-10.

WEEKLY SUMMARY LOG

(19 July through 25 July 1971)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( ) IE2 DR5314 LAP-1 DR5324 CAI-1 DR5313 IE3 DR5315	IE2-11 received and rejected by Q.C. per DR5314 (height out of tolerance, connector out of tolerance, no test history received. Unit conditionally accepted for integration. LAP-1, S/N 10, received and rejected by Q.C. per DR5324 (high voltage not connected, not loctited). Returned to GSFC. CAI-1, S/N 11, received and rejected by Q.C. per DR5313 (unit dirty, screws not installed and loctited, incorrect pin installed). Unit conditionally accepted for integration. IE3, S/N 11, received and rejected by Q.C. per DR5315 (cover screws missing, thermal paint chipped, height out of tolerance). Unit conditionally accepted for integration.
Mechanical Log, HEL-002 IE2 LAP-1 CAI-1 IE3 Solar Panel RF Antenna Booms	Mechanical systems performed IE2, S/N 11; LAP-1, S/N 10; CAI-1, S/N 11; IE3, S/N 11; receiving inspections. CAI GSE equipment was installed. Floaters for solar panel connectors were installed. Assembled RF antenna cups. Continued to fabricate boom parts.
Electrical Log, HEL-001 IE2 LAP-1 CAI-1 IE3 GWP IE2	Electrical systems performed IE2, S/N 11; LAP-1, S/N 10; CAI-1, S/N 11; IE3, S/N 3; receiving inspections. Integration of GWP continued; completed integration of LAP-1, S/N 10. Integration of CAI-1, S/N 11 and IE3, S/N 11 begun. Integration of IE2, S/N 11, completed.
Spacecraft Nonconformance Log, HEL-005-4 IT10 SDR-048 SDR-049 CAI-1 SDR-050 MRD01715	The following SDR's were written: SDR-048 (unable to command experiment programmer, IT10), SDR-049 (experiment programmer, IT10, connector 11E103 intermittent), SDR-050 (CAI-1, S/N 11, mismatch of commands). MRD01715 resulted from SDR-050. All SDR's cited are in process.
MPAS Log, HEL-004	Operated Radump, checked GWP commands and tone command without data.
Work Authorization Log, HEL-005-5 Spacecraft	WOA-023 removed and replaced the deployment encoder, IT11, S/N 10.

WEEKLY SUMMARY LOG
(26 July through 1 August 1971)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( ) MAE, GME DR 5316 DR 5317 GME DR 5318 GME DR 5319	MAE-1 and -2, S/N 10, received and passed QC inspection. GME-2, S/N 01, and GME-4, S/N 10, received and rejected by QC per DR 5316 (potting, loctite indication, plug ID's incomplete), and DR 5317 (thru bolt holes too small, experiment enclosure oversize, drawings incorrect). Units conditionally accepted for spacecraft integration. GME-5, S/N 11, received and rejected by QC per DR 5318 (loctite indication missing, drawings incorrect). Unit conditionally accepted for spacecraft integration. GME-7, S/N 11, received and rejected by QC per DR 5319 (screws not loctited, unknown label glue, wax-like substance in connector shell). Unit conditionally accepted for spacecraft integration.
Mechanical Log, HEL-002 MAE, GME ACS RF Boom Wiring	Mechanical Systems performed MAE-1 and -2, S/N 10; GME-2, S/N 01; GME-4, S/N 10; GME-5, S/N 11; and GME-7, S/N 11, receiving inspections. MAE and GME experiments were readied for electrical integration. ACS components were assembled, weighed, and installed in the spacecraft. RF antenna assembly was initiated. Boom mounting and location established for wiring.
Electrical Log, HEL-001 Turn On Card, MAE, GME, Encoder, CHE	Integration of Turn On Card, IE3-11; MAE-1 and -2; GME; Encoder, IT1; and CHE was initiated. Integration of Turn On Card, IE3-11, and Encoder, IT1, completed.
Spacecraft Nonconformance Log, HEL-005-4 Spacecraft, SDR-051 Encoder, SDR-052 CHE, SDR-053 ACS, SDR-054 MRD01716 DR 5313	The following SDR's were written: SDR-051, Humidity over specification; SDR-052, Encoder connector pin not seated; SDR-053, Connector 11EJ03 malfunction resulting in loss of Command 46P to CHE experiment; SDR-054, ACS component 1063846-1 defective. No MR's resulted from the above SDR's. MRD01716 was written as a result of DR 5313 (28 Vdc ret. to grd. less than 100 k ohms). All SDR's above are in process.

REFERENCE	SUMMARY
MPAS Log, HEL-004	
MPAS GWP	Removed antenna hybrid and SKL filter from MPAS for use in main lab. Compiled GWP program.
Work Order Authorization Log, HEL-005-5	
Spacecraft	WOA-024 ordered to remove spacecraft encoder system to facilitate spacecraft wiring.

WEEKLY SUMMARY LOG

(2 August through 8 August 1971)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( ) GME-1 DR5320 DR5321 GME-2 and -4 DR5316 DR5317 GME-6 DR5322 IT9 DR5323 IT10 DR5325 IT11 DR5233	GME-1, S/N 02, received and rejected by Q. C. per DR5320 (damaged detector window, covers misaligned, foam damaged and flight connector inadequately identified), and DR5321 (dust caps missing, scratches, screw slots dirty and not loctite indicated, flight connector missing, and missing drawings). Unit conditionally accepted for integration. GME-2, S/N 10, and GME-4, S/N 01, received and passed Q.C. inspection. DR5316 and DR5317 are open from previous inspection (7/26/71). GME-6 received and rejected per DR5322 (top cover bowed, length +0.004, front and sides not riveted). Unit conditionally accepted for integration. IT9, S/N 10, received and rejected per DR5323 (subsystem test history form incomplete, dirty connectors). Unit conditionally accepted for integration. IT10, S/N 11, received and rejected per DR5325 (subsystem test history form incomplete, covers not secured, ink used for loctite, glue on connectors, unit length +0.004 to +0.007). Unit conditionally accepted for integration. IT11, S/N 11, received and rejected per DR5233 (arming plug missing, ink used for loctite, drawing 1072728A incorrect). Unit conditionally accepted for integration.
Mechanical Log, HEL-002 GME IT9 IT10 IT11 Booms Spacecraft	Mechanical systems performed GME-1, S/N 02; GME-2, S/N 10; GME-4, S/N 01; GME-6, S/N 11; IT9, S/N 10; IT10, S/N 11; and IT11, S/N 11 receiving inspection. The above components were fit checked and readied for electrical integration. Supported electrical integration of all components. Work continues on experiment boom assembly. Miscellaneous hardware fit checked, painted, aligned, installed and removed as required. RF shielding of spacecraft systems and components begun.
Electrical Log, HEL-001 GME IT9 IT10 IT11 MAE GWP Wire Harness SCDR, IT9 IT11 LAP	Electrical systems performed GME-1, S/N 02; GME-2, S/N 10; GME-4, S/N 01; GME-6, S/N 11; IT9, S/N 10; IT10, S/N 11; and IT11, S/N 11, receiving inspection. Completed special testing of MAE. Calibration of GWP continues. Special GWP T/M computer program test run. New wiring in spacecraft verified. Integration of IP3, S/N 10, (SCDR) continues. Integration of IT9, S/N 10; IT11, S/N 11; and LAP, S/N 10, initiated.

(OVER)

REFERENCE	SUMMARY
Spacecraft Nonconformance Log, HEL-005-4 Encoder SDR-052 GME SDR-055 (MRD01729) SDR-056 (MRD01730) SDR-057	The following SDR's were written: SDR-052, encoder connector pin 01EP04-5M not seated. SDR-055, GME-7 receiving RFI through GSE cables. SDR-056, GME-5 readout inhibit signal counted by LED channels. SDR-057, GME-1 connector 15LJ02-2/5 straps open. MRD01729 resulted from SDR-055; MRD01730 resulted from SDR-056. SDR-052 was closed; all remaining SDR's are in process.
Work Order Authorization Log, HEL-005-5	No work orders were written during this period.
MPAS Log, HEL-004 SPT TCT	Compiled and debugged SPT and TCT computer programs.

WEEKLY SUMMARY LOG

(9 August through 15 August 1971)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( ) LAP-1 and -2 DR5324 GCE-1 DR5294	LAP-1, S/N 10, and LAP-2, S/N 10, received and passed Q.C. inspection. DR5324 is open from previous inspection (7/19/71). Unit conditionally accepted for integration. GCE-1, S/N 01, received and passed Q.C. inspection. DR5294 is open from previous inspection (6/16/71).
Mechanical Log, HEL-002 LAP GCE Flipper Units Magnetometer Boom Deploy Spacecraft	Mechanical systems performed LAP-1, S/N 10; LAP-2, S/N 10, and GCE-1, S/N 01, receiving inspection. The above components were fit checked and readied for electrical integration. Supported electrical integration of all components. Flipper, IS20-1, S/N's 10 and 11, processed for magnetic tests. Fabrication of magnetometer canisters, S/N's 10 and 11, begun. Fabrication of boom deploy guillotines begun. Miscellaneous hardware fit checked, painted, aligned, installed and removed as required. RF shielding of spacecraft systems and components continued.
Electrical Log, HEL-001 LAP GCE GWP IP3 IT9, IT11 LAP, GCE	Electrical systems performed LAP-1, S/N 10; LAP-2, S/N 10; and GCE-1, S/N 01; receiving inspection. Calibration of GWP continued. Integration of IP3, S/N 10, (SCDR) completed. Integration of IT9, S/N 10; IT11, S/N 11; continues. LAP, S/N 10; and GCE integration was initiated.
Spacecraft Nonconformance Log, HEL-005-4 GWP SDR-058 GCE SDR-059 (MRD01728) GSE SDR-060 GCE SDR-061	The following SDR's were written: SDR-058, GWP-1 coax test point center pin off center. SDR-059, GCE-1, a_4 function voltage levels incorrect. SDR-060, GSE sequence tone generator not modulating test transmissions for addresses. SDR-061, GCE-1 computer printout indicates excessive counts. MRD01728 resulted from SDR-059.
Work Order Authorization Log, HEL-005-5 Spacecraft GME Connectors	WOA-025 was generated to correct solar panel support frame connector clearance. WOA-026 was generated to trim GME-2 and -4 rivets. WOA-027 was generated to remove IE3, IT10, IT11, IOE, and IP5 from spacecraft and shim connectors. WOA-024 and WOA-027 were completed this week.

(OVER)

REFERENCE	SUMMARY
MPAS Log, HEL-004 GNF GCE	Compiled and debugged GNF and GCE computer programs.

WEEKLY SUMMARY LOG

(16 August through 22 August 1971)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( ) GOP-1 DR5234 GOP-1 GCE-1	GOP-1, S/N10, received and rejected by Q.C. per DR 5234 (loctite indication missing, tape used as sensor cover, front and side not riveted). GOP-1 conditionally accepted for spacecraft integration. GCE-1, S/N 01, received and passed Q.C. inspection for integration.
Mechanical Log, HEL-002 GOP-1 GCE-1 Booms Flipper Unit Solar Array	Mechanical systems performed GOP-1, S/N 10, and GCE-1, S/N 01, receiving inspection. GOP and GCE experiments were fit checked and readied for electrical integration. Supported electrical integration of GOP and GCE experiments. Initiated assembly boom restraint system and experiment booms. Prepared flipper units S/N's 10 and 11 for vibration tests. Both units passed vibration successfully. Fit checked solar panel support frames, and initiated installation of support frame wire harness and connectors. Integration of middle solar panel support frame completed.
Electrical Log, HEL-001 GOP-1 GCE-1 IT-11 GOP-1 GCE-1	Electrical systems performed GOP-1, S/N 10, and GCE-1, S/N 01, receiving inspection. Integration of IT-11, deployment programmer, S/N 11, continued. Integration of GOP-1 and GCE-1 was initiated.
Spacecraft Nonconformance Log, HEL-005-4 GCE-1 SDR-064 (MRD01720) Harness, wire SDR-065 (MRD01721) GOP-1 SDR-066	The following SDR's were written: SDR-064, GCE-1, S/N 01, $\pi/4$ signal not gating E_O because of loose wire in experiment. SDR-065, spacecraft wire harness incorrect at connector 16EJ05-14. SDR-066, signals to GOP-1 experiment incorrect at connector 06EJ02-47. MRD01720 resulted from SDR-064; MRD01721 resulted from SDR-065; and MRD01727 resulted from SDR-066. MRD01717 was written as a result of DR5300 (system programmer 28 volt return to signal common <100kohms). All SDR's above are in process. The following SDR's were closed: SDR-048, -049, -051, -057, -060, -061, and -062.
Work Order Authorization Log HEL-005-5	No work orders were written during this period.
MPAS Log, HEL-004 GNF	Compiled GNF program. Initiated overhaul of MPAS air conditioning system.

WEEKLY SUMMARY LOG

(23 August through 29 August 1971)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( ) GOP-1 DR5328 IE12 DR5327	GOP-1, S/N 10, received and rejected by Q.C. per DR5328 (test history form not available, dust caps not installed). Unit conditionally accepted for integration. IE12, S/N 11, received and rejected by Q.C. per DR5327 (shorting plug not identified, screws not loctited, covers missing or reversed, front not riveted). Unit conditionally accepted for integration.
Mechanical Log, HEL-002 GOP-1 IE12 Flippers	Mechanical systems performed GOP-1, S/N 10; and IE12, S/N 11, receiving inspections. GOP-1, S/N 10 was installed in the spacecraft and removed. Experiment booms and experiment panel on facet 12 were installed for fit check. IE12, S/N 11, was installed in spacecraft. Flipper assemblies were checked electrically at GSFC vacuum chamber.
Electrical Log, HEL-001 GOP-1 IE12 IT11, IE12 IP10	Electrical systems performed GOP-1, S/N 10, and IE12, S/N 11, receiving inspections. Installed GOP-1, S/N 10, in spacecraft, integration continuted. Continued testing IT11, S/N 11; IE12, and IP10, S/N 11.
Spacecraft Nonconformance Log, HEL-005-4 Spacecraft IE12 SDR-069 SDR-070 (MRD01732)	The following SDR's were written: SDR-069 (IE12, S/N 11, calibration out of tolerance); SDR-070 (IE12, S/N 11, electronic output defective). MRD01732 was written as a result of SDR-070. All SDR's above are in process.
Work Order Authorization Log, HEL-005 GOP IT5 Spacecraft	WOA-028 (pin from 06EJ02 removed for wiring change to GOP-1, S/N 10); WOA-029 (removed IT5, S/N 10, PCM Decoder, from spacecraft); WOA-030 (authorized installation of foil under cards); WOA-031 (performed inspection of connector 15LJ02 for loose welds).
MPAS Log, HEL-004 GNF	Assembled GNF including tape printout. Air conditioning repairs were performed by GSFC personnel.

WEEKLY SUMMARY LOG

(30 August through 5 September 1971)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( ) IE2 DR5314 IP2 IT5	IE2, S/N 11, received and rejected by Q.C. per DR5314 (subsystem test history form missing, connector +0.010 too high, and unit height +0.031). Unit conditionally accepted for integration. IP2, S/N 10, and IT5, S/N 10, received and accepted for integration.
Mechanical Log, HEL-002 IE2, IP2 IT5 TRF1 Experiments Flippers Spacecraft Boom	Mechanical systems performed IE2, S/N 11; IP2, S/N 10; and IT5, S/N 10, receiving inspections. Supported electrical integration of all components. Removed TRF1, S/N 10, experiment from spacecraft to epoxy paint and reinstalled using gold foil. TRF1, S/N 10; IT4, S/N 10; IT6, S/N 10; IP4, S/N 03; IT3, S/N 10; IE11, S/N 12; IP3, S/N 10; GME2, S/N 10; and GME 4, S/N 01, removed from spacecraft and all screwheads epoxy painted; experiments reinstalled using gold foil. Supported thermal vacuum testing of boom flippers. Mounted plume shield on lower solar panel support frame. Aligned TRF sensor and mounted to experiment boom. Overall assembly of experiment boom continues.
Electrical Log, HEL-001 IE2, IP2 IT5 Spacecraft RF system OA system IT5, IT11 IE2	Electrical systems performed IE2, S/N 11; IP2, S/N 10; and IT5, S/N 10, receiving inspections. Connected spacecraft to UTC and GSE after mechanical systems completed work. Verified RF wiring and performed OA system checkout. Completed integration of IT5, S/N 10, and IT11, S/N 11. Re-integration of IE2, S/N 11, continues.
Spacecraft Nonconformance Log, HEL-005-4	No SDR's were written this period.
Work Order Authorization Log, HEL-005-5	No work orders were written this period.
MPAS Log, HEL-004	Continue to debug and compile GNF program.

WEEKLY SUMMARY LOG

(6 September through 12 September 1971)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( ) IT3	Mechanical and electrical systems performed IT3, S/N 11, receiving inspection. The unit was accepted for integration.
Mechanical Log, HEL-002 Harness Flipper Booms Experiments Antenna Rings ACS	Installed power dump circuit harness to lower solar panel support frame. Aligned and installed +X boom flipper bellhousing tie-down adapter. Fitchecked GNF and TRF boom cables and sent booms to GSFC for thermal coating. Work continues on experiment panels. Installed antenna ring between upper and lower solar panel support rings. Supported pressurization of ACS.
Electrical Log, HEL-001 IT3 WOA-032 Connector WOA-031 IP2, Spacecraft	Electrical systems performed WOA-032 (command level checks for IT3, S/N 10) and WOA-031 (inspect connector 15LJ02 for strap welds). Integration of IP2, S/N 10, started. Spacecraft UTC and GSE disconnected for mechanical systems work.
Spacecraft Nonconformance Log, HEL-005-4 Deployment Programmer SDR-071 GSE SDR-072, (MRD01733)	SDR-071 (deployment programmer flag level low, $0.5 \approx 0.55$ volts) and SDR-072 (GSE tone generator command pulse width too short) were written. MRD01733 resulted from SDR-071.
Work Authorization Log, HEL-005-5	WOA-34 removed GME1, S/N 02, for calibration.
MPAS Log, HEL-004 HLIST GNF	Compiled and debugged HLIST and GNF programs.

WEEKLY SUMMARY LOG
(13 September thru 19 September 1971)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( ) GNF CHE DR5329	Electrical and mechanical systems performed the receiving inspections listed below. GNF2, S/N 10, and GNF3, S/N 10, received, fit checked, and returned to GSFC. CHE1, S/N 10; CHE2, S/N 10; CHE3, S/N 11; and CHE4, S/N 10, received and accepted conditionally for integration. CHE4, S/N 10, was rejected by Q.C. per DR5329 (connector socket oversized and unit too high). Remaining CHE units were not flight configured.
Mechanical Log, HEL-002 RF Antennas Separation Switch Solar Panels Booms RF Antennas	Mechanical systems installed RF antenna ring and spacecraft separation switch. A fit check of solar panels to the upper solar panel support frame. Work continues on boom restraint system and experiment panels. Tips for RF antennas fabricated.
Electrical Log, HEL-001 GSE, IT3 Testing GWP	Electrical systems reconnected spacecraft to UTC and GSE for integration of IT3, S/N 11. Performed RF, CHE, LET II, and GWP tests and calibration. Integration of GWP1, S/N 10, completed.
Spacecraft Nonconformance Log, HEL-005-4 GSE Tone Generator SDR-072 GME2 SDR-073 (MRD01734)	SDR-072 (GSE tone generator command pulses too short), and SDR-073 (GME2 counts excessive in accumulators R1 and R5) were written. SDR-073 resulted in MRD01734.
Work Order Authorization Log, HEL-005-5 GME1 and 6	WOA-034 removed GME1, S/N 02, and GME6, S/N 11, from spacecraft for calibration.
MPAS Log, HEL-004 Computer	XDS computer contract expired.

WEEKLY SUMMARY LOG

(20 September through 26 September 1971)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	Electrical and mechanical systems performed the receiving inspections listed below. MAP-1, S/N 10, received. System Programmer IT-9, S/N 11, received.
MAP-1 IT-9	
Mechanical Log, HEL-002	
GME GCE MAP	Mechanical systems reinstalled two upper plume shields. GCE1-10 was removed from the S/C. GME-1, S/N 02, was installed in the S/C. MAP, no S/N, was installed in S/C with "gold foil." Continued work on cradles for booms. Work continued on experiment panels and boom restraint system.
CAI	CAI-1, S/N 11, was removed from S/C.
Electrical Log, HEL-001	
CAI MAP-1 IT9	Electrical systems performed test and checkout of CAI. Installed MAP-1, S/N 10, in S/C, performed integration test procedure to completion. Reintegrated IT9, S/N 11, integration not completed due to harness work on kick motor and pyrotechnics wiring.
Spacecraft Nonconformance Log, HEL-005-4	
CAI-1 MAP-1 GSE-MAP	SDR-074, CAI-1, S/N 11 (low counts), and SDR-075, MAP-1, S/N 10 (freon not on materials list), were written. SDR-076, GSE-MAP (teletype smokes). SDR-074 resulted in MRDO1735.
Work Order Authorization Log, HEL=005-5	
IT-11	WOA-035, IT-11, S/N 11, reversed two wires. WOA-036 installed two separation switch stops.
MPAS Log, HEL-004	Compiled GNF. Initiated air conditioners.

WEEKLY SUMMARY LOG

(27 September through 3 October 1971)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	
GOP-1	Electrical and mechanical systems performed the following receiving inspection: GOP-1, S/N 10.
Mechanical Log, HEL-002	
CAI MED GOP CHE	Mechanical systems reinstalled CAI-1, S/N 11, in S/C. Work continued on the thermistors for the kick motor. Fabrication of the thermal blanket for MED completed. MED thermal blanket installed in S/C. GOP-1, S/N 10, installed in S/C with "gold foil." CHE-1; CHE-2, S/N 02; CHE-3, S/N 10; and CHE-4, S/N 02, experiments removed from S/C and sent to GSFC.
Electrical Log, HEL-001	
CAI-1 IT9 Solar Array RF. Antennas GOP-1	Electrical systems performed bench checks of CAI-1, S/N 11, and reinstalled it in the S/C. Continued Part IV of IT9, S/N 11, integration procedure to completion. Began integration of solar array and R.F. antennas. Installed GOP-1, S/N 10, in S/C, and performed reintegration procedure.
Spacecraft Nonconformance Log, HEL-005-4	
IT9	SDR-077 (IT-9, S/N 11, system programmer overload trip point is too low). SDR-077 resulted in MRDO1736.
Work Order Authorization Log, HEL-005-5	
GWP	WOA-037 removed GWP, S/N 10, from spacecraft.
IT10	WOA-038 authorized redressing led wires.
MPAS Log, HEL-004	Debugged Taprad which copies tape telemetry to RAD. Compiled GNF paper tape mode. Compiled HSNP commands. Used system commands for PCM Decoder Integration. Performed repair on PCM Decoder, and checked out Decoder.

WEEKLY SUMMARY LOG

(4 October through 10 October 1971)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	
IE12	Electrical and mechanical systems performed IE12, S/N 11, receiving inspection.
Mechanical Log, HEL-002 RF Antennas IT9 ACS MAE-1 MAE-2	Mechanical systems removed antenna simulators and installed RF antennas, fiberglass heat shields protecting boom ends, and IT9, S/N 11. An ACS system pressure check was performed. MAE 1, S/N 10, and MAE-2, S/N 10, were removed from the spacecraft.
Electrical Log, HEL-001 RF Antennas GME IT9	Electrical systems performed integration of RF antennas. Removed antennas and installed simulators. Performed special testing of GME. Installed IT9, S/N 11.
Spacecraft Nonconformance Log, HEL-005-4	
IT9 SDR-078 (MRD01740)	SDR-078 (IT9, S/N 11, curve does not agree with measurements.) SDR-078 resulted in MRD01740.
Work Authorization Log, HEL-005-5	
CHE WOA-039	WOA-039 removed CHE from spacecraft.
MAE WOA-040	WOA-040 removed MAE from spacecraft.
Upper Center Tube WOA-041	WOA-041 authorized drilling 0.5" hole in upper center tube.
GME WOA-042	WOA-042 authorized filing GME standoffs.
IE15 WOA-043 WOA-044	WOA-043 reworked IE15 (DIP) to remove from kick motor heater power. WOA-044 added power cable to DIP.

WEEKLY SUMMARY LOG
(11 October through 17 October 1971)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	
GNF-1 GNF-2, GNF-3	Electrical and mechanical systems performed the following receiving inspections: GNF-1, S/N 10; GNF-2, S/N 10; and GNF-3, S/N 10.
Mechanical Log, HEL-002	
IT11 GME-5 Pyrotechnics ACS Booms APP-1 Thermal Blankets GNF-3 GNF-2.	Mechanical systems installed thermal blanket to fiberglass heat shield for the -Y ACS boom. Installed IT11, S/N 11, and removed GME-5, S/N 01. Installed GME-5, S/N 11. Installed pyrotechnics used for line cutter of experiment booms. Successfully fired pyrotechnics. Installed flight ACS booms. Installed pyrotechnics used to deploy ACS booms and successfully fired pyrotechnics. Removed APP-1, S/N 10, from spacecraft. Installed APP-1, S/N 11. Fabricated thermal blanket for lower center tube cover, ACS fiberglass heat shield and one experiment boom heat shield. Installed GNF-3, S/N 10, and GNF-2, S/N 10, in spacecraft.
Electrical Log, HEL-001	
GME-5 IT11 ACS Pyros APP-1 MAE-10	Electrical systems performed the following: removed GME-5, S/N 11, from spacecraft; installed GME-5, S/N 01, and removed; installed GME-5, S/N 11, and IT11, S/N 11. Completed integration of ACS boom pyrotechnics. Removed APP-1, S/N 10, and installed APP-1, S/N 11, and MAE-10.
Spacecraft Nonconformance Log HEL-005-4	
IC1 SDR-079	SDR-079 (IC1, S/N 10, pulse and width change from expected.)
MAE SDR-080 (MRD01737)	SDR-080 (MAE-1, S/N 10, detector noisy). MRD01737 resulted from SDR-080.
GNF SDR-081	SDR-081 (GNF GSE command pulses vary out of tolerance).
Work Order Authorization Log, HEL-005-5	
Umbilical Bracket WOA-045	WOA-045 replaced umbilical bracket.

WEEKLY SUMMARY LOG
(18 October through 24 October 1971)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( ) IOE GWP, GCE, CHE GNF, IT9	Electrical and mechanical systems performed the following receiving inspections: IOE, S/N 12; GWP, S/N 10; GCE, S/N 1; CHE-1, S/N 1, 2, 11, 12; GNF-3, S/N 10; and IT9, S/N 10.
Mechanical Log, HEL-002 IT11, IT9 IT10, IE3 GCE CHE IE12 CHE IT9, IT11	Mechanical systems removed IT11, S/N 11; IT9, S/N 11; IT10, S/N 11; and IE3, S/N 11, from spacecraft to install ACS deflector with thermal blanket and reinstalled experiments. Integration inspection of GCE-1, S/N 01; CHE-4, S/N 02; CHE-2, S/N 2; CHE-1, S/N 1; and CHE-3, S/N 11 performed. Installed IE12, S/N 11; CHE-4, S/N 02; CHE-3, S/N 11; CHE-2, S/N 2; CHE-1, S/N 1 in spacecraft. Removed IT9, S/N 11, and IT11, S/N 11, from the spacecraft.
Electrical Log, HEL-001 GNF GWP, GCE	Electrical systems performed the following: installed the special GNF test connectors and continued integration of GNF; set up spacecraft to perform long functional test; performed integration testing of GWP; installed GCE-1, S/N 1, and completed integration testing.
Spacecraft Nonconformance Log HEL-005-4 GNF SDR-081 SDR-082 (MRD01738) GCE SDR-083 (MRD01741) IT2 SDR-084	SDR-081, GNF (GSE command pulses vary from 170-240 msec.). SDR-082, GNF-3, S/N 10 (data readout not correct). SDR-083, GCE-1, S/N 1 (tag bits not the same at all times). SDR-084, IT2, S/N 10 (transmitter on low output mode then changed to normal). SDR-082 resulted in MRD01738. SDR-083 resulted in MRD01741.
Work Order Authorization Log, HEL-005-5 Umbilical Bracket WOA-045 Facet 11 WOA-046 ACS Plume Shield WOA-047 IC1 WOA-048 IT11 WOA-049	WOA-045 replaced umbilical bracket. WOA-046 removed and replaced Facet 11 cards. WOA-047 modified ACS plume shield. WOA-048 removed IC1. WOA-049 removed IT11 for spacecraft overload test.

WEEKLY SUMMARY LOG
(25 October through 1 November 1971)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( ) IE15 GNF	Electrical and mechanical systems performed receiving inspections on IE15, S/N 10, and GNF-3, S/N 10.
Mechanical Log, HEL-002 IC1 IE2 CHE CAI Dummy Kick Motor Thermal Blankets	Mechanical systems performed the following: installed the IC1, S/N 10, ACS electronics in the spacecraft; removed IE2, S/N 11, from the spacecraft; installed CHE-3, S/N 11; CHE-4, S/N 02; CHE-2, S/N 2; CHE-1, S/N 1; CAI-1, S/N 11 with foil beneath cards and thermistors in place in the spacecraft. Fit checked the dummy kick motor in spacecraft. Fabricated thermal blankets for upper RF shield and birdcage.
Electrical Log, HEL-001 GNF IT9	Electrical systems performed the following: removed GNF-3, S/N 10; reintegrated IT9, S/N 10. Continued preparations for the long functional test.
Spacecraft Nonconformance Log HEL-005-4 IT9 SDR-085 (MRD01739)	SDR-085, IT9, S/N 10 (overload current trips at 6.14 amps). SDR-085 resulted in MRD01739.
Work Authorization Log, HEL-005-5 ACS Boom Cables WOA-050	WOA-050 authorized replacing ACS boom cables.
Cards WOA-051	WOA-051 removed and replaced cards for final mechanical check.

WEEKLY SUMMARY LOG
(1 November through 7 November 1971)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( ) GME IT9 IE12 DR5316 IT9 IE12 DR6081	Electrical and mechanical systems performed GME 1 and 4, S/N 10 and 01; IT9, S/N 10; IE12, S/N 10 receiving inspection. GME accepted for integration. DR5316 (not loctite indicated and flight plug ID not clear) remains open from a previous inspection. IT9, S/N 10 inspected and accepted for integration. IE12, S/N 10 rejected per DR6081 (front and side panels not riveted, screws not loctite indicated and connector not identified as non-flight).
Mechanical Log, HEL-002 Solar Panels Thermal Blanket S/N Spacecraft SCDR RF Antenna GNF Boom Spacecraft	Installed dummy solar panels to upper and lower support frame. Epoxy painted screws. Fabricated and installed upper thermal blanket and grounded same with aluminum strips. Replaced MED thermal blanket and secured in place. Stamped S/N's to spacecraft structural components. Installed Velcro strips to upper center tube and secured ground lugs in the facets. Installed heat sink screws in the SCDR, IP3-10. Installed RF antenna assemblies and plungers for separation switches. Installed GNF boom, processor and electronics cable and flipper. Supported electrical systems in integration, testing, and handling of the spacecraft.
Electrical Log, HEL-001 GNF IE13, IE14, IT9, GME, CHE GNF, APP GSE HTP-022, LFT IE12, IP10	Electrical systems performed integration of GNF, IE13, and IE14. Special tests for IT9, GME, CHE, GNF and APP were performed. Tone commands failed during testing and GSE was disconnected to isolate failure. GSE attenuator AT-75-20 #96 replaced. LFT, HTP-022, for IE12 and IP10 was started. Power removed from spacecraft and ACS deploy switch wired.
Spacecraft Nonconformance Log HEL-005-4 MRD01742 DR6078 SDR-086 SDR-087	MRD01742 (CHE3, S/N11, detector window torn in center when received from GSFC testing) resulted from DR6078. SDR-086 (IE13, S/N11 connectors 06 and 07 are reversed); and SDR-087 (IE13, S/N11 command pulse 64P overloaded and disappears) were written.
Work Order Authorization Log, HEL-005-5	No work orders were written this period.

WEEKLY SUMMARY LOG
(8 November through 14 November 1971)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( ) GME 6 IE13 IE14 IE15	Electrical and mechanical systems performed GME6, S/N 02; IE13, S/N 10; IE14, S/N 10; and IE15, S/N 10 receiving inspection. All units except IE15 accepted by QC for integration. IE15, S/N 10 accepted for integration; DR6079 remains open from a previous inspection.
Mechanical Log, HEL-002 IOE Grounding Solar Panels Kick Motor Booms	Performed re-integration inspection on IOE 1, S/N 01. Continued inner layer grounding of upper RF shield and installed dummy solar panels to middle support frame at facets 2, 3, 4 and 6. Installed kick motor wire support bracket and manually folded and deployed booms to check mechanical mechanisms.
Electrical Log, HEL-001 ACS IE15, HTP-022, LFT IOE	Potted ACS boom switches and connected ACS AP signal line to spacecraft wiring. Performed special tests for GME, IE13 and IE14. Integrated IE15 and performed LFT, HTP-022. During LFT source Co 60, S/N 99 was directed to IOE.
Spacecraft Nonconformance Log HEL-005-4 SDR-088 GNF SDR-089 Lab, DR6080 MRD01744 MRD01746 IOE MRD01743	SDR-088 (GNF will not command to calibrate mode) and SDR-089 (laboratory temperature and humidity out-of-specification) were written. DR6080 (IE15, S/N 10 signal common to chassis $\leq$100K ohms) resulted in MR D01744. MRD01746 (IOE, S/N 12 high voltage steps as monitored by AP not always correct) was written. SDR-058, -076, and -089 were closed this period. MRD01743 (IT11, S/N 10/11 pyro flags connected such that flag state is indeterminate) was written.
Work Order Authorization Log, HEL-005-5 MED	WOA-052 replaced MED electronics.
IOE	WOA-053 replaced IOE.
TRF	WOA-054 removed and replaced TRF to enable work on DST.
GNF	WOA-055 removed GNF for connection through interrupter boxes.

WEEKLY SUMMARY LOG
(15 November through 21 November 1971)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( ) IT10 IE13, IE14	Electrical and mechanical systems performed IT10, S/N's 10 and 11; IE13, S/N11; and IE14, S/N 10 receiving inspections. All units accepted for integration by QC.
Mechanical Log, HEL-002 Solar Panel Shields DIP, ULET LFT Pyros, ACS Booms	Installed dummy solar panels at facet 1, 7, and 16. Continued to ground shields and installed facet 16 upper and lower experiment panels. Installed gold foil under DIP and connected ULET vacuum pump to MAE in support of LFT, HTP-022. Transfer the spacecraft to mobile work platform and setup for continuation of LFT. Installed pyros and secured ACS booms with safety cord.
Electrical Log, HEL-001 GNF Experiments IE15, IT10, IE13 IE14 OA Spacecraft WOA-059 Solar Array GSE	Performed WOA-055 (special GNF test) and LFT, HTP-022. Completed special LBR test on all experiments. Integrated IE15, S/N 10; IT10, S/N 11; IE13, S/N 11; IE14, S/N 10; and GCE 1, S/N 01. Stimulated OA System and checked OA operation. Applied power to spacecraft using new automatic computer control turn ON. Performed special test of OA/TM mode, OA/ACS mode, and separation switch. Completed WOA-059 and check spacecraft operation using external battery. Completed special solar array shadow test. Disconnected GSE in preparation for transfer of spacecraft to GSFC.
Spacecraft Nonconformance Log, HEL-005-4 SDR-090 SDR-091 SDR-090 (MRD01750) SDR-091 (MRD01751) MRD01752, MRD01753 MRD01749 MRD01755	SDR-090 (GNF2, S/N 10 will not switch to calibrate mode when command 48P sent) and SDR-091 (Analog voltage from ULET does not increase as designed) were written. SDR-090 resulted in MRD01750 and SDR-091 resulted in MRD01751. MRD01752 (MAE 2, S/N 10 detectors P and B noisy); MRD01753 GSE solar simulator voltage and current not responding properly); MRD01749 (IT10, S/N 11 malfunctioning); and MRD01755 (CAI, S/N 11 detectors have excessive counts) were written.
Work Order Authorization Log, HEL-005-5 CAI MAE IT10 TRF GME	WOA-056 removed and replaced CAI for access to MAP. WOA-057 removed MAE from spacecraft. WOA-058 removed IT10, S/N 11 from spacecraft and WOA-059 installed IT10 through interrupter boxes. WOA-060 removed and replaced experiment panel and TRF for DST Test. WOA-061 removed and replaced GME battery for installation of flight plug.

WEEKLY SUMMARY LOG
(22 November through 28 November 1971)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	No receiving inspections were performed this period.
Mechanical Log, HEL-002 Spacecraft Sun Spin Test HTP-002	Installed Velostat bag and loaded spacecraft/mobile work platform on to truck for transport to GSFC, building 7, room 138. Secured the spacecraft in room 138 downflow tent and setup spacecraft for inspection and checkout. Moved the spacecraft to building 10 sun spin test area. Supported Sun Spin Test, HTP-002, of spacecraft. Readied and moved space craft back to room 138 at end of Sun Spin Test.
Electrical Log, HEL-001	Performed Sun Spin Test, HTP-002. Re-integrated IT9, S/N 11 at end of Sun Spin Test in room 138.
Spacecraft Nonconformance Log, HEL-005-4 MRD01762 IE2-11	MRD01762 (no output from OA system when spacecraft spinning under a 1 sun lamp) was written during Sun Spin Test
Work Order Authorization Log, HEL-005-5 OA MAE GME, IT9 IT11	WOA-062 and 063 removed and replaced OA electronics and sensor components for inspection and trouble shooting during Sun Spin Test. WOA-064 removed and replaced MAE for inspection by the experimenter. WOA-065 removed and installed GME and WOA-066 removed and installed IT9, S/N 10 and 11; and IT11, S/N 11.

WEEKLY SUMMARY LOG
(29 November through 5 December 1971)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( ) GME6 IT9 IP5	Mechanical and electrical systems performed GME6, S/N 02; IT9, S/N 10; and IP5, S/N 03 receiving inspections. All components accepted for integration.
Mechanical Log, HEL-002 Spacecraft	Mechanical systems moved the spacecraft from Room 138 to SMTF for Magnetic Measurement and Calibration Test, HTP-001. Configured spacecraft for SMTF tests. Handled, reconfigured, and moved spacecraft as required during test and calibration.
Electrical Log, HEL-001 IT9	Reintegrated IT9, S/N 11, and performed integration tests per HIP-002-4. Investigated SMTF ground scheme in preparation for spacecraft magnetic measurements and calibration. Performed short functional tests and operated spacecraft per HTP-001 during SMTF tests.
Spacecraft Nonconformance Log, HEL-005-4	No spacecraft nonconformances were written this reporting period.
Work Order Authorization Log, HEL-005-5 MAE1-10 MAE2-10 GME6-02 GME6-11 IT9-10 IT9-11 IT11-11 GME TRF Sensor ACS & OA Electronics IE1 & IE2-10 Experiment Boom	WOA-064 directed removal and installation for experimenter tests. WOA-065 directed removal of GME6-02 and installation of GME6-11. WOA-066 directed removal of IT9-10, installation of IT9-11, and removal and installation of IT11-11. WOA-067 directed installation of insulation against experiment panel. WOA-068 directed a dc resistance check of TRF sensor B loop. WOA-069 directed removal of OA electronics for bench check. WOA-070 directed positioning check of boom cable.

WEEKLY SUMMARY LOG
(6 December through 12 December 1971)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	No instruments or experiments received during this time.
Mechanical Log, HEL-002 Spacecraft IE13, IE14 TRF Spacecraft HTP-004	Prepared and moved spacecraft from SMTF to Room 138, Building 7. Inspected IE13, S/N 11, and IE14, S/N 10; loctite covers screws and installed in spacecraft. Also, installed TRF2, S/N 10. Configured spacecraft per HTP-004 procedure in preparation for thermal vacuum testing. Supported thermal vacuum testing of spacecraft.
Electrical Log, HEL-001 Spacecraft HTP-001 Thermal Vacuum HTP-004	Completed spacecraft tests at SMTF, HTP-001. Prepared spacecraft and GSE for move to Room 138, Building 7. Setup spacecraft in Room 138 and performed special LFT prior to thermal vacuum testing. Assisted in moving spacecraft from Room 138 to Thermal Vacuum Chamber 238. Setup, tested, and readied spacecraft for Thermal Vacuum Test, HTP-004.
Spacecraft Nonconformance Log, HEL-005-4 Environment SDR-092 APP SDR-093 (MRD01766) GNF SDR-094 (MRD01782) SDR-095 (MRD01781) MAP SDR-096 (MRD01767) APP SDR-097 (MRD01766) GME SDR-098 TRF MRD01780 IT9 MRD01757 MRD01758 CHE MRD01759 UTC MRD01760	The following SDR's were written: SDR-092 (RH out-of-specification); SDR-093 (APP test connector standoff loose); SDR-094 (GNF flipper microswitch lever bent); SDR-095 (GNF flipper-position microswitch wired wrong - flag 90^{o} off); SDR-096 (MAP connector standoff loose); SDR-097 (APP collimator improperly secured); SDR-098 (GME GSE cable has open wires); SDR's 093 through 097 resulted in MR's D01766, D01767, D01781, and D01782. The remaining MR's were written as a direct result of spacecraft testing: MRD01780 (TRF sensor coil bent at SMTF test site); MRD01757 (System Programmer, IT9, S/N 11, UTC solar array simulator current from telemetry erratic) MRD01758 (System Programmer, IT9, S/N 11, battery switch does not operate when commanded); MRD01759 (CHE GSE program generator does not command CHE to high gain mode); MRD01760 (UTC solar array simulator failed with spacecraft turned on).
Work Authorization Log, HEL-005-5 GNF IS20 (Mag Boom)	WOA-071 directed adjustment of Mag sensor position. WOA-072 directed a check of the cable length to micro-

REFERENCE	SUMMARY
HEL-005-5 (Cont.) 11FP14 (Arm Plug) Mag Boom Microswitch	switch and for shadowing of OA sensor. WOA-073 directed LAP removal, test and installation. WOA-074 directed modification of experiment panel 5 and 12 to provide adequate clearance for microswitch.

WEEKLY SUMMARY LOG
(13 December through 19 December 1971)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	No instruments or experiments received during this time period.
Electrical Log, HEL-001	Performed Thermal Vacuum tests per HTP-004.
Mechanical Log, HEL-002 Experiment Booms MOI-GNF Spacecraft TV Experiment Panels Spacecraft	Assisted GSFC on weight and CG of experiment booms. Completed MOI for GNF boom. Assisted GSFC in spacecraft removal from thermal vacuum chamber. Removed experiment panels and sent out to be strip coated. Configured spacecraft for post thermal vacuum long functional test.
Spacecraft Nonconformance Log, HEL-005-4 GME SDR-099 (MRD01792)	SDR-099 (GME4, S/N 1, connector standoff loose); SDR-099 resulted in MRD01792.
MAE ULET MRD01761 Separation Switch MRD01763 ACS MRD01764 IT5 MRD01756 IT3 MRD01765 IT9 MRD01768 CHE MRD01769 MAP MRD01770 GWP MRD01771 IT5 MRD01772 IT9 MRD01773 LAP MRD01774 CAI MRD01775 MRD01776 MAE MRD01777 LAP MRD01778	The following MR's were written as a result of spacecraft tests: MRD01761 (MAE ULET proportional counter is noisy); MRD01763 (separation switch GSE required excessive voltage for operation); MRD01764 (ACS nozzle IC4 leaks Freon 14 at -20°C); MRD01756 (IT5, S/N 10, commands 5P and 13P did not function); MRD01765 (IT3, S/N 11, sensitivity decreased 3 db at -20°C); MRD01768 (IT9, S/N 11, command 3P removes power from spacecraft); MRD01769 (CHE detectors D2 and D3 have high counts); MRD01770 (MAP GSE - spectra 0-10 does not sequence properly); MRD01771 (GWP channels A1, F, and D1 are noisy); MRD01772 (IT5, S/N 10, command 1P does not operate battery at -20°C); MRD01773 (IT9, S/N 10, battery discharge current 7.0 amps at UTC); MRD01774 (LAP goes into cycle bypass mode when not commanded); MRD01775 (CAI, S/N 11, detectors D0 through D9 do not sense Co60 source); MRD01776 (CAI, S/N 11, D2 and ADC have high counts at +40°C); MRD01777 (MAE, S/N 10, detector N_3B noisy); MRD01778 (LAP does not come up in proper modes).
Work Authorization Log, HEL-005-5	No WOA's were initiated during this time period.

WEEKLY SUMMARY LOG
(20 December through 26 December 1971)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	No instruments or experiments received during this time period.
Mechanical Log, HEL-002 Spacecraft TV LFT LAP mirror TRF boom Experiment Panels.	Configured spacecraft for post thermal vacuum long functional test. Assisted in post TV LFT. Installed LAP mirror. Assisted in TRF boom CG's and MOI. Modified Facets 5 and 12 experiment panels.
Electrical Log, HEL-001 Spacecraft TV LFT	Configured spacecraft for post TV LFT. Performed and completed post TV LFT.
Spacecraft Nonconformance Log, HEL-005-4	No SDR's or MR's were written during this time period.
Work Order Authorization Log, HEL-005-5 LAP Pyro WOA-075 Spacecraft WOA-076	WOA-075 directed removal of LAP pyro S/N 22 and installation of S/N 11. Woa-076 directed removal and installation of experiment packages.

WEEKLY SUMMARY LOG
(27 December 1971 through 2 January 1972)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	No instruments or experiments received during this time period.
Mechanical Log, HEL-002 Pyros Spacecraft ACS & Experiment Booms Pyros & Kick Motor Pyros OA	Removed pyros tested during thermal vacuum. Configured spacecraft for OA. Installed ACS and experiment booms, pyros and kick motor pyros. Assisted GSFC in moving spacecraft to OA test area. Setup and completed OA tests. Moved spacecraft to Room 138.
Electrical Log, HEL-001 OA/Experiment Angle Measurement Test, HTP-006	Spacecraft turned over to Mechanical Systems for performance of OA Angular Measurement, HTP-006.
Spacecraft Nonconformance Log, HEL-005-4 IE15-10 (DIP) MRD01793 IT4-10 MRD08001 IE2-10 (OA) MRD08002	The following MR's were written: MRD01793 (accelerometer channel to DST noisy during C_1); MRD08001 (R&RR video attenuation not consistant); MRD08002 (OA telemetry indicates stimulant angle incorrectly).
Work Order Authorization Log, HEL-005-5	No WOA's were initiated during this time period.

WEEKLY SUMMARY LOG
(3 January through 9 January 1972)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	The following experiments were received during this time period: CHE1-1, CHE2-2, CHE3-11, CHE4-2, GWP1-10, and IE15-11.
Mechanical Log, HEL-002	
EMC	Moved spacecraft to EMC test area. Setup spacecraft and supported initial EMC tests.
Electrical Log, HEL-001	
EMC Test HTP-003	Performed initial EMC test according to procedure HTP-003.
GME	Performed special GME test at end of EMC.
Spacecraft Nonconformance Log, HEL-005-4	No nonconformances were recorded during this reporting period.
Work Order Authorization Log, HEL-005-5	
Spacecraft WOA-077	WOA-077 directed preparation of spacecraft to continue thermal vacuum testing.
RF Protection WOA-078	WOA-078 directed addition of RF protection.
GCE WOA-079	WOA-079 directed removal of GCE for rework.
MAP WOA-080	WOA-080 directed removal of MAP for repair.
RF Shield	WOA-081 directed enlargement of RF shield opening.

WEEKLY SUMMARY LOG
(10 January through 16 January 1972)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	No instruments or experiments were received during this time period.
Mechanical Log, HEL-002 EMC Mass Properties HTP-005	Supported initial EMC tests. Moved spacecraft to Room 138 and reconfigured spacecraft for special electrical testing. Inspected and determined that HSP bowed, causing connectors to cant. Reconfigured spacecraft for balance and mass properties tests. Performed balance and mass properties test per HTP-005.
Electrical Log, HEL-001 Sun Angle MAP GCE Mass Measurements HTP-005	Spacecraft moved to Room 138, Building 7. Spacecraft setup and turned on to perform Sun Angle check, and MAP and GCE special tests. Operated spacecraft using newly developed computer-controlled quick turn-on procedure. Completed a GCE source test. Spacecraft turned over to to EMR Mechanical Systems for performance of Mass Measurement and Balance procedure (HTP-005).
Spacecraft Nonconformance Log, HEL-005-4 RF Filter SDR-102	SDR-102 (RF filter test connector has no protective cover) was written this reporting period.
Work Order Authorization Log, HEL-005-5 IE15, WOA-082 IT9, WOA-083 GME, WOA-084 IE12, WOA-085 IS24, WOA-086	WOA-082 directed installation of flight DIP package. WOA-083 directed investigation of command loss. WOA-084 directed investigation and correction of GME noise. WOA-85 directed correction of loose fastener screw on attenuator plugs. WOA-086 directed replacement of connector covers.

WEEKLY SUMMARY LOG
(17 January through 23 January 1972)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	No instruments or experiments were received during this time period.
Mechanical Log, HEL-002	
HTP-005	Moved spacecraft to Center of Gravity test area. Setup spacecraft and performed Center of Gravity tests per HTP-005.
Electrical Log, HEL-001	Mechanical Systems performing HTP-005, Mass Measurement and Balance.
Spacecraft Nonconformance Log, HEL-005-4 EMC (MRD03391) Spacecraft (MRD03392)	MRD03391 (spacecraft radiated at 15.5 MHz during EMC test) and MRD03392 (RF illumination caused spacecraft power to turn off during EMC test) were written.
Work Authorization Log, HEL-005-5 Structure WOA-087	WOA-087 directed installation of balance weights.

WEEKLY SUMMARY LOG
(24 January through 30 January 1972)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	No instruments or experiments were received during this time period.
Mechanical Log, HEL-002 HTP-005 Spacecraft Harness Support Panel	Setup and performed MOI tests per HTP-005. Removed and reworked experiment panels 3, 11, and 15, and sent same to Thermal Coating section. Worked on HSP. Replaced fastener on Facet 8. Installed new HSP. Prepared spacecraft for SES and vibration tests.
Electrical Log, HEL-001	Mechanical Systems performing HTP-005, Mass Measurement and Balance.
Spacecraft Nonconformance Log, HEL-005-4 IT6 (MRD03390)	Analog Xmtr (IT6, S/N 10) current varied to approximately 970 ma during EMC tests and is documented in MRD03390.
Work Order Authorization Log, HEL-005-5 Spacecraft, WOA-088 Battery, WOA-089 Spacecraft, WOA-090 ACS, WOA-091 Kick Motor, WOA-092 Solar Panels, WOA-093 IE12, WOA-094 MAE, WOA-095 Structure, WOA-096	WOA-088 directed removal and replacement of Facet 11 harness support panel. WOA-089 directed removal and re-installation of battery. WOA-090 directed verification of separation switch operations. WOA-091 directed installation of flight ACS valve assemblies. WOA-092 directed installation of kick motor for SES test. WOA-093 directed installation of dummy solar panels. WOA-094 directed removal of IE12, S/N 10, and replacement with IE12, S/N 11. WOA-095 directed removal and rework of MAE. WOA-096 directed completion of spacecraft thermal coating.

WEEKLY SUMMARY LOG.
(31 January through 6 February 1972)

REFERENCE	SUMMARY
Receiving Inspection QCP-( )	IE12, S/N 11, (TCT) was received and accepted. A previous DR (DR 5327) remains open. CAI, S/N 11, received and accepted. ACS valve nozzles, S/N's 7 and 8, received and rejected by DR's 6110 and 6111.
Mechanical Log, HEL-002 HTP-005 HSP, Facet 11 HSP, Facet 5 SES Sources Kick Motor SES	Completed HTP-005. Mass Measurement and Balance. Reinstalled experiment components in Facet 11 at completion of HSP work. Removed Facet 5, HSP, and installed RF shield connector standoffs. Replac ed battery, IP2, S/N 10; thermal painted balance weights, and Facet 5 HSP. Prepared spacecraft for pre-SES long functional test (LFT). Removed and installed radioactive sources in support of the LFT. Installed dummy kick motor in spacecraft and configured spacecraft for SES test.
Electrical Log, HEL-001 SES	Spacecraft mass properties completed by Mechanical Systems. Performed reduced long functional test in Room 138 for pre-SES test.
Spacecraft Nonconformance Log, HEL-005-4 Spacecraft SDR-104	SDR-104 (Paint and tar fumes filtering into Clean Room 138) was written.
Work Order Authorization Log, HEL-005-5 Experiment Panel WOA-097	WOA-097 directed additional electrical insulation be installed to the experiment panel.

WEEKLY SUMMARY LOG
(7 February through 13 February 1972)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	MAE1 and 2, S/N 10, received and accepted by Q.C. Solar panels received and rejected per DR 6115 through DR 6120.
Mechanical Log, HEL-002 SES	The spacecraft was moved from Room 138 to the SES Chamber. Assisted electrical systems in setting up spacecraft for SES test. Installed live solar panels for the SES test.
Electrical Log, HEL-001 SES HTP-011 SFT HTP-021	Spacecraft moved from Room 138 to SES Chamber. Spacecraft setup in accordance with HTP-011 for SES. Performed spacecraft aliveness test per HTP-021 prior to chamber pump-down. SES test started and performed according to test procedure HTP-011.
Spacecraft Nonconformance Log, HEL-005-4	The following malfunction reports (MR's) were written:
GNF (MRD01795) TRF (MRD01796) IP2, Battery (MRD01797) XDS 930 Computer (MRD01798) Telephone (Bldg. 11) (MRD01799) Telephone (SES) (MRD01800)	MRD01795 (GNF GSE does not stimulate the experiment). MRD01796 (TRF low frequency oscillator inoperative). MRD01797 (spacecraft battery IP2, S/N 10, went into undervoltage unexpectedly). MRD01798 (XDS 930 Computer spacecraft command 8T did not turn on PCM transmitter). MRD01799 (Building 11 telephone does not disconnect). MRD01800 (Telephone at SES is intermittent).
OA (MRD03380) MAP (MRD03381) XDS 930 Computer (MRD03382) ACS (MRD03383)	MRD03380 (OA, IE2, spin rate 0.0; should be 46.8 rpm). MRD03381 (MAP in non-tracking mode when not commanded). MRD03382 (XDS 930 Computer tone command 41T did not switch data when first sent). MRD03383 (ACS leaking gas during cold (shadow) SES test
Work Order Authorization Log, HEL-005-5	
Plume Shield WOA-098	WOA-098 directed repair of plume shield.
Kick Motor WOA-099	WOA-099 replaced live kick motor squib for dummy.
Insulating Blanket WOA-100	WOA-100 directed installation of additional insulation blanket.

WEEKLY SUMMARY LOG
14 February through 20 February 1972)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	IT9, S/N 10, and IP2, S/N 11, received and accepted by QC.
Mechanical Log, HEL-002	SES test completed and chamber door opened. Installed sensor covers and removed cables. Spacecraft readied and moved to Clean Room 138. In Room 138, removed live solar panels and installed dummy panels. Supported electrical tests of kick motor heater blanket. Readied spacecraft for vibration tests and assisted with pre-vibration reduced lone functional testing of the spacecraft.
Electrical Log, HEL-001 SES HTP-011 Special Tests Kick Motor	Completed SES test per HTP-011. SES chamber pressure and temperature returned to ambient. Special post-SES tests including commands, battery undervoltage, kick motor and system programmer, were performed. Kick motor moved to Room 138 for troubleshooting heater blanket assembly.
Spacecraft Nonconformance Log, HEL-005-4 Solar Array SDR-105 Kick Motor (MRD03384) XDS 930 Computer (MRD08003)	SDR-105 (solar array panel IP1, S/N 142, is chipped and contact is brushing against protective cover). The following malfunction reports (MR's) were written: MRD03384 (kick motor heater blew a fuse in the system programmer when enabled). MRD08003 (Spacecraft command 2T sent by XDS 930 computer three times, did not change status of DP 2-5).
Work Order Authorization Log, HEL-005-5 Experiment Panel WOA-101 Solar Panels (WOA-102) MAP, CAI (WOA-103) Experiment Booms WOA-104 System Programmer WOA-105 Battery (WOA-106) LAP (WOA-107)	WOA-101 removed and installed experiment panels for application of strip coating. WOA-102 directed removal of live solar panels from spacecraft. WOA-103 directed removal and reinstallation of MAP, S/N10; and CAI, S/N 11; for rework. WOA-104 directed removal and installation of experiment booms. WOA-105 directed removal and installation of system programmer for troubleshooting kick motor heating system. WOA-106 directed installation of flight battery IP2, S/N 11. WOA-107 directed changing of LAP door pyro.

WEEKLY SUMMARY LOG
(21 February through 27 February 1972)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	No instruments or experiments were received for inspection during this time period.
Mechanical Log, HEL-002	Continued to assist electrical systems in performance of long functional test (LFT). Worked on kick motor configuration and installed inertia weights to booms. Investigated boom shadowing of OA sensor. Mounted kick motor to spacecraft and configured spacecraft for vibration tests. Moved spacecraft to vibration cell C-210. Supported GSFC and EMR Electrical Systems in performance of Vibration Test.
Electrical Log, HEL-001 XDS 930 Computer CHE Special Test RLFT Kick Motor Vibration Test HTP-007	Completed measurements of XDS 930 computer tone command frequencies. Performed special CHE tests. Performed pre-vibration reduced long functional test. Troubleshooting of kick motor heater assembly continues. Spacecraft moved to Vibration Cell C-210 and setup according to test procedure HTP-007. Vibration and shock tests begun and performed in accordance with HTP-007.
Spacecraft Nonconformance Log, HEL-005-4 GNF Boom SDR-106 DIP SDR-107	SDR-106 (potting split on outer layer of GNF boom connector) and SDR-107 (DIP accelerometer cable to bracket too short) were written.
MAE (MRD08005) XDS 930 Computer (MRD08006)	MRD08005 (MAE, S/N 10, has noisy P_{2b} and N_{3b} detecors) and MRD08006 (XDS 930 computer tone command frequencies out of specification) were written.
Work Order Authorization Log, HEL-005-5 DIP WOA-108	WOA-108 directed routing of DIP accelerometer wiring.

WEEKLY SUMMARY LOG
(28 February through 5 March 1972)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	
APP	Electrical and mechanical systems performed APP1, S/N 10, receiving inspection. The unit was accepted for integration.
Mechanical Log, HEL-002	
Vibration Test	Configured spacecraft for vibration test per HTP-007. Moved spacecraft to vibration chamber and secured to shaker table. Performed and completed vibration test (HTP-007). Installed sensor covers and moved spacecraft to Room 138.
GWP, APP	Removed GWP, S/N 10, and APP, S/N 11, experiments
ACS	and tested ACS for leakage.
Electrical Log, HEL-001	
Vibration/Shock Test	Electrical systems performed the spacecraft vibration and shock test according to HTP-007.
Spacecraft Nonconformance Log, HEL-005-4	There were no SDR's or MR's written during this time period.
Work Order Authorization Log, HEL-005-5	
APP, GWP	WOA-109 removed APP1, S/N 11, and GWP1 and 2, S/N 10, for calibration.
ACS	WOA-110 directed ACS leak test.
Kick Motor	WOA-111 installed kick motor for vibration test.
Kick Motor	WOA-112 removed kick motor.

WEEKLY SUMMARY LOG
(6 March through 12 March 1972)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( ) GWP	Electrical and mechanical systems performed GWP1 and 2, S/N 11, receiving inspection. The unit was accepted for integration.
Mechanical Log, HEL-002	Moved spacecraft to DTC chamber. Prepared, performed, and completed spacecraft boom deployment test. Moved spacecraft from DTC and installed on rotary table for OA Angle Measurement. Prepared, performed, and completed OA Angle Measurement. Moved spacecraft to Room 138.
Electrical Log, HEL-001 Boom Deployment	Spacecraft and GSE moved from vibration to Dynamic Test Chamber (DTC) in Building 10 for the spacecraft boom deployment test, HTP-008. Test completed according to HTP-008, and spacecraft moved to Room 138 of Building 7.
Spacecraft Nonconformance Log, HEL-005-4 ACS (MRD08016)	The following malfunction report (MR) was written during this time period: MRD08016 (The -Y ACS boom [IS34] failed to lock in the deployed position when released on command).
Work Order Authorization Log, HEL-005-5 ACS	WOA-114 readjusted ACS boom switch.

8

WEEKLY SUMMARY LOG
(13 March through 19 March 1972)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( ) GWP APP CAI	Electrical and mechanical systems performed the following inspections: GWP1 and 2, S/N 10, received and rejected per DR 6129 (no connector dust caps). APP1, S/N 11, received and rejected per DR 6123 (no loctite indication). CAI1, S/N 11, received and accepted for integration.
Mechanical Log, HEL-002	Attended safety class for handling pyros. Prepared, performed, and completed EMC test. Prepared spacecraft for Long Functional Test, and supported same. Installed line cutters on pyros. Prepared spacecraft for Thermal Vacuum Test. Started installation of kick motor heater assembly.
Electrical Log, HEL-001 Post Boom Deployment Pre-Final Thermal Vacuum	Electrical systems performed the following special tests: 1) EMC, 2) OA, 3) CHE, 4) IOE, and 5) GNF. A post boom deployment long functional test (LFT) was completed and the pre-final thermal vacuum LFT begun.
Spacecraft Nonconformance Log, HEL-005-4 Boom Restraint Cable SDR-113 TRF Boom SDR-114 XDS 930 Computer Tone Card (MRD08018) CAI (MRD08019) IE14 (MRD08020)	The following SDR's were written during this time period. SDR-113 (boom restraint cable kinking when booms are in the deployed position). SDR-114 (TRF boom scuffed while being folded). The following MR's were written during this time period. MRD08018 (XDS 930 computer tone card out of specification). MRD08019 (CAI1, S/N 11, DS and D8 high count when stimulated). MRD08020 (IE14, S/N 10, no data out of A/D converter).
Work Order Authorization Log, HEL-005-5 GCE, APP GWP LAP Kick Motor CAI IE13, IE14 GME CHE MAE	WOA-115 reinstalled experiments (GCE1, S/N 01; APP1, S/N 11; GWP1 and 2, S/N 10) for thermal vacuum test. WOA-116 directed pressurization of LAP1 and 2, S/N 10, for vibration test. WOA-117 directed installation of kick motor for thermal vacuum test. WOA-118 directed installation of live panels (IP1, solar array) for thermal vacuum test. WOA-119 directed removal of CAI1, S/N 11; IE13, S/N 11; and IE14, S/N 10, for failure checkout. WOA-120 directed removal of GME2, S/N 10, and GME4, S/N 01, for rework. WOA-122 directed removal and rework of CHE1, 2, 3, and 4 (S/N 01, 02, 11, and 02). WOA-123 directed removal and replacement of MAE1 and 2, S/N 10.

WEEKLY SUMMARY LOG
(20 March through 26 March 1972)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( ) GME, CHE IP10, IE14 CHE CHE CHE MAE IE13 Solar Panels	Electrical and mechanical systems performed the following inspections: GME5, S/N 11; CHE3, S/N 11; GME2, S/N 10; GME4, S/N 01; IP10, S/N 10; and IE14, S/N 10 received and accepted for integration. CHE1, S/N 10, was rejected per DR 6092 (front and side panels not riveted and no loctite indication), and DR 6124 (wrong top and bottom cover type). CHE2, S/N 10, was rejected per DR 6093 (front and side panels not riveted and no loctite indication). CHE4, S/N 10, was rejected per DR 6094 (front and side panels not riveted and no loctite indication), DR 6127 (coax connector bent and no protective covers), and DR 6128 (wrong type cover). MAE1, S/N 11, and MAE2, S/N 10, were rejected per DR 6098 (no component history form, non-flight plug not potted, and vacuum port not non-flight identified). IE13, S/N 11, rejected per DR 6083 (no component history form, screw missing, loctite not indicated, 28V ret to signal common <2100 K ohms, and test connector not potted.) Solar panels IP8, S/N's 103, 104, 106, 107, 108, 110, 111, 112, 113, 115, 117, 120, 121, 122, 123, 124, 125, 127, 128, 129, 130, 131, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, were received and all rejected per DR's 6088 (chip in cover glass), 6087 (fingerprints on back of panel), 6089 (chip in cover glass), 6090 (fingerprints on back panel), 6091 (chipped cells), 6095 (turret terminal and ground lug not insulated, no connector protective cover, cell glass cover cracked and peeling), 6096 (same as DR 6095), 6097 (same as DR 6095), 6115 (connectors not potted, no protective cover on connector, no loctite indication, and turret terminal and ground lug not insulated), 6116 (red ink on connector insert, cell cover fractured, glue residue, epoxy on front and back, and cell fractured), 6117 (glue residue and fractures), 6118 (fractures and no output voltage), 6119 (same as DR 6118), 6120 (fractures), 6122 (spots on glass), 6125 (no protective covers, no loctite indication, ground lug not insulated, and connector not potted), and 6126 (28V return shorted to frame).
Mechanical Log, HEL-002 Thermal Vacuum	Supported Long Functional Test and prepared spacecraft for Thermal Vacuum Test. Completed kick motor heater assembly installation. Moved GSE and spacecraft to Building 10 for installation of kick motor. Moved spacecraft and GSE back to Room 138. Configured spacecraft for thermal vacuum test. Moved spacecraft to thermal

REFERENCE	SUMMARY
	vacuum chamber number 238. Assisted in positioning spacecraft in chamber. Supported BRN in troubleshooting chamber hardware. Completed configuration for thermal vacuum test.
Electrical Log, HEL-001 Final Thermal Vacuum Test, HTP-010	Pre-Final Thermal Vacuum LFT completed. Spacecraft moved to thermal vacuum chamber 238 and installed. GSE checkout completed and final thermal vacuum test started.
Spacecraft Nonconformance Log, HEL-005-4	The following SDR's were written during this time period.
Test Solar Panel SDR-115 Thermal Vacuum Chamber SDR-116	SDR-115 (Test Solar Panel - short between chassis and 28V return). SDR-116 (Thermal Vacuum Chamber environment [Temperature: 79°F, RH: 11%] out of specification; see MRD08086).
	The following MR's were written during this time period.
CHE4 (MRD08022) TV Chamber (MRD08086) IC1 (MRD08023)	MRD08022 (CHE4, S/N 10, 07EJ01 connector pin A3 misaligned). MRD08086 (Thermal Vacuum Chamber 238 RH out of specification). MRD08023 (IC1, S/N 10, ACS came up ON, should be OFF).
Work Order Authorization Log, HEL-005-5	No WOA's were written during this time period.

WEEKLY SUMMARY LOG
(27 March through 2 April 1972)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	No experiments or instruments were received during this period.
Mechanical Log, HEL-002	Spacecraft turned over to electrical systems for performance of the Thermal Vacuum Test.
Electrical Log, HEL-001 Final Thermal Vacuum Test, HTP-010	Final thermal vacuum tests continued during this period according to HTP-010.
Spacecraft Nonconformance Log, HEL-005-4	The following MR's were written:
Kick Motor (MRD08024) Data Point (MRD08025) XDS 930 (MRD08026) GME7 (MRD08027) GME2 (MRD08029)	MRD08024 (kick motor thermistors D1 and D2 readout through DST as open). MRD08025 (data point 3300, S/N 876, printout incorrect). MRD08026 (spacecraft did not respond to command 8T from XDS 930 computer due to frequency shift). MRD08027 (GME7, S/N 11, rates $A + B \overline{B} \overline{C}$ should be 0 at +40°C). MRD08029 (GME2, S/N 10 rate S3 was 100,000 counts instead of 0).
Work Order Authorization Log, HEL-005-5	No WOA's were written during this time period.

WEEKLY SUMMARY LOG
(3 April through 9 April 1972)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	No instruments or experiments were received this week.
Electrical Log, HEL-001 Thermal Vacuum Test	Electrical systems performed the continuing Final Thermal Vacuum Test according to Procedure HTP-010.
Mechanical Log, HEL-002 Thermal Vacuum Test	Supported Thermal Vacuum Tests according to Procedure HTP-010.
Spacecraft Nonconformance Log, HEL-005-4 MAE (MRD08030) CHE4 (MRD08031) CAI1 (MRD08032) MAP1 (MRD08033) GWP2 (MRD08035) LAP1 (MRD08036) XDS-930 (MRD08037) APP1 (MRD08038) PCM XMTR IT2 (MRD08041) GCE1 (MRD08039)	MRD08030 (P_2b detector high counts at -20°C). MRD 08031 (CHE4, S/N 10, CKD6 counts high). MRD08032 (CAI1, S/N 11, detectors D3 and D8 noisy). MRD08033 (MAP1, S/N 10, high voltage modulator generator noise when keyed ON). MRD08035 (GWP2, S/N 10, detector A noisy). MRD08036 (LAP1, S/N 10, experiment heater information missing). MRD08037 (XDS-930, Cmd 108T failed to mode DST). MRD08038 (APP1, S/N 10, D_2 noise level high). MRD08041 (PCM XMTR IT2, S/N 10, carrier drop). MRD08039 (GCE1, S/N 10, gain mode for P_1 DS-1 incorrect).
Work Order Authorization Log, HEL-005-05	No work orders were written during this time period.

WEEKLY SUMMARY LOG
(10 April through 16 April 1972)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	No instruments or experiments were received this week.
Electrical Log, HEL-001 Thermal Vacuum Test NTTF Tests	Final Thermal Vacuum Tests completed and and spacecraft moved to Room 138. Spacecraft configured and set up for post thermal vacuum long functional test (LFT). Special NTTF tests were performed.
Mechanical Log, HEL-002 Spacecraft LFT	Moved spacecraft from thermal vacuum test chamber to Room 138. Configured spacecraft for post LFT. Provided support during performance of post thermal vacuum LFT.
Spacecraft Nonconformance Log, HEL-005-4 XDS-930 (MRD08040)	MRD08040 (XDS-930 tone cmds inoperative).
Work Order Authorization Log, HEL-005-5 IP1	WOA 124 directed removal of solar array.

WEEKLY SUMMARY LOG
(17 April through 23 April 1972)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	No instruments or experiments were received this week.
Electrical Log, HEL-001 LFT DST	Performance of post thermal vacuum LFT was completed. Special checks of DST D_1 and D_2 indications were performed.
Mechanical Log, HEL-002 LFT DST	Mechanical systems provide support to the electrical system for the post thermal vacuum LFT and DST checks.
Spacecraft Nonconformance Log, HEL-005-4 PCM RCVR IT4 (MRD08042)	MRD08042 (PCM RCVR IT4, S/N 10, sensitivity varies from -105 to -109 dbm).
Work Order Authorization Log, HEL-005-5 Boom Restraint Cables	WOA 125 directed replacement of boom restraint cables.
GME	WOA 126 directed removal of GME for rework.
OA Sensor	WOA 127 directed removal and reinstallation of OA sensor for calibration.
CAI and MAP	WOA 128 directed removal of CAI and MAP for rework and calibration.
CHE	WOA 129 directed removal of CHE for rework and calibration.
LAP, GWP, APP, GCE, MAE, GOP, GNF, GME, IE2 and IE1	WOA 130 directed removal of LAP, GWP, APP, GCE, MAE, GOP, GNF, GME, IE2 and IE1 for rework and calibration.
Experiment Panels	WOA 131 directed removal, protection, storage and reinstallation of experiment panels.
IS31	WOA 132 directed replacement of hot thermal system.
Kick motor and Heater Assembly	WOA 133 directed rework for kick motor and heater assembly.

WEEKLY SUMMARY LOG
(24 April through 30 April 1972)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( ) GCE, GWP, GOP GNF, CAI GME, GOP GNF, GME, CAI GCE DR6100 GNF1 DR6104	GCE1, S/N 01; GWP1 and 2, S/N 10; GOP1, S/N 10; GNF1, 2 and 3, S/N 10; CAI1, S/N 11; and GME, S/N 02 received for inspection. GOP, GNF1 and 2, GME, and CAI were accepted for integration. GCE was rejected per DR6100 (no front panel rivets and excess epoxy on bottom). GNF1 was reject per DR 6104 (screws not locktited).
Electrical Log, HEL-001	Electrical systems performed upper center tube kick motor heater, tone command, RF, and DST special tests and checks. CAI was re-integrated and tested.
Mechanical Log, HEL-002	Mechanical systems supported all electrical testing, checks and integration.
Spacecraft Nonconformance Log, HEL-005-4	
Thermal Blankets (SDR-117)	SDR-117 (thermal blankets upper shield torn in 2 places).
Heater Blanket (SDR-118)	SDR-118 (heater blanket hole for harness does not agree with Drawing GE 1073284).
Dump Ckt (SDR-119)	SDR-119 (dump ckt transistor leads may be shorting out on metal).
IE 10 (SDR-120)	SDR-120 (10UJ10-36 and 37 reads less than 0.2 ohms to chassis. Drawing 1325-164, C shows an open. 10UJ09-24 and 25 reads less than 0.2 ohms. Drawing 1325-164, C shows an open).
Room 138 Environment (SDR-121)	SDR-121 (Room 138 environment has ammonia vapor).
Work Order Authorization Log, HEL-005-5	
Kick Motor	WOA 134 directed removal of kick motor nozzle.
TRF	WOA 135 directed removal of TRF and DST harness panel for wiring.
Boom inertia weights	WOA 136 directed replacement of experiment boom inertia weights.
Boom EED's	WOA 137 directed removal and replacement of boom EED's.

WEEKLY SUMMARY LOG
(1 May through 7 May 1972)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( ) LAP, CHE GME APP MAE GME (DR6106)	Electrical, Mechanical, and Quality Control performed the following receiving inspections: LAP1, S/N 10; CHE1, 2, and 4, S/N's 10, and CHE3, S/N 11; GME2, S/N 10; GME4, S/N 01; GME5, 6, and 7, S/N's 11; APP1, S/N 10; MAE1, S/N 11; MAE2, S/N 10. All experiments were accepted for integration except for GME5, 6, and 7, S/N's 11. GME5, 6, and 7 were rejected per DR6106 (front panel not riveted), and conditionally accepted for integration.
Mechanical Log, HEL-002	Supported electrical systems in performing pre-thermal vacuum test number 3. Covered and purged spacecraft when overheated transformer fumes entered Room 138. Cleaned and performed general spacecraft work including installation and removal of experiments, loctiting, thermal blanket installation, and replacement of spent EED's.
Electrical Log, HEL-001	Continued pre-thermal vacuum number 3 long functional test.
Spacecraft Nonconformance Log, HEL-005-4 Spacecraft CHE (MRD08043) APP	The following SDR's and MR's were written during this time period. SDR #122 (heavy odor in Room 138). SDR #123 (CHE improperly delivered). MRD08043 (APP does not respond to Cmd 123T).
Work Order Authorization Log, HEL-005-5 RF Solar Panels	The following WOA's were written during this time period. WOA #138 (remove and replace RF stack). WOA #140 (install flight solar panels).

WEEKLY SUMMARY LOG
(8 May through 14 May 1972)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( ) APP	Electrical, Mechanical, and Quality Control performed APP1, S/N 10, receiving inspection. APP was accepted for spacecraft integration.
Electrical Log, HEL-001 TV #3	Completed long functional test for TV #3. Turned spacecraft over to Mechanical Systems to configure for thermal vacuum (TV) #3. Prepared spacecraft for transfer to TV chamber 238. Prepared TV chamber 238 for TV #3. Transferred spacecraft to TV chamber 238. Configured spacecraft for TV #3. Started TV #3.
Mechanical Log, HEL-002 TV #3	Mechanical Systems readied the spacecraft for thermal vacuum test #3 including experiment and ACS boom restraint cables, and spacecraft test configuration per TV #3 procedure HTP-015. Moved spacecraft into thermal vacuum chamber 238 and assisted in GSE hookup.
Spacecraft Nonconformance Log, HEL-005-4 SAS (MRD08044) Spacecraft (MRD08045) Flippers (MRD08046) CAI (MRD08047) CAI (MRD08048) CHE (MRD08049)	The following SDR's and MR's were written during this time period. MRD08044 (SAS output fluctuates). MRD08045 (spacecraft does not respond to PCM Cmds). MRD08046 (flags indicate flipper did not flip). MRD08047 (detector D10 with no source stimulation,out-of-tolerance at -20°C). MRD08048 (cmds 88T and 85T,at -20°C,did not put detector D3 off line). MRD08049 (PH1, 2 and 4 do not alternate on PR O at -20°C).
Work Order Authorization Log, HEL-005-5 APP GSE	The following WOA's were written during this time period. WOA #141 (remove APP experiment for check). WOA #142 (investigate command problem).

WEEKLY SUMMARY LOG
(15 May through 21 May 1972)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	No experiments or instruments were received during this week.
Electrical Log, HEL-001 TV #3	Performed and completed TV #3. Transferred spacecraft from TV chamber 238 to Room 138.
Mechanical Log, HEL-002	Spacecraft thermal vacuum test #3 completed. Mechanical Systems prepared and moved the spacecraft back to Room 138. Continued GNF boom damage investigation including X-rays.
Spacecraft Nonconformance Log, HEL-005-4 CAI (MRD08050) APP (MRD08063) CAI (MRD08065) CAI (MRD08066) GOP (SDR #124)	The following SDR's and MR's were written during this time period. MRD08050 (CAI - D2H > D2, should be D2H < D2). MRD08063 (APP does not go into calibrate mode on Cmd 60T). MRD08065 (CAI detector D7 has high counts during TV #3). MRD08066 (Cmd did not put CAI detector D10 off line). SDR #124 (depression in GOP bottom cover).
Work Order Authorization Log, HEL-005-5 GNF CHE, GOP Exp. Panels T&E Thermistor MAE	The following WOA's were written during this time period. WOA 143 (repair GNF boom tube). WOA 144 (remove CHE & GOP experiments for calibration). WOA 145 (remove experiment panels for strip coat). WOA 146 (remove T&E thermistor harness). WOA 147 (remove MAE for repair).

WEEKLY SUMMARY LOG
(22 May through 28 May 1972)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( ) CHE MAE, MAP CAI, GME GME (DR6159)	Electrical, mechanical, and quality control performed the following receiving inspections: CHE1, 2, 4, S/N's 10; CHE3, S/N 11; MAE1, S/N 11; MAE2, S/N 10; MAP1, S/N 10; CAI1, S/N 11, GME2, S/N 10; GME4, S/N 01; and GME5, S/N 11. All experiments were accepted for integration except for GME2 and 4. GME2 and 4 were rejected per DR6159 (two screws missing from top cover), and conditionally accepted for integration.
Electrical Log, HEL-001 GME, GCE MAE, CHE, RF, Spacecraft	Performed GME and GCE source checks. Performed special tests on the MAE and CHE experiments, and RF system. Reconfigured spacecraft for Mass Measurements.
Mechanical Log, HEL-002 Spacecraft	Supported Electrical Systems test of instruments and experiments. Loctite painted thru bolts and inspected boom flipper mechanism as part of post TV #3 spacecraft verification. Mounted nutation damper in middle birdcage. Installed flight solar panels.
Spacecraft Nonconformance Log, HEL-005-4 CHE Solar Panel	The following SDR's and MR's were written during this time period. SDR #125 (part of CHE thru bolt remained in spacecraft when removing). SDR #126 (cracked solar panel cover glass). MRD 03386 (no output from solar panel IP1). MRD 03387 (test solar panel sensor leads connected improperly).
Work Order Authorization Log, HEL-005-5 CAI Spacecraft MAP Spacecraft	The following WOA's were written during this time period. WOA #148 (remove CAI for mass measurements). WOA #149 (loctite thru bolts). WOA #150 (install MAP for mass measurements). WOA #151 (install nutation damper).

WEEKLY SUMMARY LOG
(29 May through 4 June 1972)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( ) GOP	Electrical, Mechanical, and Quality Control performed GOP1, S/N 10, receiving inspection. GOP was accepted for spacecraft integration.
Mechanical Log, HEL-002 Spacecraft; Center-Of-Gravity; Spin Balance	Mechanical Systems prepared the spacecraft for weighing. The spacecraft was moved to Building 10 scales and weighed prior to performing center-of-gravity measurements. From center-of-gravity measurements the spacecraft was moved to Building 15 spin balance fixture. At spin balance, the spacecraft was readied for spin balance operations.
Electrical Log, HEL-001 Spacecraft; GSE	Spacecraft turned over to Mechanical Systems for Mass Measurements. Electrical Systems performed GSE checkout and verification during this period.
Spacecraft Nonconformance Log, HEL-005-4	No spacecraft SDR's or MR's were written this period.
Work Order Authorization Log, HEL-005-5	WOA-152 directed installation of the nutation damper into the spacecraft.

WEEKLY SUMMARY LOG
(5 June through 11 June 1972)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	No experiments or instruments were received this week.
Mechanical Log, HEL-002 Mass Measurements, HTP-012	Mechanical Systems continued performance of Mass Measurements per Procedure HTP-012. Specifically, initial spacecraft spin balance including boom and spacecraft weights and weight location was determined.
Electrical Log, HEL-001 Spacecraft	Electrical Systems investigated spacecraft operation caused by overhead lights. This occurred while Mechanical Systems was performing Mass Measurements.
Spacecraft Nonconformance Log, HEL-005-4	No spacecraft nonconformances were reported this week.
Work Order Authorization Log, HEL-005-5 Spacecraft Weights	WOA-153 directed rework of boom inertia weight. WOA-154 directed installation of boom inertia weights. WOA-155 directed installation of balance trim weights.

WEEKLY SUMMARY LOG
(12 June through 18 June 1972)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	No experiments or instruments were received this week.
Mechanical Log, HEL-002 Mass Measurements Kick Motor	Mechanical Systems continues performance of Mass Measurements per Procedure HTP-012. The kick motor interface and alignment were verified. All weights were installed and balance verification runs performed. The kick motor was installed, and spin balance and center-of-gravity performed. Finally, the spacecraft/kick motor was weighed.
Electrical Log, HEL-001	Electrical Systems performed documentation review, GSE tests, and reviewed techniques for ETR launch operations.
Spacecraft Nonconformance Log, HEL-005-4	No spacecraft nonconformances were reported this week.
Work Order Authorization Log, HEL-005-5	WOA-156 directed an increased hole diameter in Upper RF Shield for kick motor mounting.

WEEKLY SUMMARY LOG
(19 June through 25 June 1972)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	No experiments or instruments were received this week.
Mechanical Log, HEL-002 Mass Measurements, HTP-012	Mechanical Systems continues performance of Mass Measurements per Procedure HTP-012. During this week, Mechanical Systems completed MOI measurements with the kick motor installed.
Electrical Log, HEL-001	Electrical Systems continued software review and revision, and GSE checkout.
Spacecraft Nonconformance Log, HEL-005-4	No spacecraft nonconformances were reported this week.
Work Order Authorization Log, HEL-005-5	WOA-157 directed removal of solar panels for access to experiment boom attaching structure. WOA-158 directed a change in the solar panel test sense leads.

WEEKLY SUMMARY LOG
(26 June through 2 July 1972)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	No experiments or instruments were received this week.
Mechanical Log, HEL-002 Mass Measurements, HTP-012	Mechanical Systems continued performance of Mass Measurements per Procedure HTP-012. MOI measurements with kick motor installed were completed. Boom weights were installed and kick motor removed and weighed. The spacecraft, less kick motor, center-of-gravity was performed. Completing center-of-gravity, the spacecraft was moved to the MOI test facility for further MOI tests.
Electrical Log, HEL-001	Electrical Systems continued review and revision of software.
Spacecraft Nonconformance Log, HEL-005-4	No spacecraft nonconformances were reported this week.
Work Order Authorization Log, HEL-005-5	
Booms	WOA-159 directed modification of boom inertia weights.

WEEKLY SUMMARY LOG
(3 July through 9 July 1972)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	No experiments or instruments were received this week.
Mechanical Log, HEL-002	
Final Mass Measurement and Balance, HTP-012	Mechanical Systems completed final spacecraft mass measurement and balance per procedure HTP-012.
Electrical Log, HEL-001	Electrical Systems performed software review and correction while the spacecraft was undergoing final mass measurement and balance.
Spacecraft Nonconformance Log, HEL-005-4	No spacecraft nonconformances were reported this week.
Work Order Authorization Log, HEL-005-5	The following WOA's were written and performed: WOA-160 installed ramp onto CHE3 telescope. WOA-161 installed inertia booms. WOA-162 replaced MAE. WOA-163 removed MAP1, S/N 10. WOA-164 installed balance trim weights. WOA-165 removed GME5, S/N 11, for rework.

WEEKLY SUMMARY LOG
(10 July through 16 July 1972)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	
GME	GME5, S/N 11, was inspected by Electrical Systems, Mechanical Systems, and Q.C., and rejected for the following: top cover not flush and metal cracked around screw hole. The unit was conditionally accepted for integration.
Solar Panel	Solar panel IP1, S/N 146, was inspected and accepted for integration.
Mechanical Log, HEL-002	
Final Vibration, HTP-013 Spacecraft Testing, HTP-013	Mechanical Systems readied the spacecraft for final vibration testing per HTP-013 and turned spacecraft over to Electrical Systems for pre-vibration spacecraft checkout. Assisted T&E in performing CG and weighing of MAE experiment. Rework nylon standoffs on solar panel protective covers, installed nutation damper and balance weights. Moved spacecraft to vibration cell 210 and began setup.
Electrical Log, HEL-001	
GSE Spacecraft	Electrical Systems performed a complete GSE checkout and reduced long functional test of spacecraft systems prior to performing final vibration testing.
Spacecraft Nonconformance Log, HEL-005-4	No spacecraft nonconformance were reported.
Work Order Authorization Log, HEL-005-5	The following WOA's were completed: WOA-166 removed and installed solar panels. WOA-167 removed nutation damper for thermal painting. WOA-168 installed accelerometer for vibration test. WOA-169 pressurized LAP for vibration test. WOA-170 installed kick motor for vibration tests. WOA-171 reworked spare GNF1, S/N 10, flipper. WOA-172 added vent holes to booms. WOA-173 reworked solar panel covers. WOA-174 secured balance weights in spacecraft.

WEEKLY SUMMARY LOG
(17 July through 23 July 1972)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( ) GNF (DR7452)	Electrical, Mechanical Systems, and Q.C. performed the following receiving inspections: GNF2, S/N 11, rejected per DR7452 (no component history form, 15-pin connector bent, tape on inside cover, residual glue, and cover bent).
GNF (DR7451)	GNF3, S/N 11, rejected per DR7451 (no component history form, unapproved tape on cover, no connector protective cover, thermal paint chipped, and connector potting overflow).
GNF (DR7453)	GNF1, S/N 11, rejected per DR7453 (no component history form, vapor deposit and aluminum delaminating from bottom and no connector covers).
Mechanical Log, HEL-002 Kick Motor Vibration Tests HTP-013 LAP Kick Motor F-2 Countdown Dry Run	Mechanical Systems completed spacecraft setup for final vibration testing including kick motor installation and LAP pressurization. Mechanical Systems continued to support vibration testing per HTP-013. Vibration testing completed and spacecraft moved back to Room 138. Kick motor was removed, LAP depressurized, and spacecraft set up for countdown day F-2 dry run. The dry run was supported by Mechanical Systems.
Electrical Log, HEL-001 IOE, CAI F-2 Day Countdown Spacecraft	Electrical Systems performed IOE and CAI special tests. Completed final spacecraft vibration tests and F-2 Day Countdown dry run. Spacecraft GSE was prepared for move to Magnetic Test Site.
Spacecraft Nonconformance Log, HEL-005-4 DPU Solar Panel	The following nonconformances were written: MRD08067 (IE14, S/N 10, temperature readout is erratic). Solar panel IP1, S/N 122, cell A12 chipped/cracked.
Work Order Authorization Log, HEL-005-5	The following WOA's were written: WOA-175, loctite experiment panel hardware. WOA-176, loctite solar panel hardware.

WEEKLY SUMMARY LOG
(24 July through 30 July 1972)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	No experiments or instruments received this week.
Mechanical Log, HEL-002	
Final Magnetic Measurement and Calibration, HTP-014	Mechanical Systems prepared spacecraft for final magnetic measurement testing and calibration per HTP-014. Moved the spacecraft to the test site, set up, and supported testing.
Electrical Log, HEL-001	
Final Magnetic Measurement and Calibration, HTP-014 Solar Panel	Electrical Systems completed final magnetic measurements and calibration per procedure HTP-014, including a solar panel operation check.
Spacecraft Nonconformance Log, HEL-005-4 Antennas SAS (MRD03388)	The following nonconformances were reported: Antenna rod bent slightly and MRD03388 (SAS shutdown during F-2 day countdown dry run causing spacecraft to switch to internal battery.)
Work Order Authorization Log, HEL-005-5	No work orders were written this week.

WEEKLY SUMMARY LOG
(31 July through 6 August 1972)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	
MAE	MAE1-11 and MAE 2-10 received and passed incoming inspection.
Mechanical Log, HEL-002	
Spacecraft LFT	Mechanical Systems transported the spacecraft from the Mag Site to Building 7 to set up for special RF testing in the Screen Room. Supported EMI testing and prepared the spacecraft for the pre-shipment LFT and supported the testing.
Electrical Log, HEL-001	
EMI Test LFT LFT CHE GME	Conducted a special EMI test in shield room. The pre-shipment to ETR, Long Functional Test, was started in Room 138, Building 7. During the LFT, Electrical Systems conducted special ampere-hour tests on the flight battery. A special RF test was conducted for CHE and a Mu-Meson run conducted for GME.
Spacecraft Nonconformance Log, HEL-005-4	
IP1 CHE GME	The following nonconformances were written: SDR-131 (solar panel, IP1, cover glass broken), MRD03389 (CHE4-10 main telescope D6 had a light leak), MRD08725 (CHE4-10 D1 mode was ocassionally noisy), MRD08726 (GME1-02 improper operation of thermostat).
Work Order Authorization Log, HEL-005-5	
Solar Panels HRC K/M Insulator Ring Inertia Booms	The following WOA's were written: WOA-177 (remove solar panels), WOA-178 (pot HRC for use at ETR), WOA-180 (remove kick motor insulator ring), WOA-181 (install restraint eyebolts in inertia booms).
MAE	The following WOA was completed: WOA-162 (MAE1-11, MAE2-10 installed).

WEEKLY SUMMARY LOG
(7 August through 13 August 1972)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( ) MAP, LAP, IP1, IP10, GME	MAP1-10 received with non-flight plugs; MAP1-10-1 and 1-10-2 were inspected and accepted. LAP1-10 and 2-10 were received and rejected by QC per DR5324 (high voltage not connected to analyzer plates, and no loctite indication on front panel). IP1 serial numbers 102, 118, 123, 106, 108, 100, 119, 122, 131, 149, 101, 145, 104, 128, 146, 135, 148, 116, 150, 124, 105, 147, and 132, were received and rejected on various defect reports (chips, cracks, and dirt). IP10-10 was received and rejected per DR6096 (excess potting material, cracks, chips). GME2, 4-10 were received and accepted for integration.
Mechanical Log, HEL-002 LFT, MAP, Encoder	Mechanical Systems supported the pre-shipment LFT and started final preparations to move to ETR. Assisted in MAP Data Line troubleshooting by removing and reinstalling both MAP and the encoder. Encoder installation was accomplished without any problems.
Electrical Log, HEL-001 LFT, MAP, Harness, Encoder, SFT	The Long Functional Test was completed. A problem with MAP was investigated and found to be a low resistance short in the harness cable to the encoder. To verify the problem was in the harness, the encoder was disengaged. After re-installation, a short functional test was conducted.
Spacecraft Nonconformance Log, HEL-005-4 IE10	The following nonconformance was written: MRD08729 (IE10 5k ohm short in harness data line from Encoder to MAP).
Work Order Authorization Log, HEL-005-5 LAP, GME, MAP, GNF, HRC, Inertia Booms	The following WOA's were written: WOA-184 (remove LAP1 and 2-10 to investigate malfunction), WOA-185 (remove GME2-10 and GME4-01 to investigate malfunction), WOA-186 (install MAP), WOA-187 (remove MAP for investigation of malfunction), WOA-188 (GNF3-10 removed for investigation of MAP/Encoder problem). The following WOA's were completed: WOA-179 (pot HRC for ETR use), and WOA-181 (install restraint eybolts in inertia booms).

WEEKLY SUMMARY LOG
(14 August through 20 August 1972)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( ) GNF IP1	GNF2-11 received and rejected per DR7452 (no component history form; 15P connector case bent; tape on inside rim of top cover; residual glue on covers; top corner of cover bent; covers not taped in flight configuration). IP1-121 and 146 received and accepted by QC.
Mechanical Log, HEL-002 Spacecraft	Mechanical Systems completed preparations for shipping the spacecraft to ETR. Assisted GSFC in loading the spacecraft shipping container on the transporter and provided one vehicle and two people for the convoy. On 8/18, the spacecraft was offloaded in Hangar S at ETR and secured under GN2 purge for the weekend.
Electrical Log, HEL-001	No activity.
Spacecraft Nonconformance Log, HEL-005-4	No spacecraft nonconformances were written.
Work Order Authorization Log, HEL-005-5 K/M Insulator Experiment Panel Solar Panel CHE LAP GME MAP, CAI GNF, LAP K/M Insulator	The following WOA was written: WOA-190 (rework kick motor insulator). The following WOA's were completed: WOA-175 (loctite experiment panel hardware), WOA-176 (loctite solar panel hardware), WOA-177 (reinstall solar panels), WOA-183 (add screws to CHE4-10 to block light leak), WOA-184 (LAP1-10, LAP2-10 reinstalled), WOA-185 (GME2-10, GME4-01 reinstalled), WOA-186 (MAP1-10, CAI1-11 reinstalled), WOA-188 (GNF3-10 reinstalled), WOA-189 (LAP1-10, LAP2-10, remove LAP EED), WOA-190 (rework kick motor insulator).

WEEKLY SUMMARY LOG
(21 August through 27 August 1972)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( ) MAE GCE	MAE1-11 and 2-10 were received and accepted. GCE1-01 received and rejected per DR1356 (one screw on top cover pulled through cover, excess epoxy paint on all screws, dust particles on front of experiment).
Mechanical Log, HEL-002 Spacecraft Encoder/MAP Pyros ACS, LFT Kick Motor Heater	Mechanical Systems mated the spacecraft to a dummy third stage to perform a Delta fit check. WOA-191 was supported by encoder removal and reinstallation for installation of another MAP Data Line. Supported the following operations in Hangar S at ETR: Pyro installation, ACS leak test, long functional test. Performed receiving inspection on the kick motor and heater assembly.
Electrical Log, HEL-001 GSE MAP/Encoder Final LFT GCE GME, GCE MAE	Setup of electrical GSE for spacecraft operation was completed. Lines from ETR to GSFC were checked. The shorted cable between MAP and the encoder was disconnected and a new replacement cable installed. The final long functional test was started. Special GCE RF and spacecraft receiver desensitization tests were conducted. A GME Mu-Meson run, GCE source run, and MAE pulser test were conducted.
Spacecraft Nonconformance Log, HEL-005-4 MAP GME APP Computer MAE	The following nonconformances were written: MRD08722 (MAP1-10 starting energy level in spectrums five and six were incorrect), MRD08721 (GME6-11 logic function rates read one-half of the expected value), MRD08724 (APP1-10 C2 discriminator did not function, in-flight calibration gave incorrect values for C2 and C3), MRD08723 (GSE-computer-spacecraft did not respond to six commands when computer was used for quick turn on). MRD09080 (MAE2-10 GSE setup for pulser calibration run, N3B linear channel generated inconsistent data).

REFERENCE	SUMMARY
Work Order Authorization Log, HEL-005-5	
IE1	The following WOA was written: WOA-197 (IE1-102 install OA collimator).
MAP/Encoder MAE Solar Panels Red Tag Items Accelerometer MAE IOE IP1 APP/GWP GME Experiment Panel	The following WOA's were written and completed: WOA-191 (MAP/Encoder harness rework), WOA-192 (MAE1-11, MAE2-10 removed for test and reinstalled), WOA-193 (remove and reinstall solar panels for ACS leak test), WOA-194 (remove and weigh red tag items), WOA-195 (remove T&E accelerometer), WOA-196 (MAE1-11 -- removed sensor cover), WOA-198 (IOE1-01 -- loctite IOE collimators), WOA-199 (IP1-1 -- remove/reinstall solar panel and remove loose screw), WOA-200 (remove/reinstall APP and GWP), WOA-201 (GME2-10 -- remove pins from GME2 plug), WOA-202 (remove/reinstall facet 16 experiment panel).

WEEKLY SUMMARY LOG
(28 August through 3 September 1972)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	No instruments or experiments were received during this period.
Mechanical Log, HEL-002	
LFT HCM-001 Spacecraft	Mechanical Systems worked in Hangar S to support the spacecraft long functional test. Participated in the final ACS fill operation, and the Task 1 Dry Run. Spacecraft Open Items were worked off and the spacecraft was prepared for transport to the Spin Balance Facility (SBF).
Electrical Log, HEL-001	
CHE LFT Spacecraft CHE	A Mu-Meson run for CHE was conducted. The long functional test of the IMP H spacecraft was completed. The spacecraft was configured for the F-3 Day Dry Run, and the test was conducted. A special test for CHE was conducted.
Spacecraft Nonconformances Log, HEL-005-4	No spacecraft nonconformances were written.
Work Order Authorization Log, HEL-005-5	
Open Items	The following WOA was written: WOA-204 (open work items list).
Lower Center Tube Spacecraft ACS Boom	The following WOA's were written and completed: WOA-203 (inspect lower center tube), WOA-205 (spacecraft configuration photographs), WOA-206 (repair potting on ACS boom position switch wires).

WEEKLY SUMMARY LOG
(4 September through 10 September 1972)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	No instruments or experiments were received during this period.
Mechanical Log, HEL-002 Spacecraft, HOP-002 OA Angular Meas. Kick Motor K/M Heater Pyrogen Spacecraft	Mechanical Systems transported the spacecraft to SBF per HOP-002, and performed an OA Angular Measurement Procedure, HMP-001. The kick motor was installed in the spacecraft and measurements were taken to support thrust vector alignment. The kick motor heater assembly was secured to the spacecraft. Damage to one pyrogen connector was detected and a repair was made. The spacecraft was weighed by the Delta personnel and secured to the third stage. Preparations were completed for transport to Complex 17.
Electrical Log, HEL-001	No activity.
Spacecraft Nonconformances Log, HEL-005-4	No spacecraft nonconformances were written.
Work Order Authorization Log, HEL-005-5	The following WOA was written: WOA-207 (repair shield wire on kick motor pyro connector).

WEEKLY SUMMARY LOG
(11 September through 17 September 1972)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	No instruments or experiments were received during this period.
Mechanical Log, HEL-002	
Spacecraft	Mechanical Systems monitored transport of the spacecraft from SBF to Pad 17B and mate to the booster. A GN2 purge was applied to the spacecraft until the white room relative humidity was brought under control. A spacecraft monitor was on the Gantry 9A Level at all times when the pad was open for work. The fairing installation and removal was monitored and problems with umbilical lanyards were detected.
Electrical Log, HEL-001	
Spacecraft	With the spacecraft on the gantry, a communications check was conducted to verify receipt of RF at Hangar S, command capability from Hangar S to the spacecraft, and operation of the lines between ETR and GSFC. The spacecraft was energized for a vehicle RFI test.
Spacecraft Nonconformance Log, HEL-005-4	The following spacecraft nonconformance was written: MRD09082 (antenna release cord could not be removed from spacecraft with fairing installed).
Work Order Authorization Log, HEL-005-5	The following WOA was written: WOA-208 (loctite and indicate experiment restraint turnbuckles).

WEEKLY SUMMARY LOG
(18 September through 24 September 1972)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	No instruments or experiments were received during this period.
Mechanical Log, HEL-002 HCM-001	Mechanical Systems worked in support of the Countdown Manual on electrical checkout, strip coat removal, solar panel final checks, and final flight configuration. The Red Tag Box was checked and secured by QC. Fairing installation was monitored. IMP H was launched on 9-22-72.
Electrical Log, HEL-001	The spacecraft was energized for the F-3 Day checkout (Task 1), F-2 Day Post Fairing Installation (Task 7), F-0 Day Pre-Tower Removal (Task 8), and Terminal Count (Task 9). The spacecraft was launched on September 22.
Spacecraft Nonconformances Log, HEL-005-4	No spacecraft nonconformances were written.
Work Order Authorization Log, HEL-005-5	The following WOA's were completed: WOA-197 (install OA collimators), WOA-207 (repair shield on kick motor pyro connector), WOA-208 (loctite and indicate experiment restraint turnbuckles).

WEEKLY SUMMARY LOG
(25 September through 1 October 1972)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( ) CHE	CHE1-01, 2-02, 3-12, and 4-02 were received and rejected per DR4449 and 4450 (dimensions out of tolerance, and units not loctite indicated).
Mechanical Log, JEL-002	
IMP H Spare	Mechanical Systems disassembled the IMP H spare flipper/sensor/canister assembly and returned the sensor to the experimenter.
Electrical Log, JEL-001	Electrical Systems unpacked equipment shipped back from ETR and began GSE setup for IMP J integration. Power was not applied to the IMP J spacecraft during this period.
Spacecraft Nonconformances Log, JEL-005-4	No spacecraft nonconformances were reported during this period.
Work Order Authorization Log, JEL-005-5	No work orders were written or completed during this period.

WEEKLY SUMMARY LOG
(2 October through 8 October 1972)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	
IT2-13 IT3-03 IT4-03 IT6-13	Quality Control received IT2-13, IT3-03, and IT4-03, and rejected them per DR6166, DR6165, DR6167, respectively (component history form did not indicate test status and package dimensions did not meet acceptable tolerance). IT6-13 was received, inspected, and accepted.
Mechanical Log, JEL-002 EFM Antenna EFM Preamp Line Cutters RF Shield/Antennas GWP	Mechanical Systems installed the following items on the spacecraft: (a) heat sink screws for the EFM Antenna Mechanisms, (b) EFM Preamplifier platforms, and (c) Line Cutters were added to the birdcages. Mechanical Systems removed the lower RF Shield and RF Antennas from the spacecraft for thermal painting, and (d) removed malfunctioning GWP experiment from spacecraft.
Electrical Log, JEL-001	
GSE GWP PCM/Analog Xmtrs. RF Link	Electrical Systems: (a) unpacked and configured GSE; (b) integrated IMP H Umbilical Test Console with IMP J Solar Array Simulator, Brush Recorder, and OA GSE; (c) checked out all GSE lines to spacecraft; (d) integrated GWP Experiment; (e) monitored baseline RF power output from PCM and Analog Transmitters; (f) tested and used hardline command from GSFC; (g) verified RF link to Building 11 Computer.
Spacecraft Nonconformance Log, JEL-005-4	No spacecraft nonconformances were written during this week.
Work Order Authorization Log, JEL-005-5	No work order authorizations were written during this week.

WEEKLY SUMMARY LOG
(9 October through 15 October 1972)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	
IT9-12	Quality Control received IT9-12 and rejected it per DR6169, DR6170, and DR7482 (component history form did not indicate test status, package dimensions did not meet acceptable tolerance, top and bottom covers were not available, and electrical wiring errors existed in the package).
IT12-12	IT12-12 was received, inspected, and accepted.
Mechanical Log, JEL-002 Line Cutters Plume Shields	Mechanical Systems manufactured nylon saddles and installed them on each Line Cutter assembly Plume Shields were installed on the upper birdcage. Incoming inspection and fit-checks were performed on various Instrumenter/Experimenter packages.
Electrical Log, JEL-001 Seq. Decoder & Rcvr. PCM Transmitter Tone Rcvr & Decoder Analog Transmitter R&RR and PCM Rcvr.	Electrical Systems: (a) integrated the flight Sequential Decoder and Receiver; (b) integrated the flight PCM Transmitter; (c) obtained initial sensitivity measurements of Tone Receiver and Decoder; (d) integrated the flight Analog Transmitter; and (e) integrated the flight Range and Range Rate and PCM Receiver.
Spacecraft Nonconformance Log, JEL-005-4	No spacecraft nonconformances were written during this week.
Work Order Authorization Log, JEL-005-5	No work order authorizations were written during this week.

WEEKLY SUMMARY LOG
(16 October through 22 October 1972)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	
IT10-12	Quality Control received IT10-12 and rejected it per DR7483 and DR7488 (component history form did not indicate test status, package dimensions did not meet acceptable tolerance, and connector
GME2-11 GME4-02	shell was damaged). GME2-11 and GME4-02 were received and rejected per DR7485 and DR7489, respectively (top and bottom covers had to be replaced, and cover screws were missing).
GME5-03	GME5-03 was received and rejected per DR7487 (package identification markings were for IMP I).
GME6-02	GME6-02 was received and rejected per DR7486 (component history form did not indicate test status, package identification markings were
GME7-10	for IMP I). GME7-10 was received and rejected per DR7484 (package height and thrubolt holes did not meet acceptable tolerances).
Mechanical Log, JEL-002 Boom Restraints	Mechanical Systems rigged nylon pullies for the Boom Restraint Systems and began preliminary work on the experiment panels.
Electrical Log, JEL-001 MAP GME	Electrical Systems made special OA checks to determine interference on MAP OA Center Sun Pulse line. Integration was begun on the GME Experiment.
Spacecraft Nonconformance Log, JEL-005-4 System Programmer	The following nonconformance was written: SDR-611 (System Programmer, IT9, signal common and 28V return pins were wired incorrectly).
Work Order Authorization Log, JEL-005-5	No work order authorizations were written during this week.

WEEKLY SUMMARY LOG
(23 October through 29 October 1972)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( ) IE3-12 IT10-12	Quality Control received IE3-12 and returned it to GSFC since it failed to pass visual inspection prior to formal receiving inspection. IT10-12 was received again and was rejected again for the same reasons as stated in the previous weekly log.
Mechanical Log, JEL-002 Exp. Booms Plume Shields	Mechanical Systems performed incoming inspection and fit-checks on various Instrumenter/Experimenter packages. Experiment booms were cut to length and insert bonded. Also, the ACS and GNF plume shields were modified with the latest cutouts and were fit-checked on the upper birdcage.
Electrical Log, JEL-001 GME Exp. Programmer	Electrical Systems continued integrating the GME Experiment and began integration of the flight Experiment Programmer.
Spacecraft Nonconformance Log, JEL-005-4 GME4 (LED)	The following nonconformance was written: SDR-612 (LED Detector, GME4, package does not mate correctly in spacecraft since there was not a square fit of LED to the harness connector).
Work Order Authorization Log, JEL-005-5	No work order authorizations were written during this week.

WEEKLY SUMMARY LOG
(30 October through 5 November 1972)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	Quality Control received IE11-11 and rejected it per DR7502 (component history form did not indicate test status). IT9-12 was received and rejected per DR7504, DR7505, and DR7589 (component history form did not indicate test status and electrical wiring errors existed in the package). IT9-13 was received and rejected per DR7503 (component history form did not indicate test status, top and bottom covers were not supplied, screws were not loctite indicated, package dimensions did not meet acceptable tolerance). IOF1-10 was received and rejected per DR7491 (component history form did not indicate test status, no shipping report was supplied, and a flight cover was required for a test connector). IOF2-10, -11, and -12 were received and rejected per DR7497 (screws were missing and were not loctite indicated, and no covers were on connectors). IOF3-10 was received and rejected per DR7499 (no shipping report was supplied, and preamplifier cover was dented). IOE1-12 was received and rejected per DR7494 (component history form did not indicate complete test status). MAE1-10 and MAE2-11 were received and rejected per DR7495 and DR7496 (component history forms were not supplied, package appearance was not acceptable, screws and connector standoffs were not loctite indicated, location of connector was out-of-tolerance, and connector mating required some modification to the spacecraft). IOF3-11, IOF4-10, -11, and IT11-12 were received, inspected, and accepted. IT11-13 was received and placed into storage before being submitted to formal Receiving Inspection.
Mechanical Log, JEL-002	Mechanical Systems supported integration of the IMP J spacecraft in the EMR laboratory. The following experiments were integrated: IOF, GME, IOE, and MAE. Fabricated experiment panels for seven facets. Prepared several experiment boom parts for moly-koting. Performed work on the upper birdcage (solar array support frame).

REFERENCE	SUMMARY
Electrical Log, JEL-001	Electrical systems: (a) integrated the flight Experiment Programmer, (b) integrated the IOF and IOE Experiments, (c) checked out cabling on middle birdcage, and (d) performed special GME testing.
Spacecraft Nonconformance Log, JEL-005-4	The following nonconformances were written: SDR-613 (Experiment Programmer, IT10, all commands were not being received); SDR-614 (Experiment Programmer, IT10, command 60P does not activate relay); SDR-615 (Harness, broken wire on 18EJ03). SDR-614 was closed out during this week.
Work Order Authorization Log, JEL-005-5	No work order authorizations were written during this week.

WEEKLY SUMMARY LOG
(6 November through 12 November 1972)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	Quality Control received CHE1-11 and rejected it per DR7492 (package dimensions did not meet acceptable tolerance, and screws were not loctite indicated). CHE3-12 was received and rejected per DR7500 (component history form did not indicate test status, screws were not loctite indicated, and screws were not flush with package). CHE4-11 was received and rejected per DR7501 and DR7510 (package height did not meet acceptable tolerance, package appearance was not acceptable, screws were not loctite indicated, and electrical wiring errors existed in the package). CHE2-11 was received, inspected, and accepted. CAI1-12 was received for fit check only.
Mechanical Log, JEL-002	Mechanical Systems supported integration of the IMP J spacecraft in the EMR laboratory. The following experiments and instruments were integrated: MAE, Deployment Programmer, and CHE. Continued preparation of the lower birdcage and experiment panels. Initiated work on IMP J thermal blankets. Fit checked the CAI experiment and shimmed its harness panel.
Electrical Log, JEL-001	Electrical Systems: (a) integrated CHE1 and MAE1 and 2 Experiments, (b) performed IOF special test, (c) changed wiring to Separation Switch, and (d) started integrating the flight Deployment Programmer.
Spacecraft Nonconformance Log, JEL-005-4	No spacecraft nonconformances were written during this week. SDR-611 was closed out during this week.
Work Order Authorization Log, JEL-005-5	WOA-001 directed changes to the separation switch wiring.

WEEKLY SUMMARY LOG
(13 November through 19 November 1972)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	Quality Control received GNF1-11 and rejected it per DR7603 (connector gold plating faulty). GNF3-12 was received and rejected per DR7605 (package height did not meet acceptable tolerance and Malfunction Reports were still open). GNF2-11 was received, inspected, and accepted. IT10-12 was received and rejected per DR7507 (package covers were too large and rear connector screws were not accessible). IE3-12 was received and rejected per DR7508 and DR7582 (relay flight plug was missing, and flight connector was damaged). IT9-12 was received and rejected per DR's 6169, 6170, 7482, 7504, 7505, and 7589 (component history form did not indicate test status, electrical wiring errors existed in the package, package covers were missing, screws were not loctite indicated, and connector location and package dimensions did not meet acceptable tolerance).
Mechanical Log, JEL-002	Mechanical Systems supported integration of the IMP J spacecraft in the EMR laboratory. The following experiments and instruments were integrated: Deployment Programmer and GNF. The separation switches were adjusted for flight. Supported harness installation by servicing cables and supporting connectors. Continued work on thermal blankets and initiated temporary installation of the lower RF Shield and lower birdcage. Initiated work to prepare the S/N 10 flipper for subsystem tests.
Electrical Log, JEL-001	Electrical Systems: (a) completed integration of the flight Deployment Programmer, (b) reintegrated the flight Experiment Programmer, and (c) performed spacecraft harness work.
Spacecraft Nonconformance Log, JEL-005-4	The following nonconformance was written: SDR-618 (Deployment Programmer, IT11, digital parameter 3-4 takes too long to notify the computer when changing states).
Work Order Authorization Log, JEL-005-5	No work order authorizations were written during this week.

WEEKLY SUMMARY LOG
(20 November through 26 November 1972)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	Quality Control received GWP1-11 and GWP2-11 and rejected them since DR5335 was still open.
Mechanical Log, JEL-002	Mechanical Systems supported integration of the IMP J spacecraft in the EMR laboratory. The following experiments and instruments were integrated: Experiment Programmer, Turn On, GNF2 and 3, and GWP1 and 2. Initiated work on the upper center tube thermal blanket and heater system. Continued work on the thermal blankets for the upper RF Shield and birdcage. Removed GME2, 4, 6, and 7 from spacecraft. Started thermal blankets for Experiment Boom Plume Shield. Fit checked System Programmer.
Electrical Log, JEL-001	Electrical Systems: (a) integrated GNF2 and 3 Experiment, (b) integrated the flight Turn On card, and (c) started integrating the flight System Programmer.
Spacecraft Nonconformance Log, HEL-005-4	No spacecraft nonconformances were written during this week. SDR-611a was closed out during this week.
Work Order Authorization Log, HEL-005-5	No work order authorizations were written during this week.

WEEKLY SUMMARY LOG
(27 November through 3 December 1972)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	Quality Control received GME6-2 and rejected it since DR7486 was still open. GME1-3 was received and rejected per DR7585 (component history form did not indicate test status, shipping report was missing, and package nonconformances existed). IC2-4 and -8, IC5-5, and IC34 were received, inspected, and accepted.
Mechanical Log, JEL-002	Mechanical Systems supported integration of the IMP J spacecraft in the EMR laboratory. Continued work on the upper center tube thermal blanket and heater system. Inspected GME1 and 6. Fit checked GME1. Bonded five heaters to upper center tube blanket. Set up the -10 Flipper Mechanism and the -11 Flipper Sensor for bench testing.
Electrical Log, JEL-001	Electrical Systems: (a) started reintegration of GWP Experiment and completed computer portion, (b) started special OA testing, special IOF testing, and EFM Mechanical testing, and (c) started reintegration of System Programmer.
Spacecraft Nonconformance Log, JEL-005-4	No spacecraft nonconformances were written during this week. SDR-616 and SDR-617 were closed out during this week.
Work Order Authorization Log, JEL-005-5	No work order authorizations were written during this week.

WEEKLY SUMMARY LOG
(4 December through 10 December 1972)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	Quality Control received IT9-12 and rejected it per MR 9008 (spacecraft level detectors turned the spacecraft off due to opening of battery line). IT9-13 was received and rejected since items on DR 7503 were still open.
Mechanical Log, JEL-002	Mechanical Systems supported integration of the IMP J spacecraft in the EMR laboratory. Prepared and installed RF antenna cables. Installed ACS tanks and associated hardware. Modified and tested flipper mechanisms. Prepared upper and lower birdcage restraint system assemblies for moly-coating. Assembled IOF experiment booms. Installed dummy solar panels is upper and middle birdcage for RF testing.
Electrical Log, JEL-001	Electrical Systems integrated lower birdcage dump circuits, checked flight System Programmer for malfunction, and initiated CHE special GSE test.
Spacecraft Nonconformance Log, JEL-005-4	The following nonconformances were written: MR 9008 (System Programmer, IT9, spacecraft level detectors turned the spacecraft off due to opening of battery line).
Work Order Authorization Log, JEL-005-5	The following work order authorizations were written during this week: WOA-003 directed harness changes for AGC. WOA-004 directed harness changes for spacecraft current (I_{SA} and I_{SC}) to DST. WOA-005 directed assembly and installation of preamplifier platforms. WOA-006 directed fabrication of a new cable.

WEEKLY SUMMARY LOG
(11 December through 17 December 1972)

JEL-005-9

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	Quality Control received IT9-12 again and held it for inspection. DR 7482, items 3 and 4, were still open (connector location and package dimensions did not meet acceptable tolerance). IT11-13 was received and forwarded to the Project Office. LAP 1 and 2-12 were received and rejected per DR 7583 (screws were not loctite indicated, EED was expended, cutout was not provided for test connector and cover in experiment panel, flight connector cover was not provided, and flight closeout cover was not provided for coax connector.) MAP 1-11 was received and rejected* (no shipping report or component history form were supplied, screws were missing, experiment package was not painted, and provisions for front mounting were not installed). GME 2-11 and GME 4-2 were received and rejected per DR 7587 (GME 2 rear frame is not rigid and may flex to cause GME 4 connection problem), DR 7485 was still open, and DR 7489 was closed. GME 5-3 was received and rejected per DR 7584 (screws were not loctite indicated). GME 7-10 was received and rejected per DR 7586 (edges of connector shell were deformed).
Mechanical Log, JEL-002	Mechanical Systems supported integration of the IMP J spacecraft in the EMR laboratory. Installed flight RF antennas. Fit checked the LAP experiment. Installed experiment panels for Facets 8, 9. and 10 to support RF testing. Performed MED thermal blanket work.
Electrical Log, JEL-001	Electrical Systems initiated integration of the LAP experiment, but command problems developed. Integration of MAP experiment was initiated with a special RF test. Initiated re-integration of flight System Programmer.
Spacecraft Nonconformance Log, JEL-005-4	The following nonconformances were written: MR 9009 (Deployment Programmer, IT11, command lines to LAP experiment have decaying or differentiated pulses); SDR-619 (harness, EED wire was pinched between upper shelf and radial brace).
Work Order Authorization Log, JEL-005-5	WOA-007 directed fabrication and installation of OA/DST cable.

*No DR's were written since experiment was not received for integration.

WEEKLY SUMMARY LOG
(18 December through 24 December 1972)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	Quality Control rejected IT11-12 per MR 9009 (all command lines to LAP experiment have decaying or differentiated pulses due to new amplifiers which are unacceptable).
Mechanical Log, JEL-002	Mechanical Systems supported integration of the IMP J spacecraft in the EMR laboratory. Continued MED thermal blanket work. Performed thermal vacuum testing on S/N 10 flipper. Prepared spacecraft for CCB changes by removal of the Encoder and Facet 11 cards. Preamp support panels were relocated. Installed preamplifiers in Facets 2, 6, 10, and 14. Potted spacecraft connectors. Facet 12 cards were reinstalled.
Electrical Log, JEL-001	Electrical Systems performed continuity checking and LO-Pot testing of spacecraft harness. Damaged sockets for connectors 12UJ10-14 and 12UP10-14 were discovered. For the majority of this week, IMP J spacecraft was under control of Mechanical Systems.
Spacecraft Nonconformance Log, JEL-005-4	The following nonconformance was written: SDR-620 (harness, IE10, Pin 14 damaged on Solar Array disconnect connectors 12UJ10 and 12UP10).
Work Order Authorization Log, JEL-005-5	The following work order authorizations were written during this week: WOA-008 directed cable replacement between Deployment Programmer, IT11, and Kick Motor EED. WOA-009 directed CCB changes to be incorporated. WOA-010 directed installation of flight RF cable in Facet 12. WOA-011 directed movement of upper platform. WOA-012 directed 2-17 and 3-17 changes for GME. WOA-013 directed relocation of Preamplifier Panels. WOA-014 directed modifications to upper spacecraft shield for wiring. CCB subsequently cancelled several of these changes after the work had been performed.

WEEKLY SUMMARY LOG
(25 December through 31 December 1972)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	Quality Control received IT11-12 and placed it into storage before submittal to formal Receiving Inspection.
Mechanical Log, JEL-002	Mechanical Systems supported integration of the IMP J spacecraft in the EMR laboratory. Installed thermistor wiring system, and upper center tube thermal blanket and heater system. Fabricated and installed a thermal blanket for the upper center tube platform.
Electrical Log, JEL-001	Electrical Systems performed continuity checks of the spacecraft harness. For the majority of this week, IMP J spacecraft was under control of Mechanical Systems.
Spacecraft Nonconformance Log, JEL-005-4	No spacecraft nonconformances were written during this week.
Work Order Authorization Log, JEL-005-5	No work order authorizations were written during this week.

WEEKLY SUMMARY LOG
(1 January through 7 January 1973)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	Quality Control received CAI 1-12 and rejected it per DR 7591 (covering foil defaced). However, the Experimenter gave his acceptance.
Mechanical Log, JEL-002	Mechanical Systems supported integration of the IMP J spacecraft in the EMR laboratory. Performed fit-check of Facet 11 Instruments and CAI Experiment. Installed Encoder, System Programmer, Relay Card, and Antenna Simulators on spacecraft. Fabricated a static-free cover for the spacecraft. Worked on Kick Motor Blanket and Heater Assembly and on Experiment Panels.
Electrical Log, JEL-001	Electrical Systems integrated CAI Experiment and started reintegration of flight Deployment Programmer.
Spacecraft Nonconformance Log, JEL-005-4	No spacecraft nonconformances were written during this week. However, SDR 619 on the Harness was closed out.
Work Order Authorization Log, JEL-005-5	No work order authorizations were written during this week.

WEEKLY SUMMARY LOG
(8 January through 14 January 1973)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	Quality Control completed acceptance of LAP 1 and 2-12 by closing out DR 7583. APP1-11 was received and rejected per DR 7601 (no shipping report or component history form were supplied, package did not have a serial number, left sensor was defaced, and screws were not loctite indicated); however, all items were corrected except receipt of component history form. GAF2-10 was received and rejected per DR 7593 (test results were incomplete on component history form, discrepancies existed in the package, and screws were not loctite indicated). GAF3-10 was received and rejected per DR 7597 (test results were incomplete on component history form, outline drawings were not available, package hardware was not proper, screws were not loctite indicated, wires to preamps needed rerouting). GAF4-10 was received and rejected per DR 7596 (test results were incomplete on component history form, no outline drawings were available, package hardware was not proper, and screws were not loctite indicated). GAF5-10 was received and rejected per DR 7595 (test results were incomplete on component history form, no outline drawings were available, package hardware was not proper, screws were not loctite indicated, and epoxy was in connector). GAF6-10 was received and rejected per DR 7594 (test results were incomplete on component history form, no outline drawings were available, package hardware was not proper, screws were not loctite indicated, wires to hardware needed rerouting).
Mechanical Log, JEL-002	Mechanical Systems supported integration of IMP J spacecraft in the EMR laboratory. Continued work on Experiment Panels, and on Kick Motor Thermal Blanket and Heater assembly. Performed fit-checks of GAF Experiment. Installed LAP, APP, and GME Experiments in the spacecraft. Potted ACS boom cable connectors.

REFERENCE	SUMMARY
Electrical Log, JEL-001	Electrical Systems: (a) reintegrated the flight System Programmer and LAP Experiment, (b) integrated the APP and GME Experiments, and (c) performed CHE and CAI Experiment special tests.
Spacecraft Nonconformance Log, JEL-005-4	The following nonconformance was written: SDR 621 (IOF, noise is present at the -X Preamplifier when CHE is ON). The following nonconformances were closed out during this week: SDR 612 on LED Detector, SDR 615 on spacecraft harness, and SDR 618 on Deployment Programmer.
Work Order Authorization Log, JEL-005-5	The following Work Order Authorizations were written during this week: WOA-015 directed changes to connector 12UJ10. WOA-016 directed removal of CHE cards. WOA-017 directed removal and replacement of Turn-On Card and Experiment Programmer.

WEEKLY SUMMARY LOG
(15 January through 21 January 1973)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	Quality Control received OA Sensor and held for inspection.
Mechanical Log, JEL-002	Mechanical Systems supported integration of IMP J spacecraft in the EMR laboratory. Continued work on Kick Motor Thermal Blanket and Heater assembly. Worked on flipper mechanism, upper solar panels, upper RF shields, and boom plume shield thermal blankets. Installed thermal blankets on upper solar panel supports. Potted birdcage interface connectors and routed EED cables.
Electrical Log, JEL-001	Electrical Systems performed part of IOF special tests, performed GAF harness check, checked out all solar panel harness connectors, and started performing the Solar Panel/RF Antenna Integration Procedure.
Spacecraft Nonconformance Log, JEL-005-4	No spacecraft nonconformances were writted during this week.
Work Order Authorization Log, JEL-005-5	The following Work Order Authorization was written during this week: WOA-018 directed the installation of gold foil on the spacecraft.

WEEKLY SUMMARY LOG
(22 January through 28 January 1973)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	Quality Control did not receive any Experiments or Instruments this week.
Mechanical Log, JEL-002	Mechanical Systems supported integration of the IMP J spacecraft in the EMR laboratory. Continued work on Kick Motor Thermal Blanket and Heater assembly. Installed gold foil, thermal blankets, and boom plume shields on the spacecraft. Configured flippers for environmental tests. Performed wire routing. Conducted vibration tests for flipper mechanism.
Electrical Log, JEL-001	Electrical Systems took measurements of IOF preamplifier frame and performed spacecraft and EED wiring.
Spacecraft Nonconformance Log, JEL-005-4	No spacecraft nonconformances were written during this week. However, the following nonconformance was closed out: SDR 620 on the spacecraft harness.
Work Order Authorization Log, JEL-005-5	The following Work Order Authorizations were written during this week: WOA-019 directed removal and replacement of Deployment Programmer, IT11-12. WOA-020 directed installation of the spacecraft harness between DST and IP10. WOA-021 directed changes to MAE Harness Panel.

WEEKLY SUMMARY LOG
(29 January through 4 February 1973)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	Quality Control received MAP 1-11 and rejected it per DR 7588 (flight plugs were not available).
Mechanical Log, JEL-002	Mechanical Systems supported integration of the IMP J spacecraft in the EMR laboratory. Continued work on Kick Motor Thermal Blankets and Heater assembly. Installed thermal blanket for MED Experiment. Potted various spacecraft connectors. Worked on main harness routing. Installed triple boom rests, MAP Experiment, ACS Electronics, OA Sensor, IOF Collimator, and LAP EED. Conducted thermal vacuum tests on flipper mechanism at GSFC.
Electrical Log, JEL-001	Electrical Systems started integration of MAP Experiment, performed MAP special modular test, started special MAP RFI test, recorded analog tape data for IOF Experiment, and performed spacecraft wiring.
Spacecraft Nonconformance Log, JEL-005-4	No spacecraft nonconformances were written during this week.
Work Order Authorization Log, JEL-005-5	The following Work Order Authorizations were written: WOA-022 directed the fabrication of three flight plugs and one non-flight plug. WOA-023 directed installation of LAP EED.

WEEKLY SUMMARY LOG
(5 February through 11 February 1973)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	Quality Control did not receive any Experiments or Instruments during this week.
Mechanical Log, JEL-002	Mechanical Systems supported integration of the IMP J spacecraft in the EMR laboratory. Assisted in performance of Long Functional Test. Measured and made thru-bolt spacers. Fabricated kick motor band and collar thermal blankets and submitted for QC inspection. Fabricated pedestal for bench testing triaxial sensors. Set-up S/N 10 Flipper. Molded canister cover and modified CHE lexan covers. Modified triaxial boom and Z-axis boom rest. Delivered and picked-up spacecraft items at GSFC.
Electrical Log, JEL-001	Electrical Systems started performing the initial Long Functional Test.
Spacecraft Nonconformance Log, JEL-005-4	The following nonconformances were written: MR 9018 (MAP1-11, erroneous data after high voltage modulator run).
Work Order Authorization Log, JEL-005-5	The following work order authorization was written: WOA-024 directed removal and replacement of MAE Experiment.

WEEKLY SUMMARY LOG
(12 February through 18 February 1973)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	Quality Control received Delta Instrument Package (IE15-11), including Pressure Transducer, Accelerometer, and Shorting Connector with DST plug and rejected them per DR 7493 and DR 7512 (package interferes with experiment panel, serial number is not visible). IC1-11 was received and accepted. IT11-13 was received and rejected per DR 6168 (test history results were incomplete, package frame marred, foreign substance on various surfaces, no front connector standoffs for holding EED arming plug, and arming plug pins vary in height). IT9-13 was received and rejected since DR 7503 was still open. MAE1-10 and MAE2-11 were received and rejected since DR 7495 and DR 7496 were still open (Test results incomplete on Component History Form). MAP1-11 was received and rejected since DR 7588 was still open (flight plugs not available). Non-flight ACS Booms were received and accepted.
Mechanical Log, JEL-002	Mechanical Systems supported integration of the IMP J spacecraft in the EMR laboratory. Assisted in performance of Long Functional Test. Fabricated flight connectors for 13FP02, 13FP03, and 11FP05. Delivered S/N 10 Flipper to GSFC and set-up for test. Removed IT4-3, IT5-11, IT6-11, and MAE from spacecraft. Installed IOF Boom, ACS Booms, GAF Preamplifiers 3 thru 6, experiment covers, protective connector covers, thru-bolt spacers, and lower restraint system. Fit checked Inertia Booms. Routed IOF Boom cable and Preamplifier wiring. Bonded ACS tank wires, standoffs, and thermistors to spacecraft. Modified and installed connector hardware.
Electrical Log, JEL-001	Electrical Systems continued performing the Long Functional Test during the beginning of the week. First floor computer at GSFC was reprogrammed for use and tone command frequencies were measured. For the majority of this week, IMP J spacecraft was under control of Mechanical Systems.

REFERENCE	SUMMARY
Spacecraft Nonconformance Log, JEL-005-4	The following nonconformances were written: MR 9019 (MAE2-11, sector rate R7 receives crosstalk from other channels); MR 9020 (PCM Decoder, IT5, PCM command sensitivity is below acceptable level); SDR-622 (harness; DIP harness routing improper).
Work Order Authorization Log, JEL-005-5	The following work order authorizations were written: WOA-026 directed removal of PCM Decoder for bench testing. WOA-027 directed troubleshooting of flipper in Thermal Vacuum. WOA-028 directed sending R&RR and PCM Receiver, and Analog Transmitter to GSFC for rework. WOA-029 directed modification of IOF Restraint System. WOA-030 directed performance of RFI test at EMR.

WEEKLY SUMMARY LOG
(19 February through 25 February 1973)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	Quality Control received IT4-3, IT5-11, and IT6-13, and accepted them. GAF1-10 was received and rejected per DR 7519 (test results on Component History Form were incomplete, screws were not loctite indicated). GAF2-10 was received and rejected since DR 7593 was still open (screws were not loctite indicated, but items 2 thru 5 were cleared).
Mechanical Log, JEL-002	Mechanical Systems supported integration of the IMP J spacecraft in the EMR laboratory. Closed out open QC items in upper and lower birdcage. Installed MAE, MAP, GNF 2 and 3, IC1, IE2, IT4, IT5, IT6, experiment panels, and upper, middle and lower solar array panels and covers. Removed red heat sink plume shield protective covers. Inspected and fit checked GAF, IT4, IT6, and simulated appendages. Installed EED's on spacecraft. Made cover for spacecraft. Did potting. Configured and mounted spacecraft for transporting to GSFC Spacecraft Magnetic Test Facility.
Electrical Log, JEL-001	Electrical Systems completed the Long Functional Test. Visually inspected EED's and determined that Boom and Kick Motor EED's did not fire inadvertently. Part of this week, the spacecraft was under control of Mechanical Systems.
Spacecraft Nonconformance Log, JEL-005-4	The following nonconformance were written: SDR-623 (harness, puncture in sleeving); SDR-624 (structure, screw did not extend through lock-nut); SDR-625 (GAF, possible RF interference into GAF Preamplifier harness from unwrapped cables); SDR-626 (GME4, connector standoff is loose); SDR-627 (APP, connector standoffs are loose); MR 9021 (GAF2, erroneous data occurs on 4 digital scan lines from ADC to Encoder); MR 9022 (CAI, large noise count is received on 3 or 4 detectors when live antennas are used and both Xmtrs are ON).
Work Order Authorization Log, JEL-005-5	The following work order authorizations were written: WOA-031 directed installation of live EED's in Boom Restraint System. WOA-032 directed removal and replacement of APP Experiment for hardware adjustment.

WEEKLY SUMMARY LOG
(26 February through 4 March 1973)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	Quality Control received ACS Booms (IS33-11 and IS34-12) and accepted them. GAF2-11 was received and accepted.
Mechanical Log, JEL-002	Mechanical Systems configured and secured the IMP J spacecraft and transported it to GSFC Spacecraft Magnetic Test Facility. Set up spacecraft and supported magnetic measurement and calibration testing. At EMR, performed drilling operations for Magnetometer Boom Assembly. Potted and installed Experiment Boom cables. At Mag Site, removed spacecraft from "Down Flow" tent, installed antennas and Relay Card, and checked for deperm. Installed booms and configured for Flipper testing. After supporting testing, configured and secured spacecraft for transporting to COMSAT Laboratory.
Electrical Log, JEL-001	Electrical Systems prepared spacecraft for power-up and performed initial Short Functional Tests, Magnetic Measurement and Calibration Tests, and Special IOF EMI Test in a noise-free environment.
Spacecraft Nonconformance Log, JEL-005-4	No spacecraft nonconformances were written during this week.
Work Order Authorization Log, JEL-005-5	The following work order authorization was written: WOA-033 directed removal and replacement of Facet 6 Experiment Panel.

WEEKLY SUMMARY LOG
(5 March through 11 March 1973)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	Quality Control received GAF2-11 and rejected it per DR 7516 (Open MR on EMC completion test, and markings do not agree with drawings.) Though not presently approved for flight, it was taken to COMSAT for installation into IMP J. GAF2-10 was returned to GSFC. ACS Booms (IS33, IS34) were returned to GSFC for Moment of Inertia tests.
Mechanical Log, JEL-002	Mechanical Systems transported the IMP J spacecraft from the Mag Cal Site at GSFC to COMSAT Laboratories, and supported RFI/Antenna Pattern testing with the installation and removal of spacecraft components. Mounted spacecraft on turntable and configured for RFI tests. Assisted with Antenna Pattern troubleshooting. Worked on back-up Flipper. Installed two thermal blankets on Kick Motor. Monitored temperature and humidity of test area.
Electrical Log, JEL-001	Electrical Systems performed RF Interference testing at COMSAT to acquire base line data and to obtain RF measurements when the spacecraft was configured with RF antennas. Antenna Pattern testing was started, but a malfunction was detected. Troubleshooting procedures were started to isolate the Antenna Pattern problem.
Spacecraft Nonconformance Log, JEL-005-4	The following nonconformances were written: SDR-628 (System Programmer, IT9, battery current did not read zero when spacecraft battery was on-line, but not charging); SDR-629 (ACS Electronics, IC1, ACS Electronics was ON when power was reapplied to the spacecraft); MR 9023 (MAE2-11, data printout shows noise on P2-A detector during SFT's); MR 9024 (IOF2, cancelled by GSFC MR 4621); MR 9025 (Antennas, 8 to 10 db dips occurred in antenna pattern).
Work Order Authorization Log, JEL-005-5	The following Work Order Authorizations were written: WOA-034 directed removal and replacement of experiment panels. WOA-035 directed replacement of GAF2 with its spare. WOA-036 directed the procedures to follow in troubleshooting the RFI/Antenna Pattern test.

WEEKLY SUMMARY LOG
(12 March through 18 March 1973)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	Quality Control received GNF1-11 and GNF2-11. They were accepted for integration.
Mechanical Log, JEL-002	Mechanical Systems configured the IMP J and transported it from the COMSAT Laboratories to the Spacecraft Checkout Area at GSFC. Cleaned dolly, installed center tube adapter, and moved spacecraft to work platform area. Assisted in testing with the installation and removal of spacecraft components. Checked EED's and antenna cable connections. Performed flipper test. Assisted Antenna personnel with trouble-shooting. Removed Experiment Panels and sent to paint shop. Removed GNF2 and 3 and sent to Experimenters. Worked on Kick Motor at EMR.
Electrical Log, JEL-001	Electrical Systems assisted GSFC RF Section to troubleshoot and isolate antenna pattern problem at COMSAT. At Spacecraft Checkout Area of GSFC, a Special CAI Test was performed using antenna simulators. A CAI Special RF Test was performed, and Special RF Phase Testing of the Antenna System was conducted. Integration of DIP was started using the DST plug and without the DST plug.
Spacecraft Nonconformance Log, JEL-005-4	The following nonconformances were written: SDR-630 (IOF2, search coil does not deploy due to stiff cable and/or weak spring); SDR-631 (GSE, OA Portable Stimulator caused incorrect MAP and GAF data); SDR-632 (DIP, IE15, Analog Transmitter data indeterminate without DST installed).
Work Order Authorization Log, JEL-005-5	The following Work Order Authorizations were written: WOA-037 directed reworking Facet 4, 5, 12, and 13 panels to ensure non-interference with Experiment Boom hinges. WOA-038 directed removal of APP for return to its Experimenter. WOA-039 directed removal of CHE for return to its Experimenter. WOA-040 directed changes to harness 01LJ15. WOA-041 directed RFI trouble-shooting procedures for CAI. WOA-042 directed removal of GNF for return to its Experimenter. WOA-043 directed removal of dummy Solar Panels to loctite screws. WOA-044 directed disconnection of RF coax from

REFERENCE	SUMMARY
Work Order Authorization Log, JEL-005-5 (Cont.)	antenna cups. WOA-045 directed removal of GME to repair standoff. WOA-046 directed testing of RF antenna deployment. WOA-047 directed installation of EED in spacecraft. WOA-048 directed installation of ACS Booms.

WEEKLY SUMMARY LOG
(19 March through 25 March 1973)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	Quality Control received GAF2-10 and accepted it for reintegration after a wiring fix. APP1-11 was received and accepted. CHE1-11, CHE2-11, and CHE4-11 were received and held for inspection. Magnetometer Boom Assembly (IS20-1) was received and accepted.
Mechanical Log, JEL-002	Mechanical Systems supported testing of the IMP J in the Spacecraft Checkout Area of GSFC with installation and removal of spacecraft components. Ran 3 flip tests on S/N 10 Flipper prior to Thermal Vacuum testing. Performed EED firing test. Configured spacecraft and supported GAF testing. Made bezel for CAI Experiment Panel cutout. Completed a lighter, lower spacecraft platform. Removed all dummy solar array panels for ETU testing. At EMR, made shims for ACS Boom standoffs, and modified Facet 8 Experiment Panel.
Electrical Log, JEL-001	Electrical Systems completed integration of DIP; performed integration of EED's; performed ACS special test of orient solenoids; obtained a PCM Receiver AGC plot; conducted a Shadow Test; performed integration of GAF Experiment; rechecked spare ACS Diode Pack (IC3); reintegrated APP Experiment; conducted Tone Receiver and PCM Receiver sensitivity checks; started OA Portable Stimulator life test; and initiated reintegration of CHE Experiment per the Long Functional Test.
Spacecraft Nonconformance Log, JEL-005-4	The following nonconformances were written: MR 9026 (ACS Tank, IC2, gas does not flow); MR 9027 (PCM Decoder, IT5, the first PCM command after 28V does not decode); SDR-634 (RF antenna rods damaged).
Work Order Authorization Log, JEL-005-5	The following Work Order Authorizations were written: WOA-049 directed performance of a power system shadow test. WOA-050 directed installation of the MED middle bracket. WOA-051 directed checkout of a valve solenoid. WOA-052 directed performance of CAI Special RFI Test. WOA-053 directed installation of four antenna restraint eyebolts. WOA-054 directed checking

REFERENCE	SUMMARY
Work Order Authorization Log, JEL-005-5 (Cont.)	locknut torque. WOA-055 directed installation of GAF A/D Converter. WOA-056 directed shimming ACS Boom standoff. WOA-057 directed performance of harness checkout at connector 05UP02. WOA-058 directed removal of GWP to check wiring. WOA-059 directed removal of dummy solar panels. WOA-060 directed replacement of ACS Boom Assembly (-Y) Diode Pack.

WEEKLY SUMMARY LOG
(26 March through 1 April 1973)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	Quality Control received EFM Antenna Mechanisms (IS36-11, -14) and accepted them for preintegration tests. ACS Valve Nozzle Assemblies (IC4-11, -12) were received and accepted. GAF2-11 was received and accepted. GNF3-12 was received and sent to L. Ripley of GSFC for Vibration Test.
Mechanical Log, JEL-002	Mechanical Systems supported testing of the IMP J in the Spacecraft Checkout Area of GSFC with the installation and removal of spacecraft components. Started balance operation on Experiment Booms. Supported preintegration tests of EFM Antenna Mechanisms. Completed RF shield for Facet 8 Experiment Panel. Fit checked EFM Antenna Mechanism, found discrepancy in Harness Panel Connector location, and modified at EMR. Made protective plates for EFM Antenna Mechanism connector. Reworked and installed dummy EFM packages. Started fabrication of non-flight IOF sensor coil thermal blanket. Supported CAI RF test. Performed deployment test on each RF antenna.
Electrical Log, JEL-001	Electrical Systems completed the reintegration of CHE Experiment; collected data for Pre-Mass Measurement Short Functional Test (SFT); performed Pre-Mass Properties SFT with Special Source Test; performed integration of EFM Antenna Mechanisms, IS36-11 and -14; performed Special IOF Test; and performed CAI Special RF Interference Test. Also, ACS Long Functional Test was initiated.
Spacecraft Nonconformance Log, JEL-005-4	The following nonconformances were written: SDR-635 (structure, EFM harness support panels were not correct); MR 9050 (EFM Antenna Mechanism, IS36, current was above specification); SDR-636 (GAF, preamplifiers had loose coax connectors); MR 9051 (ACS Valve Nozzle, IC4, low flow rate from nozzle).
Work Order Authorization Log, JEL-005-5	The following Work Order Authorizations were written: WOA-061 directed removal and refabrication of harness panels associated with the EFM Antenna Mechanisms. WOA-062 directed performance of Special IOF/EFM tests. WOA-063 directed installation of dummy EFM Antenna Mechanisms for mass measurements.

WEEKLY SUMMARY LOG
(2 April through 8 April 1973)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	Quality Control received CHE1-11, CHE2-2, and CHE4-02, and accepted them. CHE2-11 and CHE4-11 were returned to the Experimenter.
Mechanical Log, JEL-002	Mechanical Systems initiated the Initial Mass Measurement and Balance Test. Configured spacecraft for mass measurements and performed the test. Completed mass measurements on IOF Boom. Performed fit check of coax at Facet 10. Removed Facet 8 Experiment and modified RF shield at EMR. Installed dummy solar array panels. Installed antennas and experiment panels for CAI test. Performed ACS boom tasks. Checked nozzle installation. Worked on dummy DST. Removed flight CHE cards to perform reintegration inspection on spare CHE cards. Transported the spacecraft for weighing and then set up at Spin Balance Facility.
Electrical Log, JEL-001	Electrical Systems performed special CAI RF Interference Test and special ACS test. The rest of the time the spacecraft was under control of Mechanical Systems.
Spacecraft Nonconformance Log, JEL-005-4	No Spacecraft Nonconformances were written during this week.
Work Order Authorization Log, JEL-005-5	The following Work Order Authorizations were written: WOA-064 directed installation of a new ACS design nozzle. WOA-065 directed installation of a Vibration Control Accelerometer. WOA-066 directed installation of CHE spares.

WEEKLY SUMMARY LOG
(9 April through 15 April 1973)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	Quality Control did not receive any Experiments or Instruments during this week.
Mechanical Log, JEL-002	Mechanical Systems continued work on Mass Measurement and Balance Test. At Spin Balance Facility, removed, weighed, and listed all red tag items. After several balance tests, prepared and mounted dummy nutation dampers. Determined exact balance weight, fabricated weights, and installed. After permanently installing upper and lower weights and associated trim weights, checked preliminary balance. Transported spacecraft to MOI Facility, set up, installed GNF and IOF booms, and performed moment of inertia tests.
Electrical Log, JEL-001	During this week, the spacecraft was under control of Mechanical Systems.
Spacecraft Nonconformance Log, JEL-005-4	No spacecraft nonconformances were written during this week.
Work Order Authorization Log, JEL-005-5	The following Work Order Authorizations were written: WOA-067 directed balancing of the Experiment Booms. WOA-068 directed fabrication and installation of spacecraft balance weights.

WEEKLY SUMMARY LOG
(16 April through 22 April 1973)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	Quality Control did not receive any Experiments or Instruments during this week.
Mechanical Log, JEL-002	Mechanical Systems continued work on Mass Measurement and Balance Test. Transported spacecraft to CG Facility, configured, and obtained center of gravity measurements. Returned spacecraft to Spacecraft Checkout Area (SCA) for inspection by GSFC antenna group. Transported spacecraft to MOI Facility, configured, and obtained horizontal moment of inertia. Returned to SCA and removed RF antenna cups and cables. Configured for RLFT including hook-up from preamplifier to experiment cover of each EFM facet.
Electrical Log, JEL-001	Electrical Systems performed Pre-Vibration RLFT and collected data for LAP, CHE, and MAE Experiments. The rest of the time, the spacecraft was under control of Mechanical Systems.
Spacecraft Nonconformance Log, JEL-005-4	The following nonconformance was written: MR D09052 (GME4-02, half cards did not seat properly; and consequently, improper rates were detected.)
Work Order Authorization Log, JEL-005-5	The following Work Order Authorizations were written: WOA-069 directed removal of panels to trace RF cables. WOA-070 directed replacement of MAE, LAP, and CHE experiments in the spacecraft with their flight units. WOA-071 directed removal of RF cables and antenna cups.

WEEKLY SUMMARY LOG
(23 April through 29 April 1973)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	Quality Control received CHE1-11 and CHE2-11. They were accepted for integration. CHE4-11 was received and rejected per DR 5338; however, existing condition of front panel was acceptable to Experimenter. LAP1 and 2-12 were returned to Experimenter for repair and adjustment. MAE1-12 was received and rejected per DR 7533 (package plug-in connectors are contaminated, connector error, improper fit for thru-bolts, collimator screws were not loctite indicated, front panel marred, experiment panel does not fit). GAF3-10, GAF4-10, GAF5-10, and GAF6-10 were received and accepted. Antenna Distribution Unit (IT12-10) was received and accepted. EFM Antenna Mechanisms (IS36-11, -12, -13, -14) were received and are being held for approval.
Mechanical Log, JEL-002	Mechanical Systems configured the spacecraft for test. Removed cards for experiments MAE, CHE, and LAP. Installed flight CHE cards, replaced GNF Boom Assembly with dummy load plug, and modified Magnetometer Boom Assembly. Weighed IOF thermal blanket and dummy sensor. Fabricated IOF search coil associated parts. Performed mechanical inspection of dispensers for EFM Antenna Mechanisms. Inspected and fit-checked MAE experiment. Configured spacecraft for RF phase measurements. Installed flight and spare Antenna Distribution Units (IT12) for RF phase tests. Prepared for RLFT.
Electrical Log, JEL-001	Electrical Systems performed RLFT. This consisted of IOF, power checks, MAP, and CHE. After turning over the spacecraft to Mechanical Systems for two days, Electrical Systems conducted passive RF testing of Antenna Distribution Unit and Antenna System. Provided assistance to GSFC RF Section.

REFERENCE	SUMMARY
Spacecraft Nonconformance Log, JEL-005-4	The following nonconformance was written: SDR-637 (GNF Preamps, standoff hex hardware was loose at connectors).
Work Order Authorization Log, JEL-005-5	The following Work Order Authorizations were written: WOA-072 directed removal of GAF Preamplifiers for repair. WOA-073 directed removal of GNF Magnetic canister for painting. WOA-074 directed removal of IOF Antenna. WOA-075 directed the manufacture of a part for IOF experiment.

WEEKLY SUMMARY LOG
(30 April through 6 May 1973)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	Quality Control received and accepted LAP1-12.
Mechanical Log, JEL-002	Mechanical Systems configured the spacecraft and GSE for LFT's and RLFT's of Experiments. Installed Vacuum Pump Assembly for MAE test. Installed LAP cards and Pulser for test. Installed flipper assembly, bell housing, and canister on GNF Boom for test. Installed Magnetometer Boom Assembly. Weighed solar panels. Worked on IOF Sensor thermal blanket and IOF search coil system.
Electrical Log, JEL-001	Electrical Systems conducted IOF Mod. Index measurements at NTTF; and performed a series of LFT's or RLFT's on Experiments in the spacecraft. The RLFT's consisted of CAI, APP, EFM, GME (Source and Antenna Simulator), IOF, ACS, and GNF. The LFT's consisted of MAE, LAP, and GAF. Other tests performed were IOE and MED source, DIP checkout, IOF checkout and calibration, LAP Pulser, GNF SFT, and IOF Special Sensor check.
Spacecraft Nonconformance Log, JEL-005-4	The following nonconformances were written: MRD09053 (PCM Transmitter, IT2-13, DIP VCO data did not correctly interface with PCM Transmitter); MRD09056 (ACS Valve Nozzle, IC4, -Y-axis spin up nozzle releases gas sporadically); MRD09057 (ACS Electronics, IC1, spin up gas release time is 10% over tolerance); MRD09058 (IOF, Z-axis coil did not read out correctly.)
Work Order Authorization Log, JEL-005-5	The following Work Order Authorization was written: WOA-076 directed checkout of DIP-Analog Transmitter modification.

WEEKLY SUMMARY LOG
(7 May through 13 May 1973)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	Quality Control did not receive any Experiments or Instruments during this week.
Mechanical Log, JEL-002	Mechanical Systems configured the spacecraft for Electromagnetic Compatibility testing (EMC) and prepared for transporting the spacecraft to the RF Screen Room. Installed Antenna Simulators and set up for SFT. Replaced Antenna Simulators with RF Antennas and set up for Radiated Interference tests. Assisted Electrical Systems with the testing. Configured the spacecraft for RFI/Antenna Pattern tests and prepared for transporting to COMSAT.
Electrical Log, JEL-001	Electrical Systems performed SFT and EMC testing. Radiated Interference portion of tests were performed first for the H-field and the E-field using a frequency spectrum of 10 MHz to 1 GHz. Susceptability portion of tests were performed to complete EMC.
Spacecraft Nonconformance Log, JEL-005-4	No spacecraft nonconformances were written during this week.
Work Order Authorization Log, JEL-005-5	The following Work Order Authorization was written: WOA-077 directed an RFI test of EFM's at the COMSAT test facility.

WEEKLY SUMMARY LOG
(14 May through 20 May 1973)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	Quality Control had MAE1 and 2-12 removed from the spacecraft and turned over to John Cain of the University of Maryland.
Mechanical Log, JEL-002	Mechanical Systems prepared the spacecraft and transported it to COMSAT. Moved spacecraft into Anechoic Chamber, mounted on test fixture, and configured for Antenna Patterns. Assisted Electrical Systems during testing by reconfiguring and repositioning the spacecraft for Antenna Patterns and RFI tests, and by changing connections at Antenna Distribution Unit. Configured spacecraft and transported to SCA of GSFC. Removed MAE1 and 2-12 and weighed.
Electrical Log, JEL-001	Electrical Systems performed RFI and Antenna Pattern tests at COMSAT. Ran antenna patterns for different operating configurations of PCM and Analog Transmitters, and for different spacecraft configurations with a test transmitter operating. Performed RFI tests, receiver sensitivity tests, EFM special RFI test, IOF special RFI test, and special Range and Range Rate test.
Spacecraft Nonconformance Log, JEL-005-4	The following nonconformances were written: MR 9041 (MAE1-12, noise appeared on detector P6 during an RFI test, but was not related to RFI); MR 9042 (IOF1-10, during special RFI test, IOF saw noise on its 100 kHz SFR1 data channel, Y antenna, with all other experiments ON); MR 9043 (CAI1-12, detector D5 sees excessive counts with Analog and PCM Transmitters ON during experiments RFI tests). An MR was written by the Instrumenter (25 db loss in receiver command sensitivity when doing Range and Range Rating).
Work Order Authorization Log, JEL-005-5	No Work Order Authorizations were written during this week.

WEEKLY SUMMARY LOG
(21 May through 27 May 1973)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	Quality Control received MAE1 and 2-12 (DR 7533, item 4 still open - Collimator screws not loctite indicated. Items 1 through 6 remaining were subsequently cleared.) GME2-11 and 4-02 were removed from the spacecraft and given to the Experimenter; they were subsequently accepted and reinstalled into the spacecraft. MAE1-10 and 2-11 were removed from the spacecraft. EFM Antenna Mechanisms, IS36-11 and -13, were rejected per DR 7520 and DR 7522, respectively (screws were not loctite indicated, and subsystem tests were incomplete; several MR's unresolved). Both were returned to the Instrumenter for modification. EFM Antenna Mechanism, IS36-10, was received and delivered to the spacecraft.
Mechanical Log, JEL-002	Mechanical Systems prepared the spacecraft for vibration. Removed EFM Antenna Mechanisms, IS36-11 and -13. Worked on spacecraft. Assembled and weighed Inertia Booms. Obtained nutation dampers from Thermal Coating Lab, weighed, and mounted on spacecraft. Pressurized LAP and removed for troubleshooting. Assisted with ACS fill. Assembled scaffolding and installed inert Kick Motor. Worked on CAI Sensor. Performed incoming inspection on IS36-10 and installed. Assembled IOF Boom and installed. Installed GME2-11 and 4-02, ACS and Experiment Boom inertia weights, and antenna cable tip mass.
Electrical Log, JEL-001	Electrical Systems performed electrical test of Kick Motor wiring, special RF sensitivity R&RR test, special CAI test, and IOF special test. During the beginning of the week, the spacecraft was under the control of Mechanical Systems.
Spacecraft Nonconformance Log, JEL-005-4	The following nonconformance was written: SDR-640 (Structure, IOF Boom cable connector body has variable resistance reading).
Work Order Authorization Log, JEL-005-5	The following WOA's were written: WOA-078 directed removal of MAE from the spacecraft; WOA-079 directed the addition of nutation dampers to the spacecraft; WOA-080 directed removal of GME and EFM's from spacecraft; WOA-081 directed removal of LAP from the spacecraft.

WEEKLY SUMMARY LOG
(28 May through 3 June 1973)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	Quality Control did not receive any Experiments or Instruments during this week.
Mechanical Log, JEL-002	Mechanical Systems inspected LAP1 and 2-12 and installed into spacecraft; moved spacecraft to Vibration Cell C210 and configured for Vibration/ Shock tests. The spacecraft was set up for the following tests: a) Separation Shock, b) X-axis Vibration, c) Y-axis Vibration, and d) Z-axis Vibration. Then, the spacecraft was moved to SCA to prepare for Kick Motor Z-axis Vibration test.
Electrical Log, JEL-001	Electrical Systems worked with the GSFC Test Conductor to perform the following spacecraft tests: a) Third Stage Separation Shock, b) X-axis Vibration, c) Y-axis Vibration, d) Z-axis Vibration, and e) Short Functional Tests.
Spacecraft Nonconformance Log, JEL-005-4	Refer to Vibration/Shock Test Report, JTR-007, for MR's written during these tests.
Work Order Authorization Log, JEL-005-5	No Work Order Authorizations were written during this week.

WEEKLY SUMMARY LOG
(4 June through 10 June 1973)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	Quality Control did not receive any experiments or instruments nor were any removed for changes.
Mechanical Log, JEL-002	Mechanical Systems assisted Electrical Systems in the performance of Z-axis, X-axis, and Y-axis Vibration tests through the kick motor interface. Removed four dummy solar panels on lower solar array for ACS leak test. Installed g-negation cord clamps, set up spacecraft in DTC, and configured for Boom Deployment tests. Monitored nitrogen supply, humidity, and temperature during testing.
Electrical Log, JEL-001	Electrical Systems powered-up the spacecraft and assisted GSFC Test Conductor in performing Z-axis, X-axis, and Y-axis Vibration tests through the kick motor interface. Performed Post Kick Motor Vibration SFT. Completed Umbilical Slip-Ring Checkout. Started Boom Deployment test and completed ACS and EED checkout.
Spacecraft Nonconformance Log, JEL-005-4	The following nonconformances were written: MRD09060 (CHE4-11, detector D6 exhibits excessive noise counts); MRD09061 (System Programmer, IT9, spacecraft goes into under-voltage when battery relay is opened); MRD09062 (MAE2-12, P3B appears continuously under computer ID column on printout during post Y-K SFT); MRD09063 (GAF1-10, printout data do not agree with expected data on all Vibration/Shock SFT).
Work Order Authorization Log, JEL-005-5	No Work Order Authorizations were written during this week.

WEEKLY SUMMARY LOG
(11 June through 17 June 1973)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	Quality Control received the spare PCM Transmitter, IT2-11, and accepted it. EFM Antenna Mechanisms, IS36-12 and -14, were removed from the spacecraft to complete subsystem tests.
Mechanical Log, JEL-002	Mechanical Systems assisted in the completion of the Boom Deployment tests. Put booms in flight configuration; removed spent EED's. Assisted Electrical Systems with EED checkout. Folded and secured X and Y booms and RF antennas. Prepared spacecraft and assisted Electrical Systems with Sun Spin test. Removed IOF Sensor thermal blankets for sensor thermal painting. Removed two EFM's. Transported spacecraft to SCA and configured for RF tests. Prepared CAI for a special test.
Electrical Log, JEL-001	Electrical Systems completed Boom Deployment tests and Sun Spin tests. Accumulated data for MAE, CAI, and CHE. Initiated special RF desensitization testing and a ranging test.
Spacecraft Nonconformance Log, JEL-005-4	The following nonconformances were written: MRD09065 (Experiment Booms deploy command, 20P, would not execute); MRD09066 (OA System not stimulated by external lamp); MRD09067 (ACS released gas randomly during orient west and south).
Work Order Authorization Log, JEL-005-5	The following Work Order Authorization was written: WOA-082 directed performance of a special RF test to check RF desensitization.

WEEKLY SUMMARY LOG
(18 June through 24 June 1973)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	Quality Control received IOF4-12 and -13, and accepted them. EFM Antenna Mechanism, IS36-10, was removed from the spacecraft and taken to EMR. GME6-02 was removed from the spacecraft per Experimenter request. IOF1-10, 4-10, and 4-11 were removed from the spacecraft due to Experiment/Spacecraft malfunction.
Mechanical Log, JEL-002	Mechanical Systems installed aluminum foil for RF tests and assisted Electrical Systems and L. J. Rogers with this testing. Installed thermal coated GNF Boom subassemblies & boom balance weights. Removed dummy solar panels for bake-out, and experiment panels for thermal painting. Removed antennas, GSE cables, dummy EFM, prototype EFM, GME6-02, GAF1-10, GAF2-10, CAI1-12, MAP1-11, and IOF1-10. Replaced IOF4-10 and -11 with IOF4-12 and -13. Installed inert kick motor, pyrogens, & ACS restraint system. Inspected and cleaned spacecraft. Configured spacecraft for LFT and assisted Electrical Systems with testing.
Electrical Log, JEL-001	Electrical Systems continued special RF desensitization testing. Performed special IOF troubleshooting test. Initiated performance of LFT II. Performed EED checks. Sent and confirmed Experiment Boom deploy commands.
Spacecraft Nonconformance Log, JEL-005-4	The following nonconformances were written: MRD09068 (MAP1-11, noise counts are high in calibrate mode during all vibration tests); SDR-641 (Structure, ACS plume shields are cracked); MRD09069 (IOF1-10, Delta current was low at turn-on); MRD09070 (MAP1-11, experiment did not go into telemetry (TM) when commanded); MRD09072 (MAE1-12, commands 101T and 102T, detector bias off and on, result in opposite actions); MRD09073 (R&RR and PCM Receiver, IT4-03, receiver sensitivity decreased to 95.5 dbm); and MRD09074 (MAE1-12, sectored rate 3 has a counting rate of 1000).

REFERENCE	SUMMARY
Work Order Authorization Log, JEL-005-5	The following Work Order Authorizations were written: WOA-083 directed removal of solar panels for bakeout and experiment panels for painting; WOA-084 directed installation of EED's; WOA-085 directed installation of kick motor; WOA-086 directed removal and replacement of GME6-02; WOA-087 directed performance of IOF special test for troubleshooting; WOA-088 directed removal and replacement of CAI1-12; WOA-089 directed removal and replacement of MAP1-11.

WEEKLY SUMMARY LOG
(25 June through 1 July 1973)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	Quality Control received EFM Antenna Mechanisms, IS36-10 through -14, and accepted them. IOF1-10, 4-10, and 4-11 were received and accepted. CAI1-12 was received and accepted. GME6-02 was received and accepted. GME1-04 was received and rejected per DR's 7514, 7524, and 7525. (All items were either corrected, or accepted for flight by the Experimenter or Project Office.) GME1-04 was accepted when all DR's were closed.
Mechanical Log, JEL-002	Mechanical Systems configured spacecraft and continued assisting Electrical Systems with LFT II. Assisted QC with incoming inspection. Removed and replaced MED detector and thermal blanket assembly, and IOE Collimators. Installed GNF Boom, GME1-04, GME6-02, IOF1-10, CAI, EFM's (IS36-11 through -14), and vacuum hose to ULET. Installed and removed MAP1-11 and GSE. Weighed and installed dummy solar panels. Removed and installed upper and lower boom restraint cables.
Electrical Log, JEL-001	Electrical Systems continued performing LFT II which included LAP Special, IOE, EED, Special R&RR, GME, IOF, CAI, ±Y EFM's, and MAP. Special R&RR test and special RF test were performed by L. J. Rogers.
Spacecraft Nonconformance Log, JEL-005-4	The following nonconformances were written: MRD09075 (Magnetometer Flipper, IS20-10, flipper did not respond when commanded); MRD09901 (CHE3-12, data printout does not agree with expected data).
Work Order Authorization Log, JEL-005-5	The following Work Order Authorizations were written: WOA-090 directed troubleshooting of the Magnetometer Flipper malfunction; WOA-091 directed installation of GME1-04.

WEEKLY SUMMARY LOG
(2 July through 8 July 1973)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	Quality Control received GNF1-11 and accepted it. MAP1-11 was received and removed for spacecraft troubleshooting before accepting. GAF1-11 was received and accepted.
Mechanical Log, JEL-002	Mechanical Systems continued assisting Electrical Systems with LFT II. Installed IOF Boom, GAF1-11 and 2-10, and experiment panels. Inspected MAP1-11, removed, and gave to Experimenter. Fit checked flight solar array panel. Vibrated S/N-10 Flipper and installed on GNF Boom. Soldered and routed thermocouple wiring. Tensioned restraint system. Connected deployment actuator switches. Measured K/M EED resistance. Transported spacecraft to T/V Chamber 238 and installed. Configured with thermocouples and MAP1-11. Tensioned ACS Booms and installed safety release cords. Assisted Electrical Systems with T/V test setup. Assisted GSFC with K/M vacuum line hook-up. Worked on K/M leak and removed K/M when repair was unsuccessful. Adjusted third-stage separation switch actuating mechanism & completed configuration for the start of T/V testing.
Electrical Log, JEL-001	Electrical Systems continued performing LFT II which included a continuity check, EFM ± X Antenna Mechanisms, MAP, GME Special, GAF, and R&RR Sensitivity. After spacecraft was installed in T/V Chamber 238, actuating mechanism of third-stage separation switch was tested, K/M vacuum system was checked, and initial turn-on and EFM deployment was performed for Pre-Door Closing Checkout. T/V testing was started with Vacuum Corona and B1 Bakeout.
Spacecraft Nonconformance Log, JEL-005-4	The following nonconformances were written: SDR-642 (GAF1-11, Encoder function a_6 did not reach Spectrometer); and SDR-643 (GSE, spacecraft separation readout was incorrect when GSE mechanism was actuated).
Work Order Authorization Log, JEL-005-5	The following Work Order Authorization was written: WOA-092 directed removal and replacement of MAP1-11.

WEEKLY SUMMARY LOG
(9 July through 15 July 1973)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	Quality Control did not receive any experiments or instruments nor were any removed for changes.
Mechanical Log, JEL-002	Mechanical Systems continued assisting Electrical Systems with operational monitoring of T/V testing. Fabricated and load tested three flight boom restraint cables. Modified Inertia Booms, and fabricated end caps at EMR. Fabricated tool holding boxes at EMR. Repaired GN_2 dolly. Modified connector cover screw relief.
Electrical Log, JEL-001	Electrical Systems continued performing T/V testing which included Shadow Simulation, C1 and C2 Cold Temperature Soaks, and H1 and part of H2 Hot Temperature Soaks.
Spacecraft Nonconformance Log, JEL-005-4	The following nonconformances were written: MRD09902 (ACS Valve Nozzle, IC4-12, leak developed while approaching simulated shadow temperature of -30°C); MRD09903 (GME1-04, low input impedance to Channel E of MED); MRD09904 (MAE2-12, sun gate is intermittent); MRD09905 (MAE1-12, high counts in detectors P7 and P4); MRD09906 (CHE4-11, high counts in detectors D1 and D3); MRD09907 (LAP1-12, will not change modes); MRD09908 (MAE1-12, ULET indications are in conflict); MRD09909 (GME6-02, improper event number was indicated); MRD09929 (GME6-02, MED Electronics reads 190 counts instead of zero); MRD09930 (GME7-10, LET II Electronics reads 1089 counts instead of 5281 counts).
Work Order Authorization Log, JEL-005-5	No Work Order Authorizations were written during this week.

WEEKLY SUMMARY LOG
(16 July through 22 July 1973)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	Quality Control received the Solar Panels, IP1-201 through 223 and 228, and accepted them. The flight Battery, IP2-13, was received and accepted.
Mechanical Log, JEL-002	Mechanical Systems continued assisting Electrical Systems with operational monitoring of T/V testing.
Electrical Log, JEL-001	Electrical Systems continued performing T/V testing which included completion of H2 Hot Temperature Soak, C3 Cold Temperature Soak, H3 Hot Temperature Soak, and Completion of Test.
Spacecraft Nonconformance Log, JEL-005-4	The following nonconformances were written: SDR-644 (System, commands were missed during T/V testing); MRD09910 (CHE3-12, L2 detector reads excessive counts); MRD09912 (GAF1-11, Spectrometer draws excessive current).
Work Order Authorization Log, JEL-005-5	No Work Order Authorizations were written during this week.

WEEKLY SUMMARY LOG
(23 July through 29 July 1973)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	Quality Control received GNF3-11 and rejected it per DR 7476 (connector hardware not loctite indicated, foreign material on connector pins, ten screws missing, subsystem test not complete). EFM Antenna Mechanisms, IS36-10 through -14, were removed for modification, -11 through -14 returned, rejected per DR 7475 (screws not loctite indicated), and accepted with EMR agreement to loctite. LAP1-12 was removed per DR 7529 and accepted when DR was closed. The following Experiments were removed due to MR disposition: MAE 1 & 2-12; CHE1-11, 2-11, 3-12, 4-11; GME2-11, 4-02, 5-03, 6-02, 7-10; and GAF1-11.
Mechanical Log, JEL-002	Mechanical Systems inspected spacecraft inside T/V Chamber. Replaced IOE flight plug with dummy plug. Installed red tag covers. Replaced dummy antennas with RF antennas and then dummy loads. Removed GNF and IOF Booms; GAF1-11; GNF3-12, MAE1-12 & 2-12; CHE 1-11, 2-11, 3-12, and 4-11; GME2-11, 4-02, 5-03, 7-10, and 6-02; and LAP1-12. Removed solar array lower panels for sniff test. Assisted Electrical Systems to prepare spacecraft for chamber removal. Transported spacecraft to SCA. Removed experiment panels, EFM Antenna Mechanisms, and lower C/T strip coat, cover, and thermocouple wire. Installed Battery IP2-13 and loctited. Installed antenna simulators, relay box, umbilical, MED flight plugs, and 3 EFM Antenna Mechanisms. Assisted Electrical Systems with MAP special test and K/M heater test. Assisted QC with incoming inspection. Installed MAP for checkout and removed. Fit checked inert K/M. Picked up IOF Boom from T&E. Located new card in Facet 13. Worked on Umbilical bracket. Checked new EED's and installed.

REFERENCE	SUMMARY
Electrical Log, JEL-001	Electrical Systems worked to conclude T/V testing. Chamber entered and EED's were examined. Special ACS leak test and Battery UVLO test were performed. LAP T/V test was performed. After spacecraft was returned to SCA, special MAP test and special K/M Heater test were performed. With GSE set up, performed special MAP post T/V test, special K/M Heater test, and K/M Heater integration.
Spacecraft Nonconformance Log, JEL-005-4	The following nonconformances were written: MRD09914 (System Programmer, IT9-12, Battery UVLO point was 12.16 volts instead of 12.9 volts); and MRD09913 (IOF Boom Spar Assembly, IS35-3-10, Z-axis Sensor would not deploy properly).
Work Order Authorization Log, JEL-005-5	The following Work Order Authorizations were written: WOA-093 directed set-up for RF Special Test; WOA-094 directed removal of Boom Assemblies for Mass Measurements; WOA-095 directed removal and replacement of MAE1-12 and 2-12; WOA-096 directed removal and replacement of GNF3-12; WOA-097 directed removal and replacement of GAF1-11; WOA-098 directed removal and replacement of GME6-02; WOA-099 directed removal and replacement of LAP1-12 and 2-12; WOA-100 directed removal and replacement of CHE1-11, 2-11, 3-12, and 4-11; WOA-101 directed troubleshooting of ACS leak; WOA-102 directed removal and replacement of EFM's IS36-11, -12, -13, -14; WOA-103 directed removal and replacement of spacecraft panels; WOA-104 directed installation of flight Battery, IP2-13; and WOA-105 directed special test of K/M Heaters.

WEEKLY SUMMARY LOG
(30 July through 5 August 1973)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	Quality Control received GNF2-1 and returned it to its Experimenter. GME4-02 was received and rejected per DR7689 (pins on connector 24W7S are bent); but, it was decided to use as is. The following Experiments were received and accepted: GME5-03, GME6-12, and GME 7-10. GME7-20 was received and rejected per DR7690 (hardware not loctite indicated); but was decided to use as is. GAF1-11 was received and rejected per DR7688 (hardware not loctite indicated); but, was accepted when completed.
Mechanical Log, JEL-002	Mechanical Systems assisted Electrical Systems with testing at GSFC. Configured spacecraft for EFM Deployment Test with dummy pyros installed for kick motor. Configured spacecraft for Long Functional Test with LAP pyro installed. Troubleshoot IOF Boom Sensor. Performed incoming inspection on GME.
Electrical Log, JEL-001	Electrical Systems performed EFM Deployment Test; GNF Special Test; and Post Thermal Vacuum #1 LFT which included LAP, MAE, IOE, OA, APP, GNF, MAP, CAI, EED's, ACS, VLET, ULET, MED/LED, Battery, Accelerometer, RF Interference, and miscellaneous instrument checks. Also, performed ULET pumpdown and troubleshooting of MAP, GNF, and VLET.
Spacecraft Nonconformance Log, JEL-005-4	The following nonconformance was written: MRD09915 (GAF4-10, -X axis EFM Preamp fails to mode from AC to DC when properly stimulated).
Work Order Authorization Log, JEL-005-5	The following Work Order Authorizations were written: WOA-106 directed mounting of DST and relocated umbilical cable; and WOA-107 directed installation of boom balance weights.

WEEKLY SUMMARY LOG
(6 August through 12 August 1973)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	Quality Control received CHE4-11 and rejected it per DR7686 (indentation on sensor window). The following Experiments were received and accepted: CHE1-11, CHE2-11, and CHE3-12.
Mechanical Log, JEL-002	Mechanical Systems continued assisting Electrical Systems with Long Functional Test and Final Mass Measurement and Balance Test. Configured spacecraft for moves to Weights and Balance Area, Spin Balance Facility, and MOI Fixture. Weighed spacecraft before and after ACS Fill. Installed balance weights. Performed Z-Axis Moment of Inertia.
Electrical Log, JEL-001	Electrical Systems continued performing Post Thermal Vacuum LFT which included GWP, GAF, CHE, and RF test with live antennas. The majority of the week, the spacecraft was under control of Mechanical Systems for Mass Measurements and Balance Testing.
Spacecraft Nonconformance Log, JEL-005-4	The following nonconformance was written: MRD09917 (MAE1-12, detectors N, P3, and P6 are noisy intermittently).
Work Order Authorization Log, JEL-005-5	No Work Order Authorizations were written during this week.

WEEKLY SUMMARY LOG
(13 August through 19 August 1973)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	Quality Control received GME6-02 and accepted it. GME6-12 was removed per WOA-108. CAI1-12 was removed per WOA-114. MAE1-12 and 2-12 were removed per WOA-109. EFM Antenna Mechanisms,IS36-11 through -14,were removed per WOA-111. PCM Transmitter, IT2-13, and Analog Transmitter, IT6-13, were removed per WOA-110; but were reaccepted. DIP Electronics, IE15-11, was received and accepted.
Mechanical Log, JEL-002	Mechanical Systems continued performing Mass Measurement and Balance Test. Ran X-Axis Center of Gravity Test and Moment of Inertia Test. After test, removed Solar Array panels for cleaning and inspection. Configured spacecraft for Special GME Test. Inspected CAI1-12 and IT6-13. Configured spacecraft for Aliveness Test.
Electrical Log, JEL-001	Electrical Systems performed Special GME Test, CHE Post Mass Properties Test, and Aliveness Test of solar panels. During the beginning of this week, the spacecraft was under control of Mechanical Systems for Mass Measurements and Balance Testing.
Spacecraft Nonconformance Log, JEL-005-4	The following nonconformances were written: SDR-645 (Solar Array Panels, IP1, insulation was nicked), SDR-646 (IOF Boom Assembly, IS35, nicked insulation exposed shield), SDR-647 (Analog Transmitter, IT6-13, coax insulation for connector 12EP13 was scuffed exposing shield), SDR-648 (CAI1-12, sensor cover causes grounding problem).
Work Order Authorization Log, JEL-005-5	The following WOA's were written: WOA-108 through WOA-111 directed removal and replacement of GME6-12, MAE, Transmitters and DIP, and EFM Antenna Mechanisms, respectively. WOA-112 directed removal and painting of inertia and balance weights; and WOA-113 and 114 directed removal and replacement of Solar Array Panels & CAI experiment panel, respectively.

WEEKLY SUMMARY LOG
(20 August through 26 August 1973)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	Quality Control received EFM Antenna Mechanisms, IS36-11 through -14, and accepted them. GNF3-12 was received and accepted. MAE1-12 and 2-12 were received and accepted. GAF4-10 was received and accepted. GAF2-10 was received and rejected per DR7685 (connector cover screws are short and screws were not loctite indicated); but it was accepted when the items were closed.
Mechanical Log, JEL-002	Mechanical Systems assisted Electrical Systems by configuring the spacecraft for CAI Special RF Test. Repaired ACS plume shields. Inspected & installed Solar Array panels, and EFM Antenna Mechanisms. Assisted Experimenters to set-up GSE. Delivered MAE1-12 and 2-12 for weight & center of gravity measurements. Assisted with Magnetometer Boom ring-out. Prepared kick motor for Wallops Island.
Electrical Log, JEL-001	Electrical Systems performed CHE, VLET, and CAI Special Tests. Checked the four EFM Antenna Mechanisms and all of Facet 12 to spacecraft ground. Performed MAE LFT, IOF checkout, GNF Special Quiet Look, and LAP Special with vacuum pump.
Spacecraft Nonconformance Log, JEL-005-4	The following nonconformances were written: MRD09918 (GNF boom harness, IE10-1, wire was stressed due to insufficient service loop during Z-Axis Vibration Test); and SDR-649 (GNF Boom Harness, IE10-1, RF potting resistance is $\approx$ 2.5 ohms).
Work Order Authorization Log, JEL-005-5	The following WOA's were written: WOA-115 directed removal and replacement of EFM IS36-11, Solar Array Panel Middle Facet; WOA-116 directed removal and replacement of GAF Preamplifier; WOA-117 directed repotting of GNF Boom Cable; and WOA-118 directed removal & replacement of CAI experiment panel.

WEEKLY SUMMARY LOG
(27 August through 2 September 1973)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	Quality Control did not receive any experiments or instruments, nor were any removed for changes.
Mechanical Log, JEL-002	Mechanical Systems assisted Electrical Systems by setting up for GAF/ADC Special Test, installed dummy kick motor and configured spacecraft for Z-Axis Random Vibration Test, and configured for Sun Spin Test. Installed balance weights on IOF, ACS, and Magnetometer Booms. Weighed spacecraft and performed Leak Test. Assisted with IOF and GWP checkout.
Electrical Log, JEL-001	Electrical Systems performed Solar Panel Illumination Test, GAF/ADC Special Test, Final Random Z-Axis Vibration, Short Functional Test, Sun Spin Test, Special IOF Test, Common Mode Rejection Test, Special GNF Investigation Test, and CAI Special Test.
Spacecraft Nonconformance Log, JEL-005-4	The following nonconformances were written: SDR-650 (Facet 10 panel, problem with Facet 10 top right nut plate); and SDR-651 (Magnetometer Boom Canister, IS20, part of strip coat brushed off).
Work Order Authorization Log, JEL-005-5	The following WOA was written: WOA-119 directed removal and replacement of GME2, 4, 5, 6, and 7.

WEEKLY SUMMARY LOG
(3 September through 9 September 1973)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	Quality Control received DST (IE13 & 14-1) and rejected it per DR 7539 (marking, ID, + finish incomplete; not loctite indicated; and package does not fit spacecraft).
Mechanical Log, JEL-002	Mechanical Systems assisted with spacecraft testing at GSFC. Fit checked flight DST. Returned EFM Antenna Mechanism IS36-12 to EMR for repairs. Participated in solar illumination test. Replaced GNF2-11 and 3-12 with GNF2-01 and 3-11, and IS36-12 with IS36-10. Installed IOF4-10 in Facet 2 and IOF4-11 in Facet 10. Configured spacecraft for move to Mag Test Site.
Electrical Log, JEL-001	Electrical Systems performed DST integration, ACS test with MSOCC, solar panel illumination test, and special RF Phase Measurement test. Started Final Magnetic Measurement and Calibration Tests.
Spacecraft Nonconformance Log, JEL-005-4	The following nonconformances were written: SDR-652 (DST, IE13 & 14-1, 28V return to signal common ≤100 k ohms), MRD09919 (DST, IE13-1 & IE14-1, did not respond correctly to DST command), MRD09920 (EFM, IS36-12, broken bus wire), MRD09921 (IOF3-11, trimmer capacitor loose), and SDR-654 (Solar Panel, IP1-205 & -207, cover glass cracked).
Work Order Authorization Log, JEL-005-5	The following Work Order Authorizations were written: WOA-120 directed removal of EFM for repair/replacement; WOA-121 directed removal of IOF preamplifiers for inspection; WOA-122 directed installation of spare GNF cards for magnetic calibration.

WEEKLY SUMMARY LOG
(10 September through 16 September 1973)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	Quality Control did not receive any Experiments or Instruments for inspection this week.
Mechanical Log, JEL-002	Mechanical Systems assisted with testing at the GSFC Mag Test Site. Installed GNF and IOF booms, inertia booms, RF antennas, and Relay Card; and performed GNF boom test. Replaced spare Magnetometer flipper with flight unit, and GNF2-01 and 3-11 with GNF2-11 and 3-12. Leveled GNF boom. Set IOF boom for test. Assisted with checkout of Facet 6 and 14 EFM's and DST. Prepared spacecraft for transporting to KSC.
Electrical Log, JEL-001	Electrical Systems continued with Magnetic Measurement and Calibration Tests at Mag Test Site. Tests consisted of flight GNF calibration, antenna phase measurements, and special IOF test. At SCA in Building 7, IOF common mode rejection was performed.
Spacecraft Nonconformance Log, JEL-005-4	The following nonconformances were written: SDR-655 (structure, screw broken off where relay card attaches), and MRD09922 (IOF1-10, spacecraft went into 28V undervoltage).
Work Order Authorization Log, JEL-005-5	No Work Order Authorizations were written during this week.

WEEKLY SUMMARY LOG
(17 September through 23 September 1973)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	Quality Control received GME6-02 and 7-20 and DST (IE13 and 14), and accepted them. Visual inspection was made of Solar Array panels upon arrival at KSC.
Mechanical Log, JEL-002	Mechanical Systems installed spacecraft on white shipping dolly, covered it with RCAS and OAO white bags, mounted it on flat-bed transporter, and readied it for shipment to KSC. Spacecraft was transported to Hangar "S" at KSC, off-loaded, removed from shipping container and white dolly, and readied for visual inspection. Configuration for LFT was started.
Electrical Log, JEL-001	Electrical Systems prepared GSE for transportation to KSC. At Hangar "S" of KSC, assisted with setup of "Blue Max" communications center and communications checkout, and setup GSE. Spacecraft was under cognizance of Mechanical Systems during this week.
Spacecraft Nonconformance Log, JEL-005-4	No spacecraft nonconformances were written during this week.
Work Order Authorization Log, JEL-005-5	The following Work Order Authorizations were written: WOA-123 directed installation of DST for flight, WOA-124 directed installation of IOF and GAF for flight, and WOA-125 directed preparation of GNF Boom for flight.

WEEKLY SUMMARY LOG
(24 September through 30 September 1973)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	Quality Control received IOF1-10 and CHE1-11, 2-11, 3-12, and 4-11, and accepted them.
Mechanical Log, JEL-002	Mechanical Systems assisted with spacecraft testing at KSC. Checked and installed EED's. Performed Incoming Inspection on IOF1-10. Configured spacecraft and assisted with testing. Made velostat cover for spacecraft. Set up for EED checkout and measured resistance of kick motor EED bridgewires. Installed flight ACS test connector plug and assisted with ACS leak test. Performed ADU connector inspection.
Electrical Log, JEL-001	Electrical Systems ran SFT with antenna simulators and RF antennas. Established output levels of Blue Max for both PCM and Tone commands. Performed LFT's for GME, IOE, APP, Battery Undervoltage, GWP, MAE, GNF, CAI, EFM, ACS, and EED. Also performed special tests for DST, IOF, GME, MAP, ULET, MAE, GAF, and RF. Performed GME and CHE Mu Meson tests and MAE Pulser Calibration test.
Spacecraft Nonconformance Log, JEL-005-4	The following nonconformances were written: SDR-656 (EFM red tag items, tip mass shorted against tip mass covers at Facets 2 and 10); SDR-657 (GWP, coax A on test connector damaged insert and pin); SDR-658 (Kick Motor, transducer was dropped); and SDR-659 (Kick Motor pyro/transducer connectors were cross-connected).
Work Order Authorization Log, JEL-005-5	The following Work Order Authorizations were written: WOA-126 directed preparation of the IOF Boom for flight; WOA-127 directed inspection of RF antennas; WOA-128 directed a trial performance of the rope trick; WOA-129 directed the performance of a detailed mechanical inspection; WOA-130 directed mechanical assistance for the ACS Leak Test and removal/replacement of a Solar Panel; WOA-131 directed removal of EFM's and IOF preamplifiers for repair and their replacement; and WOA-136 directed the inspection of an RF cable -90° fitting.

WEEKLY SUMMARY LOG
(1 October through 7 October 1973)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	Quality Control received MAE2-12 and accepted it.
Mechanical Log, JEL-002	Mechanical Systems configured spacecraft for special RF troubleshooting. Replaced GAF4-10 with 4-11. Tied-up antennas for rope trick and performed. Removed and stored MAP1-11. Supported MAP and CHE testing. Initiated ACS fill and spacecraft weighing. Removed CAI1-12. Closed out all mechanical open items. Installed balance weight.
Electrical Log, JEL-001	Electrical Systems performed special RF troubleshooting and RF sensitivity tests. Performed LAP special and LFT, GAF special and LFT, and CAI LFT retest. Performed LFT of IOF, CHE, and DST with DIP. Performed special RF test of CHE and MAP. Troubleshot MAP RF problem. Performed solar array illumination test and final SFT with antennas.
Spacecraft Nonconformance Log, JEL-005-4	No spacecraft nonconformances were written during this week.
Work Order Authorization Log, JEL-005-5	The following Work Order Authorizations were written: WOA-133 directed modification to MAP RF shielding; WOA-134 directed modification to CHE RF shielding; WOA-135 directed replacing -X EFM Preamplifier GAF4-10 with GAF4-11; WOA-137 directed removal of MAP1-11 for RF shielding; WOA-138 directed removal of MAE1-12 and 2-12 for rework; and WOA-139 directed removal of CAI1-12 for bench test and rework.

WEEKLY SUMMARY LOG
(8 October through 14 October 1973)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	Quality Control did not receive any Experiments or Instruments for inspection this week.
Mechanical Log, JEL-002	Mechanical Systems transported spacecraft to Spin Balance Facility and placed on Precision Measurement Fixture. Performed runout measurements to center spacecraft. Installed CAI1-12. Performed OA Angular Measurements. Installed precision plate and performed runout measurements to verify kick motor parallel with separation plane. Installed kick motor and performed runout measurements for thrust vector alignment. Fabricated connector thermal blankets. Installed kick motor thermal blankets. Prepared spacecraft for weighing. Mated spacecraft to third stage and removed separation switch plunger restraint assemblies. Transported spacecraft/third stage to Complex 17 and monitored mating to launch vehicle.
Electrical Log, JEL-001	The spacecraft was under control of Mechanical Systems during this week.
Spacecraft Nonconformance Log, JEL-005-4	No spacecraft nonconformance were written during this week.
Work Order Authorization Log, JEL-005-5	No Work Order Authorizations were written during this week.

WEEKLY SUMMARY LOG
(15 October through 21 October 1973)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	Quality Control did not receive any Experiments or Instruments for inspection this week.
Mechanical Log, JEL-002	Mechanical Systems assisted Electrical Systems with testing and monitored MDAC operations. Performed Task S1B Delta Fairing Fit Check. Tied-up antennas and inertia booms for rope trick and performed rope trick. Installed umbilical cable from fairing to spacecraft. Connected MAE acoustic cover to its lanyard. Monitored spacecraft umbilical cable and ULET lanyards during fairing roll-back.
Electrical Log, JEL-001	Electrical Systems performed Task S1A Spacecraft Aliveness Test (Pre-Task S1) and Task S1 Spacecraft Checkout. Performed a checkout on flight fairing umbilical connector and installed it on the spacecraft.
Spacecraft Nonconformance Log, JEL-005-4	No spacecraft nonconformances were written during this week.
Work Order Authorization Log, JEL-005-5	No Work Order Authorizations were written during this week.

WEEKLY SUMMARY LOG
(22 October through 28 October 1973)

REFERENCE	SUMMARY
Receiving Inspection, QCP-( )	Quality Control did not receive any Experiments or Instruments for inspection this week.
Mechanical Log, JEL-002	Mechanical Systems completed final mechanical preparations for spacecraft flight including kick motor preparation, and EED hook-up. Performed rope trick, attached MAE sensor plug, monitored MDAC operations, and installed umbilical connector & turn-on plug for fairing RF test.
Electrical Log, JEL-001	Electrical Systems performed Task S1A Spacecraft Aliveness Test (Post Task S1), Task S6 Post Fairing Installation Spacecraft Turn-On, Task S7 Pre-Tower Removal Spacecraft Turn-On, and Task S8 Terminal Count, Launch Mode. IMP J was successfully launched from Pad 17 of KSC.
Spacecraft Nonconformance Log, JEL-005-4	No spacecraft nonconformances were written during this week.
Work Order Authorization Log, JEL-005-5	No Work Order Authorizations were written during this week.

SECTION IV

IMP H/J LAUNCH PARAMETERS

4-1. BACKGROUND

4-2. For the purpose of this report, the launch parameters of the IMP H and J spacecraft are defined as the Inventory and the Weight Summary. These two documents were periodically submitted by EMR to the Project Office to serve as management tools.

4-3. The Inventory was submitted periodically during the integration phase and at the start of each T&E test to report to the Project Office all those experiments and instruments which were in the spacecraft or in EMR's control at the time of the report. This document aided the Project Office to control the status of the spacecraft complement, the status of spares, and the status of the spacecraft structural buildup. The Inventory included as Appendix E has been modified so that one document shows the spacecraft complement of experiments and instruments by serial numbers in the as-launched configuration for both spacecraft. The information regarding which experiment/instrument was under EMR's control and the spacecraft mechanical buildup status have been deleted for the purpose of this document.

4-4. The Weight Summary document was submitted to the Project Office to provide a method of reporting and controlling the spacecraft weight. The final weight summaries for IMP H and IMP J, which are included as Appendix J, show the evolution of the spacecraft weight

from early in the program, as well as a detailed breakdown for subsystems and components. Through the program, the weight limit for IMP H was 860 pounds as dictated by the kick motor capability and the spacecraft weight was controlled accordingly. However, late in the program, the limit was increased by Delta to 865 pounds. This provided a 4.74 pound margin for IMP H as the launch weight was 860.26.

4-5. Similarly, the IMP J weight was controlled to an 872 pound launch limit through the program, and upgraded to 877 pounds by Delta late during the project. The launch weight was 875.34 pounds providing a 1.66-pound margin.

APPENDIX A

IMP H EASTERN TEST RANGE DAILY OPERATIONS SUMMARY

21 August, Monday

The spacecraft was transported from the North Clean Room (Room 21) to the North Systems Test Area (Room 23). There a sling was attached and the spacecraft was hoisted to the top of the launch vehicle third stage, where McDonnell-Douglas Astronautics Co. performed a fit check. After a successful fit check, the spacecraft was lowered and returned to the Clean Room, where it was placed on grounding plates. Solar panels and their covers were removed to access experiments and instruments. Then Encoder (IT1) and experiments CAI 1, MAP 1, MAE 1 and 2,were removed along with their associated hardware. An ACS Leak Check was run after lower solar panels were removed. Middle solar panels were removed to check the two separation switches, which proved to be in satisfactory condition. Work was concluded by covering the spacecraft and setting up an overnight purge.

22 August, Tuesday

MAP fix was completed by the addition of a new data line to the Encoder according to WOA-191. Then the Encoder was reinstalled and spacecraft power was turned on to verify Encoder operation. At the completion of the Encoder test, spacecraft power was turned off, all experiments (GCE, MAP, and CAI) were installed, and all spacecraft hardware and solar panels were installed. These items had been removed to facilitate MAP fix.

The Kick Motor was moved from the bunker storage area to the Non-Destructive Test Lab (NDTL) for X-ray. At NDTL, the Kick Motor was removed from the shipping container per Appendix F of the ETR Handling Plan, HHP-005. After Kick Motor removal from the shipping container, NDTL personnel moved the motor to the X-ray facility where 32 X-rays

were taken. X-rays were expected for viewing on 8/23 or 8/24. The Kick Motor was secured at NDTL for overnight storage.

The bridgewires of all EED's (except LAP EED) were tested at EMT by EMT personnel. All Kick Motor EED's were checked at a later date.

The spacecraft was completely configured and ready for Long Functional Test (LFT). This LFT was scheduled to begin on 23 August.

23 August, Wednesday

The spacecraft was turned on with all instruments and experiments on, except IOE, for a data link check between the spacecraft and Building 11, GSFC. Completing the data link check, the spacecraft was turned off and configured for live electroexplosive device (EED) installation. Mechanical Systems installed all live EED's per HHP-004, excepting LAP door release EED which was not installed at this time. The Kick Motor was not in the spacecraft at this time. Mechanical Systems completed EED installation with no problems and the spacecraft was reconfigured for a Long Functional Test (LFT) per procedure HTP-022. Spacecraft was turned on for the MAP and GME LFT; however, spacecraft-to-computer data link failure prevented continuation, and the spacecraft was turned off. Data link communications were established in the early evening. The spacecraft was again turned on, and the MAP and GME LFT was performed. MAP LFT was completed, but GME LFT was stopped at 90% completion and was completed on 24 August. During GME GSE setup, a screw fell into an inaccessible area of the spacecraft. A work order was written and performed to remove the screw prior to performing MAP and GME LFT.

The Kick Motor was installed in the lower half of the shipping container, covered with RCAS material, and moved from NDTL to the Missile Research Test Building (MRTB) area. At MRTB, the Kick Motor was transferred from the shipping contained to the Kick Motor dolly. While the Kick Motor was suspended on the crane, the lower thermostat and thermistors were installed. Electrical tests directed by Kick Motor Procedure HAP-015-2 were not performed at this time due to pending range safety approval of the electrical test procedure. These tests were completed on 1 September 1972.

The following was the spacecraft status of 23 August 1972.

1) Spacecraft configured for LFT.
2) All experiments and instruments installed.
3) Live EED's installed (except LAP).
4) No Kick Motor.
5) All booms mounted.
6) Antenna simulators installed.
7) MAP LFT completed.
8) GME LFT 90% complete.

24 August, Thursday

The Long Functional Test was continued and the following experiment tests were completed: APP, GWP, TRF, TCT, and IOE.

APP malfunctioned during testing. An MR was written to document the problem. During GWP testing, the computer commands from GSFC failed. GWP testing continued with manual commands at the ETR.

25 August/26 August, Friday/Saturday

The prelaunch Long Functional Test continued with the following experiment LFT's having been performed: IOE source, GOP, GNF, GCE, GME source, and DST.

The RF system LFT was started and finished on Saturday, 26 August. The special LAP pumpdown was started and continued through the weekend. APP was removed from the spacecraft for bench tests after the package malfunctioned. GWP was also removed to facilitate APP removal. On 26 August, the GME source run, GCE source run, and MAE pulser test were performed. During these tests, the GSE command system malfunctioned. Specifically, the ON commands for CHE, MED, OA, LED, and LAP failed to turn on associated components the first time. The malfunction was documented by MRD08723. APP was returned to the spacecraft on 26 August, and reinstalled after experimenter repairs were completed. The spacecraft was mounted to the mobile work platform and the LAP special GSE (electron gun and vacuum pump) was attached to the spacecraft.

The PMF was transported from Hangar "S" to the Spin Balance Facility for setup. The CHE Experimenter setup and performed a bench test of the spare CHE package.

APP was reinstalled after repairs and bench tests. With APP installed, all instruments and experiments were in the spacecraft.

28 August, Monday

The prelaunch Long Functional Test continued with a special test of LAP. The LAP vacuum pump was operated for 24 hours. The LAP special high voltage test, performed by the Experimenter, was begun. An odor of burning electronics was detected and the spacecraft was turned off. After a careful investigation, it was determined that LAP GSE had malfunctioned. The malfunction was corrected and the special LAP test was completed at approximately 2330 hours. The MAE LFT was completed. Prior to performing the LAP test, the LAP EED was installed according to Appendix A of HHP-004.

The prelaunch LFT was 95% complete. The spacecraft was mounted to the mobile work platform and ring assembly for the CHE Mu Meson test. All experiments and instruments were mounted in the spacecraft.

29 August, Tuesday

The spacecraft was prepared for the CHE Mu Meson and test connector tests. The tests began at 0230 hours and were completed at 1000 hours. A DP check using "P" commands was performed including ACS boom position checks. Following these checks, a complete test of the ACS response to commands was performed with the Instrumenter present. Following the ACS checks, the CAI LFT was completed at 2400 hours. Strip coating was removed from the lower center tube. A solar array illumination test was performed.

Electrical and Mechanical Systems personnel attended the spin balance safety lecture in preparation for spacecraft spin balance operations.

30 August, Wednesday

Morning operations consisted of preparing the spacecraft for the Countdown Manual Task 1 Dry Run. These operations included spacecraft configuration, GSE, communications, and personnel station readiness. The Task 1 Dry Run was started at 1215 hours and ended at 2015 hours. Actual time to complete the dry run was 7 hours and 47 minutes. Special tests of the CHE equipment were performed after the completion of the dry run. These tests were designed to aid the Experimenter in determining operation of the CHE experiment.

31 August, Thursday

Official ETR photographers took motion pictures of EMR personnel performing work on the spacecraft. These pictures were to be used as part of a film on the IMP H launch. The experiment booms were walked through a deployment sequence to verify proper operation and to complete final boom hardware adjustment. Following boom deployment, the GSFC Thermal Coatings technician performed paint touch-up and boom striping repairs. EMR Mechanical Systems performed loctite application and loctite verification, including spacecraft hardware torque tests. The ACS was charged by GSFC personnel beginning at 1930 hours and finishing at 2330 hours.

The test setup and test fixture devices at the Spin Balance Facility were completed. Final weighing of red tag items was completed and personnel attended the Gantry safety lecture. EMR Electrical Systems began a study to resolve umbilical cable checkout procedures on the Gantry. One MDAC wire was discovered missing, and was subsequently installed.

1 September, Friday

Touch-up of thermal paint and tape was completed by the GSFC technician. EMR Mechanical Systems completed final configuration of the boom restraint system and final preparations for moving the spacecraft to the Spin Balance Facility. Preparations included configuration and mounting on the mobile work platform.

Electrical measurements and circuit verification of the kick motor wire harness and heaters were completed per HAP-015-2. Following the electrical checks, the kick motor assembly was weighed. The kick motor assembly remained in storage until final mating to the spacecraft.

The Spin Balance Facility setup was completed and ready for the IMP spacecraft. EMR Electrical Systems completed a communications check between the Blockhouse and Hangar "S".

5 September, Tuesday

The spacecraft was configured and transferred to the OAO Transporter for the move to the Spin Balance Facility (SBF). ETR and MSD personnel accomplished the move with EMR escorting. On arrival at the SBF, the spacecraft was transferred to the Precision Measurement Fixture (PMF) and eccentricity measurements were completed. Using the OA Angle Measurement Procedure, Mechanical Systems completed all measurements by the end of the working day. The spacecraft protective cover was installed and GN_2 purge was maintained through the night.

6 September, Wednesday

The spacecraft was configured and prepared for mounting of the fourth stage kick motor including installation and alignment of the spacer ring. The kick motor was moved from the storage area to the Spin Balance Facility by ETR personnel supported by EMR personnel. The kick motor plug was removed and the ETR lifting cranes used to lift, lower, and align the kick motor assembly to the spacecraft. Thrust vector alignment was begun.

7 September, Thursday

Spin balance operations continued with final kick motor thrust vector alignment. Completing vector alignment, the kick motor plug was reinstalled and the kick motor collar blanket installed. The schedule was delayed due to problems encountered during kick motor alignment operations.

8 September, Friday

Spacecraft weighing operations were initiated at the Spin Balance Facility. A sling was attached to the spacecraft and the marmon clamp was removed. Then the spacecraft was raised and the ground strap was removed. After a weight was obtained for the spacecraft, the procedures were performed in reverse order. This operation was repeated four times to ensure that the weight data correlated.

Personnel of McDonnell-Douglas Astronautics Co. worked on dead weight lifts for the spacecraft and installed line cutters on the third stage motor of the launch vehicle.

EMR completed kick motor installation and thermal blanket work. A fault in the shield for the kick motor EED cable was discovered and corrected.

9 September, Saturday

EMR personnel monitored operations while the third stage ordnance was installed. Spacecraft work was stopped for approximately ten hours since the relative humidity was high at the Spin Balance Facility. When conditions were satisfactory, the RCAS 2400 protective cover was cut from the spacecraft due to deterioration. Then the lifting sling was attached, and the spacecraft was removed from the Precision Measurement Fixture. Operations for mating the spacecraft to the launch vehicle third stage were then started. However, McDonnell-Douglas Astronautics Co. personnel were delayed in performing their tasks until an electrical engineer was available to run the strain gage operation for clamp band torquing. During the torquing operation, EMR personnel removed the separation switch plunger restraints. The mating operation was completed in approximately two hours.

The mated spacecraft and launch vehicle third stage were placed in a transport can and a purge was initiated. In preparation for the move from the Spin Balance Facility to the Gantry, a velostat cover was fabricated for the bottom of the transport can. This cover would allow the can to be opened in the greenhouse without losing the purge.

11 September, Monday

The spacecraft was transported from the Spin Balance Facility to the Gantry at Pad 17A. A sling was attached, and the spacecraft and its transport can were hoisted to the 9A level. Here the spacecraft and the third stage motor assembly were mated and secured to the second stage of the launch vehicle. Then a work platform was installed around the lower section of the spacecraft and was secured to the deck of the Gantry 9A level.

Now the spacecraft was to be prepared for turn-on. The TRF Antenna was installed on the TRF Boom. Special checks were made on the new spacecraft cabling. The Relay Card, OA Stimulator, and umbilical cable were installed. The spacecraft was powered-up and Task #8, F-8 Day Spacecraft Turn-On and Communications Check, was performed.

12 September, Tuesday

The spacecraft was OFF and no activity was performed on it.

The vehicle system underwent simulated flight operations with the fairing adjacent to and electrically connected to the spacecraft.

13 September, Wednesday

The spacecraft was OFF and no activity was performed on it.

Various activities were performed on the launch vehicle.

14 September, Thursday

The spacecraft was configured for performance of the Vehicle RF Interference Test at the Pad 17A Gantry with the tower moved back. The RF Antennas and Inertia Booms were installed on the spacecraft; and their release cord was routed to tie them in place for a fairing fit check. After further modifications to the spacecraft structure, McDonnell-Douglas Astronautics Co. personnel installed the fairing. The spacecraft was placed in the ON state, the Launch Mode was established, and the Vehicle RF Interference test was initiated.

15 September, Friday

Performance of the Vehicle RF Interference Test was resumed. Release cord for the RF Antennas and Inertia Booms got hung-up when it was to be released. However, it was visually confirmed that the antennas had deployed. Then RF Interference testing was completed and the fairing was removed from the spacecraft my McDonnell-Douglas Astronautics Co. personnel.

The vehicle ordnance was installed and the Eastern Test Range (ETR) complex was closed to all other activity.

18 September, Monday

Power was applied to the spacecraft to initiate performance of the Spacecraft Task #1, F-3 Day Spacecraft Checkout, procedures. The spacecraft was configured as necessary to perform the individual check-out steps. Operations proceeded smoothly without any spacecraft mal-functions being detected. After switching from external power to internal

power, the checkout procedures were completed. The spacecraft was then returned to the configuration prior to the start of checkout, and this was verified by EMR Quality Control.

Vehicle checks were performed and the equipment was operating satisfactorily.

19 September, Tuesday

Launch schedule was slipped by one day when McDonnell-Douglas Astronautics Co. was unable to maintain its schedule. While vehicle activities were being performed by MDAC personnel, EMR personnel monitored the operations. The operations lasted most of the day. Then, the Spacecraft Task #2, Strip Coat Removal, procedures were initiated by Grace Miller, GSFC Instrumentation Section, who started removing strip coat from thermal coated parts, and cleaned parts as needed. Strip coat was also removed from the face of the APP Experiment.

Various vehicle activities were performed by MDAC personnel on the launch vehicle. These operations consumed most of the day.

20 September, Wednesday

Grace Miller of GSFC Instrumentation Section completed Spacecraft Task #2, Strip Coat Removal, operations, and cleaned the RF antennas. These antennas were installed as designated and secured for fairing installation. Spacecraft Tasks #3 through #6 were also completed. These tasks included final spacecraft mechanical preparations, fourth stage motor ordnance installation and leak check, final spacecraft inspection, and fairing installation. Inertia Booms were tied up for fairing

installation. After McDonnell-Douglas Astronautics Co. personnel installed the fairing, the Inertia Booms and RF Antennas were released.

21 September, Thursday

Power was applied to the spacecraft for the performance of the Spacecraft Task #7, F-2 Day Post Fairing Installation Spacecraft Turn On, procedures. The procedures were successfully completed and power was removed from the spacecraft. After McDonnell-Douglas Astronautics Co. personnel performed ordnance checks and pulled back the upper gantry sections, the spacecraft was configured for flight.

22 September, Friday

Power was applied to the spacecraft for the performance of Spacecraft Task #8, F-0 Day Pre-Tower Removal Spacecraft Turn On, procedures. The procedures were successfully completed and power was removed from the spacecraft. Later in the day, the Spacecraft Task #9, F-0 Day Terminal Count, Launch Mode procedures were performed. All steps of the procedure were satisfactory. At 9:20 p.m. Eastern Daylight Time, the IMP H spacecraft was successfully launched from Pad 17B of the Kennedy Space Center Launch Complex.

APPENDIX B

IMP J EASTERN TEST RANGE DAILY OPERATIONS SUMMARY

19 September, Wednesday

The ground support equipment (GSE) truck arrived at the Kennedy Space Center in the morning and was off-loaded. Simultaneously, the ESB Mobile Ground Station (Blue Max) was setup and a communications check was performed. The EMR truck arrived late in the afternoon and was off-loaded. Also during the afternoon, the ground support equipment was setup.

20 September, Thursday

The unpacking and setup of ground support equipment continued during most of the day. Simultaneously, attempts were made to establish a communications link with the Building 11 Computer at GSFC. The IMP J spacecraft arrived late in the day. The spacecraft was off-loaded from the flat-bed truck, removed from its shipping container, and moved on the transporter (white dolly) into the Clean Room of Hangar S. A GN_2 purge was applied to the spacecraft overnight.

21 September, Friday

In Hangar S Clean Room, the IMP J spacecraft was hoisted from the transporter support frame and transferred to the work stand. Mechanical Systems temporarily removed protective covers from solar array panels and experiment sensors. Quality Assurance made visual inspection of the spacecraft. DST and GME experiment modules were inspected and installed in the spacecraft. The spacecraft was configured for the Long Functional Test (LFT) with the installation of the Relay Card, Antenna Simulators, and Pin Socket Protectors (PSP's). Experiment panels, solar array panels, and protective covers were reinstalled.

24 September, Monday

In the morning, ACS and experiment boom electroexplosive devices (EED's) were checked out and installed in the IMP J spacecraft. Mechanical Systems performed incoming inspection on IOF 1-10 including the taking of pictures. The spacecraft was then setup for a Long Functional Test (LFT). Electrical Systems checked out the 28-volt harness lines to IOF and Mechanical Systems installed IOF and GAF modules.

In the afternoon, Short Functional Tests were run on the RF antenna simulators and then on RF antennas. Special tests for DST were run on RF antenna simulators and on RF antennas. Output levels for the ESB Mobile Ground Station were established for both PCM and Tone commands. GME LFT was performed. MED and LED worked satisfactorily; but there was a question on VLET concerning view angle versus the experiment panel. Subsequently, the experimenter stated the experiment panel was acceptable for flight. Activities were slowed somewhat due to communication lines to ETR from Building 11 Computer at GSFC being down. There were no computer commands, no line printer, and no CRT at the IMP J spacecraft. However, spacecraft configurations for LFT continued. All experiments were installed, but the kick motor and experiment booms were not installed.

25 September, Tuesday

In the morning, Mechanical Systems installed the GNF and IOF experiment booms and sensors on the IMP J spacecraft. The spacecraft was further configured and a MAP Short Functional Test was performed. The results were satisfactory.

In the afternoon, Long Functional Tests were run. The tests consisted of IOE, APP, Battery Undervoltage, and specials for IOF, GME,

and MAP. Problems occurred during the latter test with the PCM Transmitter operating in the Calibrate Mode. Mechanical Systems lowered and raised the ACS booms while assisting with the ACS Leak Test.

The kick motor was transported to the Missile Research Test Building (MRTB) at the start of this day. Then the kick motor was uncrated and a visual inspection was performed. After the Accelerometer was removed and inert pyrogens were changed to shipping plugs, an electrical check was performed.

In the afternoon, the kick motor was further configured and a leak check was performed. After verifying the existence of lockwire on the Accelerometer and Pressure Transducer and reinstalling the thermal blankets, the kick motor was weighed and the scales were point calibrated.

26 September, Wednesday

Long Functional Tests (LFT) on the IMP J spacecraft continued with GWP, MAE, and GNF being performed. Mechanical Systems removed all solar array panel covers and Electrical Systems performed a Solar Illumination Test. A walkout exercise was performed on the ACS and experiment booms. There was photo coverage and a performance parameter flag check.

The kick motor was transported to the Non-Destruct Test Lab (NDTL) for X-ray inspection. Due to a crane problem, the facility was not prepared, and the kick motor was returned to the Missile Research Test Building (MRTB).

27 September, Thursday

The LFT for CAI was continued in the Hangar S Clean Room at KSC with ULET special and MAE special tests being performed. An EFM

runout test was performed with the antenna mechanisms operating in pairs. Results were satisfactory. An ACS LFT was performed. Upon test completion, the flight test connector plug was installed and loctited. Finally, an EED resistance box test was performed, and the results were satisfactory.

28 September, Friday

The IMP J spacecraft was configured for a GAF test; however, the test start was delayed two hours when the Building 11 computer at GSFC was not ready for operation. Mechanical Systems removed Solar Array panels to access the Antenna Distribution Unit for connector inspection. CHE modules were inspected and installed in the IMP J spacecraft. Late in the day, an RF special test was performed and a MAP special test with foil was performed. Finally, the spacecraft was configured for a GME Mu Meson test with the IOF search coil removed.

The kick motor was hoisted off the truck at the Missile Research Test Building (MRTB). Thermal blankets, pressure transducer, and inert pyrogens were removed for access; and shipping plugs were installed. The pressure transducer was bench tested and reinstalled, and the leak test was rechecked. Then, the previously removed items were reinstalled to return to a "near flight" configuration.

29 September/30 September, Saturday/Sunday

The IMP J spacecraft continued to be configured for Mu Meson testing with the installation of RF antenna simulators, OA and MAE GSE, and the Relay Card. The GME Mu Meson test was performed and the MAE Pulser Calibration test was performed. Late in the day, Mechanical Systems started reconfiguring the spacecraft for the CHE Mu Meson test.

On Sunday, the CHE Mu Meson test was started and was terminated after nine hours. Then, Mechanical Systems installed flight RF antennas for a special RF interference test for CHE. Interference was eliminated by use of an aluminum collar around the main telescope.

1 October, Monday

The IMP J spacecraft was configured to conduct special RF troubleshooting at Hangar S, ETR. A quick turn-on was performed and all currents were normal. However, due to GSE problems the ULET command did not get through to the spacecraft. Command 55P was sent twice before this command made it through the system to turn-on ULET. After the RF sensitivity test of the spacecraft was completed, a LAP special test using low bit rate was performed. Then LAP Long Functional Test (LFT) was performed. After the spacecraft was further configured, RF interference tests were performed. The day concluded with a GAF special test.

The kick motor was transported from the Missile Research Test Building (MRTB) to the Non-Destruct Test Lab (NDTL) for radiographic inspection. Upon completion of satisfactory radiographic inspection, the kick motor was reinstalled in its shipping container and transported to MRTB for final build-up.

2 October, Tuesday

Retesting of CAI LFT was performed. IOF LFT was performed, and at the conclusion, RF antenna simulators were replaced with RF antennas. A special RF test of MAP and CHE was performed, and then the IMP J spacecraft was turned on for the performance of a CHE LFT.

3 October/4 October, Wednesday/Thursday

Mechanical Systems set up the spacecraft for DST Long Functional Test. The majority of the time was spent RF testing MAP. Thursday afternoon a solar array illumination test was performed.

5 October, Friday

The final Short Functional Test with antennas was performed on the IMP J spacecraft.

8 October, Monday

The IMP J spacecraft was transported from Hangar S to the Spin Balance Facility (SBF) at Kennedy Space Center. Mechanical Systems off-loaded the spacecraft and a Delta fit check was performed on the third stage flight unit. No discrepancies were noted during this operation. Then the spacecraft was positioned on the Precision Measurement Fixture (PMF) and runout measurements were performed to center the spacecraft. Afterwards, the spacecraft was secured.

The CAI experiment was reinstalled in the IMP J spacecraft; but, CHE and MAP experiment panels were removed and given to NASA Thermal Coatings for thermal painting. Then the OA Angular Measurements Procedure, JTP-009, was performed. Additional operations for checking the perpendicularity of the OA mirror and Earth Telescope completed this procedure.

The kick motor was not transported to the Spin Balance Facility (SBF) today due to the presence of lightning in the area.

9 October, Tuesday

At the Spin Balance Facility of Kennedy Space Center, EMR Mechanical Systems loosened the screws that held the fiberglass thermal spacer to the upper center tube of the IMP J spacecraft. Dial readings of the precision plate were checked until the plate was centered. Then the spacer securing screws were tightened, and flatness readings were taken on the precision plate to verify that the kick motor interface surface was parallel with the separation plane. When the precision plate was removed from the spacecraft, the kick motor was installed and the 20 securing bolts were tightened. The kick motor nozzle plug was removed and runout measurements were taken to determine distance from the kick motor spin axis to the spacecraft center-of-gravity. Runout measurements were also taken at the exit plane. Afterwards, the kick motor and spacecraft were secured for the night.

The kick motor was transported from the Missile Research Test Building (MRTB) and brought into the Spin Balance Facility (SBF) at 0600. This was in preparation for installation with the IMP J spacecraft.

10 October, Wednesday

At 0800, Test and Evaluation personnel confirmed that the kick motor installation was acceptable and that the perpendicular distance from the kick motor spin axis to the spacecraft center-of-gravity was within specification. Then, the Thiokol representative installed the kick motor nozzle plug. The accelerometer and pressure transducer connections were mated and the thermal blankets were temporarily installed for transport. The Air Force Explosive Ordnance Team inspected the spacecraft with emphasis on location of EED's and the

Turn-On plug. Then the IMP J spacecraft was prepared for weighing. Detailed red tag and green tag item weights were finalized and the IMP J spacecraft weighed 875.3 pounds. At the end of the day, the spacecraft was secured.

11 October, Thursday

The IMP J spacecraft was lifted, its adapters were removed, and the spacecraft/third stage mating surface was cleaned with methanol by Mechanical Systems. Then the spacecraft was mated to the third stage for flight, and the separation switch plunger restraint assemblies were removed. McDonnell-Douglas Astronautics Co. (MDAC) personnel torqued the flight clamp band and performed the spacecraft canning operation. A GN_2 purge was applied to the cans and the assembly was prepared for transporting to Complex 17 of Kennedy Space Center the following morning.

12 October, Friday

At 0630, the IMP J spacecraft was transported to Complex 17 at Kennedy Space Center (KSC) for mating to the second stage of the launch vehicle. Mating of the second and third stages was completed by noon. Then GSE tools and equipment were brought up to Level 9A of the Gantry during the afternoon. The spacecraft was secured and a purge was started for the weekend.

Installation of IMP J spacecraft work platforms was started by McDonnell-Douglas Astronautics Co. (MDAC); but, the work was not completed before the end of the day.

13 October/14 October, Saturday/Sunday

The IMP J spacecraft purge was checked. However, the Gantry GN_2 system leaked excessively and the four GN_2 bottles were emptied over this weekend. Pan American Airways modified the Gantry system, minimized the leak in the system, and the spacecraft purge continued.

15 October, Monday

Starting at 0700, the Task S1A Spacecraft Aliveness Test (Pre-Task S1) was performed. During Task S1A, the McDonnell-Douglas Astronautics Co. (MDAC) completed the spacecraft work platform. Task S1A was completed before noon. Monitoring of the IMP J spacecraft was performed for the remainder of the day.

16 October, Tuesday

Monitoring of the IMP J spacecraft started at 0630. At 0700, a GN_2 purge was connected to the spacecraft velostat bag since Gantry Level 9A and 9B air conditioners went out at 0400. While spacecraft monitoring was occurring during the rest of the day, launch vehicle work was being performed by McDonnell-Douglas Astronautics Co. (MDAC).

17 October, Wednesday

At 0500, preps were initiated for the Delta fairing fit check, Task S1B. The Telesat movable work platform was used for the performance of these preps, which were completed at 0630. However, the fairing installation went slowly. EMR removed the restraint lacing cord that secured the IMP J spacecraft inertia booms and RF antennas. This operation was completed successfully. By the end of the day, the fairing

was left installed on the third stage spacecraft and monitoring of the IMP J spacecraft was being performed.

18 October, Thursday

The MAE acoustic cover on the IMP J spacecraft was connected to its lanyard, and a fishing swivel was used as the interface between the lanyard and the cover. EMR requested that the lanyard be covered with teflon tape for the flight condition.

EMR electrical technicians performed a checkout on the flight fairing umbilical connector and installed it on the IMP J spacecraft. Since connector keying was 180° out of phase between connector halves, the pigtail on the fairing had to be rotated. This in turn, caused interference with the lanyard which then had to be reconfigured.

The lanyard, which pulls the fairing umbilical connector from the IMP J spacecraft, had a string tied in the middle to prevent the lanyard from looping. However, the lanyard still could loop due to a loose string tie. Thus, EMR requested a change. For the flight condition, a new string tie was installed using waxed lacing cord, which does not slide.

As the fairing was manually started to be separated, an interference was detected between the fairing and the Facet 9 active antenna. It was discovered that the MDAC fairing drawing incorrectly called for a passive antenna rather than an active antenna at Facets 1 and 9. Thus, an interference of 2.5 inches existed.

McDonnell-Douglas Astronautics Co. (MDAC) started modifications to the fairing to add a ramp to each fairing half.

19 October, Friday

At 0600, preps for the IMP J spacecraft checkout, Task S1, were initiated. Then Task S1 spacecraft checkout was performed.

20 October/21 October, Saturday/Sunday

The IMP J spacecraft was purged for the weekend. Spacecraft monitoring was performed with periodic checking of the purge system.

22 October, Monday

Preps for Task S1A Spacecraft Aliveness Test (post Task S1) were started at 0730. At 0800, the communications network was called up, and Task S1A was started. This task was completed at approximately 1100. From this point until 1700, NASA performed the monitoring of the IMP J spacecraft. At 1700, Tasks S2, Strip Coat Removal, and S3, Final Mechanical Preparations, were started simultaneously. NASA Thermal Coatings Technician performed strip coat removal and cleaning, and NASA Solar Array Instrumenter performed solar panel final inspection. These tasks were continued into the next day.

23 October, Tuesday

Tasks S2, Strip Coat Removal, and S3, Final Mechanical Preparations, were continued from the previous day, and were both completed by 0500. The Experimenters made their final inspection of their experiment packages at this time.

For fairing installation, the IMP J spacecraft antennas and inertia booms were folded and secured with lacing cord in preparation for fairing installation. Due to the fairing modification that added ramps for the Facet 1 and 9 antennas, these 2 antennas were not secured inside the lacing cord. Thus, during final fairing installation, a fit check was able to be performed. The fairing halves were rolled up one at a time to check out the fit of the new ramps and the Facet 1 and 9 antennas.

Facet 1 and 9 antennas were manually held back to allow the fairing to close as each half was rolled up. Then antenna deployment was observed as the fairing was rolled back. This operation was completed successfully. Fairing final installation was completed at approximately 1400. Then the inertia booms and antennas were released and the MAE ULET acoustic cover was connected. Operations were completed by 1515.

Task S4, Fourth Stage Motor Ordnance Installation and Leak Check, was performed. This task included kick motor final pyrogen installation, squib installation, cable hook-up, and thermal blanket build-up for flight.

24 October, Wednesday

Preps for Task S6, Post Fairing Installation Spacecraft Turn-On, were started at 0430. Upon completion of preps, the communications net was called up and Task S6 was started. Task S6 was completed by 0715. For the remainder of the day, monitoring of the IMP J spacecraft was performed.

25 October, Thursday

At 0730, preps were started for Task S7, F-0 Day Pre-Tower Removal Spacecraft Turn-On. Then Task S7 was successfully completed by 1100. Until the evening, monitoring of the IMP J spacecraft was performed. At 2040, the communications network was called up and Task S8, F-0 Day Terminal Count, Launch Mode, was initiated. At 2211, the beginning of the launch window, the countdown of the IMP J spacecraft occurred, but the launch vehicle engines did not fire. Before the 21-minute launch window had elapsed, the vehicle was rechecked and an improperly positioned launch vehicle switch was discovered in the blockhouse. The countdown was restarted and the IMP J spacecraft was successfully launched from Complex 17 of the Kennedy Space Center at 2226 EDST 25 October 1973 (0226 UT, 26 October 1973).

APPENDIX C

IMP H SUMMARY TECHNICAL REPORT

IMP H

SUMMARY TECHNICAL

REPORT

NOVEMBER 1972

CONTRACT NO. NAS 5-11211

EMR-Aerospace Sciences
EMR Division
Weston Instruments, Inc.
5012 College Avenue
College Park, Maryland 20740

TABLE OF CONTENTS

SECTION 1

INTRODUCTION

The IMP H Summary Technical Report is published by EMR-Aerospace Sciences to provide technical and administrative guidance for design, fabrication, integration, testing, and prelaunch activity on future spacecraft programs. General problems encountered on the IMP H program are described, and a recommendation is offered for these problems on future programs.

This report addresses technical problems encountered during the IMP H program which could recur on future programs; it is not the intent of the report to criticize program administrative policy or program "philosophy".

Each of the pertinent problems which occurred during the IMP H program is generally described in this report. This description is followed by a summary conclusion as to the nature of the problem including a statement of the conditions which caused the problem to occur. In each case, a recommendation is given for avoiding similar problems on future spacecraft programs.

SECTION 2
DESIGN PROBLEMS AND RECOMMENDATIONS

The following design problems were encountered and are noted here because they are potential problem areas on future spacecraft.

2-1. EXPERIMENT INSTALLATION/REMOVAL

The installation or removal of one experiment (MAP) required that the experiment next to it (CAI) be removed to allow access to MAP's mounting screws.

2-1-1. Conclusion

It should not be necessary to disturb other components in the spacecraft to remove one experiment. However, the MAP Experiment employed a non-standard mounting arrangement.

2-1-2. Recommendation

Design reviews must ensure that experimenters do not deviate from standard practices in any way.

2-2. DETECTOR PROTECTIVE COVERS

On removing a detector cover on the GCE Experiment, a thin foil ruptured due to the pressure change.

2-2-1. Conclusion

The protective cover fit the experiment detector with a very close tolerance. A small ($\approx$ 1/32-inch) vent hole was provided in the cover. This proved to be insufficient.

2-2-2. Recommendation

Experimenters should give sufficient attention to venting of their entire package. In this case, the problem was solved when additional vent holes were drilled in the detector cover.

2-3. DIGITAL PERFORMANCE PARAMETERS (DP's)

The DP's (flags) used in the Deployment Programmer were not independently true. A flag might indicate a true reading only if certain other parameters were in a proper state.

NOTE

This problem has been corrected for IMP J.

2-3-1. Conclusion

The DP's should give a valid reading irrespective of other parameters. This is particularly true as concerns pyrotechnics. For example, the state of the ARM/SAFE relay was indeterminate if the separation switch was NOT SEPARATED.

2-3-2. Recommendation

DP's should give a proper indication when interrogated. To correct this DP problem for IMP J, the instrumenter used a 4PDT relay instead of the 2PDT relay.

2-4. SPACECRAFT CURRENT

The spacecraft current (I_{SC}) is read out in telemetry every 40.96 seconds with a resolution of ± 35 ma.

2-4-1. Conclusion

There are advantages to having I_{SC} read out more frequently and with better resolution. For example, some spacecraft functions, when commanded, cannot be monitored by I_{SC} since the ΔI_{SC} is within the established resolution.

2-4-2. Recommendation

When advanced data systems on the spacecraft are operational, it would be desirable to read out I_{SC} more frequently in a variable format and with improved resolution (± 3 ma).

2-5. DETECTOR COVERS

Detector covers (Red Tags) remain on the spacecraft for many tests to provide detector protection. This can be a disadvantage since the aluminum covers also protect the experiment from RFI.

2-5-1. Conclusion

Metal detector covers unduly protect experiments from RFI effects. Additional exposure to RFI effects is desirable.

2-5-2. Recommendation

Detector covers should be RF transparent in order that the experiments receive RFI exposure more frequently.

2-6. DEUTSCH CONNECTORS

Schedule time was lost since Deutsch harness connectors had to be individually shimmed to maximize pin engagement.

2-6-1. Conclusion

Tolerances on Deutsch connector dimensions were sufficiently loose that intermittent electrical contact resulted. Since these connectors rely on the position of the instrument and harness panel to assure full pin engagement, deviations from the established tolerances can produce intermittent connector pin contact. The loose tolerances coupled with flexing of honeycomb panels resulted in commands not being received by the spacecraft.

2-6-2. Recommendation

The following recommendations are offered to eliminate the problem:

a. Minimize the use of Deutsch connectors in a "rack and panel" installation on the spacecraft.

b. Provide better definition of Deutsch connector dimensions and tolerances in order to maximize pin engagement. Current pin engagement for Deutsch connectors is approximately 0.055-inch as compared to 0.125-inch for Cannon connectors.

c. Avoid the use of Deutsch connectors where low pin density is a factor. (Two instruments on IMP H used Deutsch connectors with a less than 50% pin utilization.)

2-7. CAPTIVE SCREWS

Schedule time was lost on IMP H searching the spacecraft for screws dropped during installation of flight plugs. Although no problem was encountered at ETR, a screw dropped inside the fairing or on the gantry would have caused loss of time.

2-7-1. Conclusion

Captive screws were not used on all spacecraft components removed from the spacecraft on the gantry.

2-7-2. Recommendation

All experiments and instruments must have their removable components equipped with captive screws when the cards are delivered for integration. This includes sensor protective covers and enable and disable plugs.

2-8. ACS PROPELLANT

The ACS propellant budget was not clearly defined, and therefore, the IMP H launch weight and mass distribution was not known until late in the T&E program.

2-8-1. Conclusion

During ACS propellant fill operations at T&E, the weight of Freon gas being added to the system was carefully measured; however, the total weight of gas being added to the spacecraft was controlled by the Instrumenter. As a result, the weight of propellant flown in IMP H was two pounds in excess of the established budget.

2-8-2. Recommendation

The ACS propellant budget must be established by the Project Office and changes to that budget must not be made without the Configuration Control Board (CCB) approval.

SECTION 3
INTEGRATION PROBLEMS AND RECOMMENDATIONS

The following problems were encountered during integration and are noted here because they are potential problem areas on future spacecraft.

3-1. DELIVERY OF COMPONENTS

To integrate a spacecraft, a prescribed order is followed: a) structure, b) harness, c) power system, d) telemetry system. After this point, any of several paths may be chosen. During integration of IMP H, sometimes components were not available and compromise paths of integration were taken. For example, several components of the power system were integrated, but they were not intended for flight or as spares.

3-1-1. Conclusion

Deviations from a planned order of integration create difficulties regarding uncompleted tests and procedures.

3-1-2. Recommendation

Scheduling of instruments should be more closely related to the order of integration. Compromise routes should be avoided since they introduce risk to the spacecraft.

3-2. INSTRUMENTATION TECHNIQUES

This is an area where several problems were avoided and is mentioned here so that these techniques may continue to be used on future spacecraft.

Instrumenting to a component or the spacecraft harness was performed to virtually eliminate an accidental short circuit. For example, oscilloscopes were always grounded through the power cord, and the oscilloscope chassis was always insulated from the spacecraft. A one-to-one scope probe was used, but it had a built-in 1 k-ohm resistor in series. Thus, an accidental short of the cable at the oscilloscope end would be through 1 k-ohm and, in most cases, it would cause no damage.

Oscilloscope measurements were made without referencing the oscilloscope to spacecraft signal common. The oscilloscope was only referenced through its power cord, and ultimately to spacecraft signal common. This technique can avoid many possible short circuit problems.

3-2-1. Conclusion

Instrumentation techniques employed on IMP H avoided damage to the spacecraft through accidental shorts, etc. This indicates that good techniques will prevent problems.

3-2-2. Recommendation

Instrumentation techniques on the spacecraft should be continuously reviewed and updated from the point of view of protecting spacecraft systems.

3-3. DEFECTS IN DELIVERED COMPONENTS

Components delivered for inspection and integration frequently do not pass the incoming inspection. When this occurs, a Discrepancy Report is written and the component returned to the Instrumenter or Experimenter for repair or modification.

3-3-1. Conclusion

Delivered items which do not pass inspection cause schedule delays and generate additional paperwork.

3-3-2. Recommendation

A careful visual inspection of components at GSFC prior to delivery to EMR for Receiving Inspection could reduce rejections by as much as 50 percent. Thus, it is recommended that components be submitted to a thorough visual inspection by GSFC QC prior to delivery.

3-4. APPROVED MATERIALS

The integration team continually monitored the spacecraft vicinity for unapproved materials which might be harmful to solid state detectors. In addition, the materials used on the spacecraft had to be screened and approved.

3-4-1. Conclusion

Interfacing organizations were not always apprised of the importance of the Approved Materials List. This includes Experimenters and the Vehicle Contractor.

3-4-2. Recommendation

a. EMR must continue to coordinate with the GSFC Materials personnel and periodically update the Approved Materials List.

b. An updated copy of the Approved Materials List must be available to the Test Conductor.

c. The Approved Materials List should be distributed to all interfacing organizations on a periodic basis.

SECTION 4

ENVIRONMENTAL TEST PROBLEMS AND RECOMMENDATIONS

The following problems were encountered during the Test and Evaluation (T&E) phase at GSFC and are noted here because they are potential problem areas on future spacecraft.

4-1. THERMAL VACUUM TEST VS. HIGH VOLTAGE

During the Thermal Vacuum Tests, the possibility of high voltage discharge from an experiment is always present. Several precautions must be taken to minimize this possibility.

a. Have a detailed Design Review of the experiment high voltage design with particular attention to packaging techniques,

b. Provide a clean vacuum chamber (relatively free from outgassing),

c. Provide a clean spacecraft (relatively free from outgassing),

d. Establish a sufficient time-pressure factor before high voltage turn-on (i.e., 10 hours at 1×10^{-6} torr or less before turn-on).

4-1-1. Conclusion

To avoid a high voltage discharge problem in thermal vacuum, the previous precautions must be followed. The vacuum chamber cleanliness, spacecraft cleanliness, and time-pressure factor are presently recognized and agreed upon principles which have been applied to IMP H with success.

The remaining item is a high voltage design review with particular attention to packaging techniques, and it requires greater discussion. The high voltage design review of experiments should be held separate from the general review and should be conducted by a GSFC high voltage packaging expert. This review should be held early, i.e., before significant packaging design has been performed. It would be most desirable to have examples of high voltage power supplies available for display at this design review. Having a list of materials and examples would also be of value. Displaying an X-ray of a hollow core resistor and an X-ray of a resistor without a hollow core, along with cut-open examples of each resistor type, could be valuable.

4-1-2. Recommendation

Although IMP H experienced a minimum of high voltage problems in thermal vacuum (MAP +6500V had problems due to packaging techniques), careful consideration of the previous precautions is recommended. The high voltage design review should be held separate from the general design review and should include those persons who are associated with high voltage design and packaging problems. Since it may be advisable to have this review organized and conducted by a GSFC high voltage expert, this is being recommended. The high voltage review should display physical examples of good and bad component selection and packaging techniques.

Even with the considerable effort being applied toward solving the high voltage vs. thermal vacuum test problems, many packaging designs seem oblivious to the prior history of problems. There is much information in existance concerning these high voltage problems. However, one of the reasons that all this data seems to be ignored is that it is not compiled into a more comprehensive form.

Precautions b, c, and d listed at the beginning of this section, and requiring a clean vacuum chamber, a clean spacecraft, and a sufficient time-pressure factor, have been implemented for IMP H. However, continual attention should be paid to these areas. It is recommended that the vacuum chamber be "baked out" prior to installing the spacecraft for a thermal vacuum test. Two choices are available for this "bake out". One choice is to use the same temperature cycle for the empty vacuum chamber as the first cycle will be for the spacecraft (see Figure 1). An advantage of this cycle is that the pressures encountered with the chamber empty can then be correlated

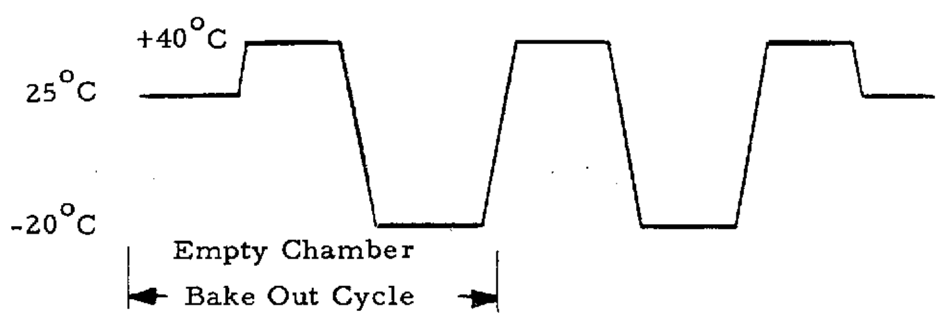


Figure 1. Vacuum Chamber Temperature Cycle

to the pressures with the chamber containing the spacecraft. This result could give an indication of spacecraft outgassing. The other choice is to "bake out" the empty vacuum chamber at as high a temperature as practicable and for as long as reasonable (24 hours to 48 hours).

A clean spacecraft can be obtained if certain items are properly handled. Basically, the spacecraft will be clean in some respects due to the cleanliness restraints. However, materials which will outgas under vacuum are not easily removed except by a vacuum exposure. It is assumed that this exposure removes most materials which could outgas since each component has undergone a thermal vacuum test. Some parts of the structure have not been exposed to vacuum and are the most probable contributors to a large gas load. Specifically, any honeycomb structure parts are potential outgassing areas. This would be -- main platform, harness support panels, dummy solar panels, and the live solar panels. The gas load from such honeycomb structure is unknown. It appeared that the IMP H dummy solar panels outgassed heavily during the thermal vacuum testing. Due to this suspicion, the panels were "baked out" in a vacuum chamber prior to a spacecraft thermal vacuum test. Subsequently, it appeared that the spacecraft gas load was less. The relative cleanliness of such a structure could be determined by a special test on a sample piece and this is recommended. If it is determined that the honeycombed structure is a large contributor to outgassing, then all honeycombed pieces should be thermal vacuum exposed prior to installation on the spacecraft.

In addition to having a clean spacecraft, it is desirable to first expose the spacecraft to a hot temperature instead of a cold temperature. The hot exposure should be performed with the spacecraft experiments off. The exposure temperature should be $\approx +40^{\circ}C$ for at least 24 hours. This will provide the spacecraft with an opportunity to outgas. If the empty chamber had been operated previously at this temperature (outgassed), then a comparison of the pressure vs. time curves for the chamber with and without the spacecraft would indicate the relative cleanliness of the spacecraft.

For IMP H, the three thermal vacuum tests were performed by using the hot non-operating exposure first. Only a minimum of high voltage problems occurred. Therefore, it seems fair to attribute some of this success to the thermal vacuum operating modes.

A sufficient time-pressure factor in a vacuum chamber before high voltage turn-on has already been implemented for IMP H and J. The procedures call out exactly how many hours are required at a certain vacuum before high voltage turn-on. This factor was used on IMP H and resulted in a minimum of high voltage problems.

4-2. GROUND SUPPORT EQUIPMENT

Considerable difficulty was encountered with GSE during the IMP H integration, test, and launch operations. Primarily, these problems occurred with the Solar Array Simulator and the computer-controlled Tone Command Generator. The Tone Command Generator was replaced late in the program with a new unit which has performed well.

4-2-1. Conclusion

Select GSE that is well designed and which has sufficient re-calibration information available. Back-up units should be available on a stand-by basis.

4-2-2. Recommendation

Ground Support Equipment should have an integrity comparable to the spacecraft. The two most basic pieces of GSE for operating the spacecraft were the most problematic pieces. It is recommended that back-up GSE always be available for these two units in order that the spacecraft operations may proceed even in the event of a GSE failure.

4-3. ELECTROMAGNETIC INTERFERENCE PROBLEMS (EMI)

During the IMP H spacecraft T&E Phase, interference problems caused by the spacecraft transmitters were noted and MR's were written. These problems occurred when the spacecraft was operating with the flight antennas (no problems noted when the spacecraft was operating with antenna simulators), and when the spacecraft was in an environment considered to be very harsh. An example of a harsh environment is inside the vibration cell, or inside the dynamic test chamber (DTC). EMR believed that the RF reflections inside these areas caused the interference problems and that the spacecraft would work properly within a less reflective area. This proved to be true since the particular problems (I_{SA}, I_B, OA, CHE, GME) encountered during ground operations functioned normally in orbit. However, a problem occurred in orbit that was not detected during ground operations. This problem seemed to be induced into the MAP Experiment by RF from the transmitters.

4-3-1. Conclusion

EMI testing of the IMP H spacecraft was insufficient. It appears that the subsystem or individual component EMI test is adequate in severity; but in making a conclusion of the test (Is the component susceptible to EMI?), the component is too readily assumed to be acceptable. In the system test for EMI, the same situation exists. The test is adequate in severity; but the conclusion of system acceptability is too readily assumed. Compounding the EMI test conclusion problem is the ability to interrogate the components with or without GSE, and the ease with which test data can be reviewed.

4-3-2. Recommendation

It is recommended that a special design review be held concerning component integrity vs. EMI. When a design review is held for an experiment, the EMI integrity should be discussed. However, it would be advantageous to hold this review by itself, with the review being conducted by one of GSFC's EMC experts. This way more attention would be given to the details of EMC potential problems. The acceptable/not acceptable decision criteria for subsystem and system tests should be clear. For system tests, this decision criteria should be detailed in the Experiment Requirements Document (ERD) for use during testing; and the spacecraft should be operated more frequently on the flight antennas instead of on the simulators. This recommendation may be implemented during a Long Functional Test (LFT) by operating on flight antennas for perhaps 10 minutes and providing a printout of data from each experiment. The aforementioned tests should be implemented and the EMC should be checked. If the problems still exist or the EMC are still suspect, a test in an anechoic chamber should then be scheduled. However, an anechoic chamber test may not be necessary if the spacecraft is known to function acceptably in more severe environments (EMR clean room, GSFC shield room, Room 138 at T&E).

4-4. MASS MEASUREMENTS TEST

The Final Mass Measurements Test at T&E required approximately five weeks to perform. During this period of time, it was difficult to assess the engineering results or the conclusion of any particular test. Some testing was repeated several times when the test results were not clear; for example, how these results related to an acceptable or unacceptable mass properties of the spacecraft. This occurred even though the GSFC Project Office endeavored to have this test performed in a timely and conclusive manner.

Part of the problem was due to insufficiently detailed T&E procedures. The procedures should designate acceptable results and their tolerances. Also, the procedure should be marked "Control Copy" and should be handled the same as all EMR procedures. This would allow the Project Office to quickly review the testing status, progress, and results.

4-4-1. Conclusion

The Mass Measurements Test should be performed in a manner similar to other T&E tests:

a. Detailed Procedures,

b. Control Copy,

c. Entered Data and Comments.

This information would then be available for review by GSFC, EMR Test Conductors, and the Project Office.

4-4-2. Recommendation

For the Mass Measurements Test, additional control should be applied to avoid re-tests and inconclusive data. This control may be applied most effectively by the standard type procedures used in all other T&E test.

Prior to the test, the Project Office should closely review the test procedure to ensure that it will help obtain the desired result.

4-5. SUBSYSTEM TESTING AT T&E

The subsystem (component) testing at T&E is conducted by a GSFC Test Conductor working with the Experimenter or Instrumenter. During this testing, there are situations where the Test Conductor should exercise his authority to stop the test, or contact the Project Office, or write a Malfunction Report (MR). Several areas have been noted where this authority has not been exercised. This in turn affects mission success.

During subsystem testing (as in spacecraft system testing), a correct positive action must occur at the proper time. If this correct action is not taken, the opportunity is lost since the action cannot be taken while the test is still in process. The problem, malfunction, or failure is then published weeks or months later in a test report. When the test data become available, the subsystem may already have been integrated into the spacecraft. At this time, a decision to reperform the subsystem test is severely limited by cost and schedule.

4-5-1. Conclusion

Correct action must be taken by the Test Conductor when problems occur during subsystem testing. Since the failure of the test is not known until the Test Conductor's report is published, a delay occurs. This is usually too late in the program.

4-5-2. Recommendation

The GSFC Test Conductors must be made aware of their authority to stop a test, to contact the Project Office, to write an MR, or to do all of these things. When a problem is noted, the Test Conductors may recommend that the Experimenter or the Project Office write an MR. If this does not occur, the Test Conductor should write the MR.

4-6. MOMENT OF INERTIA

A favorable Moment of Inertia ratio was not obtained on the IMP H flight spacecraft until late in the T&E program.

4-6-1. Conclusion

The mass properties of the IMP H spacecraft were not accurately defined until the final mass measurements were made.

4-6-2. Recommendations

a. The ETU should be more closely configured to the flight spacecraft when mass measurements are made.

b. At the conclusion of initial mass measurements on the flight spacecraft, an acceptable ratio measurement should be measured. On IMP H, an acceptable ratio was never measured, even during final mass measurements.

SECTION 5

PRELAUNCH OPERATIONS PROBLEMS AND RECOMMENDATIONS

The following operation problems which occurred should be avoided in future spacecraft or launch operations.

a. The Long Functional Test at ETR was originally scheduled as five 10-hour days. Although the test was completed in five days, the time periods were considerably longer than 10 hours. This was due to the performance of many unplanned tests, which required additional time. On subsequent operations, the plan should be reviewed more closely and the time required should be estimated more realistically.

b. The requirements of the Gantry Work Platform area were discussed and decided upon in a preliminary meeting at ETR several months before the start of launch operations. Upon arrival at ETR, it was found that the work platform did not meet the established requirements.

c. At the launch site, it was somewhat unexpectedly found that certain vehicle tests required the spacecraft to be operating for background RF and susceptibility data. This discovery caused changes to the countdown manual. These requirements should be well defined before arrival at the launch site.

d. Changes in configuration tests or techniques should be avoided. Specifically, the technique for RF antenna deployment within the fairing by

removal of a restraining cord was changed at the launch site. This change caused a problem and a short time delay. In addition, epoxy material applied for the first time to a restraint cable turnbuckle caused a problem when an antenna rod was folded against the epoxy. These problems occurred due to a desire to provide improved techniques. However, at the launch site, this effort should be restrained.

e. It would be desirable to take an Analog Tape Recorder to the launch site so that spacecraft data may be sent to GSFC for test purposes without the necessity of turning on the spacecraft.

f. The continuity of data lines from ETR to GSFC were a problem at times. The lines were frequently disconnected when not in use, then they were not available when needed again. This could be avoided by personnel attaching tape to the connections and marking the use of the cable.

g. Due to the significant number of changes in the Countdown Manual, considerable reproduction of procedures was required. Availability of reproduction facilities was very limited and caused delays which, in turn, minimized the time available for review and familiarization of procedures.

h. The areas of responsibility for coordinating the total packing of the spacecraft and GSE for shipment to ETR was insufficiently defined. GSFC personnel from Building 16 were trained for these packing operations, but they were not enlisted. This packing operation should be improved.

i. The truck transporting the spacecraft had instrumentation for monitoring relative humidity and temperature. This instrumentation had

pre-set alarm levels. However, the alarm levels were set incorrectly, causing the alarm flag to be raised continuously. These levels should be adjusted so that the instrumentation and alarms perform effectively.

j. An additional access hole in the fairing at 180° from the existing one would have been a benefit when deploying the RF antennas to the fairing and inspecting this operation. A request should be made for the additional access hole on IMP J.

k. Communications on the gantry would be significantly improved if the phone were inside the white room instead of being outside. This phone link forms a part of the spacecraft launch communications network. Thus, phone availability and convenience are important.

l. During the Safety Training session required for access to the gantry, a drill on the use of gas masks was required for all personnel. The drill sequence clearly pointed out that a hazard exists with the gas mask itself. It was very difficult to remove a piece of tape that blocks the inlet to the filtering canister. If you cannot remove this protective tape, it is impossible to breathe with the gas mask. You must then quickly remove the mask and possibly be exposed to toxic gas.

This gas mask hazard should be rectified. It would be a simple matter to provide a pull tab for the tape by adding a short strip of cloth. The tab would hang down for easy access, and could be grasped and pulled to remove the tape restriction to the canister.

APPENDIX D

IMP J SUMMARY TECHNICAL REPORT

IMP J

SUMMARY TECHNICAL

REPORT

DECEMBER 1973

CONTRACT NO. NAS 5-11211

EMR-Aerospace Sciences
EMR Division
Weston Instruments, Inc.
5012 College Avenue
College Park, Maryland 20740

TABLE OF CONTENTS

SECTION I

INTRODUCTION

The IMP J spacecraft was launched from Complex 17B of the Eastern Test Range at 2226 EDT on 25 October 1973 (0226, 26 October, GMT). Upon successful launch, IMP J was designated Explorer 50.

The IMP J Summary Technical Report is published by EMR-Aerospace Sciences to provide technical and administrative guidance for design, fabrication, integration, testing, and prelaunch activity on future spacecraft programs. General problems encountered on the IMP J program are described, and a recommendation is offered for these problems on future programs.

This report addresses technical problems encountered during the IMP J program which could recur on future programs; it is not the intent of the report to criticize program administrative policy or program "philosophy".

Each of the pertinent problems which occurred during the IMP J program is generally described in this report. This description is followed by a summary conclusion as to the nature of the problem including a statement of the conditions which caused the problem to occur. In each case, a recommendation is given for avoiding similar problems on future spacecraft programs.

SECTION II

DESIGN PROBLEMS AND RECOMMENDATIONS

The following design problems were encountered and are noted here because they are potential problem areas on future spacecraft.

2-1. ELECTRICAL CONNECTOR MISMATING

The IMP J spacecraft had approximately 100 electrical connectors. A few locations existed where a connector could be incorrectly mated. One location concerns the Turn-On Plug which is physically, but not electrically, interchangeable with the EED Arming Plug. Another location concerns the two pyrogen connectors which appear the same as the connector for the kick motor pressure transducer.

2-1-1. Conclusion

Physical mating of connectors at incorrect locations can cause damage to the spacecraft or personnel.

2-1-2. Recommendation

Optimally, non-fixed connectors should be unique physically. This may not always be possible. However, this type problem should be recognized early. Then the appropriate color coding could be used to minimize incorrect connector mating. Frequently, equipment designs are complete before this

type problem can be recognized. Thus, the color coding solution would be the most readily implementable. The color coding should be unique and applied to both the non-fixed and fixed connectors or the area adjacent to the fixed connector.

2-2. SPACECRAFT BATTERY PROTECTION

The spacecraft battery was not required to deliver more than ≈ 8 amps steady-state or ≈ 20 amps transient. However, the 14-cell AgCd, 10 AH battery could easily deliver 100 amps for a short period of time.

In order to minimize the IR drop from the battery terminals, four #20 wires were tied in parallell in the harness. In this configuration, a short circuit in the spacecraft harness from $+V_b$ to $-V_b$, signal common, 28V return, or chassis could cause the spacecraft harness insulation to burn-off with resultant damage to other parts of the harness.

Depending on several parameters, some other point in the circuit may open circuit before significant harness damage occurs. This, however, is dependent on and varies with the situation.

2-2-1. Conclusion

The spacecraft battery is unprotected. This is particularly true when the spacecraft is not powered-up since the level detectors cannot then function to protect the battery. Even with the spacecraft powered-up, the level detectors only open the battery switch. This would not necessarily open a short circuit since the switch is not physically near the battery, but is inside the System Programmer.

2-2-2. Recommendation

To protect the spacecraft battery or to protect the spacecraft wiring harness from the battery, the ability of the battery to deliver current should be limited. This limiting may take several forms and could also be varied for "ground operations" versus in-orbit operations.

It is recommended that for ground operations, a fuse or fusible link (short piece of wire that will fuse at approximately 20 amperes in 50 msec) be used on future spacecraft. This link would be at the battery terminals. For launch, the link could remain as is or be jumpered with a wire or switch of additional current capability. If jumpered with a switch, this could be a commandable latching relay or a ground-only stimulated relay.

This seems to be a proper area for additional consideration and investigation. Coupled into this consideration could be the possibility of firing EED's with capacitors properly sized so that the battery is not essential to EED firing. Preliminary calculations show that for ≈ 12 amperes and 5 msec, a capacitor of the order of 3000 μf would be required.

2-3. SPACECRAFT CURRENT

The spacecraft current (I_{SC}) is read out in telemetry every 40.96 seconds with a resolution of ± 35 ma.

2-3-1. Conclusion

There are advantages to having I_{SC} read out more frequently and with better resolution. For example, some spacecraft functions, when

commanded, cannot be monitored by I_{SC} since the ΔI_{SC} is within the established resolution.

2-3-2. Recommendation

When advanced data systems on the spacecraft are operational, it would be desirable to read out I_{SC} more frequently in a variable format and with improved resolution (± 3 ma).

2-4. RF TRANSPARENT DETECTOR COVERS

The IMP H Summary Report, Section 2-5, page 2-3, recommended that experiment detector covers be RF transparent in order to expose the experiments to RF rather than protect them from RF.

2-4-1. Conclusion

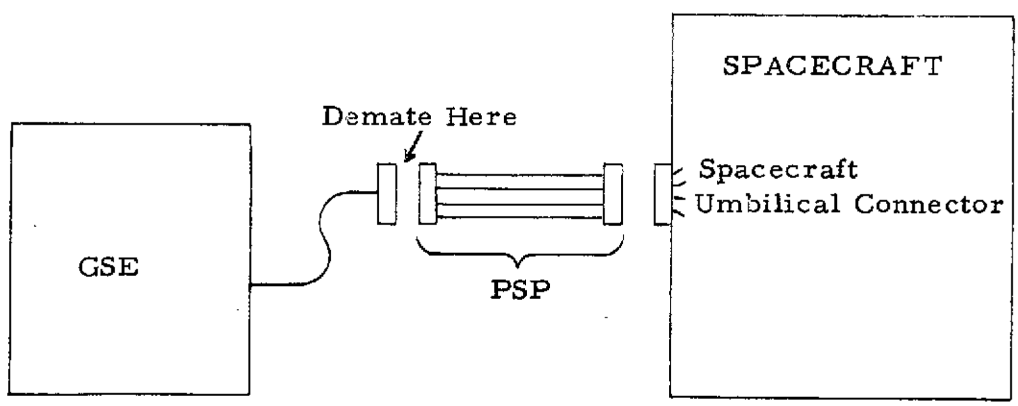
This recommendation from the IMP H Summary Report was implemented for IMP J. Then RF interference problems were noted and solved early in the program.

2-4-2. Recommendation

Future spacecraft should be carefully reviewed for the value which may be obtained by using RF transparent covers instead of covers which would protect experiments from RF interference.

2-5. SPACECRAFT CONNECTOR PROTECTION

Some electrical connections to the spacecraft were mated and demated several times a day. This handling over a period of time can degrade the spacecraft mounted connector. Specifically, the umbilical and GSE test connectors were exercised regularly. To avoid damage to these connectors, a short extension, designated Pin Socket Protector (PSP), was attached and left connected to the spacecraft connector. The make and break connection was then secured at the non-spacecraft end of this short extension. Thus, any connector damage would be confined to the PSP.



2-5-1. Conclusion

The PSP protection of spacecraft connectors saved some rework time since it was anticipated that the excessive mating and demating would have degraded the spacecraft connectors.

2-5-2. Recommendation

For future spacecraft, an evaluation should be made of those areas where the PSP could effectively be employed. However, occasional testing without the PSP's should be performed to ensure that the connection without PSP's works properly.

2-6. DEUTSCH CONNECTORS

Schedule time was lost since Deutsch harness connectors had to be individually shimmed to maximize pin engagement.

2-6-1. Conclusion

Tolerances on Deutsch connector dimensions were sufficiently loose that intermittent electrical contact resulted. Since these connectors rely on the position of the instrument and harness panel to assure full pin engagement, deviations from the established tolerances can produce intermittent connector pin contact. The loose tolerances coupled with flexing of honeycomb panels resulted in commands not being received by the spacecraft during ground operations.

2-6-2. Recommendation

The following recommendations are offered to eliminate the problem:

a. Minimize the use of Deutsch connectors in a "rack and panel" installation on the spacecraft.

b. Provide better definition of Deutsch connector dimensions and tolerances in order to maximize pin engagement. Current pin engagement for Deutsch connectors is approximately 0.055-inch as compared to 0.125-inch for Cannon connectors.

c. Avoid the use of Deutsch connectors where low pin density is a factor.

2-7. CAPTIVE SCREWS

Schedule time was lost on IMP J searching the spacecraft for screws dropped during installation of flight plugs. Although no problem was encountered at ETR, a screw dropped inside the fairing or on the gantry would have caused loss of time.

2-7-1. Conclusion

Captive screws were not used on all spacecraft components removed from the spacecraft on the gantry.

2-7-2. Recommendation

All experiments and instruments must have their removable components equipped with captive screws when the cards are delivered for integration. This includes sensor protective covers and enable and disable plugs.

2-8. SPACECRAFT RF CONFIGURATION

When testing the spacecraft for RF interference either in an anechoic chamber or in a laboratory, it was difficult to configure the spacecraft sufficiently close to the orbital situation to make the test valid. Although some areas must be compromised due to lack of experiments or flight solar panels, etc., other areas can and should be configured more nearly orbital. For example, removal of solar panel covers, deployment of booms, and installation of experiment cover panels.

2-8-1. Conclusion

RF interference testing is frequently misleading due to the RF environment or the spacecraft RF configuration.

2-8-2. Recommendation

Spacecraft configuration and environment should be reviewed more closely before RF interference tests since these parameters affect the test results and confuse the test conclusions.

A scheme for resolving the RF environmental aspect of the problem was partially implemented at Hangar S of ETR for the IMP J prelaunch operations. This scheme used an RF detector probe, placed near experiments, to determine their RF levels when the spacecraft was operational and using flight antennas. In this manner, the spacecraft could be mapped for direct and reflected RF at any point. It is specifically recommended that this idea be further developed as a tool for determining whether RF interference at an experiment is real or due to a poor RF environment.

As a starting point, a mapping probe would be designed, developed, and used with a spacecraft in the optimum environment of an anechoic chamber to map the spacecraft areas. The spacecraft would then be remapped during subsequent RF testing in a lab or elsewhere; and this data would be compared to the anechoic chamber data to determine if the RF interference at an experiment is due to the uncontrolled RF environment.

2-9. OPTICAL ASPECT SYSTEM TESTING

The test set-up and instrumentation for dynamically testing the OA system in the spacecraft is insufficient for the task, and has resulted in additional questions upon test completion. On smaller spacecraft (IMP F and G), the spacecraft was tested outside in sunlight. With larger spacecraft, this is not as easily performed.

Areas of responsibility for this test are defined less clearly than for any other similar spacecraft tests. This relates mostly to test instrumentation and techniques. A prime problem is that the lamp used to stimulate the OA sensor may work marginally or not at all. The lamp parameters of intensity,

spectral purity, collimation, and alignment to the sensor have not been sufficiently under control for the last several tests.

2-9-1. Conclusion

The test set-up for the dynamic OA system test lacks a proper and controlled stimulating light source.

2-9-2. Recommendation

For subsequent spacecraft OA system tests, the stimulating lamp should be improved as related to the spectral output, intensity, collimation, and alignment of the lamp to the spacecraft sensor. Either T&E or the OA Instrumenter should be responsible for this test equipment, but not both.

2-10. OPTICAL ASPECT SYSTEM GEOMETRY

On both IMP H and IMP J there was confusion up until launch regarding the geometric relationship between the Optical Aspect sun slit and earth telescope. In order to determine the earth telescope line-of-site relative to the spin axis and sun slit, certain rough measurements were made on both IMP H and J spacecraft at ETR.

2-10-1. Conclusion

The geometry associated with the Optical Aspect system was not understood completely by anyone except the OA Instrumenter.

2-10-2. Recommendation

At the start of spacecraft design, a review should be held during which all requirements for attitude sensing equipment is discussed in detail. If the line-of-site of sun and earth sensors is quite critical, then a special rigid structure should be provided for that system. In addition, the instrumenter should write a test procedure for determining these LOS, and he should provide the associated GSE.

2-11. PROJECT DRAWINGS

On both the IMP H and IMP J spacecraft, the spacecraft umbilical connector was keyed 180° differently than the mating connector on the fairing provided by MDAC. Consequently, the fairing connector and pigtail had to be rotated to mate with the spacecraft. This caused unnecessary stress on the wiring.

2-11-1. Conclusion

The Delta Interface Document generated by the spacecraft personnel and the Compatibility Drawing generated by the Launch Vehicle Contractor were not thorough concerning all details.

2-11-2. Recommendation

The Project Office should review these documents for details, such as connector keying and lanyard material, length, and positioning.

2-12. SUBSYSTEM FIT CHECKS

On several occasions during the IMP H and J program, an existing problem was discovered just prior to starting a certain operation or test. Some of these problems were physical interference, cable routing, lack of material, wrong size material, etc. As a result, either schedule time was lost or the test configuration was compromised.

2-12-1. Conclusion

In the interest of meeting production and test schedules, full fit checks of certain subsystems were compromised. Included in this category were: 1) fully configured experiment booms, and 2) fully configured kick motor, including thermal blankets.

2-12-2. Recommendation

A formal fit check must be required and witnessed by the Project Office with photographic coverage. These photos will help to answer subsequent questions, and the fit checks will assure that tests may start on schedule.

SECTION III

INTEGRATION PROBLEMS AND RECOMMENDATIONS

The following problems were encountered during integration and are noted here because they are potential problem areas on future spacecraft.

3-1. DELIVERY OF COMPONENTS

To integrate a spacecraft, a prescribed order is followed: a) structure, b) harness, c) power system, d) telemetry system. After this point, any of several paths may be chosen. During integration of IMP J, sometimes components were not available and compromise paths of integration were taken. For example, several components of the power system were integrated, but they were not intended for flight or as spares.

3-1-1. Conclusion

Deviations from a planned order of integration create difficulties regarding uncompleted tests and procedures.

3-1-2. Recommendation

Scheduling of instruments should be more closely related to the order of integration. Compromise routes should be avoided since they introduce risk to the spacecraft.

3-2. INSTRUMENTATION TECHNIQUES

This is an area where several problems were avoided and is mentioned here so that these techniques may continue to be used on future spacecraft.

Instrumenting to a component or the spacecraft harness was performed to virtually eliminate an accidental short circuit. For example, oscilloscopes were always grounded through the power cord, and the oscilloscope chassis was always insulated from the spacecraft. A one-to-one scope probe was used, but it had a built-in 1 k-ohm resistor in series. Thus, an accidental short of the cable at the oscilloscope end would be through 1 k-ohm and, in most cases, it would cause no damage.

Oscilloscope measurements were made without referencing the oscilloscope to spacecraft signal common. The oscilloscope was only referenced through its power cord, and ultimately to spacecraft signal common. This technique can avoid many possible short circuit problems.

3-2-1. Conclusion

Instrumentation techniques employed on IMP J avoided damage to the spacecraft through accidental shorts, etc. This indicates that good techniques will prevent problems.

3-2-2. Recommendation

Instrumentation techniques on the spacecraft should be continuously reviewed and updated from the point of view of protecting spacecraft systems.

3-3. DEFECTS IN DELIVERED COMPONENTS

Components delivered for inspection and integration frequently do not pass the incoming inspection. When this occurs, a Discrepancy Report is written and the component returned to the Instrumenter or Experimenter for repair or modification.

3-3-1. Conclusion

Delivered items which do not pass inspection cause schedule delays and generate additional paperwork.

3-3-2. Recommendation

A careful visual inspection of components at GSFC prior to delivery to EMR for Receiving Inspection could reduce rejections by as much as 50 percent. Thus, it is recommended that components be submitted to a thorough visual inspection by GSFC QC prior to delivery.

3-4. APPROVED MATERIALS

The integration team continually monitored the spacecraft vicinity for unapproved materials which might be harmful to solid state detectors. In addition, the materials used on the spacecraft had to be screened and approved.

3-4-1. Conclusion

Interfacing organizations were not always apprised of the importance of the Approved Materials List. This includes Experimenters and the Vehicle Contractor.

3-4-2. Recommendation

a. Integration personnel must continue to coordinate with the GSFC Materials personnel and periodically update the Approved Materials List.

b. An updated copy of the Approved Materials List must be available to the Test Conductor.

c. The Approved Materials List should be distributed to all interfacing organizations on a periodic basis.

SECTION IV

ENVIRONMENTAL TEST PROBLEMS AND RECOMMENDATIONS

The following problems were encountered during the Test and Evaluation (T&E) phase at GSFC and are noted here because they are potential problem areas on future spacecraft.

4-1. THERMAL VACUUM TEST VS. HIGH VOLTAGE

During the Thermal Vacuum Tests, the possibility of high voltage discharge from an experiment is always present. Several precautions must be taken to minimize this possibility.

a. Have a detailed Design Review of the experiment high voltage design with particular attention to packaging techniques,

b. Provide a clean vacuum chamber (relatively free from outgassing),

c. Provide a clean spacecraft (relatively free from outgassing),

d. Establish a sufficient time-pressure factor before high voltage turn-on (i.e., 10 hours at 1×10^{-6} torr or less before turn-on).

4-1-1. Conclusion

To avoid a high voltage discharge problem in thermal vacuum, the previous precautions must be followed. The vacuum chamber cleanliness, spacecraft cleanliness, and time-pressure factor are presently recognized and agreed upon principles which have been applied to IMP J with success.

The remaining item is a high voltage design review with particular attention to packaging techniques, and it requires greater discussion. The high voltage design review of experiments should be held separate from the general review and should be conducted by a GSFC high voltage packaging expert. This review should be held early, i.e., before significant packaging design has been performed. It would be most desirable to have examples of high voltage power supplies available for display at this design review. Having a list of materials and examples would also be of value. Displaying an X-ray of a hollow core resistor and an X-ray of a resistor without a hollow core, along with cut-open examples of each resistor type, could be valuable.

4-1-2. Recommendation

Although IMP J experienced no high voltage problems in thermal vacuum, careful consideration of the previous precautions is recommended for future spacecraft. A definite trend of less and less high voltage problems has been established when IMP F, G, I, H, and J are considered, with IMP J having had no high voltage problems during the thermal vacuum testing.

The high voltage design review should be held separate from the general design review and should include those persons who are associated

with high voltage design and packaging problems. Since it may be advisable to have this review organized and conducted by a GSFC high voltage expert, this is being recommended. The high voltage review should display physical examples of good and bad component selection and packaging techniques.

Even with the considerable effort being applied toward solving the high voltage vs. thermal vacuum test problems, many packaging designs seem oblivious to the prior history of problems. There is much information in existance concerning these high voltage problems. However, one of the reasons that all this data seems to be ignored is that it is not compiled into a more comprehensive form. It is recommended that such data be compiled into a guide book and be made available to designers.

Precautions b, c, and d listed at the beginning of this section, and requiring a clean vacuum chamber, a clean spacecraft, and a sufficient time-pressure factor, have been implemented for IMP J. However, continued attention should be paid to these areas. It is recommended that the vacuum chamber be "baked out" prior to installing the spacecraft for a thermal vacuum test. Two choices are available for this "bake out". One choice is to use the same temperature cycle for the empty vacuum chamber as the first cycle will be for the spacecraft (see Figure 1). An advantage of this cycle is that the pressures encountered with the chamber empty can then be correlated to the

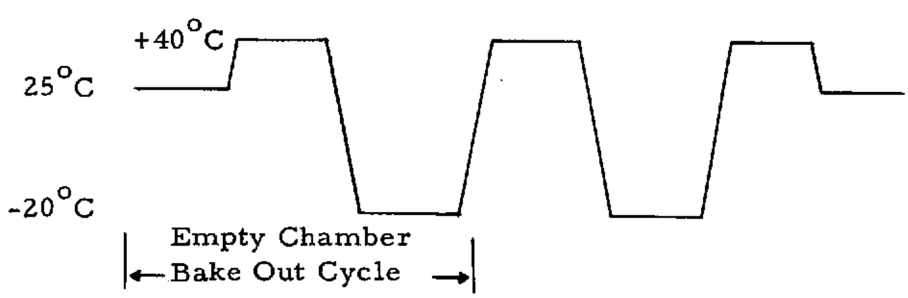


Figure 1. Vacuum Chamber Temperature Cycle

pressures with the chamber containing the spacecraft. This result could give an indication of spacecraft outgassing. The other choice is to "bake out" the empty vacuum chamber at as high a temperature as practicable and for as long as reasonable (24 hours to 48 hours).

A clean spacecraft can be obtained if certain items are properly handled. Basically, the spacecraft will be clean in some respects due to the cleanliness restraints. However, materials which will outgas under vacuum are not easily removed except by a vacuum exposure. It is assumed that this exposure removes most materials which could outgas since each component has undergone a thermal vacuum test. Some parts of the structure have not been exposed to vacuum and are the most probable contributors to a large gas load. Specifically, any honeycomb structure parts are potential outgassing areas. This would be -- main platform, harness support panels, dummy solar panels, and the live solar panels. The gas load from such honeycomb structure is unknown. It appears that the dummy solar panels outgas heavily during thermal vacuum testing. Due to this suspicion, the panels were "baked out" in a vacuum chamber prior to a spacecraft thermal vacuum test. Subsequently, it appeared that the spacecraft gas load was less. The relative cleanliness of such a structure could be determined by a special test on a sample piece and this is recommended. If it is determined that the honeycombed structure is a large contributor to outgassing, then all honeycombed pieces should be thermal vacuum exposed prior to installation on the spacecraft.

In addition to having a clean spacecraft, it is desirable to first expose the spacecraft to a hot temperature instead of a cold temperature. The hot exposure should be performed with the spacecraft experiments off.

The exposure temperature should be $\approx +40^{\circ}C$ for at least 24 hours. This will provide the spacecraft with an opportunity to outgas. If the empty chamber had been operated previously at this temperature (outgassed), then a comparison of the pressure vs. time curves for the chamber with and without the spacecraft would indicate the relative cleanliness of the spacecraft.

For IMP J, a single thermal vacuum test was performed by using the hot non-operating exposure first. No high voltage problems occurred. Therefore, it seems fair to attribute some of this success to the thermal vacuum operating modes.

A sufficient time-pressure factor in a vacuum chamber before high voltage turn-on has already been implemented for IMP J. The procedures call out exactly how many hours are required at a certain vacuum before high voltage turn-on. This factor was used on IMP J and no high voltage problems occurred.

4-2. SUBSYSTEM TESTING AT T&E

The subsystem (component) testing at T&E is conducted by a GSFC Test Conductor working with the Experimenter or Instrumenter. During this testing, there are situations where the Test Conductor should exercise his authority to stop the test, or contact the Project Office, or write a Malfunction Report (MR). Several areas have been noted where this authority has not been exercised. This in turn affects mission success.

During subsystem testing (as in spacecraft system testing), a correct positive action must occur at the proper time. If this correct action is not taken, the opportunity is lost since the action cannot be taken while the test is still in process. The problem, malfunction, or failure is then published weeks or months later in a test report. When the test data become available, the subsystem may already have been integrated into the spacecraft. At this time, a decision to reperform the subsystem test is severely limited by cost and schedule.

4-2-1. Conclusion

Correct action must be taken by the Test Conductor when problems occur during subsystem testing. Since the failure of the test is not known until the Test Conductor's report is published, a delay occurs. This is usually too late in the program.

4-2-2. Recommendation

The GSFC Test Conductors must be made aware of their authority to stop a test, to contact the Project Office, to write an MR, or to do all of these things. When a problem is noted, the Test Conductors may recommend that the Experimenter or the Project Office write an MR. If this does not occur, the Test Conductor should write the MR.

4-3. STORAGE BATTERIES (CELLS) USED WITH GROUND SUPPORT EQUIPMENT

For several test applications GSE incorporated the use of storage batteries. This includes lead-acid and carbon-zinc types.

All of these batteries have a massive capability of delivering energy. In particular, an automotive lead-acid battery can easily deliver 500 amperes for a short period. There is no need for such a capability near a spacecraft or personnel.

4-3-1. Conclusion

The hazard of storage batteries used in GSE has not been fully recognized. Several incidents with such batteries involving IMP J have been previously reported.

4-3-2. Recommendation

All GSE storage batteries or cells should be limited in their capability to deliver energy. Consider $500 \frac{\text{coul}}{\text{sec}}$ at $12 \frac{\text{joules}}{\text{coul}} \rightarrow 6000 \frac{\text{joules}}{\text{sec}}$.

The limiting of capability should be in the form of a properly sized fuse or a fusable link. This protection shall be as close to the output terminals of the battery as practicable in order that a short circuit before the fuse be minimized.

SECTION V

PRELAUNCH OPERATIONS PROBLEMS AND RECOMMENDATIONS

The following operation problems which occurred should be avoided in future spacecraft or launch operations.

a. The Long Functional Test at ETR was originally scheduled as five 10-hour days. Although the test was completed in five days, the time periods were considerably longer than 10 hours. This was due to the performance of many unplanned tests, which required additional time. On subsequent operations, the plan should be reviewed more closely and the time required should be estimated more realistically.

b. It would be desirable to take an Analog Tape Recorder to the launch site so that spacecraft data may be sent to GSFC for test purposes without the necessity of turning on the spacecraft. This was implemented for IMP J.

c. The continuity of data lines from ETR to GSFC were a problem at times. The lines were frequently disconnected when not in use, then they were not available when needed again. This could be avoided by personnel attaching tape to the connections and marking the use of the cable.

APPENDIX E

LAUNCH CONFIGURATION SPACECRAFT EXPERIMENT/ INSTRUMENT INVENTORY

LAUNCH CONFIGURATION SPACECRAFT

EXPERIMENT/INSTRUMENT INVENTORY

Facet	Spacecraft Item	I. D.	Spacecraft/Serial Number	
			IMP H	IMP J
12	GNF			
	GNF Sensor (Boom Mounted)	GNF 1	10	11
	Magnetometer Electronics	GNF 2	10	11
	Magnetometer Processor	GNF 3	10	12
15	GME			
	VLET Electronics	GME 7		20
	MED Electronics	GME 6	11	02
	Low Energy Detector	GME 4	01	02
	VLET Detector	GME 2		20
	LED Electronics	GME 5	11	03
	Medium Energy Detector	GME 1	02	04
	LET II Electronics	GME 7	11	
	LET II Detector	GME 2	10	
7	CHE			
	Main Telescope-Output Electronics	CHE 1	10	11
	Main Telescope-Input Electronics	CHE 2	10	11
	Low Energy Telescope Detector	CHE 3	11	12
	Main Telescope Detector	CHE 4	10	11
3	GWP			
		GWP 1	10	11
		GWP 2	10	11

Facet	Spacecraft Item	I. D.	Spacecraft/Serial Number	
			IMP H	IMP J
3	APP			
		APP 1	10	11
8	CAI			
		CAI 1	11	12
4	MAE			
	Ion-Electron Sensor	MAE 1	11	12
	Ion-Electron Electronics	MAE 2	10	12
11	IOE			
		IOE 1	01	12
16	LAP			
	Sensor	LAP 1	10	12
	Electronics	LAP 2	10	12
9	MAP			
		MAP 1	10	11
5	IOF			
	AC EM Fields Experiment	IOF 1		10
	Sensor	IOF 2		A, B, O
	X EFM Preamp	IOF 3		10, 11
	Y EFM Preamp	IOF 4		10, 11

Facet	Spacecraft Item	I. D.	Spacecraft/Serial Number	
			IMP H	IMP J
5	GAF			
	Spectrometer	GAF 1		11
	A/D Converter	GAF 2		10
	+X EFM Preamp	GAF 3		10
	-X EFM Preamp	GAF 4		10
	+Y EFM Preamp	GAF 5		10
	-Y EFM Preamp	GAF 6		10
5	TRF			
	Sensor (Boom Mounted)	TRF 1	10	
	Electronics	TRF 2	10	
13	GCE			
	Electron Position Detector	GCE 1	01	
6	GOP			
	Ion Composition	GOP 1	10	
	TELEMETRY & COMMAND			
1	Encoder	IT 1	11	12
16	PCM	IT 2	10	13
Up	Sequential Decoder & Receiver	IT 3	11	03
12	R&RR and PCM Receiver	IT 4	10	03
Up	PCM Decoder	IT 5	10	11
12	Analog Transmitter	IT 6	10	13

Facet	Spacecraft Item	I. D.	Spacecraft/Serial Number	
			IMP H	IMP J
1	Encoder Convolver	IT 8	01	10
11	System Programmer	IT 9	10	12
11	Experiment Programmer	IT 10	11	12
11	Deployment Programmer	IT 11	11	12
Up	Antenna Distribution Unit	IT 12	11	10
	<u>POWER</u>			
	Solar Panels (48)	IP 1	See back pages.	
Lwr. Ctr. tube	Battery	IP 2	11	13
Lwr. Ctr. tube	Shunt, Charge, Discharge Regulators	IP 3	10	12
Up	OA Converter	IP 4	03	11
11	Decoder Converter	IP 5	10	11
1	Encoder Converter	IP 7	10	11
	Dump Resistors	IP 8		
	Dump Transistors	IP 9		
	Test Solar Panels	IP 10	10	11
	<u>ELECTRICAL</u>			
12	OA Sensor	IE 1	102	104
12	OA Electronics	IE 2	10	11
11	Turn On	IE 3	11	12
	Harness	IE 10	10	11
Up	RF Filter	IE 11	12	10

Facet	Spacecraft Item	I. D.	Spacecraft/Serial Number	
			IMP H	IMP J
6	Thermal Coatings Test	IE 12	10	
13	DST-DMU	IE 13	11	01
13	DST-DPU	IE 14	10	
13	Delta Instrumentation	IE 15	10	11
K/M	DIP Pressure Transducer		5127	2571
K/M	DIP Accelerometer		171987	171981
	CONTROL			
12	ACS Electronics	IC 1	10	12
	ACS Tank (2-Filled)	IC 2	05,03	04, 08
	ACS Diode Pack	IC 3	05,07	11,04
	ACS Valve Nozzle	IC 4	07,08	11,12
	ACS Shelf Assembly	IC 5	04	05
	ACS Boom Line	IC 6		
	ACS Swivel Joint	IC 7		
	ACS Temp. Probe	IC 8		
	ACS High Pressure Line	IC 9		
	ACS Low Pressure Line	IC 10		

FACETS - IMP H

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Upper Solar Array	135	101	117	144	110	104	141	109	145	123	118	114	120	112	129	128
Middle Solar Array	150	149	119	122	138	115	103	108	IP10-10	102	106	131	134	142	136	143
Experiment Section																
Lower Solar Array	107	113	127	147	139	130	137	140	116	125	111	121	105	148	124	146

SOLAR PANEL SERIAL NUMBERS

FACETS-IMP J

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
235	236	237	238	239	240	242	243	244	245	246	247	248	249	226	229	Upper Solar Array
217	218	219	220	221	224	225	227	228	230	231	* IP10-11	** 241	232	233	234	Middle Solar Array
																Experiment Section
201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	Lower Solar Array

SOLAR PANEL SERIAL NUMBERS

*Test Solar Panel

**Reference Solar Panel

APPENDIX F

IMP H & J MECHANICAL INTERFACE DOCUMENT

29 September 1969

Revision A
October 19, 1971

IMP H & J

MECHANICAL INTERFACE DOCUMENT

This document is a revision for IMP H & J of referenced document (a).

Revised by EMR-Aerospace Sciences for the Goddard Space Flight Center.

Approved by ______________________
T. Eng, Mechanical
Systems Engineer

Approved by B. H. Ferer
B. H. Férer, Associate
Project Manager

REVISION PAGE

REVISION	DATE	BY	DESCRIPTION	APPROVED
A	10-19-71	HSA	This document has been revised in its entirety.	BHB 11/14/71 R.E. 11-14/71

REFERENCES

(a) IMP H & J Mechanical Interface Document, Preliminary, GSFC Mechanical Systems Branch.

(b) Specifications for Electrical Interface, IMP I, Preliminary, T. C. Goldsmith, GSFC, dated April 1968.

(c) IMP H & J Specification for Electrical Interface, revised September 12, 1969.

(d) Environmental Test Specifications for Spacecraft and Components Using Launch Environments Dictated by Delta Launch Vehicles, GSFC S-320-D-3.

(e) Magnetic Restraints Document, IMP I, GSFC X325-67-70.

TABLE OF CONTENTS

C-4

INTRODUCTION

The need for a larger and more capable spacecraft have required design of a new structure; in addition, the new structure will carry on board an attitude and spin control system to maintain the S/C at a desired attitude and spin rate throughout its mission. To provide for a relatively clear view angle for those experiments which have sensors looking into space, body mount type solar arrays are used rather than solar paddles (Fig. 1A). The new structure is larger than the previous IMP designs and the new module frames are larger. They enclose an area of approximately 79 sq. in. which is almost twice as large as the previous IMP modules. The increase in module area should alleviate overcrowding of electronic components. The various mechanical requirements are as set forth.

It should be noted that the dimensions set forth in this document are for reference only and thus should not be used as production dimensions. None of the drawings in this document are controlled and therefore the document will not be ammended should later drawing revisions occur. Production drawings can be obtained by contacting G. D. Linsey IMP H Program Manager, EMR-Aerospace Sciences, 5012 College Avenue, College Park, Maryland, tel. 301/864-6340.

CAUTION

This revision is intended to eliminate many mechanical defects that were found on the IMP H hardware. The most frequent of these include:

a) use of non-locking hardware.

b) locking hardware not identified by epoxy paint.

c) interference with mating mechanical surfaces because of protruding screws, pins, last minute test connectors, etc.

d) covers don't fit properly.

e) covers not fastened when card is delivered.

f) top covers not thermal painted.

g) painting not completed or started when card is received.

h) magnetic materials used (particularly in co-ax).

i) changing exterior configuration such as replacing a Cannon type test connector for a Deutsch test connector.

j) addition of a shorting plug (mechanical dimensions must be furnished.

k) special GSE attachment to the instrument while in the spacecraft. A mechanical problem usually exists due to the experiment panel (Figure 9) or a boom interface while the booms are in the stowed position.

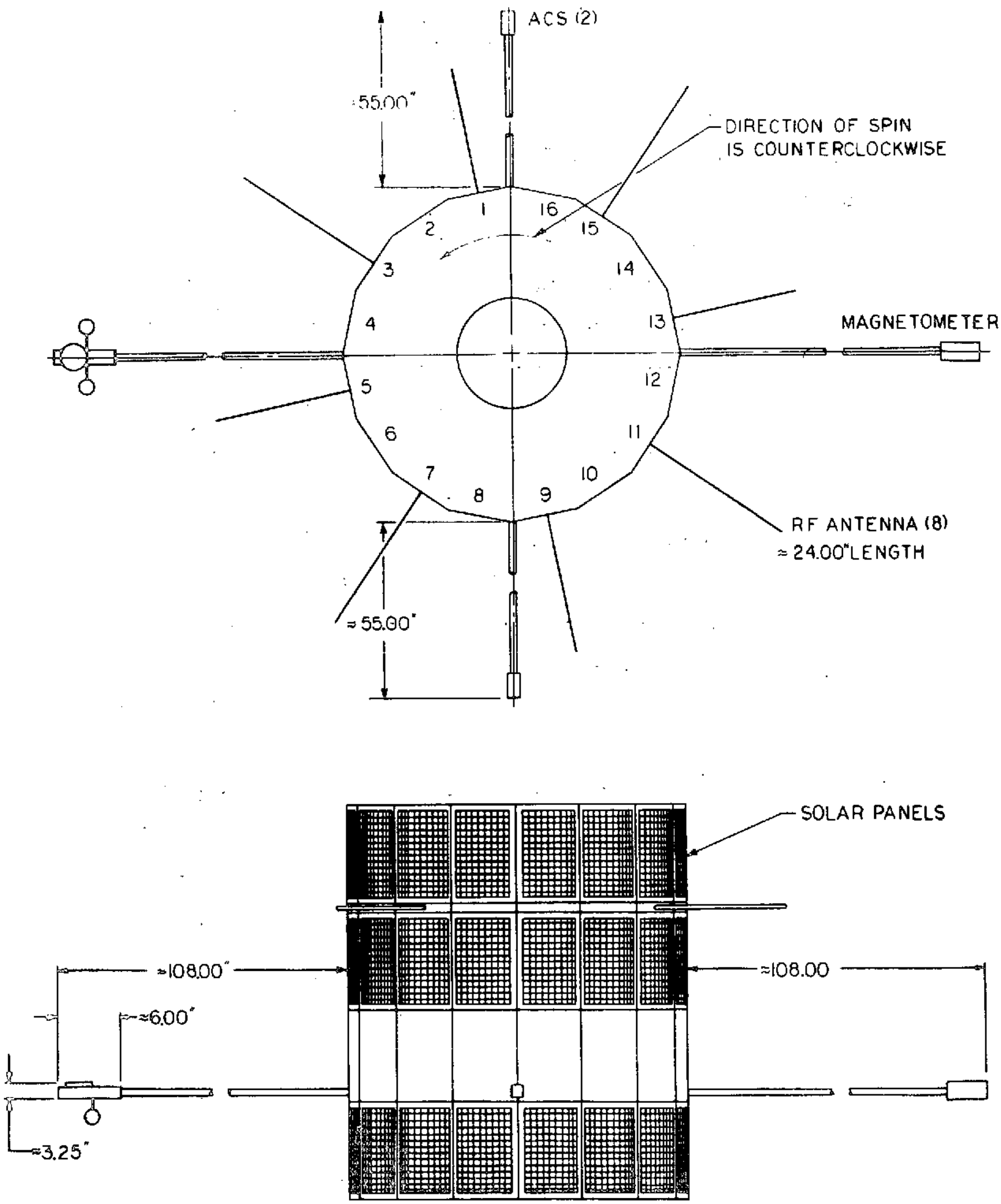


FIGURE 1A
IMP H APPENDAGES

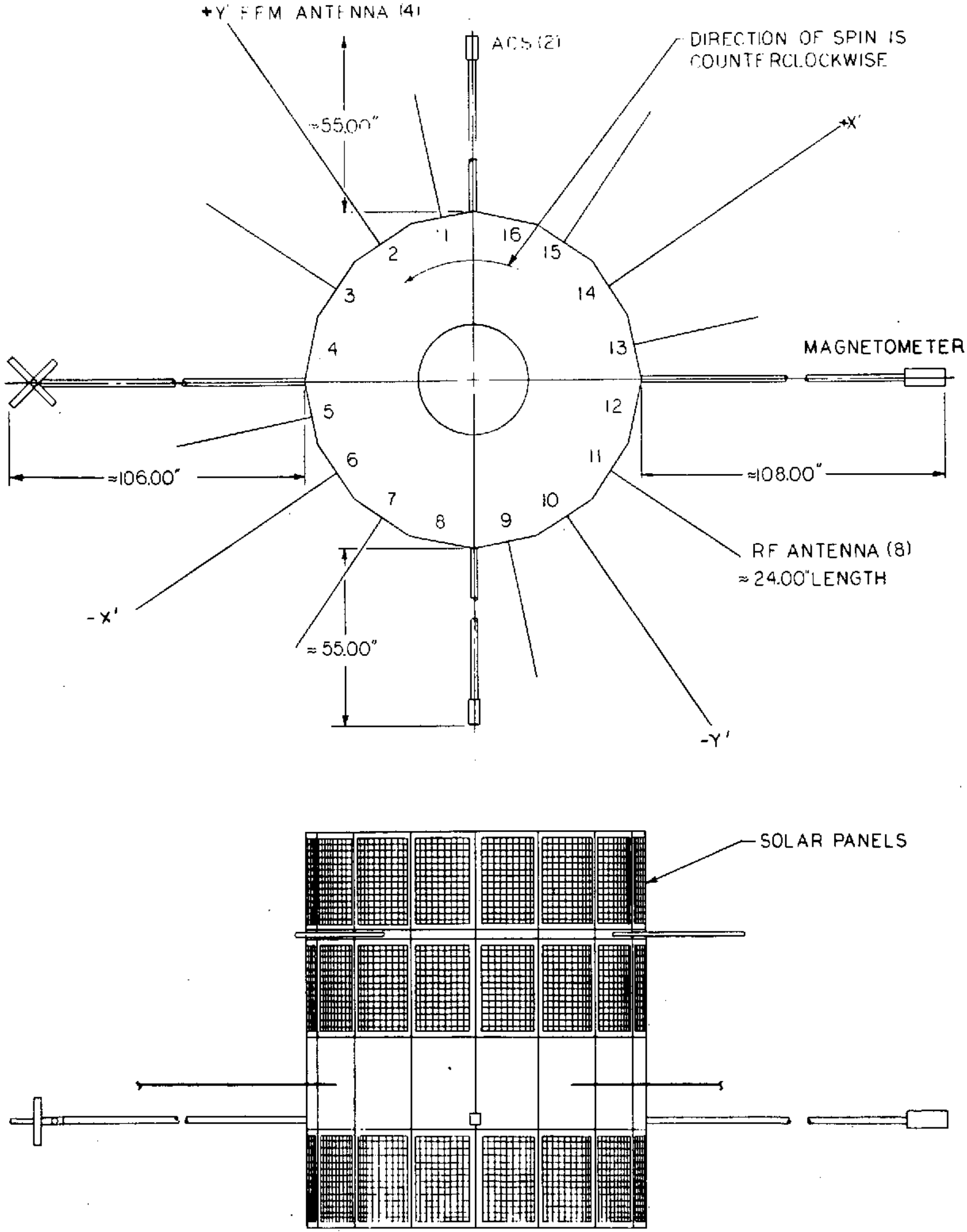
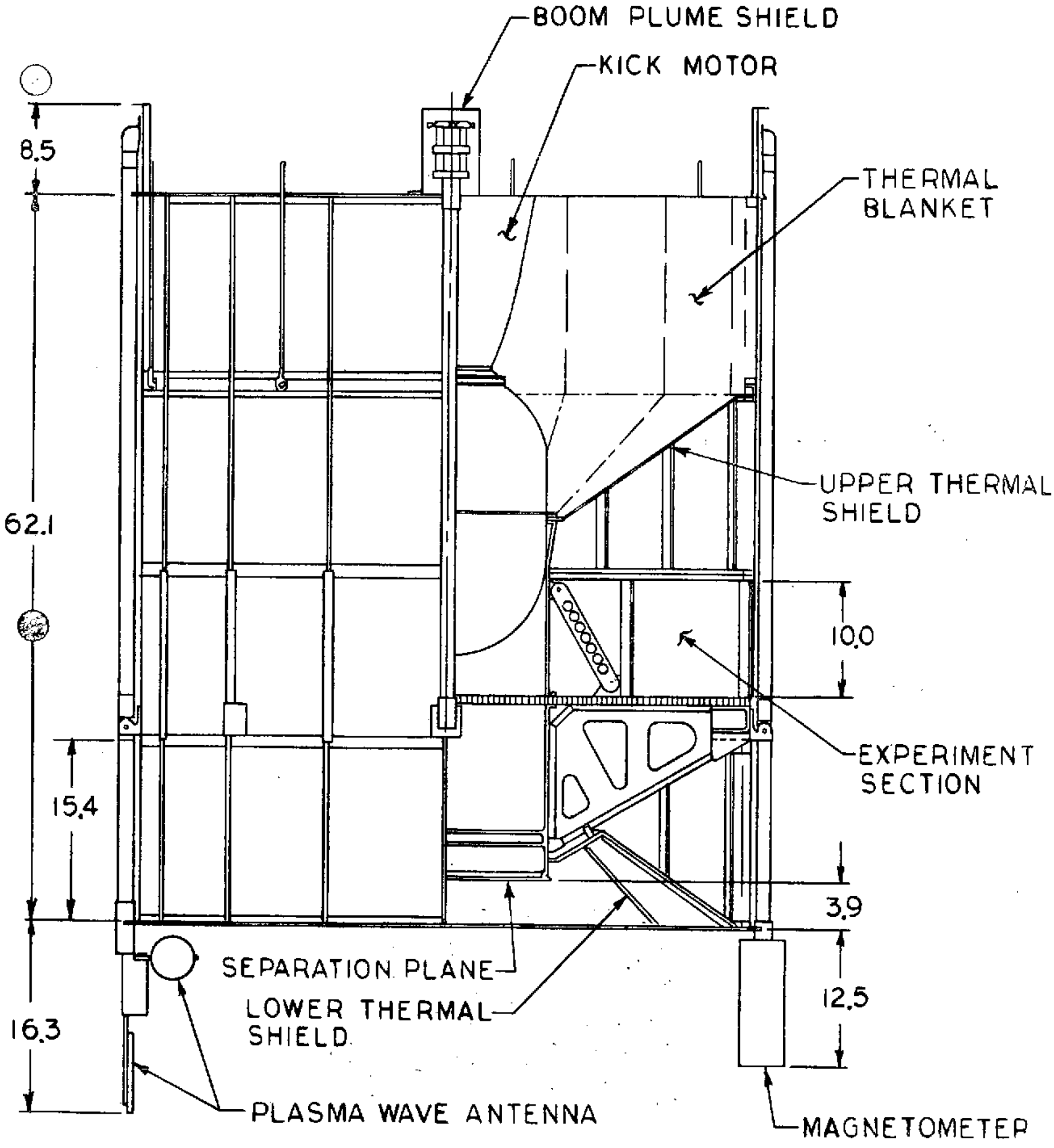


FIGURE 1B

IMP [illegible] APPENDAGES

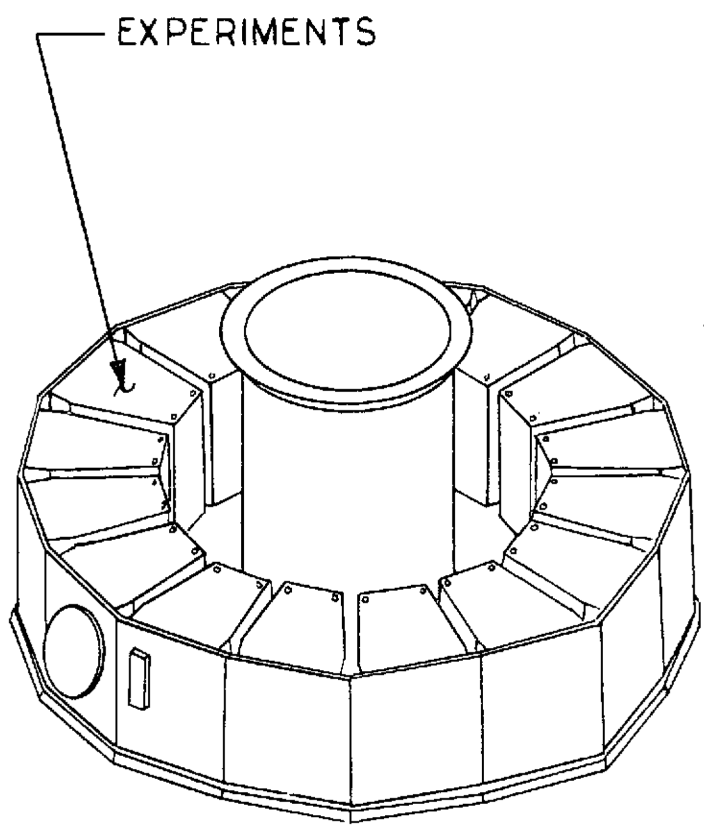


IMP-H GENERAL LAYOUT

FIGURE 1.C

STRUCTURE

Geometrically, the structure is a 16-sided drum measuring approximately 52 inches across flats and 51 inches minimum in height. It basically consists of an aluminum honeycomb shelf supported by 8 struts and an 18" diameter thrust tube on the under side. The experiment modules are mounted on the top of the shelf (Fig. 1D). These modules are used as integral members of the structure to support the mid-section panels. The mid-section panels in turn support a solar array section on each end. The S/C will be equipped with a metallic top and bottom cover for thermal and RF control.



INTERPLANETARY MONITORING PLATFORM

IMP-H & J

FIGURE 1D

IMP H & J APPENDAGES

(Reference Fig. 1A and 1B)

A. ACS BOOMS (2 each) — IMP H & J

These booms are made of 1.25-inch O.D. fiberglass tubing. Adjacent and clamped to each boom is a 0.25-inch diameter aluminum tube which is used to carry the gas (Freon 14) to the exhaust jets. The boom length projects outward approximately 55 inches from the main body of the spacecraft. These booms are located between Facets 1 and 16; Facets 8 and 9 on the spacecraft body.

B. MAGNETOMETER (1 each) — IMP H & J

This boom is made of 1.25 O.D. fiberglass tubing. An electric shielded cable of approximately 0.30-inch in diameter is placed outside the boom which provides signal and power to the triaxial sensor. This boom projects outward approximately 108 inches from the spacecraft body. At the end of this boom is the triaxial sensor which is approximately 3.25 inches in diameter and 6 inches long. This boom is located between Facets 12 and 13 on the spacecraft.

C. PLASMA WAVE BOOM (1 each) — IMP H Only

This boom will be almost identical in size and length to the magnetometer boom; however, at the end of this boom is an antenna consisting of a loop with two calibrating spheres. This boom is located between Facets 4 and 5 on the spacecraft.

D. IOF BOOM ASSEMBLY - Dr. Gurnett (1 each) IMP J Only

This boom is made of 1.25 O.D. fiberglass tubing. A signal coaxial cable is placed outside the fiberglass tubing which will provide signals from the antenna to the spacecraft. At the end of this boom is a search coil magnetic antenna used in conjunction with the EFM antennas on the IMP J spacecraft. This boom is located between Facets 4 and 5 on the spacecraft, and thus serves as a counterbalance to the IMP J magnetometer boom.

E. EFM ANTENNAS - Dr. Aggson (4 each) IMP J Only

These antennas will probably be made of small diameter wires and could be deployed as much as 200 feet in length from the spacecraft body. These antennas originate at the center lines of Facets 2, 6, 10, and 14.

F. RF ANTENNA - Telemetry (8 each) IMP H & J

The antennas are made of aluminum alloy and are approximately 0.312-inch in diameter and approximately 24 inches in length. They are located on the upper section of the spacecraft between adjacent rows of solar cells. These antennas originate at the center lines of Facets 1, 3, 5, 7, 9, 11, 13, and 15.

MATERIAL AND MAGNETIC CLEANLINESS

The use of magnetic materials will be avoided. To reduce or prevent a buildup of magnetic fluxes, aluminum alloy or fiberglass material should be used extensively in the fabrication of the experiment components. Certain brasses, magnesiums, phenolics, and other non-ferrous materials have been found to exhibit a relatively high amount of magnetic properties. A careful investigation of these items should be made prior to their use. It is expected that each subsystem or experiment will meet the following magnetic restrictions:
(Reference-Magnetic Field Restraints for S/C Systems and Subsystems-X-325-67-70, GSFC).

1. After a 15 gauss exposure, the residual magnetism of the test specimen shall not exceed 32 gammas at 18 inches.
2. After a 50 gauss deperm, the residual magnetism of the test specimen shall not exceed 2 gammas at 18 inches.
3. The stray magnetism of the test specimen shall not exceed 2 gammas at 18 inches.

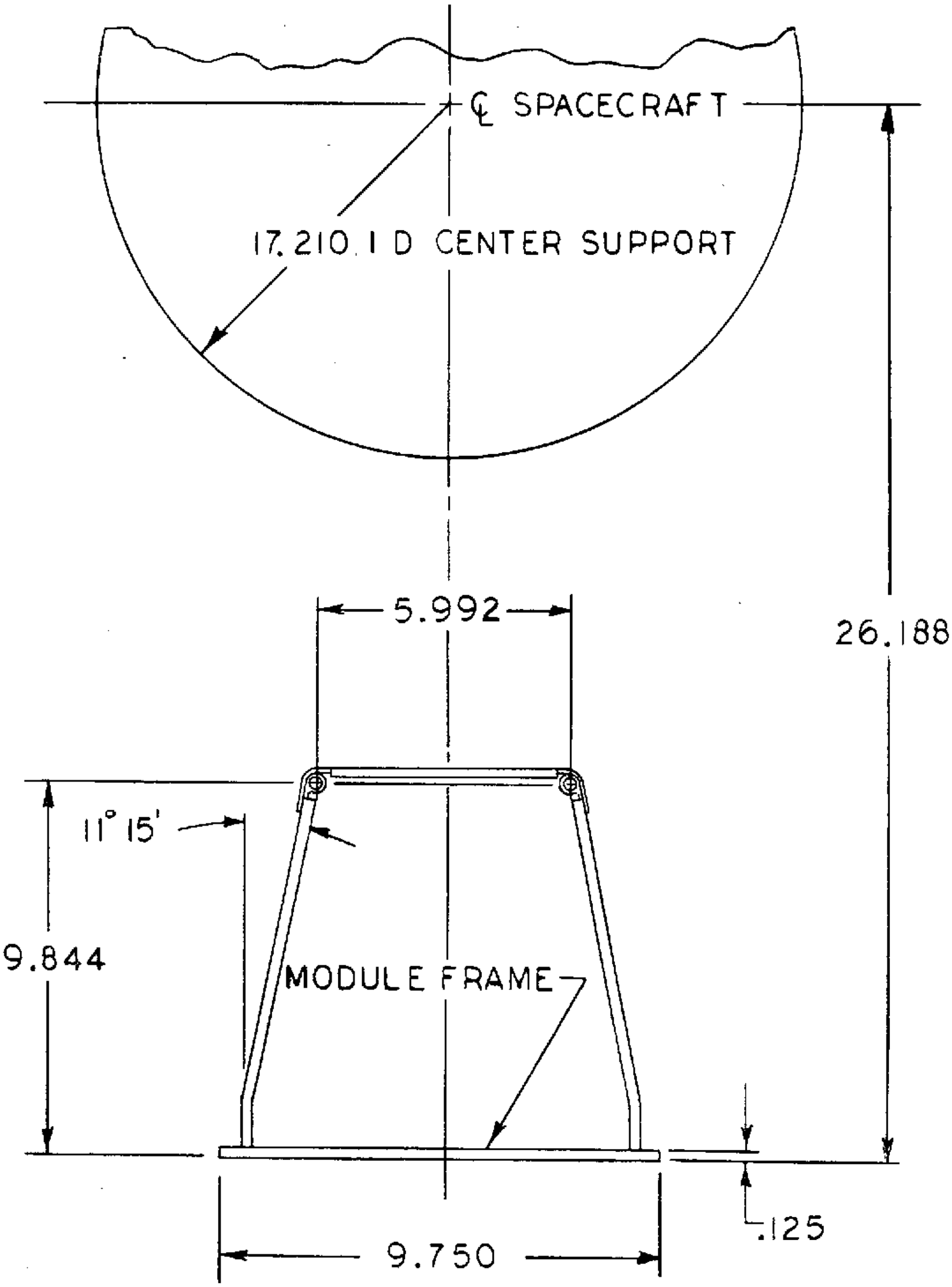
The following table lists some of the commonly known "non-magnetic" materials and their permeability values.

These values were derived from measurements made with a Russka Astatic Magnetometer at a magnetizing force of 0.5 oersteds.

Material		Permeability (Gammas)
Aluminum Alloy	356	All less than 1.001
	214	
	1100	
	2024	
	2017	
	5086	
	6061	
	7075	
Magnesium Alloy	AZ31B	All less than 1.001
	ZK60A	
	A292A	
	A263A	
	A291	
	ZRE1	
	AM100A	
Beryllium Copper-Berylco No. 2		
Cast Electrolytic Copper		
Naval Brass		
Aluminum Bronze (AL/7%, Fe/2%, Si/1%, Cu/bal		
Nickel-Chrome-Boron Alloy-Colmonoy No. 6		
Cartridge Case Brass		
Titanium 150A		
Titanium 140A		1.001 ± .001
Tungsten Copper Alloy		1.001 ± .001
Carboloy (CoWc)		1.001 ± .001
Copper Nickel Alloy (70/30)		1.001 ± .001
Haynes C. Alloy		1.001 ± .001
Beryllium Copper- Berylco No. 25		1.001 ± .001
Beryllium Copper- Berylco No. 10		1.001 ± .001
Haynes No. 18 Alloy		1.001 ± .001
Titanium RS 110Z		1.001 ± .001
Haynes No. 25 Alloy		1.002 ± .001
Hastelloy No. 13		1.002 ± .001
K-Monel		1.002 ± .001
Haynes No. 16 Alloy		1.002 ± .001
Type 310 Stainless Steel		1.003 ± .0015
Type 310 75% Cold Drawn		1.003 ± .0015
Type 301 Stainless Steel		1.003 ± .0015
Nickel-Chrome-Boron Alloy (Colmonoy No. 4)		1.003 ± .0015
Haynes No. 6 Alloy		1.003 ± .0015
Elgiloy		1.004 ± .0015
Inconel 750		1.005 ± .0015

BODY MOUNTED ELECTRONICS AND EXPERIMENTS

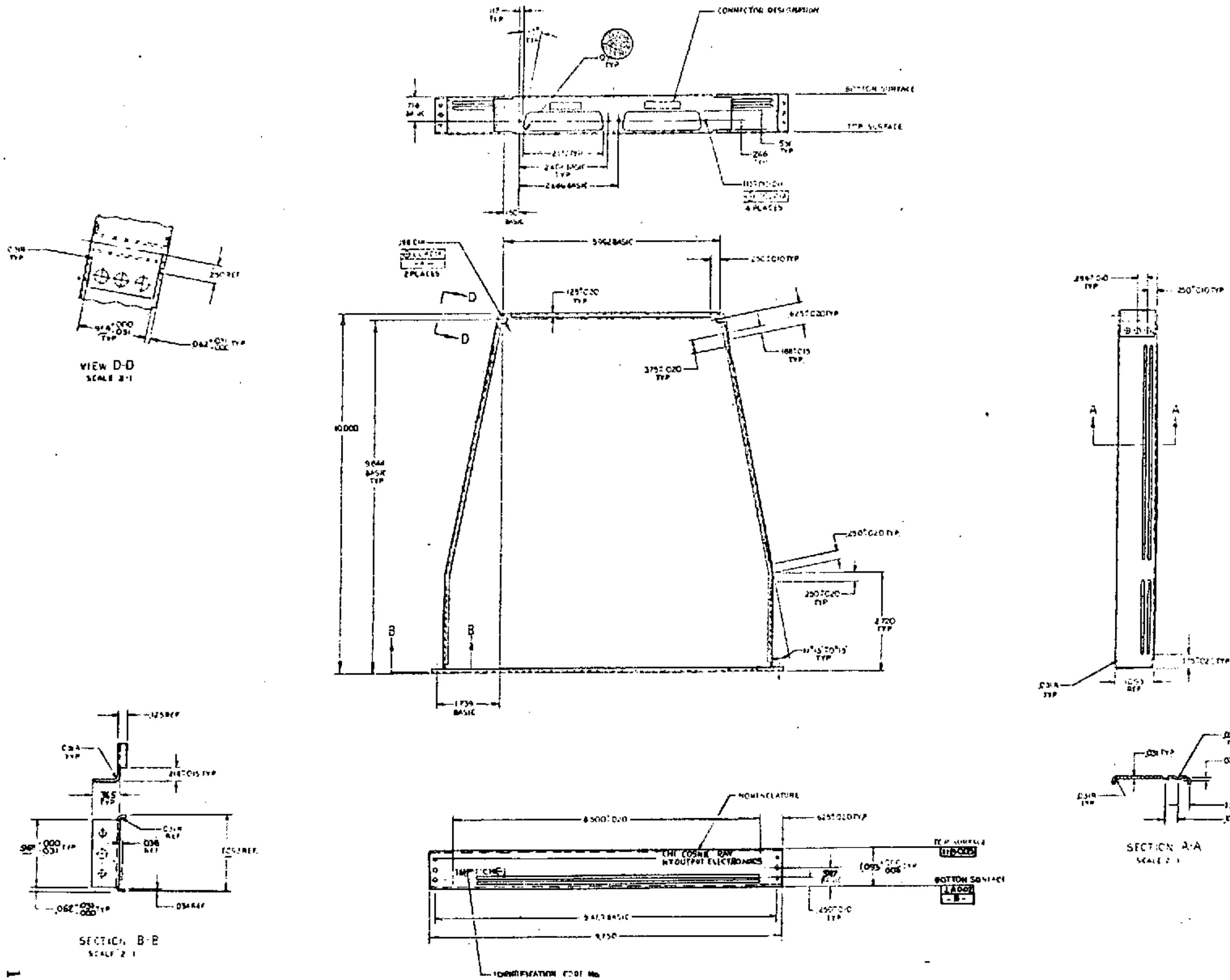
The basic geometry of the body mounted experiment and electronics module is trapezoidal (as illustrated in Fig. 2). The circuit board geometry is as shown in Fig. 3. The module height shall not be less than 1 inch and not more than 10 inches including cover(s). If an experiment cannot fit within the module frame, the experimenter may extend part of his experiment through the inboard and outboard faces of the module frame as shown in Figures 4 and 5. Prior approval from EMR is required for any experiments protruding beyond the prescribed form factor. An up-to-date configuration drawing of the experiment or electronics module should be submitted to EMR at the earliest date to facilitate structural definition. No electrically insulating coating should be put on the module frame.



INTERPLANETARY MONITORING PLATFORM

IMP H&J

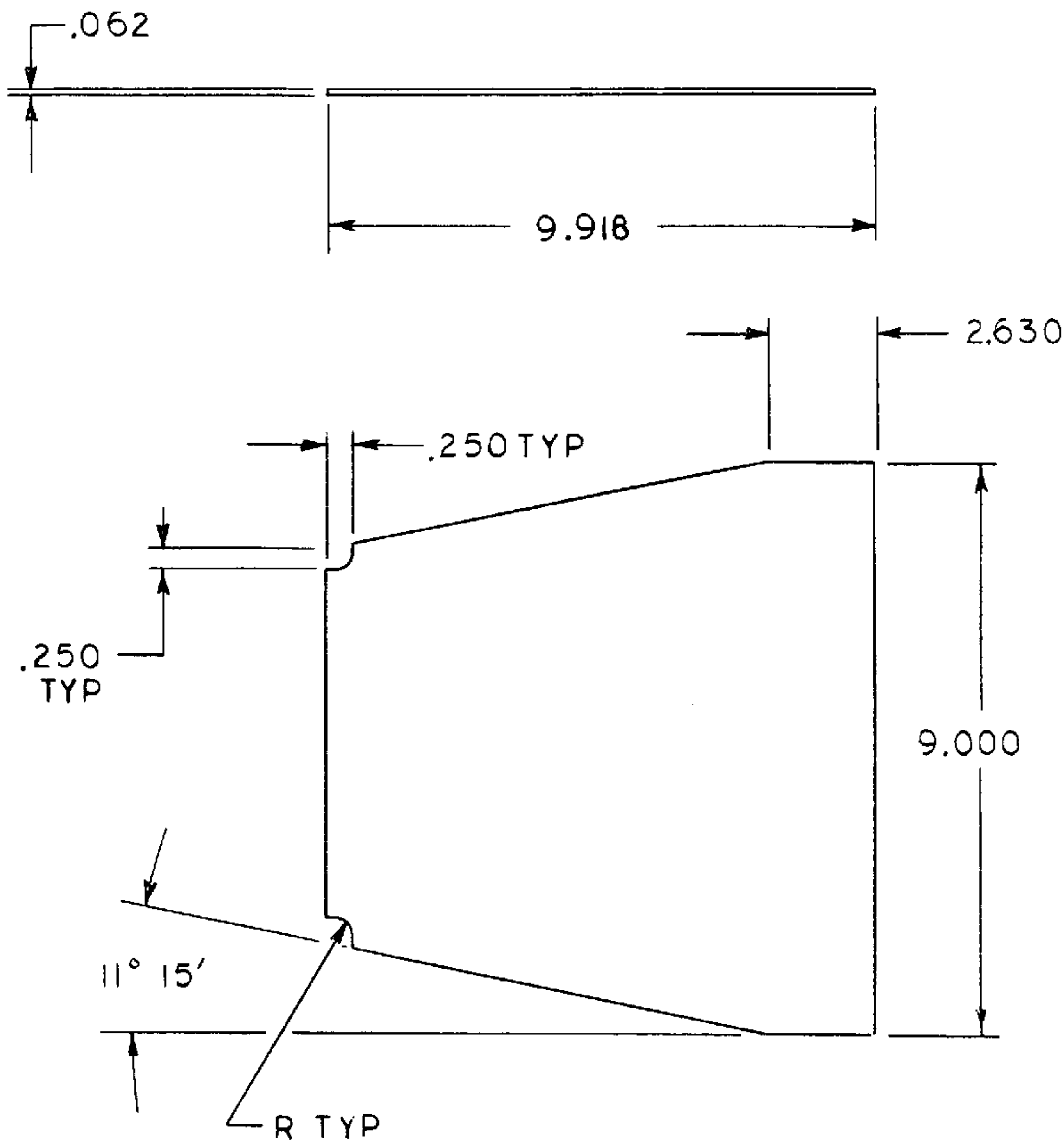
FIGURE 2



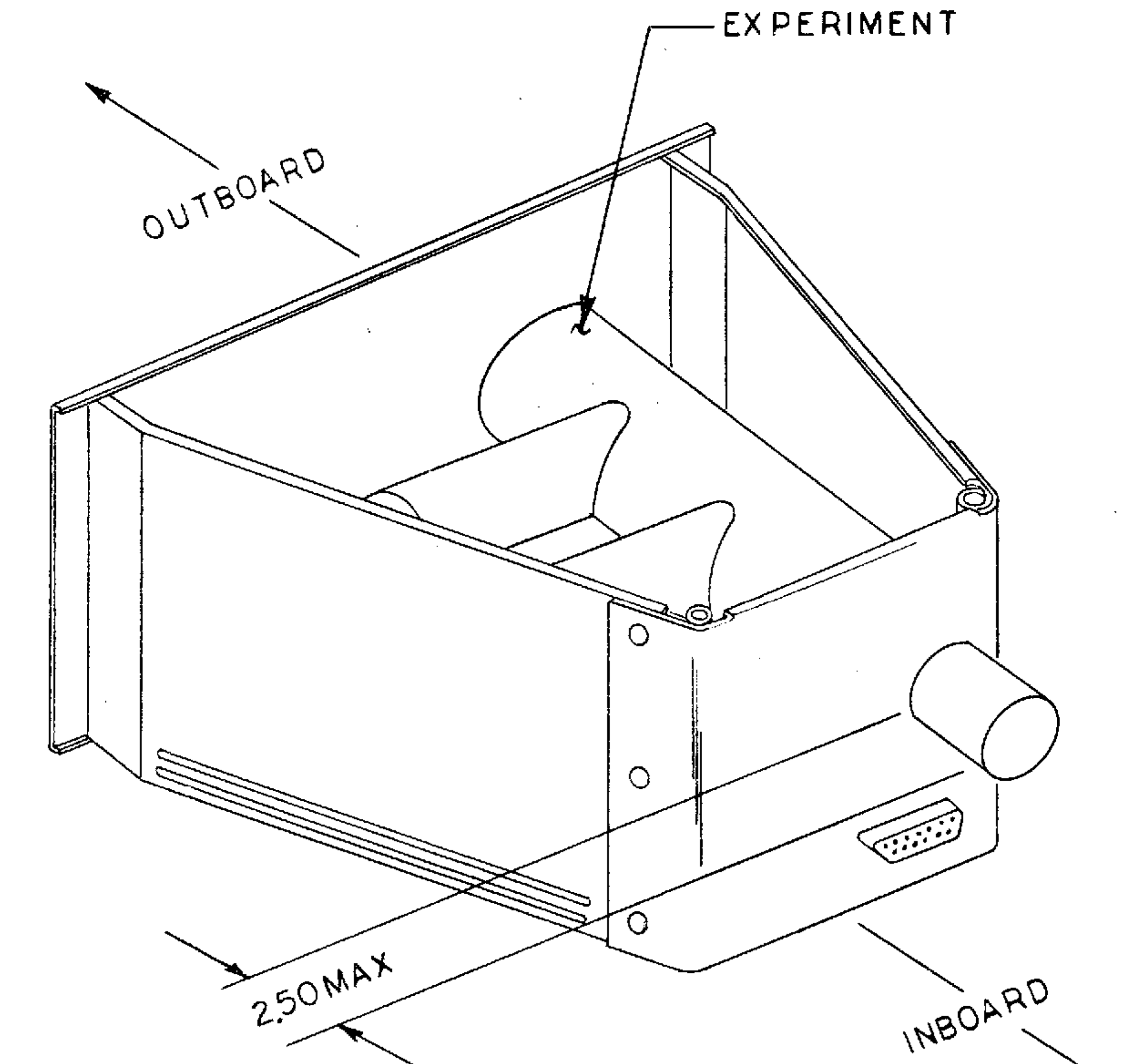
MODULE FRAME
FIGURE 2B

CIRCUIT BOARD

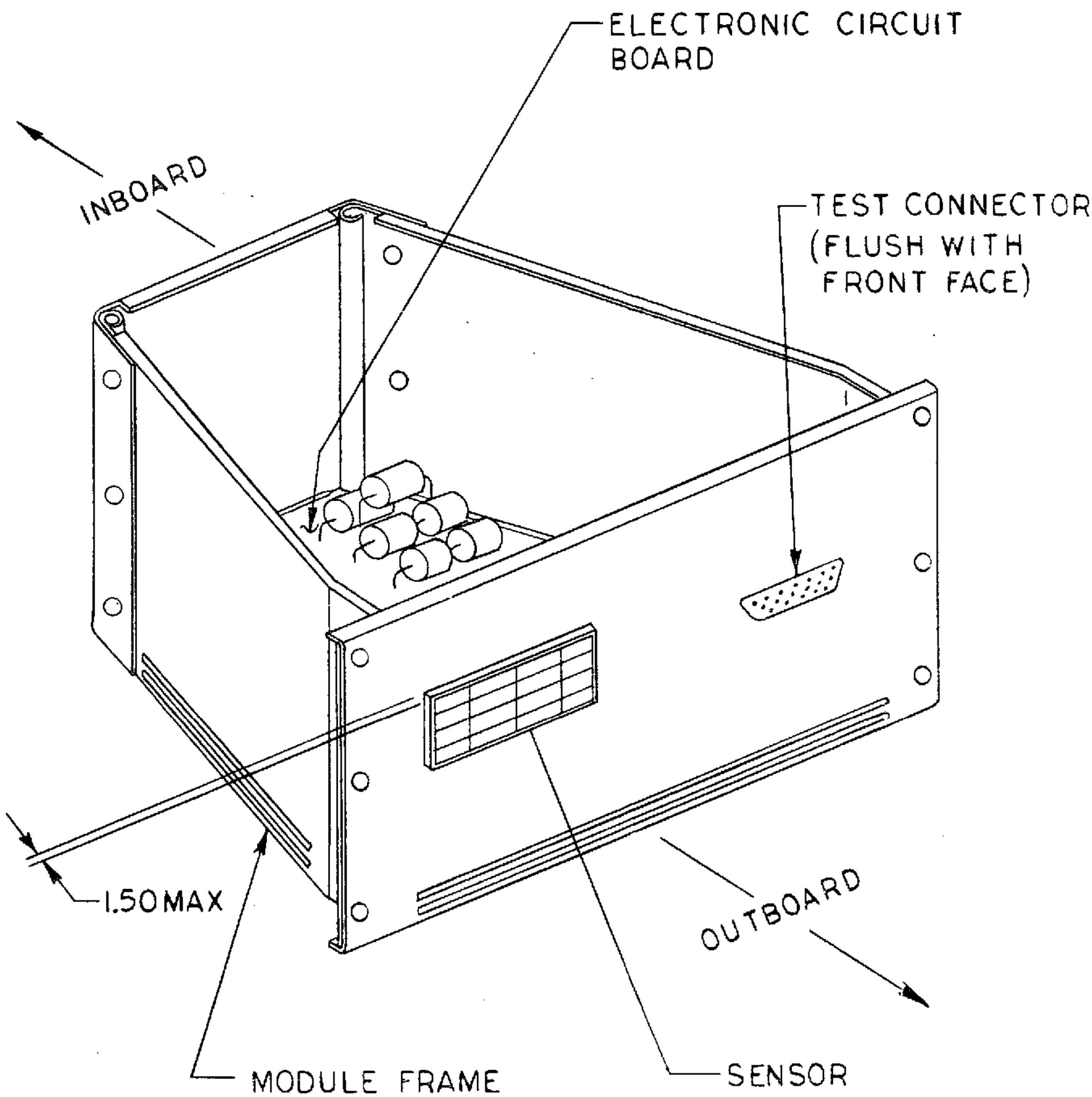
MAT'L: FIBERGLASS PRINTED CIRCUIT
BOARD MIL-R-13949-GE-062-C1



INTERPLANETARY MONITORING PLATFORM
IMP H&J
FIGURE 3



INTERPLANETARY MONITORING PLATFORM
IMP H&J
FIGURE 4



INTERPLANETARY MONITORING PLATFORM
IMP H & J
FIGURE 5

CONNECTORS AND THEIR LOCATIONS

Only connector types approved by GSFC/ESB shall be used at the spacecraft interface.

All Cannon type main harness connectors will be located (with the wider edge on top) on the inboard face at a 0.032-inch thick mounting surface as shown in Figure 7. To ensure proper mating with the spacecraft harness, all frames, sheetmetal or milled, must meet this requirement.

All Deutsch type main harness connectors will be located on the inboard face of a 0.032-inch thick mounting surface as shown in Figure 8. To ensure proper mating with the spacecraft harness all frames, sheetmetal or milled, must meet this requirement.

Front test connectors may be used on an experiment/instrument; however, their location must be clearly defined on an outline drawing with the preferred method of mounting shown in Figure 5. Any connector used in conjunction with a boom or flight arming plug must have proper length hex standoffs so the connector could be fastened at boom installation or arming plug installation.

All connectors must be electrically grounded to their respective mounting surfaces using self-locking hardware or loctite. A mounting screw may be used for this purpose, but located between the connector and the lock-nut.

WINDOWS AND LOOK ANGLES

Openings on the structure will be provided for those experiments which have sensors looking into space. These sensors should not protrude more than 1-1/2" from the outboard face of the module frame Figure 5. Those experimenters whose experiments must have a clear view angle should bear in mind that the orbiting spacecraft will have two rigid experiment booms (approximately 10' plus experiment) and eight 2' antennae radiating from the spacecraft in a plane perpendicular to the spin axis and two 55-inch ACS booms (90^{o} to the experiment booms) extended outward from the main body of the spacecraft (Figures 1A and 1B), and on IMP J four flexible EFM antennas each 200 feet long.

EXPERIMENT PANEL INSTALLATION

In order to meet thermal and mechanical requirements, an experiment panel with cutouts for sensors, test connectors, purging ports, adjustment holes, is mounted flush with the front face of the module frame(s). Any projection on the front (outboard) side of a frame must be located by dimension on the instrumenter's/experimenter's outline drawing. The experiment panel consists of a 0.156-inch thick honeycomb panel and provides access to the frame for adjustments, test connectors, etc. Figure 9 indicates a typical installation.

HARDWARES (SCREWS, NUTS, WASHERS, FASTENERS, ETC.)

To minimize magnetic flux build-up and eliminate possible failure of the spacecraft when it is subjected to environmental testings, it is suggested that all designs employ anodized aluminum screws with KEL-F locking insert (same as or similar to those made by the Long Lok Corp., L. A., Calif.). In cases where high strength is required, 300 series stainless steel or titanium may be used. "Locktite" may be utilized where KEL-F locking inserts are not available. On non-permanent assemblies, the use of Locktite on aluminum screws smaller than #6 is not recommended. All grades of Locktite outgases to a varying degree. Any experiment that is sensitive to outgasings should take note of this fact.

Flight experiments or instruments should have all hardware with self-locking features or loctite to prevent failure due to loose screws, hardware, etc; moreover, a spot of white epoxy paint must be added to screw heads and exterior screws. The white epoxy paint is 3M Co. Part No. 101-A10.

ENCAPSULATING

All electronic components, circuit boards, solder joints, etc., shall be conformal coated, for encapsulated in foam if needed. It is anticipated that complete metallic shielding, to prevent RF interference, of all electronic circuitry will be necessary to meet electrical interference specifications. Complete covering of electrical circuits to eliminate entry of loose particles is required.

HEAT SINKS

All heat liberating components will be attached to the metal module frame either directly or indirectly through a BeO insulator. EMR shall be notified as to the locations of all "hot spots".

WEIGHT

EMR shall have the responsibility for the control of the weight budget for all electronics and experiment packages; however, all changes in weight must be approved by the Project Office.

SPIN AND ATTITUDE CONTROL

The spacecraft will be spin stabilized. Aboard the spacecraft will be a spin and attitude control system to maintain the spacecraft in its desired attitude and spin-rate throughout the life of the mission. Nominal orbital spin rate for IMP H is 46 RPM and for IMP J, 24 RPM.

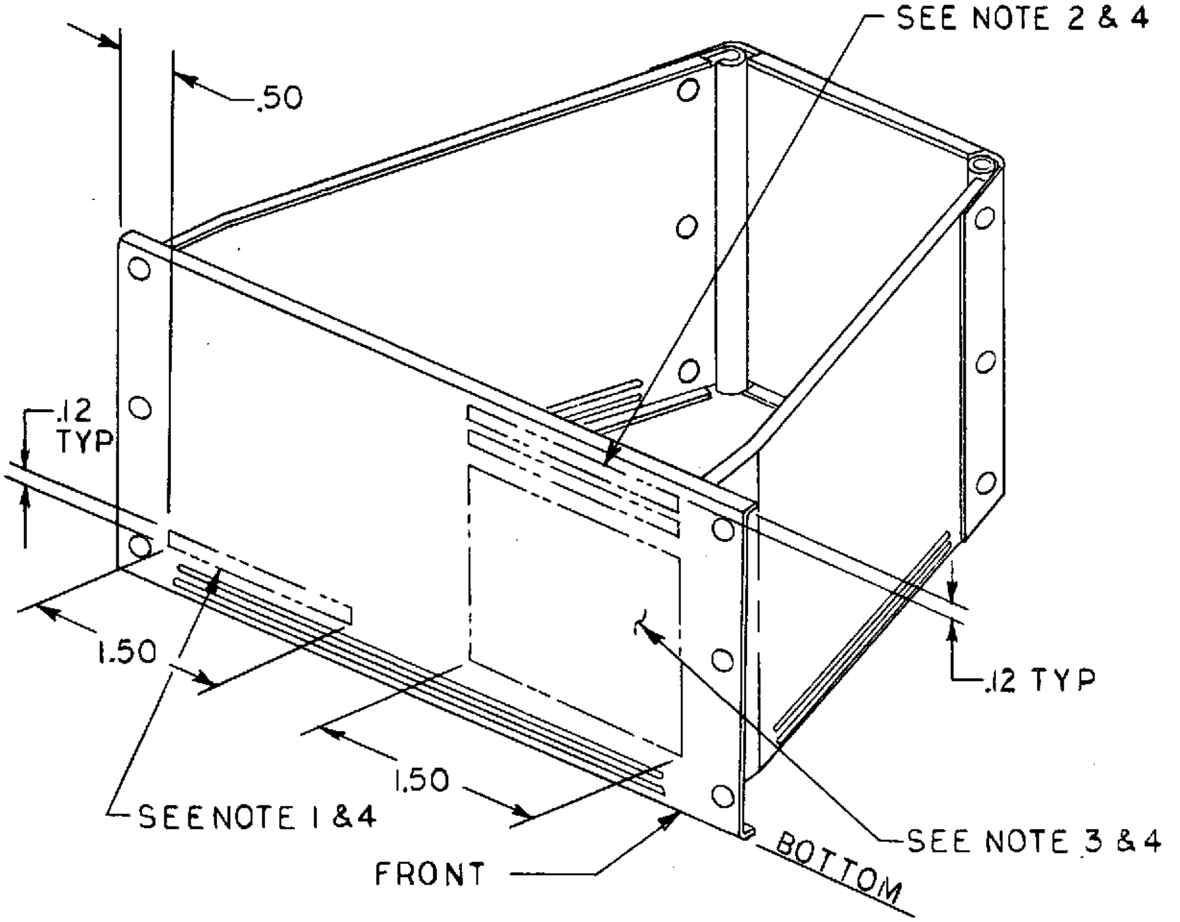
IDENTIFICATION MARKINGS

All experiments and electronic packages will be clearly identified (Fig. 6) by engraving the following information on the module frame:

1. nomenclature
2. I.D. code and serial number starting with -10 for units built for IMP H/J.
3. the project in which the experiment will be flown.

APPROVAL OF MECHANICAL INTERFACE

EMR has the responsibility for the control of all mechanical interfaces mentioned in the preceeding paragraphs. All mechanical interface information and directions to the above requirements shall be submitted to EMR for approval.. Such request should be directed through Mr. G. D. Linsey, Program Manager IMP H, EMR-Aerospace Sciences, 5012 College Avenue, College Park, Maryland, 301-864-6340.



NOTES:

1. Identification Code No. and Serial No. (1 line bottom left)
2. Nomenclature (Component Name) 2 or 3 lines top right
3. All other markings to be located in bottom right hand corner as noted.
4. All lettering to be 1/8 high, capital letters .005 deep.

INTERPLANETARY MONITORING PLATFORM
IMP H & J
FIGURE 6

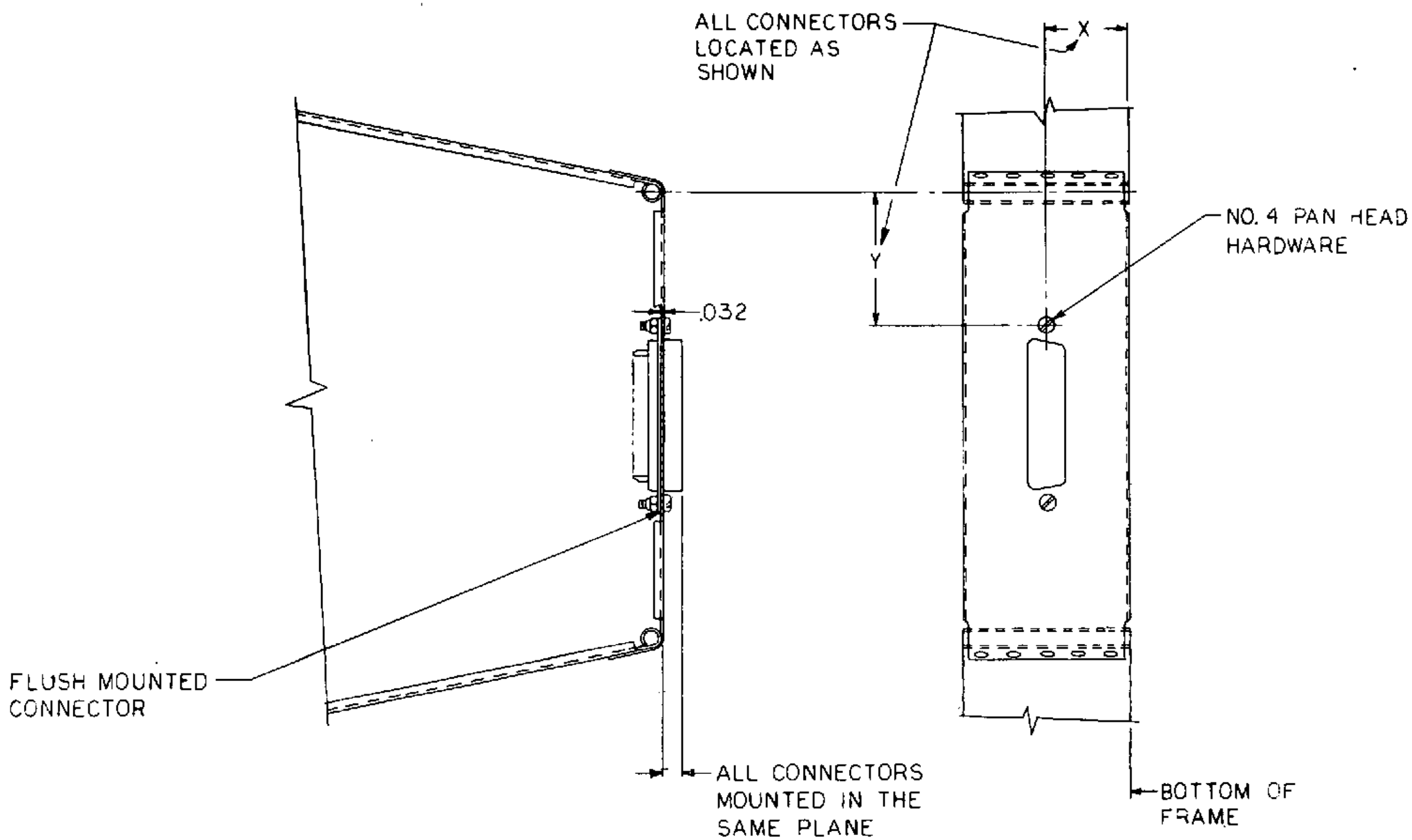
THERMAL PAINTING

All module frames, including the TOP cover of each facet, will be thermal painted by the Thermal Group at Goddard Space Flight Center. Each experimenter or instrumenter should discuss in detail their requirements with the Thermal Group. You should not expect quick turn-around on your experiment by the thermal group. Make a schedule with them at least two weeks before you want your package painted.

MODULE FRAME COVERS

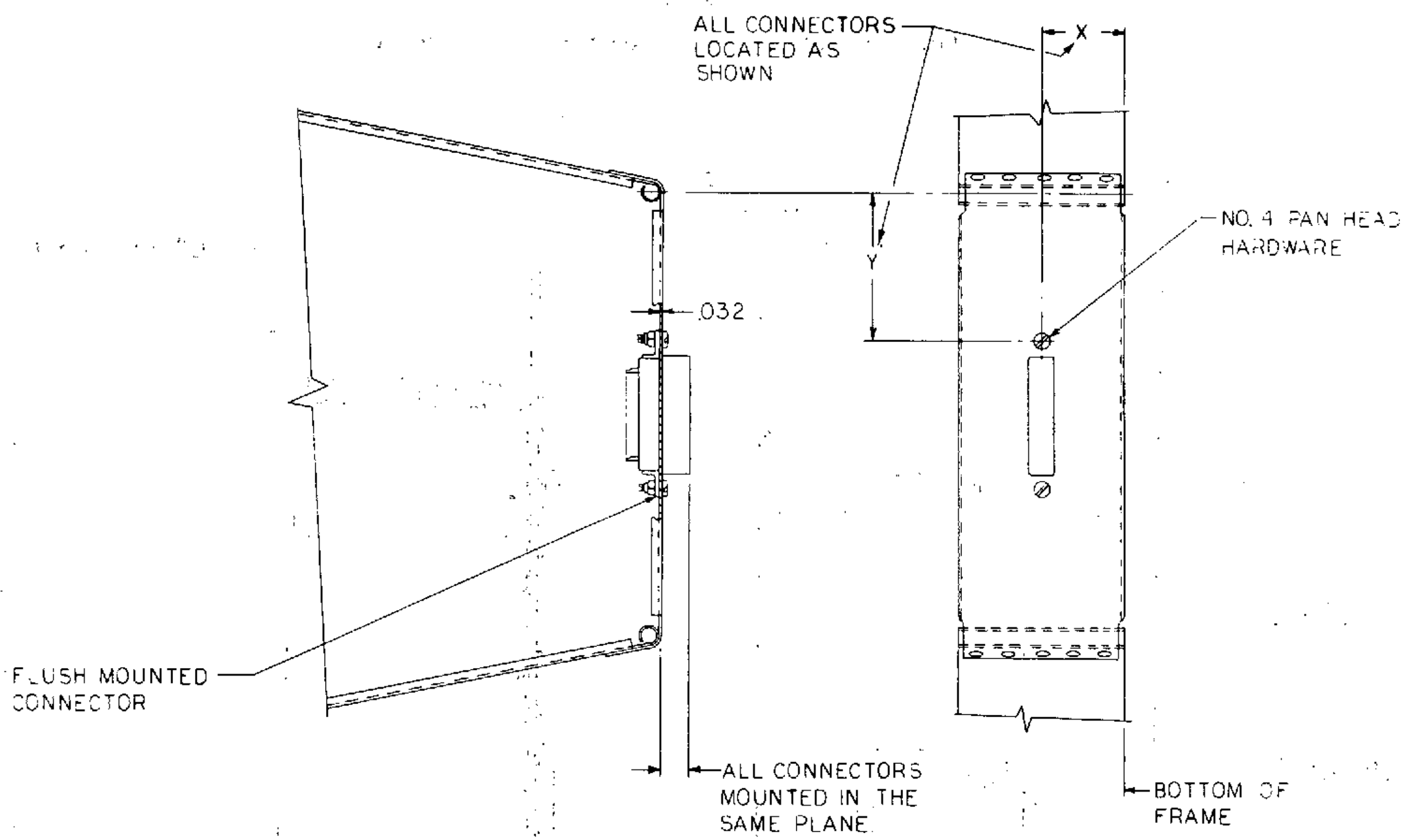
Each experiment/instrument will be covered with a cover on the top and bottom of the instrument. In most cases, these covers are standard 0.020 thick aluminum which is provided to the instrumenter or experimenter by the Mechanical Systems group.

TOP COVERS of each facet will be attached to the module frame with the use of No. 0-80 or equal hardware; moreover, these covers will be thermal painted by the Thermal Group. In general, the balance of the covers could be attached a variety of ways such as taping with Kapton tape, bonded with conductive epoxy, or with the use of hardware. Special requirements are usually approved; however, the Mechanical Group must be consulted.



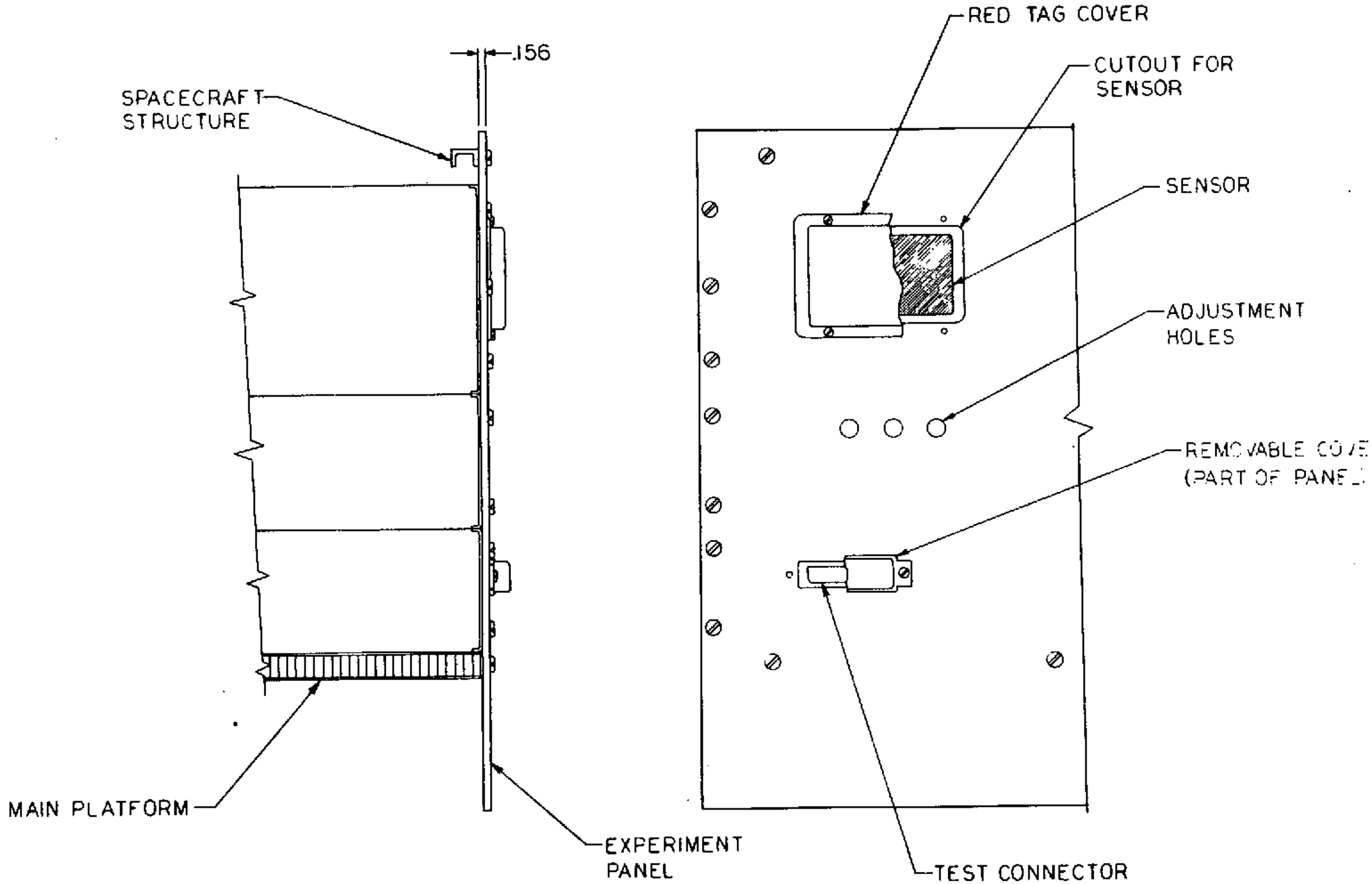
TYPICAL CANNON CONNECTOR ASSEMBLY

FIGURE 7



TYPICAL DEUSCH CONNECTOR ASSEMBLY

FIGURE 8



TYPICAL EXPERIMENT PANEL INSTALLATION
FIGURE 9

APPENDIX G

IMP H & J SPECIFICATIONS FOR ELECTRICAL INTERFACE

15 October 1969
Revision B 31 January 1972
Revision C 8 November 1972

IMP H & J
SPECIFICATIONS FOR
ELECTRICAL INTERFACE

This document is a revision for IMP H & J of referenced document (a).

Revised by EMR-Aerospace Sciences for the Goddard Space Flight Center.

Approved by T C Goldsmith
T. C. Goldsmith
Electrical Systems Engineer

Approved by B. H. Ferer
B. H. Ferer, Associate
Project Manager

REVISION PAGE

REVISION	DATE	BY	DESCRIPTION	APPROVED
A	11/15/71	CK	Revised Paragraph 3.1, Page 3-1 Paragraph 3.2.1, Page 3-2	CPK 11/15/71 BH 7 12/13/71
B	1/31/72	FPC	Change "experiment" to "component" in Paragraph 1.0, Page 1-1 Added last sentence to Paragraph 1.1, Page 1-1 Changed "920" to "930" in Paragraph 2.2, Page 2-1 Corrected Figure 1, Page 2-2 Revised Paragraph 2.2, Page 2-3 Paragraph 2.6, Page 2-5 Paragraph 3.1, Page 3-1, 3-2 Figure 3, Page 3-3 Paragraph 5.0.h, Page 5-2 Paragraph 5.0.m, Page 5-3 Paragraph 5.3.d, Page 5-4 Paragraph 5.4, Page 5-5 Paragraph 5.5, Page 5-7	FOC 1/31/72 BH 7 3/21/72
C	11/8/72	ACM	Page ii: Added last two items. Page 3-2, Paragraph 3.2.1: +8 volts changed to +9 volts, 0.25 second changed to 0.35 second, & +8 volts changed to +9.5 volts. Page 5-2, Step h: Deleted "per second" (at end of sentence). Page 5-3, Paragraph 5.1: Added Steps d and e.	9 NOV 72 11-15-72 11-20-72

REFERENCES

(a) Specification for Electrical Interface, IMP I, Preliminary, T. C. Goldsmith, GSFC, dated April 1968.

(b) IMP H & J Mechanical Interface Document, Preliminary, GSFC Mechanical Systems Branch.

(c) IMP H & J Mechanical Interface Document, Preliminary, revised by EMR-Aerospace Sciences, Revision A, October 19, 1971.

(d) Environmental Test Specifications for Spacecraft and Components Using Launch Environments Dictated by Delta Launch Vehicles, GSFC S-320-D-3.

(e) Magnetic Restraints Document, IMP I, GSFC X325-67-70.

(f) Connectors, Subminiature, Electrical and Coaxial Contact, For Space Flight Use, GSFC S-323-P-10.

(g) Potting and Spray Solder Information - Memorandum of 13 March 1969, File No. 15823.

(h) Connectors (and Contacts), Electrical, Rectangular, For Space Flight Use, GSFC S-311-P-4.

(i) IMP H & J Encoding System Interface Document (Draft), July 1970.

(j) IMP H Encoding System Specification, Appendix E, April 1971.

(k) Environmental Test Specification for the Interplanetary Monitoring Platform, IMP H & J Subsystems, GSFC S-320-IMP-6, November 1969.

(l) The Prevention of Electrical Breakdown in Spacecraft, NASA SP-208 by F. Paul & D. Burrowbridge.

(m) Internal Pressures of a Spacecraft or Other System of Compartments Connected in Various Ways and Including Outgassing Materials in a Time-Varying Pressure Environment, J. J. Scialdone, GSFC X-327-69-524. C

TABLE OF CONTENTS

SECTION I

1.0 SPACECRAFT CONNECTORS

All component connectors (interfacing with the spacecraft harness) for either experiments or instruments shall be Cannon D type meeting the specifications of reference (f), or Deutsch Series 75,000 connectors meeting the specification of reference (h). Use of the "P" or male type connector on component assemblies is recommended unless two connectors of the same size are involved. (The use of identical connectors on an assembly provides an opportunity for incorrect connection of mating test cables.) Coaxial inserts are permitted only for exceptionally sensitive signals carried between assemblies of the same experiment. When the coaxial inserts are used, the female center contact must be located in the Cannon "P" type connector and vice versa. Location of connectors shall meet requirements of reference (c). Flight quality connectors will be furnished by the Project Office to all requesting instrumenters and experimenters. B

1.1 TEST CONNECTORS

A test connector may be located on the outside surface of an experiment assembly so that it is accessible when the unit has been integrated into the spacecraft. Test connectors may be used for connection of ground support equipment or jumper plugs, and are not restricted as to size or gender. All spacecraft 28 vdc lines and/or encoder lines must be buffered prior to routing through a test connector.

1.2 SPECIAL CONNECTOR PLUGS B

Special plugs such as High Voltage Enable, Disable, etc., may be used to control the component during various phases of spacecraft operations. These plugs shall be potted and color-coded using a green color for flight plugs (orbited), and a red color for the non-flight plugs. In addition, the plugs must be assigned an I.D. code and a serial number.

SECTION 2

2.0 SPACECRAFT GROUND SUPPORT

2.1 SPACECRAFT FUNCTIONAL TEST

The Spacecraft Functional Test will be performed an estimated 50 times between experiment integration and launch. The object of the functional test is to confirm the gross operation of all the electrical circuits in the spacecraft by exercising them through the use of ground commands or stimulus and observing their operation through telemetry. The only practical approach to testing the encoder is to stimulate each experiment in B such a way as to not only confirm the operation of all the circuits in the experiment, but also all of the circuits in the encoder which are used exclusively by that experiment. This aspect should be considered when planning stimulus equipment and functional test procedures.

2.2 IMP COMPUTER GROUND EQUIPMENT

Figure 1 shows a block diagram of the XDS 930 Computer Ground System which will be used to test IMP H and J. The computer has 24-bit words, and 32k words of memory along with three tape drives and one-half B million words of drum storage. Program controlled telemetry input and PCM command generation are performed by special interface equipment. Commands are hard-wired to the EMR laboratory.

During test operations, raw data will be continuously saved on the drum file. Individual processing and printout programs will be prepared for each experiment to display data in engineering units in a format as requested by the experimenter. If the main display program reduces the data by pulse height analysis, averaging, or other techniques, an additional program capability for printing out one formatted engineering "number" for each telemetered value will be developed. Real time FORTRAN II

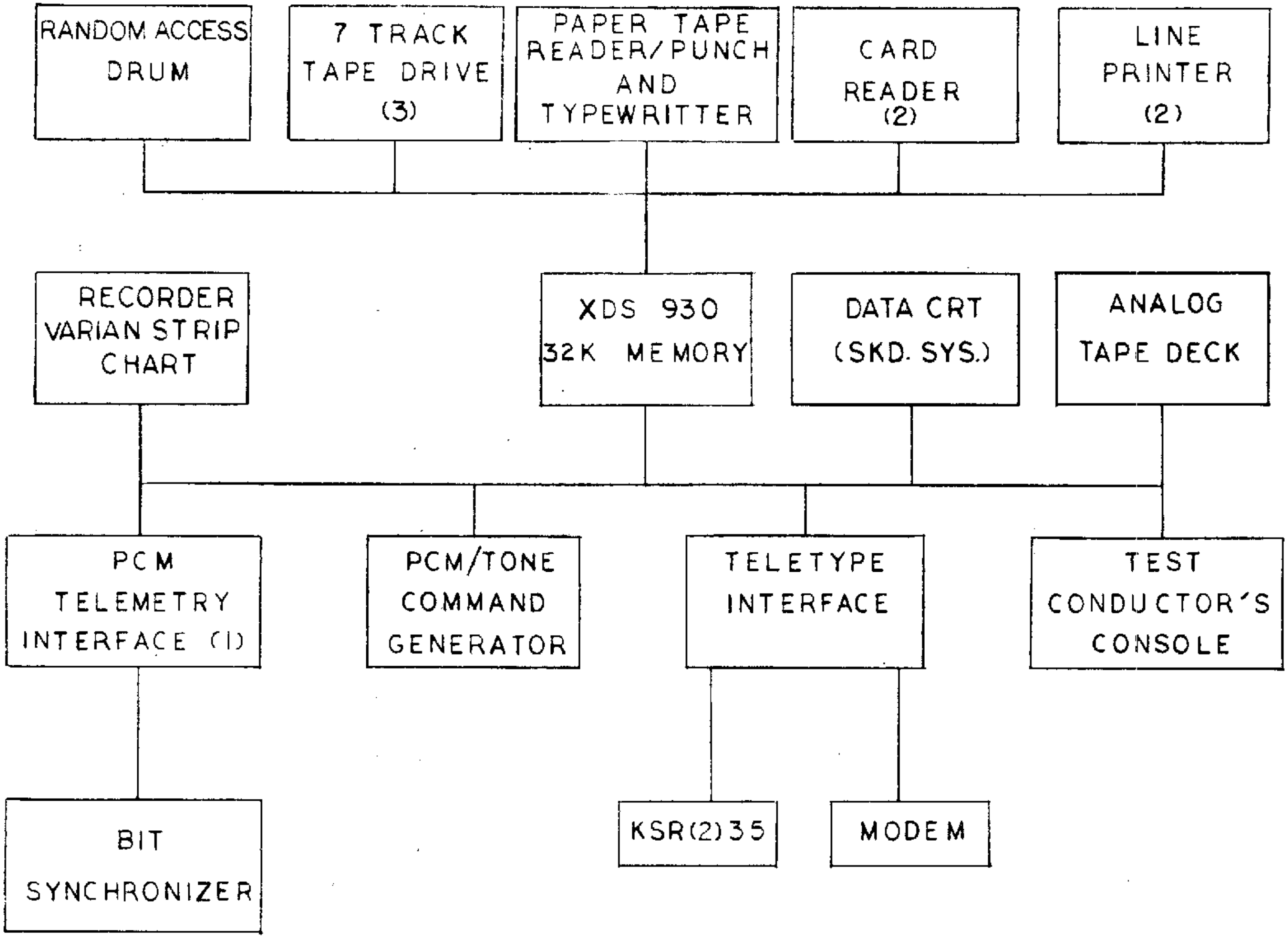


FIG. 1 IMP/XDS GROUND SYSTEM

and TOLINT compilers are available for generation of special "one-shot" calibration or troubleshooting programs.

Because some of the software developed for testing will be used for flight operations, it should be as general as possible with regard to being capable of usefully displaying "unknown" data as well as the known data produced by fixed stimulus.

2.3 OPTICAL ASPECT GROUND SUPPORT EQUIPMENT

In order to simplify testing of the Optical Aspect (OA) System, OA controlled sections of the encoder, and sectorized experiments, special OA ground support equipment (OA/GSE) will be provided during spacecraft test operations. This equipment generates a synthetic rotational time base with adjustable, fixed, or varying spin period and stimulates the spacecraft OA sensors with appropriate artificial sun signals. In addition, it can provide parallel signals (5 bits or 32 sectors) to an experimenter's GSE to allow the experiment to be stimulated only during selected parts of the spin period. Goddard Space Flight Center should be advised of any requirements for this service.

2.4 EXPERIMENT BREAKOUT HARNESS

In order to provide for observation of signals in the spacecraft interface during experiment integration and during any subsequent troubleshooting, EMR will provide an experiment breakout harness for each experiment approximately as shown in Figure 2. Any special requirements or restrictions on this harness should be brought to the attention of the Project Office and/or EMR.

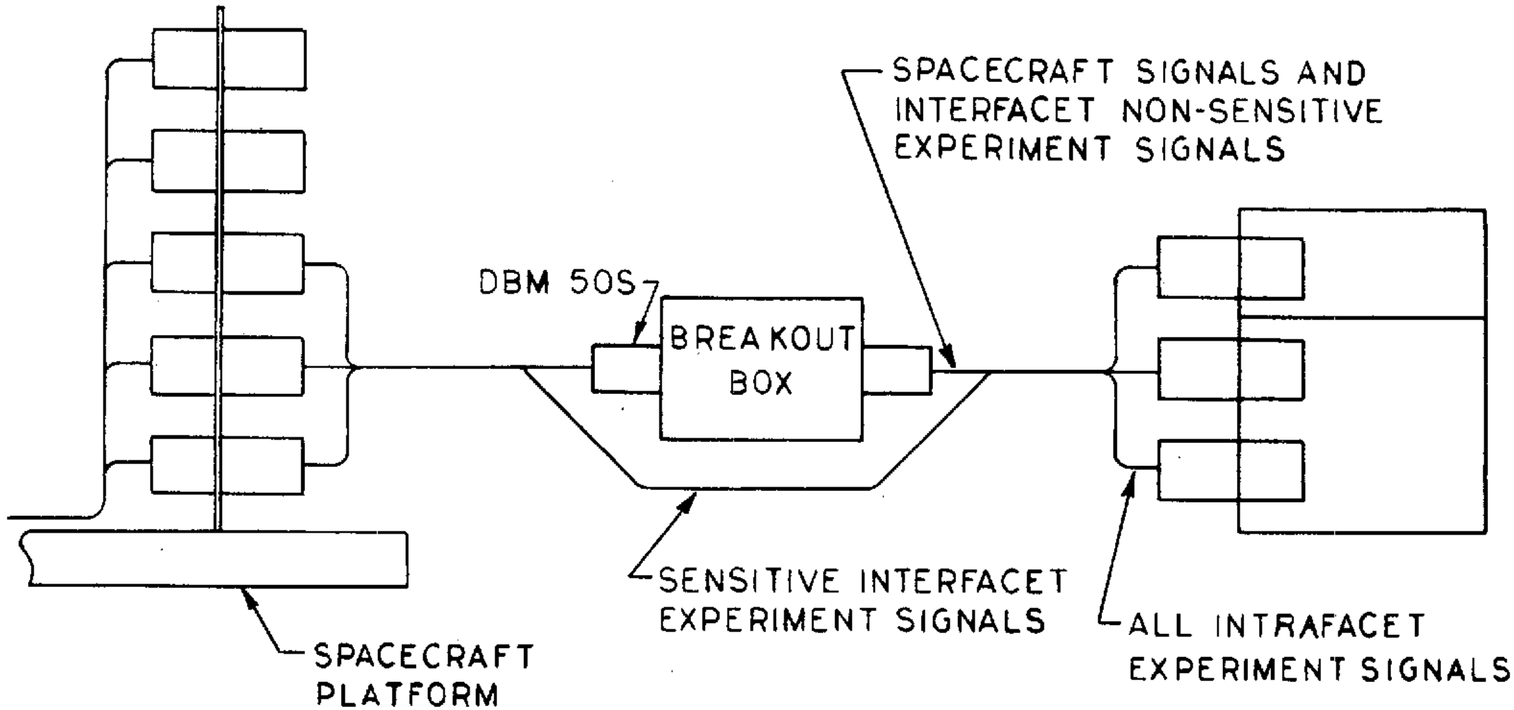


FIG.2 EXPERIMENT BREAKOUT HARNESS

2.5 EXPERIMENT INTERCONNECTION DRAWING

This drawing, which is prepared for each experiment, shows all experiment connectors, pin assignments, wire sizes, shielding, and grounding arrangements, signal names, destination connectors, and completely defines the experiment harness and test connectors. Experimenter sign off of his interconnection drawing will be required.

2.6 FUNCTIONAL TEST PROCEDURE

This document describes the procedure whereby the experiment is exercised and telemetry data examined. It details in a sequential time sequence the initial setup of the stimulus equipment, spacecraft commands, stimulus changes, and computer data taking operations as well as the expected values of the data. This procedure is normally finalized during experiment integration. B

2.7 GROUND SUPPORT EQUIPMENT

Experimenter electrical ground support equipment falls into two categories: electrical support equipment and stimulus.

The electrical support unit contains the power supplies and simulated spacecraft signal sources necessary to simulate the spacecraft when the experiment assembly is operated on the bench. It may also contain capability for display of scientific or engineering data from the experiment. The support equipment is needed subsequent to experiment delivery to GSFC to support preintegration checks, assembly level environmental tests and any troubleshooting operations. Since it may also be used for assembly level RFI testing, the support equipment itself should be carefully designed to contribute as little RFI as possible. The support equipment should be reasonably portable, and operate from single phase 117V, 60 cps, ac power.

The stimulus unit contains any additional equipment needed to stimulate or exercise the experiment so that all of its modes of operation

may be observed. In many cases the stimulus can represent a known physical input so that calibration of the experiment may also be performed. The ideal experiment contains in-flight calibration capability and does not require nonflight stimulus except for infrequent detailed calibrations. Where this is not feasible, small self-contained stimulus units (such as radioactive sources, battery operated pulse generators or current sources, etc.) may be attached to the experiment or connected to its test connector. In some cases, it is possible to arrange the experiment so that a special jumper plug in the test connector will modify the experiment's operation to facilitate testing. (e.g., scaler reset might be inhibited to allow the entire scaler to be exercised with a low count rate, coincidence requirements may be relaxed to allow more events to be observed, etc.) Stimulus equipment should be packaged separately from support equipment, should be as small as possible and battery operated, if possible, so that it can be mounted directly on the experiment. Use of long leads connecting equipment to experiments is discouraged because of RFI problems. This is especially true during thermal vacuum testing. For the benefit of spin sensitive experiments, it is possible to supply timing signals from the spacecraft GSE to the experimenter's GSE to allow synchronization of experiment stimulus to the simulated spacecraft spin period or to the spacecraft telemetry period.

If a stimulus unit is to be used within the chamber during thermal vacuum testing, it must be thermal vacuum qualified and must not significantly disturb thermal balance.

SECTION 3

3.0 ELECTRICAL INTERFACES

3.1 POWER

Electrical power for IMP H & J experiments will be supplied from a central bus at 28V dc ± 2%. Power for each experiment will be supplied through a relay in the spacecraft which can be commanded to "ON" or "OFF" positions by ground command. In addition, all experiment and nonvital spacecraft relays can be set to the "OFF" position by activation of an over-current circuit which senses current to the entire nonvital system's bus (which should occur only in case of failure in a load) or by activation of the battery or spacecraft bus undervoltage sensors which preserves operation of the command system in the event that the available average solar array power is exceeded by load requirements. These sensors can be disabled simultaneously by a single ground override command. They may also be abled simultaneously by another single ground command.

Experiment power turn-on transients shall be limited to a maximum of 2 A with a time constant of no more than 1 millisecond. Experiment peak power must not exceed average power by more than 100%. Experiments must withstand 1 ms 3V transients on power leads without performance degradation. Experimenters should provide a 0-5 volt analog telemetry point to be included in the spacecraft performance parameter data. This point must act as a positive indicator of experiment main power supply operation by being in the range 0.5 to 5V whenever the experiment is operating, but may otherwise be used to indicate any desired experiment engineering information. In lieu of the above, a digital telemetry point may be used to indicate whether the experiment is operating or off.

A battery bus at 14.8 - 21.1 volts (depending on state of charge) is available for use where high peak currents are required (ordnance, motors, etc.)

The 28V power will be supplied by means of twisted pair leads. To reduce stray magnetic fields and interference with signal leads, it is important that power currents be isolated from signals. In most cases this will require power switching and transformer conversion. Since it is very difficult to completely eliminate EMI produced by the conversion process, experimenters must operate their converters at the same frequency as the spacecraft conversion (20 kHz) unless a waiver to use a higher frequency is granted by the Project Office. Stability of the 20 kHz fundamental frequency must be no worse than $\pm$ 3%. The stability requirement will be dropped following proper demonstration that the converter will not be detected by a sensitive experiment. B

3.2 PULSE SIGNALS

Four types of pulse signals are available and originate in the Tone Sequential Decoder, the PCM Decoder, the O.A. System, and the Encoder System. Figure 3 shows the Communications and Data Handling System.

3.2.1 Tone Sequential Decoder

The Tone Sequential Decoder has 125 command outputs. An output pulse will be +9 volts ± 1 volt for a nominal duration of 0.35 second. C The pulse width can vary between 0.1 and 0.3 second as the received RF signal varies in level. The pulse rise time is approximately 1 ms. While the pulse is at its nominal value of +9.5 volts, the impedance of the source C is 800 ohms shunted by 1 microfarad. During the absence of a pulse, the impedance of the source is essentially infinite. Certain outputs of the Tone Sequential Decoder are operated in a redundant fashion with the PCM Decoder outputs to control spacecraft instruments and experiment power by means of circuits in the spacecraft programmer unit.

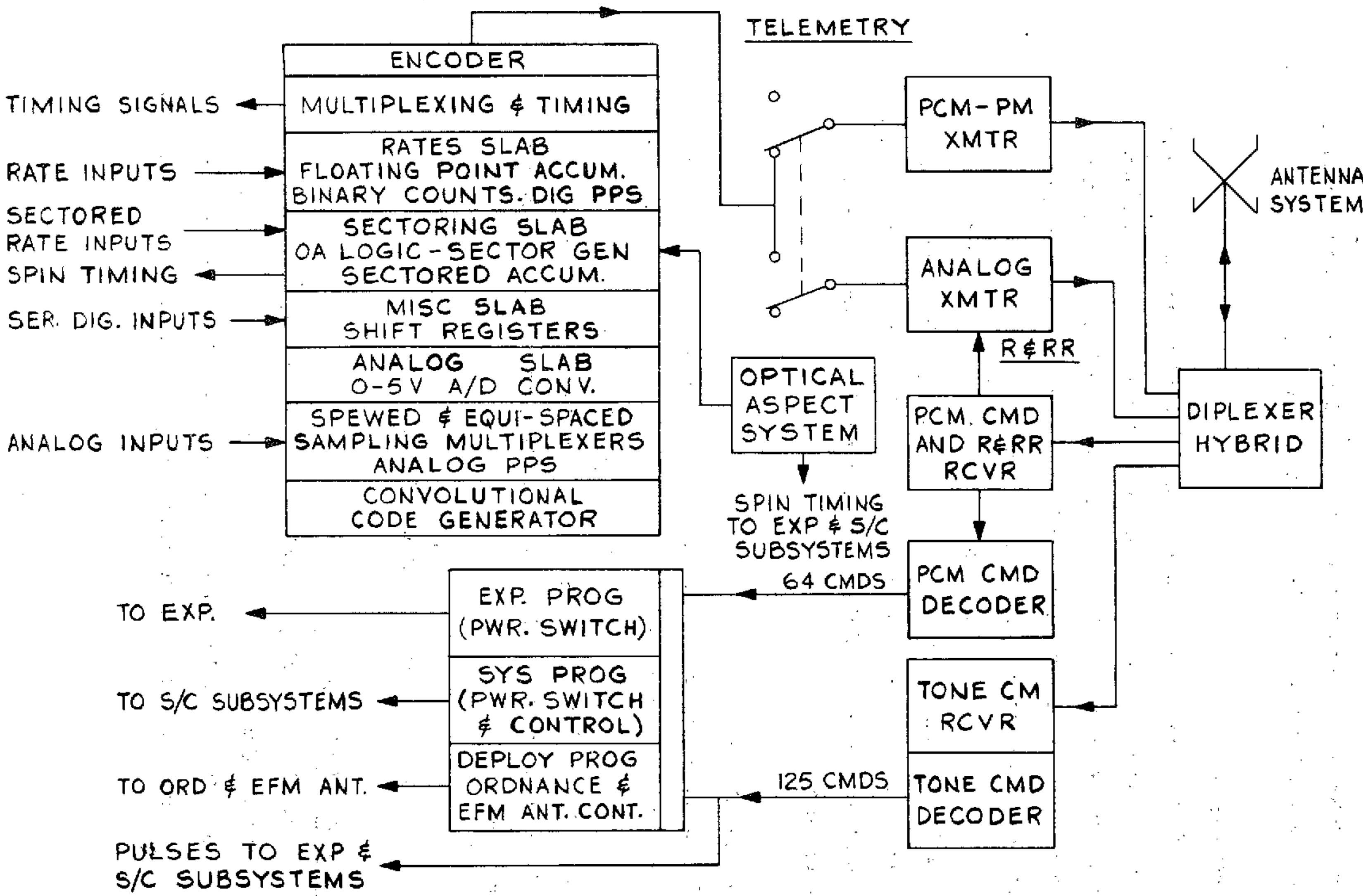


FIG-3

COMMUNICATIONS & DATA HANDLING SYSTEM - BLOCK DIAGRAM

It is recommended that the user design his circuit to not respond to a 12 volt pulse of 10 microsecond duration. The user's input should be a minimum of 5 kilohms and diode decoupling should be used.

3.2.2 PCM Decoder

The PCM Decoder has a 64 command capability and is used mainly to provide a redundant or backup command system for the Tone Sequential Decoder command system as shown in Figure 3. Redundant commands will be handled by the programmers and especially the experiment programmer insofar as experiment power is concerned.

The output of the PCM Decoder will be +3 ± 0.5 volt amplitude pulse of 31.25 milliseconds duration when loaded by 10 kilohms. The output signal is provided by a LPDT micrologic gate. The user will have to insert a diode (anode connected the PCM decoder output) to provide isolation or feedback protection.

3.2.3 Optical Aspect

The O.A. output levels will be +3 ± 0.5 volt pulses or 50% duty cycle waveforms. The sources of these signals are LPDT micrologic gates. For user loads of less than 10 kilohms, the output level will divide to a lower voltage. The user must use diode decoupling. A separate gate will be used to supply each output, thus two experimenters will not be fed from one gate.

3.2.4 Encoder signal levels are cited in Reference (j).

3.3 COMMAND SECURITY

Because of the complexity of the system, it is impossible to guarantee that any given command will be avoided during the integration and test of the IMP. It is therefore necessary to disable experiment response to any commands which could cause equipment damage if inadvertently

executed. This is normally done by routing the circuit through the experiment's test connector and using an "in-flight-jumper" for flight.

3.4 TEMPERATURE SENSORS

To allow engineering data on the performance of the spacecraft thermal control system to be obtained during testing and flight operations, thermistors will be located in some experiment and instrument assemblies. The thermistors will be supplied by the IMP Project Office to be placed in locations to be determined by the Thermal Systems Branch and the concerned experimenter. The sensors will be connected to the encoder by means of a twisted pair and require space in the spacecraft connector. Experimenters desiring additional temperature measurements may request additional thermistors and supply their own resistor networks and power which match the thermistors supplied by the Project Office.

SECTION 4

4.0 ELECTROMAGNETIC INTERFERENCE CONTROL

The IMP H and J spacecraft will carry experiments having great sensitivity to electric and magnetic fields and essentially covering the frequency range of dc to 200 kHz. As a result, a coordinated effort by everyone involved is required to ensure as low a spacecraft-generated noise level as possible.

The following general philosophies will be applied to the EMI problem.

4.1 GENERAL PHILOSOPHY

All experiments and nonvital spacecraft subsystems will be provided with separate power commands which will enable the relative interference contribution of each unit to be measured during system level interference tests, and will allow time sharing operations in the event of interference during flight.

Spacecraft power conversion and operation of the telemetry will generate the baseline interference level. Experiment processes should use the same spectrum space occupied by these spacecraft processes whenever possible. These spacecraft processes have fundamental spectra at 200, 400, 800, 1600, and 3200 hertz as well as 20 kilohertz.

4.2 SHIELDING

The majority of the spacecraft electronic components will be enclosed in a metallic shield formed by the bottom and top plates, center tube, and outside cover. It is expected that all electronic assemblies will themselves be completely covered by a metallic shield and that the harness used to interconnect the electronic assemblies will be substantially shielded.

With this approach it can be seen that the permissible levels of RFI are different depending on location in the spacecraft. Interfering signals must be confined within the individual electronics assembly (to the greatest extent possible) by shielding and by filtering of leads connecting to the spacecraft harness. Shielding and judicious placement of the harness leads will reduce contamination of other signal leads. The spacecraft structural shielding and very careful shielding and filtering of leads penetrating the outer shield (boom experiments and solar array) are the final barriers to interfering signals.

Because shielding is less effective in the reduction of low frequency magnetic interference, the primary control technique involves reduction of the current loop to the smallest possible area. Power converters should be designed so that the current loop areas between the transformer and the input or output filter capacitors are as small as possible and leakage from the transformer confined by enclosing it and/or the entire unit in a shield. Such shields must be made by milling or welding and have very tightly fitting covers to ensure very low resistance eddy current conduction paths.

4.3 ASSEMBLY LEVEL TESTING

Anticipated routine environmental testing of electronics assemblies is described in Reference (d). The unit is operated from GSE and measurements taken for radiated electric and magnetic fields and for noise signals transmitted into the harness. A signal generator may also be used to expose the unit to spacecraft transmitter frequencies to disclose any susceptibility problem.

The sensitive experimenters have volunteered their services for providing prototype receiver equipment, supporting the assembly level tests, and providing consultive support regarding interference control on request.

4.4 GROUNDING

All IMP H and J equipment should be so designed that its outer case may be securely grounded by means of mechanical contact with the structure. The spacecraft harness will provide a signal common lead which is to be used as the return reference for signals transmitted to or from the telemetry system. A power common lead will also be supplied which is to be used to return all power currents. All common leads should be dc isolated from the case and bypassed to the case to reduce transmitted interference. Shields of signal leads should be connected to the case within the experiment. Isolation for dc signals between the case, power circuit, or signal return is required to be at least 100 K ohms unless waived by the Project Office. Each spacecraft connector must have one pin internally connected to chassis within the experiment to allow grounding of shields in the spacecraft harness. Typical experiment cable arrangements are shown in Figure 4.

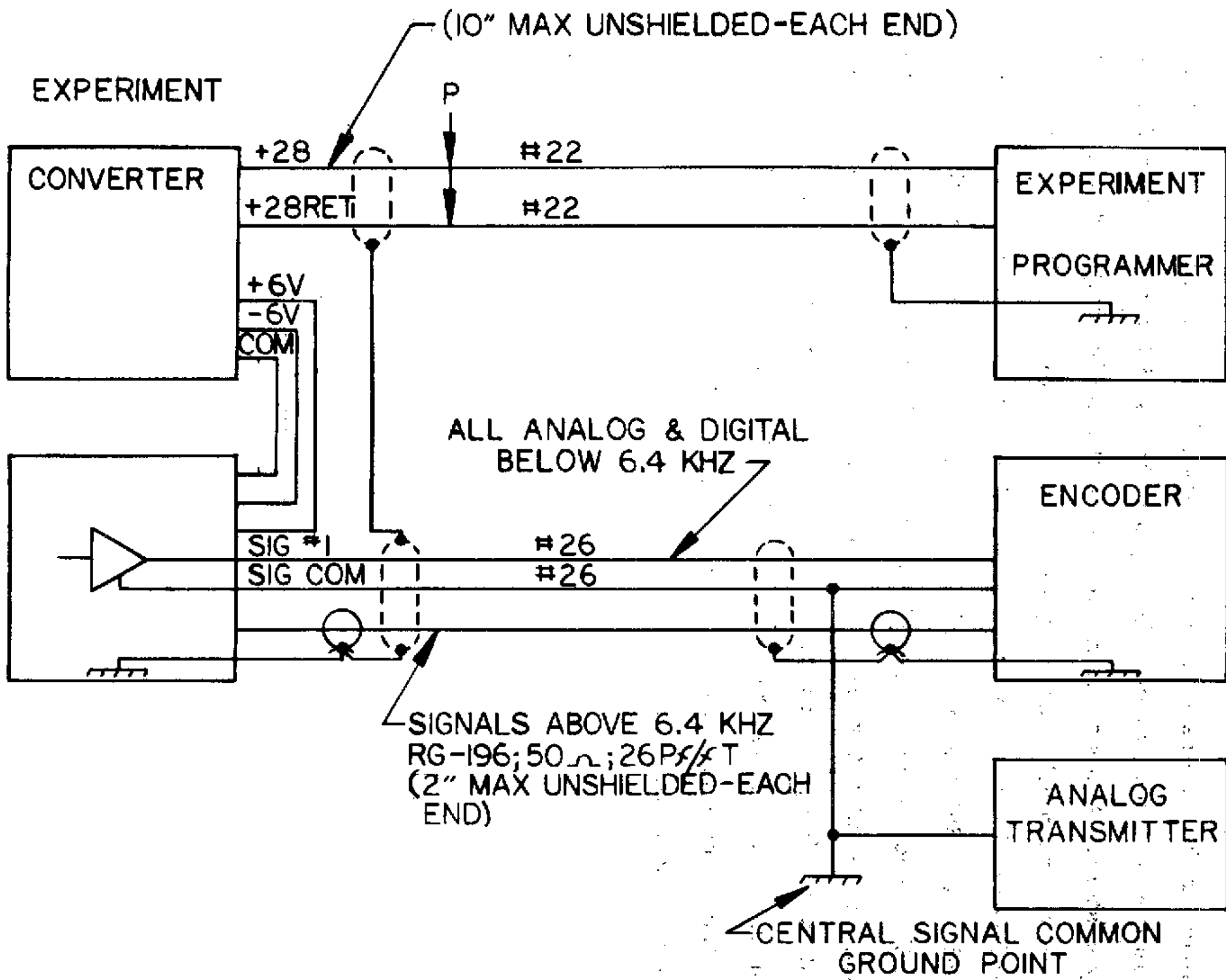


FIG 4 TYPICAL EXPERIMENT CABLE

SECTION 5

5.0 ELECTRICAL ENGINEERING GUIDELINES

The following guidelines apply to all electronic systems built for flight on GSFC Explorer spacecraft.

a. The shells of all connectors mounted on either cards or the structure must be electrically continuous to their respective mounts. All anodizing or other insulating material should be removed before mounting the connectors.

b. Since it is known that mating and demating reduces connector reliability, the designer should use short extender cables for accomplishing required mating-demating during bench checks; thus only a minimum number of connections need be made to the flight hardware connectors.

c. All low level signals should be run shielded into the experiment.

d. Lines carrying high level transients should be shielded and run through connector pins which are selected to be remote from the more sensitive lines.

e. All power leads should be twisted and, in addition, if they must be run adjacent to sensitive lines, the power leads should be shielded.

f. All precautions should be made to ensure that the components of the structure are electrically continuous, i.e., all anodizing

should be removed in the area of an aluminum joint with any other metallic part.

g. Extreme care must be taken with the location of the several cards that make up an experiment, the location of components within cards and their spatial relationship to other cards and components in order to minimize interaction. Power converters or other power oscillators should not be placed adjacent to sensitive experiment detectors or electronics.

h. All systems should be carefully checked to ensure that there are no parasitic oscillations. This should be measured to as high a frequency as is convenient, but at least to two hundred megahertz. B & C

i. Converter transients on both inputs and outputs should be filtered or otherwise controlled in such a manner that switching transients are adequately filtered between both high and low sides of the supply and the frame of the card. The converter must be completely shielded. See "n" below.

j. All converters shall have the primary dc isolated from the secondary dc.

k. All converters shall have the primary system electrostatically shielded from the secondaries and the shield shall be connected to the frame or structure of the subsystem or experiment if possible.

l. Neither the power return nor the signal return shall be conductively coupled to the frame of the card or to any other

place that is connected to the spacecraft structure when in flight configuration (capacitor bypass is premitted).

m. The peak current during the turn-on transient shall not exceed 2 amperes for one millisecond. B

n. The turn-on transient shall not exceed one volt above the bus voltage and shall fall smoothly to zero volts without oscillation as measured at the connector.

o. All converters shall operate at a frequency of 20 kc ± 3%, unless special dispensation is allowed by the Project Office.

5.1 CORONA

a. Great care should be used with all potentials above 200 volts. Potentials above 200 volts should be insulated or potted so that air cannot come in contact with the conductor.

b. Potentials above 200 volts should not be run through connectors, but should be hard wired. (We know of no acceptable corona-proof connectors for space use.)

c. When it is essential to run high voltages through connectors, arrangements should be made to turn off the high voltage while traversing the corona region.

d. Selection of material and components for high voltage use should conform to current spacecraft high voltage design practice.

C

e. Where voltages of 100 or more volts dc or 75V ac are applied to resistors, hollow core resistors shall not be used.

5.2 MATERIALS

a. Insulation materials should be selected with regard to minimum outgassing, radiation resistance, hardness and weight. The aerospace version of the Spec. 44 wire manufactured by the Raychem Corporation appears to be the best compromise of these characteristics for space use below $135^{o}C$.

b. No magnetic materials should be used in the spacecraft. All materials must be checked magnetically before use.

c. Cadmium should not be used because of its tendency to grow whiskers.

d. All connectors must be nonmagnetic and qualified by test prior to use in packages (see "Construction", paragraph 5.4)

5.3 RF INTERFERENCE

a. Radiation or conduction from the packages of either the fundamental or harmonic frequencies from all oscillators in the package must be eliminated.

b. Checks must be made for parasitic oscillations and they must be eliminated when found.

c. All wires entering the payload must be filtered at the interface.

d. Great care must be taken to ensure that the RF shield of the spacecraft is electrically continuous. B

e. All leads connected to the spacecraft for testing must be designed to eliminate RF from being conducted into the spacecraft. Ferrite cores over wires or shields have been found to be effective.

5.4 CONSTRUCTION

NOTE: These provisions are in addition to the "Procedures-Specifications-Standards Manual", GSFC Publication X-670 64-61. The manual will take precedence in case of conflict.

a. All solder-type connections should be made such that the wires involved are strain relieved.

b. Insulation is to be stripped from wires with the use of thermal wire strippers only.

c. All solder cups should be filled with solder before soldering wires into cup. B

d. All wires should be pretinned before soldering.

e. At all solder connections, the insulations on the wire will terminate as close as possible to the terminal. B

f. Shrinkable tubing sleeves are to be used over all solder type connector pins. Clear, differentially irradiated, modified polyolefin shrinkable tubing is preferred for the application. (Raychem type SCL.)

g. The base of the solder type connector should be sealed with a bead of epoxy. Refer to IMP H/J Connector Potting Procedure QCP-006. B

h. At all crimp connections, the insulation on the wire will terminate as close as possible to the crimp barrel of the contact. However, great care shall be taken to ensure that the insulation on the wire does not enter the crimp barrel of the contact

as this will create a tensile force on the wire and may cause it to break easily.

i. Before vibration tests, the back of all crimp type connectors will be sealed with a qualified removable potting compound to ensure that adjacent terminals cannot be accidentally shorted by any loose metal debris.

j. Care should be taken to terminate shields on cables or wires as close to destination as possible and still maintain reliability. Extreme caution should be used when attaching a wire to the shield to protect the insulation of the wire from excessive heat.

k. All cables should be carefully laced such that the wires are firmly tied together, but not so tight as to harm the insulation on any of the wires.

l. Sufficient clamps should be used to ensure no excessive flexing of the cable, i.e., cable runs between clamps should not exceed six inches.

m. On all cable runs care shall be taken to eliminate all sharp edges from contact with the cable.

n. Where the function is critical to the operation of the satellite, the wires should be redundant.

o. All connectors used in the spacecraft must be tested for proper pressure on all pins or jacks with a verified test fixture. The Project Office will arrange for the testing of connectors which

will be furnished to the experimenters or instrumenters.

p. External connections through turn-on plug shall be held to a minimum consistent with testing of the spacecraft.

q. The test leads for all experiments shall be on a separate connector which shall be mounted to the front face of the experiment so that it is available through the RF shield of the spacecraft for all testing. Care must be taken in the mechanical location of this test connector on the experiment so that it does not interfere with the folded booms.

5.5 POTTING AND SPRAY SOLDERING

a. Potting shall be accomplished in accordance with the memorandum of Reference (g), 13 March 1969, File No. 15823 and/or EMR IMP H/J Connector Potting Procedure, QCP-006. B

5.6 GROUND SUPPORT EQUIPMENT

a. All GSE shall be designed to operate over the temperature range 0 to $+50^{o}$C.

b. All GSE shall be fabricated and packaged to survive rough handling in field use.

c. All GSE shall be designed to operate from 117 Vac, 50 - 60 cps, single phase.

d. All GSE shall be designed and packaged to operate in the presence of RF fields and electrical disturbances (powerline transients, etc.)

e. All GSE shall be rack mountable with a standard 19-inch rack panel as the front panel of the GSE, if it is larger than 300 in^3.

f. GSE common shall be dc isolated from chassis, and bypassed to chassis with sufficient capacitance to assist in noise suppression.

g. All racks containing equipment connected to the spacecraft shall be connected to a common building ground with heavy ground strapping.

h. All GSE shall be fully documented, including schematic diagrams, stenciled chassis and controls, etc.

i. The GSE shall not use spacecraft primary power or any power whose source is in the spacecraft to power any test equipment or other GSE.

5.7 MAGNETICS

a. All power leads that enter a connector shall do so on adjacent pins. If the power leads also leave the same connector, they should enter and leave on adjacent sets of pins in parallel planes.

b. On cards carrying heavy currents (i.e., approximately one ampere), the leads carrying this current should be hard-wired and twisted. Experience has shown that it will probably be necessary to build compensating loops in such cards to bring the resulting magnetic field within limits.

c. No experiment or instrument except the transmitter shall have signal or power common electrically attached to frame.

d. As stated under paragraph I, "General", all experiment or instrumentation packages operating from the main +28 V bus shall have their converter primaries dc isolated from their converter secondaries.

e. All materials to be used in the spacecraft must be checked for magnetic properties before use in the spacecraft. Materials capable of high magnetism (e.g., kovar, iron) should not be used if it can be avoided.

f. The layout of a subsystem should be arranged so that the net area in any power loop is minimized.

APPENDIX H

IMP H&J INTEGRATION PLAN
FLOW DIAGRAM

Page intentionally left blank

Page intentionally left blank

APPENDIX I

IMP H TEST PLAN
FLOW CHART

Page intentionally left blank

APPENDIX J

IMP H & J WEIGHT SUMMARIES

IMP H WEIGHT SUMMARY

AS OF

October 10, 1972 Rev. Q

	Date	Weight		Date	Weight
Initial Release	5-8-70	794.81	Revision I	7-20-71	838.09
Revision A	7-24-70	799.94	Revision J	8-15-71	838.23
Revision B	10-1-70	820.04	Revision K	9-15-71	832.39
Revision C	11-1-70	817.02	Revision L	10-15-71	835.62
Revision D	12-1-70	815.13	Revision M	12-1-71	820.91
Revision E	2-2-71	825.05	Revision N	2-1-72	848.58
Revision F	4-1-71	821.09	Revision O	3-17-72	856.11
Revision G	5-3-71	835.30	Revision P	7-8-72	861.04
Revision H	6-7-71	838.88	Revision Q	10-10-72	861.12*

*This corresponds to an actual ETR launch weight of 860.26.

Prepared by EMR

Date: 10-10-72

Revision: Q

IMP H WEIGHT SUMMARY

ITEM	I.D. CODE	GSFC APPROVED WEIGHT (LBS)	EST/ACT WEIGHT (LBS)	Change From Last Issue	REASON
TOTAL SPACECRAFT WEIGHT	IMP H	839.40	861.12A	+0.08	
1.0 EXPERIMENTATION		147.60	148.90A		
1 GNF-Magnetic Fields (GSFC-Ness)	GNF	5.00	5.66A*		
2 GME-Charged Particles (GSFC-McDonald)	GME	24.00	23.45A		
3 CHE-Cosmic Ray (Chicago-Simpson)	CHE	17.30	16.48A		
4 GWP-Charged Particles (GSFC/APL- Williams)	GWP	6.00	7.03A		
5 APP-Charged Particles (APL-Krimigis)	APP	8.50	8.43A		
6 CAI-Electron Isotopes (Cal. Tech.-Stone)	CAI	18.20	18.12A		
7 MAE-Ion & Electron (Maryland-Gloeckler)	MAE	15.70	15.50A		
8 IOE-Low Energy Particles (Iowa-Frank)	IOE	5.60	5.71A		
9 LAP-Plasma (Los Alamos-Bame)	LAP	13.50	13.68A		

*Sensor and flipper included in weight of IS-20, Magnetometer Boom Assembly.

ITEM			I.D. CODE	GSFC APPROVED WEIGHT (LBS)	EST/ACT WEIGHT (LBS)	Change From Last Issue	REASON
	10	MAP-Plasma (MIT-Bridge)	MAP	13.30	14.20A		
	11	TRF-Plasma Wave (TRW-Scarf)	TRF	3.50	2.88A*		
	12	GCE-Electron-Positron (GSFC-Cline)	GCE	10.00	10.02A		
	13	GOP-Ion Composition (GSFC-Ogilvie)	GOP	7.00	7.74A		
2.0		IT-TELEMETRY & COMMAND	IT	45.20	37.51A		
	1	Encoder	IT-1	23.40	16.12A		
	2	PCM Transmitter	IT-2	2.80	2.61A		
	3	Sequential Decoder & Receiver	IT-3	3.30	3.34A		
	4	R&RR and PCM Receiver	IT-4	2.50	2.48A		
	5	PCM Decoder	IT-5	1.40	1.62A		
	6	Analog Transmitter	IT-6	2.60	2.64A		
	7	Encoder Convolver	IT-8	1.00	1.16A		
	8	System Programmer	IT-9	2.00	1.99A		
	9	Experiment Programmer	IT-10	2.10	2.26A		

*Boom mounted components included in IS-22, Plasma Wave Boom Assembly.

ITEM			I.D. CODE	GSFC APPROVED WEIGHT (LBS)	EST/ACT WEIGHT (LBS)	Change From Last Issue	REASON
	10	Deployment Programmer	IT-11	2.60	2.23A*		
	11	Antenna Distribution Unit	IT-12	1.50	1.06A		
3.0	IP-POWER		IP	72.10	68.59A		
	1	Solar Panels (48)	IP-1	50.00	46.87A		
	2	Battery	IP-2	11.00	11.12A		
	3	Shunt, Charge, & Discharge Regulators	IP-3	4.80	4.58A		
	4	OA Converter	IP-4	0.90	0.74A		
	5	Decoder Converter	IP-5	2.30	2.23A		
	6	Encoder Converter	IP-7	1.80	1.97A		
	7	Dump Resistors	IP-8	0.80	0.74A		
	8	Dump Transistors	IP-9	0.50	0.34A		
	9	Test Solar Panel	IP-10				Weight included in IP-1.

*Weight includes arming plug.

	ITEM	I.D. CODE	GSFC APPROVED WEIGHT (LBS)	EST/ACT WEIGHT (LBS)	Change From Last Issue	REASON
4.0	IE-ELECTRICAL	IE	54.10	46.47A		
1	Optical Aspect Sensor Optical Aspect Electronics	IE-1, IE-2	2.80	0.19A 2.48A		
2	Turn On	IE-3	1.20	1.57A		
3	Harness	IE-10	35.00	30.15A		
4	RF Filter	IE-11	1.60	1.44A		
5	Thermal Coating Test (Maag)	IE-12	2.00	3.20A		
6	Data System Test-DMU (Goldsmith)	IE-13	8.00	3.19A		
7	Data System Test-DPU (Goldsmith)	IE-14		2.75A		
8	Kick Motor Instrument Pkg.	IE-15	3.50	1.50A***		
5.0	IC-CONTROL	IC	34.30	34.38A		
1	ACS Electronics	IC-1	1.40	1.56A		
2	ACS Tank (2-Filled)	IC-2	28.50	28.92A**		
*3	ACS Diode Pack	IC-3				
*4	ACS Valve Nozzle	IC-4				
5	ACS Shelf Assembly	IC-5	3.50	3.17A		
*6	ACS Boom Line	IC-6				

*Weight included as part of IS-33 and IS-34 - ACS Boom Assemblies.
**16.00 lb. propellant + (6.46 lb/tank x 2 tanks) = 28.92 lbs.

***DIP = 0.81
Kistler Accelerometer = 0.42
Pressure Transducer = 0.27
1.50

ITEM		I.D. CODE	GSFC APPROVED WEIGHT (LBS)	EST/ACT WEIGHT (LBS)	Change From Last Issue	REASON
*7	ACS Swivel Joint	IC-7				
8	ACS Temp. Probe	IC-8	0.20	**		
9	ACS High Pressure Line	IC-9	0.50	0.73A		
10	ACS Low Pressure Line	IC-10	0.20			
6.0	IS-STRUCTURE	IS	208.10	248.57A		
1	Lower Structure Assembly	IS-1	38.70	44.05A		
2	Upper Center Tube	IS-2	5.80	8.36A		
3	Lower Experiment Panel Support Ring	IS-3	2.40	1.61A		
4	Upper Experiment Panel Support Ring	IS-4	2.00	1.91A		
5	Lower Experiment Panel Support Ring Brackets	IS-5	1.00	0.62A		
6	Harness Support Panels	IS-6	4.00	2.64A		
7	Support Columns, Experiment Panels	IS-7	2.60	2.25A		

*Weight included as part of IS-33 and IS-34 - ACS Boom Assemblies. **Weight included as part of IC-2.

	ITEM	I.D. CODE	GSFC APPROVED WEIGHT (LBS)	EST/ACT WEIGHT (LBS)	Change From Last Issue	REASON
8	Radial Braces	IS-8	2.30	2.56A		
9	Support Columns, Harness Support	IS-9	2.40	2.08A		
10	Upper Struts	IS-10	2.00	1.42A		
11	Main Structure Assembly Hardware	IS-11	2.00	1.50A		
12	Upper Solar Panel Assembly	IS-12	8.80	9.66A***		
13	Middle Solar Panel Assembly	IS-13	11.60	8.79A***		
14	Lower Solar Panel Assembly	IS-14	8.70	9.62A***		
15	RF Antennas	IS-15	1.60	1.48A		
16	Experiment Panels	IS-16	7.90	8.02A		
17	RF Shield Assembly (Upper)	IS-17	7.00	6.57A		
18	Bottom Shelf Assembly	IS-18	1.50	1.56A		
19	ACS Structural Pieces	IS-19	3.80	2.54A		
20	Magnetometer Boom Assembly	IS-20	7.00	9.36A****		
21	Upper Platform Assembly	IS-21	6.50	2.76A		
22	TRF Boom Assembly	IS-22	7.00	9.36A**		
23	Yo-Yo Despin System	IS-23	0.00	0.00		
24	Miscellaneous	IS-24	24.70	30.51A*	+0.08	Adjustment to launch weight.

*Balance Weights Included: Approved = 15.00
Actual = 19.50

**Includes 1.16 lbs. TRF Antenna

***Includes electrical harness: Upper 1.54
Middle 1.90
Lower 2.08
5.52

****Includes 0.81 lb. for sensor, flipper, canister.

ITEM		I.D. CODE	GSFC APPROVED WEIGHT (LBS)	EST/ACT WEIGHT (LBS)	Change From Last Issue	REASON
25	Mid Ring, Antenna Mounting	IS-25	3.50	2.80A		
26	RF Shield Assembly (Lower)	IS-26	5.00	8.65A		
27	Umbilical Plug Bracket	IS-27	0.30	0.20A		
28	Heat Sink Panels	IS-28	0.50	1.46A		
29	Separation Switch	IS-29	0.10	0.16A		
30	Center Tube Thermal Insulator	IS-30	0.30	1.48A		
31	Thermal Blankets	IS-31	4.00	9.05A**		
32	MED Shelf	IS-32	2.50	2.51A		
33	ACS Boom Assembly (+Y)	IS-33	5.30	4.97A		
34	ACS Boom Assembly (-Y)	IS-34	5.30	4.93A		
35	Plume Shield	IS-37		1.93A		
36	Inertia Weights (Facet & Booms)	IS-38	20.00	29.02A*		
37	Heaters (Cone & Upper Motor Case)	IS-39		1.77A		
38	Inertia Booms	IS-40		8.14A		
39	Nutation Damper***	IS-41		2.27A		
7.0	FOURTH STAGE KICK MOTOR		278.00	276.70A		
IMP H TOTAL WEIGHT			839.40	861.12A	+0.08	

*Facet 2 Inertia Weight = 10.62A
Boom Inertia Weights = 18.40A
Total = 29.02A

**Includes upper center tube heaters.
***Includes attaching hardware.

IMP J WEIGHT SUMMARY

AS OF

November 13, 1973 Rev. X

	Date	Weight		Date	Weight
Initial Release	5-8-70	851.48	Revision M	12-1-71	826.85
Revision A	7-24-70	856.61	Revision N	2-1-72	859.44
Revision B	10-1-70	867.36	Revision O	3-17-72	864.21
Revision C	11-1-70	864.34	Revision P	7-1-72	871.86
Revision D	12-1-70	862.45	Revision Q	10-10-72	872.85
Revision E	2-2-71	848.82	Revision R	12-8-72	879.63
Revision F	4-1-71	844.83	Revision S	2-5-73	875.42
Revision G	5-3-71	839.54	Revision T	4-5-73	877.76
Revision H	6-7-71	842.92	Revision U	5-21-73	874.40
Revision I	7-20-71	852.05	Revision V	8-1-73	873.64
Revision J	8-15-71	855.89	Revision W	9-11-73	877.49
Revision K	9-15-71	848.39	Revision X	11-13-73	876.22*
Revision L	10-15-71	850.50			

*This corresponds to an actual ETR launch weight of 875.34.

Prepared by EMR

Date: 11-13-73

IMP J WEIGHT SUMMARY

Revision: X

ITEM	I.D. CODE	GSFC APPROVED WEIGHT (LBS)	EST/ACT WEIGHT (LBS)	EST/ACT WEIGHT (KG)	Change From Last Issue	REASON
TOTAL SPACECRAFT WEIGHT	IMP J		876.22A	398.42A	-1.27	Adjustment to launch weight.
1.0 EXPERIMENTATION		144.65	147.26A	66.91A	+0.04	
1 GNF-Magnetic Fields (GSFC-Ness)	GNF	5.00	5.88A*	2.67A		
2 GME-Charged Particles (GSFC-McDonald)	GME	24.00	24.27A	11.05A		
3 CHE-Cosmic Ray (Chicago-Simpson)	CHE	17.30	16.03A	7.30A		
4 GWP-Charged Particles (GSFC/APL-Williams)	GWP	6.00	7.15A	3.25A		
5 APP-Charged Particles (APL-Krimigis)	APP	8.50	8.58A	3.90A		
6 CAI-Electron Isotopes (Cal. Tech. -Stone)	CAI	18.20	17.58A	7.99A		
7 MAE-Ion & Electron (Maryland-Gloeckler)	MAE	15.70	15.53A	7.04A		
8 IOE-Low Energy Particles (Iowa-Frank)	IOE	5.60	5.65A	2.58A		
9 LAP-Plasma (Los Alamos-Bame)	LAP	13.50	13.68A	6.23A		

*Sensor and flipper included in weight of IS-20, Magnetometer Boom Assembly.

ITEM	I.D. CODE	GSFC APPROVED WEIGHT (LBS)	EST/ACT WEIGHT (LBS)	EST/ACT WEIGHT (KG)	Change From Last Issue	REASON
10 MAP-Plasma (MIT-Bridge)	MAP	13.30	14.30A	6.51A	+0.04	Addition of copper tape.
11 GAF-Electric Fields (GSFC-Aggson)	GAF	9.85	9.90A*	4.49A		
12 IOF-Electric & Magnetic Fields (Iowa-Gurnett)	IOF	7.70	8.71A**	3.98A		
2.0 IT-TELEMETRY & COMMAND	IT	45.20	38.56A	17.49A		
1 Encoder	IT-1	23.40	16.77A	7.62A		
2 PCM Transmitter	IT-2	2.80	2.45A	1.11A		
3 Sequential Decoder & Rcvr.	IT-3	3.30	3.20A	1.46A		
4 R&RR and PCM Receiver	IT-4	2.50	2.43A	1.10A		
5 PCM Decoder	IT-5	1.40	1.62A	0.74A		
6 Analog Transmitter	IT-6	2.60	2.52A	1.15A		
7 Encoder Convolver	IT-8	1.00	1.17A	0.53A		
8 System Programmer	IT-9	2.00	2.28A	1.03A		
9 Experiment Programmer	IT-10	2.10	2.36A	1.07A		

*GAF1 } 8.16
GAF2 }
GAF Preamps 1.74
9.90

**IOF1 = 7.69
IOF Preamps = 1.02
8.71

ITEM			I.D. CODE	GSFC APPROVED WEIGHT (LBS)	EST/ACT WEIGHT (LBS)	EST/ACT WEIGHT (KG)	Change From Last Issue	REASON
	10	Deployment Programmer	IT-11	2.60	2.69A*	1.22A		
	11	Antenna Distribution Unit	IT-12	1.50	1.07A	0.46A		
3.0	IP-POWER		IP	72.10	64.26A	29.65A		
	1	Solar Panels (48)	IP-1	50.00	42.75A	19.90A		
	2	Battery	IP-2	11.00	11.13A	5.06A		
	3	Shunt, Charge, & Discharge Regulators	IP-3	4.80	4.42A	2.00A		
	4	OA Converter	IP-4	0.90	0.72A	0.33A		
	5	Decoder Converter	IP-5	2.30	2.20A	0.99A		
	6	Encoder Converter	IP-7	1.80	1.96A	0.88A		
	7	Dump Resistors	IP-8	0.80	0.74A	0.34A		
	8	Dump Transistors	IP-9	0.50	0.34A	0.15A		

*Includes plug.

	ITEM	I.D. CODE	GSFC APPROVED WEIGHT (LBS)	EST/ACT WEIGHT (LBS)	EST/ACT WEIGHT (KG)	Change From Last Issue	REASON
4.0	IE-ELECTRICAL	IE	59.90	45.43A	20.57A	-0.43	
1	Optical Aspect Sensor Optical Aspect Electronics	IE-1, IE-2	2.80	0.19A 2.48A	0.08A 1.12A		
2	Turn On	IE-3	1.20	1.66A	0.73A		
3	+X EFM Preamp	IE-4	2.20	0.00 *			
4	-X EFM Preamp	IE-5	2.20	0.00 *			
5	+Y EFM Preamp	IE-6	2.20	0.00 *			
6	-Y EFM Preamp	IE-7	2.20	0.00 *			
7	Harness	IE-10	35.00	31.50A	14.30A		
8	RF Filter	IE-11	1.60	1.48A	0.67A		
9	Data System Test-DMU	IE-13	7.00	6.57A	2.96A	-0.43	Actual weight.
10	Data System Test-DPU	IE-14					
11	Delta Instrumentation Package (DIP)	IE-15	3.50	1.55A**	0.71A		

*Preamps now included in weight of GAF and IOF.

**DIP Estimates:

DIP	≅ 0.86		Turn-On Card	= 1.55
Kistler Accelerometer	≅ 0.42		Turn-On Plug	= 0.07
Pressure Transducer	= 0.27		Relay Card Plug	= 0.04
	1.55			1.66

ITEM		I.D. CODE	GSFC APPROVED WEIGHT (LBS)	EST/ACT WEIGHT (LBS)	EST/ACT WEIGHT (KG)	Change From Last Issue	REASON
5.0	IC-CONTROL	IC	34.30	37.89A	17.16A	-0.60	
1	ACS Electronics	IC-1	1.40	1.47A	0.67A		
2	ACS Tank (2-Filled)	IC-2	28.50	32.26A**	14.60A	-0.60	Actual weight of gas flown.
*3	ACS Diode Pack	IC-3					
*4	ACS Valve Nozzle	IC-4					
5	ACS Shelf Assembly	IC-5	3.50	3.43A	1.56A		
*6	ACS Boom Line	IC-6					
*7	ACS Swivel Joint	IC-7					
8	ACS Temp. Probe	IC-8	0.20	***			
9	ACS High Pressure Line	IC-9	0.50	0.73A	0.33A		
10	ACS Low Pressure Line	IC-10	0.20				

*Weight included as part of IS-33 and IS-34 -- ACS Boom Assemblies.
**19.40 lb. propellant + (6.43 lb/tank x 2 tanks) = 32.26 lbs.
***Weight included as part of IC-2.

ITEM		I.D. CODE	GSFC APPROVED WEIGHT (LBS)	EST/ACT WEIGHT (LBS)	EST/ACT WEIGHT (KG)	Change From Last Issue	REASON
6.0	IS-STRUCTURE	IS	247.10	265.04A	120.36A	-0.28	
1	Lower Structure Assembly	IS-1	38.70	44.05A	19.93A		
2	Upper Center Tube	IS-2	5.80	8.36A	3.82A		
3	Lower Experiment Panel Support Ring	IS-3	2.40	1.61A	0.73A		
4	Upper Experiment Panel Support Ring	IS-4	2.00	1.91A	0.87A		
5	Lower Experiment Panel Support Ring Brackets	IS-5	1.00	0.62A	0.28A		
6	Harness Support Panels	IS-6	4.00	2.64A	1.20A		
7	Support Columns, Experiment Panels	IS-7	2.60	2.25A	1.02A		
8	Radial Braces	IS-8	2.30	2.56A	1.16A		
9	Support Columns, Harness Support	IS-9	2.40	2.08A	0.95A		
10	Upper Struts	IS-10	2.00	1.42A	0.65A		
11	Main Structure Assembly Hardware	IS-11	2.00	1.50A	0.68A		
12	Upper Solar Panel Assembly	IS-12	8.80	9.60A	4.36A		

	ITEM	I.D. CODE	GSFC APPROVED WEIGHT (LBS)	EST/ACT WEIGHT (LBS)	EST/ACT WEIGHT (KG)	Change From Last Issue	REASON
13	Middle Solar Panel Assembly	IS-13	11.60	8.73A	3.97A		
14	Lower Solar Panel Assembly	IS-14	8.70	9.58A	4.31A		
15	RF Antennas	IS-15	1.60	1.47A	0.67A		
16	Experiment Panels	IS-16	7.90	8.29A	3.75A	+0.20	Field Mod to MAP and CHE panels.
17	RF Shield Assembly (Upper)	IS-17	7.00	6.57A	2.98A		
18	Bottom Shelf Assembly	IS-18	1.50	0.73A	0.33A		
19	ACS Structural Pieces	IS-19	3.80	3.17A	1.44A		
20	Magnetometer Boom Ass'y.	IS-20	8.20	11.55A	5.25A		
21	Upper Platform Assembly	IS-21	6.50	2.76A	1.25A		
22	Yo-Yo Despin System	IS-23	0.00	0.00	0.00		
23	Miscellaneous	IS-24	22.70	20.69A*	9.40A	-0.48	Adjustment to launch weight.
24	Mid Ring, Antenna Mounting	IS-25	3.50	2.80A	1.27A		
25	RF Shield Assembly (Lower)	IS-26	5.00	8.65A	3.93A		
26	Umbilical Plug Bracket	IS-27	0.30	0.20A	0.09A		
27	Heat Sink Panels	IS-28	0.50	1.51A	0.68A		
28	Separation Switch	IS-29	0.10	0.16A	0.07A		
29	Center Tube Thermal Insulator	IS-30	0.30	1.48A	0.67A		

*Balance Weights Included: Approved = 15.00; (nutation dampers utilized as balance weights).
Estimated = 8.86** Spacecraft Main Body
0.59 Kick Motor
9.45

**0.36 balance weight added at ETR.

ITEM	I.D. CODE	GSFC APPROVED WEIGHT (LBS)	EST/ACT WEIGHT (LBS)	EST/ACT WEIGHT (KG)	Change From Last Issue	REASON
30 Thermal Blankets	IS-31	4.00	8.52A	3.87A		
31 MED Shelf	IS-32	2.50	2.51A	1.14A		
32 ACS Boom Assembly (+Y)	IS-33	5.30	4.96A	2.26A		
33 ACS Boom Assembly (-Y)	IS-34	5.30	4.85A	2.26A		
34 IOF Boom Assembly	IS-35	8.20	11.55A	5.25A		
35 EFM Antenna Mechanism	IS-36	27.20*	29.64A	13.49A		
36 Plume Shield	IS-37		1.99A	0.90A		
37 Inertia Weight	IS-38	18.20	17.90A***	8.12A		
38 Heaters (Cone & Upper Motor Case)	IS-39		1.77A	0.82A		
39 Inertia Booms	IS-40	8.20	9.58A	4.35A		
40 Nutation Damper	IS-41	5.00	4.83A	2.19A		
7.0 FOURTH STAGE KICK MOTOR		278.00	277.78A	126.20A		
IMP J TOTAL WEIGHT		882.25	876.22A	398.42A	-1.27	

*Letter: Ferer to Sours, 5/15/72.
**Includes 2.49 IOF Boom Sensor.

***1.25/ACS Boom — 1.25 x 2 = 2.50
7.70/Experiment Boom — 7.70 x 2 = 15.40
17.90