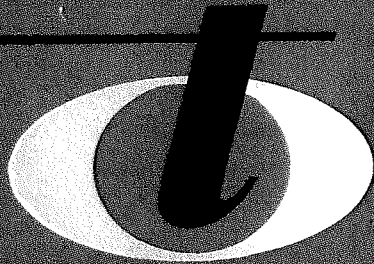


Lobb



ALSEP/SIDE/CCGE



design review
presentation

prepared for : Rice University
Houston, Texas

reference : Prime Contract NAS 9-5911
Contract No. S-1966-14

TIME-ZERO corporation

3530 TORRANCE BOULEVARD, TORRANCE, CALIFORNIA 90503 . 213/772-444

Table of Contents

SECTION 1 Electrical

SECTION 2 Mechanical

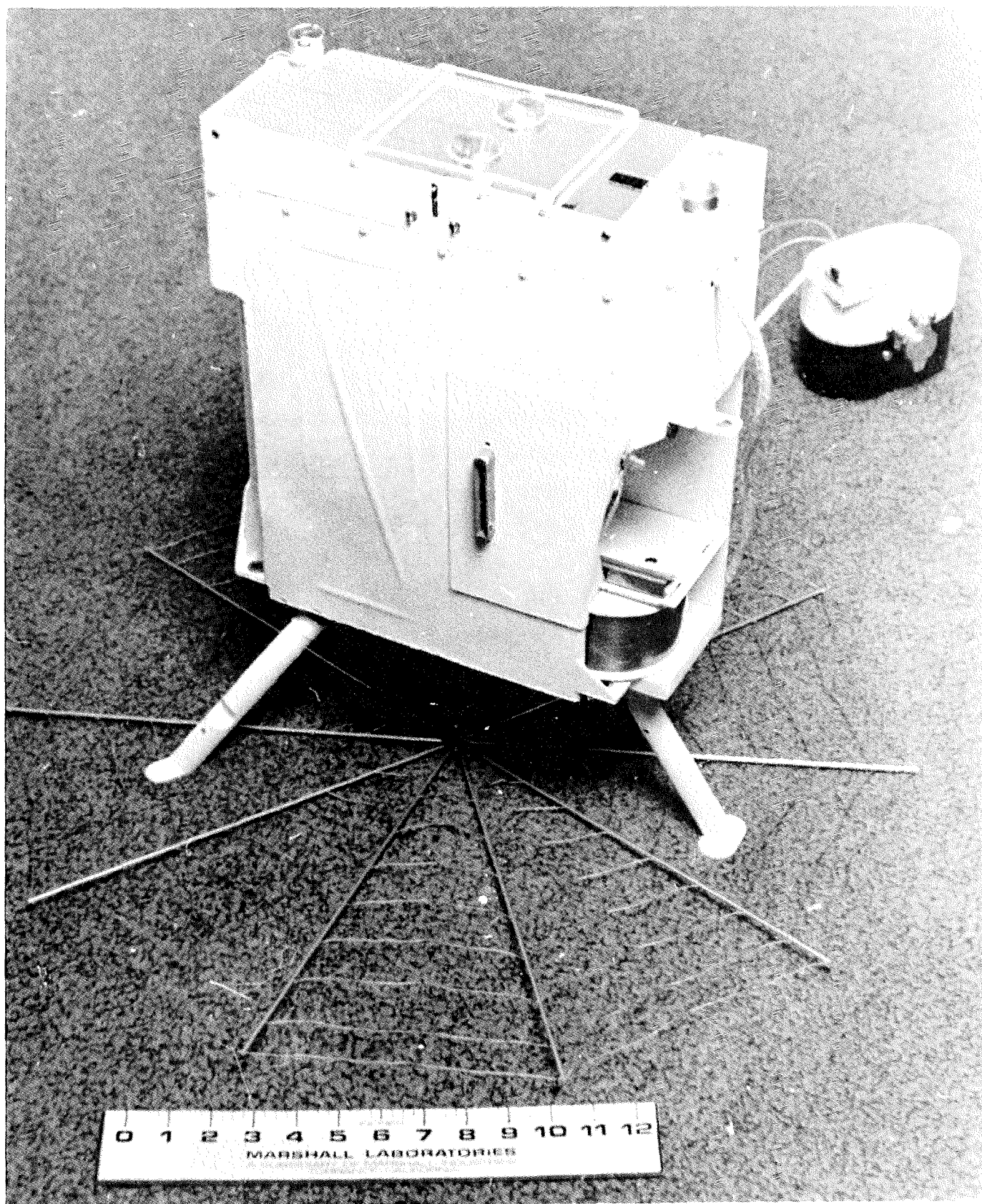
SECTION 3 Thermal

SECTION 4 Test

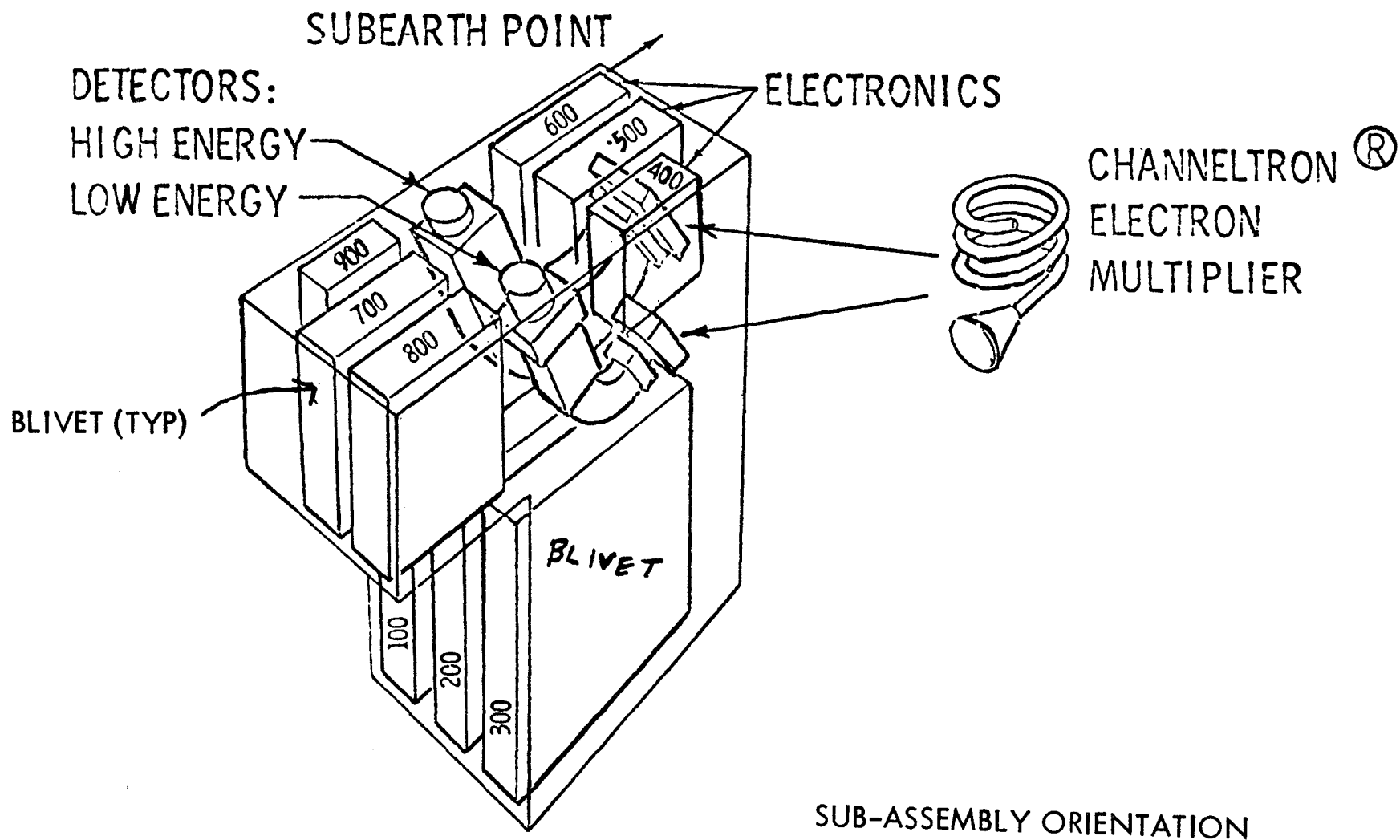
APPENDIX

SECTION 1

Electrical

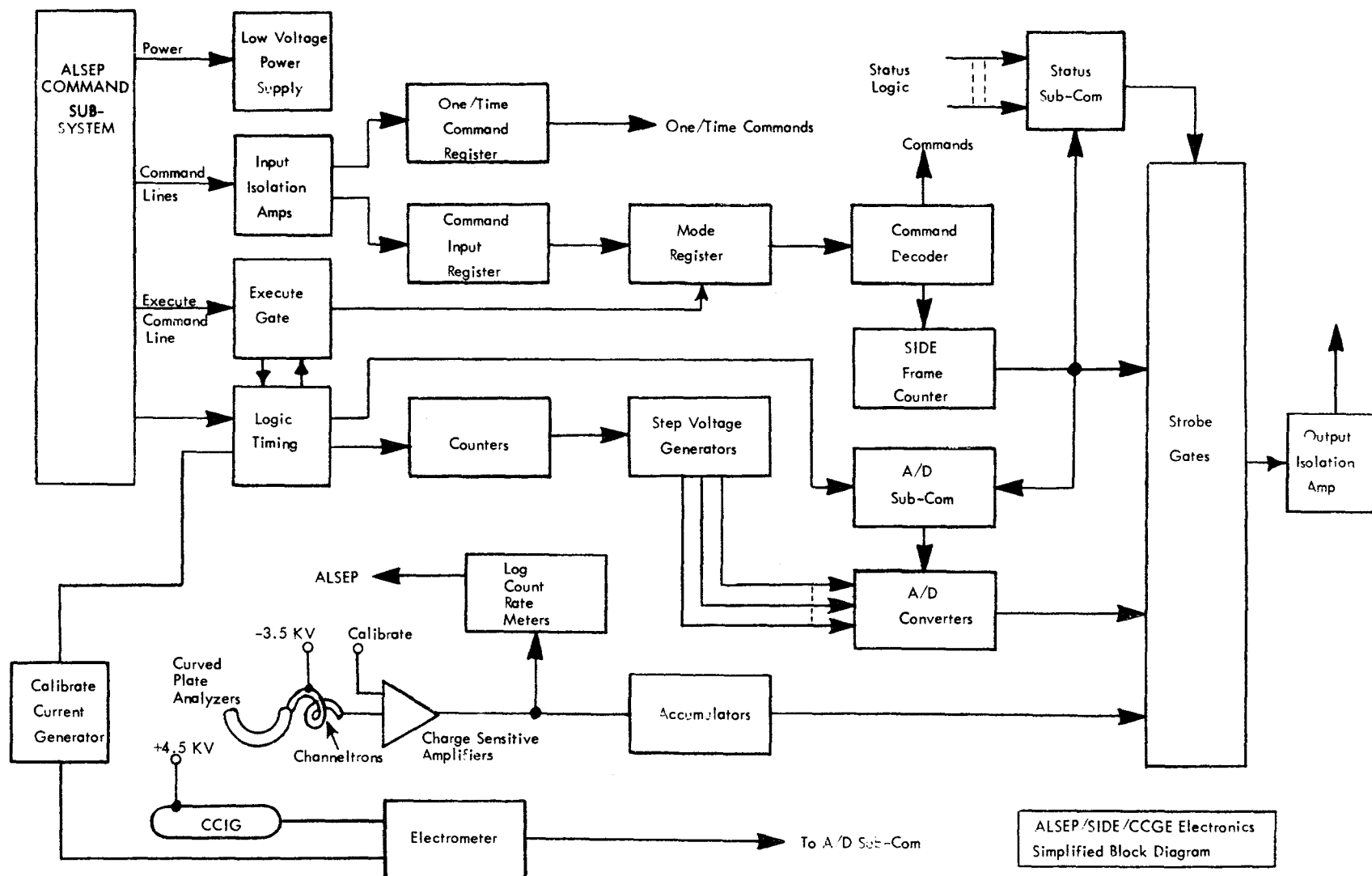


0 1 2 3 4 5 6 7 8 9 10 11 12
MARSHALL LABORATORIES
U.S. DEPARTMENT OF DEFENSE, THE ARMY
WASHINGTON, D.C. 20315



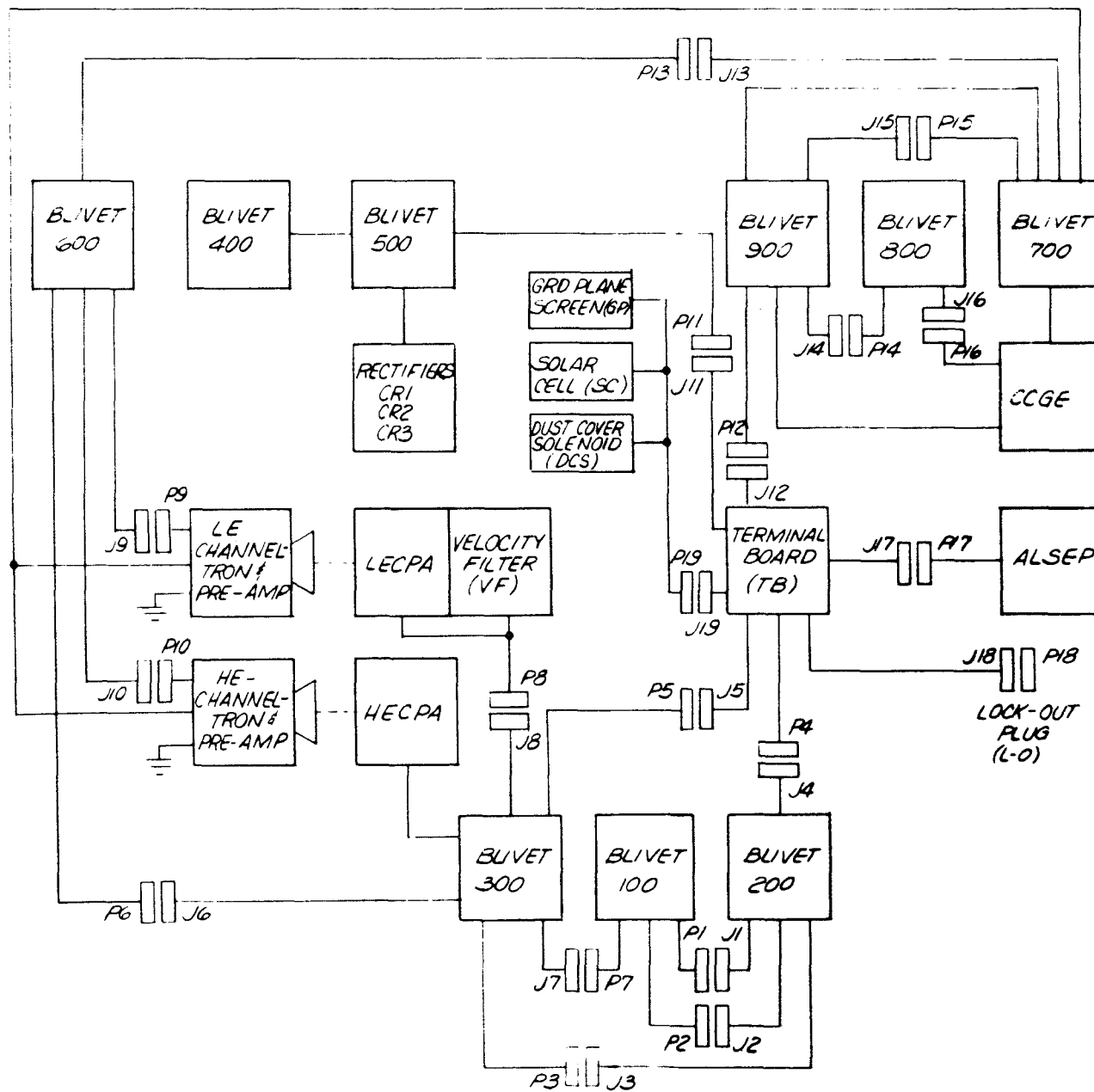
- | | | |
|----|---------------------|--|
| a) | Blivet 100 | Logic Timing, Command System, Strobe Gates, SIDE Frame Counter, Accumulators. |
| b) | Blivet 200 | A/D Converters, ALSEP/SIDE Interface Networks, Logic Timing, Sub-commutators, CCGE Cal Command Generator, Dust Cover Removal Circuit, Cal Dividers |
| c) | Blivet 300 | Step Voltage Counters & Generators, Cal Pulse Generator |
| d) | Blivets 400/
500 | Low Voltage Power Supply |
| e) | Blivet 600 | Cal Shapers, Deadtime Circuits, Log Count Rate Meters, -3.5 kV Regulator |
| f) | Blivet 700 | -3.5 kV Converter & Multiplier, 4.5 kV Multiplier and Output Divider |
| g) | Blivet 800 | Electrometer for CCGE |
| h) | Blivet 900 | 4.5 kV Regulator and Converter, Electrometer Range Relay Drivers & Power Supply, CCGE Seal Break Circuit |

SUB-ASSEMBLIES (BLIVETS) AND FUNCTIONS

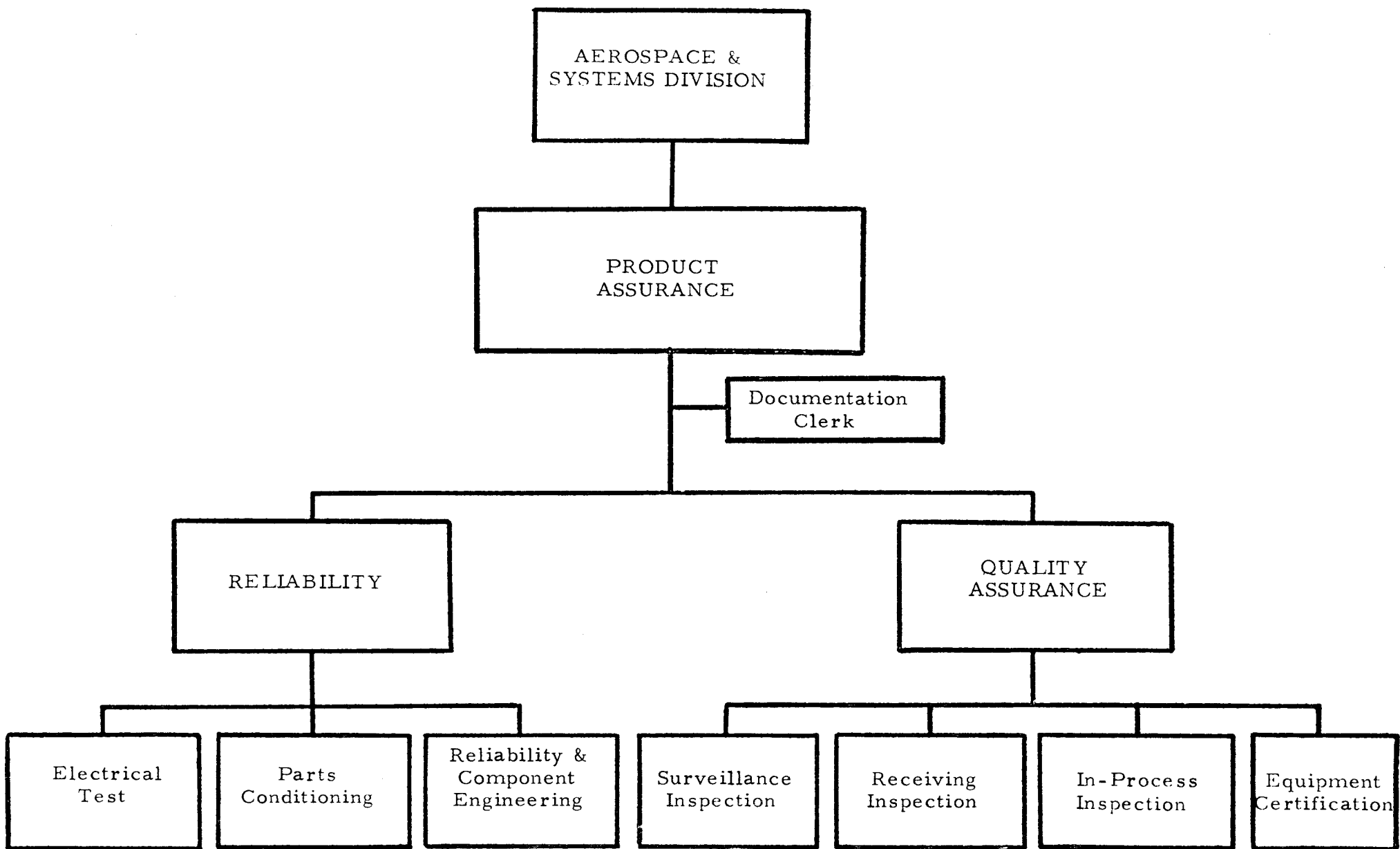


ALSEP/SIDE/CCGE Electronics
Simplified Block Diagram

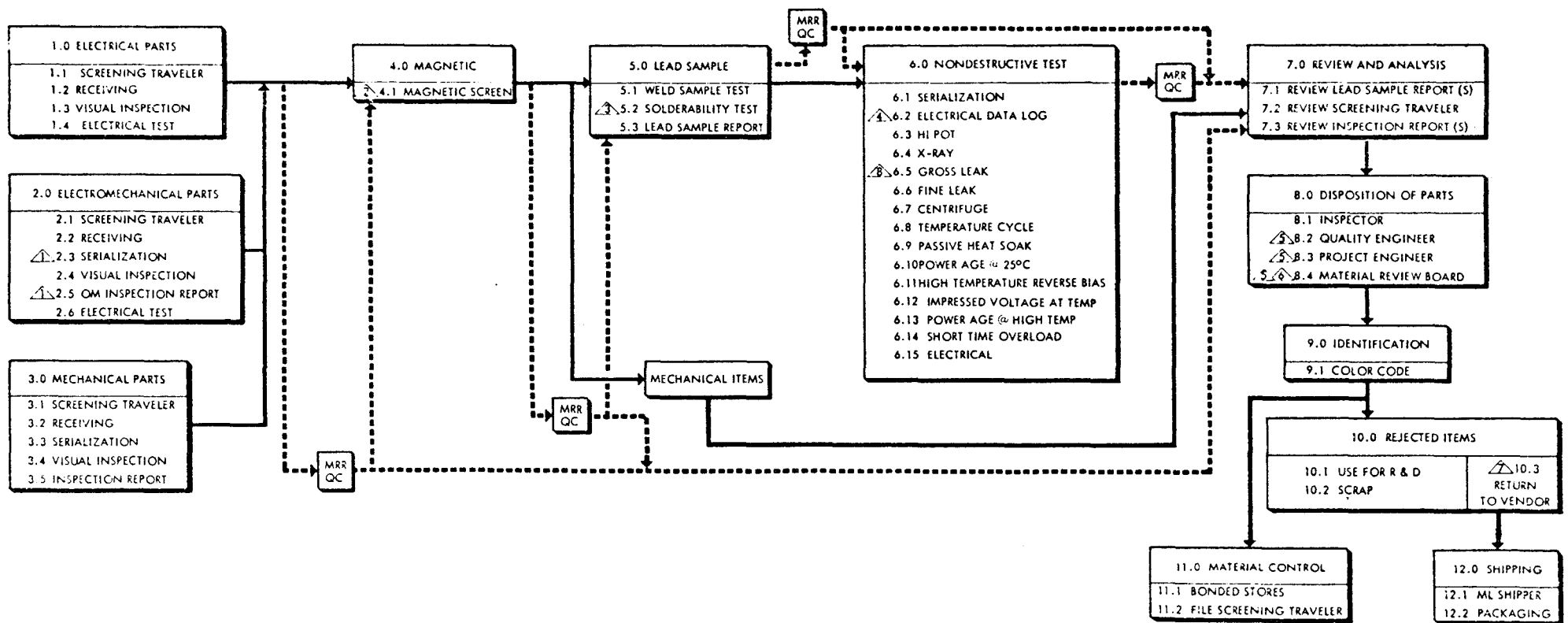
NOTE: Only one Ion Detection system and sensor is shown.



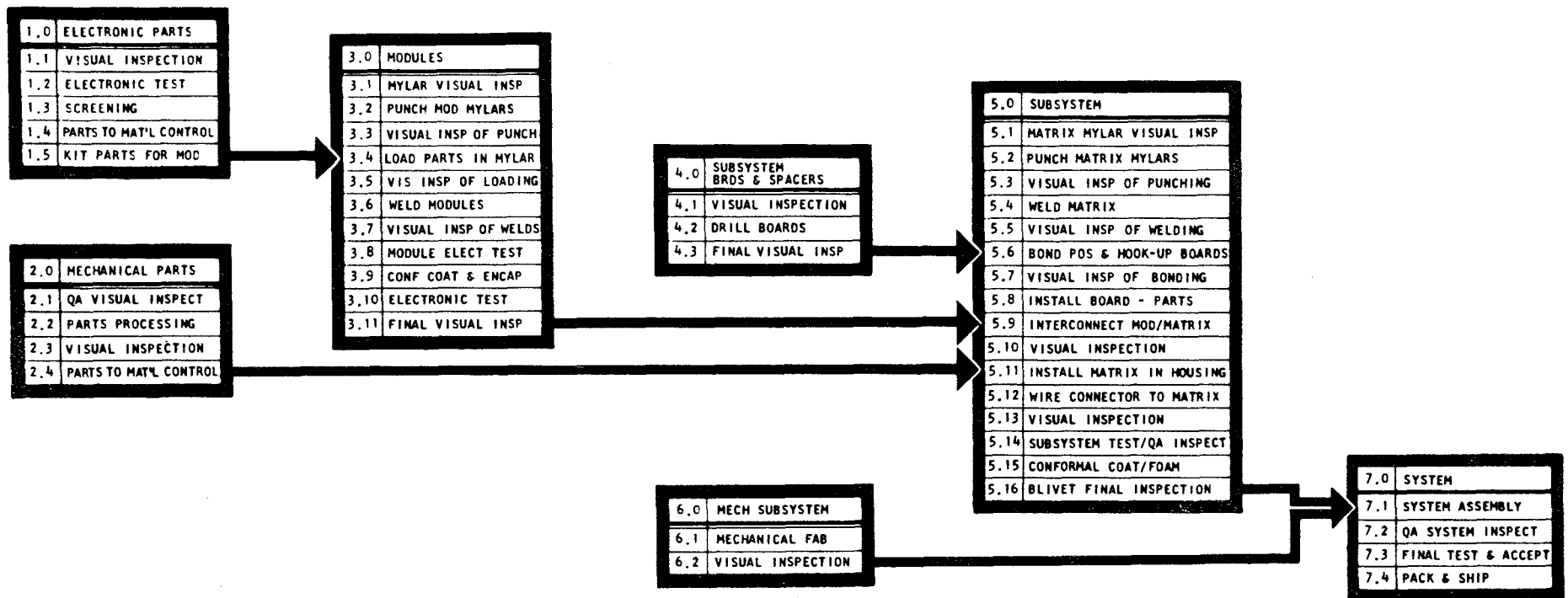
SYSTEM INTERCONNECT DIAGRAM



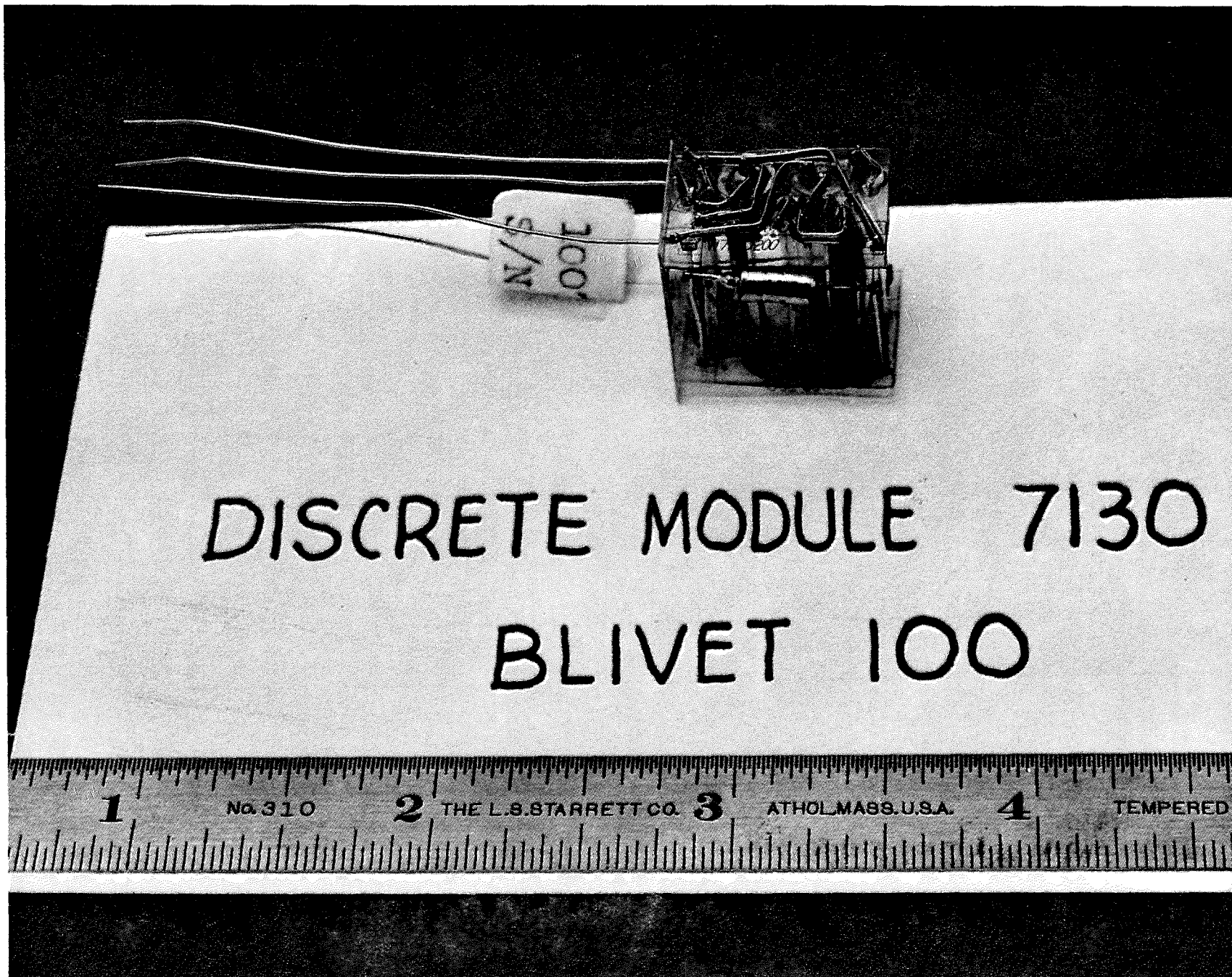
PRODUCT ASSURANCE ORGANIZATION CHART



TYPICAL SCREENING/INSPECTION PLAN



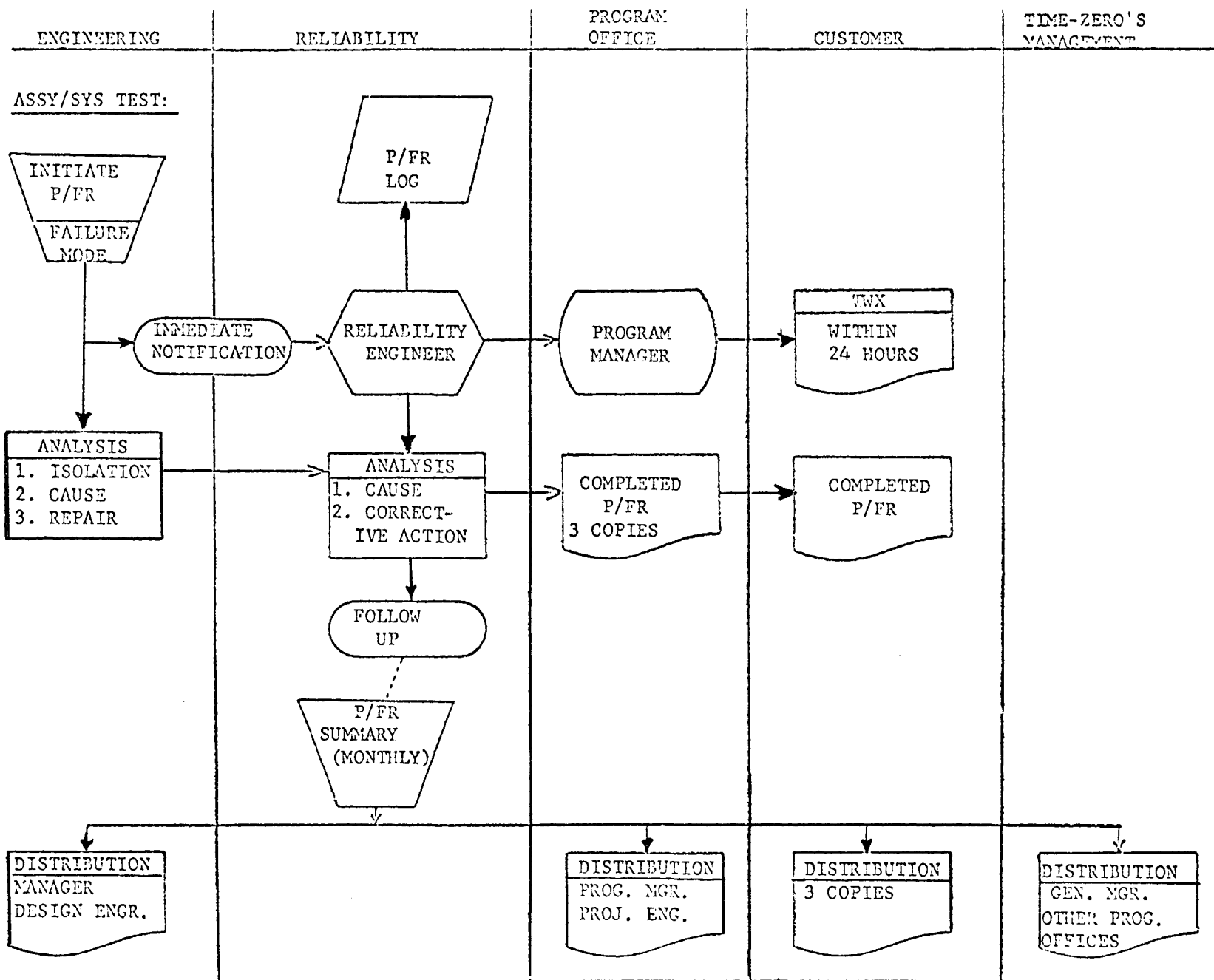
TYPICAL FABRICATION/INSPECTION PLAN



DISCRETE MODULE 7130
BLIVET 100

**TIME-ZERO** corporation**WELDED MODULE
SHOP TRAVELER**

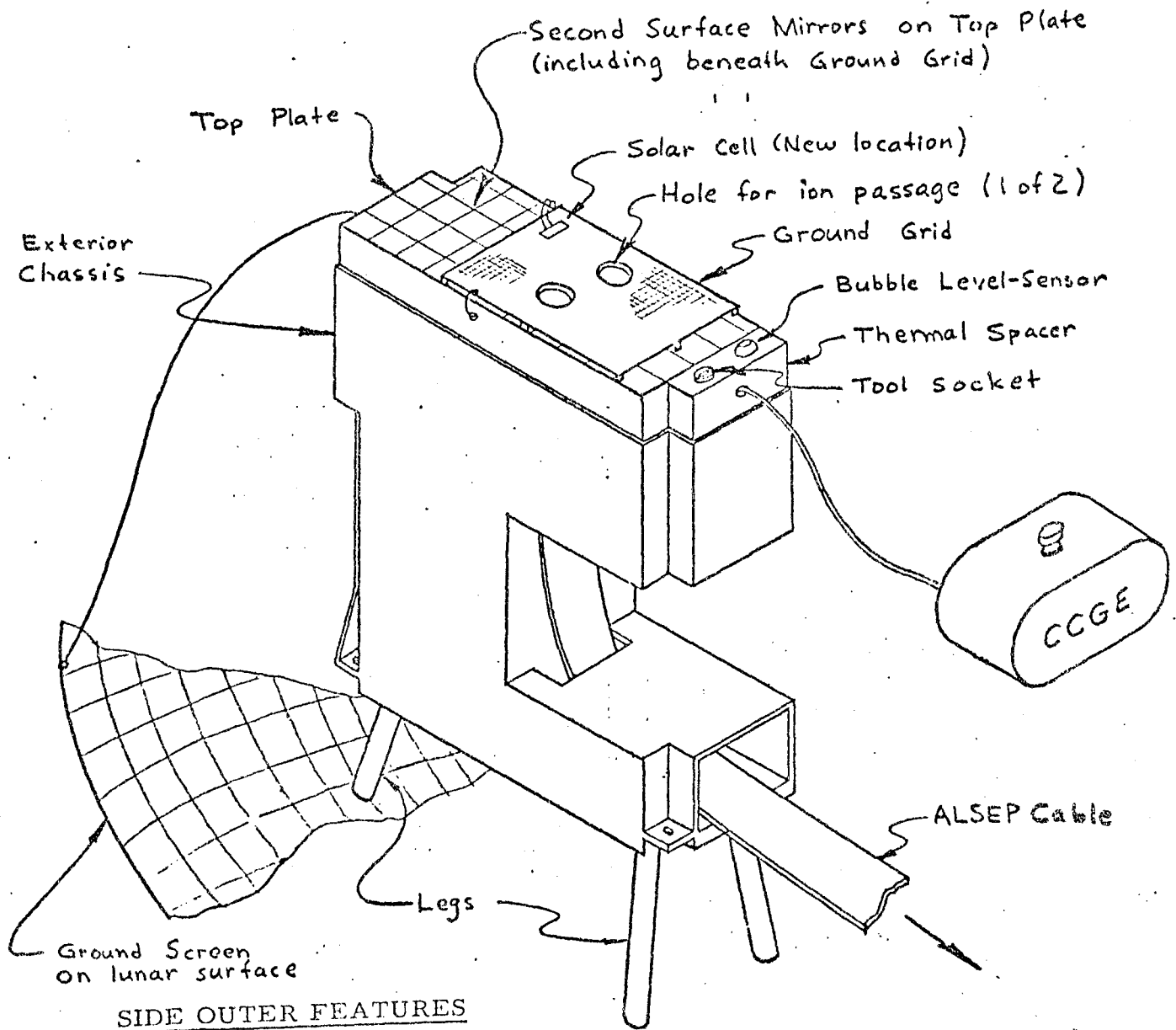
PART NO.		S/N		JOB NO.	
TRAVELER NO. 14889			P.W.O. NO.		
STEP	OPERATION			DATE COMPLETED	OPERATOR
1	COMPONENT LOADING				
2	QC VISUAL INSPECTION				
3	WELD -100 & -200 LAYER (WELD STA. _____)				
4	QC VISUAL INSPECTION				
5	WELD -300 & -400 LAYER (WELD STA. _____)				
6	QC VISUAL INSPECTION				
7	TRIM MYLARS				
8	ELECTRICAL TEST				
9	MAGNETIC MEASUREMENT				
10	CONFORMAL COAT _____ CLASS _____ TYPE _____				
11	ENCAPSULATE ASSEMBLY _____ CLASS _____ TYPE _____				
12	IDENTIFY ASSEMBLY				
13	ELECTRICAL TEST				
14	WEIGH ASSEMBLY				
15	FINAL INSPECTION				
16	DELIVER TO STORES				

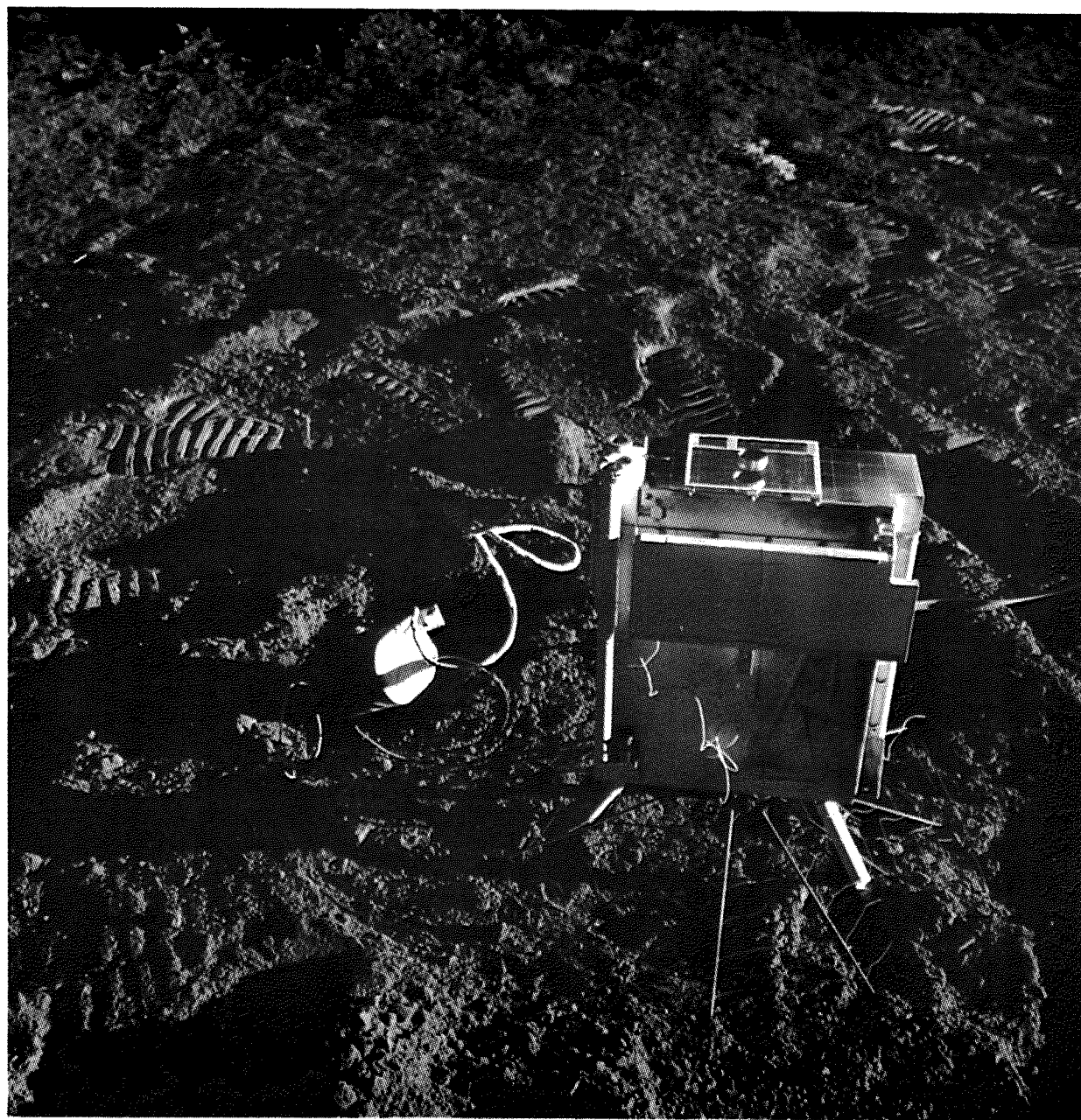


PROBLEM/FAILURE REPORT (P/FR) SYSTEM INFORMATION FLOW

SECTION 2

Mechanical





ALLOY 180
INTERCONNECT
RIBBON USED FOR
POINT-TO-POINT
HOOK-UP

*Weld joint
no problem
they say*

MODULE LEADS USING ALLOY 180
(NON-MAGNETIC) WIRE

HEADER (EPOXY GLASS)

MYLAR
POSITIONING
WAFER

COMPONENTS
MOUNTED
BETWEEN
MYLARS

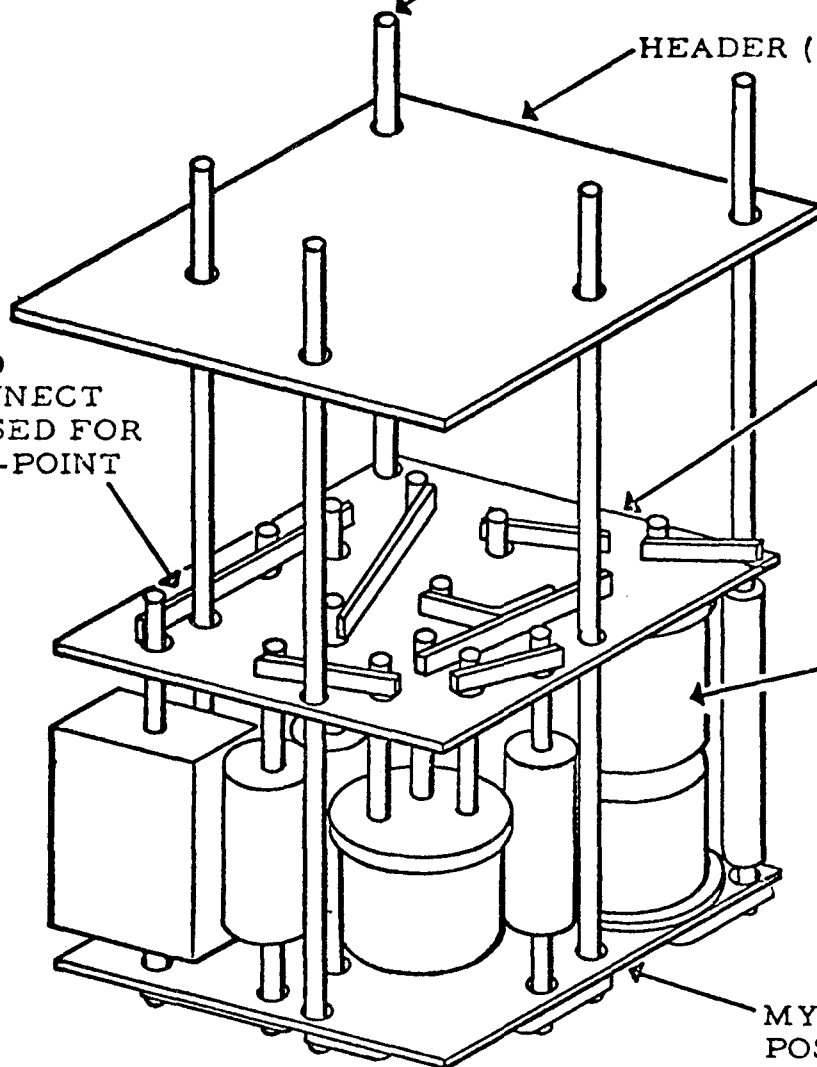
MYLAR
POSITIONING
WAFER

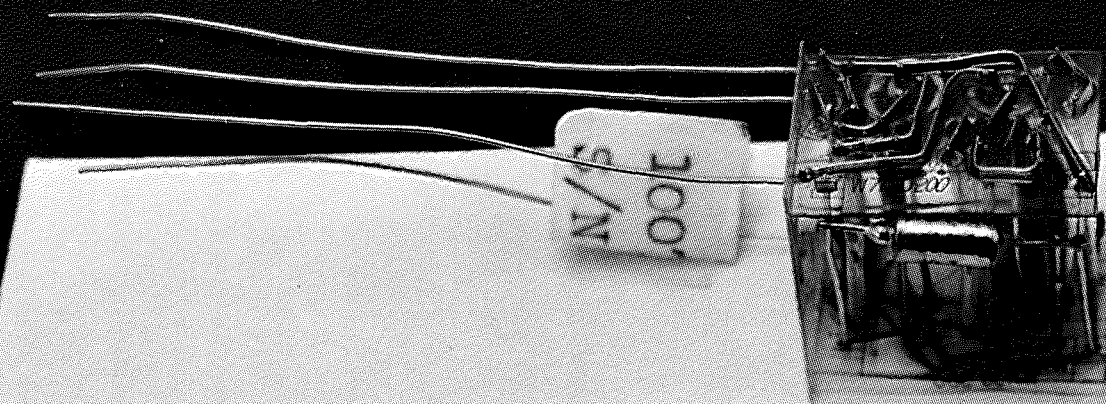
WELDED MODULE

*120 modules
400 integrated circuits*

Relay pack

Weld pull tests daily

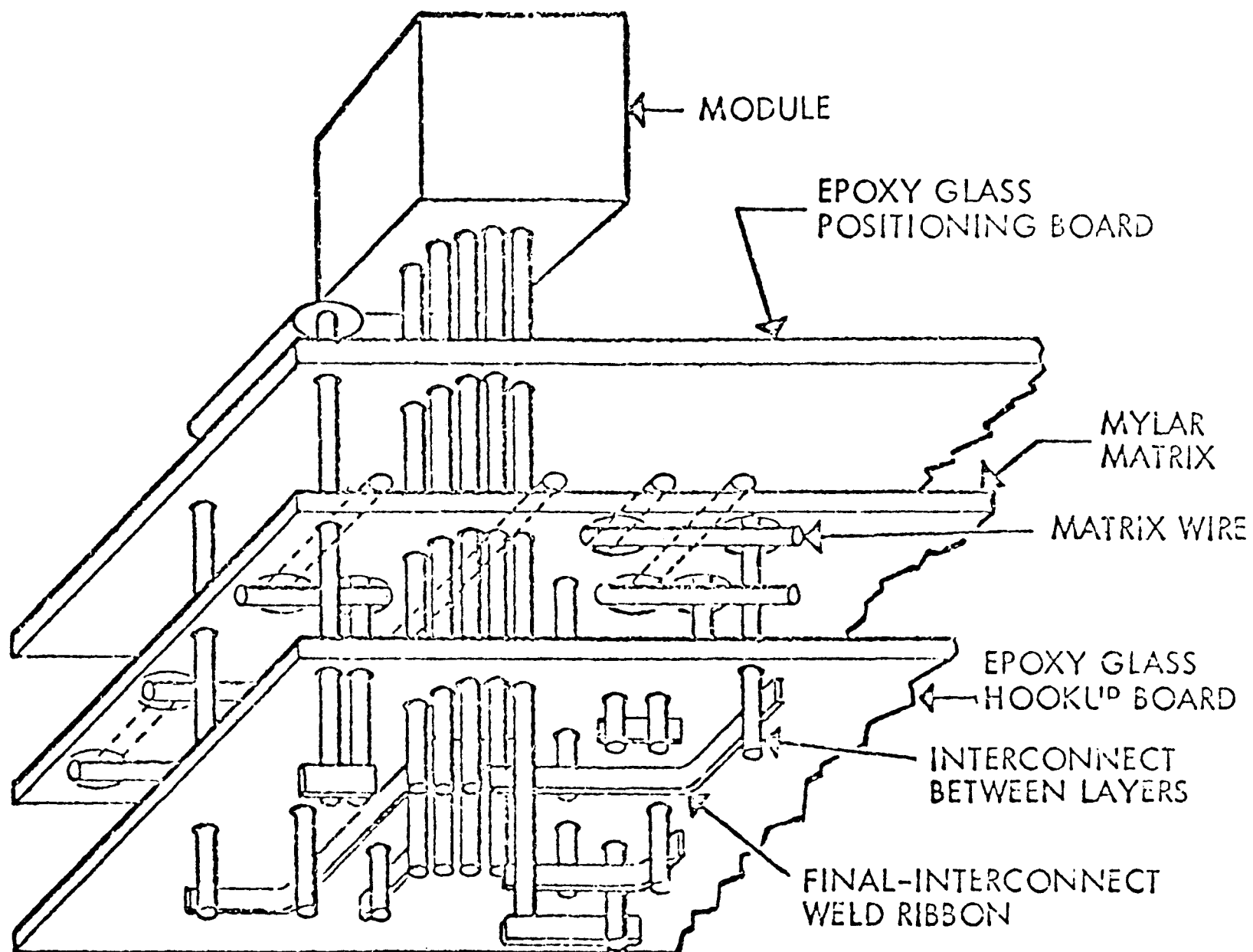




DISCRETE MODULE 7130
BLIVET 100

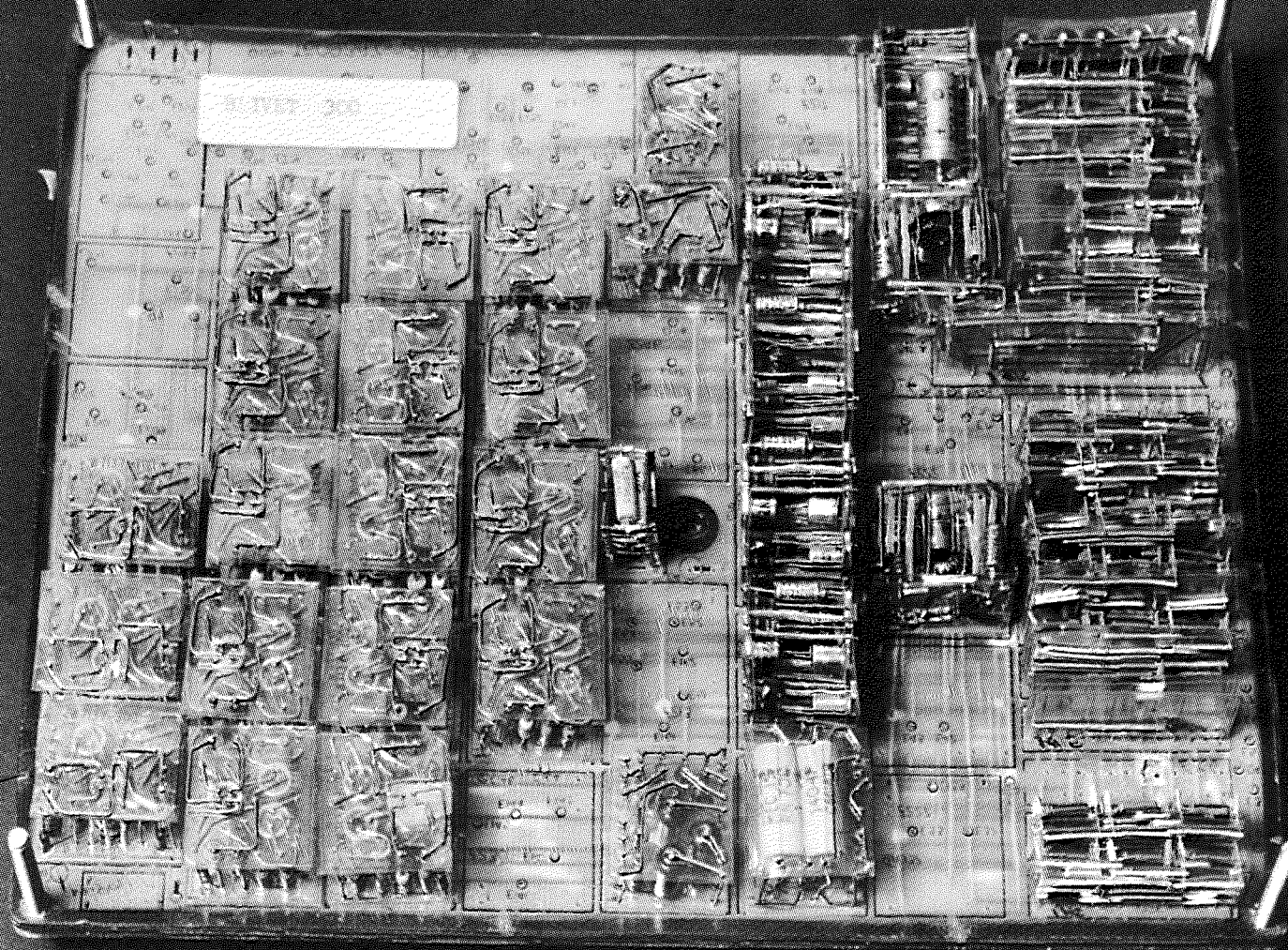
**TIME-ZERO** corporation**WELDED MODULE
SHOP TRAVELER**

PART NO.		S/N	JOB NO.	
TRAVELER NO. 14889		P.W.O. NO.		
STEP	OPERATION	DATE COMPLETED	OPERATOR	
1	COMPONENT LOADING			
2	QC VISUAL INSPECTION			
3	WELD -100 & -200 LAYER (WELD STA.____)			
4	QC VISUAL INSPECTION			
5	WELD -300 & -400 LAYER (WELD STA.____)			
6	QC VISUAL INSPECTION			
7	TRIM MYLARS			
8	ELECTRICAL TEST			
9	MAGNETIC MEASUREMENT			
10	CONFORMAL COAT ____ CLASS ____ TYPE ____			
11	ENCAPSULATE ASSEMBLY ____ CLASS ____ TYPE ____			
12	IDENTIFY ASSEMBLY			
13	ELECTRICAL TEST			
14	WEIGH ASSEMBLY			
15	FINAL INSPECTION			
16	DELIVER TO STORES			

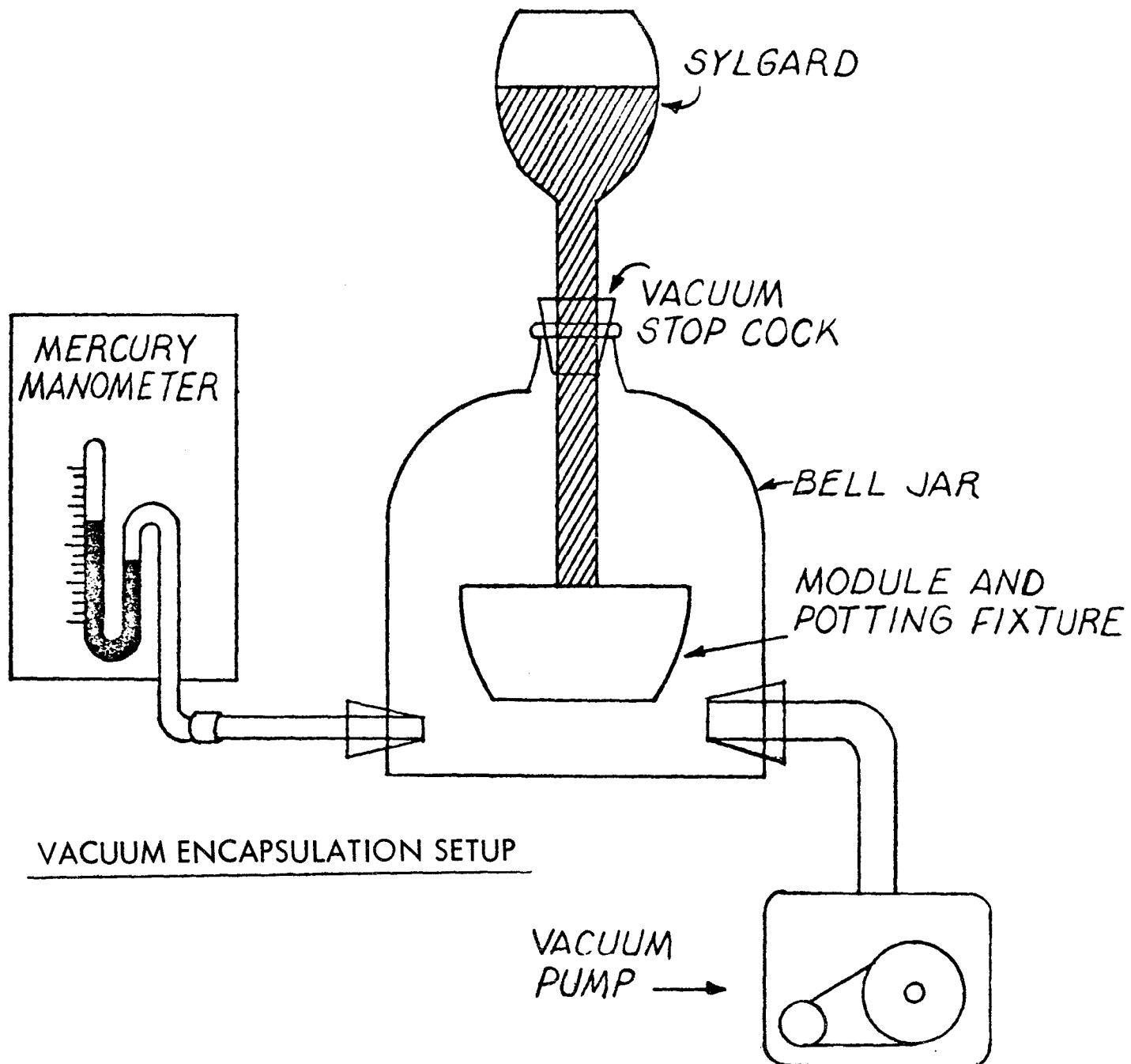


MODULE INTERCONNECT MATRIX (Typical)

SUB-ASSEMBLY



MODULES



MARSHALL LABORATORIES

A SUBSIDIARY OF MARSHALL INDUSTRIES

ASSEMBLY PLAN

PART NAME
BLIVET NO. 300 ALSEP/SIDE/CCGE

PART NUMBER AP
609527-102A

JOB NUMBER
~~6-095-40~~

6-09-05-40

SERIAL NUMBER

5104 SYSTEM 8

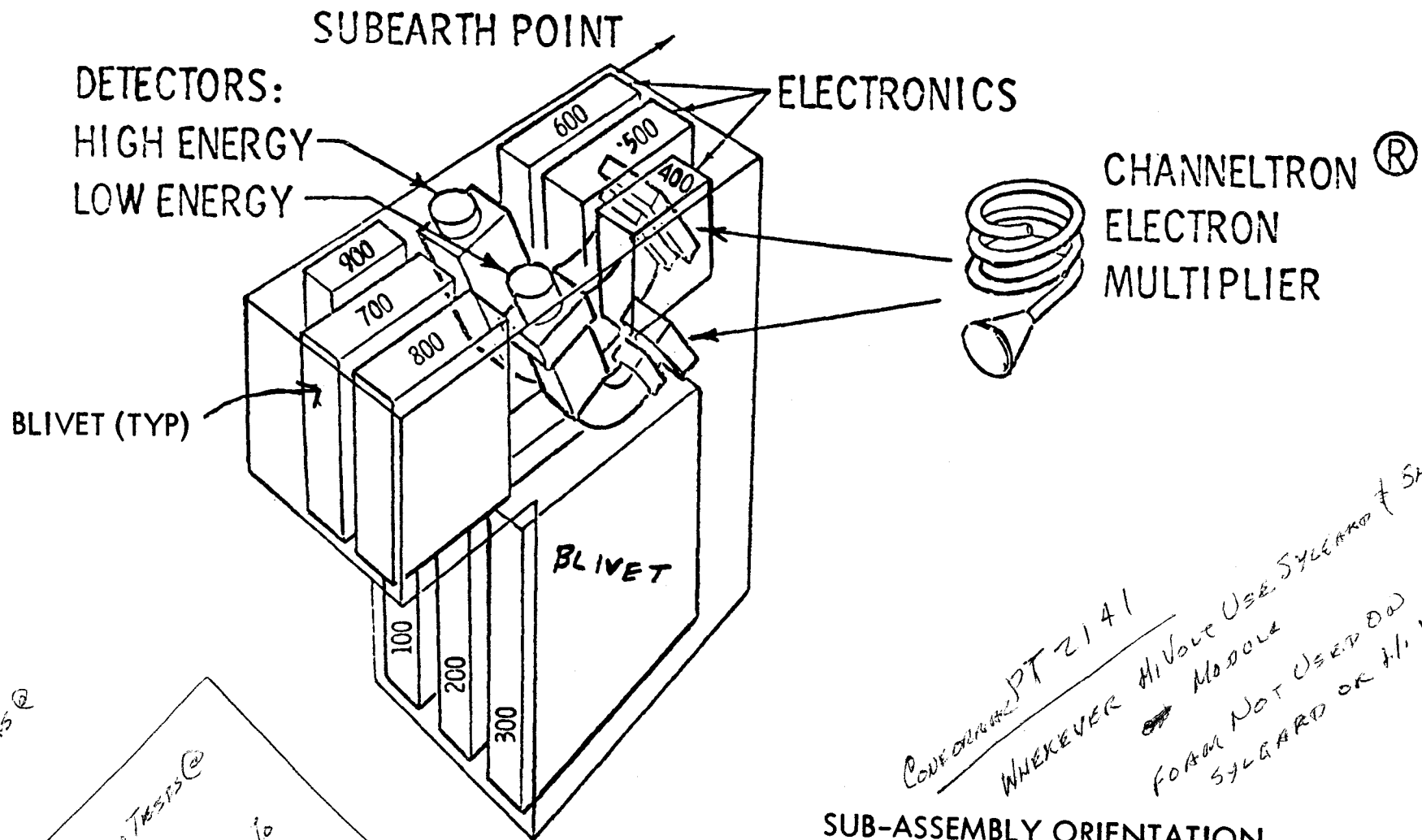
APPROVALS/DATE

ENG

PROD

QC

STEP	OPERATION	SPEC/PRINT REFERENCE	DATE COMPLETED	OPERATOR INSPECTOR
23	Visual Inspection		JUL 20 1968	
24	DCASR Inspection B.		7-22-68	
25	Install selected components	609527		
26	Visual Inspection		JUL 20 1968	
27	Conformal coat per Note 7.	S40091	JUL 21 1968	
28	Visual Inspection		JUL 22 1968	
29	Spot bond insulator & face and spot bond harnesses as required.	S40149	JUL 21 1968	
30	Visual Inspection		JUL 22 1968	
31	Electrical Test	S46822		
32	Visual Inspection		JUL 22 1968	
33	DCASR Inspection B		7-22-68	
34	Foam inside of copper foil shield box only, per Note 6.	609527 S40092	JUL 22 1968	
35	Electrical Test	S46822		
36	Visual Inspection		JUL 23 1968	
37	DCASR Inspection B		7-23-68	

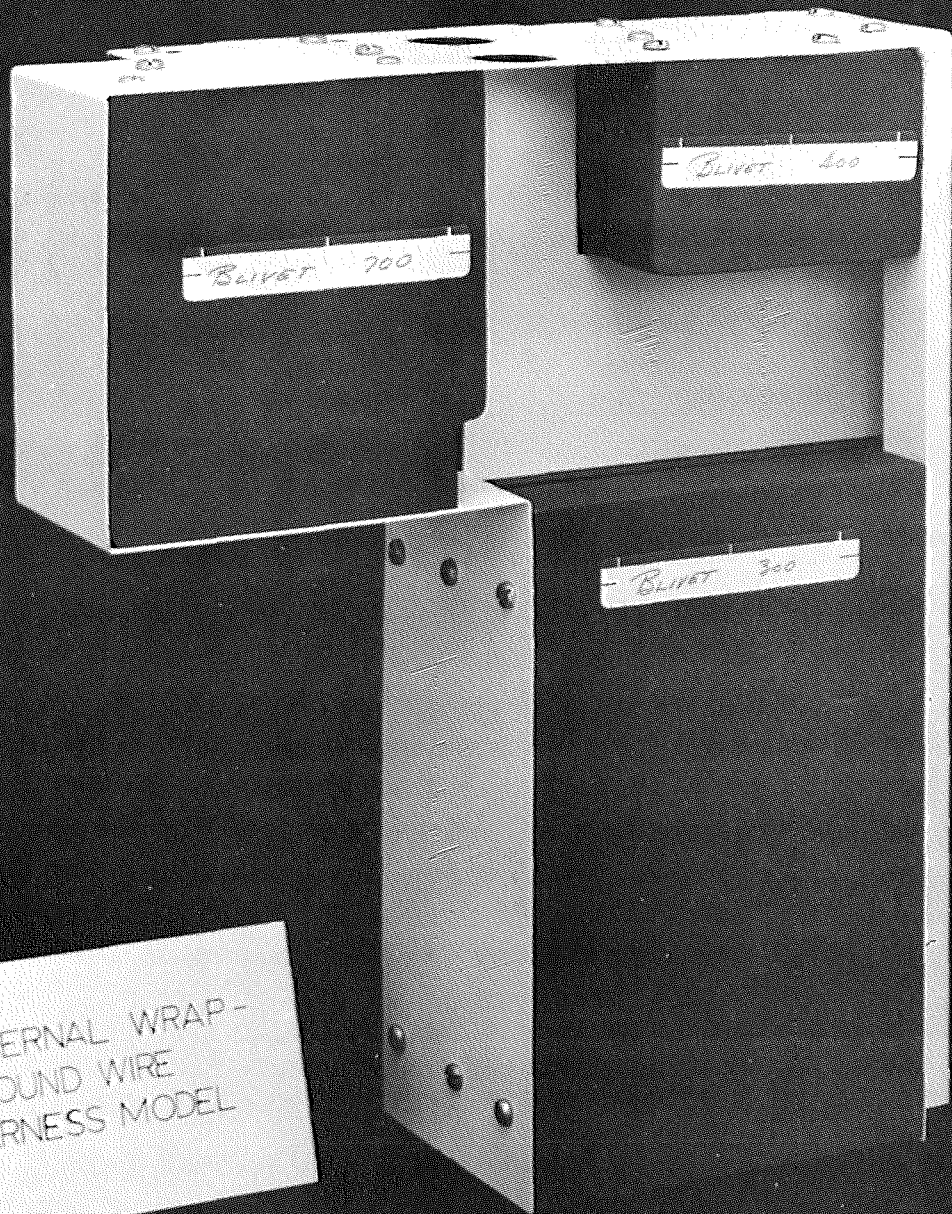


SYLGARD
OUTERS®

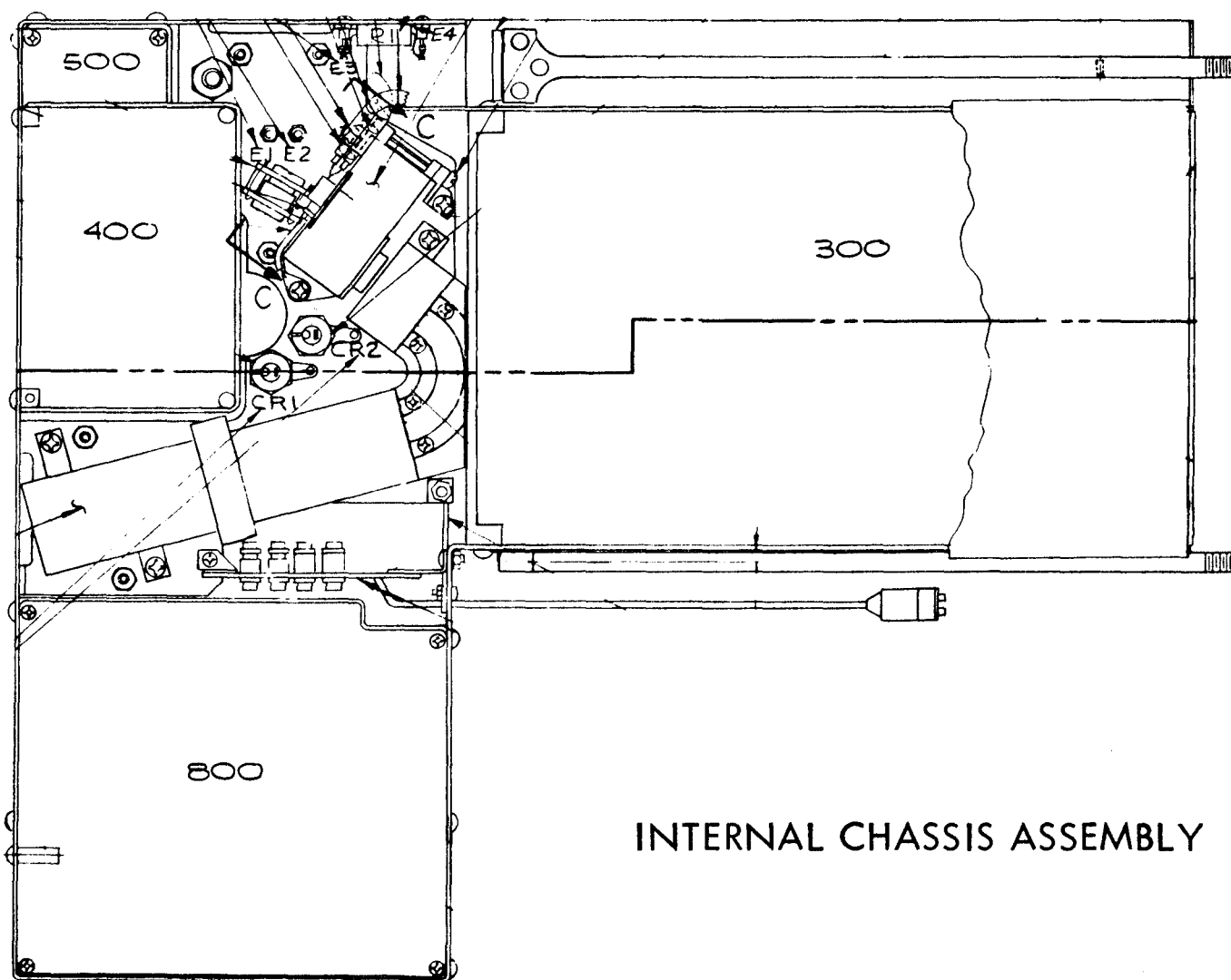
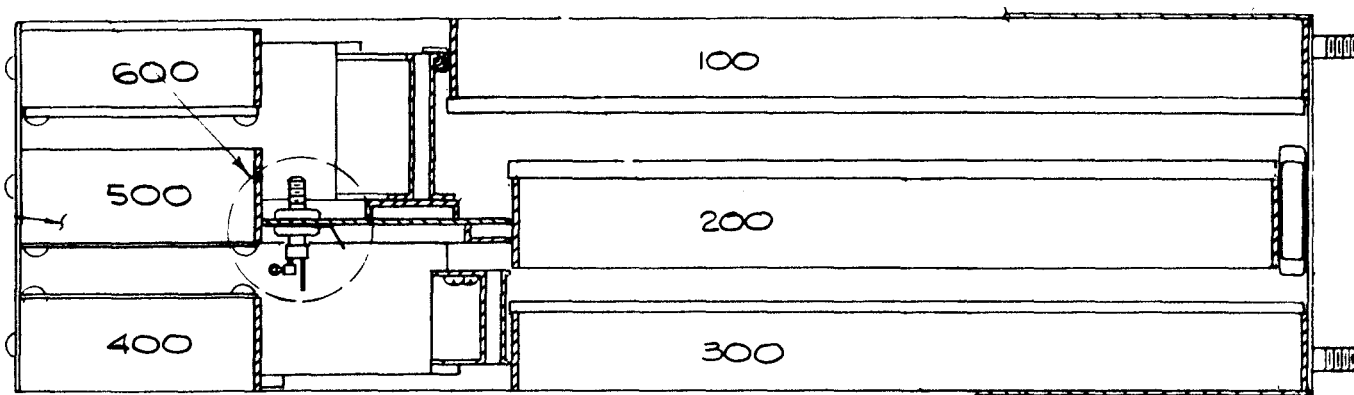
NOTE THERM. TESTS @
90°C
(COMPARED TO
80°C
EXPECTED)

CONFIDENTIAL PT 2141
WHENEVER HI VOLT USE SYLGARD & SHIELD
MODULE
FORM NOT USED DO
SYLGARD OR HI VOLT

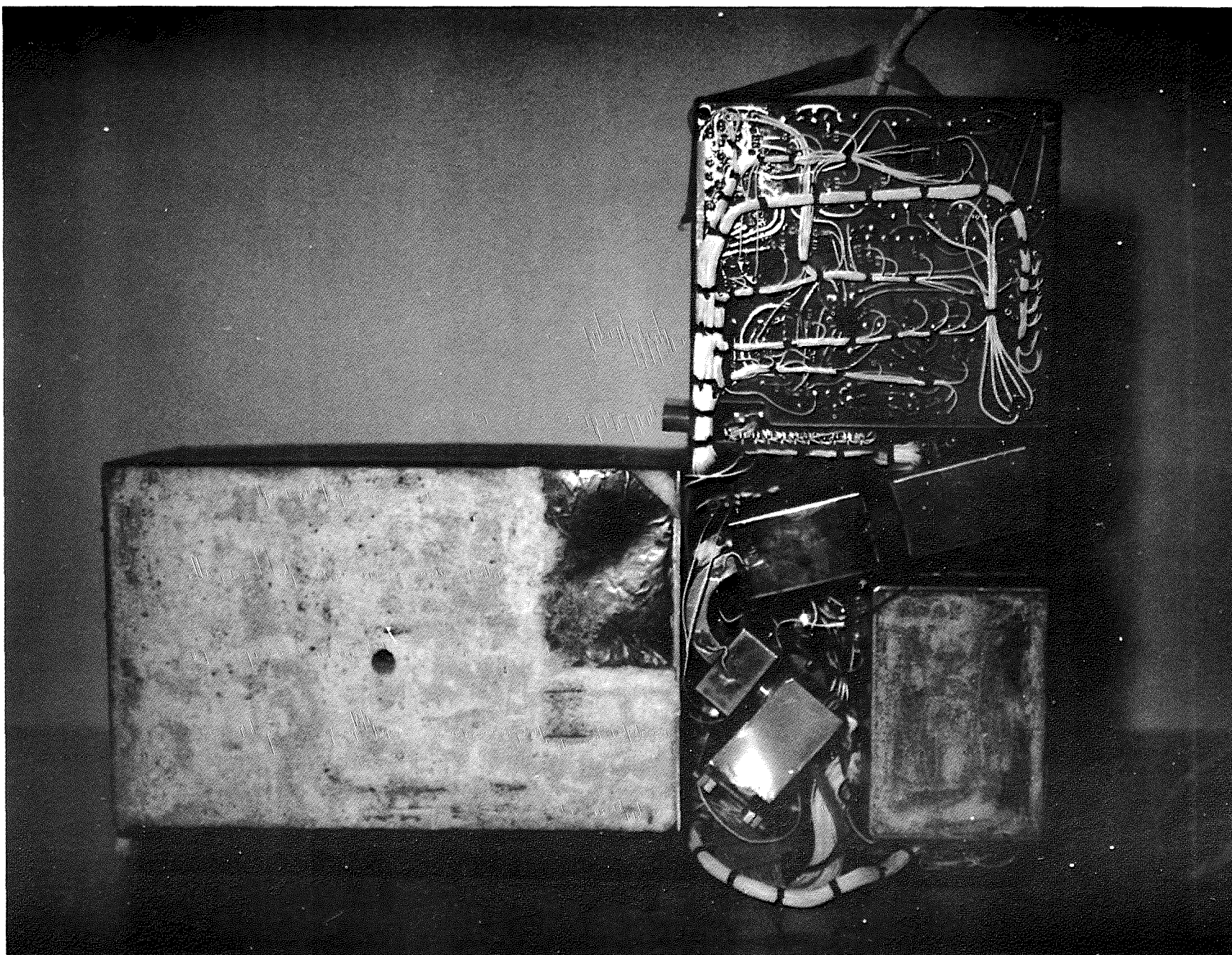
SUB-ASSEMBLY ORIENTATION

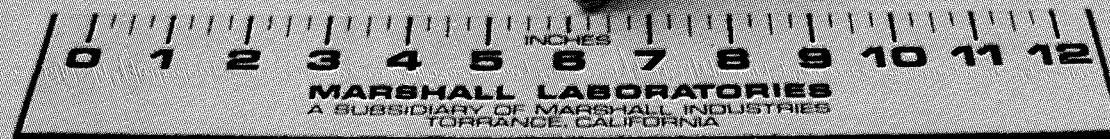
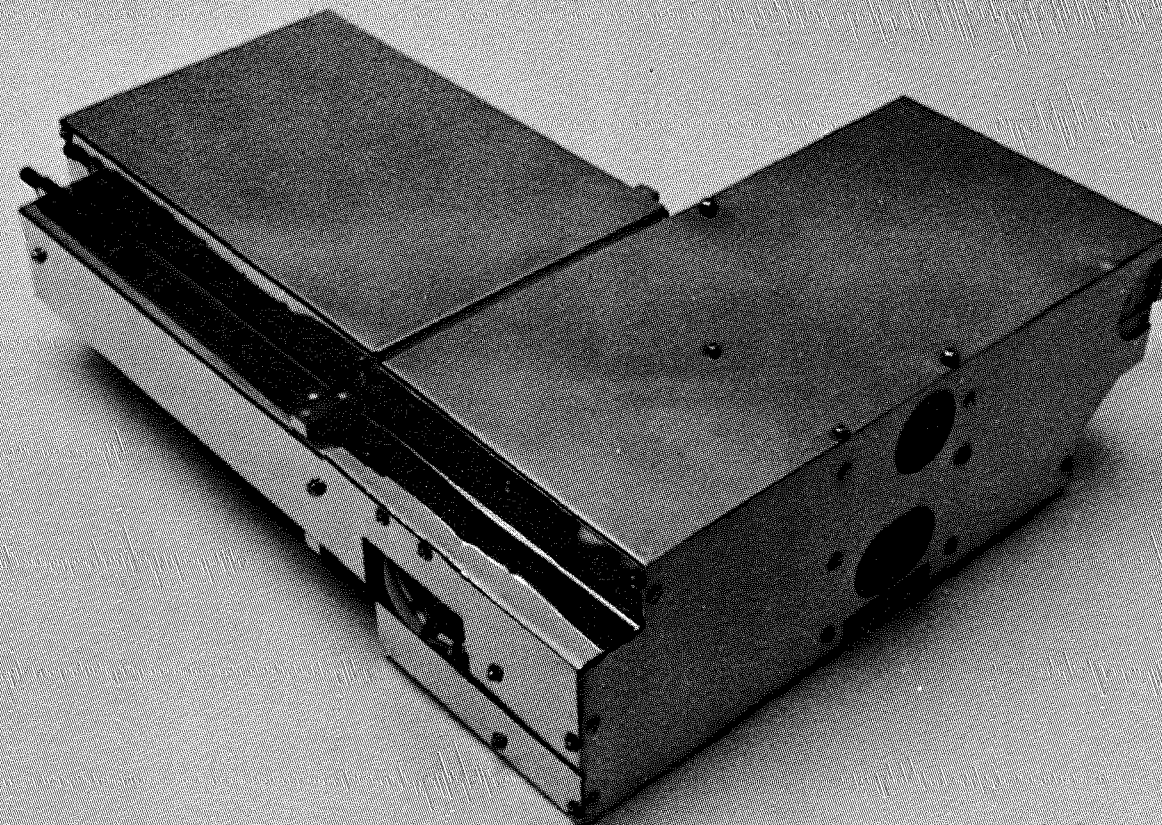


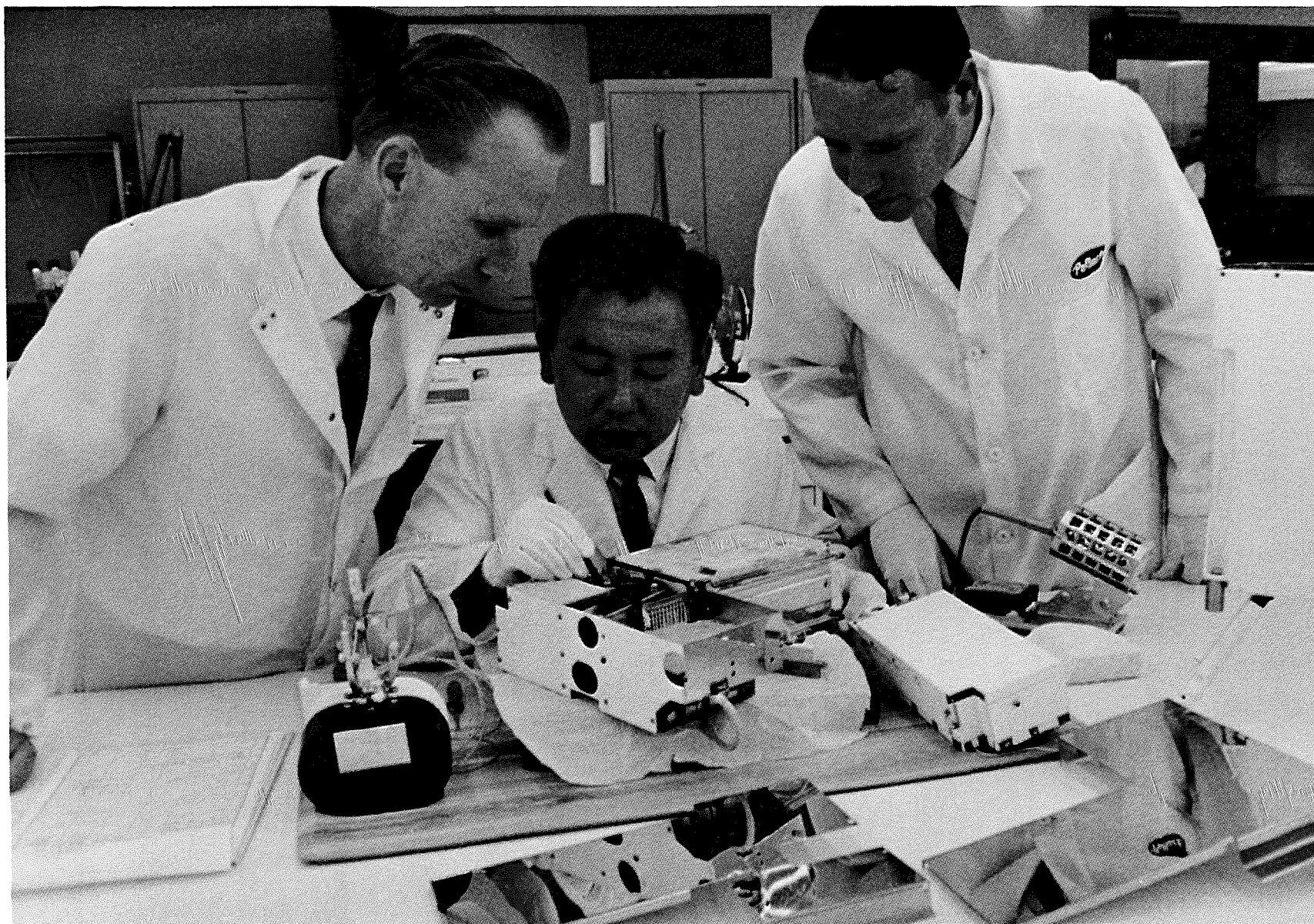
INTERNAL WRAP-
AROUND WIRE
HARNESS MODEL



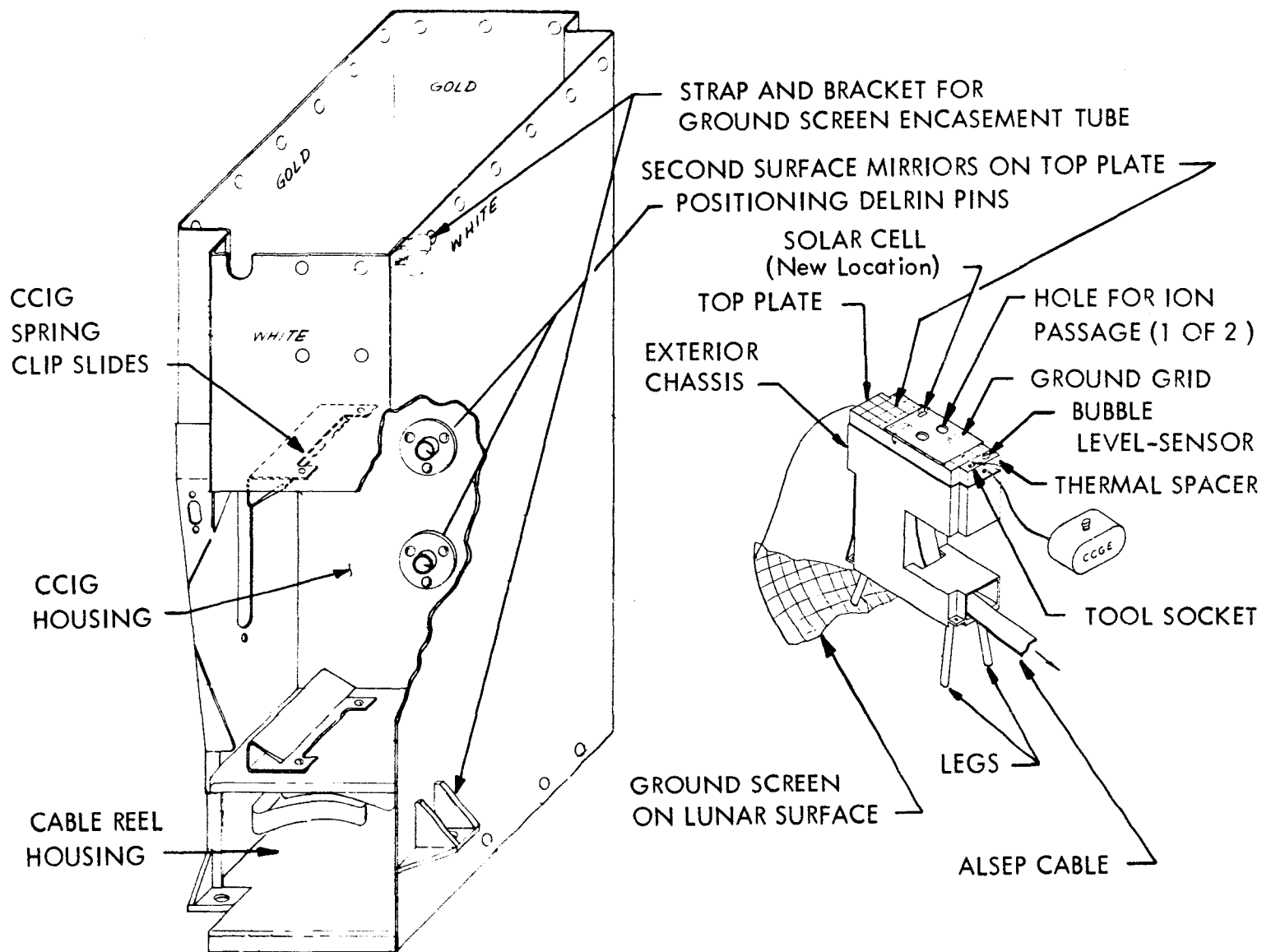
INTERNAL CHASSIS ASSEMBLY



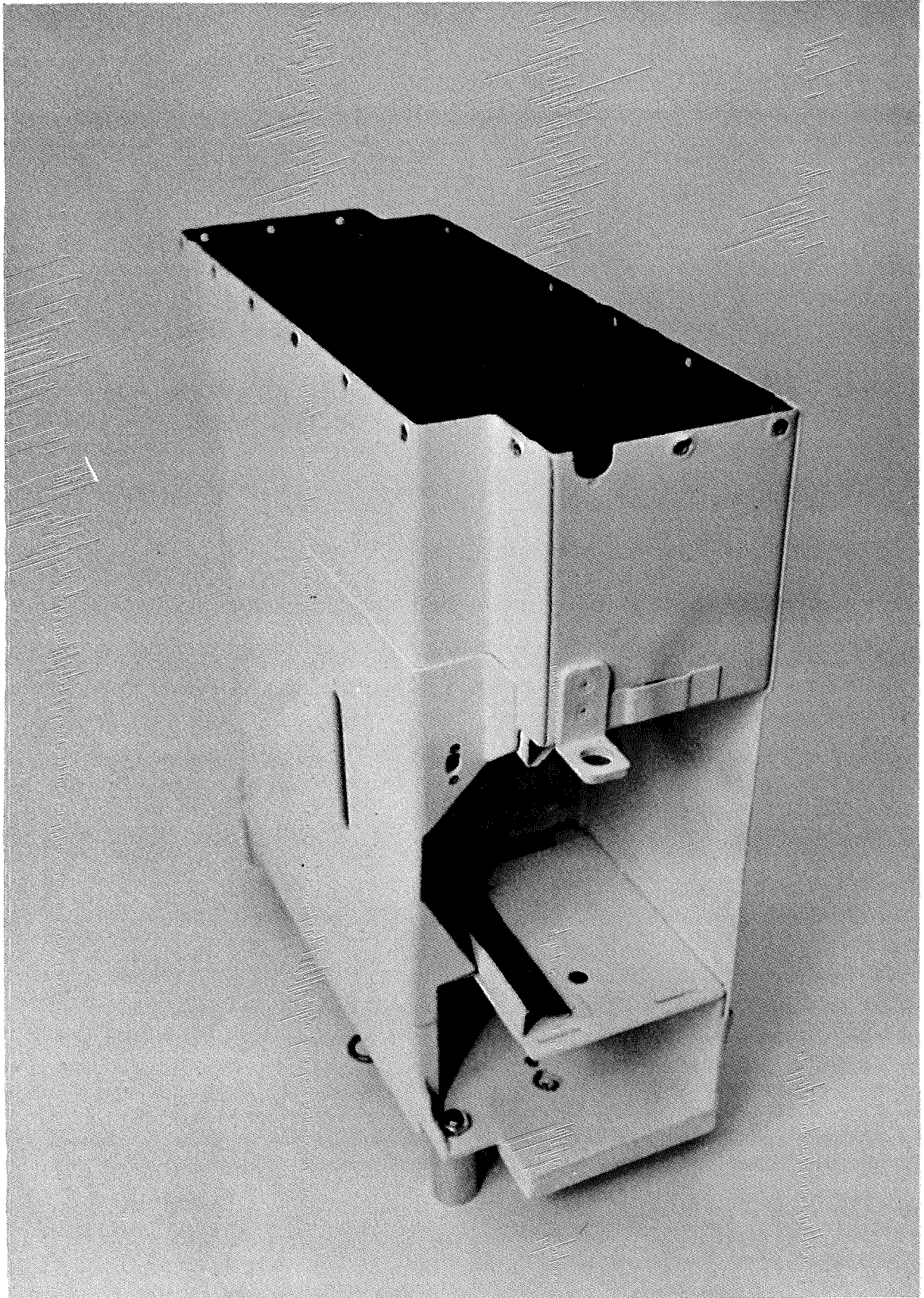


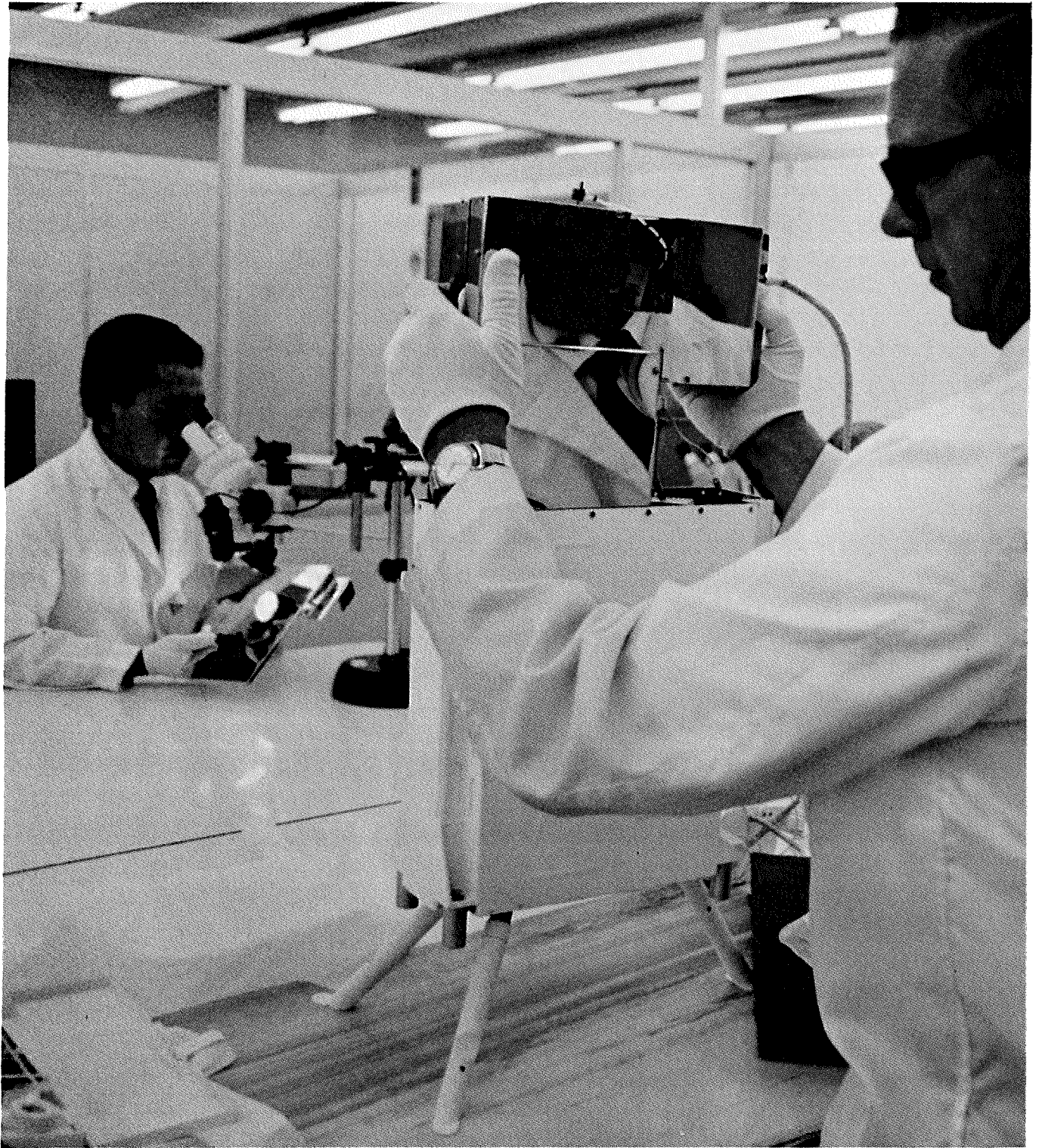


MARSHALL LABORATORIES A SUBSIDIARY OF MARSHALL INDUSTRIES		ASSEMBLY PLAN		
PART NAME CHASSIS ASSEMBLY		PART NUMBER AP AP 609512-104		
JOB NUMBER 6-09		SERIAL NUMBER		
APPROVALS/DATE				
ENG		PROD		QC
STEP	OPERATION	SPEC/PRINT REFERENCE	DATE COMPLETED	OPERATOR/ INSPECTOR
12	DCASR Inspection B		3-12-68	
13	Install Item 59 Blivet Assy (200)	609512	3-12-68	
14	Install Item 50 Blivet Assy (100) mate connectors P1-J1 & P2-J2	609512	3-12-68	
15	Install Item 60 Blivet Assy (300) Mate connectors P3-J3 & P7-J7	609512	3-12-68	
16	Visual Inspection		3-12-68	
17	DCASR Inspection B		3-12-68	
18	Install Items 19, 53, 62 & 65 (CCGE, Blivets 700, 900 & insulator) Mate connectors J12-P12, J15-P15.	609512	3-14-68	
18a	NOTE: Do not open CCGE anytime.			
19	Install items 61 & 64 (blivet assy 800 & insulator). Inspect (operator) pin of P16 for damage, then mate P14-J14 and P16-J16.	609512	3-14-68	
20	Visual Inspection		3-14-68	
21	DCASR Inspection B		3-14-68	
22	Install Item 13 Blivet Assy (600) mate connectors J6-P6 & J13-P13	609512	3-13-68	



SIDE OUTER FEATURES

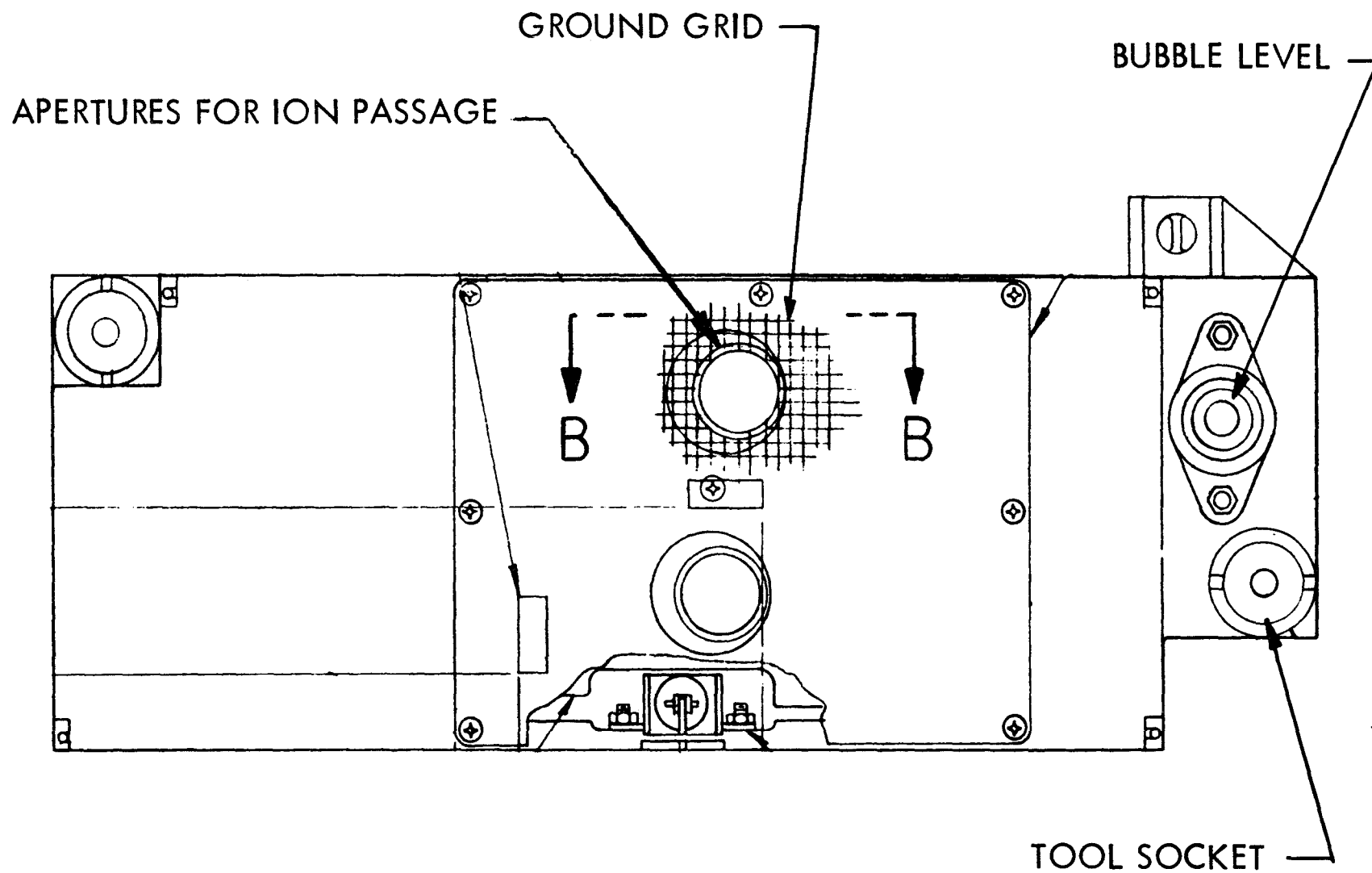




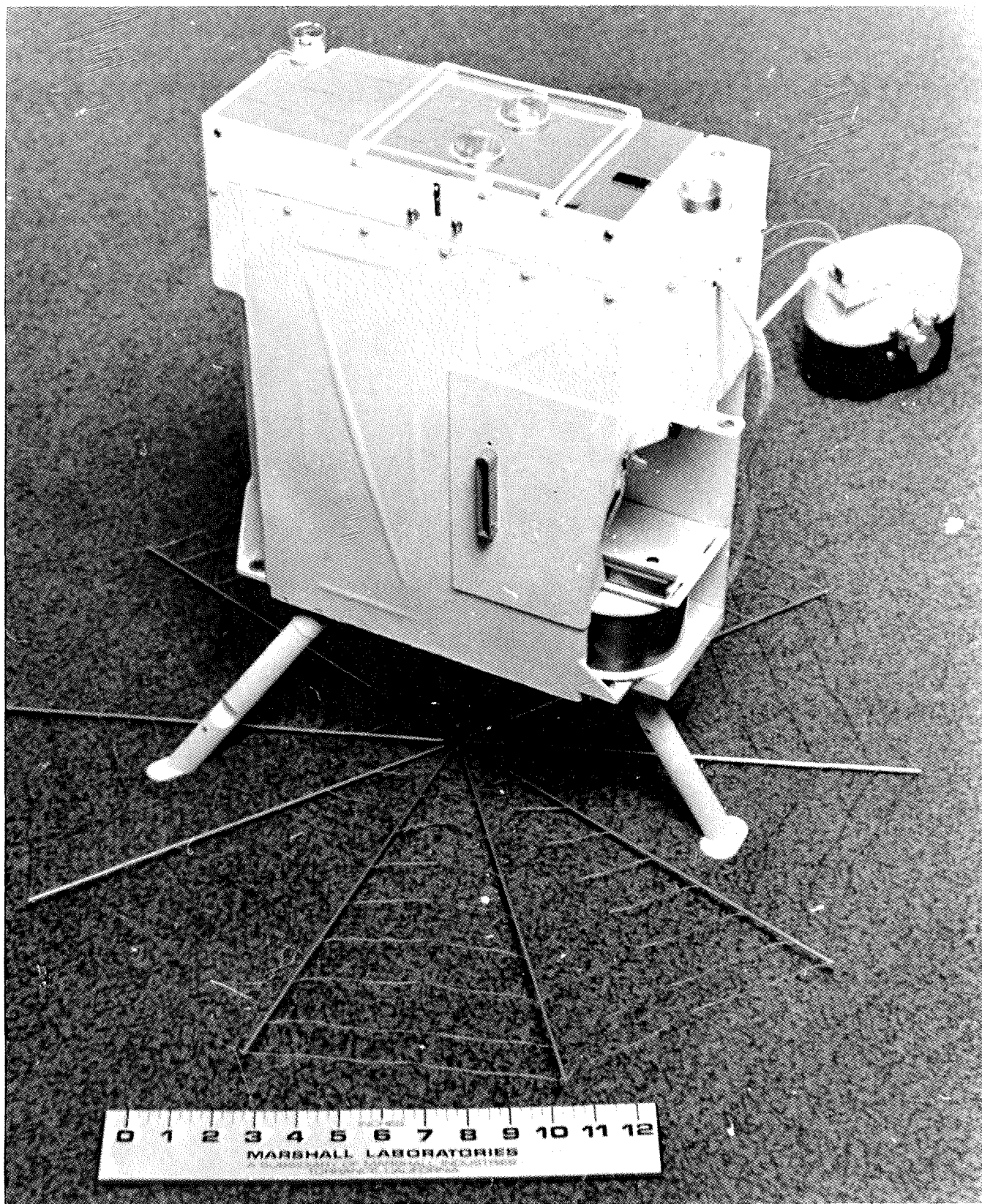
*Type 1000
element*

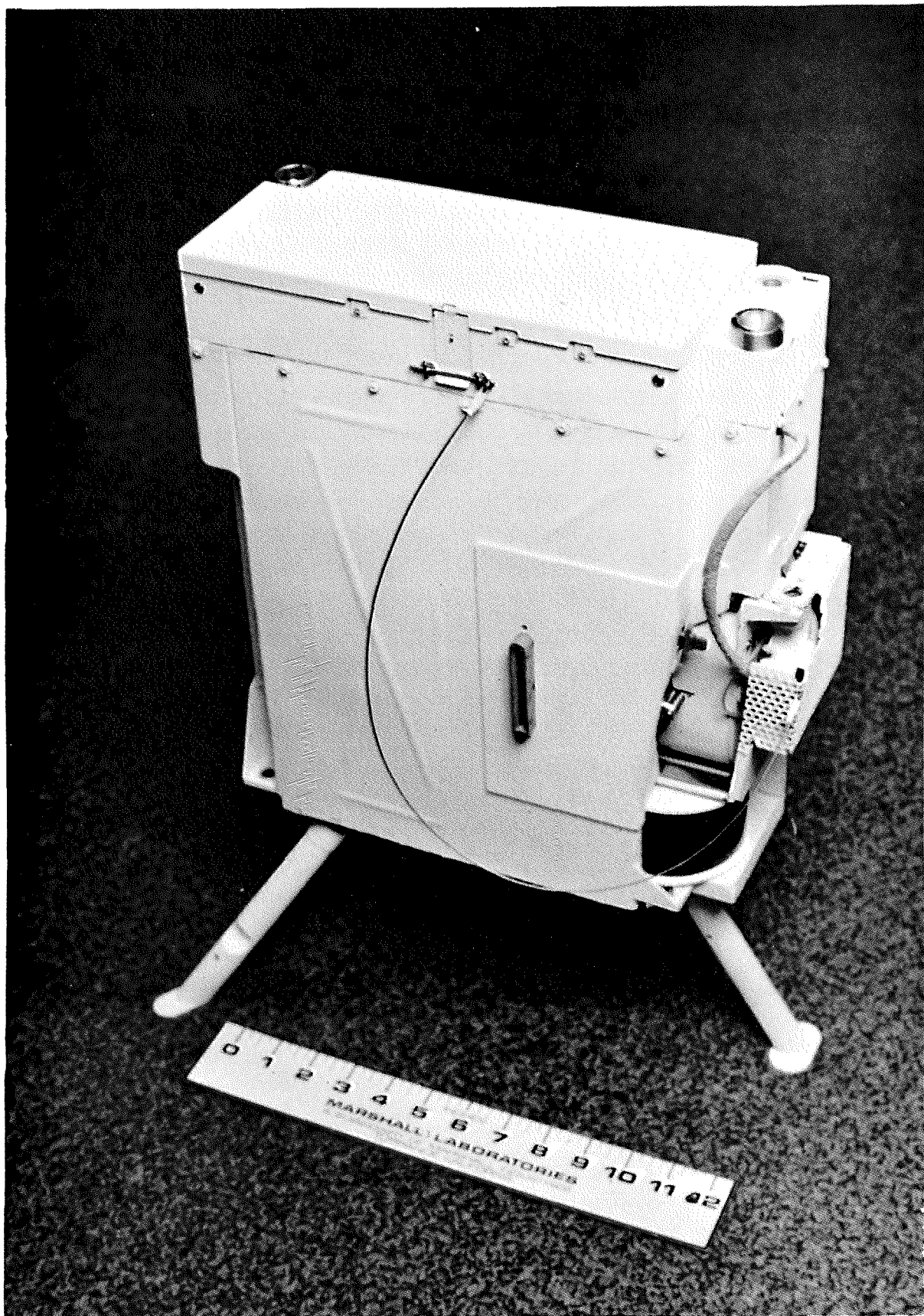
A SUBSIDIARY OF
MARSHALL INDUSTRIES
TORRANCE CALIFORNIA

marshall
laboratories

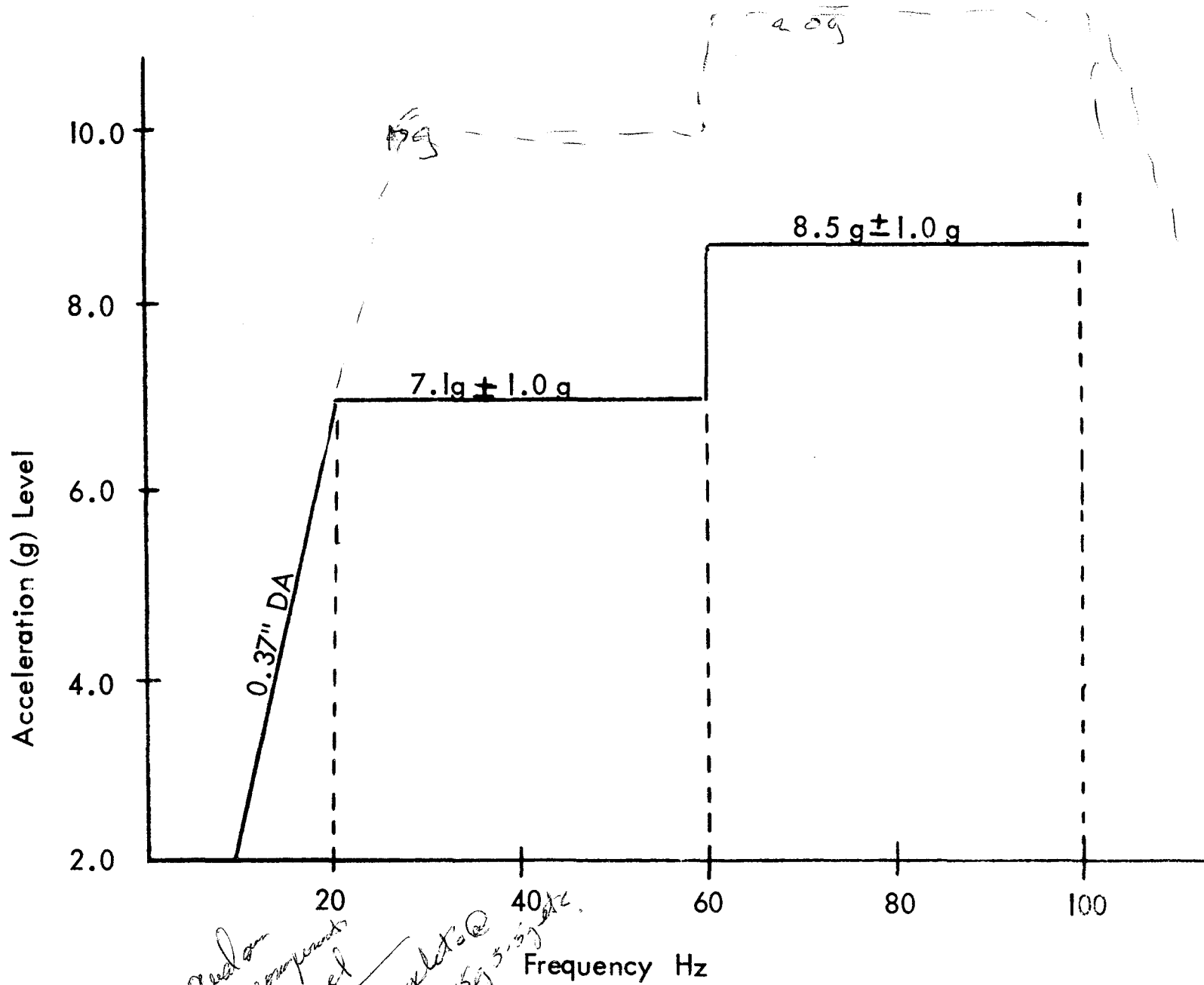


THERMAL SPACER, TOP VIEW

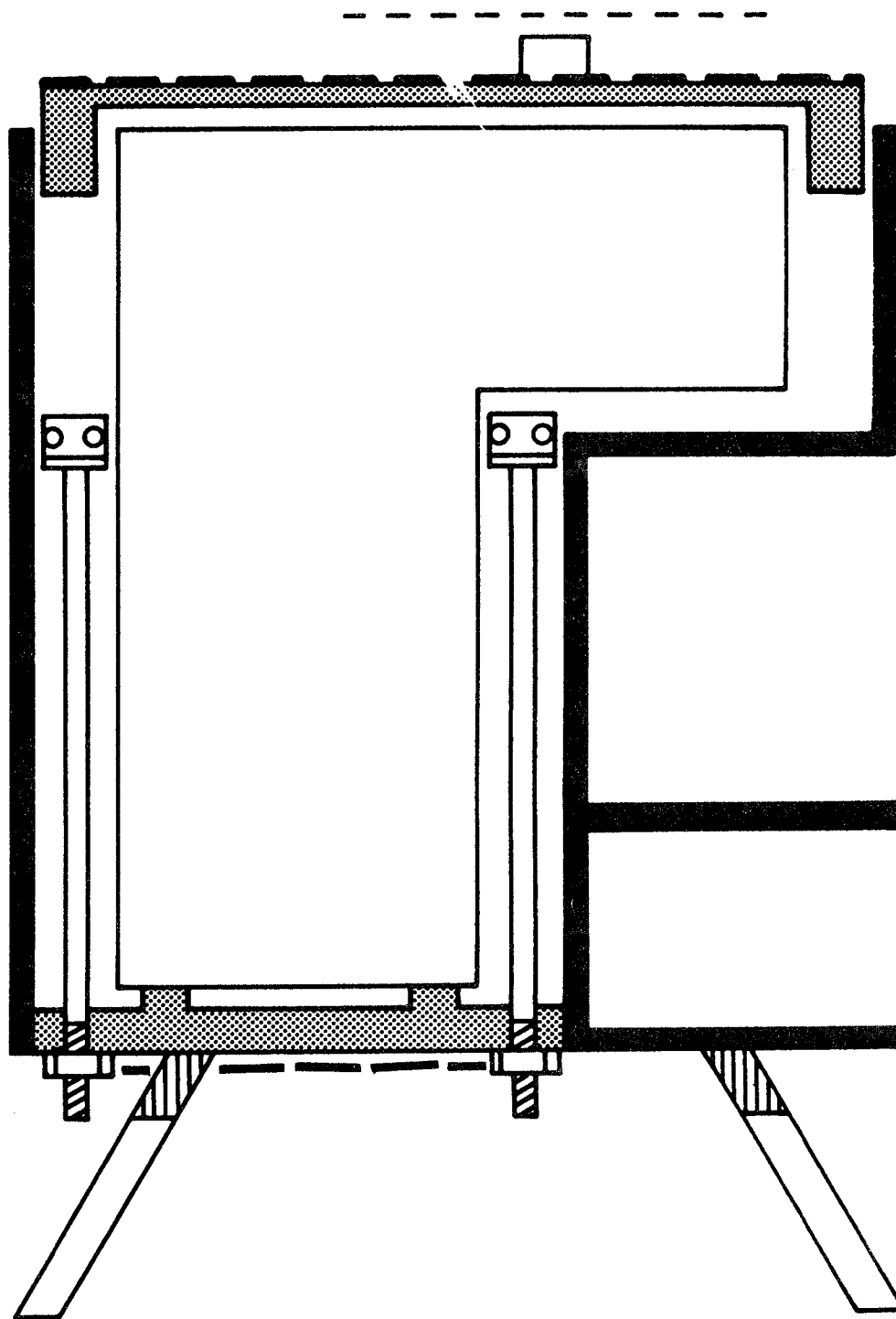




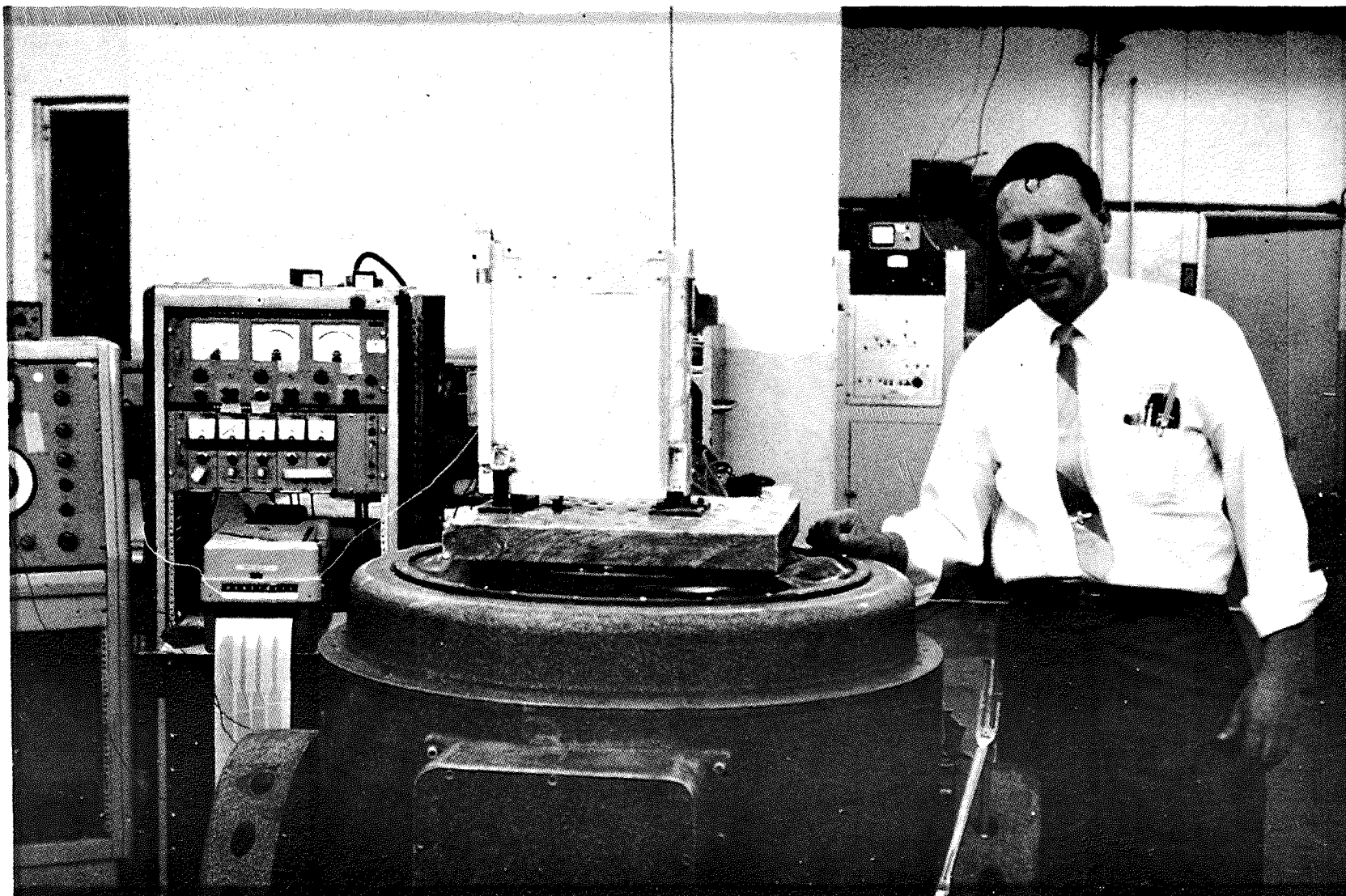
Mechanical Test

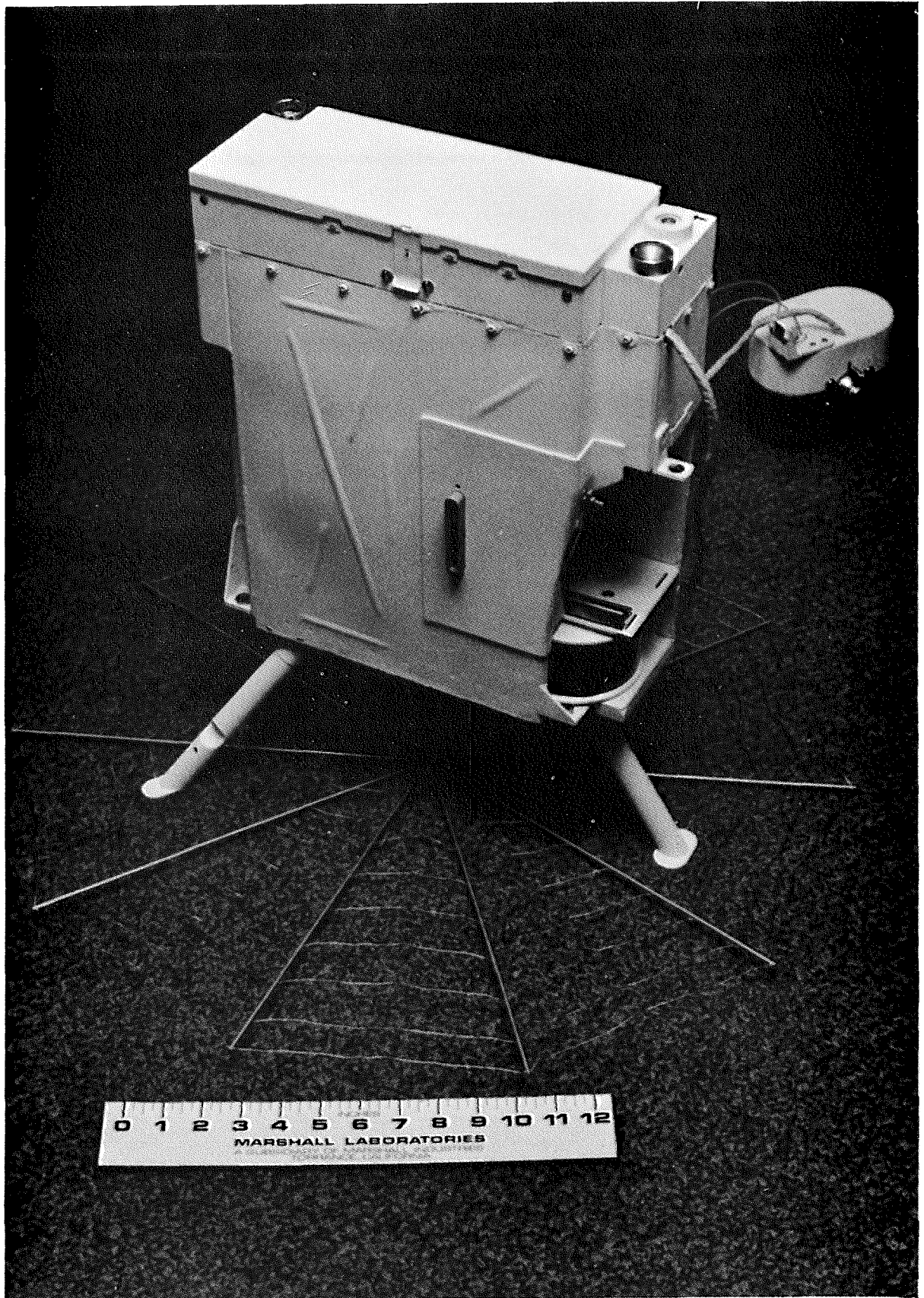


QUAL VIBRATION PROFILE

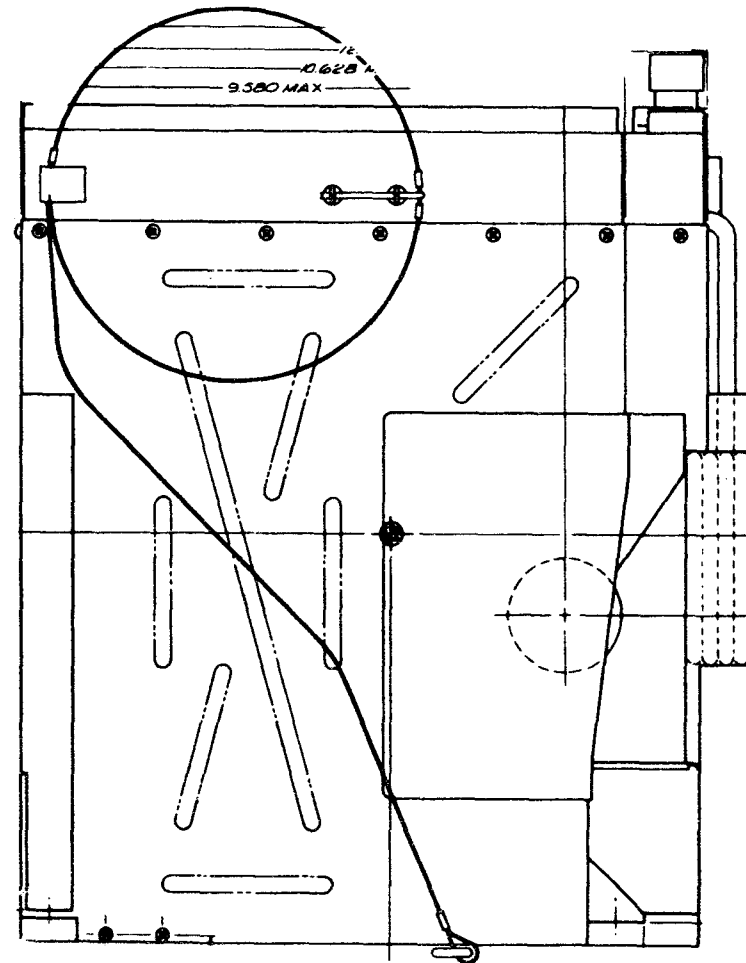
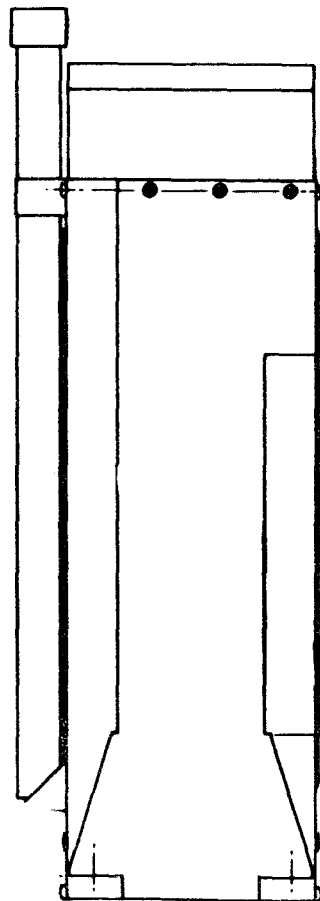
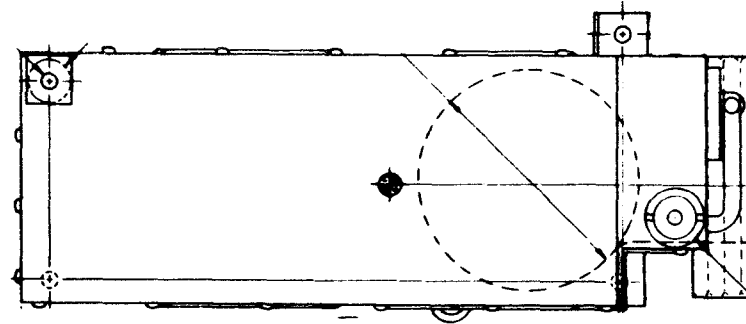


**THERMAL / MECHANICAL
OUTLINE**

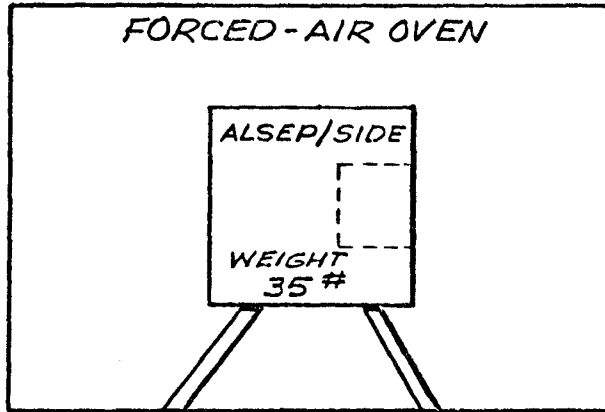




LANYARD FEATURE



ALSEP/SIDE THERMAL TEST SET-UP TEST NO. 1



DATA

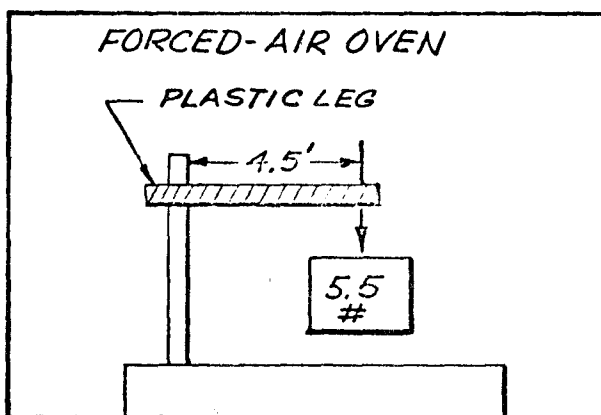
1. OVEN TEMP... 250°F
2. TOTAL WEIGHT.. 35 LB
(1.5 X EARTH WEIGHT)
3. TIME IN OVEN.. 72 HRS

NEW LEG & SUPPORT CONFIGURATION

TOTALLY ENCLOSED
IN INNER PACKAGE
AND OUTER PACKAGE
FOR DURATION OF TEST.
NO VENTING OTHER THAN
THROUGH LEAKS. NO PURGE.
COMPONENTS NOT
SUBJECTED TO THERMAL
ACCELERATION

THIS DOES NOT
APPLY TO THIS
TEST. THIS
TEST WITH
MICK UNOF
EXPER. Pkg
FOR THERMAL
TEST OF Pkg
LEG WITH
WEIGHT ETC

TEST NO. 2



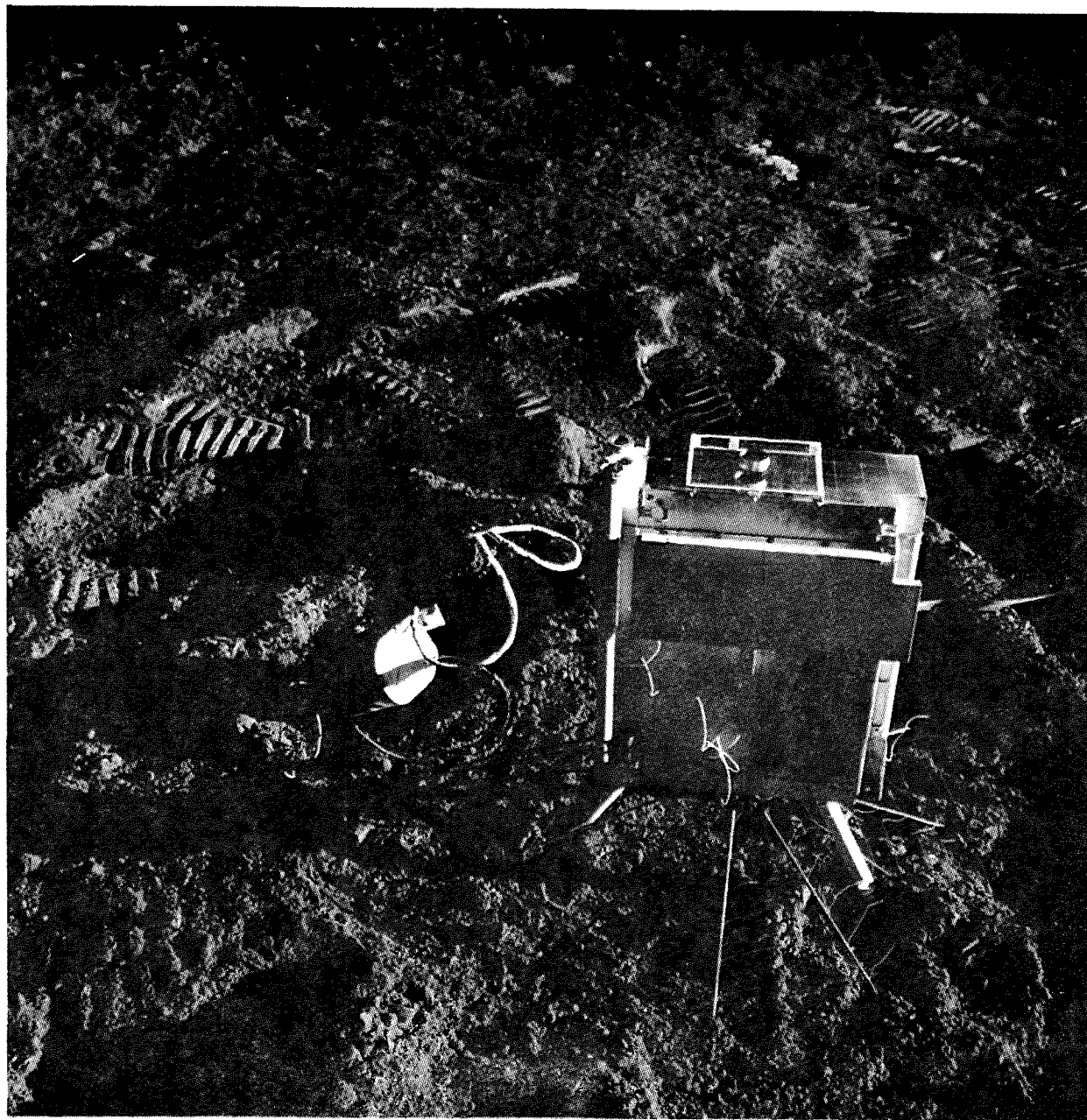
1. OVEN TEMP... 250°F
2. WEIGHT.. 5.5 LB AT 4.5"
(25 IN)
ESTIMATED EARTH WEIGHT
3. TIME IN OVEN... 7 DAYS

111

SECTION 3

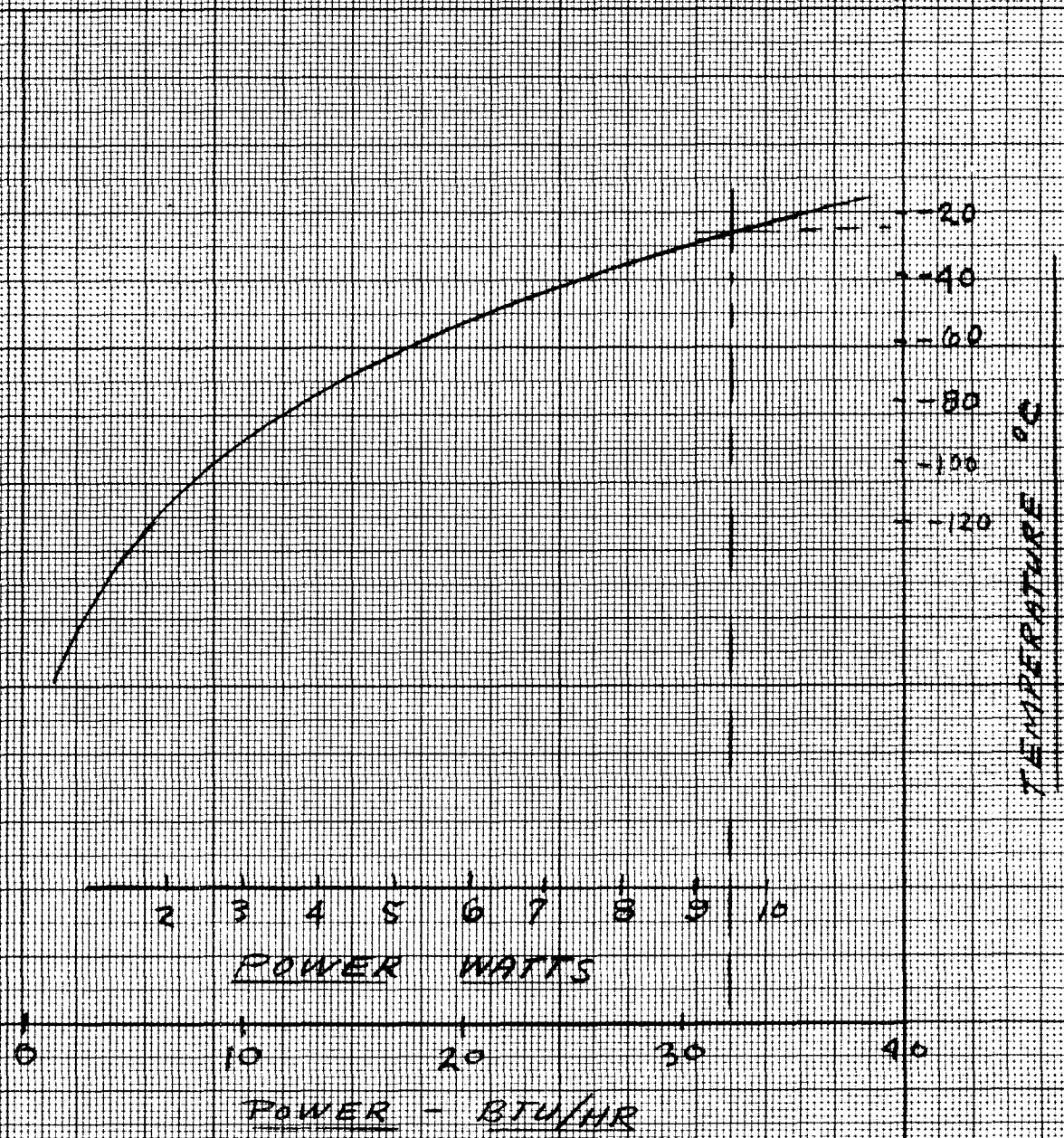
Thermal

Handwritten signature: *W. H. C. Brown*



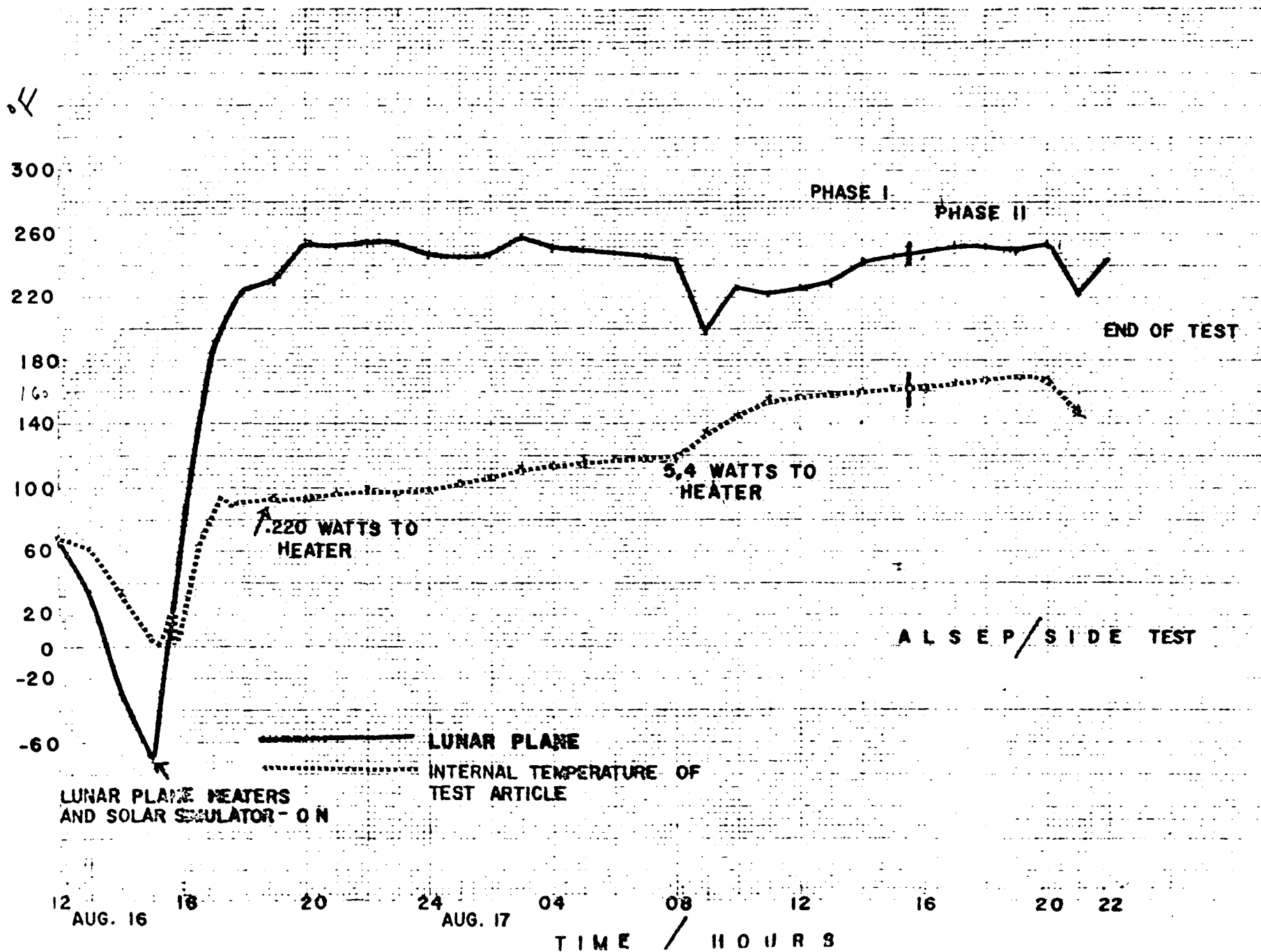
POWER DISSIPATION VS INTERIOR PACKAGE TEMPERATURE

(LUNAR NIGHT)



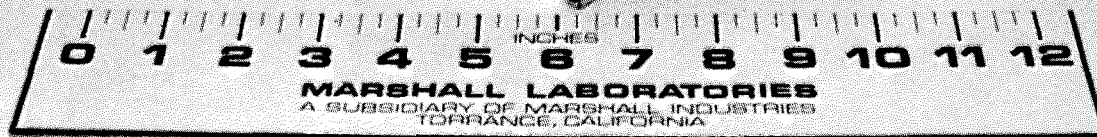
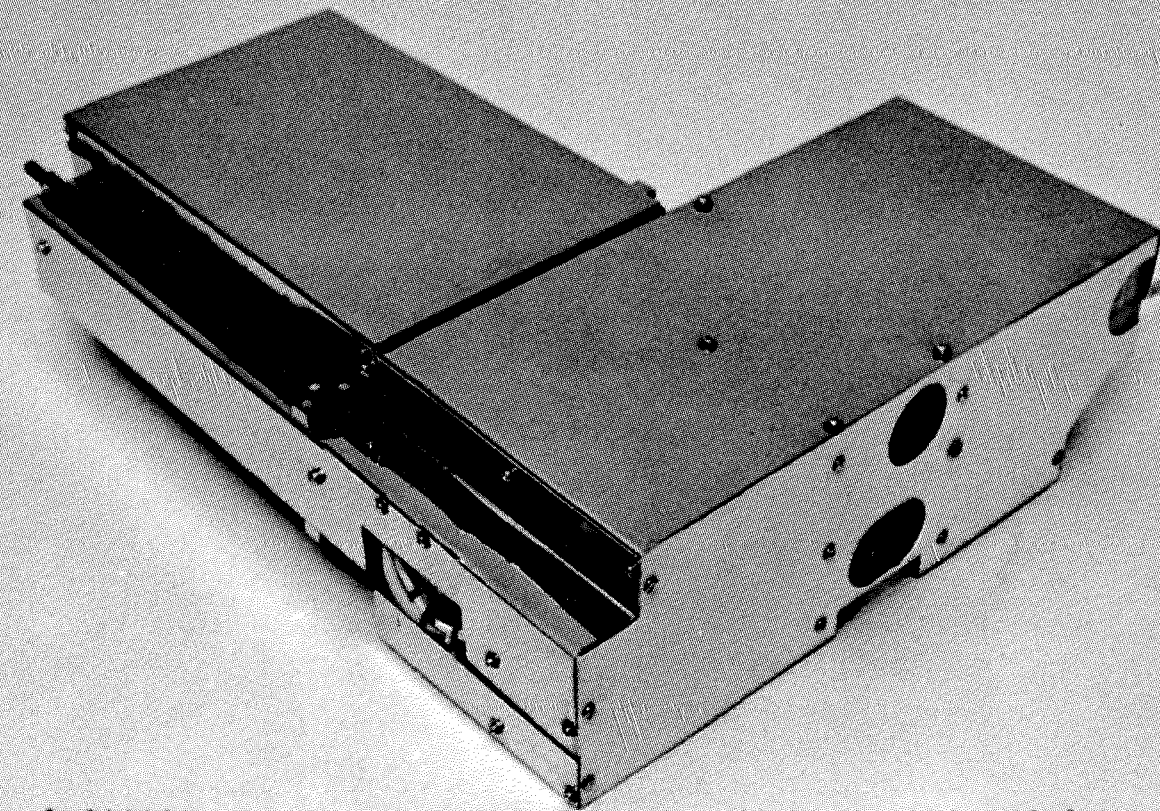
TOTAL ELECTRICAL POWER DISSIPATION

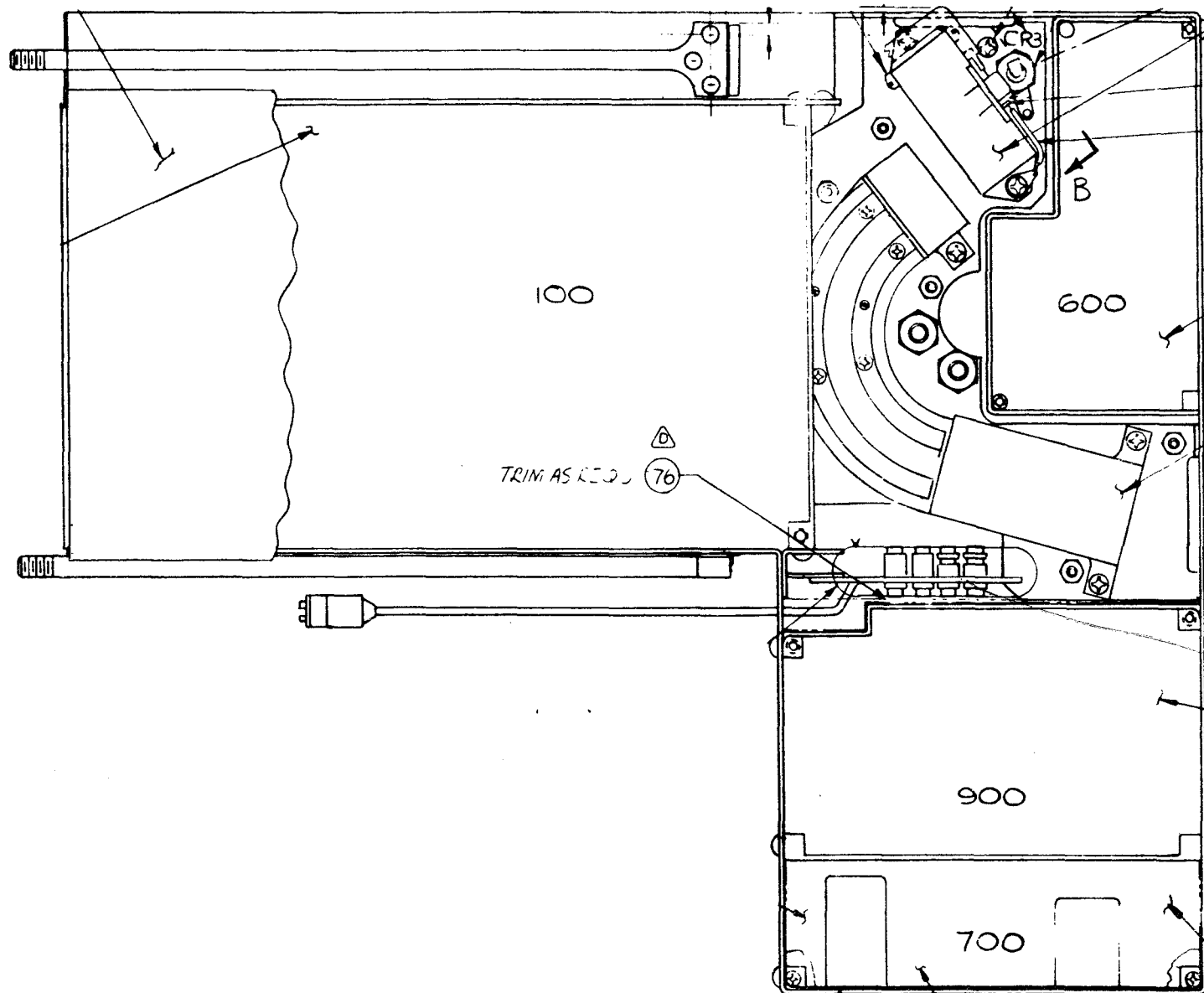
includes power for electronics and also the heater



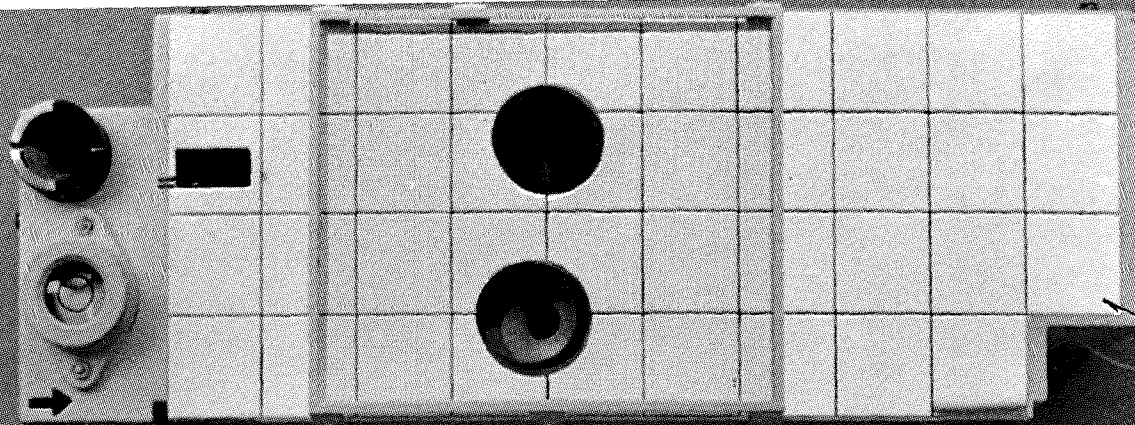
ALSEP/SIDE THERMAL DESIGN FEATURES

Item	General Description
1	Thermal Survival Heater
2	Second Surface Mirrors
3	Dewar (Thermos Bottle) Flask Principle
4	Thermal Space Assembly (Top section of inner and outer assembly)
5	Thermal (S-13G) paint (<i>against UV degradation</i>)
6	Aluminized mylar and silk mesh thermal blanket on bottom exterior of case
7	G10 fiber-glass base on external housing
8	Thermal isolation legs; support and isolation of lunar surface from ALSEP/SIDE package
9	Constantan wire used for connector internal leads

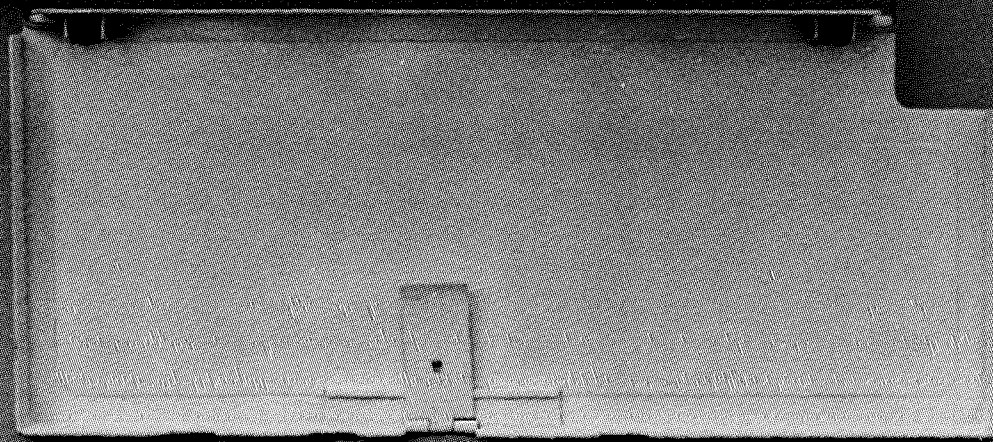


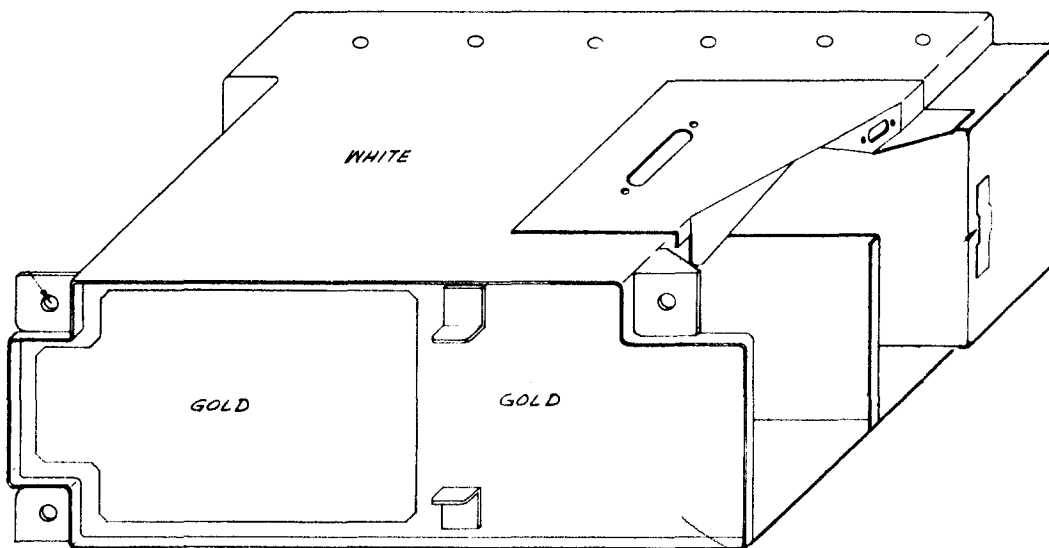
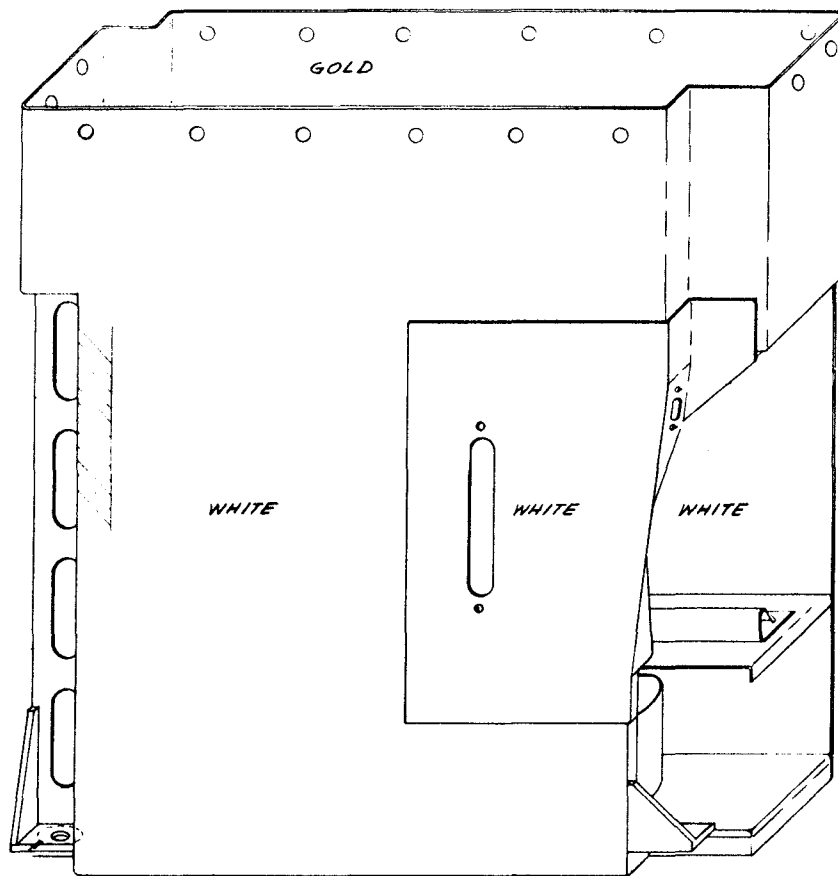


INTERNAL CHASSIS ASSEMBLY



Plumb



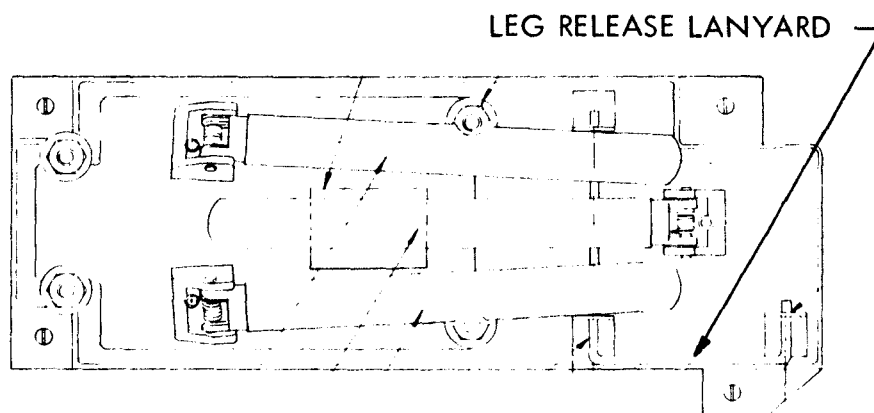
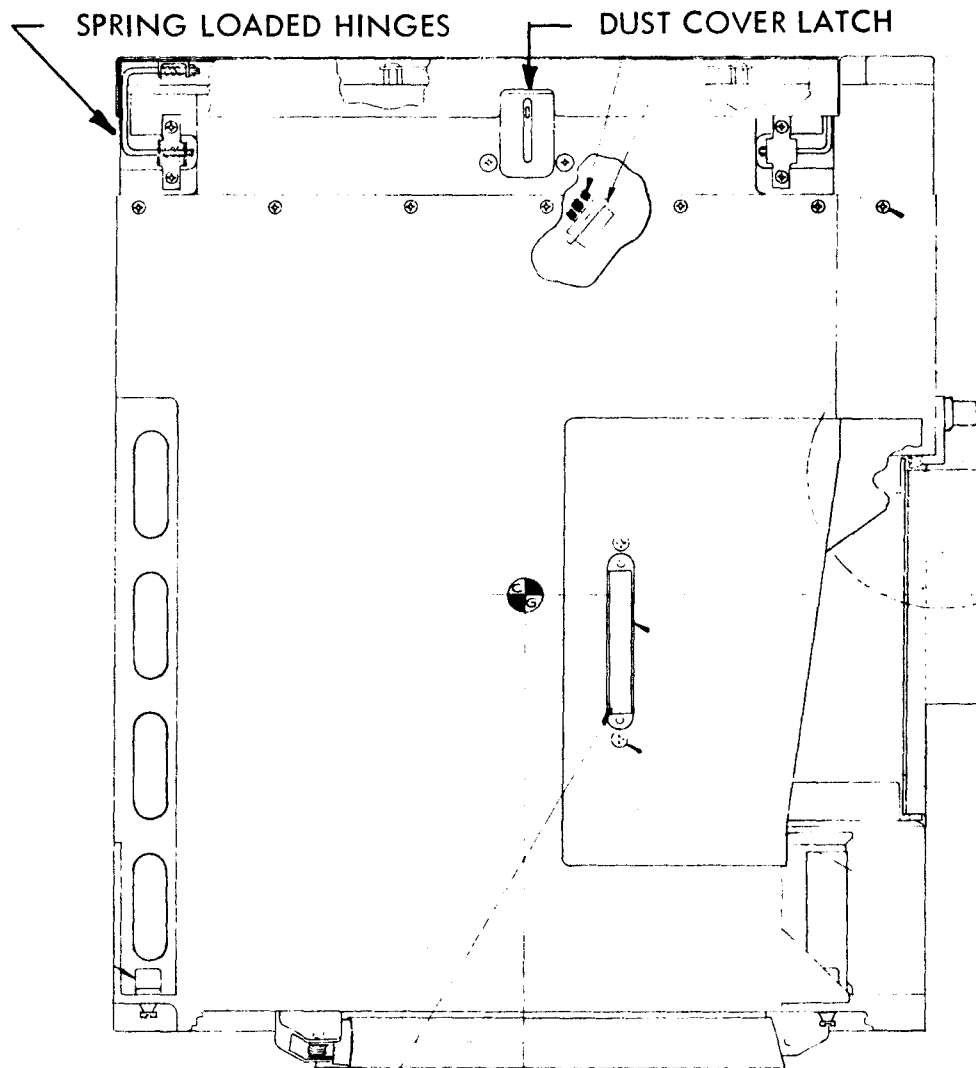


THERMAL CONTROL SURFACES

6-10 plates

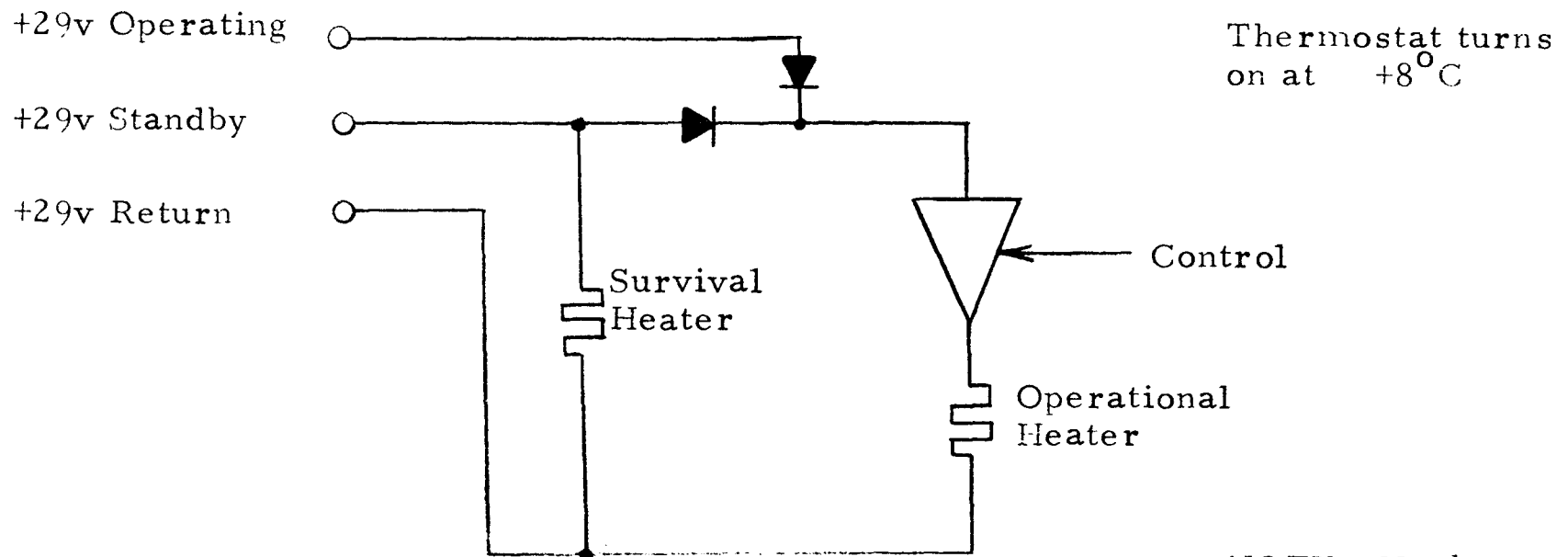
(also 6-10 tie rod)

blanket
plate



PROTOTYPE DEVELOPMENT MECHANICAL FEATURE

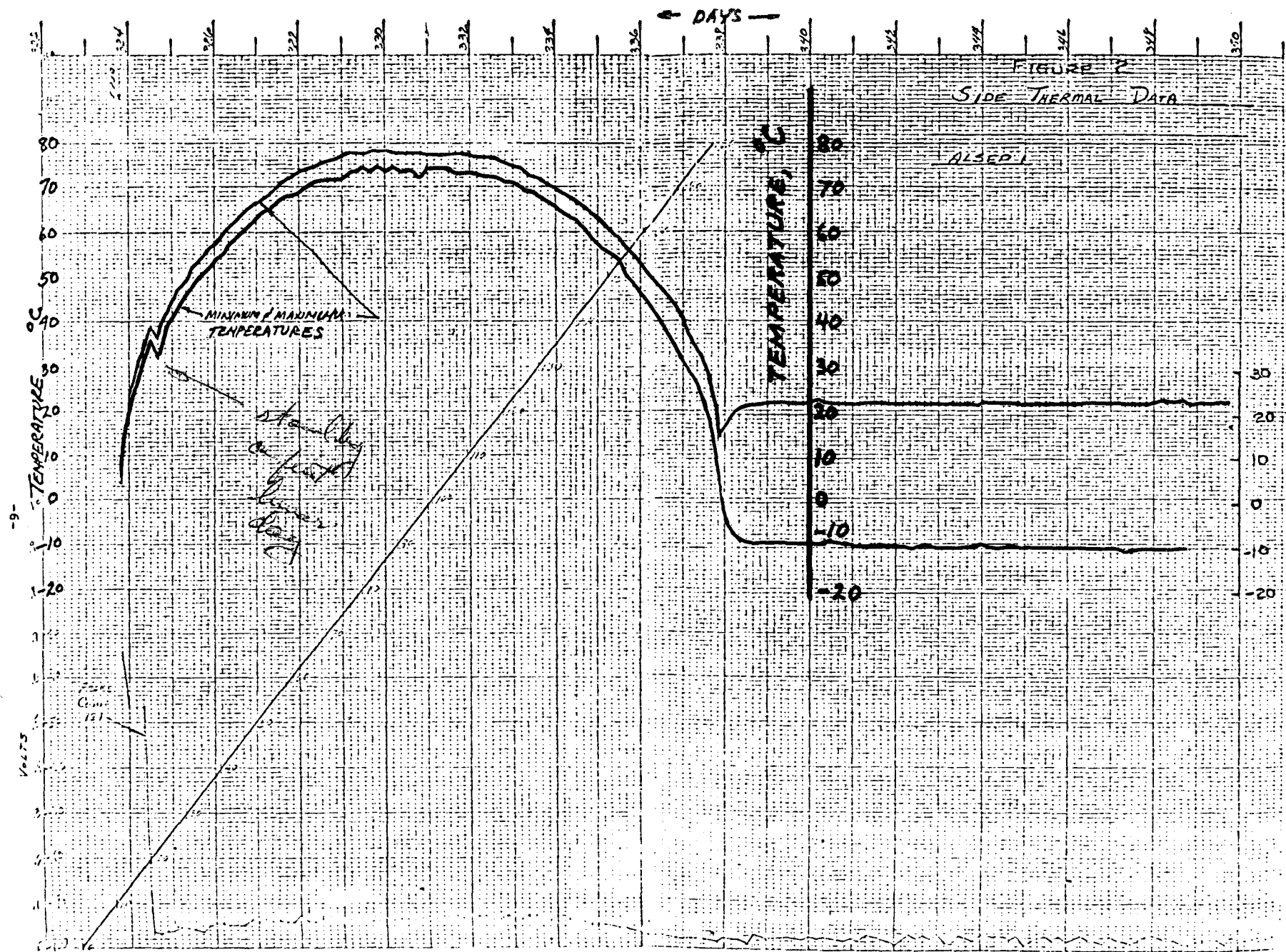
SIDE THERMAL CONTROL



NOTE: No heater
in CCIG

Heater

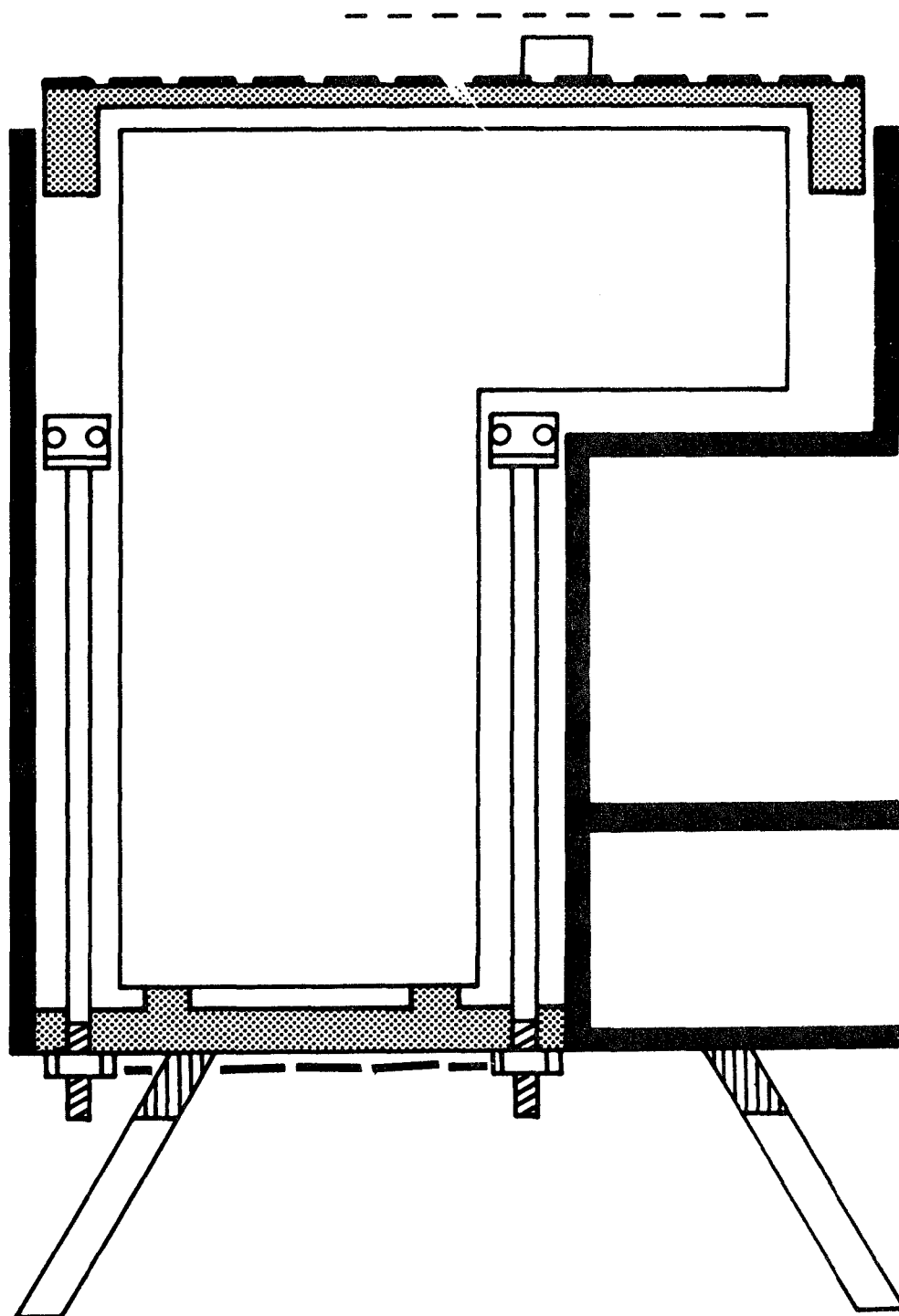
FRAME
121



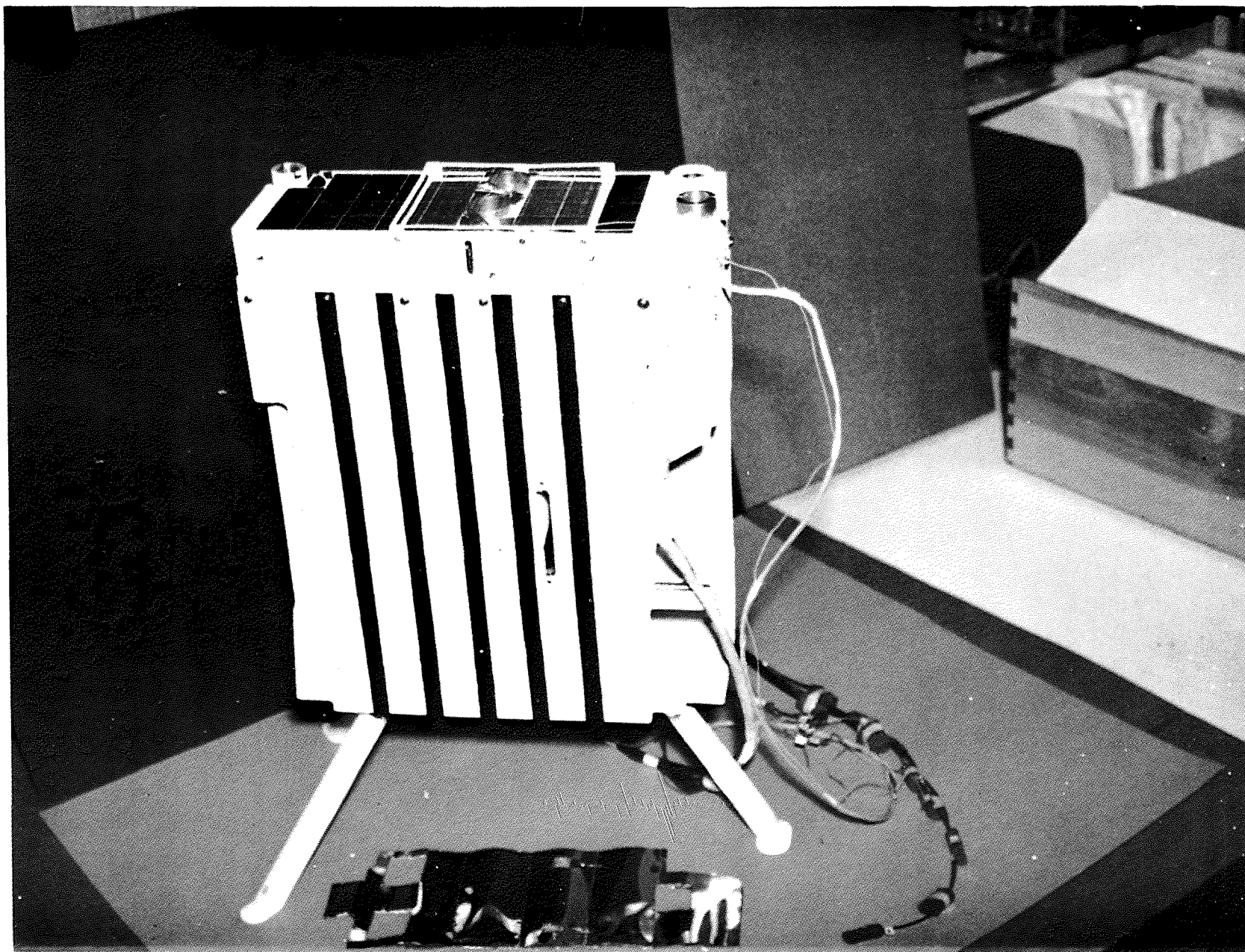
ALSEP/SIDE LUNAR TEMPERATURE EXCURSION (ACTUAL)

CELE RADIM

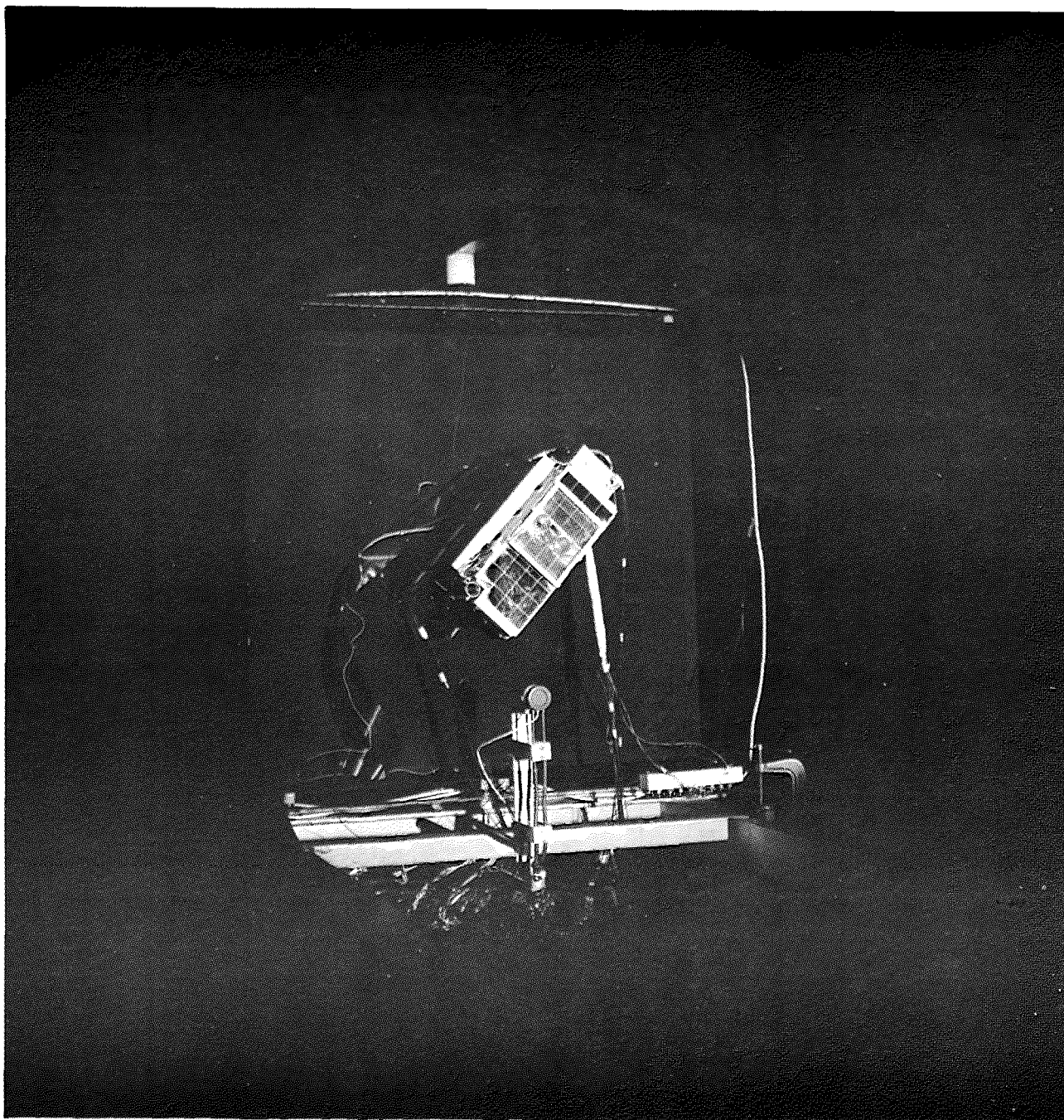
Thermal Test



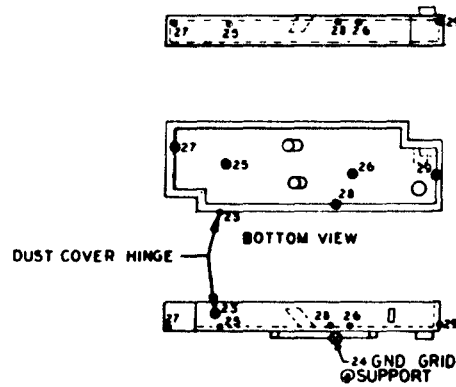
**THERMAL / MECHANICAL
OUTLINE**



Daytime
Test @
HSC

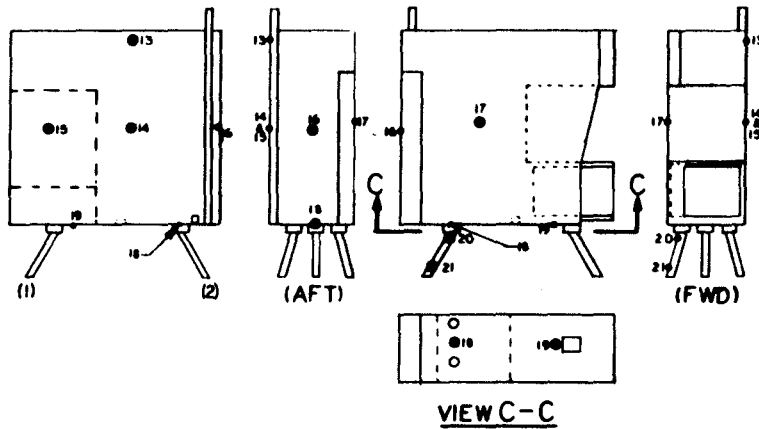


TC'S 24 THRU 29



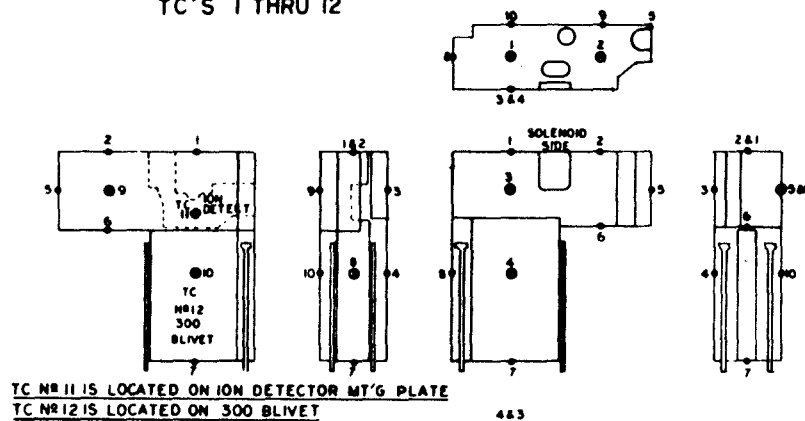
TOP PLATE / THERMAL SPACER

TC'S 13 THRU 19-EXTERIOR CHASSIS
TC'S 20 & 21-LEG



EXTERIOR CHASSIS & LEG ASSEMBLY

TC'S 1 THRU 12



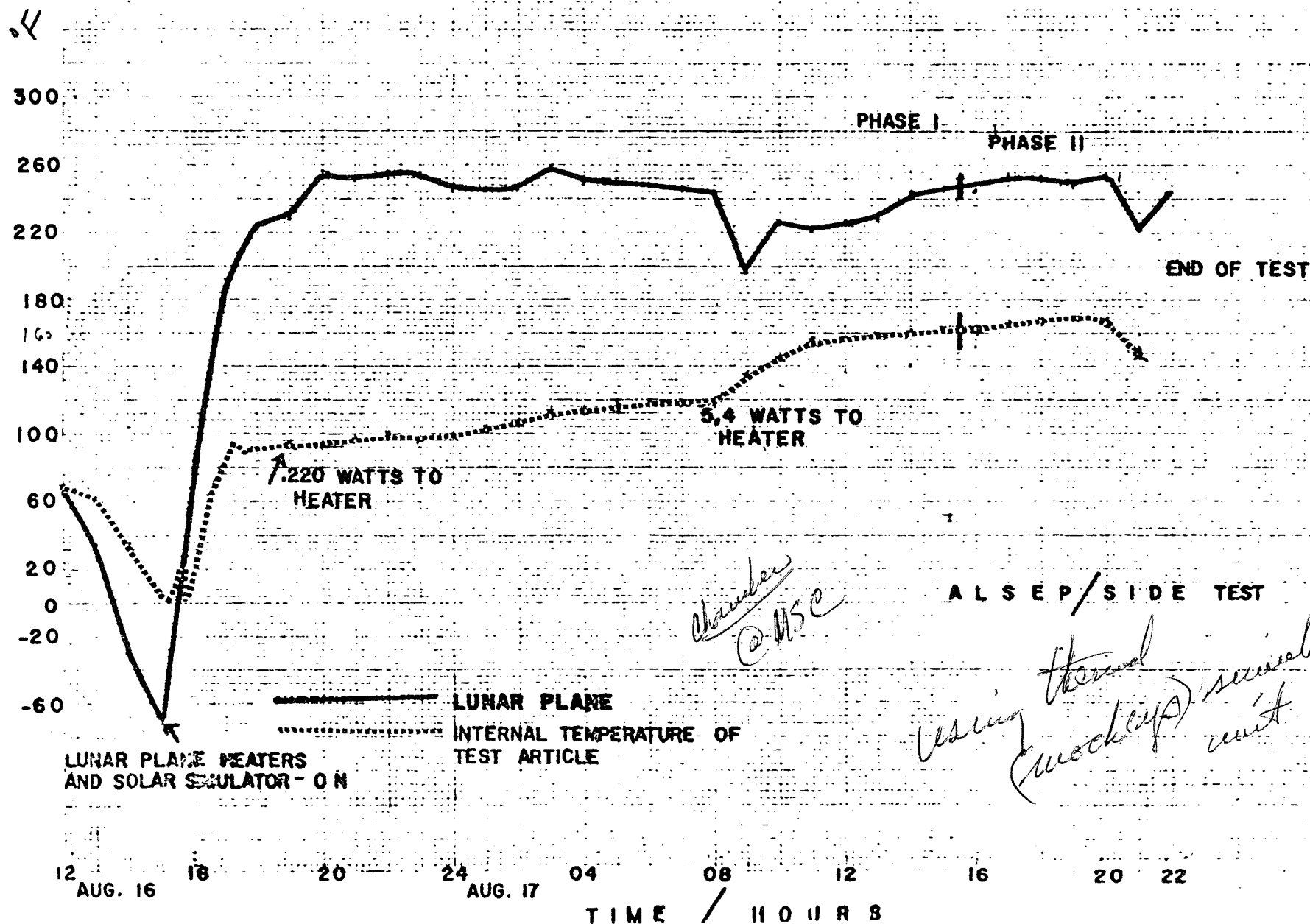
TC NR11 IS LOCATED ON ION DETECTOR MT'G PLATE
TC NR12 IS LOCATED ON 300 BLIVET

NOTE Except for thermocouples 11 & 12, all
are attached to inside surface of
outer enclosure of interior package

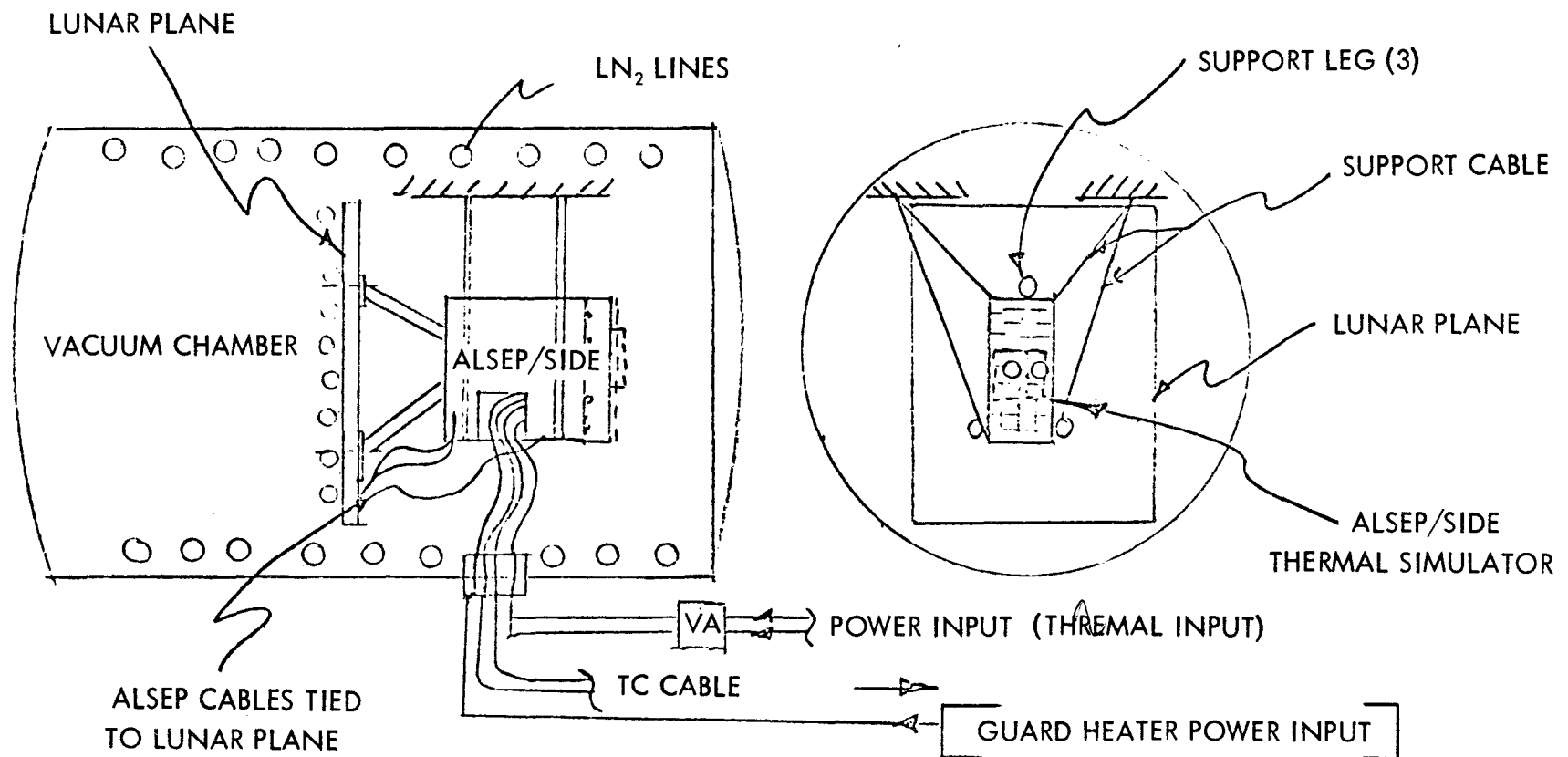
INTERIOR PACKAGE

⊗ Thermocouple, frontal view
● Thermocouple, edge view

THERMOCOUPLE LOCATIONS



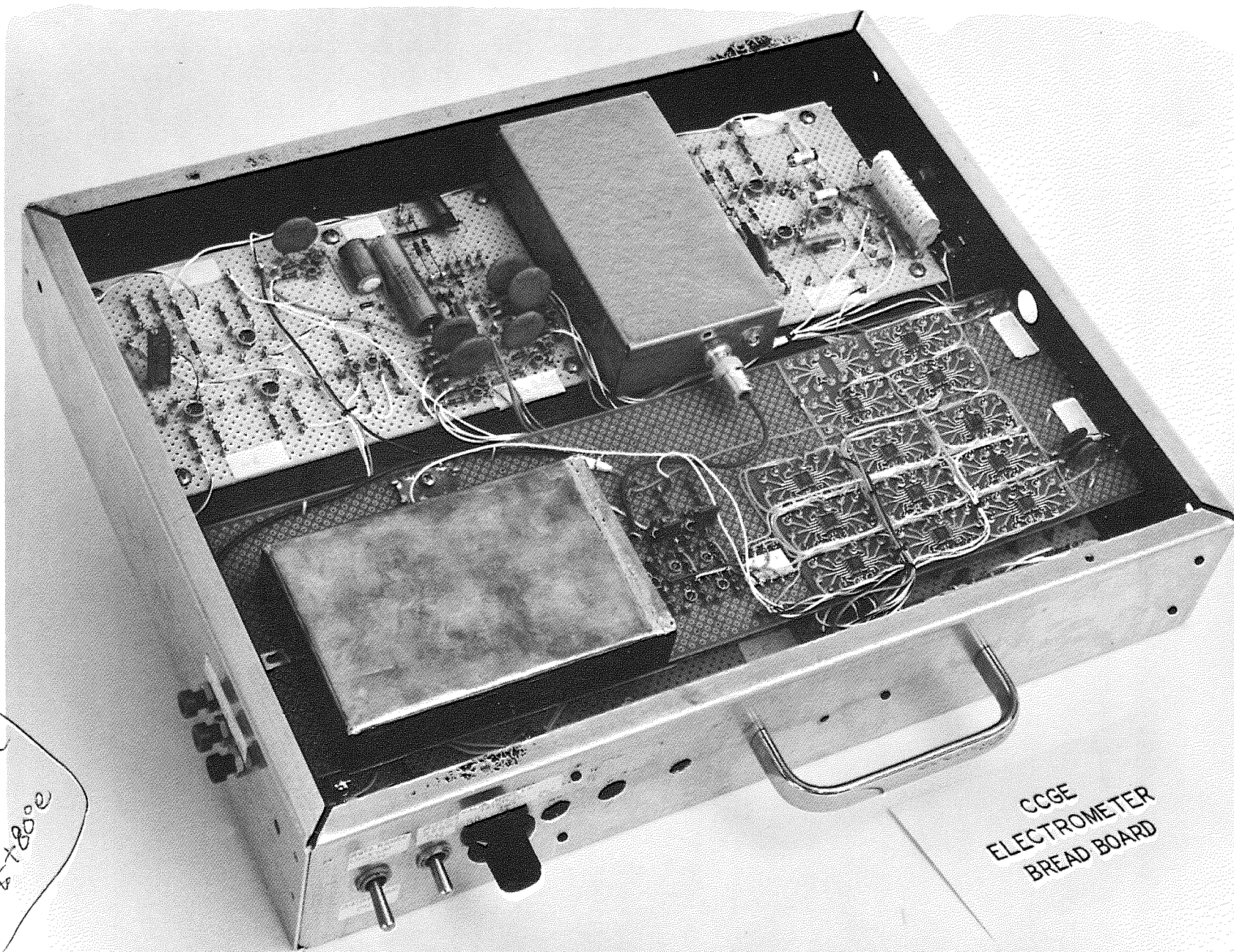
THERMAL SIMULATOR TEST SET-UP



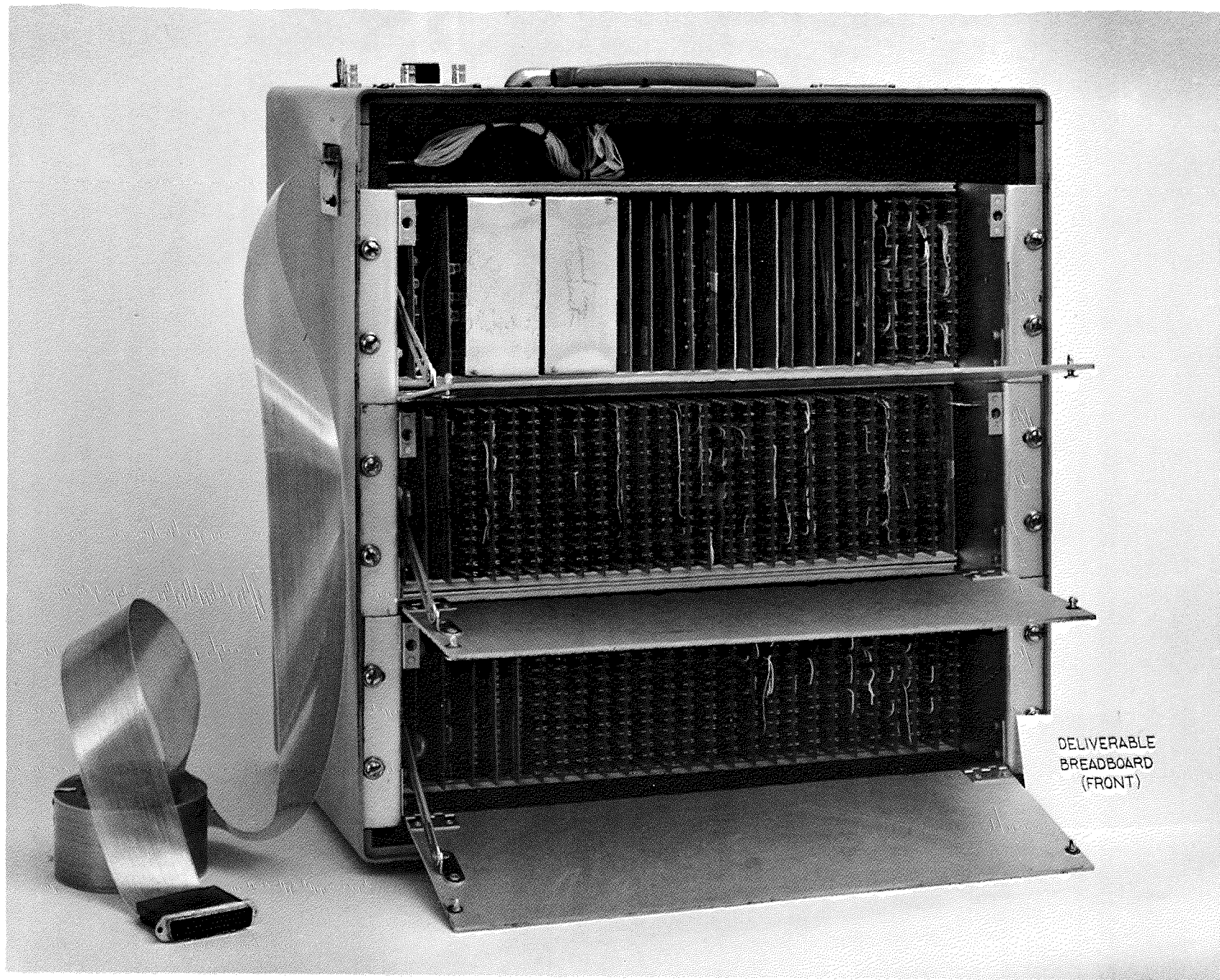
SECTION 4

Test

Temp
-50°C to +90°C
Range
-400 to +800

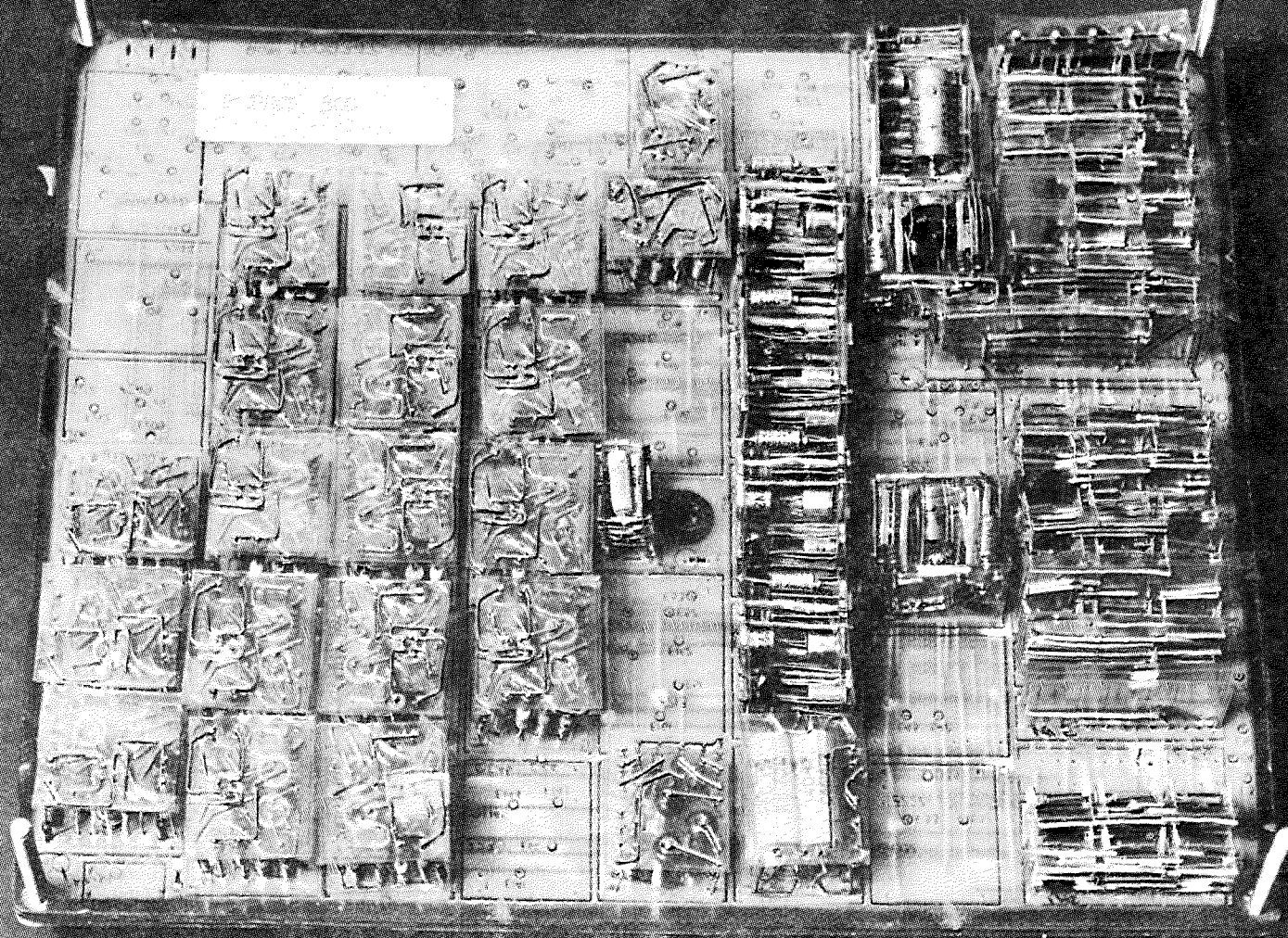


CCGE
ELECTROMETER
BREAD BOARD



DELIVERABLE
BREADBOARD
(FRONT)

SUB-ASSEMBLY



MARSHALL LABORATORIES

A SUBSIDIARY OF MARSHALL INDUSTRIES

ASSEMBLY PLAN

PART NAME
BLIVET NO. 300 ALSEP/SIDE/CCGE

PART NUMBER AP
609527-102A

JOB NUMBER
~~6-095-40~~

6-09-05-40

SERIAL NUMBER

SLUG SYSTEM 8

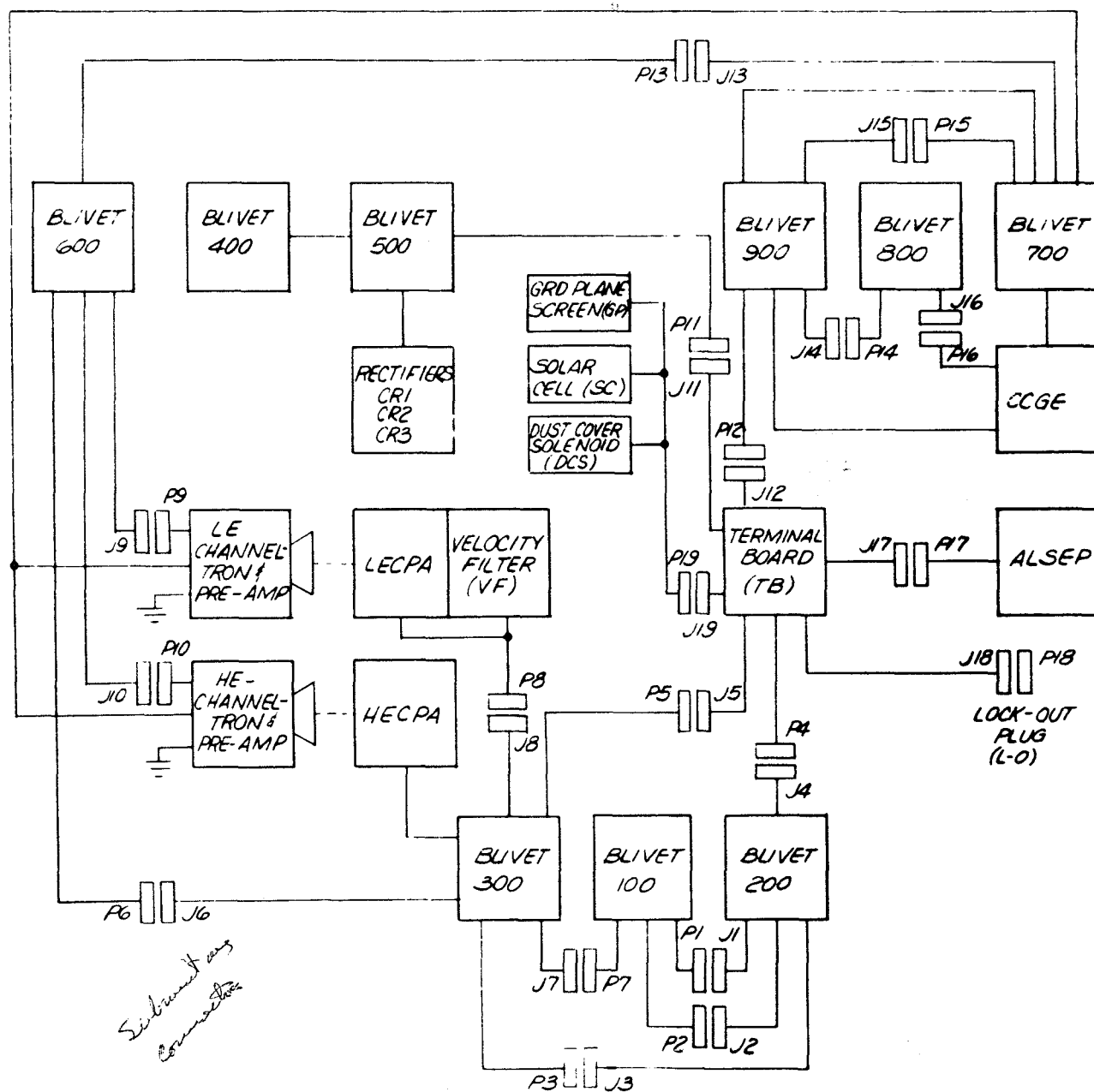
APPROVALS/DATE

ENG

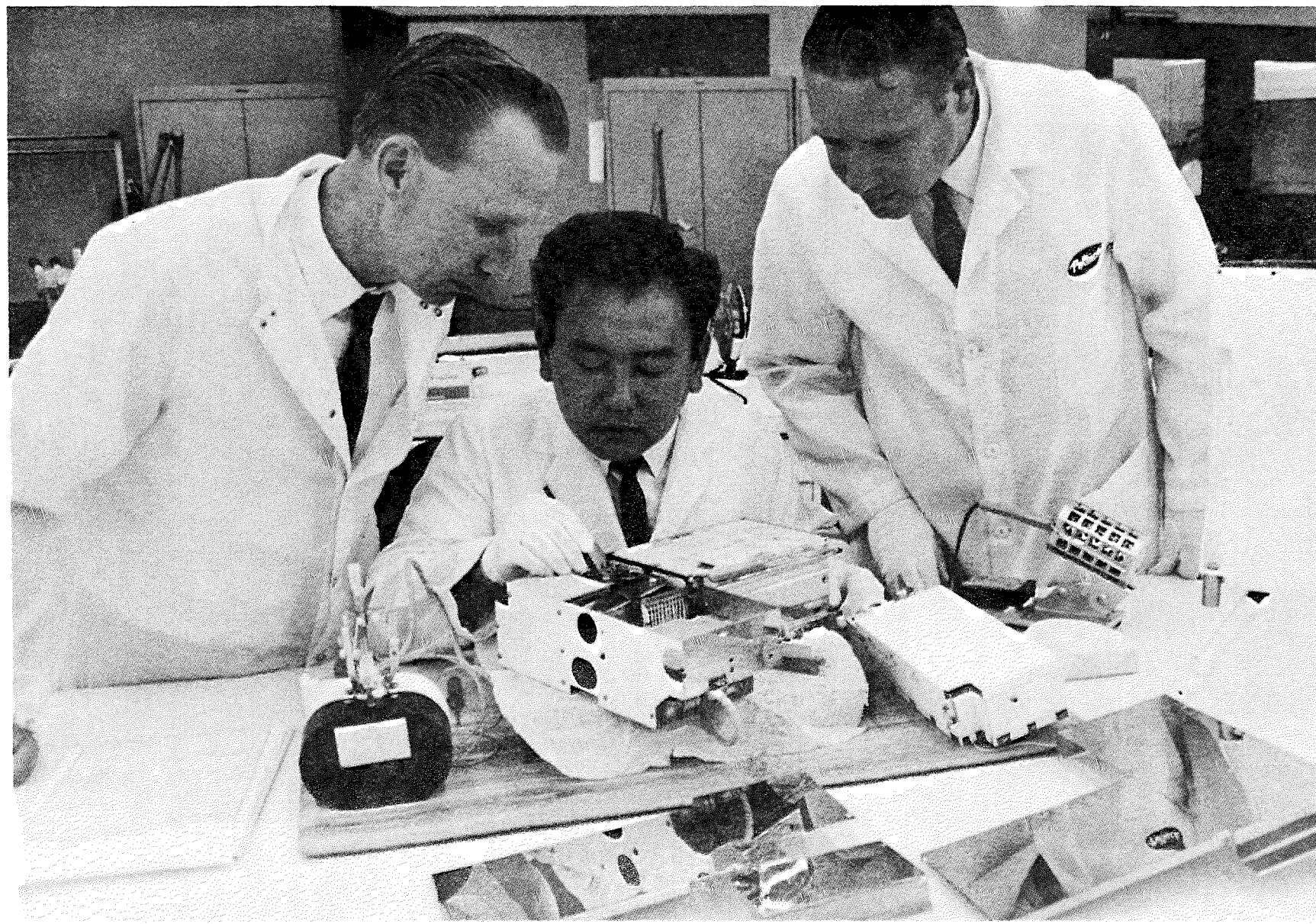
PROD

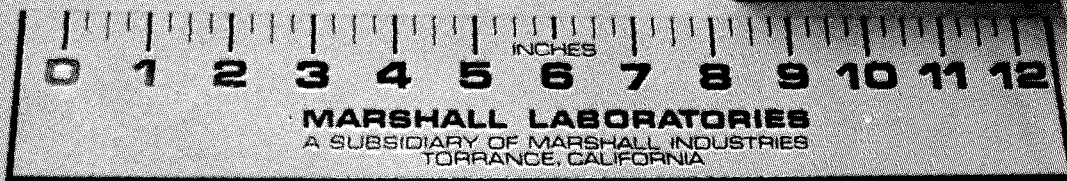
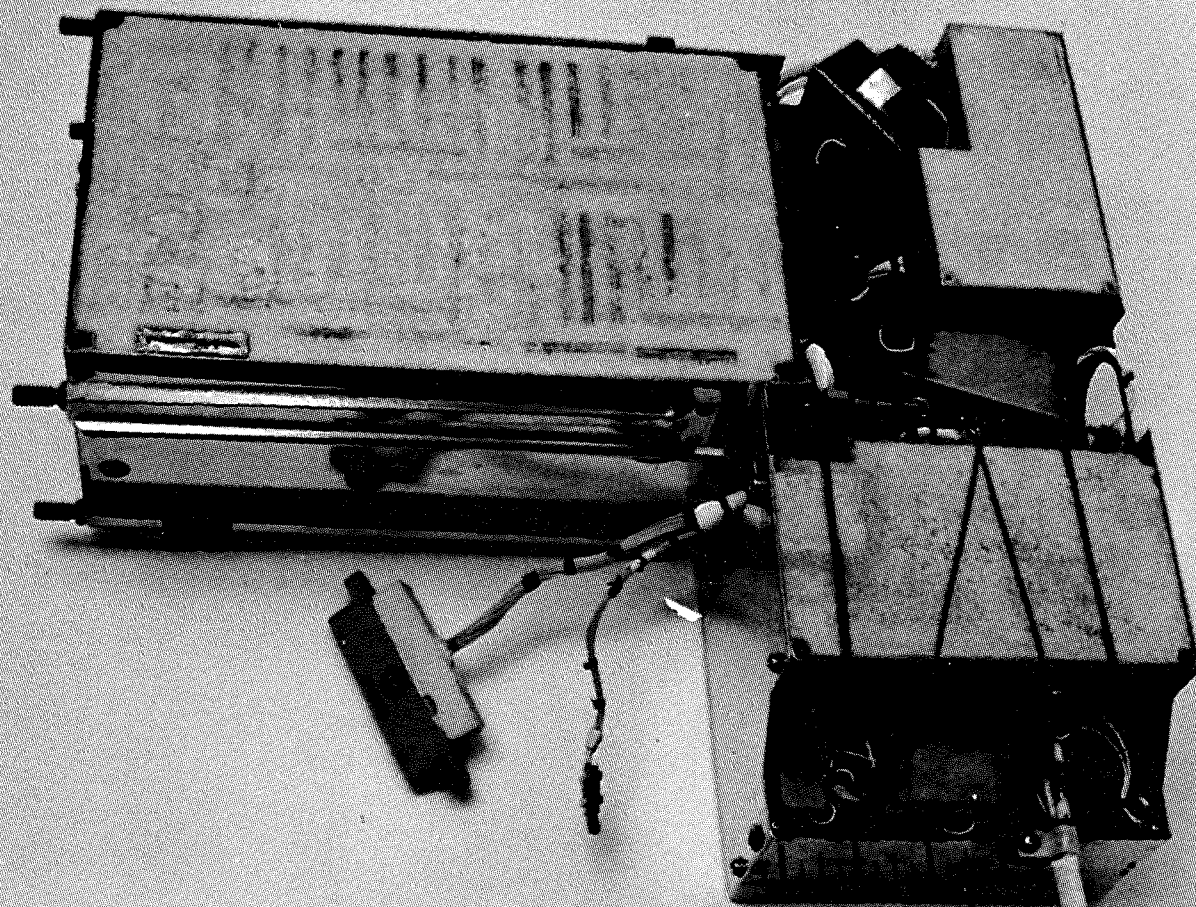
QC

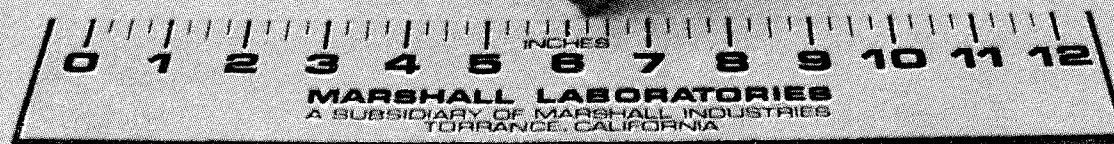
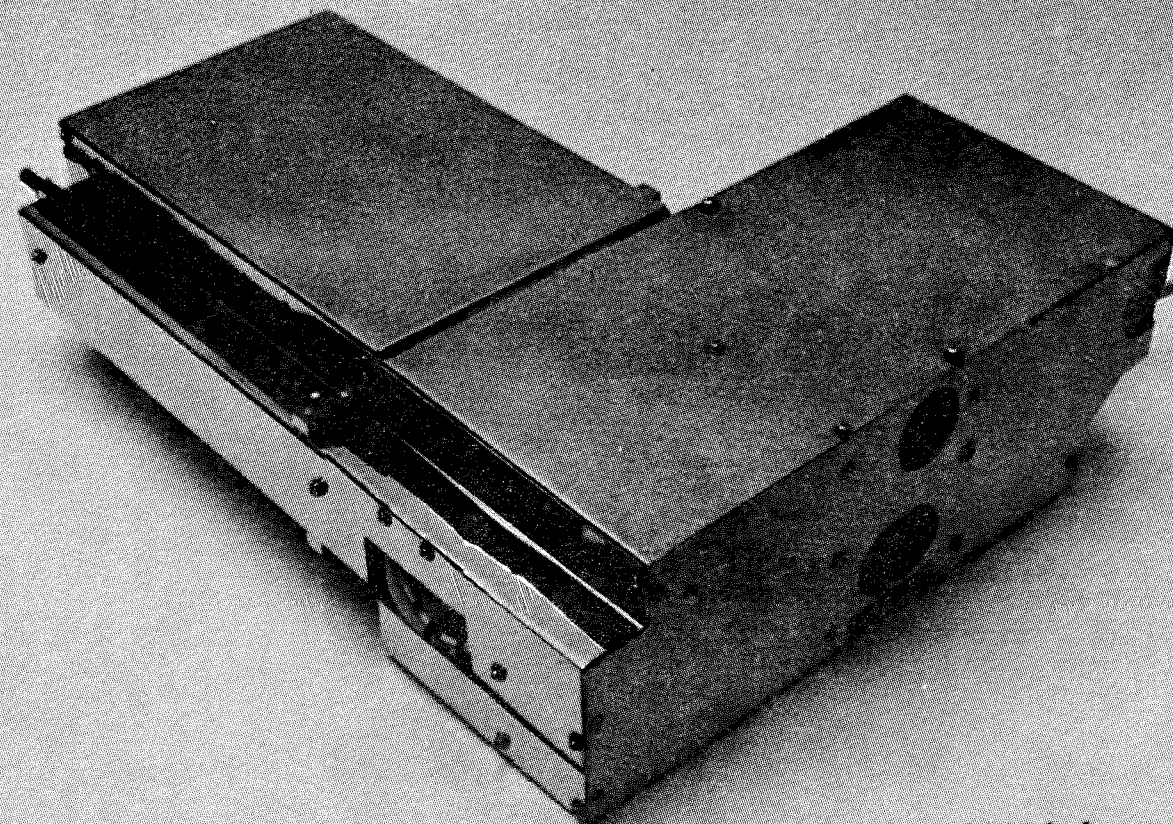
STEP	OPERATION	SPEC/PRINT REFERENCE	DATE COMPLETED	OPERATOR INSPECTOR
23	Visual Inspection		JUL 20 1968	ML
24	DCASR Inspection B.		7-22-68	ML
25	Install selected components	609527		
26	Visual Inspection		JUL 20 1968	ML
27	Conformal coat per Note 7.	S40091	JUL 21 1968	ML 69
28	Visual Inspection		JUL 22 1968	ML
29	Spot bond insulator & face and spot bond harnesses as required.	S40149	JUL 21 1968	ML 69
30	Visual Inspection		JUL 22 1968	ML
31	Electrical Test	S46822		
32	Visual Inspection		JUL 22 1968	ML
33	DCASR Inspection B		7-22-68	ML
34	Foam inside of copper foil shield box only, per Note 6.	609527 S40092	JUL 22 1968	ML 69
35	Electrical Test	S46822		
36	Visual Inspection		JUL 23 1968	ML
37	DCASR Inspection B		7-23-68	ML

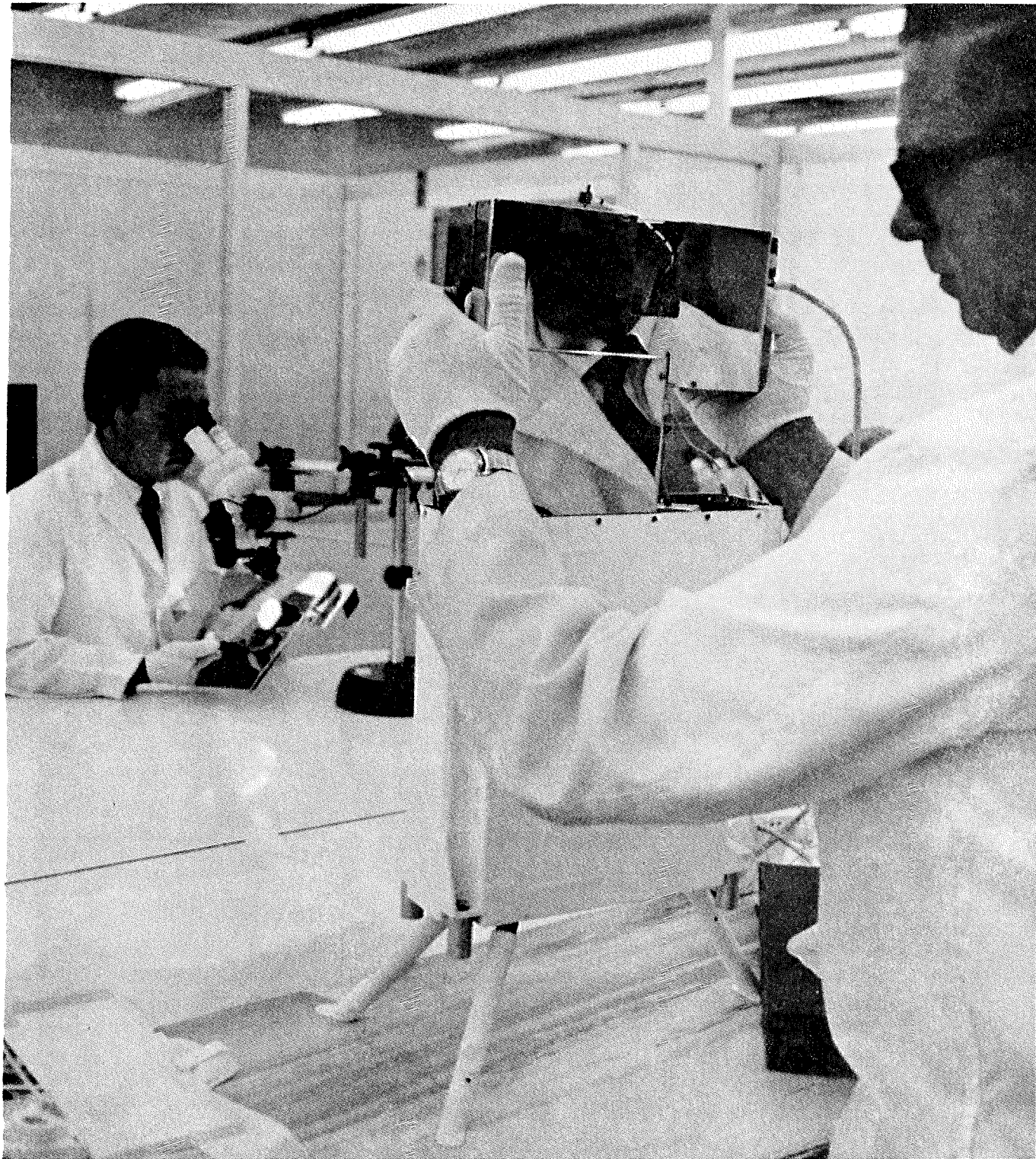


SYSTEM INTERCONNECT DIAGRAM



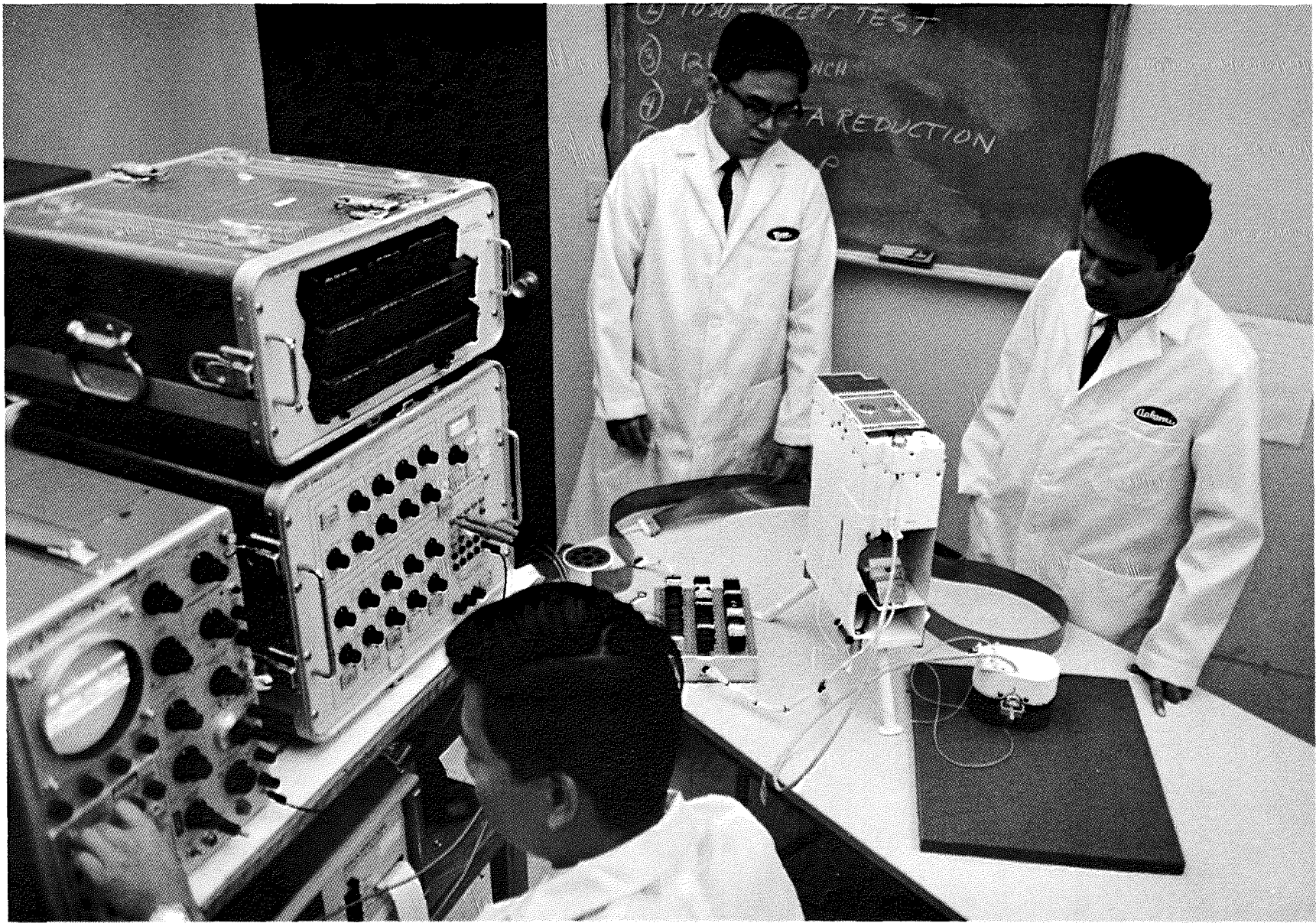




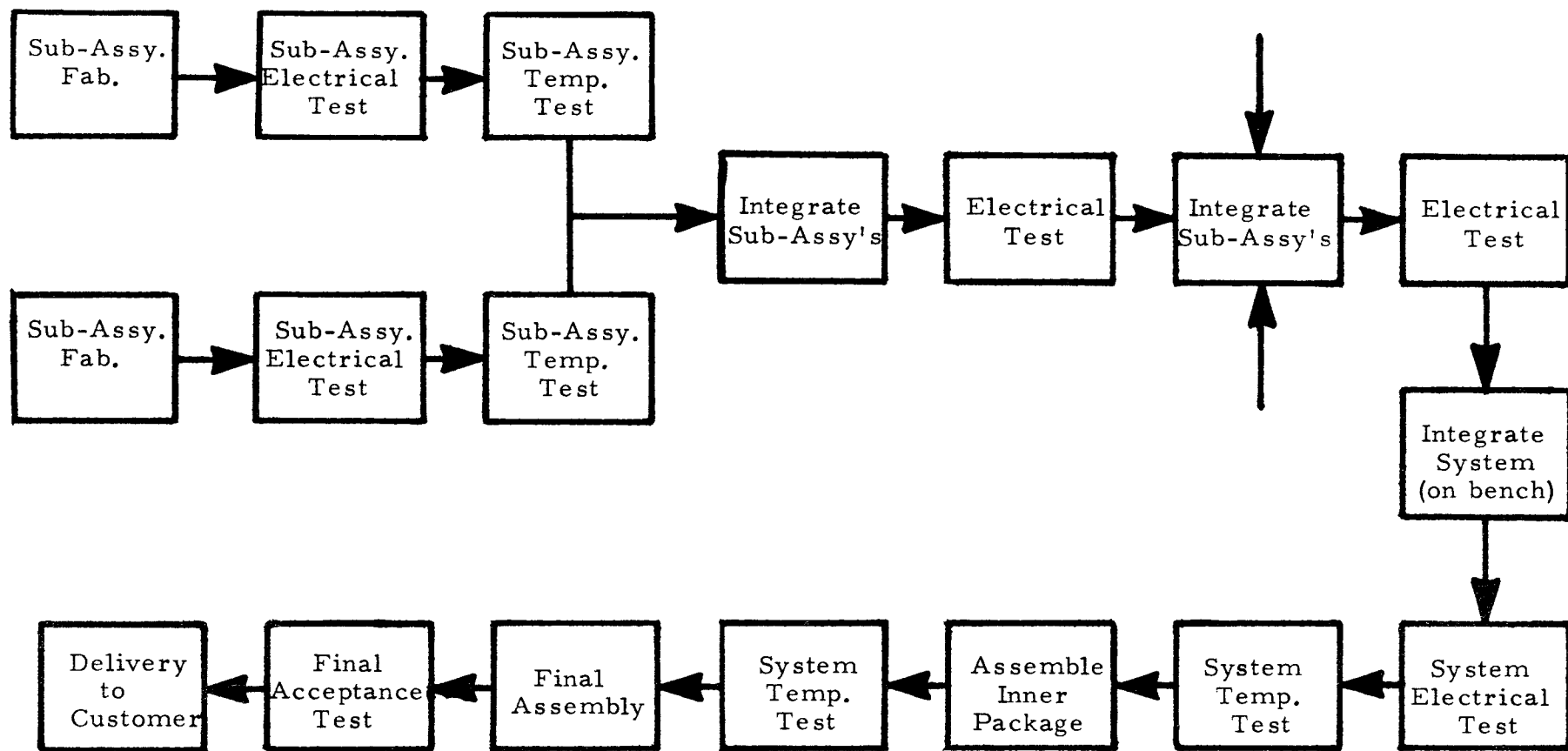


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APPENDIX



TYPICAL ELECTRICAL TEST PLAN FLOW CHART

NOTES: Conformal Coat, potting, and inspections not shown. Electrical tests performed before and after all coating, potting and production work. Temperature tests performed before coating.