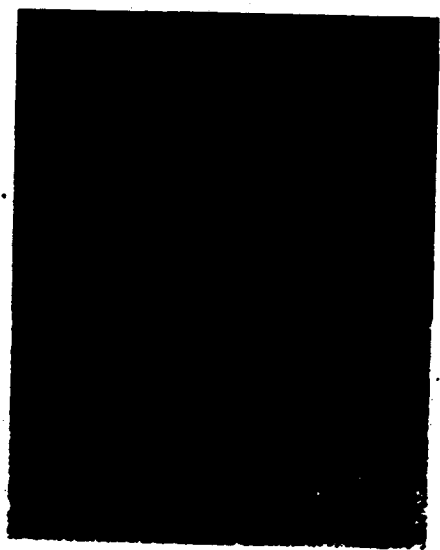


Col. Hartman

AL 60 0000 2585A

" SAFUS Presentation to NSC
25 August 1960 "

~~SECRET~~



SAMOS

NATIONAL SATELLITE RECONNAISSANCE SYSTEM

PHOTOGRAPHIC
ELECTRONIC

REQMTS PROVIDED BY:
UNITED STATES INTELLIGENCE BOARD
--SATELLITE INTELLIGENCE REQMTS COMMITTEE

DEVELOPMENT AGENCY,
UNITED STATES AIR FORCE

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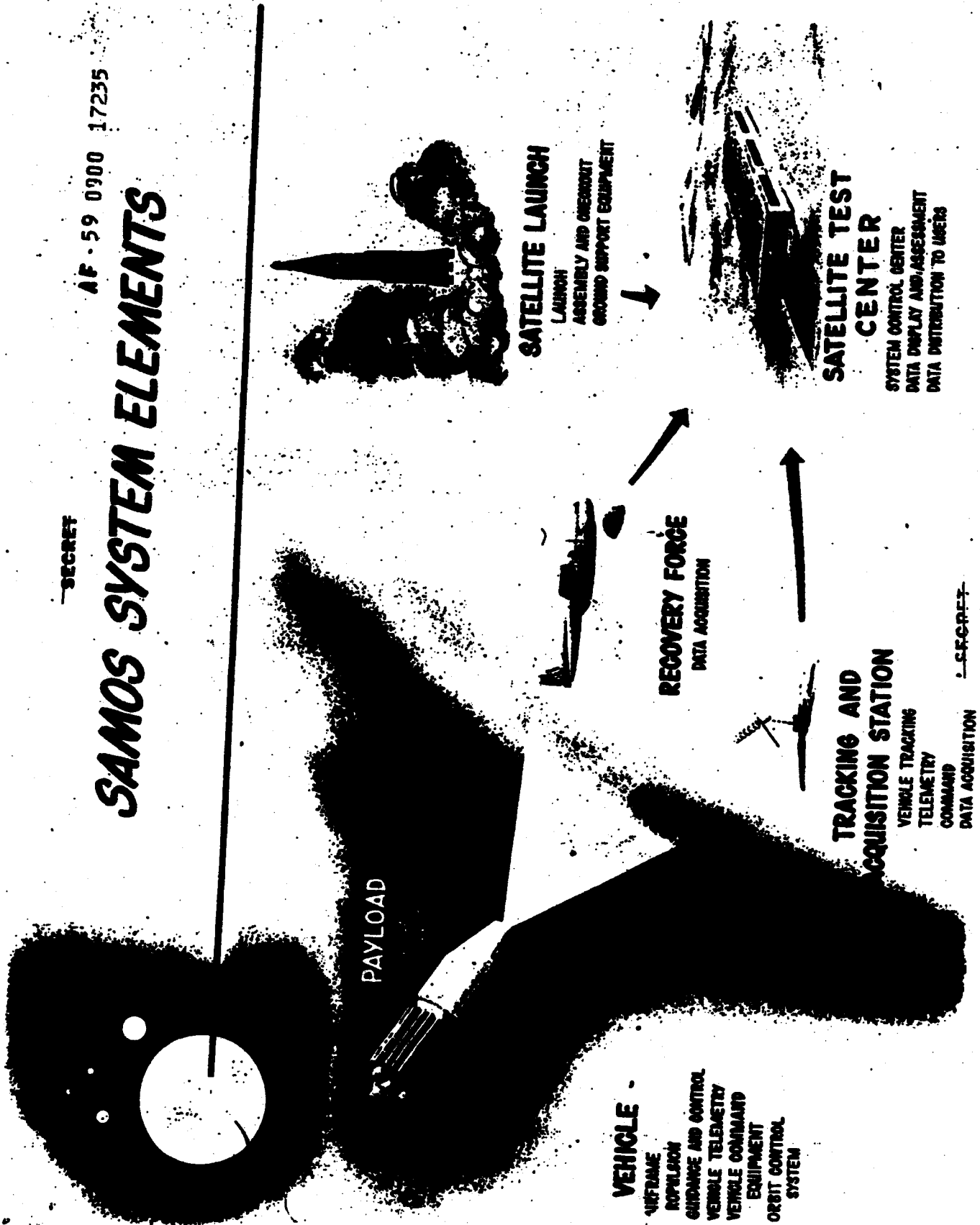
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#105

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AF 59 0900 17235

SAMOS SYSTEM ELEMENTS



PAYLOAD

VEHICLE

- AIRFRAME
- BOOSTER
- GUIDANCE AND CONTROL
- VEHICLE TELEMETRY
- VEHICLE COMMAND EQUIPMENT
- ORBIT CONTROL SYSTEM

RECOVERY FORCE

- DATA ACQUISITION

SATELLITE LAUNCH

- LAUNCH
- ASSEMBLY AND CHECKOUT
- GROUND SUPPORT EQUIPMENT

TRACKING AND ACQUISITION STATION

- VEHICLE TRACKING
- TELEMETRY
- COMMAND
- DATA ACQUISITION

SATELLITE TEST CENTER

- SYSTEM CONTROL CENTER
- DATA DISPLAY AND ASSESSMENT
- DATA DISTRIBUTION TO USERS

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DATA ACQUISITION

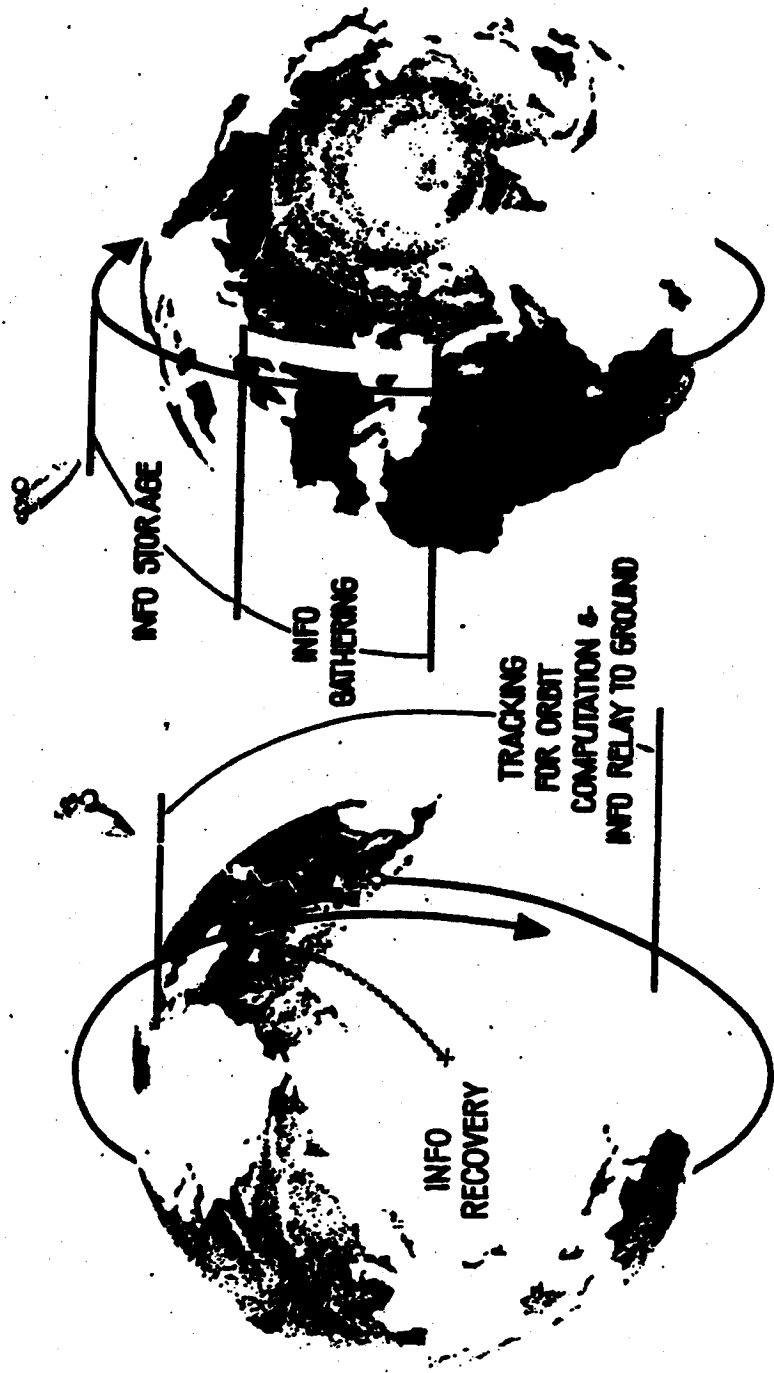


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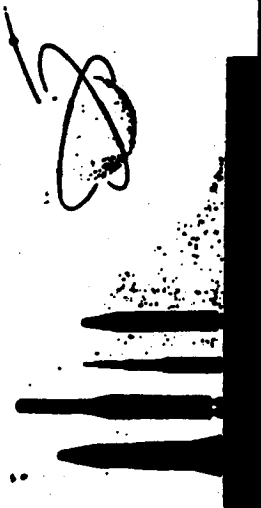
AI 641 0000 25844

SAMOS CONCEPT

150-300 S. MI. ALTITUDE - PHOTO & ELECTRONIC



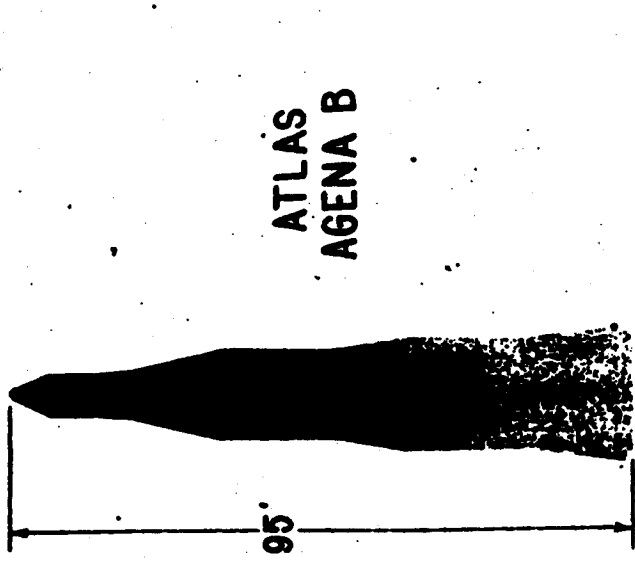
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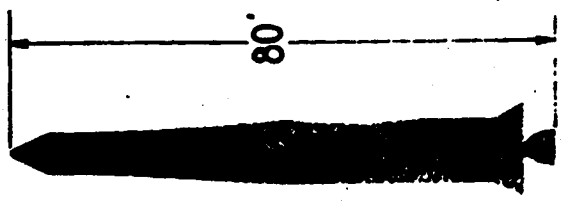
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~~CONFIDENTIAL~~

TYPICAL SIZE AND WEIGHT



ATLAS
AGENA B



THOR
AGENA B

AGENA B	EMPTY WEIGHT 1,400	AGENA B	EMPTY WEIGHT 1,400
	LAUNCH WEIGHT 16,150		LAUNCH WEIGHT 19,800
THOR	EMPTY WEIGHT 8,830	ATLAS	EMPTY WEIGHT 14,150
	LAUNCH WEIGHT 107,170		LAUNCH WEIGHT 258,130
TOTAL BOOSTER AND AGENA WEIGHT AT LAUNCH 123,320 LBS		TOTAL BOOSTER AND AGENA WEIGHT AT LAUNCH 277,930 LBS	

~~CONFIDENTIAL~~

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SAMOS

- A SATELLITE RECONNAISSANCE SYSTEM IS COMPLEX WITH MANY ADVANCED DEVELOPMENTS REQUIRED, BUT IT CAN BE MADE TO WORK

- DEVELOPMENT PROGRESSION REQUIRED DUE TO PRESENT STATE-OF-THE-ART LIMITATIONS:

PHOTOGRAPHIC: 20' GROUND RESOLUTION \rightarrow 3' OR LESS

ELECTROMAGNETIC: SIMPLE DIGITAL \rightarrow COMPLEX DIGITAL & ANALOG

ACTIVE LIFE: 1 WEEK \rightarrow 4 MONTHS \rightarrow 1 YEAR

- THE DEVELOPMENT PROGRAM WILL INCLUDE FAILURES IN THE COURSE OF THE DEVELOPMENT EFFORT

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INTELLIGENCE REQUIREMENTS FOR SAMOS

PRIORITY I

1. Identification - LOCATION OF OPERATIONAL ICBM SITES

PRIORITY II

- A. Identification - DESCRIPTIVE INFORMATION ON HIGH PRIORITY TARGET LIST ITEMS
- B. Identification - ANTI-BALLISTIC MISSILE RADARS, MISSILE TELEMETRY, EARTH TO SATELLITE TRANSMISSIONS

PRIORITY III

- A. Identification - TECHNICAL CHARACTERISTICS OF HIGH PRIORITY LIST ITEMS
- B. Identification - OTHER RADARS SUCH AS EARLY WARNING, AAA, GCI, SHORAN, SAM

PRIORITY IV

1. Identification - TO THE EXTENT DEVELOPMENT PROVES FEASIBLE

~~SECRET~~

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OUTLINE REQUIREMENTS USIB - 6 JULY '60

PHOTOGRAPHIC

"GENERAL SEARCH" - 20' "RECOGNIZABILITY"

- 1ST PRIORITY -- TO LOCATE SUSPECTED ICBM LAUNCH SITES BETWEEN NOW & END OF 1962
REPETITIVE SEARCH - ONCE EACH MONTH INITIALLY

"DESCRIPTIVE" INFORMATION - 5' "RECOGNIZABILITY"

- 2ND PRIORITY -- COVERAGE OF HIGHEST PRIORITY TARGET CATEGORY & SUSPICIOUS LOCATION
LAUNCH & CONTROL OF THESE - MISSION ON SHORT NOTICE

"TECHNICAL CHARACTERISTICS" - BETTER THAN 5' "RECOGNIZABILITY"

- 3RD PRIORITY -- HIGH RESOLUTION COVERAGE TO DETERMINE TECHNICAL CHARACTERISTICS OF HIGHEST PRIORITY TARGETS BY THE END OF 1962

E-2 (LIMITED SEARCH CAPABILITY)
1ST FLT - APR. '61

E-6
1ST FLT - JAN '62

E-6
1ST FLT - SEPT '61



~~SECRET~~

OUTLINE REQUIREMENTS

USIB - 6 JULY '60

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OUTLINE REQUIREMENTS

USIB · 6 JULY 60

ELINT / COMINT

LESS PRIORITY AND VALUE THAN PHOTOGRAPHIC
RECONNAISSANCE, BUT SHOULD BE CARRIED ON
WITH HIGHEST PRIORITY SHORT OF INTERFERING
WITH PHOTOGRAPHY

IN VIEW OF THE UNCERTAINTIES OF A FULLY DEVELOPED ELECTRONIC RECON-
NAISSANCE SYSTEM, THERE IS A RELUCTANCE TO SPECIFY DETAILED
REQUIREMENTS FOR THE SHORT TERM

MOST IMPORTANT IS THE SEARCH FOR EMISSIONS ASSOCIATED
WITH BALLISTIC MISSILE SYSTEMS

~~SECRET~~

EXAMPLE OF TARGET THAT MAY BE IDENTIFIED AT DIFFERENT GROUND RESOLUTION

CITIES, FORESTS, RAIL ALIGNMENT, INDUSTRIAL COMPLEXES, MAJOR MILITARY INSTALLATIONS, AND LARGE BODIES OF WATER.

COMPONENTS OF MILITARY INSTALLATIONS, AIRBASE RUNWAYS, SUBMARINE BASES, MAJOR SURFACE TO AIR MISSILE SITES, ATOMIC ENERGY INSTALLATIONS, BALLISTIC MISSILE SITES, SURFACED SUBMARINES, LARGE AIRCRAFT AND MISSILE LAUNCHING PADS, IDENTIFICATION OF MAJOR SOVIET NAVAL FORCES.

LARGE AIRCRAFT AND KNOWN MISSILE CARRYING SUBMARINES, LOCATING SPECIAL WEAPONS, ABOVE GROUND ICBM AND IRBM FACILITIES, CAPACITY OF MILITARY STORAGE FACILITIES, IDENTIFICATION OF NAVAL SHIPS BY TYPES.

DETAILED INFORMATION ON MOST MILITARY AND INDUSTRIAL INSTALLATIONS, ALL AIRCRAFT, GROUND FORCES EQUIPMENT AND DISPOSITION, LARGE MISSILES, AAA SITES, STRUCTURAL SHIPBOARD CONFIGURATIONS, LEVELS OF MILITARY ACTIVITY.

DETAILED TECHNICAL INFORMATION ON AIR, NAVAL AND GROUND FORCES EQUIPMENT AND INDUSTRIAL PRODUCTION PROCESSES.



ORBITAL CAPABILITY

VEHICLE

THOR & AGENA B
ATLAS & AGENA B

WEIGHT ON ORBIT

AT 150 N. MILES ALTITUDE: 2800 LBS
 AT 261 N. MILES ALTITUDE: 2600 LBS

6500 LBS
 6200 LBS

SYSTEM

E-5
E-1 / F-1
F-2
F-3
E-2

WEIGHT ON ORBIT

AT 150 N. MILES ALTITUDE: 5700 LBS
 AT 261 N. MILES ALTITUDE: 4300 LBS
 4100 LBS
 4400 LBS
 4900 LBS

E-5 WEIGHT DISTRIBUTION

AGENA EMPTY WEIGHT (1400 LBS)	ON ORBIT POWER SUPPLY SYSTEM	ATTITUDE CONTROL AND SYSTEM COMMAND	PAYLOAD AND RECOVERY SYSTEM (CAMERA & FILM - APPROX. 1000 lbs)	RESTART AND RESIDUAL PROPELLANTS
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² WEIGHT ON ORBIT - (IN THOUSANDS OF LBS)

³

⁴

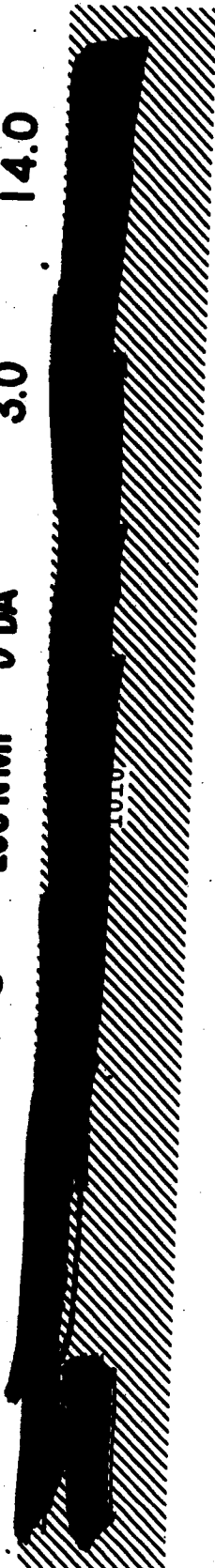
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⁶

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CHARACTERISTICS PHOTO PAYLOAD SYSTEMS

SYSTEM	DATA		RESOLUTION	SWATH WIDTH	OPERATING LIFE	MAX DAILY COVERAGE MILLION SQ NMI	TOTAL COVERAGE MILLION SQ NMI
	RETRIEVAL METHOD						
E-1	READOUT		100'	87 NMI	10 DAYS	.57 (1 STA)	5.7
E-2	READOUT		20'	14.5 NMI	4 MOS	.033 (2 STA)	4.0
E-5	RECOVERY		5'	53 NMI	15-30 DA	0.6	4.9
E-6	RECOVERY		8'	200 NMI	5 DA	3.0	14.0



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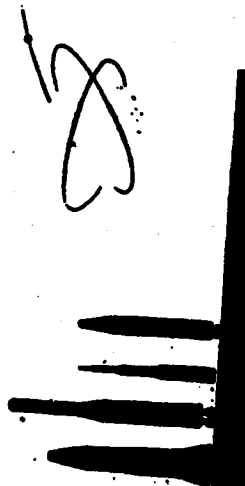
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VISUAL SENSORS CAPABILITIES

SECRET

E-1 COMPONENT TEST PAYLOAD	E-2	E-5	E-6	HIGH RESOLUTION ADVANCED SYSTEM
TERRAIN FEATURES & COMMUNICATION CENTERS	IDENTIFY FEATURES & COMPLEXES	LEVEL OF MILITARY ACTIVITY	IDENTIFY FEATURES & COMPLEXES	ARCHITECTURAL FEATURES TECHNICAL EMPLOYMENT
AIRFIELDS	LARGE AIRCRAFT	IDENTIFY AIRCRAFT	LARGE AIRCRAFT	TECHNICAL CHARACTERISTICS
HARBOR FACILITIES & SHIPPING	SUBS - PIERS - SUPPORTING FACILITIES	IDENTIFY TYPES & USES ie. SHIPBOARD MISSILE FACILITIES	SUBS-PIERS SUPPORTING FACILITIES	TECHNICAL CHARACTERISTICS
LOCATE INDUSTRIAL COMPLEXES	IDENTIFY INSTALLATIONS	IDENTIFY MATERIAL PRODUCTION	IDENTIFY INSTALLATIONS	IDENTIFY
SUSPECT CONSTRUCTION OF MISSILE SITES	LOCATE MISSILE SITES	IDENTIFY TYPE OF MISSILE SITE	LOCATE MISSILE SITES	IDENTIFY TECHNICAL MISSILE CHARACTERISTICS
FIRST FLIGHT - SEP 60 3 FLIGHTS STRIP CAMERA 6" FOCAL LENGTH	FIRST FLIGHT - APR. 61 3 FLIGHTS STRIP CAMERA 36" FOCAL LENGTH	FIRST FLIGHT - SEPT. 61 7 FLIGHTS PANORAMIC CAMERA 66" FOCAL LENGTH	[REDACTED]	[REDACTED]



AL 50 0000 25118

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FERRET SENSORS CAPABILITY

F-1

RECOGNITION OF CONVENTIONAL
GROUND, NAVAL & AIRBORNE
RADAR SIGNALS

LOCATION WITHIN 150 N.M.
CIRCLE

FREQUENCY COVERAGE OF S
AND X BAND

ONETIME COVERAGE OF 60%
- 70% OF SOVIET BLOC

1ST FLIGHT SEPT. 60 - 3 FLTS.
(IN COMBINATION WITH E-1)

F-2

RECOGNITION OF KNOWN AND
SUSPECTED SIGNALS

IMPROVED LOCATION ACCURACY

FREQUENCY COVERAGE FROM
59 TO 18,000 MC/S

COVERAGE OF ENTIRE SOVIET
BLOC EVERY FIVE DAYS

1ST FLT. JUNE-61
2 FLTS.

F-3

"FINE" LOOKS AT SIGNALS
DISCOVERED BY GENERAL
COVERAGE SYSTEM

"LOOKS" AT GIVEN SIGNALS
FROM HORIZON-TO-HORIZON

FREQUENCY COVERAGE SAME
AS GENERAL COVERAGE SYSTEM

WIDE BAND WIDTH (6 MC/S)
RECORDING OF ALL SIGNALS

1ST FLIGHT WILL BE
SCHEDULED

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AL 601 0001 25-446

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SAMOS OUTPUTS

READOUT

READOUT TIME { VAFB STA ONLY - 25 MIN PER DAY
 VAFB & NEW BOSTON STA - 53 MIN PER DAY
 PER MINUTE OF READOUT - 800 SQ MILES 90 FT
 OF 35 M PRIMARY RECORD = 12 - 9 1/2" X 18" PHOTOS
 10,000 INTERCEPTS

PHOTO E-2 (20')

ELINT F-2 (DIGITAL)

RECOVERY

PHOTO E-5 (5')

PER MISSION - 4.9 MILLION SQ N MI

E-6 (8')

PER MISSION - 90 MILLION SQ N MI



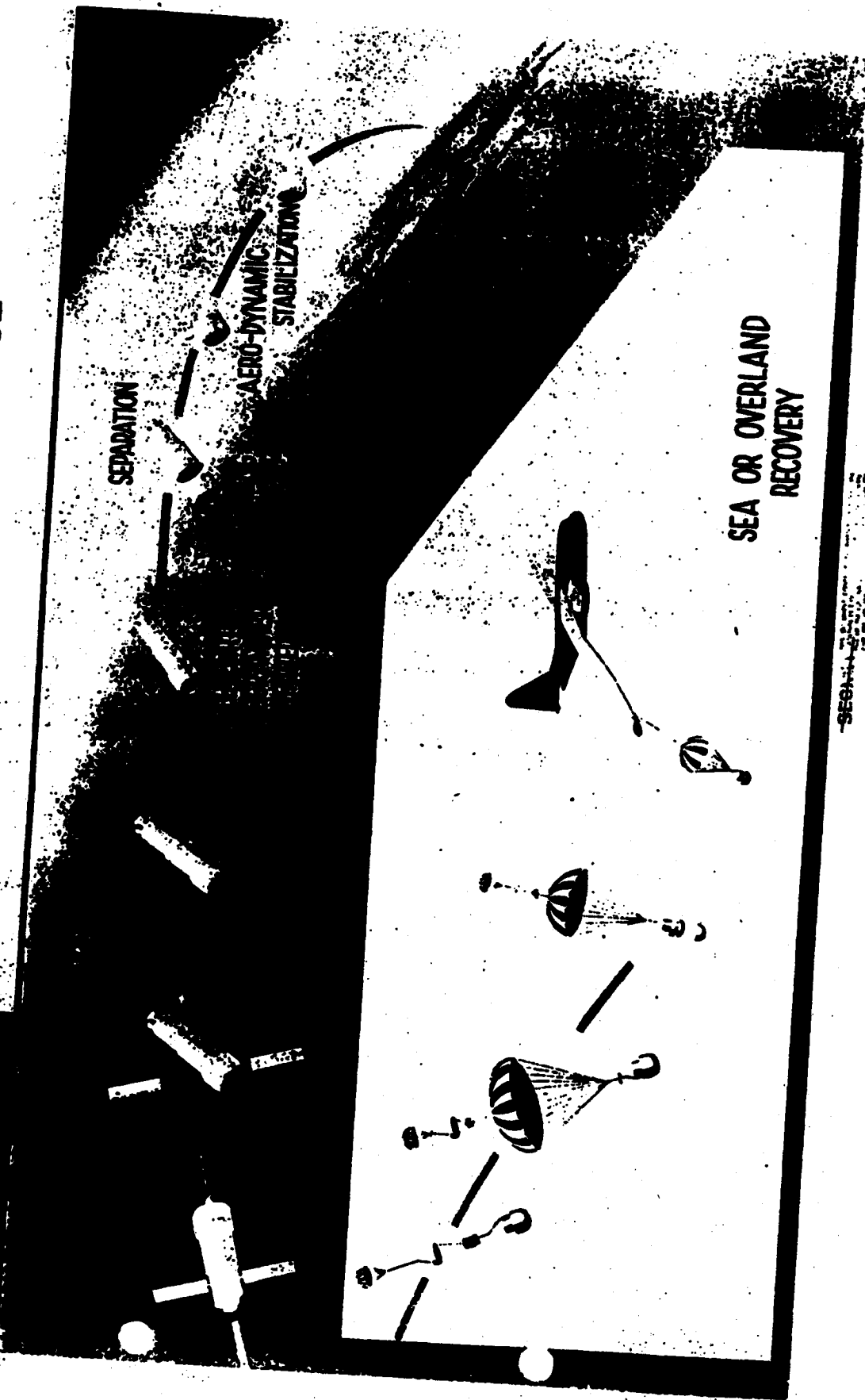
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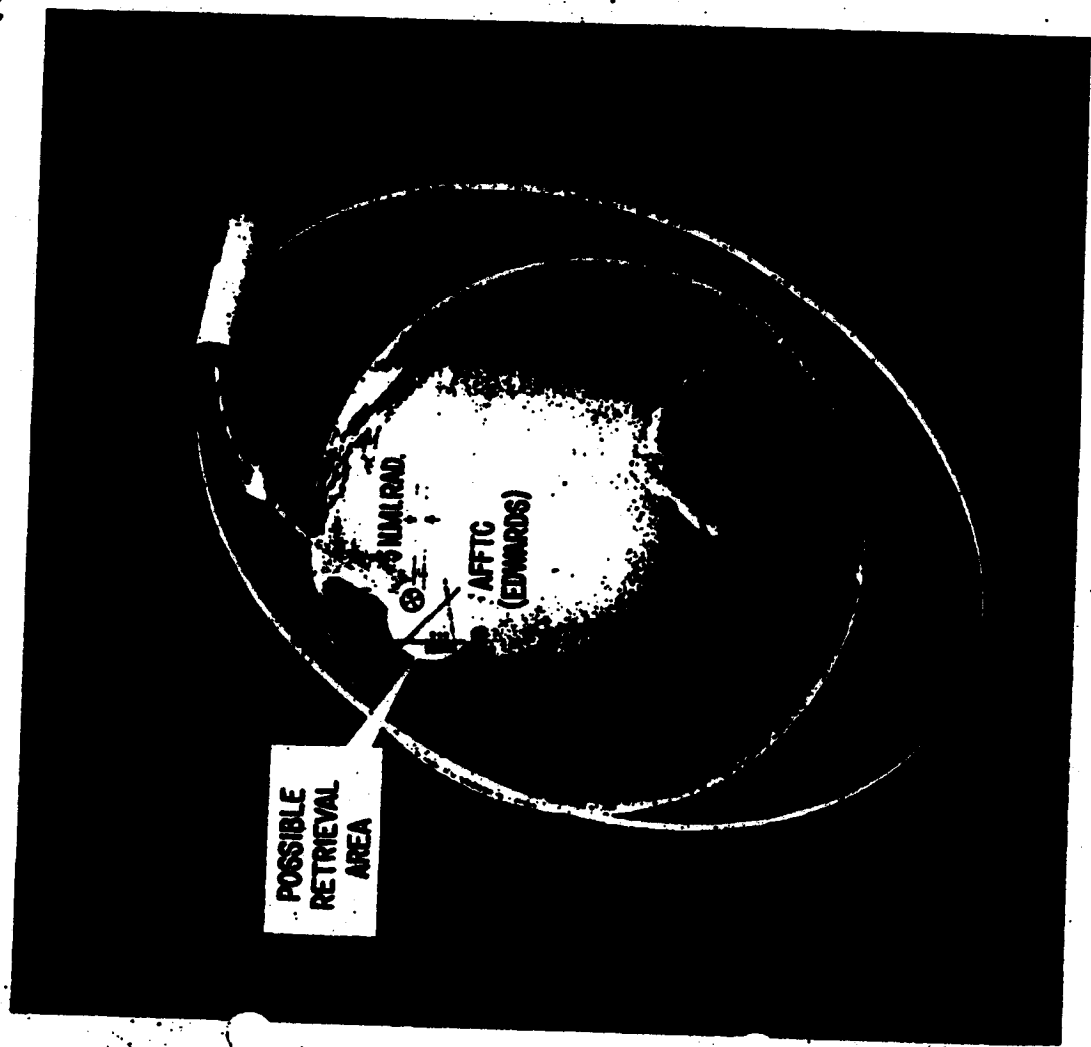
SAMOS E5 RECOVERY SEQUENCE

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SAMOS E-6 — A NEW APPROACH



RELIABILITY (SHORT LIFE)

LARGE AREA COVERAGE

HIGH RESOLUTION

EARLY CAPABILITY

PRECISE OVERLAND RETRIEVAL

BROADENED CONTRACTOR BASE

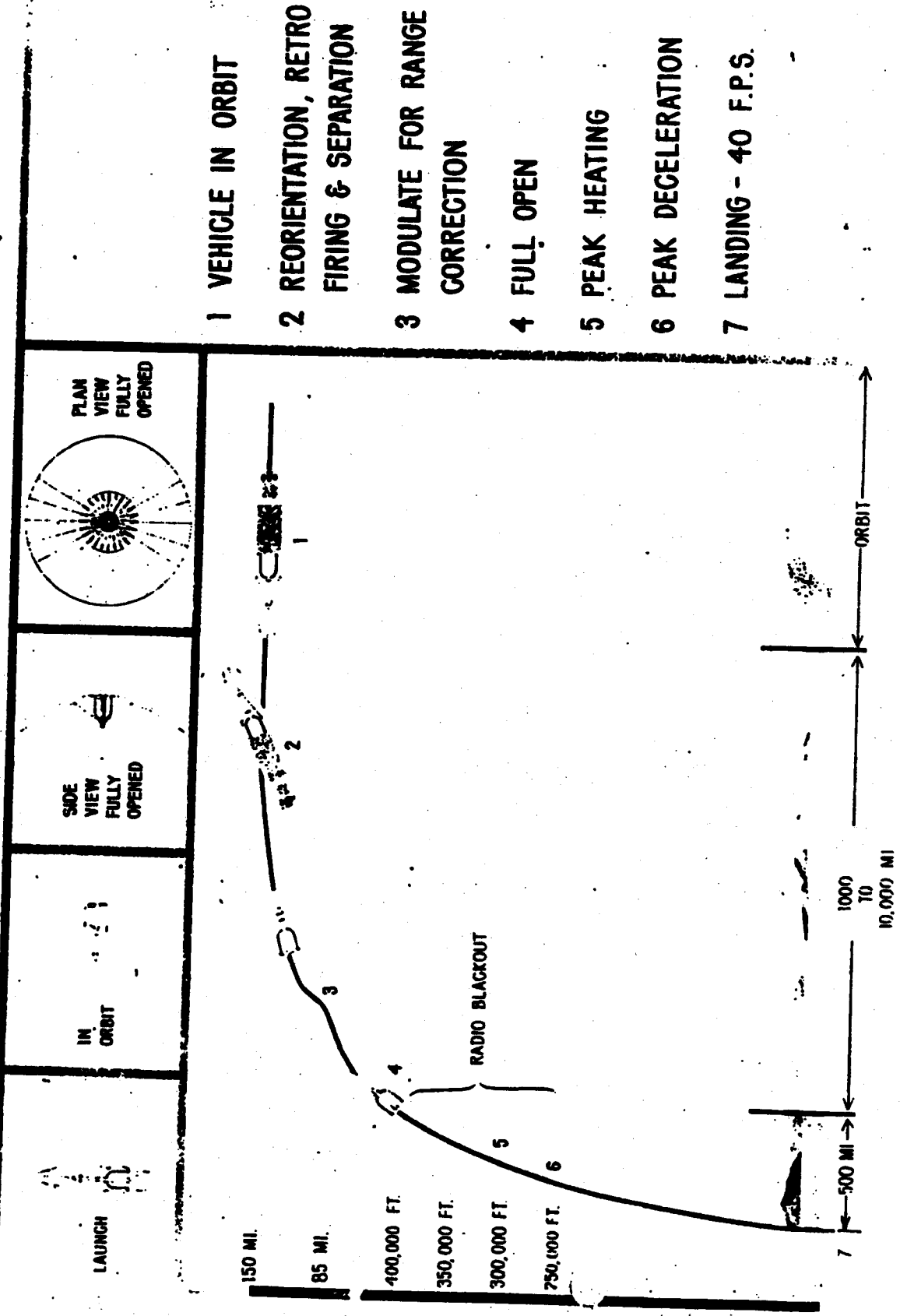
COMPATIBLE WITH DATA

PROCESSING EQUIPMENT

UTILIZE EXISTING GROUND FACILITIES

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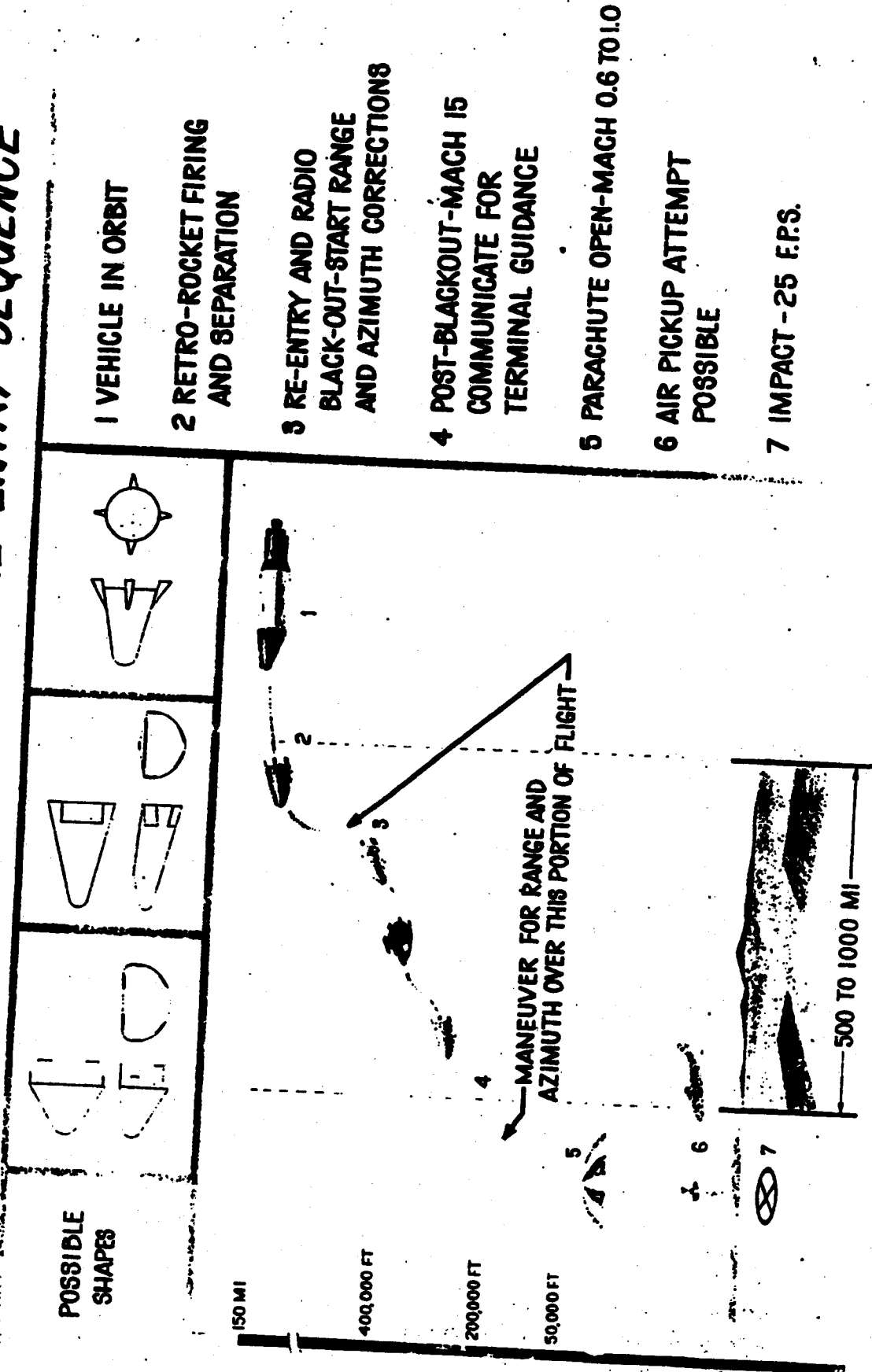
SAMOS E-6 - DRAG BRAKE RE-ENTRY SEQUENCE



SECRET

SAMOS E-6 - TYPICAL LIFT RE-ENTRY SEQUENCE

AL GO UUUU 2388c



POSSIBLE SHAPES

150 MI

400,000 FT

200,000 FT

50,000 FT

500 TO 1000 MI

1 VEHICLE IN ORBIT

2 RETRO-ROCKET FIRING AND SEPARATION

3 RE-ENTRY AND RADIO BLACK-OUT-START RANGE AND AZIMUTH CORRECTIONS

4 POST-BLACKOUT-MACH 15 COMMUNICATE FOR TERMINAL GUIDANCE

5 PARACHUTE OPEN-MACH 0.6 TO 1.0

6 AIR PICKUP ATTEMPT POSSIBLE

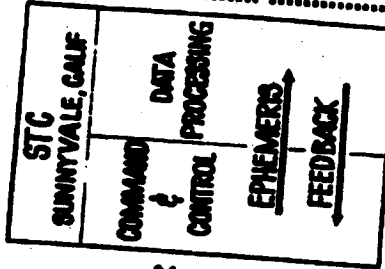
7 IMPACT - 25 F.P.S.

MANEUVER FOR RANGE AND AZIMUTH OVER THIS PORTION OF FLIGHT

~~SECRET~~

INTERIM READOUT R & D DATA FLOW

SECURITY CONTROLLED
WITHIN R & D FACILITIES



35 MM PRIMARY RECORD
AND FERRET MAGNETIC TAPE
VIA ARMED FORCES OR SPECIAL COURIER

T & A
STATIONS
WASH DC
AFB CALIF
NEW BOSTON
NEW MEXICO

TRACKING DATA VIA 100 W/M TT

PHOTO-RECONSTRUCTED & TITLED TRANSPARENCIES & PRIMARY
RECORDS (SINGLE MASTERS FOR SUBSEQUENT DUPLICATION)

FILM PROCESSING
ORGANIZATION
"DUPLICATING"

REPRODUCTIONS
AS REQUESTED
&
DISTRIBUTION
TO USERS

FERRET TABULAR PRINTOUT OF INTERCEPTS

~~SECRET~~

~~SECRET~~

SUMMARY

ELEMENTS OF SAMOS RESEARCH AND DEVELOPMENT PROGRAM

● RECOVERY

E-5 PHOTO 5' RESOLUTION	7
E-6 PHOTO 8' RESOLUTION	7
DIAGNOSTIC RECOVERY	7
● READOUT	4

COMPONENT TESTS

PHOTO-ELINT E-1/F-1-3	24
E-2 PHOTO 20' RESOLUTION	2
F-2 ELINT DIGITAL	1

- SPECIAL COMPONENT TESTS
- LAUNCHINGS FROM PT. ARGUELLO
- TRACKING STATIONS

VANDENBERG AND NEW BOSTON, INCL. READOUT
 HAWAII AND ALASKA VHF ONLY

- CONTROL - SATELLITE TEST CENTER - SUNNYVALE
- DATA PROCESSING

DEVELOPMENT LABORATORY - DENVER
 INTERIM PROCESSING OF R&D TAKE - SUNNYVALE

- RECOVERY CENTER - HAWAII

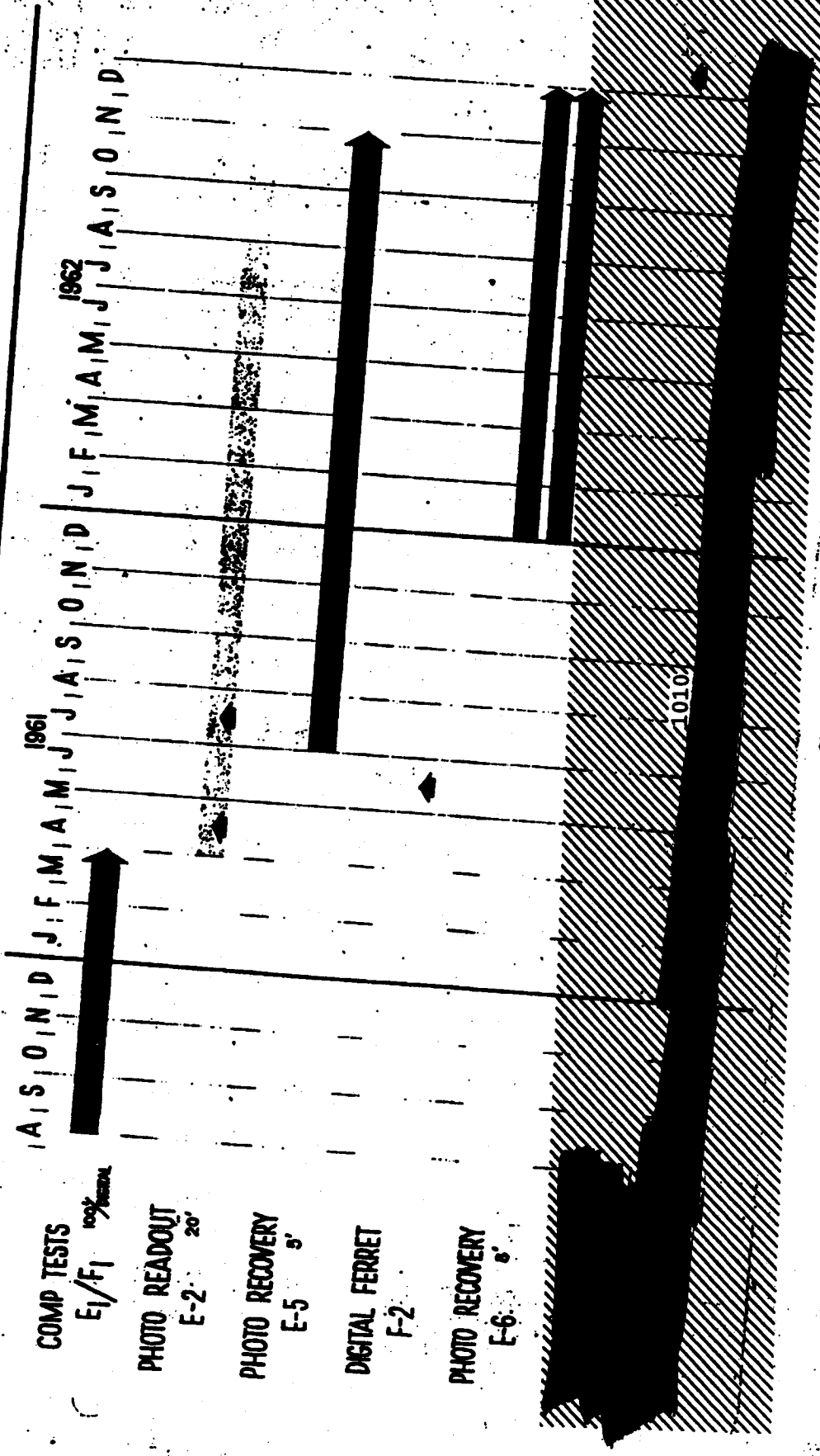
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SAMOS LAUNCH SCHEDULE

11 AUG 60 DEV PLAN

AL 60 0000 21045



COMP TESTS
E1/F1 100% Normal

PHOTO READOUT
E-2 20'

PHOTO RECOVERY
E-5 5'

DIGITAL FERRET
F-2

PHOTO RECOVERY
E-6 8'

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DIAGNOSTIC FLIGHTS

See memo

CONFIDENTIAL

SAMOS FUNDING STATUS (IN MILLIONS)

REALIGNMENT OF PRESENT PROGRAM.
TECHNICAL DIRECTION AND SYSTEM
INTEGRATION FOR PRESENT PROGRAM.
TOTAL PRESENT PROGRAM FOR FY 1961.
NEW RECOVERY PROGRAM.
ADDITIONAL BACK-UP TECHNICAL EFFORT.
ADDITIONAL BOOSTERS + AGENAS FOR
FLEXIBILITY.
AGENA GROUND SUPPORT EQUIPMENT FOR
NEW STANDS.
TOTAL ADDITIONAL PROGRAM

**TOTAL REVISED FY 61
SAMOS PROGRAM**

**FY 1961 FUNDING
REQUIREMENTS**



CONFIDENTIAL

BACKGROUND

**PROGRAM UNDERTAKEN BY U.S. AIR FORCE IN 1956
FEASIBLE ONLY WITH THE DEVELOPMENT OF LARGE BOOSTERS
RESULTING FROM BALLISTIC MISSILE PROGRAM
ORIGINALLY ORIENTED TOWARD A "READOUT" DATA RETRIEVAL
TECHNIQUE**

- **ELECTRONIC WIDE BAND LINK - VEHICLE TO GROUND**
- **PHYSICAL RECOVERY OF PACKAGE FROM ORBIT DID NOT
APPEAR TO BE WITHIN STATE OF THE ART**

**REORIENTED AUGUST 1960 TOWARD "RECOVERY" DATA RETRIEVAL
TECHNIQUE**

**PHYSICAL RECOVERY TECHNIQUES HAVE BECOME A FACT
AND OFFER A BETTER AND MORE ECONOMICAL
SOLUTION TO UNITED STATES INTELLIGENCE BOARD
INTELLIGENCE REQUIREMENTS**

SECRET

NATIONAL SECURITY COUNCIL DIRECTIVE

1 SEPTEMBER 1960

REORIENT PROGRAM TO HIGHEST PRIORITY FOR RECOVERABLE, HIGH RESOLUTION, CONVERGENT STEREO PHOTOGRAPHY

LAND RECOVERY AS SOON AS POSSIBLE
COMPETENCE TO IDENTIFY WITH CERTAIN MISSILE SITES BOTH IN CONSTRUCTION

AND AFTER COMPLETION

COMPETENCE TO STUDY STATE OF READINESS, TYPE OF ACTIVITY AND TYPE OF MISSILE

REDUCE ELECTRONIC READ-OUT EFFORT TO LOWER PRIORITY-SUBSTANTIALLY
CUTBACK GROUND-BASED ELECTRONIC READ-OUT SYSTEM

CONTINUE FERRET (ELECTRONIC) PROGRAM WITH PRIORITY LOWER
STAN PHOTOGRAPHY

PROGRAM TO BE MANAGED WITH DIRECT LINE OF COMMAND-SECRETARY OF DEFENSE TO SECRETARY OF THE AIR FORCE TO GENERAL OF FICER
OPERATIONAL CHANGE OF PROGRAM

REQUIREMENTS

UNITED STATES INTELLIGENCE BOARD
6 JULY 1960

PHOTOGRAPHIC

"GENERAL SEARCH" - 20' "RECOGNIZABILITY"

- 1ST PRIORITY - TO LOCATE SUSPECTED ICBM LAUNCH SITES BETWEEN NOW AND END OF 1962

"DESCRIPTIVE" INFORMATION - 5' "RECOGNIZABILITY"

- 2ND PRIORITY - COVERAGE OF HIGHEST PRIORITY TARGET CATEGORY AND SUSPICIOUS LOCATION LAUNCH AND CONTROL OF THESE - MISSION ON SHORT NOTICE

"TECHNICAL CHARACTERISTICS" - BETTER THAN 5' "RECOGNIZABILITY"

- 3RD PRIORITY - HIGH RESOLUTION COVERAGE TO DETERMINE TECHNICAL CHARACTERISTICS OF HIGHEST PRIORITY TARGETS BY END OF 1962

ELECTRONIC

LESS PRIORITY THAN PHOTOGRAPHIC RECONNAISSANCE BUT SHOULD BE CONSIDERED WITH HIGHEST PRIORITY SHORT OF INTERFERING WITH OTHER PHOTOGRAHY

• 4TH PRIORITY - SEARCH FOR EMISSIONS FROM ICBM MISSILE SYSTEM