User:Ashmanskas/p364/lab 1 jose

From LaPET electronics

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Physics 364 -- Fall 2010 -- Lab 1 writeup -- Jose Vithayathil

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Experiment:

Start 11:10

Lab 1 —

Aim. Purpose: Learn to use ~~lab instruments~~ Multimeter to study resistive circuits + to learn to use scope + fn generator.

Picked 5 arbitrary resistor set 1Ω-1MΩ.

Tolerance - Gold band → 5%

Color code	Nominal Ω	Measured Ω with HP multimeter
Br B Gold	1Ω	1.10.
Br B B.	10Ω	10.02
Br B Br	100Ω	99.48.
Gr Blue Y	57×10^4 570k	~~8.05K~~ 552K.
~~R R Grey~~	~~22K~~	
Grey R R.	$82\times10^2 = 8.2K$.	8.05K.

within tolerance.

Data not Organize table better

Slightly warm.

	Color code	Nominal	Max V for ¼ watt	Measured V	Measured I	R
(1)	Br Bla Gold	$10\times10^1=1\Omega$.	0.5V	~~0.5V~~	~~0.4A~~	0.5V 81.9mA
(2)	Br Bla Bla.	10Ω.	1.6V.			
(3)	Br Bla Br	100Ω.	5V			
4	~~Green Blue Y~~	$57\times10^4=570k$				
4	Grey R R	$82\times10^2=8.2K$.	>10V			
5	Green Blue Y	$57\times10^4=570k$.	>10V.			

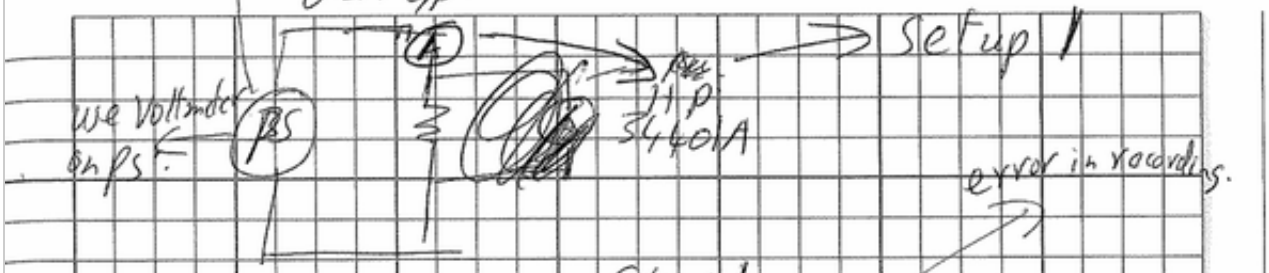
Recorded in NP.

→ Setup Next page

page 2

Name: Date:

Experiment: HPE3631A 0-25V o/p.



error in recording.

Setup 1 power

Nominal Ω	Multimeter Ω	Volts.	Current	R Setup 1
1	1.10			

Setup 1

Nominal	Multimeter	Volts (PS)	I ps	I multimeter	R ($\frac{V_{ps}}{I_{multimeter}}$)
1	1.1	0.5	0.077A	77.87 mA	6.4 Ω.
10	10.02	1.5V	0.097A	97.72mA	15.3Ω
100Ω	99.48	5V	0.047	47.94mA	100.4
8.2K	8.05K	10.0	0.001	1.246 mA	8.03K
570K	552K	25V	0.000	0.04543A	550.7

→ 1Ω + 10Ω resistor large measurement error.

Looked up HP34401A specs in. 10mA & 100mA ranges the ammeter resistance is 5Ω. (pg 217 in manual).

So roughly expect results. (larger ± fractional error for test. lower resistances

At For large R expect good results.

(Don't PS source resistance

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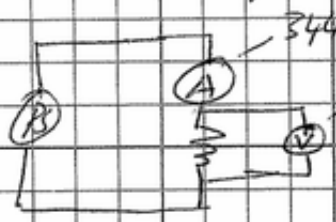
Experiment:

Using a 2nd multimeter (Handheld DT-830B) to measure V across R

Setup 2



R	V_{PS}	I_{PS}	3440A I(A)	V(DT-830B)	$\frac{V}{I}$
1Ω	0.5V	0.077	77.1mA	77.2mV	~1Ω
10Ω	1.5V	0.077	97.73	0.964V	~10Ω

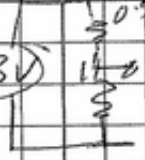
Agreement good.

Part → Resistor circuits:

Picked 1k + 2k, Measured 0.99k + 1.98k

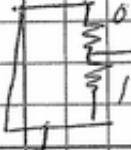
V_0. $V_0 = 2.01V$

V_{Th} = Open load voltage



$V_{Th} = 2.008V$.

R_{Th} = Short circuit PS



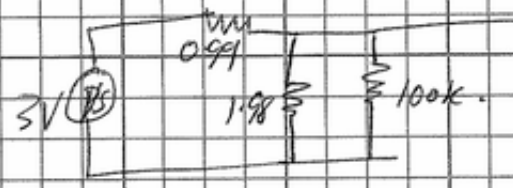
$R_{Th} = 0.659k\Omega$.

Calculate V_{Th} 3.00V R_{TH} 0.66k (agreement good)

Name: Date:

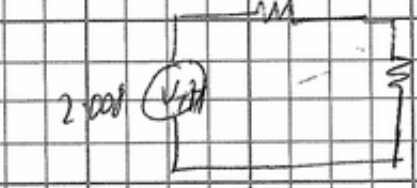
Experiment:

Used 99.12 kΩ load



$V_o = 1.995$ V.

Thevenin eq circuit

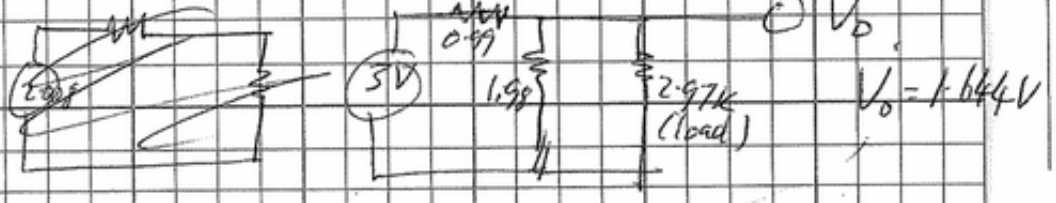


V_o expected $= \frac{2.008 \times 99.12}{(99.12 + 0.659)}$

$= 1.994$

Good agreement with measured V_o.

Replaced 100kΩ with 2.97kΩ resistor.



$V_o = 1.644$ V

Expect from Thev $= 2.008 \left[\frac{2.97}{(2.97 + 0.6)} \right] = 1.67$ V

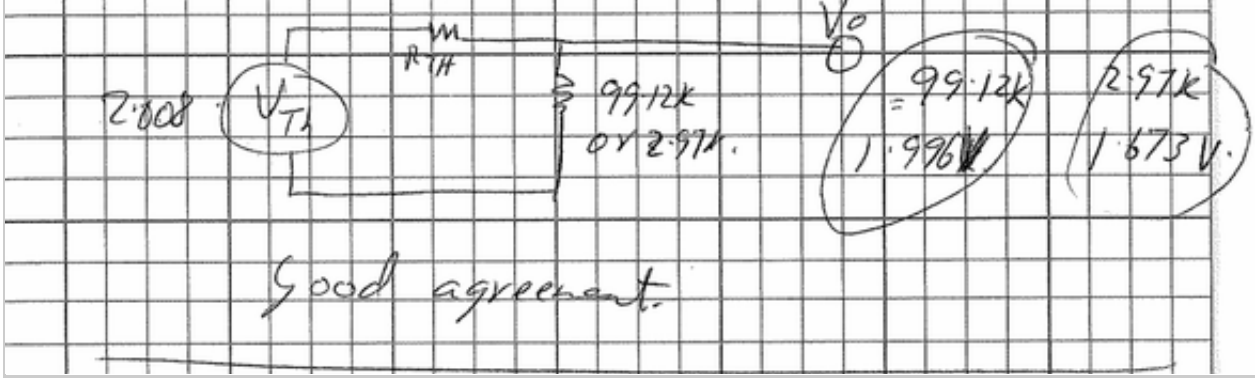
Fair agreement

Have trouble making reliable contact on the bread board.

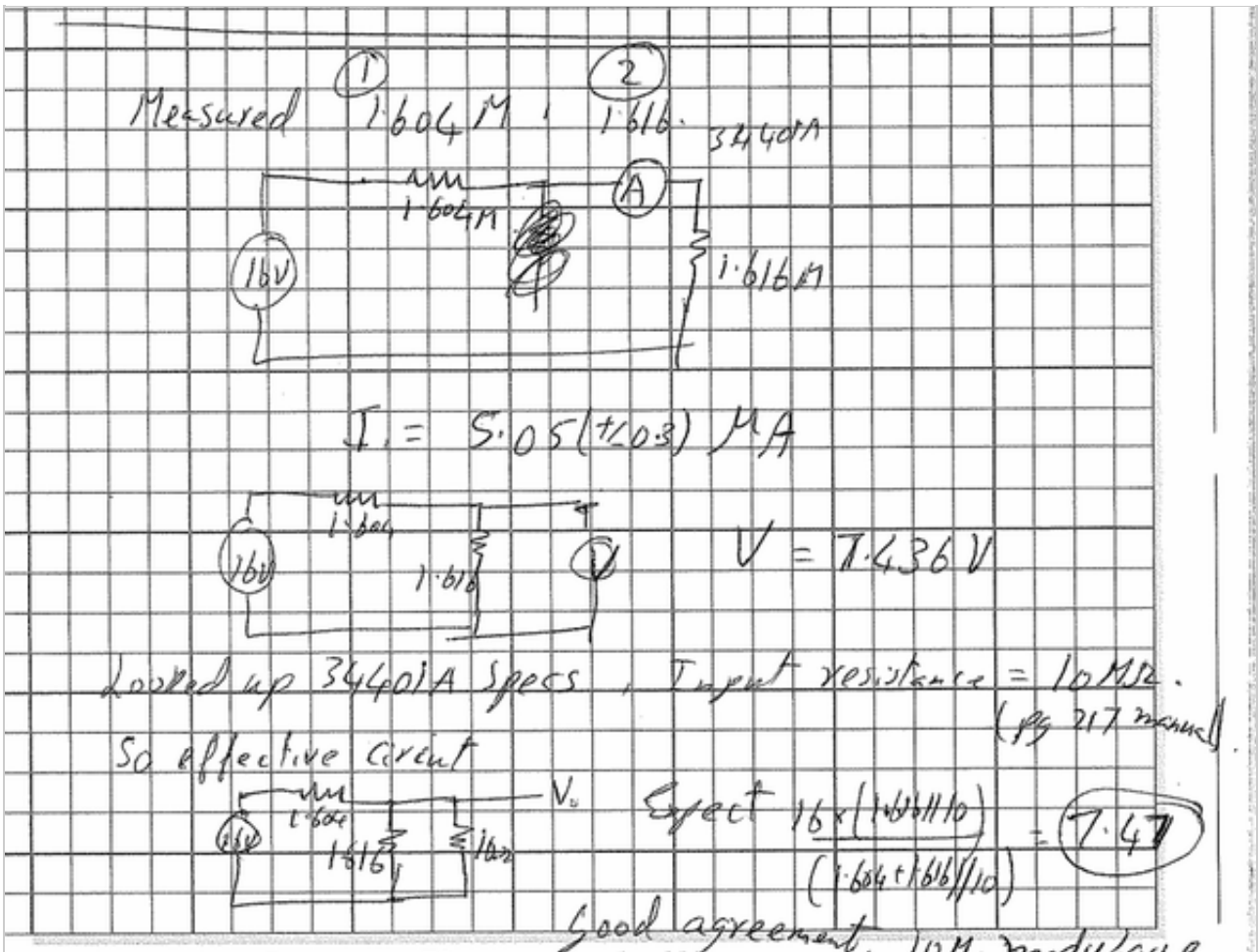
Name: Date:

Experiment:

Constructing Thevenin eq circuits for previous voltage divider, combing (0.327+0.266k) to get 0.593k.



Good agreement.



Important: Place card under blue copy.

Name: Date:

Experiment:

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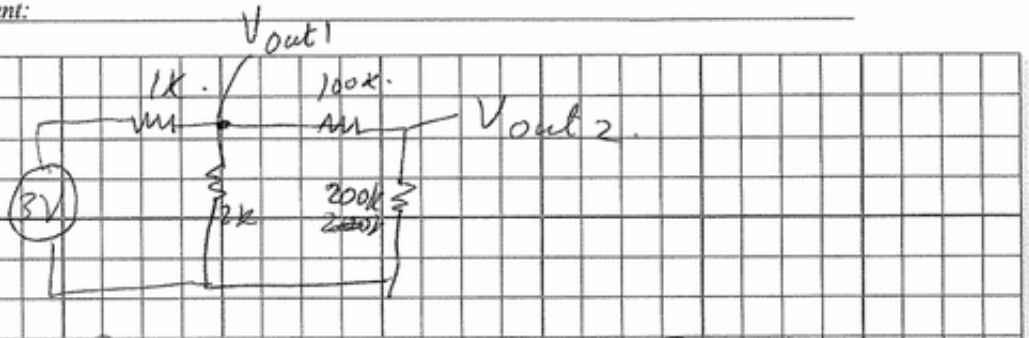
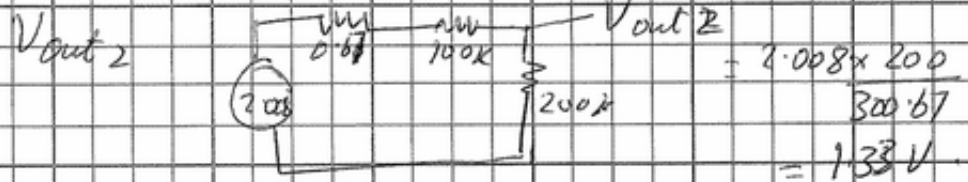


$R_{th} - R_s = \frac{2 \cdot 1}{1+2} \approx 0.67k$

Expect Vout, very close to 2.008V

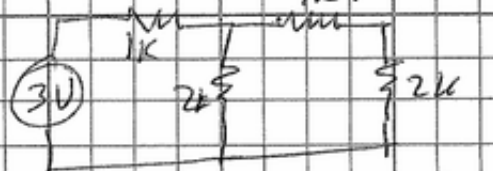


$= \frac{2.008 \times 200}{300.67}$

$= 1.33V$

Measure Vout1 = 2.00V } good agreement
Vout2 = 1.324 }

Replace Rebuild replacing 100K+200K with 1K+2K.



Expect $V_{out1} = \frac{3 \times \left(\frac{3 \times 2}{3+2}\right)}{\left(\frac{3 \times 2}{3+2}\right) + 1} = 1.636V.$

$V_{out2} = 2.0 \times \left(\frac{2}{2+1.067}\right) = 1.09V.$

Measure Vout1 = 1.64V. } good agreement
Vout2 = 1.09V }

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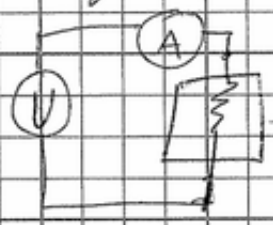
Experiment:

Mystery Boxes. ⇒ Measuring I-V to see if linear.



MB1 ⇒ current dependant on direction.

connected leads for max currents

V	MB1 (I)	MB2 (I).
2	1.47 MA	0.038 mA
4	126 MA (not	0.075 mA
6	12.6 mA (Note 10^3 change)	0.112 mA
8	22.5 mA	0.150 mA
10	25.7 mA	0.188 mA

non resistive. Resistive

Total time (Jose) = 3 hours, 10 minutes