

~~(D) SECRET SPECIAL HANDLING~~

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Pages 37

27 July 1967

TECHNICAL STATUS

~~(D) SECRET SPECIAL HANDLING~~

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ELECTRICAL POWER SUMMARY

7-5-67

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P 3

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**OV ELECTRICAL LOAD SUMMARY  
(CONTRACTOR REPORTED)**

	<u>Average Power (Watts)</u>	<u>PEAK POWER MODES (WATTS)</u>									
		<u>MPSS OPER.</u>					<u>COMM</u>				
		<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>E</u>	<u>F</u>	<u>G</u>	<u>H</u>	<u>I</u>	<u>J</u>
		<u>TMS</u>	<u>PO</u>	<u>+SGLS</u>	<u>Other</u>	<u>SGLS</u>	<u>WB</u>	<u>SGLS/WB</u>	<u>Other</u>	<u>EO/LO</u>	<u>Ascent</u>
GEMINI B	93	235	235	235	235	320	235	320	235	735	0
LABORATORY	1040	1791	1791	1925	2354	2158	1755	2024	2728	2215	886
MPSS	434	1948	1227	1227	1154	569	569	569	498	543	604
PPAC	273	586	1103	1103	593	259	243	259	521	274	274
WIDEBAND	13	0	0	0	0	0	700	700	0	0	0
TOTAL	1853	4560	4356	4490	4336	3306	3502	3872	3982	3767	1764
SPEC. ALLOC.	1825				4500						

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POTENTIAL POWER REDUCTION

o EMPLOY ADDITIONAL INHIBITS

APPROX. WATTS REDUCTION

ITEM

90

GEMINI-B RCS TANK HEATERS

220

EK THERMAL HEATERS

200

ATS LOAD MANAGEMENT

100

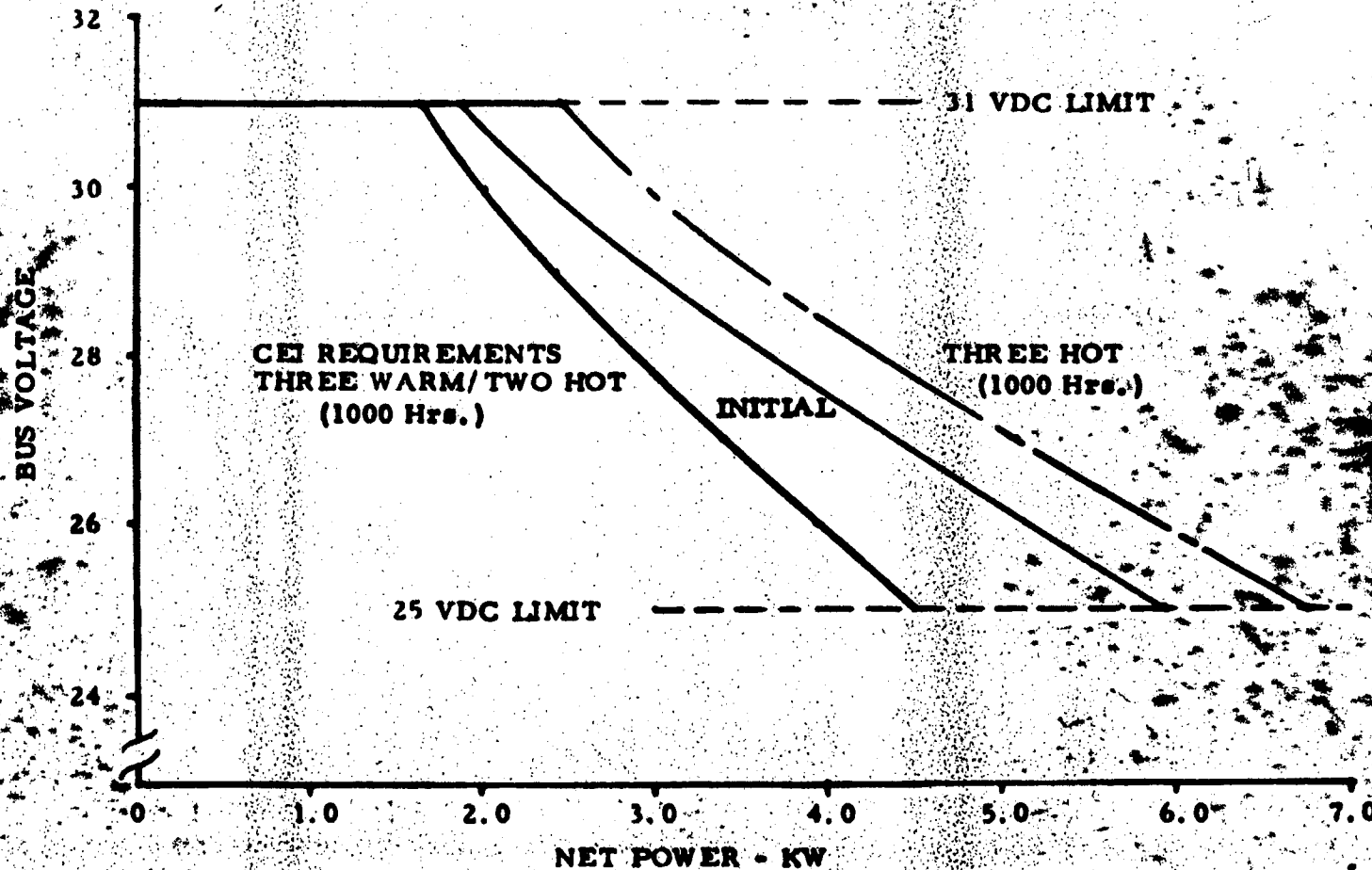
MISCELLANEOUS

o FURTHER REFINEMENT AND NEGOTIATION

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ST-2061

### FUEL CELL OUT OF LIMITS CAPABILITY



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WEIGHT SUMMARY

21 JULY 1967

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**ORBITING VEHICLE SYSTEM SEGMENT**

**WEIGHT SUMMARY - 20 JULY 1967**

	<u>Contractor</u>	<u>SP/DR Weight</u>	<u>Projected Changes to SP/DR</u>	<u>Adjusted SP/DR Weight</u>	<u>Current Predicted Weight</u>
<b><u>GEMINI B</u></b>		<u>6,120</u>	<u>+320</u>	<u>6,440</u>	<u>6,430</u>
<b>GEMINI B SYSTEM SEGMENT</b>	MAC	5,680	+320	6,000	5,985
<b>FLIGHT CREW SYSTEM SEGMENT</b>	SPO	360	----	360	360
<b>PRESSURE SUIT ASSEMBLY SEGMENT</b>	SPO	80	----	80	85
<b>LABORATORY VEHICLE SYSTEM SEGMENT (AVE)</b>	DAC	<u>14,449</u>	<u>+217</u>	<u>14,666</u>	<u>14,740</u>
<b><u>MISSION PAYLOAD SYSTEM SEGMENT</u></b>		<u>8,622</u>	<u>-306</u>	<u>8,316</u>	<u>8,322</u>
<b>G. E.</b>	GE	2,435	+ 74	2,509	2,585
<b>E. K.</b>	EK	5,583	+ 79	5,662	5,544
<b>GFE</b>	SPO	441	-296	145	145
<b>WIDEBAND READOUT SYSTEM</b>		163	-163	0	0
<b><u>TOTAL</u></b>		<u>29,191</u>	<u>+231</u>	<u>29,422</u>	<u>29,444</u>

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**PROJECTED WEIGHT CHANGES TO SP/DR**

**ESTIMATED CONTRACTUAL  
WEIGHT CHANGES**

● <b>GEMINI B - MAC</b>		
- <b>PAD ABORT CONTROL SYSTEM</b>	<b>+ 46</b>	
- <b>REDESIGN TENSION STRAPS DUE TO SHUTDOWN LOADS</b>	<b>+ 14</b>	
- <b>BLAST SHIELD</b>	<b>+260</b>	<b>+320</b>
● <b>LABORATORY VEHICLE SYSTEM SEGMENT - DAC</b>		
- <b>REMOVE DRV PROVISIONS</b>	<b>- 67</b>	
- <b>PROVISIONS FOR EXTENDED MISSION DURATION</b>	<b>+ 12</b>	
- <b>PROVISIONS FOR ACQUISITION SYSTEM - WEIGHT</b>	<b>+201</b>	
- <b>REVISE GEOMETRY OF AFT BULKHEAD BATHUB FITTING</b>	<b>+ 16</b>	
- <b>CHANGE STIFFNESS CHARACTERISTICS OF MM PAYLOAD FORWARD MOUNTING STRUCTURE</b>	<b>+ 20</b>	
- <b>SLIDING MASK PROVISIONS</b>	<b>+ 12</b>	
- <b>SPACE PROVISIONS FOR WIDEBAND SYSTEM</b>	<b>+ 26</b>	
- <b>ELIMINATE 1 PSI REQUIREMENT FOR FOOD LOCKER</b>	<b>- 10</b>	
- <b>INCREASE INVERTER SIZE TO PROVIDE AC FOR GE PANEL ELECTRO-LUMINESCENCE</b>	<b>+ 7</b>	
		<b>+217</b>

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PROJECTED WEIGHT CHANGES TO SP/DR (CONTINUED)

		<u>ESTIMATED CONTRACTUAL WEIGHT CHANGES</u>	
•	<b>MISSION PAYLOAD SYSTEM SEGMENT</b>		
-	<b>OE</b>		
	REMOVE DRV PROVISIONS	- 61	
	REMOVE 5" ACQUISITION SYSTEM	- 326	
	ADD 10" ACQUISITION SYSTEM	+ 537	
	SLIDING MASK REDESIGN	- 99	
	ADD AN ANGULAR ACCELEROMETER	+ 6	
	REDUNDANT WIRING FOR MDAU CONNECTIONS	+ 7	
	PROVIDE 2° INCLINATION OF THE TRACKING MIRROR HUB	+ 10	+ 74
-	<b>EK</b>		
	REMOVE DRV SPLICER-HANDLER	- 8	
	REMOVE DRV TAKEUP	- 20	
	ADD MIRROR SLATS & MOUNTS	+ 50	
	INCREASE CAPACITY FOR FILM SUPPLY (CCN 14)	+ 23	
	INCREASED HARDWARE FOR POWER SWITCHING (CCN 11)	+ 34	+ 79
-	<b>GFE</b>		
	REMOVE DRV	- 300	
	MISC. GFE REVISIONS - SEE GFE CHART	+ 4	- 296
-	<b>WIDEBAND READOUT SYSTEM</b>		
	DELETE SP/DR WEIGHT		- 163
•	<u><b>TOTAL PENDING WEIGHT CHANGES TO SP/DR</b></u>		<u>+ 231</u>

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OV WEIGHT MARGIN

ORBIT  
90° INCL.  
80/187, 55° N.

NO DRV

NO  
WIDEBAND

WITH  
WIDEBAND

CONFIGURATION

BOOSTER CAPABILITY

31,090

31,090

PREDICTED SP/DR OV WEIGHT \*

29,322

29,930

P/L MARGIN

1,768

1,160

PERCENT OF DRY WEIGHT

6.9

4.4

\* ADJUSTED SP/DR

29,422

29,422

MODIFIED PROCESSOR & BIMAT

- 100

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WB

---

508

DRV

---

---

PREDICTED SP/DR OV WEIGHT

29,322

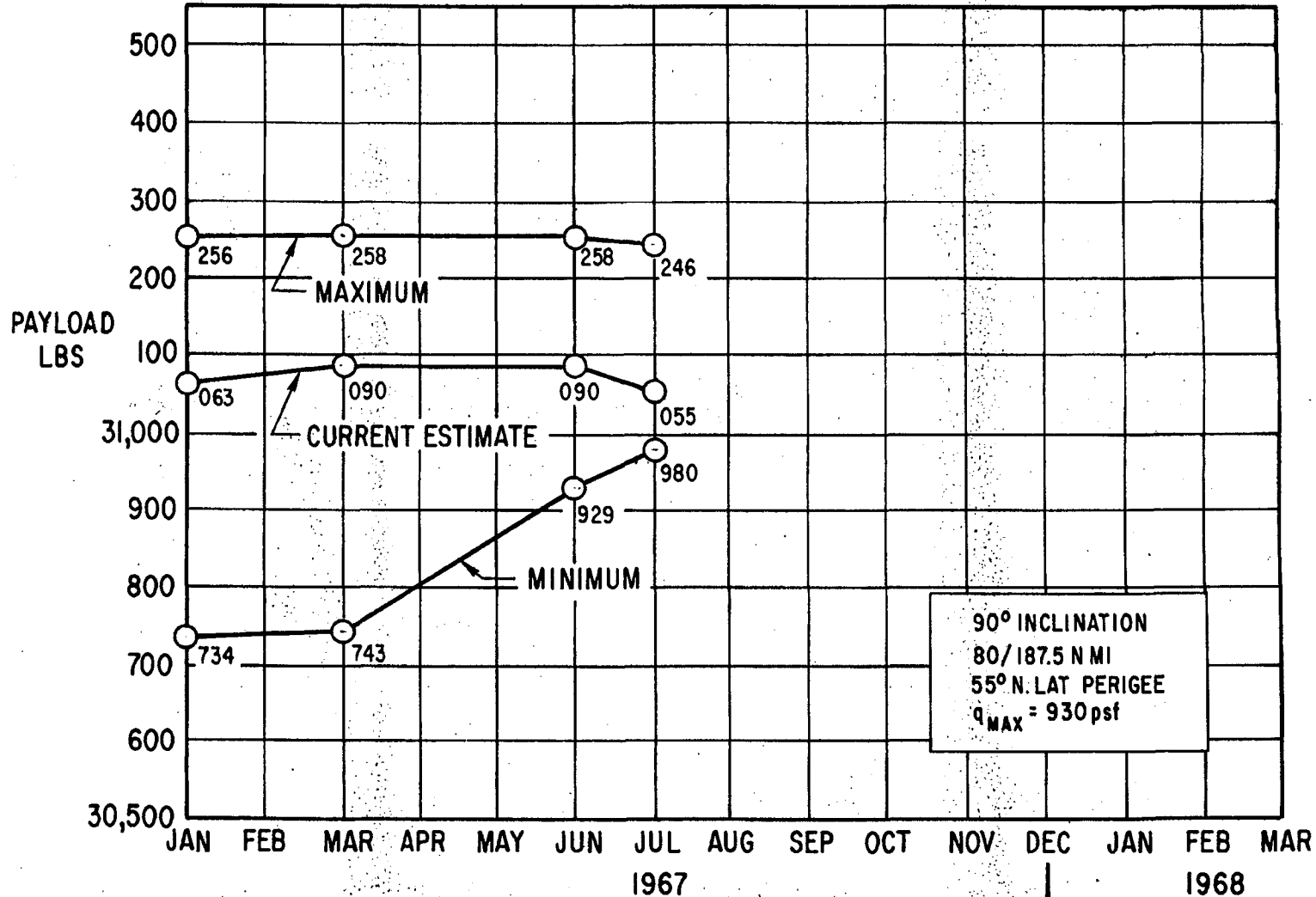
29,930

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# TITAN III M PERFORMANCE ESTIMATE (3 $\sigma$ )



DOWNGRADED AT 12 YEAR INTERVALS;  
NOT AUTOMATICALLY DECLASSIFIED  
DOD DIR 5200.10

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ABROSPACE CORPORATION  
EL SEGUNDO, CALIF  
JUL 25-67

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PITCH AND ROLL GIMBAL BEARINGS

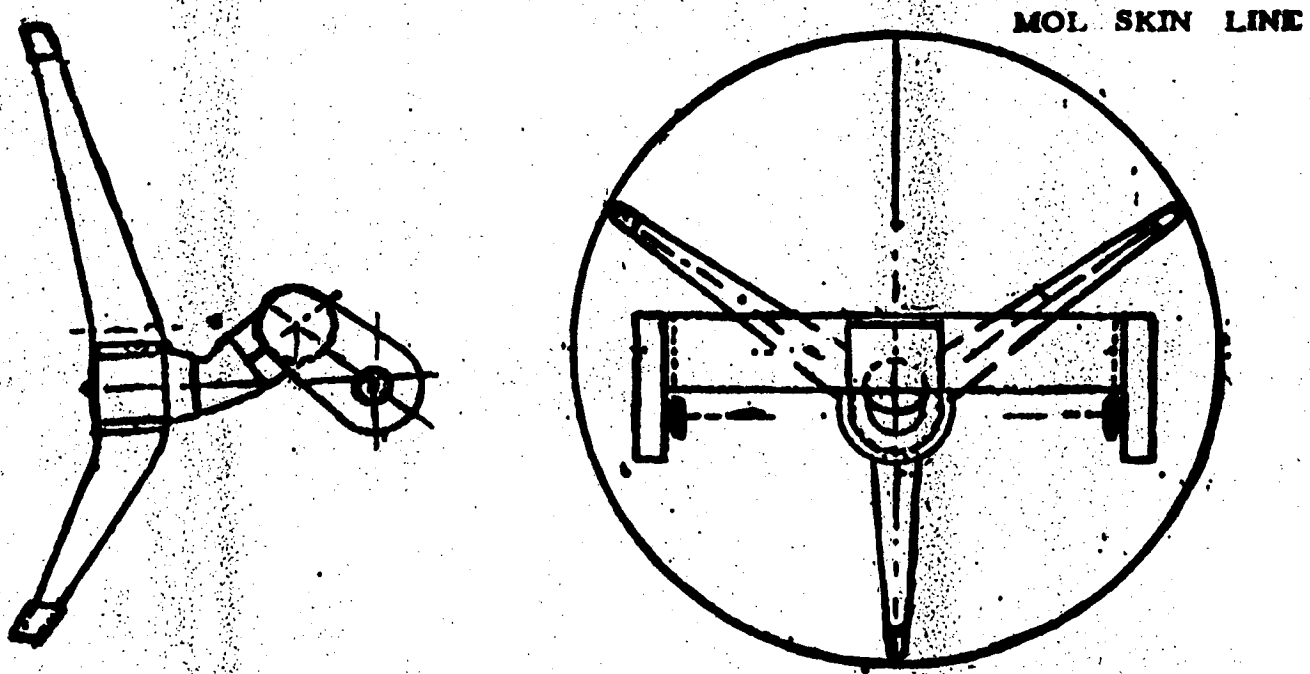
- BALL BEARINGS CHOSEN FOR MIRROR GIMBAL AXES
- WHY IS THERE A PROBLEM?
- WHAT IS BEING DONE ABOUT IT?

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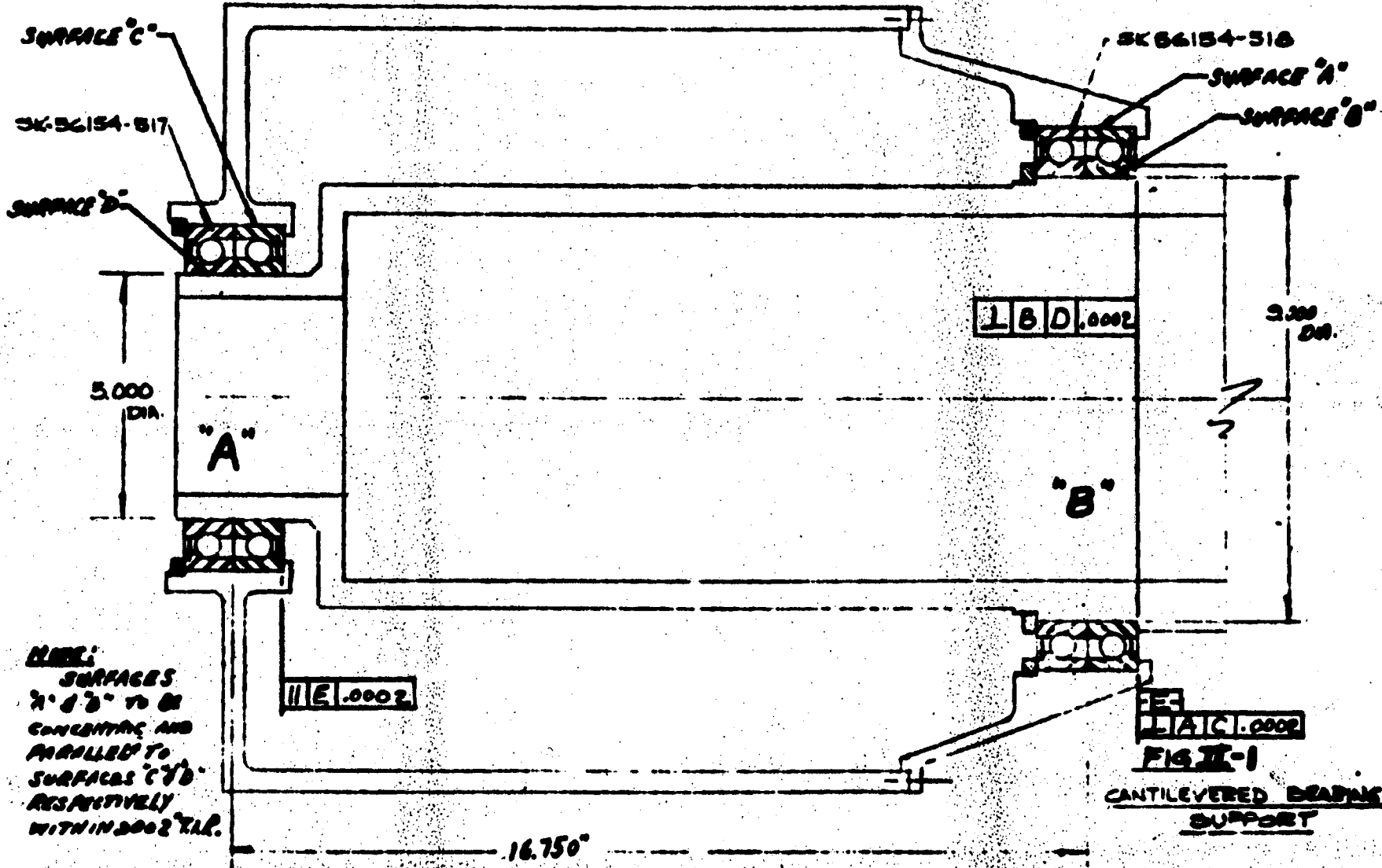
GIMBAL TRIPOD AND T-BAR ASSEMBLY

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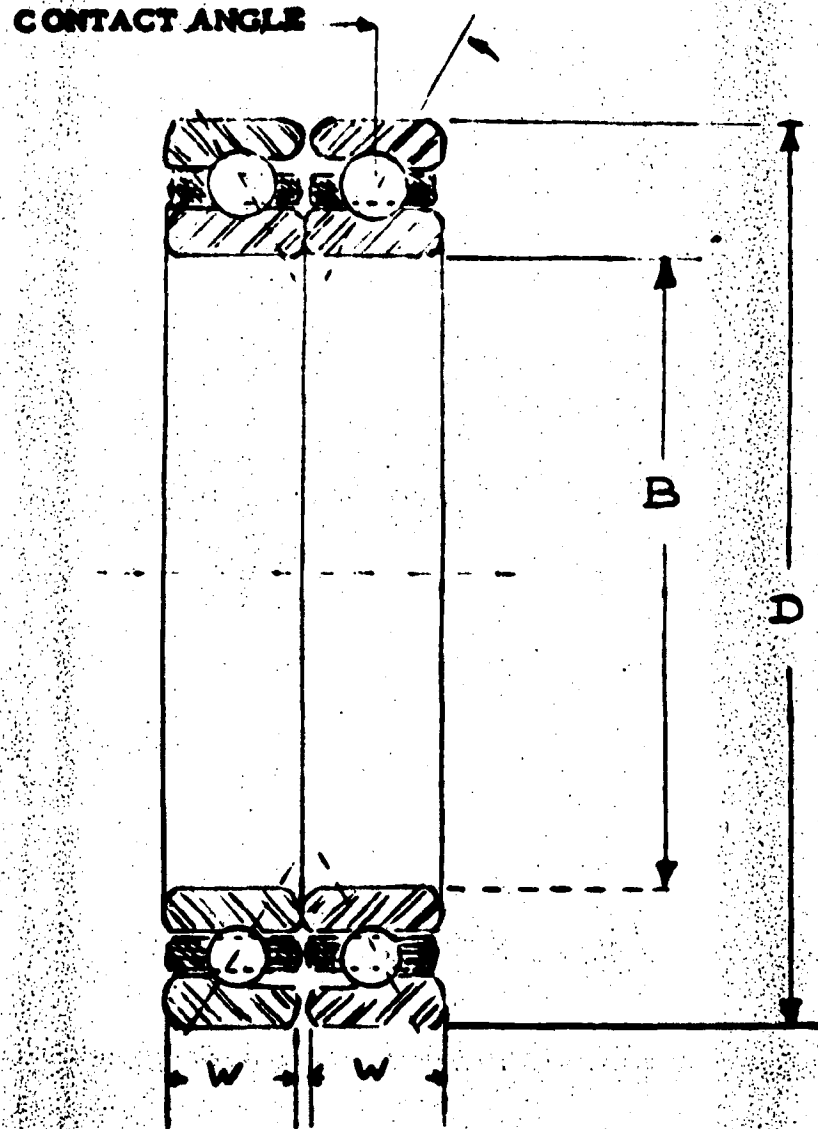
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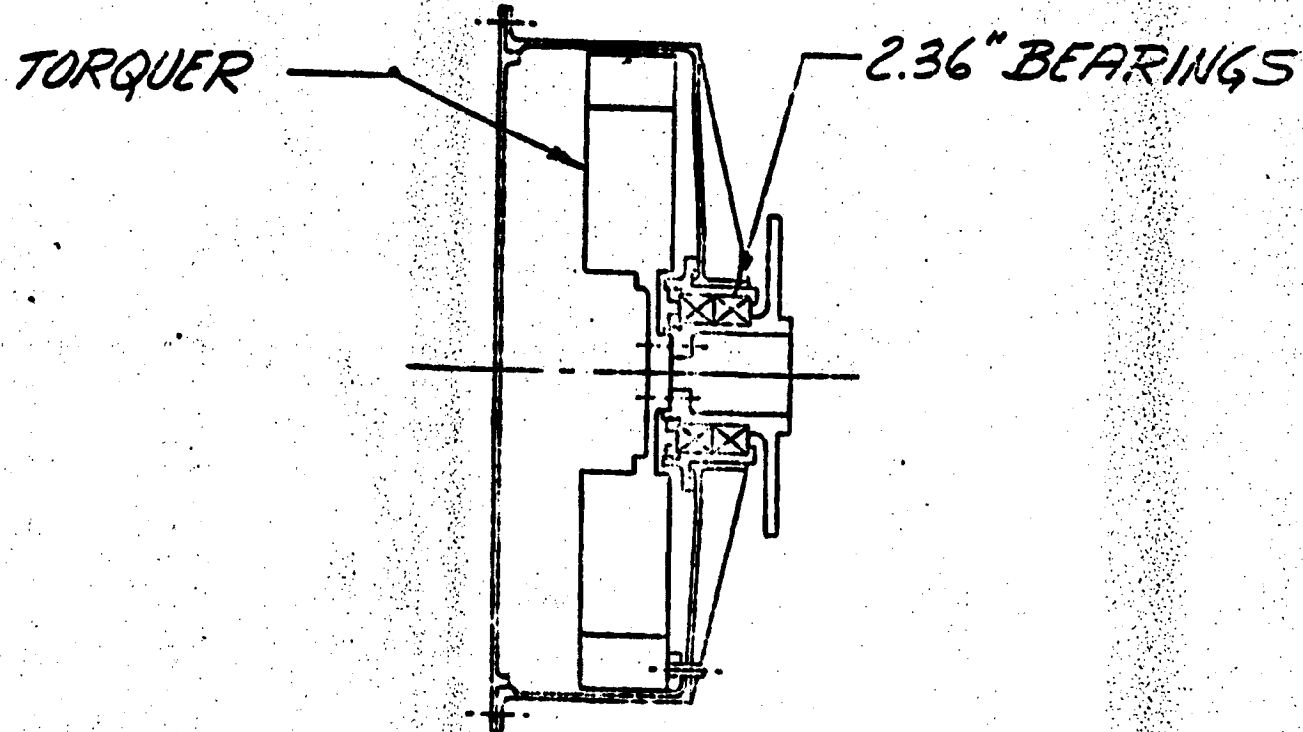


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**ANGULAR CONTACT BEARING**



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PITCH BEARINGS & TORQUER INSTALLATION

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0217

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BEARING REQUIREMENTS

○ SMOOTHNESS (EFFECT ON TRACKING MIRROR DRIVE)

/ SMEAR BUDGET

○ LINE OF SIGHT ANGULAR RATE

PITCH: 15  $\mu$  RAD/SEC

ROLL: 10  $\mu$  RAD/SEC

○ STIFFNESS (FOR GIMBAL STRUCTURE NATURAL FREQUENCY

>13 CPS)

/ 2 TO 3 X 10<sup>6</sup> LB/IN

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FACTORS AFFECTING BEARING NOISE

- BEARING CONFIGURATION
- PRE LOAD (INTERACTS WITH STIFFNESS REQUIREMENT)
- LUBRICATION
- QUALITY OF BEARING
- EXTERNAL ENVIRONMENT
  - / BRINELLING
  - / FRETTING
  - / EFFECT ON LUBRICATION
  - / FOREIGN PARTICLES
- MANUFACTURING AND ASSEMBLY TOLERANCES

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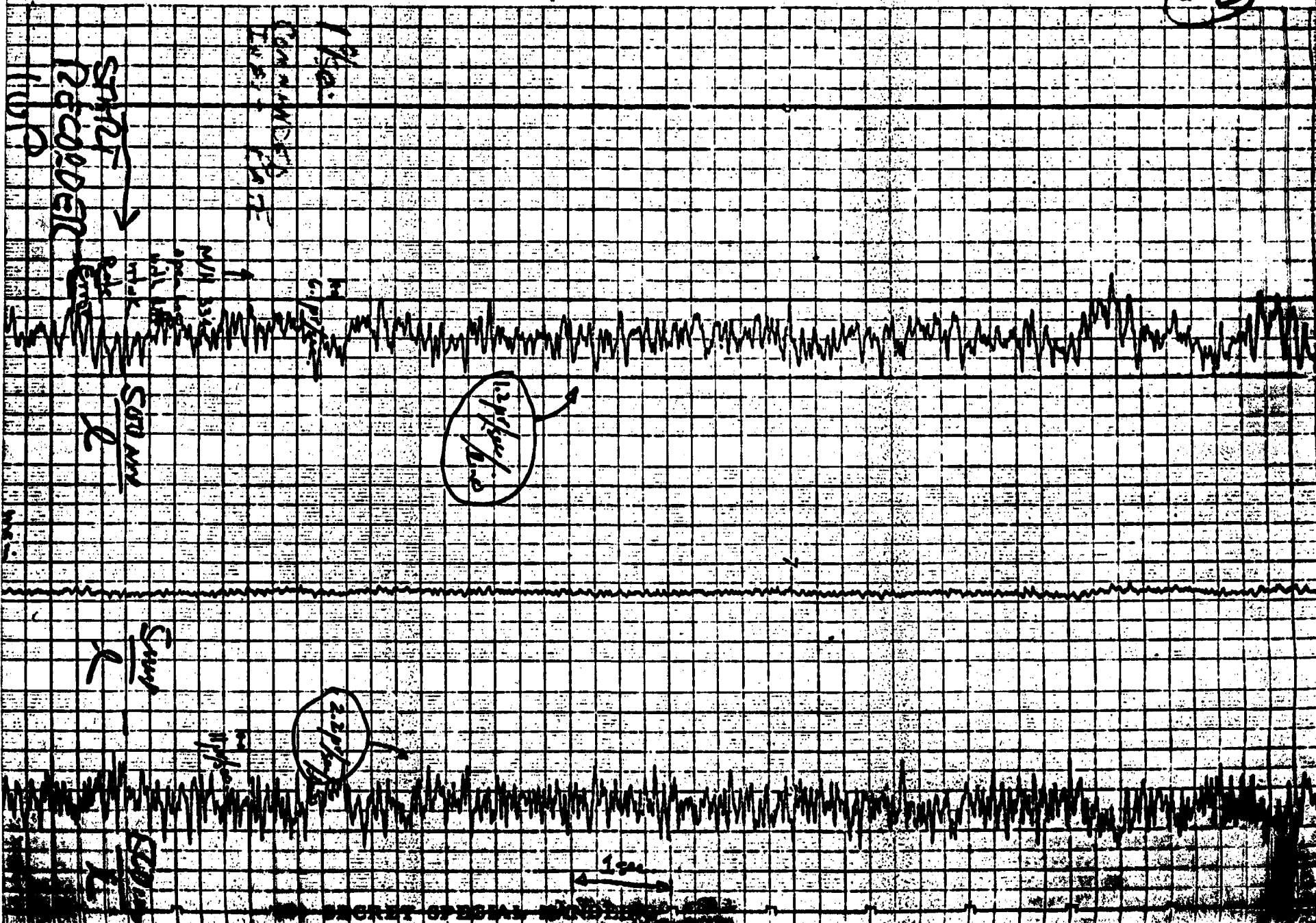
BRUSH INSTRUMENTS

DIVISION OF CLEVITE CORPORATION

CLEVELAND, OHIO

PRINTED IN U.S.A.

#2



NOT APPROVED FOR RELEASE 14 JULY 2015

RRU11

1  
- commands  
- rpt  
- etc



1.2 μsec/div  
↑

MH 330C  
operating  
with 115V  
etc etc

min  
input



range to  
measure  
etc

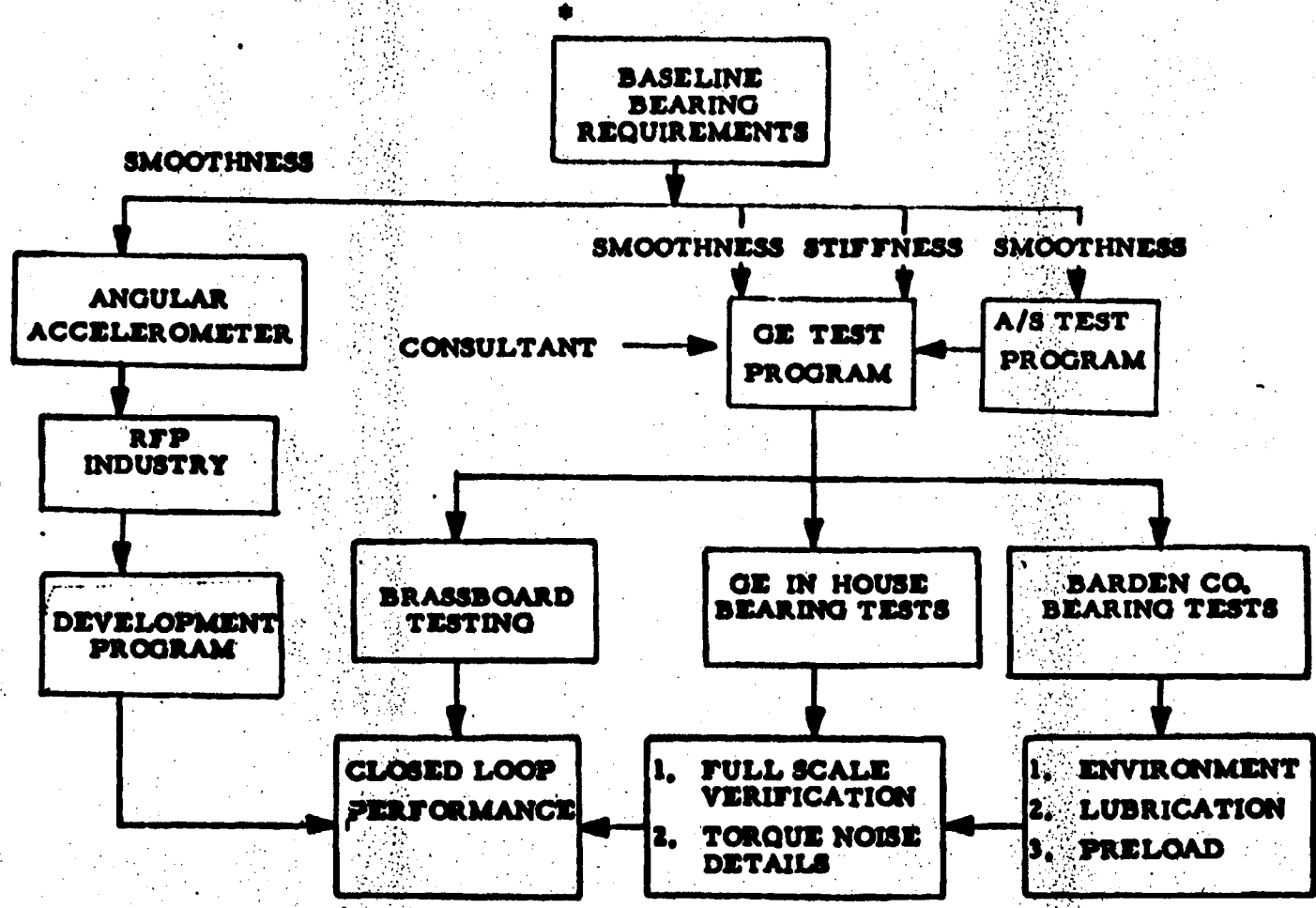
2.2 μsec/div  
↓



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MAJOR EFFORT IS EXTENSIVE TEST PROGRAM



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BEARING TEST SCHEDULE

- ① ADEQUACY DECISION
- ② VERIFICATION

	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O
<b>SMOOTHNESS TESTING</b>																		
<b>ERLIM BRASSBOARD-PITCHEROLL</b>			△	R	R				△									
<b>BARDEN RIPPLE TESTS</b>		△				△												
<b>LUBRICATION SELECTION</b>	△					△												
<b>MATERIAL EVALUATION</b>																		
<b>MICRO BRINNELING</b>	△					△												
<b>LONG TERM CREEP*</b>					△	R	R	R			R					R		
<b>MATERIAL ADEQUACY</b>																△		
<b>PROTOTYPE TESTING (FULL SCALE)</b>																		
<b>SET #1 (F-50)</b>				△			△											
<b>SET #2</b>							△				△							
<b>SET #3</b>									△				△					
<b>TEST REPORT</b>																	△	
<b>LONG TERM CREEP*</b>					△	R	R	R			R						R	
<b>DEMONSTRATION TESTING (DRIVE A)</b>									△			△						
<b>DSS-1 TESTING (NIC)</b>													△					△

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R REPORTS  
\* SAME TESTS

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SUMMARY

- o INITIAL RESULTS ARE ENCOURAGING
- o FUNDAMENTAL LACK OF HEARING NOISE DATA
- o LONG TERM EFFECTS OF EXTERNAL ENVIRONMENT ARE UNKNOWN
- o EXTENSIVE TEST PROGRAM INITIATED TO PROVIDE NECESSARY DATA

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IMAGE VELOCITY SENSOR (IVS)

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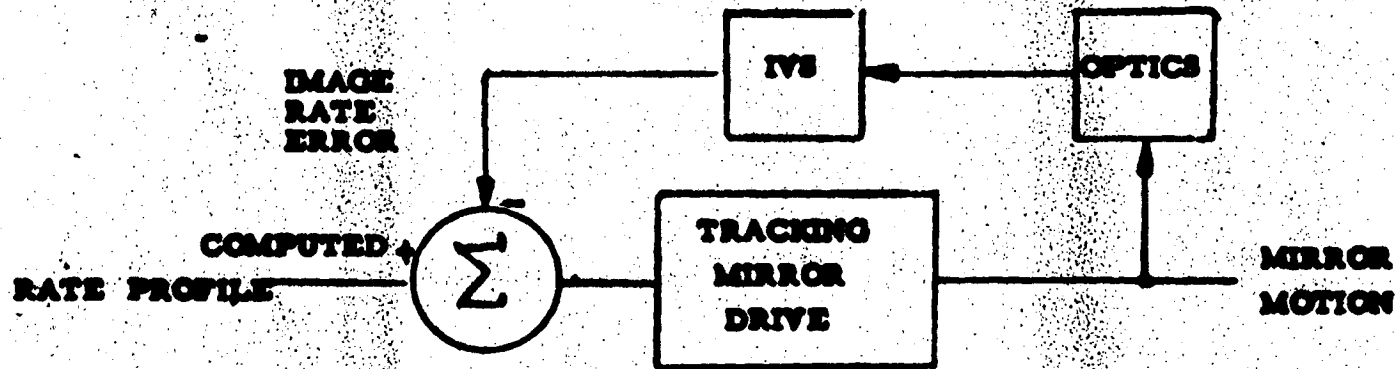
IVS PRESENTATION

- SYSTEM REQUIREMENTS
- SENSOR REQUIREMENTS
- PROBLEM AREAS
- SCHEDULE AND STATUS

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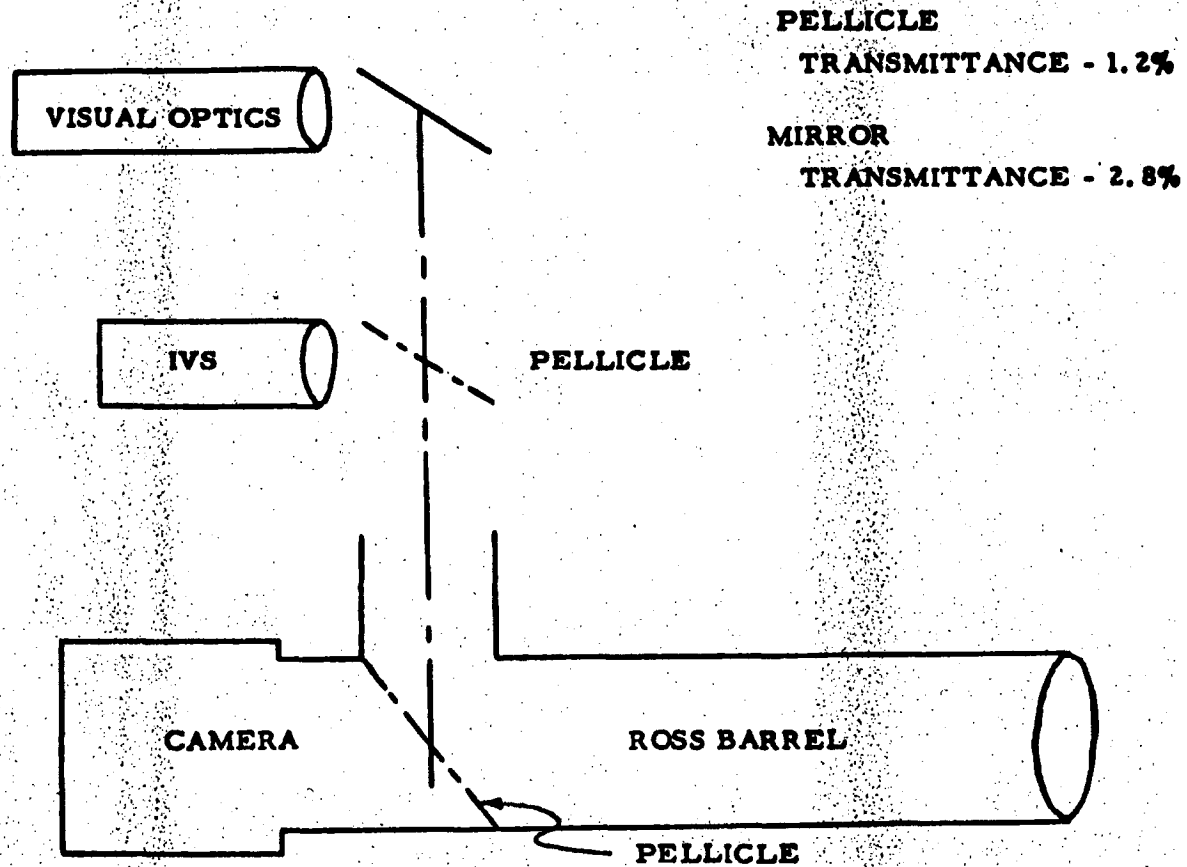


- USING IVS, SLEW AND SETTLE FOR PHOTOGRAPHY TO A RATE ERROR OF [REDACTED] ( $2\sigma$ ) IN  $\left[\frac{\text{ANGLE}}{6} + 4\right]$  SECONDS
- LEADS TO REQUIREMENT FOR IVS TO AID TMD TO SETTLE FROM [REDACTED] TO [REDACTED] IN LESS THAN 3 SECONDS

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SCHEMATIC OF ROSS BARREL AND ATTACHMENTS



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IVS PERFORMANCE REQUIREMENTS

NULL ACCURACY



FOR V S

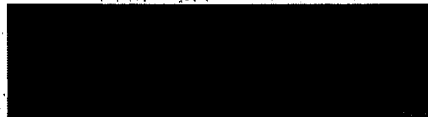


DYNAMIC RANGE



LINEARITY

25%



SATURATION

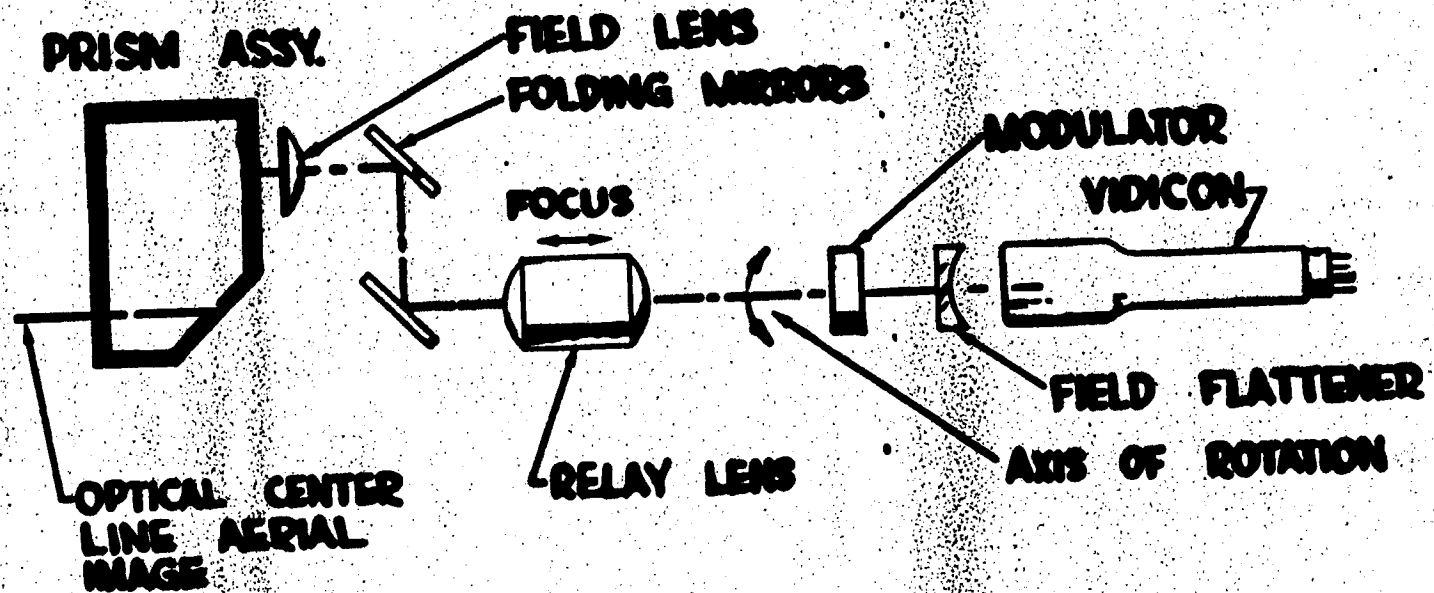
.3 IN/SEC

POLARITY OUTPUT  
REQUIRED BETWEEN

.3 IN/SEC TO .5 IN/SEC  
(600  $\mu$ R/S TO 1,000  $\mu$ R/S)

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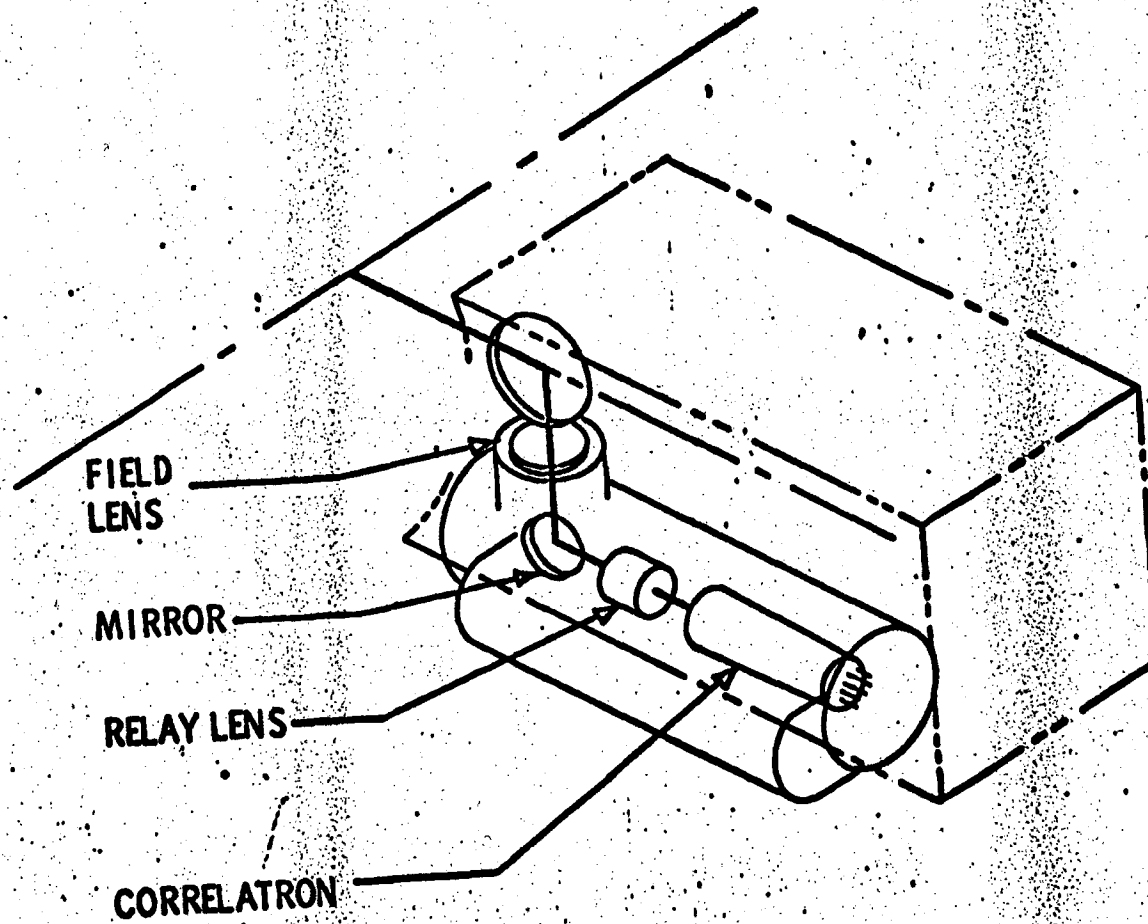
# IVS SCHEMATIC



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GOODYEAR IVS



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P331

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PROBLEM AREAS

- LOW LIGHT LEVELS
- WEIGHT
- RELIABILITY
  - SINGLE IVS FOR MANNED
  - ITEK IVS HAS MANY MOVING PARTS
  - LIMITED LIFE DATA FOR GOODYEAR CORRELATRON TUBE
- TESTING
  - REALISTIC IMAGE AND IMAGE MOTION
  - EVALUATION OF IVS AS A COMPONENT
  - EVALUATION OF EFFECT OF IVS IN COMPLETE SYSTEM

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CURRENT ACTIVITY

ITEK

- COMBINED BRASSBOARD AND SIMULATOR TESTING  
STARTED JULY 1 - COMPLETE 1 SEPT

GOODYEAR

- COMBINED BRASSBOARD AND SIMULATOR TESTING  
TO BEGIN 15 AUG - COMPLETE 1 OCT
- 6 CORRELATRON TUBES IN LIFE TEST

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Pg 34

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CURRENT ACTIVITY

LIGHT LEVEL AT APERTURE BEING DEFINED

ITEK SOW BEING REVISED

OPTICAL AND MECHANICAL INTERFACES  
BEING STUDIED

HYCON PROPOSAL BEING EVALUATED

CCN HAS BEEN SENT TO GE FOR AN RFP  
ON TESTER (INCLUDES ORDERING LONG  
LEAD ITEMS)

TECHNICAL DIRECTION TO GE ON CLOUD  
DETECTION IN PREPARATION

DETAIL DEFINITION OF GE INTEGRATION  
TASK UNDERWAY

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CERVIT FOR MOL

**R&D CONTRACT**

- TO OWENS-ILLINOIS                      **STARTED AUGUST 1966**
- PROVIDED FOR 71" PRESS AND 20 TRIAL POURS
- COST                      **\$1.5M\***

**PRODUCTION CONTRACT**

- TO BE INITIATED AFTER SUCCESSFUL DEMONSTRATION OF TECHNIQUE
- PROVIDES FOR:
  - 5 TRACKING MIRROR FLATS
  - 6 PRIMARY MIRROR CURVES
- TO BE COMPLETED ONE YEAR FROM GO-AHEAD
- COST                      **\$1,080,000\***

\*ONE FUSED SILICA BLANK: \$225,625.00

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CERVIT STATUS 72"

- NR 1 - 13      UNSUCCESSFUL (ON THE LEARNING CURVE)  
APR - JUL 67
- NR 14          14 JULY    APPARENT SUCCESS\*
- NR 15          20 JULY    PRESSED, IN ANNEALING
- NR 16          26 JULY    TO BE PRESSED
- NR 17          3 AUGUST   TO BE PRESSED
- NR 18 - 20     IF ONE MORE SUCCESSFUL BLANK IS OBTAINED, THESE  
MAY BE CANCELLED AND PRODUCTION CONTRACT  
STARTED.

\*DR. MEINEL, University of Arizona, WILL POLISH NR 14 TO 1 WAVE,  
OR BETTER, FOR DELIVERY TO EK.

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CERVIT FOR MOL

R&D CONTRACT

- o TO OWENS-ILLINOIS                      STARTED AUGUST 1966
- o PROVIDED FOR 72" PRESS AND 20 TRIAL POURS
- o COST                      \$1.5M\*

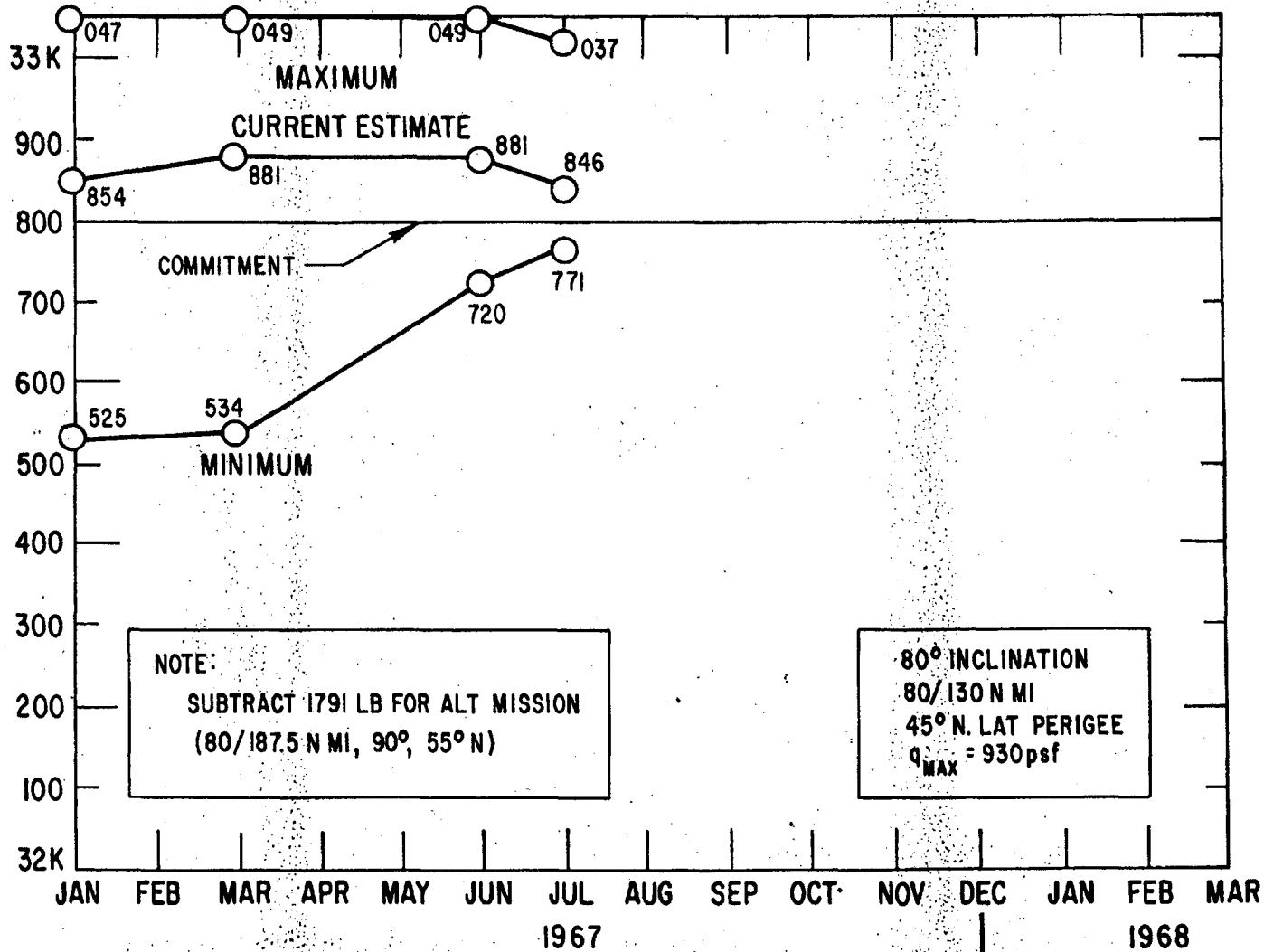
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- o COST                      \$1,080,000\*

\* ONE FUSED SILICA BLANK: \$225,625.00

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# TITAN III M PERFORMANCE ESTIMATE (3 $\sigma$ )



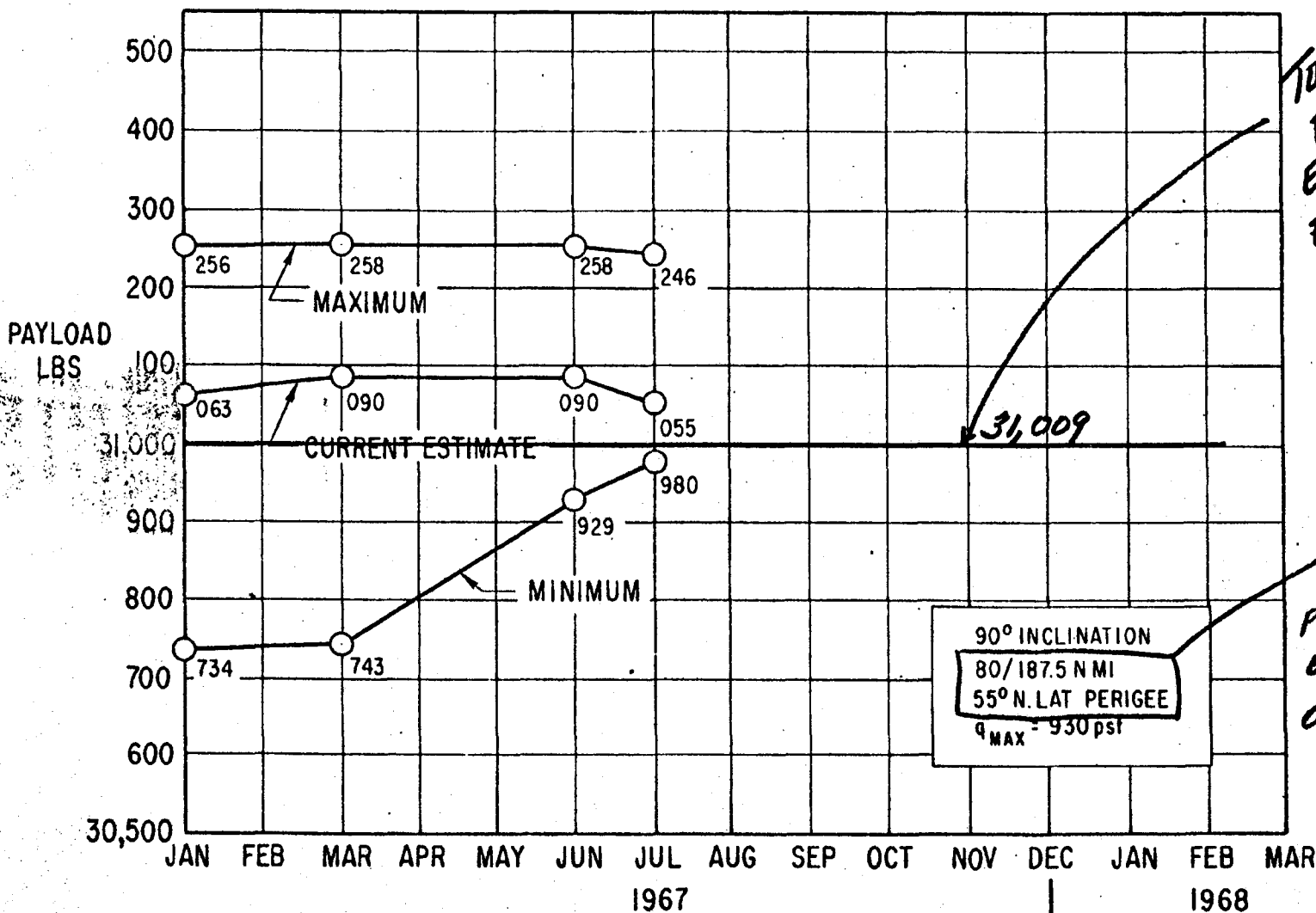
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NOT AUTOMATICALLY DECLASSIFIED  
DOD DIR 5200.10

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EL SEGUNDO, CALIF  
JUL 24-67

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# TITAN III M PERFORMANCE ESTIMATE (3σ)



*TEAM COMMITMENT  
FOR THIS ORBIT.  
EQUIV. TO 32,800 LB;  
FOR 80/130 @ 80°.*

*FOR THIS ORBIT,  
SUBTRACT 123 LB  
PAYLOAD FOR  
EACH DEGREE  
OF I INCR.*

90° INCLINATION  
80/187.5 N MI  
55° N. LAT PERIGEE  
q MAX = 930 psi

DOWNGRADED AT 12 YEAR INTERVALS;  
NOT AUTOMATICALLY DECLASSIFIED  
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JUL 25-67