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29 Pages
(Including Cover Sheet)

CORONA "M" FLIGHT DATA BOOK

SYSTEM NO. M12

VEHICLE NO. 1133

MISSION NO. 9093

Prepared by: [redacted]

Checked by: [redacted]

Approved by: [redacted]
(Engineering Manager)

Approved by: [redacted]
(Project Manager)

Approved by: [redacted]
(SAFSP)

[redacted]

[redacted] TOP SECRET

SYSTEM NO. _____
VEHICLE NO. _____
MISSION NO. _____
CAMERA NOS. _____

[redacted] TOP SECRET

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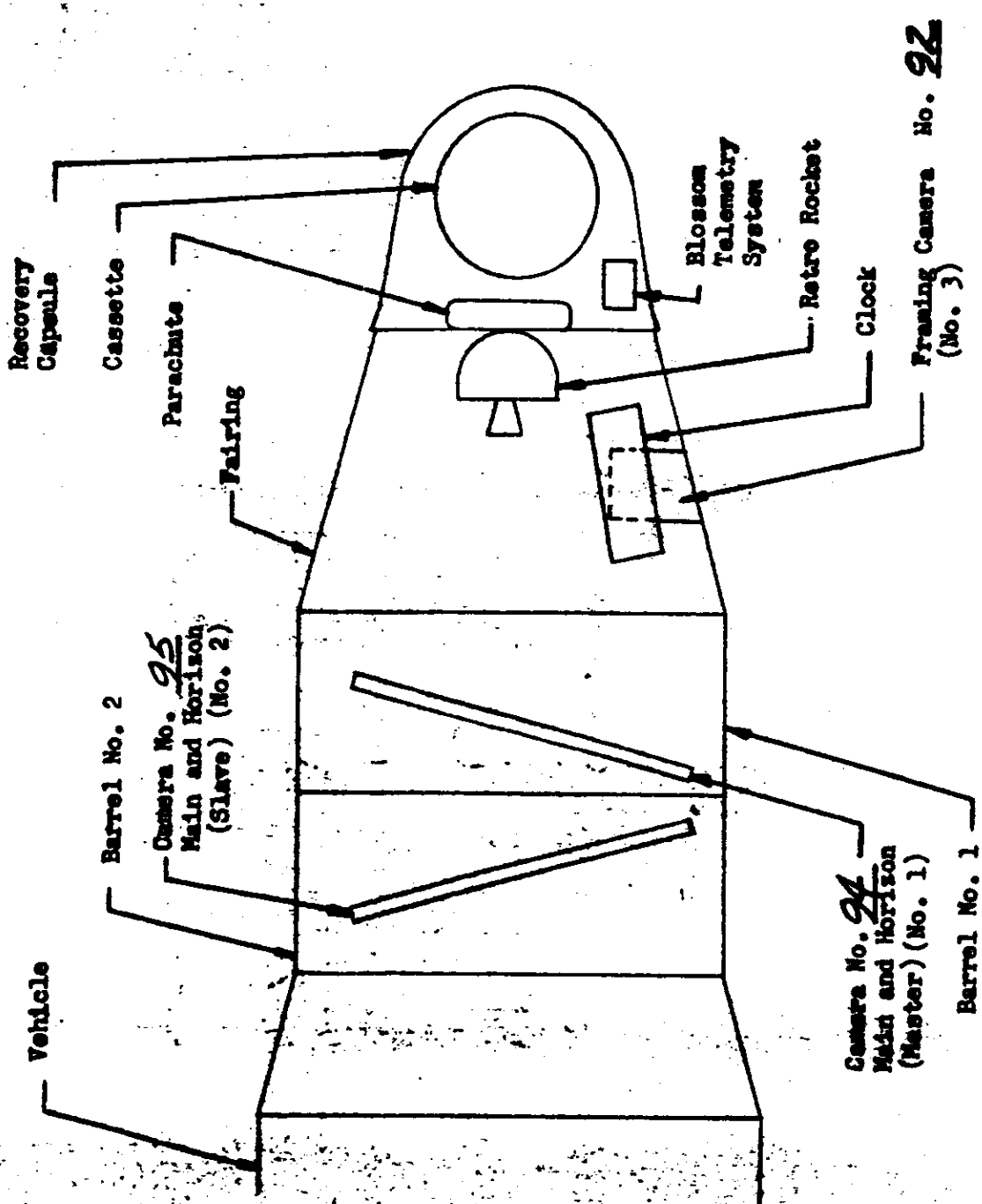
SYSTEM NO. M12
VEHICLE NO. 1133
MISSION NO. 9013
CAMERA NOS. 92 & 95

VEHICLE LAYOUT:



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SYSTEM NO. 1112
VEHICLE NO. 1133
MISSION NO. 9043
CAMERA NOS. 94 & 95

TOP SECRET [redacted]

GENERAL FLIGHT DATA:

Discoverer No. 51

Main Camera No. 1 Serial No. 94

Main Camera No. 2 Serial No. 95

Framing Camera Serial No. 92

Launch Date 9/17/62

Orbital Parameters: (Rev. 2)

Period 93.33 Min. Eccentricity .034

Perigee 112 NM Perigee Latitude 23.6 Deg. N

Apogee 362 NM Inclination Angle 81.87 Deg. N

Recovery Revolution No. 17

Recovery Date 9/18/62

REMARKS:

PAGES 21 THRU 29.

TWX FORMAT, WITH STELLAR INDEX INFORMATION IS INCLUDED FOR ESTABLISHING FORMAT FOR TRANSMISSION PURPOSES ON FUTURE MISSIONS.

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[redacted]

TOP SECRET

SYSTEM NO. M12
VEHICLE NO. 1133
MISSION NO. 9043
CAMERA NOS. 94 & 95

PRE-LAUNCH INFORMATION:

V/H Programmer Set On Step 3 At Launch

Main Camera Settings:

	Camera No. 94	Camera No. 95
Main Optics Slit Width	.200 in.	.200 in.
Horizon Optics Exposure Time	1/200 Sec.	1/200 Sec.
Horizon Optics Aperture	F 6.8	F 6.8

Framing Camera Settings:

Exposure Time 1/250 Sec.

Aperture F 6.3

Ratio: One Framing Camera Frame Per 7 Camera No. 1 Frames

Film:

	Camera No. 94	Camera No. 95	Framing Camera
Type	J23(S0132)	J23(S0132)	J30 (S0130)
Length	1800 Ft.	1800 Ft.	135 Ft.
No. of Splices	2	3	NONE
Emulsion Data	26-10-2-5-2	26-2-1-7-5-2	15-2-7-2

TOP SECRET

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PERFORMANCE ESTIMATE

Pass No.	Frames Camera No.			Feet Camera No.			Latitude Degrees On	Latitude Degrees Off	Time On Hr. Min.	Dur Sec.	Solar Angle On	Solar Angle Off	Exp. Time Milliseconds On	Exp. Time Milliseconds Off	Ramp No.	Instr. On Sec Up Ramp
PRE-LAUNCH	133	132		351	348		---	---	---	---	---	---	---	---	---	---
1AX1	22	21		58	55		73	77	0106	78	4	6	4.9	4.7	3	684
2AX1	44	44		116	116		70	78	0239	169	3	7	5.2	4.8	3	517
2DX1	31	31		82	82		70	65	0248	96	17	18	4.1	4.0	3	1085
3AX1	35	35		92	92		77	82	0414	144	6	9	5.6	5.2	1	665
3DX1	84	83		221	219		71	53	0421	274	16	22	4.6	4.1	1	1089
4AX1	58	57		153	150		80	78	0549	221	8	14	5.4	4.9	1	740
4DX1	80	79		211	208		75	58	0553	270	15	20	4.8	4.3	1	1018
4DX2	43	42		113	111		59	46	0559	132	20	23	4.2	4.0	1	1343
5DX1	27	27		71	71		81	80	0723	105	10	13	5.2	4.9	1	826
5DX2	146	145		385	382		77	49	0726	477	14	22	4.8	4.0	1	988
6DX1	37	37		98	98		81	77	0858	124	12	14	4.5	4.3	3	866
6DX2	153	153		403	403		74	47	0900	446	15	23	4.2	3.6	3	1028
6DX3	55	55		145	145		43	34	0908	147	23	24	3.5	3.3	3	1511
6DX4	68	67		179	177		29	19	0912	167	25	25	3.3	3.2	3	1724
7DX1	177	176		467	464		77	41	1033	569	14	24	4.8	3.8	1	998
8DX1	165	165		435	435		69	36	1208	512	17	24	4.5	3.7	1	1122
9AE	8	8		21	21		38	40	1324	48	0	0	8.4	8.1	1	51
9DX1	95	94		250	248		62	44	1344	293	19	23	4.3	3.9	1	1253
14AX1	40	40		105	105		72	78	2119	150	4	7	5.0	4.7	3	558
14DX1	72	72		190	190		22	12	2140	175	25	24	3.2	3.1	3	1803

SYSTEM NO. M-12
VEHICLE NO. 1123
MISSION NO. 9043
CAMERA NOS. 92 & 93
FRAMING CAMERA NO. 92

TOP SECRET

PERFORMANCE ESTIMATE

Pass No.	Frames Camera No.		Feet Camera No.		Latitude Degrees On	Latitude Degrees Off	Time On Hr. Min.	Dur. Sec.	Solar Angle On	Solar Angle Off	Exp. Time Millisec On	Exp. Time Millisec Off	Ramp No.	Instr. On Sec in Ramp
15AX1	35	35	92	92	71	78	2252	131	3	7	5.0	4.7	3	561
15DE	17	17	45	45	38	35	2310	46	24	24	3.4	3.3	3	1603
16AX1	46	46	121	121	72	80	0026	169	4	8	5.0	4.7	3	564
17AX1	30	30	79	79	80	81	0202	105	8	9	4.7	4.5	3	728

TOP SECRET

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TOP SECRET

SYSTEM NO. M12
VEHICLE NO. 1123
MISSION NO. 9043
CAMERA NOS. 94 & 95

PRE-FLIGHT CYCLE PERIOD: (CAMERA NO. 94)

V/H Ramp	Cycle Period Seconds	FMC Rate		Scan Rate		
		Rad. Per Second	In. Per Second	Rad. Per Second	In. Per Second	Exposure Millisec
1 START	6.46	.013	.313	.973	23.393	8.57
1 END	2.72	.031	.745	2.310	55.459	3.61
3 START	5.32	.016	.381	1.181	28.345	7.06
3 END	2.53	.033	.800	2.483	59.603	3.36

IN-FLIGHT CYCLE PERIOD: (CAMERA NO. 94)

Rev. No.	V/H Ramp	Cycle Period Seconds	FMC Rate		Scan Rate		
			Rad. Per Second	In. Per Second	Rad. Per Second	In. Per Second	Exposure Millisec
9	1(100)	6.03	.014	.336	1.042	25.007	8.00
15	3(160)	2.62	.032	.773	2.398	57.555	3.47

(XX) = TIME UP RAMP IN SECONDS

TOP SECRET

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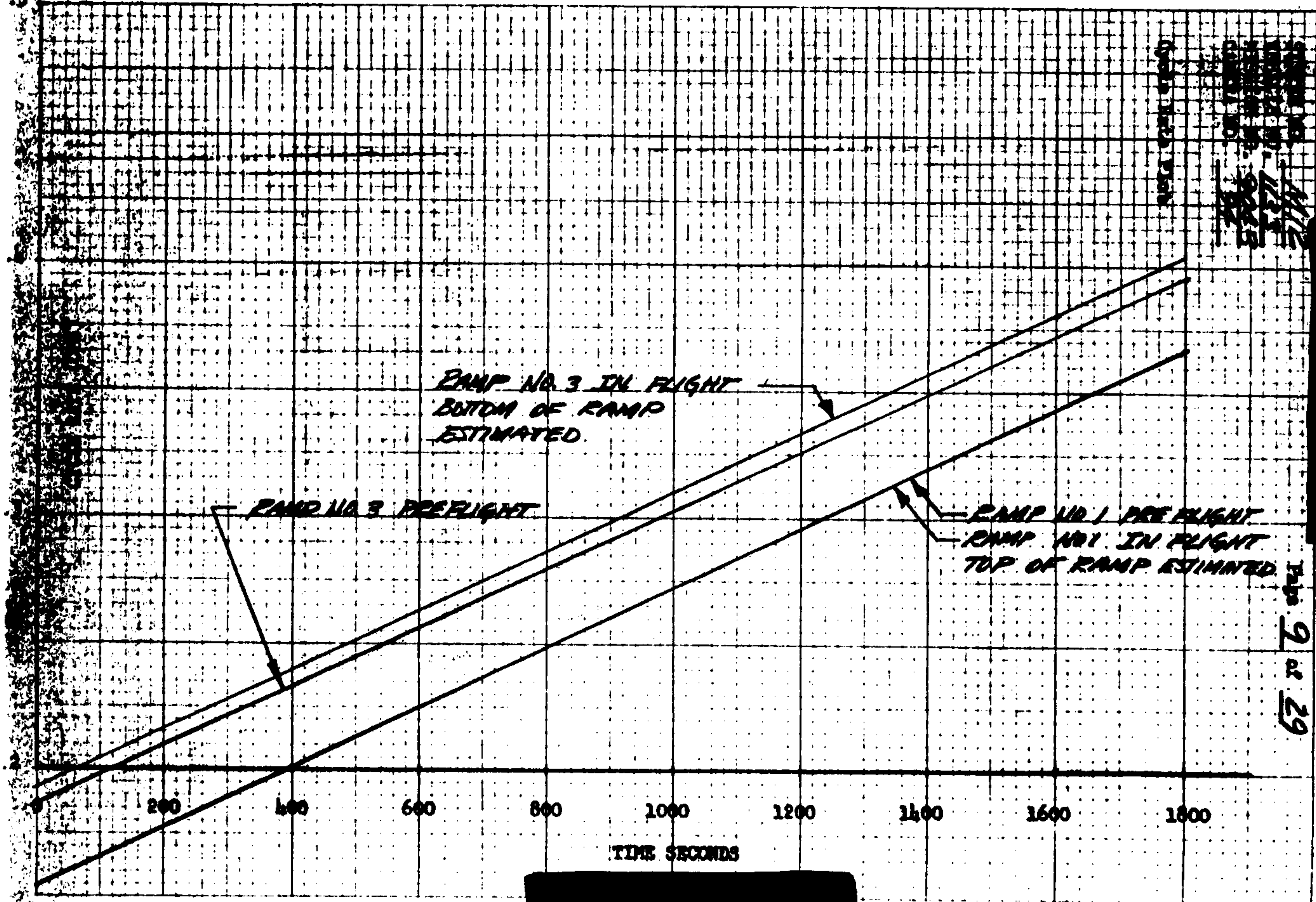
TOP SECRET

[redacted]

TOP SECRET



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SYSTEM NO. M12
VEHICLE NO. 4133
MISSION NO. 9023
CAMERA NOS. 94,95

TOP SECRET

PRE-FLIGHT CYCLE PERIOD: (CAMERA NO. 95)

V/H Ramp	Cycle Period Seconds	FMC Rate		Scan Rate		
		Rad. Per Second	In. Per Second	Rad. Per Second	In. Per Second	Exposure Millisec
1 START	6.44	.013	.314	.976	23.415	8.54
1 END	2.68	.031	.756	2.344	56.267	3.55
3 START	5.28	.016	.384	1.190	28.560	7.00
3 END	2.49	.034	.813	2.523	60.560	3.30

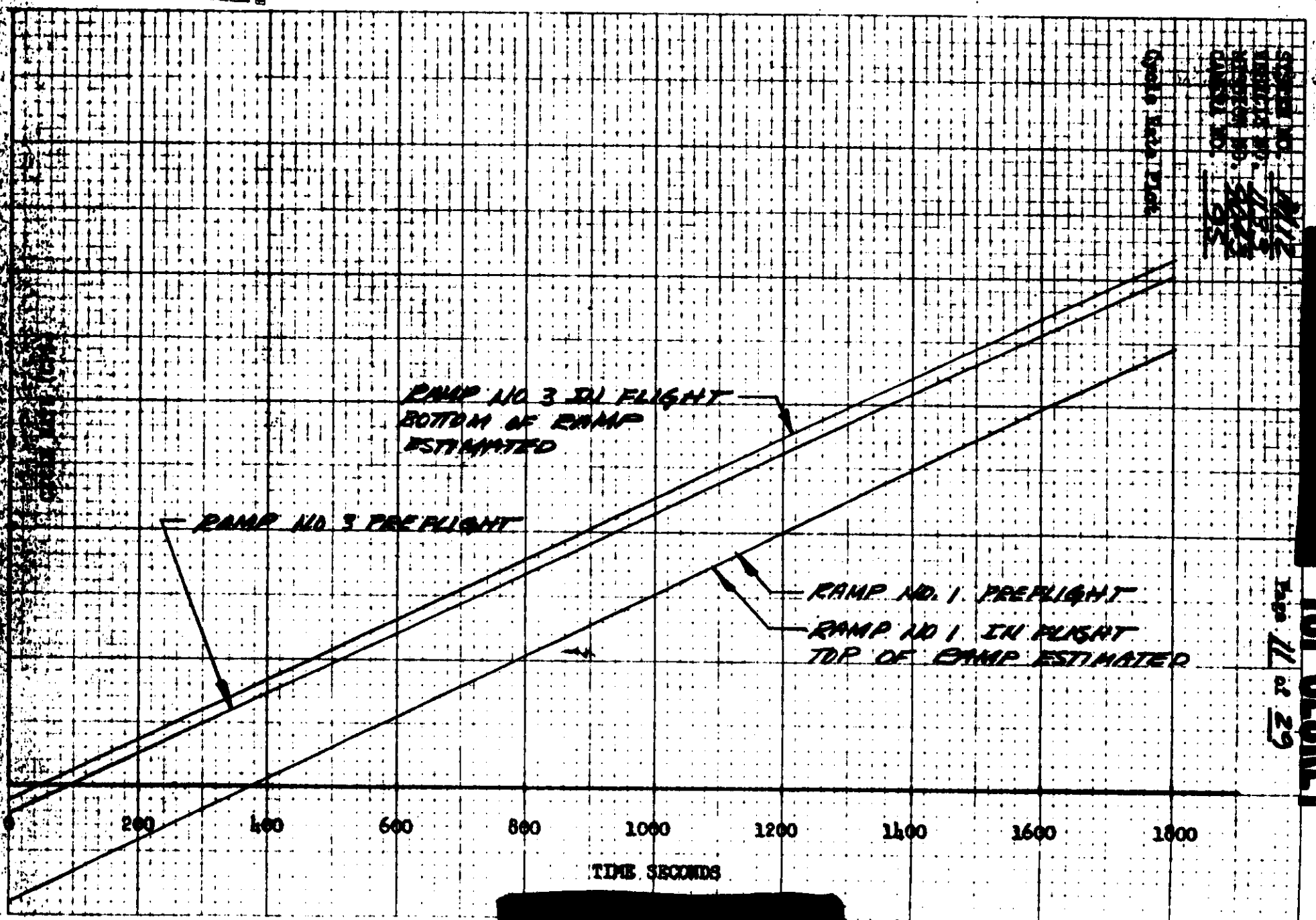
IN-FLIGHT CYCLE PERIOD: (CAMERA NO. 95)

Rev.No.	V/H Ramp	Cycle Period Seconds	FMC Rate		Scan Rate		
			Rad. Per Second	In. Per Second	Rad. Per Second	In. Per Second	Exposure Millisec
9	1 (100)	5.96	.014	.340	1.054	25.301	7.90
15	3 (1600)	2.61	.032	.776	2.407	57.776	3.46

(XX) = TIME UP RAMP IN SECONDS

TOP SECRET

[redacted]



LENS DATA SUMMARY: (Main Camera No. 94)

Lens Serial No. 0352435

Filter Type _____

Equivalent Operational Focal Length 609.600 MM

Resolution:

Static:

	Lines/MM	Film Type	Target Contrast
Bench Test	210.5	SO243	HIGH
Other	____	____	____

Dynamic:

Itek Pre-Vibration	166	SO132	HIGH
Itek Post Vibration	166	SO132	HIGH
AP	152.8	SO132	HIGH
AP	77.2	SO132	LOW
Other	____	____	____

Note: Itek Post Vibration Resolution of 166 lines/MM Reported In Message No. [redacted] dated 9/17/62

Distortion - Positive (Pincushion)

Angle Off Axis Deg.	3	2	1	0	359	358	357		
Distortion Millimeters	.004	.002	.000	.000	.000	.001	.004		

LENS DATA SUMMARY: (Horizon Cameras for Main Camera No. 94)

	Take-Up	Supply
Lens Serial No.	807559	807550
Exposure Time	1/200 Sec.	1/200 Sec.
Filter Type	Wratten 25	Wratten 25
Aperture	F6.8	F6.8
Operational Focal Length	89.2 MM	89.3 MM
Radial Distortion:		
10° off Axis	.016 MM	.006 MM
20° off Axis	.044 MM	.031 MM
Tangential Distortion (Maximum Vector)	.010 MM	.004 MM

Resolution:

Angle off Axis Deg.	0	5	10	15	20	25	27.5	0	5	10	15	20	25	27.5
Radial Resolution	51	44	40	37	36	34	29	51	47	40	30	31	29	24
Tangential Resolution	51	42	37	34	34	25	20	Not Available						

36.7 Lines/MM Avg. 36.0 Lines /MM Avg.

Note:

1. Distortion and resolution are read at equivalent operational focal length.
2. Resolution in lines per mm on Super XX film and High contrast target.

SYSTEM NO. M12
VEHICLE NO. 1133
MISSION NO. 9023
CAMERA NOS. 94&95

[redacted] TOP SECRET

LENS DATA SUMMARY: (Main Camera No. 95)

Lens Serial No. 0362435

Filter Type WRATTEN 21

Equivalent Operational Focal Length 609.628 MM

Resolution:

Static:

	Lines/MM	Film Type	Target Contrast
Bench Test	215.5	SO243	HIGH
Other			

Dynamic:

Itek Pre-Vibration	164	SO132	HIGH
Itek Post Vibration	164	SO132	HIGH
AP	164	SO132	HIGH
AP	88	SO132	LOW
Other			

Note: Itek Post Vibration Resolution of 164 lines/MM Reported In Message No. [redacted] dated 9/17/62

Distortion - Positive (Pincushion)

Angle Off Axis Deg.	3	2	1	0	359	358	357		
Distortion Millimeters	.009	.006	.002	.000	.002	.005	.008		

[redacted] TOP SECRET

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LENS DATA SUMMARY: (Horizon Cameras for Main Camera No. 95)

	Take-Up	Supply
Lens Serial No.	807563	807526
Exposure Time	1/200 Sec.	1/200 Sec.
Filter Type	WRATTEN 25	WRATTEN 25
Aperture	F6.8	F6.8
Operational Focal Length	89.0 MM	89.3 MM
Radial Distortion:		
10° off Axis	.001 MM	.007 MM
20° off Axis	.027 MM	.037 MM
Tangential Distortion (Maximum Vector)	.012 MM	.014 MM

Resolution:

Angle off Axis Deg.	0	5	10	15	20	25	27.5	0	5	10	15	20	25	27.5
Radial Resolution	51	49	39	39	30	31	27	51	53	40	29	24	27	29
Tangential Resolution	51	49	39	29	32	25	20	51	47	37	34	32	25	21

36.5 Lines/MM Avg. 35.7 Lines/MM Avg.

Note:

1. Distortion and resolution are read at equivalent operational focal length.
2. Resolution in lines per mm on SUPER XX film and HIGH contrast target.

TOP SECRET

[redacted]

DEFINITION OF MAIN CAMERA FORMAT CALIBRATIONS:

1.0 Measurements are made with respect to collimator targets fixed with respect to the mechanical interface between the total payload assembly and the Agena vehicle with the position of the total payload being changed for each instrument calibration.

2.0 Three targets are aligned to be coplanar within ± 5" of arc. The longitudinal axis of the vehicle (Z axis) is so positioned to form an angle of 105.00° ± 5" to the target plane for camera number one calibrations and an angle of 75.00° ± 5" to the target plane for camera number two calibrations.

2.1 One target, Target 1, is in the ZX plane (Nadir) imaging on the Terrain format.

2.2 The second and third targets are at angles of 75.00° ± 5" from target one and are imaged on the horizon formats.

3.0 The indicated center of format of the main cameras is given by the intersection of a line through the center of mass of the central shrinkage marker drawn normal to the edge of format containing the shrinkage marker and a line parallel to the same edge located at a position half-way between the format edges.

4.0 The indicated principal points of the horizon cameras are the points of intersection of lines joining opposite fiducials.

5.0 Xvo and Yvo are the offsets of Target 1 from the indicated center of format as defined in paragraph 3.

6.0 Xs, Ys and Xt, Yt are the offsets of Targets 2 and 3 from the indicated principal points of the supply and take-up horizon cameras respectively.

7.0 The indicated flight direction is the direction of vehicle travel during orbit. The forward edge of format is the edge opposite the shrinkage markers for camera number one and is the edge containing the shrinkage markers for camera number two.

8.0 Dimensions A, B, and C are the spacings of the shrinkage markers. Dimensions D and E are the spacings of the Y Axis fiducials. Techniques for exact measurement of these dimensions have not been developed. The figures quoted are measurements made on hand processed film without control of shrinkage.

9.0 The format dimensions are measured to the best estimate of format edge.

10.0 Measurement of the angle between the indicated axis of the main cameras and the line of intersection of the plane dfined in Para. 2 on the format is not currently available. It is assumed to be zero, but is uncontrolled.

11.0 Measurement of the angle between the indicated axis of the horizon cameras and the line of intersection of the plane defined in Para. 2 on the format is made by positioning two targets for each horizon format normal ± 5" of arc to the plane defined in Para. 2. Dimensions F, G, H, J, K, L, M and N are the offsets of these targets.

SYSTEM NO. 4112
VEHICLE NO. 1133
MISSION NO. 0025
CAMERA NOS. 24, 25

FORMAT DIMENSIONS: (MAIN CAMERAS)

[redacted]

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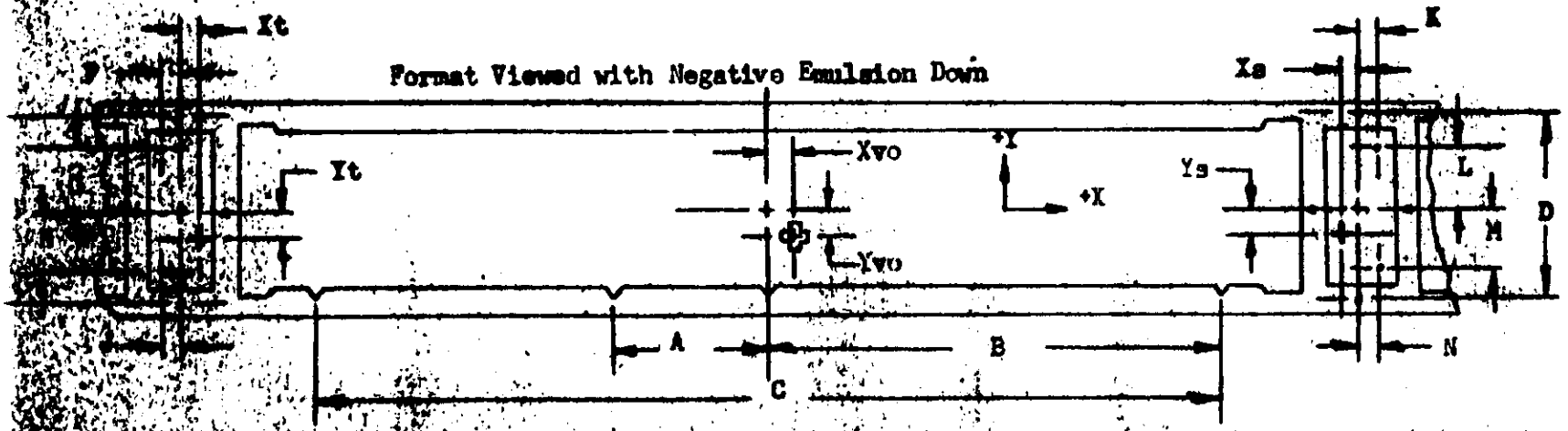


Camera No. 24 Vehicle Motion | Scan Direction →

A	76.150	Xs	-.137	H	-23.563
B	355.297	Ys	+.153	J	-5.341
C	710.637	Xvo	-.743	K	+5.024
D	56.521	Yvo	-.345	L	+23.316
E	56.483	F	-.5489	M	-23.040
Xt	-.455	G	+24.095	N	+4.808
Yt	+.350				

Format Dimensions:

	Main Take-Up	Supply
Height	55.8	Not Available
Width	753.9	Not Available

Camera No 25 Vehicle Motion | Scan Direction →

A	76.198	Xs	-.647	H	-23.750
B	355.332	Ys	-.082	J	-4.737
C	710.627	Xvo	+.592	K	+4.348
D	56.470	Yvo	+.502	L	+23.740
E	56.373	F	-4.534	M	-23.919
Xt	+.404	G	+22.654	N	+4.211
Yt	-.521				

Format Dimensions:

	Main Take-Up	Supply
Height	55.9	Not Available
Width	753.7	Not Available

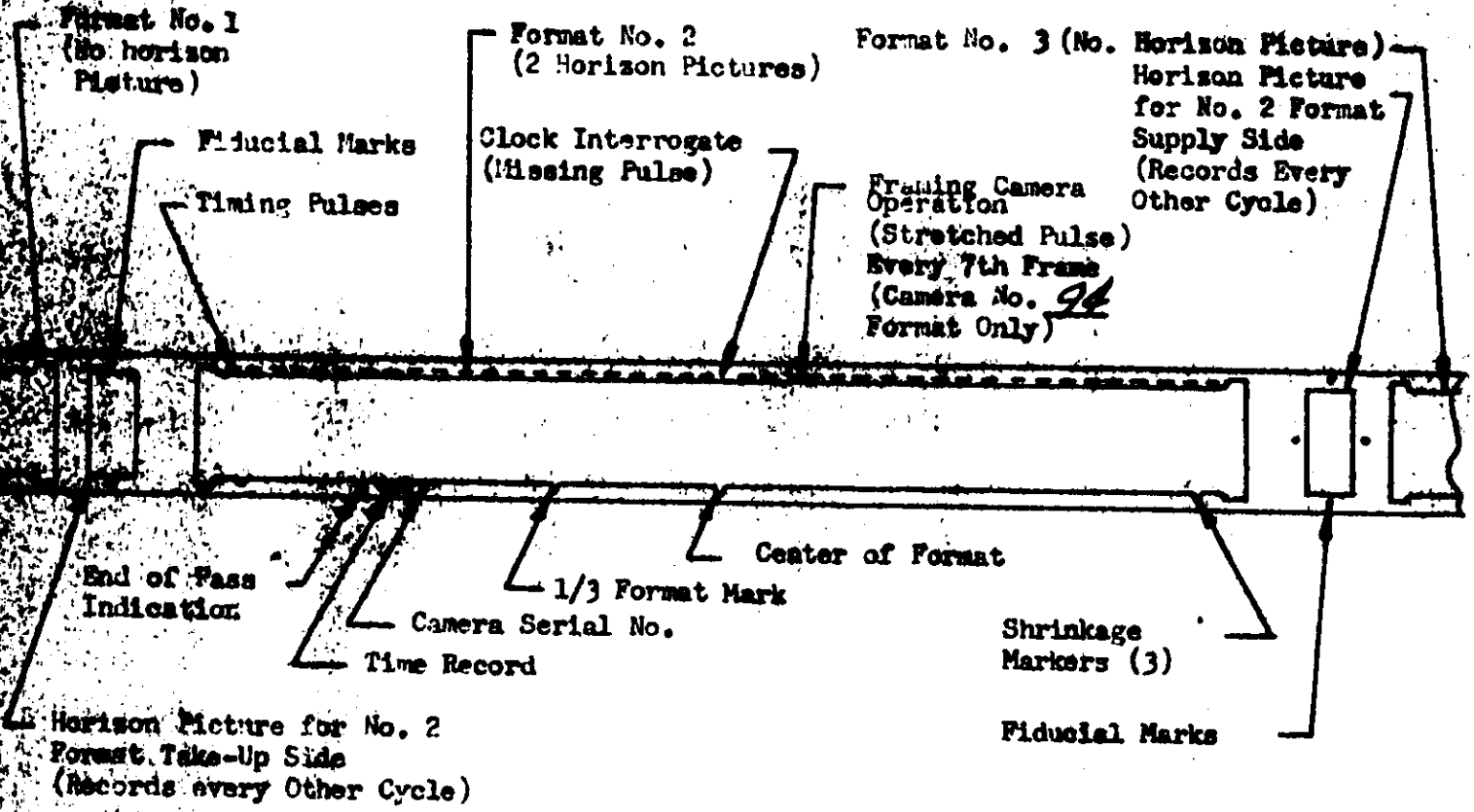
Note: 1. All dimensions are in millimeters and are average dimensions of three formats.
2. Height of main format is taken at center of format.
3. Format sign convention

-X +Y	+X +Y
-X -Y	+X -Y

[redacted]

SYSTEM NO. 462
VEHICLE NO. 1113
MISSION NO. 9023
CAMERA NOS. 94 95

FORMAT LAYOUT (MAIN CAMERAS)



Camera No. 94

Viewed With Negative Emulsion Down

Film Transport ←

Scan →

Vehicle Motion ↓

Camera No. 95

Viewed With Negative Emulsion Down

Film Transport →

Scan →

Vehicle Motion ↑

SYSTEM NO. M12
VEHICLE NO. 133
MISSION NO. 9043
CAMERA NOS. 92 & 95

[redacted]

LENS DATA SUMMARY: (Framing Camera No. 92)

Lens Serial No. 2552605

Reseau Serial No. 92

Filter Type WRATTEN 21

Aperture F 6.3

Exposure Time 1/250 Sec.

Equivalent Focal Length 38.50 MM O.F.L 38.55 MM

Resolution: 67 Lines/MM AWAR

Angle off axis	0	10	20	30	35
Resolution L/MM High Contrast	127/127	119/110	77/70	63/48	67/39
Resolution L/MM Low Contrast	76/76	72/63	53/43	43/37	48/34

Note: Resolution data read from SO 130 Film

Distortion:

Angle off Axis Deg.	0	10	20	30	35	325	330	340	350
Distortion Millimeters	.000	.012	.044	.105	.133	.137	.109	.045	.012

Perpendicularity of Reseau to Optical Axis .10 MM IN 57 MM

Date of Stellar Calibration 6/9/62

LOCATION OF PRINCIPAL POINT:

X = −.06 MM
Y = −.04 MM

[redacted]

STATION NO. M 12
VEHICLE NO. 1173
MISSION NO. 9013
CAMERA NOS. 90 192

PRELIMINARY CLOCK CORRELATION:

Rev. No.	System Time	Clock Time	Delta Sys. Time	Delta Clock Time	Diff.
9	48260.954	285600.332			
15	83431.346	320777.217	35176.892	35176.885	-.007

OPERATIONAL TMX

[redacted]

A. Mission No.	A. _____
B. Vehicle	B. _____
C. Instrument Numbers	C. Instrument Numbers
1. Master	1. _____
2. Slave	2. _____
3. Framing	3. _____
D. Lens Serial Numbers	D. Lens Serial Numbers
1. Master	1. Master
a. Main Lens	a. _____
b. Take-up Horizon	b. _____
c. Supply Horizon	c. _____
2. Slave	2. Slave
a. Main Lens	a. _____
b. Take-up Horizon	b. _____
c. Supply Horizon	c. _____
3. Framing	3. Framing
a. Terrain (Lens/Reseau)	a. _____/___
b. Stellar (Lens/Reseau)	b. _____/___
E. Operational Focal Lengths (MM)	E. Operational Focal Lengths (MM)
1. Master	1. Master
a. Main Lens	a. _____
b. Take-up Horizon	b. _____
c. Supply Horizon	c. _____
2. Slave	2. Slave
a. Main Lens	a. _____
b. Take-up Horizon	b. _____
c. Supply Horizon	c. _____
3. Framing	3. Framing
a. Terrain	a. _____
b. Stellar	b. _____

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TOP SECRET

F. Lens Distortion

1. Master

a. Main Lens

b. Take-up Horizon

1. Radial

2. Tangential

c. Supply Horizon

1. Radial

2. Tangential

2. Slave

a. Main Lens

F. Lens Distortion

1. Master

a. MM Deg.

____ ____

____ ____

____ ____

____ ____

____ ____

____ ____

____ ____

____ ____

____ ____

b.

1. MM Deg.

____ ____

____ ____

2.____ Max Vector

c.

1. MM Deg.

____ ____

____ ____

2.____ Max Vector

2. Slave

a. MM Deg.

____ ____

____ ____

____ ____

____ ____

TOP SECRET

F. Lens Distortion (continued)

[redacted]

b. Take-Up Horizon

1. Radial

2. Tangential

c. Supply Horizon

1. Radial

2. Tangential

3. Framing

a. Terrain

____	____
____	____
____	____
____	____
____	____

b.

1. MM Deg.

____	____
____	____

2. _____ Max. Vector

c.

1. MM Deg.

____	____
____	____

2. _____ Max. Vector

3. Framing

a. MM Deg.

____	____
____	____
____	____
____	____
____	____
____	____
____	____
____	____
____	____

F. Lens Distortion (Continued)

b. Stellar

b.	MM	Deg.
	____	____
	____	____
	____	____
	____	____
	____	____
	____	____
	____	____
	____	____
	____	____

G. Resolution

1. Master (L/MM Avg)

a. Main Lens

b. Take-Up Horizon

c. Supply Horizon

2. Slave (L/MM Avg)

a. Main Lens

b. Take-Up Horizon

c. Supply Horizon

3. Framing (L/MM AWAR)

a. Terrain

b. Stellar

G. Resolution

1. Master (L/MM Avg)

a. _____

b. _____

c. _____

2. Slave (L/MM Avg)

a. _____

b. _____

c. _____

3. Framing (L/MM AWAR)

a. _____

b. _____

H. Platen And Format Dimensions (MM)

1. Master

A. Shrinkage Marker Dimension

B. Shrinkage Marker Dimension

C. Shrinkage Marker Dimension

D. Horizon Fiducial Spacing

E. Horizon Fiducial Spacing

H. Platen And Format Dimensions (MM)

1. Master

A. _____

B. _____

C. _____

D. _____

E. _____

H. Platen And Format Dimensions (Continued)

2. Slave

A.

B.

C.

D.

E.

3. Framing (Location of Principal Point)

a. Terrain

b. Stellar

I. Angular Relation Between Cameras (MM)

1. Master

a. Horizon Offset

2. Slave

A._____

B._____

C._____

D._____

E._____

3. Framing (Location of P.P.(MM))

a. Terrain

1.X_____

2.Y_____

b. Stellar

1.X_____

2.Y_____

I. Angular Relation Between Cameras(M

1. Master

a.

XT_____

YT_____

XS_____

YS_____

F _____

G _____

H _____

J _____

K _____

L _____

M _____

N _____

I. Angular Relation Between Cameras(Continued)

b. Vertical Offset

[redacted]

b.

XVO _____

YVO _____

2. Slave

2. Slave

a. Horizon Offset

a.

XT _____

YT _____

XS _____

YS _____

F _____

G _____

H _____

J _____

K _____

L _____

M _____

N _____

b. Vertical Offset

b.

XVO _____

YVO _____

3. Angle Between Master and Slave

3. _____

4. Direction of X Dimensions

4. X _____

Direction of Y Dimensions

Y _____

5. Framing (Perpendicularity of Reseau to Optical Axis)

5. Framing

a. Terrain

a. _____

b. Stellar

b. _____

[redacted]

J. IMC Ramps And Cycle Periods

Launch

1. Master

2. Slave

J. IMC Ramps And Cycle Periods

Ramp _____ At Launch

1. Master

Ramp	C.P. Start	C.P. End
1.	_____	_____
2.	_____	_____
3.	_____	_____
4.	_____	_____
5.	_____	_____
6.	_____	_____
7.	_____	_____
8.	_____	_____
9.	_____	_____
10.	_____	_____

2. Slave

Ramp	C.P. Start	C.P. End
1.	_____	_____
2.	_____	_____
3.	_____	_____
4.	_____	_____
5.	_____	_____
6.	_____	_____
7.	_____	_____
8.	_____	_____
9.	_____	_____
10.	_____	_____

K. Filters And Exposures

1. Master

a. Main Lens

1. Filter Type=

2. Aperture

3. Exposure

4. Slit Width

b. Horizon Optics

1. Filter Type

2. Aperture Setting

3. Exposure Time

2. Slave

a. Main Lens

1. Filter Type

2. Aperture

3. Exposure

4. Slit Width

b. Horizon Optics

1. Filter Type

2. Aperture Setting

3. Exposure Time

3. Framing

a. Terrain

1. Filter Type

2. Aperture Setting

3. Exposure Time

b. Stellar

1. Filter Type

2. Aperture Setting

3. Exposure Time

ilters And Exposures

1. Master

a.

1._____

2._____

3._____Sec

4._____Inch

b.

1._____

2._____

3._____Sec

2. Slave

a.

1._____

2._____

3._____Sec

4._____Inch

b.

1._____

2._____

3._____Sec

3. Framing

a. Terrain

1._____

2._____

3._____Sec

b. Stellar

1._____

2._____

3._____Sec

[redacted]

L. Film

1. Master

a. Film Type

b. Film Identification

c. Box Serial Number

2. Slave

a. Film Type

b. Film Identification

c. Box Serial Number

3. Framing

a. Terrain

1. Film Type

2. Film Identification

3. Box Serial Number

b. Stellar

1. Film Type

2. Film Identification

3. Box Serial Number

L. Film

1. Master

a._____

b._____

_____

_____

c._____

2. Slave

a._____

b._____

_____

_____

c._____

3. Framing

a. Terrain

1._____

2._____

_____

_____

3._____

b. Stellar

1._____

2._____

_____

_____

3._____

[redacted]