Jaypee University of Engineering & Technology Guna(M.P.)

ELECTRICAL SCIENCE LAB

(18B17EC271)

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Enroll No. :201B172

LAB EXPERIMENT NO. : 01 | Enroll no. - 201B172

Aim :

Familiarization with CRO, function generator and D.C power supply source.

Apparatus Required :

CRO, function generator, D.C power supply source, BNC Connectors.

Activity 1 : Familiarization with CRO.

a) Draw the front Panel Diagram.

→ Fig 1 (Page 03)

b) Calculate the following.

(i) Main and Sub divisions are on X axis and Y axis.

→ 1 block is main division and each has 5 sub divisions.

(ii) Maxi & mini time / div.

→ 5 μsec/div to 0.1 sec/div

(iii) How much maxi. & mini. time can be measured?

→ 0.1 sec to 5 μsec.

(iv) Maxi & mini. volt / div.

→ 10 mV/div to 5 V/div

(v) How much maxi & mini. volt can be measured?

→ 5V to 10mV.

Activity 2 : Familiarization with Function Generator

a) Draw the front Panel diagram.

→ Fig 2 (Page 04)

b) Answer the following.

(i) How much max & mini frequency can be generated?

→ 0 - 2 MHz

(ii) How much max & mini. amplitude can be generated?

→ max is 10 Vpp (load → 50 ohm) - 0

Activity 3: Familiarization with D.C source

a) Draw the front panel diagram.

→ Fig 3 (Page 05)

b) Answer the following.

(i) How much max. DC voltage can be obtained?

→ 0-32 VDC

(ii) What is the difference between coarse and fine adjustment?

→ Coarse adjustment covers the entire range from min. to max. while fine adjustment only covers a fraction of the entire range.

Discussion:

CRO and function generator are useful electronic devices by which we can measure the amplitude, time period and frequency of a signal. Function generator generates different types of signals and from visual screen of CRO, we can easily measure amplitude, time period and also the frequency of the signal generated by function generator and DC regulated power supply was maintained with D.C source.

Fig 1

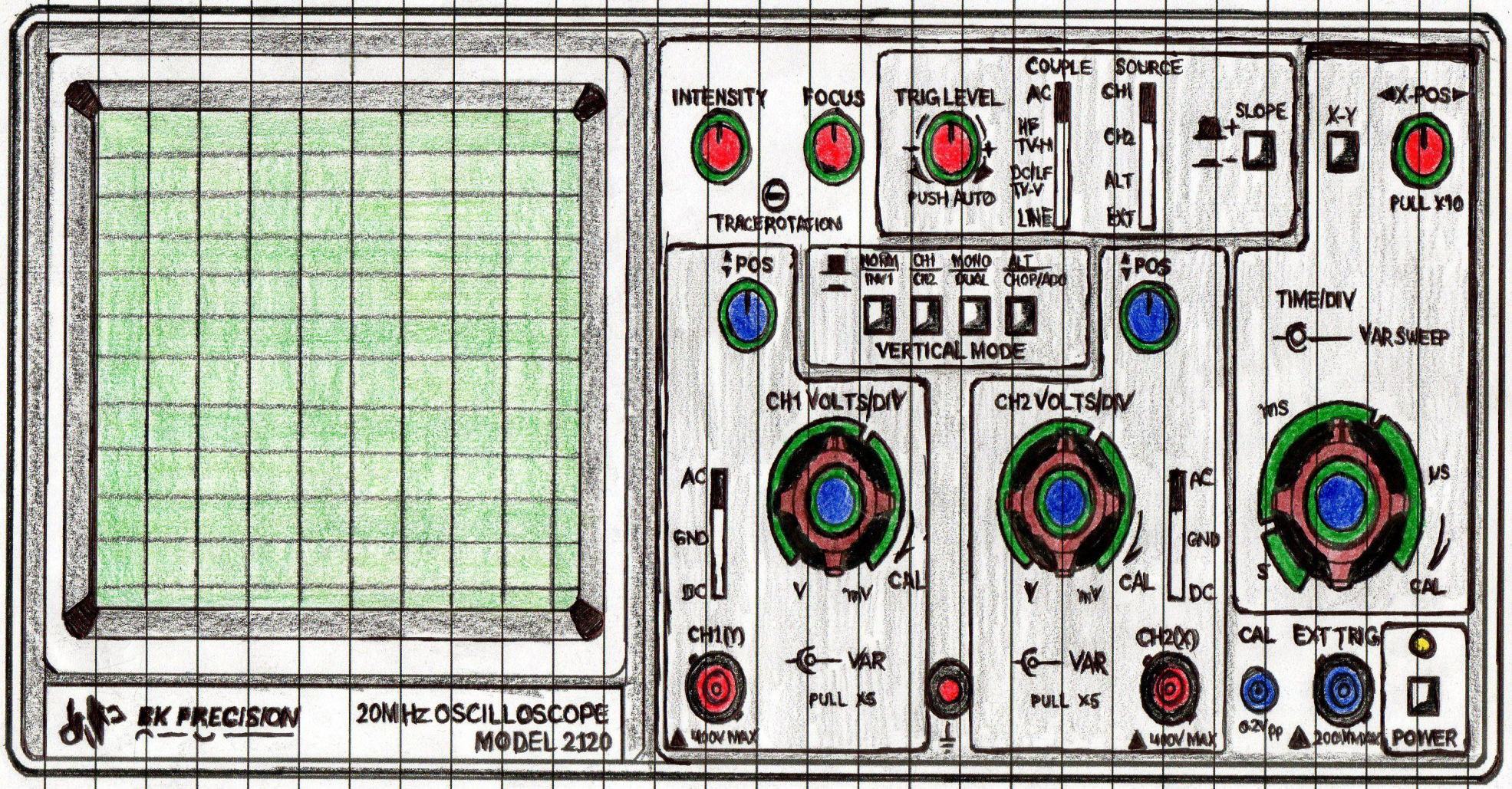
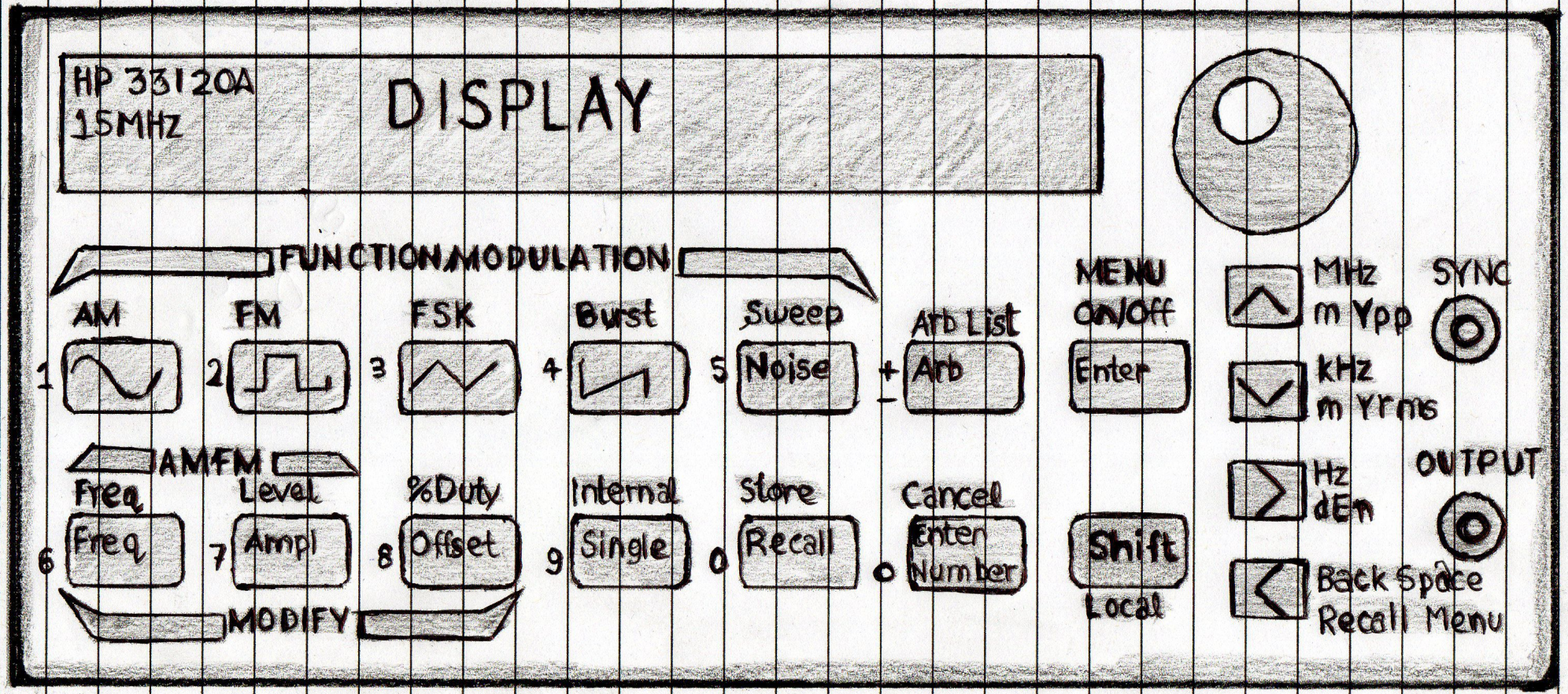

INTENSITY
FOCUS
TRACEROTATION
TRIG LEVEL
PUSH AUTO
COUPLE
AC
HF TV-H
DC/LF TV-V
LINE
SOURCE
CH1
CH2
ALT
EXT
SLOPE
X-Y
X-POS
PULL X10
POS
NORM/INV1
CH1/CH2
MONO/DUAL
ALT/CHOP/ADD
VERTICAL MODE
POS
TIME/DIV
VAR SWEEP
CH1 VOLTS/DIV
AC
GND
DC
V
mV
CAL
VAR
PULL X5
CH1(Y)
400V MAX
CH2 VOLTS/DIV
CH2(X)
ms
μs
s
CAL
EXT TRIG
0.2V pp
200V MAX
POWER
EK PRECISION
20MHz OSCILLOSCOPE
MODEL 2120

Fig 2


HP 33120A
15MHz
DISPLAY
FUNCTION/MODULATION
AM
FM
FSK
Burst
Sweep
Arb List
1
2
3
4
5
Noise
+
-
Arb
MENU
On/Off
Enter
MHz
mYpp
SYNC
kHz
mYrms
AM/FM
Freq
Level
%Duty
Internal
Store
Cancel
Hz
dBm
OUTPUT
6
Freq
7
Ampl
8
Offset
9
Single
0
Recall
.
Enter
Number
Shift
Local
Back Space
Recall Menu
MODIFY

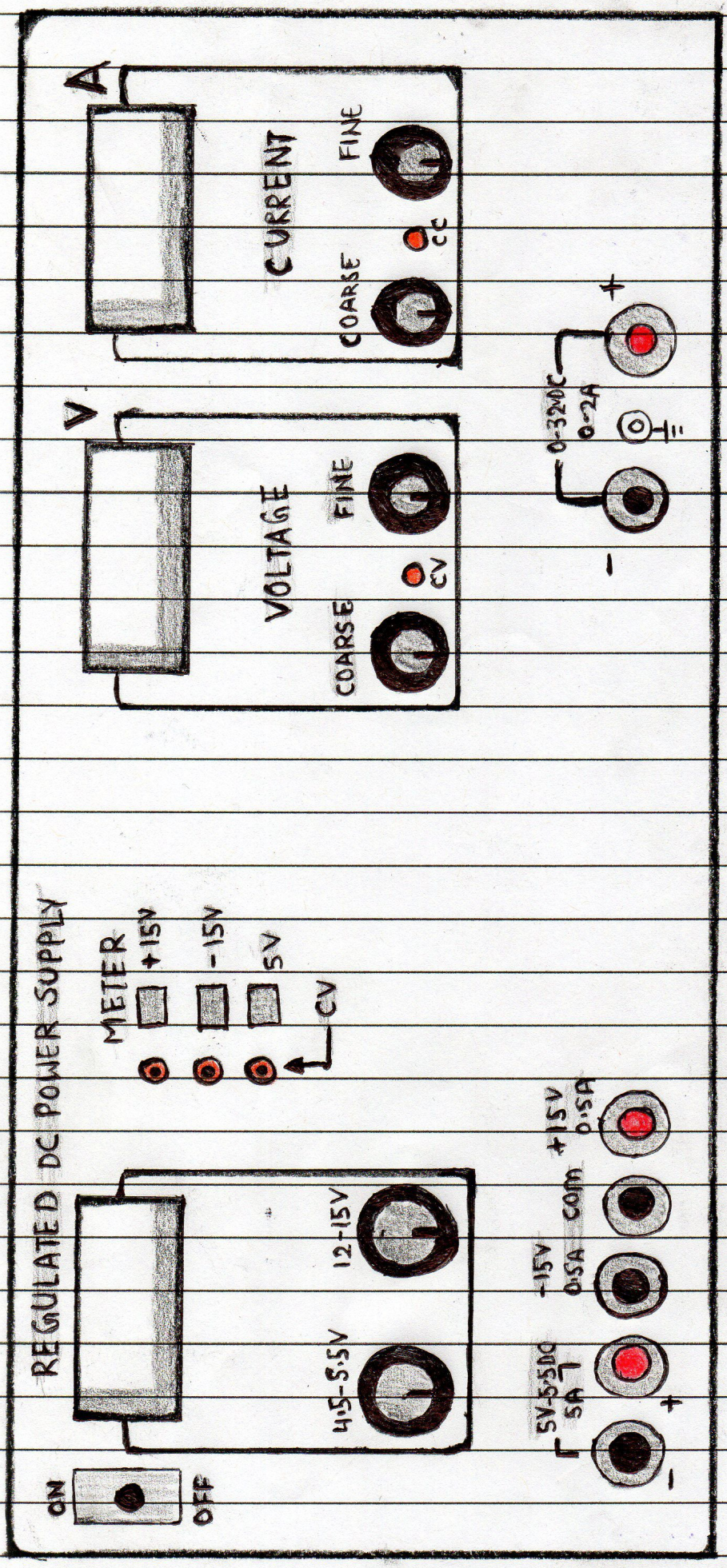

A
CURRENT
FINE
COARSE
CC
V
VOLTAGE
FINE
COARSE
CV
0-32VDC
0-2A
+
-
REGULATED DC POWER SUPPLY
METER
+15V
-15V
5V
CV
12-15V
4.5-5.5V
+15V
0.5A
com
-15V
0.5A
5V-5.5DC
5A
ON
OFF

Fig: 3

LAB EXPERIMENT NO. : 02 | Enroll no. 201B172

Aim :

@ To familiarization with the Digital Multimeter (DMM)

Apparatus Required :

DMM, Resistance, Capacitance, AC & DC source, Diode, Transistor

Activity 1 : Familarization with DMM

Exercise :

(a) Draw the front panel diagram.

→ Fig 1, page 03

(b) Calculate the following :

(i) Max AC & DC voltage can be measured?

→ Max AC ⇒ 750V and Max DC ⇒ 1000V

(ii) Max AC & DC current can be measured?

→ Max AC ⇒ 10A Max DC ⇒ 200mA

(iii) what precaution should be taken while checking components with DMM?

→ (•) When not in use, keep it off or in highest voltage position.

(•) If you want to check hazardous voltage in a circuit with digital multimeter, it is imp. to check for both AC and DC voltage.

Discussion : A digital multimeter is a test tool used to measure two or more electrical values - principally voltage, current, and resistance. And the basic principle behind the digital multimeters is the Analog to digital Converter.

Activity 2 : Familarization with Resistance/Resistor.

Discussion:

Resistor is a passive electrical component with two terminals that are used for either ~~learning~~ limiting or regulating the flow of electric current in electrical circuits. The main purpose is to reduce the current flow and lower the voltage in any particular portion of the circuit.

Diagram : Fig 2, page 4

Activity 3: Familarization with Capacitance / Capacitor

Discussion:

The capacitor is a device in which electrical energy can be stored. It is an arrangement of two conductor generally carrying charges of equal magnitudes and opposite sign and separated by an insulting medium. The non-conductive region can either be an electric insulator or vaccum such as glass, paper, air, or semiconductor called as dielectric.

Diagram : Fig 3, Page 5.

Activity 4: Familarization with Diode.

Discussion:

A diode is a two terminal electronic component that conducts electricity primarily in one direction. It has high resistance on one end and low resistance on the other end.

Diodes are used to protect circuits by limiting the voltage and also transform AC into DC. Semiconductor like silicon and germanium are used to make the most of the diodes.

Diagram: Fig 4, Page 6.

fig 1:

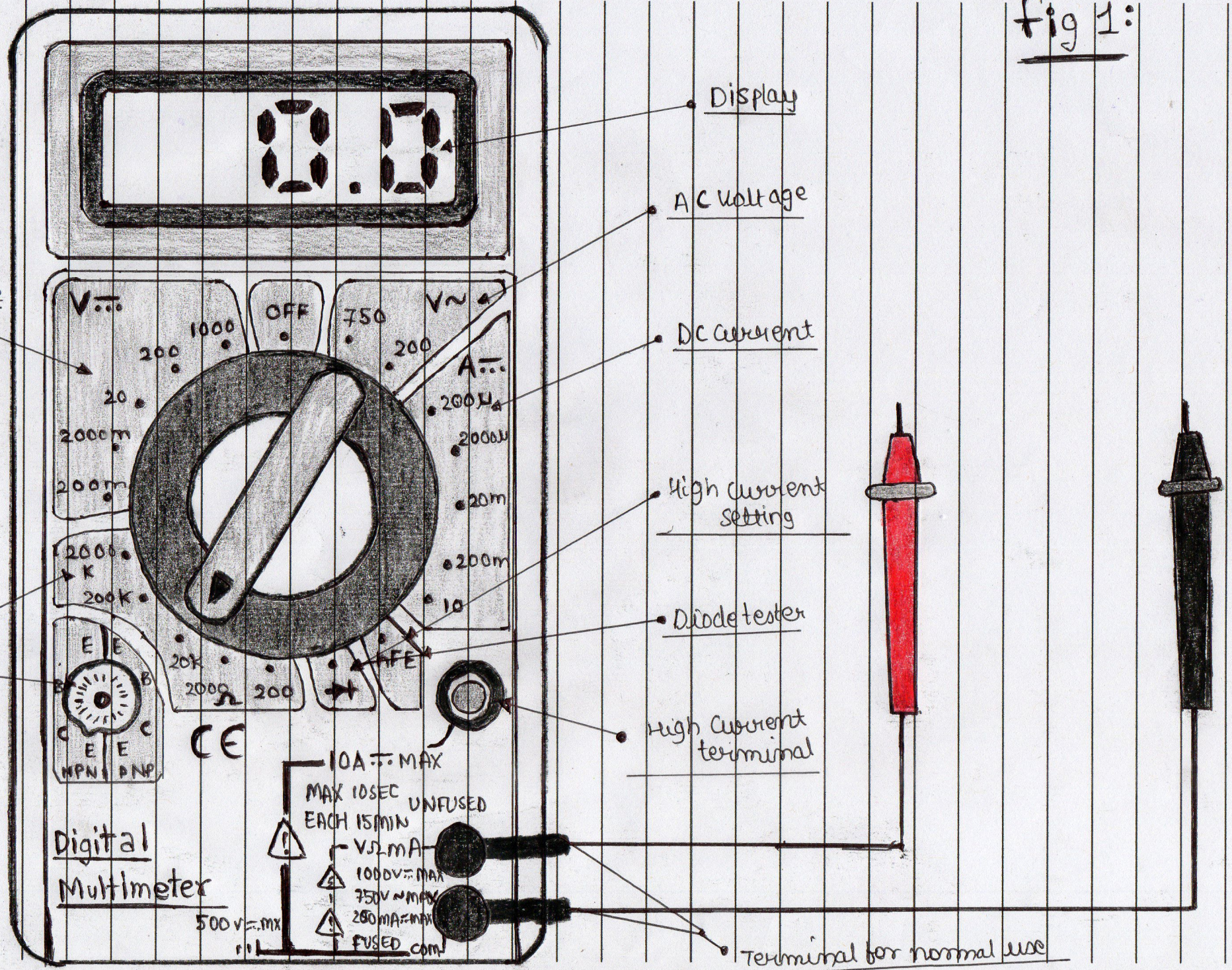
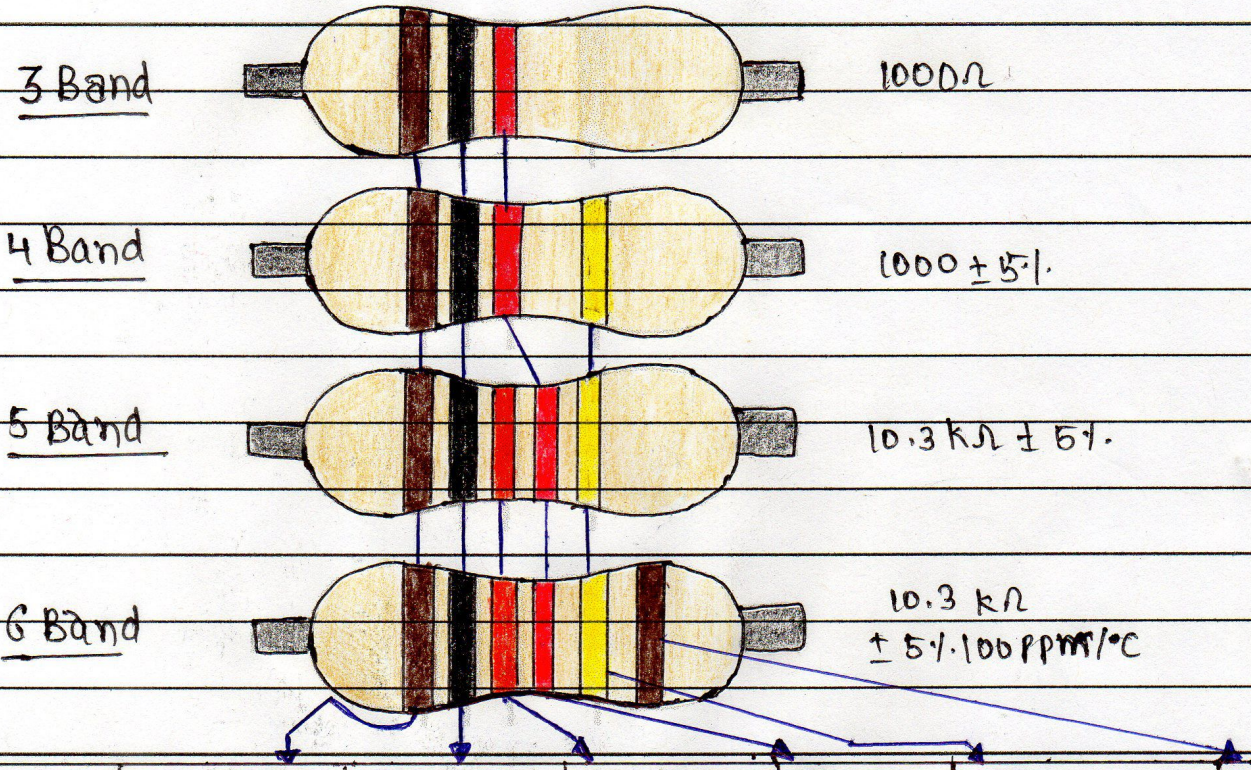

Display
AC voltage
DC current
High current setting
Diode tester
High current terminal
Terminal for normal use
DC voltage
Res. Range
Transistor tester
Digital Multimeter
OFF
V⎓
V~
A⎓
hFE
10A ⎓ MAX
MAX 10SEC
EACH 15MIN
UNFUSED
VΩmA
1000V⎓ MAX
750V ~ MAX
200mA⎓ MAX
FUSED
COM
500V⎓ MAX
NPN
PNP

Fig : 2

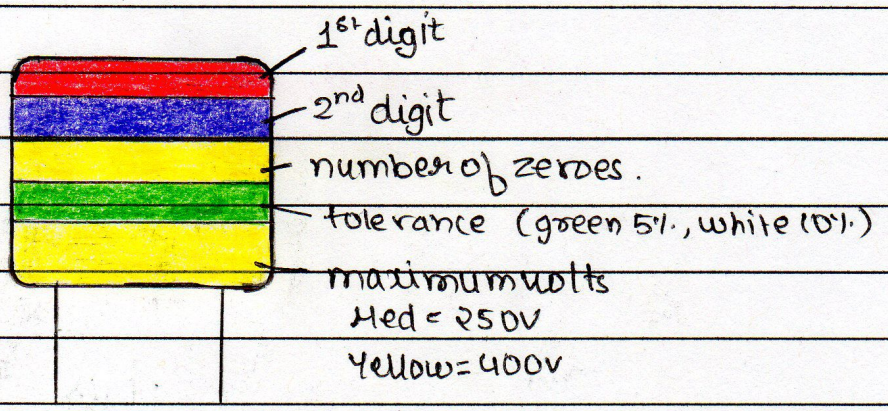
> Resistors with different no. of bands
> And the table for there color codes



Color	1st Digit	2nd Digit	3rd Digit	Mult.	Tolerance	Temp.
Black	0	0	0	1Ω		
Brown	1	1	1	10Ω	± 1%. (F)	100
Red	2	2	2	100Ω	± 2%. (G)	50
Orange	3	3	3	1kΩ	± 3%.	15
Yellow	4	4	4	10kΩ	± 4%.	25
green	5	5	5	100kΩ	± 0.5%. (D)	
blue	6	6	6	1MΩ	± 0.25%. (C)	10
Violet	7	7	7	10MΩ	± 0.10%. (B)	5
Grey	8	8	8	100MΩ	± (0.05%) (A)	
White	9	9	9	1GΩ		
Gold				0.1Ω	± 5%. (J)	
Silver				0.01Ω	± 10%. (K)	

Fig 3 :

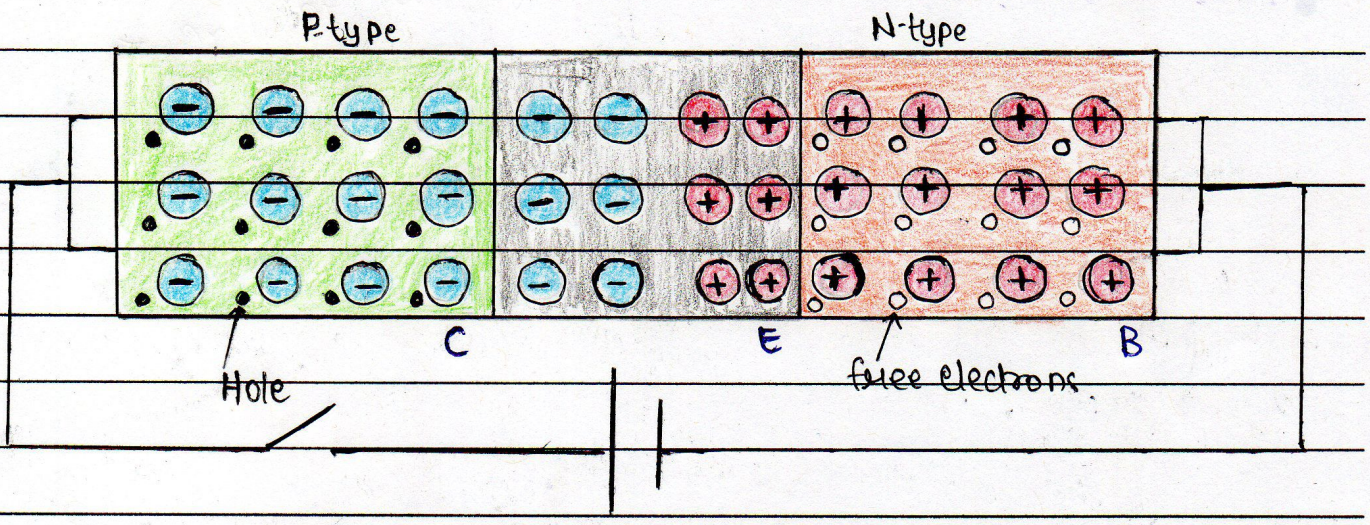
> Capacitor with diff. color bands
> And the table for color codes.

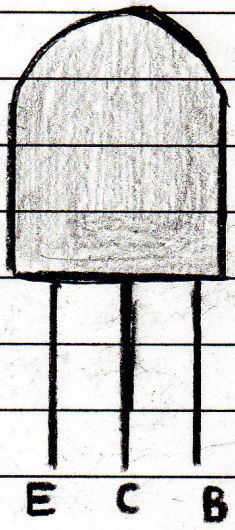


Color	Digit A	Digit B	Multiplier D	Tolerance (T) >10pf	Tolerance (T) <10pf	Temperature Coef. (TC)
Black	0	0	X1	± 20%	±2.0pf	
Brown	1	1	X10	±1%	±0.1pf	-33×10^{-6}
Red	2	2	X100	±2%	±0.25pf	-75×10^{-6}
Orange	3	3	X1000	±3%		-150×10^{-6}
Yellow	4	4	X10000	±4%		-22×10^{-6}
Green	5	5	X100000	±5%	±0.5pf	-330×10^{-6}
Blue	6	6	X1000000			-470×10^{-6}
Violet	7	7				-750×10^{-6}
Grey	8	8	X0.01	+80%, -20%		
White	9	9	X0.1	±10%	±1.0pf	
gold			X0.1	±5%		
Silver			X0.01	±10%		

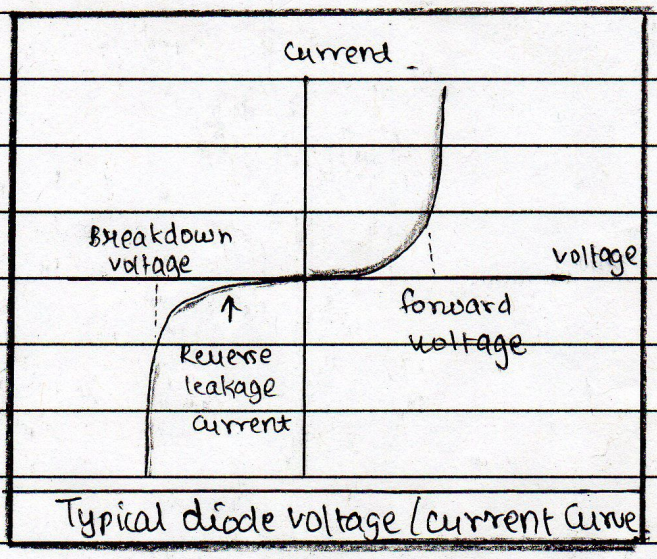
Fig 4:

> Diode : Emitter - Collector - Base
> Voltage/current curve





Diode



Typical diode voltage/current curve