

#49

~~SECRET~~

LMSD-6134

12 AUGUST 1958

COPY NO. 60

85 SHEETS



WS 117L
SENTRY SYLLABUS

LOCKHEED AIRCRAFT CORPORATION
MISSILE SYSTEMS DIVISION
SUNNYVALE, CALIFORNIA

~~SECRET~~

188

808 12 001

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.

SECRET

LMSD-6134

**117L/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	
	Communications	
	Data Control	
1430	Break	J. J. Knopow
		J. G. Schaub
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	
0930	TV Sensing	C. W. Burrell
1000	Ferret	Peter C. Goldmark
1015	Infrared Detection & Tracking	P. D. Doersam
		J. J. Knopow
1035	Break	
1055	Data Storage	
1125	Propulsion	J. P. Nash
		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	

CONTENTS

CHART REPRODUCTIONS:

Chart No.	
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 83 ⁰ Orbits

P232(2) WS117L Vehicle System
P468(1) WS117L Structural Breakdown
P422(2) WS117L Propulsion System
P315(2) WS117L Auxiliary Power Supply
P162 Advanced Auxiliary Power Systems
P335(1) WS117L System APU Life Limitations
P763 Guidance and Control System
- Typical Sentry Ascent (Thor - Prog. IIA)
P166(4) Guidance and Control System
- Typical Sentry Ascent (Atlas - Prog. I)
P707(1) Sentry Ascent Boost Phase
- Guidance and Control Functioning Components
P708(1) Sentry Coast Phase
- Guidance and Control Functioning Components
P164(1) Steady-State Orbital Control System
P262(3) WS117L Satellite Vehicle Weight Analysis
P400 WS117L Visual Reconnaissance System
P175(4) WS117L Ferret Subsystem - Project Structure
P182(3) Airborne Reception
P204(3) ICBM Attack Alarm
P609(1) ICBM Attack Alarm System
- Satellite Power Requirements vs. Supply
P620(1) ICBM Attack Alarm System
- Vehicle Payload
P617(2) ICBM Attack Alarm System
- Operational Ground Base Requirements
P509(2) Station Locations - Thor
P513(3) Station Locations - Atlas

- P163(2) G-S Communications Intercept Station**
- P540 Orbiting Object - Traffic Intelligence**
- P654 WS117L Data Control - Reconnaissance Mission**
- P653 WS117L Data Control - Reconnaissance Mission Assignment**
- P652(1) WS117L Data Control - Data Indexing**
- P465 WS117L/SM-75 Program Objectives**
- P591(4) Flight Missions and Objectives**
- P639 WS117L Recovery Orbits**
- P621(2) WS117L Recovery Operations**
- P577 WS117L Capsule Recovery**
- P544(1) WS117L Biomedical Vehicle**
- P475 WS117L Aeromedical Recovery Configurations**
- P503 WS117L Useful Payload vs. Altitude**
- P546 Satellite Weather Missions**
- P376(1) WS117L Weather Surveillance**
- 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**

SECRET

LMSD-6134

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 Unit)

P3047 LACE Unit (Systems Checkout Complex)

LOCKHEED AIRCRAFT CORPORATION

SECRET

MISSILE SYSTEMS DIVISION

This document contains information affecting the national defense of the United States within the meaning of the Espionage Laws, Title 18,

SECRET

ADVANCED RECONNAISSANCE VEHICLE

SECRET



LOCKHEED AIRCRAFT CORPORATION
MILWAUKEE, WISCONSIN

SECRET

PHS (S) 8 10/22/77
WD-50-052-43

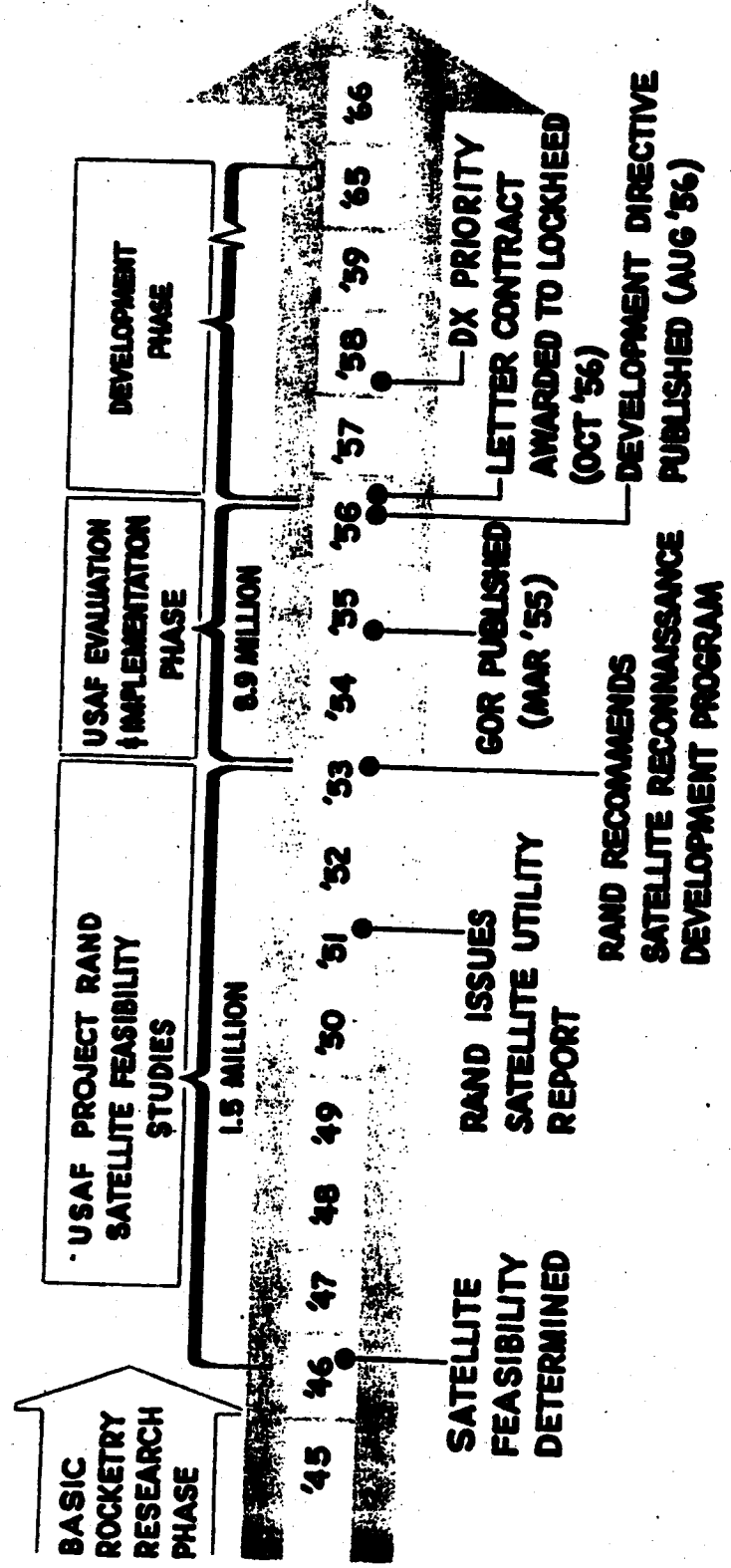
LOCKHEED AIRCRAFT CORPORATION

SECRET

MISSILE SYSTEMS DIVISION

ADVANCED RECONNAISSANCE SYSTEM EVOLUTION

SECRET



SECRET

LOCKHEED AIRCRAFT CORPORATION
MEMBER PRATT & WHITNEY GROUP

SECRET

PM (4) S 5/7/56
WD-56-01366

~~SECRET~~

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

~~SECRET~~

P 799 8/8/58
WD-39-05183

~~SECRET~~

UNCLASSIFIED

MAJOR DEVELOPMENT OBJECTIVES

MAJOR DEVELOPMENT OBJECTIVES

- | PROGRAM TITLE | MAJOR DEVELOPMENT OBJECTIVES |
|--|--|
| I. ENGINEERING PROTOTYPE DEVELOPMENT & TESTS | PLACE STABILIZED SATELLITES ON ORBIT AT 300 N.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 100 MILE PHOTO STRIP PER PASS AVERAGE
100 FT. RESOLUTION
1 MILE TARGET LOCATION ACCURACY |
| IIA. 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 50-10,000 MCS SPECTRUM
RECEIVE AND MEASURE BASIC SIGNAL PARAMETERS; 30-100 MILE LOCATION ACCURACY
SORT KNOWN SIGNALS FROM UNKNOWN SIGNALS
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 AICM DETECTION - PREDICTION DATA
SIMILAR TO PROGRAM V, BUT USING:
MULTIPLE FUNCTIONS AND FLEXIBILITY
EMPLOYS MULTIPLE VEHICLES
LONG DURATION POWER SUPPLY
IMMINENCE OF HOSTILITIES WARNING |

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

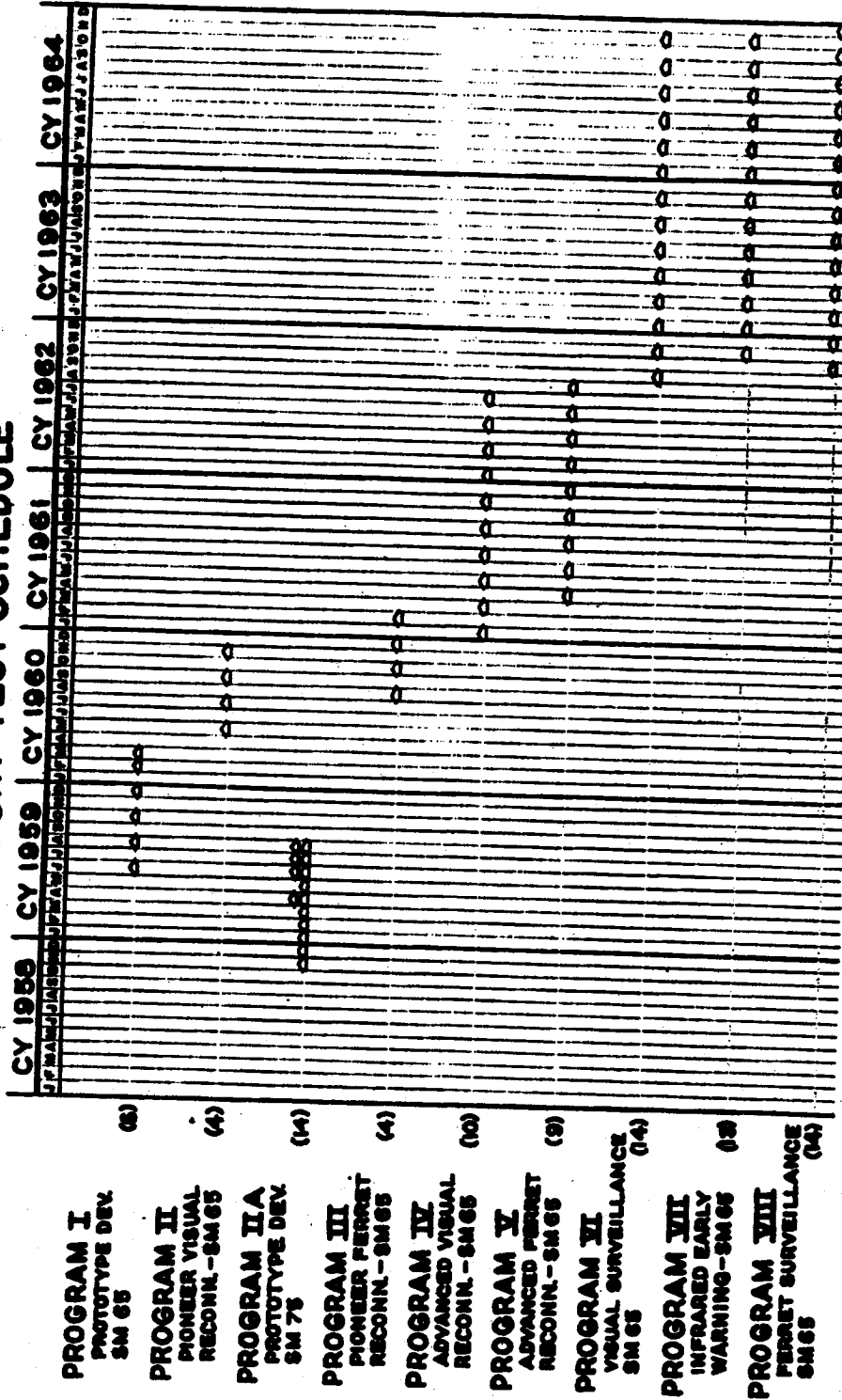
SECRET

LOCKHEED AIRCRAFT CORPORATION
MISSILE SYSTEMS DIVISION

SECRET

SECRET

FLIGHT TEST SCHEDULE



WS 117L STATEMENT OF WORK, AFB MO. 16 APRIL 1958
 AS AMENDED 7 JULY 1960
 LOCKHEED AIRCRAFT CORPORATION
 MISSILE SYSTEMS DIVISION

P 257 (8)-6/23/58
 WD-58-02843

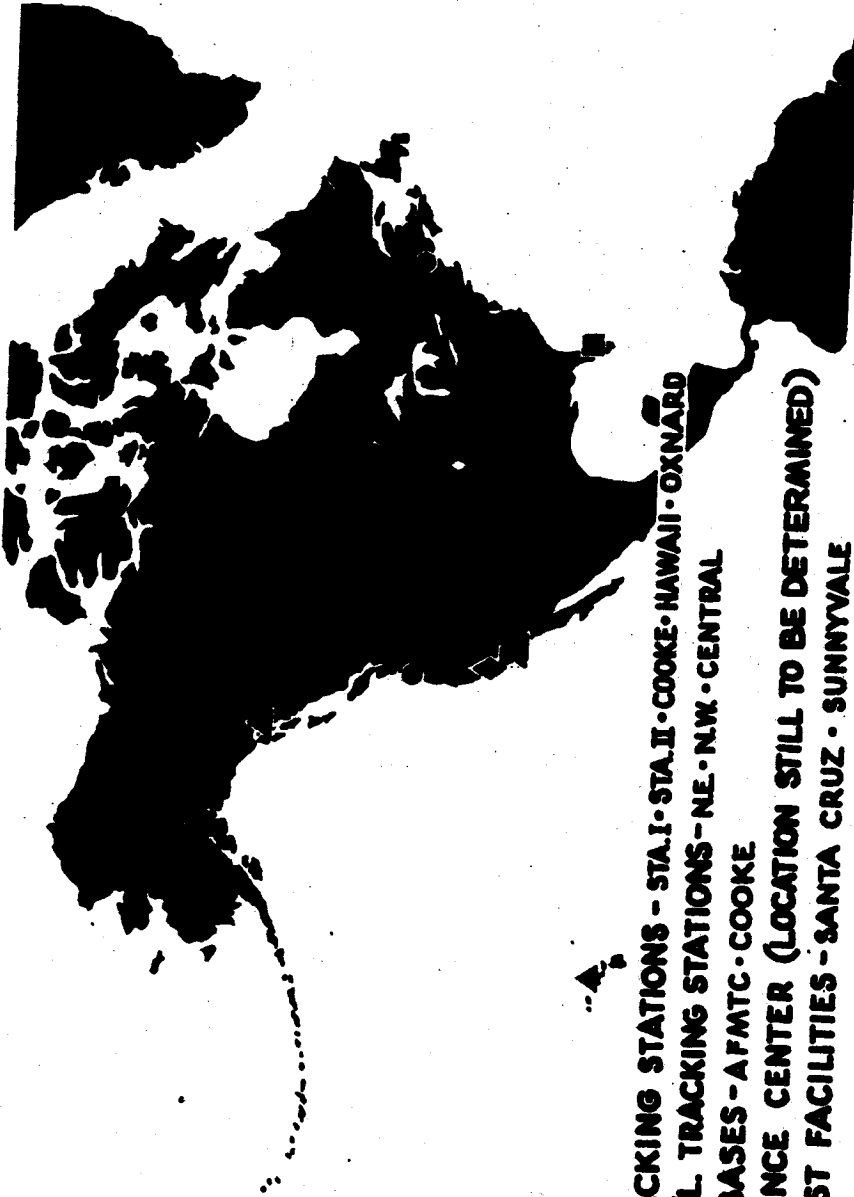
SECRET

SECRET

~~CONFIDENTIAL~~

~~CONFIDENTIAL~~

SENTRY FACILITIES



LEGEND

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

P102 (5) 80 5/2/58
WD-86-02843

~~CONFIDENTIAL~~

LOCKHEED AIRCRAFT CORPORATION
MISSILE SYSTEMS DIVISION

LOCKHEED AIRCRAFT CORPORATION

~~CONFIDENTIAL~~

MISSILE SYSTEMS DIVISION

This document contains information affecting the national defense of the United States within the meaning of the Espionage Laws, Title 18,

~~SECRET~~

SENTRY PAYLOAD - DEFINED

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 600
WD-56-08163

8/2/56

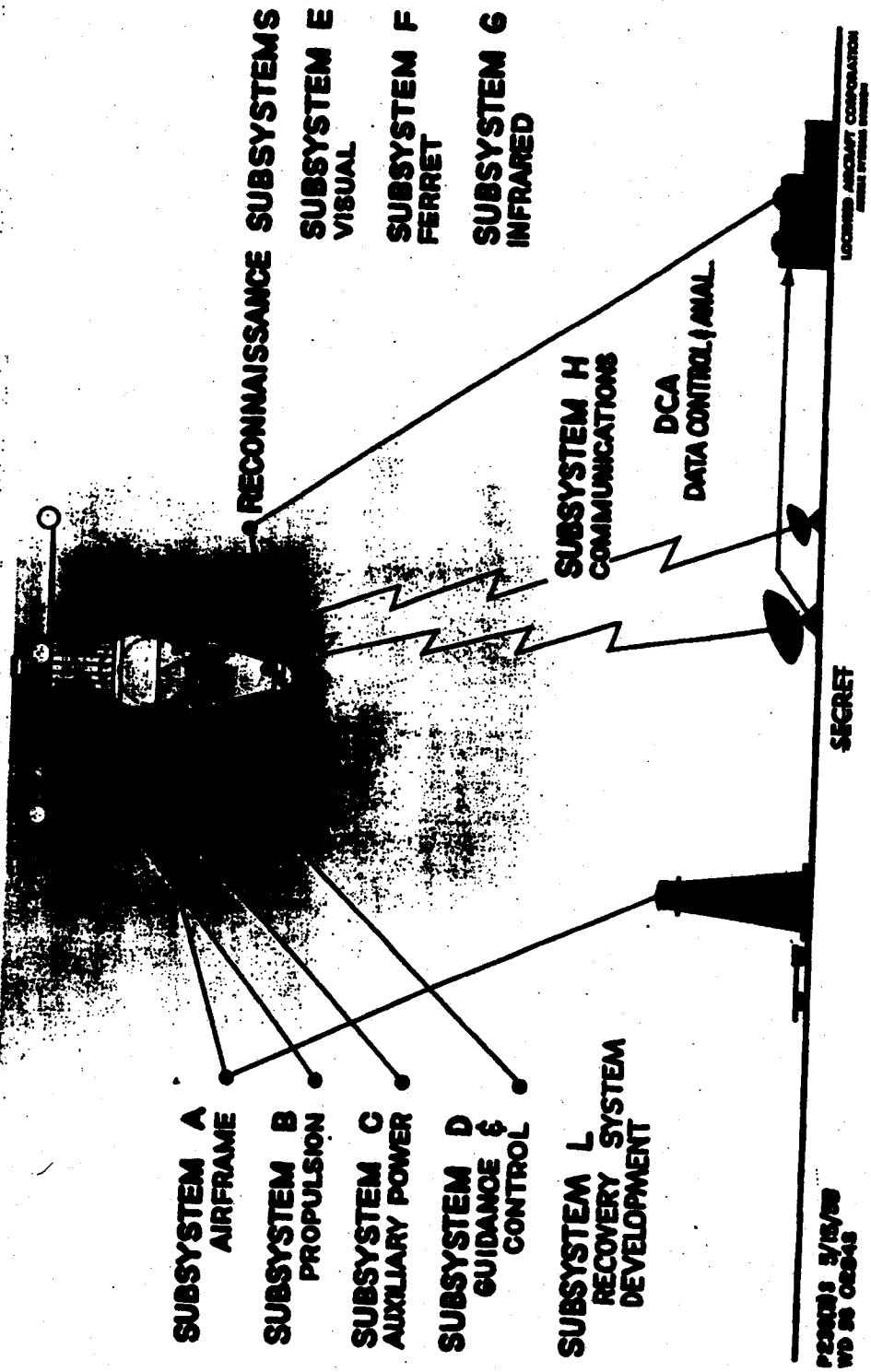
~~SECRET~~

~~SECRET~~

~~SECRET~~

THE SENTRY SUBSYSTEMS

~~SECRET~~



FORM 31/12/78
WD 28 02845

SECRET

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.
- AEROJET-GENERAL CORP.

AUXILIARY POWER

- SONYTONE CORP.
- EAGLE-PICHER CO.
- ENGINEERED MAGNETICS
- HOFFMAN ELECTRONICS CORP.
- BEECHCRAFT 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 SYE.
- SPICA INC.
- AMPEX CORP.

FERRET

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

INFRARED RECONN.

- EASTMAN KODAK CO.
- BAIARD ATOMIC CO.
- AEROJET-GENERAL CORP.
- GENERAL MILLS INC.

GROUND-SPACE COMM.

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

TEST MGMT & OPERATIONS

- AEROJET-GENERAL CORP.
- RALPH M. 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-78)
- CONVAIR AERONAUTICS (SM-65)

GUIDANCE & CONTROL

- INSTRUMENTATION LAB., MIT
- GENERAL ELECTRIC CO.

AUXILIARY POWER

- THE MARTIN CO.
- ATOMICS INTERNATIONAL

DATA PROCESSING

- RAMO-WOOLRIDGE CORP.

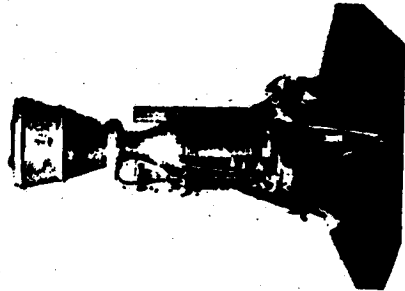
SECRET

LOCKHEED AIRCRAFT CORPORATION
MISSILE SYSTEMS DIVISION

SECRET

P288 (S) 'S' 8/4/58
WD-58-02843

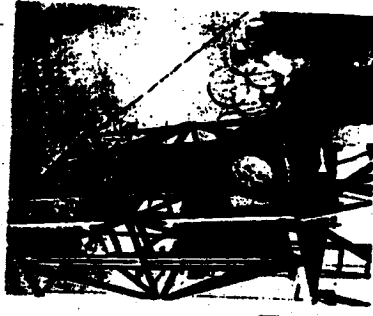
~~CONFIDENTIAL~~



BELL ENGINE

LOCKHEED AIRCRAFT CORPORATION
GENERAL INVESTIGATIONS DIVISION

FUNCTIONAL
MOCK UP



AIRFRAME

PROPULSION
CHECK OUT



~~CONFIDENTIAL~~

~~CONFIDENTIAL~~

MOCK UP



P566 S 6/9/58
WD-58-08485

LOCKHEED AIRCRAFT CORPORATION

~~CONFIDENTIAL~~

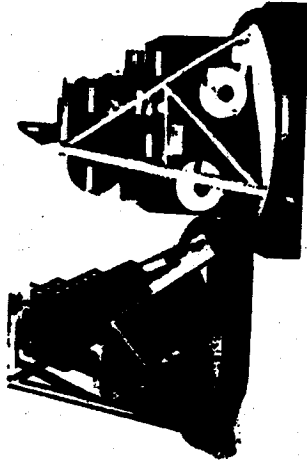
MISSILE SYSTEMS DIVISION

This document contains information affecting the national defense of the United States within the meaning of the Espionage Laws, Title 18.

~~SECRET~~

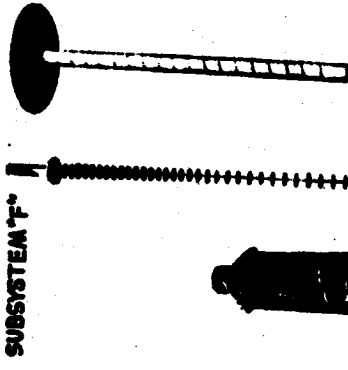


~~SECRET~~

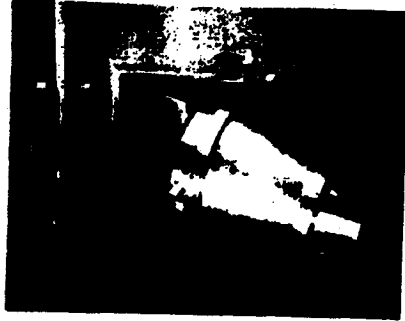


SUBSYSTEM 'E'

SUBSYSTEM 'F'



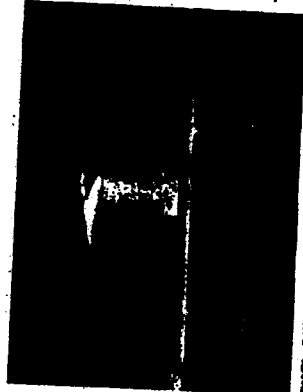
SUBSYSTEM 'G'



LOCKHEED AIRCRAFT CORPORATION

~~SECRET~~

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



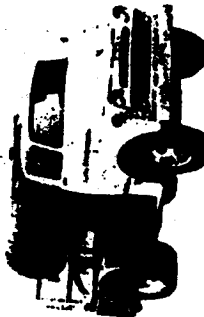
FUEL DUMP TRAILER



ACID DUMP TRAILER



ENGINE THRUST CHAMBER FLUSHING



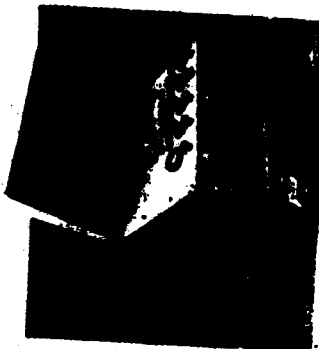
FUEL TRUCK



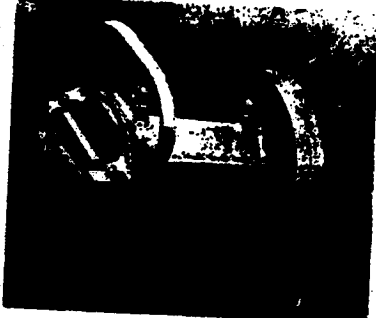
ENGINE FLUSHING TRAILER



ACS TRAILER AND FLUSHING TRUCK



PROPPELLANT CABINET CONTROL MOUNTED BELL UNIT



UBM LOADER

P. 568 GSE 6/3/58
WD-58-02458

LOCKHEED AIRCRAFT CORPORATION
MISSILE SYSTEMS DIVISION

MISSILES



SUNNYVALE
COMPONENT ASSEMBLY



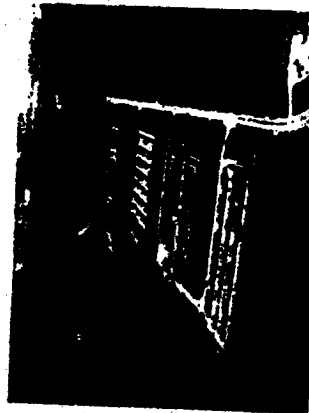
SANTA CRUZ
HAZARDOUS TEST FACILITY

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

LOCKHEED AIRCRAFT CORPORATION
MISSILE SYSTEMS DIVISION



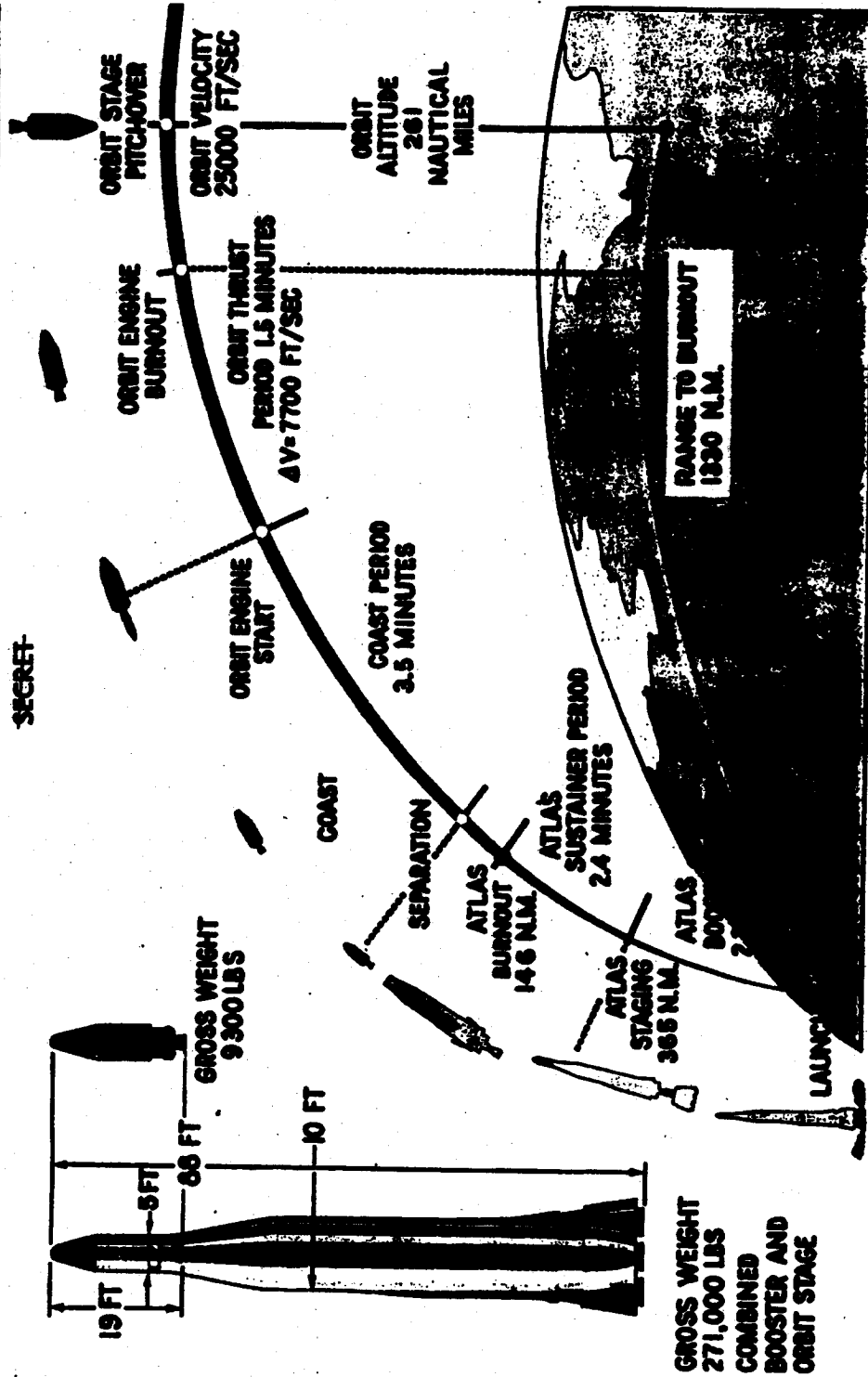
VAN NUYS
AIRFRAME FABRICATION



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

P 565 SO 6/2/58
WD-58 09495

SECRET



GROSS WEIGHT
271,000 LBS
COMBINED
BOOSTER AND
ORBIT STAGE

P 238 00 91W/11/57

LOCKHEED AIRCRAFT CORPORATION
MISSILE SYSTEMS DIVISION

SECRET

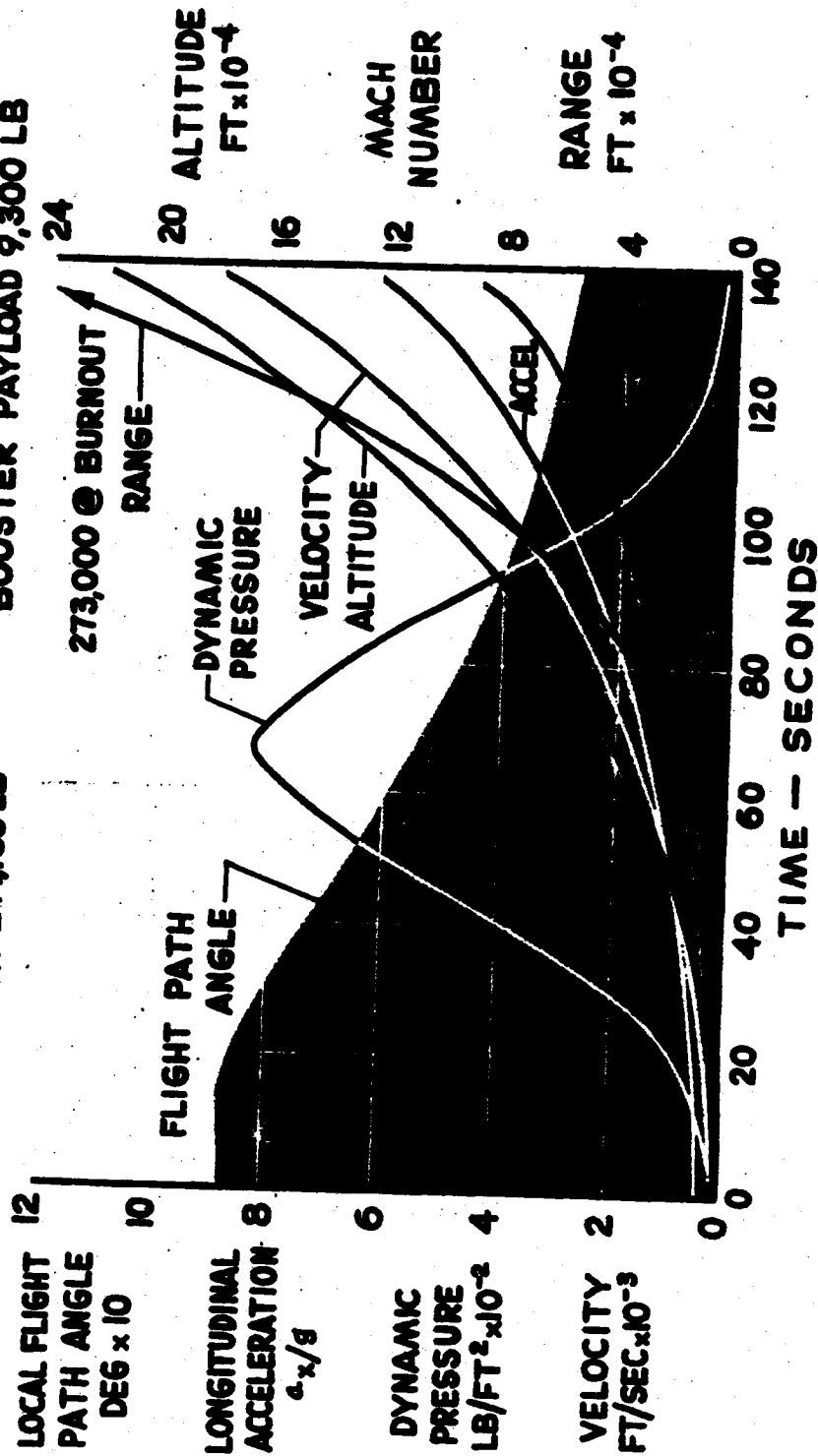
SECRET

SECRET

BOOSTER STAGE

GROSS WT @ LAUNCH 271163 LB BOOSTER PAYLOAD 9,300 LB

SECRET

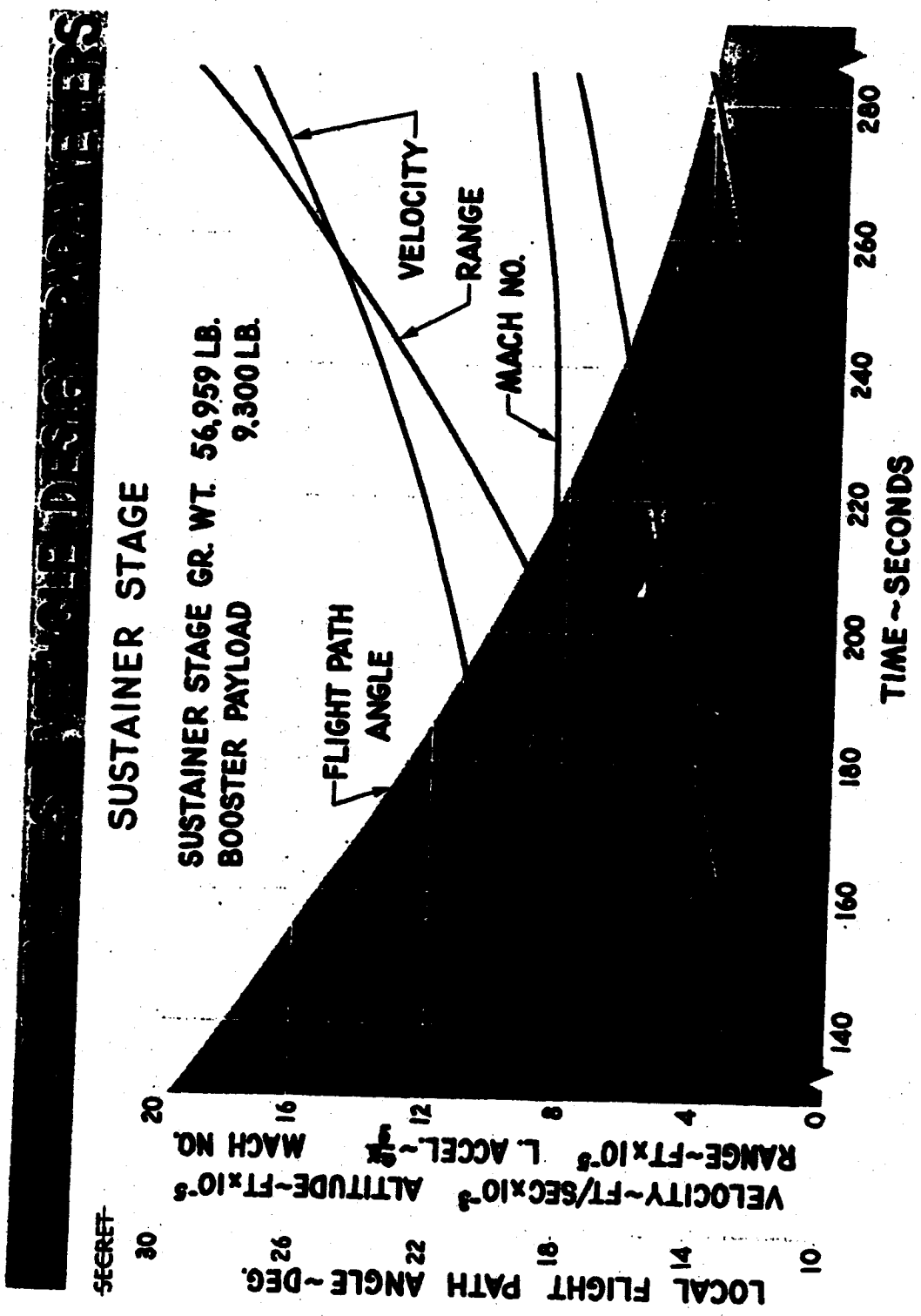


SECRET

P 229 (1) 59-A 3/27/58
WD-59-01388

LOCKHEED AIRCRAFT CORPORATION
ANN ARBOR, MICHIGAN

~~SECRET~~



~~SECRET~~

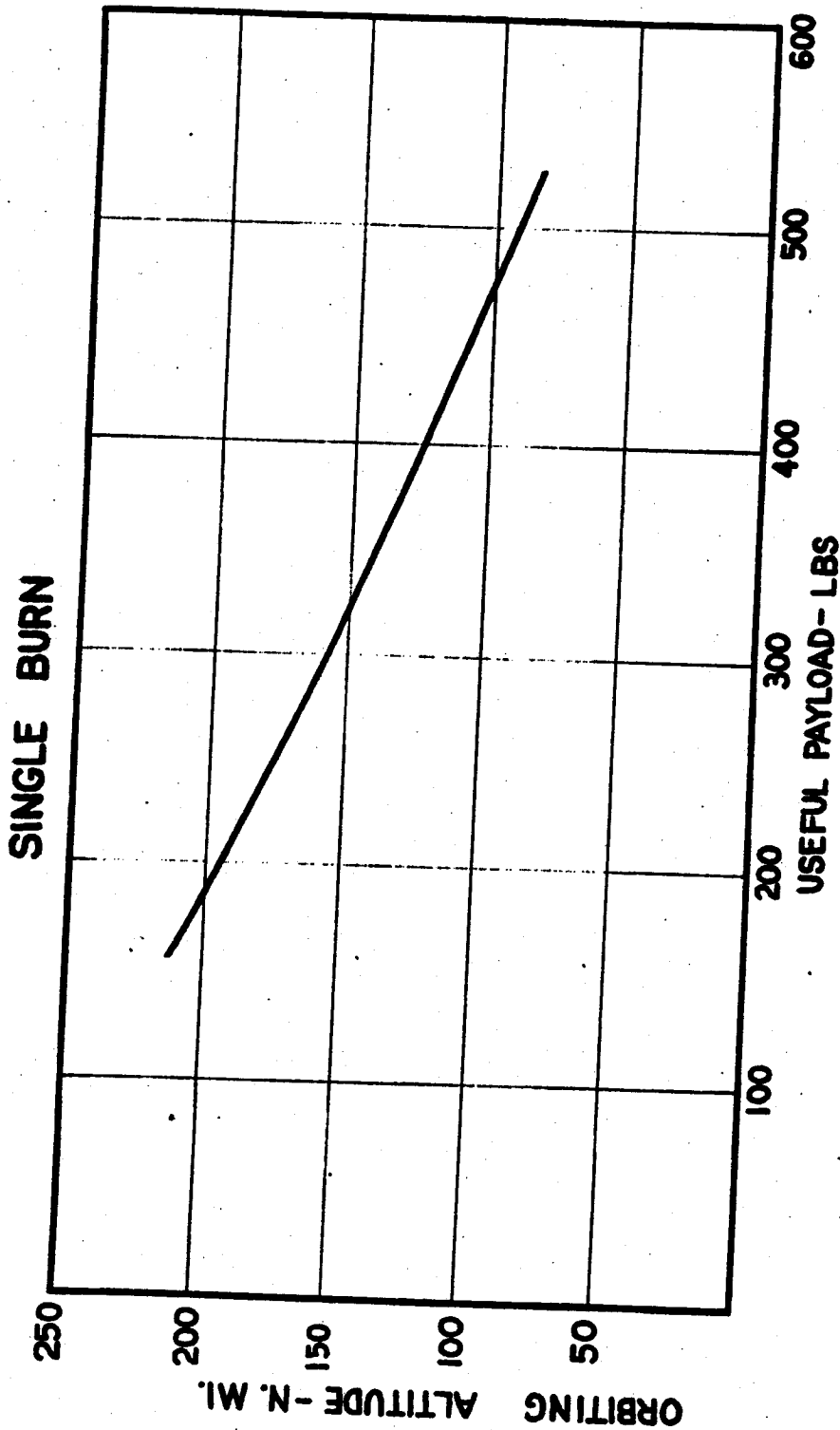
~~SECRET~~

P228 (1) 88A 2/20/58
WD-58-01266

~~SECRET~~

~~SECRET~~

ALTITUDE VS. PAYLOAD-SENTRY/THOR



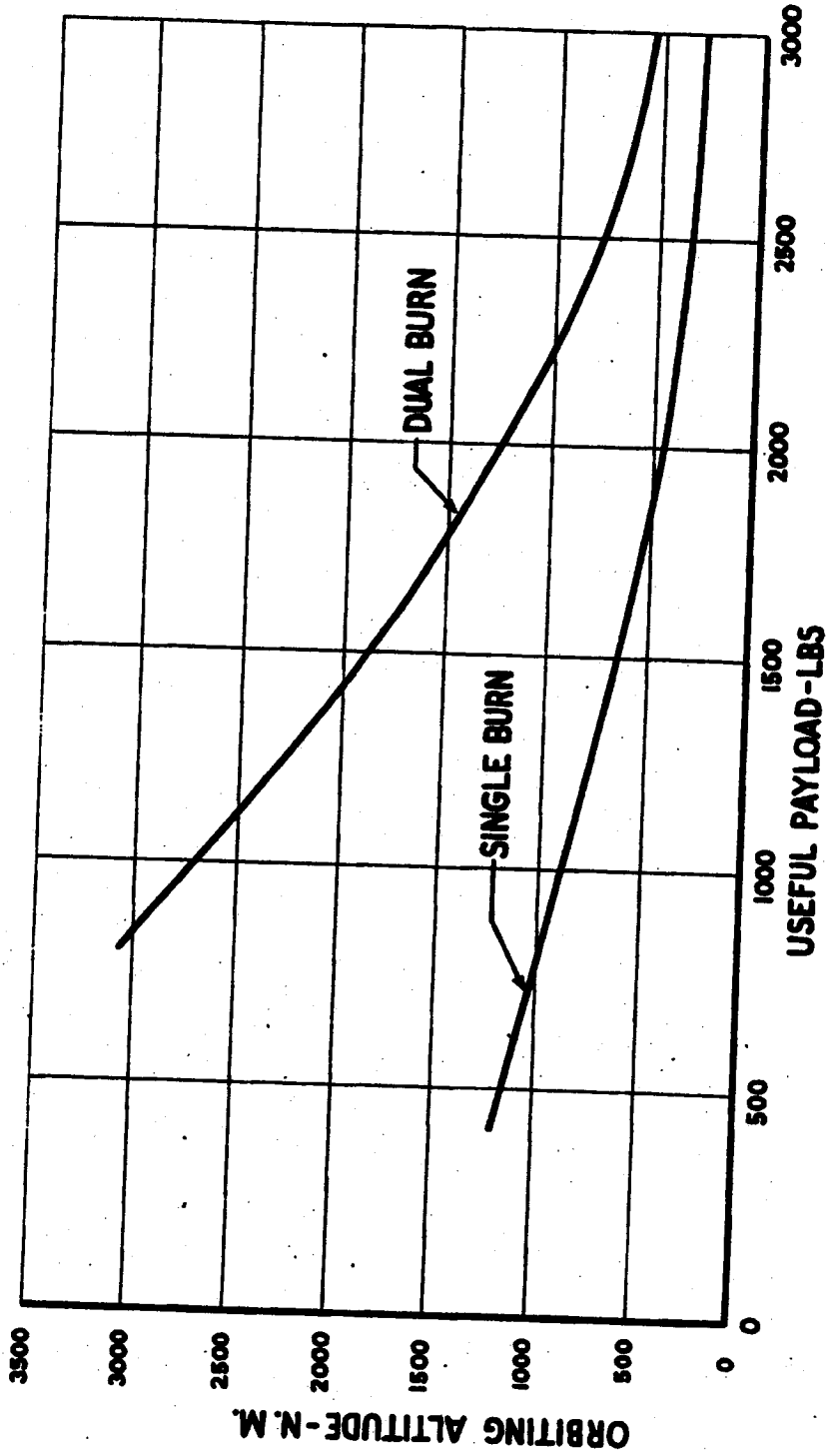
~~SECRET~~

P 792
8/8/58

WD-58-06183

~~SECRET~~

ALTITUDE VS PAYLOAD-SENTRY/ATLAS



~~SECRET~~

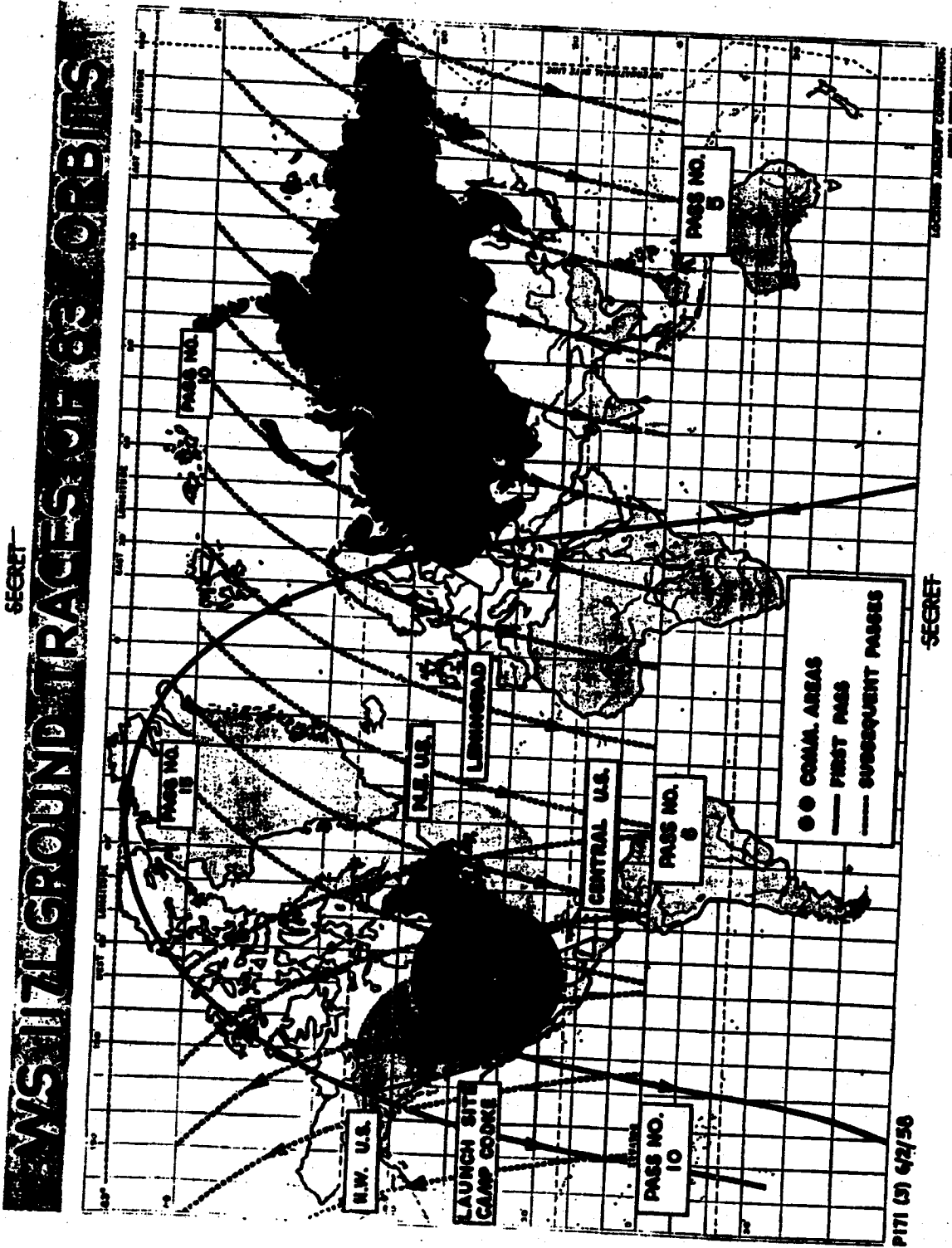
LOCKHEED AIRCRAFT CORPORATION

~~SECRET~~

9/8/58

P 791
WD-58-05189

~~SECRET~~



LOCKHEED AIRCRAFT CORPORATION

~~SECRET~~

MISSILE SYSTEMS DIVISION

This document contains information affecting the national defense of the United States within the meaning of the Espionage Laws, Title 18.

~~SECRET~~

VISUAL RECONNAISSANCE MODEL

~~SECRET~~

ENGINE GIMBAL LIMITS 5°
SQUARE PATTERN

ENGINE - BELL AIRCRAFT
THRUST 15,000 LB ALT
I_{sp} 263 SEC.

NOZZLE EXPANSION RATIO 15:1
N₂ GAS STORAGE FLASK
3000 PSI

ATTITUDE ROLL AND
REORIENTATION CONTROL
GAS JETS (6)

AUXILIARY POWER
SOURCE (BATTERIES)

FUEL TANK
JP-4 60 PSI

VISUAL RECONNAISSANCE SYSTEM
CAMERA PACKAGE (EKC)
PHOTO, PROCESS, STORAGE,
ELECTRONIC READOUT

OXIDIZER
TANK (IRFNA)
60 PSI

He GAS STORAGE FLASK (2)
PROPELLANT TANK
PRESSURIZATION 3000 PSI

SUBSYSTEM ELECTRONICS COMPARTMENT
AND CAMERA SUPPORT STRUCTURE
(GUIDANCE, CONTROL, ETC.)

CAMERA LENS SHIELD

NOSE (JETTISONS)

REMOVABLE NOSE FAIRING

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

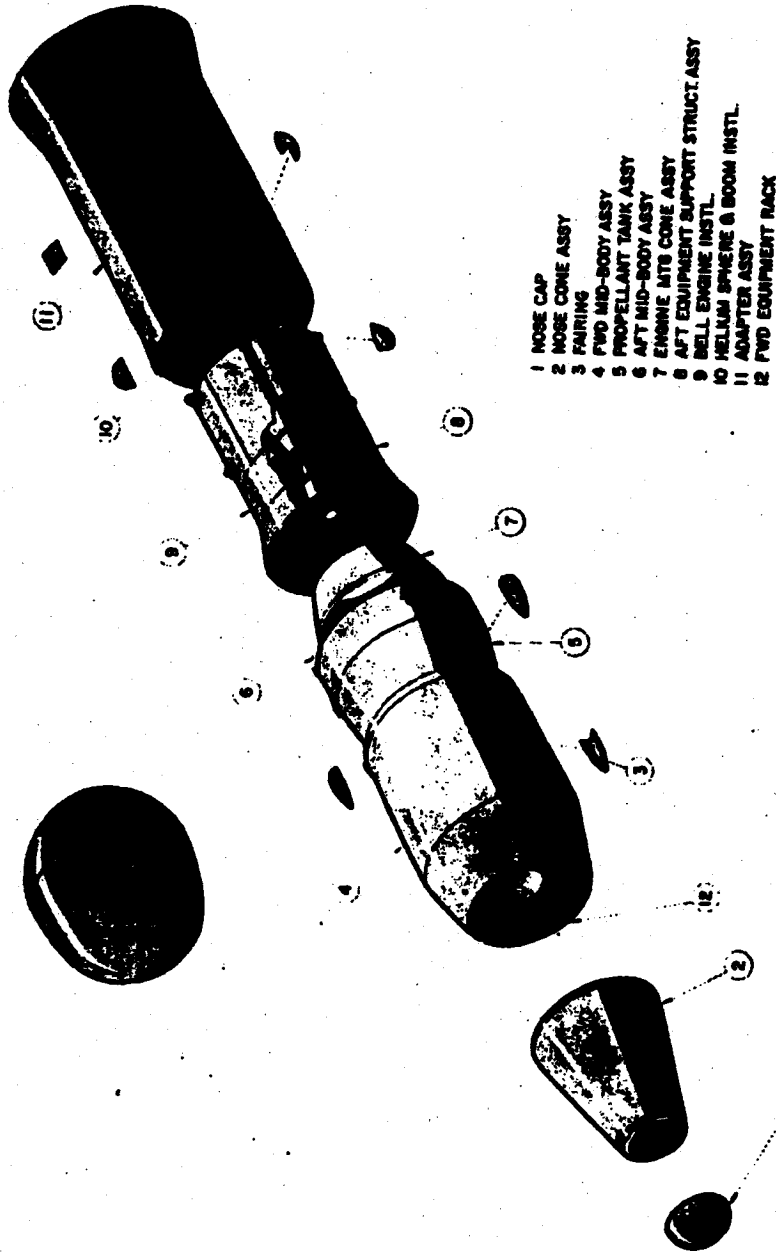
~~SECRET~~

LOCKHEED AIRCRAFT CORPORATION
ANN ARBOR, MICHIGAN

~~CONFIDENTIAL~~



~~CONFIDENTIAL~~



LOCKHEED AIRCRAFT CORPORATION
Missile Division

~~CONFIDENTIAL~~

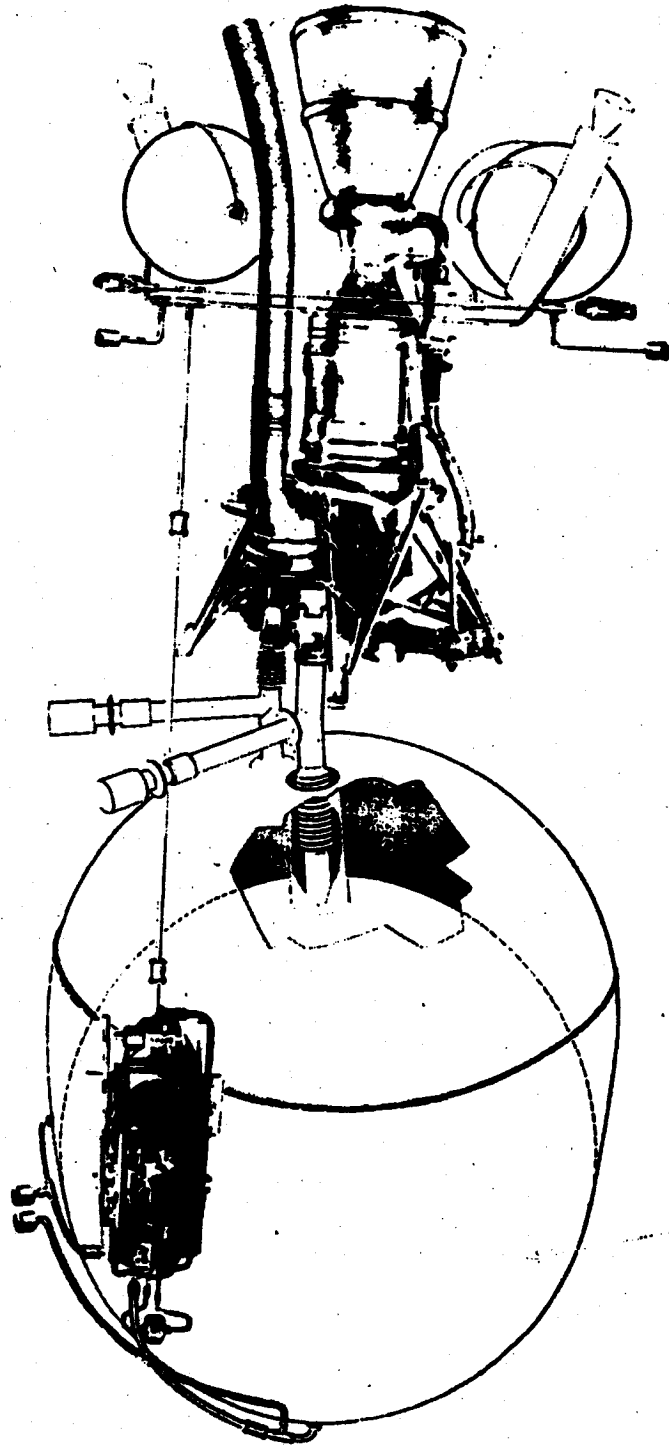
P-406 (1) 88A 6/13/58
WD-58-03495

LOCKHEED AIRCRAFT CORPORATION

~~CONFIDENTIAL~~

MISSILE SYSTEMS DIVISION

This document contains information affecting the national defense of the United States within the meaning of the Espionage Laws, Title 18



ULLAGE ROCKETS

CONTROL JETS
NITROGEN SUPPLY

JP4

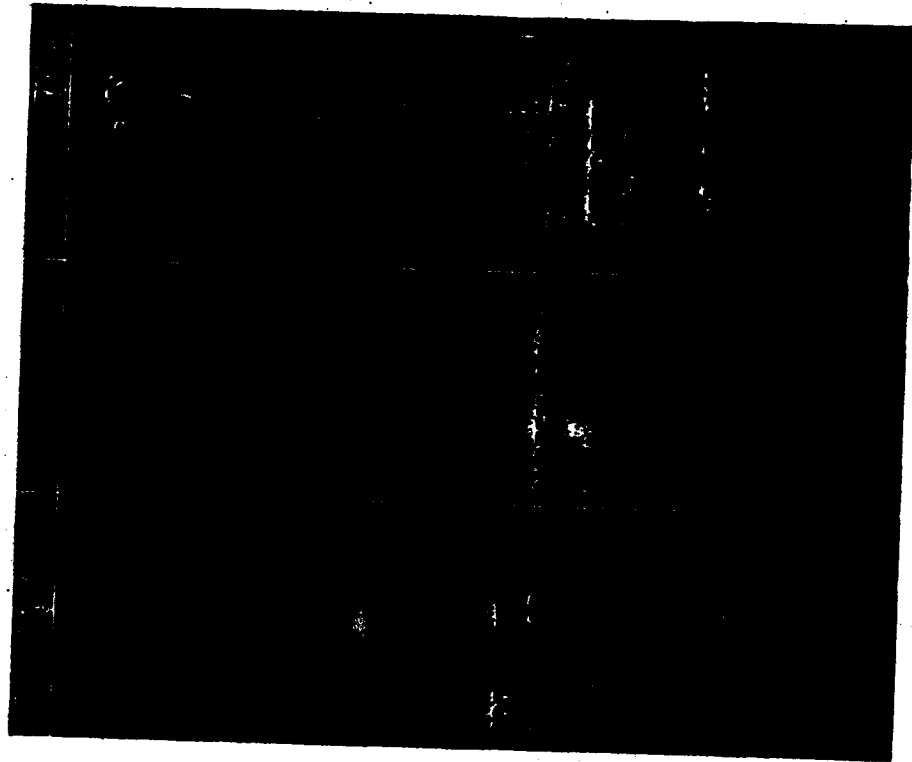
IRFNA

P-422 (2) 85-8 3/21/58
WD-58-01286

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



LOCKHEED AIRCRAFT CORPORATION
Missile Systems Division

P 315 (A) 88 "C" 3/13/76

~~SECRET~~

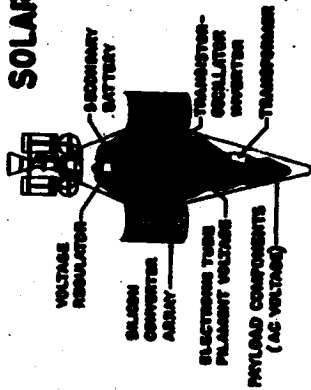
~~SECRET~~

ADVANCED AIRBORNE POWER SOURCES

SECRET

SECRET

SOLAR



CHARACTERISTICS

- (1) 10% CONVERSION 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 BURNON
- (4) TWILIGHT ORBIT ADVANTAGES: CONSTANT IRRADIATION AT NORMAL INCIDENCE, NO HELIO-TROPIC/COOLER CALLS (MAKING MANEUVERING EASIER EFFICIENCY

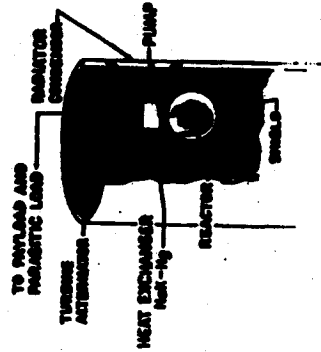
TWILIGHT ORBIT



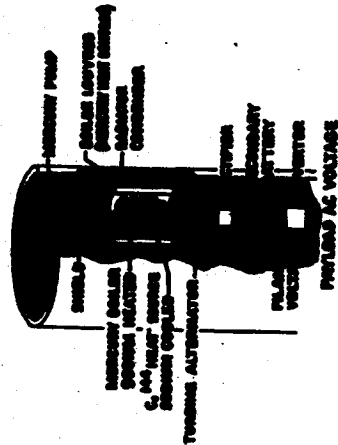
NUCLEAR REACTOR

CHARACTERISTICS

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



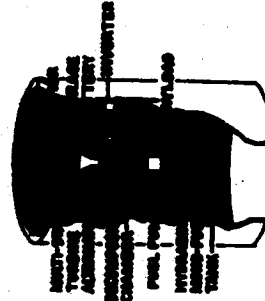
ISOTOPE



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
- (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 SCENTRICITY CONTROL
- (3) POWER LEVEL EASILY CONTROLLABLE

P102 4/19/57

SECRET

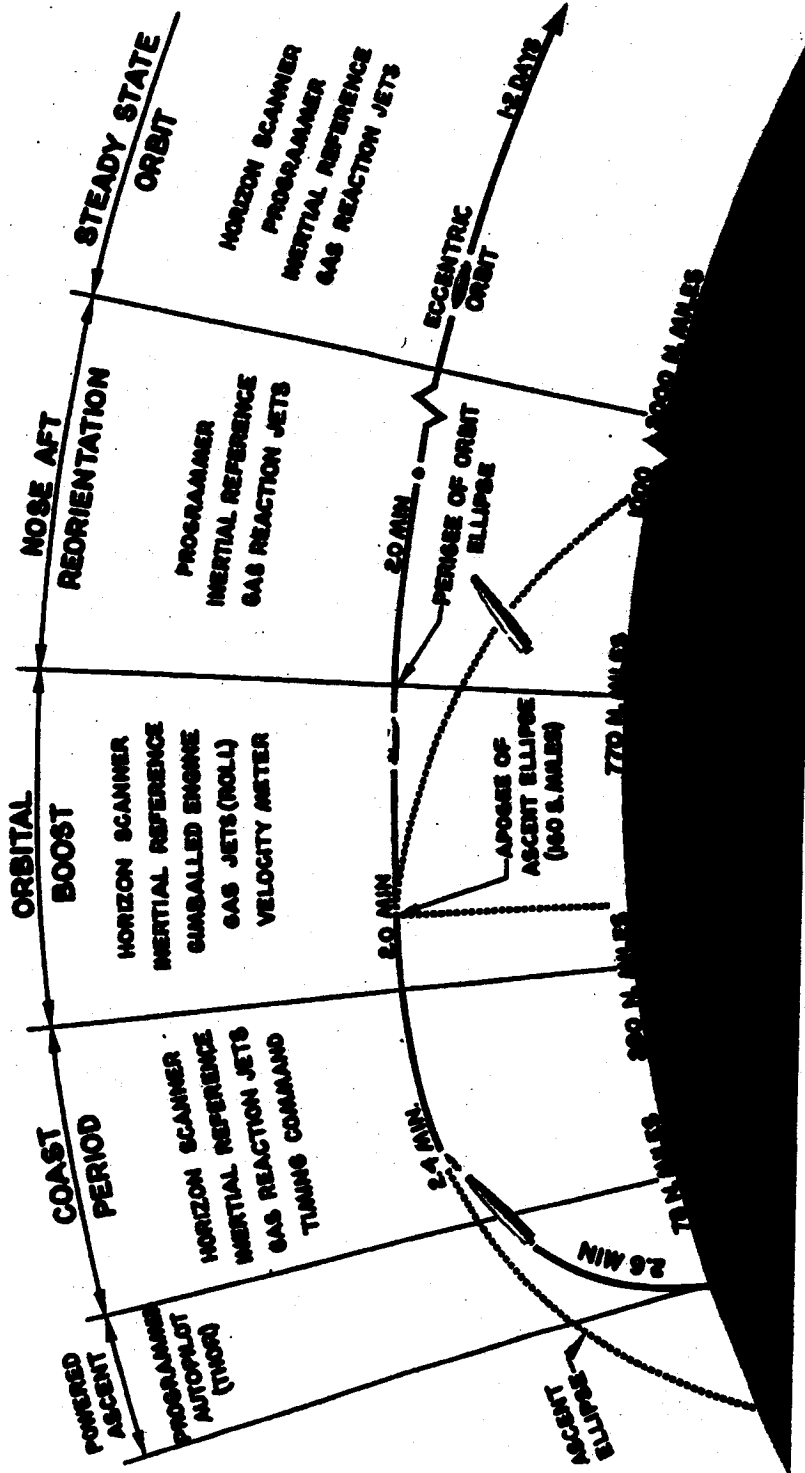
LOCKHEED AIRCRAFT CORPORATION
MISSILE SYSTEMS DIVISION

~~SECRET~~

~~SECRET~~

GUIDANCE & CONTROL SYSTEM

TYPICAL SENTRY ASCENT (THOR-PROG IIA)



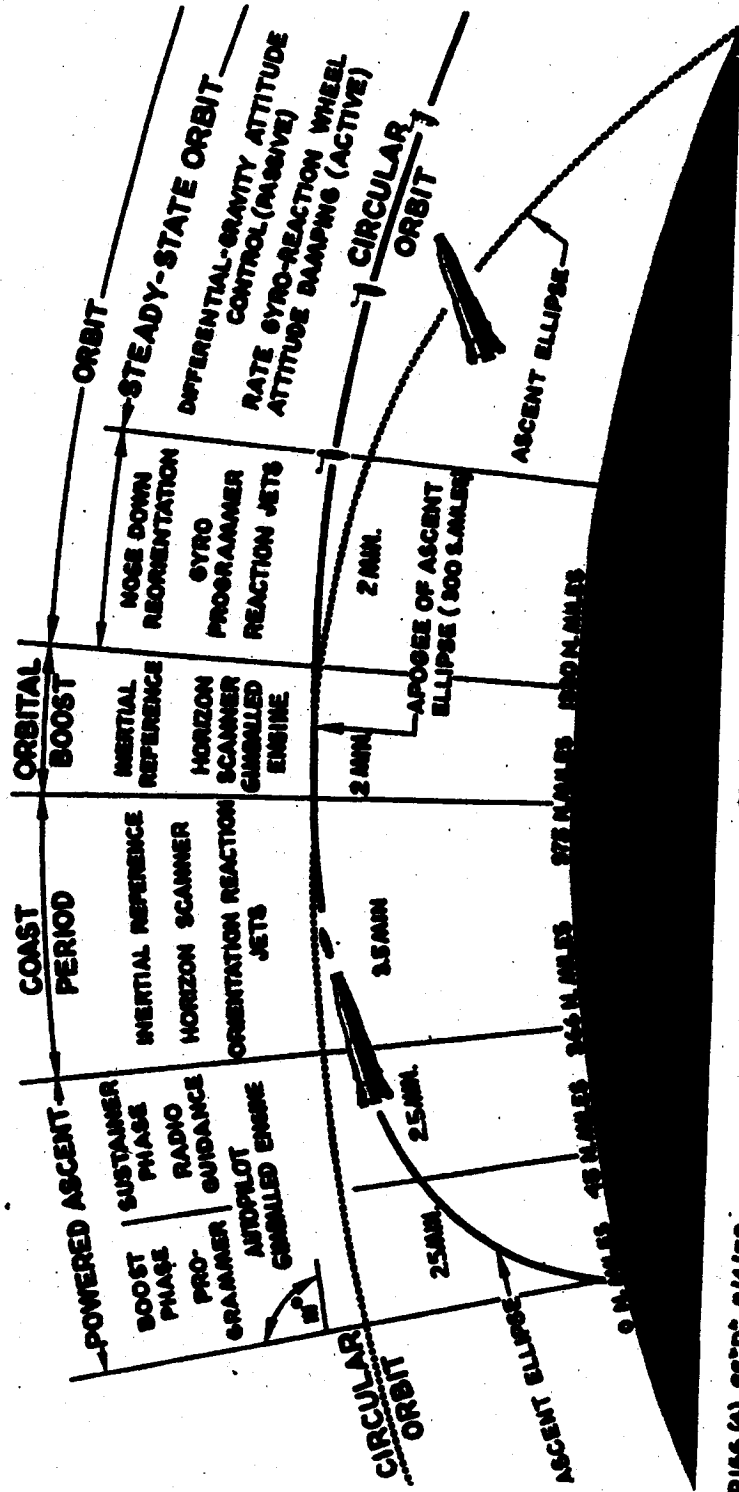
P 763 SS'D 8/4/58
WD-58-05183

~~SECRET~~

SECRET

GUIDANCE & CONTROL SYSTEM

TYPICAL SENTRY ASCENT (ATLAS-PROG. I)



P166 (4) 887D 8/4/58
WD-58-05163

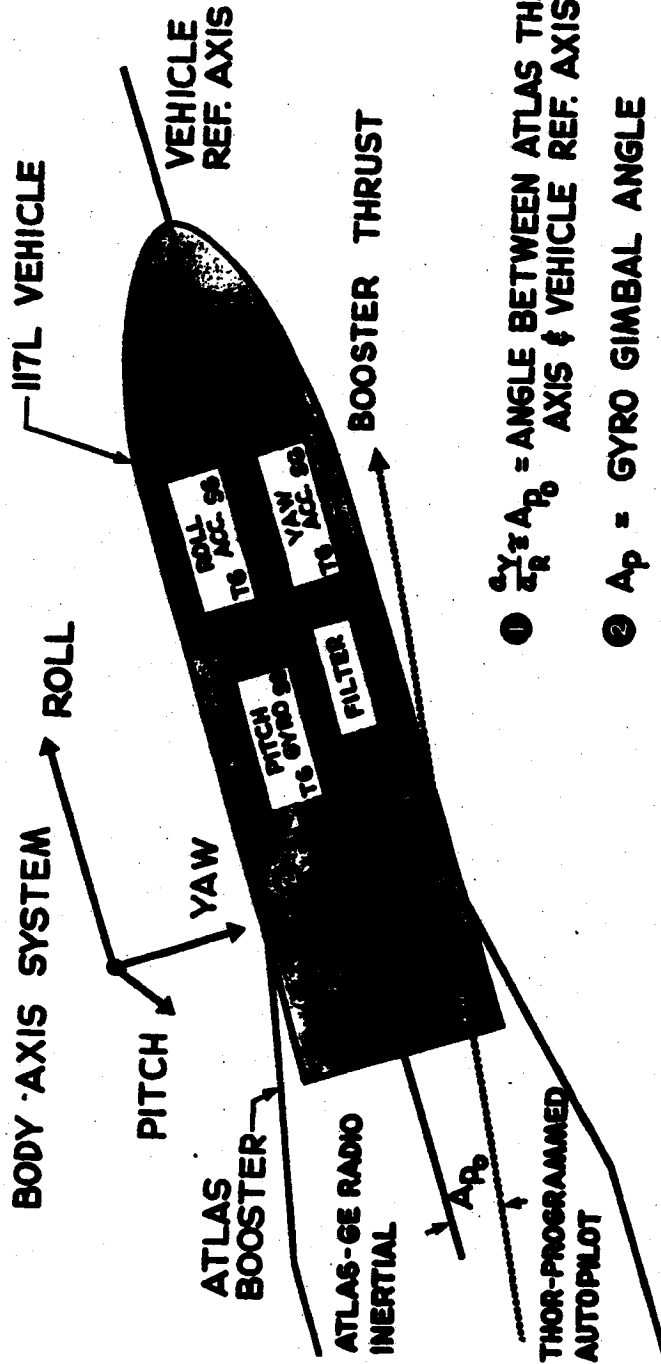
SECRET

UNCLASSIFIED

~~SECRET~~

SENTRY ASCENT BOOST PHASE

GUIDANCE & CONTROL FUNCTIONING COMPONENTS



- ① α_{P_0} = ANGLE BETWEEN ATLAS THRUST AXIS & VEHICLE REF. AXIS
- ② A_p = GYRO GIMBAL ANGLE

P. 707 (1) 987 3/22/56
WD-M. 04445

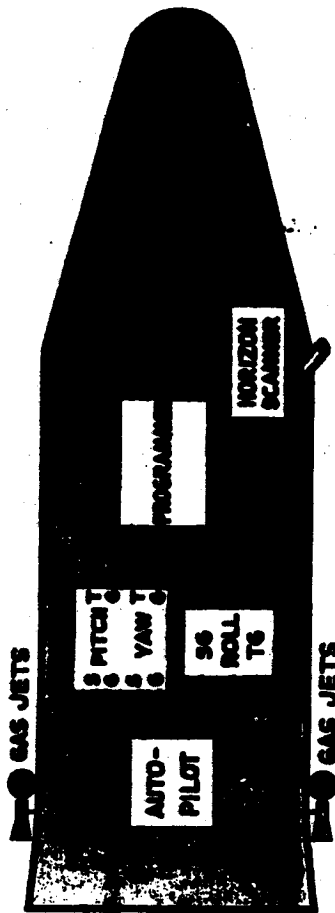
SECRET

SECRET

~~SECRET~~

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) 35 "D" 7122/68
WP-88-04448

~~SECRET~~

UNCLASSIFIED CONFIDENTIAL

SECRET

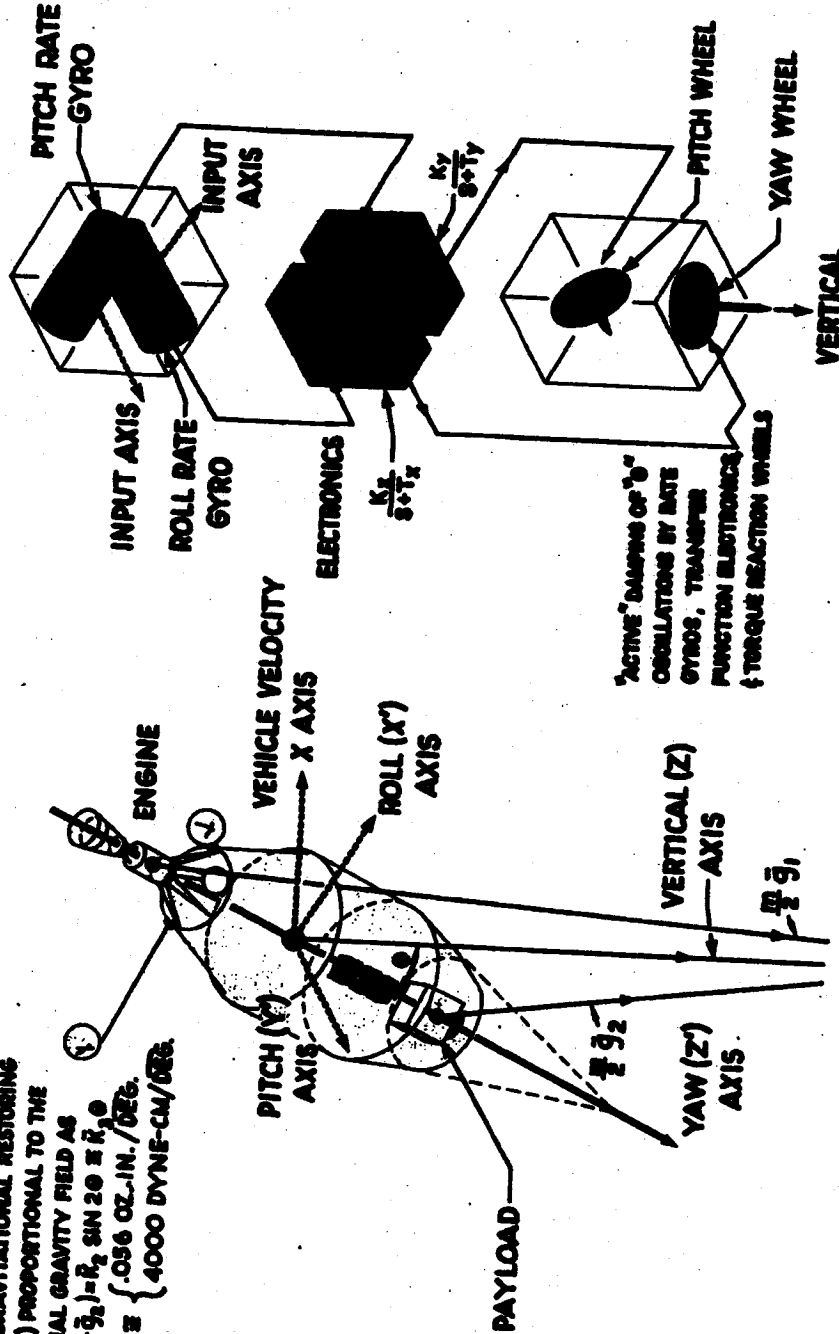
(PITCH CASE-TYPICAL)

SECRET

"PASSIVE" GRAVITATIONAL RESTORING TORQUE (T) PROPORTIONAL TO THE DIFFERENTIAL GRAVITY FIELD AS

$$\vec{T} = \vec{r} \cdot \nabla (\vec{g}_1 - \vec{g}_2) = \vec{r} \cdot \nabla \sin 2\theta \approx \vec{r} \cdot \nabla \theta$$

K_3 (PITCH) \approx { .056 OZ.-IN./DEG.
4000 DYNE-CM/DEG.



LOCKHEED AIRCRAFT CORPORATION
MISSILE SYSTEMS DIVISION

SECRET

P 16-4 (0-4/2/57)
WD-58-01856

SECRET

WS117L SENTRY VEHICLE WEIGHT

~~SECRET~~

	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) S 7/17/58
WD-58-044-45

SECRET

UNCLASSIFIED

SECRET

TECHNICAL SUMMARY

	PIONEER	ADVANCED		PIONEER	ADVANCED
FOCAL LENGTH	6"	36"	ELECTRICAL POWER REQUIREMENTS		
LENS SPEED	f 2.8	f 2.8		PEAK	300 WATTS
DURATION	9 DAYS	30 DAYS	AVERAGE	660 WATT HR/DAY	660 WATT HR/DAY
STRIP ON GROUND - WIDTH	100 ML	17 ML	SCALE ON VEHICLE FILM	1:3,169,000	1:528,000
STRIP ON GROUND - LENGTH	2000 ML. AVG.	360 ML. INTERMITTENT		RESOLUTION ON GROUND AT LOW (2:1) CONTRAST	100 FT.
AREA COVERED	107 X 10 ⁷ SQ. MI.	9.9 X 10 ⁵ SQ. MI.			
CAMERA WT. INCLUDES FILM & PROCESSOR	300 LB. 3.4 LB.	400 LB. (EST.) 11.4 LB.			

SECRET

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

GROUND ENLARGEMENT 83:1 FOR USE

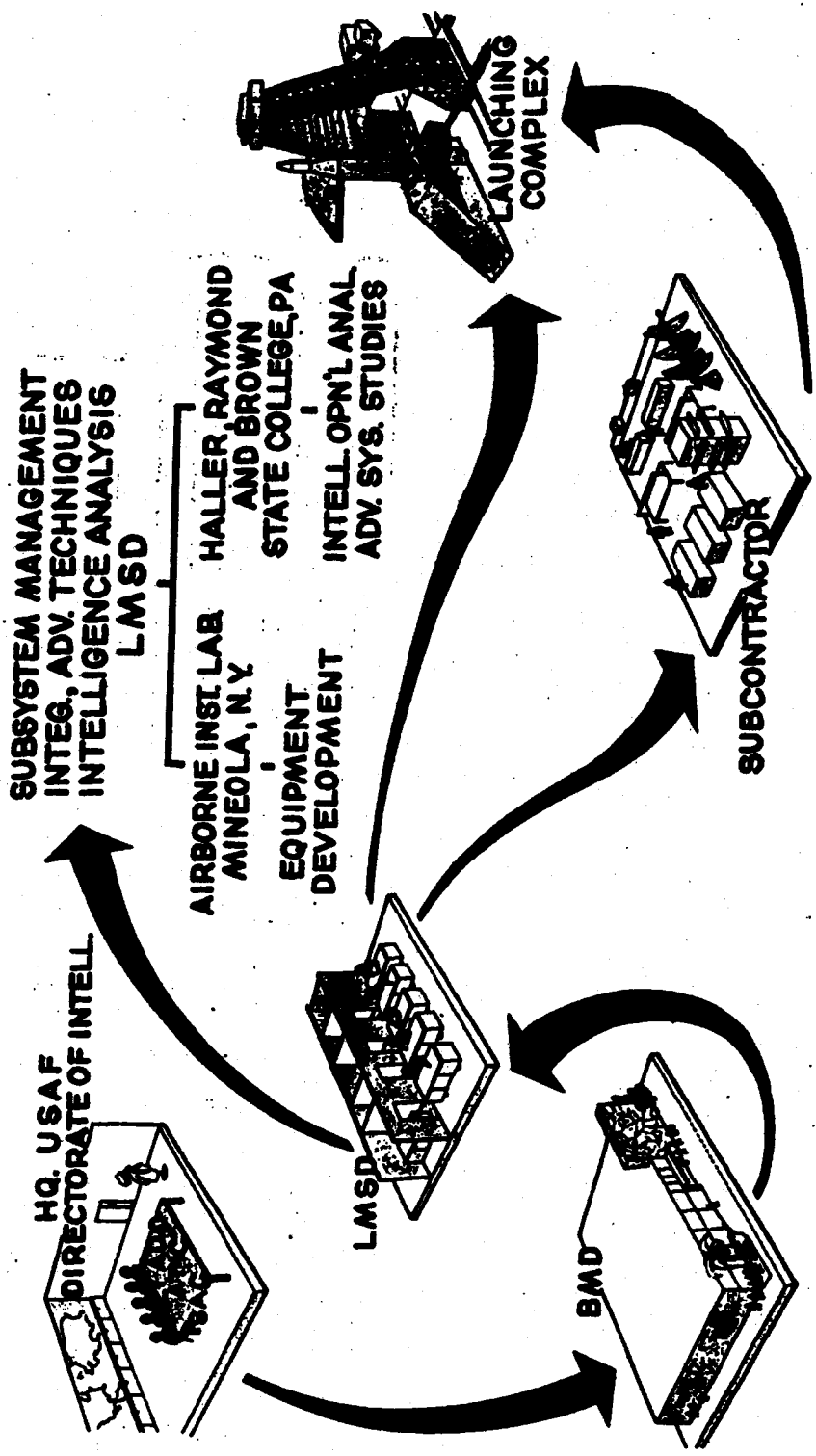
P400 85-8 12/9/57

SECRET

LOCKHEED AIRCRAFT CORPORATION MISSILE SYSTEMS DIVISION

WS117L FERRET SUBSYSTEM-PROJECT STRUCTURE

-SECRET



SECRET

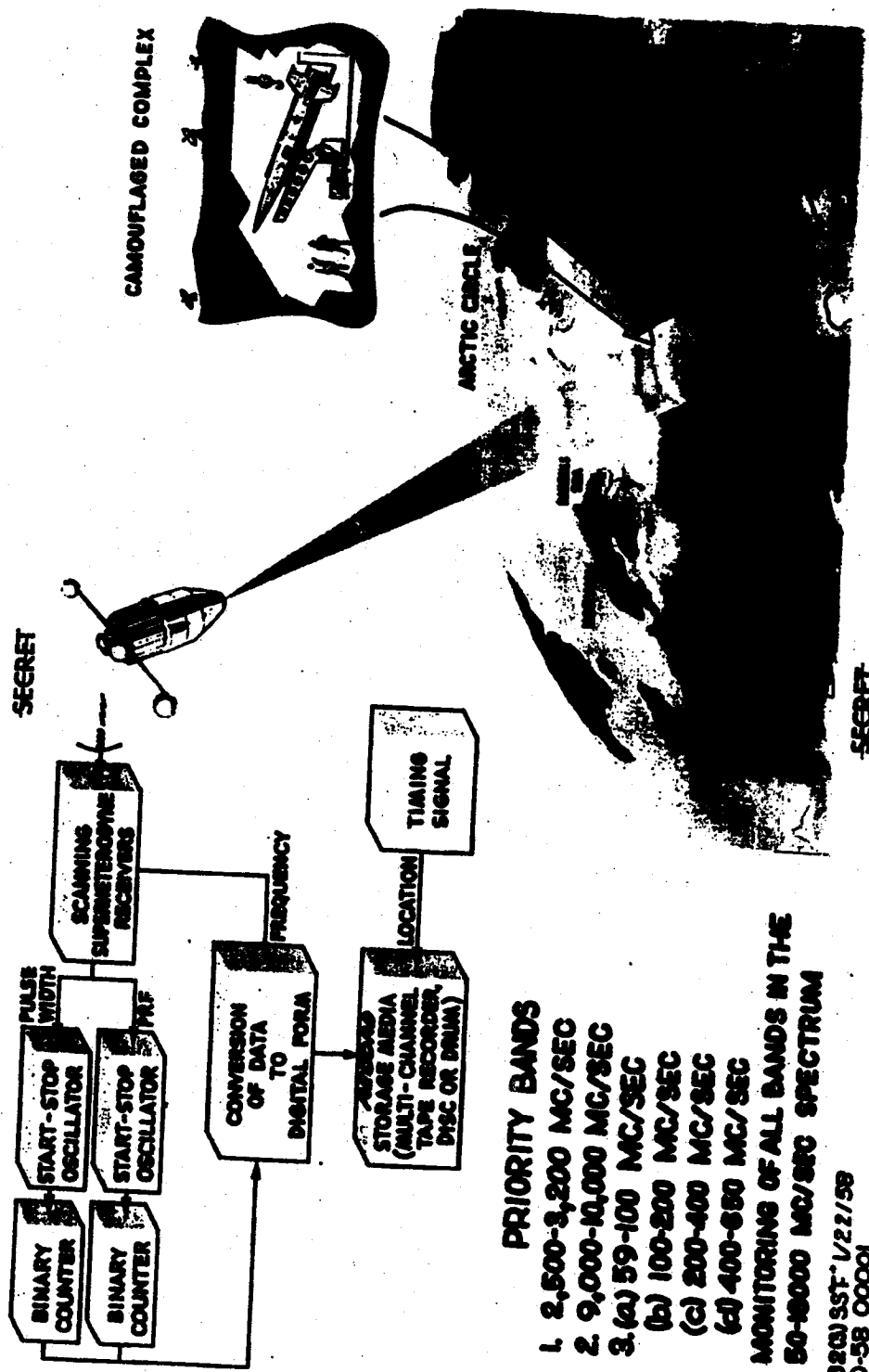
LOCKHEED AIRCRAFT CORPORATION
MISSILE SYSTEMS DIVISION

-SECRET

P 175 (4) 6/30/58 SS "r"
WD-58-03455

AIRBORNE RECEPTION

~~SECRET~~



- 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) 400-660 MC/SEC
- MONITORING OF ALL BANDS IN THE
50-10000 MC/SEC SPECTRUM**

PIB203SST 1/22/58
WD-58 00001

~~SECRET~~



SATELLITE POLAR ORBIT ALT.
APPROX. 1000 NAUTICAL MILES



~~SECRET~~

LOCKHEED AIRCRAFT CORPORATION
MILITARY AIRCRAFT DIVISION

~~SECRET~~

PR-40886-6 5/7/58
WD-58-02843

LOCKHEED AIRCRAFT CORPORATION

~~SECRET~~

MISSILE SYSTEMS DIVISION

This document contains information affecting the national defense of the United States within the meaning of the Espionage Laws, Title 18, U.S.C., Sections 793 and 794, and the Atomic Energy Act, 1954, U.S.C., Section 83c, and its amendments; transmission or revelation of its contents in any manner to an unauthorized person is prohibited by law.

~~SECRET~~



~~SECRET~~

SATELLITE POWER REQM'TS VS. SUPPLY

POWER REQUIREMENTS

UNIT	WATT HR/DAY
TRANSMITTER	171
RECEIVER	117
DECODER	176
TIMER & PROGRAMMER	120
SUBSYSTEM "G"	180
ATTITUDE DAMPING SYST.	240
YAW STAB. GYRO WHEEL	96
TOTAL REQM'T	1100

SOLAR POWER SUPPLY

UNIT	WATT HR/DAY
SOLAR CELL OUTPUT	3796
LOSS: DEGRADATION, CONVERSION STORAGE, REGULATION OTHER	2548
TOTAL USEFUL POWER FOR EQUIP.	1248

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

PG090188-6-6496/88
WD-88-08488

LOCKHEED AIRCRAFT CORPORATION
U.S. AIR FORCE

~~SECRET~~

ICBM ATTACK ALARM SYSTEM

~~SECRET~~

VEHICLE PAYLOAD

EQUIPMENT

DESCRIPTION

INFRARED

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

COMMUNICATIONS

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

AUX. POWER

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

PAGE (1) 886 014/58
WD-58-03455

SECRET

LOCKHEED AIRCRAFT CORPORATION
MADE IN THE USA

SECRET

PROPOSED ICBM ATTACK ALARM SYSTEM

SECRET

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-NORTHEAST, NORTHWEST, & SOUTH CENTRAL
 - SAME UHF INSTALLATIONS AS PROGRAMS I, II, & III
(IF VHF IS UTILIZED, ADDITIONAL EQUIPMENT REQUIRED)

3. READ OUT STATIONS, FAIRBANKS, ALASKA
 - 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 03 55 '6' 014/58
WD-58-034-58

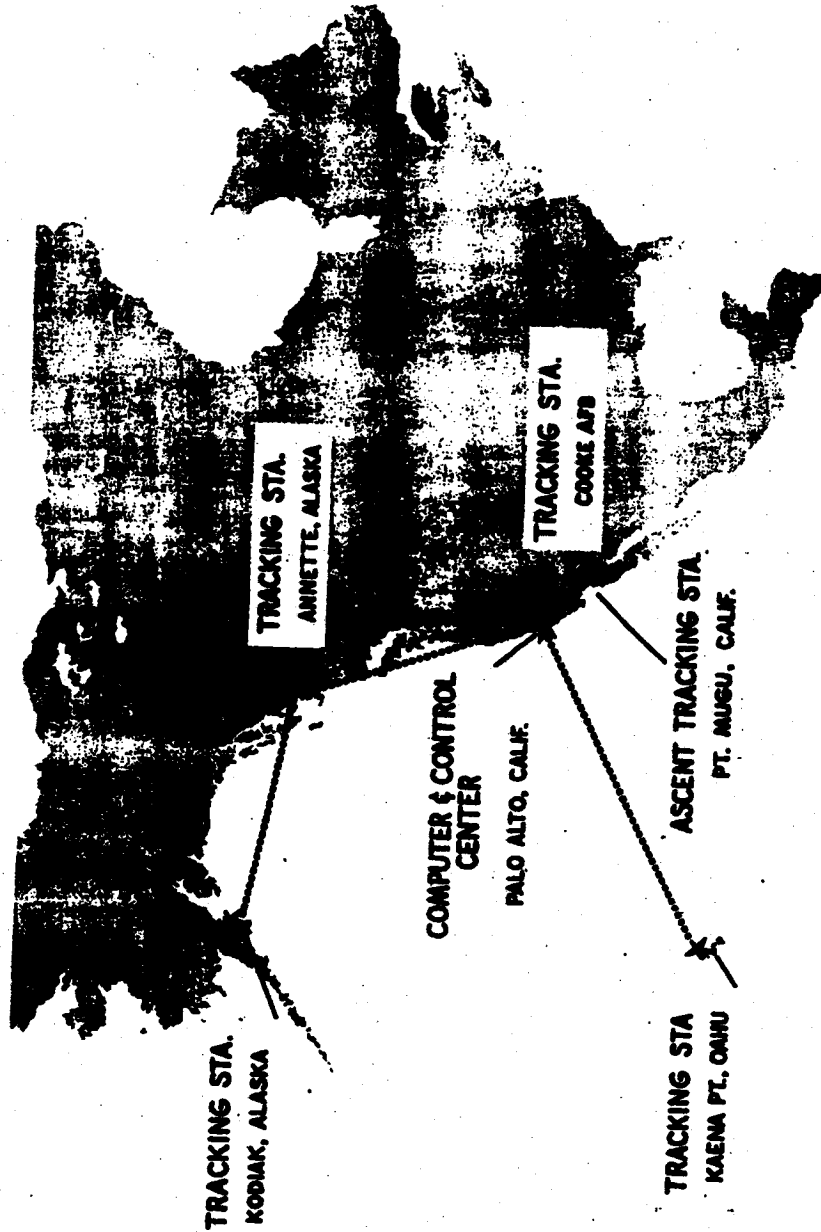
SECRET

LOCKHEED AIRCRAFT CORPORATION
MISSILE SYSTEMS DIVISION

~~SECRET~~

~~SECRET~~

STATION LOCATIONS (THOR)



~~SECRET~~

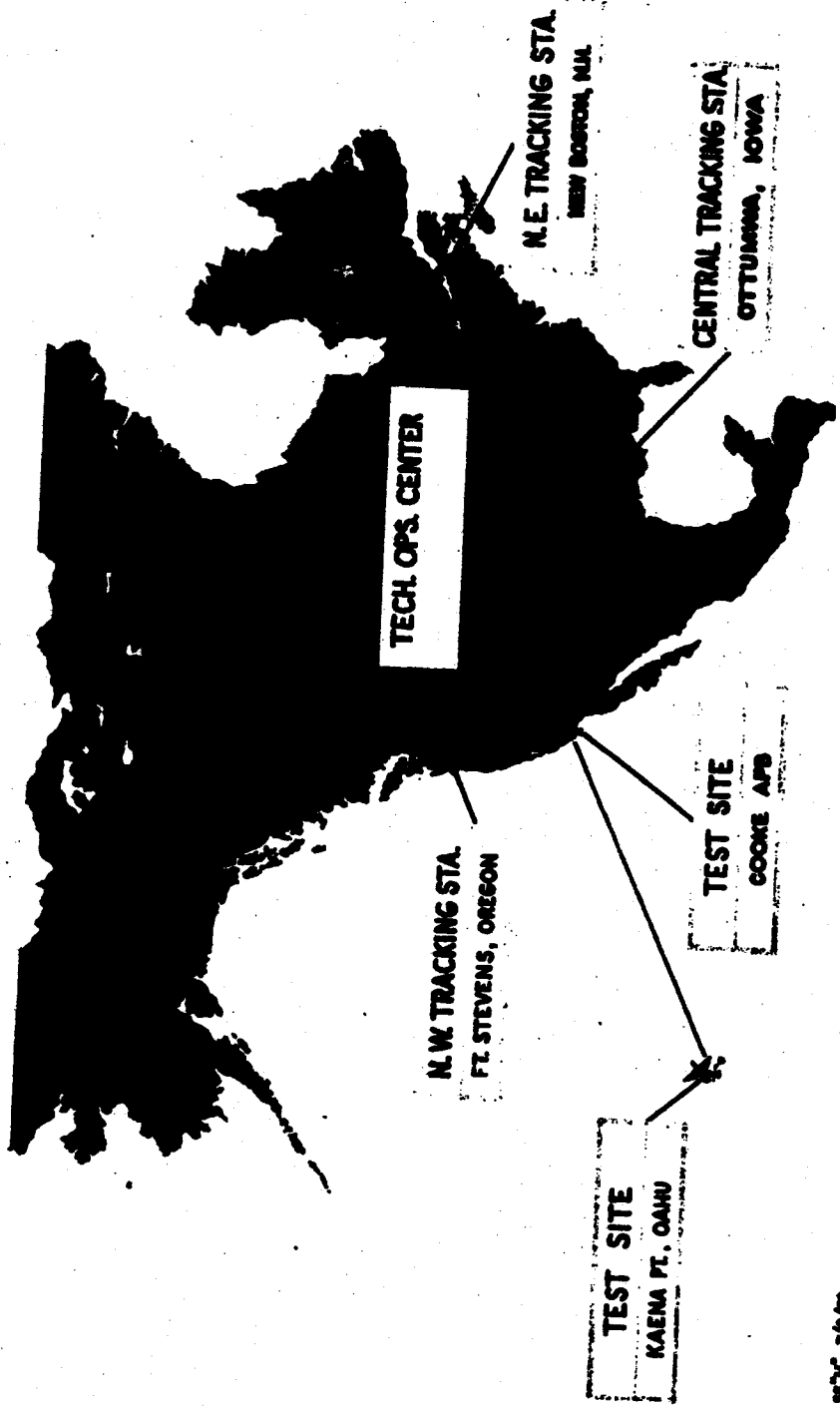
~~SECRET~~

P 809 09 25 74 7/4/78
WP-88-04445

SECRET

~~SECRET~~

STATION LOCATIONS (ATLAS)

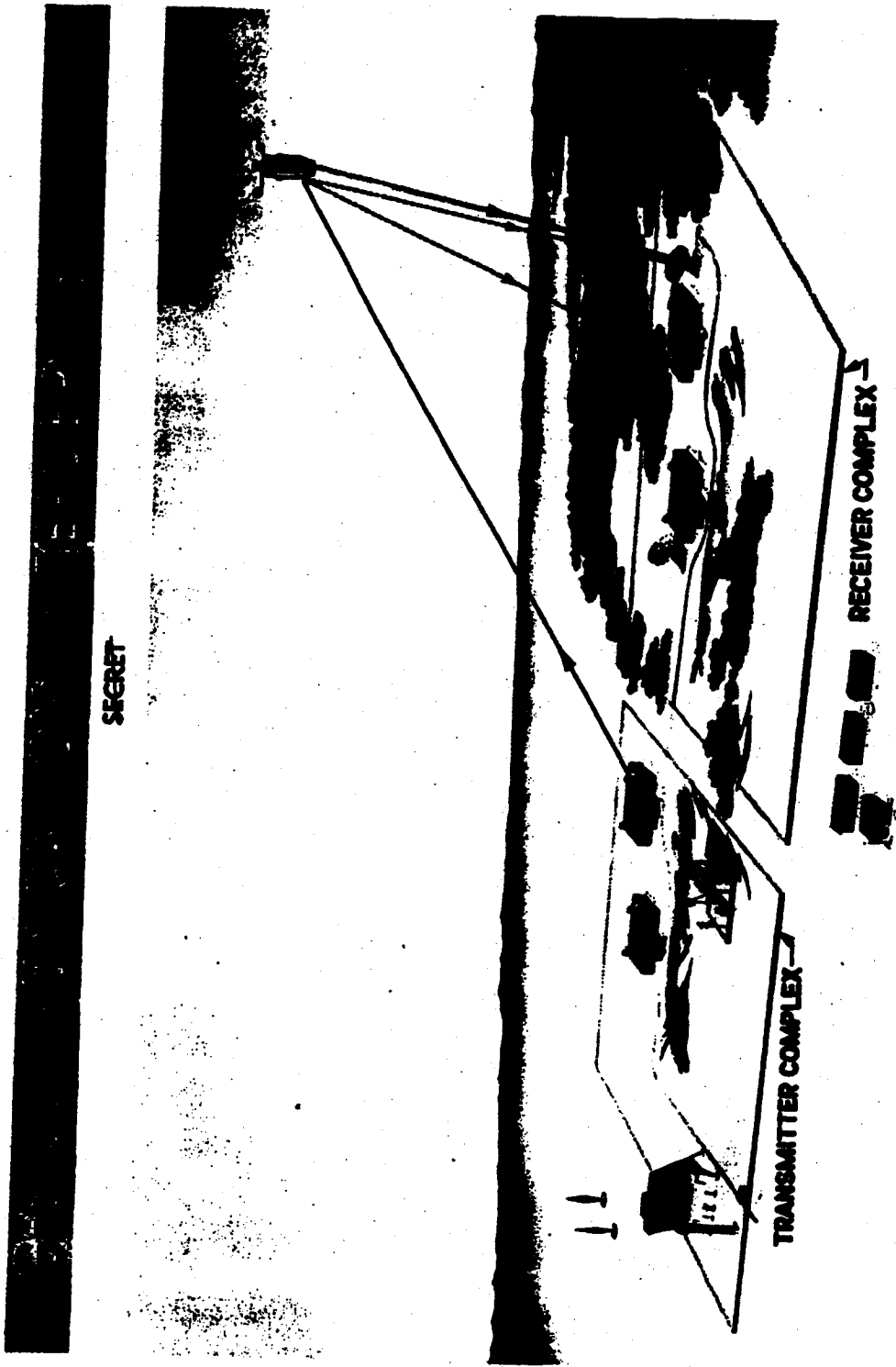


ISSUED UNDER EXECUTIVE ORDER

SECRET

PR 1088 2574 7/19/68
WB-55-04415

SECRET



SECRET

LOCKHEED AIRCRAFT CORPORATION
MISSILE SYSTEMS DIVISION

SECRET

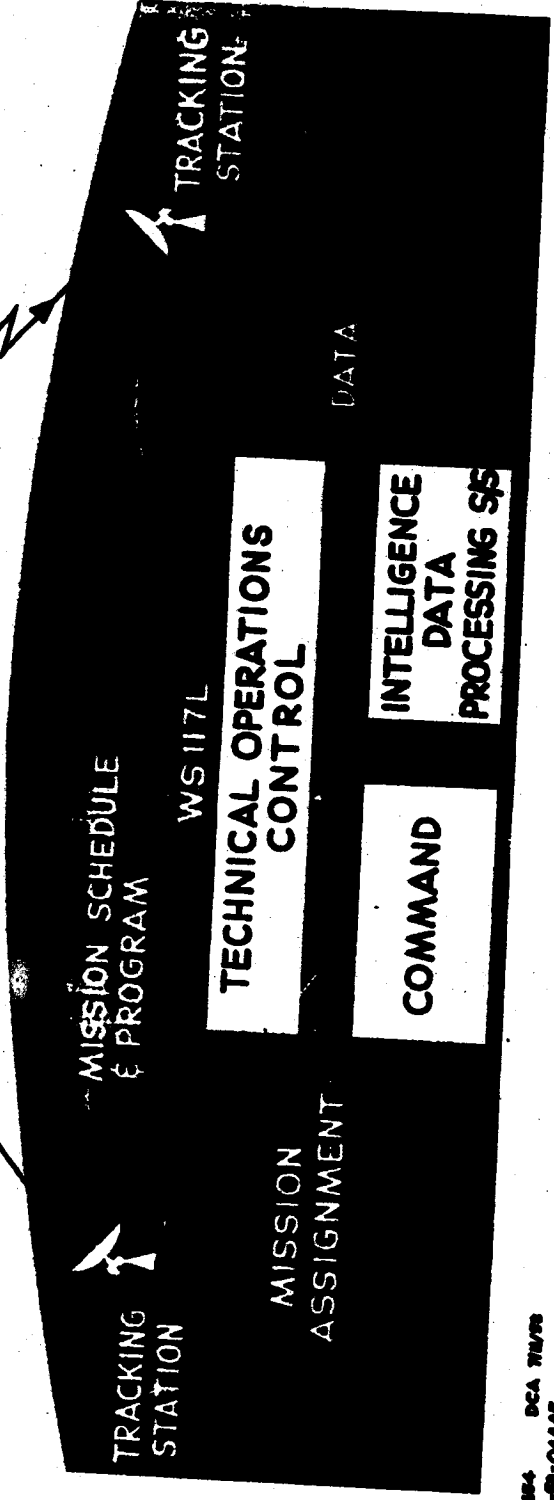
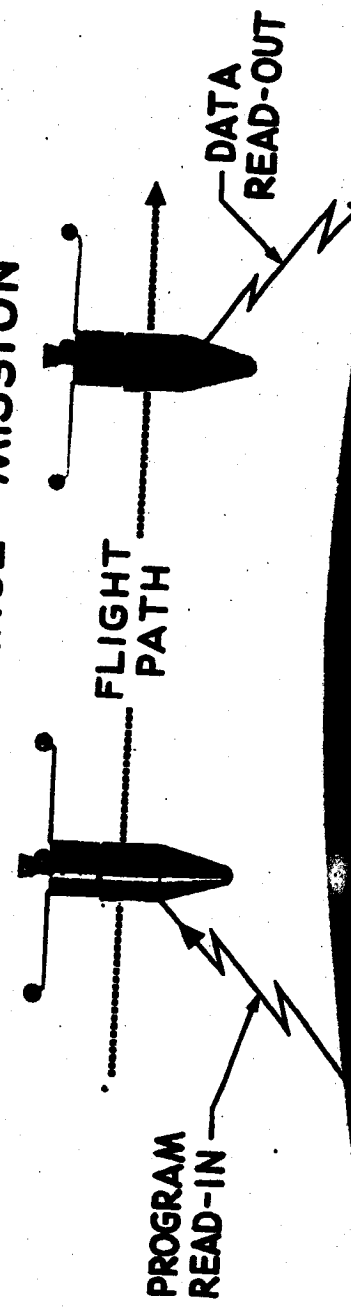
P 163(2) SS-H 7/16/57

~~SECRET~~

WS117L DATA CONTROL

~~SECRET~~

RECONNAISSANCE MISSION



P-004 DCA 7117L
WD-00-01448

~~SECRET~~

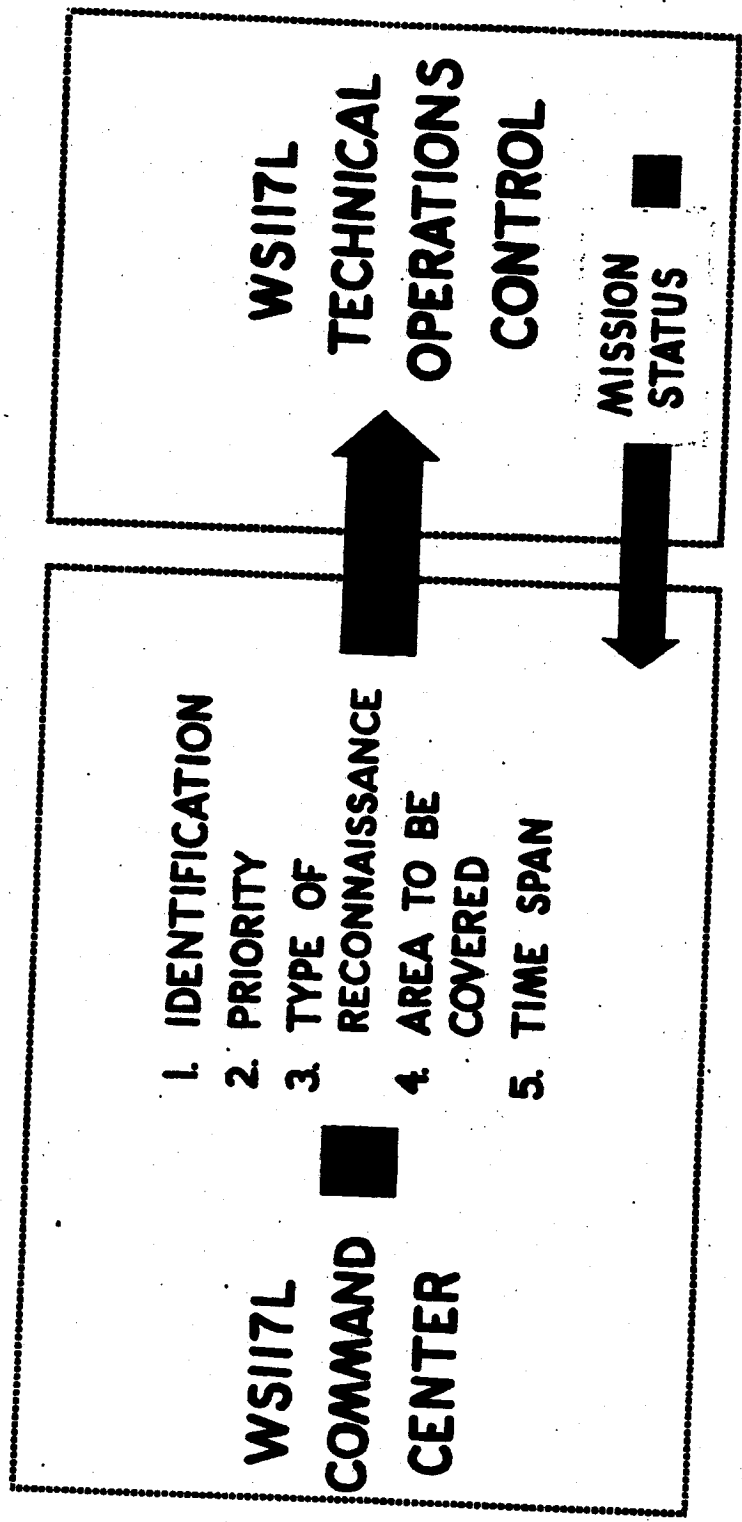
UNCLASSIFIED

~~SECRET~~

~~SECRET~~

WS117L DATA CONTROL

RECONNAISSANCE MISSION ASSIGNMENT



~~SECRET~~

P-885 DCA 7/11/78
WD-88-04445

~~SECRET~~

WS117L DATA CONTROL

DATA INDEXING

TRACKING DATA 

ATTITUDE 

VEHICLE TIME DRIFT 

DATA

PERFORMANCE DATA

CONTROL

OPERATIONS

~~INTELLIGENCE DATA INDICES~~ 

CALIBRATION DATA

PERFORMANCE STANDARDS

P-652(1) 5 7/22/58
WD-58-04445

~~SECRET~~

~~SECRET~~

~~SECRET~~



~~SECRET~~

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 3/24/56
WD-58-01368

~~SECRET~~

LOCKHEED AIRCRAFT CORPORATION
MISSILE SYSTEMS DIVISION

~~SECRET~~

FLIGHT MISSIONS & OBJECTIVES

PROGRAM II A

FLI	NOM. CIRCULAR ORBIT ENERGY ALT. S.ML	EMPTY WT. ON ORBIT	ATT.	PAYLOAD	FUEL	NOZZLE EXP. RATIO	FLI. OBJECTIVES
1	225	1275	VERT.		JP4/IRFNA	14.85:1	PHASE A ENGINEERING TESTS
2	190	1359	"		"	"	PHASE A ENGINEERING TESTS
3 & 4	145 ($H_0 = 125$ S.ML @ $e = .02$ 163° LAUNCH AZIMUTH)	1547	HORIZ.	195" CAPSULE ALBEDO FLI 3 DENSITY FLI 4	"	"	BIO-MEDICAL EXPERIMENT
5-7-9	240	1458	"	GRD ALBEDO DENSITY COSMIC RAY	UDMH/IRFNA	20:1	PHASE B ENGINEERING TESTS
6-8 & 10 THRU 14	160 ($H_0 = 140$ S.ML @ $e = .02$ 180° LAUNCH AZIMUTH)	1649	"	250 LB. CAPSULE	"	"	BIO-MEDICAL EXPERIMENT

PSPI (0) 5 24/158
WD-88-04445

~~SECRET~~

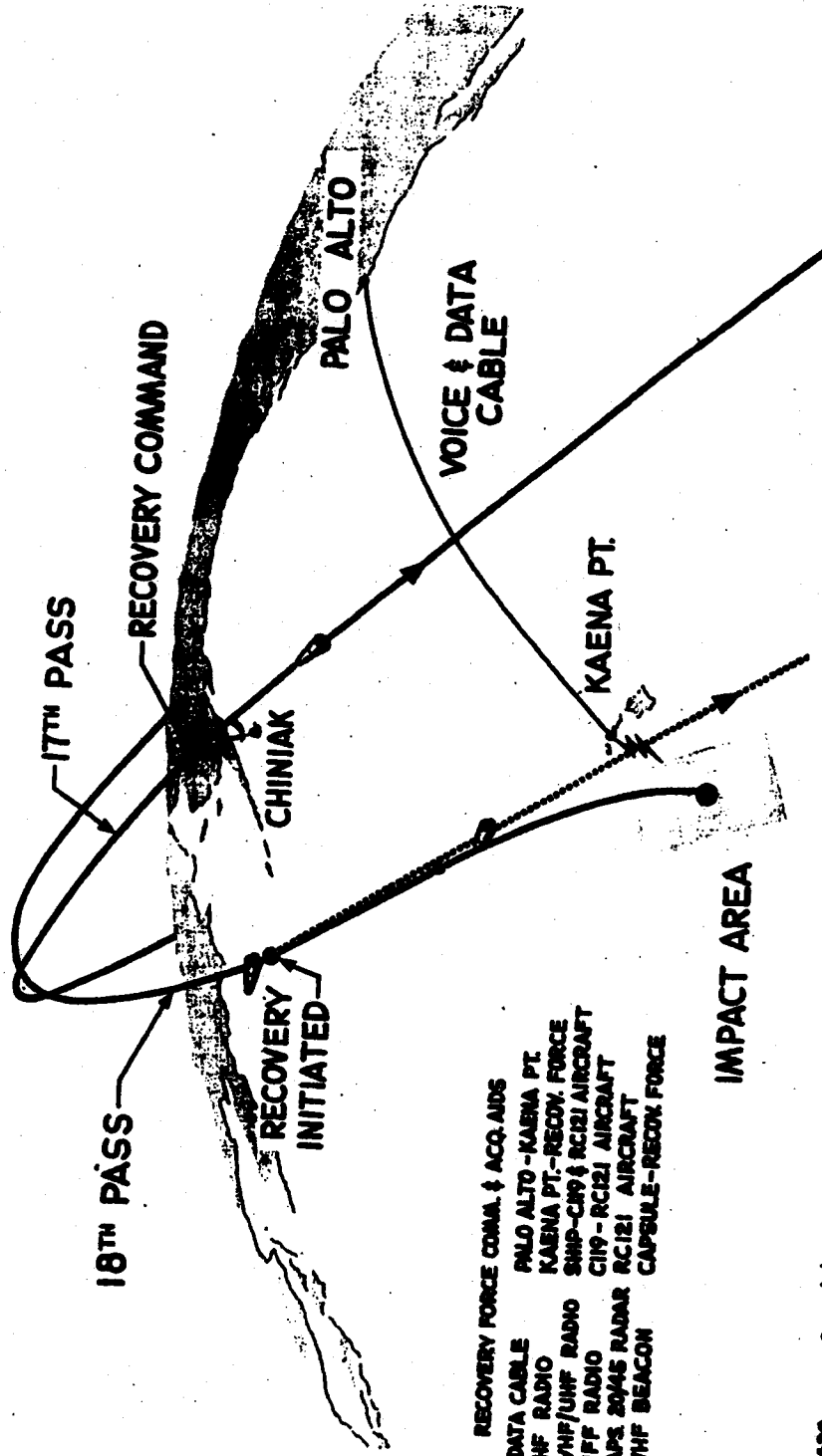
UNCLASSIFIED

~~SECRET~~

~~SECRET~~

WS117L RECOVERY ORBITS

PROGRAM IIA



- RECOVERY FORCE COMMA. & ACQ. AIDS
- DATA CABLE
- HF RADIO
- VHF/UHF RADIO
- IFF RADIO
- APS 2045 RADAR
- VHF BEACON
- PALO ALTO - KAENA PT.
- KAENA PT. - RECOV. FORCE
- SHP-C119 & RC121 AIRCRAFT
- C119 - RC121 AIRCRAFT
- RC121 AIRCRAFT
- CAPSULE-RECOV. FORCE

P689 50 7/1/58
WD-50-04445

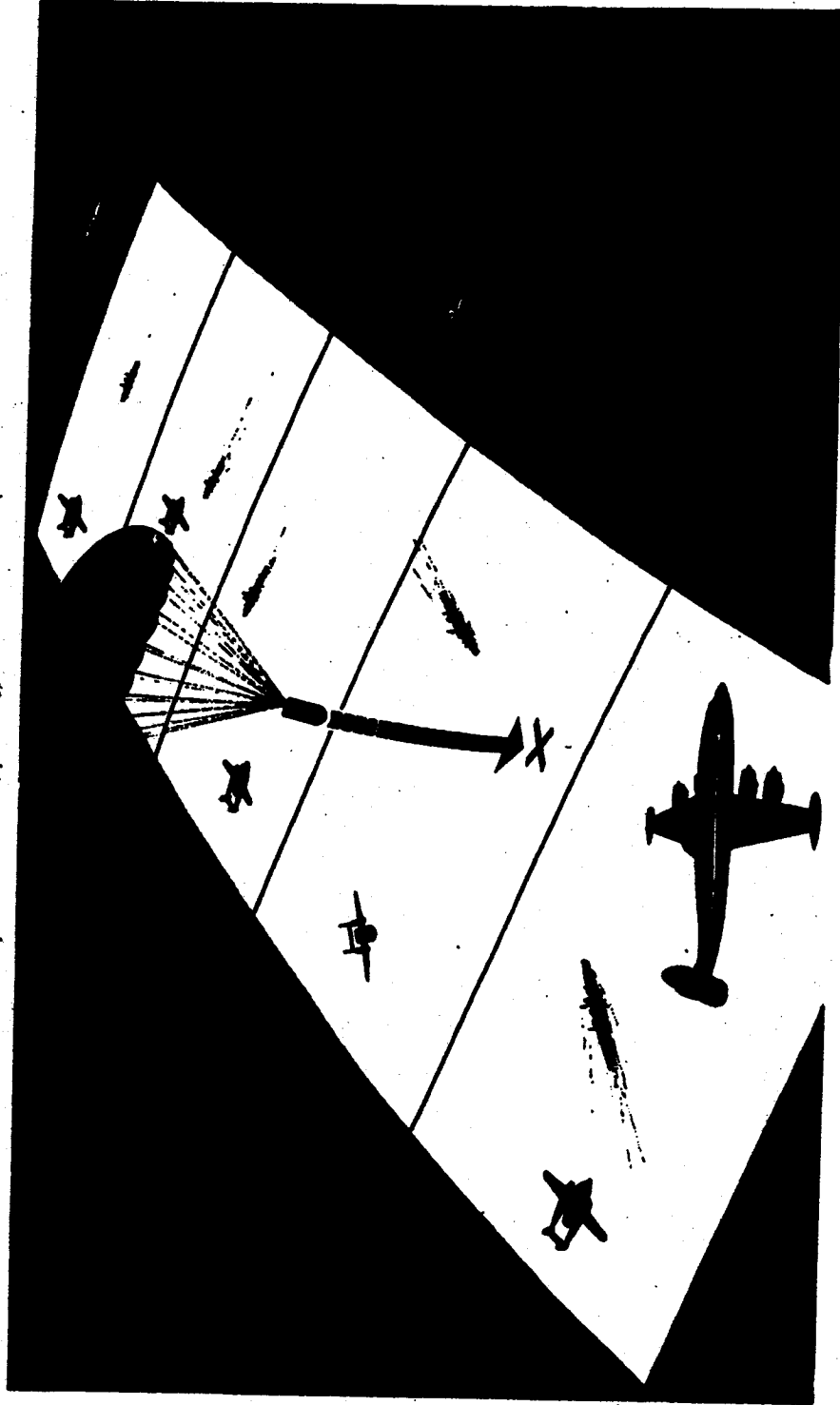
SECRET

UNCLASSIFIED//FOR OFFICIAL USE ONLY

~~SECRET~~

SECRET

SENTRY RECOVERY OPERATIONS



LOCKHEED AIRCRAFT CORPORATION
Missile Systems Division

~~SECRET~~

P 661 (D) 90 6/24/78
WD-86-09485

LOCKHEED AIRCRAFT CORPORATION

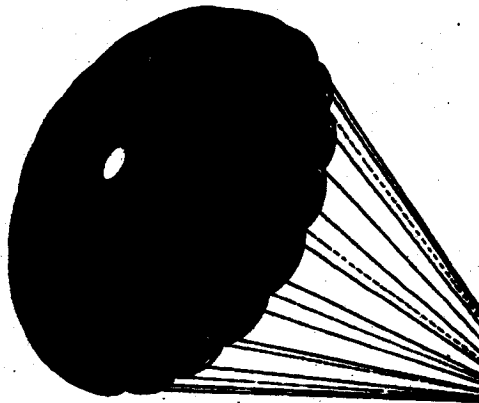
~~SECRET~~

MISSILE SYSTEMS DIVISION

~~SECRET~~

PROGRAM IIA

~~SECRET~~



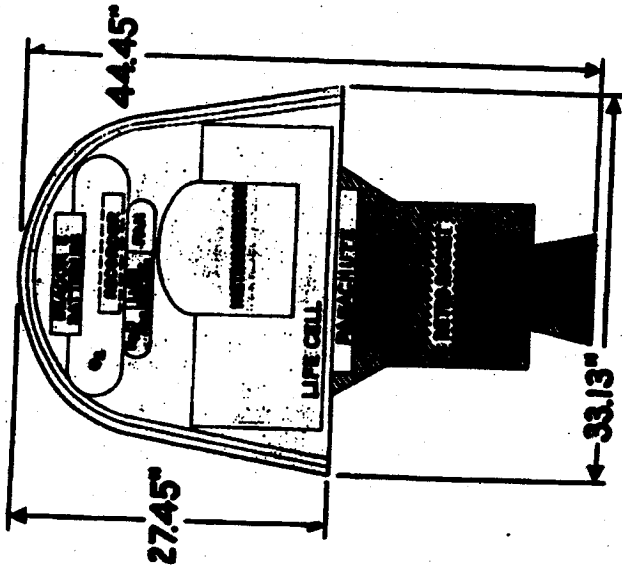
P 577 20 9/24/78
WB-56-08-488

~~SECRET~~

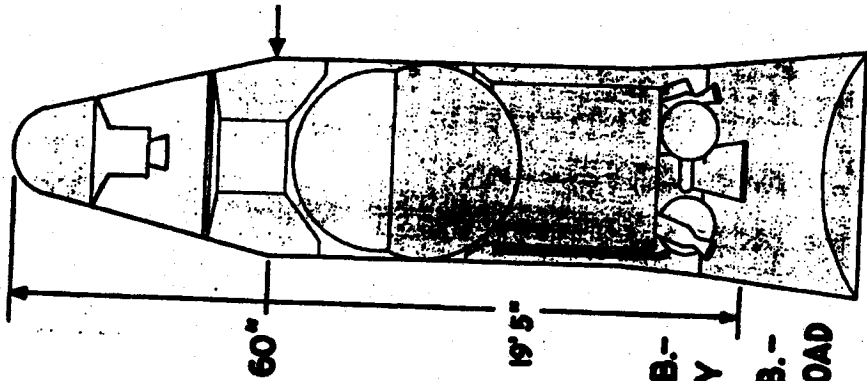
LOCKHEED AIRCRAFT CORPORATION
MILITARY PROGRAMS DIVISION

~~SECRET~~

195 LB. - JP4
279 LB. - UDMH

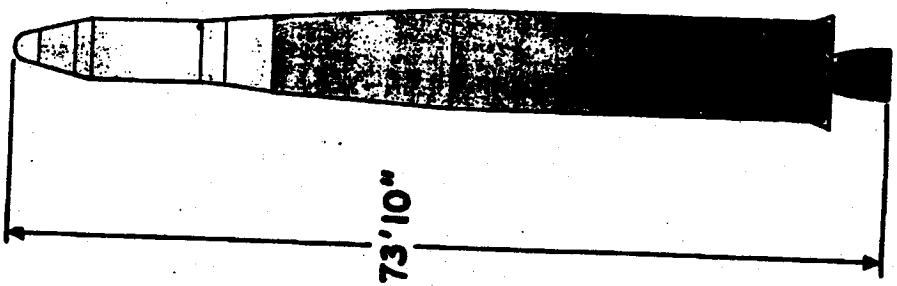


LOCKHEED AIRCRAFT CORPORATION
MISSILE SYSTEMS DIVISION



1429 LB. -
EMPTY
7309 LB. -
THOR-PAYLOAD

~~SECRET~~

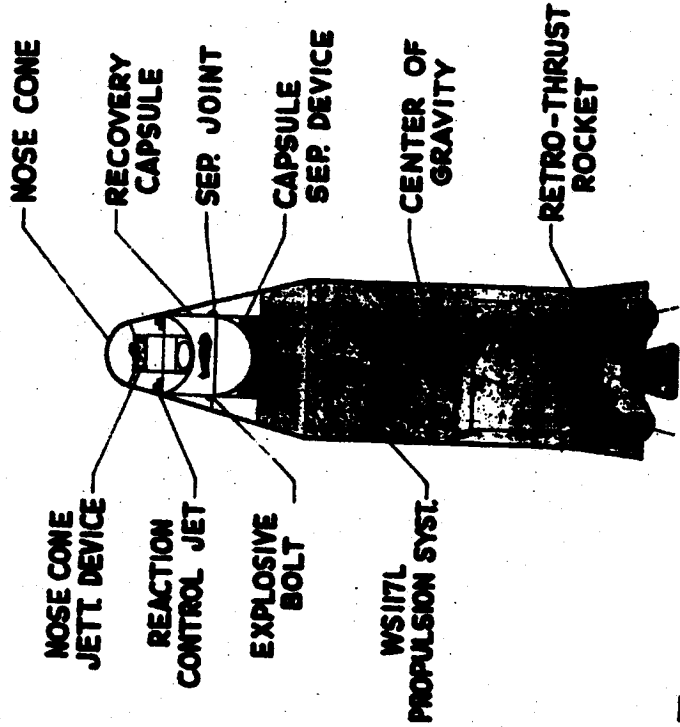


PE440887L 6/3/50
WD-58-03455

~~SECRET~~

~~SECRET~~

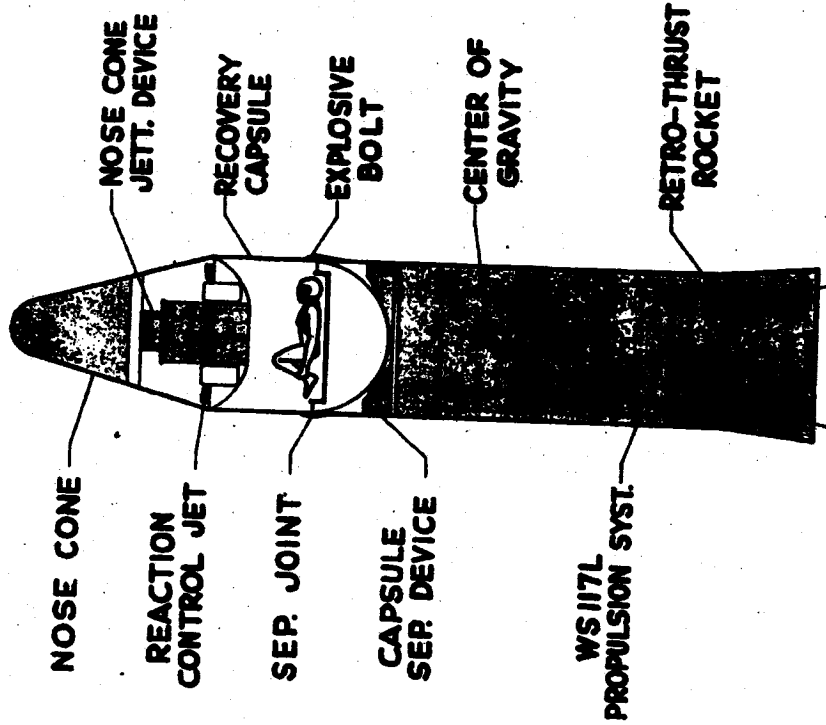
SMALL ANIMAL



LOCKHEED AIRCRAFT CORPORATION
MISSILE SYSTEMS DIVISION

~~SECRET~~

MAN



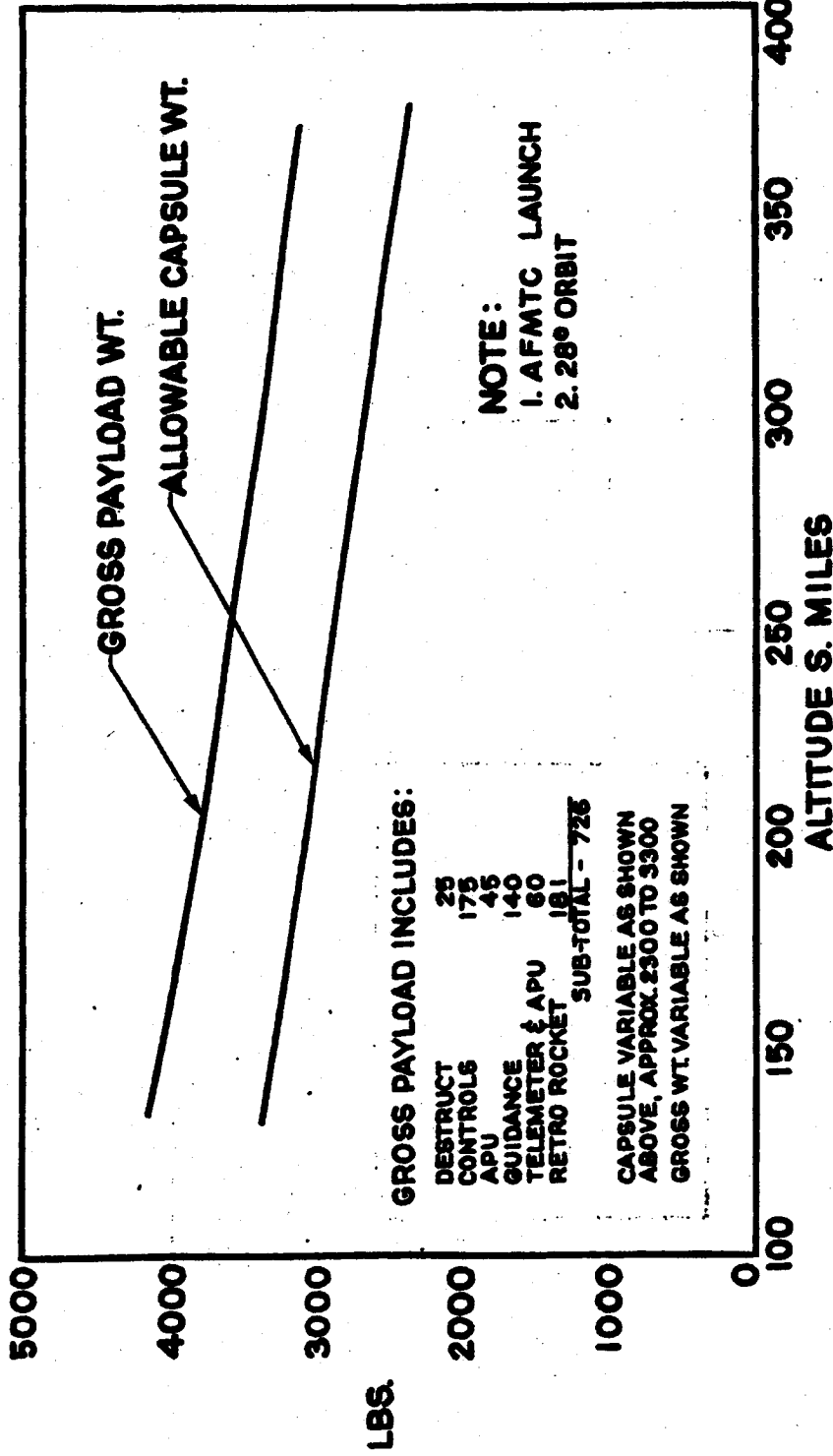
~~SECRET~~

P-475 5 4/30/58
WD-58-0275

PAYLOAD vs. ALTITUDE

-SECRET-

PROPOSED MAN IN SPACE PROG.



P503 SS 'L' 6/3/58
 WD-58-03455

-SECRET-

LOCKHEED AIRCRAFT CORPORATION
 MISSILE SYSTEMS DIVISION

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

PB46 5/29/56
WD-56-02943

~~CONFIDENTIAL~~

LOCKHEED AIRCRAFT CORPORATION
MISSILE SYSTEMS DIVISION

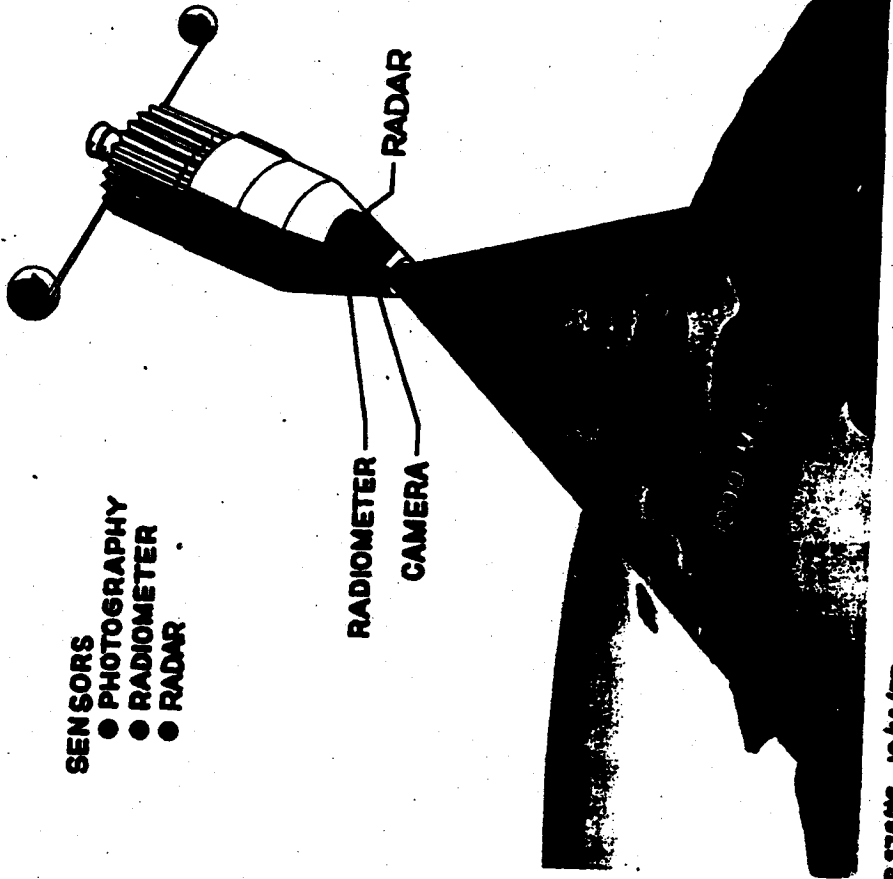
LOCKHEED AIRCRAFT CORPORATION

~~CONFIDENTIAL~~

MISSILE SYSTEMS DIVISION

~~SECRET~~

SENTRY WEATHER SURVEILLANCE



- SENSORS**
- PHOTOGRAPHY
 - RADIOMETER
 - RADAR

- RADIOMETER
- CAMERA
- RADAR



STATUS MOSAIC AT WEATHER CENTER

AFFORDS SYNOPTIC RECORD

- CLOUD TYPE
- CLOUD COVER
- CLOUD VELOCITY
- CLOUD ALBEDO
- TERRESTRIAL RADIATION SPECTRUM
- TERRESTRIAL HEAT BALANCE

~~SECRET~~

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

WEATHER INTELLIGENCE SYSTEMS DIVISION

TYPES OF WEATHER DATA

~~CONFIDENTIAL~~

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

PS-46 5/29/56
WD-56-02843

~~CONFIDENTIAL~~

LOCKHEED AIRCRAFT CORPORATION
MISSILE SYSTEMS DIVISION

SECRET

SPACE 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		▲	▲	●	▲		
INCRONOMETEORITES		▲	▲		▲		
MAGNETIC FIELD		●	▲	●	▲		
EARTH RADIATION		●	▲	●			
ALBEDO AND CLOUD COVER		●	▲	●	●		
LIGHT ION DETECTOR		●	▲	●	●		
ION SPECTROMETER	●	●	▲	●			
INCRONOMETEORITE VELOCITIES		▲	▲	●	▲		
LYMAN-ALPHA TELESCOPE	●	▲	▲		●		
ATOMIC CLOCK	●		▲		●		
ELECTRON DENSITY IN IONOSPHERE		●	▲	●			
DENSITY AND TEMPERATURE IN ORBIT	▲	●	▲	●	●	●	●

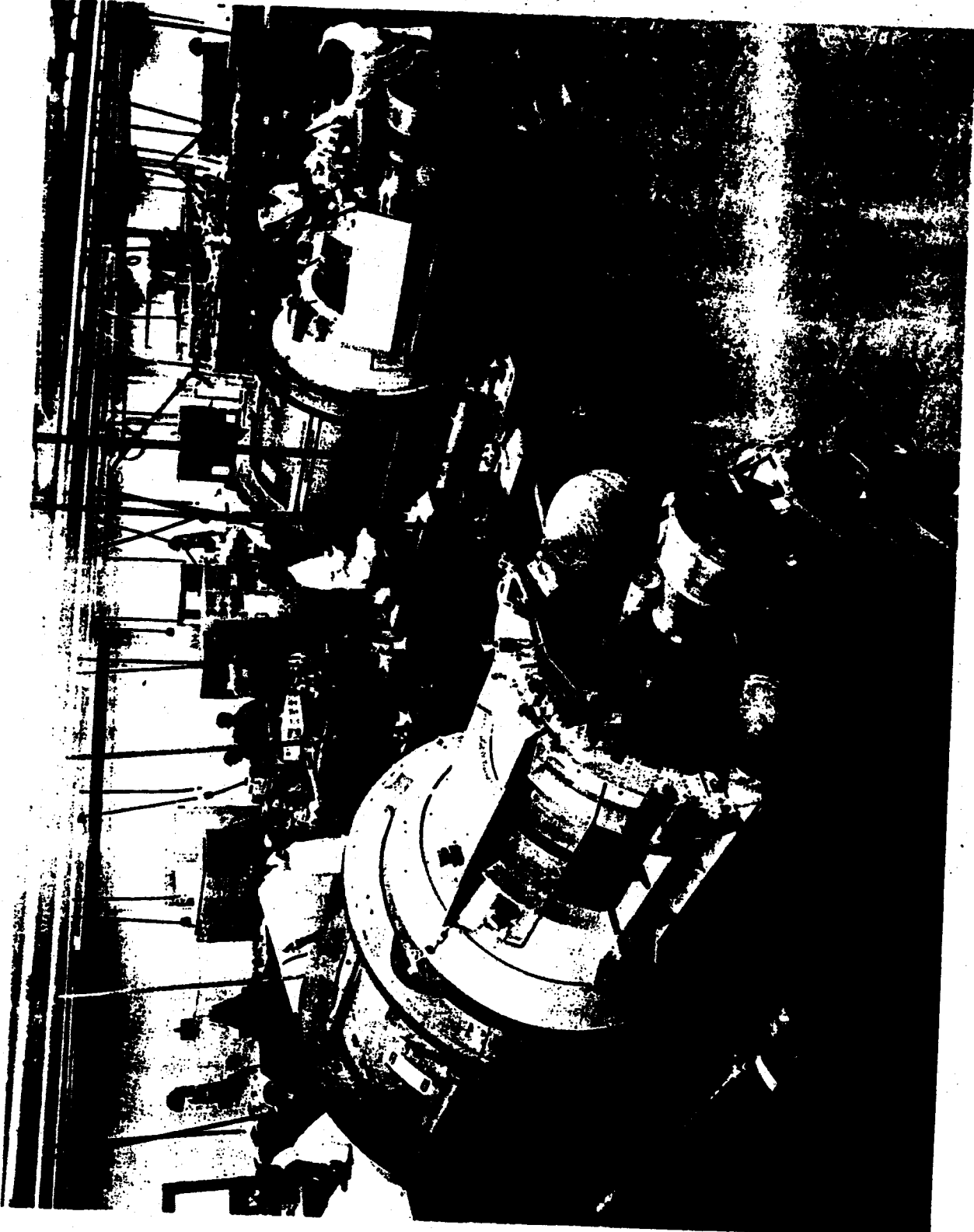
- NOT NECESSARY FOR THE MEASUREMENT
- ▲ USEFUL FOR THE MEASUREMENT
- ADDS GREATLY TO VALUE OF MEASUREMENT

P 374 G 10/14/57

LOCKHEED AIRCRAFT CORPORATION
MISSILE SYSTEMS DIVISION

SECRET

CONFIDENTIAL



P3017 FLIGHT TEST VEHICLES NOS. 1 AND 2 IN MOD & CHECKOUT - LMSD PALO ALTO

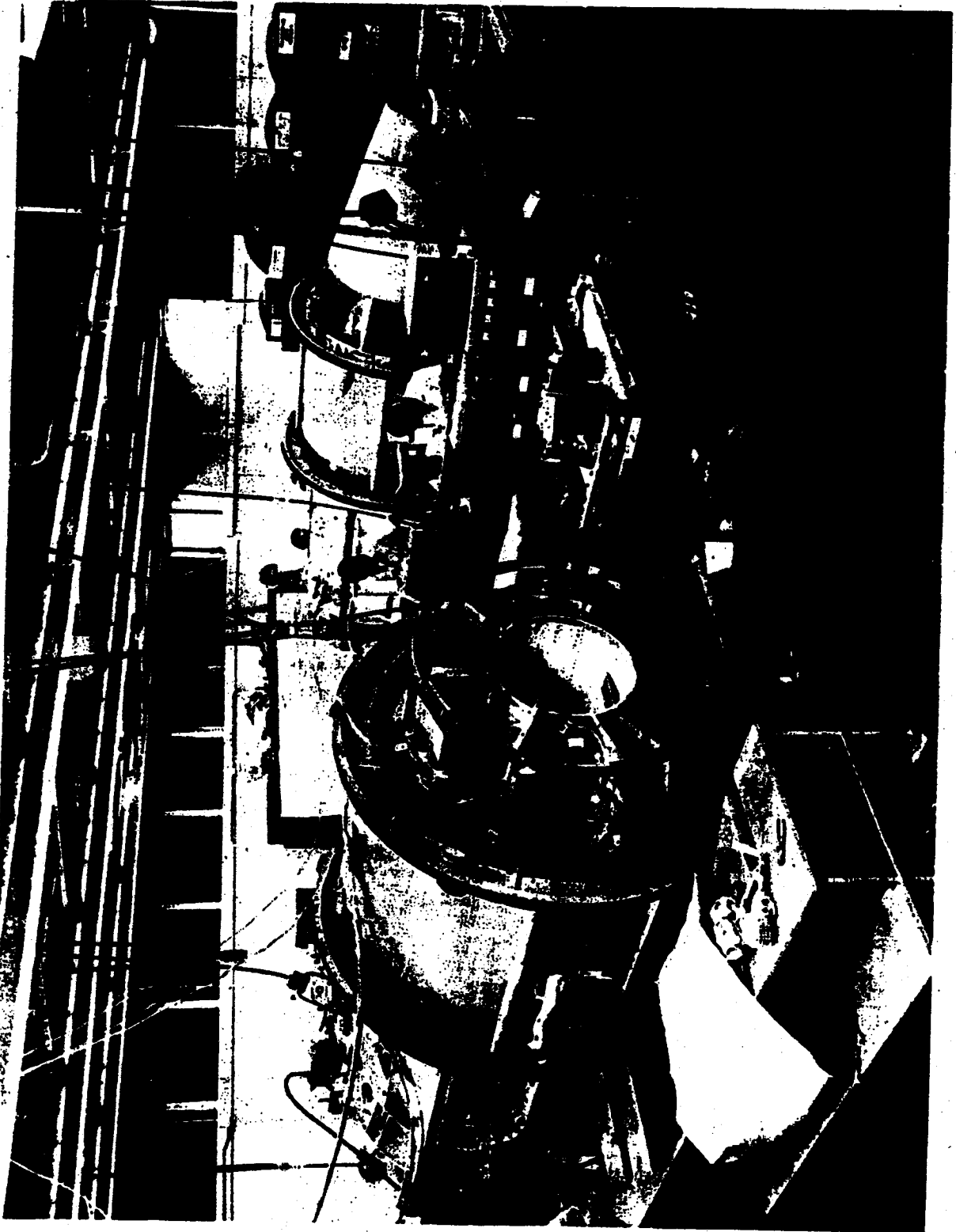
LOCKHEED AIRCRAFT CORPORATION

CONFIDENTIAL

MISSILE SYSTEMS DIVISION

... the national defense of the United States within the meaning of the Espionage Laws Title 18.

~~CONFIDENTIAL~~



P3018 FLIGHT TEST VEHICLES NOS. 1 AND 2 IN MOD & CHECKOUT - LMSD PALO ALTO

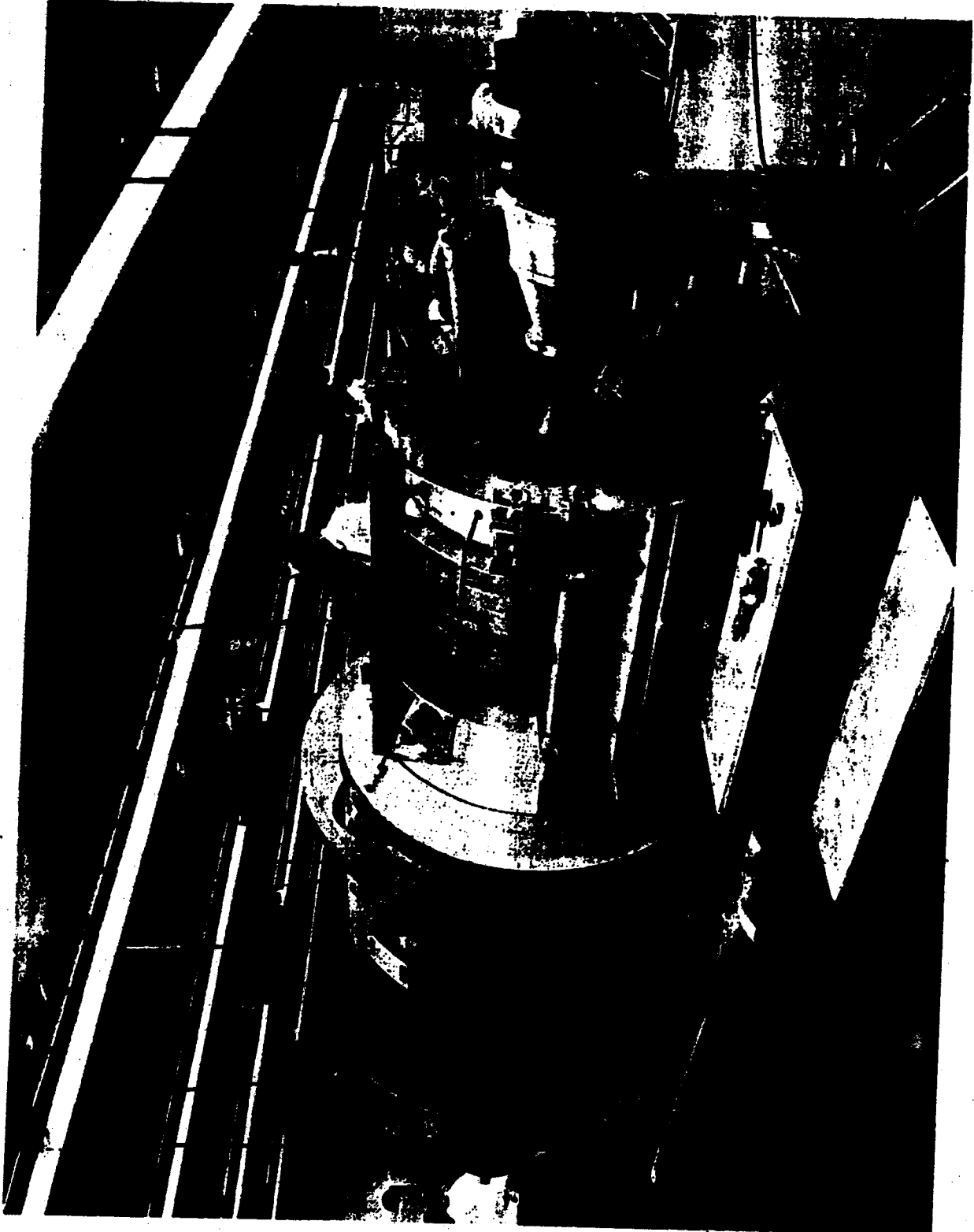
LOCKHEED AIRCRAFT CORPORATION

~~CONFIDENTIAL~~

MISSILE SYSTEMS DIVISION

This document contains information affecting the national defense of the United States within the meaning of the Espionage Laws, Title 18, United States Code, Sections 793 and 794, and the transmission or revelation of its contents in any manner to an unauthorized person is prohibited by law.

~~CONFIDENTIAL~~



P-3022 FLIGHT TEST VEHICLE NO. 2 IN MOD & CHECKOUT - LMSD PALO ALTO

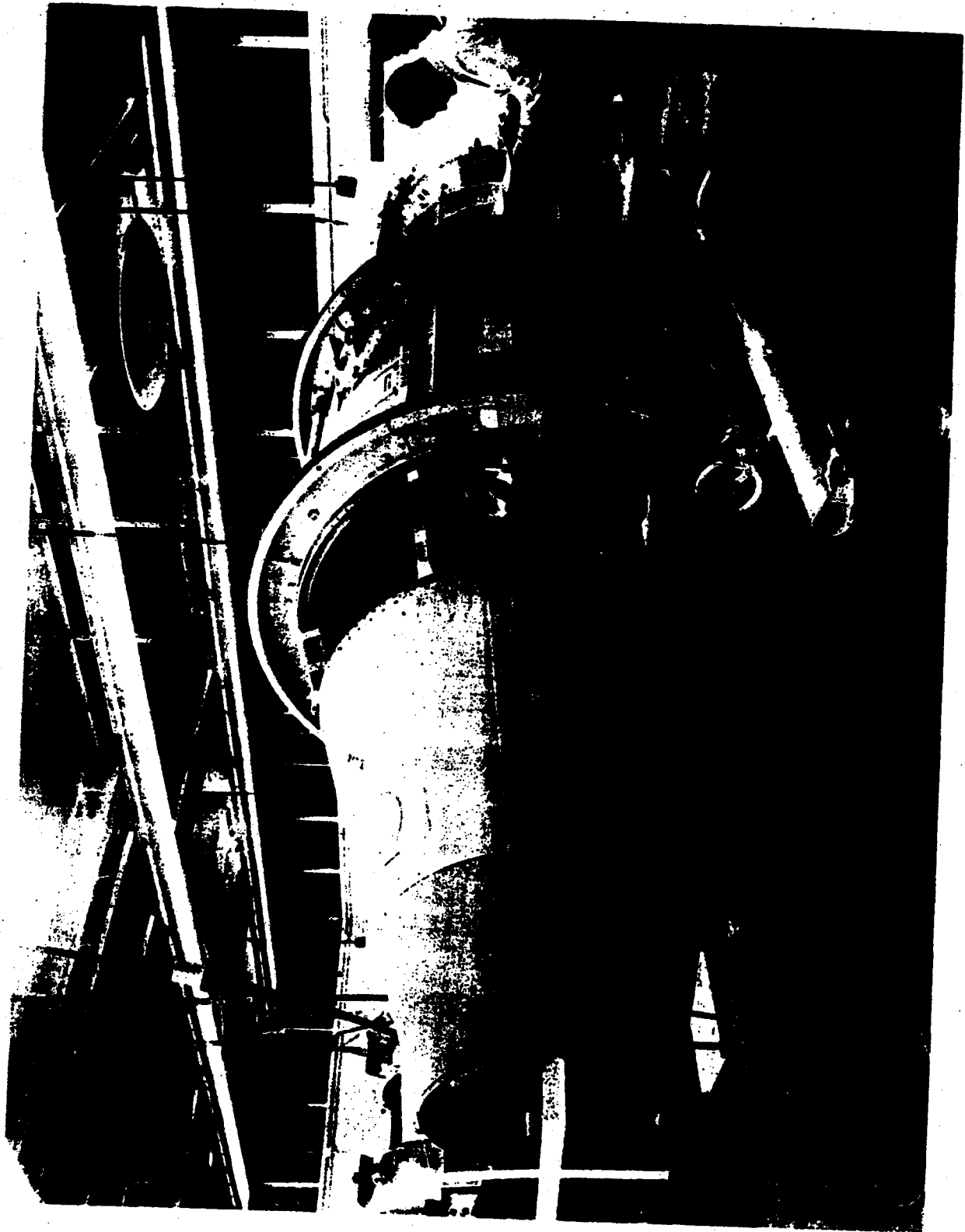
LOCKHEED AIRCRAFT CORPORATION

~~CONFIDENTIAL~~

MISSILE SYSTEMS DIVISION

This document contains information affecting the national defense of the United States within the meaning of the Espionage Laws, Title 18,

~~CONFIDENTIAL~~



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

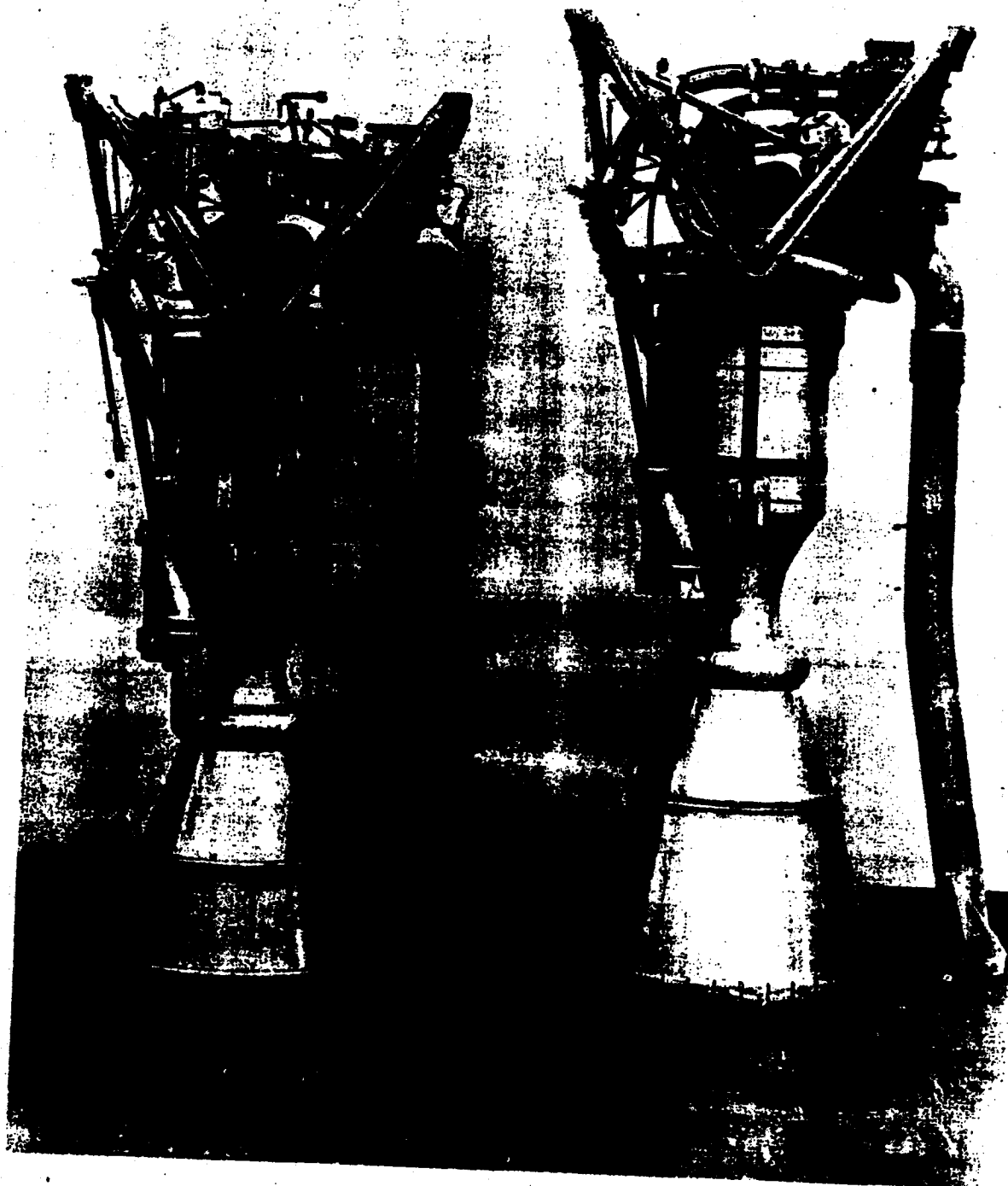
LOCKHEED AIRCRAFT CORPORATION

~~CONFIDENTIAL~~

MISSILE SYSTEMS DIVISION

This document contains information affecting the national defense of the United States within the meaning of the Espionage Laws, Title 18.

~~CONFIDENTIAL~~



P3020 MODEL XLR ENGINES - JP4 (LEFT) AND UDMH

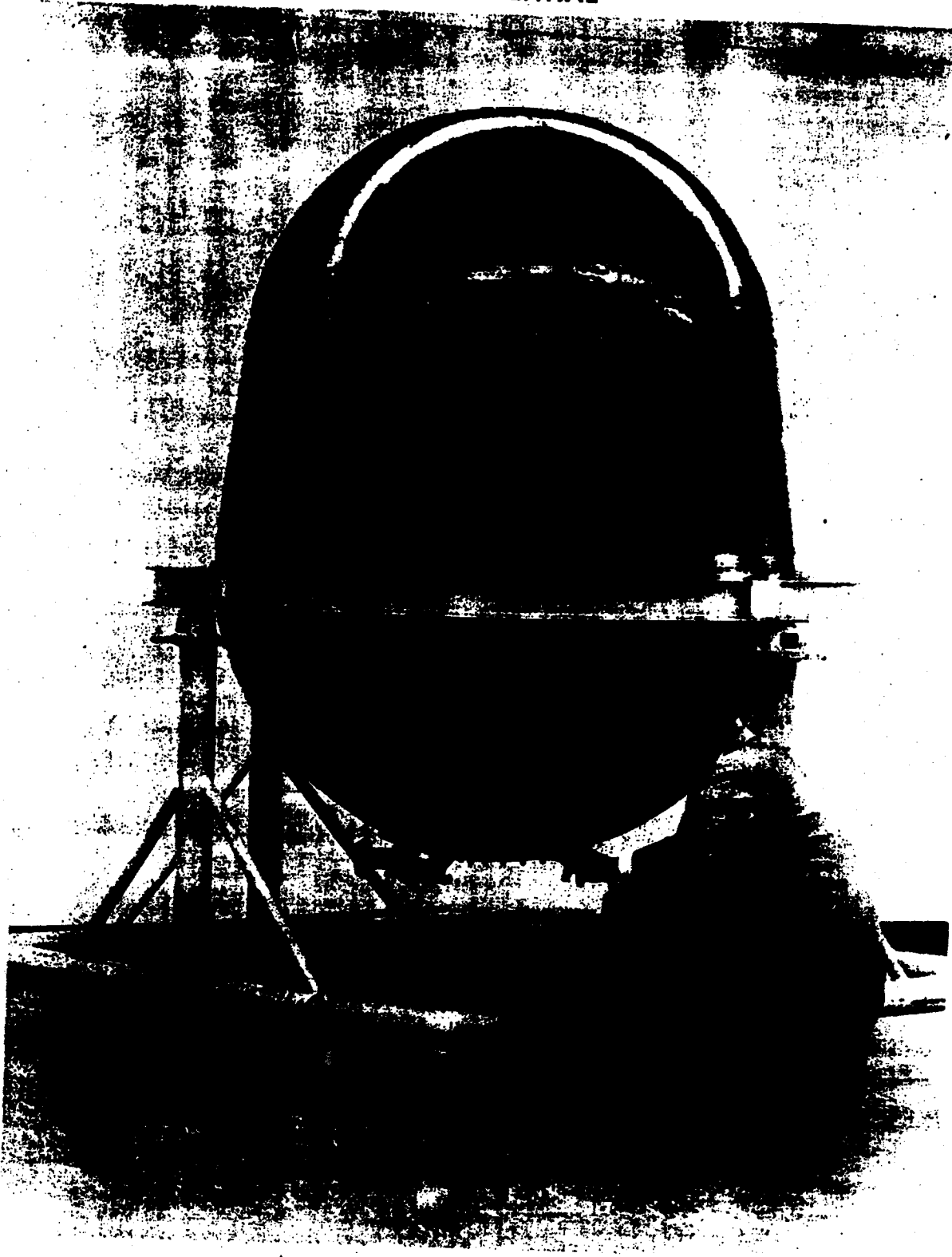
LOCKHEED AIRCRAFT CORPORATION

~~CONFIDENTIAL~~

MISSILE SYSTEMS DIVISION

This document contains information affecting the national defense of the United States within the meaning of the Espionage Laws, Title 18, United States Code, Sections 793 and 794, and the transmission or revelation of its contents in any manner to an unauthorized person is prohibited by law.

~~CONFIDENTIAL~~



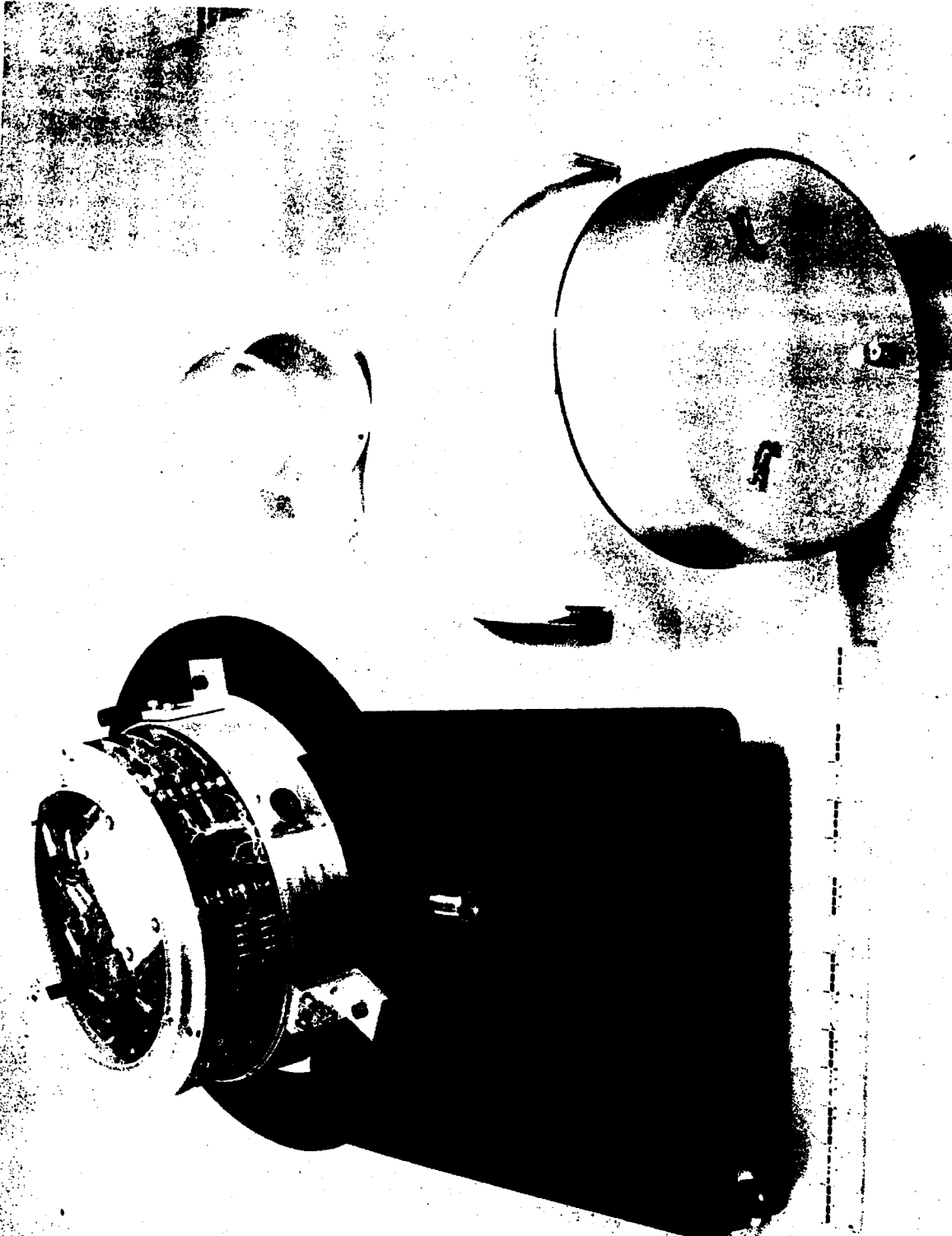
P3043 UDMH PROPELLANT TANK

LOCKHEED AIRCRAFT CORPORATION

~~CONFIDENTIAL~~

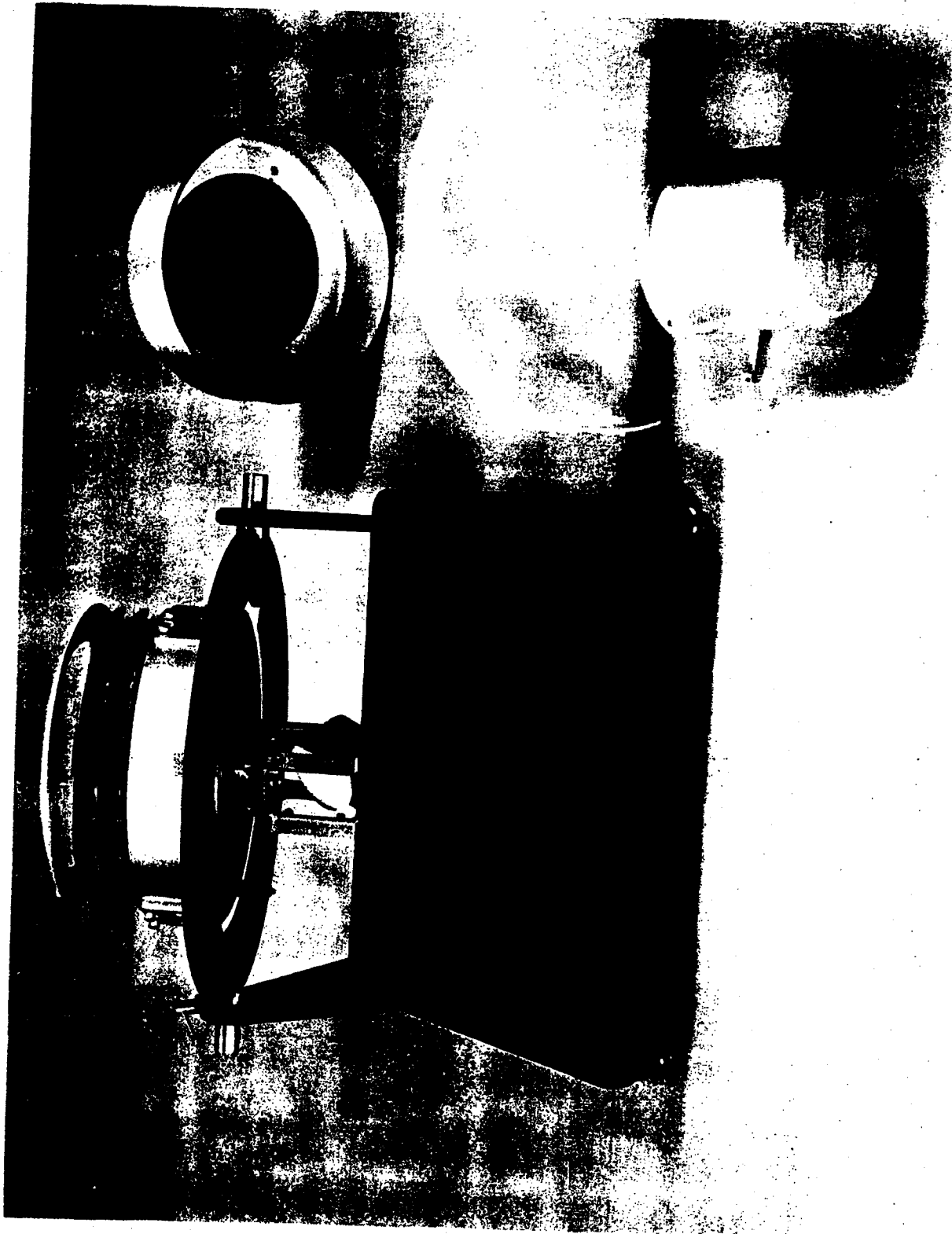
MISSILE SYSTEMS DIVISION

~~CONFIDENTIAL~~

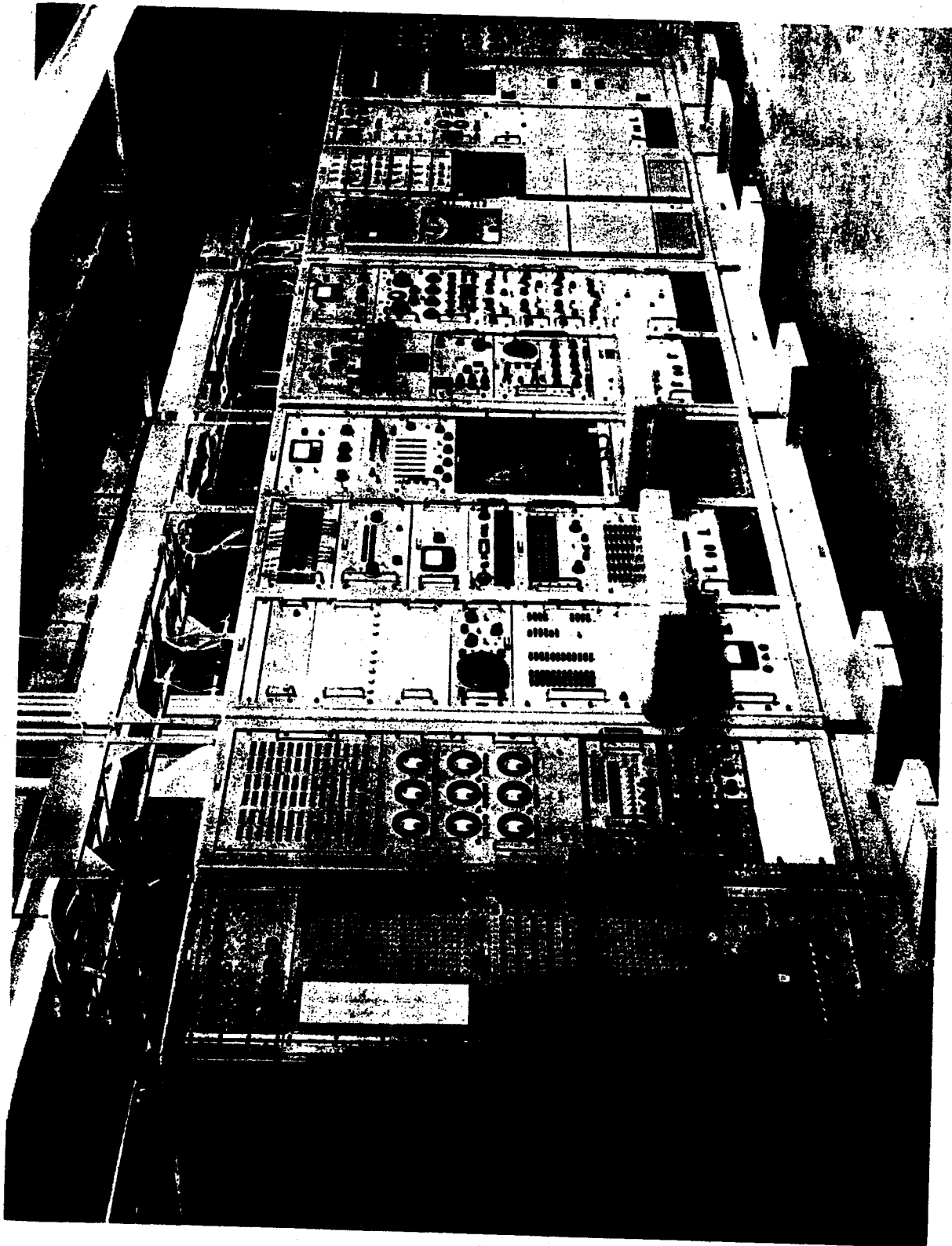


P2862 HORIZON SCANNER

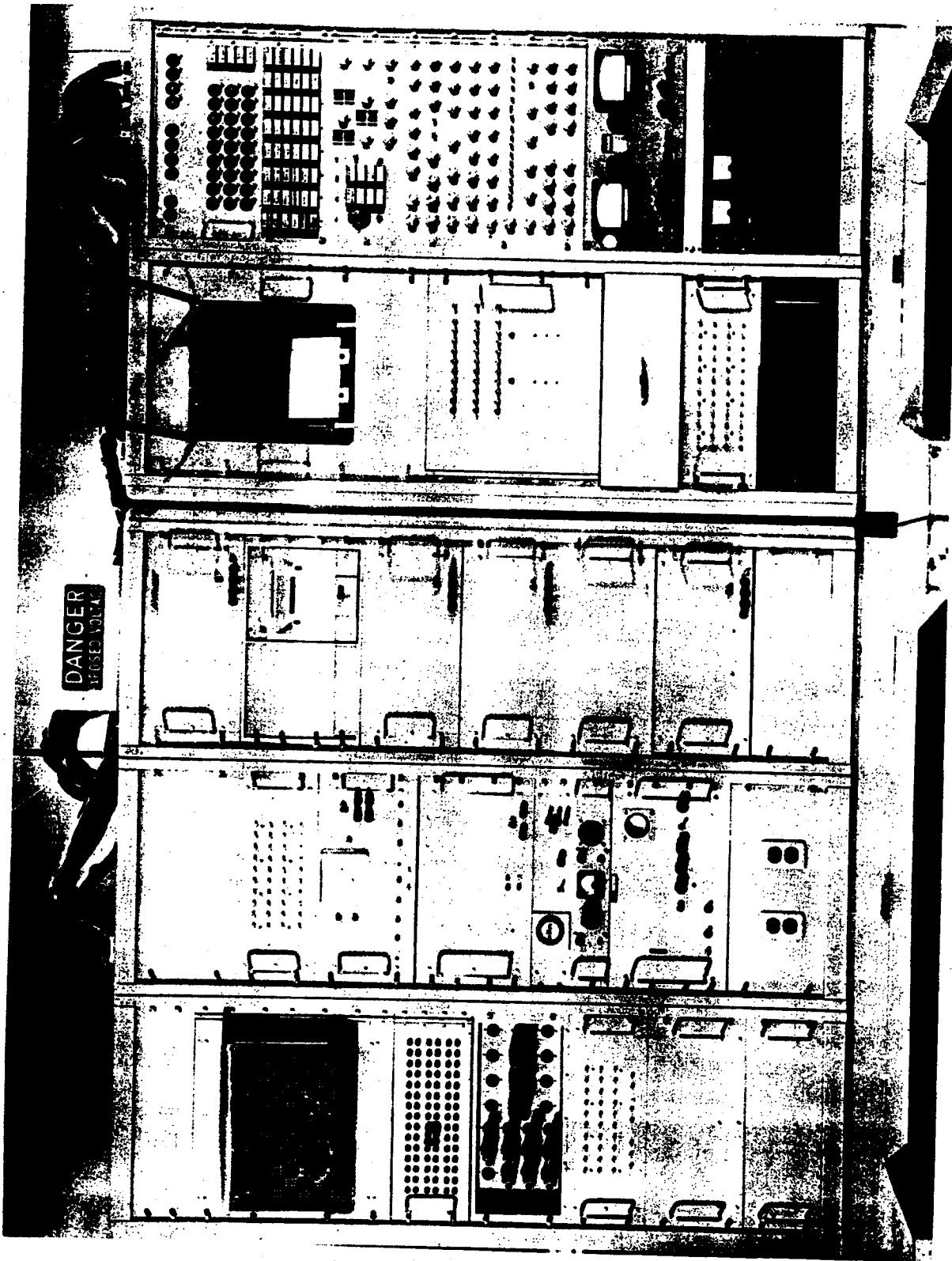
~~CONFIDENTIAL~~



P 2864 HORIZON SCANNER



P3046 SYSTEMS CHECKOUT COMPLEX (EXCLUDING LACE UNIT)



DANGER
HIGH VOLTAGE

P-3047 LACE UNIT (SYSTEMS CHECKOUT COMPLEX)