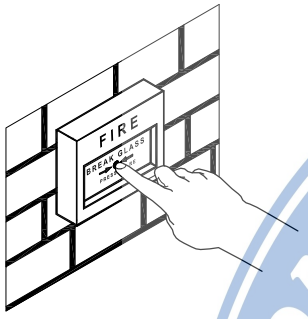
Sketches of electrical components

Fire alarm:

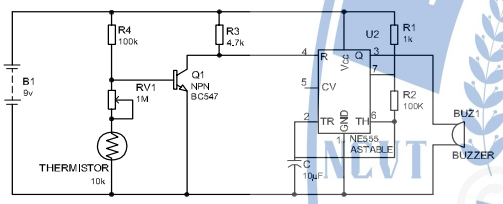
A fire alarm system has a number of devices working together to detect and warn people through visual and audio appliances when smoke, fire, carbon monoxide or other emergencies are present. **These alarms may be activated automatically from smoke, heat detectors also activated via manual fire alarm activation.** (Fig 1 & 2).

Fig 1



EDNEL220511

Fig 2



CIRCUIT DIAGRAM OF FIRE ALARM

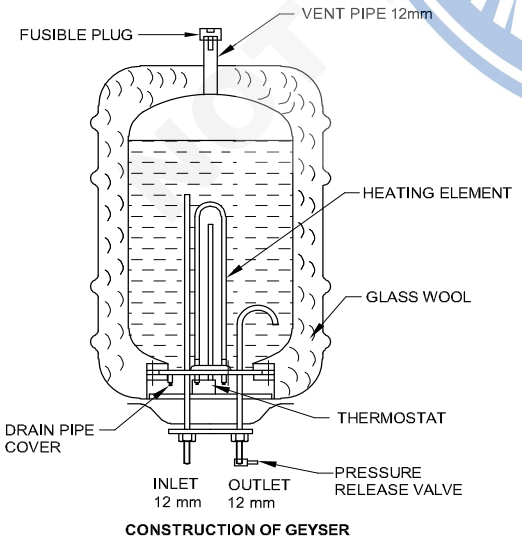
EDNEL220512

Geyser

It is an electric water heater which heats and maintains the temperature of the water stored in it.

There are several types of water heaters. The most usual one is the geyser, which is more efficient as the hot water can be directly drawn through a tap at different points. (Fig 3)

Fig 3

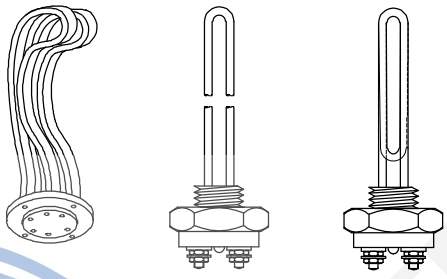


CONSTRUCTION OF GEYSER

EDNEL220513

Fig 4 shows a few shapes of heating elements.

Fig 4

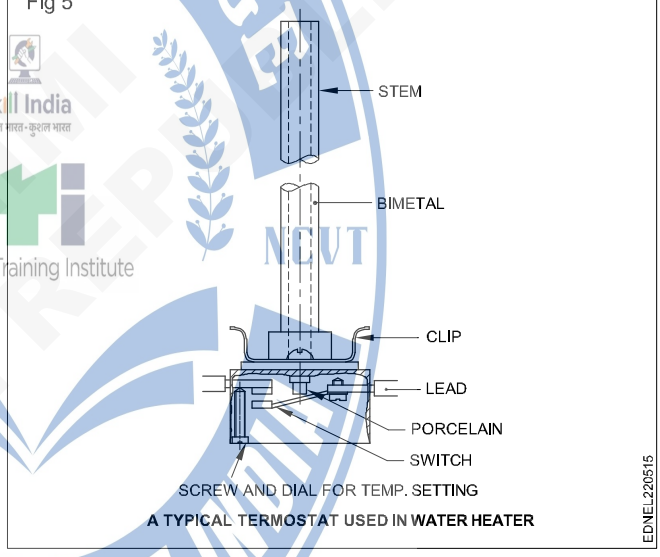


DIFFERENT SHAPES OF HEATING ELEMENTS

EDNEL220514

Thermostats: Thermostats are used in water heaters to control the current to the heating elements and thereby regulate and maintain the water temperature between 32°C to 88°C. (Fig 5)

Fig 5



A TYPICAL TERMOSTAT USED IN WATER HEATER

EDNEL220515

A fusible plug is fitted on the top of the unit to protect the inner tank to release the excess pressure that may be developed due to failure of the thermostat.

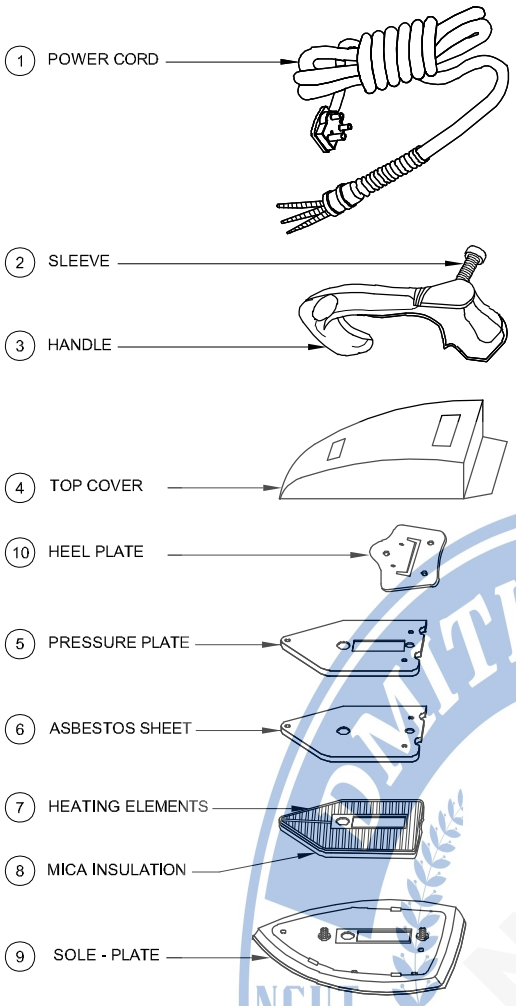
NON AUTOMATIC ELECTRIC IRON

Electric Iron:

An electric iron is a heating device in which the heat is concentrated on a smooth, flat, bottom surface which is applied to the fabrics to be ironed. (Fig 6)

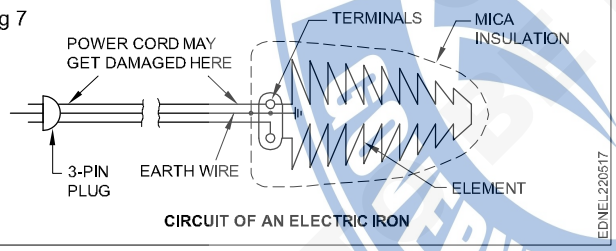
Figure 7 shows the four possible parts of the circuit which may be defective. This is an electric diagram of the simple non-automatic type of iron and does not show other non-electrical parts such as the handle cover and sole-plate.

Fig 6



PARTS OF AN ELECTRIC IRON

Fig 7

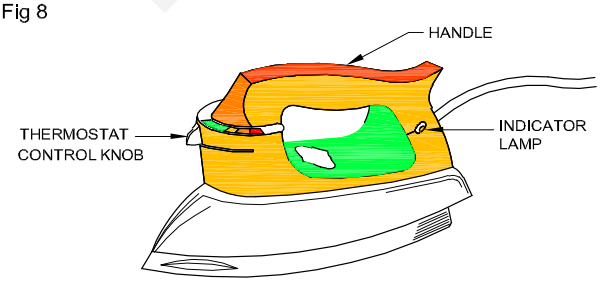


CIRCUIT OF AN ELECTRIC IRON

Automatic electric iron

The difference between an automatic iron and the ordinary (non-automatic) iron is that the automatic type has a thermostatic device to regulate the temperature. The other parts are more or less the same in both the types of irons. (Fig 8)

Fig 8



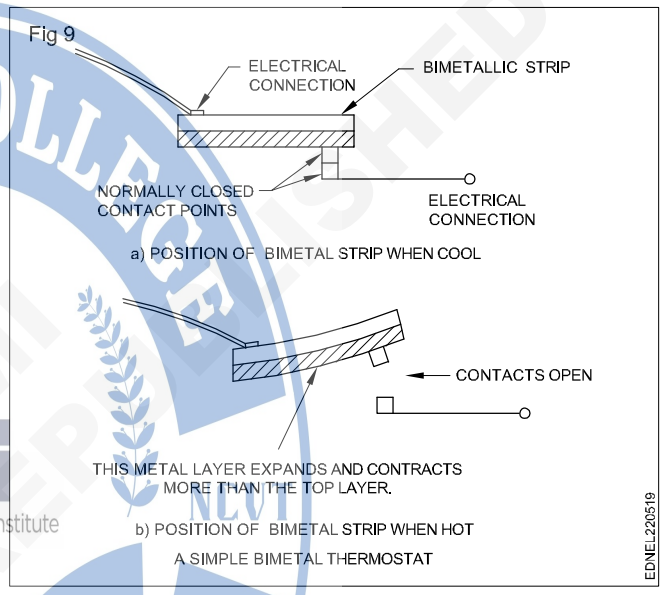
AUTOMATIC ELECTRIC IRON

Automatic irons are fitted with a thermostatic switch to regulate the heat to a specific predetermined value. The thermostatic switch disconnects the supply when the predetermined value is reached and reconnects the supply when the iron cools down. A turning knob with a dial just below the handle, marked as rayon, cotton, silk, wool etc. can be operated to select the preset temperature.

Thermostats

A thermostat is a switch which can be designed to close or open a circuit at predetermined temperature. One of the simplest and most dependable components in the modern heating appliances is the BIMETAL THERMOSTAT. It controls the temperature in stoves, toasters, food warmers, irons etc. It serves as a safety device to prevent overheating of the appliances. (Fig 9)

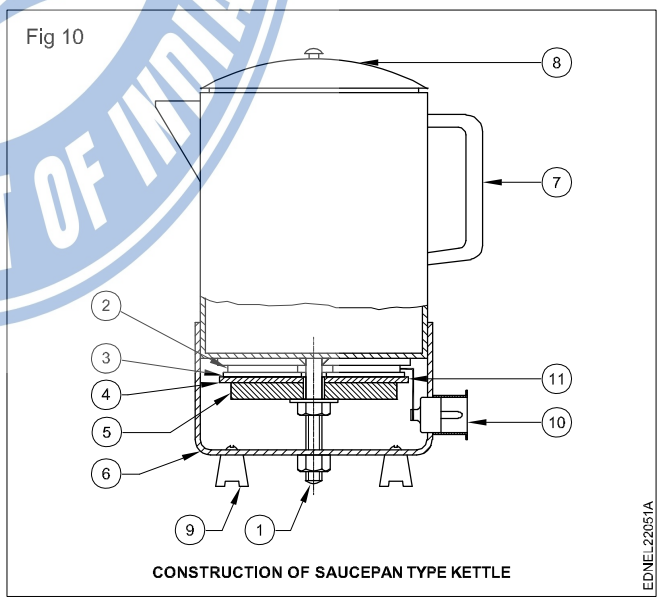
Fig 9



A SIMPLE BIMETAL THERMOSTAT

Saucepan type: The construction of the sauce pan type kettle is given in Fig 10.

Fig 10

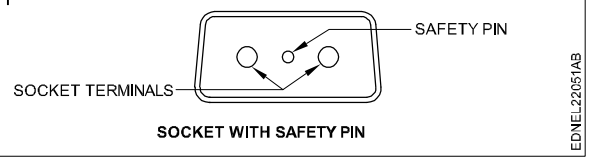


CONSTRUCTION OF SAUCEPAN TYPE KETTLE

Immersion type: The heating element in this type is of tubular immersion heating design. In some kettles an ejector type safety device is incorporated in the socket terminal side.

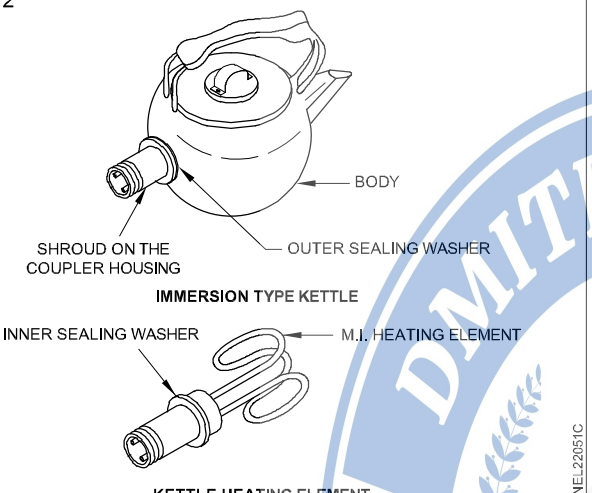
In case the kettle is switched ON without water the safety pin (Fig 11) which is soldered against a spring which is under tension comes out and pushes the plug out. This safety pin can be placed in position by soldering. The heating element is concealed inside a hollow tube and mineral insulated (Fig 12).

Fig 11



SOCKET WITH SAFETY PIN

Fig 12

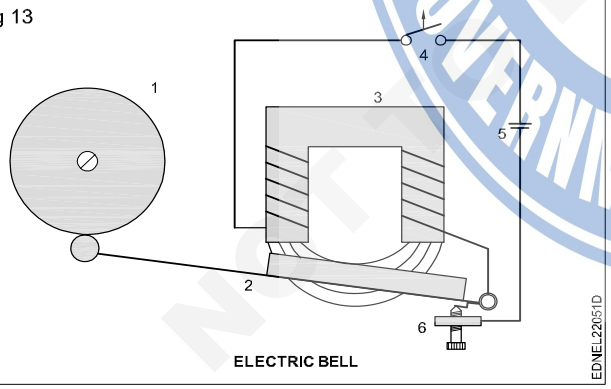


KETTLE HEATING ELEMENT

Electric bell

An electric bell is a mechanical bell that works of an electromagnet. When the current is passed through it, produces buzzing sound. It is used in rail road crossings, telephones, fire/burglar alarms, school bells and door bells etc, Now, they are replaced with electronic sounders. (Fig 13)

Fig 13



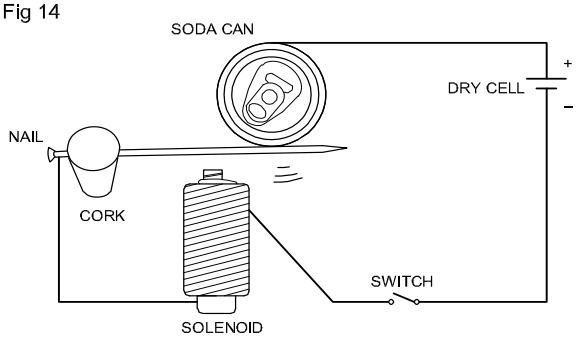
ELECTRIC BELL

Electric buzzer

A buzzer or beeper is an audio signalling device, which may be mechanical, electromechanical (or) piezoelectric.

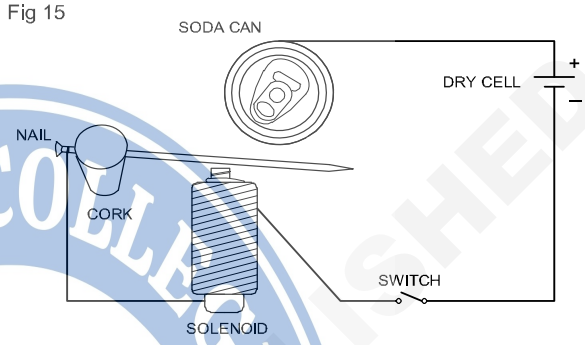
The closed & open position of buzzer are shown in Fig 14 & Fig 15.

Fig 14



BUZZER CIRCUIT IN CLOSED POSITION

Fig 15



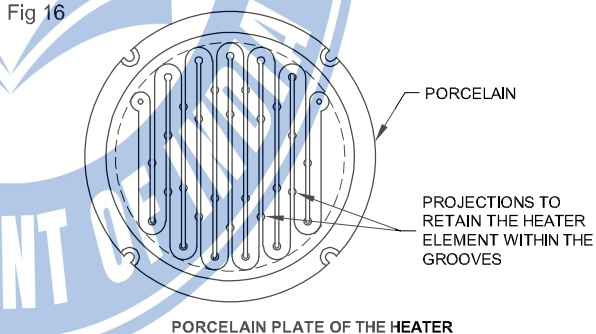
BUZZER CIRCUIT IN OPEN POSITION

Elecric heater: One of the methods of obtaining heat for cooking is to use the heating effect of electricity. An electric heater is the simplest form of an electric cooking device.

Heater plate:

A porcelain plain with a groove is made as shown in Fig 16. It houses the Nichrome wire in a coil form. It is the type of Exposed element type heater.

Fig 16

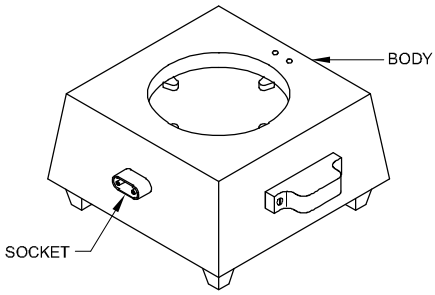


PORCELAIN PLATE OF THE HEATER

The end of the coiled elements are terminated with bolts and nuts in the plate. The frame of the heater is shown in Fig 17.

Immersion heater : As the name implies, these heaters are used in immersed conditions. These are used to heat the water or other liquid directly. The heat produced is directly dissipated to the water and thus the water is heated. In general the construction of the heating element is made of spiral shape wound with nichrome wire. The element is placed in the copper tube and insulated from the walls etc. by means of the insulated and fire proof powder or sand all around.

Fig 17

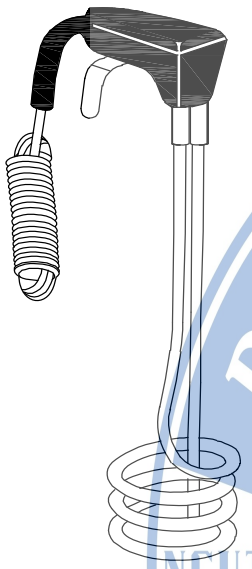


FRAME OF THE HEATER

EDNEL22051H

The arrangements as shown in fig 18

Fig 18



IMMERSION HEATER

EDNEL22051I

Electric stove

An electric stove is a common domestic heating appliances used for cooking. It works with 240V AC supply and different models are available with power rating usually from 750 to 1500 watts (Fig 19).

Hotplate:

A hotplate is a heating appliance which is basically an electrically heated plate on which flat bottomed containers to be heated are placed (Fig 20). It may be a single unit type or double unit type.

Fig 21 shows the different connections of hot plate for various wattage output.

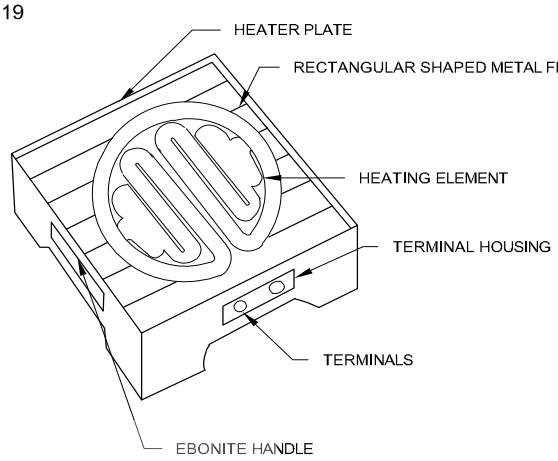
Micro oven:

It is an Electronic cooking devices which uses energy of micro waves to cook/prepare/pressure the foods unlike the conventional ovens. Micro wave energy cooks the food without applying external heat Fig 22

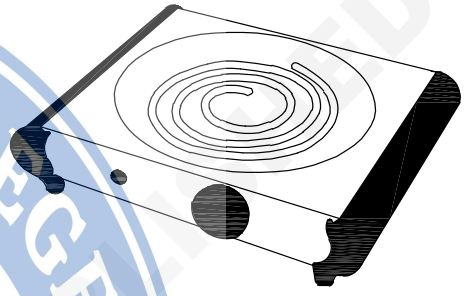
Function of microwave oven

The microwaves are short electromagnetic waves of radio frequency (RF) energy which would pass through materials such as paper, glass and plastics. Aluminum and other metal tend to reflect the microwaves so they should not be used inside.

Fig 19



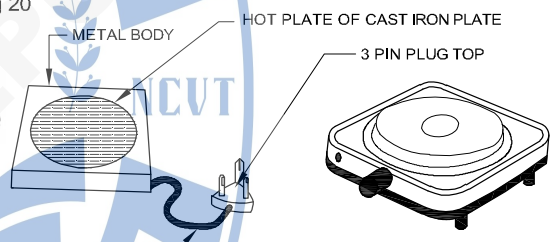
A BASIC ELECTRIC STOVE



A MODERN ELECTRIC STOVE

EDNEL22051J

Fig 20

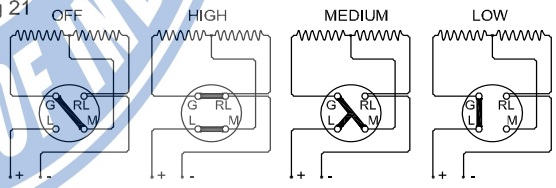


(A) HOT PLATE

(B) A MORDERN HOT PLATE

EDNEL22051K

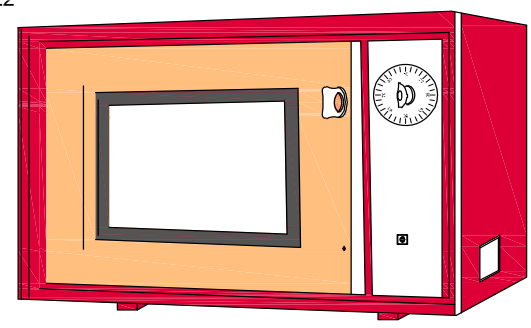
Fig 21



DEFFERENT CONNECTIONS OF HOT PLATE

EDNEL22051L

Fig 22



TYPICAL MICROWAVE OVEN ASSEMBLY

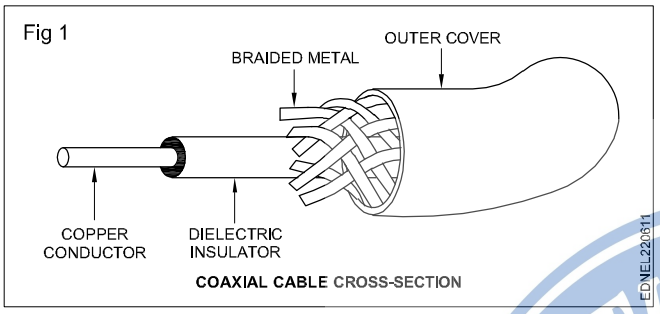
EDNEL22051M

Sketches of cable components

Sketches of components - cables

Co-axial cable (Fig 1)

Fig 1



Types of Co-axial cable

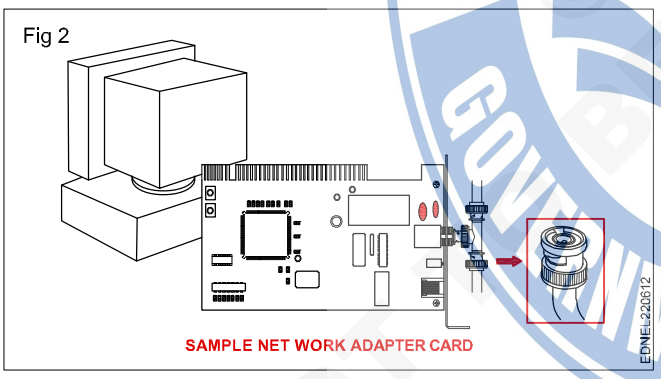
There are two types of co-axial cable

- Thin (Thinnet)
- Thick (Thicknet)

Thinnet: Thinnet is a flexible coaxial cable about 0.25 inch thickness. Because this type of coaxial is flexible and easy to work with, it can be used in almost any type of network installation.

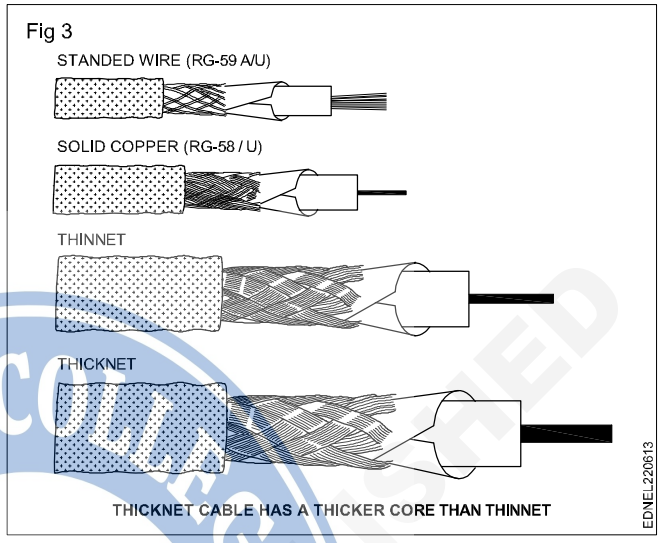
Networks that use a thinnet have the cable connected directly to a computer's network interface card as shown in Fig 2.

Fig 2



Thicknet: 'Thicknet isrelatively rig(d co-axialcable) about 0.405 inches in diameter. The copper core is thicker than a thinnet core as shown in Fig 3.

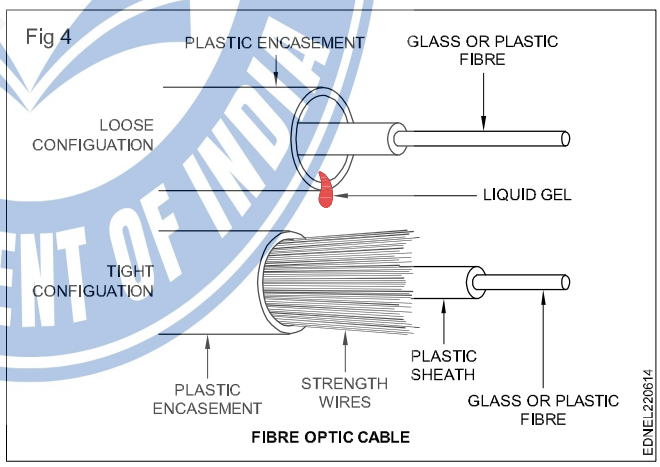
Fig 3



Fiber Optic Cable

Fiber optic cable is made of light-conducting glass or plastic core surrounded by more glass and a tough outer sheath as in Fig 4. The center core provide the light pathor wave guide while the glass or cladding is composed of varying layers of reflective glass. The glass cladding is designed to refract light back into the core. Each core and cladding strand is surrounded by a tight or loose sheath in tight configurations, the strand is completely surrounded by the outer plastic sheath.

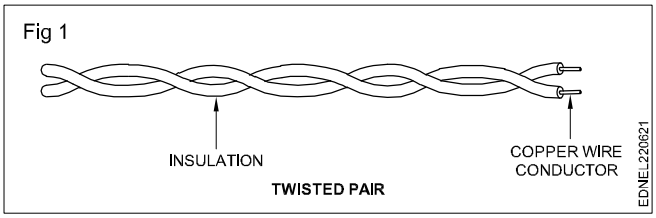
Fig 4



Different types of cable and connectors used in LAN

Twisted pairs are formed by two insulated 22 to 26 gauge copper wires that are twisted each other as in Fig 1. These twisted cables are available in two types.

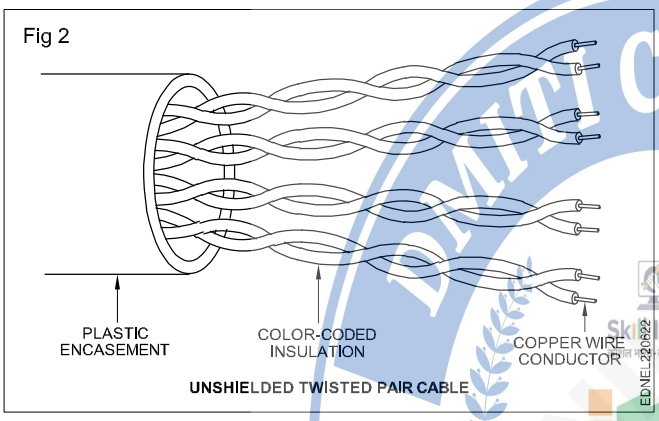
Fig 1



Unshielded twisted pair cable (UTP)

Unshielded twisted pair cable is composed of a set of twisted pairs with a simple plastic encasement as in Fig 2.

Fig 2



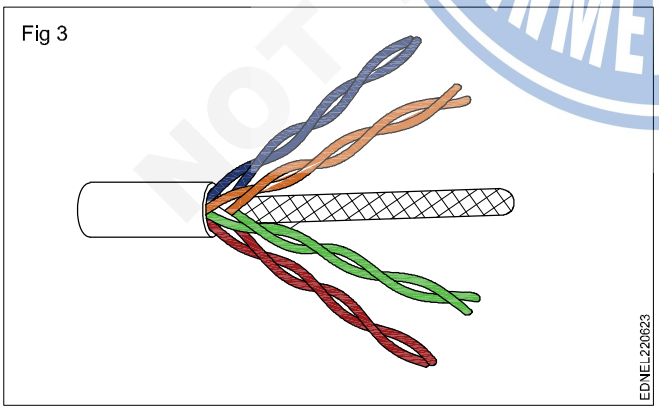
It is commonly used in telephone systems and has been largely standardized.

Twisted pair network cables are rated in terms of their capability to carry network traffic. They are referred as category 3, 4 5e and cat 6.

CAT 6 cable

Cat6 is backward compatible with the CAT 3, 5, 5e cable standards. As with Cat5 and Cat5e cabling, Cat6 cables consists of 4 unshielded twisted pairs(UTP) of copper wires with a soft supporting member in the center of the cable as shown in Fig 3.

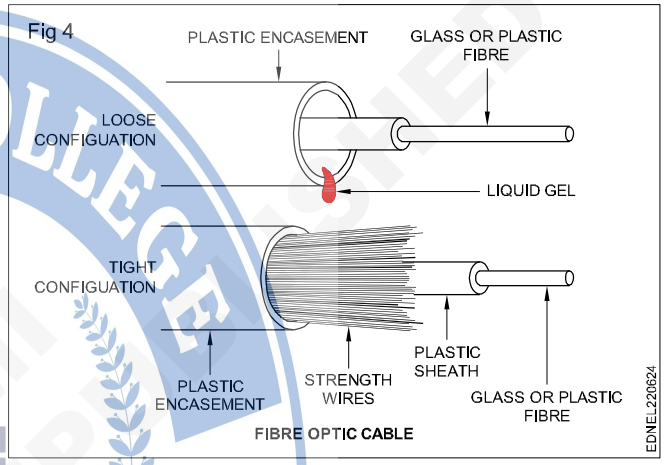
Fig 3



Fiber optic cable

Fiber optic cable is made of light- coducting glass or plastic core surrounder by more glass and a tough outer sheath as in Fig 4 The center core provide the light path or wave guide while the galss or cladding is composed of varying layers of reflective glass. The glass or cladding is composed of varying layers of reflective glass. The glass cladding is designed to refract ligh back into the core. Each core and cladding strand is surronded by a tight or loose sheath in tight configurations, the strand is completely surrounded by the outer plastic sheath. Loose configuration use a liquid gel or other material between the strand and the protective sheath.

Fig 4



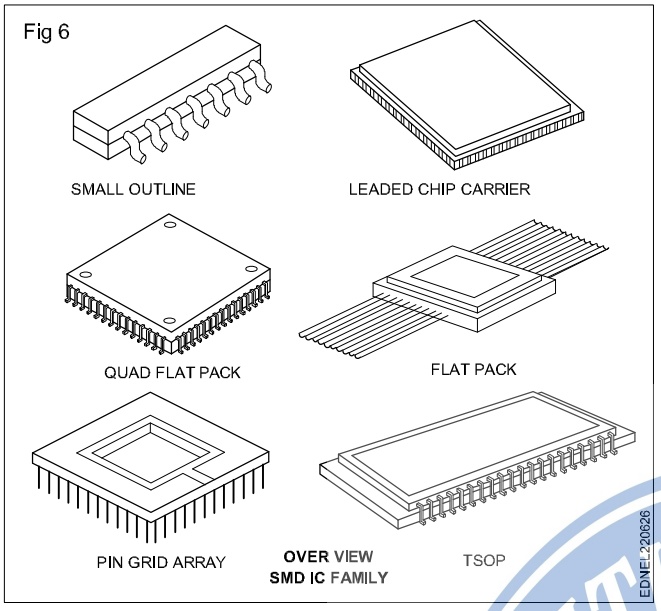
Diffrent Types of Level Sensors and their Workings

A level sensor is one kind of device used to determine the liquid level that flows in an open system or closed system The level measurements can be available in two types namely continous measurements and point level measurements. The continuous level sensor is used to measure the levels to a precise limit whereas point level sensors used to determine the level of liquid wheather that is high or low. (Fig 5)

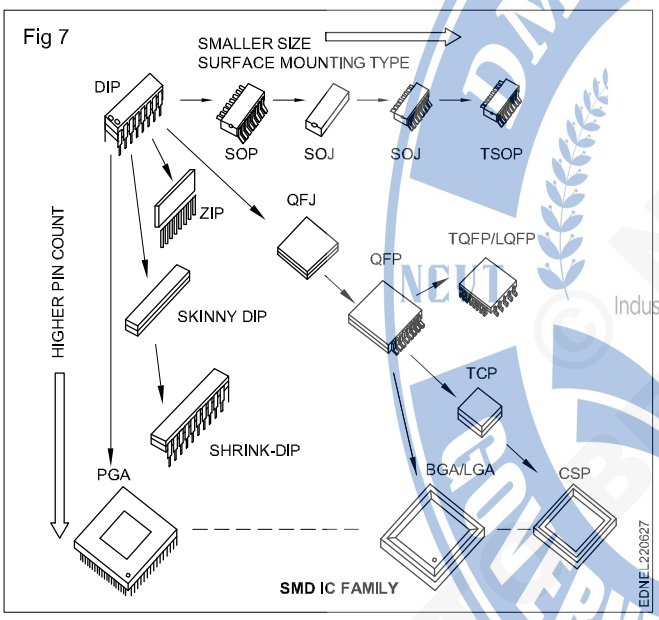
Fig 5

Generally these sensors are connected to an output unit for sending out the results to a monitoring system The present technologies use wireless transmission of information to the monitoring system, which is very useful in important and hazardous locations that cannot be simply accessed by common workers.

SMD IC family overview (Fig 6)

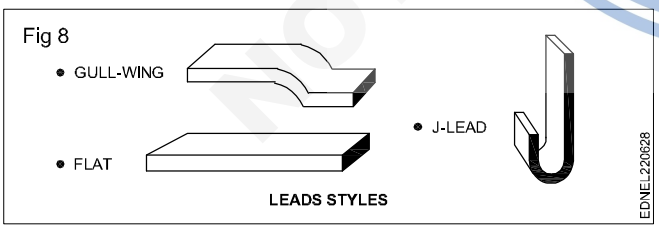


Package classifications (Fig 7)



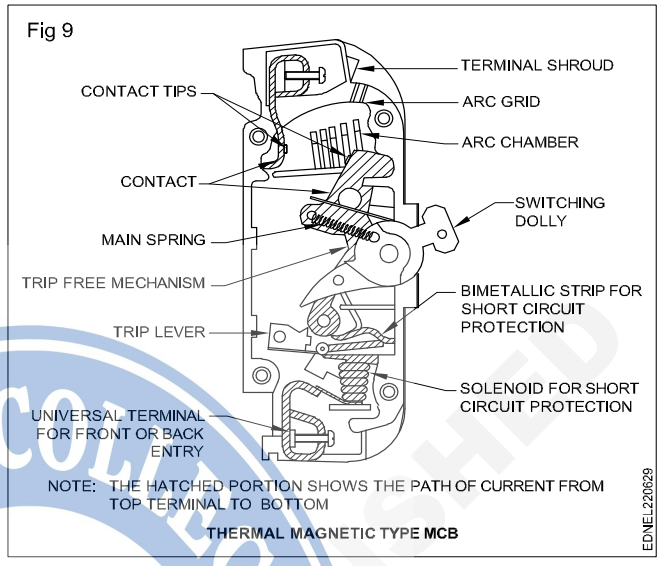
Lead styles

Heads system as shown in Fig 8.

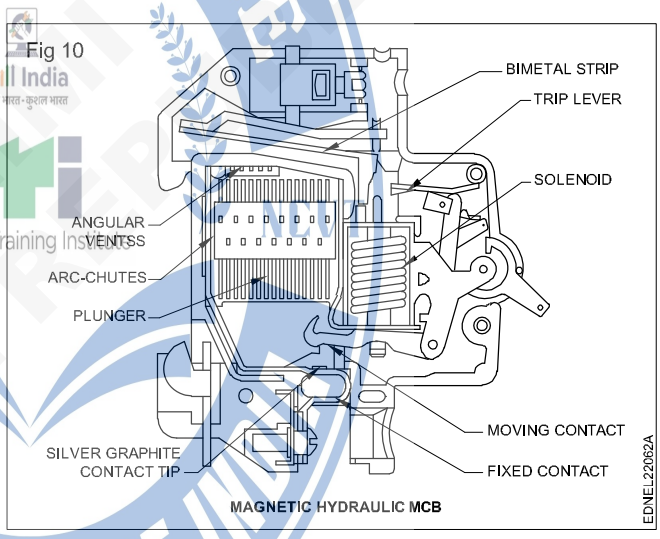


Thermal magnetic MCB

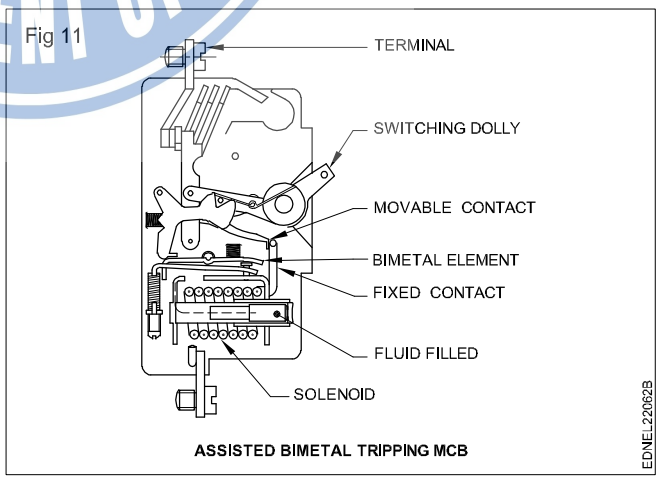
As shown in Fig 9, the switching mechanism is housed in a moulded housing with phenolic moulded high mechanically strong switching dolly. This type of MCB is also provided with bimetallic over load release.



Magnetic hydraulic MCB (Fig 10)

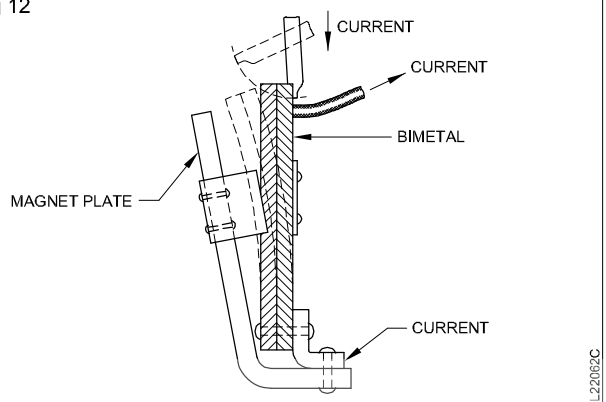


Assisted Bimetal Tripping MCB (Fig 11)



Assisted bimetal tripping (Fig 12)

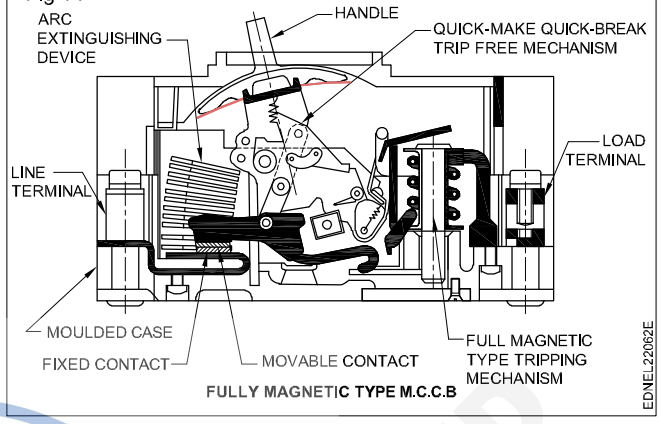
Fig 12



ASSISTED BIMETAL TRIPPING

The constructional feature of a fully magnetic MCCB design is shown in Fig 14.

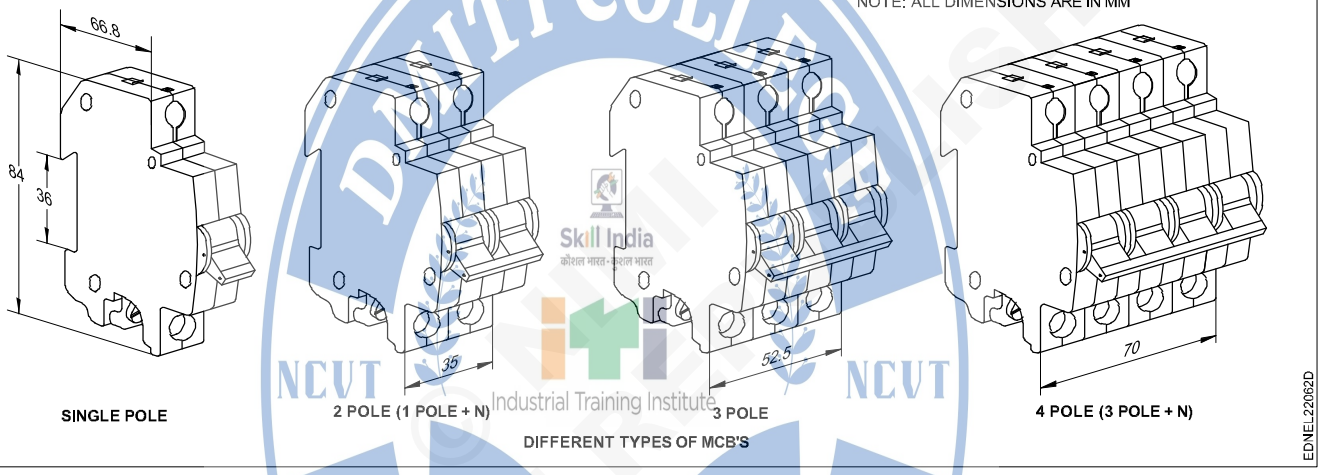
Fig 14



FULLY MAGNETIC TYPE M.C.C.B

Different types of MCB (Fig 13)

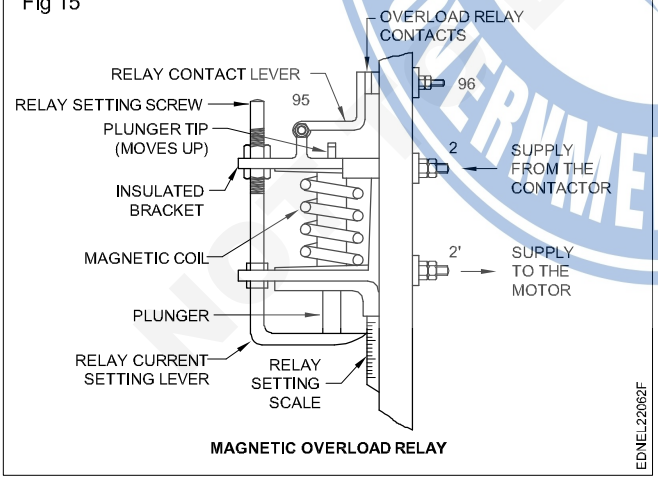
Fig 13



DIFFERENT TYPES OF MCB'S

Magentic overload relay (Fig 15)

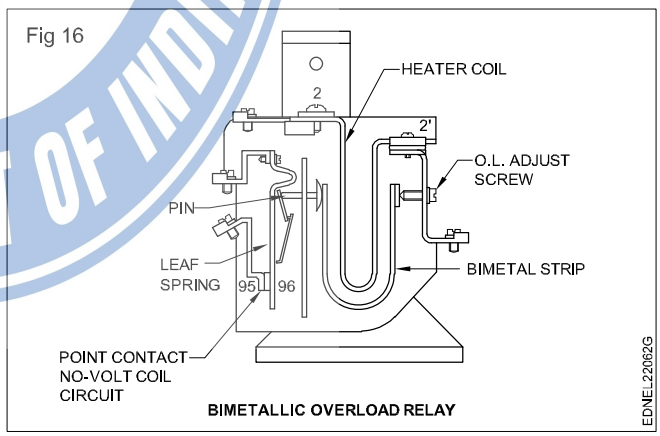
Fig 15



MAGNETIC OVERLOAD RELAY

Bimetallic overload relay (Fig 16)

Fig 16



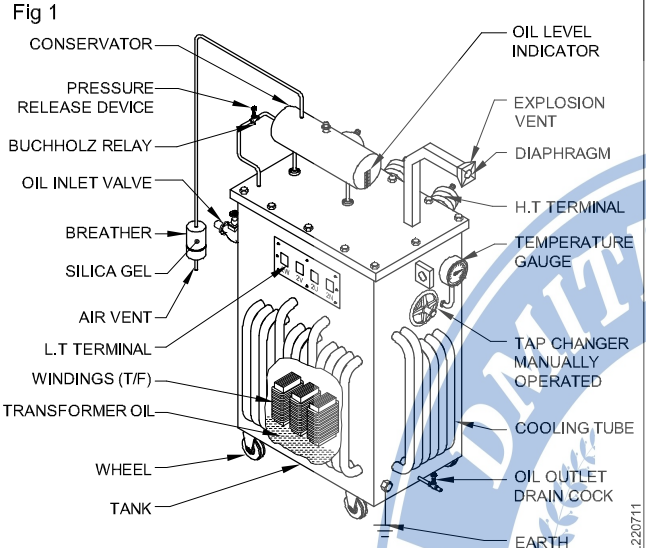
BIMETALLIC OVERLOAD RELAY

Sketches of transformer components

Exercise

Draw by free hand the following transformer parts and auxiliaries on separate A3 drawing paper.

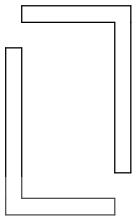
Fig 1



PARTS OF A TRANSFORMER

EDNEL220711

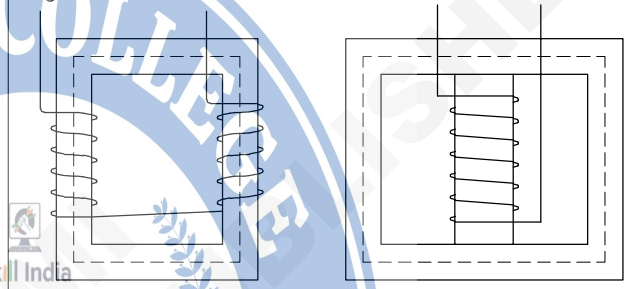
Fig 2



TWO HALF OF A LAMINATION IN 'L' SHAPE

EDNEL220712

Fig 3

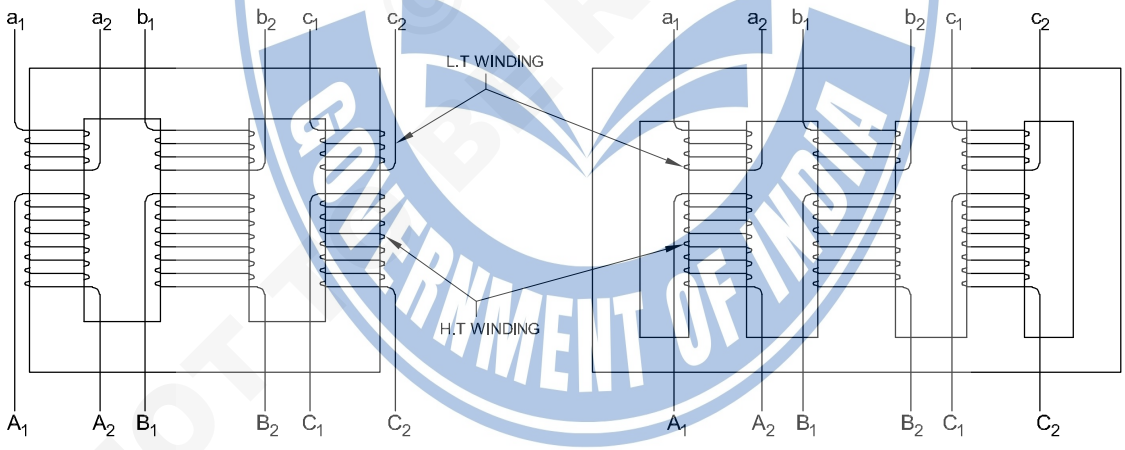


(a) TWO LIMB CORE (b) DIVIDED CORE

CORE SECTIONS FOR SINGLE PHASE TRANSFORMER

EDNEL220713

Fig 4



(a) THREE LIMB CORE (b) FIVE LIMB CORE

CORE SECTIONS FOR THREE PHASE TRANSFORMER

EDNEL220714

Fig 1 **CORE-TYPE TRANSFORMER**

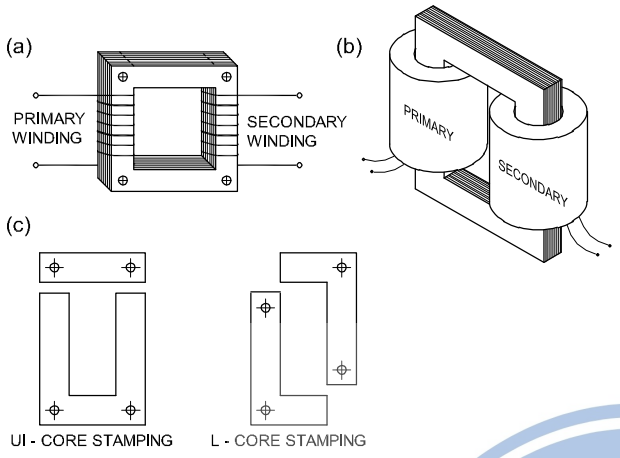


Fig 2 **SHELL-TYPE TRANSFORMER**

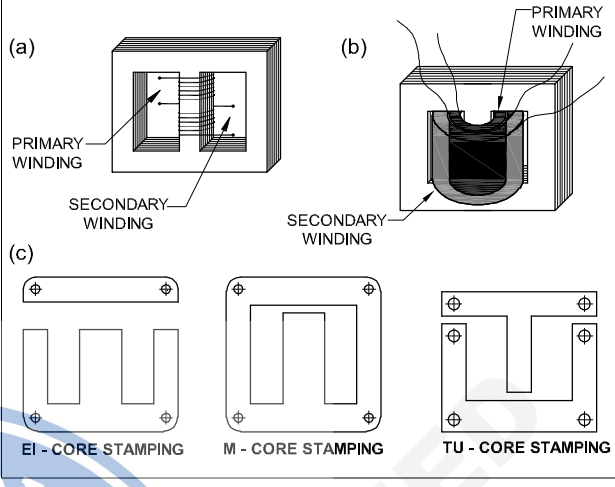


Fig 3 **RING - TYPE TRANSFORMER**

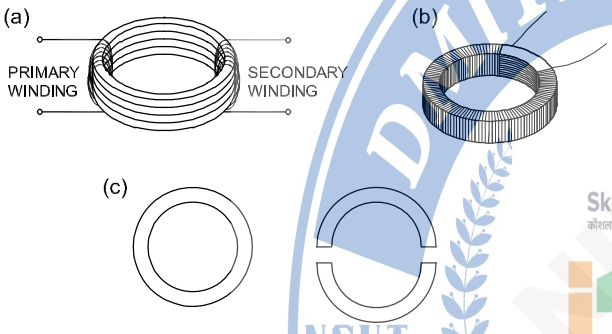


Fig 4 **MAINS FREQUENCY TRANSFORMER**

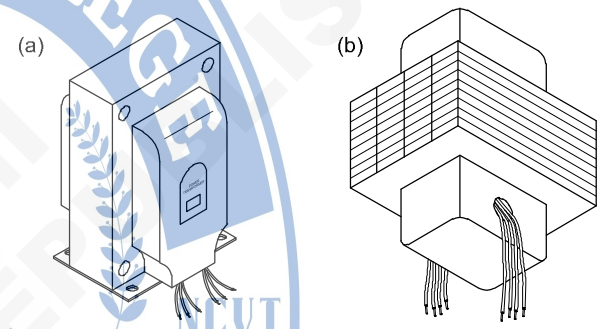
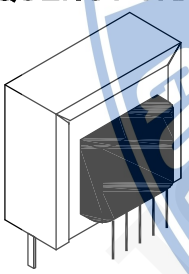


Fig 5 **AUDIO FREQUENCY TRANSFORMER**



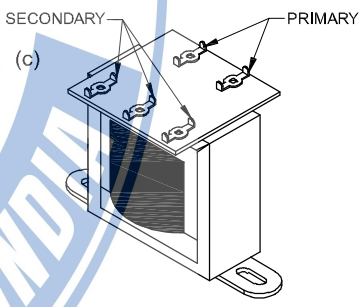
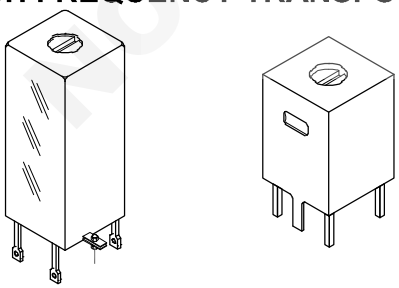
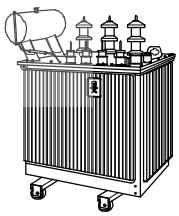


Fig 6 **HIGH FREQUENCY TRANSFORMER**



RFT's/IFT's

Fig 7 **POLY - PHASE TRANSFORMER**



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