SENTRY PROGRAM MISSION

"PLAN AND CONDUCT A PROGRAM OF RESEARCH AND DEVELOPMENT LEADING TOWARD THE ULTIMATE ATTAINMENT OF A RECONNAISSANCE SYSTEM WHICH USES A SATELLITE VEHICLE AS THE DATA GATHERING MEDIUM"

[redacted]

SECRET

36 INCH LENS

17 FOOT RESOLUTION

ORIGINAL SCENE

FILM IMAGE
IN SATELLITE

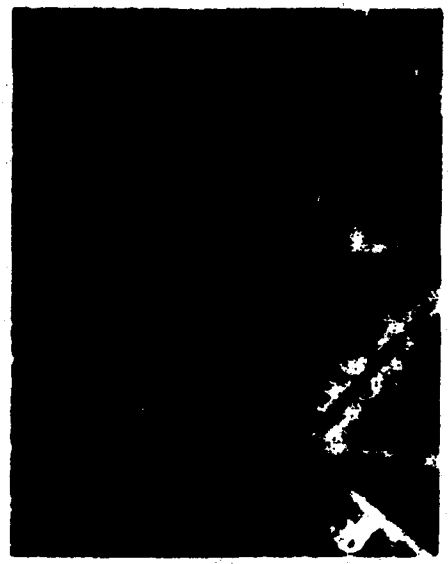


IMAGE RECORDED
ON GROUND

DR E BAASCH

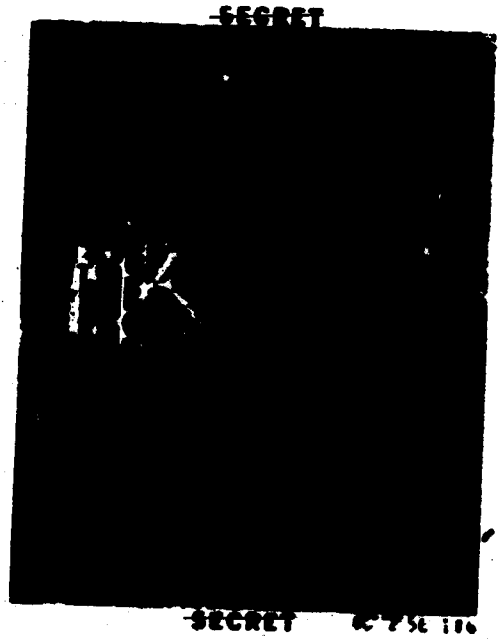
SECRET

[illegible] AIRCRAFT CORPORAT[illegible]

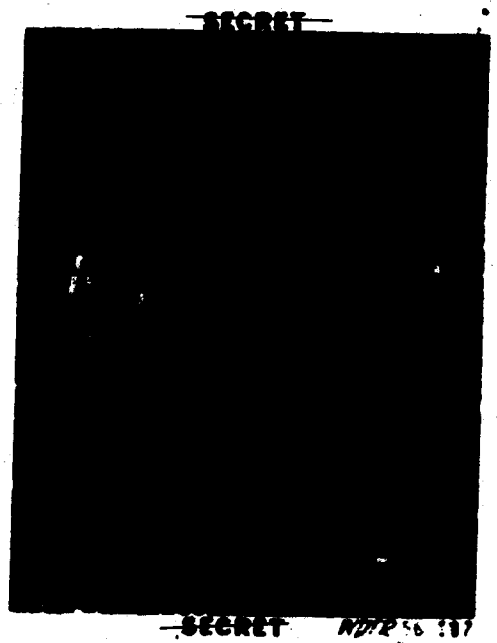
P-5

SECRET

6 INCH LENS



ORIGINAL SCENE



FILM IMAGE
IN SATELLITE

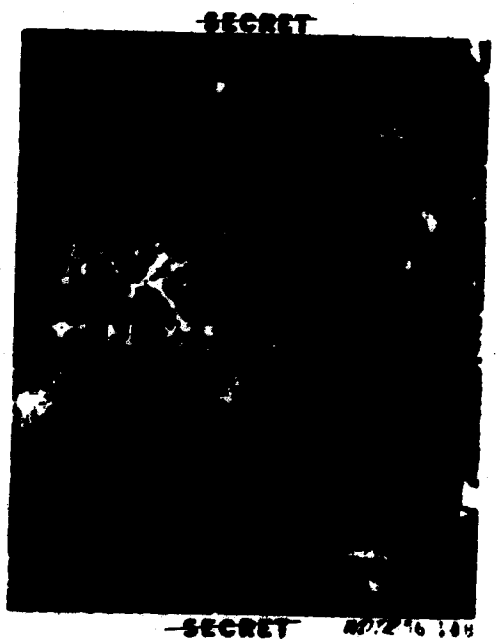
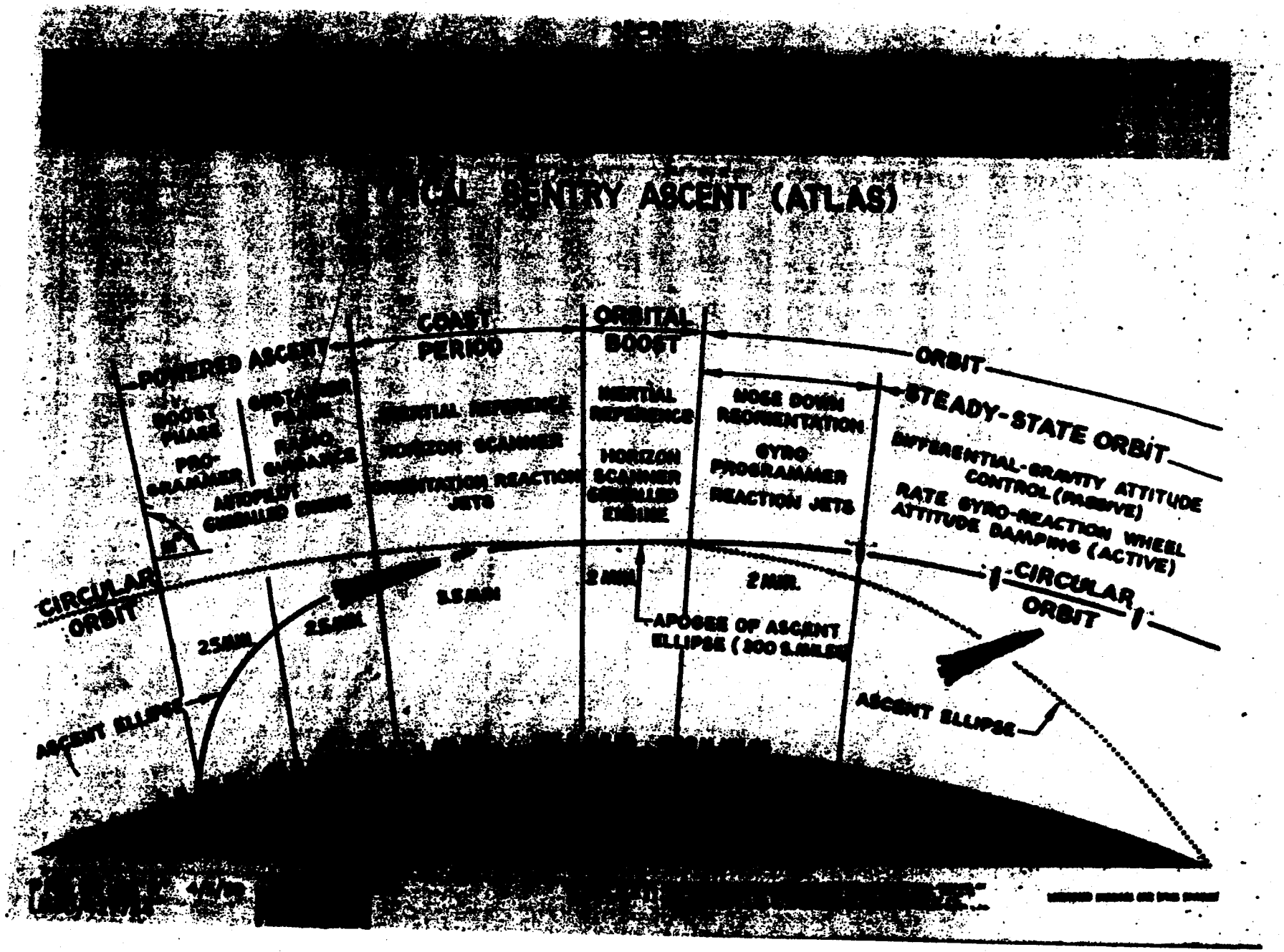


IMAGE RECORDED
ON GROUND

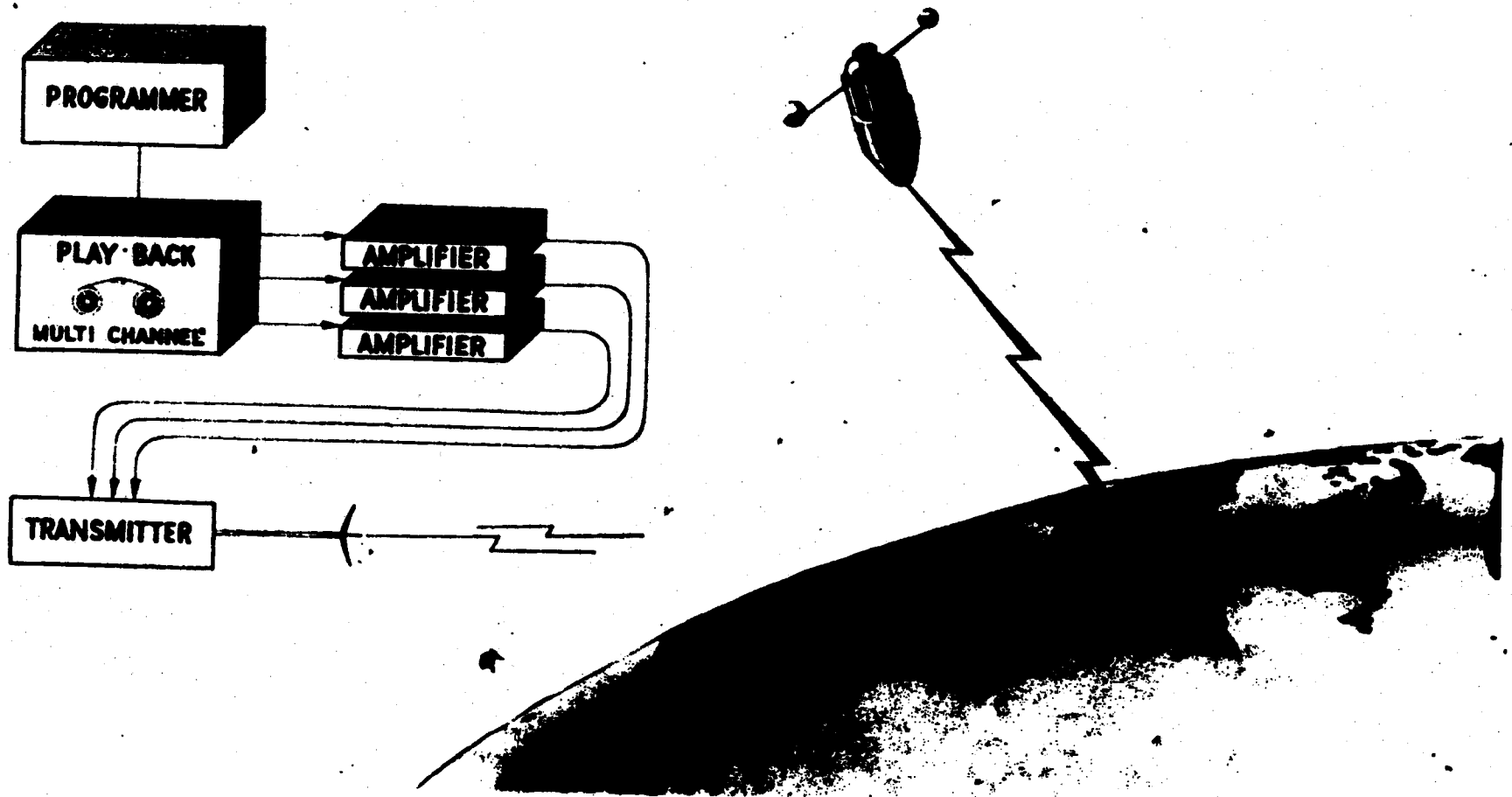
P22 EB/14/57

SECRET


SENTRY ASCENT (ATLAS)
POWERED ASCENT
COAST PERIOD
ORBITAL BOOST
ORBIT
STEADY-STATE ORBIT
BOOST PHASE
PRO-GRAMMER
INERTIAL REFERENCE
HORIZON SCANNER
REACTION JETS
NOSE DOWN REORIENTATION
GYRO PROGRAMMER
REACTION JETS
HORIZON SCANNER
GIMBALLED ENGINE
DIFFERENTIAL-GRAVITY ATTITUDE CONTROL (PASSIVE)
RATE GYRO-REACTION WHEEL ATTITUDE DAMPING (ACTIVE)
CIRCULAR ORBIT
2 MIN.
2 MIN.
APOGEE OF ASCENT ELLIPSE
ASCENT ELLIPSE
ASCENT ELLIPSE

P-166(6)

SENTRY FERRET AIRBORNE READOUT

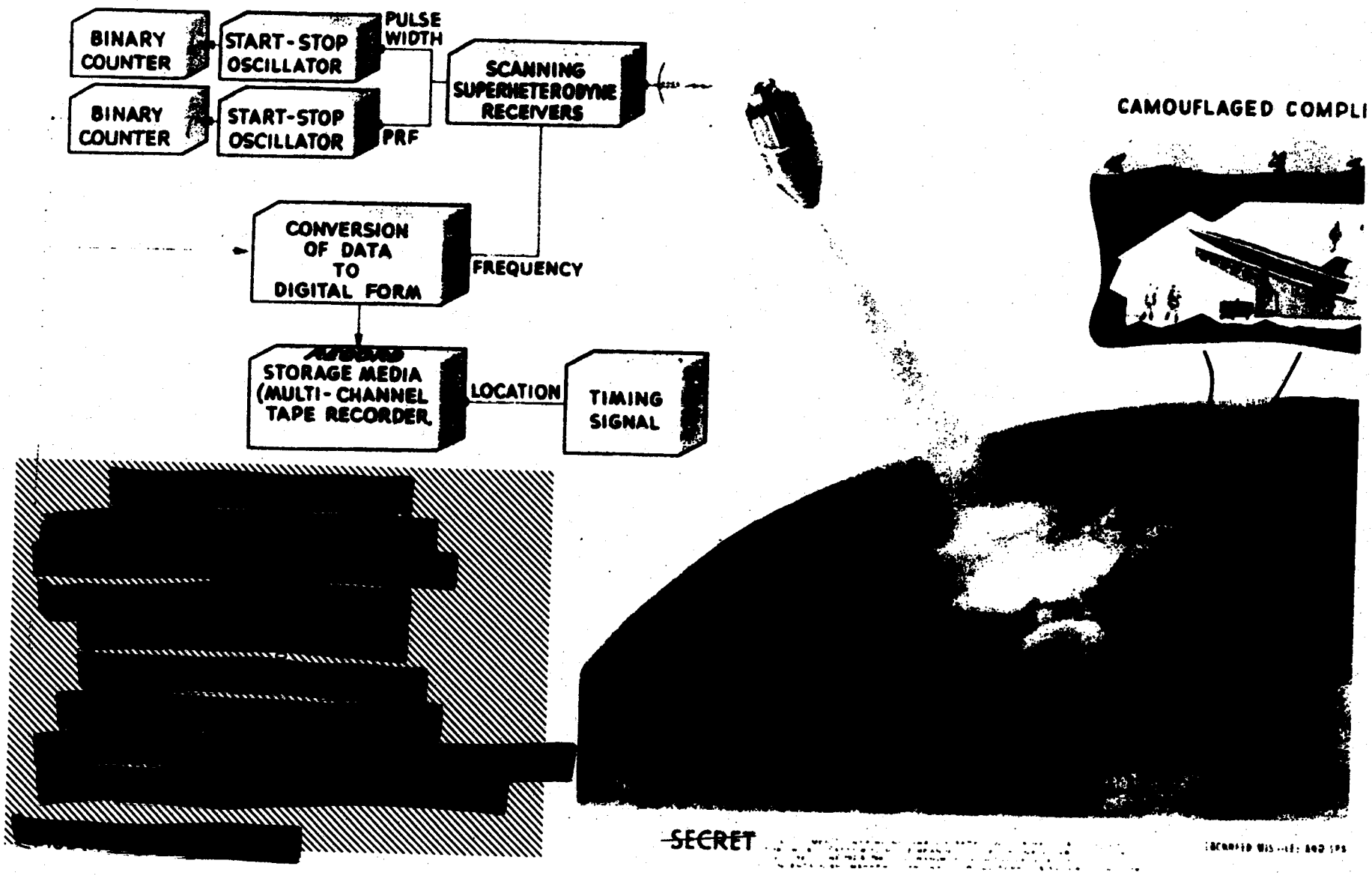


P179(2)SSF 2/15/59
WD-59 00852 LMSD/425128 COPY #7

LOCKHEED AIRCRAFT CORPORATION

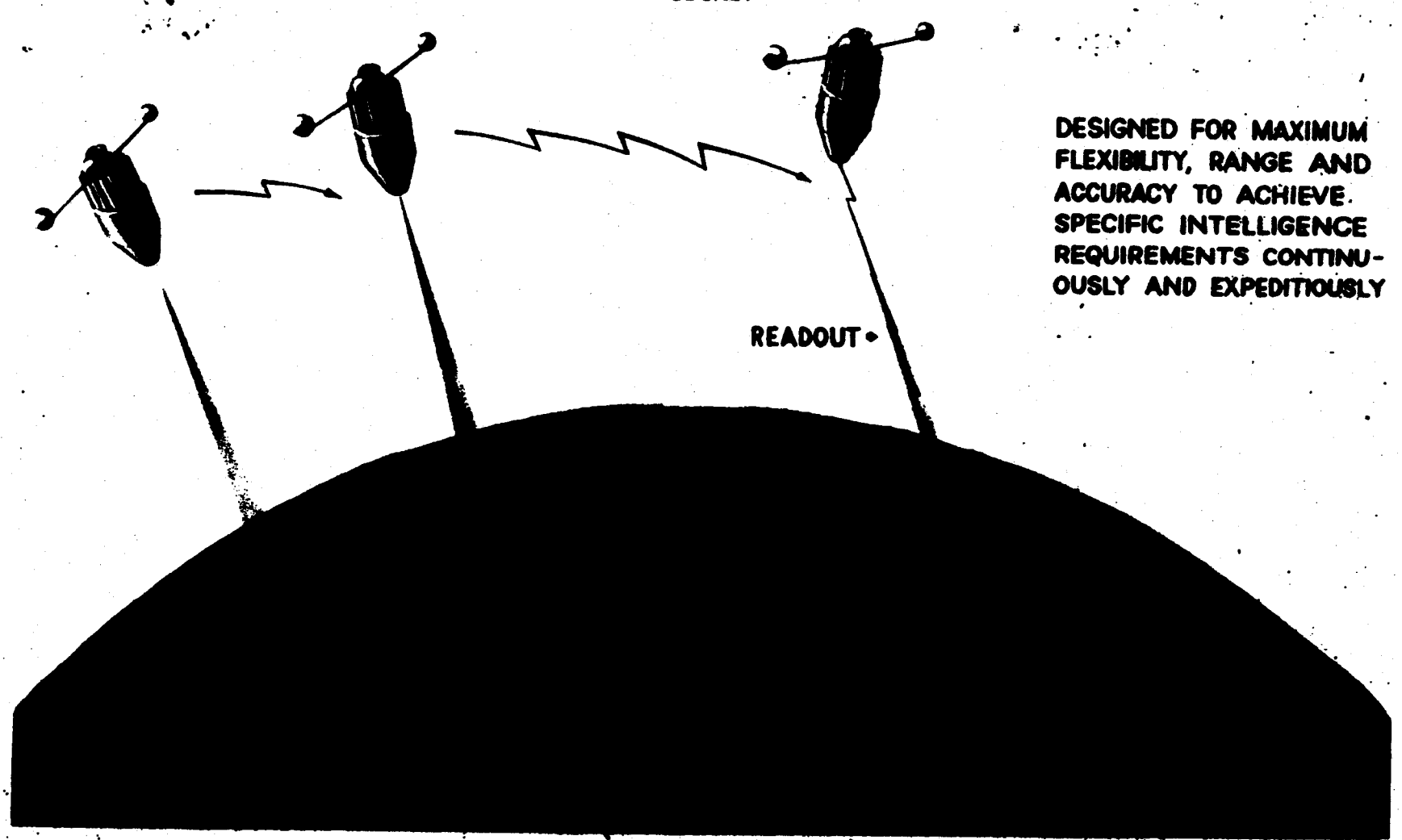
P-179(2)

SAMOS FERRET AIRBORNE RECEPTION



P-182(6)

SECRET



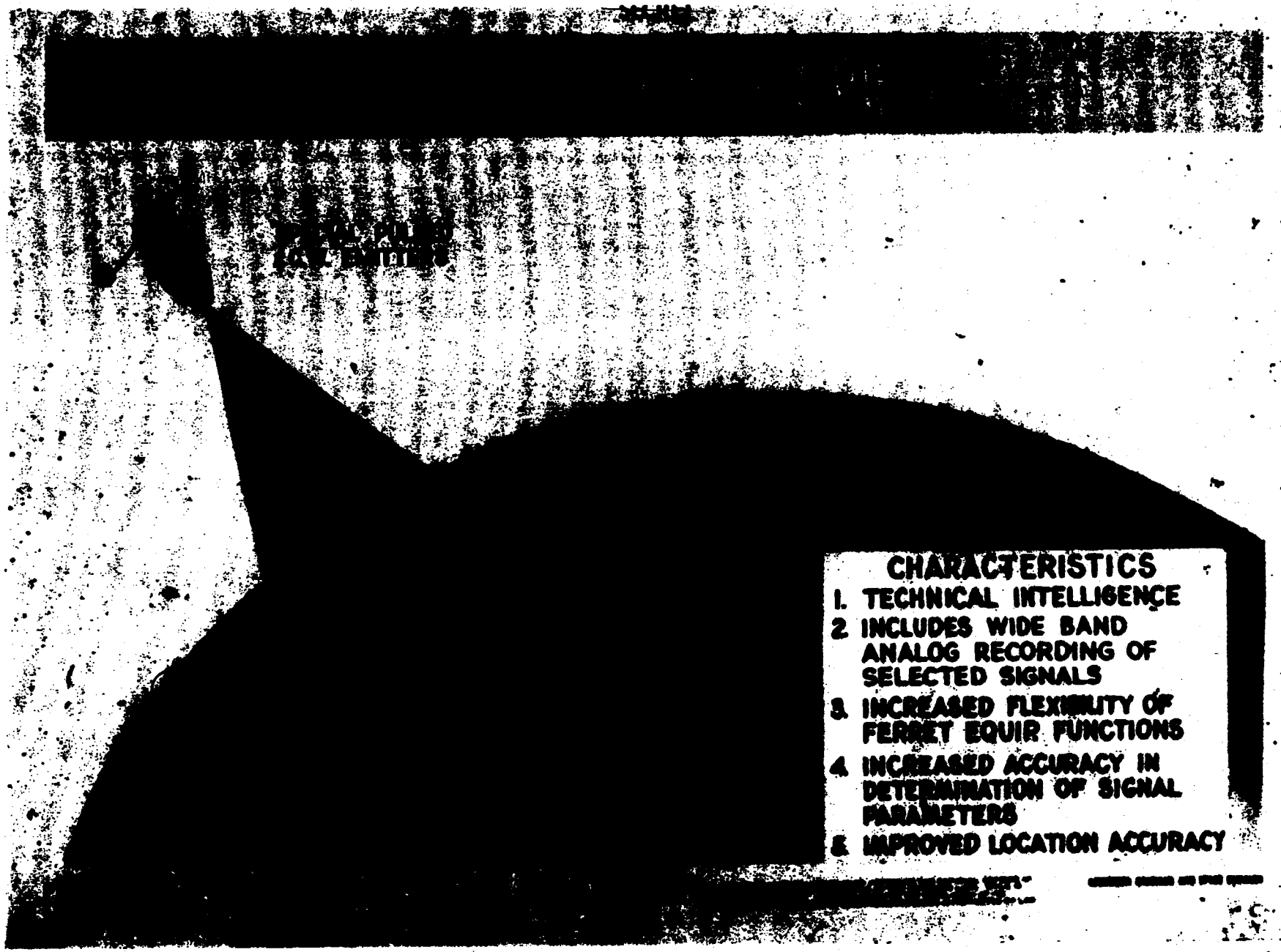
DESIGNED FOR MAXIMUM FLEXIBILITY, RANGE AND ACCURACY TO ACHIEVE SPECIFIC INTELLIGENCE REQUIREMENTS CONTINUOUSLY AND EXPEDITIOUSLY

P 183(2) SS"F" 1/22/58
WD-58 00001

SECRET

LOCKHEED AIRCRAFT CORPORATION

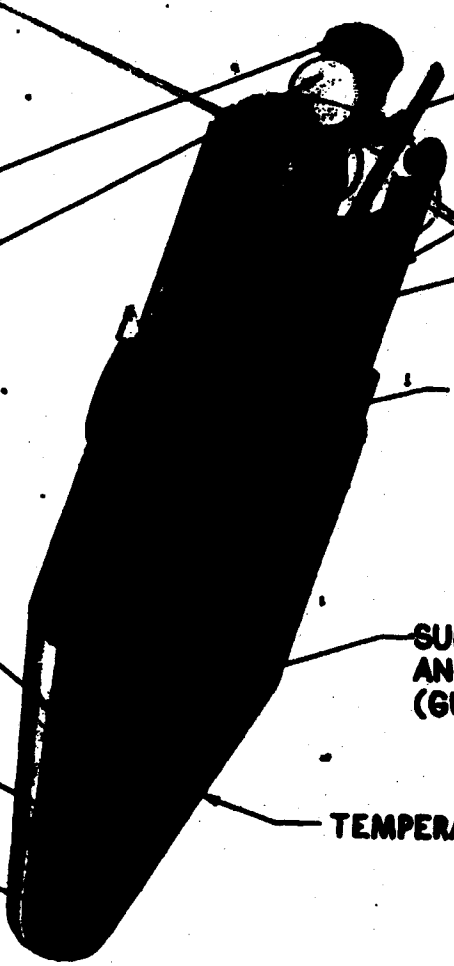
P-183(2)


CHARACTERISTICS
1. TECHNICAL INTELLIGENCE
2 INCLUDES WIDE BAND ANALOG RECORDING OF SELECTED SIGNALS
3. INCREASED FLEXIBILITY OF FERRET EQUIP FUNCTIONS
4 INCREASED ACCURACY IN DETERMINATION OF SIGNAL PARAMETERS
5. IMPROVED LOCATION ACCURACY

P-184(5)

SENTRY VEHICLE SYSTEM

VISUAL RECONNAISSANCE MODEL



ENGINE GIMBAL LIMITS 5°
SQUARE PATTERN
ENGINE-BELL AIRCRAFT
THRUST 15,000 LB ALT.
I_{sp} 277 SEC.
NOZZLE EXPANSION RATIO 20:1

N_2 GAS STORAGE FLASK
3000 PSI

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

CAMERA LENS SHIELD

NOSE (JETTISONS)

ATTITUDE ROLL AND
REORIENTATION CONTROL
GAS JETS (6)

AUXILIARY POWER
SOURCE (BATTERIES)

FUEL TANK
UDMH 60 PSI

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.)

TEMPERATURE CONTROL SHUTTERS

P232 (3) S6 "A" 10/1/58
WD-58-06744 LMSD/100296-1 COPY NO. 7

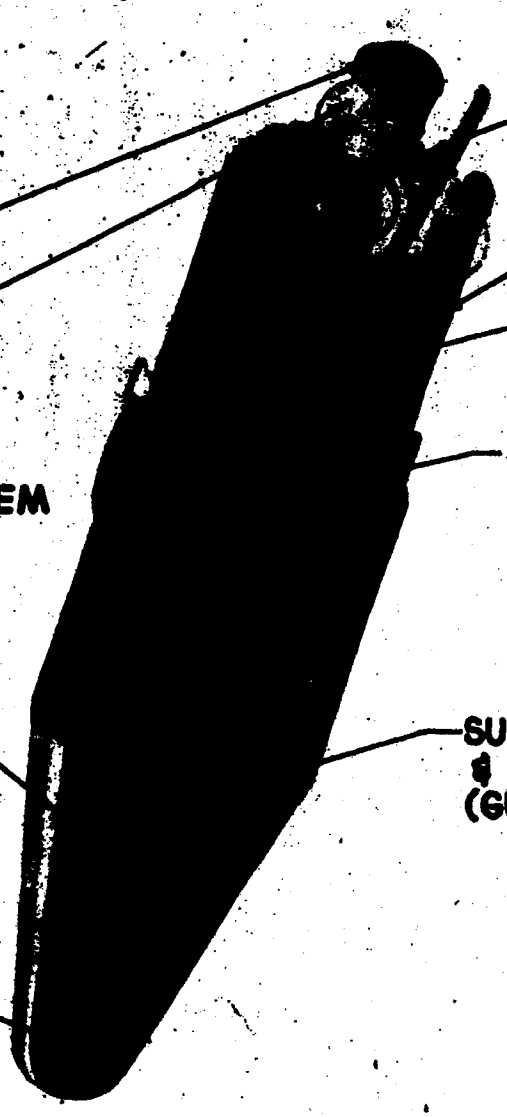
SECRET

LOCKHEED AIRCRAFT CORPORATION
MISSILE SYSTEMS DIVISION

P-232(3)

SAMOS ORBITAL VEHICLE

VISUAL RECONNAISSANCE MODEL



NGINE GIMBAL LIMITS 5°
QUARE PATTERN
ENGINE-BELL AIRCRAFT
THRUST 15,000 LB ALT
I_{sp} 277 SEC.
OZZLE EXPANSION RATIO 20:1

N_2 GAS STORAGE FLASK
3000 PSI

ATTITUDE ROLL AND
REORIENTATION CONTR
GAS JETS (6)

AUXILIARY POWER
SOURCE (BATTERIES)

FUEL TANK
UDMH 60 PSI

OXIDIZER
TANK (IRFNA)
60 PSI

ISUAL RECONNAISSANCE SUBSYSTEM

HOTO, PROCESS, STORAGE,
LECTRONIC READOUT

SUBSYSTEM ELECTRONICS COMPARTMEN
& PAYLOAD SUPPORT STRUCTURE
(GUIDANCE, CONTROL, ETC.)

NOSE (JETTISONS)

CY E-7

LOCKHEED AIRCRAFT CORP
MISSILE SYSTEMS DIVISION

P-232(3)

[redacted]

SECRET

PROVIDED BY WS-117L VEHICLE CAPABILITY

- PAYLOAD WEIGHT CAPACITY UP TO A TON (MORE FOR ADVANCED VERSIONS)
- PAYLOAD VOLUME CAPACITY UP TO 70 CUBIC FEET
- ATTITUDE ORIENTATION STABILIZATION TO ±1 DEGREE
- NUMBER OF VEHICLES AVAILABLE, ESPECIALLY FOR SMALLER PAYLOADS (DUE TO WS-117L REQUIREMENTS AND USE OF OPERATIONAL MISSILE FOR BOOSTER)
- LONG ORBITING DURATION AFFORDED BY 300-MILE ALTITUDES OR HIGHER
- LONG PAYLOAD OPERATION WITH MODEST POWER THROUGH SOLAR OR CHEMICAL BATTERIES; OR WITH NUCLEAR AUXILIARY POWER PLANTS FOR HIGH POWER
- POLAR ORBITS AVAILABLE THROUGH PERFORMANCE MARGIN AND IOC LAUNCHING SITE
- WIDE-BAND DATA LINK FOR TRANSMISSION OF INFORMATION RATES OF 5 MCS BANDWIDTH
- CAPACITY TO CARRY TWO OR MORE PAYLOADS FOR COINCIDENCE-TYPE EXPERIMENTS
- GUIDANCE ACCURACY TO PLACE VEHICLE INTO ORBITS OF AS LITTLE AS 20-MILE ECCENTRICITY
- POSSIBILITY OF SETTING UP LINKS BETWEEN TWO SATELLITES
- HIGHER ALTITUDES INCLUDING POSSIBILITY OF 70-POUND PAYLOADS AT 2700 MILES
- TRACKING SYSTEM MEASUREMENTS ANGULAR TO ±1 MIL AND ALTITUDE TO .1 MILE

P236 G 7/30/57

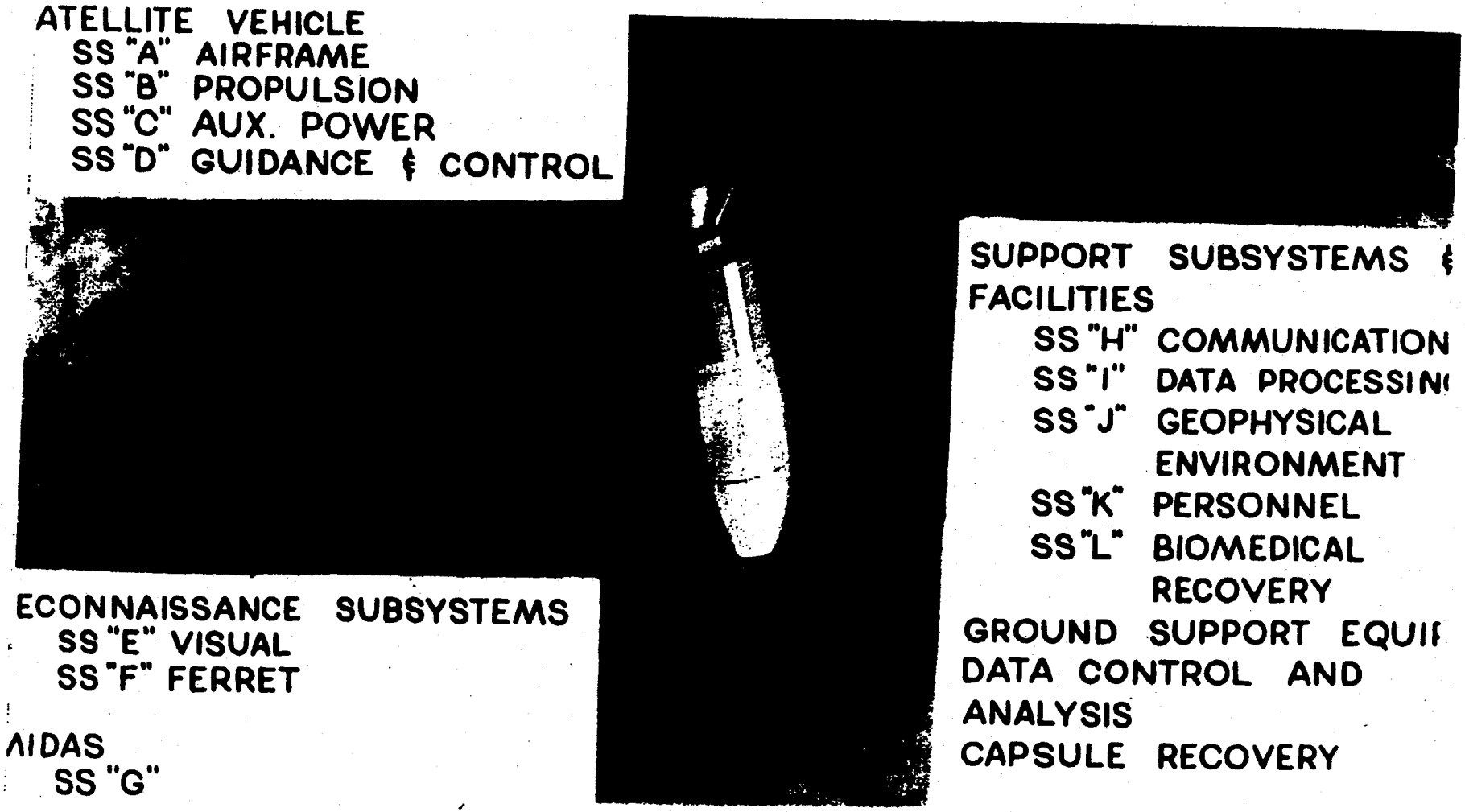
SECRET

LOCKHEED AIRCRAFT CORPORATION

P-236

SUBSYSTEM STRUCTURE

ATELLITE VEHICLE
- SS "A" AIRFRAME
- SS "B" PROPULSION
- SS "C" AUX. POWER
- SS "D" GUIDANCE & CONTROL



ECONNAISSANCE SUBSYSTEMS
- SS "E" VISUAL
- SS "F" FERRET

AIDAS
- SS "G"

SUPPORT SUBSYSTEMS & FACILITIES
- SS "H" COMMUNICATION
- SS "I" DATA PROCESSIN
- SS "J" GEOPHYSICAL ENVIRONMENT
- SS "K" PERSONNEL
- SS "L" BIOMEDICAL RECOVERY

GROUND SUPPORT EQUIP
DATA CONTROL AND ANALYSIS
CAPSULE RECOVERY

-238 (7) 8 9/4/59

~~CECDET~~

P-238(7)

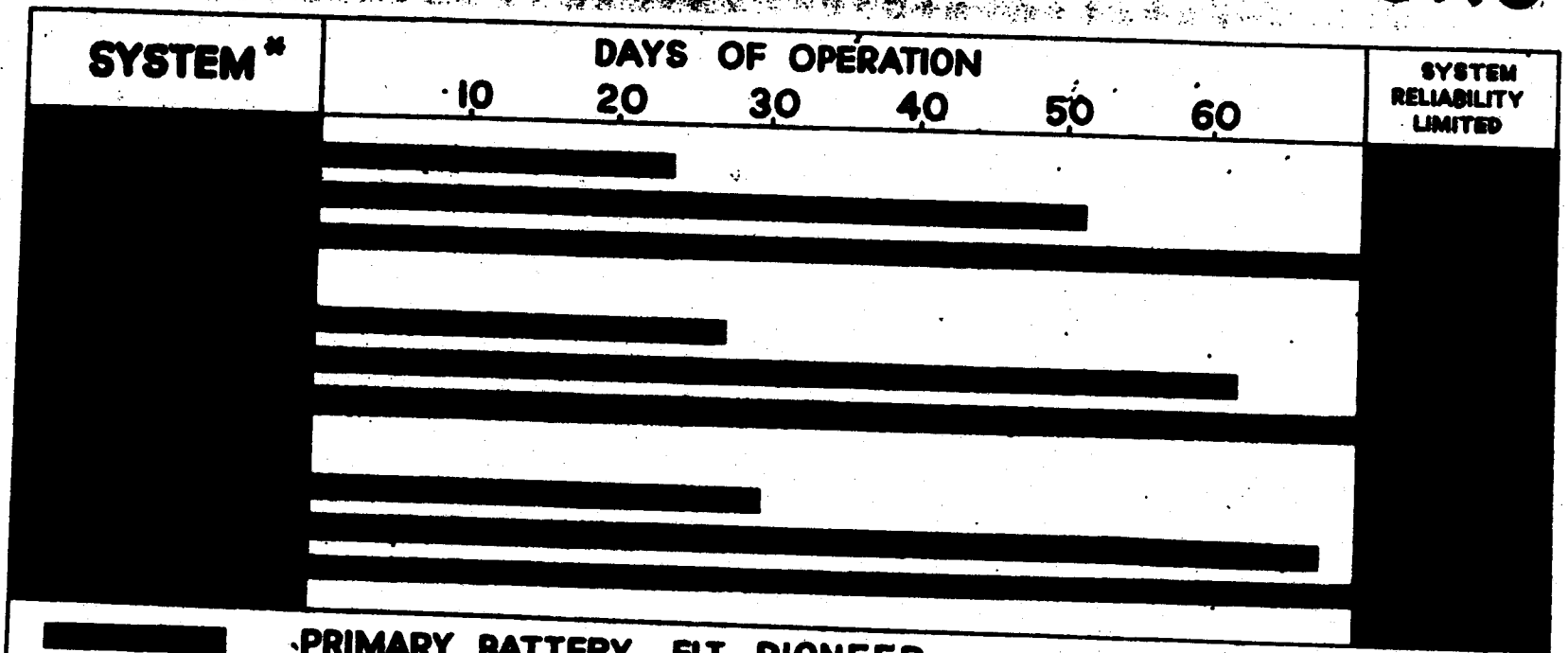
SENTRY SUBSYSTEM "E"

OPERATIONAL OBJECTIVES

- MAPPING OF U.S.S.R. AND SATELLITES
- STRATEGIC WARNING INDICATIONS
  - WEAPONS AND BASES IN BEING
  - MILITARY LOGISTICS
  - INDUSTRIAL WAR CAPABILITIES
- BOMB DAMAGE OBSERVATION
- WEATHER OBSERVATION

SECRET

SENTRY SYS. APU LIFE LIMITATIONS



- PRIMARY BATTERY FLT PIONEER
- HIGH ENERGY FUEL CELL BATTERY FLT 10-15
- SOLAR PHOTOVOLTAIC APU FLT 16 →
- NUCLEAR APU LIFE FOR ALL SYSTEMS
  - RADIO ISOTOPE 60-180 DAYS
  - NUCLEAR REACTOR 60-360 DAYS

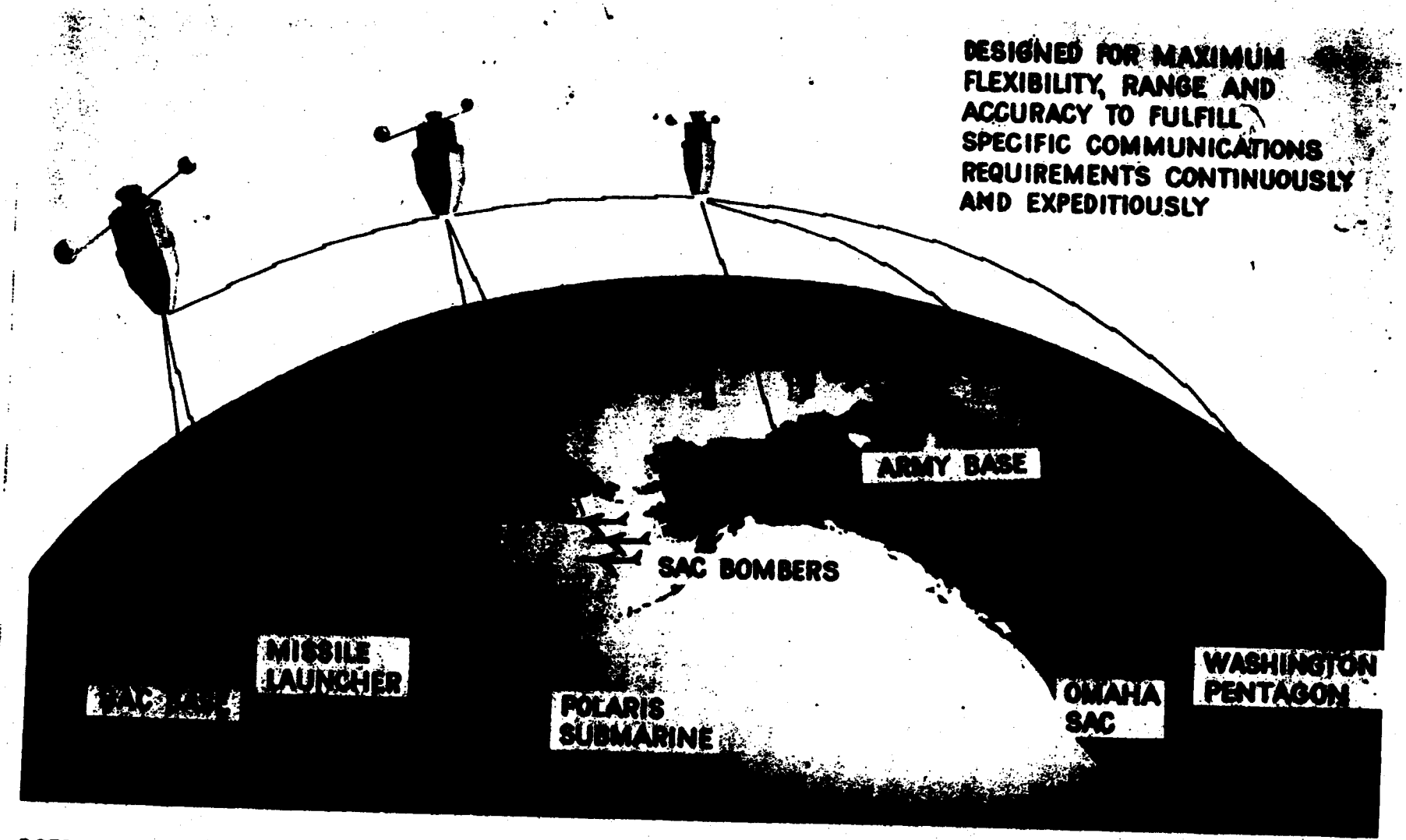
*LESS TELEMETERING

P338(2)SSC 10/2/58
WD-58-06744 LMSD/104369 COPY 7

SECRET

P-335(2)

SECRET



P 375 SS-F 10/14/57

SECRET

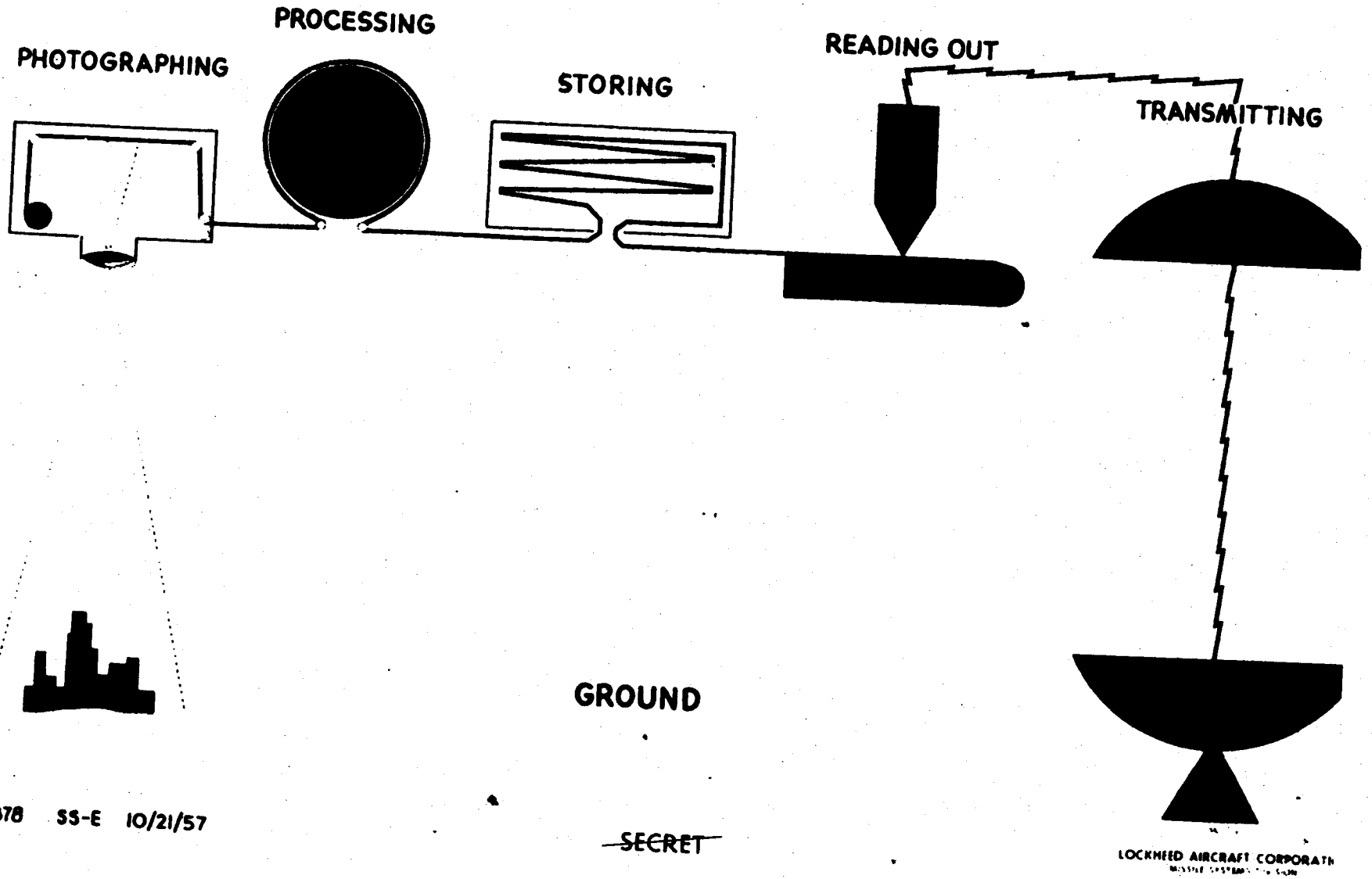
LOCKHEED AIRCRAFT CORPORATION
MISSILE SYSTEMS DIVISION

P-375

[redacted]

~~SECRET~~

VEHICLE-BORNE PROCESSOR



P 378 SS-E 10/21/57

~~SECRET~~

LOCKHEED AIRCRAFT CORPORATION

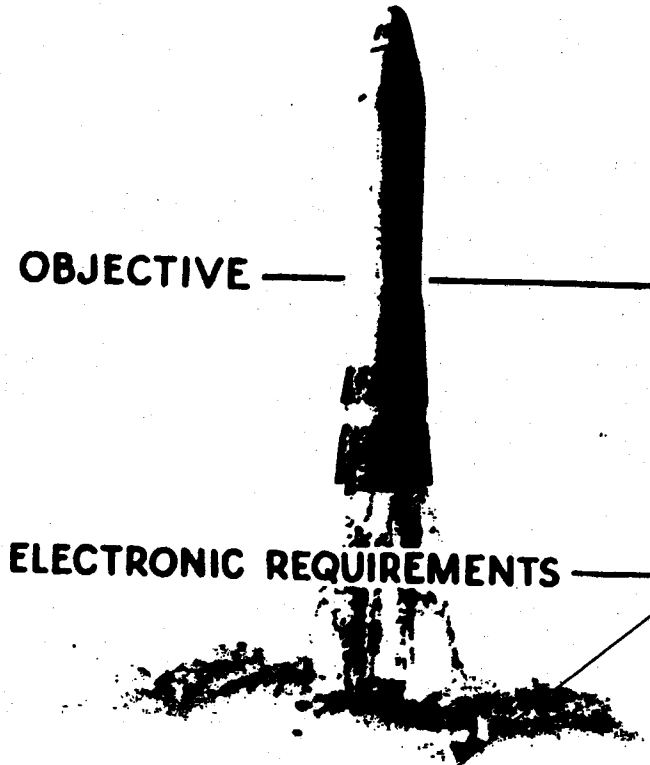
P-378

[redacted]

P-400B(1)

[redacted]

SECRET



OBJECTIVE

ELECTRONIC REQUIREMENTS

USAF PRIORITIES

[redacted]

[redacted]

[redacted]

1408 SSF 1/22/58
VD-58 00001

SECRET

LOCKHEED AIRCRAFT CORPORATION
[redacted]

P-408

SECRET

OBJECTIVE

ELECTRONIC REQUIREMENTS

USAF PRIORITIES

P409 SSF 1/22/58
WD-58 00001

SECRET

LOCKHEED AIRCRAFT CORPORATION
MISSILE SYSTEMS DIVISION

P-409

SECRET

OBJECTIVE

ELECTRONIC REQUIREMENTS

USAF PRIORITIES

P410 SSF 1/22/58
WD-58 00001

SECRET

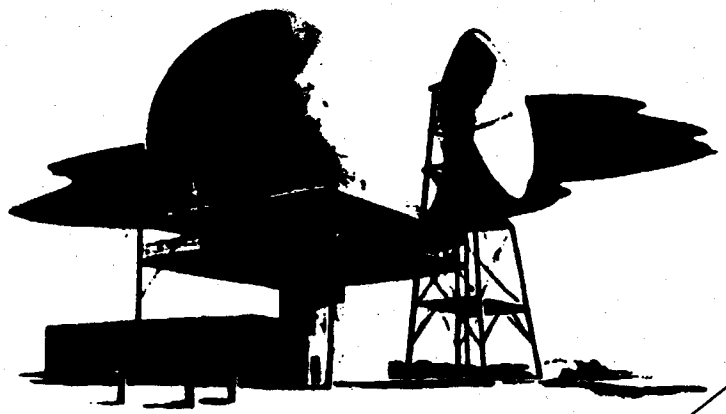
P-410

[redacted]

SECRET

OBJECTIVE

[redacted]



ELECTRONIC REQUIREMENTS

[redacted]

USAF PRIORITIES

[redacted]

P411 SSF 1/22/58

SECRET

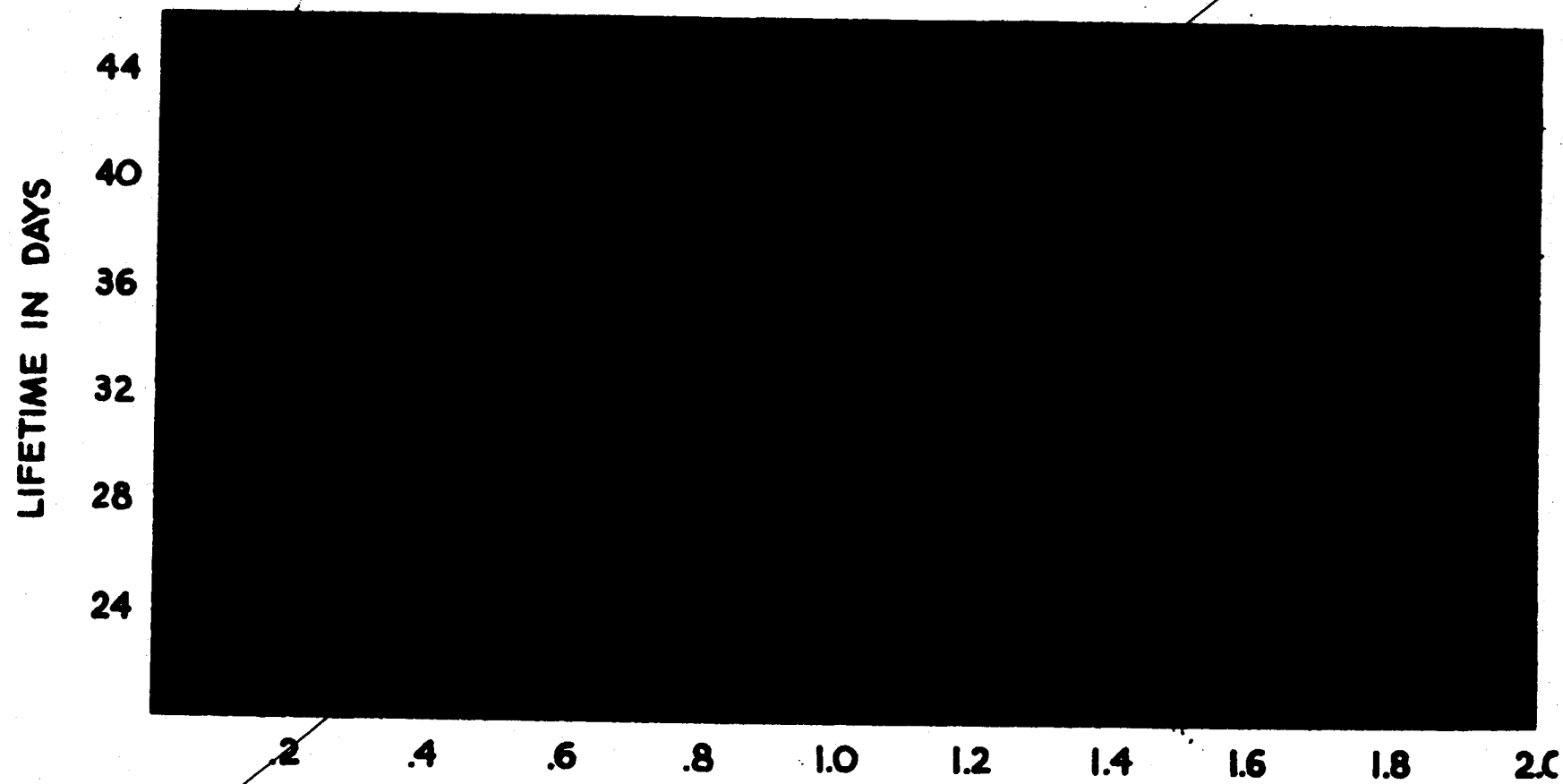
LOCKHEED AIRCRAFT CORPORATION
MISSILE SYSTEMS DIVISION

P-411

[redacted]

SECRET

OPERATIONAL LIFE VS PAYLOAD POWER CONSUMPTION



P413 SS'F' 1/22/58
WD-58 00001

SECRET

LOCKHEED AIRCRAFT CORPORATION
MISSILE SYSTEMS DIVISION

P-413

P453 (1) "M" 6/27/58
WD-58-02843

P-453(1)

SECRET

MAN

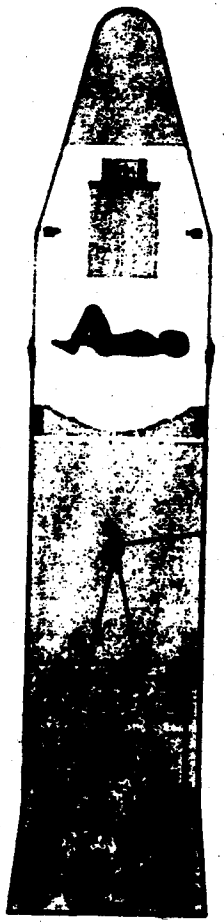
NOSE CONE

REACTION CONTROL JET

SEP. JOINT

CAPSULE SEP. DEVICE

WS117L PROPULSION SYST.



NOSE CONE JETT. DEVICE

RECOVERY CAPSULE

EXPLOSIVE BOLT

CENTER OF GRAVITY

RETRO-THRUST ROCKET

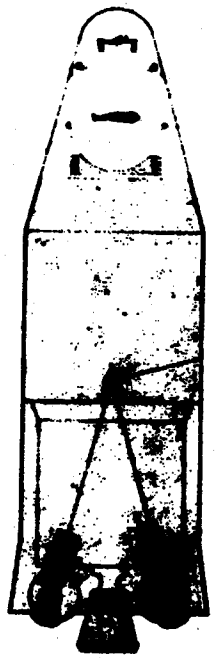
SMALL ANIMAL

NOSE CONE JETT. DEVICE

REACTION CONTROL JET

EXPLOSIVE BOLT

WS117L PROPULSION SYST.



NOSE CONE

RECOVERY CAPSULE

SEP. JOINT

CAPSULE SEP. DEVICE

CENTER OF GRAVITY

RETRO-THRUST ROCKET

~~SECRET~~

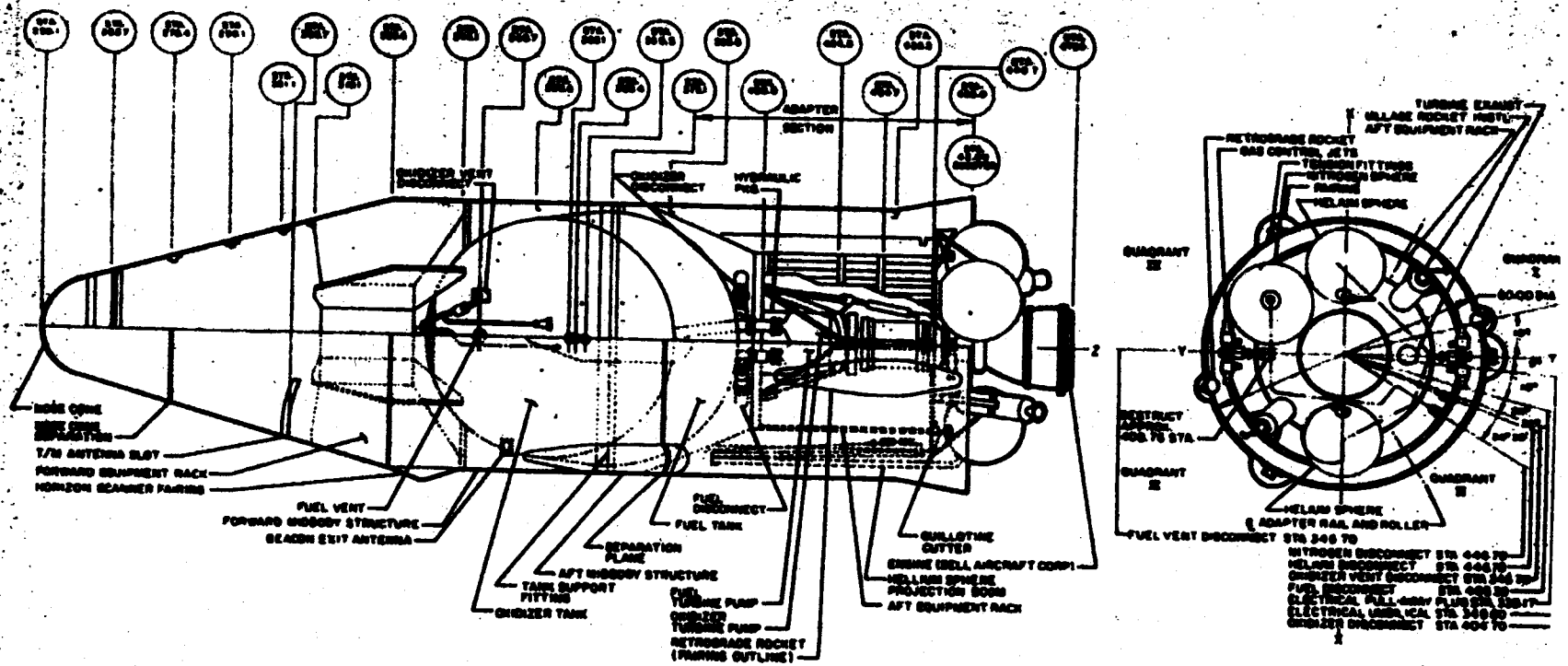
P475 S 4/30/58

LOCKHEED AIRCRAFT CORPORATION
MISSILE SYSTEMS DIVISION

P-475

[redacted]

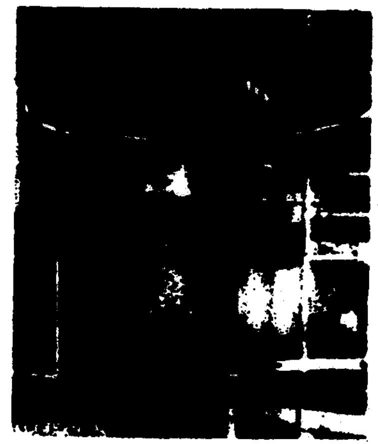
FTV 1 & 2



P-598

[redacted]

STACKING & ALIGNMENT



LMSD, SUNNYVALE
21, JUNE 1958

P64000 SFA* 10/2/58
WD-58-08744 LMSD/104396

P-640(1)

SENTRY VISUAL RECONNAISSANCE TASK

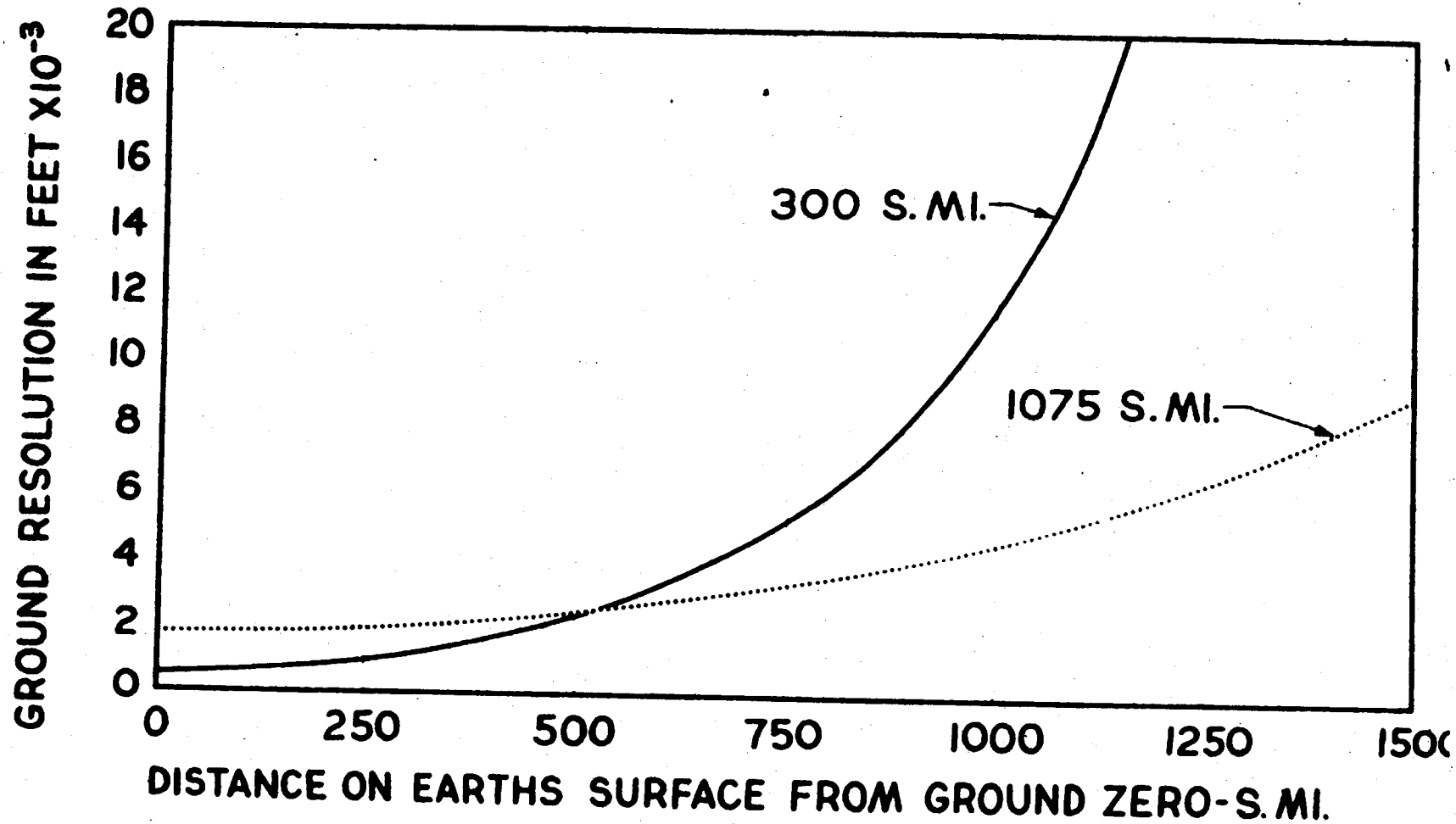
IN SPACE

- ACQUIRE VISUAL INFORMATION
- PROCESS AND STORE
- CONVERT PHOTO TO VIDEO

ON THE GROUND

- CONVERT VIDEO TO PHOTO
- PROCESS FILM RECORD
- PROVIDE PERTINENT DATA
- PROVIDE QUALITY CONTROL FUNCTIONS

GROUND RESOLUTION VS DISTANCE

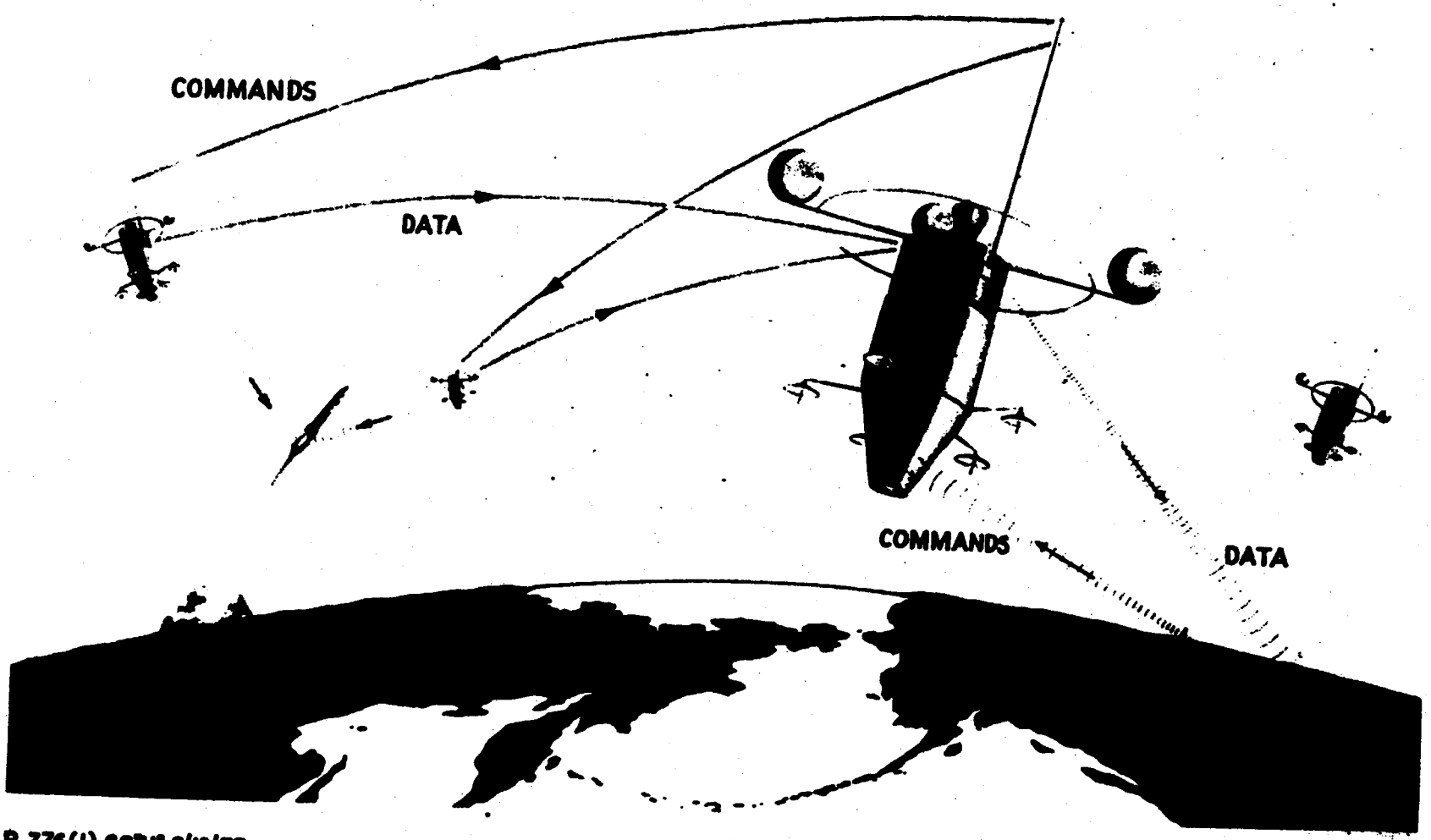


P 785 SS*E* 8/8/58
WD-58-05189 LMSD/100353

SECRET

P-785

SENTRY DATA RELAY CONCEPT



P 776(1) SS"H" 8/19/58
WD-58-05188 LMSD 100286

P-776(1)

SENTRY ADVANCED VEHICLE

VISUAL SURVEILLANCE

EQUIPMENT		WEIGHT-LBS	AVERAGE POWER REQUIRED-WATTS
DATA SENSING		1400-2100	160
HIGH RESOLUTION CAMERA	500-1200		
MEDIUM RESOLUTION CAMERA	300		
LOW RESOLUTION CAMERA	300		
HIGH RESOLUTION I.R.	300		
COMMUNICATIONS		1350	120
4 WIDE BAND DATA LINKS	800		
3 NARROW BAND DATA LINKS	300		
ON BOARD PROGRAMING EQUIP.	250		
GUIDANCE & CONTROL		550	100
M.I.T. GUIDANCE	315		
ATTITUDE STABILIZATION	85		
ORBIT ADJUSTMENT	150		
APU (SOLAR COLLECTORS)		600	
PAYLOAD SUPPORT STRUCTURE		600	
TOTAL		4500-5200	380

P 787 S 8/8/58
WD-58-05183 LMSD/100273

SECRET [redacted]

P-787

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 RECONNISSANCE

* 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
WD 58 05183

8/8/58
LMSD/101783

~~SECRET~~

[redacted]

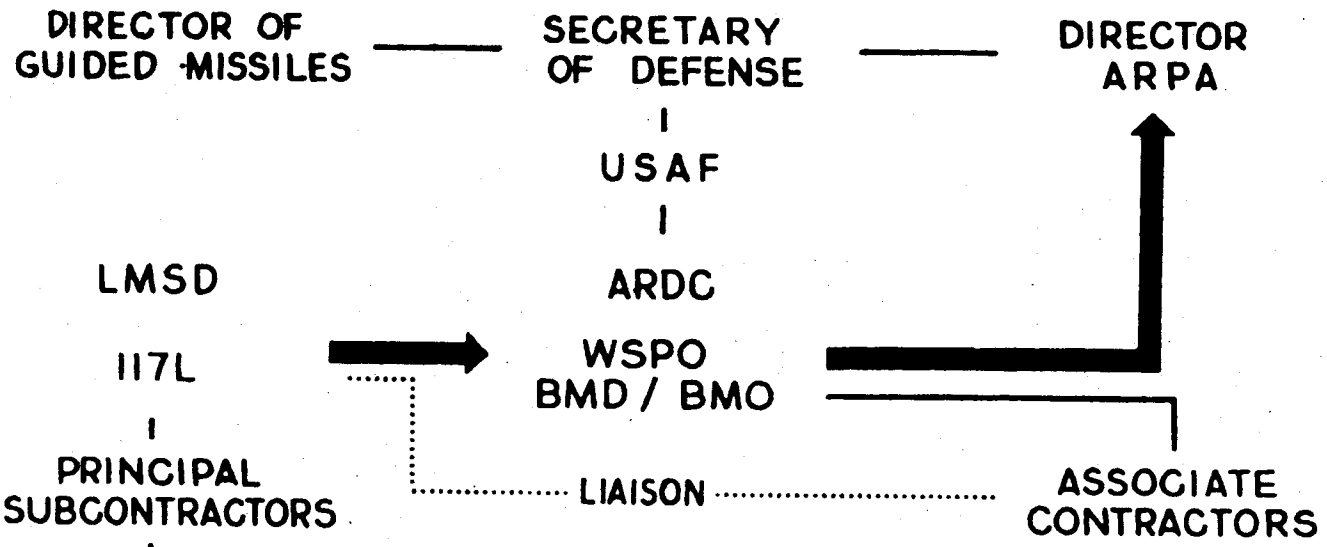
RECONNAISSANCE MISSIONS:

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

BIOASTRONAUTIC RECOVERY MISSIONS:

- RECOVERY CAPSULE & ROCKET
- CAPSULE CARGO

SENTRY - DEVELOPMENT ORGANIZATION



PROPULSION
- BELL AIRCRAFT CORP

AUXILIARY POWER
- EAGLE-PICHER CO

GUIDANCE & CONTROL
- DETROIT CONTROLS CORP

VISUAL RECONN.
- EASTMAN KODAK CO

FERRET
- AIRBORNE INST LAB INC

INFRARED RECONN.
- AEROJET - GENERAL CORP

GROUND SPACE COMM.
- PHILCO CORP

GROUND SUPPORT EQUIP.
- OTIS ELEVATOR CO

BOOSTERS
- DOUGLAS A/C CORP (SM-75)
- CONVAIR ASTRONAUTICS (SM-65)

GUIDANCE & CONTROL
- INSTRUMENTATION LAB, MIT
- GENERAL ELECTRIC CO

AUXILIARY POWER
- THE MARTIN CO
- ATOMICS INTERNATIONAL

DATA PROCESSING
- RAMO-WOOLDRIDGE CORP

P 810 8/8/58
WD-58-05183 LMSD/101781

~~SECRET~~

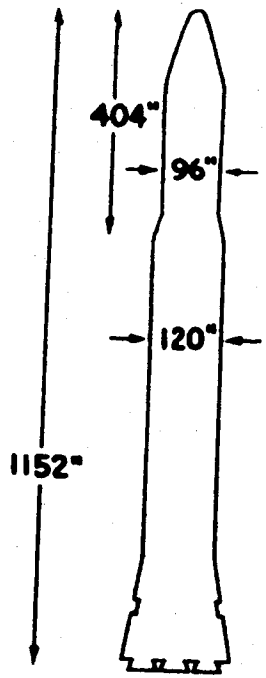
P-810

MISSIONS OF A SATELLITE WEATHER SYS.

P-813 SS "G" 8/8/58 W/142 (3)

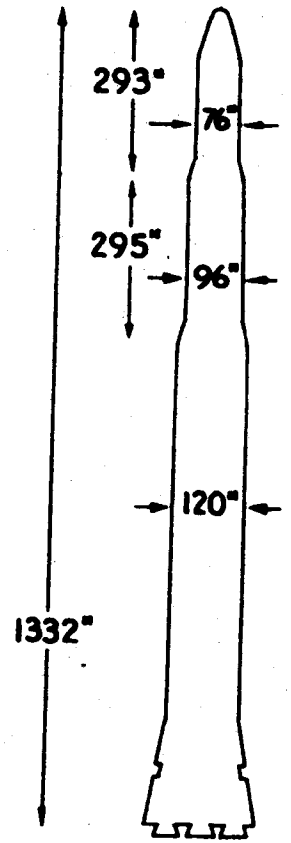
SENTRY-ADVANCED VEHICLE

ESCAPE PAYLOAD CAPABILITY



DATA	LBS.
GROSS LAUNCH	271,989
ATLAS B/O	19,280
" PAYLOAD	12,000
VEHICLE LAUNCH	11,580
" B/O	3,120

600 LB PAYLOAD



DATA	LBS
GROSS LAUNCH	279,989
ATLAS B/O	27,280
" PAYLOAD	20,000
VEHICLE LAUNCH	19,450
VEH. 1ST STAGE B/O	10,500
" 2ND STAGE LAUNCH	8,450
" 2ND STAGE B/O	3,350

1750 LB PAYLOAD

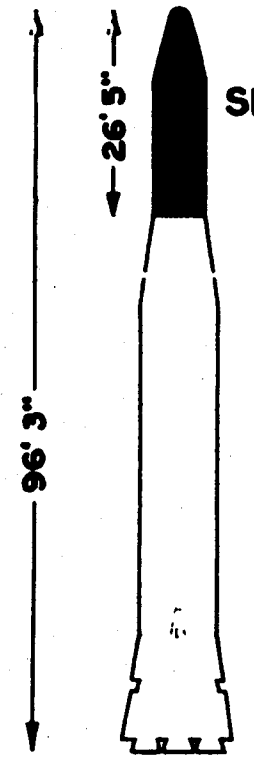
P 820 S 8/8/58

SECRET

P-820

SENTRY-MIS DESIGN CONCEPT

BOOSTER & ORBIT VEHICLE

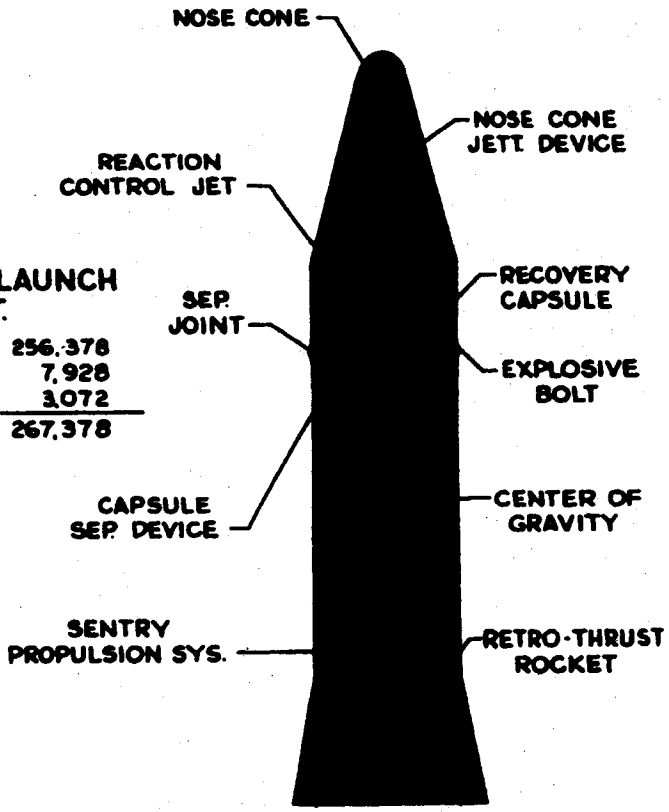


SENTRY

BOOSTER PAYLOAD (SENTRY & CAPSULE)	
SENTRY STRUCTURE	670
DESTRUCT	7
PROPULSION	640
CONTROL	160
APU	180
GUIDANCE	101
TELEM. & COMM.	100
CAPSULE	2,120
SUBTOTAL	3,978
CONTINGENCY	952
WEIGHT EMPTY	4930
PROPELLENTS	6070
GROSS WEIGHT	11,000
WT. EMPTY	4,930
ADAP. & ULLAGE RKTS.	310
EMPTY WT. ON ORBIT	4,620
MAX. RESID. PROP (σ)	170
BURNOUT WT. ON ORB.	4,790

CAPSULE (GROSS)	
STRUCTURE	395
HEAT SINK	490
ATTITUDE CONT.	161
PAYLOAD (MAN)	182
SUPPORT EQUIP.	160
FLT. ELECTRONICS	160
RECOV. GEAR	285
SAFETY PROV.	287
SUB-TOTAL	2120
CONTINGENCY	952
TOTAL	3,072

GROSS LAUNCH WT.	
BOOSTER	256,378
SENTRY	7,928
CAPSULE	3,072
TOTAL	267,378



P829
WD-58-05183

SECRET

LOCKHEED MISSILE SYSTEMS DIVISION

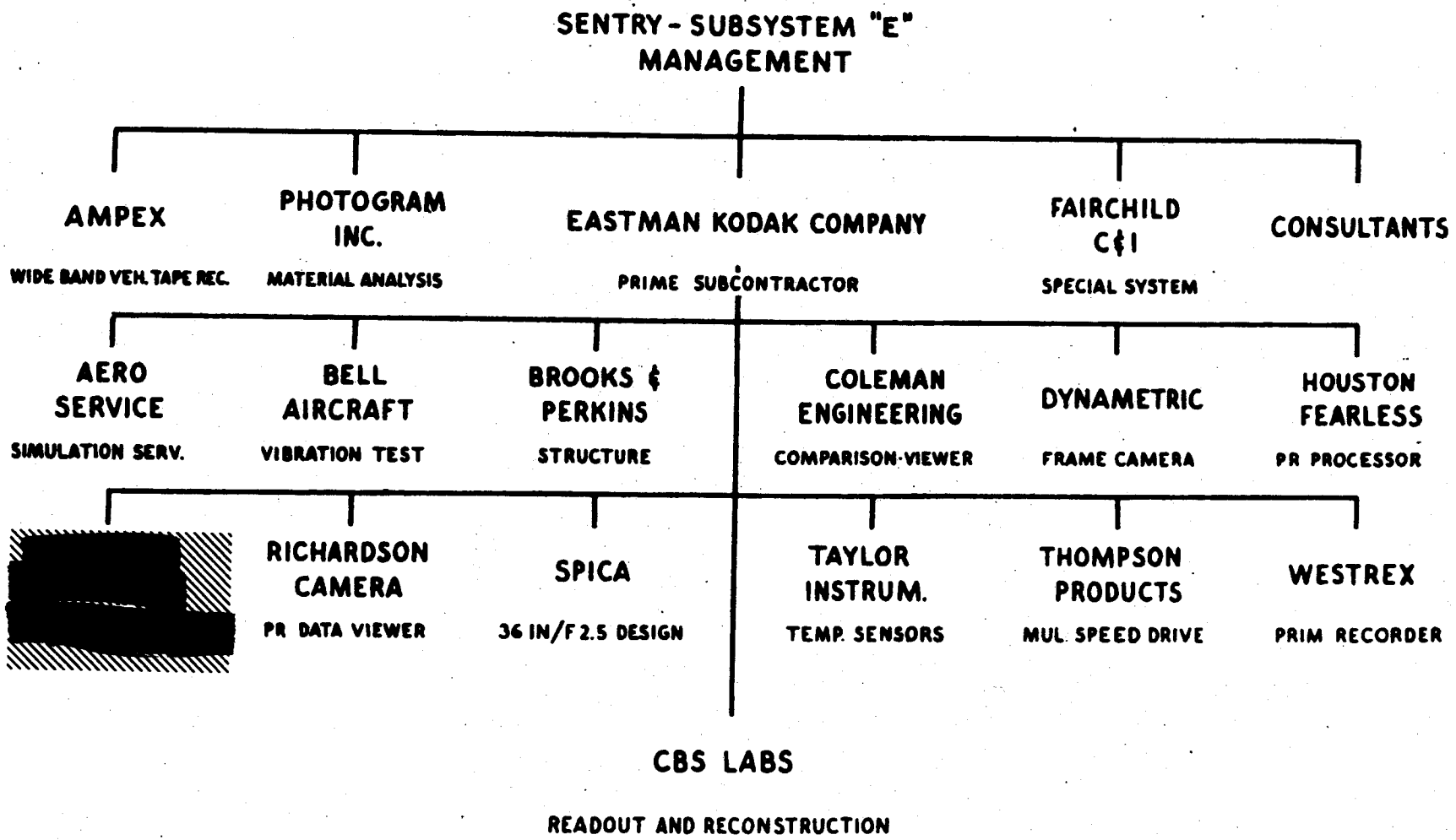
P-829

SENTRY MIS POTENTIAL SYSTEM

UNIT		SELECTION	CHARACTERISTICS
VEHICLE		BASIC SENTRY SPACE FRAM M TO CARRY MANNED CAPSULE	DESIGNED TO WITHSTAND 9.5g's AT 11,600 LB GROSS WT.
PROPULSION	ORBIT BOOST	BELL HUSTLER MODEL 8048	ACID - UDMH 15,000 LB. THRUST FOR 120 SEC. - ISP - 277 MIN.
	REENTRY RETRO-ROCKET	SOLID PROPELLANT ROCKET (S)	16,000 LB. THRUST FOR 4 SEC. MAX. ACCELERATION OF 4.5 g's
GUIDANCE & CONTROL		REEVES: INERTIAL REF. PACKAGE; GYROS, ACCELEROMETERS	GYRO DRIFT < 10°/HR. ACCELEROMETERS 1% ACCURACY
		DETROIT CONTROLS: HORIZON SCANNER	VERTICAL TO 1°
		LMSD: PROGRAMMER COMPUTOR	PROGRAMS ACCURATE < 1 SEC. - VEL. < 25 FPS
		LMSD: FLIGHT CONTROLS, PNEUMATICS ELECTRONICS, HYDRAULICS	VEH. ORIENTATION < 10 MILLIRADIANS
		LMSD: STABILIZATION; GAS JETS	
COMMUNCATIONS	T/M & COM'D. VOICE	BEACON ASSISTED RADAR TRACKING VHF TELEMETRY WITH VOICE CHANNELS	—
HUMAN ENVIRONMENT	OXYGEN & ACCEL.	HIGH PRESSURE DEMAND	
		PARTIAL PRESS. SUIT PLUS ACCESSORIES	3000 IPS, RESERVOIR, PRESS. DROPPING & DEMAND REG.
	METEORITES ULTRA VIOLET & COSMIC RAD TEMP & HUM.	VEHICLE SKIN MEASURES AS STANDARD	STANDARD HEATING OR REFRIG. RESPIRED, MOISTURE OVERBOARD
AEROTHERMAL HEAT		REFROSE ABLATION MATERIAL	SILICON COMPOUND, INTIATION TEMP. ≈ 2200°F HEAT DISSIPATION UP TO 5000 BTU/LB.
AUXILIARY POWER		SPECIAL SILVER-ZINC BATTERY (EAGLE-PICHER)	75 WATT HRS. PER LB. - 106 LB. BATTERY
TRACKING		STANDARD	
RECOVERY		PARACHUTE PLUS AUX. DRAG DEVICES	APPROX. 120 FT. DIA., 300 LBS. WT., 1.6 OZ/SQ.YD. NYLON 25 FT./SEC. SINK AT 25,000 FT. ALT.
G S E		STANDARD	

~~SECRET~~

VISUAL RECONNAISSANCE SUBSYS. STRUCTURE



P 867 SS "E" 10/3/58 COPY # 7

~~SECRET~~

p-867

p-1039

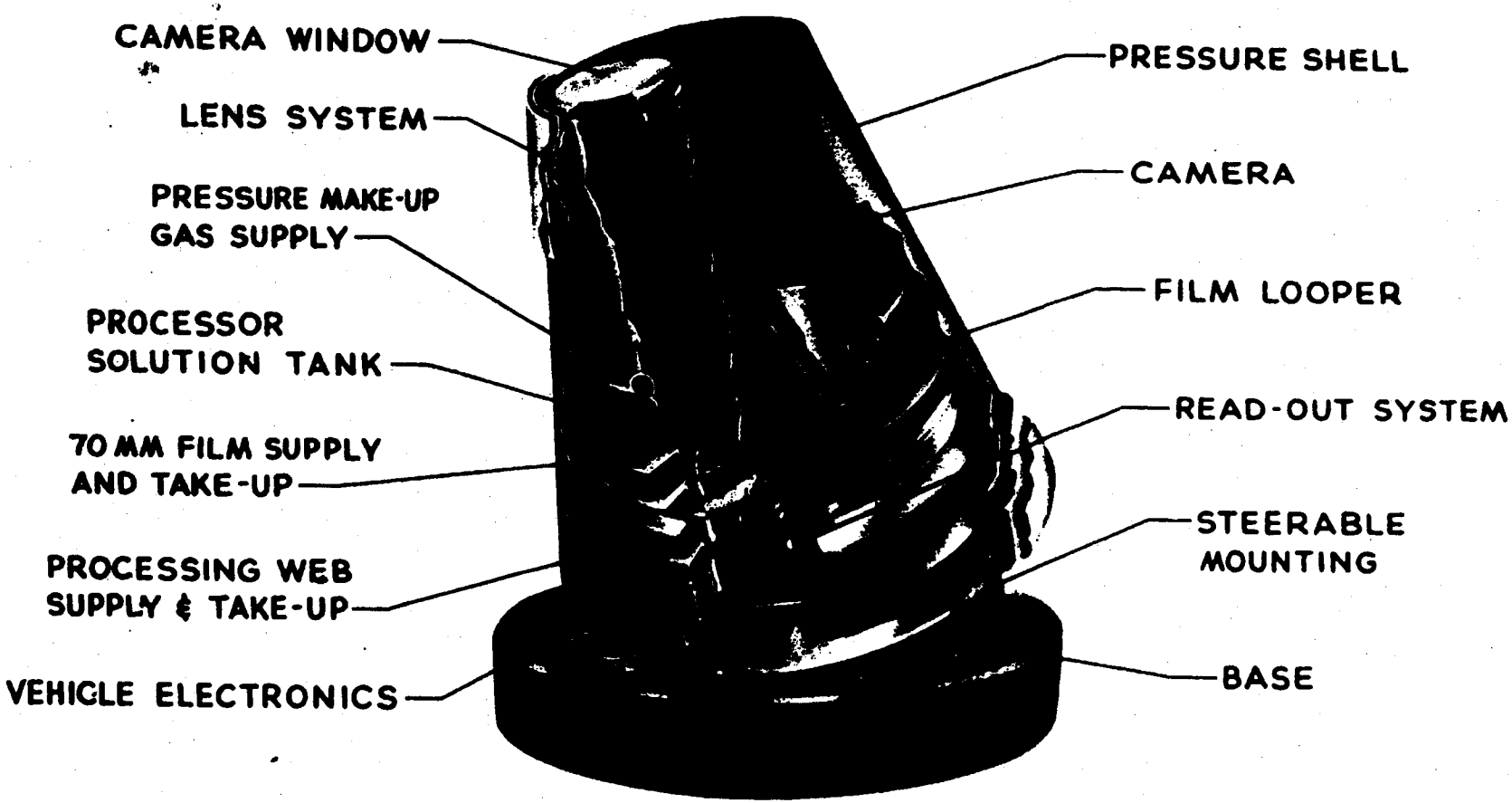
[redacted]

SENTRY PROGRAM PAYLOAD OBJECTIVES

- VISUAL RECONNAISSANCE SYSTEM, 20FT. RESOLUTION, READOUT BY TIMED RADIO TRANSMISSION FROM ORBIT
- HIGHER RESOLUTION VISUAL SYSTEM, 5 FT RESOLUTION, RECOVERED FROM ORBIT
- MAPPING SYSTEM, RECOVERED FROM ORBIT
- FERRET ELECTRONIC RECONNAISSANCE SYSTEM, READOUT BY TIMED RADIO TRANSMISSION FROM ORBIT

P-1065

VISUAL RECONNAISSANCE PAYLOAD (E-2)



P-1068(U) SS/E 4/5/59 COPY # 7

~~SECRET~~

LOCKHEED MISSILES AND SPACE

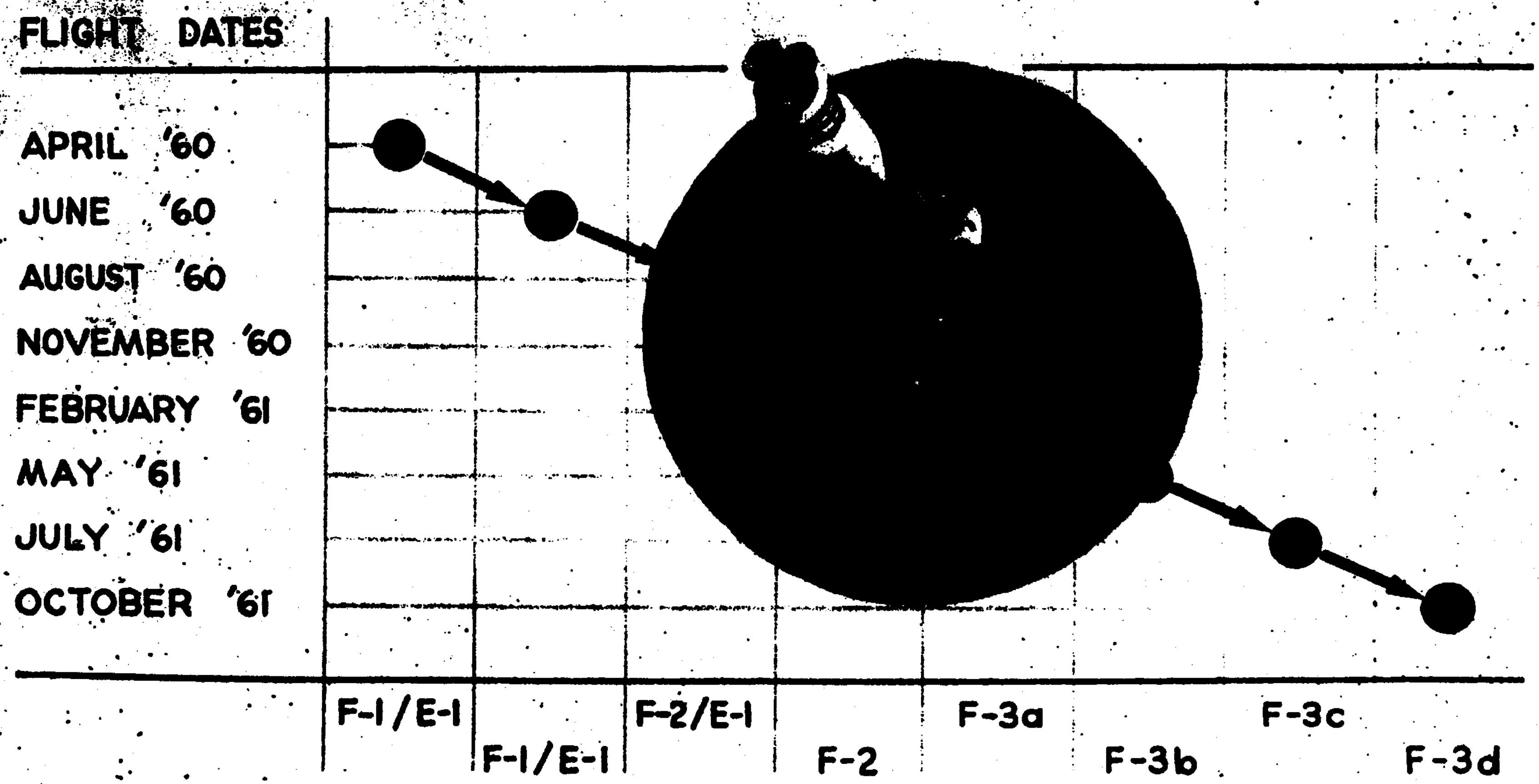
P-1068(1)

[redacted]

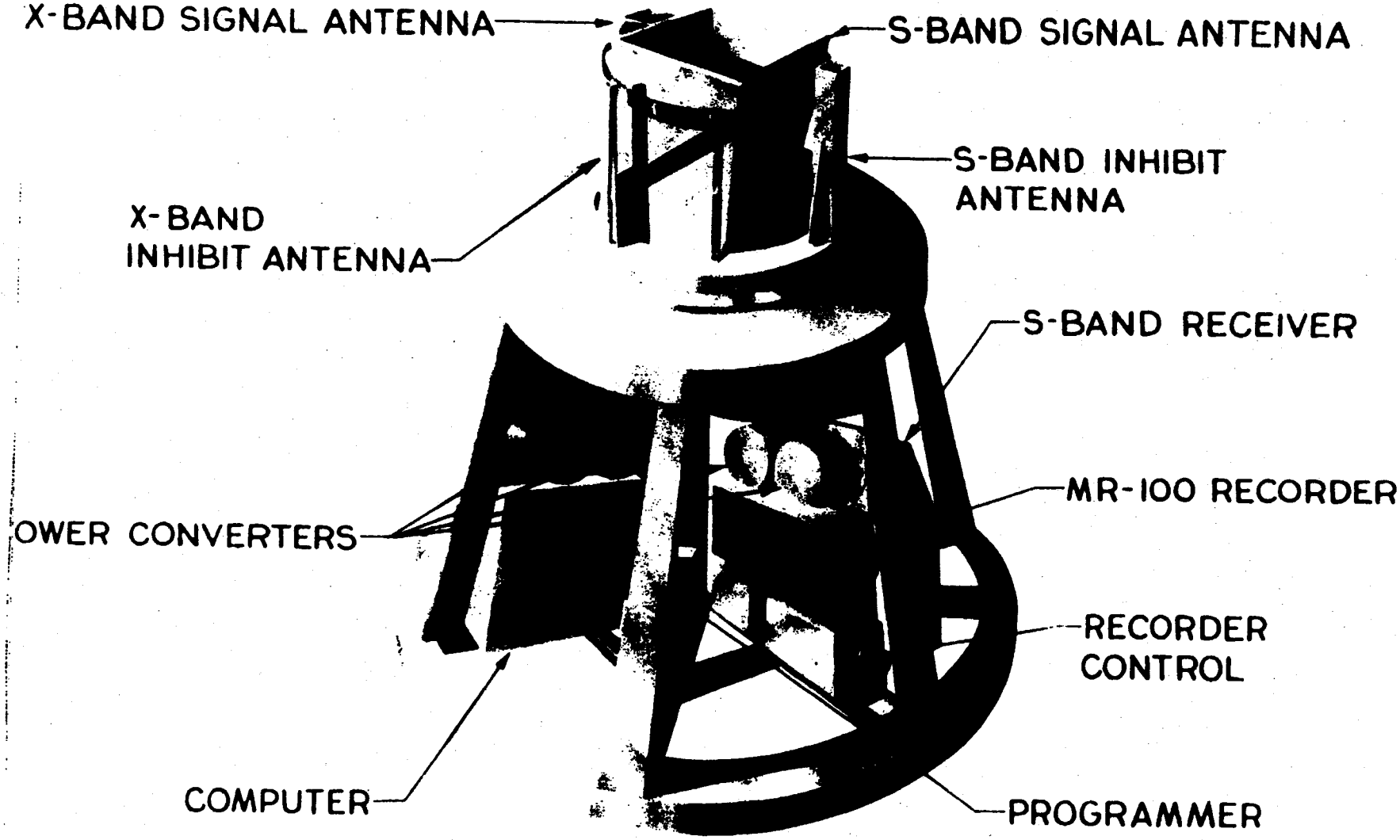
PROVIDE SATELLITE RECONNAISSANCE SYSTEM THAT WILL PERMIT:

- TERRAIN & MAPPING COVERAGE
- TARGET DETECTION, VERIFICATION & LOCATION
- MONITORING OF ELECTRONIC EMISSIONS
- DETERMINATION OF ELECTRONIC SIGNAL CHARACTERISTICS
- MILITARY SURVEILLANCE
  - EVALUATION OF MILITARY & INDUSTRIAL STRENGTH
  - BUILD-UP INDICATORS
  - SIGNIFICANT MILITARY MOVEMENTS INCL. NAVAL FORCES, WORLDWIDE
  - ATTACK WARNING
- BOMB DAMAGE ASSESSMENT
- WEATHER SURVEILLANCE, WORLDWIDE
- COLLECTION OF DATA ON TECHNOLOGICAL IMPROVEMENTS

FLIGHT


FLIGHT DATES
APRIL '60
JUNE '60
AUGUST '60
NOVEMBER '60
FEBRUARY '61
MAY '61
JULY '61
OCTOBER '61
F-1/E-1
F-1/E-1
F-2/E-1
F-2
F-3a
F-3b
F-3c
F-3d

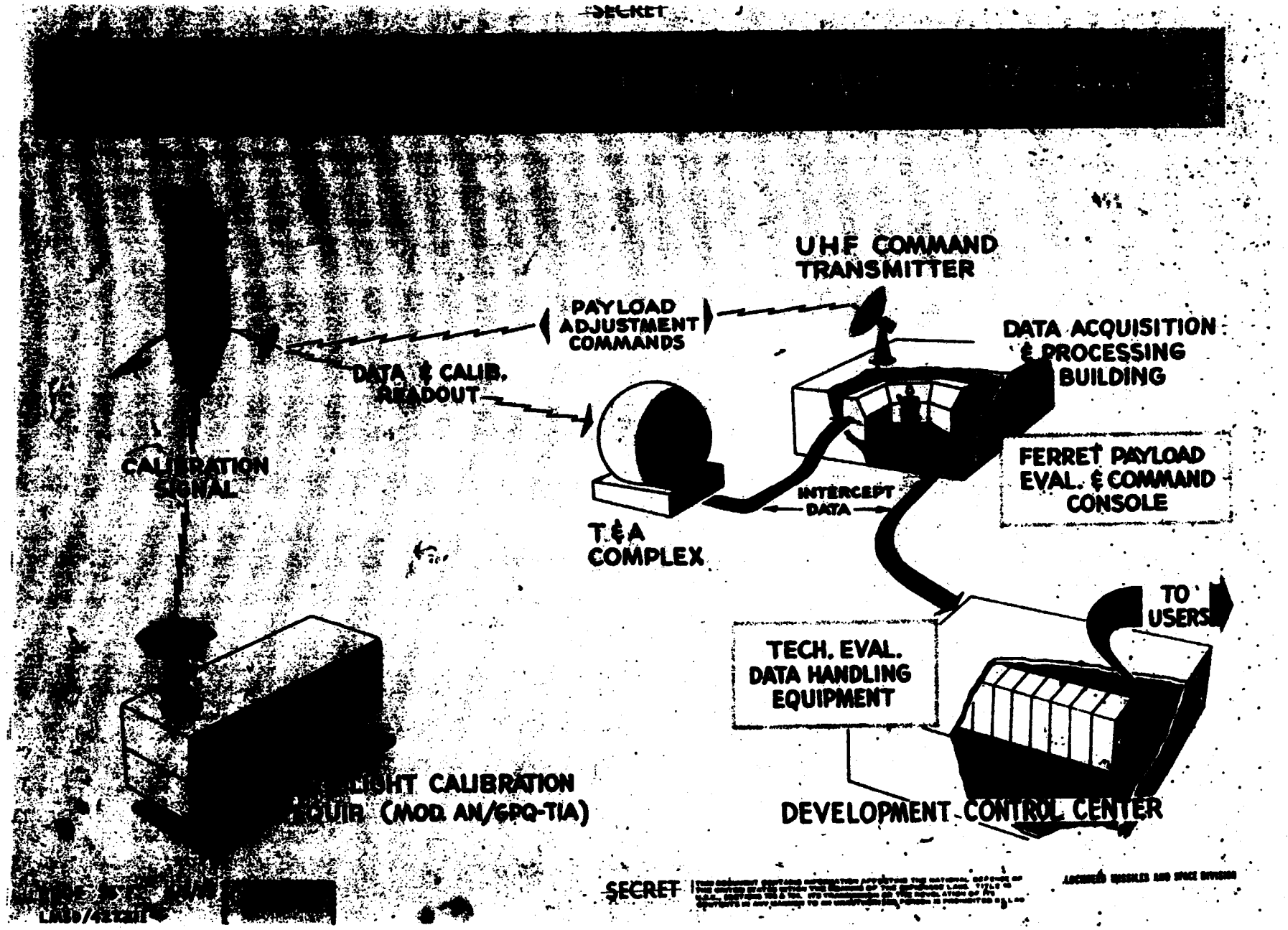
FI SAMOS FERRET PAYLOAD



P-1093(1) SS"F" 9/4/59

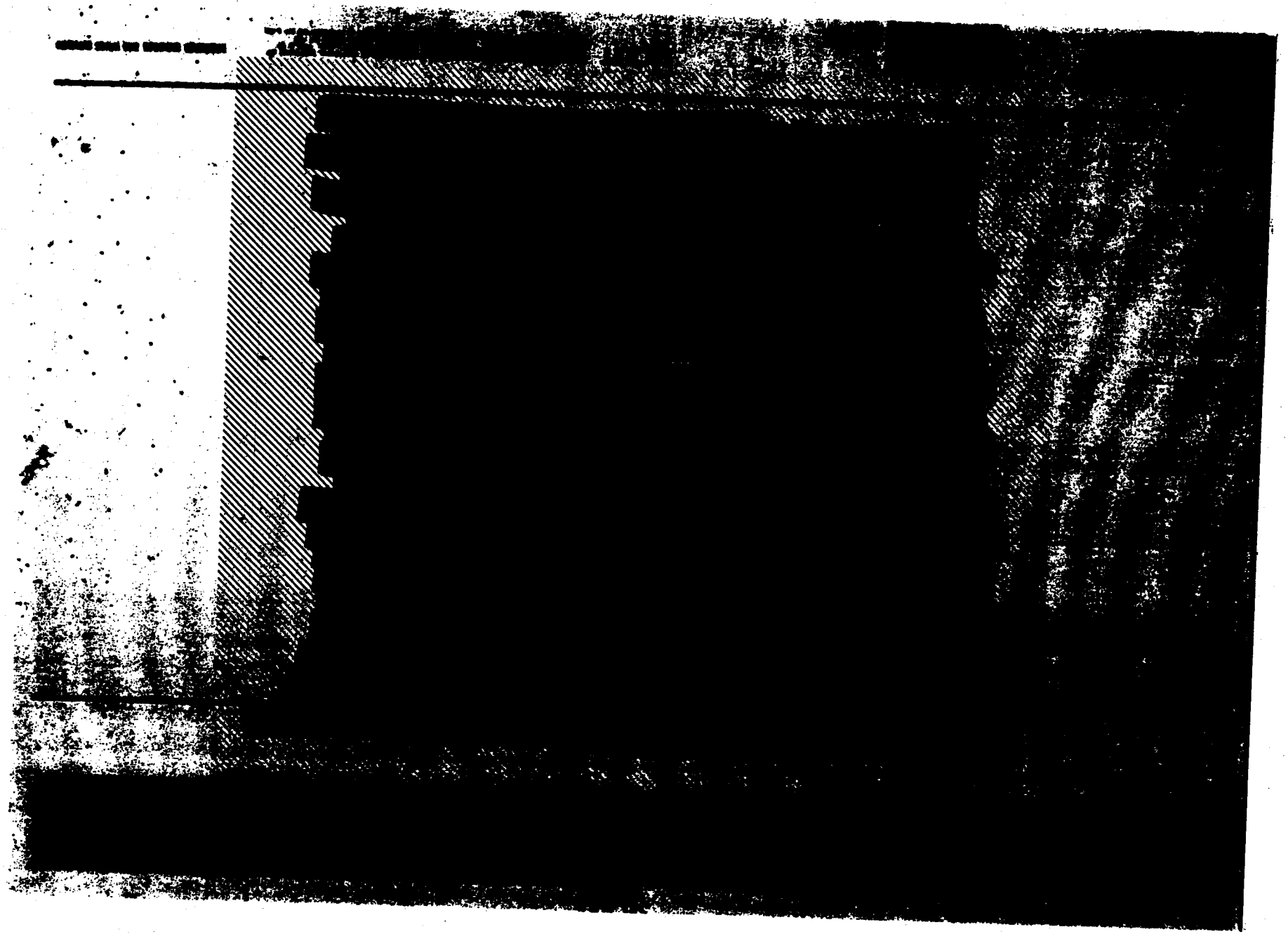
~~SECRET~~

P-1093(1)


SECRET
UHF COMMAND TRANSMITTER
PAYLOAD ADJUSTMENT COMMANDS
DATA & CALIB. READOUT
DATA ACQUISITION & PROCESSING BUILDING
FERRET PAYLOAD EVAL. & COMMAND CONSOLE
INTERCEPT DATA
T&A COMPLEX
TO USERS
TECH. EVAL. DATA HANDLING EQUIPMENT
DEVELOPMENT CONTROL CENTER
SECRET

P-1101

1111-d

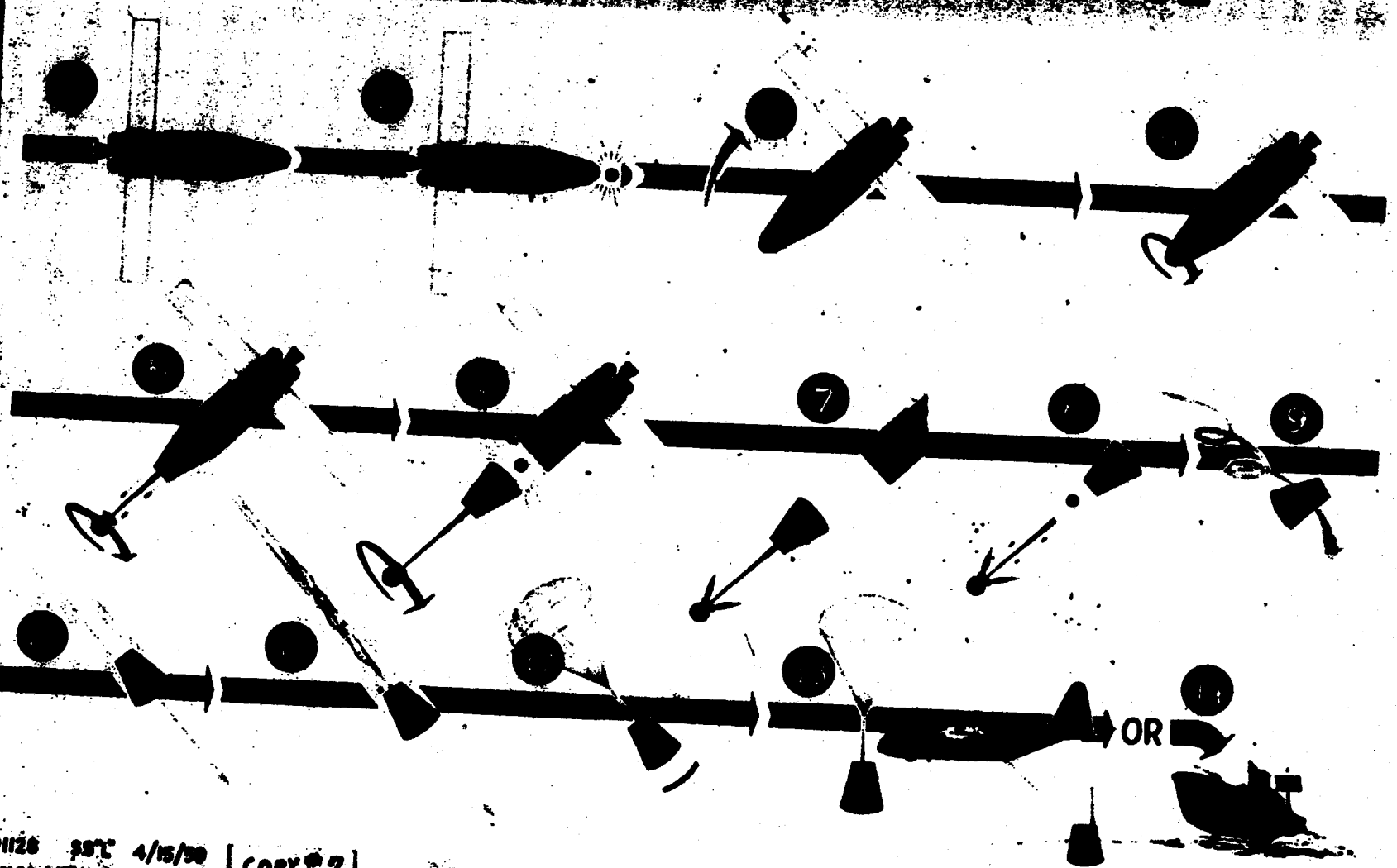


P-1117

P-1118

SECRET

[redacted]VERY - SEQUENCE



P1128 38"L 4/15/58 | COPY #7

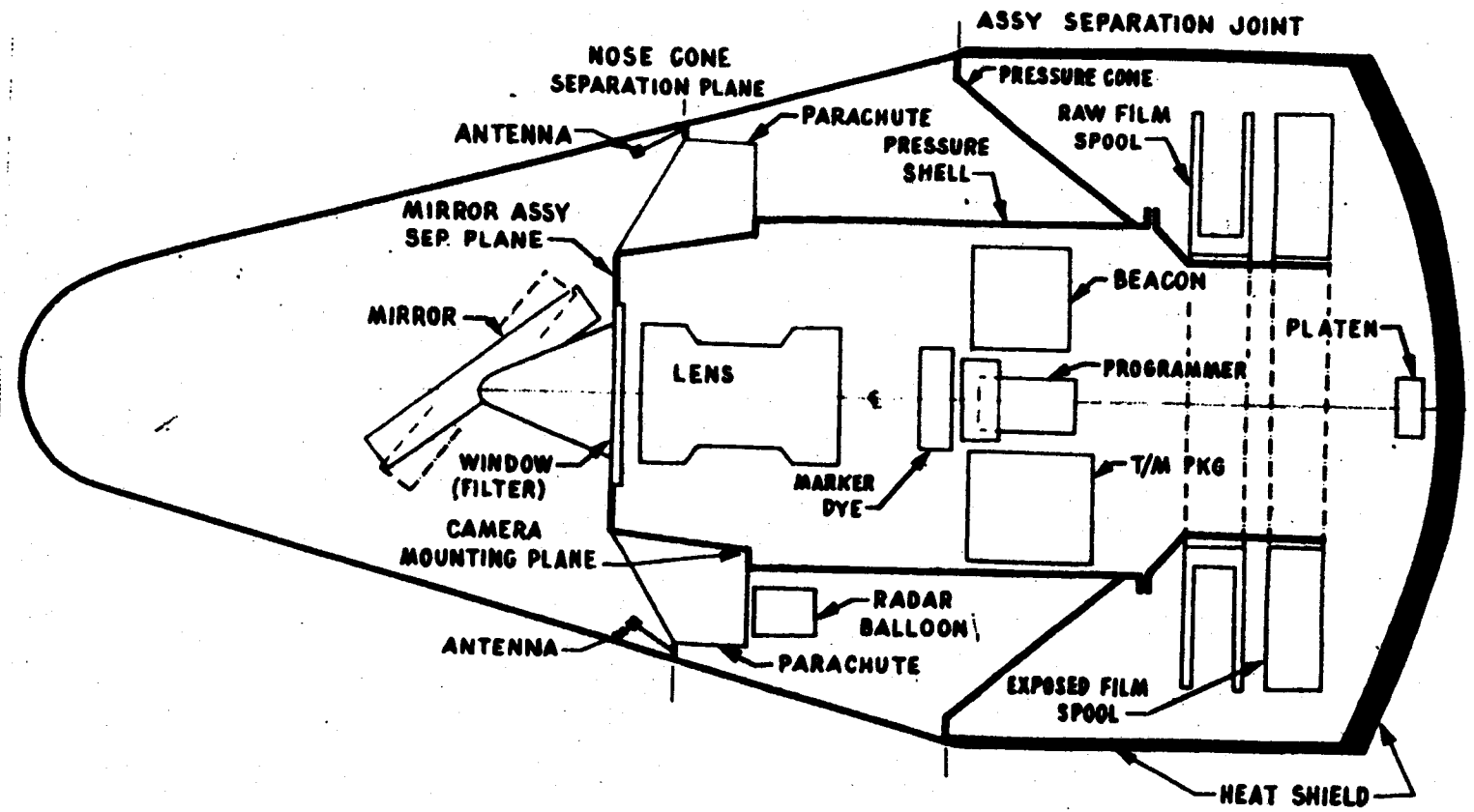
SECRET

LOCKHEED MISSILES AND SPACE DIVISION

P-1128

SAMOS RECOVERY CAPSULE (E-5)

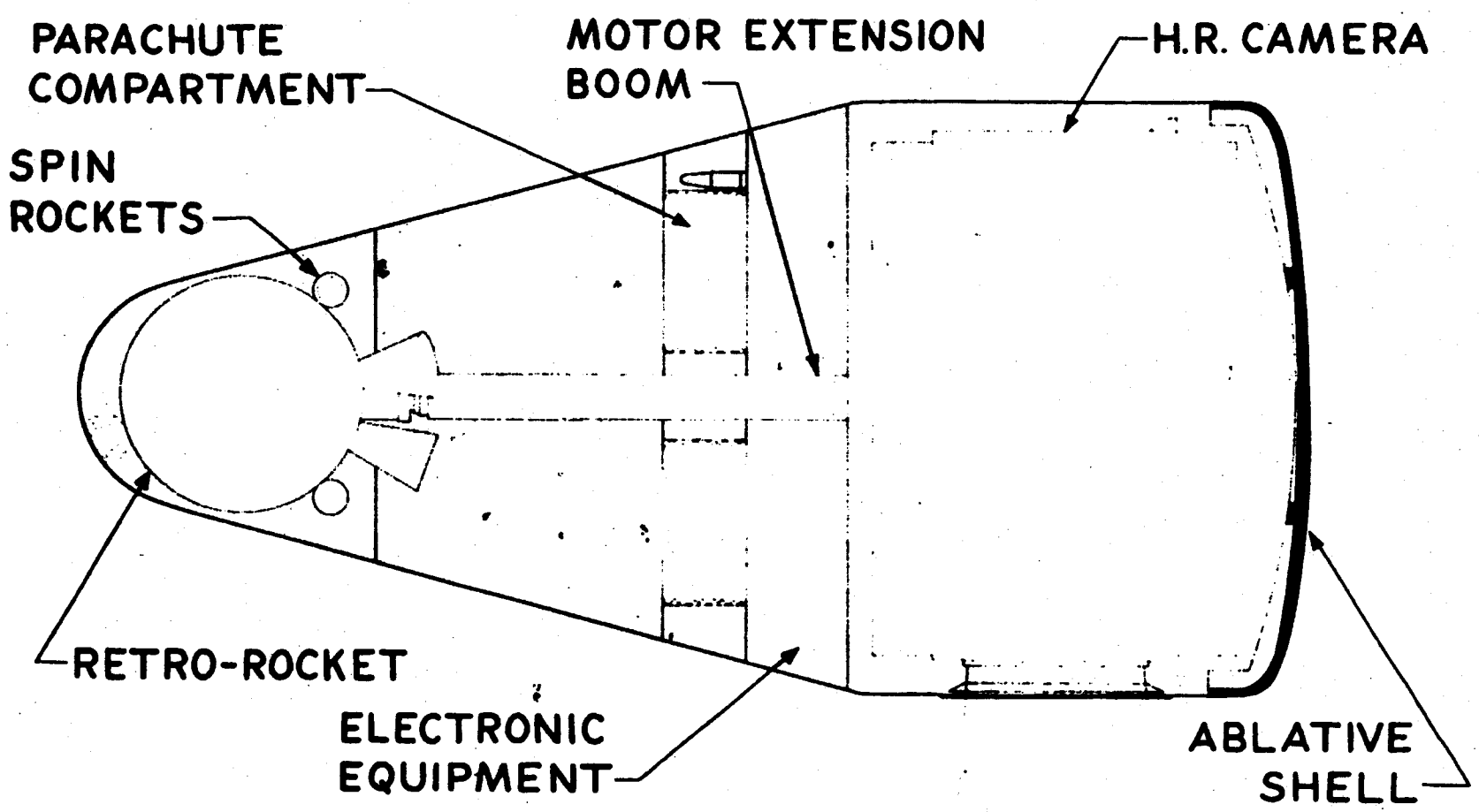
INBOARD PROFILE



SECRET

SENTRY RECOVERY-CAPSULE (H.R.-2)

INBOARD PROFILE



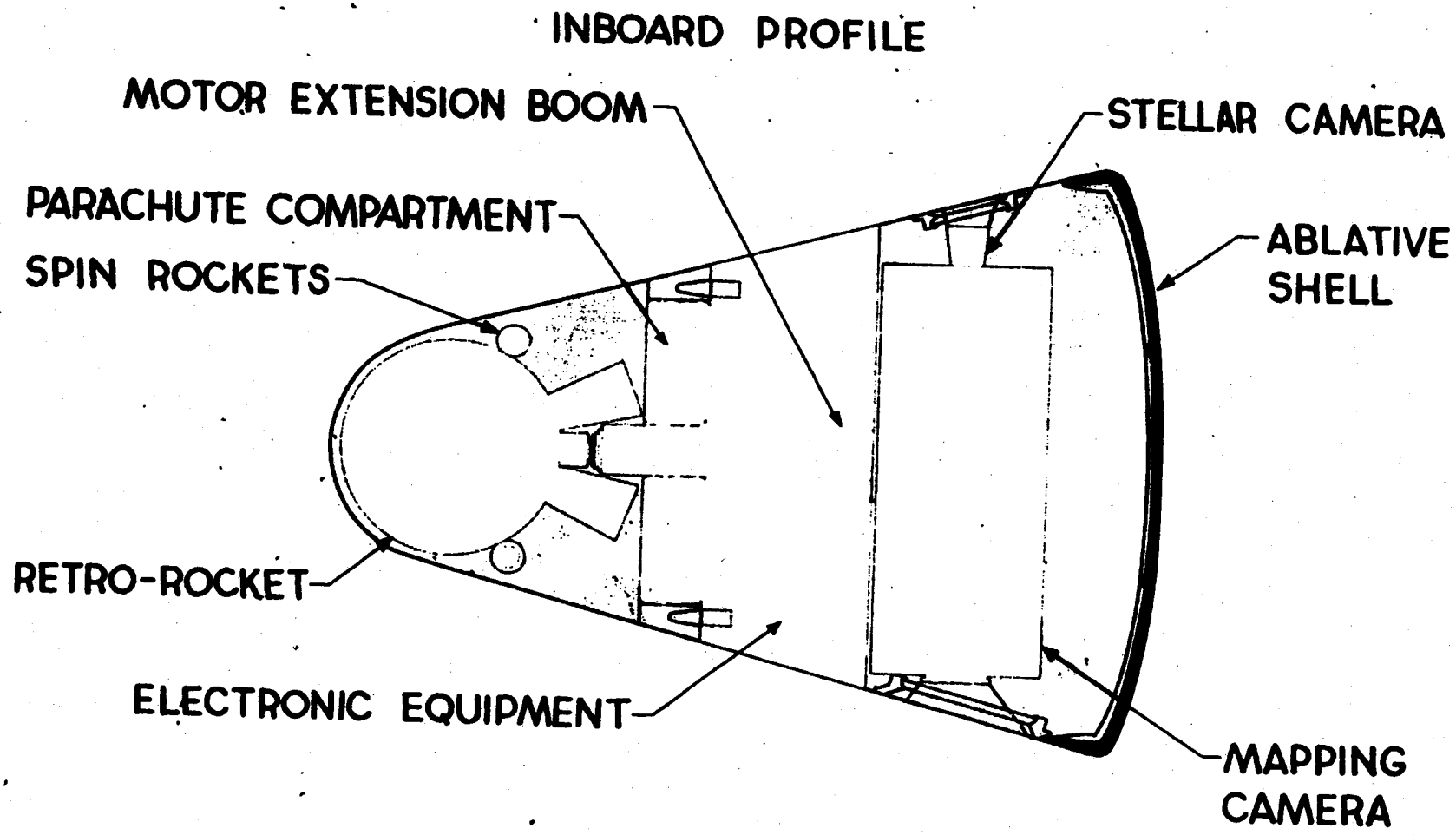
P-1131 SS"L" 4/15/59 "COPY #7

SECRET

LOCKHEED MISSILES AND SPACE DIVISION

P-1131

SENTRY RECOVERY-CAPSULE (MAPPING)

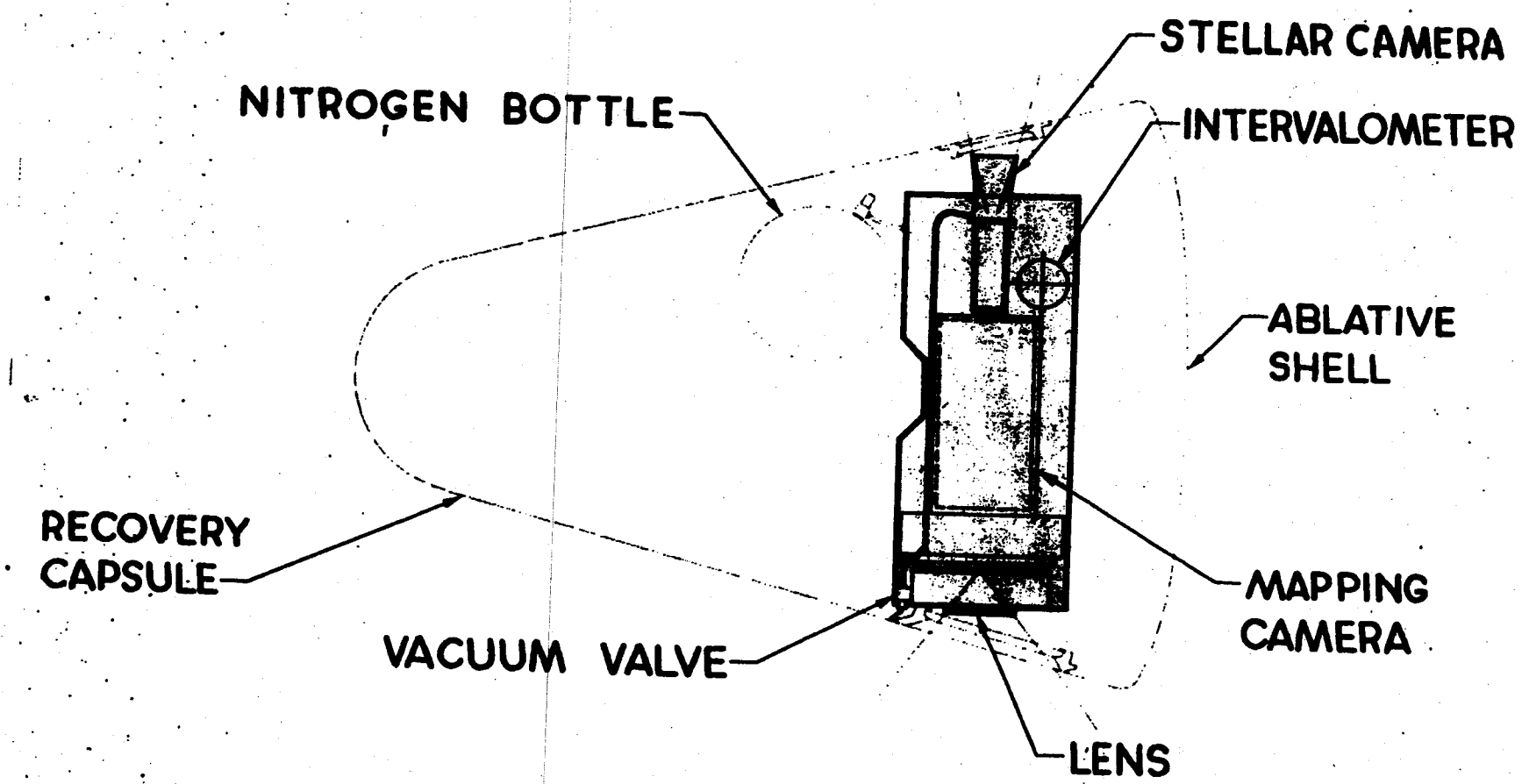


P-1132 S 4/15/59 COPY # 7

LOCKHEED MISSILES AND SPACE DIV.

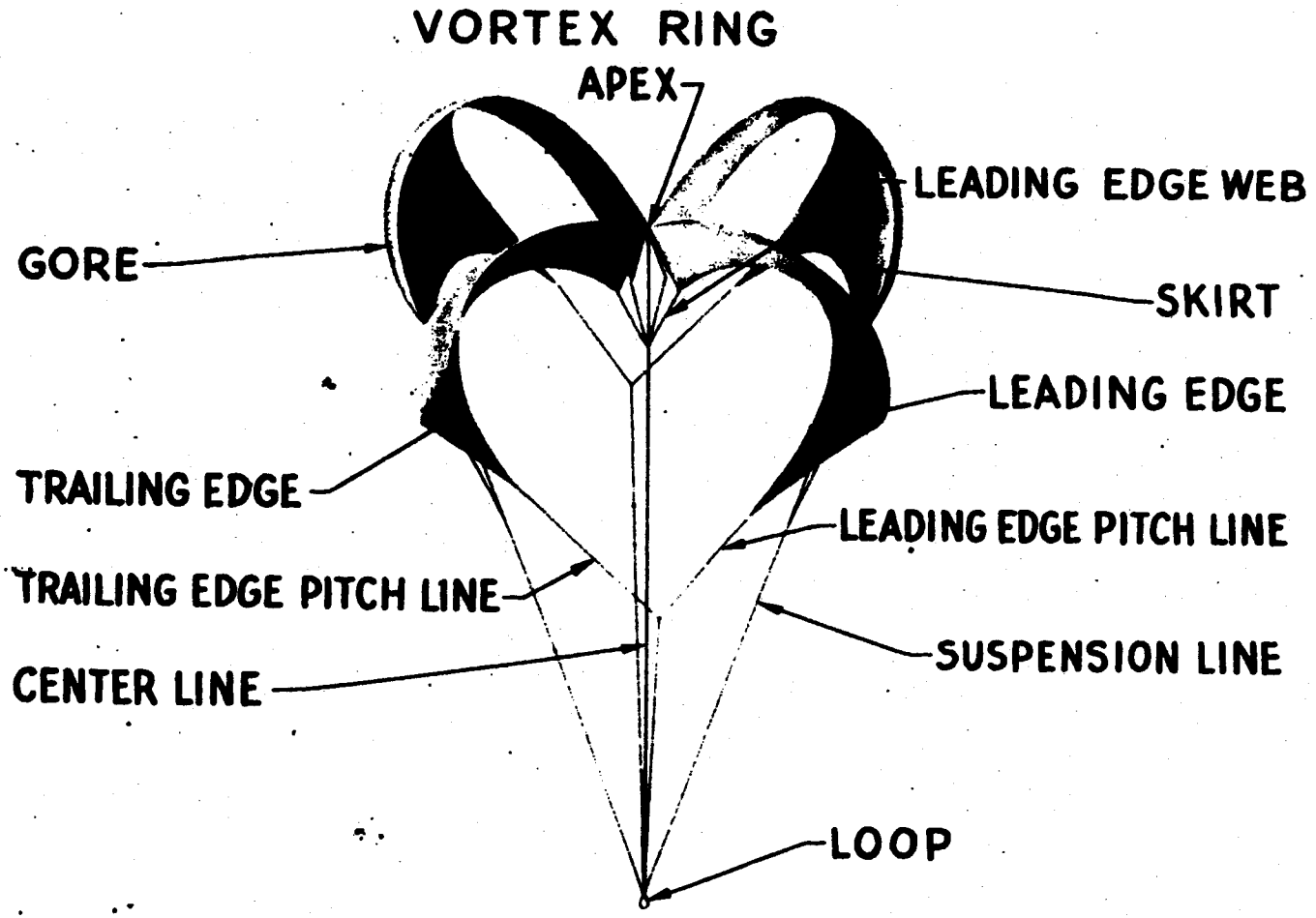
P-1132

SENTRY RECOVERY-MAPPING CAMERA



P1133 SS°L 4/15/59 COPY #7

SENTRY RECOVERY - PARACHUTE

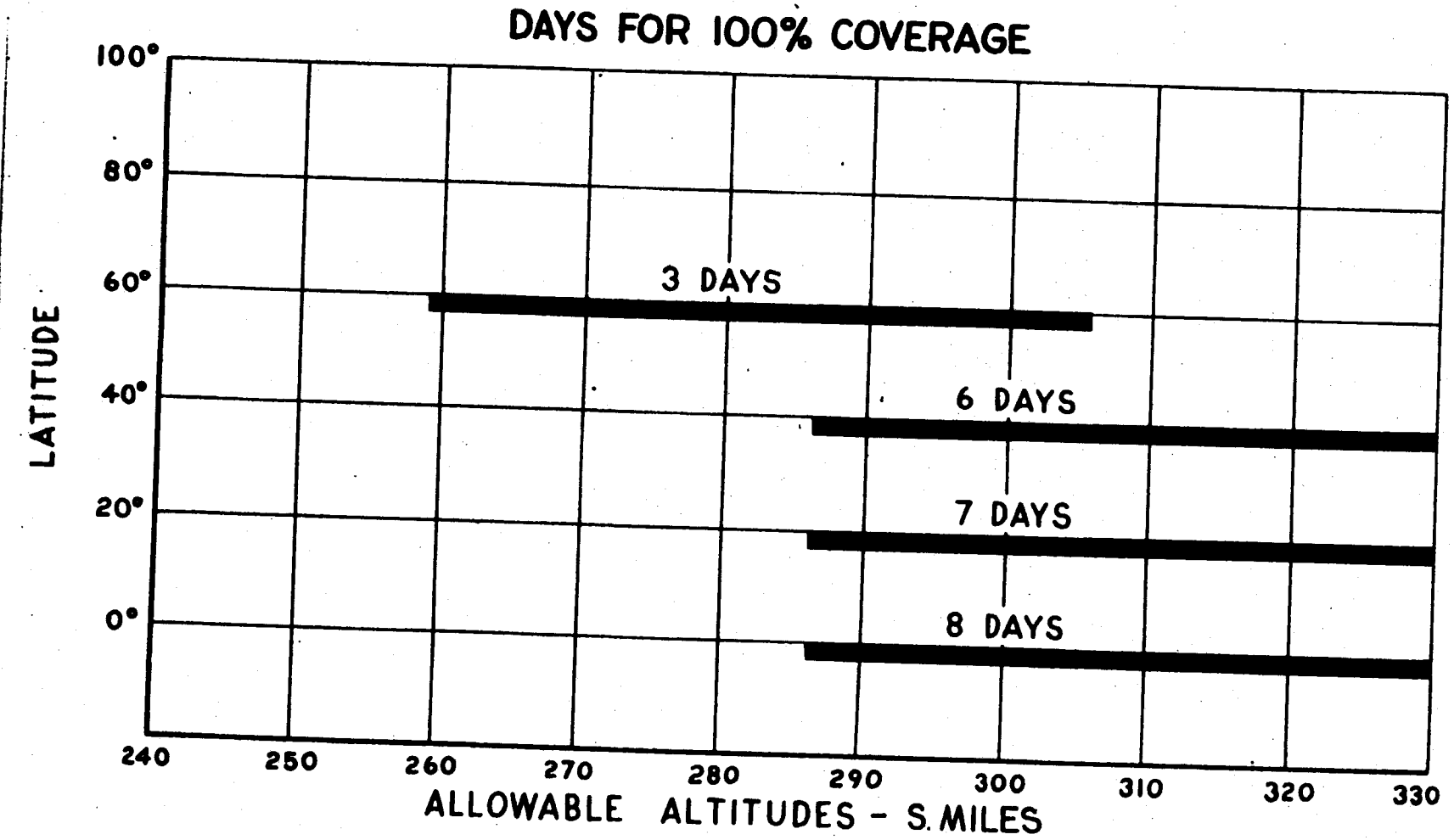


P1134 SS"L" 4/16/59 COPY #7
LMSD/427A20

SENTRY RECOVERY - H.R. OBJECTIVES

- 100% PHOTO POTENTIAL ABOVE 33° N LATITUDE
- 30 x 30 N. MI. PHOTOGRAPHS OF SPECIFIC TARGETS WITH 5 FOOT RESOLUTION
- 60 x 60 N. MI. PHOTOGRAPHS OF SPECIFIC TARGETS WITH 10 FOOT RESOLUTION
- STEREO CAPABILITY
- COMPATIBILITY WITH SENTRY READOUT
- LOCATION ACCURACY OF ONE N. MILE

SENTRY RECOVERY-MAPPING COVERAGE

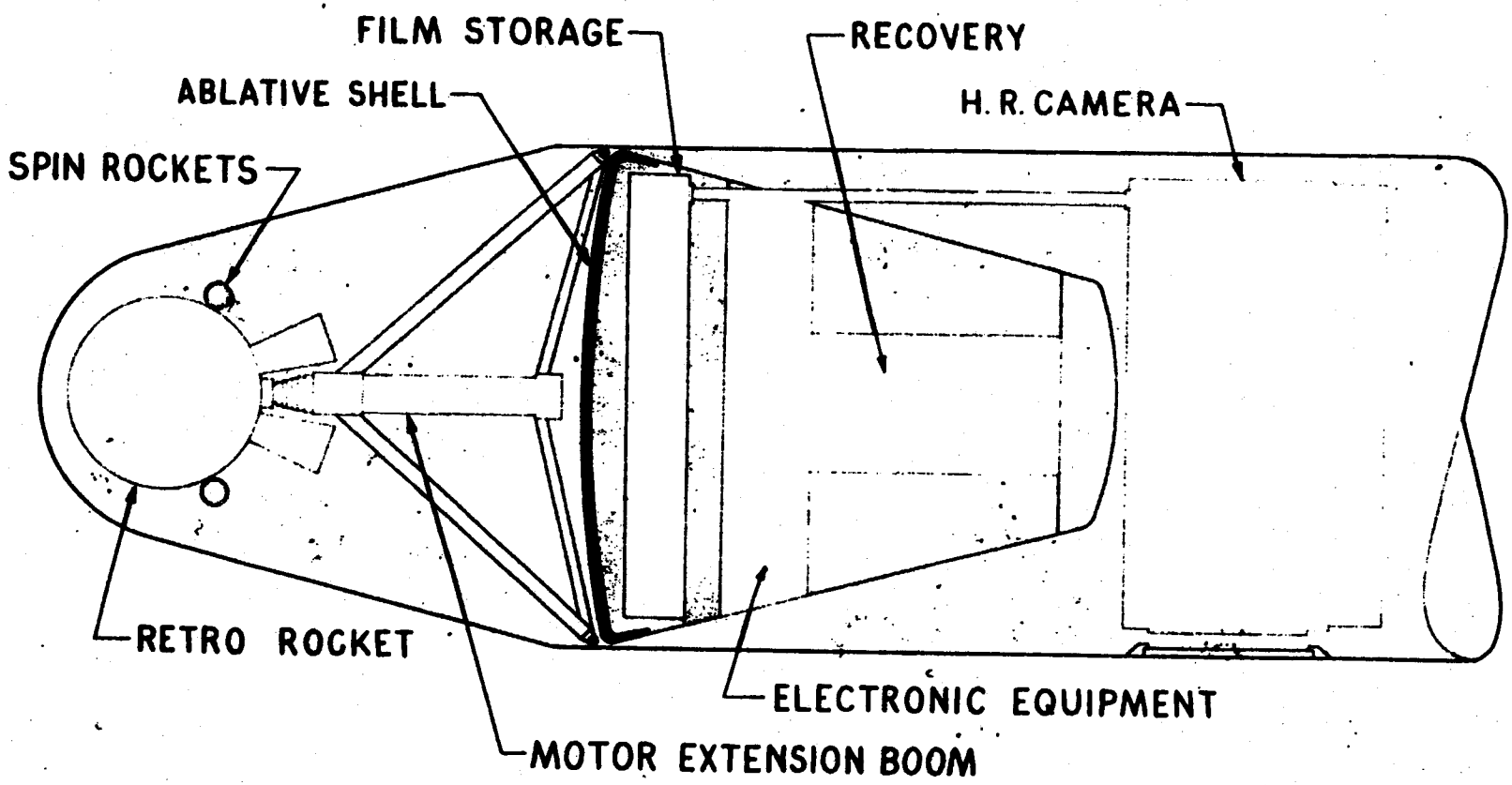


PH37 SS"L" 4/16/59
LMSD/427823 COPY # 7

~~SECRET~~

SENTRY RECOVERY - CAPSULE (HR-3)

INBOARD PROFILE



P1140 "L" 4/17/59 COPY # 7
LMSD/427824

~~SECRET~~

P-1140

SENTRY RECOVERY-MAPPING EQUIPMENT

- AF CARTOGRAPHIC CAMERA WITH GEOGON LENS (GFE)
- AF DEVELOPED STELLAR FIELD CAMERA (GFE)
- BAKER-NUNN SATELLITE TRACKING CAMERAS
- OPTICAL BEACON ON SATELLITE

~~SECRET~~

SENTRY RECOVERY - CAPSULE

FACTORS AFFECTING DESIGN

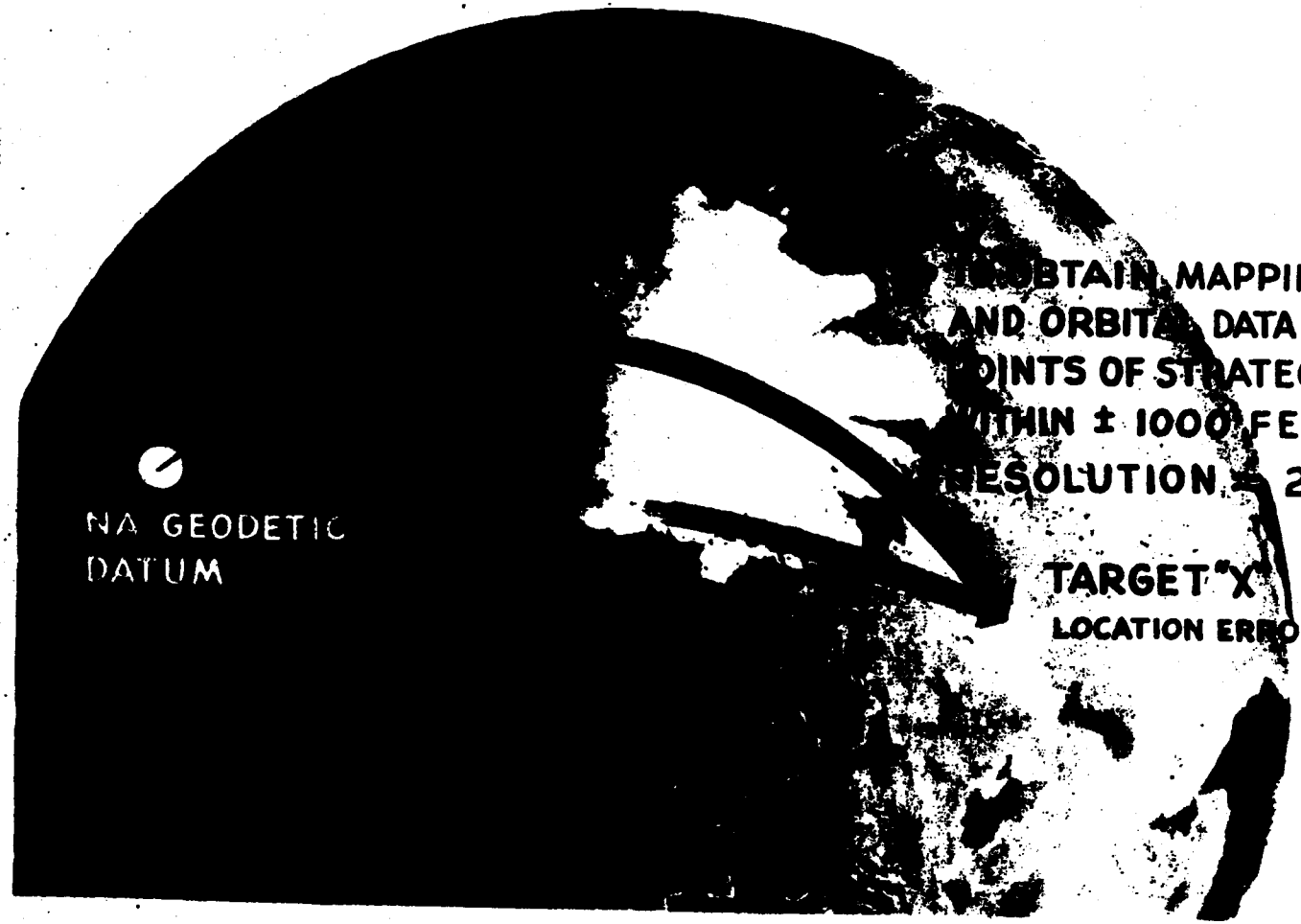
- DISPERSION REQUIREMENTS
- WEIGHT & VOLUME CONSIDERATIONS
- COMPATIBILITY WITH VEHICLE
- COMPATIBILITY WITH CAMERA PAYLOADS
- LAUNCH, ORBITAL AND REENTRY ENVIRONMENT
- ORBIT PARAMETERS
- COMPATIBILITY WITH PICKUP SYSTEM
- GROUND SYSTEM AND COMMUNICATIONS REQUIREMENTS

SENTRY RECOVERY - CAPSULE DESIGN

FLIGHT OBJECTIVES

- 5 FOOT DIAMETER RECOVERY CAPSULE
- PAYLOAD CAPACITY OF APPROXIMATELY 500 LBS OF FILM
- DISPERSION AREA WITHIN A 30 MILE DIAMETER CIRCLE
- AIR RECOVERY OVER HAWAII WITH SURFACE RECOVERY BACKUP OVER LAND OR WATER

SENTRY RECOVERY-MAPPING OBJECTIVES



OBTAIN MAPPING PHOTOGRAPHY
AND ORBITAL DATA TO LOCATE
POINTS OF STRATEGIC INTEREST
WITHIN ± 1000 FEET
RESOLUTION ± 200 FEET

TARGET "X"
LOCATION ERROR ± 1000 FT.

P1146 SS"L" 4/18/59 COPY #7
LMSD / 427803

SECRET

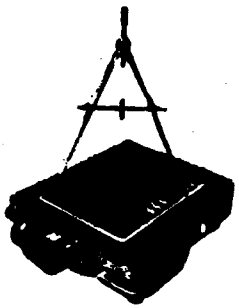
LOCKHEED MISSILES AND SPACE DIVISION

P-1146

~~SECRET~~

SENTRY RECOVERY - SYSTEM REQUIREMENTS

PRECISION PHOTOGRAMMETRIC CAMERA



WIDE ANGULAR COVERAGE
LOW DISTORTION ≈ 5 MICRONS
SIMULTANEOUS EXPOSURE
OVERLAPPING VIEWS

ACCURATE ATTITUDE DATA

CONTROL TO ± 1°
FINE DATA BY STELLAR FIELD CAMERA TO 20 SECONDS

ACCURATE TIME RECORD

2 MILLISECONDS FOR FAST CAMERA EXPOSURE

ACCURATE ORBIT DATA

TRACK TO 5 SECONDS OF ARC
ALTITUDE TO ± 50 FEET

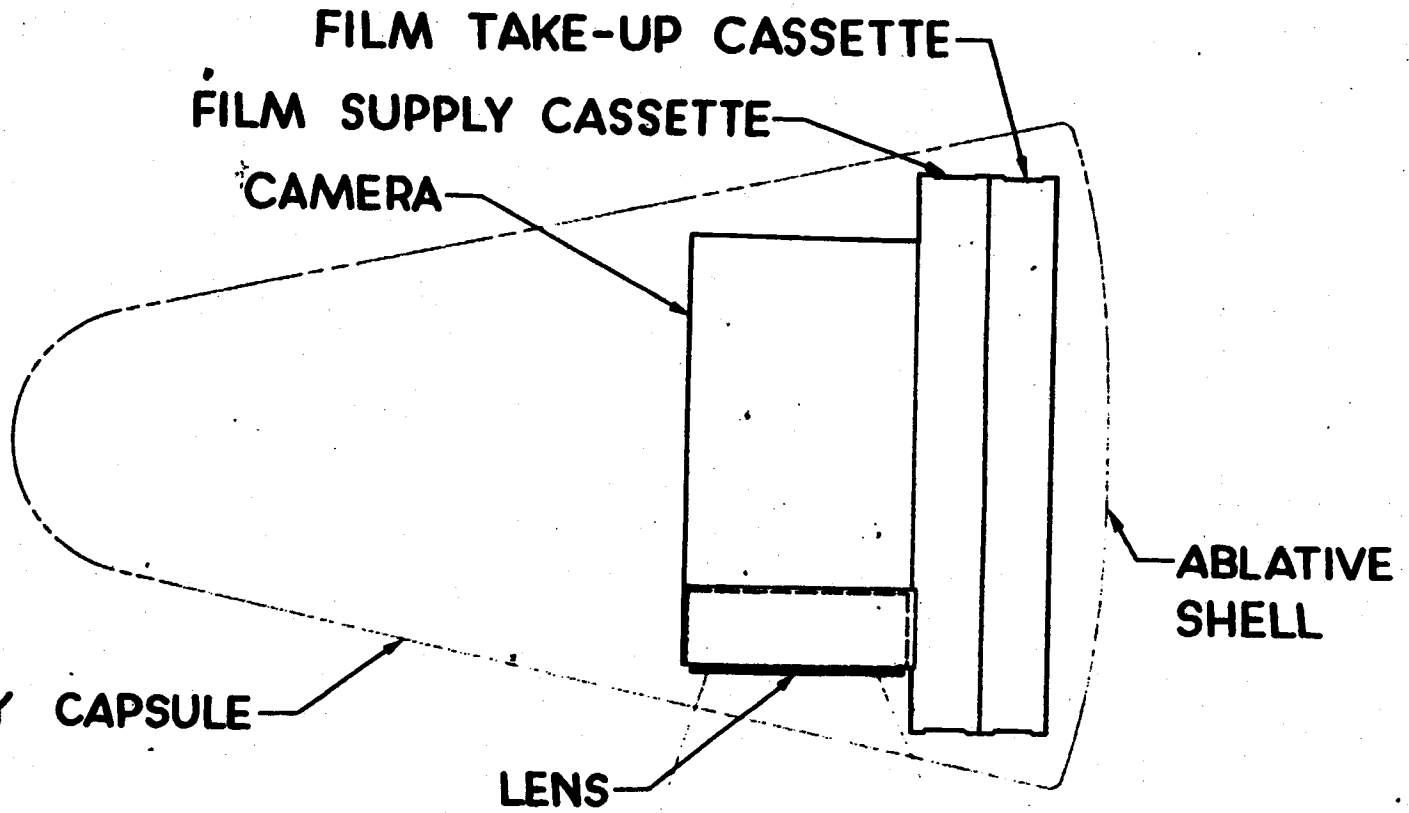
P1147 55"L" 4/13/59 copy # 7
LMSD/427904

~~SECRET~~

LOCKHEED MISSILES AND SPACE DIVISION

P-1147

SENTRY RECOVERY-H.R.-1 CAMERA



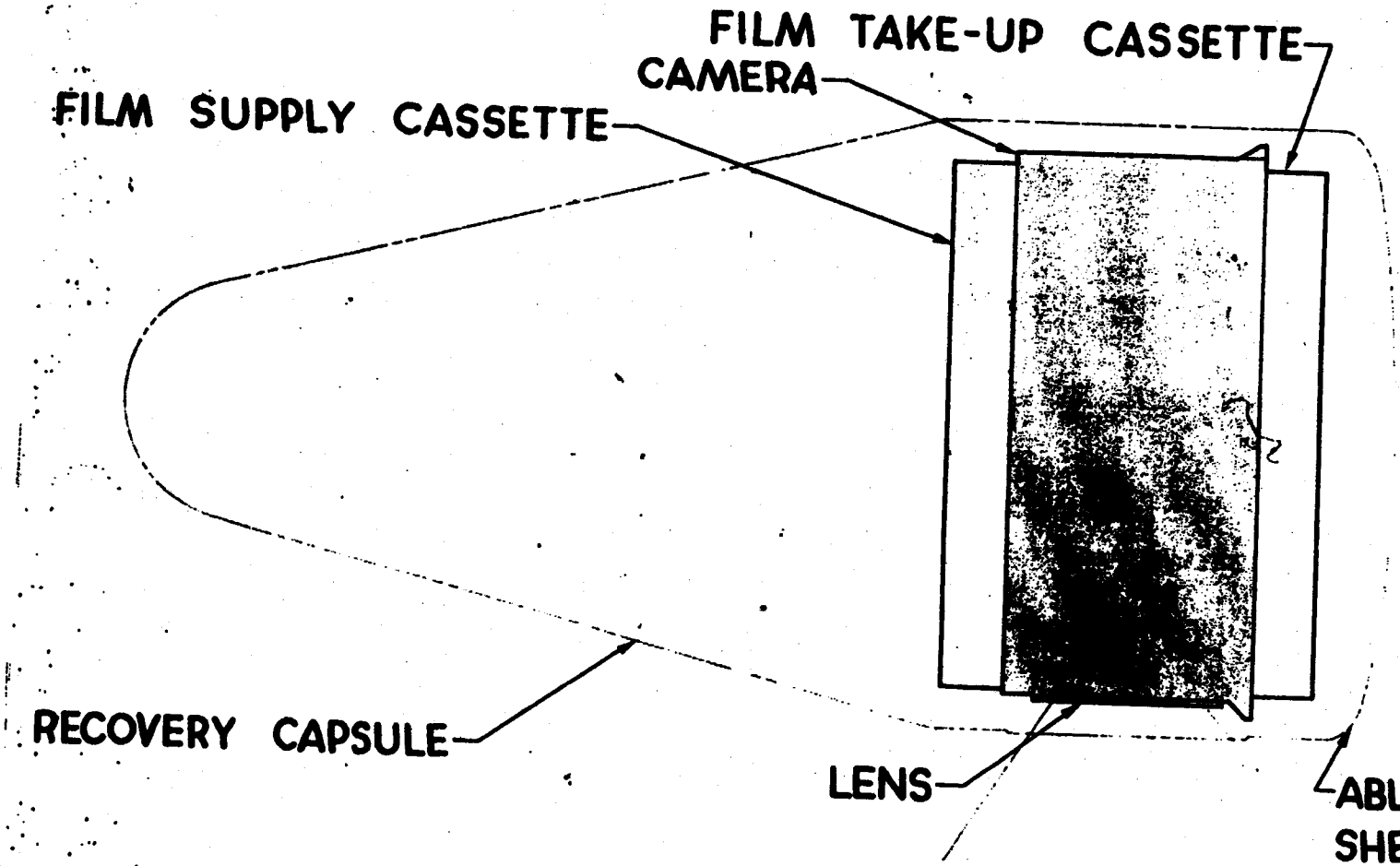
P1151. 5S"L" 4/18/59 Copy # 7
LMSD/427830

LOCKHEED MISSILES AND SPACE DIVISION

P-1151

~~SECRET~~

SENTRY RECOVERY-H.R.-2 CAMERA



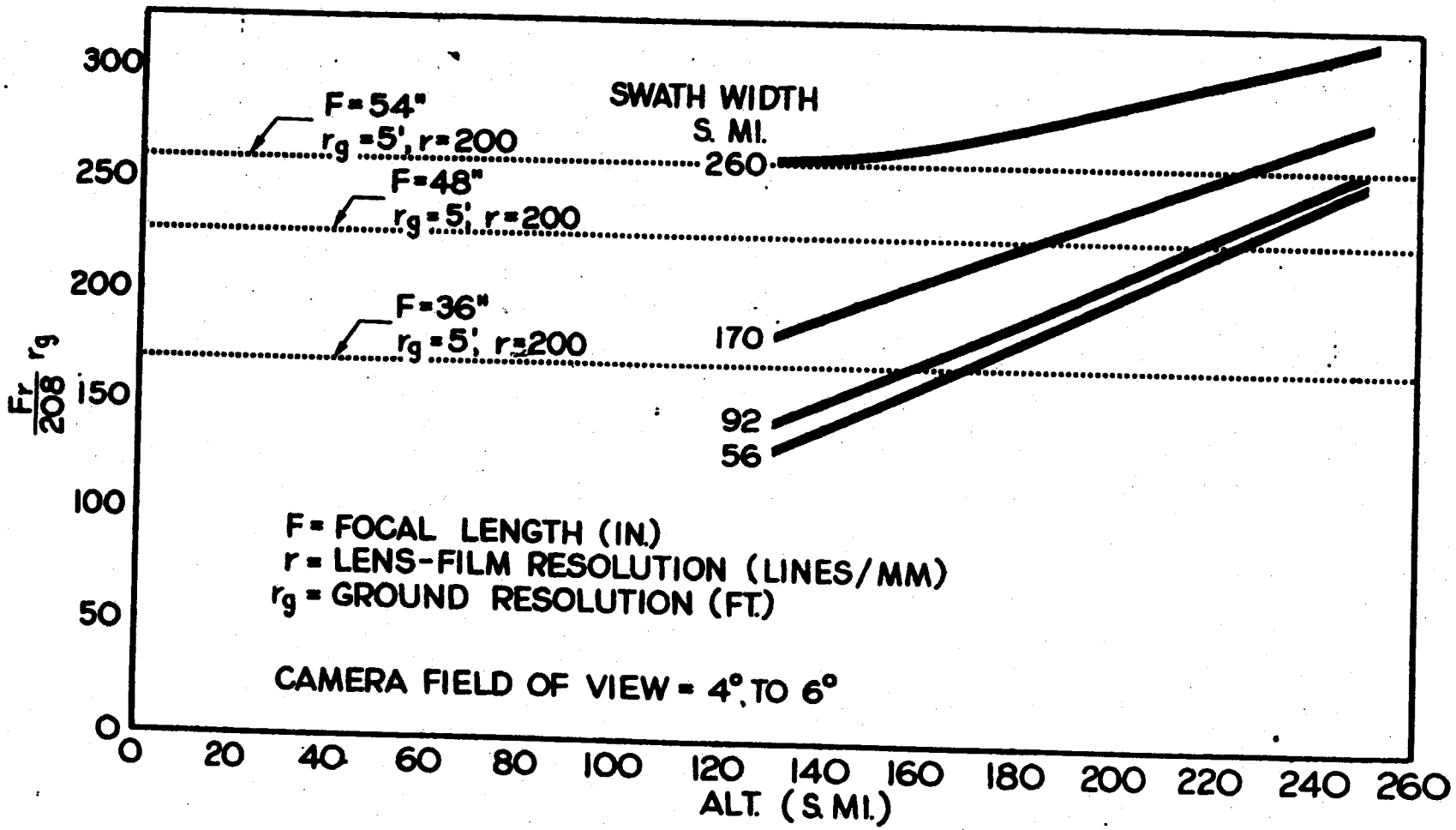
P1152 55"L" 4/18/59 COPY #7
LMSD742783I

~~SECRET~~

LOCKHEED MISSILES AND SPACE DIVISION

P-1152

SENTRY RECOVERY - H.R. PARAMETERS



P 1156 SS"L" 4/18/59 COPY # 7

LOCKHEED MISSILES AND SPACE DIVISION

P-1156

SENTRY RECOVERY- H.R. RECON. DESIGN

FACTORS INFLUENCING DESIGN

FACTOR	160 S. MILE ALT. ORBIT	200 S. MILE ALT. ORBIT
% COVERAGE	100%	100%
OPTIC COMPLEXITY	LOW	HIGH
FLEXIBILITY IN CAMERA (PAN, STRIP, FRAME)	HIGH	LOW
VOLUME	LOW	HIGH
TRACKING ACCURACY REQUIREMENT	EQUAL	EQUAL
CONTROL COMPLEXITY	HIGH	LOW
SYSTEM FLEXIBILITY	HIGH	LOW
WEIGHT	EQUAL	EQUAL

SENTRY RECOVERY-SPACE VEHICLE WEIGHT

SUMMARY

	MAPPING	HIGH RESOLUTION (190 S.MI.)
STRUCTURE	383	383
DESTRUCT	7	7
PROPULSION	526	526
AUXILIARY POWER	1059	954
GUIDANCE & CONTROL	447	447*
COMMUNICATIONS	42	42
ANTENNAE	17	17
TEST INSTRUMENTATION	64	64
PAYLOAD	1100	1809
UNUSED PROPELLANTS	92	92
CONTINGENCY	653	289**
CAPABILITY	4390	4630***

*WILL BE 572 LB. FOR 150 S. MI. ORBIT WITH ORBIT PERIOD CONTROL
** " " 224 " " " " "
*** " " 4690 " " " " "

P1171 SS"L" 4/16/59 COPY #7

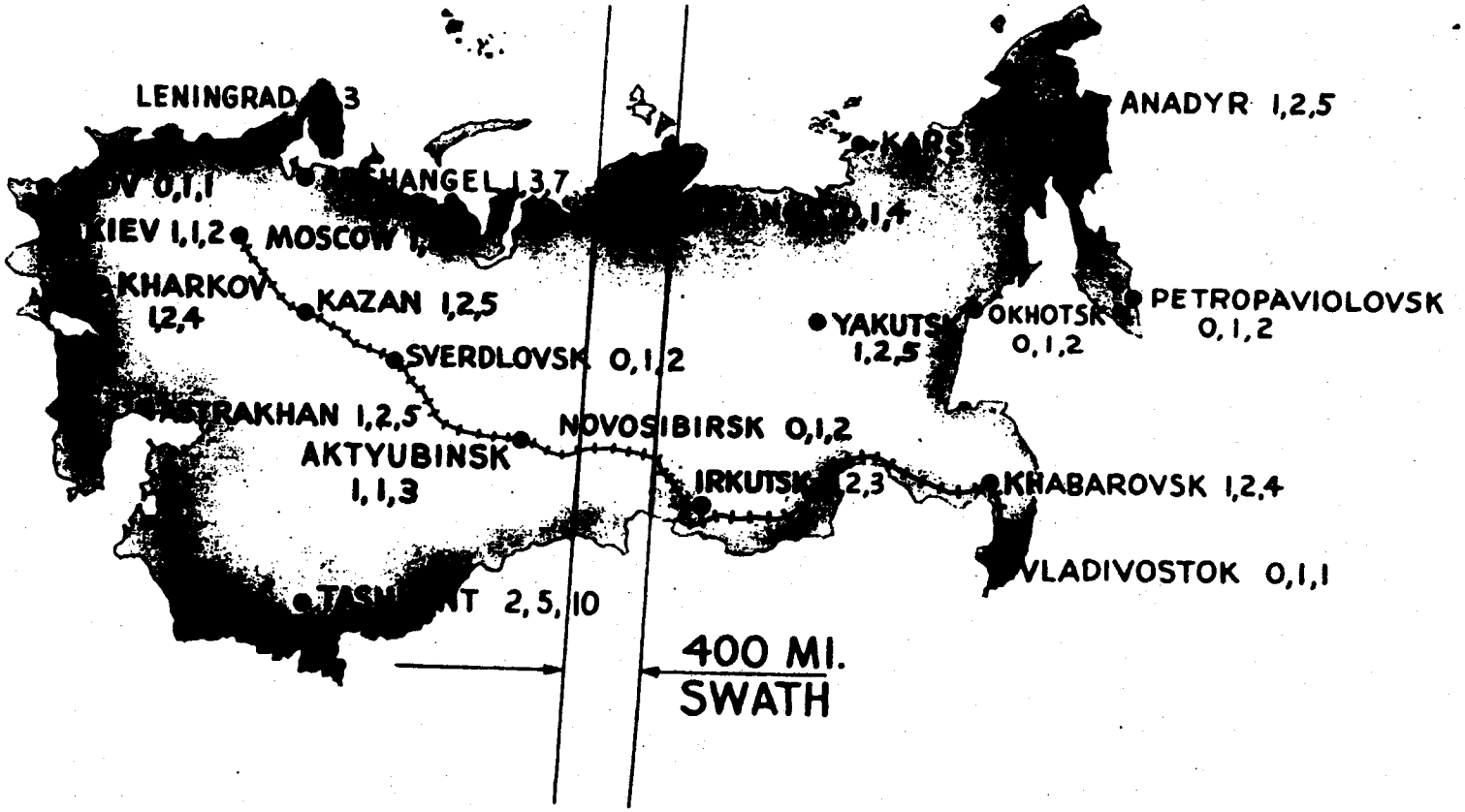
SENTRY RECOVERY-PAYLOAD WEIGHT SUMMARY

	MAPPING	HIGH RESOLUTION
ABLATIVE SHELL	241	241
STRUCTURE	164	251
PROPULSION	240	390
PARACHUTE AND COVER	26	26
EQUIPMENT ITEMS	112	81
CAMERA	110	280
STELLAR CAMERA	28	–
FILM	154	500
CASSETTE	25	40
TOTAL PAYLOAD	1100	1809

P1172 "SS"L" 4/18/59 Copy # 7
LMSD/427851

SENTRY RECOVERY-PROBABLE COVERAGE

EXPECTED NUMBER OF PHOTO PASSES WITH LESS THAN 0.3 CLOUD COVERAGE
MONTH OF JULY, 30 DAY PAYLOAD LIFE, SWATH WIDTHS OF 100,200, AND 400 MILES

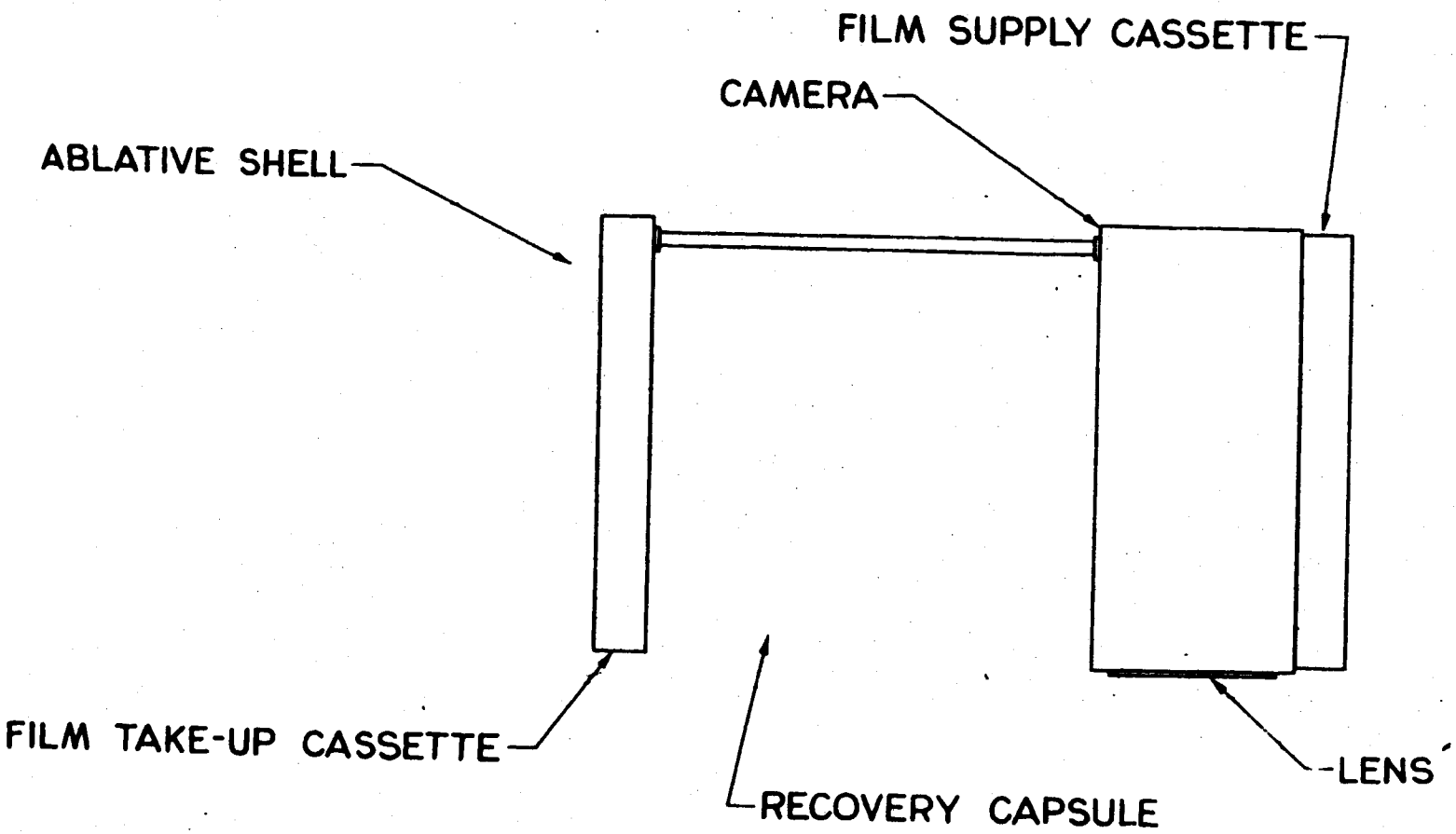


P1179 SS"L" 4/18/59 COPY # 7
LMSD/427838

LOCKHEED MISSILES AND SPACE DIVISION

~~SECRET~~

SENTRY RECOVERY-H.R-3 CAMERA



P1180 SS"L" 4/21/59
LMSD/427859

COPY # 7

~~SECRET~~

LOCKHEED MISSILES AND SPACE DIVISION

P-1180

SENTRY READOUT E-2 CAMERA DATA

FOCAL LENGTH	36 INCHES
FILM WIDTH	70 MM
PICTURE WIDTH	2 INCHES
LIMITING RESOLUTION	250 LINES/MM
APERTURE RATIO	F/4
APERTURE DIAMETER	9 INCHES
EXPOSURE TIME NOMINAL	1/100 SEC.
SPECTRAL RANGE	.500-.720 MICRONS
SLIT WIDTH	.0027 TO .085 INCH
WEIGHT	83 LB.

P1182 SSE 4.23.59 COPY #7
LMSD/427877

P-1182

SENTRY READOUT E-2 PAYLOAD DATA

GROUND RESOLUTION	20 FEET
GROUND WIDTH COVERAGE	17 MILES
MAXIMUM OBLIQUITY	26 DEGREES
STEREO CONVERGENCE ANGLE	34 DEGREES
GROUND COVERAGE AREA	55,000 SQ. MI./DAY
FILM CONSUMPTION	10 LB./MONTH
OPERATING LIFE	4 MONTHS
READOUT BANDWIDTH	6 MEGACYCLES
WEIGHT	919 LBS.
LENGTH	67 INCHES
BASE DIAMETER	55 INCHES
AVERAGE POWER CONSUMPTION	28 WATTS

P 1183 SS "E" 4/22/59 Copy # 7
LMSD/427878

SECRET

P-1183

SENTRY READOUT-DUAL PAYLOAD

DEVELOPMENT OBJECTIVES

- EVALUATE PROCESSOR OPERATION WITH PRE-EXPOSED FILM
- EVALUATE READOUT CAPAB. WITH PRE-EXPOSED PRE-PROCESSED FILM
- EVALUATE COMMAND CAPABILITY
- EVALUATE CAMERA OPERATION
- OBTAIN PHOTOS OF SUFFICIENT QUALITY TO PERMIT SCENE CONTRAST MEASUREMENTS

SAMOS READOUT-E-2 GROWTH POTENTIAL

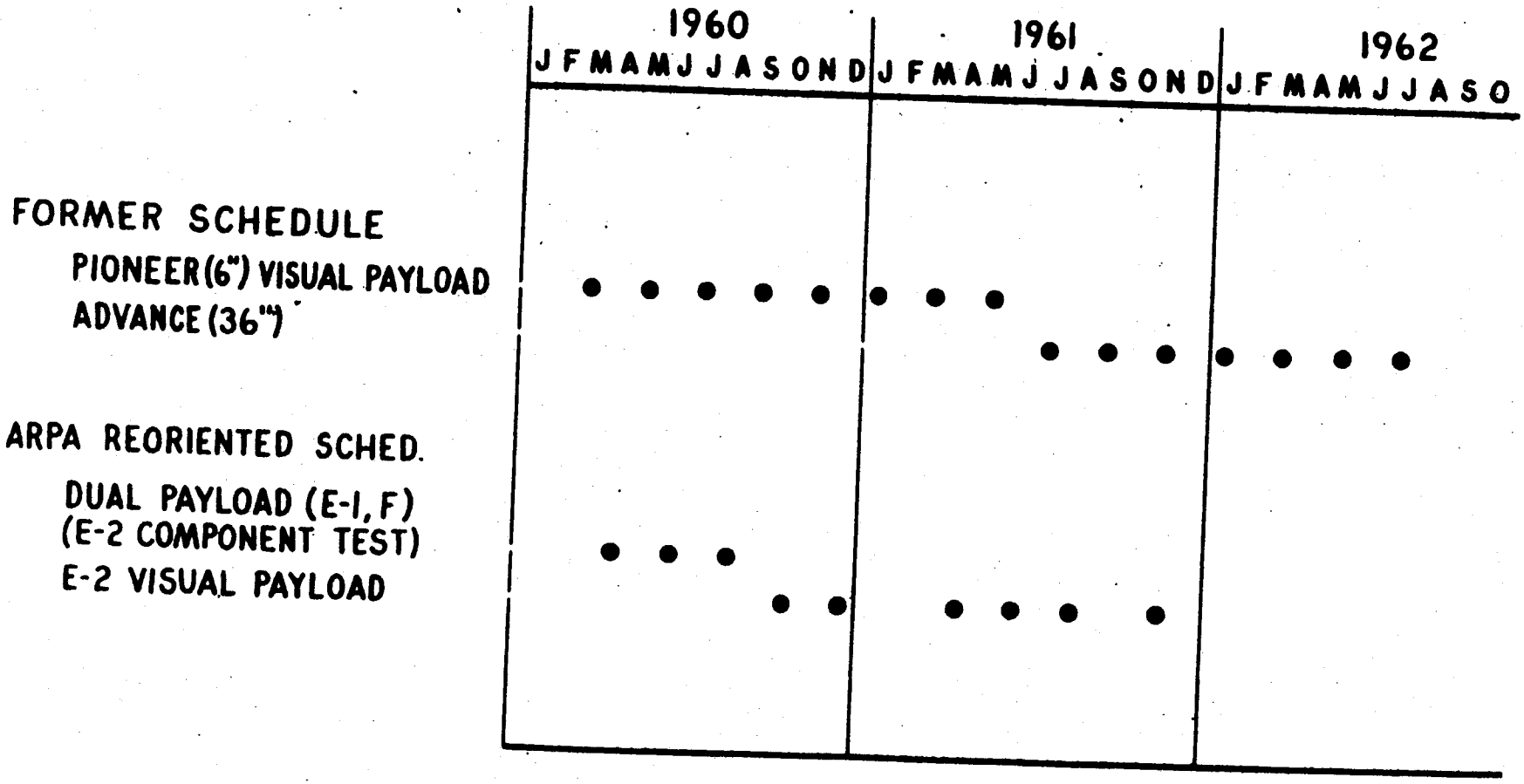
- RESOLUTION APPROACHING 5 FT. ON GROUND
- UTILIZE E-2 STRUCTURE & MAJOR COMPONENTS
- DEVELOP LONG FOCAL LENGTH LENS (120 IN. f/4)
- IMPROVE LENS-FILM RESOLUTION (250 LINES/MM)
- ADOPT LARGER FORMAT (5-IN. WIDE FILM)
- IMPROVE SCANNER RESOLUTION (100 LINES/MM)
- INCREASE DATA LINK BANDWIDTH (12 MC)
- IMPROVE ATTITUDE CONTROL (± 1/4°)
- CONSIDER FRAME TYPE CAMERA
- ADOPT AUTOMATIC IMAGE-MOTION COMPENSATION

P1165(1) SSE 9/4/59

P-1185(1)

SENTRY READOUT PROGRAM

VISUAL READOUT FLIGHT DATES



P1212 SS"E" 4/29/59

LOCKHEED MISSILES AND SPACE

P-1212

SENTRY READOUT - PAYLOAD OPERATION

E-2 CAMERA PROGRAMMING

ADJUSTMENT	TOTAL RANGE	PER STEP	TOTAL STEPS
OBLIQUITY (SIDE TO SIDE)	± 26°	½°	105
STEREO (FORE & AFT)	± 17°	0°, ± 17°	3
YAW	± 5°	1°	11
FILM VELOCITY	0.3016"/SEC TO 0.8704"/SEC 0.5280"/SEC NOMINAL	2%	54
EXPOSURE	¼X TO 16X NORMAL 1/100 SEC NOMINAL	2X	7
FOCUS	.020"	.0005"	40

P1219 SS"E" 5/6/59

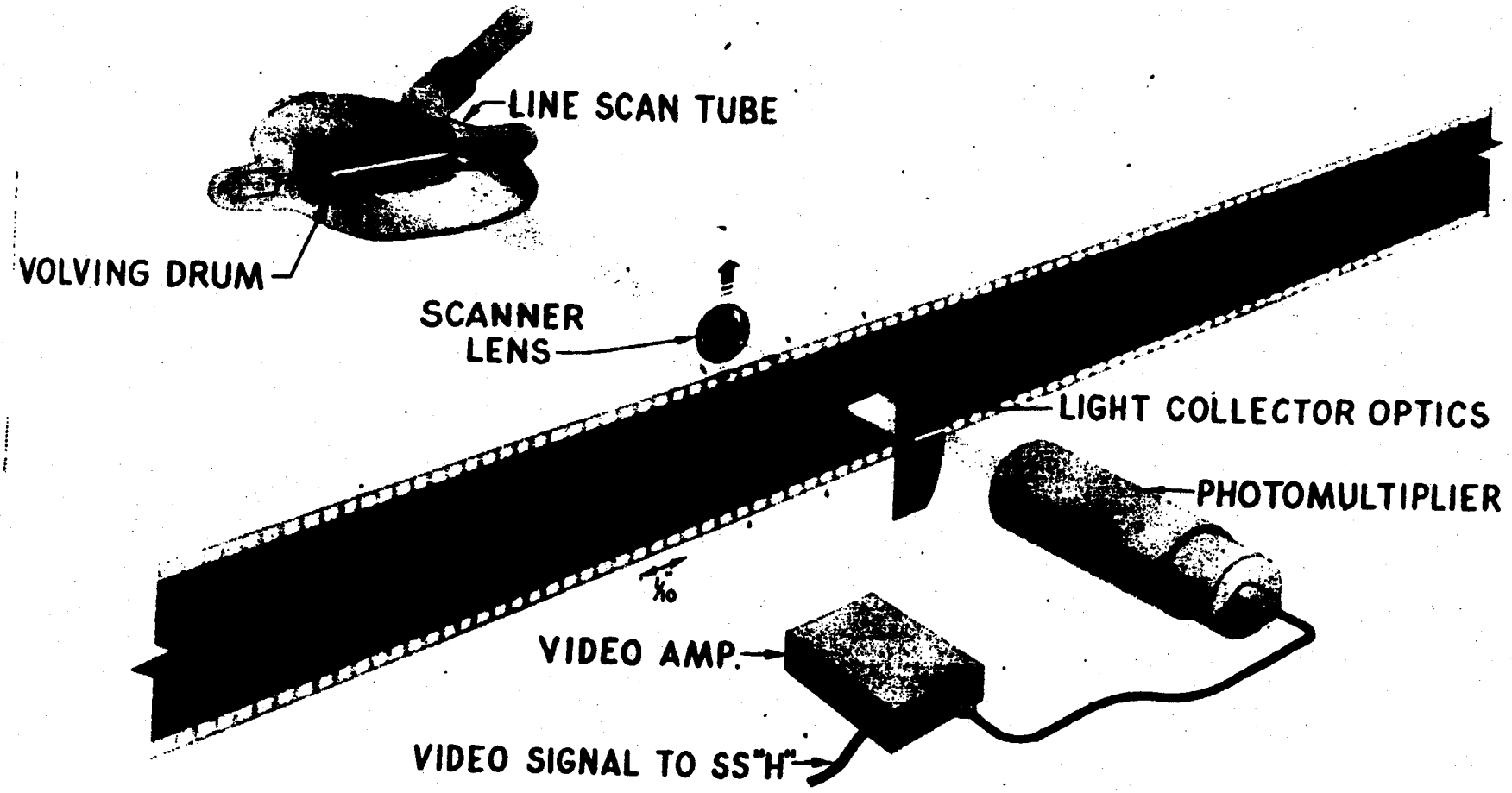
SECRET

LOCKHEED MISSILES AND SPACE DIV.

P-1219

SENTRY READOUT SYSTEM

E-2 PAYLOAD READOUT OPERATION



P-1222

05

SAMOS PROGRAM

FLIGHT I CONFIGURATION

AGENA VEHICLE # 2101 - ATLAS BOOSTER

LAUNCH - VAFB, POINT ARGUELLO

SCHEDULE - 12 APRIL 1960 (ON SCHEDULE)

ORBIT - 83° RETROGRADE, 300 S.M. ± 40 S.M.

WEIGHT STATUS - GROSS WEIGHT 11,290 LBS.
ORBIT WEIGHT 4,082 LBS. (E1-325#, F1-367#)
WEIGHT CONTINGENCY 193 LBS.

PRIMARY POWER
AVAILABLE - 12 EA. TYPE IA BATTERIES; 90,000 WATT-HOURS
REQUIRED - 10,800 W.H./DAY

ACTIVE LIFE ON ORBIT - 8.3 DAYS (POWER LIMITED)

PAYLOAD - COMBINE E-1/F-1 PAYLOAD.

SAMOS PROGRAM

FLIGHT I OBJECTIVES

MISSION:

DEMONSTRATE ORBIT INJECTION CAPABILITY
TEST E-I PAYLOAD
TEST F-I PAYLOAD

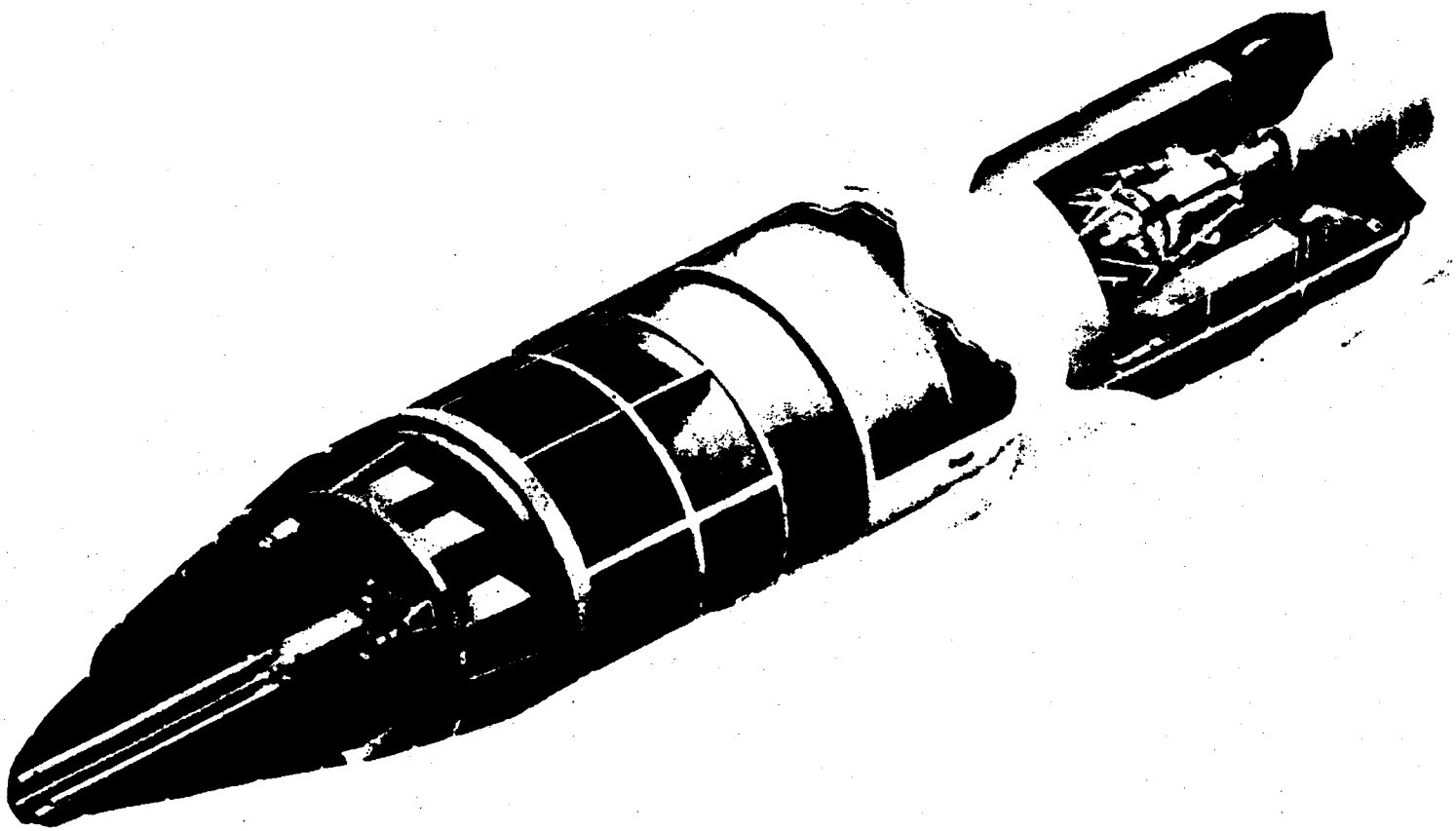
OBJECTIVES:

PRIMARY
ACHIEVE DESIRED ORBIT
TEST E-I & F-I
DETERMINE POSSIBLE INTERFERENCE DATA
TEST SS/A, B, C, D, H, & GSE

SECONDARY
DETERMINE SYSTEM ENVIRONMENTAL FACTORS
EVALUATE TRACKING, DATA RECEPTION & ORBIT PREDICTION TECHNIQUE

TERTIARY
DEVELOP PARAMETERS FOR PERSONNEL TRAINING

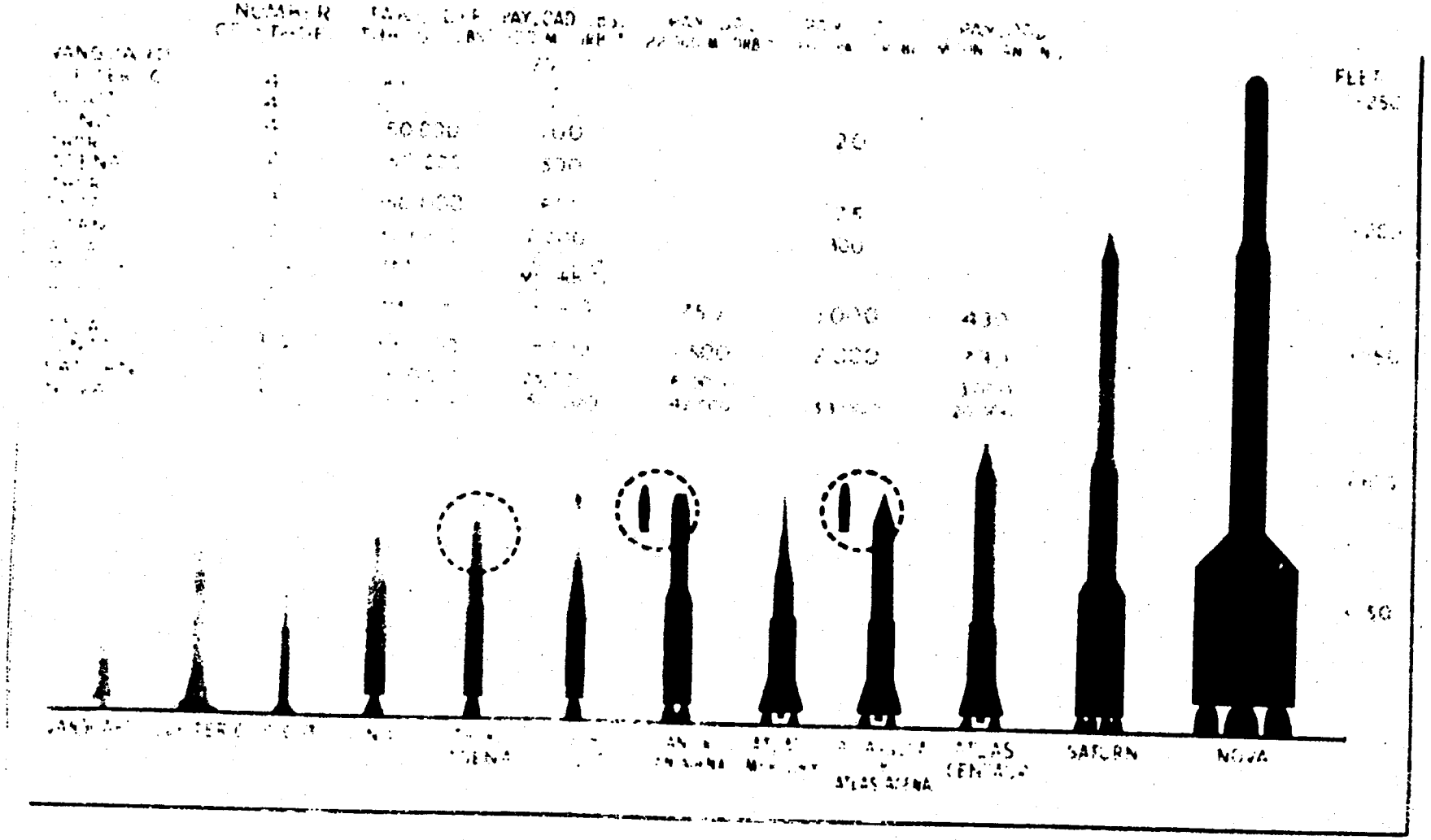
SAMOS SS "F" VEHICLE



1376 SS"F" 10/6/59
ASD '439266

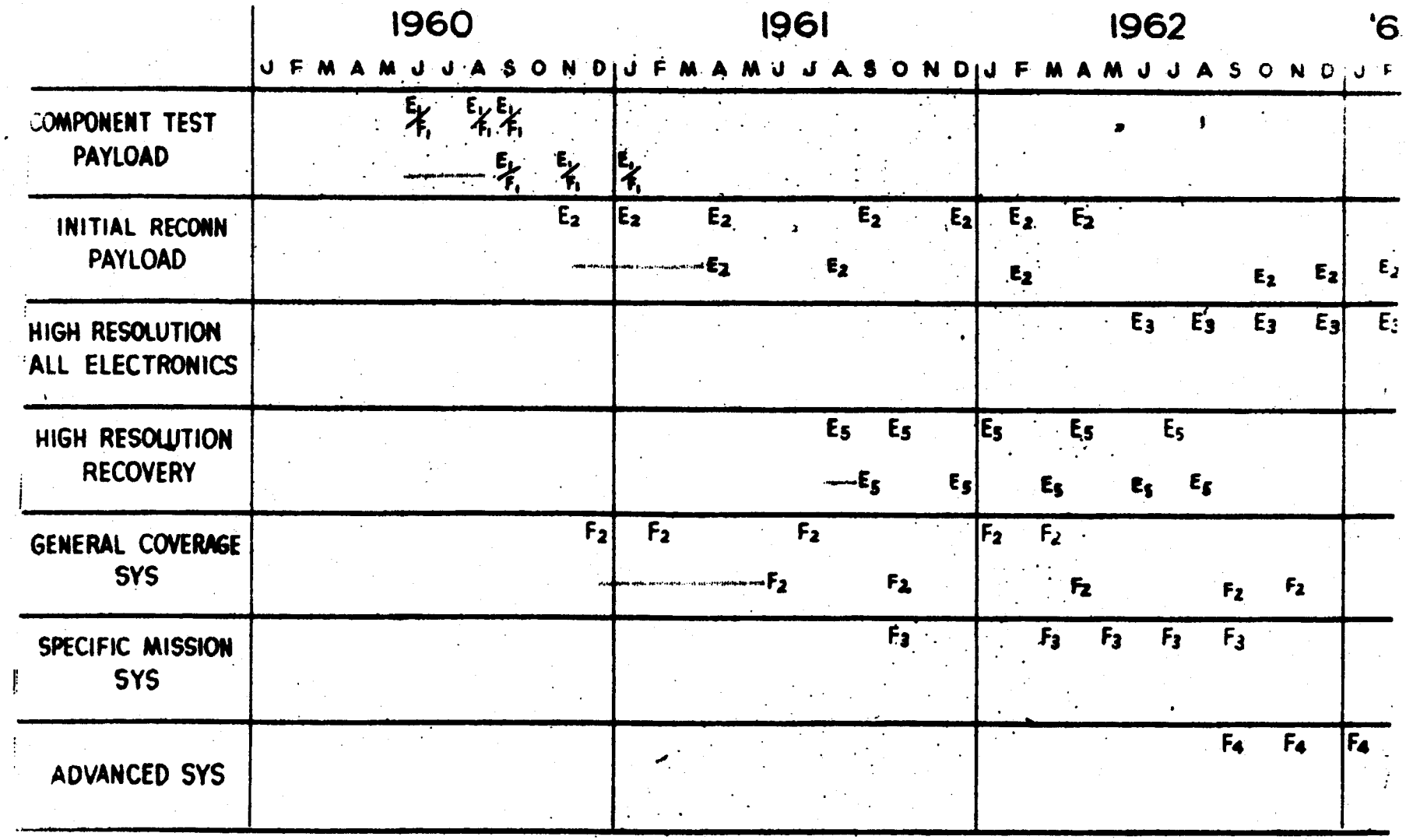
P-1376

U.S. SPACE VEHICLES



P-1421

SAMOS FLIGHT SCHEDULE



12/29/59 CY'E-7

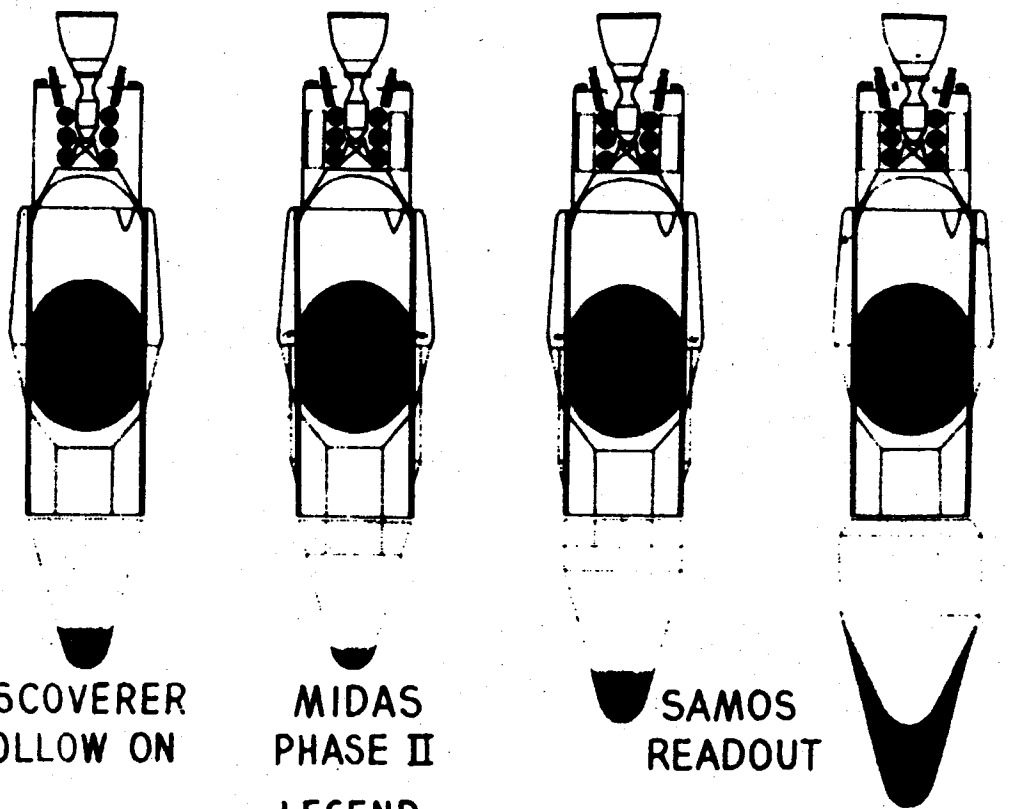
~~SECRET~~

P-1504

STANDARDIZED AGENA

CONFIGURATION SUMMARY

- AFT EQUIPMENT
  - BELL ENGINE 8096
  - ULLAGE ROCKET (B_1 PROPELLANT)
  - HELIUM PRESSURIZATION SYSTEM
  - NITROGEN CONTROL GAS SYSTEM
  - ORBIT ADJUST ROCKETS (FINE)
  - SOLAR ARRAY
- MID BODY & 2X TANKS
  - FAIRINGS (SEPARATION BOLT)
  - FAIRINGS (ELECTRICAL PLUMBING & ORBIT ADJUST ROCKETS)
  - FAIRINGS (AUXILIARY)
  - ORBIT ADJUST ROCKETS
  - RECOVERY RETRO ROCKETS
  - 4 ELEMENT ANTENNA (WBDL)
  - 6 ELEMENT ANTENNA (SS/G DL)
- FORWARD EQUIPMENT BAY
  - ORBIT ADJ. (B_1 PROPEL. TANKS)
  - AUX POWER SUPPLY COMPONENTS
  - GUID. & CONTROL EQUIP
  - COMMU. & TEST INSTRU. EQUIP.
- NOSE SECTION
  - PAYLOAD
  - AUX EQUIP PECULIAR TO PAYLOAD
  - SPECIAL TEST INSTRUMENTATION
  - EJECTABLE NOSE CAP



P-1519

SAMOS E-5 RECOVERY PROGRAM

HIGH ACUITY PANORAMIC CAMERA

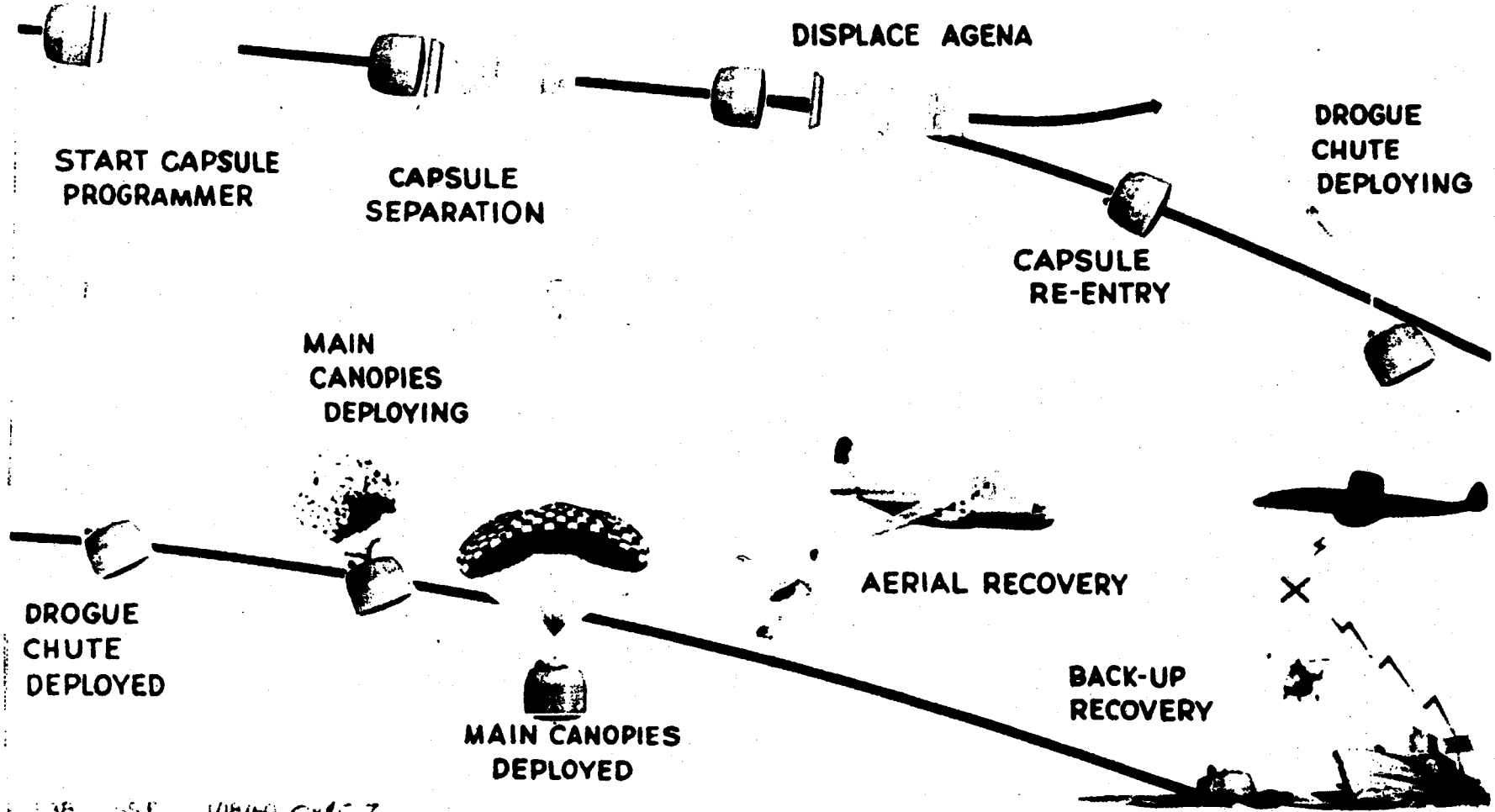
- FOCAL LENGTH — 66 IN.
- RELATIVE APERTURE — F/5
- EXPOSURE RANGE — 1/75 - 1/1400 SEC.
- FILM FORMAT — 45 IN. X 24 IN. (5 IN. FILM)
- WEIGHT:
  - TYPE 1 SPOOLS — 1000 LB.
  - TYPE 2 SPOOLS — 1400 LB.
- FILM SUPPLY:
  - TYPE 1 SPOOLS — 250 LBS.
  - TYPE 2 SPOOLS — 500 LBS.

SAMOS E-5 RECOVERY PROGRAM

E-5 PAYLOAD CHARACTERISTICS

• OPERATING LIFE	1 MO
• ORBITAL ALTITUDE	155 N. MI.
• GROUND RESOLUTION	5 FT.
• GROUND WIDTH COVERAGE	60 N. MI.
• LOCATIONAL ACCURACY	1 N. MI.
• WEIGHT:	
ON ORBIT	5766 LB.
RECOVERY CAPSULE	1525 LB.
• LENGTH	13.5 FT.
• BASE DIAMETER	6 FT.

SAMOS RECOVERY SEQUENCE 2



MSD/350147

P-1538

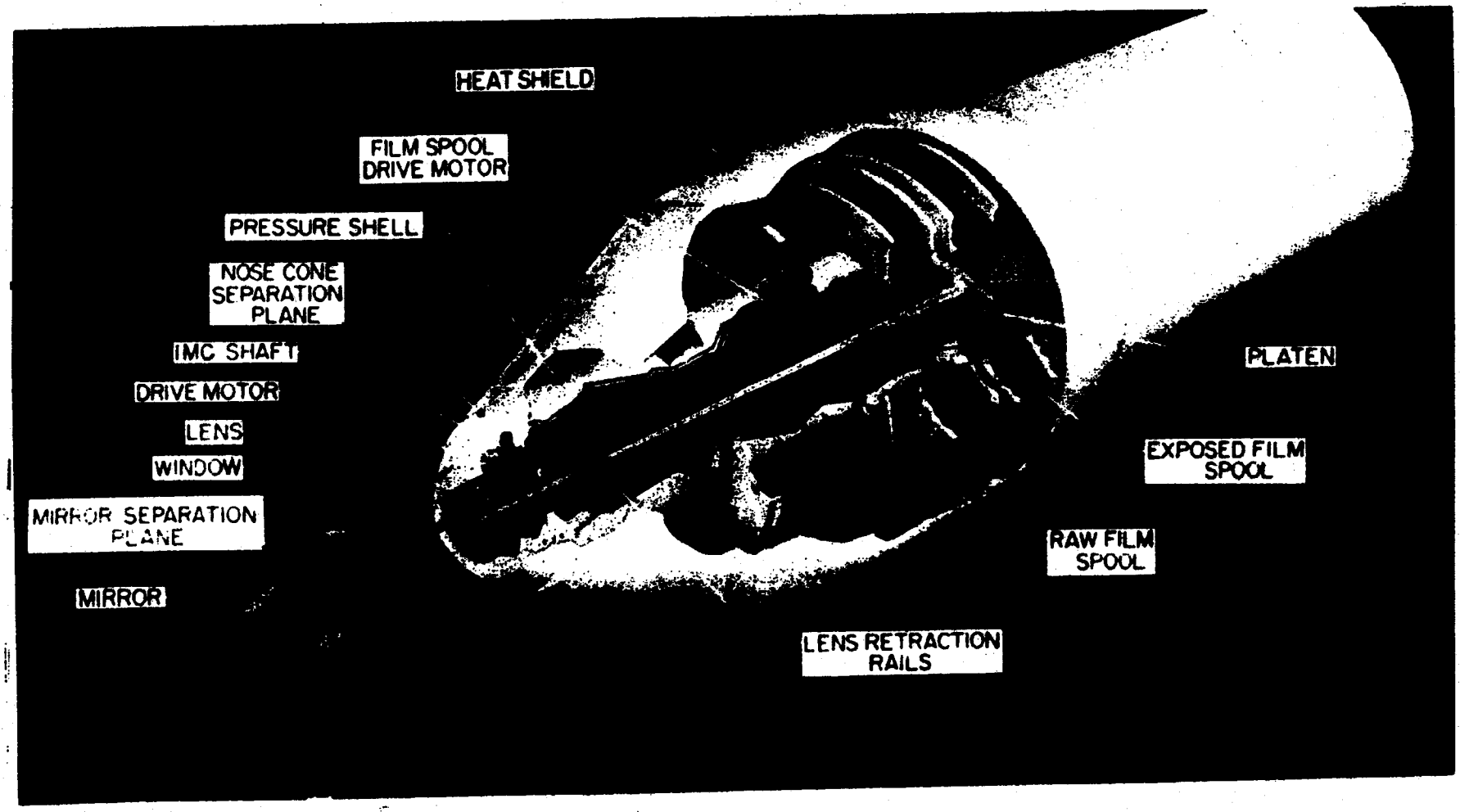
SAMOS E-2 READOUT CAPABILITY

	3 T&A STA.	2 STA.	1 STA.
READOUT TIME	66 MIN/DAY	50 MIN/DAY	25 MIN/DAY
DAILY FILM USAGE	33 FT.	25 FT.	12.5 FT.
DAILY COVERAGE	55,000 SQ. MI.	41,500 SQ. MI.	20,750 SQ. MI.
NO. OF 17 SQ. MI. SHOTS PER DAY	200 (100 STEREO)	160	80
OPERATING LIFE	4 MO.	5 MO.	10 MO.

NOTE 1. THREE STATIONS ASSUMED ARE NE-NW-CENTRAL

NOTE 2. OPERATING LIFE IS USEFUL FILM LIFE - ASSUME SOLAR POWER SOURCES

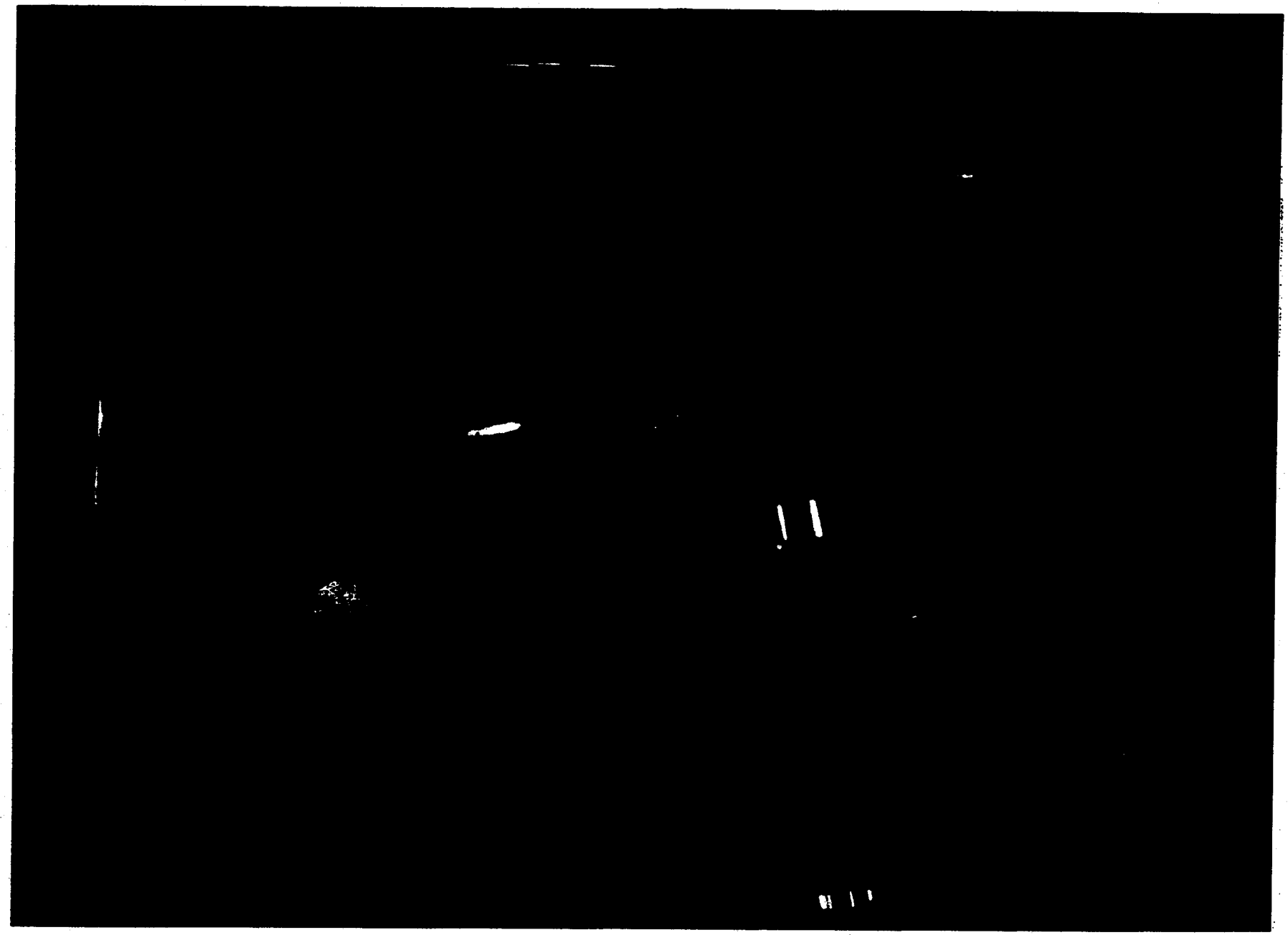
SAMOS RECOVERY E5 CAMERA PAYLOAD



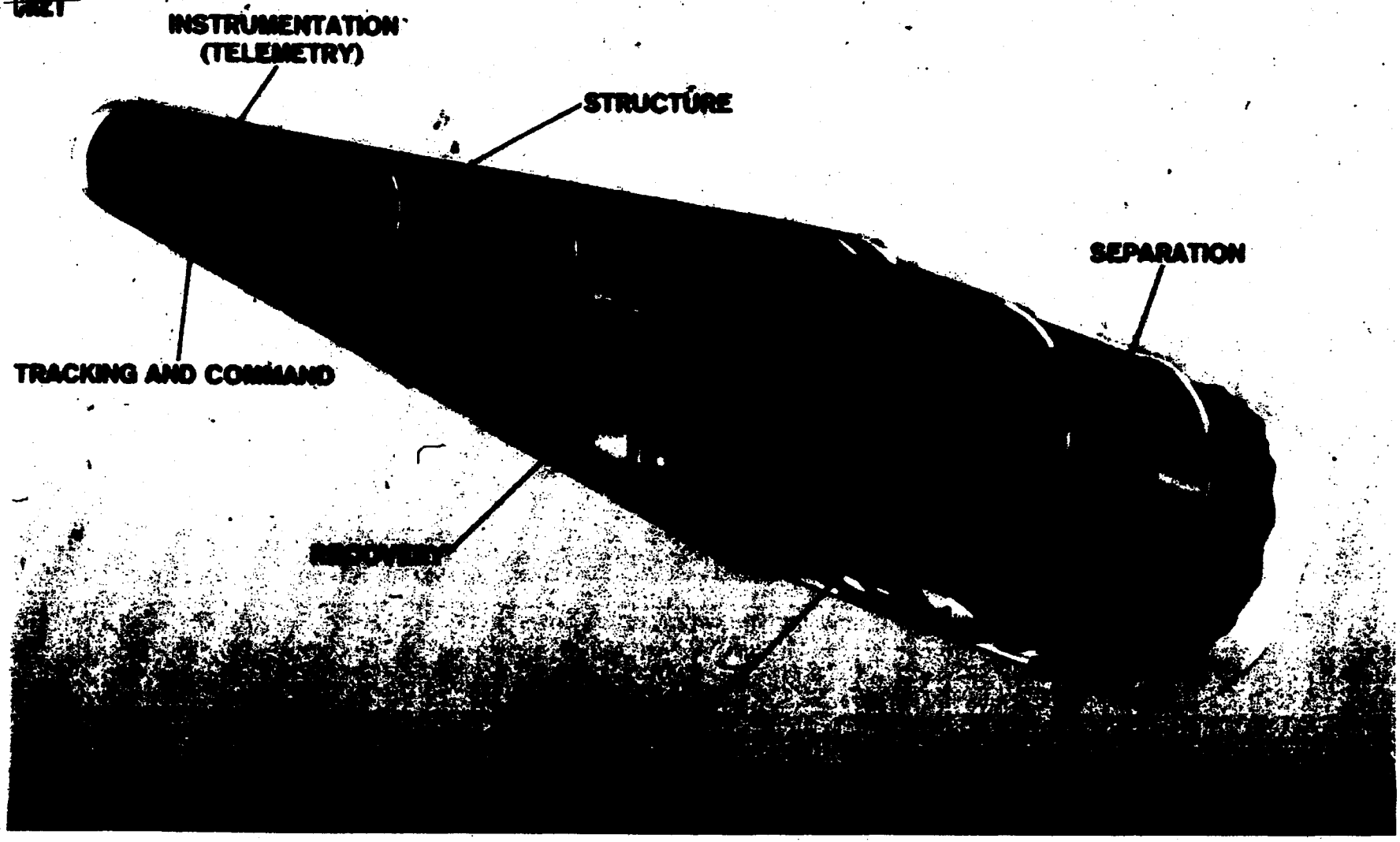
P-1616 SS"E" 3/11/60

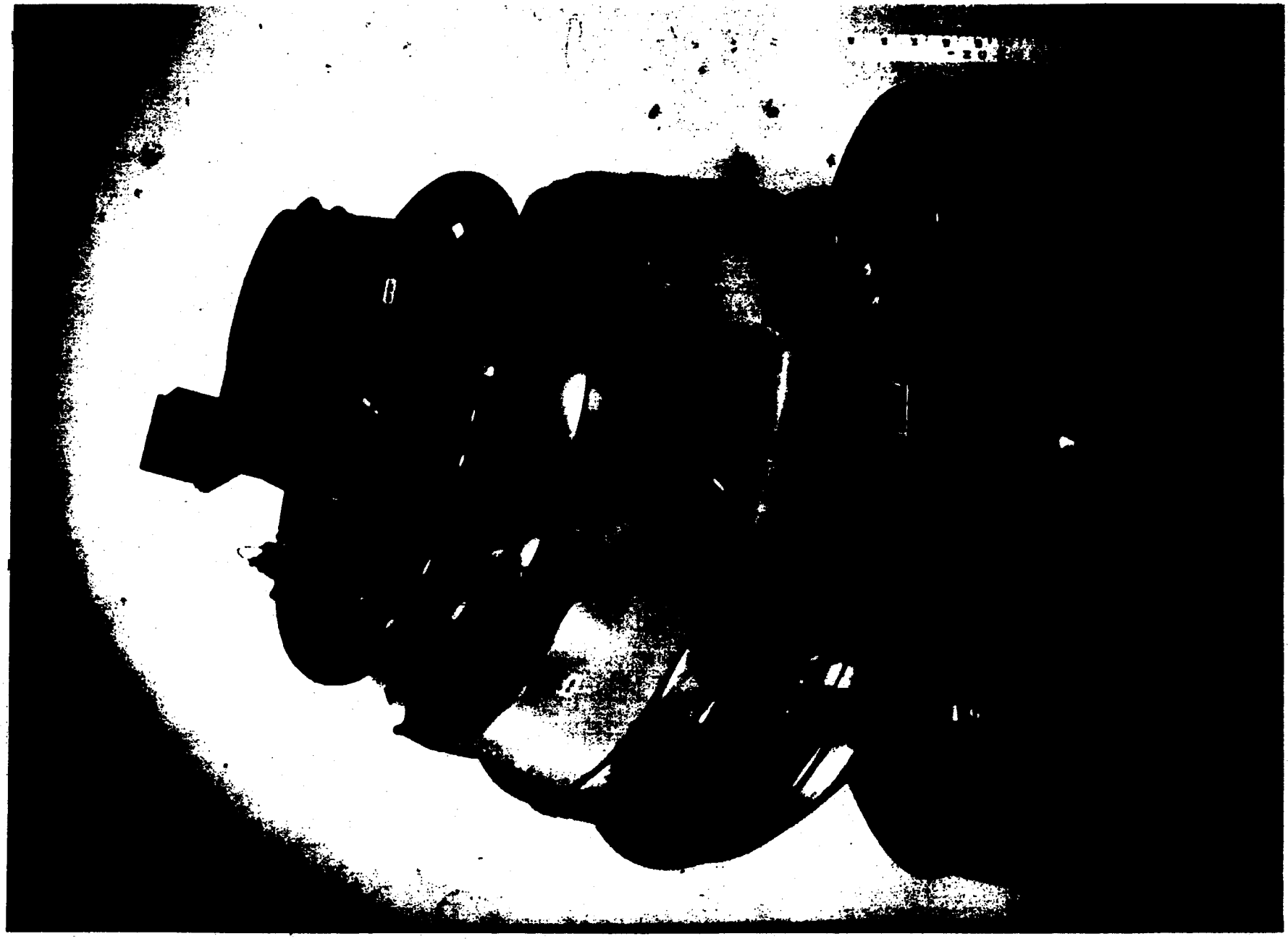
~~SECRET~~

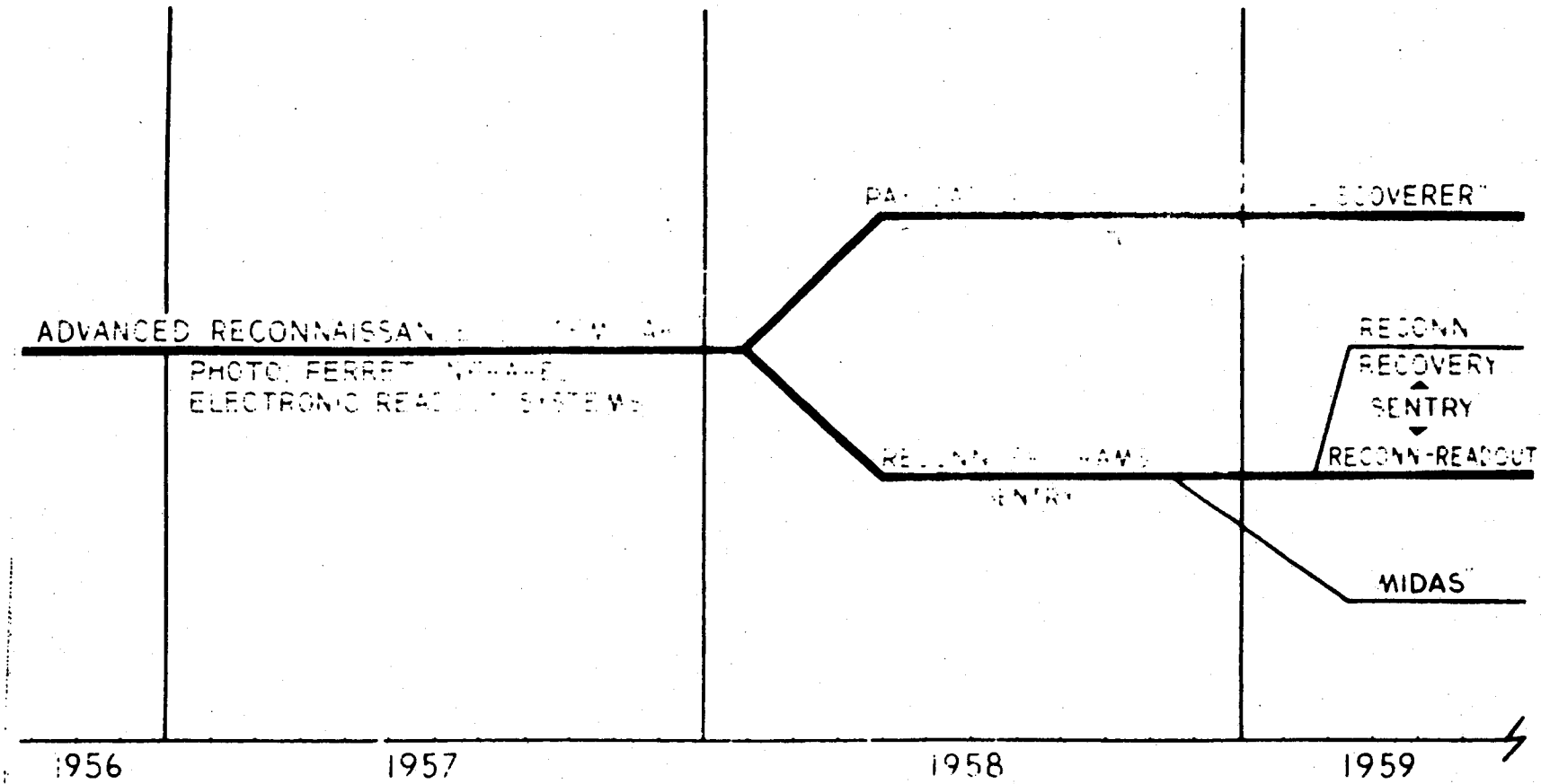
P-1616



SAMOS II RECONNAISSANCE SATELLITE SUBSYSTEMS






ADVANCED RECONNAISSA
PHOTO FERRET
ELECTRONIC REA
RECONN
RECOVERY
SENTRY
RECONN-READOUT
MIDAS
1956
1957
1958
1959