U.S. Government

MEMORANDUM

Lyndon B. Johnson Space Center — NASA

REFER TO: CB	DATE February 24, 1978	INITIATOR CB/WEThornton:lmc:2/24/78:2421	ENCL

TO: CB/J. P. Kerwin

CC
CB/J. W. Young
CB/T. K. Mattingly
CB/S. Musgrave

FROM: CB/W. E. Thornton

SIGNATURE
W E Thornton
William E. Thornton

SUBJ: Shuttle Exercise Meeting, February 17, 1978

Mr. Abbey and Mr. Johnson were intermittently present with J. Young and myself from the Astronaut Office and J. Rummel, C. Sawin, R. Sauer, W. Bush, and numerous other people from LSD.

The first item discussed was anti-g suits. Life Sciences had GE to make a study on the sizing requirements for the expected population which resulted in a requirement for some 17 different suits. A "small" contract is being left to modify some existing g-suits to fit "typical" members of the office. Life Sciences described the test at Ames in which they are participating to the extent of providing suits and an observer, Clete Booher, and also a proposed test at the School of Aerospace Medicine in which subjects would be bled one unit of blood and then run through various profiles with and without the suit. A unilateral decision has been made by Life Sciences to use only bladder suits with some discussion of using capstan suits (apparently Skylab suits without bladder) for postflight prevention of orthostasis only. These decisions were apparently accepted by Mr. Abbey. The usual requests were made that more attention be paid to operational aspects of the flight and that additional simulator runs with the suit be made to rule out some of the interferences found on the first run and to show effectiveness of the fixes.

Shuttle Exercise: I attempted to make a presentation of the rationale for the use of exercise but had the impression that there was minimal interest in this aspect. The treadmill was demonstrated in its one-g jig and also its tear down and stowage and reassembly as well as presenting the results of stowage and the mock-up studies. Details of recommendations are in the slide text.

C. Sawin and J. Rummel then presented a rather elaborate paper which focused only on the cardiovascular aspects of exercise which included data showing that the Skylab 4 crew returned within normal preflight limits. There was misinformation given which included: only two of the three Skylab crewmen used the treadmill, the treadmill is not an aerobic device as demonstrated by the Skylab lashup on its first day of operation, and there was a 50 percent increase in time of exercise on Skylab 4 (using J. Rummel's own data, there was a 9 percent increase in the amount of work done on the ergometer on Skylab 4 over Skylab 3). The principals of the discussion had left it completely by this time and no decisions of any sort were made. It was evident that what Life Sciences wants is a very elaborate,

tightly controlled experiment rather than any sort of operational use of any device. Their candidates for exercise included a commercial unmodified German bicycle ergometer and a modified mini-gym which allows arm-only exercise. It was obvious even to Life Sciences that the treadmill was something that had to be contended with but only the future will show how they will go about this. My own impressions were: that it was a presentation with conflicting and confusing data, Life Sciences expects control of all exercise and devices, their proposed devices are simply pickups without regard to requirements and with no studies as to how they will interface with operations and with no real operational recommendations, they are concerned only with cardiovascular aspects and do not appreciate major facets of this, they plan an elaborate research program and are disturbed at having to consider any alternative but their chosen method.

My recommendation is that we complete the current device, life test it, outgas test it, and fly it in "zero-g" parabolas, all ASAP. After all stowage requirements or other mods are in we should build three of the units (training and two ops) and fly them for suitability at first opportunity. The total cost of this will be very modest if documentation costs are controlled.

At some point an administrative engineer needs to be involved for I can't oversee the bean counting required in manufacturing. Crew systems have a number of people capable of this and I could spend an occasional hour to monitor it just as on other items. It will come to a sad end in LSD, for the bicycle prejudice is stronger than ever. N.B.--as a very bare minimum the existing prototype could be flown but would undoubtedly require some materials mumbo-jumbo.

Until directed otherwise, I will have this unit finished ASAP with as much testing and interfacing as possible. Apparently there will be a continuation of the meeting on March 2 and hopefully some decisions will be made.