



ELVIS操作介紹&實作

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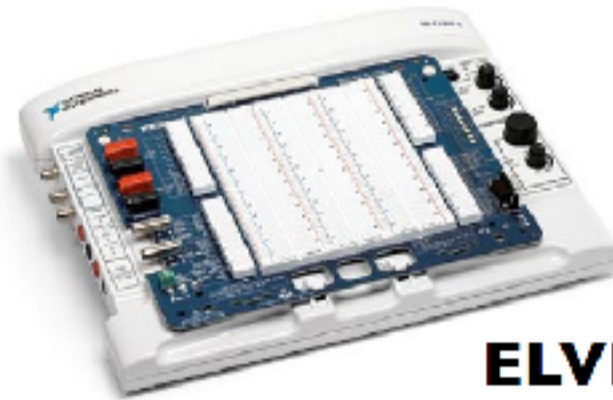


大綱

- 1. 簡介ELVIS
- 2. ELVIS硬體功能
- 3. ELVIS軟體功能
- 4. 實作注意事項
- 5. 實作練習



ELVIS I



ELVIS II





1. 簡介ELVIS

- NI ELVIS的全名是 NI Educational Laboratory Virtual Instrumentation Suite (教育實驗室虛擬儀器套件)，它包含了硬體部份以及軟體部份。
- NI ELVIS把傳統的**示波器**、**直流電壓供應器**、**函數產生器**、**三用電表**以及**麵包板**整合在一個機箱中，並有專屬的軟體與之搭配，可在個人電腦上讀取所需的數據。

電源供應器



示波器



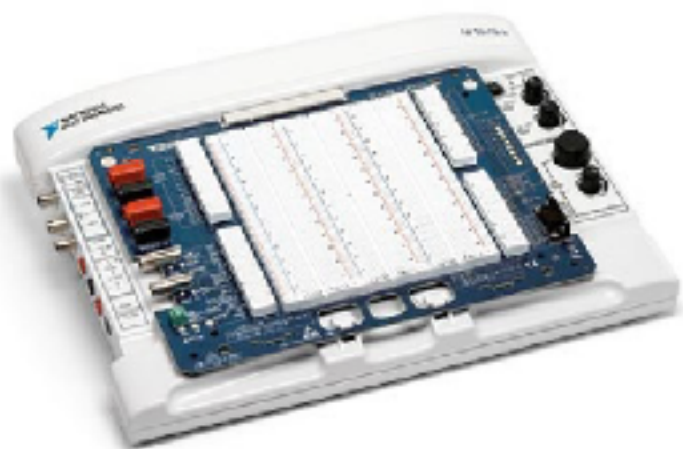
訊號產生器



三用電表



ELVIS





ELVIS I 系統前面板圖示

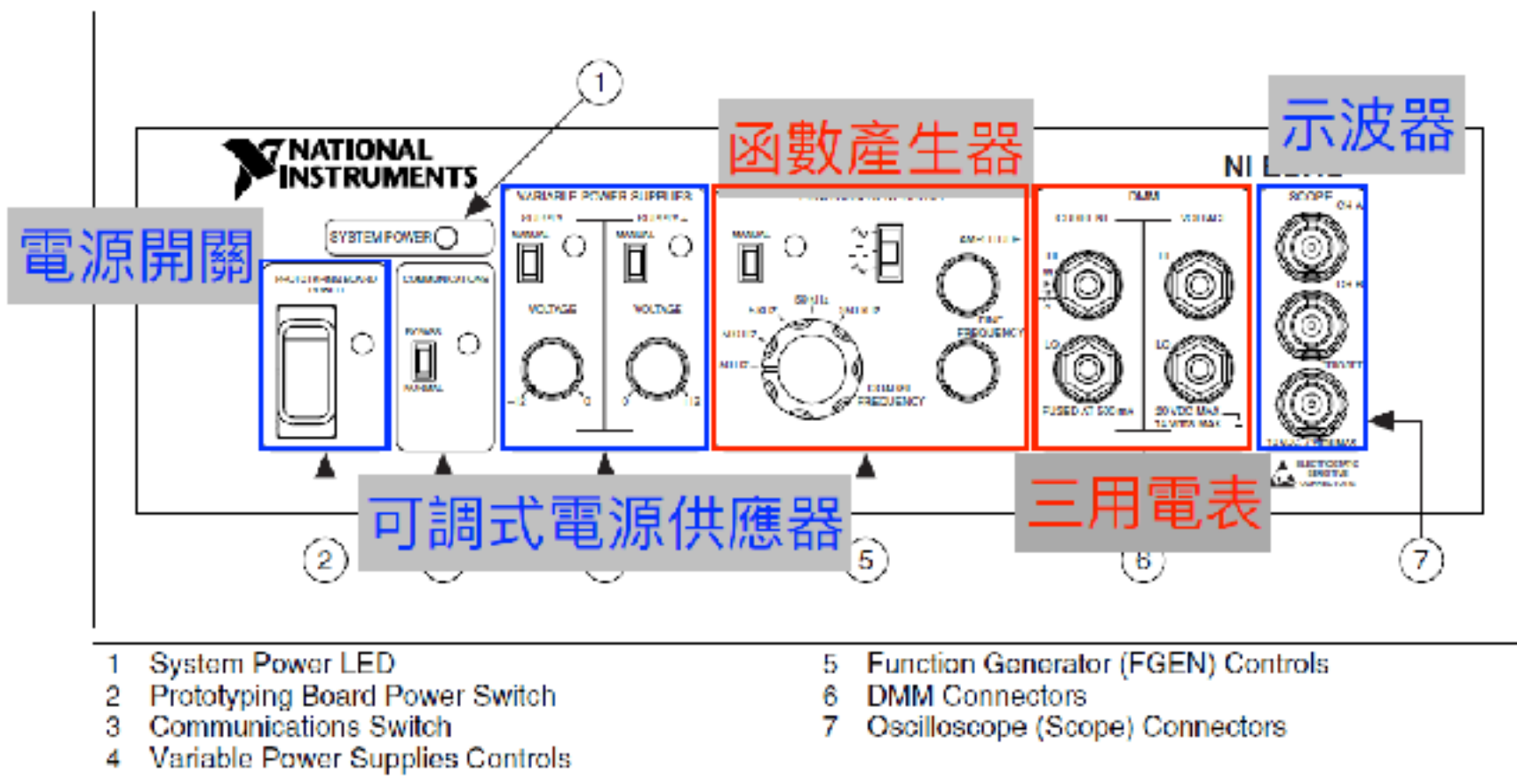


Figure 3-1. Control Panel Diagram of the Benchtop Workstation





ELVIS II 系統面板圖示

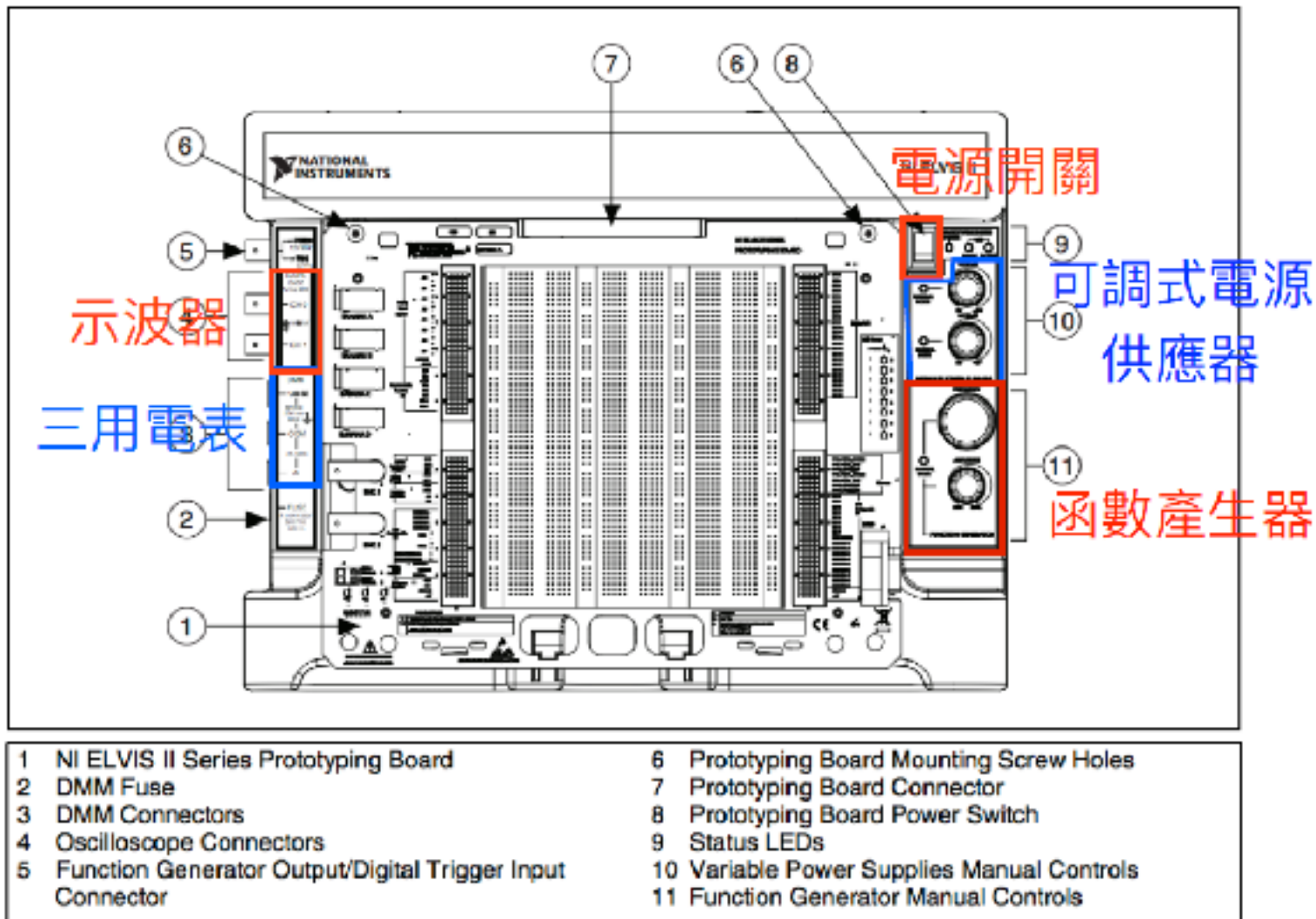


Figure 2-2. Top View of NI ELVIS II Workstation with Prototyping Board (NI ELVIS II shown)



開發麵包板配製圖

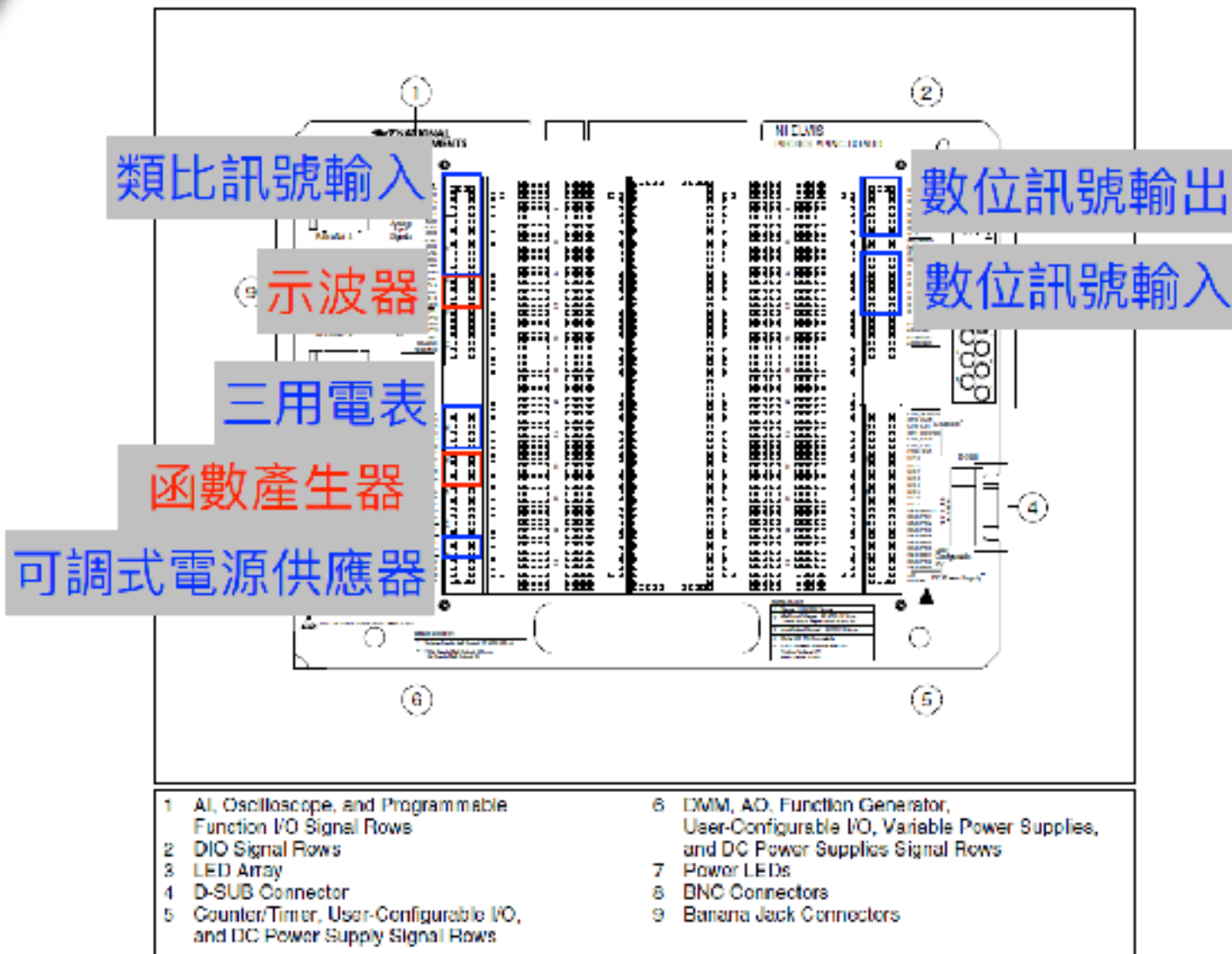
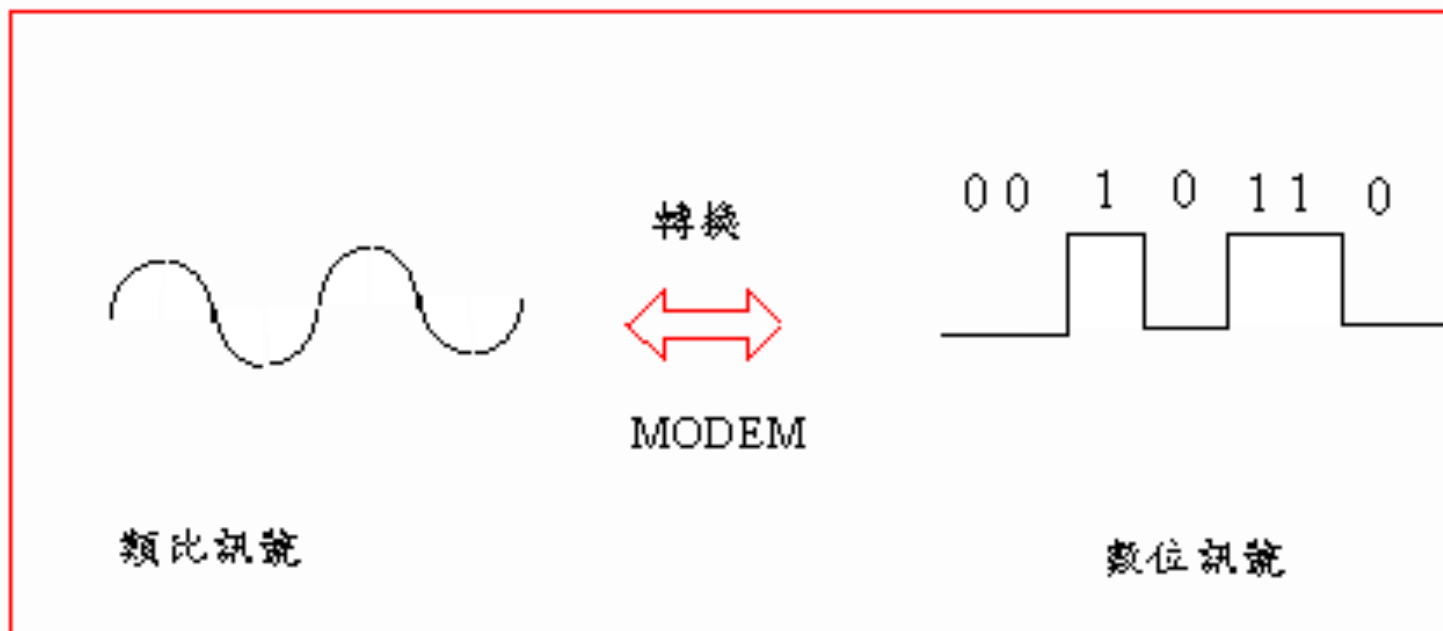


Figure 3-3. Prototyping Board Parts Locator Diagram



類比、數位訊號



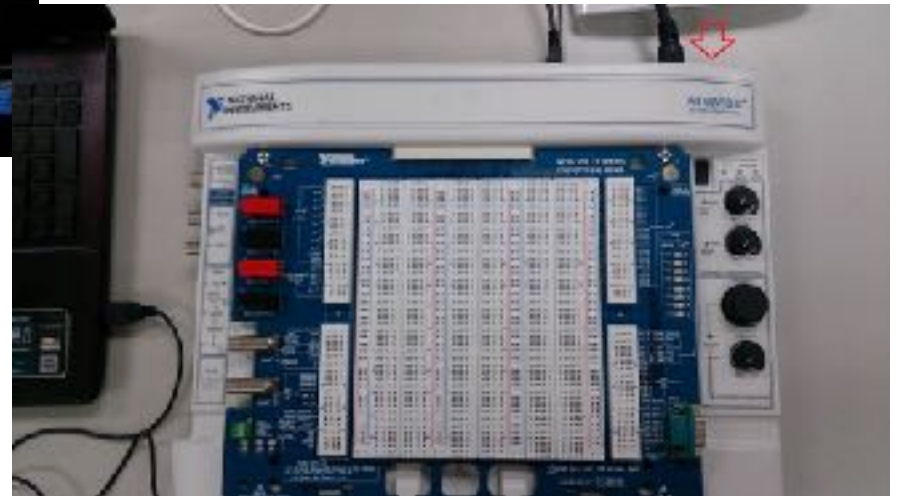


總電源位置



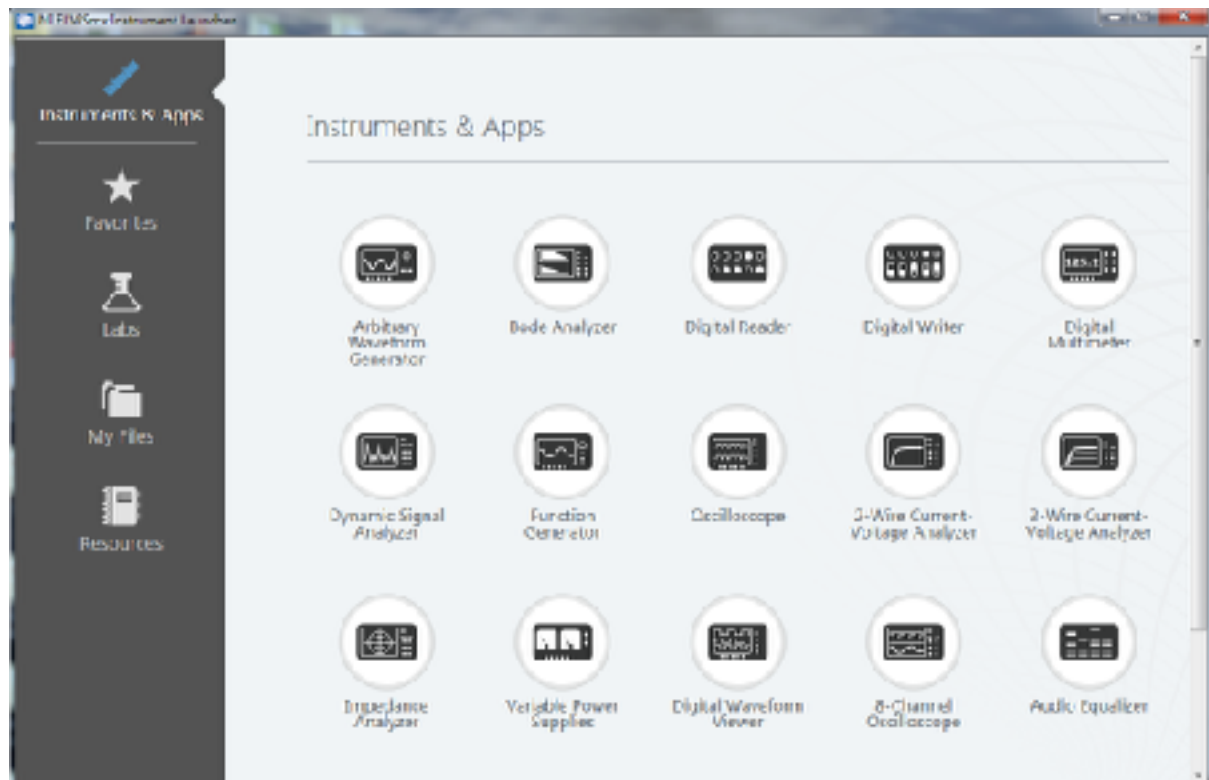
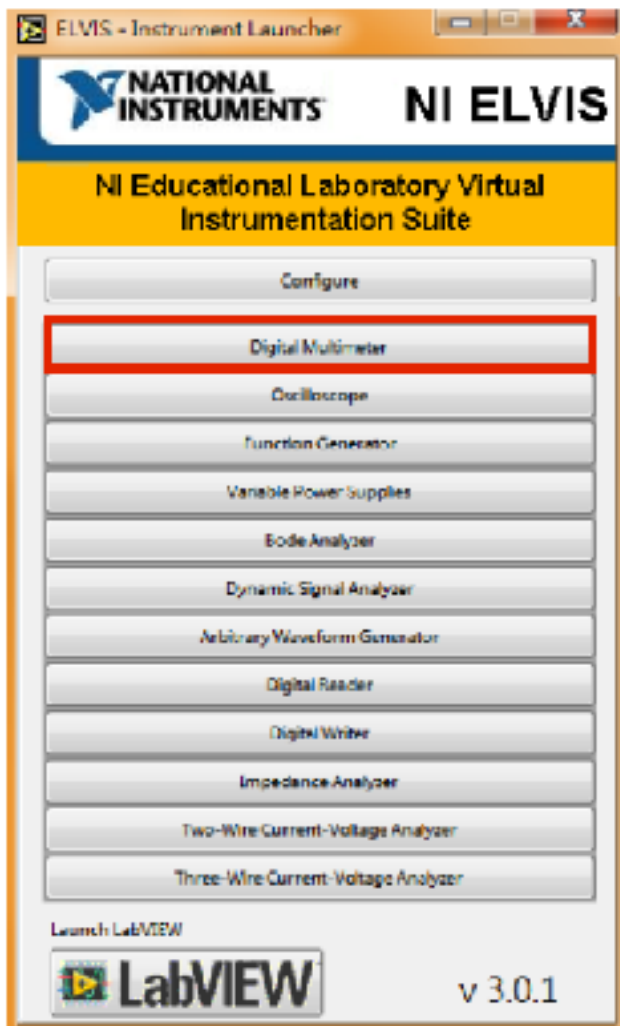
ELVIS I

ELVIS II





ELVIS軟體



ELVIS II

ELVIS I



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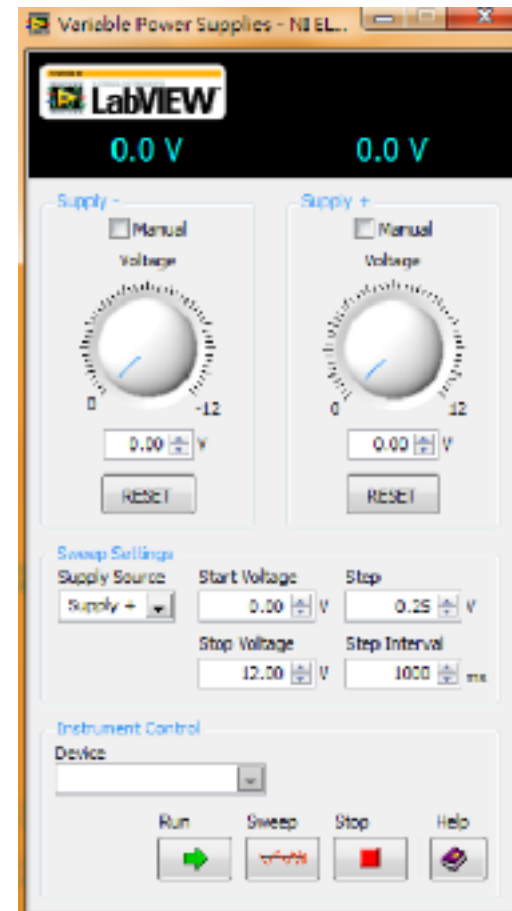
可調式電源供應器 (Variable Power Supplies)

- 供應設定電壓的電源，電壓範圍：正0V~12V、負0V~-12V。

ELVIS I



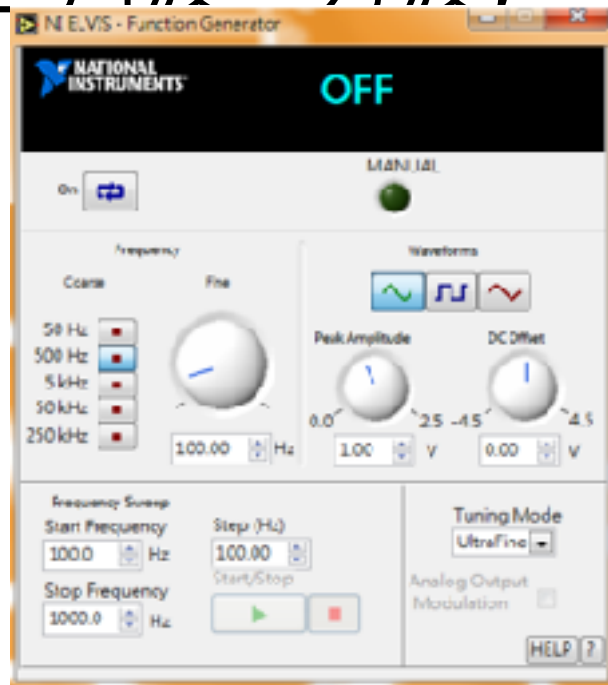
ELVIS II



函數產生器(Function Generator)

- 提供特定波形之電壓訊號，可自行調整頻率、幅度、位移...等參數(特定波形包含正弦波、三角波、方波)。

ELVIS I



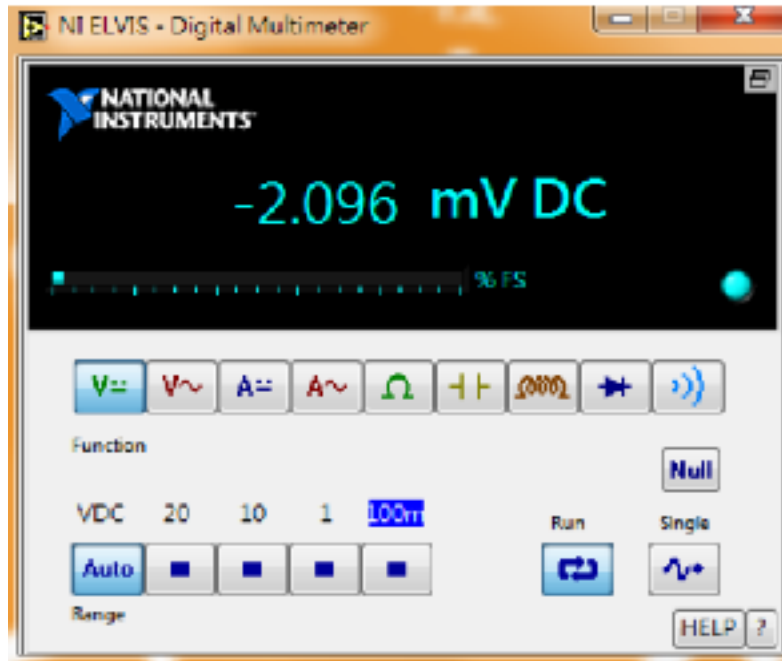
ELVIS II



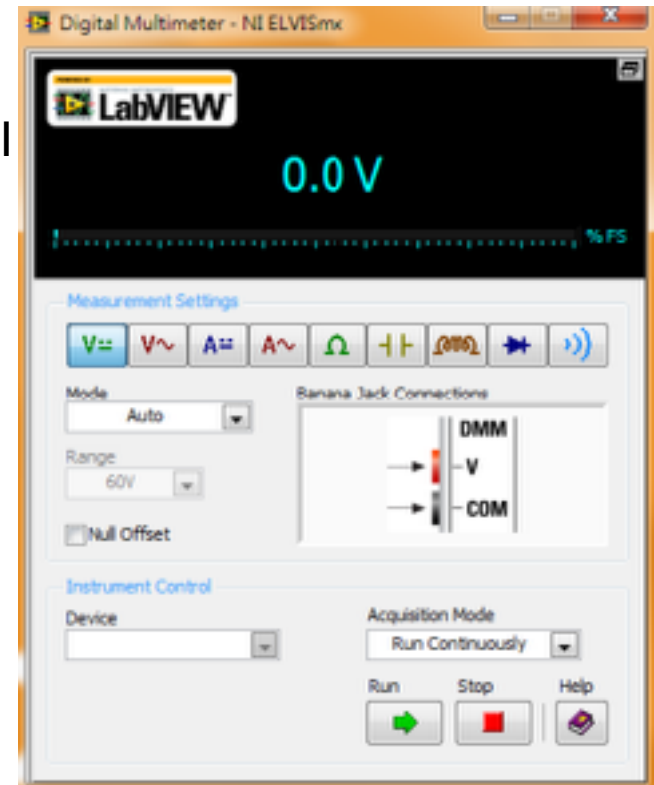
三用電表(Digital Multimeter)

- 可供量測電路的電壓、電流值，或是電子元件的電阻、電容值、另外還有通/斷路檢測以及二極體測試的功能。

ELVIS I

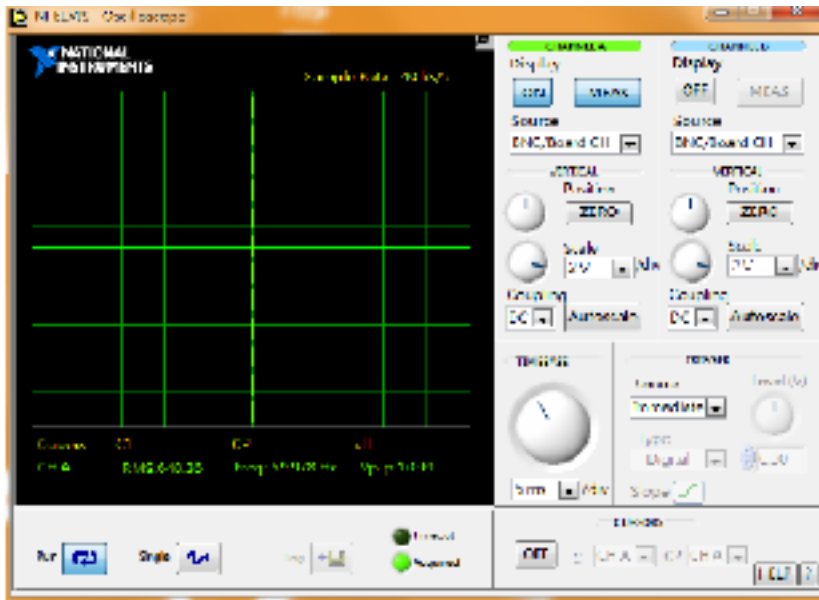


ELVIS II

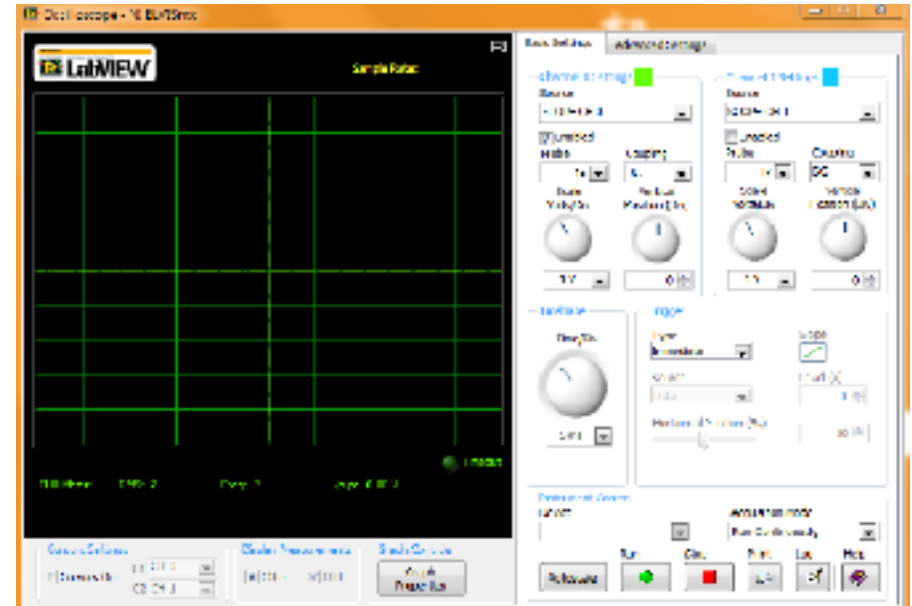


示波器(Oscilloscope)

- 可顯示電壓訊號動態波形的一種電子量測儀器，一般用來量測電路訊號隨時間的變化。

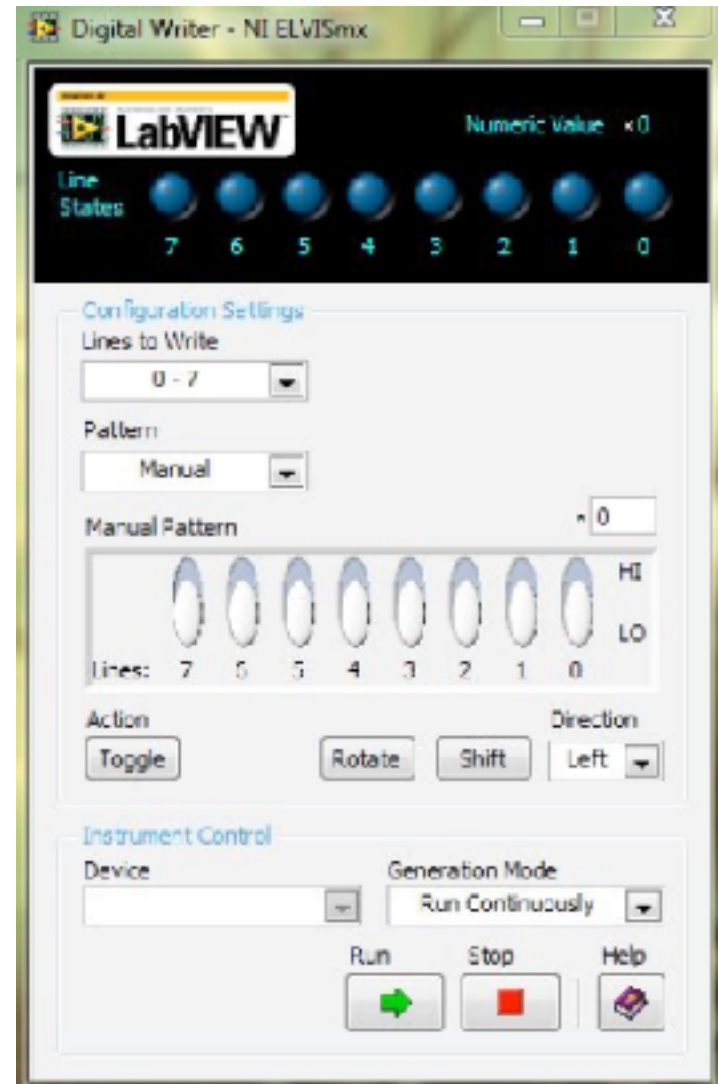
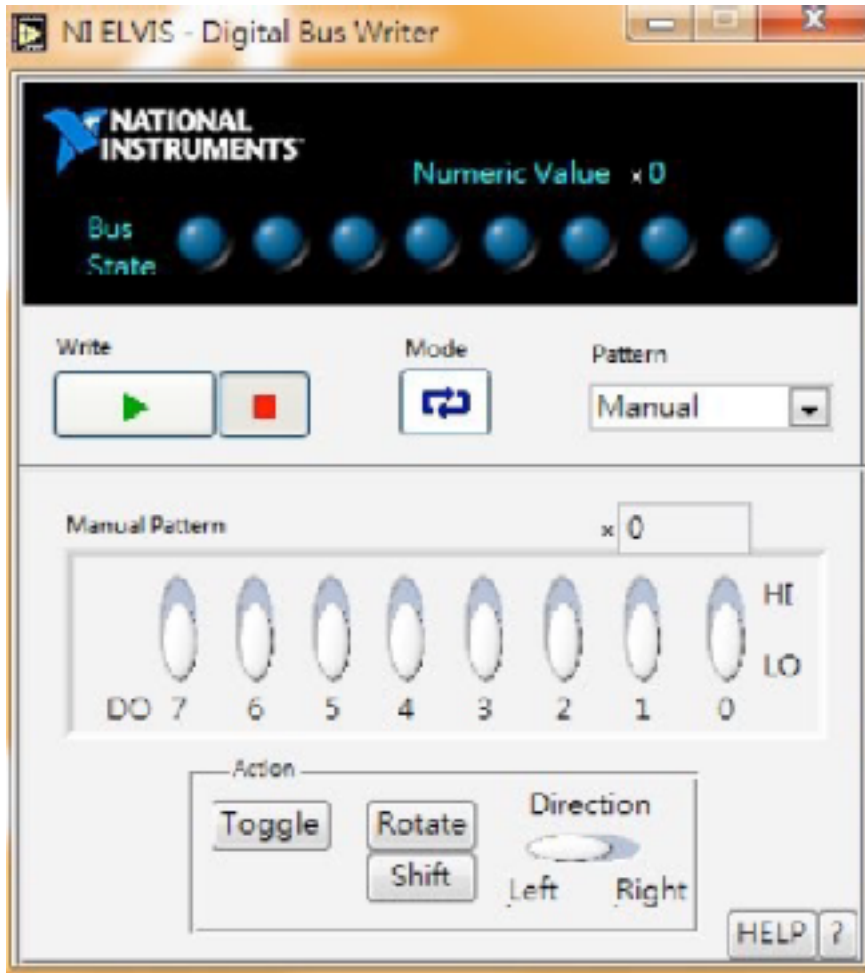


ELVIS I



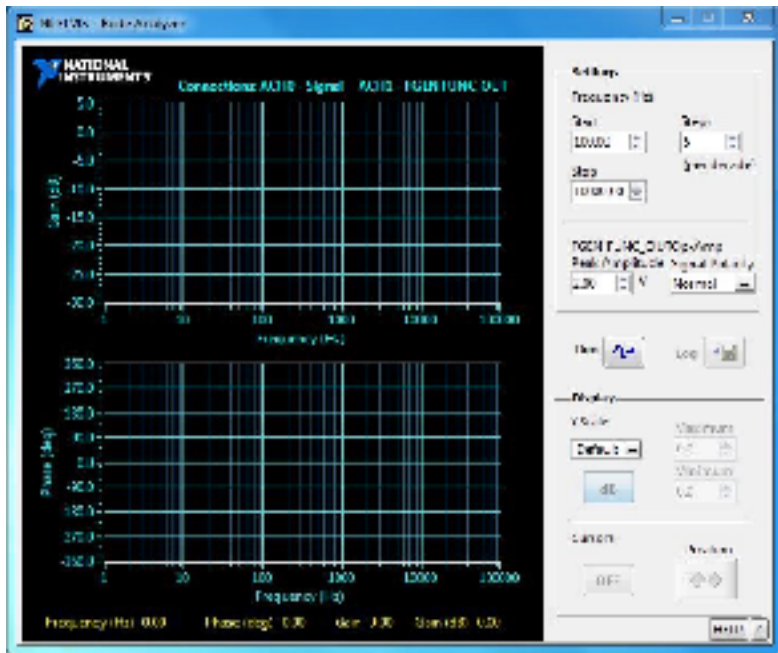
ELVIS II

數位訊號輸出(Digital Writer)

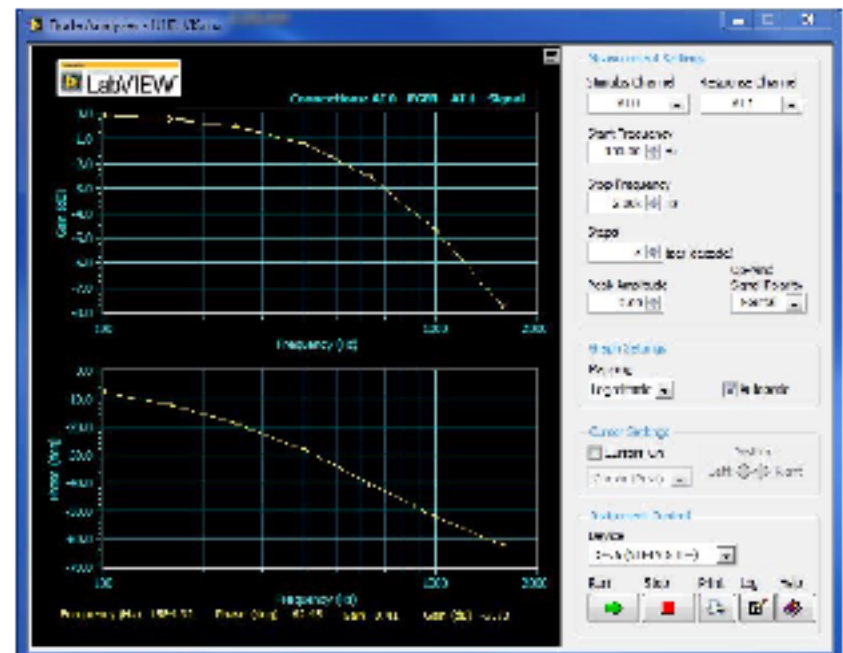


波特分析圖(Bode Analyzer)

- 可以看出頻率響應與增益的大小、相位的變化關係。



ELVIS I

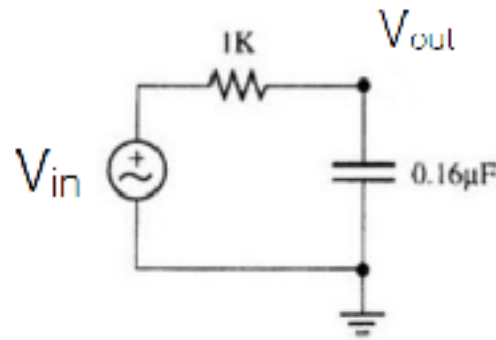


ELVIS II



分貝(decibel)

- 用來測量兩個相同單位的比例，常用dB表示。



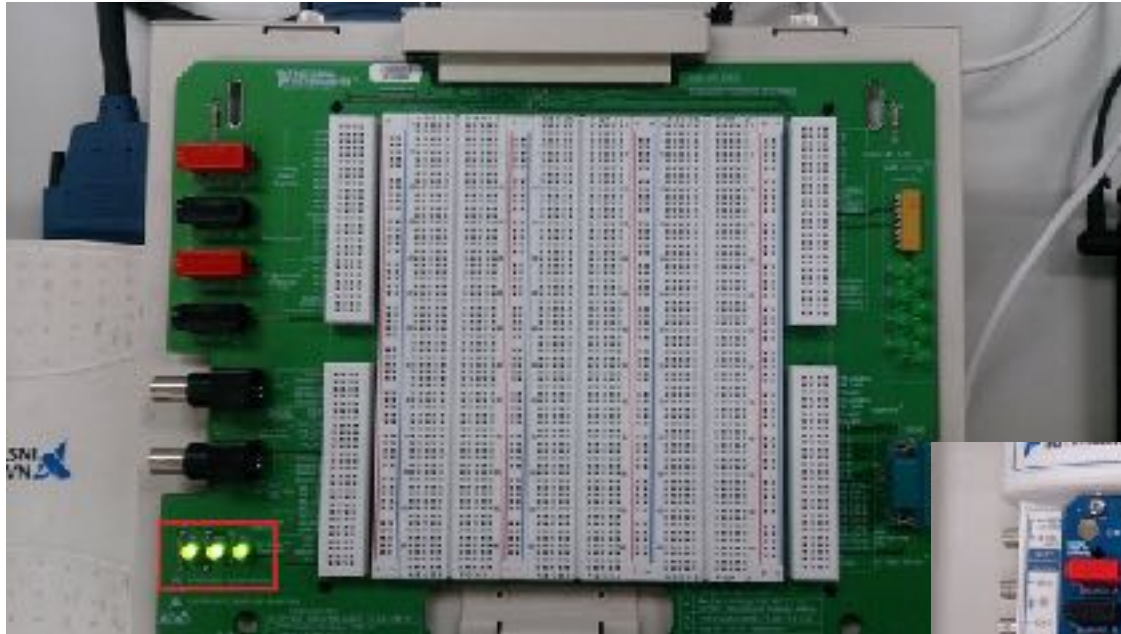
$$dB \equiv 10 \log \left(\frac{P_{out}}{P_{in}} \right) = 20 \log \left(\frac{V_{out}}{V_{in}} \right)$$





實作注意事項

- 確定所有電路都正確連接後在開啟電源
- 養成電源線使用紅色，接地線使用黑色的習慣
- 上電時避免更動麵包板的電子元件，減少觸電的機率
- 絕對避免電源線與地線直接相接造成短路



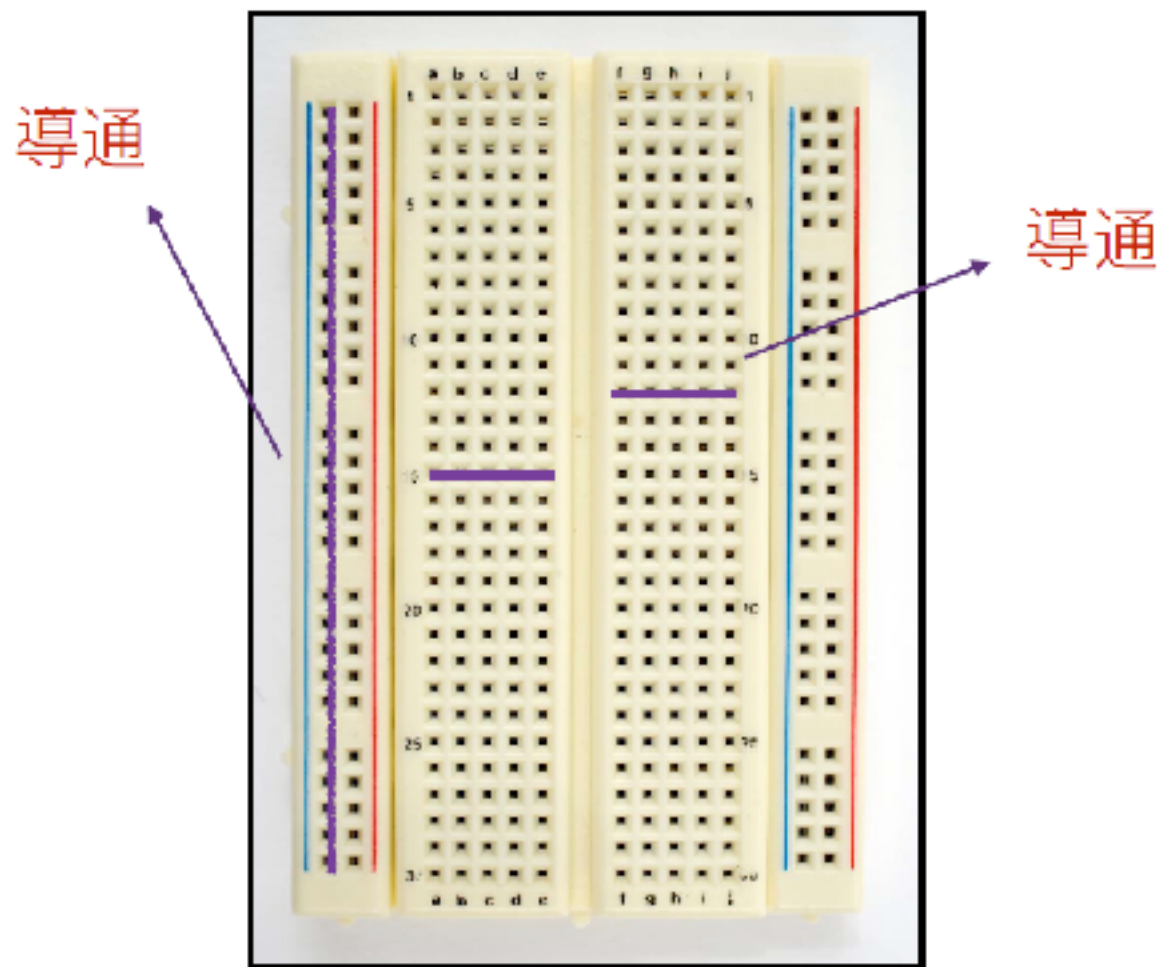
ELVIS I

ELVIS II





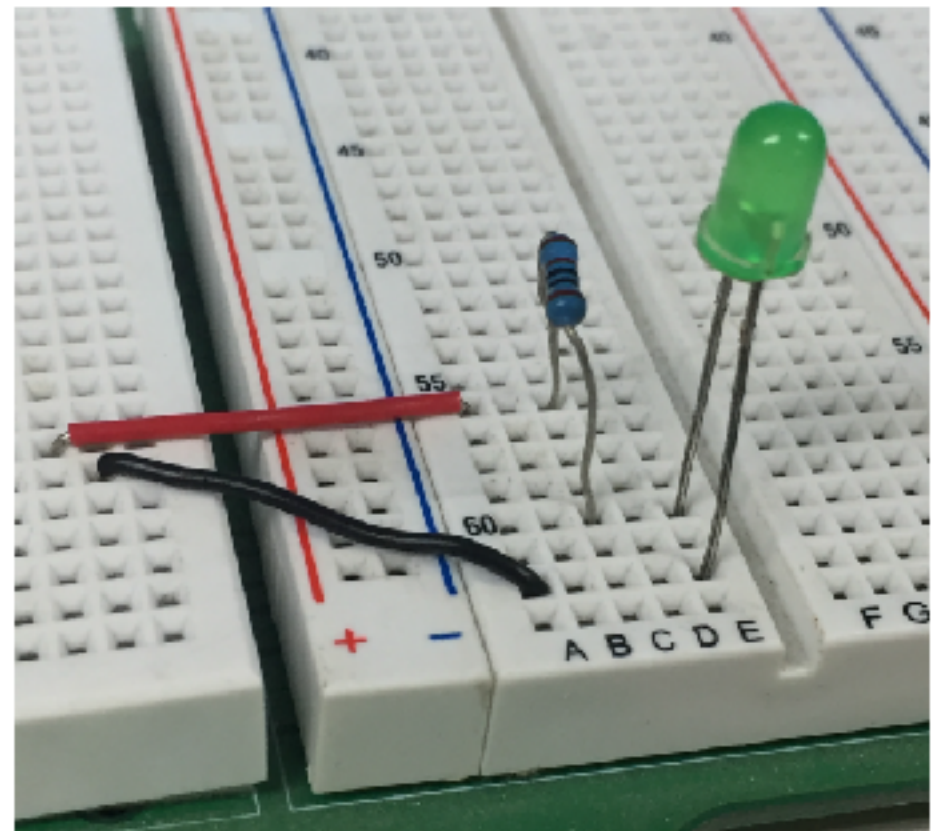
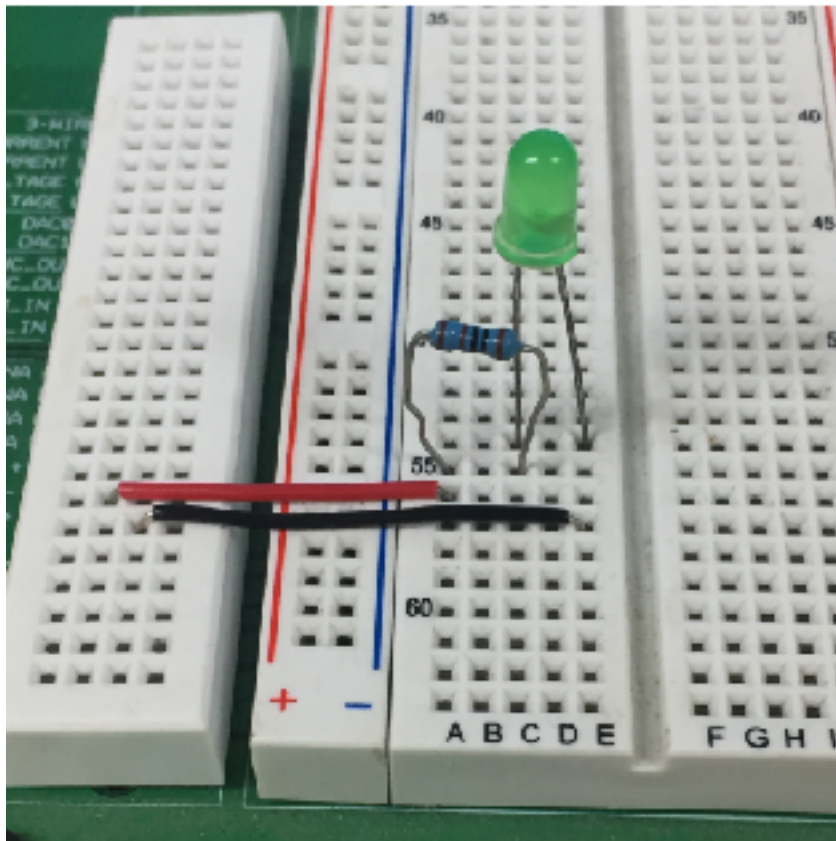
麵包板





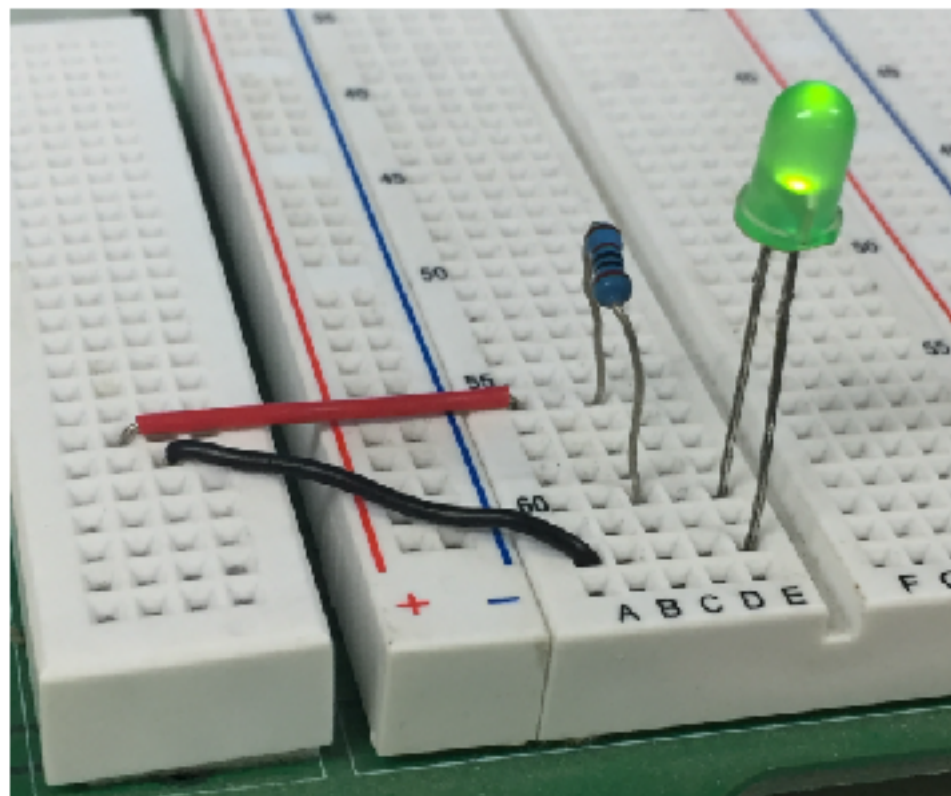
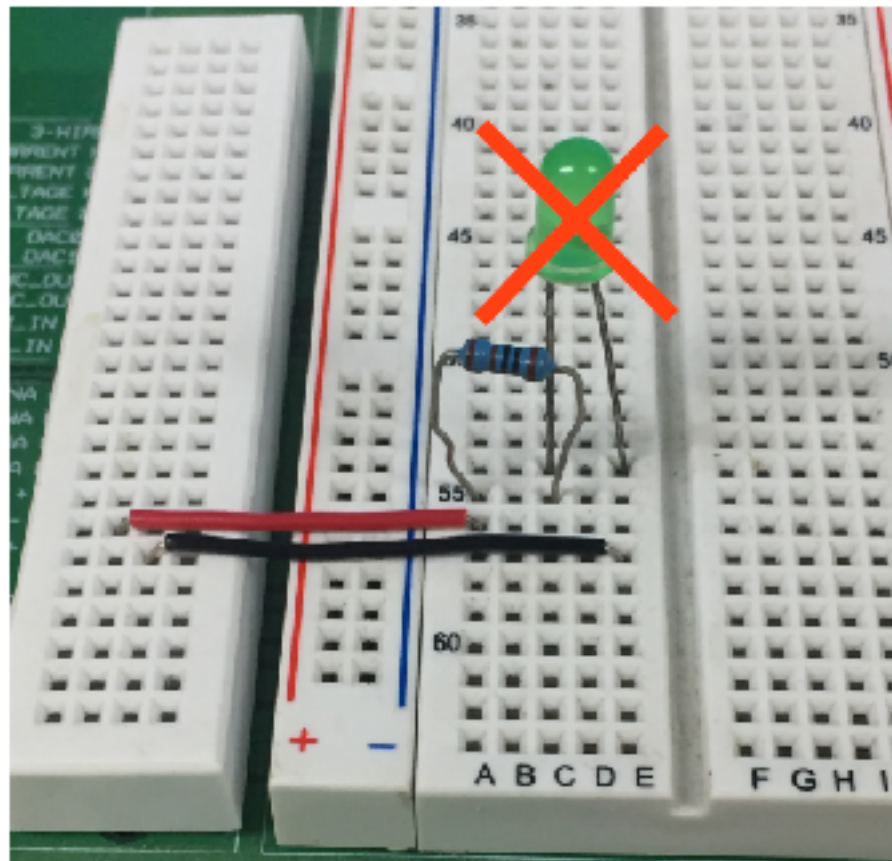
練習

- 哪一種接法是正確的？



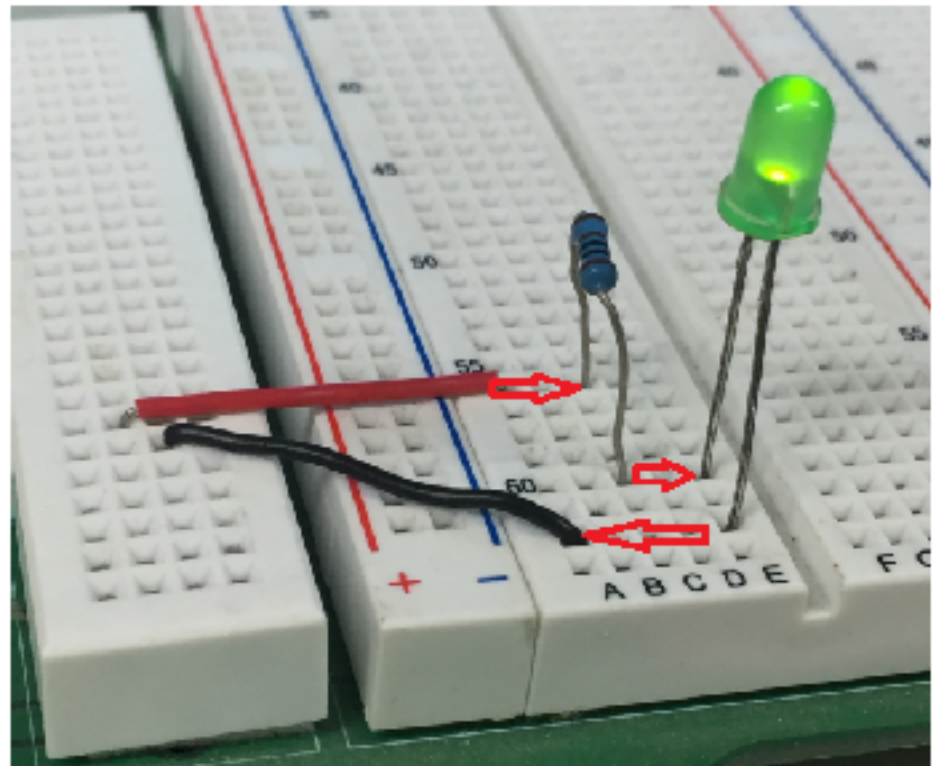
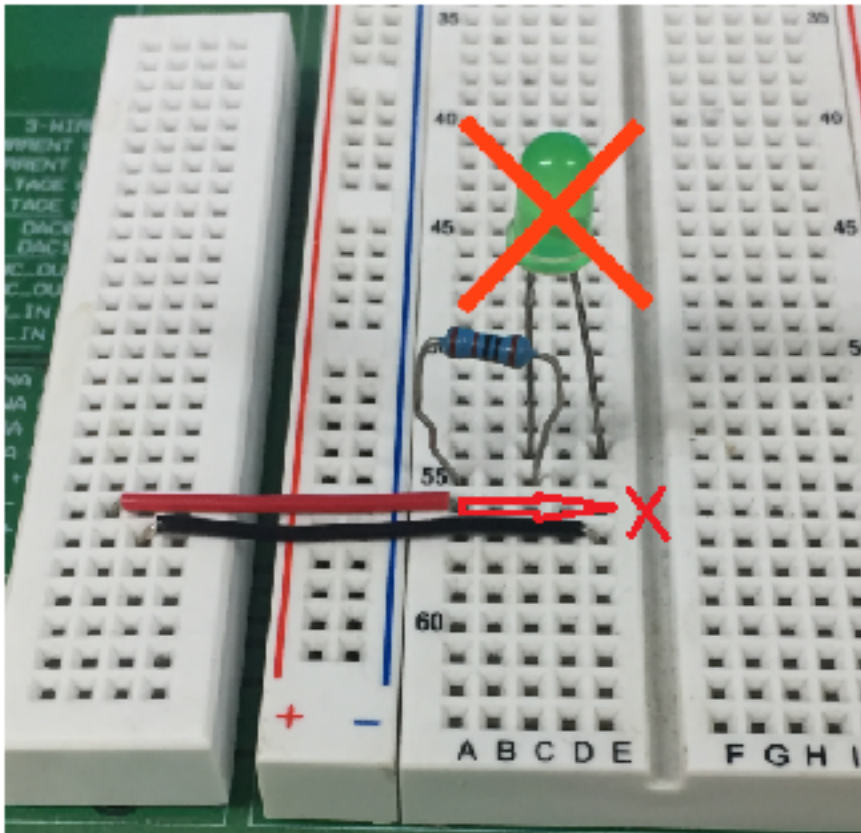


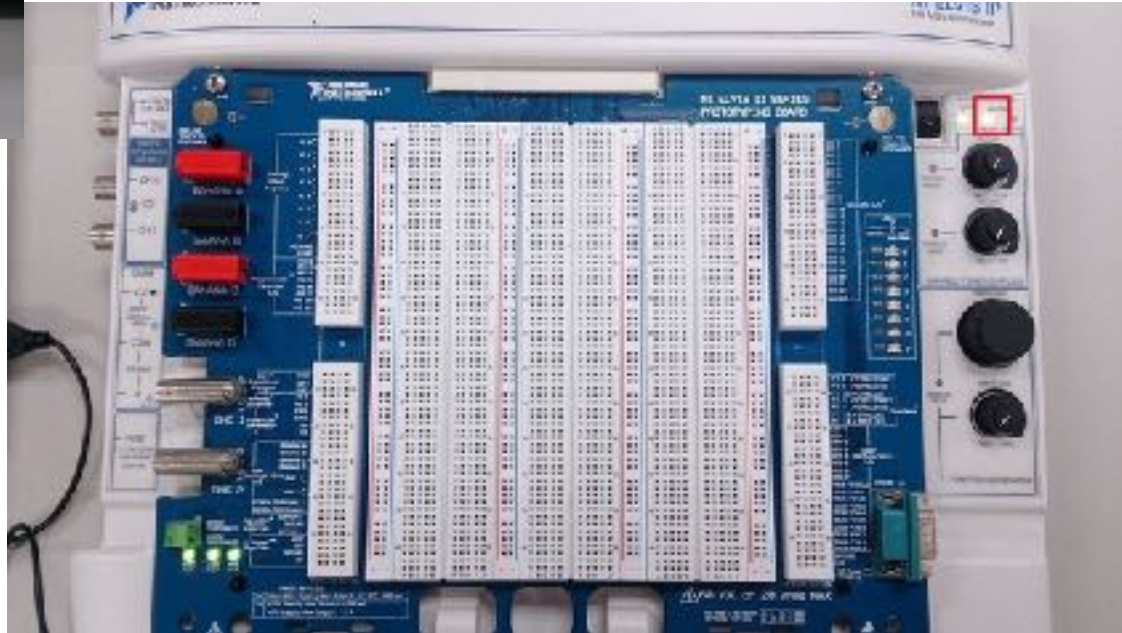
練習(解答)





練習(解答)





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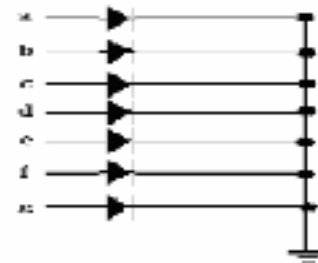
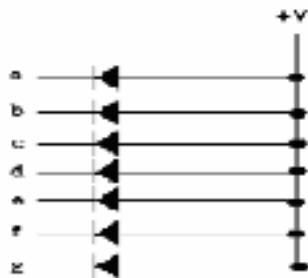
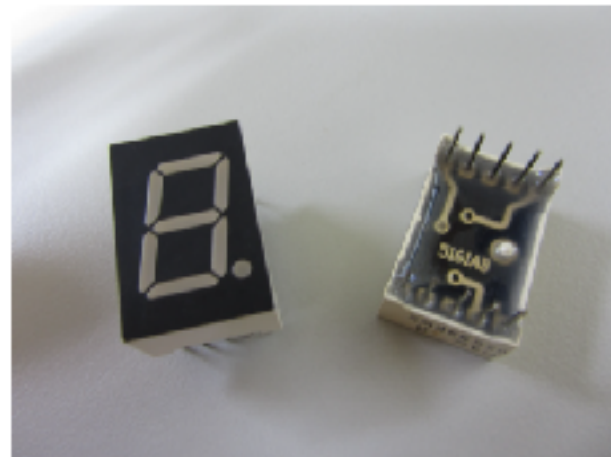
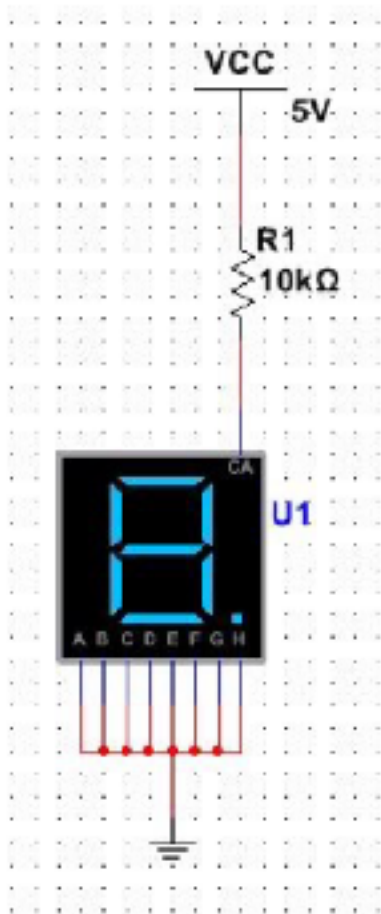
實作1-簡單量測被動元件

- 1. 打開軟體NI ELVISmx Instrument Launcher(NI ELVIS Traditional)
- 2. 點開Digital Multimeter
- 3. 利用ELVIS上的三用電表連接埠(ELVIS II會有連接線)與所要量測的被動元件連接
- 4. 將分配到的被動元件作量測並記錄量測值

如果不知道如何接線，ELVIS I 請打開Help，ELVIS II可看面板提示



實作2-七節顯示器



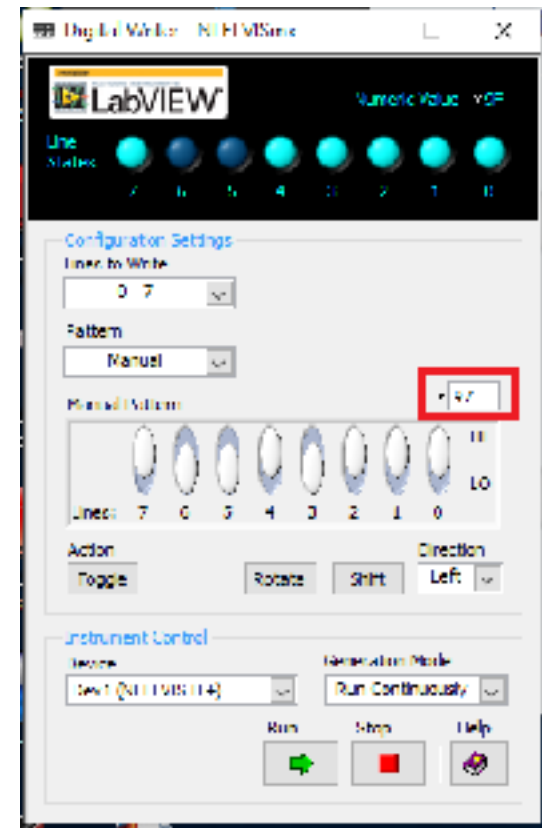
共陽極/共陰極



- 1. 利用三用電表確認所分配到的七配顯示器為共陰極或共陽極
- 2. 打開數位訊號輸出軟體(Digital Writer)
- 2. 將欲使動作的顯示部分之對應接腳連接至正確的位置，確定七節顯示器能正常運作
- 3. 搭配ELVIS麵包板上所提供的DIO控制七節顯示器

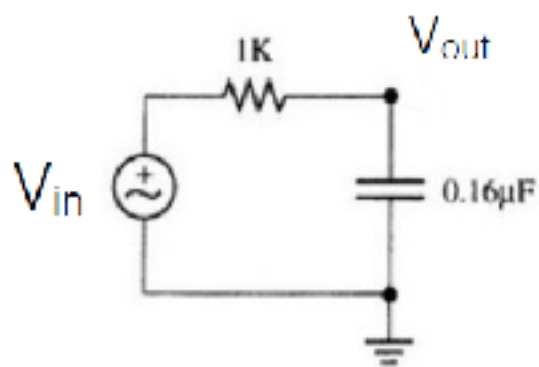


- 4.使七節顯示器成功顯示0至9
- 5.拍照展示結果
- 註:ELVIS II可直接輸入Manual Pattern的值，不用手動調整HI/LO

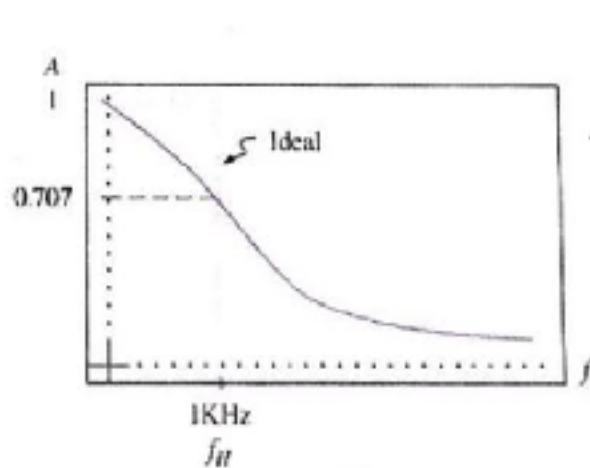




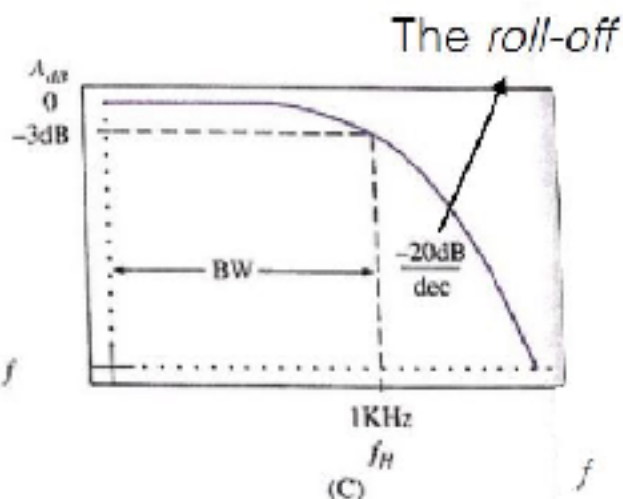
實作3-RC低通濾波器



(A)



(B)



$$f_{cut-off} = \frac{1}{2\pi RC}$$





- 利用實作1量測的電阻與電容，去選擇並配置一個cut-off約為3.3 kHz的低通濾波器
- 將低通濾波器實現於麵包板上
- 利用函數產生器(FUNC_OUT/FGEN)產生一個訊號頻率，並在波特分析圖量測cut-off是否約在3.3 kHz附近

