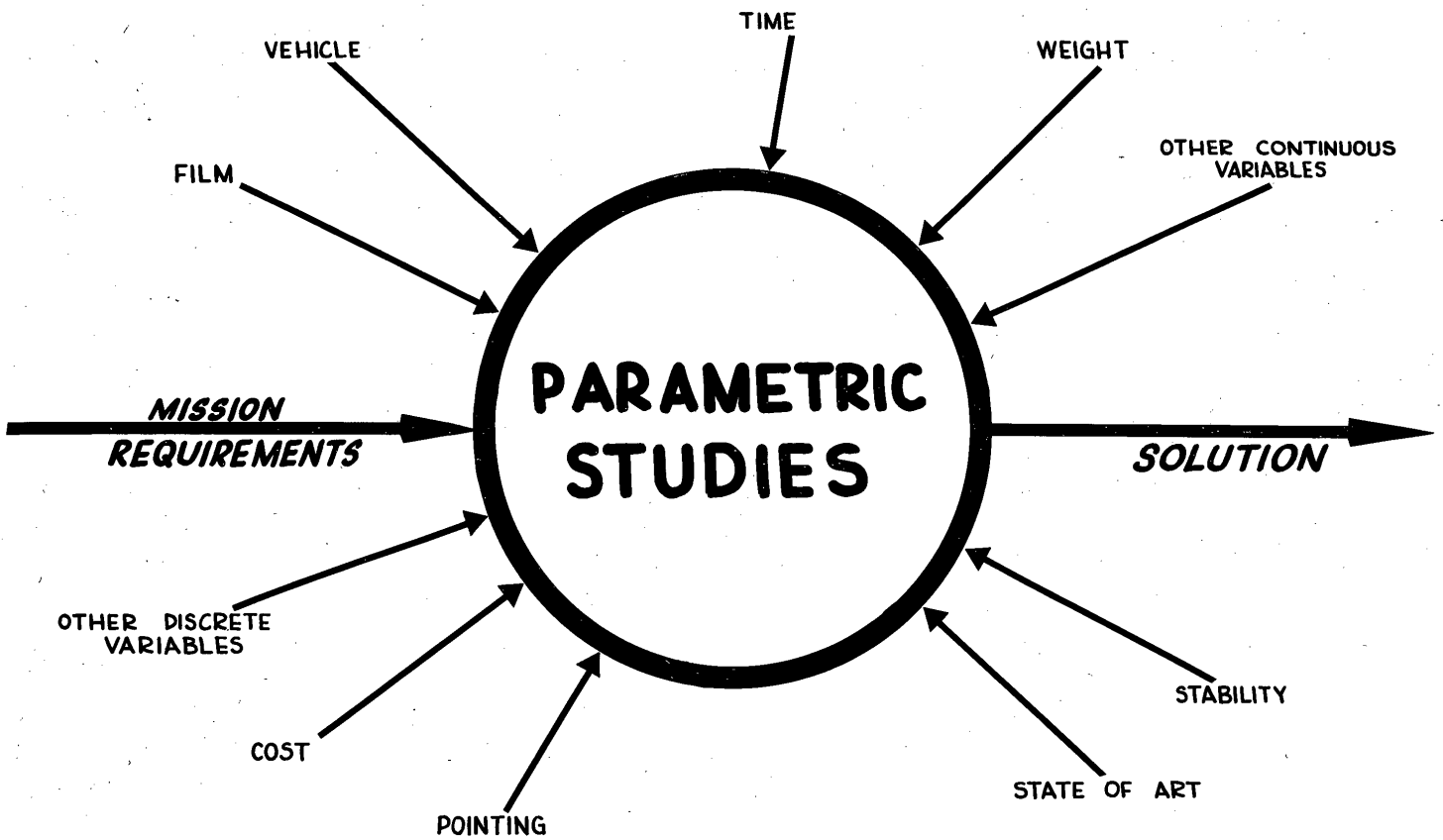


PURCELL COMMITTEE

JUNE 4, 1963

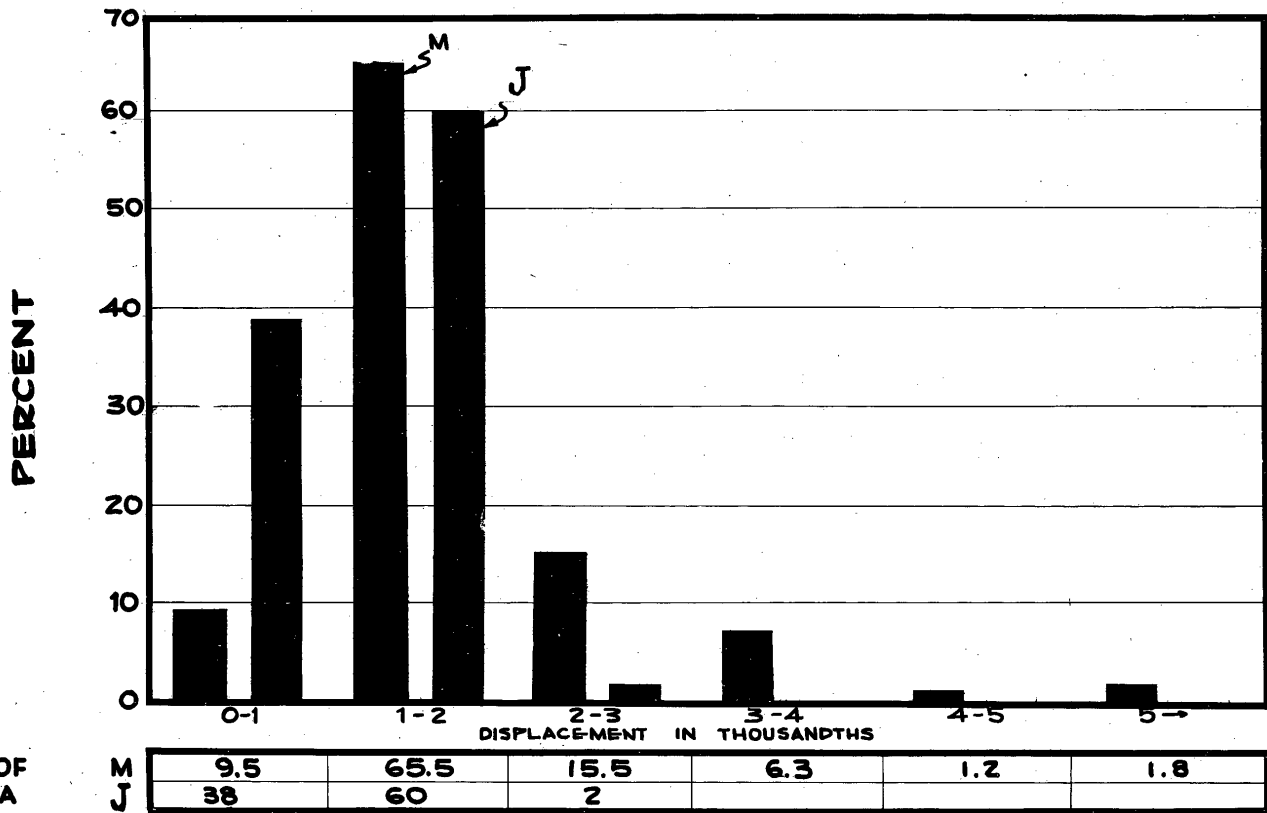
Copy #6



TECHNICAL PROBLEMS

- ① FILM FLATNESS
- ② CORONA DISCHARGE
- ③ THERMAL DISTURBANCES
- ④ RADIATION
- ⑤ V/H MATCH
- ⑥ EXPOSURE

FILM DISPLACEMENT

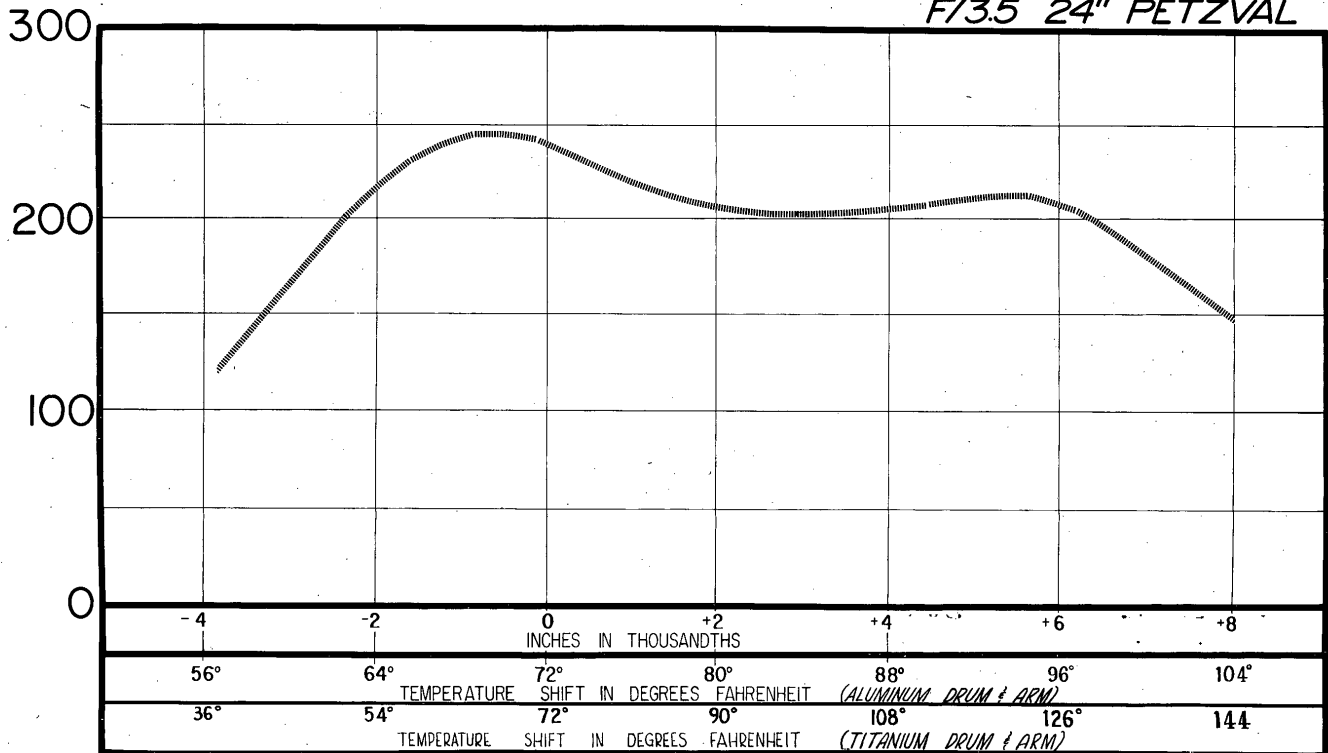


% OF AREA

OPTICAL PERFORMANCE VS TEMPERATURE

LINES/MM

F/3.5 24" PETZVAL



PROGRESSIVE IMPROVEMENT IN LENS QUALITY

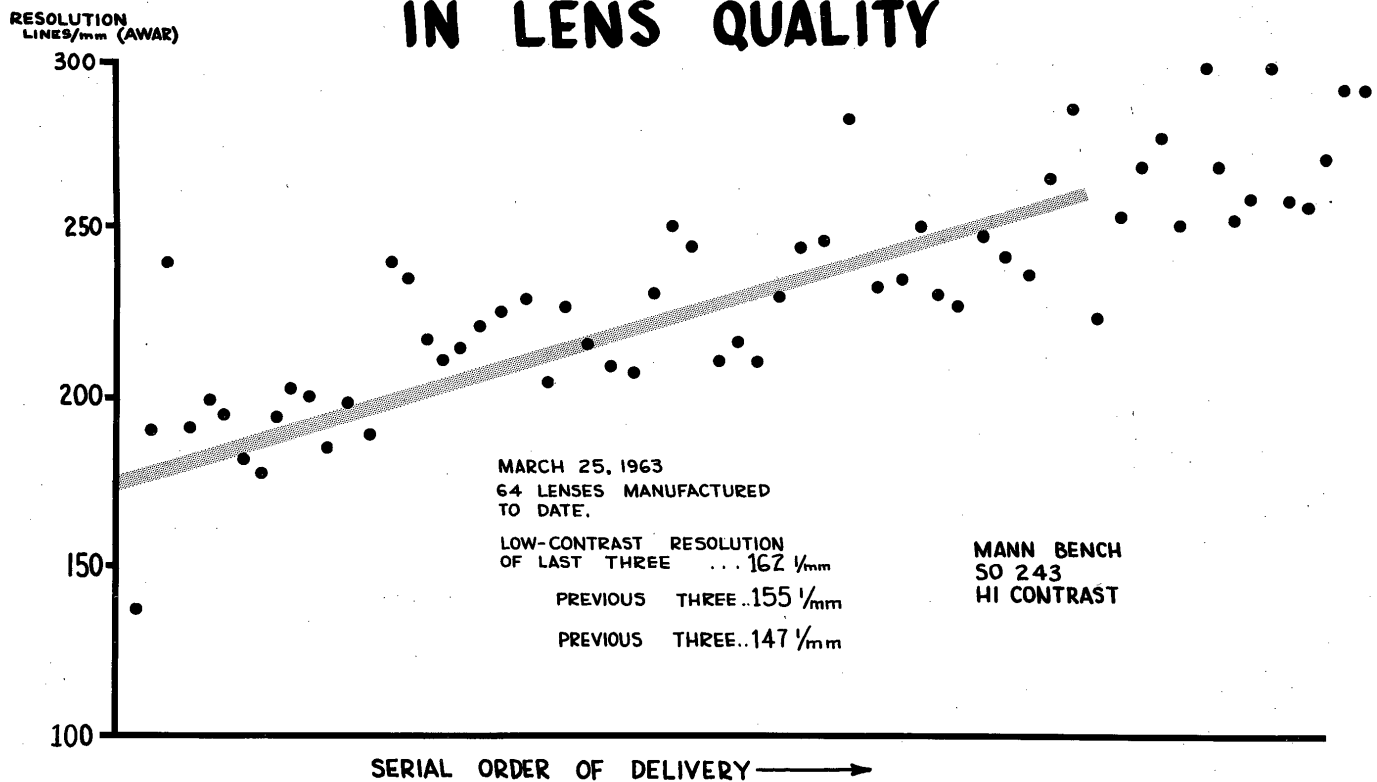
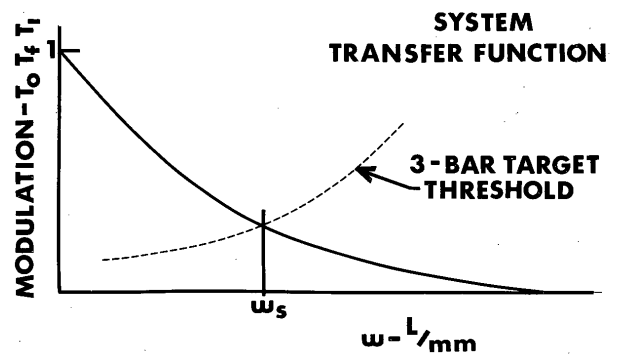
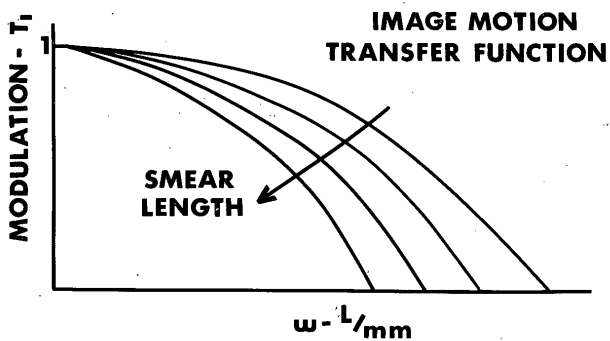
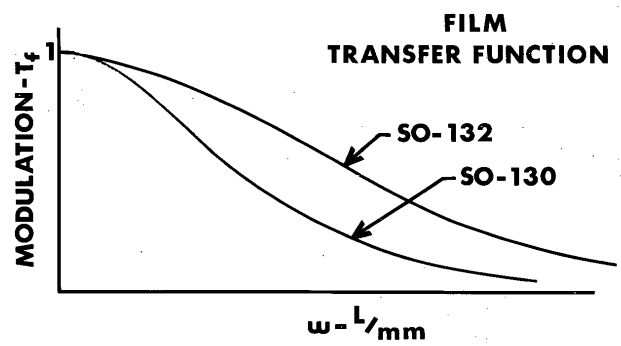
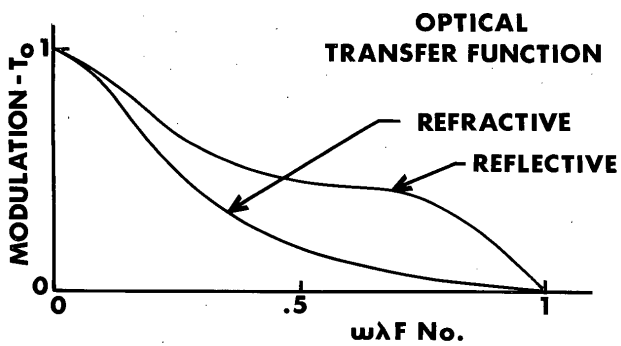


IMAGE MOTION FACTORS

90% PROBABILITY

STABILIZATION	AGENA PRESENT		AGENA 15 MOS.		U.A. PROPOSAL		ACTIVE SENSOR	
	$\frac{1}{h}$ error-%	$\frac{1}{h}$ error-%	$\frac{1}{h}$ error-%	$\frac{1}{h}$ error-%	$\frac{1}{h}$ error-%	$\frac{1}{h}$ error-%	$\frac{1}{h}$ error-%	$\frac{1}{h}$ error-%
PITCH ANGLE	$\pm \frac{1}{2}^{\circ}$	.005	$\pm \frac{1}{4}^{\circ}$	.001	.1	.001	$\frac{1}{2}^{\circ}$	.005
ROLL "	$\pm \frac{1}{3}^{\circ}$	.002	$\pm \frac{1}{4}^{\circ}$	.001	.1	.001	$\frac{1}{3}^{\circ}$	.002
YAW "	$\pm \frac{2}{3}^{\circ}$	1.18	$\pm \frac{1}{3}^{\circ}$	.53	.05	.0005	$\frac{1}{3}^{\circ}$	.53
PITCH RATE	10°/hr.	.1	3°/hr.	.032	.001°/hr.	—	10°/hr.	.1
ROLL "	30°/hr.	.32	6°/hr.	.06	.003°/hr.	—	10°/hr.	.1
YAW "	10°/hr.	0	3°/hr.	0	.003°/hr.	—	10°/hr.	0
CAMERA $\frac{1}{h}$ CONTROL		.55		.55		.55		—
APPROX. RSS $\frac{1}{h}$ ERROR	$1\frac{1}{4}\%$		$\frac{2}{3}\%$		$\frac{1}{2}\%$		$\frac{1}{2}\%$	

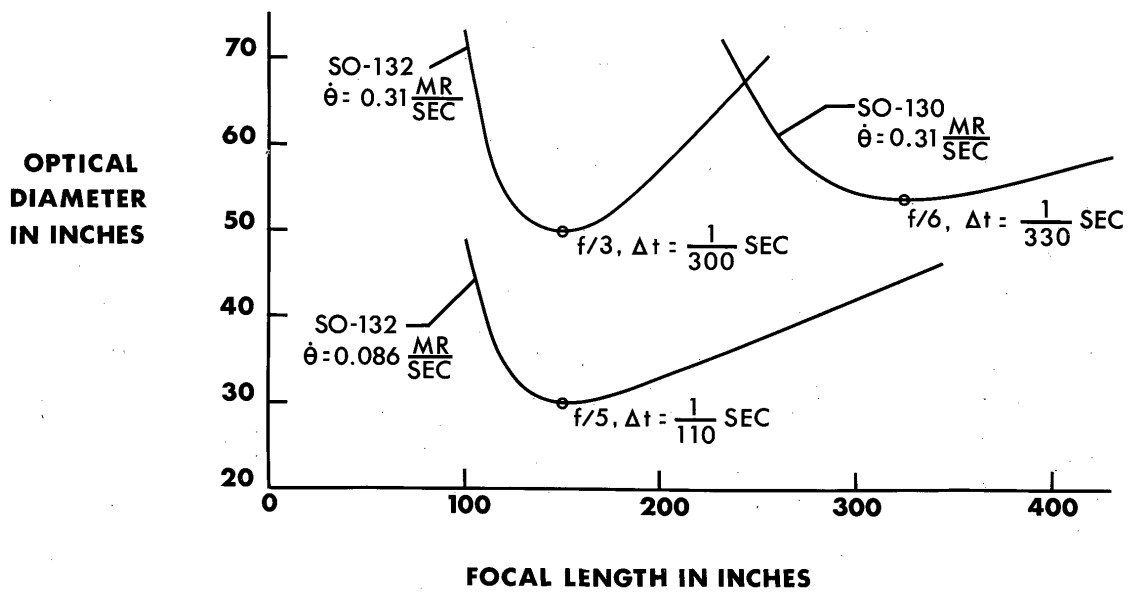
SINE WAVE ANALYSIS



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OPTIMIZATION ANALYSIS

2:1 CONTRAST
20° SUN ANGLE
90 NA. MI.
1 FT. GROUND DETECTION

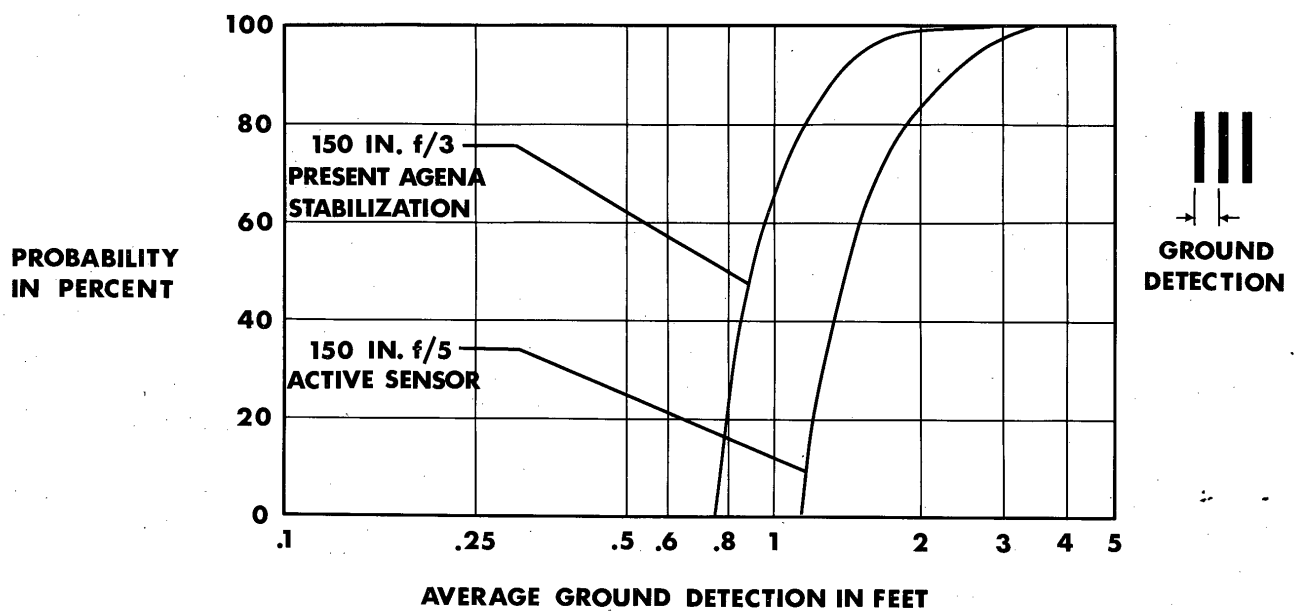


DESIGN SUMMARY

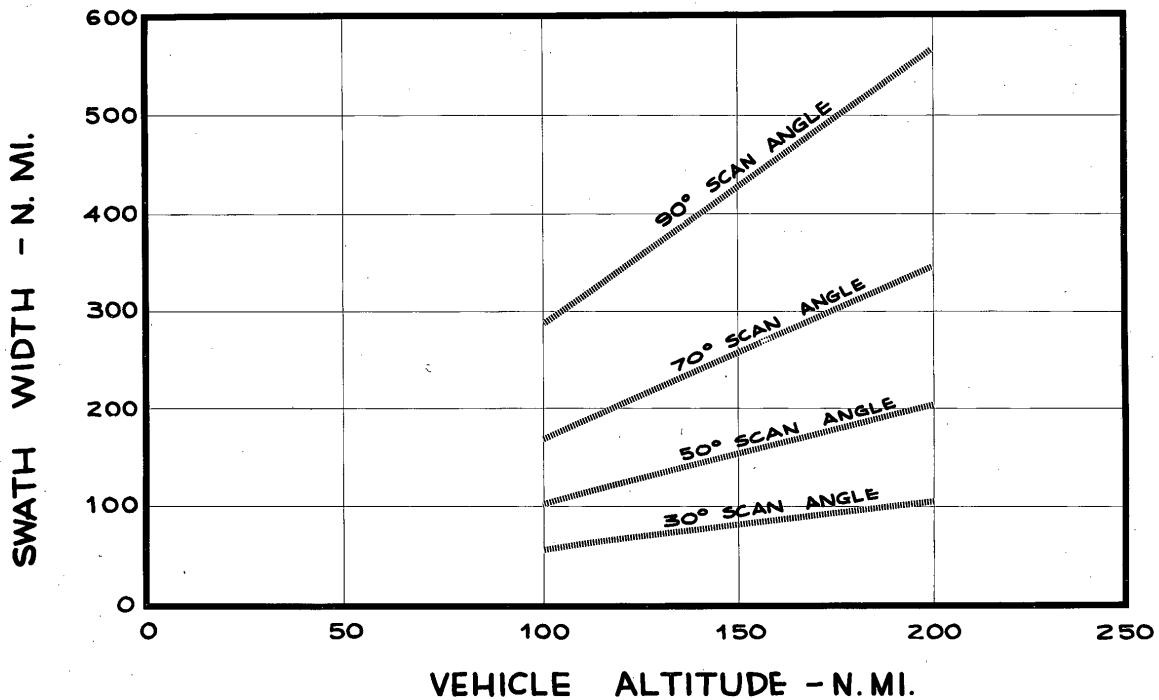
CAMERA	FOCAL LENGTH REQUIRED in.	FORMAT WIDTH in.	FILM TYPE	SCALE at 90 na.mi.	ESTIMATED WEIGHT lbs. w/out film
f/3	150	11.5	SO-132	1:44,000	2,990
f/5	150	11.5	SO-132	1:44,000	920
f/6	325	25.0	SO-130	1:20,000	4,080

PROBABILITY OF ACHIEVING A GIVEN GROUND DETECTION

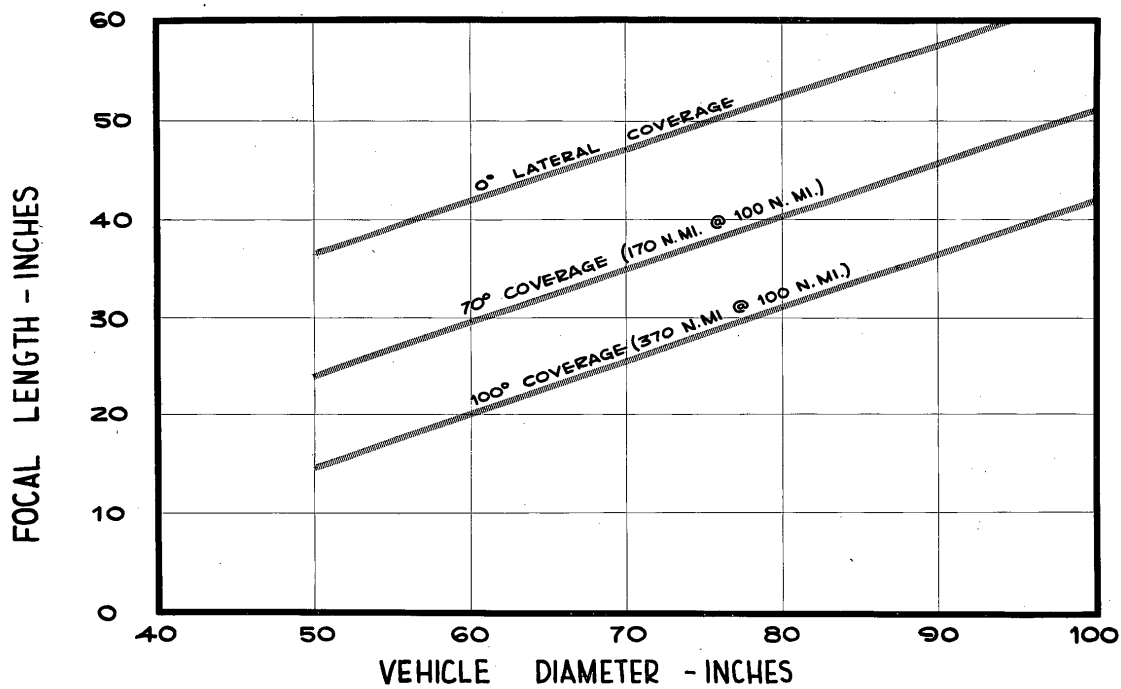
20° SUN ANGLE
SO-132 FILM AT 2:1 CONTRAST
ALTITUDE - 90 NA. MI.



SWATH WIDTH VS. ALTITUDE FOR VARIOUS SCAN ANGLES



FOCAL LENGTH VS. VEHICLE DIA.



VEHICLE CONTRIBUTIONS TO BLUR

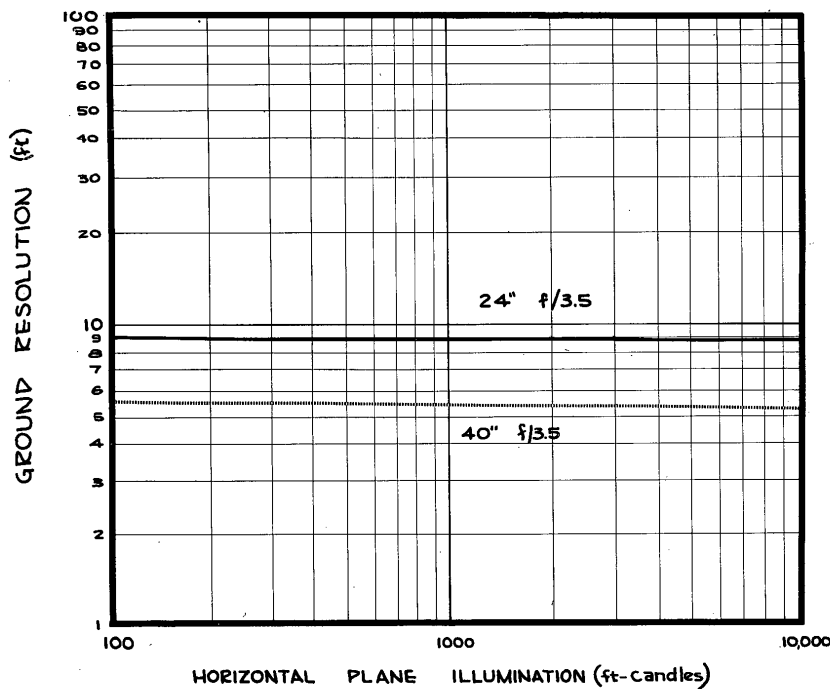
	90% probability		COMPUTATION OF BLUR
	PRESENT	1964	
PITCH ERROR	.47°	.27°	BLUR $(\frac{Y}{h})h(\sec \theta_p - 1)$
ROLL ERROR	.47°	.27°	BLUR $(\frac{Y}{h})h(\sec \theta_R - 1)$
YAW ERROR	.52°	.33°	BLUR $\frac{Y}{h}(h) \sin \theta_Y$
PITCH RATE	10° hr	3° hr	BLUR $\dot{\theta}_p h$
ROLL RATE	30° hr	9° hr	BLUR $\dot{\theta}_R h$
YAW RATE	10° hr	3° hr	BLUR $\dot{\theta}_Y * \frac{\text{swath}}{2}$

M-2 PHOTO SUBSYSTEM WEIGHT ESTIMATE

- OPTIONS -

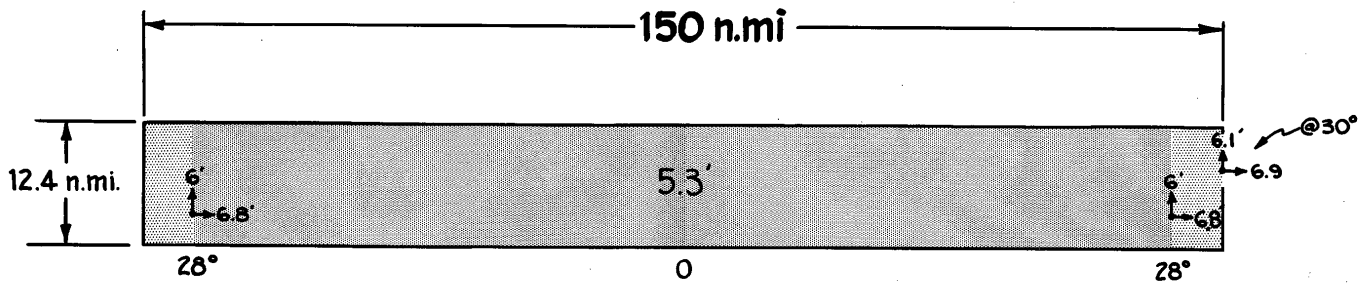
	SINGLE MK VIII	DOUBLE MK V	DOUBLE MK VIII
PAN CAMERAS	470	470	490
SUPPLY SPOOLS	20	20	25
CASSETTE(S)	25	50	55
FRAME CAMERA(S)	20	40	40
TOTAL CAMERA	<u>535</u>	<u>580</u>	<u>610</u>
FILM	<u>252</u>	<u>264</u>	<u>504</u>
TOTAL	<u><u>787</u></u>	<u><u>844</u></u>	<u><u>1114</u></u>

SYSTEM PERFORMANCE COMPARISONS



1% IM ERROR
125 N. MI. AVE. HT.
2:1 CONTRAST
SO-132 FILM
FULL DEVELOPMENT

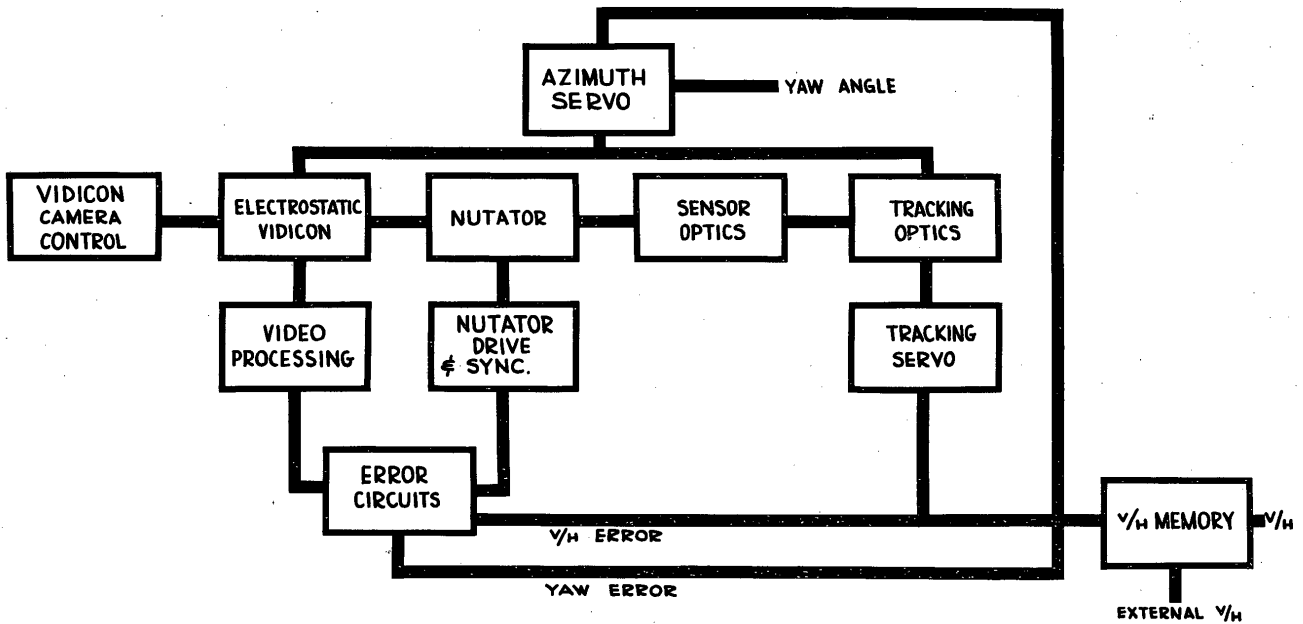
DISTRIBUTION OF d_g IN FORMAT



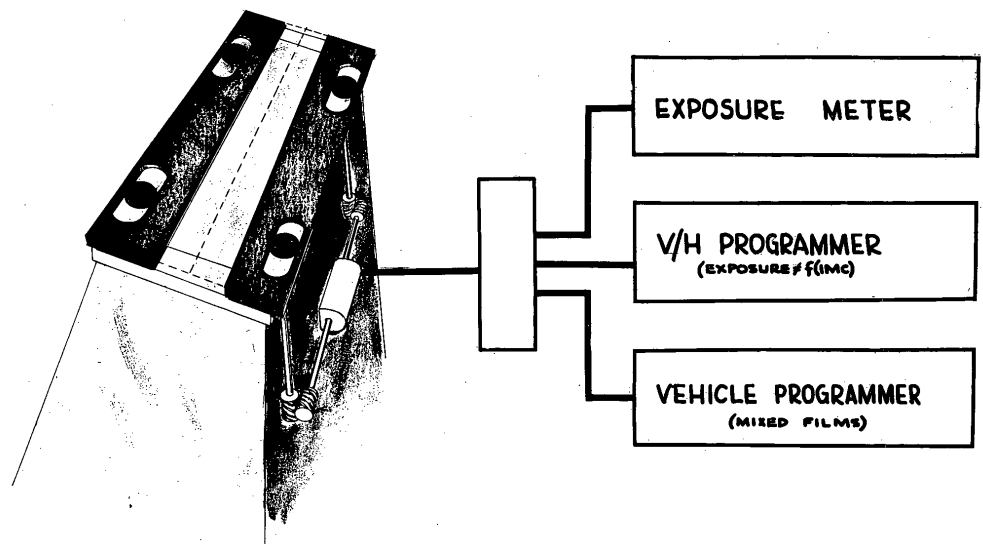
IF d_g @ CENTER OF FORMAT IS 5.3 ft.,
93% OF FORMAT HAS A d_g OF 6.0' ft.
OR BETTER.

*NOTE: 15° STEREO ANGLE HAS 3% SCALE EFFECT,
MORE THAN COMPENSATED BY STEREO.*

V/H SENSOR



IN-FLIGHT EXPOSURE CONTROL



EXPERIMENTS

- V/H DETECTION
- EXPOSURE DETERMINATION
- ATMOSPHERIC DISTURBANCE
- NIGHT LIGHT PATTERN DETECTION/RECOGNITION
- CLOUD DISCRIMINATION
- SPECTRAL DISCRIMINATION
- PERFORMANCE ANALYSIS
- READ OUT