SMMD + BMMD Temp. limits are 100°F +

FLIGHT ACT OFFICER LOG	DAY	REV	PG

SITE/ACQ/LOS	NOTES
	M-074/172 Options -
Back Ground / Justification	- Body mass measurement is one of the most critical ~~info~~ pieces of information for medical evaluation, for evaluation of longer missions and for general knowledge of the effects of weightlessness. A workable mass measurement system will also be required for any future investigation. For these reasons ~~they~~ all possible attempts should be made to obtain body mass // Of lesser priority is demonstration of non-gravimetric mass measurement.
	There are many possible methods of mass measurement and the method chosen was constrained by space available and other operational considerations.
	An ordinary beam balance in which forces from similar masses are equal will work under 1, 2, 1/4 or 1/6 G or ~~any~~ for our purposes equally well under acceleration.
See ↔ Sketch	If such a balance is oscillated with an unknown mass in the sample pan, the balance arm will move one way or the other

(over)

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SITE/ACQ/LOS	NOTES
	just as in I. G. O the balance weight will be moved along a calibrated arm until balance occurs. This requires repeated efforts; i.e. more crew time which is this devices' chief draw back. To save weight the pivots will be placed closer together to allow small balance weights, the arm will be shortened and scales will be tailored for the crew masses. This will reduce sensitivity and resolution but one pound would be a reasonable accuracy figure. It is completely passive would be made of stainless steel would weigh an estimated 4 lbs. and be approx. 1 ft. long.
	Oscillation tests have been performed to demonstrate feasibility and some data from Apollo indicate 'tumbling' of the measured crewman would not occur. This is the great unknown.
	The device can be quickly fabricated, possibly using some parts from commercial scales, at any competent machine shop. The School of Aerospace Med. Shop or the local shop with sufficient pressure (priority) could do it quickly.

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SITE/ACQ/LOS	NOTES
	Option I: M074 - delete M-172 - fabricate beam balance and station on CSM - 4-5 lb - 12" x 2" x 3" -
	Operate once each mission day as follows -
	Observer - untow scale and set balance mass to estimated wt. of subject by screwing it up or down the threaded scale -
	Subj - fold over and wrap arms around knees -
	Obs - attach hook of scale in subjects belt, ~~[illegible]~~ secure yourself and accelerate the subject at a constant rate of 1-2 ft/sec.2 (a pull of a few pounds) by translation of the handle -
	Note whether beam moves toward or away from direction of pull - If beam moves in direction of pull increase mass on balance arm by screwing outward -
	~~#to~~ Repeat accelerations and adjustments until balance is achieved -

FLIGHT ACT OFFICER LOG	DAY	REV	PG

SITE/ACQ/LOS	NOTES
	Read mass directly from scale & record.
	Unhook and stow scale.
	Option II - Same as option I only more easily performed.
	Option ~~II~~ III 172 Calibrate BMMD using C/L and then measure mass of each crewman.
	If time precludes this calibrate BMMD using only food trays and measure mass of one crewman (crewman mass will not be valid and data is for engr. purposes only)
	M074 - Calibrate one SMMD; crew option which, per C/L procedure.
	Option ~~III~~ IV - Perform M-172, M074 per C/L procedure - If power is critical - consumption can be reduced to 1/3 of normal by switching unit to off except just prior to actual measurement. When it is turned on and reset and then off when next measurement is not to be immediately made

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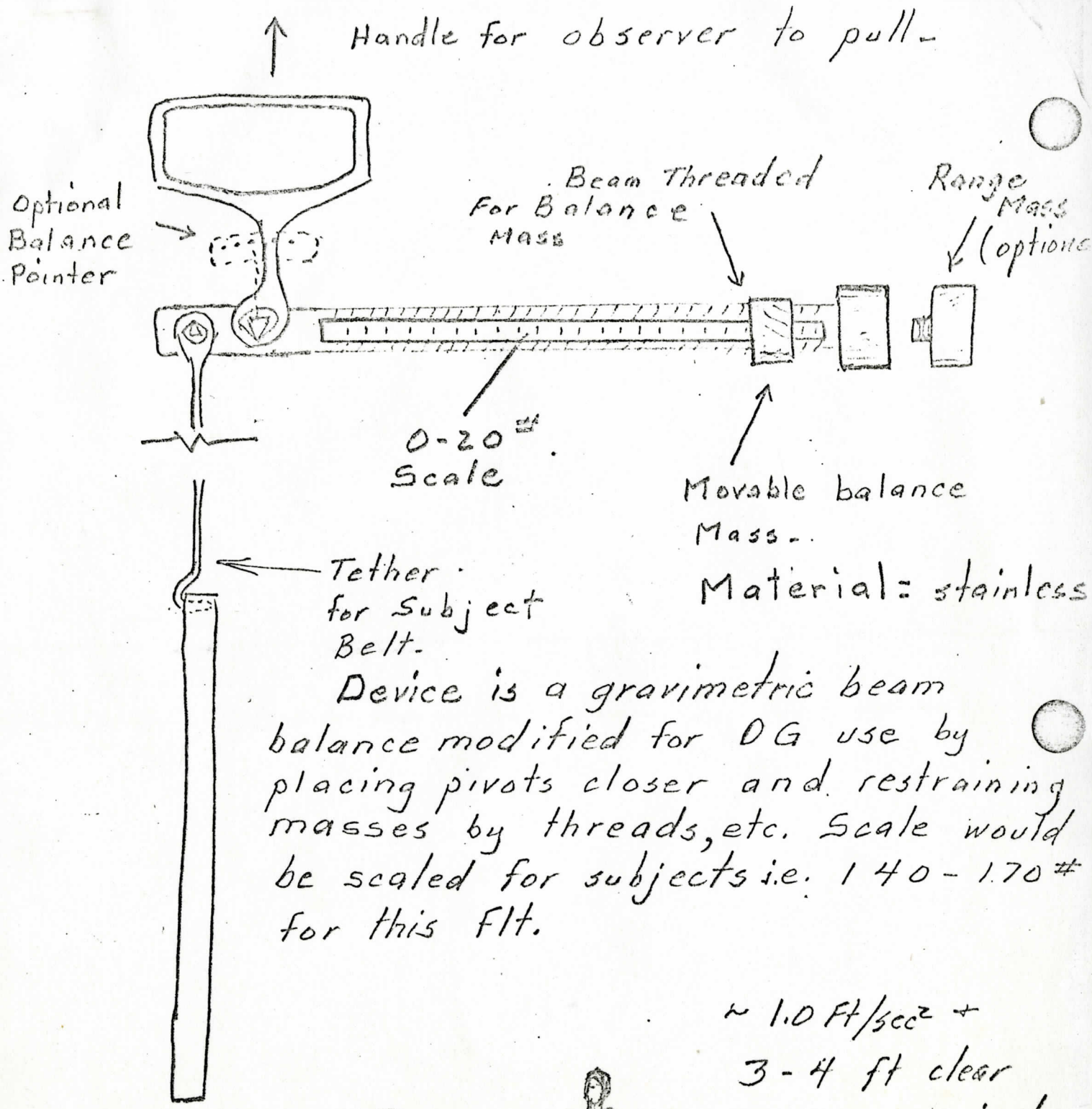
FLIGHT ACT OFFICER LOG	DAY	REV	PG

SITE/ACQ/LOS	NOTES

Comments on urine volume:

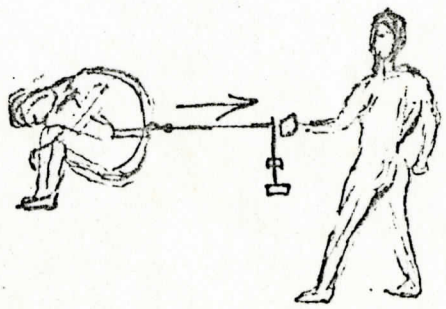
This also is one of the most needed measurements. Fortunately if regular bags are available the measurement can be made to 5-10%. If the bag is reasonably flexible it can be placed in a simple aluminum box with the top removed and a slot in one side to insert the fluid level. A short tether can be attached to the box which is then swung in a circle, or translated, which will separate gas & liquid & force the liquid into the box. Its level may then be read from a calibrated scale in terms of volume.

A more accurate method, independent of container, except tare ~~mass~~ weight, would be a mass measurement. A smaller version of the mass scale described under M-172/074 could be used.



Material: stainless

Device is a gravimetric beam balance modified for OG use by placing pivots closer and restraining masses by threads, etc. Scale would be scaled for subjects i.e. 140 - 170# for this Flt.



~ 1.0 Ft/sec² +
3 - 4 ft clear space required.