Name: Date: 9/10/10 56

Experiment:

Lab 1 — Start 11:10

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

Picked 5 arbitrary resistor bet 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	~~8.0k~~ 552k
~~R R Gr~~	~~22~~	
Gray R R	82×10^2 = 8.2k	8.05k

} within tolerance

~~For next~~ Organize table better

	Color Code	Nominal	Max V for 1/4 W	V	I	Measured R
①	Br Bla Gold	10×10^{-1} = 1Ω	0.5V	~~5~~		0.5V 21.9mA
②	Br Bla Bla	10Ω	1.6V			
③	Br Bla Br	100Ω	5V			
~~4~~	~~Green Blue Y~~	~~57×10^4 570k~~				
4	Gray R R	82×10^2 = 8.2k	>10V			
5	Green Blue Y	57×10^4 = 570k	>10V			

Slightly warm.

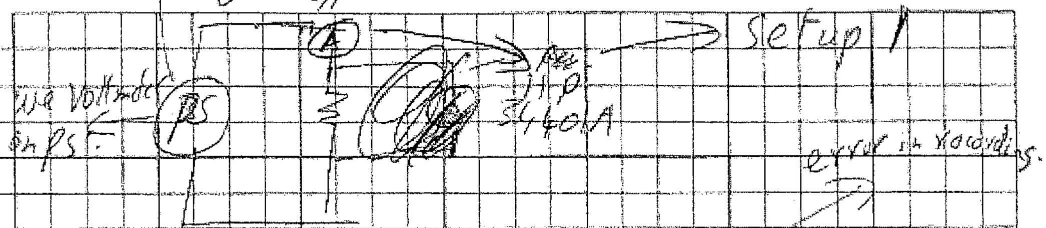
Rewrote in NP.

→ Setup Next page

page 2

Name: Date: 57

Experiment: HP E3631A 0-25V o/p.



~~Nominal Ω Multimeter Ω Volts Current R Setup 1~~

~~1 1.10~~

Setup 1

Nominal	Multimeter	Volts (PS)	I PS	I multimeter	R (V_{ps} / $I_{multimeter}$)
1	1.1	0.5	0.077A	77.87mA	6.4 Ω
10	10.02	1.5V	0.097A	97.72mA	15.3 Ω
100 Ω	99.48	5V	0.047	47.94 mA	100.4
8.2K	8.05k	10.0	0.001	1.244 mA	8.03k
570K	552K	25V	0.000	0.04542mA	550.7

→ 1Ω + 10Ω resistor large measurement error.

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

So ~~roughly~~ expect results. (large fractional error for lower rest. resistances

~~At~~ For large R expect good results.

~~Chk PS source resistance~~

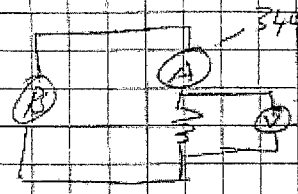
page 3

Name: Date: 58

Experiment:

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

Setup 2

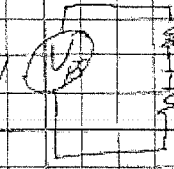


~~R~~	VPS	IPS	34401A I(A)	V(DT830B)	R = V/I
1k	0.5V	0.077	77.1mA	77.2mV	~2Ω
10Ω	1.5V	0.077	97.73	0.964V	~10Ω

Agreement good

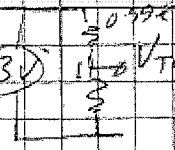
Part → Resistor circuits

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



V_0 = 2.01V →

V_{Th} = Open load voltage



V_{Th} = 2.01V

R_{Th} = Short circuit PS

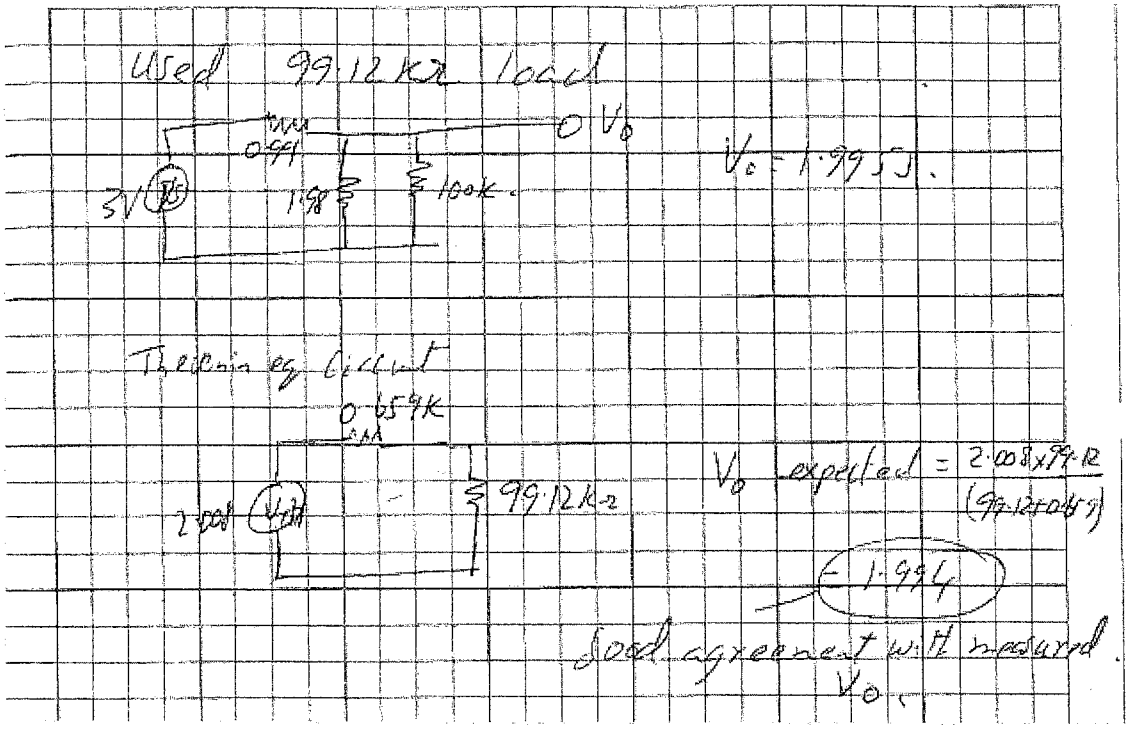
R_{Th} = 0.659kΩ

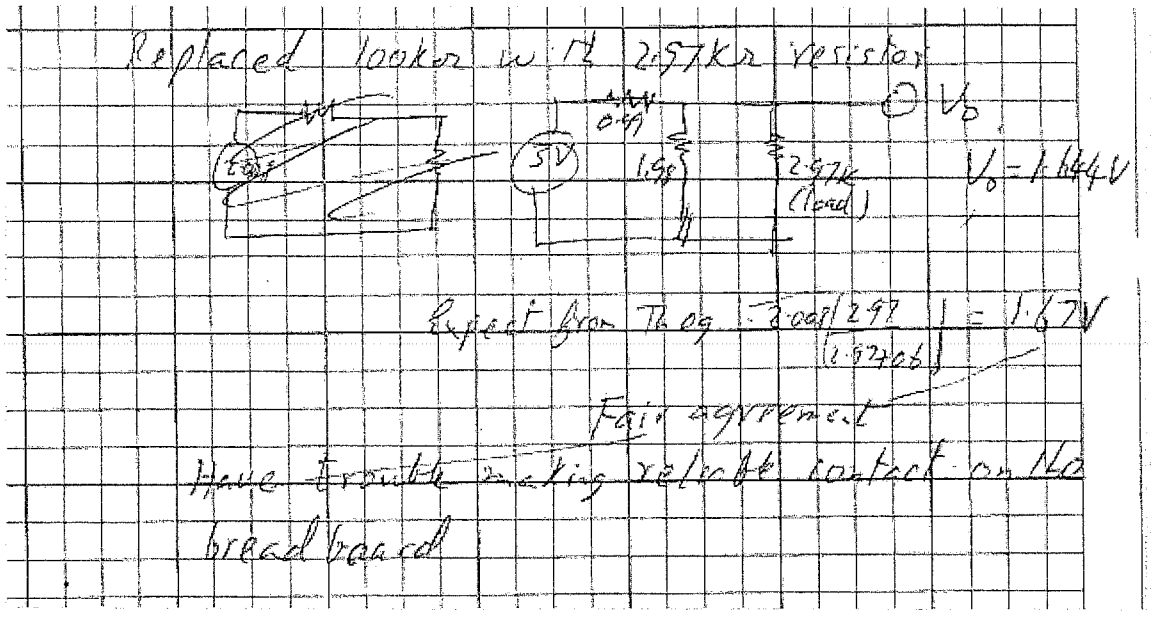
Calculate V_{Th} 3.00V R_{Th} 0.66k (agreement good)

page 4

Name: Date: 59

Experiment:

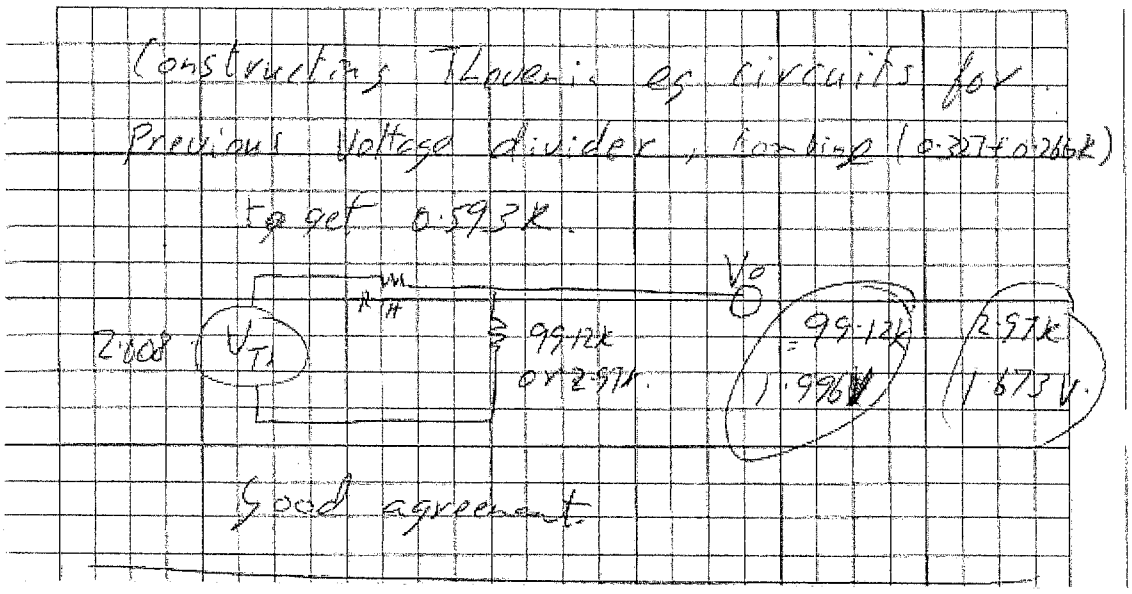


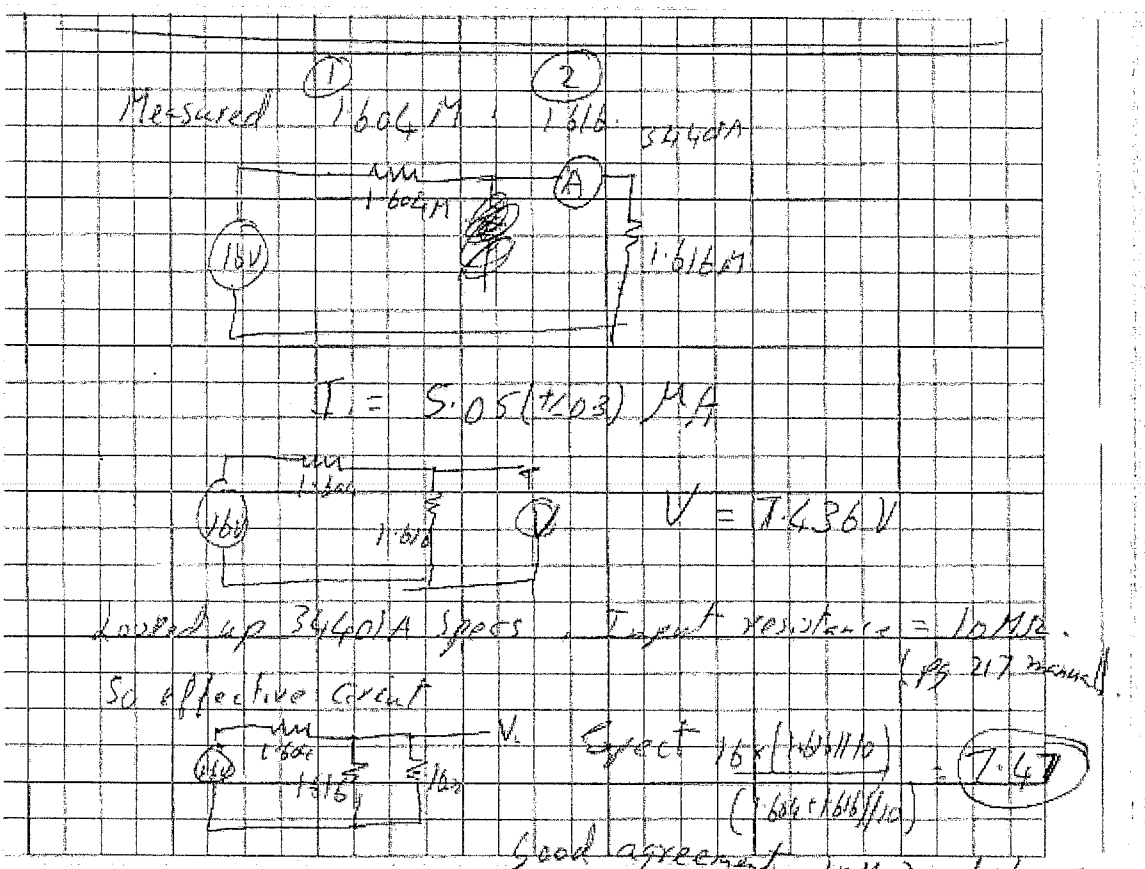


page 5

Name: Date: 60

Experiment:



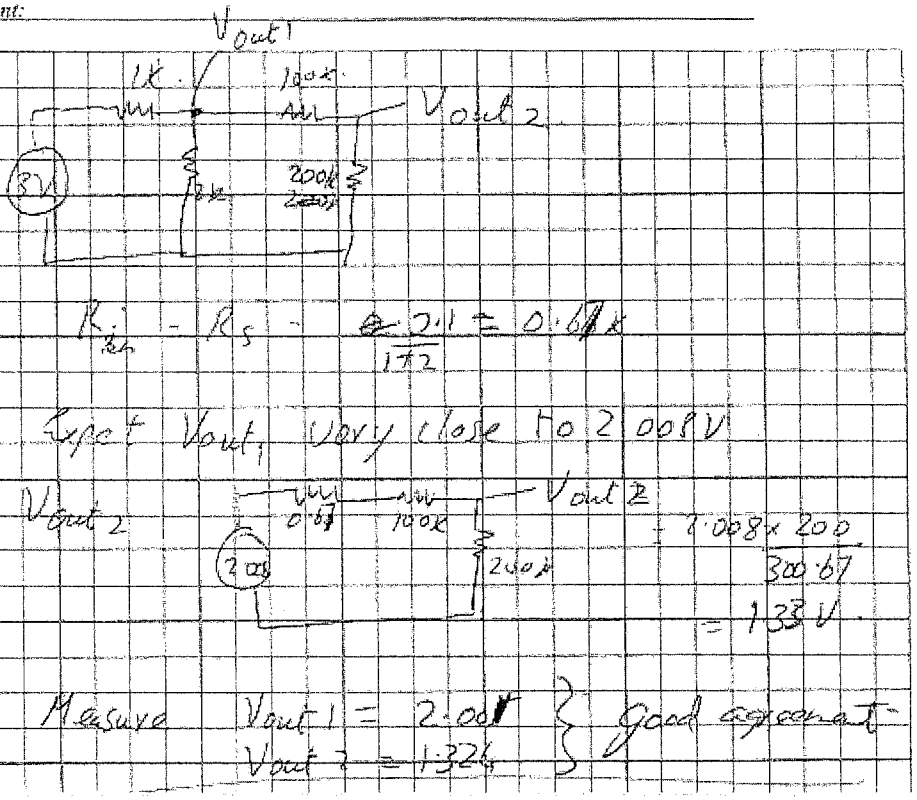


Important: Place card under blue copy.

page 6

Name: Date: 61

Experiment:



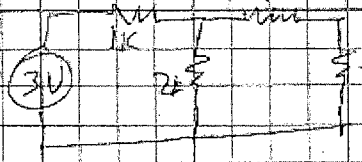
$R_{in} = R_s + \frac{R_1 R_2}{R_1 + R_2} = 0.1 + \frac{2 \cdot 1}{1+2} = 0.67\,k$

Expect Vout1 very close to 2.008 V

$V_{out2} = \frac{2.008 \times 200}{300.67} = 1.33\,V$

Measure Vout1 = 2.00 V } Good agreement
Vout 2 = 1.32 V }

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



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

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

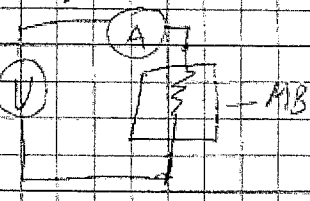
Measure Vout1 = 1.64 V } Good agreement
Vout 2 = 1.09 V }

page 7

Name: Date: 62

Experiment:

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



MB1 → current dependant on direction.

~~voltage~~

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 ½ 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