National Aeronautics and
Space Administration

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Houston, Texas
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NASA

Reply to Attn of: SD/90-177

JUL 13 1990

TO: SD/C. Sawin, SD/S. Pool, SD5/M. Greenisen, SD/T. Brown
KRUG/K. Kreutzberg and CB/S. Carter

FROM: SD/William E. Thornton, M.D.

SUBJECT: Memo for Record

A rather extensive technical discussion on validation and use of treadmills (T.M.) in flight was held.

The following conclusions and actions were agreed upon.

1. Validation of bungee loaded locomotion forces in flight.

The previously described measurement of 'vertical' force (F_Z), photography of motion, and heart rate during single axis 'locomotion' (walking, jogging in place) will be implemented as a DSO ASAP. Use of EMG was left open.

Actions-Thornton: prepare DTO draft by COB July 16, obtain strain gage force plate (FP) and demonstrate ASAP

Greenisen-will continue purchase of Kistler F.P.

2. Validation of T.M. locomotion in flight in the following areas:

Force (F_Z)

Kinesiology

Dynamic Mechanical Loading

Metabolic Loading

Sawin stressed the need to do this ASAP using the current MKI T.M. although there will be significant differences from the MKII. It will be difficult to get precise mechanical loads on the M.K.I. At this time foot/shoe force instrumentation appears to be most expedient. Greenisen favors EMG instrumentation in addition but this was left an open issue. Metabolic gas analysis will be done as soon as possible but appears to be sometime off.

Action-Thornton will produce a draft DTO by CDB July 16th. Keith K. will pursue foot/ground instrumentation.

3. The issue of adequacy of frequency response of the combined MKI T.M. and Kistler plate remains unresolved.

Action-Hold current DSO until the combination has been evaluated next week at MDC lab. by running a mechanical frequency response curve and comparison of foot ground force waveforms with other force plates including the Kistler. Greenisen will have T.M./Kistler delivered to MDC and Thornton will arrange and supervise testing. Swain will approve testing by MDC.

4. A. Current DSO use of T.M. It was agreed that the bicycle egrometer would be used in aerobic inflight testing where aerobic testing was specified. Sawin confirmed purchase of unit with Thornton acting as Tech. Monitor on contract.

B. Minimum information on mechanical loading of T.M.'s will be obtained on <u>all</u> future flights as possible per Thornton's memo. This will require the addition a miniature spring scale. Thornton will discuss this addition with commander of next flight scheduled to do DSO and Sawin will discuss it with DSO Pl's.

5. The problem of flight priority for operational needs was discussed. Two and a half years of <u>currently</u> scheduled DSO's (past and future) will provide little in way of operational information.

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