OUTLINE

- PURPOSE
- LAUNCH CONFIGURATION
  - LAUNCH VEHICLE
  - AIRCRAFT CONSIDERATIONS
  - LAUNCH TRAJECTORIES
- OPERATIONAL CONFIGURATIONS
  - CAMERA CONFIGURATION
  - REENTRY SYSTEM
  - SUMMARY

~~AXUMITE/SECRET~~

PURPOSE

- NO CONTINGENCY SATELLITE SYSTEMS ARE AVAILABLE for use over denied areas should our current systems fail or be shot down.

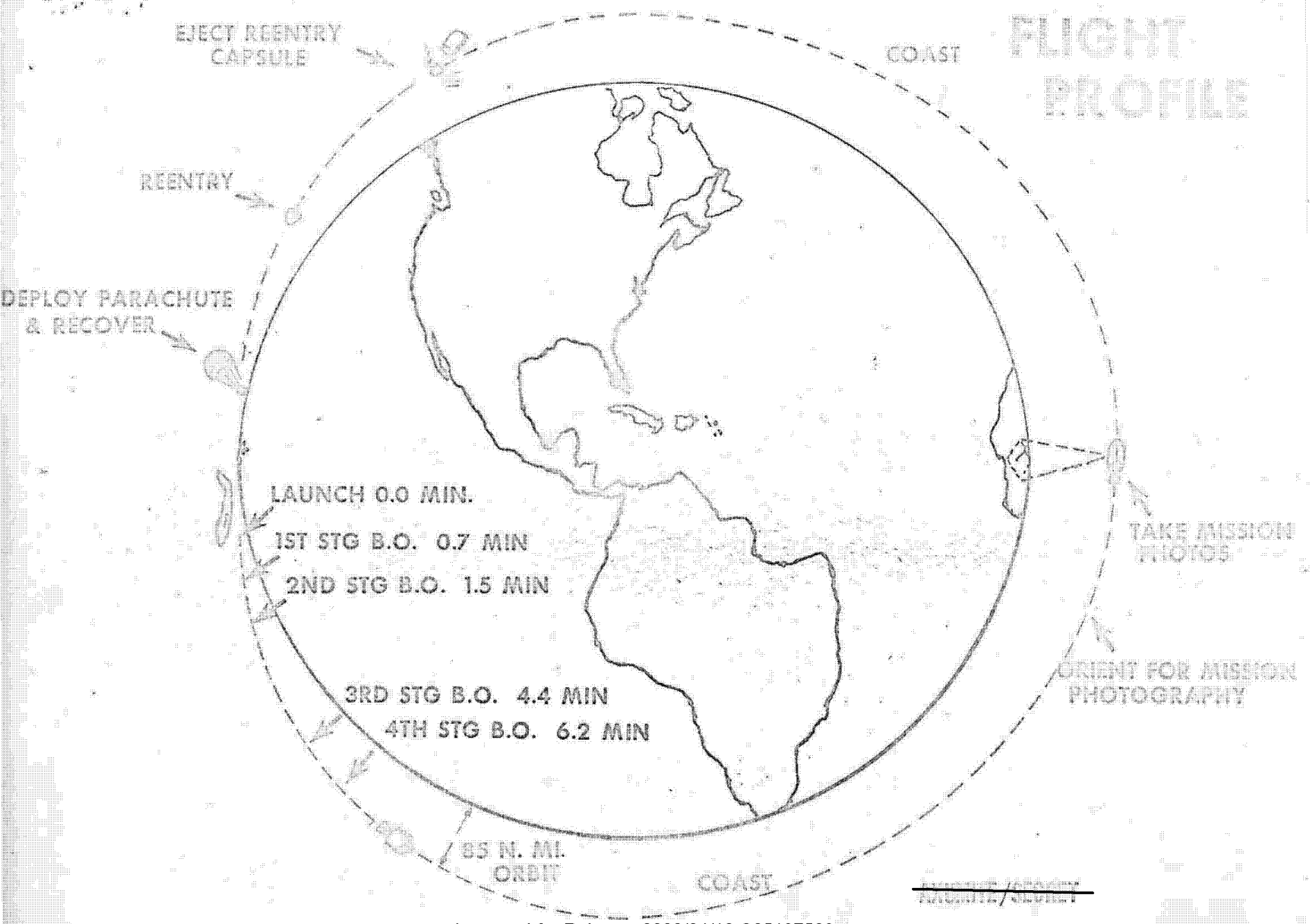
- Therefore, a quick reaction capability is needed to:
  - SUPPLEMENT EXISTING SYSTEMS for immediate cold war information.
  - SUPPORT SALT COVERAGE, as surprise check.
  - ACCESS KEY TARGETS after current satellite shoot-down.
  - COVER STRATEGIC TARGETS during hot war.

- BEST RESOLUTION OBTAINABLE within resource constraints is desired.

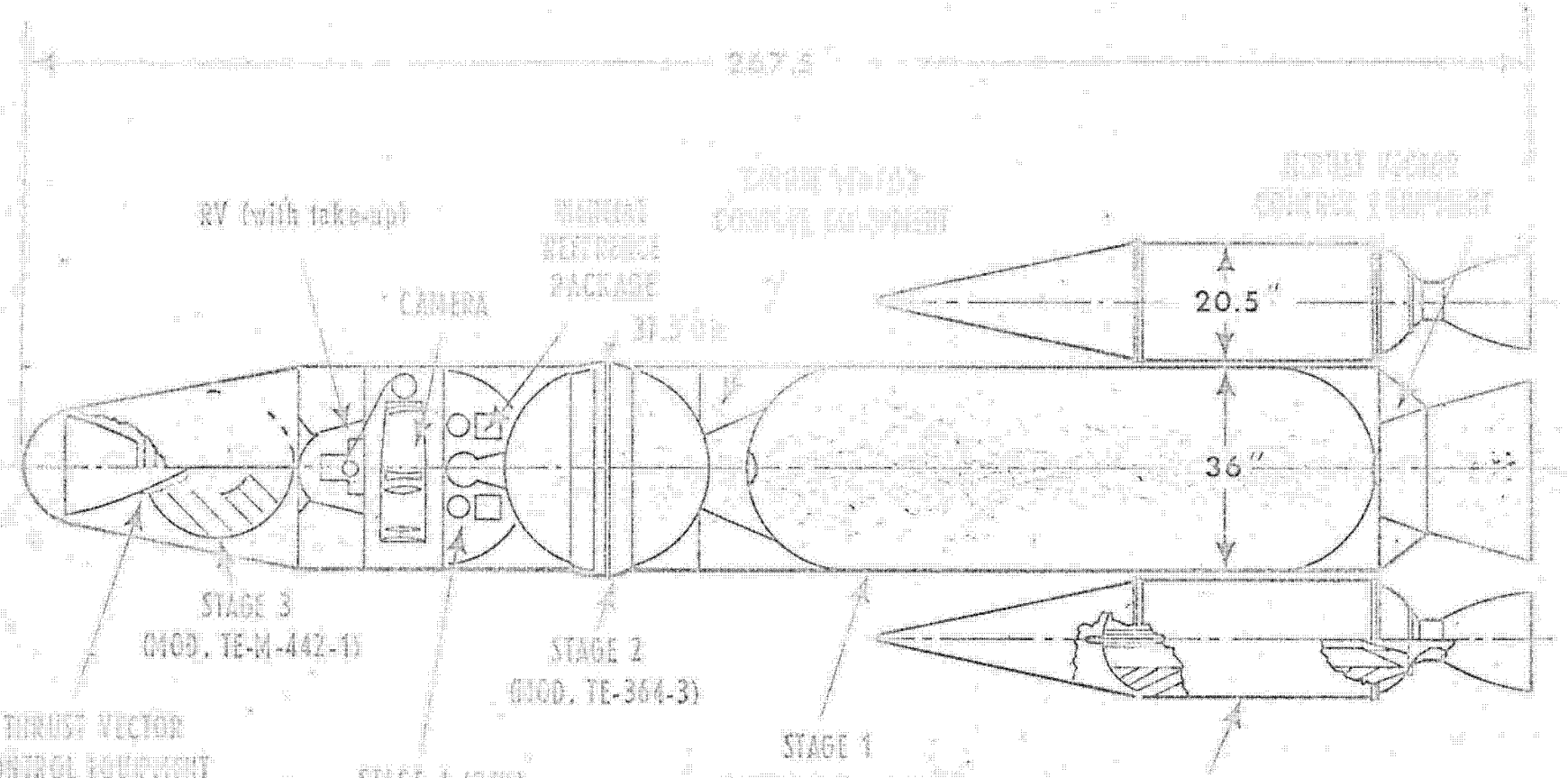
~ 5 - 7 FEET SEEMS POSSIBLE.

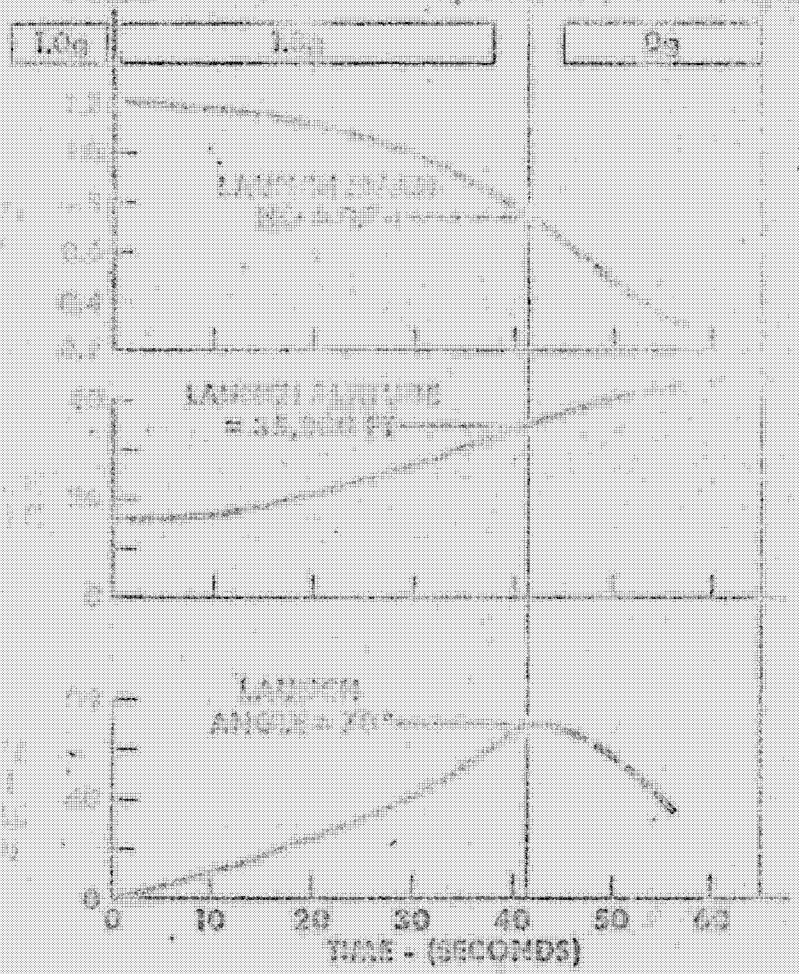
~~AXUMITE/SECRET~~

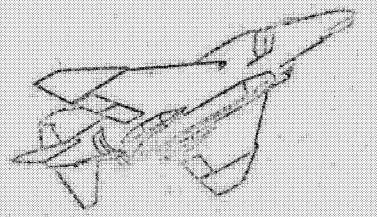
FLIGHT PROFILE



LAUNCH VEHICLE CONFIGURATION







CLEAN

(2) 370 GAL TANKS

INFLIGHT REFUEL

LAUNCH PHASE PERFORMANCE

STAGE DESIGNATION	STRAP-ON's	STAGE 1	STAGE 2	STAGE 3	STAGE 4
MOTOR DESIGNATION	THOR-DELTA (2nd Stage)	SKYBOLT (1st Stage)	MODIFIED TE-M-364-3	MODIFIED TE-M-442-1	R-4D
MOTOR MANUFACTURER	AEROJET GENERAL	AEROJET GENERAL	THIOKOL	THIOKOL	MARQUARDT
MOTOR PROPELLANT	SOLID	SOLID	SOLID	SOLID	LIQUID
I_{SP}	274	280.9	302.5 (291)	291 (272.4)	285
VEHICLE WT. at END of BURN PERIOD (INITIAL WT --- 11,150#)	9000#	2625#	900#	260#	Varies

~~ARCADIA / SECRET~~

FOURTH STAGE WEIGHT BREAKDOWN

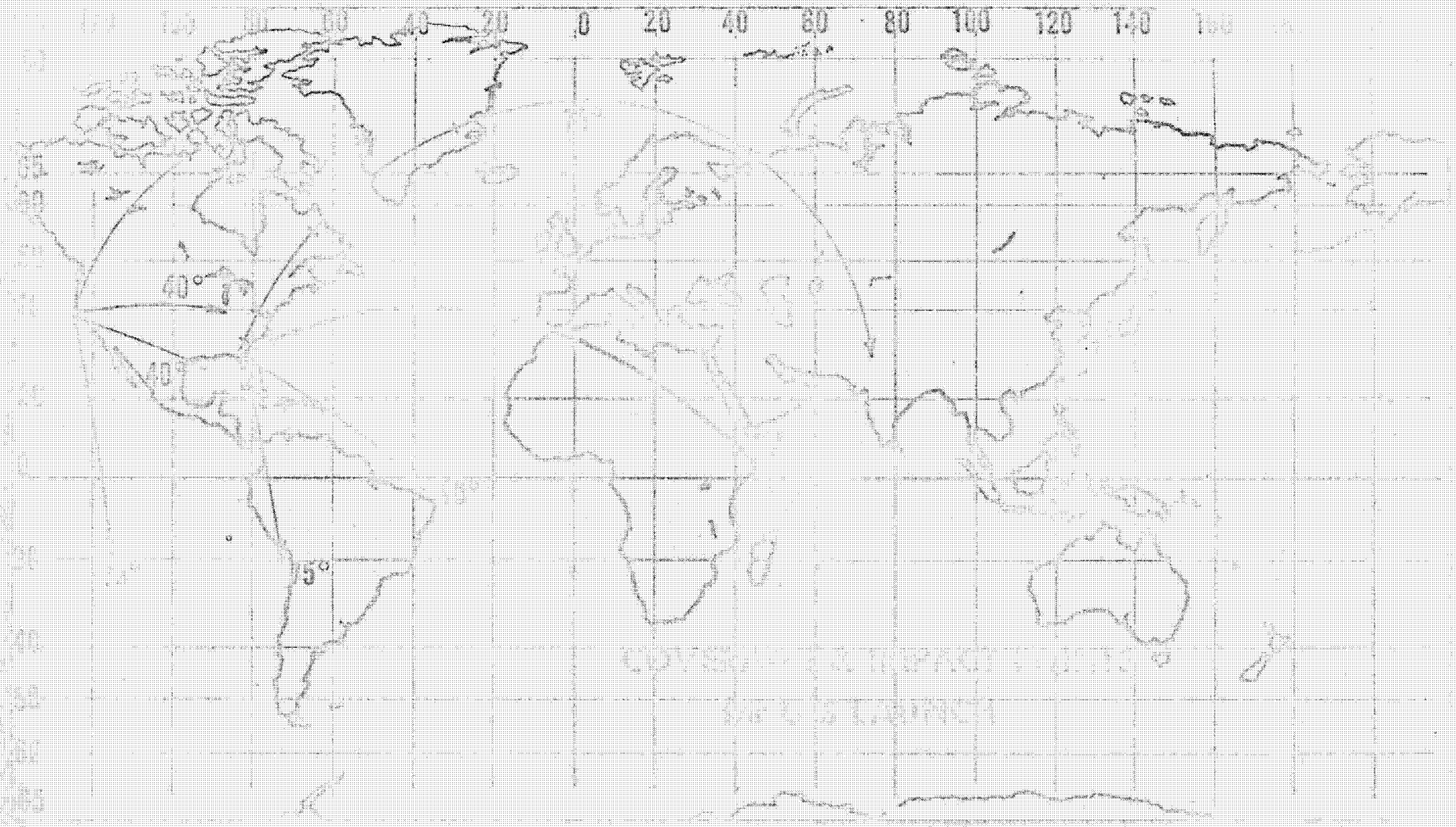
PROPULSION SYSTEM	90.0#
STRUCTURE	30.0#
ATTITUDE CONTROL SYSTEM	10.5#
POWER SUPPLY	3.0#
INERTIAL REFERENCE PACKAGE	11.5#
GUIDANCE COMPUTER	5.0#
VALVE DRIVE ELECTRONICS	1.0#
CAMERA	65.0#
REENTRY SYSTEM (INCLUDING TAKEUP)	44.0#
TOTAL	260.0#

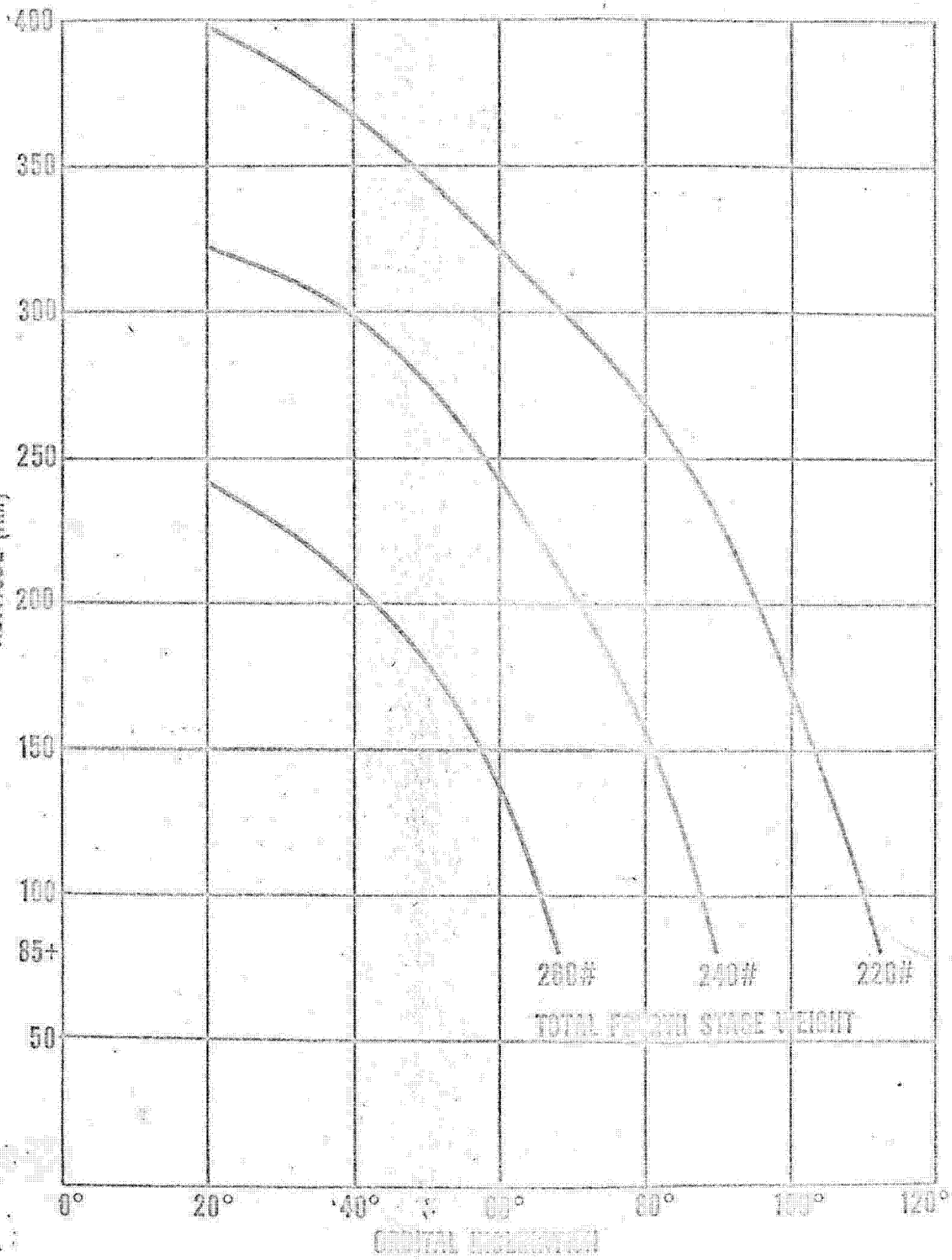
~~AXUMITE/SECRET~~

OPERATIONAL CONSTRAINTS

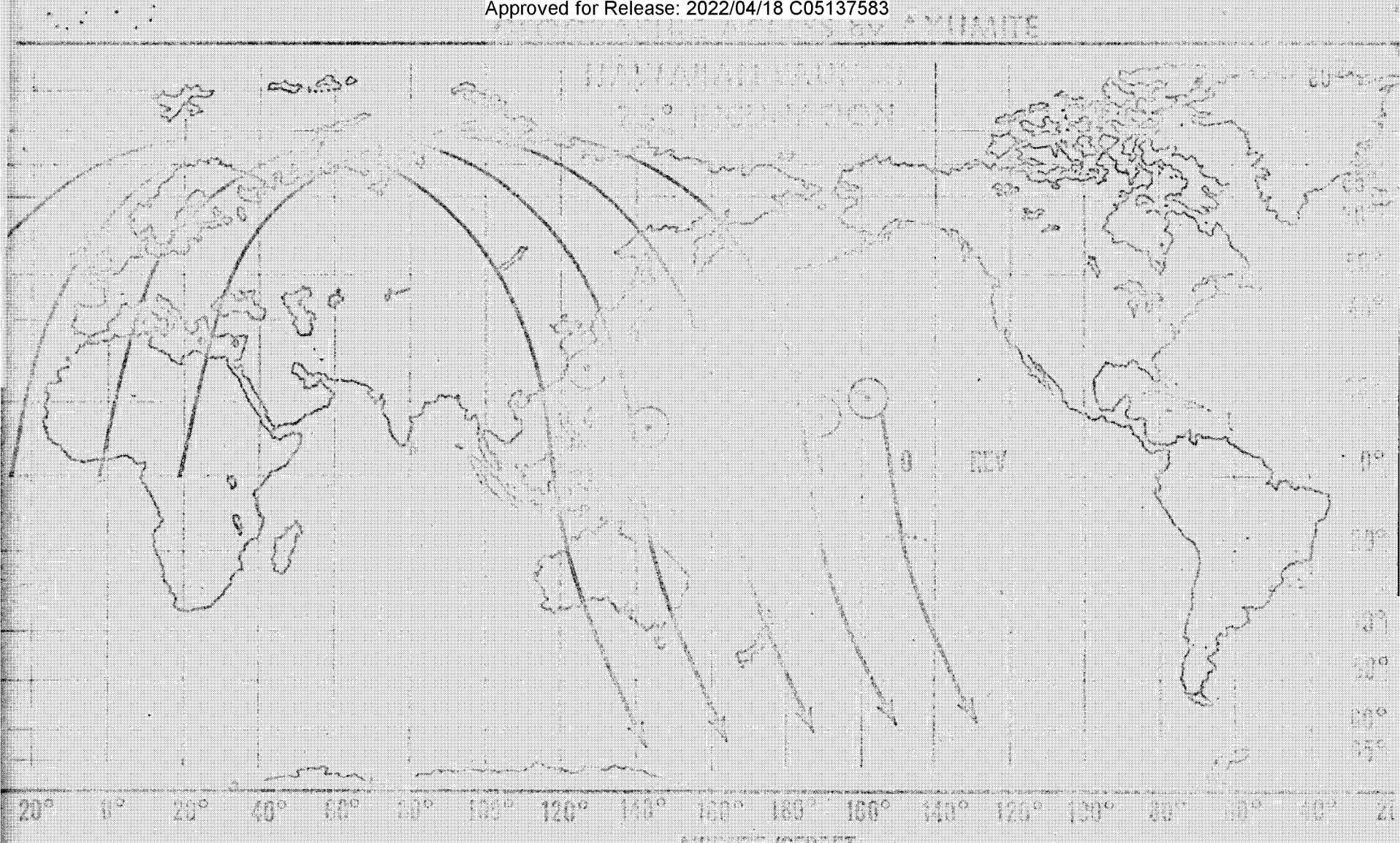
- POTENTIAL FAILURE MODES SHOULD NOT ALLOW RE-ENTRY OF MATERIAL OVER THE U.S.S.R. OR CHINA.
- ORBIT MUST BE POSIGRADE AND HAVE AN INCLINATION LESS THAN 65° - 75°.
- ORBIT SHOULD BE LOW AND CIRCULAR BUT SURVIVE FOR AT LEAST 6 REVOLUTIONS.
- COVERAGE SHOULD BE OBTAINED ON THE FIRST, SECOND, OR THIRD REVOLUTION AFTER LAUNCH.

~~AXUMITE/SECRET~~



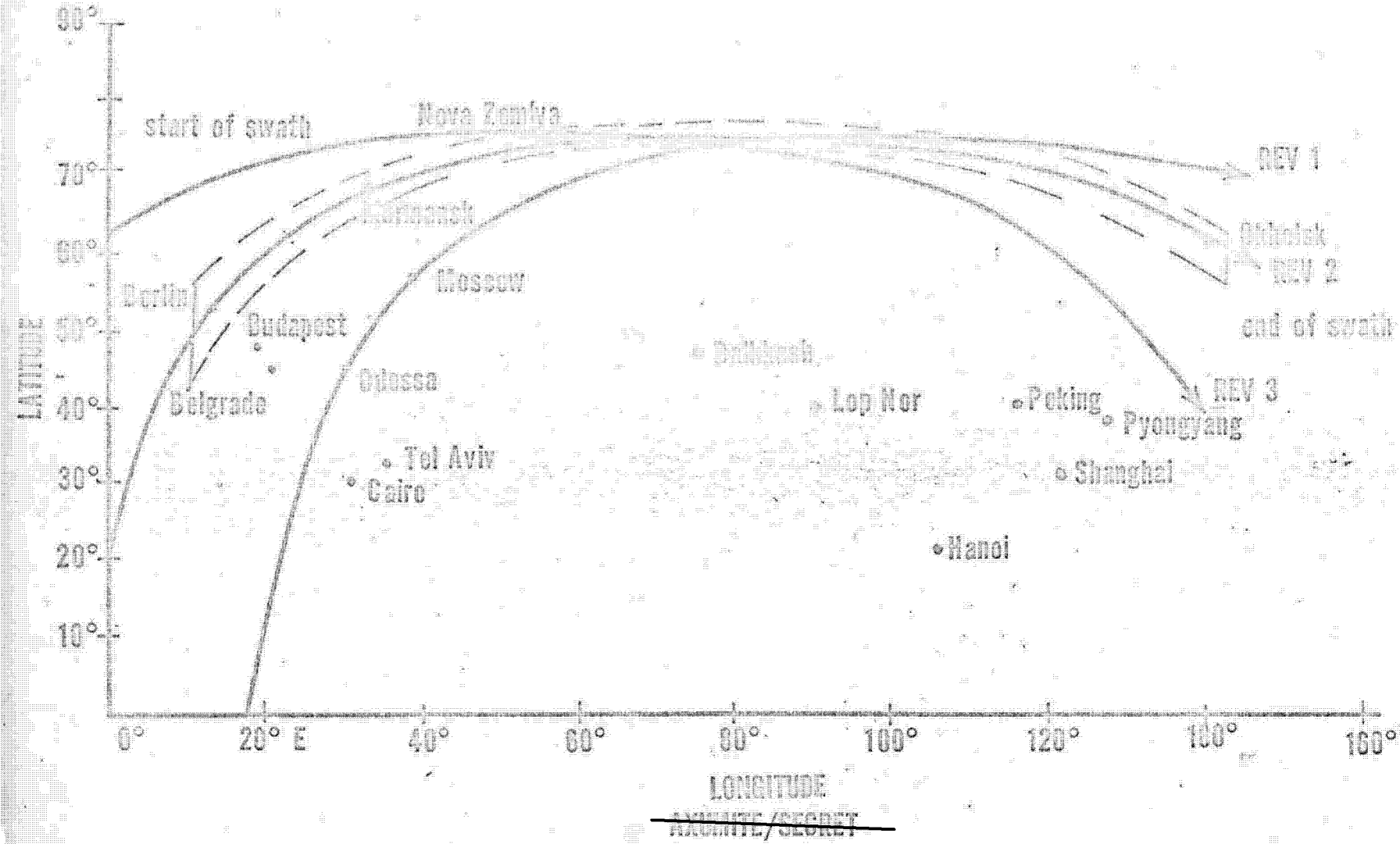


Approved for Release: 2022/04/18 C05137583

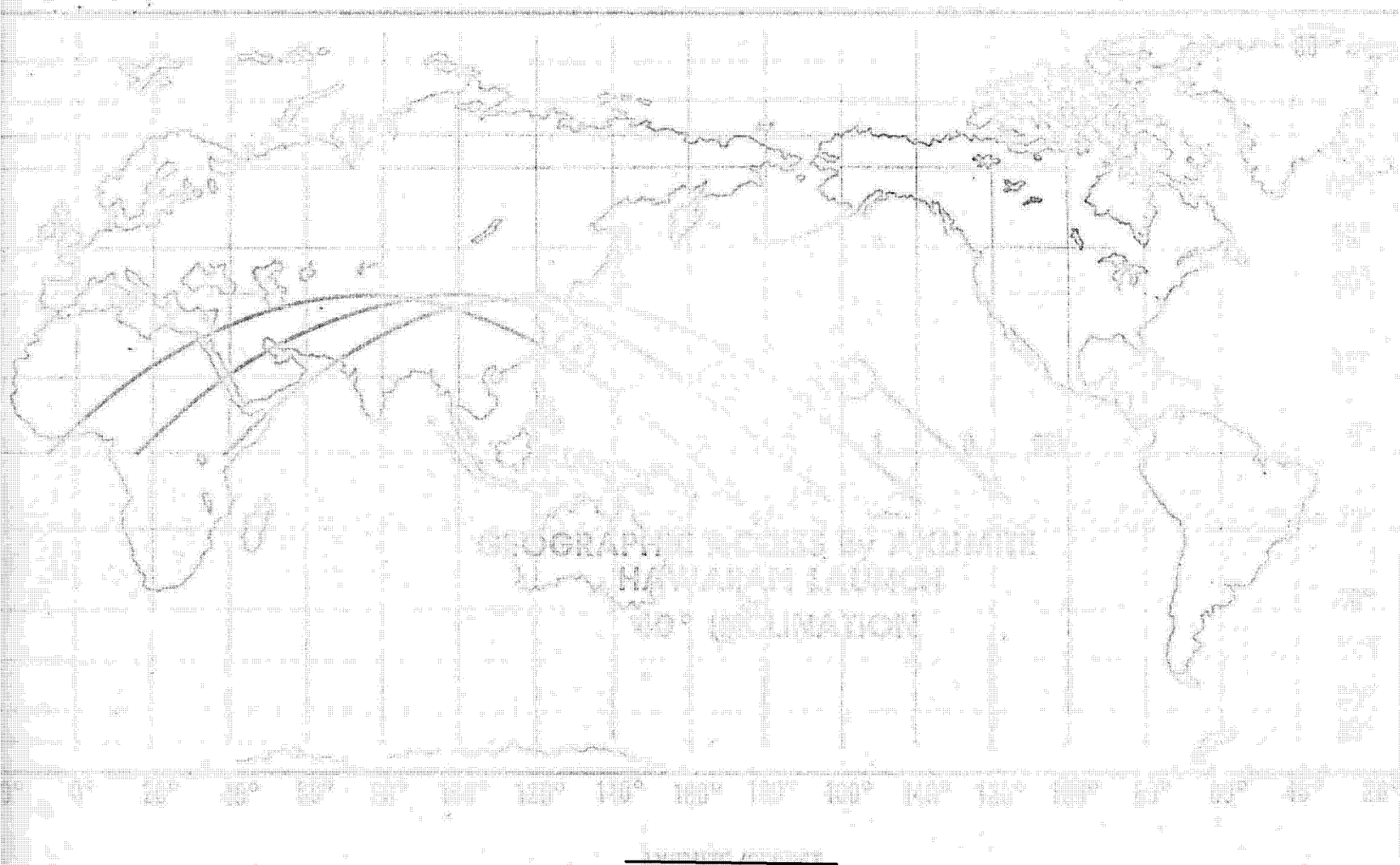


~~SECRET/SENSITIVE~~

TARGET ACCESS BY AXUMITE SYSTEM
HAWAIIAN LAUNCH - 75° INCLINATION

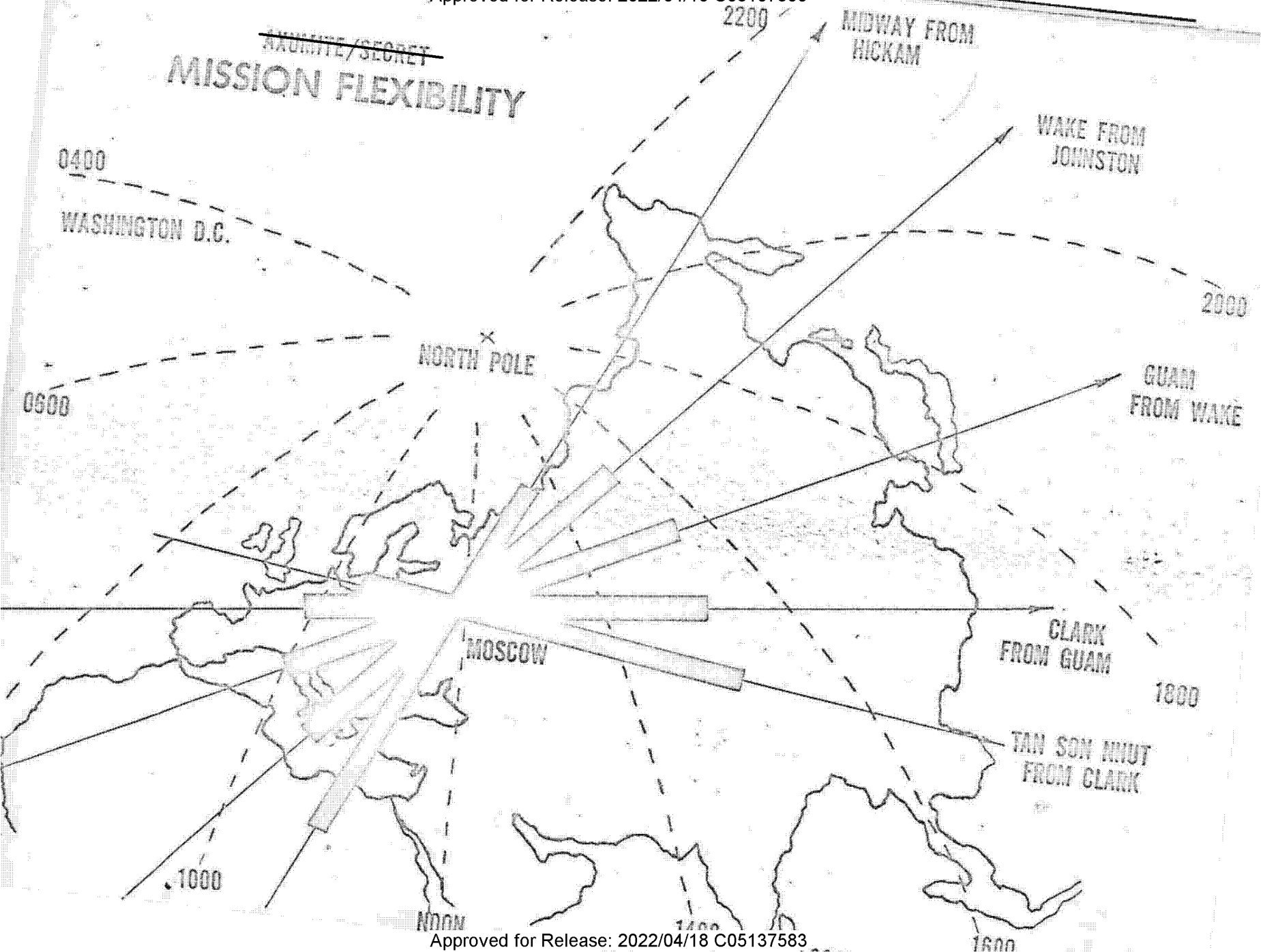


~~AXUMITE/SECRET~~



~~SECRET~~

MISSION FLEXIBILITY



RECOVERY OPTIONS FOR LAUNCHES FROM VARIOUS LAUNCH ZONES

REVOLUTION ON WHICH RECOVERY WAS ATTEMPTED

LAUNCH ZONES	HAWAII	JOHNSTON ISLAND	WAKE ISLAND	GUAM	OKINAWA	RECOVERY ZONES
HAWAII	NO	1	2	3	4	5 or 6
JOHNSTON ISLAND	NO	NO	1	2	3	4 or 5
WAKE ISLAND	NO	NO	NO	1	2	3 or 4
GUAM	NO	NO	NO	NO	1	2 or 3
OKINAWA	NO	NO	NO	NO	NO	2 or 3

IMPLICATIONS OF CONSTRAINTS

- OPERATIONAL FLIGHTS WILL BE ON SOUTHERLY POSIGRADE ORBITS.
- LAUNCH ZONES FOR BEST TARGET COVERAGE ON REVOLUTIONS 1, 2, OR 3 OF AXUMITE IS THE CENTRAL PACIFIC.
- ENTIRE EURASIAN CONTINENT CAN BE ACCESSED
- RECOVERY WILL BE BY SURFACE PICK-UP AND, IN THE PACIFIC, WILL BE IN DARKNESS.

~~AXUMITE/SECRET~~

ORDER of MAGNITUDE ESTIMATE of TIME from LAUNCH to READOUT to DELIVERY to WASHINGTON, D.C.

	TIME to READOUT and REPORT	TIME to D.C.
ATLANTIC RECOVERY	14.5 hrs.	14.5 hrs.
PACIFIC RECOVERY (JOHNSTON ISLAND)	6.5 hrs. *	17 hrs.

* Assumes processing in Hawaii and TWX or [redacted] transmission of report to D. C. (b)(1) (b)(3)

~~AXUMITE SECRET~~

AXUMITE CAMERA OBJECTIVES

- 5-7 FEET GRD FROM 85 N.M.
- 1000 N.M. MAXIMUM IMAGING RUN LENGTH
- WEIGHT - 65 LBS. MAXIMUM INCLUDING FILM
- CROSS TRACK COVERAGE - 150 N.M.
- FIT INTO 33-INCH DIAMETER, 14-INCH-DEEP SPACE

AXUNITE CAMERA REQUIREMENTS

- HIGH RESOLUTION ESSENTIAL, MEANING RELATIVELY FAST OPTICS SO SLOW FILMS CAN BE USED.
- 18-INCH FOCAL LENGTH MINIMUM REQUIREMENT TO MEET OBJECTIVES, NEAR DIFFRACTION LIMITED.
- MUST BE LIGHTWEIGHT DESIGN
  - MECHANICAL SIMPLICITY
  - MODEST PHYSICAL OPTICAL APERTURE
- APPROXIMATELY 2 LBS. OF FILM REQUIRED.

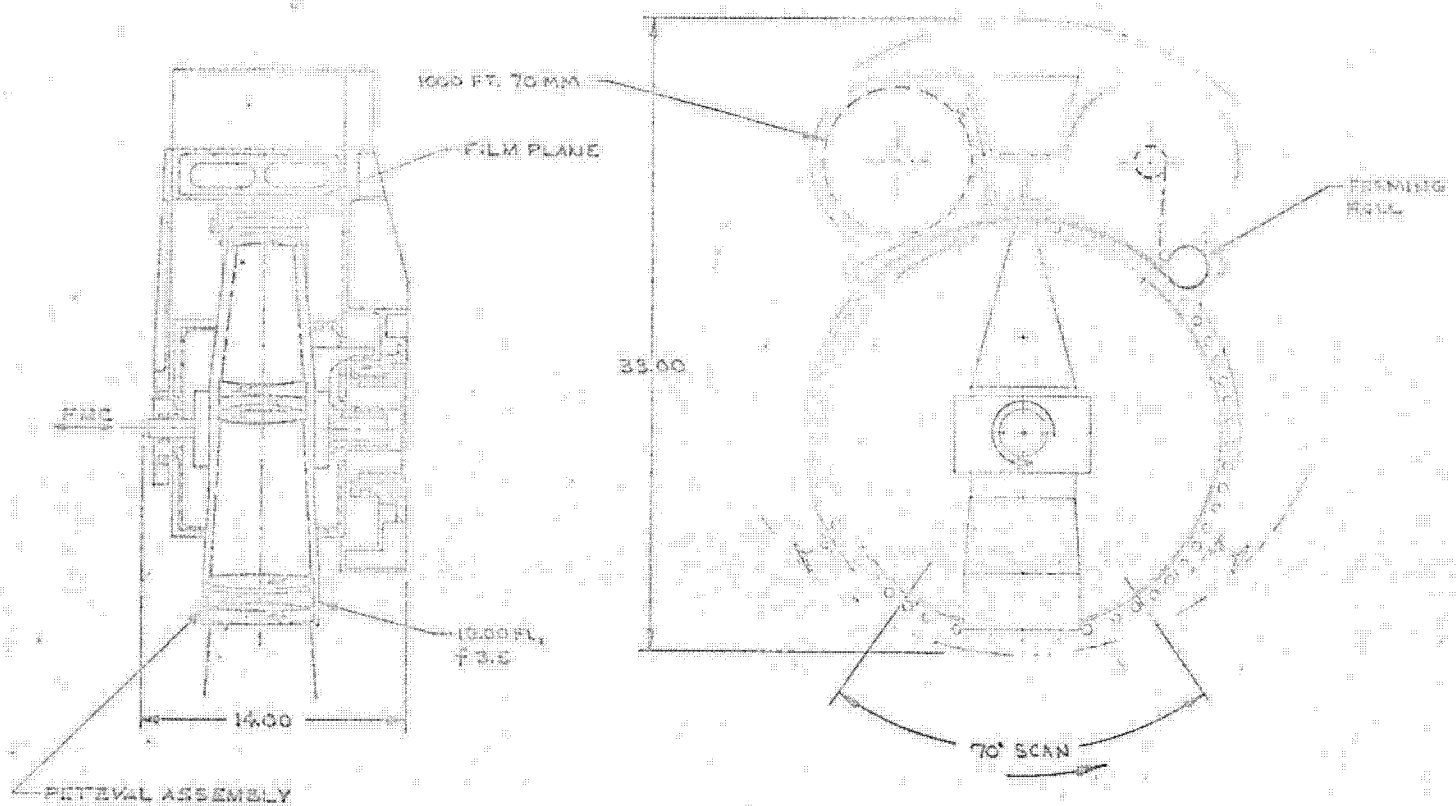
CANDIDATE CAMERA PARAMETERS

	FOCAL LENGTH (in.)	SCAN ANGLE	ESTIMATED WEIGHT (lbs.)	FILM VELOCITY (in/sec)
ECCENTRIC PUPIL SCHMIDT	20	70°	62	92
CASSEGRAIN	18	70°	50	55
PETZVAL	18	70°	60	17
PETZVAL	13	70°	53	0
DOUBLE GAUSS (FOLDED)	24	90°	72	84
DOUBLE GAUSS (STRAIGHT)	24	Hor to Hor	65	42

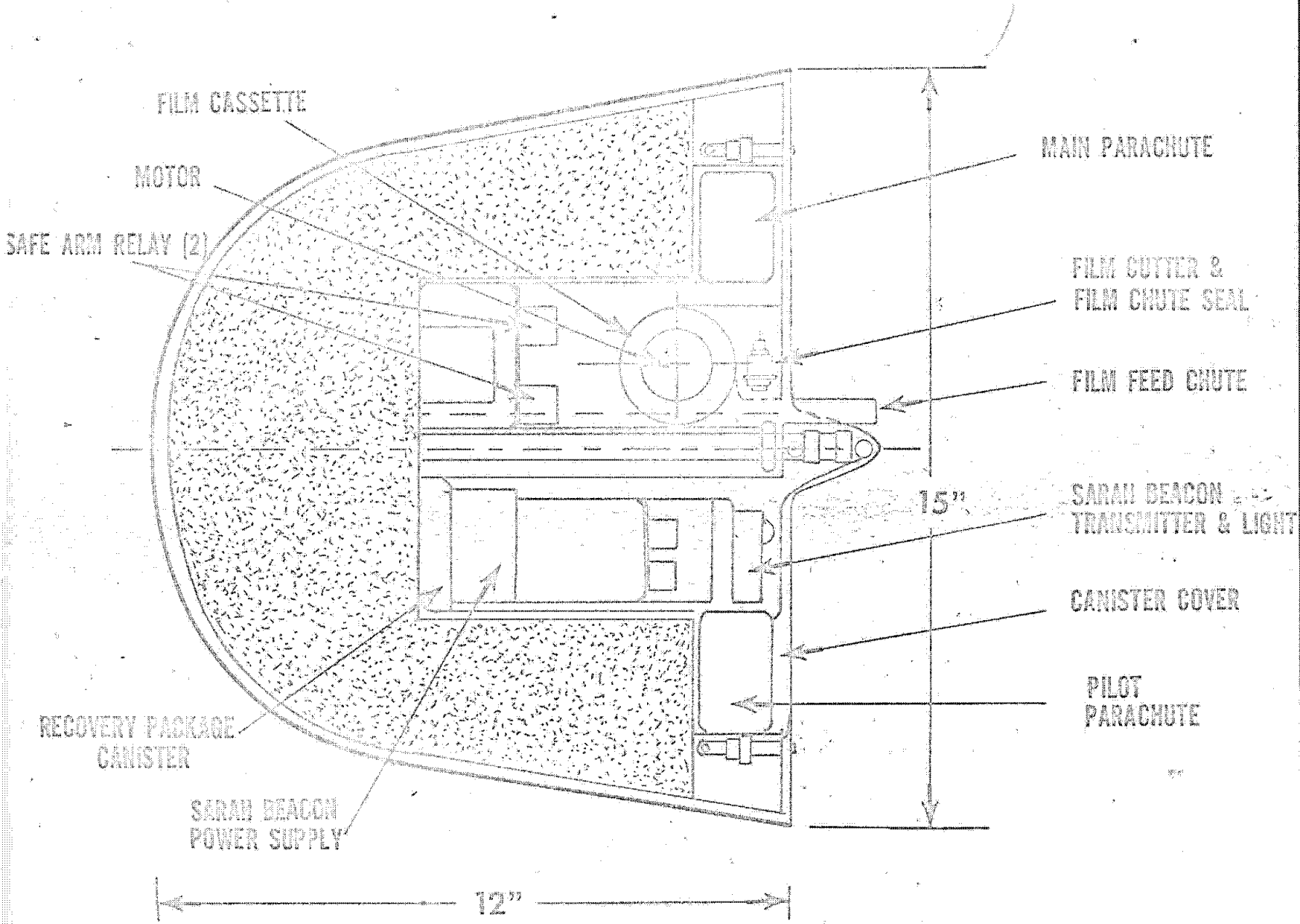
ORDER OF PREFERENCE

	SYSTEM	REASON
1.	18-INCH PETZVAL	SIMPLE, STRAIGHT FWD, PROBABLY CAN BE DONE FOR WEIGHT.
2.	CASSEGRAIN	SIMPLE, NO REAL DEVELOPMENT, CAN BE DONE FOR WEIGHT, CAN PROBABLY GET LONGER FOCAL LENGTH.
3.	E. P. SCHMIDT	CLEVER, NEAT DESIGN, BUT TRICKY LENS TO MAKE, WEIGHT PROBABLY OK, BUT IS MORE COMPLICATED. RISKY PROGRAM.
3.	STRAIGHT THRU DOUBLE GAUSS	SIMPLEST CAMERA, BUT REALLY COMPLICATES VEHICLE. LOOKS VERY RISKY AT PRESENT.
4.	FOLDED DOUBLE GAUSS	DESIGN OK, BUT LENS HEAVY, 24-INCH VERSION PROBABLY CANNOT BE MADE FOR WEIGHT. BACKING OFF ON F.L. MAKES PETZVAL MORE ATTRACTIVE.
5.	13-INCH PETZVAL	IF RESOLUTION RQMT CAN BE RELAXED, OR TIME IS CRITICAL, THIS GOES TO HEAD OF LIST.

PETZVAL—18-INCH FOCAL LENGTH, f/3.5



Approved for Release: 2022/04/18 C05137583



WEIGHT SUMMARY

RECOVERY COMPONENTS		
	PROGRAMMER	3.0 #
	BEACON	1.0
	ANTENNA	0.5
	FLASHING LIGHT CONTROLLER & LAMP	1.0
	BATTERY	7.0
	G-SWITCH	1.0
	PARACHUTES & RELEASE	5.2
	HARNESS	3.0
	DYE MARKER	1.6
		23.3 #
STRUCTURE		
	AFT COVER	3.0 #
	SHELL	3.0
	SUPPORT STRUCTURE	6.7
		12.7 #
HEAT SHIELD		8.0 #
	TOTAL	44.0 #
PAYLOAD		5 #

SUMMARY

- ADVANTAGES
  - QRC
  - OPERATIONAL FLEXIBILITY
    - LAUNCH
    - TARGET COVERAGE
    - RECOVERY
  - RELATIVELY LOW COST AND SHORT DEVELOPMENT CYCLE
- MAJOR QUESTIONS
  - BOOSTER STAGING COMBINATION
  - ORBITAL WEIGHT ACHIEVEMENT
  - SURFACE RECOVERY PROBLEMS
- THEREFORE, A FUNDED PHASE ZERO IS NEXT STEP.

~~EXCLUSIVE/SECRET~~