

TEST FOR CONTAMINATION OF  $MgF_2$  - COATED MIRRORS

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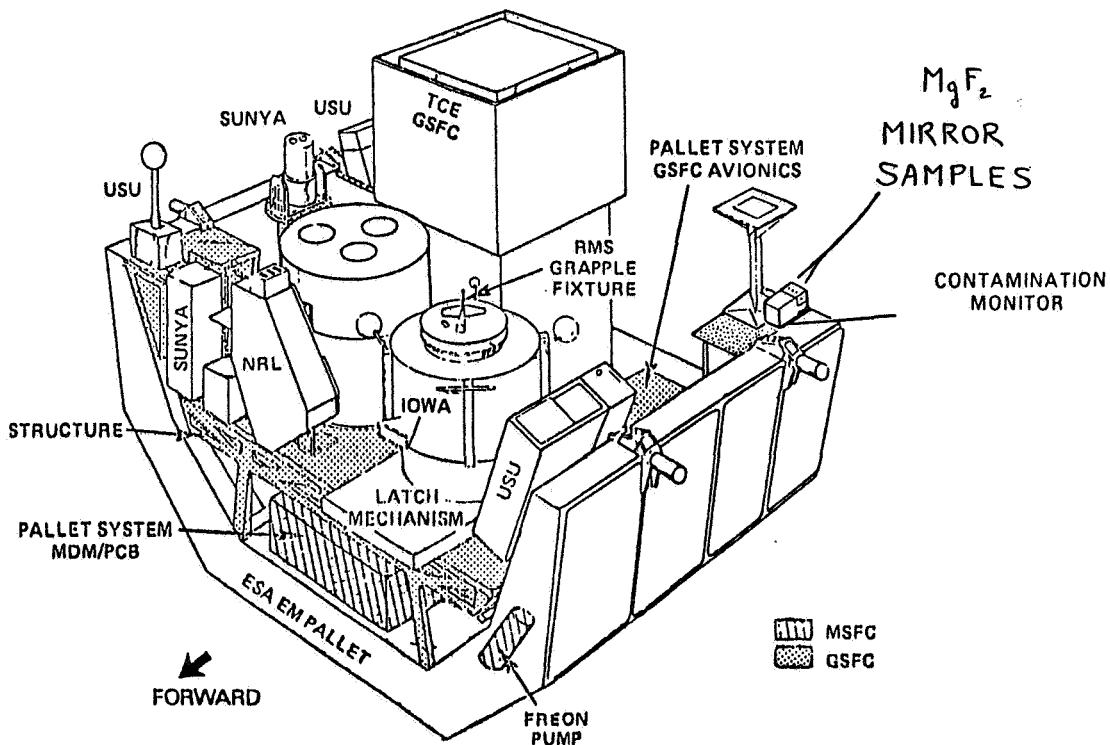
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A. N. BUNNER, PERKIN-ELMER  
B. FLINT, ACTON RESEARCH

**ORIGINAL PAGE IS  
OF POOR QUALITY**

PRE-FLIGHT REFLECTIVITIES MEASURED: AUGUST 1981  
STS-3 FLIGHT: 22 MARCH-30 MARCH 1982  
POST-FLIGHT REFLECTIVITIES MEASURED: JULY-SEPTEMBER 1982

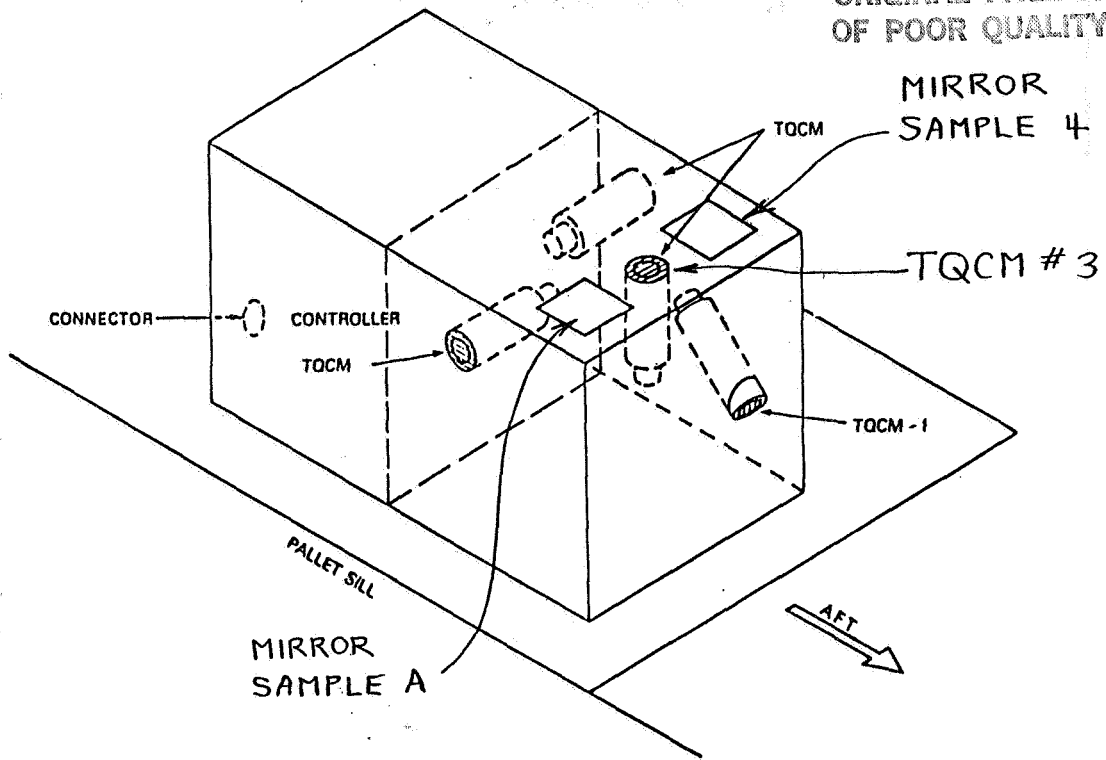
## OSS-1 PALLET PAYLOAD



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# OSS-1 CONTAMINATION MONITOR

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## OPTICAL COATING PROCEDURE

### ACTON RESEARCH

OIL-PUMPED VACUUM

$-1 \times 10^{-6}$  TORR

260-270 Å  $MgF_2$

-1000 Å ALUMINUM

$MgF_2$  DEPOSITION @  $-25 \text{ \AA/SEC}$

BOTH COATINGS ON IN  $-18 \text{ SEC}$

### PERKIN-ELMER

OIL-FREE VACUUM

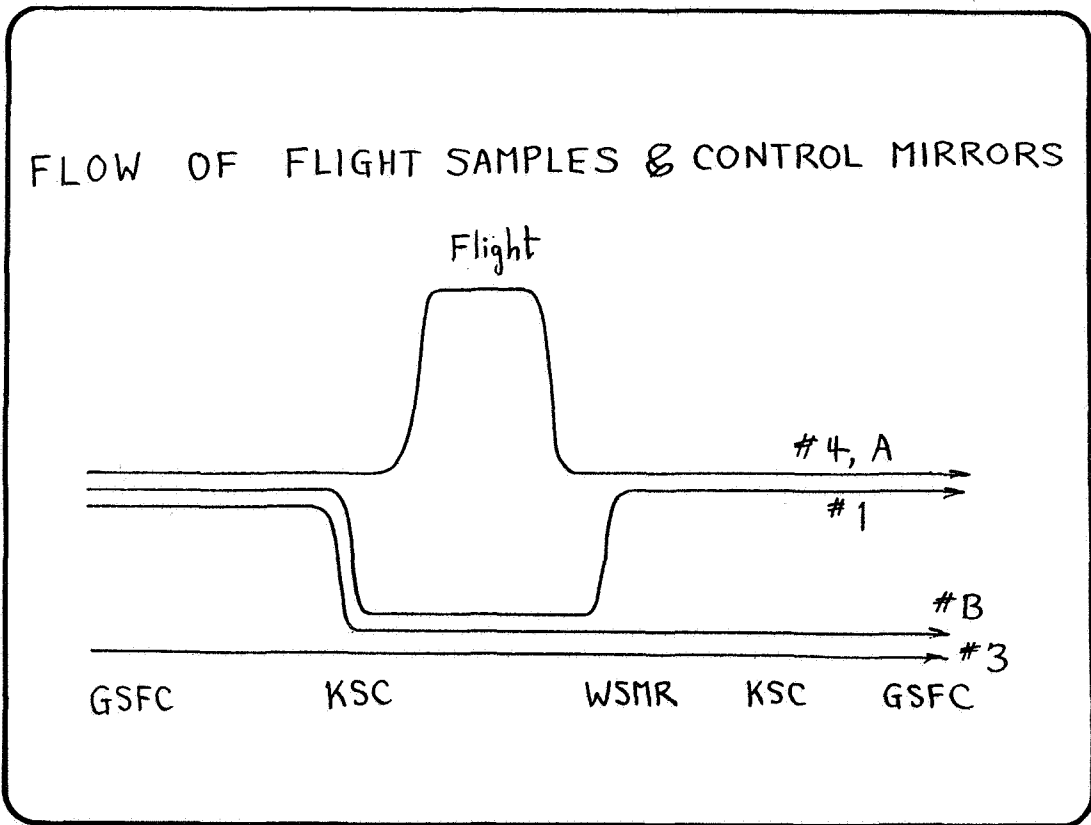
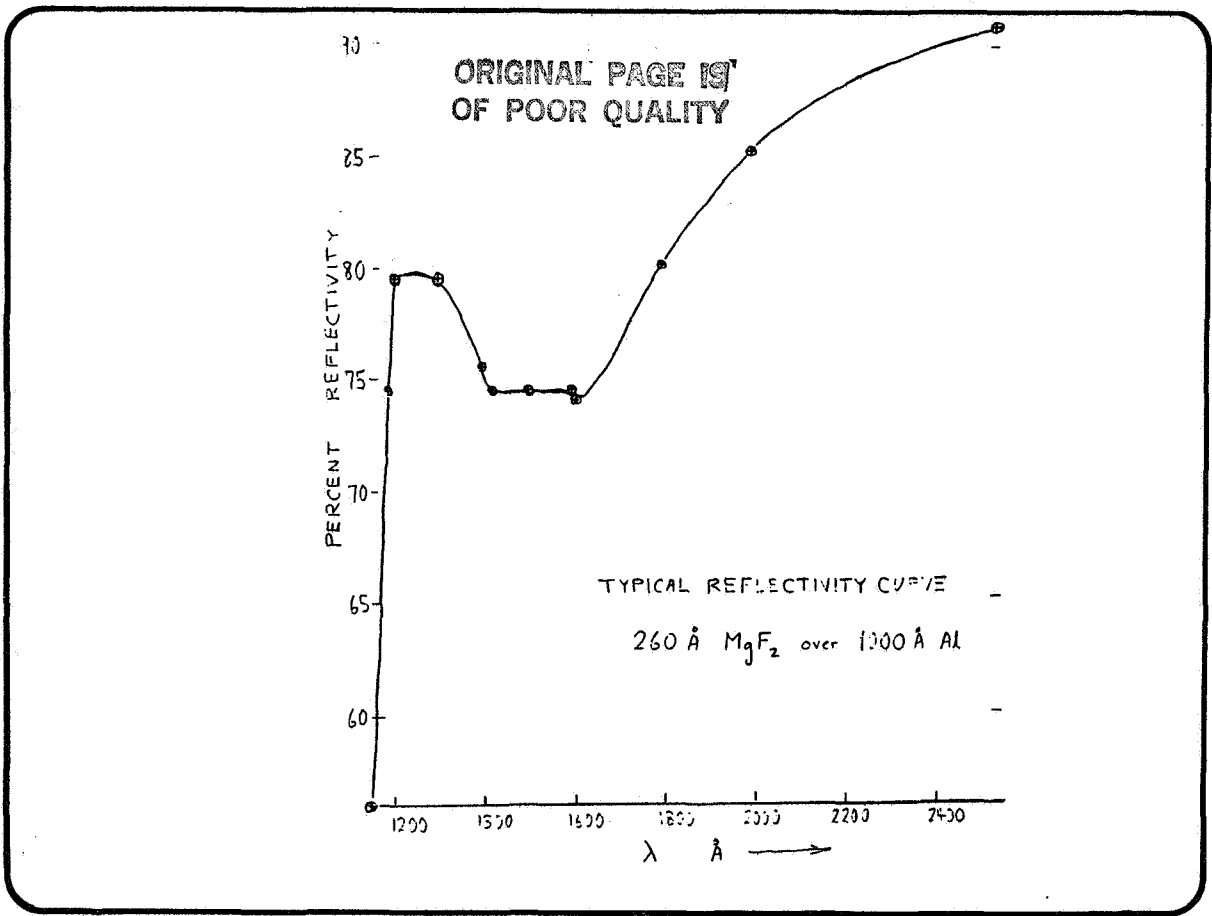
$-3 \times 10^{-7}$  TORR

250±25 Å  $MgF_2$

-650 Å ALUMINUM

$MgF_2$  DEPOSITION @  $-8 \text{ \AA/SEC}$

BOTH COATINGS ON IN  $-115 \text{ SEC}$



FLIGHT MIRRORS  
REFLECTIVITIES IN PERCENT

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SAMPLE	BEFORE FLIGHT				AFTER FLIGHT			
	1150 Å	1216 Å	1600 Å	2200 Å	1150 Å	1216 Å	1600 Å	2200 Å
A EXPOSED	<70.	81.7	77.	86.1	66.5	80.	76.5	85.3
A COVERED	<70.	81.7	77.	86.1	59.4	77.2	72.2	87.2
4 EXPOSED	55.8	72.9	74.	86.6	57.4	67.9	73.9	83.2
4 COVERED	55.8	72.9	74.	86.6	57.2	67.8	71.2	84.1

ALL VALUES ARE ±2%.

"EXPOSED" = EXPOSED TO SUN IN FLIGHT.

ALL VALUES ARE CORRECTED MEANS OF MEASUREMENTS AT P-E AND ACTON.

CONTROL MIRRORS  
REFLECTIVITIES IN PERCENT

SAMPLE	BEFORE FLIGHT				AFTER FLIGHT			
	1150 Å	1216 Å	1600 Å	2200 Å	1150 Å	1216 Å	1600 Å	2200 Å
1	55.8	72.9	74.	86.6	57.7	69.6	<u>70.1</u>	85.6
B	<70.	80.2	75.	87.2	-	81.2	74.5	87.2
3 EXPOSED	55.8	72.9	74.	86.6	57.3	<u>68.8</u>	<u>68.9</u>	85.8
3 COVERED	55.8	72.9	74.	86.6	56.1	<u>67.6</u>	<u>68.4</u>	<u>82.4</u>

(FINGERPRINT)

ALL VALUES ARE ±2%.

"EXPOSED" - NOT COVERED BY ALUMINUM SHADE.

ALL VALUES ARE CORRECTED MEANS OF MEASUREMENTS AT P-E AND ACTON.

OBSERVATIONS

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1. NO CHANGES  $>1.8\sigma$  OBSERVED, EXCEPT FOR FINGERPRINT.
2. WEAK EVIDENCE ( $\leq 1.8\sigma$ ) FOR DEGRADATION AT 1216 Å AND 1600 Å FOUND IN SEVERAL SAMPLES.
3. NO SIGNIFICANT DIFFERENCE BETWEEN FLIGHT MIRRORS AND CONTROL MIRRORS.
4. COVERED SAMPLES SUFFERED MORE THAN SAMPLES EXPOSED TO SUN, BUT DIFFERENCES BARELY SIGNIFICANT.
5. EXPOSED SIDE OF FLIGHT MIRRORS FOUND TO BE SOMEWHAT DUSTY.

CONCLUSIONS

1. NO EVIDENCE FOR PERMANENT SOLAR-INDUCED DETERIORATION.
2. NO EVIDENCE FOR PERMANENT SHUTTLE-INDUCED DETERIORATION.
3. NO EVIDENCE ON OIL-PUMPED VACUUM VERSUS OIL-FREE VACUUM DURING COATING.