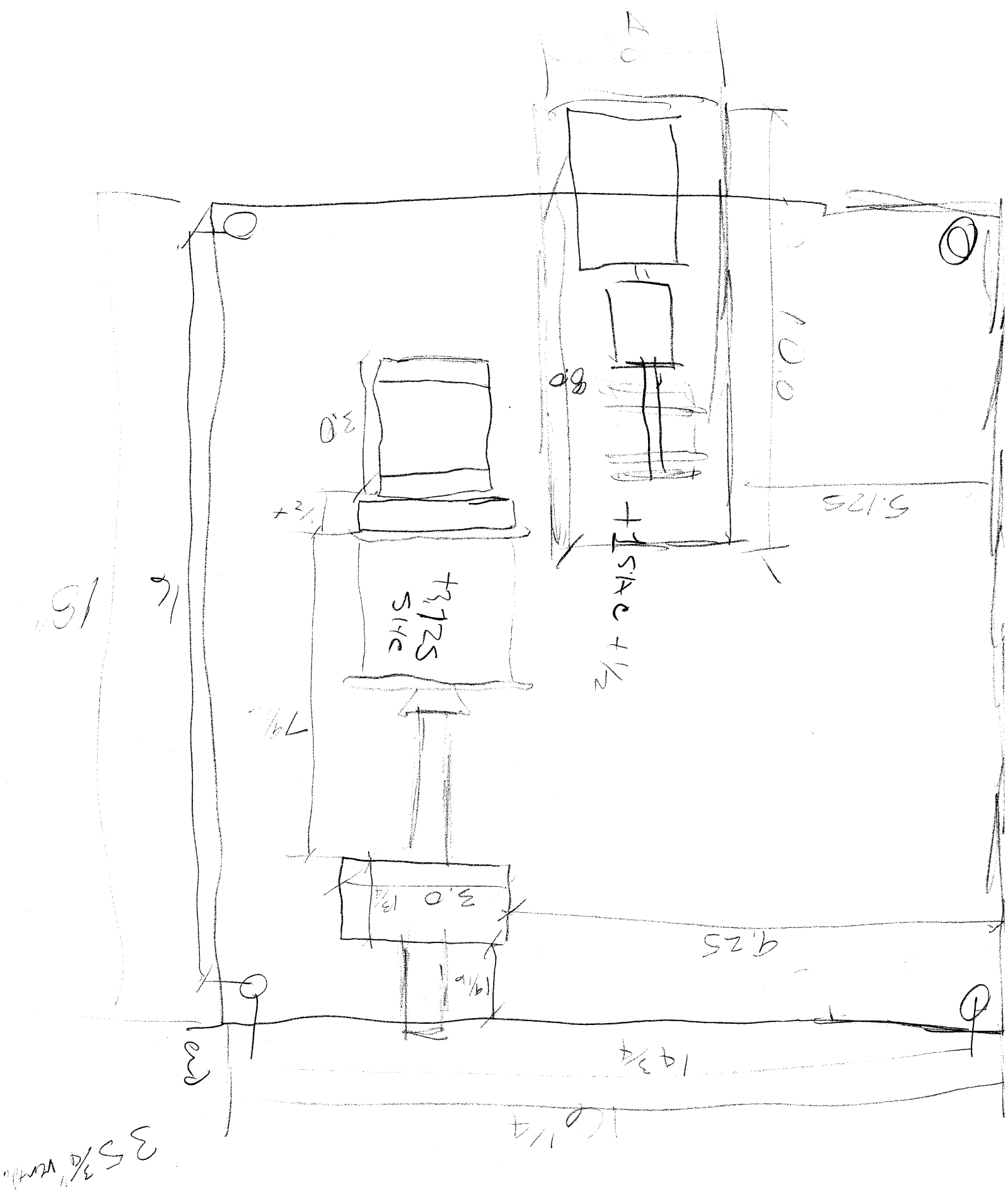
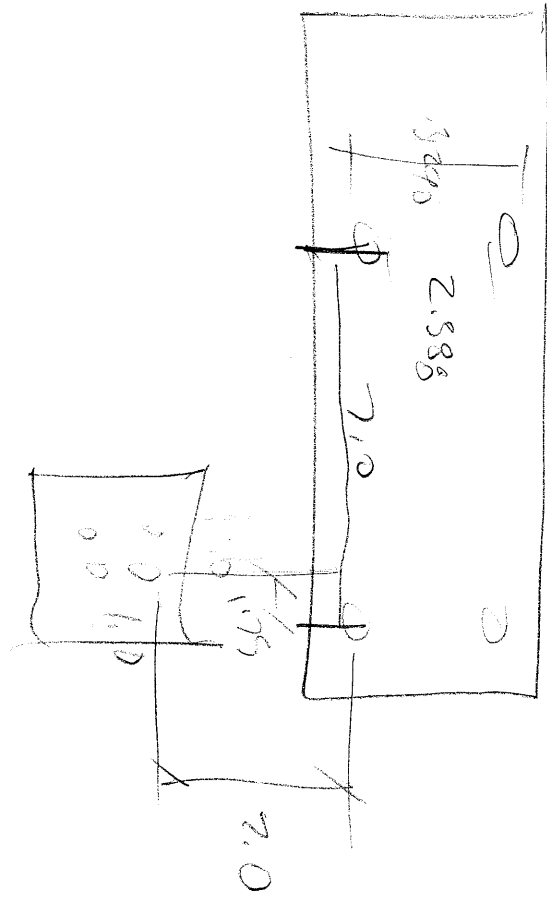


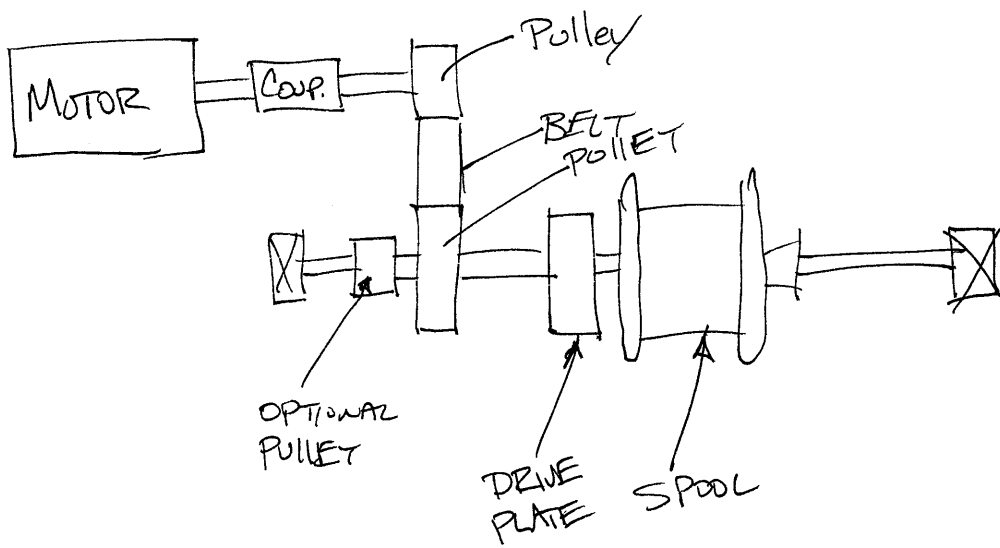
WIRE WINDER



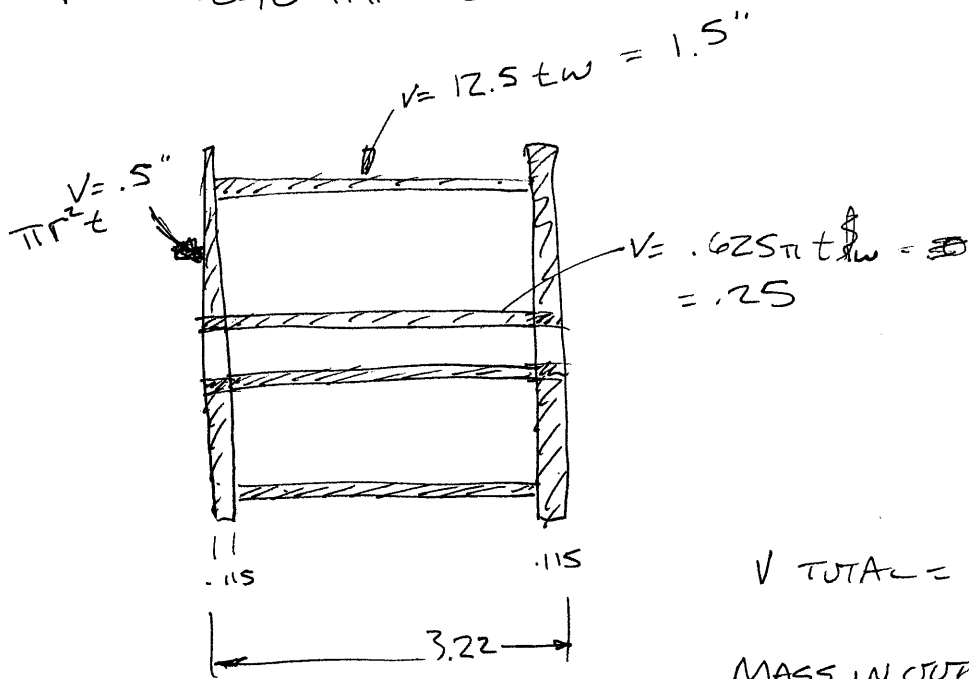




R07700- P1A/C 35 3/4 TAU
 Aligned w/ lands
 15 mil g. haw. res.



Spool : .040 THK AL



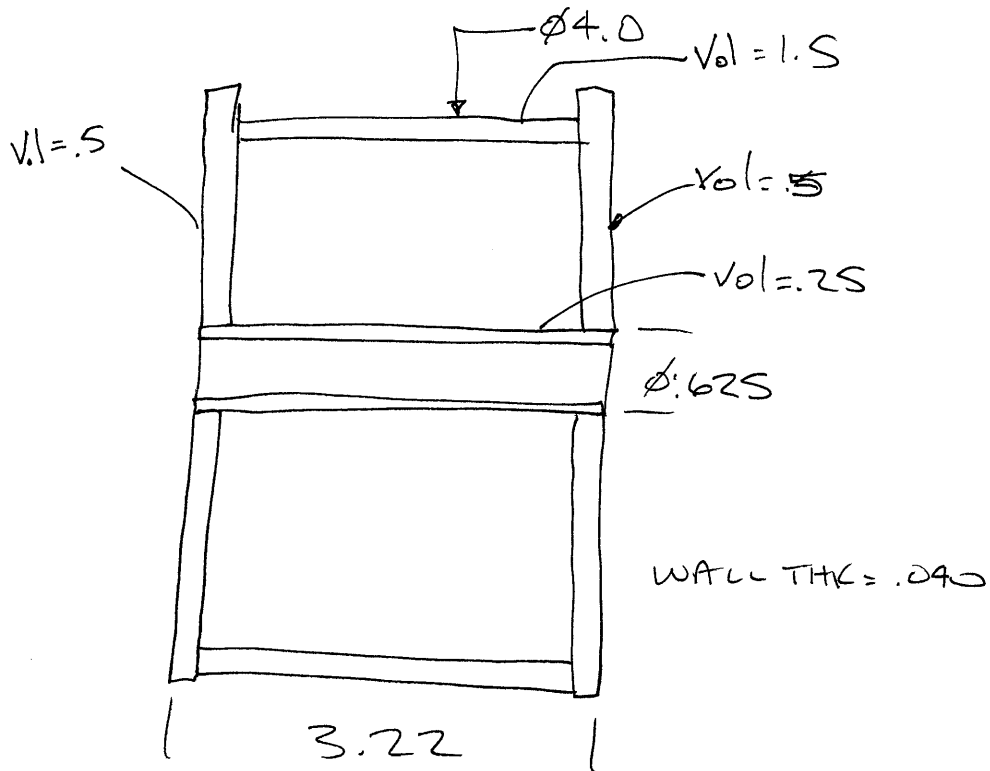
$V_{TOTAL} = 2.75$

MASS IN OUTER SHELL =

MARIK Nymman X7512 RE: CONTROL SYSTEM
ON WIRE WINDER.

CHECK Belt

GET PRINTS -- NEAR WINDER



TOTAL VOLUME = 2.75

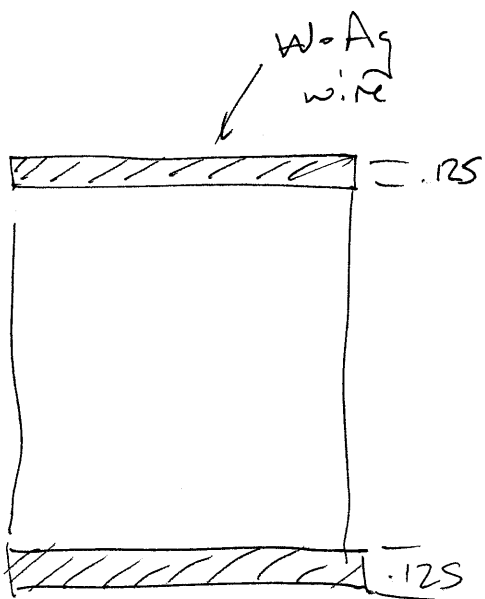
OUTER SHELL MASS = $163 \cdot \frac{1.5}{2.75}$
 = 89g

~~(BOTH)~~ INNER SHELL MASS = $163 \cdot \frac{0.25}{2.75}$
~~59g~~ 15g

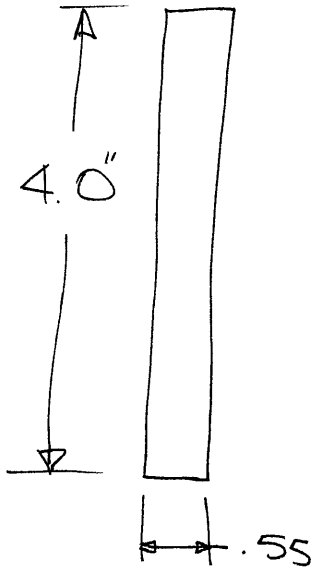
SIDE PLATES (BOTH) MASS

$59g = 163 \cdot \frac{1}{2.75}$

MASS WIRE = $400 - 163$
 = 237g



DRIVE PLATE MASS/INERTIA



$$V_{ol} = \pi r^2 t$$

$$V = .691; \quad m = 307g$$

$$I = \frac{M}{2} r^2 \quad \leftarrow \text{USE MKS}$$

$$= \frac{.307 \text{ Kg}}{2} \cdot (.0508)^2 = \cancel{396} \text{ Kg m}^2$$

$$I = 396 \times 10^{-6} \text{ Kg m}^2$$

DRIVE PLATE.

Called Daedal got catalog

Automated Actuator Division

216 336 3511 | ParPlane - structural extension

Computer

820 353 9070

D 203 481 5331

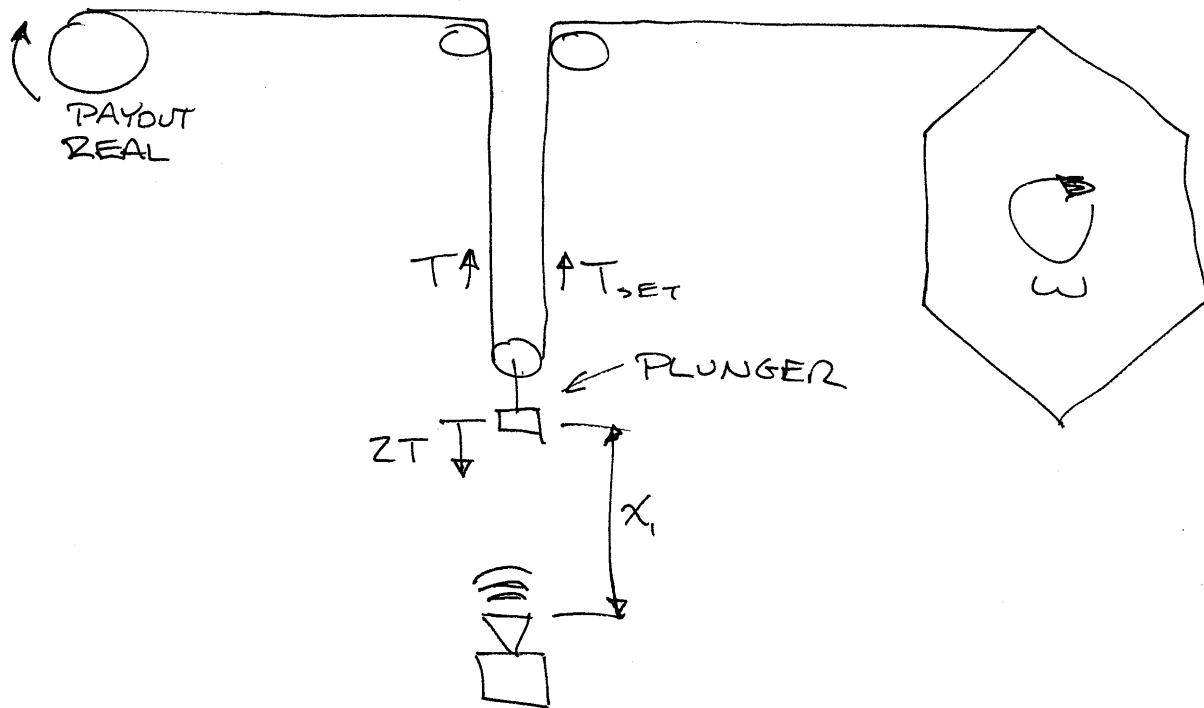
SAES GETTER All wire

\$510 ← microorder
~ 2000 meters

CAI file wire

LOOK UP Minarek

- HEXAGONAL PANEL DRUM ROTATES @ ADJUSTABLE, BUT CONSTANT VELOCITY.
- PAYOUT SYSTEM DELIVERS WIRE TO HPD @ CONSTANT TENSION, VARIABLE SPEED.



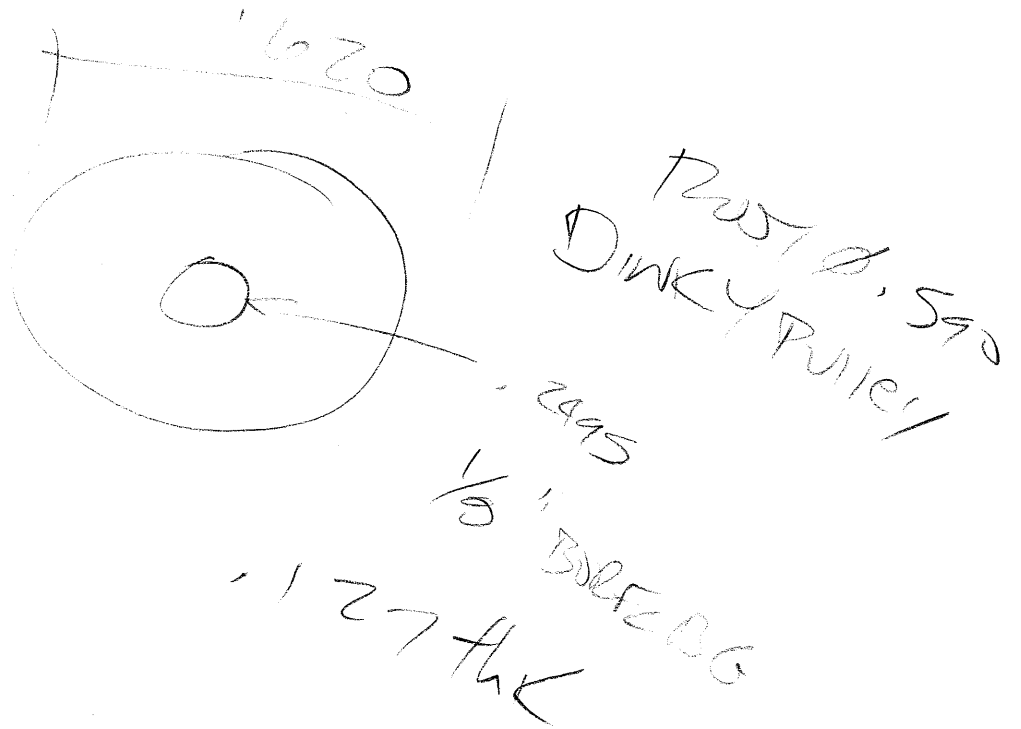
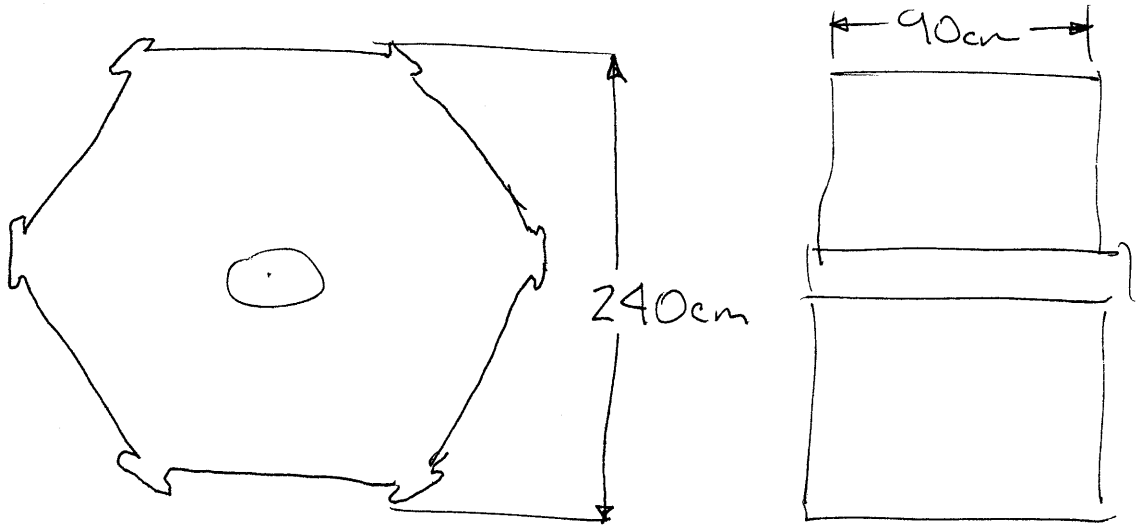
STATIC SYSTEM

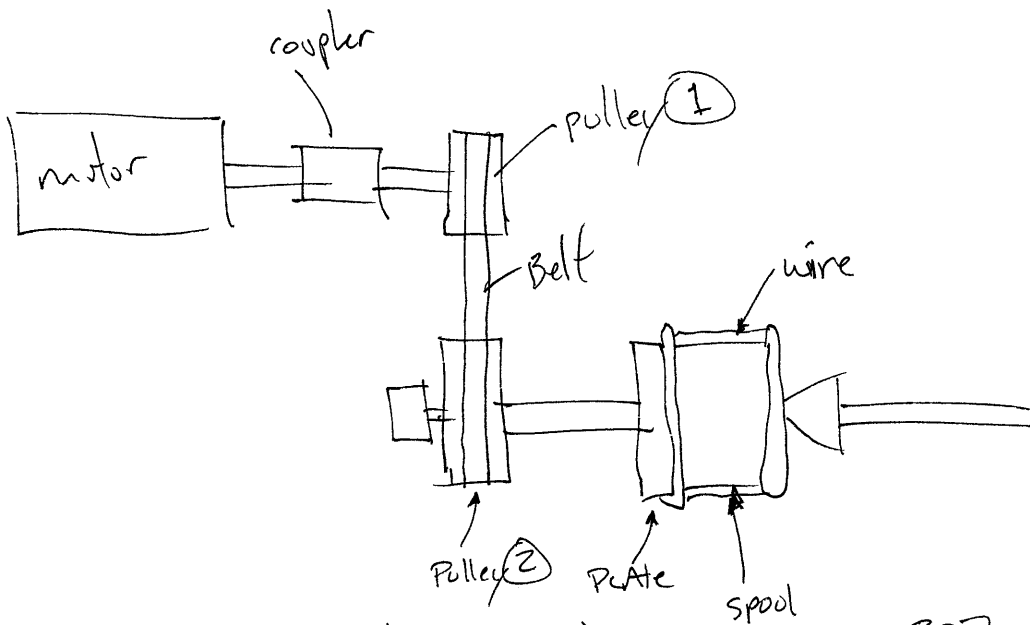
$$\text{IF } \dot{x}_i = 0 \quad ZT = ZT_{SET}$$

IF $\dot{x}_i \neq 0$ TENSION IN WIRE IS NOT CONSTANT AND EQUAL TO T_{SET}

NYMAN

WINDING "DRUM"

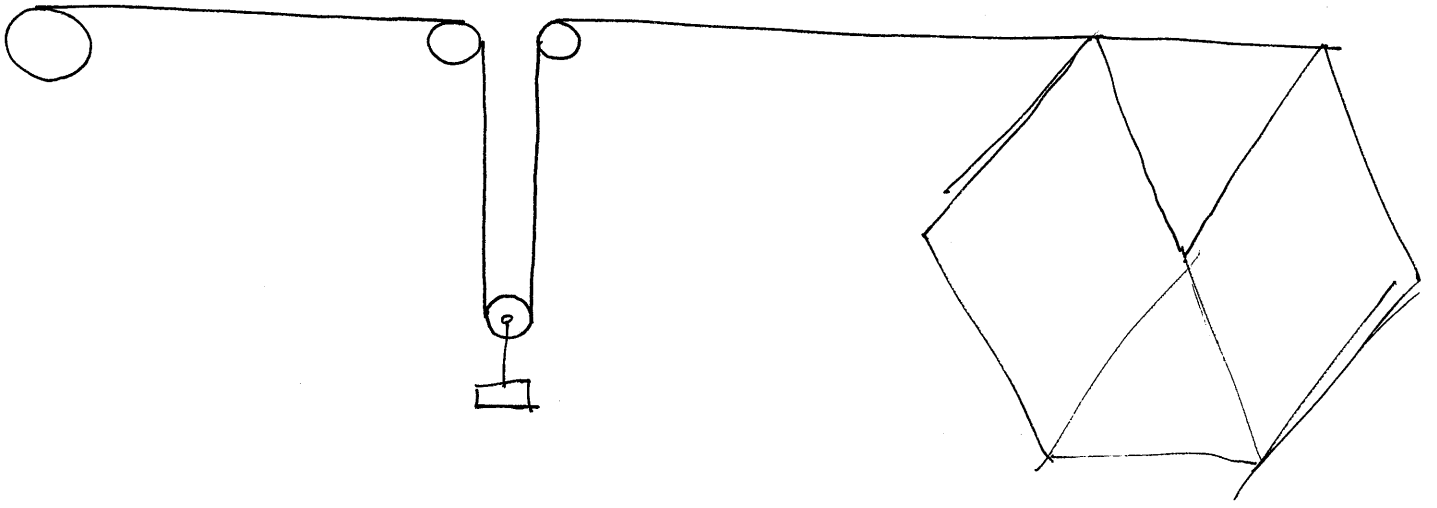




$$2(I_{\text{pulley 1}}) = 3.2 \quad \begin{matrix} \nearrow 307 \\ \searrow 187 \end{matrix}$$

$$I_{\text{pulley 2}} + I_{\text{plate}} + I_{\text{spool}} = 615$$

$$I_{\text{WIRE}} = 651$$

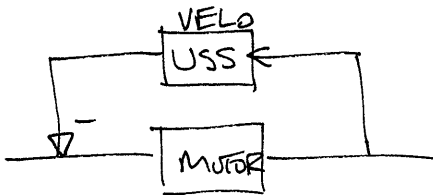


FEED BACK IS \propto ERROR IN TENSION

CONTROLLED PARAMETER IS PROPORTIONAL TO: ?

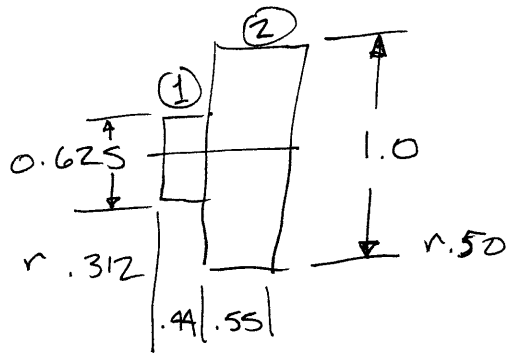
SHOULD BE VELOCITY, BUT IS PROBABLY A VOLTAGE TO THE MOTOR. WHAT SORT OF VELOCITY CONTROL IS ON THE MOTOR?

GENERALLY ZERO ERROR MEANS DO NOTHING



Pulley MASSES

1" ϕ



$$\pi r^2 t = V$$

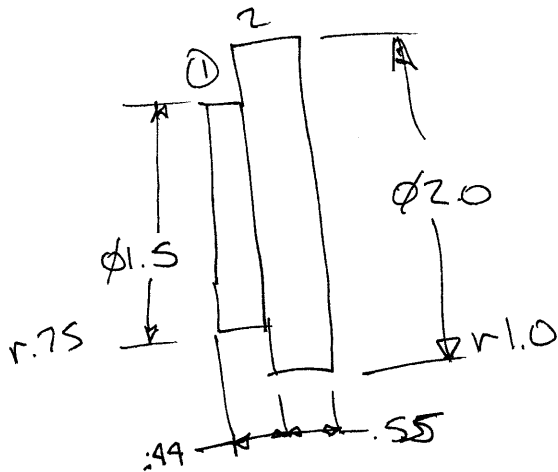
$$V_1 = .142 \text{ in}^3; m = 6.3 \text{ g}$$

$$V_2 = .431 \text{ in}^3; m = 19.2 \text{ g}$$

$$I = \frac{m_1}{2} (.0127)^2 + \frac{m_2}{2} ()^2$$

$$I = 1.6 \mu \text{ kgm}^2$$

2" ϕ



$$V_1 = .777 \text{ in}^3; m = 34.5 \text{ g}$$

$$V_2 = 1.74 \text{ in}^3; m = 77.5 \text{ g}$$

$$I = \frac{.035}{2} ()^2 + \frac{.076}{2} ()^2$$

$$I = 31 \mu \text{ kgm}^2$$

DRIVE PLATE MASS



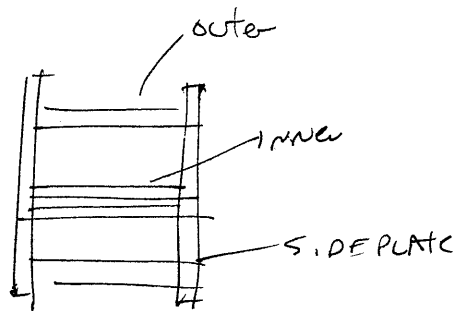
$$V = \pi r^2 t$$

$$V = 6.911; m = 307 \frac{\text{kg}}{\text{m}^3}$$

$$I = \frac{1}{2} M r^2 = .307 \frac{\text{kg}}{\text{m}^3}$$

$$I_{\text{DRIVE PLATE}} = 307 \frac{\text{kg}}{\text{m}^3}$$

SPOOL INERTIA (EMPTY)



$$I_{\text{SIDE}} = \frac{M}{2} r^2 = \frac{.059}{2} (.0508)^2 = 76 \times 10^{-6} \text{ Kg m}^2$$

$$I_{\text{SIDE}} = 76 \mu \text{ Kg m}^2$$

$$I_{\text{out}} = \frac{.089}{2} \left[(.0508)^2 + ()^2 \right]$$

$$I_{\text{out}} = 110 \mu \text{ Kg m}^2$$

$$I_{\text{IN}} = \frac{.015}{2} \left[(.008)^2 + (.009)^2 \right]$$

$$I_{\text{IN}} = 1 \mu \text{ Kg m}^2$$

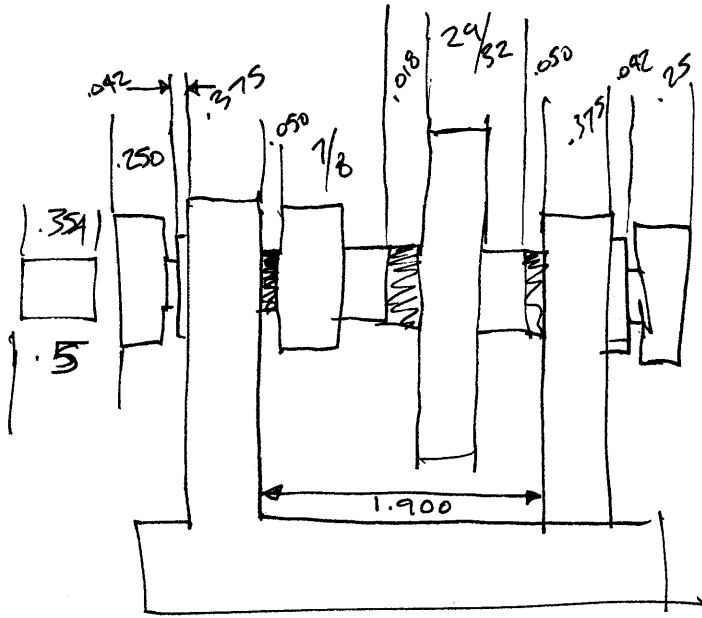
$$I_{\text{SPOOL}} = 187 \mu \text{ Kg m}^2$$

WIRE

$$I_{\text{WIRE}} = \frac{.237}{2} \left[(.0508)^2 + ()^2 \right]$$

$$I_{\text{WIRE}} = 65 \mu \text{ Kg m}^2$$

13-782 500 SHEETS, FILLER, 5 SQUARE
42-381 50 SHEETS EYE-EASE®, 5 SQUARE
42-382 100 SHEETS EYE-EASE®, 5 SQUARE
42-392 100 RECYCLED WHITE, 5 SQUARE
42-399 200 RECYCLED WHITE, 5 SQUARE
Made in U.S.A.

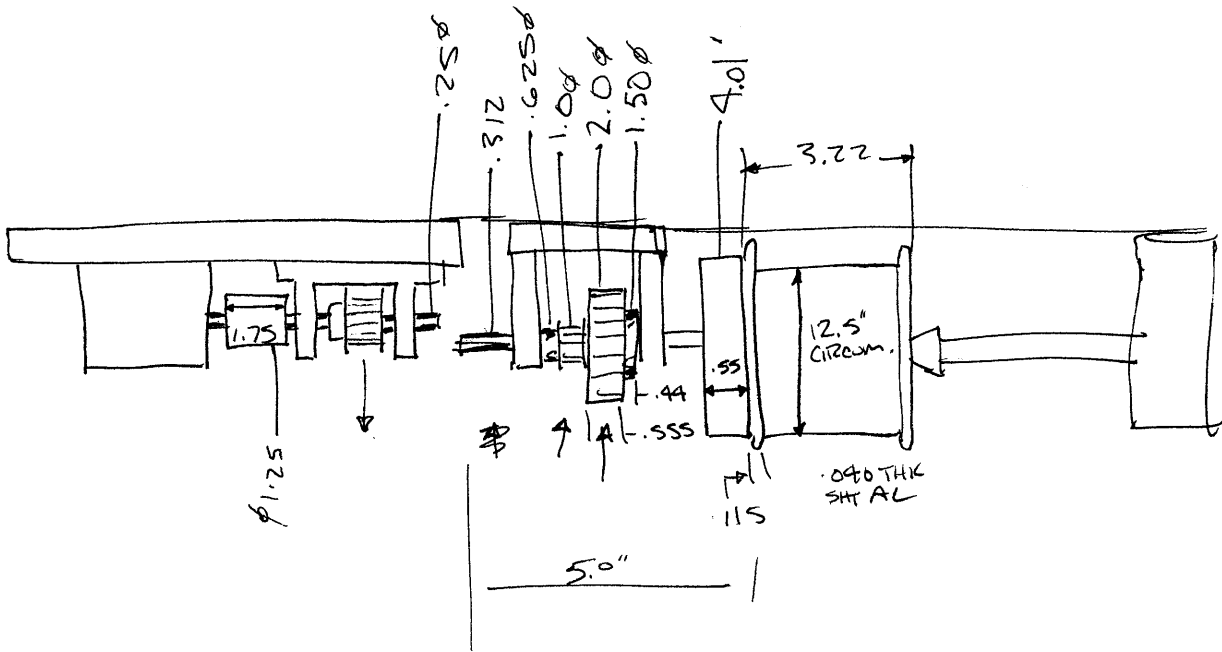


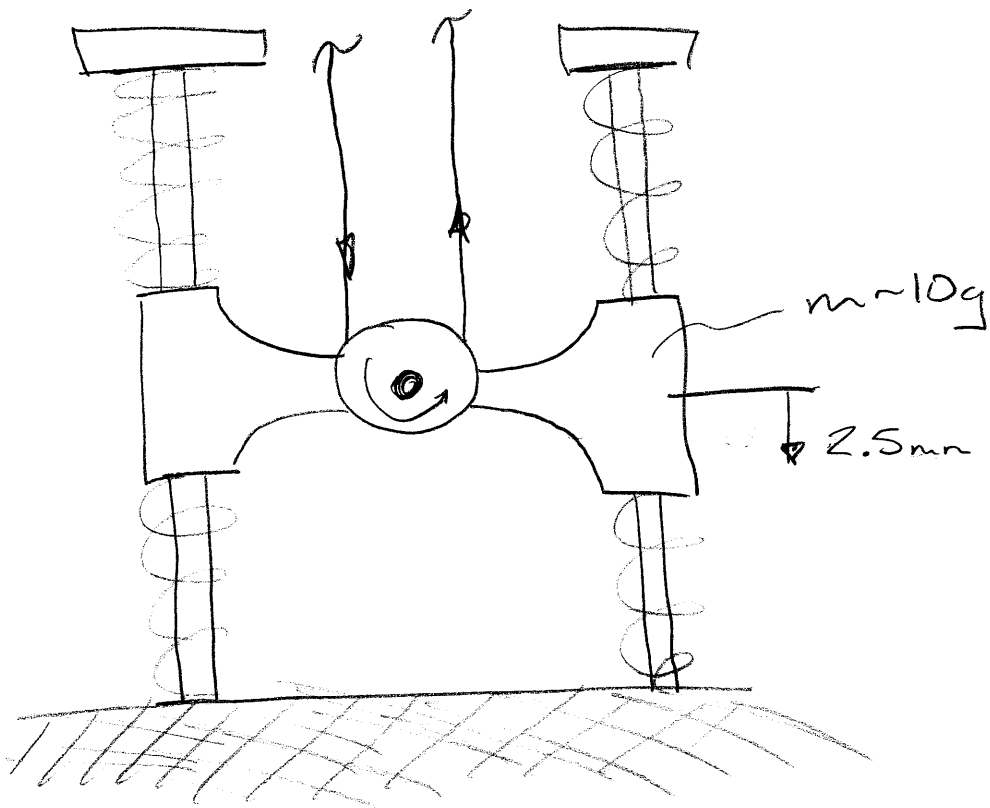
3.75

Air Column

2" OD 1/8" WALL
48" LONG

FEED MOTOR & DRUM





Maximum Allowable force = $60gf$

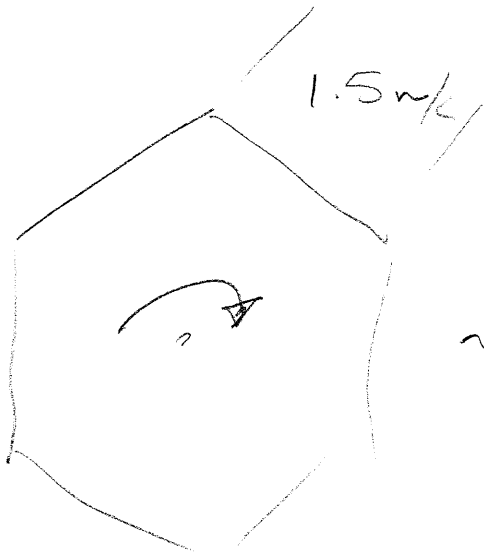
$$\text{mass} = 10g \quad a = 6g = 58.86 \text{ m/s}^2$$

$$a = \frac{v^2}{r} = 58.86 = \frac{v^2}{.0025}$$

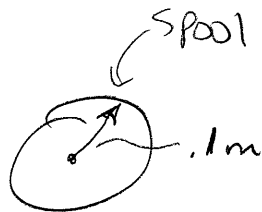
$$v^2 = .024 \left(\frac{m}{s}\right)^2$$

$$v = 153.4 \text{ m/s}$$

$$T = \frac{2\pi r}{v} = \frac{2\pi(.0025)}{153.4} = 106 \mu s$$



$$\sim \frac{1 \text{ rev}}{2 \text{ sec}} = \frac{9 \text{ m}}{2 \text{ s}} = 4.5 \text{ m/s}$$



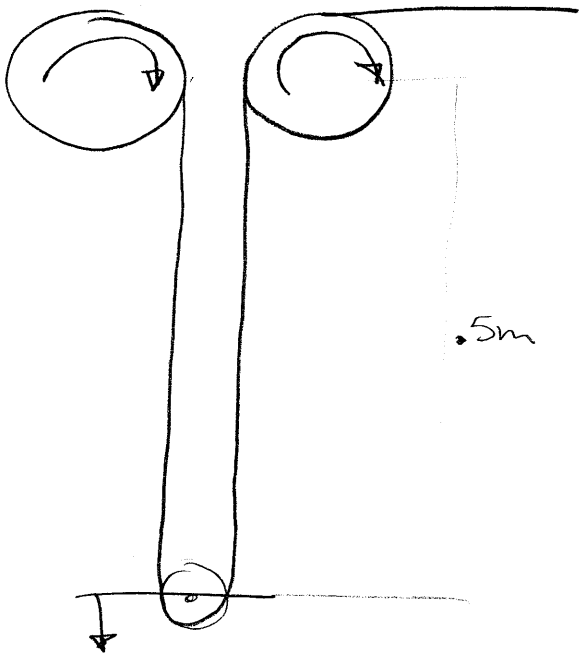
$$\text{Circumference} = 2\pi r = .628 \text{ m/rev}$$

$$\frac{4.5 \text{ m/s}}{.628 \text{ m/rev}} = 7.16 \text{ rev/s}$$

$$\frac{\text{ADDED length}}{\text{loop length}} = \frac{.0025}{.628} = .004 \text{ \% time \& extra length}$$

$$\frac{\text{ADDED Length}}{\text{INTERACTION TIME}} = \frac{1}{7.16} \cdot .004 = 556 \mu\text{s}$$

$\underbrace{\hspace{10em}}_{\text{time to rev one time}} \quad \underbrace{\hspace{10em}}_{\text{\% of Period}}$



$$K = \frac{E}{A} \cdot l = \frac{59 \text{ MSi}}{\pi (10 \mu)^2} \cdot 1 \text{ m}$$

$$K = 28.7 \frac{\text{lbft}}{\text{in}} = 5.03 \times 10^3 \text{ N/m}$$

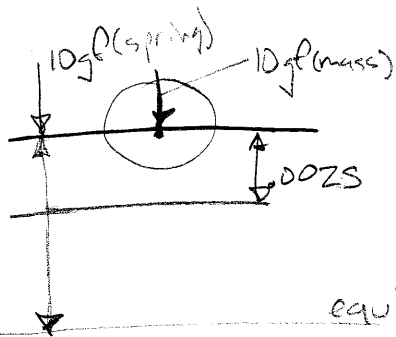
$$\text{ENERGY @ failure} = \frac{1}{2} K (\text{Failure disp})^2$$

$$W_f = \frac{1}{2} K (.002 \cdot 1 \text{ m})$$

$$W_f = \frac{1}{2} \cdot 5.03 \times 10^3 \cdot (.002)^2 \text{ N}\cdot\text{m}$$

$$W_f = .010 \text{ J}$$

Total Potential & Kinetic E in system
upon Loop Intro outflow.



Loop length = .005m

stored ENERGY is $\frac{1}{2} Kx^2 + mgh$

where $x = h = .0025 \text{ m}$

$$K = 10 \text{ g/cm} = \frac{1 \text{ kg}}{\text{m}} = 9.81 \text{ N/m}$$

$$W_{\text{pulley}} = \frac{9.81 \cdot (.0025)^2}{2} + .010 \cdot 9.81 \cdot .0025$$

$$W_p = 275 \mu \text{ J}$$

Western Servo Design, Inc.
4615 Enterprise Common-Fremont, CA 94538
Tel: 510-226-6255 Fax: 510-226-6257

Facsimile Cover Sheet

TO

FROM

Name: Eric AndersonName: Dave BloomCompany: Lawsone Berkly LabsDate: 6-27-95Fax Number: (510) 486-7105Total Pages: 1

Eric,

Thank you for your call today
Please accept my quote for the
items we discussed

- PDH-S2 6/10 Servo amplifiers
\$295.00
- EPS-S2 Enclosed power supply
with 12 volt outputs \$300.00

You will need one of each item.
Delivery is 3-4 weeks ARO typically,
Call if your requirements are
different.

Best regards,

Dave Bloom

$$NB = \frac{N_1 + N_2}{2} + \frac{N_1 - N_2}{\pi} \sin^{-1} \left(\frac{(N_1 - N_2)P}{2\pi C} \right) +$$

$$\sqrt{\left(\frac{2C}{P} + \frac{N_1 - N_2}{\pi} \right) \left(\frac{2C}{P} - \frac{N_1 - N_2}{\pi} \right)}$$

$$C = 5'' \quad N_1 = 30 \quad N_2 = 15 \quad P = .2$$

AGR 3-077 037

13-782 500 SHEETS FILLER 5 SQUARE
 42-381 50 SHEETS EYE-EASE® 5 SQUARE
 42-382 100 SHEETS EYE-EASE® 5 SQUARE
 42-383 70 SHEETS EYE-EASE® 5 SQUARE
 42-384 100 RECYCLED WHITE 5 SQUARE
 42-385 200 RECYCLED WHITE 5 SQUARE
 Made in U.S.A.



13-782 500 SHEETS FILLER 5 SQUARE
42-381 50 SHEETS EYE-EASE® 5 SQUARE
42-382 100 SHEETS EYE-EASE® 5 SQUARE
42-383 100 SHEETS EYE-EASE® 5 SQUARE
42-384 100 SHEETS EYE-EASE® 5 SQUARE
42-385 100 SHEETS EYE-EASE® 5 SQUARE
42-386 100 SHEETS EYE-EASE® 5 SQUARE
42-387 100 SHEETS EYE-EASE® 5 SQUARE
42-388 100 SHEETS EYE-EASE® 5 SQUARE
42-389 100 SHEETS EYE-EASE® 5 SQUARE
42-390 200 RECYCLED WHITE 5 SQUARE
42-391 200 RECYCLED WHITE 5 SQUARE
42-392 200 RECYCLED WHITE 5 SQUARE
42-393 200 RECYCLED WHITE 5 SQUARE
42-394 200 RECYCLED WHITE 5 SQUARE
42-395 200 RECYCLED WHITE 5 SQUARE
42-396 200 RECYCLED WHITE 5 SQUARE
42-397 200 RECYCLED WHITE 5 SQUARE
42-398 200 RECYCLED WHITE 5 SQUARE
42-399 200 RECYCLED WHITE 5 SQUARE
42-400 200 RECYCLED WHITE 5 SQUARE
Made in U.S.A.



30T is $2\frac{9}{32}$ " wide

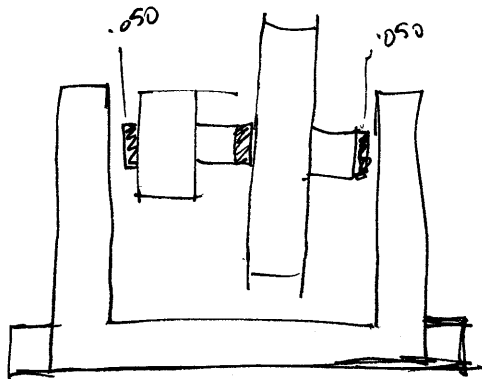
15T is $\frac{7}{8}$ " wide

Bearings .1960 wide

FLANGE is .042

Collars .250 wide

Female .354 wide



ATTN ME LIAISON

X6668

PRINT NUMBERS

UNIVERSITY OF CALIFORNIA
LAWRENCE BERKELEY LAB

SERIAL NUMBER

REQUEST FOR PROCUREMENT

REQUESTER ERIK ANDERSSON DATE REQUESTED 6/27/95

DELIVER TO JOHN WIRTH DATE NEEDED _____

BLDG 77 ROOM _____ PHONE NUMBER 5901

ACCOUNT NO. 8052-2 AUTHORIZED SIGNATURE [Signature]

QUANTITY	DESCRIPTION	APPROX PRICE (each)
1	A 7B30-250609 (METRIC-ENG. FERULE)	6.45
1	S5904Y-E410-11 (FLEXIBLE COUPLER)	49.23
1	S40PX0-HG4-036	2.76
1	S40PX0-HG4-030 (SHAFTS)	2.46
6	S9912Y-E2562FS2M (BEARINGS)	7.22
4	S25CY9-PC1616 (COLLARS)	4.08
2	A6A3-30 DF 03708	10.56
2	A6A3-15 NF 03708 (POLLETS)	25.00
2	A6R3-077037 (BELTS)	4.54

VENDOR STOCK DRIVE PRODUCTS
 ADDRESS 2101 JERICHO TURNPIKE Box 5416
 CITY NEW HYDE PARK STATE NY
 PHONE NUMBER (516) 328-3300
 CONTACT DARCY

SHIP CODE _____
 TOTAL COST _____
 P.O. NO. _____
 TERMS _____
 PICK UP DATE _____
 TIME AFTER _____
 CLOSED DURING LUNCH YES NO
 VEHICLE _____

REMARKS _____
 REQUISITION NUMBER _____

ATTN ME CLATION

X 6668

PRINT NUMBERS

UNIVERSITY OF CALIFORNIA
LAWRENCE BERKELEY LAB

SERIAL NUMBER

REQUEST FOR PROCUREMENT

REQUESTER ERIC C. ANDERSSON DATE REQUESTED 6/27/95

DELIVER TO JOHN WIRTH DATE NEEDED 5901

BLDG 77 ROOM _____ PHONE NUMBER _____

ACCOUNT NO. 8052-21 AUTHORIZED SIGNATURE JWR

QUANTITY	DESCRIPTION	APPROX PRICE
1	PDH-S2 6/10 (SERVO AMPLIFIER)	\$295 ⁰⁰
1	EPS-S2 (ENCLOSED CHASSIS)	\$300 ⁰⁰

VENDOR <u>WESTERN SERVO DESIGN</u>	SHIP CODE _____
ADDRESS <u>4615 ENTERPRISE - COMMON</u>	TOTAL COST _____
CITY <u>FREMONT</u> STATE <u>CALIF.</u>	P.O. NO. _____
PHONE NUMBER <u>(510) 226-6255</u>	TERMS _____
CONTACT <u>DAVE</u>	PICK UP DATE _____
REMARKS _____	TIME AFTER _____
	CLOSED DURING LUNCH YES <input type="checkbox"/> NO <input type="checkbox"/>
REQUISITION NUMBER _____	VEHICLE _____

ATTN M.E. LIASON X6668

PRINT NUMBERS

UNIVERSITY OF CALIFORNIA
LAWRENCE BERKELEY LAB

SERIAL NUMBER

REQUEST FOR PROCUREMENT

REQUESTER ERIC C. ANDERSSON DATE REQUESTED 6/27/95

DELIVER TO JOHN WIRTH DATE NEEDED _____

BLDG 77 ROOM _____ PHONE NUMBER 5901

ACCOUNT NO. 8052-21 AUTHORIZED SIGNATURE [Signature]

QUANTITY	DESCRIPTION	APPROX PRICE
1	RE-035-071-39-EAB200A (RARE EARTH MAGNET, GRAPHITE BRUSH, ELECTRIC MOTOR)	\$350

VENDOR <u>MAXON PRECISION MOTORS</u>	SHIP CODE _____
ADDRESS <u>838 MITTEN ROAD</u>	TOTAL COST _____
CITY <u>BURLINGAME</u> STATE <u>CALIF.</u>	P.O. NO. _____
PHONE NUMBER <u>(415) 697-9614</u>	TERMS _____
CONTACT <u>PAULA ROBINSON</u>	PICK UP DATE _____
REMARKS _____	TIME AFTER _____
	CLOSED DURING LUNCH YES <input type="checkbox"/> NO <input type="checkbox"/>
REQUISITION NUMBER _____	VEHICLE _____

FAX

Date 6-27-95

Number of pages including cover sheet 1

TO:

eric anderson
Lawrence Berkeley

Phone

Fax Phone

FROM:

Maxon Precision Motors
838 Mitten Road
Burlingame, CA 94010

Shira Simonson

Phone 415-697-9614

Fax Phone 415-697-2887

CC:

REMARKS:

Urgent

For your review

Reply ASAP

Please Comment

REDOB5-671-39 lab200a = \$289.70
valid for 1-4 pps.

Delivery 3 to 5 days ARO.

let me know if you have any
further questions.

PRINT NUMBER	UNIVERSITY OF CALIFORNIA LAWRENCE BERKELEY LAB	SERIAL NUMBER
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REQUEST FOR PROCUREMENT

REQUESTER ERIC ANDERSSON DATE REQUESTED 6/27/95
 DELIVER TO JOHN WIRTH DATE NEEDED _____
 BLDG 77 ROOM _____ PHONE NUMBER _____
 ACCOUNT NO. _____ AUTHORIZED SIGNATURE _____

QUANTITY	DESCRIPTION	APPROX PRICE
1	A7B30-250609 (METRIC - ENG. FERRULE)	6.45 STK
1	S5904Y-2910-11 (FLEXIBLE COUPLER)	49.23 STK
1	S40PYD-HG4-03	276 STK
1	S40PYD-HG4-030 (SHAFTS)	246 STK
6	S9912Y-E2562FS2M (BEARINGS)	722 STK
4	S25CV9-PC1666 (COLLAR)	4.08 STK
2	AGA3-30 DF 0370B	10.50 STK
2	AGA3-15 NF 0370B (POLLERS)	25 STK
2	AGR3-0770B7 (BELTS)	4.59 STK

\$200.84

VENDOR <u>STOCK DRIVE PRODUCTS</u>	SHIP CODE _____
ADDRESS <u>2101 JERICHO TURNPIKE Box 5416</u>	TOTAL COST _____
CITY <u>NEW HYDE PARK</u> STATE <u>NY</u>	P.O. NO. _____
PHONE NUMBER <u>(516) 328-3300</u>	TERMS _____
CONTACT <u>DARCY</u>	PICK UP DATE _____
REMARKS _____	TIME AFTER _____
REQUESTION NUMBER _____	CLOSED DURING LUNCH Y/N <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/>
VEHICLE _____	

PARTS FROM STOCK DRIVE

- METRIC-ENGLISH FERRULE ^(.250" dia)
~~#A-7A30-310609~~
#A 7B30-250609
- .25-.25 FLEX COUPLER
#S 5904Y-6410-11
3/2" dia.
- .250 SHAFT (LENGTH?) 3.75
S 40PX0-H64-030
- 2 ABEC 5 BEARINGS ^{w/shoulder}
#39912Y-F2562FS2M
- 2 COLLARS ϕ 250
#S25CY9-PC1616
- Big T.B. Pulley w/Flange
30T #ACA 3-30DF03708
29/32" W.D.F.
- Small T.B. Pulley w/Flange
15T #ACA 3-15NF03703
7/8" W.D.F.
- 3/8 Timing Belts

PDH SZ 6/10
\$295

$\pm 10V$ input

EPS - SZ ~~\$~~300



MAXON

CONSTANT TORQUE w/

RE 035 071 39

EC 070

Pete VAN BEEK

\$1700 p 85 BRUSHLESS
SC070

\$500 p 128 Amplifier

western servo design
(510) 226-6255
DAVE or EFFIE

(915) 697 9414

BeCu wire @ 2000 RPM

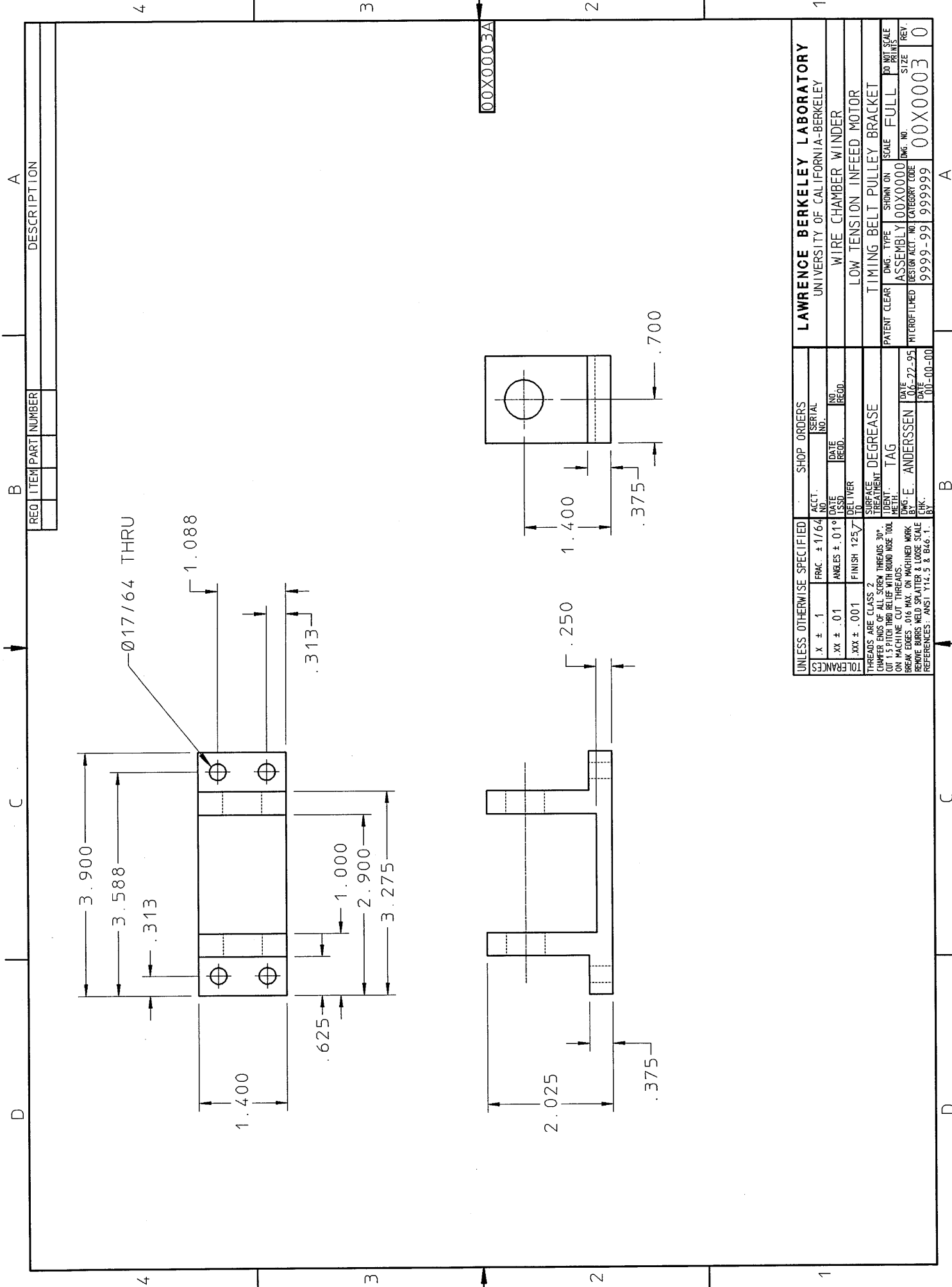
250 μ T = 720 gf
 M = 353 mNm

125 μ T = 180 gf
 M = 88.5 mNm

75 μ T = 65 gf
 M = 32 mNm

POWER PT. @ 90W MAXON
CAN JUST BEARLY HOLD
250 μ CONTINUOUSLY

10:30 7036



REQ. ITEM PART NUMBER

DESCRIPTION

LAWRENCE BERKELEY LABORATORY
 UNIVERSITY OF CALIFORNIA-BERKELEY

WIRE CHAMBER WINDER

LOW TENSION INFEED MOTOR

TIMING BELT PULLEY BRACKET

PATENT CLEAR

DWG. TYPE SHOWN ON SCALE FULL

ASSEMBLY 00X0000 DWG. NO.

DESIGN ALC. NO. CATEGORY CODE 00X0003

9999-99 999999

UNLESS OTHERWISE SPECIFIED

FRACTION ± 1/64

ANGLES ± 0.1°

FINISH 125-7

THREADS ARE CLASS 2

CHAMFER ENDS OF ALL SCREW THREADS 30°

CUT 1.5 FITUR HUB RELIEF WITH ROUND WIDE TOOL

ON MACHINE CUT THREADS.

BREAK EDGES .016 MAX. ON MACHINED WORK

REFERENCES: ANSI: Y14.2 & B46.1.

SHOP ORDERS

ACCT. NO.

DATE ISSD

DELIVER TO

SURFACE TREATMENT

DEGREASE

TAG

DWG. E. ANDERSSON

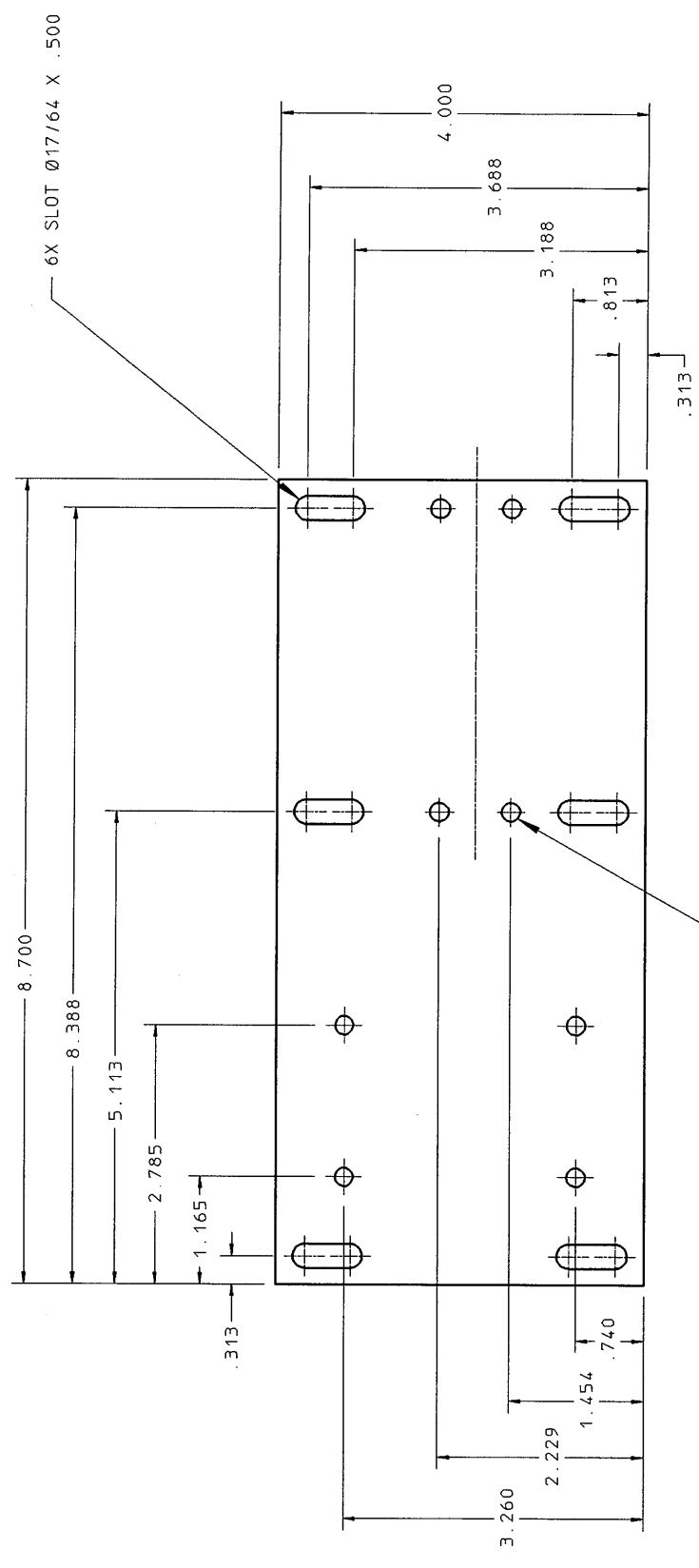
DATE 06-22-95

DATE 07-00-00

00X0003A

REO ITEM PART NUMBER DESCRIPTION

MAKE FROM 1/2" ALUM. PLATE



UNLESS OTHERWISE SPECIFIED		SHOP ORDERS		LAWRENCE BERKELEY LABORATORY	
FRAC. ± 1/64	ACT. NO.	SERIAL NO.	UNIVERSITY OF CALIFORNIA-BERKELEY	WIRE CHAMBER WINDER	
ANGLES ± 0.1°	DATE	NO. RECD.	LOW-TENSION INFEED MOTOR		
.XX ± .01	DELIVER TO		MOTOR MOUNT PLATE		
.XXX ± .001	SURFACE FINISH		PATENT CLEAR		
	1257		DWG. TYPE SHOWN ON SCALE FULL		
	DEGREASE		ASSEMBLY 00X0000		
	TREATMENT		DESIGN ACT. NO. CATEGORY CODE		
	IDENT.		9999-99 999999		
	ON MACHINE CUT THREADS		MICROFILMED		
	BREAK EDGES .016 MAX. ON MACHINED WORK		DWG. NO. 00X0003		
	REMOVE BURRS WELD SPATTER & LOOSE SCALE		REV. 0		
	REFERENCES: ANS. Y14.5 & B46.1		BY		
			DATE		
			00-00-00		
			00-00-00		

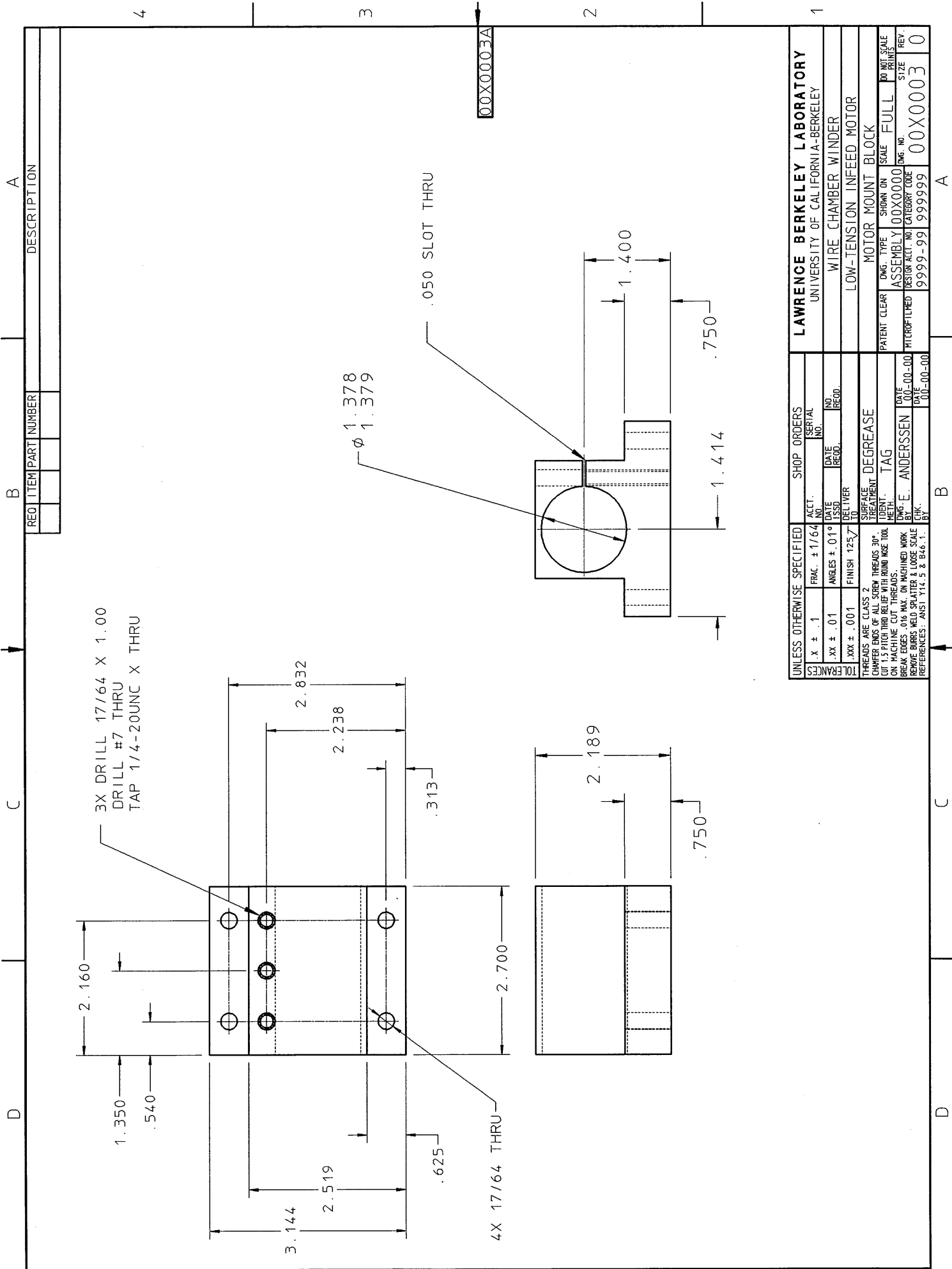
8X DRILL #7 THRU
TAP 1/4-20UNC X THRU

D C B A

4 3 2 1

D C B A

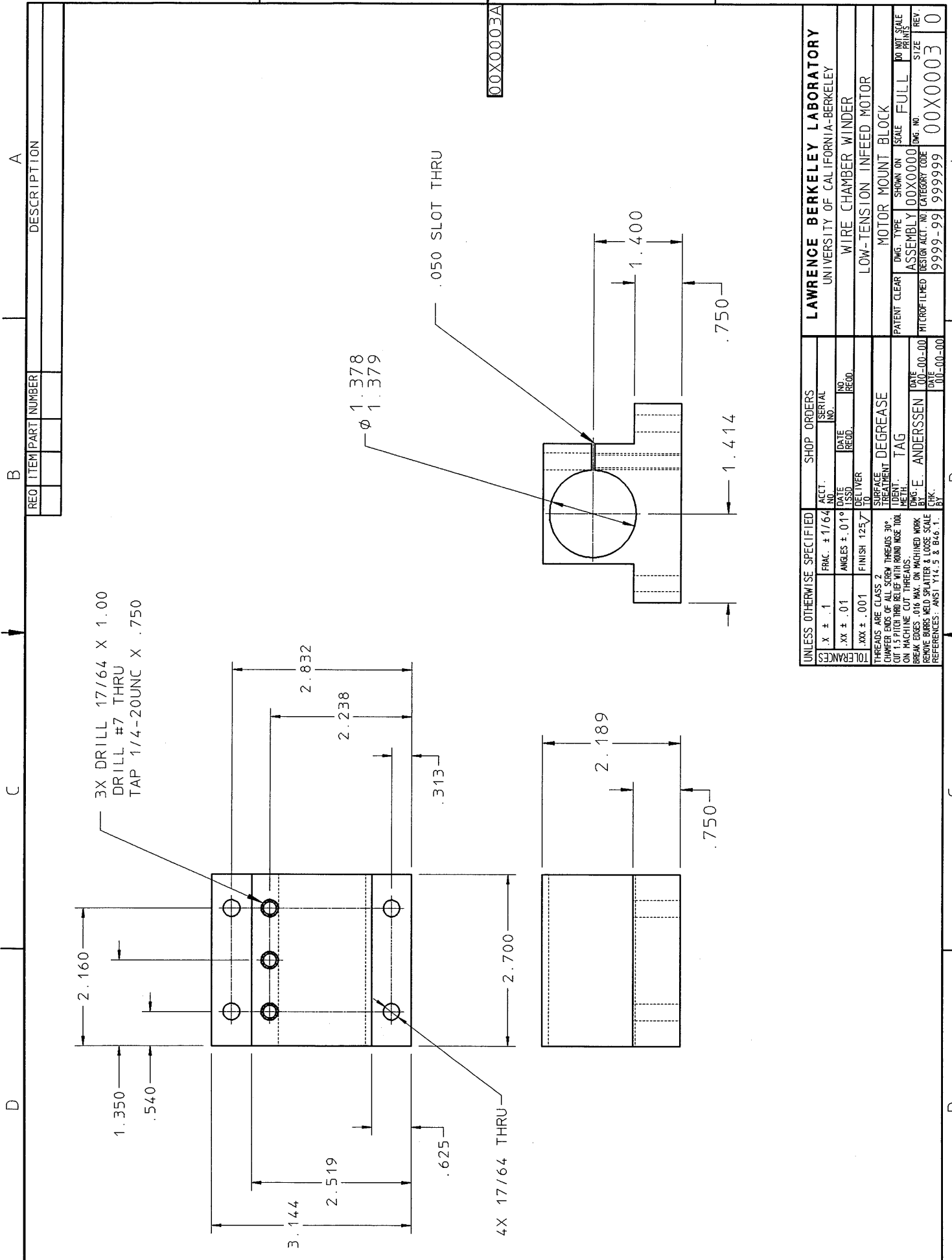
00X0003A



REG. NO.	ITEM	PART NUMBER	DESCRIPTION

UNLESS OTHERWISE SPECIFIED		SHOP ORDERS	
FRANCES	X ± .1	ACCT. NO.	SERIAL NO.
	.XX ± .01	DATE RECD.	NO. RECD.
	.XXX ± .001	DELIVER TO	
	ANGLES ± .01°	SURFACE TREATMENT	
	FINISH 1257	DEGREASE	
	THREADS ARE CLASS 2	TAG	
	CHAMFER ENDS OF ALL SOREN THREADS 30°	BY: E. ANDERSSON	
	CUT 1.5 PITCH THRO RELIEF WITH ROUND NOSE 100%	DATE 00-00-00	
	ON MACHINE CUT THREADS.	DATE 00-00-00	
	BREAK EDGES .016 MAX. ON MACHINED WORK	CHK.	
	REMOVE BURRS, WELD SPATTER & LOOSE SCALE		
	REFERENCES: ANST 174.3 & 846.1.		

LAWRENCE BERKELEY LABORATORY		UNIVERSITY OF CALIFORNIA-BERKELEY	
WIRE CHAMBER WINDER		LOW-TENSION INFEED MOTOR	
MOTOR MOUNT BLOCK		DWG. TYPE SHOWN ON SCALE FULL	
PATENT CLEAR ASSEMBLY 00X0000		DWG. NO. 00X0003	
PITROFILTED 9999-99 999999		DESIGN ACT. NO. 00X0000	
DATE 00-00-00		REV. 0	



REO ITEM PART NUMBER

DESCRIPTION

UNLESS OTHERWISE SPECIFIED		SHOP ORDERS		LAWRENCE BERKELEY LABORATORY	
SIZE	FRAC. ± 1/64	ACCT. NO.	SERIAL NO.	UNIVERSITY OF CALIFORNIA-BERKELEY	
TOLERANCES	ANGLES ± .01°	DATE RECD.	DATE RECD.	WIRE CHAMBER WINDER	
FINISHES	FINISH 1257	DELIVER TO	DELIVER TO	LOW-TENSION INFEED MOTOR	
THREADS	ARE CLASS 2	SURFACE TREATMENT	DEGREASE	MOTOR MOUNT BLOCK	
CHAMFER ENDS	OF ALL SCREW THREADS 30°	IDENT.	TAG	PATENT CLEAR	DWG. TYPE
CUT 1.5 PITCH	THRU RELIEF WITH ROUND NOSE TOOL	ON MACHINE CUT THREADS	ON MACHINE CUT THREADS	SCALE	ASSEMBLY
BREAK EDGES	.016 MAX. ON MACHINED WORK	REMOVE BURRS, WELD SPLATTER & LOOSE SCALE	REMOVE BURRS, WELD SPLATTER & LOOSE SCALE	SHOWN ON	FULL
REFERENCES:	ANSI Y14.5 & B46.1	DWG. E. ANDERSEN	DATE 00-00-00	DWG. NO.	00X0000
		CHK. BY:	00-00-00	MITROFILMED	9999-99
				DESIGN ACCT.-NOT CATEGORY CODE	9999-99
				REV. SIZE	00X0003
				REV. SIZE	0

A

B

C

D

4

3

2

1

4

3

2

1

A

B

C

D

FACSIMILE TRANSMISSION



SAES Getters/U.S.A., Inc
1122 E. Cheyenne Mtn. Blvd.
Colorado Springs, CO 80906
U.S.A.

Telephone: 719-576-3200

Fax: 719-576-5025

To: Eric Anderson
Company: Lawrence Berkley Lab
FAX Phone: 510-486-7105
CC:

From: Richard C. Kullberg
Fax Number: 1121
Date: 29 August, 1995
Time: 02:21 PM
Pages: 2
Includes Cover Page

Subject: RFQ

Per your request, I am happy to supply you with the following quotation:

SAES P.N.	DESCRIPTION	QTY	PRICE
821/60	Luma Wire	24,000 m	\$2,930.40

Lead time is 6-8 weeks after receipt of order.

Our terms are net 30 and the F.O.B. point is Colorado Springs, CO. UPS shipping charges are prepaid and billed. Prices are subject to change without notice, \$250.00 minimum order. A copy of our standard Terms and Conditions of Sale is attached.

I trust that this quotation satisfies your requirements. If I can be of further assistance, please contact me.

Sincerely,

Richard C. Kullberg
Sr. Applications Engineer

SAES GETTERS/U.S.A. INC. SALES CONFIRMATION

1. Governing Provisions from Conflicting Forms. SAES Getters/U.S.A. Inc. (SAES) acknowledges receipt of Buyer's order for the Goods, but acceptance is expressly conditioned on Buyer's assent to the terms and conditions herein contained. Any different or additional terms in any other form or document heretofore or hereafter supplied by Buyer to SAES shall not form a part of the contract. Buyer will be deemed to have assented to these terms and conditions unless SAES (A) receives written notice of any objection within fourteen (14) calendar days after Buyer's receipt of this Sales Confirmation and in all events prior to any delivery of Buyer's order, and (B) has not rejected such objection.

2. Intended Use and Patent License. If requested by SAES, Buyer shall disclose to SAES and record in this document the use to which the Goods are intended to be put. To the extent the use of the Goods is covered by any patent owned or controlled by SAES, Buyer is licensed hereunder to use the Goods solely for the use disclosed and recorded.

3. Acceptance. The Customer shall inspect the Goods when received and shall notify SAES in writing of any deficiencies within fourteen (14) calendar days of their use. In the absence of such notice, the Goods shall be deemed to have been accepted by the Customer.

Acceptance by the Buyer shall also be deemed to have been made as soon as the Buyer uses the Goods for its own commercial production or resale.

In the event an item is returned to SAES, all handling, restocking and transportation charges paid by SAES will be deducted from any credit given Buyer. Freight charges on returned Goods must be prepaid by Buyer.

4. Scope of Contract and Integration. This Sales Confirmation sets forth all of SAES' obligations regarding the sale and delivery of the Goods to Buyer. Any further obligations or specifications not included in this Sales Confirmation must be separately and expressly agreed to by SAES in writing hereafter and may require additional charges. No person has authority to make or claim any change, representation, promise or condition not expressed herein or in writing accepted by SAES.

5. Delivery Time. Unless otherwise specifically agreed to in writing, SAES does not guarantee a particular date for shipment or delivery of the Goods quoted. Shipment dates quoted are estimates of approximate date. Compliance by SAES with the quoted delivery time is conditional upon the Buyer's fulfillment of its obligations, including, but not limited to, notification of all essential technical specifications, providing samples and securing applicable import or export permits.

6. Force Majeure. SAES shall be excused from, and under no circumstances, shall be liable for any loss or damage arising from delays in performance due to fire, strikes, labor matters, governmental regulations, acts of the elements, transportation, failure to receive materials, or causes of a like or different nature reasonably beyond its control in the conduct of its business. If such delays extend the delivery date for more than 90 days, SAES or Buyer may cancel this contract, without liability. All payments received by SAES from Buyer will be refunded.

7. Delay Damages. SAES shall not be liable to the Buyer for any special, indirect, consequential or incidental damages, or for lost profits, revenues, production, use or orders arising from any delay in the delivery of the Goods.

8. Delivery/Passing of Title and Risk. Unless otherwise specified by SAES, all shipments shall be F.O.B. shipping point. Unless otherwise specified in the contract, Buyer agrees to pay for the same in accordance with the terms of payment of this order upon notification that the shipment is ready for delivery notwithstanding the fact that Buyer may be unable to receive or provide suitable storage space for any such partial delivery. In such event that portion of materials may be stored at Buyer's risk and expense.

9. Forwarding, Transport and Insurance. SAES reserves the right to ship all or part of the Goods. All loading, delivery, insurance, forwarding and transportation of the Goods are at the Buyer's risk, and pursuant to Buyer's direction and account.

10. Sales Taxes. In addition to the price for the Goods stated in SAES' quotation or in this document, Buyer shall pay any applicable sales, use, value-added or similar taxes, or provide SAES with a tax exemption certificate acceptable to the taxing authorities, at the time payment is made for the Goods.

11. Standard Terms of Payment. Payment shall be made net 30 days from date of invoice. Invoices shall be issued when the Goods are ready for immediate shipment.

Buyer is obligated to comply with the payment terms even if transportation, delivery, or acceptance of the Goods is delayed, restricted, interrupted with or prevented due to any reason or event, foreseeable or unforeseeable, beyond SAES' control.

The Buyer shall pay a late payment charge of 1 1/2 percent per calendar month or portions thereof on amounts due and owing to SAES from the date on which such payment was due until the date such payment is received. The right to claim further damages is expressly reserved by SAES.

If in the judgment of SAES, the financial condition of the Buyer at the time the equipment is ready for shipment does not justify the foregoing terms, SAES may require payment in cash before making shipment.

12. Security Interest. SAES shall retain a security interest in all Goods until SAES receives full payment.

At the request of SAES, the Buyer shall execute any and all documents and take all action necessary to establish and record SAES' security interest in the Goods.

In the event of the Buyer's failure to pay any amounts due, SAES shall be entitled, without liability, to repossess, retain and sell the Goods, with or without notice, and the Buyer shall be obliged to surrender the Goods on reasonable demand, and shall be liable to SAES for all costs associated with the repossession and sale of the Goods, or a deficiency in the case of a sale.

Except as otherwise expressly provided herein, SAES' liability on any claim for negligence, breach of contract, breach of warranty, tort, or otherwise for any damage or injury to person or property or loss arising out of, connected with, or resulting from this contract, or from the performance of breach thereof, or from the manufacture, sale or use of any Goods delivered hereunder, shall in no case exceed the price allocable to the Goods or part thereof which gives rise to the claim, and, upon the expiration of one year from date of shipment, unless otherwise extended by a term of this Sales Confirmation, all liability of any nature to Buyer shall terminate.

13. Related Parties. Any provision herein limiting the liability of SAES with respect to the Goods to be delivered pursuant to this Sales Confirmation shall also extend to any company which SAES owns or controls, or which is under common control with the company that then owns or controls SAES, or which, itself, owns or controls SAES.

14. Scope of Warranty. SAES warrants to the Buyer that the Goods manufactured by SAES to be delivered to the Buyer hereunder will be free from defect in material and workmanship when used under

proper and normal use in accordance with standard industry practice, for a period of twelve (12) calendar months from the date of initial operation or eighteen (18) months from the date of delivery, whichever is less.

If a printed product warranty certificate is supplied with the equipment and such certificate specifies a warranty period of a longer duration, such warranty certificate shall control the length of the warranty period. If such warranty certificate contains other terms and conditions which either conflict with or are additional to the provisions of this contract, terms which are additional shall be incorporated by reference in this contract and terms which are in conflict with any provision contained herein shall have no force or effect. SAES shall not be responsible for labor charges for removal or reinstallation of defective components, charges for transportation, handling and shipping, or charges for chemical losses, if the equipment supplied hereunder is used for toxic, corrosive or caustic liquids and/or gases. SAES will not be liable for the effect of these materials upon said equipment. SAES shall not be liable for the physical or chemical effect on this equipment of liquids and gases necessarily used therein. Equipment manufactured or supplied by others, but furnished by SAES hereunder, carries the same guarantee as Buyer as SAES receives. Upon any failure of the Goods to conform to the above warranty within such period and upon the prompt written request of the Buyer within such period, and confirmation that the Goods have been stored and used in accordance with standard industry practice, SAES shall inspect or cause an inspection of the Goods claimed to be defective. If an inspection confirms the claim, SAES shall repair or replace at its option, all parts which are defective or unserviceable due to improper material, faulty design or poor workmanship. Replaced parts shall be SAES' property. SAES shall only be responsible for the repair and the replacement of defective parts, and not for costs or expenses of Buyer due to the need for such repair or replacement. SAES' obligations of warranty repairs or replacement shall be rendered void if Buyer attempts or performs repairs prior or subsequent to SAES' opportunity to inspect the Goods.

The foregoing warranty for the Goods expressly does not cover consumable parts, or damage or defects caused by ordinary wear and tear, faulty maintenance, or the Buyer's failure to observe instructions for installation or operation of the Goods, or repair not carried out or authorized by SAES, as well as other reasons for which SAES is not responsible. The warranty described herein does not apply to Goods, accessories, components of Goods or auxiliary equipment manufactured by a third party and not authorized for use by SAES.

The foregoing Warranty is exclusive and in lieu of all warranties whether written, oral, express or implied, as to the description, quality, merchantability, or fitness for any particular purpose of the Goods which SAES may deliver. The Buyer acknowledges that it is not relying on SAES' skill or judgment to select or furnish Goods suitable for any particular purpose.

All cases of breach of contract and the relevant consequences, as well as all rights and claims on the part of the Buyer, are covered by this Sales Confirmation. In no case whatsoever shall the Buyer be entitled to claim damages other than as specified herein and Buyer waives all other claims, damages, remedies or liabilities, express or implied, arising by law or otherwise, occasioned by strict liability, or any contractual theory, and SAES shall not be liable for any penalty or damages with respect to any loss of production, loss of use, loss of other goods, loss of orders, loss of profits, loss of revenues, down-time costs or any costs associated with the removal of Goods from service, and other special, indirect, consequential or incidental damages.

15. Technical Documents. The information in all Technical Documents, relating to the assembly, use and maintenance of the Goods, when and if furnished by SAES to Buyer, (A) remain the sole property of SAES, and (B) are licensed solely for Buyer's own use for its use, sale or maintenance of the Goods. Without separate written approval from SAES, Buyer shall not reproduce, use other than for permitted uses or make available to any third party, such Technical Documents or their contents.

Technical Documents furnished by SAES are for information or illustration purposes only, and shall not imply, directly or indirectly, any warranties that the Goods will conform to such data, specification or information. SAES reserves the right, in its sole discretion, to make changes to such Technical Documents or the data, specifications or information they contain.

16. Cancellations. Orders may be canceled by the Buyer only with the consent of SAES and upon payment of reasonable cancellation charges. Such charges shall take into account costs and expenses incurred, purchases or contract commitments made by SAES and all other losses due to such cancellations including a reasonable profit.

17. Patents. SAES shall indemnify the Buyer against liability for infringement of any United States Letters Patent arising out of the manufacture, sale or use of SAES Goods delivered hereunder unless the infringement arises because of (1) compliance with the Buyer's specifications, or (2) the use of such Goods in an infringing process or combination and such infringement would not arise from the use of such Goods alone. This indemnification is conditioned upon the Buyer giving Seller (1) prompt notice of and the full right to defend and settle any such claim or suit and (2) the right to modify such Goods as to make them non-infringing without materially departing from the requirements of Buyer's purchase order.

18. Arbitration. Any dispute arising under or with respect to the sale confirmed by this Sales Confirmation which cannot be settled amicably within sixty (60) days after a claim is made by either the Buyer or SAES shall be resolved exclusively by binding arbitration conducted in accordance with the Commercial Arbitration Rules of the American Arbitration Association then in effect. Either party may apply to any court of competent jurisdiction for injunctive relief or other interim measures, and any such application shall not be deemed incompatible with, or a waiver of, this agreement to arbitrate. The arbitration shall be conducted by a single arbitrator and shall be held in Denver, Colorado. The arbitrator shall be guided by, in descending priority, the terms of this Sales Confirmation, the usages of the trade in the place where the party charged with an act or failure to act is principally located, and by what he seems just and equitable under the circumstances without binding reference to the law of any jurisdiction. The award of the arbitrator shall be final and binding and not subject to judicial review. Enforcement of the award may be sought in any court of competent jurisdiction over the parties or their assets.

19. Assignment. Any assignment of this contract by Buyer, in whole or in part, without SAES' prior written consent is void.

20. Severability. In the event of a judicial or arbitration determination that any provision within this contract is unenforceable or fails in its essential purpose, such determination or arbitration shall have no effect on the enforceability of the balance of the provisions herein.

25 Jul 90

**UNIVERSITY OF CALIFORNIA
LAWRENCE BERKELEY LABORATORY**
FOR CONTRACT NO. DE-AC03-76SF00098
WITH THE DEPARTMENT OF ENERGY

Vendor: SAES Getters USA
1122 E Cheyenne Mtn Blvd.
Colorado Springs CO 80906

SHIP TO: UC Lawrence Berkeley Lab
For the US Dept of Energy
2700 - 7th Street
Berkeley CA 94710

MAIL INVOICE IN DUPLICATE TO
UNIVERSITY OF CALIFORNIA.


UC Lawrence Berkeley Lab
Accounts Payable Dept
PO Box 528
Berkeley CA 94701

Purchase Order# 6411738	Page 1
This purchase order number MUST appear on all invoices, packing lists, cartons and correspondence related to this order.	
Date of Order 13-SEP-95	Buyer T PATOCK
Revision Date	Buyer 510-486-4576

Customer Account	Vendor No.	Payment Terms	Transportation Terms	FOB.	Ship Via	
Vendor Contact Mike Hagon (719) 576	102360	Net 30 Days	Acct. of Univ	Shipping Point	FedEx GOS	
PART NUMBER/DESCRIPTION			Requester / Deliver to ANDERSSSEN, ERIC C.	FOR RESALE-State Sales Tax should not be charged as the University holds State Sales Tax Permit SR CH 21-835970 for deliveries to Lawrence Berkeley Laboratory.		
LINE	DELIVERY DATE	QUANTITY	UNIT	UNIT PRICE	EXTENSION	TAX
1	08-NOV-95	24.0	MF	122.10	2,930.40	N
Ship on IBL FedEx account #0941-06541-6. *** CONFIRMED TO: ON 05-SEP-95 -- DO NOT DUPLICATE! Luma Wire, Type 821/60, Gold Plated Tungston, 20 microns dia. +/- 4%, Straightness Grade 1, Ovality +/- 2%, 1600 meters per spool. Parameters are based on your quote #1169 rev. by phone con. w/ Michael Hagen on 12-SEP-95.						
TOTAL:						2,930.40

The Terms and Conditions Attached
Constitute A Part Of This Order

-Requester's copy-

Authorized by

UNIVERSITY OF CALIFORNIA