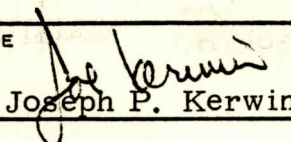


MEMORANDUM

Lyndon B. Johnson Space Center



REFER TO: CB	DATE JUN 04 1976	INITIATOR CB/JPKerwin:cl:6/4/76:2421	ENCL
TO: CB/All Astronauts		CC	
FROM: CB/Joseph P. Kerwin		SIGNATURE  Joseph P. Kerwin	
SUBJ: Astronaut Office Position on Shuttle EVA			

A serious look is being taken by the Crew Systems Division at various EVA equipment options which might save near-year dollars. I am not qualified to discuss all the engineering and cost implications of these changes, but some of them raise operational questions on which a crew position is essential.

The hardware options come in almost limitless combinations, but the basic ones are:

1. Delay procurement of Shuttle hard-torso suit, reopen ILC line for A7LB suits (scavenge hardware only from existing suits).
2. Delay procurement of Shuttle backpack, manage OFT EVA with either:
 - a. Refurbished Apollo PLSS.
 - b. Apollo CM (sim bay) EVA system.
 - c. Skylab (ALSA) EVA system.

I don't think we can comment on the suit option at this time. Obviously if A7LB suits were procured that were in configuration, qualified, custom-fitted, and in sufficient quantities, we could do the job with them.

The implications of the EVA support systems options are (roughly) as follows (all options could go either with A7LB or Shuttle suit):

1. Use PLSS.
 - a. No liquid cooling during EVA prep.
 - b. No recharge capability, therefore EVA limited to approximately 4 hours (-6 PLSS) or 6 hours (-7 PLSS).
 - c. No umbilical for EVA, except that we are already stuck with a communications-only umbilical for OFT EVA, because neither the new EVA radio nor its orbiter counterpart will be ready in time.

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2. Use CM EVA system.

- a. No liquid cooling at all.
- b. 100' umbilical for each crewman.

3. Use Skylab EVA system.

a. 100' umbilical for each crewman. Suboptions:

- (1) Manage 200' of umbilical in airlock, or
- (2) Restrict second crewman to a short umbilical (no buddy system), or
- (3) Accept one-man EVA, or
- (4) Stow second umbilical outside airlock with vacuum transfer, or
- (5) Add umbilical stowage spheres (ala Skylab) to Shuttle airlock.
(Large impact)

The principal problems with evaluating these options are that we not only don't have complete system descriptions to evaluate, but we don't have a defined EVA against which to evaluate these undefined systems - we don't know what we have to do EVA. There is a generic requirement for EVA "for inspection and remedial repair" on all shuttle missions. The working assumption is that EVA may be required to back up payload bay door and/or radiator malfunctions, and that other requirements will develop. The nature, duration and tasks of this EVA are poorly defined.

I propose the following statements as current office positions:

- 1. EVA capability on all missions is a requirement and will remain so until we're shown that there are no contingencies that require it and can be solved by it.
- 2. Two-man capability is required for planned EVA, but we have already implicitly accepted the requirement for one-man contingency EVA on early OFT missions, because payload bay door repair can't be done without one man inside.
- 3. Vacuum transfer as a planned maneuver on any EVA is unacceptable - in particular as a kluge to hardware that wasn't designed for it.

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4. Two 100-foot umbilicals cannot safely be managed in the existing airlock volume (this is an extrapolation from Skylab experience, with the help of a very crude Wif run that Musgrave and I accomplished on June 2, 1976, with two low-fidelity umbilicals in a low-fidelity airlock.)

5. The problem of one crewman managing his own 100-foot umbilical on a contingency EVA is extremely severe, and might be impossible. Management of a comm-only umbilical will also be very difficult, but due to the smaller bulk and less severe safety implications, can probably be done.

6. Gas cooling for EVA prep (contingency) is acceptable. Acceptability of gas cooling for contingency EVA depends on the nature and duration of the EVA, and is questionable at best. My personal inclination is to say it's unacceptable.

Please comment. Office acceptance of the above as general working positions would help us evaluate proposals when and if they mature.

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