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NASA TM X-55472

ANCHORED INTERPLANETARY MONITORING PLATFORM AIMP (D & E)

E. T. R. OPERATIONS CHECK-OFF LIST

MAY 1966

GODDARD SPACE FLIGHT CENTER
GREENBELT, MARYLAND

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E. W. Travis
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Goddard Space Flight Center
Greenbelt, Maryland

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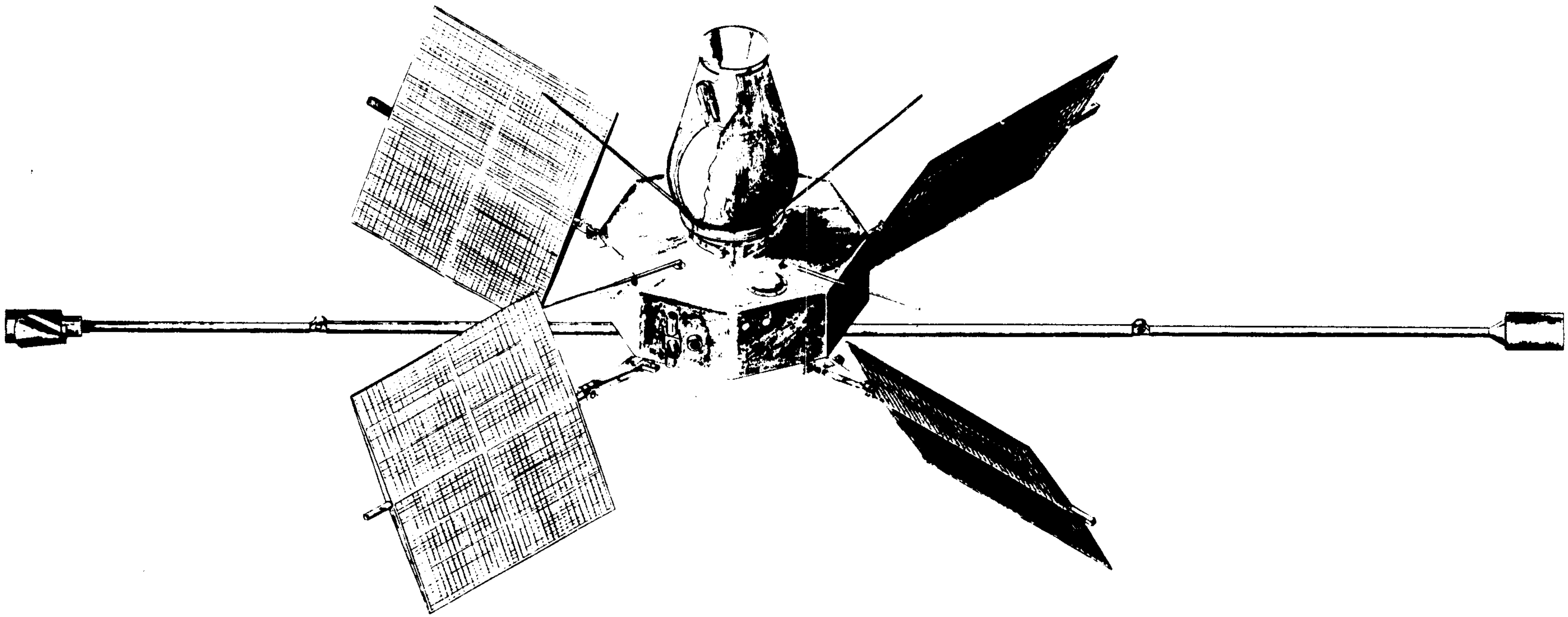
AIMP (D) SPACECRAFT



FRONTISPIECE

ANCHORED INTERPLANETARY MONITORING PLATFORM

AIMP (D & E)

E.T.R. OPERATIONS CHECK-OFF LIST

I. INTRODUCTION

The function of this check-off list is to insure that all mechanical systems (including experiments, fasteners, screws, despin systems, etc.) are properly and permanently inserted to insure a successful mission of the AIMP-D Interplanetary Monitoring Platform. The spacecraft will not be considered ready for flight until it has thoroughly been checked and doublechecked by the cognizant Project Engineer or his designated alternate. Any defect noted, no matter how insignificant, should be brought to the attention of the Project Engineer immediately.

II. SPACECRAFT MECHANICAL PERSONNEL ON AIMP-D & E FIELD OPERATIONS

(a) MECHANICAL SYSTEMS BRANCH PERSONNEL

Name	Title	Motel	Phone
E. W. Travis	Project Engineer		
D. K. McCarthy	Asst. Project Engineer		
R. C. Courtney	Research Engineer		
F. N. LeDoux	Head, Structural & Mechanical Applications Section		
A. J. Pierro	Lead Technician		
P. McConnell	Technician		
L. Paul	Technician		

(b) WESTINGHOUSE PERSONNEL

Name	Title	Motel	Phone
D. Miller	Project Engineer		
D. Brust	Technician		
J. Rauser	Technician		

III. FASTENING PROCEDURE INSTRUCTIONS

Long-Lok screws shall be used wherever possible with Nylok screws second and blue Lock-tite on standard screws third. To indicate that the screws are properly installed and are to remain in the spacecraft permanently, the head of every screw will be painted with a white dot partly on the head of the screw and partly on the adjoining surface, after which the Spacecraft technician shall initial the appropriate item in the first column with the Project Engineer's (or alternate) in the second column. This operation is necessary in that it affords an immediate visual indication that the screws are locked and ready for flight.

If the occasion arises to remove a screw, the screw will be discarded, paint removed from the adjoining surface and a new screw used and repainted as indicated previously. Fill in the comment column for removal of marked screws and state the reason.

Change and removal sheets (blank) are provided herein and any defects or changes in procedure are to be recorded.

One master check-off list shall be recorded for the Spacecraft that is launched and one master maintained on the spare Spacecraft. Extra copies shall be maintained for reference use only by the MSB and Westinghouse personnel.

IV. 4th STAGE MOTOR

	Performed By	Checked By	Comments
1. Observe shipping containers for any damage incurred during shipment.			
2. Observe inspection of the motor, nozzle, nozzle rat plug, spacecraft attach holes, etc.			
3. Observe igniter inspection - shorting plug, body, exit port, etc.			
4. X-ray the motor per the procedure outlined in Appendix A.			
5. Perform igniter resistance measurements per the procedure outlined in Appendix C.			
6. Magnetically map and deperm if necessary the igniters and retromotor per the procedure in Appendix D.			

V. FLUXGATE BOOM ASSEMBLY

	Performed By	Checked By	Comments
Check the following:			
1. Movement of secondary hinge			
(a) hinge pin loaded 1/4 turn — 2 nuts - 17 in. lb.			
(b) Lock-in of secondary hinge			
Ames (a)______ (b)______ GSFC (a)______ (b)______			
2. Crush pads (4) on main hinges (2)-Teflon — 4 scr.-1 in. lb.			
3. Leaf springs (2) on main hinges (2) — 2 scr.-1 in. lb.			
4. GSFC and Ames Housings			
(a) housing connected to F/G Boom — 4 scr.-2.5 in. lb.			
(b) housing and sleeve (#2-56) — 4 scr.-1 in. lb.			
(c) housing and connector plate — 4 scr.-2.5 in. lb.			
(d) connectors (2 each) and connector plate — 4 scr.-2.5 in. lb.			
(e) connectors (2 each) and sensor (sensor side) — 4 scr.-2.5 in. lb.			
(f) pin between housing and boom			
Ames (a)______ (b)______ (c)______ (d)______ (e)______ (f)______ GSFC (a)______ (b)______ (c)______ (d)______ (e)______ (f)______			

	Performed By	Checked By	Comments
5. GSFC Housing Confirm the proper orientation of the sensor inside the cannister by hand rotating the sensor and observing the cable clearance through the cannister cutout. Sensor connector (Continental) 2 scr. Fiberglass cannister 8 scr.-2.5 in. lb. Fiberglass fan 3 scr.-1 in. lb.			
6. Ames Housing Connection between adapter and housing 6 scr. & nuts-2.5 in. lb. Connection between adapter and sensor 6 scr. & nuts-2.5 in. lb. Sensor cannister 12 scr.-1.5 in. lb. The word "Top" is engraved on the top (external) surface of the adapter flange which mounts to the sensor package. Confirm proper orientation - the sensor package is not symmetrical in that one mounting hole and screw over the single-axis sensor is omitted from the inner circle of mounting screws (upper left side, viewed from spacecraft)			
7. Check for proper alignment of GSFC sensor in cannister by rotating sensor approximately 30° by hand.			

VI. CENTER TUBE AND MOTOR ADAPTER

Check the following:	Performed By	Checked By	Comments
1. Screws in Battery Cover — 21 scr.-1 in. lb.			
2. Screws between Battery connector bracket and center tube — 2 scr.-1.5 in. lb.			
3. Screws between Battery connector and bracket — 2 scr.-2.5 in. lb.			
4. Screws in Battery connectors on Battery — 4 scr.-2.5 in. lb.			
5. Shorting Connector in Battery Test Connector — 2 scr.-2.5 in. lb.			
6. Battery bolts — 4 bolts-17 in. lb.			
7. Third (3rd) stage Micro-Switch Assembly — 8 scr.-1 in. lb.			
8. Spring Seat Ring — 8 scr.-3 in. lb.			
9. D.A.C. Connector R-F cap — 4 scr.-2.5 in. lb.			
10. D.A.C. Connector — 4 scr.- Diallyl thialate material down to separation plane (.175 $^{+003}_{-000}$) - GSFC side.			

No.	Item	Fastening	Performed By	Checked By	Comments:
11.	Use fixture provided by GSFC to verify correct alignment of D.A.C. connector on GSFC side.				
12.	Spring Seat Disc	8 scr.-2.5 in. lb.			
13.	Screws in 4th Stage Separation Spring Housings (4)	8 scr.-4 in. lb.			
14.	Screws holding separation springs in housings (4)	4 scr.-2.5 in. lb.			
15.	Screws in Micro-Switch brackets (4th stage)	6 scr.-2.5 in. lb.			
16.	Screws through Micro-Switches (4th stage)	6 scr. & nuts-2 in. lb.			
17.	Screws through Flyaway Connectors into center tube	8 scr.-3 in. lb.			
18.	Tabs on Flyaway Connector boxes				
19.	Spring Seats (4) on Motor Adapter	8 scr.-3 in. lb.			
20.	Screws through Flyaway Connectors (motor adapter)	8 scr.-3 in. lb.			
21.	Screws (3) and pins (3) through Micro-Switch actuators	3 scr.-3 in. lb.			
22.	Screws for support rod of thermal shield	2 scr.-2.5 in. lb.			
23.	Thermal Shield Screw	1 scr.-1 in. lb.			

	Performed By	Checked By	Comments
24. Resistance of retromotor thermisters through motor adapter flyaway connector. Low temperature thermister 10,000 ohms at room temperature. High temperature thermister 1200 ohms at Room Temperature. Low Temperature: ____________________ High Temperature: ____________________			

VII. ASSEMBLY ABOVE PLATFORM PRIOR TO TOP COVER INSTALLATION

	Performed By	Checked By	Comments
Check or install the following:			
1. Screws at top of struts (8) — 32 scr. & nuts-4 in. lb.			
2. Screws at bottom of inside struts (4) — 16 scr.-4 in. lb.			
3. Screws between center tube halves — 16 scr.-29 in. lb.			
4. Screws between brackets and platform — 40 scr.-17 in. lb.			
5. Install Copper foil below the Transmitter			
6. Install Copper foil below the Prime Converter			
7. 'C' Frame Connectors (39)			
8. Connectors (39) on module frames (31)			
9. T.O. Plug Module Frame through bolt — 1 scr.-10 in. lb.			
10. 'g' switch — 4 scr. & nuts-1 in. lb.			
11. Check threads of T.O. plug module frame jack screw Rivnuts. If bad, replace them.			
12. Module frame through bolts with washers and spacers — 32 bolts-10 in. lb.			
13. Module frame front corner tie-in plates (8) — 65 scr.-5 in. lb.			

	Performed By	Checked By	Comments
14. Screws on front of module frames (test conn. etc.)			
15. Secure all Coax connectors - use thick Glyptol and Nylon pliers. a. Antenna Hybrid - 5 coax b. Antennae Cups (4) - 10 coax c. Range and Range Rate red line coax connectors (11)			
16. F/G Connectors (2) 4 nuts-5 in. lb.			
17. Antenna Hybrid Board a. 4 screws (nylon) b. Check insulation from module frame			
18. F/G Micro-switch brackets (2) 4 scr.-5 in. lb.			
19. F/G Micro-switches 4 scr.-1.5 in. lb.			
20. F/G Micro-switch plungers (2) and pins (2)			
21. Record all card serial numbers on page 41.			
22. Lower Harness disconnect brackets a. Facet D 'C' Frame - 3 brackets - 6 scr.-2.5 in. lb. b. Facet H 'C' Frame - 1 bracket - 2 scr.-2.5 in. lb.			
23. Screws between lower harness disconnect connectors a. Facet D - 6 scr.-2.5 in. lb. b. Facet H - 2 scr.-2.5 in. lb.			

	Performed By	Checked By	Comments
24. Cable clamps - screws and lacing (visual inspection)			
25. Antenna Cup Clamps 12 scr.-4 nuts			
26. De-Spin Disconnect Brackets (2) 8 scr.-3 in. lb.			

VIII. BELOW PLATFORM BEFORE LOWER CONE INSTALLATION

	Performed By	Checked By	Comments
Check the following:			
1. Balance weights			
2. Screws at bottom of outside struts (4) 16 scr.-4 in. lb.			
3. Transmitter heat sink screws (copper) 3 scr.-2 in. lb.			
4. Prime Converter heat sink screws (copper) 5 scr.-2 in. lb.			
5. Screws (8) between platform and front corner tie-in plate 8 scr.-5 in. lb.			
6. Paddle Arm resistors (8) 32 scr.-1 in. lb.			
7. Paddle Arm Transistors (8)			
8. Paddle Arm Hinge to Bracket Bolts, with Fiberglass insulators 16 bolts-50 in. lb.			
9. Paddle Arm to hinge bolt + CIBA epoxy 4 bolts & nuts			
10. Paddle Arm lock-in bolt + CIBA epoxy 4 bolts & nuts			
11. Secondary hinge spring housing (4) 8 scr.-2.5 in. lb.			
12. Paddle Arm micro-switches (4) 8 scr.-1 in. lb.			

			Performed By	Checked By	Comments
13.	Filter-con brackets	6 scr.-2.5 in. lb.			
14.	Filter-cons (5)	10 scr.-2.5 in. lb.			
15.	Third (3rd) stage micro switch Ass'y				
	a. check E-rings with epoxy				
	b. check movement of plunger				
	c. check closure of switches (8)				
	d. check height of plunger to close switches with stop nut				
16.	Cable clamps, screws and lacing (visual inspection)				
17.	Umbilical Bracket	2 scr.-4 in. lb.			
18.	Umbilical Connector	4 scr. & nuts			
19.	Umbilical Diode	1 scr. (nylon)			
20.	Lower Harness Diode Box	4 nuts-17 in. lb.			

IX. LOWER CONE INSTALLATION

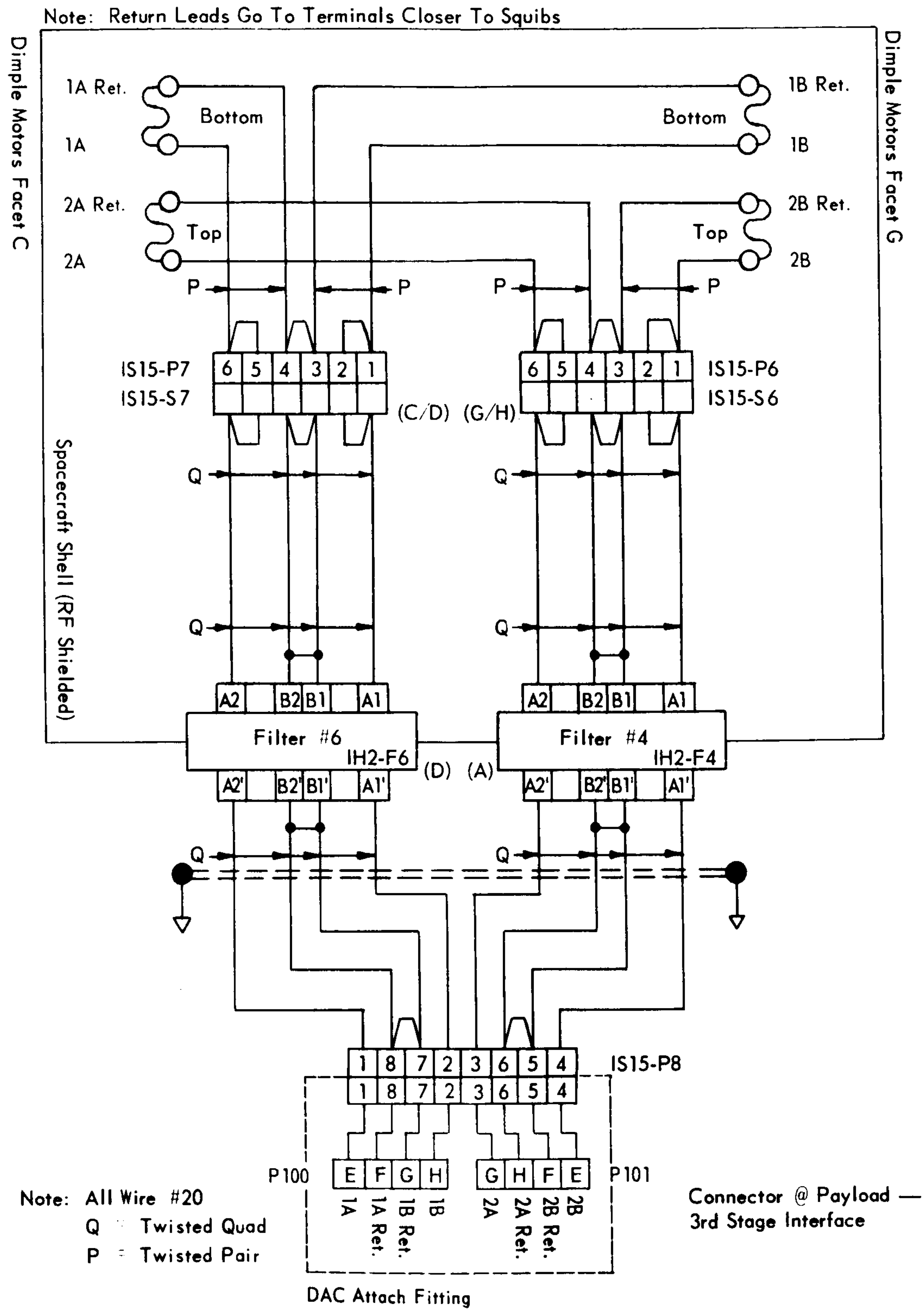
	Performed By	Checked By	Comments
Check the following:			
1. Between lower cone ring and platform 24 scr. & 8 nuts			
2. Top of cone at center tube 9 scr. & washers-3 in. lb.			
3. Base of cone, at Lower Cone Support Ring 9 scr. & washers-8 in. lb.			
4. Cone split (2) 12 scr. & washers-8 in. lb.			

X. DE-SPIN SYSTEM

Step	Performed By	Checked By	Comments:
1. Check bridgewire resistance using Alinco Model 101-5BFM of 4 prepotted and insulated Dimple Motors. Dimple Motor #1A= ohms Facet C-Bottom Dimple Motor #2A= ohms Facet C-Top Dimple Motor #1B= ohms Facet G-Bottom Dimple Motor #2B= ohms Facet G-Top			
2. Resistance readings of individual Dimple Motor should be between 1.4 and 2.6 ohms. Otherwise, reject the Dimple Motor.			
3. Install appropriate dimple motors into Facet C and G. (See enclosed pictorial schematic).			
4. Check Dimple Motors for proper fit and shim if necessary.			
5. Solder Dimple Motors per schematic using a heat sink attached to de-spin feedthroughs.			
6. Check feedthroughs on the inside of Top Cover for damage due to soldering Dimple Motors.			
7. Check total resistance at top cover connector using Alinco Model 101-5BFM squib checker. (See enclosed pictorial schematic). Dimple Motor #1A= ohms Facet C-Bottom Dimple Motor #2A= ohms Facet C-Top Dimple Motor #1B= ohms Facet G-Bottom Dimple Motor #2B= ohms Facet G-Top			

	Performed By	Checked By	Comments
8. Resistance readings through top cover connector should be between 1.6 & 3.0 ohms. Otherwise reject and install new dimple motors.			
9. Brush coat exposed terminals with Epon 828 and allow time to dry.			
10. Install R-F cover shields (2) over each terminal system. 6 scr.-2.5 in. lb.			
11. Weigh and record each end mass - inner weight, outer weight, 4 #0-80 screws, and 2 nuts. Weight #1= grams Weight #2= grams			
12. The same weights must agree with final value recorded on de-spin calculation sheet - page 54.			
13. Assemble weights to cables and wrap clockwise.			
14. Attach each weight to inner weight 8 scr.-1 in. lb.			
15. Adjust tension in cable and lock-tite end-fitting nuts with red lock-tite (4 nuts).			
16. Visually inspect complete assembly.			

XXII. DESPIN DIMPLE MOTOR WIRING DIAGRAM



	Performed By	Checked By	Comments
17. Record bridgewire resistance of dimple motors through spacecraft side of D.A.C. flyaway connector: Dimple Motor #1A= ohms Facet C-Bottom Dimple Motor #2A= ohms Facet C-Top Dimple Motor #1B= ohms Facet G-Bottom Dimple Motor #2B= ohms Facet G -Top (See enclosed pictorial schematic)			
18. If cover is ever removed from spacecraft repeat items #16 & 17.			
19. Record bridgewire resistance of dimple motors at D.A.C. timer terminals after spacecraft is mated to the third stage during balance operations: Dimple Motor #1A= ohms Facet C-Bottom Dimple Motor #2A= ohms Facet C-Top Dimple Motor #1B= ohms Facet G-Bottom Dimple Motor #2B= ohms Facet G-Top			
20. If spacecraft is ever removed from the third stage repeat items #17 & 19.			
21. Record bridgewire resistance of dimple motors at D.A.C. timer terminals at F-1. Dimple Motor #1A= ohms Facet C-Bottom Dimple Motor #2A= ohms Facet C-Top Dimple Motor #1B= ohms Facet G-Bottom Dimple Motor #2B= ohms Facet G-Top			

XI. TOP COVER INSTALLATION

	Performed By	Checked By	Comments:
Check or install the following:			
1. I & E Experiment thermal cover — 9 scr.-3 in. lb.			
2. Solar Cell Damage Experiment — 8 scr.-5 in. lb.			
3. Screws in balance weights (inside cover)			
4. California dome — 6 scr.-1 in. lb.			
5. Thermistor access cover — 6 scr.-1 in. lb.			
6. De-Spin Flyaway connector Brackets (2) — 8 scr.-3 in. lb.			
7. Cable clamps and lacing (visual inspection)			
8. Feedthroughs for damage due to soldering of Dimple Motors.			
9. Screws between top cover and center tube — 8 scr.-8 in. lb.			
10. Screws between top cover and platform — 15 scr.-8 in. lb.			
11. Antennae Cups (4) — 24 scr.-1 in. lb.			
12. Solar-Cell Damage Experiment Connector — 2 scr.-2.5 in. lb.			
13. Optical Aspect Sensor — 3 scr.-2.5 in. lb.			

14. R-F Covers:

GSFC F/G Electronics (1)
M.I.T. (3)
T.O. Plug (1)
Ames (1)
California (1)
University of Iowa (1)

Performed By	Checked By	Comments:

XII. BALANCE OPERATIONS (PROTOTYPE)

	Performed By	Checked By	Comments
1. Mount Prototype spacecraft and inert 4th stage retromotor on FW-4D.			
2. Observe D.A.C. installing 3rd stage clamp band.			
3. Check compatibility of de-spin connector.			
4. Check clearance of separation switch plungers.			
5. Install F/G booms and Paddles.			
6. Observe D.A.C. aligning and bonding the paddle and boom cradles and standoffs.			
7. Observe D.A.C.'s compatibility check of Umbilical cord and Fairing and access doors (2)			
8. Observe disconnect of umbilical and clamp band by D.A.C.			
9. Remove Prototype Spacecraft and inert 4th stage retromotor from FW-4D.			

XIII. BALANCE OPERATIONS (FLIGHT UNIT)

	Performed By	Checked By	Comments:
1. Personnel will wear flame retardant coveralls and legstats.			
2. Remove Retromotor shipping container case using air hoist and hydroset (Ground Straps between air hoist, shipping container and Building Grounding System).			
3. Remove Retromotor using air hoist and hydroset (Ground Straps between air hoist, lifting rig and Building Grounding System).			
4. Weigh TE-M-458 retromotor and record on page 46.			
5. Weigh AIMP-D Spacecraft, Booms, and Paddles and record on page 46.			
6. Place S/C on Precision Measuring Facility (PMF) and measure the two precisely machined surfaces of the center tube for T.I.R. Record on page 37.			
7. Measure flatness of center tube at 4th stage interface. Record on page 37.			
8. Remove Flyaway Connector covers and install Fiberglass Motor Adapter with the 4th stage marman clamp.			
9. Check alignment of all 24 flyaway connector pins.			
10. Align the S/C keyway with the adapter keyway.			

	Performed By	Checked By	Comments:
11. Put 75 lbs. symmetrically on top of the adapter.			
12. Position the marmon clamp, aligning its key with the S/C and adapter keyways.			
13. Install 4th Stage Bolt Cutters (with shorting connector attached) into bracket. Record serial No's. under Inventory, page 41.			
14. Snug up the two (2) marmon clamp bolts.			
15. Position the segments in each half of the clamp band:			
(a) the center segment in center of its floating position.			
(b) the other segments pushed as far as possible toward their respective ends of the clamp band.			
16. Tap the clamp band with a rubber tipped hammer above and below the rivets so the bolts are tightened simultaneously.			
17. Torque the bolts to 10 in.-lbs. after they have been snugged up equally on both sides.			
18. Proceed to tighten the two (2) bolts one-quarter (1/4) turn alternately.			
19. Final torque 35 in. lbs. $^{+5}_{-0}$			
20. Tighten Bracket with screw and nut. 2 scr.-2 nuts			

	Performed By	Checked By	Comments:
21. Remove the 75 lb. load.			
22. Install Protective Housing with teflon insert over bolt head (90 in. lb.).			
23. Safety wire two (2) bolt cutters to bolt cutter bracket.			
24. Measure flatness of Fiberglass Motor Adapter, and record on page 37.			
25. Install lower thermal blanket with Kapton tape and 8 scr.-2.5 in. lb.			
26. Check continuity between lower thermal blanket & Motor Adapter.			
27. Install ground line from the long thermal blanket screw to the motor mounting hole. Check continuity with the spacecraft ground using an Alinco tester.			
28. Place retromotor on S/C while on PMF. Align retromotor in pre-selected position (one of the 8 possible positions) with dial indicator to minimize T.I.R. between S/C and Retromotor. (Maximum allowable runout is .002 T.I.R.) Record T.I.R. on page 37.			
29. Install Retromotor hold-down bolts with ground lug under one bolt. (titanium) 8 bolts-90 in. lb.			
30. Install lanyards (2) between 4th stage Marman Clamp and 4th Stage Retromotor Bolts.			

Step	Performed By	Checked By	Comments:
31. Bond two (2) Thermistors to motor case using DC 90-006 primer and aerospace sealant. Allow to cure 12 hours @ room temperature.			
32. Insert dummy (inert loaded) igniters into Retromotor.			
33. Lace Igniter and thermistor harness to Retromotor.			
34. Check FW-4D attach fixture and payload interface for nicks, scratches, burrs, etc.			
35. Check D.A.C. side of de-spin connector - using Alignment Tool No. GE-IMP(D) 3239. See data sheet, page 31.			
36. Use fixture to verify correct alignment of de-spin connector on spacecraft side.			
37. Ground spacecraft to the building via Ground Strap.			
38. Mount Spacecraft/Retromotor on FW-4D.			
39. Use Key in S/C keyway to eliminate rotation as S/C is lowered on FW-4D.			
40. Remove Key.			
41. Observe D.A.C. installing Clamp Band (30 in. lbs. $^{+5}_{-0}$ torque)			
42. Check clearance of separation switch plungers (2).			

	Performed By	Checked By	Comments:
43. Continuity check made from D.A.C. attach fitting side through de-spin Dimple Motors using Alinco tester Model 101-5BFM. Record on pp. 19, item #19.			
44. Observe S/C runout measurements and record on page 37.			
45. Install thermal blanket using two (2) grounding clips. 16 scrs. at base (SST) 8 in. lb.			
46. Tape and seal at base.			
47. Ground blanket to the building via Ground Straps.			
48. Observe D.A.C. transfer of Retromotor/ Spacecraft/FW-4D to balance fixture.			
49. Install F/G booms (2) main hinge pin + CIBA epoxy - 2 bolts and 4 nuts - 17 in. lb.			
50. Install torsion springs (2) in brass retainers (2).			
51. Install fluxgate connectors to Spacecraft AMES______________ 2 scr.-2.5 in. lb. GSFC______________ 2 scr.-2.5 in. lb.			
52. Check movement of main hinge and insure lock-in. AMES____________, GSFC______________			
53. Remove protective covers from AMES____________, GSFC______________			

Performed By

Checked By

Comments:

54. Remove secondary hinge pin locks.
AMES______________, GSFC

55. Observe D.A.C. installation of fluxgate tie-down cord (35 lbs. $^{+5}_{-0}$).

56. Install safety cord around booms.

57. Bond Teflon crush pads using Epon 828.

58. Install Flight paddles (4) at pre-selected positions.

59. Record positions on page 51.

60. Torque of Secondary Hinge Pin Bolts (4)
17 in. lb.

61. Check
a. Movement of secondary hinges (4)
b. Proper seating of crush pads (4)

62. Record secondary plunger springs used on page 51.

63. Remove spring-plunger set screws (4).

64. Observe D.A.C. installation of paddle tie-down cord.

a. Tension 40 lbs. $(^{+5}_{-0})$.

b. Location 2-3/8 inches from tip of paddle.

65. Install safety cord around bottom of appendages.

Performed By | Checked By | Comments:

66. Remove all sensor covers.

67. Install antennae (4) 50 in. lbs. - 4 Lock-screws - 1 in. lb.
Check Continuity.

68. Observe D.A.C. balance operations.

69. Observe D.A.C. install final balance weights

70. Record D.A.C. balance weights on page 47.

71. Remove flight solar paddles (4).

72. Remove the spacecraft antennae.

73. Replace all sensor covers.

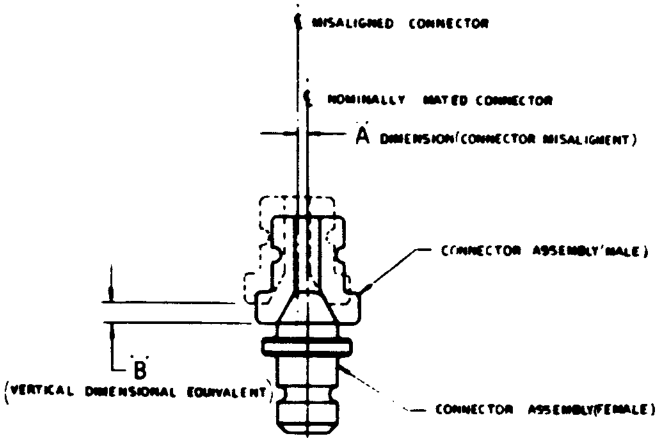
74. Replace conductive asepsis bag over spacecraft.

75. Observe D.A.C. cleaning of transport container with isopropanol alcohol prior to assembly over retromotor/spacecraft/FW-4D spin table assembly.

76. Observe assembly of transport container.

77. After container assembly, observe D.A.C. attach dry nitrogen purge system to container and activate. (Container is continuously purged until assembly arrives at gantry).

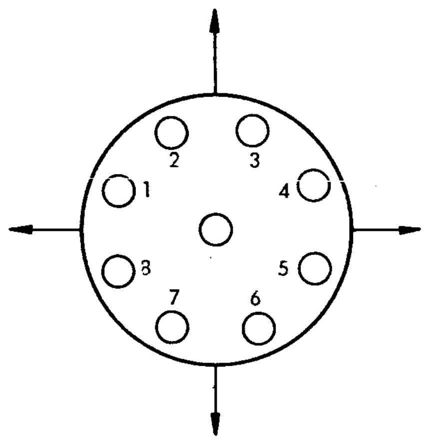
Step	Performed By	Checked By	Comments:
78. Observe shipment to launch pad and attachment to second stage.			
79. Observe removal of transport container by D.A.C.			
80. Observe placement of D.A.C. Air-conditioning Bag over S/C by D.A.C.			
81. Remove asepsis bag from S/C.			
82. Attach short bag to Retromotor.			



CONNECTOR MATING
(REPRESENTATIVE INSTALLATION)
SEE CHART BELOW

MISALIGNMENT CHART	
'A' MISALIGNMENT	'B' EQUIVALENT
.001	.00173
.002	.00346
.003	.00519
.004	.00692
.0C5	.0C8[illegible]
.006	.01039
.007	.01212
.008	.01385
.009	.01558
.010	.01732
.011	.01905
.012	.02078
.013	.02251
.014	.02424
.015	.02598
.016	.02871
.017	.02944
.018	.03117
.019	.03290
.020	.03464
.021	.03637
.022	.03810

1. With tool on DAC adapter record center displacement and then push the connector in the directions shown and record feeler gauge readings per the chart above.



Position	Gauge Reading
Center	
Between pins 1 - 8	____________
Between pins 4 - 5	____________
Between pins 2 - 3	____________
Between pins 6 - 7	____________

XIV. F-2

	Performed By	Checked By	Comments:
1. Perform No Voltage check per procedure in Appendix F, during vehicle stray voltage test.			
2. Perform Igniter Installation and Leak Check per procedure in Appendix E.			
3. Remove strip coating from spacecraft. (save for weight measurement)			
4. Take biological samples, using distilled water.			

XV. F-1

	Performed By	Checked By	Comments:

1. Decontaminate spacecraft with sterile swabs.
   a) For Black paint, buffed aluminum surfaces, evaporated aluminum surfaces:
      Acetone - general cleaning
      Ethyl Alcohol - fingerprints
      10% Acetic Acid, 90% triple distilled water -
   b) For white paint no cleaning.

2. Install O.A. fluted covers (2) - 4 scr.-2.5 in. lb.

3. Install all R-F test connector covers on sides of S/C Top Cover.

4. Remove safety cord around F/G booms.

5. Re-check tension in F/G tie-down cord (35 lbs. $^{+5}_{-0}$). Adjust if necessary.

6. Lock-tite set screws in F/G tie-down cord adjustment mechanism.

7. Remove protective bags from F/G Sensor cannisters.

8. Remove 3rd stage separation switch safety lock system (2). 4 scr.

9. Open each paddle arm to insure that the latch locks properly and proper closure of micro-switches.
   Arm No. 1 __________ __________
   Arm No. 2 __________ __________
   Arm No. 3 __________ __________
   Arm No. 4 __________ __________

	Performed By	Checked By	Comments:
10. Install Flight Solar Paddles at pre-selected positions. Record on page 51.			
11. Install Solar Paddle secondary hinge pins (4) 17 in. lb.			
12. Install Solar Paddle connectors (4) 9 scr.-2.5 in. lb.			
13. Inspect paddle arm wiring for nicks, cuts. etc.			
14. Check movement of secondary hinge, proper seating of crush pad, remove set screws (4) in spring plunger.			
15. Record spring no. and crush pad length on page 51.			
16. Observe D.A.C. installation of Solar Paddle tie-down cord.			
a. tension - 40 lbs. $^{+5}_{-0}$			
b. location 2-3/8 in. up from tip of paddle.			
17. Adjust tension with mechanism in two opposing paddles.			
18. Inspect D.A.C. tie-down system.			
19. Put Glyptol in paddle cord tie-down mechanism.			
20. Remove separation spring (4th stage) hold-down pins (4).			

	Performed By	Checked By	Comments
21. Verify that all R-F systems are 'OFF'.			
22. Verify that both Ordnance Safing Plugs are installed.			
23. Observe NO-VOLTAGE check of harness prior to connection of harness to Igniters and Bolt Cutters per the procedure in Appendix G.			
24. Remove Igniter Shorting Plugs and connect spacecraft igniter harness to the Igniters and Bolt Cutters.			
25. Complete installation of thermal blanket about the nozzle with tape.			
26. Take biological samples.			
27. Remove the short dust bag from the Retromotor.			
28. Remove protective covers from experiments: a. I. & E. b. Solar Cell Damage c. California - two (2) Teflon plugs d. M.I.T. e. University of Iowa - four (4) f. O.A. Sensor - two (2) (Visually inspect the absence of any tape on the O.A. Sensor)			
29. Install Antennae (4) 50 in. lbs. Four (4) lock screws 1 in. lb.			
30. Check continuity.			
31. Lock-tite all R-F Doors shut.			
32. Put Conductive Asepsis Bag over spacecraft.			
33. Observe D.A.C. install one-half of Fairing.			
34. Remove Conductive Asepsis Bag from Spacecraft.			
35. Observe D.A.C. Fairing installation.			
36. Observe Umbilical connection.			

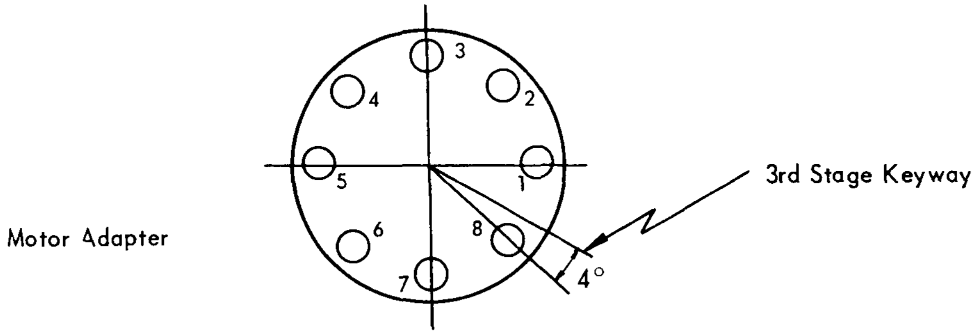
XVI. F-O

	Performed By	Checked By	Comments:
1. Perform NO-VOLTAGE check & Final Arming per the procedure in Appendix H.			
2. Take final biological samples.			
3. Observe D.A.C. seal Fairing access ports.			
4. Confirm removal of all tools, etc., taken up to the gantry.			

XVII. ALIGNMENT RECORDINGS (PMF)

	Performed By	Checked By	Comments:
Measure and record the following:			
1. T.I.R. @ 3rd stage interface. (A Diameter)			
2. T.I.R. of center tube @ 4th stage interface. (B Diameter)			
3. Flatness of center tube @ 4th stage interface (C Surface)			
4. Flatness of fiberglass 4th stage motor adapter (D Surface)			
5. T.I.R. of Retromotor mounting flange after being minimized (.002 T.I.R. max.) (E Diameter)			
6. Final optimized position of motor (Position of Igniters with reference to 3rd Keyway).			
7. T.I.R. of FW-4D/spacecraft/retromotor measured at			
Note: 3rd stage Keyway is zero reference angle. Angles increase in clockwise direction as viewed from the top of the spacecraft.			

ALIGNMENT DATA SHEET #1



1. Angle Between Motor Scribeline and 3rd Stage Keyway measured clockwise ____________________

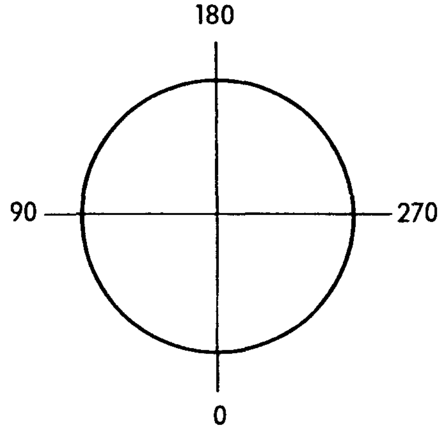
2. Shim Size & Location

Hole No.	Shim size
1	________
2	________
3	________
4	________
5	________
6	________
7	________
8	________

ALIGNMENT DATA SHEET #1 (cont'd)

3. Calculated Motor Thrust Alignment

	r	θ
Throat Center		
Exit Cone Center		



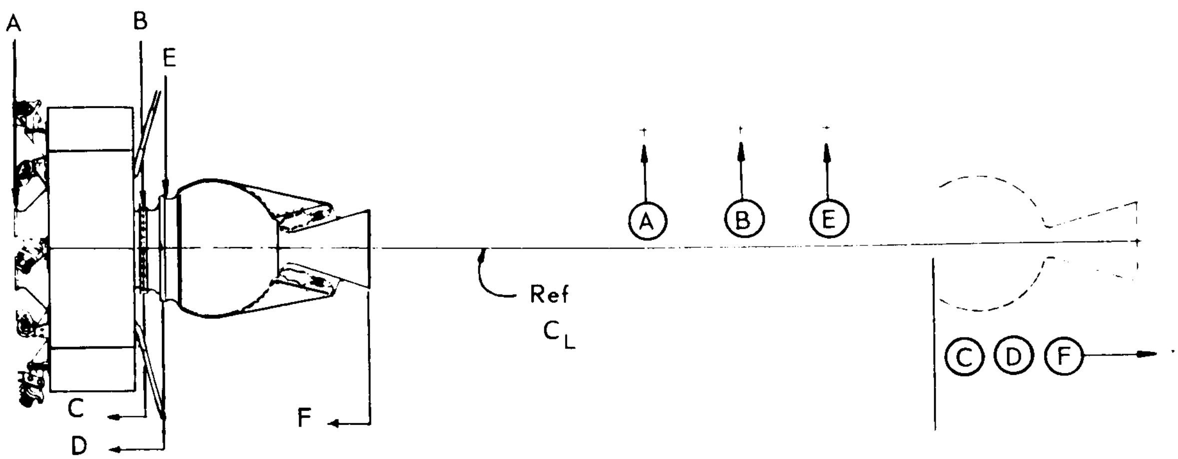
r_0 = ____________________

α = ____________________

4. Moment Arm Calculations:

ALIGNMENT DATA SHEET #2

Angle	A	B	C	D	E	F
0						
10						
20						
30						
40						
50						
60						
70						
80						
90						
100						
110						
120						
130						
140						
150						
160						
170						
180						
190						
200						
210						
220						
230						
240						
250						
260						
270						
280						
290						
300						
310						
320						
330						
340						
350						
360						



XVIII. INVENTORY

	Serial No.	Performed By	Unit No.
Facet A			
Ion & Electron Exp.	ES1		
GSFC Fluxgate Electronics	EG3		
GSFC Fluxgate A/D Electronics	EG2		
Facet B			
Prime Converter	IP4		
O.A. Converter	IP5		
O.A. Sensor	IA1		
O.A. Amplifier	IA2		
O.A. Computer	IA3		
Facet C			
Programmer No. 3 (Flipper Control)	IG3		
Solar Array Regulator	IP2		
Performance Parameters	ID2		
Programmer No. 1 (undervoltage)	IG1		
M.I.T. Logic Card No. 2	EM2		
M.I.T. Logic Card No. 3	EM3		
Facet D			
M.I.T. Plasma Probe Sensor	EM1		
Facet E			
Telemetry Encoder	ID1		
Encoder Converter	IP6		
Antenna Hybrid	IT8		

	Serial No.	Performed By	Unit No.
Facet F			
Transmitter	IT1		
R&RR No. 3	IT4		
R&RR No. 1	IT2		
R&RR No. 2	IT3		
Command Decoder No. 2	IT5		
Facet G			
Ames Sensor Electronics	EA4		
Ames Signal Processor	EA3		
Ames Data Handling	EA2		
Command Receiver No. 2	IT6		
University of California Exp.	EC1		
Facet H			
Programmer No. 2 (IV Stage Timers)	IG2		
University of Iowa Exp.	EI1		
Other Items			
Solar Cell Damage Experiment	IH4		
Ames Magnetometer Sensor	EA1		
GSFC Magnetometer Sensor	EG1		
Antennae (4)	IT7		
Antennae Cups (4)	IT7		
GSFC Flipper	EG1		
Battery	IP3		
3rd Stage Flyaway	IH6		
GSFC side			
D.A.C. side			
Solar Paddles	IP1		
Arm #1			
Arm #2			
Arm #3			
Arm #4			

Bolt cutters
#1
#2
Platinum Wire Thermister
Retromotor
Igniters
#1
#2

XIX. SPACECRAFT INERTIA DATA SHEET

Configuration	Weight (Pounds)	z (inches)	I_{xx} (Slug-Ft ^{2})	I_{yy} (Slug-Ft ^{2})	I_{zz} (Slug-Ft ^{2})
Launch (All appendages folded)					
Yo-Yo Deployed					
Paddles Erected					
Booms Erected					
Post Retro-Fire					
Post Retro-Separation					

Remarks:

XX. SPACECRAFT AND FW-4D DATA

A. FW-4D Motor Alone

I_{roll} (Loaded)	= ________ slug-ft^2
I_{roll} (Expended)	= ________ slug-ft^2
Weight (Loaded)	= ________ lbs.
Weight (Expended)	= ________ lbs.
$I_{transverse_{max.}}$ (Loaded)	= ________ slug-ft^2
$I_{transverse_{max.}}$ (Expended)	= ________ slug-ft^2

B. Attach fitting (clamp band, spring, timers, etc., except tumble rockets)

I_{roll}	= ________ slug-ft^2
$I_{transverse_{max.}}$	= ________ slug-ft^2
Weight	= ________ lbs.

C. Tumble Rockets (.6KSS)

I_{roll} (own axis)	= ________ slug-ft^2
I_{roll} (about spin axis)	= ________ slug-ft^2
$I_{transverse_{max.}}$	= ________ slug-ft^2
Weight	= ________ lbs.

D. Aluminum Foil (- Layers - Mil.)

I_{roll} = ________ slug-ft²

$I_{transverse_{max.}}$ = ________ slug-ft²

Weight = ________ lbs.

E. Cradles (6), Cords (2), Pyrotechnics

I_{roll} = ________ slug-ft²

$I_{transverse_{max.}}$ = ________ slug-ft²

Weight = ________ lbs.

F. AIMP-D Spacecraft/Retromotor

Moment of Inertia Data on page 44.

Weight = ________ lbs. (includes stripcoat)

Weight = ________ lbs. (stripcoat)

Weight = ________ lbs. (spacecraft/ retromotor

G. Folded Spacecraft/Retromotor on FW-4D

I_{roll} = ________ slug-ft²

$I_{transverse}$ = slug-ft²

C.G. ____________ separation plane

Weight = ________ lbs.

H. Weight of:

Spin table = ________ lbs.

I. Balance Weights on FW-4D

I_{roll} = ________ slug-ft^2

$I_{transverse}$ = ________ slug-ft^2

Weight = ________ lbs.

J. Ballast Weights on FW-4D

I_{roll} = ________ slug-ft^2

$I_{transverse}$ = ________ slug-ft^2

Weight = ________ lbs.

XXI. SEQUENCE OF EVENTS

The following table lists the significant engineering events which occur from liftoff to third-stage separation of the Delta Vehicle. All event times are listed in seconds-after-liftoff. In addition, all second-stage and subsequent events are referenced to the start of the second-stage program timer at the time of main engine cutoff (MECO).

First Stage

Time	Event	Initiated By
T+0	(1) Liftoff Uncage Stage I Gyros	L.O. Switch
	(2) Starts Stage I Programmer	L.O. Switch
T+2.0	Start Roll Program	Stage 1 Programmer
T+4.0	(1) Start First Stage Pitch Program	Stage 1 Programmer
	(2) Start First Stage Yaw Program	Stage 1 Programmer
T+9.67	Stop First Pitch Rate	Stage 1 Programmer
T+10.0	Start Second Pitch Rate	Stage 1 Programmer
T+39.67	Stop Second Pitch Rate	Stage 1 Programmer
T+40.0	(1) Start Third Pitch Rate	Stage 1 Programmer
	(2) Arm Solid Motor Separation	Stage 1 Programmer
T+70.0	Solid Motor Separation Pitch, Yaw and Roll Control System Gain Change	Solid, separation timer
T+79.67	Stop Third Pitch Rate	Stage 1 Programmer
T+80.0	(1) Start Fourth Pitch Rate	Stage 1 Programmer
	(2) Enable BTL	Stage 1 Programmer
T+90.0	(1) Pitch & Yaw Control System Gain Change	Stage 1 Programmer
	(2) Yaw Vernier Engine Unlock	Stage 1 Programmer
	(3) Start Stage 1 Guidance	BTL ground station
T+114.0	Enable Stage II Ignition Power	5G switch
T+130.0	Stop Pitch Program Rate	Stage 1 Programmer
T+139.0	(1) Stop BTL Guidance	Stage 1 Programmer
	(2) Enable MECO Circuitry	Stage 1 Programmer
	(3) Second Stage Roll Gyro Uncage	Stage 1 Programmer
T+148.0	MECO (M)	FIP Switch

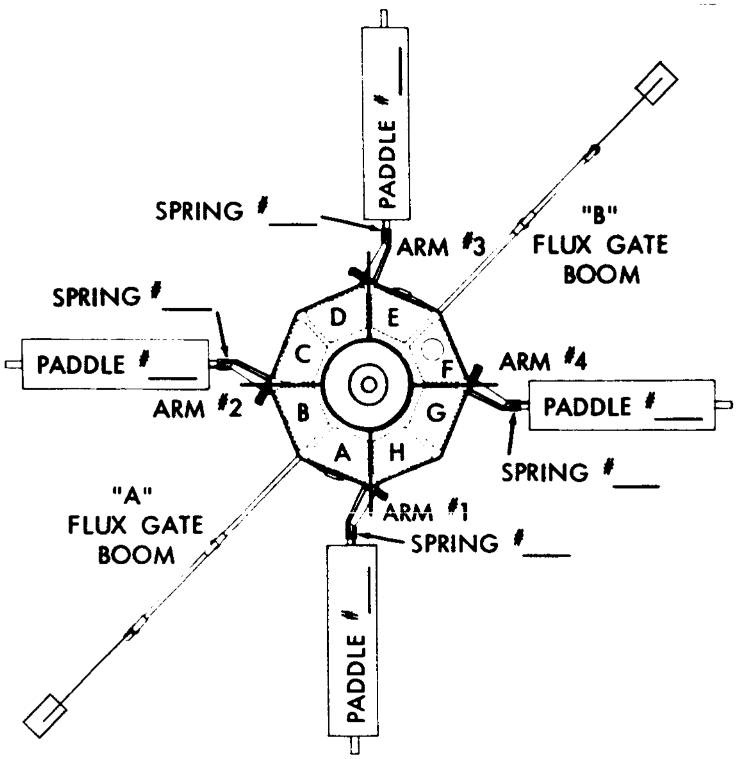
Second and Third Stages

Time	Event	Initiated By
M+0 (MECO)	(1) Start Stage II Programmer	MECO Relay
	(2) Fire Blast Band Bolts	MECO Relay
M+4	(1) Fire Stage II/I Separation Bolts	Stage II Prog. (Seq. 1)
	(2) Uncage Roll Gyro (Backup)	Stage II Prog. (Seq. 1)
	(3) Uncage Pitch and Yaw Gyros	Stage II Prog. (Seq. 1)
	(4) Transfer Guidance Reference Power	Stage II Prog. (Seq. 1)
	(5) Start Stage II Engine	Stage II Prog. (Seq. 1)
	(6) Enable Stage II Roll Control	Stage II Prog. (Seq. 1)
M+10	Start Stage II First Pitch Rate	Stage II Prog.
M+18	Stop Stage II First Pitch Rate	Stage II Prog.
M+20	(1) Start Stage II Second Pitch Rate	Stage II Prog.
	(2) Start Stage II Closed Loop Guidance	BTL
	(3) Jettison Fairing	Stage II Prog. (Seq. 2)
M+200	Stop Stage II Second Pitch Rate	BTL
M+205	Stop Stage II Second Pitch Rate (Backup)	Stage II Prog.
M+210	Stop Stage II Closed Loop Guidance	BTL
M+215	Initiate VCS	BTL
M+218	(1) Initiate VCS (Backup)	Stage II Prog. (Seq. 3)
	(2) Turn off BTL	Stage II Prog. (Seq. 3)
M+400	(1) Stage II Engine Cutoff Command	VCS relay DV set for__________ft/sec.
	(2) Switch to Coast Phase Control	VCS relay
	(3) Turn off BTL (Backup)	VCS relay
	(4) Turn off Hydraulics	VCS relay
M+403	SECO (Stage II Cutoff)	
	(1) Arm oxidizer Probes	Stage II Prog. (Seq. 4)
	(2) Arm TPS	Stage II Prog. (Seq. 4)
M+420	Start Coast Phase Pitch Prog.	Stage II Prog.
M+425	Stop Coast Phase Pitch Prog.	Stage II Prog.
M+450	Start Coast Phase Yaw Program	Stage II Prog.
M+460	Stop Coast Phase Yaw Program	Stage II Prog.

Second and Third Stages (Cont'd)

Time	Event	Initiated By
M+1073	(1) Fire Spin Rockets	Stage II Prog. (Seq. 5)
	(2) Start Pyrotechnic TDR for Seq. 6 Backup	Stage II Prog. (Seq. 5)
	(3) Start Stage III Sequence Timer	Stage II Prog. (Seq. 5)
	(4) Start Stage III Ignition Time Delay	Stage II Prog. (Seq. 5)
	(5) Start Ignition Wire Cutter TDR	Stage II Prog. (Seq. 5)
M+1074	Fire Stage III Ignition Wire Cutters	Ign. wire cutter TDR
M+1075	(1) Blow Stage III/II Separation Bolts	Stage II Prog. (Seq. 6)
	(2) Fire Retros	
M+1077	Sequence 6 Backup	Pyrotechnic TDR
M+1089	Stage III Engine Ignition	Pyrotechnic time delay
M+1121	Stage III Burnout	Depletion
M+1148	De-spin	DAC timer
M+1163	Solar Paddle Erection	DAC timer
M+1173	F/G Boom Erection	DAC timer
M+1203	Retromotor Spacecraft/Stage III Separation	DAC timer
M+1206	Tumble Stage III	DAC timer

AIMP-D PADDLE ARM ASSEMBLY ORIENTATIONS



ARM POSITION	DECAY RATE	SPRING NO.	PADDLE NO.	CRUSH PAD L.
1				
2				
3				
4				

XXIII. SCREW TORQUE VALUES

In-lb.

Bolt Size	18-8 and 300 Series S St.	Brass	Phosphor Bronze	Alumi-num 2024-T4	Mag-nesium ZK60-T5	Toler-ance
2-56	2.0	1.5	1.8	0.9	0.5	± 0.5
4-40	4.7	3.8	4.3	2.4	1.4	± 0.5
5-40	7	5	6	3	2	± 1
6-32	8	7	8	4	3	± 1
8-32	18	14	16	9	5	± 2
10-24	21	16	19	12	7	± 2
10-32	30	24	27	17	11	± 2
1/4-20	70	55	60	40	25	± 5
1/4-28	90	70	80	50	30	± 5
5/16-18	120	100	110	70	45	±10
5/16-24	130	105	120	75	45	±10
3/8-16	210	170	200	120	75	±20
3/8-24	240	190	220	130	85	±20

How to Use: Choose the smaller torque value for any combination of bolt and insert/fastener. For threaded inserts (helicoils, etc.), compare screw and insert materials.

Examples:
#4-40 Al. screw in Phos. Bronze helicoil = 2.4 in-lb.
#4-40 screw (18-8 SST) in tapped Magnesium = 1.4 in-lb.
#4-40 screw (18-8 SST) in Phs. Bronze Helicoil in Magnesium = 4.3 in-lb.

XXIV. YO-YO DESPIN CALCULATION SHEET

1. Definition of Symbols and Units

I	-	moment of inertia about spin axis - slug ft^2
a	-	radius of satellite - ft
L	-	length of one yo-yo wire - ft
m	-	total mass of both spin weights + 1/3 mass of both wires - slugs
F_{max}	-	maximum tension in wire - lbs
W_o	-	initial spin rate - R.P.M.
W_f	-	final spin rate - R.P.M.
r	-	final spin rate divided by initial spin rate
g	-	gravitational constant - ft/sec^2

2. To calculate the total mass (weight) of spin weights and wire (m):

Record

I = ____________ slug-ft^2 $\quad$ W_o = ____________ R.P.M.

a = ____________ ft $\quad$ W_f = ____________ R.P.M.

L = ____________ ft

Calculate

$$r = \frac{W_f}{W_o} = \underline{\qquad\qquad} = \underline{\qquad\qquad}.$$

Go to chart with this value of r and read off $I/m\,(L + a)^2$. Call this value B. Then calculate the following:

YO-YO DESPIN CALCULATION SHEET (Continued)

$$B = \frac{1 + r}{1 - r} = \underline{\hspace{3cm}}$$

$$w = mg = \frac{I_g}{B(L + a)^2} = \frac{(\quad)\ 32.2}{(\quad)\ (\quad)^2} = \underline{\hspace{2cm}} = \underline{\hspace{2cm}} \text{ GRAMS ANS.}$$

Subtract 1/3 mass of wire

$$1/3 \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

$$\text{Each despin weight} = \frac{(W - 1/3 \text{ mass wire})}{2} = \underline{\hspace{2cm}} \text{ GRAMS EACH}$$

NOTE: Above weight consists of 2 nuts, end fitting, weight block and weight

3. To calculate maximum tension in <u>one</u> wire:

Calculate

$$\lambda 2 = I/m + a^2 = \underline{\hspace{2cm}} = \underline{\hspace{3cm}}$$

or $\lambda = \underline{\hspace{3cm}}$ ft

also $W_o^2 = \underline{\hspace{2.5cm}}$ /sec

$$F_{max} = 1.3 \frac{m}{2} W_o^2 \lambda = 1.3 \frac{(\quad)}{2} (\quad)^2 (\quad) = \underline{\hspace{2cm}} \text{ LBS. ANS.}$$

4. Check of underlying assumption of the equations:

Calculate G

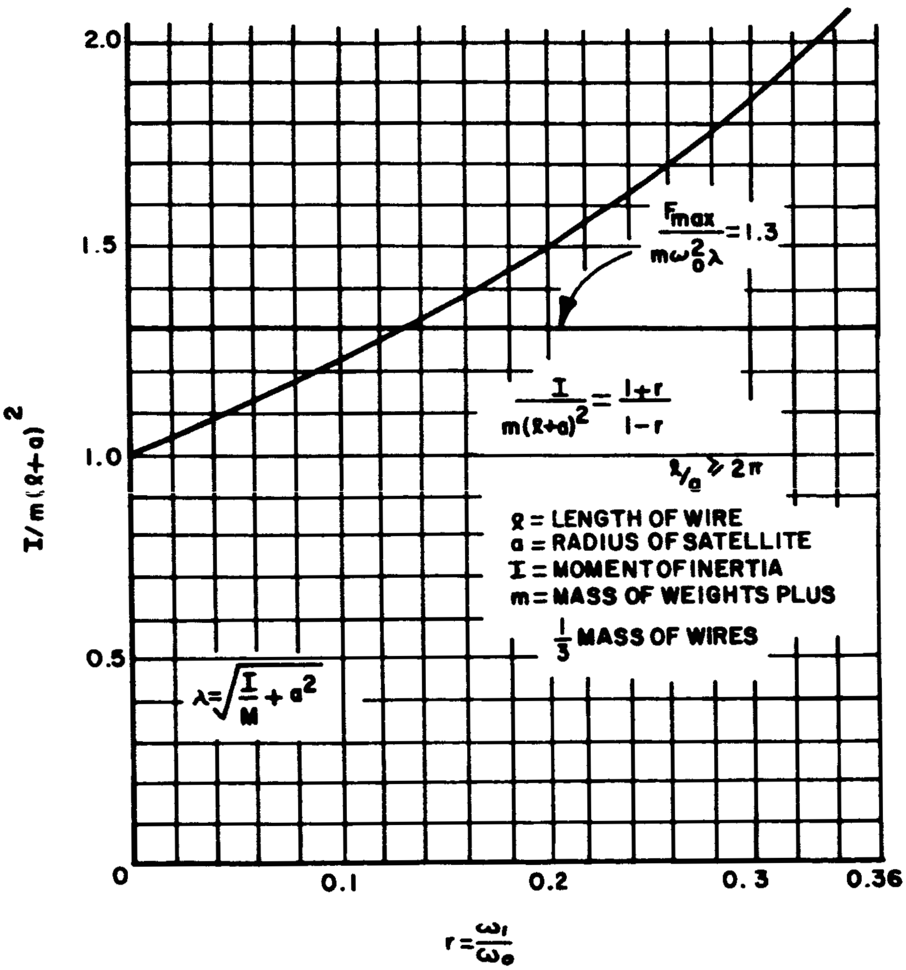
$$G = \frac{(1-r)\ I}{ma^2} = \underline{\hspace{3cm}} = \underline{\hspace{3cm}}.$$

If $G \geq 100$ and $L/a > 2\pi$, answers are accurate to about 1-1/2% of theoretically correct value.

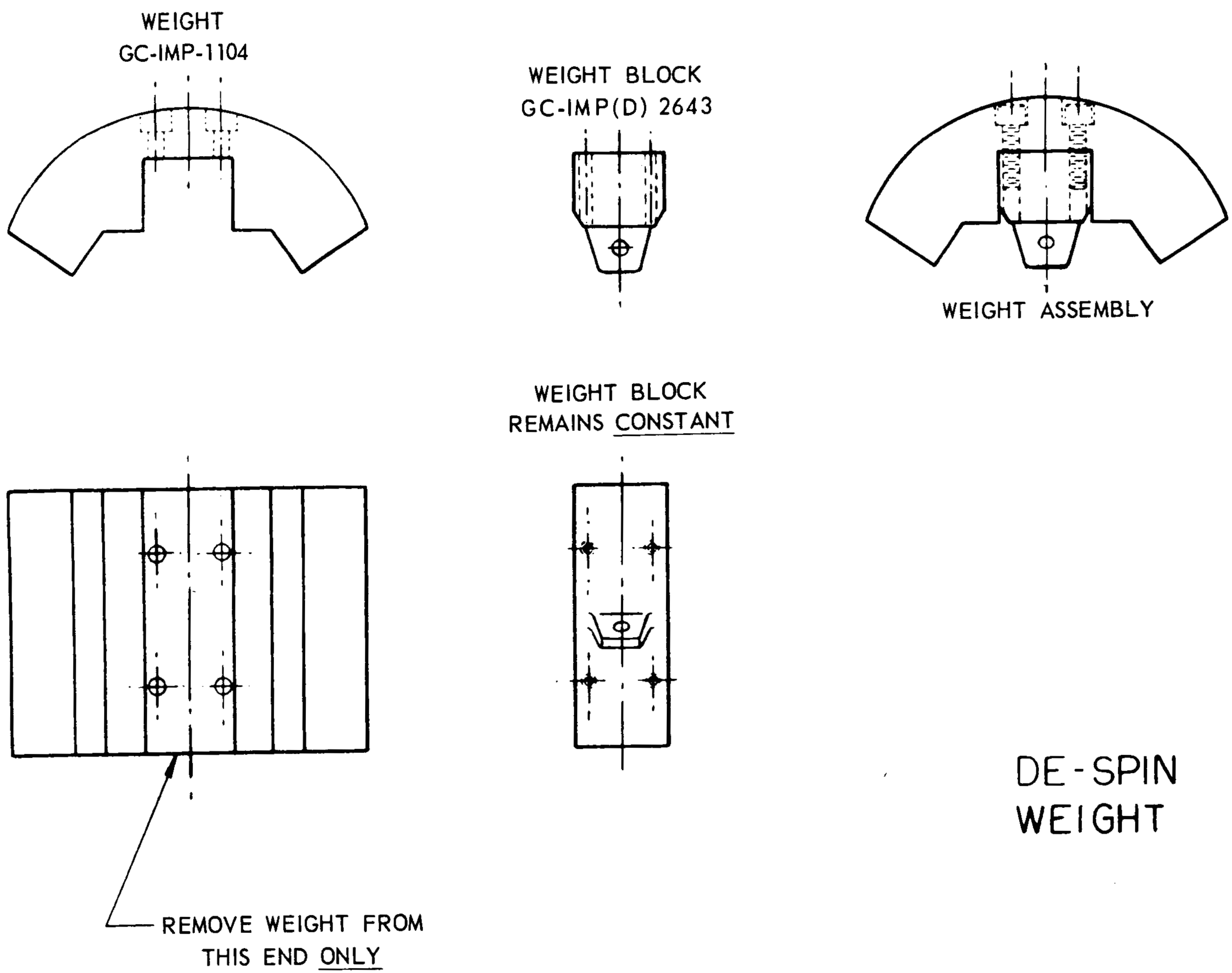
$$\frac{L}{a} = \underline{\hspace{2cm}}$$

ANCHORED INTERPLANETARY MONITORING PLATFORM AIMP (D & E)

MECHANICAL DATA SHEET



DE-SPIN WEIGHT



ANCHORED INTERPLANETARY MONITORING

PLATFORM AIMP (D & E)

MECHANICAL DATA SHEET

ASSEMBLY (TITLE)	SUBSYSTEM
Dimple Motor DM29AO	Despin System
DRAWING NO. Hercules Powder Co. Dwg. HD-920	

OUTLINE DRAWING:

I. Physical Data

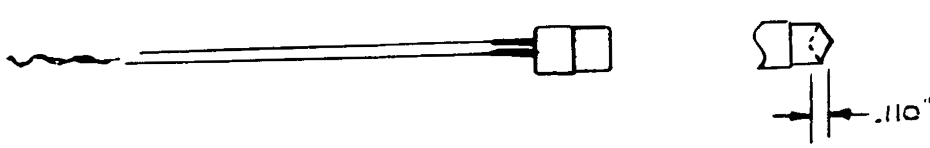
Body size - .293" dia., .51" long
Wire leads - #24 AWG, copper, solid
Seal - Phenolic
Bridge resistance - 1.4 - 2.6 ohms, wire type
Ignition - Lead styphnate
Main charge - LMNR/Black powder type

II. Performance Data

Test current (maximum) - 10 MA.
Max. nonfire (MNFC) - 0.25 amp, one 30 sec. pulse
Min fire (MFC) (Borderline, not recommended) - 0.45 AMP.
Recommended (all fire) (RFC) - 1-3 AMPs
Ignition time:

Amps -	1.0,	2.0	3.0	5.0
Milliseconds -	4.0,	3.5	3,0	2.7

High temperature - Functions after 2 hours at 250°F
Low temperature - Functions at -65°F
Reliability - 99.9%

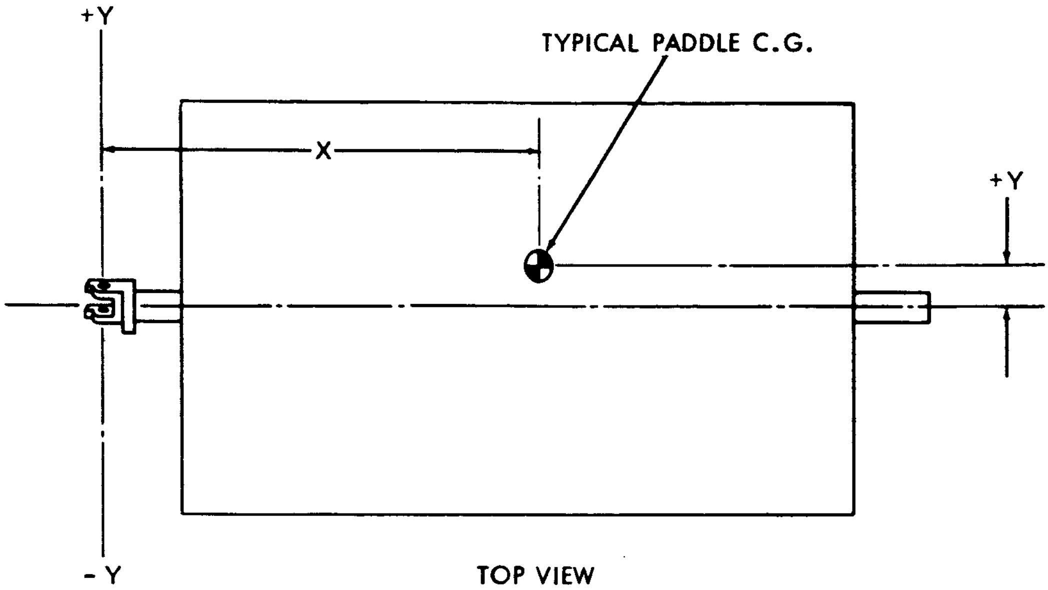


XXV	SATELLITE CHECKOUT CHANGE SHEET		
Step	Action and Comment	Performed by	Checked by

XXV	SATELLITE CHECKOUT CHANGE SHEET		
Step	Action and Comment	Performed by	Checked by

XXV	SATELLITE CHECKOUT CHANGE SHEET		
Step	Action and Comment	Performed by	Checked by

XXVI. SOLAR PADDLE WEIGHTS AND C.G.'s.



Paddle No.	X (inches)	Y (inches)	Weight (grams)

XXVII. SPIN RATE CALCULATIONS

A. SYMBOLS

ω_1 = spin rate after yo-yo despin

ω_0 = Stage III spin up rate (rpm)

I_t = total impulse of each rocket (lb.-sec.)

Δt = duration of decay time (sec) schedule:

NOTE: For combinations use the Minimum Decay time.

Rocket	Decay time (sec.)
.3KS 40	1.5
.6KS 40	1.2
1 KS 40	0.72

r = perpendicular distance from stage III spin axis to each pet rocket thrust vector (ft.)

I_{ff} = spin inertia of full stage III, attachments, and spacecraft folded (slug ft^2)

I_{ef} = spin inertia of expended stage III, attachments, and spacecraft folded (slug ft^2)

I_p = spin inertia of expended stage III, attachments, and spacecraft with paddles extended (slug-ft^2)

I_{pb} = spin inertia of expended stage III, attachments, and spacecraft with paddles and booms extended (slug-ft^2)

R = despin ratio due to yo-yo deployment

B. SPIN UP

$$\omega_0 = \frac{8.88}{I_{ff}} \left[\Sigma I_t \cdot r\right] - \frac{42.7}{I_{ff}} \Delta t$$

NOTE: This equation assumes 93% efficiency for pet rocket operations.

SPIN RATE CALCULATIONS (Continued)

C. SPIN RATE AFTER YO-YO DESPIN, ω_1

$$\omega_1 = R\,\omega_0$$

D. SPIN RATE, PADDLE EXTENDED (ω_p)

$$\omega_p = \frac{I_{ef}}{I_p}(\omega_1)$$

E. FINAL SPIN RATE, PADDLES AND BOOMS EXTENDED (ω_{pb})

$$\omega_{pb} = \frac{I_p}{I_{pb}}(\omega_p) \quad \text{or} \quad \omega_{pb} = \frac{I_{ef}}{I_{pb}}(\omega_1)$$

AIMP OPERATIONS SCHEDULE AT E.T.R.

Schedule of tasks from F −35 days through F +10 days

Day	Date	Tasks
F-35	May 16 Monday	Decontamination team and project staff arrive. Delivery of spacecraft support trailers, first set of spacecraft GSE and portable clean room to Hangar AE.
F-34 to F-32	May 17-19 Tuesday to Thursday	Preparation and cleaning of GSE for movement into clean room. Assembly of portable clean room. Biological monitoring started.
F-31	May 20 Friday	Prototype spacecraft and radioactive sources arrive at Hangar AE. GSE checkout including computer trailer with remote printout stations for experimenters.
F-30	May 23 Monday	Prototype spacecraft instrumentation checkout. Biological samples taken of prototype spacecraft. X-ray TE-M-458 motors at PAA solid propellant area.
F-29	May 24 Tuesday	California prototype experiment checkout. X-ray TE-M-458 completion.

NOTE:

(1) All items take place in Hangar AE unless noted otherwise

(2) All items start at beginning of day (8:00 a.m.) and equipment arrival means on hand at designated location at start of day.

Day	Date	Tasks
F-28	May 25 Wednesday	Iowa prototype experiment checkout.
F-27	May 26 Thursday	MIT prototype experiment checkout.
F-26	May 27 Friday	GSFC thermal ion prototype experiment checkout.

Day	Date	Prototype Spacecraft	Flight Spacecraft
F-25	May 31	Ames prototype experiment checkout.	Flight spacecraft and second set of GSE arrive. Ohm and high pot fourth stage adapter.
F-24	June 1 Wednesday	GSFC magnetometer prototype experiment checkout.	1. Igniter fit check with harness and measure bridge wire resistance. Magnetically map igniters and fourth stage and deperm igniters and fourth stage separately, if required. Igniter and fourth stage are not mated at anytime in the deperm procedure. 2. Flight spacecraft biological samples taken on non-strip coated areas. Spacecraft inspected.
F-23	June 2 Thursday	Mechanical integration. Solar array paddle check in solar array building (may be interchanged with other tests to obtain suitable day).	Instrument checkout.

Day	Date	Prototype Spacecraft	Flight Spacecraft
F-22	June 3 Friday	1. Mechanical integration and preparation for spin balance. 2. Magnetic check of spacecraft made and depermed if necessary. 3. Decontaminate both spacecraft interfaces to rocket motors.	MIT experiment checkout.
F-21	June 4 Saturday		Iowa experiment checkout.
F-20	June 5 Sunday		GSFC Thermal Ion experiment checkout.
F-19	June 6 Monday	1. Move to spin balance facility. 2. Decontaminate third stage interfaces. Take samples. 3. Mount to live third stage, put on dummy paddles. 4. Checkout despin function interface. 5. Locate standoffs and tie-down brackets.	Ames experiment checkout.

Day	Date	Prototype Spacecraft	Flight Spacecraft
F-18	June 7 Tuesday	1. Remove from live third stage. 2. Move second set of GSE to gantry.	GSFC magnetometer experiment checkout.
F-17	June 8 Wednesday	1. Move to Hangar AE. 2. Mount dummy fourth stage. 3. Mount on dummy third stage. 4. Checkout second set of GSE and blockhouse wiring and install and checkout blockhouse control panel.	California experiment checkout.
F-16	June 9 Thursday	1. Move spacecraft-dummy stage combination to gantry and mount on vehicle. 2. Take biological samples.	Spacecraft checkout.
F-15	June 10 Friday	1. Checkout spacecraft and blockhouse interface. 2. Checkout spacecraft with GSE using F-2 day procedures. 3. Fairing wiped down and biological sample taken.	1. Mechanical integration. 2. Preparation for move to spin balance facility. 3. Biological sample taken. 4. Strip spring seats, clean spring seats, take biological samples and cover spring seats. 5. Touch up paint on paddle arms. 6. Remove strip coat from magnetometer boom in areas inaccessible after booms are put in folded configuration.

Day	Date	Prototype Spacecraft	Flight Spacecraft
		Tracking and Data Systems Real Time Checkout of Programs and Operations	
F-14	June 13 Monday	1. Integration checks. 2. Biological sample taken.	1. Magnetically check spacecraft and deperm if necessary. 2. Move to spin balance.
F-13	June 14 Tuesday	1. Spacecraft checks. 2. Biological samples taken.	1. Decontaminate fourth stage motor interface. Biological sample taken. 2. Mount and align live fourth stage motor. 3. Bond on flight thermistors on fourth stage.
F-12	June 15 Wednesday	1. Spacecraft checks. 2. Biological samples taken.	1. Attach dummy igniters. 2. Decontaminate third stage interface and take biological samples. 3. Mount spacecraft on third stage. 4. Checkout despin function interface.
F-11	June 16 Thursday	1. Spacecraft checkout. 2. Biological samples taken.	1. Mount flight paddles and booms. 2. Alignment and rough balance. 3. Attach thermal blanket. (Do not tape).

Day	Date	Prototype Spacecraft	Flight Spacecraft
F-10	June 17 Friday	1. Spacecraft checkout. 2. Fairing installed. 3. Biological sample taken.	1. Final balance. 2. Biological sample taken. 3. Paddles removed. 4. Asepsis bag placed on spacecraft and bag placed over magnetometer sensors.
F-9	June 20 Monday	1. All systems RFI compatibility test. 2. Gantry removed and all systems RFI compatibility test. 3. Fairing removed. 4. Prototype returned to clean room.	1. Standby. 2. Clean carrier. 3. Install spacecraft in carrier.
F-8	June 21 Tuesday	1. Standby.	1. Mount dry nitrogen purge on carrier. 2. Move to gantry. 3. Mount on vehicle.
F-7	June 22 Wednesday	1. Standby.	1. Spacecraft checkout. 2. Biological sampling.
		Tracking and Data Systems Directorate Real Time Program Checkout	
F-6 & F-5	June 23-24 Thursday to Friday	1. Standby.	1. Spacecraft checkout. 2. Biological samples taken. 3. Fairing installed on rails.

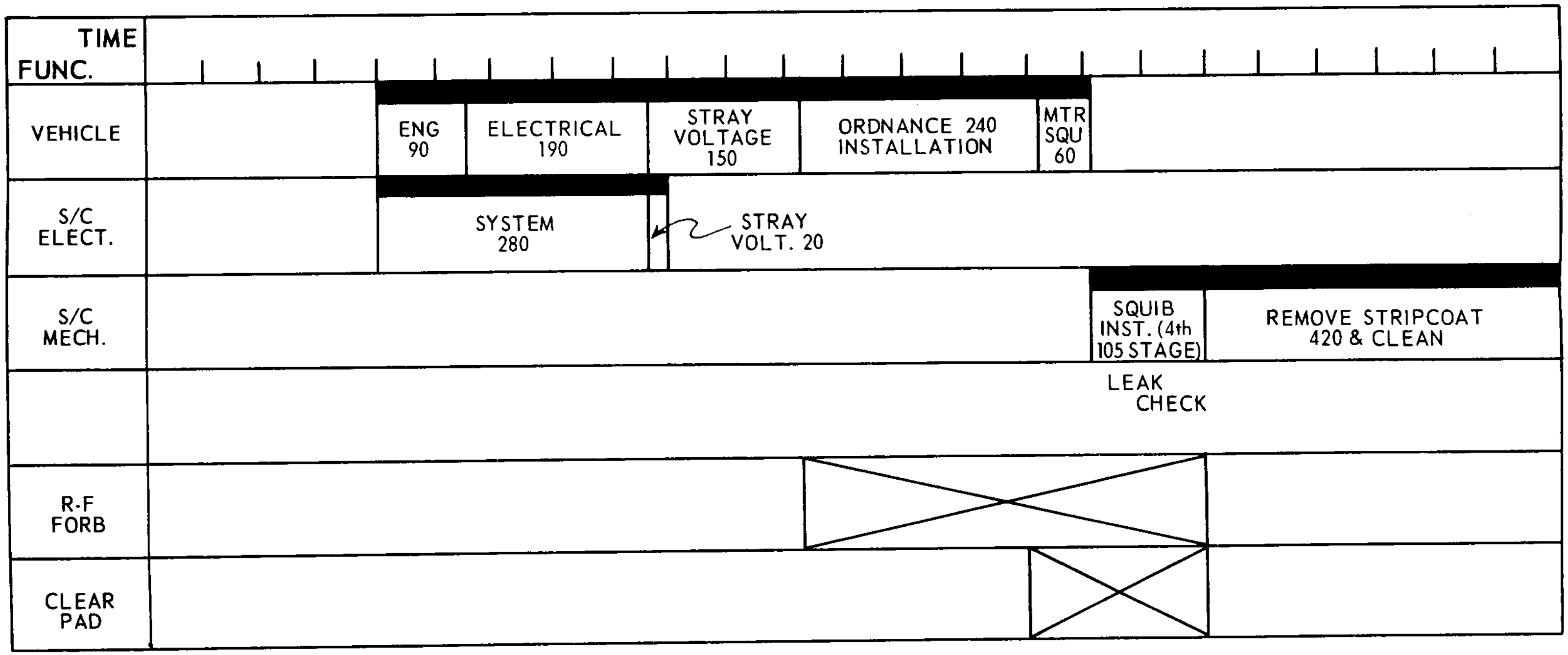
Day	Date	Prototype Spacecraft	Flight Spacecraft
F-4	June 27 Monday	1. Standby.	1. Checkout of spacecraft and compatibility check with vehicle systems. 2. Biological monitoring.
F-3	June 28 Tuesday	1. Standby.	1. Checkout of spacecraft. 2. Biological monitoring. 3. Paddles and carriers cleaned and decontaminated.
F-2	June 29 Wednesday	1. Standby.	1. Last complete spacecraft checkout. 2. Remove tone generators from GSE racks. 3. Stray voltage checks of pyro-technic lines. 4. Install live fourth stage igniters and make leak check. 5. Remove strip coat (save for weight measurement) decontaminate, take biological samples and cover spacecraft. 6. Fairing inspected and cleaned if necessary.

Day	Date	Prototype Spacecraft	Flight Spacecraft
F-1	June 30 Thursday	1. Standby.	1. Run short spacecraft checkout with live turn-on plugs. 2. Last check of RF commands (use RF trailer). 3. Paddle installation and sun gun check. 4. Stray voltage check. 5. Igniter and separation squibs connected but not armed. 6. Thermal blanket secured. 7. Final assembly of antennae. 8. Remove covers and mechanical inspection. 9. Put spacecraft in bag. 10. Install half of fairing. Remove spacecraft bag. Complete fairing installation. 11. Short spacecraft check after fairing installation. Verify RF command of transmitter on and off.

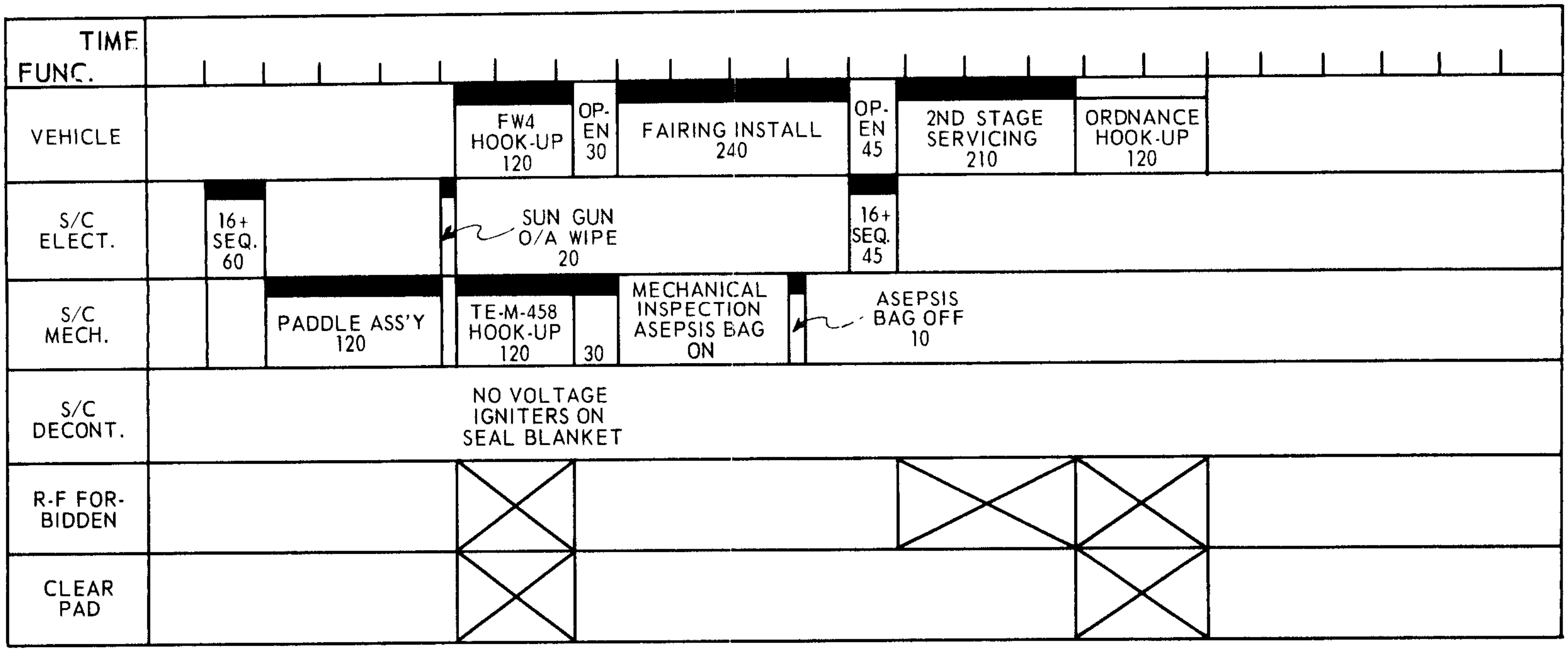
Day	Date	Prototype Spacecraft	Flight Spacecraft
F-0	July 1 Friday	1. Standby.	1. Short spacecraft check (leave life turn-on plug in). 2. Continue battery charging until ordnance hook-up and arming. 3. Stray voltage check. Spacecraft off. 4. Arm fourth stage and separation. 5. Verify all command systems are on RF silence except RF trailer. 6. Remove gantry. 7. Spacecraft turn-on for terminal count. 8. Launch. 9. Spacecraft data reduced from lift-off until loss of signal. 10. Spacecraft data transmitted from down-range site reduced in trailer.

Day	Date	Tasks
F +2 to F +5	July 2-5 Saturday to Tuesday	Spacecraft trailer standby support. Reduce telemetered data received from spacecraft.
F +5	July 6 Wednesday	All return to GSFC.
F +10	July 11 Monday	Review over-all field operations and launch support including field stations and near real time programs.

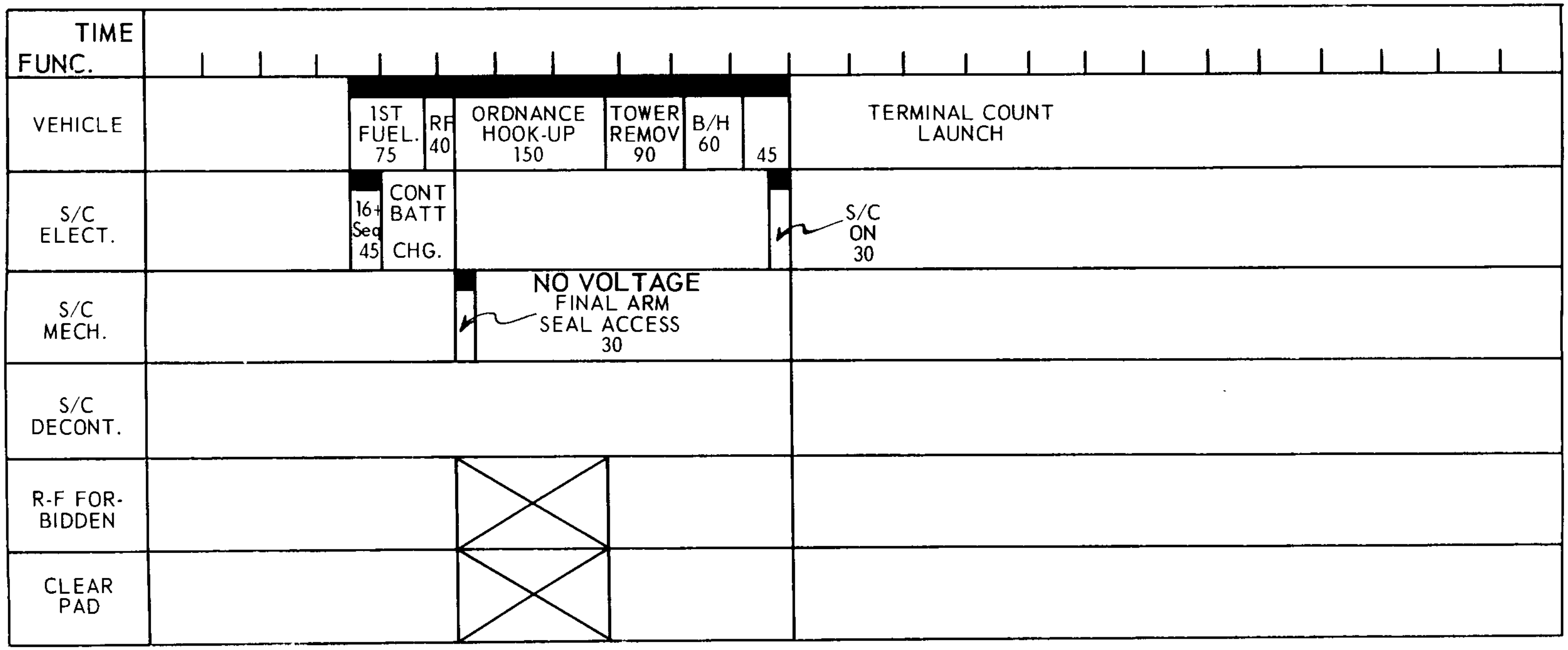
F-2 DAY


TIME
FUNC.
VEHICLE
ENG 90
ELECTRICAL 190
STRAY VOLTAGE 150
ORDNANCE 240 INSTALLATION
MTR SQU 60
S/C ELECT.
SYSTEM 280
STRAY VOLT. 20
S/C MECH.
SQUIB INST. (4th 105 STAGE)
REMOVE STRIPCOAT 420 & CLEAN
LEAK CHECK
R-F FORB
CLEAR PAD

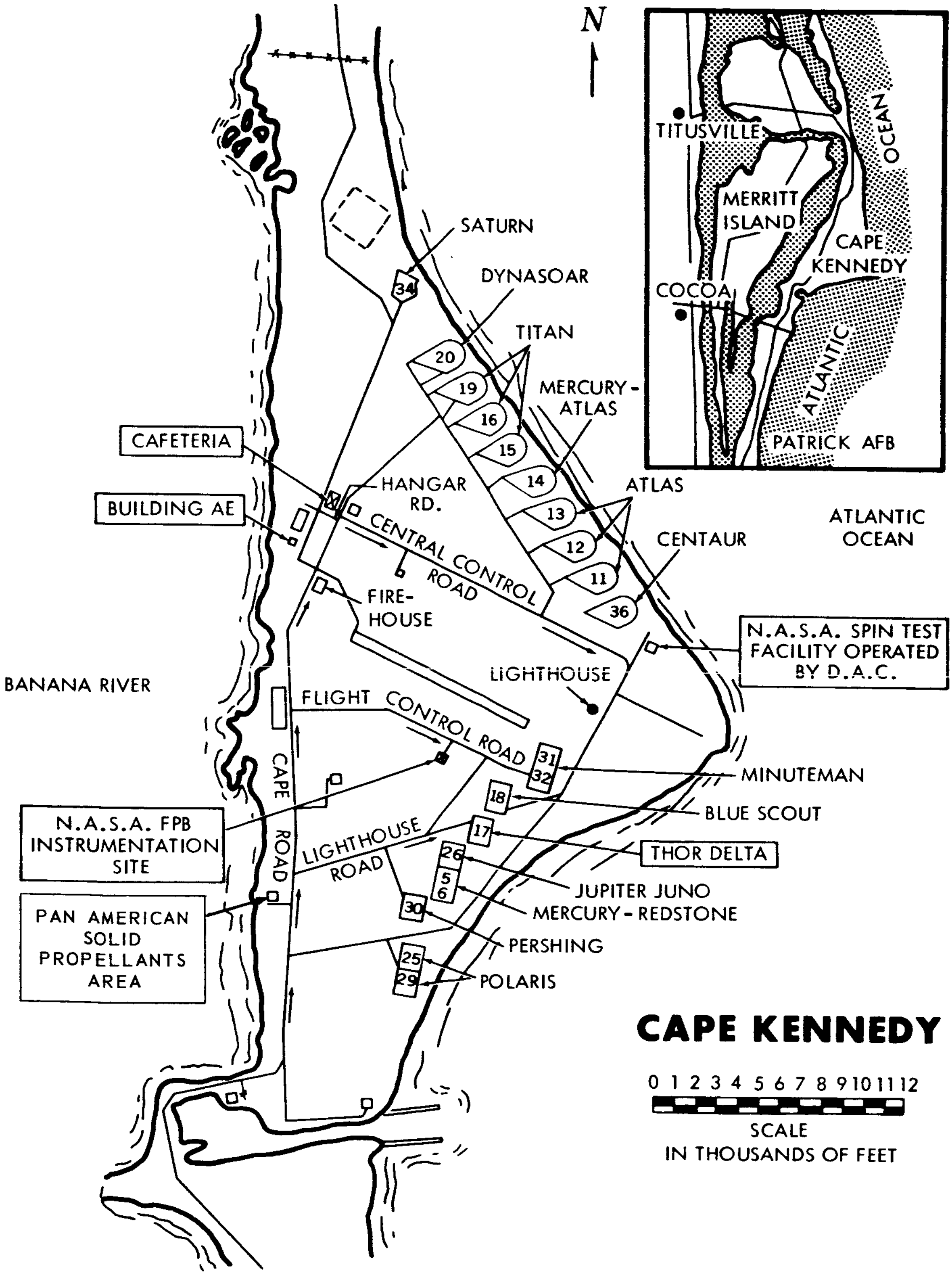
F–1 DAY


TIME
FUNC.
VEHICLE
S/C ELECT.
S/C MECH.
S/C DECONT.
R-F FOR-BIDDEN
CLEAR PAD
FW4 HOOK-UP 120
OP-EN 30
FAIRING INSTALL 240
OP-EN 45
2ND STAGE SERVICING 210
ORDNANCE HOOK-UP 120
16+ SEQ. 60
SUN GUN O/A WIPE 20
16+ SEQ. 45
PADDLE ASS'Y 120
TE-M-458 HOOK-UP 120
30
MECHANICAL INSPECTION ASEPSIS BAG ON
ASEPSIS BAG OFF 10
NO VOLTAGE IGNITERS ON SEAL BLANKET

F–O DAY

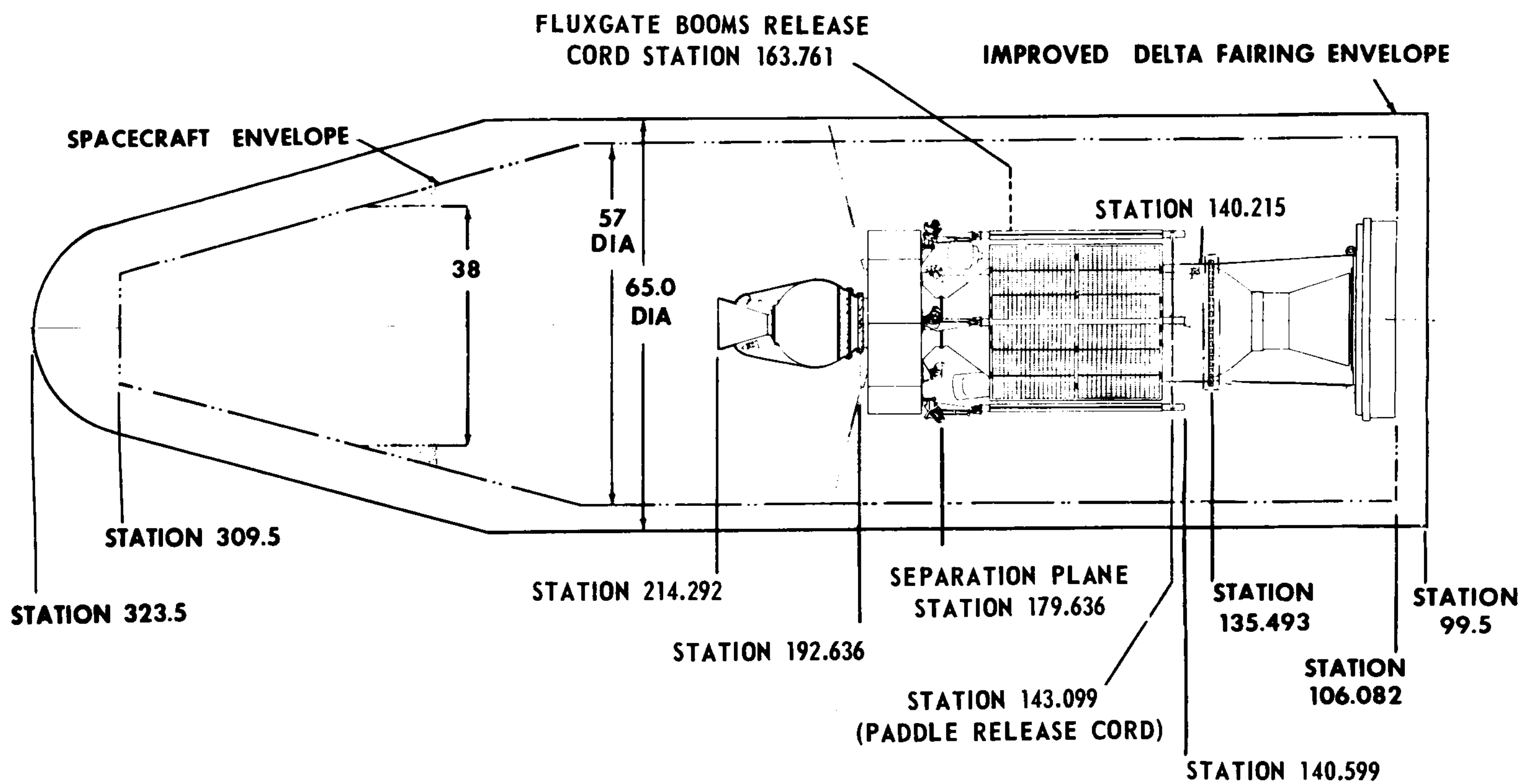


TIME
FUNC.
VEHICLE
S/C ELECT.
S/C MECH.
S/C DECONT.
R-F FOR-BIDDEN
CLEAR PAD
1ST FUEL. 75
RF 40
ORDNANCE HOOK-UP 150
TOWER REMOV 90
B/H 60
45
TERMINAL COUNT LAUNCH
16+ Seq 45
CONT BATT CHG.
S/C ON 30
NO VOLTAGE
FINAL ARM
SEAL ACCESS
30

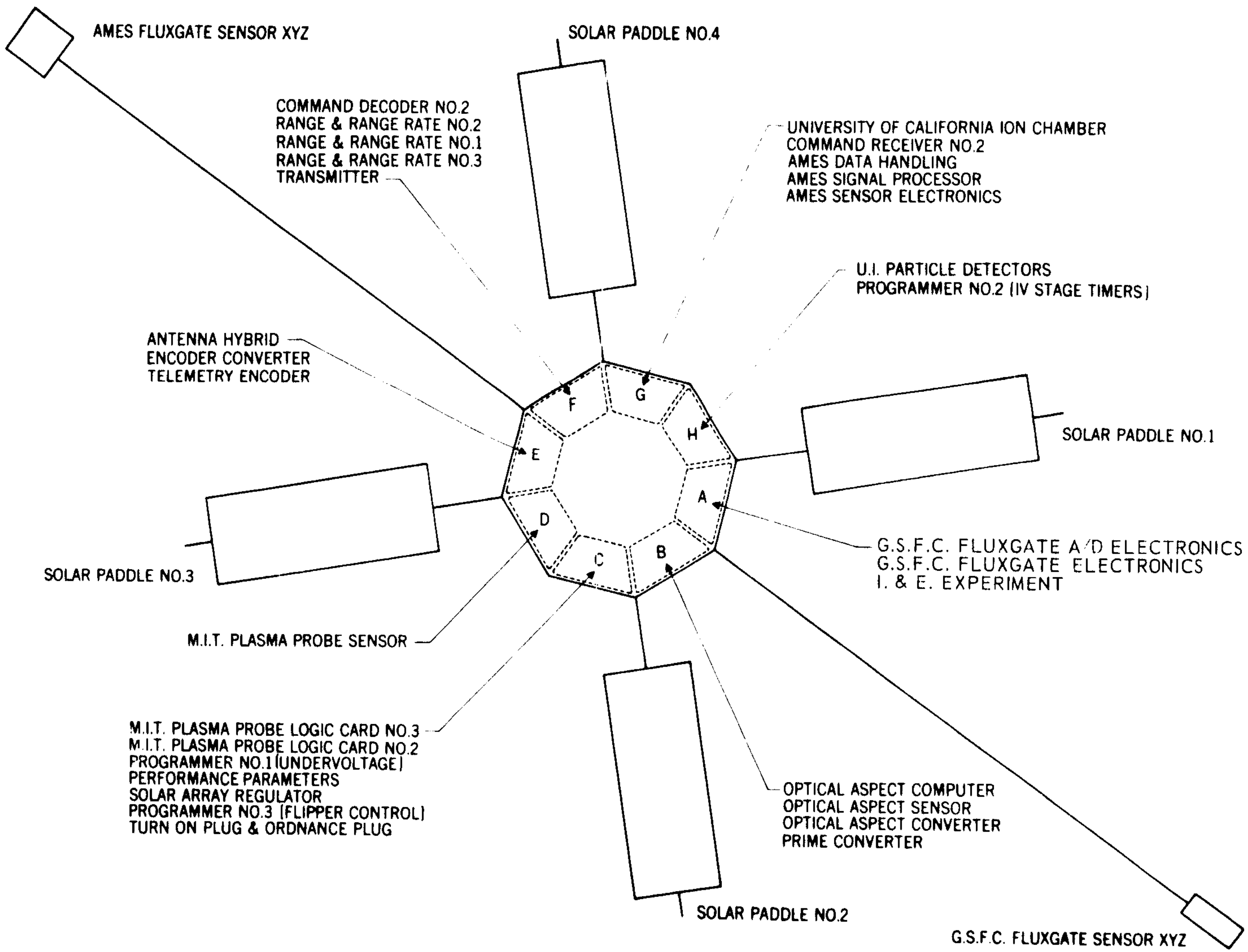


N
TITUSVILLE
MERRITT ISLAND
COCOA
CAPE KENNEDY
OCEAN
ATLANTIC
PATRICK AFB
SATURN
34
DYNASOAR
TITAN
20
19
16
15
MERCURY-ATLAS
14
13
12
11
36
ATLAS
CENTAUR
ATLANTIC OCEAN
CAFETERIA
BUILDING AE
HANGAR RD.
CENTRAL CONTROL ROAD
FIRE-HOUSE
N.A.S.A. SPIN TEST FACILITY OPERATED BY D.A.C.
LIGHTHOUSE
BANANA RIVER
FLIGHT CONTROL ROAD
31
32
MINUTEMAN
18
BLUE SCOUT
17
THOR DELTA
CAPE ROAD
N.A.S.A. FPB INSTRUMENTATION SITE
LIGHTHOUSE ROAD
26
JUPITER JUNO
5
6
MERCURY-REDSTONE
PAN AMERICAN SOLID PROPELLANTS AREA
30
PERSHING
25
29
POLARIS
CAPE KENNEDY
0 1 2 3 4 5 6 7 8 9 10 11 12
SCALE IN THOUSANDS OF FEET

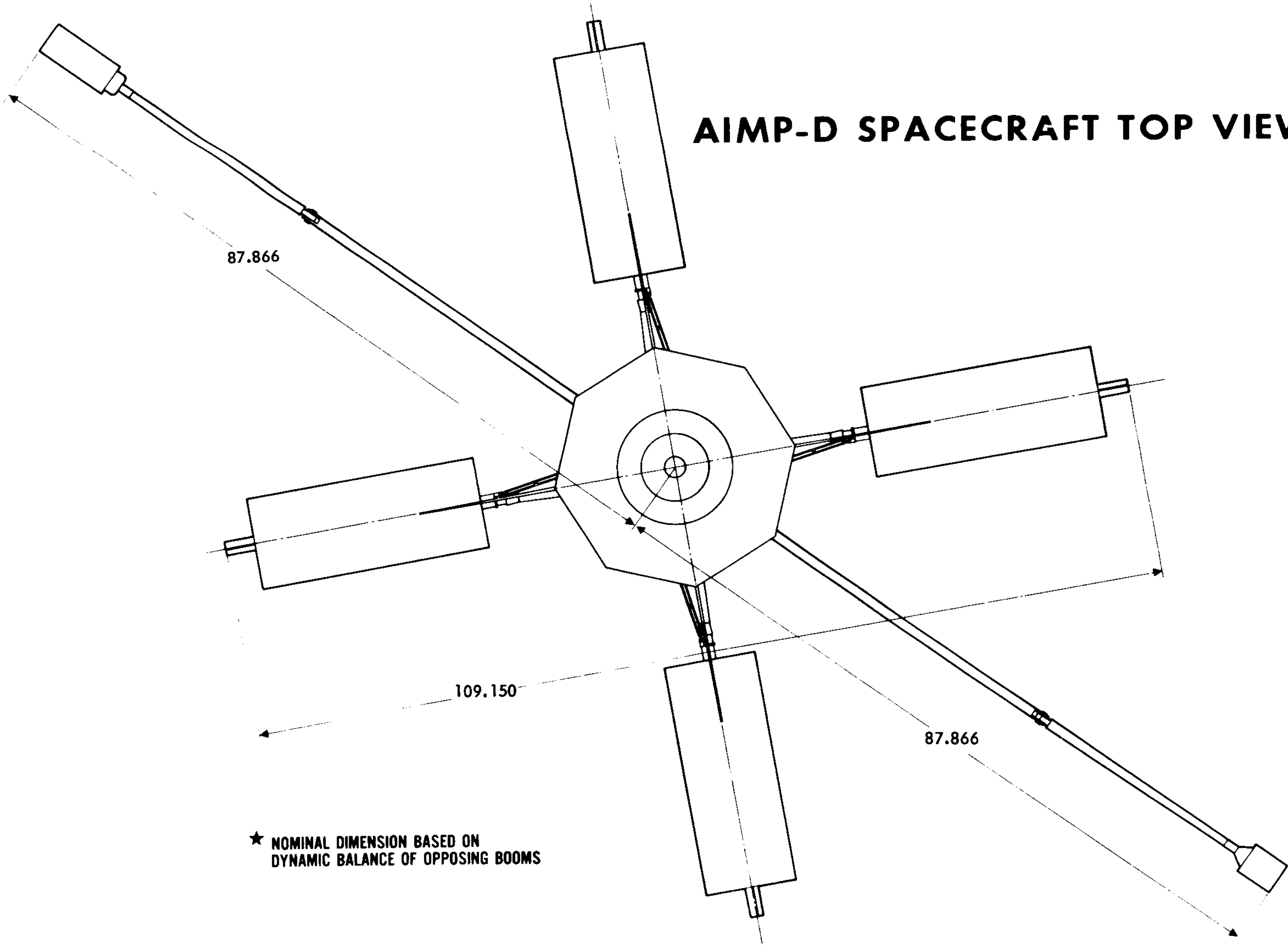
AIMP "D" INSTALLATION



AIMP D&E MODULE FRAME LOCATIONS

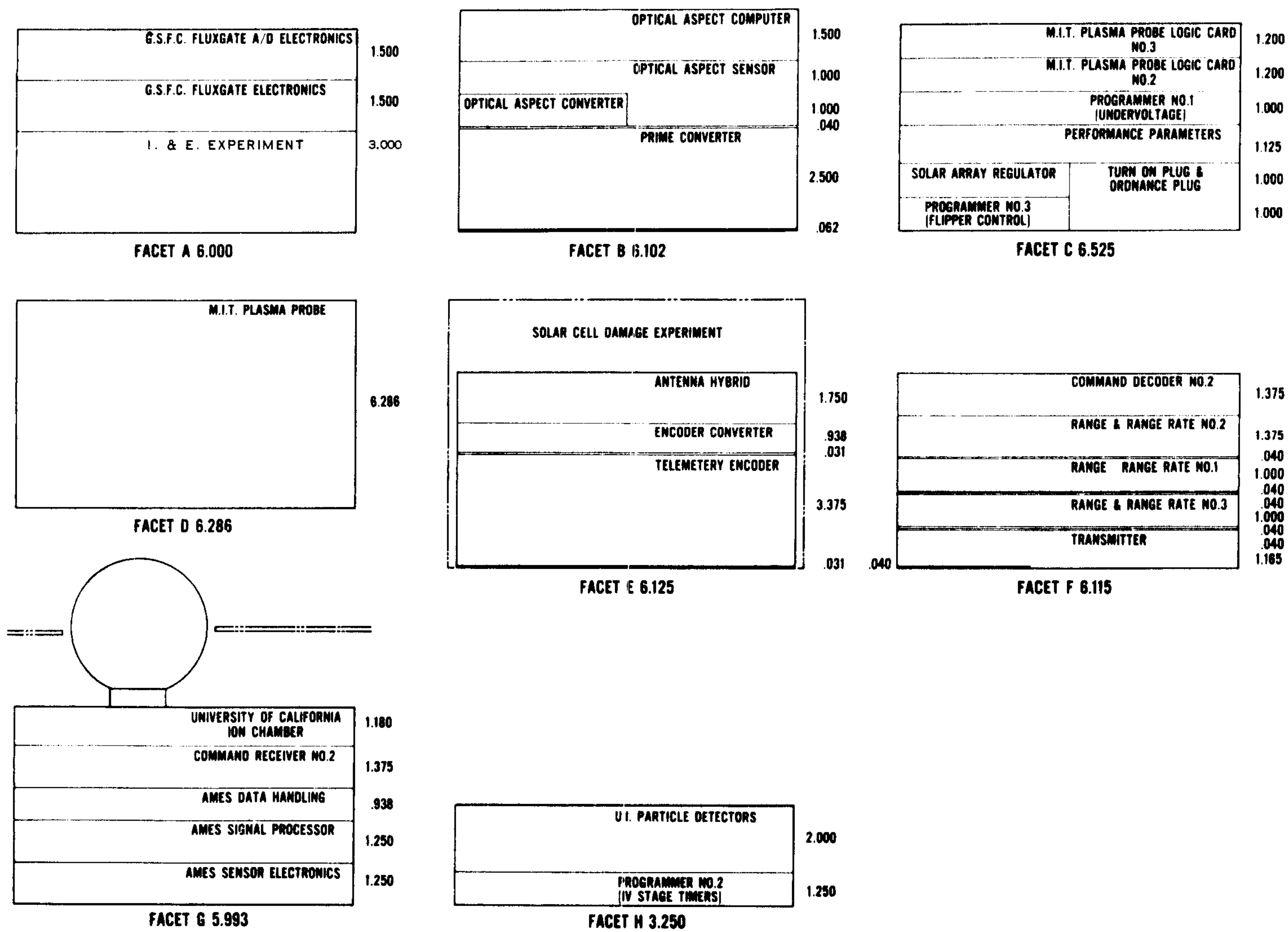


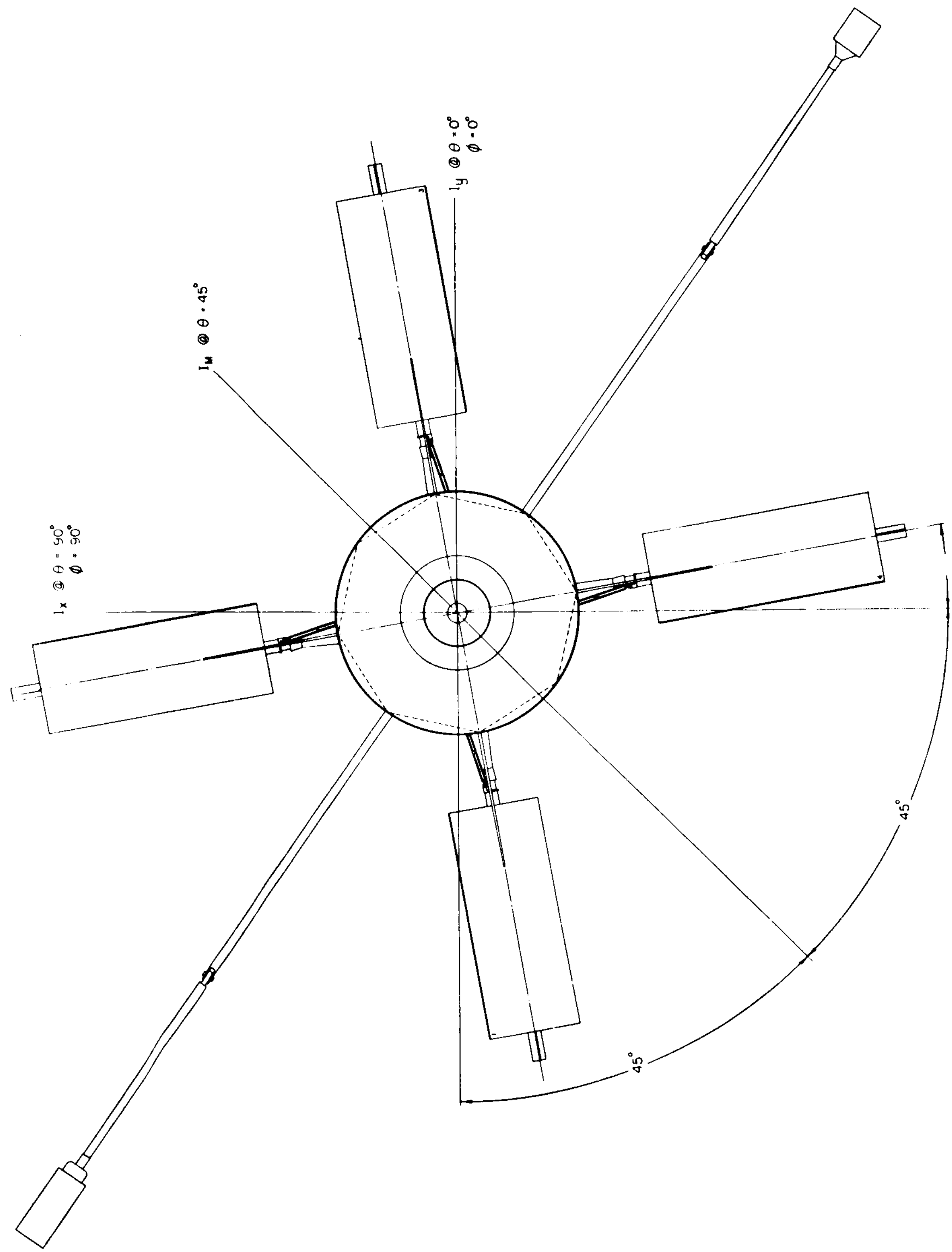
AIMP-D SPACECRAFT TOP VIEW



★ NOMINAL DIMENSION BASED ON DYNAMIC BALANCE OF OPPOSING BOOMS

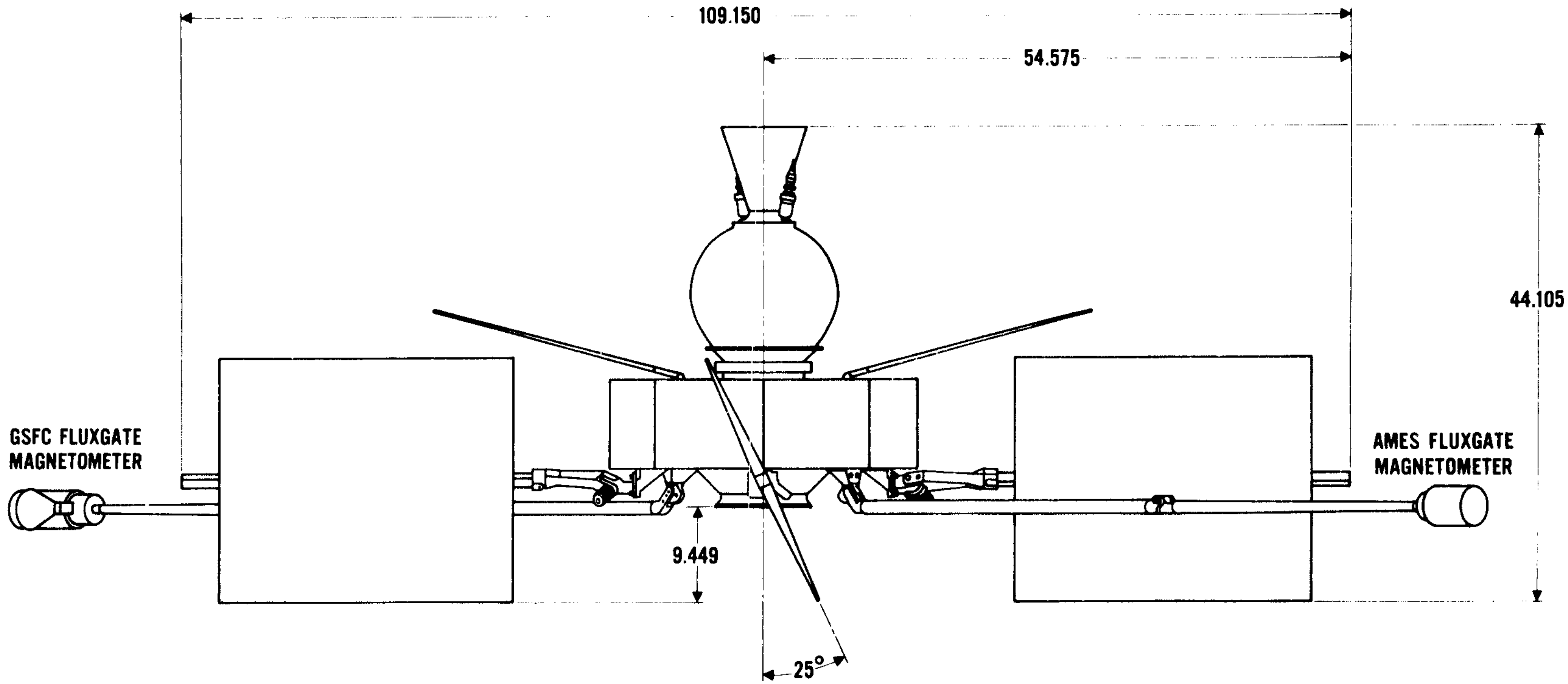
AIMP-D & E MODULE FRAME LOCATION



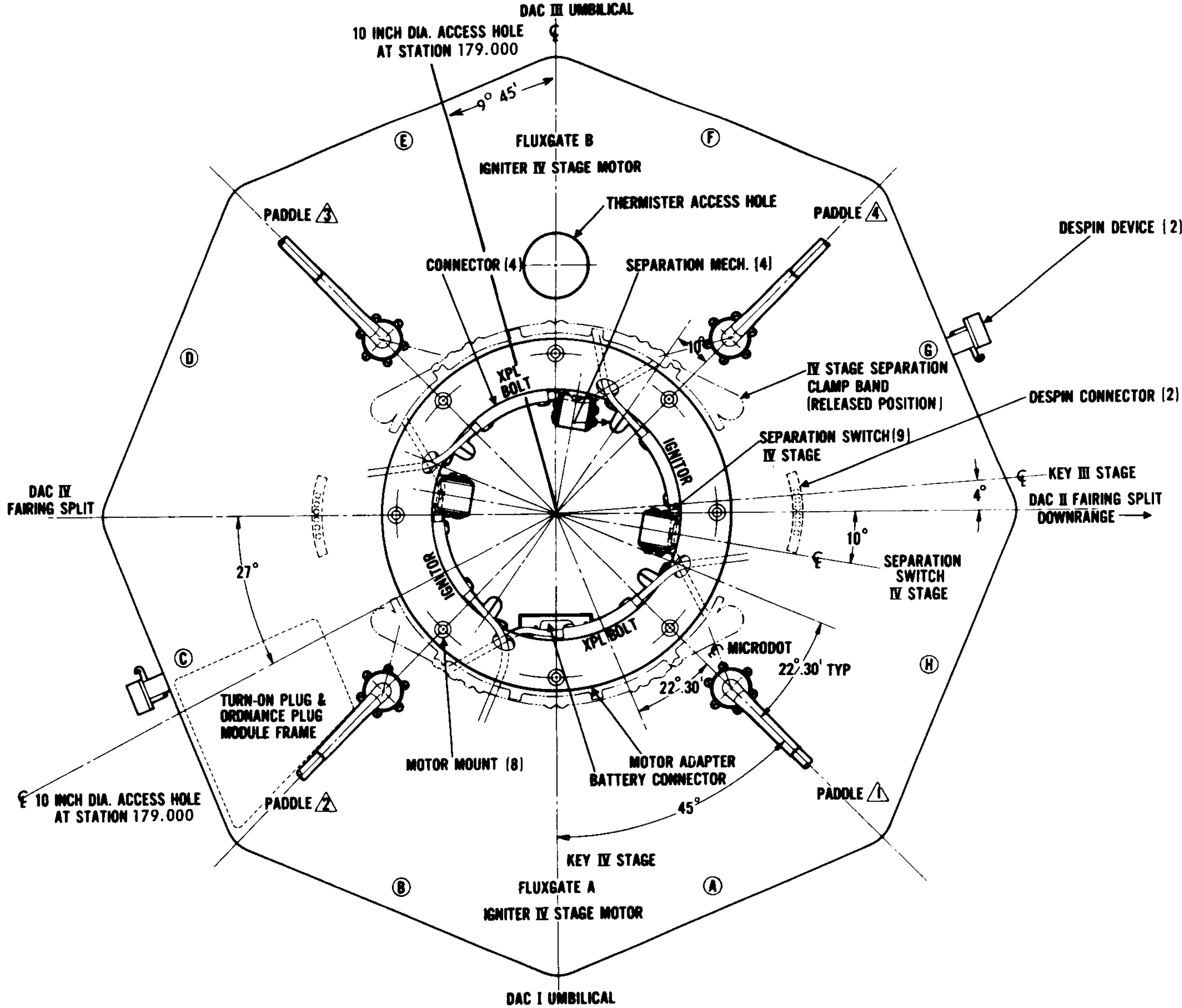


AIMP-D Moment Of Inertia-Transverse Axes

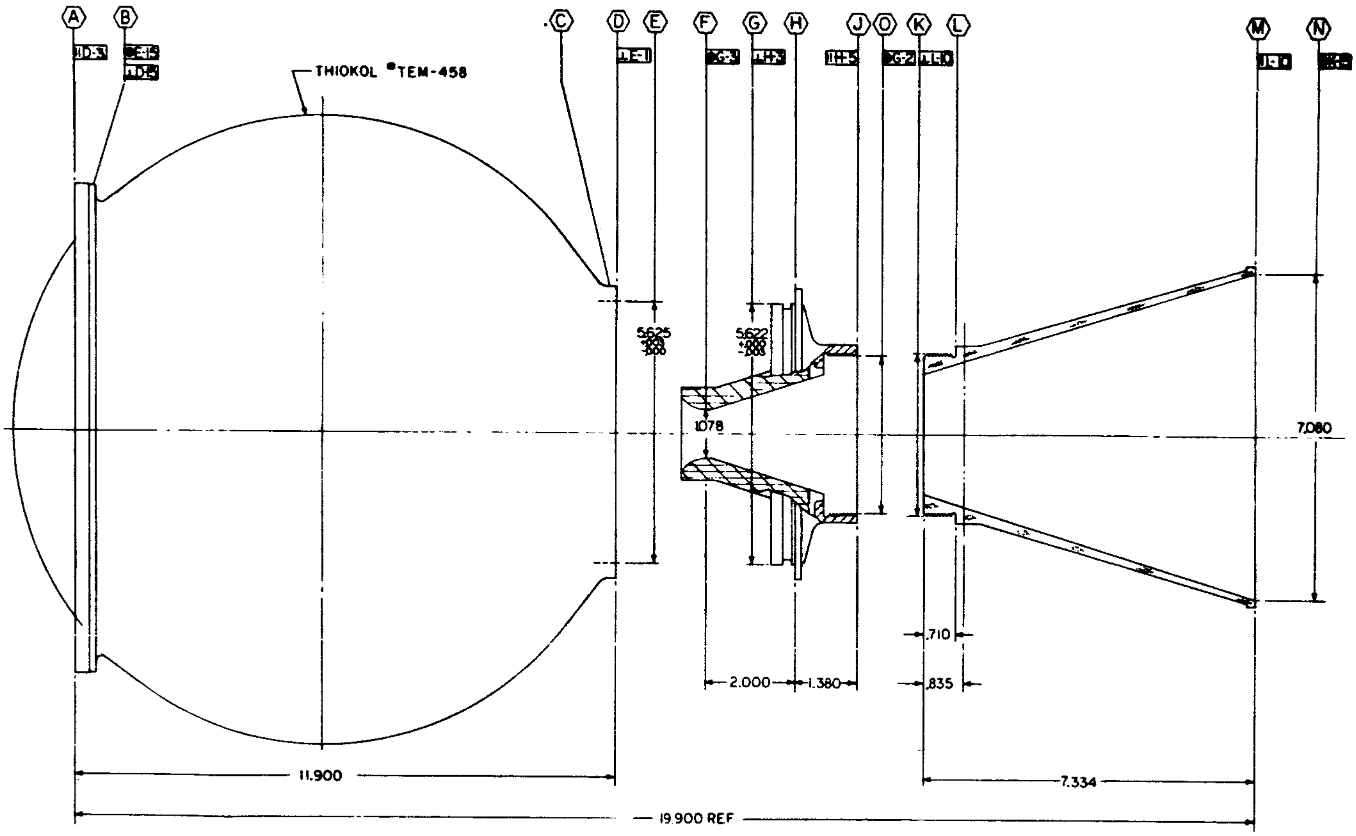
AIMP-D SPACECRAFT SIDE VIEW

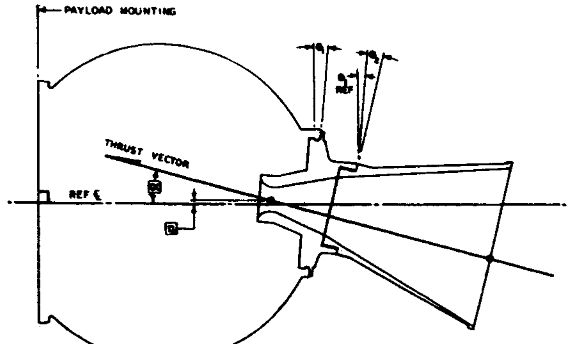


IV STAGE ORIENTATION



Thrust Vector Misalignment





① DIP OF CONE DUE TO A⟂D .003

$\theta_1 = \tan^{-1} \frac{.003}{10.33}$

$\theta_1 = 1.0'$

$Y_1 = 8.714 \tan \theta_1$

$Y_1 = .0023$

② DIP OF CONE DUE TO J⟂H .005

$\theta_2 = \tan^{-1} \frac{.009}{5.82}$

$\theta_2 = 4.5'$

$Y_2 = 6.624 \tan \theta_2$

$Y_2 = .0087$

③ DIP OF CONE DUE TO ● O TO G .002

$Y_3 = .001$

④ DIP OF CONE DUE TO ● N TO K .015

$Y_4 = .0075$

⑤ DIP OF THROAT DUE TO θ_1

$Y_5 = \tan \theta_1 (2.00)$

$Y_5 = -.0006$

⑥ DIP OF THROAT DUE TO ● F TO G .003

$Y_6 = -.0015$

⑦ THE FOLLOWING TOLERANCES CONTRIBUTE EQUALLY TO BOTH THE THROAT & EXIT CONE AND THEREFORE, AFFECT THE DISTANCE Y_0 BUT NOT THE ANGLE α.

a. ● E TO B .015 = ±.0075

b. CLEARANCE OF O-RING SURFACES

$5.625^{+.003}_{-.000}$

$5.622^{+.000}_{-.003}$

$.003^{+.006}_{-.000}$

∴ .009 DIAMETRAL CLEARANCE = ±.0045

$Y_7 = \pm .0120$

⑧ MAXIMUM OFFSET OF THROAT ℄ FROM REF ℄

$Y_0 = |Y_5| + |Y_6| + |Y_7|$

$\boxed{Y_0 = .014}$

⑨ TOTAL DROP BETWEEN THROAT ℄ & EXIT CONE ℄

$\Sigma Y = Y_1 + Y_2 + Y_3 + Y_4 + |Y_5| + |Y_6| = .0215$

⑩ MAXIMUM ANGLE OF THRUST VECTOR WITH REF ℄

$\alpha = \tan^{-1} \frac{\Sigma Y}{10.00} = \frac{.0215}{10.00}$

$\boxed{\therefore \alpha = 7.5'}$

APPENDIX A

AIMP RETROMOTOR
X-RAY PROCEDURES

APRIL 1966

E. W. Travis
D. L. Miller

RETROMOTOR

The purpose of this operation is to x-ray the motor, without igniters, to insure that no separations or cracks are evident in the grain configuration or that any discrepancies can be detected in the motor case.

The x-rays are taken in the Solid Propellants Area and consist of nine views to duplicate the x-rays taken prior to shipment from the Thiokol Elkton Division. Motor handling for these checks is under the supervision of a GSFC Mechanical Engineer.

Personnel Required:

GSFC Mechanical Engineer
GSFC Mechanical Technicians

Equipment Required:

TE-M-458 Retromotor Assembly
Retromotor Handling Dolly and lifting rig
Conductive Mat attached to building ground system
Conductive Shoe legstats for personnel
Conductive strap to be connected between Motor AFT closure bolt and building ground system
X-ray equipment as required for the views noted in Figures 2 and 3
Two (2) wooden x-ray pallets

Operational Procedure	Performed By	Checked By	Comments
1. Secure permission from the area Supervisor to remove the motor from storage and/or move it to the designated facility for x-ray checks.			
2. Move the Motor Shipping Container into the designated area as close to the work area as practicable.			

	Performed By	Checked By	Comments
3. Place a Conductive Mat in the work area and connect the mat to the building ground system			
4. Verify that personnel who handle the motor are wearing legstats. Personnel shall also wear their GSFC Radiation Badge.			
5. Remove the shipping container cover and lift the cover straight up.			
6. The retromotor and igniters are grounded to the shipping container as shown in Figure 1. The motor is covered with a velostat protective bag.			
7. Attach a conductive strap between an aft-closure bolt and the building ground system. Disconnect the shipping ground straps at points A & B (See Figure 1).			
8. Locate the motor handling dolly or plywood holding board within the field of view of the X-ray device. Attach a ground strap between the motor lifting cradle and the motor ground strap.			
9. Lift the motor from the shipping container, and set it in an upright position on the wooden pallet. The motor may be lifted by hand or crane by using the lifting cradle stored in the motor container.			
10. Remove the motor lifting cradle and pull the velostat bag down flush with the aft mounting ring.			

	Performed By	Checked By	Comments
11. Reassemble the lifting cradle around the motor and lift the motor off the pallet by hand or crane and pull the velostat bag from under motor.			
12. Set the motor back on the wooden pallet and remove the lifting cradle.			
13. X-ray the retromotor taking the views specified in Figures 2 and 3. The machine settings, film data, etc. included in the block on Figures 2 and 3 are the settings used for the machine at Thiokol-Elkton and are included for reference only.			
14. Criteria for flight acceptance of a retromotor is contained in the Thiokol specification number P 20025 (see Appendix B). The motor cross-section is shown in Figure 4.			
15. Attach a ground strap between the motor lifting cradle and the motor ground strap. Attach the lifting cradle around the motor.			
16. Lay the velostat bag across the second wooden motor pallet and set the motor onto the velostat.			
17. Remove lifting cradle and pull velostat bag up over the motor.			
18. Reassemble the lifting cradle around the motor.			
19. Transport the motor to the shipping container and set the lifting cradle with the retromotor into the shipping container.			

Step	Performed By	Checked By	Comments
20. Attach the shipping container ground straps to points A & B (See Figure 1).			
21. Remove the ground strap running from the aft closure bolt to building ground.			
22. Close and secure the container.			

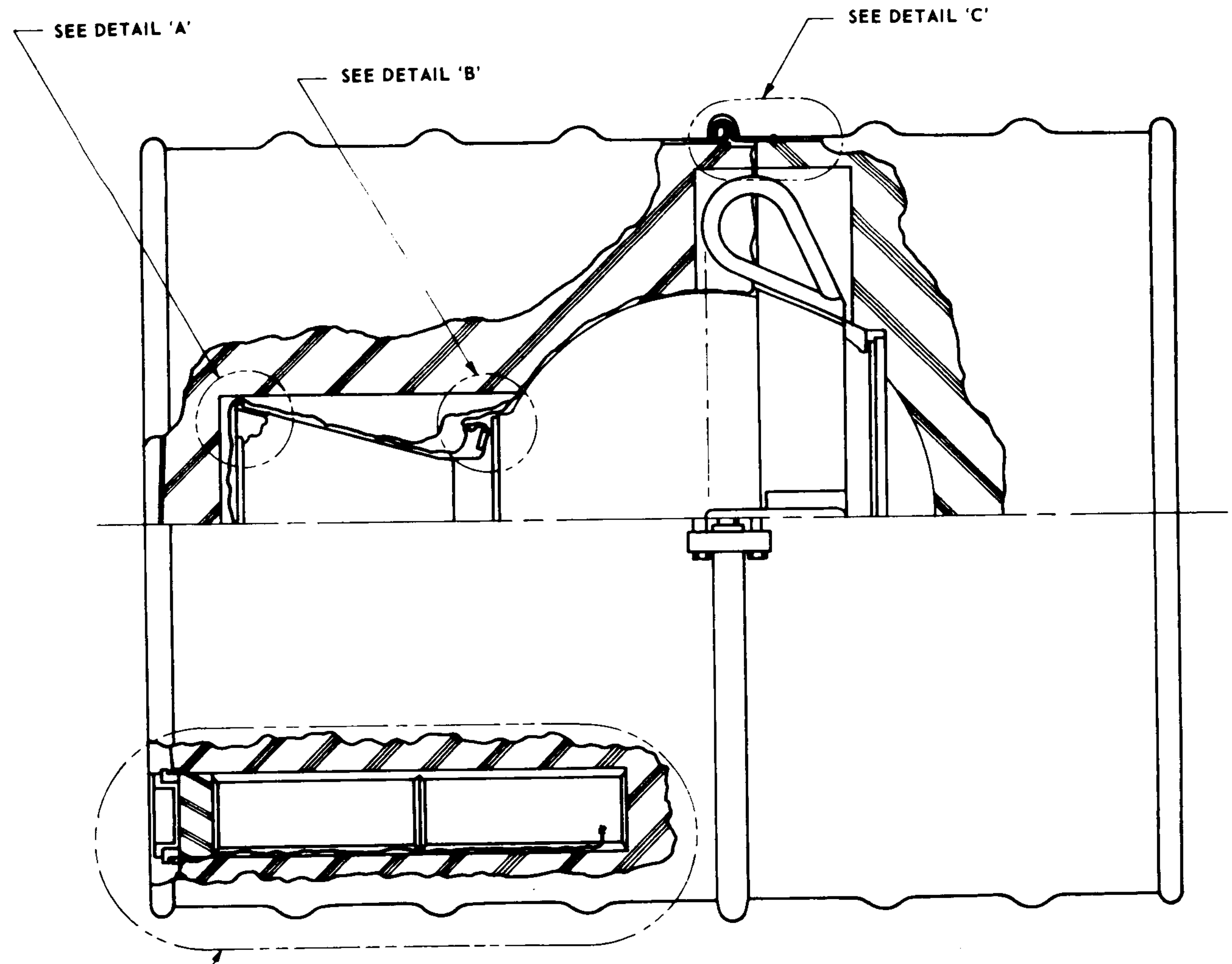


Figure 1. Retromotor Grounding In Shipping Container

Sheet 1 of 2

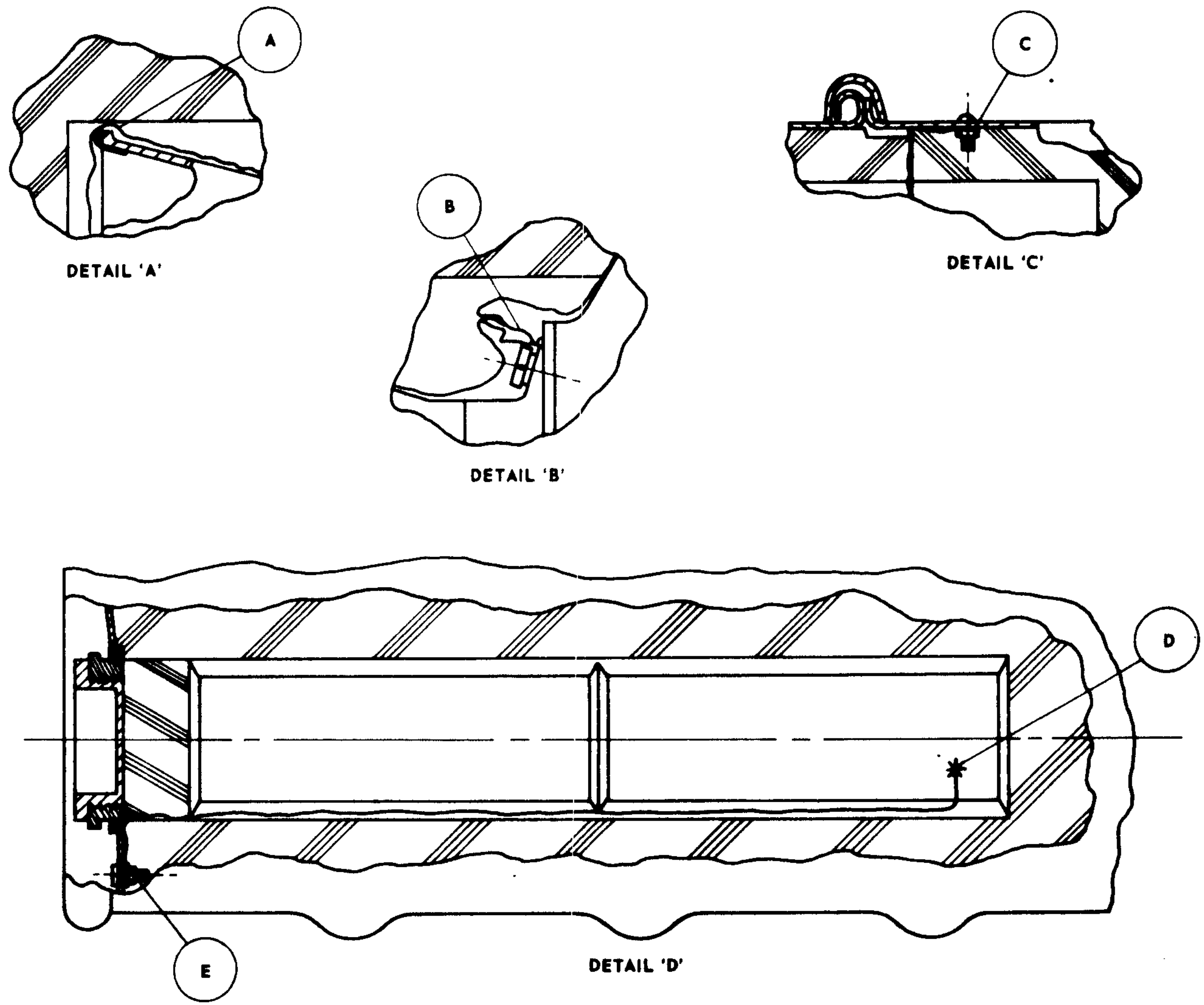
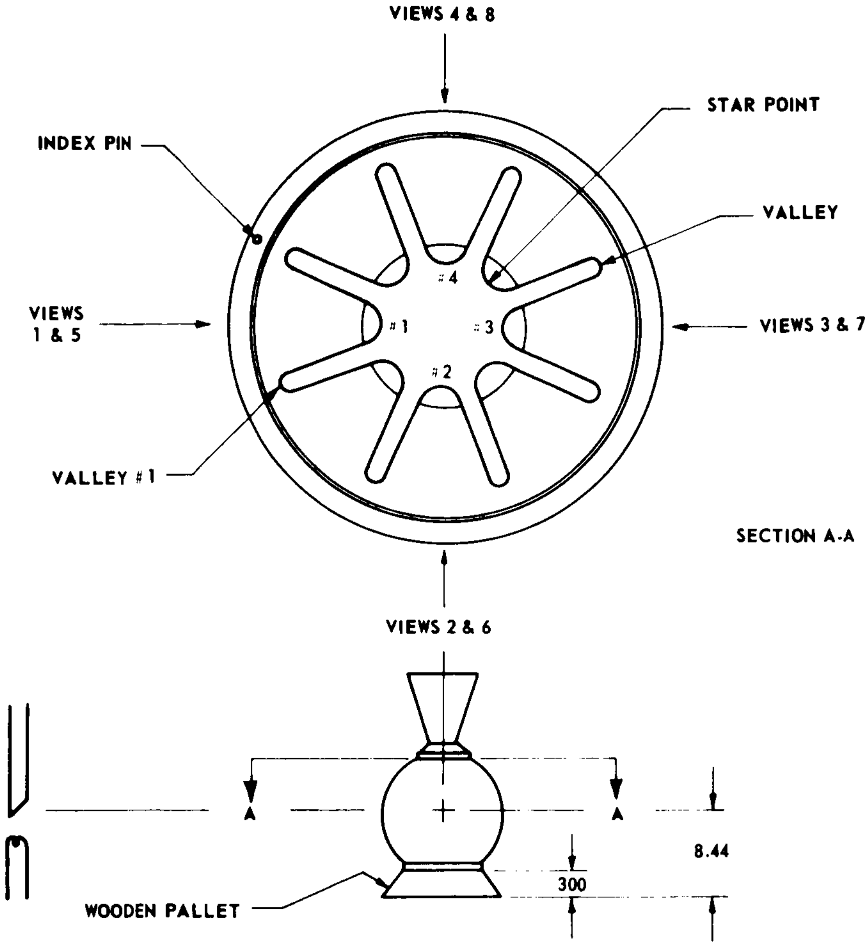


Figure 1. Retromotor Grounding In Shipping Container

Sheet 2 of 2

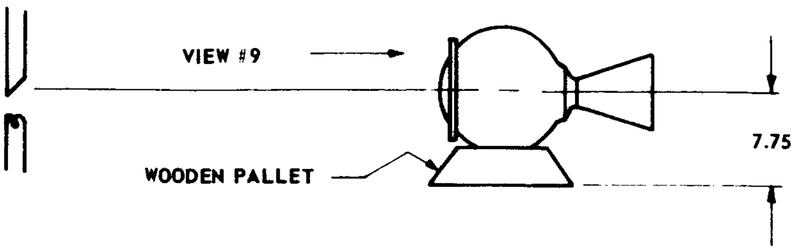


1. Star points to be numbered 1 thru 4 per the above sketch.
2. Views 1 thru 4 will concentrate on the propellant load.
3. Views 5 thru 6 will concentrate on the propellant – motor case interface at the side opposite the machine.

THIOKOL X-RAY DATA
FOR REFERENCE ONLY

KV 380 MAM 52
FFD 100" FOCAL SPOT 5mm
FILM TYPE Kodak AA/Ansco B
FILM SIZE 14 x 17
REQ'D SENSITIVITY 1%
LEAD SCREENS TOP .004–A; .020–B
INTENSIFY AA BOTTOM .010
FILTER .020 Pb/.010 Cu. @ Tube
MASKING N/A
PENETRAMETER NO. 11

Figure 2



1. No. 1 valley (see Figure 2) to be marked with a lead arrow or marker.

THIOKOL X-RAY DATA FOR REFERENCE ONLY
KV 38 MAM 56
FFD 100" FOCAL SPOT 5mm
FILM TYPE Kodak AA/Ansco B
FILM SIZE 14 x 17
REQ'D SENSITIVITY 1%
LEAD SCREENS TOP .004
BOTTOM .010
FILTER .020 Pb/.010 Cu. @ Tube
MASKING N/A
PENETRAMETER NO. 11

Figure 3

TE-M-458 RETROMOTOR MATERIALS

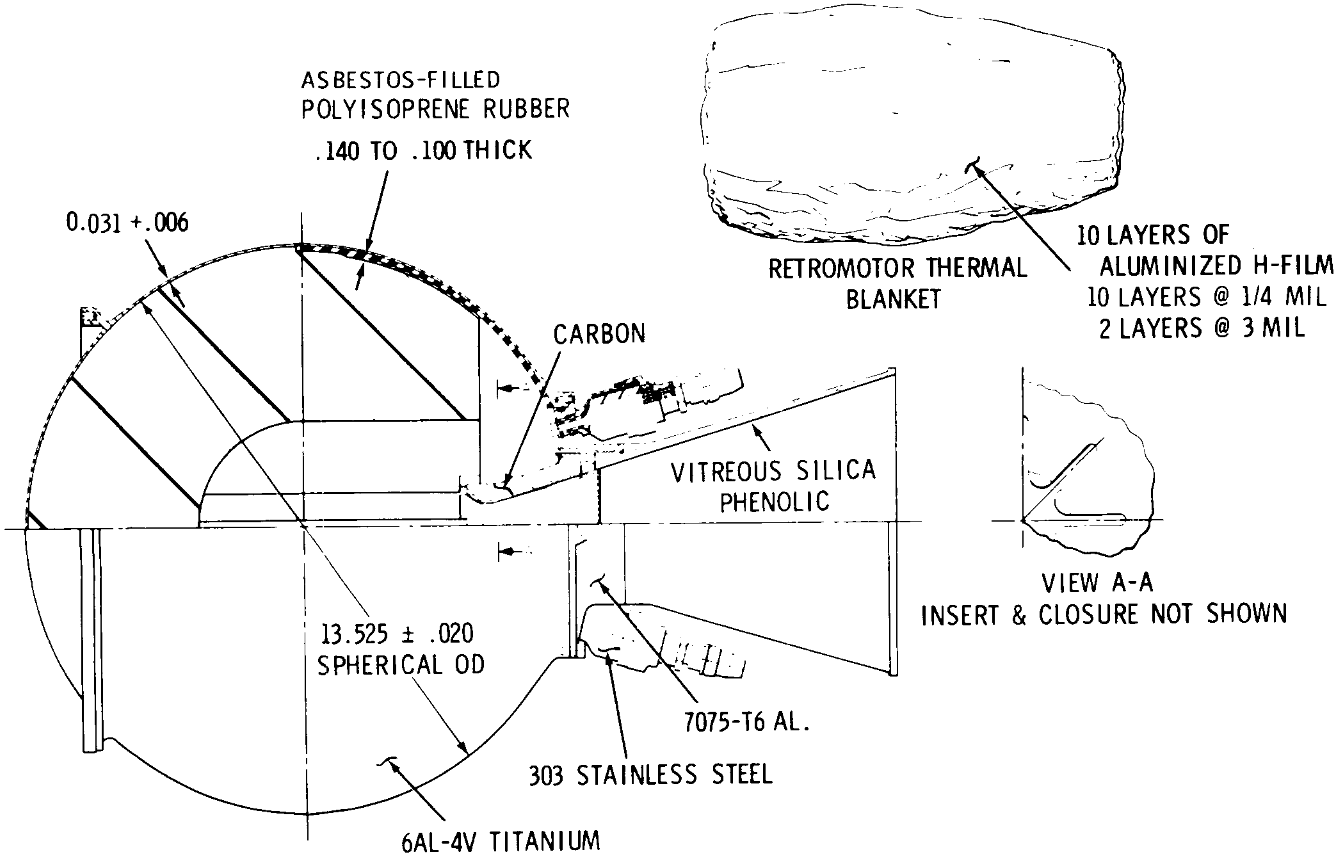


Figure 4. TE-M-458 Retromotor Materials

APPENDIX B

RADIOGRAPHIC ACCEPTANCE CRITERIA

APRIL 1966

E. W. Travis
D. L. Miller

RADIOGRAPHIC ACCEPTANCE CRITERIA, TE-M-458 LOADED CASE

1 SCOPE

1.1 This specification establishes the acceptance criteria for TE-M-458 loaded cases submitted to radiographic inspection. (See 4.1).

2 APPLICABLE DOCUMENTS

2.1 There are no applicable documents.

3 REQUIREMENTS

3.1 Surface Area

3.1.1 Total surface area of all voids shall not exceed 12 square inches.

3.2 Voids

3.2.1 The propellant shall be free from voids, or combinations of voids, that would decrease the normal minimum burning distance to any point on the case wall (insulated or uninsulated) by more than 1/2 inch.

3.2.2 The number of voids is controlled by surface area criteria.

3.3 Cracks

3.3.1 Cracks shall not be permitted.

3.4 Separation.

3.4.1 There shall be no separation between the propellant and liner, between the liner and insulation and between the liner and case.

3.4.2 There shall be no separation between the insulation and the case within 1/2 inch of any edge of the insulation.

3.4.3 Total area of separation between the insulation and the case shall not exceed 28 square inches.

3.5 Inclusions. The loaded case shall be free from foreign material.

3.6 Disposition. Failure of loaded cases to meet the requirements specified herein shall be cause for rejection or further review by MRB, depending on the nature of the discrepancy.

4 NOTES

4.1 This specification shall not be used unless referenced on an engineering drawing.

4.2 Definitions.

4.2.1 Crack. A crack is a break in material continuity with or without separation into parts.

4.2.2 Separation. Separation is a condition wherein there is lack of physical contact between adjacent materials.

APPENDIX C

RETROMOTOR IGNITER AND BOLT GUILLOTINE RESISTANCE MEASUREMENTS

APRIL 1966

E. W. Travis
D. L. Miller

IGNITER AND GUILLOTINE RESISTANCE MEASUREMENTS AND MOTOR ADAPTER CONTINUITY TEST

This procedure describes the steps necessary to measure the bridgewire resistances of the retromotor igniters and the bolt guillotines both by themselves and with these items physically connected to the spacecraft retromotor adapter harness. This test will be conducted in the Pan American Solid Propellant Electric Test Area.

Personnel Required:

GSFC Mechanical Engineer
GSFC Electrical Engineer
GSFC Mechanical Technician

Equipment Required:

Four (4) Igniter Assemblies TCC #17466-01
Spacecraft Flight Motor Adapter
Test Cable

Operational Procedure	Performed By	Checked By	Comments
1. Request the supervisor of the Pan American Solid Propellants Area to have the four flight igniter assemblies and four bolt guillotines delivered to the test area.			
2. The jumper cable required to electrically connect the retromotor igniters to the test cell is already available at the cell. This cable is marked "McDonnell Gemini." Locate this cable. See cable "C" in Figure 1.			
3. Give the guillotine test cables and the fly-away connector test cables to the Pan American test conductor so that he can have his connectors attached to the open ends of these cables. See Figure 1.			

Step	Performed By	Checked By	Comments
4. Locate the guillotine, igniters and motor adapter in the test area.			
5. The igniter bridgewire will be measured first. Connect the Igniter connector jumper (Cable C in Figure 1) to the cell.			
6. Pan American will measure test cable resistance with the pins shorted.			
7. Remove the shorting plug from the igniter and connect the jumper cable to the igniter.			
8. Pan American will test for bridgewire resistance. Record this on the Resistance Summary Sheet at the end of this procedure.			
9. Disconnect the jumper cable and replace the shorting plug on the igniter.			
10. Repeat steps 7 thru 9 for each igniter.			
11. Disconnect jumper cable "C" from the cell.			
12. Connect 2 type "A" jumper cables to the spacecraft motor adapter to connectors S2 & S4. See Figure 2.			
13. Connect both the "A" jumper cables to the cell.			
14. Pan American will measure the test cable resistance with the leads shorted.			
15. Remove the shorting connectors from the two igniters to be used with the flight motor.			

	Performed By	Checked By	Comments
16. Connect the motor adapter harness to these igniters.			
17. Locate the motor adapter in the cell in a manner such that it would be protected in the event of accidental ignition.			
18. Pan American will test the resistance of these circuits. Record these values on the resistance summary sheet.			
19. Disconnect each of the igniters from the adapter harness.			
20. Replace the shorting connectors onto both igniters.			
21. Repeat steps 14 thru 20 for the igniters to be used for the flight backup motor.			
22. Disconnect both "A" jumper cables from connectors S2 & S4 on the motor adapter and reconnect these to S1 & S3.			
23. Pan American will measure the resistance of the test cable with the pins shorted.			
24. Select the two bolt guillotines to be used for flight.			
25. Remove the shorting connectors from these guillotines.			
26. Connect each guillotine to the motor adapter harness.			

Step	Performed By	Checked By	Comments
27. Locate the motor adapter in the cell in a manner such that it would be protected in the event of accidental ignition.			
28. Pan American will measure the resistance of these circuits. Record these values on the resistance summary sheet.			
29. Disconnect the two guillotines from the adapter harness.			
30. Reconnect the shorting plugs onto the guillotines.			
31. Repeat steps 25 thru 30 for the flight backup guillotines.			
32. Disconnect the "A" style jumper cables from the motor adapter.			
33. Restore the motor adapter to its protective container.			
34. Disconnect the "A" style jumper cable from the cell.			
35. Connect two "B" style jumper cables to the cell.			
36. Pan American will measure the test cable resistance with the pins shorted.			
37. Remove the shorting connector from the two flight guillotines.			
38. Connect these guillotines to the "B" jumper cables.			

	Performed By	Checked By	Comments
39. Pan American will measure the bridgewire resistances in these guillotines. Record these values on the Resistance Summary Sheet.			
40. Disconnect the two guillotines from the "B" jumper cables.			
41. Reconnect the shorting plugs onto the guillotines.			
42. Repeat steps 37 thru 41 for the flight backup guillotines.			
43. Disconnect the "B" jumper cables from the cell.			
44. Return the igniters and bolt guillotine to their proper storage area.			

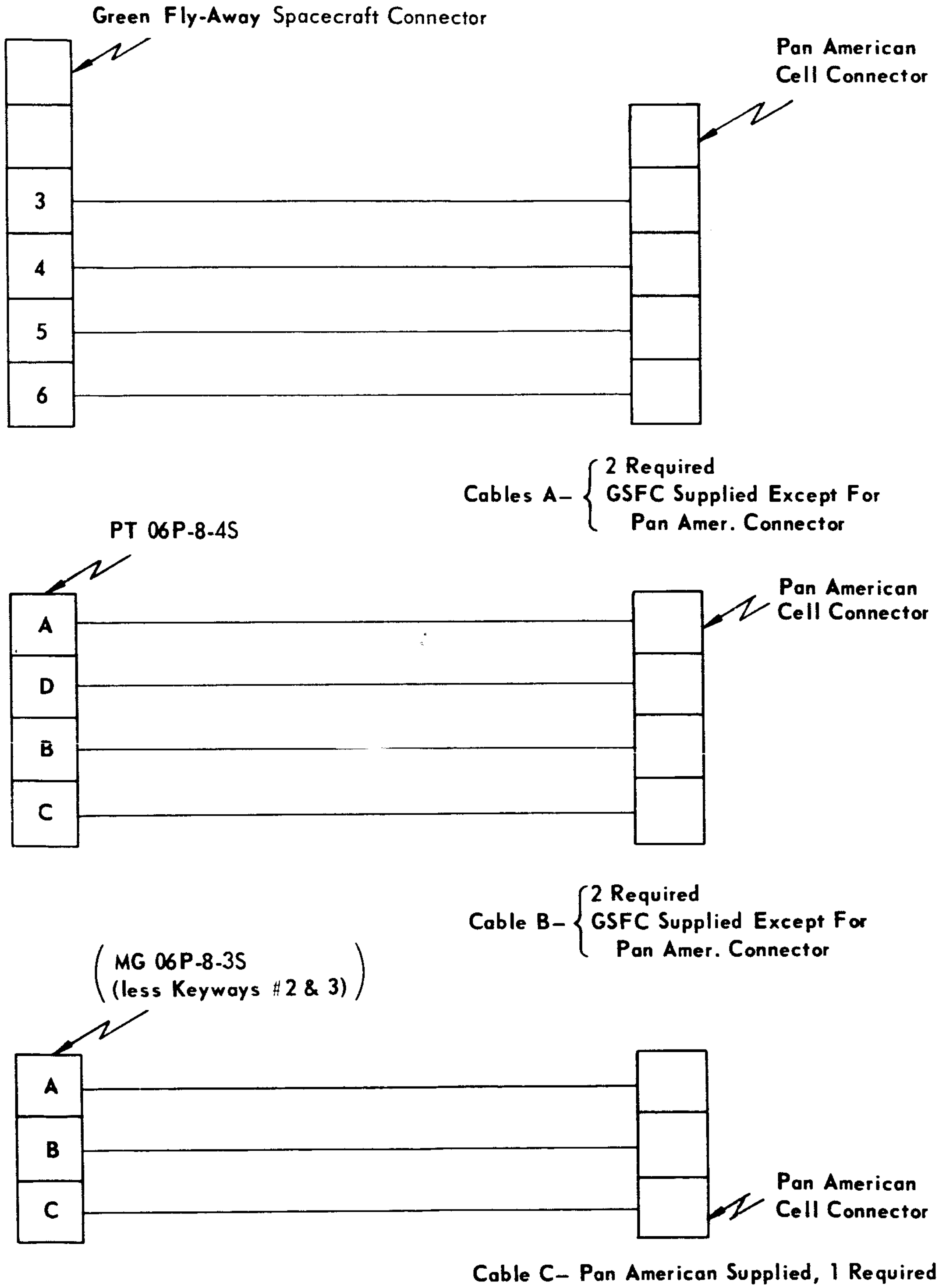


Figure 1. Jumper Cables

RESISTANCE SUMMARY SHEET

A. Igniters (Nominal Resistance = 1.0 $^{+.2}_{-.0}$ ohms B.W. only)

S/N	Bridgewire Resistance Only	Bridgewire + Motor Adapter Cabling Resistance
______		
______		
______		
______		

B. Bolt Guillotines (Nominal Resistance = 1.1 ± 0.1 ohms B.W. only)

S/N	Bridgewire Resistance Only	Bridgewire + Motor Adapter Cabling Resistance
______ A-D	______	______
B-C	______	______
______ A-D	______	______
B-C	______	______
______ A-D	______	______
B-C	______	______
______ A-D	______	______
B-C	______	______

APPENDIX D

AIMP RETROMOTOR AND IGNITERS MAGNETIC MEASUREMENTS AND DEPERMING PROCEDURE

APRIL 1966

E. W. Travis
D. L. Miller

AIMP RETROMOTOR AND IGNITER MAGNETIC MAPPING AND DEPERMING

The procedure outlines the method for magnetically mapping and deperming the AIMP Retromotor Assembly and live igniters. Each will be done separately.

Personnel Required:

Solid Propellants Area
- GSFC Mechanical Engineer
- GSFC Mechanical Technicians (2)
- GSFC Magnetic Properties Engineer
- GSFC Magnetic Properties Technician

Equipment Required:

- TE-M-458 Retromotor Assembly
- 2 Igniter Assemblies TCC #E17466-01
- Wooden Pallet
- Retromotor Lifting Sling
- Retromotor Deperm Adapter
- GSFC Deperm Coil and Dolly
- Variac, Type WSOHM
- DC Power Supply, Harrison Labs #808A, P5
- Retromotor Mounting Bolts - 8 #1/4 - 28 x 7/16 long, Titanium
- Third Stage Clamp Band - Aluminum
- Ground Strap, Non-magnetic
- Conductive Mat connected to Building Ground System
- Conductive Legstats for Personnel
- Forster/Hoover Magnetometer, #MF-55-331-10X
- Safety Wire - .032 Diameter, Aluminum
- Safety Wire Pliers

Operation Procedure	Performed By	Checked By	Comments
1. Secure permission from area supervisor to conduct magnetic deperming on motor in a designated area within the Solid Propellants facility.			

	Performed By	Checked By	Comments
2. Perform a functional checkout on the sensor and deperming equipment.			
3. Move the motor in its shipping container into the designated area. Locate the Motor Shipping Container as close to the work area as practicable.			
4. Locate a conductive mat connected to the building ground system in the motor work area. Connect a non-magnetic conductive ground strap from the deperm dolly to the building ground system.			
5. Verify that personnel who work on the motor are wearing legstats.			
6. Clear the area of all unnecessary personnel.			
7. Remove the cover of the motor shipping container by lifting the cover straight up.			
8. Connect a non-magnetic conductive strap, tied to the building ground system, to the motor case on an aft closure bolt.			
9. Disconnect the shipping ground straps at points A and B. See Figure 1.			
10. Lift the motor by hand from the shipping container using the lifting cradle stored in the shipping container with the motor.			
11. Set the motor on the wooden pallet.			
12. Remove the lifting cradle.			

	Performed By	Checked By	Comments
13. Peel the velostat bag from around the motor down to the mounting ring.			
14. Reassemble the lifting cradle to the motor.			
15. Assemble the deperm adapter to the deperm dolly.			
16. Place motor mounting bolts (8 #1/4 - 28 x 7/16 hex head) on the deperm dolly.			
17. Connect a ground strap from the motor lifting cradle to the motor ground strap. Lift the motor from the wooden pallet using the cradle sling and a crane.			
18. Lower the retromotor onto the deperm dolly.			
19. Mount the motor to the dolly using the 8 bolts provided.			
20. Remove the motor lifting cradle and sling.			
21. Perform magnetic measurements and deperming as required. Record the magnetic measurement motor s/n __________, Magnetic Measurements: a)______Gamma @______inches Initial b)______Gamma @______inches after deperming			
22. Attach a ground strap from the motor lifting cradle to the motor ground strap. Attach motor lifting cradle to the motor and attach the sling to a crane.			

Step	Performed By	Checked By	Comments
23. Remove the eight mounting bolts.			
24. Lift the motor from the dolly using the crane.			
25. Place the velostat bag across the wooden pallet.			
26. Lower the motor onto the pallet.			
27. Remove the lifting cradle and sling.			
28. Pull velostat bag up over the motor.			
29. Attach the lifting cradle ground strap to the motor ground strap. Reassemble the lifting cradle to the motor.			
30. Lift the motor by hand and set it inot the shipping container.			
31. Connect the shipping container ground straps at points A and B. See Figure 1.			
32. Disconnect the ground strap connected to the building ground.			
33. Pull velostat bag up over the nozzle.			
34. Put the shipping container top back in place and bolt closed.			
35. Remove both igniter containers from their storage cavity in the shipping container.			
36. Connect a non-magnetic conductive strap, tied to the building ground system, to each igniter.			

	Performed By	Checked By	Comments
37. Disconnect the shipping container ground strap from the igniters.			
38. Remove the RED warning tag from the shorting connector by cutting the safety wire. NOTE: DO NOT REMOVE THE IGNITER SHORTING CONNECTORS			
39. Reassemble the warning tag to the shorting connector using aluminum safety wire.			
40. Magnetically map and deperm the igniter assemblies as required.			
41. Record the magnetic properties of the igniters: s/n _______, a)______Gamma @ ______inches Initial b)______Gamma @ ______inches after deperming			
42. Reconnect the shipping container ground strap.			
43. Disconnect the ground strap to building ground.			
44. Put the igniters in their containers.			
45. Place the containers in their cavity in the motor shipping container.			
46. Relock wire the cap on the shipping container.			
47. Repeat the process for the flight backup motor using the second copy of this document.			

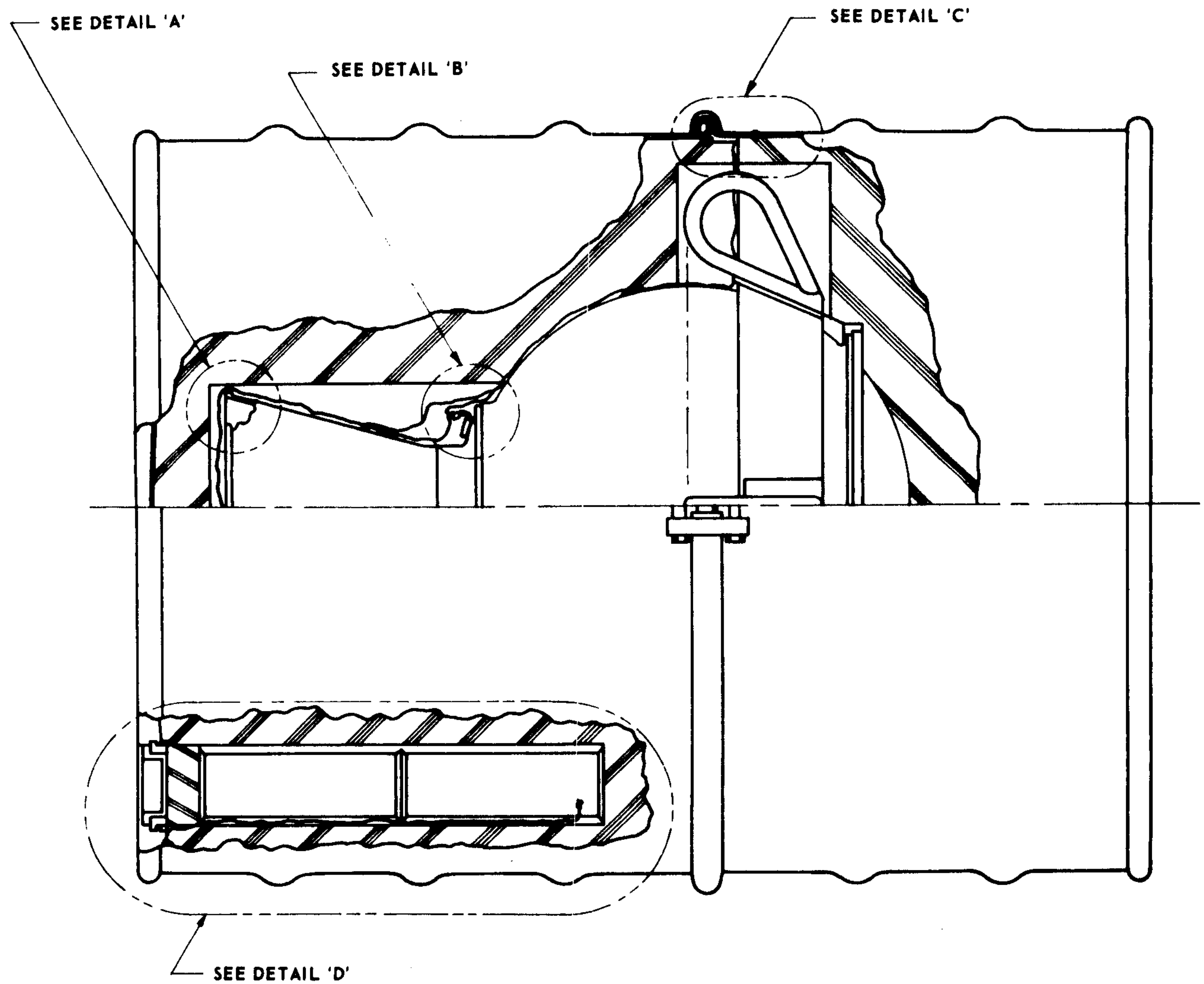


Figure 1. Retromotor Grounding In shipping Container

Sheet 1 of 2

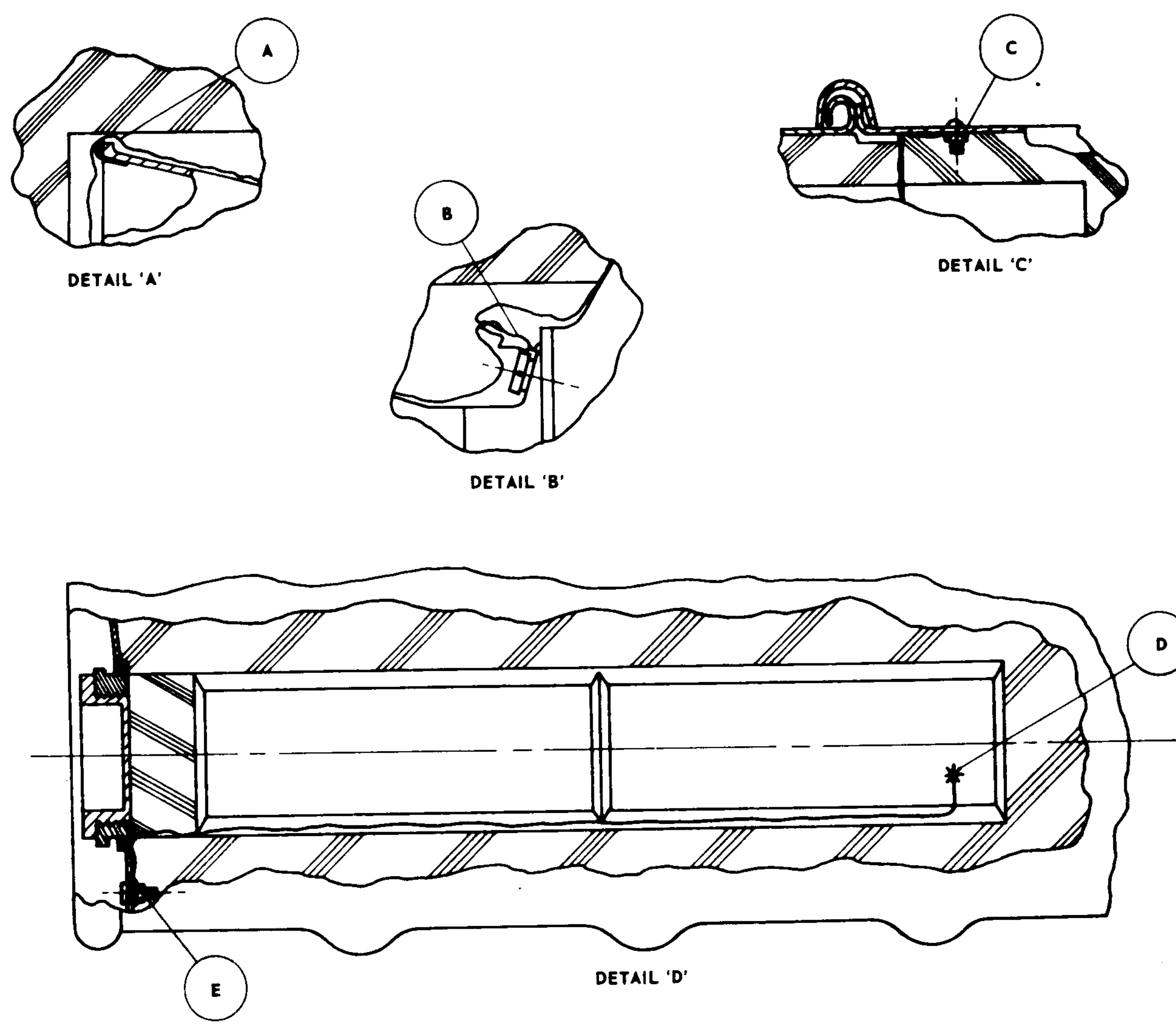


Figure 1. Retromotor Grounding In Shipping Container (Sheet 2 of 2)

APPENDIX E

AIMP RETROMOTOR
IGNITER INSTALLATION AND LEAK TEST

APRIL 1966

E. W. Travis
D. L. Miller

IGNITER INSTALLATION AND LEAK TEST

This procedure describes the installation of the igniters into the motor for flight and the method for conduction of a leak test to verify the pressure integrity of the motor assembly with igniters installed.

Personnel Required:

GSFC Mechanical Engineers (2)
GSFC Mechanical Technician

Equipment Required:

Two (2), Igniter Assemblies	TCC #E17466-01
Igniter 0-Rings	MS 28775-012
0-Ring Lubricant	Dow Corning #55M
Deep Well Socket Wrench	
Torque Wrench (60 in-lb)	
Safety Wire - .032 Diameter, Stainless Steel	
Safety Wire Pliers	
Leak Test Suitcase	
Acetone	
Kimwipes	
Cotton Swabs	
Watch	
1 Container of Liquid Nitrogen (3 gallons minimum)	
Inspection Mirror	
Approved Flashlight	

Operational Procedure	Performed By	Checked By	Comments
1. Secure permission from the area supervisor to remove the two (2) igniter assemblies from the storage area.			

Performed By | Checked By | Comments

2. Open the cap on the top of the shipping container and remove the ground strap from each igniter.

3. Transport the igniter assemblies in their cannisters to the gantry via an approved vehicle.

4. The Vacsorb pumps shall be filled approximately 1/2 hour prior to the estimated time for ascending the gantry to perform igniter installation. Secure estimate for this starting time from the Blockhouse.

5. Close valves A, B, and C on the leak check gear. See Figure 1. Do not attach hose to quick disconnect at this time.

6. Fill both the LN_2 containers in the leak check suitcase.

7. Replace the cover on the leak check suitcase.

8. Verify that the automatic relief valve has been removed from the suitcase.

9. Upon being notified that the test can begin, remove the suitcase cover and refill the Vacsorb pumps with LN_2.

10. Replace the suitcase cover.

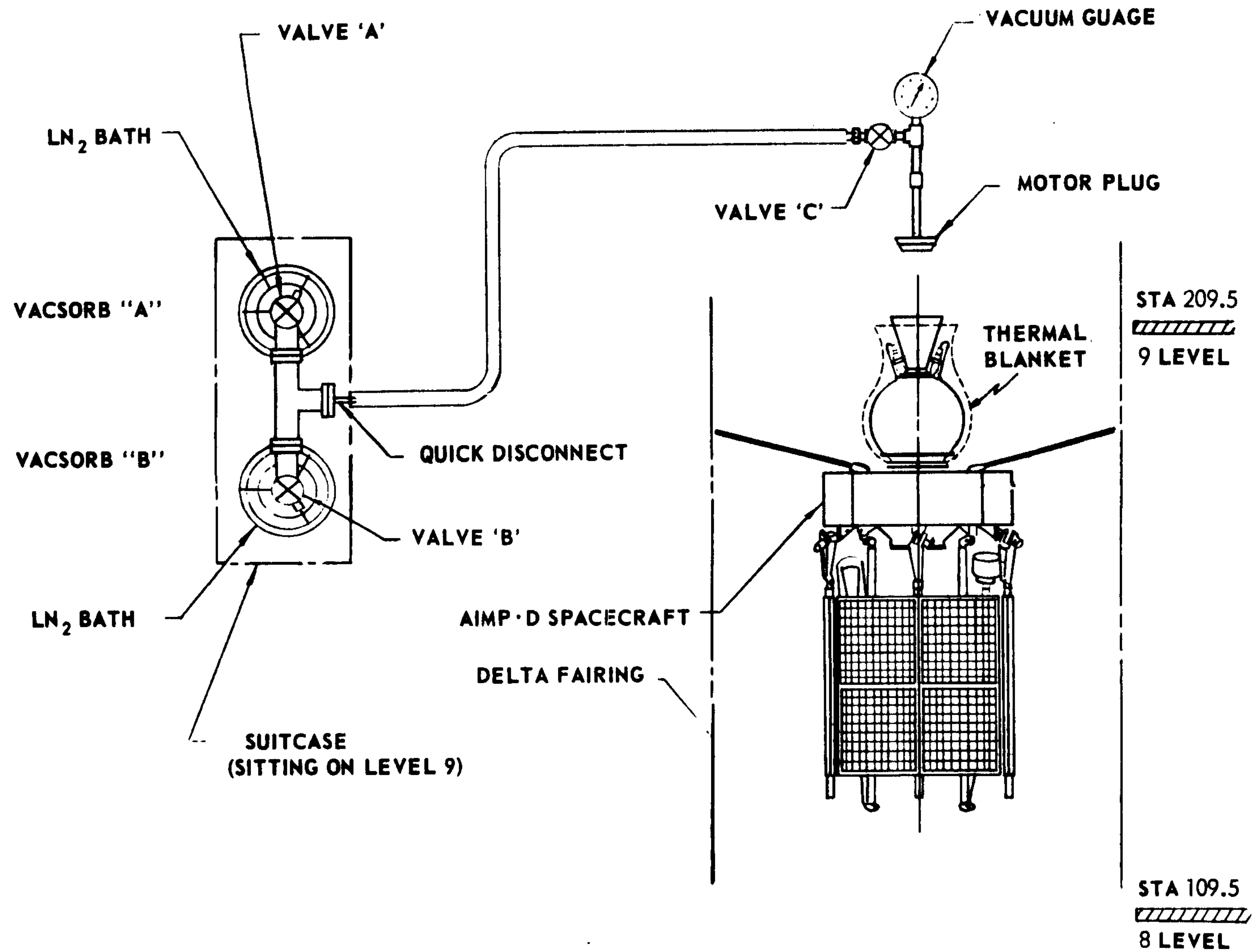
11. Notify the blockhouse that the igniter installation and leak check are commencing.

12. Carry the igniters and equipment required to the 9 level of the gantry.

	Performed By	Checked By	Comments
13. Position the leak test suitcase approximately 8 feet from the vehicle centerline. Check to insure that the suitcase is close enough to allow the plug to be placed into the motor nozzle.			
14. Unpack the igniters record igniter serial numbers on this page. S/N Location Igniter A ________ ________ Igniter B ________ ________ NOTE: DO NOT REMOVE SHORTING PLUGS			
15. Secure 0-Rings for each igniter from the envelopes inside the igniter cannister and inspect for damage.			
16. Remove the bag covering the retromotor.			
17. Remove the dummy igniters from the retromotor.			
18. Inspect the igniter ports in the aft closure and clean, using cotton swabs and alcohol, if necessary.			
19. Lightly grease the 0-Rings with the Dow Corning #55M lubricant.			
20. Slip the 0-Rings in place on the igniters.			
21. Cut the lockwire holding the WARNING tag to the shorting plug and remove the WARNING tag.			
22. Install both igniters, finger tight, locating igniters A-B recorded in step #14.			

	Performed By	Checked By	Comments
23. Torque each igniter to 60 in-lbs. using the deep well socket and torque wrench.			
24. Lockwire the igniter base to the aft closure bolt. Recheck igniter torque.			
25. Replace the WARNING tag onto the shorting plugs using the SST lockwire.			
26. Lightly grease the 0-Ring on the leak test motor plug using Dow Corning #55M lubricant.			
27. Remove suitcase cover and attach hose to vacsorb pumps with the quick disconnect fitting.			
28. Open valve "C", near the gauge.			
29. With a finger resting lightly over the hole in the motor plug, open valve "A" slightly to verify suction. Close valve "A" immediately after verification.			
30. Manually remove the aft closure rat plug from the nozzle.			
31. Insert the motor plug into the nozzle.			
32. Open valve "A" slightly and close valve "A" when the vacuum reaches 27 ± 1 inches of Mercury. Record pressure. P = ______ inches of Mercury.			
33. Close valve "C".			
34. Disconnect hose from the pump at the quick disconnect.			

	Performed By	Checked By	Comments
35. Close the cover on the suitcase and check automatic valve operation.			
36. Should vacsorb "A" be inoperative or incapable of pumping to the required level, close valve "A" and use vacsorb "B" by opening valve "B".			
37. Wait five (5) minutes for the system to stabilize, Vacuum must be 27 $\pm$ 1 inches of Mercury. Record gauge reading. P = ______inches of Mercury.			
38. Wait for ten minutes. The vacuum pressure shall not have reduced more than 1/2 inch of Mercury from the valve recorded in step #37. record the reading. P = ______inches of Mercury.			
39. Holding onto the pipe attached to the motor plug, open valve "C" to vent the motor.			
40. When the motor is vented, remove the motor plug and store it in the suitcase.			
41. Inspect motor rat plug for damage and wipe the top and bottom aluminum foil with acetone.			
42. Press the rat plug into the nozzle until it seats fully.			
43. Replace the dust bag over the retromotor.			
44. Notify the blockhouse that the igniter installation and leak check are complete.			
45. Remove leak check gear, and other equipment from the gantry. CAUTION: BE CAREFUL NOT TO SPILL THE LN_2 IN THE LEAK CHECK SUITCASE.			


VALVE 'A'
LN$_2$ BATH
VACSORB "A"
VACSORB "B"
LN$_2$ BATH
SUITCASE
(SITTING ON LEVEL 9)
QUICK DISCONNECT
VALVE 'B'
VACUUM GUAGE
VALVE 'C'
MOTOR PLUG
STA 209.5
9 LEVEL
THERMAL BLANKET
AIMP · D SPACECRAFT
DELTA FAIRING
STA 109.5
8 LEVEL

APPENDIX F

NO VOLTAGE CHECK OF
PYROTECHNIC CIRCUITRY

F-2 DAY

APRIL 1966

E. W. Travis
D. L. Miller

F-2 DAY NO VOLTAGE CHECK

NOTE: This test will be conducted during the vehicle stray voltage test.

	Performed By	Checked By	Comments
1. Request permission from test conductor to commence spacecraft no voltage test.			
2. Verify that the turn-on plug (either live or GSE) is installed. (See Figure 1)			
3. Verify that the umbilical plug is connected to the spacecraft.			
4. Request the electrical integration engineer to verify that the blockhouse panel is functioning properly.			
5. Verify that no plug is installed in the ordnance connector. If a plug is installed, identify the plug to the electrical integration engineer and request permission to remove this plug.			
6. Turn the S-1 switch on the pyrotechnic test box to OFF.			
7. Plug the Spacecraft End of the Pyrotechnic Test Cable into the spacecraft ordnance test connector. See Figure 1. Remove the safe test ordnance connector.			
8. Turn the S-2 switch to the ON position. This places the voltmeter across the circuits.			
9. Request permission from the spacecraft electrical engineer to commence testing. Verify that the spacecraft harness is not connected to the igniters or bolt guillotines.			

	Performed By	Checked By	Comments

10. Switch the S-1 switch thru each of the pyrotechnic positions and record below the voltage for each.

NOTE: Each position has a maximum allowable voltage reading. Should any reading exceed that value, record the value, turn the S-1 switch to OFF and notify the blockhouse engineer.

Switch Position	Maximum Allowable Voltage (Millivolts)	Reading
Shield		
IGN 1 RLY	50	______
IGN 2 RLY	50	______
SEP A RLY	50	______
SEP B RLY	50	______
IGN 1 SQUIB	200	______
IGN 2 SQUIB	200	______
SEP A SQUIB	200	______
SEP B SQUIB	200	______
MID-QUAD	50	______
QUAD-OUTPUT	50	______

11. Turn the S-1 switch to OFF.

12. Place the LIVE ordnance plug (green) into the ordnance connector.

13. Switch the S-1 switch thru each of the pyrotechnic positions and record below the voltage for each.

NOTE: Each position has a maximum allowable voltage reading. Should any

	Performed By	Checked By	Comments

reading exceed that value, record the value, turn the S-1 switch to OFF and notify the blockhouse engineer.

Switch Position	Maximum Allowable Voltage (Millivolts)	Reading
Shield		
IGN 1 RLY	50	________
IGN 2 RLY	50	________
SEP A RLY	50	________
SEP B RLY	50	________
IGN 1 SQUIB	50	________
IGN 2 SQUIB	50	________
SEP A SQUIB	50	________
SEP B SQUIB	50	________
MID-QUAD	50	________
QUAD OUTPUT	50	________

14. Turn the S-1 switch to OFF.

15. Remove the LIVE ordnance plug.

16. Install the SAFE ordnance plug (red) into the ordnance connector.

17. Switch the S-1 switch thru each of the pyrotechnic positions and record below the voltage for each.

    NOTE: Each position has a maximum allowable voltage reading. Should any reading exceed that value, record the value, turn the S-1 switch to OFF and notify the blockhouse engineer.

			Performed By	Checked By	Comments
Switch Position	Maximum Allowable Voltage (Millivolts)	Reading			
Shield					
IGN 1 RLY	50	______			
IGN 2 RLY	50	______			
SEP A RLY	50	______			
SEP B RLY	50	______			
IGN 1 SQUIB	50	______			
IGN 2 SQUIB	50	______			
SEP A SQUIB	50	______			
SEP B SQUIB	50	______			
MID-QUAD	50	______			
QUAD OUTPUT	50	______			

18. Turn the S-1 switch to OFF.

19. Notify the test conductor that the "Spacecraft - ON" portion of the spacecraft no voltage check is complete.

20. Request permission from the test conductor to turn the spacecraft OFF for the "Spacecraft-OFF" portion of the spacecraft no voltage test.

21. Request the spacecraft electrical engineer to switch the spacecraft OFF and reduce the power supply to zero amps.

22. Request verification from the spacecraft electrical engineer that the spacecraft is OFF.

23. Remove the SAFE ordnance plug.

24. Switch the S-1 switch thru each of the pyrotechnic positions and record below the voltage for each.

	Performed By	Checked By	Comments

NOTE: Each position has a maximum allowable voltage reading. Should any reading exceed that value, record the value, turn the S-1 switch to OFF and notify the blockhouse engineer.

Switch Position	Maximum Allowable Voltage (Millivolts)	Reading
Shield		
IGN 1 RLY	50	______
IGN 2 RLY	50	______
SEP A RLY	50	______
SEP B RLY	50	______
IGN 1 SQUIB	200	______
IGN 2 SQUIB	200	______
SEP A SQUIB	200	______
SEP B SQUIB	200	______
MID-QUAD	50	______
QUAD OUTPUT	50	______

25. Turn the S-1 switch to OFF.

26. Install the LIVE ordnance plug (green) into the ordnance connector.

27. Switch the S-1 switch thru each of the pyrotechnic positions and record below the voltage for each.

    NOTE: Each position has a maximum allowable voltage reading. Should any reading exceed that value, record the value, turn the S-1 switch to OFF and notify the blockhouse engineer.

Switch Position	Maximum Allowable Voltage (Millivolts)	Reading	Performed By	Checked By	Comments
Shield					
IGN 1 RLY	50				
IGN 2 RLY	50				
SEP A RLY	50				
SEP B RLY	50				
IGN 1 SQUIB	50				
IGN 2 SQUIB	50				
SEP A SQUIB	50				
SEP B SQUIB	50				
MID-QUAD	50				
QUAD OUTPUT	50				

28. Turn the S-1 switch to OFF.

29. Remove the LIVE ordnance plug.

30. Install the SAFE ordnance plug (red) into the ordnance connector.

31. Switch the S-1 switch thru each of the pyrotechnic positions and record below the voltages for each.

    NOTE: Each position has a maximum allowable voltage reading. Should any reading exceed that value, record the value, turn the S-1 switch to OFF and notify the blockhouse engineer.

Switch Position	Maximum Allowable Voltage (Millivolts)	Reading	Performed By	Checked By	Comments
Shield					
IGN 1 RLY	50				
IGN 2 RLY	50				
SEP A RLY	50				
SEP B RLY	50				
IGN 1 SQUIB	50				
IGN 2 SQUIB	50				
SEP A SQUIB	50				
SEP B SQUIB	50				
MID-QUAD	50				
QUAD OUTPUT	50				

32. Turn the S-1 switch to OFF.

33. Disconnect the ordnance test cable at the spacecraft.

34. Replace the SAFE ordnance test plug.

35. Notify the spacecraft electrical engineer that the no voltage check is complete.

36. Notify the test conductor that the spacecraft no voltage test is complete.

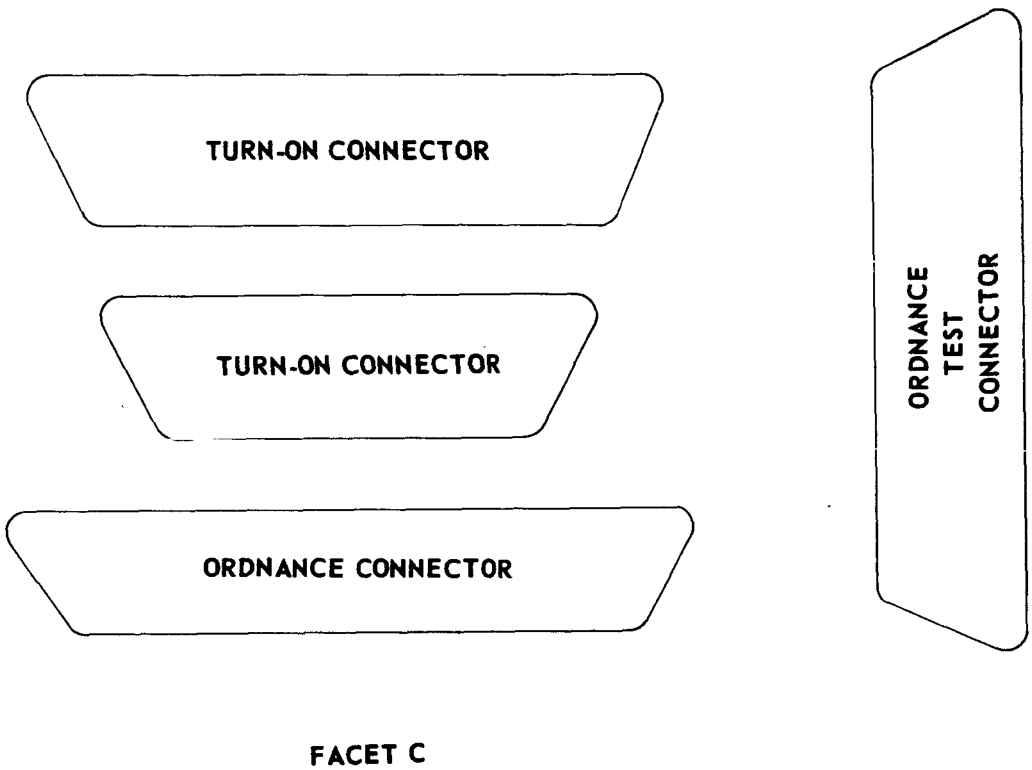


Figure 1. Spacecraft Connector Locations

APPENDIX G

NO VOLTAGE CHECK OF
PYROTECHNIC CIRCUITRY

F-1 DAY

APRIL 1966

E. W. Travis
D. L. Miller

F-1 DAY NO VOLTAGE CHECK

NOTE: This test will be conducted prior to connecting the spacecraft harness to the retromotor igniters and bolt guillotines, during sun gun checks.

	Performed By	Checked By	Comments
1. Request permission from test conductor to commence spacecraft no voltage test with the spacecraft on.			
2. Verify that the turn-on plug (either live or GSE) is installed. (see Figure 1)			
3. Verify that the umbilical plug is connected to the spacecraft.			
4. Request the electrical integration engineer to verify that the blockhouse panel is functioning properly. Verify that the spacecraft harness is not connected to the igniters & guillotines.			
5. Remove the SAFE ordnance plug.			
6. Turn the S-1 switch on the pyrotechnic test box to OFF.			
7. Remove the SAFE ordnance test plug and plug the Spacecraft End of the pyrotechnic test cable into the spacecraft ordnance test connector. (see Figure 1)			
8. Turn the S-2 switch to the ON position. This places the voltmeter across the circuits.			
9. Request permission from the spacecraft electrical engineer to commence testing.			
10. Switch the S-1 switch thru each of the pyrotechnic positions and record below the voltage for each.			

	Performed By	Checked By	Comments

NOTE: Each position has a maximum allowable voltage reading. Should any reading exceed that value, record the value, turn the S-1 switch to OFF and notify the blockhouse engineer.

Switch Position	Maximum Allowable Voltage (Millivolts)	Reading
Shield		
IGN 1 RLY	50	________
IGN 2 RLY	50	________
SEP A RLY	50	________
SEP B RLY	50	________
IGN 1 SQUIB	200	________
IGN 2 SQUIB	200	________
SEP A SQUIB	200	________
SEP B SQUIB	200	________
MID-QUAD	50	________
QUAD OUTPUT	50	________

11. Turn the S-1 switch to OFF.

12. Place the LIVE ordnance plug (green) into the ordnance connector.

13. Switch the S-1 switch thru each of the pyrotechnic positions and record below the voltage for each.

NOTE: Each position has a maximum allowable voltage reading. Should any reading exceed that value, record the value, turn the S-1 switch to OFF and notify the blockhouse engineer.

Performed By | Checked By | Comments

Switch Position	Maximum Allowable Voltage (Millivolts)	Reading
Shield		
IGN 1 RLY	50	______
IGN 2 RLY	50	______
SEP A RLY	50	______
SEP B RLY	50	______
IGN 1 SQUIB	50	______
IGN 2 SQUIB	50	______
SEP A SQUIB	50	______
SEP B SQUIB	50	______
MID-QUAD	50	______
QUAD OUTPUT	50	______

14. Turn the S-1 switch to OFF.

15. Remove the LIVE ordnance plug.

16. Install the SAFE ordnance plug (red) into the ordnance connector.

17. Switch the S-1 switch thru each of the pyrotechnic positions and record below the voltage for each.

    NOTE: Each position has a maximum allowable voltage reading. Should any reading exceed that value, record the value, turn the S-1 switch to OFF and notify the blockhouse engineer.

				Performed By	Checked By	Comments
	Switch Position	Maximum Allowable Voltage (Millivolts)	Reading			
	Shield					
	IGN 1 RLY	50	______			
	IGN 2 RLY	50	______			
	SEP A RLY	50	______			
	SEP B RLY	50	______			
	IGn 1 SQUIB	50	______			
	IGN 2 SQUIB	50	______			
	SEP A SQUIB	50	______			
	SEP B SQUIB	50	______			
	MID-QUAD	50	______			
	QUAD OUTPUT	50	______			
18.	Turn the S-1 switch to <u>OFF</u>.					
19.	Notify the test conductor that the "Spacecraft-ON" portion of the spacecraft no voltage check is complete.					
20.	Request Permission from the test conductor to turn the spacecraft OFF for the "Spacecraft-OFF" portion of the spacecraft no-voltage test.					
21.	Request the spacecraft electrical engineer to switch the spacecraft OFF and reduce the power supply to zero amperes.					
22.	Request verification from the spacecraft electrical engineer that the spacecraft is OFF.					
23.	Remove the SAFE ordnance plug.					
24.	Switch the S-1 switch thru each of the pyrotechnic positions and record below the voltage for each.					

	Performed By	Checked By	Comments

NOTE: Each position has a maximum allowable voltage.reading. Should any reading exceed that value, record the value, turn the S-1 switch to OFF and notify the blockhouse engineer.

Switch Position	Minimum Allowable Voltage (Millivolts)	Reading
Shield		
IGN 1 RLY	50	______
IGN 2 RLY	50	______
SEP A RLY	50	______
SEP B RLY	50	______
IGN 1 SQUIB	200	______
IGN 2 SQUIB	200	______
SEP A SQUIB	200	______
SEP B SQUIB	200	______
MID-QUAD	50	______
QUAD OUTPUT	50	______

25. Turn the S-1 switch to OFF.

26. Install the LIVE ordnance plug (green) into the ordnance connector.

27. Switch the S-1 switch thru each of the pyrotechnic positions and record below the voltage for each.

    NOTE: Each position has a maximum allowable voltage reading. Should any reading exceed that value, record the value, turn the S-1 switch to OFF and notify the blockhouse engineer.

		Performed By	Checked By	Comments

Switch Position	Maximum Allowable Voltage (Millivolts)	Reading
Shield		
IGN 1 RLY	50	______
IGN 2 RLY	50	______
SEP A RLY	50	______
SEP B RLY	50	______
IGN 1 SQUIB	50	______
IGN 2 SQUIB	50	______
SEP A SQUIB	50	______
SEP B SQUIB	50	______
MID-QUAD	50	______
QUAD OUTPUT	50	______

28. Turn the S-1 switch to OFF.

29. Remove the LIVE ordnance.

30. Install the SAFE ordnance plug (red) into the ordnance connector.

31. Switch the S-1 switch thru each of the pyrotechnic positions and record below the voltage for each.

    NOTE: Each position has a maximum allowable voltage reading. Should any reading exceed that value, record the value, turn the S-1 switch to OFF and notify the blockhouse engineer.

Switch Position	Maximum Allowable Voltage (Millivolts)	Reading	Performed By	Checked By	Comments
Shield					
IGN 1 RLY	50	______			
IGN 2 RLY	50	______			
SEP A RLY	50	______			
SEP B RLY	50	______			
IGN 1 SQUIB	50	______			
IGN 2 SQUIB	50	______			
SEP A SQUIB	50	______			
SEP B SQUIB	50	______			
MID-QUAD	50	______			
QUAD OUTPUT	50	______			

32. Turn the S-1 switch to OFF.

33. Disconnect the ordnance test cable at the spacecraft.

34. Replace the SAFE ordnance test connector.

35. Notify the spacecraft electrical engineer that the no voltage check is complete.

36. Notify the test conductor that the spacecraft no voltage test is complete.

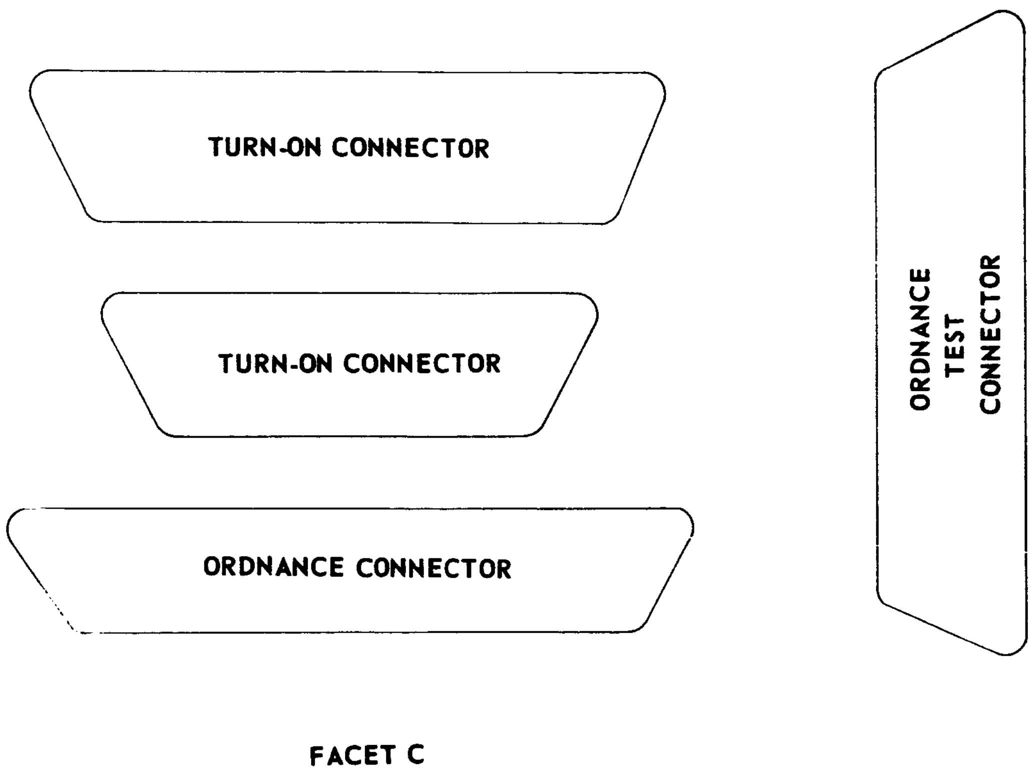


Figure 1. Spacecraft Connector Locations

APPENDIX H

NO VOLTAGE CHECK AND FINAL ARMING

F-0 DAY

APRIL 1966

E. W. Travis
D. L. Miller

F-0 DAY NO VOLTAGE CHECK AND FINAL ARMING

This check will be conducted on F-0 day prior to final sealing of the fairing access parts.

	Performed By	Checked By	Comments
1. Request permission from test conductor to commence spacecraft no voltage test.			
2. Verify that the live turn-on plug is installed. (see Figure 1)			
3. Verify that the umbilical plug is connected to the spacecraft.			
4. Request the electrical integration engineer to verify that (a) blockhouse panel is functioning properly, (b) the spacecraft is OFF and (c) the power supply is reduced to zero amperes.			
5. Remove the SAFE ordnance test plug. Do not remove the SAFE ordnance plug.			
6. Turn the S-1 switch on the pyrotechnic test box to OFF.			
7. Plug the Spacecraft End of the pyrotechnic test cable into the spacecraft ordnance test connector. (see Figure 1)			
8. Turn the S-2 switch to the ON position. This places the voltmeter across the circuits.			
9. Request permission from the spacecraft electrical engineer to commence testing.			
10. Switch the S-1 switch thru each of the pyrotechnic positions and record below the voltage for each.			

	Performed By	Checked By	Comments

NOTE: Each position has a maximum allowable voltage reading. Should any reading exceed that value, record the value, turn the S-1 switch to OFF and notify the blockhouse engineer.

Switch Position	Maximum Allowable Voltage (Millivolts)	Reading
Shield		
IGN 1 RLY	50	______
IGN 2 RLY	50	______
SEP A RLY	50	______
SEP B RLY	50	______
IGN 1 SQUIB	50	______
IGN 2 SQUIB	50	______
SEP A SQUIB	50	______
SEP B SQUIB	50	______
MID-QUAD	50	______
QUAD OUTPUT	50	______

11. Turn the S-1 switch to OFF.

12. Disconnect the ordnance test cable at the spacecraft.

13. Replace the SAFE ordnance test connector.

14. Notify the spacecraft electrical engineer that the no voltage check is complete.

15. Notify the test conductor that the spacecraft no voltage test is complete, and request permission to proceed with the final arming.

16. Remove the SAFE ordnance plug.

Step	Performed By	Checked By	Comments
17. Install the LIVE ordnance plug, using yellow locktite.			
18. Remove the SAFE ordnance test plug.			
THE SPACECRAFT IS NOW ARMED.			
19. Install the LIVE ordnance test plug, using yellow locktite.			
20. Secure the "Turn-On Plug Door" with yellow locktite.			
21. Notify the test conductor that the spacecraft arming has been completed.			

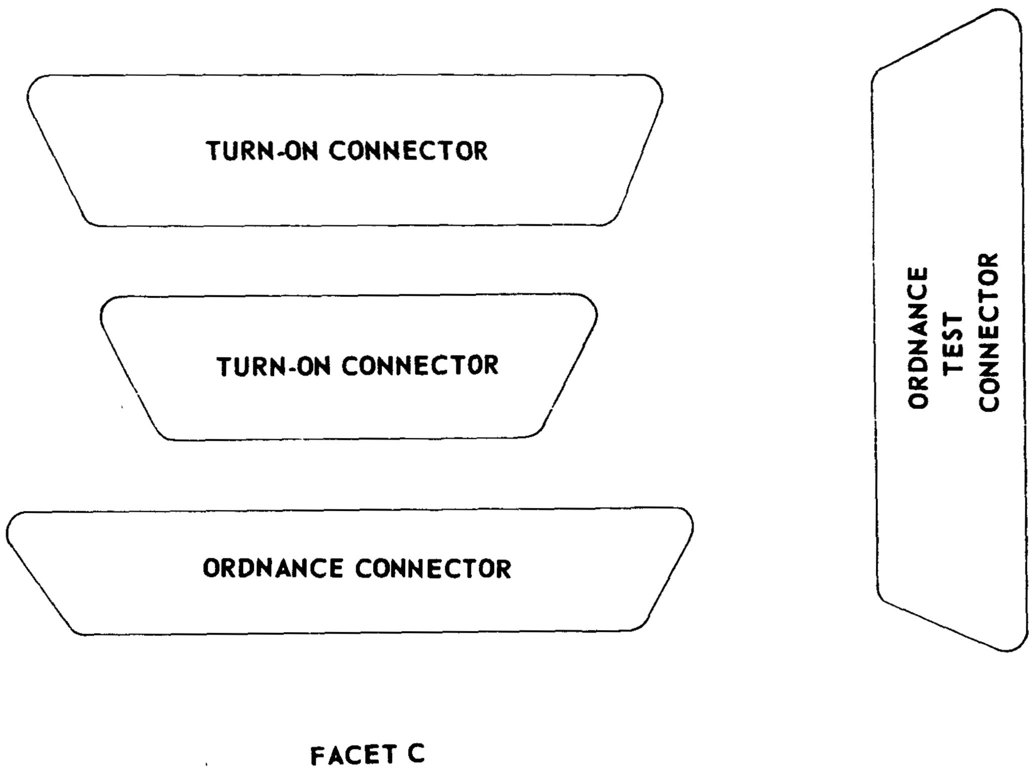


Figure 1. Spacecraft Connector Locations