

MEMORANDUM

Lyndon B. Johnson Space Center



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SUBJ: Payload Specialist Selection and Training			

Because of the close relationship between payload specialist (PS) and mission specialist (MS) functions, and because selection and training policies flow from assigned functions, I would like to summarize our thinking down here in the trenches about payload specialists.

Our memorandums to you of July 29 and August 6 presented what we believe to be the correct division of roles between the MS and the PS and the procedure for arriving at the need for and numbers of PS's on a specific flight. The important characteristics of the PS and his role are as follows:

a. He is an expert in performing and/or interpreting one or more of the onboard experiments--usually a designee of the PI; possibly the PI himself.

b. He is not (in the usual case) a career astronaut and is not expected to spend a great deal of time in training outside his discipline. The enclosed excerpts from Senate hearings show that both the Congress and at least part of the scientific community has this impression.

These characteristics need to be agreed upon because they have great effect on the selection and training of PS's. Some cross-training of PS's will always be required, but if the PS were to be a generalist, with extensive responsibility for experiments outside his discipline, and for management of payload support systems and coordination of multi-discipline payloads, his training would have to be much more extensive. Our guidelines have these implications:

SELECTION

a. Source - The PS candidates should be nominated by the PI's (payload sponsors) for the flight, after the joint decision with NASA as to the number required. Whether the payload is NASA-sponsored should not matter. If the PI's are NASA people, they'll be involved, but it seems to me that NASA in its function as STS operator or payload integrator should stay out of PS nominations, other than defining the necessary standards. NASA's one option in this area is to offer career crewmen as PS's if desired. If this procedure is followed, the issue of what responsibility NASA PS's have over non-NASA payloads will be solved automatically.

b. Timing - The screening process should be complete and the prime and back-up assignees to each PS billet identified (though not necessarily as prime - back-up) in time to commence payload training. This date depends on

(1) complexity of training.

(2) amount of cross-training for each PS.

(3) the payload hardware schedule, since PS's will be required to support hardware testing and integration in many cases.

The latest acceptable date should be determined by the payload sponsor, since he's responsible for the training. For reference, it is our desire to assign an MS to each flight soon after payload definition (at least as a technical assignment) to assist in hardware and flight plan development.

c. Screening - I will not comment in detail on medical screening. It seems logical to provide the payload sponsors with medical standards so that they can perform pre-screening but not to make such screening mandatory. Certainly, a description of the STS, the physical stresses to be expected in flight, and the screening and training procedures to be required by JSC should be provided to potential PS's so that they can make their decision to volunteer intelligently.

Besides medical testing, it seems fair and reasonable to permit the prospective PS to sample the two unique physical environments of space flight--zero G and launch and re-entry G profiles. Thus, a KC-135 ride and a centrifuge ride should be scheduled. It is not clear that this needs to be done prior to selection. There is no clear requirement for T-38 flying (or for WIF training, since PS's will not perform EVA).

The question of when the two PS's should be designated as prime and back-up is interesting. From our point of view, the earlier the better; it will make relationships and responsibilities clearer during training and flight plan development. At the latest, it should be done prior to beginning integrated training with CDR and PLT because it's doubtful that we'll be able to afford to duplicate all integrated training exercises to provide equal training for both. This implies that although both PS's will receive equal mission-independent training, the back-up will receive less integrated training and, therefore, will be less efficient if he flies. This should be understood and accepted if we go that way. Designation of the prime PS is also the responsibility of the payload sponsor.

There has got to be a final screening opportunity late in training. The payload sponsor should be permitted to replace the prime with the back-up based on inadequate experiment performance, provided that the back-up has received the operational and safety training necessary to satisfy the STS operator. The STS operator should be permitted to do the same based on inadequate performance in mission-independent or integrated training.

TRAINING

Detailed training plans for PS's are being prepared elsewhere. I would like to comment only upon the need for integrated training and simulators. These will:

- a. verify procedures and timelines which involve the whole crew.
- b. increase the efficiency of the crew and the controllers, especially payload controllers.
- c. exercise malfunction and emergency procedures.
- d. allow the CDR to estimate crew readiness.

I have two questions about current planning:

- a. Will we do integrated training early enough to modify procedures as required?
- b. What payload hardware will we use for integrated training; what is the proper balance between hardware cost and efficient training?

SENATE
Hearings on
Space Research in
Life Sciences -
Lexington, KY
April 2, 1976

Senator FORD. My questions are for either one that wants to answer so I'll just ask the question and you can say, "Will you answer this?"

There is a prepared statement by Dr. Musgrave that a scientist will receive 6 months of training before he can conduct his experiment on the Spacelab. Is this not a lot of time to require a scientist leave his work and do you think that requirement will discourage any scientists from participating?

Dr. KEEFE. In terms of a university-based researcher that's quite a time commitment, 6 months of training to fly a particular mission, run a particular set of biological experiments and that is not the understanding that we have been led to believe in the past, that relatively nontrained, nonspecialized individuals so far as flight experience is concerned, would be passengers, visiting scientists on Spacelab.

Senator FORD. I'm not sure whether this is true or not but it may mean that the original group that will go up will need some training.

Dr. KEEFE. That could very well be.

Senator FORD. After we get into the routineness of it hopefully by 1980, it may mean what you say, but he may have been referring to the original group that will go up to experiment and their training. Six months still is a long time to ask a scientist to leave his work and to train and prepare for this.

Dr. KEEFE. On the other hand, an individual, a program specialist, a mission program manager, a program scientist that would fly the mission and carry out the various experiments themselves would be very useful, in terms of his overall training, his familiarity with the system, his being onsite. That to me would be a very useful operation.

Senator FORD. Thank you very much, Doctor.

I want to ask you a question that I've asked all of the others, Doctor, and it goes back in reading the statements prior to visiting this morning, from your statement that was presented to us earlier. Are we correct that you stated that a scientist will have to receive 6 months training prior to personally conducting their experiment aboard a space lab? Will this be 6 months of training and will it be full time for the 6 months? Where will it be done? What will it consist of and who will pay for the 6 months?

Dr. MUSGRAVE. I had better qualify that 6 months. I would call that total involvement, not total training. It doesn't mean 6 months away from the individual's institution entirely. It's a 6-month involvement. It depends upon what the individual's involvement is in the mission. In these life sciences simulations, we've had 20 experiments. If a principal investigator has his own experiment and he wishes to be involved say only in his experiment and not in the other experiments, you could probably shorten that time down to maybe a month or two.

What's it like to live in space? In terms of that training, I think NASA will do that training. In terms of the scientific training, the scientific community will do that training. They will get help from

NASA if they would like help in those areas of scientific training. But the baseline is that, in terms of operating the experiments themselves, the scientific community will train the people to operate their experiments the way they would like their experiments to be operated. And to clarify just a little bit their participation in the mission, for example, on this last simulation we had over 20 experiments which were extremely complex. Now, if a person wished just to only fly his own experiment, he would not need much training in it, but only training in his experiment as things are different in space flight as opposed to in his laboratory. And he would not need any other training in terms of operating the experiments themselves. But if he would like to, if there are areas related to his discipline, experiments close to his discipline, he might like to operate those other experiments as would those scientists. So, if he's going to train on 8 or 9 or 10 other experiments besides his own, he would need training in those as well.

Senator FORD. Let's get to the cost. Would they be required to pay their own expenses for that 6 months training; maybe they were at NASA for some training and back in the scientific community for other training. I am trying to eliminate some problems that I can see that we might be able to accommodate from the committee if we