George Edens

August 3, 1960

Owen A.Harrison

Dear George:

I have a request for a special that I feel should be built. Medical research is in need of a dual beam scope with 8 or 10 cm of vertical scan and capabilities of 4 or more traces. There is one definite order and possibly two if we can deliver before December. This scope will be a popular unit with medical people. Therefore I suggest no work be done unless you want to continue. The market should be a pretty good one.

The 502/127/CA/CA fails because of bandpass. The 532/127/CA/CA works reasonably well but requires modification. We have modified 127's for New York University Medical Center for $45.00. Modification consists of a transient blanking mod, a 2 times frequency divider for control of the 532/C unit multi and two slave resistors which lock the 127/CA units together; so a single blanking mod will blank all switching transients in the 127 and the 532 when in the chopped mode. It permits a 4 trace presentation in either chopped or alternate modes. This was claimed but not possible before. John West, Robert Hoag and I worked with manuals and I believe present manuals are correct.

The ideal unit's requirements:

1. 551 main chassis, horizontal and low voltage power supply.

2. 502 CRT and high voltage power supply with an amphenol connector to supply a slave CRT (specs at the end of this IOC).

3. 4 megacycles vertical bandpass to permit use of standard CA and M units in the chopped mode. The 531 vertical amplifier with an additional 3 times gain and 1/3 bandpass would be ideal. The 502 CRT has a sensitivity of 15 v/cm against 7 v/cm for the 531 CRT. It would be possible to eliminate the delay line since it is not required in a medical scope.

4. A blanking mod should be included with power to blank a slave CRT as well as the main CRT.

5. The C unit's multi's should be slaved by direct coupling of their grids with a 47 k isolation resistor placed in the scope, connections being made through the amphenol strip contacts. This will insure all transients will be blanked and that the sequence of the count will always be the same regardless of how the scope

is triggered or if it's turned off then turned back on. This is also a very good feature when two CA units are used and two different frequencies are being displayed on a regular 551. Since production would not be interested in this feature, a write-up of the possibility as a field mod is suggested. I have suggested this several times before without results.

A scope as described without item 5 and the slave CRT terminal strip, but with two CA's would be valued up to $2500.00 by medical research people, furnishing the research people with a multi channel display that would exceed the Electronics for Medicine and Sanborn equipment presently used. When furnished with a slave CRT for photography it could give more information than present equipment costing $7500.00. This I quote from Dr. Kavaler, Dr. Hoffman, Dr. Stuckey and Dr. Jungi Ishiyama. The last has actually taken time to modify his 551 and assemble a slave CRT. If biologists can work out the problems of the requested equipment, we should be able to deliver quickly and at no greater cost than the present 551. It is claimed that an everage of four groups a week ask for advice on equipment at this one lab.

Slave CRT Specifications:

1. Normally used with moving film so would not need horizontal sweep. However, if it contained a 2 times horizontal amplifier the CRT could be swept from the sawtooth out on the scope.

2. Should contain positioning controls capable of a range to cover differences in 502 CRT's.

3. Should contain an unblanking circuit that cuts off the slave CRT beam when the film stops to prevent film loss.

4. Consider separate intensity controls for each beam so that a CA and D unit used together could present three traces. The D unit's trace would occur each sweep, therefore beam current must not be as high for photography. The camera would be mounted on the slave unit and time markers desired. This could be a small generator like the one sent to Field Engineers and could be used as an auxiliary piece of equipment.

5. The slave CRT could contain its own high voltage supply if necessary to meet the suggested specification. Transient blanking would be necessary, unblanking would be needed when the trace was swept, and blanking would be necessary when the film was stopped.

George Edens

August 3, 1960

Owen A.Harrison

I would appreciate information on the possibilities of supplying this scope at the earliest practical date. Hope this project gets off the ground to a flying start. Feel it's worthwhile.

Sincerely,

Owen

OAH/eg

cc: Scotty Pyle
Chuck Nolan

George Edens

August 3, 1960

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cc: Scotty Pyle
Chuck Nolan

Chuck Nolan

8-18-60

PRIMARY CONSIDERATIONS

1. DUAL BEAM (SEP. HORIZ. PLATES)
2. INEXPENSIVE ($100 - $200)
3. BEFORE DEC.
4. UTILIZE STD. PARTS & CKTS
5. 4 TO 5 mc BW

SECONDARY CONSIDERATIONS

1. DUAL X-Y
2. MAXIMUM FLEXIBILITY

9-6-60 CONF WITH ECON. E.

552 CRT

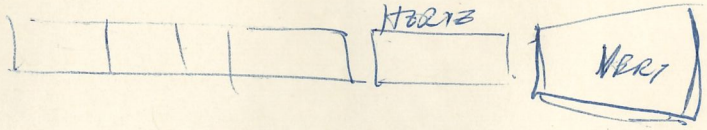
CONNIE WILSON PHOTOGRAPHICS

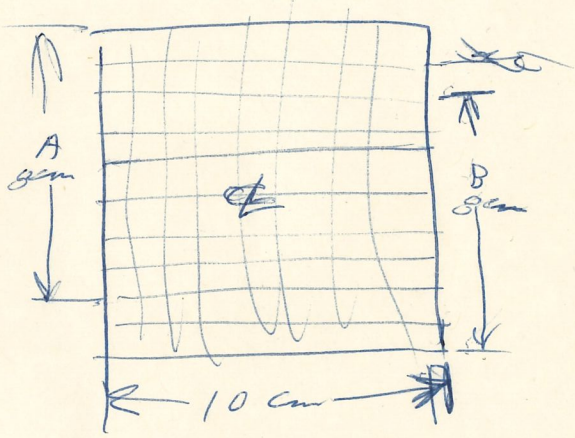
INDEP. X-Y DUAL 10 X 10 FULL OVERLAY

VERT. AMPL. COMPAB.
12 V/cm

HORIZ AMP
20 V/cm

4 KV





555 ENV.

552 FILE

10-3-60

BOB BROWNING

RADIATION INC

6 MOS DEL

3 - RM 5 MC.

NO D.L.

50 MV

400 CYCLES LINE

LARGE SCREEN BAR-GRAPH REQ'D.

BOB WILL CHECK WITH COST & ADVISE.

(POSSIBLY WE CAN BUILD 3 UNITS OURSELVES)

October 3, 1960

Mr. Carl Mohre
Project Engineer
Radiation, Inc.
P. O. Box 37
Melbourne, Florida

Dear Mr. Mohre:

This letter will confirm our telephone conversation of this date.

The Type 552, Rack Mounted Oscilloscope, which is currently in the prototype stage, will have the following features - duo beam, 4 to 5 megacycles vertical band width, with each channel accommodating our standard 530/540 plug in units. The horizontal sweep circuit will consist of a single sweep generator with two independently controlled output amplifiers so that both traces may display the same base or one trace may be a magnified portion of the other. The rack mounting height is approximately 14 inches and the depth is approximately 22-1/2 inches with standard 19 inch rack width.

The price of this instrument is not firm but is expected to be around $1200.00. Although a production schedule has not been established it may be possible that we could provide you with three of these instruments by May or June of 1961.

The RM 15 Rack Mounted Oscilloscope is described on page M-17 of our long form catalogue, which I am sending you under separate cover. The price for the RM 15 is $875.00 and the delivery currently running two weeks.

If you decide that the Type 552 Oscilloscope will fulfill your requirements, please let us know as soon as possible so that we may firm up the price and delivery with you.

Very truly yours,

TEKTRONIX, INC.

R. N. Browning
Field Engineer

RNB/ls
CC:Chuck Nolan

TEKTRONIX, INC.
PORTLAND, OREGON

RECEIVED
Oct 6 8 30 AM '60

October 3, 1960

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Project Engineer
Radiation, Inc.
P. O. Box 37
Melbourne, Florida

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Very truly yours,

TEKTRONIX, INC.

R. N. Browning
Field Engineer

RNB/js
cc: Chuck Nolan

Chuck Nolan
Dept
Engineering

001-364 D

SPECIAL Transformer ORDER

ORDER NO: _____ FOR CAPITAL ASSETS INDICATE STARTED DATE: 10/7/60
DATE REQUIRED: _____ TEK SERIAL NUMBER _____ COMPLETED DATE: 10/12/60

REQUESTED BY: B. Barnes
DEBIT DEPARTMENT: Special Products.
DEPARTMENT NO.: _____
DEL. ADDRESS: 81-330

ISSUED BY: Bob Cogan
CREDIT DEPARTMENT: Transformers
DEPARTMENT NO.: 2064
DEL. ADDRESS: 76-562

ORDER DESCRIPTION: Build 552 Power.

DIRECT LABOR:
All labor will be posted as direct unless indicated in columns below;

602 INDIRECT-604 TOOLING
603 SUPERVISION-605 ENG.

DATE	TIME			EMPLOYEE		602	603	604	605	ACCOUNTING USE ONLY	
	START	FINISH	TOTAL	NAME	NUMBER					PER HOUR	TOTAL
10/10/60			2.00			X					
			.25				X				
			.25						X		
TOTALS:			2.50 Hr.								

MATERIAL

DATE	QUAN.	TEK. NO.	DESCRITION	ACCOUNTING USE ONLY	
				EACH	TOTAL
10/12/60	1	-----	$14.00 Misc. Transformer Material.		
TOTALS:					

Name Dick Ellstrom

Date Sept 19 1960

Type X552

Please let us have your comments, opinions, and reactions to this proposed instrument.

A lighter accelerating voltage than 4 KV would seem desirable. This is based upon common complaints from 536 customers who aren't even using the bandwidth capabilities of the 536.

The bandwidth of 5 MC sounds reasonable. There seems to be many groups building or planning new instruments with Plug-ins. It is my personal opinion this is being overdone. I would prefer to see a good basic scope with a very well regulated power supply, good writing rate, and a dual trace amplifier. Something like our 516 with 10 KV acc potential. In addition to this make it easy to feed the CRT vertical from an external source. The source could be from an accessory line of amplifiers patterned after the 530/540 plug-ins. Perhaps the DC level setting circuit could be in the ~~scope~~ scope or it could be built into every accessory amplifier so these amplifiers could be used with other scopes. This didn't tell you much about the X552 but I do believe a system ~~of~~ comprised of the above mentioned pieces would be attractive to ~~many~~ many customers. Would like to talk with you more about this.

Name Leo Wulff

Date Sept. 16, '60

Type X552

Please let us have your comments, opinions, and reactions to this proposed instrument.

1. Bravo! glad to see this and so will some of my customers
2. I'm in favor of doing the RM version first because most medical researchers prefer that -- and it won't be hard to go to cabinet style later.
3. Maybe this would be a better instrument with some more accelerating voltage on crt -- could sacrifice some BW if that would help get gain increase needed.
4. In medical work a front panel output for both vertical signals (via C.F.'s) would be very useful to supply signals to chart recorders, tape recorders, slave crt's, etc.
5. I think we can get orders for this scope from other industry's besides the medical people.

Name Tom Long

Date _____

Type X552

Please let us have your comments, opinions, and reactions to this proposed instrument.

#1200

Bandwidth 4 to 5 MC
3½ to 4KV Mono. ← TO Low
Should not be rackmount
Need high Sensitivity Plug-in
10 microvolts per cm

Name Ted Brandt

Date 9/15/60

Type X552

Please let us have your comments, opinions, and reactions to this proposed instrument.

1. Almost all medical groups are committed to dual beam. X552 seems to be a good start. I think a majority of users could use a 503 type or 560 series, dual beam separate time base instrument.

3. Hi Voltage PIV mod. — Yes

516 A only triggering positive

Name MARVIN CROUCH

Date SEPT. 15/60

Type X552

Please let us have your comments, opinions, and reactions to this proposed instrument.

medical people in my area would like in addition to what you have said...

A- intensity modulation for writing rate circuitry that is differentiating the signal etc

B- signals out both channels to run pen recorders (1 ma movement) or audio devices (1 v full scale).

C- a mixer circuit to allow mixing in time marks, back panel (moving film etc) without losing any differential advantages.

D- CA chopped blanking

E- A plug-in narrow band differential dual trace

F- Calibrator to permit cal real low level preamps.

G-

Name Bob Seaberg

Date 9-15-60

Type X552

Please let us have your comments, opinions, and reactions to this proposed instrument.

Dual B 5" 1 Swp 2 Sep Out Amp 100:1 Cal Horiz Pos

8cm & 6cm OVERLAP 4-5 MC Single Sweep, Trig Upper Lower

3-4KV - Rackmount - 14" Ht $1200

CONVENTIONAL INST FIRST — THEN POSSIBLY A RACK MOUNT.
(REGULAR INST WITH RACK PANEL)

CRT Anode Voltage 6 KV or higher.

Name C L Murphy

Date Sept 15, 1960

Type X552

Please let us have your comments, opinions, and reactions to this proposed instrument.

1- More + more demand for rack mount. We should really consider more thinking

2- Strive for more insulation and/or ability of 507 to stand high transients,

3- 516 install "A" input trigger ability when using for phase measurements, etc. to eliminate ext triggering necessity.

4- provision for remote location of bridge circuit is "X" assist up to 500 feet

5 no report of failure of H.V., 50 meg resist. (is 507 mod 24-A since we installed the new external resistor.

Name Warren E. Dixon

Date Sept. 29, 1960

Type X552

Please return this sheet (before you leave Portland) with your comments, opinions, and reactions to this proposed instrument.

2-X amplifiers Cal X pos. dual beam 8 cm 4-5 Mc

I have no feel for any real need for a specific application but it looks like this instrument will fill a hole that some other company will certainly do. in Time

If this instrument is to be aimed at low frequency applications, our past experience with CRTs may give reason to consider chopping between horizontal amplifiers rather than going to Two sets of horizontal deflection plates.

Inter-Office Communication

552 Fleck

To: Chuck Nolan

Date: October 27, 1960

From: Kerm Fleck

SYRACUSE

Subject: Type X552"

Dear Chuck:

I didn't turn in my list of comments, opinions and reactions to the proposed Type X552 when I was in Portland, because I wanted to chat with and get the feelings of some fellows at the Upstate Medical Center in Syracuse, so as to have a better feeling for this instrument myself.

In chatting with the folks in the Electronic Section, I find a favorable reaction, particularly if the price will be substantially lower than the 551. They like a dual beam CRT, and if the beams will have 6 centimeters of overlap, they would be quite happy. They like the common sweep with 2 output amplifiers, capable of being magnified. A rack-mounted version should be fine, especially if it is completely covered, as in our regular rack-mounts.

Their comments on front panel terminology, aimed at the Medical Profession, was this. The majority of medical people who use Tek Scopes, or any Scopes, either have or will become familiar with electronic terminology, especially as time goes on, so that a special front panel should not be necessary.

Incidentally, Chuck, these folks are somewhat interested in the "M" Plug-in, especially as its chopping frequency will be at least a megacycle.

Sorry to keep you waiting for your answer.

Best regards,

Kerm

KF/mm
nr

10-24-60

RON BELL

552 INFO REQUEST

U OF PITTS.

DR. COHEN

RESEARCH NERVE

LAB SETUPS FOR 30-40 STUDENTS

WHEN GET DEMO ADVISE RON

100KC @ 100μV D.C. COUPLED.

PLUG-IN BRD.

N.I.

10-19-60

X552 CRT.

X552 FILE

50Ω GUN, WITH SEP. DEFL. PLATES.

---

20 V/cm HORIZ
15.3 V/cm VERT

@ 4KV

---

10 cm HORIZ. SCAN (NO INTERCEPT.)
8 cm. VERT SCAN (NO INTERCEPT)

GRID CUTOFF 65 – 85V

FOCUS
ASTIG
NO GEOM. CONTROL
CROSSTALK CONTROL

COMMON HEATERS
SEP. CATHODES.

8-16-60

CONTINUE WORK ON NEW 4-5 MC DUAL BEAM.

JOHN VERT. AMPL. DESIGN

HANK HORIZ. AMPL. + MAG. DESIGN. (CONS. WITH SWP PLUG-IN AND

RUSS COMPLETE SWP GEN + AMPL, MAG, DES.

(WHOEVER GETS THERE FIRST) POWER SUPPLY FOR WHOLE MESS

BILL MECHANICAL MOCKUP. AND LIKE THAT.

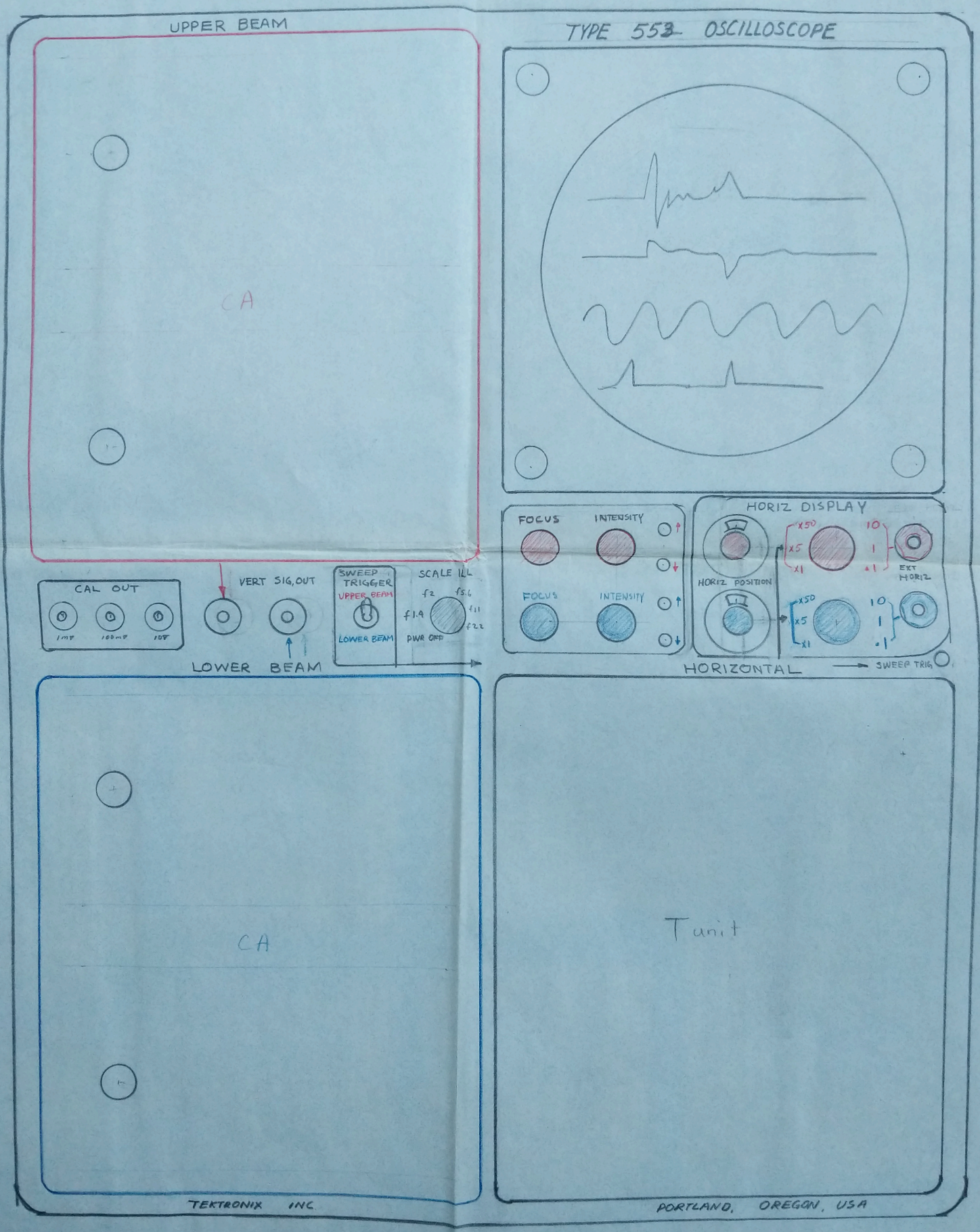
LET'S SAVE THIS FILE IN DUAL BEAM '55

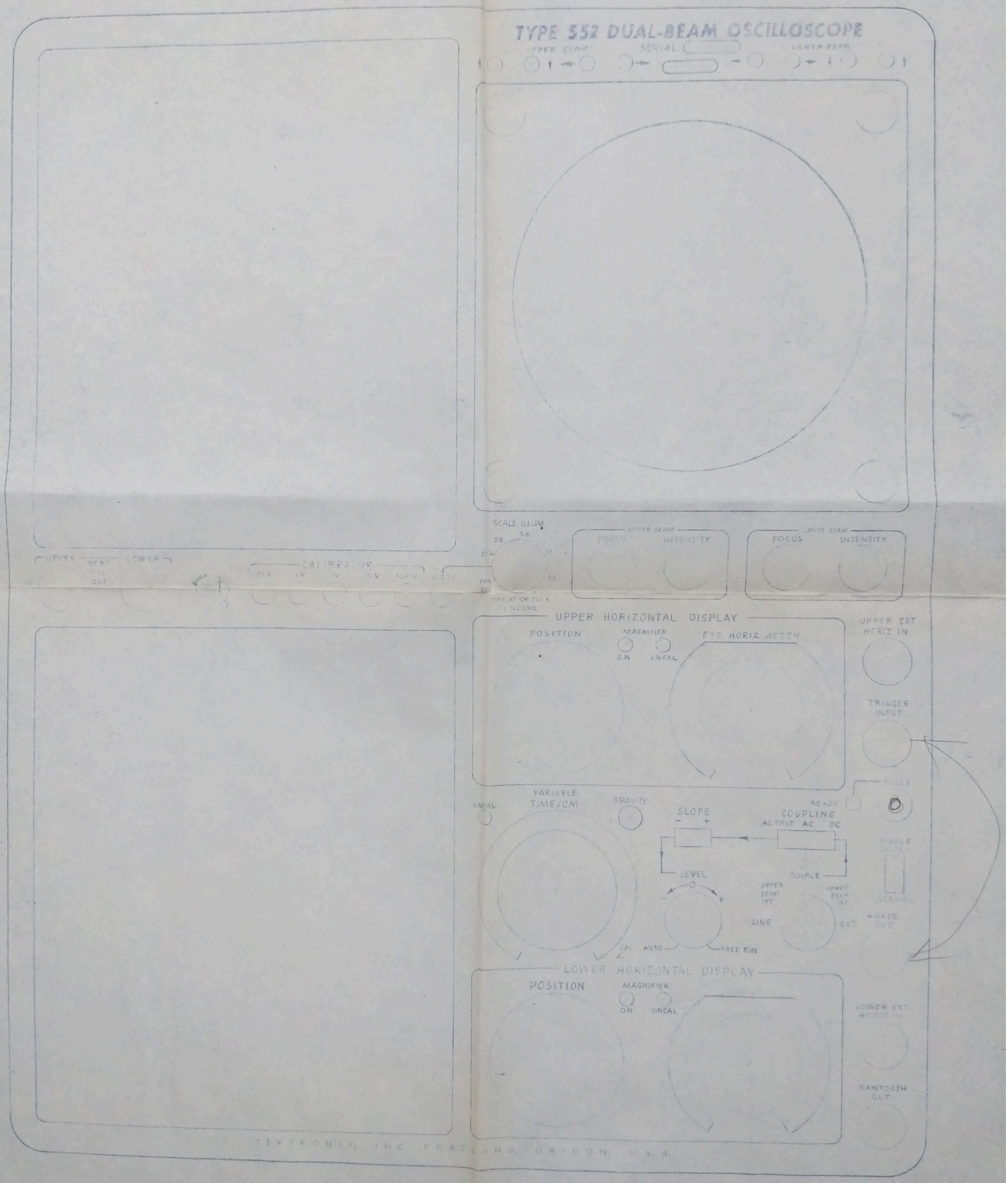
RUSS WOULD YOU —

CHECK PRICE ON INDUSTRIAL TIME CORP.

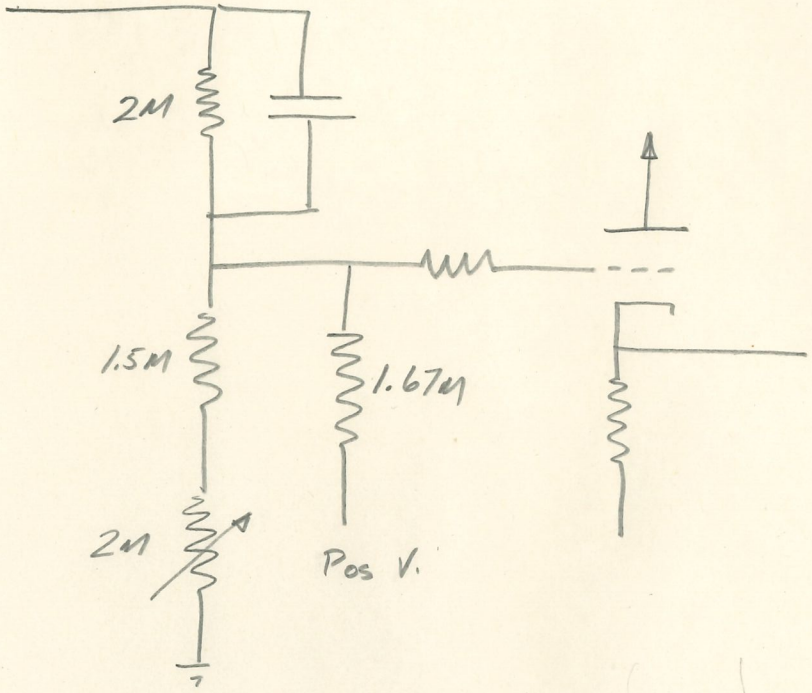
MODEL 05 RUNNING TIME METER

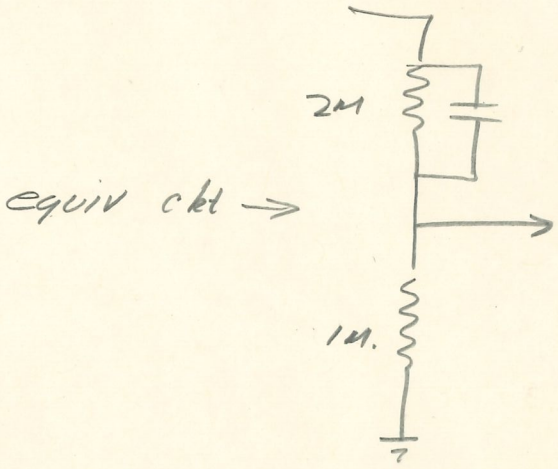
TED HOPPER PRESUMABLY HAS "3" $30 ~~$40~~


UPPER BEAM
TYPE 553 OSCILLOSCOPE
CA
FOCUS
INTENSITY
HORIZ DISPLAY
HORIZ POSITION
EXT HORIZ
CAL OUT
1 mP
100 mP
10P
VERT SIG. OUT
SWEEP TRIGGER
UPPER BEAM
LOWER BEAM
SCALE ILL
PWR OFF
LOWER BEAM
HORIZONTAL
SWEEP TRIG
CA
Tunit
TEKTRONIX INC
PORTLAND, OREGON, USA

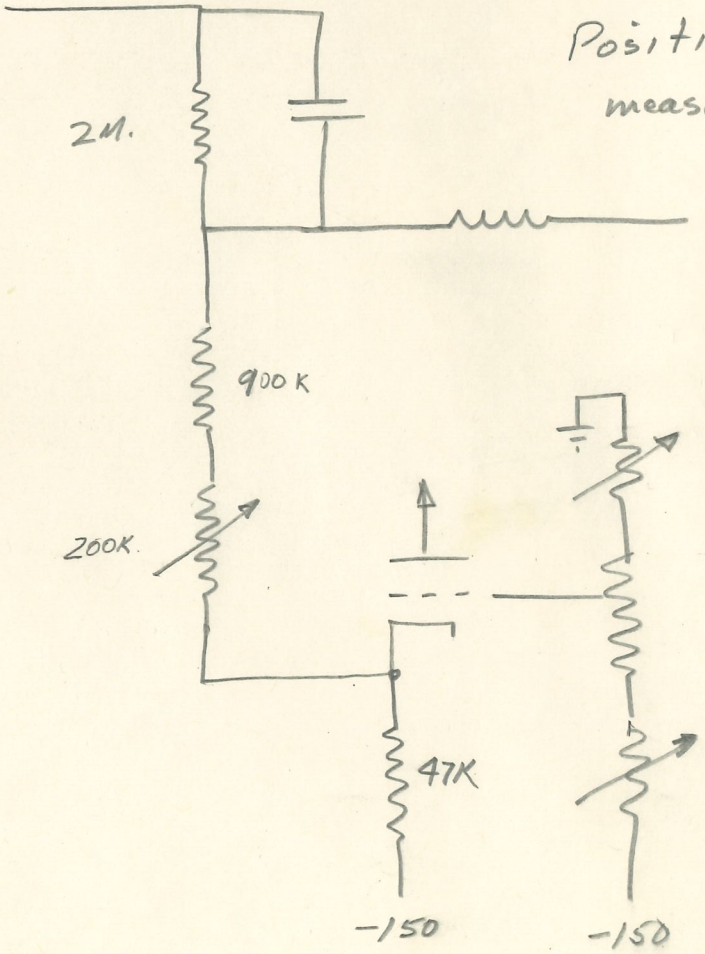

TYPE 552 DUAL-BEAM OSCILLOSCOPE
UPPER BEAM
SERIAL
LOWER BEAM
SCALE ILLUM
UPPER BEAM
FOCUS
INTENSITY
LOWER BEAM
FOCUS
INTENSITY
UPPER
VERT
OUT
LOWER
CALIBRATOR
.01V
.1V
1V
10V
100V
1 KV
TYPE 47 OR TEK X
1 SECOND
UPPER HORIZONTAL DISPLAY
POSITION
MAGNIFIER
ON
UNCAL
EXT. HORIZ ATTEN.
UPPER EXT
HORIZ IN
TRIGGER
INPUT
RESET
READY
UNCAL
VARIABLE
TIME/CM
STABILITY
SLOPE
COUPLING
AC FAST
AC
DC
SINGLE
SWEEP
LEVEL
SOURCE
UPPER
BEAM
INT
LOWER
BEAM
INT
LINE
EXT
+GATE
OUT
AUTO
FREE RUN
LOWER HORIZONTAL DISPLAY
POSITION
MAGNIFIER
ON
UNCAL
LOWER EXT
HORIZ IN
SAWTOOTH
OUT
TEKTRONIX, INC PORTLAND, OREGON, U.S.A.

552 Horiz Pos.





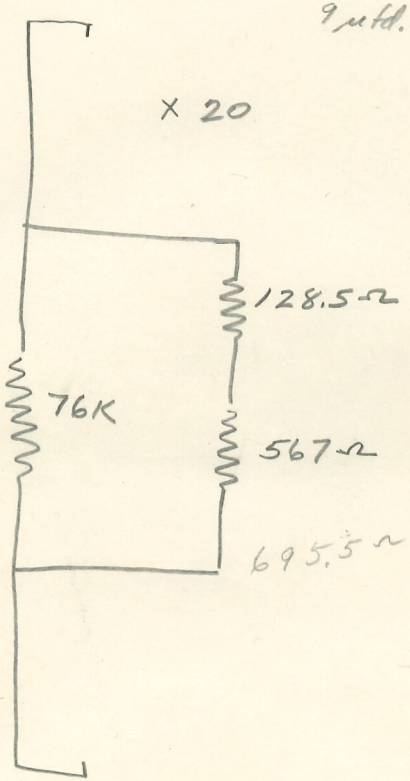
New Ckt.

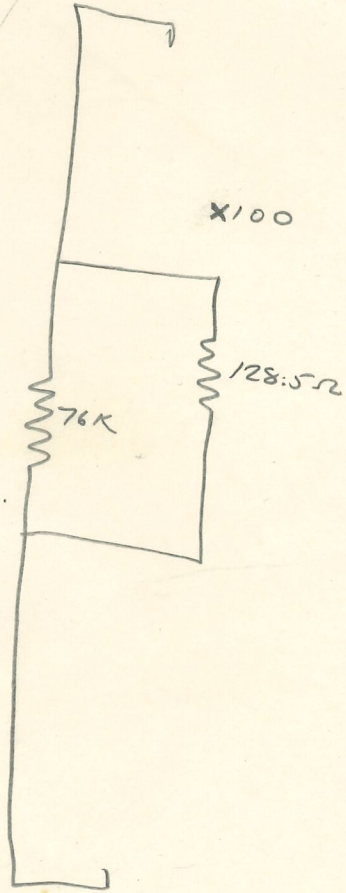


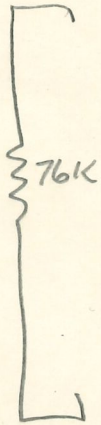
Position Lin
measured at approx
.1%

0.000
1.000
2.000
3.000
4.000
5.000
6.000
7.000
8.000
9.000
10.000

9 μfd.



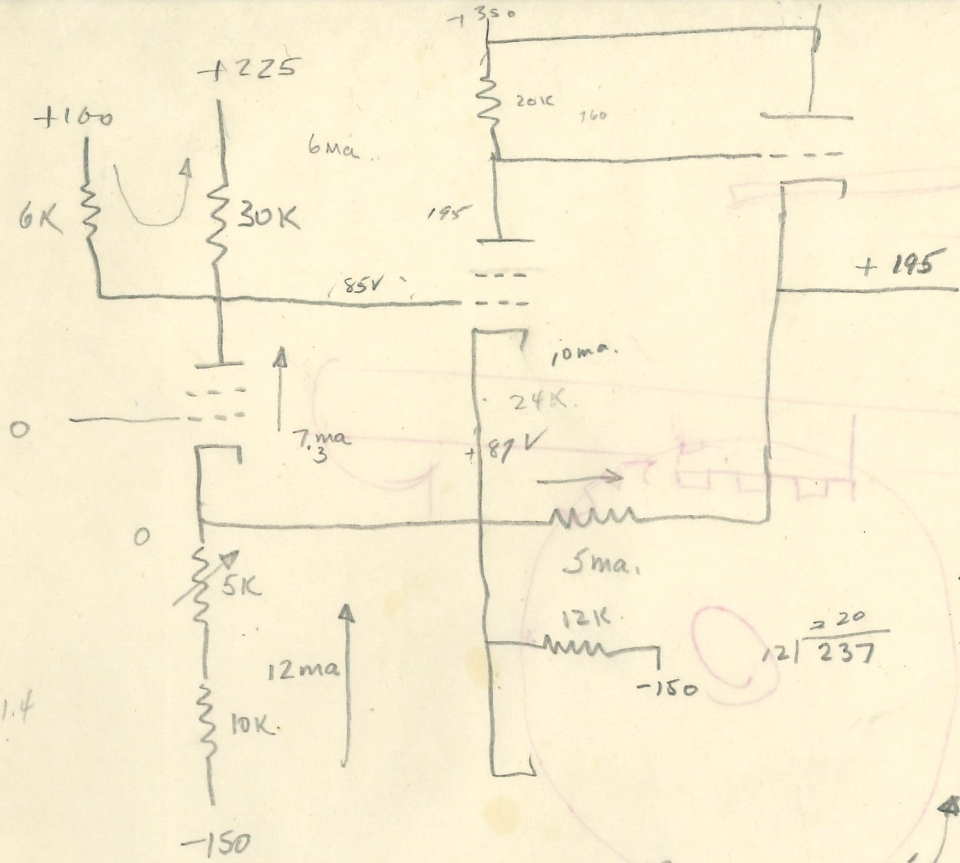




$$\frac{76X}{760+10X} = \frac{\frac{76X}{76+X}\cdot\frac{1}{10}}{X+\frac{76\cdot 1.4785}{77.4785}} = \frac{\frac{76\cdot 1.4785}{77.4785}\cdot X}{X+\frac{76\cdot 1.4785}{77.4785}}$$

1478.5

$$\frac{128.5\cdot X}{128.5+X} = \frac{1}{10}\,\frac{1478.5X}{1478.5+X}$$



1-5ma/v

5000- 20K

5K

$$121\overline{)237}\quad \approx 20$$

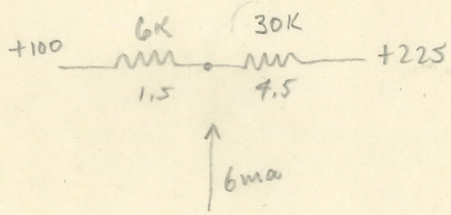
$$41.5\overline{)1950}\quad 44.7$$
1660
2900

1.4

295 - 350

195 → 95V

$$125\overline{)150}\quad 12$$
125
250



9v. 91V

.005000 × 20,000 = 100

120
135
90V

$$225 - x \cdot 30 = 100 - (6-x)(6)$$
$$100 - 36 + 6x$$
$$225 - 30x = 64 + 6x$$
$$\begin{array}{r}225\\ 64\\ \hline 161\end{array} = 36x$$
$$x = \frac{161}{36} = 4.5$$

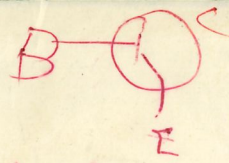
$$\frac{dv}{dt} = \frac{i}{c} \quad \frac{.6^{\,120}}{\frac{1}{120}^{\,120}} = \frac{1}{C}$$

$$C = \frac{1}{72} = \quad 72$$

.010000

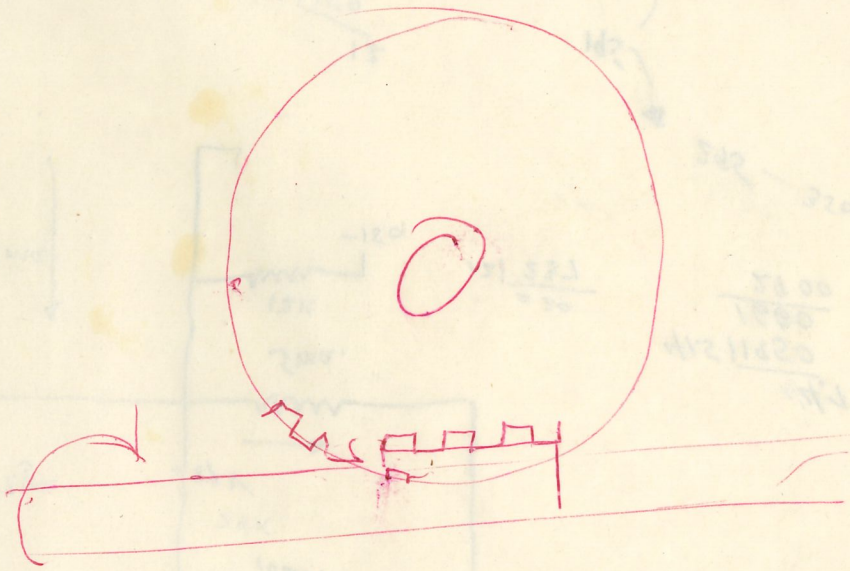
$$72\overline{)100}\quad 15,000$$
72
30

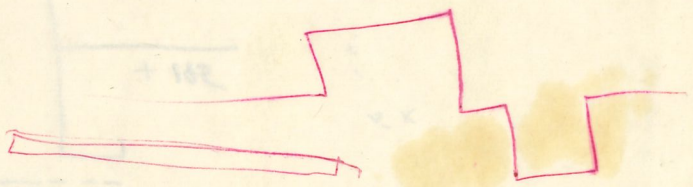
Base Volts

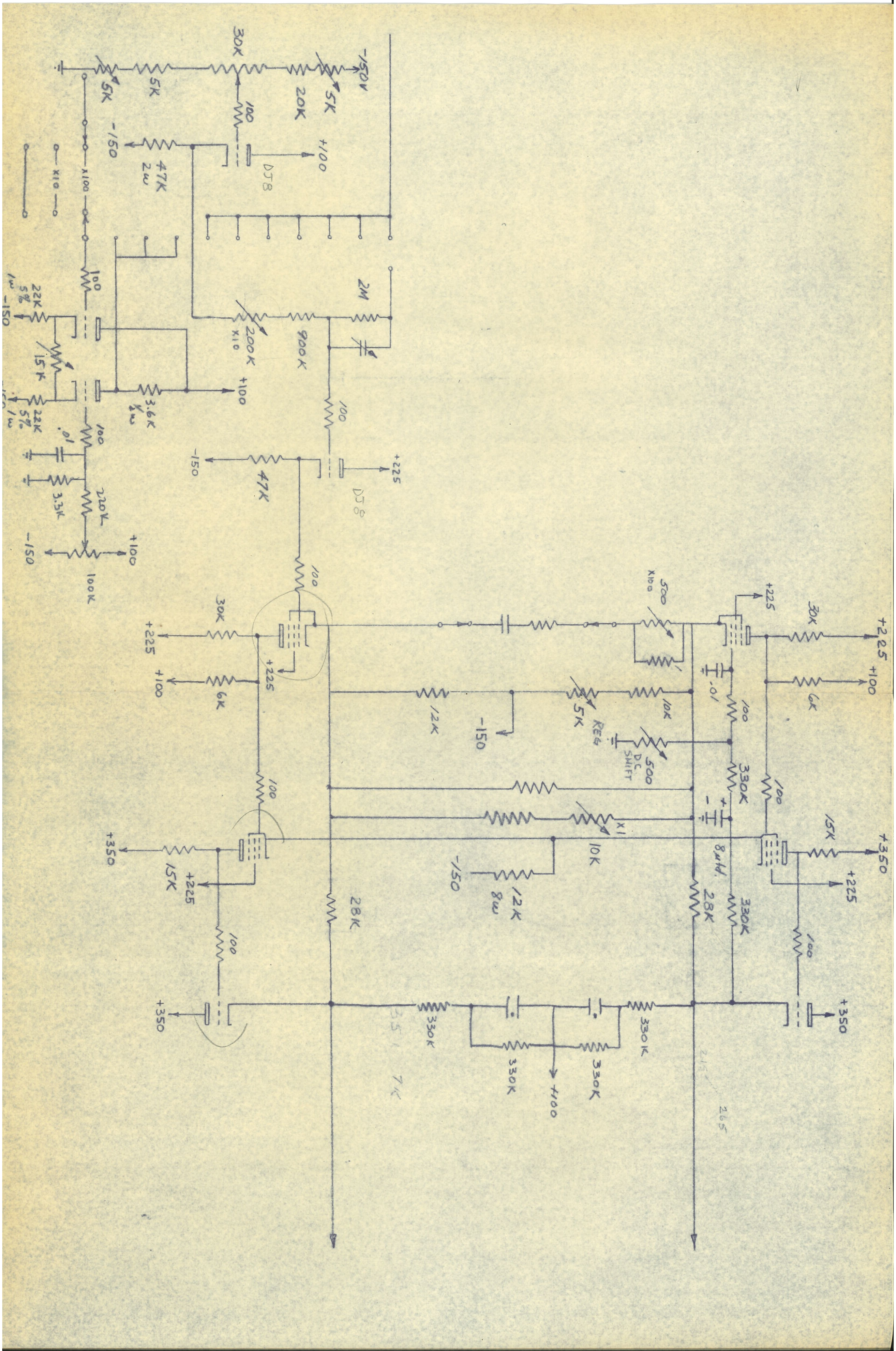


Collector Current (MA) y axis (Emitter grounded)

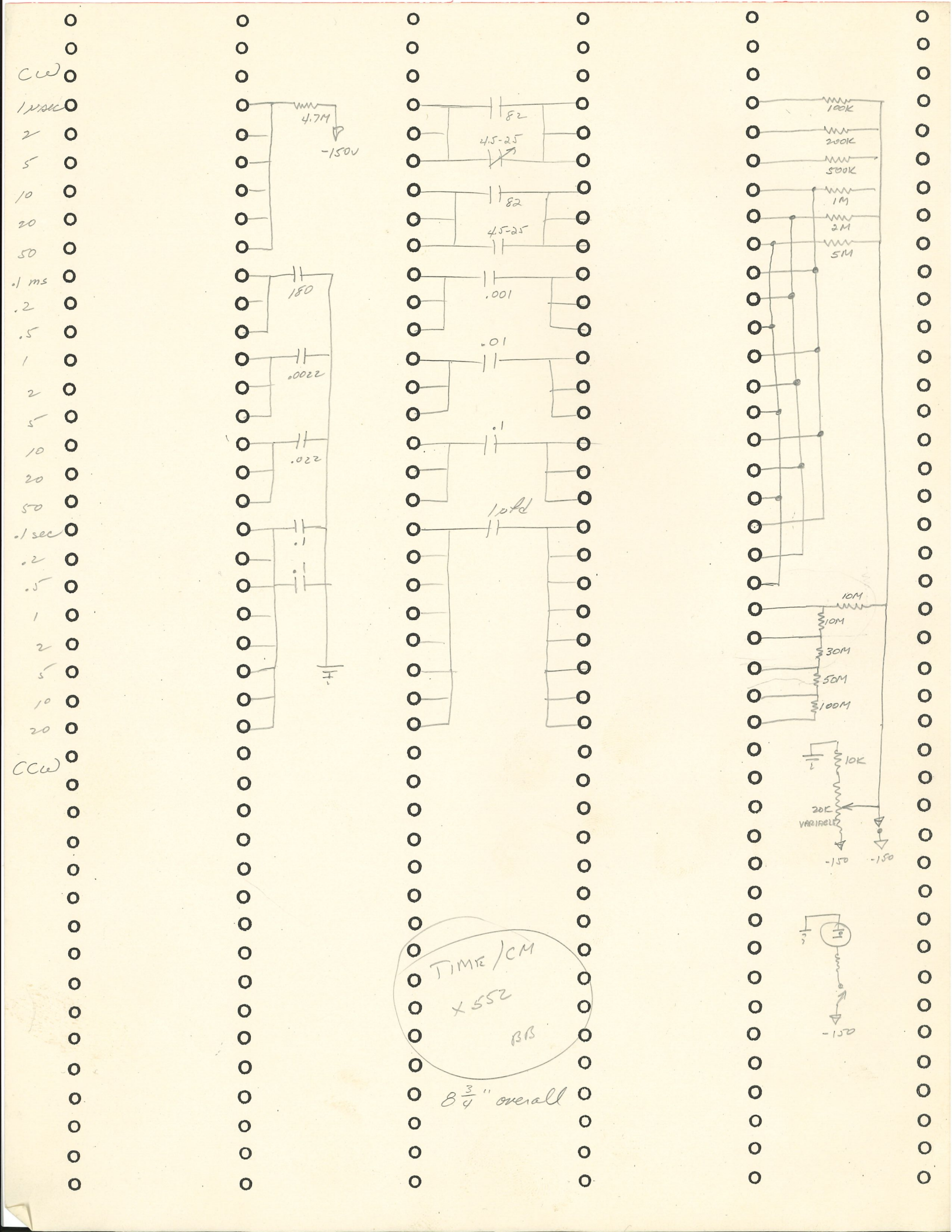
Base grounded (Base readings become Emitter)







-150V
30K
5K
20K
100
+100
DJ8
-150
47K
2w
X10
X100
2M
900K
200K
3.6K
22K
5%
1w
15K
.01
3.3K
220K
100K
+225
DJ8
30K
6K
+350
15K
28K
330K
12K
8w
10K
REG
500
DC SHIFT
8μfd.
X1


CW
1 μsec
2
5
10
20
50
.1 ms
.2
.5
1
2
5
10
20
50
.1 sec
.2
.5
1
2
5
10
20
CCW
4.7M
-150V
180
.0022
.022
.1
.1
82
4.5-25
82
4.5-25
.001
.01
.1
1 old
100K
200K
500K
1M
2M
5M
10M
10M
30M
50M
100M
10K
20K
VARIABLE
-150
-150
-150
TIME/CM
x552
BB
8 3/4" overall