[redacted]

BRIEFING

CR-1 PERFORMANCE EVALUATION

13 OCTOBER 1967

TOP SECRET/C [redacted]

[redacted]

Copy No. [redacted]

BRIEFING

CR-1 PERFORMANCE EVALUATION

13 OCTOBER 1967

Itek

ITEK CORPORATION

LEXINGTON, MASSACHUSETTS 02173

[redacted]

TOP SECRET/C [redacted]

[redacted] CORN RESOLUTION 1101-1

PASS	FRAME	CAMERA	FMC-ft	SCAN-ft		FORMAT POS.
D14	13	FWD	△16 (12)	NO(NO)	TU	*
	19	AFT	12'(12)	16(12)	S	*
D14	31	FWD	8(12)	12(12)	TU	*
	39	AFT	16(NO)	16(16)	S	*
D16	5	FWD	NO(NO)	NO(NO)	TU	*
	11	AFT	12(12)	NO(NO)	S	*

LARGEST TARGET AVAILABLE WAS 16 ft GROUND RESOLUTION

D16 IMAGES WERE IN THE BONUS AREA

△ BY [redacted]

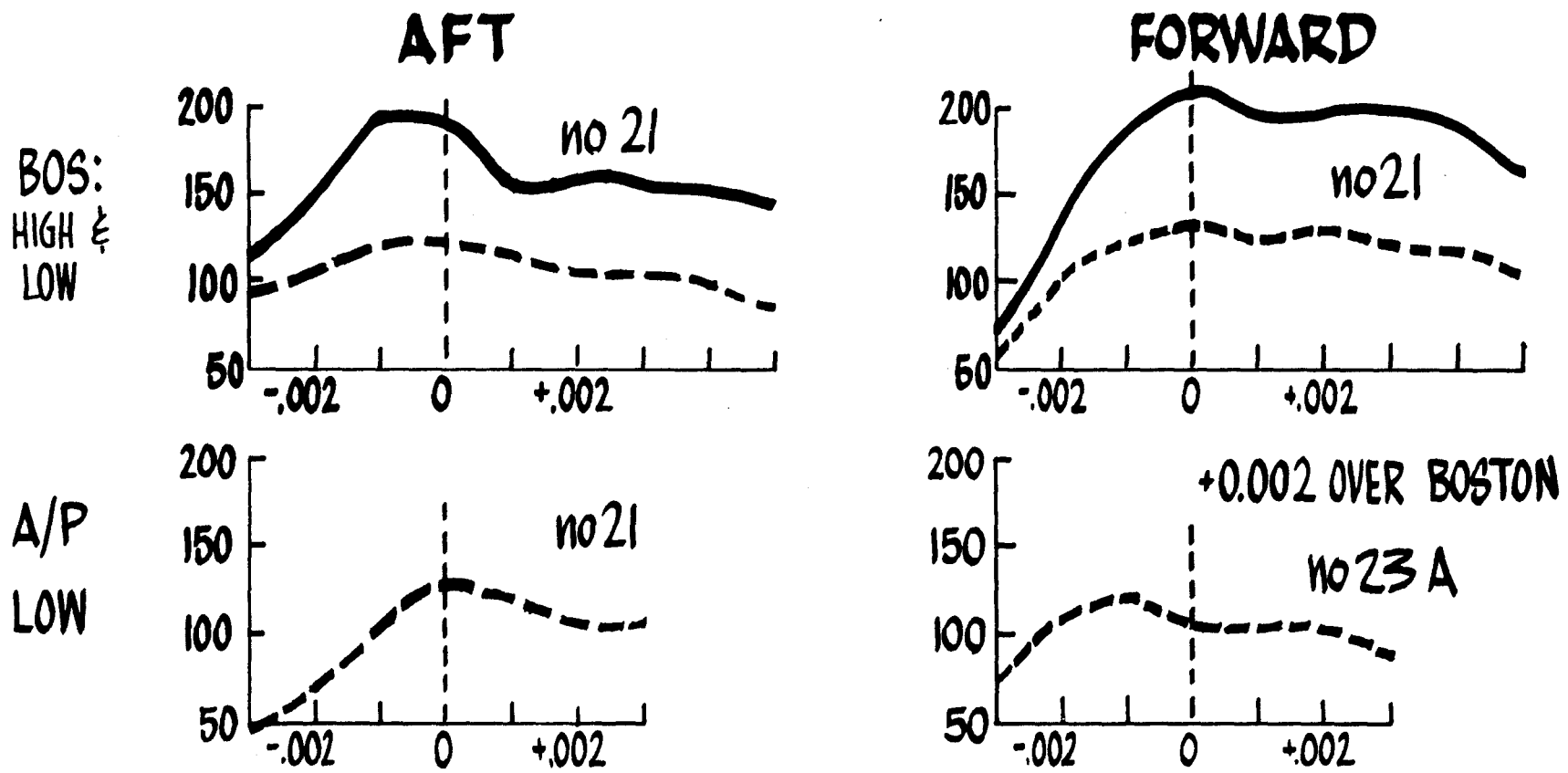
( ) BY [redacted]

1101 PERFORMANCE PREDICTION

1101-1 GROUND RESOLUTION, FEET
2:1 CONTRAST

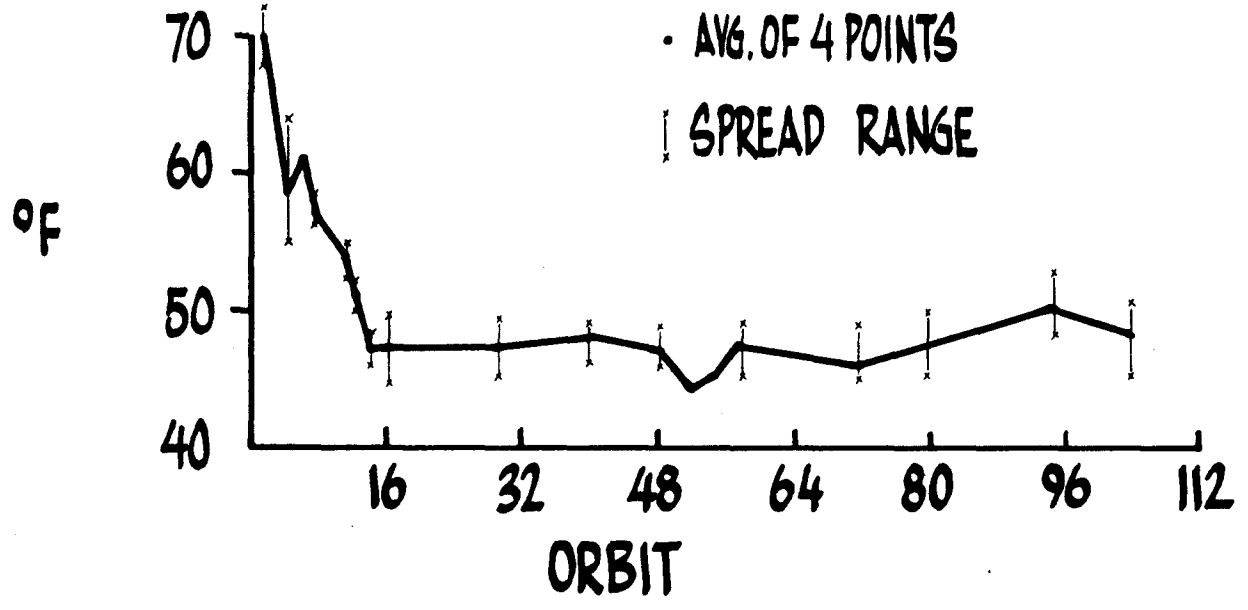
PASS NO	FRAME NO	FWD IMC	FWD SCAN	AFT IMC	AFT SCAN
14	13	11	13	—	—
14	19	—	—	17	19
14	31	10	10	—	—
14	37	—	—	15	15
16	5	12	14	—	—
16	11	—	—	17	21

[redacted] FOCUS SETTINGS OF CR-1



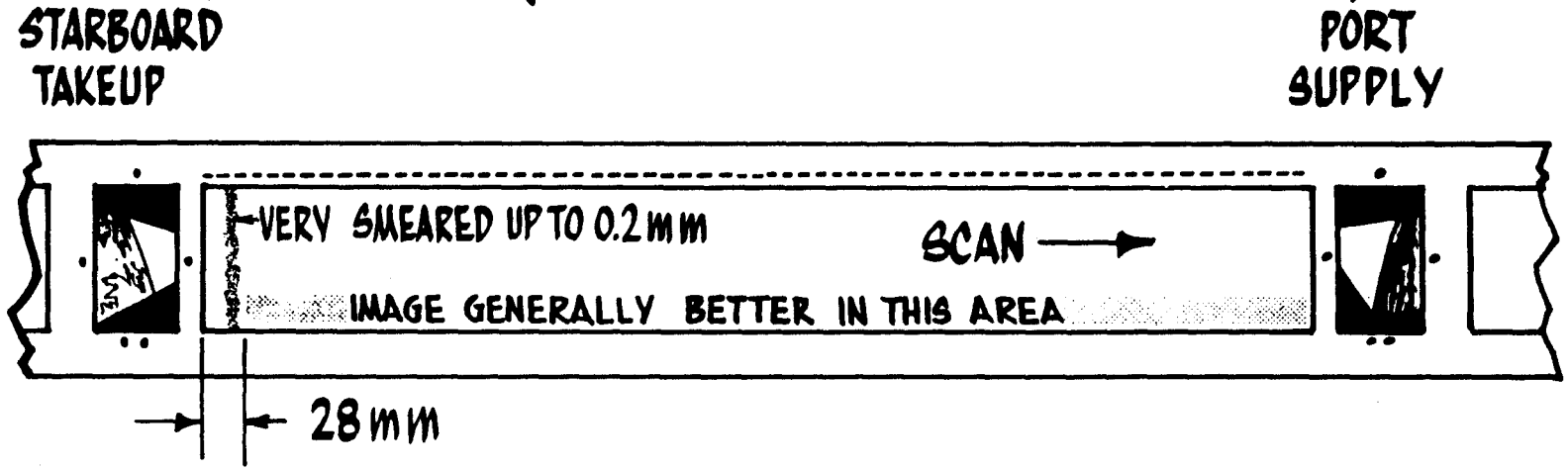
THERMAL PROFILE OF LENS 1101-1

AVG. OF FWD & AFT SCAN HEAD AND LENS CELL TEMP. SENSORS



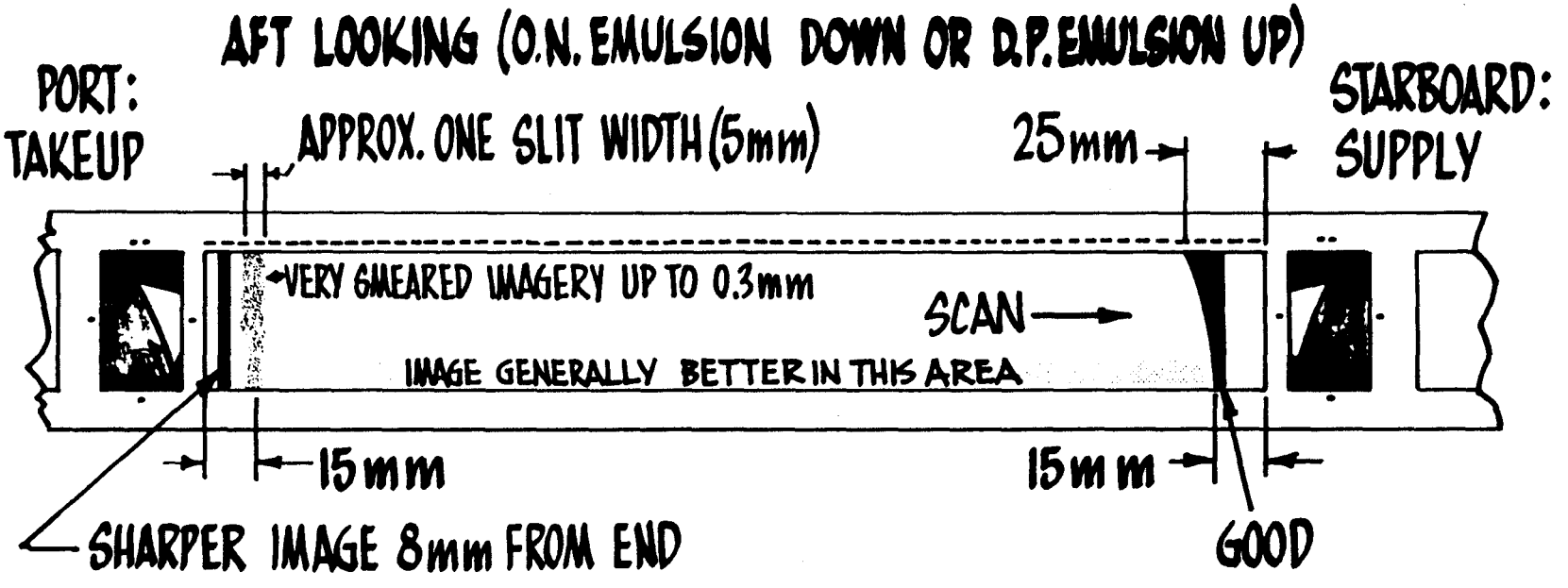
(U) FORMAT

FORWARD-LOOKING (O.N. EMULSION DOWN OR D.P. EMULSION UP)



BONUS AREA - LAST 25 mm OF EACH END OF FORMAT

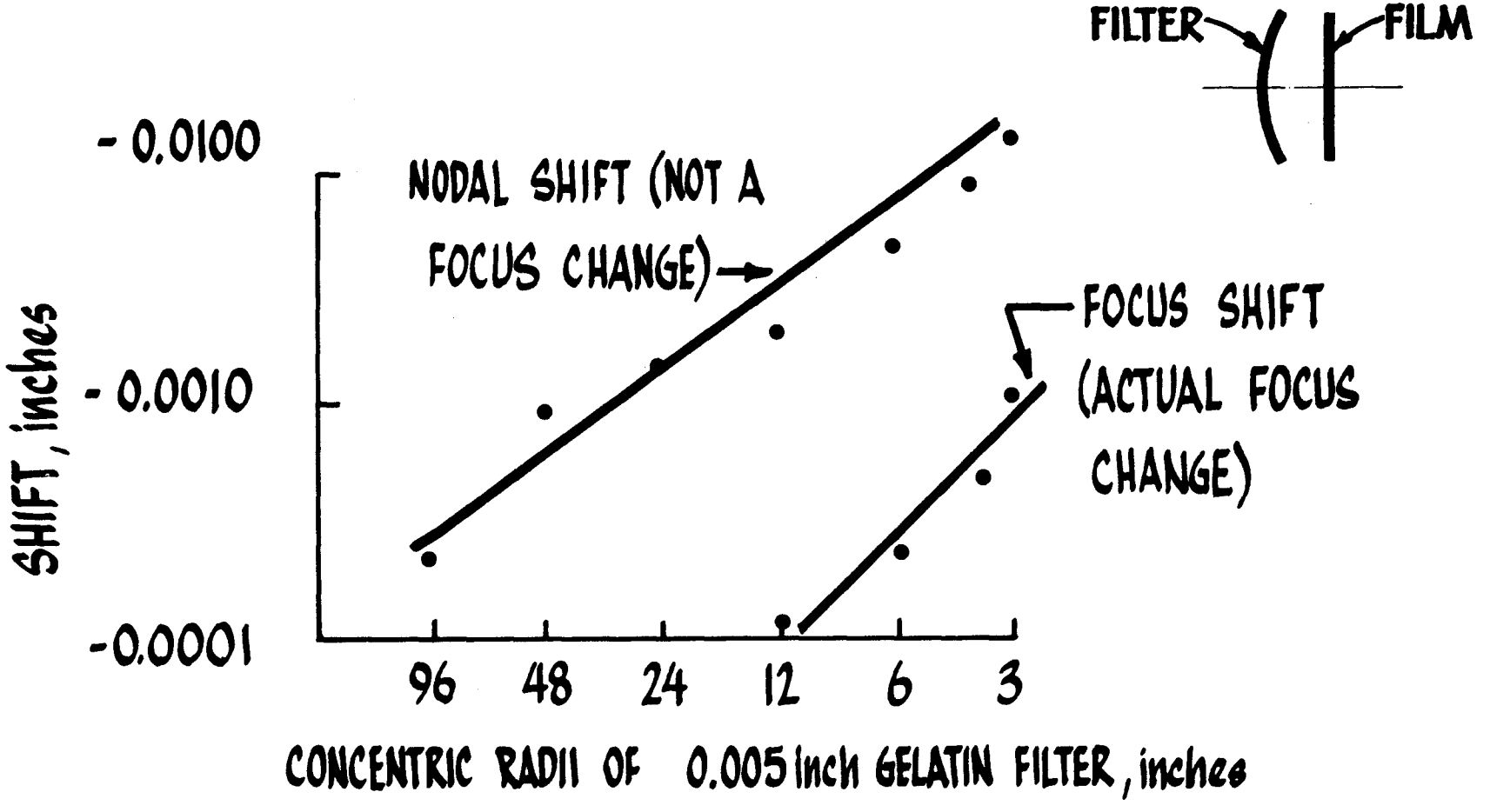
FORMAT



BONUS AREA - LAST 25 mm OF EACH END OF FORMAT

NODAL SHIFT AND BACK FOCUS CHANGE

AS A FUNCTION OF POSITIVE FILTER BOW



FILTER BOWING EFFECT ON CR-1

THERE WAS PROBABLY NO FILTER BOWING

BASIS

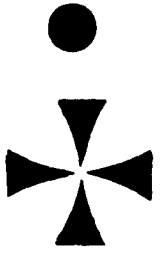
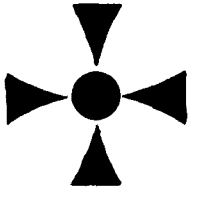
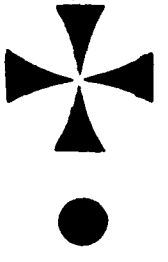
FILTER CHANGES WERE EFFECTED DURING OPERATION WITH NO APPARENT RESOLUTION CHANGE

EXCELLENT IMAGERY WAS APPARENT ON SEVERAL PASSES

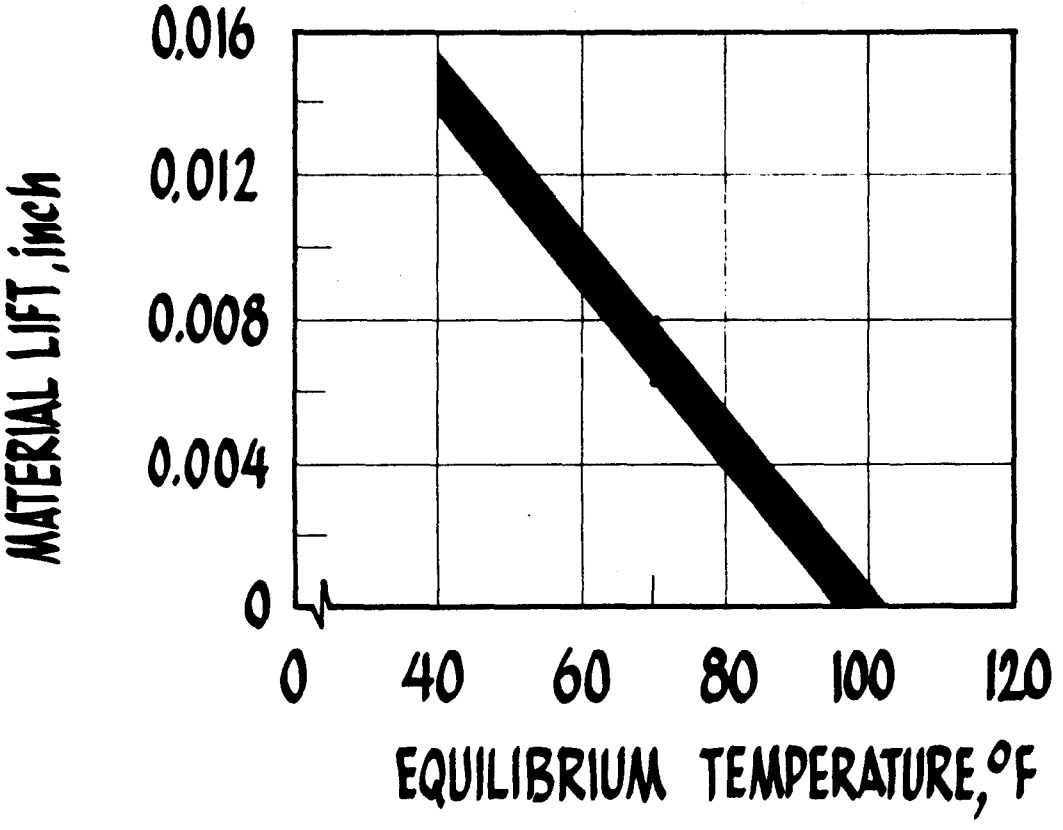
GOOD IMAGERY WAS OBSERVED IN BONUS AREAS

IMAGE MOTION

GENERATED BY ROTATING AT A POINT OTHER THAN THE NODE

IMAGE SMEAR	←	NONE	→
SCAN DIRECTION	←	←	←
● OPTICAL NODE ✣ MECHANICAL POINT OF ROTATION			

MATERIAL LIFT vs TEMPERATURE

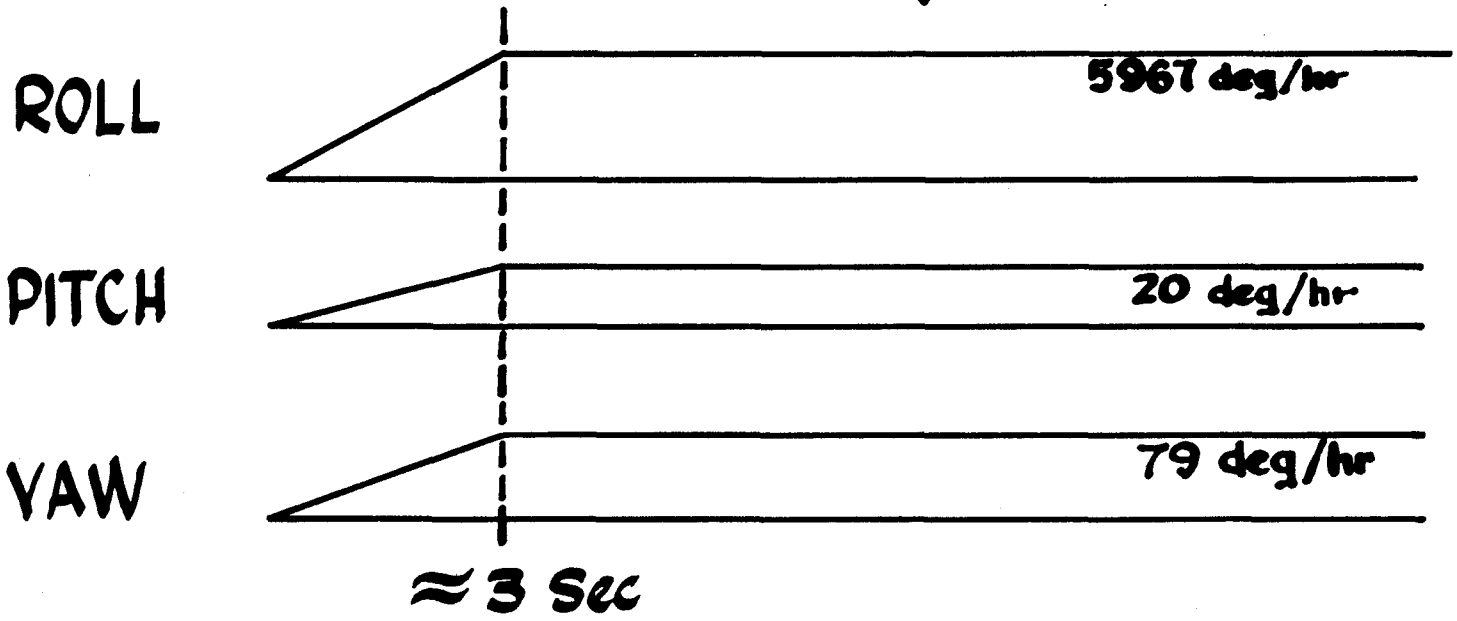


CALCULATED SLOPE

INITIAL LIFT $\frac{0.006}{0.008}$

(U) MAX VEHICLE RATES

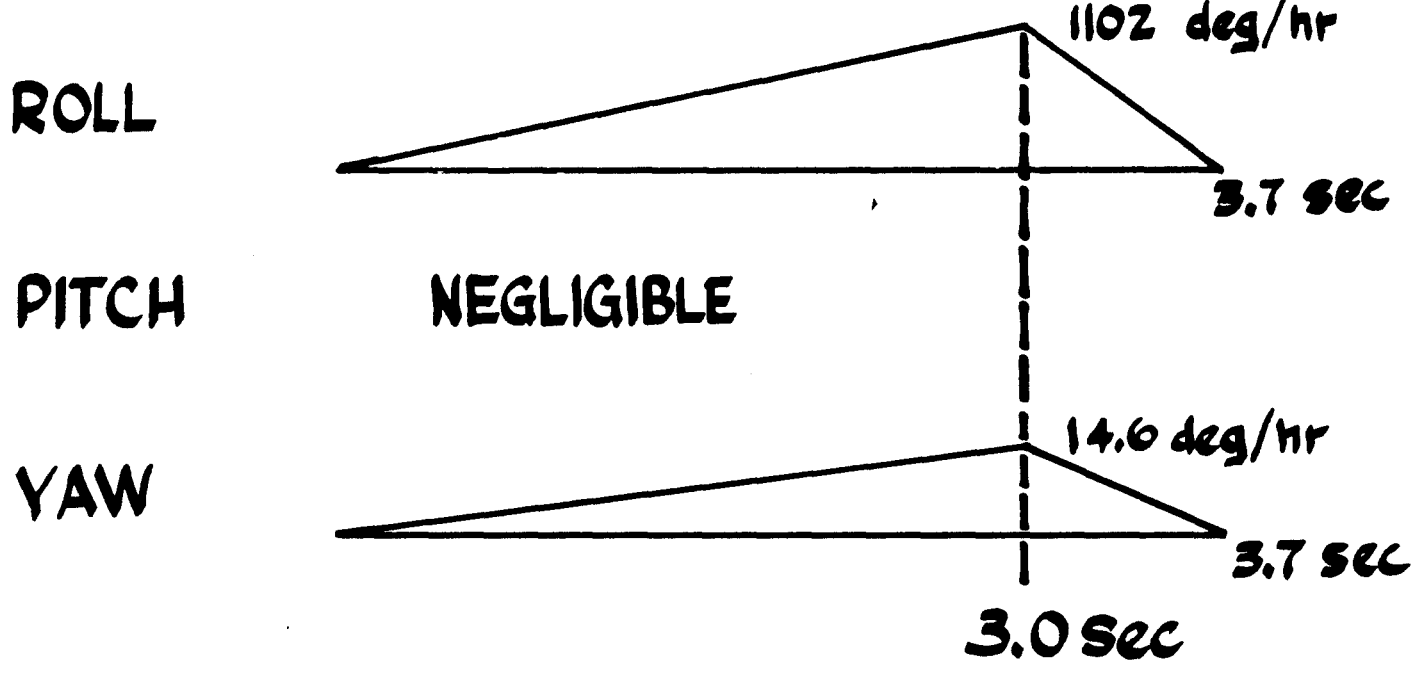
MONO OPERATION (START UP)



BASED ON: END OF B MISSION
3.75 rad/sec
UNSTABILIZED VEHICLE

(U) MAX VEHICLE RATES

STEREO OPERATION (CR-1 START UP)



BASED ON: END OF B MISSION
3.75 rad/sec
#302 73 deg OUT OF PHASE
FROM #303
UNSTABILIZED VEHICLE

10. MAX VEHICLE RATES

STEADY STATE MONO

ROLL - PERIODIC WITH 28.4 deg/hr PEAK

PITCH - PERIODIC LESS THAN 1 deg/hr

YAW - PERIODIC WITH 3.4 deg/hr PEAK

BASED ON: 3.75 RAD/SEC
END OF B MISSION
YAW INERTIA 9944 slug-ft^2
ROLL INERTIA 322 slug-ft^2
UNSTABILIZED MISSION

(U) MAX VEHICLE RATE

STEADY STATE STEREO

ROLL: PERIODIC WITH 45.4 deg/hr PEAK

PITCH: PERIODIC LESS THAN 1 deg/hr

YAW: PERIODIC WITH 3.8 deg/hr PEAK

BASED ON: 3.75 RAD/SEC
END OF 'B' MISSION
ROLL INERTIA : 322 slug/ft^2
YAW INERTIA : 9944 slug/ft^2
#302 73° OUT OF PHASE FROM #303

(10) CAMERA SYNCHRONIZATION

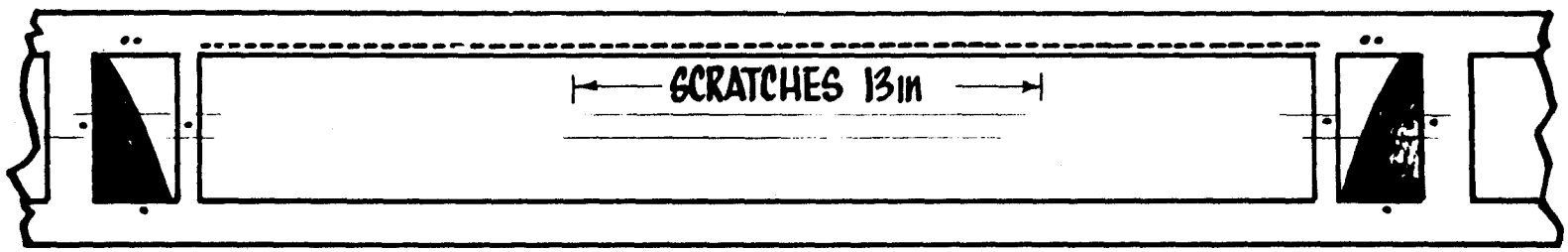
PASS NO		9A	14D	16D	32D	48D	143D	175D
CYCLE PERIOD (sec)	START	3.37	2.20	2.10	2.05	1.90	1.85	1.80
	STOP	3.37	2.10	2.10	2.00	1.90	1.83	1.78
STARTUP TIME 302 (sec)		2.18	2.80	2.38	2.51	2.45	2.55	2.70
STARTUP TIME 303 (sec)		1.55 (3.30 TACH/TM)	2.70	2.92	3.05	2.85	3.10	3.23
DIFFERENCE (sec)		0.63 (1.12 TACH/TM)	0.10	0.54	0.54	0.40	0.55	0.53
TOTAL CYCLES	(302)	15	40	19	19	20	53	38
	(303)	15	39	19	19	19	53	38

10 VEHICLE ROLL RATES - STEREO

PASS NO	ROLL RATE	TIME TO PEAK	M.I. ACC TIME
1D			
9E			
14D			
16D			
32D			
48D			
86D C/W			
89D			
111D			
127D SPEC. DAY			
143D			
157D			
159D			
173D			
175D			
190D			

(U) FORMAT AREA SCRATCHES

AFT CAMERA



TYPICAL AFT FORMAT

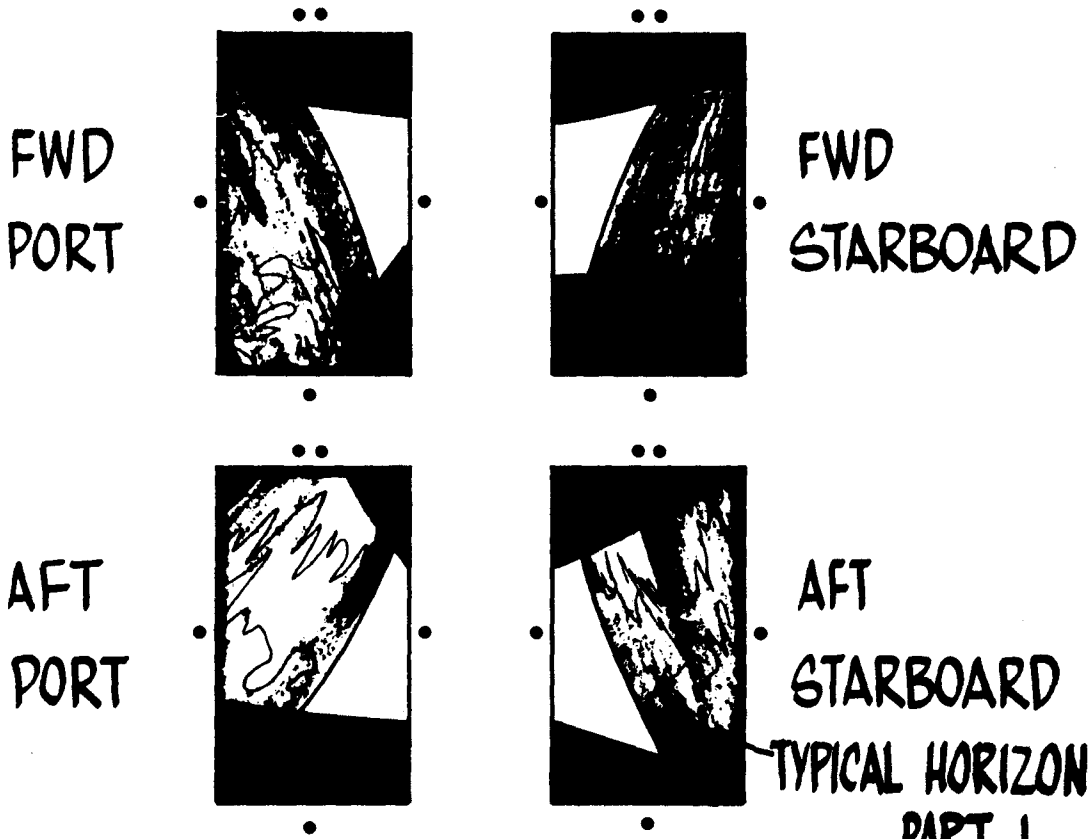
SCRATCHES FREQUENTLY START 13in FROM TAKEUP END OF FORMAT AND MOST DOMINATLY CONTINUE FOR 13in

SCRATCHES ARE SPORADICALLY CONTINUOUS THROUGHOUT MISSION, OCCURRING AS ILLUSTRATED

PART 2 OF MISSION WAS MUCH LESS SEVERELY SCRATCHED

(U) AUXILIARY OPTICS VIGNETTING

VIGNETTING PATTERN CHANGED FROM THE FIRST TO SECOND PARTS, PARTLY DUE TO ALTITUDE CHANGE



COMPOSITE OF PARTS 1 AND 2

OTHER CR-1 ANOMALIES

- BINARY BLOCK- TIME READOUT ALWAYS MISSING ON NEXT TO LAST FRAME, SOMETIMES ALSO MISSING ON SECOND TO LAST FRAME.
  NORMAL SEQUENCE- REFER TO MEMO [redacted]
- MISSING RAIL HOLE IMAGES- HOLES NOT FILLED ON CR-1
- MINOR FOG- FORWARD- 1ST FRAME AND NEXT TO LAST OF SOME OPERATES
  AFT- 1ST AND 2ND FRAME AND NEXT TO LAST OF SOME OPERATES
- AUXILIARY OPTICS MISFIRE- LOSS OF A.O. IMAGERY AND FIDUCIALS ON AFT CAMERA FOR FRAMES 76, 78, AND 80 OF PASS D06
- EMULSION BUILDUP ON RAILS WAS SUFFICIENT TO CAUSE CUTOUTS IN THE SCAN TRACE BY MISSION END. THIS ANOMALY IS A BEAUTY DEFECT

(U) PEAK ANGULAR MOMENTUM

MONO - ROLL AXIS

MAIN INSTRUMENT	MAX @ 11.1 ft.-lbs-sec
SUPPLY CASSETTE	MIN @ 1.3 ft.-lbs-sec

(U) ACTION PROGRAM

- DEVELOP QUARTZ SUBSTRATE FILTERS
- IDENTIFY AND CORRECT A/O VIGNETTING
- PERFORM THERMAL VACUUM TEST ON I 182 @ VIDYA

(U) RECOMMENDATIONS CR-2

- REFOCUS FOR .015 inch VACUUM SHIFT
- REMOVE VENT FILTER FROM LENS CELL
- CHANGE STOW POSITION OF 304 BY 180°
- RELOCATE TEMP. SENSORS
- ADJUST PAINT PATTERN
- DECREASE EXPOSURE BY 50%
  (.134" IS MINIMUM)

(U) GYROSCOPIC COUPLE