

Computation Book

NUMBER OF BOOK _____

NAME William Thornton - Houston, TX 77508 CB NASA JSCSUBJECT K' meter, + Visual AcuityUSED FROM Apr. 79 - Jan '80 TO Dec. '80 - Oct, '81

No. 09-9890 (89)

11 $\frac{1}{4}$ IN. X 9 $\frac{3}{8}$ IN. (29.8 cm x 23.8 cm) • 152 PAGES

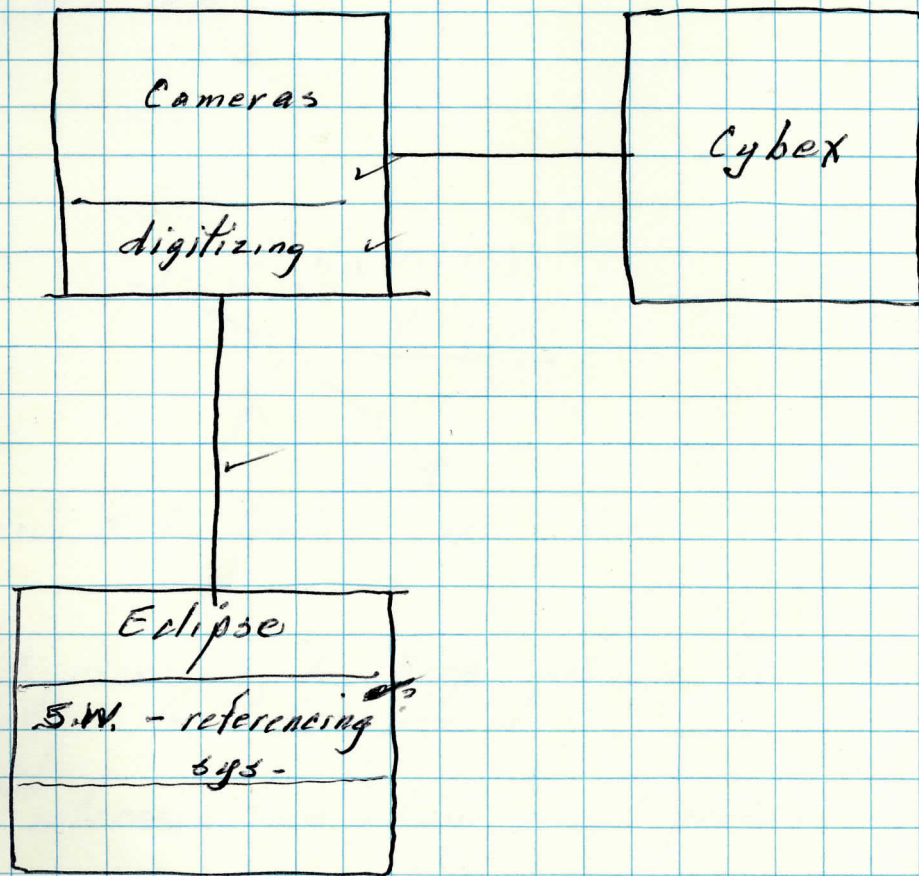
VERNON McMILLAN, Inc., ELIZABETH, N.J. 07208

VERNON McMILLAN Inc.
VJM
THE ROYAL LINE

30 Apr '79

SWRI Cater

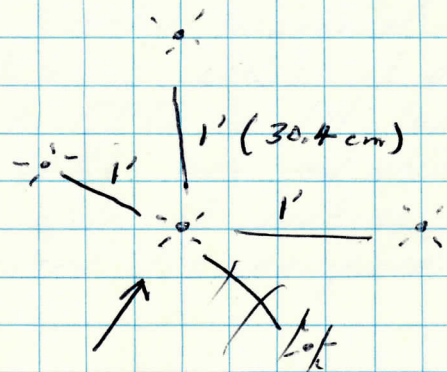
3



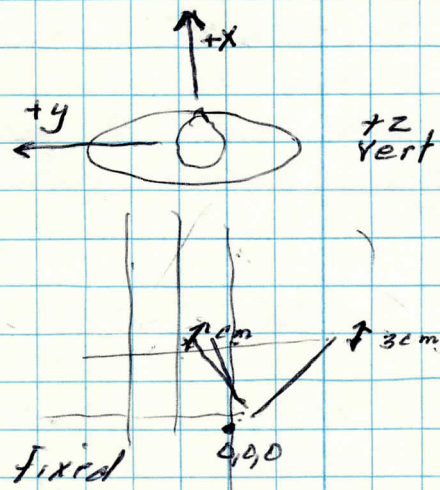
Facilities

8 May '79

Verification of K meter. Calibration



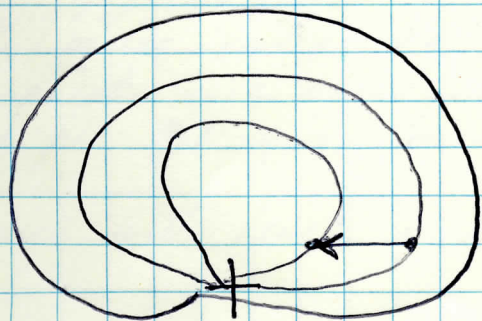
Zero Ref. during cal.



Is it necessary to keep person in fixed relation to reference -

Reach

Put reference on chair - not person -

Do not
generate
curves
or sheetsNow collect points on spheroid -Velocity & Acc -

Action

J. bottle conn-
Velcro
Lockbaum Ltr.
* Single Lamp

8 May '79 K meter CK Out Contd.

Unit was tried by attaching light to thumb and moving hand at extremes of motion -

Plot was then made at Z₀ see Fig.

There appear to be too many points inside extremes envelope
Reron $\bar{c}$ careful sinusoidal movements around extremity of ref. lamp
but result was a scatter of points.

Returned to EFD to let engineers clean up - Cater will call when ready

NB - SWRI has not done program to interpolate between points
In spite of making multiple delays for them they have not tested the equipment and are not putting apparent priority on it

9

9 May Called Cater who claimed device worked well after I left.
Suit techs & John J. will arrive Thurs ~1300
Musgrave can only go Fri -

1500 - SWRI

Light must be seen by 3 cameras

The plots have too few points

No spare lamps - Call J.J. to bring old fixtures

Too few points to reasonably define curves.

Program takes nearest points ^{above & below} ~~along~~ ^{plane} ~~Z~~ ~~axis~~ + connects them & determines intersection $\bar{c}$ plane -

Program switches between two lights for angular determinations reducing dwell time of active light. This was changed to a continuous source which increased number of points - Machine capacity is 10^4 points -

A ^{sphere of} 1 meter radius has an area of $4\pi r^2 = 12.56 \times 10^4 \text{ cm}^2$ or
if points were evenly distributed $\bar{c}$ one point per 12.6 cm^2 or ~
one per 2.5 sq in. more than adequate -

Device will track a trajectory nicely.

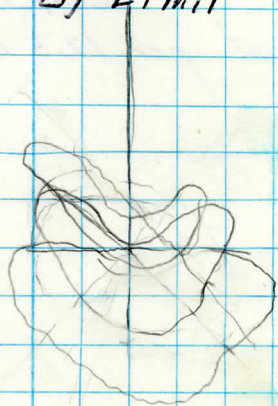
9 May

Review of Reach Tests, Changes Rqd., Etc.

Last group of charts, Z planes, look reasonable but could still use more points.

A major problem is display of velocity and acceleration. They are entirely different ^{from each other} throughout range of motion eg - a point near the extreme range of motion may have low velocity in one direction but may be capable of high acceleration. Another complexity is the vector nature of both quantities.

- Changes
- 1) Establish Anatomical Ref. to lamp ref.
 - 2) Title data + plots
 - 3) CK aberrant points
 - 4) Limit extrapolation
 - 5) Limit computer



10 May - SWRI - K meter CK out.

Protocol today

Rerun reach & spiral motion

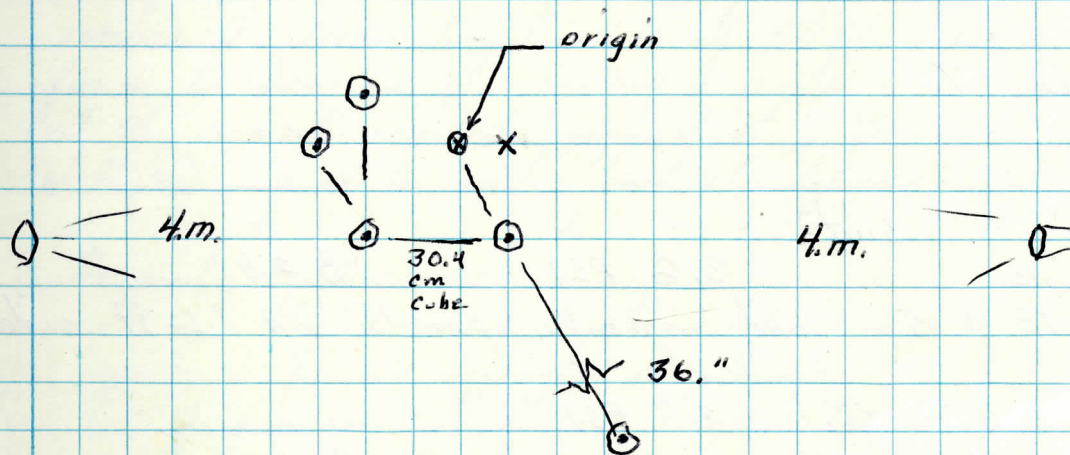
A few vel. & accel. points

Run calib.

Run eccentric & excentric forces.

Cater will get extrapolations reduced to 10 cm.

Calib.



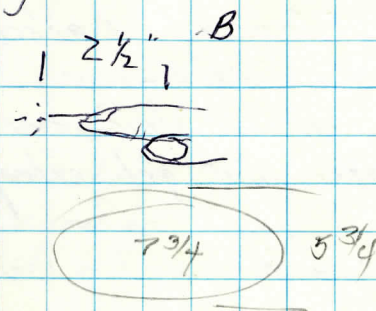
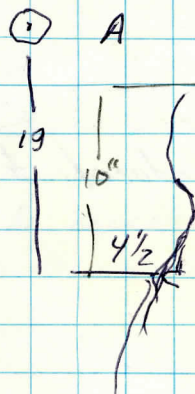
Attempted calib. (repeatability) by first setting scale

11 May 79 SWR1 Suit/Non Suit/

① 0920 — M

trial shirt sleeves in Cybox Chair

See pg. 12
for chair dimensions.



2.54
9
22.86

Threshold delays —

Removed hot spot from ② camera

2. 1000 shirt sleeve M

B = 3 1/2

Fair take T.

3. 1120 A-7 suit

6 1/2 mins

3.8 PSI

B = 4

AA = 19 & 5 had impossible points on Left side

4. 1140 A-7 suit 3.8 PSI

6 1/2 mins

B = 4

A - same

Shielded helmet & suit in opaque material.

5. 1300 A-7

0 PSI

B = 4

6. 1400 A-7

1.9 PSI

B = 4

7. 1500 ~~5-5~~ Force - Program error

11 May '79 Summary

1. Camera wasn't tracking - will fix
2. John will run demo after fix
3. " " " Force " fixing program

Action promised next wk. by SWRI

4. Velocity & acc - sweep - Tape -

12 May '79

Program was ambitious from beginning as regards financing. S.W.R.I. made a crash effort at last but were not familiar enough with operations to pull it off. Result: only a tiny portion of one phase of the program was demonstrated and that very imperfectly. In spite of this just the two runs, suited and unsuited will prove to have been worth the effort for it finally became obvious what some of the capacities were. The system is far from complete as a prototype & I convinced Lewis to leave it at SWRI until we can get some additional funds to clean up the system & make an orderly transfer to J.S.C. which at the moment cannot support it. J. Lewis is going to pursue S/W displays. S.W.R.I. agreed to make good the deficiencies listed above.

Reach

Original objectives were:

1. A flight/camera system which would track at least 2 points in space & provide digitized coordinates.
2. A program which would generate a mathematical sheet to govern the reach envelope - this sheet would be fitted to the points.
3. A program which would then provide the coordinates and plot the intersection between a series of x, y planes along the z axis.
4. A program which would extract the velocity and acceleration of the lamps -
5. A system which would connect the system of 1. with an isokinetic ergometer such that force could be continually measured along eccentric & excentric radii - manual plots would be made of the above.

If the actions listed at the top of this pg. are taken then all the major objectives were met with the exception of generation of the mathematical sheet.

14 May

Attempted to make transparent reproductions of the z planes but could not find suitable material. It became very obvious that more points are needed.

14 May Cont'd.

Ditmo money is available - Talked to Bean → J. Horgan → Cecil who felt this proj. would be a candidate. Show results to J.K. & asked whether to pursue to Abbey & he advised against it - strongly!

15 May 0830 Told Cecil to forget efforts for Money -

1630 Met C. Lewis and we redrew contour lines and reproduced a set including onto a set of heavy view graph - cut those out at home and attempted assy. but requires better facilities -

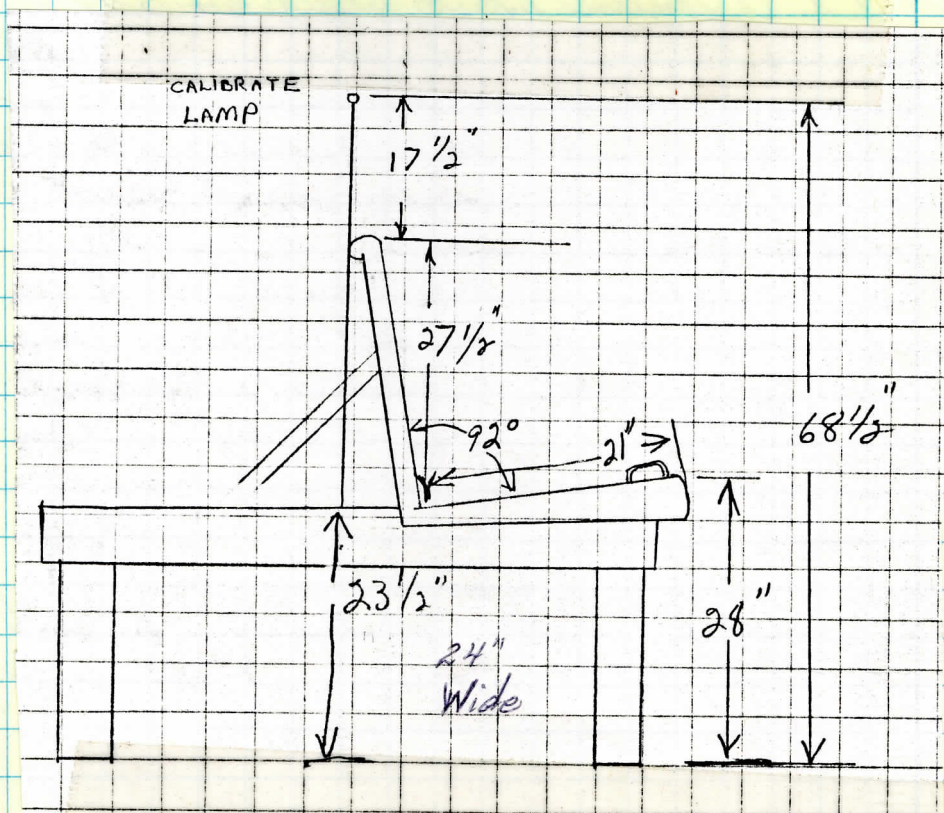
NB - there were sh. sl. areas that seemed improbable but when compared to arm movements they were found to be correct eg Xy planes became oblong at near max vertical reach & this was confirmed by having S.M. draw lines on a plane -

16 May 1030 Returned Doug Johnson's (Dem. Res. Inst. - Tech. Util.) call and he wants to go forward & a joint NIH, NASA proposal for study for improving aging life quality & wants to include B.R. & anthropometrics - Promised to throw something together in a week and they will send a writer here later -

Documents Needed At This Time -

- | | | |
|-----------------------------|------------------------|-----------------------|
| 2. Local Tech. Util. Descr. | } combine 5. Paper - 1 | 4. Rehab/aging discl. |
| 1. System Descr. | | |
| 3. Patent Discl | | |

Arrangement
used on 11 May



16 July. SWRI Lewis,

Item. 1. Increase number of points -
discussion of problems of.

○ / slopes

sliding avg.
* Use all pts. within user specified & take interpolations
up to user spec. width on contiguous path.

2. Run 4 pulls } old contract
α 2 acc + vel swps.

Set up -

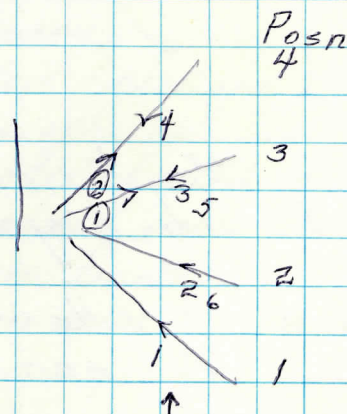
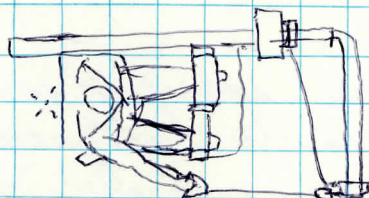
8. Measurement of new suit

The new suit has arrived and there is great interest in
measuring ROM. Lewis wants to try to do this in next few days.
S. Mas. feels he can act as subject.

27 July. Agreed to go to SWRI Tues. after return from DTW and
work and act as subject as long as possible reqd. to
finish muscle & $\dot{x} + \ddot{x}$ demos.

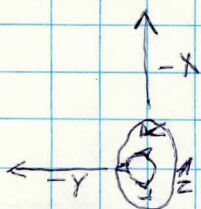
31 July

Finish of old contract - Force vel & accel.
 Unit was set up but numerous hot spots had to be killed.
 Calibrated $\bar{c}$ 30.4 cm cube. Ref. is 16 5/4 ins above floor.
 First ran force data as below. Ref. pt. was D



Mechanical arr. & table interfere - Order in which pulled
 Made ref. meas at vertex, R+L concoids + st. only 1, 4, 5, 6 were saved -
 Next made a "trombone" arr. $\bar{c}$ concentric pipes &
 moved light over D shoulder out & back - then
 made lateral & vertical sweeps -
 Raw data is noisy in posn. ex. Z axis.
 Verbally expressed above to T. Green & J. Coter.

Wt = 30.5 #

Cybex - 19 RPM
154° 5

Preliminary plot of data~~s~~ is exciting. While there are obviously bad points in X, Y data, the plot is smooth & correlates well $\bar{c}$ ROM plots. This can be a powerful instrument in many areas.

1 Aug 79 Suit

Rodriguez, Lewis, Jackson

Nelson
McCandless
Buckley

- Need reach & work envelope for new suit
- Decided to try for the following;
- Seated Reach Envelope, Bilateral
- Standing " " " Bilateral
- Selected strength tasks

The first item is simple enough ex. the hard torso suit has a large back pack and it will not be possible to use the existing CYBEX chair. Plan is to modify seat which Coleman has & take it to SWRI.

Existing suits may not fit S.M. but will try. He is also on vac. until 19(?) Aug. We have tentatively set 110 Aug. as date and plan is to go over to SWRI & chase any probs., develop protocol & put in use & then final rehearsal.

2 Aug John J.

Most needed force meas:

Subject will only be foot restrained per present thinking -
Then need standing forces in shirt sleeve & suit - these will be much higher than possible in w.

Need rapid low forces in seated position.

Rodriguez, Jackson

Bob suggests log. in donning sta.

Put ref. @ neck ring.

SP-8



Arm RDM in don. sta c & s suit.
" forces " " " " " (ratchet)
" " in work sta. cc. & ex, c & s suit.

Can.

2 Aug. D esor. above to Cater & will go over tomorrow for run thru.

3 Aug SKF & SWRI.

3 Aug - (summary made 27 Nov.)

Obviously made at least 2 strength Meas

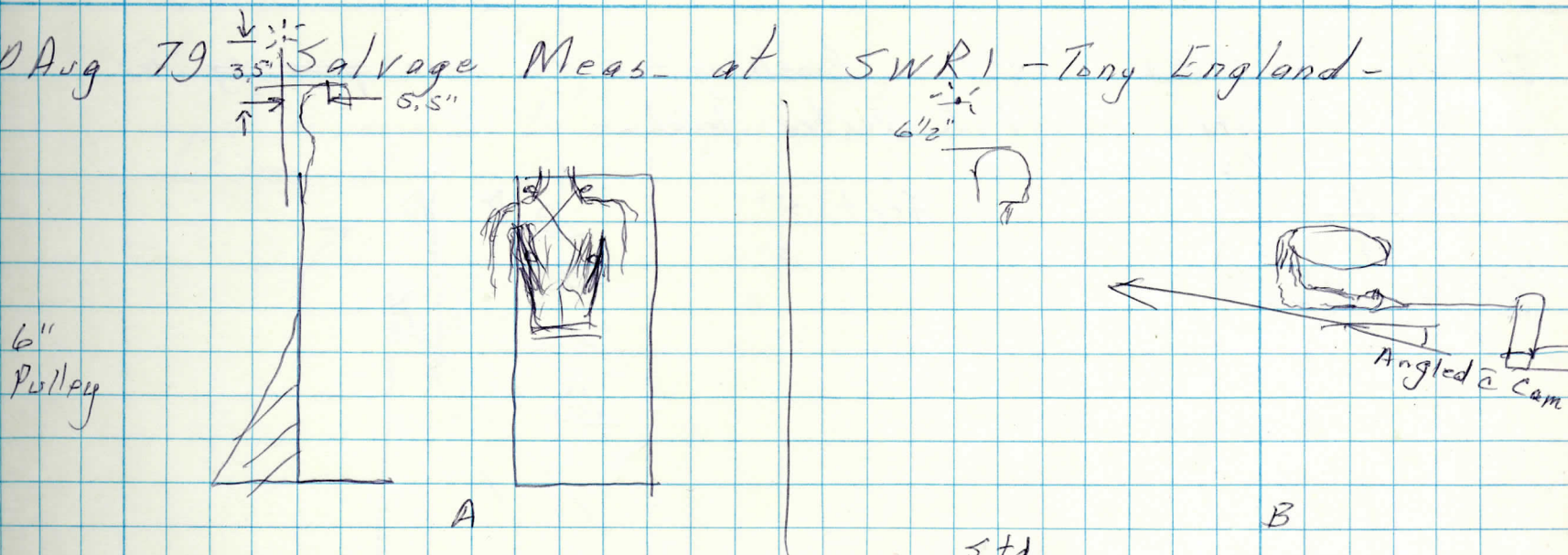
Summary - lengthen - Cam #1 cord -

Get Program to allow widens vertical band

Mech. - Make "L" bracket, cable guide, clamps

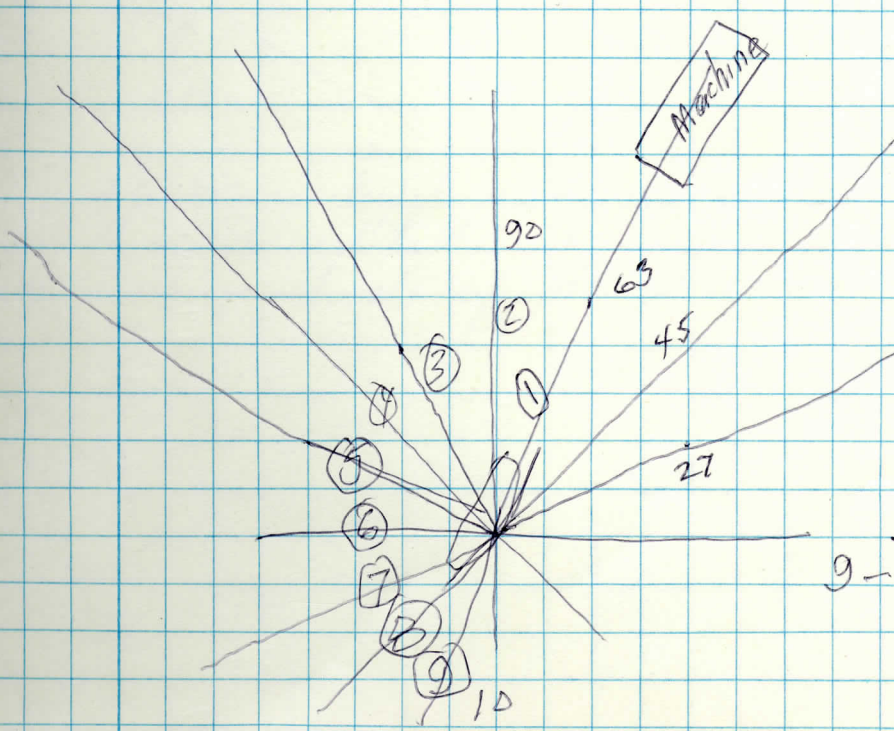
Calib. Forces for fast swp.

10 Aug 79 Salvage Meas. at SWRI - Tony England -



- A { 1° - Make ROM c R arm last data from #1 cam
2° - " " " " " - good data

- 3 - Lat. pulls R arm ① to ⑧ 4 @ 120° 5 @ 240° shoes separated by 3"
4 - As above ex pulls @ 120°/3e & ref of vertex leve behind Tony - feet spread 35"
5. Stdg. 2 feet together & lift on c/L - R arm
6. " " " " " " " 12" parallel path
7 " " " " " " " & "push" down



- 120°
Ref 5" above head & 75" above floor
8 - All R arm Pulls - floor 3 ea - 120° ft 3" apart
① ✓ "
② "
③ "
④ "
⑤ "
⑥ "
⑦ "
⑧ "
⑨ "
⑩ "
9 - ⑩ " Tony pushing
① - Ratchet Push
① - Joan - 5'5" 120 lbs

feet may have spread

ft 6"

10 Aug - SWRI Cont'd Pushing - stdg - see ~~prev pg~~ for
arr - ref. set. to vertex level -

std at ① 3 pulls

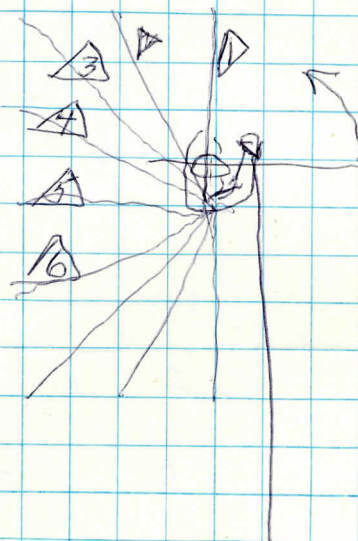
shoulder ②

Zero ref. ③

④ precordium -

feet 5"

" 3"



9 - Rerun as above - Cybex pwr. off on prev. Run -

10 - stdg. ROM ④ Arm - ref. at vertex level -

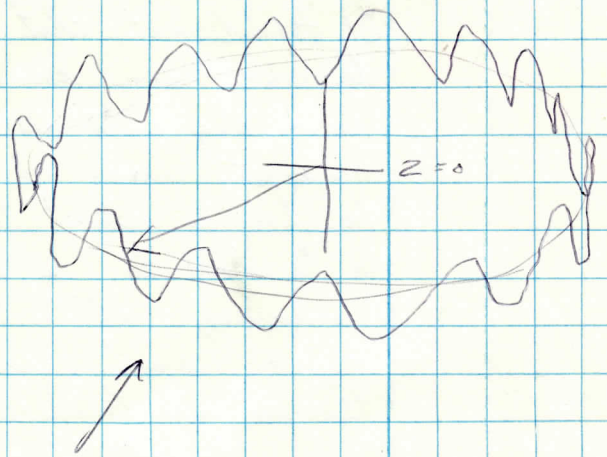
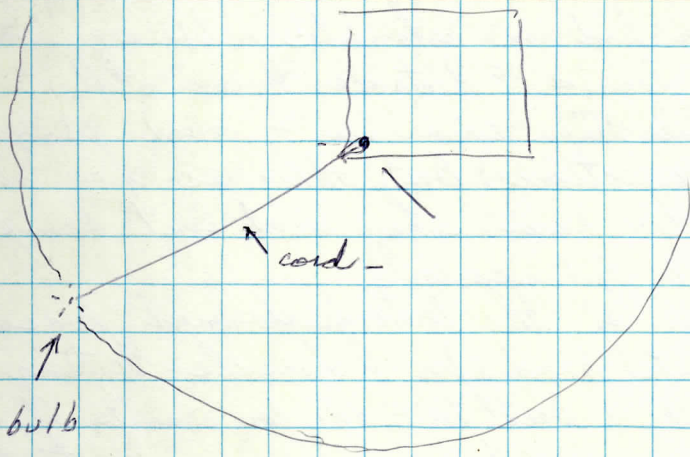
Review 28 Aug.

Since at the prev. suit run, pressure was brought to bear
mgmt. as regards to need for this data & decision was made to bring
suit over using BUCH21

Arrived 5WR1 - unit had been set up but not calib.

0915

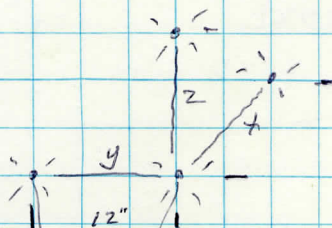
1030 Ran a combined CAL & test as below:



A Cord was looped around the ref. axis bulb was moved in Z-axis plane as
& maintained taut and swung in an arc above -
arc around the ref. pt.

28 Aug - Contd - CAL procedures

Cater 681-9262



30,4

I

$$y' = (14)12$$

1 y'

1330

A 5% error was found on the ϕ cm. Z axis plane and we SWRI began to try to correct this. No one knew how he was calibrating the arrangement & further runs only made the matter worse. It turned out that program had an automatic calib. seq. which depended upon known F.L. lens & F. distance. Worse still it was completely automatic. Jackie Hipp came in & mod. program to accept manual cal. corrections but there is no obvious way to know what to correct & how. They used last lamp in house & I had to go to R/S to R/S spaces.

Summary - virtually none of the testing planned was done & no good arrangements made for muscle testing. Picked up Buckle last 5KF & back to SWRI for results of cal. changes. Ran more arcs which were improvement. Once again SWRI had no sense of urgency & once again nothing was ready. Travers would not even return calls on Mon & Green was not avail until yesterday afternoon. It will reduce the amount of data take tomorrow.

28 Aug.

Tent. Protocol -

1. Dry run in ~~W/S~~ S press - Ref. Lamp on neck ring - NB -
relate this light to foot restraint (R) arm -
2. ^a_b Run (R) + (L) arm ROM in foot restraints, free stdy -
3. ^a_b " " " " " (Functional) " " " " "
- ?? 4 " " " " " " " " " , D/S ?? Min Work Sta -
- 5 (L) arm force meas - feet fixed -
- 6 " " " " " spread -
- 7 Shirt sleeves - Max ROM

30 Aug Suit Run -

John Jackson

Jim Lewis

Brian

Pacheco

- Suit Eng -

Brian Pacheco - ILS "

AL

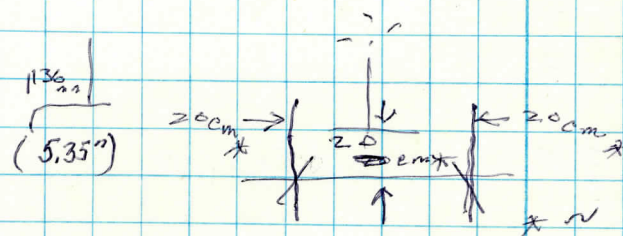
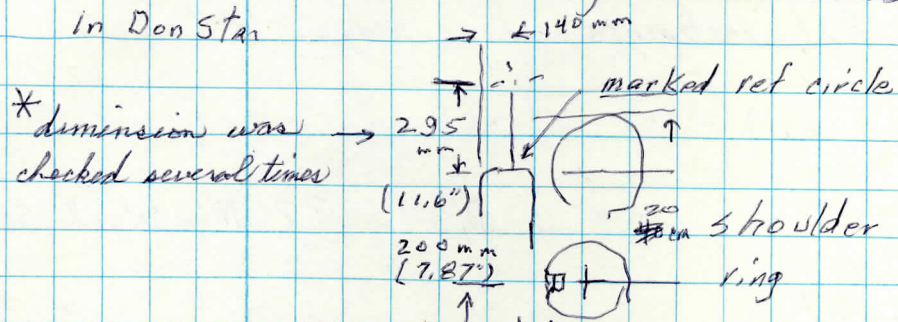
Suit Tech

Jim Buchli

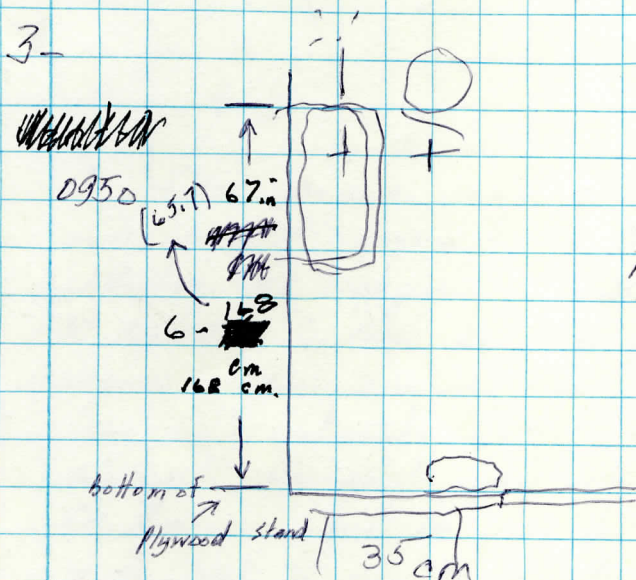
Subj -

³⁰~~29~~ Aug- Suit Meas. SWRI Buchli - ② handed
0850 1- Cal Run c single 100 cm. radius sweep - Didnt Store

Press 1 Placed ref light on PLSS
In Don Star



Vent 1 2- Dry Run in Work Star Light on Thumb - helmet hooded



① arm c suit vented-

Buchli was placed in stand, an L shaped plywood bracket & PLSS was strapped to it - Suit was 4 PSI + max ROM made

Press 2?

4

1015

Press 3

4 PSI

as above

4 PSI

① arm

Max ROM

Incomplete

4 Press 4

5

1100

② arm

Max ROM

" as above

~~Went back~~

5 PRESS FUNC 6

5

1145

Func ② arm

Light was on ② lat aspect thumb - 1 cm beyond tip - fist was clenched

4 PSI

6 PRESS FUNC 7

6

1215

Func ① arm

same posn as above

Light 2 cm beyond ① tip - stat cal

30 Aug Suit test cont.

Press Pull	17-	Speed	Ht	Angle	Arm	Runs	Feet
6	17-	45 RPM	52"	-135	(2)	1.5 Push	13
		"	"	-135	(2)	2.5 "	13+18
		"	"	-180	↓	3.5 "	13
		"	"	-180	↓	4.5 "	13+18

NB on 1st 2 or 3 above (4.5) shoulders rotated & number increased

7 (?) 18 45 Rpm Vertical pull down (1) 5 (7)

Press Pull-B 19 " " pull up (1) 1.6 Vert ↑
 " 2. " 2. " 45° 45°
 " 3.6 " 1.2 } View from rear

Press Pull 20 " 45° Pull Up (1) 1.6 ↑
 49 2.5 2.5 } as above
 3.7 ↑ ex. also 45°
 angle from ver

Data File Lost21 Cal 100.5 & 662 mm arcs -
Z axis - 0 - 10 cm Δs & + 10 cm Δs

Cal. Circs.

Calib.

Plot was off center for?

1835
1850Ran another set of Calib. arcs - string & light - $\bar{c} R = 860.4$ & $685. \text{ mm}$
" " " " " " " " 1012 & 412 "

CALIB

Initial cal. circs. were run at 100 cm. R this A.M. & plotted
 There were -8 cm. errors on (1) side & +2 cm. on (2) & ant. correct. Some corrections were added which increased error & these were supposedly removed & initial error left but CAL CIRC'S were then dumped (1) On re-run of cal. circs. $\bar{p}$ data take showed a different pattern. Using the best of the calib. measurements.

At 41 cm. max error was $\pm 1 \text{ cm.}$ & at 101 cm. was $\pm 3 \text{ cm. max (3\%)}$
 These errors were systematically distributed $\bar{c} -3 \text{ cm. on (1) and } +3 \text{ cm. ant}$

Z axis was also meas. at 10 cm. Δs. by holding tracking bulb at 10 cm. Δs on meter scale (precision)

Meas.	Indic. (Mode)				
0	+0.7	-60.	-57.0	+50.	51.2
-10.	-10.9	-80.	-77.8	+60	61.0
-20.	-20.4	-90.	-87.0	+70	—
-30.	-30.5	+10	10.3	+80	—
-40.	-39.8	+20	20.6	+90	—
-50.	-48.0	+30	31.0	+100	—
		+40	41.2		

30 Aug Contd.

2300 Playback of 10 cm cuts in unsuited config. showed surprising similarity except at end of range.

31 Aug. Analysis

Need force curves
& vertical planes.

Hipp reprogrammed

computer for vertical

planes but the algorithm requires crossing of the plane for detection & the vertical sweeping motions do not do that.

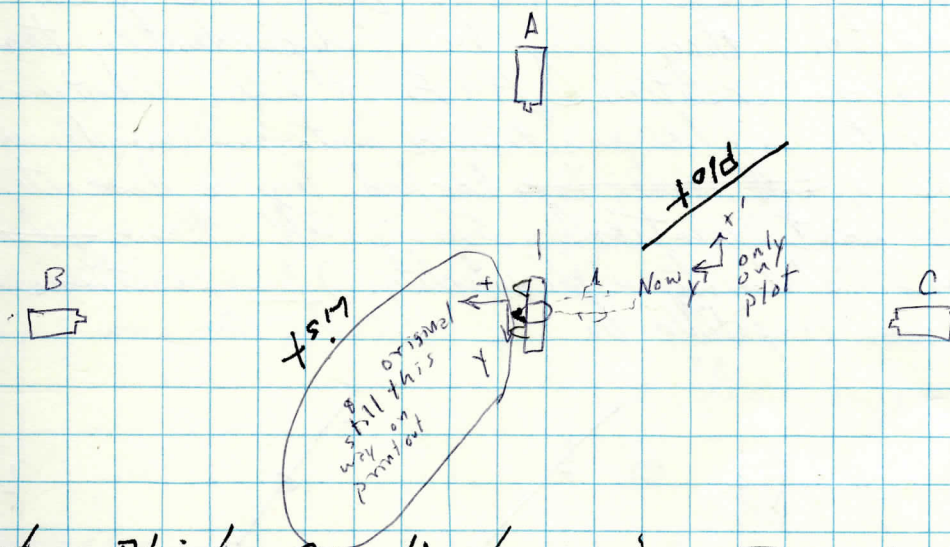
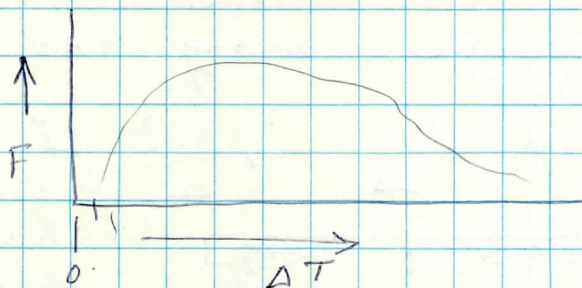


Chart : Print Coordinates

$$X = -Y$$

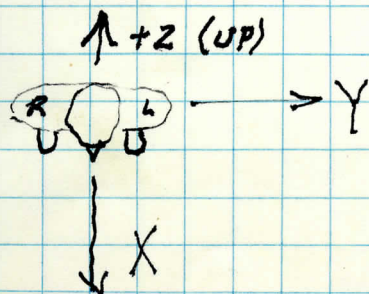
$$Y = X$$

$$Z = Z$$

To change old Heading
on Print Outs

X	Y	Z	to now
Y	-X	Z	

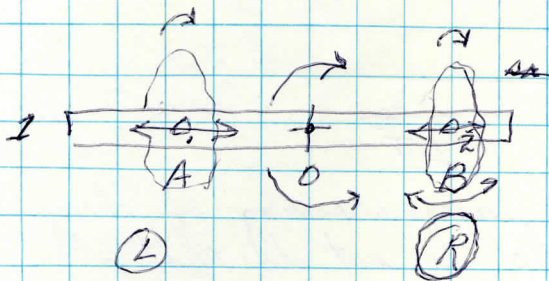
Will USE Chart Coords -



1 Sept. Analysis of Suit records

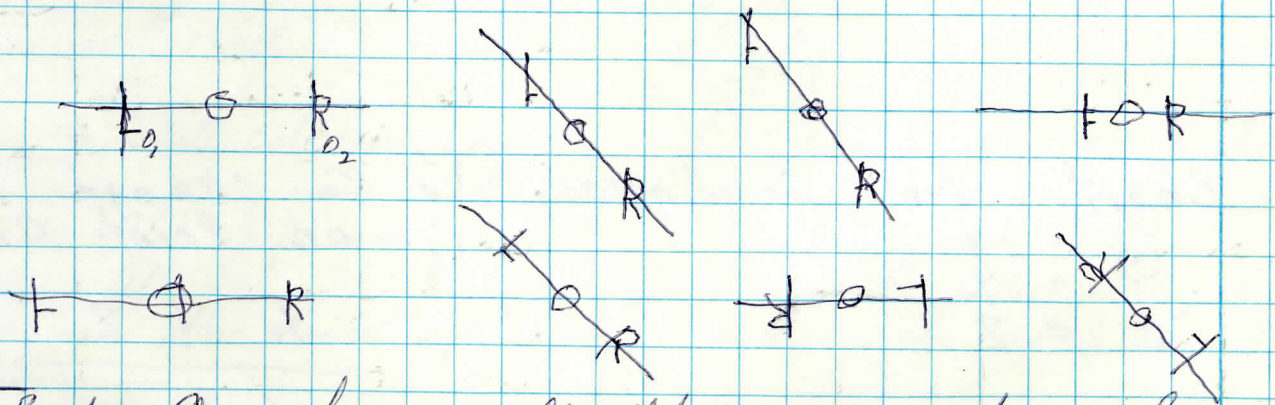
Improved Some very obvious fall out has or should have been foot restraint noted already as regard restraint work station design eg, it became obvious(?) during TE ^{10 Aug} mess, that a fixed foot position is wrong and I proposed the following:

This was discussed with Lewis, Herwin and others
3 Sept-



I is a bar pivoted at O normally locked in any position but capable of $\pm 180^\circ$ motion about O when activated by say an unusual foot movement such as eversion. O_1 & O_2 the foot pivot points are also normally locked until actuated but can also be pivoted $\pm 180^\circ$.

In addition they may be independently translated along the bar, from position $A+B$, in either direction. Thus the bar & feet may be positioned into a wide variety of configurations & ~~held~~ locked by a discrete signal such as the foot motion. This will allow great improved position, stability & flexibility. A few positions are shown below which are more compatible to



3 Sept. A much more flexible arrangement can be made by allowing the bars to pivot about the center.

1 Sept. Analysis, cont'd.

The following measurements are needed and will attempt to get as many as possible on a quick look basis.

Suited range of motion in work planes

Maximum ROM in suit in

Z planes, (vertical)

X " front

} bilat

and for comparison unsuited

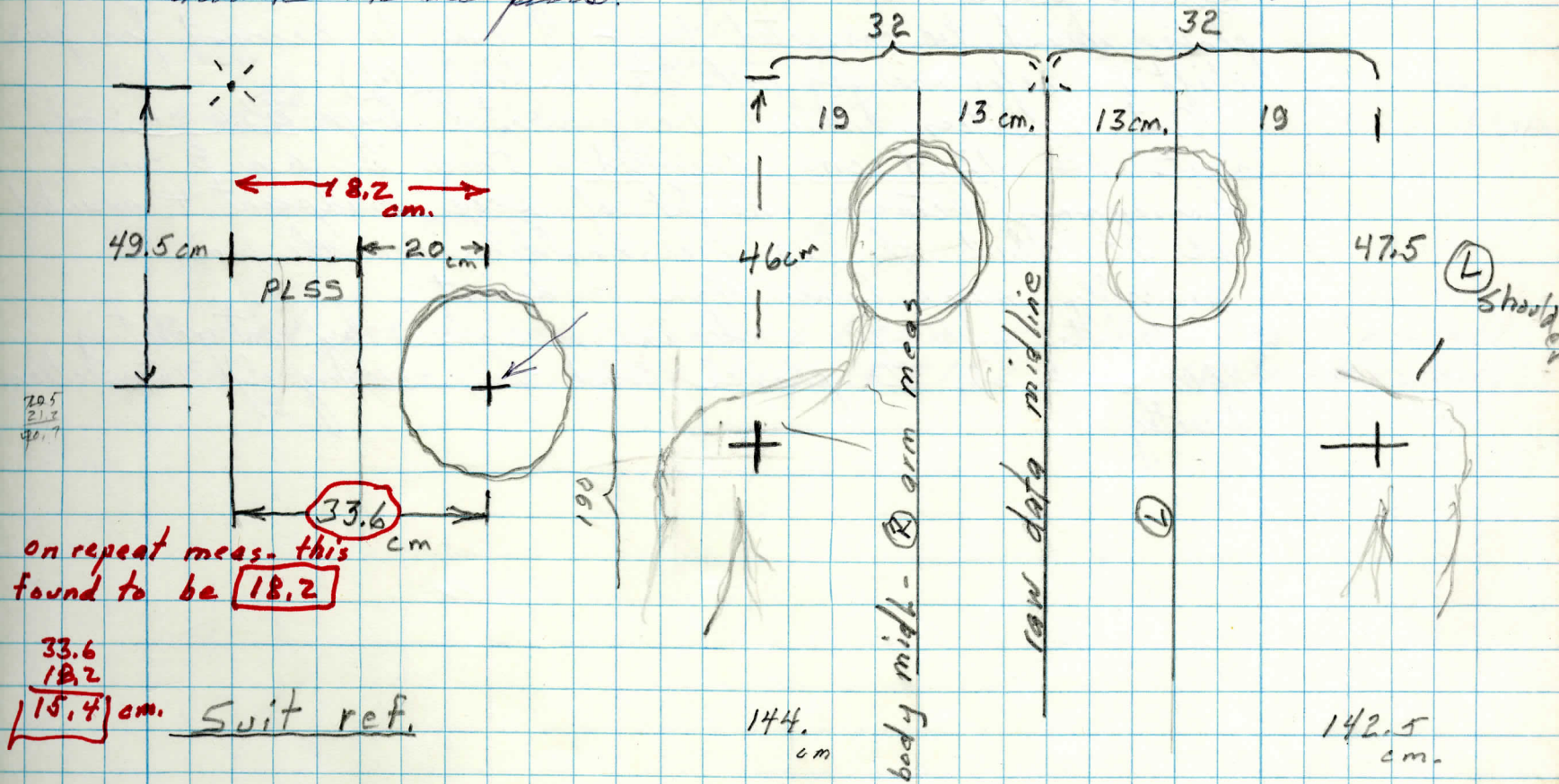
Functional ROM as above

Functional two hand task ROM as above

Forces, as iso contours if possible

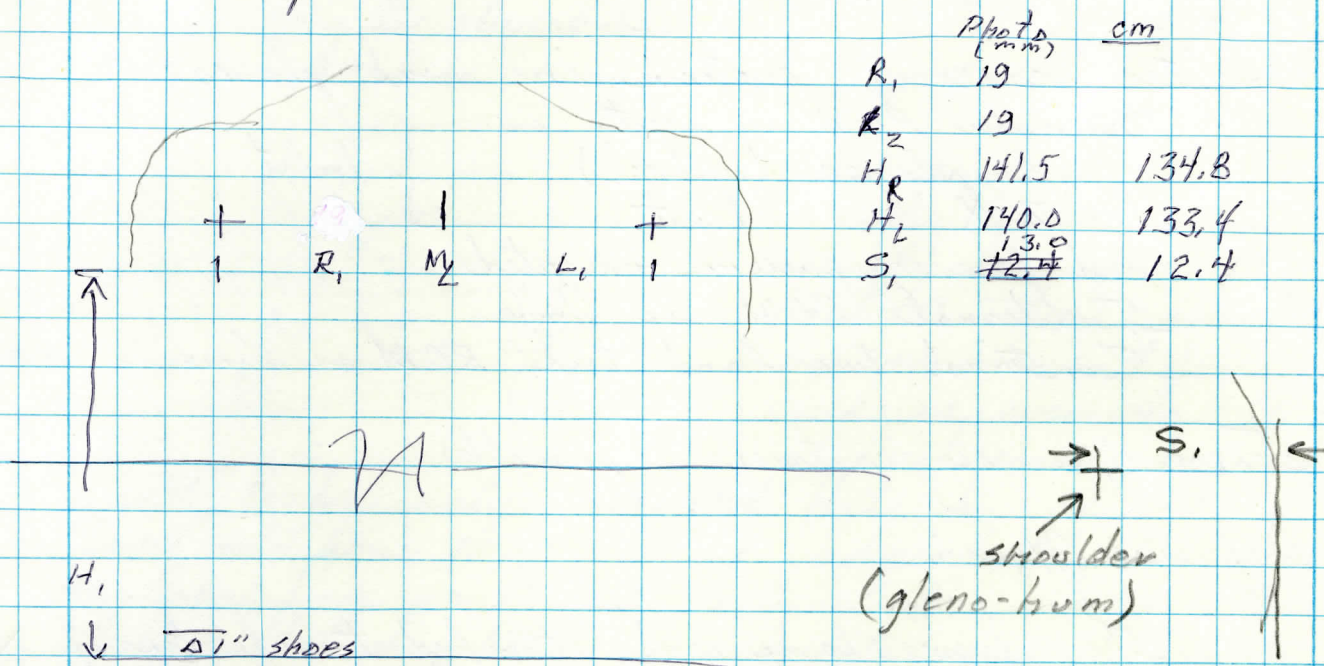
Reference Axes:

The reference lamp was attached to the top of ~~the~~ a PLSS member & referenced (P-22) and as below for all suited ops. Midpoint of scyes (shoulder opening of suit) was measured as shown below & this is taken as the zero reference shown on the plots:



1 Sep. '79 Analysis contd.

Subj. dimensions from anthro. work - Scale $6'' = 16 \text{ mm} = 36.15$
 Exam photos or $1 \text{ mm} = .9525 \text{ cm}$



148

Suited plots have correct lat. posn. but unsuited plots must be corrected by -13 cm . to account for posn. shift in reference jig. rel. to midline (M_2).

Ant. position must be corrected by 33.6 cm in suit & 12.4 cm unsuited - There is an 8 cm . discrepancy between height of scap midpoint & unsuited ref. ht. But this is reasonable since the arm is probably much lower than midpoint.

Plots will be made in X planes by interpolating RDM and on Z planes and then scaling off intersections directly.

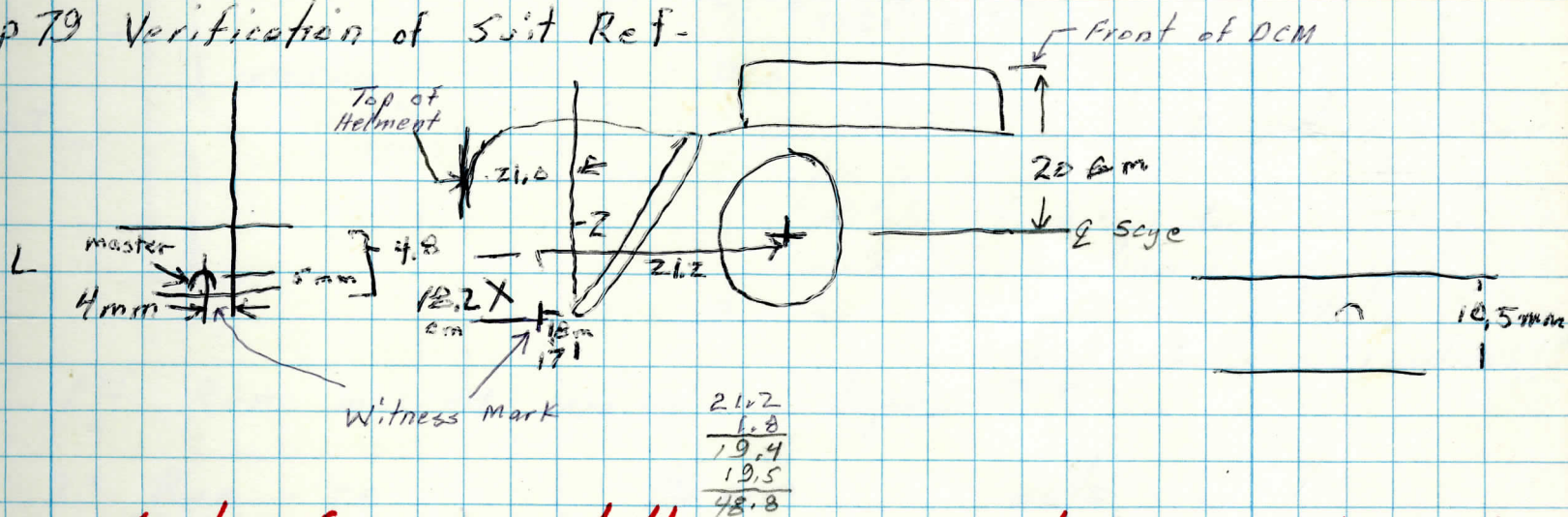
3 Sep '79 Analysis Cont'd.

5.21 Missing Data -70cm @ FROM -95cm FROM bit. 5 cm. cuts reach envelope both sup. + inf. get the functional reach was symmetrical on suit. There is not time to reduce strength data and only a portion of the reach data. X plane curves are quite complex and time consuming Data is r

Plots were made along the Z axis by manually drawing a curve around the extreme points. Both max. and functional (ROM, reach, ^{curves} were made and copied using the ^{scanned points as the} horiz. & vertical zero refs. Pp 22, 3, 5, 78

Two facts became obvious; 1) the @ max. reach was very different from the @ in the ant. prop. position while the funct. reach was compatible @ arm. 2) B's @ shoulder was sagging as shown by max. reach envelope both sup. + inf. get the functional reach was symmetrical on suit. There is not time to reduce strength data and only a portion of the reach data. X plane curves are quite complex and time consuming Data is r

4 Sep 79 Verification of Suit Ref.



Vertical ref. is acceptable < 1 cm & horiz. was 4 mm off
Will not correct - Vertical was off +15.4 cm & will be corrected.

Preparation for shirt sleeve tests

1. Cal. & trim system
2. Change readings $\times 52$
3. Make cal jig & curves

Planned S.S. tests -

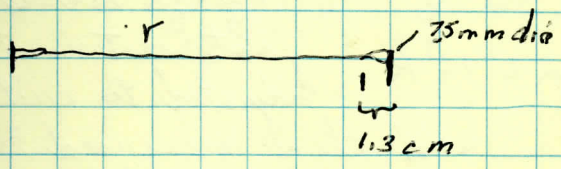
functional reach 1 & 2 handed
strength lat. @ 45°
overhead
pull up

5 Sept - SWRI
Cal. Circles

Probs -
Cam Cables

#1
 $r_1 = 995 \text{ mm}$
 $r_2 = 735 \text{ mm}$
1145

#2
993
735
1200



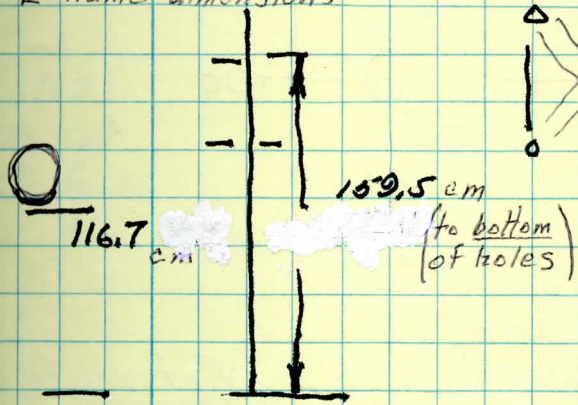
see cal sheets

Calc. hadn't been done or even started, arrived at 1100 & started at 1300.

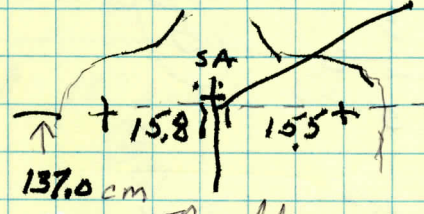
Buehli

made ② ROM funt. in L frame
-50 - 1 cm

L frame dimensions



Ref. It. 1" Ant. to SA - (sternal angle)



Buehli was X strapped in L frame for functional ROM. Z_0 is level of the gleno-humeral joints which was palp. & marked. X_0 was lateral proj. of GH joints and Y_0 was middle of sternum. Sternal angle was level $\bar{c}$ these points & used as $X'Y'Z'$.

1st Run was not recorded on tape - ? ?

2nd Run - re ② arm data lost

File Title

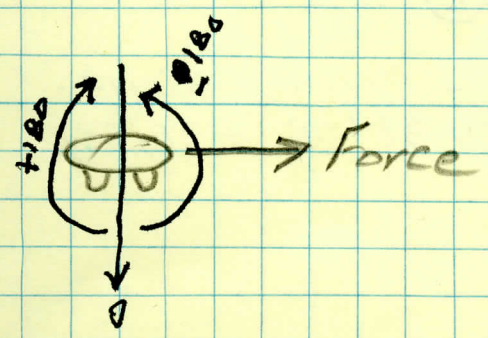
F(ROM) $\leq A + 1\frac{1}{2}" \Delta X$ $\Delta 2 \text{ cm}$ from thumb tip

No Suit
L Funct 1
②

3rd Run ref. + $\Delta X 1\frac{1}{2}"$ SA

② Arm - Funct ROM 1445
 $\Delta 2 \text{ cm}$ fr. thumb tip

No Suit
② Funct 1



5 SWRI - Force 1°

1°

Reps 45°

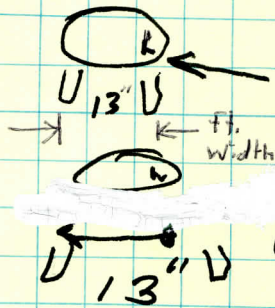
Circled numbers are reps.

Time 1530

File Names

NDSUT ②

Force 1

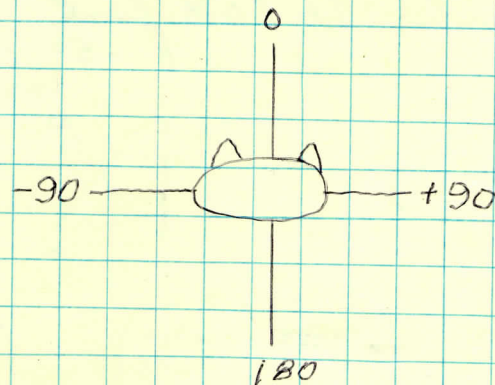


⑤

⑥

was from L to R extremes

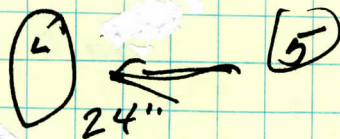
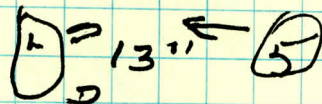
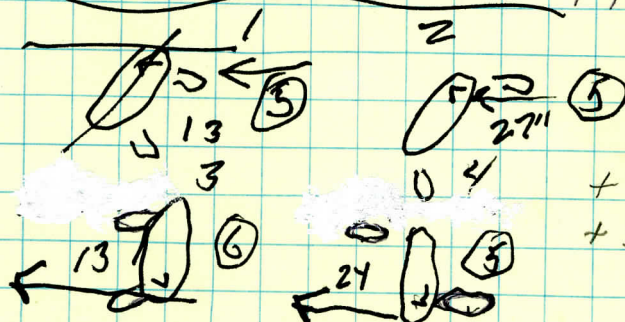
Buchli was standing unsupported 2 feet either in the foot restraint pos'n. or adjusted to suit the situation and then measured. He attempted to maintain a fixed upright pos'n. but 3 support - Pulls & pushes were made in the ② arm in the positions shown



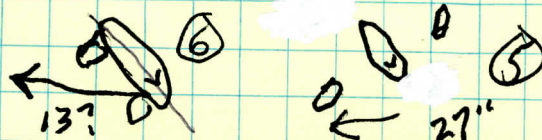
② arm

Reference

Push	Pull
-90 (13)	-90 (13)
-90 (13)	-90 (13)
0 (13)	0 (13)
0 (24)	0 (24)
	-45 (13) x 2?
	-45 (27) x 2?
+45 (13)	+45 (13)
+45 (27)	+45 (24)

No Sut ②
Force 2

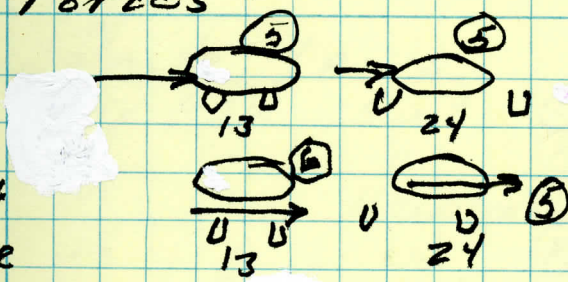
+90 (13)	+90 (13)
+90 (24)	+90 (24)



Forces

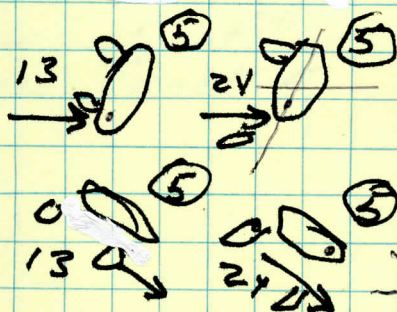
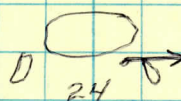
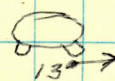
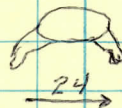
1605

No Sut
② Force
3



45°/3 on cybex

believe these
~~should~~ be -



45°

← NB

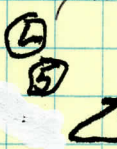
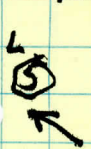
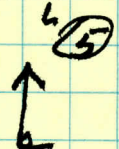
These were Lat pulls

1620

No Sut
④ Force
4

Vert pulls - feet 13" apart. ④

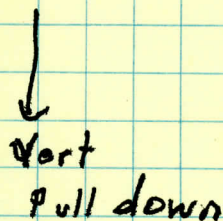
1st run aborted



Facing cam 1

as above 2 wire at 45° in 2X plane

1645



1700

6 Aug 79

Data to Lewis

Max ROM Suit (L)

" " " (R)

" " Unsuit (L)

" " " (R)

Funct Bilat Suited

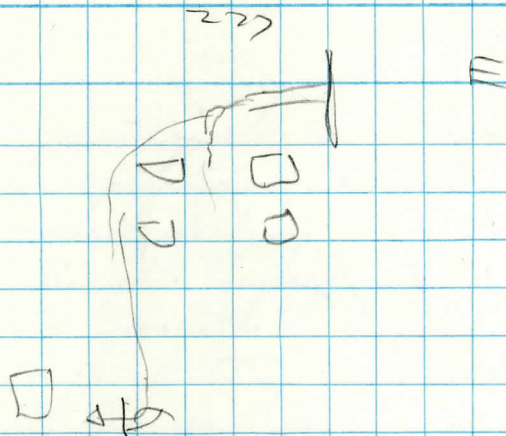
Press 1A Fill in

Unpress 7 ?

Press 5 Fill in

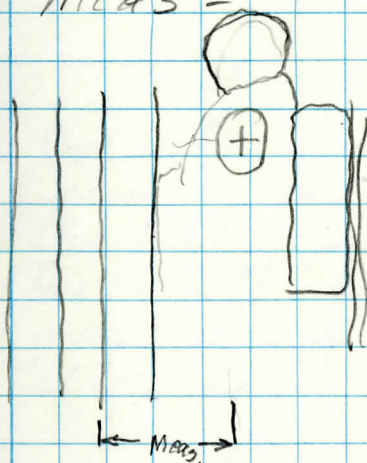
Press Funct 5

14 Sep. Jim Lewis & J.J.



WIF
ROM

Meas -

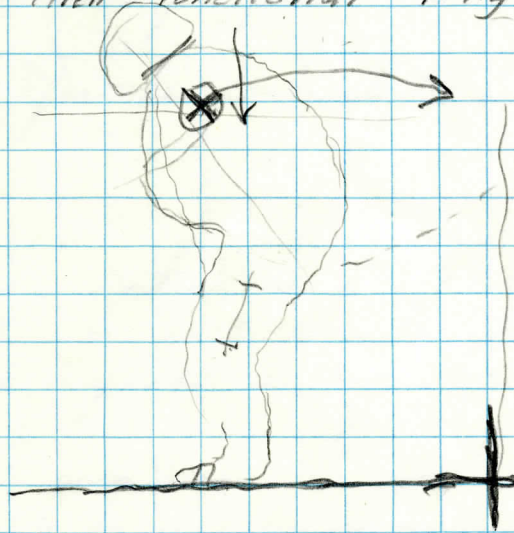


Fix PLSS

Option to float free - + make ROM
+ foot restraints -

Then Free floating blind-folded, relaxed
+ side + front photos - 2 fiducials

? Then "functional" long axis ROM



AIE

Chumley —

Probs

data



Introd

Static
Data

- M/S to AIE by express mail. Lewis wants copies of illustrations & will provide. The AIE rpt. should be expanded & merged c quick look rpt. The latter illus. should be redone.
- muscle should be done
 - as medical application should be illustrated

17 Sep '79.

Bill Lenoir asked me to participate in & comment on strength measurements for gloved operations. Comments were made in memo. SP-8(?) gloves totally distort normal anatomy such that grasp & thumb approp. are lost and one is left w/ a straight fingered pinch. Strength is the least important meas. Offered to make quantitative ROM & cameras on TKM. Completed quick paper for AIEE proceedings & will get decent dwgs & sketches completed for more comprehensive report.

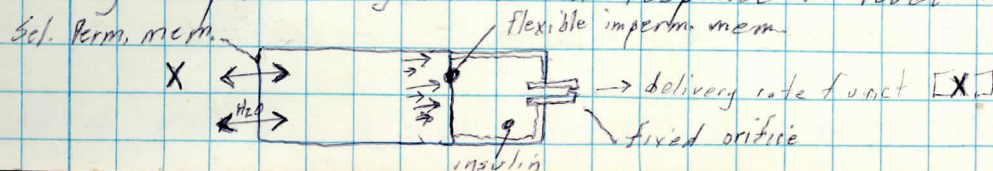
21 Sep Met & Hermling the test conductor for WIF studies on protocol for SP-8 studies in WIF on reach, functional reach, free floating posture & long axis mobility, max. & functional. Made a number of suggestions including no waist restraint for long axis, use of Babble/Crippen, calib. for stadiometric ranging, 'blinding' for free float, random motion for funct. reach, etc. Coord. - Lewis
Gave Lewis cal data, etc. for San Ant. studies.

3 Oct. Resume

A number of people in the office are working the EVA-like repair problems in the usual cut & try fashion. Neither L. or Cr. have approached Young on my role. L. claims he wants me to aid in tool design but this remains to be seen. Lewis has gotten his computers to process SWRI data and has a variety of algorithms. His current plots use a ± 5 cm. wide band & the restriction that they cross the plane of intersection within cm. He has a marked increase in point density but little other advantage on the plots.

Yardley agreed to use only the MMS for tile repair and it is to be ready in Aug. Craft will launch I & or 3 tile repair capability depending upon

Note — If a ^{membrane} selectively permeable for glucose were found then insulin ^{or other substances} might be administered by a pressure gradient in response to level of controlled chemical — ie method is not limited to gluc./insul.



9 Nov. Anthropometrics

J. Honeycutt called asking me to review a Ltr. to Lockheed specifying anthro. design stds. signed by Lunney and originated by Zedaker(?) SPIDPO. It was a misimask and recommended against sending it.

14 Nov. Jay asked me to try to 'fix' the letter and said he would support me in it. I am trying to get the interested groups - spacecraft design and suits together to reach agreement on an interim std.

20 Began to work the problem seriously and several issues are immediately obvious incl.: need for a defined representative population; existing military populations are biased since they are preselected per ht. & wt.

After spending considerable time on trying to find a representative population, the best of which would probably be 'recent female college graduates':

Bene Coleman, Profess. Health Leisure Sports UACLC - know of no such large study - he called

Dr. Molina U.T. who has done most of such related studies - also nothing

Dr. J. Jackson U.H.

- discussed prob. and plan for taking existing candidate data - he recommended this and suggested examining its validity by comparing Standard Error of the mean of this group $\bar{x}$ means of other available studies as follows:

$$S.E. = \frac{\sigma}{\sqrt{n-1}}$$

$S.E. \times 2.045$ gives a 95% probability that other studies of "some" population will fall within $\pm$ the range defined ($S.E. \times 2.045$)

He also gave me two studies of ♀:

A) College women; Wake Forest Age - 20.2 18-23 range $n=83$
Ht: 166.2 $\sigma = 5.9$

B) U.T. women: Age 31 18-55 $n=249$ Ht. 165.02 $\sigma = 6$

Charles Clauser AMRL: he has a 1960 HEN study $\bar{x}$ reach, etc. and suggested pulling an 18-24 Y.O. sample and comparing to our candidate sample.

19 Nov - Interim Std - John Jackson

1. Choose few points:
2. Examine existing data to set std.
3. Choice of "best" data

FEMALE

	%	"NASA" Std. (1985)	Army '77	NASA M/S (range)	College Women n=83 Δ T=5.9	NASA Candidates LESS M/S	NASA Candidates All
Height	5	60.	60.1				
	50	64.1	64.1		65.4		
	95	68.0	68.5				
Mean		63.8		(62.7-69.8) <u>65.4</u>	65.4	<u>65.8</u>	65.7
Height	5	32.0	31.1				
Seated	50	33.9	33.5				
	95	36.0	35.8				
Mean		33.7		(33 3/8 - 35 9/16) <u>34.6</u>		<u>35.1</u>	34.9
Reach*	5	26.7	25.2				
	50	29.3	27.95				
	95	31.7	31.1				
Mean		<u>29.2</u>		(26-32) <u>28.33</u>		<u>28.38</u>	<u>28.3</u>

McConville: agrees that no suitable college women study is available:
2/Nov. suggested adding wt age

Univ Oregon
Anthropom

P-103B - 538 - 21.6 8.5 20.5
534 60-62 HES 63.77 Δ 2.46 wt 129.8 Δ 24.3

Weight
5%
50%
95%

130.9 (104.8-150.3)
123.9 (100-156.3) 125.9 (100-156.3)

* NASA Reach Δ Wake Forest • M.I 1472 b

20 NOV. '79 I.D. of Cands. ♀

S-S.L	46
M.S	52
A.F	53
S.R	117
J.R	173
K.S	196

26, 27 Nov - Met & Zehaber SPIDPO apropos anthropometric agmts. for R1D - LMSC telescopes - he agreed that a standard is needed and that data for in SPIDPO ltr. was not appropriate. He called Chet May LMSC who suggested we contact Tom Fisher LMSC. He, Fisher, called me this morning and he will request the following meas. on candidates female & largest male - unsuited

Statue	Knee buttock
Weight	Shoulder Width
Erect Sit Height	Hip Width
Reach	
Max Angles head	

Arm, Arm Shoulder str. & Forearm torques -
Suited & Unsuited RDM + strength - Buchli

26 Nov. Anthropometrics Male

NASA Std. (1985)

NASA MS

Height	5%	66.2	
	50%		
	95%	74.3	73.9
Mean		70.2	

74 $\frac{3}{4}$

Height	5%	34.8	
sit	50%	36.9	
	95%	39.0	
Mean		36.9	38.8

39.75

Reach	5%	29.3	
	50%	31.8	
	95%	34.4	34.3
Mean			

31

Weight	5%	143.7	
	50%	170	
	95%	215.4	
Mean		179.7	

209

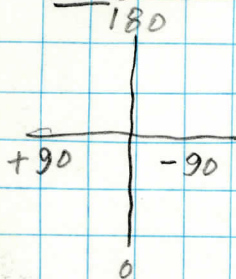
27 Nov '79 Analysis of Strength Records:

Records Available.

- 11 May S.M. in suit - program bad
Dean Davis make some random runs
- 3 July W² T Several 5/5 runs
- 10 Aug T. England 5/5 runs + 1 female run
- 30 Aug Buchli in SP-8 suit
- 5 Sept Buchli Unsuited

File PP-1

Run 1.1 see opp pg + pg. 23



Camera coords remain fixed - see opp. pg. If coord. sys on P-23 refers to angle of pull then directions + trajectory are consistent. (R) handed pull (Q) to (Q) Force plots will be made using Time as ind. variable. This assumes a linear path which is not the case. Will try plane plots $\bar{c}$ finish pt. as origin

2.1

PP-2

⊖ Y

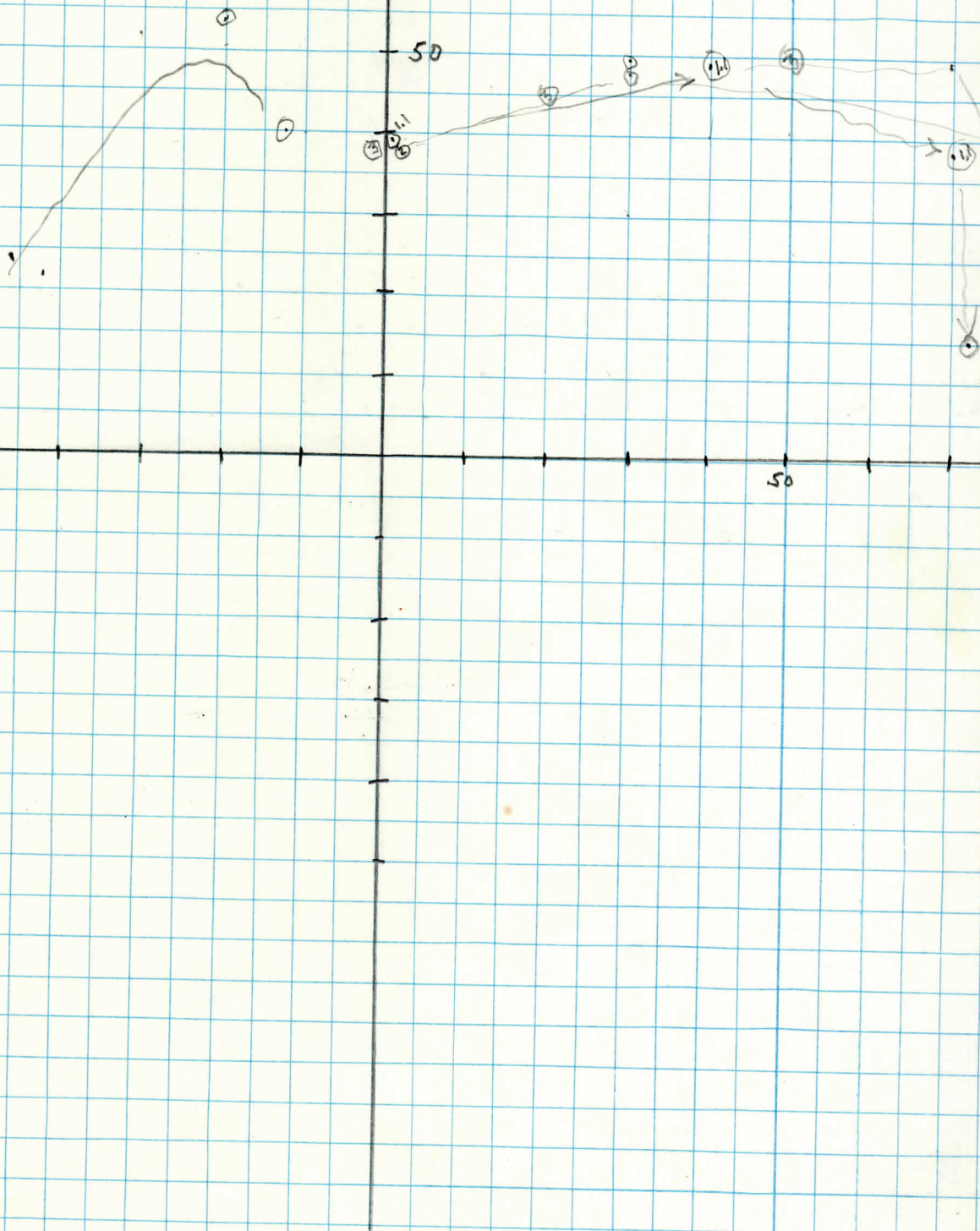
3
12
9
6
origin

100

50

50

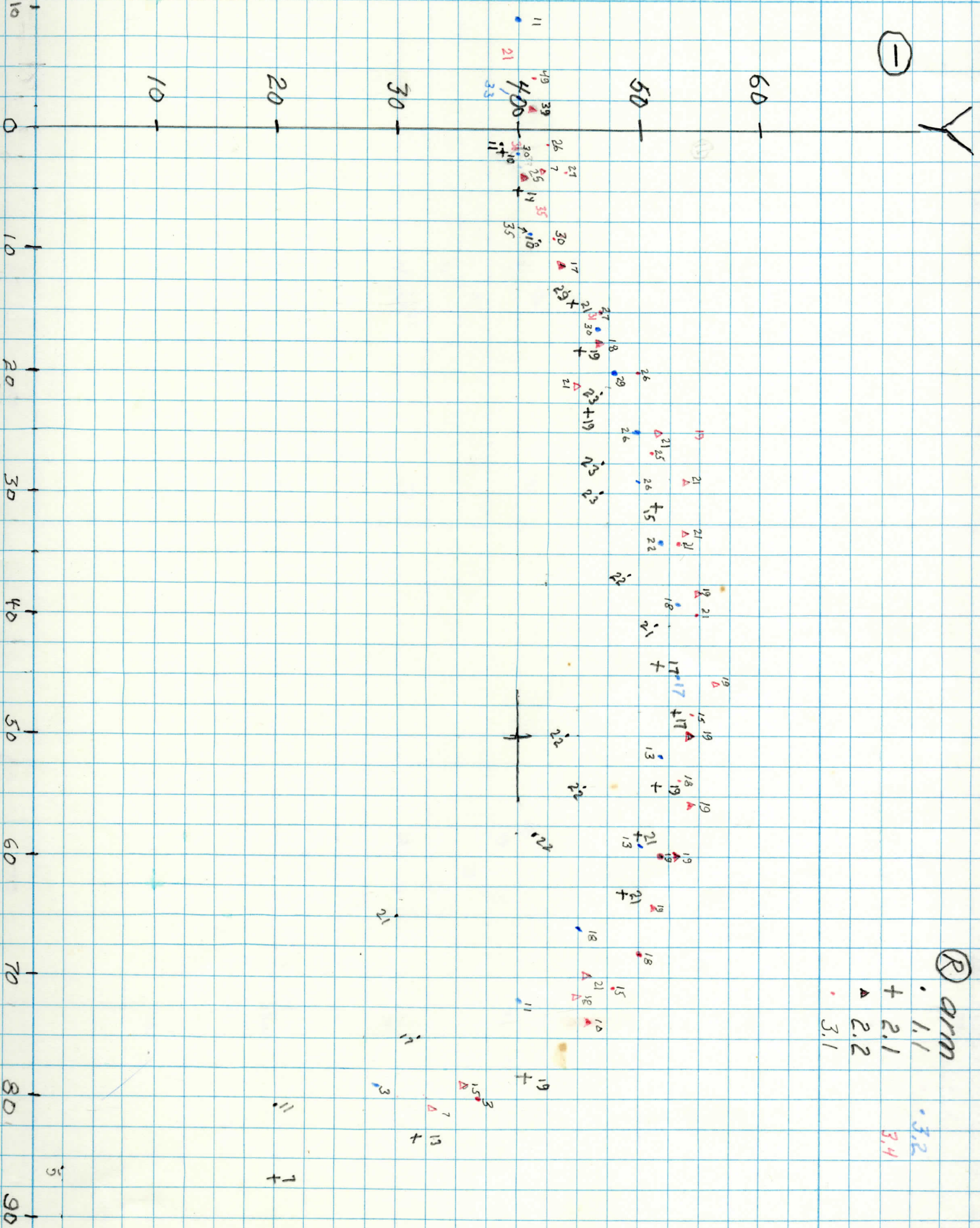
Ⓛ



27 Nov '79
Cont'd.

Strength Analysis cont'd.
Dia of Cybex pulley

①



②

arm

• 1.1

+ 2.1

• 2.2

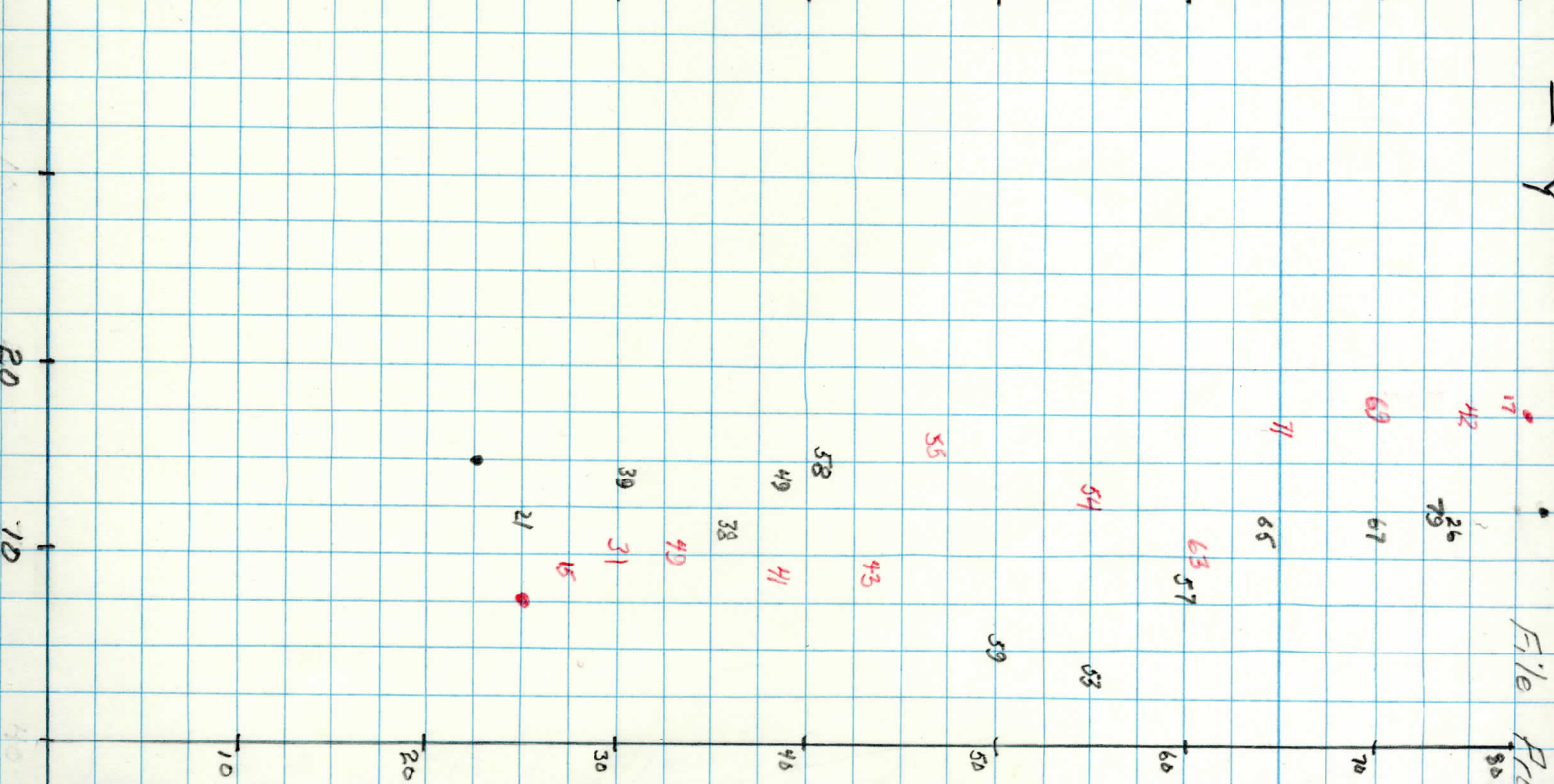
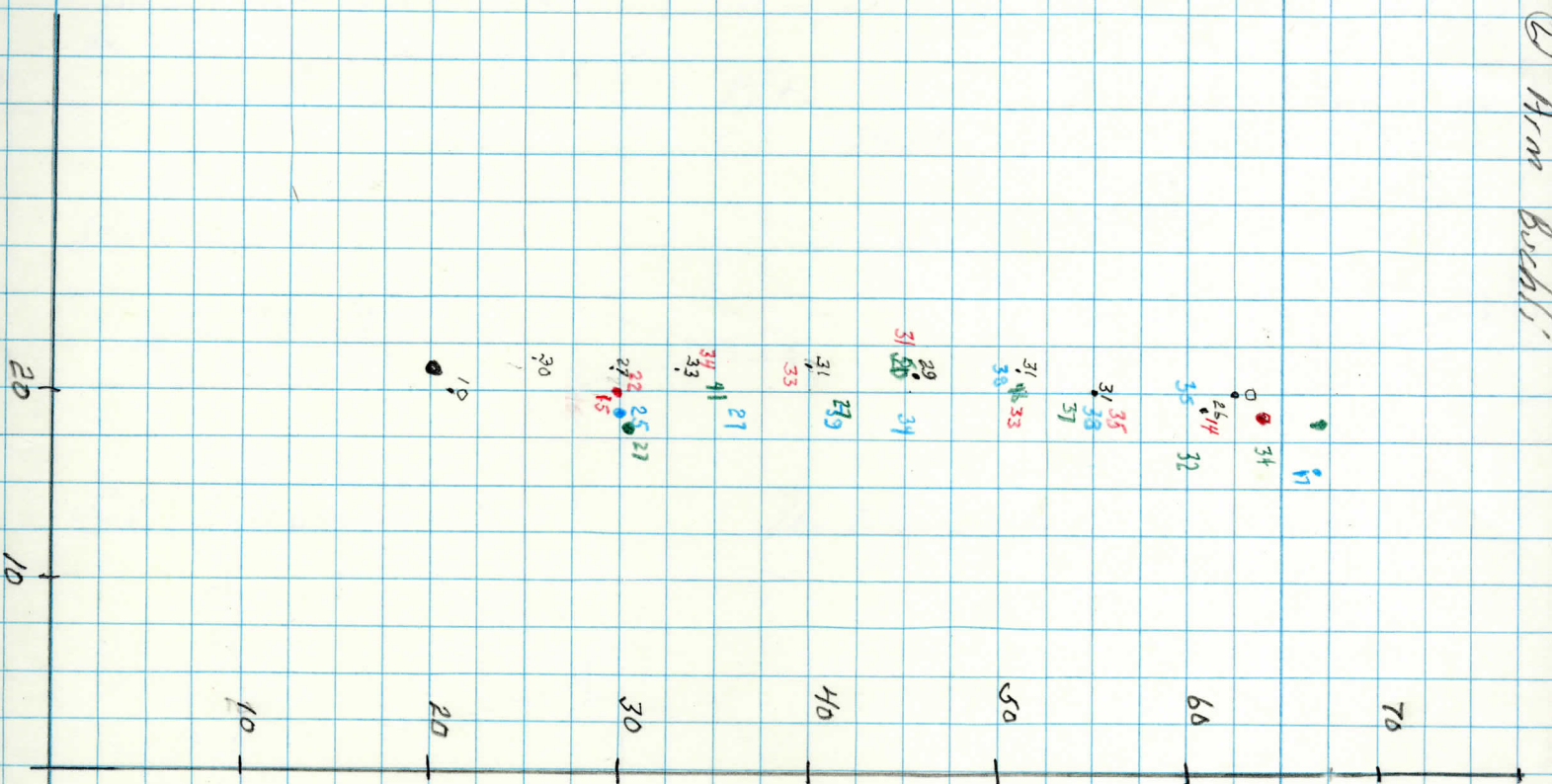
• 3.1

• 3.2

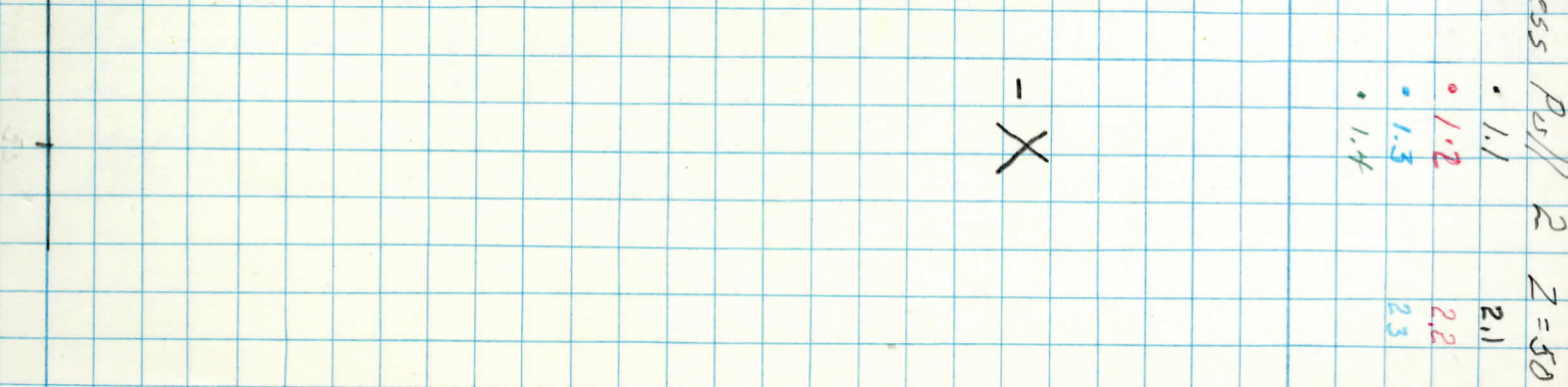
• 3.4

Arm Buchi

+ X



- X



File Press Pul 2 Z=50

A V G

Sept-4

Setting Up Lewis' Lab *

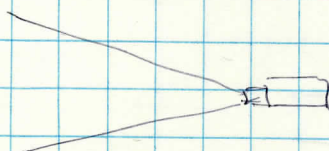
Bill

Plan to go through existing list - of angles - spent PM. in running a survey of existing equip.

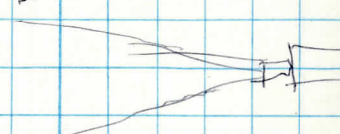
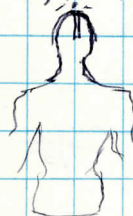
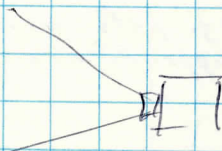
Neck

Flex, Ext

Rot - Pt. supine table long - Cam low
Head jig

Rotation

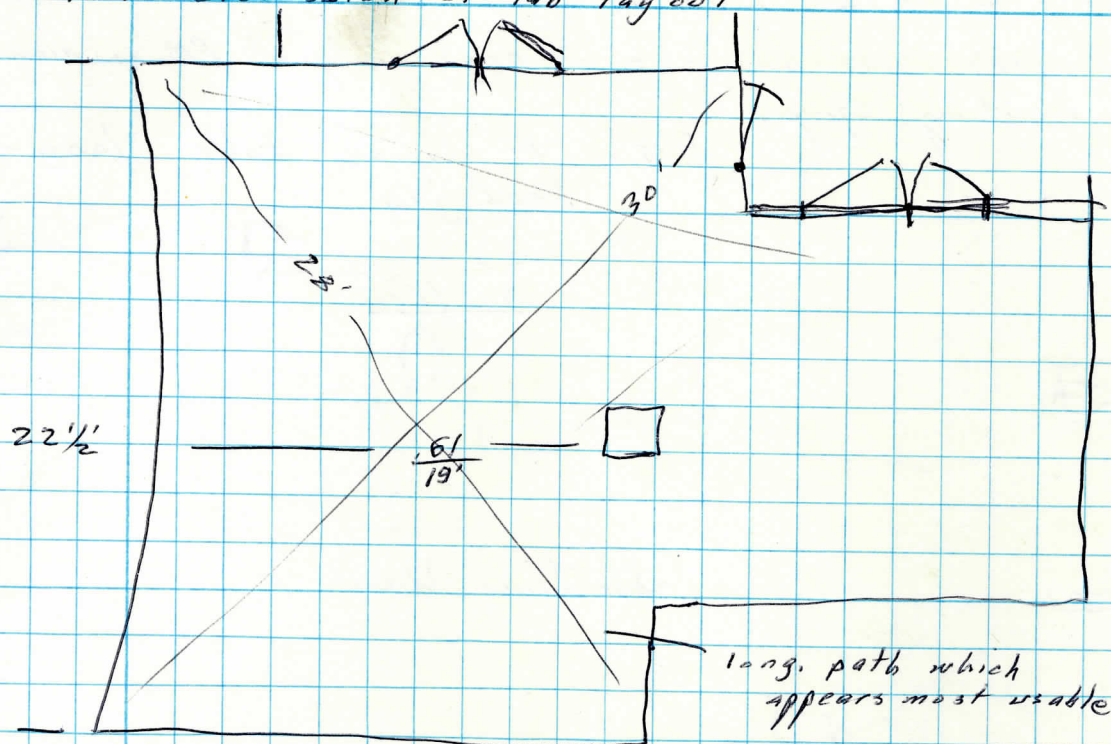
Flex / EXT.

Lat. FlexionShoulder Add.

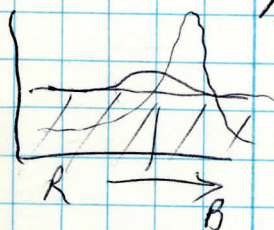
* Approx 1 wk. ago Jackson/Lewis found a med. stud. coop & computer experience and requested I help him in setting up the AVG & K/M in Lewis Lab. Have continued in this and we have the AVG coupled to an RS 43 & working & are now trying to get the K/M coupled to a computer.

16 Sept. A-K Lab.

Lewis, Woolford - Discussion of lab layout



Need longer travel area to track subj. c spastic lateral gait.



B-44
Paul Cochran
6/54

18 Sep. Mike & Moreno from J. Lewis

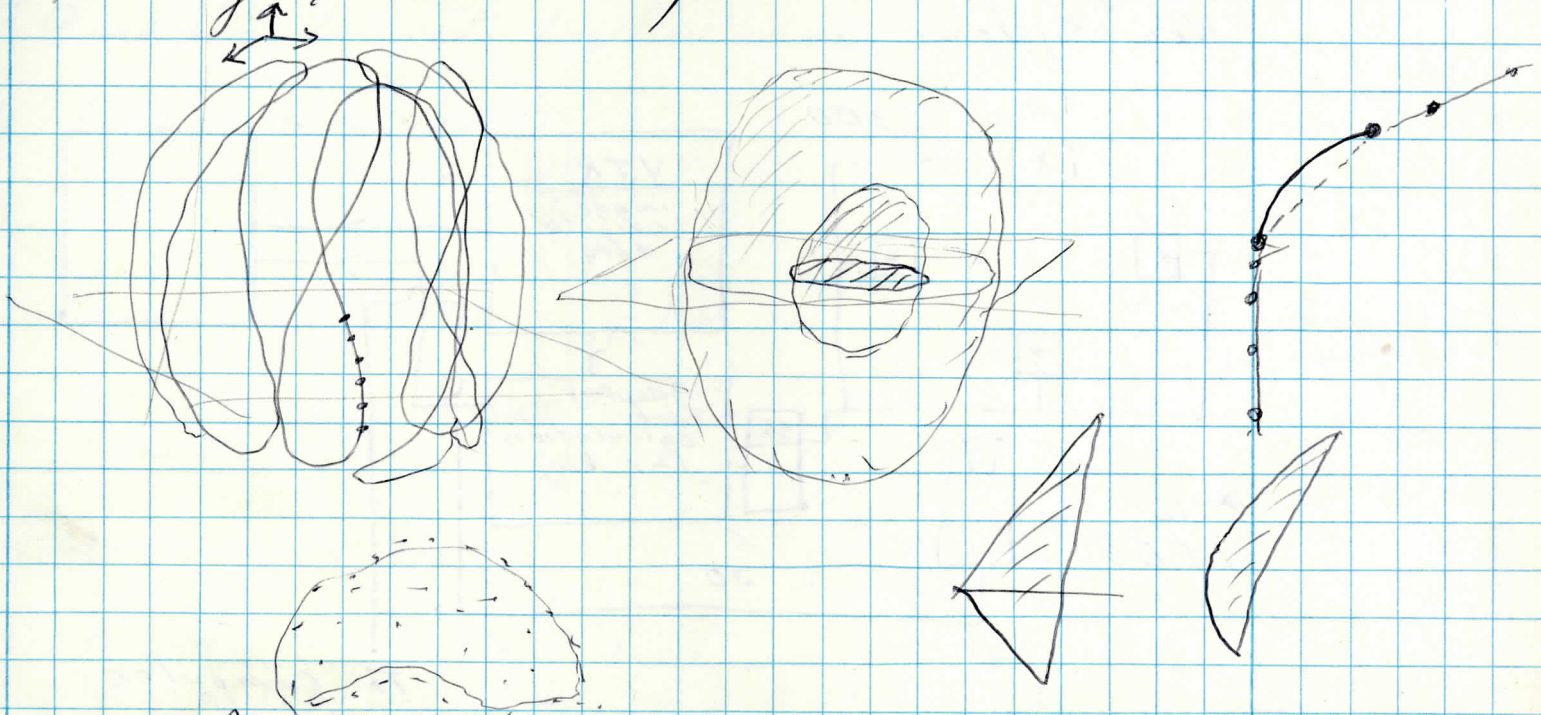
Provided description & 4 pp. sketches of to them on calibration devices, A V G table & light bars & ergom. support plus discussion of data probs. & arrangements c Mike. Copies of sketches stapled to rear of book.

24 Sep. J. L. called for appt. for Moreno, discussed development plans. Yde (?) and Barbara are going to SWRI to discuss new sys. for 2 days.

24 Sep. Moreno - brought sketches for too simple a cal. jig & showed what was req'd.

3 Oct, 80 Coord. $\bar{c}$ Barbara

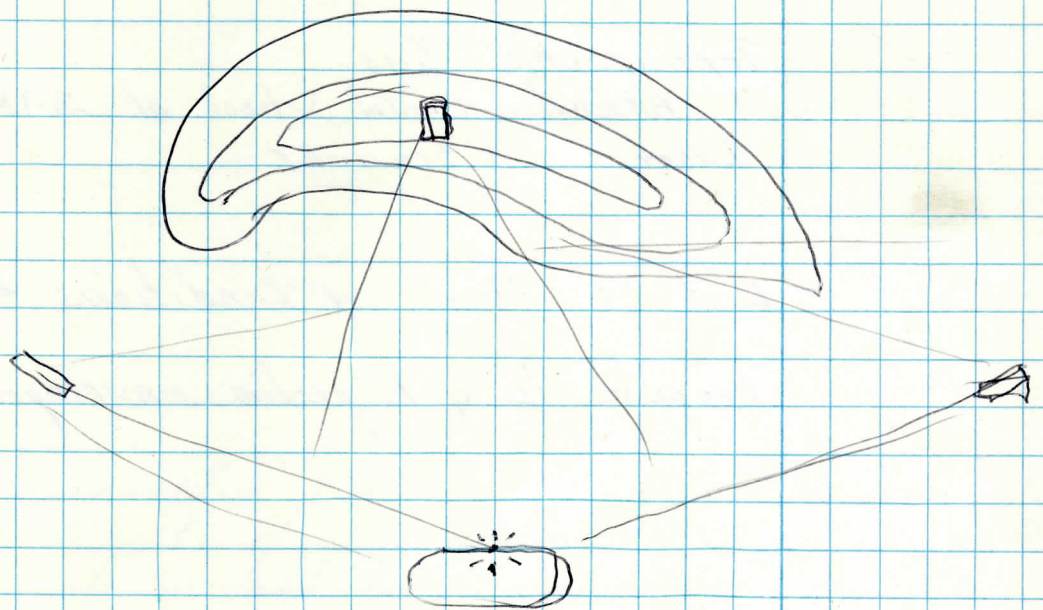
Still have posn. coords. + Cybex. on Digital Minic II
Needs Cybex ~~equipment~~ in operation



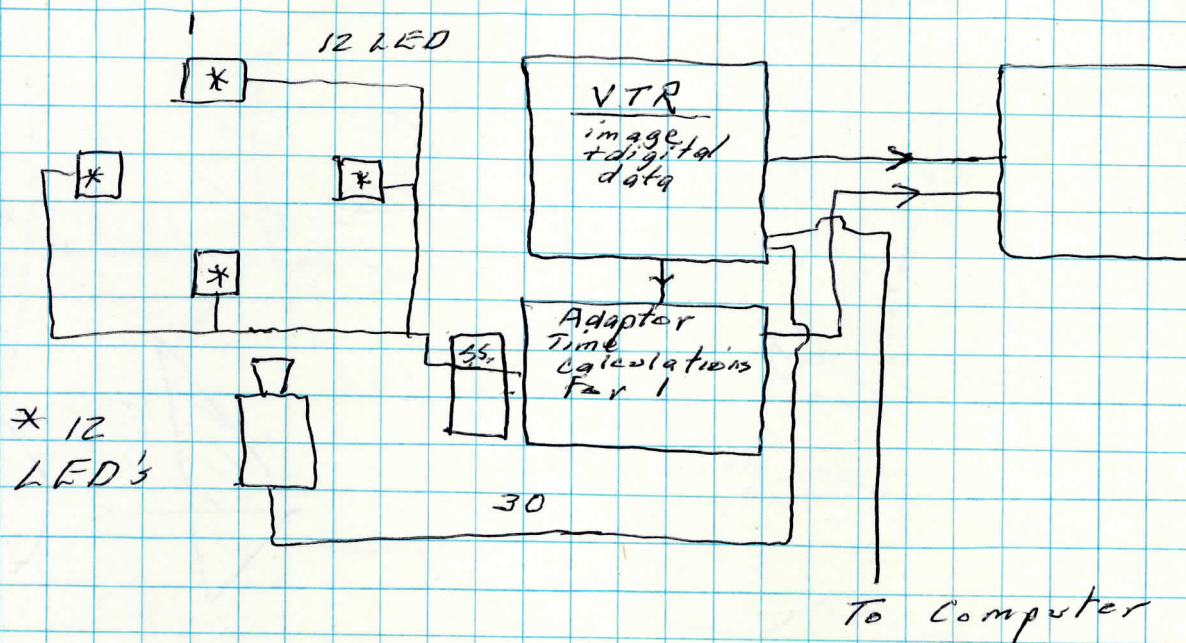
Max ROM
Functional "

Restricted ROM

Laser system -
USAF
Sel spot - SWRI
4 cameras
12 points



6 Nov Mtg. E Lewis, Mike, Barbara
 SWRI Selaput System now funded.
 Modify
 New System.



Topographic Sys.

Altschuler, Dental School at SAM (~~Wittford Hall~~)

Laser & T.V. Scanner

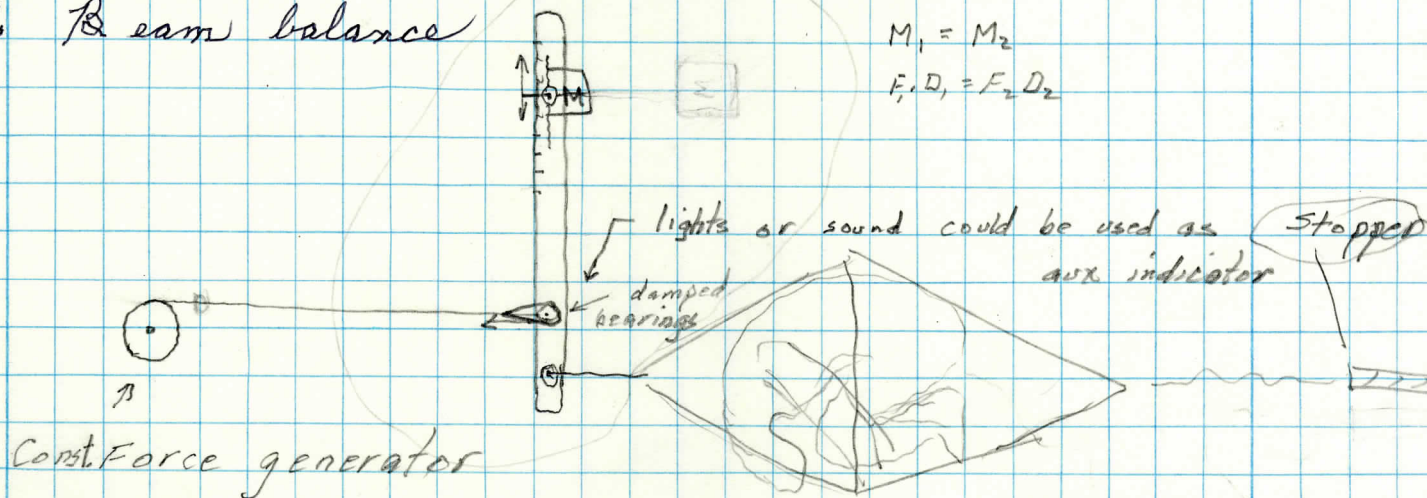
List of Meas. & Conditions ←

Promise to get prelim. envelopes & times —

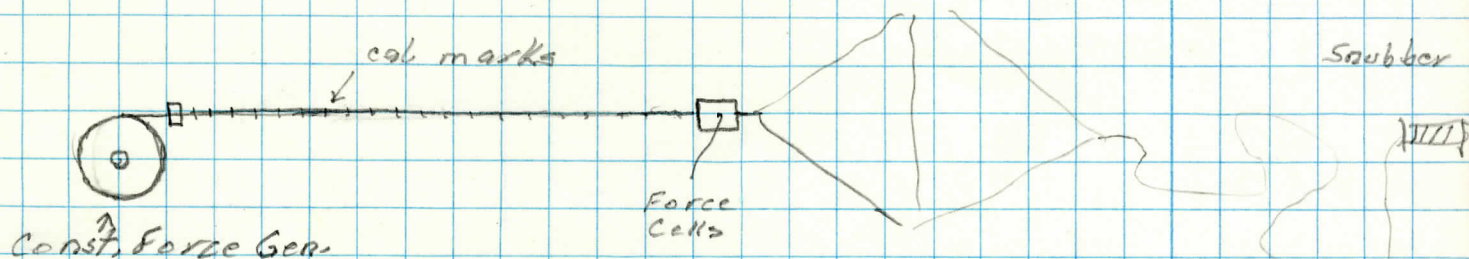
5 Jan I injected note: MMD development
 Mike Bungo called saying that end of yr. discretionary funds might be available for clinical MMD development. I promised to put together some concepts.

Covington
 Partin
 Mendall

1. Beam balance



2. $F = MA$ if forces are reduced to $1/20$ —
 $A = 16.1 \text{ F/sec}^2$ & F is $8.5\#$ or $.025\#$ resolution
 at 5 sec. $\sim 10\#/\text{sec}$



There are obviously endless iterations on above

7 June Took draft of proposal & 3 illus. to M.B. & discussed. First discussed mgmt. of proj. and M's proposal was that he obtain the money and that I would manage all technical aspects & support from T/ personnell which is acceptable — if it in fact works that way. Have done a set of vae graphs and will give to MB today.

Visual Acuity testing

Tgt. c rotatable L. 'C' rings + E's dist. 20'
Illum. level - Top

11 Aug -
2230

	[E]	[C]
100	(2) 10-0	10-1
	(1) 10-0	10-0
80	(2) 10-0	10-0
	(1) 10-0	10-0
50	(2) 10-0	10-1
	(1) 10-0	10-0
	32 ft.L + 60 ft.L	

shadowing of tgts - Light 3 removed

	[E]	[C]
	10-0	10-1
	10-0	10-1
	10-1	10-1
	10-1	10-1

E1 = 8.8 = 17 ft.L

(2) = both eyes open
(1) = occluded

(1) = (2) eye closed

12 Aug
0700

O/H lts. only E=8.8

50	(2) 10-0	10-2
	(1) 10-0	10-0
	17 ft.L	

13 Aug

0730

50	(2) 10-0	10-1
	(1) 10-0	10-1
	17 ft.L	

2230

(2) 10-0	10-7	p Movies
(1) 10-1	10-4	
(2) 10-3	10-3	
(1) 10-0	10-0	
(2) 10-2	10-2	
(1) 10-3	10-3	

1 cd/m² = 292 ft.L

85 cd/m² = 24.8

ft.L

14 Aug

0730

50	(2) -	10-0
	(1) -	10-1

50	10-0	10-1
2030	10-2	10-0

← NB turn
Tgt Bd. such
that tgts. were
near top -
shadows were
prom. + caused
cons. errors
in

15 Aug

0730

50	(2) 10-0	10-2
	(1) 10-1	10-2

50	(2) 10-2	10-5
	(1) 10-1	10-5

E1 = 5.2 = 15 ft.L

2 = 8.7 = 16 ft.L Conv. of Foot Lambert to candela meter (2)

$$\text{Contrast} = \frac{16 - 1.5}{16} = \frac{14.5}{16} = 0.9$$

$$C.F. = 3.426$$

32 Ed HB
Phy + Chem

$$\text{Foot Lambert} = \text{cd}/\pi \text{ ft}^2 = \text{cd}/\pi \text{ m}^2 = \text{cd}/(9.29 \times 10^{-2} \times 3.14 \text{ m}^2) = \text{cd}/29.18 \times 10^{-2}$$

$$\text{Foot Lambert} \times 2.918 \times 10^{-1} = \text{candela}/\text{m}^2 \text{ or } 8$$

$$1 \text{ ft}^2 = 9.29 \times 10^{-2} \text{ m}^2$$

$$K = \frac{\text{cd}}{\text{m}^2} = \frac{\text{cd}}{9.29 \times 10^{-2} \text{ ft}^2} = 9.29 \times 10^{-2}$$

$$\begin{array}{r} 145 \overline{) 160} \\ \underline{145} \\ 5 \\ \underline{50} \\ 10 \\ \underline{95} \\ 5 \\ \underline{50} \\ 0 \end{array}$$

Visual Acuity Testing contd.

16 th	C	E	18 th	C	②	10-6	Immediately p awakening -
0800	80 ②	10-1	50	①	10-2		
p bkfst.	①	10-1	p bkfst.	②	10-1		
	50 ②	10-3	50	①	10-1		
	①	10-2	p bkfst.	②	10-1		
p bkfst	50 ②	10-2		①	10-1		
	①	10-2	19 th				
1430	50 ②	10-1	50				
60 FL	①	10-4 *					
1630	50 ②	10-0					
5000 FL	①	10-0					
Shade	50 ②	10-2					
E1:	①	10-0					
26	50 ②	10-1	28	50 ②	10-1	Flew to BKF & ret.	
30	50 ②	10-1	2100	①	10-0	viser down	
2100	①	10-1	31 st	80 ②			
F-883 1 st	50 ②	10-1	~2100	①			
18FL 1000	①	10-0	☆ 50				

Tgts. Size: calc. from
inches

$$\tan \theta = y/x \quad \& \quad y = x \tan \theta \quad \theta = 1 \text{ min}$$

$$x = 240'' \text{ etc.}$$

20/	1'	4'	5'	1°
20	.0698131	.2792	.3490	4.19"
50	.1745	.6981	.87266	
80	.27925	1.117	1.3962	
100	.34906	1.3962	1.745	
200	.69813	2.7925	3.4906	

$$\tan 1' = \tan \frac{1}{60}^\circ = \tan 1.66 \times 10^{-2} = 2.9088 \times 10^{-4}$$

$$y =$$

$$x = y / \tan \theta =$$

$$\tan 5' =$$

30	.1047	.5235
		.48

Distances for 0.48 (5 mins)

* ① made before ② and immed. p sunlight before adapting
 ☆ J.K. was observer - had 2 glass wine prior

19th-20th Enoch Items -

Spot Meter- Relation of general level of illum to V.A. vs contrast: This has
Records - been poorly investigated for corrected vision.

Fry Detection 1 11

Sloan

Recognition (description) C, E

Ginsberg - USAF

Goodson - Penns.

Interpretation

A B

Hollenbrander

Pacific Med

Correlative

words (the)

Cell -

Fry

Kubrick

20th

Spent AM at School Optom. Berkeley first c Dr. Jay Enock 1 1/2 hrs & then Enock & Bailey who did the following tests -

Refraction 1 + (2.75)

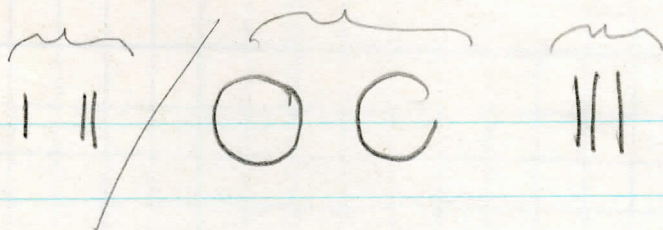
Acuity

optotypes, reflected, low illum. level, projectors (20/30/20/30)

'Bailey' chart - back illum. c variable level (not corr. for color temp.) 20/37 20/26 at high level. + 20/57 - 20/34

Some significant points: there is sheer chaos in visual testing in general, there is very little in the lit. on acuity vs. level exp. of ametropias, there are sig. differences in charts up to two lines and charts are more difficult than L.C.'s

Detection



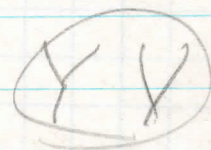
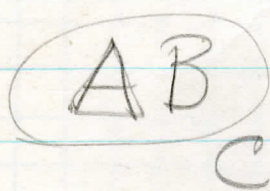
1111 OKN

Recognition
(Descriptives)



equal/not
equal

Interpretation
Knowledge
familiarity



Correlative These

the

rpea

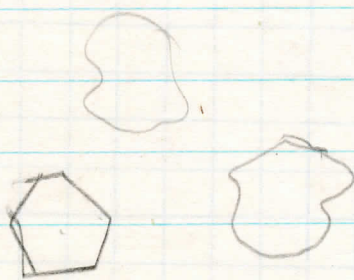
pare

earp

pear

reap

{rape



	<u>R</u>	<u>L</u>	
Clinic	20/30--	20/30--	20/40--
Chart	20/57	20/34	20/9.6
PL-	20/29 37	20/26	

1st Sep. Acuity Testing see P-102,3

0820 C₅₀ ② 10-2
② 10-0

3rd Sept. C₅₀ ② 10-6
2300 p wine " ① 10-1
C₈₀ ② 10-0

4th 0800 C₅₀ ② 10-0
① 10-0

5th 0730 C₅₀ ② 1-11, 1111
① 111-1, 1111

6th 0920 C₅₀ ② 1111, 1111
① 1111, 1111

7th 1900 0900 C₅₀ ② 1111, 1111
① 1-11, 1-11

10th 830 C₅₀ ② 1-11, 1111
① 1111, 1111

13 0730 C₅₀ ② 1111, 1111
old ① 1111, 1111

new* ② 1111, 1111
① 1111, -1111

C₃₀ new ① 1111, -1111

15 C₅₀ new ② 1111, 1111

C₃₀ new ② 1111, 1111
①

16th Sept. new C₅₀ ② 1111, 1111
8.00a C₃₀ ② 1111, 1111

18th old C₅₀ ② 1111, 1111, 1111, 1111
6.30a new C₃₀ ② 1111, 1111, 1-11, 1111
C₃₀ 1-11, -1-11, 1-1-1, 1111-
E₅₀ 1111, 1111

18th old C₈₀ ② 1111, 1111
7.50a " C₅₀ ② 11-11, 11-11

19 old C₈₀ ② 11-11, 1111
C₅₀ 1111, 1111

25th old C₅₀ ② 1111, 1111, -

Oct 3 C₈₀ old ② 1111, 1111
C₃₀ 1111, 11-11

Oct 13 FL: 23 * C₈₀ new ② 1111, 1111
C₅₀ new 1111, 1111
C₃₀ new ②

Oct 14 C₈₀ new ② 1111, 1111
before b'test C₅₀ 1-11, 1111
after b'test C₅₀ 1111, 1111
(overhead light only)

after supper C₈₀ ② 1111, 1111
C₅₀ 1111, 1111

Oct 15 C₈₀ ② 1111, 1111
C₅₀ 1111, 1111

NB - 'New' refers to photo copied opto-types, i.e. 'c's' which are taken

Eors

R
2 K Hz

30 1--
35 40 III
40 50 -II
45 II
50 III
55 II

--- II
--- (2) II - II
60
65 III
70 II

Visual Acuity

Nov 5 Old C₂₀ III-I, IIII
② C₅₀ IIII, IIII
E₅₀ IIII, IIII

Nov 9 ²²⁰⁰ New C₅₀
C₃₀
C₂₀ E₅₀
E₅₀ E₃₀
E₃₀ E₂₀
E₂₀

Nov 10 C₅₀ IIIII, IIIII
C₃₀ IIII-, IIIII
C₂₀ --- III, --- II
E₅₀
E₃₀ IIIII, IIIII
E₂₀ --- I-I, --- I-

Nov. 11 C₃₀ IIIII, IIIII

C₂₀ - I- - - - - III-
Real U F N D Z E P S V R O C K H
50 ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓
20 P V C S ✓ R B Z D Z ✓ B

Nov. 12 C₅₀ IIIII,

Letter 50 ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓

Real 80 Z R S K P N F O U C D E H V
See 80 ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓
50 ✓ P ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓

} presented randomly.

20 Z P N P

17th Sept. Pensacola NAM I - ?

— Briska —

Sam P. want "eye exam"

Visual Acuity —

Any sort of Ar-

Vision Test - X

Illuminated chart -

Projected chart

— Near & Far —

Px exam -

Muscle Bal -

Max Refraction

Steropsis - Vicrkoff

Dr. Briska, Joe R & myself reviewed the situation after an initial attempt was made by corpsmen to do a routine "screening".

Called Tom

Cherry East.

Kodak

87 473-5700

724-4000

re. screen.

Characteristics

also A.O.

BBL-let

526-3633

716-338-6262

Rochester

FTS 87-473-5700

Jim Spire

Briska either administered or monitored all tests.

First was a VTAND (or equiv) -

? L 20/70 ? R 20/100

Next was a projected eye line, A.O., with far end of room / dark and a single line

at a time projected onto a 'granular' reflective

screen - It was impossible for me to resolve properly

even the 3rd line on this projector. Next there were

two charts c modified ROMAN optotypes which

had a measured luminance (1" spot meter) of

~ 90 F.L. but a contrast of ~ .66 - Read to 30-/20

on this test. Then to a second lane c Snellen

test optotypes & could go only to ~ 30-/20.

At this point asked Briska for eval. and he

stated that it was impossible to say what my

activity was because I squinted & ~~for~~ kept dropping

the occluder on the other eye, etc. Has increased

and gave him a L.C. 30x50 & offered to let any

corpsman occlude the eye and prop open the other.

He used the L.C. 30 first and with my right

eye held open and my palm in my left and

J.K. holding this board in front of me while he

turned the card, I resolved consistently the 30 + then after finding it was 30 went to the C₃₀ also (resolution). He declared himself satif satisfied that I was resolving the test, but it remains to be seen what was reported. I could summarize this as:

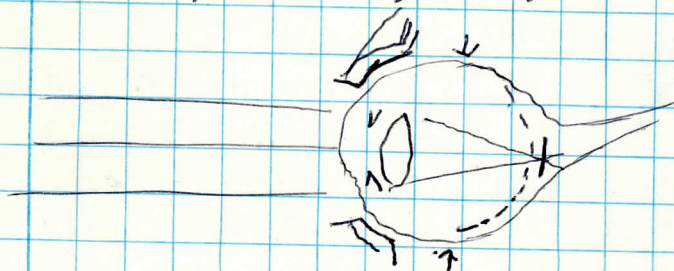
an example of the testing problem

the question of "squint" needs resolution.

" " of such wide variation (projectors) etc. needs clarification

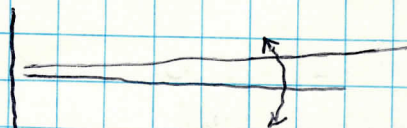
18 Sept.

Squint prob: The facial maneuver referred to by Briska is in my case a frown & furrowing of forehead lowering of the eyebrows & partial closure of the lids & impingement on the pupillary light path. Briska claimed this 1) reduced pupillary area and 2) changed the retina by compression of ? by muscles. This morning & the face flaccid and @ eye open the results on P-104 were obtained. By frowning it is possible to increase resolution 1-2 lines. Something of the same effect can be obtained by tensing of the cervical muscles but not by Valsalva nor by shading the eyes in a way compable to that produced by the frown. N.B. This frown is very distinct from my definition of the "squint" which reduces eyelid separation forming a slit.



- Vanberg Monitor
Inst

A.O. Projector -



Bernard Grollman, M.D.
617 765 9711

Dr. Grollman talked about 'specular' problems from screen not being normal to projector and viewing angle not co-aligned to projection angle. Promised to send any available info in two wks.

3 Oct. 80. Tgt. Construction

From
Std.

Landolt C's

 $85 \pm 5 \text{ cd/m}^2$

4 Posn.

Contrast 0.85

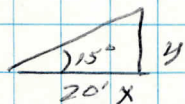
 15° Field - 64" $L/P^2 = \text{cd/m}^2 \div 3.426$

SPACING - 2X width

T of 10 responses

Sloan - C D H K N O R S V Z

5x5



$$\theta = \tan^{-1} \frac{y}{x}$$

$$\tan \theta = \frac{y}{x}$$

$$y = x \tan \theta$$

$$= 240. \tan 15^\circ$$

$$= " 0.2679$$

$$= 64"$$

Steps 0.1 Log $\approx$ 1.26 progression

20.	20
25.2	15.87
31.75	12.59
40.	9.99
50.	7.93
63.	6.30
80.	
100.	
127.	
158.75	
200.	

13 Oct. Summary & Chart Construction

After much prodding M.B. contacted Briska, PNA who would not commit himself on testing & recommended that it be repeated locally. M.B. verbally agreed to use NRC recommended procedures and optotypes and will review & agree upon these the 14th. I agreed to provide tgts. & lights to meet stds. ex. use 20 ft vs 4 M.

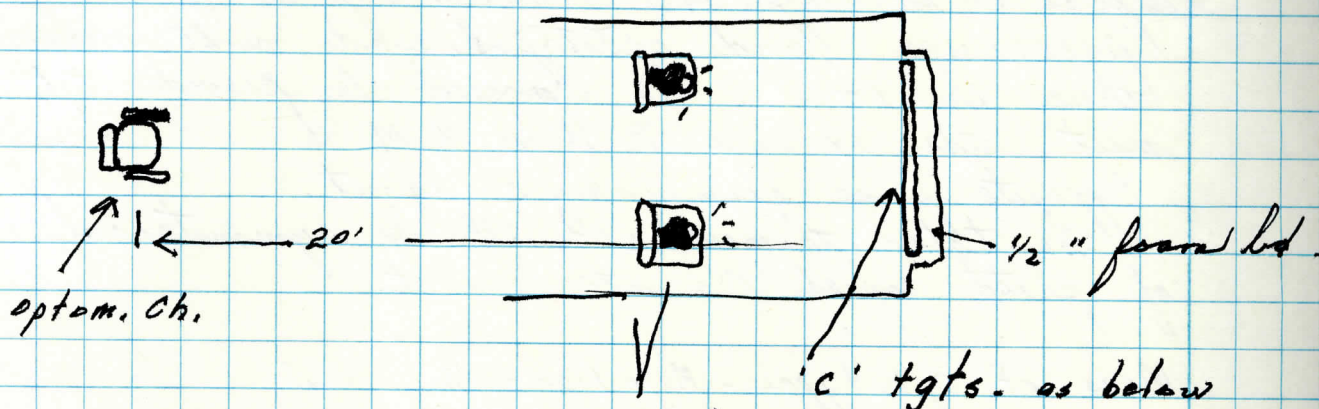
Opposite page summarizes agmt.

The tgts. themselves will be symmetrical i.e. exact squares of photo copied C's mtd. on lt.

Meas. of Optotypes - Magnifier + $\frac{1}{100}$ " scale

	Dia	Stroke	Gap
20/20	.35	.065	.068
20/30			

14-50 Oct. 1980 Meas. of Visual Acuity by F/M using std. Tgts.
The vision test lane at B-8 was arranged as below:



Chairs &
200 W work lamps
lamps in spun Al reflectors
att.

light level: Meas. & 1st sp. Photom.
 $EI \times Cal = Lumin(Ft. Lam.) \times 3.43 \text{ Cd./M}^2/\text{Ft. Lam.} = Lumin$

$$9.3 = 25 \cdot 3.43 = 85.75 \text{ Cd./M}^2$$

0030 15th

Tgts

Land. C's mtd. on 6" ~1/32 stiffener -

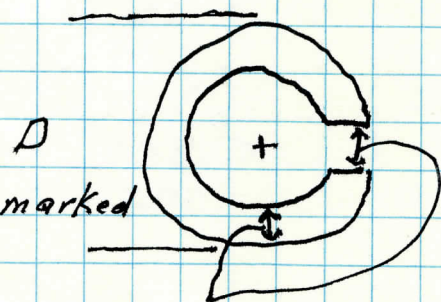
Photo reproduced to $\pm .02$ of dimens.
on P-101 -

Contrast Meas. & spot photom -
from 1/2 bl & 1/2 wh sheet reprod.
at same time:

$$\text{Black} - 5.1 = 4.4 \quad G = \frac{20 - 1.4}{20} = .93$$

$$\text{White} - 8.9 = 20$$

A tiny square
center



Gap + stroke = 1

D = 5

recorded by Dr. Sue H. - Dr. MB observed face &

shielded eyes during reset. Results

C₈₀
C₅₀
C₃₀
C₈₀

OD

14/-0

14/-0

14-2

5-0 *

OS

15/-

14 -1?

14 -3

5-0 *

& eyelid held full open

Summary of Results

Date/Place

Test procedure

Results uncorr./corr.

Projected A/D chart, old AO projector,
NASA Clinic small round screen, room totally
dark except 1 line of tgt.

①

②

10 Nov. Notes from Literature

Sloan, L. Meas. of acuity, Review Arch. Opth - 45:704

Land. C adopted 1911 Int. Cong.

1930

1980 NRC.

5log. ^{Quart Rev.} optn B.

11 Nov

Tgts - L - C's, E's & Optotypes.

Lights, Photometer, Calib.

Std.

Lit.

Tgts -

C's

E's

Optos

Board

Lights

Photometer & calib

Lit.

Verbally directed by M. Berry (ltr. in typing) to have another exam this time by Holland and promised to get results to board immediately.

Ma
Dr
F

Orig. Bd.

Austin

S.P. sety. & head
M BHanley
Bergman

Recommendation kept by Sam

M.B. presented case

Did not meet stds.

YR	SID	RIGHT EAR						LEFT EAR					
		500	1000	2000	3000	4000	6000	500	1000	2000	3000	4000	6000
67	ASA 51	-5	0	5	5	10	15	-5	-5	5	25	35	40
68	INTR 0	-10	5	15	25	20	0	-5	5	15	0	35	25
69	ISO 64	10	15	20	35	25	10	15	15	35	55	40	5
70	ISO 64	5	15	20	20	25	15	5	15	30	40	20	25
71	ANSI 69	5	15	25	25	35	5	5	10	45	40	45	30
72	ANSI 69	10	15	25	35	40	5	10	15	45	60	45	30
73													
74	ANSI 69	15	15	35	40	45	10	15	25	65	65	55	35
75	ANSI 69	10	20	35	45	45	5	10	25	45	55	45	25
76	ANSI 69	10	20	35	45	45	5	10	25	45	55	45	25
77	ANSI 69	10	25	5	40	40	15	10	20	45	50	15	10
78	ANSI 69	5	25	30	35	15	5	5	30	50	45	30	20
79	ANSI 69	10	25	35	45	40	15	10	35	55	50	45	25
80	ANSI 69	20	25	40	45	40	20	20	30	50	55	45	30
12/80	"	15	25	40	40	15	20	20	40	60	50	50	35
12/1													

8K 250

8K

Maddox 12/80

Draper 2/81

F/M 2/81

A

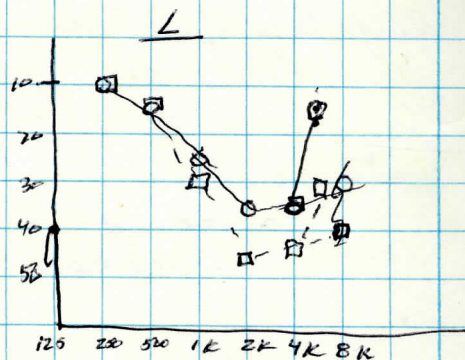
250

	15	20	35	45	45	10		15	30	50	50	40	35		
5	15	25	35	40	40	25	30	5	15	25	50	50	45	35	
10	10	25	40	45	50	20	40	15	15	40	55	55	50	40	30
-5	5	0	-5	-5	-10	+5	-10	-10	0	-15	-5	-5	-5	-10	+10

Audio

Date/Freq.		R		L
17 Nov.	2 K	40	35	45
	1 K	25		30
	500N	15		15
	1.5	40		45
	250N	10		10
	6 K	15		30
	8 K	40		30
	4 K	35		35
	50 40	30	25	
	0.5	11	11	
	1.0	11	11	
	2.0	11	11	
		45		
		35		
		R		L

18 Nov.	125	5	5
Post Fit.	250	5	5
	500	20 10	20 15
	1000	25 20	30 25
	2 K	40 40-30 ^N	30 50
	4 K	40 35	40 45
	6 K	20 25	5 30



SMB - 20 Nov '80

P. Johnson, C. Fisher, S. Pool, S. Hanley, L. Bergman,
 Dietlein not available
 S. Pool Chairman
 M. Berry -

Showed copy of Vision Testing - & discussed
 Audiometry -
 Minimal compensable loss - waiverable

Thornton

Presented background of case, elements of visual acuity measurement
 and demonstrated gross error in my case and reasons for plus need and plea
 for proper tests at NASA - board was receptive to presentation
 Pool stated that VA tests at NASA would be brought up to std. but that
 it would take SMB 'week or ten days' to make its report - Questioned
 cause for this & he promised by next Wed.!

While jogging was told that bd. seemed unanimous in its intention to restore
 my status but S.P. insisted that it be delayed til Mon.

Tues - Now told board will not pass hearing loss but will insist on
 eval. for waiver!

Wed Spent hour & 1/2 laggy. As might have been expected, only if rules are
 broken or is he concerned. Recommended against see G.A. or C.K.
 S.P. & M.B. met again Mon.

20/50 20/80 wear

Auditory - note shift
 don't meet std.

may be potentially waiverable - auditory threshold
~~before~~ - 3rd Draper - speech discrim -

Pink sheet - Mr. Directive
 Guidelines & will
 standard -

Rtn to Dty & Waiver

Form 1042
 Completed by
 Exam. Phys

cc

Health Ctr. Dir A372
 Record Dir Fed

Waiver for IIA is granted
 Waiver for IA is up for
 determination

Performance -

26 Nov. Review of Bd. Findings cont'd.

Saw copy of bd. action (promised copy of this & previous bd.) which concluded my true acuity was 20/50-80 & that hearing was outside of limits and a waiver might be considered if certain data including speech discrimination, manual audiometry etc. is accomplished. Para. 1 on "marginal" ~~performance~~ with some reference to verification of flying performance.

29 Nov. Audiometry

Ran the following series on Maico and S.T. using random 1 sec bursts

Hearing
d
ometry28th
0800

Freq/dB	R	L
	Hit/Miss/FP/%	
500/	7-0-0-100	500/
20		20
10	11-0-0-100	15
15	15-0-0-100	10
5	2-6-4-~8	
<u>20</u>	<u>500 -7 1/2 db</u>	<u>20</u>
1K-30	6-0-0-100	30
25	8-0-0-100	25
20	13-0-5-72	20
15	6-8-0-43	15
10	10-4-0-71	
<u>25</u>	<u>1K -17 db</u>	<u>30</u>
2K/40	5-0-0-100	50
35	9-1-1-82	45
30	6-5-0-55	40
25	6-6-0-50	35
20	6-6-0-50	
<u>2K</u>	<u>~30</u>	<u><-35</u>

1830

2K/	6-0-0-100	55
40		50
35	9-3-0-75	45
30	2-9-0-18	40
25	4-6-0-40	35
20	3-7-0-30	
<u>40</u>	<u>~35 db</u>	<u>50</u>

29 Nov
0830

2K/		
35	8-1-0-89	55
30	8-4-0-66	50
25	8-3-0-73	45
20	6-4-0-60	40
15	5-5-0-50	35
<u><-30 db</u>		<u>30</u>
		<u>25</u>

L Masking

11-0-0-100
4-4-0-50
5-7-0-42
3-8-0-27
4-6-0-40
<u>-50 db</u>

Repeat (2)

8-1-2-72
8-1-3-57
10-1-1-83

<-40 db

1 Dec.

Audiometry

Calls to Creech & Thomas, both out.
At this time need:

Calibration of my audiometer. #66 by comm. ~~unit~~ operation
NASA has dummy head and will try to get levels
there tomorrow -

Information on testing standards -

NRC - committee on hearing Dr. Whitcomb (?)
They were going to prepare a testing procedure but were so
impressed w/ one prepared by
Norma Hopkinson, 55-1 S. Megley Ave, Pittsburgh PA 15232
that the group was dissolved.
He recommended

Univ. Pittsburgh

412-361-6485 San

87 722 3311

Grady Thomas 87-678-2211

X 966 247
966 2347Dr. Hirsch Center Inst. Deaf 314-⁶⁵012-3200 -
²⁷⁶
87-⁶⁵

758 7212

Queller - NASA HQ

Hearing Measurements Ventry, et. al. Apple Cent Craft
Am. Speech Lang & H ASHA
April 77 guidelines for Manual testing
Hughes Westlake

Gasaway - 512-333-7428

Fletcher John - Memphis State - Audiology -
Audiology Clinic Dir. Walter ReedMaj. - Roy Sedge - 202-57-
Ernie 576-2414. enr 576-1685

Jim Kreul -

Calif. Rucker
J. Goldstein576-2414. enr 576-1685
strings 60-76 comb of 4

Queller is at NASA ^{HQ} on a hearing conservation program.
She is obviously well acquainted w/ problem and first remark was
that audiometry must be correlated w/ function -
Test procedures are supposed to be rigidly followed in
automation of audiometers. Still trying to get audiometer calibrated
to Tgt. made.

2 Dec. Sloan Letters

Steps. $0.1 \log (\sim 126\%)$

20/

		1'	5'
20	20.	.0698	.3490 ✓
25.20	25.	.0873	.4363 ✓
31.75	32.	.1117	.5584 ✓
40.01	40.		
50.41	50.	.1745	.8727 ✓
63.52	64.		
80.03	80.	.2793	1.396 ✓
100.84	101.		
127.06	127.		
160.09	160.		
201.71	202.		
15.87	16.		
12.60	13.		
10.00	10.	.0349	.1745 ✓
7.94	8.		

0698

32

1396

2094

22336

698

16

4188

698

11168

5

55840

698

1.25

3490

1396

698

87250

5

43625

Request in to graphics for set of above items checked using Sloan
lhrs.

Survey of audiometry standards:

Calib. of MAICO using artific. head and GEN RAD eq
at NASA audio test lab. Techn. - Mr. Scholer

	Freq			
	500	1K	2K	
20	62.1		56.5	+30 db {subtract 30} re. 2×10^{-4} Bar
40	82.1	77	76.5	
50		87	86.5	
630			66.6	

Telephonics TDH 39
MX 41/AR cush

ANSI values 70 83.5 77.5 81.5 per Bill Creech

Called: Grady Thomas; would do measurements for me, suggested Gasaway (P-120) & Fletcher, retired Army. He felt that pure tone audiometry was not a measure of performance and that standards were tight.

Fletcher; adamant about lack of correlations between performance and pure tone thresholds - final criteria must be performance in absence of data. He confirmed that Walter B. would be unexcelled spot for testing and suggested Brian H. Read of experimental lab as person to contact. He suggested that a series of operational tapes be made and then replayed under equivalent noise levels. Also suggested a study be made by a panel apptd. by NRC.

Walden; did not want to be quoted but felt that stds. were restrictive & if applied to USAF combat troops including ~~helicopter~~ pilots, that 60-70% would fail. This caused recision of such a standard some years ago. He would not test me at NRC under pressure of work load. Suggested Jerry Goldstein, Ft. Rucker & Jim Kneel in Calif. Fld. Surg. 87-229-1000 225-4101, 2

USN - Williams
USAF - Gasaway

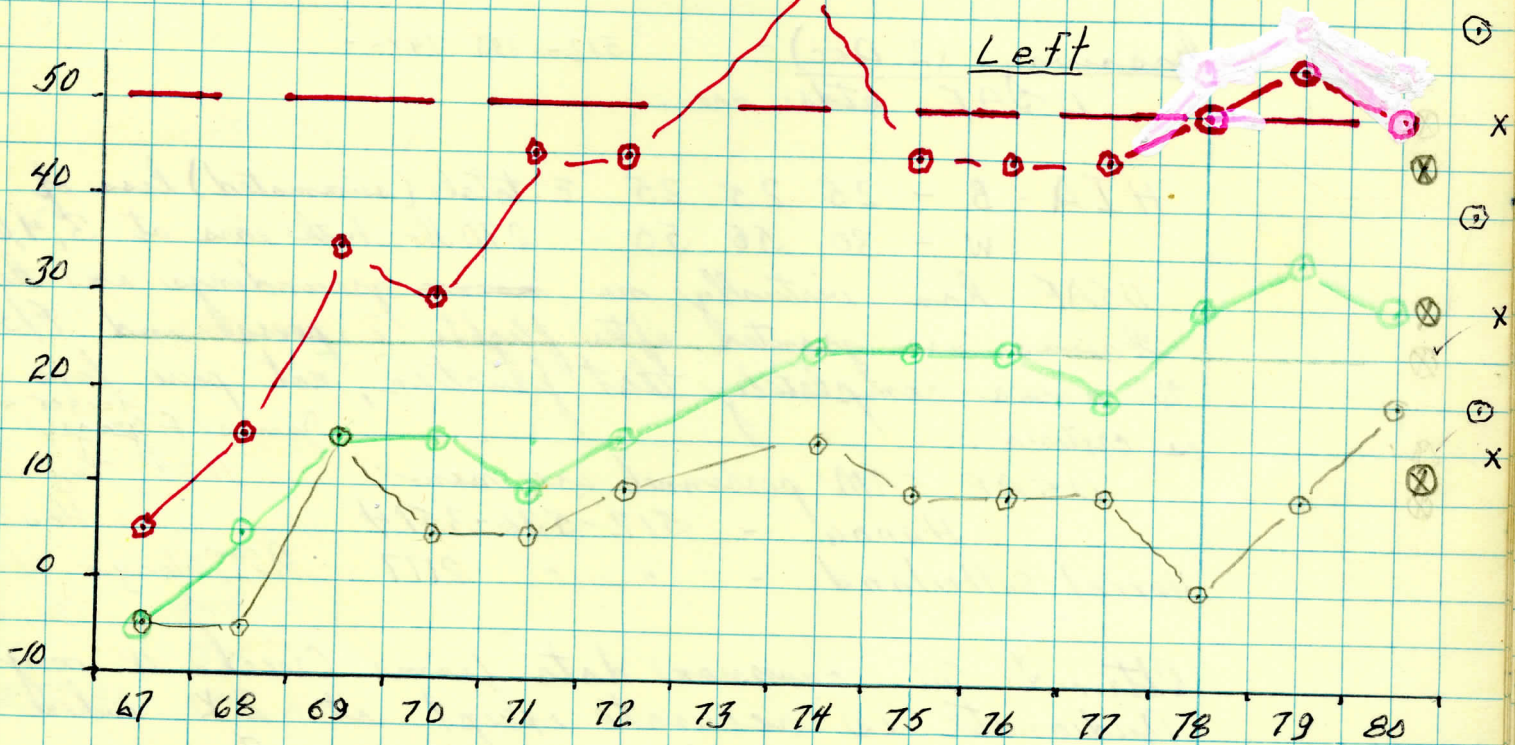
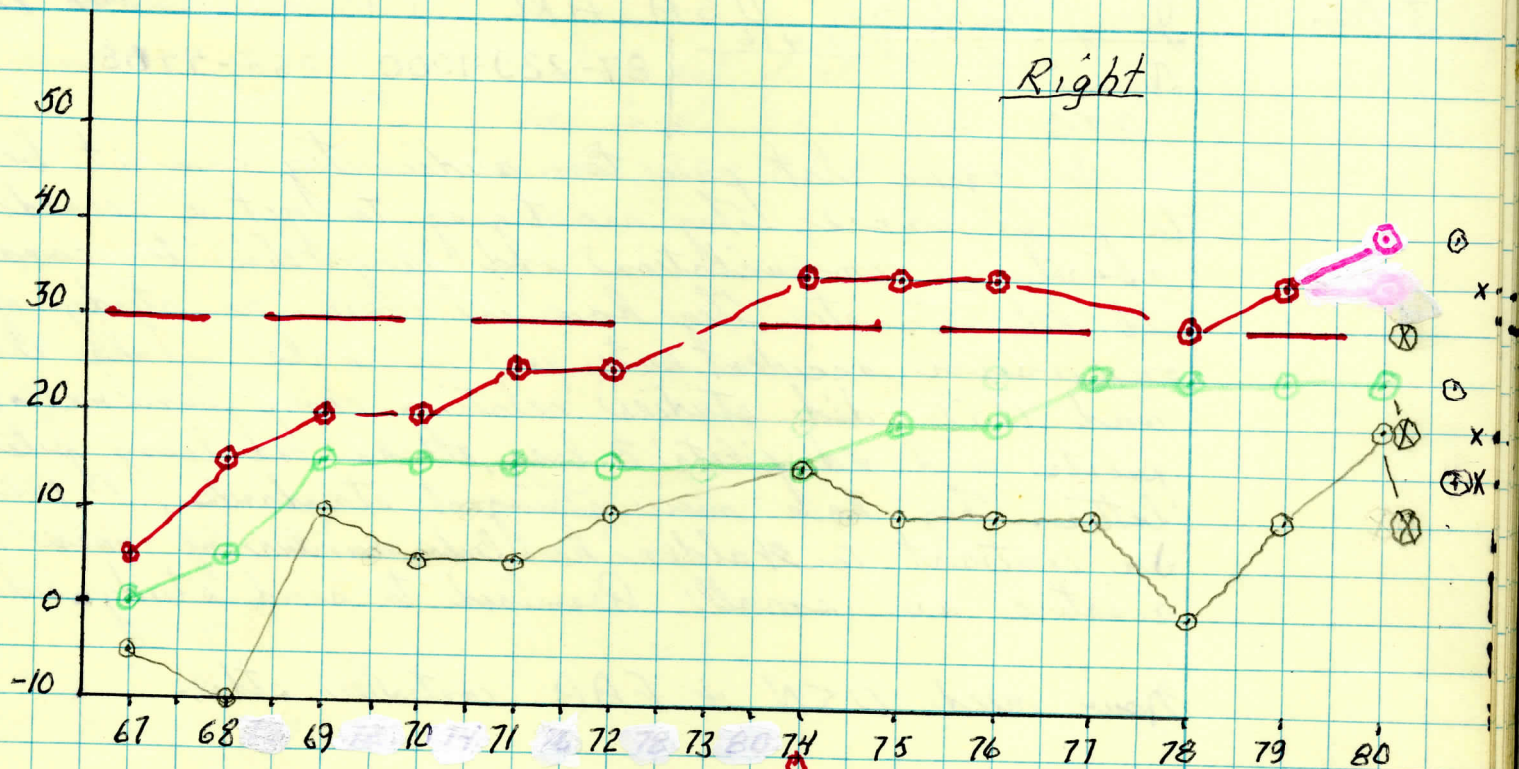
Std. Speech - based on loss
Aviator - old aviators -

Rucker uses

Proposed Rucker Stds.

		5	1	2	3	4	6	
Entrance	E	I	25	25	25	35	45	75
		II	25	25	25	35	65	75
Retention	B		25	35	35	45	65	85

} guidelines -



3 Dec

Jerry Goldstein, USA ARL (acoustic research lab.)
 Army 5 1 2 3 4 6 { 87-229-1000 255-4408
 ATC

He agrees that pure tone audiometry cannot be related to performance. They are trying to get a recording of aviation communication and play this to candidates using std. helmets etc. They have in work a study of pilots' on waiver accident rate vs normals. Think that Gasaway and USN did studies relating comprehension of new pilots and old pilots' loss, thinks old lossy pilots were better. They have more stringent standards, Pt. 120, proposed. In contrast to Halden he feels number of noise damaged aviators are small. Promised to send study when avail.

Now need USN & FAA controller stds.-

Gasaway (2 Dec) - 512-333 7428 -
 USAF stds are.

HIA - B - 25 25 25 = total (summed) loss of
 W - 30 50 50 270 db. both ears at 3, 4, 6 KHz.

USAF has virtually no ~~noise~~ groundings on hearing loss. Waivers are granted after flights & peers and F/S. He agrees completely that function, not pure tone audiometry is criteria.

USAF SAM personnel are now:
 Hanna - 512-536-3514
 Harrel Sotherland - " " 2177
 James F. Genger - 1122 Taylor crest
 Houston 77024
 Aram Glorig - otologic med gp
 2122 W 2nd

Obtained Cal. conversion data from Creech & my
 Audiometer is accurate except at 2K where it is
 - 5 db. off i.e. my hearing passes!

1. Must confirm this calibration
2. " " testing procedures
3. " " testing procedures

Dr. Jim Maddox -
 Garland
 530 Clara Barton
 S - 215 75042
 214-272 5556

At this time

3 Dec Audiometry

 † Ascending ASHA JT
 R L 2400

Past the date of the 9th a 2.5 db. increment is added to the 2 KHz posn. to largely compensate for the 3.3 + 3.6 db. ~~test~~ audiometer deficit at this freq.

ing
 error
 uncorr
 † 4 Dec

1.5 10, 15
 1 20
 2* 35, 30 corr 55 50, corr
 1.5 15
 1 25
 2* 40 35 corr 50 45 corr

† 4 1.5 15 15
 2000 1 20 30
 2* 35 30 corr 45, 40 corr

5 1.5 15 10
 0800 1. 25 30
 2* 30 25 corr 45 40 corr

6
 0930 1.5 15 15
 1. 20 30
 2. 30 50 45

2200 .5
 1.
 2

8 Dec.
 0800 1.5 5-10. 0.10
 1 20 30
 2 ~~30~~ 30 50 45

1930
 .5 10 10
 1 20 ~~30~~ 30
 2 30 45

9 Dec
 2200 .5 10 10
 1 15 25
 2 35-25 50

† Severe Tinnitus on these dates following cold-general sx incl. herpes

2 5 Dec. Audiometry

RA 310
" 410
" 411

Took a repeat test in clinic $\bar{c}$ a TRACOR ~~FR-24T~~ automated audiometer wired through plugs, etc. into booth $\bar{c}$ TDH-39 phones, very worn, but booth was quiet.

7 Dec Saw MB at 0830 who promised to contact Hamick & call me re. audiometer calib. by 1000.

1015 Called MB who was $\bar{c}$ a pt. for 45 min. discussed $\bar{c}$ S.K. who visited MB.

Draper

JK from MB - Phil Johnson saw me in Hamick's lab Fri, told S.P. who ordered that no calibration be done on the clinic audiometer. J.K. visited Pool who convinced that all was being done in my interest

ANSI -

Audiom.

S-3.6-1969 (r 73) deriv. - \$5.50

dB

S 3.21 - 078

8.75

3.00

Monitor - ± 3 250 - 3000

PanKey 4# 4

5 12 6, 8

Repeatability ± 5 db. $\bar{c}$ below

Tracor -

Hal Hinnagar 512-926-2800

Charles Stokes

Jack Forman -

11 Dec -

Jim Freeman, Audio Electronics, 774-4832 - Model 410 TRACOR is supposed to be repeatable to $\pm 2\frac{1}{2}$ db., had no refs., and the inst. is trimmed individually for freq. & ear phone.

Need - A, N, USAF actions

Frequency
dB HTL

125 at 60

250 at 80

500 at 80

750 at 80

1000 at 40

1500 at 40

2000 at 80

3000 at 80

4000 at 80

6000 at 80

8000 at 80

~~10000 at 60~~

~~39~~
~~TDH~~

CHANNEL 1

Right
EAR

Corr

Left
EAR

Corr

~~107.5~~
105.0

83.5 -21.5

103.2 -1.8

105.5

98.6 -6.9

104.5 -1.5

91.5

95.5 +4.0

90.0 -1.5

87.0

87.0 0

86.0 -1.0

87.5

84.5 -3.0

84.5 -3.0

89.0
~~91.0~~

85.7 -3.3

85.4 -3.6

90.0
~~89.5~~

88.3 -1.7

88.0 -2.0

89.5
~~90.5~~

85.4 -4.1

85.0 -4.5

96.0
~~94.0~~

83.6 -12.4

87.5 -8.5

96.0

80.0 -16.0

83.5 -12.5

~~CHANNEL 2~~

~~Right~~
~~EAR~~

~~Corr~~
~~EAR~~

~~Left~~
~~EAR~~

~~Corr~~
~~EAR~~

1000 Hz

dB HTL dB SPL

30 = 66.3

40 = 66.8

50 = 67.5

60 = 69.5

70 = 76.4

80 = 86.0

90 = 95.0

2000 Hz

dB HTL dB SPL

20 = 58.4

30 = 58.5

40 = 58.5

50 = 61.0

60 = 68.6

70 = 78.3

80 = 87.0

6000 Hz

dB HTL dB SPL

30 = 41.0

40 = 48.5

50 = 57.4

60 = 67.2

70 = 77.2

80 = 87.0

Corrections:

0-3.0 = 0 dB

3.1-7.5 = 5 dB

7.6-12.5 = 10 dB

12.6-17.5 = 15 dB

17.6-22.5 = 20 dB

9 Dec. 1980

The audiometer was connected to the PIONEER 5X 34 amp. 12 D.
aux. input $\bar{c}$ two PIONEER spkrs. in parallel & $\sim$ apart
in a X cm. Levels were such that amp/spkrs remained in
their linear range. min. threshold was determined by ascending level

Freq Hz	$\bar{c}$ Helment db	$\bar{c}$ Helment db	Δ db	$\bar{c}$ EARO db	$\bar{c}$ EAR db	Δ db @
125	-5	-5	0			
250	5	5	0			
500	25	30	-5	20	35	-15
1K	30	45 65	-25 -15	30	50	-20
2K	40	65 80	-25	40	60	-20
4K	40	80 65	-40			
6K	15	50	-35			
8K	15	35	-20			

10 Dec.

One hour and quarter discussion $\bar{c}$ S.P. He became angry & agitated
when I requested a fair test $\bar{c}$ accurate instruments, called "raising
dust" & insisted on "boards directives" being followed. Further he
is now in a terrible hurry, as was Abbey. Most significant ~~point~~
point is that he was in a conference $\bar{c}$ management some weeks
ago and the question of ~~voluntary resignation~~ mandatory resignation
at 50 was raised but could not be sustained and when ~~some~~
S.P. pointed out that the Navy recently raised their age limit on carrier
pilots ~~that~~ because of too few pilots was told "we don't have that
problem"

Saw M.B. and explained calibration procedures. He saw Draper
set up and it sounds above reproach. Made arrangements to go to
Dallas tomorrow to J. Maddox's lab.

Tried, unsuccessfully to get appt. $\bar{c}$ G.A.

Call from Gene Coleman wanting photos & other material for exercise
symposium being held by NASA.

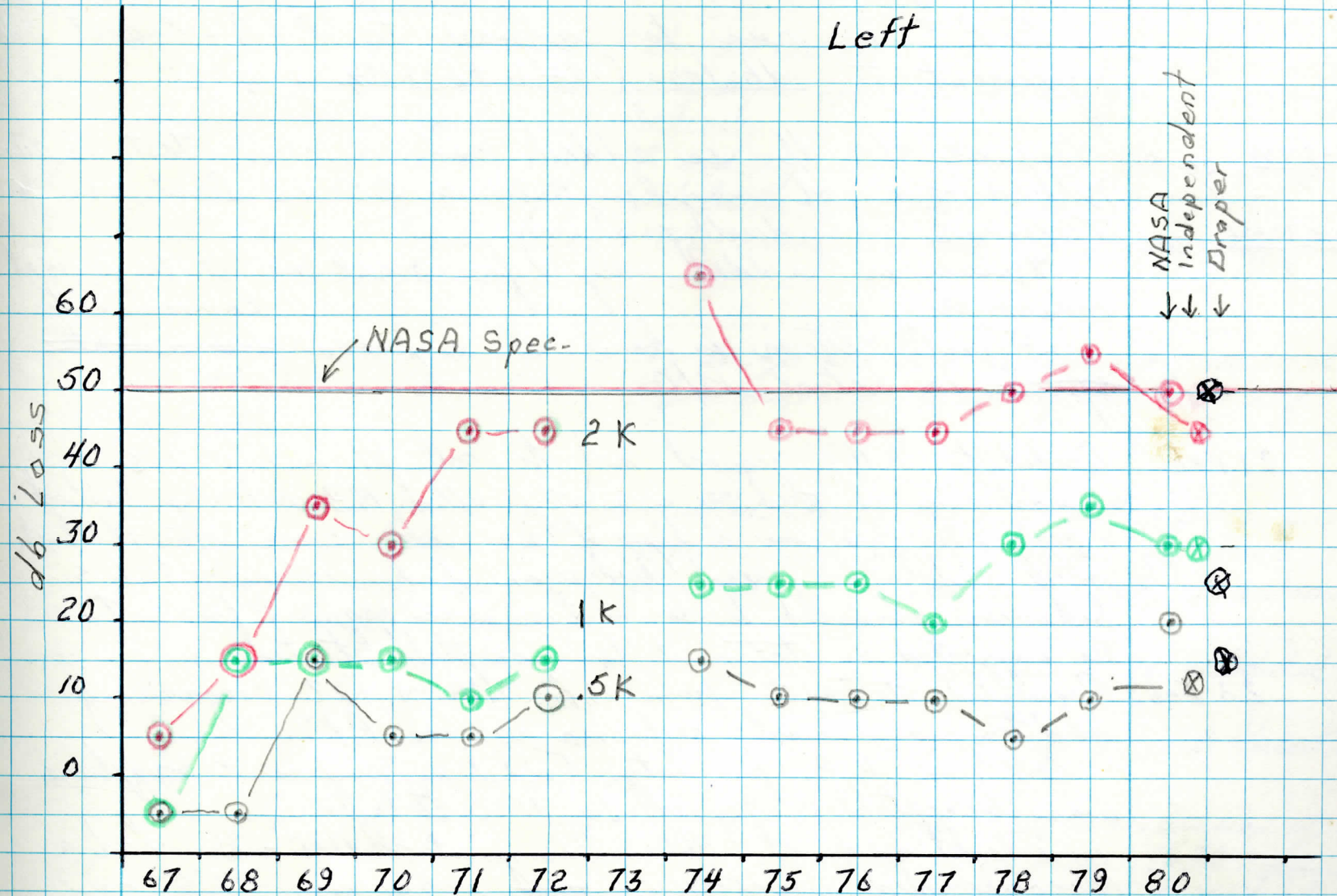
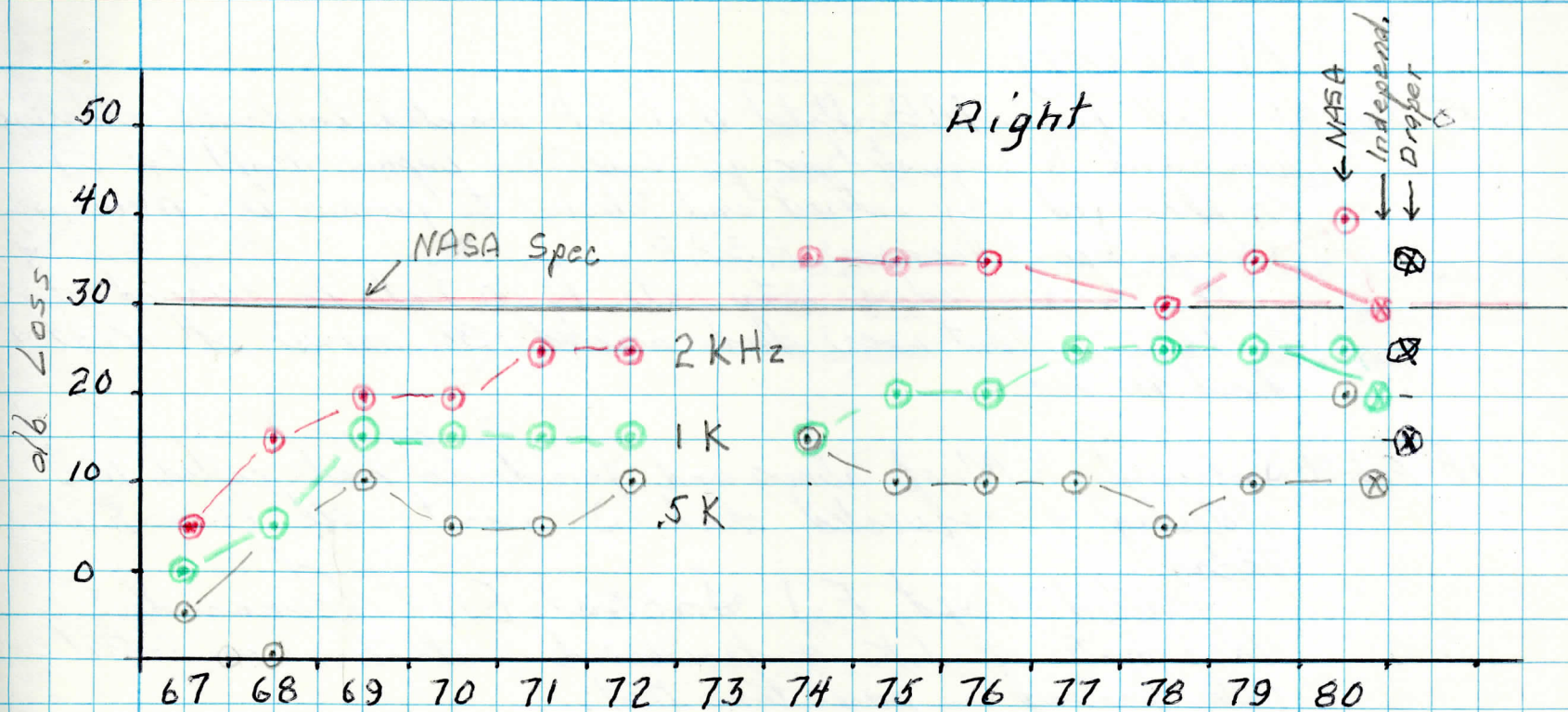
12 Dec 80

DAL $\rightarrow$ HUB push back - 84-6 db
'c' curve Taxi 91-92"
TO 100-104
Climb 98
Cruise 93-94 (02-A)

14 Jan

- 12 Dec. Appt. c GA scheduled next Thurs @ 1100.
Call from M.B. while I was out - returned but he was busy -
He is planning to go to W coast Mon.
- 18 Dec. Saw G.A. at 1100 gave my views of the situation which are;
NASA has a right to hire fire or otherwise place any employee
wherever the mission requires but medical stds. should not be manipulated
to achieve admin goals.
I have and everyone else at SSC has the right to accurate testing;
the right to accurate recording of the results & the right to a
reasonable interpretation of them.
G.A. said he would ~~call~~ try to get something done about it
- 22 Dec. Called 15 mins. before time to go to consult to say it had been delayed.
- 07 Jan Met c Biland & Dietlein and presented above. Biland made very strong
statements that neither he nor Craft would tolerate any meddling c
medical procedures for any reason. Dietlein said nothing.
- 12 Jan Spent weekend in Washington at exercise mtg. and it is obvious
that a concerted effort was made to get rid of ^{old} astronauts. One statement
that Dietlein was requested to sign a cut off of 45 Y.O. for astros. A
meeting c Abbey on another subj. was turned into session on what was
going to be done about vision 'defects'. H.Q. has apparently washed
its hands of establishing stds. possibly after it was estimated that
40% of other center pilots would be lost through imposition of the
stds.
Tried to reach M.B. c effect & called Dietlein who simply
dawdled about what would be done other than saying he would "meet c
M.B. & S.P. this week".
Reached M.B. who stated that the local sales agency had calibrated
the clinical audiometer & found it no more than 5 db. off adjusted
it & Jerry Wernick recalibrated & measured it c discrepancy.
Mike reiterated that ~~under a~~ _____ was tested locally &
then at Drapers c significant differences. He is still ~~for~~ wants
an appt. c Draper. I raised question of correct value of visual
acuity being in my records and he claims it is. I requested
the opportunity to see it. I requested early local retest and said he would
try for 1600 today & would call back.
- 14 Jan On further consideration it seems likely in view of his previous actions
and Pool's warning via M.B. that an evaluation would be required no
matter what pure tone results are, I made a request to M.B. to delay
the tone test until I could make a last effort to discuss it c
Dietlein Pool & Berry. Finally reached D. this AM and he agreed to a
mtg. tomorrow AM c these people. Left msg. for M.B. concerning this -

- 15 Jan 0900 Jack Lister - Reviewed situation personal and general in ofc. stressing right of mgr. to hire, fire, etc. then reviewed briefly my ATC experience, and not being allowed to do medical research and recent attempts to have an age cutoff in ofc. Lister protested this strongly & claimed total ignorance. Outlined medical probs first visual then auditory in detail and requested 1) valid tests, 2) accurate recording of these tests and 3) reasonable interpretation of tests. Asked specifically if grievance procedures were available & answer was yes but strongly encouraged not to use it at this time. He recommended Craft or Charlesworth and promised to see Charlesworth and call back.
- No word from Dietlein on promised mtg.
- 19 Jan More calls to Dietlein = effect or answer.
- 22 Jan Found request to call both L.D. & S.P. on return. Asked L.D. to arrange mtg. today or tomorrow. Call from SP saying it wouldn't be possible for mtg. 'til Mon. 26 & we agreed to meet at 1500 Tues Feb. 3 when I return.
- 23 Jan J. K. & P.J.W. ~~confirmed~~ informed me that I have been assigned to medical work again & will be relieved of SSUS. ~~They~~ said that Kraft, Abbey, Dietlein, Berry & S.P. met Mon. on astronaut retention.
- 30 Jan Back early. Called Joe Allen about astron. retention mtg. & he was aware only that it had been held.



Audiometry

17 Feb. '81 Call from M.B. Stated that S.P. wanted to draft stds. for him and I suggested we get together & prepare draft for S.P. Emphasized my interest and desire to pursue the previously agreed upon course ASAP.

He scheduled a mtg. at 1530 but he delayed this to 1630. Went over and waited 30 mins at 1630 & had to leave.

18 Feb. '81 Informed K.M. of above and found he had called M.B. yesterday & requested that I wait call from him today.

Called Capt. E.J. Sachs, ENT Pensacola, a classmate of J.K. & discussed evaluation in detail. After failing a pure tone test:

SRT is run to compare to PTA - Expect 5 db. agreement $\bar{c}$ $\frac{db \text{ loss } (.5 + 1. + 2) \text{ KHz}}{3} \pm 5 \text{ db.}$

$\frac{10+20+30}{3} = 20 \text{ R}$ Approx 40 db. is added and discrim. test is run. No concern of anything above 80 in best ear & 70% was considered passing.

$$\frac{10+30+50}{3} = 30 \text{ L}$$

Noise is added only for masking i.e. to prevent crossover - communicates

Final criteria is how well a person discriminates ~~speech~~ in actual A/C. 2.7

21 Feb. Acceded to K.M.'s request not to call flt. med. on 2/5. & reminded him of this. He apparently called MB each day last wk. 5 reply. He gave me a copy of his aide memoir after the last mtg. and after general discussion of his outrage at L.S. behavior promised to do whatever was required for action. He suggested a statement for acceptable testing. 2.1

23 Feb. Requested statements from J.K., S.M. & R.Z. regarding auditory & visual performance in A/C. 3

Call from M.B. for mtg. Told him anytime & anyplace was acceptable. Agreed to 1100 today.

Light med. at 1100. Bury at 1110 - He had a recommended procedure requiring 92% on speech discrim. Presented my ~~own~~ recommendation for 70% pass 80% good and agreed & gave MB ph. # of Sachs - He will call to verify numbers which ~~to~~ and will meet c S.P. to see if these 4.1

Audiometry

are agreeable & if so will take test tomorrow - Requested Ltrs. & Mayer called to confirm date of 10 June as grounding.

25 Feb. Letters or rather ~~in~~ correction of board found that vision was 20/30 and that a speech discrimination test would be run - 90-100 normal, 80-90% normal for flying, 70-80 acceptable & further eval. - binural

26 Feb Test at Draper's set up -

1. SRT -

R - L -

2. Speech Discrim.

R	L	Bin.	%
94	98	96	

3. P.T. audiometry

only 2K² was 5 db. in excess.

Has examined anatomically by Draper - Witnessed by F.S. - Paul Vandershough sp?

Showed results to KM & JK and requested all possible press. to get medical clearance to fly - Real battle may start then.

Also ran a local auto P.T.A. giving my best. Significant difference in machines favor.

27 Feb. ⁰⁹¹⁵ Called MB. who promised to try to get Dietlein to clear my medical flight status & to call back before noon or to call if there were any difficulties.

1600 No word from MB and called. He claims D. is out of town for unknown time but that a SMB is set for 1400 in D's ofc. Tues. He offers no assurance as to findings. Told M. & K. Only option now seems Draft & grievance.

2 Mar Dissuaded from seeing Abbey by M. & K. K. will attend bd. scheduled tomorrow at 1330.

Craig F. has repl. S. B. as STS-1 F.S. - on basis of personal character defamation. B plans libel.

3 Mar Bd. mtg. - W.T. does not meet guidelines but it is consensus of board that he is medically qualified to fly the T-38. per JK App. Dietlein, Pool & Johnson opposed med. qual. & wanted to disqual.

4 Mar Further info. on bd. by JK. Present - Dietlein, Pool, Berry, Johnson, Vandershough, Fromme, Bergmann, ^{Wanderly} - Began by S.H. questioning procedure for SRT was explained - Results presented by MB.

- 4 Mar 0900 Called D. who repeated MB findings to me and said S.P. was arranging a briefing for Abbey and Kraft Requested and rec'd. permission to attend mtg.
~1000 Called G.A. who agreed to my attending and previously got memo from S.Y. requesting permission to attend.
- 5 Mar Called S.P. who stated that D had briefed K on the 4th and that a mtg. for 1400 w/ GA had been sched. He waffled on when board rpt. would be or what it might contain.
- 11 Mar Called M.B. who had no further information on status but requested ~~any~~ information. notification should any attempt be made at distorting board findings.
0900 Called S.P. - no return
1000 Called S.P. - again who read board finding report to me -
SA
SMB Mar 3 see copy
- 1400 Presentation to GA - S.P., C.F. & M.B. - JK also present. GA was shown results from clinic - audiogram and speech discrimination. I showed him Test Rk. ref. pointing out that P.T.A. is only a screening device. S.P. read board findings that I was qual. for IPA, and GA had to talk to Kraft and this might be next week.
- 16 Mar 1800 Kraft is in town no word - Tried to get copies of board minutes and record changes but board mins. unsigned by D.
- 17 Mar 0800 S.P. promised to have board mins. signed at noon mtg. w/ D. today
- 18 Mar 0800 S.P. now promises signed copy w/it would be avail. at ofc. by 0840 when D. is to visit if not done by 0840 would call - no call.
1000 S.P. called. D. has signed the board's minutes (action) but refuses to release it to me until ~~the~~ it has been released & reviewed by Dr. Kraft. Pointed out that Dr. K's. function was admin. not medical and discussion ensued in which S.P. stated that if he were directed to ~~sign~~ modify findings he would. He also invited my help in review of medical exam. facilities



Comparison of Automatic & Manual PTA

Freq K Hz (A)

5

1

2

3

4

6

.5

1

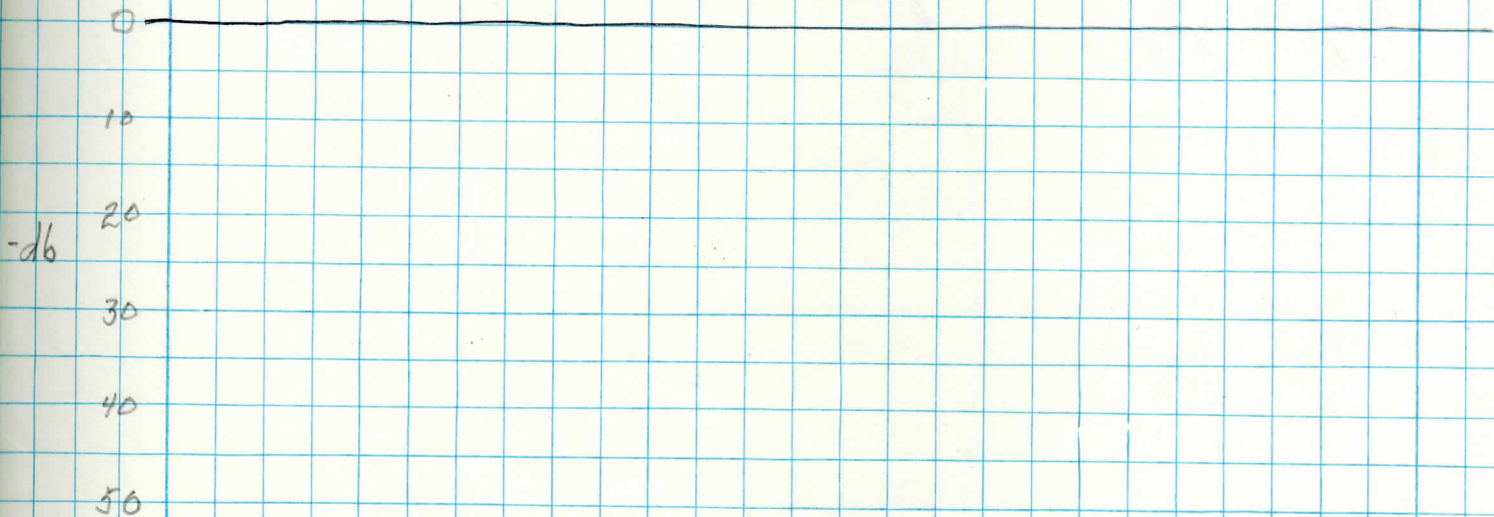
2

3

4

6

(B)



24 MAR

Sam pool answered the memo of 24th by a written statement that he had been requested not to release the information until review. I made 4 copies & on return from WH could not find any. He reiterated the point that mgmt. might require changes. Have requested phone call from G.H. for 2 days & reply.

18 Jan C.S.

Craig Fisher has RTOP (Crew Health
A. Micogossian -

199-1030)

Anti-G - Phil Johnson (Craig F.) J. Bagian
Clete Booker, S.R.I. Chuck Stever → Bungo -

MMD Dave White LBLE Rip Kirby

MASCO
G.E.

Cardio-Pulmonary Analyzer -
Q $\dot{V}$, Resp Gases, Programmable calculation.

Ergometer -
Collins -

Hargens - → 718255 ←

30 Mar '81

Mtg. w Dietlein

At ~0900 after waiting for his arrival I met Dr. Dietlein in L.S. and asked if he had a minute to read a memo. He said "yes come on in the office". I gave him the attached which he read and then said that he did not have the material. I pointed out that Dr. Pool had it and would not release ~~the~~ a copy until given permission and had stated that he had been ordered not to release it ~~without~~ by Dietlein. D. then asked what I wanted him to do T- "Either give me the copy or tell me why in writing you can't". He stated that it would be released today or tomorrow and ~~started~~ gave appearances that he would make a written statement. He appeared to look for a pen and I gave him mine. After studying the memo briefly he appeared to become agitated and threw both pen and paper away from him saying "I don't have to sign this". H- "Of course you don't have to but a series of mistakes have been made - - -". D. interrupted w "You're on the Distribution list". In view of his apparent continued agitation & tone of voice after pointing out that it had been ^{almost} a month since the board met and another refusal I left the ofc. At no time did I become angry or ~~try~~ threaten or even raise my voice -

31 Mar '81

Received the minutes of the board and they have been entirely changed by removal of material favorable to me and by not even addressing the question of flying qualification but only "recommending that I be kept in the astronaut corps". Saw M.B., R.J., W.F., R.B. + V de P, all board members, all of whom recall the same conclusion, that I was qualified to fly and all promised a statement to this.

1 Apr.

D. called TK and admitted changing the board findings by direction of senior management. Called C.H. who expressed outrage over change & promised statement on board and contents of original findings which were presented to G.A.

2 Apr.

S.K. wrote memo on 31 to G.A. + Pilgrod pointing out change and requesting correction but he, T.K. & P.S. want to wait until mission is over and let S.V. carry it forward but in interim leave it w Y as a statement of record. They want me to hold any further action until $\bar{p}$ mission -

Some interim notes entered in 2° N.B.

Summary - Had mtg. w/ Abbey who had previously briefed PSW telling him there was no question of my medical qualifications to fly but that he was not going to put me back on status for budgetary reasons. He essentially said this to me and requested that I brief Diland which I did and to no apparent effect. He ^(GA) called and asked me brief Clements which I did.

Word from within U.S.D. and from Clements via J.A. were that U.S. had been directed to correct the board record which he changed and word from within U.S. that such a corrected version had been prepared. In the interim I took & passed the annual px. which was signed out, and concurred in by a review board, as I.A.

28 May '81

A meeting was held yesterday w/ Clements, J.K., S.P. & myself (plus an unknown). I had to be in the mtg. in 45 mins. but a correction to the bd. findings had not been made, rather an unsigned memo by Dietlein was given (Dietlein 5.21.81) to me for comment in which D. justifies his action & pretends that the changed version was in fact the board findings. Considerable argument was raised by S.P. that the standards were correct & that a waiver should be granted for any deviation. This of course was opposed by J.K. & myself.

I have requested a mtg. w/ Mr. Clements in which I ~~plan~~ will ask him to convey to Dr. Kraft my prolonged attempts to have a series of errors corrected, inability to have this done and plans to seek other courses of relief. Have tent. appt. at 1830.

Mtg. w/ Clements - Reiterated my complaints which were

1. inadequate standards (medical)
2. " test procedures
3. " handling of results eg. charging medical records
4. being grounded unjustly

Reiterated my attempts to have these corrected & avail for a year & repeated unkept promises, my attempts to see Kraft. "He is not interested in details", Clements. That I was aware of penalties for formal complaint that I had no other recourse. He assured me that he would take some action but gave no assurance as to nature

Clements mtg., cont'd.

of meeting. Informed him that I had sought counsel - "within or outside NASA/C" - "both" T. He told me to do what felt best & did not appear pleased. He like the rest have agreed there were problems & L.S.

Called Jack Lister requesting grievance proceedings. Promised to get someone in touch & me.

Called Craig F. requesting statement promised earlier as to content of original board report & refused on basis of jeopardizing his career here but said he would give deposition under subpoena.

1 June John Allen of Jack Lister's ofc. called and brought over procedures for grievance proceedings & informal request that I delay action until Friday since Lister had "been on 9th floor twice today about this."

5 June Received the memo which I had been previously shown by Clements, signed by Dietlein which attempts to justify their actions.

12 June During call to NG when it was agreed to start action, RSW asked me to see him. He had been shown a memo written by Clements criticizing many aspects of the procedures which P.I. felt was favorable to me and suggested I talk further to Clements. Had NG hold the action. Call from Recognition trying to explain their concurrence.

15 June Discussion & Clements who confirmed that such a memo had been written was passed around & then withdrawn, that Piland had been tasked to clean up the procedures, that a waiver was on his desk & for the hearing question. He further stated that G.A. had been repeatedly told that he had to remove a significant number of people from the front seat and that G.A. had persistently delayed. G.A. had inf. told Clements that only those being considered for Pilot/astro. duties would continue to fly as pilots but that I was not one of those being considered. Again suggested a mtg. & Kraft but he personally advised against it saying that Kraft was very well aware of all aspects of this case.

1 July Called Clements who said the waiver was still on his desk waiting for a decision as to who would sign it and that he had been pushing Piland for his report justifying the standards and recommending who was to sign it. He agreed I could read (Clements) withdrawn memo. Go to P-142

3 Aug

Blank discs 5 protection

[3M 744-0]

Turn Computer to "T-B Disc in place
DOS READY

* Entries

* BACKUP-ENTER

SOURCE DRIVE NUMBER

* 0 - (E)

DESTINATION DRIVE NUMBER

* 0 - (E)

BACKUP DATE (MM/DD/YY)

* MM/DD/YY (E)

INSERT DESTINATION DISC (ENTER)

* (insert new disc) (E)

(VERIFIES)

INSERT SOURCE DISC (5 protection)

insert source (E)

will go to track 20

INSERT DESTINATION DISC

(insert dest) (E)

INSERT SOURCE DISC

(insert source) (E)

INSERT DESTINATION DISC

(inst. dest) (E)

BACKUP COMPLETE

(E)

To Examine Files -

DOS READY

DIR (E)

To do data file - kill everything -

DOS READY

Kill XXXX

Verify by DIR (E)

To Examine & Kill Files after Loading Program -
Must have Ready > -

* CMD "I", "DIR" (E)
i not 1

* Then to save program load
BASIC * (E) ~~then on~~ ~~current~~ ~~main~~ ~~progr~~
↑
space

To count bytes -
* DIR (A) (E)
↑
space

To Chg. name - if data is fully loaded name & date will
type Break (E)

READY

NA ~~##~~ \$ = "NAME" (E)

READY

DA \$ = "DD/MM/YY~~##~~" (E)

GO TO 100

6 July Called Clements requesting to see memo. He agreed & went by at 1300 but he was in conf -

7 July Went back to ofc. and allowed to copy memo. Also talked briefly c C. who said that Piland had been directed over a month ago to prepare directions for waivers but in spite of prodding had not done so.

13 Jul Mtl. to NG.

Summary 11 July

1 "

Note book pp- 137, 89+142

Cc Clements memo

12 Aug. Found that Dietlein had met c Armitage and stated that no countermeasures were needed in space flights of less than 10 (or 12 or 14). Talked c M. Bungo who confirmed mtg. & then called Fein -

2 Sept.

Document case -

Degr. circumstance -

Dat.

8 Sept.

In phone call of 12th Aug. C.F. said & was concerned over statement from Peter Armitage that the reason I was pushing the T.M. so hard was that I had financial interests in and expected to ^{profit} benefit from the use and that they were looking closely at the treadmill for this reason. Reassured C.F. that this was not the case and to pass it back it A. Discussed briefly that day c P.S. & unable to reach A before vacation & after decided to wait until seeing N.G. on 27th who ~~at~~ was briefed completely on my relationship c Whitmore which is: an old friend from USAF days who is very experienced honest capable & does outstanding work for a fraction of the cost, he has built ~~one~~ and been paid for several items for me including the Apollo bicycle ergometer which was subsequently offered to NASA & rejected by L.S. as having no req't. after spending \$1064 c Beckman for development of such a unit, he built the SL treadmill, and I detailed the involvement on the

~1500 called B.S. Ferguson, K's scty. c request for appt. c K. She promised to ask him & call me back soon.

Review, contd.-

visual acuity tester including discussions) & It. more than a year ago on reducing my ideas to practice, interactions) & L.B. on visual acuity including my briefings by Tech. Inc. & my attempts to get them to implement my scheme for NRC stds., my discussion & Keith, letting of the verbal contract for the mechanisms and patent agreements.

On return briefed Ed Fin & Hank Flagg on my Whitmore relationships and patent plans as above and ~~offered~~ to grant patent rights to NASA if need be i.e. did not want contest over it. ~~Called Ed~~ Fin wanted a statement describing this which he planned to refer to chief counsel Marvin Matthews.

Called ~~MMMM~~ Armitage for appt. to discuss allegation of financial interest, 1600 today. C.F. and others are having conf. on T/M tomorrow.

1600 Spent ~ 1/2 hr. & P. Armitage L/S PRCB board members who stated that they had no interest or concern in personal/financial arrangements of T/M, the exact opposite of statements to C.F. Strongly expressed my lack of any financial ties and gave brief hx. of relations & Whitmore and warning for anyone making future statements to that effect. He apparently wanted to discuss details of T/M and problems & rationale. I tried to avoid interpersonal problems except to say 1) they were virulent and of long standing and 2) I have tried repeatedly and would like nothing better than to resolve them. He wanted to know how there could be such a divergence of opinion among experts and pointed out that people like P. Johnson, Dietlein, etc., had been selected by mgmt. ~~to~~ for their expertise. I pointed out that their backgrounds were not in this area.

Related Armitage mtg. to C.F.

9 Sept.
10 Sept. Craig F. - mtg. & Armitage, Red, Johnson, Bunge - Craig feels they convinced P.A. that 1) 10 days w/ is not harmless

2) T/M is a countermeasure 3) desirable to be on board.
CF wants to reopen the entire exercise rationale & experiment & wants to meet & me today to discuss program - ~~will~~ agreed & encourage broad view - hypothesis - fill knowledge gaps - build & test C/M

Pilot
Mtg.
5 Oct. 3 engine failures in 2 mos. fatigue cracks at injector head - plug injector ports & failure & 40 were plugged so a new fuel pump turbine was burned up. arguments over autoland and landing site
James Abelson is H.P. director

25 Sept. Kraft, Clements and P.J. Weitz

Mtg. sched. for 1530? and waited 20+ min. K affable and prefaced mtg. w statement that he had heard in detail about the problems from Abbey, Piland, Pool, even squinting, and about the aging astronaut population - Followed protocol and gave a 10-15 run through of problems. He was attentive, Pete² became hard faced but it was as mild but direct as possible. K interrupted me only once to ask how I felt about the medics persistent efforts to disqualify me. At the end he ~~then~~ rather abruptly terminated it said he would talk to Clements about it, & parted on an affable note. P.J. feels I should wait 2 weeks, pulse the system through John & then take any action I was going to.

13 Oct. Approached John c above and requested he ask if any action were planned -

14 Oct. John saw Abbey but said he did not understand what was said which was I ^{WT} could correct the medical tests procedures but that the flying status was between Abbey and I and that "I wasn't interested in flying since I had put in only 27 hrs. time as M.S." Protested this vigorously and requested that John, Joe K., and I go back to Abbey to follow up medical procedures statements. Young agreed to get appt.

19 Oct. Again requested John to seek appt.

23 Nov. In p flt. discussions c D.T. he suggested I attend the med. debriefing if possible & chd. c J.H. & J.E. who had no objection but GWA forbade it on basis of 'medical privacy' -

1 Dec GI -
Narrative Summary
C.V. -

Rawena -

25 Jan. Mtg. c Clements, Paul, J.K., Huntton on Discretionary Funds
Joe Loftus - for research

- 4- VU - 1. Statement
2- Need Understand.
3- " device
2. Schedule -
3. How -
4-

At above mtg. c Clements et.al. the posn. was taken that the work could not be 'duplicated' by existing NASA efforts. J.K. made strong statement that this insured superior work would never be funded. C. then went to J. Loftus to see if discretionary funds were available and asked me to see & brief J.R. which was done at 1030. J.R. seemed to understand & asked for 4 vu-graphs as above. ~~then~~ for presentation to Charlesworth tomorrow.

1230 Presentation of treadmill to Clayton's PRCB went routinely. Accepted for 3 & 4 c directions to study for remounting on 5. Agreed to do vib. test -

26 Jan Charlesworth review of Cdrs. Discretionary funds - Presented few, brief questions - Other requesters asking for

13 Oct -

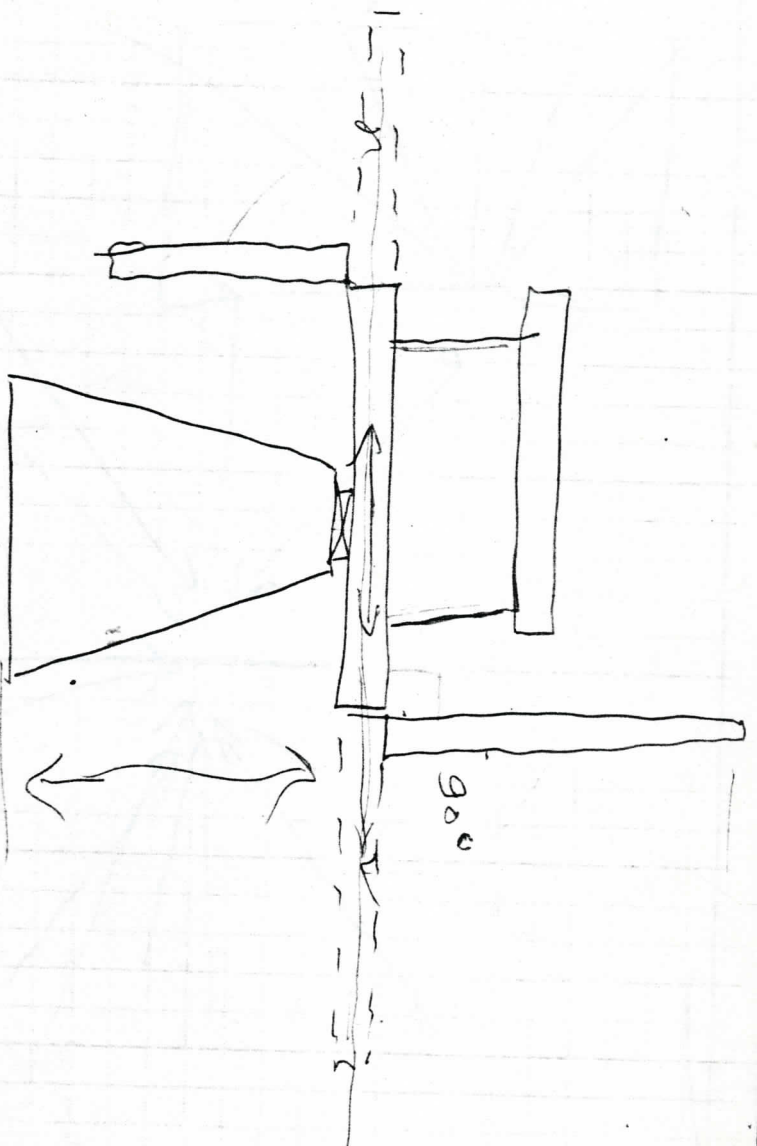
Col. De Jesus arranged a meeting & tour w/ Dr. E.O. Sarmiento, brother Gen Sarmiento¹⁵⁴, who is active in medical missions [Bapt]. He, Dr. Almonte of Medical Ambassadors & Dr. Robt. Bethel, would concern took me to a shanty town subsisting on the city dump, a mountain some 75' high which occ. slips and buries shack occupants. They claim ~ 20,000 people are on 2 HA (24 acres) and live several families to multi-story shanties. The stench was the worst ever experienced and it seemed a travesty to take a photograph - it would have been the last straw for me. There were fat gray rats & their heads smashed - A black & white cat was sleek & asleep on a shanty roof - the only normal living thing I saw. Push carts & gray plastic acid bottles were filled & whatever water was available & sold from push carts at 50¢ P ea, the only water in the area except the mud holes in the rats of a road just wide enough for the push carts. The shanties, just a jumble, of cardboard & planks, formed a continuous pueblo, ~~with~~ A tiny gray building = doors or windows but & a 3 foot steeple was the chapel of a Norwegian missionary effort. Apparently the govt. is trying to discourage occupancy by doing nothing. People actually like their entire life in the place. There is a govt. hosp. a few blocks away but inhabitants are reputed to avoid it because of staff attitudes. A 6-7 room school is across the street and on the ^{same} lot ~~there is~~ a kitchen & 3 pots on open fires in the room ^{serve} prepared 100 ~~malnourished~~ malnourished children/day. A single indian girl & training in nutrition does this. They are trying to start a clinic which is at the same elemental level. A chapel/lecture room completed this installation, which would not make the inhabitants uncomfortable after their shacks. The various ministries are baffled by the magnitude & depth of the problem but are trying to work on a personal ministerial approach. It boggles the mind. We discussed various mission - medical efforts & their problems.

14 Oct.

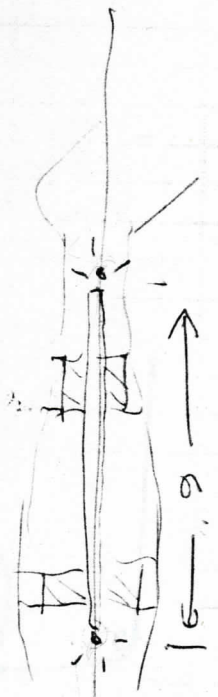
Today De J & Sarmiento took me to several missions supported by various groups but apparently Baptist. There is a strong ecumenical feeling and holistic approach & emphasis on medical ~~material~~ material & spiritual areas. From the discussions yesterday it appears that money is the primary problem for there are sufficient locally trained physicians willing to work in the area at P1000 (w/ 130) total incl. supplies. Transportation/communication is a 2° problem along & medical supplies. Technical problems appear to be a distant 3°. The missions are scattered over the entire island chain but we visited the mountain provinces. There are a number

3

FOR DE. THORNTON

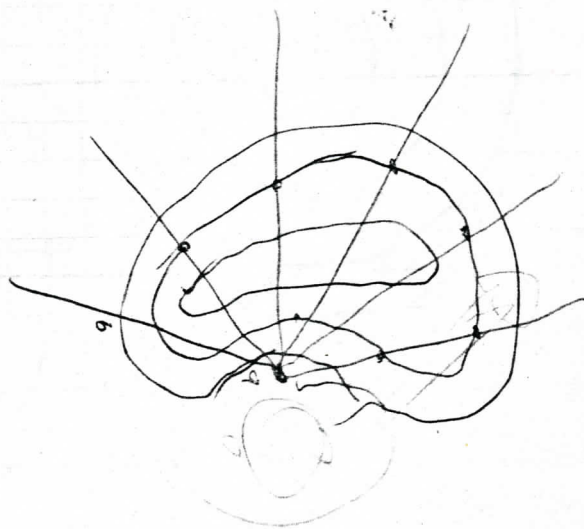
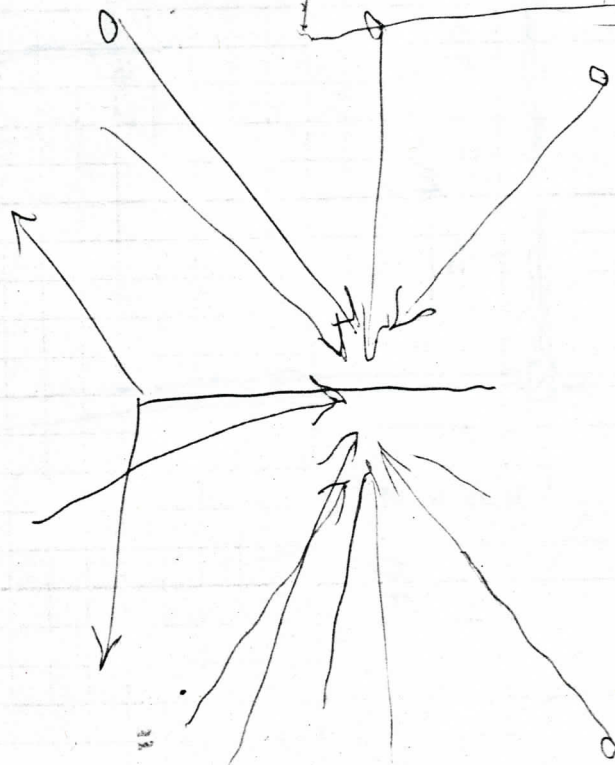
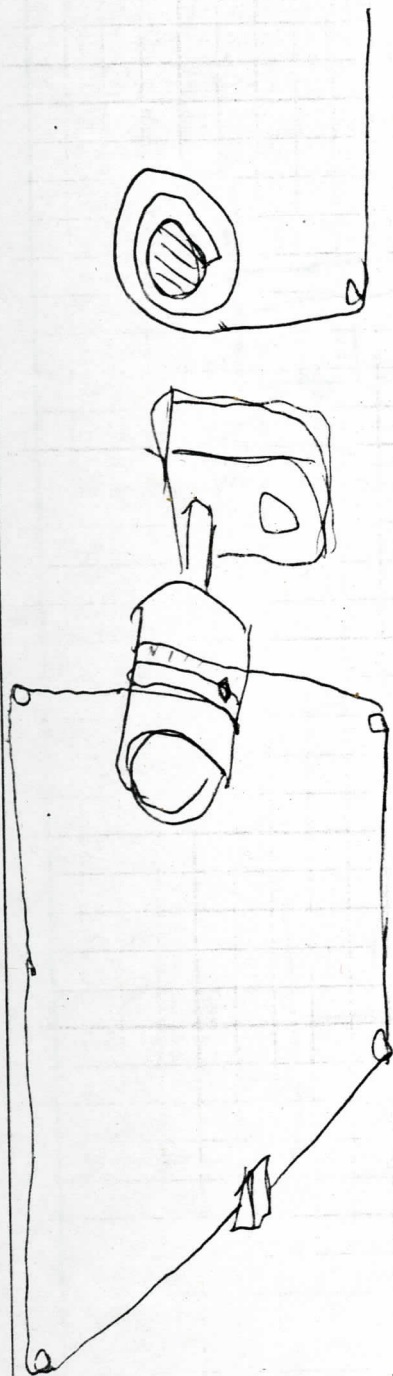


① Light Bars



5 volt computer lights

1 arm
1 palm
1 sole



FOR OR THANTON

(4)

Wavy

2

FOR DR THORNTON

