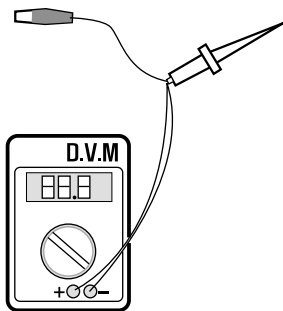# 2. Reference Information

2

This chapter contains the tools list, list of abbreviations used in this manual, and a guide to the location space required when installing the printer. A definition of tests pages is also included.

2.1 Tool for Troubleshooting

The following tools are recommended safe and easy troubleshooting as described in this service manual.
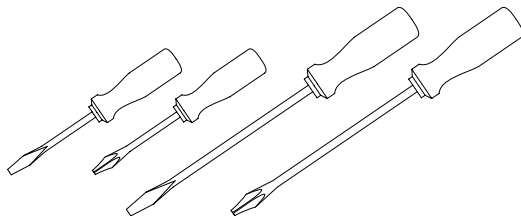
- **DVM(Digital Volt Meter)**
  Standard : Indicates more than 3 digits.

- **Driver**
  Standard : "-" type, "+" type (M3 long, M3 short, M2 long, M2 short).

- **Tweezers**
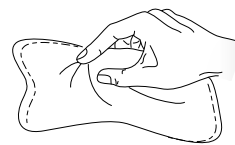 Standard : For general home use, small type.

- **Cotton Swab**
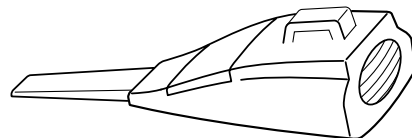 Standard : For general home use, for medical service.

- **Cleaning Equipments**
  Standard : An IPA(Isopropyl Alcohol)dry wipe tissue or a gentle neutral detergent and lint-free cloth.
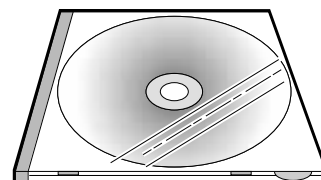
- **Vacuum Cleaner**

- **Spring Hook**
  Standard : For general use

- **Software (Driver) installation CD ROM**

2.2 Acronyms and Abbreviations

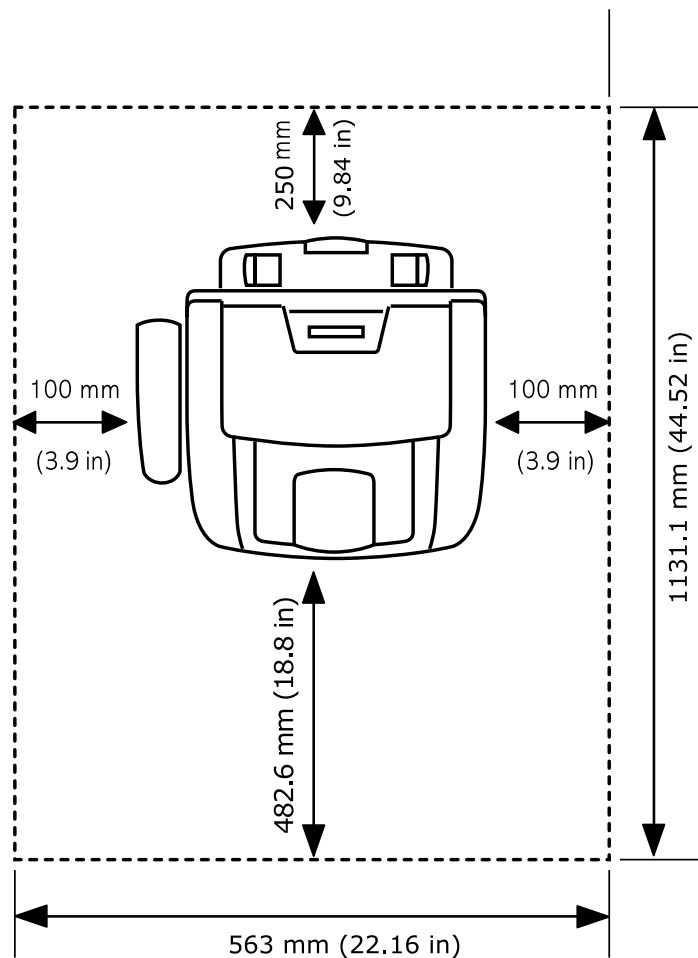The table in the below explains abbreviations used in this service manual.
The contents of this service manual are declared with abbreviations in many parts. Please refer to the table.

ADC	Analog-to-Digital-Conversion	EPP	Enhanced Parallel Port
AP	Access Point	F/W	Firmware
AC	Alternating Current	FCF/FCT	First Cassette Feeder/First Cassette Tray
ASIC Circuit	Application Specific Integrated	FISO	Front-In, Side-Out
ASSY	Assembly	FPOT	First Print out Time
BIOS	Basic Input Output System	GDI	Windows Graphic Device Interface
BLDC Motor	Brushless DC Motor	GIF	Graphic Interchange Format
CMOS	Complementary Metal Oxide Semiconductor	HBP	Host Based Printing
CMYK	Cyan, Magenta, Yellow, Black	GND	Ground
CN	Connector	HDD	Hard Disk Drive
CON	Connector	HTML	Hyper Text Transfer Protocol
CPU	Central Processing Unit	HV	High Voltage
CTD Sensor	Color Toner Density Sensor	HVPS	High Voltage Power Supply
dB	Decibel	I/F	Interface
dBA	A-Weighted decibel	I/O	Input and Output
dBm	Decibel milliwatt	lb	Pound(s)
DC	Direct Current	IC	Integrated Circuit
DCU	Diagnostic Control Unit	ICC	International Color Consortium
DIMM	Dual In-line Memory Module	IDE	Intelligent Drive Electronics or Integrated Drive Electronics
DPI	Dot Per Inch	IEEE	Institute of Electrical and
DRAM	Dynamic Random Access Memory	Electronics	Engineers. Inc
DVM	Digital Voltmeter	IOT	Image Output Terminal (Color printer, Copier)
ECP	Enhanced Capability Port	IPA	Isopropy Alcohol
ECU	Engine Control Unit	IPC	Inter Process CommunicationEPP Enhanced parallel Port
EEPROM	Electronically Erasable Programmable Read Only Memory	IPM	Images Per Minute
EMI	Electro Magnetic Interference	ITB	Image Transfer Belt
EP	Electro photographic	RAM	Random Access Memory
LAN	local area network	ROM	Read Only Memory
LBP	Laser Beam Printer	SCF/SCT	Second Cassette Feeder/Second Cassette Tray

LCD	Liquid Crystal Display		SMPS	Switching Mode Power Supply
LED	Light Emitting Diode		SPGP	Samsung Printer Graphic Processor
LSU	Laser Scanning Unit		SPL	Samsung Printer Language
MB	Megabyte		Spool	Simultaneous Peripheral Operation Online
MHz	Megahertz		SURF	Surface Rapid Fusing
MPBF	Mean Prints Between Failure		SW	Switch
MPF/MPT	Multi Purpose Feeder/Multi Purpose Tray		sync	Synchronous or Synchronization
NIC	Network Interface Card		T1	ITB
NPC	Network Printer Card		T2	Transfer Roller
NVRAM	Nonvolatile Random Access Memory		TRC	Toner Reproduction Curve
OPC	Organic Photo Conductor		PnP	Universal Plug and Play
PBA	Printed Board Assembly		URL	Uniform Resource Locator
TRC	Toner Reproduction Curve		USB	Universal Serial Bus
PCL	Printer Command Language , Printer Control Language		VCCI	Voluntary Control Council for Interference Information Technology Equipment
PCI	Peripheral Component Interconnect by Intel 1992/6/22, is a local bus standard developed by Intel and introduced in April, 1993 : A60, B60 Pins		WECA Alliance	Wireless Ethernet Compatibility
PDF	Portable Document Format		Wi-Fi	Wireless Fidelity
PDL	Page Description Language			
Ping	Packet internet or Inter-Network Groper			
PPD	Postscript Printer Discription			
PPM	Page Per Minute			
PS	Post Script			
PTL	Pre-Transfer Lamp			
PWM	Pulse Width Moduration			
Q'ty	Quantity			

2.3 Select a location for the printer

• Leave enough room to open the printer trays, covers, and allow for proper ventilation. (see diagram below)

• Provide the proper environment :
- A firm, level surface
- Away from the direct airflow of air conditioners, heaters, or ventilators
- Free of extreme fluctuations of temperature, sunlight, or humidity
- Clean, dry, and free of dust

250 mm (9.84 in)

1131.1 mm (44.52 in)

100 mm (3.9 in)

100 mm (3.9 in)

482.6 mm (18.8 in)

563 mm (22.16 in)

2.4 The Sample Pattern for the Test

The sample pattern shown in below is the standard pattern used in a factory.
The contents of the life span and the printing speed are measured with the pattern shown in below.
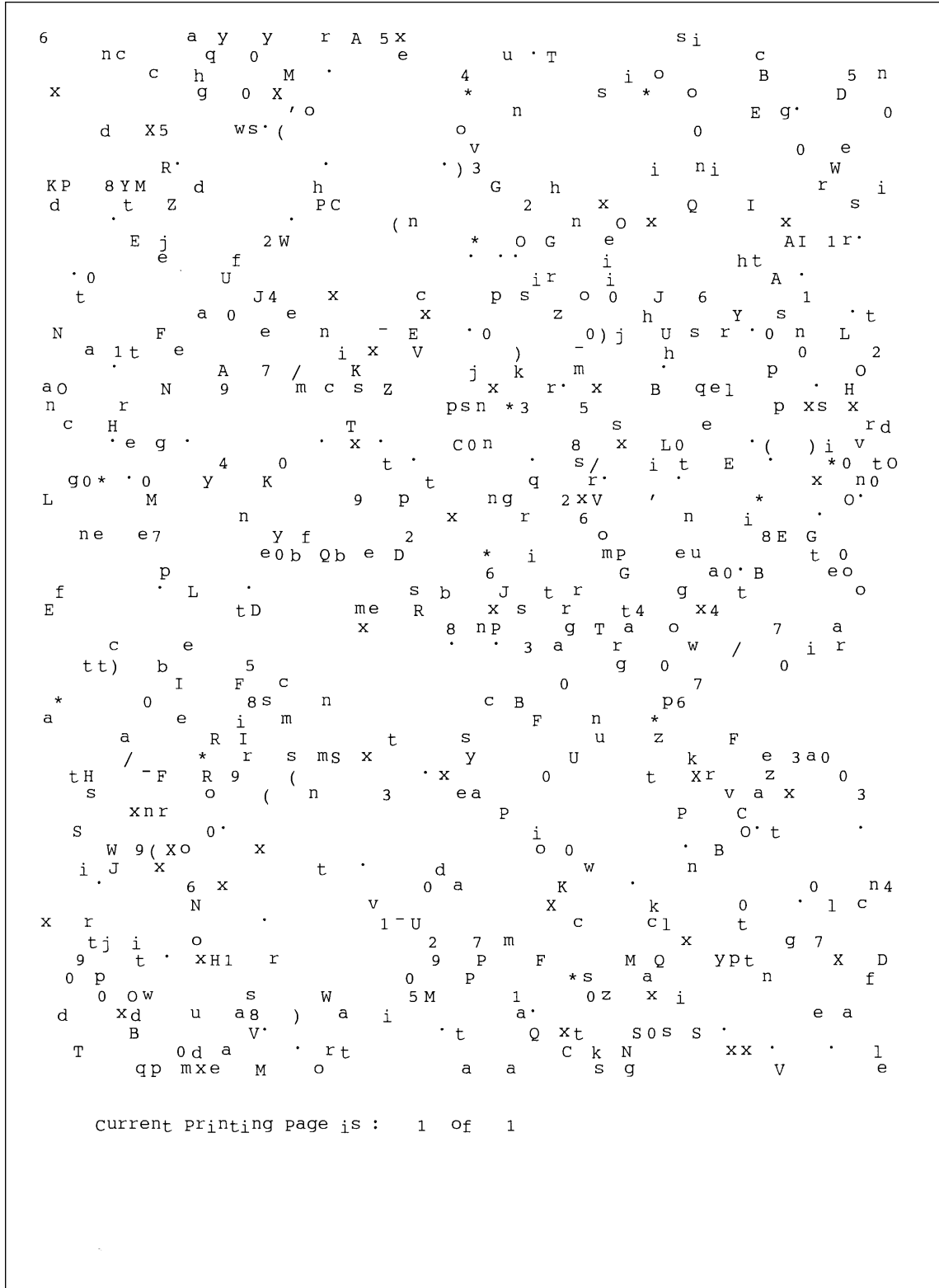(The picture in the manual is 70% size of the actual A4 size.)

2.4.1 A4 5% Pattern

```
i  o   0  e  /   A  K   O6   cs  hh     r  m   E     ei      *·0  Y  s    r      a  i
     r   a)     (    Y   b  S         lM*     s      g       ·3      A  A4  r     n
  t  Leyi   Rs  ·    s            d  u     Xo   0     lg  P      t   f   l
N  l   0t       f   '  t  psF  ott    O  2  ux⁻s  o   i  t  Anvp  N    0  tQ
 tl  ti    uso  w·i   aG·       1  u  p  O ·    n         X0t    li   at
  L  ey  oH     m    m    n    N:    lC      T   c  hrry  x   i  t
   ia*  X  0  t·        utst⁻  N*Qir  ep    n  b  pepa  We   t
eo  t  s    IT· i  'e    dn   o    S      b*     te  *   G  *  srx  isn
   ·  auo     s  t  s  e  1    A  cko          o          9  0  gs
ne  3    o  n    1* r  a/n  i      0p    r   r         i      *  ee
s    O  aeoCs  p  *  *  Ke·0  sn*s  z        e0  cr       O    0  ma  go
  FpT  sonm  da    t  s  l  xopr    a   r  p  ·  o      o  '  -   u
ac⁻n  *  /    sac     Y    t      e  (tY*  mlaI   p   b   t2  (l
i     edu  ar   ⁻0    l    DPr  e  Dse  ag   c   e  sa6g   p  p·
 */mnoov      P   se*   W   a   0  r   *      9m  0   P   p   r   P00
n  t*n     su    n  h*xV  ri  tp'  o  rg  co    Ine  s  vo  ⁻0    1  T
    y    01       m   '  (10   M  '  u/     r  ne      o   p  e
     0b       d  t  nu  e      n  e           lA      apro  i0tre
  s      o  e    d  0  u·  I  si  esC   o         i  X·ee
pe   e    t  i  md      0Pc  e  Letyo   aoI    t  nn  1  tm   e  B
   x  i  Xlo   )    c  aIcn   fern   i)x  i   p  n*  n   0i  e  u  in  D  W
X   y  X  r    eo  0o1  dE    bs         PB  teo      *  RO   H   g  u*K
d  s  Fxr   rCF  a   bh   s   p   gs  le  r  roJ    n     e     pp
   a       p     tr  ps(s    oadrr   la  s      p  z  uis     n  oa
   ·m     d   t   E   *F  i*   opn    E   h   i     rudc  r  s     0
   a  petya  b  d   e     V"  d      t·e·P)      ·  ro  ·h   n  s  t
n  p  t      e  v  t   ho  *f0X*a  0  ic  0    em  i   a      c4      FA0
  i2q  n/    s8·   i   )    BZ      P  cd~  Pso  o   30a        Or    y  *h
dr  ⁻e   tu9  t      F  iet3  rhP       *  e   mo   dt        x  De
wTpp   xix  n  m(      Wd   lAacc         a  ⁻0  z)l  i   i  n  e
5   e   *   sno      Pd  ·Xl      o   ic  sa  y    X       pk
i⁻  PO0  P      h   Yb  olo)   C    e  (   w  sco⁻o  o  ynn   !Xnj
   i  Va3   Ac  H  a    C    Xt0rP    ow  ·     ersIco   s  l0   a
PlPlaIe       a   tid    eP/tF  t  )s      pn     F  't  g(eD   e
so  ss    w  l0h    yXt    0S    p)  Dno⁻       o          r
*dYnM    0  u  ii      Tp  nly    ne'  l      c  X    s(se0  0·c
i   O8   BW  ouCH   ue  k    EX  t2·     i     sonn   *       op
  is1   n  g  ir   r        Q     o   X  gr  ny*  tu    0  mxsar   uj*
a  0/*      p    8       ur     f   o  t  a     ip  P  no       e
  es       pn  ·*i*  i   ·t)  ·t   W    5A  *  iyn  t  I     O  stn  rtx
       n  te·  s  ev    s   n   x  (  Xen  eo   Xw    td  l·  -
   Ui   c  i7        e  )SPX   m  uros3*is  s   ·n  n  M   o   l    L⁻g
   at  *sUrn2       7e  u   l  X    o  o  tH⁻res  c    p  eO      W
5*    oe      O(  Q   F0P  nN  *      em·r*ud  e   t      mM   c  iOX5
  iOg    s⁻  a      os  on    d  b  so'6p    s  6At   e0  ·  n   s
HiST        0    J   t  R   6    ei   T    rJ  iil  '  i  0        ank'
    p   r  er0   F    Bui        oP  mM  e0M  0    00  1Ee  u    e  B   u
q    t  i  o  XB  iO  *hn  t   r  i    a  ses  "       t  X  t    t   s       n
m)  g    p  d  G    FI   soy   Ors  fE*0  o      Ie  hd  e       n
p       gnO·  t   H    r  s   nzE  e     iea   p   *  t   ⁻  P/4e  l
   t   E  oo     w  a  g    e    s6  n  0c  xpc      -w   n
d     X    er   s   t         o  t  idt  *o  s  0·  P   e    t  1l/R
  XX   i  g      i  efg  s   P   C  ·  m  x  h  te  C   g  os  ta       e
Pa(oO  n/t0O'oZdI       dno      x·p    O  W  ae   or  R   t  iCF
(l   xa  B   co  o  s    )r  s    8Y*x  toe·   ie   t        o   ah
 r        B  0     rlr         d    t  ·l  Ei  et0Da  h       n  s7
    C  ⁻  s  oolo  t    ga  'r   FM  *d   i*s  0  X    o  pe           *


     Current Printing Page is :    1  of   1
```
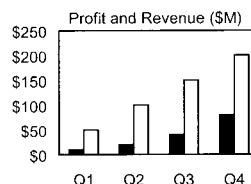
2.4.2 A4 2% Pattern

```
6           a  y   y      r  A  5 X                            s i             c
    n c       q   0             e              u · T        s  i   o      B        5  n
x         c    h     M    ·                4              s   *   o             D
          g    0  X        , o              *              n                E  g·       0
    d   X 5      w s · (                     o                              0          0    e
                             · )  3                   i   n i                   W
K P    8 Y M   d          h         G    h            x        Q   I      r      i
d     t   Z          P C            2              n   o   x          x           s
       ·         ·           ( n      *  O  G     e               A I  1 r ·
      E  j      2 W           · ·         i            h t       A  ·
     · 0        U                        i r    i                   1
    t         J 4    x      c      p s    o  0   J   6              1
         a  0    e        x         z       h       Y   s       · t
N        F      e   n    − E    · 0        0 ) j   U  s  r · o  n   L
     a  1 t   e           i  X  V       )       − h        p    0        2
       ·         A  7  /    K        j   k    m     ·            p        O
a O        N    9      m  c  s  Z        x    r · x    B   q e l      · H
n     r                         p s n * 3    5         s       e        p  x s  x
  c   H             T        ·           C 0 n    8   x   L 0    · (   ) i  v    r d
   · e  g  ·        · X  ·         ·        s /    i  t   E    ·     * 0  t O
    g 0 *  · 0    Y    K          t        q    r ·    i   ·         x   n 0
L        M          9    p      n g   2 X V   ,        *         O ·
            n           y  f    2        x    r   6       n    i    ·
  n e   e 7          y  f      2          o              8 E   G
          e 0 b  Q b  e  D      *   i     m p    e u   a 0 · B    t  0
        p                     6       G        a 0 · B        e o
f      ·  L    ·           s  b    J   t  r      g    t           o
E           t D       m e   R   x  s   r   t 4     x 4
           x        8  n P    g  T  a   o     7      a
    c    e            · ·  3  a    r    w  /      i  r
  t t )   b     5                g   0         0
      I    F  c              0              7
 *      0     8 s    n        c  B          p 6
a      e   i   m             F    n    *
    a     R  I    s  m S  x      y       u    z    F
   /    *   r  s  m S  x      y      U       k     e  3 a 0
t H    − F   R  9    (       · x       0       t   X r   z     0
  S       o   (   n    3     e a    P              v  a  x    3
    x n r                        P           P   C
S          0 ·               i             O · t       ·
  W  9 ( X o    x            o  0          ·  B
i  J   x        t    ·    d         w       n
  ·    6   x         0   a       K    ·         0    n 4
       N         v         X     k    0   ·  l  c
x   r            ·   1 − U      c    c l    t
  t j  i    o           2   7  m        x      g  7
 9    t  ·  x H 1   r       9  P   F     M  Q    Y P t      X   D
0  p            0  P    F   * s    a      n         f
   0  O w    s    W    5 M     1    0 z   x  i
d   x d   u  a 8  )   a   i      a ·                 e  a
    B      V ·       · t    Q  X t   S 0 s  S  ·
  T     0 d  a   · r t         C  k  N      x x  ·   ·    l
     q p  m x e   M   o         a   a    s  g         V         l e


         Current printing page is :    1   of   1
```

2.4.3   A4 IDC 5% Patten

INTEROFFICE MEMORANDUM

TO: Cathy Scott
FROM: Lane Wolters
SUBJECT: The Typical Printed Page
DATE: 07/14/09

What does the typical laser printer document look like? Well, across the diverse business community it would be impossible to capture all aspects of printing style within a single page document.   However, if attention is focused on the majority of printing volume, text and simple business graphics would stand out as the most prevalent output from laser printers.   This sample memo represents a reasonable example of the typical business document. This memo covers approximately 5% of a letter or A4-sized piece of paper. This number (5%) has historically been called the "average" page coverage by laser printer manufacturers. It may seem to the naked eye that there is much more than 5%, but in fact, alphanumeric characters rely on a large portion of white space for their composition.

Mileage Chart

City	London	Los Angeles	New York	Tokyo
London	--	5456	3453	5975
Los Angeles	5456	--	2468	5451
New York	3453	2468	--	6736
Tokyo	5975	5451	6736	--

There are many factors that can influence the actual page coverage of a document as well as the page-yield of a toner cartridge. Testing parameters such as font size and style, internal printer settings, print environment, paper stock, sample size, job length and criteria for determining "end of life", can all influence how long a toner cartridge will last. The best competitive analysis of printer page yield should occur under similar conditions using industry standards for the variables listed above.

1 of 1

MEMO