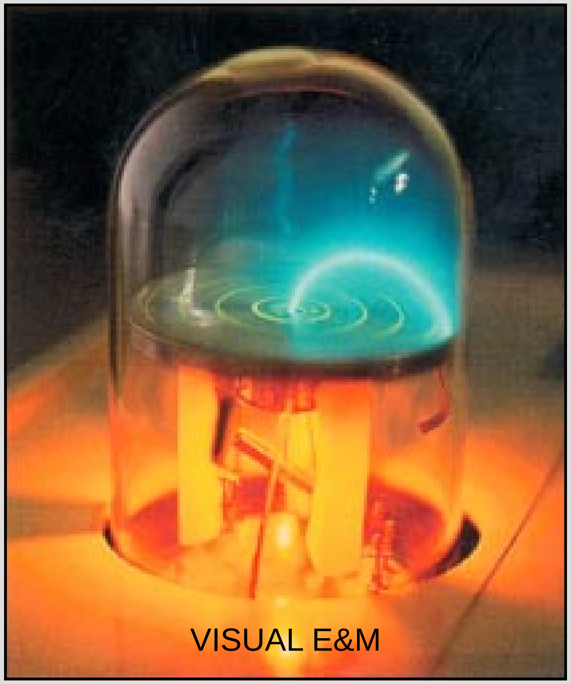
Induction



~~A FOCUSSED CONCEPT~~ eLAB

Fig 1. An Induction Flashlight

Introduction

Figure 1 shows a flashlight that does not use batteries. The flashlight contains a coil of wire called a *solenoid*, a permanent magnet, a simple circuit, and a solid state light bulb called a *light emitting diode* (LED). As the magnet is moved through the coil, voltage pulses are generated by Faraday's Law of Induction. The circuit converts the pulses into a DC voltage that is stored on a capacitor and used to light the LED.

The goal today is to explore Faraday's Law of Induction by investigating the operation of the flashlight.

In 1831 Michael Faraday and Joseph Henry independently studied electric currents that arose in circuits because of a changing magnetic field. They found that the relative motion between a conductor and a magnetic field is important. The faster the relative motion, the greater the emf generated across the ends of the conductor. Faraday found that the emf, $\mathcal{E}$, induced in a solenoid (a coil with N turns of wire) is proportional to the rate of change of the magnetic flux through the area of the solenoid. That is:

$$\mathcal{E} = -N\frac{d\Phi_B}{dt} \quad \text{where: } \Phi_B = \int \vec{B}\cdot d\vec{A}$$

By definition, Φ_B is the *magnetic flux* through one turn of the coil. The magnetic flux depends on the magnetic field strength (B) in *Tesla*, the area of the loop (A) in m^2 and the angle (θ) between them.

An induced current, i, will flow in a solenoid of resistance, R, as a result of the induced emf. From Ohm's law: $i = \mathcal{E} / R$.

The direction of the induced current in the solenoid can be found by applying Lenz's law and the right hand rule.

Lenz's Law

The direction of the induced current is such as to oppose the change that caused it.

The Right Hand Rule

If you point the thumb of your right hand in the direction of the changing magnetic field, the fingers of your right hand will curl in the direction of the current. See Figure 2.

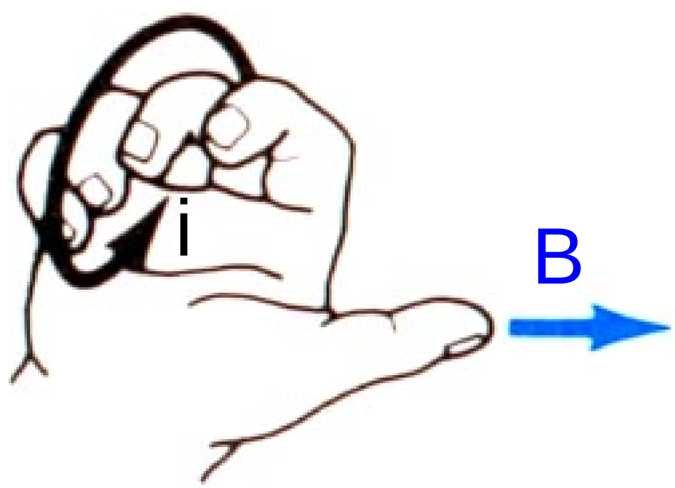


Figure 2. The Right Hand Rule

The Experiment

Getting Started

A breadboard is a set of formed, metal sockets inserted into a plastic housing which holds them firmly in place. Sockets called “tie points” are attached to “connector strips” built into the breadboard. The connector strips are visible on the back side of the breadboard. Look at the connector strips. Visualize the function of the connector strips.

1. Discuss the theory and the experiment. Plan a way to share the workload. Managers: select a discussion question.

2. Discuss the layout of the connector strips and how they might be used for interconnecting components.

3. Review the use of a multimeter to measure voltage.

An induction flashlight has been modified by removing all of its internal components except for the solenoid and magnet. The solenoid is connected to red and black terminals at the front end of the flashlight.

4. Carefully remove the internal housing from the flashlight. See Figure 3.

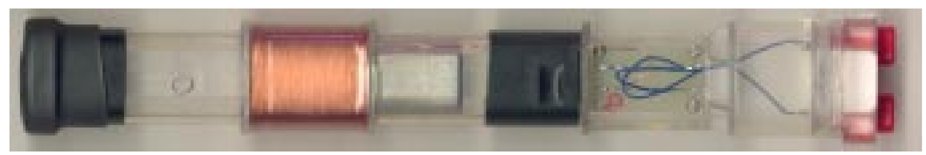


Figure 3. Modified Induction Flashlight (Internal Housing)

Caution: The magnet is powerful. Keep magnetic media (credit cards, etc.) far away from the housing.

5. Examine the housing and identify its components. Reassemble the flashlight (insure the housing is locked in place).

Prepare for Data Collection

Examine the circuit board and the schematic diagram shown in Figure 4.

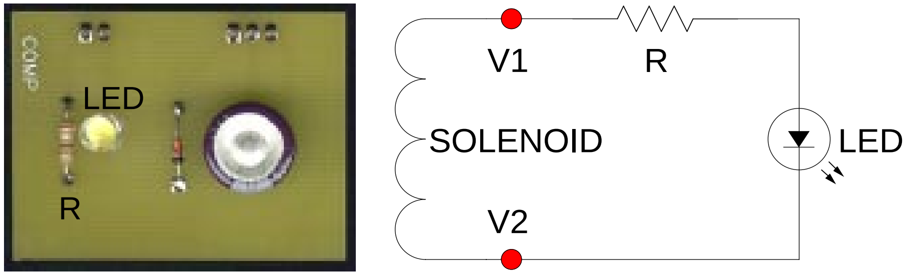


Figure 4. Circuit Board and Schematic Diagram

1. Connect the terminals at the top of the flashlight to the red *terminal posts,* VI and V2, on the breadboard. Wire the LED and the resistor, R, as shown in the schematic diagram. The LED draws much less current than a conventional flashlight bulb and will last much longer.

2. Tilt the flashlight to slide the magnet slowly, back and forth, through the solenoid. The LED will flash in response to the induced emf. Increase the tilt rate.

3. The resulting voltage across the solenoid (V2 - V1) is shown in Figure 5.

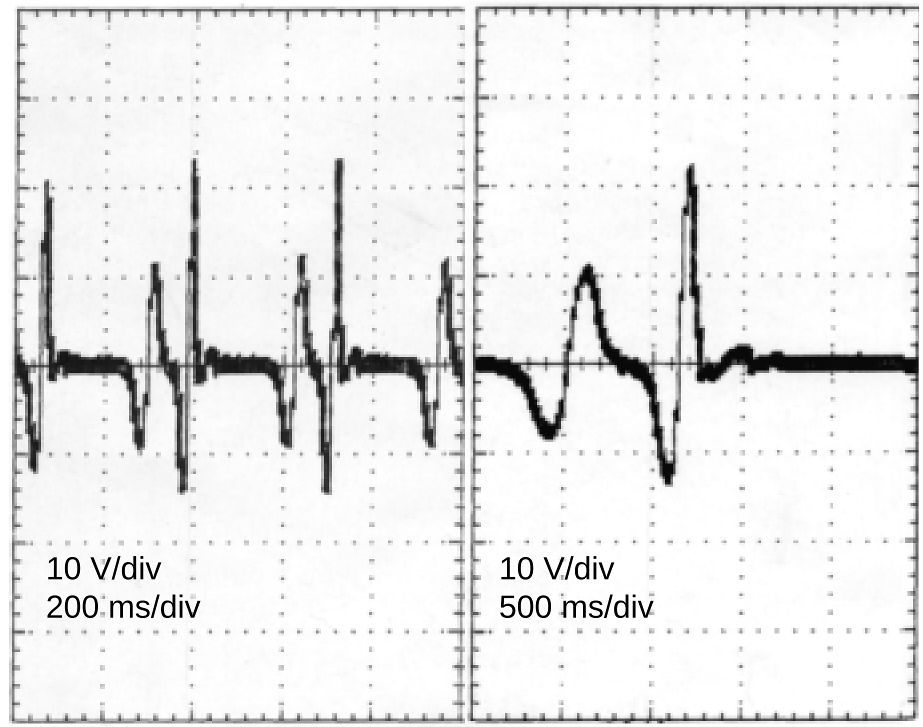


Figure 5. Solenoid Voltage Versus Time.

4. Decide on a format to record data and observations in your lab notebook. Include the SI units for all parameters.

Examine the Time Constant

1. Make an induction flashlight by creating the circuit shown in Figure 6.

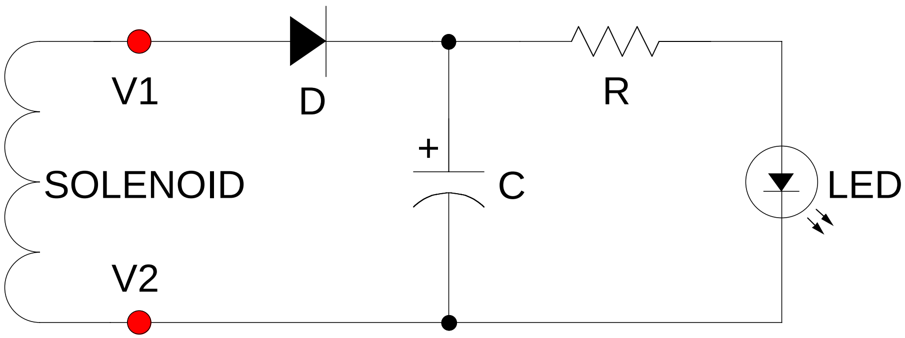
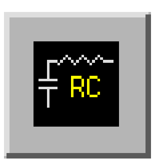


Figure 6. Flashlight Schematic

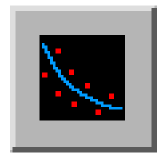
The solid state *diode* (D) and the *capacitor* (C) are mounted on the circuit board shown in Figure 4. The diode conducts current only in the direction of the arrow which prevents the capacitor from discharging through the solenoid. The time constant, RC, determines how long the LED will be brightly illuminated.

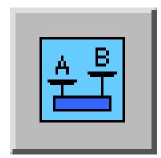
1. Measure the resistance, R.

2. 

Find the theoretical value of the time constant for C = 0.1 F.

3. Connect a voltmeter across the capacitor and shake the flashlight vigorously until the LED is brightly illuminated. Quickly measure and record the voltage as a function of time in 30 s intervals from t = 0 to t= 240 s.

5. 
Enter the voltages and find the experimental value of the time constant.

6. 

Compare the theoretical and experimental values of the time constant.

Team Discussion

1. Summarize the experiment and the conclusions that were reached. Go to the blackboard, sketch the essential features of the apparatus and compare the results from all the teams.

2. Examine Figure 5. Justify each feature in the waveform by applying the right hand rule to a solenoid and a magnet that moves, back and forth, through the solenoid.

3. Discuss your measurements of the time constant. Provide a rationale for the difference between the theoretical and the experimental value of RC.

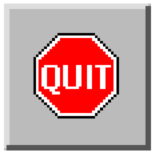
4. The flashlight is called a “Forever”, or “Lifetime” flashlight. Discuss the lifetime of the flashlight in terms of your observations and your investigations of the flashlight circuit.

5. An MRI imaging magnet can create a field strength of $\approx$1.5 T in a circular bore $\approx$ 60 cm in diameter. Discuss the consequences of reducing the field in the magnet by 10% in 1 ms.

6. Your team is asked to design a generator based on Faraday’s Law of Induction. Sketch and discuss a design that will deliver 120 VAC at 60 Hz.

Finish Up

1. Enter a brief summary of the experiment and the team discussion in your lab notebook.

2. 

Quit the software menu.

3. Manager: Ensure that all components and hardware used by your team are returned to their original state and placed in their original location.

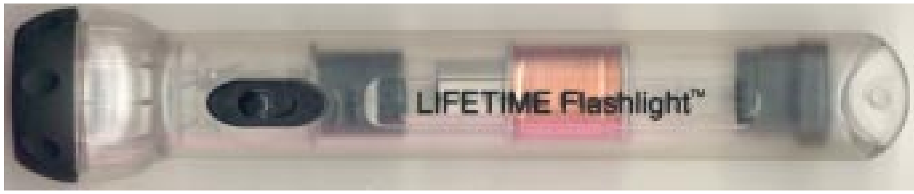


Figure 7. Forever Flashlight

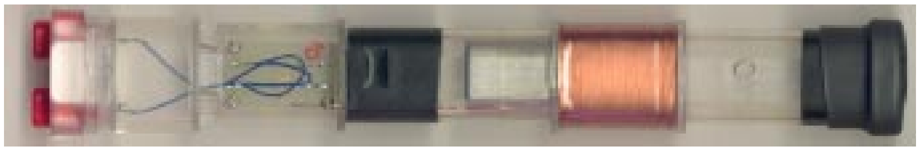


Figure 8. Forever Flashlight Modified

Figure 9. Breadboard

Materials and Supplies

1 each	Forever Flashlight model 422-D. See Figure 7.
1 each	Forever Flashlight model 422-D modifed (circuit board, spring and rubber buffer removed). With UNM161L-027 and UNM0032T01 inserted and wired. See Figure 8.
1 each	Breadboard. Global Specialties PB-60. Figure 9.
1 each	Circuit board. UNM0037T01 (See Figure 4).
2 each	Patch Cord. 60" Banana (Red). Pomona B-1524-2.
1 each	Plier (Snub Nose). Wire Cutting. GC Electronics 12-7072.
1 spool	Wire. Buss Bar (ASW 22). Consolidated C0S3818C (100 ft).
1 each	Multimeter (Zmin =10 MΩ). 3 1/2 Digit. Wavetek 15XL.

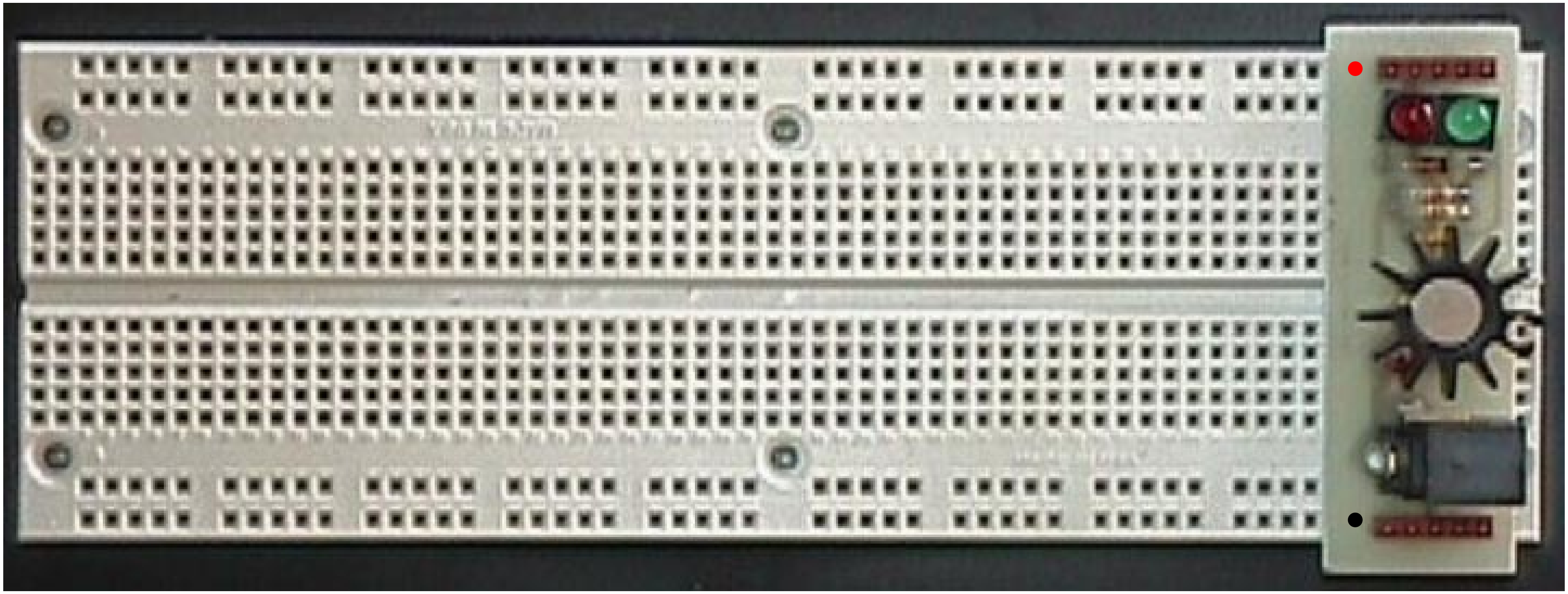
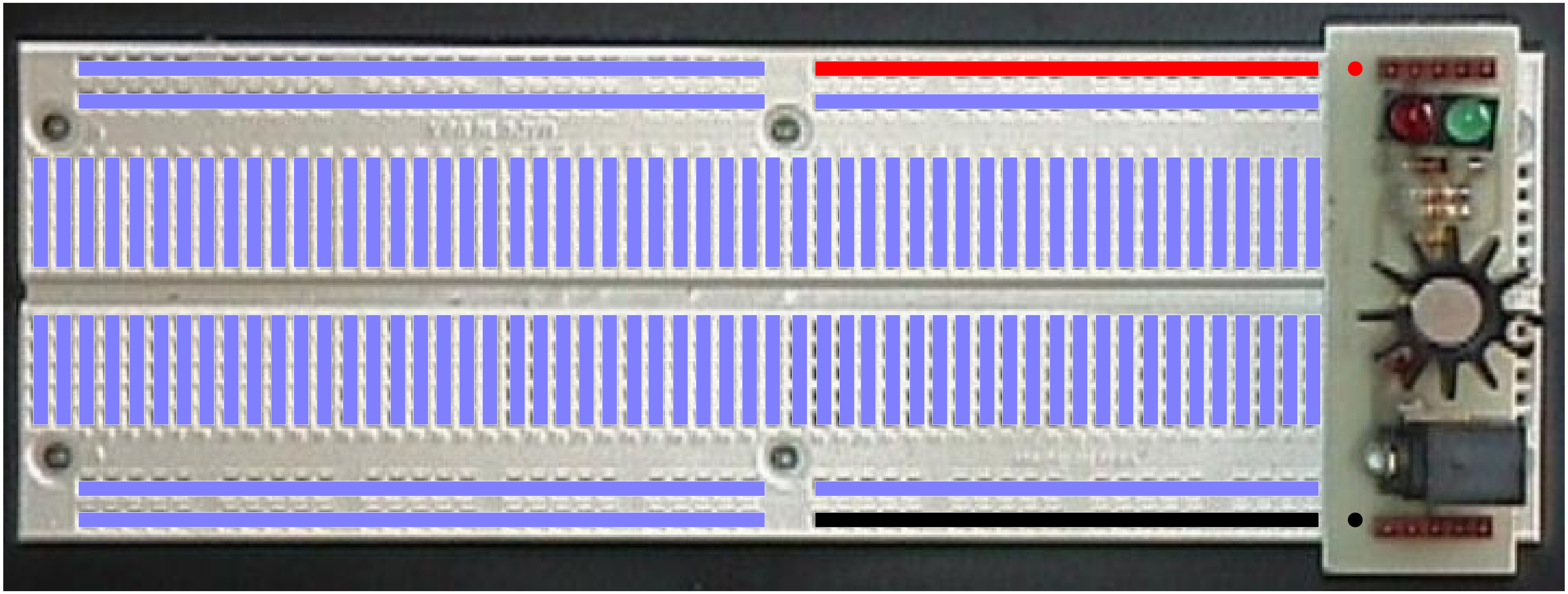


Figure 1. A breadboard with a +5 V regulated power supply mounted on a PC board (right).

Figure 1 shows a breadboard assembly. A breadboard is an extremely useful device because it can be used to interconnect electronic components in an variety of ways without the use of “solder” to connect them together. This is accomplished by using groups of sockets that are connected internally to create a common “connector strip.” Each socket in a connector strip is called a “tie point. A tie point will accept a # 22 AWG (American Wire Gage) pin or wire.

Each connector strip behaves like a separate wire and each tie point is a connection to it. The module at the right is plugged into two connector strips. It provides multiple tie points at +5V (red) and common (black). Show the connector strips.

RETURN



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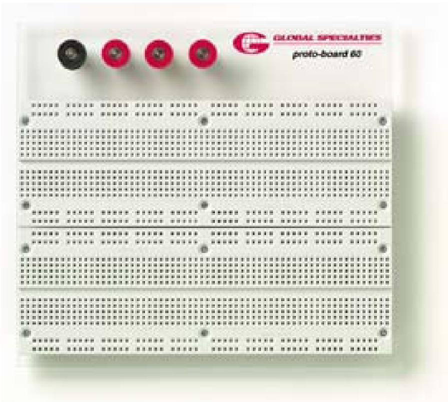
Each connector strip behaves like a separate wire and each tie point is a connection to it. The module at the right is plugged into two connector strips. It provides multiple tie points at +5V (red) and common (black). Hide the connector strips.

PB-60

Transparent Proto-Board®

Ideal for teaching applications



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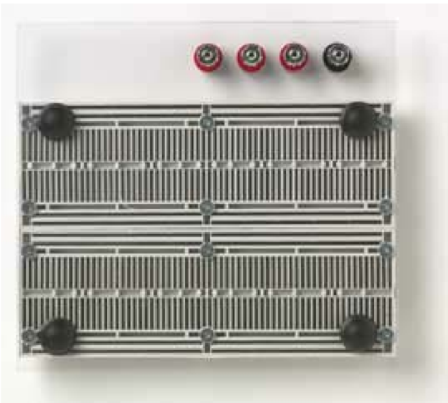
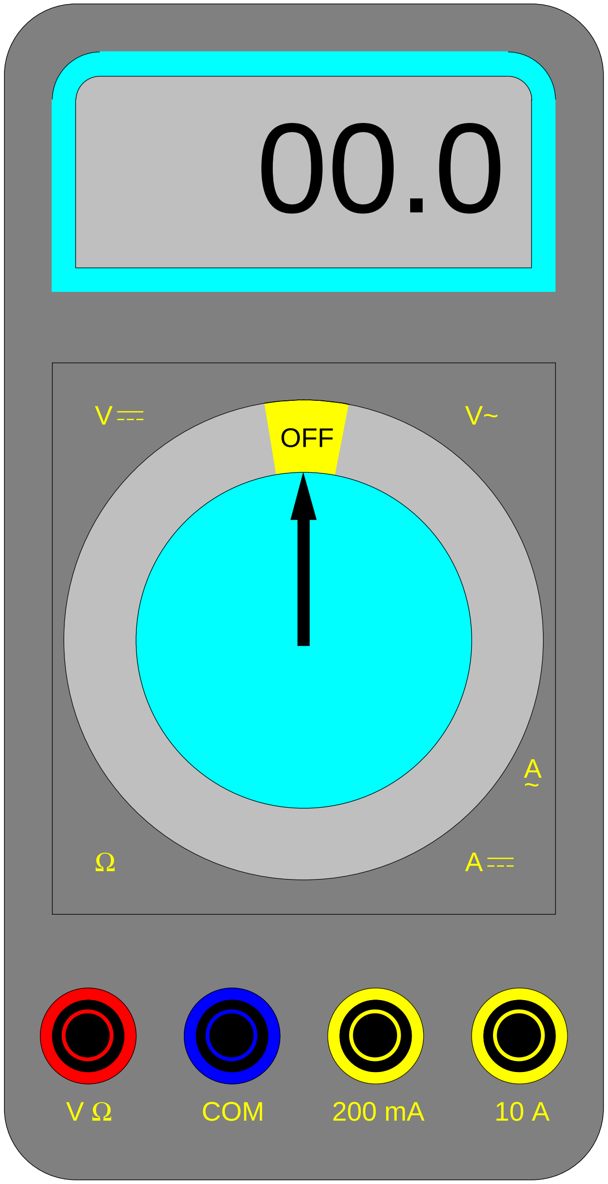


back

- **1680 tie points**
- **IC capacity for 16 ICs (based on 14 pin ICs) y**
- **Lifetime warranty on sockets**
- **Nickel silver alloy pins are pre-stressed, spring loaded and noncorrosive for long-term reliability**
- **Molded in rugged thermoplastic for durability and high temperature applications**
- **Parts plug in and pull out without soldering or damage**
- **Patented design**
- **Proudly made in the U.S.A. from domestic materials**
- **From the innovators of high quality breadboards since 1973**
- **Perfect for educational purposes, product design, test fixture design, quality control, and hobbyists**
- **Specifications**
- **Download Spec Sheet in PDF format**
  Download Acrobat Reader

This new model PB-60 is a special breadboard, specifically designed for educational training. Two Global UBS-100s are screwed to a clear Plexiglass plate, leaving the pin layout and bus strip pin connections clearly visible, which is ideal for teaching circuit continuity. Three red and one black binding post are provided for voltage or signal connections. Four rubber feet keep the PB-60 from sliding on the work area.



Wavetek 15XL Digital Multimeter
(M = 10^6, k = 10^3, m = 10^{-3}, μ = 10^{-6})

Set the function/range switch to the OFF position when the multimeter is not in use.

DC Voltage (0 - 1000 V)

1. Connect one test lead to the common input (COM) and another test lead to the Volt or Ohm input (V Ω). Read the note at the meter input.

2. Set the function/range switch to (V⎓), and to the highest DC voltage range: 1000 V (1000 volts full scale).

3. Place the ends of the test leads across the circuit element.

4. Read the voltage and the polarity. Select a lower range (if feasible) to give a higher resolution.

   Range overload is indicated by a "1" or a "-1" in the display with all the other digits blanked.

5. Select a higher range. If the highest voltage range is in use, interrupt the measurement immediately.

6. Set the function/range switch OFF.

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News

FOREVER FLASHLIGHT PRESS
Forbes.com states, "A flashlight that goes on forever...."

USA Today labeled the Forever Flashlight one of the **Best Products of 2002**

Read what the media has to say about this incredible LED, batteryless, shake flashlight.

More Information

BUYER BEWARE
Don't say we didn't warn you! This is the original Forever Flashlight manufactured by Excalibur Electronics. Since it's inception, others have tried to mimic the Forever Flashlight. These companies produce copycat models that look almost exactly like ours marketing their products under other catchy brand names and/or even using the phrase "Forever Flashlight" in their marketing ploys.

But the similarities stop there. A large copycat Forever LED Flashlight retails for about $20.00 vs. $29.00 with us for the real deal. The performance of these Forever Flashlight knockoffs range from almost no light produced at all, to very dim beams that burn out within seconds.

If you are shopping around for the best price and think you've found the best deal, be sure to inquire with the company offering such a bargain and demand to know whether their light is produced by Excalibur Electronics.

If it is not, don't say we didn't warn you. Because if you purchase a knockoff, you will soon see the light....or not!

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- small yellow
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GREAT DEALS

- small clear gift set
- small yellow gift set

How it Works

FARADAY PRINCIPLE OF ELECTROMAGNETIC ENERGY
Would you believe the Forever Flashlight never needs bulbs or batteries! Just shake and produce light forever!

The Forever Flashlight uses the Faraday Principle of Electromagnetic Energy to eliminate the need for replacement bulbs and batteries. The Faraday Principle states that if an electric conductor, like copper wire, is moved through a magnetic field, electric current will be generated and flow into the conductor.

This is the principle by which the Forever Flashlight operates. By shaking the Forever Flashlight back and forth for 15-30 seconds, enough electricity is generated to light the LED bulb for up to five minutes of continuous light.

The Forever Flashlight uses a super bright blue LED light that is highly visible, allowing you to see exactly what you need to see, when you need to see it.

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If it is not, don't say we didn't warn you. Because if you purchase a knockoff, you will soon see the light....or not!

Large Clear Forever Flashlight

Buy Now! Only $29.99 *Lowest price on the web!*

Introducing the last flashlight you'll ever need to buy...and it never needs batteries or bulbs!

The LED Forever Flashlight uses the Faraday Principle of Electromagnetic Energy that guarantees replacement parts will never be needed!

- Super bright Blue LED light
- Never needs batteries
- Never needs bulbs
- Waterproof
- Visible for over a mile
- Great for cars, boats and campers and all emergency kits.

Buy Now $29.99

Dimensions: 11 1/4" Long and 1 1/2" in diameter

15-30 seconds of shaking provides up to 5 minutes of continuous bright light!

We only ship to customers within the United States. We do not accept any International orders. We apologize for any inconvenience.

Large Clear Forever Flashlight
Style Number: 422-D
Our Price: $29.99
Others: $34.00 - $40.00

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Availability: In stock
Shipping: Ships Fed Ex within 24-48 hours

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Product Line

- large clear
- medium clear
- small clear
- large yellow
- small yellow
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GREAT DEALS

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How it Works

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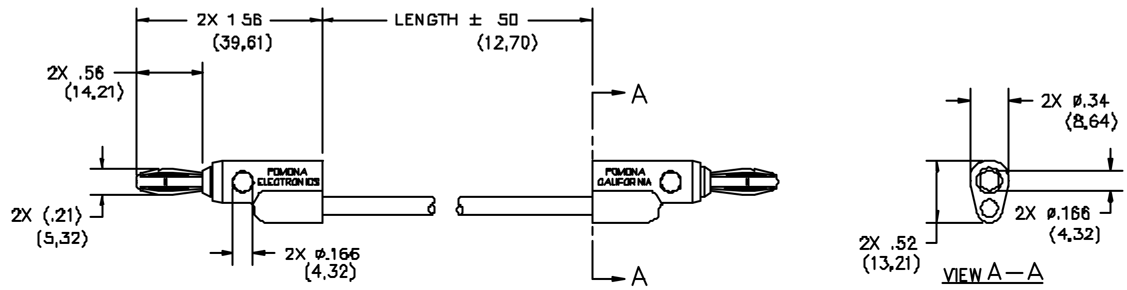
Pomona®

Model B
Stack-Up Banana Plug
Both Ends



FEATURES:

- Mates to Model #1581, 2854 or standard Banana Jack.
- Cross and vertical stacking banana plug.
- Ideal for providing jumpers or chassis boxes.

MATERIALS:

Conn: Extension Stacking Banana Plug

Material: Spring, Beryllium Copper per QQ-C-533, Allow 172, Cond. HT.
Plug Body: Brass, per QQ-B-626, Alloy 360, ½ hard.

Finish: Nickel plate per QQ-N-290 class 2, 200/300 microinches.

Insulation: Polypropylene molded to plug body and wire

Color: Matches color of wire.

Marking: "MODEL B-XX"

Wire: 18 AWG, stranding 65 x 36 t.c., PVC insulated, 3.66 (.144) O.D.

Color: See Ordering Information

Marking: "POMONA B-XX-*"

RATINGS: (Entire Assembly)

Operating Temperature.: +55ºC. (+131ºF.) Max.

Operating Voltage: Hand-held Testing: 30VAC/60 VDC Max.
Hands free testing in Controlled Voltage Environment: 5000 WVDC

Current: 15 Amperes Cont.

ORDERING INFORMATION: Model B-XX-*

XX = Cable Lengths, Standard Lengths: 4" (102), 8" (203), 12" (305), 18" (457), 24" (610), 36" (914), 48" (1219), 60" (1524) & 72" ((1829). Additional lengths can be quoted upon request.

*= Color, -0 Black, -1 Brown, -2 Red, -3 Orange, -4 Yellow, -5 Green, -6 Blue, -7 Violet, -8 Gray, -9 White

Ordering Example: B-72-2 Indicates 72" in length, Color is Red.

All dimensions are in inches. Tolerances (except noted): .xx = ±.02" (,51 mm), .xxx = ± .005" (,127 mm).
All specifications are to the latest revisions. Specifications are subject to change without notice.

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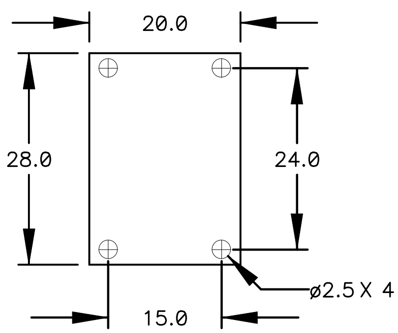
REVISIONS			
REV	DESCRIPTION	DATE	APPROVED



NOTES:

1. BASE MATERIAL SHALL BE LAMINATED GLASS EPOXY, NEMA GRADE FR–4 (SHALL MEET UL 94V–0).
2. FINISHED BOARD THICKNESS TO BE .062 +/–.005" EXCLUDING COPPER FOIL.
3. TRACE LAYER TO BE 1 OZ. COPPER.
4. CONSTRUCTION OF BOARD AS SHOWN IN DETAIL "A".
5. ALL HOLE SIZES SPECIFIED ARE UNPLATED.
6. FOR ARTWORK SEE DWG NO. 0032T0103.

DETAIL A

SINGLE LAYER CONSTRUCTION

SCALE: NONE

DWG FILENAME 0032T01.pcb

PLOTTED Thu Oct 16, 2003 14:14:58

UNLESS OTHERWISE SPECIFIED DIMENSIONS AND TOLERANCES ARE IN MILLIMETERS AND APPLY TO THE FINISHED PART

TOLERANCE ON:

1 PLACE DEC	2 PLACE DEC	ANGLES
±0.1	±0.01	±1/2°

MATL 1 2 3

FINISH

DRAWN	J. BEHRENDT	DATE 10/16/03
DESIGNER		DATE
APPROVED		DATE
ENGINEER		DATE

UNIVERSITY OF NEW MEXICO
DEPARTMENT OF PHYSICS AND ASTRONOMY
ELECTRONICS SHOP
ALBUQUERQUE, NEW MEXICO, USA 87131

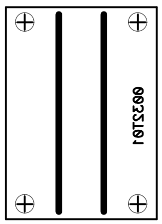
TITLE

FLASHLIGHT PCB FABRICATION

SIZE	DWG NO	REV
B	0032T0102	—

SCALE 1/1 SHEET 1 OF 1

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED



SOLDER

DWG FILENAME	0032T01.pcb
PLOTTED	Thu Oct 16, 2003 14:14:59

UNLESS OTHERWISE SPECIFIED DIMENSIONS AND TOLERANCES ARE IN MILLIMETERS AND APPLY TO THE FINISHED PART

TOLERANCE ON:		
1 PLACE DEC	2 PLACE DEC	ANGLES
±0.1	±0.01	±1/2°

MATL

FINISH

DRAWN	J. BEHRENDT	DATE	10/16/03
DESIGNER		DATE	
APPROVED		DATE	
ENGINEER		DATE	

UNIVERSITY OF NEW MEXICO
DEPARTMENT OF PHYSICS AND ASTRONOMY
ELECTRONICS SHOP
ALBUQUERQUE, NEW MEXICO, USA 87131

TITLE

FLASHLIGHT PCB ARTWORK

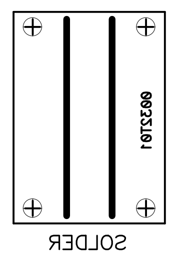
SIZE	DWG NO	REV
B	0032T0103	—

SCALE		
1/1		SHEET 1 OF 1

Exposure Mask

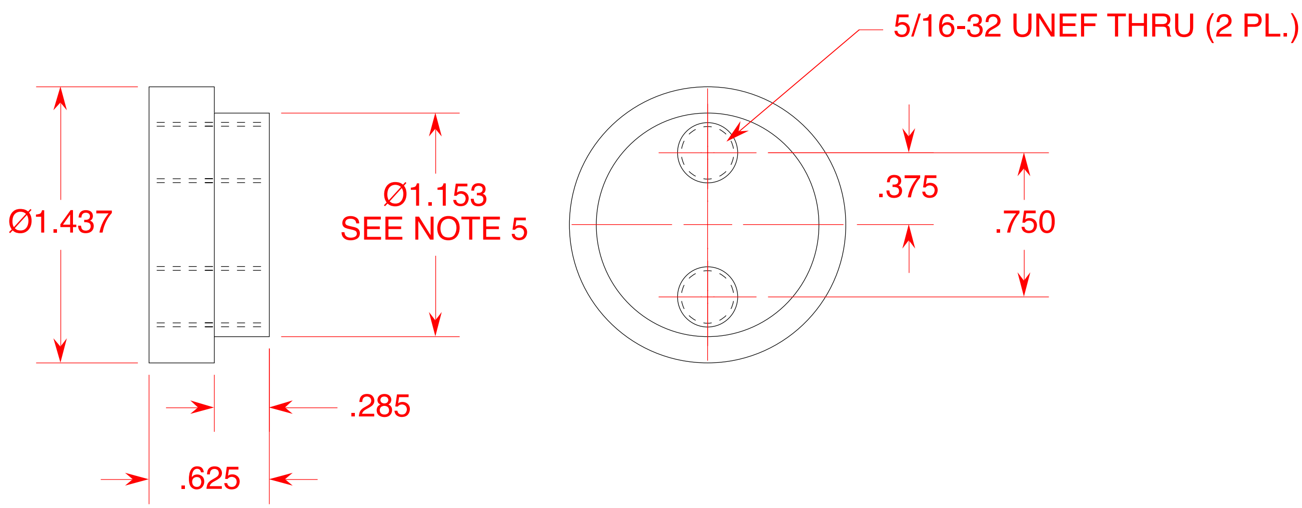
Laser print on an 8-1/2” x 11” sheet of tracing Vellum (Dietzgen 196M100 or equivalent). Print in Landscape orientation.

The exposure mask must be printed full size. Deselect the Shrink Oversized Pages to Paper Size option (Acrobat 5.0) or the Fit To Page option (Acrobat 4.0). To see this option in Mac OS you must choose Acrobat x.x from a pop-up menu in the Print dialog box. In Windows, this option is visible in the Print dialog box. In Mac OS deselect all PostScript™ Options found in the Page Setup dialog box.


0032101
SOLDER

NOTES:

1. MATERIAL: LUCITE, CLEAR
2. FINISH: HIGH POLISH ALL OVER (NO SCRATCHES).
3. BREAK EDGES AND CORNERS .005 MIN. R (SMOOTH).
4. ALL DIMENSIONS ±.005 UNLESS NOTED.
5. REF Ø. SMOOTH FIT WITH LIFETIME FLASHLIGHT™ ID.

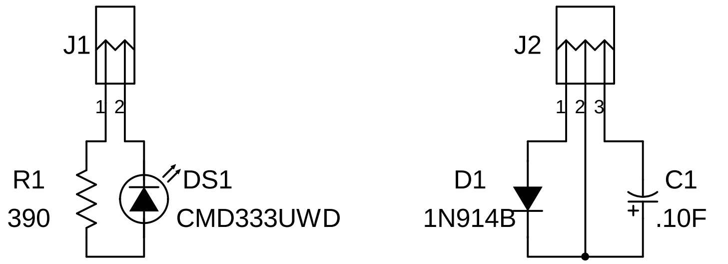


UNM	UNDERGRADUATE LABORATORIES Phone: (505) 277-5805 FAX: (505) 277-1520
TITLE: CONTACT HOLDER	
Prepared By: JAP	Drawing Number: 161L-027
Approved By:	Size: ANSI B / Sheet: 1 OF 1
Scale: 1/1 / Date: 09.23.03	Rev A 09.27.03
UNM PROPIETARY AND CONFIDENTIAL INFORMATION	

NOTES:
UNLESS OTHERWISE SPECIFIED:
1. ALL 5% RESISTORS ARE 1/4 W CARBON FILM WITH VALUES IN OHMS.
2. ALL 1% RESISTORS ARE 1/4 W METAL FILM WITH VALUES IN OHMS.
3. ALL POLARIZED CAPACITORS ARE TANTALUM ELECTROLYTIC WITH VALUES IN MICROFARADS.
4. FOR FABRICATION DETAILS SEE DRAWING 0000T0102.
5. FOR ARTWORK SEE DRAWING 0037T0103 REV A.
6. FOR ASSEMBLY SEE DRAWING 0037T0104 REV A.

REVISIONS

REV	DESCRIPTION	DATE	APPROVED



CONTRACT NO.

DRAWN	DATE
J. BEHRENDT	1/14/04
APPROVED	DATE
APPROVED	DATE
APPROVED	DATE

UNIVERSITY OF NEW MEXICO
DEPARTMENT OF PHYSICS AND ASTRONOMY
ELECTRONICS SHOP
ALBUQUERQUE, NEW MEXICO, USA 87131

TITLE

INDUCTION PCB

SIZE B

DWG NO 0037T0101

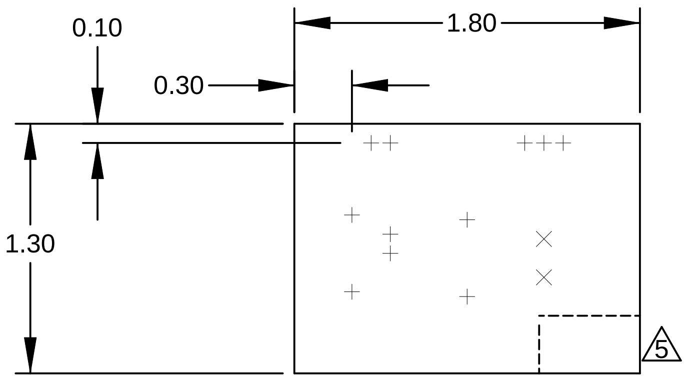
REV A

SCALE NONE

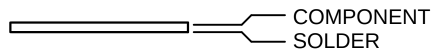
SHEET 1 OF 1

PLOTTED Tue Feb 17, 2004 13:45:36

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED



NOTES:
1. BASE MATERIAL SHALL BE LAMINATED GLASS EPOXY, NEMA GRADE FR-4 (SHALL MEET UL 94V-0).
2. FINISHED BOARD THICKNESS TO BE .062 +/-.005" EXCLUDING COPPER FOIL.
3. TRACE LAYERS TO BE 1 OZ. COPPER.
4. FABRICATE BOARDS IN ACCORDANCE WITH IPC-RB-6011 AND IPC-RB-6012, CLASS 2.
5. FABRICATION PROCESS SHALL BE UL APPROVED AND PCB SHALL BE IDENTIFIED WITH MANUFACTURERS APPROVED LOGO AND TYPE DESIGNATION IN ETCH IN AREA SHOWN.
6. CONSTRUCTION OF BOARD AS SHOWN IN DETAIL "A".
7. FOR ARTWORK SEE DWG NO. 0037T0103 REV A.



DETAIL A
DOUBLE LAYER CONSTRUCTION
SCALE: NONE

Drill Table			
Hole Dia (inch)	Symbol	Quantity	Plated
0.038	+	11	Yes
0.070	×	2	Yes

UNLESS OTHERWISE SPECIFIED DIMENSIONS AND TOLERANCES ARE IN INCHES ANDAPPLY TO THE FINISHED PART

TOLERANCE ON:

2 PLACE DEC	3 PLACE DEC	ANGLES
±0.02	±0.005	±1/2 °

MATL: 1 2 3

FINISH: ———

CONTRACT NO.

DRAWN: J. BEHRENDT DATE: 1/15/04

APPROVED DATE

APPROVED DATE

APPROVED DATE

UNIVERSITY OF NEW MEXICO
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ELECTRONICS SHOP
ALBUQUERQUE, NEW MEXICO, USA 87131

TITLE

INDUCTION PCB FABRICATION

SIZE: B ———

DWG NO: 0037T0102

REV: A

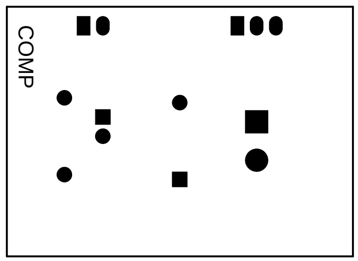
SCALE: 1/1 ———

SHEET 1 OF 1

DWG FILENAME: 0037t01a.pcb

PLOTTED: Tue Feb 17, 2004 13:47:08

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED



TOP
0037T01 REV A
INDUCTION PCB

UNLESS OTHERWISE SPECIFIED DIMENSIONS AND TOLERANCES ARE IN INCHES ANDAPPLY TO THE FINISHED PART

TOLERANCE ON:

2 PLACE DEC	3 PLACE DEC	ANGLES
±0.02	±0.005	±1/2 °

MATL

FINISH

CONTRACT NO.

DRAWN	DATE
J. BEHRENDT	1/15/04
APPROVED	DATE
APPROVED	DATE
APPROVED	DATE

UNIVERSITY OF NEW MEXICO
DEPARTMENT OF PHYSICS AND ASTRONOMY
ELECTRONICS SHOP
ALBUQUERQUE, NEW MEXICO, USA 87131

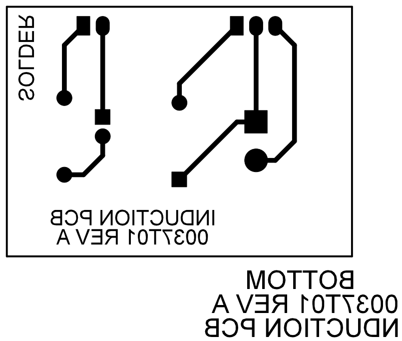
TITLE

INDUCTION PCB ARTWORK

SIZE		DWG NO	REV
B	———	0037T0103	A
SCALE 1/1	———	SHEET 1 OF 2	

DWG FILENAME
0037t01a.pcb

PLOTTED
Tue Feb 17, 2004 13:47:08



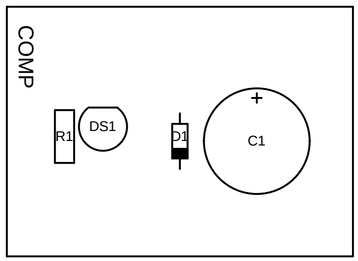
ARTWORK

SIZE		DWG NO	REV
B		0037T0103	A
SCALE 1/1		SHEET 2 OF 2	

PLOTTED
Tue Feb 17, 2004 13:47:08

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED

NOTES:
1. REFERENCE ELECTRICAL SCHEMATIC DRAWING,0037T0101 REV A.
2. ASSEMBLE AND SOLDER PER IPC-A-610A AND MIL-STD-2000.
3. OBSERVE POLARITY OF CAPACITORS, DIODES, ETC..
4. ELECTRICAL REFERENCE DESIGNATIONS ARE FOR REFERENCE ONLY AND NEED NOT APPEAR ON THE PARTS OR COMPONENTS UNLESS OTHERWISE SPECIFIED.



TOP
0037T01 REV A
INDUCTION PCB

UNLESS OTHERWISE SPECIFIED DIMENSIONS AND TOLERANCES ARE IN INCHES ANDAPPLY TO THE FINISHED PART

TOLERANCE ON:

2 PLACE DEC	3 PLACE DEC	ANGLES
±0.02	±0.005	±1/2 °

MATL ——————

FINISH ——————

CONTRACT NO.

DRAWN J. BEHRENDT	DATE 1/15/04
APPROVED	DATE
APPROVED	DATE
APPROVED	DATE

UNIVERSITY OF NEW MEXICO
DEPARTMENT OF PHYSICS AND ASTRONOMY
ELECTRONICS SHOP
ALBUQUERQUE, NEW MEXICO, USA 87131

TITLE

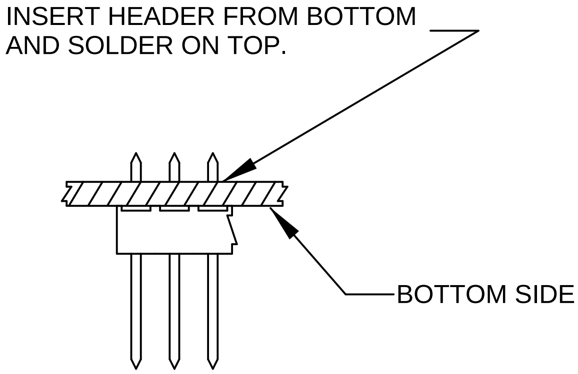
INDUCTION PCB ASSEMBLY

SIZE		DWG NO	REV
B	———	0037T0104	A
SCALE 1/1	———	SHEET 1 OF 2	

DWG FILENAME
0037t01a.pcb

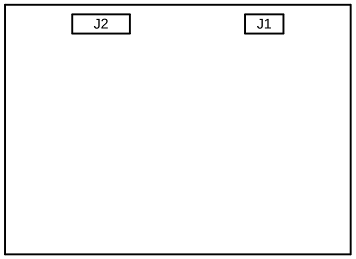
PLOTTED
Tue Feb 17, 2004 13:47:21

NOTE: ASSEMBLE HEADERS AS SHOWN IN DETAIL A.



DETAIL A

HEADER MODIFICATION
SCALE: NONE



VIEWED FROM BOTTOM

PLOTTED	
Tue Feb 17, 2004	13:51:00

SIZE		DWG NO	REV
B	——	0037T0104	A
SCALE 1/1	——	SHEET 2 OF 2	

2/11/04

0037T01ABOM

INDUCTION PCB
PARTS LIST

PCB PARTS

ITEM	COUNT	REFDES	DESCRIPTION	MPN	MFR
1	1	C1	CAP., DOUBLE LAYER, 0.10 F, 5.5V	DB-5R5D104	ELNA
2	1	D1	DIODE, FAST SWITCHING, 100 MA., 100 PRV	1N914B	ON SEMI
3	1	DS1	LED, WHITE CLEAR, T1-3/4	CMD333UWC	CML
4	1	J1	HEADER, STR., .200 IN., 2 PIN	22-03-2021	MOLEX
5	1	J2	HEADER, STR., .200 IN., 3 PIN	22-03-2031	MOLEX
6	1	R1	RESISTOR, CF, 1/4 W,5%, 390 ohm	CFR-25JB-390R	YAGEO