TH 3/Bragg
ALSEP papers

MINUTES

Tenth Apollo Lunar Surface Program

Interface Meeting

September 7, 1967

The tenth of a series of Apollo Lunar Surface Program Interface meetings was held at The Bendix Aerospace System Division, Ann Arbor, Michigan, September 7, 1967.

Mr. Joe Clayton, Bendix ALSEP Program Director, opened the meeting and welcomed all to Bendix. Mr. Small, Manager, Lunar Surface Project Office then introduced Dr. C. O. Alley of the University of Maryland as the PI for the Lunar Laser Ranging Retro-Reflector experiment.

Each organization (PI's, contractors, etc.) gave a status report which included the following:

a. Overall schedule status

b. Accomplishments to date

c. Forecasted accomplishments

d. Problems

The enclosed agenda shows the organizational elements and subject material presented. Presentation material used is attached. Pertinent points discussed are briefly summarized below:

a. The schedule presented by Dr. Snyder on the SWS shows that the Qual Model will marginally support the required delivery. However, due to conflicts with OGO calibration, it probably will be shipped uncalibrated. Dr. Snyder introduced Mr. Bob White who is replacing Mr. Gary Walker as project engineer at Jet Propulsion Laboratories.

b. Mr. Herb Cross, speaking for Dr. Sonett, stated that the LSM design is now frozen. The Proto type unit has been delivered. The Qual unit does not support the System Qual at Bendix.

c. The PSE schedule was presented as supporting the System Qual. However, a recently discovered problem could cause some delay. Dr. Latham requested and was given Mr. Phil Claskey, at Teledyne, as a point of contact for Test Program Status. LGO plans to have continuous coverage during all testing at Teledyne and Bendix.

d. The SIDE schedule was reported as approximately 3 weeks late to support the System Qual at Bendix. This is due basically to long calibration time.

e. The CCGE gauge is currently undergoing mount revision. However can still support system testing.

f. Dr. C. Alley gave a brief description of the Lunar Laser Ranging Experiment including the scientific objectives. It was pointed out by Mr. Small that this experiment has not been assigned to a flight but development and fabrication is geared to the first Lunar landing mission.

g. Mr. Al Schorken presented the ALSEP Test Program Status and briefly described the planned tour of Plant #2.

h. After the tour Mr. John Driscoll described the LM/ALSEP Interface Design Summary and Mr. J. Burns presented the ALSEP Status.

i. An integrated lunar surface program schedule is enclosed.

The following action items resulted from the meeting:

B70907-01M - MSC will provide clarification of ALSEP hardware nomenclature by October 1, 1967.

Mr. Moke to each PI.

B70907-02S - ARC to provide impact to add survival heater to LSM by October 1, 1967.

Mr. Cross to Mr. Moke.

B70907-03B - Bendix to provide plan for calibration of GFE/GSE by September 21, 1967.

Mr. Clayton to Mr. Small.

John W. Small, Manager
Lunar Surface Project Office

AGENDA

APOLLO LUNAR SURFACE EXPERIMENTS PACKAGE

Interface Meeting

Bendix Aerospace Systems Division

Ann Arbor, Michigan

September 7, 1967

9:00 a.m.	Welcome	Mr. J. Clayton
9:05	Introduction	Mr. J. Small
9:15 - 1:30 p.m.	Organizational Status Reports: . Overall Schedule Status . Accomplishments To Date . Forecasted Accomplishments . Problems	
9:15	SWS	Dr. C. Snyder
9:30	LSM	Dr. C. Sonett
9:45	PSE	Dr. G. Latham
10:00	SIDE	Dr. J. Freeman
10:15	CCGE	Dr. F. Johnson
10:30	CPLEE	Dr. B. O'Brien
10:45	ASE	Dr. R. Kovach
11:00	HFE	Dr. M. Langseth
11:15	LRR	Dr. C. Alley
11:30	DRILL	Mr. M. Goldman
11:45	RTG	Mr. W. Remini

12:00 Noon	ALSEP Test Program Status	Mr. A. Schorken
12:30 p.m.	Lunch	
1:30	Review of ALSEP Plant #2 Operations (Prototype Testing, Manufacturing, Human Factor, etc.)	
3:00	ALSEP Status	Mr. J. Clayton
3:30	LM/ALSEP Interface Design Summary	Mr. J. Driscoll
4:00	Question Period	
4:30	Adjourn	

ATENDEES

L. Tiffany	Bendix
A. Ketler	General Electric
J. Burns	Bendix
G. Chang	Bellcomm, Inc.
J. McDowell	Bendix
R. Shay	Bendix
R. Kovach	Stanford University
G. Latham	Columbia University
P. Maloney	NASA-MSC
J. Langford	NASA-MSC
R. Moke	NASA-MSC
J. Clayton	Bendix
J. Small	NASA-MSC
C. Schorken	Bendix
J. Kenney	NASA-MSC at Bendix
J. Sanders	NASA-MSC
A. Collins	Bendix
R. Swain	Teledyne
R. Schmidt	Bendix
P. Hickson	Bellcomm, Inc.
J. Zill	NASA-MSC
W. Sandstrom	Marshall Labs.
W. Smith	Rice University
J. Stenning	Bendix
E. Van Valkenburg	Bendix

J. Musslewhite	Rice University
A. Robinson	Bendix
J. Dye	Bendix
G. Walker	Jet Propulsion Laboratory
W. Collier	Jet Propulsion Laboratory
B. White	Jet Propulsion Laboratory
J. Redd	NASA-MSC
D. Sherwood	NASA-MSC
J. Harris	NASA-MSC
M. Yates	Bellcomm, Inc.
H. Rudolph, Jr.	NASA-KSC
W. Johnson	Bendix
C. Ahlstrom	Bendix
J. Grayson	NASA-MSC
L. Fekete	Grumman Aircraft Engineering Corp.
T. Newman	Grumman Aircraft Engineering Corp.
L. Lewis	Bendix
C. McClenny	NASA-MSC
K. McDermott	Columbia University
H. Miller	Bendix
H. Greider	NASA-MSC
L. Paine	Bendix
A. Stephenson	NASA-MSC
J. Sulester	NASA-MSC
R. Longmire	NASA-MSC
R. Irwin	NASA-MSC

W. Dunaway	NASA-MSC
C. Vaughn	NASA-MSC
W. Durrett	NASA-KSC
J. Driscoll	Grumman Aircraft Engineering Corp.
G. Young	Teledyne
E. Davin	NASA Headquarters
H. Culver	Goddard Space Flight Center
K. Schaver	Bendix/GSFC
F. Pallon	Bendix/GSFC
J. Lewko	Bendix
W. Collier	Jet Propulsion Laboratory
M. Goldman	Martin-Marietta Corporation
W. Remini	NASA-MSC
J. Carroll	Graduate Research Center of the Southwest
Dr. J. Freeman	Rice University
Dr. C. Alley	University of Maryland
Dr. B. O'Brien	Rice University
H. Cross	Ames Research Center
Dr. C. Snyder	Jet Propulsion Laboratory

SOLAR WIND SPECTROMETER

SCHEDULE AND STATUS

UNIT	STATUS	SCHEDULED DELIVERY TO BASD
SN 5 QUAL 1	95% COMPLETE	SUBSEQUENT TO 10 SEPTEMBER TO BE NEGOTIATED
SN 6 QUAL SPARE	75% COMPLETE STALLED FOR TRANSFORMER	6 NOVEMBER
SN 7 FLIGHT 1	60% COMPLETE	27 NOVEMBER
SN 8 FLIGHT 1 SPARE	40% COMPLETE	18 DECEMBER

SWS PROBLEMS

1. CHOICE OF HIGH-VOLTAGE RESISTOR
2. SENSOR MOUNTING
3. STRENGTH OF HIGH-VOLTAGE STANDOFFS
4. BREAKAGE OF FILAMENTS FOR DUST COVER REMOVAL
5. REJECTION OF POWER TRANSFORMERS FOR FLIGHT UNITS

SWS FORECAST

1. COMPLETE QUALIFICATION OF SENSOR
2. INSTITUTE FAILURE REPORTING TO MSC
3. APPROVE CALIBRATION PROCEDURE
4. EVALUATE RESULTS OF PROTO-G TEST AND TAKE APPROPRIATE ACTION
5. IMPLEMENT SOLUTIONS TO HIGH-VOLTAGE ARCING PROBLEM
6. SELECT HIGH-VOLTAGE RESISTOR

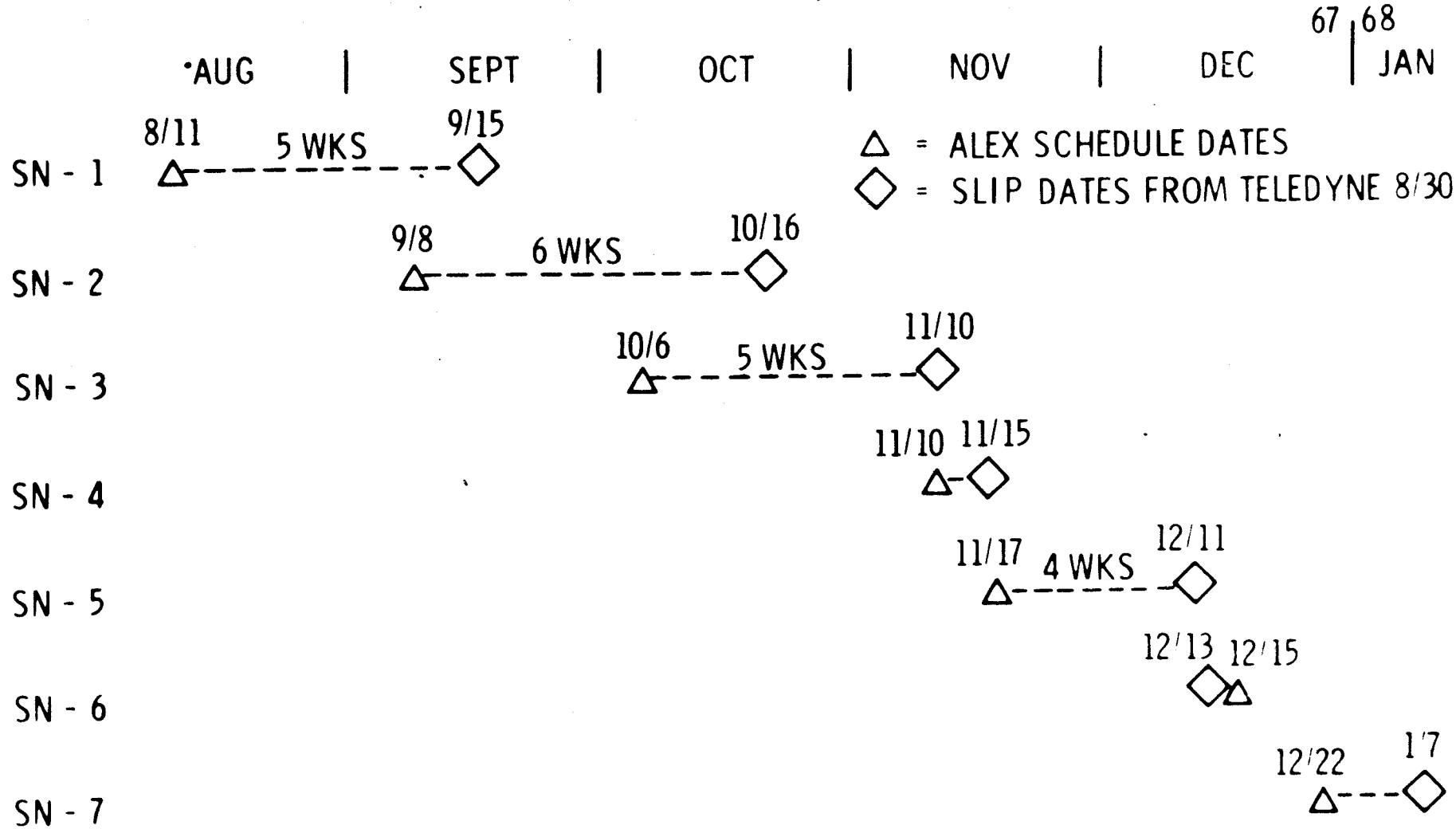
SWS ACCOMPLISHMENTS

1. CALIBRATION PROCEDURE GENERATED
2. MECHANICAL STRUCTURE DESIGN AND INTERFACE FINALIZED
3. INSTRUMENT QUAL TESTING SUCCESSFULLY COMPLETED, EXCEPT FOR SENSOR
4. FAILURE REPORTING SYSTEM WITHIN EOS AND JPL INSTITUTED
5. SENSOR STIMULATOR TESTED AND APPROVED
6. THERMAL-MECHANICAL SIMULATION UNIT CONSTRUCTED AND DELIVERED
7. SWS NO. 4 DELIVERED TO JPL
8. FIRST ARTICLE CONFIGURATION INSPECTION COMPLETED, INCLUDING
   - A. FREEZE OF DELIVERABLE DOCUMENTS
   - B. FREEZE OF HARDWARE DESIGN, INSPECTION TECHNIQUES, AND FABRICATION DETAILS
   - C. DRAWING FREEZE
   - D. IMPLEMENTATION OF CONFIGURATION CONTROL
   - E. APPROVAL OF INSTRUMENT PERFORMANCE

COPIES OF MR. H. CROSS'S SLIDES

WERE NOT AVAILABLE AT PRESS TIME

PSE PRODUCTION SCHEDULE



4422-2700

PSE ACCOMPLISHMENTS - I

- LGO TESTS (MODEL EM-2)
  - OPERATION THROUGH 26 JULY
  - LIGHTNING DAMAGE 26 JULY
  - RETURNED TO TELEDYNE
    - RETAIN AS REFERENCE MODEL
  - DVT UNIT TO LGO AFTER TESTS
    - LONG TERM FUNCTIONAL TESTS

4422-2703

PSE ACCOMPLISHMENTS - III

- DVT
  - SCHEDULED TO RESUME WEEK OF 4 SEPT
  - DELAY CAUSED BY
    - PERIOD ADJUSTMENT
      - FLEXURE SPRING RATE
    - DRIVE SCREW PASSIVIZATION
      - RECOATED
    - CAGING MECHANISM
      - REVISIONS MADE, PASSES LEAK TEST
    - NOISE EVALUATION
      - UNIT USED IN TEST
    - LPZ CLAMSHELL INSTALLATION
      - LATEST DESIGN

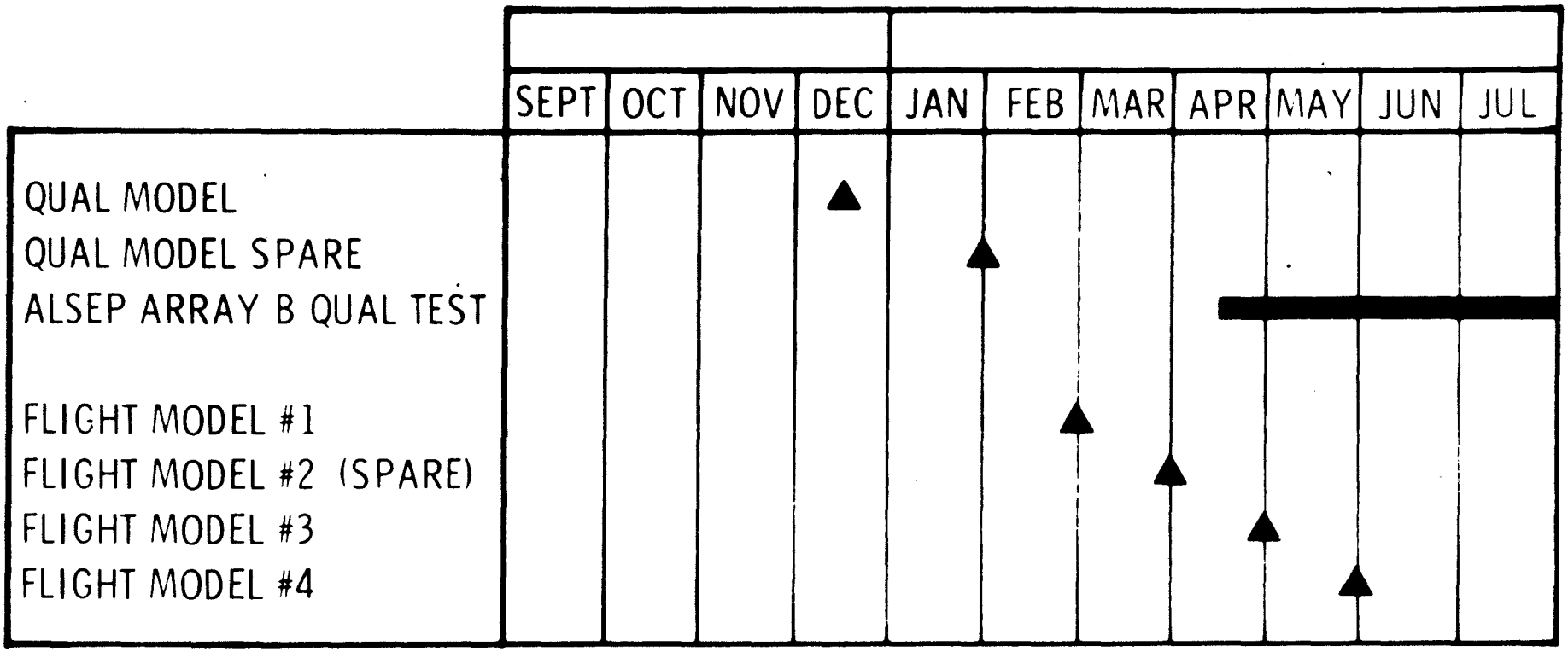
4422-2701

PSE ACCOMPLISHMENTS - II

- PROTO
  - RETURNED TO BxA 1 AUG
    - NEW BELLOWS
    - NEW LPZ CLAMSHELL
    - NOISE SURPRESSION MODS
  - PRE-INTEGRATION TESTS 2-3 AUG.
  - INTEGRATION TESTS 4 AUG.
    - SENSOR EXCITER MODIFIED TO
    - ELIMINATE CAL SIGNAL LOADING
    - INTEGRATION TESTS REPEATED 31 AUG

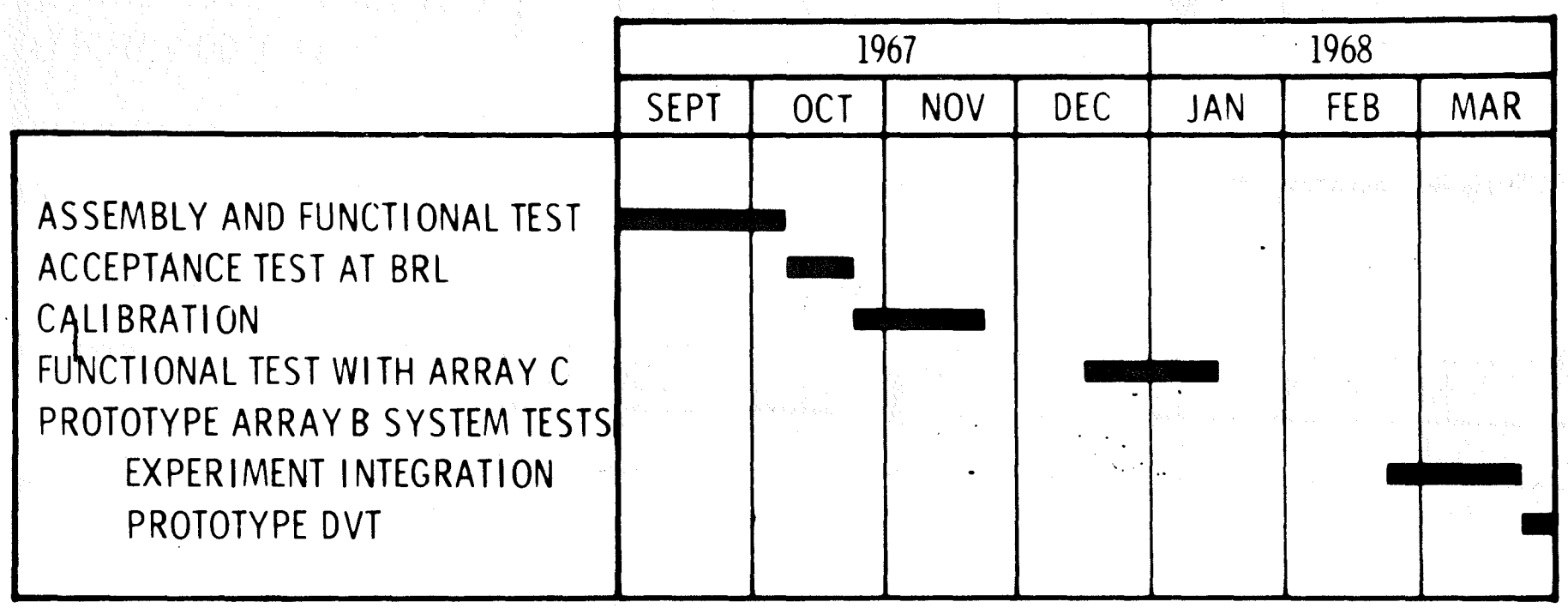
4422-2702

CPLEE QUALIFICATION AND FLIGHT MODEL SCHEDULE



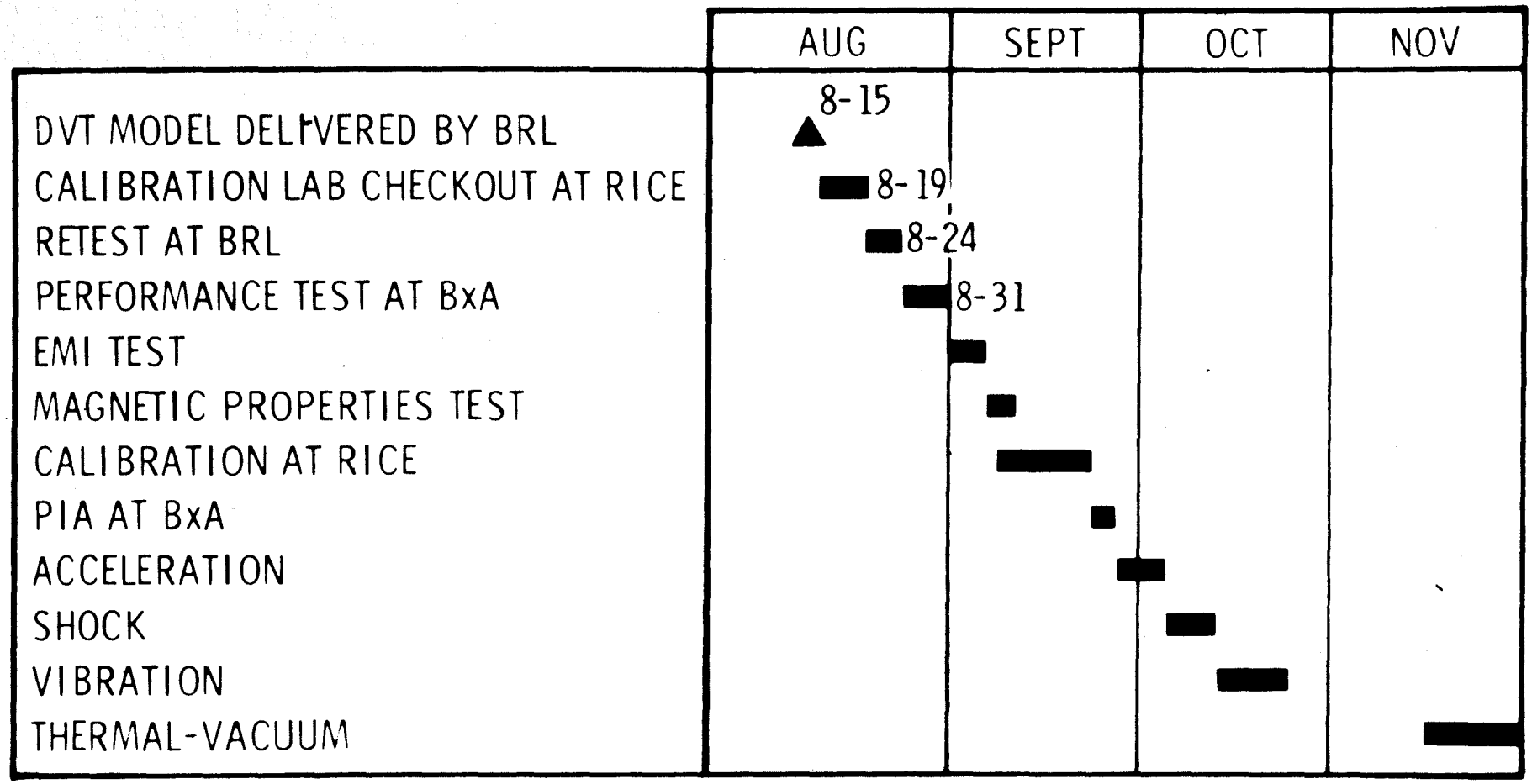
4422-2709

CPLEE PROTOTYPE SCHEDULE



4422-2708

CPLEE DESIGN VERIFICATION TEST MODEL



4422-2707

MAJOR ACCOMPLISHMENTS CPLEE

- DESIGN VERIFICATION TEST MODEL DELIVERED BY BRL
- FUNCTIONAL TEST PERFORMED AT RICE CALIBRATION LAB.
- DVT TESTS STARTED AT BxA
- ALL SUBASSEMBLIES FABRICATED FOR CPLEE PROTOTYPE MODEL
- 70 % OF QUAL MODEL SUBASSEMBLIES FABRICATED.

4422-2704

CPLEE PROBLEMS

- RADIAL CRACKS IN SWAGED TERMINALS
- BLACK COATINGS ON PHYSICAL ANALYZER BAFFLES AND APERTURES
- VACUUM TEST FACILITIES AT BRL
- COMPLETION OF IN-PROCESS AND SUB-ASSEMBLY TEST SPECIFICATIONS

4422-2705

ACTIVE SEISMIC EXPERIMENT

SCHEDULE STATUS

- OVERALL SCHEDULE-NO CHANGE
- SUB-CONTRACTOR SLIP (TRANSMITTER PROBLEM)

ACCOMPLISHMENTS

- SUCCESSFUL RECEIVER QUAL TEST
- GRENADE BALLAST REMOVAL CHANGE
  3 GRENADES, TOTAL 0.6 LBS
- GLA/GLA T/S REWORK COMPLETED
  - MODIFIED GLA
  - MODIFIED TEST SET
  - NEW CABLES
  - NEW PROCEDURES

  } VERIFIED BY INERT GLA TEST

- SOS RESUMED GRENADE TESTING

4422-2716

ACTIVE SEISMIC EXPERIMENT

ACCOMPLISHMENTS (CONTINUED)

- BENDIX BOARD OF INQUIRY COMPLETED
  - ASE INVESTIGATION
  - ASE CORRECTIVE STEPS

  } CONCURRENCE
- WSTF PROGRAM
  - INITIAL SUBSYSTEM TESTS COMPLETED
  - SYSTEM NOISE CHECK AT WSTF
- △ CDR AT GEOTECH
  - S/N LEVEL CHANGE IMPLEMENTED
  - QUAL UNIT COMPLETED ACCEPTANCE TESTS
- DVT PLAN COMPLETED

4422-2717

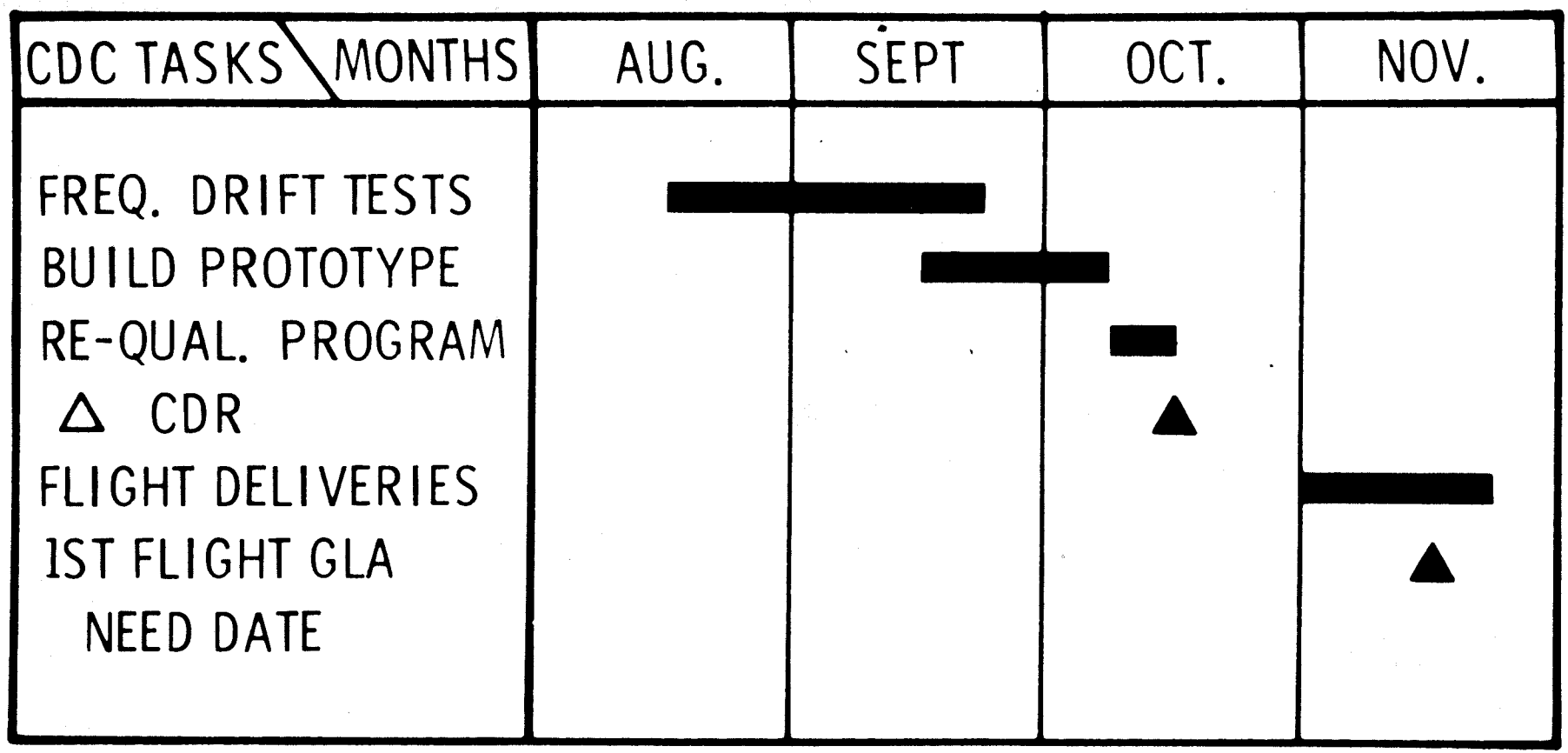
ACTIVE SEISMIC EXPERIMENT

PROBLEMS

- TRANSMITTER LONG TERM FREQ. DRIFT
  - CDC TEST/EXPERIMENTAL MODEL PROGRAM
  - BERRY RECEIVER STUDY
- INCLINOMETER
  - NEW ANGLE SENSOR EVALUATION
  - RANGE ACCURACY ANALYSIS
- TEST EQUIPMENT

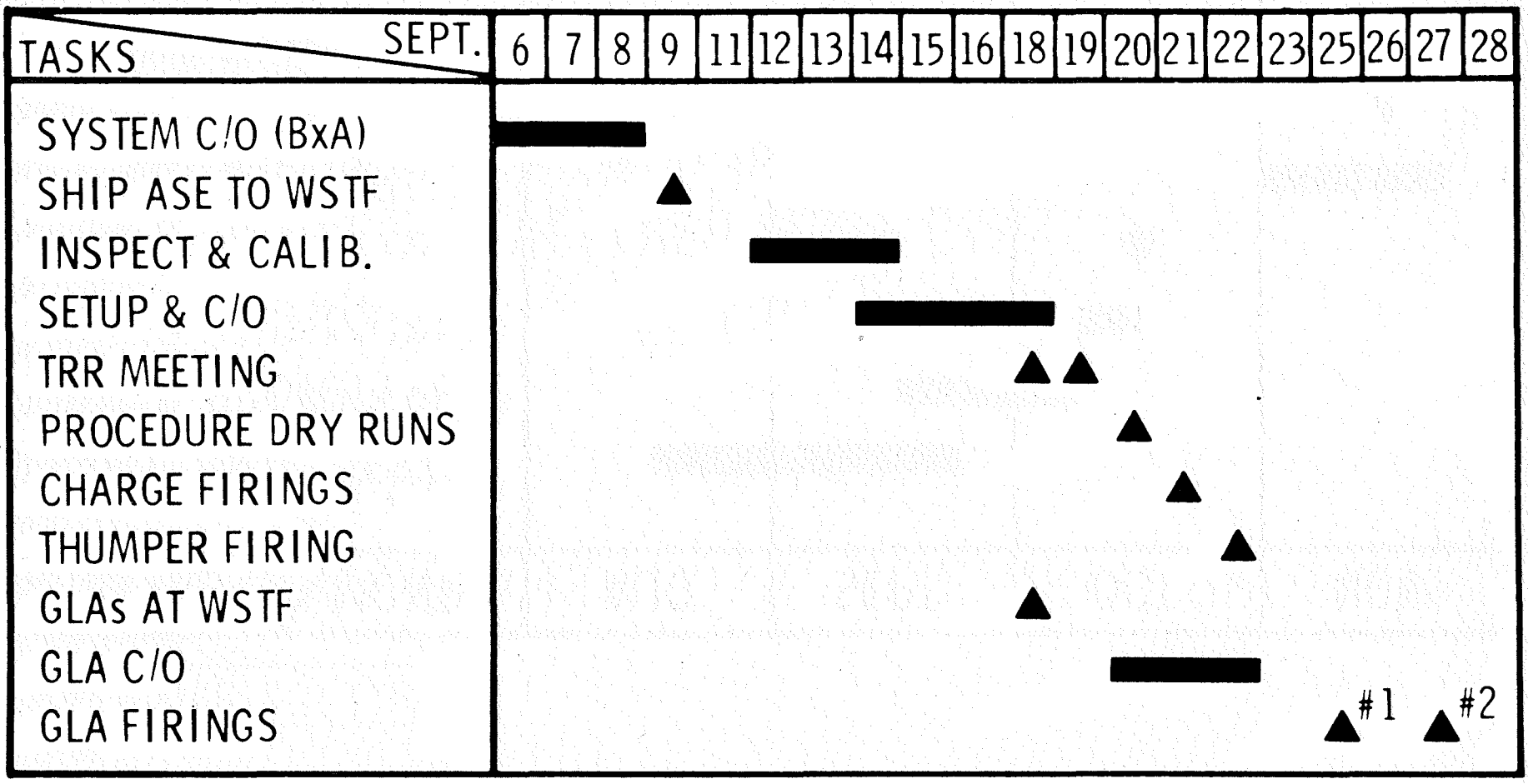
4422-2718

ASE TRANSMITTER SCHEDULE



4422-2721

ASE/WSTF PROGRAM



4422-2720

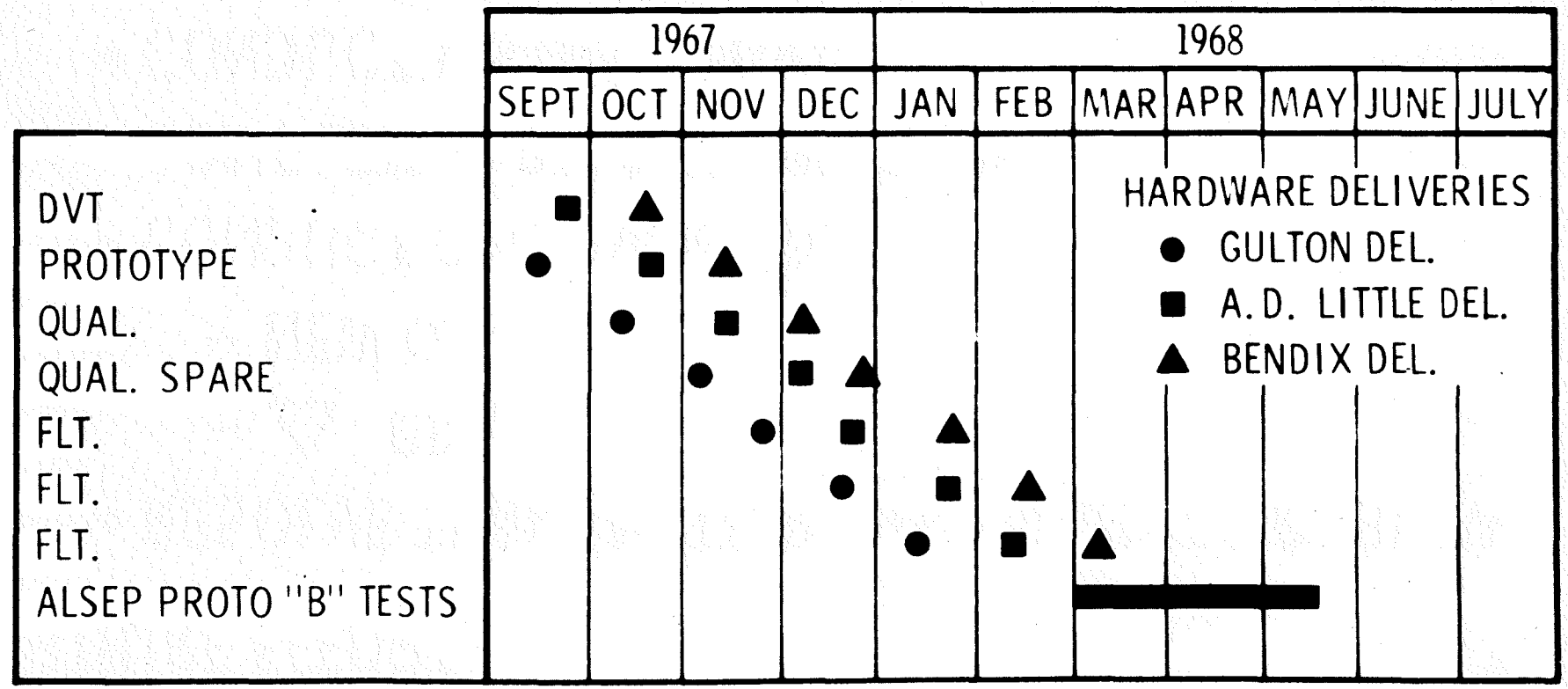
ACTIVE SEISMIC EXPERIMENT

FUTURE EFFORTS

- RESOLVE TRANSMITTER FREQ. DRIFT PROBLEM
  - △ CDR
  - NEW QUAL
- CONDUCT RECEIVER CDR
- COMPLETE & DELIVER WSTF GLAs
- CONDUCT WSTF PROGRAM
  - COMPLETE SYSTEM TEST AT BxA
  - TRR MEETING
  - CONDUCT TESTS AT WSTF

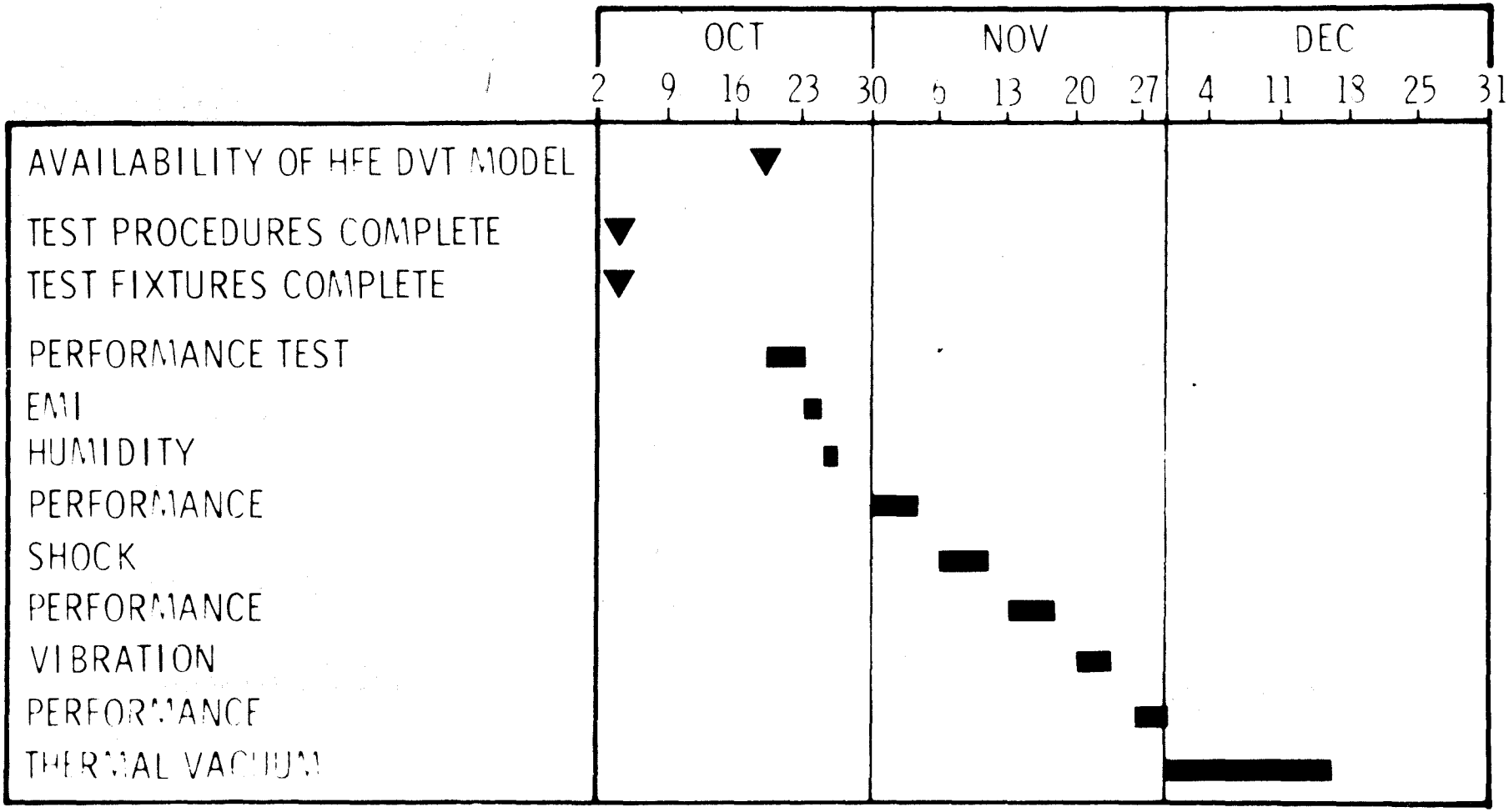
4422-2719

H.F.E. DELIVERABLE HARDWARE SCHEDULE



4422-2710

H.F.E. DESIGN VERIFICATION TEST SCHEDULE



4422-2711

ACCOMPLISHMENTS TO DATE

1. ENGINEERING MODEL 2 ELECTRONICS SHIPPED FROM GULTON TO A. D. LITTLE ON 8/4/67.
2. DVT (FORMER PROTO) MODEL ELECTRONICS SHIPPED FROM GULTON TO A. D. LITTLE ON 8/17/67.
3. THE QUAL #1 (FORMER QUAL #2) IS UNDERGOING ELECTRICAL CHECKOUT AT GULTON.
4. ALL OF THE PROBE AND PROBE PACKAGE DRAWINGS HAVE BEEN APPROVED AT A. D. LITTLE.
5. E2 TRAINING SIMULATOR AT A. D. LITTLE IS BEING UPDATED TO LATEST DRAWINGS CONFIGURATION.
6. THE CONTENTS OF THE ACCEPTANCE DATA PACKAGE TO BE USED BY A. D. LITTLE HAS BEEN APPROVED.

4422-2712

ACCOMPLISHMENTS TO DATE (CONT.)

7. THE PROBES ARE BEING INTEGRATED WITH THE ENGINEERING MODEL ELECTRONICS.
8. THE DVT PROBE (FORMER PROTOTYPE) HAVE BEEN ACCEPTED AT A. D. LITTLE. THEY ARE BEING INTEGRATED WITH THE ELECTRONIC AT A. D. LITTLE.
9. FLIGHT MODEL PROBE BEING ASSEMBLED.
10. THERMAL SIMULATOR CDR HAS BEEN HELD DURING JULY. ALL ACTION ITEMS HAVE BEEN COMPLETED.
11. TEST PLAN FOR DVT AT BENDIX COMPLETED AND ISSUED
12. APOLLO LUNAR SURFACE DRILL INTERFACE CONTROL SPECIFICATION HAS BEEN SIGNED OFF BY MARTIN, BxA AND MSC.

HFE MAJOR PROBLEMS

1. THE DVT MODEL HAD TO BE RETURNED TO GULTON TO REMOVE METAL CHIPS WHICH GOT INTO ELECTRONICS.
2. SOME DIFFICULTY IS BEING EXPERIENCED BY A. D. LITTLE IN SATISFYING THE REQUIREMENTS OF NPC 200-4 IN SOLDERING THE PROBE LEADS TO THE ELECTRONICS.
3. THE THERMAL SIMULATOR SHIPPING DATE HAS SLIPPED TWO WEEKS.

4422-2715

HFE MAJOR FORECASTED ACCOMPLISHMENTS

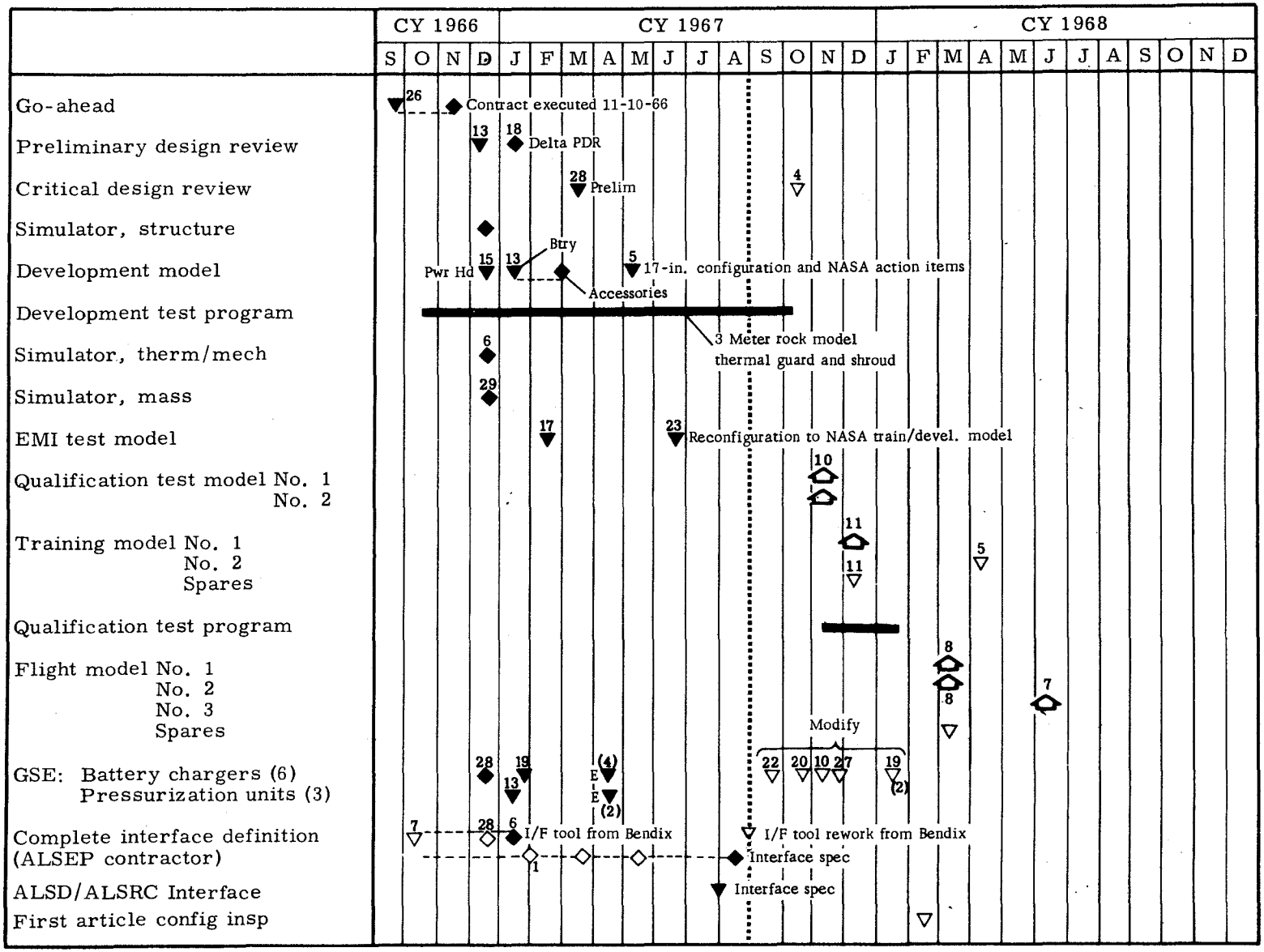
1. THE DVT MODEL SHOULD BE TESTED AT A. D. LITTLE AND INTEGRATED AT BENDIX DURING THE MONTH OF OCTOBER.
2. THE PROTOTYPE SHOULD BE SHIPPED FROM A. D. LITTLE DURING OCTOBER.
3. THE LABORATORY AND THERMAL VACUUM SIMULATORS SHOULD BE IN ACCEPTANCE TESTING DURING SEPTEMBER AND EARLY OCTOBER.
4. DESIGN VERIFICATION TESTING SHOULD START DURING OCTOBER.

COPIES OF DR. C. ALLEY'S SLIDES

WERE NOT AVAILABLE AT PRESS TIME

MAJOR MILESTONE SCHEDULE--ALSD

DPR 3-10
Appendix II



Status as of 8-31-67

DELIVERABLE GLFC HARDWARE

ENGINEERING UNITS -

- HARDWARE AVAILABILITY

M5 - PRIME CASK

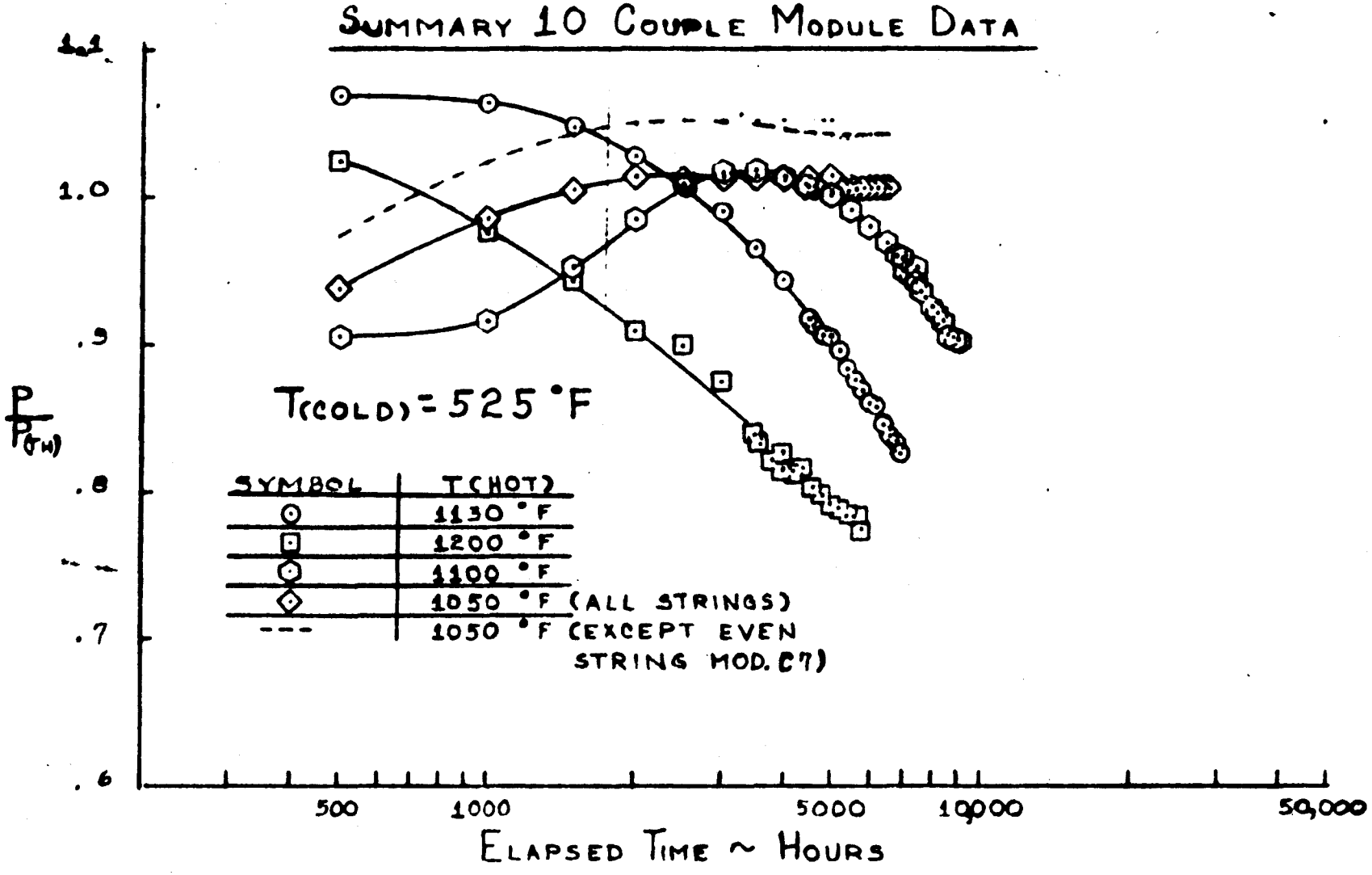
- QUALIFICATION PER PRIME UNITS
- SPARE WILL BE SPARE FOR ALL PRIME UNITS
- COMPLETION THROUGH AEC STAGE INSPECTION BY 4/15/68

M6 AND M7 - 1G AND 1/6G TRAINING MOCKUPS

- NON GRAPHITE MATERIALS - WOOD/MAGNESIUM
- WEIGHT/CG SIMULATION
- SIZE AND SHAPE SIMULATION
- OPERATING BREECH LOCK AND SPLINE MECHANISMS
- NO THERMAL OR LOAD REQUIREMENTS
- COMPLETION SET FOR 10/1/67

PRIME UNITS - 4 FLIGHT PLUS ONE SPARE

- TWO UNITS THROUGH STAGE INSPECTION BY 4/15/68
- THREE UNITS THROUGH STAGE INSPECTION BY 6/30/68


SUMMARY 10 COUPLE MODULE DATA
1.1
1.0
.9
.8
.7
.6
P/P(H)
T(COLD) = 525 °F
SYMBOL
T(HOT)
1130 °F
1200 °F
1100 °F
1050 °F (ALL STRINGS)
1050 °F (EXCEPT EVEN STRING MOD. C7)
500
1000
5000
10000
50,000
ELAPSED TIME ~ HOURS

PROCEDURE

1. INCOMING INSPECTION TEST, PCU TEST CHASSIS

   A. VISUAL INSPECTION

   B. ELECTRICAL BENCH TEST WITH SIMULATED PCU

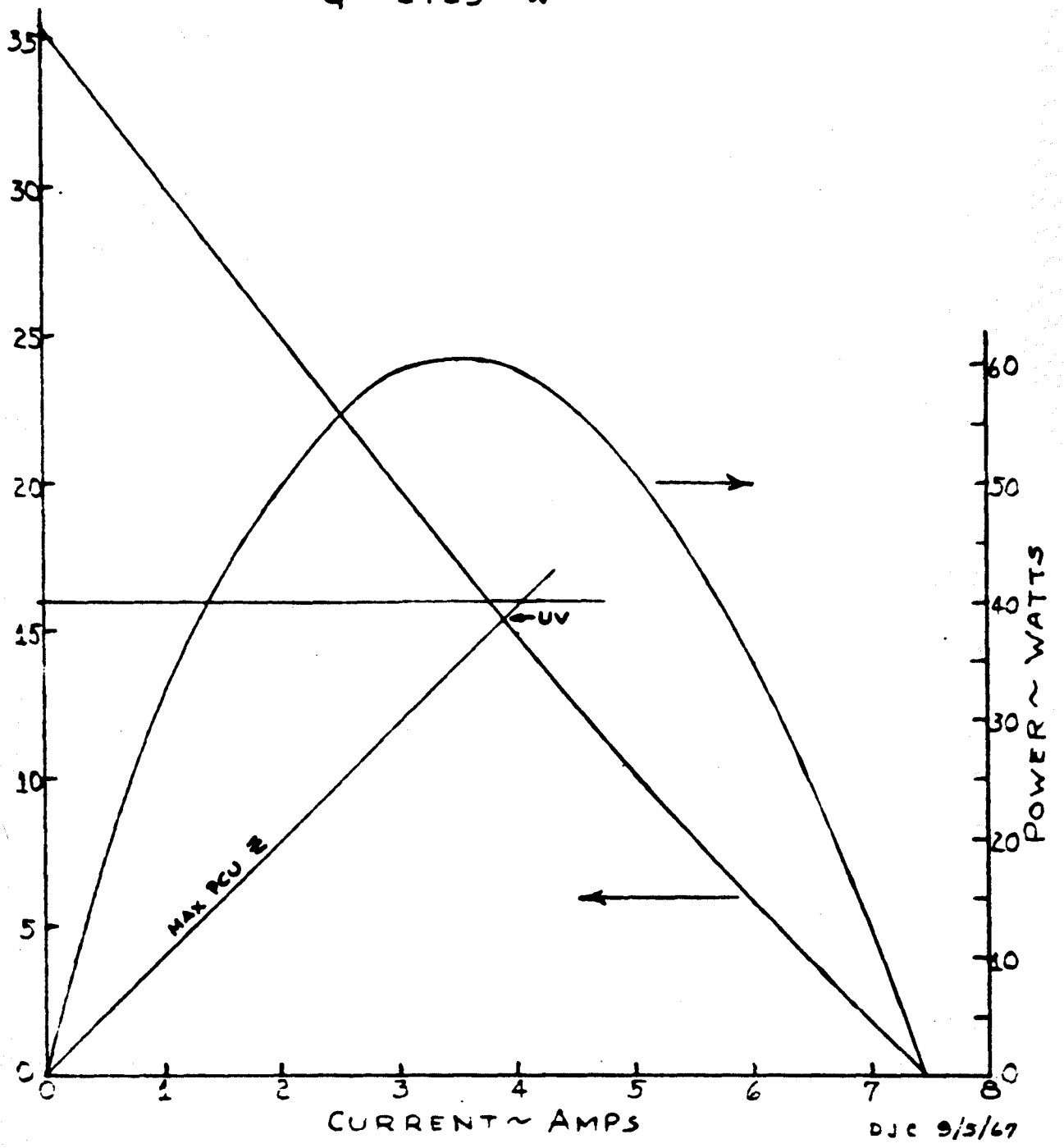
   C. ELECTRICAL BENCH TEST WITH BENDIX PCU

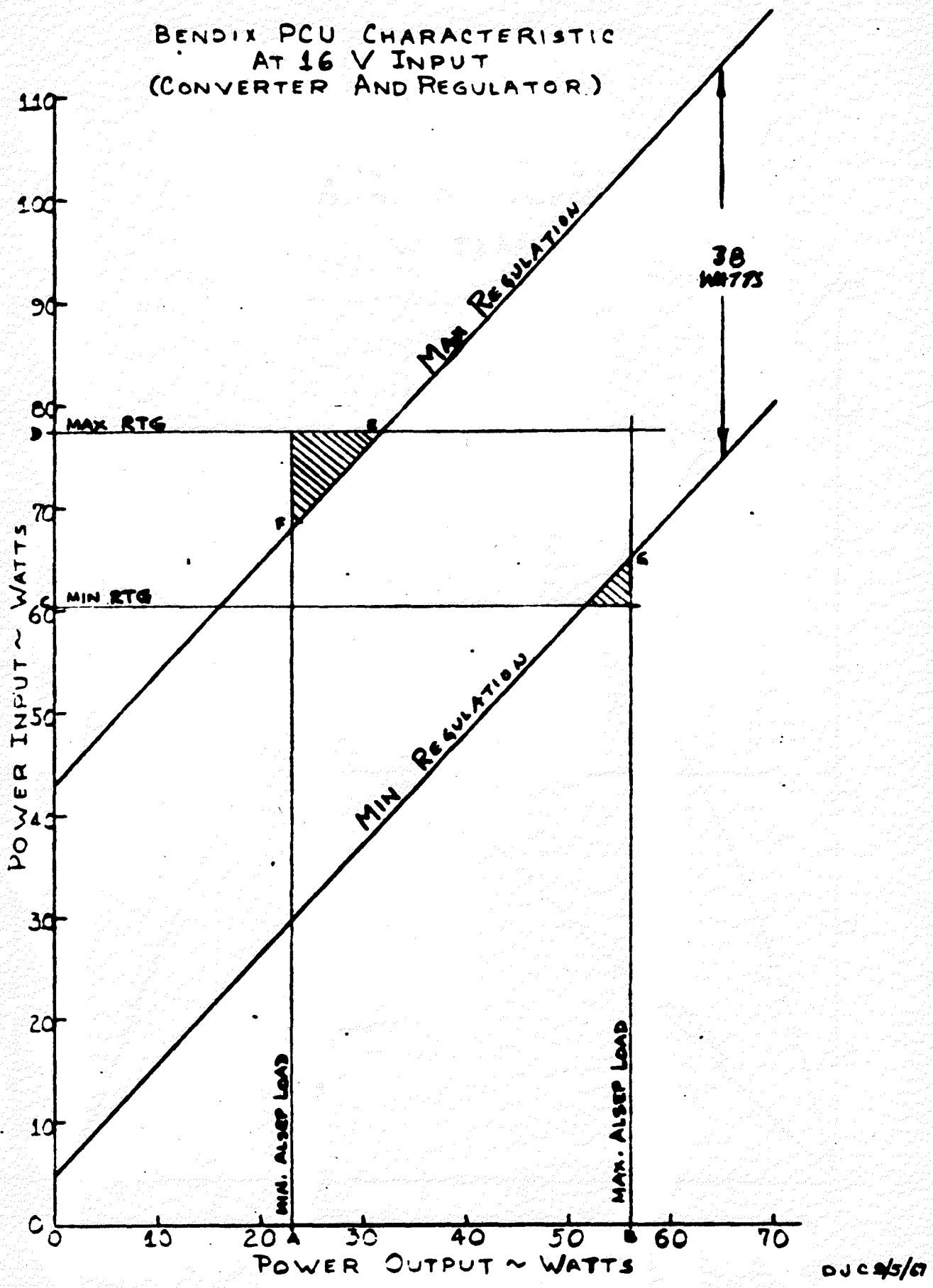
2. ELECTRICAL CHECKOUT, PCU TEST CHASSIS WITH IPU TEST CONSOLE

3. RTG-PCU INTEGRATION TEST

RTG CHARACTERISTIC
THEORETICAL MINIMUM

Q = 1415 W




BENDIX PCU CHARACTERISTIC
AT 16 V INPUT
(CONVERTER AND REGULATOR)
MAX REGULATION
38 WATTS
MAX RTG
MIN RTG
MIN REGULATION
MIN. ALSEP LOAD
MAX. ALSEP LOAD
POWER INPUT ~ WATTS
POWER OUTPUT ~ WATTS
0
10
20
30
40
50
60
70
80
90
100
110
A
B
C
D
E
F
G
DJC 9/5/67

42

RTG - PCU INTEGRATION TEST PROGRAM

PURPOSE

1. CHECK COMPATIBILITY OF PCU AND RTG DESIGNS.

2. DETERMINE PERFORMANCE CHARACTERISTICS OF PCU-RTG SYSTEM UNDER SELECTED CONDITIONS

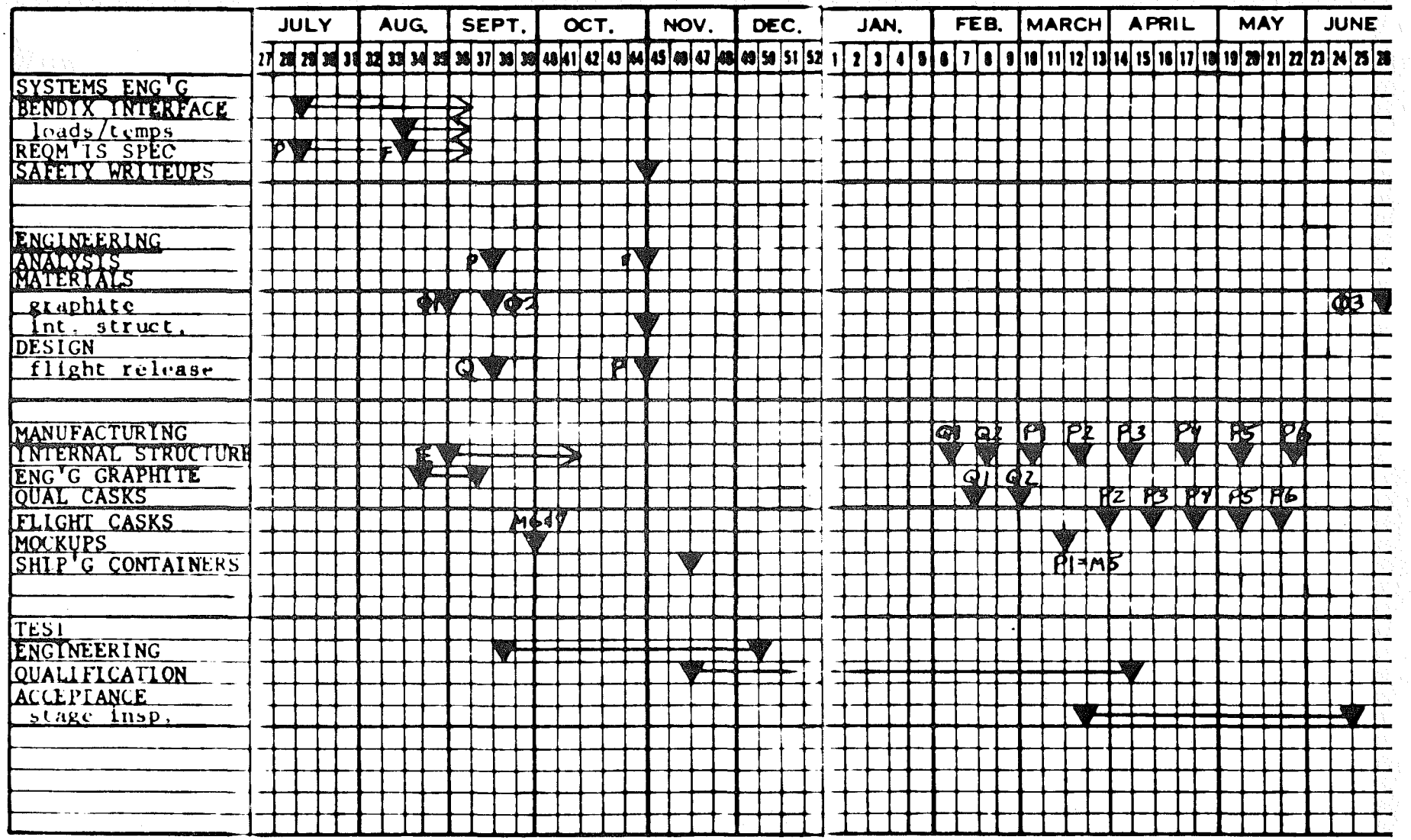
RTD TEST RESULTS - 1100°F UNITS

	NON VENTED			VENTED	
	1	2	3	4	5
PHASE I - 418 HOURS IN T/V	± .4%	± .4%	± .3%	± .15%	± .15%
	(3024)	(2896)	(2958)	(2977)	(3007)
CALIBRATION - CYCLING	± .005%	± .09%	± .05%	± .01%	± .015%
PHASE II - 200 HOURS IN T/V	± .10%	± .05%	± .05%	± .05%	± .05%
	(2992)	(2987)	(3041)	(3012)	(2972)

44

RTD STATUS

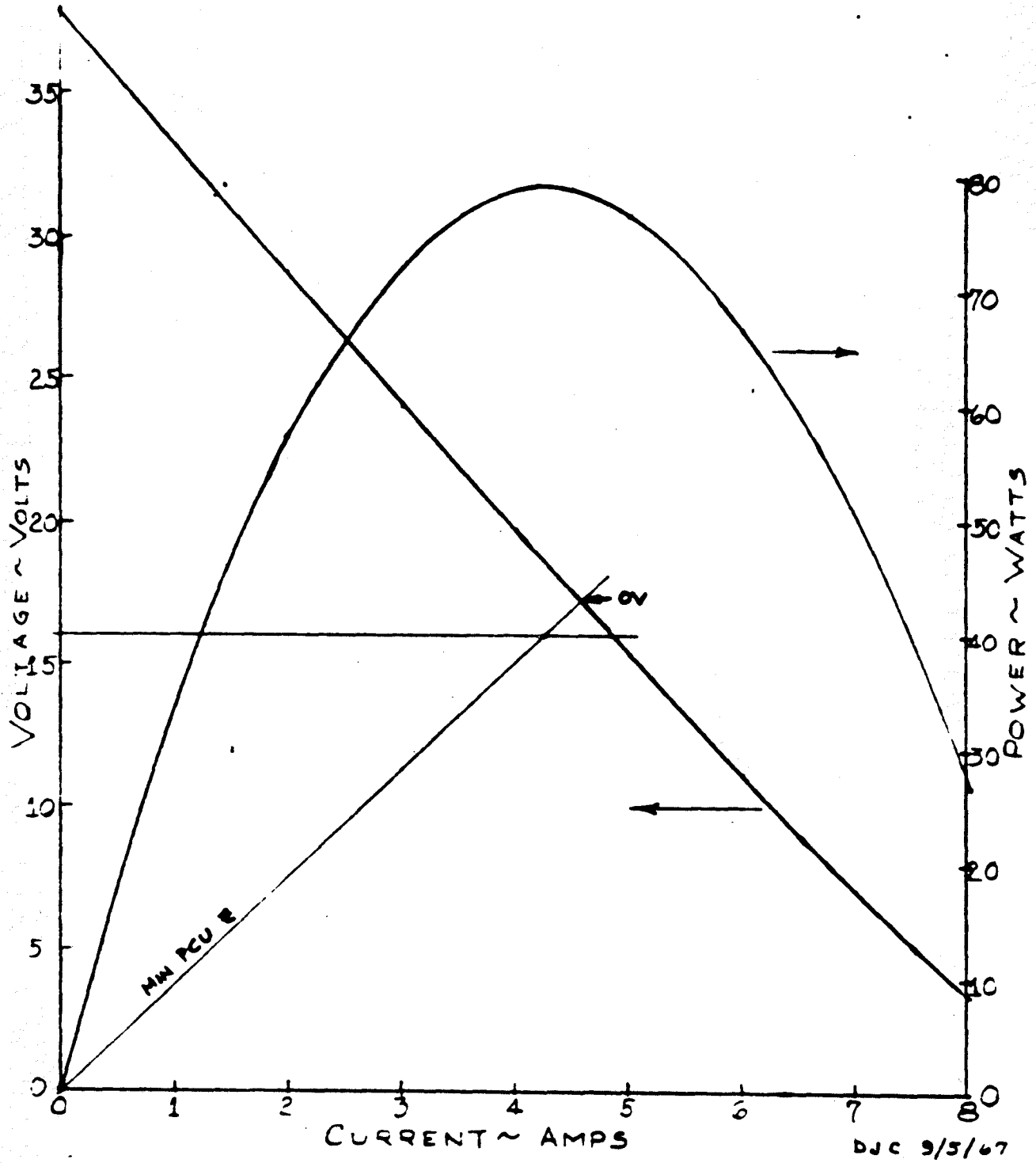
PROBLEMS:	MOISTURE ABSORPTION AND SLOW DRY OUT DUE TO SMALL CRACKS IN HERMETIC SEAL YIELDING LOW INSULATION RESISTANCE AND DRIFT
SOLUTION:	VENTING WITH POROUS PLUGS
RESULTS:	TESTING OF TWO VENTED AND THREE NON VENTED UNITS
	PHASE I - T/V TESTING BEFORE AMBIENT CALIBRATIONS
	PHASE II - T/V TESTING AFTER AMBIENT CALIBRATIONS
	ACCEPTANCE TESTING OF PRIME UNITS
CONCLUSIONS:	DRY OUT RATES ARE ACCELERATED AND UNITS ARE NOW CONSISTENTLY STABLE
	HERMETIC SEAL IS NOT NECESSARY
	UNITS MUST BE INDIVIDUALLY CALIBRATED TO EACH GENERATOR INSTALLATION

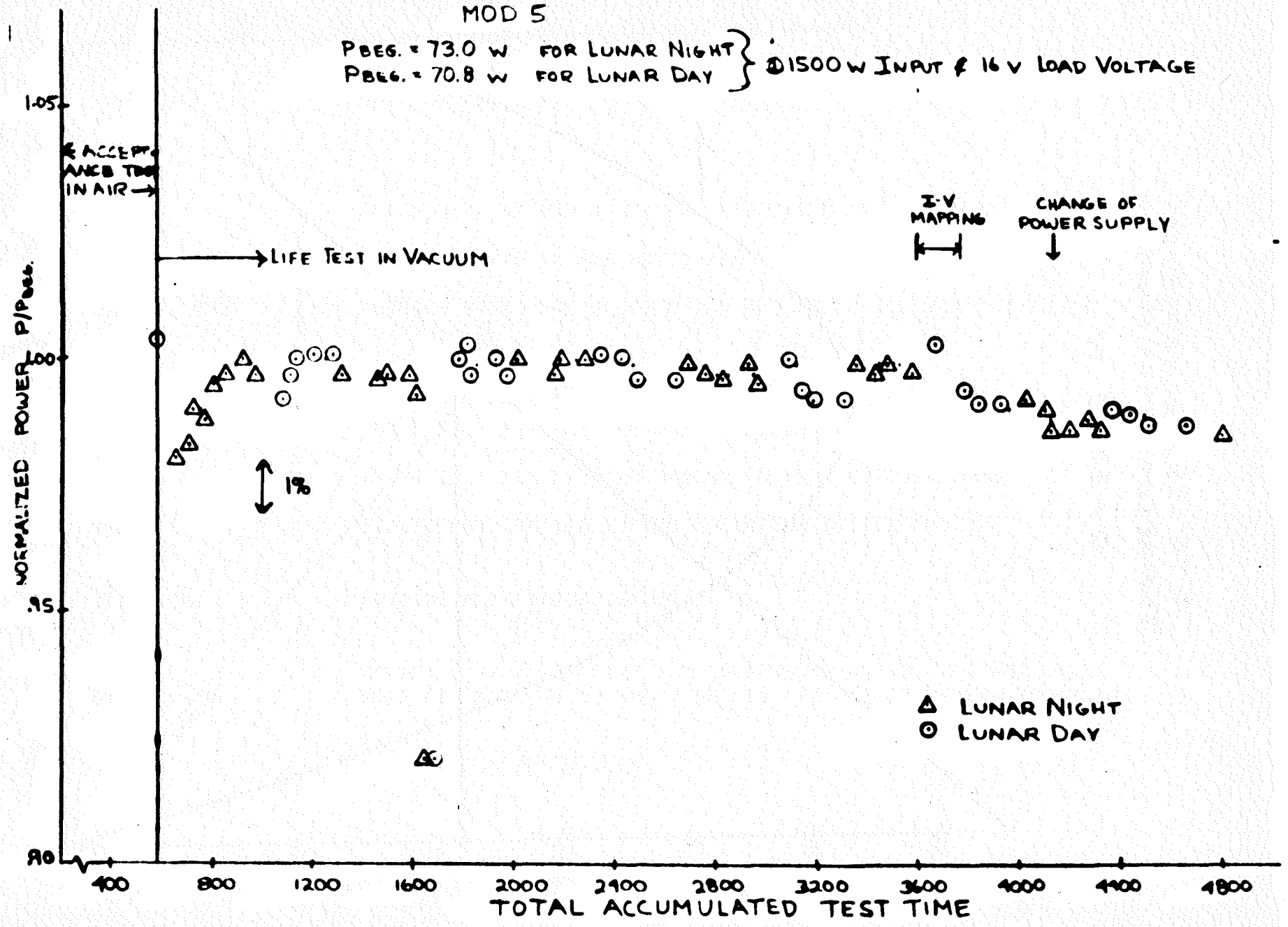


FORM 1134 REV. (12-66)

RTG CHARACTERISTIC
THEORETICAL MAXIMUM

Q = 1505 W




MOD 5
PBEG. = 73.0 W FOR LUNAR NIGHT
PBEG. = 70.8 W FOR LUNAR DAY
@ 1500 W INPUT & 16 V LOAD VOLTAGE
1.05
1.00
.95
.90
NORMALIZED POWER P/PBeg.
ACCEPTANCE TEST IN AIR
LIFE TEST IN VACUUM
I-V MAPPING
CHANGE OF POWER SUPPLY
1%
LUNAR NIGHT
LUNAR DAY
400
800
1200
1600
2000
2400
2800
3200
3600
4000
4400
4800
TOTAL ACCUMULATED TEST TIME

84

RTD STATUS

PROBLEMS:	MOISTURE ABSORPTION AND SLOW DRY OUT DUE TO SMALL CRACKS IN HERMETIC SEAL YIELDING LOW INSULATION RESISTANCE AND DRIFT
SOLUTION:	VENTING WITH POROUS PLUGS
RESULTS:	TESTING OF TWO VENTED AND THREE NON VENTED UNITS
	PHASE I - T/V TESTING BEFORE AMBIENT CALIBRATIONS
	PHASE II - T/V TESTING AFTER AMBIENT CALIBRATIONS
	ACCEPTANCE TESTING OF PRIME UNITS
CONCLUSIONS:	DRY OUT RATES ARE ACCELERATED AND UNITS ARE NOW CONSISTENTLY STABLE
	HERMETIC SEAL IS NOT NECESSARY
	UNITS MUST BE INDIVIDUALLY CALIBRATED TO EACH GENERATOR INSTALLATION

RTD TEST RESULTS - 1100°F UNITS

	NON VENTED			VENTED	
	1	2	3	4	5
PHASE I - 418 HOURS IN T/V	± .4%	± .4%	± .3%	± .15%	± .15%
	(3024)	(2896)	(2958)	(2977)	(3007)
CALIBRATION - CYCLING	± .005%	± .09%	± .05%	± .01%	± .015%
PHASE II - 200 HOURS IN T/V	± .10%	± .05%	± .05%	± .05%	± .05%
	(2992)	(2987)	(3041)	(3012)	(2972)

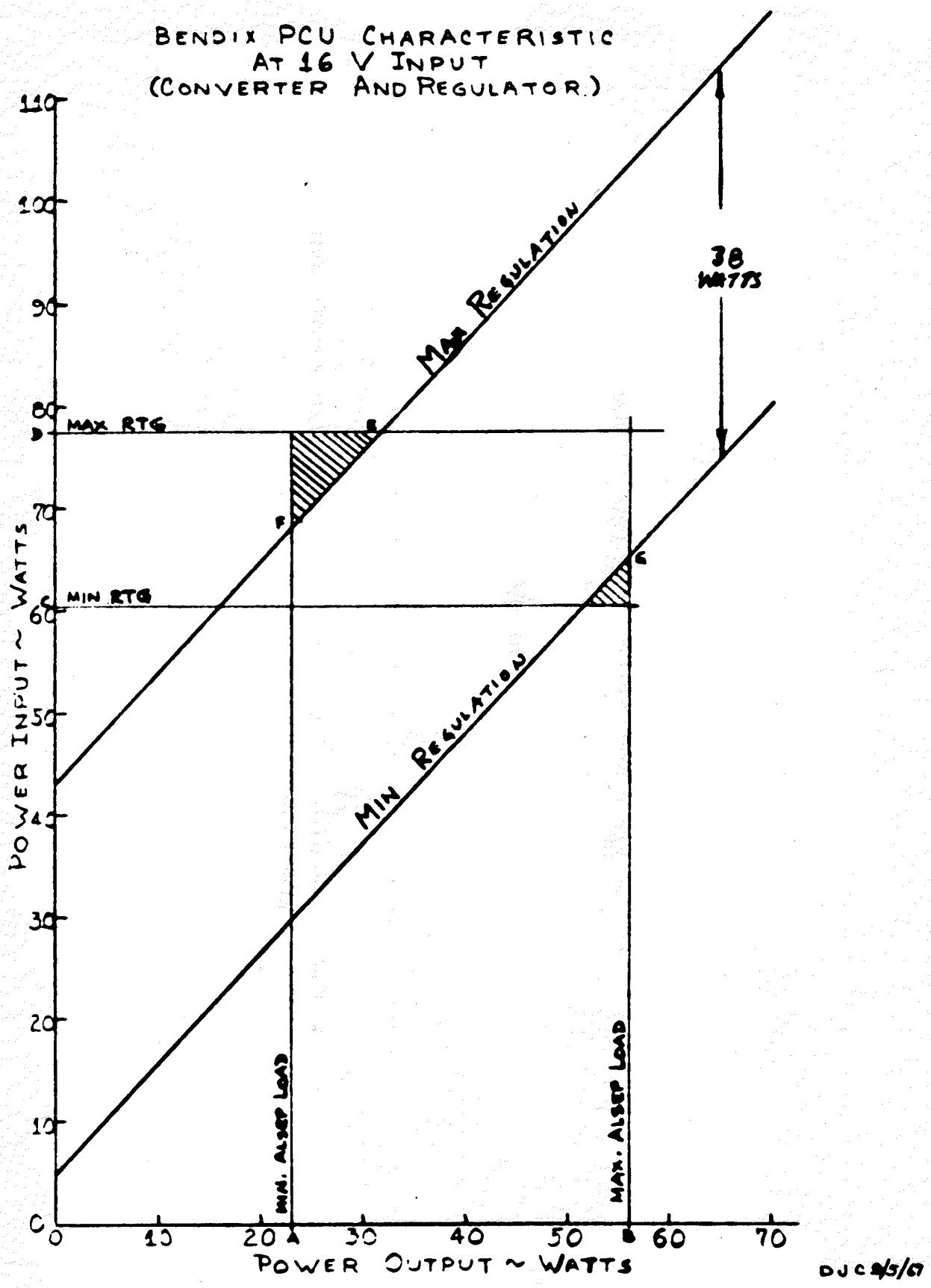
05

RTG - PCU INTEGRATION TEST PROGRAM

PURPOSE

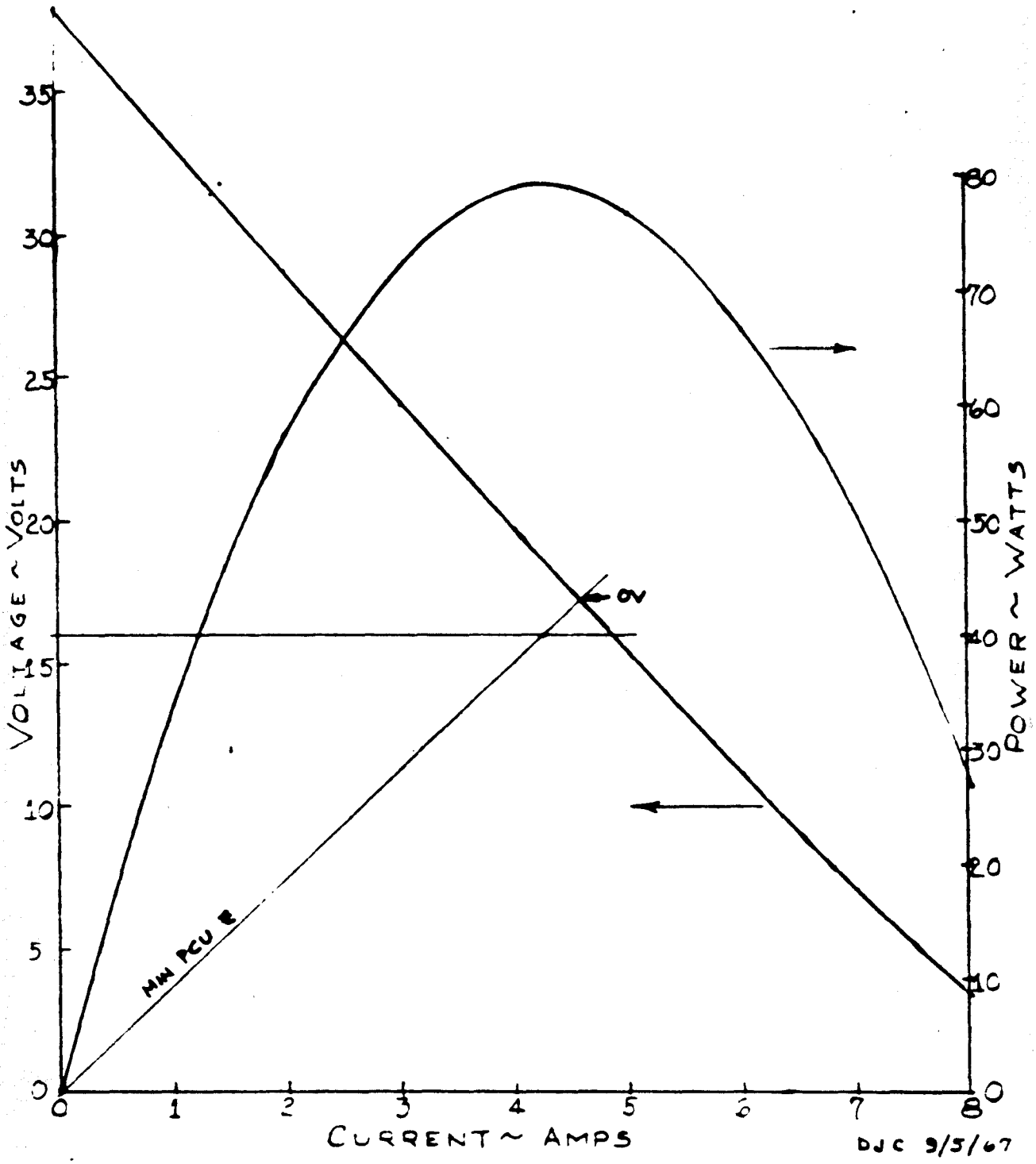
1. CHECK COMPATIBILITY OF PCU AND RTG DESIGNS.

2. DETERMINE PERFORMANCE CHARACTERISTICS OF PCU-RTG SYSTEM UNDER SELECTED CONDITIONS.


BENDIX PCU CHARACTERISTIC
AT 16 V INPUT
(CONVERTER AND REGULATOR.)
MAX REGULATION
38 WATTS
MAX RTG
MIN RTG
MIN REGULATION
MIN. ALSEP LOAD
MAX. ALSEP LOAD
POWER INPUT ~ WATTS
POWER OUTPUT ~ WATTS
0
10
20
30
40
50
60
70
80
90
100
110
A
B
C
D
E
F
G
DJC 8/5/67

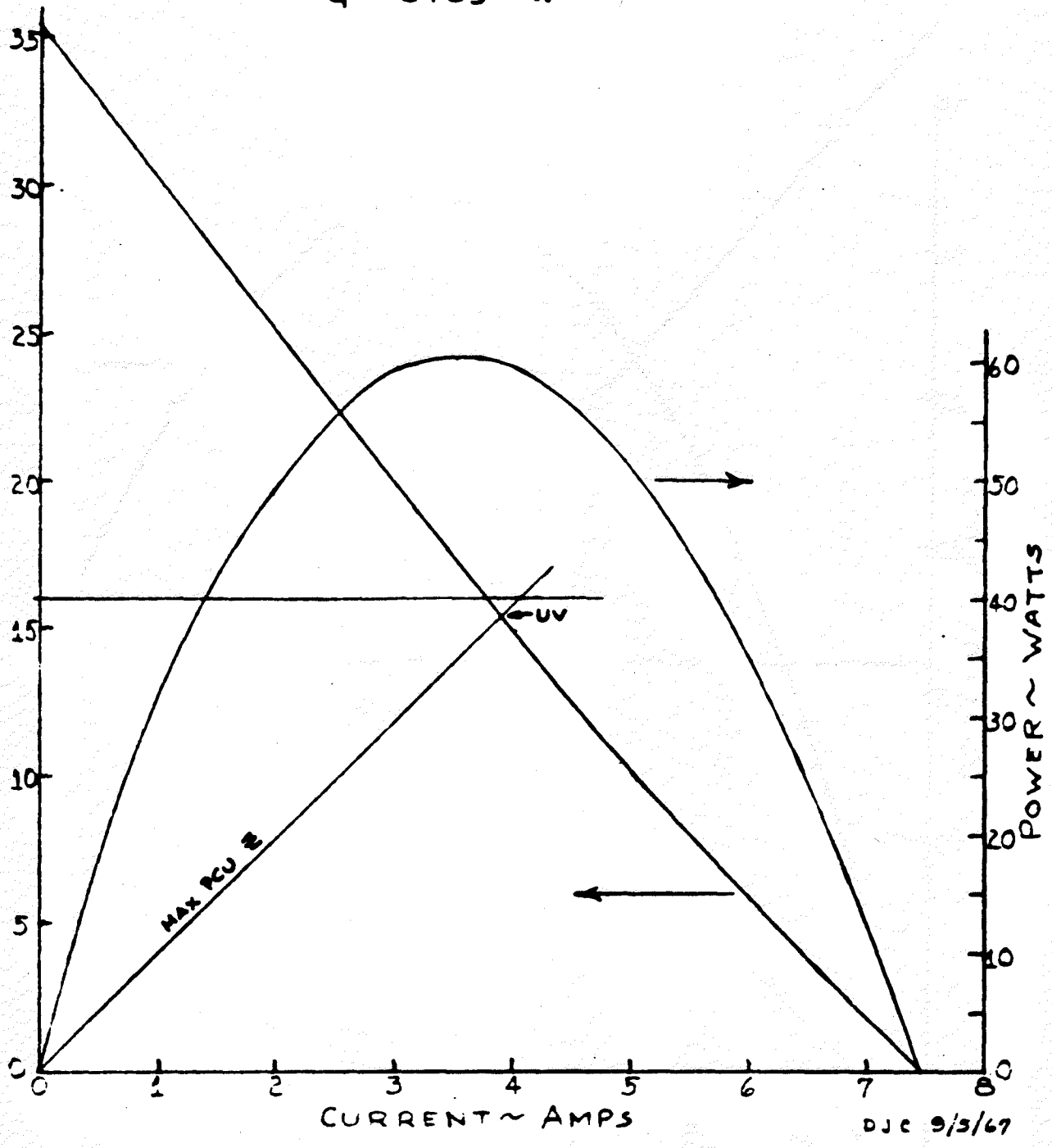
RTG CHARACTERISTIC
THEORETICAL MAXIMUM

Q = 1505 W



RTG CHARACTERISTIC
THEORETICAL MINIMUM

Q = 1415 W



DJC 9/3/67

45

PROCEDURE

1. INCOMING INSPECTION TEST, PCU TEST CHASSIS

   A. VISUAL INSPECTION

   B. ELECTRICAL BENCH TEST WITH SIMULATED PCU

   C. ELECTRICAL BENCH TEST WITH BENDIX PCU

2. ELECTRICAL CHECKOUT, PCU TEST CHASSIS WITH IPU TEST CONSOLE

3. RTG-PCU INTEGRATION TEST

DELIVERABLE GLFC HARDWARE

ENGINEERING UNITS -

- HARDWARE AVAILABILITY

M5 - PRIME CASK

- QUALIFICATION PER PRIME UNITS
- SPARE WILL BE SPARE FOR ALL PRIME UNITS
- COMPLETION THROUGH AEC STAGE INSPECTION BY 4/15/68

M6 AND M7 - 1G AND 1/6G TRAINING MOCKUPS

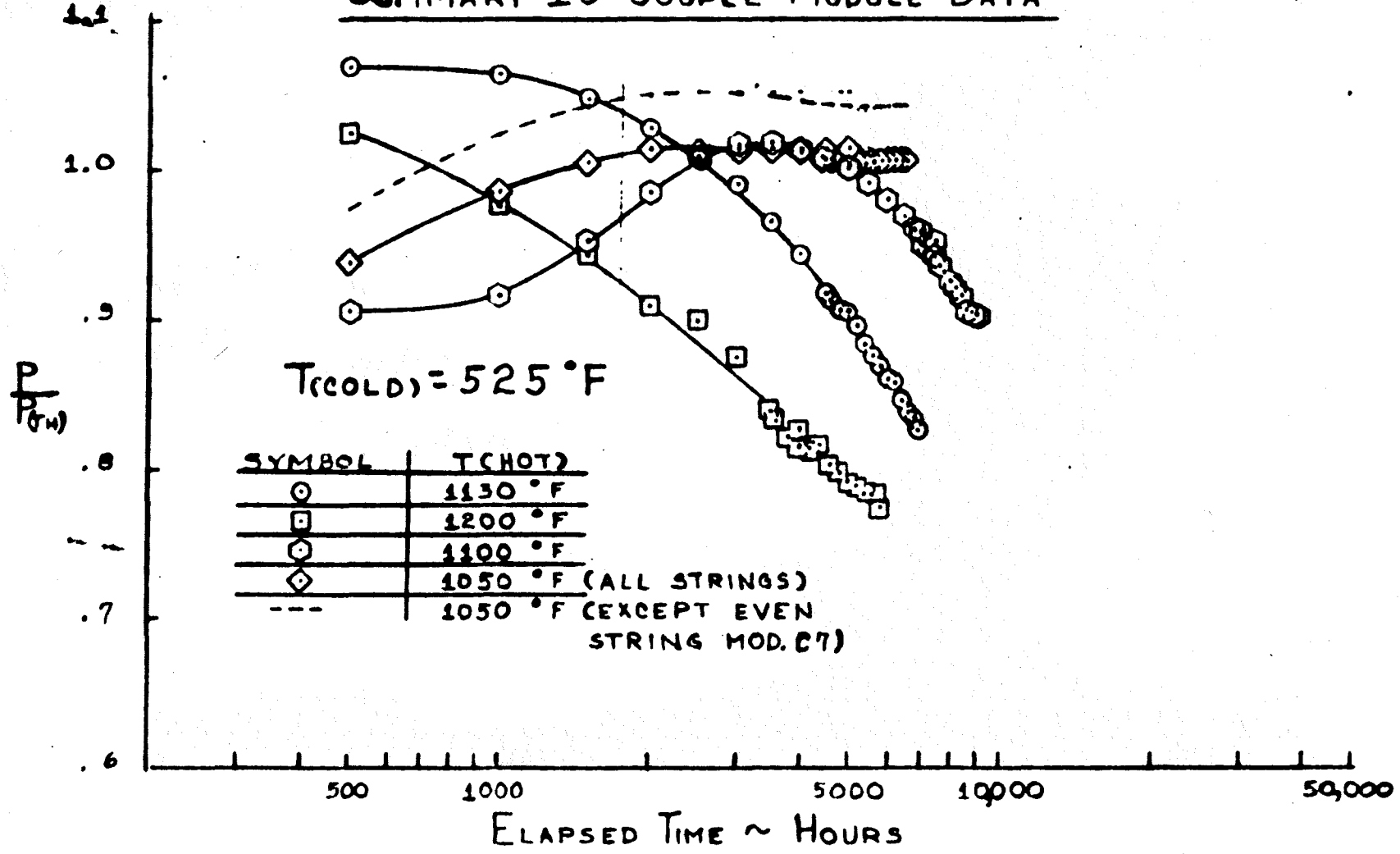
- NON GRAPHITE MATERIALS - WOOD/MAGNESIUM
- WEIGHT/CG SIMULATION
- SIZE AND SHAPE SIMULATION
- OPERATING BREECH LOCK AND SPLINE MECHANISMS
- NO THERMAL OR LOAD REQUIREMENTS
- COMPLETION SET FOR 10/1/67

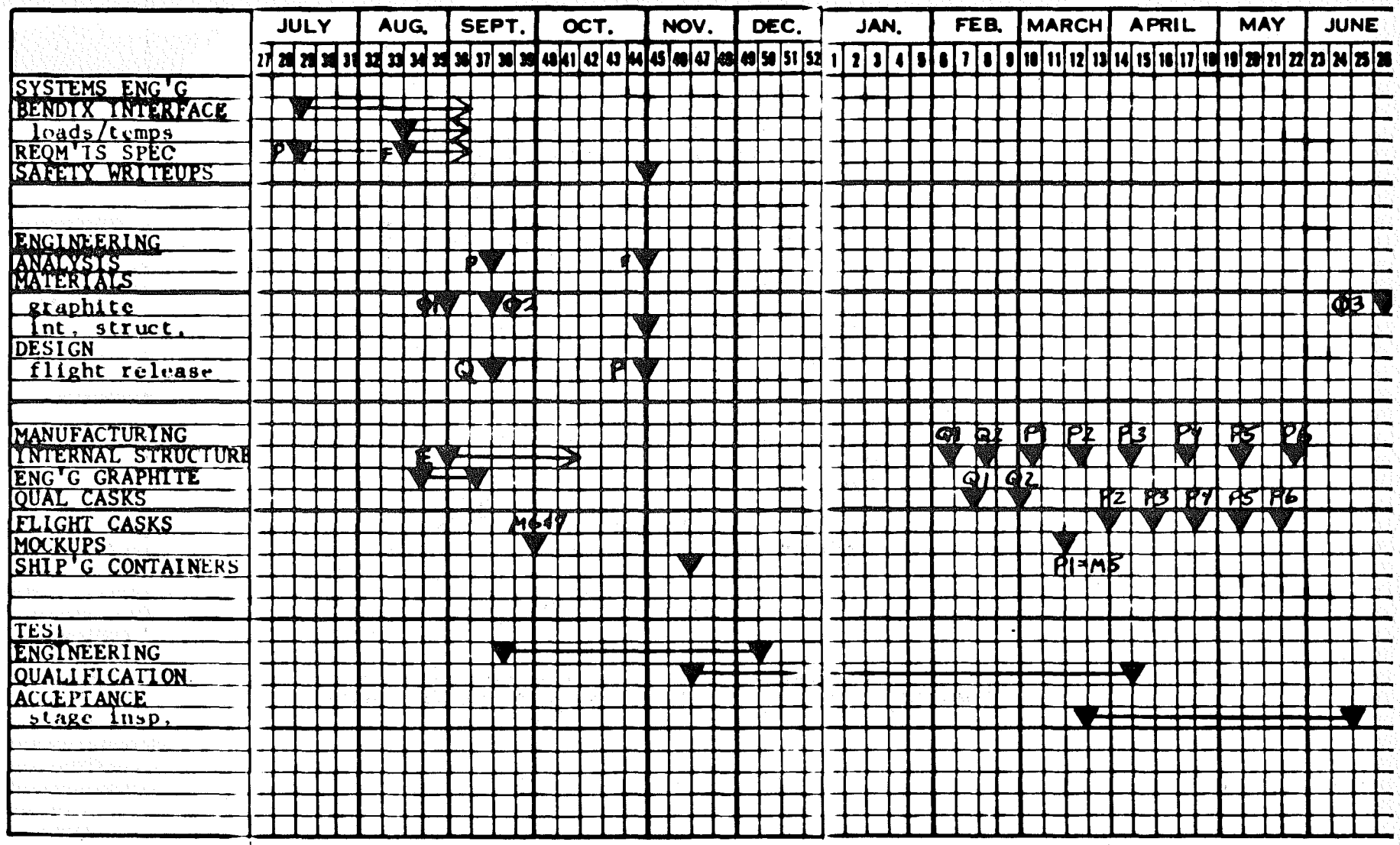
PRIME UNITS - 4 FLIGHT PLUS ONE SPARE

- TWO UNITS THROUGH STAGE INSPECTION BY 4/15/68
- THREE UNITS THROUGH STAGE INSPECTION BY 6/30/68

35

SUMMARY 10 COUPLE MODULE DATA





FORM 1134 REV. (12-66)

85

PCU TEST STATUS

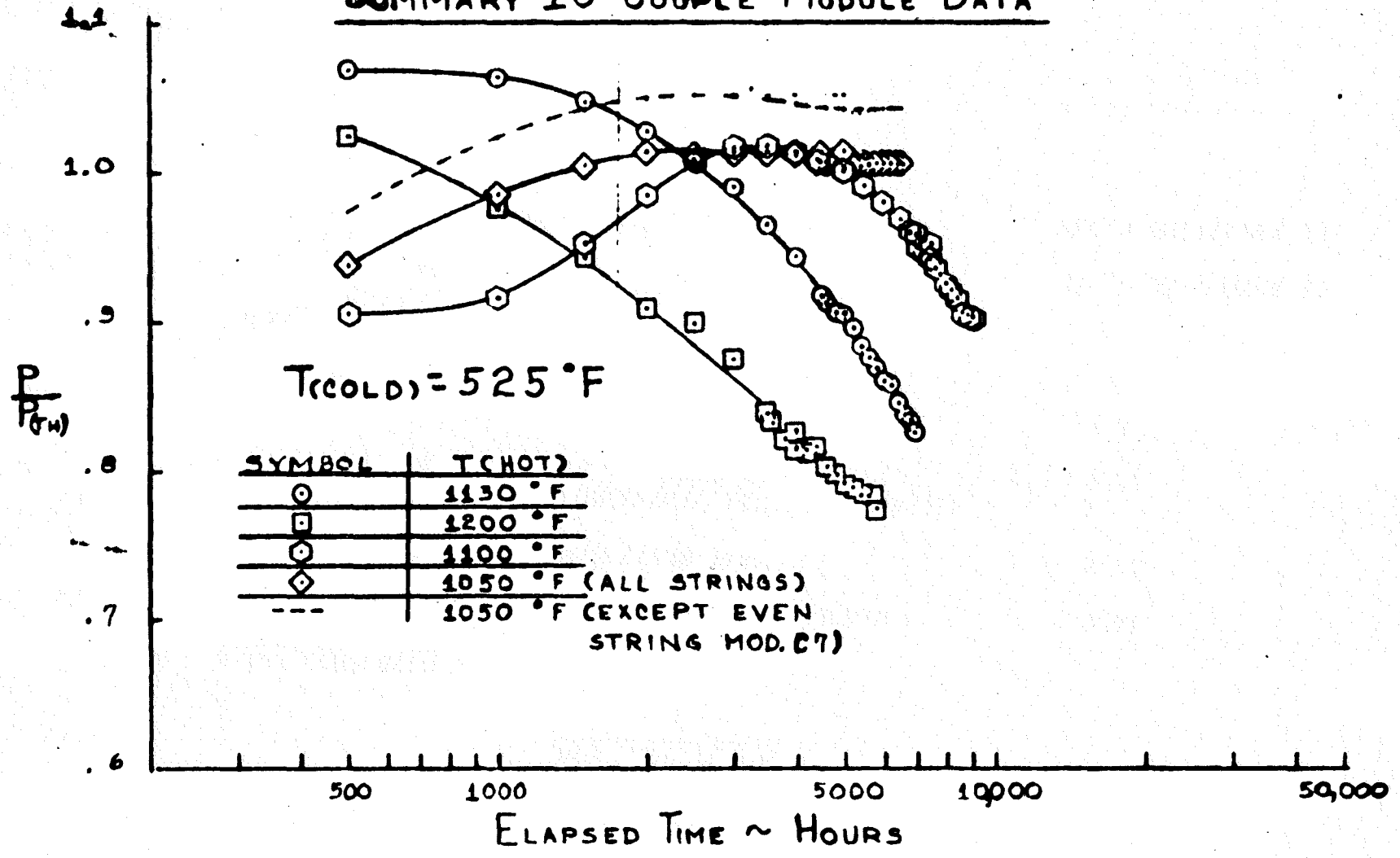
A. PLANS COMPLETED

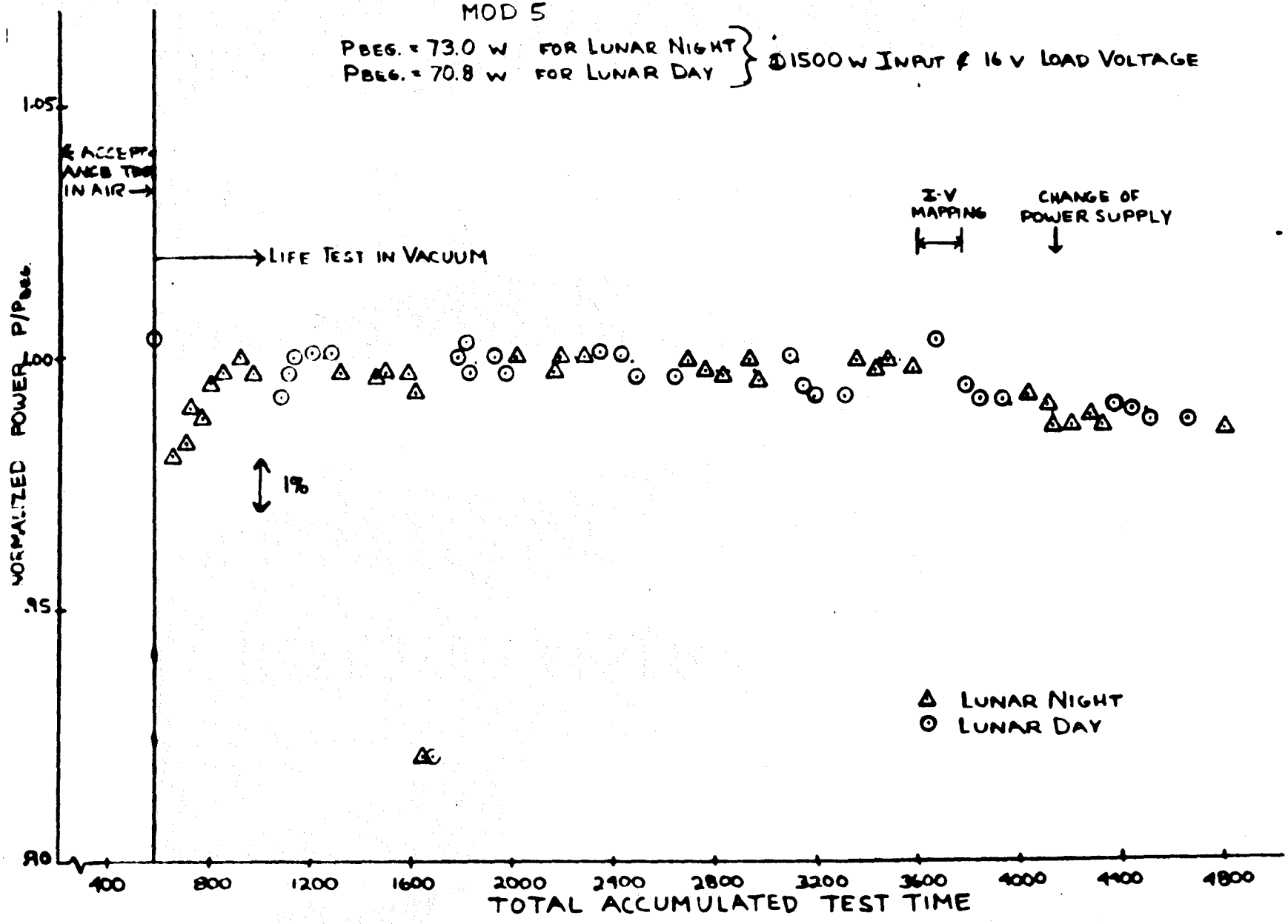
o RTG/PCU INTEGRATION TEST PROGRAM	8/31
o INCOMING INSPECTION TEST	8/31
o ELECTRICAL CHECKOUT, PCU TEST CHASSIS INSTALLED IN IPU TEST CONSOLE	8/31
o RTG/PCU INTEGRATION TEST	9/8

B. SCHEDULE

o ACCEPTANCE AND COMPATIBILITY TESTS	BEGIN SEPTEMBER 11
o INTEGRATION TEST WITH MOD 8B	BEGIN SEPTEMBER 18

Summary 10 Couple Module Data




MOD 5
PBEG. = 73.0 W FOR LUNAR NIGHT
PBEG. = 70.8 W FOR LUNAR DAY
@ 1500 W INPUT & 16 V LOAD VOLTAGE
1.05
1.00
.95
.90
ACCEPTANCE TEST IN AIR
LIFE TEST IN VACUUM
I-V MAPPING
CHANGE OF POWER SUPPLY
1%
NORMALIZED POWER P/PBEG.
LUNAR NIGHT
LUNAR DAY
400
800
1200
1600
2000
2400
2800
3200
3600
4000
4400
4800
TOTAL ACCUMULATED TEST TIME

THERMAL VACUUM TEST

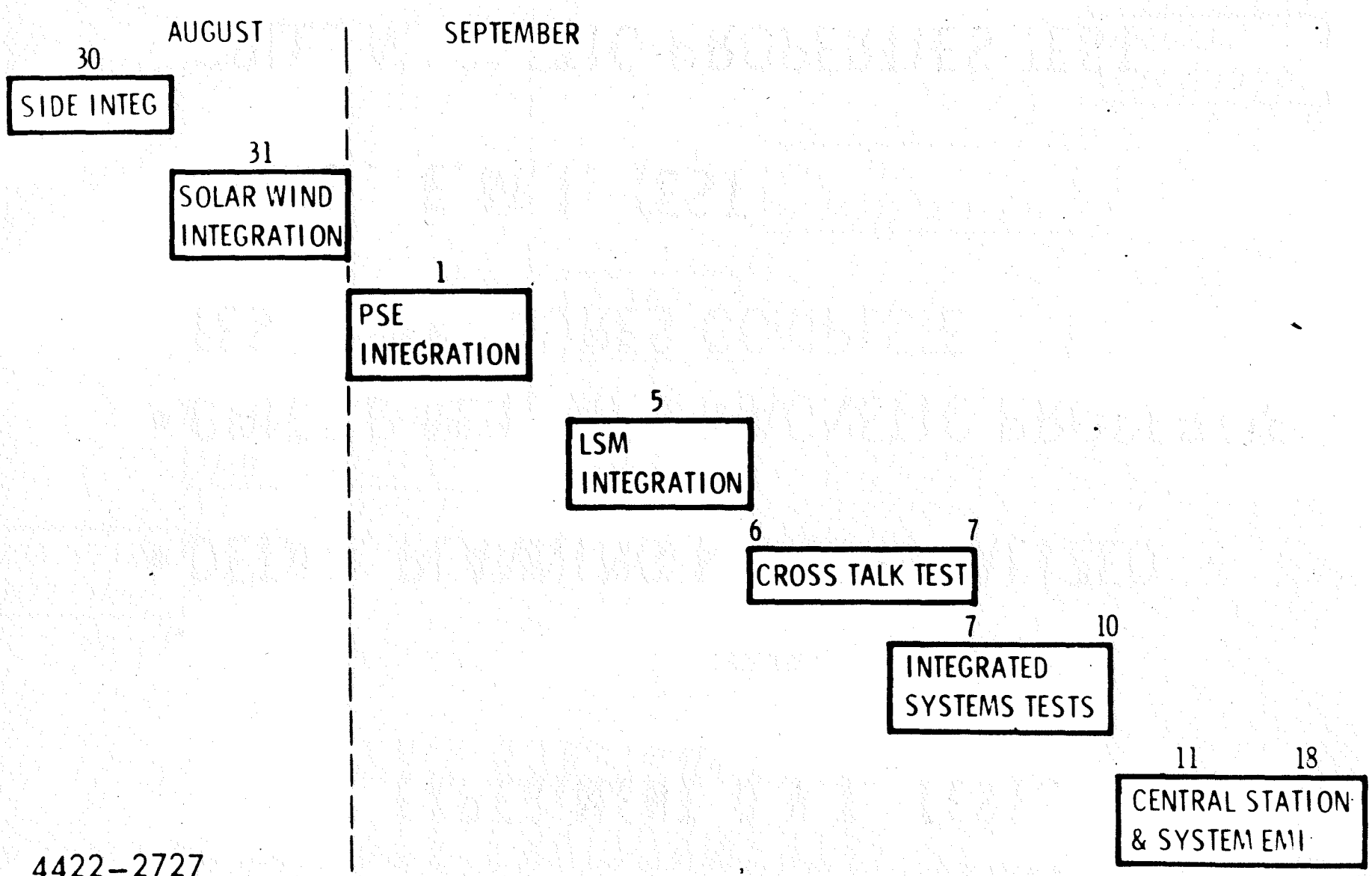
- FULLY DEPLOYED ALSEP
- LUNAR SURFACE SHROUD (-300 F, +278)
- INFRA-RED SOLAR SIMULATION
- 200 ENVIRONMENT PARAMETERS
- NORMAL ALSEP H/K DATA
- SIMULATOR BACK UP

4422-2734

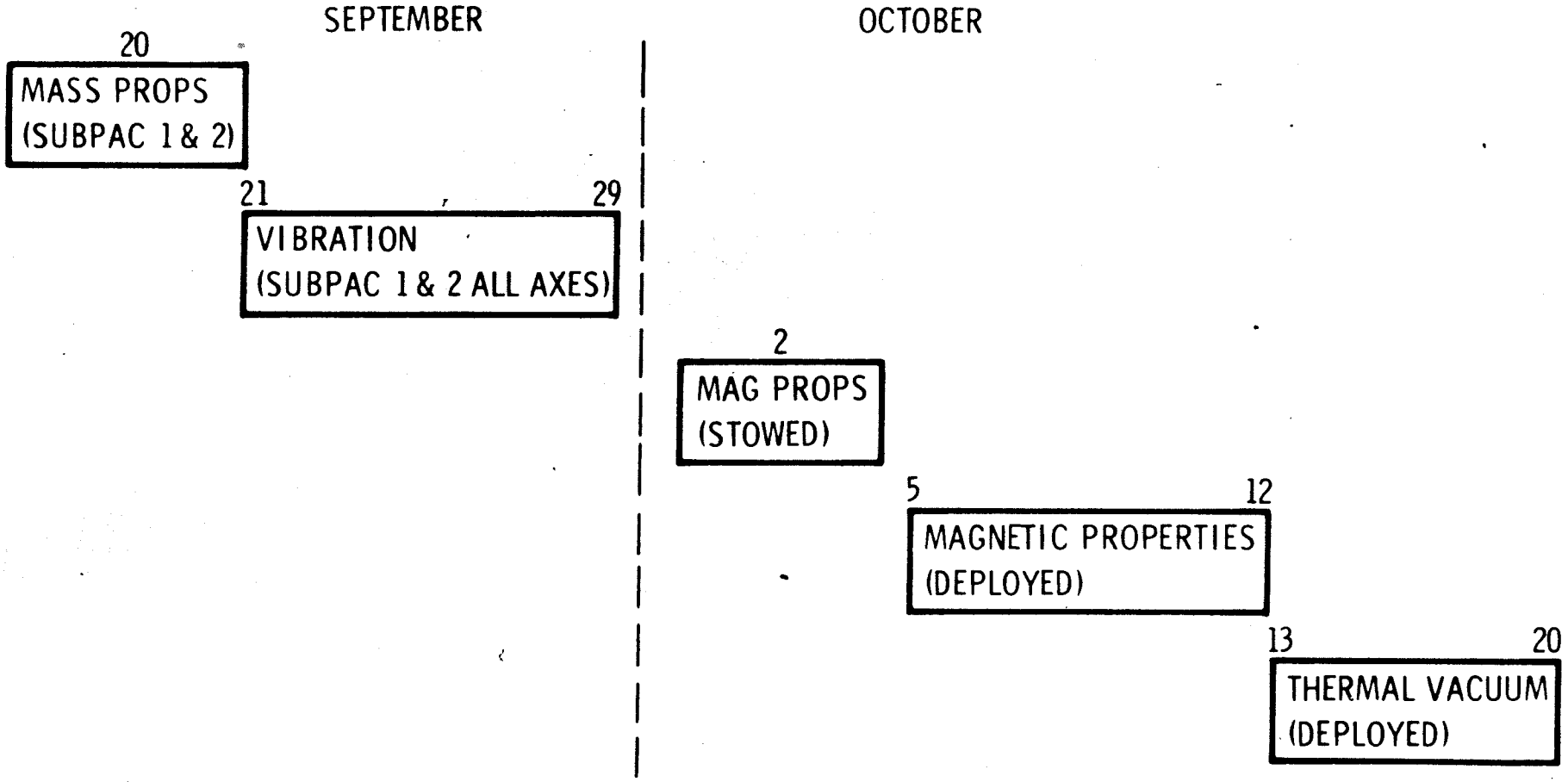
EXPERIMENT D.V.T. TESTS

- DETAIL PLANNING BEING FINALIZED
- CPLEE E.M.I. AND MAGNETIC PROPERTIES TEST PROCEDURES COMPLETE
- CPLEE E.M.I. TEST
- CPLEE MAGNETIC PROPERTIES TEST

PROTOTYPE INTEGRATION "A" CONFIGURATION

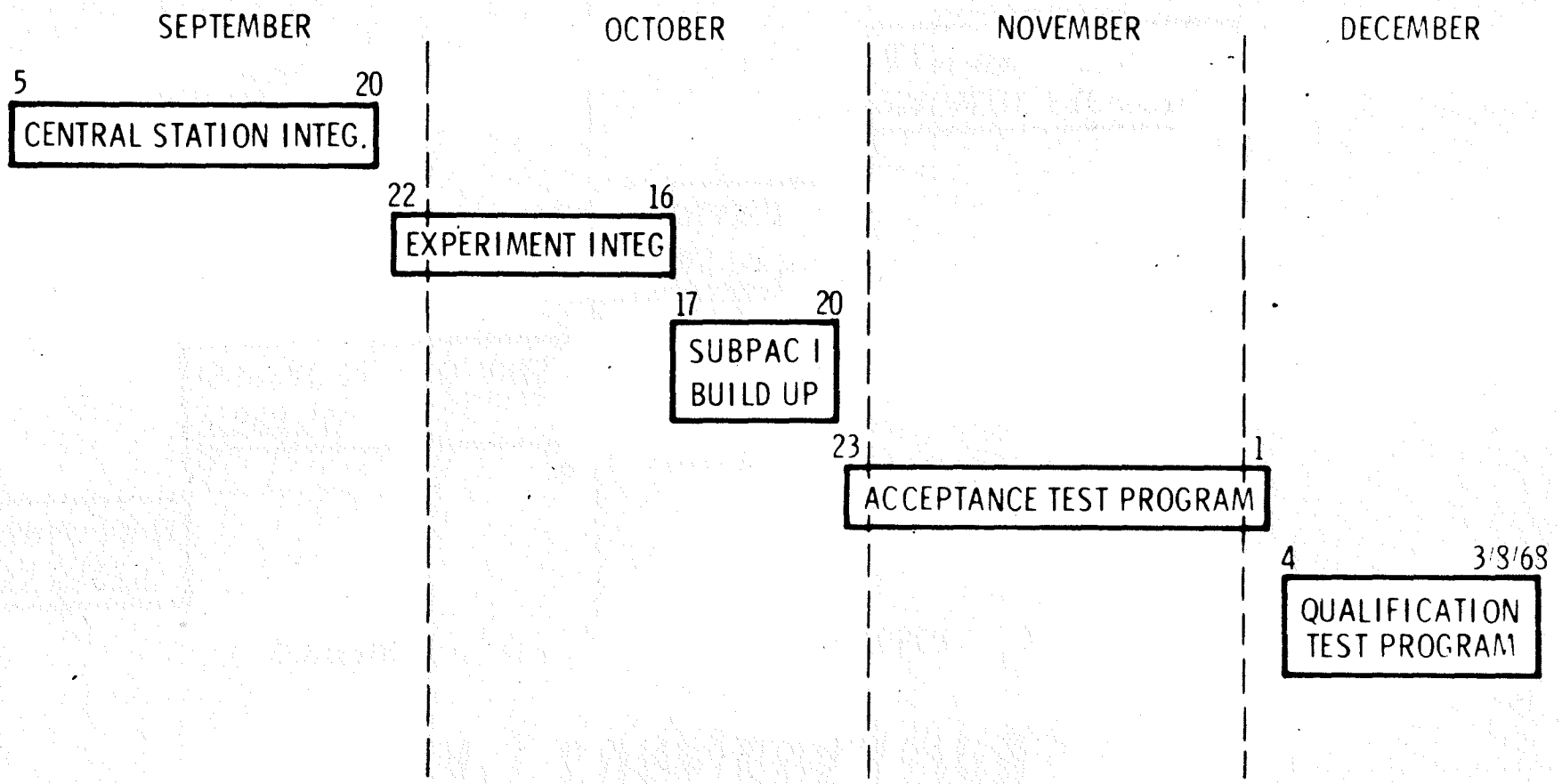


PROTOTYPE ENVIRONMENTAL TESTING
"A" CONFIGURATION



4422-2731

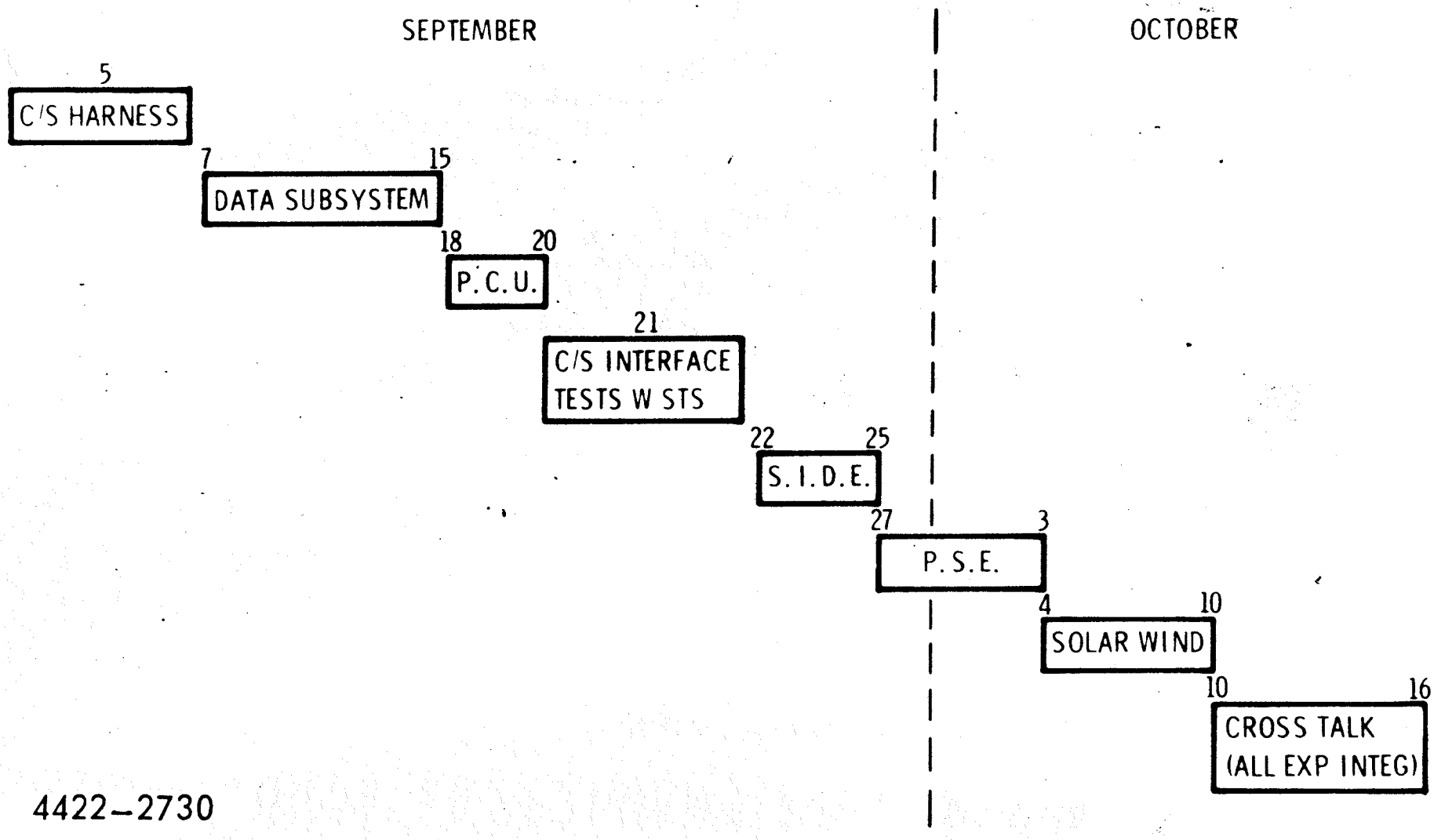
QUAL TEST PROGRAM SCHEDULE
"A" CONFIGURATION



4422–2729

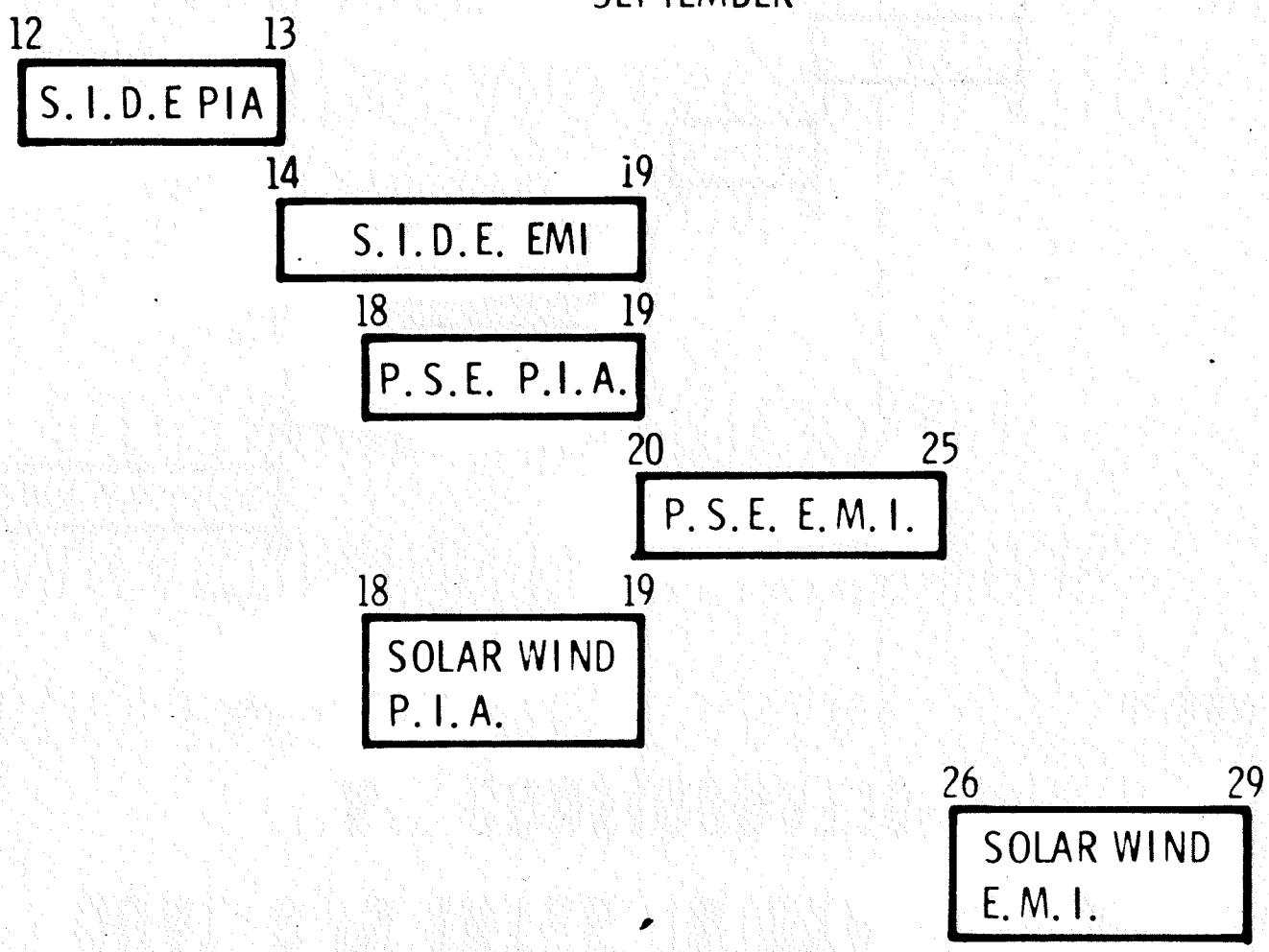
QUAL C/S INTEG. & EXP INTEG.

"A" CONFIGURATION



4422–2730

QUAL EXPERIMENT P.I.A & E.M.I
"A" CONFIGURATION



4422-2728

PLANT 2 TOUR

- HUMAN FACTORS TEST AREA
- MANUFACTURING FACILITIES TOUR
  - ELECTRONICS FABRICATION
    - CLEAN ROOM
    - GSE FABRICATION
    - POTTING AND ENCAPSULATION
    - IN-PROCESS TEST
  - MECHANICAL FABRICATION AREA

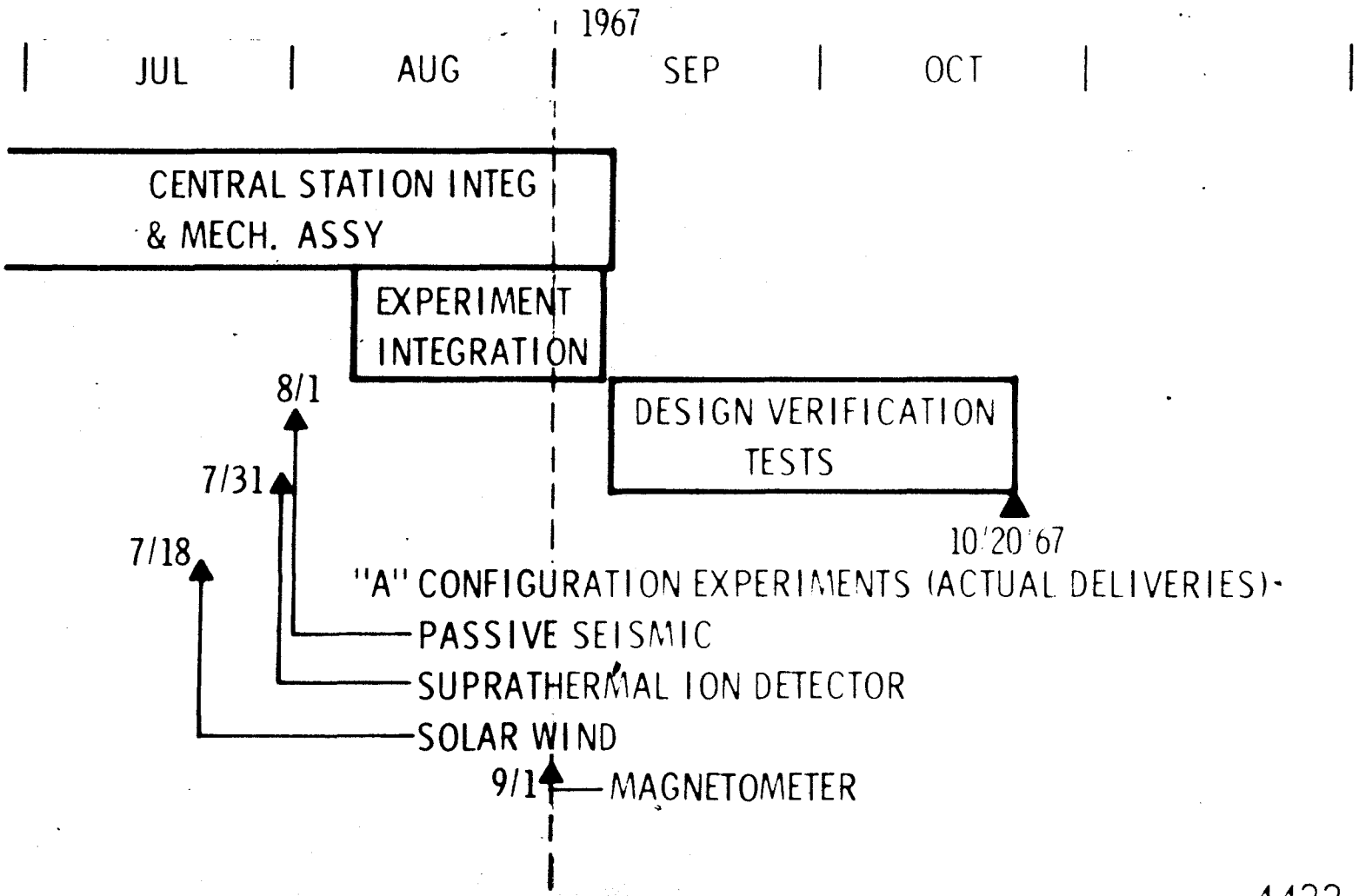
4422–2732

PLANT 2 TOUR

- TEST PRESENTATION
  - QUAL TEST IN COMPONENTS LAB
  - PROTO SYSTEM TEST IN SYSTEM TEST LAB
  - ASE TEST IN EXPERIMENT TEST LAB
  - CPLEE MAGNETIC PROPERTIES TEST IN SCREEN ROOM
  - TOUR OF T/V AND VIBRATION TEST AREAS
  - PRESENTATION OF EQUIPMENT, PLANS AND TEST SET UP FOR PROTO T/V TESTS

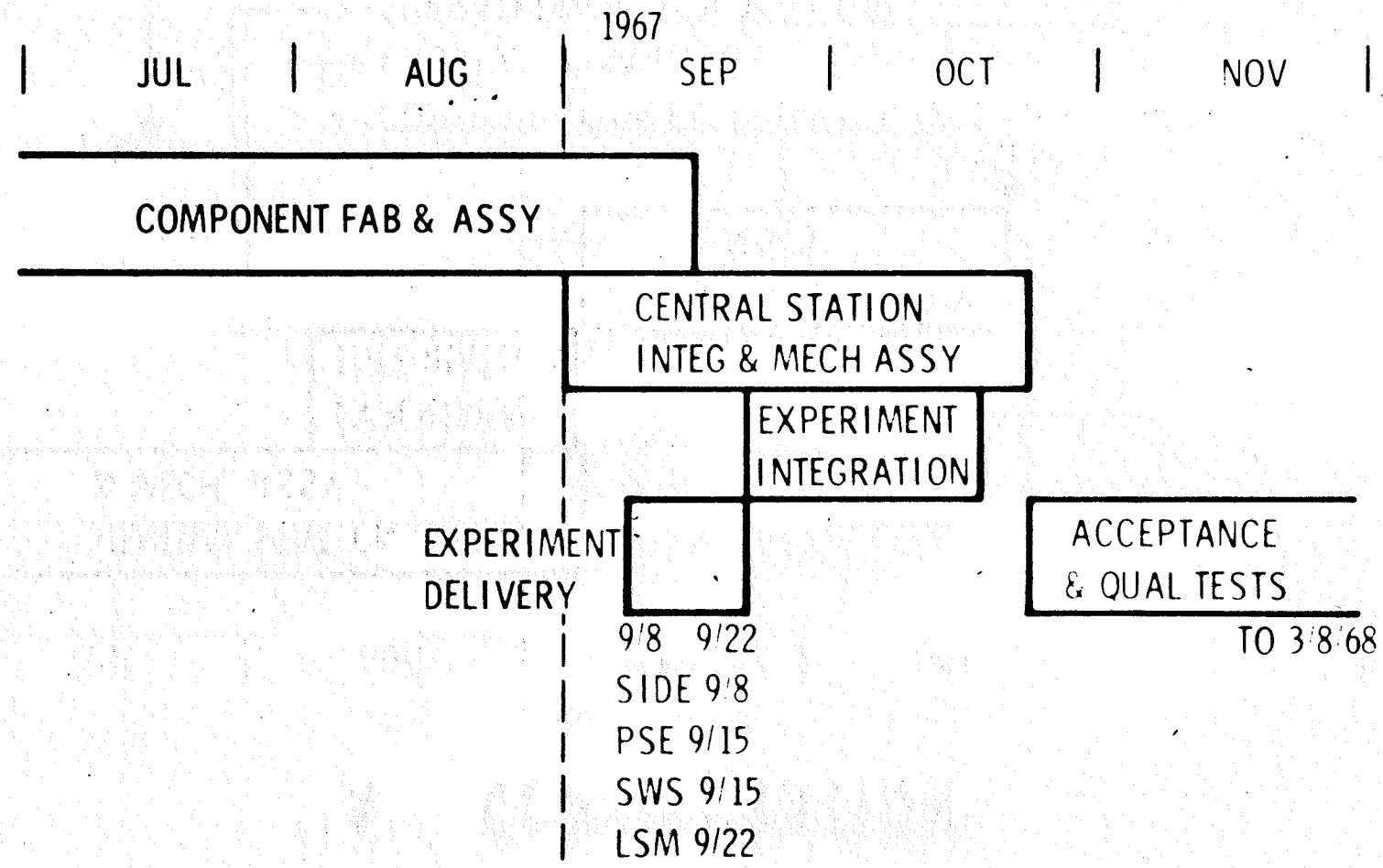
4422-2733

PROTOTYPE MODEL SCHEDULE
"A" CONFIGURATION



4422-2723

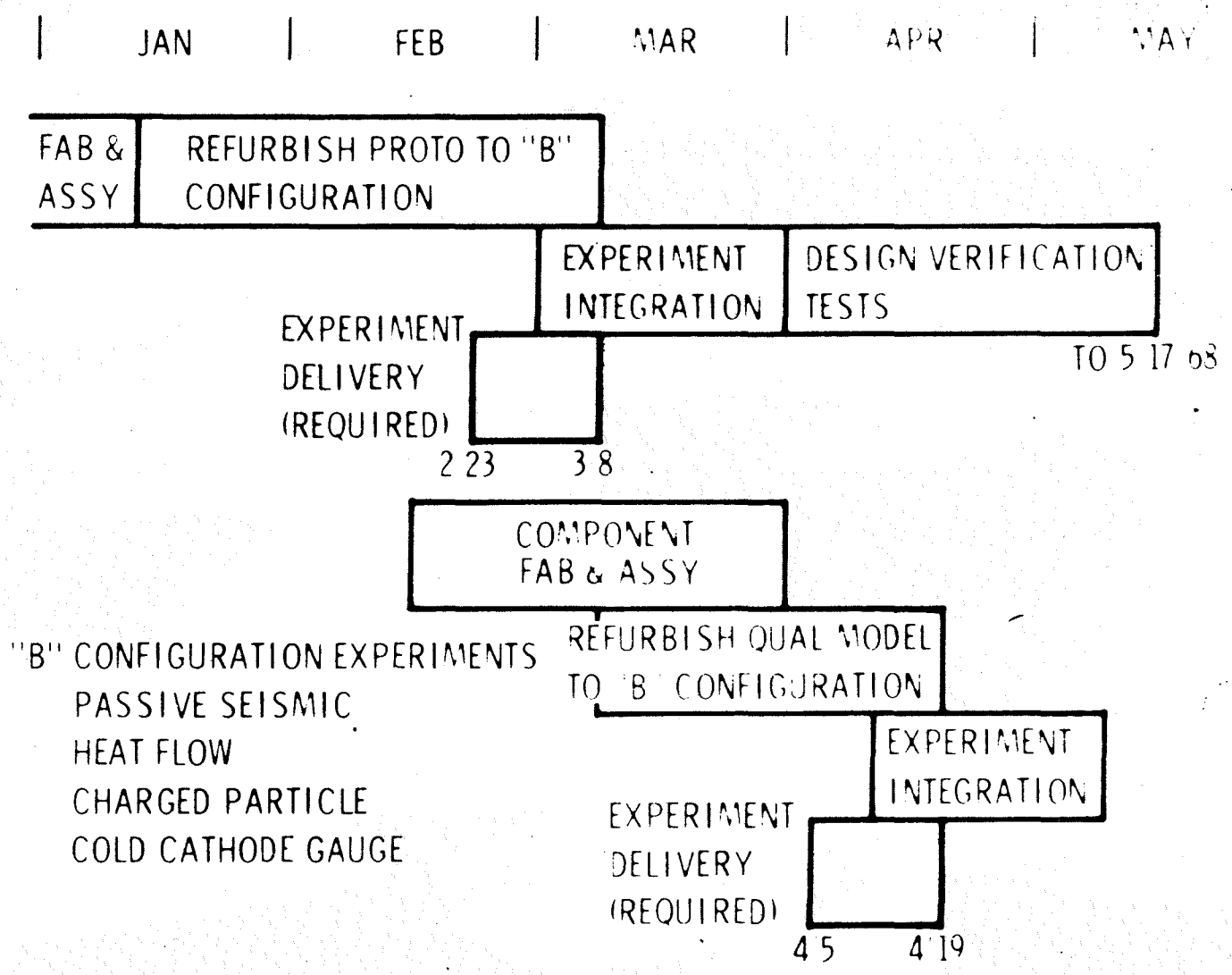
QUALIFICATION MODEL SCHEDULE
"A" CONFIGURATION



4422–2722

PROTOTYPE AND QUAL MODEL SCHEDULE

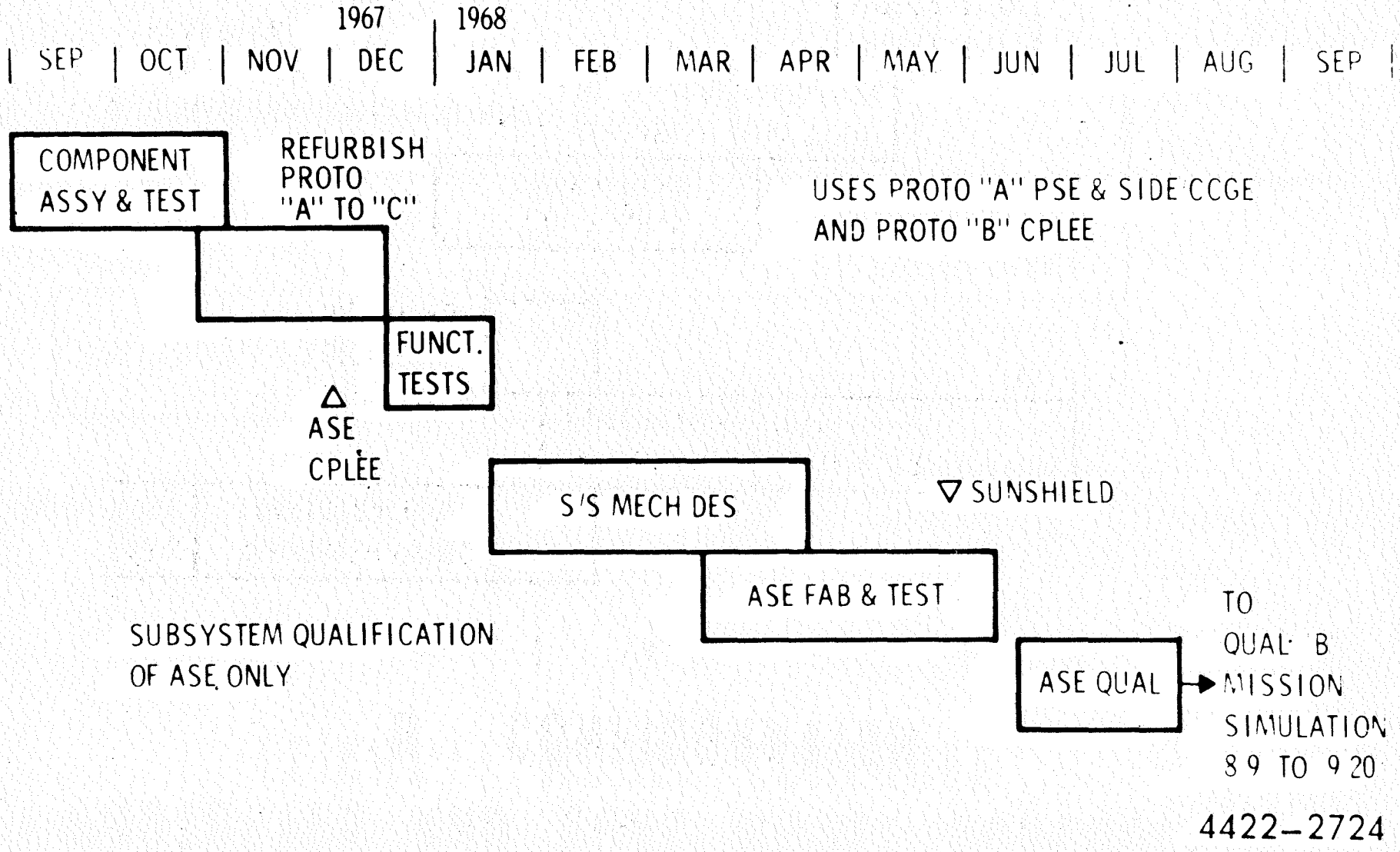
"B" CONFIGURATION



4422–2725

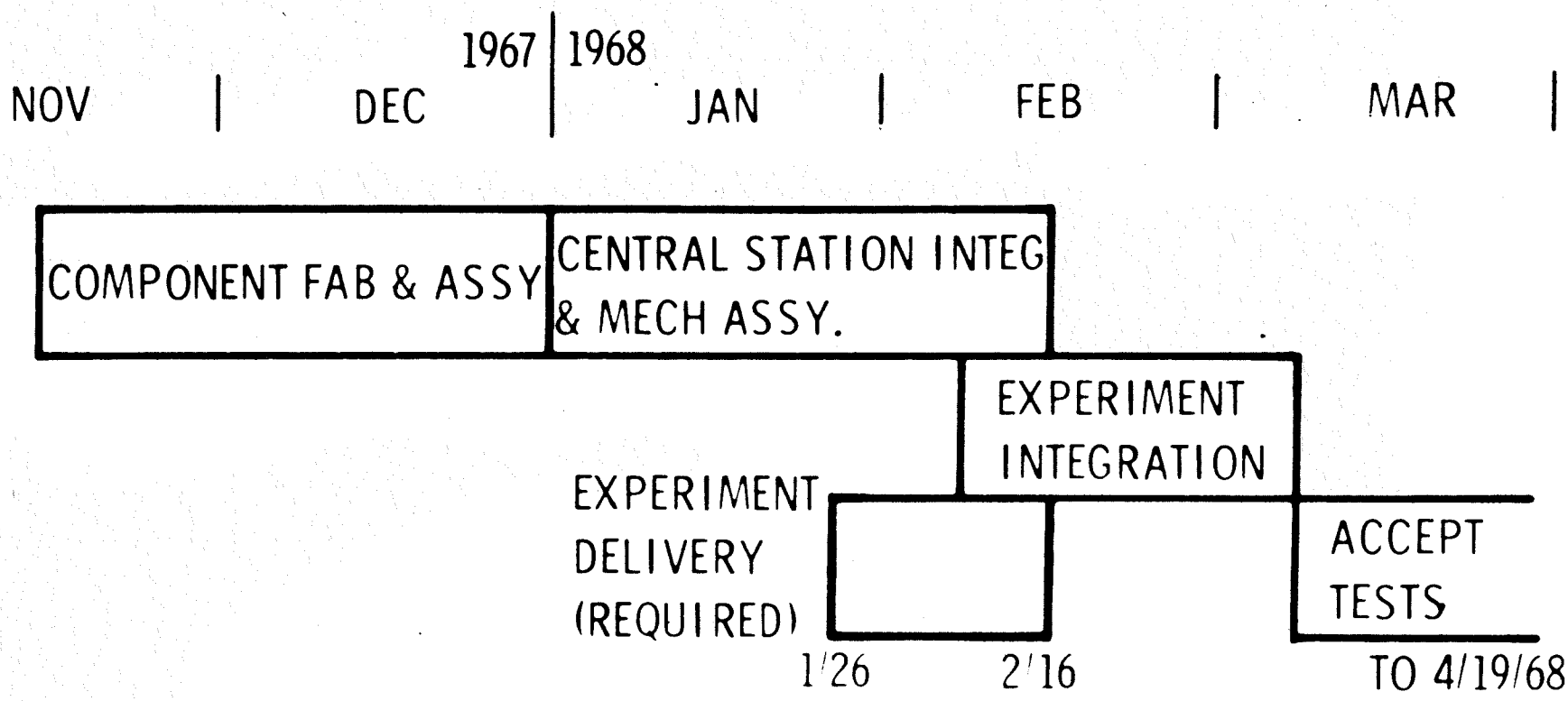
PROTOTYPE AND QUAL MODEL SCHEDULE

"C" CONFIGURATION



4422–2724

FLIGHT 1 MODEL SCHEDULE



4422-2726

PRESENTATION

TO

SEQ INTERFACE CONFERENCE

SEPTEMBER 7, 1967

GRUMMAN AIRCRAFT ENGINEERING CORPORATION

A. LM FUEL CASK

1. Struts finalized and manufactured for 60 lb cask. Parts are presently available and two assembled units can be made available for shipment to Bendix when required for DVT.

2. Preliminary drawing showing access to cask in SLA with new thermal door (CCA586) is available now. Loading operation will be somewhat more difficult and new installation demonstration at KSC is suggested.

3. One temperature measurement (MCR 550C) has been added to the LM Fuel Cask System. This will be routed through the LM telemetry and will be able to record a Bendix selected temperature from time of fuel element insertion to seconds prior to launch; and would then give system temperatures whenever LM telemetry is on.

4. GAEC to redesign parts of LM thermal shield (secondary door) to withstand direct view of cask.

5. 18 accelerometers on LM Fuel Cask recorded data during LTA 3 DR (LM6) . Data will be available (approx.) end of October.

B. SEQ SUBPACKAGES NOS. I & II (ALSEP) (CCA 586)

1. GAEC/Bendix Hard Point interface drawing signed off on 7/26/67.

2. Mock-up proved over-all boom concept is OK but many corrections were required.

3. Retro-fit to LM 4, 5 and 6.

4. + 15 - 25 lbs.

5. Installation check fixtures and master tooling to be sent to Bendix on _____

6. ALSEP/LM Withdrawal System Test Philosophy.

A. COMPONENT TESTING

Qualify each member of ALSEP withdrawal mechanism for: Salt Fog, Vibration, Static Load, Sand and Dust and Thermal Vacuum environment as required.

B. STRUCTURAL TESTING

(a) Build Quad II Structure and vibrate for required mission levels. (Use ALSEP and RTG Fuel Cask as GFE). These tests are anticipated to terminate 1/1/68.

(b) Measure deflections of Quad II structure on LTA-3D or LTA-3DR for three (3) leg landing conditions, and other reasonable worst case landing attitudes.

C. THERMAL VACUUM TESTING

(a) Update Quad II Structure (same unit as for structural testing) to deliver to:

(a) Chamber A
or (b) Chamber B
or (c) G.E
or (d) Bendix

for functional, thermal verification of integrated mechanisms and possibly the interfaces.
Alternate: Use GAEC T/V facilities and remote actuation of mechanisms.

D. 1/6 g SIMULATION

GAEC recommends that MSC conduct a simulation of access and deployment in the KC-135 Airplane. (Ref. LTX-480-65 dated 8/15/67).

NOTE: Preliminary Test plan due 10/1/67.

C. SAMPLE RETURN CONTAINERS (SRC'S)

1. New NASA requirement will move SRC's to a modularized container in the descent stage out bound and return them in the ascent stage.

Other items in this d/s container will be:

a) PLSS batteries

b) TV camera System (Including 100' TV cable)

c) 10' dish cable

D. STILL CAMERA PACKAGE

1. GAEC is currently proposing to build this package (ECP #1114)

a) Items will be soft stowed by compressing them in foam.

b) New Environmental conditions on contents (engine box).

c) could serve as utility container.

SIGN OFF

ICD AND IRN NUMBER AND TITLE	GAEC	S & AD	CURRENT EFFORT OR NEED FOR ACTION
LIS-360-22101 LM SCIENTIFIC EQUIPMENT MATERIALS COMPATABILITY REQUIREMENTS .	10/21/65	10/21/65	
LIS-360-22101-1 ADDED LUBECO AND EVER-LUBE TO THE MATERIALS LIST.		4/13/67	
LIS-360-22102 SCIENTIFIC EQUIPMENT MASS PROPERTIES.	10/21/65	10/21/65	GAEC IS CURRENTLY STUDYING THE WEIG AND BALANCE IMPLICATIONS OF LAUNCH ANY IM WITHOUT SEQ.
LIS-360-22102-1 COMBINED FILM CONTS	12/21/65	12/21/65	

ICD AND IRN NUMBER AND TITLE	SIGN OFF '7 GAEC	S & AD	CURRENT EFFORT OR NEED FOR ACTION
LIS-360-22102			
22102 - 2. LAUNCHED F & T CONT., SEQ. CAMERA EXTRA FILM CONT. AND STILL CAMERA CONT. IN LEM VS CM.	7/1/66	8/25/66	
22102 - 3. INCORPORATED CCA 183	6/7/66	DISAPPROVED	
22102 - 4. LAUNCH STILL CAMERA IN LM VS CM. INCORPORATE SCN # 27b	7/1/66	DISAPPROVED	
5. REDUCED WT. OF F & T.	8/9/66	DISAPPROVED	
6. PROVIDE FOR RTG (CCA183)	1/10/67	2/13/67	
7. 27 lb. SRC	1/19/67	2/10/67	
8. CCA498 (60 lb. CASK)	4/15/67	6/21/67	
9. 40 lb. SRC	5/2/67	6/20/67	
10. EFFECTIVITY	6/1/67	6/21/67	
A. GENERAL UPDATE	9/11/67	DISAPPROVED	
B. GENERAL UPDATE AND MOD. KIT DEFINITION.	9/15/67	10/15/67	
LIS-360-22301 ENVIRONMENTAL CONDITIONS INDUCED BY THE LM ON THE STILL CAMERA PACKAGE.	10/21/65	12/21/65	A NEW SECTION FOR CAMERA CONTENTS W BE REQUIRED IF GAEC IS TO BUILD CO TAINER.
LIS-360-22301-1 GENERAL UPDATING INCLUDING AN UPDATED CABIN PRESSURE (VS) ELAPSED TIME CURVE.	4/20/66	12/13/66	

SIGN OFF 8

ICD AND IRN NUMBER AND TITLE		GAEC	S & AD	CURRENT EFFORT OR NEED FOR ACTION
LIS-360-22301-2	DEFINES ENVIRONMENTS FOR LAUNCH, BOOST AND TRANS-LUNAR PHASES BECAUSE SCN 276 REQUIRED CAMERA TO BE CARRIED IN LEM (VS) CM	8/1/66	9/1/66	
LIS-360-22301-3	DEFINED VEHICLE EFFECTIVITY AS LM-4-15 (CCA575)	3/18/67	6/21/67	
LIS-360 -22301-A	ADDED THE ENVIRONMENTAL CRITERIA FOR THE LUNAR ASCENT PHASE (CCA468) AND INCORPORATED IRN's NO 1, 2, 3.	11/15/67(EST)	12/15/67 (EST.)	
LIS-360-22302	ENVIRONMENTAL CONDITIONS INDUCED BY LM ON THE SCIENTIFIC EQUIP. IN THE DESCENT STAGE.	10/21/65	10/21/65	VIBRATION SECTION WILL NEED UPDATI A RESULT OF THE LTA3 DR (LM6) AND (LIVE T/V RACKET FIRING) TESTING: THERMAI SECTION WILL NEED UPDATING RESULT OF CCA586 (MAX DOOR-OPEN TI
REMARKS -	VEHICLE EFFECTIVITY LM-4 AND SUBSEQUENT			
LIS-360-22302-1	REVISE VIBRATION WORDING	7/1/66	8/25/66	
LIS-360-22302-2	TEMPERATURE CONDITIONS	11/2/66	11/09/66	
LIS-360-22302-3	ADDED TEMP. TIME HISTORY CURVE OF THE SEQ BAY TO ICD.			

SIGN OFF 9

ICD AND IRN NUMBER AND TITLE	GAEC	S & AD	CURRENT EFFORT OR NEED FOR ACTION
LIS-360-22303 ENVIRONMENTAL CONDITIONS INDUCED BY LM ON THE LUNAR SAMPLE RETURN CONTAINERS	12/21/65	12/21/65	NEW ENVIRONMENTAL CONDITIONS WILL BE ADDED FOR NEW D/S SRC LOCATION OUT BOUND.
LIS-360-22303-1 DEFINES TEMPERATURE TIME HISTORY CURVES OF LM WALL AND LM ASCENT ENGINE COVER	4/20/66	11/9/66	
LIS-360-22303-2 CHANGE SPECIMEN TO SAMPLE TO AGREE WITH LSP-360-11	8/1/66	9/1/66	
LIS-360-22303-3 VEHICLE EFFECTIVITY LM 4 ANS SUB.	5/6/67	6/21/67	
LIS-360-22303-4 CCA 668-SRC's OUTBOUND IN D/S	11/15/67(est)	1/2/68 (Est.)	

ICD AND IRN NUMBER AND TITLE	GAEC	S & AD	CURRENT EFFORT OR NEED FOR ACTION
LIS-360-22304 ENVIRONMENTAL CONDITIONS INDUCED BY LM ON SEQUENCE CAMERA EXTRA FILM CONTAINER.	12/21/65	12/21/65	DRAFT OF 304-2 COMPLETED BY 10/14/ IRN NOW BEING REVIEWED IN HOUSE BY GAEC. DELAY BETWEEN COMPLETION OF AND GAEC REVIEW DUE TO NAA FAILURE SIGN OFF IRN 6043.
LIS-360-22304-1 DEFINES A TEMPERATURE TIME HISTORY CURVE OF THE LM CABIN WALLS	4/20/66	11/09/66	
LIS-360-22304-2 DEFINES ENVIRONMENTS FOR LAUNCH AND BOOST AND TRANS-LUNAR (SCN 276)	9/11/67	10/11/67	
LIS-360-22304-3 VEHICLE EFFECTIVITY LM4 AND SUB.	5/30/67	6/21/67	

ICD AND IRN NUMBER AND TITLE	SIGN OFF GAEC	SIGN OFF S & AD	CURRENT EFFORT OR NEED FOR ACTION
LIS-360-22305 ENVIRONMENTAL CONDITIONS INDUCED BY LM ON THE FILM AND TAPE CONTAINER.	12/21/65	12/21/65	
LIS-360-22305-1 DEFINES TEMPERATURE TIME HISTORY CURVES OF LM CABIN WALLS AND ASCENT ENGINE COVER.	4/20/66	11/9/66	
LIS-360-22305-2 DEFINES ENVIRONMENTS FOR LAUNCH AND BOOST AND TRANS-LUNAR (SCN27b)	10/1/66	11/21/66	
LIS-360-22305-3 VEHICLE EFFECTIVITY LM4 AND SUB.	5/12/67	6/21/67	

ICD AND IRN NUMBER AND TITLE		SIGN OFF GAEC	S & AD	CURRENT EFFORT OR NEED FOR ACTION
LIS-360-22402	ENVIRONMENTAL CONSTRAINTS IMPOSED BY LM ON THE LM FUEL CASK	10/20/66	11/16/66	LTA 3 DR (LM6) VIBRATION RESULTS TO INCORPORATED IN -2 IRN. NEW SURFAC EMISSITIVITIES DUE TO CCA 586 WILL ADDED LATER.
LIS-360-22402-1	NEW THERMAL AND VIBRATION CRITERIA	2/28/67	DISAPPROVED	ACTIVE COOLING MAY ELIMINATE 48 HR ASSOCIATION REQUIREMENT.
LIS-360-22402-2	NEW VIBRATION RESULTS	10/67 (Est).	11/67 (Est).	
LIS-360-22501	LM ELECTRICAL POWER ALLOCATION AND CONSTRAINTS FOR THE SCIENTIFIC EQUIPMENT (SEQ).	10/21/65	10/21/65	A GFE IMPEDANCE SIMULATOR MAY BE REQUIRED (NASA DECISION) FOR LM 4 AND SUB "FEAT" TESTS.
LIS-360-22501-1	GENERAL UPDATING INCLUDES CHANGE OF LM NOMINAL VOLTAGE RANGE FROM 24-33VDC TO 26-33 VDC AND CHANGE OF PEAK POWER FROM 1,000 WATTS TO 780 WATTS	12/21/66	12/13/66	

ICD AND IRN NUMBER AND TITLE	SIGN OFF GAEC	SIGN OFF S & AD	CURRENT EFFORT OR NEED FOR ACTION
LID-360-22502 LM WIRING ELECTRICAL INTERFACE FOR SCIENTIFIC EQUIPMENT	12/21/65	12/21/65	ESI, LTA-1, LTA-8, LM4 and SUBQ. EFFECTIVITIES WILL BE ADDED. LM-3 CAN BE ADDED IF DESIRED
REMARKS - VEHICLE EFFECTIVITY LTA-1, LTA-8, LM-4AND SUB. SIGNED OFF BY EPO AND GAEC AT SEQ MEETING NO. 4. 502-1 ADD EFFECTIVITIES			ADD LM-3. 9/15/67
LIS-360-22503 ELECTRICAL INTERFACE BETWEEN THE RADIOISOTOPE THERMOELECTRIC GENERATOR (RTG) CASK SHIELD TEMPERATURE TRANSDUCER AND THE LM VEHICLE.	9/15/67	10/15/67	DRAFT COPY AVAILABLE TODAY

ICD AND IRN NUMBER AND TITLE	SIGN OFF GAEC	SIGN OFF S & AD	CURRENT EFFORT OR NEED FOR ACTION
LIS-360-22700 DELIVERY, INSTALLATION AND PRE-LAUNCH SERVICING REQUIREMENTS FOR LM SCIENTIFIC EQUIPMENT.	3 Mo. SUBQ. TO REQUIREMENT DEFINITION.		SEQ REQUIREMENTS NOT YET DEFINED TO GAEC - BEING RESOLVED TODAY.
LID-360-22704 SCIENTIFIC EQUIPMENT BAY PRE-LAUNCH ASSESSIBILITY	10/1/67(Est.)	11/1/67 (Est.)	BEING UPDATED DUE TO CCA586 AND MAY REQUIRE REVISION TO PLANS FOR PRE-LAUNCH INSTALLATION OF THE RTG FUEL ELEMENT. COPY IS AVAILABLE TODAY.

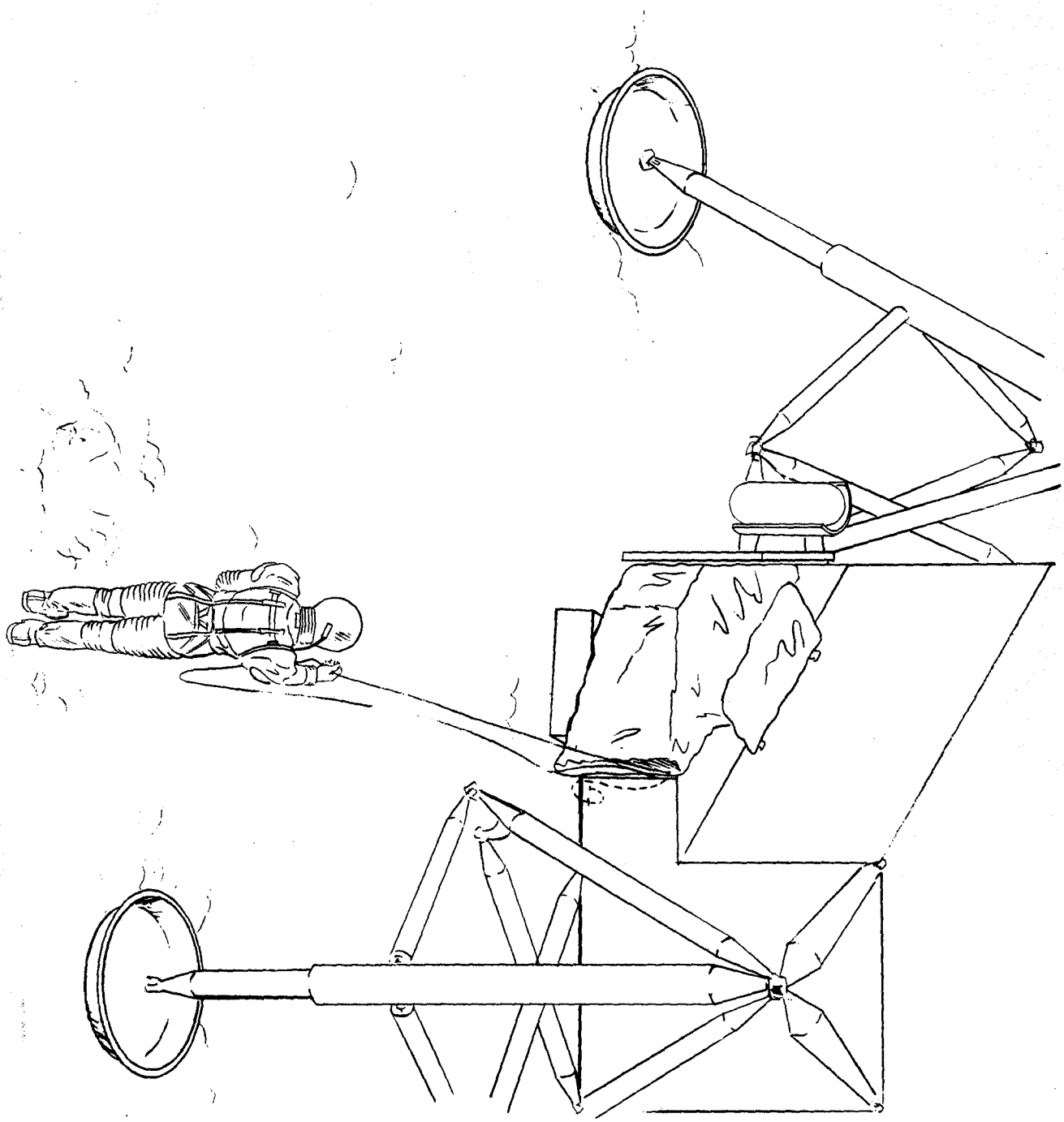
ICD AND IRN NUMBER AND TITLE		SIGN OFF GAEC	SIGN OFF S & AD	CURRENT EFFORT OR NEED FOR ACTION
LID-360-22802	SPECIMEN RETURN CONTAINERS STOWAGE (LM)	10/21/65	10/21/65	A NEW IRN-3 WILL BE REQUIRED TO EXP/ EXTERNAL ENVELOPE TO INCLUDE NEW (PIANO TYPE) HINGES. DWG NEEDED FRC NASA.
LIS-360-22802-1	CHANGE NOMENCLATURE	9/1/65	8/15/66	
LIS-360-22802-2	REDUCED CORNER RADIUS, 4.00 INCH CRITICAL DIMENSION TO BE MEASURED FROM CENTER-LINE OF PINS TO BOTTOM OF CONTAINER, CHANGED TOLERANCE OF SRC WIDTH AND VERTICAL C.G. DIMENSION.	6/7/67		
LID-360-22803	SEQUENCE CAMERA EXTRA FILM CONTAINER STOWAGE (LM).	12/21/65	12/21/65	THE CONTENTS OF THIS CONTAINER (100' CABLE) WILL BE STOWED IN THE DESCENT STAGE WITH THE TV CAMERA, AND A NEW T CONNECTOR WILL BE ADDED TO THE D/S. (CCA 668).
LID-360-22803-1	CHANGE CORNER RADIUS OF CONTAINER SO WESTINGHOUSE DOESN'T HAVE TO BEAD	9/20/67(EST)	10/20/67(EST.)	

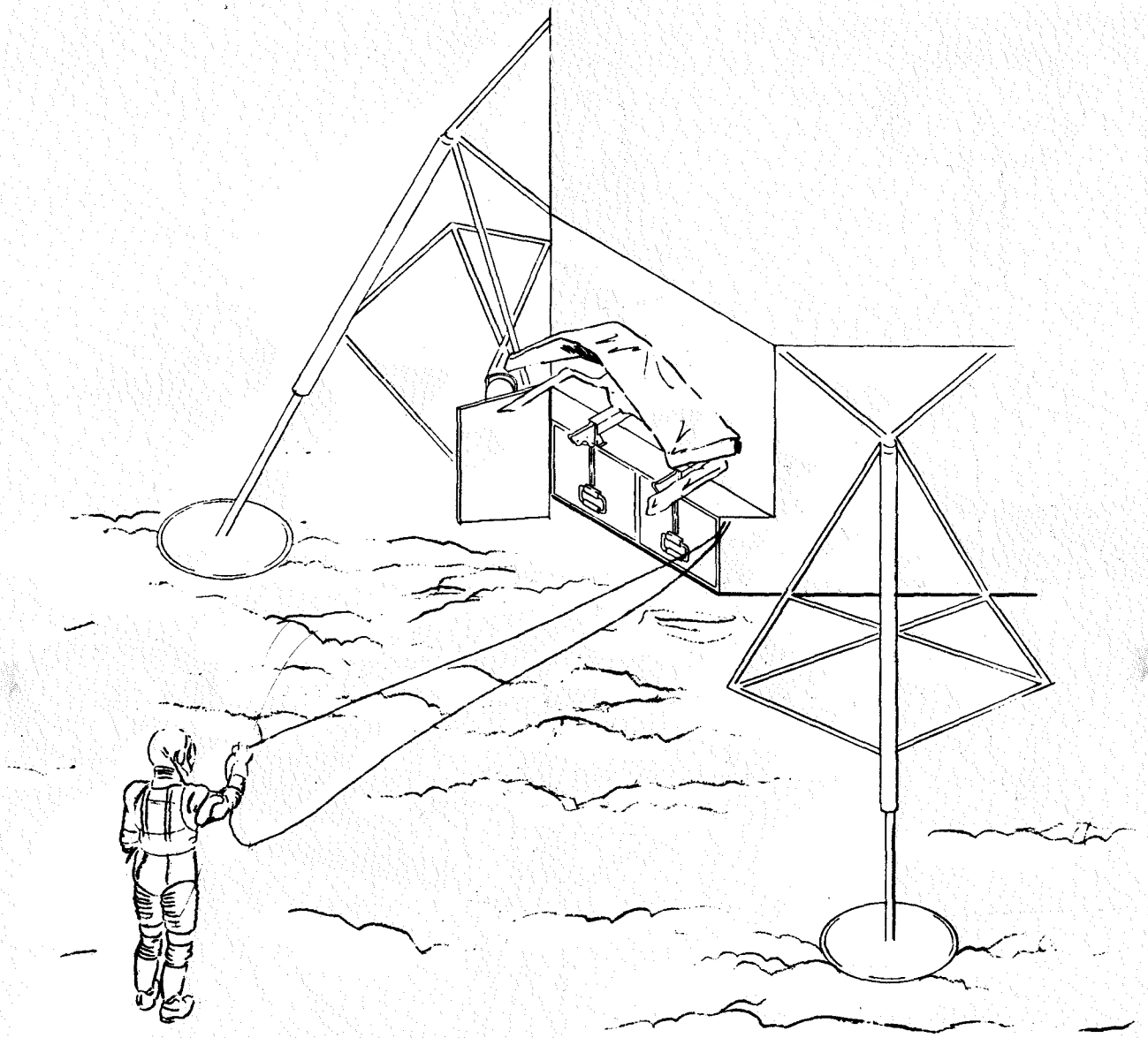
ICD AND IRN NUMBER AND TITLE		SIGN OFF GAEC	SIGN OFF S & AD	CURRENT EFFORT OR NEED FOR ACTION
LID-360-22804	STILL CAMERA PACKAGE STOWAGE (LM)	10/21/65	10/21/65	MIGHT NEED NEW ICD FOR INTERFACE BETWEEN CONTAINER AND CONTENTS DUE TO ECP 1114. (GAEC TO PROVIDE CONTAINE
REMARKS - VEHICLE EFFECTIVITY LM-4 AND SUBSEQUENT. SIGNED OFF BY EPO AND GAEC AT SEQ MEETING NO. 3				
LID-360-22804-1	DEFINES MAX. ALLOWED TOLERANCE IN DISTANCE BETWEEN THE PARALLEL MOUNTING RAILS ON LM ENGINE COVER FOR CAMERA	10/19/66	11/9/66	
LID-360-22804-A	REVISED INTERFACE DIMENSIONS TO IMPROVE INTERCHANGEABILITY, INCORPORATED IRN# 1, ADDED NOT PERTAINING TO DRY FILM LUBRICANTS.	3/24/67	7/25/67	
LID-360-22805	FILM AND TAPE CONTAINER STOWAGE (LM)	12/21/65	12/21/65	NAA IS REQUESTING THAT CONTAINER BE MOVED INBOARD 5/16".
LIS-360-22805-1	DELETES 4 OF THE 6 CALFAX FASTENERS (SWIP PROGRAM)	10/14/66	11/9/66	

ICD AND IRN NUMBERS AND TITLE		SIGN OFF GAEC	SIGN OFF S & AD	CURRENT EFFORT OR NEED FOR ACTION
LID-360-22809	MOUNTING OF 34 lb RTG FUEL CASK TO THE LM.	7/15/66	12/10/66	INCORPORATION OF BENDIX DESIGN AS S 3 OF THE INTERFACE. HARD POINT INT
LID-360-22809A	MOUNTING OF 60 lb RTG CASK TO THE LM	9/15/67(EST) (SHEET 1)	3/16/67 (SHEET 2)	FACE S/O AND PARTS IN STOCK TO LM 7 SHEETS 1 & 3 ARE BEING UPDATED TO C
809-1	CHANGE TOLL.	5/18/67	6/21/67	TO CCA 498 and 586.
809-2	CHANGE DATUM TOLLERANCE	6/2/67	6/27/67	
LID-360-22810	SCIENTIFIC EQUIPMENT CONTAINERS STOWAGE AND REMOVAL (LM DESCENT STAGE)	10/21/65	10/21/65	THIS ICD APPLICABLE TO LTA-8 AND LM ONLY (OLD INTERFACE PRIOR TO CCA 58
LID-360-22810A	NEW ALSEP I/F	9/15/66	10/5/66	
LID-360-22810 1	DEFINED C.Q.	10/21/65	10/21/65	
LID-360-22810-2	TOLERANCE CHANGE	6/7/66	10/5/66	
LID-360-22810-3	VERTICAL COLUMN CLEARANCE	4/27/66	11/09/66	
4	CHANGE DEMS.		8/31/66	
5	CHANGE DEMS.		6/21/67	
6.	CHANGES TABS on LM-3		6/24/67	
7	LTA-8 ONLY (DISAPPROVED)		DISAPPROVED	
8	APPLIES 810 TO LM-3 & LTA8 ONLY	7/25/67	7/26/67	

ICD AND IRN NUMBER AND TITLE		SIGN OFF GAEC	SIGN OFF S & AD	CURRENT EFFORT OR NEED FOR ACTION
LID-360-22811	NEW ALSEP INTERFACE FOR REMOTE REMOVAL (CCA 586)	7/20/67	7/26/67	INTERFACE MUST BE QUALIFIED THROUGH JOINTLY BY GAEC/NASA
LID-360-22812	LM DESCENT STAGE SCIENTIFIC EQUIPMENT WITHDRAWAL SYSTEM (CCA 586) (FUNCTIONAL)	10/1/67(EST)	11/1/67(EST)	WITHDRAWAL SYSTEM CURRENTLY UNDER DEVELOPMENT.
LID-360-22813	LM SCIENTIFIC EQUIPMENT ELECTRICAL INTERFACE CONNECTOR LOCATION	1/28/66	2/7/66	

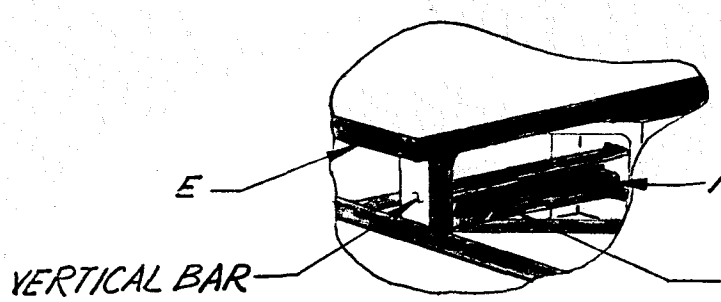
ICD AND IRN NUMBER AND TITLE		SIGN OFF GAEC	SIGN OFF S & AD	CURRENT EFFORT OR NEED FOR ACTION
LID-360-22814	LM SCIENTIFIC EQUIPMENT ELECTRICAL CONNECTOR THERMAL DOOR (FUNCTIONAL) METHOD OF ATTACHING DOOR TBD.	4/25/67	4/25/67	ATTACHMENT MATERIAL (VELCRO) WAS FLAMABLE AND NEW MATERIAL MUST BE DEVELOPED.

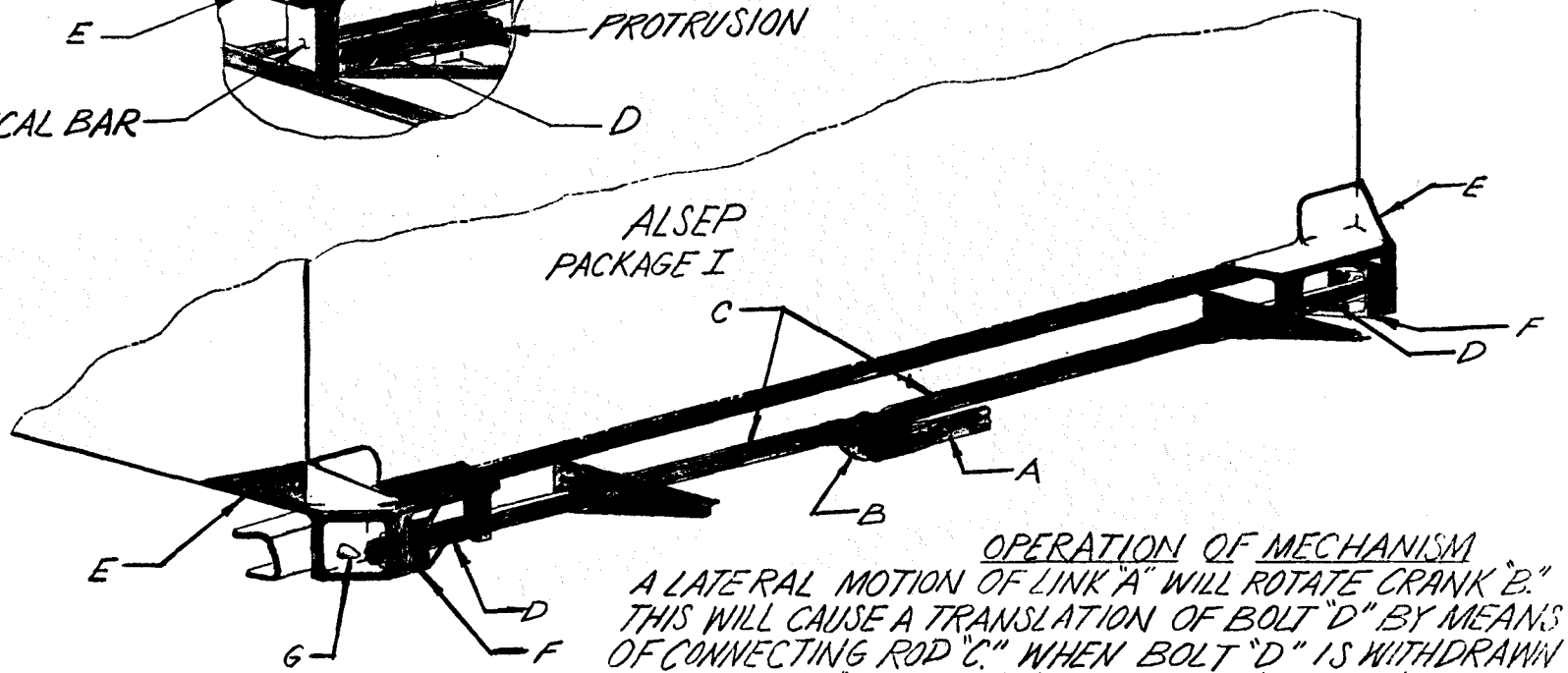




ALSEP LOCKING MECHANISM

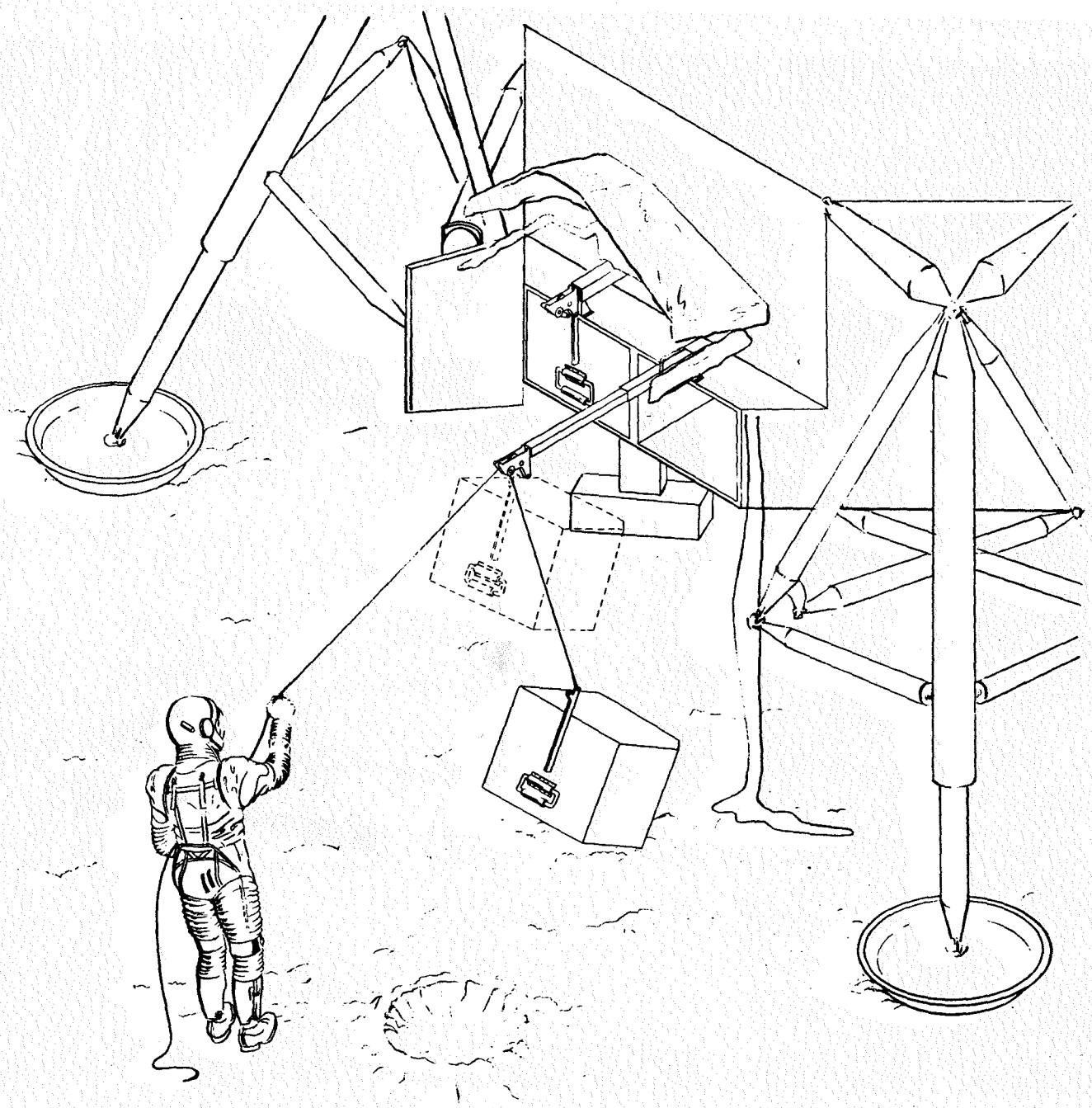
PKG I SHOWN
PKG II OPP.

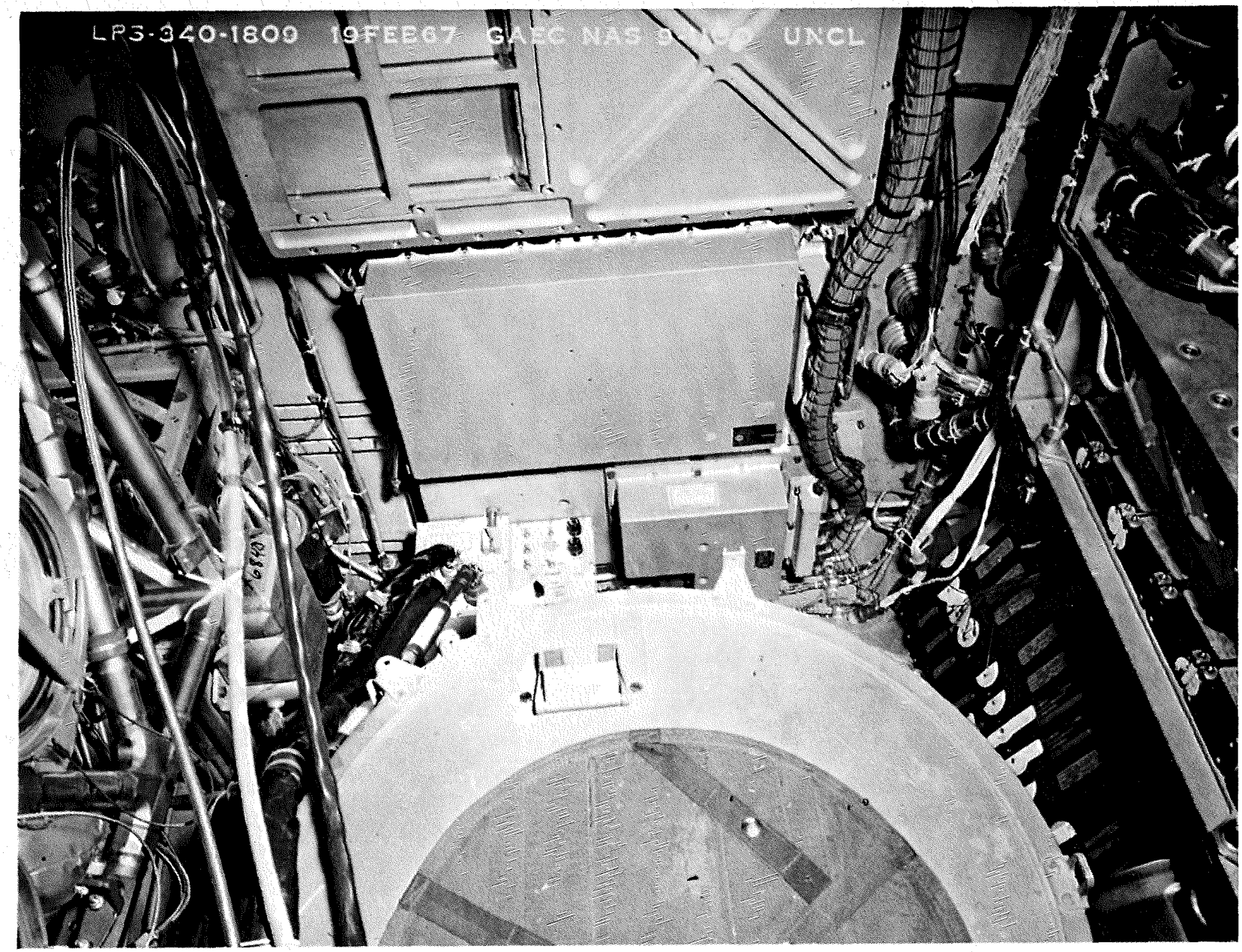




OPERATION OF MECHANISM

A LATERAL MOTION OF LINK "A" WILL ROTATE CRANK "B." THIS WILL CAUSE A TRANSLATION OF BOLT "D" BY MEANS OF CONNECTING ROD "C." WHEN BOLT "D" IS WITHDRAWN FROM FITTING "E" (ON ALSEP) AND FITTING "F" (ON LM) ALSEP WILL BE FREE TO MOVE. AN INITIAL OUTBOARD MOTION WILL BE ASSURED BY MEANS OF A RAMP TYPE PROTRUSION ON BOLT "D" (SEE BLOW-UP). THIS PROTRUSION WILL SLIDE AGAINST A VERTICAL BAR ON FITTINGS "F," PUSHING ALSEP OFF STUDS ("G"). THIS RAMP WILL BE OPERATIONAL ONLY AFTER BOLT "D" IS WITHDRAWN FROM FITTINGS "E" & "F."

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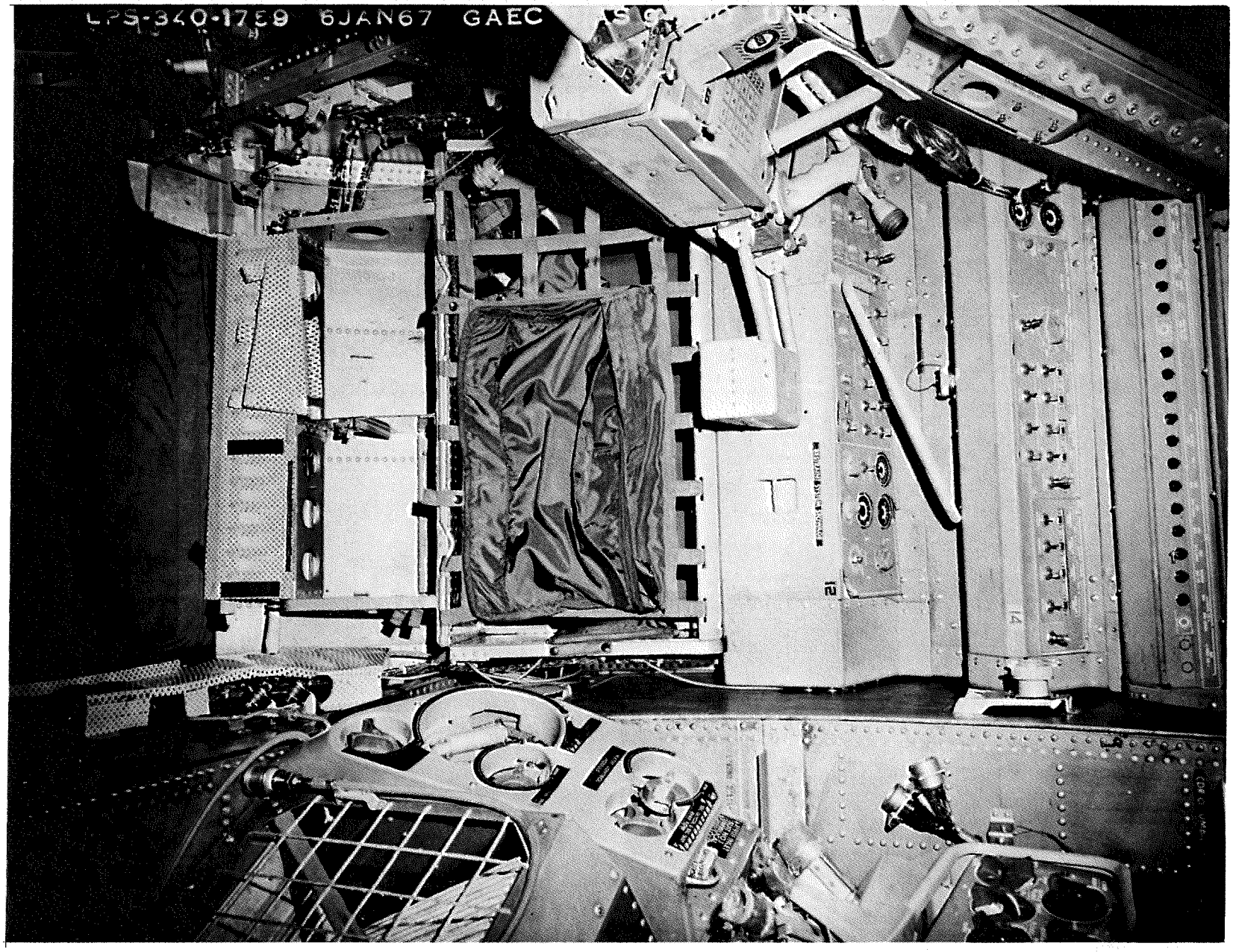
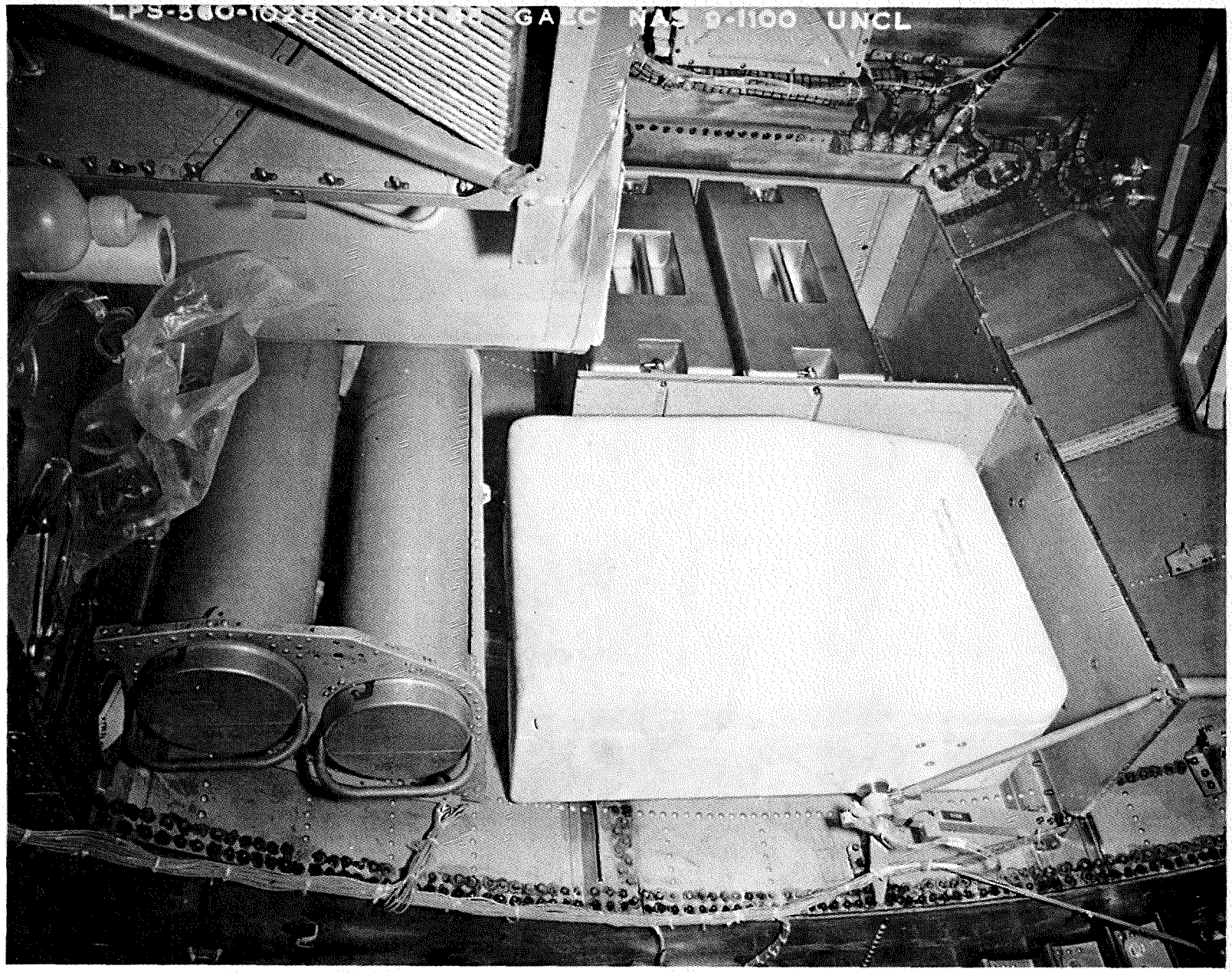
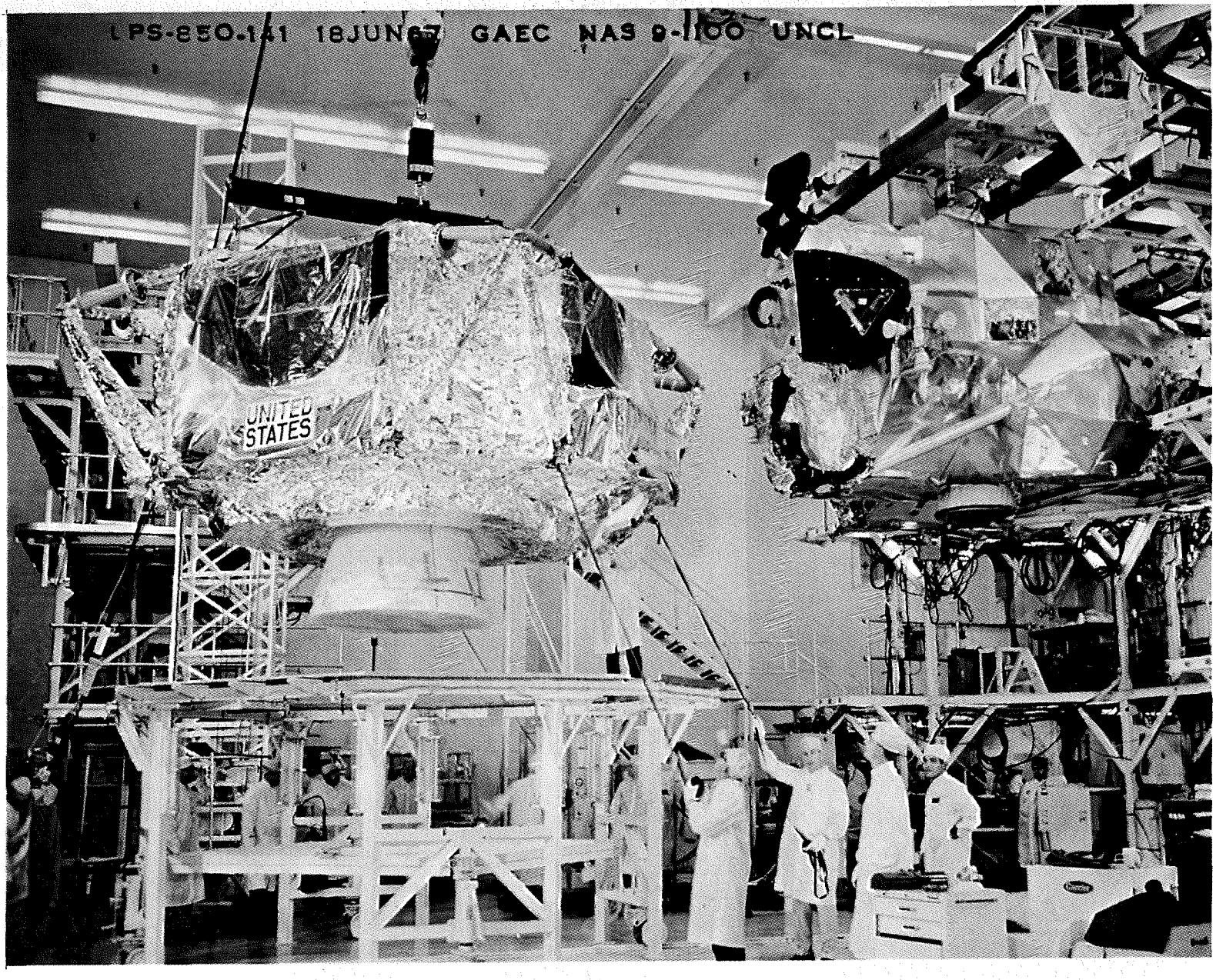
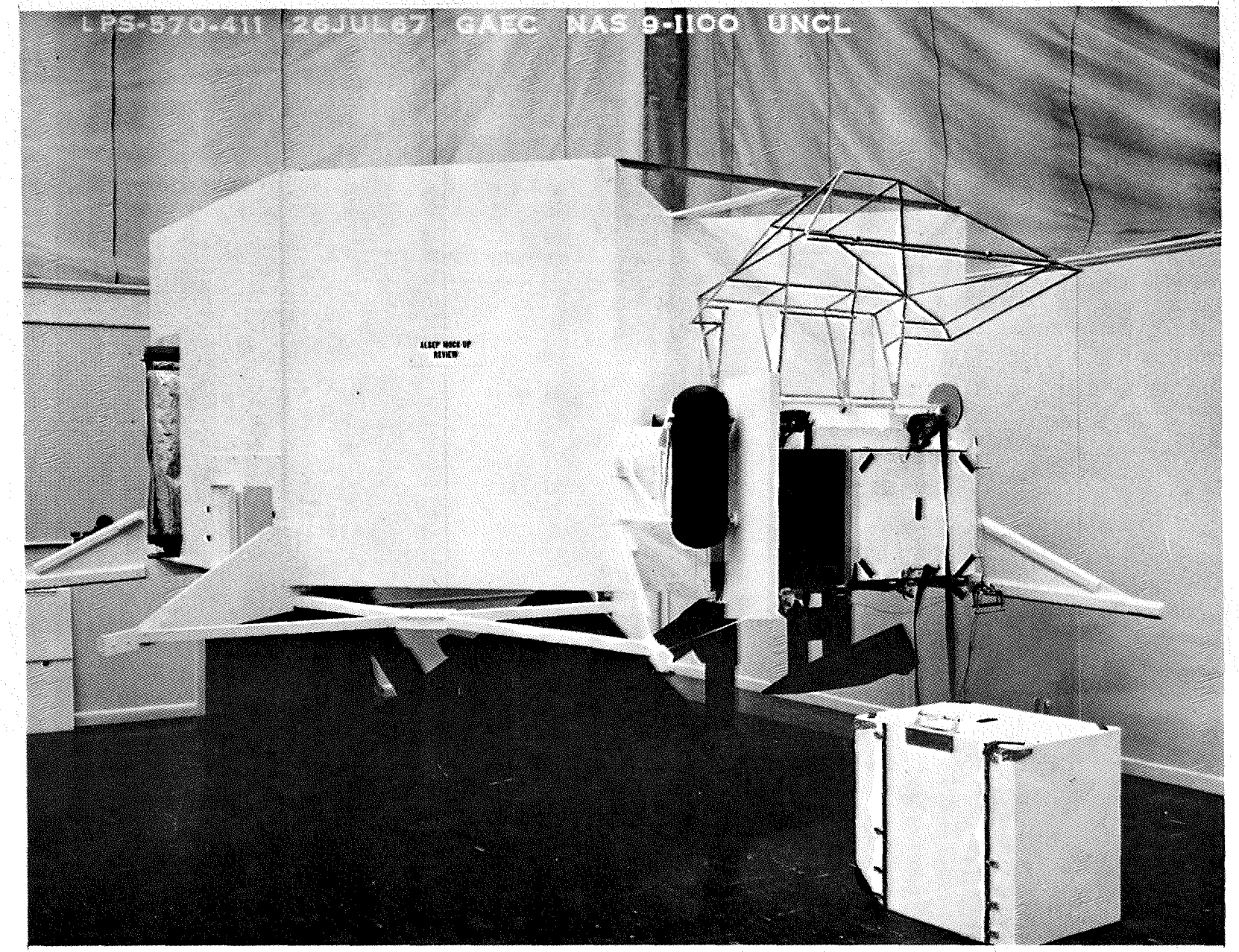
LPS-E70-396 25JUL67 GAEC NAS 9-11CO UNCL


LPS-340-1759 6JAN67 GAEC


LPS-560-1028 GABC NAS 9-1100 UNCL


LPS-850-141 18JUN67 GAEC NAS 9-1100 UNCL
UNITED
STATES


LPS-570-111 26JUL67 GAEC NAS 9-1100 UNCL
ALSEP MOCK UP
REVIEW

LPS-E70-407 25JUL67 GA8C
N

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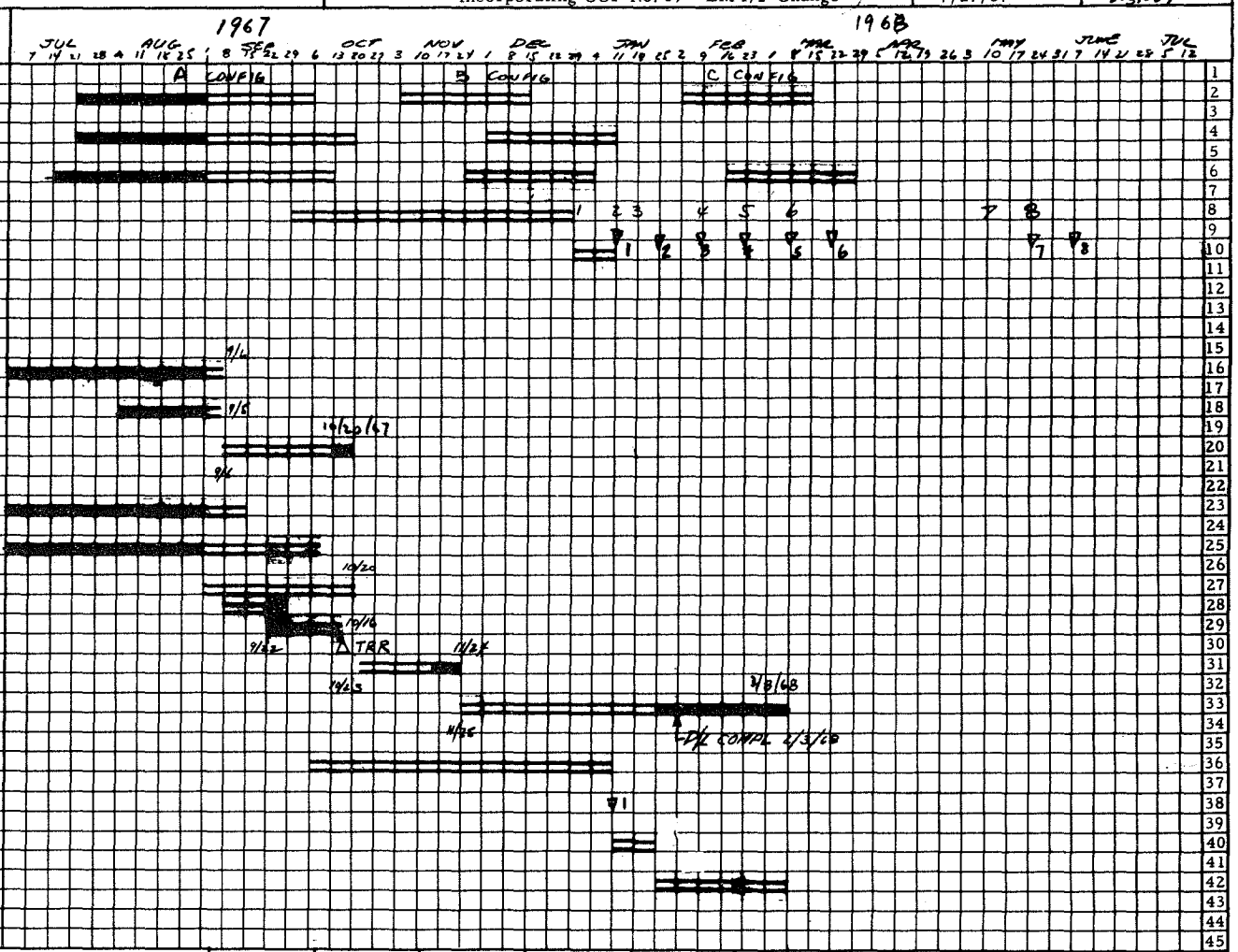

Line	Item
1	LM I/F Design Changes
2	Primary Structure Assy
3	
4	Sub Package 2 Assy
5	
6	Sunshield Assembly
7	
8	Sunshield Procurement
9	
10	Sunshield Assy Build up
11	
12	
13	
14	"A" Configuration
15	Prototype
16	C/S Integ & Mech Assy
17	
18	Expt Integration
19	
20	Design Verif. Tests
21	
22	Qualification Model
23	Component Fab & Assy
24	
25	Struct. Fab & Assy
26	
27	C/S Integ & Mech Assy
28	Expt PIA
29	Expt Integration
30	
31	Accep Tests
32	
33	Qual & Simul Mission Tests
34	
35	Struct/Therm Subsys Qual
36	Struct. Fab & Assy
37	
38	Sunshield Assy Avail
39	
40	Subsystem Assy & Chkout
41	
42	Struct/Therm Qual Test
43	
44	
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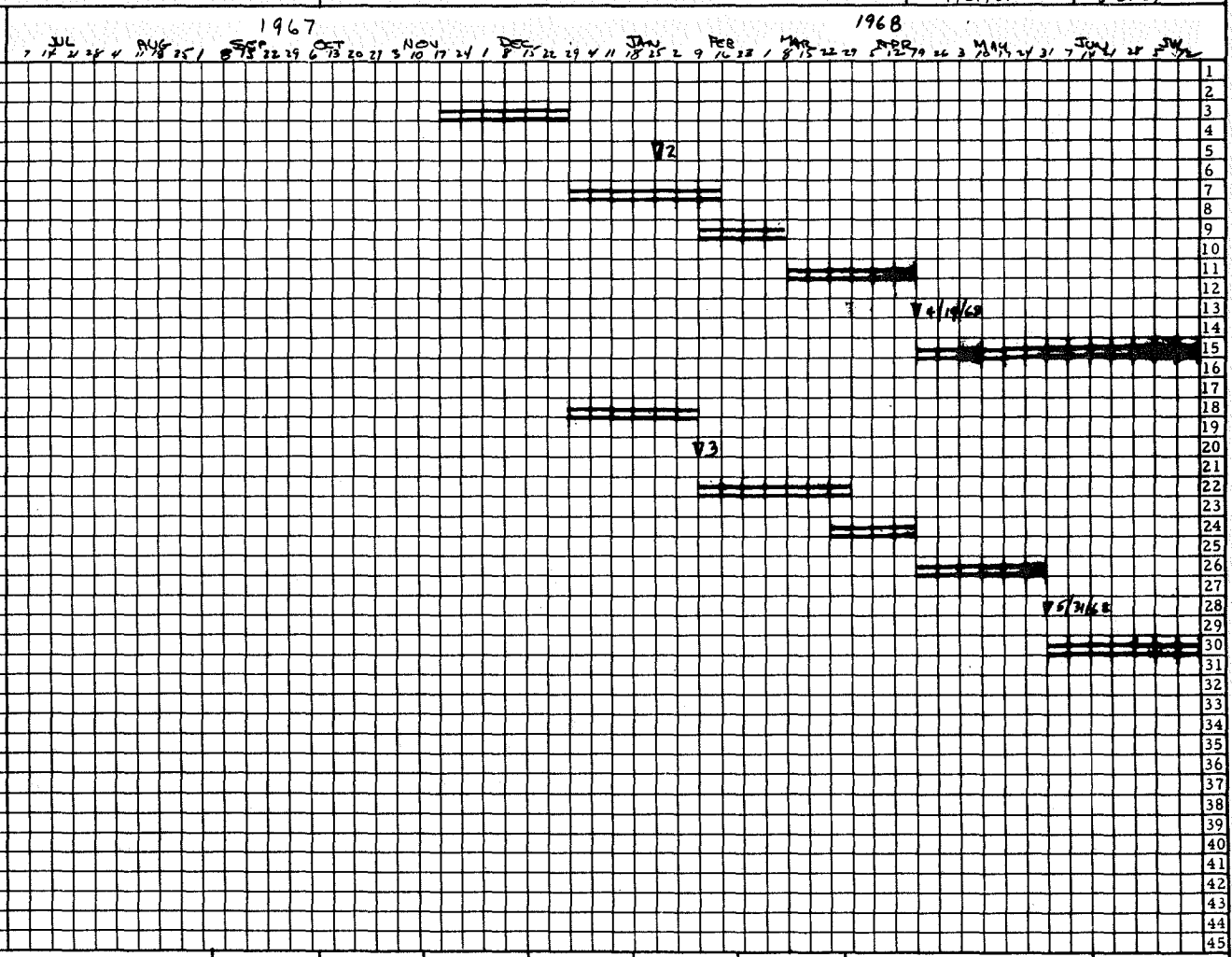

Line	Item
1	"A" Configuration
2	Flight 1
3	Component Fab & Assy
4	
5	Sunshield Assy Avail
6	
7	C/S Integ & Mech Assy
8	
9	Expt Integration
10	
11	Accept Tests
12	
13	Delivery
14	
15	KSC Checkout Suppt.
16	
17	Flight 2
18	Component Fab & Assy
19	
20	Sunshield Assy Avail
21	
22	C/S Integ & Mech Assy
23	
24	Expt. Integration
25	
26	Accept Tests
27	
28	Delivery
29	
30	KSC Checkout Suppt
31	
32	
33	
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Line	Item	JUL 19	26	AUG 2	9	16	23	30	SEP 6	13	20	27	OCT 4	11	18	25	NOV 1	8	15	22	29	DEC 6	13	20	27	Line
1	"A" Configuration																									1
2	Flight 1																									2
3	Component Fab & Assy																									3
4																										4
5	Sunshield Assy Avail																									5
6																										6
7	C/S Integ & Mech Assy																									7
8																										8
9	Expt Integration																									9
10																										10
11	Accept Tests																									11
12																										12
13	Delivery																									13
14																										14
15	KSC Checkout Suppt																									15
16																										16
17	Flight 2																									17
18	Component Fab & Assy																									18
19																										19
20	Sunshield Assy Avail																									20
21																										21
22	C/S Integ & Mech Assy																									22
23																										23
24	Expt Integration																									24
25																										25
26	Accept Tests																									26
27																										27
28	Delivery																									28
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30	KSC Checkout Suppt																									30
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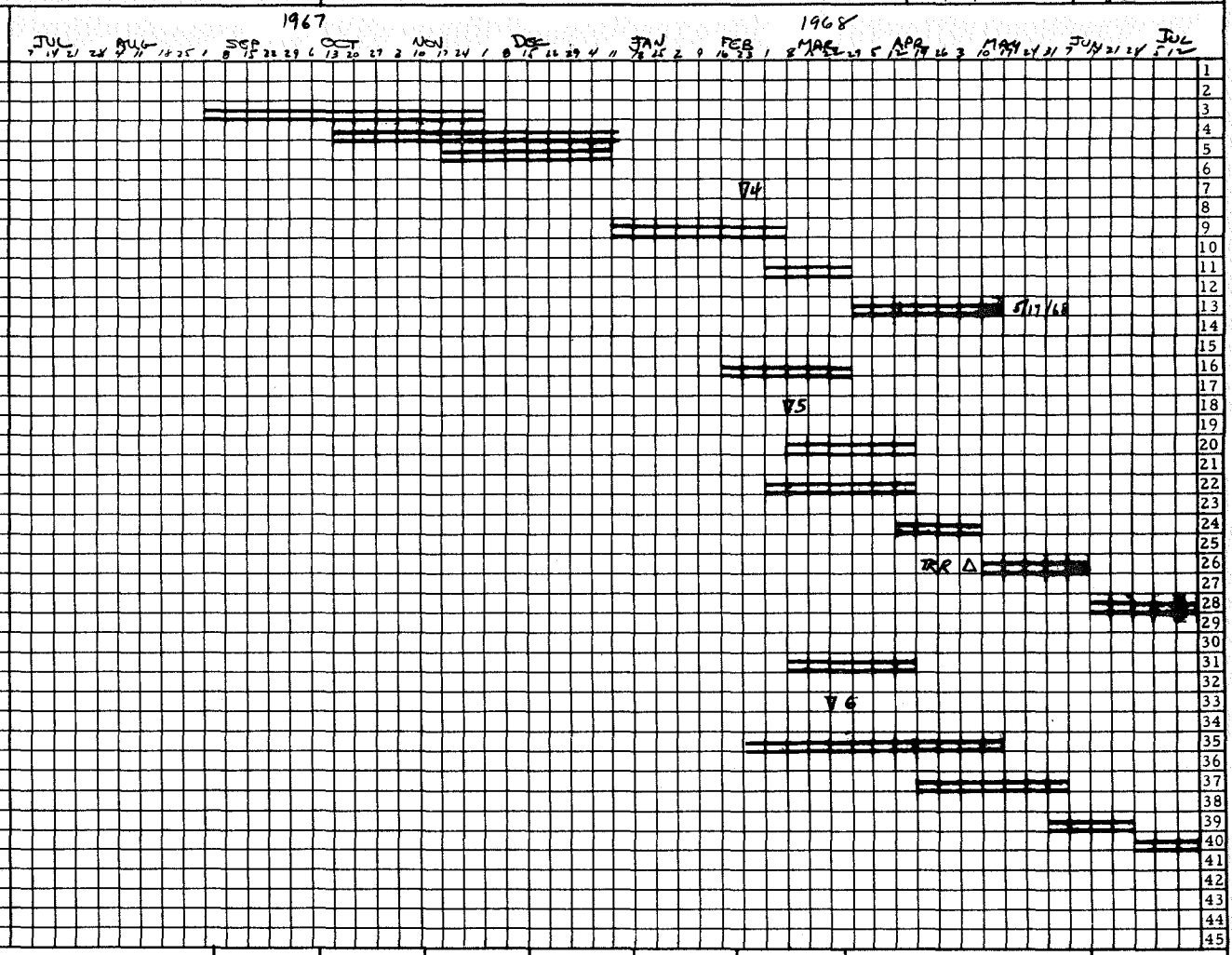

Line	Item
1	"B" Configuration
2	Prototype
3	Elect Design
4	Mech Design
5	Elect Fab
6	
7	Sunshield Assy Avail
8	
9	Refurbish "C" to "B"
10	
11	Expt Integration
12	
13	Design Verification Tests
14	
15	Qualification Model
16	Component Fab & Assy
17	
18	Sunshield Assy Avail
19	
20	Refurb Qual S/S Struct
21	
22	C/S Integ & Mech Assy
23	
24	Expt Integration
25	
26	Accept Tests
27	
28	Qual & Simul Mission Tests
29	
30	Flight 3
31	Component Fab & Assy
32	
33	Sunshield Assy Avail
34	
35	Struct Fab & Assy
36	
37	C/S Integ & Mech Assy
38	
39	Expt Integration
40	Accept Tests
41	
42	Delivery
43	
44	KSC Checkout Suppt
45	

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1968
JUL 17 24 | AUG 1 9 16 23 30 | SEP 6 13 20 27 | OCT 4 11 18 25 | NOV 1 8 15 22 29 | DEC 6 13 20 27

Line	Item	
1	"B" Configuration	
2	Prototype	
3	Elect Design	
4		
5	Elect Fab	
6		
7	Sunshield Assy Avail	
8		
9	Refurbish "C" to "B"	
10		
11	Expt Integration	
12		
13	Design Verification Tests	
14		
15	Qualification Model	
16	Component Fab & Assy	
17		
18	Sunshield Assy Avail	
19		
20	Refurb Qual S/S Struct	
21		
22	C/S Integ & Mech Assy	
23		
24	Expt Integration	
25		
26	Accept Tests	
27		
28	Qual & Simul Mission Tests	9/20/68
29		
30	Flight 3	
31	Component Fab & Assy	
32		
33	Sunshield Assy Avail	
34		
35	Struct Fab & Assy	
36		
37	C/S Integ & Mech Assy	
38		
39	Expt Integration	
40	Accept Tests	
41		
42	Delivery	9/23/68
43		
44	KSC Checkout Suppt	
45		

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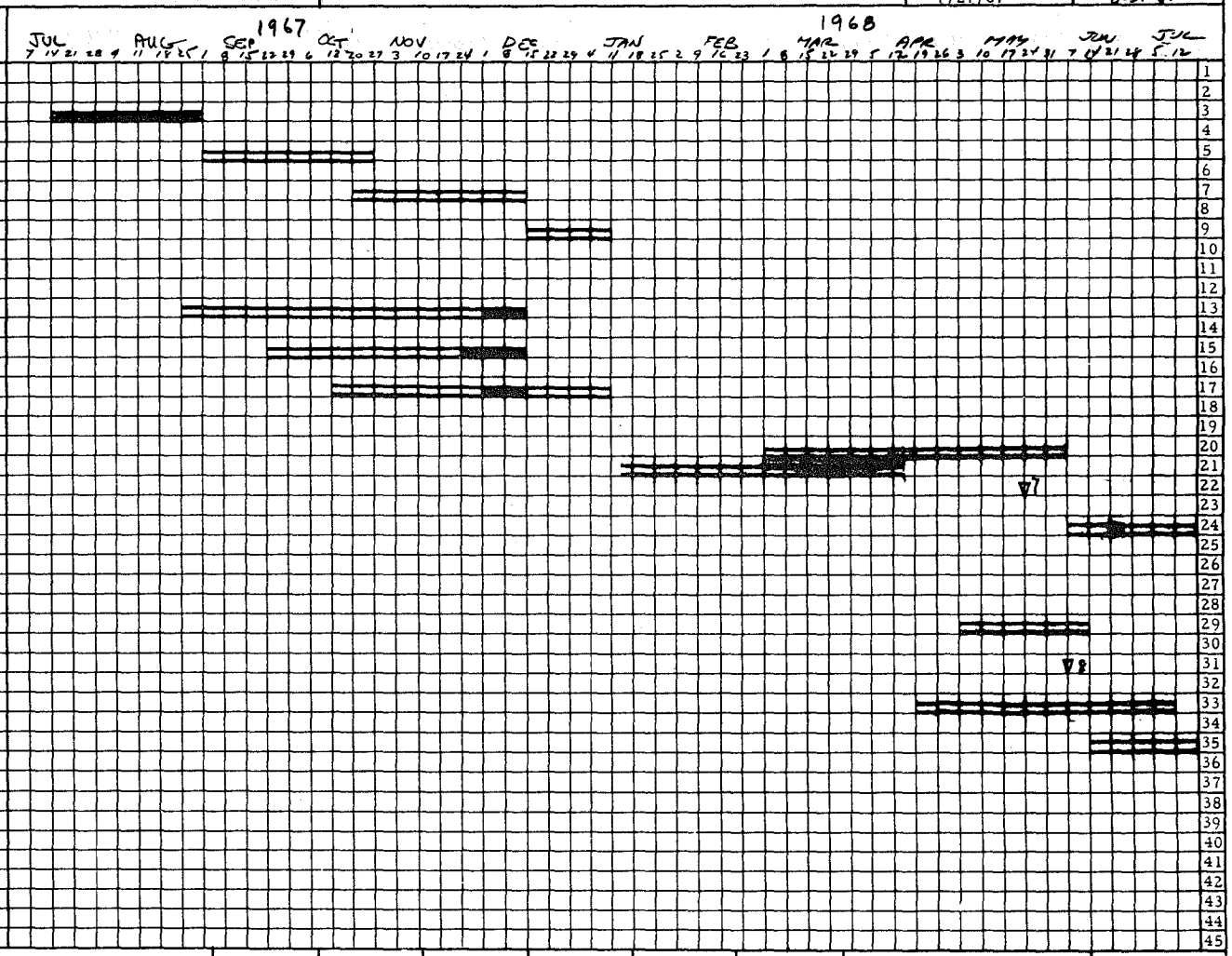

Line	Item
1	"C" Configuration
2	Prototype
3	Elec Design
4	
5	Elec Fab & Test
6	
7	Refurbish "A" to "C"
8	
9	ASE/Expt Funct. Tests
10	
11	Expt Subsystems
12	
13	CPLEE DVT
14	
15	Heat Flow DVT
16	
17	ASE DVT
18	
19	Qualification Model
20	ASE Fab & Test
21	Mech Design
22	Sunshield Assy Avail
23	
24	ASE Qual Test
25	
26	ASE Simul Mission
27	
28	Flight 4
29	Component Fab & Assy
30	
31	Sunshield Assy Avail
32	
33	Struct Fab & Assy
34	
35	C/S Integ & Mech Assy
36	
37	Expt Integration
38	
39	Accept Tests
40	
41	Delivery
42	
43	KSC Checkout Suppt
44	
45	

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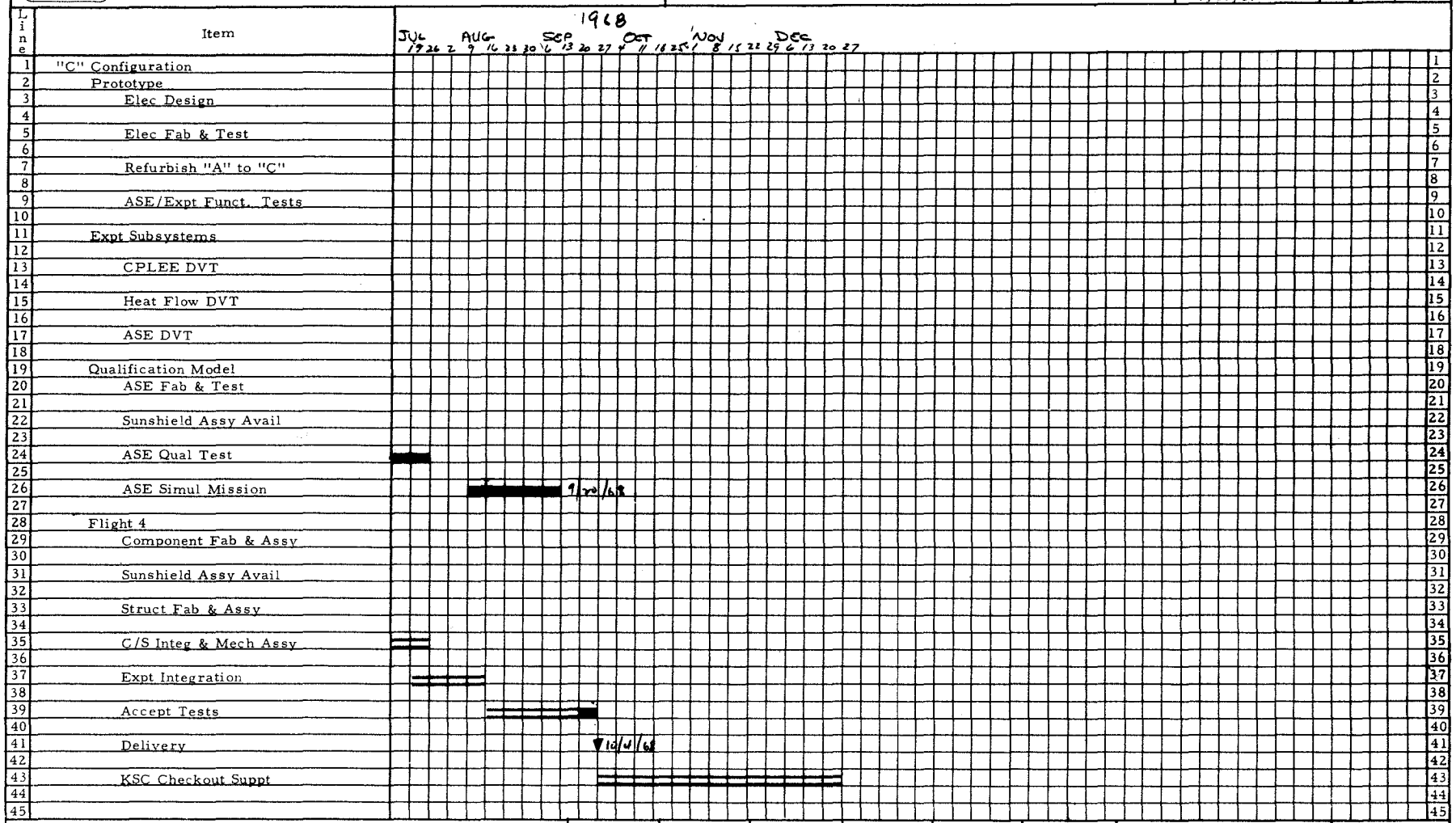

Line	Item
1	"C" Configuration
2	Prototype
3	Elec Design
4	
5	Elec Fab & Test
6	
7	Refurbish "A" to "C"
8	
9	ASE/Expt Funct. Tests
10	
11	Expt Subsystems
12	
13	CPLEE DVT
14	
15	Heat Flow DVT
16	
17	ASE DVT
18	
19	Qualification Model
20	ASE Fab & Test
21	
22	Sunshield Assy Avail
23	
24	ASE Qual Test
25	
26	ASE Simul Mission
27	
28	Flight 4
29	Component Fab & Assy
30	
31	Sunshield Assy Avail
32	
33	Struct Fab & Assy
34	
35	C/S Integ & Mech Assy
36	
37	Expt Integration
38	
39	Accept Tests
40	
41	Delivery
42	
43	KSC Checkout Suppt
44	
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Remarks

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Line	Item
1	Inert Models
2	Structural Model F
3	LM-3 I/F
4	
5	LM-4 I/F
6	
7	Therm/Mech Simul D-1
8	
9	Therm/Mech Simul D-2
10	LM-3 I/F
11	
12	LM-4 I/F
13	
14	Trainer Dev. Model E-2
15	
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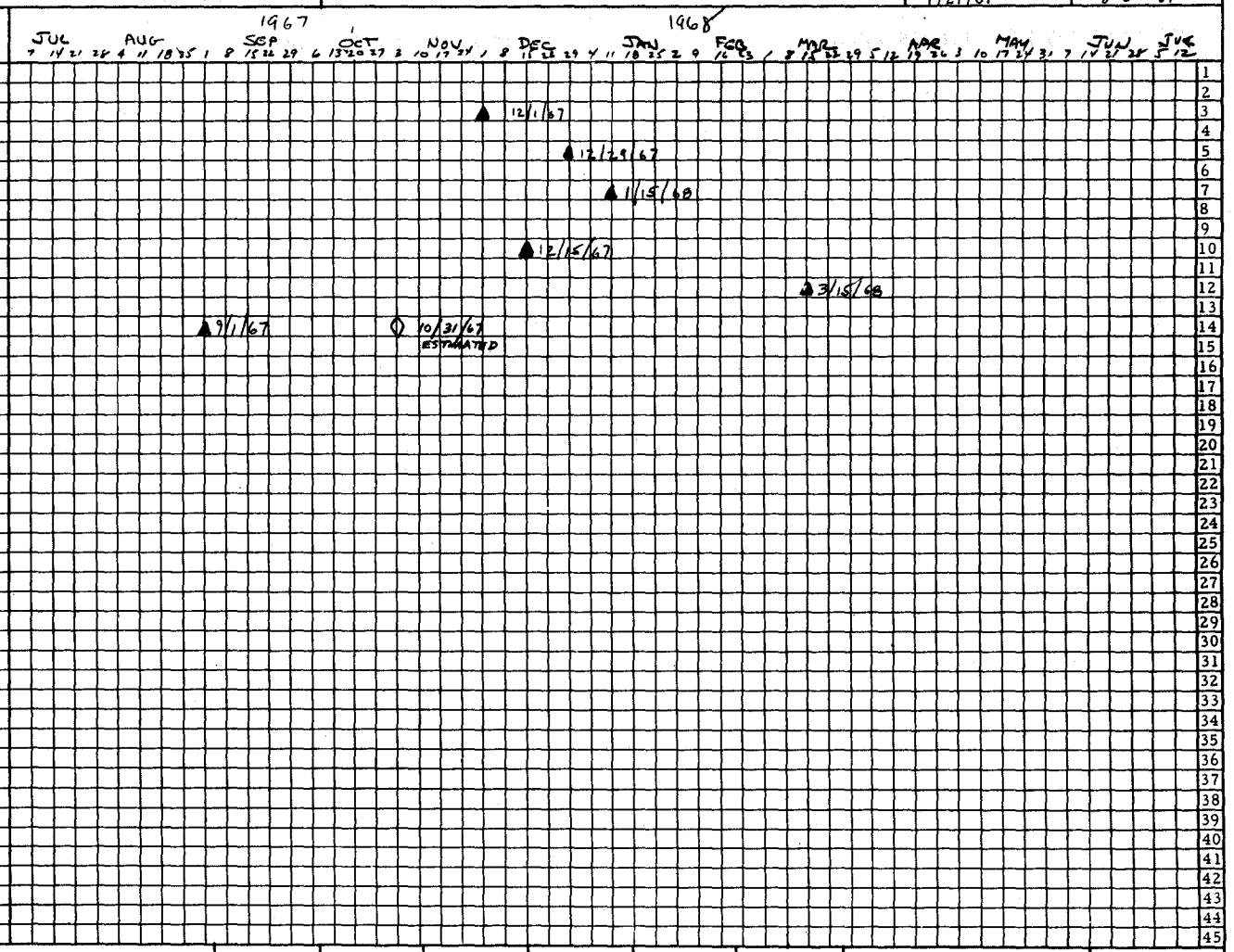

Remarks: Dates shown are MSC need dates as defined 7/27/67.
BxA schedule will be developed.

Other	Test	Mfg Dept	Mfg Prog	Engr	Prog Con.

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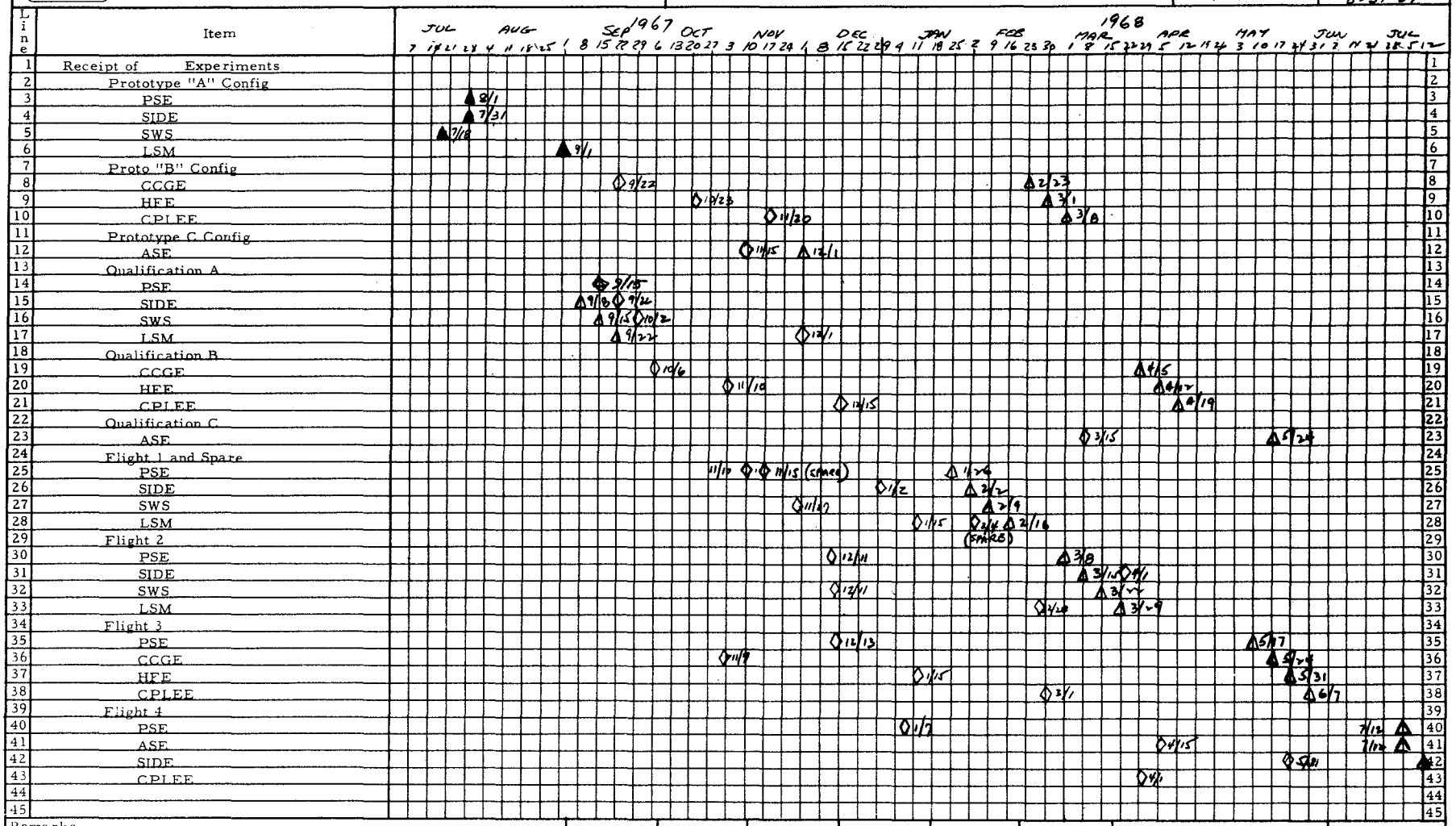
REVISED ALSEP PROGRAM Incorporating CCP No. 49 - LM I/F Change	H	
	Issued On: 7/27/67	Updated On: 8-31-67



Remarks
◇ EXPERIMENT EXPECTED DELIVERY DATES
△ EXPERIMENT REQUIRED DELIVERY DATES

Other	Test	Mfg Dept	Mfg Prog	Engr	Prog Cont

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Systems Division
Ann Arbor, Michigan

MASTER SCHEDULE

Title	No:	Revision No:
REVISED ALSEP PROGRAM Incorporating CCP No. 49 - LM I/F Change	Issued On: 7/27/67	Updated On: 8-31-67

1968

Line	Item	JUL 19 26	AUG 2 9 16 23 30	SEP 6 13 20 27	OCT 4 11 18 25	NOV 1 8 15 22 29	DEC 6 13 20 27	Line
1	Receipt of ___ Experiments							1
2	Prototype "A" Config							2
3	PSE							3
4	SIDE							4
5	SWS							5
6	LSM							6
7	Prototype "B" Config							7
8	CCGE							8
9	HFE							9
10	CPLEE							10
11	Prototype "C" Config							11
12	ASE							12
13	Qualification A							13
14	PSE							14
15	SIDE							15
16	SWS							16
17	LSM							17
18	Qualification B							18
19	CCGE							19
20	HFE							20
21	CPLEE							21
22	Qualification C							22
23	ASE							23
24	Flight 1 and Spare							24
25	PSE							25
26	SIDE							26
27	SWS							27
28	LSM							28
29	Flight 2							29
30	PSE							30
31	SIDE							31
32	SWS							32
33	LSM							33
34	Flight 3							34
35	PSE							35
36	CCGE							36
37	HFE							37
38	CPLEE							38
39	Flight 4							39
40	PSE							40
41	ASE							41
42	SIDE	△ 7/19						42
43	CPLEE	△ 7/26						43
44								44
45								45

Remarks	Other	Test	Mfg Dept	Mfg Prog	Engr	Prog Cont	Next Higher Schedule No	Page 6B of 6

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