Index to Book Pages.

Index to Book Pages.

Index to Book Pages.

Index to Book Pages.

Index to Book Pages.

Operational Amplifiers (OP Amps)

Recap Resistance Calculations and the effects of circuit loading.

16V — 12KΩ — 12KΩ — 6KΩ

Voltage monitor point

After the 6KΩ resistor is attactched the equivalent circuit becomes →

16V — 12KΩ — 4KΩ

Before 6KΩ resistor is attached the monitor voltage is :-
Resistor is series Rs = R1 + R2 ...
Therefore Rs = 12KΩ + 12KΩ
Process to find current { Current = Voltage [divided by] Resistance }
I Amps = V Volts / R Ohms   Calculate Current in resistor chain
I Amps = V/R = 16Volts/(12 KΩ+12 KΩ)
I Amps = V/R = 16Volts /(12000Ω+12000Ω)
I Amps = V/R = 16Volts /(24000Ω)
I Amps = V/R = 16Volts /(24Ω) * 1000
I Amps / 1000 = V/R = 16Volts /(24Ω) (* 1000 / 1000)
I Amps / 1000 = V/R = 16Volts /(24Ω)
I milli Amps = V/R = 16Volts /(24Ω)
I mA = V/R = 16Volts /(24Ω)
I = 16 /24 mA

Process to find Voltage { Voltage = Current [multiplied by] Resistance
V Volts = I Amps * R Ohms   Calculate Voltage across lower resistor
Vout = I*R = ({16/24mA} * {12KΩ}) = 8V Unloaded

Loaded with 6K
1/RT =1/6+1/12 = 2+1/12 = 3/12 =1/4
∴ RT = 4K
I = V/R = 16/(12+4) mA
Vout = I*R = (16/16*4) = 4V

Loaded with 60K
1/RT =1/60+1/12 = 1+5/12 = 6/60 =1/10
∴ RT = 10K
I = V/R = 16/(12+10) mA
Vout = I*R = (16/22*10) = 7.72V
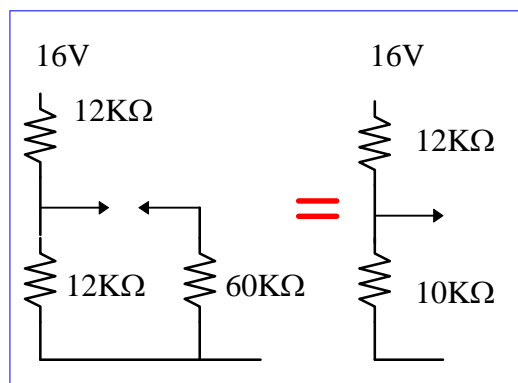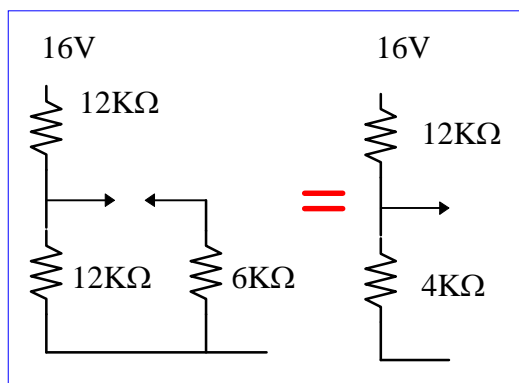
16V — 12KΩ — 12KΩ — 6KΩ   =   16V — 12KΩ — 4KΩ

16V — 12KΩ — 12KΩ — 60KΩ   =   16V — 12KΩ — 10KΩ

Operational Amplifiers (OP Amps)

Recap Resistance Calculations and the effects of circuit loading.
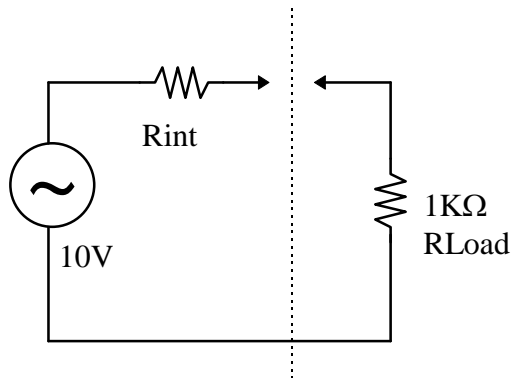
IF Rint = 1KΩ then
Total resistance Rs = 1K + 1K
ThereforeVoltage across Rload is
I = V/R = 10/(1+1) mA
Vload = I*R = 10/2*1 = 5V

IF Rint = 100Ω then V across Rload is
Total resistance Rs = 1K + 100Ω
ThereforeVoltage across Rload is
I = V/R = 10/(1+0.1) mA
Vload = I*R = 10/1.1*1 = 9.09V

Observations.

1. When you are monitoring a circuit the higher the Resistance/Impedance of the
    probes then the less the actual circuit is effected.
2. The lower the internal Resistance/Impedance of a circuit then the the less effect the
    load external Resistance/Impedance will have on the circuit.

Operational Amplifiers (OP Amps)

The Analogy   Seeds to Flowers   (See OPAmps Presentation)
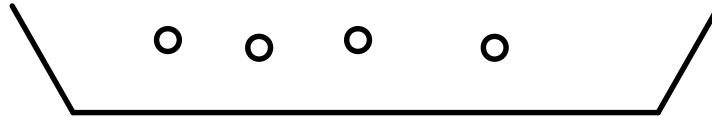
Gain = A = Output/Input

? What are the other factor of the Bio Amplifier

    TIME from input to output
    The POWER i.e. Water / Sunlight / nurture / ....

Now the Electronic Differential Voltage Amplifier
    can be consider as the following equivalent circuit.

V-

Vin

Rin

O/P Res

Vout =
A * Vin

V+
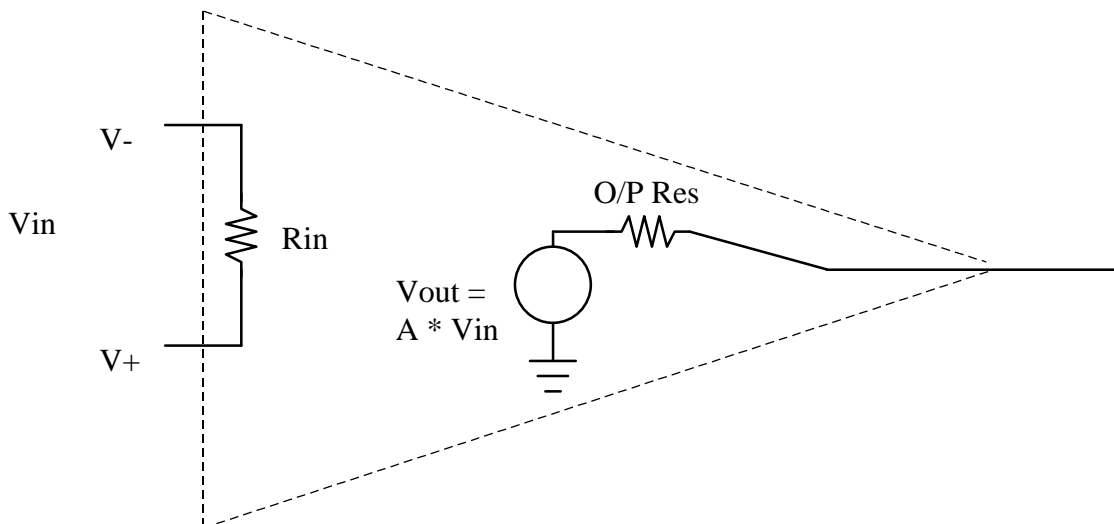
If this was the ideal Amplifier What characteristics do we want for :-
    Rin ?   (to have least effect on circuit we are monitoring)
    O/P Resistance ?   (to have least effect on Amplifier output)
    Gain ?   (How many seeds would we want from a plant?)

Conclusion.
    Rin ?   (Infinite Ohms   In practice $> 10^{+6}\Omega$)
    O/P Resistance ?   (Zero Ohms   In practice $< 100\Omega$)
    Gain ?   (Infinite Gain   In practice $> 10^{+6}$)

Operational Amplifiers (OP Amps)

Show Phase relationship I/P to O/P .

Inverting and Non Inverting inputs
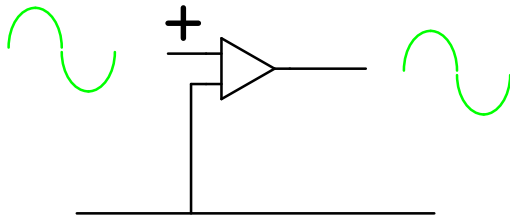
Non-Inverting Amplifier   Inverting Amplifier
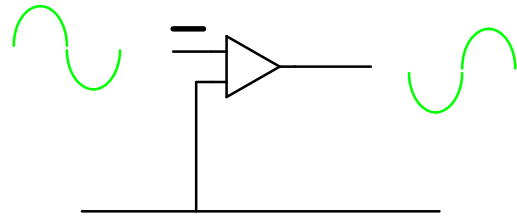
Negative Feedback.

Output of Amplifier connects to Negative Input.

Negative Feedback

Rf = 10K ,
If = Iin

Rin = 1K ,
Iin = Vin/Rin
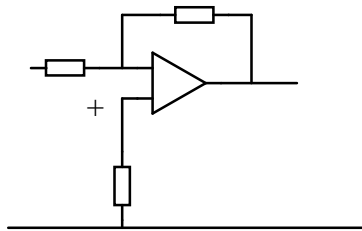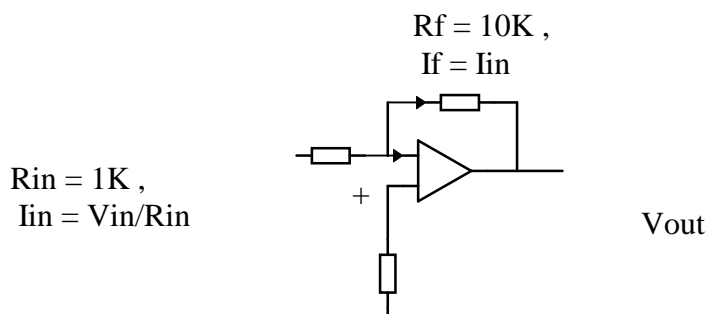
Vout

Iin = (Vin - 0) / Rin = Vin / Rin

If = (0 - Vout) / Rf = -Vout / Rf   so Vin/Rin = -Vout/Rf

But Gain = Vout / Vin   so Gain = Av = -Rf / Rin

Operational Amplifiers (OP Amps)

Positive Feedback.

Output of Amplifier connects to Positive Input.

Positive Feedback

$Rin = 1K$,
$Iin = Vin/(Rin+\infty\Omega)$
$Iin = 0A$

$Rf = 10K$,$R1=1K$
$Ifb = IR1$
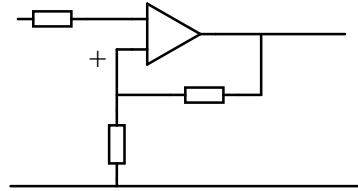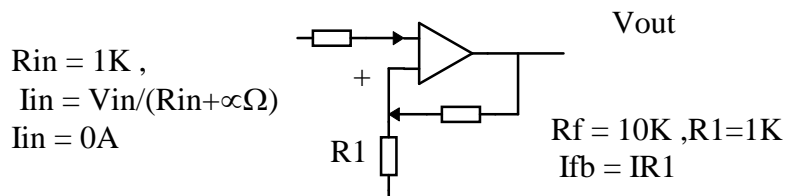
$Ifb = Vout-Vin/Rf$ $\qquad$ $IR1 = Vin/R1$ $\qquad$ But $IR1 = IFb$

$Vin/R1 = (Vout - Vin) / Rf$ $\qquad$ Multiply both sides by Rf/Vin

gives $\quad Rf/R1 = Vout/Vin - Vin/Vin = Vout/Vin -1$

But Gain = $Vout / Vin$ $\qquad$ so Gain = $Av = Rf / Rin +1$

Project or Activity Log Sheet / Diary.

Activity or Project name.		
Student Name		Page of

Date/Time	Activities performed, Comments or Remarks

```
          Useful Mathematics Information Data File.
          ========================================


          A
         / \                    a^2 = b^2 + c^2 - 2bc cos A
      c /   \ b                 b^2 = a^2 + c^2 - 2ac cos B
       /     \                  c^2 = a^2 + b^2 - 2ab cos C
      /       \
     B --------------- C        a/Sin(A) = b/Sin(B) = c/Sin(C) = 2R
              a                 Where Radius R is the circumference
                                circle of the triangle.

                                Area General 3 Known Sides
                                S = (a + b + c) / 2
                                Area = Sqrt(S(S-a)(S-b)(S-c))



----------------------------------------------------------------------

       A
       | \                      b^2  =  a^2 + c^2
       |  \                     Sin C = c/b    Sin A = a/b
     c |   \ b                  Cos C = a/b    Cos A = c/b
       |--   \                  Tan C = c/a    Tan A = a/c
       | |    \
       B -------- C             Tan X = Sin X / Cos X
            a

                                Area = (Base * Height)/2



----------------------------------------------------------------------

         PI/2
          |
      Sin |  All
          |
   PI  -------+--------- 0 or 2PI
          |
      Tan |  Cos
          |
        3PI/2



----------------------------------------------------------------------
```
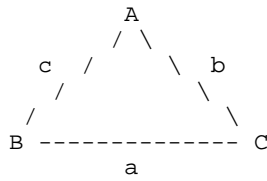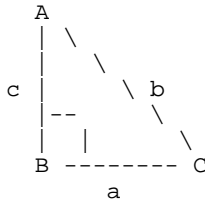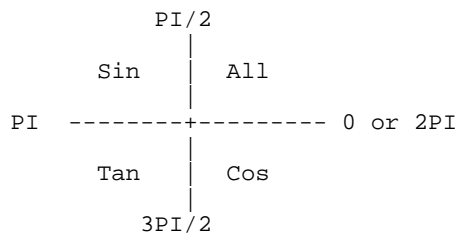
```
    Series

    Sin (x)      = x - x^3/3! + x^5/5! - x^7/7! + x^9/9! .........

    Cos (x)      = 1 - x^2/2! + x^4/4! - x^6/6! + x^8/8! .........

    Tan (x)      = x - x^3/3  + 2*x^5/15 + 17*x^7/315 +  ........

    ArcSin (x)   = x + 1/2*x^3/3 + 1/2*3/4*x^5/5 +       ........
                 = ArcTan ( x / SQRT ( -x * x + 1))

    ArcCos (x)   = PI/2 - ArcSin(x)
                 = PI/2 - ArcTan ( x / SQRT ( -x * x + 1))

    ArcTan (x)   = x - x^3/3 + x^5/5 - x^7/7 + x^9/9    ........
                 = PI/2 - 1/x + 1/3/x^3 -

    Sinh (x)     = x + x^3/3! + x^5/5! + x^7/7! + x^9/9! .........

    Cosh (x)     = 1 + x^2/2! + x^4/4! + x^6/6! + x^8/8! .........

    Tanh (x)     = Sinh (x) / Cosh (x)

    ArcSinh (x)  = LN ( x + SQRT( x^2 + 1 ) )

    ArcCosh (x)  = LN ( x + SQRT( x^2 - 1 ) )

    ArcTanh (x)  = 1/2*LN ( ( 1 + x ) / ( 1 - x ) )

    LN (1 + x)   =  x - x^2/2 + x^3/3 - x^4/4 + x^5/5  ..........

    LN (1 - x)   = -x - x^2/2 - x^3/3 - x^4/4 - x^5/5  ..........

    Exp (x)      = 1 + x + x^2/2! + x^3/3! + x^4/4!   ..........  = e^x

    e            = 1 + 1 +  1/2! +   1/3! +   1/4!

    PI/4         = 1 - 1/3 + 1/5 - 1/7 + 1/9 - 1/11    ..........

    PI           = 4 - 4/3 + 4/5 - 4/7 + 4/9 - 4/11    ..........

    a ^ x        = e^( x * LN(a) )


    ----------------------------------------------------------------------

    Quadratics

        ax^2 + bx + c = 0


        x =  -b +- SQRT ( b^2 - 4ac )
             ----------------------
                      2a

    ----------------------------------------------------------------------

    Greater Circle

    From Ref to Destination Dst

    Latitude     North or South
    Longitude    East or West

    Degrees to Radians  (Angle/360) * 2 * Pi
    Radians to Degrees  (Angle/2 * Pi) * 360

    Distance =  ACos(
              Sin(Lat_Ref) * Sin(Lat_Dst) +
              Cos(Lat_Ref) * Cos(Lat_Dst) *
              Cos(Long_Ref - Long_Dst)
              ) * (Distance per degree)

    Distance per degree = 111.133 Km

    ----------------------------------------------------------------------
```

```
Filename Useful1.Txt   Author R. J. Spriggs    File Started  17/10/94
Revision 1.3                                   Latest Update 06/11/97

            Useful Technical Information Data File.
            =======================================

NOTE    All Pin Assignments refer to 25 way D Type Connector
        however on IBM PC 9 Way D Types are sometimes used.

25 Way Pin       Description                 Signal Name   9 Way Pin
    1            Frame Ground
    2            Transmit Data                   TXD           3
    3            Receive  Data                   RXD           2
    4            Request to Send                 RTS           7
    5            Clear to Send                   CTS           8
    6            Data Set Ready                  DSR           6
    7            Signal Ground                   GND           5
    8            Data Carrier Detect             DCD           1
   20            Data Terminal Ready             DTR           4
   22            Ring Indicator                  RI            9

==========================================================================

RS232 NULL Modems

3/4 Wire Null Modem

        Pin           Signal Name    Comments              Pin
        1             Frame  Gnd     Optional Connection    1
        2             TXD                                   3
        3             RXD                                   2
        7             Signal Gnd                            7

==========================================================================

4/5 Wire Null Modem

        Pin           Signal Name    Comments              Pin
        1             Frame  Gnd     Optional Connection    1
        2             TXD                                   3
        3             RXD                                   2
        5             CTS                                  20
        20            DTR                                   5
        7             Signal Gnd                            7
                                     Plus Internal Links
        4             RTS      -->--+              +--<--   4
        6             DSR      --<--|              |-->--   6
        8             DCD      --<--+              +-->--   8

==========================================================================


6 Wire EPSON Printer Null Modem

        Pin           Signal Name    Comments              Pin
        1             Frame  Gnd                            1
        2             TXD                                   3
        3             RXD                                   2
        20            DTR                                   5
        7             Signal Gnd                            7
                      DTR        +--<-------------------   20
        6             DSR      --<--|
        8             DCD      --<--+
                                     Plus Internal Links
                      RTS                            +--<--   4
                      DSR                            |-->--   6
                      DCD                            +-->--   8


==========================================================================
```

```
7/8 Wire Null Modem  or Interlink Serial

        Pin         Signal Name    Comments                 Pin
        1           Frame Gnd      Optional Connection      1
        2           TXD                                     3
        3           RXD                                     2
        6           DSR                                     20
        20          DTR                                     6
        7           Signal Gnd                              7
                    DCD            +-->--------------------  8
        4           RTS     --<--|
        5           CTS     --<--+
        8           DCD     -------------------<--+
                    RTS                           |--<--  4
                    CTS                           +-->--  5


========================================================================

                     IBM Loop Back Connector.

        1   ->  7
        2   ->  3
        4   ->  5   ->  8
        6   ->  11  ->  20  ->  22
                15  ->  17  ->  23
                18  ->  25


========================================================================


    INTERLINK Parrallel Cable connections

        Pin         Signal Name    Comments                 Pin
        2           D0             Black                    15
        3           D1             Brown                    13
        4           D2             Red                      12
        5           D3             Orange                   10
        6           D4             Yellow                   11
        15          -Error         Green                    2
        13          +Select        Blue                     3
        12          +Paper_End     Violet                   4
        10          -Ack           Grey                     5
        11          +Busy          White                    6
        25          Ground         Black                    25


========================================================================

    Port Address + 0   =   [0408h,0409H  Low,High byte address] for LPT1:
    Port Address + 0   =   [040Ah,040BH  Low,High byte address] for LPT2:
    Port Address + 0   =   [040Ch,040DH  Low,High byte address] for LPT3:

    Port Address + 0   =   Data Register   (Output)
            Bit 0  =   D0          ( 2)
            Bit 1  =   D1          ( 3)
            Bit 2  =   D2          ( 4)
            Bit 3  =   D3          ( 5)
            Bit 4  =   D4          ( 6)
            Bit 5  =   D5          ( 7)
            Bit 6  =   D6          ( 8)
            Bit 7  =   D7          ( 9)

    Port Address + 1   =   Status Register  (Input)
            Bit 3  =   -Error      (15)
            Bit 4  =   +Select     (13)
            Bit 5  =   +Paper End  (12)
            Bit 6  =   -Ack        (10)
            Bit 7  =   +Busy       (11)

    Port Address + 2   =   Control Register (Output)
            Bit 0  =   -Strobe     ( 1)
            Bit 1  =   -Auto Feed  (14)
            Bit 2  =   -Init       (16)
            Bit 3  =   -Sel I/P    (17)


========================================================================
```

```
     Printer Parrallel Cable connections
        25D                                                Centronics
        Pin          Signal Name   Comments                Pin
        1            -Strobe       O/P Control (0)          1
        2            D0            O/P Data    (0)          2
        3            D1            O/P Data    (1)          3
        4            D2            O/P Data    (2)          4
        5            D3            O/P Data    (3)          5
        6            D4            O/P Data    (4)          6
        7            D5            O/P Data    (5)          7
        8            D6            O/P Data    (6)          8
        9            D7            O/P Data    (7)          9
        10           -Ack          I/P Status  (6)          10
        11           +Busy         I/P Status  (7)          11
        12           +Paper End    I/P Status  (5)          12
        13           +Select       I/P Status  (4)          13
        14           -Auto Feed    O/P Control (1)          14
        15           -Error        I/P Status  (3)          32
        16           -Init         O/P Control (2)          31
        17           -Sel I/P      O/P Control (3)          36
        18 -> 25     Gnd           Common Links            19 -> 29
                     Gnd               "      "             30
                     Gnd               "      "             33
                                   No  Connection           15
                                   Logic Ground             16
                                   Chassis Ground           17
                                   No  Connection           18
                                   No  Connection           34
                                   Pull up +5V via 3.3K     35

     ========================================================================

        MDA Connector Pins

           Pin          Signal Name                          I/O
           01           Ground                               -
           02           Ground                               -
           03           Not Used                             -
           04           Not Used                             -
           05           Not Used                             -
           06           +Intensity                           Out
           07           +Video                               Out
           08           +Horizontal                          Out
           09           -Vertical                            Out

     ========================================================================

        CGA Connector Pins

           Pin          Signal Name                          I/O
           01           Ground                               -
           02           Ground                               -
           03           Red                                  Out
           04           Green                                Out
           05           Blue                                 Out
           06           +Intensity                           Out
           07           Reserved                             -
           08           +Horizontal                          Out
           09           -Vertical                            Out

     ========================================================================

        EGA Connector Pins

           Pin          Signal Name                          I/O
           01           Ground                               -
           02           Secondary Red                        Out
           03           Red                                  Out
           04           Green                                Out
           05           Blue                                 Out
           06           Secondary Green / +Intensity         Out
           07           Secondary Blue  / Mono               Out
           08           Horizontal Retrace                   Out
           09           Vertical   Retrace                   Out

     ========================================================================
```

```
        VGA Connector Pins

         Pin          Signal Name     Mono          Colour        I/O
          1           Red             No Pin        Red           Out
          2           Green           Mono          Green         Out
          3           Blue            No PIn        Blue          Out
          4           Monitor ID 2    No Pin        No Pin/Gnd    In
          5           Digital Ground  Self test     Self Test     Self Test
          6           Red Ground      N/C           Red Ground
          7           Green Gnd       Mono Gnd      Green Gnd
          8           Blue Gnd        No Pin        Blue Gnd
          9           Key             Key           Key
         10           Sync Gnd        Ground        Ground
         11           Mon ID 0        No Pin        Gnd/-Pin      In
         12           Mon ID 1        Ground        No Pin        In
         13           H Sync          H Sync        H Sync        Out
         14           V Sync          V Sync        V Sync        Out
         15           Mon ID 3        No Pin        Gnd/-Pin      In


    =========================================================================

    Keyboard Connectors.
    --------------------

                      Signal Name     5 Pin DIN   Mini DIN    9 Way D
                      KBD Data        2           1           1
                      Gnd             4           3           3,4
                      +5v             5           4           9
                      KBD Clk         1           5           2

                      N/C             3
                      N/C                         2           5,6
                      N/C                         6           7,8


         5 Pin DIN Plug                   5 Pin DIN Socket


             2                                    2
         4       5                          5         4

       1    -    3                        3    -    1
           |2|                                |2|



       Mini DIN Plug 6 Way           Mini DIN Socket 6 Way

           6 || 5                          5 || 6
             ||                              ||
         4   ||   3                      3   ||   4

          2    1                          1    2



             All Viewed from the Rear

    =========================================================================
```
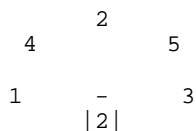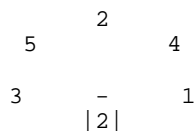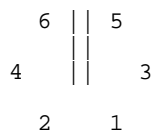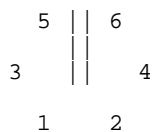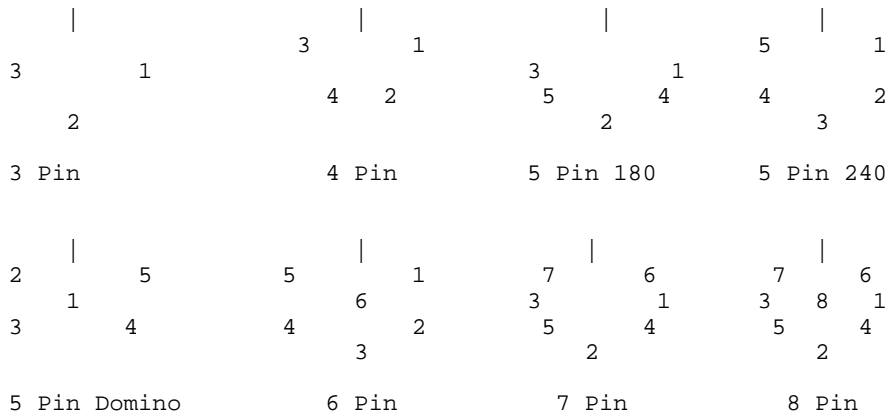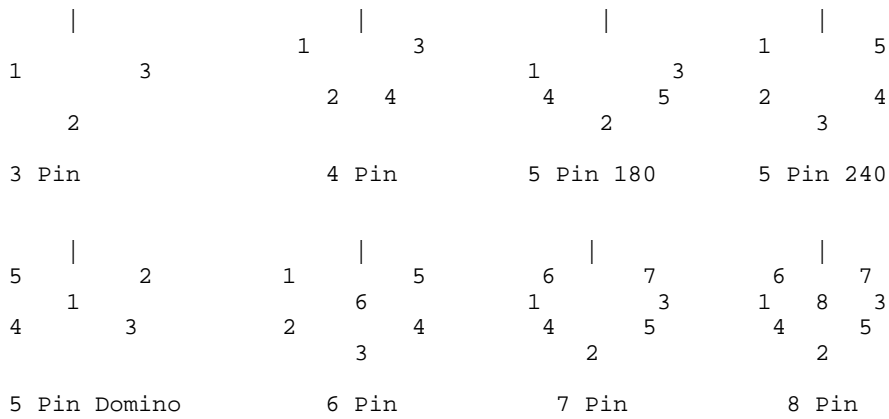
```
              DIN Audio Connectors (Plugs viewed from rear)

        |                  |         |            |           |
                          3    |    1           |     5      |    1
    3         1                                  3         1
                          4    2           5         4    4         2
        2                                              2            3

    3 Pin              4 Pin         5 Pin 180      5 Pin 240


        |                  |         |            |           |
    2         5          5    |    1         7    |    6    7    |    6
        1                  6                3         1    3    8    1
    3         4          4         2        5         4    5         4
                          3                      2                2

    5 Pin Domino         6 Pin         7 Pin           8 Pin

    ========================================================================

              DIN Audio Connectors (Sockets viewed from rear)

        |                  |         |            |           |
                          1    |    3           |     1      |    5
    1         3                                  1         3
                          2    4           4         5    2         4
        2                                              2            3

    3 Pin              4 Pin         5 Pin 180      5 Pin 240


        |                  |         |            |           |
    5         2          1    |    5         6    |    7    6    |    7
        1                  6                1         3    1    8    3
    4         3          2         4        4         5    4         5
                          3                      2                2

    5 Pin Domino         6 Pin         7 Pin           8 Pin

    ========================================================================
                  'D' Connectors (Sockets viewed from rear)


                        9 Way 'D' Socket
                  --------------------------
                  \  1   2   3   4   5  /
                   \                   /
                    \  6   7   8   9  /
                     ------------------


                        25 Way 'D' Socket
            ------------------------------------------------------
            \ 1   2   3   4   5   6   7   8   9   10  11  12   13 /
             \                                                  /
              \ 14  15  16  17  18  19  20  21  22  23  24  25 /
               -----------------------------------------------


                        37 Way 'D' Socket
      ---------------------------------------------------------------------------
    \ 1   2   3   4   5   6   7   8   9   10  11  12  13  14  15  16  17  18  19 /
     \                                                                         /
      \ 20  21  22  23  24  25  26  27  28  29  30  31  32  33  34  35  36  37 /
       ----------------------------------------------------------------------

    ========================================================================
```
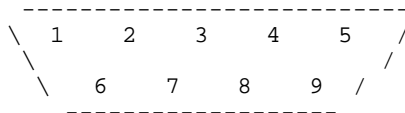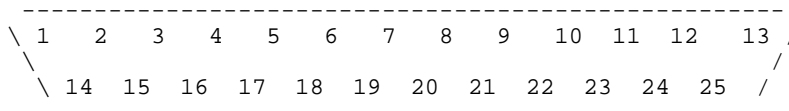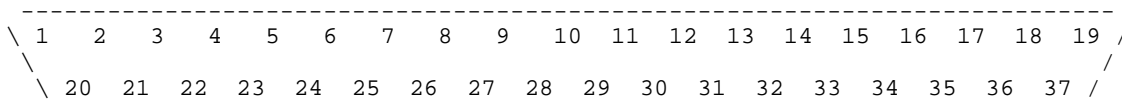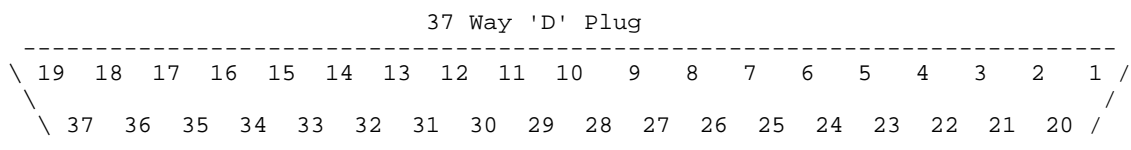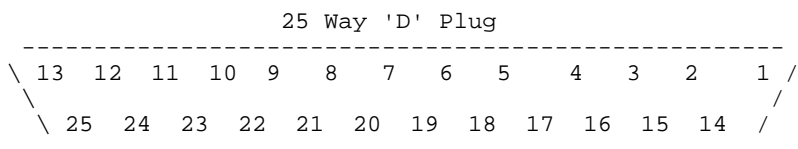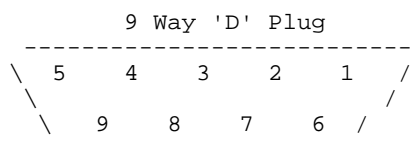
```
                      'D' Connectors (Plugs   viewed from rear)


                           9 Way 'D' Plug
                     --------------------------
                    \  5    4    3    2    1   /
                     \                        /
                      \   9    8    7    6   /
                       ------------------


                          25 Way 'D' Plug
                 ---------------------------------------------------
                \ 13  12  11  10  9   8   7   6   5   4   3   2   1 /
                 \                                                 /
                  \ 25  24  23  22  21  20  19  18  17  16  15  14 /
                   -----------------------------------------------


                          37 Way 'D' Plug
      ----------------------------------------------------------------------------
     \ 19  18  17  16  15  14  13  12  11  10  9   8   7   6   5   4   3   2   1 /
      \                                                                        /
       \ 37  36  35  34  33  32  31  30  29  28  27  26  25  24  23  22  21  20 /
        ------------------------------------------------------------------


        =========================================================================


                    'D' Connectors Hi-Density (Sockets viewed from rear)


                          15 Way 'D' Socket


                     --------------------------
                    \    1   2   3   4   5    /
                     \   6   7   8   9  10    /
                      \  11  12  13  14  15  /
                       ------------------


                    'D' Connectors Hi-Density (Plugs   viewed from rear)


                          15 Way 'D' Plug


                     --------------------------
                    \    5   4   3   2   1    /
                     \    10   9   8   7   6  /
                      \  15  14  13  12  11   /
                       ------------------


        =========================================================================
```
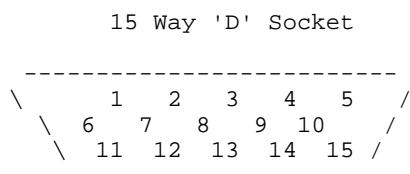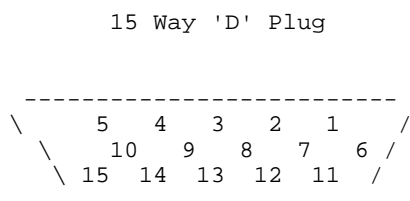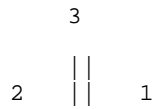
```
        Mini DIN Plug 3 Way         Mini DIN Socket 3 Way

               3                            3

             ||                           ||
          2  ||  1                  1     ||   2


        Mini DIN Plug 4 Way         Mini DIN Socket 4 Way

            4   3                       3    4
          2       1                  1        2
            ====                        ====


        Mini DIN Plug 6 Way         Mini DIN Socket 6 Way

          6 ||  5                       5 ||  6
            ||                            ||
          4 ||  3                       3 ||   4

           2    1                       1    2


        Mini DIN Plug 8 Way         Mini DIN Socket 8 Way

          8   7   6                     6   7   8

         5     4  3                    3   4     5

          2     1                       1    2



           All Viewed from the Rear

   =========================================================================

  Game/Joystick - 15 Pin Connector (Game Port Side/Standard "IBM" Type)

       Pin         Signal Description

       1           +5v DC
       2           Button 0
       3           Position 0
       4           Ground (GND)
       5           Ground (GND)
       6           Position 1
       7           Button 1
       8           +5v DC
       9           +5v DC
       10          Button 2
       11          Position 2
       12          Ground (GND)
       13          Position 3
       14          Button 3
       15          +5v DC
```
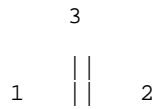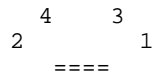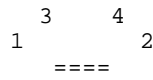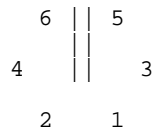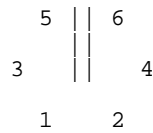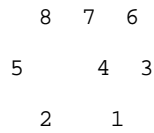
Witness Statement for Activities and viewing of Log/Diary events.

Activity or Project name.			
Student Name		Page	of

Witness Date/Time And Signature	Brief Summary of Diary or Log book entry contents being assessed or activity being performed.

The Generic Report Project

Author R. J. Spriggs
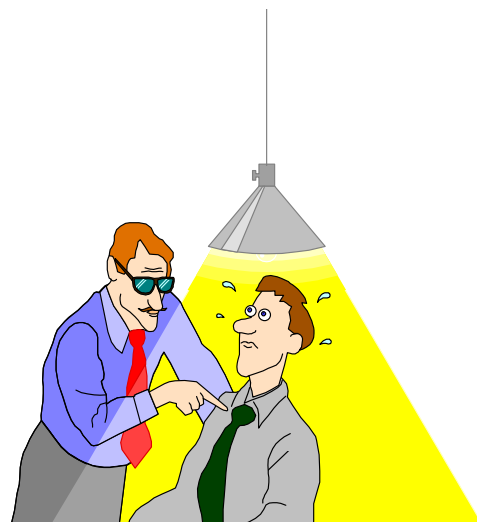
The Generic Project Report.

Table of Contents

The Generic Project Report.

Introduction.

The purpose of this report is show an example of how a general engineering report could be constructed. It will typically show headings that are likely to be required. It may also include notes describing what could be included within those sections. This is not a definitive template but a guideline document only.

Research.

Define what research you have performed.

Customer Specification.

The General purpose report should be suitable as an example of how to produce a report for a project or similar activity. Typically, the report will have defined headers to separate sections. The pages will be numbered. The report will have a table of contents so that the information can be located quickly in the report via the page number displayed in the table close to its right hand margin.

Feasibility Study.

The purpose of this section is to identify the most appropriate method of developing the project or report. You would look at various design solutions and evaluate cost and risk associated with that course of action. The final process is to agree a specific course of action for completion of the project or report. A plan can be developed that would identify when the project or report would be completed and milestones could be placed in the plan to identify progress and how well deadlines are being met.

Design solutions.

This section would be used to identify different solutions to the problem you wish to solve, for example:

Design Solution 1.

Take a copy of a genuine report, delete the main contents so that it will roughly meet the customer specification.

Design Solution 2.

Start a brand new document. Create appropriate headers and footers for your pages. Use some of the advanced features of Microsoft WORD to build a table of contents. Create section headings that meet the customer's requirements. Fill in all the appropriate sections with enough information to satisfy the customer's specifications.

Design Solution 3.

Contact "Report Designer inc." 44 Falls Road, York, YT6 2BF and task them to produce the required report.

Selected Design Solution.

Explain why you are going to use one solution rather than the other options.

"I have decided to use Design Solution number two as this should be the most cost effective and quickest solution to implement. Design Solution one would not be ethical and Design Solution three may cost too much."

Technical Specification.

As an example, this report will be created with the following features:-
1)   A Cover page containing:-
   - The Report's name
   - The Author's name
   - The date the report was required by.
2)   Every page will have a Header and a Footer Section **except** the Cover page
   - The Header will contain the name of the report
   - The Footer will contain:-
          The Filename of the report.
          The Author's name.
          The Page Number
          The Date of the last time the report was changed.
3)   The report will contain the following sections:-
   - An Introduction
   - A Customer's Specification
   - A Feasibility Study containing such items as:-
          A set of Design Solutions.
          A Technical Specification.
          Cost Analysis.
          Risk Analysis.
          A Time allocation plan.
          A Resource allocation plan.
   - A Report Body
   - A Conclusion
   - A Bibliography or Reference section
   - An Appendix section if required
4)   Some sections may contain notes about the expected contents.

Cost analysis.

This is where you would discuss the cost aspects of your project. This section may contain a table or Bill of Materials from various suppliers. You may need to consider the implications of VAT and 'post and packaging' costs when ordering small quantities of goods. You may need to consider delivery dates for items of a specialist nature which could be on the projects critical path.

Risk Analysis.

This is where you can discus "Project Constraints and Risks" and assess where problems could occur. You can also explain how you will overcome any difficulties, should they arise.

Project Plan.

This is where you discuss "Project Resource Planning". You may use this section to identify what manufacturing processes are, or will be needed and their availability. Typically, you would include a Gantt chart as part of the project plan.

Activity		Expected
1	Documentation	4.33
2	Order Parts	1.16
3	Develop Code	11
4	Write report	6.33
5	Activity 1	3.66
6	Activity 2	13.67
7	Activity 3	3.167
8	Activity 4	3.33
9	Activity 5	39.16
10	Activity 6	17.67
11	Activity 7	7.5
12	System Design	5
13		

Milestone 1   Milestone 2
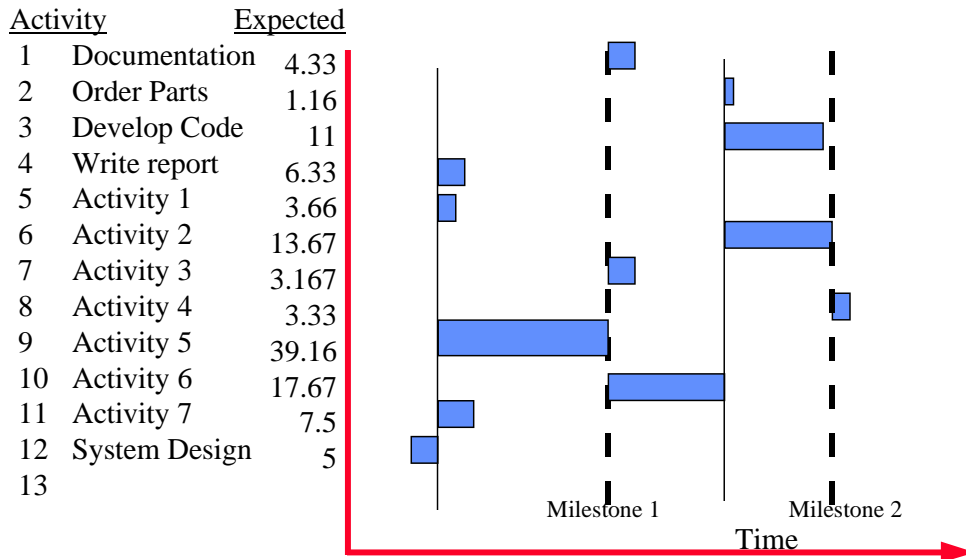
Time

Table of activities with Gantt type display.

The Generic Project Report.

<u>Project Deliverables.</u>

This is where you define how and what you are going to produce and in what time frame.

<u>Marketing Exercise.</u>

If you are developing a commercial product, you would identify how you would market that product and what market research you have done. You may show a Break even analysis for a production run.

<u>The Report Body.</u>

As this is a demonstration report, there is very little to be placed in the report body, however, there could be many subsections here, for example:.

1)   Research.
   - Reasons for research.
   - Research methods.
   - Research areas or locations.
2)   Development Methods used.
3)   Personnel or companies contacted.
   - Outcomes of contacts
4)   Detailed Project Design
   - Detailed Plans.
   - Resource allocation.
   - Sub module designs.
   - Schematics, Flow diagrams, Structure diagrams etc.
   - Processes required or to be used.
   - Interfaces needed or used..
   - Design process Conclusion, Outcomes or Summary.
5)   Hardware and Software needed used or developed etc.
6)   Calculations.
7)   Testing
   - Testing methodology
   - Test equipment.
   - Test procedures.
   - Testing outcomes.
8)   Health and Safety

Project Evaluation.

This is where you can discuss how the project has developed and areas where you might change were you to do the project again. You might discuss what you have learnt from the project and what you would have done differently. You would use this section to define or explain why there may be differences between the project plan and actual events. The purpose of this section is to show that you have learnt from your possible mistakes and that you can reason for the future.

Conclusion.

If your introduction posed a question, you should ensure that you have answered it in this section using valid reasoning.
This is the place where you can discuss how successful the project has been. A summary of what has been achieved or why you have not had the success you had initially expected.
You would draw the report to a close in this section.

Bibliography or References.

This section is used to identify documents and other references you have used in the production of you report and where they can be located.
Note that if you have used an Internet reference, you should also identify when you accessed that resource.

Appendix.

This is where you might insert diagrams, drawings, notes, programme source code, circuit diagrams, logs and diaries that relate to the report but are not intrinsically part of the report.

This section may also contain copies of User and Technical documentation for reference.

It is important that you remember that the reader of your report does not have to read the contents of the appendix and therefore it is of no added value to your work but merely a useful source of interest, should the reader want to see more information. It is always tempting when you have completed your report to put as much material as possible in the appendix in the hope that this will raise your mark. Beware! If you feel that it is vital or relevant to the report, it should be in the main part of the report but NOT in the appendix.

Programming Exercise.

Using the theory of a "First In First Out" structure :-

Develop a programme in QBASIC that implements Subroutines and/or Functions that could support a FIFO (First In First Out) Data Structure.

Activities to complete :-
1. Create a flow chart that shows how your programme will operate.
2. Ensure your programme is designed in a modular form so that the code created can be re-used in other applications.
3. Create your initial programme.
4. Fully comment and document your programme.
5. Describe how your Data Structure works and is used.
6. Use your programme to verify that your Data Structure, Subroutines and/or Functions operate correctly.
7. Modify your programme so that you can analyse how fast data can be entered and removed. Get your programme to perform appropriate calculations to show average time for a character to be added and removed from the structure.
8. Comment on what you will do if :-
    a)   you wish to add data and the structure is full.
    b)   you wish to remove data and the structure is empty.

Background information.

The routines that you develop for this assignment are most likely to be used in the 'data capture application' you will develop in a further assignment.
The calculations you perform will identify if the software you have developed will meet the timing constraints of the data logging application.

RIGHTS

DUTY

British Standard Proof-Reading Symbols.

Common Proof-reading Symbols.

Instruction	Mark in Text	Mark in Margin
Correction is concluded	None	
Leave unchanged	under characters to remain	
Insert in the text the matter indicated in the margin		New matter followed by
Insert additional matter identified by a letter in a diamond		Followed by for example A
Delete	through character(s) or through words to be deleted	
Delete and close up	through character or through characters	
Substitute character or substitute part of one or more words	through character(s) or through words	New characters or new word(s)
Set in or change to italic	under character(s) to be set or changed	
Set in or change to capital letters	under character(s) to be set or changed	
Set in or change to bold type	under character(s) to be set or changed	

British Standard Proof-Reading Symbols.

Common Proof-reading Symbols.

Instruction	Mark in Text	Mark in Margin
Change capital to lower case letters	Encircle character(s) to be changed	≠
Substitute or insert full stop or decimal point	/ through character or Where required	⊙
Substitute or insert colon	/ through character or Where required	⊙
Substitute or insert semi-colon	/ through character or Where required	;
Substitute or insert comma	/ through character or Where required	,
Start a new paragraph		
Run on (No new paragraph)		
Transpose characters or words		
Close up. Delete space between characters or words	linking characters	
Insert space between words		
Reduce space between words		

YOUR MAIN LIFE GOALS/JOB GOALS

Allocate 100 points between the following Life Goals to represent your priorities - the more points, the higher the priority for you.

	Points	Option 1	Option 2	Option 3	Option 4	Option 5
To be professionally successful, exercise skill, do difficult work well.						
To do important work, recognised by the community as such, helpful and supportive of other people.						
To achieve high status, to be recognised as being at or near the top of the ladder.						
To have the power and influence to change your environment and affect the lives of other people.						
To be accepted and liked by your chosen social group, have good friends and enjoy their company.						
To enjoy family life, see your partner happy, and your children grow and develop.						
To be continually enjoying what you are doing, both at work and at leisure.						
To achieve fame.						
To achieve security.						
To achieve independence.						
	100					

Name

Address, Telephone, Date of Birth, {and Health State optional}

PERSONAL PROFILE

A brief description of you (your attributes) as if it was written by another person.

KEY SKILLS AND EXPERIENCE

Focused towards the occupation you are seeking however may be general.

EDUCATIONAL QUALIFICATIONS

Often in date acquired order most recent first.

CAREER HISTORY

Most recent job first

LEISURE PURSUITS AND OTHER ADDITIONAL INFORMATION

Hobbies , interests etc.

References available upon request

Note: Try to keep whole document to one page if not, two pages maximum.

Typical example of a speculative or covering letter. (Young person with little experience)

Their address   Your Address
Number/name Street   Number/name Street
Town   Town
County   County
Post Code   Post Code

                                 Date

Dear Sir/Madam

Application for Employment

My name is <Put you name here> I am <Put your age here> years old and currently at <Your college or training establishment> finishing off my <Name your course> course and due to leave <Season or month>.

I am very keen to develop a career in the <type of industry> and particularly interested in your organization.

I have enclosed a curriculum vitae giving full details of myself and would be grateful if you would let me know if any opportunities you have in the near future.

You would find me hard working and reliable.

Yours faithfully

<Sign your name here>

<Print/Insert your name here>

Example of a covering letter on a speculative basis

Sample Covering Letter
The content and format of covering letters largely depends on the nature of the position applied for and whether the job is advertised you are enquiring on a speculative basis. Here is a sample of a speculative covering letter:

Their address	Your Address
Number/name Street	Number/name Street
Town	Town
County	County
Post Code	Post Code
	Date

Dear Sir/Madam

Application for <State type of Work>

I have recently returned from a year's visit to the USA , and am looking for a suitable secretarial opportunity. I have enclosed my CV for your attention, and would hope that you find my details of interest.

My previous work in London was not in banking, but I am confident that my secretarial skills are appropriate to a banking environment, as my last role at JD Wills and Partners (a law firm) was as team secretary to a small team of partners working with banking clients.

Owing to my circumstances, I am available immediately, and would be delighted to discuss my CV with you, should you think this would be helpful.

I look forward to hearing from you.

Yours sincerely

<Your Name>, <Title>

Useful words or phrases to use in a Personal Profile.

Able

Adaptable

Analytical

Ambitious

Cheerful

Consistent

Competent

Confident

Committed

Considerate

Creative

Dexterous

Discrete

Driven

Dynamic

Enthusiastic

Energetic

Focused

Helpful

Independent

Literate

Motivated

Neat

Natural

Outgoing

Organised

Patient

Polite

Professional

Productive

Quiet

Relaxed

Reliable

Respected

Responsible

Smart

Skilled

Skillful

Supportive

Technical

Tidy

Willing

Tools and Including the H&S aspects.

Tools to issue :-

Toolbox
   No particular hazards, (DO NOT EAT {Joke}) keep all tools
   in it when not in use for safety and demonstrating that you
   can work in a clean and tidy manner. Complete the contents check
   list start and end of every week. (As part of your evidence)

Soldering Iron with Bench Power supply
   Sharp end very Hot. Heat resistant cable , May become brittle
   and crack , Examine for damage , Replace as required.
   Note operation , Tip number sets/describes temperature range.
   Show how to change tips.
      NOT TO BE USED for cutting braid or branding.

De-soldering Pump
   Do Not hammer end on bench to clear Solder this will cause
   the pin to shatter its fixing. Dismantle if jammed, clear
   obstruction , reassemble. Describe how to use.

Mini Bench Vice
   Avoid over tightening , could crack vice , be aware of
   of materials being clamped. (Spring Loaded item may fly)
   Leave jaws slightly open when unused else temp changes
   could place undue pressure on tool.

Auto Wire Strippers
   Beware of cable cutter may slice fingers if not wary.
   May cut strands especially fine gauge wires.

Manual End Wire Strippers
   Needs to be adjusted for each different wire type.
   Should NOT be used as spanner. May cut/pinch skin
   if used incorrectly. Beware of elbow punches if insulation
   sticks. Clamp followed by Quarter turn then Pull to strip.

Wire Cutters
   Hazards cutting wire sharp bits flying off. Sharp ends
   keep out of pockets etc. Always use so if bits do fly
   off they fly downwards preferable in impact absorbing surface.
   Hardened Jaws NOT for cutting Braid (End will snap off)
   at high speed capable of puncturing skin. (Show demo)

Tools and Including the H&S aspects.

Pliers
   Hardened jaws can shatter used incorrectly / wrong job.
   to be used for bending shaping only.
   Pliers should not be used as crimping tools.
   Same flying metal hazard as wire cutters.

Screw Drivers in Pack
   Screw down ie NOT into hands etc Very sharp points
   Again Hardened metal NOT to be used to prise things apart
   Same flying metal hazard as wire cutters.
   Two types of screwdriver in pack Slot and Cross point.

Helierman / Expanding Pliers
   Sharp points try to avoid puncture wounds.

Craft Knife
   Most dangerous item in the set. Retractable blade. Blade
   must be retracted when not in use ie. when it is out of
   your hands. 4 occasions of identified bad handling will
   result in failure of course. When using cut down and away
   from body. Always consider what happens if knife were to
   slip.
   Again Hardened metal NOT to be used to prise things apart
   Same flying metal hazard as wire cutters.

Non personal issue Tools and Safety aids.

Heat Gun.
  End gets very hot , (Demo paper char) , ensure safety when
  putting down. (Example store in centre of cable drum)
  Additional safety care of leads , tripping hazard.

Braid Cutting Iron.
  Same as soldering Iron.

Crimping Tools.
  See instructions , DO NOT use as Pliers.

Crimping Extractor Tools.
  Usually brittle and delicate DO NOT FORCE or TWIST.
  Could give puncture wound with improper use.

Fume Extractor Fans.
  Leave filters in. Use as directed.

Safety Glasses
  Available if required

Open ended spanners.
  No particular hazard, Check for distortion on jaws may cause
  the tool to slip. Used where access may be limited.

Ring and Box spanners.
  No particular hazard, Check for distortion and rounding on
  contact points or flats which may cause the tool to slip.
  Used where greater torque is needs to be applied to fixing
  and access is less limited / restricted.

Vero Board Cutter
  Cuts tracks on Vero Board , Rotate , ensure track is cut
  Try to avoid too many board cuts in a line as this will
  weaken the board. Danger cuts by Swarf , puncture wound
  by improper use.

Non personal issue Tools and Safety aids.

Vero Board Pin inserter
   Use to push Vero pins into board from non copper side

Heat Shunts
   Clip onto temp sensitive components to avoid damage.

ESD Protection
   Use station whenever handling IC's and static sensitive devices.

Hammers , Nails , Pinchers
   Avoid punching nails through Cable Form Boards

Magnifying Glasses
   Table mounts keep covered when not in use (sun light fire risk)
   Hand held ones return to storage area for reasons above.

PCB Work Scalpel and Tweezers
   Scalpel as per craft knife only sharper , used for track cutting
   and fine wire cutting , cleaning small surfaces , positioning
   small components and tracks.
   Tweezers , some have sharp points , puncture wounds ,, use for
   positioning components tracks , fine detail work or tiny heat
   shunts. Do not use tweezers as replacements for pliers or
   heavy duty clamping devices.

General checking points for tools and machines.

Examine/check gripping surfaces and hinges for wear or rounding.
Check that cutting surfaces meet and are sharp and have not been
damaged. Check that handles and other fitments are secure and
fitted correctly. Check/ensure that all guards are correctly
placed and safety features operational before using machinery.
Check tools for cracks in structure or insulation as appropriate.
Ensure that trailing leads do not become tripping hazards or
are damaged.

JOB or PRODUCT QUALITY CHECKING.

What to look for :-

Cable Looms and or PCB's

1.   Appearance.
1.1   Overall Appearance does it look acceptable/Good ?
1.2   Has correct Braiding been used ?
1.2.1   Have braiding ends been sealed correctly ?
1.2.2   Has braiding been secured at ends its ends ?
1.2.3   Is braiding at the correct tension / stretch ?
1.3   Has correct Heat Shrink been used ?
1.3.1   Has heat shrink any marks or edge damage ?
1.4   Has excess of glue spilled from Heat Shrink ?
1.5   Has braiding or wires been overheated ?
1.6   Has specified sealing method been used ?
1.6.1   Is sealing method effective/correct ?
1.7   Is Job built to the correct revision or version ?

2.   Sizes and Markings.
2.1   Is it the correct size and built to tolerance ?
2.2   Has the Cable loom / Job been tagged ?
2.3   Have all connections been correctly identified ?

3.   Connectors
3.1   Have the correct connectors been used ?
        i.e. Plugs where plugs specified etc.
3.2   Have the correct sizes of crimps been used ?
3.3   Have connector shells been fitted correctly ?
3.4   Have connector Hoods been fitted correctly ?
3.5   Have shells been correctly populated ?
3.6   Has correct orientation been set on connector ?
3.7   Are cable clamps securely and correctly attached ?

JOB or PRODUCT QUALITY CHECKING.

4. Soldering
4.1 Have the wires been tinned ?
4.1.1 Can the wire strands outline be seen ?
4.2 Is the soldering Shiny ,Concave ,No Bumps & holes etc ?
4.3 Is the insulation burnt ?
4.4 Are any of the Connector burnt/damaged ?
4.5 Are the wires well secured in the buckets ?
(Check for dry joints).
4.5.1 Can the wire shape be seen in the buckets ?
4.5.2 If terminal pins used does wire make a
good mechanical joint.
4.5.3 Is the wire loop greater than 240 degrees
and less than 360 degrees ?
4.5.4 Is there sufficient loose wire to allow
rework if required ?
4.5.5 Is there too much slack wire making connections
look untidy.
4.6 Is the insulation above the bucket within spec ?
4.7 Are there any solder bridges , whiskers between pins ?
4.8 Has all flux/flux staining , dirt and other
contamination been removed ?

5. Crimping
5.1 Does crimp make a good mechanical connection ?
5.2 Does crimp make a good electrical connection ?
5.3 Does the wire show on both sides of the Crimp
by the specified distance ?
5.4 Has an appropriate tool been used to make the
correct connection ?

6. Has the correct type of wire been used ?
6.1 Have sleeves been specified ?
6.2 Have ID's been requested ?
6.2.1 Do the numbers read the correct way round ?
6.2.2 Have the correct ID's been connected to
the specified pins ?
6.3 Has the wire been kinked ?
6.4 Have any wire strands been cut or damaged ?
6.5 Is the wire the correct colour , markings.
6.6 Has the insulation any nicks , cuts or damaged
areas ?

JOB or PRODUCT QUALITY CHECKING.

7.   Continuity Checking.
7.1   Do all connections go to the correct destinations ?
7.2   Are all circuit track Breaks in the correct place ?
7.3   Are all circuit track Links in the correct place ?
7.4   Are Earthing points/tags correctly attached ?

8.   Components.
8.1   Have the correct value components been used
         and are they in the correct places ?
8.2   Are all components connected to the correct places ?
8.3   Are polarity conscious components the correct
         way round ?
8.4   Have ESD (Electro Static Discharge) precautions
         been taken with static sensitive components ?
8.5   Have Heat Shunts been used on Heat sensitive
         components ?
8.6   If needed have Heat Sinks been fitted correctly ?
8.7   Are power connection correct and of the
         specified polarity and voltage ?

9.   Paperwork , Documentation and Workspace.
9.1   Is workspace clean and tidy ?
9.1.1   Have all surplus materials/parts been
            correctly returned or stored in recycle bins ?
9.2   Has Job Card been completed ?
9.2.1   Does job number agree with job tag/s
9.3   Has Job time sheet been completed ?
9.4   Is stores order paperwork correct ?
9.4.1   Have all used items been placed on master records ?
9.4.2   Were correct part numbers identified ?
9.4.3   Were all quantities converted to metric units and
            format then placed on master records correctly ?
9.5   Have quality checks been completed and recorded ?
9.6   Is all Job paperwork filled and easily available
         if required for inspection or traceability ?

COLOUR PERCEPTION TEST

Using a colour chart or coloured tokens rate the following colours in order of preference from 1 most liked to 8 least liked.

Colour	RED	BROWN	YELLOW	GREEN	BLUE	VIOLET	GREY	BLACK
Order								

Now using your selected choice order then mark on the matrix below your selection for your analysis.

Colour \ Choice	1	2	3 & 4	5 & 6	7 & 8
	The means by which you achieve your objectives.	Your objectives in life.	The way you feel existing circumstances require you to act.	You neither accept nor reject these qualities.	Your inhibited needs.
(Yellow) Active, Spontaneous, creative, adaptable					
(Blue) Passive, relaxed, tender, affectionate.					
(Red) Extrovert, competitive, urge to dominate, revolutionary, sexual desire.					
(Green) Defensive attitude to life, stubbornness, resistance to change					
(Violet) Artistic, mystical, attempting to glamorise.					
(Brown) Security, physical comfort.					
(Black) Resignation, withdrawal.					
(Grey) Neutrality, uninvolved, uncommitted.					

Note: Yellow as your first choice has been identified with suicidal tendencies in some studies.