[redacted]

CORONA
TECHNICAL
INFORMATION

VOLUME 1

INTRODUCTION

INTRODUCTION

HISTORY

1954

When the U-2 High Altitude Photographic Reconnaissance Aircraft was under development, it was anticipated that the Soviets would be able to counter with a surface-to-air missile within 1 to 1½ years. This was an overestimation since a U-2 was not destroyed until 1960.

March 1958

Awareness of the U-2 vulnerability and the growing concern over the failures in the SAMOS Program prompted the CIA to begin exploring the possibility of employing a recoverable capsule to return film from an orbiting reconnaissance satellite.

15 April 1958

The White House approved the development of a camera and recoverable capsule, thus marking the beginning of the CORONA Reconnaissance Program. Simultaneously, the SENTRY Program was cancelled.

19 August 1960

The first film recovered from orbit was obtained by an air catch. The camera was a C model built by Fairchild while the lens was fabricated by Itek. It was a single, vertical panoramic camera and returned photography with a ground resolution of approximately 25 feet. The orbital life of the photographic mission was 1 day. Ten of these cameras were launched with one successful recovery.

7 December 1960

The second mission launched that returned usable film employed a C′ camera which had minor mechanical improvement. The orbital life of this photographic mission was 3 days. A total of 10 of these cameras were launched; film was recovered from 4.

30 August 1961

The first C''' camera launched returned usable film. This camera, built by Itek, employed an improved lens and the camera supported the film with rails rather than by a platen. The instrument had the same basic characteristics; it was a single, vertical-looking, panoramic, fixed slit/filter camera. These missions were 3 days long and a total of six cameras were launched with four returning usable film.

27 February 1962

The first stereo panoramic cameras, designated Mural (M) and built by Itek, were essentially two C''' cameras mounted at a 30-degree convergence angle. The useful mission lifetime was usually 4 to 5 days. A total of 26 units were launched with 20 returning usable film.

24 August 1963

The J-1 series of CORONA cameras was basically configured like the M units but it returned twice the coverage by using two recovery vehicles. The ground resolution was generally 10 feet, and the useful mission lifetime was 4 to 5 days for each mission segment. By the end of 1969, 52 systems (total of series) were launched with all but three returning usable film.

15 September 1967

This date marked the launch of the improved CORONA camera system, J-3. Substantial improvements afforded additional photographic flexibility through a multiple exposure/filtration mechanism and increased dynamic stability due to constant rotation of the instrument. The design goal of 7-foot ground resolution has been achieved with some photographic recording of ground resolved distances of 5 feet.

ANECDOTES

In the beginning of 1959, the first of the Discoverer series, an Agena with no payload, aborted on the launch pad. Due to a vehicle sneak circuit, the separation retro rockets and explosive bolts fired when a hydraulic motor was exercised at T-60 minutes. Initiation ceremonies for the program were thus celebrated with a brilliant pyrotechnic display.

The second Agena (Discoverer I) achieved orbit in later February, although in radio silence. Speculation was that the protective nose cone over the antennas was ejected just before the Agena firing; such that the Agena then rammed into the nose cone, damaging the antennas. Orbit was confirmed by radar skin-track.

The third Agena launched a biomedical purpose capsule (Discoverer II) housing a life support cell. Four "mechanical mice" consisting of transitorized multivibrators were installed to give a T/M readout. This capsule achieved orbit in April 1959, but due to an incorrect setting of a timing device in the Agena, it was ejected within hours over the North Pole and came down in the snow near Spitzbergen, Norway. Opinion was that the recovery functions occurred; but the capsule was never retrieved — by the United States team. A few years later, the movie, "Ice Station Zebra," was enjoyed by the box office public.

The next go was a more ambitious biomedical experiment because the life support cell carried four live black mice. Just before the first try at launch, telemetry indicated a lack of mouse activity. At first it was thought that the little fellas were asleep, so a cherrypicker was sent up with a technician who banged on the side of the vehicle in an attempt to wake them up. Catcalls and meows were used to no avail. It was then found that the mouse cage had been sprayed with krylon to make it smooth; but that the krylon had chipped off the screen, the mice had found it tasty — and that was that. Several days later, the second try at this launch was almost aborted when the capsule life-cell humidity sensor suddenly indicated 100 percent RH, out-of-band on T/M. The panic button was pushed and trouble-shooters were dispatched. They soon

realized that since the humidity sensor was located directly under the cage with the vehicle in a verticle position, it reacted in accordance with nature when a mouse decided to do his thing. But after a while the wetness dried out, all was forgiven and the vehicle was launched — into a 100 percent moisture environment (the Pacific Ocean).

This same payload was also distinguished by a unique fairing attachment. It was desired to develop a system whereby the payload doors could be hidden from inquisitive eyes during pad time. The fairings were covered with paper, under which were two piano wires tipped with ping-pong balls. It was supposed that the wind caused by lift-off would blow the ping-pong balls to the rear and the wire would tear the paper off, exposing the fairing. The automatic strip-away system was tested by mounting a test fairing on a sports car and the unit was driven up and down the Bayshore Freeway at 90 miles per hour. For some reason this activity attracted attention, including that of the local Gendarmes, who ticketed the driver. However, the test data indicated a "go" situation, and at 2 a.m. on a foggy cold morning under a blaze of searchlights, paper, piano wire, and ping-pong balls were attached to a million dollar satellite. But because test conditions do not always perfectly simulate operational conditions, the paper never did come off the fairing during lift-off. For all we know, the ping-pong balls are still in orbit.

During this initial period of unsuccessful missions, "witch hunts" were conducted to isolate and remedy certain problems. One such problem was to devise a cooler for the fairing interface which was heating up during ascent. A water receptacle was installed around the leading edge of the fairing, the idea being that the water would boil during ascent and the steam would carry away the heat. In order to contain the water and prevent sloshing, something absorbent, soft, and easy to work with was required. Kotex fulfilled these requirements. The reservoir was to be filled using a large hypodermic needle poked through the small holes in the water receptacle, and then each hole was to be sealed with wax. This unit became part of a display rigged for some visiting VIP's so as to satisfy their desire to come in contact with the hardware. Standing around the display, the moment came for the hypodermic needle loading action. The water was squirted in through one hole and squirted right out again through another hole, to the embarrassed surprise of a drenched VIP.

At least he did realize intimate contact with the hardware; and as it turned out, the Kotex and wax cooling system actually did work in flight.

Although Discoverer XIV is credited as being the first successful mission, Discoverer X actually had launch and payload recovery previously. Lift-off was perfect, but then the Thor began to fishtail and was destructed at 10,000 feet. The payload came down about a mile from Pad 5 and was located by helicopter, which landed payload people to guard it and render the pyrotechnics safe. Recovery was then made inauspiciously by Jeep. Something of a first.

In order to test the SRV sink valve under in-house conditions, an old four-legged tub was brought into the test facility. The sink valve, a metal plug filled with compressed salt, is designed to dissolve at a controlled rate. To provide sufficient sea water of proper salinity for operation "test tub," repeated trips to Half Moon Bay in a pick-up truck with a 50 gallon drum were required. The sea water was at first conveniently loaded from a wooden dock extending into the bay. But soon the owner put an end to this wholesale pilfering of sea water by chasing the thieves the hell out. Not to be frustrated in their mission, the salt water acquisition team courageously obtained access via a steep and twisting natural path along the cliffs of the bay. Carrying a 50 gallon drum of sea water up this path required spirit and dedication. During one of the many decents, the barrel carrier slipped and tumbled head over heels into the sea. This is a fine example of how project people sometimes throw themselves into their work.

Discoverer XIII is famous. It was a diagnostic capsule and it worked all the way. This capsule, picked up from the ocean on 11 August 1960, now reposes in the Smithsonian Institute, Washington, D.C., as the first object to be recovered from orbit. A principal factor in this success was the inauguration (in the previous mission) of the cold-gas spin and despin system. Earlier capsules on their re-entry from orbit were being destroyed by explosions of the small rockets used for spin and despin. Pictures of the lift-off from Vandenberg AFB on the 10th, the recovery ship, Haiti Victory, and the capsule in the Pacific Ocean 330 miles northwest of Honolulu, as well as close-ups of the capsule with Air Force personnel were published in the Illustrated London News, page 314, on the 20th.

Well into the program of evolving systems, an SRV recovery (mission 1005) was made that was a no-no. In June of 1964, a full bucket descended gracefully under its colorful canopy against the soft blue sky of northern South America. Unnoticed, the SRV crash landed on Guaramito Farm No. 35 owned by Pablo García. For over a month the payload lay neglected on the nearly deserted mountainous terrain of La Fría, Táchira, Venezuela, 2 kilometers from the Columbian border. Then, on July 7, 14 year old Eladio Becerra and 40 year old Gabino Mora stumbled upon the mysterious object. Excited by the glimmering gold, the two campesinos reported the treasure to their boss, Facundo Albarracin, who immediately got the thing moved 100 meters to his own property, Farm No. 36; then sent out word in an attempt to sell it. But the demand for space vehicles in Táchira is limited. He could not even get a worthwhile offer to smuggle it to Columbia. Intent on benefiting from this heavenly gift, the campesino and his family let loose on the SRV with hammer and machéte. La señora cut up the parachute and made it into clothing. Facundo claimed its nylon shrouds and fashioned some fine fancy reins for his horse. Odd pieces from the radio transmitter and take-up assembly became kitchen utensils and wonderful toys for the children. Word finally got around to the city, and people were making the scene to take a look. One of these, Leonardo Davila, a commercial photographer, telephoned the U.S. Embassy in Caracas on 1 August to report that he had photographed a fallen space satellite. The remains of the bucket were carried out of its locale on foot by the campesinos, taken over by the Venezuelan Defense Ministry and flown to Caracas. The local newspapers had a hay day. Diario Católico, San Cristóbal, for example, along with a lengthly report, published three pictures of the SRV revealing the rolls of film. There was great interest in the three curious "mascots": two quarters and a buffalo nickel. The most common hypothesis was that the thing was a Ranger probe from Cape Kennedy gone astray. The Daily Journal staff got a little playful when they wrote a sequel to Longfellow's verse:

> I shot an arrow into the air,
> It fell to earth, I know not where.
>
> Cape Kennedy signalled: "Where is it at you are?"
> Responded the rocket: "La Fria, Táchira."

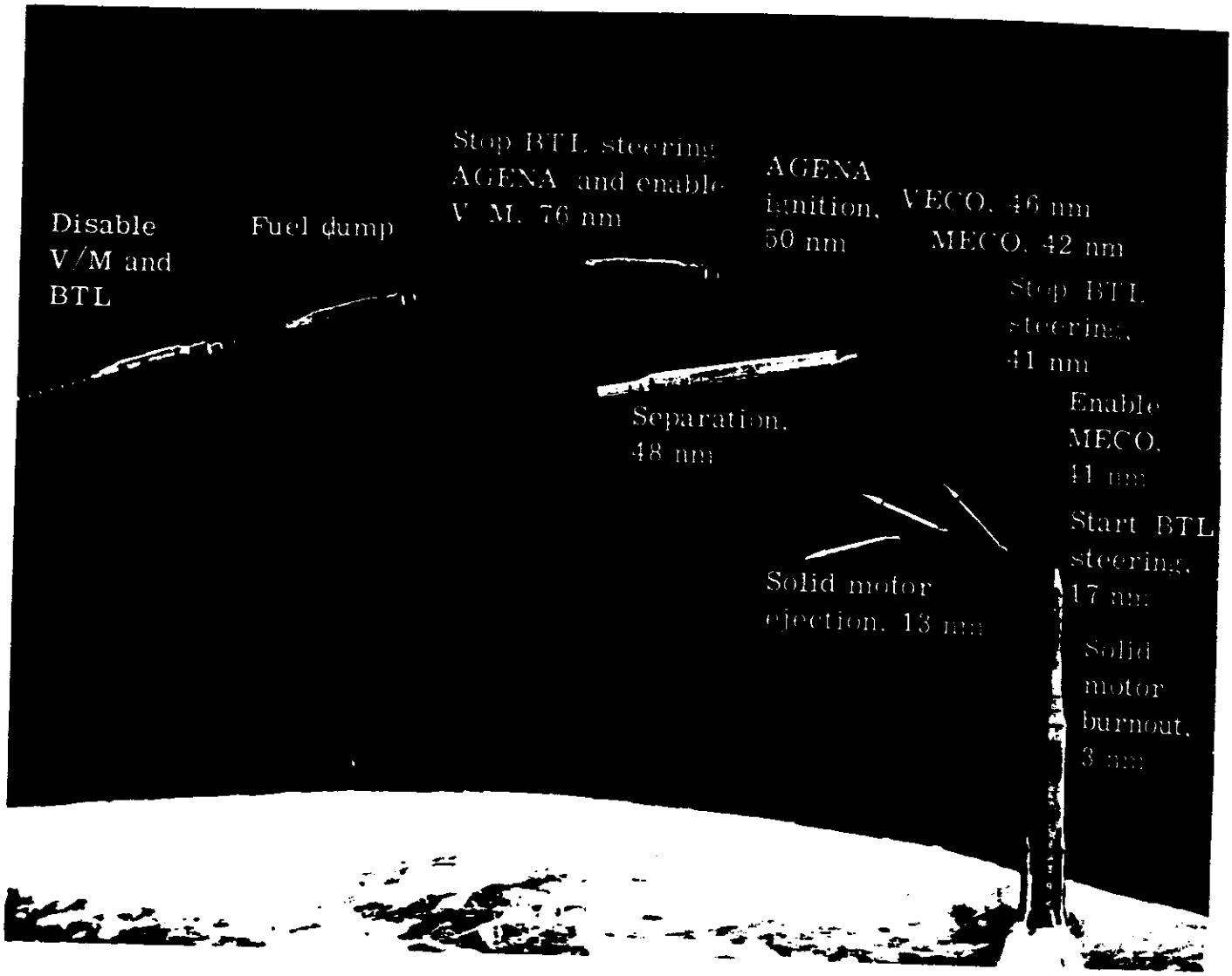
The Venezuelan government finally sold the crumpled specimen, along with all the fragments that could be collected, to the USAF, who quietly dismissed public attention from the unimportant NASA scientific instrumentation.

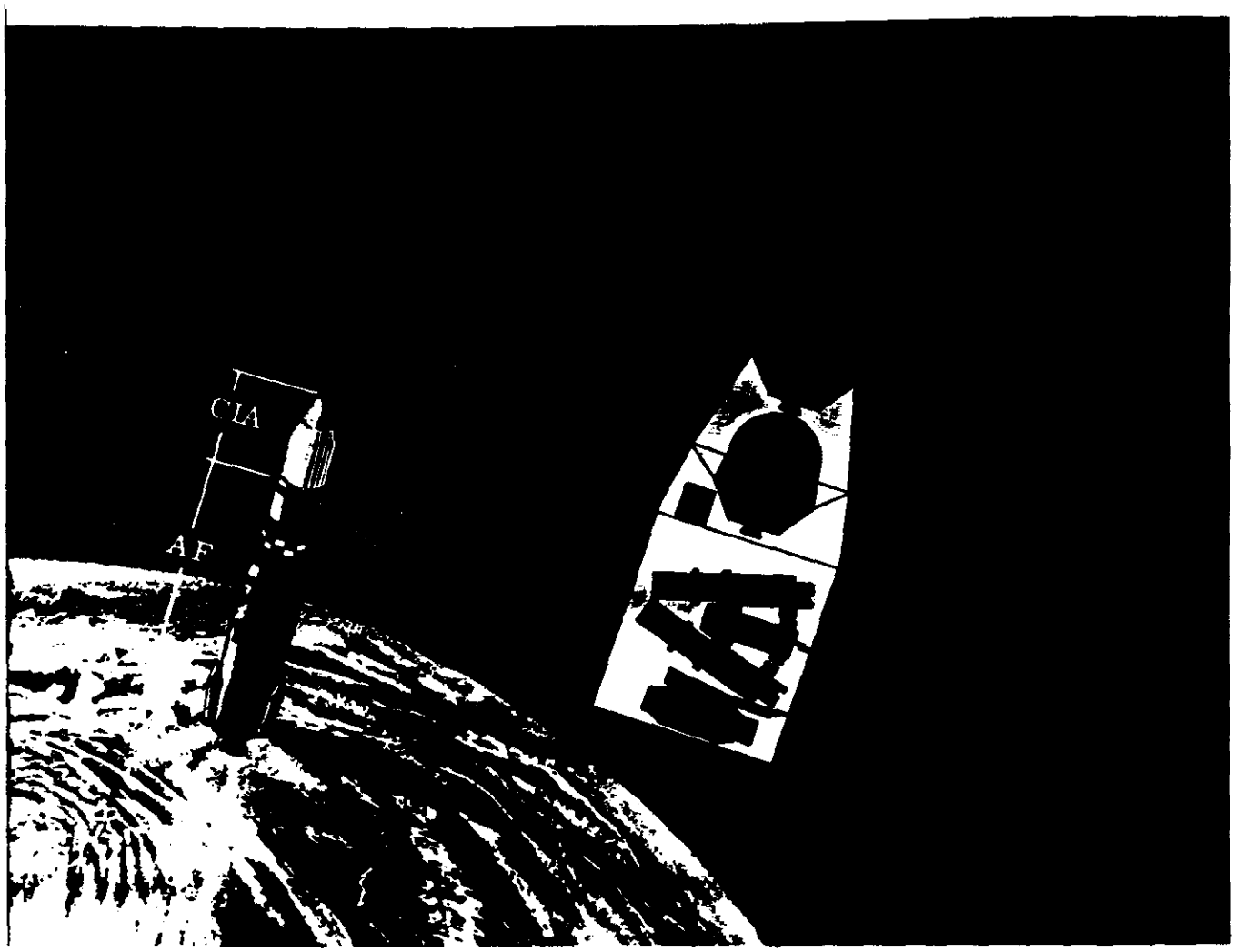
COMPUTER PROGRAM DEFINITIONS

CALICO	Determines camera operations and displays operations information.
CACTUS	Advance listing of target locations for photointerpretation.
CLICK	The original GE target acquisition program developed for ADIC. Predecessor to CACTUS/CALICO.
COMET	Better preflight orbit selections.
CORONA	[redacted]
LETHAL	The digital storage register command generation software used in the satellite control facility for automatic command and control.

[redacted]

ASCENT SEQUENCE

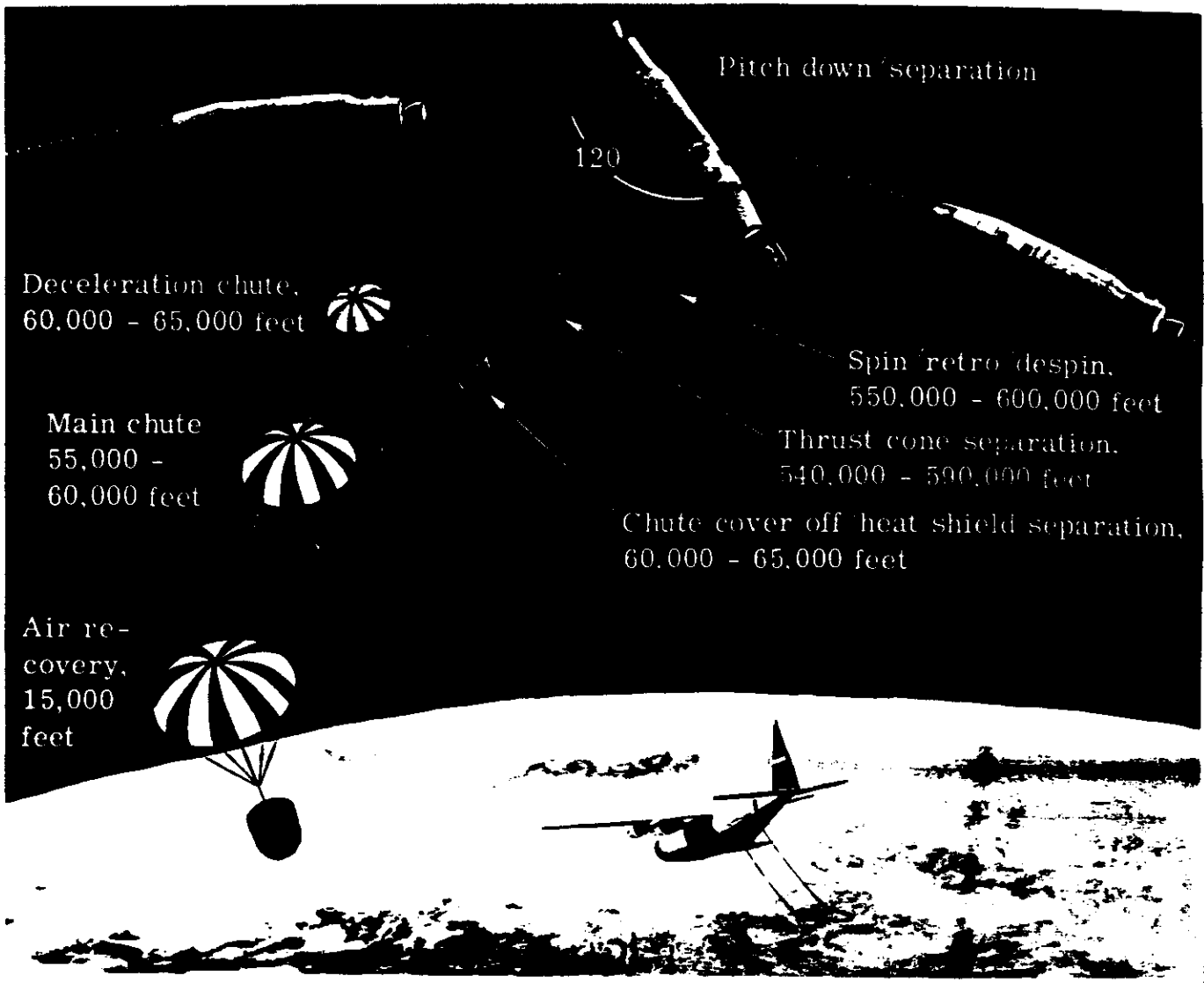




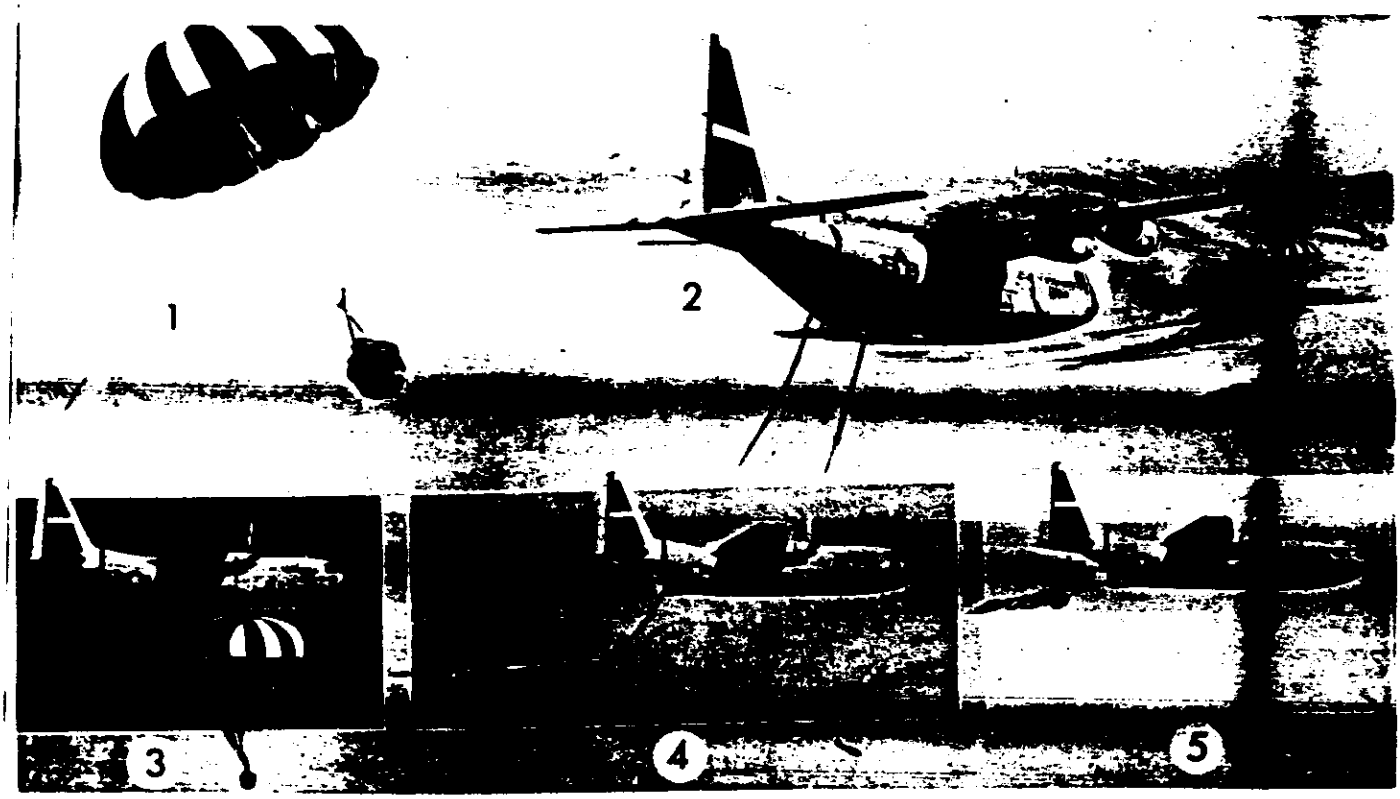
10M sq. nm coverage thin base film
15M sq. nm coverage ultra-thin base film
Mission life — 15 to 18 days dual recovery
Altitude — 80 to 100 nm
Features — selectable filter (2 per camera)
Coverage based on 100 nm mean altitude

[redacted]

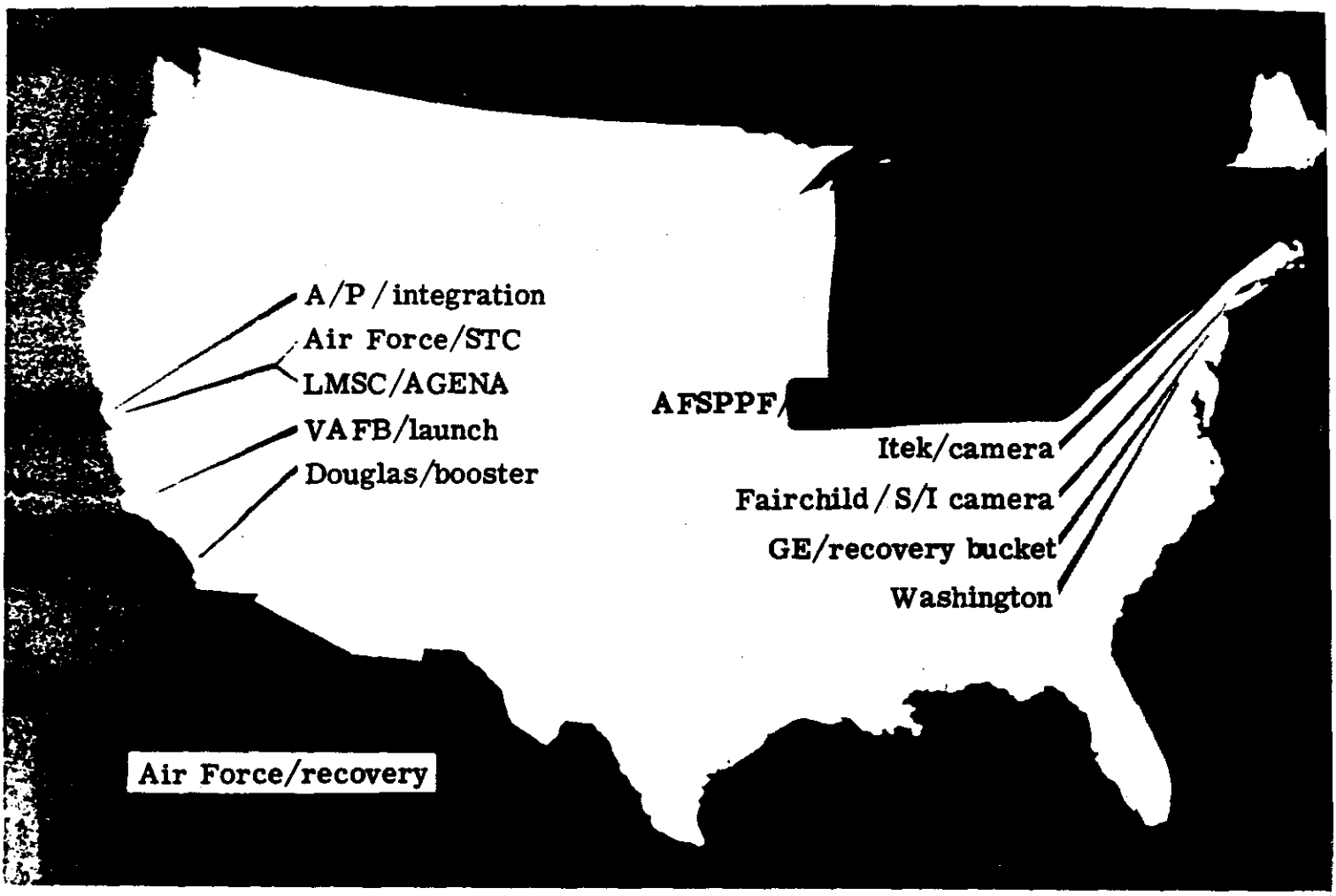
RECOVERY SEQUENCE



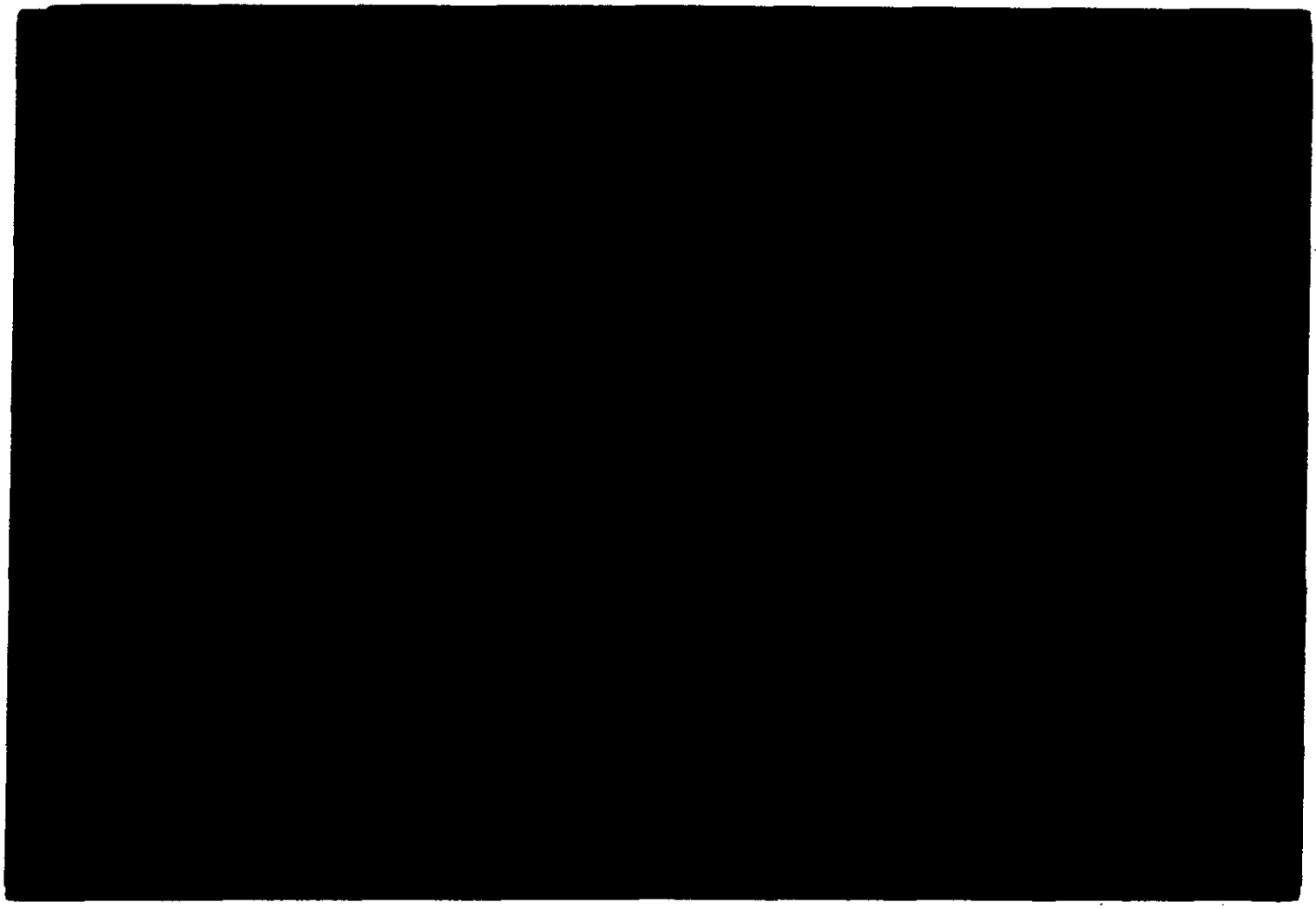
AERIAL RECOVERY OF CAPSULE



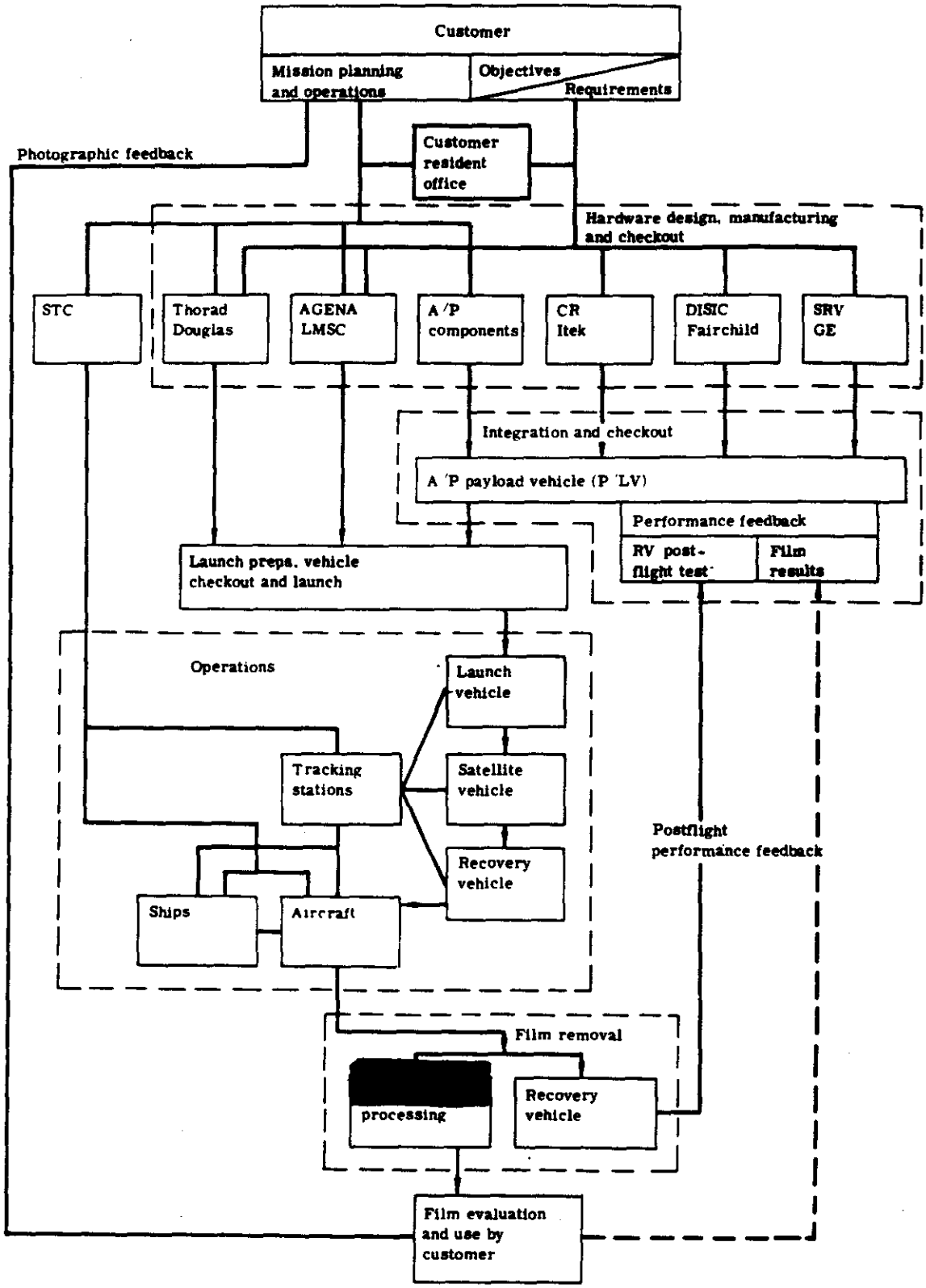
FACILITY LOCATIONS



TRACKING STATIONS



COMPOSITE ORGANIZATION CHART AND HARDWARE FLOW



AVERAGE SHIPMENT, TRANSFER, AND PROCESSING TIME OF CORONA MATERIAL (PRIORITY 1 DUPES ONLY)

Event	Average Time Required, hours
Air catch to Hawaii	1½
Transfer to Air Force Jet Transport at Hickham AFB	1
Hickham AFB to Travis AFB	5
Delay — Travis AFB — crew change*	1
Travis [redacted]	5
[redacted]	1½
In [redacted] — out	77
[redacted] to Andrews AFB — OSA Project A/C	3
Andrews AFB to NPIC	1
Total	96

*When defilming is accomplished at AP, add 3 additional hours.

EVOLUTION

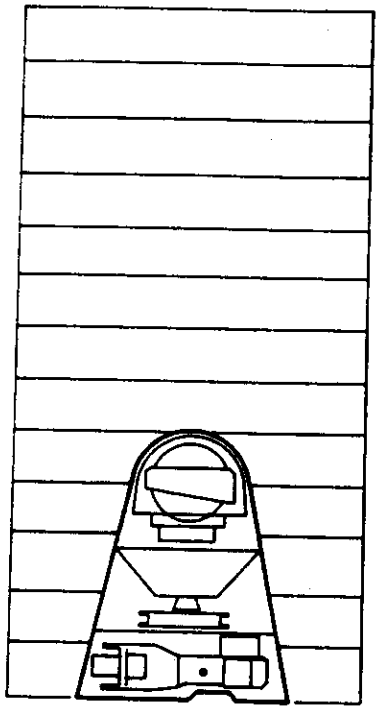
EVOLUTION OF CORONA SYSTEM CHARACTERISTICS

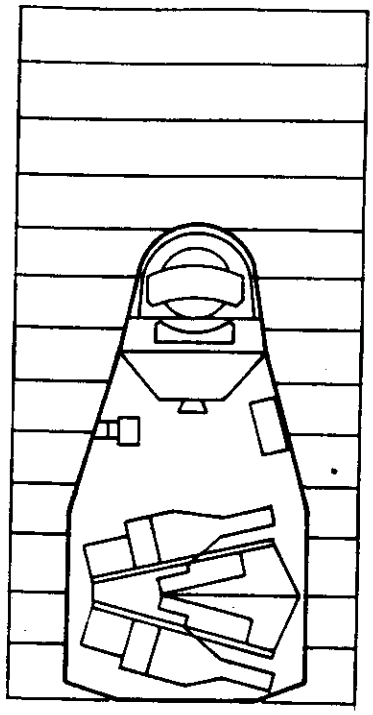
	C	C′	C‴	M	J1	J3
Camera manufacturer	Fairchild	Fairchild	Itek	Itek	Itek	Itek
Units built	10	10	6	26	52	17
Lens manufacturer	Itek	Itek	Itek	Itek	Itek	Itek
Design type	Tessar, 24-inch, f/5.0	Tessar, 24-inch, f/5.0	Petzval, 24-inch, f/3.5	Petzval, 24-inch, f/3.5	Petzval, 24-inch, f/3.5	Petzval, 24-inch, f/3.5
Camera type	70° pan, vertical, recipro-cating	70° pan, vertical, recipro-cating	70° pan, vertical, recipro-cating	70° pan, 30° stereo, recipro-cating	70° pan, 30° stereo, recipro-cating	70° pan, 30° stereo, rotating
Exposure control	Fixed	Fixed	Fixed	Fixed	Fixed	(4) selectable
Filter control	Fixed	Fixed	Fixed	Fixed	Fixed	(2) selectable
Primary film/base	1213/ acetate	1221/ polyester	4404/ polyester	4404/ polyester	3404/ polyester	3404;3414 polyester
Recovery vehicles	1	1	1	1	2	2
S/I subsystem	0/0	0/1	0/1	1/1	2/2	2/1
Time period	1959-1960	1960-1961	1961-1962	1962-1963	1964-1969	1967-1971

[redacted]

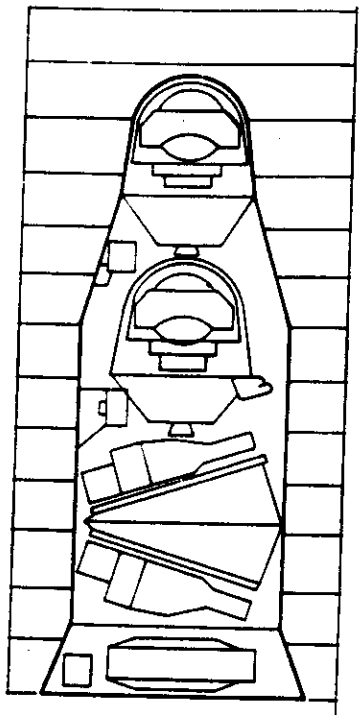
C, C′, C‴

M

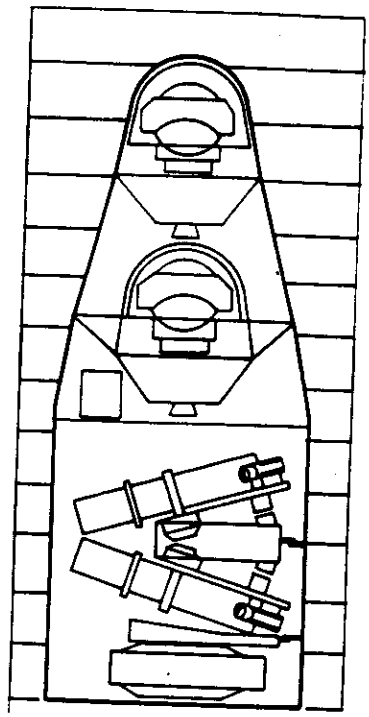




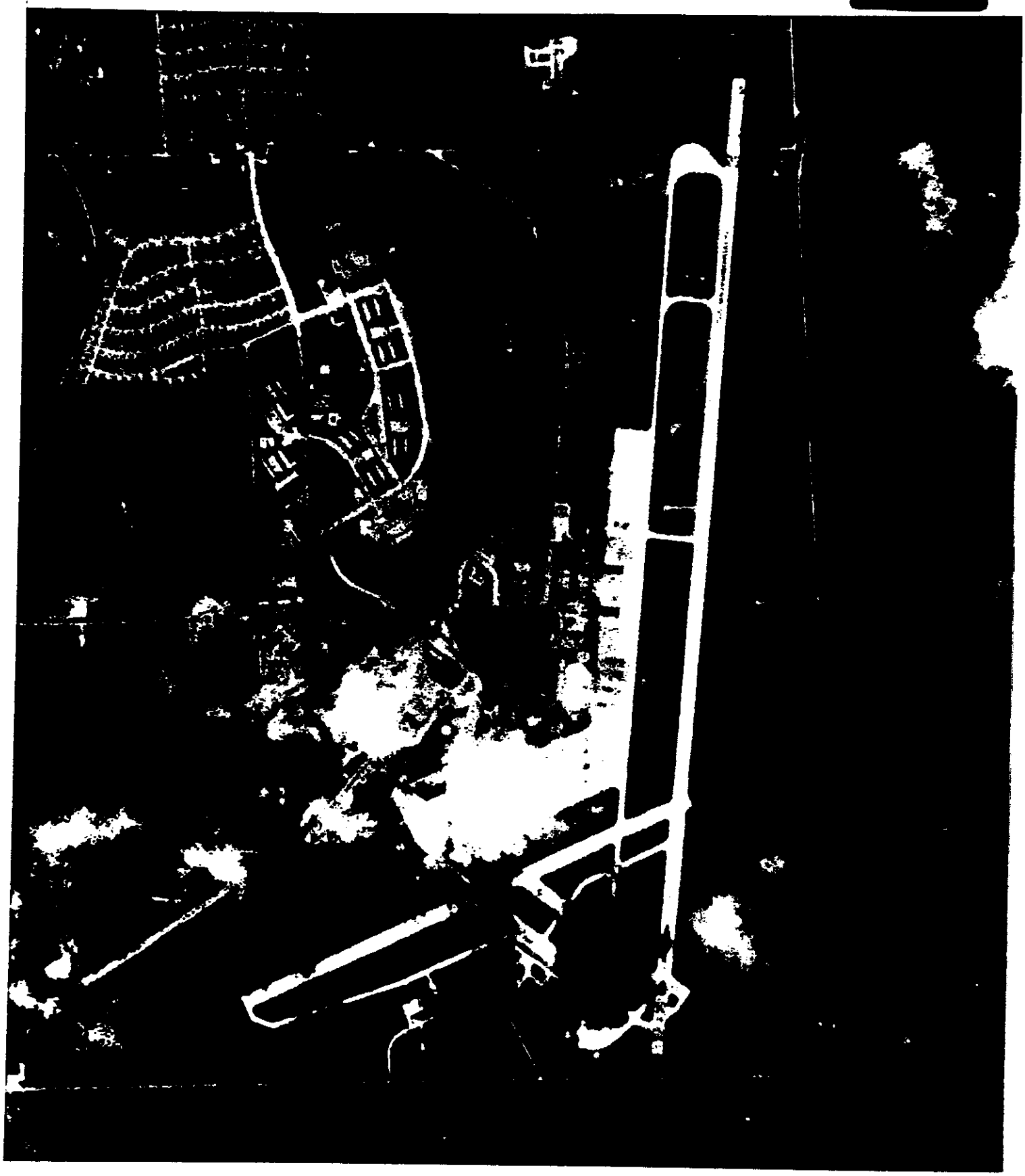
J-1



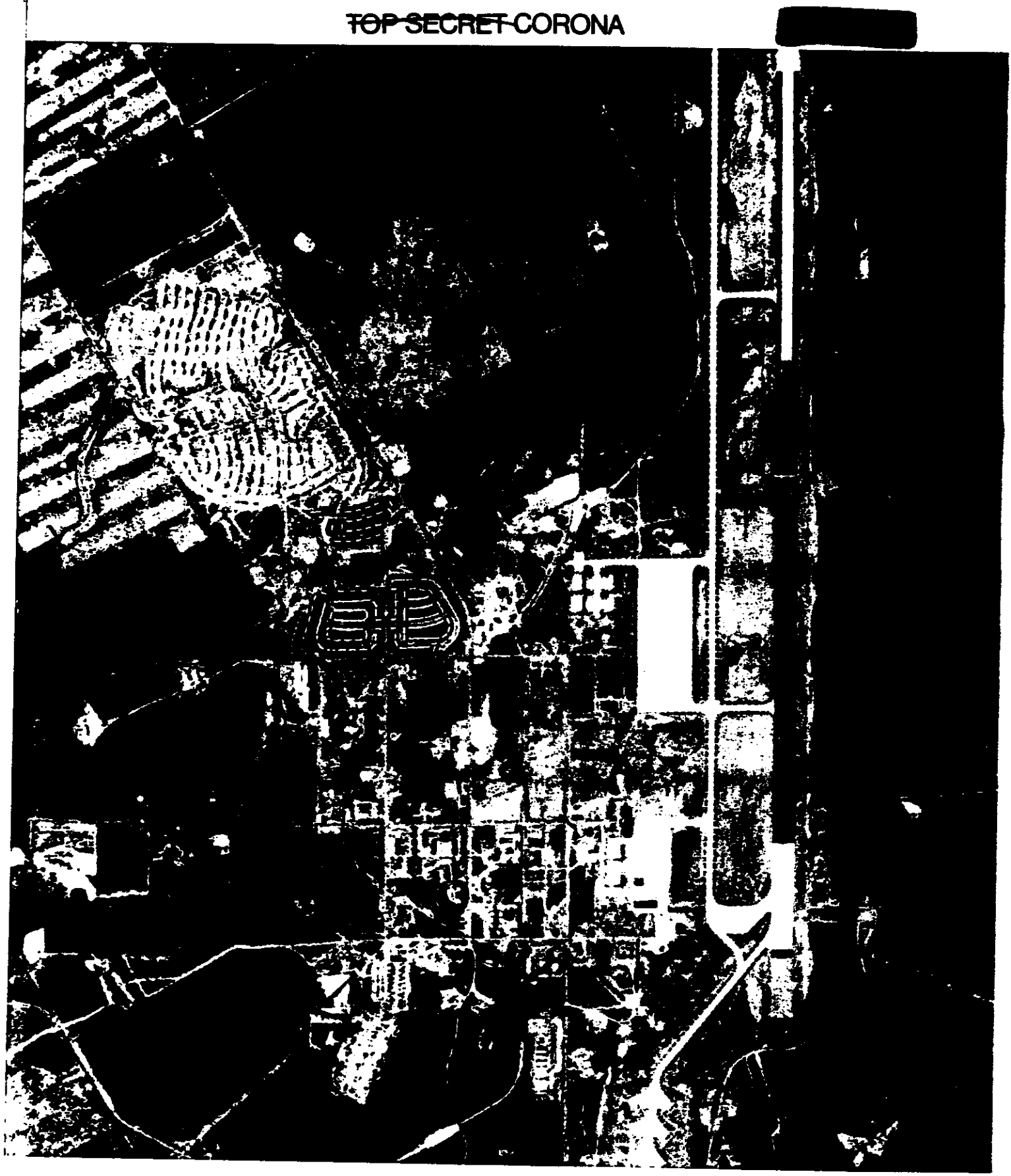
J-3



Mission	9009
Pass	14
Frame	29
Date	19 August 1960
Film	1188
Exposure time	1/1000
Filter	W-21
Latitude/longitude	39 N / 95 W
Scale	1:345,165
Altitude	114 nm
Solar altitude	63°
Enlargement	20×

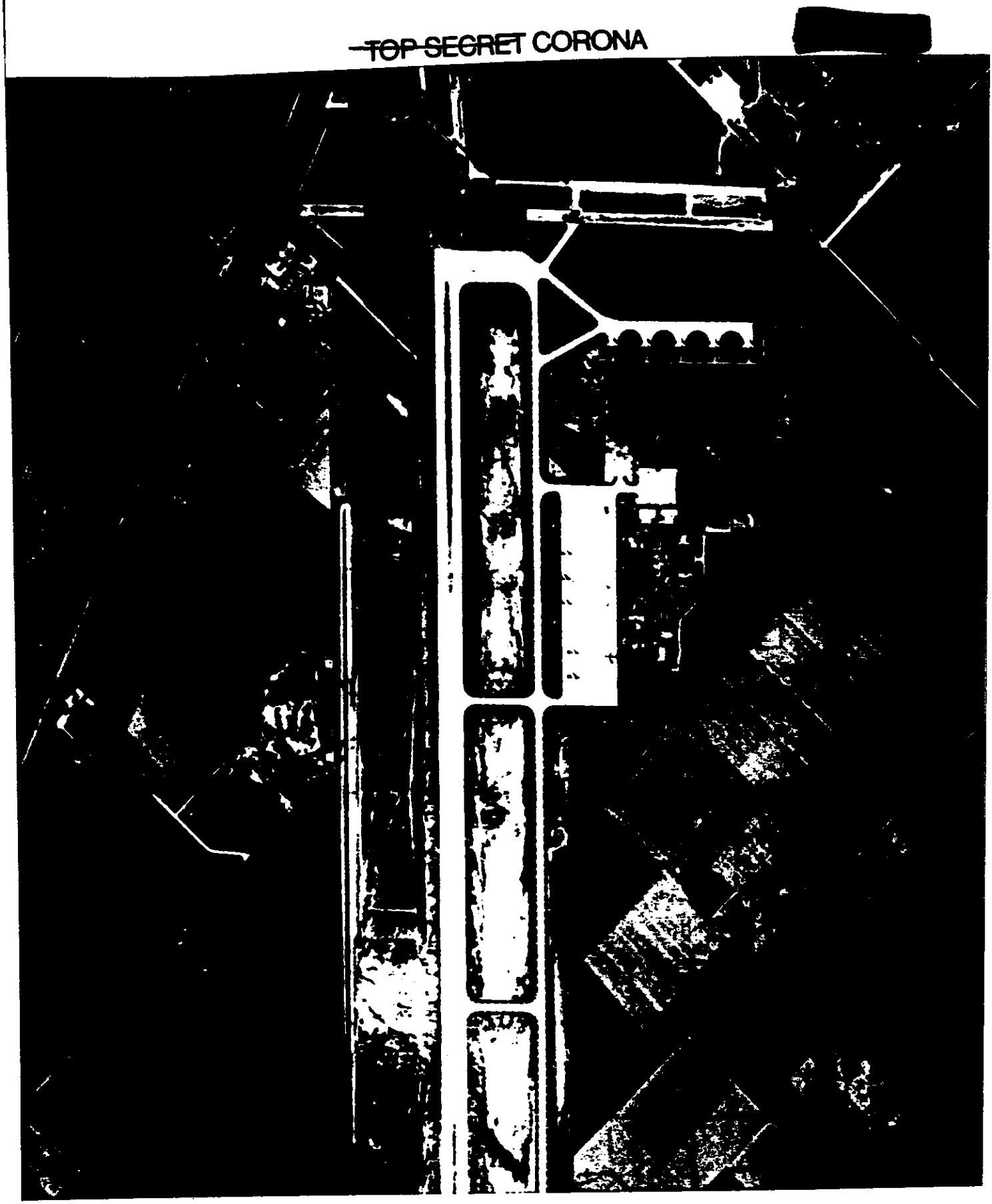


Mission	9017
Pass	15
Frame	3
Date	17 June 1961
Film	4400
Exposure time	1/500
Filter	W-21
Latitude/longitude	48 N / 106 W
Scale	1:427,384
Altitude	141 nm
Solar altitude	49°
Enlargement	20×



Mission	9022
Pass	1
Frame	12
Date	12 December 1961
Film	4404
Exposure time	1/250
Filter	W-21
Latitude/longitude	61 N / 150 W
Scale	1:431,225
Altitude	142 nm
Solar altitude	33°
Enlargement	20×

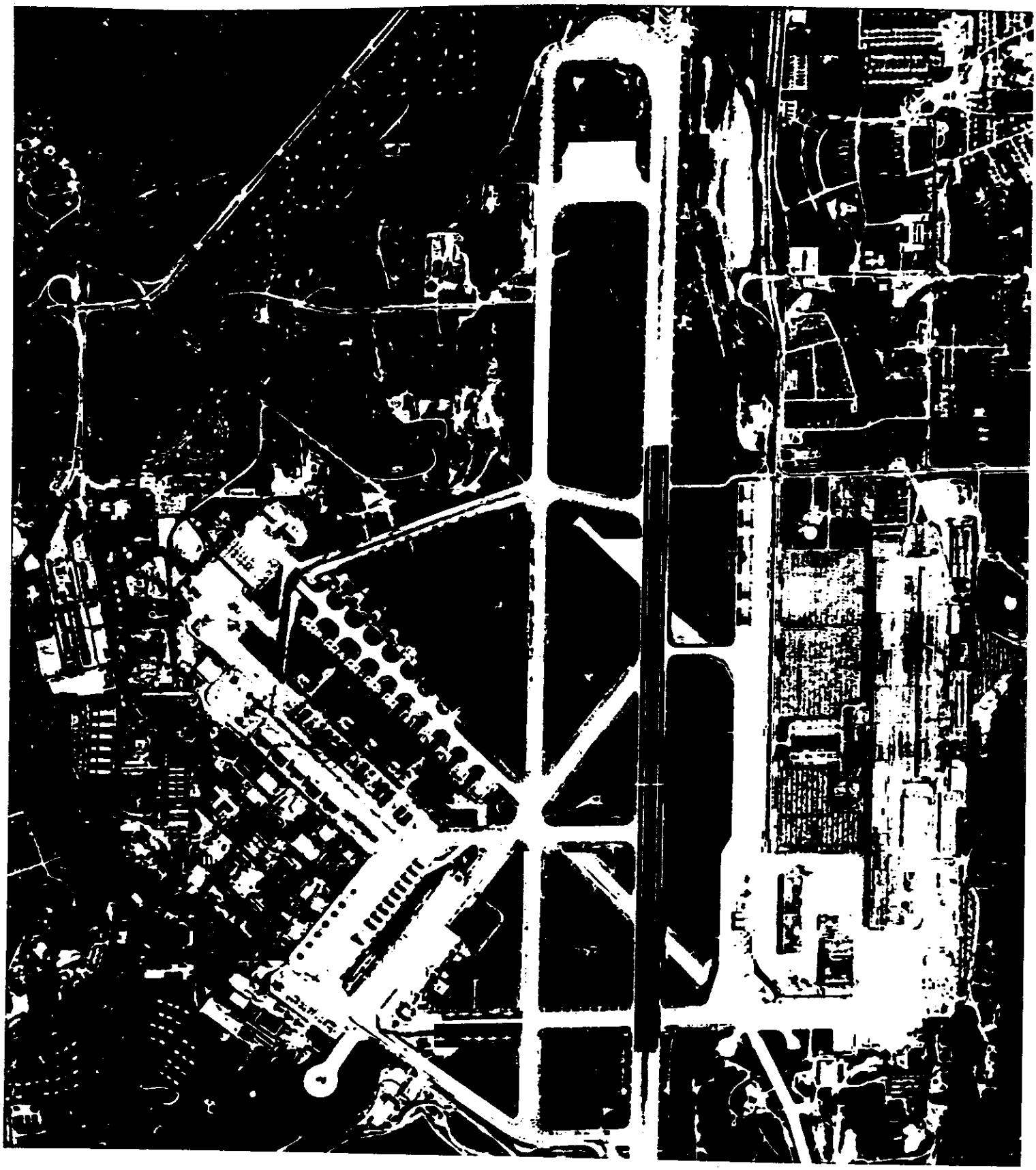
Mission	9037
Pass	31
Frame	17 AFT
Date	25 June 1964
Film	4404
Exposure time	1/270
Filter	W-21
Latitude/longitude	36 N / 103 W
Scale	1:348,388
Altitude	115 nm
Solar altitude	36°
Enlargement	20×



[redacted]

J-1 SYSTEM

Mission	1006
Pass	78
Frame	19 AFT
Date	9 June 1964
Film	4404
Exposure time	1/339
Filter	W-21
Latitude/longitude	33 N / 97 W
Scale	1:329,000
Altitude	105 nm
Solar altitude	58°
Enlargement	20×



Mission	1104
Pass	127
Frame	15 AFT
Date	15 August 1968
Film	3404
Exposure time	1/549
Filter	W-21
Latitude/longitude	42 N / 72 W
Scale	1:261,300
Altitude	83 nm
Solar altitude	61°
Enlargement	20×

CORONA FILM RECOVERY BUCKETS LAUNCHED, ORBITED, AND RECOVERED PER YEAR

		1959	1960	1961	1962	1963	1964	1965	1966	1967	1968
C	Launched	5	5								
	Orbited	3	3								
	Recovered	0	1								
C′	Launched		3	7							
	Orbital		2	4							
	Recovered		2	3							
C‴	Launched			5	1						
	Orbited			5	0						
	Recovered			4	0						
M	Launched				17	9					
	Orbited				17	7					
	Recovered				14	6					
J-1	Launched					4	26	26	18	14	8
	Orbited					4	24	26	16	14	8
	Recovered					2	21	25	16	14	8
J-3	Launched									4	8
	Orbited									4	8
	Recovered									4	8
Total	Launched	5	8	12	18	13	26	26	18	18	16
	Orbited	3	5	9	17	11	24	26	16	18	16
	Recovered	0	3	7	14	8	21	25	16	18	16

SATELLITE PHOTOGRAPHIC RECONNAISSANCE FLIGHT SUMMARY (Concl.

Mission	Camera	Launch	Recovery	Comments
[redacted]				
1052	J-46	22 Sept 1969	(-1) 29 Sept 1969	Last J-1
			(-2) 7 Oct 1969	Successful
[redacted]				
1108	CR-9	4 Dec 1969	(-1) 11 Dec 1969	Successful
			(-2) 21 Dec 1969	Successful
[redacted]				
1109	CR-10	4 Mar 1970	(-1) 12 Mar 1970	Successful
			(-2) 23 Mar 1970	Successful
[redacted]				
1110	CR-11	20 May 1970	(-1) 31 May 1970	Successful
			(-2) 8 June 1970	Successful
[redacted]				
1111	CR-12	23 July 1970	(-1) 30 July 1970	Successful
			(-2) 10 Aug 1970	Successful
[redacted]				
1112	QR-2	18 Nov 1970	(-1) 27 Nov 1970	Successful
			(-2) 7 Dec 1970	One camera failed

SATELLITE PHOTOGRAPHIC RECONNAISSANCE FLIGHT SUMMARY (Cont.)

Mission	Camera	Launch	Recovery	Comments
[redacted]				
1046	J-48	14 Mar 1968	(-1) 22 Mar 1968	Successful
			(-2) 30 Mar 1968	Successful
[redacted]				
1103	CR-3	1 May 1968	(-1) 8 May 1968	Successful
			(-2) 15 May 1968	Successful
[redacted]				
1047	J-47	20 June 1968	(-1) 29 June 1968	Successful
			(-2) 5 July 1968	Successful
[redacted]				
1104	CR-4	7 Aug 1968	(-1) 15 Aug 1968	Successful
			(-2) 22 Aug 1968	Successful
[redacted]				
1048	J-49	18 Sept 1968	(-1) 28 Sept 1968	Successful
			(-2) 2 Oct 1968	One inst. failed
1105	CR-5	3 Nov 1968	(-1) 11 Nov 1968	Successful
			(-2) 21 Nov 1968	Successful
[redacted]				
1049	J-50	12 Dec 1968	(-1) 19 Dec 1968	Successful
			(-2) 23 Dec 1968	Successful
[redacted]				
1106	CR-6	5 Feb 1969	(-1) 10 Feb 1969	Successful
			(-2) 14 Feb 1969	Successful
[redacted]				
1050	J-43	19 Mar 1969	(-1) 22 Mar 1969	Unstable after
			(-2) 23 Mar 1969	rev 22
[redacted]				
1051	J-44	2 May 1969	(-1) 9 May 1969	Successful
			(-2) 18 May 1969	Successful
[redacted]				
1107	CR-7	24 July 1969	(-1) 2 Aug 1969	FWD inst. failed on rev 1. All mono
			(-2) 12 Aug 1969	Successful

SATELLITE PHOTOGRAPHIC RECONNAISSANCE FLIGHT SUMMARY (Cont.)

Mission	Camera	Launch	Recovery	Comments
1037	J-38	8 Nov 1966	(-1) 12 Nov 1966	Successful
			(-2) 20 Nov 1966	Successful
[redacted]				
1038	J-34	14 Jan 1967	(-1) 19 Jan 1967	Westover process
			(-2) 26 Jan 1967	Successful
[redacted]				
1039	J-39	22 Feb 1967	(-1) 28 Feb 1967	Successful
			(-2) 5 Mar 1967	Successful
[redacted]				
1040	J-35	30 Mar 1967	(-1) 4 Apr 1967	Successful
			(-2) 8 Apr 1967	Successful
[redacted]				
1041	J-40	9 May 1967	(-1) 16 May 1967	Successful
			(-2) 24 May 1967	Successful
[redacted]				
1042	J-37	16 June 1967	(-1) 22 June 1967	Successful
			(-2) 1 July 1967	Water recovery
[redacted]				
1043	J-42	7 Aug 1967	(-1) 14 Aug 1967	Successful
			(-2) 22 Aug 1967	Successful
[redacted]				
1101	CR-1	15 Sept 1967	(-1) 21 Sept 1967	Successful
			(-2) 28 Sept 1967	Successful
[redacted]				
1044	J-41	2 Nov 1967	(-1) 9 Nov 1967	Successful
			(-2) 11 Nov 1967	Successful
1102	CR-2	9 Dec 1967	(-1) 15 Dec 1967	Successful
			(-2) 23 Dec 1967	Successful
[redacted]				
1045	J-45	24 Jan 1968	(-1) 1 Feb 1968	Successful
			(-2) 8 Feb 1968	Successful

SATELLITE PHOTOGRAPHIC RECONNAISSANCE FLIGHT SUMMARY (Cont.)

Mission	Camera	Launch	Recovery	Comments
1026	J-25	28 Oct 1965	(-1) 3 Nov 1965	Successful
			(-2) 7 Nov 1965	Successful
[redacted]				
1027	JX-27	9 Dec 1965	(-1) 10 Dec 1965	D-timer failure
			(-2) 11 Dec 1965	Successful
1028	J-26	24 Dec 1965	(-1) 29 Dec 1965	Successful
			(-2) 2 Jan 1966	Successful
[redacted]				
1029	J-27	2 Feb 1966	(-1) 8 Feb 1966	Successful
			(-2) 12 Feb 1966	Successful
[redacted]				
1030	J-29	9 Mar 1966	(-1) 15 Mar 1966	Successful
			(-2) 19 Mar 1966	Successful
[redacted]				
1031	J-30	7 April 1966	(-1) 14 April 1966	Successful
			(-2) 18 April 1966	One inst. failed
[redacted]				
1032	J-28	3 May 1966		No orbit
[redacted]				
1033	J-33	24 May 1966	(-1) 29 May 1966	Successful
			(-2) 4 June 1966	Successful
[redacted]				
1034	J-31	21 June 1966	(-1) 26 June 1966	Successful
			(-2) 1 July 1966	Successful
[redacted]				
1036	J-32	9 Aug 1966	(-1) 17 Aug 1966	Successful
			(-2) 23 Aug 1966	Successful
[redacted]				
1035	J-36	20 Sept 1966	(-1) 26 Sept 1966	Successful
			(-2) 30 Sept 1966	Successful
[redacted]				

SATELLITE PHOTOGRAPHIC RECONNAISSANCE FLIGHT SUMMARY (Cont.)

Mission	Camera	Launch	Recovery	Comments
1013	J-15	2 Nov 1964	(-1) 6 Nov 1964	Successful
			(-2) 8 Nov 1964	Inst. failed rev. 52
1014	J-16	18 Nov 1964	(-1) 23 Nov 1964	Successful
			(-2) 27 Nov 1964	Successful
[redacted]				
1015	J-17	19 Dec 1964	(-1) 24 Dec 1964	Successful
			(-2) 30 Dec 1964	Successful
1016	J-18	15 Jan 1965	(-1) 20 Jan 1965	Successful
			(-2) 25 Jan 1965	Successful
[redacted]				
1017	J-14	25 Feb 1965	(-1) 2 Mar 1965	Successful
			(-2) 6 Mar 1965	Successful
[redacted]				
1018	J-19	25 Mar 1965	(-1) 29 Mar 1965	Successful
			(-2) 31 Mar 1965	Successful
[redacted]				
1019	J-4	29 April 1965	(-1) 4 May 1965	Successful
			(-2) Not recovered	Command failure
1021	J-21	18 May 1965	(-1) 23 May 1965	Successful
			(-2) 28 May 1965	One inst. failed
[redacted]				
1020	J-20	9 June 1965	(-1) 15 June 1965	Successful
			(-2) 16 June 1965	Successful
[redacted]				
1022	J-22	19 July 1965	(-1) 24 July 1965	Successful
			(-2) 28 July 1965	Successful
[redacted]				
1023	J-23	17 Aug 1965	(-1) 22 Aug 1965	Successful
			(-2) 26 Aug 1965	Successful
1024	J-24	22 Sept 1965	(-1) 27 Sept 1965	Successful
			(-2) 2 Oct 1965	Successful
[redacted]				
1025	JX-28	5 Oct 1965	(-1) 10 Oct 1965	Successful
			(-2) 15 Oct 1965	Successful

SATELLITE PHOTOGRAPHIC RECONNAISSANCE FLIGHT SUMMARY (Cont.)

Mission	Camera	Launch	Recovery	Comments
9059	A-6	29 Oct 1963	3 Nov 1963	Successful
9060	M-24	9 Nov 1963		No orbit
9061	M-25	27 Nov 1963	Not recovered	Faulty separation
[redacted]				
9062	M-26	21 Dec 1963	26 Dec 1963	Successful
1004	J-5	15 Feb 1964	(-1) 18 Feb 1964	Successful
			(-2) 22 Feb 1964	Successful
[redacted]				
1003	J-6	24 Mar 1964		No orbit
[redacted]				
1005	J-8	27 April 1964	(-1) Not recovered	Power failure
			(-2) Not recovered	Power failure
[redacted]				
1006	J-9	5 June 1964	(-1) 8 June 1964	Successful
			(-2) 12 June 1964	Successful
9065	A-21	13 June 1964	19 June 1964	Successful
1007	J-7	19 June 1964	(-1) 24 June 1964	Successful
			(-2) 28 June 1964	Successful
[redacted]				
1008	J-10	10 July 1964	(-1) 14 July 1964	Successful
			(-2) 18 July 1964	Successful
1009	J-12	5 Aug 1964	(-1) 9 Aug 1964	Successful
			(-2) 14 Aug 1964	Successful
[redacted]				
9066	A-22	21 Aug 1964	27 Aug 1964	Successful
1010	J-11	14 Sept 1964	(-1) 19 Sept 1964	Successful
			(-2) 24 Sept 1964	Successful
[redacted]				
1011	J-3	5 Oct 1964	(-1) 9 Oct 1964	Successful
			(-2) Not recovered	Battery failure
[redacted]				
1012	J-13	17 Oct 1964	(-1) 20 Oct 1964	Successful
			(-2) 23 Oct 1964	Water recovery
[redacted]				

SATELLITE PHOTOGRAPHIC RECONNAISSANCE FLIGHT SUMMARY (Cont.)

Mission	Camera	Launch	Recovery	Comments
9034	A-5	15 May 1962	19 May 1962	Timer failure
9035	M-4	30 May 1962	2 June 1962	Successful
9036	M-5	1 June 1962	Not recovered	SRV sank
9037	M-6	23 June 1962	26 June 1962	Successful
9038	M-7	28 June 1962	2 July 1962	Successful
9039	M-8	20 July 1962	22 July 1962	Timer failure
9040	M-9	28 July 1962	31 July 1962	Successful
9041	M-10	2 Aug 1962	6 Aug 1962	Successful
9044	M-11	28 Aug 1962	1 Sept 1962	Successful
9042	A-10	1 Sept 1962	Not recovered	SRV sank
9043	M-12	18 Sept 1962	19 Sept 1962	Successful
9045	M-13	30 Sept 1962	2 Oct 1962	Successful
9046	A-9	9 Oct 1962	13 Oct 1962	Shutter timer failure
9047	M-14	5 Nov 1962	9 Nov 1962	Successful
9048	M-15	24 Nov 1962	29 Nov 1962	Successful
9049	M-16	4 Dec 1962	Not recovered	SRV sank
9050	M-17	15 Dec 1962	17 Dec 1962	Successful
9051	M-18	8 Jan 1963	11 Jan 1963	Water recovery
9052	M-20	28 Feb 1963		No orbit
8001	L-1	18 Mar 1963		No orbit
9053	M-19	2 April 1963	4 April 1963	Successful
9055	A-12	26 April 1963		No orbit
8002	L-2	18 May 1963	20 May 1963	Decoder failure
9054	M-21	13 June 1963	16 June 1963	Successful
9056	M-22	27 June 1963	30 June 1963	Successful
[redacted]				
9057	M-23	19 July 1963	22 July 1963	Successful
8003	L-3	30 July 1963	1 Aug 1963	Successful
1001	J-1	25 Sept 1963	(-1) 29 Sept 1963	Successful
			(-2) Not recovered	Inverter failure
9058	A-11	29 Aug 1963	2 Sept 1963	Successful
[redacted]				
1002	J-2	23 Oct 1963	(-1) 26 Oct 1963	Successful
			(-2) Not recovered	Decoder failure
[redacted]				

SATELLITE PHOTOGRAPHIC RECONNAISSANCE FLIGHT SUMMARY

Mission	Camera	Launch	Recovery	Comments
9001	C-1	25 June 1959		No orbit
9003	C-2	13 Aug 1959	Not recovered	Low temperatures
9002	C-3	19 Aug 1959	Not recovered	Retro failure
9004	C-4	7 Nov 1959		No orbit
9005	C-5	20 Nov 1959	Not recovered	Eccentric orbit
9006	C-6	4 Feb 1960		No orbit
9007	C-7	19 Feb 1960		No orbit
9008	C-8	15 April 1960	Not recovered	Spin-up failure
Diagnostic		29 June 1960		No orbit
Diagnostic		10 Aug 1960	11 Aug 1960	Water recovery
9009	C-9	18 Aug 1960	19 Aug 1960	First film recovered
9010	C-10	13 Sept 1960	Not recovered	Capsule sank
9011	C'-1	26 Oct 1960		No orbit
9012	C'-2	12 Nov 1960	14 Nov 1960	No film recovery
9013	C'-3	7 Dec 1960	10 Dec 1960	Successful
9014	A-1	17 Feb 1961	Not recovered	Programmer failure
9015	C'-4	30 Mar 1961		No orbit
9016	A-2	8 April 1961	Not recovered	Vehicle unstable
9018	A-3	8 June 1961		No orbit
9017	C'-5	16 June 1961	18 June 1961	Water recovery
9019	C'-6	7 July 1961	9 July 1961	Successful
9020	A-4	21 July 1961		No orbit
9021	C'-7	3 Aug 1961		No orbit
9023	C'''-1	30 Aug 1961	1 Sept 1961	Successful
9022	C'''-2	12 Sept 1961	14 Sept 1961	Successful
9024	C'''-3	17 Sept 1961	Not recovered	No separation
9025	C'''-4	13 Oct 1961	14 Oct 1961	Successful
9026	C'-8	23 Oct 1961		No orbit
9027	C'-9	5 Nov 1961	Not recovered	Vehicle unstable
9028	C'-10	15 Nov 1961	16 Nov 1961	Successful
9029	C'''-5	12 Dec 1961	16 Dec 1961	Successful
9030	C'''-6	13 Jan 1962		No orbit
9031	M-1	27 Feb 1962	3 Mar 1962	Successful
9032	M-2	18 April 1962	20 April 1962	Successful
9033	M-3	28 April 1962	Not recovered	No chute—SRV sank

PHOTOGRAPHIC SATELLITE SUMMARY

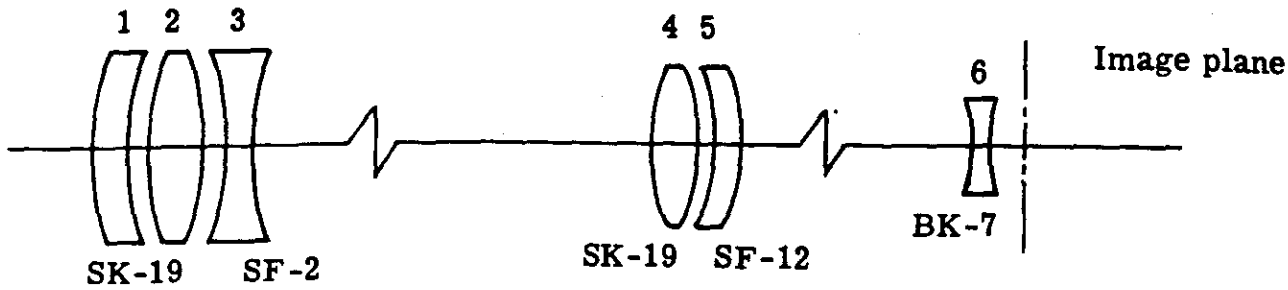
FILM RETURN HISTORY

Year	No. of Flights	System Ident.	Film Recovered, percent	Mission Flight Numbers
1959	5	C	0%	9001-9005
1960	5	C	20% 9009 1st recovery	9006-9010
	3	C′	33%	9011-9013
1961	7	C′	29%	9015, 17, 19, 21, 26-28
	5	C‴	66%	9022-25, 29
1962	1	C‴	0%	9030
	17	M	69%	9031-41, 43-45, 47-50
1963	9	M	66%	9051-54, 56, 57, 60-62
	2	J	50%	1001, 02
1964	13	J	73%	1003-15
1965	13	J	87.5%	1016-28
1966	9	J	87%	1029-37
1967	7	J	99%	1038-44
	2	CR	100%	1101, 02
1968	5	J	97%	1045-49
	3	CR	99%	1103-05
1969	3	J	94%	1050-52
	3	CR	83%	1106-08
1970	4	CR	94%	1109-12
1971	5	CR	Proposed flight schedule	1113-17

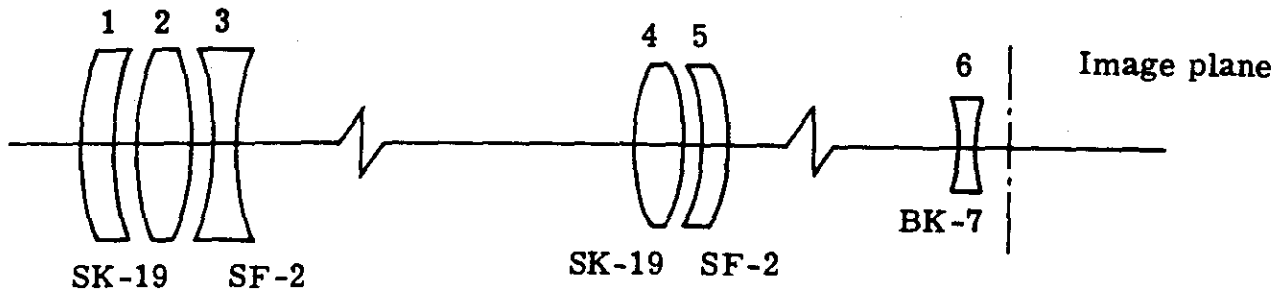
		Camera Type	Film Load
10	C	Mono Camera	40 lbs
10	C′	Mono Camera	40 lbs
6	C‴	Mono Camera	40 lbs
26	M	Stereo Camera	80 lbs
52	J	Stereo Camera/2 buckets	160 lbs
17	CR	Stereo Camera/2 buckets	160 lbs
121	Systems		

PETZVAL LENS DIAGRAMS

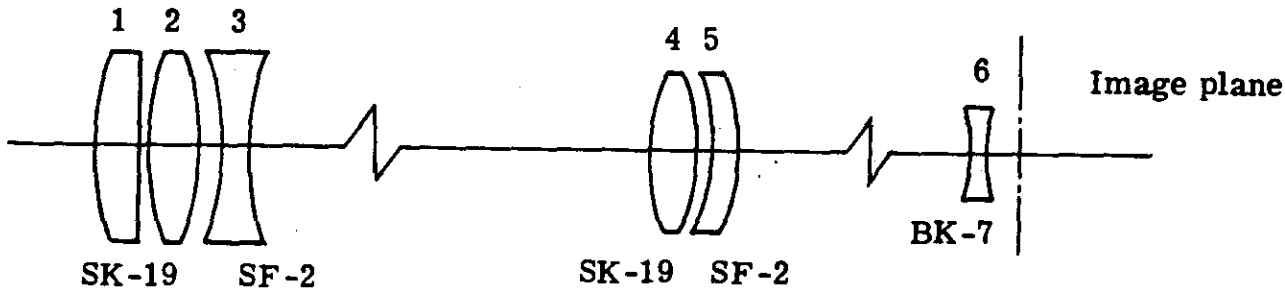
J-1, J-3, Type I



J-3, Type II



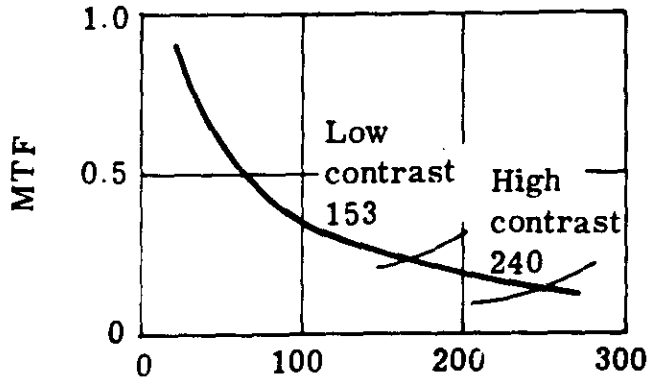
J-3, Type III, Type IV



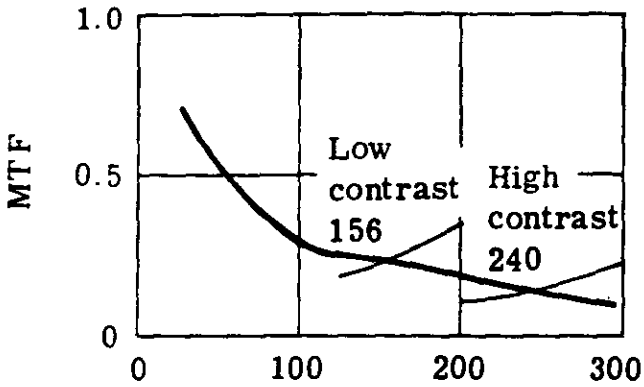
PETZVAL LENS

Design MTF

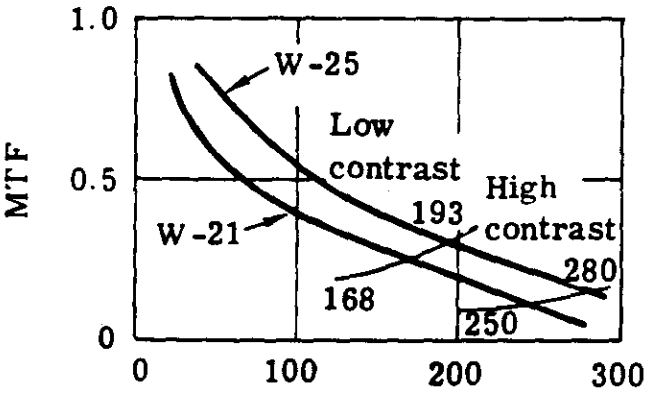
J-1, J-3, Type I



J-3, Type II



J-3, Type III, Type IV



Resolution, cycles per millimeter

Static Resolution Specifications

Filter	Resolution EK 3404 at 2:1	Resolution EK 3404 at 1,000
W-21	140 l/mm	240 l/m
W-25	None	None

Filter	Resolution EK 3404 at 2:1	Resolution EK 3404 at 1,000
W-21	140 l/mm	240 l/m
W-25	None	None

	Filter	Resolution EK 3404 at 2:1	Resolution EK 3404 at 1,000
Type III	W-21	150 l/mm	240 l/mm
	W-25	175 l/mm	240 l/mm
Type IV	W-21	160 l/mm	240 l/mm
	W-25	185 l/mm	240 l/mm

System	Comments
J-1	• Elements 1 and 3 relatively thin; fabrication problem • Element 3 undersize in diameter • Normal quality glass used • Loss of resolution with Wratten 25 filter
J-3 Type I	• Same characteristics as J-1 lens
J-3 Type II	• First three elements same diameter, alignment improved • Astronomical objective quality glass used, more homogeneous • Elements 1, 3, and 4 thickened for structural integrity • SF-2 (more readily available) replaces SF-12 in element 5
J-3 Type III	• Design central wavelength raised to 0.6500 micron to improve performance with Wratten 25 filter • Improved performance with Wratten 21 filter • Same glass types, glass quality, element thickness as Type II lens • Slightly different radii, airspaces
J-3 Type IV	• Same nominal design as Type III lens • PH-3, select precision quality for improved homogeneity, reduced optical path difference at image plane • Tighter tolerances and improved material for hardware used to mount optics • Surface quality of optical elements improved

PETZVAL LENS CHARACTERISTICS

System	Year	Approximate Glass Weight, pounds	Glass Quality	Design Wavelengths, microns (lower, central upper)
J-1	1964-1969	15	Normal (Schott RQ)	0.5461, 0.6200, 0.6900
J-3 Type I	1967-1969	15	Normal (Schott RQ)	0.5461, 0.6200, 0.6900
J-3 Type II	1967-1970	17	Precision (Schott AO)	0.5461, 0.6200, 0.6900
J-3 Type III	1968-1971	17	Precision (Schott AO)	0.6000, 0.6500, 0.7100
J-3 Type IV	1971	17	Select precision (Schott PH-3)	0.6000, 0.6500, 0.7100

CORONA LENS EVOLUTION

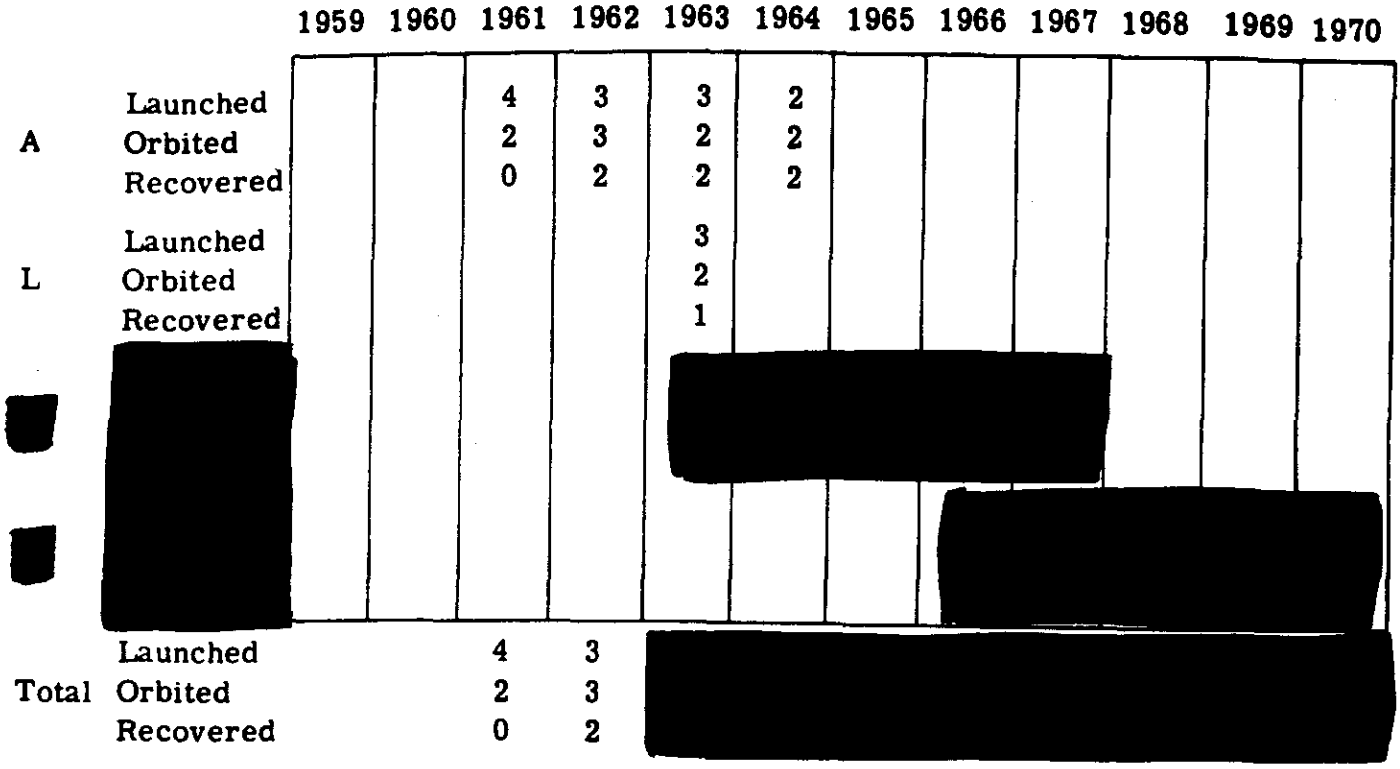
The first CORONA missions employed a Tessar lens design with a relative aperture of f/5.0. These lenses were fabricated by Itek and integrated into the C and C′ cameras by Fairchild. The C′′′ and subsequent camera systems were built entirely by Itek and employed a Petzval lens design with a relative aperture of f/3.5. All of these lenses were 24-inch focal length.

The physical characteristics of the Itek Petzval lenses have remained virtually unchanged through J-3. Performance of the lenses, however, has been continually upgraded from 1964 through present systems while necessitating no changes in either camera or vehicle interface. This was accomplished by taking advantage of improvements in materials, Itek computer programs, and improved fabrication and test techniques, coupled with an overall tightening of lens tolerances. The result of these upgradings from the J-1 through J-3 type IV lenses is a 15 percent improvement in low contrast resolution with a Wratten no. 21 filter and a 30 percent improvement in low contrast resolution with a Wratten no. 25 filter.

CORONA FILM RECOVERY BUCKETS LAUNCHED, ORBITED, AND RECOVERED PER YEAR

		1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970
C	Launched	5	5										
	Orbited	3	3										
	Recovered	0	1										
C′	Launched		3	7									
	Orbital		2	4									
	Recovered		2	3									
C‴	Launched			5	1								
	Orbited			5	0								
	Recovered			4	0								
M	Launched				17	9							
	Orbited				17	7							
	Recovered				14	6							
J-1	Launched					4	26	26	18	14	8	6	
	Orbited					4	24	26	16	14	8	6	
	Recovered					2	21	25	16	14	8	6	
J-3	Launched									4	8	6	8
	Orbited									4	8	6	8
	Recovered									4	8	6	8
Total	Launched	5	8	12	18	13	26	26	18	18	16	12	8
	Orbited	3	5	9	17	11	24	26	16	18	16	12	8
	Recovered	0	3	7	14	8	21	25	16	18	16	12	8

ARGON, LANYARD, [redacted] AND [redacted] FILM RECOVERY BUCKETS LAUNCHED, ORBITED, AND RECOVERED PER YEAR



CORONA PERFORMANCE

CORONA SYSTEM PERFORMANCE SUMMARY

Year	Systems	Capsules Launched	Capsules Orbited	Capsules Recovered
1959	C	5	3	0
1960	C,C′	8	5	3
1961	C′, C‴	12	9	7
1962	C‴, M	18	17	14
1963	M, J-1	13	11	8
1964	J-1	26	24	21
1965	J-1	26	26	25
1966	J-1	18	16	16
1967	J-1, J-3	18	18	18
1968	J-1, J-3	16	16	16
1969	J-1, J-3	12	12	12
1970	J-3	8	8	8

CORONA J-3 PERFORMANCE PREDICTIONS FROM ERROR BUDGET (Two Sigma Low)

	Second Generation Lens				Third Generation Lens			
	Along Track		Across Track		Along Track		Across Track	
	0°	30°	0°	30°	0°	30°	0°	30°
Resolution, lines per millimeter	130	132	126	72	155	158	151	76
Blur, microns	3.28	3.01	2.64	11.0	3.28	3.01	2.64	11.0
GRD, feet	6.4	7.3	6.6	13.5	5.6	6.3	5.6	14.8

Conditions: Altitude: 82 nm
Film type: SO-380, 3404
Exposure: 2.44 msec
Contrast: 2:1
Field angle: 0°

[redacted]

Dynamic Resolution Tests for J-3 Camera Lenses

System A/P	Instrument*	Itek Dynamic Tests 2:1 Resolution FL/FC	Itek Dynamic Tests Filter/Film	A/P Dynamic Tests 2:1 Resolution FL/FC	A/P Dynamic Tests Filter/Film	Flight Conditions Lens No./Type	Flight Conditions Filter (Prime/Alternate)	Flight Conditions Film
CR-1	303	137/123	21/3404	125/119	23/3404	172/1	23A/25	3404
	302	123/120	21/3404	128/122	21/3404	167/1	21/23A	3404
CR-2	305	138/140	21/3404	134/140	21/3404	181/2	25/SF09†	3404/SO-230
	304	126/129	21/3404	123/120	21/3404	165/1	21/SF05‡	3404/SO-230
CR-3	307	141/132	21/3404	143/150	21/3404	192/2	25/12	3404/SO-380
	306	135/129	21/3404	137/134	21/3404	166/1	21/SF05	3404
CR-4	309	169/168	25/3404	176/168	25/3404	205/3	25/15	3404/SO-180
	308	135/140	21/3404	143/140	21/3404	183/2	21/SF05	3404
CR-5	311	169/176	25/SO-380	188/186	25/SO-380	207/3	25/23A	SO-380
	310	137/126	21/SO-380	158/158	21/SO-380	168/1	21/2E	SO-380/SO-1
CR-6	313	180/172	25/SO-380	192/188	25/3404	206/3	23A/25	3404
	312	144/144	21/SO-380	129/157	21/3404	190/2	21/2E	3404/SO-121
CR-7	315	200/195	25/SO-380	182/182	25/3404	208/3	23A/21	3404/3400
	314	138/133	21/SO-380	141/140	21/3404	191/2	21/SF05	3404
CR-8	319	180/172	25/3404			209/3	§	
(refurb.)	318	126/129	21/3404			169/1	§	
CR-9	317	192/184	25/SO-380	190/186	25/3404	200/3	25/25	3404
	316	140/137	21/SO-380	135/129	21/3404	195/2	21/2B	3404/SO-242
CR-10	321	184/182	25/SO-380	204/200	25/3404	211/3	25/23A	3404
	320	168/174	21/SO-380	156/152	23/3404	212/3	23A/25	3404
CR-11	323	172/168	25/SO-380	167/165	25/3404	210/3	23A/25	3404/14/04
	322	143/132	21/SO-380	119/121	21/3404	193/2	21/23A	3404/14/04
CR-12	325	168/184	25/SO-380	185/183	25/3404	213/3	25/25¶	3414
	324	140/135	21/SO-380	127/129	21/3404	184/2	21/21¶	3414
CR-13	327	182/182	25/SO-380	170/169	25/3414	214/3		
	326	166/160	21/SO-380	139/138	21/3414	215/3		
CR-14	329	166/170	25/SO-380			216/3	§	
	328	166/162	21/SO-380			217/3	§	
CR-15	331	182/172	25/SO-380			220/4	§	
	330	164/166	21/SO-380			219/4	§	
CR-16	333	174/170	25/SO-380			221/4	§	
	332	168/180	21/SO-380			222/4	§	
QR-2	301	172/172	25/SO-380			224/4	§	
	300	170/172	21/SO-380			223/4	§	

* Odd numbered instruments are forward-looking.

† SF09 = Polaroid filter.

‡ SF05 = Glass filter 0.005 inch thick with similar Wratten no. 57 coating.

§ Glass filter coated to match Wratten transmissions.

¶ Glass filter 0.007 inch thick versus Wratten gel 0.004 inch thick for increase of 0.001 inch in focu

Flight	Mission	Camera	Agena	Thor	Camera Received at A/P	Camera Shipped to Base	Launch Date	SRV Recovery Date	Recovery Revolution	Film Footage		
										Panoramic	Stellar	Index
1			1022	163			2/28/59					
2			1018	170			4/13/59					
3			1020	174			6/3/59					
4	9001	C-1	1023	179	5/5/59	5/29/59	6/25/59					
5	9003	C-2	1029	192	6/5/59	7/23/59	8/13/59					
6	9002	C-3	1028	200	5/18/59	6/3/59	8/19/59					
7	9004	C-4	1051	206	6/24/59	7/23/59	11/7/59					
8	9005	C-5	1050	212	7/25/59	11/7/59	11/20/59					
9	9006	C-6	1052	218	6/26/59	1/10/60	2/4/60					
10	9007	C-7	1054	223	12/7/59	2/4/60	2/19/60					
11	9008	C-8	1055	234	1/11/60	2/24/60	4/15/60					
12	Diagnostic		1053				6/29/60					
13	Diagnostic		1057				8/10/60	8/11/60				
14	9009	C-9	1056	237	1/28/60	3/28/60	8/18/60	8/19/60	17	3,353		
15	9010	C-10	1058	246	2/22/60	8/25/60	9/13/60					

Mission No.	Comments
—	Orbit achieved without payload; propulsion, guidance and control systems tested during launch; remained in orbit for about 5 days.
—	Capsule ejected over Norway on 4/13/59.
—	Failed to orbit.
9001	Failed to orbit due to insufficient velocity.
9003	Low internal temperatures; not recovered; camera failed on rev 1.
9002	Retro-rocket malfunction; not recovered; camera failed on rev 2; improved temperatures.
9004	Did not stabilize in orbit; failed to eject due to inverter malfunction.
9005	Eccentric orbit (1,000-mile apogee, 120-mile perigee); camera failure; not recovered due to uncontrollable attitude.
9006	Failed to orbit due to insufficient velocity.
9007	Failed to orbit; destroyed by RSO at 20,000 feet, 56 seconds after lift-off.
9008	Spin rocket failure; not recovered; camera operation good.
—	Failed to orbit due to electrical malfunction; diagnostic.
—	Successful water pick-up; diagnostic.
9009	All cameras operated without failure; first successful air recovery; major degradations were plus and minus density bars (pressure streaks) running diagonally across format.
9010	Vehicle pitch attitude improper at re-entry; capsule sank before recovery; camera operation good.

Flight	Mission	Camera	Agena	Thor	Camera Received at A/P	Camera Shipped to Base	Launch Date	SRV Recovery Date	Recovery Revolution	Film Footage		
										Panoramic	Stellar	Index
16	9011	C'-1	1061	253	6/6/60	9/17/60	10/26/60					
17	9012	C'-2	1062	297	9/12/60	10/17/60	11/12/60	11/14/60	31	1.7		
18	9013	C'-3	1103	296	10/9/60	10/29/60	12/7/60	12/10/60	48	7,012		
19			1101	258			12/20/60					
20	9014	A-1	1104	298	10/18/60	10/21/60	2/17/61					
21			1102	261			2/18/61					
22	9015	C'-4	1105	300	2/21/61	3/28/61	3/30/61					
23	9016	A-2	1106	307	11/30/60	3/16/61	4/8/61					
24	9018	A-3	1108	302	4/3/61	5/25/61	6/8/61					
25	9017	C'-5	1107	306	3/7/61	4/17/61	6/16/61	6/18/61	33	6,479		
26	9019	C'-6	1109	308	10/18/60	5/15/61	7/7/61	7/9/61	33	5,378		
27	9020	A-4	1110	322	4/4/61	6/24/61	7/21/61					
28	9021	C'-7	1111	309	11/13/60	5/20/61	8/3/61					
29	9023	C‴-1	1112	323	6/23/61	8/17/61	8/30/61	9/1/61	32	6,798		
30	9022	C‴-2	1113	310	5/29/61	7/17/61	9/12/61	9/14/61	33	7,078		

Mission No.	Comments
9011	Failed to orbit; D-timer malfunction.
9012	Film broke; air recovery successful.
9013	Camera operation good; telemetry no. 37; first successful mission employing C′ camera system; first use of Agena "B"; image quality considered to be as good as the best of mission 9009.
—	No satellite recovery vehicle installed; RM-1 payload.
9014	Orbital programmer failed at rev 31; camera failed.
—	No satellite recovery vehicle installed; RM-2 payload.
9015	Agena failure; no orbit; telemetry no. 39.
9016	Recovery attempted on rev 31 due to loss of control gas; camera operation good.
9018	Agena power failure and guidance problem resulted in ocean impact.
9017	Successful water pick-up.
9019	Camera failed on rev 22; air recovery successful.
9020	No orbit; Thor guidance destruct.
9021	No orbit; Agena guidance failure.
9023	First use of C‴ camera system; good operation.
9022	Successful mission.

Flight	Mission	Camera	Agena	Thor	Camera Received at A/P	Camera Shipped to Base	Launch Date	SRV Recovery Date	Recovery Revolution	Film Footage		
										Panoramic	Stellar	Index
31	9024	C″′-3	1114	324	5/22/61	8/23/61	9/17/61					
32	9025	C″′-4	1115	328	8/9/61	9/14/61	10/13/61	10/14/61	18	2,107		
33	9026	C′-8	1116	329	3/16/61	7/20/61	10/23/61					
34	9027	C′-9	1117	330	5/22/61	9/26/61	11/5/61					
35	9028	C′-10	1118	326	8/30/61	10/18/61	11/15/61	11/16/61	17	2,508		
36	9029	C‴-5	1119	325	11/10/61	11/27/61	12/12/61	12/16/61	64	7,392		
37	9030	C‴-6	1120	327	11/16/61	12/19/61	1/13/62					
38	9031	M-1	1123	241	1/3/62	2/16/62	2/27/62	3/3/62	65	14,218		
39	9032	M-2	1124	331	1/5/62	4/5/62	4/8/62	4/20/62	33	8,755		
40	9033	M-3	1125	333	1/26/62	4/11/62	4/28/62		64			
41	9034	A-5	1126	334	5/26/61	4/25/62	5/15/62	5/19/62	63			
42	9035	M-4	1128	336	2/16/62	5/13/62	5/30/62	6/2/62	49	14,678		

Mission No.	Comments
9024	Successful orbit; camera operation good; power failure before recovery precluded the event.
9025	Suspected Agena power problems prompted early recovery.
9026	Agena failed; went into sea after launch.
9027	Successful orbit; camera operation good; no recovery made due to gas valve failure.
9028	1-day operation due to shortage of control gas; camera operation good; recovery vehicle reused.
9029	Successful orbit; camera operation good; water pick-up; best mission to date; test of SO-132 film.
9030	Agena failure; no orbit.
9031	First mission of the M (stereo) series successful; first binary data block; frame camera failed; ablative shield recovered intact.
9032	Successful mission.
9033	Successful orbit; operation malfunction of orbital timer; chute ejector squibs failed; capsule sank.
9034	Bellows missing; H-timer and shutter timer malfunction.
9035	No frame camera operation; no filters on master horizon cameras; horizon camera shutter remained open 114 times; successful air recovery even though chute strap burned off and vehicle was 200 miles out of recovery zone.

Flight	Mission	Camera	Agena	Thor	Camera Received at A/P	Camera Shipped to Base	Launch Date	SRV Recovery Date	Recovery Revolution	Film Footage		
										Panoramic	Stellar	Index
43	9036	M-5	1127	335	3/1/62	5/21/62	6/1/62					
44	9037	M-6	1129	339	3/21/62	5/30/62	6/23/62	6/26/62	50	14,891		3
45	9038	M-7	1151	340	3/20/62	6/13/62	6/28/62	7/2/62	63	14,618		
46	9039	M-8	1130	342	4/11/62	6/20/62	7/20/62	7/22/62	33	3,019		5
47	9040	M-9	1131	347	4/19/62	7/3/62	7/28/62	7/31/62	65	14,896		1
48	9041	M-10	1152	344	4/30/62	7/17/62	8/2/62	8/6/62	65	14,523		46
49	9044	M-11	1153	348	5/19/62	8/24/62	8/28/62	9/1/62	65	14,723		6
50	9042	A-10	1132	349	6/22/62	8/6/62	9/1/62		65			
51	9043	M-12	1133	350	5/16/62	9/1/62	9/18/62	9/19/62	17	820		29

Mission No.	Comments
9036	Chute tore loose; SRV went into ocean; floated for 3 minutes then sank.
9037	No filters on slave horizon camera; first take from index camera; binary data block malfunctioned.
9038	First Agena "D" burned too long causing 3 minutes high on period; no filters on master horizon cameras; severe corona static.
9039	H-timer malfunction; mission limited to 2 days.
9040	Frame camera failed after two operates; no filters on slave horizon cameras; heavy corona and radiation fog.
9041	[redacted]
9044	Mission successful; frame camera intermittent.
9042	Chute tore from SRV during air pick-up; capsule sank.
9043	Low perigee (100 miles) prompted early recovery.

Flight	Mission	Camera	Agena	Thor	Camera Received at A/P	Camera Shipped to Base	Launch Date	SRV Recovery Date	Recovery Revolution	Film Footage		
										Panoramic	Stellar	Index
52	9045	M-13	1154	351	6/20/62	9/13/62	9/30/62	10/2/62	49	12,516	35	76
53	9046	A-9	1134	352	3/31/62	9/30/62	10/9/62	10/13/62	65			
54			1401				10/26/62					
55	9047	M-14	1136	367	6/25/62	10/23/62	11/5/62	11/9/62	65	14,946	43	99
56	9048	M-15	1135	353	7/10/62	11/12/62	11/24/62	11/29/62	61	14,896	9	21
57	9049	M-16	1155	361	9/19/62	11/24/62	12/4/62					
58	9050	M-17	1156	368	6/13/62	12/7/62	12/5/62	12/17/62	64	14,704	41	95
59	9051	M-18	1157	369	10/23/62	12/20/62	1/8/63	1/11/63	64	15,086	42	97
60	9052	M-20	1159	370	12/8/62	2/13/63	2/28/63					
61	8001	L-1	1164	360	11/27/62	3/5/63	3/18/63					
62	9053	M-19	1160	376	9/21/62	2/25/63	4/2/63	4/4/63	49	12,845	35	81

Mission No.	Comments
9045	First use of stellar camera; erratic vehicle attitude; numerous light leaks.
9046	High apogee (242 miles); shutter timer malfunction.
—	Deep probe radiation.
9047	Successful mission.
9048	Frame camera failed; picked up capsule 32 miles from Honolulu.
9049	Successful orbit; 2-day orbit due to 80-mile perigee; during air recovery, C-130 skyhook tore chute causing SRV to sink.
9050	Wratten no. 12 filter used on slave camera; best mission to date.
9051	Successful water pick-up 1,000 miles out of recovery zone.
9052	First use of thrust augmented Thor-3 booster; destroyed by RSO 100 seconds after launch; booster failed because third bottle was inoperative.
8001	First launch of Lanyard; second TAT worked perfectly; no orbit due to failure of pneumatic guidance of Agena booster.
9053	Agena 400-cycle inverter failed.

Flight	Mission	Camera	Agena	Thor	Camera Received at A/P	Camera Shipped to Base	Launch Date	SRV Recovery Date	Recovery Revolution	Film Footage		
										Panoramic	Stellar	Index
63	9055	A-12	1411	372	1/10/63	4/10/63	4/26/63					
64	8002	L-2	1165	364	2/26/63	4/14/63	5/18/63	5/20/63	33			
65	9054	M-21	1161	362	12/7/62	4/13/63	6/13/63	6/16/63	65	14,439	35	81
66	9056	M-22	1166	381	4/15/63	6/1/63	6/27/63	6/30/63	65	14,512	43	98
67	9057	M-23	1412	388	5/1/63	6/16/63	7/19/63	7/22/63	64	14,810	43	99
68	8003	L-3	1167	382	3/7/63	7/8/63	7/30/63	8/1/63	32	8,000	165	10
69	1001	J-1	1162	377	4/1/63	8/3/63	9/25/63	9/29/63 (-1) (-2)	64	14,909	40	92
70	9058	A-11	1169	394	9/3/62	8/2/63	8/29/63	9/2/63	65	4,300		
71	1002	J-2	1163	383	4/24/63	8/27/63	10/23/63	10/26/63 (-1) (-2)	49	15,159	36	83
72	9059	A-6	1601	386	2/21/61	10/8/63	10/29/63	11/3/63	65	4,300		

Mission No.	Comments
9055	No orbit achieved; attitude sensors misaligned.
8002	Agena boost too strong; erratic orbit; decoder 103 had no activate signal; D-timer slow.
9054	Mock-up P camera included in mission.
9056	First and only operational P camera included but its door failed to eject; main master camera seriously affected by light leaks.
9057	Center format switch closure on slave unit failed because of high temperatures.
8003	Camera malfunctioned on rev 23.
1001	First J-1 system flown; dual SRV system introduced; master horizon shutter remained open 1,000 times seriously fogging adjacent pan photography; unusually high system temperatures; S/I camera system operation intermittent; Agena 400-cycle inverter failed; second SRV not recovered.
9058	Successful mission.
1002	Sit period fogging due to light leaks; decoder failure in Agena; second SRV not recovered.
9059	Best Argon system to date; discontinuities three times on digital recording clock generator.

Flight	Mission	Camera	Agena	Thor	Camera Received at A/P	Camera Shipped to Base	Launch Date	SRV Recovery Date	Recovery Revolution	Film Footage		
										Panoramic	Stellar	Index
73	9060	M-24	1171	400	8/10/63	10/30/63	11/9/63					
74	9061	M-25	1172	406	9/27/63	11/18/63	11/27/63		81			
75	9062	M-26	1168	398	10/24/63	11/27/63	12/21/63	12/26/63	81	15,600	41	96
76	1004	J-5	1174	389	6/25/63	2/1/64	2/15/64	2/18/64 (−1) 2/22/64 (−2)	49 112	30,744	79	193
77	1003	J-6	1175	396	7/26/63	3/6/64	3/24/64	(−1) (−2)				
78	1005	J-8	1604	395	1/16/64	4/10/64	4/27/64	(−1) (−2)				
79	1006	J-9	1176	403	1/27/64	4/26/64	6/5/64	6/8/64 (−1) 6/12/64 (−2)	65 128	31,689	69	154
80	9065	A-21	1606	408	3/5/64	6/2/64	6/13/64	6/19/64	96			
81	1007	J-7	1609	410	12/30/63	5/13/64	6/19/64	6/24/64 (−1) 6/28/64 (−2)	65 128	31,725	82	189
82	1008	J-10	1177	404	2/27/64	5/19/64	7/10/64	7/4/64 (−1) 7/8/64 (−2)	49 112	31,690	124	118
83	1009	J-12	1605	413	3/30/64	6/26/64	8/5/64	8/9/64 (−1) 8/14/64 (−2)	49 128	29,727	89	178

Flight	Mission	Camera	Agena	Thor	Camera Received at A/P	Camera Shipped to Base	Launch Date	SRV Recovery Date	Recovery Revolution	Film Footage		
										Panoramic	Stellar	Index
84	9066	A-22	1603	412	4/9/64	8/4/64	8/21/64	8/27/64	96			
85	1010	J-11	1178	405	3/12/64	7/14/64	9/14/64	9/19/64 (-1) 9/24/64 (-2)	65 144	31,924	170	197
86	1011	J-3	1170	421	5/25/64	8/21/64	10/5/64	10/9/64 (-1) (-2)	64 112	16,250	20	95
87	1012	J-13	1179	418	3/30/64	7/30/64	10/17/64	10/20/64 (-1) 10/23/64 (-2)	49 81	21,637	86	48
88	1013	J-15	1173	420	4/17/64	9/16/64	11/2/64	11/6/64 (-1) 11/8/64 (-2)	65 81	12,213	70	120
89	1014	J-16	1180	416	6/4/64	10/26/64	11/18/64	11/23/64 (-1) 11/27/64 (-2)	81 145	31,646	104	177
90	1015	J-17	1607	424	9/30/63	11/16/64	12/19/64	12/24/64 (-1) 12/30/64 (-2)	81 175	29,618	114	175
91	1016	J-18	1608	414	9/6/63	11/24/64	1/15/65	1/20/65 (-1) 1/25/65 (-2)	81 159	32,107	106	194
92	1017	J-14	1611	432	11/15/63	12/21/64	2/25/65	3/2/65 (-1) 3/6/65 (-2)	81 145	30,756	71	103

Mission No.	Comments
9060	Vehicle became unstable 90 seconds after launch; crashed into ocean.
9061	Improper SRV separation precluded recovery.
9062	Successful mission.
1004	First recovery of both SRV's; stellar camera shutter operation erratic during -2.
1003	No orbit due to Agena regulated power failure.
1005	Successful launch and orbit; no power from Agena due to pyro buss failure; slave instrument failed due to film breakage; SRV crash-landed in Venezuela.
1006	One main camera door stuck for 2 orbits.
9065	Successful mission.
1007	First use of Wratten no. 25 filter on master camera; multiple exposures of stellar and index cameras on -2.
1008	Successful mission.
1009	Agena beacon problem; successful mission.

Mission No.	Comments
9066	Successful mission.
1010	Successful mission.
1011	Drogue chute failed on SRV-1; vehicle battery dropped to 18.5 volts; SRV-2 did not separate from Agena.
1012	Agena beacon problem; guidance problem on Agena required LIFEBOAT recovery; vehicle attitude became erratic on -2 and necessitated an early (water) recovery; first use of yaw steering; S/I camera system malfunction on -1.
1013	400 cycles accumulated involuntarily during rev 1 on both main cameras; both cameras failed on rev 52.
1014	Successful mission.
1015	First in-orbit deactivation; Zombie Mode for 3 days; early second recovery due to battery problem on Agena.
1016	Air recovery 40 miles from estimated point of impact.
1017	S/I cameras failed on -2; yaw programmer failure on rev 88, capping shutter malfunction.

Flight	Mission	Camera	Agena	Thor	Camera Received at A/P	Camera Shipped to Base	Launch Date	SRV Recovery Date	Recovery Revolution	Film Footage		
										Panoramic	Stellar	Index
93	1018	J-19	1612	249	5/20/63	1/13/65	3/25/65	3/29/65 3/31/65	(-1) 66 (-2) 99	30,320	6	13
94	1019	J-4	1614	437	5/8/63	1/28/65	4/29/65	5/4/65	(-1) 80 (-2)	14,630	54	92
95	1021	J-21	1615	438	11/18/64	4/29/65	5/18/65	5/23/65 5/28/65	(-1) 81 (-2) 161	25,313	80	185
96	1020	J-20	1613	444	11/13/64	3/15/65	6/9/65	6/15/65 6/16/65	(-1) 97 (-2) 113	21,577	87	98
97	1022	J-22	1617	446	12/28/64	5/17/65	7/19/65	7/24/65 7/28/65	(-1) 65 (-2) 144	31,990	79	192
98	1023	J-23	1618	449	1/28/65	6/9/65	8/17/65	8/22/65 8/26/65	(-1) 81 (-2) 144	28,072	63	146
100	1024	J-24	1619	458	3/2/65	8/10/65	9/22/65	9/27/65 10/2/65	(-1) 81 (-2) 161	32,062	88	185

Mission No.	Comments
1018	S I camera programmer failed; first J series reconnaissance system to be launched into a retrograde orbit; first use of stereo suppress mode.
1019	No recovery of -2 due to malfunction of recovery command system programming.
1021	S I camera failed on rev 74; first cartographic effort utilizing J-1 camera system; master camera failed on rev 102 because of a film jam caused by a post-emulsion coating cut in the film.
1020	Locked-on attitude jet caused uncontrollable vehicle tumbling; SRV recovered via LIFEBOAT system.
1022	Cycle counter on slave camera intermittent.
1023	Master camera operation intermittent; relay in command box probable cause.
1024	First use of Yardleigh frame processor; system deactivated (Zombie Mode) for 5 orbits.

Flight	Mission	Camera	Agena	Thor	Camera Received at A/P	Camera Shipped to Base	Launch Date	SRV Recovery Date	Recovery Revolution	Film Footage		
										Panoramic	Stellar	Index
101	1025	JX-28	1616	433	12/11/63	9/16/65	10/5/65	10/10/65 10/15/65	(-1) 81 (-2) 161	32,025	82	197
102	1026	J-25	1620	439	4/30/65	10/1/65	10/28/65	11/3/65 11/7/65	(-1) 81 (-2) 160	32,050	89	196
103	1027	JX-27	1621	448	6/4/64	10/25/65	12/9/65	12/10/65 12/11/65	(-1) 17 (-2) 33	11,376	28	65
104	1028	J-26	1610	451	5/26/65	12/2/65	12/24/65	12/29/65 1/2/66	(-1) 81 (-2) 144	31,864	95	197
105	1029	J-27	1623	450	5/28/65	12/16/65	2/2/66	2/8/66 2/12/66	(-1) 81 (-2) 160	32,051	86	124
106	1030	J-29	1622	452	7/2/65	1/24/65	3/9/66	3/15/66 3/19/66	(-1) 81 (-2) 159	31,995	110	222
107	1031	J-30	1627	474	9/21/65	3/2/66	4/7/66	4/14/66 4/18/66	(-1) 113 (-2) 177	24,140	98	188

Mission No.	Comments
1025	Anomalous deployment of main chute; excessive image smear due to poor control of vehicle attitude.
1026	Intermittent center of format switch operation; sticky shutter on horizon camera; smeared imagery due to vehicle command problem.
1027	D-timer switch failure; LIFEBOAT recovery for both SRV's; cameras not activated on -2 because of vehicle instability.
1028	Ascent vibration measurements made; index shutter operation abnormal on -2.
1029	Stellar shutter frequently overexposed on -1, -2 dual framing device inoperative from cut and and wrap (rev 81) to rev 134; relay failed to latch at cut and wrap.
1030	V/h stepper switch operation intermittent.
1031	First 7-day mission segment; slave camera failed on -2; battery activation redesign used; first use of Wratten no. 23A filter on master camera.

Flight	Mission	Camera	Agena	Thor	Camera Received at A/P	Camera Shipped to Base	Launch Date	SRV Recovery Date	Recovery Revolution	Film Footage		
										Panoramic	Stellar	Index
108	1032	J-28	1625	465	7/9/65	4/5/66	5/3/66		(-1) (-2)			
109	1033	J-33	1630	469	11/9/65	5/5/66	5/24/66	5/29/66 6/4/66	(-1) 82 (-2) 176	32,026	95	203
110	1034	J-31	1626	466	10/6/65	5/18/66	6/21/66	6/26/66 7/1/66	(-1) 81 (-2) 161	31,959	125	184
111	1036	J-32	1631	506	10/27/65	8/1/66	8/9/66	8/7/66 8/23/66	(-1) 115 (-2) 212	32,031	94	195
112	1035	J-36	1628	477	1/26/66	6/21/66	9/20/66	9/6/66 9/30/66	(-1) 81 (-2) 160	32,037	120	237
113	1037	J-38	1632	507	6/30/66	10/13/66	11/8/66	11/12/66 11/20/66	(-1) 66 (-2) 195	31,855	97	213
114	1038	J-34	1629	495	12/3/65	1/10/67	1/14/67	1/19/67 1/26/67	(-1) 81 (-2) 193	31,985	109	211
115	1039	J-39	1653	493	4/8/66	2/16/67	2/22/67	2/28/67 3/5/67	(-1) 81 (-2) 177	31,992	118	225

Mission No.	Comments
1032	Failed to achieve orbit; crashed into ocean.
1033	First use of orbit adjust system; special target orbit; system temperatures (100 °F) above predicted; excessive heating due to special ascent parameters; prograde 1-day synchronous orbit; 66° inclination.
1034	V/h programmer failure; pressure makeup gas depleted by rev 30.
1036	First interim phase III system; first Thorad booster; first 13-day total mission life; ascent vibration measurements made; introduction of five-rocket orbit adjust system.
1035	V/h programmer failed on rev 157; first use of pan geometry; new command system; first use of production model orbital sine function generators.
1037	Successful mission.
1038	High system temperatures; -2 film processed at Air Force Special Project Processing Facility.
1039	High system temperatures.

Flight	Mission	Camera	Agena	Thor	Camera Received at A/P	Camera Shipped to Base	Launch Date	SRV Recovery Date	Recovery Revolution	Film Footage		
										Panoramic	Stellar	Index
116	1040	J-35	1636	501	12/17/65	2/26/67	3/30/67	4/4/67 4/8/67	(−1) 81 (−2) 145	32,003	122	231
117	1041	J-40	1634	508	5/20/66	5/4/67	5/9/67	5/16/67 5/24/67	(−1) 93 (−2) 215	31,956	106	240
118	1042	J-37	1633	509	3/22/65	6/8/67	6/16/67	6/22/67 7/1/67	(−1) 97 (−2) 204	31,983	106	219
119	1043	J-42	1637	510	8/4/66	8/1/67	8/7/67	8/14/67 8/22/67	(−1) 113 (−2) 240	30,389	109	218
120	1101	CR-1	1641	512	2/14/67	9/19/67	9/15/67	9/21/67 9/28/67	(−1) 97 (−2) 208	31,131	1,844	2,02
121	1044	J-41	1639	513	7/6/66	10/29/67	11/2/67	11/9/67 11/11/67	(−1) 97 (−2) 144	31,972	107	216
122	1102	CR-2	1642	514	5/2/67	12/2/67	12/9/67	12/15/67 12/23/67	(−1) 83 (−2) 212	32,515	1,859	1,951
123	1045	J-45	1640	516	12/9/66	1/13/68	1/24/68	2/1/68 2/8/68	(−1) 112 (−2) 223	31,148	101	197

Mission No.	Comments
1040	Side-band link inoperative and ultrahigh frequency employed.
1041	Air recovery 225 nm down range due to abnormal orbit; Agena velocity meter failure.
1042	-2 water recovered.
1043	Film out of rails during last 803 feet on master camera; scan rate on master camera progressively slower; first 15-day mission.
1101	First J-3 mission; slit/filter change device test; constant rotator; system vibration telemetry link; SRV tape recorder; aft-looking camera incorrectly focused; average temperature low at 49 °F; through exposure test invalidated by cloud cover.
1044	First use of dual-gamma processing.
1102	Experimental tests included use of bi-color filter, polarizer filter, and tag-on of SO-230 film.
1045	Loss of telemetry of rev 85.

Flight	Mission	Camera	Agena	Thor	Camera Received at A/P	Camera Shipped to Base	Launch Date	SRV Recovery Date	Recovery Revolution	Film Footage		
										Panoramic	Stellar	Index
124	1046	J-48	1638	518	6/30/67	3/10/68	3/14/68	3/22/68 3/30/68	(−1) 113 (−2) 240	32,248	108	221
125	1103	CR-3	1643	511	3/24/67	4/25/68	5/1/68	5/8/68 5/15/68	(−1) 115 (−2) 220	32,427	1,861	1,980
126	1047	J-47	1645	517	6/18/67	6/13/68	6/20/68	6/29/68 7/5/68	(−1) 129 (−2) 240	32,298	102	221
127	1104	CR-4	1644	515	11/14/67	8/2/68	8/7/68	8/15/68 8/22/68	(−1) 115 (−2) 244	31,787	1,174	1,982
128	1048	J-49	1647	524	10/23/67	9/13/68	9/18/68	9/28/68 10/2/68	(−1) 145 (−2) 224	27,337	75	145
129	1105	CR-5	1646	515	2/2/68	10/24/68	11/3/68	11/11/68 11/21/68	(−1) 131 (−2) 292	46,502	None	None
130	1049	J-50	1648	527	1/22/68	11/30/68	12/12/68	12/19/68 12/23/68	(−1) 99 (−2) 179	32,424	111	234
131	1106	CR-6	1650	519	3/26/68	1/30/69	2/5/69	2/10/69 2/14/69	(−1) 66 (−2) 147	30,305	1,264	2,112
132	1050	J-43	1651	541	10/20/66	3/14/69	3/19/69	3/22/69 3/23/69	(−1) 34 (−2) 50	25,877	89	175

Mission No.	Comments
1046	First full load of SO-230 film; cameras exhibited a decrease in performance from rev 9 to end of mission; SO-230 emulsion buildup degraded focus in -2.
1103	First operational use of bi-color acquisition; experimental tests included a Wratten no. 12 filter and a tag-on of SO-380 film.
1047	Cold booster caused ground track mismatch; Agena/payload incompatibility caused concern but no mission impact.
1104	First use of third generation Petzval lens; excessive pressure in -2 due to PMU failure; tape recorder failure in -2 SRV; experimental tag-on of SO-180 film; first color acquisition in Corona series.
1048	Film tear and consequent camera failure in -2.
1105	First full load of SO-380 (UTB) film; experimental tag-on of SO-121 color film.
1049	Successful mission.
1106	First operational color film photography (with SO-121); first use of the digital shift register stored command system.
1050	Instability after rev 22 resulted in vehicle yaw of 30° per minute.

Flight	Mission	Camera	Agena	Thor	Camera Received at A/P	Camera Shipped to Base	Launch Date	SRV Recovery Date	Recovery Revolution	Film Footage		
										Panoramic	Stellar	Index
133	1051	J-44	1649	544	11/17/66	3/26/69	5/2/69	5/9/69 (-1) 5/18/69 (-2)	113 256	32,399	150	270
134	1107	CR-7	1652	038	4/20/68	7/17/69	7/24/69	8/2/69 (-1) 8/12/69 (-2)	147 308	32,539	2,150	1,889
135	1052	J-46	1653	030	2/10/67	9/11/69	9/22/69	9/29/69 (-1) 10/7/69 (-2)	115 244	32,489	150	270
136	1108	CR-9	1655	039	10/16/68	11/21/69	12/4/69	12/11/69 (-1) 12/21/69 (-2)	115 276	32,300	2,114	1,179
137	1109	CR-10	1657	041	5/17/69	2/27/70	3/4/70	3/12/70 (-1) 3/23/70 (-2)	115 309	31,775	2,147	1,479
138	1110	CR-11	1656	045	8/9/69	5/12/70	5/20/70	5/31/70 (-1) 6/8/70 (-2)	179 309	31,598	2,123	1,491
139	1111	CR-12	1654	556	9/25/69	7/15/70	7/23/70	7/30/70 (-1) 8/10/70 (-2)	112 301	31,702	2,138	1,445
140	1112	CR-2	1650	42	1/4/70	11/11/70	11/18/70	11/27/70 (-1) 12/7/70 (-2)	147 309	23,863	752	1,090

Mission No.	Comments
1051	Successful mission.
1107	Forward-looking camera (highest quality tested) failed.
1052	Last of the J-1 series.
1108	Experimental tag-on of SO-242 improved color film.
1109	Successful mission.
1110	3414 splice-in's on both cameras; first observation of electrostatic discharge spots.
1111	First full load of 3414 film; first in-flight focus-adjust test; first focus set for 60° nominal temperature; highest quality imagery to date; electrostatic spotting pattern associated with the recovery operation.
1112	Highest quality imagery to date; visual edge matching (VEM) used to evaluate in-flight focus adjust; during the cut and wrap sequence the forward camera film transport failed.

Flight	Mission	Camera	Agena	Thor	Camera Received at A/P	Camera Shipped to Base	Launch Date	SRV Recovery Date	Recovery Revolution	Film Footage		
										Panoramic	Stellar	Index
141	1113	CR-13	1659	537	10/11/69	2/10/71	2/17/72		(-1) (-2)			
142	1114	CR-14	1660	538	2/ 6/70	3/17/71	3/24/71	3/31/71 4/ 9/71	(-1) 115 (-2) 260	32,418	2,218	1433
143	1115	CR-15	1662	567	3/19/70	9/ 5/71	9/10/71	9/18/71 9/29/71	(-1) 115 (-2) 309	32,260	2,161	1543
144	1116	CR-16	1661	569	8/ 5/70	4/14/72	4/19/72	4/30/72 5/ 8/72	(-1) 180 (-2) 309	32,491	None	None
145	1117	CR-8	1663	571	8/27/68	5/16/72	5/25/72	5/27/71 5/31/72	(-1) 34 (-2) 98	32,565	None	None

Mission No.	Summary
1113	Failed to orbit.
1114	Highest quality M.I.P. 125 and highest preflight resolution of 218 c/mm at 2:1 contrast. Successful mission.
1115	Successful mission. Part 2 processed at Air Force special project processing facility 1st mission completely duplicated on SO-192.
1116	Successful mission. Highest percentage of cloud free photography for any KH4 mission. Part 2 processed at AFSPPF. No Disic flown.
1117	Short mission. Solar array failed to deploy and a high rate of control gas loss. All film processed at AFSPPF. No Disic flown.

92 B

[redacted]

J-3 ORBIT HISTORY

Mission	Inclination, degrees	Life, days	Mean Perigee Altitude, nm	Mean Frame Altitude, nm
1101	80.1	14	85	84.6
1102	81.6	14	85	86.7
1103	83.0	14	85	88.1
1104	82.1	15	83	87.3
1105	82.1	17	84	85.1
1106	81.5	9	81	83.5
1107	74.9	19	98	99.5
1108	81.5	17	95	94.2
1109	88.0	19		97.3
1110	83.0	19		96.2
1111	60.0	18		100.4
1112	83.0	19		100.0
1113		0		
1114	81.5	16	86.5	97.0
1115	74.94	19	86.03	85.4
1116	81.5	19	91.5	87.0
1117	96.4	6	93.3	88.0

VEHICLE

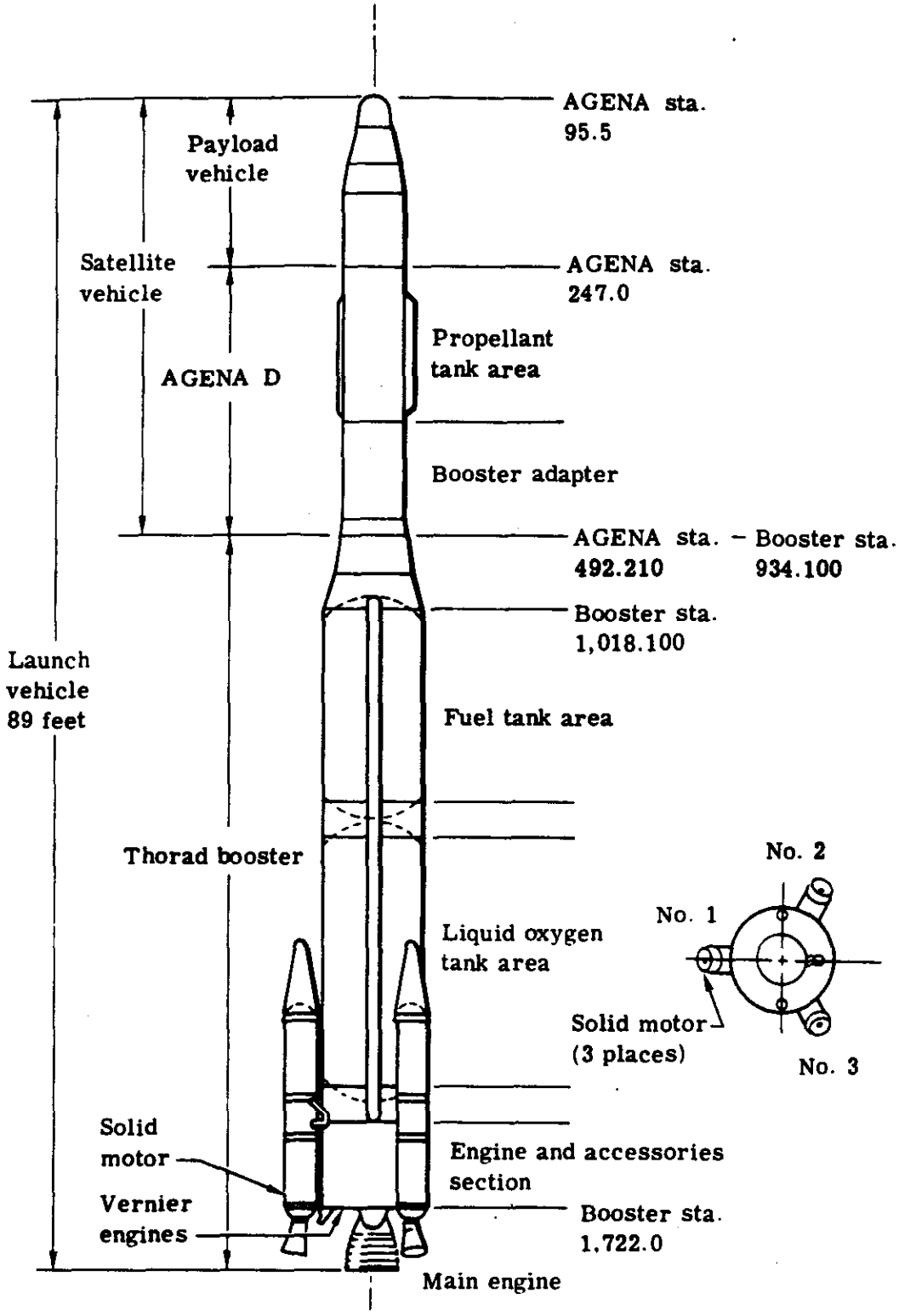
COMMANDS

The J-3 system receives its power from the AGENA vehicle and its command signals from the LMSC control package via the vehicle interface harness which interfaces with the J-3 system's main electronics box. Inputs to the main electronics box interface are as follows:

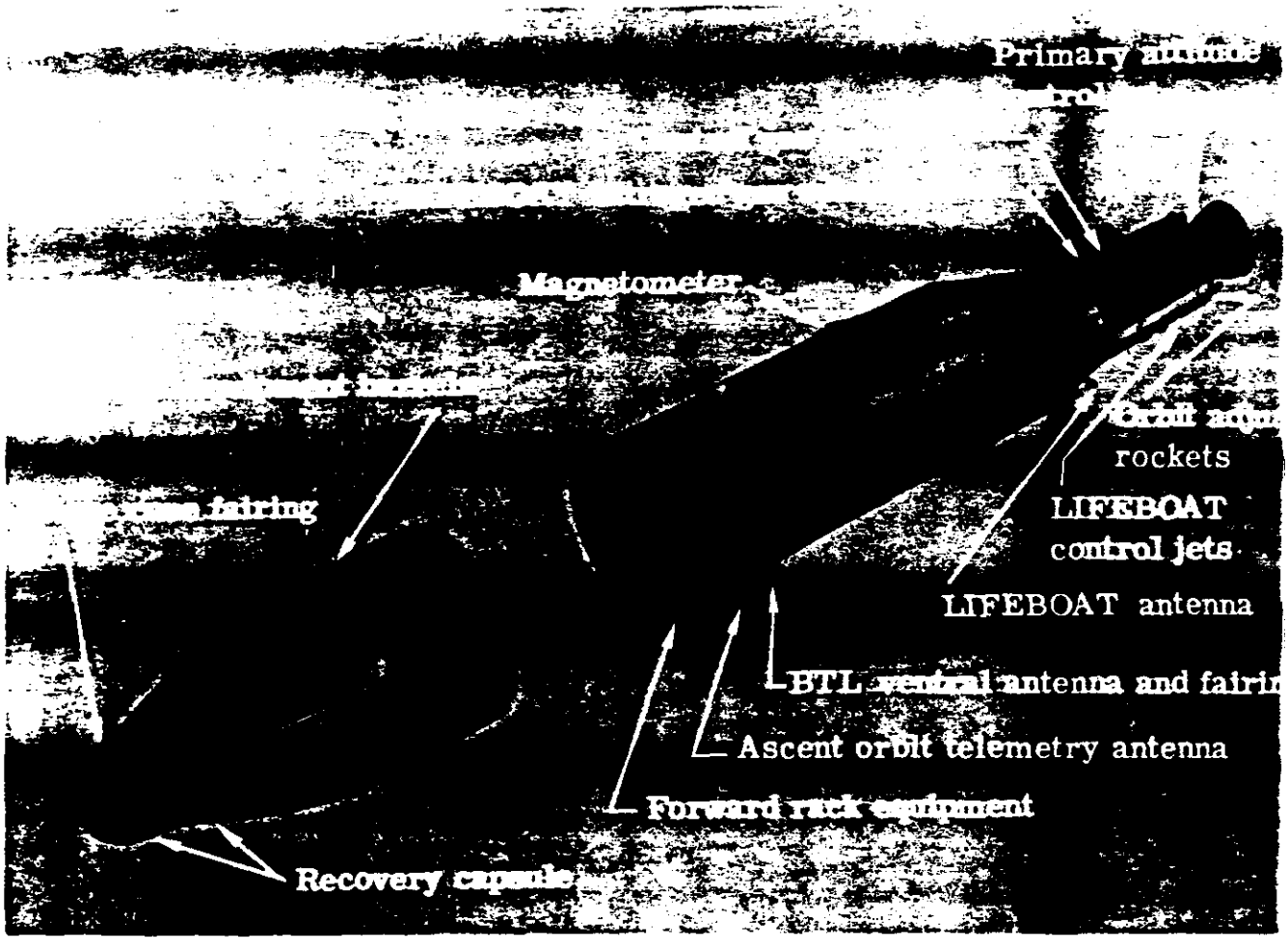
1. Plus 24 vdc, unregulated, 115 vac, 400 cps power
2. Control commands
    a. Launch mode
    b. Orbit (standby) mode
    c. Operate
    d. V/h
    e. A to B transfer
3. Other commands
    a. Exposure slit position
    b. Clock signal
    c. Slit width failsafe
    d. Filter change
    e. Slit width failsafe reset.

[redacted]

NOMENCLATURE OF THE MAJOR COMPONENTS OF THE LAUNCH VEHICLE



AGENA AND PAYLOAD VEHICLE



VEHICLE BOOSTER (SLV-2G THORAD)

The SLV-2G booster consists of a main liquid-propellant vernier engine, and three solid-propellant thrust augmentation rocket motors.

Propulsion Performance Characteristics

1. Liquid-propellant engine

Fuel	RJ-1
Oxidizer	Liquid oxygen
Thrust	176,962 pounds
Mixture ratio	2.06 ± 2 percent
Specific impulse	286.6 seconds
Propellant utilization (min)	99.8 percent
Total impulse	41,737,441 pound-seconds

2. Solid engines (each)

Axial specific impulse	265.3
Thrust (nominal during web-burn)	56,919 pounds
Total impulse	2,138,447 pound-seconds
Operational temperature range	10 to 110 °F
Main engine burn time	219 seconds
Vernier engine burn time	228 seconds
Solid motor burn time	37 seconds
Reliability	0.98

SLV-2G THORAD BOOSTER WEIGHT BUDGET

Item	Weight, pounds	Total Weight, pounds
1. Weight Empty		
Propellants	145,926	7,797
Pressurization gas	798	
Solid motor boosters (3)	29,589	
2. Stage I Weight at Liftoff		
Less expendables	93,044	183,906
Less solid motor cases (3) (burn out at 40 seconds)	4,803	
3. Weight at Solid Motor Separation		
Less expendables (102 seconds)	76,557	86,059
4. Weight at Main Engine Cutoff		
Less expendables (218.4 seconds)	163	9,502
5. Weight at vernier engine cutoff		
(228.9 seconds)		9,339

NOMINAL AGENA WEIGHT SUMMARY

Item	Weight, pounds	Total Weight, pounds
1. Weight Empty (including three gas bottles and DMU supports)		2,005
Propellants	13,540	
Helium	1	
Attitude control gas (-3 mix)	115	
Ex. altitude control gas – L/B (-3 mix)	16	
IM batteries	744	
DMU rockets	185	
2. Gross Weight Without Payloads		16,606
Less adapter and attach	408	
Less retro rockets	10	
Less destruct system	6	
Less horizon sensor fairings	7	
Less attitude control gas	1	
3. Ignition Weight Without Payloads		16,174
Less propellants	13,392	
Less engine start change	1	
Less attitude control gas	3	
4. Burnout Weight		2,778
Less residual propellants	48	
Less helium	1	
Propellant margin	100	
5. Weight On Orbit With Gas But Without Payload		2,629
Less remaining attitude control gas	111	
Less remaining L/B gas	16	
6. Empty Weight On Orbit Without Gas, Without Payload, 12 DMU Rockets and W6 IH Batteries		2,502

SATELLITE VEHICLE (AGENA)

The AGENA SS01B, vehicle is a liquid fueled second stage booster, powered by a gimballed rocket engine. The AGENA assumes both ascent and orbital functions. Nominal thrust of the AGENA is 16,000 pounds and nominal thrust duration is 245 seconds for a maximum payload capability of 1,850 pounds. Propellants consist of unsymmetrical dimethylhydrozine (UDMA), and inhibited red fuming nitric acid (IRFNA) oxidizer.

The reliability objective for the satellite vehicle is 0.956 for the period of time during which the vehicle is functioning in the ascent mode, and 0.91 in the active orbital mode for 15 days.

The orbital programmer provides a capability of 52 stored command (brushes), operating with 13 brushes each on four reels of punched tape. Tape length is compatible with the mission duration, and tapes shall be capable of maintaining synchronization by resetting ± 150 second of programmed events with the determined position of the AGENA. Accuracy of the orbital programmer is ± 3.5 seconds, including the effect of clearances on tape punching.

Ascent functions of the AGENA vehicle are to:

1. Provide thrust required to attain injection of the satellite vehicle and payload into the specified orbit
2. Maintain attitude control and respond to guidance steering commands so that injection into orbit is accomplished within allowable tolerances
3. Provide a means for relaying radio guidance commands to the stage I booster from a receiver mounted in the satellite vehicle during the first stage booster guided portion of flight
4. Provide telemetry data concerning vehicle performance and equipment status during the ascent.