[redacted]

1400039094

[redacted]

Copy [redacted]

[redacted]

1101

CR-1 FLIGHT

CR INSTRUMENT VEHICLE DISTURBANCE

[redacted]

[redacted]

INTRODUCTION

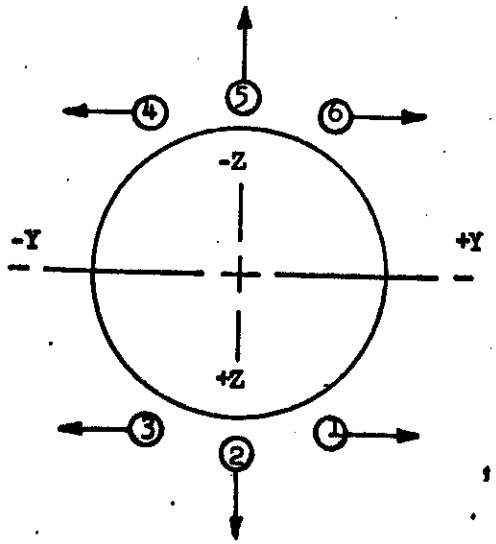
- IN-FLIGHT DISTURBANCE TO THE CR-1 VEHICLE RESULTING FROM CR INSTRUMENT OPERATION (SIMULTANEOUS START-STOP, MONO, & DELAYED STEREO START) HAS BEEN REVIEWED BY A STUDY OF THE FOLLOWING FLIGHT DATA:
  - CONTROL GAS CONSUMPTION & THE ASSOCIATED GAS JETS FIRED
  - VEHICLE ROLL DISPLACEMENT
  - VEHICLE ROLL RATES
- THE EFFECT OF THE CONTROL GAS CONSUMPTION, VEHICLE DISPLACEMENT & VEHICLE ROLL RATES ON THE ANTICIPATED MISSION (SIMULTANEOUS START-STOP, EMERGENCY MONO & DELAYED STEREO START) & ON THE RESULTING PHOTOGRAPHIC QUALITY DURING CR INSTRUMENT START-UP ARE PRESENTED.

[redacted]

[redacted]

NORMAL OPERATION

(SIMULTANEOUS START & STOP OF INSTRUMENTS)



GAS JET LOCATION & FIRING DIRECTION
(REAR VIEW)

START

- 0 - 2.5 SECONDS JETS 1 & 4 FIRE
- 3.0 TO 6.0 SECONDS JETS 6 & 3 FIRE
  - PROBABLE CAUSE: INSTRUMENT #1 STARTS FIRST
  - GAS CONSUMPTION: .02 LB/START

RUNNING

- .01 LB/OPERATE
- NO ROLL RATES EXCEEDING 100 o/HR

STOP

- JETS 1 & 4 & 3 & 6 TYPICALLY FIRE; PATTERN VARIES WITH NATURE OF SHUTDOWN
  - GAS CONSUMPTION .02 LB/STOP

TOTAL GAS CONSUMPTION

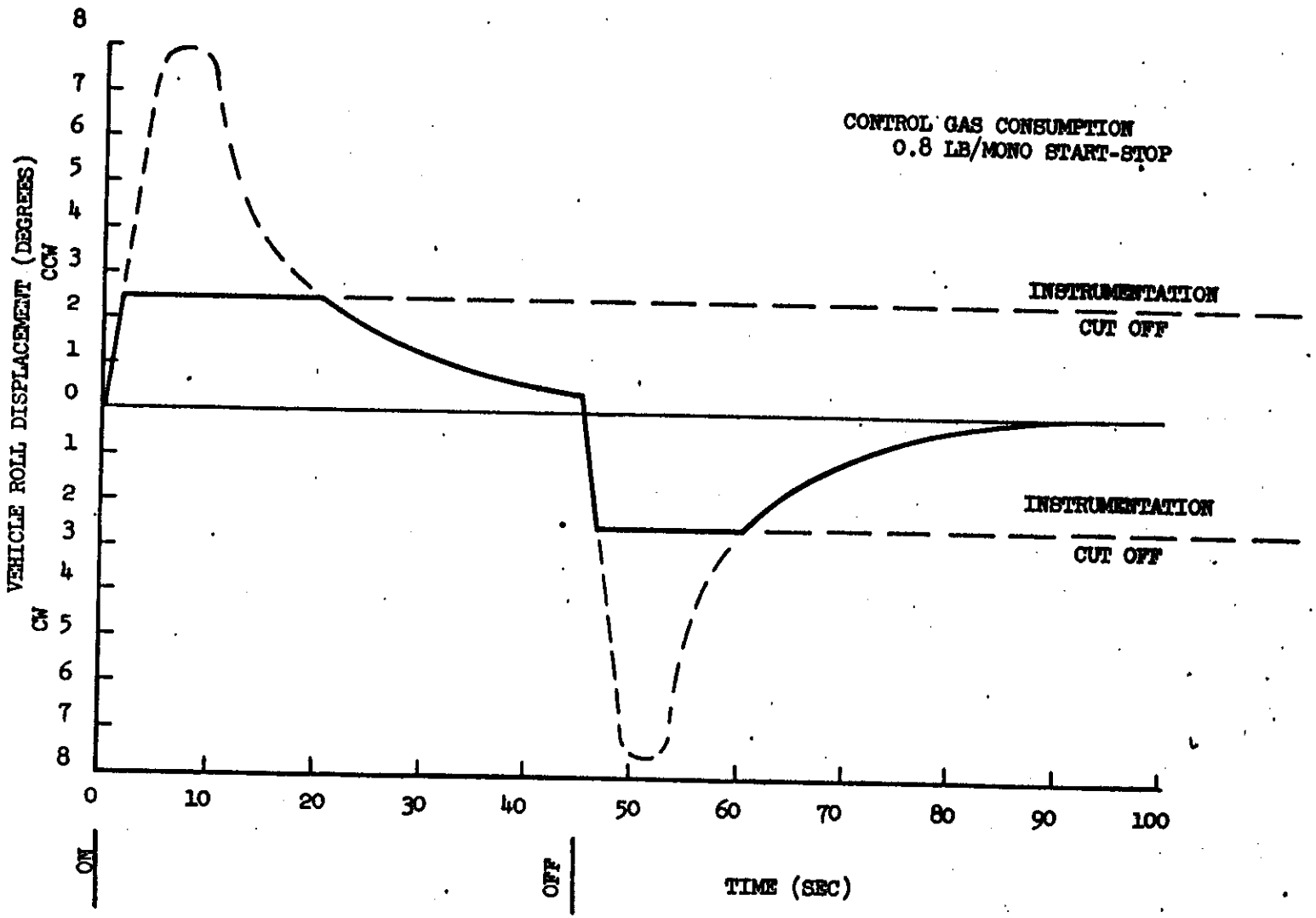
- .05 LB/OPERATE

[redacted]

[redacted]

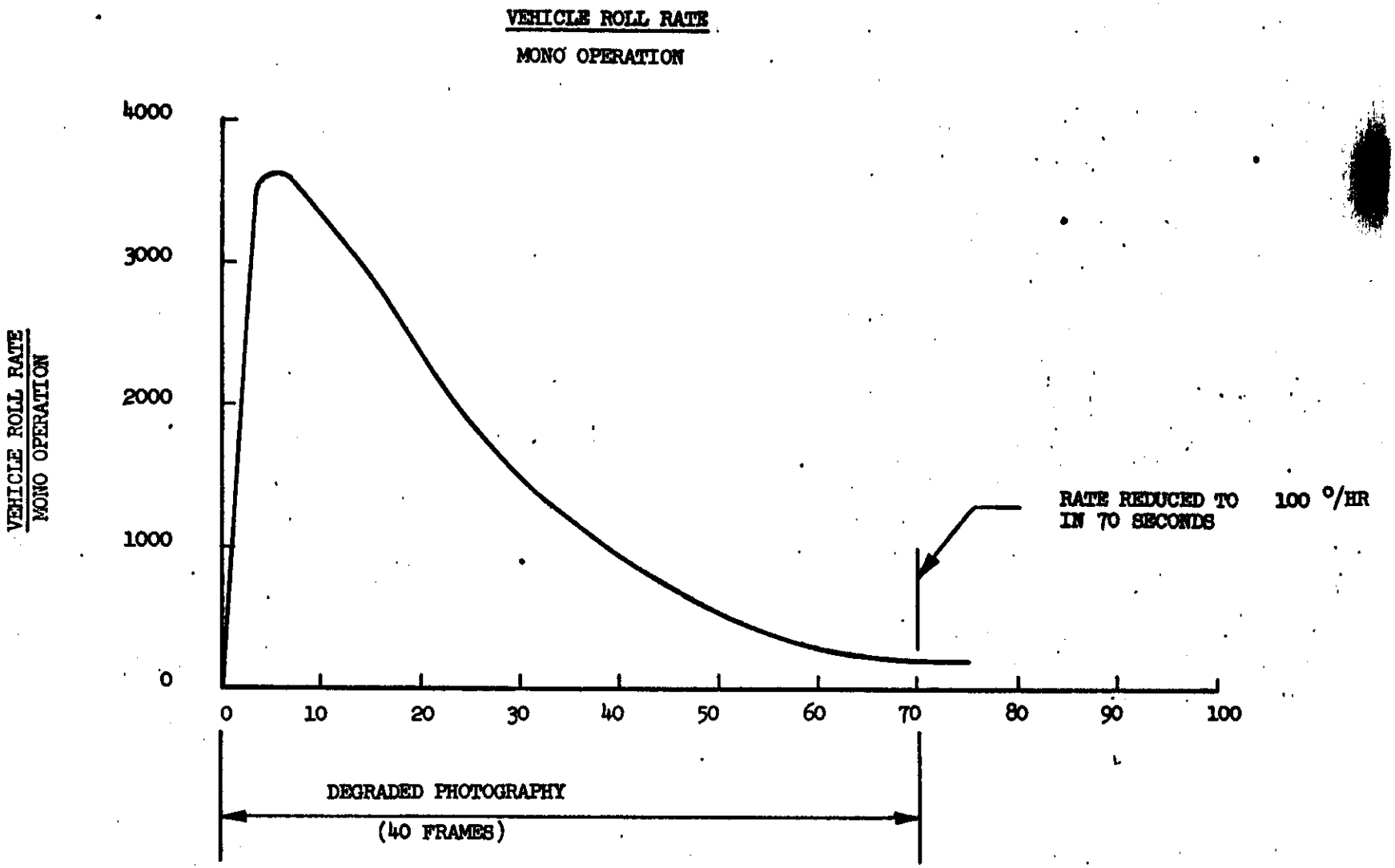
VEHICLE ROLL DISPLACEMENT

MONO OPERATION



[redacted]

[redacted]

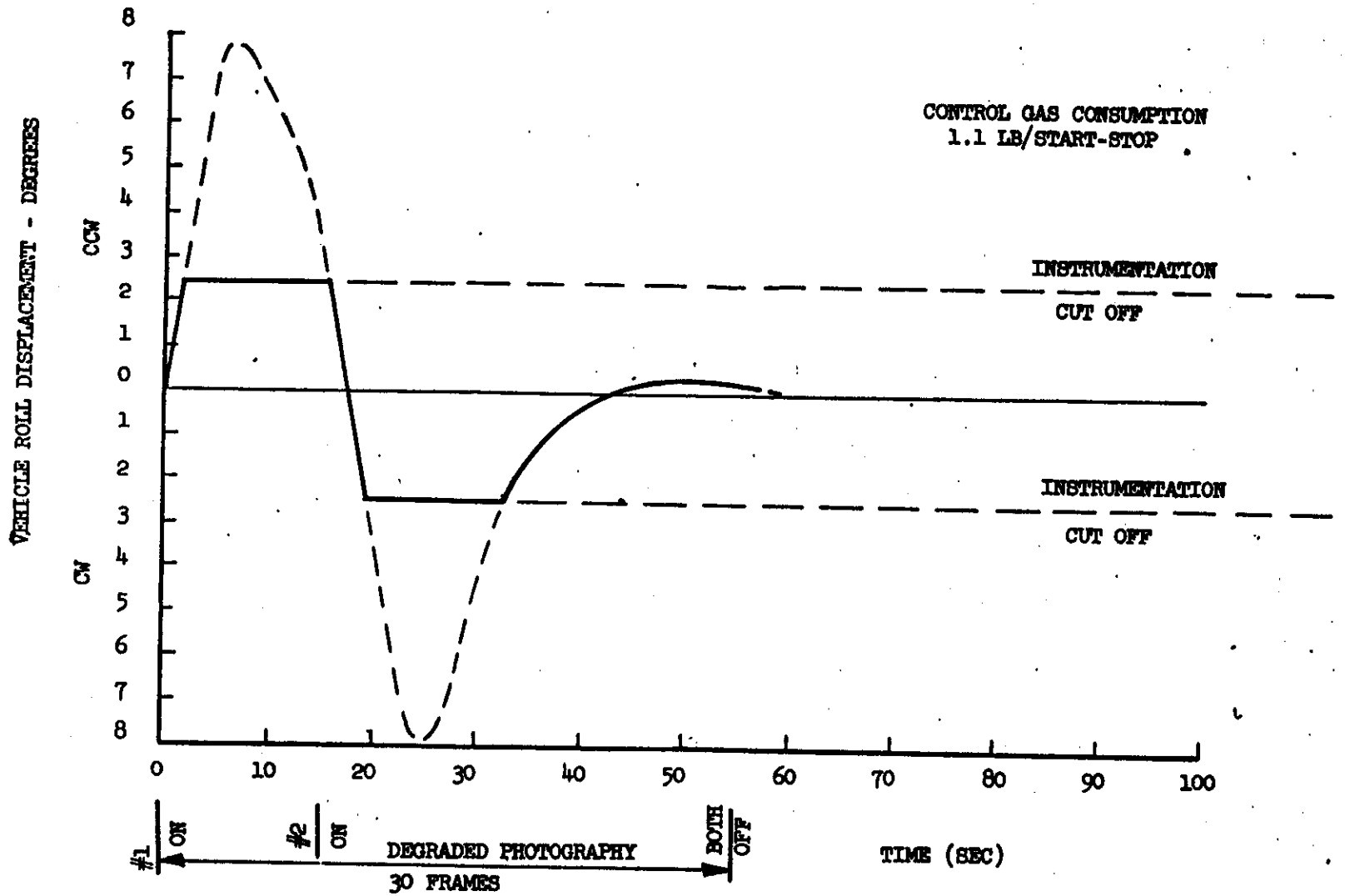


[redacted]

[redacted]

VEHICLE ROLL DISPLACEMENT

DELAYED STEREO START



[redacted]

[redacted]

CR-1 CONTROL GAS UTILIZATION

- GAS LOADING: 3 BOTTLES, -3 MIXTURE, HEAVY LOAD, WT = 110 LB
- GAS EXPENDED:

	PREDICTED	ACTUAL USED
. ASCENT	-	13
6 ROCKETS	-	18
2 RECOVERIES	-	9
15 DAYS ON ORBIT	- .	10.7
126 OPERATIONS	2.5	6.3
		57 LBS
(POST RECOVERY EXERCISES)		
2 LIFEBOAT EXERCISES	-	6.0
1 MONO CR OPERATE	.15	0.8 +
1 DELAYED STEREO START	.30	1.1 +
2 DAYS ON ORBIT	-	3.0
		10.9 LBS
TOTAL EXPENDED:		68 LBS
REMAINING:		42 LBS

[redacted]

[redacted]

CONCLUSIONS

SIMULTANEOUS START-STOP OF CR INSTRUMENTS

- BETTER W BALANCE BETWEEN CR #1 AND CR #2 WOULD REDUCE THE .02 LB/START; HOWEVER, THE MAGNITUDE OF GAS SAVING DOES NOT JUSTIFY THE CHANGE .

POT'I INSTRUMENTS AT SPEED

- GAS CONSUMPTION AVERAGED ONLY .01 LB/OPERATE
- NO EXCESSIVE ROLL RATES TO DEGRADE PHOTOGRAPHY.

SHUT-DOWN

- POSSIBLE W MISMATCH AT SHUT-DOWN DEPENDS ON THE NATURE OF THE STOP, AND WOULD REQUIRE A MAJOR INSTRUMENT REDESIGN TO IMPROVE. THE MAGNITUDE OF CONTROL GAS SAVING DOES NOT JUSTIFY THE EFFORT.

EMERGENCY MONO OPERATION

- A FAILURE WHICH PREVENTS ROTATION OF ONE INSTRUMENT RESULTS IN .8 LB OF CONTROL GAS EXPENDED PER START-STOP CYCLE. UNDER THESE CONDITIONS A LIMITED NUMBER OF OPERATES COULD BE PERFORMED BEFORE RUNNING OUT OF GAS. HIGH ROLL RATES (3600 °/HR MAX.) AT INSTRUMENT START COULD CAUSE AS MANY AS 50 DEGRADED FRAMES.

DELAYED STEREO START

- RESULTS ARE SIMILAR TO THE MONO OPERATE EXCEPT THAT STARTING THE SECOND INSTRUMENT HELPS RETURN THE VEHICLE TO CENTER. GAS CONSUMPTION 1.1 LB/OPERATE.