



**Aerospace  
Systems Division**

Space Suited Crew Engineering Evaluation  
of the Proposed Array A-2 PSE Decoupled  
Shroud (Crew Engineering Mockup)

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A. INTRODUCTION

On January 22, 1971, the BxA Crew Engineering group performed a 1G, space-suited handling and deployment test with the PSE decoupled shroud mockup.

This test was a continuation of a Crew Engineering evaluation started in the 3rd week of Nov. 1970 with a "shirt sleeve" test (See BxA Internal Memorandum Letter No. 9712-111).

The purpose of the test was to determine if a space-suited deployment of the shroud would present any handling problems to the crew.

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B. HARDWARE USED

1. PSE Crew Engineering Mockup.
2. PSE Stool Crew Engineering Mockup.
3. PSE Shroud Crew Engineering Mockup.

This shroud mockup is a nondeployable configuration, i.e., consisting of an uncollapsible frame equipped with a removable D-handle, a simulated thermal shroud, and a pull ring/lanyard assembly for the release of the thermal skirt.

The shroud was simulated on the top and side by one layer of .005 inches thick aluminum and by a .0005 inches thick Al-layer for the thermal skirt (See picture No. 3).

4. A UHT for thermal skirt deployment was utilized.

C. TEST FACILITIES

Crew Engineering Laboratory, Plt 2.

D. TEST PROCEDURE

The PSE Stool and the experiment were placed on the floor (See Picture No. 1) and the space-suited subject performed the crew evaluation in the following steps corresponding to the present A-2 deployment procedure:

1. Using the astronaut emplacement handle (in this configuration a D-handle) the subject simulated the shroud deployment from the stowed condition.
2. The subject performed shroud emplacement over the experiment by "eyeballing" the alignment of the main axes.
3. The test subject, next released the velcroed pull ring/lanyard assembly at the emplacement handle, (See Picture No. 2).
4. Release of the folded skirt was accomplished by using the pull ring/lanyard assembly which retains the skirt against the side of the shroud with velcro.



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5. Deployment of the thermal skirt, using the UHT in the deployment loops, was accomplished.
6. Finally, the test subject removed the astronaut emplacement handle. (See Picture No. 3).

E. RESULTS AND CONCLUSIONS

1. Reach parameters (See Picture No. 3) are acceptable, however the crew engineering group recommends a change of the total shroud height from the present 24" to 26" (See Fig. No. 1) to eliminate the possibility of physical contacts of the upper shroud blanket with the experiment gnomon.
2. The glove interface to the astronaut emplacement handle mock-up was acceptable. The D-handle design allows very good control of the shroud during all phases of emplacement.
3. During the "shirtsleeve" deployment in Nov. 1970 the visual alignment aspects of the shroud during emplacement were vastly improved by incorporation of an alignment stripe on the C/S cable of the PSE.

Although during the space-suited test the PSE was not equipped with a marked C/S cable, a series of 5 shroud alignment tests have also shown satisfactory results w/o the mark.

Nevertheless the incorporation of an alignment stripe on the cable should be fixed as a recommended input for an Engineering Model evaluation. (See Picture No. 4, made during the shirtsleeve test in Nov. 1970).

The alignment reliability won by this improvement might be an asset for reducing the present shroud diameter (30") to 25". (See Fig. 1).

The release and deployment concept of the shroud skirt are acceptable.

The stowed configuration of the skirt (See Picture No. 1) requires additional design engineering evaluation, but final comments on this point should be based on the Engineering Model tested with a flight configuration skirt (12 layers of .5 mil mylar).



Picture No. 1

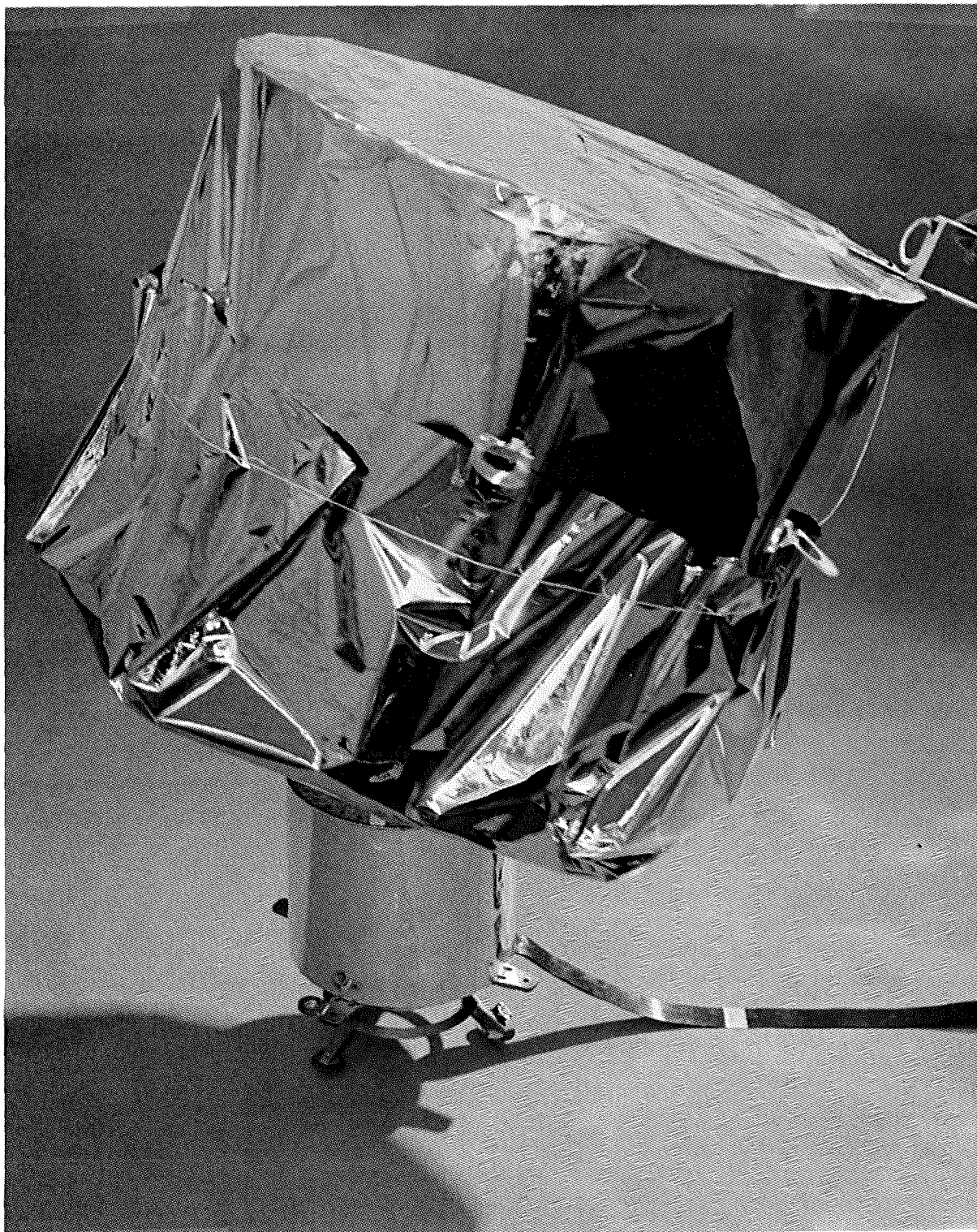


Picture No. 2





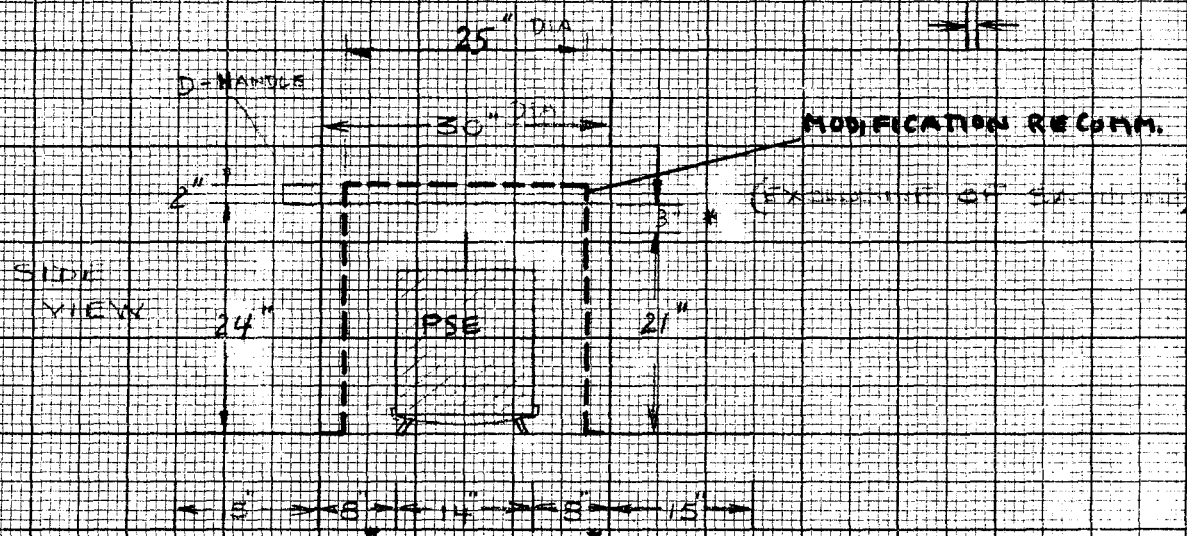
Picture No. 3



Picture No. 4

PSE DECOUPLED SHROUDMINIMUM GREN SIZE

SCALE



\* EXPECTED  
CLEARANCE TO  
ASTRONAUT  
SUBJECT TO  
VERIFICATION  
BY TEST WITH  
ENGR. MODEL

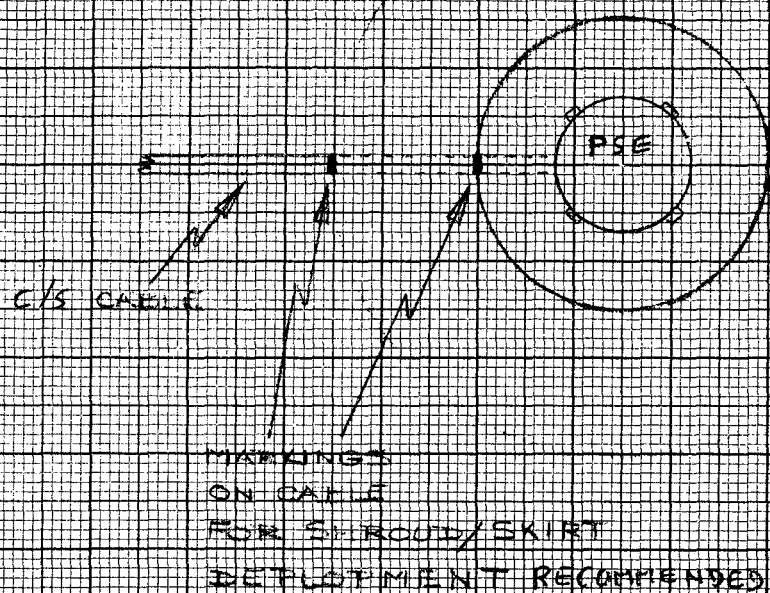
TOP VIEW

Fig. 1