

Lyndon B. Johnson Space Center
Houston, Texas
77058

20 Sept. 1990

Reply to Attn of: SD/90-131

TO: SP/Division Manager for Space Shuttle
FROM: SD/William E. Thornton, M.D.
SUBJECT: STS Treadmill Operations and Support

The memorandum dated August 16, 1990, addressed problems in several areas including:

- a. Maintenance and test.
- b. Bungee and harness design.
- c. Training.
- d. Operations.

Your reply to the memorandum addressed some of the items in a, b, and c.

There are issues here which are not the responsibility of SP, and that is why the original and this memorandum were widely distributed. It would seem reasonable to give someone responsibility for coordination of this effort until these problems have been resolved for I have acted in the absence of such.

Service and Check-out Procedures.

I am not familiar enough with the detailed service requirements, e.g., inspection and lubrication points, etc., to comment on the Preflight Check Out of Treadmill. Standard procedure in such cases is to have the manufacturer generate the procedures or at least provide information on items essential to generation of procedures, and it is my recommendation that this be done. It would also be appropriate for him to review the proposed maintenance procedures.

Recommendations and specifications for preflight performance testing are attached. Inspection of a flight harness with representative loads showed that the adjustable strap was marginally short in my case. The shoulder padding is also marginal. Since there are now larger subjects in the program, recommend an additional 5 inches be added and that the padding be increased if possible.

An attempted measurement of bungee forces within normal operating range resulted in failure of two bungees, apparently thorough jamming of the flame ~~resistant~~ cover. Several ~~correc-~~ *resistant* tive measures were discussed.

Training and Operations.

Having a properly functioning treadmill complete with accessories and with a stand to allow realistic 1-g locomotion are essential to allow adequate training. It should be noted that the existing "red" test stand was designed for development testing of the first prototype treadmill and was donated to us by the contractor for use with it. It was never intended for use with the current (MKI) Shuttle treadmill and requires partial disassembly of this treadmill to be used with it. The new test stand should not be a copy, except in elevation steps, of this ancient item. Stands for both "check out" and training should allow the flight ready treadmill to be snapped to it and provide the necessary levels of elevation. A conceptual sketch is attached.

The Director of the training organization was called, and it was agreed that a session would be held to ensure valid procedures would be used. I still remain willing to write or to aid in writing valid training procedures.

A valid problem raised at the meeting on these problems is transmission of the inflight experience to the proper agencies for action. The crew should be specifically questioned at debriefings on function of this apparatus.

Another item is attempted quantitative use of this treadmill in DSO's. Although some attempts to do this are on STS-35 including flying a miniature scale for measuring equivalent subject weight, better procedures must be included to avoid problems.

In short, this was a good start, but there is a way to go.

William E. Thornton, M.D.

Enclosure

SD/WETHornton:32785:9-20-90