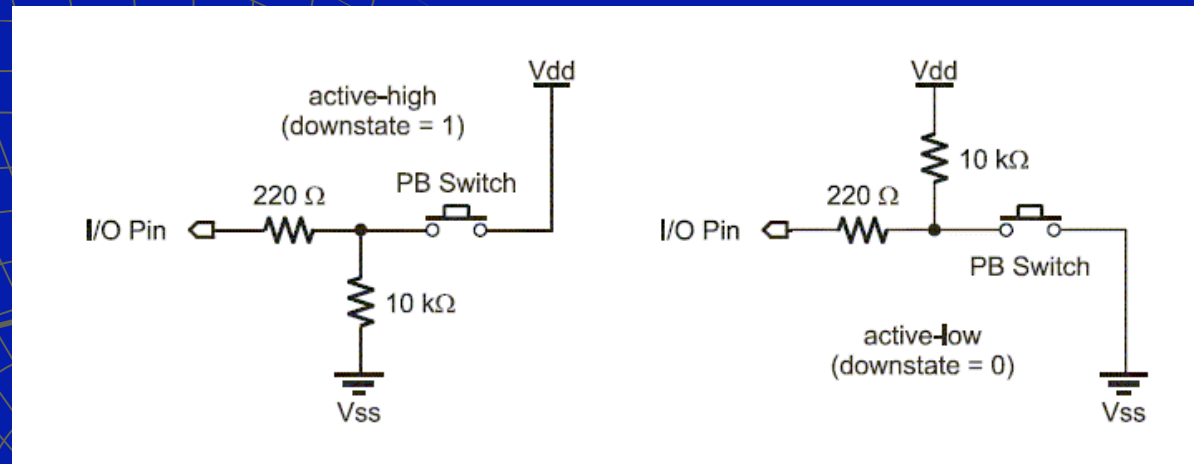


The University of Hong Kong

Department of Electrical
and Electronic Engineering

Anemometer Design Competition (Circuit & Sensor)

Reed Switch



- ◆ Stamp Command
 - BUTTON
 - PULSIN
 - COUNT

Reed Switch

```
DEBUG "Cup Anemometer....",CR
```

```
EXEC:
```

```
COUNT VxTRG,6000,Value
```

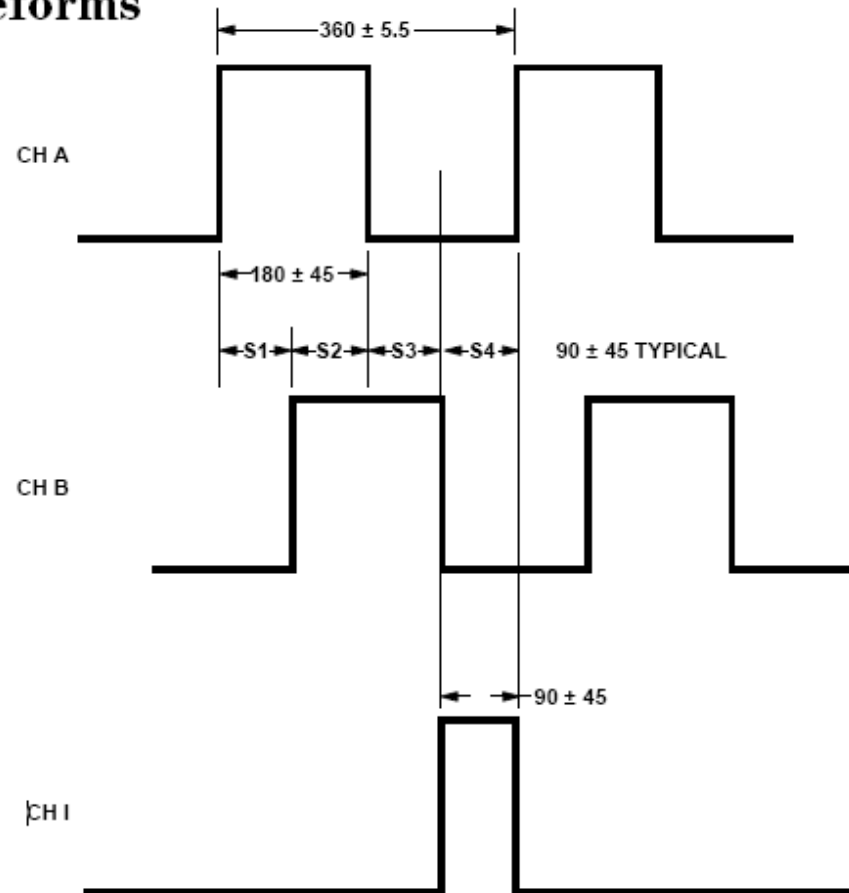
```
DEBUG DEC Value,CR
```

```
GOTO EXEC
```



Incremental Encoder

Output Waveforms



Incremental Encoder

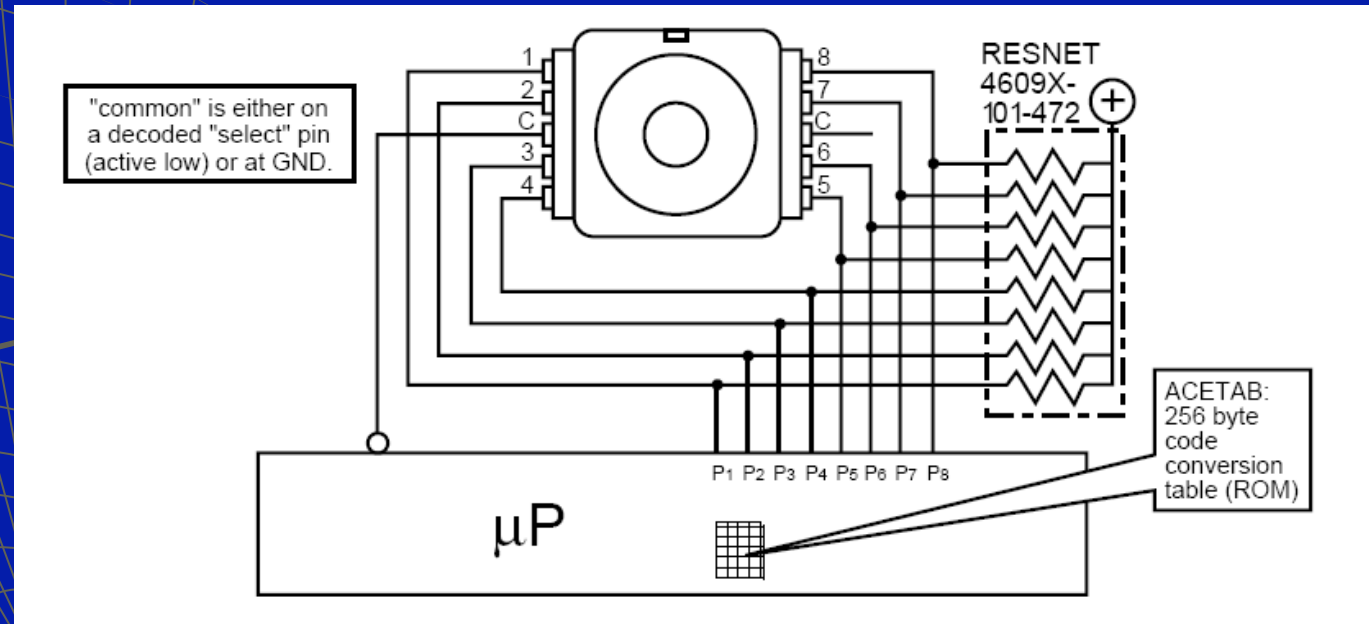
- ◆ Pulse width Measurement

```
PULSIN VxTRG,0,Value(9)  
DEBUG DEC AVG, "-", DEC Value(9), " ",CR
```

- ◆ Rotation Encoding with Channel A/B

```
DO WHILE VxTRG=0 : LOOP  
  IF VxDIR=1 THEN  
    PNTR = PNTR + 1  
  ELSE  
    PNTR = PNTR - 1  
  ENDIF
```

Absolute Encoder



http://en.wikipedia.org/wiki/Gray_code

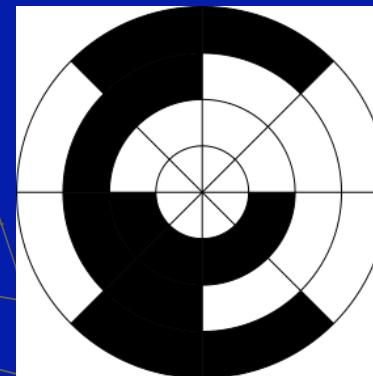
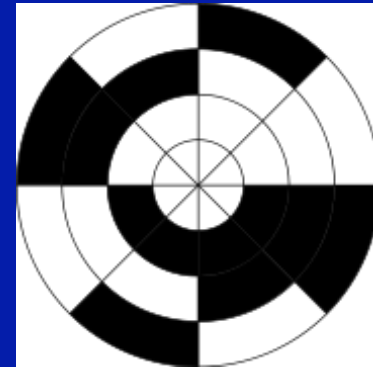
http://en.wikipedia.org/wiki/Rotary_encoder

<http://www.mathematik.uni-bielefeld.de/~sillke/PROBLEMS/gray>

<http://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=00532900>

Absolute Encoder – Gray Code

Number	Binary	Gray
0	000	000
1	001	001
2	010	011
3	011	010
4	100	110
5	101	111
6	110	101
7	111	100



Single Track Gray Code



10000

10100

11100

11110

11010

11000

01000

01010

01110

01111

01101

01100

00100

00101

00111

10111

10110

00110

00010

10010

10011

11011

01011

00011

00001

01001

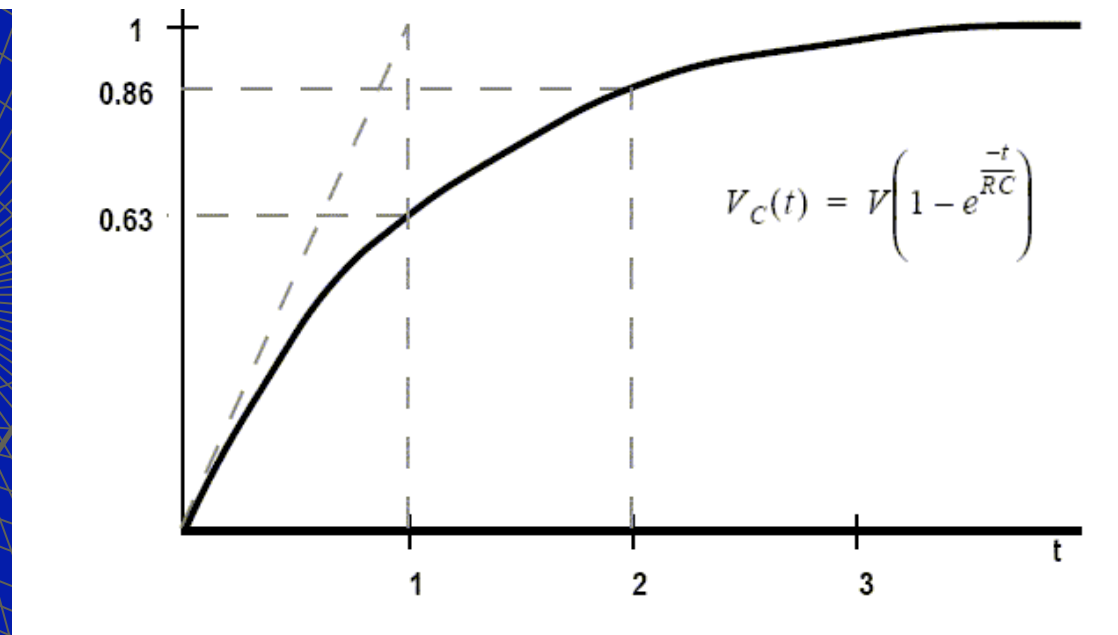
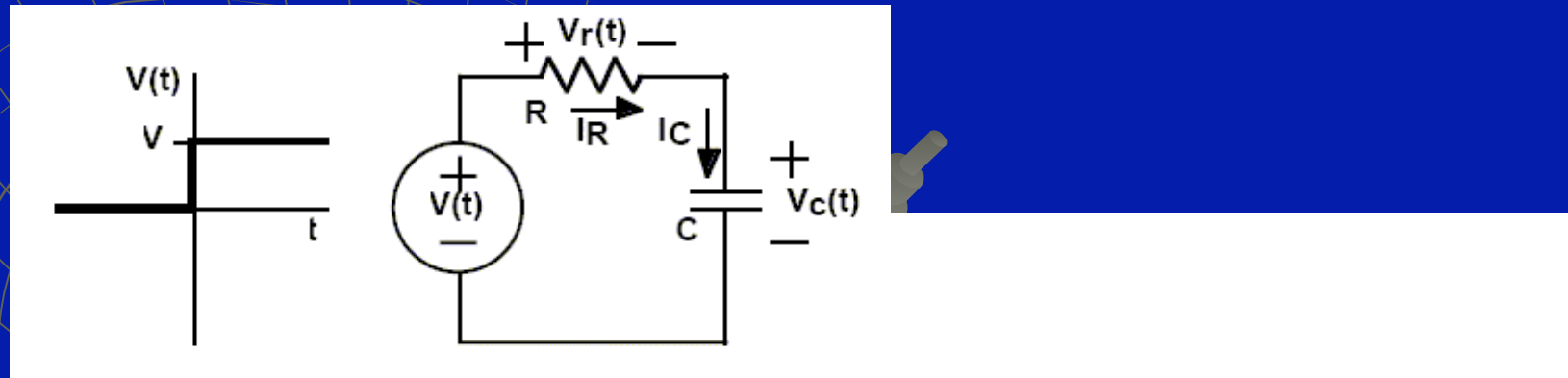
11001

11101

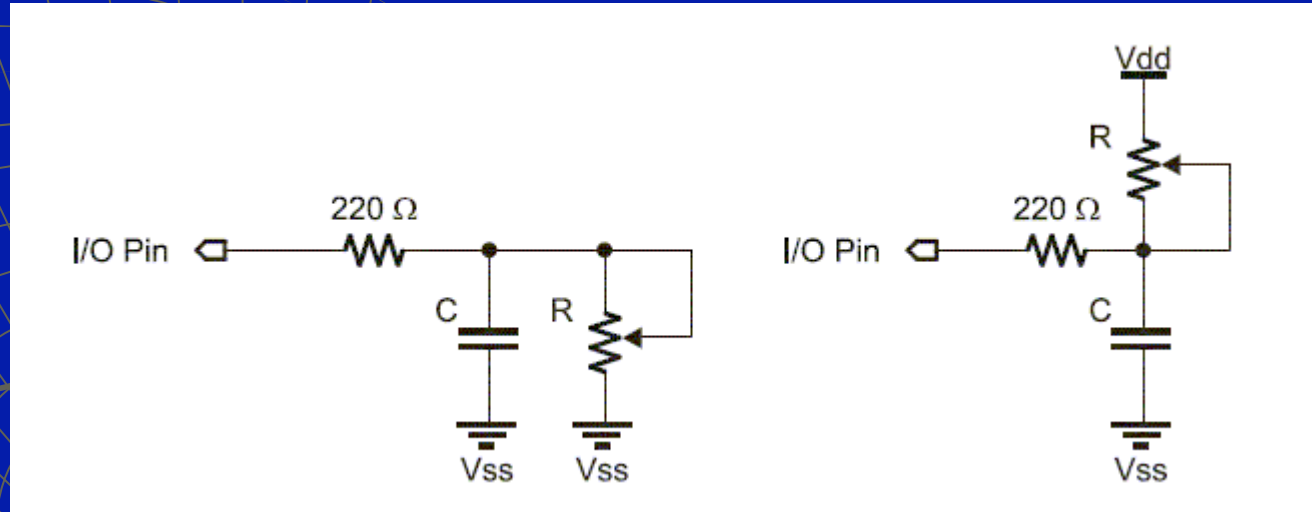
10101

10001

Resistance Measurement

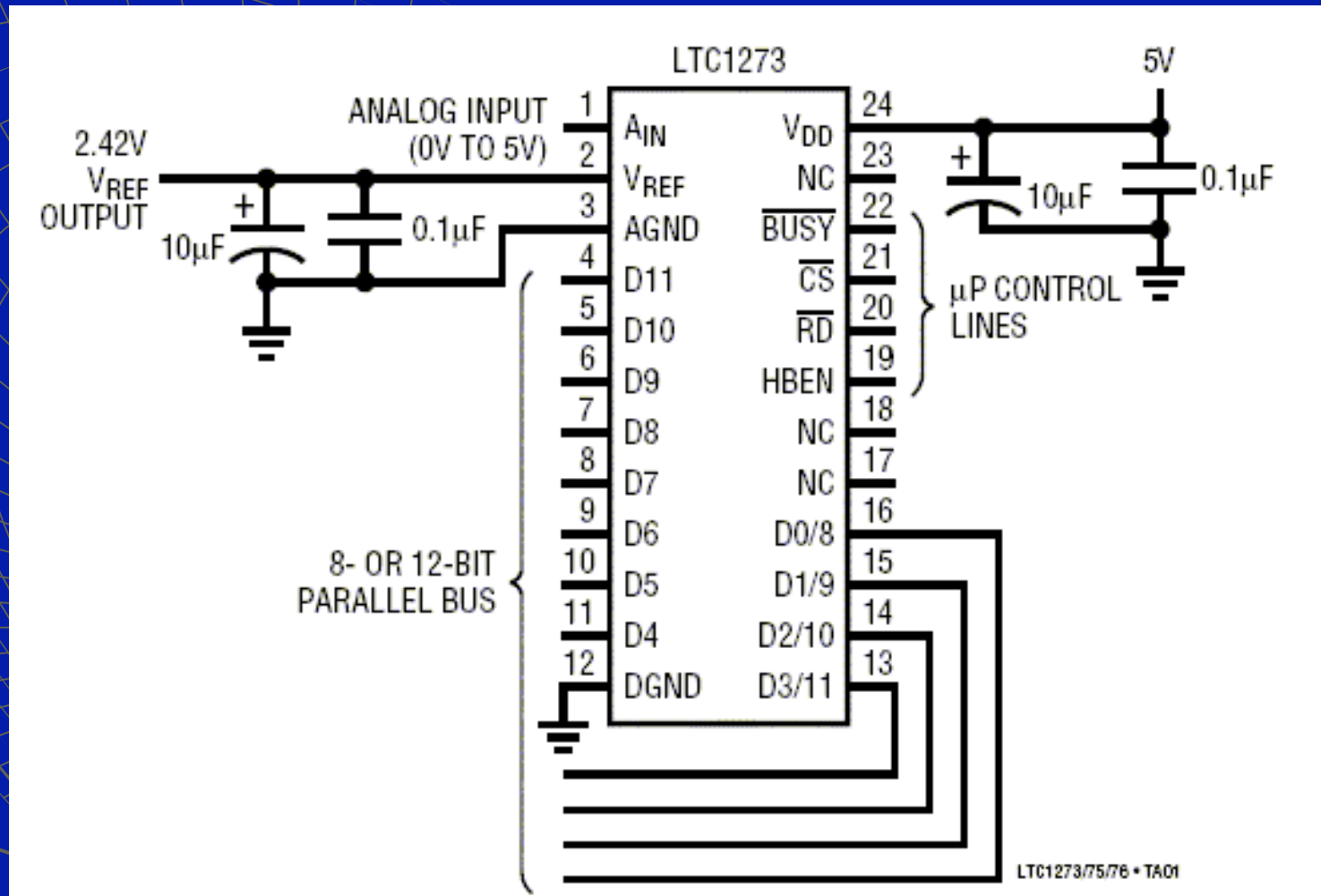


Resistance Measurement

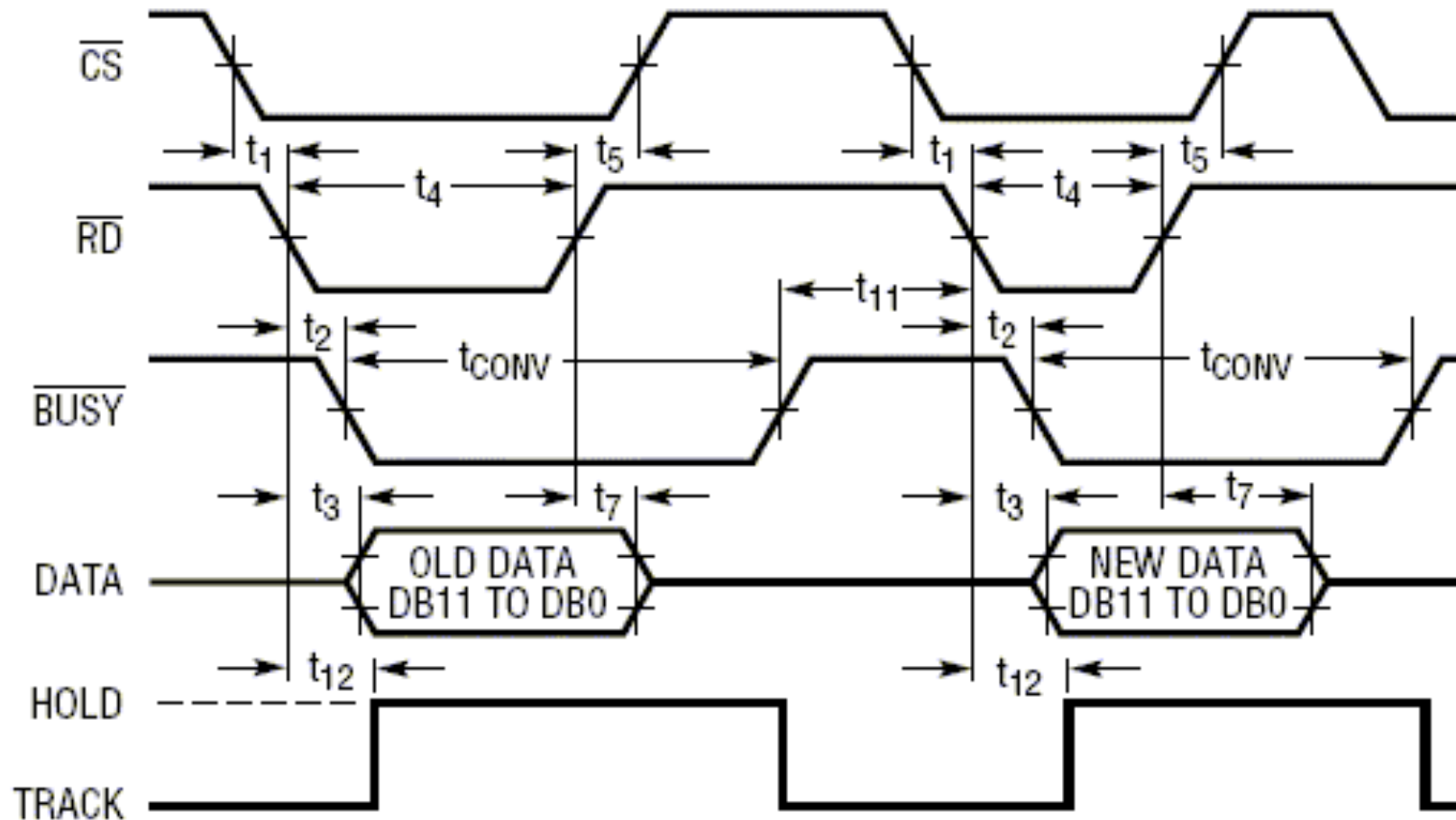


```
result VAR Word  
HIGH 7  
PAUSE 1  
RCTIME 7, 1, result  
DEBUG DEC ? result
```

Analog-to-Digital Converter



Analog-to-Digital Converter



Analog-to-Digital Converter

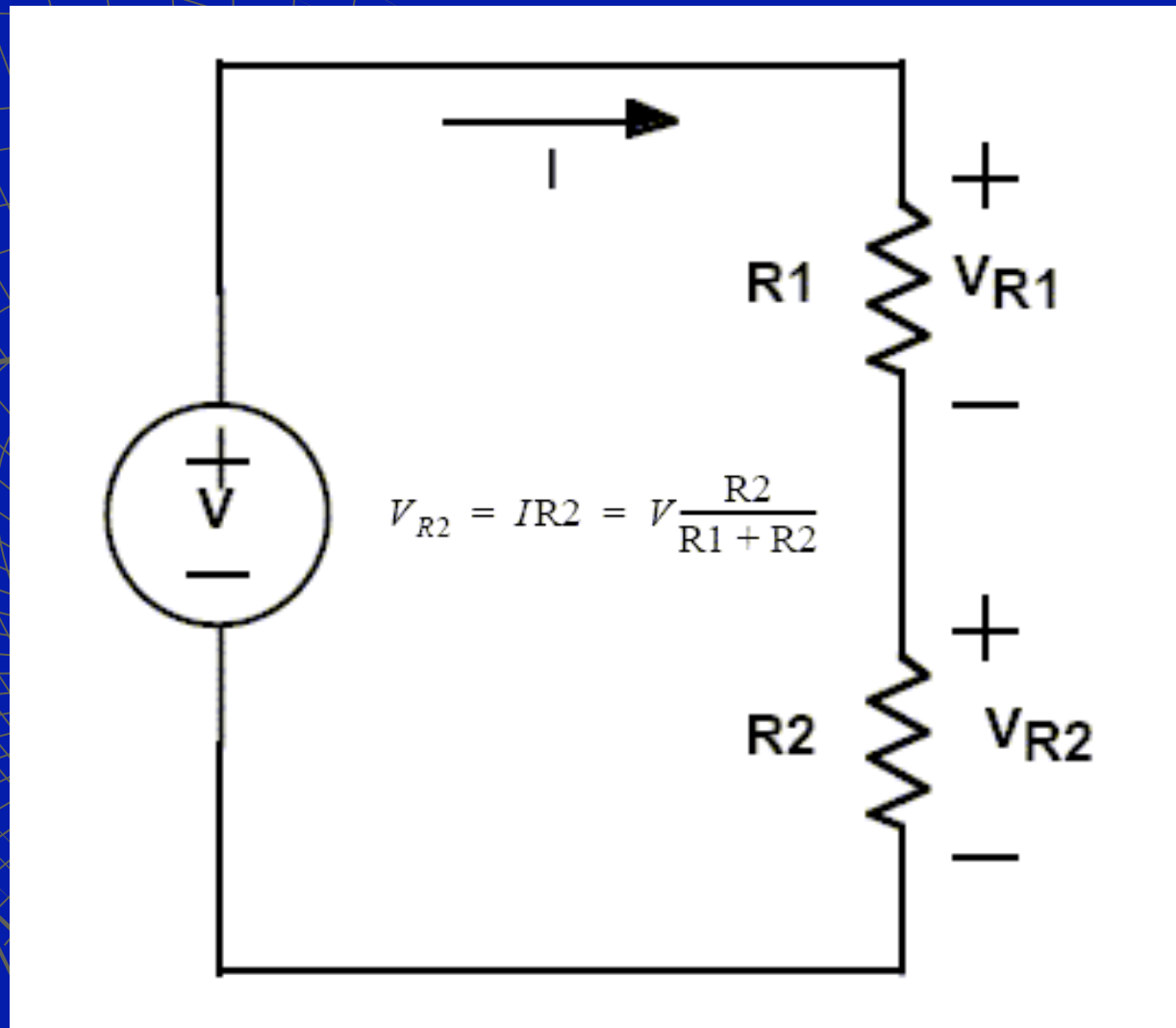
EXEC:

```
PULSOUT VxCSR D, 20000  
DO WHILE VxBUSY=0  
LOOP
```

```
LOW VxCSR D  
DEBUG HEX1 VxD2, HEX VxD1, CR  
HIGH VxCSR D  
PAUSE 200
```

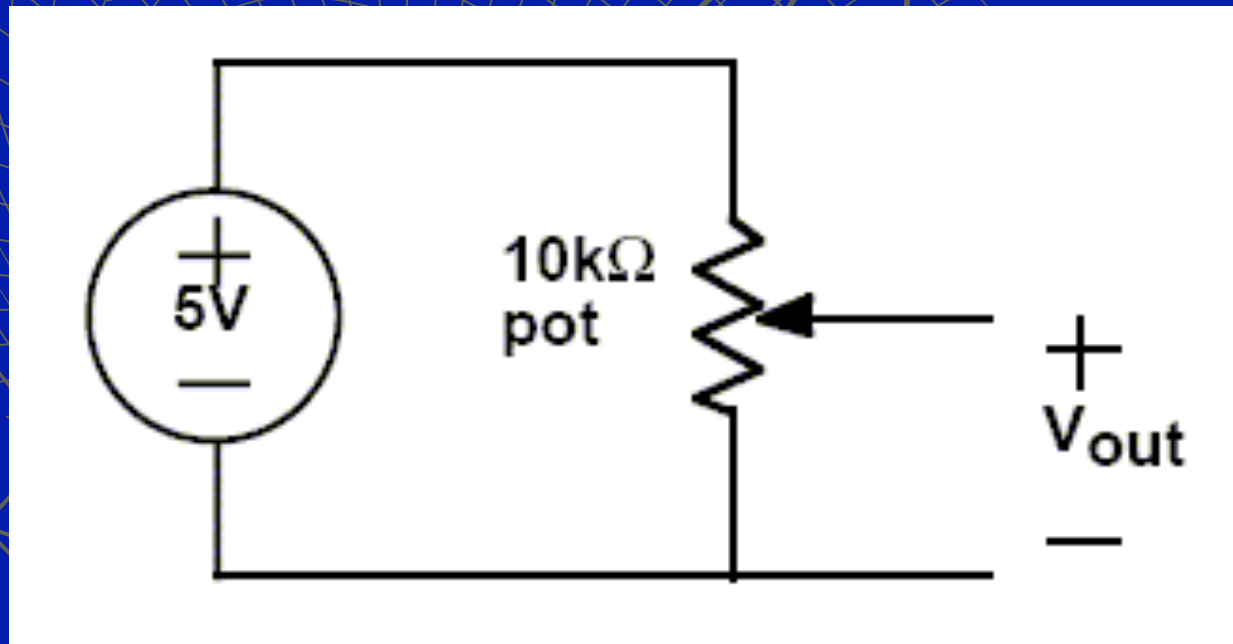
```
GOTO EXEC
```

Voltage Divider



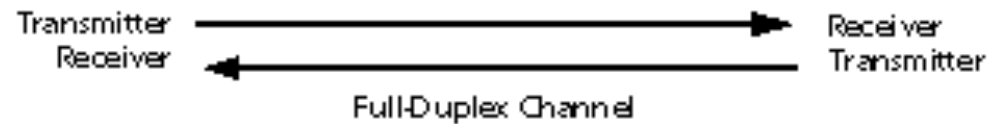
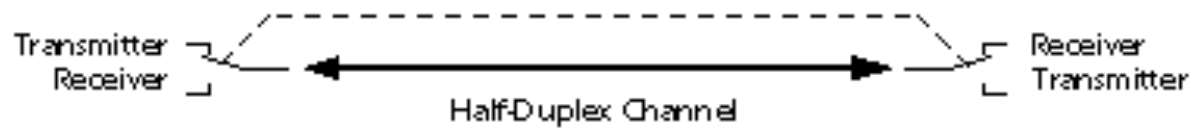
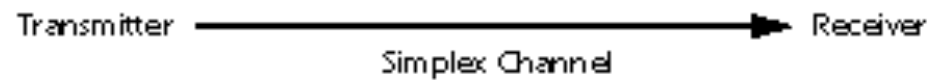
Voltage Divider

$$V_{R2} = IR2 = V \frac{R2}{R1 + R2}$$



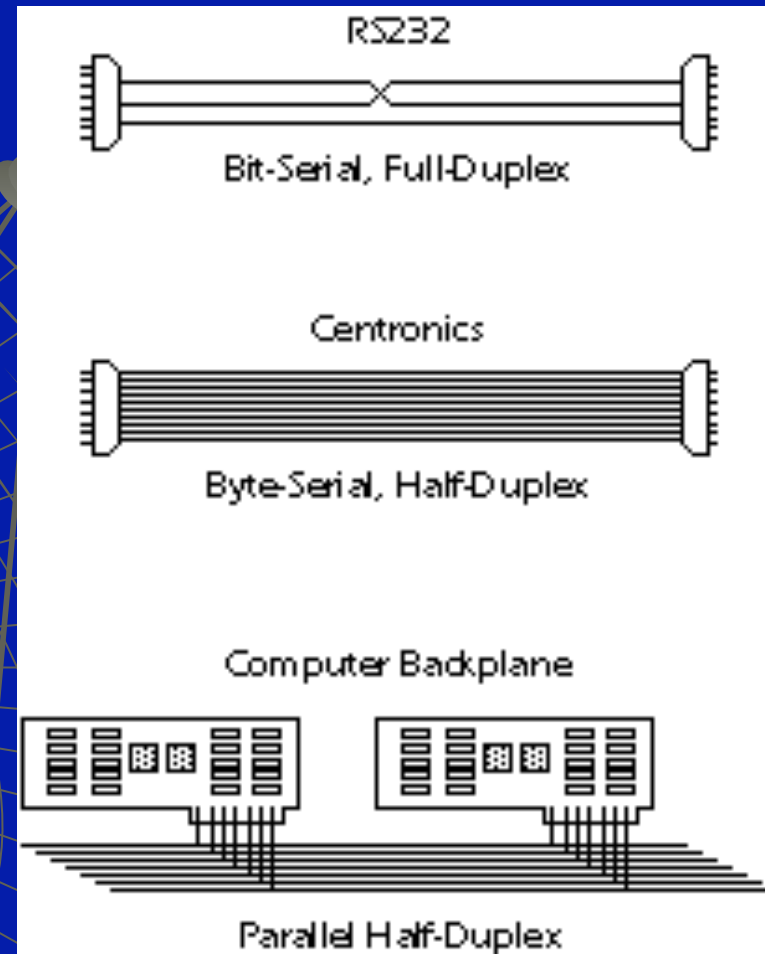
Communication

Channel Types

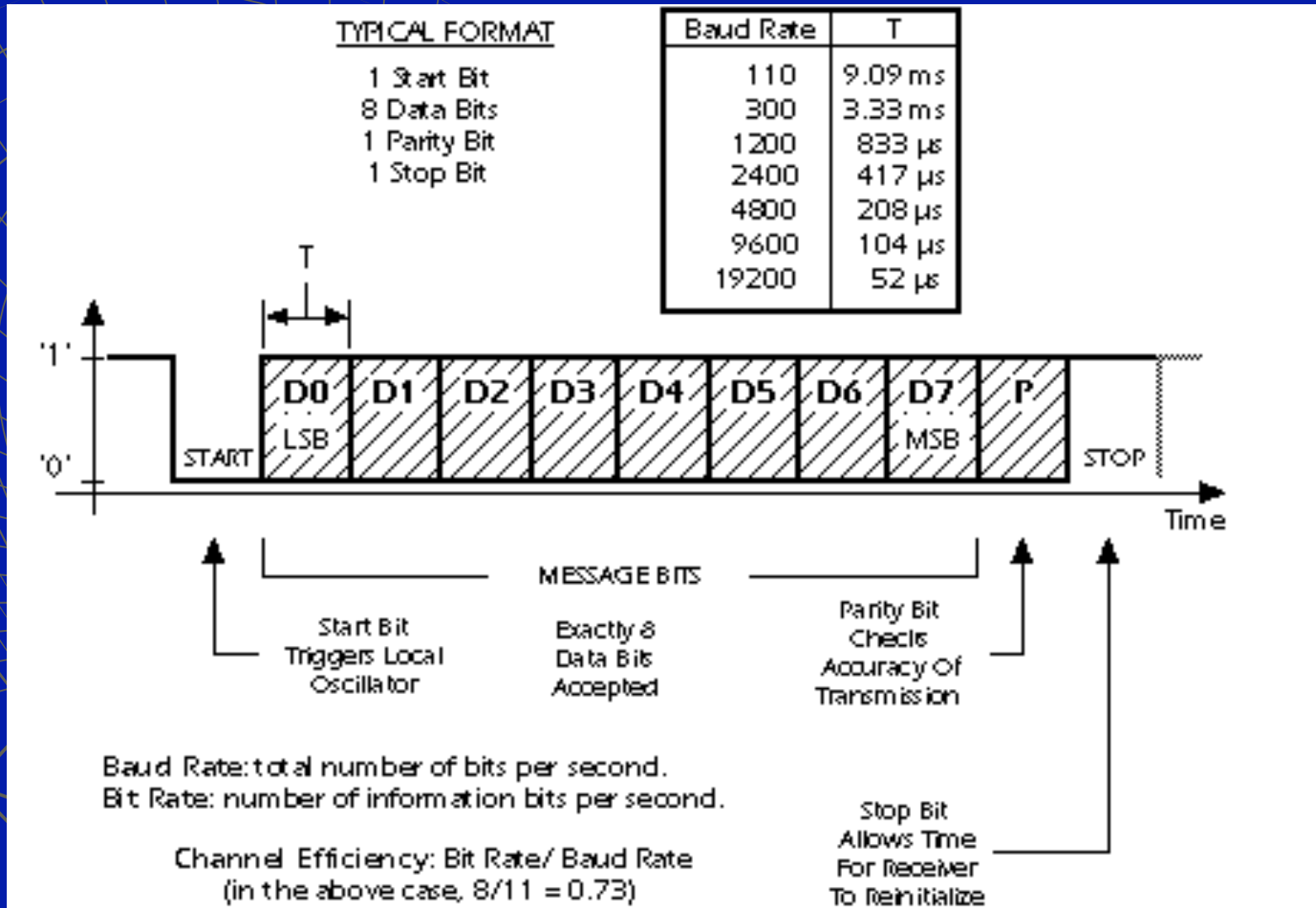


Communication

- ◆ RS-232
 - Long Distance
 - Low Noise
 - Easy Cabling
 - Cheap

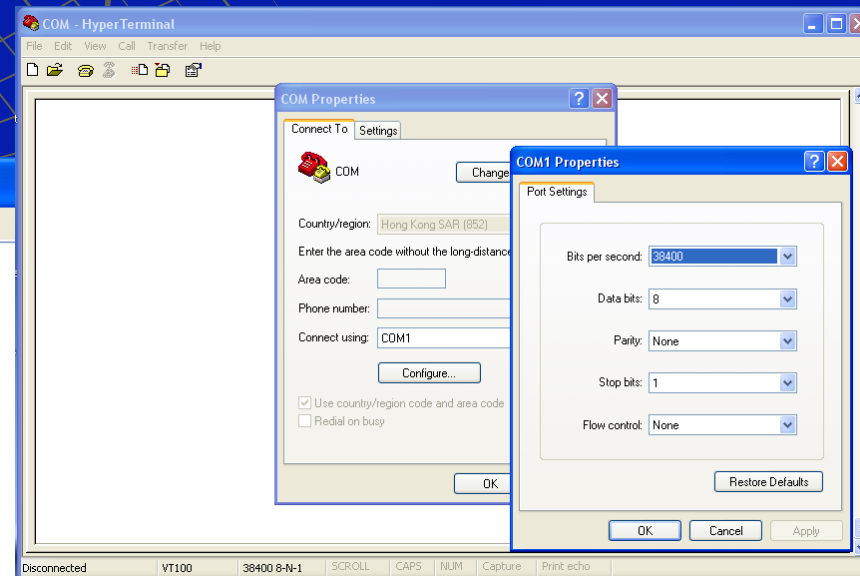
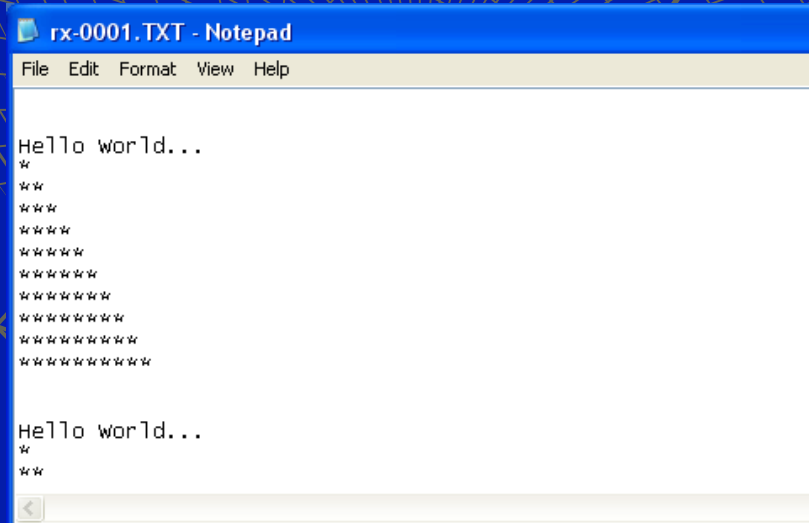
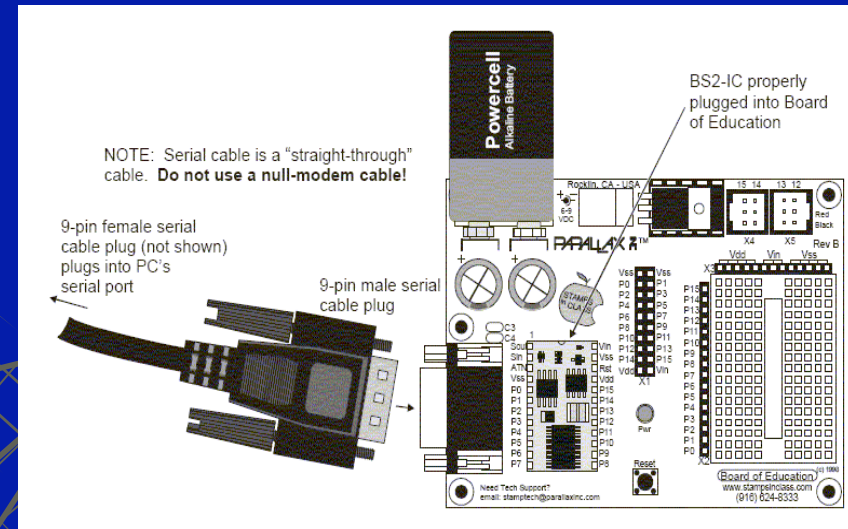


Communication



Data Logging

- Connect Stamp to PC
- Start Hyper-Terminal
- Setup Protocol
- Start Capture Text
- Stop & Save to File



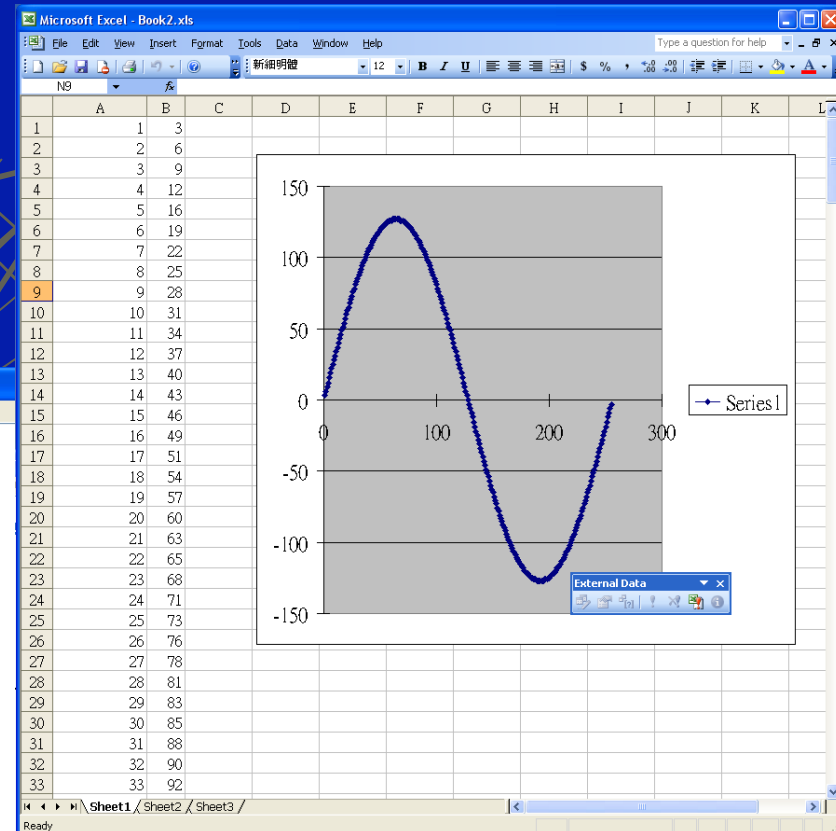
Processing & Plotting

- Import Data
- Post-Processing
- Define Plotting

rx-0002.TXT - Notepad

File Edit Format View Help

```
PC Logging...
001,003
002,006
003,009
004,012
005,016
006,019
007,022
008,025
009,028
010,031
011,034
012,037
013,040
014,043
015,046
016,049
017,051
018,054
019,057
020,060
021,063
022,065
023,068
024,071
025,073
026,076
027,078
028,081
029,083
030,085
031,088
032,090
033,092
034,094
035,096
036,098
037,100
038,102
039,104
```



Components Suppliers

- ◆ Slide Pot
 - RS www.rshongkong.com
- ◆ IR Sensor
 - Farnell www.farnell.com
- ◆ Basic Stamp
 - Parallax www.parallax.com
 - Mind Research www.mindresearch.com.hk
- ◆ General Parts
 - Welfare www.wecl.com.hk
 - IC Master www.icmaster.com.hk
 - Wo Hing www.wohingradio.com.hk