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BYE-15704-71
VOLUME 4, PART I
24 PAGES
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VOLUME 4
PART I
CORONA 6-PACK

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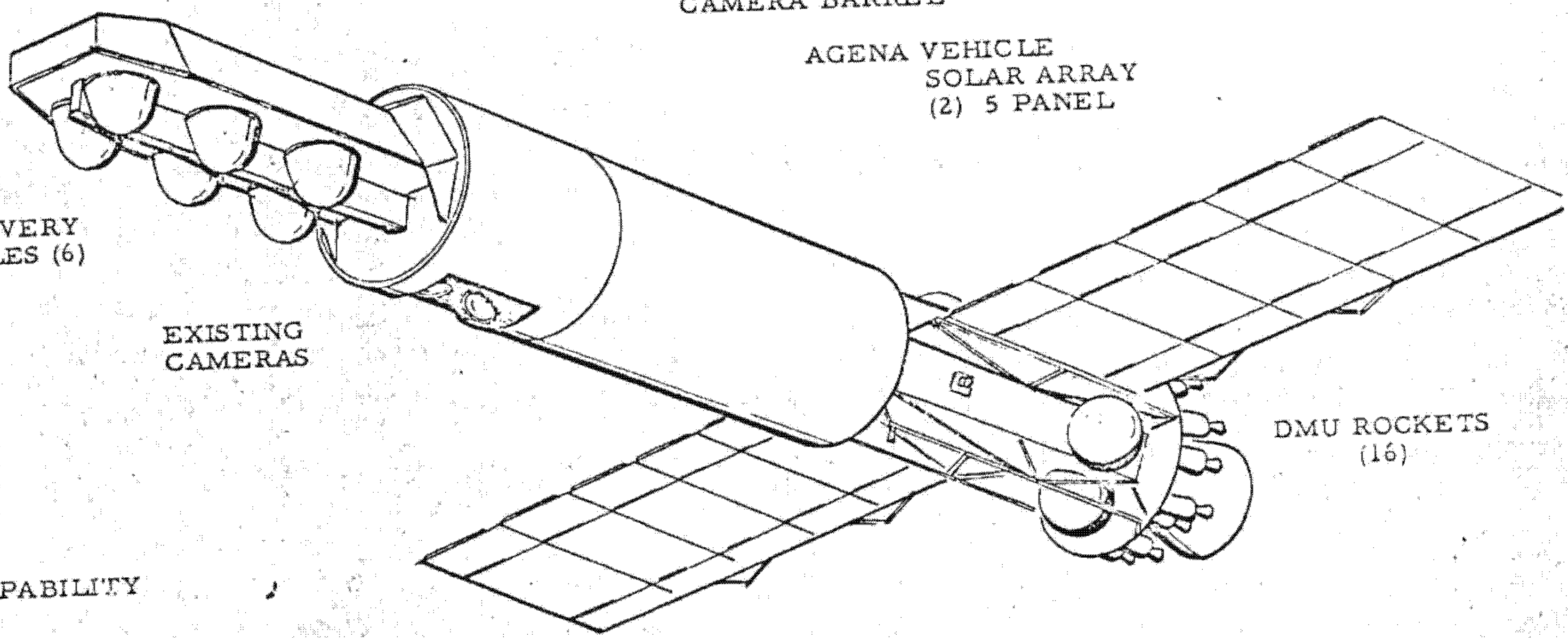
CHART 1

This is a representation of the orbital configuration of the 6-PACK CORONA vehicle. The recovery section consists of six 24" GE buckets mounted on a pylon structure. The system uses a standard J-3 camera without DISIC. The Agena can either be the present 20-day life configuration, or the slightly modified configuration with 30-day life. There is another option available for replacing the drag makeup rockets with the liquid bi-propellant Secondary Propulsion System (SPS) used by the GAMBIT Program.

CONFIGURATION

ORBITAL VEHICLE CONCEPT



CAPABILITY

RESOLUTION	- 5 FT. NADIR; 7'-12' AVERAGE
RESPONSE	- 38 HOURS LAUNCH TO EVALUATED PHOTO IN WASHINGTON
COVERAGE	- 3 MILLION SQ. MI. PER 30-DAY MISSION
	- ANYWHERE IN THE WORLD - IN STEREO
OPERATIONAL	- 24 MONTHS A. R. O.

CHART 2

Although the original intent of the CORONA 6-PACK configuration was to keep the system components unchanged except for the recovery section, the added weight makes the THORAD SLV-2H impractical because, even with a stripped down 20-day Agena, the inclination range is limited to 60° to approximately 80°. This severely limits the first day target access capability of the system. The NASA configuration SLV-2K, with six solid strap-on rockets would give adequate inclination, but the cost (approximately 3.5 million per launch) is excessive. The Atlas F, on the other hand, is readily available/at moderate cost and provides a substantial margin for future growth.

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BOOSTER - WEIGHT CAPABILITIES

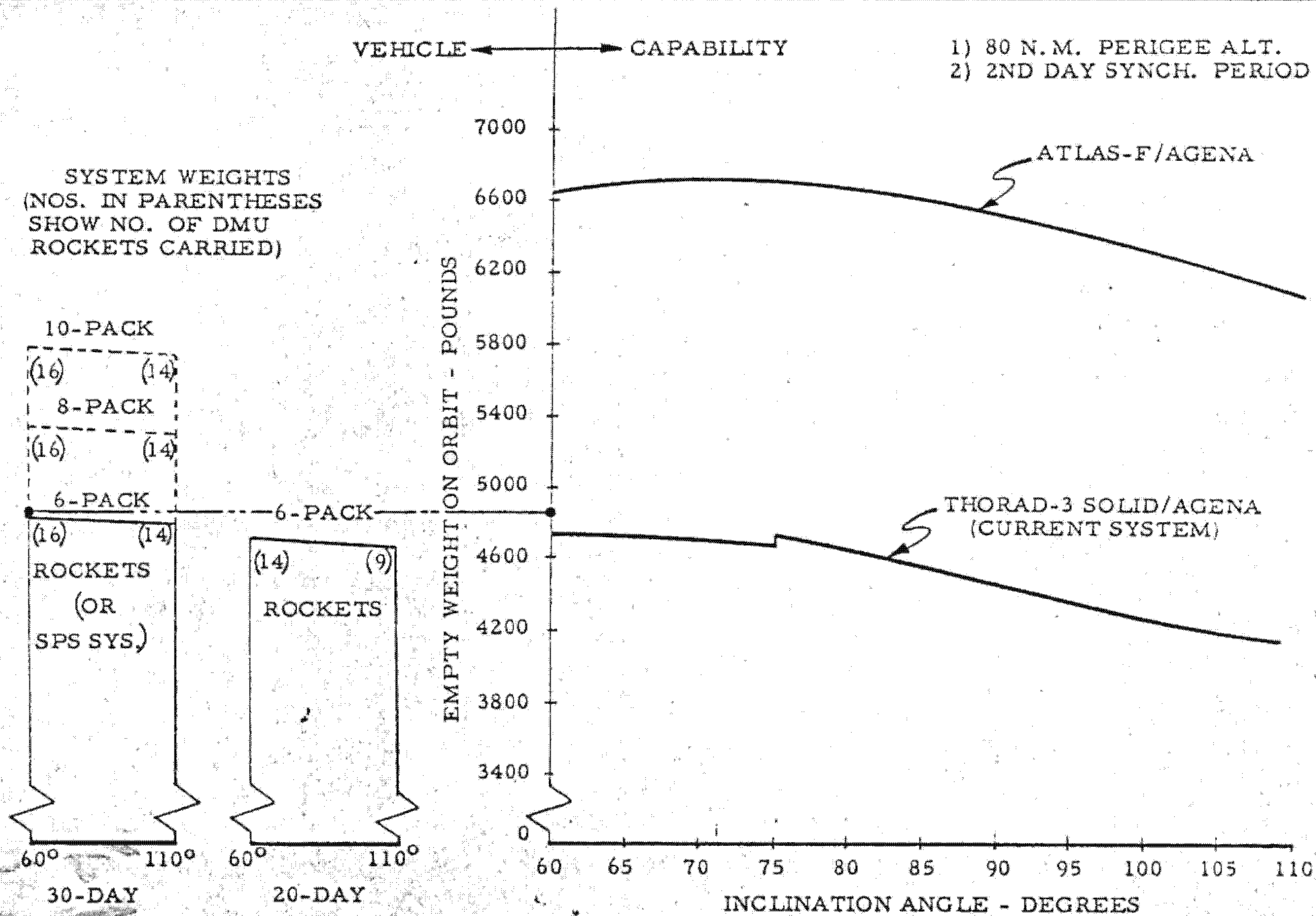
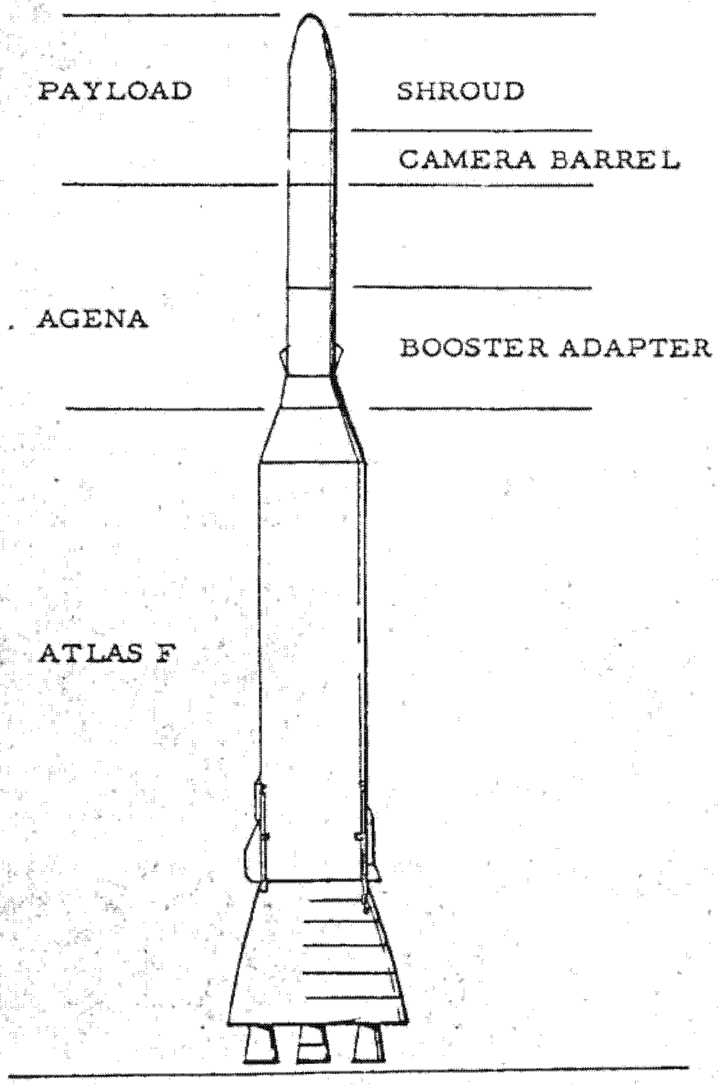


CHART 3

The launch vehicle configuration has therefore been selected as the Atlas F booster with a 30-day Agena spacecraft, and the 6-PACK CORONA payload with a protective shroud. Our present pad SLC-3W can easily be modified to handle the Atlas. In fact, it was originally an Atlas pad.

LAUNCH VEHICLE



LAUNCH WILL BE FROM
S. L. C. 3-W V.A.F.B.

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CHART 4

The recovery vehicle section carries six 24" diameter GE buckets mounted on a pylon structure. The recovery vehicle is essentially a scaled down version of the present Mark V R/V. The upper side of the pylon carries the cut and splice devices, and the several rollers along the film path. It is covered with a light-tight shield. The R/V section is protected by a shroud during ascent. The film capacity of each take-up reel is approximately 1300 feet, so the total vehicle capacity is slightly less than half of the present CORONA system. The payload is the standard J-3 camera.

SAFSP

PAYLOAD VEHICLE GENERAL ARRANGEMENT
PLAN VIEW

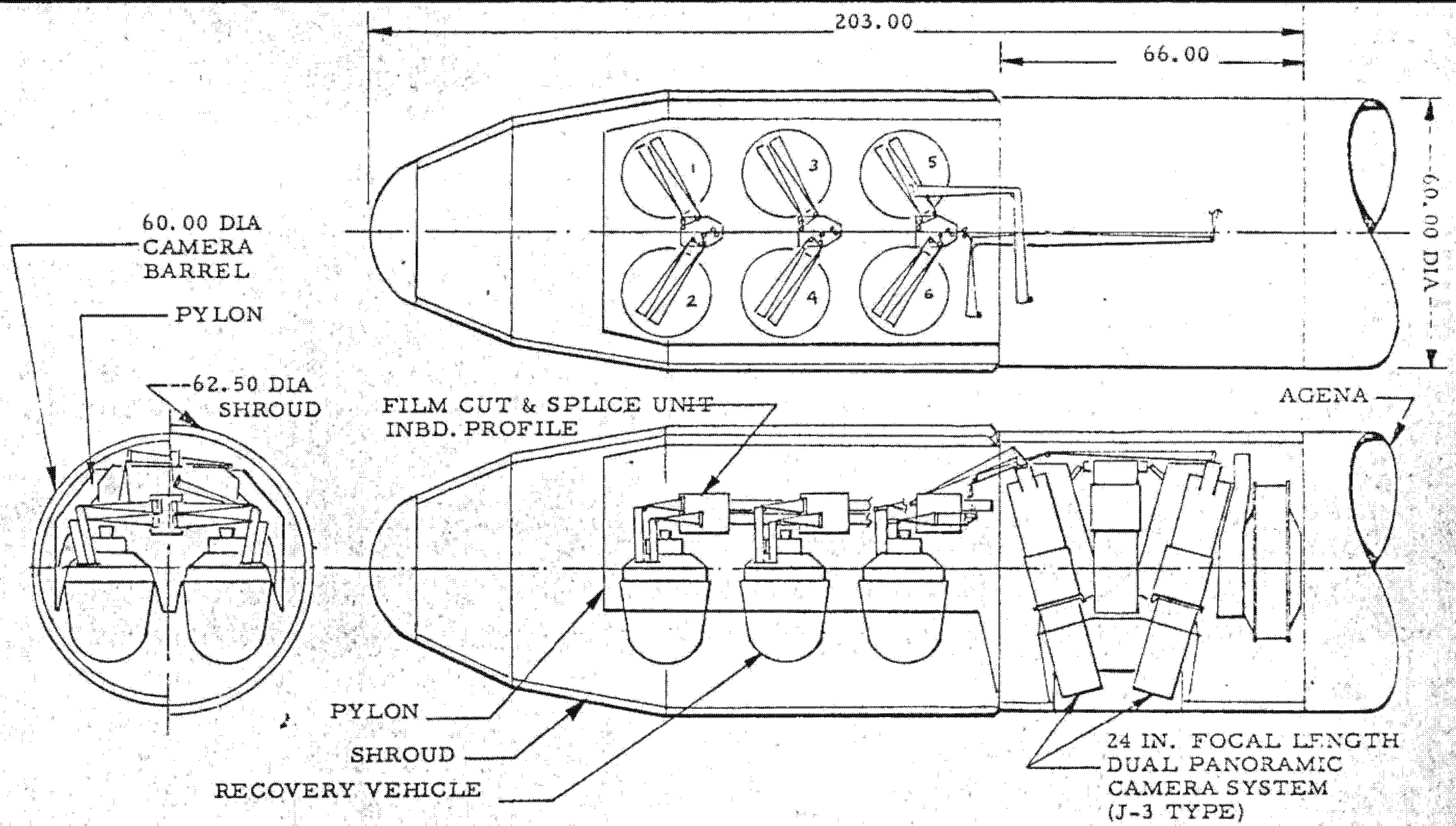

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CHART 5

The 5 ft. resolution at nadir from 85 n.m. is marginal for satisfying search requirements, and inadequate for surveillance. The mission average of 7 to 12 ft. does not meet mission requirements. Area coverage is certainly ample for the Crisis Mission, and the Crisis area can be accessed daily for up to 30 days. However, the system is limited to only 6 recoveries so a choice must be made to either recover the buckets daily for 6 days, or to accumulate coverage for several days in each bucket in order to stretch the mission duration. The response time is adequate if one assumes development and initial photo interpretation are done in Hawaii (OPIC-A), and that the intelligence report, which is generated approximately 6 hours from recovery, is sufficient to satisfy time critical requirements.

CRISIS MISSION SUITABILITY

CHARACTERISTIC	REQUIREMENT	J-3 CAPABILITY
RESOLUTION	3 Ft for Surveillance 5 Ft for Search Stereo Preferred	5 Ft Nadir @ 85 NM (Mission Avg. 7 to 12 Ft) 30^{0} Stereo
COVERAGE	50 x 85 NM Area, Daily	125 NM Swath x any desired length, daily
OUTPUT	Daily Readout / Recovery for up to 30 days	30-Day orbital life, 6 Recoveries at intervals of one or more days
RESPONSE	24 - 48 hrs from Alert to First Intelligence Report	24 - 48 Hrs, depending on target location and recovery area

CHART 6

This chart shows first orbit ground traces for inclination angles of 60° to 110° launched from VAFB. With a mid-night launch it is obvious that the system has a wide range of flexibility to achieve first pass coverage of a target anywhere between the two extreme traces by merely selecting the appropriate inclination angle. Recovery can be made on Rev 9, 10 or 11, depending on inclination angle. This provides rapid response for targets anywhere in Europe, Africa, Mid-East, most of the USSR and India, and the northwestern part of China. Any targets to the south and east of the 60° trace cannot be covered until Revs 10 to 16, and recovery would have to wait until the second daylight pass over the recovery area. Some targets in the southeastern part of Asia can be accessed during the first 7 Revs by launching at mid-day and performing photography on descending passes. First day coverage is limited to about 50% of the area between latitude 15 degrees north and 47 degrees north for orbital periods of approximately 90 minutes because orbital traces for all inclinations converge at the latitude of the launch pass (approximately 34° North) with nodes spaced 22 1/2° apart in longitude. Furthermore, the day-time launch delays the first recovery opportunity until Rev 25 to 27.

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FIRST ORBIT COVER SE TO W LAUNCH

* Note: Range Limit is i = 60°

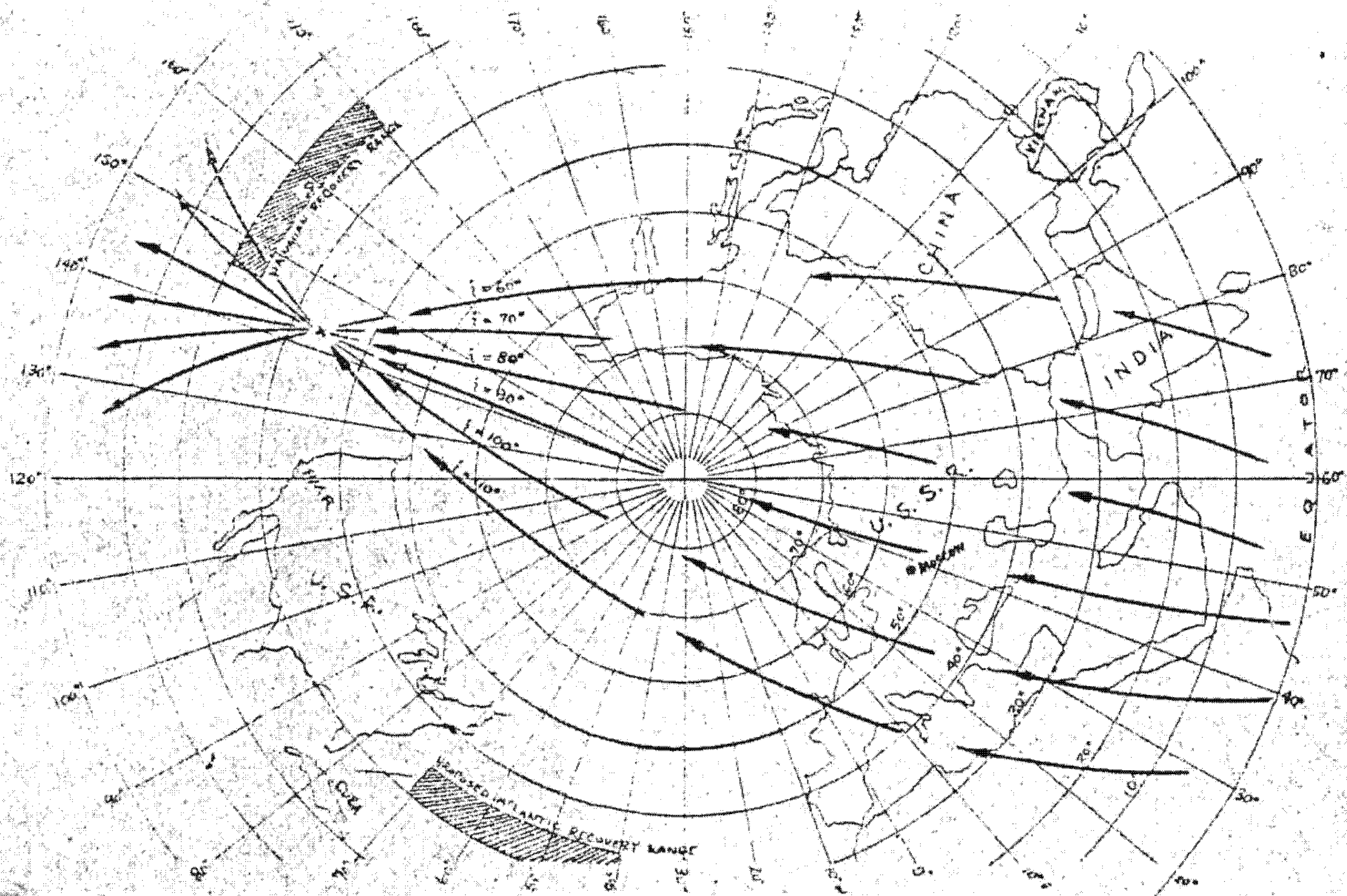

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CHART 7

The CORONA system with the Atlas booster and the slightly modified Agena is readily adaptable to the operational requirements of the Crisis Mission. Sustained pad hold time of 60 to 90 days appears to be feasible, and a launch countdown time of 8 hours can be achieved assuming that there are no major anomalies during the countdown. 30 day orbital life of the spacecraft can easily be achieved without significant cost. The major configuration changes would be extension of the orbital programmer from 20 to 30 days, and increased expendables (power, control gas and drag make-up rockets). 15 hours from launch to first recovery is the average time for a night launch. The estimate of 6 hours from recovery to first intelligence reports assumes an average of one hour flight time from recovery to landing at Hickam, and it assumes film processing and initial photo interpretation at OPIC. The 16 solid drag make-up rockets can maintain average period in ground track for 20 days at 80 n.m. perigee or 30 days at 84 n.m. perigee. A significant improvement in operational flexibility can be achieved by installing a GAMBIT secondary propulsion system in lieu of the solid rockets. The cost of this option is about $50K non-recurring, plus slightly over $100K per vehicle recurring.

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OTHER OPERATIONAL FACTORS

* 60 - 90 DAY PAD HOLD
* 8 - 12 HOUR LAUNCH REACTION TIME
* 30 DAY ORBITAL LIFE
* 15 HOURS FROM LAUNCH TO FIRST RECOVERY.
* 6 HOURS FROM RECOVERY TO FIRST INTELLIGENCE REPORT
* IMPROVED ORBIT ADJUST CAPABILITY AVAILABLE AT MODERATE COST

CHART 8

Initial operational capability can be achieved in 24 months. Development of the recovery vehicle and its supporting structure can be completed in 18 months, which leaves 6 months for integrated system testing. Booster and pad modifications are not pacing and we have assumed that the pad would not be available for any modification work until July '72.

CORONA (J-3) SYSTEM SCHEDULE

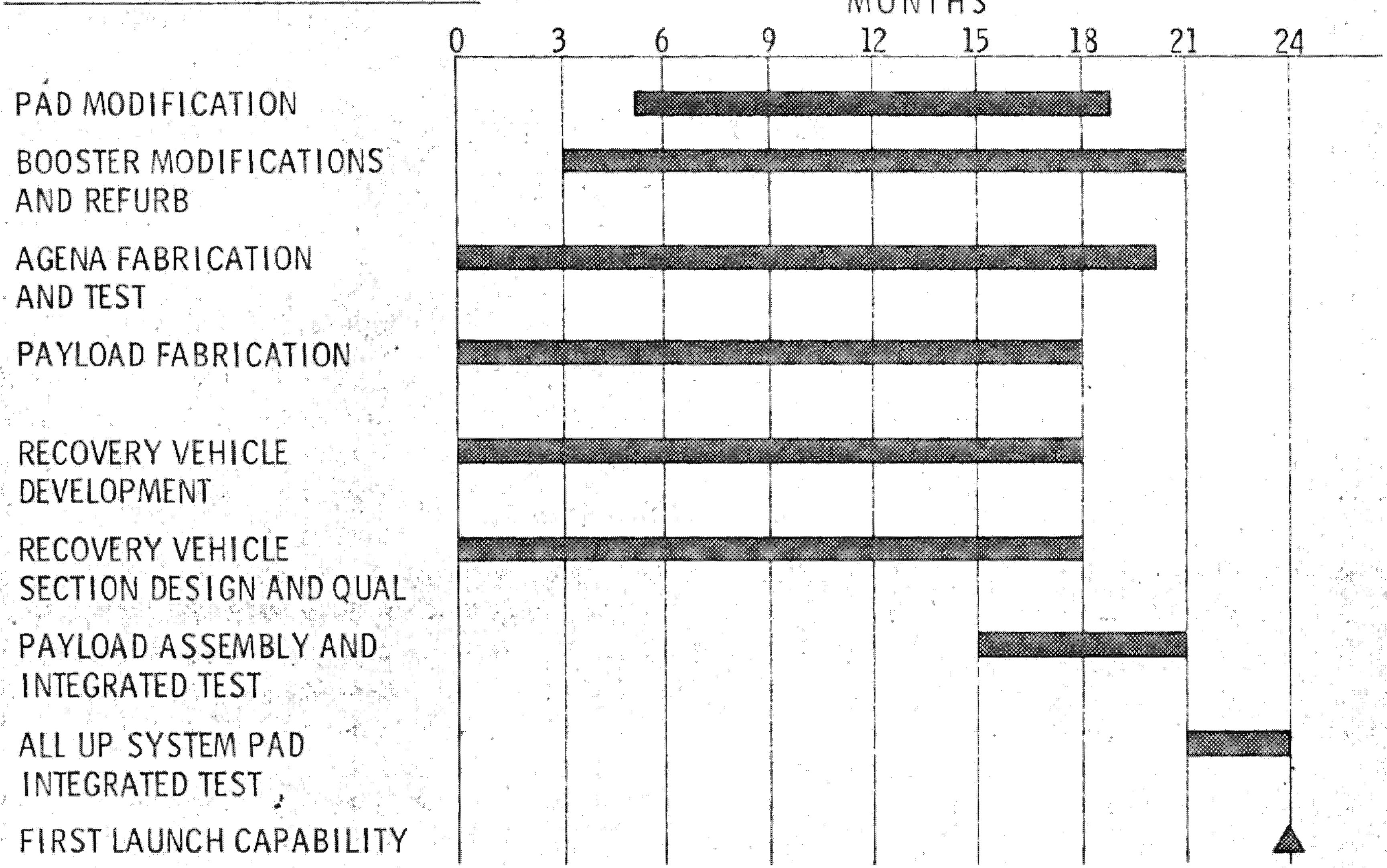

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CHART 9

This is a summary of fund requirements broken down by FY. The non-recurring costs total 28.9 million and the recurring costs are ~~262~~ 250 million. We assumed procurement in two lots for a total of 17 vehicles with the program ending in FY '77. The rationale for the number of vehicles was an average of four per year for four years, plus one pipe line vehicle.

SAFSP

CORONA J-3/6-PACK COST ESTIMATE - 1 MAY 71 GO-AHEAD

(Includes 15% Fee)

	FY 71	FY 72	FY 73	FY 74	FY 75	FY 76	FY 77	Total
Non-Recurring								
Spacecraft	.400	3.800	2.000					6.200
Booster (Pad Mod/Software)		2.000	2.500					4.500
Payload (Agency)	1.000	10.400	6.800					18.200
Sub-Total	1.400	16.200	11.300	-0-	-0-	-0-	-0-	28.900
Hardware								
Spacecraft	1.000	22.000	21.300	27.300	21.500	21.600	21.900	136.600
Booster		6.450	4.800	5.250	4.800	5.250	4.800	31.350
Payload (Agency)	.700	21.900	21.200	27.000	21.300	21.400	21.700	135.200
Sub-Total	1.700	50.350	47.300	59.550	47.600	48.250	48.400	303.150
Operating Costs								
Spacecraft Launch			2.500	6.000	6.000	6.000	6.000	26.500
Booster Launch			1.700	4.000	4.000	4.000	4.000	17.700
Support Services		.300	.300	.300	.300	.200	.200	1.600
Sub-Total		.300	4.500	10.300	10.300	10.200	10.200	45.800
Total for Continuing Program	3.100	66.850	63.100	69.850	57.900	58.450	58.600	377.850
Work in Process for FY 78 & on				.180	1.940	48.250	48.400	98.770
Net Funding Req'd - 17 Vehicles	3.100	66.850	63.100	69.670	55.960	10.200	10.200	279.080

RECURRING UNIT COST $14.720M

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CHART 10

Recognizing that the standard J-3 camera was inadequate for the Crisis Mission, ITEC came in shortly before the completion of the study with a preliminary design of a 36" focal length Off-Node Rotating dual panoramic camera system which would fit within the 5 ft diameter of the CORONA spacecraft, but would require a slightly longer barrel, and of course would be slightly heavier than the standard J-3. The general arrangement, however, is just like the standard J-3.

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PAYLOAD VEHICLE GENERAL ARRANGEMENT PLAN VIEW

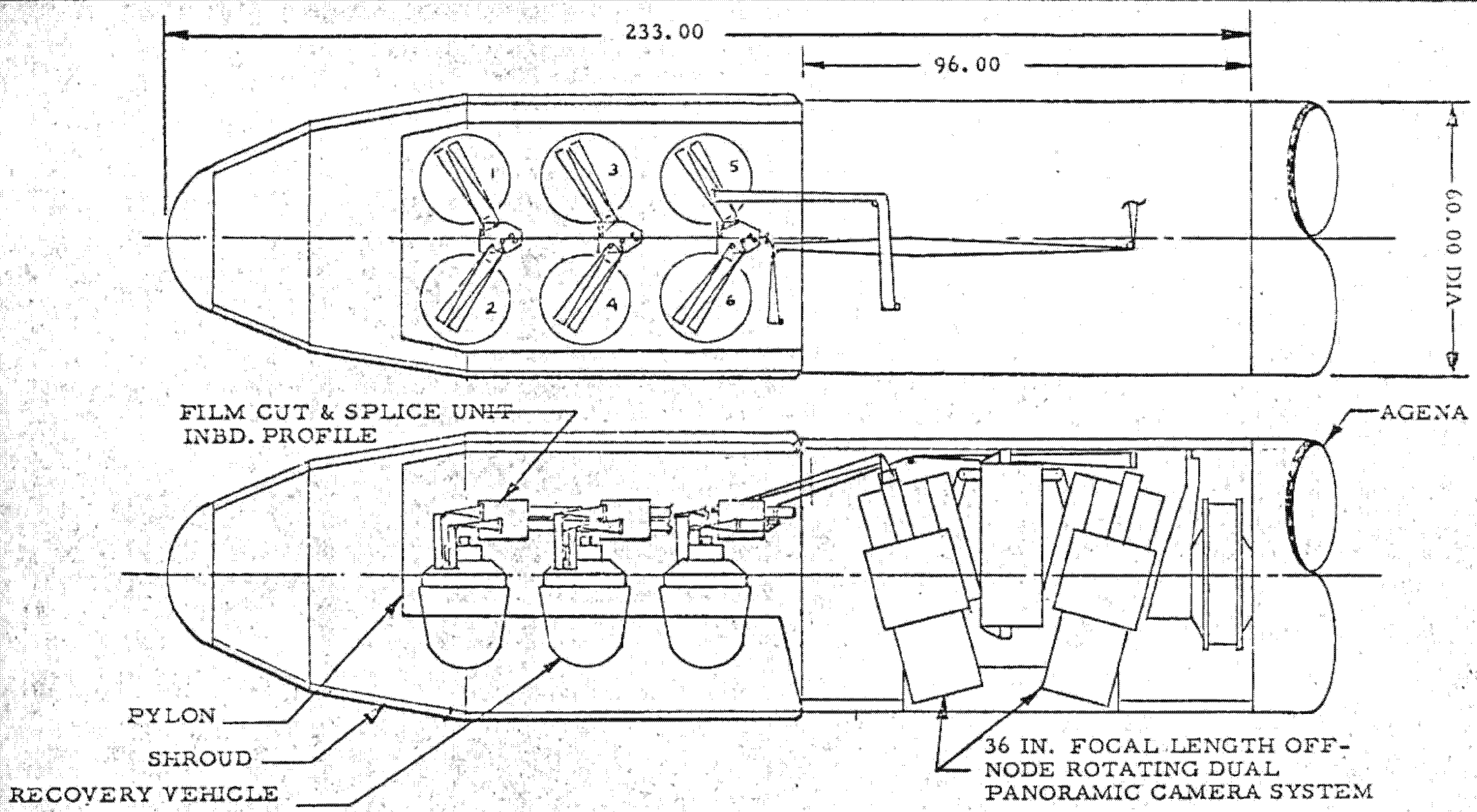

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CHART 11

The Off-Node Rotating (ONR) camera has a 36" focal length F-3 apochromatic petzval lens. It uses the same type size film as the J-3 but it has a 120° scan angle. Although this scan angle is larger than required for the mission, there is a very practical reason for leaving it at that value. Off-node rotation requires the film to travel in the opposite direction from the slit, and, in this case, the linear velocity is 1/2 the velocity of the slit. Therefore, a 120° scan angle allows continuous movement of the film at a steady rate, whereas a smaller scan angle would require that the film start and stop for each cycle. The 2 3/4 ft resolution at nadir from 85 n. m., with a mission average of 3 and 4 ft, corresponds to a 30-day orbit maintenance capability with 16 drag make-up rockets. The system can operate up to 20 days at 80 n. m. and the nadir resolution is estimated at 31 1/2 inches.

- 36" FOCAL LENGTH f/3 APOCHROMATIC PETZVAL LENS
- 70mm 3414 FILM
- 120^{0} SCAN ANGLE
- 2 3/4 FT RESOLUTION AT NADIR FROM 85 n.m., MISSION AVERAGE 3-4 FT

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CHART 12

Camera development paces the program. Lead time to IOC is estimated at 29 mo.

The delta cost is $6.4M non-recurring and slightly over $0.5M per vehicle recurring.

ONR CAMERA COST AND SCHEDULE

- AVAILABLE IN 29 MONTHS
- ADDED COST (COMPARED TO J-3)
  - NON-RECURRING $6.4M
  - RECURRING $8.9M

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VOLUME 4
PART II
PINTO

Early in the study, Fairchild made a presentation to [redacted]. SP-7, suggesting the adaptation of their KA-81 aircraft camera for the Crisis Management Mission. The 2-ft resolution met most of the resolution requirements, and the weight and size were nearly the same as the CORONA payload, so it looked like a promising candidate. A more detailed study of interfaces showed the system to be very compatible with the Agena and all CORONA operational procedures. In addition, [redacted] allowed LMSC to prepare preliminary design drawings of an 8-bucket R/V section. These payload elements together with an Agena spacecraft, an Atlas F booster, and special arrangements for fast count-down, comprise a new system which is similar to CORONA, but specifically designed for the Crisis Management Mission. We have named this system "PINTO", because of its simplicity and low cost.

(b)(3)
(b)(3)

PINTO

A small, simple, state-of-the-art system for crisis management.

* Responsive
* Reliable
* Inexpensive
* Available in 2 years

The heart of the PINTO system is a 48-inch focal length, f/4, refractive apochromatic lens in a panoramic stereo camera which uses 5-inch perforated 3414 film. The camera section is pressurized to about 0.5 psia. A single rotating lens gimbals back and forth between two platens. The film is stationary during exposure and is held flat by a vacuum platen. The stereo angle is 22° and the scan angle is 60°. Successive cycles have 10% in-track overlap. Exposure is through a slit, synchronized with lens rotation, and exposure times are variable from approximately 1/500 to 1/300 sec. by changing the rotational velocity of the lens. Format is 4.5" x 50", and each take-up will hold approximately 1300 ft, or a little over 300 cycles.

In this type of camera, thermal gradients across the lens are important. Fairchild is proposing to incorporate an automatic focus adjustment. We will attempt to achieve adequate thermal control by passive means, but we can, if necessary, resort to slow rotation of the lens during inoperative periods, or, as a last resort, we have adequate power for active heaters around the lens.

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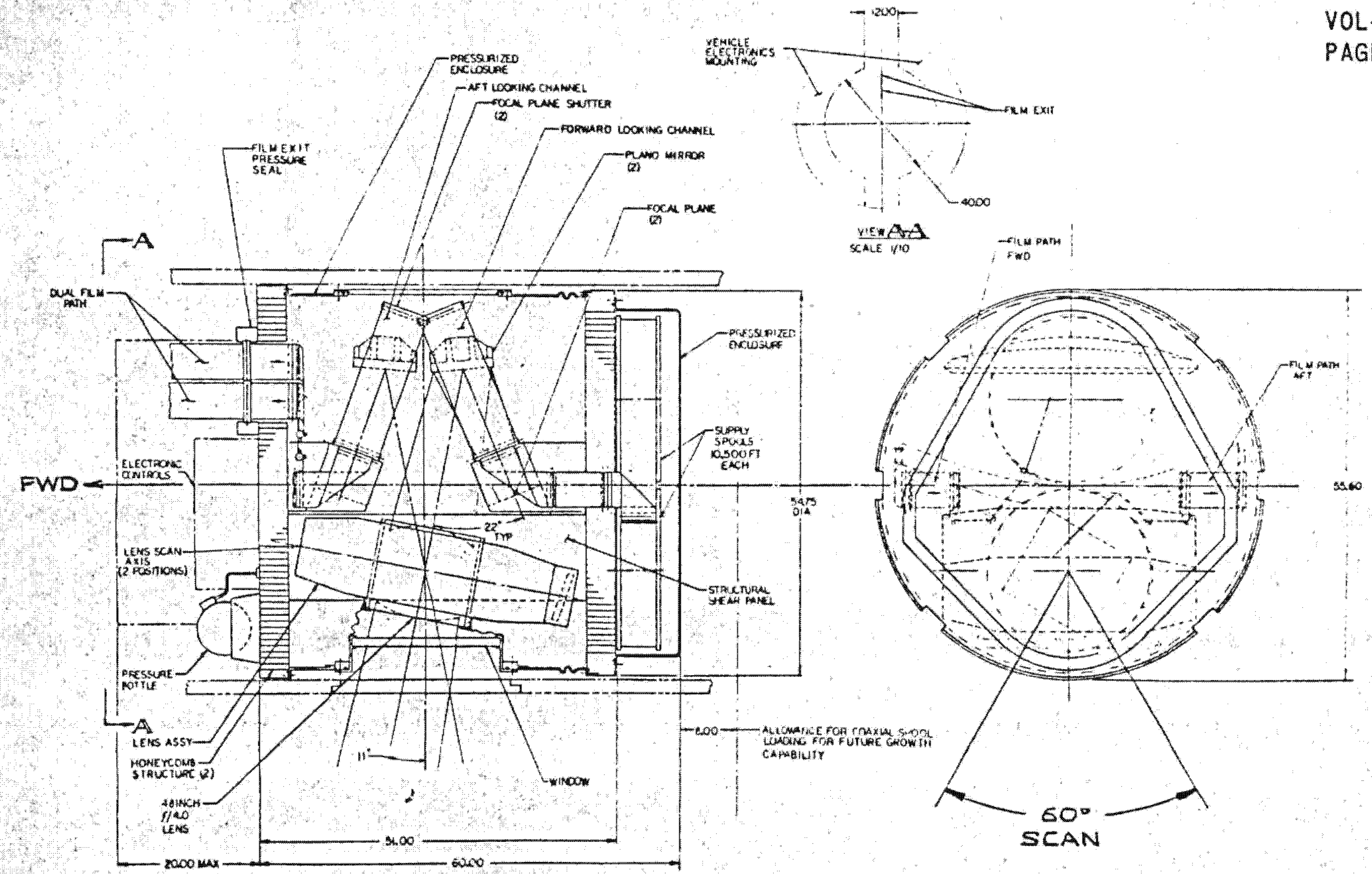

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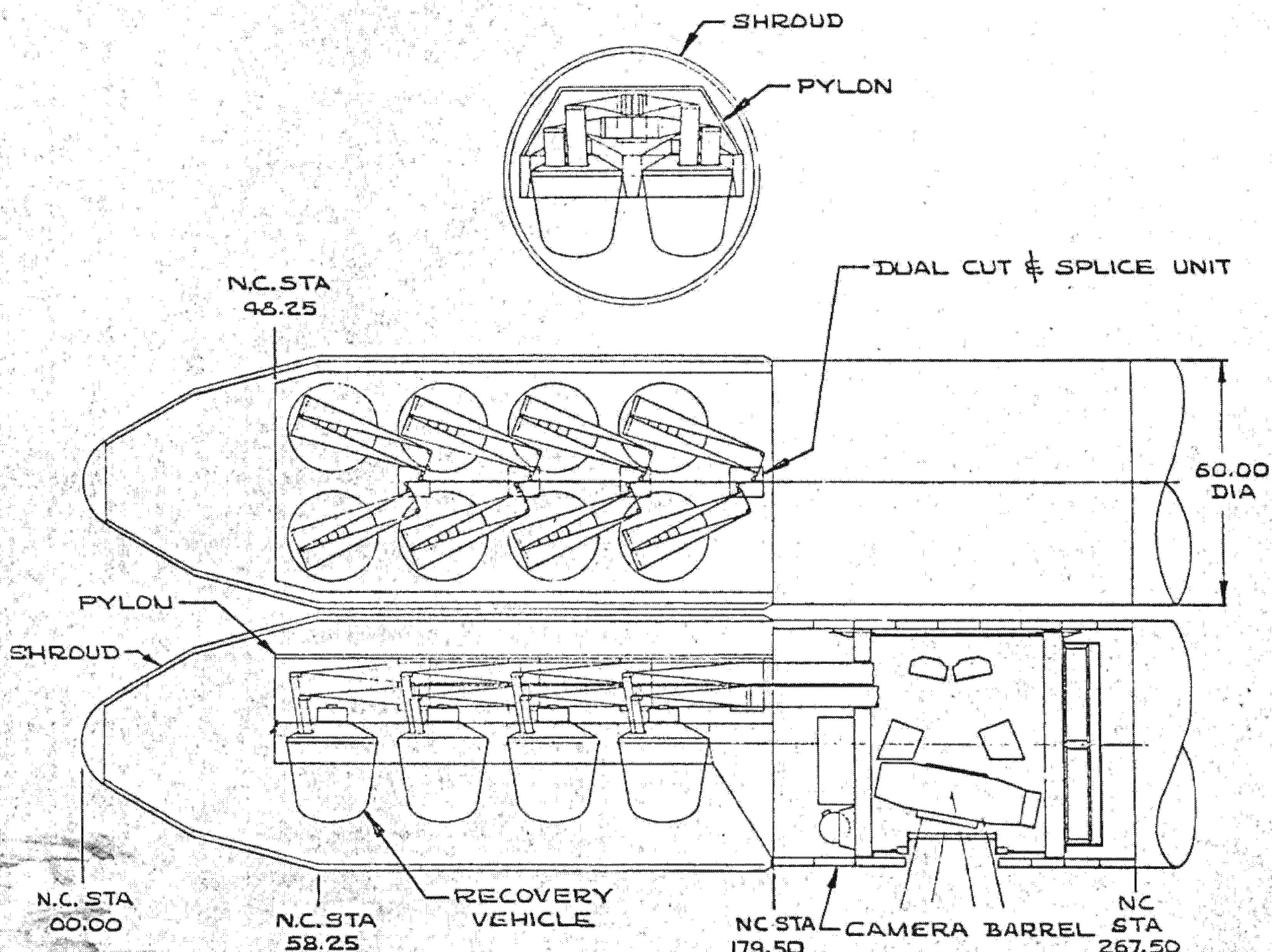
The general arrangement of the front end is very much like the CORONA 6-PACK, but, of course, PINTO has 8 R/V's and better resolution. This configuration is compatible with the Atlas/Agena configuration defined for CORONA.

VEHICLE GENERAL ARRANGEMENT



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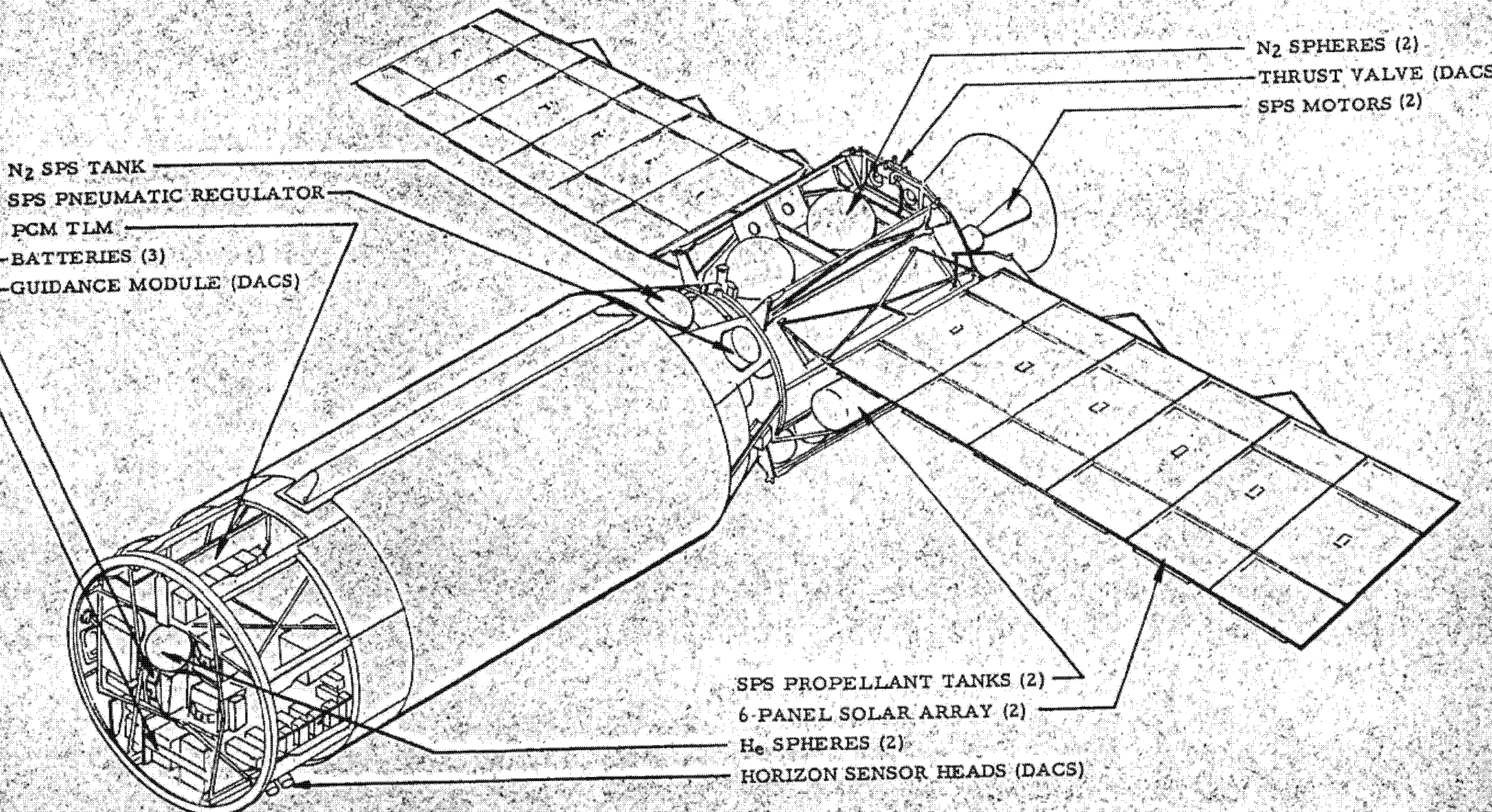
The Agena configuration is similar to the present CORONA space-craft except that the guidance system is replaced by the GAMBIT dual attitude control system and the drag-make-up rockets are replaced by the GAMBIT secondary propulsion system. Other minor changes include extension of the orbital programmer from 20 to 30 days, increased control gas volume, reconfiguration of the solar array from a single assymetric panel to two shorter symmetrical panels, addition of a third type 1-H battery, and incorporation of PCM telemetry in lieu of the present (obsolete) FM/FM.

BASIC AGENA CONFIGURATION



There are no high-risk design efforts in the PINTO proposal. Both the Atlas and the Agena are mature, flight-proven vehicles, and there are no exotic modifications proposed. The camera is the highest-risk development in the PINTO system, but it uses proven technology and a monoscopic version has flown in an aircraft. The recovery vehicle is essentially a 2/3-scale model of the present Mark V R/V. Although qualification testing of the new R/V is fairly expensive, the design risk is low. Existing software can be easily adapted for PINTO

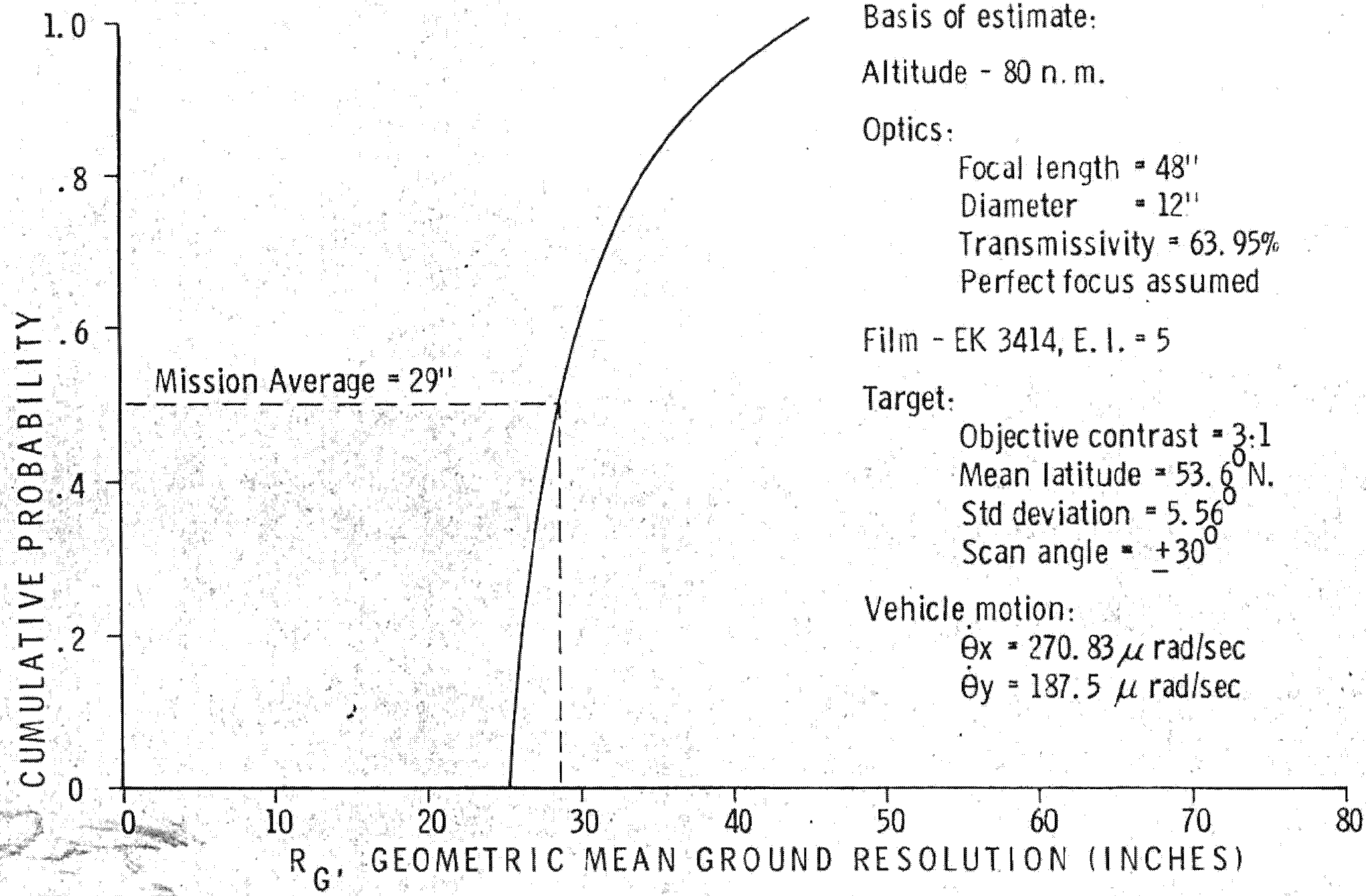
FLIGHT COMPONENTS

BOOSTER	ATLAS-E/F (with structural beef-up) (45 available)
UPPER STAGE	AGENA D (a cross between CORONA and GAMBIT configurations)
CAMERA	48" PANORAMIC STEREO (Adaptation of Fairchild K-81 aircraft camera)
REENTRY VEHICLE	Approximately 2/3-scale version of Mk V (Competitive designs available from GE & LMSC)
COMMAND & CONTROL	Essentially the same as CORONA

NO HIGH-RISK DESIGN EFFORT

This estimate, made by Aerospace Corp., uses a contrast of 3:1 at the target, and includes expected variations in atmospheric conditions, scan angle, time of day, and time of year through a monte carlo technique. This method yields a geometric mean resolution of from 25 to 45 inches, with a mission average (50% cumulative probability) of 29 inches.

PINTO SYSTEM RESOLUTION



Basis of estimate:

Altitude - 80 n. m.

Optics:

Focal length = 48"
Diameter = 12"
Transmissivity = 63.95%
Perfect focus assumed

Film - EK 3414, E. I. = 5

Target:

Objective contrast = 3:1
Mean latitude = 53.6^{0} N.
Std deviation = 5.56^{0}
Scan angle = $\pm 30^{0}$

Vehicle motion:

$\dot{\theta}x$ = 270.83 μ rad/sec
$\dot{\theta}y$ = 187.5 μ rad/sec

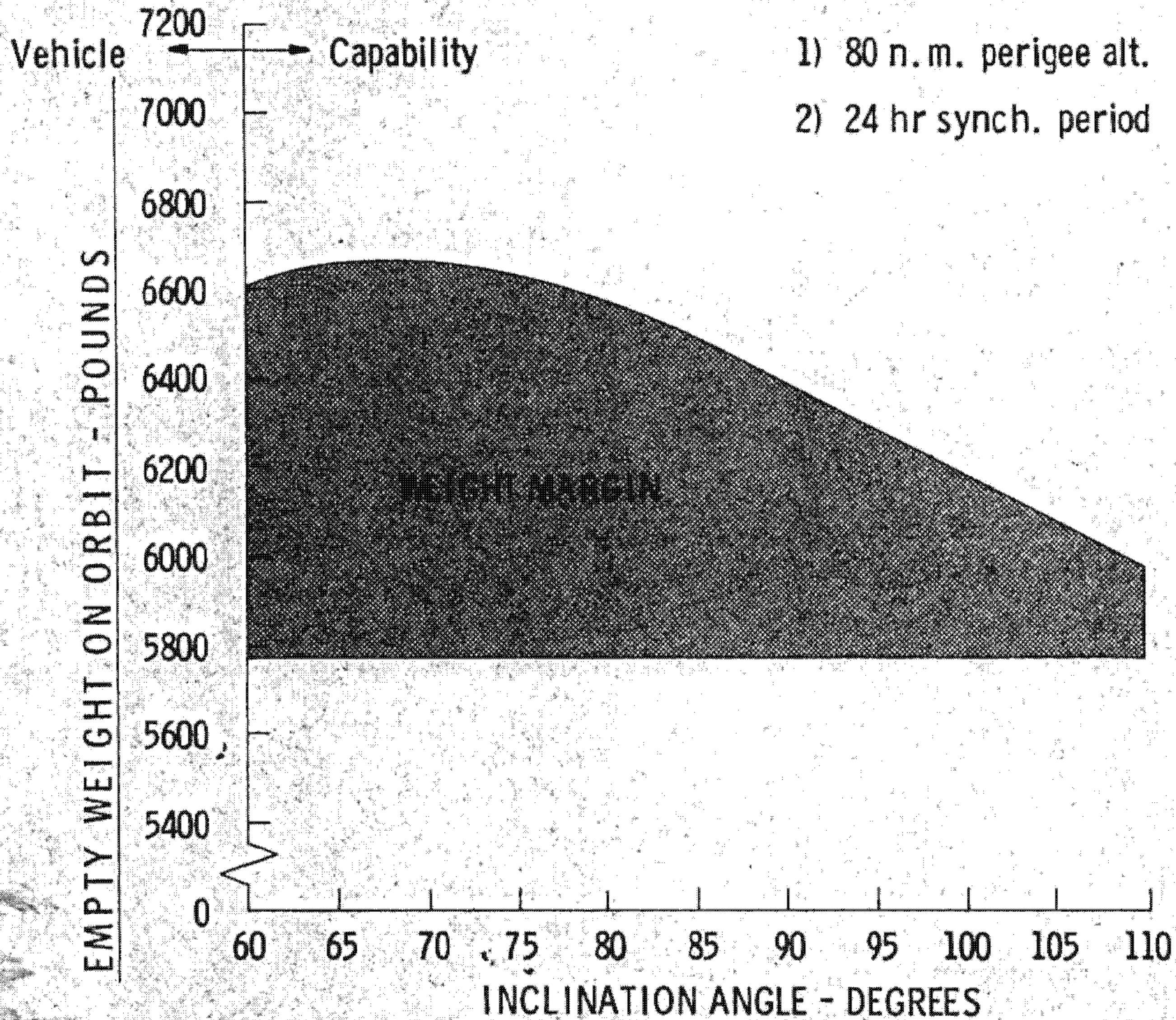
This chart shows the coverage of the system per frame, per bucket, and per mission. Increasing operating altitude to 100 n. m. results in a 25% increase in linear coverage and a 56% increase in area coverage.

AT 80NMi:

- SINGLE FRAME: 7.5 NM IN-TRACK x 100NM CROSS-TRACK
- FRAME-TO-FRAME OVERLAP: 10%
- NUMBER OF FRAMES: 303 Per R/V
  2424 Per Mission
- FORWARD COVERAGE (Net): 675 NM Per Frame
  2045 NM Per R/V
  16,360 NM Per Mission
- AREA COVERAGE (Net): 675 NM^2 Per Frame
  204,500 NM^2 Per R/V
  1,636,000 NM^2 Per Mission

The weight of the orbital vehicle is slightly less than 5800 lbs. This leaves a healthy weight margin for inclination angles from 60° to over 110°. This wide range of inclination angle capability greatly enhances the ability of the system to achieve early coverage of a very wide range of target locations. As a matter of fact, a range of 60° to 92° would be sufficient for complete coverage capability.

ESTIMATED MISSION CAPABILITY (ATLAS-F / AGENA)



This chart shows the range of ground tracks for first orbit. If the system is launched near midnight, then any location to the west of the 60° trace can be accessed during the first few orbits and the data recovered on Rev 9, 10 or 11 (depending on inclination). There is also a degree of flexibility. For example, the Suez Canal can be covered on Rev 1 at an inclination of 100°, on Rev 2 at an inclination of slightly over 80°, or on Rev 3 at an inclination of about 62°. Targets to the east of the 60° trace will have to wait until the latter half of the first day on orbit, and the data can not be retrieved until the second daylight pass over the recovery area.

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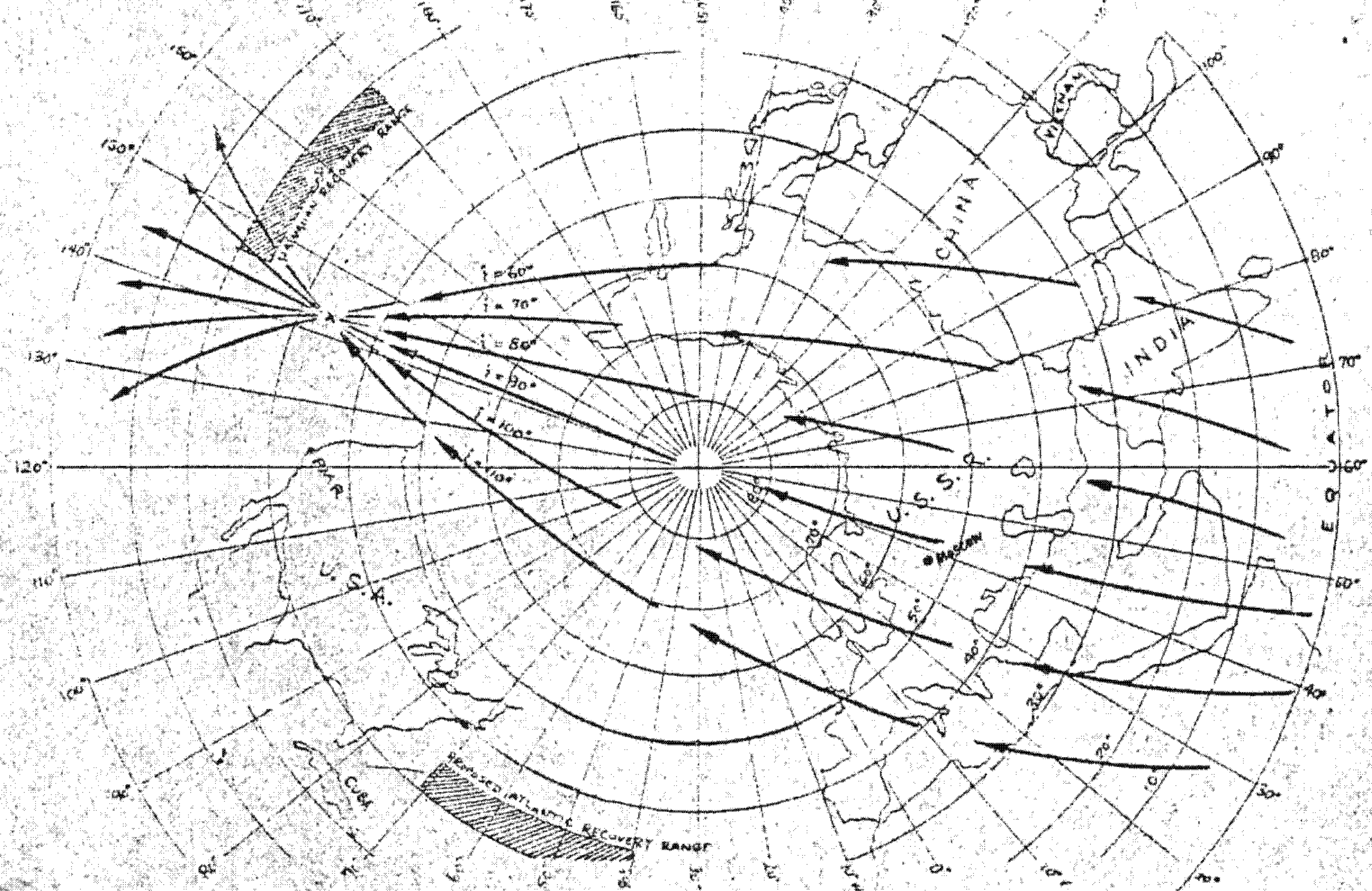
FIRST ORBIT COVER SE TO W LAUNCH

* Note: Range Limit is i = 60°



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If the system is launched near noon with a 90 minute period, there are large gaps in access capability because the traces for the various inclinations all converge at the latitude of the launch base, and the cross-hatched area cannot be covered unless the period is changed so that the ground track will "walk" through the area on subsequent days. Roughly 50% of the area between 15°N. Lat. and 47°N. Lat. is therefore inaccessible as long as a 90 minute period is maintained.

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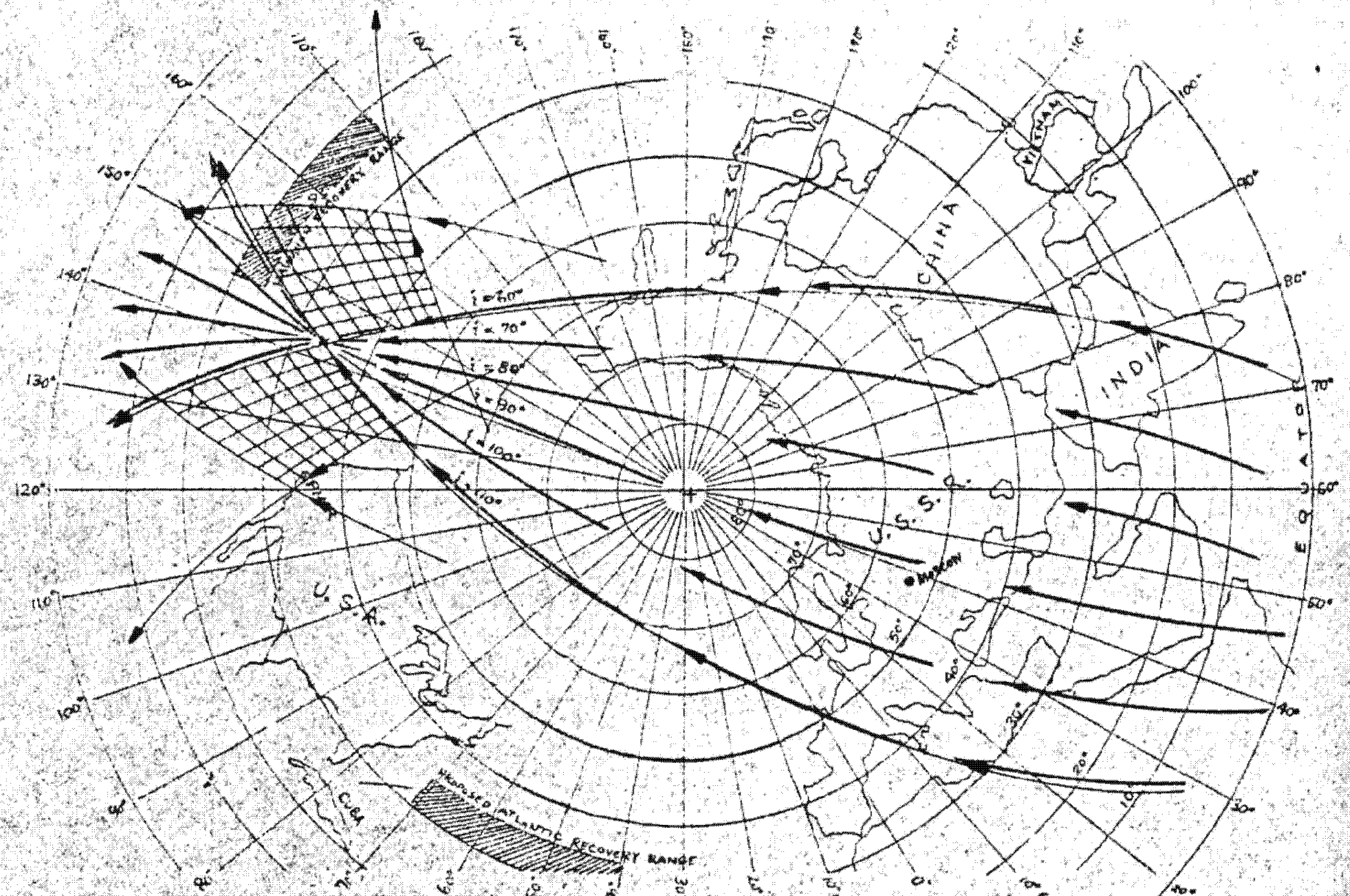
FIRST ORBIT COVER SE TO W LAUNCH

* Note: Range Limit is i = 60°



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The previous two charts show clearly that target access capability is much better with a night launch than a day launch. In addition, the first recovery is 12 hours earlier with a night launch than with a day launch. Furthermore, elimination of the day launch window allows a reduction in launch crew manning.

The size of the launch window is primarily determined by the requirement for adequate daylight over the target. Thermal control is also a consideration, but the effect is usually to either shorten the window or to require the addition of a small amount of thermal tape to modify the paint pattern. Our study has shown that, for night launches, all missions can be accommodated with launches between 2100 and 0100.

LAUNCH WINDOW CONSIDERATIONS

DAY vs NIGHT

* TARGET ACCESS CAPABILITY
* TIME FROM LAUNCH TO FIRST RECOVERY
* LAUNCH CREW MANNING

LAUNCH WINDOWS

* DAYLIGHT AT TARGET
* SPACECRAFT THERMAL CONTROL

These are the steps by which a nominal 90-day pad hold can be achieved. Obviously, if a component failure occurs, it will have to be replaced and retested, so the system may not be in an R-8 hr status 100% of the time.

If major maintenance is required, the back-up vehicle can be put on the pad.

90-DAY PAD HOLD

- NO PROPELLANTS LOADED IN VEHICLE UNTIL START OF COUNT
- ENVIRONMENTAL CONTROL FOR AGENA AND PAYLOAD
- DAILY HEALTH CHECK
- PERIODIC VERIFICATION OF SUBSYSTEMS ON A TIME-PHASED BASIS
- PERIODIC RECHARGING OF THE BATTERIES
- DRY COUNTDOWN EVERY 30 DAYS
- AFTER 90 DAYS:
  - RELOAD CAMERA
  - REPLACE BATTERIES AND PYROS
  - RECALIBRATE
  - REVALIDATE COMPLETE SYSTEM

The ascent trajectory and the orbital program are the two most significant hurdles in achieving an 8-hr launch reaction time. The Atlas F was designed for quick reaction as an ICBM. Even for a space mission, a 2-hr countdown is feasible. Most of the trajectory changes can be handled by the radio guidance software. Only a small number (perhaps two or three) ascent programs will be sufficient for the Atlas.

The Agena requires a larger "library" of programmers (perhaps 15 or 20), but, once installed, the countdown would proceed in pretty much the same manner as the present CORONA system. The use of RF data for vehicle checkout eliminates the physical labor of removing test plugs prior to start of final count.

8 HOUR LAUNCH REACTION TIME

ATLAS

- PREPROGRAMMED ASCENT EVENTS AND RATES (LIBRARY)
- RADIO GUIDANCE SOFTWARE FINALIZED DURING COUNTDOWN

AGENA

- PREPROGRAMMED ORBITAL EVENTS TIMER (LIBRARY)
- NO TEST PLUGS
- MINIMUM USE OF UMBILICAL
- VEHICLE CHECKOUT VIA TELEMETRY WITH COMPUTER EVALUATION OF DATA

The SCF has declared that they could not support Atlantic recoveries with existing resources. A fleet of 7 C-130 aircraft would be required in order to assure 4 aircraft on station during a recovery. The cost of 7 aircraft, including modification to the recovery configuration is estimated to be $27.8M. Operating and maintenance costs would be over $4.6M per year.

Weather conditions are much worse in the Atlantic because of the frequency of frontal activity, and this is also the spawning area for hurricanes.

The Atlantic recovery area would logically extend from Puerto Rico to Bermuda and would have to be about 25° of longitude in the E-W direction. Therefore, the average transit time from recovery to the processing facility in the Washington area would be 4 hours, compared to 1 hr in Hawaii. This eats up half of the 6 hours saved by recovery in the Atlantic.

SAFSP

RECOVERY AREA OPTIONS

ATLANTIC

- REQUIRES A SECOND RECOVERY FORCE
- WEATHER CONDITIONS WORSE THAN HAWAII
- AVERAGE TIME FROM RECOVERY TO PROCESSING FACILITY IS 4 HRS

PACIFIC

- RECOVERY FORCE IN BEING
- NORMALLY GOOD WEATHER
- AVERAGE TIME FROM RECOVERY TO PROCESSING FACILITY IS 1 HR

Processing facilities are available both at Hawaii (OPIC-A) and Washington (NRTSC). I have assumed that both facilities can process 2600 ft of 5-inch film in less than 2 hours, and that expert photo interpreters could be available at either location. I have allowed 3 hours for initial, highest priority PI work and issuance of the initial intelligence report, supplemented by [redacted] of photos from Hawaii if desired. (b)(1) (b)(3)

The net saving in time by Atlantic recovery is only 3 hours. In my opinion, the added cost and risk is not warranted, and the cost of the second recovery force is not included in the system estimates for PINTO.

PACIFIC RECOVERY

* DEVELOP ORIGINAL NEGATIVE AND PRINT INITIAL POSITIVES IN HAWAII (OPC-A)
* FLASH REPORT 6 HRS AFTER RECOVERY WITH ANNOTATED PRINTS OF HIGHEST PRIORITY PHOTOS [redacted] (b)(1) (b)(3)

ATLANTIC RECOVERY

* DEVELOP ORIGINAL NEGATIVE AND PRINT INITIAL POSITIVES AT NRTSC
* FLASH REPORT 9 HRS AFTER RECOVERY

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In addition to having a bird on the pad, ready for launch in 8 hours, we will have a back-up vehicle all checked out and ready to put on the pad. With a two-shift launch crew, we can launch the second PINTO on the same day that the 8th R/V from the first PINTO is recovered. Therefore we can sustain daily coverage and recovery for 16 days.

If economy is more important than sustained coverage, we can reduce to a single shift and launch the second bird in 14 days. The cost reduction would be roughly $3.0 million per year.

PAD TURNAROUND TIME

DOUBLE SHIFT: 8 DAYS

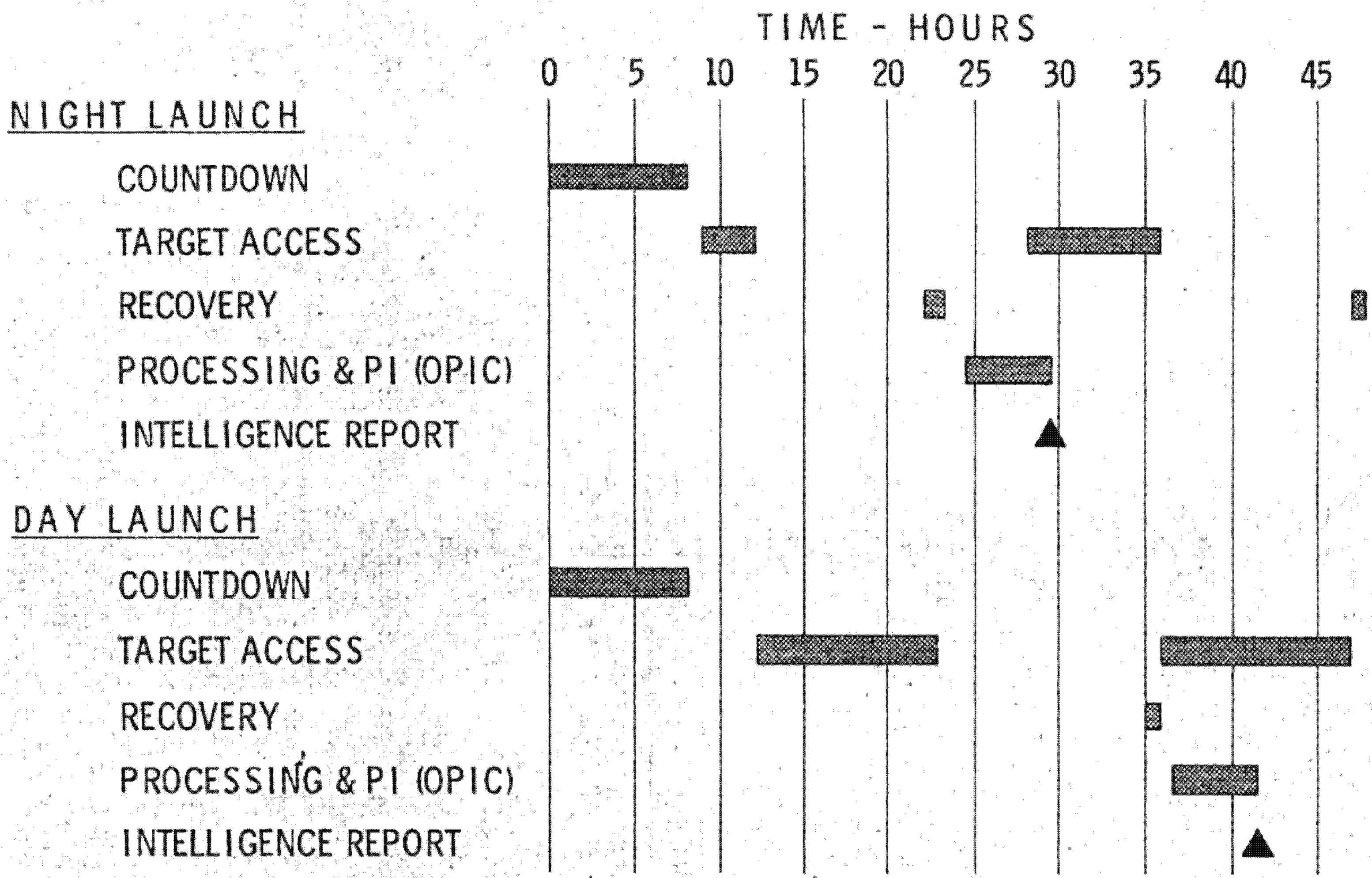
SINGLE SHIFT: 14 DAYS

The countdown will take 8 hours. Initial target access for a night launch will be about 1 hour after launch, and first recovery will be 15 hours after launch (±1 1/2 hours, depending on inclination). Subsequent recoveries can be at 24 hour intervals. Allowing 1/2 hour for recovery, 1 hour for return to Hickam, and 5 hours for processing and initial evaluation, the total time from launch to first intelligence report is 21 1/2 hours.

The cycle is longer for a daytime launch because the first recovery opportunity is nominally rev. 26 instead of 10, or a difference of 12 hours.

SAFSP

PINTO RESPONSE TIME



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Approved for Release: 2022/03/29 C05137580

The Secondary Propulsion System (SPS) provides better flexibility for orbit control than the present CORONA system. It has more than twice the total impulse (84K vs 36K lb-sec), and it has flexibility for varying both the time of firing and the length of the burst. This capability can be used either for precise maintenance of the orbit or for changing it to cover other target areas. If increased area coverage is desired, the perigee altitude can easily be raised to 100 N.M., or even higher.

Take-up capacity is small in comparison to the Mark V, but the typical crisis area only requires a few feet of film. A 100 x 100 N.M. area only uses 15 cycles, and each take-up can hold over 300 cycles. Therefore, additional capacity is available for secondary targets or for accumulating several days photography before recovering a bucket.

PINTO SYSTEM FLEXIBILITY

IN ADDITION TO DAILY COVERAGE OF A CRISIS AREA, PINTO HAS FEATURES WHICH ALLOW OTHER OPERATIONAL MODES:

* CHANGE OF PERIOD / GROUND TRACK
* CHANGE OF PERIGEE ALTITUDE / LATITUDE
* MORE TAKE-UP CAPACITY THAN REQUIRED FOR ONE DAY'S OPERATION OVER CRISIS AREA
* 30-DAY ORBITAL LIFE

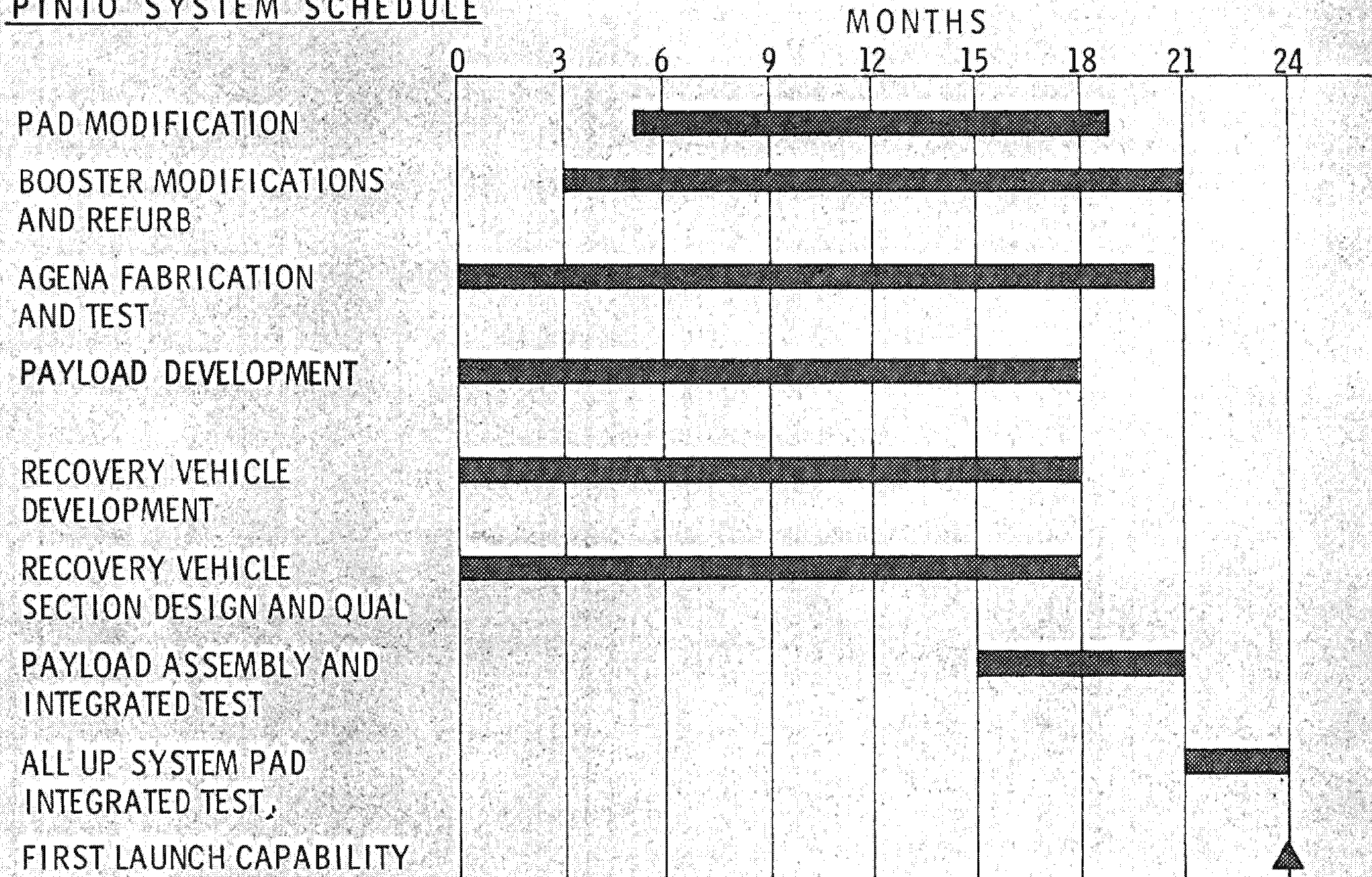
PINTO has resolution as good as HEXAGON, but its capacity is much smaller. However, its rapid response and low cost make it an ideal "junior partner" for HEXAGON. If HEXAGON is delayed or has a failure, PINTO can leap off to cover the high priority targets until HEXAGON gets back in business. Furthermore, HEXAGON does not have a rapid response capability, and no "pipeline" vehicles are planned. Therefore, if urgent search or surveillance requirements come up between scheduled HEXAGON missions, PINTO could easily and quickly fill the gap. The recent requirement for surveillance of Soviet missile sites is a good example.

BACK-UP FOR HEXAGON IN CASES OF:

- LAUNCH DELAY DUE TO HARDWARE PROBLEMS
- ON-ORBIT FAILURE
- HIGH PRIORITY REQUIREMENTS BETWEEN MISSIONS

PINTO system lead-time from Go-Ahead to initial operational capability is 24 months. Subsystem development requires 18 months, which leaves 6 months for system integration tests and checkout of the first flight vehicle.

PINTO SYSTEM SCHEDULE



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This listing is provided to avoid confusion. It includes all of the features which we feel are necessary to provide a cost-effective system for Crisis Management.

There are some items which could be cut out if a "bare-bones" system is desired. For example, we could use 16 solid DMU rockets in lieu of the SPS and save over $100K per vehicle. We could stick with the 20-day Agena configuration and save another $100K per vehicle. We could restrict ourselves to a single-shift launch crew and give up responsiveness, especially the capability to recover from component replacements or to launch the back-up bird in a hurry. The net saving would be about $3 million per year.

I do not recommend any of these reductions.

PINTO CONFIGURATION FOR COSTING

- 22" LMSC R/V, 8 PER VEHICLE
- AIRCHILD 48" PAN CAMERA, STEREO ONLY
- 30-DAY AGENA
  - Liquid SPS
  - Dual Attitude Control System
  - PCM Telemetry
  - CORONA Command System & Software
  - Programmer "Library"
- ATLAS F BOOSTER
  - Structural Beef-up
  - GE Radio Guidance
- LAUNCH OPERATIONS
  - 90-Day Pad Hold
  - 8-Hour Countdown
  - 8-Day Launch Cycle for Back-up Vehicle
  - Pacific Recovery

SAFSP

PINTO COST ESTIMATE - 1 MAY 71 GO-AHEAD

(Includes 15% Fee)

	FY 71	FY 72	FY 73	FY 74	FY 75	FY 76	FY 77	Total
Non-Recurring								
Satellite Vehicle	2.800	21.200	11.500					35.500
Booster	-0-	.500	.500					1.000
Launch Facility	-0-	1.500	2.000					3.500
Sub-Total	2.800	23.200	14.000					40.000
Hardware								
Satellite Vehicle	2.500	46.120	44.660	56.940	44.970	45.180	45.800	286.170
Booster	-0-	6.450	4.800	5.250	4.800	5.250	4.800	31.350
Sub-Total	2.500	52.570	49.460	62.190	49.770	50.430	50.600	317.520
Launch Support								
Satellite Vehicle		-0-	2.500	6.000	6.000	6.000	6.000	26.500
Booster		-0-	1.700	4.000	4.000	4.000	4.000	17.700
Support Services		.300	.300	.300	.300	.200	.200	1.600
Sub-Total		.300	4.500	10.300	10.300	10.200	10.200	45.800
Total for Continuing Program. Work in Process for FY 78 & on.	5.300	76.070	67.960	72.490	60.070	60.630	60.800	403.320
Net Funding Req'd - 17 Vehicles thru FY 77	5.300	76.070	67.960	72.135	57.710	10.200	10.200	299.795

AVERAGE RECURRING UNIT COST $15.282

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A 10-bucket R/V section may be feasible. However, my confidence in the 8-bucket configuration is much higher than for the 10-bucket at this point.

A Mark V R/V section may be desired for the alternate mission suggested for HEXAGON back-up.

In a couple of years, film read-out technology may have progressed to the stage where it could be applied to the PINTO camera and still meet resolution requirements. There is ample room to increase the film supply, and longer orbital life is feasible.

PINTO GROWTH POTENTIAL

- 10-BUCKET R/V SECTION
- 2 OR 3-BUCKET MARK V R/V SECTION
- FILM READOUT