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LMSD-6134

~~PRO A-1~~

~~(1960)~~



©

WS 117L

SENTRY SYLLABUS

LOCKHEED AIRCRAFT CORPORATION
MISSILE SYSTEMS DIVISION
SUNNYVALE, CALIFORNIA

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LMSD-6134

12 AUGUST 1958

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WS 117L

SENTRY SYLLABUS

LOCKHEED AIRCRAFT CORPORATION
MISSILE SYSTEMS DIVISION
SUNNYVALE, CALIFORNIA

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FOREWORD

The chart and photograph reproductions which comprise this report are pertinent to a presentation made to Mr. Roy W. Johnson, Director, Advanced Research Projects Agency, and members of his staff. Essentially, the presentation was given in two parts.

Part I a detailed technical briefing on the Sentry Weapon System 117L as currently programmed or proposed, and

Part II a discussion of advanced component requirements and possible system applications to other programs.

Information pertinent to the system is presented herein. The presentation was given at the Pentagon on 14 and 15 August 1958.

W7L/ARPA BRIEFING
14-15 August 1958
Pentagon, Room 3E144

Thursday 14 August

0900	Introduction - Mission Concept	Lt. Col. Lee Battle
0910	Sentry System Program	J. H. Carter
0925	System Development Plan	F. W. O'Green
0940	Present Status	
	Support Systems	R. D. King
	Facilities and GSE	
	Recovery	
	Operations Control Plan	
1020	Break	
1040	Subsystems	
	Airframe	} F. W. O'Green
	Propulsion	
	Guidance and Control	
	Power	C. W. Burrell
1200	Lunch	
1300	Visual	} F. W. O'Green
	Biomedical	
	Ferret	P. D. Doersam
	Infrared	J. J. Knopow
	Communications	} J. G. Schaub
	Data Control	
1430	Break	
1450	Film: Progress Report No. 7	
1510	Questions	
1600	Brochure	
1615	Conclude	

117L/ARPA BRIEFING
14-15 August 1958
Pentagon, Room 3E144

Friday 15 August

0900	Advanced Components	
	Power	C. W. Burrell
0930	TV Sensing	Peter C. Goldmark
1000	Ferret	P. D. Doersam
1015	Infrared Detection & Tracking	J. J. Knopow
1035	Break	
1055	Data Storage	J. P. Nash
1125	Propulsion	J. E. Laurance
1200	Lunch	
1300	Other Applications of the Sentry System	
	General Satellite Tracking	} J. Jenkins
	Communications	
1330	Weather	E. V. Stearns
1345	Scientific Measurements	F. S. Johnson
1400	Break	
1420	MIS	J. W. Brandon
1440	AICBM	S. H. Browne
1500	Summary	J. H. Carter
1520	Conclude	

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CHART REPRODUCTIONS:

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- P142(3) Advanced Reconnaissance Vehicle
- P14(4) Advanced Reconnaissance System Evolution
- P799 Sentry Operational Objectives
- P250(3) WS117L Program Objectives
- P257(5) WS117L Development Program
- P102(5) Sentry Facilities
- P800 Sentry Payload - Defined
- P238(3) The Sentry Subsystems
- P283(5) WS117L R&D Organization
- P566 WS117L Airframe and Propulsion
- P567 WS117L Payload
- P568 WS117L Ground Support Equipment
- P565 Lockheed Facilities for WS117L
- P235(1) WS117L Trajectory to Orbit
- P229(1) WS117L Orbital Test Vehicle Design Parameters
 - Booster Stage
- P228(1) WS117L Orbital Test Vehicle Design Parameters
 - Sustainer Stage
- P792 Altitude vs. Payload - Sentry/Thor
- P791 Altitude vs. Payload - Sentry/Atlas
- P171(3) WS117L Ground Traces of 83⁰ Orbits

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P162 Advanced Auxiliary Power Systems

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- Typical Sentry Ascent (Thor - Prog. IIIA)

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- Typical Sentry Ascent (Atlas - Prog. I)

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- Guidance and Control Functioning Components

P708(1) Sentry Coast Phase
- Guidance and Control Functioning Components

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P400 WS117L Visual Reconnaissance System

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P546 Satellite Weather Missions
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P545 Types of Weather Data
P374 Possible Scientific Experiments

PHOTOGRAPH REPRODUCTIONS:

Photo No.

P3017 Flight Test Vehicles Nos. 1 and 2 in Mod & Checkout
- LMSD Palo Alto
P3018 Flight Test Vehicles Nos. 1 and 2 in Mod & Checkout
- LMSD Palo Alto

P3022 Flight Test Vehicle No. 2 in Mod & Checkout
- LMSD Palo Alto

P3021 Flight Test Vehicle No. 2 in Mod & Checkout
- LMSD Palo Alto

P3039 Model XLR Engines - JP4 and UDMH

P3043 UDMH Propellant Tank

P2862 Horizon Scanner

P2864 Horizon Scanner

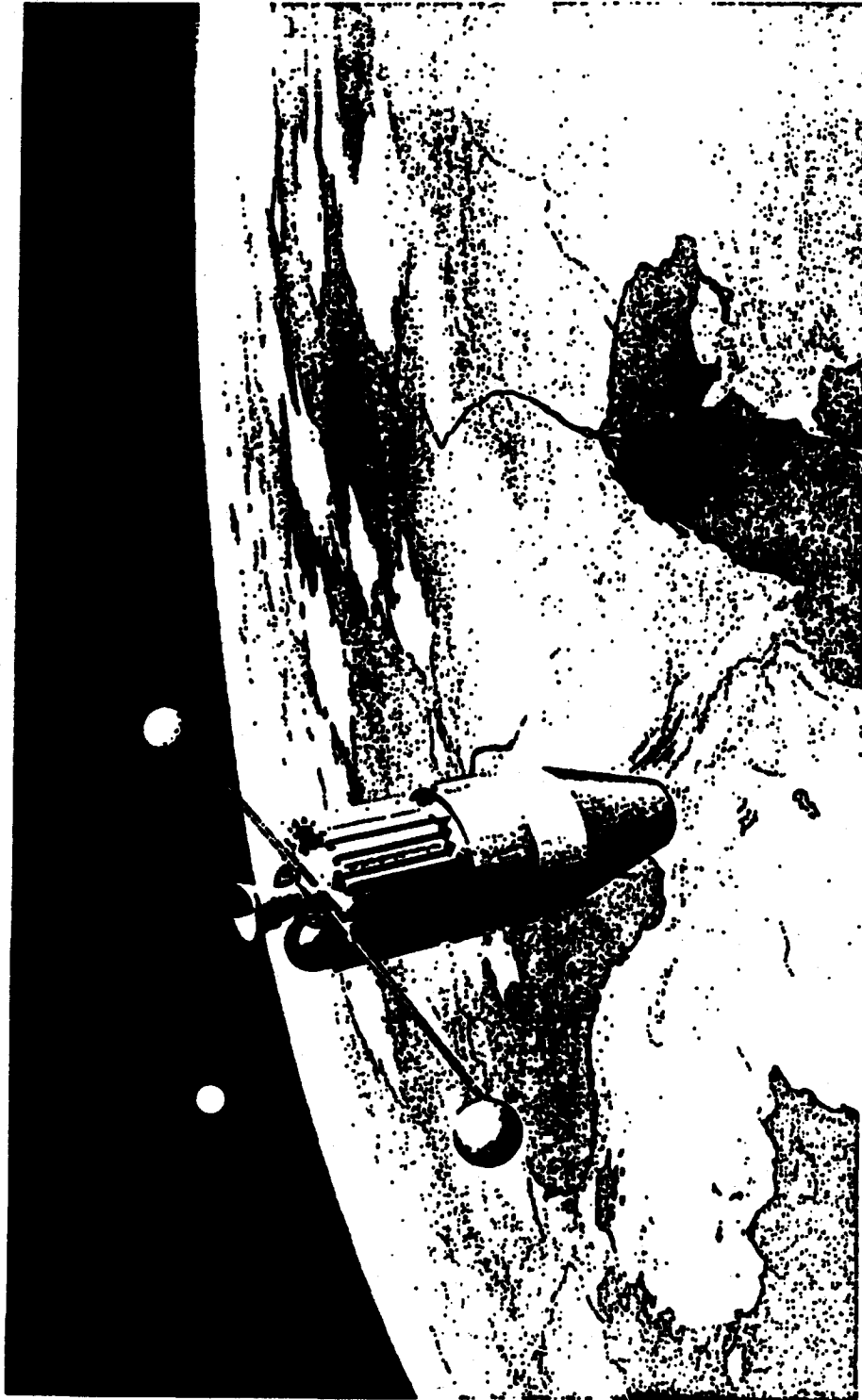
P3046 Systems Checkout Complex (excluding LACE U ..)

P3047 LACE Unit (Systems Checkout Complex)

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ADVANCED RECONNAISSANCE VEHICLE

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P142 (U) 5 01/22/57
WD-55-029-43

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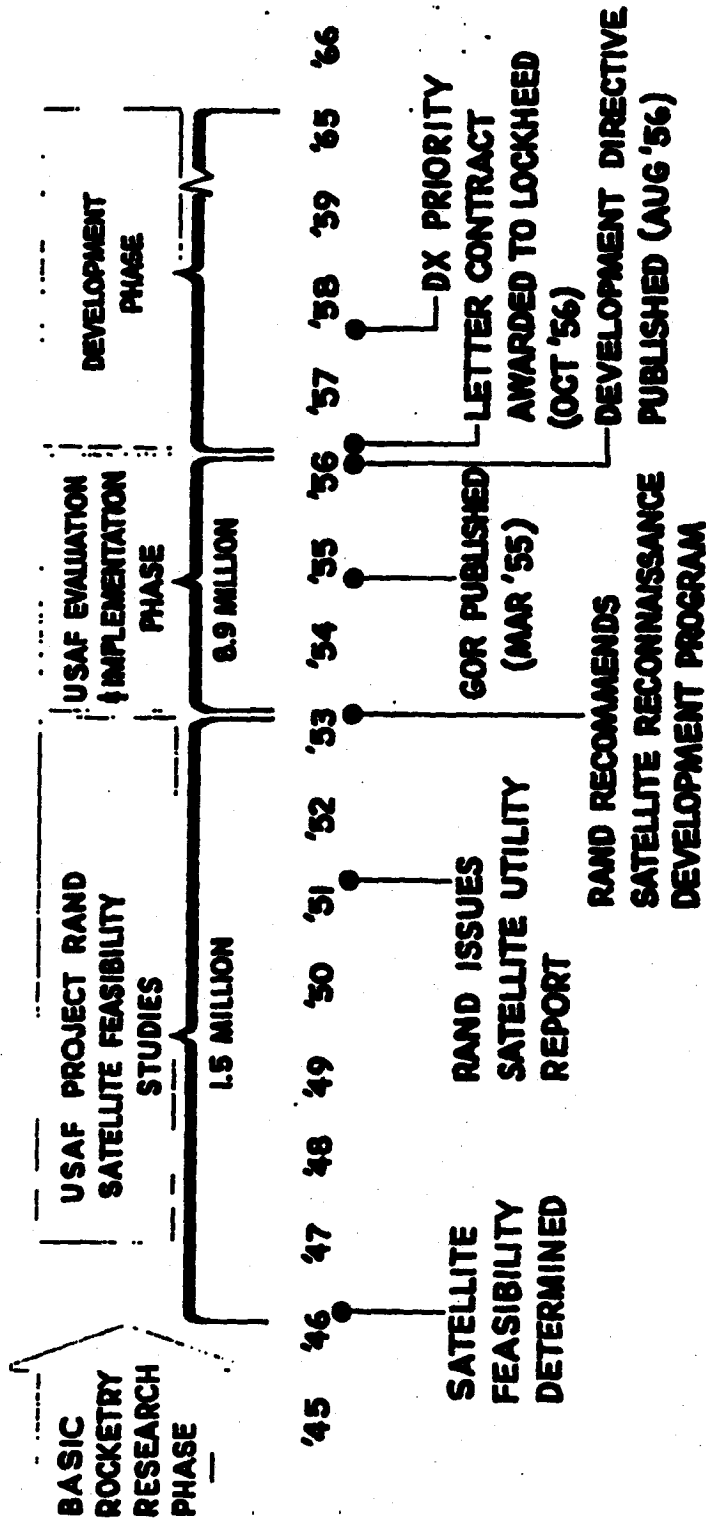
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MISSILE SYSTEMS DIVISION

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ADVANCED RECONNAISSANCE SYSTEM EVOLUTION

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PM 4 (4) S 5/7/58
WD-58-01306

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SENTRY OPERATIONAL OBJECTIVES

VISUAL RECONNAISSANCE

- MAPPING OF USSR AND SATELLITES
- * STRATEGIC WARNING INDICATIONS
 - WEAPONS AND BASES IN BEING
 - MILITARY LOGISTICS
 - INDUSTRIAL WAR CAPABILITIES
- NUCLEAR DETONATION DETECTION
- WEATHER OBSERVATION

* OPEN SKY NATIONAL OBJECTIVES

ELECTRONIC RECONNAISSANCE

- * DETECT & OBTAIN INFORMATION ON ELECTRONIC EMITTERS IN AREAS OF USSR & SATELLITES NOT NOW AVAILABLE

INFRARED RECONNAISSANCE

- * ICBM ATTACK WARNING

COMMUNICATIONS

- * SATELLITE LINKS FOR SECURE & RAPID GLOBAL COMMUNICATIONS

P 799

8/8/58

WD-58-05103

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WS 117L PROGRAM OBJECTIVES

~~SECRET~~ MAJOR DEVELOPMENT OBJECTIVES

- | | |
|--|--|
| I. ENGINEERING PROTOTYPE DEVELOPMENT & TESTS | PLACE STABILIZED SATELLITES ON ORBIT AT 300 I.M. ALTITUDE TEST RECONNAISSANCE PAYLOAD AND GENERAL SYSTEM OPERATIONS |
| II. PIONEER VISUAL RECONNAISSANCE | PROVIDE SMALL SCALE PHOTOGRAPHIC COVERAGE OF USSR SATELLITE-BORNE FILM PROCESSING; VIDEO TRANSMISSION OF PHOTO IMAGES 100 X 1200 MILE PHOTO STRIP PER PASS AVERAGE 100 FT. RESOLUTION 1 MILE TARGET LOCATION ACCURACY |
| II.A. EARLY ACHIEVEMENT OF ORBITAL CAPABILITY TEST CAPSULE RECOVERY SYSTEM | PLACE SATELLITES ON POLAR ORBIT; INCORPORATE RECOVERABLE CAPSULE IN SELECTED SATELLITES FOR BIOMEDICAL RESEARCH PURPOSES |
| III. PIONEER FERRET RECONNAISSANCE | INTERCEPT USSR ELECTROMAGNETIC EMISSIONS IN THE 30-10,000 MCS SPECTRUM RECEIVE AND MEASURE BASIC SIGNAL PARAMETERS; 50-100 MILE LOCATION ACCURACY PROVIDE GUIDANCE FOR DESIGN OF ADVANCED FERRET EQUIPMENTS |
| IV. ADVANCED VISUAL RECONNAISSANCE | PROVIDE HIGH RESOLUTION PHOTOGRAPHS OF SPECIFIC GROUND TARGETS 17 MILE SWATH WIDTH 20 FT. RESOLUTION 1/2 MILE TARGET LOCATION ACCURACY |
| V. ADVANCED FERRET RECONNAISSANCE | MORE ACCURATELY DETERMINE PARAMETERS OF ELECTRONIC SIGNALS FREQUENCY RANGE: 50-10,000 MCS |
| VI. VISUAL SURVEILLANCE | SIMILAR TO PROGRAM IV, BUT USING:
LONG DURATION POWER SUPPLY
MULTIPLE VEHICLES
HIGHER RESOLUTION
HIGH SPEED GROUND TRANSMISSION OF DATA |
| VII. INFRARED SURVEILLANCE | POSSIBLY SUBSTITUTE TV WITH TAPE RECORDING FOR FILM |
| VIII. FERRET SURVEILLANCE | PROVIDE SATELLITE SYSTEM TO FURNISH INSTANTANEOUS WARNING OF AN ICBM ATTACK LATER SATELLITE SYSTEM TO PROVIDE PRECISION AICBM DETECTION-PREDICTION DATA
SIMILAR TO PROGRAM V, BUT USING:
MULTIPLE FUNCTIONS AND FLEXIBILITY
MULTIPLE VEHICLES
LONG DURATION POWER SUPPLY
IMMINENCE OF HOSTILITIES WARNING |

P-250 (3) S 2/17/58
WD-58-00776

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P.O. BOX 1081
FORT WORTH, TEXAS

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WS117L DEVELOPMENT PROGRAM

* FLIGHT TEST SCHEDULE

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	CY 1958	CY 1959	CY 1960	CY 1961	CY 1962	CY 1963	CY 1964
	JFMAMJJASON	JFMAMJJASON	JFMAMJJASON	JFMAMJJASON	JFMAMJJASON	JFMAMJJASON	JFMAMJJASON
PROGRAM I PROTOTYPE DEV. SM 65 (8)		o o o o o					
PROGRAM II PIONEER VISUAL RECONN. - SM 65 (4)			o o o o				
PROGRAM IIA PROTOTYPE DEV. SM 75 (14)							
PROGRAM III PIONEER FERRET RECONN. - SM 65 (4)							
PROGRAM IV ADVANCED VISUAL RECONN. - SM 65 (10)							
PROGRAM V ADVANCED FERRET RECONN. - SM 65 (9)							
PROGRAM VI VISUAL SURVEILLANCE SM 65 (14)							
PROGRAM VII INFRARED EARLY WARNING - SM 65 (12)							
PROGRAM VIII FERRET SURVEILLANCE SM 65 (14)							

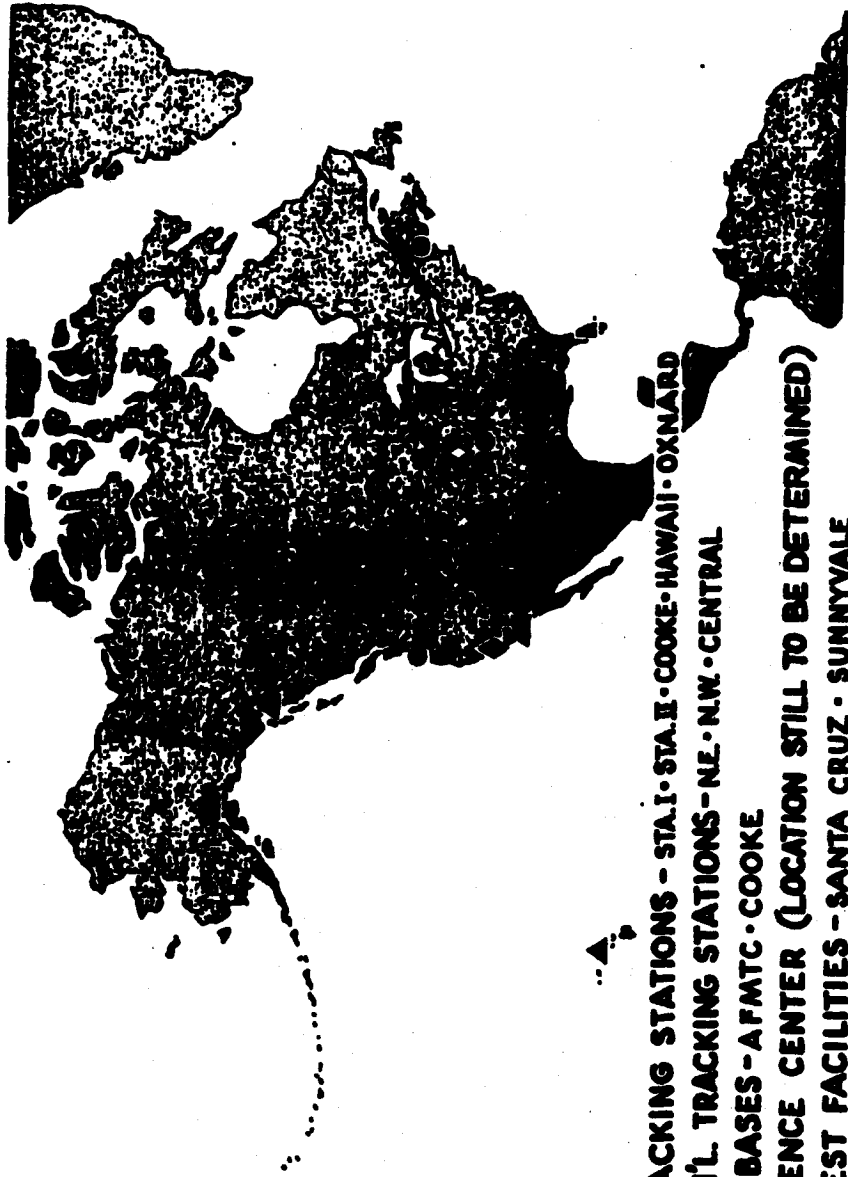
WS117L STATEMENT OF WORK, AFBMO, 16 APRIL 1958
 AS AMENDED 7 JULY 1958

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P257 (5)-57/22/66
 WD-58-02843

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SENTRY FACILITIES



LEGEND

- ▲ TEST TRACKING STATIONS - STA. I - STA. II - COOKE - HAWAII - OXNARD
- DEV./OPN'L. TRACKING STATIONS - NE - NW - CENTRAL
- ◆ LAUNCH BASES - AFMTC - COOKE
- ◇ INTELLIGENCE CENTER (LOCATION STILL TO BE DETERMINED)
- ◻ LMSD TEST FACILITIES - SANTA CRUZ - SUNNYVALE

P102 (5) 50 5/2/58
WD-58-02843

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SENTRY PAYLOAD - DEFINED

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RECONNAISSANCE MISSIONS:

- ALL SENSING, PROCESSING & STORAGE EQUIPMENT
- ALL RELATED AUXILIARY POWER SYSTEM EQUIPMENT
- ALL RELATED COMMUNICATIONS EQUIPMENT

BIOASTRONAUTIC RECOVERY MISSIONS:

- RECOVERY CAPSULE & ROCKET
- CAPSULE CARGO

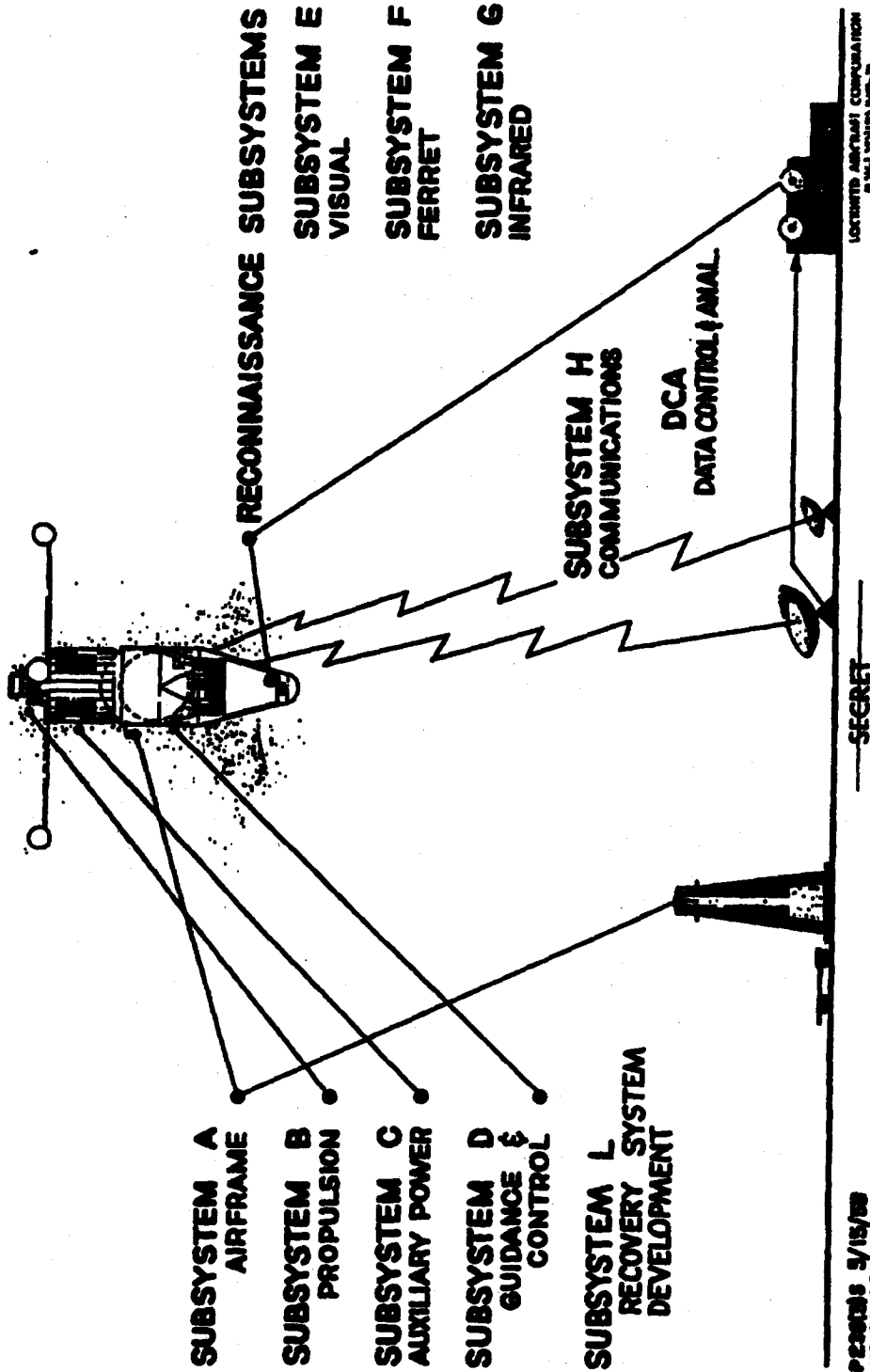
P 800 8/8/58
WD-58-03183

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FORMERLY MISSILE SYSTEMS DIVISION

THE SENTRY SUBSYSTEMS

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WS117L R&D ORGANIZATION

LOCKHEED AIRCRAFT CORP. MISSILE SYSTEMS DIVISION WEAPON SYSTEM CONTRACTOR

RESEARCH & ANALYSIS
ANTENNA DEVELOPMENT
TELEMETRY
AIRFRAME FABRICATION
CHECKOUT & ASSEMBLY
STATIC & FLIGHT TESTS

PRINCIPAL SUBCONTRACTORS

PROPULSION

- BELL AIRCRAFT CORP.
- AERONET-GENERAL CORP.

AUXILIARY POWER

- SONOTONE CORP.
- EAGLE-PICHER CO.
- ENGINEERED MAGNETICS
- HOFFMAN ELECTRONICS CORP.
- BECHCRAFT R&D INC.

GUIDANCE & CONTROL

- DETROIT CONTROLS CORP.
- REEVES INSTRUMENT CORP.
- MINNEAPOLIS-HONEYWELL REGULATOR CO.
- BENDIX AVIATION CORP.

VISUAL RECONN.

- EASTMAN KODAK CO.
- COLUMBIA BROADCASTING SYS.
- SPICA INC.
- AMPEX CORP.

FERRET

- AIRBORNE INSTRUMENTS LAB. INC.
- HALLER, RAYMOND & BROWN INC.

INFRARED RECONN.

- EASTMAN KODAK CO.
- BAIRD ATOMIC CO.
- AERONET-GENERAL CORP.
- GENERAL MILLS INC.

GROUND-SPACE COMM.

- PHILCO CORP.
- REEVES INSTRUMENT CORP.
- RADIATION INC.
- LOCKHEED AIRCRAFT SERVICES INC.
- HUGHES AIRCRAFT CO.
- TEXAS INSTRUMENT CORP.

TEST MGMT & OPERATIONS

- AERONET-GENERAL CORP.
- RALPH N. PARSONS CO.

GROUND SUPPORT EQUIP.

- OTIS ELEVATOR CO.
- CONSOLIDATED AVIONICS CORP.
- BEMCO, INC.
- STANDARD MFG. CO. INC.
- HUFFORD CORP.

BIO MEDICAL CAPSULE

- GENERAL ELECTRIC CO.
- ALL AMERICAN ENGINEERING CO.

ASSOCIATE CONTRACTORS

BOOSTERS

- DOUGLAS A/C CORP (SM-75)
- CONVAIR AERONAUTICS (SM-85)

GUIDANCE & CONTROL

- INSTRUMENTATION LAB., MIT
- GENERAL ELECTRIC CO.

AUXILIARY POWER

- THE MARTIN CO.
- ATOMICS INTERNATIONAL

DATA PROCESSING

- RAMO-WOOLDRIDGE CORP.

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P283 (5) 'S' 8/4/58
WD-58-02843

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EXCLUDED ANALYST SIGNATURE

WS 117L AIRFRAME & PROPULSION

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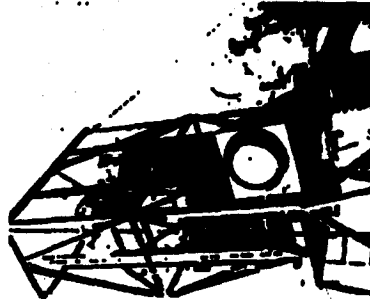
MOCK UP



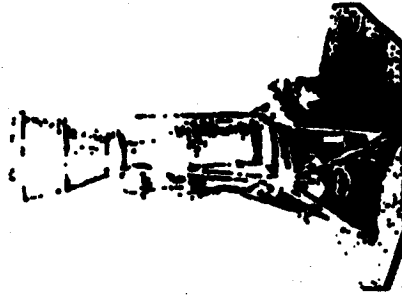
FUNCTIONAL
MOCK UP



AIRFRAME



PROPULSION
CHECK OUT



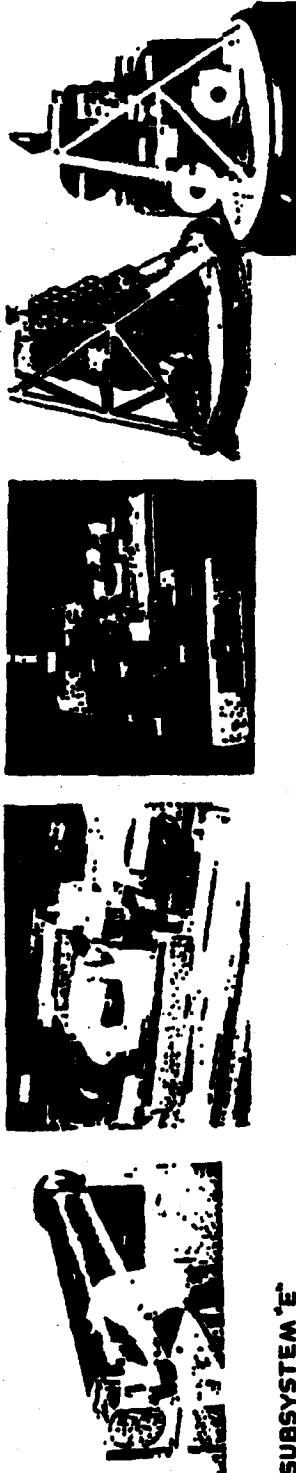
BELL ENGINE

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P 566 S 6/9/58
WD-58-09155

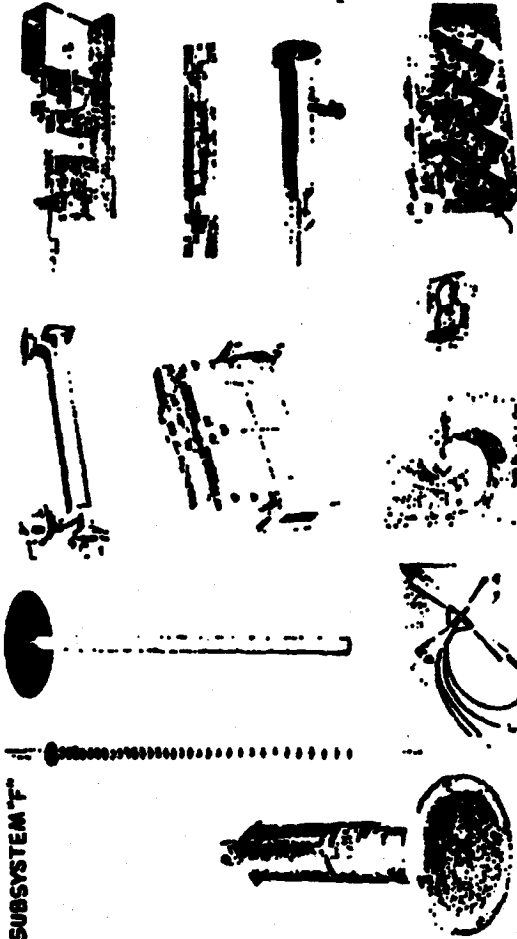
WS117L PAYLOAD

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SUBSYSTEM 'E'

SUBSYSTEM 'F'



SUBSYSTEM 'G'



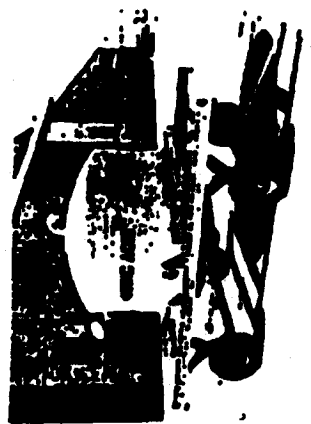
P567 S 6/3/58
WD-58-03455

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ANSI Z39-18 GROUND SUPPORT EQUIPMENT



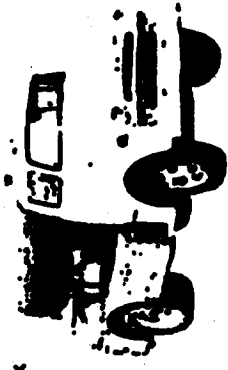
FUEL DUMP TRAILER



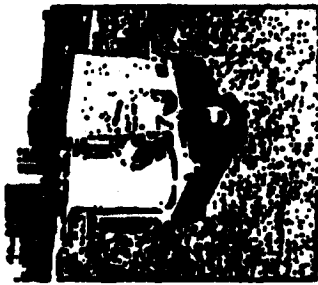
ACID DUMP TRAILER



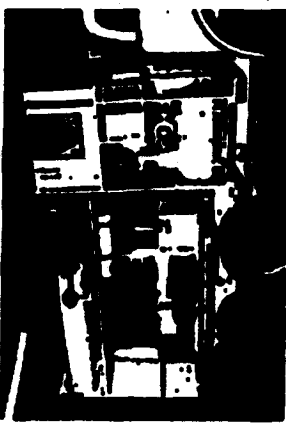
ENGINE THRUST CHAMBER FLUSHING



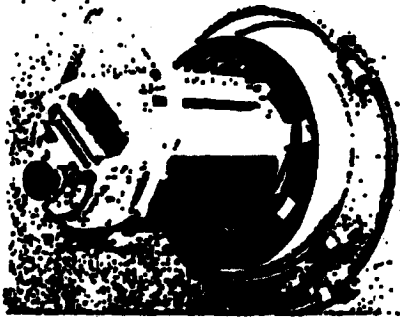
FUEL TRUCK



ENGINE FLUSHING TRAILER



ACID TRAILER AND PUSHING TRUCK



UDM LOADER



PROPULSION CHECKOUT CONSOLE MODIFIED BELL UNIT

P. 568 GSE 6/3/58
WD-58-03455

LOCKHEED FACILITIES FOR WS117L



VAN NUYS
AIRFRAME FABRICATION



SUNNYVALE
COMPONENT ASSEMBLY



PALO ALTO
PROJECT MGMT. SYSTEM DESIGN
VEHICLE MOD. & CHECKOUT

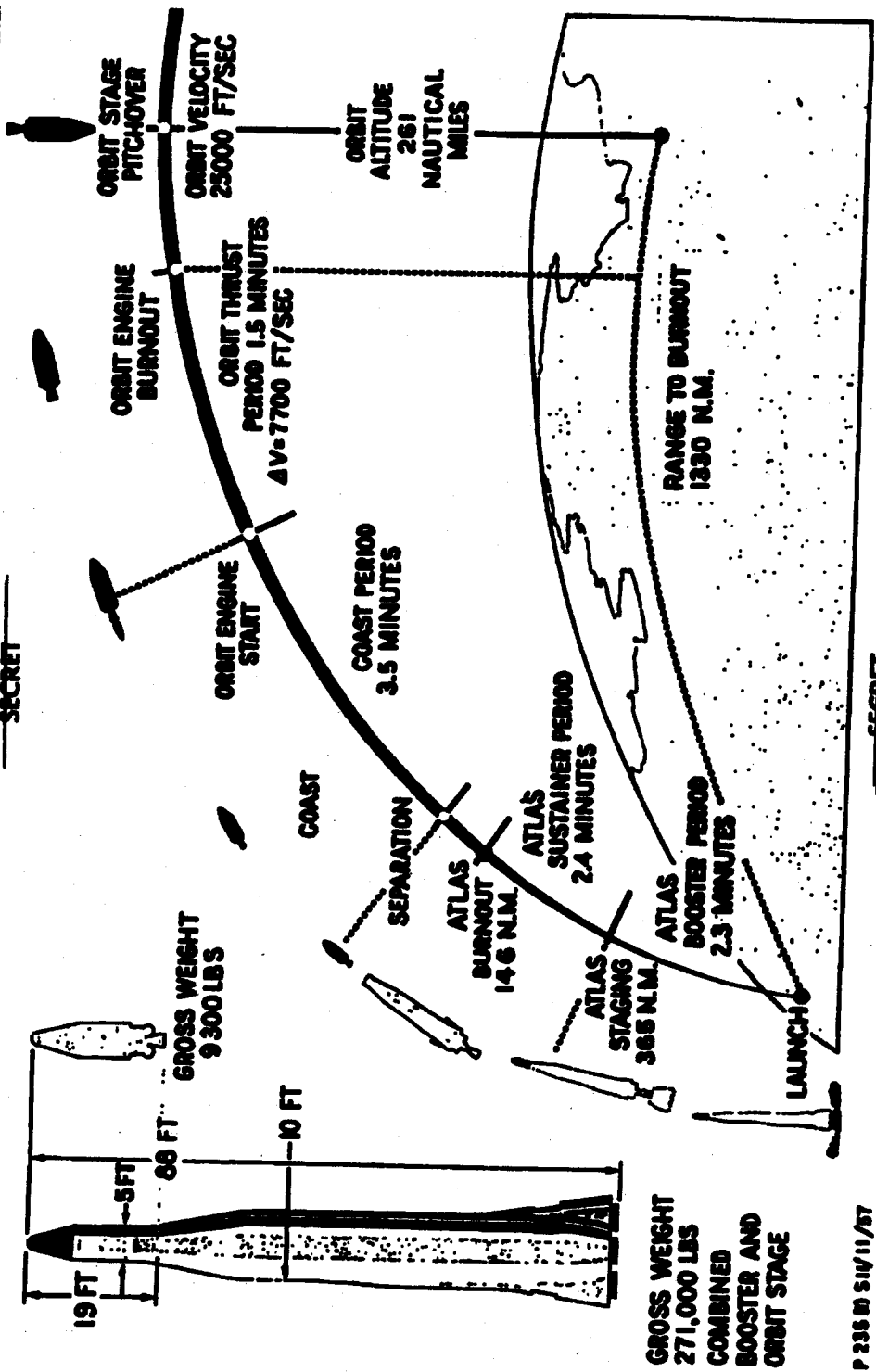


SANTA CRUZ
HAZARDOUS TEST FACILITY

P 565 SO 6/8/58
WD-58 03455

NOTE: BURBANK C-1 - COMPONENT MFG. & TEST

ATLAS-17E TRAJECTORY TO ORBIT



LOCKHEED AIRCRAFT CORPORATION
DALLAS, TEXAS

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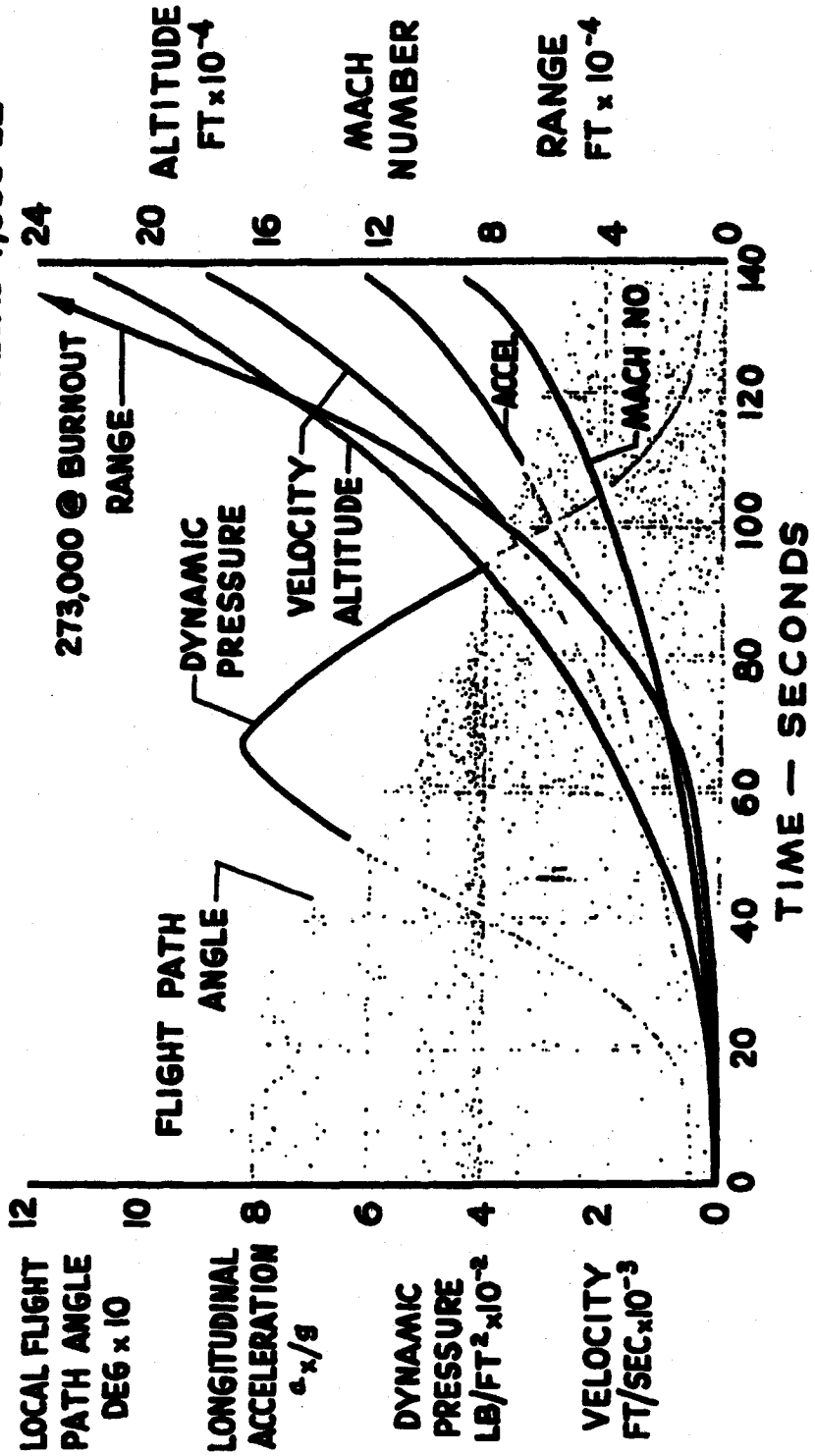
P 238 00 514 11/57

WS17L ORBITAL TEST VEHICLE DESIGN PARAMETERS

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BOOSTER STAGE

GROSS WT @ LAUNCH 27,163 LB BOOSTER PAYLOAD 9,300 LB



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P 229 (I) 58-A 3/27/58
WD-58-01388

LOCKHEED AIRCRAFT CORPORATION

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MISSILE SYSTEMS DIVISION

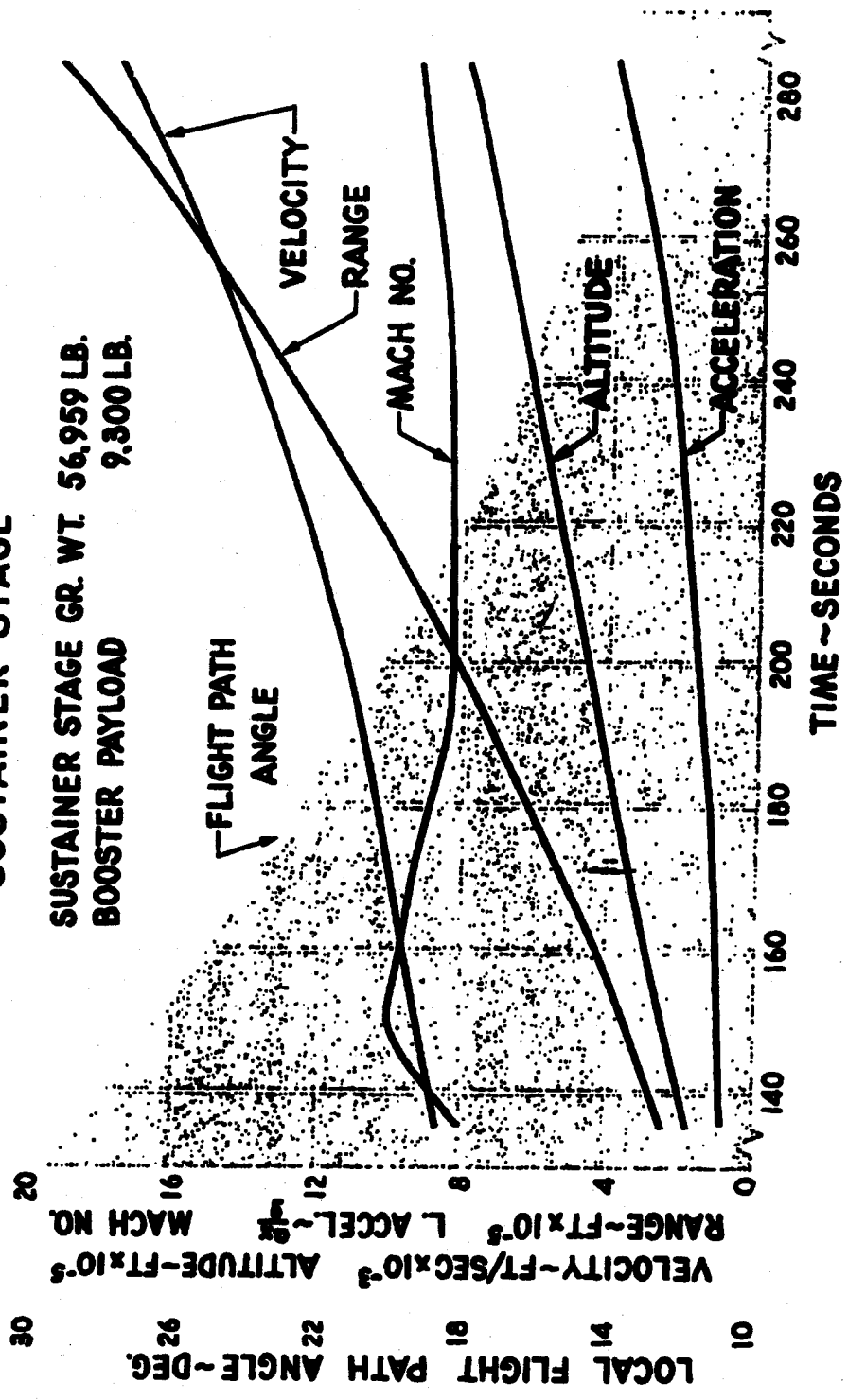
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WS117L ORBITAL TEST VEHICLE DESIGN PARAMETERS

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SUSTAINER STAGE

SUSTAINER STAGE GR. WT. 56,959 LB.
 BOOSTER PAYLOAD 9,300 LB.



P228 (1) 86'A 3/20/58
 WD-55-01266

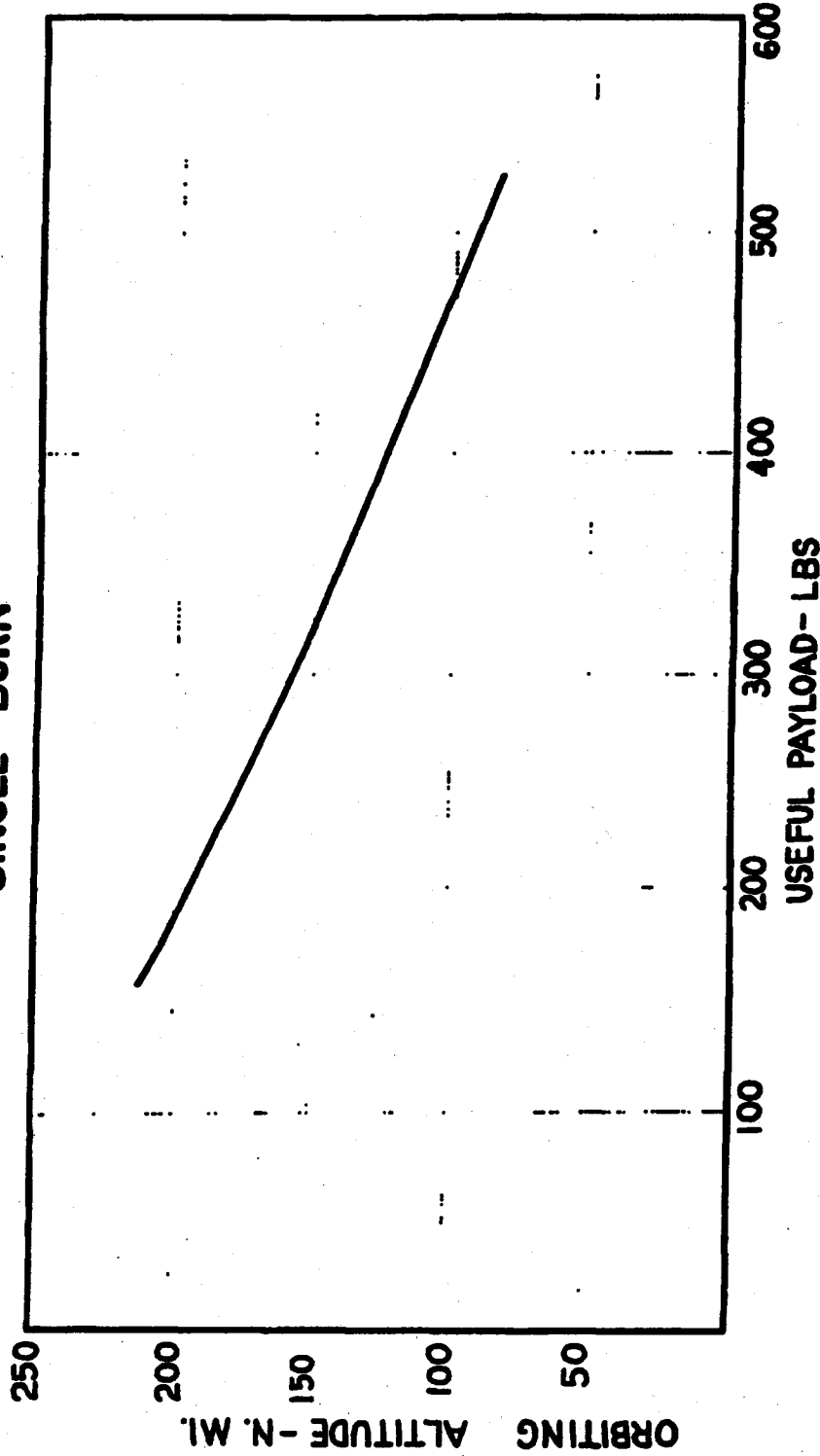
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ALTITUDE VS. PAYLOAD-SENTRY/THOR

SINGLE BURN



EXEMPT FROM GDSR, E.O. 11652

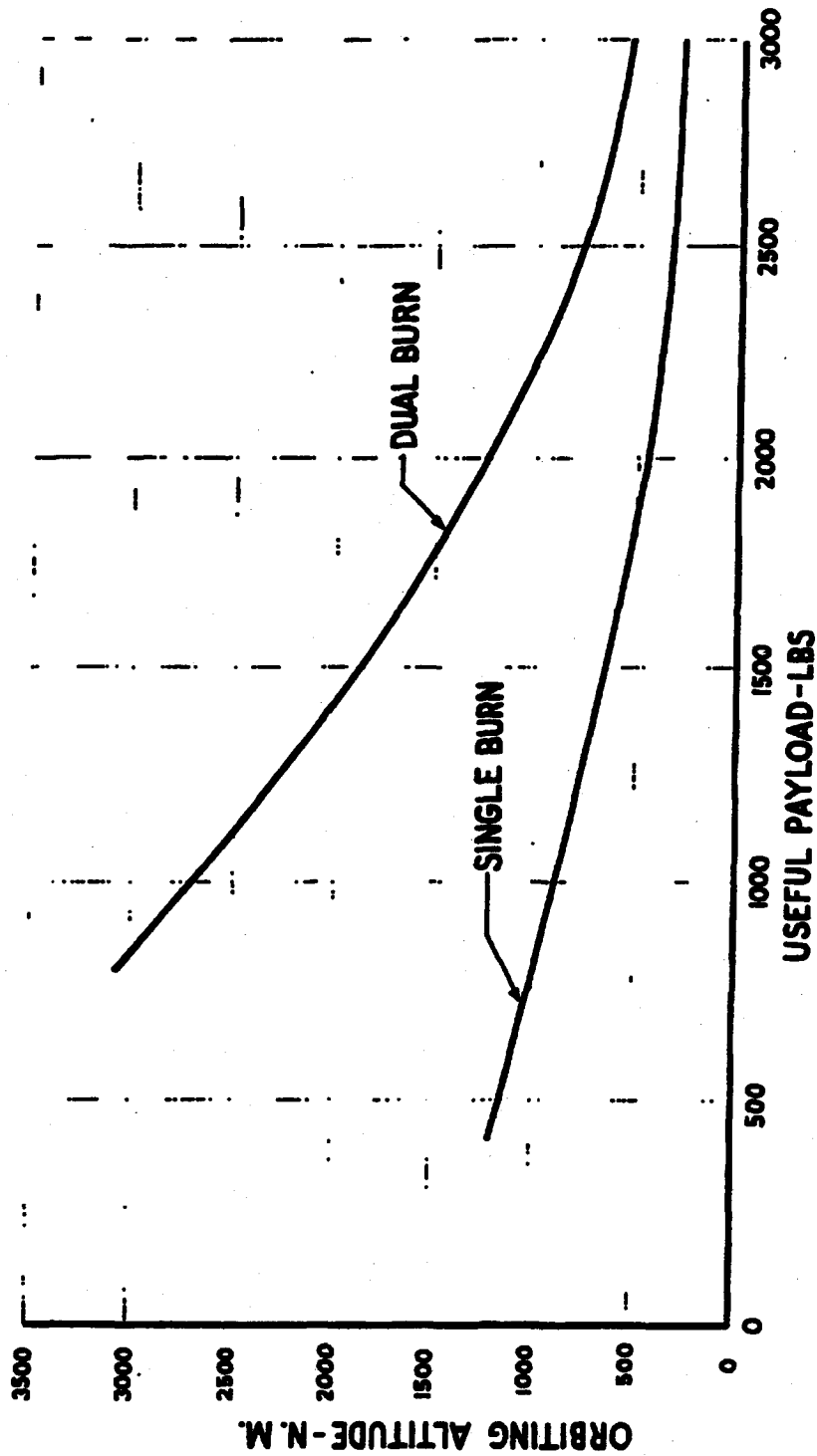
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P 792
WD-58-08183

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ALTITUDE VS PAYLOAD-SENTRY/ATLAS



IC-00111 MISSILE SYSTEMS DIVISION

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P 791
WD-58-05183

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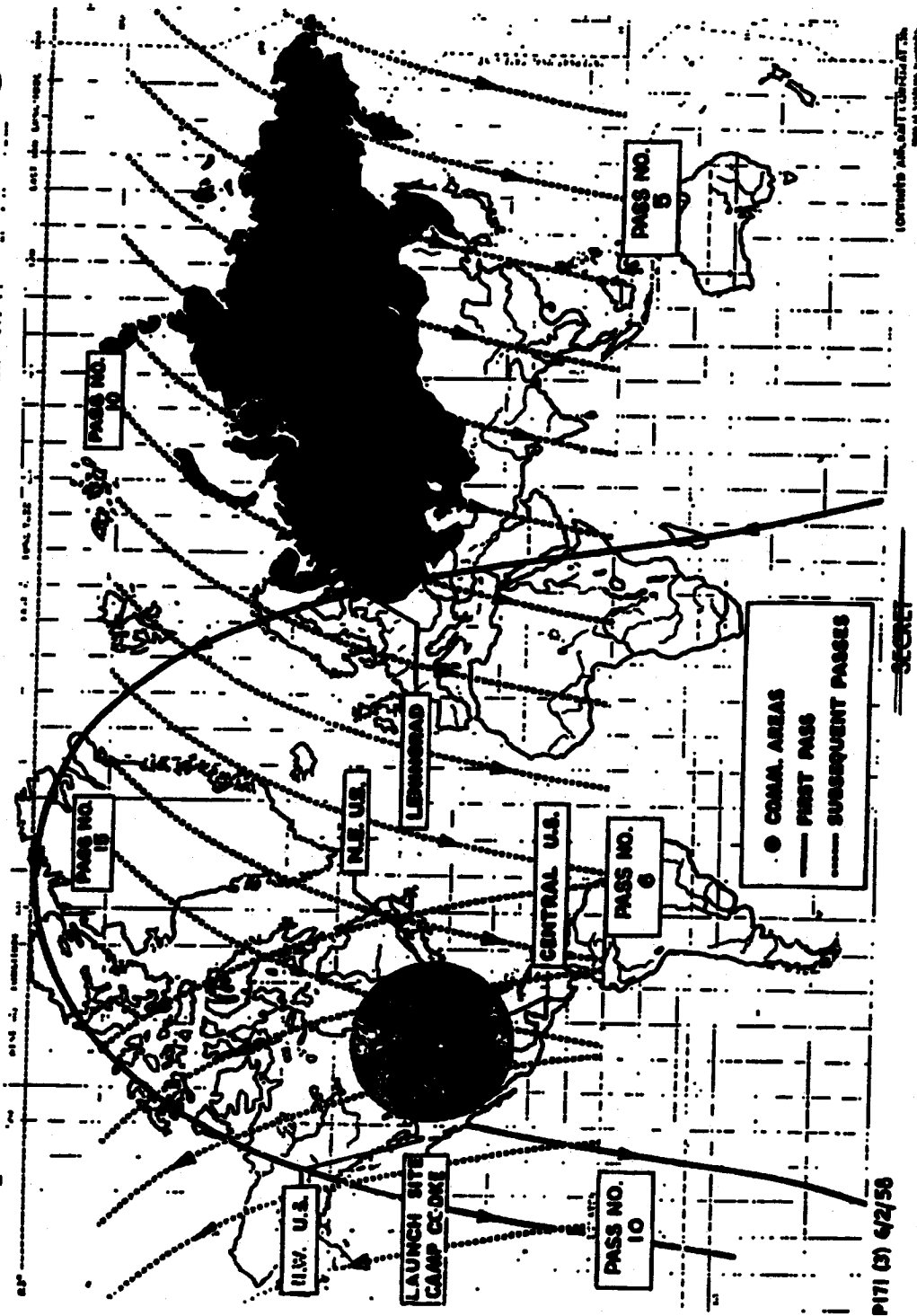
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WS 117L GROUND TRACES OF 83° ORBITS

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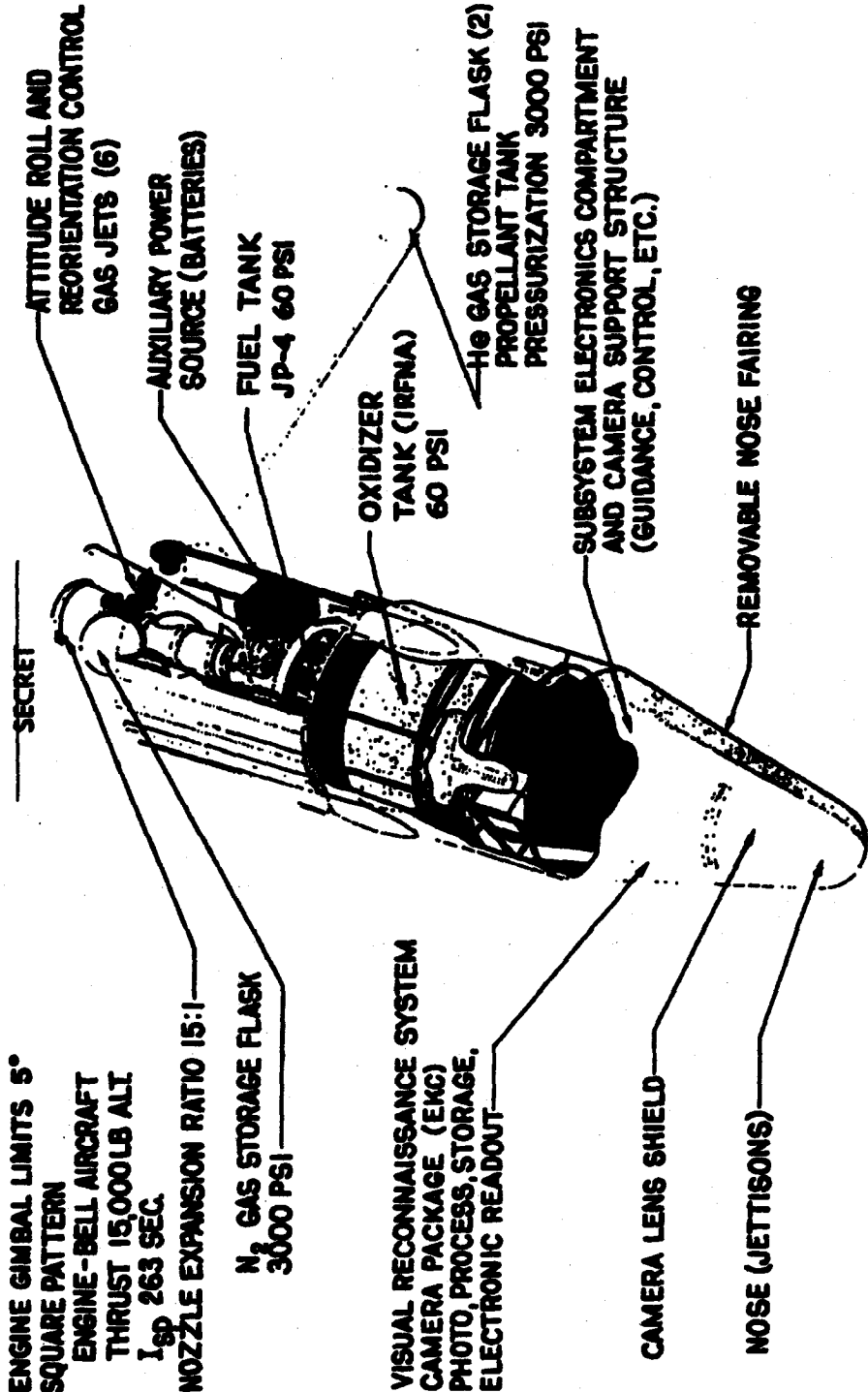
Corrected 10/15/58 (10/15/58)

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P171 (3) 6/2/58

VEHICLE

VISUAL RECONNAISSANCE MODEL



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P232 (2) SSA 5/20/58
 WD-58-00776

LOCKHEED AIRCRAFT CORPORATION
 10000 WILSON AVENUE
 TOLSON, MD 21086

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W5H7E STRUCTURAL BREAK

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- 1 MISS CAN
- 2 MISS COYL ASSY
- 3 TANK
- 4 100 PFC INBY ASSY
- 5 100 PFC INBY TANK ASSY
- 6 AT 1 NAD-ROCK ASSY
- 7 INCLAL NTR CONE ASSY
- 8 AT 1 EQUIPMENT SUPPORT STRUCT ASSY
- 9 HULL ENGINE INSTL
- 10 FILLION STAKE & BUSHING INSTL
- 11 ACQUIER ASSY
- 12 W/ EQUIPMENT RACK

P 400 (1) SS'A 6/13/58
WD-58-03455

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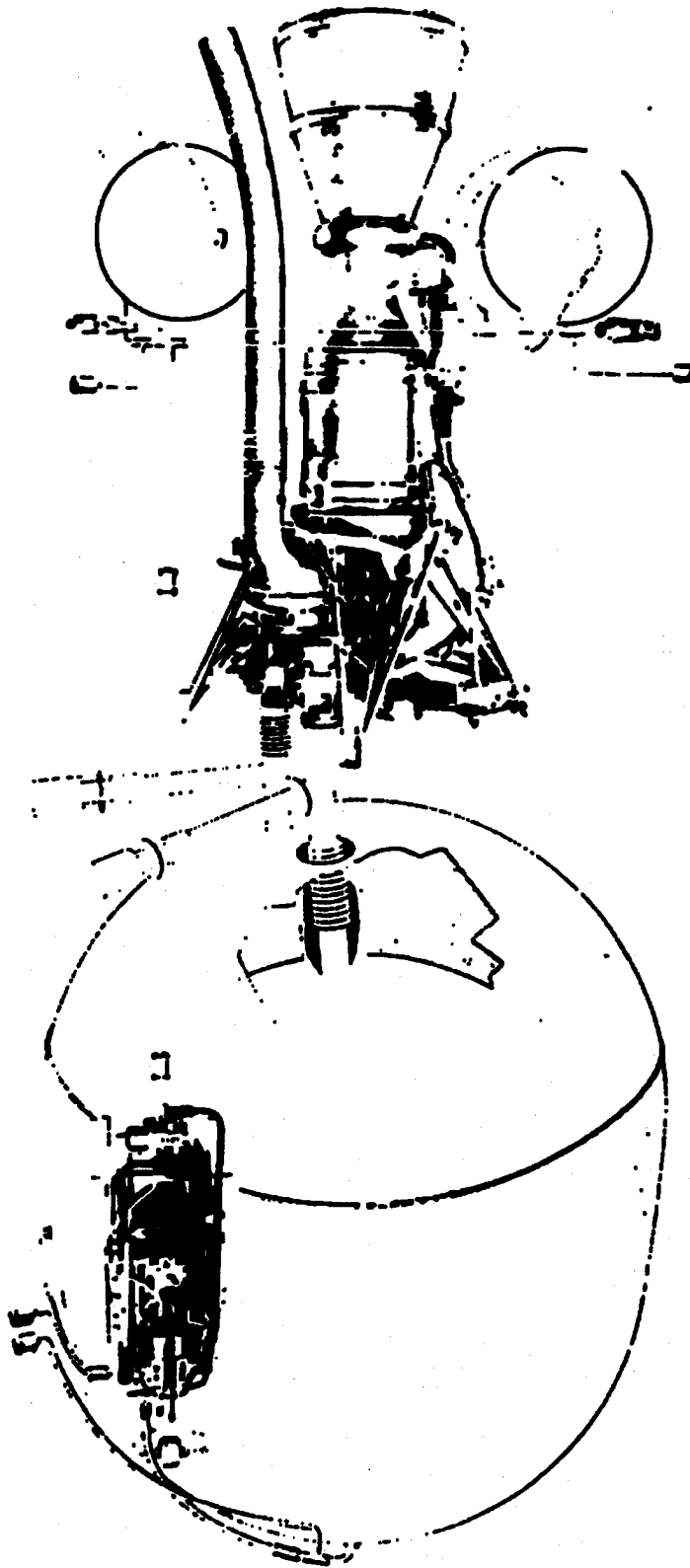
LOCKHEED AIRCRAFT CORPORATION

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MISSILE SYSTEMS DIVISION

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WS117L PROPULSION SYSTEM



ULLAGE ROCKETS

CONTROL JETS
NITROGEN SUPPLY

JP4

IRFNA

P422 (2) 55" 3/21/58
WD-58-01380

SENTRY AUXILIARY POWER SUPPLY

DEVELOPMENT PROGRAM

- CONVENTIONAL PRIMARY BATTERIES
SILVER PEROXIDE
- HIGH ENERGY BATTERY
HYDROGEN - OXYGEN
- SOLAR VOLTAIC CONVERTER
SILICON BORON DIFFUSED P-n JUNCTION
- NUCLEAR THERMOMECHANICAL
RADIOISOTOPE HEAT SOURCE
- REACTOR HEAT SOURCE

ENERGY YIELD	ADVANTAGES	DISADVANTAGES
75 WATT HRS/LB.	COMMERCIALY AVAILABLE	LOW ENERGY YIELD
180 WATT HRS. PER LB.	HIGH ENERGY YIELD	NOT DEVELOPED
200 WATT CONT. 600 LB.	OPERATES INDEFINITELY	REQ'S DEVELOPMENT TEMR CONTROL. METEORITE DAMAGE
500 WATT 200 LB. + SHIELD LIFE 60 DAYS 5 KW	LONG LIFE	HEAVY SHIELD REQUIRED
500 LB. + SHIELD LIFE 1 YEAR	LONG LIFE	HEAVY SHIELD REQUIRED

P 315 (A) 66°C 3/13/66

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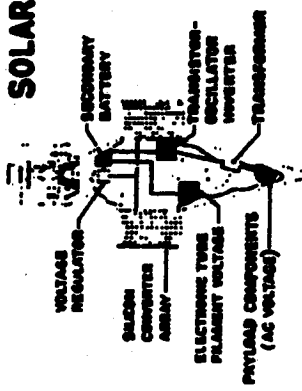
LOCKHEED AIRCRAFT CORPORATION
Missile Systems Division

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ADVANCED AUXILIARY POWER SYSTEMS

SECRET

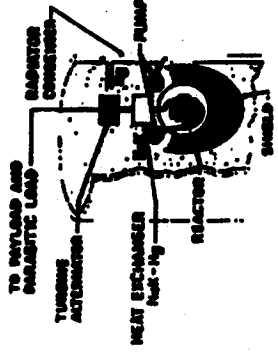
SOLAR



CHARACTERISTICS

- (1) 40-50% EFFICIENCY (10-12 WATTS/FT²)
- (2) NICKEL CADMIUM SECONDARY BATTERY OF 10 WATT-HRS/LB ~ 2500 CYCLE LIFE
- (3) POWER SYSTEM LIFE LIMITED BY BATTERY AND/OR METEORIC BURNING
- (4) TWILIGHT ORBIT ADVANTAGES: CONSTANT IRRADIATION AT NORMAL INCIDENCE, NO HELIO-TIMING, COOLER CELLS (ACTIONS BANNING) HIGHER EFFICIENCY

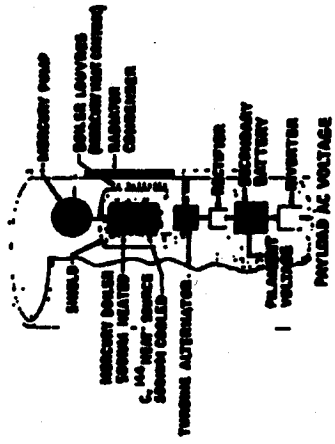
NUCLEAR REACTOR



CHARACTERISTICS

- (1) 2KW CONTINUOUSLY (LONG DURATION (~1 YEAR))
- (2) SHIELDING REQUIRED (OR SEPARATION)
- (3) PAYLOAD COMPATIBILITY PROBLEMS

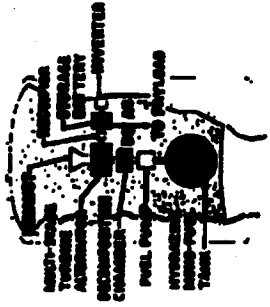
ISOTOPE



CHARACTERISTICS

- (1) 500 WATTS AT 60 DAYS
- (2) 250 WATTS AT 340 DAYS
- (3) TUBE FILAMENTS PROVIDE PARASITIC RESISTIVE LOAD FOR EXCESS POWER IN EARLY VEHICLE LIFE DURING COAST PERIODS
- (4) SHIELDING REQUIRED
- (5) TOTAL WEIGHT WITH SHIELD 700-800 POUNDS

CHEMICAL (POWER SOURCE)



CHARACTERISTICS

- (1) LIFE LIMITED BY MONOFUEL SUPPLY
- (2) EXHAUST PRODUCTS USEFUL FOR ORBIT ECCENTRICITY CONTROL
- (3) POWER LEVEL EASILY CONTROLLABLE

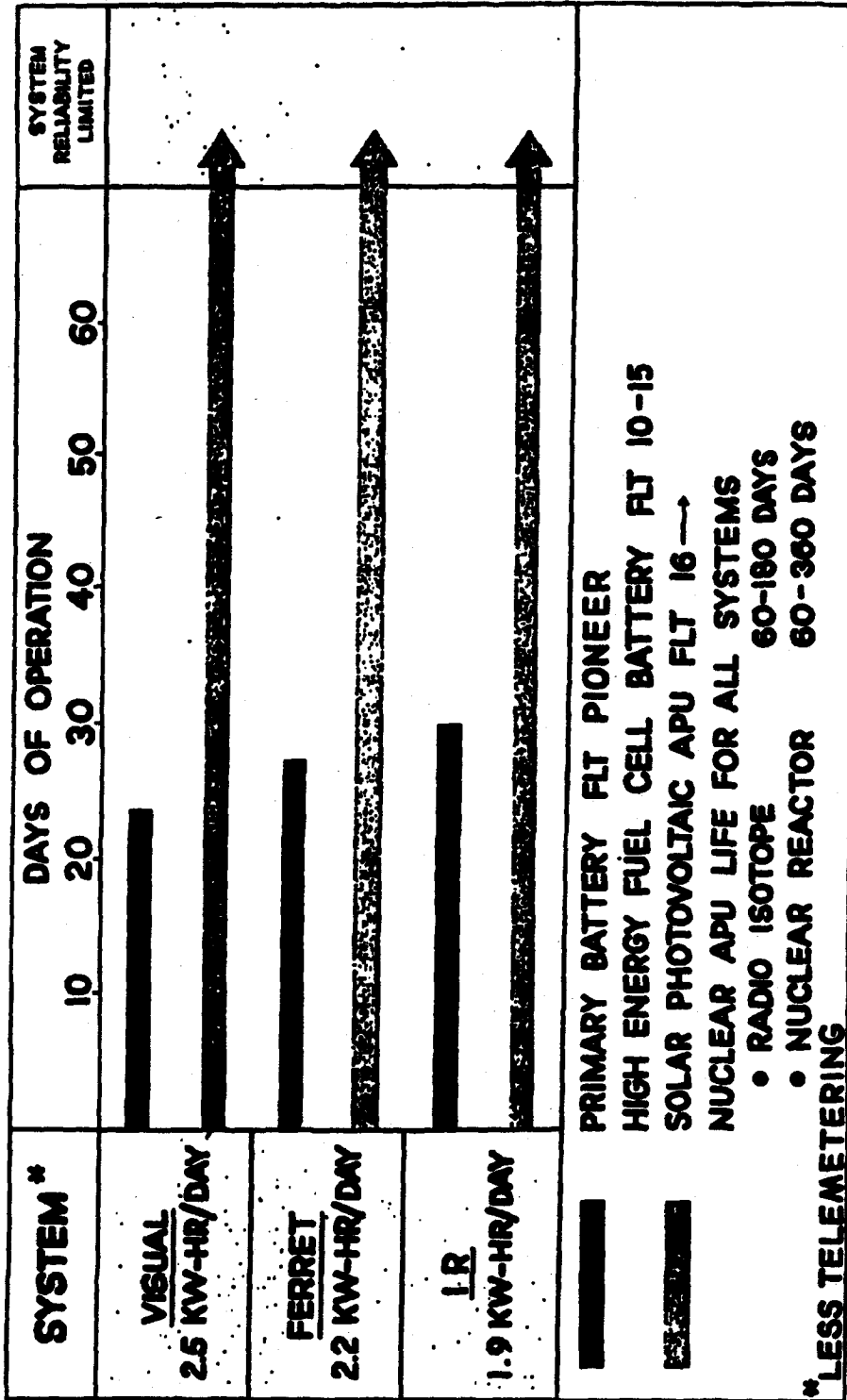
PAGE 4/10/67

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LOCKHEED AIRCRAFT CORPORATION
MAY 1967

WS-117L SYSTEM APU LIFE LIMITATIONS

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LOCKHEED AIRCRAFT CORPORATION

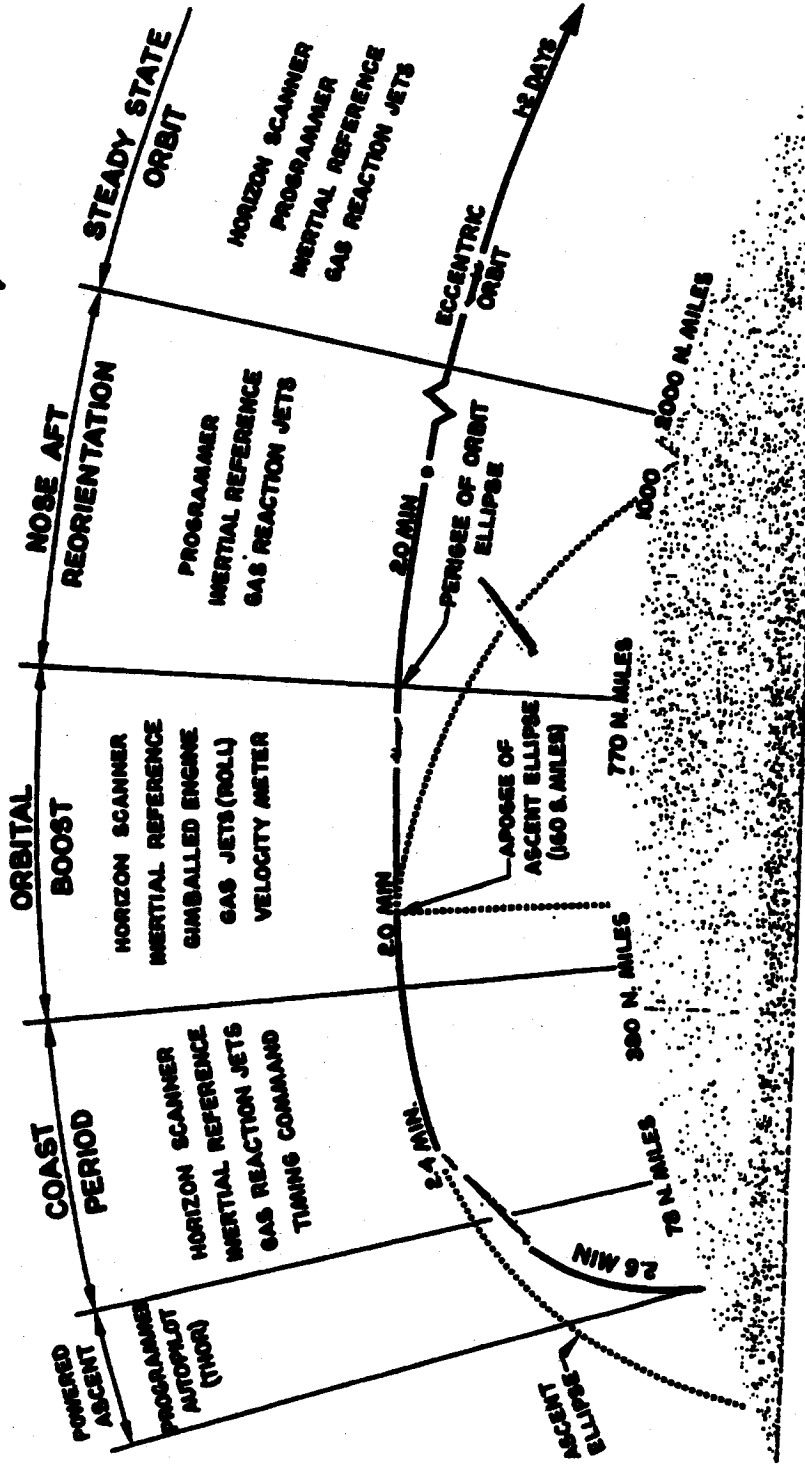
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P 338(1)55C 2/13/56
WD-56-01366

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GUIDANCE & CONTROL SYSTEM

TYPICAL SENTRY ASCENT (THOR-PROG. IIA)



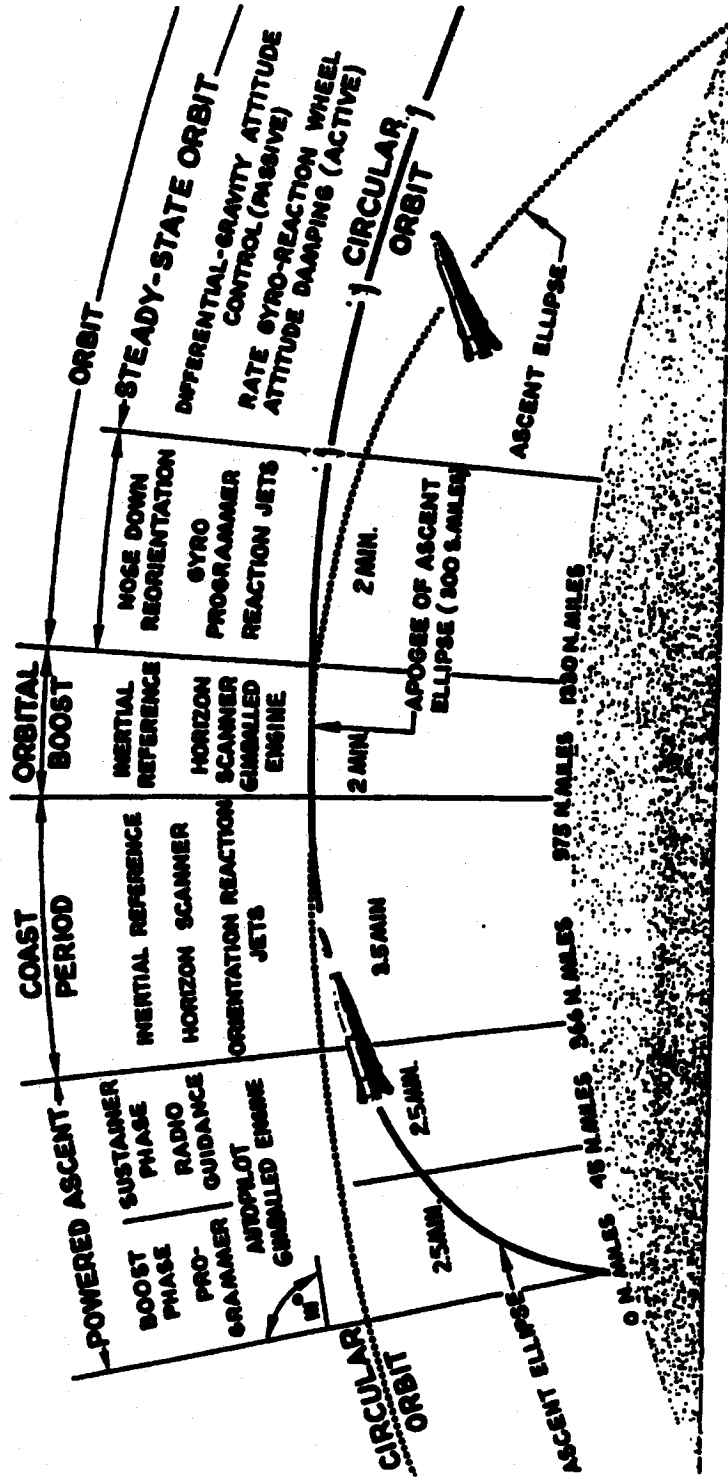
P 763 88'D' 8/4/58
WD-58-05183

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FORMER SERIAL NUMBER L-1008

GUIDANCE & CONTROL SYSTEM

TYPICAL SENTRY ASCENT (ATLAS-PROG I)

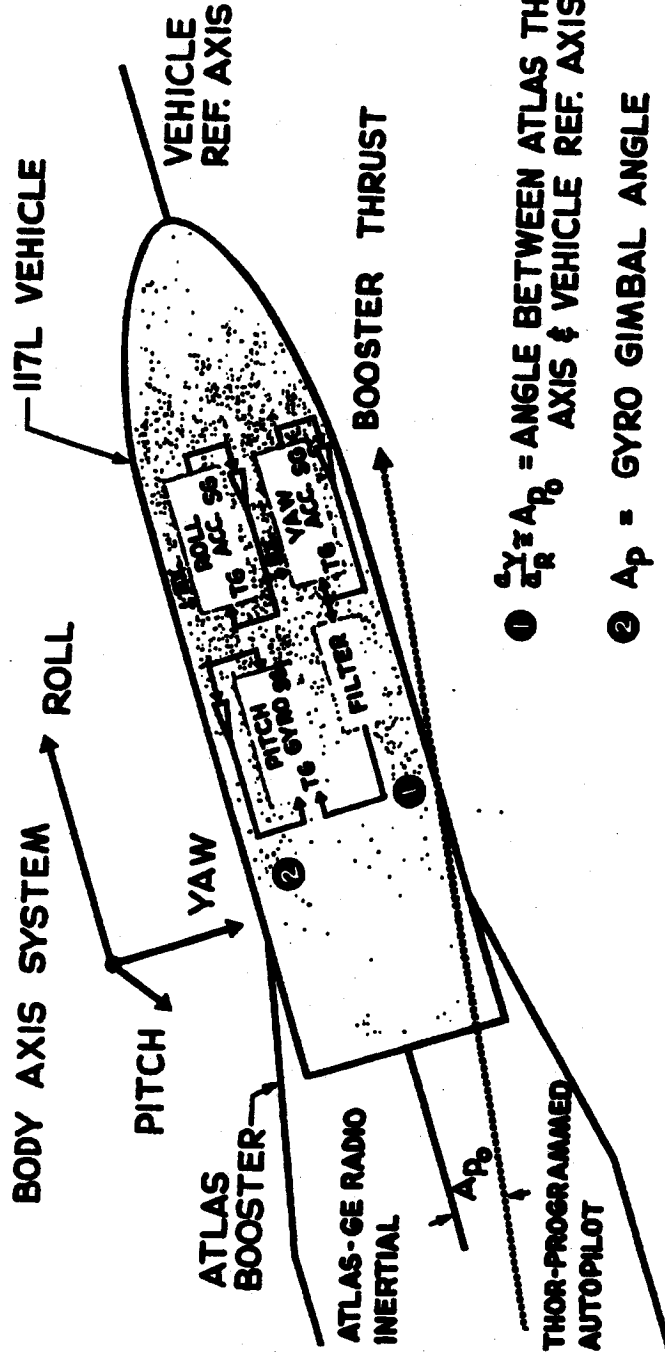


PI66 (4) SS'D' 8/4/58
WD-58-05183

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SENTRY ASCENT BOOST PHASE

GUIDANCE & CONTROL FUNCTIONING COMPONENTS



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FORMERLY MILITARY SYSTEMS GROUP

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P. 707 (1) 8870 7/25/60
WB-50-04445

LOCKHEED AIRCRAFT CORPORATION

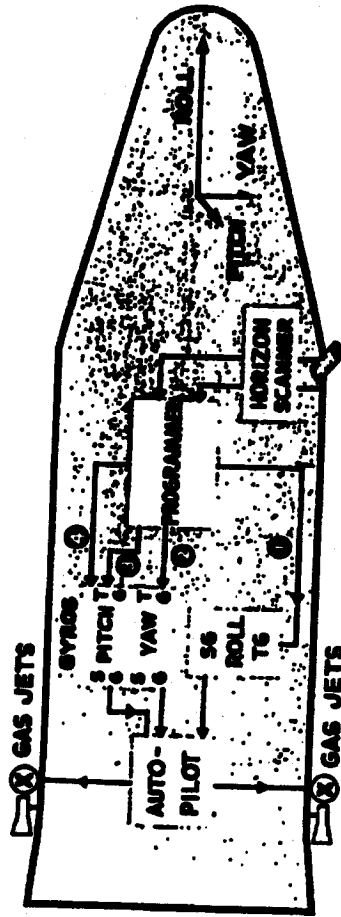
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MISSILE SYSTEMS DIVISION

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SENTRY COAST PHASE

GUIDANCE & CONTROL FUNCTIONING COMPONENTS



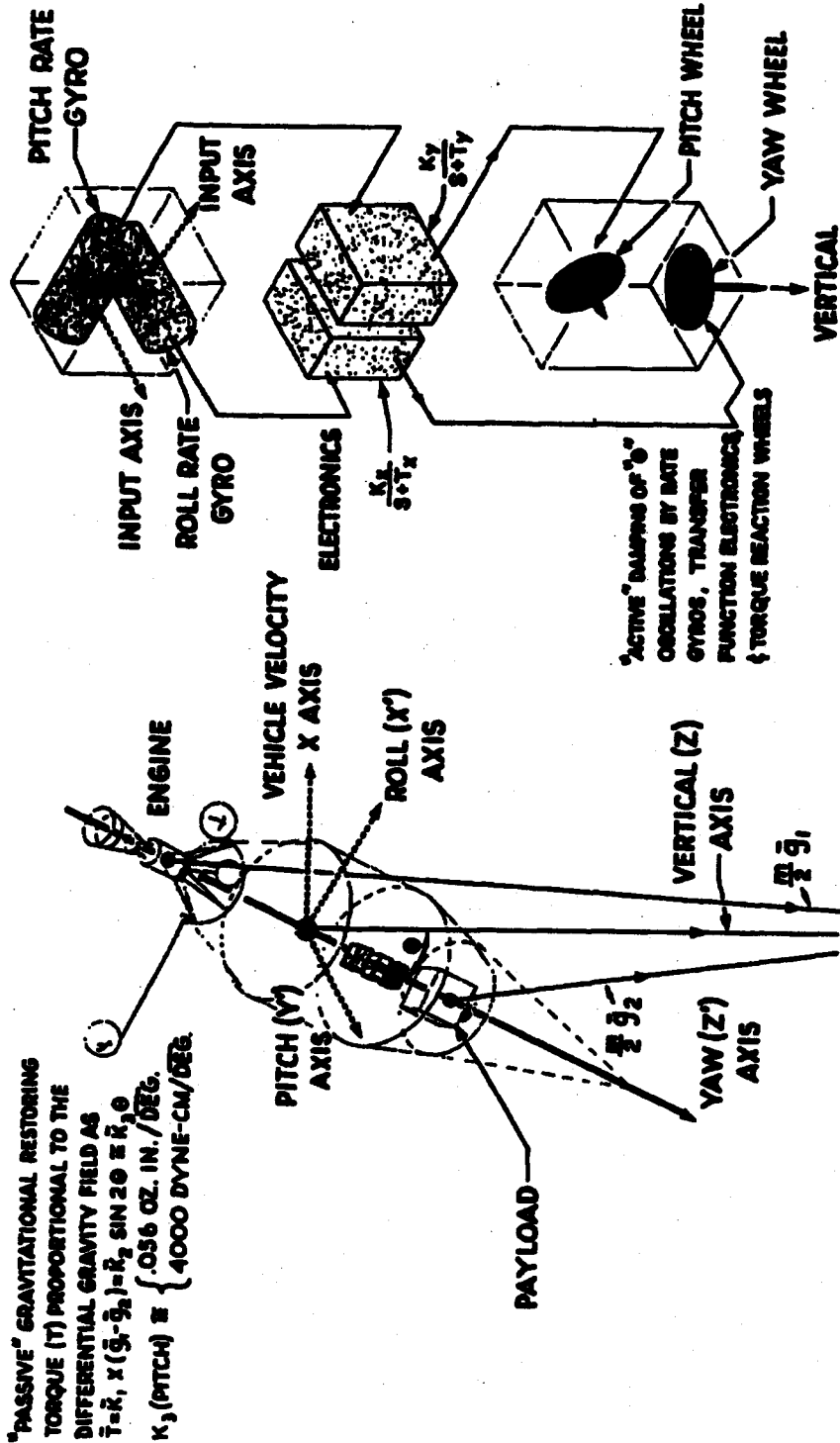
- ① HORIZON SCANNER ROLL ERROR SIGNAL
- ② YAW ANGLE RESET
- ③ HORIZON SCANNER PITCH ERROR SIGNAL
- ④ PROGRAM PITCH RATE

PROGRAMMER COMMANDS
 GYRO PACKAGE REF. ATTITUDE,
 GAS JETS VIA AUTOPILOT
 ALIGN VEHICLE ATTITUDE
 TO GYRO REF. ATTITUDE.

P 708 (1) SS "D" 7/22/56
 WP-30-01446

STEADY-STATE ORBITAL ATTITUDE CONTROL SYSTEM

(PITCH CASE - TYPICAL)



P 164 (4/8/57)
WD-58-01556

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WS117L SENTRY VEHICLE WEIGHT

	PROGRAM IIA(0) LBS.	PROGRAM I(2) LBS.
VEHICLE PAYLOAD (INCLUDES PRIMARY PAYLOAD & A.R.S. TELEMETRY, & COMMUNICATIONS)	573	3197
STRUCTURE GROUP (INCLUDES AIRFRAME & EQUIPMENT SUPT. STRUCTURE)	402	554
PROPULSION GROUP (INCLUDES ENGINE, PROPELLANT TANKS, PRESS. SYSTEM & ULLAGE ROCKETS)	593	593
CONTROLS GROUP (INCLUDES ASCENT & ORBITAL CONTROLS)	160	123
GUIDANCE GROUP (INCLUDES ASCENT & ORBITAL GUIDANCE)	100	140
VEHICLE WEIGHT EMPTY	1828	4607
PROPELLANTS	6624	4693
BOOSTER PAYLOAD	8452	9300
VEHICLE WEIGHT ON ORBIT	1776	4466

(1) UDMH-IRFNA ENGINE & LAUNCHED FROM CAMP COOKE - THOR BOOSTED NOM. CIRCULAR ORBIT
 ALTITUDE = 160 STATUTE MILES

(2) UDMH-IRFNA ENGINE & LAUNCHED FROM AFMTC - ATLAS BOOSTED NOM. CIRCULAR ORBIT
 ALTITUDE = 300 STATUTE MILES

P 262 (3) 5 7/77/58
 WD-58-04445

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WEIGHTS IN POUNDS

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WS-117L VISUAL RECONNAISSANCE SYSTEM

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TECHNICAL SUMMARY

		PIONEER	ADVANCED			PIONEER	ADVANCED
FOCAL LENGTH		6"	36"	ELECTRICAL POWER REQUIREMENTS			
LENS SPEED		f2.8	f2.8	PEAK		300 WATTS	300 WATTS
DURATION		9 DAYS	30 DAYS	AVERAGE		660 WATT HR/DAY	660 WATT HR/DAY
STRIP ON GROUND - WIDTH		100 MI.	17 MI.	SCALE ON VEHICLE FILM			
STRIP ON GROUND - LENGTH		2000 MI. AVG.	360 MI. INTERMITTENT	RESOLUTION ON GROUND AT LOW (2:1) CONTRAST		1:3,168,000	1:528,000
AREA COVERED		107 X 10 ⁷ SQ. MI.	9.9 X 10 ⁸ SQ. MI.			100 FT.	20 FT.
CAMERA WT. INCLUDES FILM & PROCESSOR		300 LB. 3.4 LB.	400 LB. (EST.) 11.4 LB.				

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FILM USED: MICROFILM EASTMAN F5740-6
 FILM RESOLUTION: 250 μ /mm HIGH CONTRAST
 > 100 μ /mm LOW CONTRAST

GROUND ENLARGEMENT 53:1 FOR USE

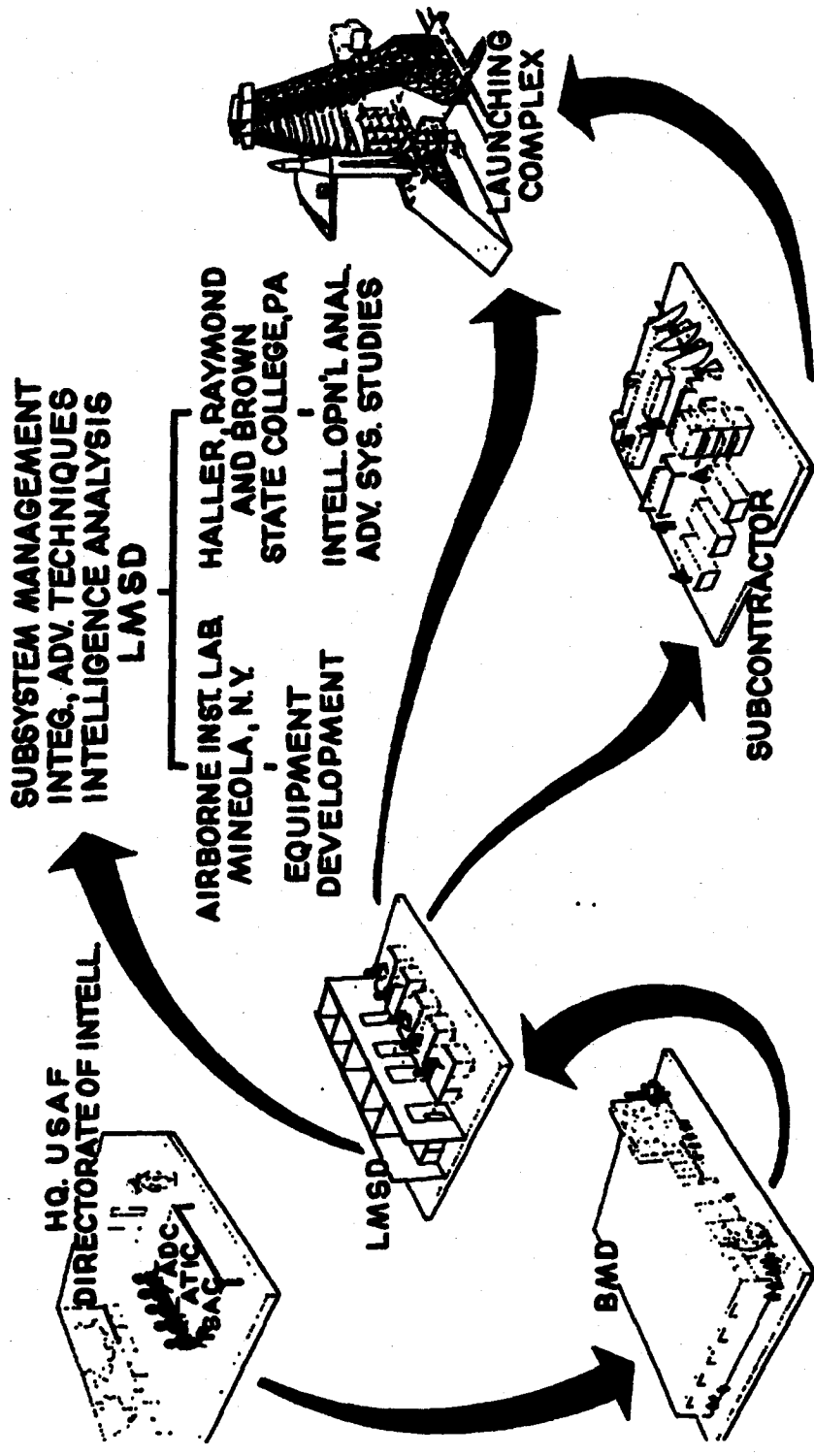
P400 55-1 12/9/57

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FORM 10-64 (REV. 11-22-54)

WS117L FERRET SUBSYSTEM-PROJECT STRUCTURE

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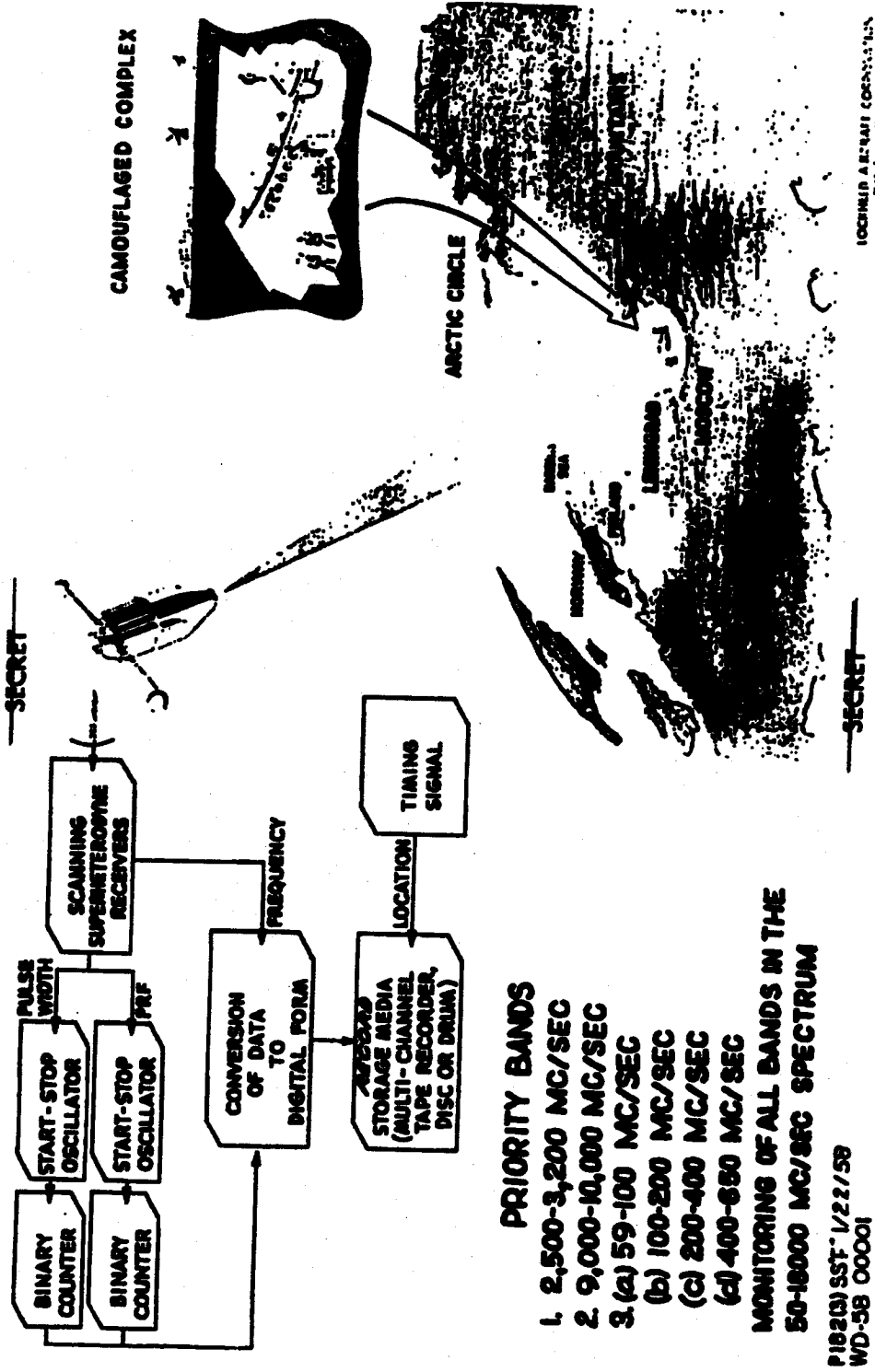


P 175 (4) 6/30/56 SS"R"
WD-56-03455

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100-44110-442-7841

AIRBORNE RECEPTION



PRIORITY BANDS

- 1. 2,500-3,200 MC/SEC
- 2. 9,000-10,000 MC/SEC
- 3. (a) 59-100 MC/SEC
- (b) 100-200 MC/SEC
- (c) 200-400 MC/SEC
- (d) 400-650 MC/SEC

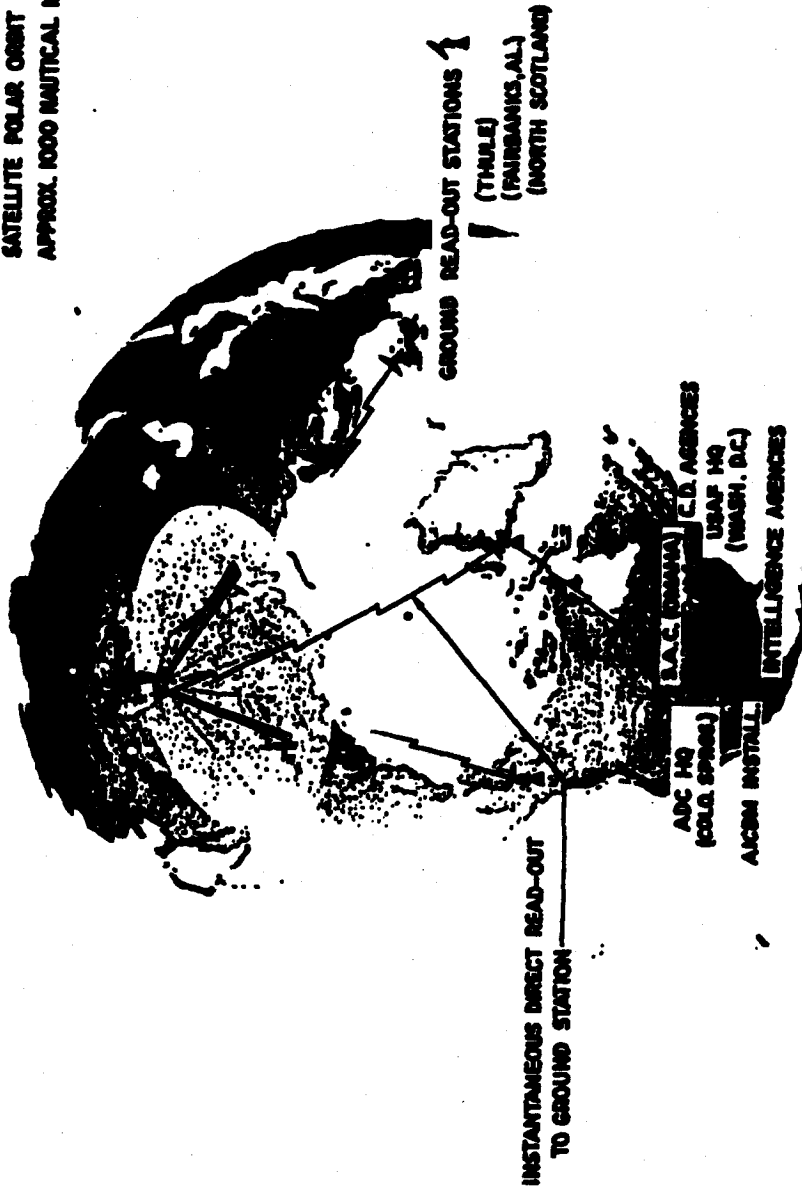
MONITORING OF ALL BANDS IN THE 50-16000 MC/SEC SPECTRUM

PIB(13) SST 1/22/58
WD-58 00001

ICBM ATTACK ALARM

~~SECRET~~

SATELLITE POLAR ORBIT ALT.
APPROX. 1000 NAUTICAL MILES



PRO-408578 5/7/58
WD-58-02943

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LOCKHEED AIRCRAFT CORPORATION
MILWAUKEE, WISCONSIN

PROPOSED ICBM ATTACK ALARM SYSTEM

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SATELLITE POWER REQM'TS VS. SUPPLY

POWER REQUIREMENTS		SOLAR POWER SUPPLY	
UNIT	WATT HR/DAY	UNIT	WATT HR/DAY
TRANSMITTER	171		
RECEIVER	117	SOLAR CELL OUTPUT	3796
DECODER	176		
TIMER & PROGRAMMER	120		
SUBSYSTEM "G"	180	LOSS: DEGRADATION, CONVERSION STORAGE, REGULATION	2548
ATTITUDE DAMPING SYST.	240	OTHER	
YAW STAB. GYRO WHEEL	96		
TOTAL REQM'T	1100	TOTAL USEFUL POWER FOR EQUIP:	1248

- 80 FT² SOLAR CELLS REQUIRED AT 1000 N. MI. ALTITUDE ON MOON ORBIT
- OVERALL PERFORMANCE FACTOR - 33%

PG0901 SC '6' 424/88
WD-88-084-85

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ICBM ATTACK ALARM SYSTEM

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VEHICLE PAYLOAD

EQUIPMENT

DESCRIPTION

BOUWERS CONCENTRIC OPTICAL SYSTEM
7-INCH APERTURE, 1.3 APERTURE RATIO
UNCOOLED LEAD-SULPHIDE DETECTORS
MODULATING RETICLE MOUNTED ON ROTATING SCANNER FRAME
TRANSISTORIZED INFRARED SIGNAL AMPLIFIERS

INFRARED

TRANSMITTER & MODULATORS
COMMAND RECEIVER
DECODER
TIMER/PROGRAMMER
4 QUADRANT RECEIVING ANTENNAS
TRANSMITTER ANTENNA

COMMUNICATIONS

SOLAR ENERGY COLLECTOR CELLS
400 CYCLE INVERTER
2000 CYCLE INVERTER
28V DC REGULATOR
NICKEL - CADMIUM BATTERY

AUX. POWER

P620 (1) 886' 6/4/58
WD-58-03455

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LOCKHEED AIRCRAFT CORPORATION

PROPOSED ICBM ATTACK ALARM SYSTEM

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OPERATIONAL GROUND BASE REQUIREMENTS

1. LAUNCH SITE - COOKE AIR FORCE BASE
 - LAUNCH PADS THREE
 - GRND. SUPP. EQUIP. THREE SETS
 - ASSEMBLY HANGARS ONE

2. TRACKING STATIONS - NORTHWEST, NORTH, & SOUTH CENTRAL
 - SAME UHF INSTALLATIONS AS PROGRAMS I, II, & III
(IF VHF IS UTILIZED, ADDITIONAL EQUIPMENT REQUIRED)

3. READ OUT STATIONS - THULE, GREENLAND, FAIRBANKS, ALS, N. SCOTLAND
 - THREE 60 FT. TRACKING ANTENNAS FOR IR DATA & TELEMETRY RECEPTION.
 - THREE DATA LINK & THREE TELEMETRY RECEIVERS.
 - TWO DIRECTION FINDERS & TWO COMMAND TRANSMITTERS WITH ANTENNAS.
 - THREE SETS OF DISPLAY CONSOLES & CONTROL CONSOLES.
 - MASTER CONTROL CONSOLE, DATA RECEIVERS, ORBIT TRACKING PROGRAMMER.

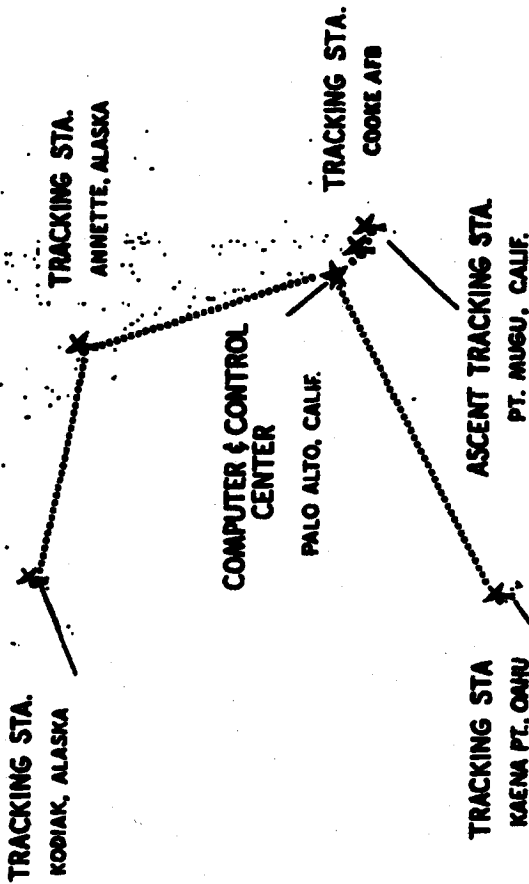
P 617 (2) 55 '6' 01/4/58
WD-58-034-55

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FORMERLY A SECRET DOCUMENT

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STATION LOCATIONS (THOR)



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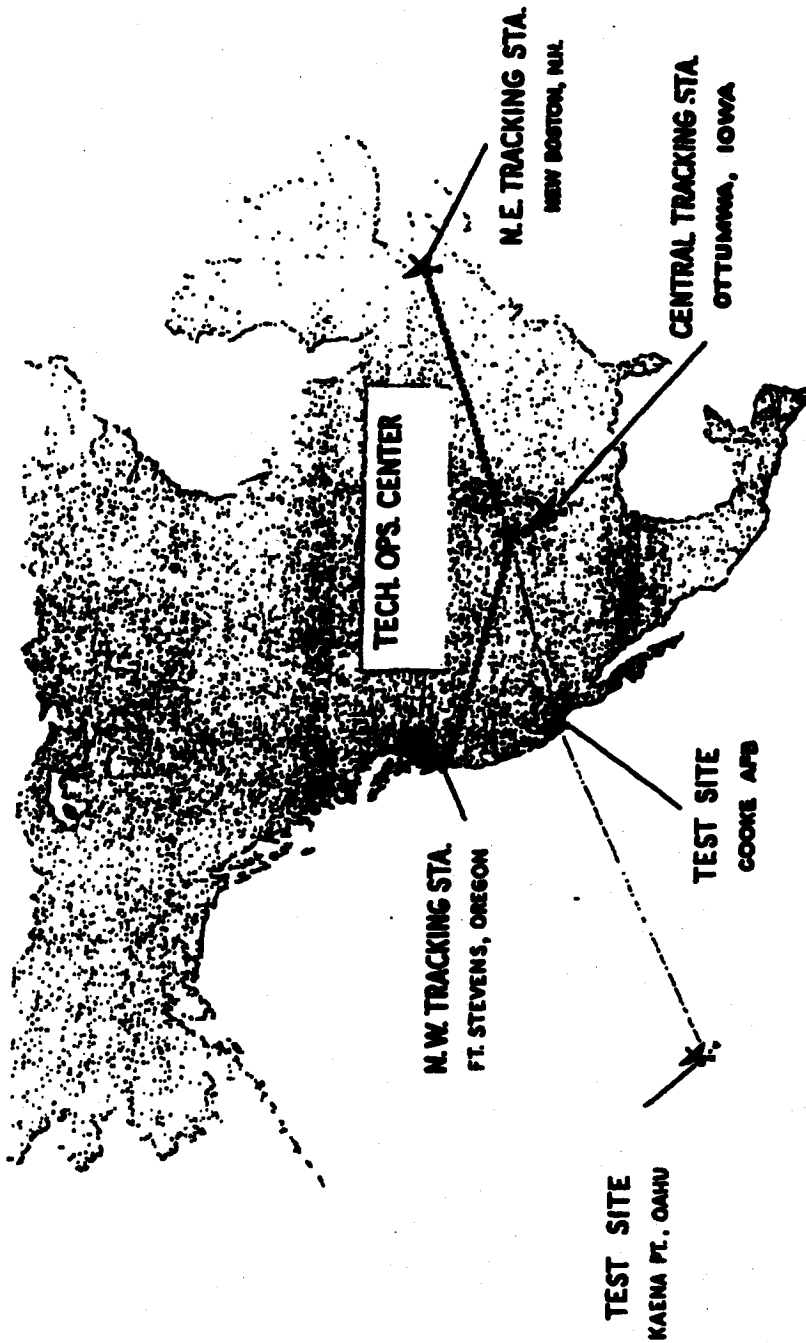
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P 009 00 20 "11" 7/4/78
WB-20-01118

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STATION LOCATIONS (ATLAS)



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P 215 08 25 17 7/7/70
WB-22-04445

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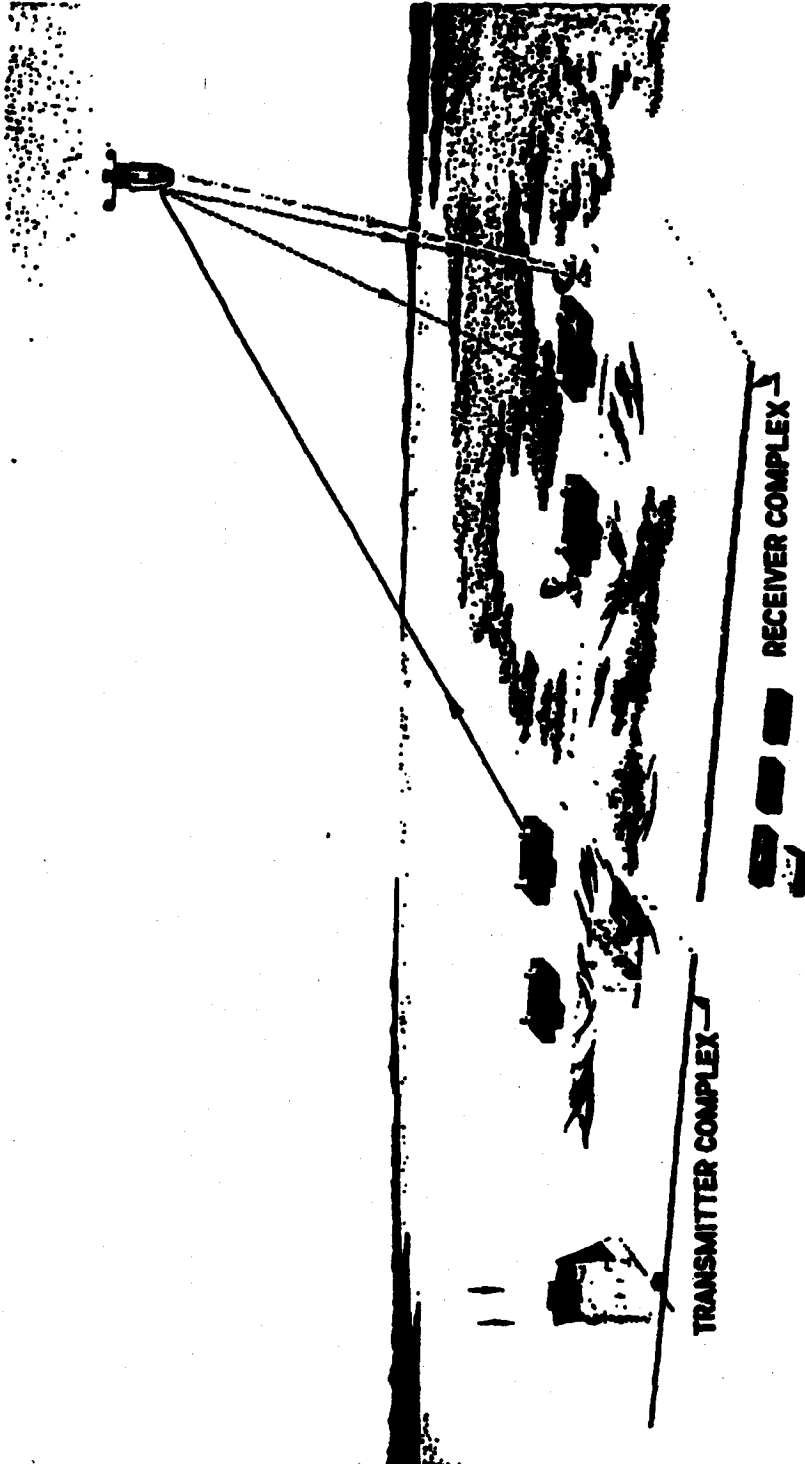
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G-S COMMUNICATION INTERCEPT STATION

~~SECRET~~



LOCKHEED AIRCRAFT CORPORATION
100-10000000000

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P 163(2) SS-H 7/10/57

LOCKHEED AIRCRAFT CORPORATION

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ORBITING OBJECT-TRAFFIC INTELLIGENCE

~~SECRET~~

- ● ● IDENTIFY & TRACK VEHICLES ENTERING ORBIT
ATTACK ALARM SYSTEM
PRECISION TRACKING & PREDICTION SYSTEM
- ● ● MAINTAIN DATA ON ACTIVE U.S. VEHICLES
BEACON TRACKING
ORBIT PREDICTION
- ● ● MAINTAIN DATA ON INACTIVE U.S. VEHICLES
SKIN TRACKING (VISUAL & IR TRACKING)
ORBIT COMPUTATIONS
- ● ● MAINTAIN DATA ON FOREIGN VEHICLES
SKIN TRACKING (VISUAL & IR TRACKING)
RAPID ORBIT & TRAJECTORY COMPUTATIONS

P540 GDC 5/12/58
WD-58-02843

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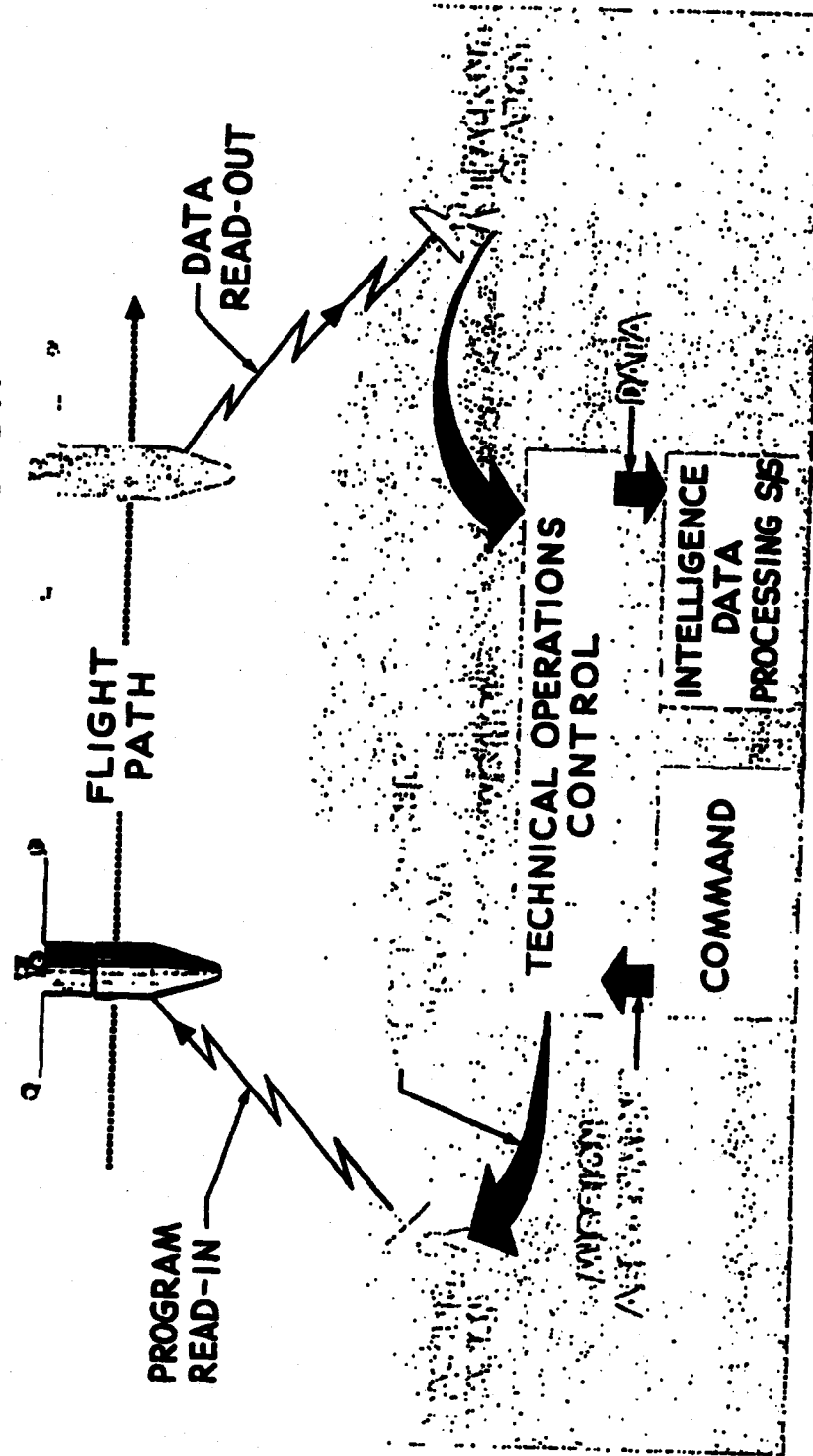
LOCKHEED AIRCRAFT CORPORATION

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MISSILE SYSTEMS DIVISION

WS117L DATA CONTROL

RECONNAISSANCE MISSION



SECRET

RECONNAISSANCE MISSION

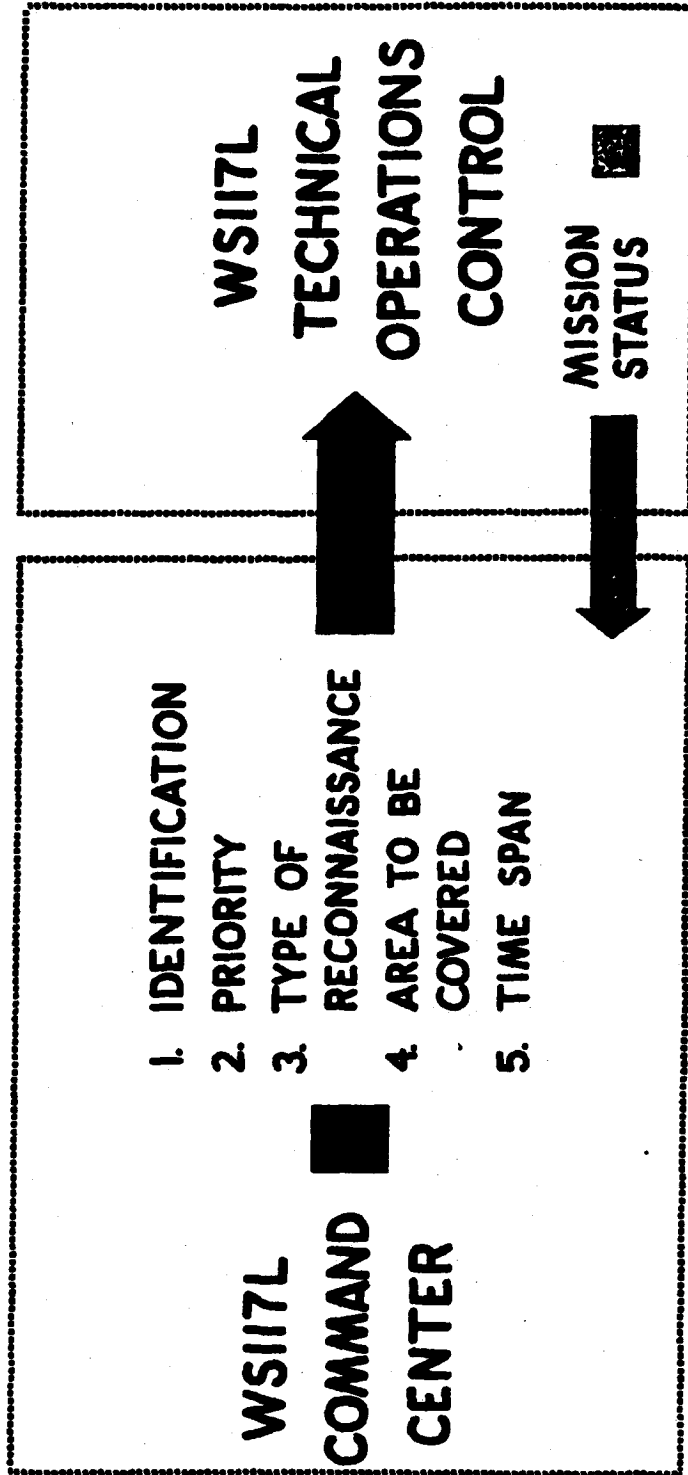
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P-864 DCA 7/11/78
WD-88-04445

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WSII7L DATA CONTROL

RECONNAISSANCE MISSION ASSIGNMENT



RECONNAISSANCE MISSION ASSIGNMENT

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P-683 8CA 7/11/58
WD-58-0444E

~~SECRET~~

WS117L DATA CONTROL

DATA INDEXING

TRACKING DATA 

ATTITUDE 

VEHICLE TIME DRIFT 

~~INTELLIGENCE DATA INDICES~~ 

DATA
CONTROL
OPERATIONS

PERFORMANCE DATA

CALIBRATION DATA

PERFORMANCE STANDARDS

P-652 (1) 5 7/22/50
WD-50-04445

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CONTROL MODEL SYSTEM DESIGN

~~SECRET~~

WS 117L/SM-75 PROGRAM OBJECTIVES

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PRIMARY

- LAUNCH OF WS 117L/SM-75 COMBINATION
- ACHIEVEMENT OF ORBIT
- DEVEL. WS117L AIRBORNE & GROUND SYSTEMS
- DEVEL. OF GROUND/SPACE COMMUNICATIONS

SECONDARY

- RECOVERY
- AEROMEDICAL MEASUREMENTS
- G. R. D. MEASUREMENTS

P-465 SO 324/58
WD-58-01888

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LOCKHEED AIRCRAFT CORPORATION

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MISSILE SYSTEMS DIVISION

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FLIGHT MISSIONS & OBJECTIVES

PROGRAM II A

NOM. CIRCULAR ORBIT	EMPTY	NOZZLE		
FLY ENERGY ALT.	WT ON ATT.	PAYLOAD	FUEL	EXP. RATIO
S. AL.	ORBIT			FLY. OBJECTIVES

	225	1275	VERT.	JP4/IRFNA	14.85:1	PHASE A
1						ENGINEERING TESTS
2	190	1359	"	"	"	PHASE A ENGINEERING TESTS
3 & 4	145 ($M_p = 140$ S.M.L.C. = .02 163° LAUNCH AZIMUTH)	1547	HORIZ.	"	"	BIO-MEDICAL EXPERIMENT
5-7-9	240	1458	"	UDMH/IRFNA	20:1	PHASE B ENGINEERING TESTS
6-8 & 10 THRU 14	160 ($M_p = 140$ S.M.L.C. = .02 180° LAUNCH AZIMUTH)	1649	"	"	"	BIO-MEDICAL EXPERIMENT

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WD-50-00445

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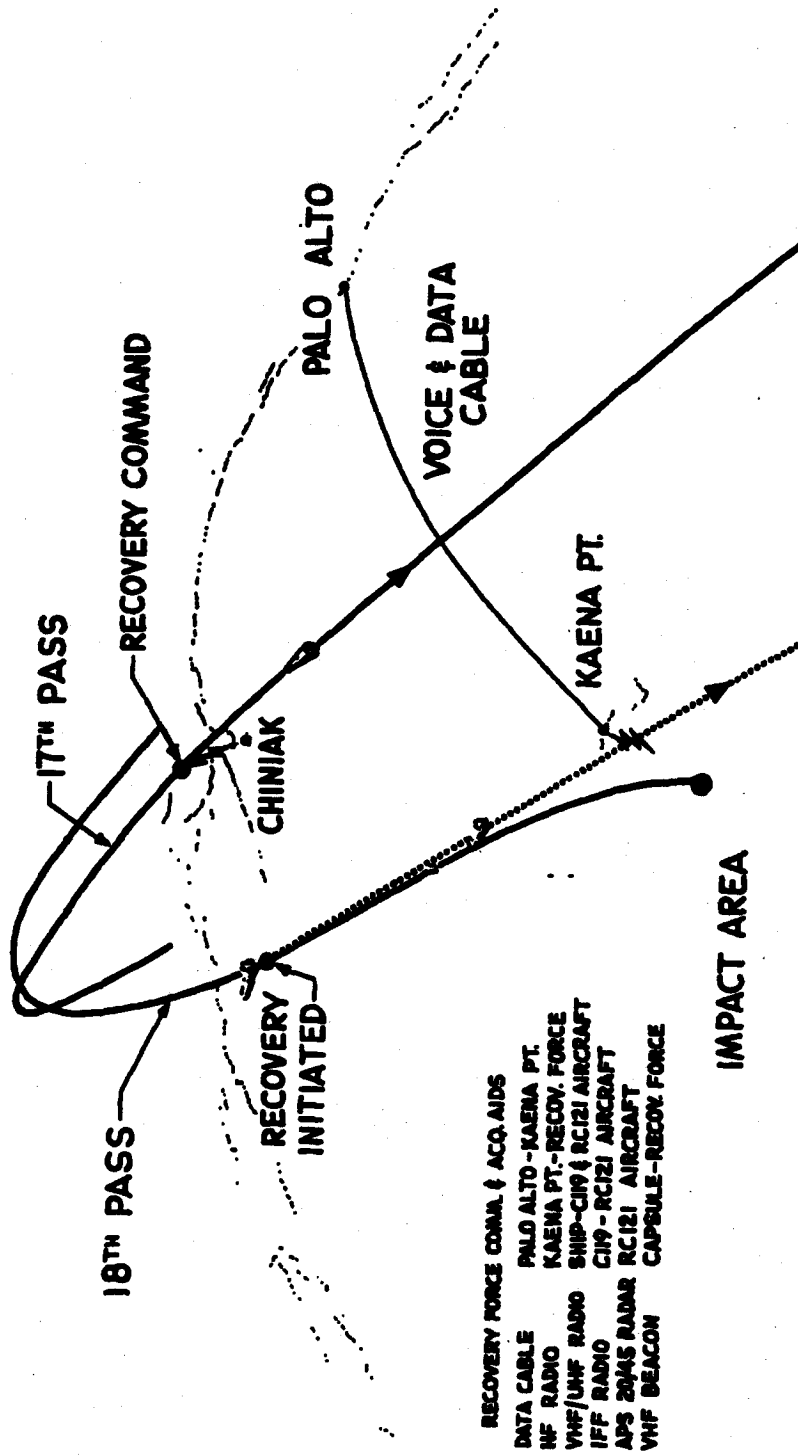
FORM 100 (REV. 1-55)

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WS117L RECOVERY ORBITS

PROGRAM IIA



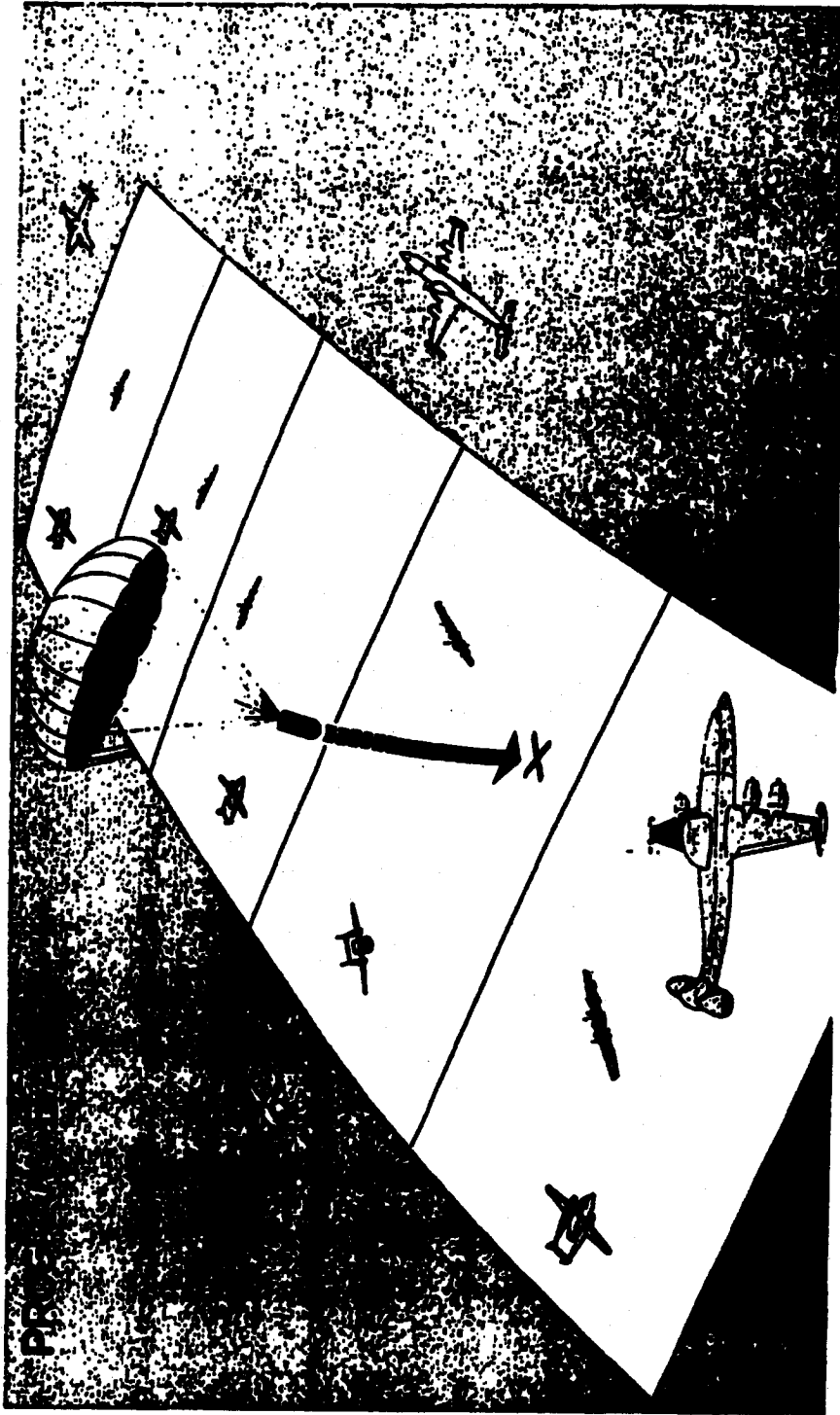
P639 50 7/7/56
WD-55-04445

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WD-55-04445 (1 of 1) (1 of 1)

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SENTRY RECOVERY OPERATIONS



LOCKHEED AIRCRAFT CORPORATION
MILWAUKEE, WISCONSIN 53212

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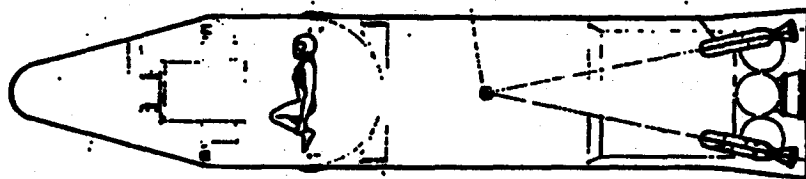
PAGE 02 20 6/24/58
WD-58-08485

WS117L AERO-MED RECOVERY CONFIGURATIONS

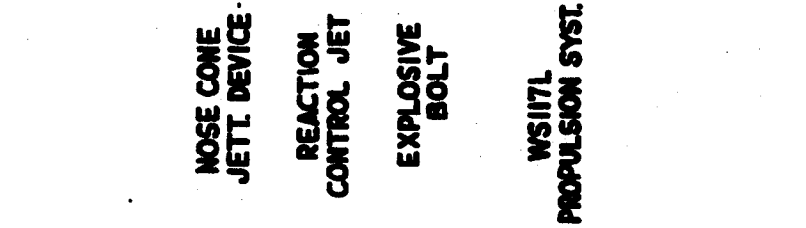
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MAN

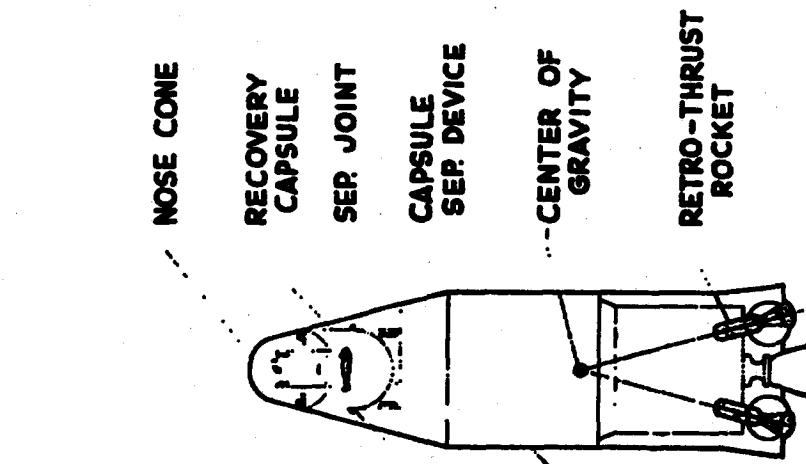
SMALL ANIMAL



NOSE CONE
 REACTION CONTROL JET
 SER. JOINT
 CAPSULE SER. DEVICE
 WS117L PROPULSION SYST.
 RETRO-THRUST ROCKET



NOSE CONE JETT. DEVICE
 REACTION CONTROL JET
 EXPLOSIVE BOLT
 WS117L PROPULSION SYST.
 RETRO-THRUST ROCKET



NOSE CONE
 RECOVERY CAPSULE
 SER. JOINT
 CAPSULE SER. DEVICE
 CENTER OF GRAVITY
 RETRO-THRUST ROCKET

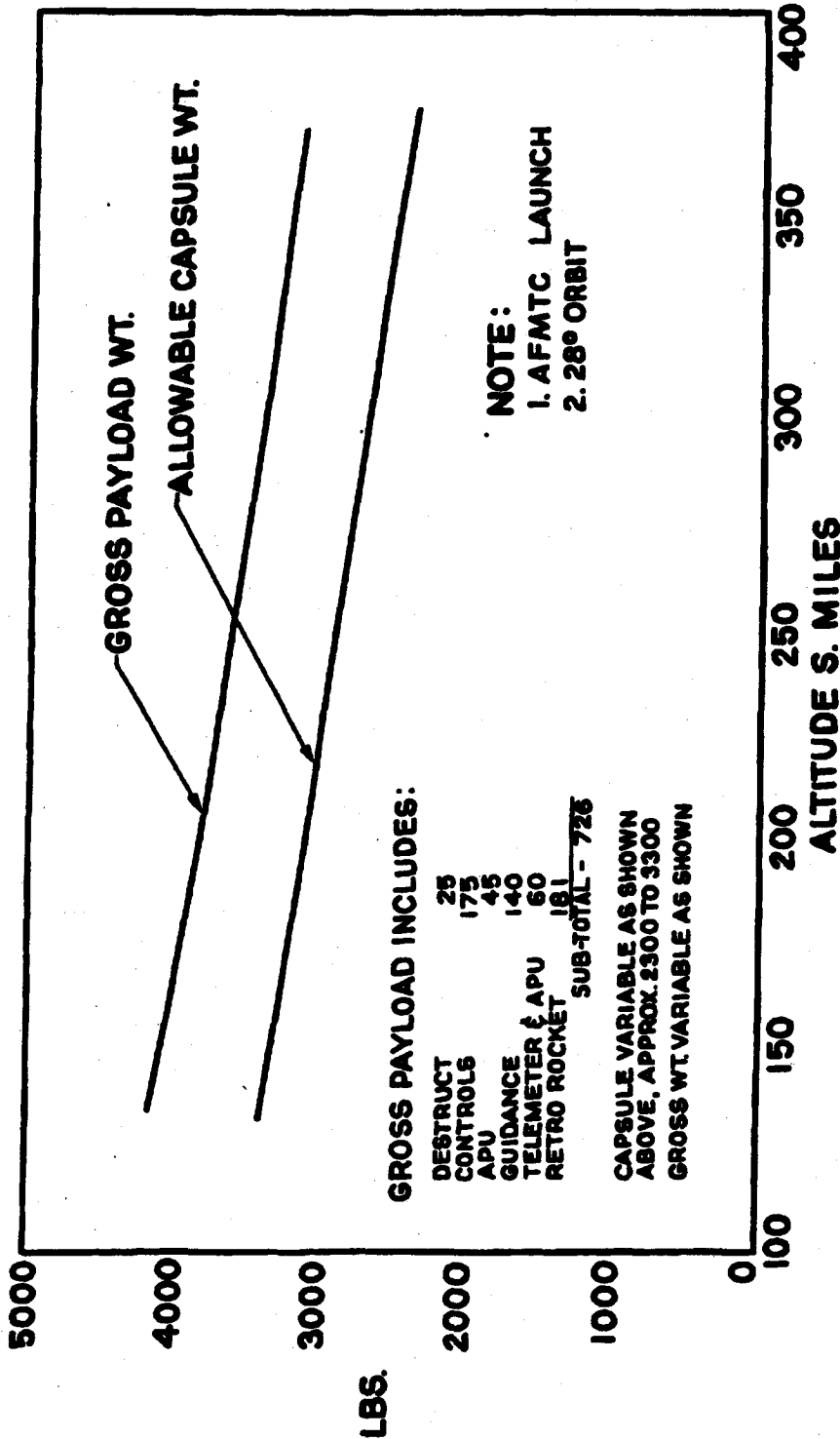
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P 475 6 4/30/58
 WD-58-0275

LOCKHEED AIRCRAFT CORPORATION
 1000 W. 10th Ave., Burbank, Calif.

WS117L USEFUL PAYLOAD WEIGHT VS ALT.

PROPOSED MAN IN SPACE PROG.



SECRET

P503 SS'L' 6/3/58
WD-58-03495

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~~CONFIDENTIAL~~

SATELLITE WEATHER MISSIONS

~~CONFIDENTIAL~~

SCIENTIFIC RESEARCH

**DETERMINE MEANS FOR UTILIZING SATELLITE DATA
CORRELATE DATA OVER LARGE AREAS OF EARTH
PERFORM STUDIES ON WEATHER CONTROL**

STORM PATROL

**DETECT PRESENCE OF MAJOR STORM CENTERS
PERFORM TIMELY TRACKING AND WARNING**

DOMESTIC WEATHER FORECASTING

**AUGMENT PRESENT SYSTEM OF STATIONS
PROVIDE ADDITIONAL COVERAGE**

MILITARY MISSIONS

**WEATHER DATA FOR OPERATIONAL MISSIONS
INTELLIGENCE INFORMATION
WS-117L TECHNICAL SCHEDULING**

P646 5/28/58
WD-58-02843

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LOCKHEED AIRCRAFT CORPORATION
MISSILE SYSTEMS DIVISION

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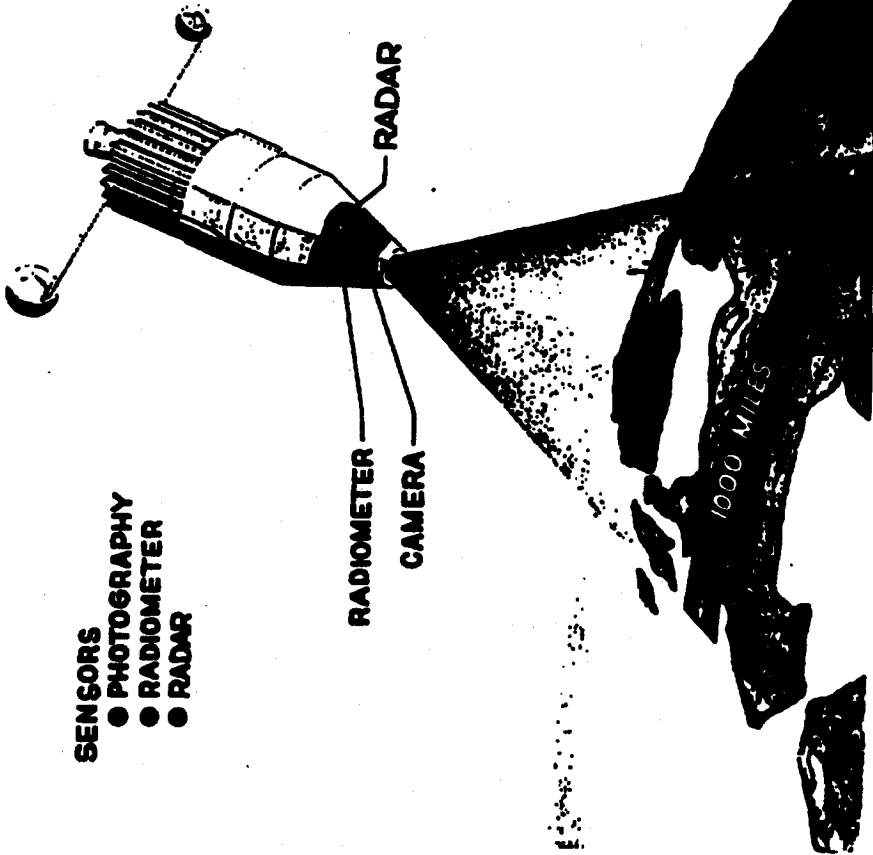
MISSILE SYSTEMS DIVISION

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SENTRY WEATHER SURVEILLANCE



STATUS MOSAIC AT WEATHER CENTER



- SENSORS**
- PHOTOGRAPHY
 - RADIOMETER
 - RADAR

- RADIOMETER
- CAMERA
- RADAR

- AFFORDS SYNOPTIC RECORD**
- CLOUD TYPE
 - CLOUD COVER
 - CLOUD VELOCITY
 - CLOUD ALBEDO
 - TERRESTRIAL RADIATION SPECTRUM
 - TERRESTRIAL HEAT BALANCE

P 37646 10/14/57
WD-56-05163

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MISSILE SYSTEMS DIVISION

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TYPES OF WEATHER DATA

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MILITARY AND DOMESTIC

PRESENT METHODS

TEMPERATURE

PRESSURE

HUMIDITY

WIND VELOCITY

RECENT WEATHER HISTORY

SATELLITE DATA

VISUAL

CLOUDS - SEMI QUANTITATIVE

1. EXISTENCE
2. WIND VELOCITY
3. WIND SHEARS
4. VERTICAL STRUCT
5. WATER VAPOR
6. AIR STABILITY
7. LEE CLOUDS OVER MOUNTAINS
8. FRONTAL CLOUDS

RADIO METRIC

ALBEDO

OZONE CONCENTRATIONS

SOLAR RADIATIONS

RADAR

PRECIPITATION

ALBEDO

P846 5/29/58
WD-58-02843

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LOCKHEED AIRCRAFT CORPORATION
MISSILE SYSTEMS DIVISION

POSSIBLE SCIENTIFIC EXPERIMENTS

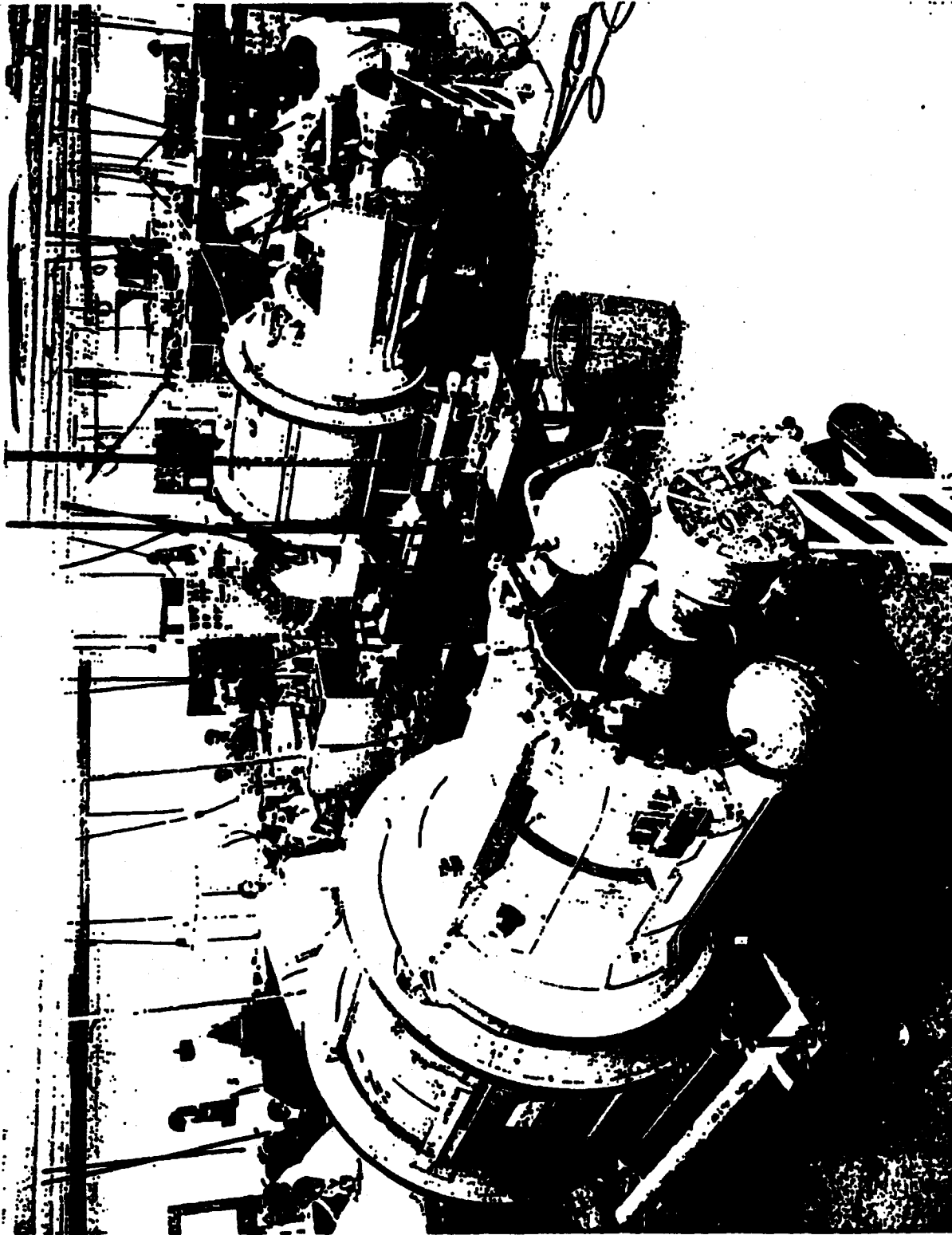
UTILIZING WS-117L VEHICLE

	LARGE PAYLOAD	DATA STORAGE & WIDE-BAND TRANSMISSION	LARGE POWER (LONG LIFE)	POLAR ORBIT	CONTROLLED ATTITUDE	INTER-SATELLITE COMM.	CONCISE-TYPE EXPERIMENTS
DRAG							
SOLAR UV, X-RAYS, & TOTAL RADIATION		▲	▲		▲		
PRIMARY AND ALBEDO COSMIC RAYS	●	▲	▲	●	▲		
AURORAL PARTICLES AND X-RAYS		▲	▲	●	▲		
MICROMETEORITES		▲	▲		▲		
MAGNETIC FIELD		●	▲	●			
EARTH RADIATION		●	▲	●	●		
ALBEDO AND CLOUD COVER		●	▲	●	●		
LIGHT ION DETECTOR		●	▲	●			
ION SPECTROMETER	●	●	▲	●	▲		
MICROMETEORITE VELOCITIES		▲	▲		●		
LYMAN-ALPHA TELESCOPE	●	▲	▲		●		
ATOMIC CLOCK	●		▲				
ELECTRON DENSITY IN IONOSPHERE		●	▲	●			
DENSITY AND TEMPERATURE IN ORBIT	▲	●	▲	●	●	●	

- NOT NECESSARY FOR THE MEASUREMENT
- ▲ USEFUL FOR THE MEASUREMENT
- ADDS GREATLY TO VALUE OF MEASUREMENT

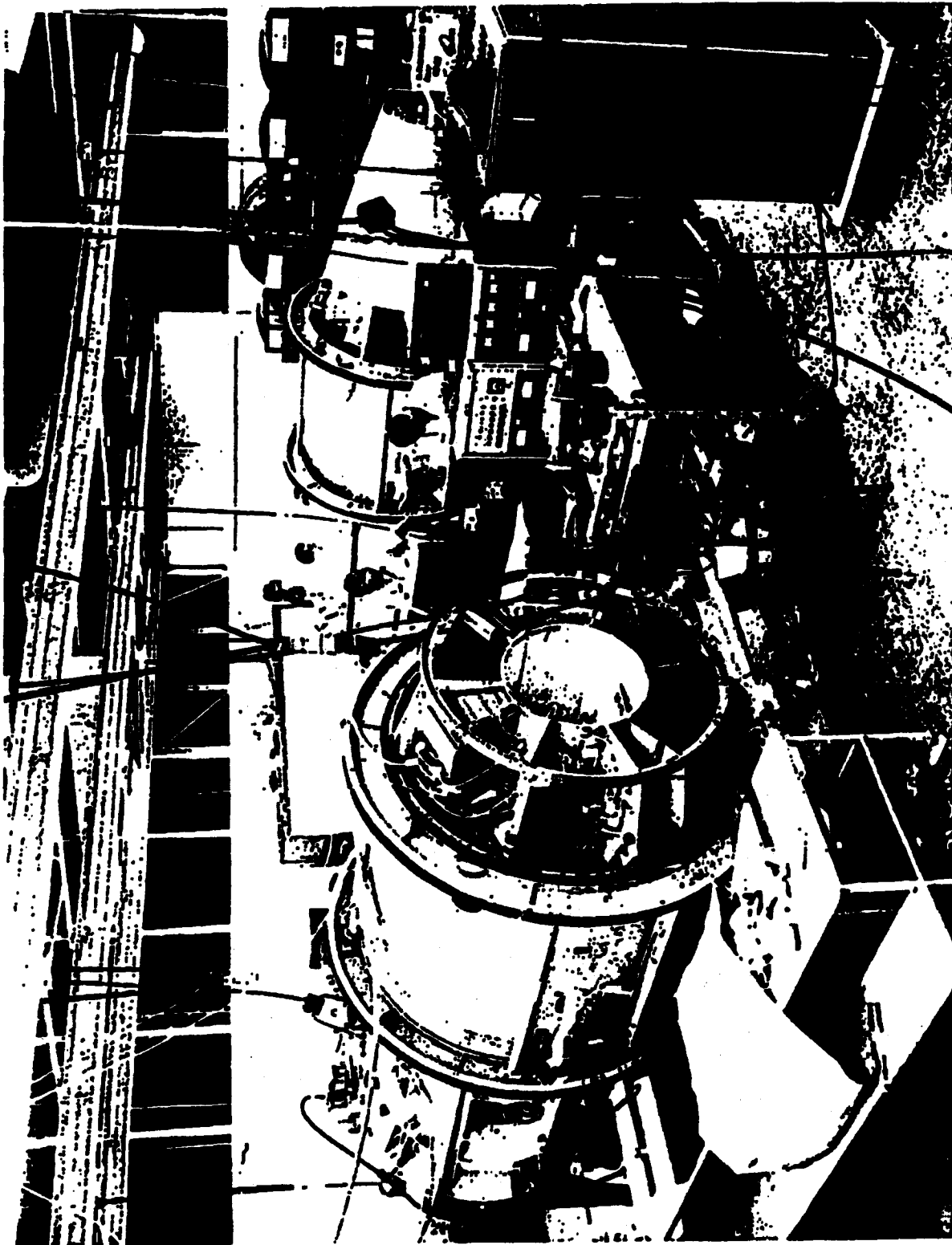
P374 6 10/14/57

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P 3017 FLIGHT TEST VEHICLES NOS. 1 AND 2 IN MOD & CHECKOUT - LMSD PALO ALTO

~~CONFIDENTIAL~~



P-2018 FLIGHT TEST VEHICLES NOS. 1 AND 2 IN MOD & CHECKOUT - LMSD PALO ALTO

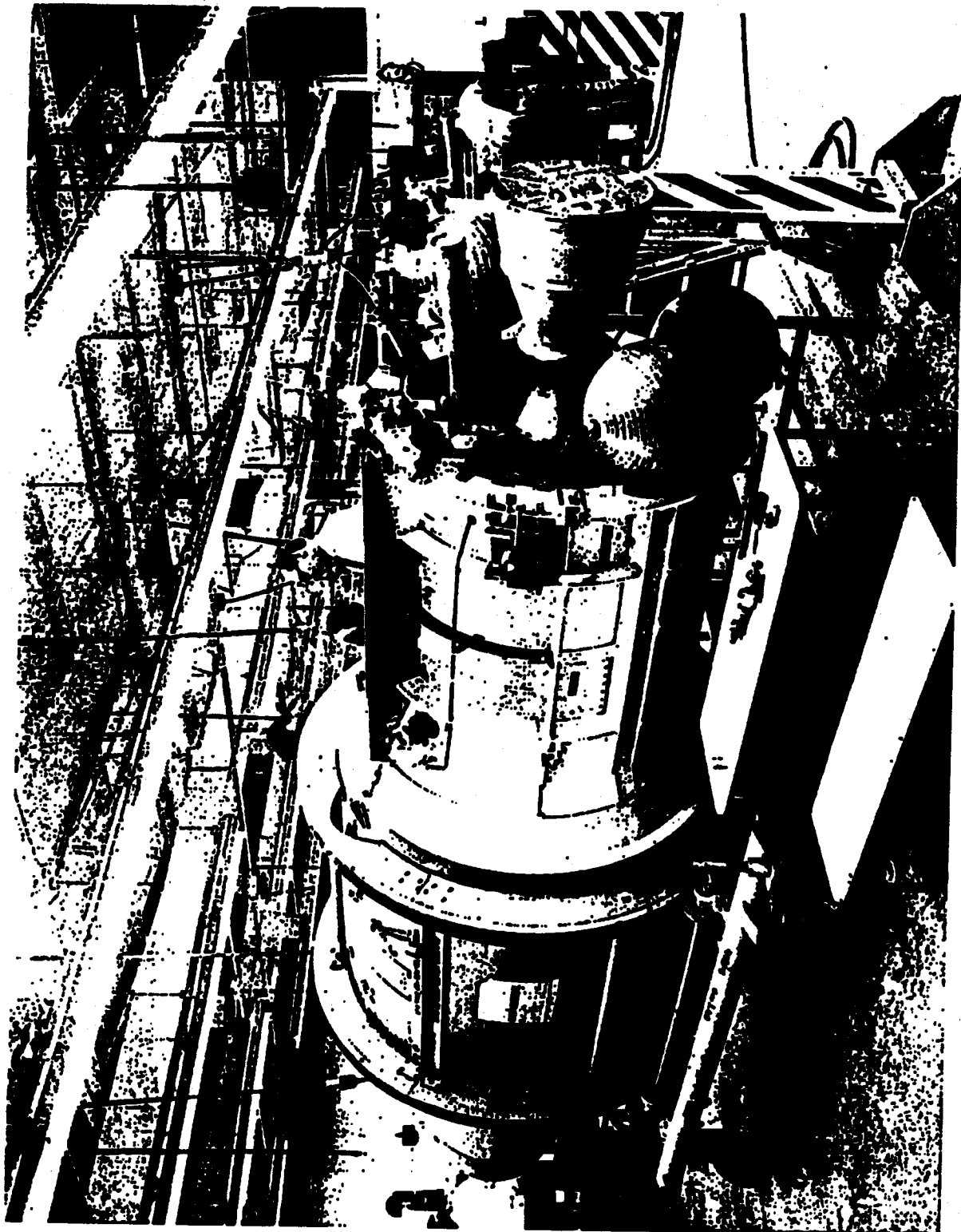
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P-2022 FLIGHT TEST VEHICLE NO. 2 IN MOD & CHECKOUT - LMSD PALO ALTO

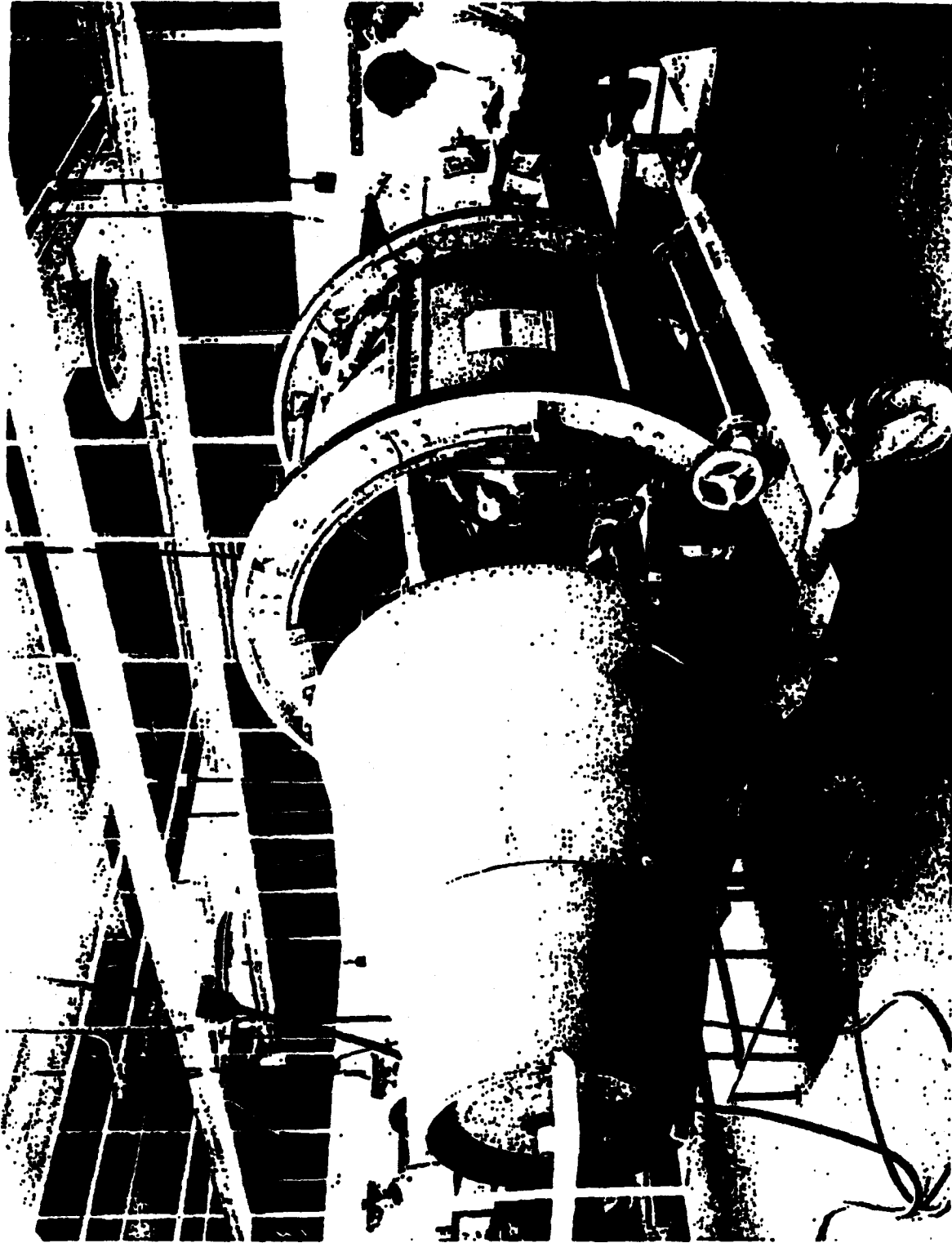
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P-3021 FLIGHT TEST VEHICLE NO. 2 IN MOD & CHECKOUT - LMSD PALO ALTO

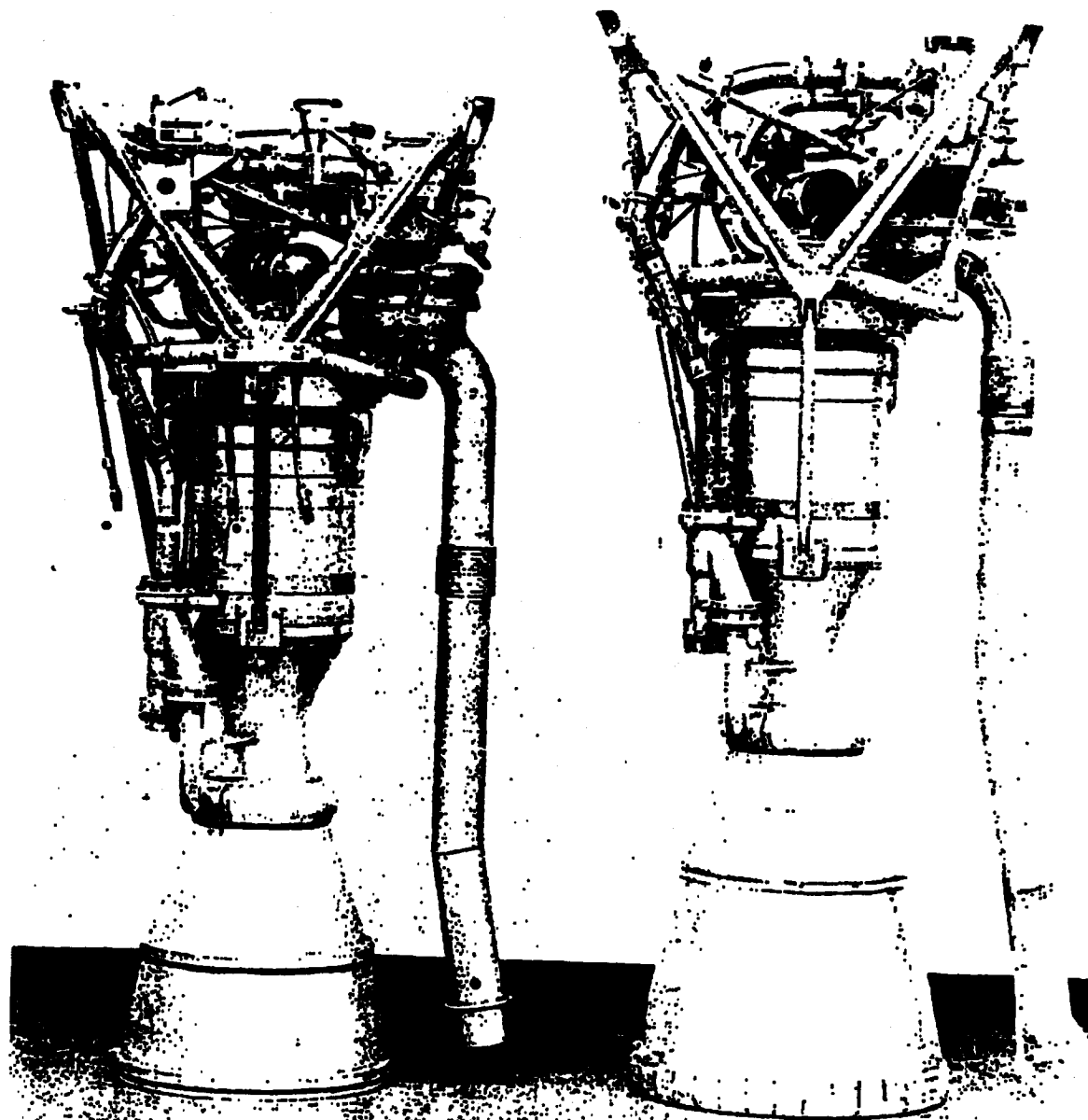
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P3039 MODEL XLR ENGINES - JP4 (LEFT) AND UDMH

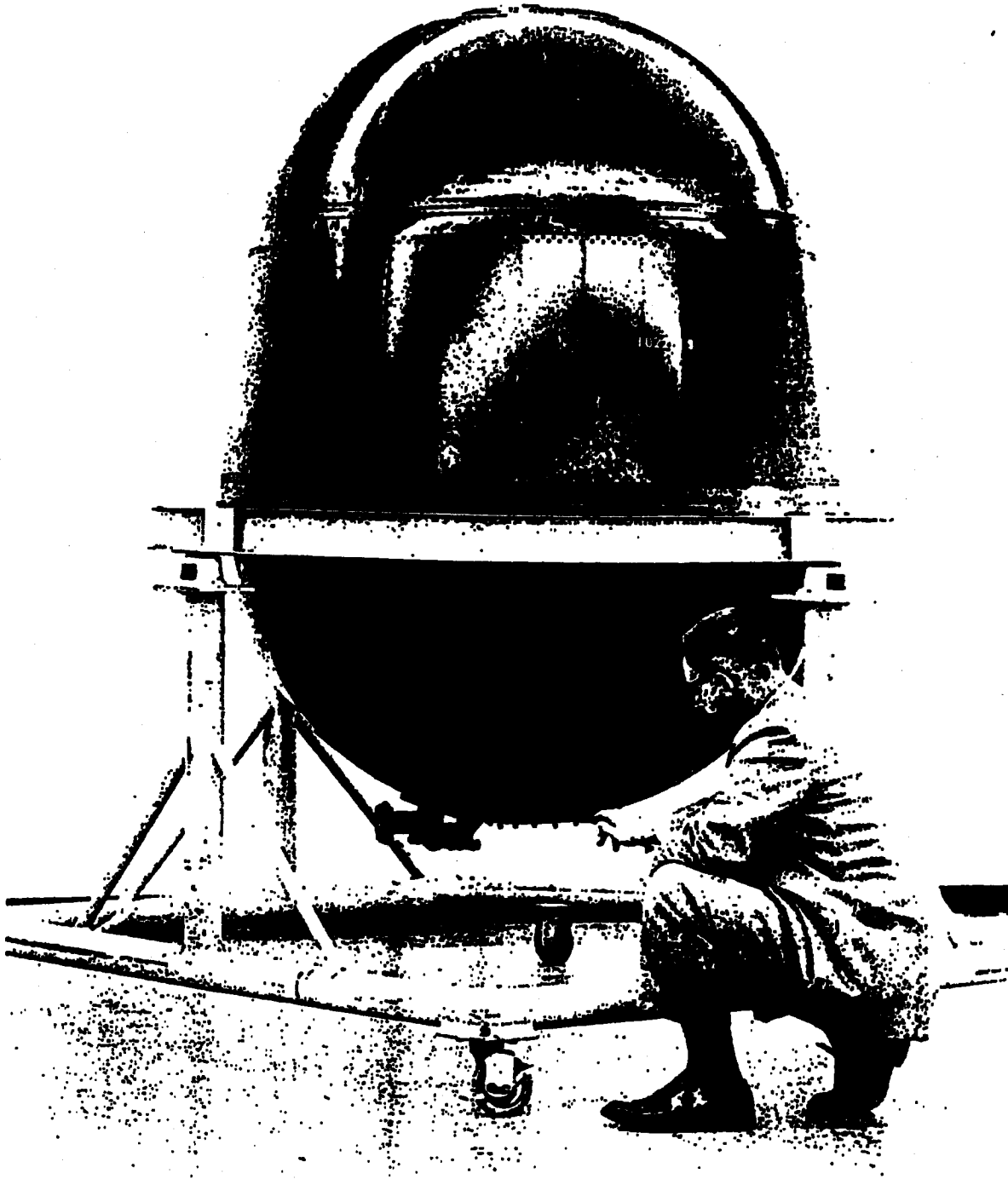
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P 3043 UDMH PROPELLANT TANK

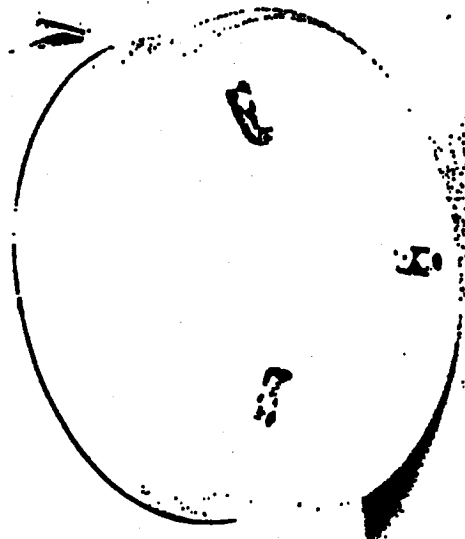
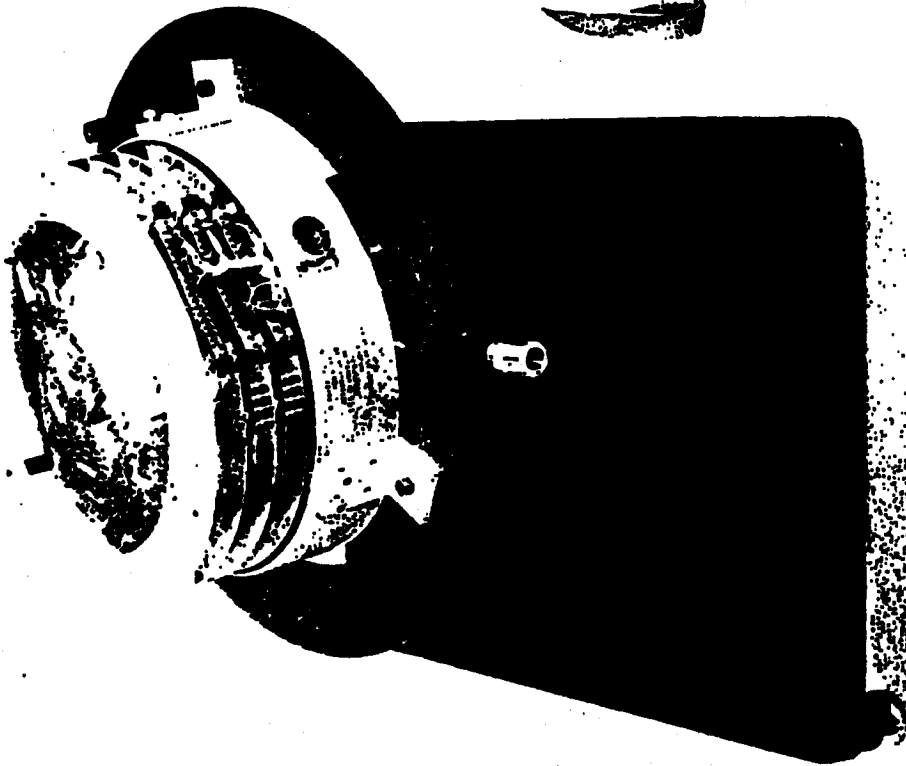
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P-2862 HORIZON SCANNER

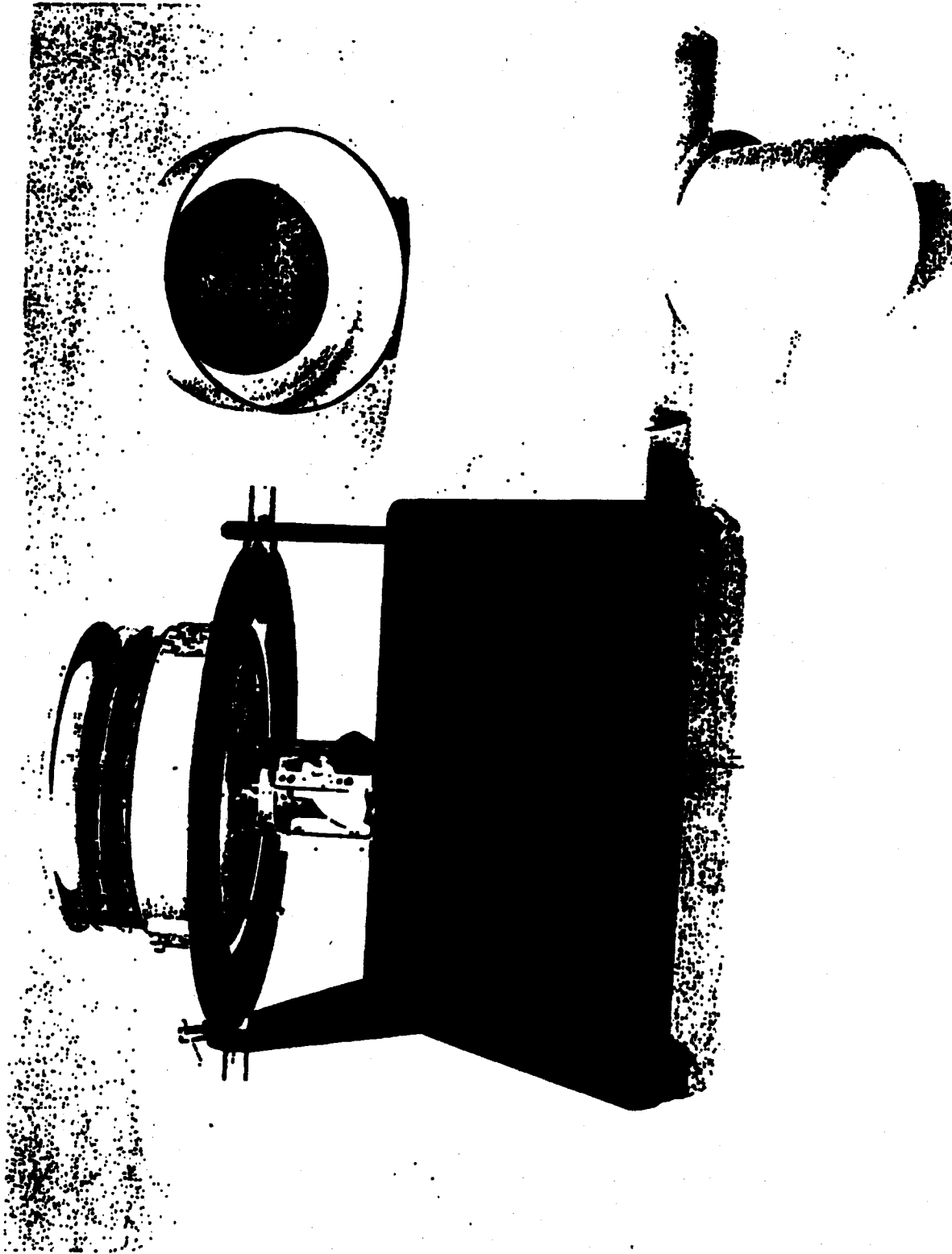
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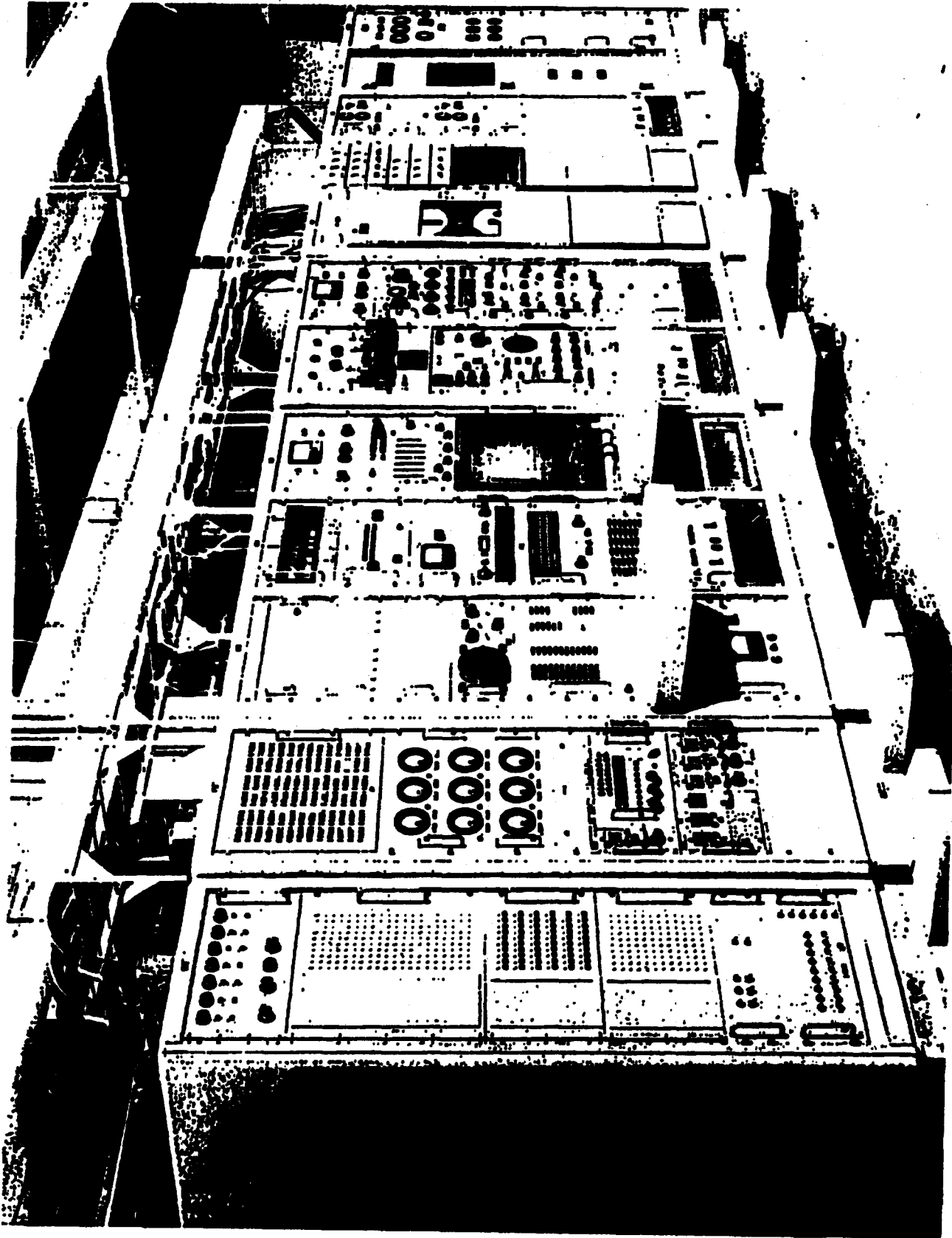
P 2884 HORIZON SCANNER

LOCKHEED AIRCRAFT CORPORATION

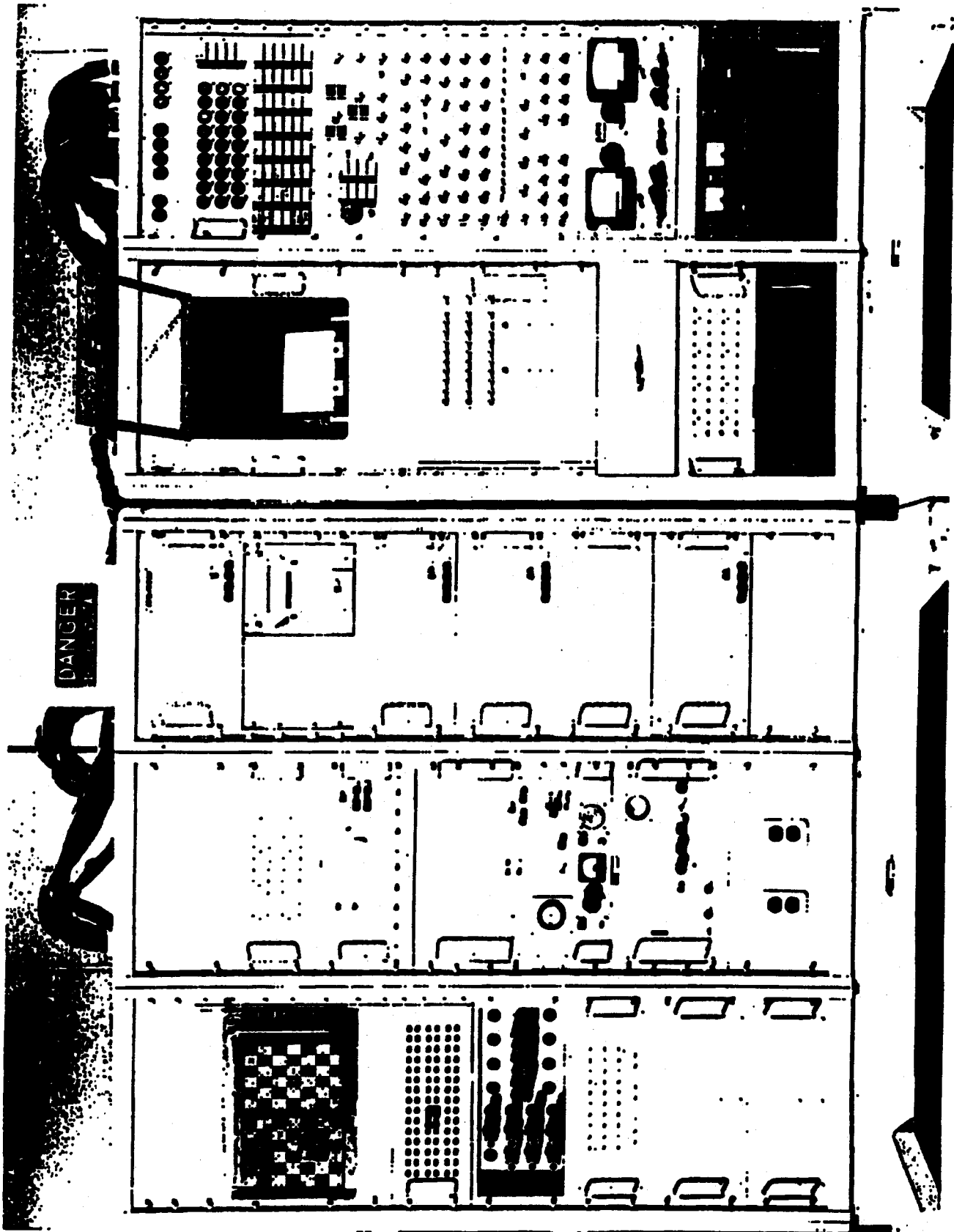
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P 2046 SYSTEMS CHECKOUT COMPLEX (EXCLUDING LACE UNIT)



P-3047 LACE UNIT (SYSTEMS CHECKOUT COMPLEX)

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