I. Orthostasis To Be Done for 13-16 Day Flights

Continue current pre-entry fluid load and post-landing stand tests.

A. Revise Volume Replacement Schedule

1. Quantitate on individual basis to determine minimum replacement volume. Do inflight leg volumes (simplified) girth measurements.*

B. Drink immediately before, during and after entry G loads as tolerated.

C. Avoid activity which may deplete fluids or shift more from legs near entry: sweating, prolonged motor activity, high suit temperature, precautionary suit inflation before G loads, etc.

1. Do leg volume studies to verify effect of above on orbit.*

D. Shift and maintain fluid in leg by abdominal and upper thigh counter pressure and rehydrate prior to entry.

1. Do studies and leg volumes on orbit to confirm.*

E. Improved Anti G-G suit which is battery powered (independent of gas supply) and can apply selected positive pressure to either trap fluid or remove it from legs during normal activity.

1. Design is complete: needs I-D-1 above, money (approximately 100K) and six months.

II. Strength/Endurance

A. Define magnitude of short term (tens of minutes) neuromuscular loss of strength present immediately post flight.

1. Fly existing instrumentation, DTO needs priority.

B. Demonstrate counter measure to above. (A)

1. Fly existing heavy body exercise device (one locker) and do inflight studies. (Flight hardware is available.)

C. Evaluate disuse atrophy of muscle strength studies.

1. Correctly apply existing pre-post strength studies.
2. Do quantitative treadmill protocols in conjunction with above.

D. Provide adequate locomotor (and arm if indicated) exercise.

1. Purchase improved quantitative treadmill for EDO ($350K, nine months) for legs and cardiovascular.
2. Provide improvements of II-B-1 above if needed (est. $100K, nine months).

E. Provide alternative to D above, on vibration sensitive missions, e.g. bicycle ergometer and heavy body exerciser, (II-D-1) on missions no longer than 16 days.

III. Vestibular

A. Do simple re-entry and postflight tests to demonstrate that problems exist. Note: none of the launch-entry-post flight studies on STS-4 through STS-8 showed significant problems--do not confuse transient strength loss with vestibular phenomena.

1. Entry eye-head studies and post flight postural stability in conjunction with strength studies. Need limited immediate post landing access.*

IV. Loss of piloting skill: Pilot, not Life Sciences function unless physiological problems are identified.

V. Demonstration of Emergency Egress by crew who have not left seats post landing. **

*New DSO

K. Thornton

* **NOTE:** This study must be coordinated with other work described and with pre-post flight